

# *Compaq StorageWorks*

## **Windows 2000 Datacenter Version 1.1**

Installation Guide

Second Edition (May 2001)  
Part Number: AA-RNARB-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:

<b>Keys</b>	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 and italics.
COMMANDS, DIRECTORY NAMES, and DRIVE NAMES	These elements appear in upper case. [NOTE: UNIX commands are case sensitive and will not appear in uppercase]
Type	When you are instructed to <i>type</i> information, type the information <b>without</b> pressing the <b>Enter</b> key.
Enter	When you are instructed to enter information, type the information and then press the <b>Enter</b> 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.

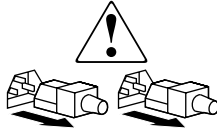
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Any surface or area of the equipment marked with these symbols indicates the presence of a hot surface or hot component. If this surface is contacted, the potential for injury exists.

**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.

---



Any product or assembly marked with these symbols indicates that the component exceeds the recommended weight for one individual to handle safely.

**WARNING:** To reduce the risk of personal INJURY or damage to the equipment, observe local occupational health and safety requirements and guidelines for manual material handling.

---

## 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-COMPAQ. This service is available 24 hours a day, 7 days a week.

**NOTE:** For continuous quality improvement, calls may be recorded or monitored.

Outside North America, call the nearest Compaq Technical Support Phone Center. Telephone numbers for world wide Technical Support Centers are 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 numbers
- Product model names and numbers
- 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 latest 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/storage>.

## **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.





## Preparing Your Windows 2000 Datacenter Server

This chapter provides an installation overview and describes how to install the KGPSA Adapter device driver, the Fibre Channel (FC) software, and StorageWorks RAID Windows 2000 device driver in your host servers.

The steps to prepare *each* Windows 2000 host server in your configuration for use with the RA8000/ESA12000 or MA8000/EMA12000 storage system, are as follows:

- Install the KGPSA Adapter Device Driver.
- Adjust Initial Setup Settings.
- Run the Fibre Channel Software Setup and install the RAID Windows 2000 Device Driver.
- If multiple KGPSA adapters are installed in the Datacenter server for multiple path connection, install Secure Path version 3.1A software. If you have Secure Path version 3.1, download Secure Path version 3.1A from our website at <http://www5.compaq.com/products/sanworks/secure-path/downloads.html>

The Secure Path 3.1A software checks for the existing version of Secure Path.

### Installation Overview

Following is a quick overview of the major steps in preparing a Compaq Datacenter Server system:

1. Unpack the hardware.
2. Install hardware components.

Please read the documents on the Windows 2000 Datacenter Solution Storage CD-ROM on hardware installation and configuration.

3. Connect all the cabling.

Please read the documents on the Windows 2000 Datacenter Solution Storage CD-ROM on hardware installation and configuration.

4. Power up and perform software installation.

Please read the Installation Reference Guide found on the Datacenter Solutions Kit CD.

5. For Secure Path installations, proceed to step 6. The following instructions are for systems without Secure Path. Two CDs are required for this step, the Windows 2000 Datacenter QuickRestore CD and the Windows 2000 Datacenter Solution Storage CD.
  - a. If the server Windows 2000 pre-install image is not intact, install the OS with the QuickRestore CD.
  - b. After the OS is installed, update the time and date.
  - c. Update the Emulex drivers with the KGPSA adapter device driver (the instructions are described in the Device Driver section in this chapter).
  - d. Install the StorageWorks FC-Switch software (you will use the Datacenter Solutions Kit CD).
  - e. Go to Step 7 – installing StorageWorks Command Console.
6. Install Secure Path 3.1A. If you have Secure Path version 3.1 installed, download 3.1A from the Compaq website at  
<http://www5.compaq.com/products/sanworks/secure-path/downloads.html>  
The Secure Path 3.1A software checks for the existing version of Secure Path.
  - a. If the server Windows 2000 pre-install image is not intact, install the OS with the QuickRestore CD.
  - b. After the OS is installed, update the time and date.
  - c. Update the Emulex drivers with KGPSA adapter device driver (the instructions are described in “Installing the KGPSA Adapter Device Driver” in this chapter).
7. Install StorageWorks Command Console using the Windows 2000 Datacenter Solution Storage CD.

## Installing the KGPSA Adapter Device Driver

To install the KGPSA adapter device driver, follow these steps:

---

**IMPORTANT:** The KGPSA Adapter Device Driver must be installed as the first step in preparing you servers. Otherwise, improper KGPSA driver registry settings will result.

---

1. Insert the Windows 2000 Datacenter Solution Storage CD-ROM into the CD-ROM drive. The Raid Array Solution Storage installation dialog box will open, but do not install the solution software at this time. Select *Exit* to close this dialog.
2. From the Windows 2000 Start Menu, select *Settings*, then open *Control Panel*.
3. From *Administrative Tools*, select *Computer Management*, then open *Device Manager*.
4. Select *SCSI and RAID controllers* to select the driver type. Select *Emulex 8000, PCI-Fibre Channel Adapter*.
5. Open the *Properties* screen by right-clicking and selecting *Properties*. Select the *Driver* tab.
6. From the *Driver* screen, select the *Update Driver* button to begin the *Upgrade Device Driver Wizard*.
7. Select *Next*. From the second screen of the wizard, select *Display a list of the known drivers for this device so that I can choose a specific driver*.
8. In the third screen of the wizard, click on the *Have Disk* button. The *Install From Disk Box* will appear. Select *Browse*.
9. From *Browse*, select *CD-ROM*. Then, from the CD, open the *KGPSA* folder.
10. Select the *WIN2K* folder for OEM setup. Click *Open* and proceed through the remaining step instructions of the wizard to complete the driver installation.

**NOTE:** During installation an *Update Driver Warning* dialog box may appear. Select *Yes to Continue*.

After driver installation a dialog box will prompt to restart the computer. If there are more KGPSA adapters to install, do not restart. Repeat steps 3 through 9 to install the device driver on remaining adapters. After the last adapter is installed, restart the computer.

## Initial Setup Settings

It may be useful to be familiar with the following terms and definitions when making the necessary choices for initial setup.

## ***Terms and Definitions***

*SCSI* – Data transfer protocol used in computers and storage systems. SCSI-3 is a superset of SCSI-2. Both types are available in the RA8000/ESA12000 or MA8000/EMA12000 and its supported computers.

*CCL* – Command Console LUN, a “SCSI Logical Unit Number” virtual device used for communicating with Command Console Graphical User Interface (GUI) software.

*Failover* – The ability for HSG80 controllers to transfer control from one controller to another in the event of a controller failure. This ensures uninterrupted operation. Use Transparent Failover mode for single HBA server configurations. Use Multiple-bus mode for Secure Path based configurations.

*Fibre Channel* – Very high-speed data bus protocol and technology used to connect computer components. Fibre Channel technology is what connects the RA8000/ESA12000 or MA8000/EMA12000 to your server. Use Arbitrated Loop mode for hub configurations and Fabric mode for switches.

## ***Settings***

Your new storage system components must be initially configured using a serial cable connection to the HSG80 array controllers. You may change one or more of the following settings: SCSI-2 or SCSI-3 mode, CCL enabled or disabled, Transparent or Multiple-bus Failover mode, and Arbitrated Loop or Fabric mode.

The controllers are preset with the following settings:

- SCSI-2 mode
- CCL enabled
- Transparent Failover mode
- Arbitrated Loop mode (fixed addresses)

You can use either SCSI-2 or SCSI-3 mode with the ACS 8.5 version of HSG80 controller software. However, if you intend to use your storage system in a heterogeneous system environment, a specific SCSI mode may be needed depending on the requirements for the other, connected operating systems. If you use the preset SCSI-2 mode, then you must change CCL to the disabled state. Instructions for making these changes are in Chapter 2 of this book titled, “Installing SWCC Client and Creating Your First Virtual Disk.”

The KGPSA adapter driver installs by default to FC Loop mode and must be changed to FC Fabric mode for Windows 2000 Datacenter switched fabric configurations. This change to fabric mode is performed automatically by the Fibre Channel Setup Software installation.

If you plan to install Secure Path software, then you must select Multiple-bus mode in both of your HSG80 controllers. Instructions are available in the Secure Path Version 3.1A software kit or if you have Secure Path Version 3.1 installed, download Secure Path Version 3.1A located on the Compaq website at

<http://www5.compaq.com/products/sanworks/secure-path/downloads.html>

The Secure Path 3.1A software checks for the existing version of Secure Path.

## Run the Fibre Channel Software Setup Program

Two paths exist for Fibre Channel Software setup depending on the number of KGPSA host bus adapters in the system.

### Fibre Channel Software Setup for Single Path Configurations

The Fibre Channel Software and RAID Windows 2000 Device Driver (HSXDISK.SYS) software installs on your host server from the Windows 2000 Datacenter Solution Storage CD-ROM. After you insert the CD-ROM, the program should start automatically.

**NOTE:** If the program does not start automatically after inserting the CD-ROM, go to the CD-ROM drive directory and click on install.bat in the root directory.

