

Compaq StorageWorks

Release Notes

HSG60 Enterprise/Modular Storage RAID Array Fibre Channel Solution Software Version 8.6 for Windows NT and Windows 2000

These Release Notes contain last-minute and supplemental information about the HSG60 Enterprise/Modular Storage RAID Array Fibre Channel Solution Software Version 8.6 for Windows NT and Windows 2000.

Be sure to read these Release Notes before installing your Enterprise/Modular Storage RAID Array. In the event of conflicting information between these Release Notes and other documents contained in this product release, the Release Note content takes precedence. Product documentation is periodically updated and available on the Compaq Website:

<http://www.compaq.com/storage/index.html>

Third Edition (June 2001)
Part Number: AA-RMBGC-TE
Compaq Computer Corporation

2 *HSG60 Enterprise/Modular Storage RAID Array Fibre Channel Solution Software Version 8.6 for Windows NT and Windows 2000*

© 2001 Compaq Computer Corporation.

Compaq, the Compaq logo, and StorageWorks Registered in U. S. Patent and Trademark Office.

SANworks, Tru64 UNIX, and OpenVMS are trademarks of Compaq Information Technologies Group, L.P. in the United States and other countries.

Microsoft, MS-DOS, Windows, Windows NT and Windows 2000 are trademarks of Microsoft Corporation in the United States and other countries.

Intel, Pentium, Intel Inside, and Celeron are trademarks of Intel Corporation in the United States and other countries.

Motif, OSF/1, UNIX, the "X" device, IT DialTone, and The Open Group are trademarks of The Open Group in the United States and other countries.

All other product names mentioned herein may be trademarks of their respective companies.

Confidential computer software. Valid license from Compaq required for possession, use or copying. Consistent with FAR 12.211 and 12.212, Commercial Computer Software, Computer Software Documentation, and Technical Data for Commercial Items are licensed to the U.S. Government under vendor's standard commercial license.

Compaq shall not be liable for technical or editorial errors or omissions contained herein. The information in this document is provided "as is" without warranty of any kind and is subject to change without notice. The warranties for Compaq products are set forth in the express limited warranty statements accompanying such products. Nothing herein should be construed as constituting an additional warranty.

Compaq service tool software, including associated documentation, is the property of and contains confidential technology of Compaq Computer Corporation. Service customer is hereby licensed to use the software only for activities directly relating to the delivery of, and only during the term of, the applicable services delivered by Compaq or its authorized service provider. Customer may not modify or reverse engineer, remove, or transfer the software or make the software or any resultant diagnosis or system management data available to other parties without Compaq's or its authorized service provider's consent. Upon termination of the services, customer will, at Compaq's or its service provider's option, destroy or return the software and associated documentation in its possession.

Printed in the U.S.A.

HSG60 Enterprise/Modular Storage RAID Array Fibre Channel Solution Software Version 8.6 for Windows NT and Windows 2000

Third Edition (June 2001)

Part Number: AA-RMBGC-TE

Release Notes Contents

These release notes include the following topics:

- [Document Catalog, page 3](#)
- [Intended Audience, page 5](#)
- [Conventions, page 5](#)
- [Release Package Contents, page 5](#)
- [Important Notice Regarding Cache Sizes, page 6](#)
- [Identifying ACS Software Revision Level, page 6](#)
- [Using the Array Controller in a Modular Solution, page 7](#)
- [Hardware and Software Support, page 10](#)
- [New Features, page 15](#)
- [ACS Feature Support, page 20](#)
- [Configuration Rules, page 20](#)
- [Operating Constraints, page 21](#)
- [Saving Your Configuration, page 23](#)
- [Avoiding Problem Situations, page 23](#)
- [Host Operating System Notes, page 25](#)
- [Documentation Anomalies, page 27](#)

Document Catalog

To view and access product documentation included with your StorageWorks Solution Software CD-ROM, open the *manuals.pdf* file found on your CD-ROM. This file serves as a catalog and provides links to all manuals and documents included on your CD-ROM. Multiple document search functionality is also provided through the use of this catalog file.

NOTE: All provided documents are included in the *document* folder of your CD-ROM, should you choose to access them directly.

Release Notes (such as the document you are now reading) are not included on the CD-ROM. This is by design and allows for last minute changes that become available after documents go to press.

IMPORTANT: Please see the “Documentation Anomalies” Section of these Release Notes for any last minute corrections or additions to the provided documentation set.

