hp StorageWorks

Release Notes –
HSG80 Enterprise/Modular Storage RAID Array Fibre Channel Solution Software Version 8.7A for Linux X86 and Alpha

Product Version: 8.7A

This document contains last-minute and supplemental information about your Solution Software. In the event of conflicting information between these Release Notes and other documents contained in this product release, the Release Notes content takes precedence.

For the latest version of these Release Notes and other product documentation, visit the *StorageWorks* website at:

http://h18006.www1.hp.com/storage/index.html

HSG80 Enterprise/Modular Storage RAID Array Fibre Channel Solution Software Version 8.7A for Linux X86 and Alpha
Sixth Edition (March 2003)
Part Number: AA-RKJRF-TE

Release Notes Contents

These Release Notes cover the following major topics:

Intended Audience

This document is intended for storage administrators and *StorageWorks* customer service personnel who install and maintain *StorageWorks* Enterprise/Modular Storage RAID Array products that include *StorageWorks* HSG80 RAID Array Controllers.

Conventions

The following conventions are used throughout this document:

- Unless otherwise specified, all references to controllers or array controllers imply the *StorageWorks* HSG80 RAID Array Controller.

- Unless otherwise specified, all references to *StorageWorks* Array Controller Software Version 8.7 imply the released *StorageWorks* ACS Version 8.7 code or subsequently patched versions of ACS Version 8.7.

- For the purpose of this document, Enterprise/Modular Storage RAID Array refers to the following *StorageWorks* RAID Array products:

    — RA8000—Fibre Channel RAID Array 8000

    — ESA12000—Enterprise Storage Array 12000 Fibre Channel

    — MA8000—Modular Array 8000 Fibre Channel

    — EMA12000—Enterprise Modular Array 12000 Fibre Channel

    — EMA16000—Enterprise Modular Array 16000 Fibre Channel

Abbreviations and Acronyms

The following abbreviations and acronyms are used throughout this document:

- **ACS**—Array Controller Software

- **CCL**—Command Console LUN

- **CLI**—Command Line Interpreter

- **EISA**—Extended Industry Standard Architecture

- **EMU**—Environmental Monitoring Unit

- **EVA**—Enterprise Virtual Array

- **FC**—Fibre Channel

- **FC-AL**—Fibre Channel - Arbitrated Loop

- **FC-SW**—Fibre Channel - Switched

- **FRU**—Field-Replaceable Unit

- **HBA**—Host Bus Adapter

- **LUN**—Logical Unit

- **LVD**—Low Voltage Differential

- **NVRAM**—Non-Volatile Memory

- **PCMCIA**—Personal Computer Memory Card Industry Association

- **PVA**—Power Verification and Addressing Assembly

- **RAID**—Redundant Array of Independent Disks

- **RETMA**—Radio Electronics Television and Manufacturing Association

- **SAN**—Storage Area Network

- **SBB**—Storage Building Block

- **SCSI**—Small Computer System Interface

- **SMART**—Self-Monitoring Analysis and Reporting Technology

- **SWCC**—*StorageWorks* Command Console

- **VCS**—Virtual Controller Software

- **WWID**—World Wide Identifier

- **WWN**—World Wide Name

Release Package Contents

This HSG80 Fibre Channel Solution Software Kit consists of the following:

- The HSG80 Solution Software documentation set which includes:

  — *HSG80 ACS Solution Software Version 8.7 for Linux X86 and Alpha Installation and Configuration Guide*

  — *HSG80 Array Controller ACS Version 8.7 CLI Reference Guide*

  — *HSG80 Array Controller ACS Version 8.7 Maintenance and Service Guide*

  — *HSG80 Array Controller ACS Version 8.7 Troubleshooting Reference Guide*

  — *Command Console Version 2.5 User Guide*

  — *Command Console Version 2.5 Release Notes*

  — *Registration and Warranty Package*

  — *HSG80 Enterprise/Modular Storage RAID Array Fibre Channel Solution Software Version 8.7A for Linux X86 and Alpha Release Notes (this document)*

- HSG80 Modular Storage RAID Arrays Solution Software V8.7A for Linux/Alpha and Linux/Intel CD-ROM

  — Installation and scripting utilities

  — SWCC Version 2.5 Agent and Client software

  — Device drivers

The following supporting documentation is available from the *StorageWorks* website:

> http://h18006.www1.hp.com/storage/index.html

- *SAN Design Reference Guide*, Part Number: AA-RMPNE-TE

- *Enterprise/Modular Storage RAID Array Fibre Channel Arbitrated Loop Configurations Application Note*, Part Number: AA-RS1ZA-TE

- *Model 2100 and 2200 Ultra SCSI Controller Enclosures User Guide*, Part Number: EK–SE2C8–UA. C01

- *Model 4300 Family Ultra3 LVD Disk Enclosures User Guide*, Part Number: EK–LVDU3–UA. A01

- *Modular Array Cabinet Restrictions*, Part Number EK-MACON-CA. B01

Important Notice Regarding Cache Sizes

For ACS Version 8.7, minimum cache size requirements are 128 MB in unmirrored configurations, and 256 MB in mirrored configurations, per cache module.

The cache size requirements for running ACS Version 8.7S remain at 512 MB.

Identifying ACS Revision Level

The ACS release package you received should include a PCMCIA program card containing the new ACS software. Included in this section are instructions for determining the ACS version running on your RAID Array.

Once ACS is installed, you can identify the specific version of ACS by typing the following command at the CLI prompt:

```
HSG80> SHOW THIS_CONTROLLER
```

The resulting display lists the software revision level as one of the following:

```
V87G
V87F
V87S
```

If the ACS version is not Version 8.7 or a subsequently patched version of ACS Version 8.7, contact your support provider for instructions on how to obtain the updated version.

If the ACS version is Version 8.7S, you need additional layered application software beyond this Solution Software Kit to take advantage of the added functionality of these versions. See "Layered Software Applications", page 26, for additional information on compatible layered application software.

ACS Version 8.7 is fully compatible with Version 8.7A Solution Software. In addition, Version 8.7A Solution Software is backward compatible with ACS Version 8.6, which benefits the upgrade process across your SAN.

Patching ACS

Each ACS patch builds on the current version of ACS and all previously installed patches. ACS patches must be installed in order, from lowest to highest, when multiple patches are installed. ACS patches are available for download from the following *StorageWorks* website:

http://h18000.www1.hp.com/products/storageworks/softwaredrivers/acs/index.html

ACS patch downloads come packaged with the instructions and scripts needed to apply the patch. See the *HSG80 Array Controller ACS Version 8.7 Maintenance and Service Guide* for further information on patching ACS.

ACS Patch Memory

Any installed ACS Version 8.6 (or lower) patches should be removed after an ACS Version 8.7 installation since they are no longer applicable. This frees up HSG80 patch memory for future ACS patches.

To check or remove ACS patches, run the Code Load and Code Patch utility by typing the following command:

```
HSG80> RUN CLCP
```

New Features

This section briefly describes new features and changes that are supported by the Version 8.7A release of the Solution Software together with the array controller running ACS Version 8.7.