1. Insert the Windows 2000 Datacenter Solution Storage CD-ROM and select Solution Software for ACS version 8.5.
2. Select Transparent Mode FC Software and follow the installation wizard steps to complete the installation.
3. After installation completes, restart the server.

### Fibre Channel Software Setup for Multiple-path Configurations and Secure Path Software Installation

1. Insert the Windows 2000 Datacenter Solution Storage CD-ROM and select Solution Software for ACS version 8.5.

2. Select Multiple Path Mode FC Software and follow the installation wizard steps to complete the installation.
3. Insert the Secure Path version 3.1A CD-ROM. If you already have Secure Path Version 3.1 installed, download Secure Path Version 3.1A from the Compaq website at [www5.compaq.com/products/sanworks/secure-path/downloads.html](http://www5.compaq.com/products/sanworks/secure-path/downloads.html)

The Secure Path 3.1A software checks for the existing version of Secure Path.

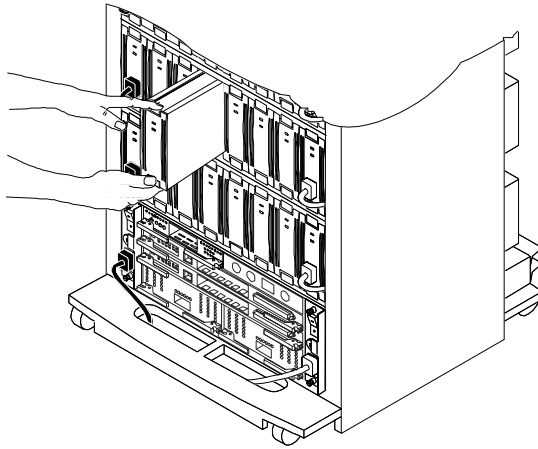
### **Extended Configuration Setting**

The Extended Configuration option is set by default by the Solution Storage setup software for Windows 2000 Datacenter servers. This setting must be set on all other Windows NT and Windows 2000 servers accessing the same HSG80 host ports. Selecting this option will adjust registry settings for your KGPSA host bus adapter to operate in an Extended Configuration environment.

## Install the SBBs in the RA8000/ESA12000 Storage System Cabinet

Perform the following steps to install the Storage Building Blocks (SBBs) into the storage cabinet and refer to Figure 1-1.

1. Insert an SBB into the shelf guide slots and slide the SBB into the shelf until the mounting tabs snap into place.
2. For optimum SCSI bus distribution, install the SBBs from left-to-right and from bottom-to-top.



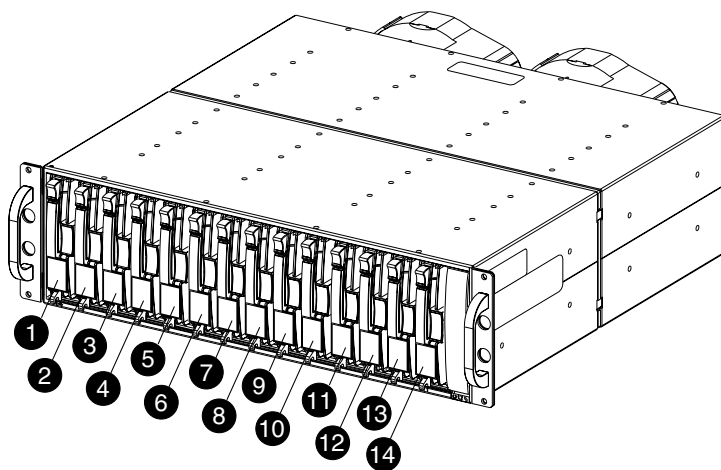
SHR-1542

Figure 1-1 Installing SSBs into Storage System Cabinet

## Install Disks in the Model 4200 Family Disk Enclosure for the MA8000/EMA12000 Storage System

To install disks into Model 4200 family disk enclosure insert a disk into the enclosure guide slots and slide the disk into the shelf until the mounting tabs snap into place. This task is illustrated in Figure 1-2:

**NOTE:** Only 12 disks are supported in the single-bus Model 4214 disk enclosure.



CX07219A

Figure 1-2 Model 4200 Family Disk Enclosure



Bay number and SCSI IDs are represented in the following tables for Model 4214 (Table 1-1) and model 4254 (Table 1-2).

**Table 1-1: Model 4214 Disk Enclosure (Single Bus)**

<b>Bay</b>	1	2	3	4	5	6	7	8	9	10	11	12	13	14
<b>SCSI ID</b>	00	01	02	03	04	05	08	09	10	11	12	13	14	15

**Table 1-2: Model 4254 Disk Enclosure (Dual Bus)**

<b>Bay</b>	1	2	3	4	5	6	7	8	9	10	11	12	13	14
<b>SCSI ID</b>	SCSI Bus A							SCSI Bus B						
	00	01	02	03	04	05	08	00	01	02	03	04	05	08

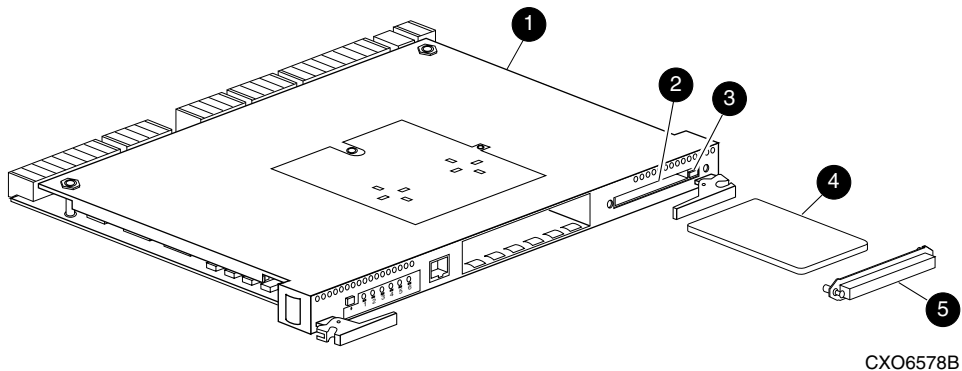
## Install the PCMCIA Card into the HSG80 Controller

Install the PCMCIA card into the HSG80 controller as follows and refer to Figure 1-3.

1. Remove the ESD cover from the controller PCMCIA slot.
2. Insert the PCMCIA card in the controller PCMCIA slot.
3. Replace the ESD cover over the controller PCMCIA slot.
4. Repeat the procedure for a second controller.



**CAUTION:** If you bump against the SCSI ID selector switch above the top controller, you can change the switch setting by mistake. Check the setting before you go on and reset the switch if necessary; the switch should be set on 0 for the first cabinet, 2 for the second cabinet, and 3 for the third cabinet.



CXO6578B

Figure 1-3 Install PCMCIA Card into HSG80 Controller

- |   |                              |   |                       |
|---|------------------------------|---|-----------------------|
| ① | Controller                   | ② | Program Card Slot     |
| ③ | Program Card Ejection Button | ④ | Program (PCMCIA) Card |
| ⑤ | Program Card ESD Cover       |   |                       |

## Install the Fibre Channel Adapter in the Host

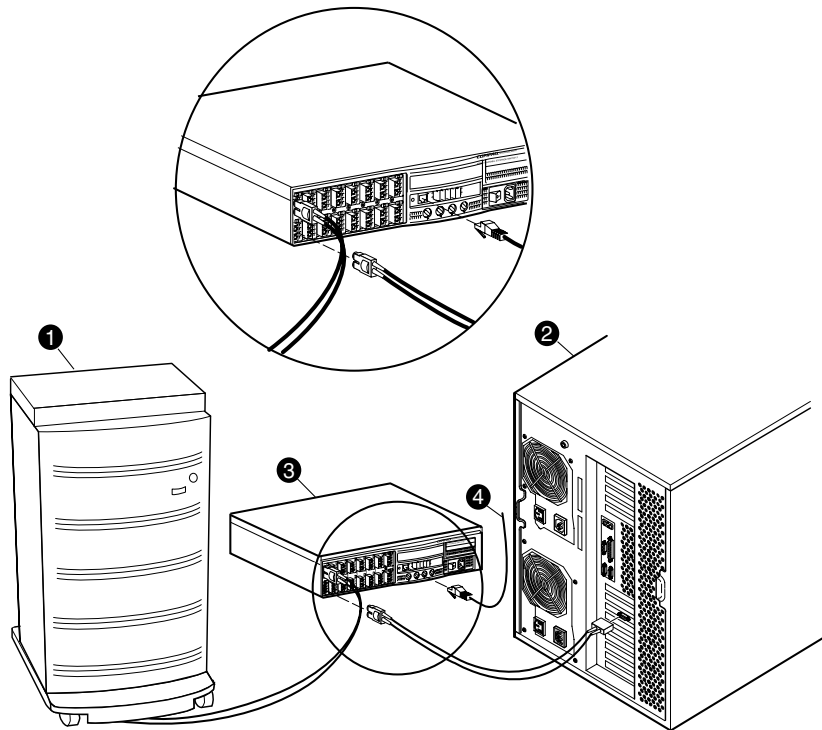
Install the adapter according to instructions provided with the adapter and the host.

