

## **Sun Storage 6580 and 6780 Array**

Hardware Release Notes, Release 6.9.x



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# Sun Storage 6580 and 6780 Array Hardware Release Notes

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This document contains important release information about the Sun Storage 6580 and 6780 arrays running Sun Storage Common Array Manager (CAM), Version 6.9.x. Read about issues or requirements that can affect the installation and operation of the arrays.

The release notes consist of the following sections:

- “What’s In This Firmware Release” on page 1
- “About the Array” on page 3
- “System Requirements” on page 3
- “Device Mapper Multipath (DMMP) for the Linux Operating System” on page 16
- “Restrictions and Known Issues” on page 24
- “Product Documentation” on page 34
- “Documentation, Support, and Training” on page 35

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## What’s In This Firmware Release

Array controller firmware version 7.80.xx.xx provides Sun Storage Common Array Manager enhancements and bug fixes as described in the *Sun Storage Common Array Manager Software Release Notes*.

# Downloading Patches and Updates

To download Sun Storage Common Array Manager, as well as server patches pertaining to the Sun Storage 6580 and 6780 arrays, follow this procedure.

**1. Sign in to My Oracle Support:**

<https://support.oracle.com/>

**2. At the top of the page, click the Patches & Updates tab.**

**3. Search for CAM software and patches in one of two ways:**

■ If you have a patch number:

a. Under the Patch Search section, click the Search tab.

b. In the Patch Name or Number field, enter the patch number. For example, 10272123 or 141474-01.

c. Click Search.

■ If you do not have a patch number:

a. Under the Patch Search section, click the Search tab, and then click the Product or Family (Advanced Search) link.

b. Check Include all products in a family.

c. In the Product field, start typing the product name. For example, "Sun Storage Common Array Manager (CAM)" or "Sun Storage 6580 array."

d. Select the product name when it appears.

e. In the Release field, expand the product name, check the release and patches you want to download, and then click Close.

f. Click Search.

**4. Select the patch you want to download.**

**5. Click ReadMe for a patch description and installation instructions.**

**6. Click Download for a single patch, or Add to Plan to download a group of patches.**

# Cache Battery Expiration Notification

Sun Storage 6580 and 6780 arrays use smart battery technology which maintains and reports its own status, providing a more accurate reporting of battery status. When a battery can no longer hold a charge, the battery is flagged for replacement, rather than a battery expiration report provided by the array firmware.

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## About the Array

The Sun Storage 6580 and 6780 array models are compared in [TABLE 1](#).

**TABLE 1** Comparison of Sun Storage 6580 and 6780 Array Configurations

	<b>6580</b>	<b>6780</b>
Total cache size per array	8, 16, or 32 Gbytes	8, 16, 32, or 64 Gbytes
Number of host ports	8 4-Gbit/second or 8 G-bit/second	8 or 16 4-Gbit/second or 8-Gbit/second
Host interface cards	2	2 or 4
Maximum number of drives supported	256	448
Disk reads	IOPS* 115K Throughput 3000 MB/second	IOPS* 175K Throughput 6400 MB/second
Maximum array configuration	1x16	1x28
Maximum raw capacity	512 Tbytes	896 Tbytes

\* Input/output operations per second

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**Note** – Upgrading from a 61x0 array to a Sun Storage 6580 or 6780 array is a data-in-place migration.

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## System Requirements

The software and hardware products that have been tested and qualified to work with the Sun Storage 6580 and 6780 arrays are described in the following sections.

- “Firmware Requirements” on page 4

- [“Disk Drives and Tray Capacity”](#) on page 4
- [“Solid State Disk Requirements”](#) on page 6
- [“Array Expansion Tray Support”](#) on page 6
- [“Data Host Requirements”](#) on page 7

## Firmware Requirements

The firmware version for Sun Storage 6580 and 6780 arrays features described in this release note is version 07.80.xx.xx. This firmware version (or higher) is installed on the array controllers prior to shipment and is also delivered with the latest version of Sun Storage Common Array Manager (CAM).

To update controller firmware on an existing array:

1. **Download the software as described in** [“Downloading Patches and Updates”](#) on page 2.
2. **Log into Sun Storage Common Array Manager.**
3. **Select the check box to the left of the array you want to update.**
4. **Click Install Firmware Baseline.**
5. **Follow the wizard instructions.**

## Disk Drives and Tray Capacity

TABLE 2 lists the size, spindle speed, type, interface speed, and tray capacity for the supported Fibre Channel (FC), Serial Advanced Technology Attachment (SATA), and Solid State Disk (SSD) disk drives for Sun Storage 6580 and 6780 arrays. Additional legacy drives might also be supported with this product.

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**Note** – For special requirements concerning FC Solid State Disks (SSDs), see [“Solid State Disk Requirements”](#) on page 6.

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**TABLE 2** Supported Disk Drives

<b>Drive</b>	<b>Description</b>
FC, 73GB, Solid State Disk	73-Gbyte SSD drives (4 Gbits/sec); 1168 Gbytes per tray
FC, 146G15K	146-Gbyte 15,000-RPM FC drives (4 Gbits/sec); 2336 Gbytes per tray
FC, 300G15K	300-Gbyte 15,000-RPM FC drives (4 Gbits/sec); 4800 Gbytes per tray
FC, 400G10K	400-Gbyte 10,000-RPM FC drives (4 Gbits/sec); 6400 Gbytes per tray
FC, 450G15K	450-Gbyte 15,000-RPM FC drives (4 Gbits/sec); 7200 Gbytes per tray
SATA-2, 500G7.2K	500-Gbyte 7,200-RPM SATA drives (3 Gbits/sec); 8000 Gbytes per tray
FC, 600GB15K, Encryption Capable	600-Gbyte 15,000-RPM FC drives Encryption Capable (4 Gbits/sec); 9600 Gbytes per tray
SATA-2, 750G7.2K	750-Gbyte 7,200-RPM SATA drives (3 Gbits/sec); 12000 Gbytes per tray
SATA-2, 1T7.2K	1-Tbyte 7,200-RPM SATA drives (3 Gbits/sec); 16000 Gbytes per tray
SATA-2, 2TB7.2K	2-Tbyte 7,200-RPM SATA drives (3 Gbits/sec); 32000 Gbytes per tray

# Solid State Disk Requirements

Solid State Drives (SSDs) have the following installation requirements:

- A maximum of 20 SSD drives can be installed in a single array.
- While it is technically possible to populate an entire tray with SSD drives (16 drives), it is recommended to distribute SSD drives across multiple drive channels.
- SSD drives can be mixed with other drive types in a single tray, but cannot be mixed within the same volume group.

## Array Expansion Tray Support

To add capacity to a Sun Storage 6580 or 6780 array, refer to the following Service Advisor procedures:

- Adding Expansion Trays
- Upgrade Firmware

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**Caution** – To add trays with existing stored data, contact Oracle Support for assistance to avoid data loss.

