StorageTek 2500 Series Array

Release Notes, Release 6.10

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Contents

StorageTek 2500 Series Array Release Notes

This document describes features of and requirements for Oracle's StorageTek 2510, 2530, and 2540 arrays. It also includes the procedure for replacing the controller in a single-controller (simplex) array.

These release notes include the following sections:

Note – Single Expansion Storage Modules (ESMs) cannot be used with a duplex 25xx array.

What's New in This Release

Array controller firmware version 07.35.74.10 is delivered with the CAM 6.10. It provides the hardware bug fixes listed in "Notable Fixes" on page 11.

See the *Sun Storage Common Array Software Release Notes* for CAM 6.10 bug fixes.

StorageTek 2500 Series Array Features

The StorageTek 2540, 2530, and 2510 arrays, along with the StorageTek 2501 expansion module, make up the 2500 family of arrays.

The StorageTek 2500 arrays contain disk drives for storing data and controllers that provide the interface between a data host and the disk drives. The StorageTek 2540 array provides Fibre Channel connectivity from the data host to the controller. The StorageTek 2530 array provides Serial Attached SCSI (SAS) connectivity from the data host to the controller. The StorageTek 2510 array supports Internet Small Computer Systems Interface (iSCSI) over Ethernet networks.

The StorageTek 2501 expansion module provides additional storage. You can attach the drive expansion tray to the StorageTek 2540, 2530, and 2510 arrays.

About Common Array Manager Software

The Sun Storage Common Array Manager (CAM) software provides an easy-to-use interface from which you can configure, manage, and monitor StorageTek and Sun Storage arrays.

Downloading the Firmware

The updated firmware is delivered with CAM 6.10, which is available on My Oracle Support (MOS) `https://support.oracle.com`.

For detailed download steps, see:

- How to Download Common Array Manager (CAM) Software and Patches [Doc ID 1296274.1]

Note – Each array should be managed by one CAM management host only. Installing the management software on more than one host to manage the same array can cause discrepancies in the information reported by CAM.

Common Array Features

- Storage domain licenses are required to map additional initiators on data hosts to volumes.

- One drive expansion tray Serial Attached SCSI (SAS) connector per controller with 3GB/s drive expansion tray connection speed
- Maximum of 48 disk drives (one controller tray and three drive expansion trays)
- Maximum of 256 LUNs, with 32 per storage domain
- Dual redundant controllers
- SAS disk drives supported
- SATA disk drives supported
- 512-MB cache per controller or 1-GB mirrored cache, with the option for 1-GB cache per controller

Auto Service Request Feature

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

You can enable ASR for your storage devices via the Sun Storage Common Array Manager software. Refer to the *Sun Storage Common Array Manager Release Notes* for more information.

Premium Features

Premium features require licenses which must be ordered separately:
- 4, 8, 16, or 32 Storage Domains
- Enhanced Volume Snapshot (8 per volume and 128 per array)
- Volume-Copy

2500 Series Array Ship Kit Contents

Ship Kit Notes:
- StorageTek 2500 Series array controller and expansion trays are shipped separately.
- Small form-factor pluggable (SFP) transceivers are included only with the StorageTek 2540 array.

- AC power cords are ordered and shipped separately.
- DC power cords are included with DC configurations.
- Cables for connecting the controller tray to the data host, such as Serial Attached SCSI (SAS), Fibre Channel (FC) fiber-optic, and Ethernet, are not included and can be ordered separately. SAS cables for inter-tray cabling are included with the StorageTek 2501 expansion tray ship kit.

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)
- Documentation
- *Accessing Documentation* card
- *Important Safety Information for Sun Hardware Systems*

Content for the 2540 controller tray only:

- Four 4GB/s FC SFPs (2 per FC Controller module)

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

System Requirements

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

Firmware Requirements

- Firmware version 07.35.74.10 for CAM 6.10 requires that controllers have a minimum of 512 MB of memory.
- You cannot upgrade directly from 6.x firmware to 07.35.74.10. You must first upgrade to the firmware bundled in the upgrade utility or in CAM 6.2.
- See the *Sun StorageTek 2500 Series Array Firmware Utility Upgrade Guide* about upgrading from 06.xx.xx.xx controller to firmware version 07.xx.xx.xx.
- Firmware is bundled with the CAM software download package. To download CAM, follow the procedure in "Downloading the Firmware" on page 2.

