Sun StorageTek™ 2500 Series Array Release Notes

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Sun StorageTek 2500 Series Array Release Notes, Release 1.1

This document contains important release information about the Sun StorageTek™ 2500 Series Array or information that was not available at the time the product documentation was published. Read this document so that you are aware of issues or requirements that can affect the installation and operation of the Sun StorageTek 2500 Array.

These release notes cover the Sun StorageTek 2500 Series Array, Release 1.1 and Release 6.17.52 firmware, and related hardware issues. For information on management software requirements, operations, and issues, see the *Sun StorageTek Common Array Manager Software Release Notes, Release 5.1.3* or higher.

The release notes consist of the following sections:

- "Features in This Release" on page 1
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Features in This Release

This section describes the main features of the Sun StorageTek 2500 Array, including the following:

Sun StorageTek 2500 Array Features

The Sun StorageTek 2540 Array, the Sun StorageTek 2530 Array, the Sun StorageTek 2501 Expansion Module, and upcoming models are a family of storage products.

The Sun StorageTek 2500 Arrays contains disk drives for storing data and controllers that provide the interface between a management and/or data host and the disk drives. The Sun StorageTek 2540 Array provides a Fibre Channel connection from the data host to the controller. The Sun StorageTek 2530 Array provides a Serial Attached SCSI (SAS) connection from the data host to the controller.

The Sun StorageTek 2501 Expansion Module provides additional storage. You can attach the drive expansion tray to the Sun StorageTek 2540 and 2530 Arrays.

Array Features

Common features:

- One drive expansion tray Serial Attached SCSI (SAS) connector per controller with 3 Gb/s drive expansion tray connection speed
- 512-MB cache per controller or 1 GB mirrored cache
- Maximum connection of 36 disk drives (one controller tray and two drive expansion trays)
- Dual redundant controllers
- Serial Attached SCSI (SAS) disk drives

Sun StorageTek 2540 features:

- Fibre Channel (FC) controller tray
- Two data host connectors per controller that support a fiber-optic interface with 1, 2, or 4 Gb/s data host connection speed

Sun StorageTek 2530 features:

- SAS controller tray
- Three SAS host connectors with 3 Gb/s host connection speed per controller

Note – SAS multipathing is supported for Windows and Linux data hosts. Only single-path is supported for Solaris data hosts pending the release of a new Solaris multipath driver..

Auto Service Request Feature

Auto Service Request (ASR) is a new feature of the array management software that monitors the array system health and performance and automatically notifies the Sun Technical Support Center when critical events occur. Critical alarms generate an automatic Service Request case. The notifications enable Sun Service to respond faster and more accurately to critical on-site issues.

You enable the Auto Service Request capability by using a Sun StorageTek Common Array Manager software feature, Sun Connection, to register devices to participate in the ASR service. *Refer to the Sun StorageTek Common Array Manager Release Notes, Release 5.1.2* or higher, for more information.

Premium Features

Premium features require licenses which must be ordered separately. (The 2500 Series Arrays provide two free storage domains.) The following premium features are available for 2500 Series Arrays:

- 4 storage domains
- 8 storage domains
- 16 storage domains
- Data Snapshot (4 per volume and 128 per array)

Note – Storage domain licenses are required to map initiators on data hosts to volumes.

2500 Series Array Ship Kit Contents

The Sun StorageTek 2500 Series Array controller and expansion trays are shipped separately.The Ac power cords are ordered separately. The following is a list of the contents in the tray ship kits. There may also be read me first notices.

Sun StorageTek 2540 and 2530 Array Controller Kits

Common contents:

- One pair left and right end caps (plastic bezels)
- Two 6-meter RJ45 -RJ45 Ethernet cables (one per controller module)
- One RJ45-DIN9 cable
- One RJ45-DB9 adapter
- One RJ45-DB9 adapter (with null modem)
- Sun StorageTek Common Array Manager Software CD, including firmware updates
- *Sun StorageTek Common Array Manager Software Installation Guide*
- *Common Array Manager sscs CLI Quick Reference Card*
- *Sun StorageTek 2500 Series Array Hardware Installation Guide*
- *Accessing Documentation* card
- One Sun Safety Document

Content for the 2540 controller tray only:

- Four 4 Gbps FC SFPs (2 per FC Controller module)

Sun StorageTek 2501 Array Expansion Kit

Ship kit for each 2501 expansion tray:

- Two copper SAS cables (one per I/O module)
- One pair left and right end caps (plastic bezels)
- *Accessing Documentation* guide

Management Software

The Sun StorageTek Common Array Manager software (5.1.2 and above) provides you with an easy-to-use interface to configure, manage, and monitor Sun StorageTek storage systems, including the Sun StorageTek 2500 Series Array. You can also use the Common Array Manager software to diagnose problems, view events, and monitor the health of your array. Each release of the Common Array Manager provides the latest firmware updates for all the arrays it supports and provides the means to upload the firmware to them.

The Common Array Manager is the only supported management software for the 2500 Series Array. Refer to the Release Notes and other Sun StorageTek Common Array Manager documentation described in "Release Documentation" on page 23."

Release Firmware

Release 1.1 of the Sun StorageTek 2540 and 2530 Arrays support firmware release 6.17.52.10.

TABLE 1 lists the firmware files for Release 1.1. Updates to the firmware are included with releases of the Sun StorageTek Common Array Manager software or patches. For a listing of the firmware files in subsequent releases, refer to the Sun StorageTek Common Array Manager Release Notes or patch notes.

After you install the CAM software, these files will be located in:

- Solaris: `/var/sadm/swimages/2540`
- Windows: <system drive>:\Program Files\Sun\Common Array Manager\Component\SunStorageTekArrayFirmware\
- Linux: /opt/sun/cam/share/fw/

TABLE 1   2540 Array and Disk Firmware for Release 1.1

Type	Version
CRM-F	06.17.52.10
CRM-F-NVSRAM	N1932-617843-002
CRM-F-NVSRAM-S	N1932-617843-903
DISK/ST330055SSUN300G	0791
DISK/ST314655SSUN146G	0791
DISK/ST373455SSUN72G	0791
IOM	0166

TABLE 2 lists the firmware files for the StorageTek 2530 Array included in this release. After you install the CAM software, these files will be located in:

- Solaris: `/var/sadm/swimages/2530`
- Windows: <system drive>:\Program Files\Sun\Common Array Manager\Component\SunStorageTekArrayFirmware\
- Linux: /opt/sun/cam/share/fw/

TABLE 2   2530 Array and Disk Firmware

Type	Version
CRM-F	06.17.52.10
CRM-F-NVSRAM	N133X-617843-003
CRM-F-NVSRAM-S	N133X-617843-904
DISK/ST330055SSUN300G	0791
DISK/ST314655SSUN146G	0791
DISK/ST373455SSUN72G	0791
IOM	0166

These firmware types are defined as follows:

- `CRM-F/` contains controller firmware
- `CRM-F-NVSRAM/` contains controller non-volatile system random access memory (NVSRAM) firmware
- `CRM-F-NVSRAM-S/` contains NVSRAM firmware for a Simplex configuration or single controller option
- `IOM/` contains the input/output module (IOM) firmware
- `DISK/` contains disk drive firmware

System Requirements

The software and hardware products that have been tested and qualified to work with the Sun StorageTek 2500 Series Array are described in the following sections:

- "Disk Drives and Tray Capacity" on page 7
- "Data Host Requirements" on page 7

Disk Drives and Tray Capacity

TABLE 3 lists the size, speed, and tray capacity for the supported Serial Attached SCSI (SAS) disk drives in the Sun StorageTek 2500 Series Array.