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**TABLE 3** Supported Expansion Trays and IOM Codes

Array Controller	Firmware	Supported Expansion Tray	IOM Code
Sun Storage 6580 and Sun Storage 6780	07.80.51.10	CSM200	98D6
		CSM100 FC	9682
		CSM100 iSATA	9728

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**Note** – FLAxxx and FLCxxx expansion trays are not supported on Sun Storage 6580 and Sun Storage 6780 arrays with this firmware release.

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- For additional baseline firmware information, such as controller, NVSRAM, disk drive, version, and firmware file, see *Sun Storage Array Baseline Firmware Reference*.

# Data Host Requirements

This section describes supported data host software, HBAs, and switches.

- [“Multipathing Software”](#) on page 7
- [“Supported Host Bus Adaptors \(HBAs\)”](#) on page 9
- [“Supported FC and Multilayer Switches”](#) on page 14
- [“Supported Premium Features”](#) on page 15

## Multipathing Software

TABLE 4 provides a summary of the data host requirements for the Sun Storage 6580 and 6780 arrays. It lists the current multipathing software and supported host bus adapters (HBAs) by operating system.

You must install multipathing software on each data host that communicates with Sun Storage 6580 and 6780 arrays.

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**Note** – Single path data connections are not recommended. For more information, see [“Single Path Data Connections”](#) on page 24.

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TABLE 4 lists supported multipathing software by operating system.

**TABLE 4** Multipathing Software

Operating System	Multipathing Software	Minimum Version	Host Type Setting	Notes
Solaris 10*	STMS/MPxIO	Update 6	Solaris with MPxIO	Multipathing software is included in Solaris OS 10
Solaris 10 with DMP	Symantec Veritas Dynamic Multi-Pathing (DMP)	5.0MP3	Solaris with DMP	
Windows 2003 SP2 R2 Non-clustered	MPIO	01.03.0302.0504	Windows 2003 Non-clustered	
Windows 2003/2008 MSCS Cluster	MPIO	01.03.0302.0504	Windows Server 2003 Clustered	You must use MPIO for 7.10 and above
Windows 2003 Non-clustered with DMP	DMP	5.1	Windows Server 2003 Non-clustered (with Veritas DMP)	See Symantec Hardware Compatibility List (HCL)

**TABLE 4** Multipathing Software (Continued)

Operating System	Multipathing Software	Minimum Version	Host Type Setting	Notes
Windows 2003 Clustered with DMP	DMP	5.1	Windows Server 2003 clustered (with Veritas DMP)	See Symantec HCL
Windows Server 2008 R2 SP1 (64-bit only)	MPIO	01.03.0302.0504	Windows Server 2003	
Oracle VM 2.2.2	RDAC	09.03.0C02.0331	Linux	RDAC version 09.03.0C02.0331 is included with Oracle VM 2.2.2
Oracle Linux 6.0, 5.6, 5.5	RDAC	09.03.0C02.0453	Linux	
Unbreakable Linux	DMMP		Unbreakable	DMMP is included with the Unbreakable OS.
SUSE Linux Enterprise Server 11 SP1 and 10 SP3	RDAC/MPP DMMP	09.03.0C00.0453	Linux	
SLES 10.4, 10 SP1	RDAC/MPP	09.03.0C02.0453	Linux	
Red Hat 6.0, 5.6, 5.5	RDAC	09.03.0C00.0453	Linux	
Red Hat 4, SLES 10	RDAC/MPP	09.03.0C00.0453	Linux	
Red Hat SLES with DMP	DMP	5.0MP3	Linux with DMP	See Symantec HCL
VMware ESX(i) 4.1 U1 and 5.0	Native Multipathing (NMP)		VMware	
HP-UX	Veritas DMP	5.0MP3	HP-UX	See Symantec HCL
AIX 6.1, 5.3	Cambex DPF	6.1.0.63	AIX	Not supported with CAM 6.9, firmware 7.80.xx.xx, but is supported with CAM 6.8.1 firmware 7.77.xx.xx
AIX 6.1, 5.3 with DMP	DMP	5.0	AIX with DMP	Not supported with CAM 6.9, firmware 7.80.xx.xx, but is supported with CAM 6.8.1 firmware 7.77.xx.xx

\* Oracle recommends installing the latest Solaris update.

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**Note** – Download the multipathing drivers from My Oracle Support at <https://support.oracle.com>. Search for the driver using one of the keywords “MPIO,” “RDAC,” or “MPP.” See “[Downloading Patches and Updates](#)” on page 2.

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**Note** – The multipathing driver for the IBM AIX platform is Veritas DMP, bundled in Veritas Storage Foundation 5.0 for Sun Storage 6580 and 6780 arrays. Download the Array Support Library (ASL) from <http://support.veritas.com/>.

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## Supported Host Bus Adaptors (HBAs)

TABLE 5, TABLE 6, and TABLE 7 list supported HBAs and other data host platform elements by operating system.

To obtain the latest HBA firmware:

- For Fibre Channel HBAs, download firmware from My Oracle Support using keyword “HBA.” For download instructions, see “[Downloading Patches and Updates](#)” on page 2.
- For other HBA support information, refer to the manufacturer’s web site.

Download operating system updates from the web site of the operating system company.

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**Note** – Always install the multipathing software before you install any OS patches.

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**TABLE 5** Supported HBAs for Solaris Data Host Platforms

Operating System	Minimum OS	Sun 2-Gbit HBAs	Sun 4-Gbit HBAs	Sun 8-Gb HBAs
Solaris 10 SPARC*	Update 6	SG-XPCI1FC-QL2 (6767A)	SG-XPCIE1FC-QF4	SG-XPCIE1FC-QF8-Z
		SG-XPCI2FC-QF2-Z (6768A)	SG-XPCIE2FC-QF4	SG-XPCIE2FC-QF8-Z
		SG-XPCI1FC-EM2	SG-XPCIE1FC-EM4	SG-XPCIE1FC-EM8-Z
		SG-XPCI2FC-EM2	SG-XPCIE2FC-EM4	SG-XPCIE2FC-EM8-Z
			SG-XPCI1FC-QF4	SG-XPCIEFCGBE-Q8
			SG-XPCI2FC-QF4	SG-XPCIEFCGBE-E8
			SG-XPCI1FC-EM4	
			SG-XPCI2FC-EM4	
			SG-XPCIE2FCGBE-Q-Z	
			SG-XPCIE2FCGBE-E-Z	
Solaris 10 x64/x86	Update 6	SG-XPCI1FC-QL2 (6767A)	SG-XPCIE1FC-QF4	SG-XPCIE1FC-QF8-Z
		SG-XPCI2FC-QF2-Z (6768A)	SG-XPCIE2FC-QF4	SG-XPCIE2FC-QF8-Z
		SG-XPCI1FC-EM2	SG-XPCIE1FC-EM4	SG-XPCIE1FC-EM8-Z
		SG-XPCI2FC-EM2	SG-XPCIE2FC-EM4	SG-XPCIE2FC-EM8-Z
			SG-XPCI1FC-QF4	SG-XPCIEFCGBE-E8
			SG-XPCI2FC-QF4	SG-XPCIEFCGBE-Q8
			SG-XPCI1FC-EM4	
			SG-XPCI2FC-EM4	
			SG-XPCIE2FCGBE-Q-Z	
			SG-XPCIE2FCGBE-E-Z	

\* Oracle recommends installing the latest Solaris update.