Supported Disk Drives

TABLE 1-1 lists the size and speed for the supported disk drives in the StorageTek 2500 Series array.

Note – Upgrading from a 06.xx.xx.xx version to 07.xx.xx.xx requires a special utility. Consult the *Sun StorageTek 2500 Array Series Firmware Upgrade Utility Guide*.

TABLE 1-1   Supported Disk Drives

Drive	Description
Seagate ST3146855SS	146GB - 15000 RPM SAS
Hitachi HUS153014VLS300	146GB - 15000 RPM SAS
Seagate ST3146356SS	146GB - 15000 RPM SAS
Seagate ST3300655SS	300GB - 15K RPM SAS

TABLE 1-1   Supported Disk Drives *(Continued)*

Drive	Description
Hitachi HUS153030VLS300	300GB - 15K RPM SAS
Seagate ST3300656SS	300GB - 15K RPM SAS
Seagate ST3400755SS	400GB - 10000 RPM SAS
Seagate ST3450856SS	450GB - 15000 RPM SAS
Hitachi HUA721010KLA330	1TB - 7200 RPM SATA
Hitachi HDS725050KLA360	500GB - 7200 RPM SATA
Seagate ST3500630NS	500GB - 7200 RPM SATA
Hitachi HUA721050KLA330	500GB - 7200 RPM SATA
Seagate ST3750640NS	750GB - 7200 RPM SATA
Hitachi HUA721075KLA330	750GB - 7200 RPM SATA
Seagate ST373455SS	73.4GB - 15000 RPM SAS
Hitachi HUS153073VLS300	73GB - 15000 RPM SAS

For more information about supported disk drives, see the Sun System Handbook:

https://support.oracle.com/handbook_private/Systems/2510/compone
nts.html#Disks

https://support.oracle.com/handbook_private/Systems/2530/2530.ht
ml

https://support.oracle.com/handbook_private/Systems/2540/2540.ht
ml

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 Oracle sales or support representative.

2540 Array Data Host Requirements

The 2540 Array supports Fibre Channel-only connections to the data host.

TABLE 1-2 lists the supported host Operating Systems (OSs) and multipathing availability. HBAs can be ordered from Oracle's respective manufacturers or directly from Oracle. For information about Oracle HBAs, go to: http://www.oracle.com/us/sun/index.htm .

You can download HBA drivers and other host software from My Oracle Support (MOS) at https://support.oracle.com . To download operating system updates, go to the web site of the operating systems company.

Dual path failover requires multipath software. Follow the instructions in the *Sun StorageTek 2500 Series Array Hardware Installation Guide* to download and install the software from MOS.

Solaris patches can be downloaded from: https://support.oracle.com .

TABLE 1-2 Supported Data Host Platforms for 2540 Arrays

Host OS	Multipathing Support	Cluster Support
Solaris 9	SAN 4.4.12 and higher	Sun Cluster (SC)3.1
Solaris 10 SPARC	included in OS	SC 3.1, SC 3.2
Solaris 10 x64	included in OS	SC 3.1, SC 3.2
Windows 2003	MPIO	Microsoft Cluster Server
Linux Red Hat 4/5; SUSE 9/10 SP1	RDAC	Linux Cluster
Windows 2008	MPIO	Microsoft Cluster Server
ESX 3.5, ESX 3.0, ESX 3.0.2	included in OS	VMware HA

- Windows 2000 is not supported.
- For details on patches and supported VMware versions, go to: http://www.vmware.com/
- StorageTek RDAC Driver RDAC and MPIO drivers can be found at: https://support.oracle.com.
- For more information about Sun Cluster support, go to: http://www.oracle.com/us/sun/index.htm or contact your service engineer.

TABLE 1-3 Required Patches for Solaris Versions

Solaris Version	Required Patch (Minimum)
Solaris 9	SAN 4.4.12
	113039-24 patch
Solaris 10 SPARC	120011-14
	127127-11
Solaris 10 x86	120012-14
	127128-11

2530 Data Host Requirements

The 2530 Array supports SAS-only connections to data hosts.

The table below lists supported 2530 data host platforms and indicates the kind of support they have for SAS connections.