## Connect the Fibre Channel Adapter to the HSG80 Controller

Connect the Fibre Channel Adapter to the HSG80 controller as follows and refer to

**NOTE:** Figure 1-4 shows a switch configuration. A hub configuration is similar.

1. Install a GBIC-SW module in each switch or hub port you are using.
2. Connect a fiber optic cable from the RAID system controller to a switch or hub port.
3. Connect a fiber optic cable from the server's Fibre Channel adapter to a switch or hub port.
4. If you are using a switch, connect the Ethernet network to the switch RJ-45 connector.



SHR-1549

Figure 1-4 Connecting the Fibre Channel Adapter to the HSG80 Controller (using a switch and the RA8000)

- |                  |                    |
|------------------|--------------------|
| ❶ RAID System    | ❷ Server           |
| ❸ GBIC-SW Module | ❹ Ethernet Network |



# Chapter 2

## Installing SWCC Client and Creating Your First Virtual Disk

This chapter contains instructions for installing StorageWorks Command Console (SWCC) Client, a Graphical User Interface (GUI), configuring the HSG80 array controller for Windows 2000 operation, and creating your first virtual disk.

**NOTE:** For more information, use the online HELP in the SWCC Storage and CLI Windows.

### Introduction

This chapter provides the instructions required to accomplish the following tasks:

- Install the HSG80 StorageWorks Command Console (SWCC) software.
- Launch Command Console Client.
- Establish communications with the HSG80 controller over the serial port.
- Configure the HSG80 controller for Windows 2000 operation.
- Create your first virtual disk.

### Connection Methods

There are three connection methods for SWCC:

- Serial
- SCSI
- Network

You will need to use serial for your initial setup to define how your server and storage system interact. The HSG80 controller comes with a setting of SCSI-2 and with CCL enabled. The HSG80 storage controller can then communicate using SCSI-2 protocols and its Command Console LUN feature is enabled. With the newest ACS V8.5 version of the controller's software, SCSI-3 protocol is also supported. If you choose to use SCSI-3, then CCL is permanently enabled.

**NOTE:** If you choose SCSI-2 with CCL enabled, you will get Disk Administrator errors. Therefore, at initial setup, you will need to either:

- Leave the controller set to SCSI-2 protocol but disable CCL
- or Set the controller to SCSI-3 protocol.

Your choice will depend on how you later intend to use your storage system. In certain heterogeneous environments, you may be required to use SCSI-3 protocols (for example, if sharing your storage system with an Open VMS-based server). You may choose to use SCSI-2 protocol if you are sharing your storage system with a server that requires SCSI-2 protocols. In this case, whether CCL is required may become an issue. You can get up-to-date information about configuration rules from application notes that are available at Compaq's support website at

[www.compaq.com/storageworks](http://www.compaq.com/storageworks)

**NOTE:** If you disable CCL under SCSI-2 or if you enable CCL under SCSI-3, an initial serial line connection to your HSG80 controller is required.

## **Serial Port Connection**

This method is required to setup your controller and create your first virtual disk. This chapter shows you how to use the Command Line Interpreter (CLI) to disable CCL in SCSI-2. You will also use the CLI to create an initial virtual disk that enables subsequent SWCC communications using one of the other two methods. The serial port method provides a local, direct connection to your storage array.

**NOTE:** The rest of this chapter describes controller setup assuming SCSI-2 mode is selected and CCL is disabled.

## **Other Communication Methods**

After initial setup, you will be able to connect and communicate with your RA8000/ESA12000 or MA8000/EMA12000 Fibre Channel system over a network or the SCSI bus.

### ***SCSI Bus Connection***

You can communicate to connect to your RA8000/ESA12000 or MA8000/EMA12000 Fibre Channel system using a local connection method over the SCSI bus.

### ***Network Connection***

You can communicate with your RA8000/ESA12000 or MA8000/EMA12000 Fibre Channel system over a TCP/IP network. Refer to Chapter 5, "Communicating Over A Network" for details.

## **Installing StorageWorks Command Console Client**

Verify that you have SNMP service installed. Refer to Chapter 2 of the *Compaq StorageWorks Command Console V2.3 User Guide* document for further instructions.

The Command Console Client software installs on your host system from the Compaq Windows 2000 Datacenter Solution Storage CD-ROM. After you insert the CD-ROM, the program should start automatically.

**NOTE:** If the program does not start automatically after inserting the CD-ROM, go to the CD-ROM drive directory and click on install.bat.

The installation program provides one primary option:

- Solution Software for ACS version 8.5

Select it to install the software.

From the Fibre Channel Solution Software menu that appears, select *Install StorageWorks Command Console* option. The StorageWorks Command Console software automatically installs.

## **Launching Command Console Client**

To start Command Console from the Start Menu, click on the HSG80 Storage Window name (Figure 2-2).

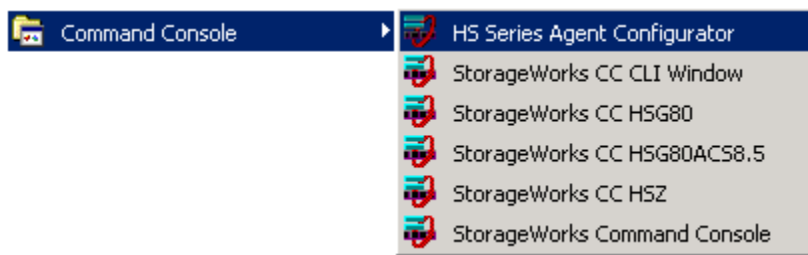


Figure 2-1 Command Console Client's Start Menu

The Client provides these choices at startup:

- **HS Series Agent Configurator:** Configure the HS-Series Agents. You will provide password, Client information, and storage subsystem information.
- **SWCC 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.
- **StorageWorks CC 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).
- **StorageWorks CC HSG80ACS8.5 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:** HSG80ACS85 window is used with RA8000/ESA12000 or MA8000/EMA12000 storage systems using ACS V8.5 software. Older ACS versions (8.3 or 8.4) require the HSG80 window.
- **StorageWorks CC HSZ:** Not used.
- **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 5, "Communicating Over a Network" for details.



### ***Disabling CCL***

Establish a CLI connection as described in Appendix A (see also Figure 2-2) of this guide. To invoke a CLI window from the Command Console Client's **START** menu, select Command Console, then the CLI Window option.

The Connection Selection Window (Figure 2-3) appears. Select Serial. At the next window, select 9600 baud rate and click Connect to invoke the CLI window. Type this command to disable the Communication LUN:

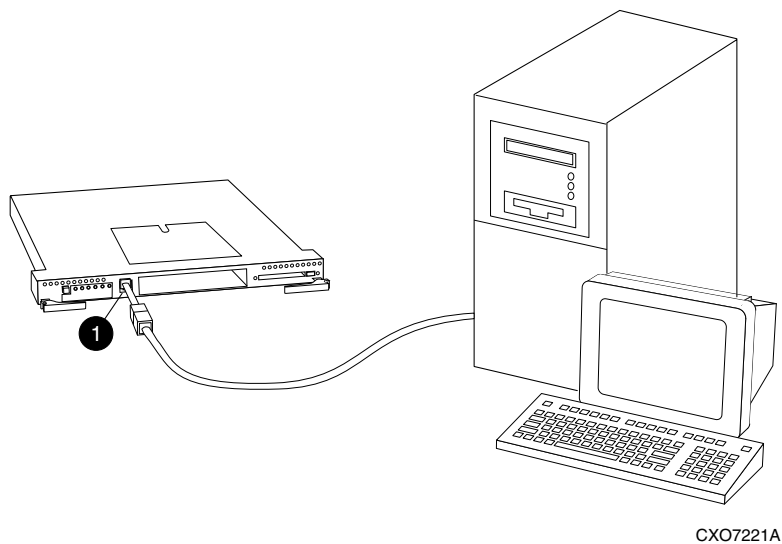
```
set this_controller nocommand_console_lun
```

Close the CLI Window.

## **Establishing a Serial Connection to the HSG80 Storage Window**

To setup your HSG80 controller and create your first virtual disk, establish a serial cable connection from one of the PC COM ports to the storage subsystem's CTR TOP or CTR BOTTOM configuration port, see Figure 2-2 (refer to *Appendix A*, the section titled, *Connecting the Cable*), and proceed as follows:

1. Click on the *Start* button on the taskbar.
2. Click on *Programs*.
3. Click on *Command Console*.
4. Click on *HSG80ACS85 Storage Window*.
5. When the Connection Selection dialog box displays, click the *Serial* radio button (Figure 2-3), then click *OK* to display the *Connect Serial* dialog box (Figure 2-4).