TABLE 3 Supported Disk Drives

Drive	Description
ST373455SSUN72G - rev 0791	72-GB 15,000-RPM SAS drives (3 Gbps); 876 GB per tray
ST314655SSUN146G - rev 0791	146-GB 15,000-RPM SAS drives (3 Gbps); 1752 GB per tray
ST330055SSUN300G - rev 0791	300-GB 15,000-RPM SAS drives (3 Gbps); 3600 GB per tray

Data Host Requirements

This section provides the data host requirements of the 2500 Series Array at the time this document was produced. These requirements can change; for complete up-to-date compatibility requirements, contact your Sun sales or support representative.

Data host requirements for 2540 arrays, which support Fibre Channel connections to the data host, are different from 2530 arrays, which use SAS connections to the data host.

Using the InterOp Tool to Find Supported HBAs

Sun provides an online tool to get the latest information about supported hosts, HBAs, switches, and drivers.

https://extranet.stortek.com/interop/interop

2540 Array Data Host Requirements

Note – The 2540 Array supports Fibre Channel-only connections to the data host. The information in this section applies only to data hosts with Fibre Channel connections.

TABLE 4 lists the supported host Operating Systems (OSs) and multipathing availability. HBAs must be ordered separately, from Sun or their respective manufacturers. Sun HBAs can be ordered from the following site: `/www.sun.com/storagetek/storage_networking/hba/`

You must install data host multipathing software on each data host that communicates with the Sun StorageTek 2540 Array. Follow the instructions in the *Sun StorageTek 2500 Series Array Hardware Installation Guide* to download and install the software from the Sun Download Center.

You can download HBA drivers and other host software from the Sun Download Center, `http://www.sun.com/software/download/`. Download operating system updates from the web site of the operating system company.

TABLE 4   Supported Data Host Platforms for 2540 Arrays

Host OS	Multipathing Support	Cluster Support
Solaris 9	SAN 4.4.12 and higher	Sun Cluster 3.1
Solaris 10 SPARC	included in OS	Sun Cluster versions SC 3.1, SC 3.2 (2, 3, or 4 nodes)
Solaris 10 x64	included in OS	Sun Cluster versions SC 3.1, SC 3.2 (2, 3, or 4 nodes)
Windows 2003	MPIO	Microsoft Cluster Server
Linux Red Hat 3.0, 4.0; SUSE 8.0, 9.0	RDAC	Linux Cluster

Note – The patches listed in Table 4 are required for Solaris.

TABLE 5 Required Solaris Patches for Data Host Platforms

Solaris Version	Required Patch (Minimum)
Solaris 9	SAN 4.4.12 113039 patch
Solaris 10 SPARC	Update 3 118833-36 patch (required by 125018) 125018-03 patch or higher
Solaris 10 x64	125019-03 patch

2530 Data Host Requirements

Note – The 2530 Array supports SAS-only connections to data hosts. The information in this section applies only to data hosts with SAS connections.

TABLE 6 lists supported 2530 data host platforms and indicates the kind of support they have for SAS connections.

TABLE 6   Data Host Platform Support for 2530 Arrays

Host OS	SAS Support	Multipathing Support	Cluster Support
Solaris 10, SPARC	yes	single path mode only; MPT driver required. See Table 7.	Not supported
Solaris 10, x64	yes	single path mode only; MPT driver required See Table 7.	Not supported
Windows 2003	yes	MPIO	Microsoft Cluster Server
Linux (Red Hat 3.0, 4.0; SUSE 8.0, 9.0)	yes	RDAC	Linux Cluster

TABLE 7   Required Solaris Patches for Data Host Platforms

Solaris Version	Required Patch (Minimum)
Solaris 10 SPARC	Update 3 118833-36 patch (required by 125018) 125018-03 patch or higher
Solaris 10 x64	125019-03 patch

Installing Firmware

The array installation procedures are described in the *Sun StorageTek 2500 Series Array Hardware Installation Guide, Release 1.1* (part number 820-0015-10) that came with your array. Host Management upgrades are described in the *Sun StorageTek Common Array Manager 5.1.2 Release Notes*. This section describes release-specific steps for firmware upgrades that you must perform.

Upgrading Array Firmware

If you have a previous release of the 2500 Series Array firmware installed, the Common Array Manager upgrade software will detect it and provide a means to upgrade to the new firmware versions required for this release. The upgrade software is included on the Sun StorageTek 2500 Series Array CD, or in the package you obtain from the Sun Download Center:
`http://www.sun.com/software/download/`

▼ To Upgrade the Firmware on the Array

Upgrade the firmware on the array using the Common Array Manager interface after the software is installed and the array registered with the software.

You can upgrade the firmware on the 2540 Array without stopping I/O. For firmware for expansion modules, disk drives, and IOMs, it is recommended that a maintenance period of low activity be scheduled in order to execute the upgrade process.

1. **On the Java Web Console page, click Sun StorageTek Common Array Manager.**

2. **Go to the Storage System Summary page and select the arrays to be upgraded.**

3. **Click the Upgrade Firmware button.**

4. **Follow the prompts.**

Known Issues

The following sections provide information about known issues and bugs filed against this product release:

-
-
-

If a recommended workaround is available for a bug, it follows the bug description.

Hardware and Firmware Issues

This section describes general issues related to the Sun StorageTek 2500 Series Array hardware and firmware.

Veritas ASL Is Not Supported in This Release

Bug 6497666 – Release 1.1 does not support Veritas ASL.

Tray and Host Board Incorrectly Identified

Bugs 6544481 and 6496643 - The wrong tray type, SS3600, for 2500 Series Arrays and a host board type of 1, unknown, displays in the management software. The can be especially confusing on the new array information screen that displays when a new array is registered in the management software.

Workaround – Refer to the packing list shipped with the array if you need to check the tray type.

Redistributing Volume Ownership May Produce Error if Array is Busy

Bug 6541677 - Using the Service Advisor function to redistribute volume ownership may produces an error if the array has heavy data input/output.

Workaround – Schedule a maintenance period of low activity in order to redistribute volume ownership.

Sharp Edges and Corners on Array

Bugs 6540408, 6538961, 6538960 - Watch out for sharp corners and edges on:

- The Controller Module (corners)
- Power Modules (corners)
- Tray edges (chassis ears edges)

Workaround – Handle the array carefully to avoid the sharp corners and edges.

Upgrading IOM Firmware May Fail During Heavy I/0

Bug 6507700 – IOM firmware upgrades may fail when the array is servicing a heavy amount of host IO.

