

**RA8000/ESA12000 and
MA8000/EMA12000 Solution
Software V8.5c for HP-UX**

Installation Reference Guide

Fifth Edition (September 2000)
Part Number AA-RFBEF-TE
Compaq Computer Corporation

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About This Guide

This guide is designed to be used as step-by-step instructions for installation and as a reference for operation, troubleshooting, and future upgrades.

Text Conventions

This document uses the following conventions to distinguish elements of text:

Keys	Keys appear in boldface. A plus sign (+) between two keys indicates that they should be pressed simultaneously.
USER INPUT	User input appears in a different typeface and in uppercase.
<i>FILENAMES</i>	File names appear in uppercase italics.
Menu Options, Command Names, Dialog Box Names	These elements appear in initial capital letters.
COMMANDS, DIRECTORY NAMES, and DRIVE NAMES	These elements appear in uppercase.
Type	When you are instructed to <i>type</i> information, type the information without pressing the Enter key.
Enter	When you are instructed to <i>enter</i> information, type the information and then press the Enter key.

Symbols in Text

These symbols may be found in the text of this guide. They have the following meanings.



WARNING: Text set off in this manner indicates that failure to follow directions in the warning could result in bodily harm or loss of life.



CAUTION: Text set off in this manner indicates that failure to follow directions could result in damage to equipment or loss of information.

IMPORTANT: Text set off in this manner presents clarifying information or specific instructions.

NOTE: Text set off in this manner presents commentary, sidelights, or interesting points of information.

Symbols on Equipment

These icons may be located on equipment in areas where hazardous conditions may exist.



Any surface or area of the equipment marked with these symbols indicates the presence of electrical shock hazards. Enclosed area contains no operator serviceable parts.

WARNING: To reduce the risk of injury from electrical shock hazards, do not open this enclosure.



Any RJ-45 receptacle marked with these symbols indicates a Network Interface Connection.

WARNING: To reduce the risk of electrical shock, fire, or damage to the equipment, do not plug telephone or telecommunications connectors into this receptacle.



Any surface or area of the equipment marked with these symbols indicates the presence of a hot surface or hot component. If this surface is contacted, the potential for injury exists.

WARNING: To reduce the risk of injury from a hot component, allow the surface to cool before touching.



Power Supplies or Systems marked with these symbols indicate the equipment is supplied by multiple sources of power.

WARNING: To reduce the risk of injury from electrical shock, remove all power cords to completely disconnect power from the system.

Rack Stability



WARNING: To reduce the risk of personal injury or damage to the equipment, be sure that:

- The leveling jacks are extended to the floor.
 - The full weight of the rack rests on the leveling jacks.
 - The stabilizing feet are attached to the rack if it is a single rack installations.
 - The racks are coupled together in multiple rack installations.
 - A rack may become unstable if more than one component is extended for any reason. Extend only one component at a time.
-

Getting Help

If you have a problem and have exhausted the information in this guide, you can get further information and other help in the following locations.

Compaq Technical Support

You are entitled to free hardware technical telephone support for your product for as long you own the product. A technical support specialist will help you diagnose the problem or guide you to the next step in the warranty process.

In North America, call the Compaq Technical Phone Support Center at 1-800-OK-COMPAQ¹. This service is available 24 hours a day, 7 days a week.

Outside North America, call the nearest Compaq Technical Support Phone Center. Telephone numbers for world wide Technical Support Centers are

¹ For continuous quality improvement, calls may be recorded or monitored.

listed on the Compaq website. Access the Compaq website by logging on to the Internet at <http://www.compaq.com>.

Be sure to have the following information available before you call Compaq:

- Technical support registration number (if applicable)
- Product serial number (s)
- Product model name(s) and numbers(s)
- Applicable error messages
- Add-on boards or hardware
- Third-party hardware or software
- Operating system type and revision level
- Detailed, specific questions

Compaq Website

The Compaq website has information on this product as well as the latest drivers. You can access the Compaq website by logging on to the Internet at <http://www.compaq.com>.

Compaq Authorized Reseller

For the name of your nearest Compaq Authorized Reseller:

- In the United States, call 1-800-345-1518.
- In Canada, call 1-800-263-5868.
- Elsewhere, see the Compaq website for locations and telephone numbers.

Chapter **1**

Preparing Your Host for Use with the HSG80 Controller

This chapter describes the steps for installing the required device drivers onto HP 9000 Series Systems running HP-UX 10.20 or 11.00. The installation steps include loading the device driver(s) to communicate through the Fibre Channel (FC) Host Bus Adapter (HBA) to the HSG80 Controller.

1.1 Initial Setup Settings

Your new storage system components must be initially configured using a serial cable connection to the HSG80 Array Controllers. You can change the following settings: SCSI-2 or SCSI-3 mode, CCL enabled or disabled, and Transparent or Multibus Failover mode. The controllers are preset to SCSI-2 mode, CCL enabled, and Transparent Failover mode. For HP-UX, only SCSI-2 mode is supported with the ACS 8.5c version of the HSG80 Array Controller software.

1.2 Installing Hardware

Fibre Channel (FC) mass storage HBAs manufactured by HP, or Compaq/QLA2200, can be used with the RA8000/ESA12000 or MA8000/EMA12000 System and your HP platform. To install a HP HBA in your HP System, use the instructions provided in the HP Host Adapter documentation before preparing the system to interface with the RA8000/ESA12000 or MA8000/EMA12000 System. To install a Compaq/QLA2200 HBA in your HP L, N, or V class System, use the instructions provided by HP for installing PCI interfaces. Refer to the appropriate HP documentation Web page:

www.doc.hp.com/hpux/systems/lclass

www.doc.hp.com/hpux/systems/nclass

www.docs.hp.com/hpux/systems/vclass

NOTE: Hewlett Packard D, K, and T-Class hosts function as private hosts when attached to a fabric. Therefore, the Compaq Fibre Channel Switch QuickLoop feature must be enabled. This allows private hosts on fabric attached loops to access private devices on different fabric attached loops.

1.2.1 Installing the Compaq/QLA2200 Driver

To install the Compaq/QLA2200 driver in your host system:

1. Make sure the Compaq/QLA2200 HBA is correctly installed in your system.
2. Place the CD labeled, Solution Software V8.5c in your host system's CD-ROM drive.
3. Mount the CD-ROM by entering:

NOTE: pfs_mount requires pfs_mount and pfsd daemons to be running. Verify that the pfs_mount and pfsd daemons are running by entering:

```
ps -ef | grep pfs
```

If pfs_mountd and pfsd are not listed start them by issuing the following commands at the root prompt :

```
pfs_mountd &  
pfsd &
```

```
pfs_mount /dev/dsk/cdrom_device_file /mnt_directory
```

For example:

```
pfs_mount /dev/dsk/clt2do /cdrom
```

4. Start the installation by entering the command:

```
swinstall -s <CD-ROM mount directory>/driver/qlc2200
```

5. Highlight the following swinstall package when it appears on the screen:

```
BHPUX1100QLC2200
```

6. Select *Mark For Install* from the *Actions* menu. In the status window, the word *Yes* should appear under the *Marked?* column.
7. Select *Install (analysis)* from the *Action* menu. The *Install Analysis* window should appear.
8. When *Ready* appears in the *Status* item, click on the *OK* button to begin the installation procedure.
9. Select the *OK* button in the dialog box for each warning that appears.
10. If the installation was successful, the status item will change to *Completed*. If this is not the case, check the log file and correct any errors that occurred.
11. Select the *Done* button. A dialog box will appear indicating that a reboot is required.
12. Select the *OK* button to reboot the system.

1.3 Verify the Host Bus Adapters and Drivers

Verification of the HP and Compaq/QLA2200 HBAs and drivers are described below.

1.3.1 Verifying the HP HBA and Driver

Ensure that you have the required FC HBA and driver available to your system by issuing the following command:

```
# ioscan -f lgrep fc
```

The output from the command should be similar to the following example:

```
fc      0    10/8    fcT1      CLAIMED   INTERFACE   HP FC Mass Storage Adapter
lan     1    10/8.5    fcT1_cnt CLAIMED   INTERFACE   HP FC Mass Storage Cntl
fcp     0    10/8.8    fcp       CLAIMED   INTERFACE   FCP Protocol Adapter
```

1.3.2 Verifying the Compaq/QLA2200 HBA and Driver

The installation of the Compaq/QLA2200 HBA and Driver can be verified by using the *swlist* and *ioscan* commands.

1. Verify that the Compaq/QLA2200 Driver is successfully installed by entering:

swlist

The output from this command should be similar to the following example:

```
#
# Bundle(s):
#
HPUXEng64RT          B.11.00.01      English HP-UX 64 bit Runtime
Environment
OnlineDia            B.11.00.12.07   HPUX11.0 Support Tools Bundle
UXCoreMedia          B.11.00.01      HP-UX Media Kit (Reference Only.
See Description)
XSWGR1100            B.11.00.47.08   General Release Patches, November
1999 (ACE)
#
# Product(s) not contained in a Bundle:
#
BHPUX1100QLC2200    2.5.8           PCI-Fibre Channel Fabric Driver
```

2. Verify that the Compaq/QLA2200 HBA is successfully installed by entering:

ioscan -nfkC ext_bus

The output from this command should be similar to the following example:

Class	I	H/W Path	Driver	S/W State	H/W Type	Description
ext_bus	0	0/0/1/0	c720	CLAIMED	INTERFACE	Fast Wide Single-Ended SCSI
ext_bus	1	0/0/2/0	c720	CLAIMED	INTERFACE	Ultra Wide SCSI
ext_bus	2	0/0/2/1	c720	CLAIMED	INTERFACE	Ultra Wide SCSI
ext_bus	3	0/8/0/0 /dev/qlc22003	Qlc2200	CLAIMED	INTERFACE	PCI SCSI (10772200)
ext_bus	9	0/10/0/0 /dev/qlc22004	Qlc2200	CLAIMED	INTERFACE	PCI SCSI (10772200)

The /dev/qlc2200xx devices are the device files for the Compaq/QLA2200 HBAs.

1.4 Connecting the RA8000/ESA12000 or MA8000/EMA12000 to Your Host System

To connect the RA8000/ESA12000 or MA8000/EMA12000 to your host system:

1. Shut down the HP System and ensure that all power switches on the HSG80 Array Controller and on the Host Computer System are in the OFF position.
2. Connect an FC cable between the FC adapter's connector on the back of the HP System and a port on the Compaq FC switch.
3. Connect FC cables from each HSG80 array controller to the Compaq FC switch.
4. Turn ON the power to the RA8000/ESA12000 or MA8000/EMA12000 system and perform the following steps:
 - a. Configure the RA8000/ESA12000 or MA8000/EMA12000 system for loop hard (for an HP FC HBA), or fabric (for a Compaq/QLA2200 FC HBA) by accessing the Command Line Interpreter (CLI). For more information about the CLI, see *Appendix A* in this guide.

b. At the CLI prompt (HSG80>) enter:

set this_controller port_1_topology = offline

set this_controller port_1_topology = loop hard (for HP D, K, T-Class systems)

set other_controller port_1_topology = offline

set other_controller port_1_topology = loop hard (for HP D, K, T-Class systems)

or

set this_controller port_1_topology = offline

set this_controller port_1_topology = fabric (for Compaq/QLA2200 HBAs)

set other_controller port_1_topology = offline

set other_controller port_1_topology = fabric (for Compaq/QLA2200 HBAs)

c. At the CLI prompt (HSG80>) enter:

set this_controller port_2_topology = offline

set this_controller port_2_topology = loop hard (for HP D, K, T-Class systems)

set other_controller port_2_topology = offline

set other_controller port_2_topology = loop hard (for HP D, K, T-Class systems)

or

set this_controller port_2_topology = offline

set this_controller port_2_topology = fabric (for Compaq/QLA2200 HBAs)

set other_controller port_2_topology = offline

set other_controller port_2_topology = fabric (for Compaq/QLA2200 HBAs)

d. At the CLI prompt (HSG80>) enter:

Restart this

e. At the CLI prompt (HSG80>) enter:

Restart other

f. At the CLI prompt (HSG80>), verify the changes by entering:

show this_controller full

The controller displays information similar to the example in *Appendix A, Establishing a Connection with a Maintenance Terminal*, in this guide.

NOTE: Step 5 applies only if you are using an HP D, K, or T-Class system.

5. Turn ON the power to the FC switch and perform the following steps:
 - a. Log on to the switch. For more information, refer to the *QuickLoop Management Guide* that was shipped with your switch.
 - b. At the admin> prompt, enter:
qlEnable
 - c. At the switch:admin> prompt, verify that all ports are online by entering:
qlShow
6. Turn ON the power to the HP 9000, but do not boot the system.
7. Use the CLI to configure your HSG80 array controller (as described in *Appendix A* of this guide) if it is not yet configured.
8. Boot the system. During the boot process, device *special* files are created for each logical unit configured on the HSG80 array controller, and a Logical Unit Number (LUN) is assigned to each storage set configured on the HSG80 array controller. If you need to reconfigure the controller at a later time or add storage dynamically, you can detect the new changes by issuing the *ioscan* and the *insf-e* commands.

NOTE: If you are using the Compaq/QLA2200 HBA and driver, you need to update and save the driver LUN data base so that the new units persist correctly after a reboot.
9. Update and save the driver LUN database by entering:
savecfg

The output from the command should appear as follows:

```
Compaq/qlc2200 configuration has been saved
```

Now that the Compaq/QLA2200 HBA has been updated, you can issue an *ioscan* command like you normally would. If the new HBAs do not have device special files associated with them, issue the *insf -e* command to create them. Once the new HBAs have been recognized and have had device special files installed for them, the output from an *ioscan -nfc disk* command should be similar to the following example:

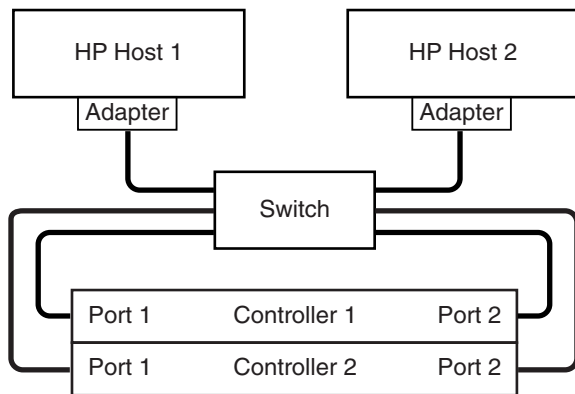
Class	I	H/W Path	Driver	S/W State	H/W Type	Description
disk	0	1/0/0.6.0 /dev/dsk/C0T6do	sdisk	CLAIMED	DEVICE	SEAGATE ST34573WC
dsk	8	1/2/0.0.0 /dev/dsk/c7t0d0	sdisk	CLAIMED	DEVICE	DEC HSG80CCL
dsk	19	1/2/0.12.0 /dev/dsk/c7t0d1	sdisk	CLAIMED	DEVICE	DEC HSG80
dsk	9	5/0/0.4.0 /dev/dsk/c9t4d0	sdisk	CLAIMED	DEVICE	DEC HSG80
dsk	4	5/0/0.12.0 /dev/dsk/c9t12d0	sdisk	CLAIMED	DEVICE	DEC HSG80

1.5 Configuring a High Availability Cluster Using MC/ServiceGuard

With MC/ServiceGuard version 10.10 on HP-UX version 10.20, a multihost configuration is supported on HP systems. The StorageWorks Command Console (CC) Agent and installation scripts allow agent failover.

To configure RA8000/ESA12000 or MA8000/EMA12000 for use with HP-UX MC/ServiceGuard:

1. On each host, connect the FC adapter to the switch.
2. Connect each port of the array controller to the switch.
3. Ensure that the controller is in transparent failover dual-redundant mode.



SHR-1541

Figure 1-1. Single switch HP MC/ServiceGuard cluster, high availability configuration

Chapter 2

Installing the Command Console Agent on Your Host System

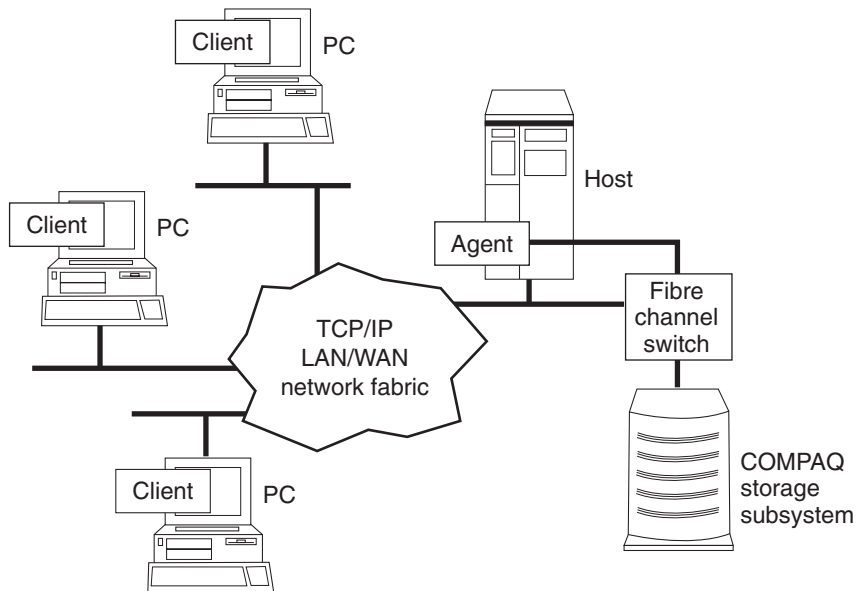
This chapter describes how to install the StorageWorks Command Console (CC) Agent on each of your host systems connected to StorageWorks RA8000/ESA12000 or MA8000/EMA12000 Systems. You can install and configure the CC Agent automatically, using a script, or manually by copying files from the CC Agent distribution CD-ROM and editing the Agent configuration and your Host System ASCII files.

2.1 Introduction

The CC Agent for HP-UX is a companion application to the CC Client graphical user interface (GUI) program. The CC Agent serves as the Client's assistant in configuring, operating, and monitoring your Host's Storage Subsystems. The CC Agent runs on your Host System as a server application. It connects to CC Client sessions via the TCP/IP network protocol, as shown in Figure 2-1.