CXO7221A

Figure 2-2 Connecting a PC as a Maintenance Terminal, Example

- 1 Serial cable connection

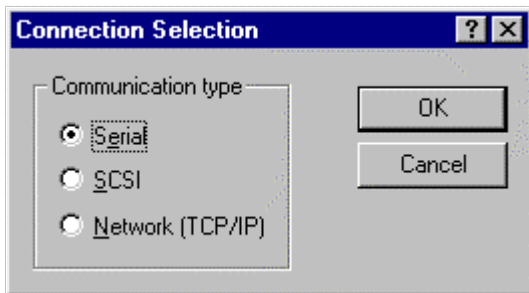


Figure 2-3 Connect Serial Dialog Box for Storage Window

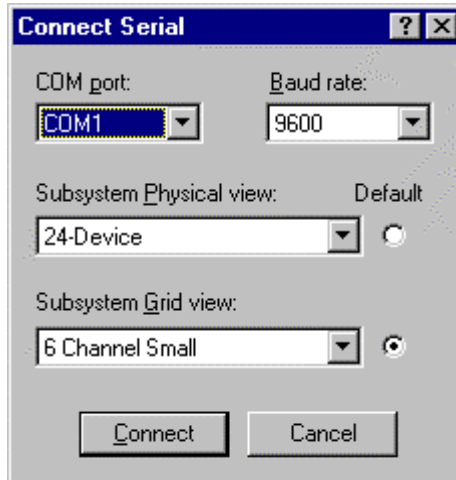


Figure 2-4 Connect Serial Dialog Box for Storage Window

6. On the *Connect Serial* dialog box, from the drop-down menu
  - a. select the PC COM port your HSG80 controller is connected to
  - b. then select the baud rate (controller default is 9600).
  - c. Click the *Connect* button to display the Storage Window (Figure 2-5). You are now connected to your storage subsystem. The next step is to configure the controller.

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

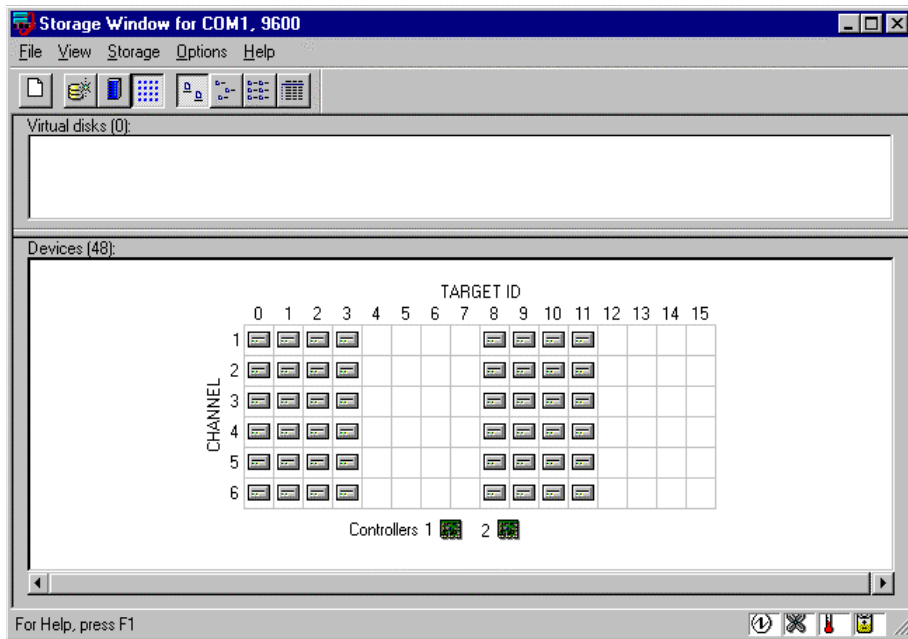


Figure 2-5 Storage Window

## Controller Properties

**NOTE:** This section discusses one method for setting controller properties. Controller properties can also be set using the CLI, as described in *Appendix A*.

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.

**NOTE:** After you change a parameter that causes a controller restart, an approximate 90-second delay occurs while the controller reinitializes.

1. Access the controller's property sheets by double-clicking the controllers' icon in the Storage Window. When you double-click on a controller's icon the *General* controller properties sheet displays (Figure-2-6). The controller has five property sheets. Each sheet is accessed by clicking on its tab.
2. Confirm the following:
  - Allocation class is 0
  - SCSI Version is SCSI-2
  - Set the date/time properties if desired.

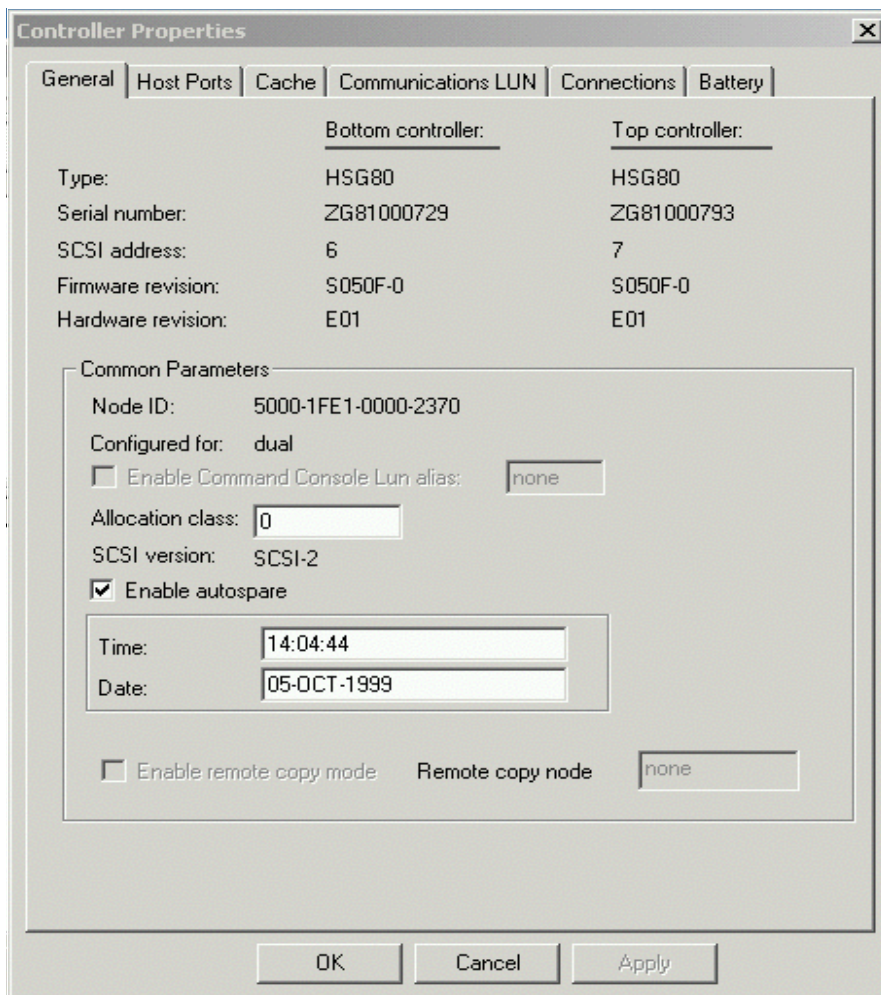


Figure 2-6 General Controller Properties Tab

- Click the *Host Ports* tab to display the host port operating parameters. For FC hub configurations, verify that the “Requested Topology” and “Actual Topology” settings appear as shown in Figure 2-7. Requested Topology should show LOOP\_HARD and Actual Topology for the Top Controller should show *Loop Up*. Actual Topology should show *standby* for the Bottom Controller.

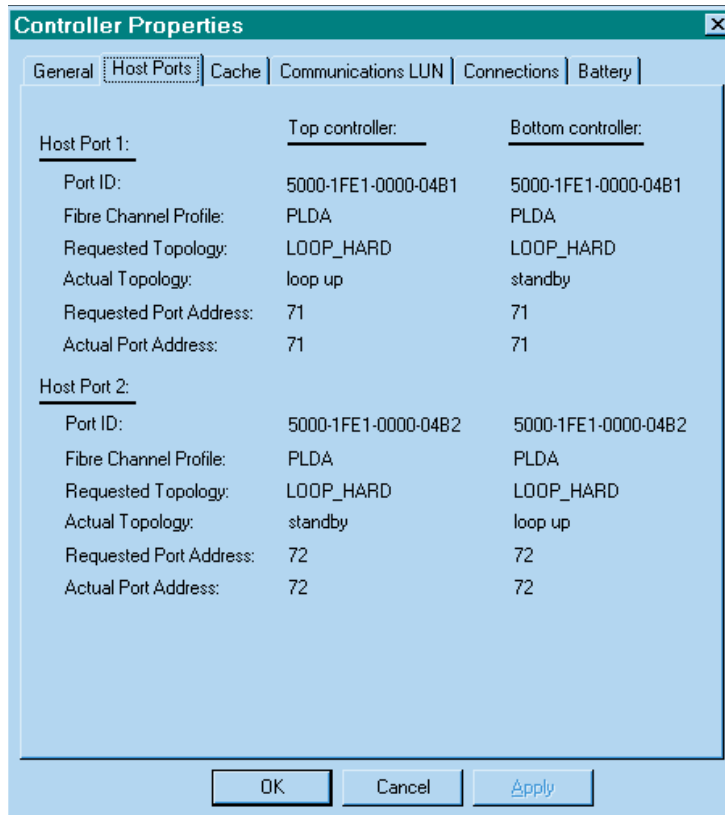


Figure 2-7 Host Ports Controller Properties tab, with FC Hub Topologies shown

For FC switch configurations, verify that the “Requested Topology” fields read FABRIC, and the “Actual Topology” field reads “fabric up.” (The “Requested Port” and “Actual Port” Address fields will not exist, and the words “REMOTE COPY = none” appears at the bottom of the window). For more details regarding host port settings, reference the *Compaq StorageWorks Command Console V2.3 User Guide*.