Workaround – No IOM upgrades are scheduled at this time. If one occurs, schedule a maintenance period of low activity in order to execute the upgrade process.

If the upgrade fails, reset the controllers before updating the IOM firmware again.

Upgrading IOM Firmware Can Result In Failback Failure

Bug 6509762 - After a firmware upgrade to an Input-Output Module (IOM), the array will display a Check Condition - Microcode Changed message on all hosts.

After a firmware upgrade, an automatic failback was generated. When the switch port connecting the data host was enabled, the auto failback failed, indicating that it did not process the MICROCODE_CHANGED message.

Workaround – No IOM upgrades are scheduled at this time. If one occurs, there are two workarounds:

1) Perform a manual failover. The issue will not happen.

2) After updating the IOM firmware, manually forcing a failover and failback of all effected LUNs on any mapped Solaris host will clear out the condition.

Failover May Generate False Error Messages

Bug 6509331 – In Solaris, under heavy data traffic, host-initiated failover may generate error messages in /var/adm/messages even though the failover is successful.

Workaround – In the CLI, use the Solaris luxadm command to verify that the failover was successful.

1. **View the controller:**

```
$ luxadm di /dev/rdsk/c9t600A0B8000245D4C0000310A458A852Bd0s2
DEVICE PROPERTIES for disk:
/dev/rdsk/c9t600A0B8000245D4C0000310A458A852Bd0s2
  Vendor:               SUN
  Product ID:           LCSM100_F
  Revision:             0617
  Serial Num:           1T60325953
  Unformatted capacity: 3072.000 MBytes
  Write Cache:          Enabled
  Read Cache:           Enabled
    Minimum prefetch:   0x3
    Maximum prefetch:   0x3
  Device Type:          Disk device
  Path(s):


  /dev/rdsk/c9t600A0B8000245D4C0000310A458A852Bd0s2
  /devices/scsi_vhci/ssd@g600a0b8000245d4c0000310a458a852b:c,raw
   Controller
/devices/ssm@0,0/pci@18,600000/SUNW,qlc@1/fp@0,0
     Device Address            202400a0b8245db7,5
     Host controller port WWN  210000e08b883b2e
     Class                     secondary
     State                     STANDBY
   Controller
/devices/ssm@0,0/pci@18,600000/SUNW,qlc@1,1/fp@0,0
     Device Address            202500a0b8245db7,5
     Host controller port WWN  210100e08ba83b2e
     Class                     primary
     State                     ONLINE
```

Note that the primary controller is online.

2. **Issue the failover command.**

An error message is generated indicating failure.

```
$ luxadm failover secondary
/dev/rdsk/c9t600A0B8000245D4C0000310A458A852Bd0s2
 Error: Unable to perform failover, standby path unavailable
```

3. **Verify the path characteristics**

```
$ luxadm di /dev/rdsk/c9t600A0B8000245D4C0000310A458A852Bd0s2
DEVICE PROPERTIES for disk:
/dev/rdsk/c9t600A0B8000245D4C0000310A458A852Bd0s2
  Vendor:               SUN
  Product ID:           LCSM100_F
  Revision:             0617
  Serial Num:           1T60326060
  Unformatted capacity: 3072.000 MBytes
  Write Cache:          Enabled
  Read Cache:           Enabled
    Minimum prefetch:   0x3
    Maximum prefetch:   0x3
  Device Type:          Disk device
  Path(s):


  /dev/rdsk/c9t600A0B8000245D4C0000310A458A852Bd0s2
  /devices/scsi_vhci/ssd@g600a0b8000245d4c0000310a458a852b:c,raw
   Controller
/devices/ssm@0,0/pci@18,600000/SUNW,qlc@1/fp@0,0
    Device Address            202400a0b8245db7,5
    Host controller port WWN  210000e08b883b2e
    Class                     secondary
    State                     ONLINE
   Controller
/devices/ssm@0,0/pci@18,600000/SUNW,qlc@1,1/fp@0,0
    Device Address            202500a0b8245db7,5
    Host controller port WWN  210100e08ba83b2e
    Class                     primary
    State                     STANDBY
```

Note that the secondary controller is now online, indicating that the failover occurred.

Configuring an Array for Simplex Can Result in Error Message

Bug 6508950 – Configuring a duplex array for simplex can result in a critical event message showing channel path 2 as degraded. Channel path 2 is not part of a simplex configuration.

Workaround – Ignore the message for simplex configurations.

Pushing Drive Housing Too Far Unseats Drive

Bug 6514411 – Inserting a disk drive into a tray by pushing on its housing until it is all the way in causes the drive to stop without being fully inserted and with the drive handle protruding.

Workaround – The correct way to insert a disk drive into the tray is as follows:

1. Push the disk drive into the chassis by slowly pushing against the drive housing until the drive handle engages with the chassis.

2. When the handle starts to move itself downwards, push the disk drive handle down. This will crank the disk drive the rest of the way into the chassis.

When the drive is completely installed, the drive and handle will be flush with the other drives.

> **Caution –** Do not insert a disk drive into a tray by pushing on its housing until it is all the way in. This can cause the handle to be stuck in the "up" position so it is unable to close.

If the drive handle is stuck because the front lock tab is engaged in the tray's frame, carefully use a flat-bladed screwdriver to temporarily increase the gap between the tray frame and the drive and remove the drive.

On x86 Platform, `luxadm probe` Command Displays Entries of UTM (Management) LUNs

Bug 6482519 – The `luxadm probe` command displays UTM LUNs on x86 platforms. The UTM (Management) LUN is a reserved space, normally hidden, where the specific configuration settings for your array are stored.

Removed Unconfigured LUNs Require Host Reboot to Configure

Bug 6487239 – Solaris only - If unconfigured LUNs are removed from the `cfgadm -al` list, they cannot be directly configured.

Workaround – Reboot the host and the LUNs will appear on the list again. Use the `cfgadm -c` option to remove specific paths.

Replacing a Battery in a Controller Results in a Failed Battery Event

Bug 6502673 – A battery replaced in a controller reports a failed battery event, while it is recharging. After the battery is fully recharged, this alarm will go away.

Battery Events Do Not Identify the Battery's Controller Location

Bug 6503171 – Battery event messages do not specify which of the two controllers the referenced battery is in.

For battery events, the array only reports the tray where it occurs, not the slot.

Workaround – For non-critical events, collect the support data and find the corresponding event in the MEL log. For critical events, the third amber LED lights on the front of the controller with the failed battery.

A Bad SFP May Not Generate a Fault Indicator

Bug 6514739 – If a bad SFP is inserted in the FC port of a 2540 array, there may not an indication in the fault list that it is bad.

Certain failure modes of an SFP may not be detected by the array firmware immediately upon insertion and the management software could report the link state as optimal.

However, when you initiate I/O on the channel with the damaged SFP, it will be reported as failed.

Workaround – Check the fault LED and link LED for link failure. Check the event log for a failure event at the time of the SFP insertion and when you initiate I/O.