TABLE 1-4 Data Host Platform Support for 2530 Arrays

Host OS	SAS Support	Multipathing Support	Cluster Support
Solaris 10, SPARC	yes	Included in OS with patch 125081-10	SC 3.1, SC 3.2
Solaris 10, x86	yes	Included in OS with patch 125081-10	SC 3.1, SC 3.2
Windows 2003	yes	MPIO	Microsoft Cluster Server
Windows 2008	yes	MPIO	Microsoft Cluster Server
Red Hat 4/5; SUSE 9/10 SP1	yes	RDAC	Linux Cluster
ESX 4.0, ESX3.5/U4	yes	Included in OS	VMware HA

For details on patches and supported VMware versions, go to:
http://www.vmware.com/

For more information about Sun Cluster support, go to:
http://www.oracle.com/us/sun/index.htm or contact your service engineer.

2510 Array Data Host Requirements

The 2510 Array supports iSCSI with Ethernet connections to Network Interface Cards (NICs) on the data host.

The table below lists the supported host OS and multipathing availability. You can download host software from the MOS Download operating system updates from the web site of the operating system company.

TABLE 1-5   Supported Data Host Platforms for 2510 Arrays

Host OS	Multipathing Support	Cluster Support
Solaris 10 SPARC	included in OS	3.1 and 3.2
Solaris 10 x64	included in OS	3.1 and 3.2
Windows 2003	MPIO	Microsoft Cluster Server
Windows 2008	MPIO	Microsoft Cluster Server
Linux Red Hat 4/5; SUSE 9/10 SP1	RDAC	Linux Cluster

- Windows 2000 is no longer supported.
- For details on patches and supported VMware versions, go to: http://www.vmware.com/.
- For more information about Sun Cluster support, go to: http://www.oracle.com/us/sun/index.htm or contact your service engineer.

The table below lists the required patches for 2510 Solaris data hosts.

TABLE 1-6   Required Solaris Patches for 2510 Data Host Platforms

Solaris Version	Required Patch (Minimum)
Solaris 10 SPARC	Solaris 10 Update 1, Build 6 or later 118833-36 119090-25
Solaris 10 x64	Solaris 10 Update 1, Build 6 or later 118855-36 119091-26

Note – Windows 2000 is no longer supported.

Smart Battery Functionality

Refer to the knowledge article *SMART Battery Functionality in Sun StorageTek 2500 and Sun Storage 6000 Arrays* (Doc ID 1207186.1) at My Oracle Support (MOS) https://support.oracle.com.

Replacing a Simplex Controller

Note – If the controller is a replacement for a duplex controller environment, do not read further. Use the Service Advisor procedure to replace the unit. From the Sun Storage Common Array Manager application, click the Service Advisor button and follow the instructions.

1. **Verify your Common Array Management Software is at the 6.2.0 level or later.**

Caution – Do NOT use the -f option to uninstall the previous version of CAM.

   See "Downloading the Firmware" on page 2 to obtain the latest CAM information and version available.

2. **Replace the controller.**

   For details, see the *Sun StorageTek 2500 Series Controller Removal and Replacement* document.

3. **If CAM shows the array is in working order, no further action is needed.**

4. **If after two minutes from powering the array back up CAM still reports "Communication Lost," then run the following:**

   ■ From a Solaris CAM host:

      # cd /opt/SUNWsefms/bin

      # ./csmservice -i -a <array-name> -Z UNLOCK -w

   ■ From a Windows CAM host:

      # cd "c:\Program Files\Sun\Common Array Manager\Component\fms\bin"

      # .\csmservice -i -a <array-name> -Z UNLOCK -w

   ■ From a Linux CAM host:

```
# cd /opt/sun/cam/private/fms/bin/
# ./csmservice -i -a <array-name> -Z UNLOCK -w
```

Results: The correct controller firmware will be loaded, the array will reboot, and CAM should report array status.

Notable Fixes

Firmware revision 07.35.74.10 delivers the following fixes:

- Bug 15741348 (SUNBT7090006) 300gb 600gb disk types show INV in sasPhyErrorLogs.csv
- Bug 15766047 (SUNBT7129549) NVSRAM for 2500 7.35 firmware should turn off battery age timer
- Bug 17172314 LSI/Netapp has released new firmware for ST2540 under ESX cluster

Known Issues

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

Important Notes and Considerations

- Linux Red Hat Enterprise v5.1 is required for in-band management using the Linux OS.
- Wait 60 Seconds Before Replacing Drives--When a drive fails, wait 60 seconds after removing the failed drive before you put in a new drive.
- You must purchase a premium license to add storage domains.