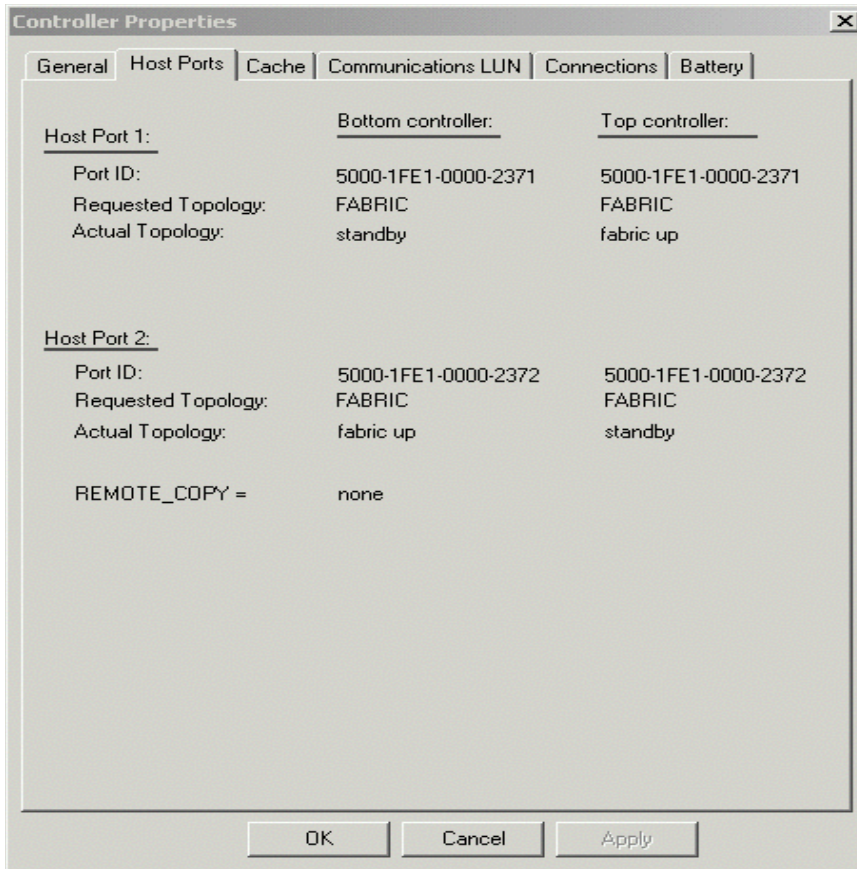


Figure 2-8 “Host Ports” controller properties tab, with Fibre Channel switch topologies shown



4. Click the *Cache* tab to check cache size (Figure 2-9).

Confirm the following:

- Cache flush\_time(seconds): 10.
- Respond to internal cache battery condition is selected.



Figure 2-9 Cache controller properties tab

5. Click the *Communications LUN* tab (Figure 2-10).

The Communications LUN is not used with Windows 2000 in SCSI-2 mode. It should be disabled (grayed out). If the Communications LUN is enabled, you must disable it using the CLI window.

- a. First close the Storage Window, and establish a CLI connection as described in Appendix A.
- b. To invoke a CLI window from the Command Console Client's **START** menu, select Command Console, then the CLI Window option.
- c. The Connection Selection Window (Figure 2-3) appears. Select Serial.
- d. At the next window select 9600 baud rate and click Connect to invoke the CLI window.
- e. Type this command to disable the Communication LUN:  
`set this_controller nocommand_console_lun`

Close the CLI Window. Return to the Windows Start Menu and select the *HSG80 Storage Window* option to re-open the storage window.

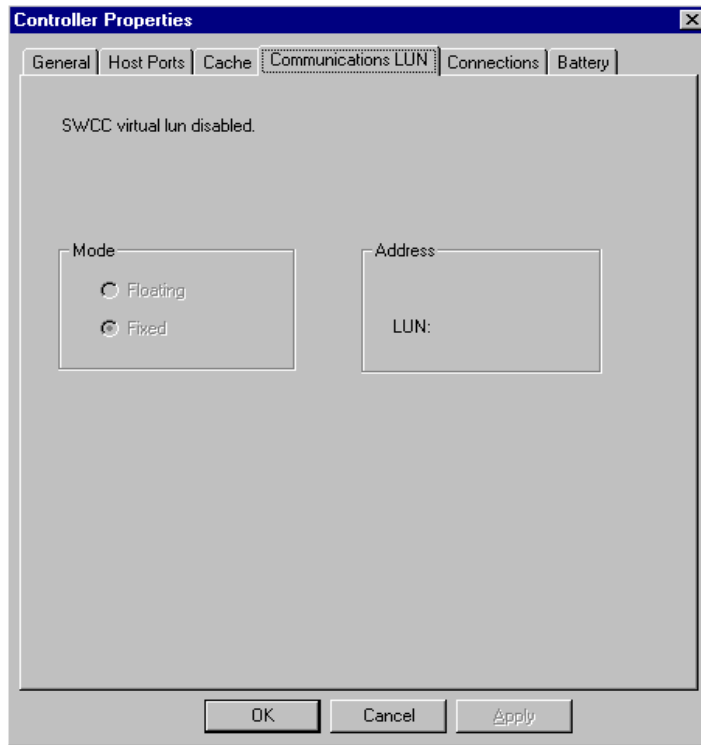


Figure 2-10 Communications LUN controller properties tab

6. Click the *Connections* tab (Figure 2-11).

Confirm the following:

- WINNT is selected
- Unit Offset should be between 0-99 for Host Port 1, and between 100-199 for Host Port 2 (if connected)