Over-temp Condition Results In PCU Failure Events and LED Fails to Light

Bug 6514846 and **6514877**– Over-temperature condition results in Power Fan CRU failed alarms. The front overtemp LED fails to light but the front panel amber LED does come on.

The controller firmware is set to report a temperature warning when any temperature sensor reaches 62 degrees. A temperature critical condition is reported at 67 degrees.

The power supply firmware will report the power supply as "failed" when it internally detects that the ambient temperature has reached 55 degrees. The controller firmware will report that failure status from the power supply, even though it is the temperature is below its usual threshold.

Workaround – Perform the following:

1. **Check the temperature in the environment where the array is located and adjust to a cooler setting if necessary.**

2. **If the environmental temperature is adequate but the event log indicates a temperature in the Power/Fan CRU of 55 degrees or greater and if the problem persists for greater than 24 hours, contact support.**

Blue LED Does Not Clear After Replacing Failed Drive

Bug 6545973 – Blue LED does not clear after replacing failed drive.

When a drive fails, LEDs display a solid light for the amber fault LED and blue LED that indicates that the drive can be replaced. Once the drive is replaced with a new or different drive, the amber fault LED clears on the drive enclosure, but the blue LED remains lit. The array enclosure fault LED behaves as expected.

Workaround – Use Sun StorageTek Common Array Manager software to revive the newly installed drive. The blue LED will clear. Note restrictions on reviving drives in the Common Array Manager online help.

Insufficient Reserve Space Fails Resnap

Bug 6523608 – Refreshing a snapshot does not update to the filesystem if there is insufficient reserve space, yet a message displays indicating success. The array's event log says the resnap completed successfully.

Workaround – In the snapshot feature of the management software, configure snapshots to fail if sufficient reserve space is not available.

Array Does Not Timeout and Clear Pending Firmware Download Session of Previous Failure

Bug 6523624 – If a firmware upgrade to an expansion module fails, the array may not clear the failed session automatically.

Workaround – After 20 minutes, retry the upgrade. If the upgrade fails again, power cycle the array to clear the failure.

Increased Common Array Manager Response Time

Bug – A busy array can increase CAM response time.

Service Advisor Does Not Verify Disk is Ready to be Removed

Bug 6501029 – When the management software lists a disk as failed and the Service Advisor procedure for replacing drives is followed, the step to verify that the disk is ready to remove may not list the failed disk.

Workaround – Use an alternative menu option, Array Troubleshooting and Recovery, to view the status of the disk.

SAS Issues

Replacing SAS Controller Affects Target ID and LUNs

Bug 6535523 – For a single path driver, replacing a SAS controller may change the Target ID of the controller. This causes a LUN name change and the current LUNs will disappear.

Workaround – Do not use the array as a boot device. Edit the sd.conf file and add the new LUN names. Need info about drive renumbering. For details, see page 40.

Removing a SAS Controller Results in False Status

Bug 6522947 – Removing a SAS controller results in outdated information on the Controller Details page in the management software. The status correctly reports the controller as removed. No work-around is available.

For SAS, Creating New Volumes During Heavy Input-Output Can Result In Errors

Bug 6522938 – For SAS, using the CLI to create a new volume on an array with high data input and output returns in a timeout and an error code of 4.

Workaround – Retry the operation when there is less I/O traffic.

Attach Failed Warning Message with MPT Drive

Bug 6529719 – An attached failed warning message for SCSI devices can be generated when using an MPT driver for SAS.

You cannot use SCSI and SAS HBAs on the same data host.

Documentation Issues

This section describes known issues and bugs related to the online help, the command-line interface sscs man page, or any other Sun StorageTek 2500 Series Array release documentation.

Solaris 8 Not Supported

The Sun StorageTek 2500 Series Array Hardware Installation Guide, part number 820-0015-10, lists Solaris 8 as supported. Only Solaris 9 and/or 10 are supported, depending on the application.

Additional Help for Lost Communications With Array

Bug 6541767 – Additional instructions are needed if the management software loses communication with the array.

Workaround – If the management software loses communication with the array, perform basic networking troubleshooting to reestablish the connection:

- Check the Ethernet cables on array and management workstation
- Ping the array from the workstation.
- Make sure that any switch between array and host has auto-negotiate on.
- Check the alarm page or Service Advisor in the management software and reselect the array.

Need to Off-line Controller During Battery Replacement

Bug 6537150 - The Service Advisor procedures for the 1500 Series Arrays lack an instruction to place the controller offline before removing and replacing a controller battery. The controller must be pulled to replaced the battery.

Workaround – Place the controller offline before removing the controller and replacing the battery.

Add Expansion Modules with Array Power On.

The *Sun StorageTek 2500 Series Array Hardware Installation Guide*, Part No. 820-0015-xx, states in Chapter 2:

"Expansion trays must be added with the power to the array and I/O data transfer turned off."

This is incorrect. It is best to add an expansion tray to a running array instead of one that is powered off. Limiting I/O traffic is recommended for the duration of the reconfiguration.

Default IP Address Netmasks

The *Sun StorageTek 2500 Array Hardware Installation Guide* gives the default IP addresses right up front (Configuring IP Address of the Array Controllers), but does not include the netmask. The netmask for these defaults is 255.255.255.0

Incorrect Number of Cables Cited in the Install Guide

Page 75 of the Sun StorageTek 2500 Series Array Installation Guide references two min-DIN to RJ45 serial port cables. Only one RJ45-DIN9 cable is supplied, as well as the following adapters:

- One RJ45-DB9 adapter
- One RJ45-DB9 adapter (with null modem)

Flathead Screwdriver Required

Bug 6515249 – In Chapter 2 of the *Sun StorageTek 2500 Array Hardware Installation Guide* the list of tools needed for the array installation in a rack does not list a flathead screwdriver, which is required if you need to loosen the rail extension screws.

Enabling SAS Multipathing Software for Solaris 10 OS

In Chapter 5 of the *Sun StorageTek 2500 Array Hardware Installation Guide* the procedure in the section "Enabling Multipathing Software for Solaris 10 OS" now applies to the enabling of SAS multipathing as well. [Note -- Solaris SAS multipathing is not supported in this release.]

Unable to Reconcile SAS Hosts With WWNs Between Controller and Array

Bug 6533616 – Unable to reconcile SAS hosts with WWNs between controllers and array and accurately discover HBAs attached to the array. Refer to Appendix A for information on how to work with WWNs on SAS hosts.

Operational Information

This section provides useful operational information not documented elsewhere.

License Required for Storage Domains

The 2500 Series array includes two storage domains. You must purchase a premium license to use additional storage domains.

When Performing an Array Import, Do Not Modify Configuration

Configure management objects while an `import array` job is running might interfere with the import. Be sure that everyone who uses the destination array does not configure any objects (including volumes, initiators, mappings, etc.) while the import is in progress.

Using a Volume Before It Is Fully Initialized

When you create a volume and label it, you can start using the volume before it is fully initialized.

Controller Tray Battery Information

During bootup, the battery light might flash for an extended period. The battery charger performs a series of battery qualification tests before starting a battery charge cycle. This series of tests occurs at subsystem power-up. The tests are automatically reinitialized approximately every 25 hours by a timer.

