

hp StorageWorks

Release Notes – HSG80 Enterprise/Modular Storage RAID Array Fibre Channel Solution Software Version 8.7 for Windows 2000 Datacenter

Part Number: AA-RNASE-TE

Fifth Edition (March 2003)

Product Version: 8.7

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>



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Release Notes – HSG80 Enterprise/Modular Storage RAID Array Fibre Channel Solution Software Version 8.7 for Windows 2000 Datacenter

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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
- **EMU**—Environmental Monitoring Unit
- **EVA**—Enterprise Virtual Array
- **FC**—Fibre Channel
- **FC-SW**—Fibre Channel Switch
- **FRU**—Field-Replaceable Unit
- **HBA**—Host Bus Adapter
- **LUN**—Logical Unit
- **LVD**—Low Voltage Differential
- **MSCS**—Microsoft Cluster Server

- **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 Windows 2000 Datacenter 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 8.7 for Windows 2000 Datacenter Release Notes* (this document)

- HSG80 Enterprise/Modular Storage RAID Array Fibre Channel Solution Software Version 8.7 for Windows 2000 Datacenter 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
- *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 8.7P or 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

V87P

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 8.7P or 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 22, for additional information on compatible layered application software.

ACS Version 8.7 is fully compatible with Version 8.7 Solution Software. In addition, Version 8.7 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.

For multi-bus configurations, use the following procedure in addition to those provided with the ACS patch download:

1. Apply ACS patches to both controllers.
2. Move all units to `OTHER_CONTROLLER`, one unit at a time, using Secure Path software. Moving the units in this manner is not a requirement, but it lets the controller do less work than moving all the units at once.
3. Reboot `THIS_CONTROLLER` during a slow time (when controllers are running at more than 50% idle). The patch takes effect once the controller is rebooted.

4. Repeat these steps for `OTHER_CONTROLLER` by moving all units to `THIS_CONTROLLER` and rebooting `OTHER_CONTROLLER` during a slow time.