**TABLE 6** Supported HBAs for Microsoft Windows Data Host Platforms

Host OS / Servers	HBAs*	Sun 2-Gb HBAs	Sun 4-Gb HBAs	Sun 8-Gb HBAs
Microsoft Windows Server 2008 R2 SP1 (64-bit only ) / AMD x86 and EM64T	<b>QLogic:</b>	SG-XPCI1FC-EM2	SG-XPCIE1FC-QF4	SG-XPCIE1FC-QF8-Z
	QLE 256x	SG-XPCI2FC-EM2	SG-XPCIE2FC-QF4	SG-XPCIE2FC-QF8-Z
	QLE 246x	SG-XPCI1FC-QL2	SG-XPCIE1FC-EM4	SG-XPCIE1FC-EM8-Z
	QLA 246x	SG-XPCI2FC-QF2-Z	SG-XPCIE2FC-EM4	SG-XPCIE2FC-EM8-Z
	QLA 234x		SG-XPCI1FC-QF4	SG-XPCIEFCGBE-Q8
	QLA 2310F		SG-XPCI2FC-QF4	SG-XPCIEFCGBE-E8
	<b>Emulex:</b>		SG-XPCI1FC-EM4	
	LPe12000/LPe12002/ LPe1250		SG-XPCI2FC-EM4	
	Lpe11000/LPe11002/LPe1150		SG-XPCIE2FCGBE-Q-Z	
	LP11000/LP11002/LP1150		SG-XPCIE2FCGBE-E-Z	
	LP9802/9802DC/982			
	LP952/LP9002/LP9002DC			
	10000/10000DC/LP1050			
Microsoft Windows Server 2003 SP2 R2 / AMD x86 and EM64T	<b>QLogic:</b>	SG-XPCI1FC-EM2	SG-XPCIE1FC-QF4	SG-XPCIE1FC-QF8-Z
	QLE 256x	SG-XPCI2FC-EM2	SG-XPCIE2FC-QF4	SG-XPCIE2FC-QF8-Z
	QLE 246x	SG-XPCI1FC-QL2	SG-XPCIE1FC-EM4	SG-XPCIE1FC-EM8-Z
	QLA 246x	SG-XPCI2FC-QF2-Z	SG-XPCIE2FC-EM4	SG-XPCIE2FC-EM8-Z
	QLA 234x		SG-XPCI1FC-QF4	SG-XPCIEFCGBE-E8
	QLA 2310F		SG-XPCI2FC-QF4	SG-XPCIEFCGBE-Q8
	<b>Emulex:</b>		SG-XPCI1FC-EM4	
	LPe12000/LPe12002/LPe1250		SG-XPCI2FC-EM4	
	Lpe11000/LPe11002/LPe1150		SG-XPCIE2FCGBE-Q-Z	
	LP11000/LP11002/LP1150		SG-XPCIE2FCGBE-E-Z	
	LP9802/9802DC/982			
	LP952/LP9002/LP9002DC			
	10000/10000DC/LP1050			

**TABLE 6** Supported HBAs for Microsoft Windows Data Host Platforms (Continued)

Host OS / Servers	HBAs*	Sun 2-Gb HBAs	Sun 4-Gb HBAs	Sun 8-Gb HBAs
Microsoft Windows 2003 64-bit with SP2 R2 / x64 (AMD) EM64T IA64	<b>QLogic:</b>	SG-XPCI1FC-EM2	SG-XPCIE1FC-QF4	SG-XPCIE1FC-QF8-Z
	QLE 256x	SG-XPCI2FC-EM2	SG-XPCIE2FC-QF4	SG-XPCIE2FC-QF8-Z
	QLE 246x	SG-XPCI1FC-QL2	SG-XPCIE1FC-EM4	SG-XPCIE1FC-EM8-Z
	QLA 246x	SG-XPCI2FC-QF2-Z	SG-XPCIE2FC-EM4	SG-XPCIE2FC-EM8-Z
	QLA 234x		SG-XPCI1FC-QF4	SG-XPCIEFCGBE-Q8
	QLA 2310F		SG-XPCI2FC-QF4	SG-XPCIEFCGBE-E8
	<b>Emulex:</b>		SG-XPCI1FC-EM4	
	LPe12000/LPe12002/LPe1250		SG-XPCI2FC-EM4	
	Lpe11000/LPe11002/LPe1150		SG-XPCIE2FCGBE-Q-Z	
	LP11000/LP11002/LP1150		SG-XPCIE2FCGBE-E-Z	
	LP9802/9802DC/982			
	LP952/LP9002/LP9002DC			
	10000/10000DC/LP1050			

\* Refer to the HBA manufacturer's web site for support information.

**TABLE 7** Supported HBAs for Linux Data Host Platforms

Host OS	HBAs*	Sun 2-Gb HBAs	Sun 4-Gb HBAs	Sun 8-Gb HBAs
SLES 11 SP1, 10.4, 10 SP3	<b>QLogic:</b>	SG-XPCI1FC-EM2	SG-XPCIE1FC-QF4	SG-XPCIE1FC-QF8-Z
	QLE 256x	SG-XPCI2FC-EM2	SG-XPCIE2FC-QF4	SG-XPCIE2FC-QF8-Z
	QLE246x	SG-XPCI1FC-QL2	SG-XPCIE1FC-EM4	SG-XPCIE1FC-EM8-Z
	QLA 246x	SG-XPCI2FC-QF2-Z	SG-XPCIE2FC-EM4	SG-XPCIE2FC-EM8-Z
	QLA 234x		SG-XPCI1FC-QF4	SG-XPCIEFCGBE-E8
	QLA 2310F		SG-XPCI2FC-QF4	SG-XPCIEFCGBE-Q8
	<b>Emulex:</b>		SG-XPCI1FC-EM4	
	LP982/LP9802/9802DC		SG-XPCI2FC-EM4	
	LP9002/LP9002DC/LP952		SG-XPCIE2FCGBE-Q-Z	
	LP10000/10000DC/LP1050		SG-XPCIE2FCGBE-E-Z	
	LP11000/LP11002/LP1150			
	Lpe11000/LPe11002/ LPe1150/Lpe12000/ LPe12002/Lpe1250			



