Compaq StorageWorks™
Release Notes

MA6000 HSG60 Array Controller ACS Version 8.5 Solution Software for Linux Alpha

This document summarizes features and characteristics of the HSG60 Array Controller (Array Controller Software Version 8.5) for Linux systems that are supported in the 8.5 release of the HSG60 Solution Software for the Linux Alpha platform kit.

These *Release Notes* provide information not covered elsewhere in the documentation. This document should be used by individuals responsible for configuring, installing, and using the HSG60 Array controller.

Read this entire document before installing or upgrading the software.

These release notes include the following sections:

1.0 Identifying Your ACS Software Revision Level

2.0 Hardware and Software Support

3.0 New Features

4.0 Configuration Rules

5.0 Operating Constraints

6.0 StorageWorks Command Console (SWCC)

7.0 Documentation Additions and Corrections

Release Package Contents

The Solution Software consists of:

- The HSG60 Solutions documentation set:

  -- Modular Array Cabinet Restrictions EK-MACON-CA. B01

  -- Compaq StorageWorks Command Console V2.3 for MA6000 User Guide AA-RMBDA-TE

  -- MA6000 HSG60 Array Controller Solution Software Kit Overview AA-RMBCA-TE

  -- HSG60/HSG80 Array Controller ACS Version 8.5 CLI Reference Guide EK-HSG85-RG. B01 (CD-ROM only)

  -- HSG60/HSG80 Array Controller ACS Version 8.5 Maintenance and Service Guide EK-HSG84-SV. D01 (CD-ROM only)

  Registration
  MA6000, RA7000/8000, ESA10000/12000 and MA8000/EMA12000
  EK-RAESA-RC. E01

  -- StorageWorks Warranty Package
  Warranty Terms and Conditions EK-HSXSW-WC. C01
  Warranty Terms and Conditions Addendum 3R-Q178A-3V. B01
  158199-021

NOTE

The Warranty book uses DIGITAL and DIGITAL terminology. A COMPAQ Warranty booklet is not yet available. Please check with your COMPAQ service representative for any questions on warranty items.

  -- MA6000 HSG60 Array Controller ACS Version 8.5 Solution Software for Linux x86 and Alpha Installation and Configuration Guide AA-RMECA-TE

- CD-ROM:
  -- MA6000 Fibre Channel Solution Software V8.5 for LINUX Alpha
  AG-RMESA-BE

Intended Audience

This document has been prepared for customers who have purchased the
MA6000 Fibre Channel system with an HSG60 controller, and for Compaq
Multivendor Customer Services personnel responsible for installing and
maintaining systems that include the HSG60 array controller.

Visit our Web Site for the Latest Information

Check our web for the latest drivers, technical tips and documentation for the
HSG60 Array Controller. We can be found in the technical area of our web page:

<p align="center">http://www.compaq.com/support</p>

1.0   IDENTIFYING YOUR ACS SOFTWARE REVISION LEVEL

You can identify ACS Software Version 8.5 by entering the following command at the CLI prompt:

`SHOW THIS_CONTROLLER`

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

`V8.5L`

2.0   HARDWARE AND SOFTWARE

This section lists the hardware and software supported by HSG60 Solution Software V8.5.

> **NOTE:**
>
> For the V8.5 release of the Solution Software, references to the QLA2100 HBA apply also to the QLA2200 HBA.

2.1 Required Driver Revision

The driver required for successful operation of the HSG60 RAID Controller with Linux is the *qla2100/ qla2200* driver version 2.17-0. This driver is included in the *CPQqla2100-2.17-0.rpm* RPM file. Through executing the *install_stgwks* script in the *agents/linux* directory on the solution CD-ROM, you will install the driver source. The driver sources are installed into the */usr/src/linux/drivers/scsi* directory. In this directory, you will also find two README files for the *qla2100/qla2200* driver:

- **README.qla2100**, which is an overview description of the functionality of the qla2100 driver.

- **README.qla2100-addkernel**, which describes the process of building the qla2100 driver into the kernel. This file also describes the patches, which are applied during the installation process.

The latter file should be used to verify that the patches made to the various files in the */usr/src/linux/drivers/scsi* directory were applied correctly.

2.2 Host Adapter BIOS Settings

A key aspect of proper operation of the CPQ/QLA2100/2200 Host Bus Adapter (HBA) with the HSG60 Controller is properly setting up the HBA BIOS.

Compaq/QLogic QLA2100/QLA2200 Fibre Channel Host Bus Adapter BIOS provides a means of controlling HBA operation. The Host Bus Adapter BIOS is configured through the *Fast*!UTIL utility, which is invoked by pressing ALT-Q during QLA2100 BIOS initialization.

> **NOTE**
>
> The AlphaServer SRM Console does not support invoking the *Fast*!UTIL BIOS utility for the QLA2100 HBA. The BIOS settings need to be verified by plugging the HBA into the PCI bus on an Intel-based system.

The following tables describe the correct settings to use to operate the HBA with the HSG60 Controller:

Host Adapter BIOS Settings

Setting Type	Options	HSG60
Host Adapter BIOS	Enabled or Disabled	Disabled
Frame Size	512, 1024, 2048	2048(*)
Loop Reset Delay	0-15 seconds	5 seconds
Adapter Hard Loop ID	Enabled or Disabled	Enabled
Hard Loop ID	0-125	125(*)

> Note: Settings in the HSG60 column that are marked with an asterisk are non-default settings.

The following list provides additional detail on the setting type described in the above table:

- **Host Adapter BIOS** - when this setting is disabled, the ROM BIOS on the QLA2100 board is not loaded into memory. For operation with the HSG60 this setting should be *Disabled*.

- **Frame Size** - this setting specifies the maximum frame length supported by the QLA2100 board. For best operation with the HSG60 Controller, this option should be set to *2048*.