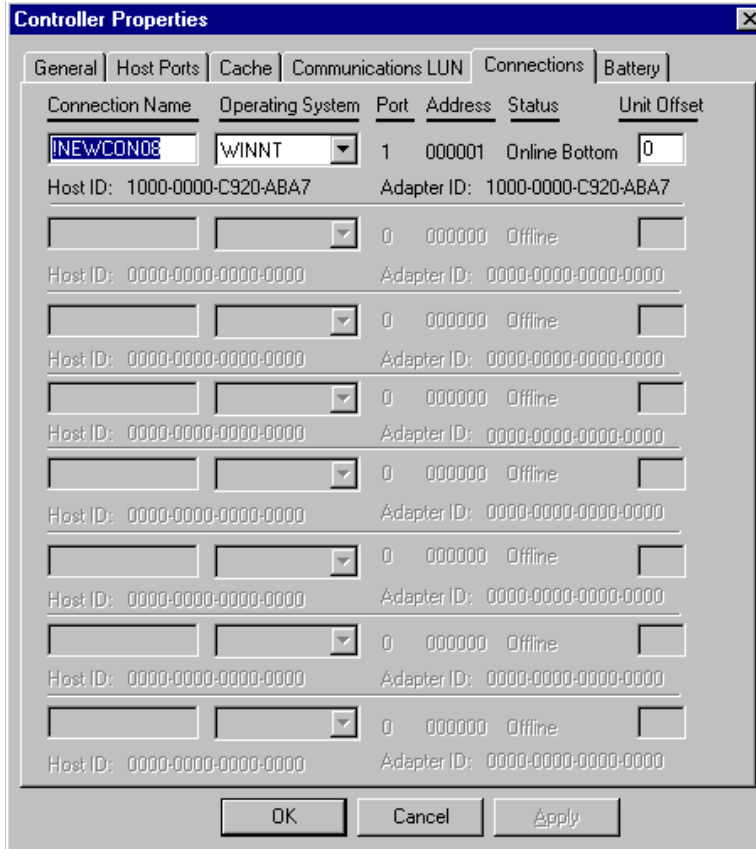


Figure 2-11 Connections controller properties tab

7. Click the *Battery* tab (Figure 2-12).

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

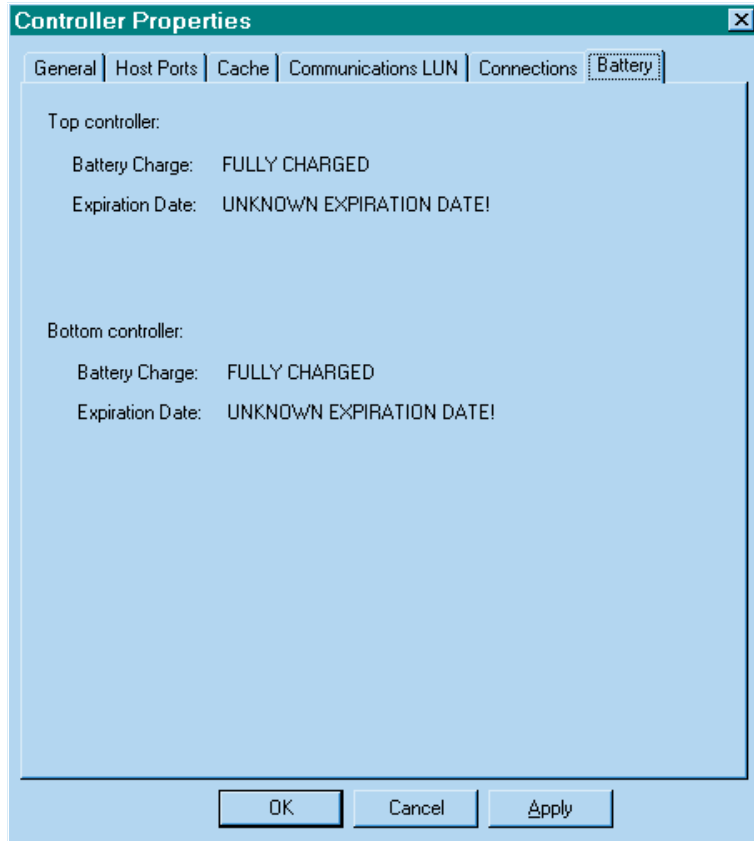


Figure 2-12 Battery controller properties tab

## Creating Your First Virtual Disk

Command Console can create a number of different types of logical storage units called virtual disks on your RA8000/ESA12000 or MA8000/EMA12000 Fibre Channel Subsystem. You can create:

- Single-device virtual disks (JBODs).

- Striped virtual disks (RAID 0).
- Mirrored virtual disks (RAID 1).
- Striped mirrored virtual disks (RAID 0+1).
- Striped parity virtual disks with floating parity disk (RAID 3/5).

Virtual disks are created using Command Console Virtual Disk Wizard.

### Start the Wizard

After you have established a serial connection to your RA8000/ESA12000 or MA8000/EMA12000 Fibre Channel Subsystem and have accessed the subsystem's Storage Window, Select *Add Virtual Disk* from the Storage menu to start the Virtual Disk Wizard.



Figure 2-13 Storage Menu

Create the Virtual Disk:

1. Click the radio button of the RAID level you want, then click *Next*.

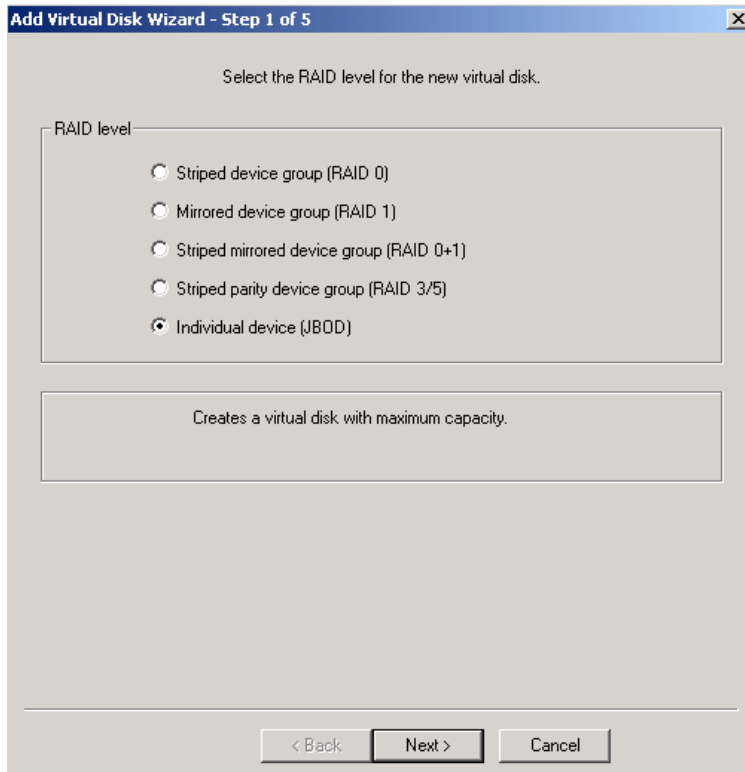


Figure 2-14 Add Virtual Disk Wizard—Step 1 of 5

2. Select the devices you want to include in the virtual disk from a list of available storage devices. You select devices by clicking on them in the *Available Storage* window in the dialog box. As you click them, they are listed in the *Selected devices:* windowpane.

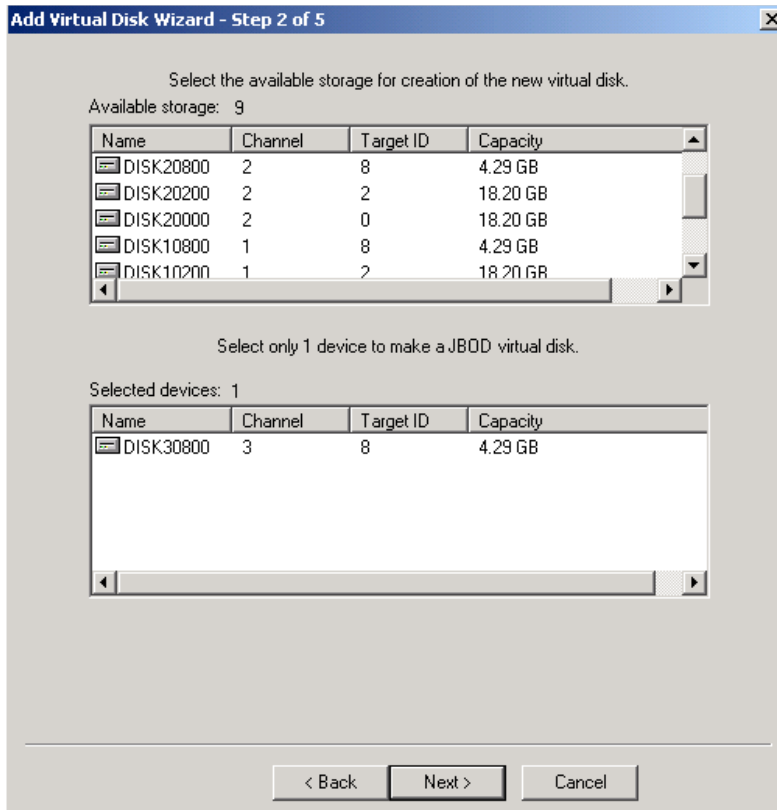


Figure 2-15 Add Virtual Disk Wizard—Step 2 of 5

3. Select the capacity for the virtual disk, then click *Next*. The wizard offers you the option of using only a portion of the capacity of the devices you have selected for your new virtual disk. It displays the total, available capacity of the devices you have selected in the capacity box.
  - a. Enter the size of the virtual disk you want to create in the box, then click *Next*. If you want to create multiple partitions, complete all steps for this partition.
  - b. Access the wizard again, and enter the same choices to create another partitioned disk. When finished, click *Next*.



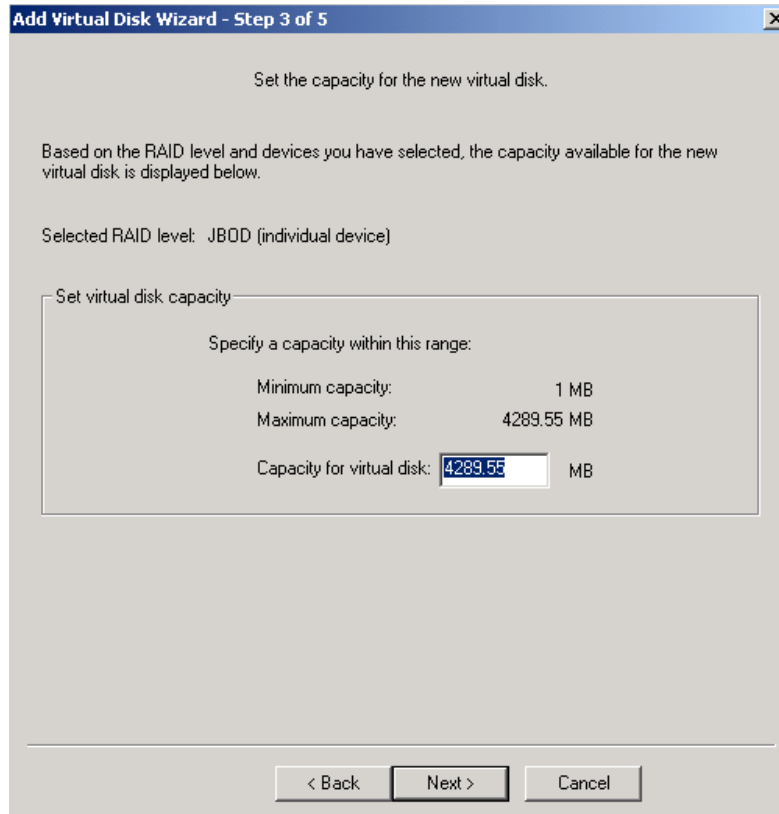


Figure 2-16 Add Virtual Disk Wizard—Step 3 of 5

4. Enter the virtual disk name (Windows 2000 recognizes D0 to D7 on Host Port 1 and D100 to D107 on Host Port 2). Enter the maximum cache transfer blocks, then click *Next*. Host Access controllers which servers are allowed to access your storage system's virtual disk as shown in Figure 2-17.