**TABLE 7** Supported HBAs for Linux Data Host Platforms (Continued)

Host OS	HBAs*	Sun 2-Gb HBAs	Sun 4-Gb HBAs	Sun 8-Gb HBAs	
Oracle Linux 6.0, 5.6, 5.5; Oracle VM 2.2.2; RHEL 6.0, 5.6, 5.5	<b>QLogic:</b>	SG-XPCI1FC-EM2	SG-XPCIE1FC-QF4	SG-XPCIE1FC-QF8-Z	
	QLE 256x	SG-XPCI2FC-EM2	SG-XPCIE2FC-QF4	SG-XPCIE2FC-QF8-Z	
	QLE 246x	SG-XPCI1FC-QL2	SG-XPCIE1FC-EM4	SG-XPCIE1FC-EM8-Z	
	QLA 246x	SG-XPCI2FC-QF2-Z	SG-XPCIE2FC-EM4	SG-XPCIE2FC-EM8-Z	
	QLA 234x		SG-XPCI1FC-QF4	SG-XPCIEFCGBE-Q8	
	QLA 2310F		SG-XPCI2FC-QF4	SG-XPCIEFCGBE-E8	
	<b>Emulex:</b>		SG-XPCI1FC-EM4-Z		
	LP982/LP9802/9802DC		SG-XPCI2FC-EM4-Z		
	LP9002/LP9002DC/LP952		SG-XPCIE2FCGBE-Q-Z		
	LP10000/10000DC/LP1050		SG-XPCIE2FCGBE-E-Z		
	Lpe11000/LPe11002/LPe1150				
	Lpe12000/LPe12002/LPe1250				
	RHEL 4u7	<b>QLogic:</b>	SG-XPCI1FC-EM2	SG-XPCIE1FC-QF4	SG-XPCIE1FC-QF8-Z
	RHEL 4.8	QLE 256x	SG-XPCI2FC-EM2	SG-XPCIE2FC-QF4	SG-XPCIE2FC-QF8-Z
QLE 246x		SG-XPCI1FC-QL2	SG-XPCIE1FC-EM4	SG-XPCIE1FC-EM8-Z	
QLA 246x		SG-XPCI2FC-QF2-Z	SG-XPCIE2FC-EM4	SG-XPCIE2FC-EM8-Z	
QLA 234x			SG-XPCI1FC-QF4	SG-XPCIEFCGBE-Q8	
QLA 2310F			SG-XPCI2FC-QF4	SG-XPCIEFCGBE-E8	
<b>Emulex:</b>			SG-XPCI1FC-EM4-Z		
LP982/LP9802/9802DC			SG-XPCI2FC-EM4-Z		
LP9002/LP9002DC/LP952			SG-XPCIE2FCGBE-Q-Z		
LP10000/10000DC/LP1050			SG-XPCIE2FCGBE-E-Z		
Lpe11000/LPe11002/LPe1150					
Lpe12000/LPe12002/LPe1250					

\* Refer to the HBA manufacturer's web site for support information.

**TABLE 8** Other Supported Data Host Platforms

HP-UX 11.31	HP RISC	HP A6795A
	IA64	HP A6826A
		HP A6684A
		HP A6685A
		HP AB378A
		HP AB379A
		HP AD300A
		HP AD355A
		AH400A (IA64)
		AH401A (IA64)
HP-UX B.11.23	HP RISC	HP A6795A
	IA64	HP A6826A
		HP A9784A
		HP AB378A
		HP AB379A
		HP AD300A
		HP AD355A
IBM AIX 5.2, 5.3, 6.1	Power	IBM 5716
		IBM 5758
		IBM 5759
		IBM 6228
		IBM 6239

## Supported FC and Multilayer Switches

The following FC fabric and multilayer switches are compatible for connecting data hosts and Sun Storage 6580 and 6780 arrays:

- Sun StorEdge Network 2 Gb FC Switch - 8, 16, and 64
- Brocade SilkWorm 200E/300/4100/4900/5000/5100/5300/7500/48000/DCX
- Cisco 9124/9134/9216/9216i/9222i/9506/9509/9513
- McDATA 6140/i10K/QPM 4 Gb blade for 6140
- QLogic SANBox 5602/9000

# Supported Premium Features

## *Tier 1 Support*

The Sun Storage 6180 arrays support the Tier 1 classified licensable features. Tier 1 classified arrays include the StorageTek 6140 and Sun Storage 6180 arrays.

Available licenses for the Sun Storage 6180:

- Domains: Base 8 domains
- Domains Upgrade: Upgrade from 8 to 128 domains
- Copy Services: Snapshot and Volume Copy
- Disk Encryption Service
- Remote Volume Mirroring

## *Tier 2 Support*

The Sun Storage 6580 and 6780 arrays support the below Tier 2 classified arrays licensable features. Tier 2 classified arrays include the StorageTek 6540, Sun Storage 6580, and Sun Storage 6780 arrays.

Available licenses for the Sun Storage 6580 and 6780 arrays:

- Domains: Base 16 domains
- Domains Upgrade: Upgrade from 16 to 256 domains
- Domains Upgrade: Upgrade from 256 to 512 domains
- Copy Services: Snapshots and Volume Copy
- Disk Encryption Service
- Remote Volume Mirroring

---

# Device Mapper Multipath (DMMP) for the Linux Operating System

Device Mapper (DM) is a generic framework for block devices provided by the Linux operating system. It supports concatenation, striping, snapshots, mirroring, and multipathing. The multipath function is provided by the combination of the kernel modules and user space tools.

The DMMP is supported on SUSE Linux Enterprise Server (SLES) Version 11 and 11.1. The SLES installation must have components at or above the version levels shown in the following table before you install the DMMP.

**TABLE 9** Minimum Supported Configurations for the SLES 11 Operating System

Version	Component
Kernel version	kernel-default-2.6.27.29-0.1.1
Scsi_dh_rdac kmp	lsi-scsi_dh_rdac-kmp-default-0.0_2.6.27.19_5-1
Device Mapper library	device-mapper-1.02.27-8.6
Multipath-tools	multipath-tools-0.4.8-40.6.1

To update a component, download the appropriate package from the Novell website at <http://download.novell.com/patch/finder>. The Novell publication, *SUSE Linux Enterprise Server 11 Installation and Administration Guide*, describes how to install and upgrade the operating system.

## Device Mapper Features

- Provides a single block device node for a multipathed logical unit
- Ensures that I/O is re-routed to available paths during a path failure
- Ensures that the failed paths are revalidated as soon as possible
- Configures the multipaths to maximize performance
- Reconfigures the multipaths automatically when events occur
- Provides DMMP features support to newly added logical unit
- Provides device name persistency for DMMP devices under `/dev/mapper/`
- Configures multipaths automatically at an early stage of rebooting to permit the OS to install and reboot on a multipathed logical unit

# Known Limitations and Issues of the Device Mapper

- When storage is configured with AVT mode, delays in device discovery might occur. Delays in device discovery might result in long delays when the operating system boots.
- In certain error conditions with `no_path_retry` or `queue_if_no_path` feature set, applications might hang forever. To overcome these conditions, you must enter the following command to all the affected multipath devices: `dmsetup message device 0 "fail_if_no_path"`, where `device` is the multipath device name (for example, `mpath2`; do not specify the path).
- An I/O hang might occur when a volume is unmapped without first deleting the DM device. **Note:** This limitation applies to only the SUSE 11 OS.
- Stale entries might not be noticed in `multipath -ll` output if the volumes are unmapped or deleted without first deleting the DM device and its underlying paths. **Note:** This limitation applies to only the SUSE 11 OS.
- Currently, the `mode select` command is issued synchronously for each LUN. With large LUN configurations, slower failovers for DM multipath devices might occur if there is any delay in completing of the `mode select` command. **Note:** This limitation applies to only the SUSE 11 OS.
- If the `scsi_dh_rdac` module is not included in `initrd`, slower device discovery might occur, and the `syslog` might get populated with buffer I/O error messages.
- If the storage vendor and model are not included in `scsi_dh_rdac` device handler, slower device discovery might be seen, and the `syslog` might get populated with buffer I/O error messages.
- Use of the DMMP and RDAC failover solutions together on the same host is not supported. Use only one solution at a time.