The CC Agent can also be used as a standalone application without the CC Client. In this mode of operation, referred to as Agent Only, the CC Agent monitors the status of the subsystem and provides local and remote notification in the event of a failure. Local notification can be made via e-mail and/or the syslog facility. Remote notification can be made via SNMP messages to an SNMP monitor. The CC Client is not required for these types of notification. To configure the subsystem, use of the CC Client or the CLI is required.

NOTE: If you plan to use a PC to configure and monitor your RAID Array System, you must install the SWCC Client. The client is located on the distribution CD in your platform kit, and the instructions are in the *Command Console V2.3 User Guide*, also in your platform kit.



CXO7220

Figure 2-1. Command console client/agent connection

The CC Agent provides a network connection between a Host Storage Subsystem and any number of CC Client sessions running on remote systems. The Agent provides access protection on a network address-by-network address basis. For example, you can configure the Agent to allow one Client session complete configuration access to the storage subsystem, while another Client session only has monitoring capability.

The Agent also provides asynchronous fault notification. The program monitors your Host's Storage Subsystems and sends notification messages to all Client sessions connected to it the moment a fault occurs. You can configure the Agent to use TCP notification to the Client and SNMP notification to an SNMP-compatible monitoring application.

2.2. Minimum System Requirements

The Agent requires the minimum Host System resources shown in Table 2–1. The program is designed to operate with the Command Console Client Version 2.3 for Windows 2000 and Windows NT.

Table 2-1
Minimum System Requirements

Host Feature	Requirement
Platform	HP 9000 Series K-Class; Models 2xx, 3xx, 4xx, and 5xx HP 9000 Series D-Class; Models 2xx, 3xx HP 9000 Series T-Class; Models T6xx *HP 9000 Series V-Class Models V2xxx *HP 9000 Series N-Class Models N4xxx *HP 9000 Series L-Class Models Lxxx
Architecture	2 MB free space in /tmp directory, and 4 MB free space for Agent installation directory
Operating System	HP-UX version 10.20 or 11.00
Controller Compatibility	StorageWorks HSG80 Controller running operating firmware Version 8.5.
*Supports Compaq/QLA2200 Fibre Channel Adapter	

2.3 Installing and Configuring the CC Agent for HP-UX®

The CC Agent is the CC Client's (the GUI's) network assistant. You must install and run the CC Agent for HP-UX on each Host System you want to connect to the CC Client over the network.

Before you can install an Agent:

- The resources of your HP Host System must meet the minimum requirements specified in the previous section, "Minimum System Requirements."

The fastest way to install and configure the StorageWorks CC Agent is automatically, using the installation program script, as described in the following section.

2.4 Installing and Configuring the CC

This section describes how to install the CC at the local host and how to configure CC for multiple paths.

2.4.1 Installing the CC at the Local Host

To configure the CC at the local host, you must have access to the superuser (root) account on the host.

Install and configure the CC Agent by running the installation script, as described in the following steps:

1. Place the CC CD-ROM labeled, *Solution Software V8.5c* in your local system's CD-ROM drive.
2. Mount the CD-ROM by entering:

NOTE: pfs_mount requires pfs_mount and pfsd daemons to be running. Verify that the pfs_mount and pfsd daemons are running by entering:

```
ps -ef | grep pfs
```

If pfs_mountd and pfsd are not listed start them by issuing the following commands at the root prompt :

```
pfs_mountd &  
pfsd &
```

```
pfs_mount /dev/dsk/cdrom_device_file /mnt_directory
```

For example:

```
pfs_mount /dev/dsk/ct2do /cdrom
```

3. Start the installation by entering the command:

```
swinstall -s <CD-ROM mount directory>/swcc/agent
```

4. Highlight the following swinstall package when it appears on the screen:

```
SWCC
```

5. Select *Mark For Install* from the *Actions* menu. In the status window, the word *Yes* should appear under the *Marked?* column.
6. Select *Install (analysis)* from the *Action* menu. The *Install Analysis* window should appear.
7. When *Ready* appears in the *Status* item, select the *OK* button to begin the installation procedure.
8. Select the *OK* button in the dialog box for the warning that appears.
9. If the installation was successful, the status item will change to *Completed*. If this is not the case, check the log file and correct any errors that occurred.
10. Select the *Done* button and exit from the swinstall package.
11. Start the configuration scripts by entering:

```
cd /tmp
```

```
./install.sh
```

The installation program begins and the copyright screen displays.

12. At the copyright screen, press **Enter** to continue. The following screen displays:

```
Enter a target directory for installation or press  
return to use the default (default = opt/steam):
```

13. Press **Enter** to use the default. The following screen displays:

```
Installing the steam Agent in "/opt/steam"  
Is this okay? [Y/n]
```

14. Enter **Y** to display the installation menu:

```

*****
* Enterprise Storage Management (steam) *
*   Agent and SCSI pass-through driver   *
*           Installation Script           *
*****
1.          Install Agent for all HP-UX systems.
NOTE:
For StorageWorks SCSI subsystems connected
To a 28696A FWD SCSI adapter, the SCSI
pass-through driver will be installed and a
System re-boot is required before installation
can be completed.
2.  Exit.
    
```

NOTE: If you are using HP MC/ServiceGuard software and want to install it automatically into a MC/ServiceGuard package and configure the Command Console, proceed to the section entitled, "Installing and Configuring with MC/ServiceGuard."

15. Select **1** to install the agent for all HP-UX systems.

NOTE: The boxed entries in the following example are inquiries from the platform. The text following the entries is a suggested response for the initial install.

16. At the copyright screen, press enter to continue

```

*****
*
*   Copyright (c) Compaq Computer Corporation, 1996-2000   *
*
*   All Rights Reserved. Unpublished rights reserved under *
*   the copyright laws of the United States.                *
*
*   The software contained on this media is proprietary to *
*   and embodies the confidential technology of Compaq    *
*   Computer Corporation. Possession, use, duplication or *
*   dissemination of the software and media is authorized *
*   pursuant to a valid written license from Compaq Computer *
*   Corporation.                                           *
*
*   RESTRICTED RIGHTS LEGEND Use, duplication, or disclosure *
*   by the U.S. Government is subject to restrictions as set *
*   forth in Subparagraph (c)(1)(ii) of DFARS 252.227-7013, *
*   or in FAR 52.227-19, as applicable.                    *
*
*****
Copyright: END[Press space to continue, q to quit, h for help]
    
```

Updating services file...

NOTE: Both the Client and the STEAM Agent applications **MUST** specify the same port numbers for “spgui” and “spagent.” It is imperative that the numbers entered here are consistent with all other Client and Agent applications throughout your network enterprise!!!

```
Adding an entry to /etc/services for the Client using port 4998
Is this OK? [Y,n]
```

Type **y** and press **Enter**.

Specifies the port number the installation program will assign for the CC Client GUI to communicate with the CC Agent. If the default port is already used, enter **N** and specify a new even-numbered port.

```
Adding an entry to /etc/services for STEAM AGENT using port 4999
Is this OK? [Y,n] y
```

Specifies the port number the installation program will assign for the CC Client GUI to communicate with the CC Agent. If the default port is already used, enter **N** and specify a new port (port specified above + 1).

```
Updating inittab file...done
```

The Install program updates the *inittab* file so every time the Host System boots, the Agent starts.

Next, configure the Agent and create necessary files.

The next three entries are mandatory; do you wish to continue [Y, n]

```
Enter a password for use with the STEAM Agent (4-> 16 characters):
Verify the password :
```

To configure the subsystem using the CC GUI, you need to set up a password. The install program does not echo what you type.

The STEAM Agent can operate with other SNMP applications. For this reason, it needs information about the Agent manufacturer and the Enterprise object identifier for use with its MIB.

Enter the name of the Agent manufacturer (no default) :

Type **Compaq Computer Corporation** and press **Enter**.

The Enterprise OID can be customized. Note that this value must be consistent with the Agent's MIB!
The default vendor-specific setting is "36.2.15.21."

Would you like to enter a new value? [y, n]:

Type **n** and press **Enter**.

Adding a Client system

Enter the Host name of the Client system :

In the event of a component failure, the CC Agent is capable of providing local or remote notification. Local notification is provided via e-mail and a system error log. Remote notification is provided to the command console for display or paging. Users that wish to only have local HP platform notification can disable messages to the client by entering the following information during CC Agent installation or Agent Maintenance (Adding a Client System):

1. Enter the Host name of the Client System: local Host
2. Enter the Access Level: 0
3. Enter the notification level: 0

Specify names for the Hosts from which you will run the GUI.

Enter the Host name of the Client system :

Type the "Host _name" of the machine running the GUI and press **Enter**.

Enter the subsystem access privilege (which controls the level of access a client has for communicating with the storage subsystems).

The possible options are:

0 = Overall Status

1 = Detailed Status

2 = Configuration

Enter Access Level (0, 1, 2) :

Type **2** and press **Enter**.

The Agent server can notify a client when an error condition occurs.

Notification schemes available are:

0 = No Error Notification

(Still have E-Mail and Syslog)

1 = Notification via a TCP/IP Socket

(E-Mail, syslog, GUI shows color status indications.)

2 = Notification via the SNMP protocol

(E-Mail, syslog, and Informed of only predefined events)

3 = Notification via both TCP/IP and SNMP

(All of the options in this category)

Enter Error Notification Level (0, 1, 2, 3) :

Type **3** and press **Enter**.

```
Adding client--
name: <Host name>
access level: 2
error notification: 3
Is this information correct? [Y,n]
```

Verify the information, type **Y** or **n**, and press **Enter**.

```
Would you like to add another client? [y,N]
```

Type **n** and press **Enter**.

```
=====
Scanning I/O Bus on nodes : hpk400a
Processing Host hpk400a
Node      HW Path          Driver  Device
-----  -
hpk400a  10/8.8.0.255.3.15.0  sdisk  HSG80CCL
hpk400a  10/8.8.0.255.4.1.0  sdisk  HSG80CCL

Found 2 Command Console LUN(s) on host hpk400a.
To remove a CCL enter: "r hardware_path", to add enter "a"
Would you like to Add, Remove or Continue? [a,r,C]
```

Type **C** and press **Enter**.

If there are CCLs that are not being shown you may answer “a” and select the hardware path from the list. You should not include the CCLs for the RA3000 as they are not supported by this agent. Note that the disc3 driver indicates that this CCL is on a HP-PB bus. The spt driver will be attached to this Hardware Path and will require this node to be rebooted.

Otherwise, enter **C** to continue.

```
Completed checking pass thru driver installation and special files.
Updating storage.ini files for each host.
Creating storage.ini files for each host.
HSG80 0 ZG81701016 ZG82001218 V85F c6t2d0 c6t2d0
```

You may now personalize your subsystem name.

```
Enter a subsystem name. [default: HSG80.0]:
Enter the desired monitoring period. [default: 180]:
```

```
HSG80 0 ZG81701016 ZG82001218 V85F c5t1d0 c5t1d0
```

```
Enter a subsystem name. [default: HSG80.1]:
Enter the desired monitoring period. [default: 180]:
```

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Would you like to enable mail notification? [Y,n]

Type **y** and press **Enter**.

Adding a User for Mail Notification
Enter the e-mail address of the user or CTRL-C to cancel:

Type the user e-mail address and press **Enter**.

Enter the error notification level for this user.
The user will be notified of errors at this level and above.

The possible options are:
1 = Fatal Errors
2 = Warning and Fatal Errors
3 = Info, Warning and Fatal Errors

Enter Notification Level (1, 2, 3) :

Type **3** and press **Enter**.

Adding Notification User--
name: **root**
Error Notification Level: Info, Warning and Fatal Errors
Is this information correct? [Y,n]

Type **Y** and press **Enter**.

Would you like to add another user? [y,N]

Type **N** and press **Enter**.

Authorized mail notification list
Username Notification Level
root Info, Warning and Fatal Errors

-- Press ENTER to continue --

The STEAM Agent package has been successfully installed.
Would you like to start the Agent now? [Y,n]

Type **Y** and press **Enter**.

The installation process is complete.

RAID Array Configuration Menu

Agent Admin Options

- 1) Change Agent Password
- 2) Change SNMP Enterprise OID
- 3) Start/Stop the Agent
- 4) Toggle Agent Startup on Boot
- 5) Uninstall Agent

Storage Subsystem Options

- 12) View Subsystems
- 13) Add a Subsystem
- 14) Remove a Subsystem
- 15) Modify a Subsystem

Agent Notification Options

- 6) Toggle Error Log Notification
- 7) Toggle Mail Notification
- 8) View Mail Notification List
- 9) Add User to Mail Notification List
- 10) Remove User from Mail Notification List
- 11) Modify Mail Notification List

Client Options

- 16) View Clients
- 17) Add a Client
- 18) Remove a Client
- 19) Modify a Client

Exit:

Q)

Enter Selection:

Type **12**.

Storage subsystem List

hpk400a

Subsystem Name	Controller Type	Firm-ware	EMU Type	Access Device 1	Access Device 2	Monitoring Period, secs
HSG80.0	HSG80	V85F	None	c6t2d0		180
HSG80.1	HSG80	V85F	None	c5t1d0		180

-- Press ENTER to continue --

RAID Array Configuration Menu

Agent Admin Options

- 1) Change Agent Password
- 2) Change SNMP Enterprise OID
- 3) Start/Stop the Agent
- 4) Toggle Agent Startup on Boot

Storage Subsystem Options

- 12) View Subsystems
- 13) Add a Subsystem
- 14) Remove a Subsystem
- 15) Modify a Subsystem

Agent Notification Options

- 6) Toggle Error Log Notification
- 7) Toggle Mail Notification
- 8) View Mail Notification List
- 9) Add User to Mail Notification List
- 10) Remove User from Mail Notification List
- 11) Modify Mail Notification List

Client Options

- 16) View Clients
- 17) Add a Client
- 18) Remove a Client
- 19) Modify a Client

Exit:

Q)

Enter Selection:

Type **Q** to exit.

At the StorageWorks Command Console Agent Installation and Configuration Menu, you can make configuration changes at any time by typing:

```
/installation_directory/steam/bin/config.sh
```

This allows changes to be made to the configuration and operation of the CC Agent. When changes are made to the CC Agent, it must be restarted for changes to become effective. The changes that require a restart of the CC Agent include:

- Change Agent Password
- Change SNMP Enterprise OID
- Add, Remove, or Modify a Client
- Add, Remove, or Modify a Subsystem
- Toggle Error Log Notification

To restart the CC Agent from the Agent Maintenance Menu, select Start/Stop the Agent from the Agent Maintenance Menu.

If STEAM Agent is Running displays, enter **y** to terminate the Agent. Repeat the menu selection and enter **y** to start the Agent.

If STEAM Agent is Not Running displays, enter **y** to start the Agent. Type **y** and press **Enter**.

```

RAID Array Configuration Menu
-----
Agent Admin Options      Storage Subsystem Options
-----
1) Change Agent Password    12) View Subsystems
2) Change SNMP Enterprise OID 13) Add a Subsystem
3) Start/Stop the Agent     14) Remove a Subsystem
4) Toggle Agent Startup on Boot 15) Modify a Subsystem

Agent Notification Options      Client Options
-----
6) Toggle Error Log Notification  16) View Clients
7) Toggle Mail Notification      17) Add a Client
8) View Mail Notification List   18) Remove a Client
9) Add User to Mail Notification List 19) Modify a Client
10) Remove User from Mail Notification List
11) Modify Mail Notification List

Exit:
----

Q) Quit
    
```

For example, to stop the Agent, type **3** and press **Enter**.

```

Agent Start/Stop
-----
    
```

```

The STEAM Agent's current state is : RUNNING
Would you like to terminate it? [Y,n]
    
```

NOTE: If you type “y”, the output is shown below. Be sure to re-enter the configuration menu and restart the Agent.

Type **y** and press **Enter**.

```

The STEAM Agent has been terminated.
-- Hit RETURN to continue --
    
```

The Agent configuration menu displays again.

Type **q** and press **Enter** to return to the main menu.

2.5 Installing and Configuring with MC/ServiceGuard

All hosts in the MC/ServiceGuard cluster must have entered into their “/rhosts” file “host_name root” of all hosts in the cluster enabling access by the root account.

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NOTE: All members of the cluster must be remotely accessible before the installation can be successfully completed.

When the CC agent is being installed into a MC/ServiceGuard package, it is recommended that selection 2 is used even if pass-through drivers are not installed.

MC/ServiceGuard has been found on your system.

The HSG80 RAID Array Controller must be connected to ALL hosts in the cluster. If you have another HSG80 RAID Array Controller that is not connected to all the hosts in the cluster, then the failover algorithm must be modified to suit your cluster needs.

NOTE: Running the CC Agent on an MC/ServiceGuard cluster requires that the name (or IP address) and root account of all hosts in the cluster are included in the "/.rhost" file on each host.

Example:	A_host	B_host	C_host
File:	/.rhost	/.rhost	/.rhost
Entries:	A_host root	A_host root	A_host root
	B_host root	B_host root	B_host root
	C_host root	C_host root	C_host root

This section will install CC agent software on the other host(s) in the cluster. Is this OK? [Y,n]

NOTE: The boxed entries in the following example are inquiries from the platform. The text following the entries is a suggested response for the initial install.

Updating services file...

NOTE: Both the Client and the STEAM Agent applications MUST specify the same port numbers for "spgui" and "spagent." It is imperative that the numbers entered here are consistent with all other Client and Agent applications throughout your network enterprise!!!

Adding an entry to /etc/services for the Client using port 4998 Is this OK? [Y,n]

Type **y** and press **Enter**.

Specifies the port number the installation program will assign for the CC Client GUI to communicate with the CC Agent. If the default port is already used, enter **N** and specify a new even-numbered port.

Adding an entry to /etc/services for STEAM AGENT using port 4999 Is this OK? [Y,n] y

Type **y** and press **Enter**.

Specifies the port number the installation program will assign for the CC Agent to send notifications to the CC Client GUI. If the default port is already used, enter **N** and specify a new port (port specified above + 1).

The next three (3) questions are required for the installation.

Would you like to continue? [Y,n]:

Enter a password for use with the STEAM Agent (4->16 characters) :

Verify the password :

To configure the subsystem using the Command Console GUI, you need to setup a password. The install program does not echo what you type.