Each controller tray contains a user-replaceable lithium ion battery pack for cache backup in case of power loss. The on-board battery is capable of holding a 2-gigabyte cache for three days (72 hours). The service life of the battery pack is two years, at the end of which the battery pack must be replaced (it is field-replaceable).

Release Documentation

Following is a list of documents related to the Sun StorageTek 2500 Series Array. For any document number with *nn* as a version suffix, use the most current version available.

You can search for this documentation online at:
`http://www.sun.com/documentation`

Application	Title	Part Number
Site planning information	*Sun StorageTek 2500 Series Array Site Preparation Guide*	820-0024-*nn*
Regulatory and safety information	*Sun StorageTek 2500 Series Array Regulatory and Safety Compliance Manual*	820-0025-*nn*
Array hardware installation instructions	*Sun StorageTek 2500 Series Array Hardware Installation Guide*	820-0015-*nn*
Hardware conceptual Information	*Sun StorageTek 2500 Series Array Hardware User Guide*	820-0023-*nn*
Release-specific information for the Sun StorageTek Common Array Manager	*Sun StorageTek Common Array Manager Release Notes*	820-2128-*nn*
Management software installation and basic configuration information	*Sun StorageTek Common Array Manager Software Installation Guide*	820-0015-*nn*
Quick-reference information for the Common Array Manager CLI	*Sun StorageTek Common Array Manager CLI Quick Reference Card*	820-0029-*nn*
Instructions for installing the Sun StorEdge Expansion cabinet	*Sun StorEdge Expansion Cabinet Installation and Service Manual*	805-3067-*nn*
Instructions for installing the Sun Rack 900/1000 cabinets	*Sun Rack Installation Guide*	816-6386-*nn*
Instructions for installing the Sun Fire cabinet	*Sun Fire Cabinet Installation and Reference Manual*	806-2942-*nn*

In addition, the Sun StorageTek 2500 Series Array includes the following online documentation:

■ Sun StorageTek Common Array Manager online help

  Contains system overview and configuration information.

■ Service Advisor

Provides guided FRU replacement procedures with system feedback. You can access Service Advisor from the Sun StorageTek Common Array Manager software.

- sscs man page commands for the CLI

  Provides help on man page commands available on a management host or on a remote CLI client.

Service Contact Information

If you need help installing or using this product, go to:

`http://www.sun.com/service/contacting`

Third-Party Web Sites

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SAS Single-Path Configuration

This appendix describes how to configure single path connections between a data host running Solaris 10 operating system and a Sun StorageTek 2530 Array, with a focus on the requirements of the configuration on the Solaris 10 operating system.

This appendix consists of the following sections:

Single Path Requirements

The Sun StorageTek 2530 arrays supports single path connections with the operating systems listed in TABLE 8. Note the required Solaris patches.

TABLE 8   Supported Data Host Platforms for Single Path

Host OS	Required Patches (Minimum)
Solaris 10 SPARC	Update 3 118833-36 patch (required by 125018) 125018-03 patch 125037-03 patch
Solaris 10 x64	125019-03 patch 125038-03 patch

Note – Solaris 9 and Sun Cluster 3.x are not supported for single path connections.

Solaris 10 Restrictions

- Solaris 10 OS does not dynamically discover volumes.
- You may have to edit the **sd.conf** file to recognize the new or undiscovered volumes as documented in this chapter.
- On Solaris 10 OS, the target id is generated from the World Wide Names of both the HBA initiators and the controller ports. Replacing controllers can change the target id. Review the file naming after changing controllers to make sure the naming conventions for single path in this document are still met.

Planning for Single Path Connections

Key requirements to configuring Solaris SAS single path are:

- Configuring one host per initiator
- Following the suggested file naming conventions
- Editing the **sd.conf** file

Before configuring single path, you need to collect host, initiator, and topology information, review the naming conventions, and prepare a table of configuration information as outlined in the following sections.

Follow the procedures in the following order to ensure smooth operations:

▼ To Collect Host Information

1. Issue the `hostname` **command to collect the host information.**

```
# hostname
 csqa221-163

 # hostname
 csqa221-168
```

This example uses two data hosts running Solaris 10 OS.

▼ To Collect Initiator Information

1. Issue the `dmesg` **command to collect initiator information. (The initiator of data on the HBA.)**

```
# dmesg | grep WWN
 Apr  9 17:02:26 csqa221-163      mpt1: Port 0/PHYs 0-3 (wide-port)
WWN: 0x500605b000253410
 Apr  9 17:02:26 csqa221-163      mpt1: Port 1/PHYs 4-7 (wide-port)
WWN: 0x500605b000253414
```

```
# dmesg | grep WWN
 Apr  9 17:00:38 csqa221-168     mpt3: Port 0/PHYs 0-3 (wide-port)
WWN: 0x500605b0000db020
 Apr  9 17:00:38 csqa221-168     mpt3: Port 1/PHYs 4-7 (wide-port)
WWN: 0x500605b0000db024
```

In each of the above lines in the output is embedded valuable information as shown in the following example:

`mpt3: Port 0/PHYs 0-3 (wide-port) WWN: 0x500605b0000d`**b020**

- mpt3 - HBA controller
- Port 0 - Port 0 or 1. Both PCI-X and PCIe HBAs are dual ported.
- PHYs 0-3 - Each physical port has 4 channels (numbered 0 – 3) and is called PHY in SAS terminology
- WWN: 0x500605b0000d**b020** - the World Wide Name. Note the last four digits.

Note – The initiator information is printed at boot up time. If the dmesg command does not return any output, the same information can be obtaining by searching on the WWN string in the `/var/adm/messages` files.

Collecting Topology Information

The Sun StorageTek 2540 Array, with a Fibre Channel data path, has built-in drivers with dynamic discovery and multi-pathing capabilities.

The Sun StorageTek 2530 Array, with a SAS data path, does not have these capabilities. There is no utility to correlate the connections between initiators, HBA ports and controller ports. You have to plan the topology prior to configuring single path connections.

In the examples that follow, the topology is listed in

FIGURE A-1 Topology of the 2530 array when connected to data hosts.

1 – data hosts
csqa221-163, csqa221-168

2 – Dual ported HBA initiator 1
csqa221-163 – WWN ending in 3410
csqa221-168 – WWN ending in b020

3 – Dual ported HBA initiator 2
csqa221-163 – WWN ending in 3414
csqa221-168 – WWN ending in b024

4 – Controller host ports

5 – Controller A of ST2530

6 – Controller B of ST2530
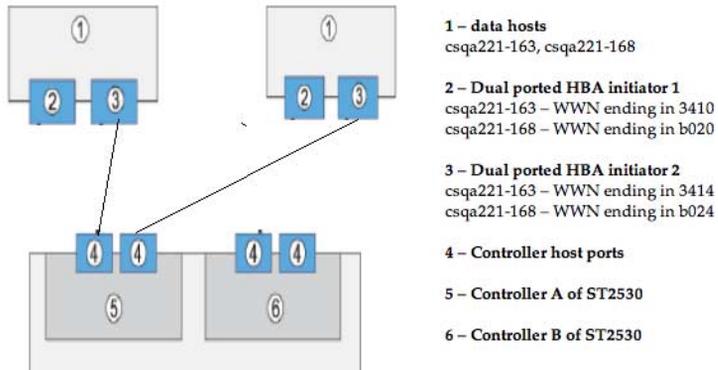
Making Naming Modifications in the Sun StorageTek Common Array Manager Software

For the volumes to be seen by a data host, the initiators need to be mapped correctly to the volumes. Additionally, when configuring single path connections on a data host running Solaris 10 OS, you need to make the naming modifications listed in TABLE A-1 in the Sun StorageTek Common Array Manager software to improve the operations.