## Installing the Device Mapper Multi-Path

1. Use the media supplied by your operating system vendor to install SLES 11.
2. Install the errata kernel 2.6.27.29-0.1.  
Refer to the *SUSE Linux Enterprise Server 11 Installation and Administration Guide* for the installation procedure.
3. To boot up to 2.6.27.29-0.1 kernel, reboot your system.
4. On the command line, enter `rpm -qa |grep device-mapper`, and check the system output to see if the correct level of the device mapper component is installed.
  - If the correct level of the device mapper component is installed—Go to [Step 5](#).

- If the correct level of the device mapper component is not installed, install the correct level of the device mapper component or update the existing component. Then, go to [Step 5](#).
5. **On the command line, enter `rpm -qa |grep multipath-tools` and check the system output to see if the correct level of the multipath tools is installed.**
    - If the correct level of the multipath tools is installed, go to [Step 6](#).
    - If the correct level of the multipath tools is not installed, install the correct level of the multipath tools or update the existing multipath tools. Then, go to [Step 6](#).
  6. **Update the configuration file `/etc/multipath.conf`.**

See “[Setting Up the multipath.conf File](#)” on page 18 for detailed information about the `/etc/multipath.conf` file.
  7. **On the command line, enter `chkconfig multipathd on`.**

This command enables multipathd daemon when the system boots.
  8. **Edit the `/etc/sysconfig/kernel` file to add directive `scsi_dh_rdac` to the `INITRD_MODULES` section of the file.**
  9. **Download the KMP package for `scsi_dh_rdac` for the SLES 11 architecture from the website <http://forgeftp.novell.com/driver-process/staging/pub/update/lsi/sle11/common/>, and install the package on the host.**
  10. **Update the boot loader to point to the new initrd image, and reboot the host with the new initrd image.**

## Setting Up the multipath.conf File

The `multipath.conf` file is the configuration file for the multipath daemon, `multipathd`. The `multipath.conf` file overwrites the built-in configuration table for `multipathd`. Any line in the file whose first non-white-space character is `#` is considered a comment line. Empty lines are ignored.

### Installing the Device Mapper Multi-Path for SLES 11.1

All of the components required for DMMP are included in SUSE Linux Enterprise Server (SLES) version 11.1 installation media. However, users might need to select the specific component based on the storage hardware type. By default, DMMP is disabled in SLES. You must follow the following steps to enable DMMP components on the host.

1. **On the command line, type `chkconfig multipath on`.**  
The multipathd daemon is enabled with the system starts again.
2. **Edit the `/etc/sysconfig/kernel` file to add the directive `scsi_dh_rdac` to the `INITRD_MODULES` section of the file.**
3. **Create a new `initrd` image using the following command to include `scsi_dh_rdac` into ram disk:**  

```
mkinitrd -i /boot/initrd -r -rdac -k /bootvmlinuz
```
4. **Update the boot loader to point to the new `initrd` image, and reboot the host with the new `initrd` image.**

## Copy and Rename the Sample File

Copy and rename the sample file located at `/usr/share/doc/packages/multipath-tools/multipath.conf.synthetic` to `/etc/multipath.conf`. Configuration changes are now accomplished by editing the new `/etc/multipath.conf` file. All entries for multipath devices are commented out initially. The configuration file is divided into five sections:

- **defaults**—Specifies all default values.
- **blacklist**—All devices are blacklisted for new installations. The default blacklist is listed in the commented-out section of the `/etc/multipath.conf` file. Blacklist the device mapper multipath by WWID if you do not want to use this functionality.
- **blacklist\_exceptions**—Specifies any exceptions to the items specified in the section blacklist
- **devices**—Lists all multipath devices with their matching vendor and product values
- **multipaths**—Lists the multipath device with their matching WWID values

## Determine the Attributes of a MultiPath Device

To determine the attributes of a multipath device, check the `multipaths` section of the `/etc/multipath.conf` file, then the `devices` section, then the `defaults` section. The model settings used for multipath devices are listed for each storage array and include matching vendor and product values. Add matching storage vendor and product values for each type of volume used in your storage array.

For each UTM LUN mapped to the host, include an entry in the blacklist section of the `/etc/multipath.conf` file. The entries should follow the pattern of the following example.

```

blacklist {
device {
    vendor "*"
    product "Universal Xport"
}
}

```

## Modify Vendor ID and Product ID

The following example shows the devices section from the `/etc/multipath.conf` file. Be sure the vendor ID and the product ID for the Sun Storage 6580 and 6780 arrays are set as shown in this example:

```

devices {
    device {
        vendor                "SUN"
        product                "STK6580_6780"
        path_grouping_policy  group_by_prio
        prio                   rdac
        getuid_callout        "/lib/udev/scsi_id -g -u -d /dev/%n"
        polling_interval      5
        path_checker          rdac
        path_selector         "round-robin 0"
        hardware_handler      "1 rdac"
        failback immediate
        features               "2 pg_init_retries 50"
        no_path_retry         30
        rr_min_io              100
    }
}

```



The following table explains the attributes and values in the devices section of the `/etc/multipath.conf` file.

**TABLE 10** Attributes and Values in the `multipath.conf` File

Attribute	Parameter Value	Description
<code>path_grouping_policy</code>	<code>group_by_prio</code>	The path grouping policy to be applied to this specific vendor and product storage.
<code>prio</code>	<code>rdac</code>	The program and arguments to determine the path priority routine. The specified routine should return a numeric value specifying the relative priority of this path. Higher numbers have a higher priority.
<code>getuid_callout</code>	<code>"/lib/udev/scsi_id -g -u -d /dev/%n"</code>	The program and arguments to call out to obtain a unique path identifier.
<code>polling_interval</code>	<code>5</code>	The interval between two path checks, in seconds.
<code>path_checker</code>	<code>rdac</code>	The method used to determine the state of the path.
<code>path_selector</code>	<code>"round-robin 0"</code>	The path selector algorithm to use when there is more than one path in a path group.
<code>hardware_handler</code>	<code>"1 rdac"</code>	The hardware handler to use for handling device-specific knowledge.
<code>failback</code>	<code>10</code>	A parameter to tell the daemon how to manage path group failback. In this example, the parameter is set to 10 seconds, so failback occurs 10 seconds after a device comes online. To disable the failback, set this parameter to <code>manual</code> . Set it to <code>immediate</code> to force failback to occur immediately.

**TABLE 10** Attributes and Values in the `multipath.conf` File (Continued)

Attribute	Parameter Value	Description
<code>features</code>	"2 <code>pg_init_retries</code> 50"	Features to be enabled. This parameter sets the kernel parameter <code>pg_init_retries</code> to 50. The <code>pg_init_retries</code> parameter is used to retry the mode select commands.
<code>no_path_retry</code>	30	Specify the number of retries before queuing is disabled. Set this parameter to <code>fail</code> for immediate failure (no queuing). When this parameter is set to <code>queue</code> , queuing continues indefinitely.
<code>rr_min_io</code>	100	The number of I/Os to route to a path before switching to the next path in the same path group. This setting applies if there is more than one path in a path group.