To view Portable Document Format (PDF) files you need Adobe Acrobat Reader Version 4.05 or higher. If you do not have this program installed, you can install it from the *acrobat* folder on your CD-ROM. See the *readme.txt* file in the *acrobat* folder for more information.

To take best advantage of the multiple document search functionality, we highly recommended that you install the Windows based Acrobat Reader and launch it as a separate application (rather than through a browser).

NOTE: If you choose to access the *manuals.pdf* catalog file through a browser, an up to date Acrobat Reader plug-in is required if you wish to utilize search functionality. However, there may be instances where search results will not display when run from within your browser.

NOTE: There may sometimes be a problem with mounting the catalog index when using Acrobat Readers. In order to take full advantage of the multiple document search functionality, you may need to manually mount the search index on a per session basis. The following steps outline this procedure:

1. After launching the Acrobat Reader, load the *manuals.pdf* catalog file.
2. If you see the error message “The index associated with this document <index> is not available,” click OK to clear the message and proceed to the next step.
If this error message does not appear, your index has been mounted correctly and this procedure does not apply.
3. From the Edit Menu, select Search > Select Indexes.
4. From the Index Selection dialogue, click the Add button.
5. Enter the path to the *index.pdx* file.
For Windows based readers, this is typically:
`\acrobat\index.pdx`
6. Click OK to accept this selection.
7. Making sure the newly added index is selected in the Index Selection dialogue, click OK to exit.

The catalog search function will now operate normally.

Intended Audience

This document was prepared for customers who have purchased Compaq StorageWorks Enterprise/Modular Storage RAID Array products that include Compaq StorageWorks HSG60 RAID Array Controller.s. This document also serves as a reference for Compaq Customer Services personnel responsible for installing and maintaining systems that include the Compaq StorageWorks HSG60 RAID Array Controller.

Conventions

The following terminological conventions are used throughout this document:

- Unless otherwise specified, all references to controllers or array controllers should be interpreted as the Compaq StorageWorks HSG60 RAID Array Controller.
- Unless otherwise specified, all references to Compaq StorageWorks ACS Version 8.6 should be interpreted as synonymous with the released Compaq StorageWorks ACS Version 8.6-1 code.
- For the purpose of this document Enterprise/Modular Storage RAID Array refers to the following Compaq StorageWorks RAID Array products:
 - MA6000 - Modular Array 6000 Fibre Channel

Release Package Contents

The HSG60 Fibre Channel Solution Software Kit consists of the following:

- The HSG60 Solution Software documentation set:
 - *HSG60 ACS Solution Software Version 8.6 for Windows NT and Windows 2000 Installation and Configuration Guide*
 - *HSG60 Array Controller ACS Version 8.6 CLI Reference Guide*
 - *HSG60 Array Controller ACS Version 8.6 Maintenance and Service Guide*
 - *HSG60 Array Controller ACS Version 8.6 Troubleshooting Reference Guide*
 - *Command Console Version 2.4 User Guide*
 - *Command Console Version 2.4 Release Notes*
 - *StorageWorks Registration and Warranty Package*
 - *Enterprise/Modular Storage RAID Array Fibre Channel Cluster for Windows NT/Windows 2000 Installation Guide*

6 *HSG60 Enterprise/Modular Storage RAID Array Fibre Channel Solution Software Version 8.6 for Windows NT and Windows 2000*

- *HSG60 Enterprise/Modular Storage RAID Array Fibre Channel Solution Software Version 8.6 for Windows NT and Windows 2000 Release Notes* (this document)
- *HSG60 Enterprise/Modular Storage RAID Array Fibre Channel Solution Software Version 8.6 for Windows NT and Windows 2000 CD-ROM*

The following supporting documentation is available from the Compaq StorageWorks Website:

<http://www.compaq.com/storage/index.html>

- *Heterogeneous Open SAN Design Reference Guide, Part Number: AA-RMPNB-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*
- *Installing the Integration Patch for Compaq Insight Manager and ACS Version 8.6 or Later*

Important Notice Regarding Cache Sizes

Due to the increased host connectivity delivered with ACS Version 8.6, it is very important that users observe new cache size requirements. When upgrading from ACS Version 8.5 to ACS Version 8.6, it is critical that minimum cache module configurations be upgraded from the prior minimum of 64 MB (ACS 8.5) to 128 MB in unmirrored configurations, and 256 MB in mirrored configurations.

