



Sun StorEdge™ Traffic Manager 4.5 Software User's Guide

For IBM AIX
Hewlett-Packard HP-UX
Microsoft Windows 2000 and 2003
Red Hat Enterprise Linux
Operating Systems

Sun Microsystems, Inc.
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Preface

The *Sun StorEdge™ Traffic Manager 4.5 Software User's Guide* provides instructions for using the Sun StorEdge™ Traffic Manager software in IBM AIX 5.2 ML02, IBM AIX 5.1 ML05, HP-UX 11.0 and 11.i, Microsoft Windows 2000 service pack 4, Microsoft Windows 2003, and Red Hat Enterprise Linux operating environments.

This guide is designed for use with the documentation that came with your storage device and is written for experienced system administrators of the supported operating environments 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

The screen shots used throughout this guide were created on a Hewlett-Packard HP-UX operating system. The information (device names, path names, and HBA names) on your screens will be generated by your operating system and may look different. However, the function of the screen will be as described in this guide.

Before You Read This Guide

To fully use the information in this guide, you must have thorough knowledge of the topics described in these documents:

- The *Sun StorEdge™ Traffic Manager 4.5 Software Installation Guide* that supports your operating environment
 - The documentation that came with your storage device
-

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 explains the Sun StorEdge™ Traffic Manager Software GUI.

Chapter 3 explains the Sun StorEdge™ Traffic Manager command line interface.

Chapter 4 describes the error messages that can be issued during software operation.

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. Replace command-line variables with real names or values.	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. To delete a file, type <code>rm filename</code> .

* The settings on your browser might differ from these settings.

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
Installation	<i>Sun StorEdge™ Traffic Manager 4.5 Software Installation Guide For the IBM AIX Operating System</i>	817-7036-10
Installation	<i>Sun StorEdge™ Traffic Manager 4.5 Software Installation Guide For the Hewlett Packard HP-UX Operating System</i>	817-7037-10

Application	Title	Part Number
Installation	<i>Sun StorEdge™ Traffic Manager 4.5 Software Installation Guide For Microsoft Windows 2000 and 2003 Operating Systems</i>	817-7035-10
Installation	<i>Sun StorEdge™ Traffic Manager 4.5 Software Installation Guide For Red Hat Enterprise Linux Operating Systems</i>	817-7034-10
SAN configuration	<i>Sun StorEdge SAN Foundation Configuration Guide</i>	817-3672-10

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Sun StorEdge™ Traffic Manager 4.5 Software User's Guide for IBM AIX, Hewlett-Packard, Microsoft Windows 2000 and 2003, and Red Hat Enterprise Linux Operating Systems, part number 817-7033-10.

Sun StorEdge™ Traffic Manager Software Overview

This chapter contains the following topics:

- “About the Sun StorEdge™ Traffic Manager Software” on page 1
- “Switch Configurations” on page 4

About the Sun StorEdge™ Traffic Manager Software

The Sun StorEdge™ Traffic Manager software is a system for managing multiple paths to storage devices. The Sun StorEdge™ Traffic Manager software is comprised of a graphical user interface application, a command line interface 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 a description of using the Sun StorEdge™ Traffic Manager software GUI and Chapter 3 for a description of using the command line interface.

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.

Each storage device and the LUNs associated with it are shown on the left side of the window and the paths and host bus adapters (HBA) system names are shown on the right.

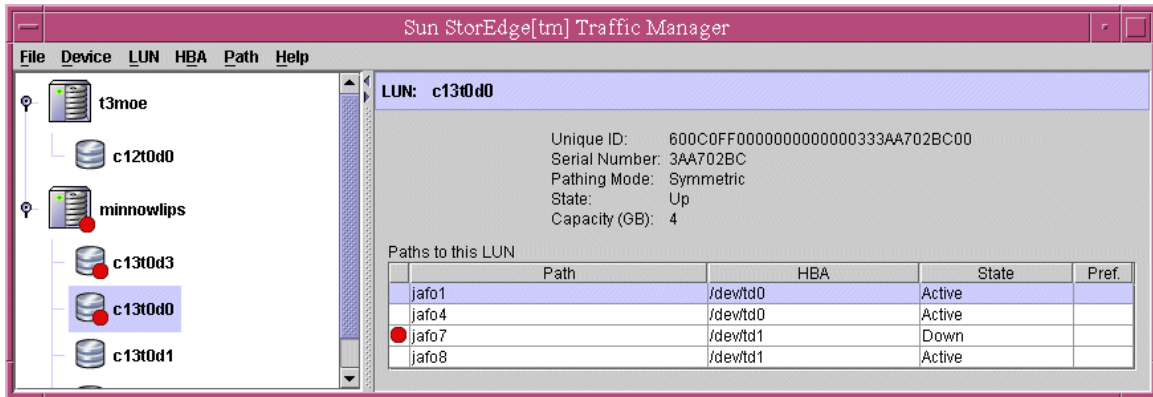


FIGURE 1-1 Host Data Paths Between HBAs and Storage Devices

In your operating environment, the device names, drive names, path designations, and HBA names may differ from the items shown in FIGURE 1-1.

Asymmetric Device Path Management Description

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

Failover

A LUN on a 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 previously active paths become passive. On the Sun StorEdge T3 and Sun StorEdge 6120 arrays, 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 “Setting the Failback Mode” on page 31.

Symmetric Device Path Management Description

For Symmetric devices, all paths are active unless a path is unhealthy, in which case it is marked as Down or Removed. 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.

Switch Configurations

The Sun StorEdge™ Traffic Manager software works with storage device configurations that include switches. For information about configuring a storage device with switches, refer to the documentation for the switch you are using.

Description of Specific Fields

Throughout its operation, the Sun StorEdge™ Traffic Manager software presents information about devices, properties, paths, and metrics using specific fields. TABLE 1-1 lists the specific fields and a description of the contents.

TABLE 1-1 Specific Fields

Specific Field	Contents
Auto Failback	Controls how the software responds when a failed path comes back online or is re-established. When a failed path is repaired or returns from a down state, it is always re-enabled but not always activated. When Auto Failback is enabled and the path is the preferred path, it is automatically re-activated. Note that automatic failback is only supported in a single-host environment.
Blocks Transferred	Displays the number of I/O read or write blocks transferred to and from the storage device. These values are only maintained from the last host boot. They are not persistent across a reboot of the host.
Capacity	Storage capacity of the LUN.
Device Description	Displays one of the Sun devices in the following list: <ul style="list-style-type: none">• 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

TABLE 1-1 Specific Fields (*Continued*)

Specific Field	Contents
Enabled or Active	The state field can contain the following states: <ul style="list-style-type: none"> • ACTIVE—is Enabled, yes Active, yes • PASSIVE—is Enabled, yes Active, no • ADMIN—is Enabled, no Active, no • DOWN—is Enabled, no Active, no • TRANSITIONING—state is changing • UNKNOWN—cannot be determined • REMOVED—is Enabled, no Active, no
Error Returns	A list of all the Error returns from the Sun StorEdge™ Traffic Manager software is in Chapter 4.
Firmware Revision	Displays the high-level firmware that is currently active on the storage device.
HBA	Displays the name of an HBA according to the conventions of your operating environment.
Host Requests	Displays the number of I/O requests that the upper-level drivers have given to the Sun StorEdge™ Traffic Manager software. These values are only maintained from the last host boot. They are not persistent across a reboot of the host.
I/O Errors	Displays the number of errors handled by the failover driver for the specified LUN. These values are only maintained from the last host boot. They are not persistent across a reboot of the host.
IP Address	Displays the management IP address for the Sun StorEdge storage device. The IP address is only exposed for select Sun StorEdge storage products that provide this information in-band to the host device drivers.
Log Level	Determines the messaging detail that is sent to the host system log. Multiple log levels can be OR'ed together for multiple log levels. All log levels can be turned on by specifying 0x1F from the CLI.
LUN Name Field	The operating-system specific name for the specified LUN. If the operating LUN name cannot be determined, it is presented as a LUN.
LUN state	Choices are: <ul style="list-style-type: none"> • UP • Down • Waiting for an active path • Transitioning • Removed (for Windows platforms only) • Unknown
LUN Unique ID	Uniquely identifies a LUN connected to the host.
Nexus Name	Displays the nexus name for the HBA to storage device controller. The nexus name is defined by the Sun StorEdge™ Traffic Manager software. The format varies with each supported operating system.

TABLE 1-1 Specific Fields (*Continued*)

Specific Field	Contents
Outstanding I/Os	Displays the number of I/Os that have been sent to the device and have not been completed. This value is comparable to the I/O queue depth from this host to a given LUN. These values are only maintained from the last host boot. They are not persistent across a reboot of the host.
Pathing mode	Asymmetric or symmetric
Poll Rate	Healthy poll rate determines how often the software checks the status of paths that are not down and are currently available. Unhealthy poll rate determines how often the software checks the status of paths that are down.
Serial Number	Contains the hardware serial number for this product. If there is more than one serial number for the product, the first serial number found is displayed.
Single Character Column	On the left side of the information produced by the command-line interface is a column that has an asterisk (*) as the column head. This column contains warning and error states if they exist. The possible values in this column are: ' ' — No warnings 'X' — The path is down or removed '!' — The path is not active and is the preferred path '!' — The path is in admin mode '.' — The path is in transition '?' — The path is in an unknown state
Storage Device	Defined as a collection of LUNs contained by a specific storage product (a Sun StorEdge 6120 partner pair). If a well-defined storage system cannot be determined, LUNs are put in collections based on their SCSI INQUIRY VENDOR/PRODUCT/SERIAL values. For example, this would occur for a third-party storage device that is attached through Sun Solaris Open-MpxIO.
Unique ID	A Sun internal ID that is used to associate LUNs to a specific storage device.
Worldwide Name (WWN)	A Sun internal identification that is used to associate LUNs to a specific storage device.

Explaining the Sun StorEdge™ Traffic Manager GUI Software

This chapter describes the Sun StorEdge™ Traffic Manager GUI software and its uses. Topics in this chapter include:

- “Understanding the Sun StorEdge™ Traffic Manager GUI” on page 7
- “Basic Operation” on page 11
- “Manipulating the Data Path” on page 11
- “Getting Storage Device Information” on page 20
- “Setting the Software Preferences” on page 28

Understanding the Sun StorEdge™ Traffic Manager GUI

This section describes the Sun StorEdge™ Traffic Manager GUI and explains the purpose of the various icons meanings.