- **Loop Reset Delay** - after resetting the loop, the firmware refrains from initiating any loop activity for the number of seconds specified in this setting. The default value of *5* seconds works well with the HSG60, allowing sufficient time for the loop to stabilize after a reset.

- **Adapter Hard Loop ID** - this setting forces the adapter to use the Target ID specified in the Hard Loop ID setting. For operation with the HSG60 this setting should be *Enabled*.

- **Hard Loop ID** - the adapter will attempt to use the value in this setting, if the Adapter Hard Loop ID is enabled. The correct setting for usage with the HSG60 Controller is *125* for the first HBA in the loop, and *124, 123 and 122* for HBA number 2 through 4. Refer to the accompanying *MA6000 HSG60 Array Controller ACS Version 8.5 Solution Software for Linux x86 and Alpha Installation and Configuration Guide*, for more information on the mapping of SCSI Target ID's to Arbitrated Loop Physical Addresses (ALPA's).

Advanced Host Adapter BIOS Settings

Setting Type	Options	HSG60
Execution throttle	*1-256*	*16*
Fast Command Posting	*Enabled or Disabled*	*Enabled*
>4Gbyte Addressing	*Enabled or Disabled*	*Disabled*
LUNs per Target	*0,8,16,32,64,128,256*	*64(*)*
Enable LIP Reset	*Yes or No*	*Yes(*)*
Enable LIP Full Login	*Yes or No*	*Yes*
Enable Target Reset	*Yes or No*	*Yes(*)*
Login Retry Count	*0-255*	*8*
Port Down Retry Count	*0-255*	*8*
Drivers Load RISC Code	*Enabled or Disabled*	*Enabled*
Enable Database Updates	*Yes or No*	*No*
IOCB Allocation	*1-512 buffers*	*8(*)*
Extended Error Logging	*Enabled or Disabled*	*Disabled*

NOTE:

Settings in the HSG60 column that are marked with an asterisk are non-default settings.

The following information provides additional detail about the setting types described in the above table:

- **Execution Throttle** - this setting specifies the maximum number of commands executing on any one port. When a port's execution throttle value is reached, no new commands are executed until the current command finishes execution. The default value of *16* has been shown to work well with the HSG60 Controller.

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

- **>4 Gbyte Addressing** - enable this setting if your system has more than 4 Gbytes of physical memory.

- **LUNs per Target ID** - this setting specifies the number of LUNs per Target ID, which will be presented by the QLA2100. This setting is critical for mapping all the LUNs that are presented by the HSG60 Controller. When using both ports, the HSG60 will present up to 100 LUNs per Target ID and 2 Target ID's. Under normal circumstances, a setting of *64* is sufficient; this will provide support for using Unit Numbers D1-D63 on port 1, and Unit Numbers D101-D163 on port 2.

- **Enable LIP Reset** - this setting determines the type of loop initialization process (LIP) reset that is used when the operating system initiates a SCSI bus reset. When set to *Yes*, the driver initiates a global LIP reset to clear target device reservations. When set to *No*, the driver initiates a global LIP reset with full login. For operation with the HSG60 Controller, this option should be set to *Yes*.

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

- **Enable Target Reset** - this setting instructs the driver to issue a Target Reset to all devices on the loop when a SCSI Bus Reset command is issued. For the HSG60 Controller this should be set to *Yes*.

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

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

- **Drivers Load RISC Code** - when enabled, the HBA accepts the RISC firmware from the driver. For the *qla2100* driver, set this option to *Yes*.

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

- **IOCB Allocation** - this setting specifies the maximum number of I/O Control Buffers allocated from the firmware's buffer pool for any one port. This setting is also used by the *qla2100* driver to set the Tagged Command Queue depth for each LUN. This setting should be set to *8 buffers*. **Important: setting this value too high may have seriously adverse effects on your system's performance with a large number of LUNs.**

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

2.3 Operating System Support

On HSG60 controllers, ACS Version 8.5L is used in conjunction with Linux. The minimum required kernel version is 2.2.12.

2.4 Device Support

ACS Software Version 8.5L supports the devices listed in the Table below at the indicated hardware and microcode levels.

Table 1 Supported Disk Drives

Device	Capacity in Gigabytes	Spindle Speed (RPM)	Minimum Microcode Version	Minimum Hardware Version
328939-B22 BD009122BA	9.1	10,000	3B07	A01
142671-B22 BD00962373 BD00962A66	9.1	10,000	BCJE B007	A01 A01
128418-B22 BD018122C9	18.2	10,000	B016	A01
142673-B22 BD01862376 BD01862A67	18.2	10,000	BCJE B007	A01 A01

2.5 StorageWorks Command Console

The StorageWorks Command Console (SWCC) version 2.3 is included in this release. 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 CPQraidsw package. Refer to the *MA6000 HSG60 Array Controller ACS Version 8.5 Solution Software for Linux x86 and Alpha Installation and Configuration Guide* for information about installing the solution software packages.

SWCC contains an on-line manual, which can be accessed in the on-line Help. For the latest information about SWCC refer to the product links available on the Compaq web site at:

http://www.compaq.com/storage

2.5.1 Identifying Your SWCC Software Revision Level

The StorageWorks Command Console Client software suite for the HSG60 V8.5 consists of various components. The following SWCC components are included in this release of the Solution Software kit:

SWCC Command Console (storage window manager)	**V 2.2.0.213**
SWCC CLI Window	**V 2.0.0.33**
HSG80 ACS85 StorageWindow	**V 2.3.0.13**
HSG80 StorageWindow	**V 2.1.0.28**
HSG60 StorageWindow	**V 2.3.0.4**
HSZ StorageWindow	**V 2.3.0.47**
HSZ80 StorageWindow	**V 2.3.0.15**
HSD StorageWindow	**V 2.0.0.5**
HSJ StorageWindow	**V 2.0.0.5**

Verification of the individual components can be done with Explorer by right clicking on the particular executable program in its folder and selecting the Properties option. In the resulting Properties window, click on the Version tab and select the Product Version to display the version of the program.