Identifying ACS Software Revision Level

The Array Controller Software (ACS) release package you received should include a Personal Computer Memory Card Industry Association (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 installed, you can identify the specific version of ACS by entering the following command at the Command Line Interpreter (CLI) prompt:

```
SHOW THIS_CONTROLLER
```

The resulting display lists the software revision level as follows:

V86L-1

If the ACS version is not Version 8.6L-1, contact your support provider for instructions on how to obtain the correct version.

Using the Array Controller in a Modular Solution

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 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 each 3U. This combination allows for several cabinet configurations.

NOTE: If you wish to use an existing controller, it will require the Cache Bulkhead upgrade for installation of the controller in the Model 2200.

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

Disk Enclosures

The array controller firmware can now address up to 14 disks per SCSI bus. The firmware can see seven disks on each bus allowing use of all 14 when configured for dual bus mode with the 4354 disk shelf. The maximum number of disks supported by an array controller (single or cooperating pair) is 28. The disk enclosures can be configured for single bus or for dual bus.

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

Single Bus Mode

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

Dual Bus Mode

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

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 for connection of the 43xx shelves to the Model 2200 enclosure. The following SCSI cables are supported.

SCSI Cable Options/Dual Bus Mode	Part Number
1 M SCSI Cable	168256-B21
2 M SCSI Cable	168258-B21
3 M SCSI Cable	189505-B21

SCSI Cable Options/Dual Bus Mode	Part Number
5 M SCSI Cable	400983-005
10 M SCSI Cable	400983-010

Modular Solution

The Modular Array/Enterprise Modular Array storage systems can be ordered three ways.

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

- MA6000: One Model 2200 controller enclosure and three dual bus Model 4354 disk enclosures in a 22U Modular Storage Cabinet

NOTE: The predefined models require the following options: Controllers, External Cache Batteries (ECBs), Controller firmware and drives.

- Configure-to-Order. This allows you to specify the number of controller shelves and drive shelves desired in a Modular Storage Cabinet.
- Assembly onsite. This 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 by this Fibre Channel Solution Software Kit:

- DS-SW600-AA—600-mm 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 rackmount 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, field-replaceable unit (FRU)
- DS-BA35X-HH—180-watt, 100 to 200-volt power supply, 240-volt, 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 1 at the indicated hardware and microcode levels.

Table 1 Supported Disk Drives

Part Number	Device/Model	Capacity in Gigabytes	Spindle Speed (RPM)	Minimum Microcode Version	Minimum Hardware Version
176494-B21	BC072638A2	72.8	10,000	BDC7	A01
176496-B22	BD03663622 BD0366349C BD036635C5	36.4	10,000	BDC4 3B02 B020	A01 A01 A05
180726-006	BD036735C8	36.4	10,000	B020	A01
188122-B22	BF01863644	18.2	15,000	3B01	A01
188120-B22	BF00963643	18.2	15,000	3B01	A01
180726-002	BD018635C4	18.2	10,000	B020	A01
180726-005	BD018735C7	18.2	10,000	B020	A01
128418-B22	BD018122C9	18.2	10,000	B016	A01
142673-B22	BD01862376 BD01862A67	18.2	10,000	BCJE B007	A01
388144-B22	BB01811C9C	18.2	7,200	3B05	A01
328939-B22	BD009122BA	9.1	10,000	3B07	A01
142671-B22	BD00962373 BD00962A66	9.1	10,000	BCJE B007	A01
180726-001	BD009635C3	9.1	10,000	B020	A01

Table 1 Supported Disk Drives (Continued)

Part Number	Device/Model	Capacity in Gigabytes	Spindle Speed (RPM)	Minimum Microcode Version	Minimum Hardware Version
180726-004	BD009735C6	9.1	10,000	B020	A01
123065-B22	BB00911CA0	9.1	7,200	3B05	A01

System Components

This Fibre Channel Solution Software Kit supports the system components and operating system versions listed in Table 2.