When the Sun StorEdge™ Traffic Manager GUI starts, the Sun StorEdge™ Traffic Manager window, as shown in FIGURE 2-1, is displayed. In a device tree on the left of the window is a list of supported storage devices attached to the current host and the LUNs contained in each of those storage devices. The first storage device is always selected and the information about that storage device is displayed on the right of the window. The right of the window contains:

- Type of device
- Unique ID
- IP address
- Firmware revision
- Name of the host the storage device is attached to

The names used in the device tree are the operating system-specific names for the particular storage devices and LUNs.

If the name of a storage device cannot be obtained, “storage device” is used for the name on the left of the window. If a LUN name cannot be obtained, “LUN” is used for the LUN name.

If the Sun StorEdge™ Traffic Manager driver or library files are not installed and working properly, the left of the window displays a message indicating the improper installation.

If no storage devices are attached, the left of the window displays a message indicating that no storage devices are attached.

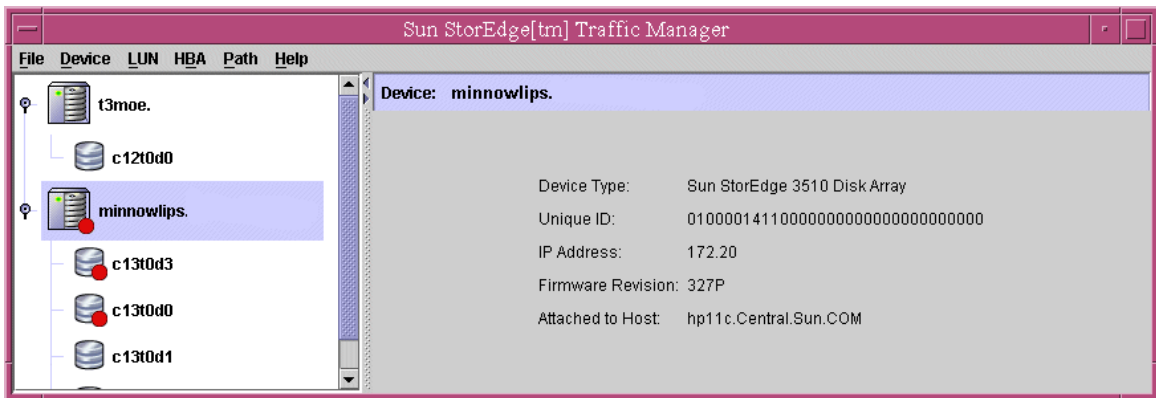


FIGURE 2-1 The Sun StorEdge™ Traffic Manager Software Window

Storage Device and LUN Icons

The left of the Sun StorEdge™ Traffic Manager GUI window shows storage device and the LUNs contained in each using the following icons.



- The name of the storage device known to the Sun StorEdge™ Traffic Manager software.



- The LUNs that are contained in each of the storage devices.



- Removed icon for a path, storage device, or LUN that is removed and needs attention.

The following status icons are layered on the storage device or LUN icons for a storage device or LUN that needs attention. For example, if a LUN is not able to allow I/O due to path conditions or it contains a broken path, the critical icon is layered on top of the LUN icon and storage device icon. Or, if a LUN has failed over and not in its normal state, the minor icon is layered on top of the LUN and the storage device icon.



- Minor icon for a path, storage device, or LUN that might need attention.



- Critical icon for a path, storage device, or LUN that is down or broken and needs attention.



- Icon that is displayed if the path is in transition.

Path Table Icons

The right of the window in FIGURE 2-1 contains information about a storage device if one is selected, or a path table for a LUN when a LUN is selected. The following status icons are displayed for the LUN in the table when that LUN needs attention. For example, if a preferred path has failed over, a minor icon is displayed for that path in the path table. If a path is down or broken, a critical icon is displayed.



- Minor icon for a path that might need attention.



- Critical icon for a path that is down or broken and needs attention



- Removed icon for a path, storage device, or LUN that is removed and needs attention.



- Icon that is displayed if the path is in transition.



- Icon that is displayed if the status of the path is unknown

Basic Operation

Updating the Path Status

When the Sun StorEdge™ Traffic Manager software detects a change in the status for a path (for example, a path goes down, fails over, or the user disconnects a cable), it sends a message to the Sun StorEdge™ Traffic Manager GUI to update. The GUI gets the updated information from the software and displays the new status.

The information displayed by the GUI automatically updates when the state of a path changes. However, if you don't want to wait (for example, a long poll rate has been specified or you think the data displayed is out-of-date), you can quickly update the information displayed by the GUI in one of two ways:

- Choose Refresh under the File menu.
- Press the F5 key.

Manipulating the Data Path

This section describes how to manipulate the data path between the host and the storage device. The following changes can be made to the data path:

- Removing a data path from admin mode
- Putting a data path into admin mode
- Activating a data path
- Activating all preferred data paths for a storage device
- Activating all preferred data paths for a particular LUN
- Removing all data paths to a particular HBA from admin mode,
- Putting all data paths to a particular HBA into admin mode,

Data Path States

The Path table contains a column labeled State. Each path listed in this column will have the following states:

- Active, if the path is active
- Passive, if the path is healthy but not active

- Admin, if the path has been put into admin mode and is not being considered for I/O
- Transition, if the state of the path is changing
- Down, if the path is broken and needs repair
- Unknown, if the state of the path cannot be determined
- Removed (This state applies only for the Windows 2000 and 2003 operating systems. It is defined as a Downed path that has been removed as a Windows Plug & Play Device.)

Putting a Single Data Path into Admin Mode

Putting a data path into admin mode prevents all normal I/O from using the path. For example, you might want to put a path in admin mode to perform maintenance on a component in the data path. A path must be in passive mode before it can be put into admin mode.

See “Removing a Single Data Path From Admin Mode” on page 13 to remove a data path from admin mode.

There are two methods in the Sun StorEdge™ Traffic Manager GUI to put a single data path into admin mode.

▼ Putting a Single Data Path into Admin Mode (Method 1)

1. From the device tree on the left of the window, select the LUN that contains the path you want to put into admin mode.
2. From the path table on the right of the window, select the path that you want to put into admin mode.
3. Choose To Admin from the Path pull-down menu.

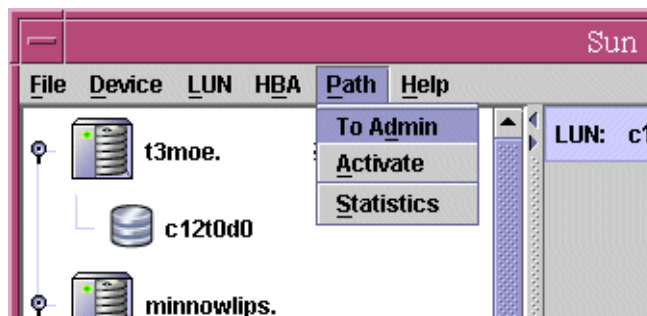


FIGURE 2-2 Using the Path Menu Button to Put a Single Path Into Admin Mode

▼ Putting a Single Data Path into Admin Mode (Method 2)

1. From the device tree on the left of the window, select the LUN that contains the path you want to put into admin mode.
2. From the path table on the right of the window, right-click on the path you want to put into admin mode.
3. Choose Put this path into admin mode from the pull-down menu.

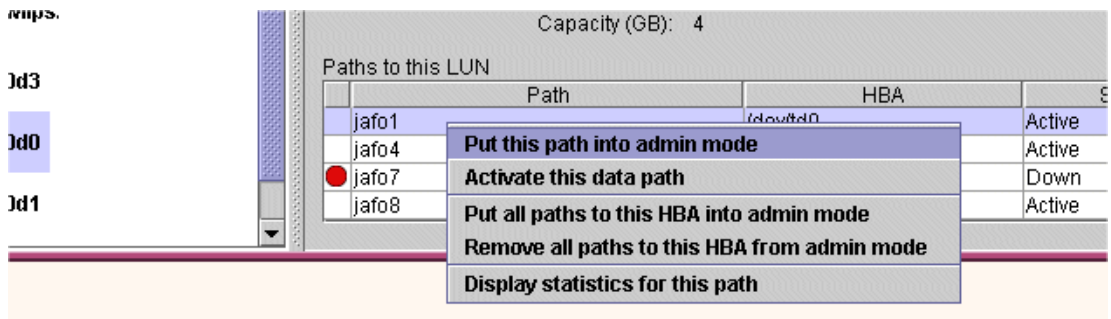


FIGURE 2-3 Using the Path Table to Put a Single Path into Admin Mode

For both methods, a dialog box is displayed to indicate the path is being put into admin mode and that you should wait until the operation is complete.

Removing a Single Data Path From Admin Mode

Removing a data path from admin mode does not guarantee that the path will become active.

A path that is down, for example, has a defective cable, stays down after being removed from admin mode if the cable is still defective.

See “Activating Data Paths” on page 15 to make a healthy data path active.

In the Sun StorEdge™ Traffic Manager software GUI, there are two methods to remove a single data path from admin mode.

▼ Removing a Single Data Path From Admin Mode (Method 1)

1. From the device tree on the left of the window, select the LUN that contains the path you want to enable.

2. From the path table on the right of the window, select the path that you want to remove from admin mode.
3. Choose Remove Admin from the Path pull-down menu.

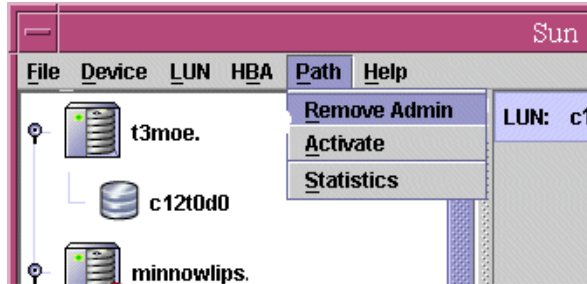


FIGURE 2-4 Using Path Menu to Remove a Single Path From Admin Mode

▼ Removing a Single Data Path From Admin Mode (Method 2)

1. From the device tree on the left of the window, select the LUN that contains the path you want to remove from admin mode.
2. On the right of the window in the path table, right-click on the path you want to enable.
3. Choose Remove this path from admin mode from the pull-down menu.