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
```

Multiple Storage System Types

The extended interoperability of the heterogeneous SAN allows you to mix several types of *StorageWorks* storage systems. *StorageWorks* recommends the following configuration rules when different storage products are shared in the same SAN:

- HSG80 ACS Version 8.7 and EVA VCS Version 2.0—Use ACS Solution Software Version 8.7 (includes SWCC Version 2.5) and VCS Version 2.0 compatible multi-bus software/drivers.
- HSG80 ACS Version 8.6 and HSG80 ACS Version 8.7—Use ACS Solution Software Version 8.7 (includes SWCC Version 2.5).

NOTE: Any multiple storage system configuration that includes EVA VCS Version 2.0 requires multi-bus support. See the "Secure Path Software", page 21, for compatible Secure Path versions. ACS Version 8.7 compatible Secure Path versions and HBA drivers are compatible with VCS Version 2.0.

New Features

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

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 have been 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 has been implemented, which 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 of which it is a member 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 have been 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

Windows 2000 Datacenter is certified for SAN Switch 16, 1 Gbps (DS-DSGGB-AB) only.

Solution Software Updates

The following improvements have been made to your Solution Software:

- Solution Software Version 8.7 has been qualified with ACS Version 8.7 and the components defined in these Release Notes.
- Added support for Windows 2000 Datacenter CSP 2.03a.
- Added support for Secure Path Version 4.0 software.
- The Solution Software installation program can now perform silent installations, which automates the installation process. See the *HSG80 ACS Solution Software Version 8.7 Installation and Configuration Guide* for more information.

- The Fibre Channel Software Setup included with this Solution Software Kit automatically corrects the ResetTPRLO parameter by setting it to a value of 1. See "ResetTPRLO Parameter in Windows Environments", page 39, for detailed information.
- The Solution Software now provides a Component Identifier program that gives the user a quick method for identifying storage components. See the *HSG80 ACS Solution Software Version 8.7 Installation and Configuration Guide* for more information.
- HsgCCL.inf is not digitally signed by Microsoft for use with Windows 2000 Datacenter.

Documentation Updates

The following documentation changes have been made in order to consolidate and reduce the number of documents associated with Version 8.7 Solution Software:

- The following documents have been incorporated into the *HSG80 ACS Solution Software Version 8.7 Installation and Configuration Guide*:
 - *Enterprise/Modular Storage RAID Array Fibre Channel Cluster for WindowsNT/ 2000 Installation Guide*
 - *Installing the Integration Patch for Insight Manager and ACS Version 8.6 or Later*

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

- A new section, "Abbreviations and Acronyms", page 4 has been added to define abbreviations and acronyms used in these Release Notes.
- A new section, "Patching ACS", page 7 has been added to clarify the process used to patch ACS.
- A new section "Multiple Storage System Types", page 8 has been added to address basic configuration rules used in mixing different *StorageWorks* products in the same SAN.
- New "SCSI-2 to SCSI-3 Migration", page 31 information has been added to assist customers who wish to extend the interoperability of their SAN.
- The section, "Layered Software Applications", page 22, has been updated.
- The section, "Disk Device Support", page 16, has been updated.

- The “Document Catalog” section and procedures have been removed because electronic copy for Solution Software documentation is being made available exclusively from the *StorageWorks* website.
- The “HSG80 Device Removal and Replacement” section and procedures have been moved from these Release Notes to the *HSG80 Array Controller ACS Version 8.7 Maintenance and Service Guide*.
- The “Solution Software Upgrade Procedures” section has been moved from these Release Notes to the *HSG80 ACS Solution Software Version 8.7 Installation and Configuration Guide*.
- The “Upgrading DS-KGPSA-BC Firmware” section and procedures have been removed since this particular HBA is no longer supported in this release.
- A new section "Disk Resource Pending Timeout for Large Configurations", page 34, was added to ensure continuous operation of Disk Resources across SAN perturbations with Disk Resource counts greater than eight.