Table 2 Minimum System Requirements

Component	Requirement
Controller Compatibility	Compaq StorageWorks HSG60 Array Controller, ACS Version 8.6L
Platform	Intel and ProLiant X86 Servers
Operating System	Microsoft Windows NT 4.0, Service Pack 6A Microsoft Windows 2000, Service Pack 1 Microsoft Cluster Server
Topology	Fibre Channel Switched (FC-SW) and Arbitrated Loop (FC-AL) Modes
SCSI Protocol	SCSI-2, SCSI-3
Free Disk Space	5 MB
Adapter Compatibility	Compaq PCI FC Host Bus Adapter KGPSA-BC, HBA driver V4-4.52a8 (NT) or V5-4.52a8 (W2K), Firmware Version 3.20x7 Compaq PCI FC Host Bus Adapter KGPSA-CB, HBA driver V4-4.52a8 (NT) or V5-4.52a8 (W2K), Firmware Version 3.81a1

IMPORTANT: For switched fabric environments, use Compaq 8-EL SAN switches (DSGGC-AA) equipped with firmware Version 2.1.9g.

Notes

1. HsxDisk.sys and HszDisk.sys are required drivers for array controller configurations. The Solution Software CD-ROM that came with your kit includes the following versions of these drivers:
 - ❑ HszDisk.sys Version 4.4.0.9 for Windows NT 4.0
 - ❑ HsxDisk.sys Version 5.4.21 for Windows 2000
2. If you see a constantly blinking light on your Fibre Channel Switch, it's possible that the topology setting is set to loop mode in your server. To correct this, remove the existing installation of the Fibre Channel Software and reinstall the desired setup.

StorageWorks Command Console

StorageWorks Command Console (SWCC) Version 2.4 is included in this release. Version 2.4 is used to identify the SWCC suite of components. The Agent, a component of the SWCC product, is delivered at Version 2.3.2.

SWCC provides a graphical user interface that can be used to configure and monitor your storage subsystem. 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 Agent installation, see the *HSG60 ACS Solution Software Version 8.6 Installation and Configuration Guide*. For more information on SWCC Client installation and operation, refer to *Command Console Version 2.4 User Guide* and *Command Console Version 2.4 Release Notes*.

Additional platform-specific information is provided below.

SWCC Client Installation

The SWCC Client software is installed on your host system from the StorageWorks Solution Software CD-ROM.

1. Insert the Solution Software CD-ROM into the host system. A menu appears on your screen.
2. If the program does not start automatically after inserting the CD-ROM, go to the CD-ROM drive directory and run the `install.bat` file.
3. The installation program provides one primary option: Solution Software for ACS version 8.6.
 - a. If you are just installing SWCC, skip the driver upgrade screen.

14 *HSG60 Enterprise/Modular Storage RAID Array Fibre Channel Solution Software Version 8.6 for Windows NT and Windows 2000*

- b. Select SWCC to install.
- c. Choose “HSG80ACS85 Controller for ACS85 new” and complete the installation as prompted.

Secure Path Software

Secure Path is a high availability, multiple pathing software application. The versions of Secure Path software shown in Table 3 are compatible with this Solution Software Kit.

Table 3 Secure Path Compatibility

Operating System	Secure Path Product Version
Windows NT 4.0 Service Pack 6A	Versions 2.2.2, 3.1A
Windows 2000 Service Pack 1	Version 3.1A

For more information on Secure Path software, see the product documentation that comes with the product, or visit the Compaq Website:

http://www.compaq.com/products/storageworks/storage_mgmt_software.html

Layered Software Applications

Compatibility with Compaq StorageWorks and SANworks layered software applications is defined in Table 4.

Table 4 Layered Application Compatibility

Application	Version	ACS Requirement
Enterprise Volume Manager (EVM)	Version 1.1B	Version 8.6L
Storage Resource Manager (SRM)	Version 4.01	Version 8.6L
Command Scriptor	Version 1.0	Version 8.6L
Virtual Replicator	Version 2.0A	Version 8.6L
Management Appliance	Version 1.0A	Version 8.6L
Storage Allocation Reporter	Version 1.0	Version 8.6L

Running EVM with ACS Version 8.6L affords you scripting with Clones.

For more information on these and other Storage Management software, see the product documentation that comes with the product, or visit the Compaq Website:

http://www.compaq.com/products/storageworks/storage_mgmt_software.html

New Features

This section briefly defines new features that are supported by the array controller running ACS Version 8.6 code, together with this release of the Solution Software.

ACS Version 8.6

The following new feature enhancements are provided with ACS Version 8.6:

Drive Support

The following drive support enhancements have been added in the ACS Version 8.6L release.