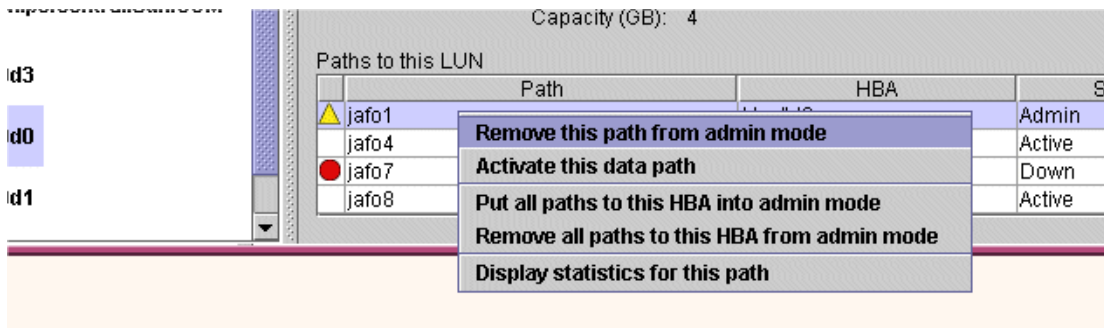


FIGURE 2-5 Using the Path Table to Remove a Single Path From Admin Mode

For both methods, a dialog box is displayed to indicate that the path is being enabled and that you should wait until the operation is complete.

Activating Data Paths

A data path must be healthy but not active (passive) before you can activate it.

There are two methods in the Sun StorEdge™ Traffic Manager GUI to activate a data path.

▼ Activating a Single Data Path (Method 1)

1. From the device tree on the left of the window, select the LUN that contains the path you want to activate.
2. From the path table on the right of the window, select the path that you want to activate.
3. Choose Activate from the Path pull-down menu.

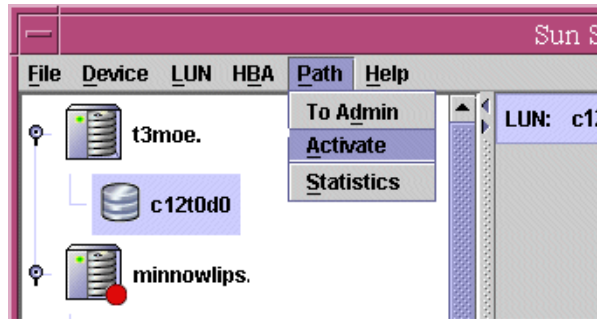


FIGURE 2-6 Using the Path Menu to Activate a Single Data Path

▼ Activating a Single Data Path (Method 2)

1. From the device tree on the left of the window, select the LUN that contains the path you want to activate.
2. On the right side of the window in the path table, right-click on the path that you want to activate.

3. Choose Activate this data path from the pull-down menu.

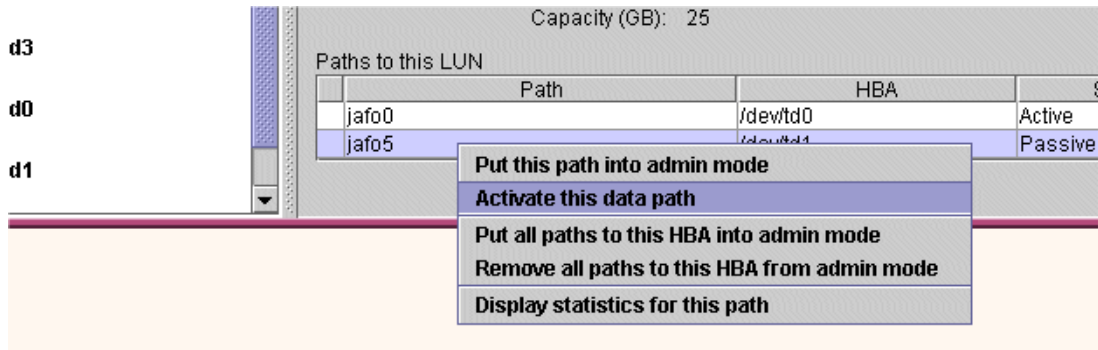


FIGURE 2-7 Using the Path Table to Activate a Single Data Path

For both methods, a dialog box is displayed to indicate that the path is being activated and that you should wait until the operation is complete.

Activating All Preferred Paths for a Storage Device

You can activate all preferred paths for a particular storage device if that device has preferred paths. Preferred paths are determined by the Sun StorEdge™ Traffic Manager software and are based on device type and connection. The preferred path is the optimal path to a device. The preferred path must be healthy but not active (passive) before it can be activated.

▼ Activating All Preferred Paths for a Storage Device

1. Select a storage device in the device tree on the left of the window.

2. Choose Activate preferred paths from the Device pull-down menu

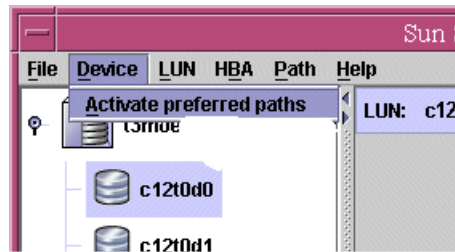


FIGURE 2-8 Using the Device Menu to Activate All Preferred Paths

A dialog box is displayed to indicate that all preferred paths are being activated and that you should wait until the operation is complete.

Putting All Paths to a Particular HBA into Admin Mode

If you want to perform maintenance on a specific HBA, to which you have several storage devices connected, you can put all paths to a particular HBA into admin mode.

In the Sun StorEdge™ Traffic Manager GUI, there are two methods to put all paths to a particular HBA into admin mode.

▼ Putting All Paths To a Particular HBA into Admin Mode (Method 1)

1. From the device tree on the left of the window, select the LUN that has a path using the particular HBA you are interested in.
2. From the path table on the right of the window, select the path that is using the HBA you are interested in.

3. Choose Put all paths in admin mode from the HBA pull-down menu.

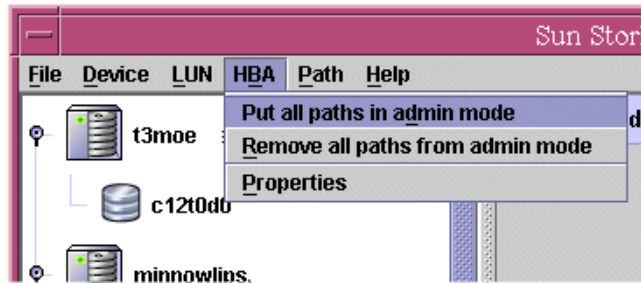


FIGURE 2-9 Using the HBA Menu To Put All Paths To a Particular HBA Into Admin Mode

▼ Putting All Paths To a Particular HBA Into Admin Mode (Method 2)

1. From the device tree on the left of the window, select the LUN that has a path using the particular HBA you are interested in.
2. On the right of the window in the path table, right-click on the path that is using the HBA you are interested in.
3. Choose Put all paths to this HBA into admin mode from the pull-down menu.

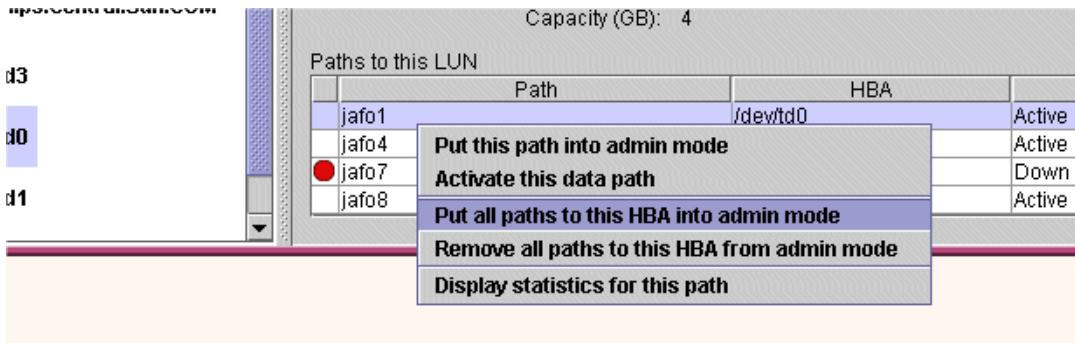


FIGURE 2-10 Using the Path Table to put All Paths to a Particular HBA into Admin Mode

For both methods, a dialog box is displayed to indicate that all paths to a particular HBA are being put into admin mode and that you should wait until the operation is complete.

Removing All Paths to a Particular HBA From Admin Mode

You can remove from admin mode all paths to a particular HBA after you have swapped out or repaired the component in the path to this HBA.

In the Sun StorEdge™ Traffic Manager GUI, there are two methods to remove all paths to a particular HBA from admin mode.

▼ Removing All Paths To a Particular HBA From Admin Mode (Method 1)

1. From the device tree on the left of the window, select the LUN that has a path using the particular HBA you are interested in.
2. From the path table on the right of the window, select the path that is using the HBA you are interested in.
3. Choose Remove all paths from admin mode from the HBA pull-down menu.

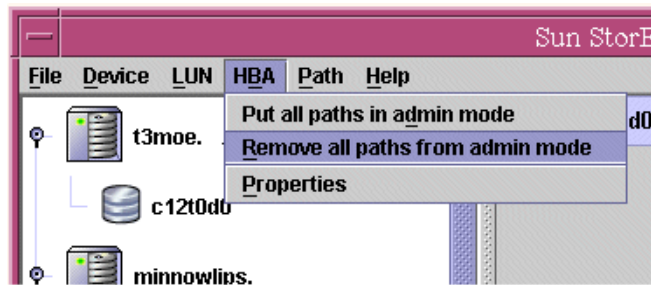


FIGURE 2-11 Using the HBA Menu to Remove all Paths to a Particular HBA From Admin Mode

▼ Removing All Paths To a Particular HBA From Admin Mode (Method 2)

1. From the device tree on the left of the window, select the LUN that has a path using the particular HBA you are interested in.
2. On the right of the window in the path table, right-click on the path that is using the HBA you are interested in.

3. Choose **Remove all paths to this HBA from admin mode** from the pull-down menu that is displayed.

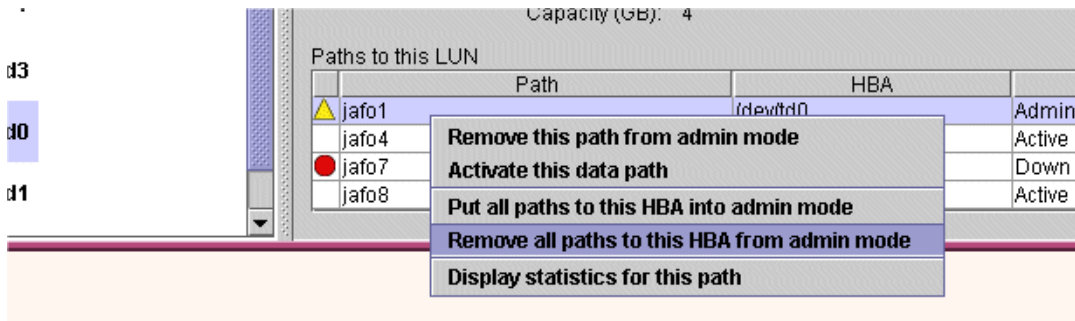


FIGURE 2-12 Using the Path Table To Remove All Paths To a Particular HBA From Admin Mode

For both methods, a dialog box is displayed to indicate that all paths to a particular HBA are being removed from admin mode and that you should wait until the operation is complete.