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.

IMPORTANT: All new Universal SCSI disk drives sold by *StorageWorks* come with an 8 MB EISA style partition at the start of the disk. This includes new *StorageWorks* SBB drives, which contain the basic universal disk drive brick internally. The EISA partition, when left on the media, is presented to a host at the storage unit level by the HSG80 storage system. Some hosts and applications may misinterpret this information. In order to resolve this potential issue, approximately 8 MB needs to be erased from the beginning of the disk.

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 switch and firmware version 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	Minimum Firmware Version
SAN Switch 16 (16 Port FC, 1 Gbps)	158223-B21 DS-DSGGB-AB	2.6.0

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	<i>StorageWorks</i> HSG80 Array Controller, ACS Version 8.7 (or a subsequently patched version of ACS Version 8.7) Note: This Solution Software is backward compatible with ACS Version 8.6, but only for the purpose of performing upgrades to the ACS firmware. <i>StorageWorks</i> does not recommend mixing ACS versions in the same SAN.
Platform	ProLiant 8500 and DL760 Servers
Operating System	Microsoft Windows 2000 Datacenter, CSP 2.03a Microsoft Cluster Server
Topology	Fibre Channel Switched (FC-SW)
SCSI Protocol	SCSI-2 SCSI-3 (recommended)
Failover Mode	Transparent Multi-bus (requires Secure Path software)
Host Mode	WINNT
Disk Space	5 MB
Adapter Compatibility	<i>StorageWorks</i> 64-bit, 1 Gbps PCI FC HBA DS-KGPSA-CB (176479-B21), HBA driver V5-4.81a9, Firmware Version 3.82a1/BIOS Version 1.60a4

Notes

- HsxDisk.sys is the required driver for array controller configurations. The Solution Software CD-ROM that came with your kit includes the following version of this driver:
 - HsxDisk.sys Version 5.4.21 for Windows 2000 Datacenter (used only in transparent failover configurations)
- HS_Service records system errors used in conjunction with remote diagnostics services provided through Proactive Services software.

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, refer to *Command Console Version 2.5 User Guide* and *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: As a reference, SWCC Agent Version 2.3.2, Build 7779 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.

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 `launch.exe` file.
3. The installation program provides one primary option: **Solution Software V8.7 for Windows 2000 Datacenter**.
 - a. If you are just installing SWCC, skip the driver upgrade screen.
 - b. Select **Install StorageWorks Command Console (SWCC)** to install.
 - c. Choose **HSG80 Controller for ACS85 or newer** and complete the installation as prompted.

Secure Path Software

Secure Path is a high availability, multi-bus software application that supports FC-SW connectivity. This Fibre Channel Solution Software Kit supports the Secure Path software shown in Table 7.

Table 7: Secure Path Compatibility

Operating System	Supported Product Version
Windows 2000 Datacenter CSP 2.03a	Secure Path Version 4.0

For more information on Secure Path software, see the product documentation that comes with the product, or visit the *StorageWorks* website:

<http://h18000.www1.hp.com/products/sanworks/secure-path/index.html>

Layered Software Applications

Compatibility with *StorageWorks* layered software applications is defined in Table 8.

Table 8: Layered Application Compatibility

Application	Version	Supported ACS Variants
Data Replication Manager (DRM)	Version 8.7P	Version 8.7P
Enterprise Volume Manager (EVM)	Version 2.0D	Version 8.7F/S/P
Storage Resource Manager (SRM)	Version 4.0B	Version 8.7F
Command Scripter	Version 1.0	Version 8.7F/S/P
Virtual Replicator	Version 3.0A	Version 8.7F
Network View	Version 2.0B	Version 8.7F/G/S/P
Management Appliance	Version 1.0C	Version 8.7F/S/P
Storage Allocation Reporter	Version 1.0D	Version 8.7F

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

If you run EVM with ACS Version 8.7F, you can use scripting with CLONES. If you want to create SNAPSHOTS with EVM, you must run ACS Version 8.7S or 8.7P.

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.

Rolling Upgrades

Rolling upgrades are not supported for Windows 2000 Datacenter. If rolling upgrades are performed in a heterogeneous environment, Datacenter servers must be shut down before the upgrade is started.

This section supersedes both the rolling upgrade and ACS upgrade procedures found in the *HSG80 ACS Solution Software Version 8.7 for Windows NT and Windows 2000 Installation and Configuration Guide*.