New Features for 8.7A

The following are major enhancements included in the 8.7A release of the Solution Software Kit.

• **Blade Servers**—Solution Software Kits now support ProLiant Blade Servers BL20p and BL40p.

• Added support for ProLiant Essentials Rapid Deployment Pack which provides automated server deployment and redeployment via a central console using imaging and scripting technologies for ProLiant servers. The deployment console provides simple drag-and-drop functionality for deployment events. The Solution Software Kit CD-ROM contains software components, drivers, and utilities that are located in the \rdp/rdp directory. See readme.txt on the CD-ROM for a more detailed description of Rapid Deployment Pack, installation instructions, and restrictions. For general information on Rapid Deployment Pack, go to http://h18013.www1.hp.com/products/servers/management/rdp/index.html

• **Rapid Deployment Pack Procedures**—Two new Rapid Deployment Pack procedures were added for the installation of Fibre Channel Utilities and the qla2x00 driver RPM. The procedures are listed under "Host Operating System Notes", page 33.

— Fibre Channel Utilities—The RPM `fibreutils-1.0.0-5.i386.rpm` contains assorted utilities that complement the qla2x00 driver package. The fibreutils package contains two major utilities: `hp_fccfg.sh` and `probe-luns`. The `hp_fccfg.sh` script allows you to recompile the driver if needed and change the default queue depth for disk devices attached to a qla2200 series or qla2300 series fibre channel adapter. Probe-luns solves the problem of non-consecutive LUNs.

— QLA2x00 Driver RPM—The RPM `qla2x00-6.0.2-5.Redhat-AS-2-1.i386.rpm` contains the adapter driver for the HP supported fibre channel adapters on Red Hat Advanced Server 2.1. The RPM contains the driver source code, precompiled modules for the base kernel of Red Hat Advanced Server 2.1, and system startup scripts.

ACS Feature Enhancements

The following major enhancements are included in the ACS Version 8.7 release:

- **Host Connection Table Locking**—Host table lock and unlock commands were added to control the connection table in NVRAM. When the table is locked, the host login request is rejected (unless the connection is already in the table), and the request is stored internally on a rejected hosts table.

- **Selective Management Presentation**—Selective Management Presentation extends the use of Selective Storage Presentation by providing control over which SAN Management Agent systems (if any) can perform management operations.

- **VENDOR_ID Field**—ACS now provides a VENDOR_ID field at the bottom of the **Extended information** area, returned by the SHOW THIS FULL or SHOW OTHER FULL commands.

- **Linked WWIDs for Snap and Clone Units**—To better manage snap and clone unit creation, a linked WWID scheme was implemented. It keeps the WWIDs of these units constant each time they are created. The linked WWID scheme reduces the number of system data records needed to track unit WWIDs, and enhances the stability of administrative scripts used in unit creation.

- **SMART Error Drive Eject**—In prior versions of ACS, SMART error notifications received from a device were treated as soft (recovered) errors. The notification was passed to the host and operations continued. ACS now provides a CLI switch (SMART error eject state) that offers an alternative to this behavior.

  With the new switch enabled, drives in a normalized and redundant set that report a SMART error are removed from that set. SMART errors reported by drives in a non-redundant or non-normal set continue to be treated as recovered errors. If the switch is disabled, all SMART errors are treated as recovered errors.

- **Error Threshold for Drives**—ACS now provides the ability to set limits for drive errors. Once the limit is reached, the questionable drive is removed from any redundant set it is a member of and put into the failed set. Errors counted are medium and recovered errors. Hardware errors are not included in this count since the drive fails immediately when a hardware error is encountered.

CLI Command Updates

The following CLI commands and switches were added or enhanced in ACS Version 8.7:

Host Connection Table Locking

```
SET controller CONNECTIONS_LOCKED

SET controller CONNECTIONS_UNLOCKED

ADD CONNECTIONS REJECTED_HOST
```

Selective Management Presentation

```
SET DISABLE_MANAGERS

SET ENABLE_MANAGERS
```

Linked WWIDs for Snap and Clone Units

```
ADD SNAPSHOT_UNITS USE_PARENT_WWID
```

SMART Error Drive Eject

```
SET controller SMART_ERROR_EJECT
```

Error Threshold for Drives

```
CLEAR_ERRORS DRIVE_ERRORS

SET DRIVE_ERROR_THRESHOLD

SHOW DRIVE_ERROR_THRESHOLD
```

See the *HSG80 Array Controller ACS Version 8.7 CLI Reference Guide* for complete syntax details.

FC Switch Support Updates

The following updates and changes to supported FC Switch products are included in this Solution Software Version 8.7A release:

- Firmware for all 1 Gbps SAN Switch products was upgraded to v2.6.0h.

- Added support for the following FC switches, many of which provide 2 Gbps switch support:

    — SAN Switch 2/16 (16 Ports FC, 2 Gbps)

    — SAN Switch 2/8-EL (8 Ports FC Entry Level, 2 Gbps)

    — SAN Switch 2/16-EL (16 Ports FC Entry Level, 2 Gbps)

    — SAN Switch 2/32 (32 Ports FC, 2 Gbps)

    — SAN Core Switch 2/64 (32-64 Ports FC, 2 Gbps)

    — SAN Director 64 (32-64 Ports FC, 1 Gbps)

— SAN Edge Switch 32 (32 Ports FC, 1 Gbps)

— SAN Edge Switch 16 (16 Ports FC, 1 Gbps)

— SAN Director 2/64 (32-64 Ports FC, 2 Gbps)

— SAN Director 2/140 (140 Ports FC, 2 Gbps)

— SAN Edge Switch 2/32 (32 Ports FC, 2 Gbps)

— SAN Edge Switch 2/16 (16 Ports FC, 2 Gbps)

— SAN Edge Switch 2/24 (24 Ports FC, 2 Gbps)

See "Switch Support", page 18, for part numbers, firmware versions, and additional information.

IMPORTANT: *StorageWorks* recommends that you do not mix switch firmware versions in your SAN. The best practice is to uniformly upgrade all switches in the SAN.

Solution Software Updates

The following improvements were made to your Solution Software:

- Solution Software Version 8.7A was qualified with ACS Version 8.7 and the components defined in these Release Notes.

- Added DS25L and ES45 servers to the supported platforms list in Table 6. Discontinued support for server DS20 from the same table.

- Added SuSE Linux Enterprise Server (SLES) for X86, Version 7 support.

- Added Red Hat Linux X86 Version 7.2 support.

- Added Red Hat Advanced Server Version 2.1 support.

- Added Red Hat Alpha 7.2 support.

- Discontinued SuSE Linux X86 support for Version 7.1.

- Discontinued Caldera Linux X86 support.

- Discontinued support for Red Hat Linux X86 Version 7.1.

- Discontinued support for SuSE Linux Alpha 7.1.

- Discontinued support for *StorageWorks* 167432-001 PCI FC HBA.

- Upgraded the Linux HBA driver to Version 6.0.2.

- Added support for *StorageWorks* 3R-A3751-AA (281541-B21) 64-bit, 2 Gbps PCI-X FC HBA.