Getting Storage Device Information

When the Sun StorEdge™ Traffic Manager GUI starts, the storage device and the operating system-specific names for the storage device are selected on the left of the window. On the right of the window is detailed information about that storage device.

To get this detailed information about any storage device shown on the left of the window, select that storage device by clicking on it.

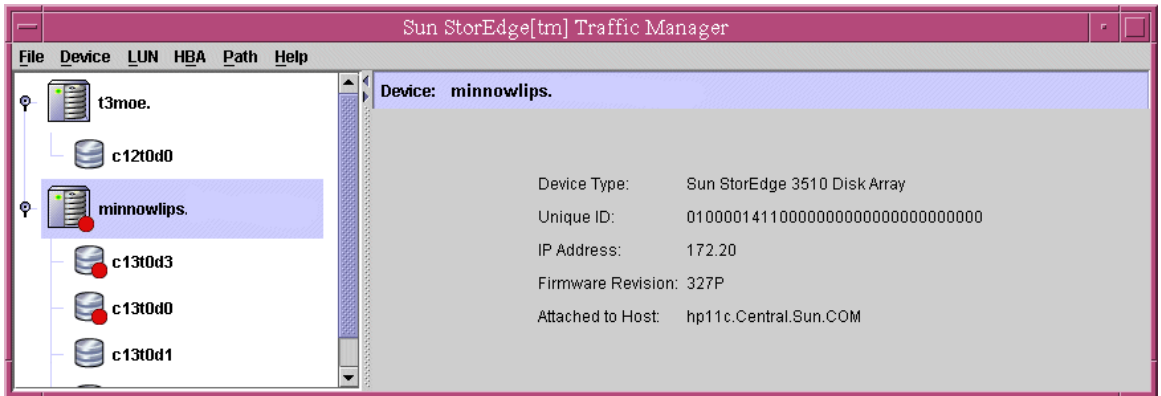


FIGURE 2-13 Storage Device Information

Getting LUN Information

To get information about a particular LUN, select that LUN icon on the left of the window by clicking on it. The LUN information is displayed on the right of the window. Some of the information is in a path table and other information is shown above the table. The following information is above the table:

- The operating system-specific name of the LUN
- Unique ID of the LUN
- The serial number
- Type of pathing mode: symmetric or asymmetric
- LUN state
- Storage capacity of the LUN

In the path table, all paths to the LUN are displayed. If any path needs attention, either the minor icon or the critical icon is displayed beside the information in the path table.

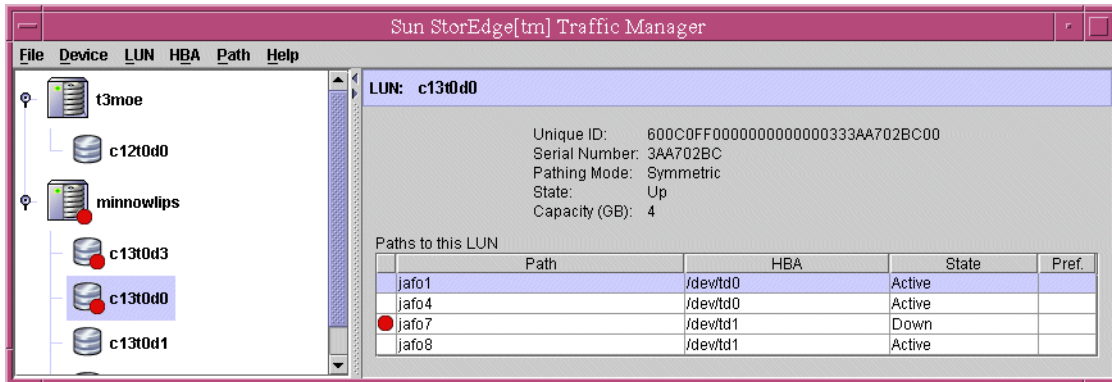


FIGURE 2-14 Getting LUN Information

▼ Getting LUN Statistics

To get I/O statistics for a particular LUN, do the following steps:

1. From the device tree on the left of the window, select the LUN for which you want statistics.
2. Choose **Statistics** from the LUN pull-down menu.

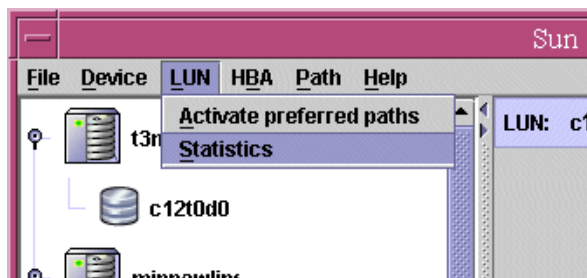


FIGURE 2-15 Selecting LUN Statistics

A dialog box is displayed containing the statistics of the LUN.

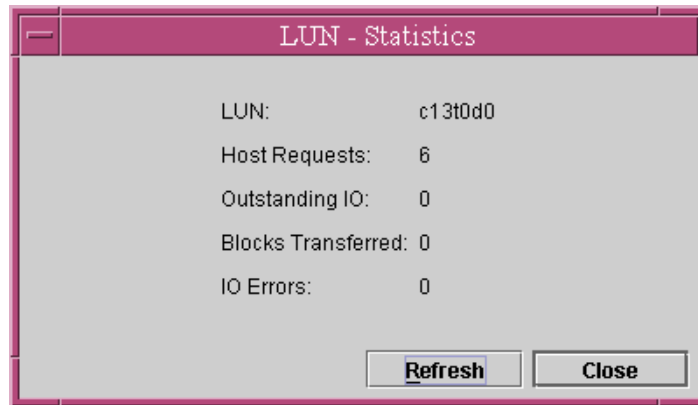


FIGURE 2-16 LUN Statistics

▼ Getting Host Bus Adapter Properties

To get information about the properties of a host bus adapter (HBA) that is in the path of a particular LUN, do the following steps:

1. Select the LUN from the device tree on the left of the window that has a path using the particular HBA you are interested in.
2. On the right of the window, select the path in the path table that is using the HBA you are interested in.

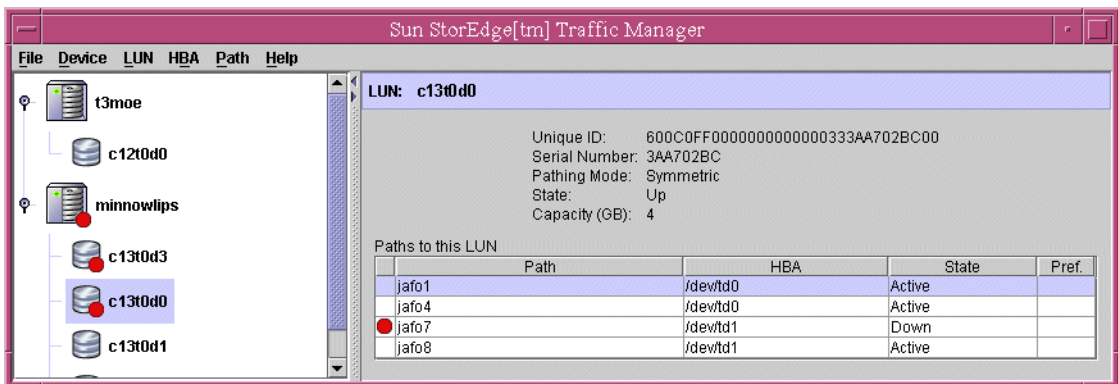


FIGURE 2-17 Selecting the HBA Path

3. Choose Properties from the HBA pull-down menu.

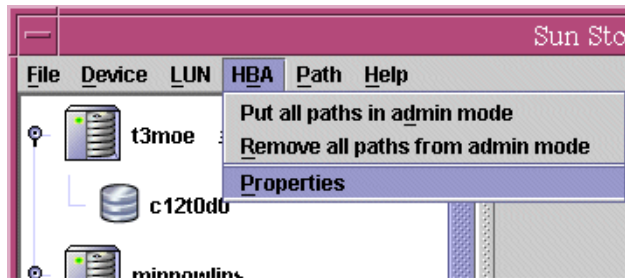


FIGURE 2-18 Selecting HBA Properties

A dialog box is displayed containing the properties of the HBA.

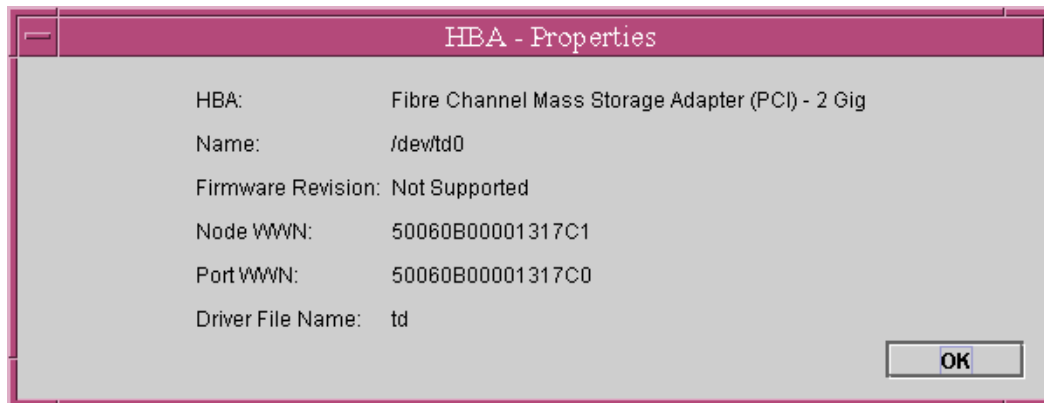


FIGURE 2-19 HBA Properties

Getting Path Statistics

In the Sun StorEdge™ Traffic Manager software GUI, there are two methods to get the statistics for a specified path.

▼ Getting Path Statistics (Method 1)

1. From the device tree on the left of the window, select the LUN that contains the path you are interested in.

- From the path table on the right of the window, select the path for which you want to view statistics.