The STEAM Agent can operate with other SNMP applications. For this reason, it needs information about the Agent manufacturer and the Enterprise object identifier for use with its MIB.

Enter the name of the Agent manufacturer (no default):

Type **Compaq Computer Corporation** and press **Enter**.

The Enterprise OID can be customized. Note that this value must be consistent with the Agent's MIB!

The default vendor-specific setting is "36.2.15.21."

Would you like to enter a new value? [y, n]:

Type **n** and press **Enter**.

Adding a Client system

Enter the Host name of the Client system:

In the event of a component failure, the CC Agent is capable of providing local or remote notification. Local notification is provided via e-mail and a system error log. Remote notification is provided to the command console for display or paging. Users that wish to only have local HP platform notification can disable messages to the client by entering the following information during CC Agent installation or Agent Maintenance (Adding a Client System):

1. Enter the Host name of the Client System: local Host
2. Enter the Access Level: 0
3. Enter the notification level: 0

Specify names for the Hosts from which you will run the GUI.

Enter the Host name of the Client system:

Type the "Host _name" of the machine running the GUI and press the **Enter**.

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Enter the subsystem access privilege (which controls the level of access a client has for communicating with the storage subsystems).

The possible options are:

- 0 = Overall Status
Monitor Event Changes with Notification
- 1 = Detailed Status
View Event Changes with the GUI
- 2 = Configuration
All of the options in this category

Enter Access Level (0, 1, 2) :

Type **2** and press **Enter**.

The Agent server can notify a client when an error condition occurs.

Notification schemes available are:

- 0 = No Error Notification
(Still have E-Mail and Syslog)
- 1 = Notification via a TCP/IP Socket
(E-Mail, syslog, GUI shows color status indications.)
- 2 = Notification via the SNMP protocol
(E-Mail, syslog, and Informed of only predefined events)
- 3 = Notification via both TCP/IP and SNMP
(All of the options in this category)

Enter Error Notification Level (0, 1, 2, 3) :

Type **1** and press **Enter**.

```
Adding client--
name: <Host name>
access level: 2
error notification: 1
Is this information correct? [Y,n]
```

Verify the information, type **y** or **n**, and press **Enter**.

```
Would you like to add another client? [y,N]
```

Type **n** and press **Enter**.

```
Would you like to enable mail notification? [Y,n]
```

Type **y** and press **Enter**.

```
Adding a User for Mail Notification
Enter the e-mail address of the user:
```

Type the user e-mail address and press **Enter**.

```
Enter the error notification level for this user.
```

```
The user will be notified of errors at this level and above.
```

The possible options are:

- 1 = Fatal Errors
- 2 = Warning and Fatal Errors
- 3 = Info, Warning and Fatal Errors

Enter Notification Level (1, 2, 3) :

Type **1** and press **Enter**.

Adding Notification User-- name:
Error Notification Level: Fatal Errors
Is this information correct? [Y,n]

Type **y** and press **Enter**.

Would you like to add another user? [y,N]

Type **n** and press **Enter**.

Starting MC/ServiceGuard Package creation for CC agent.

This MC/ServiceGuard package will monitor subnets.
The subnets that are used by this CC agent package
should be entered, so that this agent package will
failover in the event that the subnet fails.

Enter the subnets you want this package to monitor.
(or press ENTER to continue installation) :

Enter the subnet that will have your package IP on it. If this subnet goes down this package will failover to the next enabled host in the package list. When all subnets you wish to monitor have been entered, press **Enter** to continue.

Communications with services in a MC/ServiceGuard Package can use a dedicated IP address that will failover if the host fails. This will allow continuous monitoring and control of the RAID Subsystem using the SWCC Client.

Enter IP address(es) used by this package
(or press ENTER to continue installation):

Enter the unique IP address that is assigned to this package. This will be the IP address that fails over to the next host when the package fails over.

The MC/ServiceGuard package configuration file "steam_pkgconf.ascii"
and package control script "steam_control.sh" will be stored on each
host in directory path "/etc/cmcluster/steam_pkg".

Would you like to view the steam_pkgconf.ascii? [y,N] :
Would you like to view the steam_control.sh? [y,N] :

You may view the files by entering "y" for each file. The viewer is more.
When you have finished viewing the document either by spacing to the end or

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typing “q”, you may edit the document. If your favorite editor is defined by EDITOR, then that will be used. The default editor is vi.

Begin package verification...

Verification completed with no errors found.
Use the cmapplyconf command to apply the configuration.
Applying "steam_pkg" package to MC/ServiceGuard.

Begin package verification...
Completed the cluster update.

Cmmodpkg : Warning: Node aries is already able to run package steam_pkg.
Cmmodpkg: Warning: Node gemini is already able to run package steam_pkg.
cmmodpkg : Completed successfully on all packages specified.

This indicates that the package has successfully been installed.

The STEAM Agent package has been successfully installed.
steam_pkg down halted disabled unowned

No subsystems are defined so the steam_pkg has not been started.

Scanning I/O Bus cluster: aries gemini
Processing Host aries

Node	HW Path	Driver	Device
aries	8/0.8.0.255.0.2.0	sdisk	HSG80CCL
aries	8/4.8.0.255.0.2.0	sdisk	HSG80CCL
aries	8/8.0.0	sdisk	HSZ70CCL
aries	10/4/4.0.0	disc3	HSZ70CCL

Found 4 Command Console LUN(s) on host aries.
To remove a CCL enter: "r hardware_path", to add enter "a"
Would you like to Add, Remove or Continue? [a,r,C]

If there are CCLs that are not being shown you may answer “a” and select the hardware path from the list. You should not include the CCLs for the RA3000 as they are not supported by this agent. Note that the disc3 driver indicates that this CCL is on a HP-PB bus. The spt driver will be attached to this Hardware Path and will require this node to be rebooted.

Otherwise, enter **C** to continue.

Processing Host gemini

Node	HW Path	Driver	Device
gemini	8/0.8.0.255.0.2.0	sdisk	HSG80CCL
gemini	8/4.8.0.255.0.2.0	sdisk	HSG80CCL
gemini	10/4/4.0.0	disc3	HSZ70CCL
gemini	10/4/12.0.0	disc3	HSZ70CCL

Found 4 Command Console LUN(s) on host gemini.

To remove a CCL enter: "r hardware_path", to add enter "a"

Would you like to Add, Remove or Continue? [a,r,C]

This shows that on the other host, both CCLs are on different HP-PB buses.

Enter **C** to continue.

No pass thru driver found on aries for path 10/4/4.0.0

/usr/sbin/mknod /dev/rdisk/spt2t0d0 c 75 0x020000

"/dev/rdisk/spt2t0d0" has been created on host aries

No pass thru driver found on gemini for path 10/4/4.0.0

remsh gemini /usr/sbin/mknod /dev/rdisk/spt1t0d0 c 76 0x010000

"/dev/rdisk/spt1t0d0" has been created on host gemini

No pass thru driver found on gemini for path 10/4/12.0.0

gemini and aries will require rebooting before installation can be completed.

On gemini:

Compiling conf.c...

Loading the kernel...

/usr/ccs/bin/ld: (Warning) Linker features were used that may not be supported in future releases. The +vallcompatwarnings option can be used to display more details, and the ld(1) man page contains additional information. This warning can be suppressed with the +vnocompatwarnings option.

On aries:

Compiling conf.c...

Loading the kernel...

/usr/ccs/bin/ld: (Warning) Linker features were used that may not be supported in future releases. The +vallcompatwarnings option can be used to display more details, and the ld(1) man page contains additional information. This warning can be suppressed with the +vnocompatwarnings option.

Informational message showing the making of special files and kernel compilation and linking for each host.

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Reboot gemini and aries before continuing the installation.

Steps are: 1) Reboot the above machines.

2) Log in as root.

3) Enter:

/opt/steam/bin/config.sh

4) Select "13) Add a Subsystem"

After rebooting all necessary hosts, log in as root and enter this command:

/installation_directory/steam/bin/config.sh

RAID Array Configuration Menu

Agent Admin Options

Storage Subsystem Options

1) Change Agent Password

12) View Subsystems

2) Change SNMP Enterprise OID

13) Add a Subsystem

3) Start_/Stop the Agent Package

14) Remove a Subsystem

4) Enable/disable Agent Package Switching

15) Modify a Subsystem

Agent Notification Options

Client Options

6) Toggle Error Log Notification

16) View Clients

7) Toggle Mail Notification

17) Add a Client

8) View Mail Notification List

18) Remove a Client

9) Add User to Mail Notification List

19) Modify a Client

10) Remove User from Mail Notification List

11) Modify Mail Notification List

Select **13** to add a subsystem

Scanning I/O Bus cluster: aries gemini

Processing Host aries

Node	HW Path	Driver	Device
-----	-----	-----	-----
aries	8/0.8.0.255.0.2.0	sdisk	HSG80CCL
aries	8/4.8.0.255.0.2.0	sdisk	HSG80CCL
aries	8/8.0.0	sdisk	HSZ70CCL
aries	10/4/4.0.0	spt	HSZ70CCL

Found 4 Command Console LUN(s) on host aries.

To remove a CCL enter: "r hardware_path", to add enter "a"

Would you like to Add, Remove or Continue? [a,r,C]

Notice spt is now the driver on the HP-PB bus adapter.

Enter **C** to continue.

Processing Host gemini

Node	HW Path	Driver	Device
gemini	8/0.8.0.255.0.2.0	sdisk	HSG80CCL
gemini	8/4.8.0.255.0.2.0	sdisk	HSG80CCL
gemini	10/4/4.0.0	spt	HSZ70CCL
gemini	10/4/12.0.0	spt	HSZ70CCL

Found 4 Command Console LUN(s) on host aries.
 To remove a CCL enter: "r hardware_path", to add enter "a"
 Would you like to Add, Remove or Continue? [a,r,C]

The spt driver is now attached to both HP-PB bus adapter.

Enter **C** to continue.

Completed checking pass thru driver installation and special files.
 Updating storage.ini files for each host.
 HSG80 2 ZG81701016 ZG82001218 V85F c6t2d0 c6t2d0
 Enter a subsystem name. [default: HSG80.0]:

You may now personalize your subsystem name.

Enter the desired monitoring period. [default: 180]:

Enter the monitoring period if a change is desired.

Completed checking pass thru driver installation and special files.
 Updating storage.ini files for each host.

The above two questions will be repeated for each subsystem.

Would you like to start Steam_pkg? [Y,n]:

Default will start the steam_pkg package.

cmrunpkg : Completed successfully on all packages specified.
 cmmodpkg : Completed successfully on all packages specified.

RAID Array Configuration Menu

Agent Admin Options	Storage Subsystem Options
1) Change Agent Password	12) View Subsystems
2) Change SNMP Enterprise OID	13) Add a Subsystem
3) Start_/Stop the Agent Package	14) Remove a Subsystem
4) Enable/disable Agent Package Switching	15) Modify a Subsystem

Agent Notification Options	Client Options
-----	-----
6) Toggle Error Log Notification	16) View Clients
7) Toggle Mail Notification	17) Add a Client
8) View Mail Notification List	18) Remove a Client
9) Add User to Mail Notification List	19) Modify a Client
10) Remove User from Mail Notification List	
11) Modify Mail Notification List	
Exit:	

Q) Quit	

Enter Selection:

Enter **Q** to exit.

The StorageWorks Command Console Agent Installation and Configuration Menu displays. You can make configuration changes at any time by typing:

```
/installation_directory/steam/bin/config.sh
```

This allows changes to be made to the configuration and operation of the CC Agent. When changes are made to the CC Agent, it must be restarted for changes to become effective. The changes which require a restart of the CC Agent include:

- Change Agent Password
- Change SNMP Enterprise OID
- Add, Remove, or Modify a Client
- Add, Remove, or Modify a Subsystem
- Toggle Error Log Notification

To restart the CC Agent from the Agent Maintenance Menu, select Start/Stop the Agent from the Agent Maintenance Menu.

If STEAM Agent is Running is displays, enter **y** to terminate the Agent. Repeat the menu selection and enter **y** to start the Agent.

2.6 Running the CC Agent

Your Agent program was automatically started when you installed it, and it was installed to restart automatically if it stops for any reason.

The installation script places two entries in the “*/etc/inittab*” file to implement automatic execution of the Agent. The tag fields in the file are “*stmd*” and “*ntfy*”.

2.7 Reconfiguring the CC Agent

You can reconfigure previously-installed Agents using the configuration program. To reconfigure an Agent, execute the “*config.sh*” Bourne-shell script in the “*installation_directory/steam/bin*” subdirectory and follow the prompts.

2.8 Uninstalling the CC Agent

To uninstall the Agent Package:

1. First, remove all subsystems using the agent configuration tool. If there are any storage subsystems remaining in the *<steam dir>/etc/storage.ini* file, the agent package will not be able to be uninstalled.
2. Remove the agent directory by entering:

swremove SWCC

This should remove the agent directory, any edits made to configuration files in the */etc* directory, and the *stm8.5c_hp.tar* file from the */tmp* directory.

Configuring the HP-UX File System

This chapter explains how to configure the HP-UX file system for use with the RAID System.

3.1 Configuring the HP-UX File System

The HP-UX Operating System has now been modified to communicate with the HSG80 Array Controller.

In order to use the RAID Array from the HP system, perform the following steps.

1. Create new virtual disks on your RAID Array and assign LUN IDs to each virtual disk created.

NOTE: If not yet created, you can use either the Client (refer to the *Command Console Interface User's Guide*). LUNs created on the Array must be assigned consecutively starting with LUN 0. Currently there is an HP-UX limit of eight LUNs per TARGET, each HSG80 controller is a target, so plan accordingly (HP HBAs only). The Compaq/QLA2200 supports 64 LUNs per target.

Refer to the *HP System Administration Tasks Manual* for instructions on the following tasks:

- Adding the RAID storage set to a volume group.

NOTE: When using native HP host bus adapters do not use System Administration Manager (SAM) to Create/Extend Volume Groups. Creating/Extending Volume Groups must be done using HP-UX Commands. When SAM scans for hardware, any HSG80 controller LUNs created after the first LUN, are not parsed correctly by SAM and consequently, cannot be selected to create a volume group. The solution around this problem is to use HP-UX commands to create/extend the volume groups and then use SAM to create and manage logical volumes.

- Determining the mount point directory on your system.
- Using the mount command to mount the device on your system.
- Editing the *etc/fstab* file if you want this device mounted each time you boot the system.

2. Create a directory for the volume group. This is located in the */dev* directory. It is recommended to first check the */dev* directory to verify which volume groups exists by entering the following command:

```
# ls /dev
```


beep	log	ptyp6	ptyqf	strlog	ttyp1	ttyqa
c2t0d0_lp	mem	ptyp7	ptyr0	syscon	ttyp2	ttyqb
config	mux0	ptyp8	ptyr1	systty	ttyp3	ttyqc
console	mux1	ptyp9	ptyr2	telnet	ttyp4	ttyqd
crt	netlog	ptypa	ptyr3	tty	ttyp5	ttyqe
crt0	netman	ptypb	ptyr4	tty0p0	ttyp6	ttyqf
cua0p7	nettrace	ptypc	ptyr5	tty0p1	ttyp7	ttyr0
cul0p7	ni	ptypd	ptyr6	tty0p10	ttyp8	ttyr1
diag	null	ptype	ptyr7	tty0p11	ttyp9	ttyr2
dlpi	ocrtptypf	ptypf	ptyr8	tty0p12	ttypa	ttyr3
dlpi0	ocrt0	ptyp0	ptyr9	tty0p13	ttypb	ttyr4
dlpi1	ps2_0	ptyp1	ptyra	tty0p14	ttypc	ttyr5
dlpi2	ps2_1	ptyp2	ptyrb	tty0p15	ttypd	ttyr6
dlpi3	ps2kbd	ptyp3	ptyrc	tty0p2	ttype	ttyr7
dlpi4	ps2mouse	ptyp4	ptyrd	tty0p3	ttypf	ttyr8
dsk	ptmx	ptyp5	ptyre	tty0p4	ttyq0	ttyr9
echo	pts	ptyp6	ptyrf	tty0p5	ttyq1	ttyra
eprom	pty	ptyp7	qlc22007	tty0p6	ttyq2	ttyrb
ether0	ptym	ptyp8	rdsd	tty0p7	ttyq3	ttyrc
inet_clts	ptyp0	ptyp9	rmt	tty0p8	ttyq4	ttyrd
inet_cots	ptyp1	ptyqa	root	tty0p9	ttyq5	ttyre
kepd	ptyp2	ptyqb	rroot	tty0p0	ttyq6	ttyrf
klog	ptyp3	ptypc	rscsi	ttyconf	ttyq7	vg00
kmem	ptyp4	ptyqd	sad	ttyd0p7	ttyq8	
lan0	ptyp5	ptyqe	screen	ttyp0	ttyq9	

From the above list, the only volume group that exists is vg00. For the purpose of this example, we will create vg01.

3. Enter the following command:

```
# mkdir /dev/vg01
```

NOTE: The standard HP-UX kernel supports vg00 to vg09. Creation of volume groups greater than vg09 requires kernel tuning. Please refer to the appropriate HP-UX documentation for this information.

4. Create a control file named **group** in the `/dev/vg0n` directory created in Step 3. This is done with the `mknod` command:

```
# mknod /dev/vg0n/group c 64 0xnn0000
```

The *minor_number* for the group file is hexadecimal and is in the form 0xnn0000 where again *n* is the identity of the volume group being created.