- A Linux server workaround was added to correct some corrupted kernel sources and header files in Linux. In order for the driver to compile and the kit to install successfully, the kernel sources and header files must be reinstalled before launching the kit. The procedure for correcting this problem is found under "Avoiding Problem Situations", page 31.

Documentation Updates

The following changes were made to the general content of these Release Notes since they were last published:

- A new section "Abbreviations and Acronyms", page 4 was added to define abbreviations and acronyms used in these Release Notes.

- A new section "Patching ACS", page 7, was added to clarify the process used to patch ACS.

- The section "Layered Software Applications", page 26, was updated.

- The section "Disk Device Support", page 16, was updated.

- The "Document Catalog" section and procedures were removed because electronic copy for Solution Software documentation is available exclusively from the *StorageWorks* website.

- The "HSG80 Device Removal and Replacement" section and procedures were moved from these Release Notes to the *HSG80 Array Controller ACS Version 8.7 Maintenance and Service Guide*.

- The "Solution Software Upgrade Procedures "section was moved from these Release Notes to the *HSG80 ACS Solution Software Version 8.7 Installation and Configuration Guide*.

Modular Array Solutions

The modular solution consists of the array controller (single or dual configurations) installed in a Model 2200 Ultra SCSI controller enclosure, and the drives installed in either a Model 4314 disk enclosure or a Model 4354 disk enclosure. The modular solutions must be mounted in RETMA cabinets. The *StorageWorks* RETMA cabinets are available in heights of 42U, 41U, 36U, and 22U. The Model 2200 Ultra SCSI controller enclosure is 4U. The Model 4314 disk enclosure and the Model 4354 disk enclosure are both 3U. This combination allows for several cabinet configurations.

NOTE: If you wish to use a controller from an existing RA8000 or ESA12000 storage system, the Cache Bulkhead upgrade for installation of the controller in the Model 2200 is required.

- For information about how to install the array controller in a Model 2200 Ultra SCSI controller enclosure, see the *Model 2100 and 2200 Ultra SCSI Controller Enclosures User Guide*.

- For information about how to install drives in either a Model 4314 disk enclosure or a Model 4354 disk enclosure, see the *Model 4300 Family Ultra3 LVD Disk Enclosures User Guide*.

- For information about modular solution configurations and restrictions, see the *Modular Array Cabinet Restrictions* user document.

Disk Enclosures

The array controller firmware addresses up to 14 disks per SCSI bus. The maximum number of disks supported by an array controller (single or cooperating pair) is 84. The disk enclosures can be configured for single bus or for dual bus operation.

NOTE: The 43xx disk enclosures do not allow daisy chaining between shelves.

Table 1: Single Bus Mode Enclosure Options

Disk Enclosures Options/Single Bus Mode	Part Number
Model 4310R—Rack-mountable 10-drive enclosure with single bus, single power supply	174631-B21
Model 4314R—Rack-mountable 14-drive enclosure with single bus, single power supply	190209-001
Model 4314T—Tower mount 14-drive enclosure with single bus, single power supply, LCD monitor	190210-001
Second power supply for 4314 (adds a redundant power supply to the 4314)	119826-B21
Single bus I/O module for existing 4314	190212-B21
Dual bus I/O module for existing 4314 (changes the 4314 from a single bus to a dual bus)	119829-B21

Table 2: Dual Bus Mode Enclosure Options

Disk Enclosures Options/Dual Bus Mode	Part Number
Model 4350R—Rack-mountable 10-drive enclosure with dual bus, dual power supply	174630-B21
Model 4354R—Rack-mountable 14-drive enclosure with dual bus, dual power supply	190211-001

NOTE: Use a single bus I/O module to transform a Model 4354 disk enclosure to single bus.

SCSI Cables

SCSI cables must be ordered separately to connect the 43xx shelves to the Model 2200 enclosure. The following SCSI cables are supported.

Table 3: SCSI Cable Options

SCSI Cable Options	Part Number
1-meter SCSI cable	168256-B21
2-meter SCSI cable	168258-B21
3-meter SCSI cable	189505-B21
5-meter SCSI cable	400983-005
10-meter SCSI cable	400983-010

Ordering Modular Storage Systems

The Modular Array/Enterprise Modular Array storage systems can be ordered in one of the following three ways:

• Predefined models are available that provide a set number of controller shelves and drive shelves in a Modular Storage Cabinet:

— MA8000: One Model 2200 controller enclosure and three dual bus Model 4354 disk enclosures in a 22U Modular Storage Cabinet

— EMA12000 D14: Three Model 2200 controller enclosures and nine dual bus Model 4354 disk enclosures in a 42U Modular Storage Cabinet

— EMA12000 S14: One Model 2200 controller enclosure and six single bus Model 4314 disk enclosures in a 36U Modular Storage Cabinet

— EMA12000 Blue: One Model 2200 controller enclosure and three dual bus Model 4354 disk enclosures in a 41U Modular Storage Cabinet

— EMA16000 S14: Two Model 2200 controller enclosures and twelve single bus 4314 disk enclosures in a 41U Modular Storage Cabinet

— EMA16000 D14: Four Model 2200 controller enclosures with twelve dual bus 4354 disk enclosures in a 41U Modular Storage Cabinet

NOTE: The predefined models require the following options: Controllers, ECBs, Controller firmware and drives.

- Configure-to-Order. Allows you to specify the number of controller shelves and drive shelves desired in a Modular Storage Cabinet.

- Assembly onsite. Allows you to order the components separately and install them in any supported RETMA rack or cabinet.

Hardware and Software Support

This section lists the hardware, devices, and operating system versions that are compatible with this Fibre Channel Solution Software Kit.

Array Hardware Support

The following Enterprise/Modular Storage RAID Array hardware products are supported:

- DS-SW600-AA—600mm wide cabinet 50/60 Hz, dual-redundant controllers, bolting kit for coupling (two SW600 cabinets)

- DS-SW370-AA—RAID pedestal, five 180-watt power supplies; eight universal 50/60 Hz, 120/240V high-powered blowers; one AC input box; one enhanced EMU; one pedestal user's guide; six single-ended I/O modules

- DS-SW370-EA—RAID pedestal; five 180-watt power supplies; eight universal 50/60 Hz, 120/240V high-powered blowers; one AC input box; one enhanced EMU; one pedestal user's guide; six single-ended I/O modules; metric mounting hardware

- DS-BA370-AA—RAID rack mount enclosure; five 180-watt power supplies; eight universal 50/60 Hz, 120/240V high-powered blowers; one AC input box, six single-ended I/O modules; one pedestal user's guide; one enhanced EMU; one PVA, metric mounting hardware

- DS-BA370-MA—Maintenance option for the SW370 and BA370 field service option, FRU

- DS-BA35X-HH—180-watt, 100- to 200-V power supply; 240-V, AC factor-corrected power supply; blue color carrier

- DS-BA35X-MK—High-powered blower for the SW370 and BA370

- DS-BA35X-MP—Termination module

- DS-BA35X-BA—External cache battery shelf for SW370

- DS-BA35X-BC—Single battery in blue SBB

- DS-BA35X-BD—Double battery in blue SBB
- DS-BA35X-EB—Enhanced Environmental Monitor Unit of the SW370 and BA370
- DS-BA35X-MN—Single-ended, Ultra SCSI I/O module
- DS-BA35X-EC—Power verification and addressing module
- HS35X-BA—Single external cache battery in an SBB
- HS35X-BD—Dual external cache battery in an SBB
- DS-HSDIM-AB—64 MB cache upgrade for HSX80
- DS-HSDIM-AC—256 MB cache upgrade for HSX80

Disk Device Support

This Fibre Channel Solution Software Kit supports the disk devices listed in Table 4 at the indicated hardware and microcode levels.