## Using the Device Mapper Devices

Multipath devices are created under `/dev/` directory with the prefix `dm-`. These devices are the same as any other block devices on the host. To list all of the multipath devices, run the `multipath -ll` command. The following example shows system output from the `multipath -ll` command for one of the multipath devices.

```
mpathp (3600a0b80005ab177000017544a8d6b92) dm-0 LSI,INF-01-00
[size=5.0G][features=3 queue_if_no_path
pg_init_retries 50][hwhandler=1 rdac][rw]
\_ round-robin 0 [prio=6][active] \_ 5:0:0:0
sdc 8:32 [active][ready] \_
round-robin 0 [prio=1][enabled] \_ 4:0:0:0 sdb 8:16
[active][ghost]
```

In this example, the multipath device node for this device is `/dev/mapper/mpathp` and `/dev/dm-0`. The following table lists some basic options and parameters for the `multipath` command.

**TABLE 11** Options and Parameters for the `multipath` Command

Command	Description
<code>multipath -h</code>	Prints usage information
<code>multipath -ll</code>	Shows the current multipath topology from all available information (sysfs, the device mapper, path checkers, and so on)
<code>multipath -f map</code>	Flushes the multipath device map specified by the <code>map</code> option, if the map is unused
<code>multipath -F</code>	Flushes all unused multipath device maps

## Troubleshooting the Device Mapper

**TABLE 12** Troubleshooting the Device Mapper

Situation	Resolution
Is the <code>multipath</code> daemon, <code>multipathd</code> , running?	At the command prompt, enter the command: <code>/etc/init.d/multipathd status</code> .
Why are no devices listed when you run the <code>multipath -ll</code> command?	At the command prompt, enter the command: <code>#cat /proc/scsi/scsi</code> . The system output displays all of the devices that are already discovered. Verify that the <code>multipath.conf</code> file has been updated with proper settings.

---

# Restrictions and Known Issues

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

- “Installation and Hardware Related Issues” on page 24
- “Controller Issues” on page 26
- “Linux Issues” on page 28
- “Documentation Issues” on page 33

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

## Installation and Hardware Related Issues

This section describes known issues and bugs related to installing and initially configuring Sun Storage 6580 and 6780 arrays. This section describes general issues related to Sun Storage 6580 and 6780 array hardware and firmware.

### *Single Path Data Connections*

In a single path data connection, a group of heterogeneous servers is connected to an array through a single connection. Although this connection is technically possible, there is no redundancy, and a connection failure will result in loss of access to the array.

---

**Caution** – Because of the single point of failure, single path data connections are not recommended.

---

### *Setting the Tray Link Rate*

When setting the tray link rate for an expansion tray, all expansion trays connected to the same drive channel must be set to operate at the same data transfer rate (speed).

For details about how to set the tray link rate, see “Setting the Tray Link Rate” in the *Hardware Installation Guide for Sun Storage 6580 and 6780 Arrays*.

## *Upgrading the StorageTek 6540 Array*

**CR 6783749**—When upgrading a StorageTek 6540 array to a Sun Storage 6580 or 6780 Array, you cannot change the tray ID 85 to tray ID 99 using CAM.

**Workaround:** You can use controller tray ID 85 for array configurations up to a maximum of 256 drives.

## *Replacing CRUs/FRUs in Less Than 15 Minutes*



---

**Caution** – Without adequate ventilation and air circulation, the controller tray will overheat resulting in potential damage to all customer-replaceable units (CRUs) or field-replaceable units (FRUs). Do not allow any CRU/FRU slot to remain empty for an extended time. Replace the failed CRU/FRU within 15 minutes.

---

## *System Cabinet Doors Must Be Closed*



---

**Caution** – The front and back doors of the system cabinet must be closed for compliance to domestic and international EMI regulations as well as proper equipment cooling. Do not block or cover the openings of the system cabinet. Cabinet airflow is from front to back. Allow at least 30 inches (76.2 cm) in front of the cabinet, and at least 24 (60.96 cm) inches behind the cabinet, for service clearance, proper ventilation, and heat dissipation.

---

## *The `cfgadm -c unconfigure` Command Unconfigures UTM LUNs Only and Not Other Data LUNs (Solaris 10)*

**CR 6362850**—The `cfgadm -c unconfigure` command unconfigures Universal Transport Mechanism (UTM) LUNs only and not other data LUNs. When this happens, you will not be able to unconfigure LUNs.

**Workaround:** Obtain Solaris 10 patch 118833-20 (SPARC) or patch 118855-16 (x86) to fix this issue.

## *Intermittent Power Supply Failure Notification*

**CR 6760395:** CAM logEvent messages intermittently reports power supply failures and 12 seconds later changes to optimal. This is caused by devices not responding to polling.

**Workaround:** No workaround required. You can ignore the failure messages.

### *Tray ID Diagnostic Codes*

See Appendix C, Troubleshooting and Operational Procedures, in the *Hardware Installation Guide for Sun Storage 6580 and 6780 Arrays* for a description of the controller tray and expansion tray diagnostic codes.

### *Replacement drive comes in unassigned in an empty storage pool*

**Bug 7006425**—If you create a storage pool with no volumes, a replacement disk drive role is reported as “unassigned.”

**Workaround**—Delete the empty storage pool and create a new storage pool containing at least one volume.

## Controller Issues

### *I/O FAILURE Messages and Illegal Requests in Logs*

**Bug 7097416**—When an OVM2.2.2 or OEL 5.5 SLES host with Oracle Hardware Management Package(OHMP) daemon enabled is mapped to volumes on a 6180 array, it is possible to receive IO FAILURE and Illegal Request ASC/ASCQ log events.

**Workaround**—Either disable OHMP or disregard the messages. This is an issue with the host OS.

### *Incorrect controller cache block size can cause an ancient I/O*

**Bug 7110592**—Firmware 07.80.51.10 can cause ancient I/O reboots if the cache block size does not match the application I/O size.

**Workaround**—Ensure the application I/O size can fit into one cache block. If the cache block size is too small for the application I/O size, it will result in a shortage of an internal structure known as a buf\_t. By setting the cache block size to match the I/O size, the correct number of buf\_t's will be available and the ancient I/O will be avoided.

To set the cache block size, go to the Administration page for the selected array.

Firmware revision 07.80.x.x supports the following cache block sizes:

2500-M2: 4k, 8k, 16k, 32k

6x80: 4k, 8k, 16k, 32k

## *I/O Errors Occur During Controller Firmware Download*

### **Configuration:**

- Red Hat Enterprise Linux (RHEL) version 6 with kernel 2.6.32 only.
- PowerPC
- Emulex 10N9824 HBA
- Device Mapper Multipath (DMMP) failover driver
- Sun Storage 2500-M2 controller tray
- Sun Storage 6180 controller tray

---

**Note** – This problem does not occur in RHEL version 6.0 with kernel 2.6.33.

---

**Problem or Restriction:** An I/O error occurs during an online controller firmware upgrade.

**Workaround:** To avoid this problem, quiesce the host I/O before the performing controller firmware upgrades. To recover from this problem, make sure that the host reports that it has optimal paths available to the storage array controllers, and then resume I/O.