2.5.2 Compaq Insight Manager Integration

This release of the SWCC Client kit is not integrated with Compaq Insight Manager. Please check on Compaq's StorageWorks Storage Management Software website at:

www.compaq.com/products/storageworks/storage-management-software/swccdownload.html

for updates on Compaq Insight Manager integration.

2.5.3 Single SWCC Agent

There should be only one SWCC Agent per RAID system. Multiple Agents managing the same RAID system are not supported.

3.0   NEW FEATURES

This is a new release of ACS code. For information about the features of this release, see the *MA6000 HSG60 Array Controller ACS Version 8.5 Solution Software for Linux x86 and Alpha Installation and Configuration Guide* and the *HSG60/HSG80 Array Controller ACS Version 8.5 CLI Reference*.

4.0   CONFIGURATION RULES

The following list outlines the configuration rules for the controller:

- Maximum 127 visible LUNs and one Command Console LUN (CCL)
- Maximum 512-GB LUN capacity
- Maximum 24 physical devices
- Maximum 8 RAID-5 storagesets
- Maximum 8 partitions of a storageset or individual disk
- Maximum 6 physical devices per RAID 1 (mirrorset)
- Maximum 14 physical devices per RAID-5 storageset
- Maximum 24 physical devices per RAID 0 (stripeset)
- Maximum 24 physical devices per striped mirrorset

Configuring Large Storagesets

When creating large storagesets, the logical geometry presented by the HSG60 controller may be outside the limits of the operating system. When this occurs, your storageset will be reported by the operating system with a smaller size than correct.

If one of your storagesets is significantly smaller than you expect, it may be that the operating system is reporting the logical geometry of the storageset incorrectly. One of the more common occurrences of this phenomenon is when the cylinder count exceeds 65535, which will cause it to 'wrap around'. This problem can be easily remedied by bringing the logical geometry, as presented by the HSG60, within the bounds of the operating system. This is done using the ACS INITIALIZE command with the appropriate combination of the CYLINDERS, HEADS and SECTORS_PER_TRACK qualifiers.

The following example shows the steps to be taken:
1. Note the size and geometry information of the storageset using the SHOW unit-number command:

```
        SHOW D101
```

This will report the size (in blocks) and geometry of the storageset. For example:

```
        Size:              380913640
        Geometry (C/H/S): ( 74983 / 20 / 254 )
```

Note that the geometry values may be rounded, so that the formula

```
    cylinders x heads x sectors
```

may not yield the exact number for the size in blocks. When performing calculations, always ensure that the product of the above formula is no greater than the original size of the storageset in blocks (i.e., make sure that the logical geometry is no greater than the physical geometry).

2. Calculate the new values for the geometry by dviding the quantity which is too large by the same amount that is used to multiply one of the other quantities. Quite often the cylinders count is too large, and the heads count can be adjusted upware. During this process, ensure that the formula

```
        cylinders x heads x sectors
```

remains constant. In this example, divide the cylinders count by 2 and multiply the heads count by 2 to get the following values:

```
        Size:              380908560
        Geometry (C/H/S): ( 37491 / 40 / 254 )
```

Note that the resulting size is slightly smaller.

3. Delete the unit, so that the storageset can be re-initialized:

```
        DELETE D101
```

4. Initialize the storageset with the new values:

```
        INITIALIZE R0 CYLINDERS=37491 HEADS=40
```

Please be sure to use the same additional qualifiers as when the storageset was first initialized.

5. Re-add the unit:

```
ADD UNIT D101 R0
```

At this point, verify that the value is correct with the SHOW command.

Upon completion of the above steps you will be able to format the storageset and create a filesystem on it.

5.0   OPERATING CONSTRAINTS

This section describes the operating constraints for ACS Software Version 8.5. An operating constraint is a limitation placed on the operation of the controller. Keep these constraints in mind to avoid problems and to help achieve the maximum performance from your controller. Other constraints on host adapters or other system components may also apply. See the host documentation for more details.

5.1 Disk Geometry Limitations

The maximum geometry to be presented by ACS V8.5 is 512GB. Using 36GB disk drives, this limits the maximum number of disks in a Stripeset to 14.

5.2 Multi-Host SWCC Agent with a Single MA6000

This release does not support the simultaneous running of the SWCC Agent on multiple host systems, when these systems are connected to the same HSG60 RAID Controller. When multiple host systems are connected to the same HSG60 RAID Controller, please make sure that the SWCC Agent is active on only one of the host systems.

5.3 SWCC Agent Refresh Rate

The SWCC Agent refresh rate (set through the Add Subsystem or Modify Subsystem *SWadmin* option) should not be set to a very low interval; intervals in excess of 60 seconds perform best.

5.4 Command Console LUN Usage

In order to avoid access conflicts between the *sg* and *sd* drivers, the Access Device used for SWCC Agent communication *must not* be an *sd* device. Please ensure that the sg device used does not have an *sd* device mapped to the same LUN. The best way to verify this, is to use *sg_inquiry* on the *sg* device to verify that its Target ID/LUN combination has a Logical Unit Number value of 0 (zero). With the HSG60 Controller operating in SCSI-3 mode, the Command Console LUNs are always mapped to Logical Unit Number 0.

6.0   STORAGEWORKS COMMAND CONSOLE (SWCC)

This portion of the release notes provides application information on Version 2.3 of the Command Console HSG60 Client software suite. Command Console Client, HSG60 Storage Window 2.3 is a feature-rich graphical user interface (GUI) for StorageWorks HSG60, Fibre Channel controllers.