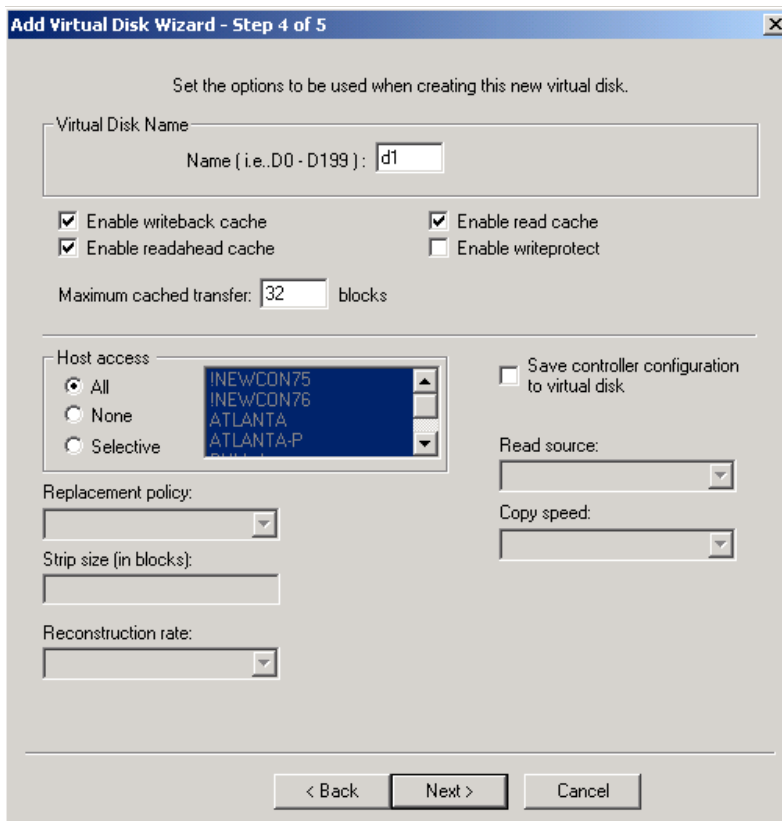


Figure 2-17 Add Virtual Disk Wizard—Step 4 of 5

5. The final Virtual Disk Wizard window shown in Figure 2-18 recaps the choices you have made in Steps 1 through 4. If you are satisfied with your choices, click *Finish*.

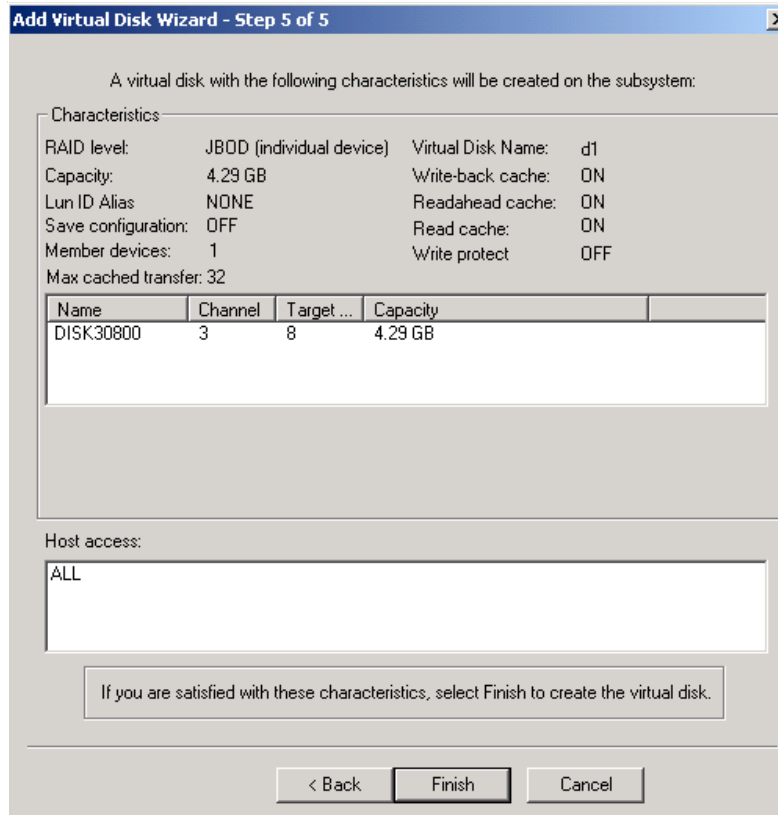


Figure 2-18 Add Virtual Disk Wizard — Step 5 of 5

When you click *Finish*, the storage set will start initialization.

You can view the virtual disk(s) you have created by returning to the Storage Window (refer back to Section “Establishing a Serial Connection to the HSG80 Storage Window” if you need help). Figure 2-19 illustrates what the Virtual Disk Window in the Storage Window looks like.

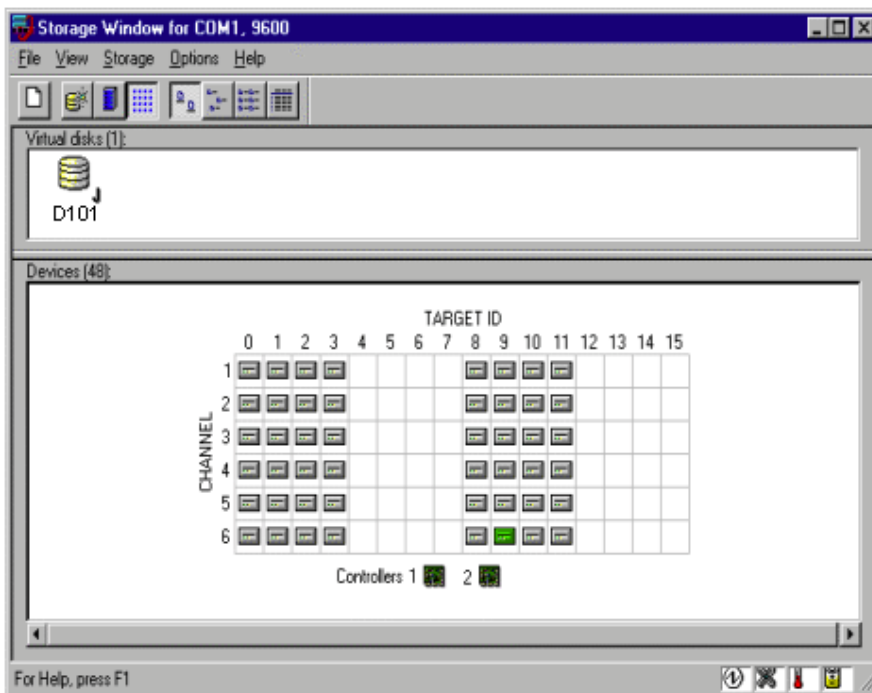


Figure 2-19 Storage Window Virtual Disk Window

**NOTE:** For more information, use the online help in the SWCC Storage and CLI Windows.

## Installing the StorageWorks Command Console for the Fibre Channel Switch

This chapter contains instructions for installing StorageWorks Fibre Channel Switch software (Client and Agent) required to monitor and manage the Fibre Channel switch in a Windows 2000 environment. This chapter is not applicable to Fibre Channel hub installation.

### Initial Fibre Channel Switch Configuration

Prior to installing the StorageWorks Client and Agent support software for the Fibre Channel switch, you must properly configure the following elements of the Fibre Channel switch:

- Ethernet IP Address
- Ethernet Subnetmask
- Fibre Channel IP Address
- Fibre Channel Subnetmask
- Gateway Address
- Domain

Switch configuration is accomplished through the switch's Configuration Menu, accessed through its front panel (or Telnet connection). Reference the *Compaq Fabric Operating System Installation Guide* supplied with your Fibre Channel switch, for procedures to establish the proper configuration settings before proceeding.

**NOTE:** After configuring the switch from the front panel or Telnet connection, you must reset the switch to implement changes.

## Installing the Fibre Channel Switch Client

This section contains instructions on how to install the Fibre Channel Switch Client on Windows 2000 for network access to the Fibre Channel Switch Agent. The Fibre Channel Switch Client, that provides the Fibre Channel Fabric window, renders a graphical interface for your Fibre Channel Switch Agent. The Fibre Channel Switch Client provides the Fabric window, which displays the status of your switches. A fabric is a collection of switches, bridges, and hubs but only switches are addressed in this chapter.