NOTE: Full 14-slot drive support per channel is available on MA/EMA Series arrays only.

Table 4: Supported Disk Drives

Option Part Number	Device/ Model	Capacity (GB)	Speed (RPM)	Minimum Microcode Version	Minimum Hardware Version
176494-B21	BC072638A2	72.8	10,000	BDC7	A01
232432-B22	BD07264546			B209	
	BD0726459C			B008	
	BD0726536C			3B02	
232916-B22	BF03664664	36.4	15,000	3B06	A01
	BF03665223			B003	

Table 4: Supported Disk Drives (Continued)

Option Part Number	Device/ Model	Capacity (GB)	Speed (RPM)	Minimum Microcode Version	Minimum Hardware Version
176496-B22	BD0366349C	36.4	10,000	3B02	A01
	BD036635C5			B020	A05
	BD03663622			BDC4	A01
	BD03664545			B209	
	BD03664553			3B04	
	BD0366459B			B005	
	BD0366536B			3B02	
127968-001	DS-RZ1FC-VW	36.4	10,000	3B02/2B07/ B020/BDC4	A01
147533-001	DS-RZ1FB-VW	36.4	7,200	N1H1/0372/ 1614/3B05	A01
188122-B22	BF01863644	18.2	15,000	3B01	A01
	BF01864663			3B06	
	BF01865222			B003	
128418-B22	BD018122C9	18.2	10,000	B016	A01
142673-B22	BD01862A67	18.2	10,000	B007	A01
	BD01862376			BCJE	
	BD018635C4			B020	
	BD01864544			B209	
	BD01864552			3B04	
	BD0186459A			B008	
	BD0186349B			3B07	
380589-B21	DS-RZ1ED-VW	18.2	10,000	0306/1614/ 3B07/B020/ BDC4	A01

Table 4: Supported Disk Drives (Continued)

Option Part Number	Device/ Model	Capacity (GB)	Speed (RPM)	Minimum Microcode Version	Minimum Hardware Version
388144-B22	BB01811C9C	18.2	7,200	3B05	A01
147598-001	DS-RZ1EA-VW	18.2	7,200	N1H1/0306/ 3B05	A01
380694-B21	DS-RZ1EF-VW	18.2	7,200	0372/N1H1	A01
188120-B22	BF00963643	9.1	15,000	3B01	A01
328939-B22	BD009122BA	9.1	10,000	3B07	A01
142671-B22	BD00962373	9.1	10,000	BCJE	A01
	BD00962A66			B007	
	BD009635C3			B020	
380588-B21	DS-RZ1DD-VW	9.1	10,000	0306/1614/ 3B07/B020	A01
123065-B22	BB00911CA0	9.1	7,200	3B05	A01
147597-001	DS-RZ1DA-VW	9.1	7,200	N1H1/3B05/ B020	A01
380595-B21	DS-RZ1DF-VW	9.1	7,200	0372/N1H1/ 1614	A01
380693-B21	DS-RZ1DB-VW	9.1	7,200	LYJ0/0307	A01
N/A	DS-RZ1CD-VW	4.3	10,000	0306	A01
N/A	DS-RZ1CB-VW	4.3	7,200	LYJ0/0656	A01
380691-B21	DS-RZ1CF-VW	4.3	7,200	0372/N1H1/ 1614	A01

Switch Support

This Fibre Channel Solution Software Kit supports the Fibre Channel switches and firmware versions listed in Table 5.

IMPORTANT: *StorageWorks* recommends that you do not mix switch firmware versions in your SAN. It is considered best practice to uniformly upgrade all switches in the SAN.

Table 5: Fibre Channel Switch Support

Description	Part Number	Firmware Version
SAN Switch 8 (8 Ports FC, 1 Gbps)	158222-B21 DS-DSGGB-AA	2.6.0h
SAN Switch 16 (16 Ports FC, 1 Gbps)	158223-B21 DS-DSGGB-AB	2.6.0h
SAN Switch 8-EL (8 Ports FC Entry Level, 1 Gbps)	176219-B21 DS-DSGGC-AA	2.6.0h
SAN Switch 16-EL (16 Ports FC Entry Level, 1 Gbps)	212776-B21 DS-DSGGC-AB	2.6.0h
SAN Switch Integrated (32 Ports FC, 1 Gbps)	230616-B21 DS-DSGGS-AA	2.6.0h
SAN Switch Integrated 64 (64 Ports FC, 1 Gbps)	230617-B21 DS-DSGGS-AB	2.6.0h
SAN Switch 2/16 (16 Ports FC, 2 Gbps)	240602-B21 DS-DSGGD-AA	3.02k
SAN Switch 2/8-EL (8 Ports FC Entry Level, 2 Gbps)	258707-B21 DS-DSGGD-AC	3.02k
SAN Switch 2/16-EL (16 Ports FC Entry Level, 2 Gbps)	283056-B21 DS-DSGGD-AD	3.02k
SAN Switch 2/32 (16 Ports FC, 2 Gbps)	230616-B21 DS-DSGGS-AA	4.0.2b
SAN Core Switch 2/64 (32-64s Ports FC, 2 Gbps)	254508-B21 DS-DSGGE-AB	4.0.2b
SAN Director 64 Switch (32-64 Ports FC, 1 Gbps)	254512-B21 DS-DMGGD-AA	02.00.00
SAN Edge Switch 32 (32 Ports FC, 1 Gbps)	2T-M3032-AA (See Note)	02.00.00
SAN Edge Switch 16 (16 Ports FC, 1 Gbps)	2T-M3016-AA (See Note)	02.00.00
SAN Director 2/64 Switch (32-64 Ports FC, 2 Gbps)	286809-B21 DS-DMGGD-BA	02.00.00
SAN Director 2/140 Switch (140 Ports FC, 2 Gbps)	316093-B21 DS-DMGGD-CA	04.01.02
SAN Edge Switch 2/32 (32 Ports FC, 2 Gbps)	286810-B21 DS-DMGGE-BC	02.00.00

Table 5: Fibre Channel Switch Support (Continued)

SAN Edge Switch 2/16 (16 Ports FC, 2 Gbps)	286811-B21 DS-DMGGE-BB	02.00.00
SAN Edge Switch 2/24 (24 Ports FC, 2 Gbps)	316095-B21 DS-DMGGE-BD	04.01.02

NOTE: The listed 1 Gbps SAN Edge Switches are CSS (Custom Services and Solutions) orderable only. Please contact your *StorageWorks* sales representative at 1-800-STORWORK for further information on these CSS components.