For example:

```
# mknod /dev/vg01/group c 64 0x010000
```

5. Make the LVM disks (physical volumes) using the `pvcreate` command. The `pvcreate` command is of the form `pvcreate /dev/rdisk/cntndn`. This information is obtained from the `ioscan -fnCdisk` command. An example of this is shown below:

```
# ioscan -fnCdisk
```

Class	I	H/W Path	Driver	S/W State	H/W Type	Description
Disk	36	8/12.8.0.255.4.0.0 /dev/dsk/c5t0d0	sdisk	CLAIMED /dev/rdisk/c5t0d0	DEVICE	DEC HSG80
Disk	37	8/12.8.0.255.4.0.1 /dev/dsk/c5t0d1	sdisk	CLAIMED /dev/rdisk/c5t0d1	DEVICE	DEC HSG80
Disk	38	8/12.8.0.255.4.0.2 /dev/dsk/c5t0d2	sdisk	CLAIMED /dev/rdisk/c5t0d2	DEVICE	DEC HSG80
Disk	28	8/12.8.0.255.4.1.0 /dev/dsk/c5t1d0	sdisk	CLAIMED /dev/rdisk/c5t1d0	DEVICE	DEC HSG80CCL
Disk	29	8/12.8.0.255.4.1.1 /dev/dsk/c5t1d1	sdisk	CLAIMED /dev/rdisk/c5t1d1	DEVICE	DEC HSG80
Disk	30	8/12.8.0.255.4.1.2 /dev/dsk/c5t1d2	sdisk	CLAIMED /dev/rdisk/c5t1d2	DEVICE	DEC HSG80
Disk	2	8/16/5.2.0 /dev/dsk/c1t2d0	sdisk	CLAIMED /dev/rdisk/c1t2d0	DEVICE	TOSHIBA CD-ROM XM-401TA
Disk	3	8/16/5.5.0 /dev/dsk/c1t5d0	sdisk	CLAIMED /dev/rdisk/c1t5d0	DEVICE	DEC RZ28M (C) DEC

```
# pvcreate /dev/rdisk/c5t0d1
```

The output from this command should appear as follows:

```
Physical volume "/dev/rdisk/c5t0d1" has been successfully created.
```

6. Create the volume group. This is done with the *vgcreate* command similar to the following:

```
# vgcreate /dev/vg0n /dev/dsk/cntndn
```

7. If necessary, extend the volume group:

```
# vgextend /dev/vg0n /dev/dsk/cntndn
```

8. The volume group may be displayed after creation with the *vgdisplay* command:

```
# vgdisplay -v /dev/vg0n
```

9. Display the volume group

```
# vgdisplay -v /dev/vg01
```

An example of this is as follows:

```
# vgcreate /dev/vg01 /dev/dsk/c5t0d0
```

Increased the number of physical extents per physical volume to 8678.

Volume group “/dev/vg01” has been successfully created.

Volume Group configuration for /dev/vg01 has been saved in
/etc/lvmconf/vg01.conf

```
# vgextend /dev/vg01 /dev/dsk/c5t0d1
```

Finally, display the volume group.

```
# vdisplay -v /dev/vg01
```

```
---Volume groups---
```

VG Name	/dev/vg01
VG Write Access	read/write
VG Status	available
Max LV	255
Cur LV	0
Open LV	0
Max PV	16
Cur PV	1
Act PV	1
Max PE per PV	8678
VGDA	2
PE Size (Mbytes)	4
Total PE	8677
Alloc PE	0
Free PE	8677
Total PVG	0

---Physical Volumes---

PV Name /dev/dsk/c5t0d1

PV Status available

Total PE 8677

Free PE 7677

PV Name /dev/dsk/c5t0d0

PV Status available

Total PE 8677

Free PE 8677

10. Creation and Management of the Logical Volumes may now be accomplished via the HP-UX commands or SAM.

An example of doing this is:

```
# lvcreate /dev/vg01
```

Logical volume “/dev/vg01/lvol1” has been successfully created with character device “/dev/vg01/lvol1”.

Volume Group configuration for /dev/vg01 has been saved in /etc/lvmconf/vg01.conf

```
# lvextend -L 100 /dev/vg01/lvol1
```

Logical volume “/dev/vg01/lvol1” has been successfully extended.

Volume Group configuration for /dev/vg01 has been saved in /etc/lvmconf/vg01.conf

#lvsdisplay /dev/vg01/lvol1

---Logical volumes---

LV Name	/dev/vg01/vol1
VG Name	/dev/vg01
LV Permission	read/write
LV Status	available/syncd
Mirror copies	0
Consistency Recovery	MWC
Schedule	parallel
LV Size (Mbytes)	100
Current LE	25
Allocated PE	25
Stripes	0
Stripe Size (Kbytes)	0
Bad block	8677
Allocation	strict

Chapter 4

Installing SWCC Client

This chapter contains instructions for installing StorageWorks Command Console (SWCC) Client, a Graphical User Interface (GUI), and setting the controller properties.

NOTE: For more information, use the on-line HELP in the SWCC Storage and CLI Windows.

4.1 Introduction

This chapter describes how to install and use Command Console Client software.

Procedure summary:

- Install Command Console software.
- Launch Command Console Client.
- Establish communications with the HSG80 controller over the network.
- Configure the HSG80 controller for operation.

4.2 Installing Command Console Client

The minimum requirements to run Command Console Client are:

- PC Requirements:
Intel 486, 66 MHz, 16 MB memory, 2 MB free disk space, and CD-ROM drive
- Operating System:
Microsoft Windows 2000 or Windows NT 4.0

Command Console Client installs from a CD-ROM disk using a standard Windows installation routine on a Windows 2000 or Windows NT platform. The program is self-extracting and stores Command Console Client into the directory C:\Program Files\SWCC by default. During setup, you have the option to change the disk or directory location.

To install Command Console:

1. Place the CD in the CD-ROM drive.
2. Run *File Manager* or *Windows Explorer*.
3. Navigate to the folder: *drive_letter:\SWCC\Client\Intel*.
4. Double click on *Setup*.
5. Follow the instructions in the setup program to complete the installation.

4.3 Launching Command Console Client

To start Command Console from the Start Menu, double-click on the HSG80ACS85 Storage Window name (Figure 4-1).

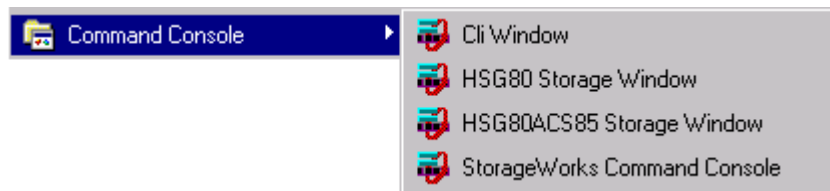


Figure 4-1. Command console client's start menu –need new screen

The four choices Client provides you with at startup are:

- **CLI Window:** HS-series controllers provide a feature called the Command Line Interpreter (CLI) for configuring and monitoring your storage controllers using text-based commands. With the CLI, you can connect a maintenance terminal directly to your controller and manage it using the complete set of CLI commands. You can also use a host-based, virtual terminal, such as Command Console's CLI Window, to make the connection. Refer to *Appendix A, Creating Your Storage Configuration with the CLI*, for details.
- **HSG80 Storage Window:** Displays the Storage Window. This choice lets you monitor and configure one storage subsystem using Client's graphical user interface. All connection choices are provided: serial line, SCSI bus and network (TCP/IP).

NOTE: The HSG80ACS85 Storage Window is used with RA8000/ESA12000 or MA8000/EMA12000 storage systems using ACS V8.5 software. Older ACS versions (V8.3 or V8.4) require the HSG80 Storage Window.

- **StorageWorks Command Console:** Displays the Navigation Window. The Navigation Window is a network navigation tool used to manage and monitor storage subsystems over a TCP/IP network. This choice lets you monitor and configure one or many storage subsystems over a network using Client's graphical tools. Refer to *Chapter 4, Communicating Over a Network*, for details.

4.4 Establishing a Network Connection

To establish a network proceed as follows:

1. Click on the *Start* button on the taskbar.
2. Click on *Programs*.
3. Click on *Command Console*.

4. Click on Storage Window.
5. When the Connection Selection dialog box displays, click the *Network* radio button (Figure 4-2), then click *OK* to display the *Connect Network* dialog box (Figure 4-3).

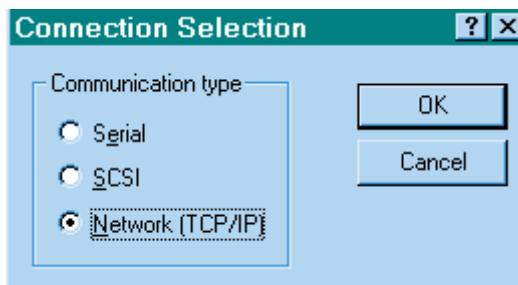


Figure 4-2. Connection selection dialog box

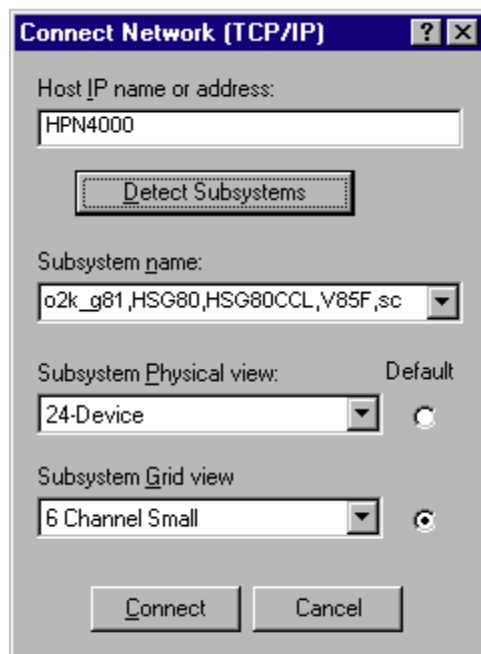


Figure 4-3. Connect network dialog box for storage window

- On the *Connect Network* dialog box, from the drop-down menu, enter the HOST name or IP address where your HSG80 controller is connected. Then click the *Detect Subsystems* button to display the storage subsystem name. Then click *Connect* to your storage subsystem. The next step is to configure the controller.

NOTE: The top window displays the virtual disks that have been created. The bottom windowpane shows the devices you have installed in the RA8000/ESA12000 or MA8000/EMA12000 Fibre Channel Subsystem. On startup, Command Console finds installed drives and displays them in a grid by channel and SCSI ID number.

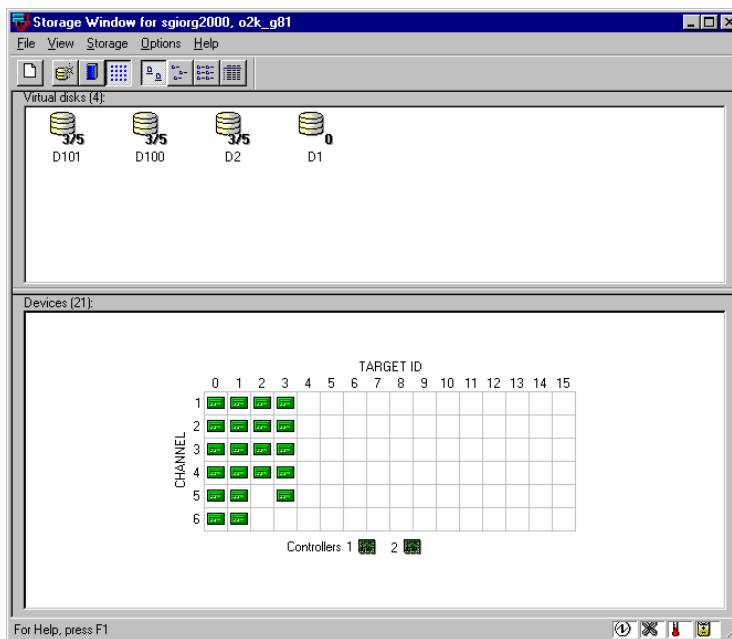


Figure 4-4. Storage window

4.5 Controller Properties

Your controller's operating parameters are stored in property sheets. Controller property sheets are accessed by double-clicking on a controller icon in the Storage Window or right clicking on the icon and selecting *Properties*. Property sheets are tabbed. To access a sheet, click on its tab.

Changes in all fields causes a controller restart to place the changes in effect. The program prompts you for confirmation before it restarts your controller. A restart of the controller will be detected by the host system. Do not make changes to the controller settings when either file systems are mounted on the RAID Array or applications are using the RAID Array.

NOTE: After you change a parameter that causes a controller restart, there is approximately a 90-second delay while the controller reinitializes.

7. Access the controller's property sheets by double-clicking the controller's icon in the Storage Window. When you double-click on a controller's icon the *General* controller properties sheet displays (Figure 4-5). The controller has five property sheets. Each sheet is accessed by clicking on its tab.

Confirm the following:

- Allocation class is 0

(You may also set the time and date.)

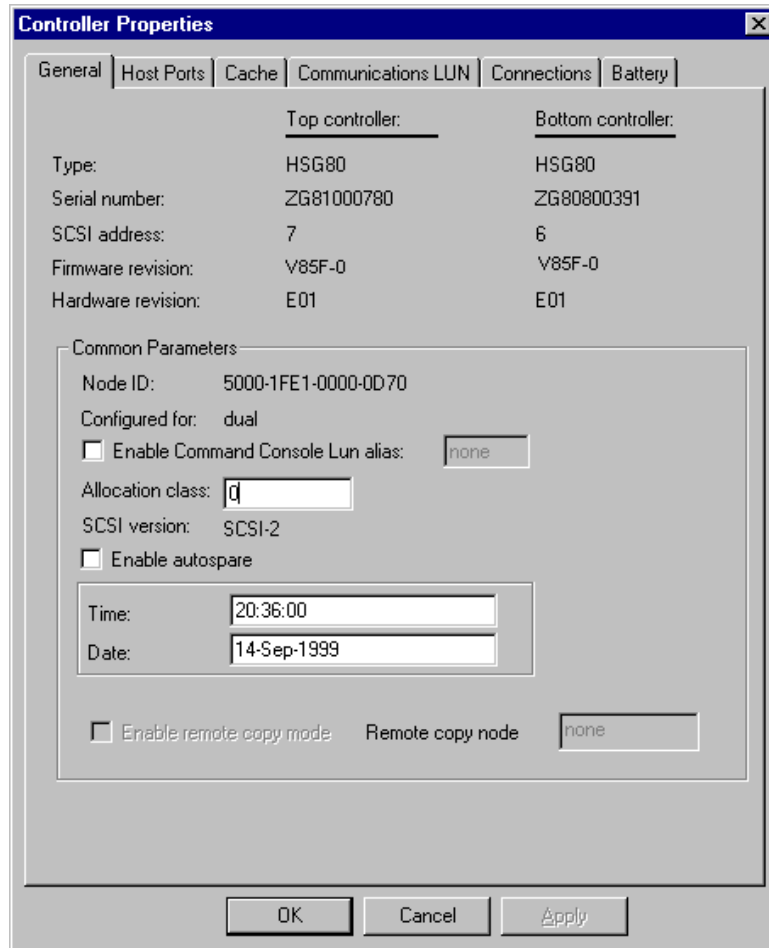


Figure 4-5. General controller properties tab

8. Click the *Host Ports* tab to display the host port operating parameters and verify the host port operating parameters shown in Figure 4-6.

The settings displayed for:

- Port ID
- Requested Topology
- Actual Topology
- Requested Port Address
- Actual Port Address

will vary depending upon your cabling, loop configuration, ALPA settings and number of host ports in use.

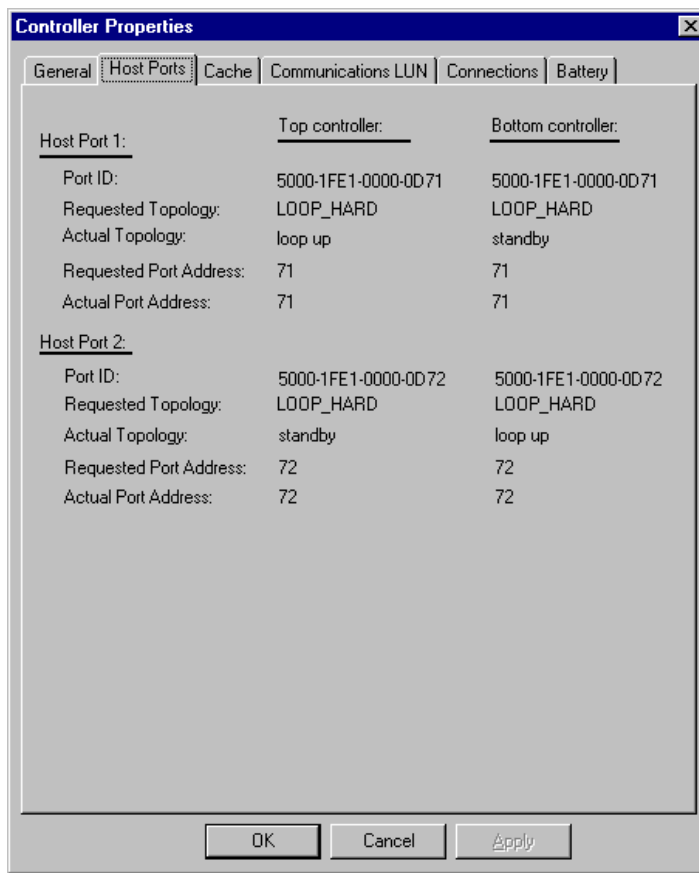


Figure 4-6. Host ports controller properties tab

9. Click the *Cache* tab to check cache size (Figure 4-7).

Confirm the following:

- Cache flush_time: (seconds): is 10

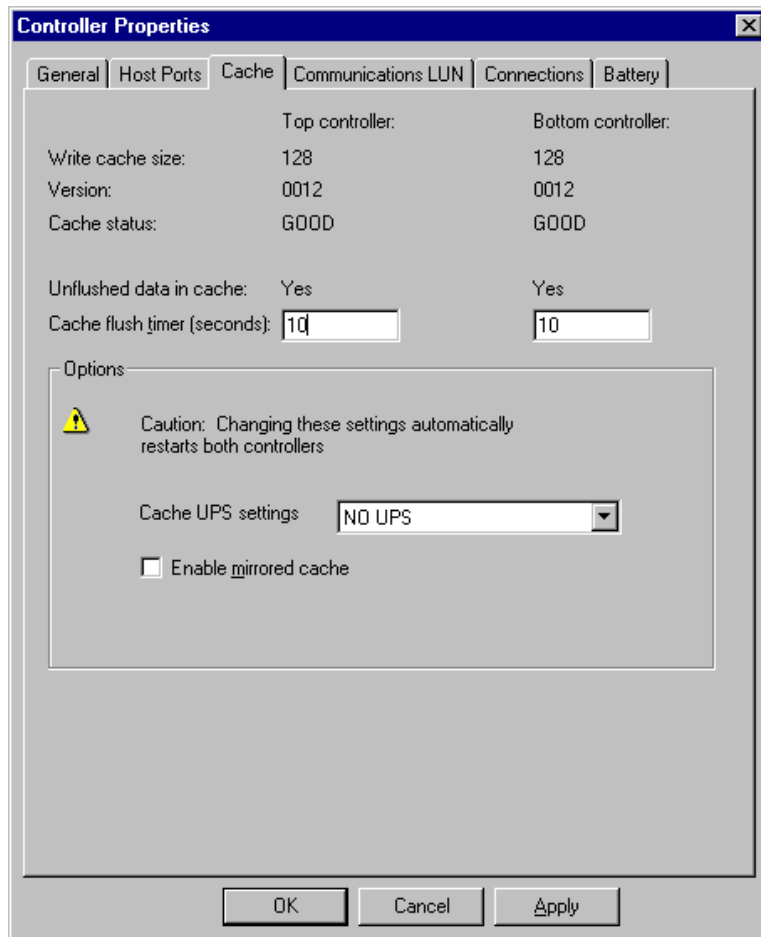


Figure 4-7. Cache controller properties tab

10. Click the *Communications LUN* tab (Figure 4-8).

NOTE: Ensure that *Fixed* is set, and that the SWCC virtual LUN is enabled.