SWCC HSG60 Storage Windows Restrictions

When installing the SWCC HSG60 Storage Window component, you must also install the HSG80 and HSG80ACS V8.5 Storage Windows components. This assures that the proper library elements are available for all of the components.

If you cannot install the HSG60 and HSG60ACS V8.5 Storage Windows or if you remove these later, you will need to execute the following command from a command line to register the required OCX component:

```
REGSVR32 C:\Progra~1\Compaq\SWCC\HSG60\PhysView.ocx
```

This path is the default path for the file *physview.ocx*.

Logical View and Physical View Note

Note that Logical View is an accurate representation of your subsystem; however, the physical view may not be an accurate representation of your subsystem.

This section of the release notes covers the Command Console Storage Manager and HS Window modules. These modules are referred to within as "*Client*".

SWCC Manual Refresh Rate

We recommend that you do not refresh SWCC windows more often than once every 30 seconds.

Storage Area Network (SAN) Configuration

In a SAN configuration, we recommend that only one SWCC Agent be active at one time.

Document Issues

The term "Command Console" can refer to the Storage Window Manager. It can also refer to the entire Command Console product suite and all of its components, or simply as "the software".

In this section, Storage Window Manager, paging, and automatic event notification issues are presented to cover situations that Command Console Clients have been installed under an installation that includes a Storage Window Manager.

Client and Agent are intimately connected in their operation. Although these release notes are meant to cover Client issues, some Agent-specific issues are included for completeness.

More Information

For complete product information on Command Console, see the product's on-line Help. Also, for details on the features of the controller software, see the controller documentation.

6.1 Installation Notes

Be careful about the order in which you install certain SWCC products. If you install SWCC from a Fibre-Channel Switch CD-ROM kit, it may overwrite newer SWCC components that have been installed with the CD-ROM that ships with this kit. You should reinstall using the CD-ROM in this kit to ensure that you have the latest client versions.

Stand-Alone Installations

After doing a stand-alone install of a device-specific Client, exit Command Console before adding or accessing a system with that type of device. Command Console will then recognize the installation.

SWCC 1.1B Client Will Not Work if Version 2.x Client Was Already Installed

SWCC 1.1b will malfunction if you already have SWCC 2.x on a Windows NT/Windows 2000 operating system. The Asynchronous Event Service that comes with SWCC 2.x uses the same port as SWCC 1.1b. SWCC 1.1b can be removed without impacting SWCC or ServerWORKS.

Perform the following to solve this:

1. Uninstall SWCC 1.1b. Ignore the error box that appears.

2. Reboot the computer. The integration for SWCC 1.1b will have been removed.

3. Integrate SWCC 2.x with ServerWORKS.

"There is no disk in the drive" Message

When you install the Command Console Client, the software checks the shortcuts on the desktop and in the Start menu. If you have Windows NT or Windows 2000, the installation will check the shortcuts of all users for that computer, even if they are not currently logged on. You may receive an error message if any of these shortcuts point to empty floppy drives, empty CD-ROM drives, or removable disks that are no longer present. Do the following:

- Ignore the error message by clicking Ignore.

- Replace the removable disks, and place a disk in the floppy drive and a CD-ROM in the CD-ROM drive. Then, click Retry.

6.2 Clarifications

This section presents clarifications on the behavior of the software in certain situations.

SWCC Agent Uninstall

The Windows NT or Windows 2000 SWCC Agent may not be completely uninstalled (that is, the service is not removed) until a system reboots.

EMU Status

The EMU status indicators do not reflect the proper status in modular storage (MA8000, EMA120000). "CLI show EMU" gets "ERROR C000 EMU not installed or operational" when it may be working correctly.

Operating System Considerations

Client provides a graphical interface that replaces your controller's CLI interface. It cannot, however, perform all operating system configuration necessary to make your subsystem's virtual disks visible to the user in the operating system.

When you create or delete virtual disks using either the CLI or Client, you are adding or removing "disks" in the subsystem in a manner similar to plugging or unplugging physical disk drives on the host bus. In either case, there are certain operating system configuration actions you must perform to make these "disks" visible or invisible to the operating system's file system.

Windows NT/Windows 2000 Configuration

On a Windows NT/Windows 2000 host, after you create or delete a virtual disk using Client (or the CLI), you must perform the following steps to properly configure the file system to recognize your changes.

1. Boot the host system. This action has the effect of forcing the Disk Administrator to recognize added virtual disks as raw disks, available for use. It also notes that deleted virtual disks are no longer present.

2. Create file system partitions on your disks. When you create a virtual disk in the controller, you have the option to partition it *at the controller level* in any way you wish, as long as you create at least one partition per disk. Each of the *controller-level* partitions you create becomes a virtual disk, visible to the host. In Disk Administrator, you must partition these newly added virtual disks at NT's file system (NTFS) level.

3. Once you have partitioned your drives in Windows NT/Windows 2000, the file system assigns each drive a unique drive letter. Make a note of the drive letters assigned.

4. Format your disks—You must format each newly added disk.

5. Start the Agent Configurator by double clicking its icon in the Command Console Start Menu group.

6. Navigate through the menus until a popup appears, prompting you to rescan your subsystems. Click Yes to perform the rescan and display a list of subsystems.

7. Make sure that the access device you've been using for your subsystem still exists. If you inadvertently deleted it, you must assign another device in its place. If no access device exists, Client cannot communicate with your subsystem unless the CCL is used.