- When Performing an Array Import, Do Not Modify Configuration: Configuring 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.

- The maximum number of volumes per storage domain is 32.

- 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 if you switch to a multipath configuration.

- When mapping multiple volumes, assign the first volume LUN number 0. A Solaris 10 data host does not need any changes to recognize LUN 0 of a target. The procedure to identify the target depends on this step.

- When converting from Simplex to Duplex arrays: Before you insert a second controller, you must change the array to "duplex" from the CAM Service Advisor and be sure each controller is set at the same firmware revision. Failure to perform these steps will cause the array to remain in simplex mode with the wrong revision of NVSRAM firmware and the firmware will not cross-load properly.

Note – For the latest firmware information, go to: http://docs.oracle.com/cd/E24008_01/index.html and open the Array Baseline Firmware Reference PDF.

- After setting a tray to Duplex mode, "Validate revision level" prompts you to analyze the firmware revision level of the new controller. Note that the NVSRAM automatically updates with the firmware. For more information, see Service Advisor documentation.

Avoiding Firmware Issues

- Upgrading from an 06.xx.xx.xx version to an 07.xx.xx.xx version requires a special utility. Consult the *Sun StorageTek 2500 Array Series Firmware Upgrade Utility Guide*.

- Before inserting a second controller, change the array to "duplex," following CAM Service Advisor procedures. Each controller must be at the same firmware level.

- For the latest firmware information, go to: http://docs.oracle.com/cd/E24008_01/index.html and open the Array Baseline Firmware Reference PDF.

Configuration, Firmware and Hardware Issues

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.

Cache is Disabled when Batteries are Charging

Please be aware that until batteries are fully charged, your system might experience lower than normal performance during: events that disable cache, battery learn cycle, battery charge cycle, battery charge level below necessary charge level (preceding a battery charge cycle).

Controller Slot Positions Contained in MEL Log are Unreliable

Bug 6747684 – The controller redundancy lost event is showing the wrong controller slot in the component field on a 2530 array.

Workaround – Review CAM Service Advisor/Alarms for more information regarding which controller has actually lost redundancy.

Controller Tray and Drive Expansion Trays - Turning off the Power

⚠ **Caution –** Before turning off the power to the drive expansion trays connected to the controller tray, you must turn off the power to controller tray. Failure to do so may cause a volume configuration loss which is not reversible.

- When powering the array off, power must first be removed from the controller tray. When the controllers are powered down, the expansion trays can be powered down.
- Turn off the power switch on both power fan assemblies in the controller tray.
- Turn off the power switch on both power fan assemblies in all of the drive expansion trays connected to the controller tray.

- When powering-up the array, power must be applied to the expansion trays first, and the disks should be given time to spin up to speed. Then the controller tray can be powered up.

Create Volume Fails on ESM During First Attempt

Bug 6767895 – Create Volume command fails on first attempt using 25x0 controller, resulting in an error message similar to the following: "An unexpected internal system error occurred. Retry the operation and then contact your Oracle service representative if the error persists."

Workaround –Try the operation again. It should work on the second attempt.

Disabled Snapshot can be Re-enabled after a Firmware Update

Bug 6529172 – A snapshot volume that is disabled can be automatically re-enabled after a firmware update occurs. If the snapshot volume is full, it can start generating warning events.

Workaround – Disable the snapshot again after the firmware update.

Expansion Module with Licensed Domains Causes Event

Bugs 6550702 and 6547615 – If you migrate an expansion module with licensed storage domains into an array that has a different number of licenses, an alarm will be generated.

Workaround –For a mismatch of license numbers, disable the licenses on the expansion module. Then, disable the storage domains on the expansion module. The array will return to the licenses for the array, and the alarm will clear. Add any new licenses, if needed.

LED Lights After Data Host Power On

Bug 6587720– The Array Service Required LED will light after powering down a data host, connecting FC cables between the HBA and controllers, and powering up the host server.

This is working as designed. Under a Direct Connect environment, rebooting the connected data host will cause a FC link down alarm. This is an expected alarm and the Amber Service Required LED is expected to illuminate. As soon as the link is back up, the Alarm should clear and the LED should turn off. The same behavior would be expected if a cable were unplugged from the HBA, or if there were an error with the HBA port or the HBA itself.