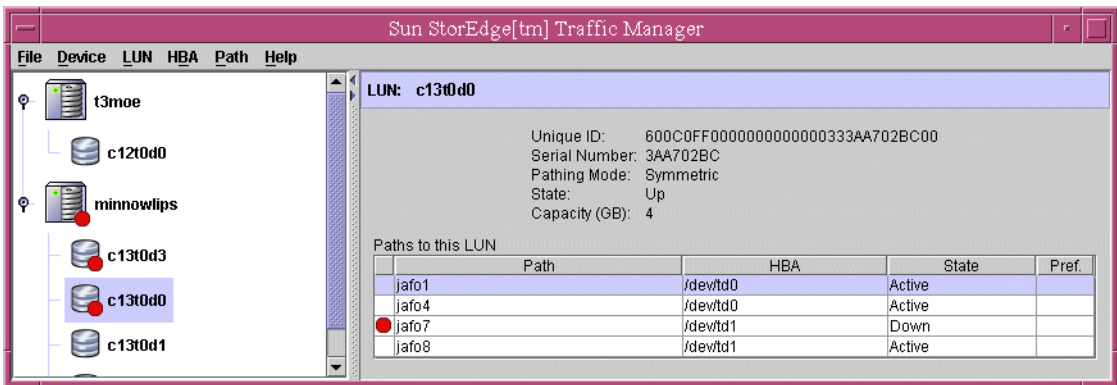


FIGURE 2-20 Selecting the Path for Path Statistics

- Choose Statistics from the Path pull-down menu.

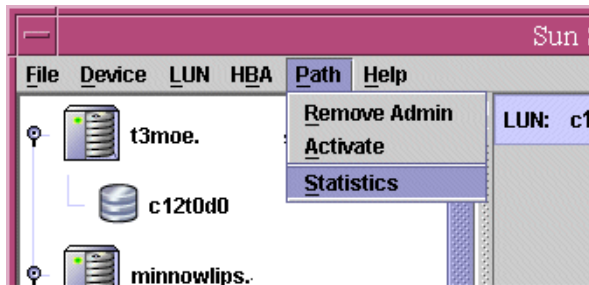


FIGURE 2-21 Choosing Path Statistics

A dialog box is displayed that contains the I/O statistics.

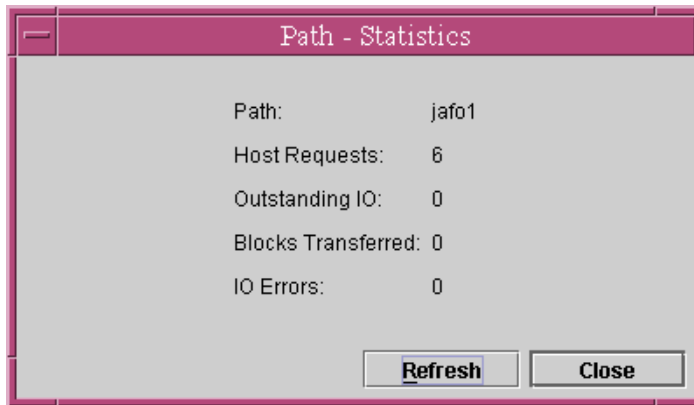


FIGURE 2-22 Path Statistics

▼ Getting Path Statistics (Method 2)

1. From the device tree on the left of the window, select the LUN that contains the path you are interested in.
2. On the right of the window in the path table, right-click on the path for which you want to view the statistics.

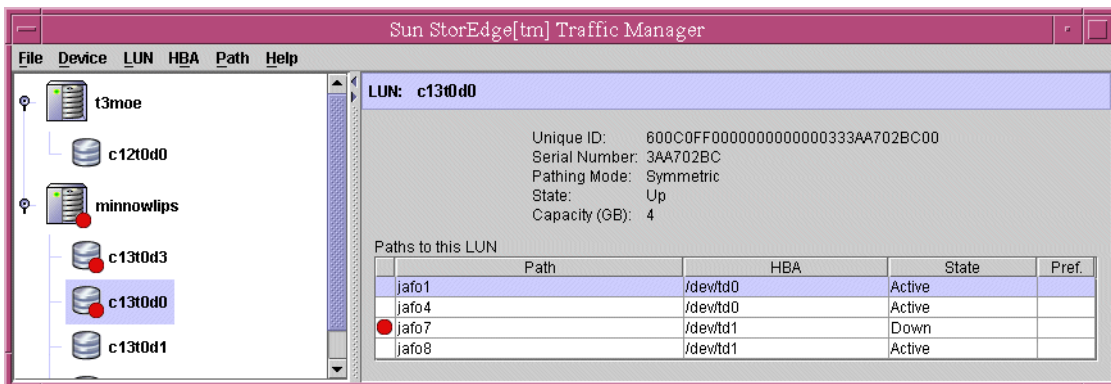


FIGURE 2-23 Selecting the Path for Path Statistics

3. From the pull-down menu, choose **Display statistics for this path**.

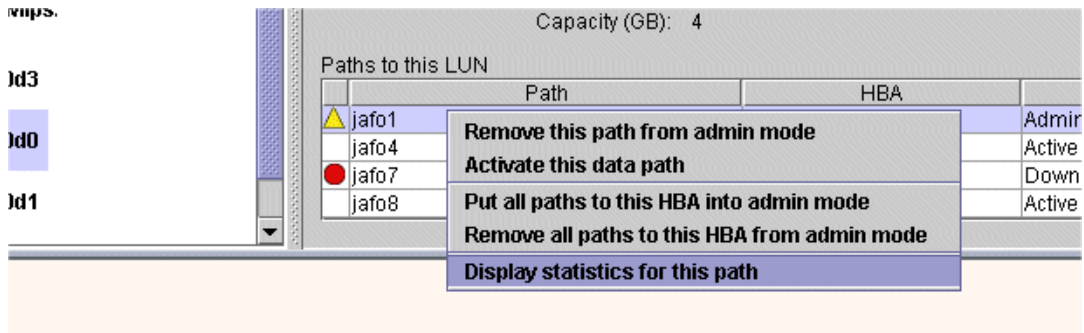


FIGURE 2-24 Path Statistics Pull-Down Menu

A dialog box is displayed that contains the I/O statistics.

The statistics in the dialog box do not change dynamically, but you can click on the Refresh button and get updated statistics.

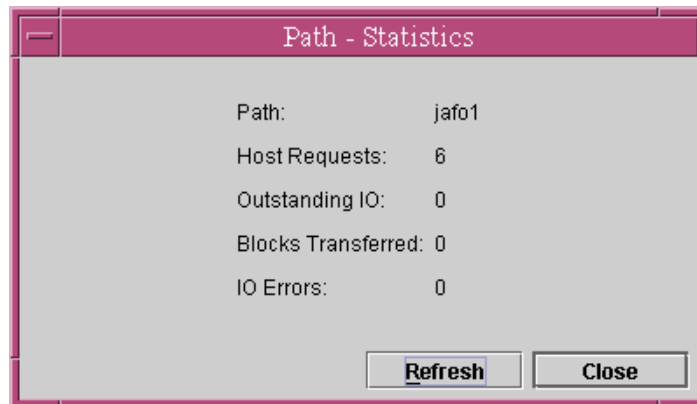


FIGURE 2-25 Path Statistics Dialog Box

▼ Getting On-Line Help

- Choose **User's Guide** from the **Help** pull-down menu to display the *Sun StorEdge™ Traffic Manager 4.5 Software User's Guide* for online help. Select **Installation and Troubleshooting Guide** to display the installation guide for your operating system.

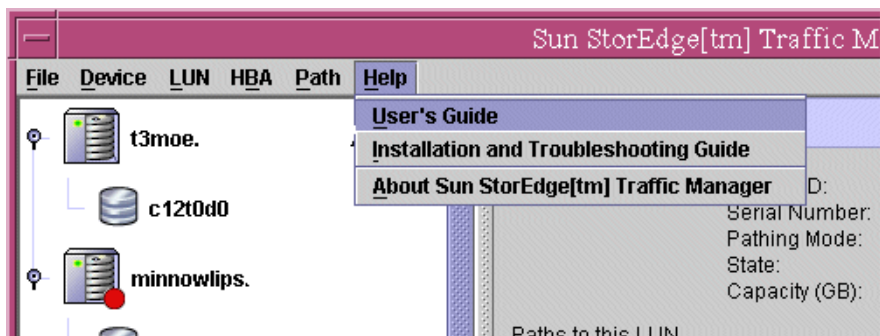


FIGURE 2-26 Choosing User's Guide for Online Help

If you select About Sun StorEdge™ Traffic Manager from the Help pull-down menu, you can get such information as the software version and the overall application version (as well as the copyright notice).

Setting the Software Preferences

This section describes how to configure the preferences for the Sun StorEdge™ Traffic Manager software. The following preferences can be configured:

- Logging level
- Failback mode
- Poll rates

Setting the Logging Level

Click Help from the task bar and select User's guide to see the *Sun StorEdge™ Traffic Manager 4.5 Software Installation Guide* for your operating environment for a description of the logging levels.

The logging level is determined for the Sun StorEdge™ Traffic Manager software on a per system basis. That is, setting the logging level sets it for all devices attached to the specified host. This enables you to control what level of messages you want to put into the operating system's log file.

▼ Setting the System Logging Level

1. Choose Preferences from the File pull-down menu.

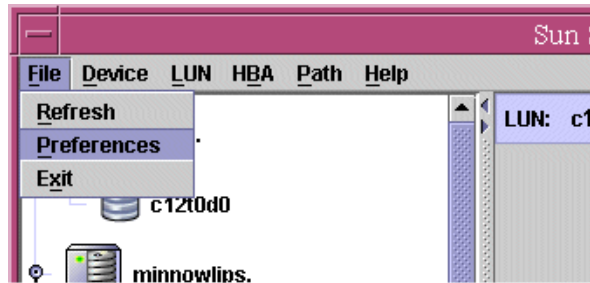


FIGURE 2-27 Choosing Preferences for the Logging Level

2. Select the desired log level options in the Host Preferences dialog box.

See FIGURE 2-28 for a list of the logging levels and the installation guide for your operating system for a description of each level. The installation guide is selected from the Help pull-down menu.