8. Click the Next button until you can exit the configurator.

9. Select the Services option in the Windows Control Panel.

10. Scroll down to highlight the Steam entry.

11. Click the Stop button and wait for a prompt indicating that the service is halted.

12. Click the Start button and wait for a prompt indicating that the service is started.

13. Exit Control Panel.

14. Windows NT/Windows 2000 now recognizes any changes you may have made in your virtual disk configuration.

UNIX-Based Configuration

On a UNIX-based host and after you create or delete a virtual disk using Client (or the CLI), you must perform the following steps to properly configure the UNIX file system to recognize your changes.

1. Reboot the host system—This action has the effect of forcing the file system to recognize added virtual disks as raw disks, available for use. It also notes that deleted virtual disks are no longer present.

2. (Optional) Create file system partitions on your disks—When you create a virtual disk in the controller, you have the option to partition it *at the controller level* in any way you wish. Each of the *controller-level* partitions you create becomes a virtual disk, visible to the host.

3. Afterward, if you desire, you can partition these newly added virtual disks at UNIX's file system level. Use the appropriate commands for your operating system version to perform this task. Once you have partitioned your drives in UNIX, the file system assigns each drive a unique drive identifier.

4. Stop and Restart the Agent—Using the Agent configuration script, you must stop and restart the Agent running on your UNIX host, using the configuration program. In the program, you must choose the option to create a new *storage.ini* file. This action updates the Agent to recognize any virtual disk changes you have made.

Display in VGA Mode

There are numerous issues involving the use of Client on a system with standard, VGA resolution. The Storage window requires a minimum amount of screen space to properly display its contents. When you use VGA display resolution, screen space becomes more limited. It is highly recommended that you use Client with a minimum of SVGA (800x600) display resolution.

If you must use VGA resolution, consider the following suggestions:

*   You may not be able to see the scroll bars on the bottom of the display. You can use the Storage window's menu settings to remove the toolbar from the display to make room for the bottom scroll bars.

*   If you are using Client with a 24-device, high-availability enclosure, it may be easier to configure the subsystem if you set the system type to *Generic* for configuration purposes. Return the setting to *High-Availability 24-Device Pedestal* for monitoring and viewing.

6.3 Operating Constraints

This section describes the operating constraints for the software. An operating constraint is a limitation placed on the operation of the controller by the nature of its design. Keep these constraints in mind, to avoid problems and to help you to get the maximum performance from your controller.

Failover Mode Set in CLI

Client is intended to be used to configure and monitor your storage only, and there are some functions available in the CLI that are not available in graphic form in the GUI. If you wish to use your controller's multiple-bus failover mode, you must enable and control that function via the CLI.

Also, if you wish to use virtual disk preferencing in multiple-bus failover mode, you must set your virtual disk preferences via the CLI when you set the failover mode.

Connection Limitations

Local SCSI or serial connections are only available with standalone Storage Windows.

Some Features Dependent Upon Connection Type

Because of the nature of the connections you can use between Client and your subsystems, the features available with each connection type vary slightly. Some connection types impose limitations on Client's features, as noted in Table 2.

Table 2 Feature Limitations

Feature Connection Type	Create virtual disk	Delete virtual disk	Fault Events: Client Visual Notification	Fault Events: Paging Notification	Windows NT and Windows 2000 Fault Events: Event Logging	Email Notification (UNIX/VMS only)
Local Serial Connection (Storage Window Manager and Agent not used)	**Supported**	**Supported**	**Supported**	**Not Supported**	**Not Supported**	**Not Supported**
Local SCSI Bus Connection (Storage Window Manager and Agent not used)	**Supported**	**Supported**	**Supported**	**Not Supported**	**Not Supported**	**Not Supported**
Local Network Connection (Client and Agent running on the same host)	**Supported**	**Supported**	**Supported**	**Supported**	**Supported**	**Supported**
Remote Network Connection (Client running on a PC remote from Agent on a host)	**Supported**	**Supported**	**Supported**	**Supported**	**Supported**	**Supported**
RAS Connection (Client running on a remote PC with a dialup network connection)	**Supported but not recommended. Followup operating system configuration cannot be performed remotely**	**Supported but not recommended. Followup operating system configuration cannot be performed remotely**	**Supported reliably only while RAS intact. Some events may be missed while dialup connection is broken.**	**Supported reliably only while RAS intact. Some events may be missed while dialup connection is broken.**	**Supported reliably at host end only. Some events may be missed at Client end while dialup connection is broken.**	**Supported**

Delayed Event Notification on RAS Connections

Visual fault notification, paging, and event logging may be delayed significantly in situations where RAS connections are used for multiple Clients. An Agent with multiple Clients in its *client.ini* file must poll each Client whenever a fault occurs. Any Clients not currently network-connected significantly delay this process, because Agent must wait for their connections to time out before moving on to the other Clients.

To avoid this situation, set the *notification_method* parameter for each Client in the *client.ini* file to "0" to delete event fault notification.

CLI RUN Commands

Do not issue RUN commands in the CLI Window. Use only a maintenance terminal connection to issue RUN commands.

Creating Partition Units Across Targets or Ports

Be aware that the name you pick for a unit assigns it to a particular host bus target. If you create a unit from free space on a device, the program forces you use a unit name that puts the unit on the same host target as the other partitions on the device.

On dual-port controllers, partitions on the same device that are assigned to different host ports are not supported.

Maximum Number of Active Connections Limited

The controller maintains a table of host port connections that can contain up to 64 named connections. Only 8 of those connections can be active (that is, "on line") at any time, however. Client shows only those connections that the controller recognizes as "on line".

Avoiding Problem Situations

In certain situations and under specific conditions, you may experience unusual behavior with the software. This section presents information to help you avoid such situations and to recover from them if they occur.

Enable Read-ahead Cache Before Enabling Write-back Cache

The controller requires that read-ahead cache mode is enabled before you can enable write-back cache mode.