Under a switch environment, this will not occur unless a cable is unplugged from the switch, the switch is rebooted, or is having errors. Rebooting the host will not cause the link to go down because the link from the controller SFP to the switch will remain up.

mpathadm Does Not Reflect Accurate Path Count After Moving or Removing a Path

Bug 6579069 – Using the "mpathadm" command to remove a path from the system or relocate from one path to another, the "Total Path Count" will not update until the system is rebooted.

Workaround – Reboot to clear the extra path.

Select File Button Does Not Work

When you use the Simplicity storage management software to download a firmware update file for an 2540 array module, the Select File button does not work.

Workaround – Enter the file path and file name into the Filename text box.

Service Advisor Does Not Verify Disk is Ready to be Removed

When CAM shows a disk is failed and the Service Advisor procedure for replacing drives is followed, the step to verify that the disk is ready to remove might not list the failed disk.

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

SES vs. SD Paths for UTM LUNs.

Bug 6500605 –For Solaris 10u4 and Solaris 8 and 9, the host cannot see the storage device's management UTM LUN.

Note – This bug is fixed in S10u5.

Workaround –Perform the following commands on the data host:

```
# setenv LD_LIBRARY_PATH /opt/SMgr/agent
```

```
# java -classpath /opt/SMgr/agent/SMagent.jar
devmgr.versioned.agent.DeviceIdentifier | grep "Volume
Access"
```

You should then receive output like the following, indicating which arrays have access LUNs visible to the agent:

```
/dev/rdsk/c5t200600A0B82458D4d31s2 [Storage Array fms-lca1, Volume

Access, LUN 31, Volume ID <600a0b80002458d20000000000000000>]

/dev/rdsk/c5t200700A0B82458D3d31s2 [Storage Array fms-lca1, Volume

Access, LUN 31, Volume ID <600a0b80002fc0740000000000000000>]
```

Small Form-Factor Pluggable (SFP) May Not Generate a Fault Indicator

Bug 6514739 – If a bad SFP is inserted in the FC port of a 2540 array, there might be no indication 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.

Upgrade Utility Automatic Array Discovery Password Verify does not Reference the Array

Bug 6736963 – When multiple arrays are discovered (using the Automatic scan subnet option), the Password Verification pop-up windows do not make reference to the array. **Workaround** – In progress.

Upgrade Utility Intermittently Fails

Bug 6723212 – Sometimes the upgrade process appears to hang, and it appears the firmware did not install. The Graphical User Interface (GUI) eventually times out, and the log contains an "Error downloading file(s) to the array" message.

Workaround – Try the upgrade process again. If failure persists, upgrade to 6.70.54.11 before attempting to use the upgrade utility.

> **Note –** For the latest firmware information, go to:
> http://docs.oracle.com/cd/E24008_01/index.html and open the Array
> Baseline Firmware Reference PDF.

UTM LUNs Controlled by "Solaris Traffic Manager"

Bug 6594360 –After you upgrade to S10U3 (or later), the in-band management UTM LUNs are controlled by Solaris Traffic Manager (MPxIO). In most cases, in-band management will not fail as a result of this; however, it is best practice to ensure that the UTM LUNs are not controlled by MPxIO. Performing the following workaround task will help prevent problems.

Workaround –Use the `format inquire` command to get the eight-character Vendor (VID) and Product IDs. Use the procedure that follows.

1. **Edit the file /kernel/drv/scsi_vhci.conf so it reads:**

```
device-type-scsi-options-list = "SUN Universal Xport",
"disable-option"; disable-option = 0x7000000
```

2. **Run the** `stmsboot -u` **command. Answer "y" to continue and reboot the system immediately.**

iSCSI Issues

Initiator with the Same Name as a Host Creates an Error

Bug 6624755 – For iSCSI on the 2510 Array only, creating an initiator with the same name as a host returns error message 57: "`The operation cannot complete because the identifier or name you provided already exists. Please provide another identifier or name and then retry the operation.`"

Workaround – Do not create an initiator with the same name as a host.

Out-of-Band Management May Lose Connectivity

Bug 6615356 – SYMbol task `ServsymRpcHandle` periodically dies, causing the management software to lose communication with the array.

The cause has been identified and will be corrected in future releases.

Workaround – Run the nicStop and nicStart commands. For more information, run nicHelp. If the issue persists, reboot the system.