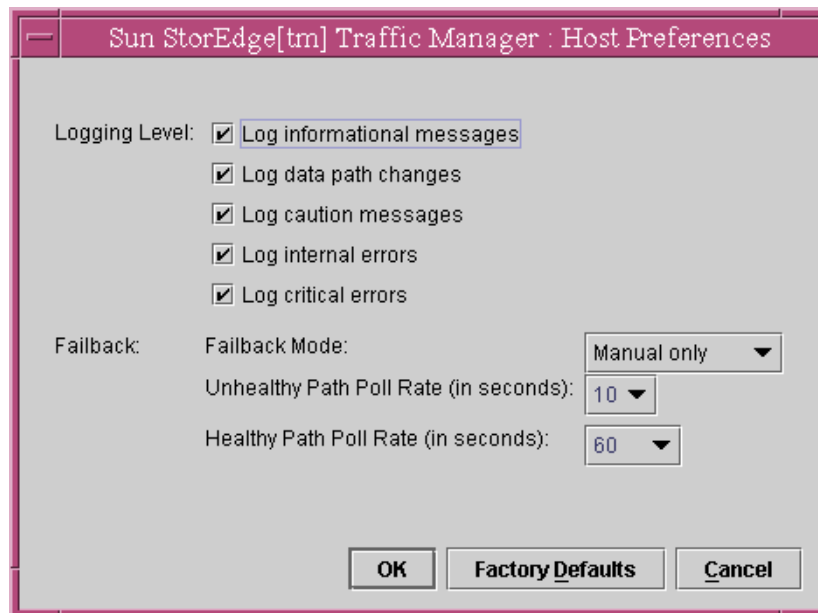


FIGURE 2-28 Setting the Logging Level

3. Click OK for the selected items to take effect.

If you do not want to save the changes made, click the Cancel button.

If you want to see the default settings for the Log Levels, click the Factory Defaults button. The factory defaults will not take effect unless you click OK.

Note – Be aware that by clicking the Factory Defaults button, you are also setting Failback Mode and Poll Rate to the factory default settings.

Setting the Failback Mode

After the failover of a data path, what is specified for the failback mode determines how the data path is changed from the alternate data path back to the preferred data path.

Symmetric Devices

For Symmetric devices, there is no failback. The path is just added back into the load balancing path pool.

Asymmetric Devices

You can specify two failback modes for asymmetric devices:

- Automatic failback
- Manual failback

Note – Automatic failback is only supported in a single-host environment.

You can configure the Sun StorEdge™ Traffic Manager software to automatically fail back to the preferred data path when that path becomes operational. By default, automatic failback is *not* enabled.

You can also manually fail back the data path for a storage device to its preferred data path. First, ensure that the Sun StorEdge™ Traffic Manager software is configured for manual failback.

The failback mode is set for the Sun StorEdge™ Traffic Manager software on a per system basis. That is, setting the failback mode sets it for all devices attached to the current host.

▼ Setting the Failback Mode

1. Choose Preferences from the File pull-down menu.

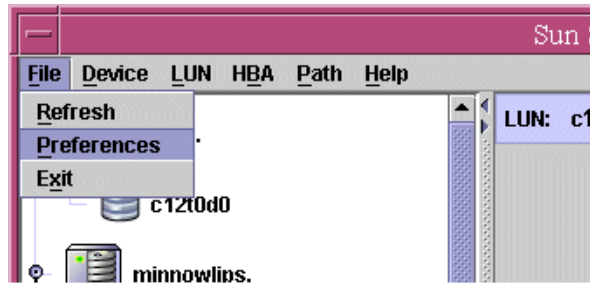


FIGURE 2-29 Choosing Preferences for the Failback Mode

2. In the Host Preferences dialog box, choose the desired failback mode from the Failback Mode pull-down menu.

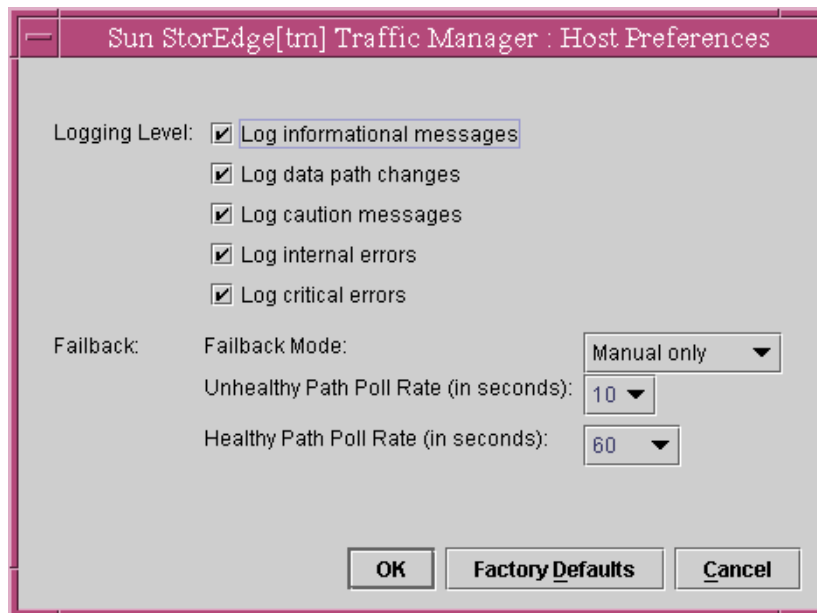


FIGURE 2-30 Setting the Failback Mode

3. Click OK for the selected item to take effect.

If you do not want to save the changes you made, click the Cancel button.

If you want to see the factory default settings, click the Factory Defaults button. The factory default will be displayed next to the Failback Mode label. The factory default will not take effect unless you click the OK button.

Note – Be aware that by clicking the Factory Defaults button, you are also setting the Logging level and Poll Rate to the factory default settings.

Setting the Poll Rate

The healthy path poll rate determines how often the Sun StorEdge™ Traffic Manager software checks the status of paths that are not down or removed and are currently available for I/O.

The unhealthy path poll rate determines how often the Sun StorEdge™ Traffic Manager software checks the status of paths that are down or removed. If failback mode is set to automatic and the Sun StorEdge™ Traffic Manager software finds that the preferred path is operational after polling, the Sun StorEdge™ Traffic Manager software fails back to the preferred path.

The poll rate is set for the Sun StorEdge™ Traffic Manager software on a per system basis. That is, setting the polling rate sets it for all devices attached to the current host.

▼ Setting the Poll Rate

1. Choose Preferences from the File pull-down menu.

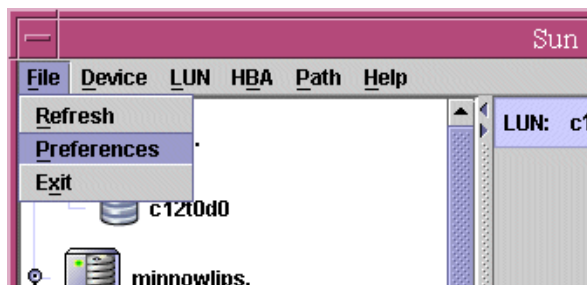


FIGURE 2-31 Choosing Preferences for Setting the Poll Rate

2. In the Host Preferences dialog box, choose the desired poll rate from the Poll Rate pull-down menu.

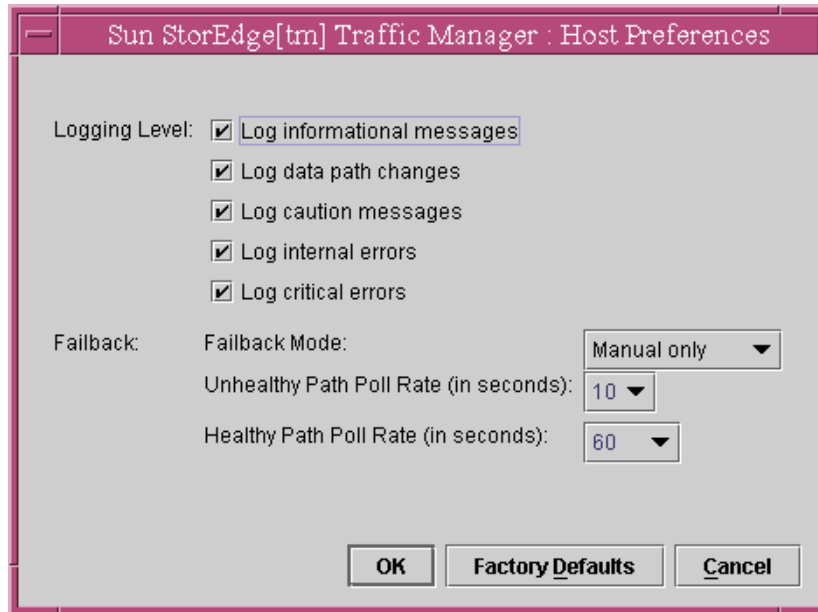


FIGURE 2-32 Setting the Poll Rate

3. Click OK for the change to take effect.

If you do not want to save the change you made, click the Cancel button.

If you want to see the factory default setting, click the Factory Defaults button. These factory defaults will not take effect unless you click the OK button.

Note – Be aware that by clicking the Factory Defaults button, you are also setting the Logging level and Failback Mode to the factory default settings.

Using the Sun StorEdge™ Traffic Manager CLI Software

This chapter describes the uses of the Sun StorEdge™ Traffic Manager command line interface (CLI) software.

The Sun StorEdge™ Traffic Manager command line interface described in this chapter is named `sstm`. The `sstm` command has similar function to the Sun StorEdge™ Traffic Manager GUI interface described in Chapter 2. The CLI enables you to collect basic path and software state information and to manage path states and software settings.

Topics in this chapter include:

- “Command-Line Interface Options” on page 35
- “sstm Command Operations” on page 37

Command-Line Interface Options

TABLE 3-1 contains an overview of all the options available for the `sstm` command.

TABLE 3-1 `sstm` Command Options

Command	Option	Description
<code>sstm</code>	None	This is the default and displays information about all devices
	<code>-v</code>	Displays information about all devices (verbose)

TABLE 3-1 sstm Command Options (Continued)

Command	Option	Description
	-d <i>device_id</i>	Displays information about the specified device
	-d <i>device_id</i> -v	Displays verbose information about the specified device
	-d <i>device_id</i> -r	Restores all preferred paths for all LUNs for the specified device
	-l <i>lun_id</i>	Displays information for a specified LUN
	-l <i>lun_id</i> -v	Displays verbose information for a specified LUN
	-l <i>lun_id</i> -r	Restores the preferred path for the specified LUN
	-l <i>lun_id</i> -m	Displays statistics for the specified LUN
	-l <i>lun_id</i> -m -v	Displays verbose statistics for the specified LUN
	-p <i>name</i>	Queries information for the specified path
	-p <i>name</i> -v	Queries verbose information for the specified path
	-p <i>name</i> -a	Activates the specified path
	-p <i>name</i> -e	Enables the specified path (take out of admin mode)
	-p <i>name</i> -d	Disables the specified path (place into admin mode)
	-p <i>name</i> -m	Displays statistics for the specified path
	-p <i>name</i> -m -v	Displays verbose statistics for the specified path
	-h <i>name</i>	Query information for this HBA
	-h- <i>name</i> -v	Query verbose information for this HBA
	-h- <i>name</i> -e	Enable all paths on this HBA (take out of admin mode)
	-h <i>name</i> -d	Disable all paths on this HBA (place into admin mode)
	-P	Displays public parameters

TABLE 3-1 `sstm` Command Options (Continued)

Command	Option	Description
	<code>-P -r</code>	Restores default settings
	<code>-P -i seconds</code>	Sets the healthy path poll rate to the specified number of seconds (from 2 through 3600 seconds)
	<code>-P -b seconds</code>	Set the unhealthy path poll rate to the specified number of seconds (from 2 through 60 seconds)
	<code>-P -l hex_value</code>	Sets the following log levels to determine what information to log: <ul style="list-style-type: none"> • 0x00 = no logging • 0x01 = data path changes • 0x02 = internal errors • 0x04 = critical errors • 0x08 = informational messages • 0x10 = caution messages • 0x1f = log everything
	<code>-P -a integer</code>	Sets the following integers to enable or disable auto failback: <ul style="list-style-type: none"> • 1 = enable • 0 = disable
	<code>-S</code>	Suspends command return until a state change occurs (for example, path up or down).
	<code>-C</code>	Cancel the suspend command and return to the user.