Solution Software Kit Upgrade Procedures

Use the procedures in this and the following sections to upgrade your Solution Software Kit:

1. Perform backups of data prior to upgrade.
2. Verify operating system versions, and upgrade operating systems to supported versions and patch levels.
3. Upgrade switch firmware.
4. Upgrade the Solution Software Kit.
5. Quiesce all I/O and unmount all file systems for the server being updated before proceeding.
6. If you are installing an operating system that uses Secure Path, upgrade Secure Path to the latest version at this time.
7. Upgrade the ACS software by using the shutdown procedure documented in the *hp StorageWorks HSG80 Array Controller V8.7 Maintenance and Service Guide* that shipped with the HSG80 array controller.

NOTE: Solely for the purpose of performing upgrades to ACS, the Solution Software Kit supports ACS V8.6. HP recommends that you avoid mixing ACS versions in the same Storage Area Network (SAN).

The extended interoperability of the heterogeneous SAN allows you to mix several types of *StorageWorks* storage systems. HP recommends that you adhere to the following configuration rules when different storage products are shared in the same SAN:

- HSG80 ACS Version 8.6 and EVA VCS Version 2.0—Use ACS Solution Software Version 8.6 (if SWCC Version 2.4 components are desired) and VCS Version 2.0-compatible multi-bus software and drivers.
- HSG80 ACS Version 8.7 and EVA VCS Version 2.0—Use ACS Solution Software Version 8.7 (includes SWCC Version 2.5) and VCS Version 2.0-compatible multi-bus software/drivers.
- HSG80 ACS Version 8.6 and HSG80 ACS Version 8.7—Use ACS Solution Software Version 8.7 (includes SWCC Version 2.5).

NOTE: Any multi-bus storage system configuration that includes EVA VCS Version 2.0 requires multi-bus support. See "Secure Path Compatibility", page 21 for compatible Secure Path versions. ACS Version 8.7-compatible Secure Path versions and HBA drivers are compatible with VCS 2.0.

See the following documentation for additional information:

- *hp StorageWorks HSG80 Array Controller ACS Version 8.7 Maintenance and Service Guide*
- *Solution Software Release Notes—HSG80 Enterprise/Modular Storage RAID Array Fibre Channel Solution Software Version 8.7 for Windows 2000 Datacenter (this document)*
- The “Upgrading ACS” section for the additional information on upgrades.

NOTE: If you are upgrading ACS, complete the upgrade after all Windows server updates are finished. Be sure to back up data before updating servers.

NOTE: For information on updating the Solution Software Kit using transparent failover procedures, see the *hp StorageWorks HSG80 ACS Solution Software Version 8.7 for Windows 2000 Installation and Configuration Guide*.

New Solution Software Kit (V8.7) Installation Procedures

To install the Solution Software Kit for the first time, complete the following steps:

1. Ensure that the Fibre Channel Adapter (FCA) is not connected.
2. Insert the CD that shipped with the Solution Software Kit and click **Solution Software v8.7 for Windows NT/2000**.
 - a. Click **Perform FCA Driver Update** to install the HBA driver.

- b. Click **Fibre Channel Software Setup**, and then choose one of the multi-bus Fibre Channel setups, based on your configuration.
- c. Click **SWCC** (optional) to install SWCC components.

NOTE: Do *not* restart the server at this time if instructed to do so.

3. Using your Secure Path Software CD, install Secure Path V4.0 for Windows in accordance with the instructions provided with that product.
4. Shutdown the server.
5. Connect the FCA fibre cables to the switch(es).
6. Restart the server.

Updating the Solution Software Kit with Secure Path on Windows NT/2000 Server

The following procedures demonstrate how to upgrade your Solution Software Kit, in conjunction with your Secure Path software, in a multi-bus failover environment.

Updating an Existing Standalone Server

To update an existing standalone server by using Secure Path in multi-bus failover mode, complete the following steps:

1. Log into an account with administrator privileges.
2. Stop all applications that access Secure Path storage.
3. Stop the SWCC STEAM agent in **Services**.
4. Click **Add/Remove Program** on the **Control Panel** and uninstall:
 - SWCC
 - *Large LUN* utility (if installed)

NOTE: Do *not* restart the server at this time if instructed to do so.

5. Insert your Secure Path Software CD and install or Secure Path V4.0 for Windows in accordance with the instructions provided with the product.
6. Reboot the server.

7. Insert your Solution Software Kit CD and click **Solution Software V8.7 for Windows NT/2000**.