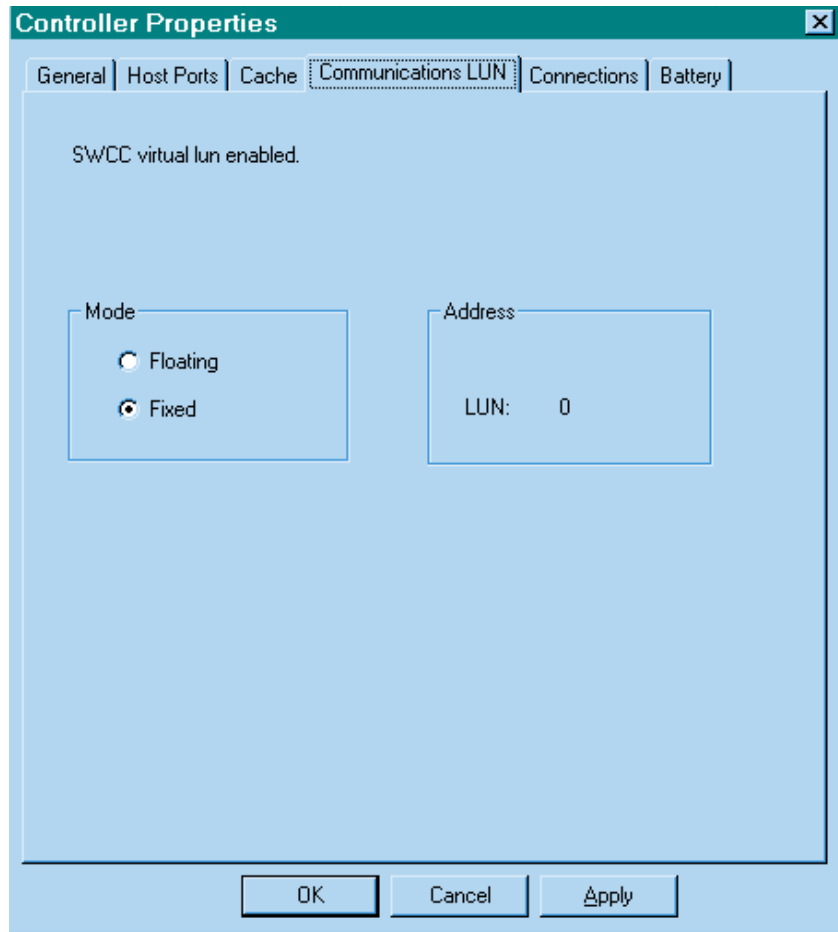


Figure 4-8. Communications LUN controller properties tab

11. Click the *Connections* tab (Figure 4-9).

Confirm the following:

- For each highlighted (not grayed-out) online *Connection Name*, change the Operating System from WINNT to HP.
- Unit Offset should be 0 for Port 1
- Unit Offset should be 100 for Port 2

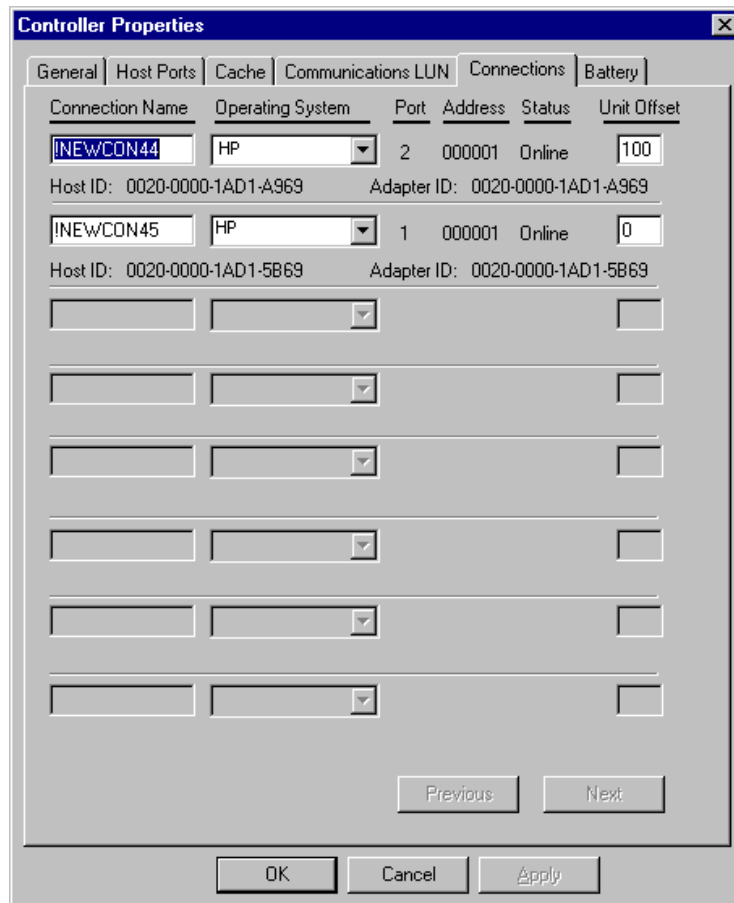


Figure 4-9. Connections controller properties tab

12. Click the *Battery* tab (Figure 4–10).

NOTE: Confirm that the battery is fully charged. If not, wait until it is fully charged, before using the system.

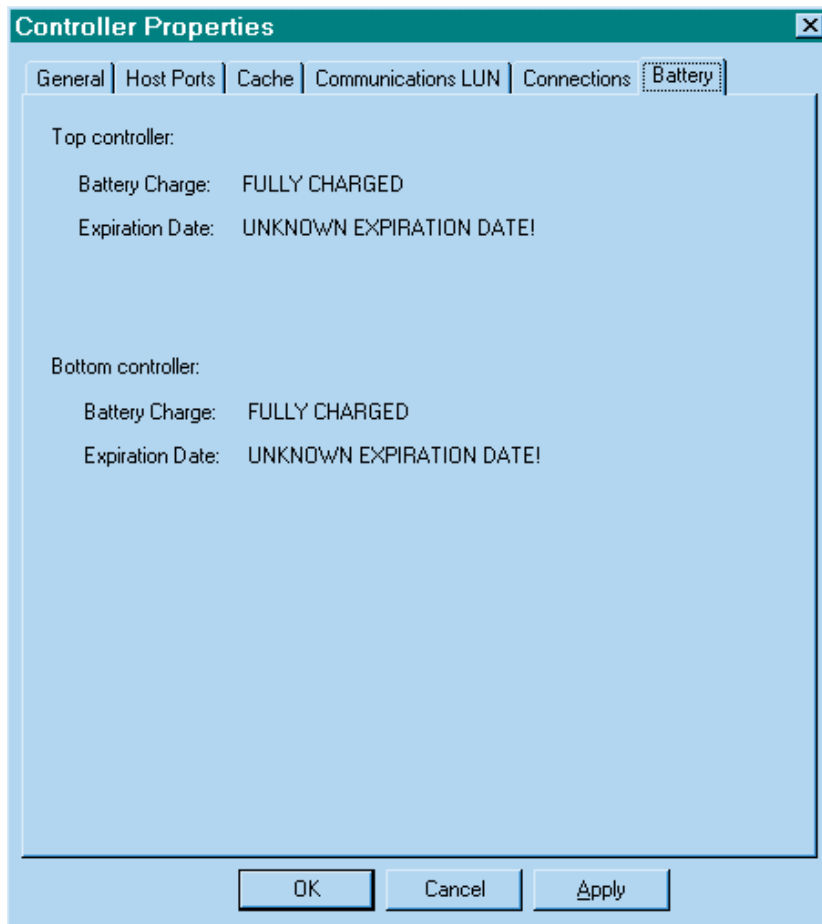


Figure 4-10. Battery controller properties tab

13. Click on the *Apply* button. Once all of the changes have been made, click the *OK* button to complete controller configuration. The storage window is now displayed. To begin using SWCC to create Virtual Disks, refer to *Compaq StorageWorks Command Console V2.3 User Guide*, to the section entitled *Creating Your First Virtual Disk*.

Appendix **A**

Creating Your Storage Configuration with the CLI

This appendix contains instructions for creating an initial storage configuration using the Command Line Interpreter (CLI). It briefly describes the CLI and how to access it. The configuration steps include: adding devices; creating and initializing RAIDsets, stripesets, mirrorsets, and striped mirrorsets; identifying a storageset as a unit to the host; and verifying and recording the final configuration.

NOTE: To create your storage configuration using the StorageWorks Command Console, refer to the *Command Console V2.3 User Guide* that is contained in your Solution Software Kit.

Once you complete the physical setup of the RAID Array, configure the devices in your subsystem into storagesets.

To configure the devices in your subsystem into storagesets, you need to:

- Plan your configuration (Refer to Appendix B)
- Add disks to the controller
- Create storagesets
- Save the configuration
- Record the configuration

A.1 Configuration Guidelines

Use the following guidelines to configure the HSG80 array controller and your host system to optimize system performance.

A.1.1 Controller Device Configuration Guidelines

- The enclosure has six device ports (SCSI buses). Evenly distribute disk devices across the separate six device ports. This permits parallel activities on the controller's available device ports to the attached drives.
- Avoid configuring multiple mirrorsets with the first member being on the same device port. Configure multiple mirrorsets similar to the following example:

```
add mirrorset mirr_1 disk10000 disk20000
add mirrorset mirr_2 disk20100 disk10100
```

A.1.2 Host System Configuration Guidelines

You need to assign a host logical unit number to each storageset or single disk unit that you want your host to know about in your subsystem. The host uses these numbers to indicate the source or destination for every I/O request it sends to the controller.

Each logical unit number contains the following:

- A letter that indicates the kind of devices in the storage unit. For example, D for disk drives
- A number from 0-99 or 100-199

Each HSG80 array controller has two host ports, Port 1 and Port 2, as shown in the following figures. Unit numbers D0-D99 are assigned to Host Port 1, unit numbers D100-D199 are assigned to Host Port 2.

NOTE: Always assign all partitions of a storageset to the same host port (do not split partitioned storagesets across host ports).

Controller A	Port 1 Active	Port 2 Unused	
EMPTY			
Cache A		EMPTY	

Figure A-1. Single controller/single host

- For single HSG80 array controller configurations connected to a single host you can configure up to 64 host logical units on Controller A - Host Port 1. Valid unit numbers are D0-D99. Controller A - Host Port 2 is unused.

Controller A	Port 1 Active	Port 2 Active	
EMPTY			
Cache A		EMPTY	

Figure A-2. Single controller/two hosts

- For single HSG80 array controller configurations connected to two host systems, for one host you can configure up to 64 host logical units on Controller A - Host Port 1. Valid unit numbers are D0-D99. For the other host, you can configure up to 64 host logical units on Controller A - Host Port 2. Valid unit numbers are D100-D199.

Controller A	Port 1 Active	Port 2 Unused	
Controller B	Port 1 Standby	Port 2 Unused	
Cache A		Cache B	

Figure A-3. Dual controller/single host

- For dual-redundant HSG80 array controller configurations connected to a single host you can configure up to 64 host logical units on Controller A - Host Port 1. Valid unit numbers are D0-D99. Controller B - Host Port 1 is automatically configured as a standby port for these same 64 units. Controller A - Host Port 2 and Controller B - Host Port 2 are unused.

Controller A	Port 1 Active	Port 2 Standby	
Controller B	Port 1 Standby	Port 2 Active	
Cache A		Cache B	

Figure A-4. Dual controllers/two hosts

- For dual-redundant HSG80 array controller configurations connected to two host systems, for one host you can configure up to 64 host logical units on Controller A - Host Port 1. Valid unit numbers are D0-D99. Controller B - Host Port 1 is automatically configured as a standby port for these same 64 units.

For the other host you can configure up to 64 host logical units on Controller B - Host Port 2. Valid unit numbers are D100-D199. Controller A - Host Port 2 is automatically configured as a standby port for these same 64 units.

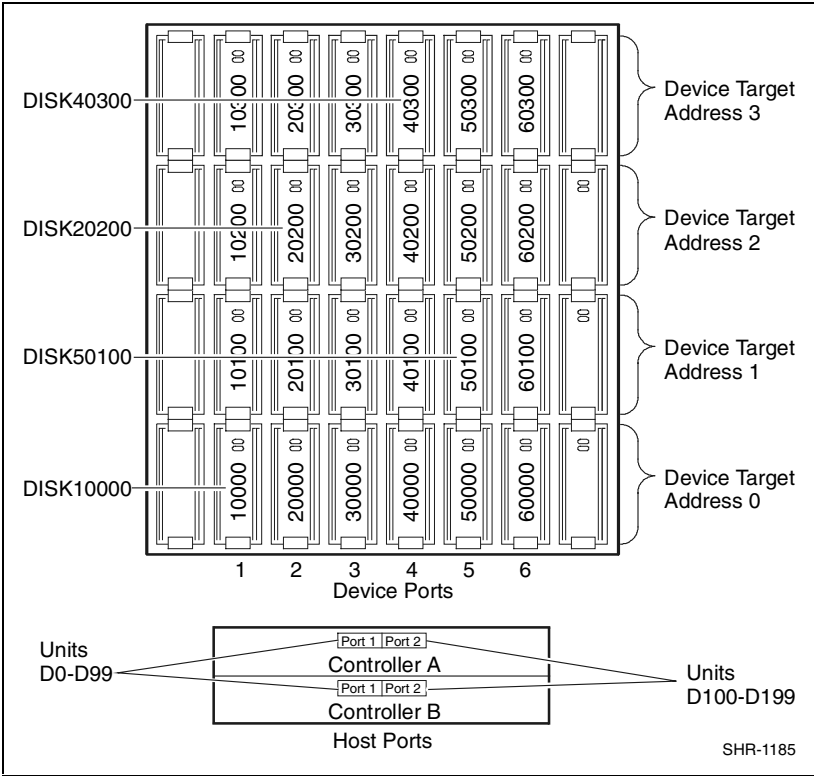


Figure A-5. Mapping of device ports/targets and host ports in a BA370 enclosure (RA8000/ESA12000)

Model 4214 Disk Enclosure Shelf 1 (Single-Bus)							
Bay	1	2	3	4	5	6	7
SCSI ID	00	01	02	03	04	05	08
	DISK10000	DISK10100	DISK10200	DISK10300	DISK10400	DISK10500	DISK10800
Bay	8	9	10	11	12	13	14
SCSI ID	09	10	11	12	13	14	15
	DISK10900	DISK11000	DISK11100	DISK11200	DISK11300	DISK11400	DISK11500

Model 4254 Disk Enclosure Shelf 1 (Dual-Bus)							
Bay	1	2	3	4	5	6	7
SCSI ID	00	01	02	03	04	05	08
	DISK10000	DISK10100	DISK10200	DISK10300	DISK10400	DISK10500	DISK10800
Bay	8	9	10	11	12	13	14
SCSI ID	00	01	02	03	04	05	08
	DISK20000	DISK20100	DISK20200	DISK20300	DISK20400	DISK20500	DISK20800

Figure A-6. Mapping of device ports/targets and host ports in a Model 4214 or Model 4254 disk enclosure (MA8000/EMA12000)

A.2 Accessing the CLI

The Command Line Interpreter (CLI) is a command line user interface to the HSG80 RAID Controller. It provides a series of commands for you to create a configuration for the subsystem through the controller's firmware.

This chapter describes only the CLI commands required to create an initial configuration on the controller.

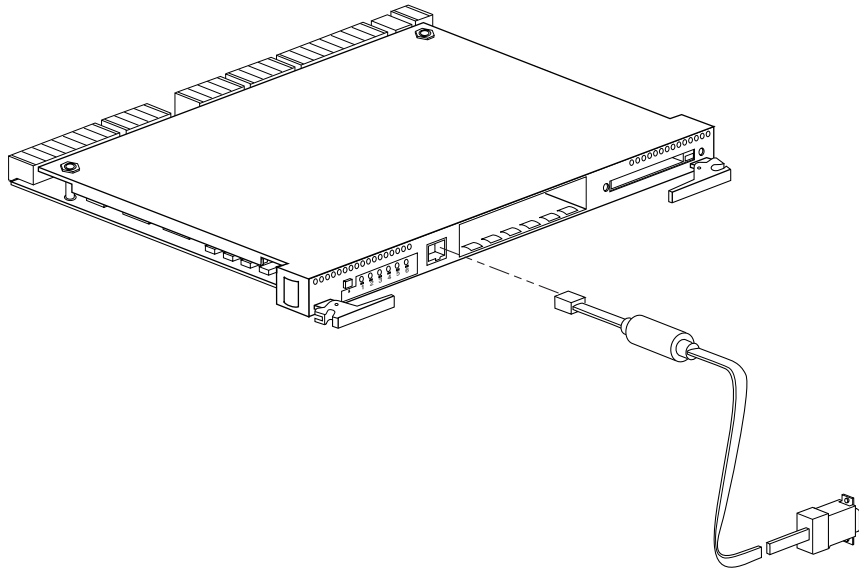
See the *Compaq StorageWorks HSG80 Array Controller ACS V8.5 CLI Reference Guide* for detailed descriptions of all CLI commands.