Values Returned for iSCSI Statistics Counters are Negative

Bug 6611655 – Negative counter values display for iSCSI Statistics large counter values. The values should be unsigned.

Workaround – From Administration->Performance, click Reset Values.

SAS Issues

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 – Re-try the operation when there is less I/O traffic.

Product Documentation

Product documentation for the 2500 Series array is available at:

http://www.oracle.com/technetwork/documentation/oracle-unified-ss-193371.html

Product documentation for Sun Storage Common Array Manager is available at:

http://www.oracle.com/technetwork/documentation/disk-device-194280.html.

Description	Title
Getting Started	*Getting Started Guide for Sun StorageTek 2500 Series Storage Arrays*
Array Installation	*Sun StorageTek 2500 Series Array Hardware Installation Guide*
CAM Release Notes	*Sun Storage Common Array Manager Release Notes*
CAM User Guide	*Sun Storage Common Array Manager Administration Guide*
Site Planning	*Sun StorageTek 2500 Series Array Site Preparation Guide*
Regulatory and Safety	*Sun StorageTek 2500 Series Array Regulatory and Safety Compliance Manual*
CAM Installation and Configuration	*Sun Storage Common Array Manager Software Installation Guide*
CAM CLI Quick Reference	*Sun Storage Common Array Manager CLI Guide*
Instructions for installing the Sun StorEdge Expansion cabinet	*Sun StorEdge Expansion Cabinet Installation and Service Manual*
Instructions for installing the Sun Rack 900/1000 cabinets	*Sun Rack Installation Guide*
Command-line-interface Help	*sscs man pages*
Replacement Procedures	*Service Advisor*

Documentation, Support, and Training

These web sites provide additional resources:

- Documentation
  http://www.oracle.com/technetwork/indexes/documentation/
  index.html
- Support
  https://support.oracle.com
- Training
  https://education.oracle.com

SAS Single Path Configuration

This appendix describes special instructions to configure SAS single path connections between a data host running Solaris 10 operating system and a StorageTek 2530 Array.

It is not recommended to have a single controller, single path configuration when uptime and availability are key concerns or requirements.

Note – Multipath and single path configurations are supported for all StorageTek 2500 Series Arrays. Oracle recommends multipath configurations for data availability.

Note – Enclosure Service Modules (ESMs) cannot be used with a duplex 25xx array.

This appendix includes the following main sections:

- "Planning for SAS Single Path Connections" on page 22
- "Configuring Single Path Connections" on page 29
- "Verifying Single Path Information After Replacing Controllers" on page 34

Planning for SAS 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

Important Notes

- Single-path can be achieved in either a simplex or duplex configuration.
- Use Common Array Manager for the host type.
- Viable options for connecting single path include:
  - Connect only one initiator to controller A for single host.
  - For a two-host configuration: Connect one initiator from first Host to first Controller and one initiator from second Host to second Controller.

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 sections that follow.

Solaris 10 Restrictions

- Solaris 10 OS does not dynamically discover volumes.
- You might 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 (WWNs) 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.

▼ Collecting Host Information

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

```
# hostname
 hostA
```

```
 # hostname
 hostB
```

This example uses two data hosts running Solaris 10 OS.

▼ Collecting Initiator Information

An initiator is a system component that initiates an I/O operation over a Fibre Channel (FC) network. If allowed by FC fabric zoning rules, each host connection within the FC network has the ability to initiate transactions with the storage array. Each host in the FC network represents a separate initiator; therefore, if a host is connected to the system through two host bus adapters (HBAs), the system identifies two different negotiators (similar to multi-homed, Ethernet-based hosts). In contrast, when multipathing is used in round-robin mode, multiple HBAs are grouped together and the multipathing software identifies the group of HBAs as a single initiator.

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

```
# dmesg | grep WWN

 Apr  9 17:02:26 hostA     mpt1: Port 0/PHYs 0-3 (wide-port) WWN:
0x500605b000253410

 Apr  9 17:02:26 hostA     mpt1: Port 1/PHYs 4-7 (wide-port) WWN:
0x500605b000253414

# dmesg | grep WWN

 Apr  9 17:00:38 hostB     mpt3: Port 0/PHYs 0-3 (wide-port) WWN:
0x500605b0000db020

 Apr  9 17:00:38 hostB     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: 0x500605b0000db020
```

- mpt3 - HBA
- 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 Controller and Target ID Information