 - a. Click **Perform FCA Driver Update** to install the HBA driver.
 - b. Click **Fibre Channel Software Setup**, and then choose one of the multi-bus Fibre Channel setups, based on your configuration.
 - c. Click **SWCC** (optional) to install SWCC components.

NOTE: The latest *Large LUN* utility must be installed if the storage system is used prior to upgrading ACS to Version 8.7-1 and a Large LUN configuration was previously employed.

8. Restart the server.

Updating an Existing Cluster

To update an existing cluster by using Secure Path in multi-bus failover mode, complete the following steps:

1. Log into the server with an account with administrator privileges.
2. Make note of your original configuration by using Cluster Administrator, and then move disk resources to the other cluster node. The node being updated should not have any disk resources online.
3. Set all cluster groups to **Prevent failback**, by using Cluster Manager, while the upgrade is taking place.

NOTE: The Cluster Service must continue to run on all nodes. Stopping the Cluster Service during this procedure could result in a Cluster Service failure and subsequent reinstallation.

4. Stop the SWCC STEAM agent in **Services**.
5. Select **Add/Remove Program** from the **Control Panel**, and uninstall:
 - SWCC
 - *Large LUN* utility (if installed)

NOTE: Do *not* restart the system at this time if instructed to do so.

6. Insert your Secure Path Software CD and install Secure Path V4.0 for Windows in accordance with the instructions provided with that product.
7. Insert your Solution Software Kit CD and click **Solution Software v8.7 for Windows NT/2000**.
 - a. Click **Perform FCA Driver Update** to install the HBA driver.

- b. Click **Fibre Channel Software Setup**, and then choose one of the multi-bus Fibre Channel setups, based on your configuration.
- c. Click **SWCC** (optional) to install SWCC components.

NOTE: The latest *Large LUN* utility must be installed if the storage system is used prior to upgrading ACS to Version 8.7-1 and a Large LUN configuration was previously employed.

8. Restart the updated cluster node.
9. Repeat steps 2 through 8 for the next cluster node.
10. After all cluster nodes are upgraded, restore all cluster groups to their original **Prevent failback** setting, and restore storage groups to their original configuration.

Upgrading ACS

Shutdown upgrade procedures are documented in the *hp StorageWorks HSG80 Array Controller V8.7 Maintenance and Service Guide* that shipped with the HSG80 array controller. You can download a copy of this guide from the HP website at <http://www.hp.com>. Follow the storage-related links to access technical documentation for the HSG80 array controllers, which are part of the HP *StorageWorks* Enterprise Modular Array and the HP *StorageWorks* Modular Array.

SWCC Agent Configuration Utility and the Displayed ACS Firmware Version

After upgrading from ACS V8.6 (any variant or patch) to ACS V8.7-1, the SWCC Agent Configuration utility displays the previous ACS version before the upgrade (same variant) on the **NT Agent Configuration Step 3 of 3** screen.

NOTE: If you installed ACS 8.7 and then upgraded to ACS 8.7-1, SWCC displays the proper ACS version number on the **NT Configuration Step 3 of 3** dialog box.

The figure below shows where the ACS version displays **③** the previous version (before the upgrade) in SWCC after you upgrade from ACS V8.6 to V8.7-1.

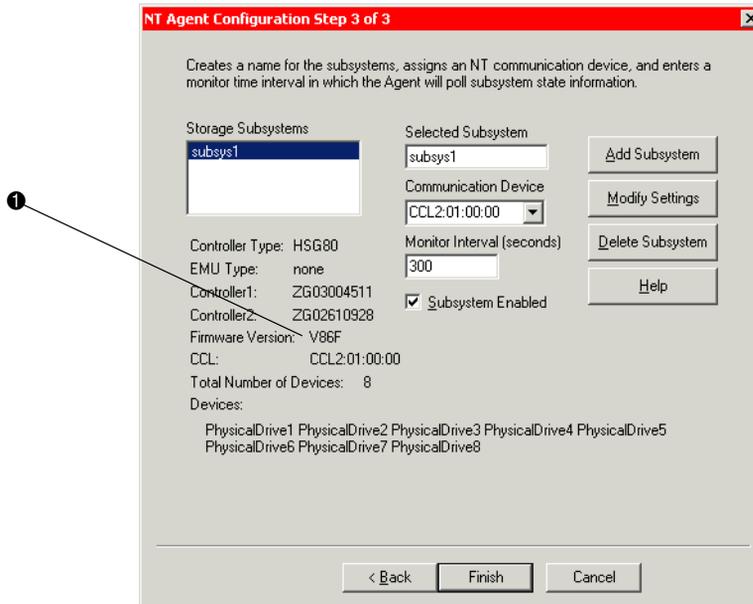


Figure 1: Location of the SWCC version number when upgrading from ACS V8.6 to V8.7-1

To verify the correct version of ACS on the HSG80 array controller in this scenario, always use the `SHOW THIS_CONTROLLER` or `SHOW OTHER_CONTROLLER` CLI command from a CLI window or any CLI prompt.

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 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 impacting 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 as 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 either ACS Version 8.7P or ACS Version 8.7S.

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

Write History Logging

Write history logging, available to users of ACS Version 8.7P, uses a log unit to log a history of write commands and data from the host on the initiator side in either of the following situations:

- The target is inaccessible.
- The initiator site data needs to be synchronized during a planned failover.