You must make a serial connection to the HSG80 array controller to access the CLI.

A.2.1 Connecting the Cable

To connect a maintenance terminal or PC to a HSG80 array controller follow these steps:

1. Locate the connecting cable that came with the HSG80 array controller. It has an RJ12 connector (similar to standard telephone plug) on one end and a 9-pin serial connector on the other end.
2. Plug the serial connector into the 9-pin serial port/com port 1 of the PC.
3. Plug the RJ12 connector from the PC or maintenance terminal into the maintenance port on the HSG80 RAID Controller (see Figure A-7).
4. Note which serial port you use; you will need that information if using a communications program.



CXO6484B

Figure A-7. Making a serial connection to the HSG80 array controller

A.2.2 Establishing Connection with a Maintenance Terminal

To establish a connection between a maintenance terminal and the controller, follow these steps:

1. After connecting the maintenance terminal cable to the controller, press the **Enter** key. The CLI prompt appears in the window similar to the following:

```
HSG80 >
```

2. To view the status of the controller, type:

```
HSG80 > SHOW THIS_CONTROLLER FULL
```

The controller displays information similar to the following example: (dual-redundant configuration shown)

Controller:

```
HSG80 ZG74100091 Software V85F, Hardware E01  
NODE_ID      = 5000-1FE1-FF00-0170
```

```
Allocation_Class=0
```

```
SCSI_Version=2
```

```
Configured for dual-redundancy with ZG74100121  
In dual-redundant configuration  
Device Port SCSI address 7  
Time: 28-SEP-1998 21:03:32
```

Host PORT_1:

```
Reported PORT_ID = 5000-1FE1-FF00-0171  
PORT_1_PROFILE  = PLDA  
PORT_1_TOPOLOGY = LOOP_HARD (loop up)  
PORT_1_AL_PA   = 71 (71 negotiated)
```

Host PORT_2:

```
Reported PORT_ID = 5000-1FE1-FF00-0172  
PORT_2_PROFILE  = PLDA  
PORT_2_TOPOLOGY = LOOP_HARD (standby)  
PORT_2_AL_PA   = 72 (72 negotiated)
```

Cache:

```
128 megabyte write cache, version 0012  
Cache is GOOD  
Battery is GOOD  
No unflushed data in cache  
CACHE_FLUSH_TIMER = DEFAULT (10 seconds)
```

Mirrored Cache:

```
Not enabled
```

Battery:

```
FULLY CHARGED
```

Expires:

```
NOCACHE_UPS
```

Extended information:

Terminal speed 9600 baud, eight bit, no parity, 1 stop bit
Operation control: 00000000 Security state code: 21429
Configuration backup disabled

NOTE: Verify that the output of the 'SHOW THIS' command from your subsystem is similar to that shown. If the controller presents a NODE_ID of all zeros (0000-0000-0000-0000), or the appropriate host port does not report a LOOP_UP condition, refer to the *Compaq StorageWorks HSG80 Array Controller ACS V8.5 Configuration Guide* for more information.

A.2.3 Establishing Connection with a Host System

To establish a connection between your PC and controller, you must use a communications program. Follow these steps to make the connection:

1. Start a communications program on your PC.
2. Set the communications program to use the serial port that is connected to the controller.
3. Set the communications parameters to:
 - 8 bits
 - 9600 baud
 - 1 stop bit
 - No parity
4. From your communications program, issue a connect command to establish a connection with the controller and press **Enter**. You should see the CLI prompt, which looks similar to:

```
HSG80 >
```

5. To view the status of the controller, type:

```
HSG80 > SHOW THIS_CONTROLLER FULL
```

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The controller displays information similar to the following example:
(dual-redundant configuration shown)

```
Controller:
  HSG80 ZG74100091 Software V85F, Hardware E01
  NODE_ID      = 5000-1FE1-FF00-0170
Allocation_Class=0
SCSI_Version=2
  Configured for dual-redundancy with ZG74100121
  In dual-redundant configuration
  Device Port SCSI address 7
  Time: 28-SEP-1998 21:03:32
Host PORT_1:
  Reported PORT_ID = 5000-1FE1-FF00-0171
  PORT_1_PROFILE  = PLDA
  PORT_1_TOPOLOGY = LOOP_HARD (loop up)
  PORT_1_AL_PA   = 71 (71 negotiated)
Host PORT_2:
  Reported PORT_ID = 5000-1FE1-FF00-0172
  PORT_2_PROFILE  = PLDA
  PORT_2_TOPOLOGY = LOOP_HARD (standby)
  PORT_2_AL_PA   = 72 (72 negotiated)
Cache:
  128 megabyte write cache, version 0012
  Cache is GOOD
  Battery is GOOD
  No unflushed data in cache
  CACHE_FLUSH_TIMER = DEFAULT (10 seconds)
Mirrored Cache:
  Not enabled
Battery:
  FULLY CHARGED
Expires:
  NOCACHE_UPS
Extended information:
  Terminal speed 9600 baud, eight bit, no parity, 1 stop bit
  Operation control: 00000000 Security state code: 21429
  Configuration backup disabled
```

NOTE: Verify that the output of the “SHOW THIS” command from your subsystem is similar to that shown. If the controller presents a NODE_ID of all zeros (0000-0000-0000-0000), or the appropriate host port does not report a LOOP_UP condition, refer to the *Compaq StorageWorksHSG80 Array Controller ACS V8.5 Configuration Guide* for more information.

A.3 Adding Disks to the Configuration

The CONFIG utility locates and adds disks to the controller. Run the CONFIG utility whenever you add new disks to the controller. Enter the following command to start the configuration utility. The disk numbers will correspond to the disk locations for your subsystem.

```
HSG80 > RUN CONFIG
```

The controller responds with a display similar to that shown below:

```
Config Local Program Invoked
```

```
Config is building its tables and determining what devices exist on the subsystem.  
Please be patient.
```

```
add disk10000 1 0 0  
add disk10100 1 1 0  
add disk10200 1 2 0  
add disk20000 2 0 0  
add disk20100 2 1 0  
add disk20200 2 2 0  
add disk30000 3 0 0  
add disk30100 3 1 0  
add disk30200 3 2 0  
add disk40000 4 0 0  
add disk40100 4 1 0  
add disk40200 4 2 0  
add disk40300 4 3 0  
add disk50000 5 0 0  
add disk50100 5 1 0  
add disk50200 5 2 0  
add disk50300 5 3 0  
add disk60000 6 0 0  
add disk60100 6 1 0  
add disk60200 6 2 0  
add disk60300 6 3 0  
Config – Normal Termination
```

In this example, the controller has located 21 new disks. The 5-digit number associated with each disk corresponds to Device Port Number, Target Number and Controller Logical Unit Number. The Controller Logical Unit Number will always be 0. DISK40000, in this example, corresponds to the disk located on Device Port 4, on controller Target 0, and Controller Logical Unit 0. DISK50100 corresponds to the disk located on Device Port 5, controller Target 1, and Controller Logical Unit 0. Figure A-5 shows the mapping of Device Ports, Targets and Host Ports.

A.4 Creating a RAIDset

RAIDsets stripe user data over multiple drives and calculate parity information for data redundancy. Create RAIDsets to use redundant stripesets in your array. RAIDsets must have at least three members and can have as many as fourteen. This example creates two three member RAIDsets using the

ADD RAIDSET command.

```
HSG80 > ADD RAIDSET DVGRPRO DISK10000 DISK20000 DISK30000  
HSG80 > ADD RAIDSET DVGRPR1 DISK40000 DISK50000 DISK60000
```

In this example, “DVGRPRO” and “DVGRPR1” are the names of the RAIDsets, and they are followed by a list of disks to be included in each RAIDset. The names of the RAID sets are user selectable. Performance of your RAIDsets will be optimized if each RAIDset includes disks from different ports as shown in the example.

A.4.1 Initializing a RAIDset

Prior to putting a RAIDset(s) into service as a logical unit, you must initialize it. The INITIALIZE command copies controller metadata onto a small amount of disk space available on the RAIDset and makes this space inaccessible to the host.

When you initialize a RAIDset, you can specify a chunksize. A chunksize is the number of blocks of data that is transferred at one time. By using the default chunksize, the controller will optimize the chunksize by selecting a number equal to the number of blocks in one track of disk data. We recommend using the default chunksize.

```
HSG80 > INITIALIZE DVGRPRO CHUNKSIZE=DEFAULT  
HSG80 > INITIALIZE DVGRPR1 CHUNKSIZE=DEFAULT
```


A.4.2 Adding a RAIDset as a Logical Unit

To make a RAIDset available to the host computer, you must identify it as a host logical unit. For single or dual controllers on a single host, the unit numbers may range from D0 through D7 with a maximum of 8 units. For dual controllers, the unit numbers may range from D0 through D7 for the first controller and from D100 through D107 for the second controller with a maximum of 8 units per host adapter. Add units by using the ADD UNIT command.

```
HSG80 > ADD UNIT D1 DVGRPRO
HSG80 > ADD UNIT D2 DVGRPR1
```

This example uses D1 and D2, as the first and second units identified on the controller.

A.4.3 Setting Writeback Cache

This feature is enabled by default; but if it is necessary, a single CLI command enables that feature for the entire RAIDset:

```
HSG80 > SET D1 WRITEBACK_CACHE
HSG80 > SET D2 WRITEBACK_CACHE
```

Where D1 and D2 represent the host logical units of the RAIDsets described above.

A.4.4 Setting Read Ahead Cache

This feature is enabled by default; but if it is necessary, a single CLI command enables that feature for the entire RAIDset:

```
HSG80 > SET D1 READAHEAD_CACHE
```

Where D1 represent the host logical unit of the RAIDsets described above.

A.5 Creating a Stripset

Use stripsets to stripe data across multiple disks. Striping data across multiple disks increases I/O performance compared with the performance of a single disk. Stripsets must have at least two members and can have as many as fourteen. All members must be single disks. This example creates a three-member stripset using the ADD STRIPESET command.

```
HSG80 > ADD STRIPESET DVGRPS0 DISK10100 DISK20100 DISK30100
```

In this example, “DVGRPS0” is the name of the stripeset, and it is followed by a list of the disks to be included in the stripeset. The names of the stripesets are user selectable. Performance of your stripesets will be optimized if each stripeset includes disks from different device ports as shown in Figures A-5 and A-6.

A.5.1 Initializing a Stripese

Prior to putting a stripeset into service as a logical unit, you must initialize it. The INITIALIZE command copies controller metadata onto a small amount of disk space available on the stripeset and makes this space inaccessible to the host.

When you initialize a stripeset, you can specify a chunksize. A chunksize is the number of blocks of data that is transferred at one time. By using the default chunksize, the controller will optimize the chunksize by selecting a number equal to the number of blocks in one track of disk data. We recommend using the default chunksize.

```
HSG80 > INITIALIZE DVGRPS0 CHUNKSIZE=DEFAULT
```

A.5.2 Adding a Stripese as a Logical Unit

To make a stripeset available to the host computer, you must identify it as a host logical unit. For single or dual controllers on a single host, the unit numbers may range from D0 through D7 with a maximum of 8 units. For dual controllers, the unit numbers may range from D0 through D7 for the first controller and from D100 through D107 for the second controller with a maximum of 8 units per host adapter. Add units by using the ADD UNIT command.

```
HSG80 > ADD UNIT D3 DVGRPS0
```

This example uses D3, since the stripeset is the third unit identified on the controller.

A.5.3 Setting Writeback Cache

This feature is enabled by default; but if it is necessary, a single CLI command enables that feature for the entire stripeset:

```
HSG80 > SET D3 WRITEBACK_CACHE
```

Where D3 represents the host logical unit of the stripeset described above.

A.6 Creating a Mirrorset

Create mirrorsets to increase data availability and achieve data redundancy by maintaining at least two drives that have exactly the same data. Mirrorsets must have at least two members, and can have as many as six. This example creates a two-member mirrorset using the ADD MIRRORSET command.

```
HSG80 > ADD MIRRORSET DVGRPMO DISK10200 DISK20200
```

In this example, DVGRPMO is the name of the mirrorset, and it is followed by a list of the disks to be included in the mirrorset. The names of the mirrorsets are user selectable. Performance of your mirror sets will be optimized if each mirrorset includes disks from different ports as shown in the example.

A.6.1 Initializing a Mirrorset

Prior to putting a mirrorset into service as a logical unit, you must initialize it. The INITIALIZE command copies controller metadata onto a small amount of disk space available on the mirrorset and makes this space inaccessible to the host.

```
HSG80 > INITIALIZE DVGRPMO
```

A.6.2 Adding a Mirrorset as a Logical Unit

To make a mirrorset available to the host computer, you must identify it as a host logical unit. For single or dual controllers on a single host, the unit numbers may range from D0 through D7 with a maximum of 8 units. For dual controllers, the unit numbers may range from D0 through D7 for the first controller and from D100 through D107 for the second controller with a maximum of 8 units per host adapter. Add units by using the ADD UNIT command.

```
HSG80 > ADD UNIT D4 DVGRPMO
```

A.6.3 Setting Writeback Cache

This feature is enabled by default; but if it is necessary, a single CLI command enables that feature for the entire mirrorset:

```
HSG80 > SET D4 WRITEBACK_CACHE
```

Where D4 represents the host logical unit of the mirrorset described above.

A.7 Creating a Striped Mirrorset

Create a striped mirrorset to achieve high I/O performance and maximum data availability. striped mirrorsets must have at least two mirrorset members, and can have as many as fourteen. All members must be mirrorsets. To create striped mirrorsets, you first create mirrorsets and then you create stripesets with those mirrorsets.

A.7.1 Creating Mirrorsets

These examples create 2, two member mirrorsets for the striped mirrorset.

```
HSG80 > ADD MIRRORSET MIRR_0 DISK30200 DISK40200  
HSG80 > ADD MIRRORSET MIRR_1 DISK50200 DISK60200
```

In these examples, MIRR_0 and MIRR_1 are the names of the mirrorsets. Each is followed by the list of disks to be included in it.

A.7.2 Striping the Mirrorsets

Striped mirrorsets must have at least two members, and can have as many as fourteen. This example uses the ADD STRIPESET command to create a two-member stripeset with the mirrorsets that you just created.

```
HSG80 > ADD STRIPESET DVGRPSM0 MIRR_0 MIRR_1
```

In this example, DVGRPSM0 is the name of the striped mirrorset, and it is followed by a list of mirrorsets to include in it. The name of the stripeset is user selectable. Performance of your striped mirrorset will be optimized if each mirrorset includes disks from different device ports as shown in Figure A-4.

A.7.3 Initializing the Striped Mirrorset

Prior to putting a striped mirrorset(s) into service as a logical unit, you must initialize it. The INITIALIZE command copies controller metadata to a small amount of disk space on the striped mirrorset and makes this space inaccessible to the host.

When you initialize a striped mirrorset you can specify a chunksize. A chunksize is the number of blocks of data that is transferred at one time. By using the default chunksize, the controller optimizes the chunksize by selecting a number equal to the number of blocks in one track of disk data.

```
HSG80 > INITIALIZE DVGRPSMO CHUNKSIZE=DEFAULT
```

A.7.4 Adding a Striped Mirrorset as a Logical Unit

To make a striped mirrorset available to the host computer, you must identify it as a host logical unit. For single or dual controllers on a single host, the unit numbers may range from D0 through D7 with a maximum of 8 units. For dual controllers, the unit numbers may range from D0 through D7 for the first controller and from D100 through D107 for the second controller with a maximum of 8 units per host adapter. Add units by using the ADD UNIT command.

```
HSG80 > ADD UNIT D5 DVGRPSMO
```

A.7.5 Setting Writeback Cache

This feature is enabled by default; but if it is necessary, a single CLI command enables that feature for the entire striped mirrorset:

```
HSG80 > SET D5 WRITEBACK_CACHE
```

Where D5 represents the host logical units of the striped mirrorset described above.

A.8 Adding Individual Disks as Logical Units

To use an individual disk in a RA8000/ESA12000 or MA8000/EMA12000 Fibre Channel subsystem, you must initialize it and then add it as a logical unit.

A.8.1 Initializing Individual Disks

Prior to putting an individual disk into service as a logical unit, you must initialize it. The INITIALIZE command copies controller metadata onto a small amount of disk space available on the disk and makes this space inaccessible to the host.

```
HSG80 > INITIALIZE DISK40100 CHUNKSIZE=DEFAULT  
HSG80 > INITIALIZE DISK50100 CHUNKSIZE=DEFAULT
```

A.8.2 Adding as Logical Units

To make an individual disk available to the host computer, you must identify it as a host logical unit. For single or dual controllers on a single host, the unit numbers may range from D0 through D7 with a maximum of 8 units. For dual controllers, the unit numbers may range from D0 through D7 for the first controller and from D100 through D107 for the second controller with a maximum of 8 units per host adapter. Add units by using the ADD UNIT command.

```
HSG80 > ADD UNIT D4 DISK40100  
HSG80 > ADD UNIT D5 DISK50100
```

A.9 Adding Devices to the Spareset

It is advisable to add devices to the spareset to create a pool of devices for the controller to use as replacements for devices in a RAIDset, mirrorset or striped mirrorset that fail. If no spareset exists, these redundant types of storagesets will run “reduced,” and you should replace the disabled disk as soon as possible. To create the spareset, identify the drive(s) using the ADD SPARESET command.

```
HSG80 > ADD SPARESET DISK60100
```

In this example, DISK60100 was identified to the controller as a spareset.

NOTE: Any disk member added to the spareset must have the same storage capacity as the largest existing individual disk member of your logical storagesets.

A.10 Saving Copies of the Configuration

Use the following INITIALIZE command to save a copy of the entire controller configuration on a device or storageset in the subsystem. Save a copy of the controller configuration on a device or storageset so that in the event of a controller failure, you will not need to create a new controller configuration.

The controller automatically updates the saved copy of the configuration whenever the configuration changes.

We recommend keeping a copy of the configuration on at least two devices or storagesets.

To save a copy of the configuration on disk, use the INITIALIZE command as follows:

HSG80 > **INITIALIZE DISK10000 SAVE_CONFIGURATION**

The controller places a copy of the configuration onto the specified device or storageset and automatically updates this saved copy whenever the configuration changes. To ensure availability of a copy of the configuration, save the configuration on at least two devices.