- 72 GB drives in 10-slot 1.6 inch shelves
- Full 14-slot drive support per channel (MA/EMA Series arrays only)
- Storage set size increased to 1.024 TB
- Maximum of 28 drives behind controllers

Increased Host Connections

The maximum number of host connections has been increased from 64 to 96 for the table of known connections. A connection is unique to the node Worldwide Name (WWN), port WWN, and controller port. This table is maintained in the non-volatile memory (NVRAM) of the controller. If the table contains 96 entries, new connections cannot be added unless some older ones are deleted. Otherwise, a host attempting FC login will be rejected.

Rolling Upgrades

The ACS upgrade path has been reworked to provide more friendly and seamless operation. However, the documented process must be followed carefully to ensure a smooth transition. For more information on upgrade and downgrade procedures, refer to the *HSG60 Array Controller ACS Version 8.6 Maintenance and Service Guide*.

IMPORTANT: Due to the increased host connectivity delivered with ACS Version 8.6, it is very important that users observe new cache size requirements. When upgrading from ACS Version 8.5 to ACS Version 8.6, it is critical that minimum cache module configurations be upgraded from the prior minimum of 64 MB (ACS 8.5) to 128 MB in unmirrored configurations, and 256 MB in mirrored configurations.

CLI Commands

The following CLI commands have been added or enhanced in ACS Version 8.6:

```
ADD/SET UNIT
ADD/SHOW/DELETE PASSTHROUGH
EXIT
SET connection-name RESERVATION STYLE
SHOW ID
```

See the *HSG60 Array Controller ACS Version 8.6 CLI Reference Guide* for additional syntax details.

ACS Improvements

The following is a list of corrections included in ACS Version 8.6.

Corrections included in all variations of ACS Version 8.6:

- Excessive polling by using “show unit status” requests (with either the CLI or SWCC) caused the controller to periodically become unavailable (Code 02DD0101).
- Excessive polling of the controller by SWCC to obtain full status information sometimes resulted in controller unavailability with an “unable to allocate large sense buckets” message.
- Correction of forced errors encountered on RAID 3/5 storage units.
- Correction of controller unavailability due to deadman timer and (LED CODE 39).
- Correction of error code in conjunction with cache hardware failure.
- Improved performance in non-mirrored 8 KB mode.
- Correction of Unit attentions being logged inappropriately to the CCL, which sometimes caused controller unavailability (Codes 02F60103 and 43130100).

Multiple Agents Are Now Supported

This release of the Solution Software Kit contains an updated SWCC Agent, which supports locking, so multiple Agents can be supported. This feature is required to use the SAN Management Appliance in addition to the host-based Agent.

Large LUNs for Windows NT and Windows 2000

Enabling Large LUNs provides the ability for a Windows NT or Windows 2000 server to have access to LUNs beyond the 0-7 range, and to access more than 8 LUNs per target. The host can access unit D10 by leaving the connection offset at 0. The maximum amount of LUNs supported is 64. The LUNs can be contiguous or non-contiguous.

NOTE: Large LUNs are supported on Windows 2000 Server, Advanced Server and DataCenter. However, this Solution Software Kit does not provide comprehensive DataCenter documentation. Windows 2000 DataCenter is supported through a separate Solution Software Kit, which should be used in conjunction with that operating system.

Large LUN Utility for Windows

The Large LUN utility is available on your Solution Software CD-ROM. It is also available for download at:

<http://www.compaq.com/storage/index.html>

Support for EBS and Secure Path Software Update 2 is included as part of the Large LUN Utility for Windows. The utility automatically installs all necessary registry keys and parameters. The utility will need to be reinstalled if Secure Path software was installed after it.

Large LUNs is now supported on ACS Version 8.5 and higher running on an array controller. Large LUNs can be used in conjunction with Secure Path, DRM, EVM and EBS solutions. For limitations specific to these applications, please see that products' documentation.

Windows 2000

To enable Large LUNs on Windows 2000 requires creating several device specific registry keys located in:

\\KEY_LOCAL_MACHINE\System\CurrentControlSet\Control\ScsiPort\SpecialTargetList

18 *HSG60 Enterprise/Modular Storage RAID Array Fibre Channel Solution Software Version 8.6 for Windows NT and Windows 2000*

The format of these keys is:

- VendorID=8 characters
- ProductID=16 characters
- Revision=1 character truncated

Spaces are replaced by the underscore character. For example, the key would look like this:

DEC_____HSG60_____V

These keys have to match exactly. The string values for these keys are:

LargeLuns	REG_DWORD	1
DisconnectedLuns	REG_DWORD	1

NOTE: For Windows 2000, a file named `HsgCCL.inf` will be installed to automate the installation of the HSGx0 device, if you chose to configure the subsystem in SCSI-3 mode.