For a description of the specific fields shown in these examples, see “Description of Specific Fields” on page 4.

In the case of a failure of a command, a variety of meaningful messages are returned. To view this list of error messages, see Chapter 4.

sstm Command Operations

The following examples show the operations of the `sstm` command and the expected output.

Topics in this section include:

- “Obtaining a Default Report” on page 38
- “Device Reports” on page 40
- “LUN Reports” on page 42
- “Path Reports” on page 44
- “Getting Software Settings” on page 51
- “Changing Software Settings” on page 51
- “The Suspend Command” on page 52
- “The Cancel Command” on page 52

Obtaining a Default Report

This section shows the default report that is created by typing the `ssm` command with no options specified. The following example is a sample output taken from a Microsoft Windows host. There is one storage device with two LUNs and each is exposed to this host. All LUNs are attached to the host through two redundant paths. The output from other operating systems is nearly identical with the exception of the operating system device names, path names, and HBA names presented.

CODE EXAMPLE 3-1 sstm Command Default Report

sstm

Device: storage device

```
Device Name:      t3mojo.Central.Sun.COM
Failover Capable: yes
Device Desc:     Sun StorEdge T3B Disk Array
Unique Id:       60020f20000069960000000000000000
IP Address:      172.20.24.100
Firmware Revision: 0201
```

LUN: \\.\PhysicalDrive4

```
Unique Id:        60020f20000069963ee74a2a000829f6
Serial Number     00535030
Capacity:         5.00GB
State:            UP
Pathing Mode:     Asymmetric-MPXIO
```

Paths to this LUN:

* Path	HBA	State	Cntr Pref
2,1,0,6	\\.\Scsi2:	ACTIVE	yes
! 3,1,0,6	\\.\Scsi3:	ADMIN	no

LUN: \\.\PhysicalDrive3

```
Unique Id:        60020f20000069963edb185e00033644
Serial Number     00210500
Capacity:         10.00GB
State:            UP
Pathing Mode:     Asymmetric-MPXIO
```

Paths to this LUN:

* Path	HBA	State	Cntr Pref
! 2,1,0,3	\\.\Scsi2:	ADMIN	no
3,1,0,3	\\.\Scsi3:	ACTIVE	yes

Device Reports

This section describes the Device Reports that can be performed on a storage device. For the device report, a storage device is defined as a collection of LUNs contained by a specific storage product (for example, a Sun StorEdge 6120 array).

The report generated by the `sstm -d device_id` is a subset of the default report that shows only the information about the device specified and its associated LUNs and paths.

CODE EXAMPLE 3-2 Specific Device Report

```
sstm -d 60020f20000069960000000000000000
```

Device: storage device

```
Device Name:      t3mojo.Central.Sun.COM
Failover Capable: yes
Device Desc:      Sun StorEdge T3B Disk Array
Unique Id:        60020f20000069960000000000000000
IP Address:       172.20.24.100
Firmware Revision: 0201
```

LUN: \\.\PhysicalDrive4

```
Unique Id:        60020f20000069963ee74a2a000829f6
Serial Number     00535030
Capacity:         5.00GB
State:            UP
Pathing Mode:     Asymmetric-MPXIO
```

Paths to this LUN:

* Path	HBA	State	Cntr Pref
2,1,0,6	\\.\Scsi2:	ACTIVE	yes
! 3,1,0,6	\\.\Scsi3:	ADMIN	no

LUN: \\.\PhysicalDrive3

```
Unique Id:        60020f20000069963edb185e00033644
Serial Number     00210500
Capacity:         10.00GB
State:            UP
Pathing Mode:     Asymmetric-MPXIO
```

Paths to this LUN:

* Path	HBA	State	Cntr Pref
! 2,1,0,3	\\.\Scsi2:	ADMIN	no
3,1,0,3	\\.\Scsi3:	ACTIVE	yes

In addition to the ability to limit a report to a specific device, the `-d` option can be used with the additional argument of `-r` to restore all the preferred paths to all the LUNs in this system.

If the command restores all the LUNs on the device to their preferred path, a successful message is displayed.

The following is an example of a command completing successfully:

CODE EXAMPLE 3-3 Command Completing Successfully

```
sstm -d 60020f20000072250000000000000000 -r
The operation completed successfully. (0)
```

In the case of a failure, a variety of other messages are returned. A list of all messages is described in Chapter 4.

LUN Reports

This section describes the LUN reports and the types of reports the options produce when they are used with this command. The report generated by the `sstm -l lun_id` command is a subset of the default report that shows only the information about the specified LUN and its associated paths.

The following is an example of the output from this option

CODE EXAMPLE 3-4 Specific LUN Report

```
sstm -l 60020f20000077043f1c0b0800007720
LUN: \\.\PhysicalDrive3
Unique Id:                60020f20000077043f1c0b0800007720
Serial Number             00030496
Capacity:                 11.00GB
State:                    UP
Pathing Mode:             Asymmetric-MPXIO

Paths to this LUN:

* Path                    HBA                    State                    Cntr
                          -----
                          Pref
-----
3,0,0,1                  \\.\Scsi3:              ACTIVE                    no
! 3,0,10,1                \\.\Scsi3:              PASSIVE                    yes
! 4,0,16,1                \\.\Scsi4:              PASSIVE                    yes
4,0,19,1                  \\.\Scsi4:              ACTIVE                    no
```

In addition to the ability to limit a report to a specific LUN, the `-l` option can be used with the additional argument of `-r` to restore all the preferred paths to a LUN.

The following is an example using the `-v` (Verbose) option.

CODE EXAMPLE 3-5 With the Verbose Option Specified

```

sstm -l 60020f20000069963edb1844000d9214 -v

LUN: \\.\PhysicalDrive2
  Unique Id:                60020f20000069963edb1844000d9214
  Serial Number             00889364
  Capacity:                 10.00GB
  State:                    UP
  Pathing Mode:             Asymmetric-MPXIO

  Paths to this LUN:

* Path                      HBA                      State                      Cntr  In
Use                          Use                          Use                          Pref
-----
-
  2,1,0,2                    \\.\Scsi2:                ACTIVE                      yes   yes
    state:ACTIVE numOut=0 flags:0x7
  3,1,0,2                    \\.\Scsi3:                PASSIVE                      no    no
    state:PASSIVE numOut=0 flags:0x2

```

The `-l` option of the LUN commands also has the option similar to the Device command to restore a LUN's path to the preferred controller. The following example is an example of using the `-l` option.

The following is an example of a command completing successfully.

```

sstm -l 60020f20000072250000000000000000 -r
The operation completed successfully. (0)

```

The `-m` option returns statistical information about the LUN. The following is an example from this option and the verbose option:

CODE EXAMPLE 3-6 With Statistical Option Specified

```
sstm -l 60020f20000072253dad916300061f41 -m -v
LUN Statistics:
  LUN:                60020f20000072253dad916300061f41
  Host Requests:      198
  Outstanding IO:     0
  Blocks Transferred: 1682
  IO Errors:          0
  Temp Dropouts:      0
  HW Dropouts:        0
  Full Dropouts:      0
```

Path Reports

The basic Path Report returns information about a specific path. The report generated by the `sstm -p name` command is a subset of the default report that only shows the information about the path specified.

This report contains a *nexus name* for the HBA to storage device controller. In these examples, it is noted by `3,0,10,1`. The nexus name is defined by the failover software.

The following is an example of the Path Report:

CODE EXAMPLE 3-7 Path Report Output

```
sstm -p 3,0,10,1
```

* Path	HBA	State	Cntr Pref
! 3,0,10,1	\\.\Scsi3:	PASSIVE	yes

Activating a Data Path

The `-a Path` command option activates a path that is passive. When this option is used, a message indicating success is sent if the command is successful. Otherwise, an error message is issued. A list of all messages is described in Chapter 4.

The following example of the `-a` option builds on the `sstm -p` example. It uses the `-a` option to activate a path. The success of the command can be verified by running a second Path Report to list the results. In the second Path Report, the `State` status is reported as `Active`.

CODE EXAMPLE 3-8 Activating a Data Path

```

sstm -p 3,0,10,1 -a
The operation completed successfully. (0)

sstm -p 3,0,10,1

```

* Path	HBA	State	Cntr Pref
-----	-----	-----	-----
3,0,10,1	\\.\Scsi3:	ACTIVE	yes

Putting a Path into Admin Mode

The `-d Path` command option puts a path into an admin mode. This option is used to stop all I/O on a path and can be used to help isolate problems in a configuration.

This example also builds on the basic Path Report example. After issuing the Path command with the `-d` option, the path becomes disabled and inactive. A warning character(!) is also placed in the left column noting that the path is in admin mode and not down. If the path was down, an `x` would be placed in the column. Only a single character (for example, `!` or `x`) can be placed in the left column.

CODE EXAMPLE 3-9 Putting A Path Into Admin Mode

```

sstm -p 3,0,10,1 -d
The operation completed successfully. (0)

sstm -p 3,0,10,1

```

* Path	HBA	State	Cntr Pref
-----	-----	-----	-----
! 3,0,10,1	\\.\Scsi3:	ADMIN	yes

Taking a Path Out of Admin Mode

The `-e Path` command option takes a path out of admin mode. After the Path command is issued with the `-e` option, the path becomes available for use.