Mini-merge—If the target becomes inaccessible, the writes that would have gone to the target are logged to the association set's assigned log unit. An inaccessible target in this context refers to both links or target controllers shutting down. When the target becomes accessible, a full copy is not necessary. Only those host writes that occurred while the links were down are reissued. This is referred to as a *mini-merge*. If a full copy was in progress at the time of the disconnect, write history logging is not initiated and the full copy is restarted when the target is accessible again.

Fast-Failback—During a planned failover, if write history logging has been enabled at the target site, then when the failback is performed, the initiator site is synchronized through a process called *fast-failback*. The writes that would have gone to the initiator are logged to the association set's log unit. Only those writes that occurred since the failover are reissued. A full copy is not necessary.

Dynamic Volume Expansion

Dynamic Volume Expansion creates a specialized volume called a concatset (short for concatenation set) from a storageset that has been 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-2 mode, the CCL is disabled, resulting in 128 visible LUNs.
 - In SCSI-3 mode, the CCL is enabled, resulting in 127 visible LUNs and one CCL.
- 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)

SCSI-2 to SCSI-3 Migration

In order to extend interoperability within the heterogeneous SAN, *StorageWorks* highly recommends that customers begin migrating from SCSI-2 to SCSI-3 protocols. Moving to SCSI-3 allows greater diversity in the operating systems and storage products (including EVA) that comprise a SAN.

All migrations from SCSI-2 to SCSI-3 should be planned during scheduled downtime. SCSI migrations require a controller restart and most likely a server restart. Data contained on CCL units needs to be moved to new units once SCSI migration is complete.



CAUTION: Before attempting a SCSI-2 to SCSI-3 migration, it is extremely important that all data be backed up and that units be available for remapping CCL data. In addition, ensure that all redundant storagesets are in normal (non-reduced) mode.

When migrating from SCSI-2 to SCSI-3, the controller checks for controller unit D0 and does not change modes until D0 (at all presented offsets) is deleted. One or more LUNs are lost after the mode change. If you are planning to move from SCSI-2 to SCSI-3, back up your data first. The data in LUN 0 (and any other offsets that map to LUN 0) that was used in SCSI-2 requires that the data be moved to a different LUN. It may be necessary to retrieve this data from a backup.

IMPORTANT: If multi-bus failover configurations or server clustering are employed in the environment, there may be additional considerations regarding CCL usage during SCSI migration procedures. Please refer to your multi-bus failover or server clustering documentation prior to implementation.

In addition, there may be OS-based limitations on SCSI-3 usage to consider, particularly in down-level versions of your OS. Please review your OS documentation prior to migration.

For more information, see the “What is the Command Console LUN?” and “Assigning Unit Numbers Depending on SCSI_VERSION” sections of Chapter 1 in the *HSG80 ACS Solution Software Version 8.7 Installation and Configuration Guide*.

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.

SAN Boot Procedures

Booting from the SAN is supported for Windows 2000 Datacenter. SAN boot procedures are available on the *StorageWorks* website:

<http://h18000.www1.hp.com/products/storageworks/san/documentation.html>

Windows 2000 Datacenter File System Limitations

Table 9 describes the known limitation that the file system has regarding storage unit size.

Table 9: File System Storage Unit Limitation

Disk Size	Storageset Configuration	Operating and File System
16 TB	Any	Windows 2000 Datacenter 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 10 (BA370 enclosures only).

Table 10: 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, a new set of instructions is displayed 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. 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.

FRUTIL Limitation

This limitation applies to users of ACS Version 8.7P with DRM only.

FRUTIL cannot be run in remote copy set environments on the target side specifically when I/O is in progress.

If the host load has been stopped, you can run FRUTIL on the initiator or target. If the host load is not quiesced and FRUTIL is run while remote copy I/O is running, the normalization process is reset.

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 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 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 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 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.