Use the cfgadm -al command to collect information about the controllers and the Target ID. The scsi-bus code identifies the SAS controller.

```
# cfgadm -al
```

Ap_Id	Type	Receptacle	Occupant	Condition
c0	scsi-bus	connected	configured	unknown
c0::dsk/c0t0d0	disk	connected	configured	unknown
c0::dsk/c0t1d0	disk	connected	configured	unknown
c5	scsi-bus	connected	configured	unknown
c5::dsk/c5t9d0	disk	connected	configured	unknown
c5::es/ses2	disk	connected	configured	unknown
c6	scsi-bus	connected	configured	unknown
c6::dsk/c6t9d0	disk	connected	configured	unknown
c6::es/ses3	disk	connected	configured	unknown
unconfigured ok				

Planning the Cabling Topology

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

The StorageTek 2530 Array, if configured for SAS single 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.

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
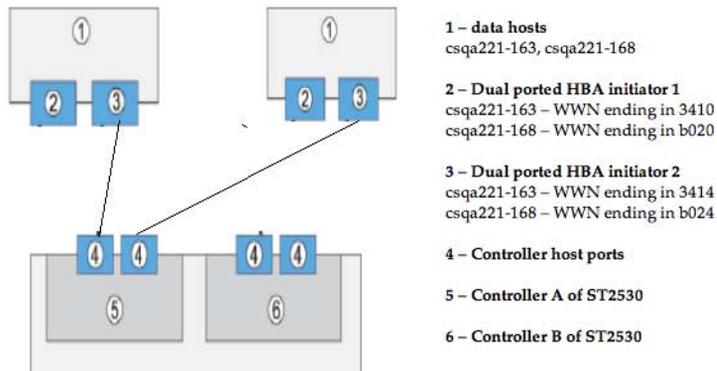
Suggested Naming Convention in the Sun Storage Common Array Manager Software

The following suggests an optional naming convention to assure the initiators are mapped correctly to the volumes. You can use the naming modifications listed in TABLE A-1 in the Sun Storage Common Array Manager software to improve the operations.

TABLE A-1 Naming Modifications in the Sun Storage Common Array Manager Software

CAM Components	Solaris Single Path Configuration	Naming Modification	Comments
Initiator names	Naming modifications 1. Start with the letter i- to denote that this is an initiator 2. Add data host name (example - hostA) 3. Add the HBA controller information (example - mpt1) 4. Add the last 4 characters of the WWN (example - 3410)	Start with i- Add naming of associated components.	**Example –** i-hostA-mpt1-3410 i-hostA-mpt1-3414 and i-hostB-mpt3-b020 i-hostB-mpt3-b024
Hosts	The initiator is associated with a particular: * Data host (example - hostA) * HBA controller (example - mpt1) * Initiator Port WWN (last four letters, example - 3410)	Start with vh- (for virtual host) Add naming of associated components.	**Example –** vh-hostA-mpt1-3410 vh-hostA-mpt1-3414 and vh-hostB-mpt3-b020 vh-hostB-mpt3-b024
Host Groups	In CAM, create one host (virtual host) per initiator The host is associated with a particular: * Data host (example - hostA) * HBA controller (example - mpt1) * Initiator Port WWN (last four letters, example - 3410)	Start with hg- (for host group) Add data host name	**Example -** **hg**-hostA hg-hostB

TABLE A-1   Naming Modifications in the Sun Storage Common Array Manager Software *(Continued)*

Host Group Restrictions	Include all hosts in the host group with the corresponding data host name.	Naming modifications Start the volume name with either **A-** or **B-** to denote which controller is the preferred controller.	Example - `hg-hostA contains vh-hostA-mpt1-3410 and vh-hostA-mpt1-3414 hosts` and `hg-hostB contains vh-hostB-mpt3-b020 and vh-hostB-mpt3-b024 hosts.`
Volumes		Ensure that all volumes beginning with A- are owned by Controller A and all volumes beginning with B- are owned by Controller B.	**Example** - **A-**vol1, A-vol2 and so on to denote that these volume's preferred owner is Controller A.
Mapping Volumes to Hosts	Map volumes to a **host group**, not to a host. (This maps the volume to all hosts in the host group.) Note - it is especially important with single path that ownership be correct as failover will not occur as it does with multipath.	Naming modifications Start the volume name with either **A-** or **B-** to denote which controller is the preferred controller.	**Example -** Map `A-vol1` to `hg-hostA` instead of to `vh-hostA-mpt1-3410`