- For symmetric devices, the path becomes active immediately if not broken.
- For asymmetric devices, like the Sun StorEdge 6120, if the path is the preferred path and Auto Failback is not on, the path becomes passive.
- For asymmetric devices, like the Sun StorEdge T3+, if the path is the preferred path and Auto Failback is on, the path becomes active immediately.

This status is shown by issuing the `sstm` command without options.

CODE EXAMPLE 3-10 Taking a Path Out Of Admin Mode

```

sstm -p 3,0,10,1 -e
The operation completed successfully. (0)

sstm -p 3,0,10,1

```

* Path	HBA	State	Cntr Pref
-----	-----	-----	-----
3,0,10,1	\\.\Scsi3:	PASSIVE	yes

Getting Path Statistical Information

The Path command `-m` option returns the statistical information for a specific path.

CODE EXAMPLE 3-11 Returning Statistical Path Information

```

sstm -p 3,0,10,1 -m -v
Path Statistics
  Path:                3,0,10,1
  Host Requests:       6266756
  Outstanding IO:      1
  Blocks Transferred: 702227085
  IO Errors:           154
  HW Dropouts:         0
  Full Dropouts:       53

```

Getting HBA Reports

The basic `-h` option returns information about a specific HBA. The specific information returned contains the Vendor name, Product Id, Firmware Version, Port and Node WWNs of the HBA, and HBA driver file name.

The report also contains all the paths seen only by the particular HBA. The listing is similar to the Path reports.

Note – The paths might belong to different devices.

CODE EXAMPLE 3-12 Returning Information About a Specific HBA

```
sstm -h \\.\Scsi4:
  Name:                Qlogic 2230 Fibre-Channel Adapter
  Firmware Revision:  5.12
  Node WWN:            00000000000000000000000000000001
  Port WWN:            00000000000000000000000000000011
  Driver File Name:   qla23xx
```

* Path	HBA	State	Cntr Pref
4,1,0,6	\\.\Scsi4:	ACTIVE	no
4,1,0,5	\\.\Scsi4:	ACTIVE	no
4,1,2,1	\\.\Scsi4:	ACTIVE	no
4,1,2,0	\\.\Scsi4:	ACTIVE	no
4,1,1,0	\\.\Scsi4:	ACTIVE	yes
4,1,1,1	\\.\Scsi4:	ACTIVE	yes

It is also possible to enable (-e) or disable (-d) all the paths to a particular HBA. The following example shows disabling all the paths to a particular HBA and placing the paths in admin mode. The output after the disable command looks like the following example:

CODE EXAMPLE 3-13 Placing all Paths to a Particular HBA in Admin Mode

```
sstm -h \\.\Scsi3: -d
pathId:3,0,0,1 status:The operation completed successfully.
pathId:3,0,10,1 status:The operation completed successfully.
pathId:3,0,0,0 status:The operation completed successfully.
pathId:3,0,10,0 status:The operation completed successfully.
pathId:3,0,3,3 status:The operation completed successfully.
pathId:3,0,21,3 status:The operation completed successfully.
pathId:3,0,4,0 status:The operation completed successfully.
pathId:3,0,20,0 status:The operation completed successfully.
pathId:3,0,1,0 status:The operation completed successfully.
pathId:3,0,13,0 status:The operation completed successfully.
pathId:3,0,1,1 status:The operation completed successfully.
pathId:3,0,13,1 status:The operation completed successfully.
pathId:3,0,2,0 status:The operation completed successfully.
pathId:3,0,5,0 status:The operation completed successfully.
```

The operation completed successfully. (0)

CODE EXAMPLE 3-14 Returning Information About a Specific HBA

```
sstm -h \\.\Scsi3:
```

```
HBA: QLogic Corporation 2300 Fibre-Channel Adapter
Name: \\.\Scsi3:
Firmware Revision: 3.01.20
NodeWWN: 200000e08b07642e
PortWWN: 210000e08b07642e
Driver File Name: ql2300.sys
```

* Path	HBA	State	Cntr Pref
! 3,0,0,1	\\.\Scsi3:	ADMIN	no
! 3,0,10,1	\\.\Scsi3:	ADMIN	yes
! 3,0,0,0	\\.\Scsi3:	ADMIN	yes
! 3,0,10,0	\\.\Scsi3:	ADMIN	no
! 3,0,3,3	\\.\Scsi3:	ADMIN	no
! 3,0,21,3	\\.\Scsi3:	ADMIN	yes
! 3,0,4,0	\\.\Scsi3:	ADMIN	yes
! 3,0,20,0	\\.\Scsi3:	ADMIN	yes
! 3,0,1,0	\\.\Scsi3:	ADMIN	yes
! 3,0,13,0	\\.\Scsi3:	ADMIN	yes
! 3,0,1,1	\\.\Scsi3:	ADMIN	yes
! 3,0,13,1	\\.\Scsi3:	ADMIN	yes
! 3,0,2,0	\\.\Scsi3:	ADMIN	yes
! 3,0,5,0	\\.\Scsi3:	ADMIN	yes

```
The operation completed successfully. (0)
```

If the verbose (-v) option is used, the output looks like the following example:

CODE EXAMPLE 3-15 Returning Verbose Information About a Specific HBA Using -v Option

```
sstm -h \\.\Scsi3: -v

HBA:                QLogic Corporation 2300 Fibre-Channel Adapter
Name:                \\.\Scsi3:
Firmware Revision:  3.01.20
NodeWWN:             200000e08b07642e
PortWWN:             210000e08b07642e
Driver File Name:   ql2300.sys
```

	* Path	HBA	State	Cntr Pref	In
Use	-----				
-	-----				
!	3,0,0,1	\\.\Scsi3:	ADMIN	no	no
	state:ADMIN numOut=0 flags:0x2				
!	3,0,10,1	\\.\Scsi3:	ADMIN	yes	no
	state:ADMIN numOut=0 flags:0x6				
!	3,0,0,0	\\.\Scsi3:	ADMIN	yes	no
	state:ADMIN numOut=0 flags:0x6				
!	3,0,10,0	\\.\Scsi3:	ADMIN	no	no
	state:ADMIN numOut=0 flags:0x2				
!	3,0,3,3	\\.\Scsi3:	ADMIN	no	no
	state:ADMIN numOut=0 flags:0x2				
!	3,0,21,3	\\.\Scsi3:	ADMIN	yes	no
	state:ADMIN numOut=0 flags:0x6				
!	3,0,4,0	\\.\Scsi3:	ADMIN	yes	no
	state:ADMIN numOut=0 flags:0x6				
!	3,0,20,0	\\.\Scsi3:	ADMIN	yes	no
	state:ADMIN numOut=0 flags:0x6				
!	3,0,1,0	\\.\Scsi3:	ADMIN	yes	yes
	state:ADMIN numOut=0 flags:0x7				
!	3,0,13,0	\\.\Scsi3:	ADMIN	yes	no
	state:ADMIN numOut=0 flags:0x6				
!	3,0,1,1	\\.\Scsi3:	ADMIN	yes	no
	state:ADMIN numOut=0 flags:0x6				
!	3,0,13,1	\\.\Scsi3:	ADMIN	yes	no

The operation completed successfully. (0)

Getting Software Settings

If the `sstm -P` command is issued without specifying options, a report is returned of all the software parameters plus the version of the failover software.

CODE EXAMPLE 3-16 Returning a Report About All Software Parameters

```
sstm -P
Driver Public Parameters
           Driver Version: 4.5.0.xx
           Healthy Path Poll Rate: 30 (seconds)
           Unhealthy Path Poll Rate: 30 (seconds)
           Auto Failback: 0 (off)
           Log Level: 0x00 (none)
```

Changing Software Settings

The `-P` command, with no subcommands, returns a report of all the driver parameters plus the failover driver version. Any of the parameters can be changed by using their respective subcommittees.

The following `sstm` commands can be used to change the software settings displayed by the `sstm -P` command:

TABLE 3-2 Changing Software Settings

Supported Subcommittees	Action
<code>-P -r</code>	Restores default settings
<code>-P -i seconds</code>	Sets healthy path poll rate (2 through 3600 seconds)
<code>-P -b seconds</code>	Sets unhealthy path poll rate (2 through 60 seconds)
<code>-P -l hex value</code>	Sets the log level to any of the following: <ul style="list-style-type: none">• 0x00 = no logging• 0x01 = data path changes• 0x02 = internal errors• 0x04 = critical errors• 0x08 = informational messages• 0x10 = caution messages• 0x1f = log everything
<code>-P -a integer</code>	Enables or disables auto failback <ul style="list-style-type: none">• 1 = enable• 0 = disable

A complete list of all the command options and their explanations are found in TABLE 3-1.

The Suspend Command

The `sstm -S` command blocks or stalls the return of the command and does not return to the user until some form of path state change occurs. For example, if a path goes down, comes back online, or is disabled, the command initiates a return to the user.

This is a very useful command for scripting because you can create your own form of logging by making a script that issues a `sstm` command default report, then an `sstm -S` command in a loop.

CODE EXAMPLE 3-17 The Suspend Command

```
sstm -S  
C:>
```

The Cancel Command

The `cancel` command cancels the suspend command.

CODE EXAMPLE 3-18 The Cancel Command

```
sstm -C
```

Error Return Messages

The following table contains all the return messages from the command line interface to the initiator of the command. To obtain a number value for these returns echo %ERRORLEVEL% after the `ssm` command completes. The echo response will be integers.

TABLE 4-1 Error Return Codes and Meanings

Code	Meaning
00	The operation completed successfully.
100	The operation contained an invalid parameter.
101	An I/O error occurred during the operation.
102	The operation did not complete within the specified time.
103	The specified HBA could not be found or does not exist.
104	The specified device could not be found or does not exist.
105	The specified LUN could not be found or does not exist.
106	The specified path could not be found or does not exist.
107	The specified device was busy and could not accept the request.
108	The host OS has no memory left to allocate.
109	An internal error was encountered during the operation.
110	No supported devices were detected.
111	There are no alternate paths available to the device.
112	The specified path could not be enabled.
113	The specified path is already the active path.
114	The specified path is down or offline and is currently not available.
115	The selection of the specified path failed.

TABLE 4-1 Error Return Codes and Meanings (*Continued*)

Code	Meaning
116	An invalid state change was attempted for the specified path.
117	The preferred path is down or offline and is currently not available.
118	An illegal or out-of-range command was specified.
119	The specified SCSI pass-through command failed.
120	The buffer specified was too small for the operation.
121	The restore operation failed.
122	A reservation conflict was encountered during the operation.
123	The operation is not supported.
124	A reboot is required.
125	The operation failed for some paths.

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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