## *Both RAID Controllers Reboot After 828.5 Days—2500/6000 Arrays*

**CR 6872995, 6949589**—Both RAID controllers reboot after 828.5 days of continuous operation. A timer in the firmware (vxWorks) called “vxAbsTicks” is a 32-bit (double word) integer that keeps count in the 0x0000 0000 format. When this timer rolls over from 0xffffffff to 0x00000000 (after approximately 828.5 days), if there is host I/O to volumes, the associated drives fail with a write failure.

**Original Resolution:** Every 24 hours, firmware spawns a task--cfgMonitorTask--that checks the value of the vxworks kernel timing counter. For controllers with 03.xx-06.60 firmware (6000 series) and 03.xx-6.70 firmware (2500 series): Both controllers reboot if counter is greater than 825 days.

**Final Resolution:** Every 24 hours, firmware spawns a task--cfgMonitorTask--that checks the value of the vxworks kernel timing counter.

This fix staggers the reboots of the controllers for approximately five days so the only impact is a small performance degradation while the reboot occurs.

For controllers with firmware 07.15.11.12 or later (6000 series) and firmware 07.35.10.10 or later (2500 series): Controller A reboots if counter is greater than 820 days. Controller B reboots if counter is greater than 825 days.

---

**Note** – There is no redundancy for failover in a simplex 2500 configuration or *any duplex configuration* where a controller is already offline for any reason.

---

## Linux Issues

### *Linux RDAC 09.03.0C02.0453 - Make Install Dependencies*

**Configuration:**

- Red Hat Enterprise Linux (RHEL) or Oracle Linux version 5.5 or 5.6
- RDAC driver version 09.03.0C02.0453

**Problem or Restriction:** CR 7042297—Before running a "make" on the RDAC driver, the following kernel packages are required:

- kernel-2.6.18-194.el5
- kernel-devel-2.6.18-194.el5.x86\_64.rpm
- kernel-headers-2.6.18-194.el5.x86\_64.rpm
- glibc-headers-2.5-49.x86\_64.rpm
- glibc-devel-2.5-49.x86\_64.rpm
- libgomp-4.4.0-6.el5.x86\_64.rpm
- gcc-4.1.2-48.el5.x86\_64.rpm

### *Log Events Using SLES 11.1 With smartd Monitoring Enabled*

CR 7014293—When a SLES 11.1 host with smartd monitoring enabled is mapped to volumes on either a Sun Storage 2500-M2 or Sun Storage 6780 array, it is possible to receive "IO FAILURE" and "Illegal Request ASC/ASCQ" log events.

Workaround: Either disable smartd monitoring or disregard the messages. This is an issue with the host OS.



## *Oracle Linux 6 Bootd With Messages*

**CR 7038184, 7028670, 7028672:** When booting an Oracle Linux 6.0 host mapped to volumes on Sun Storage 2500-M2 and Sun Storage 6780 arrays, it is possible to receive one of these messages:

```
FIXME driver has no support for subenclosures (1)
FIXME driver has no support for subenclosures (3)
Failed to bind enclosure -19
```

**Workaround:** This is a cosmetic issue with no impact to the I/O path. There is no workaround.

## *IO FAILURE Messages and Illegal Requests in Logs*

**Operating System:** SLES Linux Enterprise Server 11.1 SP1

**Problem or Restriction** CR 7014293: Several IO FAILURE and Illegal Requests log events with ASC/ASQ SCSI errors appear in `/var/log/messages` while running `vdbench` on 25 LUNs.

An application client may request any one or all of the supported mode pages from the device server. If an application client issues a MODE SENSE command with a page code or subpage code value not implemented by the logical unit, the command shall be terminated with CHECK CONDITION status, with the sense key set to ILLEGAL REQUEST, and the additional sense code set to INVALID FIELD IN CDB.

The controller responds correctly (05h/24h/00h -INVALID FIELD IN CDB). The `smartctl` tool may need to ask all supported mode pages first before sending a unsupported mode page request.

**Workaround:** Disable SLES11 `smartd` monitoring service to stop these messages.

System Services (Runlevel) > **smartd Disable**

## *Cluster Startup Fails When Devices Are in a Unit Attention State*

**Configuration:**

- Red Hat Enterprise Linux (RHEL) version 6.0 with Native Cluster
- Device Mapper Multipath (DMMP) failover driver

**Problem or Restriction:** This problem occurs when the DMMP failover driver is used with the RHEL version 6.0 OS. If you try to set up a Red Hat cluster with the DMMP failover driver, cluster startup might fail during the unfencing stage, where each host registers itself with the SCSI devices. The devices are in a Unit Attention

state, which causes the SCSI registration command issued by the host during startup to fail. When the cluster manager (cman) service starts, the logs show that the nodes failed to unfence themselves, which causes the cluster startup to fail.

**Workaround:** To avoid this problem, do not use the DMMP failover driver with RHEL version 6.0. To recover from this problem, open a terminal window, and run:

```
sg_turs -n 5 <device>
```

where <device> is a SCSI device that is virtualized by the DMMP failover driver. Run this command on every `/dev/sd` device that the DMMP failover driver manages. It issues a Test Unit Ready command to clear the Unit Attention state and allow node registration on the device to succeed.

### *Node Unfencing Fails when Automatically Generated Host Keys Are Used during a Red Hat Cluster Suite Services Startup*

**Operating System:** Red Hat Enterprise Linux 6 with Native Cluster

**Problem or Restriction:** This problem occurs the first time a cluster is set up when the cluster.conf file does not have manually defined host keys. When the cluster.conf file was first defined to set up a cluster with SCSI reservation fencing, the cluster services were started on the nodes. With SCSI reservation fencing, the hosts try to generate and register a key on the clustered devices as part of the cluster manager's startup. The cluster manager service (cman) fails to start, and the key cannot be zero error message appears in the host log.

**Workaround:** To avoid this problem, use only power fencing. Do not use SCSI reservation fencing. To recover from this problem, change to manually defined host keys, and restart the cluster services.

### *Red Hat Cluster Suite Services with GFS2 Mounts Cannot Transfer Between Nodes when the Client Mounts with NFSv4*

**Operating System:** Red Hat Enterprise Linux 6 Native Cluster

**Problem or Restriction:** This problem occurs during an attempt to transfer a cluster service manually when a client is connected using NFSv4. The Global File System (GFS) 2 mount points failed to unmount, which caused the Red Hat Cluster Suite Services to go to the Failed state. The mount point, and all other mount points exported from the same virtual IP address, becomes inaccessible.

**Workaround:** To avoid this problem, configure the cluster nodes to not allow mount requests from NFS version 4 (NFSv4) clients. To recover from this problem, restart the failed service on the node that previously owned it.