Completing the Configuration Worksheet

Whether you use the suggested naming strategy or not, you can 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		hostA	Host group 1 = `hg-hostA`
	Data host2		hostB	Host group 2 = hg-hostB
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-hostA-mpt1-3410 **Virtual host 1 =** vh-hostA-mpt1-3410
	Initiator 0 WWN, last 4 characters		0x500605b000253414, 3414, mpt1	**Initiator 2 =** i-hostA-mpt1-3414 **Virtual host 2 =** vh-hostA-mpt1-3414
	# of HBAs in data host2		1	-
	Initiator 0 WWN, last 4 characters		0x500605b0000db020, b020, mpt3	**Initiator 3 =** i-hostB-mpt3-b020 **Virtual host 3 =** vh-hostB-mpt3-b020
	Initiator 0 WWN, last 4 characters		0x500605b0000db024, b024, mpt3	**Initiator 4 =** i-hostB-mpt3-b024 **Virtual host 4 =** vh-hostB-mpt3-b024

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

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:

- "Connecting the Host and Array" on page 29
- "Configuring Storage in the Sun Storage Common Array Manager Software " on page 30
- "Identifying the Target ID" on page 31
- "Adding More Devices" on page 31

▼ Connecting the Host and Array

1. Run the /usr/sbin/devfsadm command to discover devices and load the appropriate driver (if necessary) on the host:

- Physically connect the cables for your specific topology.
- Issue the following command once from each of the data hosts:

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

If no output displays, the command ran successfully.

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

3. On the New Initiator page, view existing WWNs of initiators in Sun Storage Common Array Manager software.

Configuring Storage in the Sun Storage Common Array Manager Software

Follow the usual steps to configure storage in the Sun Storage Common Array Manager software. You can use the suggested naming conventions as you configure.

Before you begin, 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 if you switch to a multipath configuration.
- When mapping multiple volumes, assign the first volume LUN number 0. A Solaris 10 data host does not need any changes to recognize LUN 0 of a target. The procedure to identify the target 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 volumes are on the preferred controllers. Example - set all volumes named with the prefix A- to be owned by Controller A.

▼ Configuring Storage in the Management Software

Use the Sun Storage Common Array Manager software to configure the following:

- Host groups
- Creating one host for every initiator
- Adding hosts to host groups
- Creating volumes and associated objects using the Volume Creation Wizard.
- Mapping the volumes to host groups

For more information, review the Online Help.

Adding More Devices

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

-
-

▼ Identifying the Target ID

1. **Ensure that LUN ID 0 is mapped to a data host correctly as requested in** **.**

2. **Identify the controllers and Target ID using the cfgadm command, noting which elements have the proper bus.**

```
# cfgadm -al

Ap_Id       Type          Receptacle   Occupant    Condition

c0          scci-bus      connected    configured   unknown

c0::dsk/c0t0d0 disk         connected    configured   unknown

c0::dsk/c0t1d0 disk         connected    configured   unknown

c5          scci-bus      connected    configured   unknown

c5::dsk/c5t9d0 disk         connected    configured   unknown

c5::es/ses2 disk          connected    configured   unknown

c6          scci-bus      connected    configured   unknown

c6::dsk/c6t9d0 disk         connected    configured   unknown

c6::es/ses3 disk          connected    configured   unknown

unconfigured ok
```

▼ Updating the /kernel/drv/sd.conf File

1. **Edit the** /kernel/drv/sd.conf **file. Add any additional LUNs for the Target ID.**

> **Note –** Add LUN entries to the targets for each of your configured volumes. Adding unnecessary LUN entries to this file will increase 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. Review devices using the format command.

In the `format` command output for each controller, you should be able to see the Target ID and the LUN. In the example below for controller 5 (c5t9d0), the Target ID is 9 and the LUN is 0.

```
# 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. c5t9d0 <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

...
```

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

5. **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 the LUN is currently owned by the controller that the host is not connected to.

If this occurs, go to the Volume Details Page for the volume associated with this LUN and change the owner.

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.

▼ Updating Single Path Information After Replacing Controllers

1. **After replacing the controller, follow the steps to identify the new Target ID in** "Identifying the Target ID" on page 31 **and** "Updating the `/kernel/drv/sd.conf` File" on page 31.

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