Incomplete Scans Cause Connection Loss

For proper display of subsystem status, Client performs a "scan" to collect information about your storage subsystems. The program displays scan progress screens while the process occurs. In some, rare situations, you may experience incomplete scans or scans that appear to hang. In these cases, the likely cause is that Client has lost its connection with the virtual disk it was using for communication with your subsystem.

This problem may show up with either local SCSI or network connections.

To remedy this situation, you must first restart both of your controllers, followed by restarting Client and Agent. If the system still does not operate properly, you must reboot your host system. If your host is running Windows NT or Windows 2000, you must ensure that the special device driver, HSZDISK.SYS or HSXDISK.SYS is installed and running properly after it is booted.

Mirrored Cache Mode Not Retained After Configuration Restore

If you restore your controller configuration from a configuration file, the mirrored cache setting may not be properly enabled. You must restore the mirrored cache setting manually, using a CLI Window.

Error Message on Exiting Storage Window

Under certain conditions, when you exit a Storage Window, you may experience an "Illegal Operation Error" message. You may ignore this message.

Inappropriate Error Message on Device Delete

If you select a disk, then chose Device/Delete, a dialog box may appear, asking "Are you sure?". If you choose the "NO" option, the message "Nothing selected to delete!" is displayed. You may ignore this message.

Storage Window Corruption After Making/Removing Spare Device

If you select a disk and make it a spare (using either menu or context menu options), then remove the device as a spare, some information in the Storage Window may be left corrupted. To reconstruct the window, you must exit the window and open a new one.

Cache Policy Not Shown in Controller Properties Sheet

The controller cache policy may not be properly shown in the controller properties sheet. The field may be blank. You must use a CLI Window to obtain the cache policy setting.

Incorrect Capacity Shown in Add Virtual Disk Wizard

In some circumstances, in Step 3 of the Add Virtual Disk Wizard, if you specify a capacity greater than the available disk capacity, an error message results. If you back up to Step 2 of the Wizard and return to Step 3, the correct capacity is then displayed. An attempt to move to Step 4 of the Wizard at this point, however, results in the same error message, even though the correct capacity is shown.

To complete your virtual disk, you must exit the Wizard and recreate the virtual disk.

Storage Window Corruption While Deleting a Virtual Disk

In some circumstances, if you delete and confirm deletion of a RAID-based virtual disk, a "Subsystem Connection Status" window may be displayed, and the Storage Window goes blank. The Storage Window may remain blank for several seconds until the "Subsystem Connection Status" window disappears.

Application Errors When Restarting Agent

You may experience an "application error" error when attempting to restart Agent after manually changing the Agent configuration files. Either of the following issues may be the cause:

- The *client.ini* file must end with a carriage return. If any other character terminates the file, it may cause an application error.

- The *storage.ini* file must not end with a carriage return. If a carriage return terminates the file, it may cause an application error.

False Restart Message on Agent Installation

When you first install a Windows NT/Windows 2000 Agent, and you modify more than one configuration parameter, the installation program may prompt you with a message indicating the Agent must be "restarted", even though it has not yet been completely installed. You may ignore this message, and you must respond to the subsequent prompt, "Would you like to start the Agent service now?" by answering "Yes".

Client Access Changes Not in Effect

After manually editing or changing the Agent *client.ini* file with a configurator program, you may notice that your Clients' access has not changed. To place your changes in effect, you must restart Agent after editing any of the Agent configuration files.

Reconfiguration After Controller Replacement

If you replace either of the controllers in your subsystem, you must reconfigure your Agent *storage.ini* file to match the serial numbers of the new hardware. See your Agent documentation for details on reconfiguring your *storage.ini* file.

Storage Window Won't Open

If you cannot open a Storage Window from the Storage Window Manager or in standalone mode, the *client.ini* ACCESS_ALLOWED parameter for your Client is probably set to "0", disabling Storage Window access. Use the Agent configuration script or edit the *client.ini* file to enable access to the subsystem.

Invalid Network Port Numbers During Installation

During Client or Agent installation, you may experience an error if the installation program cannot find an acceptable pair of network port numbers.

Your Client uses Windows sockets (sometimes called "network ports") to communicate with its Agents. The socket numbers at the Client and Agent ends must match for network communication to occur.

In Windows NT/Windows 2000, the socket numbers are assigned in the *services* file in the *\winnt\system32\drivers\etc* subdirectory. In UNIX-based systems, the socket numbers are assigned in the *services* file in the */etc* subdirectory. In the unlikely event that you experience a conflict with the socket numbers, you may edit the file manually.

There are two default socket numbers, one for Command Console (4998) and the other for the HS series Client and Agent (4999). If you are installing either Client or Agent and these numbers are already taken by another application, the installation program prompts to warn you that you must choose another pair.

To select another pair for Client, open the file containing the sockets in an ASCII editor, after you have installed Client. Pick two numbers above 1023 that are not already used in the file, and add the following two lines:

```
spgui              number1/tcp # StorageWorks® Command
Console
spagent            number2/tcp # StorageWorks® Command
Console
```

Note that the port numbers that you select must match the port numbers used by all of the Clients to which you wish to connect your Agent.

Network Port Assignments for UNIX-Client/Server Systems

A UNIX host may use Network Information Services (NIS) to serve the *services* file containing its network port assignments.

Agent must use the *services* file to determine which network ports to use. Because of this requirement, you may need to configure your system so that Agent can access the proper *services* file.

You have two options to prevent a conflict between the two possible locations of the *services* file. See the Agent user guide for your particular Agent for more information.

Error on First Attempt to Make Connection

You may experience a system error such as a "Command Execution Error" on your first attempt to make a network connection using the Storage Window. If this happens, try the connection again, and it will succeed.