For the latest versions of switch firmware, please visit the *StorageWorks* website:

http://h18000.www1.hp.com/products/storageworks/softwaredrivers/fcsanswitch816/index.html

System Components

This Fibre Channel Solution Software Kit supports the system components and operating system versions listed in Table 6.

Table 6: Minimum System Requirements

Component	Requirement
Controller Compatibility	*StorageWorks* HSG80 Array Controller, ACS Version 8.7F (or a subsequently patched version of ACS Version 8.7F) **NOTE**: This Solution Software is backward compatible with ACS Version 8.6, but only for the purpose of performing upgrades to the ACS firmware. *StorageWorks* does not recommend mixing ACS versions in the same SAN.
Platform	Alpha Servers DS10, DS10L, DS25L, ES40, and ES45 ProLiant X86 and ProLiant BL20p and BL40p Blade Servers
Operating System	SuSE Linux Enterprise Server for X86, 7 (SLES 7) (kernel 2.4.7-4GB or 2.4.7-64GB-smp) Red Hat Linux X86 7.2 (kernel 2.4.7-10 or 2.4.7-10smp) Red Hat Linux Alpha 7.1(2.4.3-12 or 2.4.3-12smp) Red Hat Linux Alpha 7.2 (kernel 2.4.9-32.5 or 2.4.9-32.5smp) Red Hat Advanced Server 2.1 (kernel 2.4.9-e.3 or 2.4.9-e.3smp) **NOTE:** Only out-of-the-box kernels are supported.
Topology	Fibre Channel Switched (FC-SW) Fibre Channel Arbitrated Loop (FC-AL)
SCSI Protocol	SCSI-3
Failover Mode	Transparent
Host Mode	SUN
Disk Space	80 MB

Table 6: Minimum System Requirements (Continued)

Adapter Compatibility	*StorageWorks* PCI FC HBA 167433-B21, HBA driver Version 6.0.2, Firmware Version 2.01.27
	StorageWorks 64-bit, 2 Gbps PCI-X FC HBA 3R-A3751-AA (281541-B21) HBA driver V6.0.2, Firmware loaded from driver, BIOS Version 1.33
	NOTE: HBA driver V6.0.2 is used on all HBAs and storage systems and is downloadable from: http://h18007.www1.hp.com/storage/diskarrays-support.html

IMPORTANT:
NOTE: Blade server ProLiant BL20p is shipped with an in-built HBA driver version 6.0.2, Firmware Version 1.33.

Notes:

Linux kernel Version 2.4 is the minimum required for array controllers using ACS Version 8.7 software.

Driver Installation

The driver required for successful operation of the array controller with Linux is included in the HPqla2x00-v6.0.2.rpm RPM file. Through executing the install_stgwks script in the <cdrom mount point>/agents directory on the Solution Software CD-ROM, you install the driver module and the driver source. The driver sources are installed into the /var/local/HPqla2x00 directory.

Host Adapter BIOS Settings

A key aspect of proper operation of the *StorageWorks* QLA2x00 HBA with the array controller is properly setting up the HBA BIOS.

StorageWorks QLA2x00 Fibre Channel HBA BIOS provides a means of controlling HBA operation. The HBA BIOS is configured through the FAST!UTIL utility, which is invoked by pressing **<ALT-Q>** during QLA2x00 BIOS initialization.

There is no difference between the settings suggested for Alpha systems and Intel systems. Alpha systems use an Intel machine to set the FAST!UTIL settings, as there is no program available to set the NVRAM settings on Alpha. While the *StorageWorks* QLA2x00 HBA is a 64-bit PCI card, testing on a standard Compaq DeskPro EN has shown it will fit in a 32-bit slot if installed carefully.

Table 7 and Table 8 describe the correct settings to use for operating the HBA with the array controller in FC-SW Mode.

Table 7: Host Adapter BIOS Settings in FC-SW Mode

Setting	Default Value	Suggested Value
Host Adapter BIOS	Disabled	Disabled
Frame Size	1024	2048
Loop Reset Delay	5 seconds	5 seconds
Adapter Hard Loop ID	Disabled	Disabled
Hard Loop ID	0	0

Table 8: Advanced Host Adapter BIOS Settings in FC-SW Mode

Setting	Default Value	Suggested Value
Execution Throttle	16	16
Fast Command Posting	Enabled	Enabled
> 4 Gbyte Addressing	Disabled	Yes, if physical memory > 4 GB
LUNs per Target ID (see Note 1)	8	16
Enable LIP Reset	No	Yes
Enable LIP Full Login	Yes	Yes
Enable Target Reset	No	Yes
Login Retry Count	8	8
Port Down Retry Count	8	64
Drivers Load RISC Code	Yes	Yes
Enable Database Updates	No	No
Disable Database Load	No	No
IOCB Allocation (see Note 2)	256	8
Extended Error Logging	Disabled	Disabled

NOTE:

1. This is the maximum number of LUNs the HBA will see per controller. You can safely modify this to a lower number to correspond with the number of units you make on your storage system. A higher number will not adversely impact your operation, and it will give you room to add more units although there is a maximum number of LUNs. See the documentation that came with your storage system. For example: A setting of 64 will let you see units D1-D63 on port 1 and D101-163 on port 2.

2. Setting this value too high may seriously impact the performance of your storage system. Change these suggested settings at your own risk.

Table 9 and Table 10 describe the correct settings to use for operating the HBA with the array controller in FC-AL Mode.

Table 9: Host Adapter BIOS Settings in FC-AL Mode

Setting	Options	Suggested Value
Host Adapter BIOS	Enabled or Disabled	Disabled
Frame Size	512, 1024, 2048	2048(*)
Loop Reset Delay	0-15 seconds	5 seconds
Adapter Hard Loop ID	Enabled or Disabled	Enabled
Hard Loop ID	0-125	125(*)

Table 10: Advanced Host Adapter BIOS Settings in FC-AL Mode

Setting	Options	Suggested Value
Execution Throttle	1-256	16
Fast Command Posting	Enabled or Disabled	Enabled
> 4 Gbyte Addressing	Enabled or Disabled	Disabled
LUNs per Target ID	0,8,16,32,64,128,256	16(*)
Enable LIP Reset	Yes or No	Yes(*)
Enable LIP Full Login	Yes or No	Yes
Enable Target Reset	Yes or No	Yes(*)
Login Retry Count	0-255	8
Port Down Retry Count	0-255	8
Drivers Load RISC Code	Enabled or Disabled	Enabled
Enable Database Updates	Yes or No	No
IOCB Allocation	1-512 buffers	8(*)
Extended Error Logging	Enabled or Disabled	Disabled

NOTE: Settings in the Suggested Value column that are marked with an asterisk (*) are non-default settings.

The following list provides additional detail on the Host Adapter BIOS Settings described in Table 7 through Table 10 above:

- **Host Adapter BIOS**—When this setting is disabled, the ROM BIOS on the QLA2x00 board is not loaded into memory. For operation with the array controller, this setting should be *Disabled*.

- **Frame Size**—This setting specifies the maximum frame length supported by the QLA2x00 board. For best operation with the array controller, this option should be set to *2048*.