Disk Resource Pending Timeout for Large Configurations

In order to ensure continuous operation of Disk Resources across SAN perturbations with Disk Resource counts greater than eight, it is recommended that the Pending Timeout parameter for each Disk Resource be increased from 180 seconds to 360 seconds.

To view and set the Pending Timeout parameter:

1. Open the **Microsoft Cluster Administrator**.
2. Select a **Disk Group** resource in the left pane.
3. Right click each Disk Resource in right pane, one at a time, and select **Properties**.
4. Select the **Advanced** tab from the **Properties** menu.
5. Locate the **Pending Timeout** value and change it to **360**.
6. Click **OK**.

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 has been 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 have been *reduced*.



CAUTION: Ensure that all storagesets are in *normal* mode prior to moving them or data corruption will occur.

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 host reboot for the newly set offsets to take effect.

SWCC SCSI Connection

The SWCC Client SCSI connection can sometimes produce the following error message 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** drop-down list. The SWCC CLI window terminates if the **New Window** icon is selected, or if **New** is selected from the **File** Menu, and then the **Cancel** button on the **Connection Selection** dialog box is clicked. If the connection becomes lost, restart the Client application.

StorageWorks strongly recommends that you use the SWCC Agent to manage the storage system.

Host Operating System Notes

The following section lists host-specific operating notes.

Host Operating System Support of Multi-Bus Failover

Multi-bus failover is supported on the Windows 2000 Datacenter operating system through the use of Secure Path software. See "Secure Path Software", page 21, for version compatibility and restrictions.

Windows 2000 Datacenter

- Windows 2000 Datacenter can run MSCS software. Refer to documents that come with Microsoft's software kits for instructions on setting up Microsoft Clusters.
- There is no Hot Plug support for FC HBAs under Windows 2000 Datacenter at this time. Check the *StorageWorks* support website for updates.
- Windows 2000 Datacenter supports SCSI-2 and SCSI-3 modes. Refer to the *HSG80 ACS Solution Software Version 8.7 Installation and Configuration Guide* that comes with this kit for more information.
- *StorageWorks* recommends that you load software directly from the Solution Software 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 then install from there.
- Windows 2000 Datacenter dynamic volumes are supported in transparent failover configurations or in Secure Path Version 4.0 multi-bus configurations.
- Cloning a Windows 2000 Datacenter dynamic disk is allowed. However, either the CLONE or the original can be mounted to the same host but not both.

Windows 2000 Specific Notes

- New Universal Disk Drives (or units that are migrated from SmartArray controllers usage) being configured into storageset members need to be initially written to with DILX (a diagnostic utility on the HSG storage systems). DILX only operates on units. Therefore, the new disks must be configured into a unit prior to running DILX. Optionally, the HSUTIL format disk utility may be used on a disk device.
- The Fibre Channel Setup utility lets you optionally install HS_Service and HsxDisk software components.

- There are two situations in which drive letter remapping might occur and that could affect access to data by programs you may need to run. The first situation is one in which you replace one server with another. The second is a situation in which you simply replace an FC HBA in one of your systems. During such a system or adapter changeover, be sure to manually remap drives to drive letters using Disk Manager. This restores proper access to your data.
- If you replace an FC HBA in a server, you need to reinstall the HBA driver and then rerun the Fibre Channel Setup utility. This is so that Windows 2000 Datacenter can automatically reload the original driver for this adapter and reset many of the important registry settings. New connections are created on the HSG controller. Those connections should be renamed and assigned to the appropriate units.

For more information about installing the adapter, refer to the *HSG80 ACS Solution Software Version 8.7 Installation and Configuration Guide* and use the software on the Solution Software CD-ROM.

Upgrading from Windows NT 4.0 to Windows 2000 Datacenter