Windows NT

To enable Large LUNs on Windows NT requires only one registry parameter change. It is located in:

\\KEY_LOCAL_MACHINE\System\CurrentControlSet\Services\LP6NDS35

The string value for this key is:

LargeLuns	REG_DWORD	1
-----------	-----------	---

Secure Path

To enable Large LUNs on a host running Compaq SANworks Secure Path software, the registry has one parameter located in:

\\KEY_LOCAL_MACHINE\System\CurrentControlSet\Services\Raidisk\Parameters

The string value for this is:

MaximumLuns	REG_DWORD	64 (Decimal)
-------------	-----------	--------------

If a host has access to 64 LUNs, the LUN numbers must be between 0-63. See the latest Secure Path documentation for supported versions.

EBS

For Windows 2000, *cpqmdr.inf* is installed to the \\%systemroot%\inf folder to automate the installation of the Modular Data Router device.

DRM, EVM, Microsoft Clusters

Large LUN is fully supported with these products. See the documentation for each concerning restrictions or limitations.

Controller Configuration

It is recommended to set the SCSI_VERSION to SCSI-3 for maximum availability.

■ Multiple-Bus Failover Mode

Support for 64 LUNs (SCSI-2 mode) or 63 LUNs + 1 CCL (SCSI-3). These LUN numbers must be numbered between 0-63.

■ Transparent Failover Mode

Support for 64 LUNs (SCSI-2 mode) or 63 LUNs + 1 CCL (SCSI-3). These LUN numbers can range between 0-199.

The chart below indicates which cases Large LUNs is enabled.

	ACS Version 8.5		ACS Version 8.6	
	WNT	W2000	WNT	W2000
SCSI-2 LUN 0 present	Y	Y	Y	Y
SCSI-2 LUN 0 not present	N	N	N	Y
SCSI-3 LUN 0 always present	Y	Y	Y	Y

Y = functional

N = not functional

Known Limitations

In Windows 2000, if any LUN greater than 7 is removed and a subsequent disk rescan is performed, the “Found New Hardware” wizard may ask you to finish the installation of the device that was removed, and the Device Manager may show the device with a yellow warning icon on it. A reboot of the system will completely remove the device.

Utility Uninstall Procedure

1. Choose Start > Settings > Control Panel and open Add/Remove Programs.
2. Select Large LUN Utility.
3. Click **Add/Remove** (Windows NT) or Click **Change/Remove** (Windows 2000).
4. Choose Remove from Maintenance screen.

The utility is removed.

ACS Feature Support

Disk Partitioning

ACS allows partitioning of disk drives or storage sets for improved device management. A partition appears to the operating system as a single virtual disk. Up to eight partitions may be created per storage set or disk drive. Disk partitioning is supported in both transparent and multiple-bus failover modes.

Dynamic Volume Expansion

Dynamic Volume Expansion creates a specialized volume called a concatset (short for concatenation set) from a storage set that has been given a unit number. Another storage set can then be added to the concatset by using the SET CONCATSET command. See the *HSG60 Array Controller ACS Version 8.6 CLI Reference Guide* for syntax details.

Configuration Rules

The following list defines maximum configuration rules for the controller:

- 128 visible LUNs/200 assignable unit numbers: If the Command Console LUN (CCL) is enabled, the result is 127 visible LUNs and one CCL
- 1.024 TB storage set size
- 96 host connections
- 28 physical devices
- 20 RAID 3/5 storage sets
- 30 RAID 3/5 and RAID 1 storage sets

- 45 RAID 3/5, RAID 1, and RAID 0 storagesets
- 8 partitions of a storageset or individual disk
- 6 physical devices per RAID 1 (mirrorset)
- 14 physical devices per RAID 3/5 storageset
- 24 physical devices per RAID 0 (stripeset)
- 48 physical devices per RAID 0+1 (striped mirrorset)
- 4 servers per controller port

Operating Constraints

This section describes the operating constraints for ACS Version 8.6. 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 (ECB)

Compaq recommends that you replace the 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 *HSG60 Array Controller ACS Version 8.6 Maintenance and Service Guide*. This will prevent the ECB from discharging during planned power outages.