TABLE A-1   Naming Modifications to Make in the Sun StorageTek Common Array Manager Software

CAM Components	Solaris Single Path Configuration	Comments
Initiator names	Naming modifications 1. Start with the letter i- to denote that this is an initiator 2. Add data host name (example - csqa221) 3. Add the HBA controller information (example - 163-mpt1) 4. Add the last 4 characters of the WWN (example - 3410)	**Example –** i-csqa221-163-mpt1-3410 i-csqa221-163-mpt1-3414 and i-csqa221-168-mpt3-b020 i-csqa221-168-mpt3-b024
Hosts	**Restrictions** Create one virtual host per initiator to eliminate a bogus path condition. Naming modifications Make the same modifications as in case of initiator names except for Step 1. 1. Start with the letters **vh-** to denote that this is a virtual host corresponding to an initiator. 2. Add data host name (example - csqa221) 3. Add the HBA controller information (example - 163-mpt1) 4. Add the last 4 characters of the WWN (example - 3410)	**Example –** vh-csqa221-163-mpt1-3410 vh-csqa221-163-mpt1-3414 and vh-csqa221-168-mpt3-b020 vh-csqa221-168-mpt3-b024
Host Groups	**Naming modifications** 1. Start with **hg-** to denote that this is a host group. 2. Add the data hostname.	**Example -** **hg**-csqa221-163 hg-csqa221-168

TABLE A-1   Naming Modifications to Make in the Sun StorageTek Common Array Manager Software

Host Group Restrictions	**Restrictions**
	Include all virtual hosts in the host group with the corresponding data host name
		Example -
		`hg-csqa221-163 contains`
		`vh-csqa221-163-mpt1-3410`
		`and`
		`vh-csqa221-163-mpt1-3414`
		`hosts`
		`  and`
		`hg-csqa221-168 contains`
		`vh-csqa221-168-mpt3-b020`
		`and`
		`vh-csqa221-168-mpt3-b024`
		`hosts.`

Volumes	Naming modifications Start the volume name with either **A-** or **B-** to denote which controller is the preferred controller.	**Example** - A-vol1, A-vol2 and so on to denote that these volume's preferred owner is Controller A.

Mapping Volumes to Hosts	1. Map volumes to a **host group**, not to a host.
	(This maps the volume to all hosts in the host group.)
	2. Ensure that all volumes beginning with A- are owned by Controller A and all volumes beginning with B- are owned by Controller B.
		Example -
		Map `A-vol1` to
		`hg-csqa221-163`
		instead of to
		`vh-csqa221-163-mpt1-3410`

Completing the Configuration Table

Use the following table as a guideline when collecting all information prior to configuring single path connections.

TABLE A-2   Collect Configuration Information

Component Type	Component Name	Your Value	Example	Result to Add to CAMC
Data host	# hosts		2	This information translates to the host groups
	Data host1		csqa221-163	Host group 1 = `hg-csqa221-163`
	Data host2		csqa221-168	Host group 2 = hg-csqa221-168

TABLE A-2 Collect Configuration Information *(Continued)*

Initiators	# of HBAs in data host1		1	This information translates into initiator names and virtual host names. See Figure A-3.
	Initiator 0 WWN, last 4 characters, HBA controller		0x500605b000253410, 3410, mpt1	**Initiator 1 =** i-csqa221-163-mpt1-3410 **Virtual host 1 =** vh-csqa221-163-mpt1-3410
	Initiator 0 WWN, last 4 characters		0x500605b000253414, 3414, mpt1	**Initiator 2 =** i-csqa221-163-mpt1-3414 **Virtual host 2 =** vh-csqa221-163-mpt1-3414
	# of HBAs in data host2		1	-
	Initiator 0 WWN, last 4 characters		0x500605b0000db020, b020, mpt3	**Initiator 3 =** i-csqa221-168-mpt3-b020 **Virtual host 3 =** vh-csqa221-168-mpt3-b020
	Initiator 0 WWN, last 4 characters		0x500605b0000db024, b024, mpt3	**Initiator 4 =** i-csqa221-168-mpt3-b024 **Virtual host 4 =** vh-csqa221-168-mpt3-b024
Volumes to be owned by Controller A	# of volumes		3	Ensure that during mapping to a particular host group, the volumes are owned by Controller A. See Figure A-4.
	Volume 1 name		A-vol1	
	Volume 2 name		A-vol2	
	Volume 3 name		A-vol3	
Volumes to be owned by Controller B	# of volumes		2	Ensure that during mapping to a particular host group, the volumes are owned by Controller B.
	Volume 4 name		B-vol1	
	Volume 5 name		B-vol2	
	Volume 6 name			

Configuring Single Path Connections

With the information collected, you can now proceed to make the connections and configure the software for single path connections as documented in the following sections:

This appendix consists of the following sections:

- "To Connect the Host and Array" on page 33
- "Configuration Notes" on page 35
- "To Identify the Target ID" on page 37
- "Updating the `/kernel/drv/sd.conf` File" on page 36

▼ To Connect the Host and Array

1. Establish a hand shake between the host and the array

   a. Physically connect the cables for your specific topology.

      In the steps to follow, it is assumed that connections have been made as per the topology depicted in Figure 1.

   b. Issue the following command once from each of the data hosts:

      ```
      # /usr/sbin/devfsadm
      #
      ```

      If no output displays, the command ran successfully. By executing the above command, a hand shake is established between the data host and the ST2530 array.

2. Log into the Sun StorageTek Common Array Manager software as outlined in the `Sun StorageTek Common Array Manager Software Installation Guide`.

3. On the New Initiator page, view existing WWNs of initiators in Sun StorageTek Common Array Manager software as shown in FIGURE A-2.