- **Loop Reset Delay**—After resetting the loop, the firmware refrains from initiating any loop activity for the number of seconds specified in this setting. The default value of *5* seconds works well with the controller, allowing sufficient time for the loop to stabilize after a reset.

- **Adapter Hard Loop ID**—This setting forces the adapter to use the Target ID specified in the Hard Loop ID setting. This setting should be *Enabled*.

- **Hard Loop ID**—The adapter will attempt to use the value in this setting if the Adapter Hard Loop ID is enabled. The correct setting for usage with the array controller is *125* for the first HBA in the loop, and *124, 123, and 122* for HBA number 2 through 4. See the accompanying *HSG80 ACS Solution Software Version 8.7 Installation and Configuration Guide*, for more information on the mapping of SCSI Target IDs to Arbitrated Loop Physical Addresses (AL_PAs).

The following list provides additional detail on the Advanced Host Adapter BIOS Settings described in Table 7 and Table 9 above:

- **Execution Throttle**—This setting specifies the maximum number of commands executing on any one port. When a port's execution throttle value is reached, no new commands are executed until the current command finishes execution. The default value of *16* has been shown to work well with the array controller.

- **Fast Command Posting**—This setting decreases command execution time by minimizing the number of interrupts. This setting should be *Enabled*.

- **> 4 Gbyte Addressing**—Enable this setting if your system has more than 4 GB of physical memory.

- **LUNs per Target ID**—This setting specifies the number of LUNs per Target ID, which will be presented by the QLA2x00. This setting is critical for mapping all the LUNs that are presented by the array controller. When using both ports, the array controller presents up to 100 LUNs per Target ID and 2 Target IDs. Under normal circumstances, a setting of *16* is sufficient; this provides support for using Unit Numbers D1-D63 on port 1, and Unit Numbers D101-D163 on port 2.

- **Enable LIP Reset**—This setting determines the type of loop initialization process (LIP) reset that is used when the operating system initiates a SCSI bus reset. When set to *Yes*, the driver initiates a global LIP reset to clear target device reservations. When set to *No*, the driver initiates a global LIP reset with full login. This option should be set to *Yes*.

- **Enable LIP Full Login**—This setting instructs the ISP2100 chip to re-login all ports after any LIP. This should be set to *Yes*.

- **Enable Target Reset**—This setting instructs the driver to issue a Target Reset to all devices on the loop when a SCSI Bus Reset command is issued. This should be set to *Yes*.

- **Login Retry Count**—This setting specifies the number of times the software tries to log in to a device port before issuing a port down status. This should be set to *8* retries.

- **Port Down Retry Count**—This setting specifies the number of times the software retries a command to a port returning "port down" status prior to aborting the command. This should be set to *8* retries.

- **Drivers Load RISC Code**—When enabled, the HBA accepts the RISC firmware from the driver. For the *qla2x00* driver, set this option to *Yes*.

- **Enable Database Updates**—This setting allows the software to save the loop configuration information in Flash Memory when the system powers down. This can be left at *No*.

- **IOCB Allocation**—This setting specifies the maximum number of I/O Control Buffers allocated from the firmware's buffer pool for any one port. This setting is also used by the *qla2x00* driver to set the Tagged Command Queue depth for each LUN. This setting should be set to *8 buffers*.

  IMPORTANT: Setting this value too high may have adverse effects on system performance with a large number of LUNs.

- **Extended Error Logging**—This setting provides additional error and debug information to the operating system. This value can be left at *Disabled*, unless serious problems are occurring on your system.

StorageWorks Command Console

SWCC Version 2.5 is included in this release. Version 2.5 is used to identify the SWCC suite of components.

SWCC provides a graphical user interface that can be used to configure and monitor your storage system. Use of SWCC is highly recommended, but not required. The SWCC Agent is installed as part of the Solution Software Kit.

For more information on SWCC installation, see the *HSG80 ACS Solution Software Version 8.7 Installation and Configuration Guide*. For more information on SWCC Client operation, see the *Command Console Version 2.5 User Guide* and the *Command Console Version 2.5 Release Notes*.

SWCC Scalability

- The SWCC Client can monitor up to 128 host systems, each with up to 32 storage systems, for a maximum of 4096 concurrent storage connections and a total of 2.65 PB of storage.
- One Agent can support up to 32 Clients.

Multiple Agents

This Solution Software Kit contains an SWCC Agent that supports controller locking during CLI command execution, which allows support for multiple Agents. This locking feature is required in order to use the Management Appliance in addition to the host-based SWCC Agent. However, it is not recommended or required to use multiple Agents for any other purpose.

NOTE: SWCC Agent Version 2.3.2, Build 79 or higher supports the locking feature. This release of Solution Software exceeds this requirement.

Multiple Management Sessions

Though multiple clients can be used to monitor your storage system, *StorageWorks* recommends that only one instance of storage system management be active at a time. The client does allow for multiple management sessions, but there are no ownership rights given to any particular session. Without a highly coordinated effort, multiple management sessions can undermine the integrity of system maintenance. This same principle applies to multiple management sessions initiated through the Management Appliance as well.

Layered Software Applications

Compatibility with *StorageWorks* layered software applications is defined in Table 11.

Table 11: Layered Application Compatibility

Application	Version	Supported ACS Variants
Storage Resource Manager (SRM)	Version 4.0B	Version 8.7F
Management Appliance	Version 1.0C	Version 8.7F/S
Storage Allocation Reporter	Version 1.0D	Version 8.7F

In cases where ACS functional builds other than Version 8.7F are required, ensure that all necessary components for those configurations are at the proper level prior to upgrading your ACS code.

For more information on these and other Storage Management software, see the product documentation that comes with the product, or visit the following *StorageWorks* website:

http://h18006.www1.hp.com/storage/software.html

ACS Feature Support

The following sections provide details for specific ACS features.

Maximum Host Connections

The maximum number of host connections is 96 for the table of known connections. A connection is unique to the node WWN, port WWN, and controller port. This table is maintained in the NVRAM of the controller. If the table contains 96 entries, new connections cannot be added unless unused entries are deleted. Otherwise, a host attempting FC login is rejected from becoming a connection into the connection table, but not necessarily from the fabric.

Disk Partitioning

ACS allows partitioning of disk drives or storagesets for improved device management. A partition appears to the operating system as a single virtual disk. Up to eight partitions may be created per storageset or disk drive. Disk partitioning is supported under all failover modes supported by your operating system.

SNAPSHOT

ACS with SNAPSHOT capability provides a quick and efficient way to make a point-in-time copy of a storage container's data. SNAPSHOT freezes a map of the container's data, which can be separated and used for backup or testing and manipulation without having an impact on the original data. After the SNAPSHOT, the original data can continue to be updated and utilized while the SNAPSHOT copy remains unchanged.

When the need for the duplicate copy of data has ended, a new snap of a different storage container can be made and the process repeated. SNAPSHOT eliminates much of the overhead associated with mirroring and cloning since the SNAPSHOT is dissolved without having to re-merge the data.

SNAPSHOT is enabled when the following CLI command is entered:

```
HSG80> ADD SNAPSHOT_UNITS
```

See the *HSG80 Array Controller ACS Version 8.7 CLI Reference Guide* for additional syntax details.