## *Host Aborts I/O Operations*

**Operating System:** Red Hat Enterprise Linux version 6.0

**Problem or Restriction:** This problem occurs during an online controller firmware upgrade. The controller is not responding quickly enough to a host read or write to satisfy the host. After 30 seconds, the host sends a command to abort the I/O. The I/O aborts, and then starts again successfully.

**Workaround:** Quiesce the host I/O before performing the controller firmware upgrade. To recover from this problem, either reset the server, or wait until the host returns an I/O error.

## *Host Attempts to Abort I/O Indefinitely*

**Operating System:** Red Hat Enterprise Linux version 6.0 with kernel 2.6.32

**Red Hat Bugzilla Number:** 620391

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**Note** – This problem does not occur in Red Hat Enterprise Linux version 6.0 with kernel 2.6.33.

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**Problem or Restriction:** This problem occurs under situations of heavy stress when storage arrays take longer than expected to return the status of a read or write. The storage array must be sufficiently stressed that the controller response is more than 30 seconds, at which time a command is issued to abort if no response is received. The abort will be retried indefinitely even when the abort is successful. The application either times out or hangs indefinitely on the read or write that is being aborted. The messages file reports the aborts, and resets might occur on the LUN, the host, or the bus.

Factors effecting controller response include Remote Volume Mirroring, the controller state, the number of attached hosts, and the total throughput.

**Workaround:** To recover from this problem, reset the power on the server.

## *Linux Host Hangs During Reboot After New Volumes Are Added*

**Problem or Restriction:** When a Red Hat Enterprise Linux 5.1 host has more than two new volumes mapped to it, it hangs during reboot.

**Workaround:** Try one of the following options:

- After you add the new volumes, run the `hot_add` utility before rebooting the host.

- Upgrade the QLogic driver with driver version qla2xxx-v8.01.07.15-2 (or later). This option does not require that you run the `hot_add` utility.
- Perform multiple reboots of the host.

### *Linux I/O Timeout Error Occurs After Enabling a Switch Port*

**Problem or Restriction:** An I/O timeout error occurs after you enable a switch port. This problem occurs when two or more Brocade switches are used, and both the active and the alternative paths from the host are located on one switch, and both the active path and the alternative path from the storage array are located on another switch. For the host to detect the storage array on the other switch, the switches are cascaded, and a shared zone is defined between the switches. This problem occurs on fabrics managing high I/O traffic.

**Workaround:** Reconfigure the switch zoning to avoid the need for cascading. Limit the zones within each switch, and do not create zones across the switches. Configure the active paths from the host and the storage array on one switch, and all of the alternative paths from the host and the storage array on the other switch.

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**Note –** Configuring the active paths from all of the hosts on one switch will not provide optimal performance. To resolve this performance issue, alternate the hosts in terms of using active and alternative paths.

For switch 1, connect to storage array 1, and use the following arrangement: Host A\_Active port, Host B\_Alternative port, Host C\_Active port, Host D\_Alternative port.

For switch 2, connect to storage array 2, and use the following arrangement: Host A\_Alternative port, Host B\_Active port, Host C\_Alternative port, Host D\_Active port.

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### *Linux Host Hangs During Reboot*

**Problem or Restriction:** Red Hat Enterprise Linux 5.2 PowerPC (PPC) only. On rare occasions, the host hangs during reboot.

**Workaround:** Reset the host.

### *Cannot Find an Online Path After a Controller Failover*

**Problem or Restriction:** Linux Red Hat 5 and Linux SLES 10 SP1 only. After a controller failover in an open SAN environment, a controller comes back online, but the path is not rediscovered by the multi-path proxy (MPP). After a controller comes online in a fabric connection (through a SAN switch), it is possible that a link will

not be established by the Emulex HBA driver. This behavior is seen only if the SAN switch is “default” zoned (all ports see all other ports). This condition can result in an I/O error if the other path is taken offline.

**Workaround:** Set all of the SAN switches to be “default” zoned.

### *I/O Errors Occur During a Linux System Reboot*

**Problem or Restriction:** Linux SLES 10 SP2 only. I/O errors occur during a system reboot, and the host resets.

**Workaround:** None.

### *MEL Events Occur During the Start-of-Day Sequence*

**Problem or Restriction:** Red Hat Enterprise Linux 4.7 only. When the controller is going through the start-of-day sequence, the drive channel does not achieve link speed detection and logs a Major Event Log (MEL) event. This event recovers within a few seconds, and a second MEL event occurs. The second MEL event indicates that the link speed detection was achieved.

**Workaround:** None.

## Documentation Issues

This section describes issues related to Sun Storage 6580 and 6780 array documentation.

### *Total Cache Size Specification for Sun Storage 6780 Array*

In Table 1-1 of the *Hardware Installation Guide for Sun Storage 6580 and 6780 Arrays* (820-5773-11), the value for “Total cache size” is incorrectly reported as “16 Gbytes or 32 Gbytes.” As of the CAM 6.6 release, the revised value is “8, 16, 32, or 64 Gbytes.” The revised value is documented in [TABLE 1](#) of this release note document.

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# Product Documentation

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<b>Application</b>	<b>Title</b>
Site planning information	<i>Site Planning Guide for Sun Storage 6580 and 6780 Arrays</i>
Regulatory and safety information	<i>Sun Storage Regulatory and Safety Compliance Manual</i>
Installation overview for rack-mounted arrays	<i>Getting Started Guide for Sun Storage 6580 and 6780 Rack Mounted Arrays</i>
	<i>Getting Started Guide for Sun Storage 6580 and 6780 Rack Ready Arrays</i>
Rack installation instructions	<i>Sun Rack II User's Guide</i>
Rail kit installation instructions	<i>Sun Modular Storage Rail Kit Installation Guide</i>
PDU installation instructions	<i>Power Distribution Unit Installation Guide for Sun Storage 6580 and 6780 Arrays and Sun StorageTek 2500 and 6000 Array Series</i>
Array installation instructions	<i>Hardware Installation Guide for Sun Storage 6580 and 6780 Arrays</i>
Upgrade a Sun StorageTek 6540 array to a Sun Storage 6580 or 6780 array	<i>Sun Storage 6000 Series Hardware Upgrade Guide</i>
Release-specific information for the Sun StorageTek Common Array Manager	<i>Sun Storage Common Array Manager Release Notes</i>
Software installation and initial configuration instructions	<i>Sun Storage Common Array Manager Software Installation and Setup Guide</i>
Reference information for the Common Array Manager CLI	<i>Sun Storage Common Array Manager CLI Guide</i>
Multipath failover driver installation and configuration	<i>Sun StorageTek MPIIO Device Specific Module Installation Guide For Microsoft Windows OS</i>
	<i>Sun StorageTek RDAC Multipath Failover Driver Installation Guide For Linux OS</i>

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# Documentation, Support, and Training

These web sites provide additional resources:

- Documentation <http://www.oracle.com/technetwork/documentation/oracle-unified-ss-193371.html>
- Software licensing <http://licensecodes.oracle.com/>
- Support <https://support.oracle.com>
- Training <https://education.oracle.com>