FIGURE A-2 WWN after Using the `devfsadm` Command.
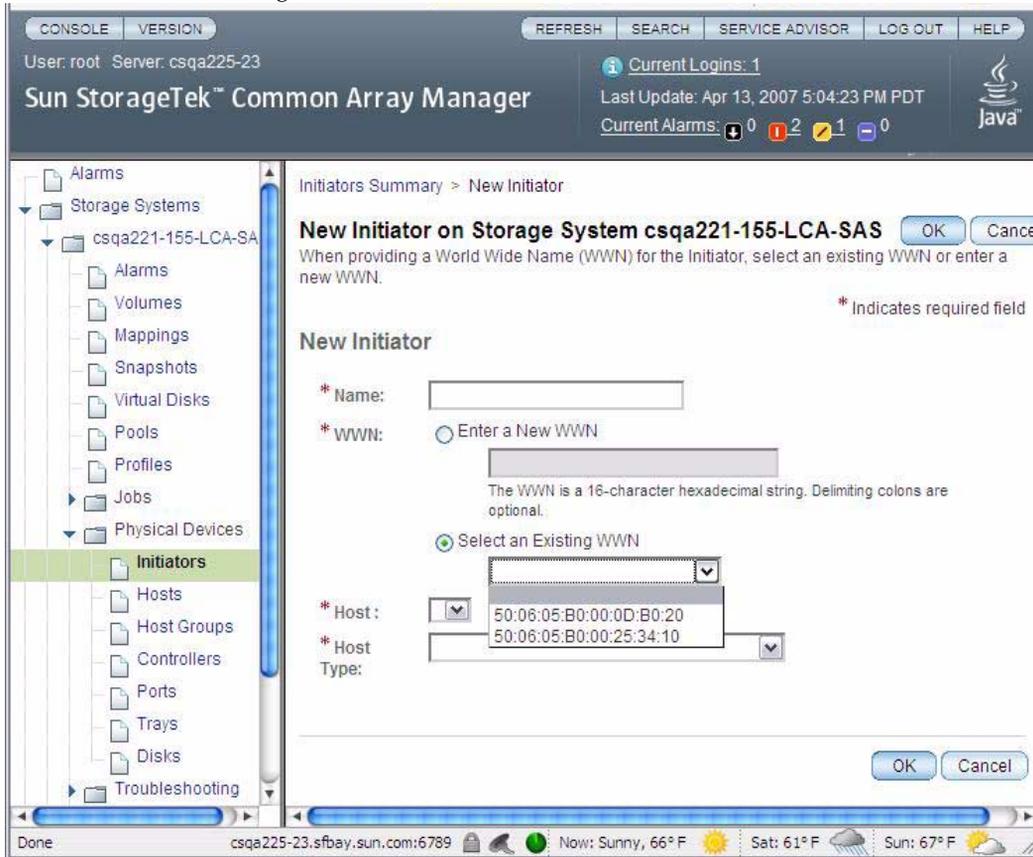
Configuring Storage in the Sun StorageTek Common Array Manager Software

Next, follow the usual steps to configure storage in the Sun StorageTek Common Array Manager software. However. you must follow the naming conventions outlined in "Naming Modifications to Make in the Sun StorageTek Common Array Manager Software" on page 30.

Configure:

- Host Groups

- Hosts
- Initiators
- Volumes and associated objects using the Volume Creation Wizard.
- Map the Initiators

For more information, review the online help, especially the "Planning for Volume Creation" topic.

Configuration Notes

Review the following configuration notes:

- Do not map volumes to the hosts you created. Map the volumes only to host groups. If you map to hosts, you will have to change the mappings when the multi-path support in Solaris is available.
- When mapping multiple volumes, assign the first volume LUN number 0. A Solaris 10 data host does not need any changes to recognize LUN0 of a target. The procedure to identify the target_id depends on this step.
- LUN 31 (named Access) is the UTM LUN and cannot be used. The UTM LUN is reserved for in-band RAID management.
- Ensure that volumes are on the preferred controllers. Example - set all volumes named with the prefix A- to be owned by Controller A.
- FIGURE A-3 shows an example of creating initiators using the naming convention outlined in "Naming Modifications to Make in the Sun StorageTek Common Array Manager Software" on page 30 using the New Initiator page.
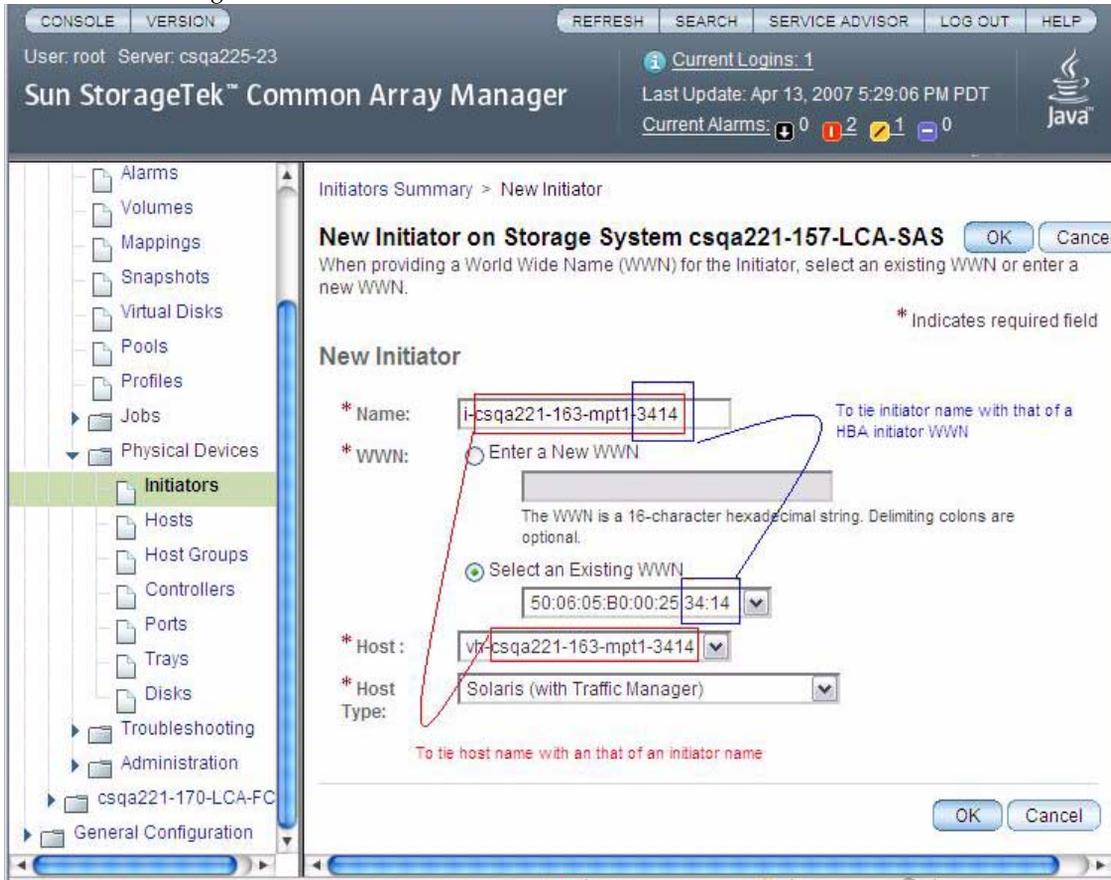
Updating the `/kernel/drv/sd.conf` File

Before the host can see more devices, identify the target ID and update the /kernel/drv/sd.conf file as noted in the following sections:

▼ To Identify the Target ID

1. Ensure that LUN ID 0 is mapped to a data host correctly as requested in "Configuration Notes" on page 35.

2. Identify the HBA controller in the output of the dmesg command issued in "To Collect Host Information" on page 27.

In this example, it is HBA controller 3, listed as `mpt3`.

```
# dmesg | grep WWN
Apr 13 19:26:54 csqa221-168    mpt3: Port 0/PHYs 0-3 (wide-port) WWN:
0x500605b0000db020
Apr 13 19:26:54 csqa221-168    mpt3: Port 1/PHYs 4-7 (wide-port) WWN:
0x500605b0000db024
```

3. Correlate the controller with the target and lun.

In the `format` command output, for each controller, identify the target id and the lun. (The controller in the prior example, `mpt3` is equivalent to `c3` below**.)**

In the example below, for controller 3 (c3t9d0), the target id is 9 and the lun is 0. You will use this information to update the `sd.conf` file.