The SNAPSHOT unit can be presented to the host. The SNAPSHOT unit remains until it is deleted.

NOTE: SNAPSHOT functionality requires ACS Version 8.7S.

IMPORTANT: ACS SNAPSHOT capability requires 512 MB of cache memory.

Dynamic Volume Expansion

Dynamic Volume Expansion creates a specialized volume called a concatset (short for concatenation set) from a storageset that was given a unit number. Another storageset can then be added to the concatset by using the SET CONCATSET command. See the *HSG80 Array Controller ACS Version 8.7 CLI Reference Guide* for syntax details.

Dynamic Disks

The use of SNAPSHOTs and SNAPCLONEs in Compaq SANs is not supported in a Windows 2000 environment if the SNAPSHOT or SNAPCLONE is presented to the same Windows 2000 host as the LUN from which the SNAPSHOT or SNAPCLONE was created. SNAPSHOTs and SNAPCLONEs are features of the HSG80 and HSV110 controller based Compaq Storage systems. All Dynamic disks on a system have information in their metadata about the other dynamic disks that exist on the system. When Windows is presented with 2 dynamic disks that have the same information on them, it does not have code to resolve the conflict.

Configuration Rules

The following list defines maximum configuration rules for the controller:

- 128 visible LUNs/200 assignable unit numbers

  — In SCSI-3 mode, if the CCL is enabled, the result is 126 visible LUNs and two CCLs.

- 1.024 TB storageset size

- 96 host connections

- 84 physical devices

- 20 RAID 3/5 storagesets

- 30 RAID 3/5 and RAID 1 storagesets (see Note)

- 45 RAID 3/5, RAID 1, and RAID 0 storagesets (see Note)

  NOTE: For the previous two storageset configurations, this is a combined maximum, limited to no more than 20 RAID 3/5 storagesets.

- 8 partitions of a storageset or individual disk

- 6 physical devices per RAID 1 storageset (mirrorset)

- 14 physical devices per RAID 3/5 storageset (RAIDset)

- 24 physical devices per RAID 0 storageset (stripeset)

- 45 physical devices per RAID 0+1 storageset (striped mirrorset)

Operating Constraints

This section describes the operating constraints for ACS Version 8.7. An operating constraint is a limitation placed on the operation of the controller. Other constraints on host adapters or other system components may also apply. Keep these constraints in mind to avoid problems and to help achieve the maximum performance from your controller. See the documentation that came with your host server for more details.

External Cache Battery

StorageWorks recommends that you replace the External Cache Battery (ECB) every two years to prevent battery failure.

If you are shutting down your controller for longer than one day, complete the additional steps in "Shutting Down the Subsystem" in the *HSG80 Array Controller ACS Version 8.7 Maintenance and Service Guide*. This prevents the ECB from discharging during planned power outages.

Dual External Cache Battery Failures

The array controller cache policy provides for proper handling of a single ECB failure as described in the *HSG80 Array Controller ACS Version 8.7 Troubleshooting Reference Guide*. For dual ECB failures, it states that no failover occurs. For this release, if a dual ECB failure is detected, both controllers are restarted.

Command Console LUN Usage

In order to avoid access conflicts between the *sg* and *sd* drivers, the Access Device used for SWCC Agent communication *must not* be an *sd* device. Please ensure that the sg device used does not have an *sd* device mapped to the same LUN. The best way to verify this is to use *scsi_info* on the *sg* device to verify that its Target ID/LUN combination has a Logical Unit Number value of 0 (zero). With the array controller operating in SCSI-3 mode, the CCLs are always mapped to Logical Unit Number 0.

Using FRUTIL to Insert a New Controller

When using FRUTIL to insert a new controller in a dual-redundant controller configuration, you see a new set of instructions after the new controller was inserted:

If the other controller did not restart, follow these steps:

1. Press and hold the **Reset** button on the other controller.

2. Remove and re-insert the program card for the other controller.

3. Release the **Reset** button.

NOTE: Whenever you are running FRUTIL you must quiesce all I/O.

Saving Your Configuration

When enabled, the SAVE_CONFIGURATION function allows you to do the following (supported on single controller configurations only):

- Save a configuration to a disk or storageset. The configuration may be retrieved later and downloaded onto a replacement controller.

- Retain code patches to the ACS software.

Saving a Configuration to Previously Initialized Storagesets

If any storageset within the configuration was previously initialized with the INITIALIZE *container-name* SAVE_CONFIGURATION command to save your configuration to disk, it is not necessary to reconfigure your devices with a new controller. SAVE_CONFIGURATION also retains code patch information to the software. This option is supported on single controller configurations only.

ACS Version 8.7 saves any installed software patches on disks initialized with the SAVE_CONFIGURATION command. To replace a controller and restore the configuration from a disk, you do not have to reinstall any software patches.

Configuration information cannot be retrieved from storagesets created on other HSx controllers (for example, HSD, HSJ, or HSZ controllers). You can only restore a configuration from a configuration saved on this or another HSG80 array controller.

Avoiding Problem Situations

Under certain conditions, you may experience unusual array controller behavior. This section presents information to help you avoid such situations and to recover from them if they occur.

Adding, Moving, and Changing Devices

The array controller maintains a configuration map of device types and locations. This map is used to communicate with devices. If you add, move, or change a device while the array controller is powered off without first changing the array controller configuration, the array controller is not able to communicate with the changed device when it returns to service.

If a device is removed by mistake while the array controller is off, delete all containers associated with the removed device after power was restored to the array controller.

If a device is replaced while the array controller is off, install the replacement device before restoring power to the array controller. Once power is restored, use the DELETE DISK CLI command to remove the disk from the configuration. Then use the ADD DISK CLI command to add the new device. This correctly removes the failed device and adds the new device after restoring power to the array controller.

See the *HSG80 Array Controller ACS Version 8.7 CLI Reference Guide* for details on CLI command usage and syntax.

See the *HSG80 Array Controller ACS Version 8.7 Maintenance and Service Guide* for correct device removal and addition procedures.

Moving Storagesets

Move only *normal* storagesets. Do not move storagesets that are *reconstructing* or were *reduced*.

$\triangle$ **CAUTION:** Ensure all storagesets are in *normal* mode prior to moving them, or data corruption occurs.

Replacing Array Controllers, Cache Modules, or External Cache Battery Storage Building Blocks

You can replace the array controller, cache module, or external cache battery (ECB) storage building block (SBB) while the storage system is shut down. However, you must enter the SHUTDOWN THIS_CONTROLLER command prior to shutting down the storage system in order to make configuration changes. If two array controllers are configured in a dual-redundant configuration, you must first enter the SHUTDOWN OTHER_CONTROLLER command.

These commands instruct the array controllers to flush all unwritten data from the cache modules and discontinue all I/O activity. For more information regarding the SHUTDOWN controller command, see the *HSG80 Array Controller ACS Version 8.7 CLI Reference Guide*. For information on maintenance and replacement of the array controller, cache module, and external cache battery, see the *HSG80 Array Controller ACS Version 8.7 Maintenance and Service Guide*.