Dual External Cache Battery (ECB) Failures

The array controller cache policy provides for proper handling of a single ECB failure as described in the *HSG60 Array Controller ACS Version 8.6 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 will be restarted.

Boot Support

Booting from the Enterprise/Modular Storage RAID Array is supported for Windows NT or Windows 2000 using the KGPSA-CB adapter only. Look for application notes or web pages in the support section of the Compaq Website.

<http://www.compaq.com/storage/index.html>

File System Limitations

Table 5 describes known limitations that certain file systems have regarding storage unit size.

Table 5 File System Storage Unit Limitation

Disk Size	Storageset Configuration	Operating and File System
4 GB	Any	Windows NT4.0 /Windows 2000 FAT File System
16 TB	Any	Windows NT 4.0/Windows 2000 NTFS File System

PVA Switch Setting

After installing the EMU in each cabinet, ensure that the SCSI ID number on the PVA is set according to Table 6.

Table 6 SCSI ID Number on the PVA

Cabinet	PVA SCSI ID Setting
Master enclosure	0
First expansion enclosure	2
Second expansion enclosure	3

Using FRUTIL to Insert a New Controller

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

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

1. Press and hold the **Reset** button on the other controller.
2. 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` switch allows you to do the following (on supported single controller configurations only):

- Save a configuration to a disk or storage set. 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 Storage Sets

If any storage set within the configuration was previously initialized with the `INITIALIZE` container-name `SAVE_CONFIGURATION` command to save your configuration to disk, it will not be 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 8.6 saves any installed software patches on disks initialized with the `SAVE_CONFIGURATION` option. To replace a controller and restore the configuration from a disk, you will not have to reinstall any software patches.

Configuration information cannot be retrieved from storage sets 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 HSG60 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 a device's type and location. 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 has been restored to the array controller.

If a device is replaced while the array controller is off, remove the device before restoring power to the array controller. Correctly remove the current device and add the new device after restoring power to the array controller.

See the *HSG60 Array Controller ACS Version 8.6 Maintenance and Service Guide* for correct device removal and addition procedures.

Moving Storage Sets

Move only normal storage sets.

CAUTION: Do not move storage sets that are reconstructing or have been reduced, or data corruption will result.

Adding, Moving, and Changing Array Controllers, Cache Modules, or External Cache Battery (ECB) Storage Building Blocks (SBBs)

You can replace the array controller, cache module, or external cache battery SBB while the subsystem is shut down. However, you must enter the SHUTDOWN THIS_CONTROLLER command before shutting the subsystem down 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 *HSG60 Array Controller ACS Version 8.6 CLI*

Reference Guide. For information on maintenance and replacement of the array controller, cache module, and external cache battery, see the *HSG60 Array Controller ACS Version 8.6 Maintenance and Service Guide*.

SWCC SCSI Connection

The SWCC Client SCSI connection can sometimes produce the following error popup when trying to connect through the CCL:

```
Error scanning subsystem. Command Execution Error:
[DeviceIOControl Error:]
```

Additionally, physical devices may not appear in the Select Device dropdown list. The SWCC CLI Window will terminate if the New Window icon is selected, or if New is selected from the File Menu, followed by clicking the **Cancel** button on the Connection Selection Dialog box.

Therefore, we strongly suggest that you use the Agent in managing the storage subsystem.

Host Operating System Notes

The following section identifies host specific operating notes.

Windows NT and Windows 2000

- Both Windows NT and Windows 2000 can run Microsoft's Cluster Server Software. Refer to documents that come with Microsoft's software kits for instructions in setting up Microsoft Clusters.
- There is no Hot Plug support for KGPSA adapters under Windows NT 4.0 or Windows 2000 at this time. Check the Compaq Support web page for updates.
- Windows NT and Windows 2000 support 8 LUNs per port unless otherwise instructed (for example: Compaq's Enterprise Volume Manager product or Large LUN).
- Windows NT and Windows 2000 support SCSI-2 and SCSI-3 modes. Refer to the *HSG60 ACS Solution Software Version 8.6 Installation and Configuration Guide* that comes with this kit for more information.
- Compaq recommends that you load software directly from the CD-ROM when installing drivers and running the Fibre Channel Setup Utility. You may experience problems on some systems if you first copy the CD-ROM contents to a disk drive and install from there.

- Cloning a Windows 2000 dynamic disk is allowed but the Clone or original can be mounted, but not both to the same host.