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

c3t9d0: configured with capacity of 40.00GB
AVAILABLE DISK SELECTIONS:
0. c0t0d0 <SUN72G cyl 14087 alt 2 hd 24 sec 424>
/pci@1f,700000/pci@0/pci@2/pci@0/pci@8/LSILogic,sas@1/sd@0,0
1. c0t1d0 <SUN72G cyl 14087 alt 2 hd 24 sec 424>
/pci@1f,700000/pci@0/pci@2/pci@0/pci@8/LSILogic,sas@1/sd@1,0
2. c3t9d0 <SUN-LCSM100_S-0617 cyl 20478 alt 2 hd 64 sec 64>

/pci@1f,700000/pci@0/pci@9/LSILogic,sas@0/sd@9,0
```

▼ To Update the `/kernel/drv/sd.conf` File

1. Add a line for each lun to see volumes from the array as shown in the following example. Add only the volumes you intend to use. Adding all volumes will increase the boot time.

```
#
 name="sd" parent="mpt" target=9 lun=0;
 name="sd" parent="mpt" target=9 lun=1;
 name="sd" parent="mpt" target=9 lun=2;
 name="sd" parent="mpt" target=9 lun=3;
  [ .. ]
```

```
name="sd" parent="mpt" target=9 lun=30;
```

Note – LUN 31 (the UTM LUN) cannot be used. Do not add it to the sd.conf file.

---

2. **Reboot the array to place the changes to sd.conf file into effect.**
   # reboot -- -r

After reboot, you should be able to see the volumes.

3. **Before using the volumes, you must label the disks using the** format
   command.

4. **After labeling the disk, verify the labels by looking at the detailed partition
   table using the** format verify **option.**

Troubleshooting

Errors When Trying to Establish Communication

If you get an error when attempting to write the label and/or when you are trying to write to a device specifically in a dual controller configuration, it is likely that the LUN is currently owned by the controller that the host is not connected to.

If this happens, go to the Volume Details Page for the volume associated with this LUN and change the owner as noted in FIGURE A-4.

FIGURE A-4 Changing Volume Ownership on the Volume Details Page.
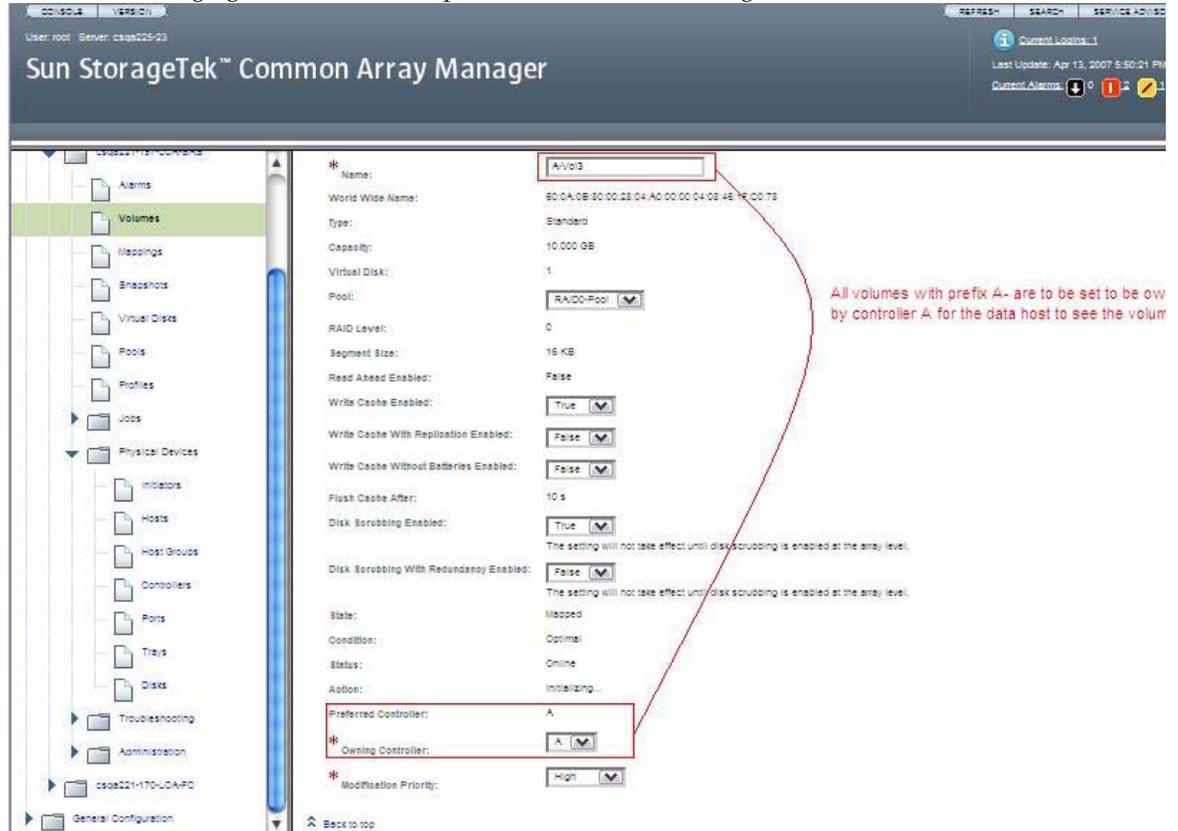
Verifying Single Path Information After Replacing Controllers

Take the following steps to ensure smooth continuation of operations when replacing controllers.

On Solaris 10 OS, the `target id` is generated by using the World Wide Names of both the HBA initiators and the controller ports. When replacing controllers, there is a very high possibility that the target id will change. Therefore, caution must be exercised when replacing controllers.

Prior to replacing the controller, note how and where the devices are being used. Typically, a system administrator will either use the devices as raw devices or create file systems on them. When a file system is created, the mount point information is typically placed in the `/etc/vfstab` file.

▼ To Verify Single Path Information After Replacing Controllers

1. **After replacing the controller, follow the steps to identify the new** `target id` **in** "To Identify the Target ID" on page 37 **and** "To Update the `/kernel/drv/sd.conf` File" on page 37**.**

2. **Make changes to** `/etc/vfstab` **and any other places to reflect the change in the** `target id`**.**