NOTE: This command applies to single controller configurations. For dual controller configurations use the “SET FAILOVER COPY” command to save the configuration. Refer to the *Compaq StorageWorks HSG80 Array Controller ACS V8.5 Configuration Guide* for more information.

A.11 Recording your Configuration

You have now completed all the steps required to create an initial configuration for your controller. In the following steps, you should verify and record your configuration for future reference. Additional worksheets are provided in this chapter for recording future new or modified configurations.

First, verify the Logical Units you have configured:

HSG80 > **SHOW UNITS**

The controller responds with a display similar to that shown below:

LUN	Uses
D1	DVGRPRO
D2	DVGRPR1
D3	DVGRPS0
D4	DISK40100
D5	DISK50100

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Record the information in the following table:

Date _____	Uses

Next, verify the storagesets you have configured:

HSG80 > **SHOW STORAGESETS**

The controller responds with a display similar to that shown below:

Name	StorageSet	Uses	Used by
DVGRPS0	stripeset DISK10100 DISK20100 DISK30100		D3
DVGRPSM0	stripeset MIRR_0 MIRR_1		D5
DVGRPM0	mirrorset DISK10200 DISK20200		D4
MIRR_0	mirrorset DISK30200 DISK40200		DVGRPSM0
MIRR_1	mirrorset DISK50200 DISK60200		DVGRPSM0
DVGRPR0	raidset DISK10000 DISK20000 DISK30000		D1
DVGRPR1	raidset DISK40000 DISK50000 DISK60000		D2
SPARESET FAILEDSET	spareset failedset	DISK60100	

Individual devices are not displayed in this report. To display individual devices, enter the following:

HSG80 > **SHOW DEVICES**

Record the above information in the following table. In the event of a controller failure, the information that is recorded here will assist you in reconstruction of the storageset on your RA8000/ESA12000 or MA8000/EMA12000 Fibre Channel subsystem.

Planning Your Storage Configuration

This appendix describes the RAID configuration options and RAID concepts which you need to know to create your storage configuration.

B.1 Planning Your Configuration

RAID stands for Redundant Array of Independent Disks. It is a way of configuring multiple physical disk drives to achieve high data availability and/or larger virtual disk devices. RAID is implemented as a set of multiple storage devices (disks, tapes, and solid-state disks), called an array, and a specialized array controller, which manages the distribution of data across the array.

A RAID array, whether it contains two, five, or seven physical drives, can be configured to look like one or more large virtual disk drives. Use a RAID array virtual drive just as you would a physical drive. You can partition it if you want, and you do not need to make any application changes to realize the benefits of RAID. A RAID array provides higher levels of data availability and performance than a single physical disk drive of similar capacity.

Data for a given file is divided into chunks that is then written across multiple drives. A *chunk* is a group of contiguous data blocks that are stored on a single physical disk drive. By using more than one physical drive, the data is transferred in chunks to multiple physical devices simultaneously, achieving transfer rates greater than each physical disk. Depending on the RAID level used, arrays also provide redundancy to protect the data availability. Arrays provide redundancy in two main ways: by mirroring and by generating parity.

The storage configuration options available depend upon your storage needs and the number of disks that you purchased for your RAID array. Table B-1 describes the storage options available and the minimum number of physical disks required to implement each.

You can use a variety of storageset type containers within a single subsystem, providing you have the disk device resources to support them.

**Table B-1
Storage Configuration Options**

Storage Method	Storageset Type	Number of Devices	Offers
RAID 3/5 A redundant-stripeset combining the optimized data transfers of RAID 3 with the striping of parity of RAID 5.	RAIDset	3 - 14	Good throughput and read bandwidth for a high request rate of small to medium transfers. High Data Availability.
RAID 0	Stripeset	2 - 24	Good performance for both read and write requests. Provides load balancing with each request requiring a single data operation. Data availability equivalent to that of an individual disk device.
RAID 1	Mirrorset	2 - 6 devices per mirrorset, up to 12 mirrorsets per RAID array	Good performance for read requests. High Data Availability
RAID 0 + 1	Striped mirrorsets	2 - 14 mirrorsets	Performance for read requests surpassing that of an unstriped mirrorset since it can achieve load balancing. High Data Availability.
Individual Devices (JBOD)	Disk Drive	1	Provides the storage capacity and access speed of the disk used. If device fails, data is lost.

Once you select the type of storagesets that you want to use in your subsystem, you must create them using an appropriate configuration manager.

Command Console LUN

This appendix discusses the Command Console LUN.

C.1 Command Console LUN

The StorageWorks RAID Array is configured by creating various types of storagesets and associating them with specific IDs called Logical Unit Numbers (LUNs). The Host uses these LUNs to access the underlying storageset. The RAID Array is preconfigured with a virtual LUN, located on Controller A, LUN 0. This device, called the Command Console LUN (CCL), allows the RAID Array to be recognized by the Host system as soon as it is attached to the Fibre Channel and configured into the operating system. The CCL also serves as a communications device for the StorageWorks Command Console (SWCC) Agent. The CCL identifies itself to the Host via a unique identification string. This string, **HSG80CCL**, is returned in response to the SCSI Inquiry command.

When the CCL is enabled, as it is upon delivery, its address can be determined using the CLI command:

```
HSG80 > SHOW THIS_CONTROLLER
```

The CCL can be disabled using the CLI command:

```
HSG80 > SET THIS_CONTROLLER NOCOMMAND_CONSOLE_LUN
```

The CCL is enabled using the CLI command:

```
HSG80 > SET THIS_CONTROLLER COMMAND_CONSOLE_LUN
```

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In dual-redundant controller configurations, these commands alter the setting of the CCL on both Controllers. When the CCL is enabled, its ID is the lowest LUN of the lowest loop ID. When creating storagesets and logical units on the RAID Array using the CLI, the address of the CCL should be reserved and not used. However, if the CCL's LUN is assigned to a storageset, the CCL will "float" to the next lowest LUN that is available. On some Host Systems, the SWCC Agent requires that the CCL remain in a fixed location. If the CCL is moved to a new address, the SWCC Agent will no longer be able to communicate with the RAID Array for configuration and monitoring purposes.

Appendix *D*

Valid ALPA Settings

This appendix provides a table of the valid arbitrated loop physical addresses available for hard addressing the fibre channel arbitrated loop.

D.1 Valid ALPA Settings

Table D-1 lists the ALPA settings and corresponding SCSI target numbers for hard addressing the fibre channel arbitrated loop using the CPQfca driver. Use this table when setting the PORT_1_AL_PA and PORT_2_AL_PA addresses on the HSG80 controller.

NOTES:

AL_PA 0x00 through 0x70 are reserved for FC adapters installed in a Host system. When setting AL_PA addresses on the HSG80 controllers, use AL_PA 0x71 through 0xEF.

The values are intentionally from lowest to highest priority. AL_PA = 00 is reserved for the FL_Port; -- it is not available.

Table D-1
Arbitrated Loop Physical Address (ALPA) Settings

AL_PA (hex)	Switch (hex)	Setting (dec)	AL_PA (hex)	Switch (hex)	Setting (dec)	AL_PA (hex)	Switch (hex)	Setting (dec)
EF	00	0	A3	2B	43	4D	56	86
E8	01	1	9F	2C	44	4C	57	87
E4	02	2	9E	2D	45	4B	58	88
E2	03	3	9D	2E	46	4A	59	89
E1	04	4	9B	2F	47	49	5A	90
E0	05	5	98	30	48	47	5B	91
DC	06	6	97	31	49	46	5C	92
DA	07	7	90	32	50	45	5D	93
D9	08	8	8F	33	51	43	5E	94
D6	09	9	88	34	52	3C	5F	95
D5	0A	10	84	35	53	3A	60	96
D4	0B	11	82	36	54	39	61	97
D3	0C	12	81	37	55	36	62	98
D2	0D	13	80	38	56	35	63	99
D1	0E	14	7C	39	57	34	64	100
CE	0F	15	7A	3A	58	33	65	101
CD	10	16	79	3B	59	32	66	102
CC	11	17	76	3C	60	31	67	103
CB	12	18	75	3D	61	2E	68	104
CA	13	19	74	3E	62	2D	69	105
C9	14	20	73	3F	63	2C	6A	106
C7	15	21	72	40	64	2B	6B	107
C6	16	22	71	41	65	2A	6C	108
C5	17	23	6E	42	66	29	6D	109

continued

Table D-1
Arbitrated Loop Physical Address (ALPA) Settings *continued*

AL_PA (hex)	Switch (hex)	Setting (dec)	AL_PA (hex)	Switch (hex)	Setting (dec)	AL_PA (hex)	Switch (hex)	Setting (dec)
C3	18	24	6D	43	67	27	6E	110
BC	10	25	6C	44	68	26	6F	111
BA	1A	26	6B	45	69	25	70	112
B9	1B	27	6A	46	70	23	71	113
B6	1C	28	69	47	71	1F	72	114
B5	1D	29	67	48	72	1E	73	115
B4	1E	30	66	49	73	1D	74	116
B3	1F	31	65	4A	74	1B	75	117
B2	20	32	63	4B	75	18	76	118
B1	21	33	5C	4C	76	17	77	119
AE	22	34	5A	4D	77	10	78	120
AD	23	35	59	4E	78	0F	79	121
AC	24	36	56	4F	79	08	7A	122
AB	25	37	55	50	80	04	7B	123
AA	26	38	54	51	81	02	7C	124
A9	27	39	53	52	82	01	7D	125
A7	28	40	52	53	83	00	7E	126
A6	29	41	51	54	84			
A5	2A	42	4E	55	85			

Appendix **E**

Agent Data Files

This appendix provides information about Agent data files and formats for advanced level troubleshooting of agent installation problems.

E.1 Editing the Services File

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

The default socket numbers for Command Console are "4998" and "4999". If you are installing SWCC Agent and these numbers are already taken by another application, the installation program prompts to warn you that you must choose another pair. If you do not choose another pair, the program uses the defaults, regardless of any conflicts with other programs.

To select another pair for Agent, open the *services* file in an ASCII editor. Pick two numbers above 1023 that are not already used in the file, and add the following two lines:

```
sogui 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.

E.2 Editing the Agent Configuration File

The agent configuration file, *steam.cfg*, configures Agent within its operating system.

E.2.1 File Format

The file contains five lines of ASCII text, formatted as follows:

device_special_file_path

In Windows 2000 or Windows NT, this line must be blank.

agent_executable_file_path

The full path to the *steam.exe*, *client.ini*, and *storage.ini* files.

encrypted_password

The encrypted password from the password generation program.

manufacturer_name

Your manufacturer name. The default is "Compaq Computer Corporation"
You can use up to 80 characters.

snmp_enterprise_assignment

Your SNMP enterprise assignment number. The default is "36.2.15.21.". (Note that this parameter is not your numerical TCP/IP address.) If you are unsure about this parameter, use the default or contact your network administrator.

E.2.2 Editing the File

To edit the *steam.cfg* file:

1. Run the password generation program by changing to the directory that the *steam.exe*, *client.ini*, and *storage.ini* files are installed in and entering the following at a command prompt:

```
sp_passwd "yourpassword"
```

where "*yourpassword*" is a 4 to 16-character text string of your choosing.

The program generates a 4 to 16-character, encrypted password string and displays it on the screen.

2. Use an ASCII editor to modify the *steam.cfg* file you copied during the installation process. Use the encrypted password from Step 1 as line 3 in the file.

Sample File

Following is a sample *steam.cfg* file:

```
/dev/rdisk  
/opt/steam  
-2V1 (z05)  
Compaq Computer Corporation  
36.2.15.21.
```

E.3 Editing the Client Access File

The client access file, *client.ini*, configures Agent for proper operation with its Clients.

E.3.1 File Format

NOTE: Blank lines are not allowed in the *client.ini* file and the file must end with a carriage return. An embedded blank line or lack of a trailing carriage return may interfere with Agent execution.

The line for each client system must be in the following format:

```
system_network_addressnotification_methodaccess_allowed <CR>
```

where:

system_network_address

The network name, including the domain information if appropriate, of the remote system to which you wish to grant access. The address may be an alphanumeric alias or a numeric IP address. The address can be up to 128 characters long, including periods. If you are unsure of this address, consult your network administrator. This parameter is case sensitive.

notification_method

The mechanism you wish Agent to use to notify Client sessions of a fault, where:

- 0 = no notification
- 1 = notify via TCP
- 2 = notify via SNMP
- 3 = notify via both TCP and SNMP

If you are unsure of which mechanism to use, use "1" for this parameter. To avoid significant delays in fault notification, set this parameter to "0" for Clients using RAS connections to the network.

access_allowed

You can configure Agent for three levels of subsystem access:

- Navigation Tree monitoring—Good/Bad indication in the Navigation Tree only. No Storage Window can be opened for the subsystem by this Client.
- Storage Window monitoring—All detailed information about the status of the storage subsystem available in a Storage Window, in addition to Navigation Tree monitoring capabilities.
- Storage Window configuration—Capability of changing the configuration of the storage subsystem in the Storage Window, in addition to monitoring the subsystem in both the Navigation Tree and Storage Window.

The ***access_allowed*** parameter sets the level of **access** you are granting to this remote system, where:

- 0 = Navigation Tree monitoring only. A Storage Window cannot be opened. No Storage Window monitoring or configuration changes allowed.
- 1 = Navigation Tree and Storage Window monitoring. No storage subsystem configuration changes allowed in the Storage Window.
- 2 = Navigation Tree monitoring and Storage Window monitoring and configuration access.

A carriage return <CR> is required at the end of the file.

E.3.2 Editing the File

Use an ASCII editor to modify the *client.ini* file you copied during the installation process. Add a separate line in the file for each system that you wish to grant access to this host system. Use vertical bars (sometimes called the “pipe” character) to delimit the fields. You may add comment lines as long as they start in very first position and begin with the pound character, “#”.

Sample File

Following is a sample *client.ini* file. This file enables full access for the remote Client system at network address *dreamon.your.company.com*, and sends fault notifications to Client using the TCP mechanism. It also disables configuration access by Client running on the system at network address *wanderlust.your.company.com*, but still enables asynchronous fault notification via the TCP mechanism.

```
# Access list for system HOST123:
dreamon.your.company.com|1|2
wanderlust.your.company.com|1|1
```

E.4 Editing the Subsystem Identification File

The subsystem identification file, *storage.ini*, configures Agent to communicate with the storage subsystems on the host on which Agent is running.

E.4.1 File Format

NOTE: Blank lines are not allowed in the *storage.ini* file and the file cannot end with a carriage return. An embedded blank line or a trailing carriage return may interfere with Agent execution.

The line for each system must have the following format:

```
subsystem_name|monitor_interval|Reserved|controller_type|emu_type|this_sn|
other_sn|fw_version|access_device|ccl_access|num_alt_dev
```

where:

subsystem_name

The name you wish to refer to the subsystem by when using the Client GUI. The name must be alphanumeric and can consist of up to 32 characters.

monitor_interval

The time interval, in seconds, between Agent's periodic status checks on this subsystem. The range of intervals is from 1 to 99,999 seconds. If you set this parameter to 0, Agent does not perform periodic status checks on the subsystem, and any event notification from the subsystem is disabled..

Reserved

This field is reserved for future use.

controller_type

A numeric identifier for the controller model used in the subsystem, as follows:

NOTE: All controller types may not be supported by your software version. Check the release notes for your, specific software version to determine which controllers are supported.

- 0=HSZ20 controller
- 1=HSZ22 controller
- 2=HSD40 controller
- 3=HSJ40 controller
- 4=HSZ40 controller
- 5=HSD50 controller
- 6=HSJ50 controller
- 7=HSZ50 controller
- 8=HSZ70 controller
- 9=HSZ80 controller
- 10=HSG80 controller
- 99=Unknown controller type

emu_type

A numeric identifier for the type of environmental monitoring unit (EMU) used in the subsystem, as follows:

- 0=no EMUs installed
- 1=standard EMUs installed
- 2=enhanced EMUs installed

this_sn

The serial number of the controller to which the Agent is communicating.

other_sn

The serial number of the companion to the controller to which the Agent is communicating.

fw_version

The version number of ACS software running on the RAID Array.

access_device

For HP-UX, the name will be of the form: *c5t0d0*

ccl_device

Note that the communications LUN is not compatible with the Windows 2000 or Windows NT operating system. Do not enable the LUN if your operating system is Windows 2000 or Windows NT.

If a controller communications LUN is used to connect Agent to the subsystem controller, this field contains information about the LUN.

num_alt_dev

This number will be zero (0) when there is no alternate access device. It will be one (1) when there is an alternate access device.

For controllers offering the communications LUN feature, this field contains either of the following:

- a. The text string “disabled”, indicating that the communications LUN is not enabled in the controller.
- b. The operating system device name representing the communications LUN. The format is the same as the *access_device* field. For HP HP-UX, the *ccl_device* is the same as the *access_device*.

For all other controller types, this field contains the text string “none”, indicating that there is no communications LUN available. In this case, Agent uses the device specified in the *access_device* field to connect to the controller. This device is a virtual disk.

E.4.2 Editing the File

Use an ASCII editor to modify the *storage.ini* file you copied during the installation process. Add a separate line in the file for each system that you wish to grant access to this host system. Use vertical bars (sometimes called the “pipe” character) to delimit the fields in each line. You may add comment lines as long as they start in very first position and begin with the pound character, #.

Sample File

Following is a sample *storage.ini* file. This file configures Agent to communicate with and to periodically monitor subsystems RA8000 / ESA12000 c8t0d0. Agent will check RA8000 / ESA12000 at 20-second intervals. Subsystem RA8000 / ESA12000 is an HSG80-based subsystem using a communications LUN for communication.