Client Hangs If Virtual Disk Deleted

If Client is monitoring a particular subsystem, and you delete the virtual disk being used to communicate with that subsystem, the program may hang. To delete the virtual disk Client is using for communications with an Agent, you must first reassign another virtual disk as the communications LUN, using the Agent configurator.

If you are using the CCL as your communications LUN, and you disable it, Client may lose its connection with your subsystem. If you wish to disable the communication LUN, you must first reassign another virtual disk as the communications LUN.

Invalid Cache Errors

Your controller module, cache module, and subsystem devices all contain configuration information used to keep their activity synchronized. This data is called *metadata.* The controller software reports an invalid cache error on the affected controller in situations where there is a mismatch between the metadata in the controller module and a cache module containing unwritten data. This mismatch can result in loss of the unwritten cache data if the error is not cleared properly.

CAUTION

Use extreme care in responding to the Command Console invalid cache error prompt. If you inappropriately instruct the program to delete unwritten cache data, you may lose valid user data.

Client displays a message and prompt box when an invalid cache error occurs. You must tell the program whether or not to delete unwritten cache data as the error is cleared. If you are not familiar with the proper treatment of unwritten cache data, see the information in the on-line Help documentation under the topic "Invalid Cache Errors."

Connecting Via the Host SCSI Port

Client may indicate that it cannot find your subsystem if you attempt to connect via the host SCSI port by using Windows NT/Windows 2000 in either of the following situations:

- A StorageWorks controller subsystem is connected to the host, but the subsystem has no virtual disks configured on it in SCSI-2 mode with CCL disabled.

- A StorageWorks controller subsystem is not connected to the host.
  If you are using SCSI-2 mode and Windows NT/Windows 2000, you must disable the Command Console LUN and create a virtual disk by using a serial connection. For more information on the Command Console LUN, refer to the *Compaq StorageWorks Command Console V2.3 User Guide*.

Note that because Agent uses a SCSI host bus connection to its subsystems, the same rules mentioned above also apply.

Communications Failure on Power Up with Low Batteries

If the battery in your cache is discharged when you power up the controller, the controller may produce an invalid cache error. If you are using Client as your controller interface at that time, the error may prevent communication with the controller. In this case, the controller status bar in Client changes to yellow, and the program displays a window containing error information.

To clear the error, you must exit Client and use a normal controller maintenance terminal to issue the CLEAR ERRORS INVALID_CACHE command before you can use the controller. See your controller documentation for instructions on use of the CLEAR ERRORS INVALID_CACHE command.

If the battery remains low, the invalid cache error may reappear. In this case, you can operate your controller with reduced capability, or you can change its cache policy to get around its built-in battery protection, although at some risk to your data. Refer to your controller documentation for details on its cache policy controls.

After you have cleared the invalid cache error, you can use either a normal maintenance terminal or Client as your controller interface.

Lost Connections Cause Invalid or Missing Fault Displays and Event Logging

Client receives notification for most types of changing subsystem fault conditions on the next monitor interval after they occur. You may experience invalid or lost notifications in situations in which Client's connection with its subsystems is broken. Any Windows NT/Windows 2000 event logs that might have occurred while the connection was broken are also lost.

If the connection between Client and its subsystems is broken for any reason, Client may continue to display faults that are cleared while the connection is broken. Similarly, faults that occur while the connection is broken are not displayed at all.

To avoid lost fault indications, make sure that Client's connections with its subsystems are monitored and maintained. To reestablish a connection with a storage subsystem, you must exit and restart Client.

Broken connections can occur for a variety of reasons:

- For RAS connections—It is the nature of a RAS connection that it is not a full-time connection. Events that occur during a period when the RAS connection is not made are not logged to Windows NT's/Windows 2000's event logging facility.

- For serial controller connections—Bad or missing serial cable. To repair this situation, plug in or replace the cable.

- For host port SCSI connections—Bad or missing SCSI host cable, no LUNs configured on controller on Client startup.

- For network connections—Agent missing or not running, network discontinuity, Agent not properly configured for your Clients.

- THIS controller halted, reset or hung—To repair this situation, restart or replace THIS controller.

- The virtual disk being used for communications with the storage subsystem is no longer available.

No Agent Notification Causes Invalid or Missing Fault Displays

For some types of faults, Agent does not send Client notification of changes in status as they occur. Client displays whatever fault information it last received. Following are three situations in which a fault can occur without immediate display in Client:

- The OTHER controller fails or is shut down.
- A cache battery on either controller fails or goes low.
- A cache module fails.
- A fan fails.
- A power supply fails.

In all of these cases, you can get current status by viewing the subsystem in question using the REFRESH option in the View menu.

Manual Restart Required in Some Situations

In some situations in multiple-bus mode, both controllers must be restarted to properly continue subsystem operation. Usually, this function is automatically performed by the software. If only one controller in a dual-redundant pair restarts, however, you must manually restart the other controller.

CCL Recognition

The Windows NT/Windows 2000 Agents will now recognize a CCL. The CCL cannot be assigned a drive letter because it is a logical device and must be recognized by its physical drive number. The Windows NT/Windows 2000 x86 Agents will recognize both device names (a-z) and physical drive numbers. The disk administrator can be used to find the associated drive number for any of the recognized devices.

Reservation Error Message

The Agent application, and other applications which access RAID storage through SCSI, will get a reservation error if a device is reserved by one host and another host attempts to access the same device. When this occurs, a generic I/O error will be logged.

Reservation Conflict

Agent will discard reserved LUNs from its list of devices to be statused. The reservation conflict will be recorded for each reserved LUN in the system error log. A notification will appear in the log for each LUN reserved. In addition to the system's binary error log (Tru64 UNIX), an error message will also be recorded in the *daemon.log* file. An example of the error message is "Device *lunName* is reserved and cannot be statused by steamd." This only applies to Agent during its current run. If Agent is restarted without either a) releasing the reservation or b) rescanning the bus, the reservation conflict will be recorded again each time Agent is restarted.