Windows NT Specific Notes

- Fibre Channel software setup handles HszDisk and HS_service installation. This is sometimes referred to as HSZinstall in the documentation.

CAUTION: Do not use the Large LUN model with Windows NT Service Pack 5 under any circumstances.

- In a situation where you are replacing a server with another and using the existing drives (storage sets) behind the array controllers, you may find drive to drive letter mapping changes. During such a system changeover, please remap drives to drive letters using the Disk Administrator to restore proper access to your data.

Windows 2000 Specific Notes

- The Fibre Channel Setup Utility installs HS_service and HsxDisk software components. These are similar to HS_service and HszDisk in the Windows NT setup procedure.
- In some Fibre Channel switch configurations, disk devices that are discovered as part of the Windows 2000 Plug-and-Play process display an erroneous message in the Device Manager screen. However, data to and from the drives is unaffected and work correctly. During subsequent system reboots, these erroneous messages disappear as the disk to driver status is correctly synchronized. It's normal to see event log messages from HS_service during certain routine procedures. These are a result of SCSI bus resets that occur during controller events like startups and controller failovers. Some messages appear as warnings and some as errors. As long as the message source is HS_service, you should let the Proactive Services software handle the interpretation.
- There are two situations where you may experience drive letter remapping. This could affect access to data by programs you may need to run. The first situation is one where you replace one server with another. The second is a situation in which you simply replace a KGPSA adapter in one of your systems. During such a system or adapter changeover, be sure to manually remap drives to drive letters using the Disk Management. This will restore proper access to your data.
- If you replace a KGPSA adapter in a server, you will need to reinstall the KGPSA driver and then rerun the Fibre Channel Setup Utility. The reason for this is that Windows 2000 may automatically reload the original driver for this adapter and reset

many of the important registry settings. For more information about installing the adapter refer to the *HSG60 ACS Solution Software Version 8.6 Installation and Configuration Guide* and use the software in the CD-ROM that is part of this kit.

Upgrading from Windows NT 4.0 to Windows 2000

If you are upgrading from Windows NT 4.0 to Windows 2000, you must remove the software components installed by the previous version of the Fibre Channel Setup Utility. The step should be as follows:

1. Remove the software components installed from the previous Fibre Channel Setup Utility. To do this, locate the previous CD-ROM and run the utility. There are procedures in it to remove components.
2. Upgrade from Windows NT 4.0 to Windows 2000 as instructed by Microsoft's documentation.
3. Reboot.
4. Install the KGPSA driver upgrade as instructed in the *HSG60 ACS Solution Software Version 8.6 Installation and Configuration Guide*.
5. Run the Fibre Channel Setup Utility to complete your installation.

Documentation Anomalies

The following are known additions and corrections to the *HSG60 ACS Solution Software Version 8.6 Installation and Configuration Guide*.

- The `Readme.txt` file found in the root directory of your CD-ROM lists *Installing the Integration Patch for Compaq Insight Manager and ACS Version 8.6 or Later* as an included document. This document is not included on the CD-ROM, nor is it listed in the `\document\doc-list.txt` or `manuals.pdf` files. However, it is available from the Compaq Website:
- The `Readme.txt` file found in the root directory of your CD-ROM lists *Enterprise/Modular Storage RAID Array Fibre Channel Cluster for Windows NT/Windows 2000 Installation Guide* as an included document. This is true. However, this document is not listed in the `\document\doc-list.txt` or `manuals.pdf` files.
- Even page headers in Chapter 4 should read *HSG60 ACS Solution Software Version 8.6 Installation and Configuration Guide*.
- Under “Installing the Client,” on page B-2 of Appendix B, the following restriction should be observed when installing SWCC on Windows NT 4.0 Workstations:

28 *HSG60 Enterprise/Modular Storage RAID Array Fibre Channel Solution Software Version 8.6 for Windows NT and Windows 2000*

If you select all of the applets during installation, the installation will fail on the HSG60 applet and again on one of the HSG80 applets. The workaround is to install all of the applets you want except for the HSG60 applet and the HSG80 ACS 8.5 applet. You can then return to the setup program and install the one that you need.

In a SAN environment where you would need both G60 and G80 subsystems, we recommend you install both, but one at a time. This problem is not seen under Windows NT 4.0 Server.

- Under “Installing the Client,” in step 3 on page B-3 of Appendix B, select the “HSG80 Controller for ACS85 newer” menu option to properly install SWCC client.