If you are upgrading from Windows NT 4.0 to Windows 2000 Datacenter, you must remove the software components installed by the previous version of the Fibre Channel Setup utility. Follow these steps:

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. Follow the procedures in it to remove components. Alternately, you can use the **Add/Remove Programs** tool.
2. Upgrade from Windows NT 4.0 to Windows 2000 Datacenter as instructed by Microsoft's documentation.
3. Reboot.
4. Install the HBA driver upgrade as instructed in the *HSG80 ACS Solution Software Version 8.7 Installation and Configuration Guide*.
5. Run the Fibre Channel Setup utility to complete your installation.

ResetTPRLO Parameter in Windows Environments

All Windows SAN installations require the ResetTPRLO (Third Party Logout Extended Link Service) HBA driver parameter be set to a value of 1. When HBA driver Version x-4.53a7 or higher is installed, this parameter must be changed from the default value, which is 0.

For HBA driver versions above Version x-4.53a7, this value is set automatically by the Fibre Channel Software Setup included in this release of Solution Software.

For HBA driver Version x-4.53a7, this parameter must be set manually. For all Windows configurations using this driver version, verify that the ResetTPRLO HBA driver parameter is set to 1 by using the LPUTILNT utility. Use the following procedure:

1. Select **Start** and then **Run**.
2. Type `LPUTILNT` and select the first HBA.
3. Select **Driver Parameters** in the Category pane.
4. Click **Parameters**.
5. Scroll down and double-click **ResetTPRLO**.
6. Set the value to **1**.
7. Select **Permanent** and **Global**.
8. Click **Change**.

Do this for each HBA that uses Version x-4.53a7 drivers in the system. If you use this method, you do *not* have to restart Windows after the registry is modified. The ResetTPRLO Parameter is dynamic.

Refer to Customer Advisory OI020510_CW0x for additional information.

Registry Growth in Windows

The Windows plug-and-play architecture has a limitation on the number of plug-and-play device entries that can be added to the registry. Whenever devices are added or removed, or SNAPSHOT is created or deleted, entries are added to the registry by the Plug-and-Play manager, potentially causing the registry to grow beyond the allowed capacity.

Please refer to the Microsoft Knowledge Base article (Q269075), which provides more information about the registry growth problem.

Large LUNs for Windows 2000 Datacenter

Enabling Large LUNs allows a Windows 2000 Datacenter 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 number of LUNs supported is 128 per storage system. If using Secure Path Version 3.1A SP1, the maximum number of LUNs is 64 per storage system. If using Secure Path Version 4.0, the maximum number of LUNs is 128 per storage system. The LUNs can be contiguous or noncontiguous.

NOTE: Large LUNs are supported on Windows NT, Windows 2000 Server, Windows 2000 Datacenter Server, and Windows 2000 Advanced Server.

Large LUN Utility for Windows 2000 Datacenter

The Large LUN utility is available for download at the *StorageWorks* website:

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

NOTE: The Large LUN utility is provided, but it is unnecessary if ACS Version 8.6 or higher is running alone or in conjunction with Secure Path software that has built-in support.

Controller Configuration

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

- Multi-bus failover mode (with Secure Path Version 3.1A SP1)—Support for 64 LUNs per storage system (SCSI-2 mode) or 63 LUNs + 1 CCL (SCSI-3). The LUN numbers must be between 0 and 63.
- Multi-bus failover mode (with Secure Path Version 4.0)—Support for 128 LUNs per storage system (SCSI-2 mode) or 127 LUNs + 1 CCL (SCSI-3). The LUN numbers must be between 0 and 199.
- Transparent failover mode—Support for 128 LUNs per storage system (SCSI-2 mode) or 127 LUNs + 1 CCL (SCSI-3). The LUN numbers must be between 0 and 199.

The chart below indicates in which cases Large LUNs are enabled.

	ACS Version 8.5		ACS Version 8.6/8.7	
	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 Datacenter, if any LUN greater than seven 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. The Device Manager may show the device with a yellow warning icon on it. A reboot of the system removes the device.

Documentation Anomalies

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

- In order to successfully perform a rolling upgrade on controllers connected to Windows 2000 Datacenter hosts, a change to the “Solution Software Upgrade Procedures,” found on page 3-24, must be observed. See the "Rolling Upgrades", page 23, of these Release Notes for further details.