For **prior Agent releases**, to avoid filling the binary error log, Agent must be stopped and restarted with bus scan enabled. Agent will not record the reserved LUN in the storage.ini file, and will not status the reserved LUN.

Switching SCSI Modes

When switching HSG60 controllers from SCSI-3 to SCSI-2 mode, the host system should be rebooted after the change is made. This will clear any unclaimed SCSI-3 CCL devices from the system. Failure to clear devices can cause erratic Agent behavior or crash the NT system (BSOD). It is also recommended that you reboot when changing from SCSI-2 to SCSI-3 mode.

Add Virtual Disk Wizard Cache Functionality

The Add Virtual Disk Wizard allows you to try to add a unit that has readahead cache enabled while read cache is disabled. This is an invalid action. The controller will not allow the "add unit" to execute. The result is a storageset without an attached unit. This "orphaned" storageset may be used to create a new unit by returning to the Add Virtual Disk Wizard and adding a unit of the same redundancy level as the failed unit.

Ensure that you do not check Enable readahead cache if Enable read cache is unchecked. Refer to Step four of the Add Virtual Disk Wizard.

Add Virtual Disk Wizard – Partitioned Units and Ports Functionality

The Add Virtual Disk Wizard allows you to choose a port when adding a unit based upon a partitioned set that is different from the port of a current unit that is using the same partition.

Ensure that you use a LUN ID that corresponds to units that have already been used for a partitioned storageset. For example, if a unit using a partitioned set has a LUN ID below 100 (e.g., D55), then the subsequent units should also be below 100. Likewise, if a LUN ID is 100 or above, subsequent LUN IDs should also be above 100.

LUN ID is set on Step 4 of the Add Virtual Disk Wizard.

NT Agent CCL Access Device Recognition

For ACS 8.5 in SCSI-3, it is possible to have multiple CCLs based on the unit offsets. Agent picks the last of the set as the access device. The CCLs will not appear in the disk administrator, but are visible in the registry with their port, target, and LUN. The CCL will show as CCLp:b:t:I, each with a different target number (port bus target LUN, e.g., CCL2:1:1:0) in the storage.ini file.

In SCSI-2, you will only get one CCL, which is presented as an offline device in disk administrator. This CCL will show as "PhysicalDrive#" in the storage.ini file.

Host Non-descriptive Error Message

If the host machine running the Storage Window is not in the client.ini file of an Agent and attempts to access that Agent, a non-descriptive error message is returned. For example, "Cannot establish communication with '77FORD' ". [Socket message is incorrect type.]

Multiple Connections in Controller Properties Connections Tab

When paging through more than 8 connections in the Controller Properties window Connections tab and then pressing the Previous button to return to previous pages, some of the host id and adapter id labels may disappear. This will not affect functionality.

Selecting Disk Drives When Creating Snapshots

When creating a snapshot, if you select disk drives of different sizes, Storage Windows reports the size erroneously. Storage Window adds all selected devices together for selected capacity. The selected capacity is actually the smallest drive multiplied by the quantity of drives selected. Storage Windows will allow you to proceed when you have inadequate storage selected. When you select drives of different sizes, you should calculate the selected storage by multiplying the smallest drive by the quantity of drives selected. If you select drives of the same size, this feature functions properly.

Client Domain Network Server (DNS) Setup Application Error

You must ensure that your client DNS is set up correctly. In some situations, Storage Window will get an application error if the Host of the Agent exists but cannot be reached directly by the Client machine.

Expand Option Not Implemented

The Expand Unit option is not implemented in ACS version 8.5.

Agent Failure using Multiple Storage Windows

If the Agent fails while you have multiple Storage Windows connected to different subsystems, you may not be able to close the Storage Window. When this occurs, close the Storage Window by using Windows Task Manager.

7.0   HSG60 DOCUMENTATION ADDITIONS AND CORRECTIONS

Following are the additions and corrections to the HSG60 documentation set.

Note that all of the corrections are to the:

MA6000 HSG60 Array Controller ACS Version 8.5 Solution Software for Linux x86 and Alpha Installation and Configuration Guide AA-RMECA-TE

7.1 Operating Setting for Connections to the Linux system is Sun.

Installation and Configuration Guide, Chapter 5, Configuration Procedures: Note that the operating system setting for connections to the Linux system is Sun.

7.2 QLA2100/QLA2200

Installation and Configuration Guide, Chapter 3, Installing the CPQraidsw Package: For the V8.5 release of the Solution Software, references to the QLA2100 HBA apply also to the QLA2200 HBA.

7.3 Install Script Reports Previous Version

Installation and Configuration Guide, Chapter 3, Verifying/Installing Required Versions: The install script (**usr/local/steam/bin/install.sh**) may report an earlier version of the Solution Software.

You may ignore this message.

7.4 SWadmin

Installation and Configuration Guide, Chapter 4, Mapping SCSI-generic Devices: You may use the following command to invoke the configuration script:

```
# SWadmin
```

7.5 Uninstall Error

Installation and Configuration Guide, Chapter 4, Configuring the Agent: You may get an error if you attempt to uninstall the Agent package while the steamd daemon is running. To correct this error, stop the Agent prior to removing the package.

7.6 Man Page

Installation and Configuration Guide, Chapter 4, Configuring the Agent: On-line information can be viewed by displaying the Agent manual page: # man steamd.

7.7 sg_inquiry

Installation and Configuration Guide, Chapter 4, Configuring the Agent: The sg_inquiry utility may be used to query sg devices. For example:

```
# cd /usr/local/steam/sg
# ./sg_inquiry /dev/sgc
```