```
# Storage subsystems for HOST123
ra8000|20|0|4|2|cx3459688|cx3459699|v85flc8t0d0|c8t0d0|0|
```

E.5 Agent/Controller Communications

Command Console communicates with your controller via a virtual disk that you must specify in the *storage.ini* file. There must be at least one virtual disk on your subsystem, so that Agent can use it to make a connection.

Use care in making changes to your virtual disk configuration with Command Console. If the virtual disk that Agent is using to communicate with your subsystem fails or is deleted, Agent loses its connection with the controller, and Client loses its connection with your subsystem.

SNMP MIB Information

This appendix provides information about the SNMP traps that may be generated by the Agent.

F.1 SNMP Trap Information

When a physical storage device, a logical storage unit, or a physical enclosure component changes state, the Agent sends out an SNMP trap (that is, an asynchronous event notification) to any hosts that are listed in the CLIENT.INI file with this option enabled. (See *Appendix E* of this guide for more information on *client.ini* settings.)

This section describes the format of the SNMP traps that may be generated. There are 21 trap types, one for each FRU type and state.

F.1.1 Disk Device Failure Trap

Enterprise = 1.3.6.1.4.1.36.2.15.21
Source address = <ip address>
Generic = 6
Specific = 1
Variable Binding List :
Object 1 = 1.3.6.1.4.1.36.2.15.21.1.4
Value 1 = <host name>
Object 2 = 1.3.6.1.4.1.36.2.15.21.3.2.1.2
Value 2 = <subsystem name>
Object 3 = 1.3.6.1.4.1.36.2.15.21.3.2.1.28
Value 3 = <disk device name>
Object 4 = 1.3.6.1.4.1.36.2.15.21.3.2.1.33
Value 4 = <cabinet>

Object 5 = 1.3.6.1.4.1.36.2.15.21.3.2.1.35
Value 5 = <channel>
Object 6 = 1.3.6.1.4.1.36.2.15.21.3.2.1.36
Value 6 = <target ID>

F.1.2 Disk Device Recovery Trap

Enterprise = 1.3.6.1.4.1.36.2.15.21
Source address = <ip address>
Generic = 6
Specific = 2
Variable Binding List :
Object 1 = 1.3.6.1.4.1.36.2.15.21.1.4
Value 1 = <host name>
Object 2 = 1.3.6.1.4.1.36.2.15.21.3.2.1.2
Value 2 = <subsystem name>
Object 3 = 1.3.6.1.4.1.36.2.15.21.3.2.1.28
Value 3 = <disk device name>
Object 4 = 1.3.6.1.4.1.36.2.15.21.3.2.1.33
Value 4 = <cabinet>
Object 5 = 1.3.6.1.4.1.36.2.15.21.3.2.1.35
Value 5 = <channel>
Object 6 = 1.3.6.1.4.1.36.2.15.21.3.2.1.36
Value 6 = <target ID>

F.1.3 Power Supply Device Failure Trap

Enterprise = 1.3.6.1.4.1.36.2.15.21
Source address = <ip address>
Generic = 6
Specific = 3
Variable Binding List :
Object 1 = 1.3.6.1.4.1.36.2.15.21.1.4
Value 1 = <host name>
Object 2 = 1.3.6.1.4.1.36.2.15.21.3.2.1.2
Value 2 = <subsystem name>
Object 3 = 1.3.6.1.4.1.36.2.15.21.3.2.1.33
Value 3 = <cabinet>
Object 4 = 1.3.6.1.4.1.36.2.15.21.3.2.1.29
Value 4 = <power supply location>

F.1.4 Power Supply Device Recovery Trap

Enterprise = 1.3.6.1.4.1.36.2.15.21
Source address = <ip address>
Generic = 6

Specific = 4
Variable Binding List :
Object 1 = 1.3.6.1.4.1.36.2.15.21.1.4
Value 1 = <host name>
Object 2 = 1.3.6.1.4.1.36.2.15.21.3.2.1.2
Value 2 = <subsystem name>
Object 3 = 1.3.6.1.4.1.36.2.15.21.3.2.1.33
Value 3 = <cabinet>
Object 4 = 1.3.6.1.4.1.36.2.15.21.3.2.1.29
Value 4 = <power supply location>

F.1.5 Fan Device Failure Trap

Enterprise = 1.3.6.1.4.1.36.2.15.21
Source address = <ip address>
Generic = 6
Specific = 5
Variable Binding List :
Object 1 = 1.3.6.1.4.1.36.2.15.21.1.4
Value 1 = <host name>
Object 2 = 1.3.6.1.4.1.36.2.15.21.3.2.1.2
Value 2 = <subsystem name>
Object 3 = 1.3.6.1.4.1.36.2.15.21.3.2.1.33
Value 3 = <cabinet>
Object 4 = 1.3.6.1.4.1.36.2.15.21.3.2.1.30
Value 4 = <fan location>

F.1.6 Fan Device Recovery Trap

Enterprise = 1.3.6.1.4.1.36.2.15.21
Source address = <ip address>
Generic = 6
Specific = 6
Variable Binding List :
Object 1 = 1.3.6.1.4.1.36.2.15.21.1.4
Value 1 = <host name>
Object 2 = 1.3.6.1.4.1.36.2.15.21.3.2.1.2
Value 2 = <subsystem name>
Object 3 = 1.3.6.1.4.1.36.2.15.21.3.2.1.33
Value 3 = <cabinet>
Object 4 = 1.3.6.1.4.1.36.2.15.21.3.2.1.30
Value 4 = <fan location>

F.1.7 Cache Battery Failure Trap

Enterprise = 1.3.6.1.4.1.36.2.15.21
Source address = <ip address>
Generic = 6
Specific = 7
Variable Binding List :
Object 1 = 1.3.6.1.4.1.36.2.15.21.1.4
Value 1 = <host name>
Object 2 = 1.3.6.1.4.1.36.2.15.21.3.2.1.2
Value 2 = <subsystem name>
Object 3 = 1.3.6.1.4.1.36.2.15.21.3.2.1.31
Value 3 = <cache battery location>

F.1.8 Cache Battery Low Trap

Enterprise = 1.3.6.1.4.1.36.2.15.21
Source address = <ip address>
Generic = 6
Specific = 8
Variable Binding List :
Object 1 = 1.3.6.1.4.1.36.2.15.21.1.4
Value 1 = <host name>
Object 2 = 1.3.6.1.4.1.36.2.15.21.3.2.1.2
Value 2 = <subsystem name>
Object 3 = 1.3.6.1.4.1.36.2.15.21.3.2.1.31
Value 3 = <cache battery location>

F.1.9 Cache Battery Recovery Trap

Enterprise = 1.3.6.1.4.1.36.2.15.21
Source address = <ip address>
Generic = 6
Specific = 9
Variable Binding List :
Object 1 = 1.3.6.1.4.1.36.2.15.21.1.4
Value 1 = <host name>
Object 2 = 1.3.6.1.4.1.36.2.15.21.3.2.1.2
Value 2 = <subsystem name>
Object 3 = 1.3.6.1.4.1.36.2.15.21.3.2.1.31
Value 3 = <cache battery location>

F.1.10 Temperature Sensor Over Threshold Trap

Enterprise = 1.3.6.1.4.1.36.2.15.21
Source address = <ip address>
Generic = 6
Specific = 10
Variable Binding List :
Object 1 = 1.3.6.1.4.1.36.2.15.21.1.4
Value 1 = <host name>
Object 2 = 1.3.6.1.4.1.36.2.15.21.3.2.1.2
Value 2 = <subsystem name>
Object 3 = 1.3.6.1.4.1.36.2.15.21.3.2.1.33
Value 3 = <cabinet>
Object 4 = 1.3.6.1.4.1.36.2.15.21.3.2.1.32
Value 4 = <temperature sensor location>

F.1.11 Temperature Sensor Below Threshold Trap

Enterprise = 1.3.6.1.4.1.36.2.15.21
Source address = <ip address>
Generic = 6
Specific = 11
Variable Binding List :
Object 1 = 1.3.6.1.4.1.36.2.15.21.1.4
Value 1 = <host name>
Object 2 = 1.3.6.1.4.1.36.2.15.21.3.2.1.2
Value 2 = <subsystem name>
Object 3 = 1.3.6.1.4.1.36.2.15.21.3.2.1.33
Value 3 = <cabinet>
Object 4 = 1.3.6.1.4.1.36.2.15.21.3.2.1.32
Value 4 = <temperature sensor location>

F.1.12 Communication Failure Trap

Enterprise = 1.3.6.1.4.1.36.2.15.21
Source address = <ip address>
Generic = 6
Specific = 12
Variable Binding List :
Object 1 = 1.3.6.1.4.1.36.2.15.21.1.4
Value 1 = <host name>
Object 2 = 1.3.6.1.4.1.36.2.15.21.3.2.1.2
Value 2 = <subsystem name>

F.1.13 Communication Recovery Trap

Enterprise = 1.3.6.1.4.1.36.2.15.21
Source address = <ip address>
Generic = 6
Specific = 13
Variable Binding List :
Object 1 = 1.3.6.1.4.1.36.2.15.21.1.4
Value 1 = <host name>
Object 2 = 1.3.6.1.4.1.36.2.15.21.3.2.1.2
Value 2 = <subsystem name>

F.1.14 Controller Failure Trap

Enterprise = 1.3.6.1.4.1.36.2.15.21
Source address = <ip address>
Generic = 6
Specific = 14
Variable Binding List :
Object 1 = 1.3.6.1.4.1.36.2.15.21.1.4
Value 1 = <host name>
Object 2 = 1.3.6.1.4.1.36.2.15.21.3.2.1.2
Value 2 = <subsystem name>

F.1.15 Controller Recovery Trap

Enterprise = 1.3.6.1.4.1.36.2.15.21
Source address = <ip address>
Generic = 6
Specific = 15
Variable Binding List :
Object 1 = 1.3.6.1.4.1.36.2.15.21.1.4
Value 1 = <host name>
Object 2 = 1.3.6.1.4.1.36.2.15.21.3.2.1.2
Value 2 = <subsystem name>

F.1.16 LUN Failure Trap

Enterprise = 1.3.6.1.4.1.36.2.15.21
Source address = <ip address>
Generic = 6
Specific = 16
Variable Binding List :
Object 1 = 1.3.6.1.4.1.36.2.15.21.1.4
Value 1 = <host name>
Object 2 = 1.3.6.1.4.1.36.2.15.21.3.2.1.2
Value 2 = <subsystem name>

Object 3 = 1.3.6.1.4.1.36.2.15.21.3.2.1.34
Value 3 = <lun name>

F.1.17 LUN Reconstructing Trap

Enterprise = 1.3.6.1.4.1.36.2.15.21
Source address = <ip address>
Generic = 6
Specific = 17
Variable Binding List :
Object 1 = 1.3.6.1.4.1.36.2.15.21.1.4
Value 1 = <host name>
Object 2 = 1.3.6.1.4.1.36.2.15.21.3.2.1.2
Value 2 = <subsystem name>
Object 3 = 1.3.6.1.4.1.36.2.15.21.3.2.1.34
Value 3 = <lun name>

F.1.18 LUN Reduced Trap

Enterprise = 1.3.6.1.4.1.36.2.15.21
Source address = <ip address>
Generic = 6
Specific = 18
Variable Binding List :
Object 1 = 1.3.6.1.4.1.36.2.15.21.1.4
Value 1 = <host name>
Object 2 = 1.3.6.1.4.1.36.2.15.21.3.2.1.2
Value 2 = <subsystem name>
Object 3 = 1.3.6.1.4.1.36.2.15.21.3.2.1.34
Value 3 = <lun name>

F.1.19 LUN Recovery Trap

Enterprise = 1.3.6.1.4.1.36.2.15.21
Source address = <ip address>
Generic = 6
Specific = 19
Variable Binding List :
Object 1 = 1.3.6.1.4.1.36.2.15.21.1.4
Value 1 = <host name>
Object 2 = 1.3.6.1.4.1.36.2.15.21.3.2.1.2
Value 2 = <subsystem name>
Object 3 = 1.3.6.1.4.1.36.2.15.21.3.2.1.34
Value 3 = <lun name>

F.1.20 EMU External Input Failure Trap

Enterprise = 1.3.6.1.4.1.36.2.15.21
Source address = <ip address>
Generic = 6
Specific = 20
Variable Binding List :
Object 1 = 1.3.6.1.4.1.36.2.15.21.1.4
Value 1 = <host name>
Object 2 = 1.3.6.1.4.1.36.2.15.21.3.2.1.2
Value 2 = <subsystem name>
Object 3 = 1.3.6.1.4.1.36.2.15.21.3.2.1.33
Value 3 = <cabinet>

F.1.21 EMU External Input Recovery Trap

Enterprise = 1.3.6.1.4.1.36.2.15.21
Source address = <ip address>
Generic = 6
Specific = 21
Variable Binding List :
Object 1 = 1.3.6.1.4.1.36.2.15.21.1.4
Value 1 = <host name>
Object 2 = 1.3.6.1.4.1.36.2.15.21.3.2.1.2
Value 2 = <subsystem name>
Object 3 = 1.3.6.1.4.1.36.2.15.21.3.2.1.33
Value 3 = <cabinet>

Setting Up Controllers and Switches

G.1 Introduction

The host bus adapters (installed in Chapter 1) attach to the storage system through Fibre Channel switches (also called “FC switches” or just “switches”). The switches constitute the fabric connection. This appendix explains how to attach the cables.

NOTE: Power to the host computer, switches, and storage subsystem should be OFF at the start of this procedure. Powering on the equipment in order so the switches can automatically configure the fabric.

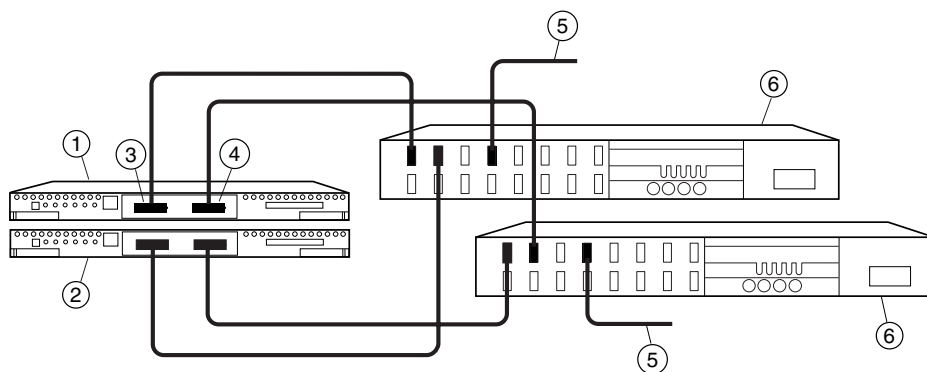
G.2 Cabling

The storage subsystem can contain either one or two controllers. The figures and their keys are as follows:

- Table H-1 is the key to Figure H-1 that shows cabling for systems with two controllers and two FC switches.
- Table H-2 is the key to Figure H-2 that shows cabling for systems with two controllers and one FC switch.
- Table H-3 is the key to Figure H-3 that shows cabling for systems with one controller and one switch.
- Table H-4 is the key to Figure H-4 that shows cabling for systems with one controller and one switch.

Table G-1
Cabling Two Controllers and Two Switches

Figure Legend	Description
①	Controller A
②	Controller B
③	Host port 1
④	Host port 2
⑤	FC cable to host bus adapter
⑥	FC switch

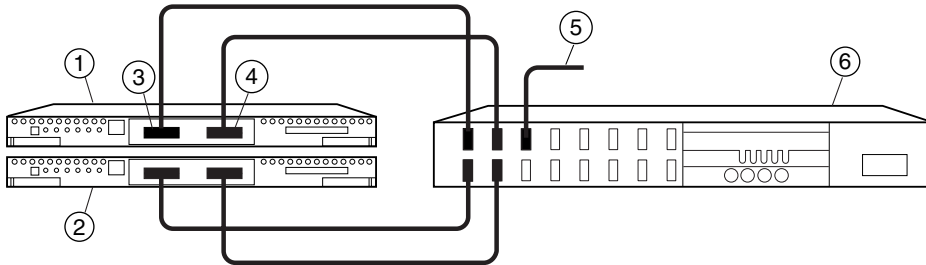


CXO6887A

Figure G-1. Cabling two controllers and two switches

Table G-2
Cabling Two Controllers and One Switch

Figure Legend	Description
①	Controller A
②	Controller B
③	Host port 1
④	Host port 2
⑤	FC cable to host bus adapter
⑥	FC switch

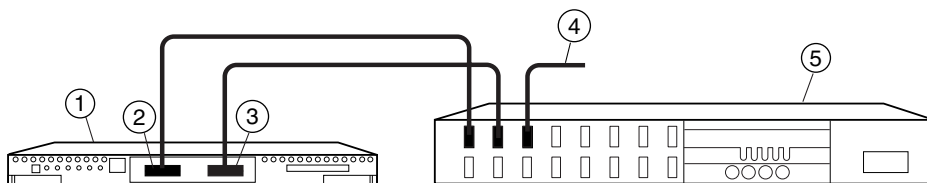


CXO6882A

Figure G-2. Cabling two controllers and one switch

Table G-3
Cabling One Controller and One Switch

Figure Legend	Description
①	Controller
②	Host port 1
③	Host port 2
④	FC cable to host bus adapter
⑤	FC switch

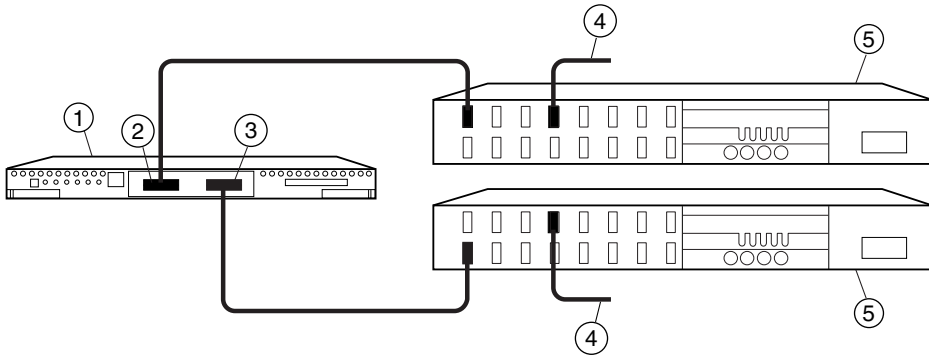


CXO6880A

Figure G-3. Cabling one controller and one switch

Table G-4
Cabling One Controller and Two Switches

Figure Legend	Description
①	Controller
②	Host port 1
③	Host port 2
④	FC cable to host bus adapter
⑤	FC switch



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Figure G-4. Cabling one controller and two switches

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