Unit Offsets

Setting unit offsets requires a bus rescan using probe-luns or lmgr utilities for the newly set offsets to take effect.

Linux Server Workaround

Before installing the Solution Software Kit, kernel sources and header files must be reinstalled or the kit will not install properly. To install the files, type the following commands:

```
rpm -e kernel-source-2.4.x
rpm -e kernel-headers-2.4.x
rpm -i kernel-source-2.4.x
rpm -i kernel-headers-2.4.x
```

NOTE: This procedure applies to all versions of Linux.

Host Operating System Notes

The following section lists host-specific operating notes.

QLA2x00 Adapter Driver Package

The RPM, **qla2x00-6.0.2-5.Redhat-AS-2-1.i386.rpm**, contains the adapter driver that supports the HP Fibre Channel adapters on Red Hat Advanced Server 2.1. The RPM contains the driver source code, precompiled modules for the base kernel of Red Hat Advanced Server 2.1, and system startup scripts.

The driver revision in this RPM is 6.0.2. This procedure applies to ProLiant blade servers only.

Install and Uninstall

To install the qla2x00 RPM, follow the directions that are in the Rapid Deployment Pack User Guide for deploying RPMs to a ProLiant server. You can also copy the qla2x00.rpm file to your system by typing the command:

```
# rpm -i  qla2x00-6.0.2-6.Redhat-AS-2-1.i386.rpm
```

To remove the qla2x00 package, type the command:

```
# rpm -e qla2x00
```

Components of QLA2x00

Driver Source Code

The driver source code is located in the `/opt/hp/storage_drivers/qla602/src` directory. You may need to compile new driver modules if you rebuild your kernel. It is recommended that you use the `hp_fccfg.sh` script in the fibreutils RPM.

NOTE: You must have the kernel sources for the current kernel installed to proceed with the driver module recompilation.

However, if you want to rebuild the driver modules manually, perform the following steps:

1. Change the directory to `/opt/hp/storage_drivers/qla602/src`

2. Remove any previously compiled drivers by typing the command:

   make -f makefile.nonsp clean

3. Compile the driver modules by typing the command:

   make -f makefile.nonsp SMP=x

   where x=0 if you are using a uni-processor machine or x=1 if you are using an SMP machine.

4. Copy the qla2200.o and qla2300.o files to the `/lib/modules/<kernel version>/kernel/drivers/scsi` directory.

5. Reload the qla2200 and qla2300 modules or reboot your server.

Precompiled Driver Binaries

Included in the RPM are precompiled qla2200 and qla2300 driver modules. The modules were compiled for the 2.4.9-e.3 kernel, which should be the base kernel with the Red Hat Advanced Server distribution. The RPM installer will attempt to load the precompiled modules when the RPM is installed. If the driver load fails for some reason, you can also recompile the driver modules for your environment by following the steps above.

System Startup Scripts

Also included in the RPM are system startup scripts which are copied into the `/etc/rc.d/init.d` directory. There are also links created from the startup scripts to the `/etc/rc.d/rcX.d` directories. Links are created and driver modules are started when the system is processing the specific run-level startup directory.

Fibreutils Utilities

The RPM, `fibreutils-1.0.0-5.i386.rpm`, contains assorted utilities that complement the qla2x00 driver package.

Fibreutils contains two major utilities:

- hp_fccfg.sh
- probe-luns

The `hp_fccfg.sh` script allows you to recompile the driver if needed and change the default queue depth for disk devices attached to a qla2200 series or qla2300 series fibre channel adapter. Probe-luns solves the problem of non-consecutive LUNs.

Install and Uninstall

To install the fibreutils RPM, follow the directions that are in the Rapid Deployment Pack User Guide for deploying RPMs to a ProLiant server. The fibreutils RPM can also be installed by copying the .rpm file to your system and typing the command:

```
# rpm -i fibreutils-1.0.0-5.i386.rpm
```

To remove the fibreutils package, type the command:

```
# rpm -e fibreutils
```

Components of Fibreutils

Here is a more detailed description of each component.

Hp_fccfg.sh

The `hp_fccfg.sh` script allows you to recompile the qla2200.o and qla2300.o modules, invoke the probe-luns script, and change the default queue depth of the disk devices attached to a qla2200 or qla23xx adapter. To use this script, you must have the qla2x00 driver RPM installed on your system, as well as the kernel sources.

1. Start the script by typing the command:

   ```
   # hp_fccfg.sh
   ```

The Main Menu is displayed.

2. To recompile the driver, choose **Recompile QLA Driver**.

The **Recompile and Reload QLA Driver Menu** is displayed.

Menu options **Compile SMP QLA Single Path Driver** and **Compile Non-SMP QLA Single Path Driver** compile the qla2200.o and qla2300.o modules and place them in the correct directory to be used by `insmod`. Any change to driver module files, such as copying, are displayed in the `/var/log/messages` file.

3. Return to the Main Menu by choosing the **Back to Main Menu** option.

4. To invoke the different probe-luns options, choose **LUN Rescan Options** from the Main Menu.

The **LUN Rescan Options Menu** is displayed.

The most useful options are **Show Adapters in System** and **Probe for LUNs**.

- The **Show Adapters in System** option shows all SCSI subsystem adapters on your server.

- The **Probe for LUNs** option is the best option to scan for non-consecutive LUNs.

5. Choose the **Probe for IDs** option from the Main Menu to change the default queue depth of the qla2200 and qla2300 modules when the modules are loaded at boot time.

When you choose the **Probe for IDs** option, the current default queue depth is displayed.

6. Enter the new queue depth number when prompted for a response.

Probe-LUNs

The purpose of the probe-luns script is to configure non-consecutive LUNs that are seen through a qla2200 or qla23xx adapter.

NOTE: the probe-luns script does NOT do dynamic LUN discovery. The script should be invoked from the command-line as follows:

    # probe-luns <options>

The two most useful options are:

- `-a` displays a list of available adapters to scan

- `-l` scan adapters by LUNs

    NOTE: This is the preferred method of scanning for non-consecutive LUNs.

The probe-luns script is run automatically at system startup through the use of startup scripts in `/etc/init.d`.

Selective Storage Presentation (SSP) on SuSE SLES-7

A server reboot is required after using Selective Storage Presentation (SSP) to grant host access to a LUN.

Host Operating System Support of Multi-Bus Failover

Although the array controller has the capability to support multi-bus failover, the Linux operating system does not currently support this feature.

Documentation Anomalies

The following are known additions and corrections to the *HSG80 ACS Solution Software Version 8.7 Installation and Configuration Guide*.

- Under "What is the Command Console LUN?" on page 1-9, the last sentence of the first paragraph should read, "The HSG80 uses SCSI-3 with your platform."

- The "Minimum System Requirements" found on page 3-8 are incorrect. See "System Components", page 20, for corrected data.

- Under "Installing Linux Platform Kit Packages" on page 3-9, the last sentence of the last paragraph should read, "The install_stgwks program directs you through several screens to check and configure your system."

- Under "Plug in the FC Cable and Verify Connections" on page 5-17, step 16, the example should read, "SET ANGEL1A1 OPERATING_SYSTEM=SUN" as a display result.