---

**IMPORTANT:** Before you install the Fibre Channel Switch Client, do the following:

- Verify that you have installed Command Console Client version 2.3. The Client software packages must be on the same Client system. You can determine a Client's version by selecting *Help>About* in its window
  - Read the fswitch.txt file for more information on the installation.
  - Exit the Command Console Client before you install the Fibre Channel Switch Client. This will allow the command Console Client to recognize the new Client.
  - Verify that you have installed one of the following browsers (minimum versions shown): Netscape navigator version 4.0, Internet Explorer version 4.0, or HotJava version 1.1. Your Fibre Channel Switch Client will use one of these browsers to display the status of your switch.
- 

### Fibre Channel Switch Client Installation

To install the Fibre Channel Switch Client, perform the following steps:

1. Place the *Compaq StorageWorks Fibre Channel Switch* CD, packaged with your Fibre Channel Switch, into the CD-ROM drive.
2. Run *File Manager* or *Windows Explorer*.
3. Navigate to the folder:  
DRIVE\_LETTER:\SWCC\NTINTEL\Client
4. Double-click on *Setup*.
5. Click *N*ext to continue. The Command Console License Agreement window appears.

6. Click *N*ext to continue. The software may display a message saying that it has found Command Console and that it will now install the Fabric window into the Command Console directory structure.
7. Click *O*K. The Fibre Channel Switch Client installs into the directory in which the Command Console Client is located. In most cases, the Fibre Channel Switch Client will be installed into the following directory:  
`C:\PROGRAM FILES\SWCC\FibreWindow`
8. Start the asynchronous event service (AES).

AES must be running for the Fabric window to function properly. AES allows users to see traps and refreshes to the Fabric window (for example, to show that a switch has been added). AES starts when your system is started.

### **Windows 2000**

To stop or restart AES, click the *S*ervices icon located under the Control Panel. “*A*syncEventSvc” is the entry for AES in the Services window. AES is one of several services that you can start, stop, pause, and continue under the *S*ervices icon.

### **Removing the Fibre Channel Switch Client from Windows 2000**

When you remove the Fibre Channel Switch Client, you will remove the Fabric window. The Command Console Client will still be on your computer. Use the following procedure to remove the Fibre Channel Switch Client on Windows 2000.

1. Click *S*ettings under the *S*tart menu, then click *C*ontrol Panel.
2. Double-click the *A*dd/Remove Programs icon in the Control Panel. The Add/Remove Program Properties window appears.
3. Highlight *S*torageWorksFibreApplet located in the window, and then click *A*dd/Remove. The computer removes the Fibre Channel Switch Client.

## **Installing the Fibre Channel Switch Agent**

This section contains instructions for installing the Fibre Channel Switch Agent on Windows 2000. Whenever you install the Fibre Channel Switch Client to operate over a network, you must install the Fibre Channel Switch Agent. The Agent is responsible for establishing communication with the Client and its subsystems on the network.

Compaq recommends that you install the Fibre Channel Switch Agent on only one host system. You may install the Fibre Channel Switch Agent on multiple host systems if you intend to manage separate collections of Fibre Channel switches.

Instructions on how to install the Fibre Channel Switch Agent on the Windows 2000 operating system are separated into two sections in this chapter: “Beginning the Installation” and “Completing the Installation.” The first section tells you how to access the installation file from the CD-ROM. The second section describes how to configure your Agent during the installation.

---

**IMPORTANT:** Before you install the Fibre Channel Switch Agent, do the following:

- Read the *fcswitch.txt* file for more information on the installation
  - Verify that you are logged into an account that is a member of the administrator group. All Fibre Channel Switch Agent installations on Windows NT/Windows 2000 must be done locally. Do not attempt to install the Agent over the network
  - Verify that you have the SNMP service installed on your computer. If this service is not installed, the Fibre Channel Switch Agent will be unable to monitor your Fibre Channel switches. The SNMP service is available on your Windows 2000 installation CD-ROM. To check, double-click *Services* in *Start|Settings|Control Panel*.
- 

## Beginning the Fibre Channel Switch Agent Installation

To install the Fibre Channel Switch Agent, perform the following steps:

1. Place the Compaq StorageWorks Fibre Channel Switch CD, (packaged with your Fibre Channel Switch), into the CD-ROM drive.
2. Run File Manager or Windows Explorer.
3. Navigate to the folder:  
drive\_letter:\SWCC\NTInte\client
4. Double click on *Setup*.

## Completing the Fibre Channel Switch Agent Installation

1. Click *Next* to continue. The Command Console License Agreement window appears.
2. Click *Next* to continue. The Command Console Setup window appears.
3. Select the destination directory for the Agent software, then click *Next*. The default is the following: C:\Program Files\swcc\FibreAgent\



The Folder Selection window appears.

4. Type a name for the folder, then click *Next*. The default filename is StorageWorksFibreAgent. This name will appear in the Add/Remove Program Properties window.

The software will check for configuration files in the directory that you specified to install the Agent. You will not have these files if you are installing the Agent for the first time. The software will do one of the following:

- If any of the configuration files are missing, the Fibre Agent Configuration Utility appears. Go to Step 5.
- If all three configuration files are found, the program will tell you where it found the configuration files. To change the configuration, run the Fibre Agent Configuration Utility after the installation. Click OK. The program finishes the installation and starts the Agent. The following steps do not apply because the software has been installed and the Agent has a previous configuration.

5. Click *Next* to configure your Agent. The Agent Setting window appears.
6. Type an interval to poll each element in the fabric. The default is 5 minutes; however, you can enter an interval from 1 to 60 minutes.
7. Click *Next*. The Client List window appears.
8. Type the Client's name and monitor mode: TCP/IP and/or SNMP or none. The notification scheme defines the network method that the Agent will use when notifying the selected Client of a change in the state in a subsystem, which is comprised of switches. You can select one, both, or none of the notification options. Table 3-1 lists the definitions of the notification schemes:

**Table 3-1: Notification Scheme Definitions**

Notification Scheme	Function
Transmission Control Protocol/Internet Protocol (TCP/IP)	TCP/IP is the Client's notification scheme. If you do not select TCP/IP, the Client will only display a subsystem change when you refresh the Fabric window.
Simple Network Management Protocol (SNMP)	Must have an SNMP-compatible monitoring program (ServerWORKS, for example) running on the Client's system.

9. Click *Add* to add the Client.
10. Click *Finish* if satisfied or *Back* for changes. The program prompts you with the message:  

Changes have been made to the Fibre Agent Configuration. The Agent is not currently running. Start the Agent now?
11. Click *Yes* to run Agent. The Agent is started and the program finishes loading.

## Removing the Fibre Channel Switch Agent from Windows 2000

The following instructions tell you how to remove the Agent:

1. Click *S*ettings under the *S*tart menu, then click *C*ontrol Panel. Double-click *S*ervices, and select *SWCC Fibre Agent*.
2. Click *S*top to stop the Agent.
3. Click the *Add/Remove Programs* icon in the Control Panel. The *Add/Remove Program Properties* window appears.
4. Select *StorageWork FibreAgent* located in the window, and click *A*dd/*R*emove. The following question appears:  

Are you sure you want to completely remove the selected application and all of its components?
5. Click *Yes*. The Agent is removed.
6. To remove the configuration, Client list, and the parameter files, change to the C:\PROGRAM FILES\SWCC\FibreAgent directory and delete the files listed in the following table. These files may be in a different directory if you did not install the Agent in C:\PROGRAM FILES\SWCC\. If you delete these files, you will need to reconfigure the Agent during reinstallation.



**CAUTION:** Other Agents use the *client.ini* and *Storage.ini* file names, but their files are in different directories. If you cannot locate the files for the Fibre Channel Switch Agent, use the Find command in Windows Explorer to find the *FibreAgent.cfg* file. The *Storage.INI* file is located in the directory referenced by the second line in the *FibreAgent.cfg* file.

---

**Table 3-2: SWCC Fibre Channel Agent Configuration Window**

File Name	File Type
<i>FibreAgent.cfg</i>	Configuration File
<i>Client.ini</i>	Client List File
<i>Storage.ini</i>	Parameter File

## Configuring the Fibre Channel Switch Agent on Windows 2000

This section contains instructions on how to configure the Fibre Channel Switch Agent on Windows 2000. You configure the Fibre Channel Switch Agent by using the Fibre Agent Configuration program. Topics in this section include:

- Client Notification Options
- Adding a Client System Entry
- Modifying a Client System Entry
- Deleting a Client System Entry
- Changing the Polling Interval
- Starting and Stopping the Agent

### Client Notification Options

The notification scheme defines the network method that the Agent will use when notifying the selected Client of a change in the state in a subsystem, which is comprised of Fibre Channel Switches. You can select one, both, or none of the notification options. Table 3-3 lists the definitions of the notification schemes:

**Table 3-3: Notification Scheme Definitions**

Notification Scheme	Function
Transmission Control Protocol/Internet Protocol (TCP/IP)	TCP/IP is the Client's notification scheme. If you do not select TCP/IP, the Client will only display a subsystem change when you refresh the Fabric window.
Simple Network Management Protocol (SNMP)	Must have an SNMP-compatible monitoring program (ServerWORKS, for example) running on the Client's system.

### Adding a Client System Entry

To add a Client system entry, follow these instructions:

1. Select the Fibre Agent Configure entry in *Start\Programs\StorageWorks*, as shown in Figure 3-1.

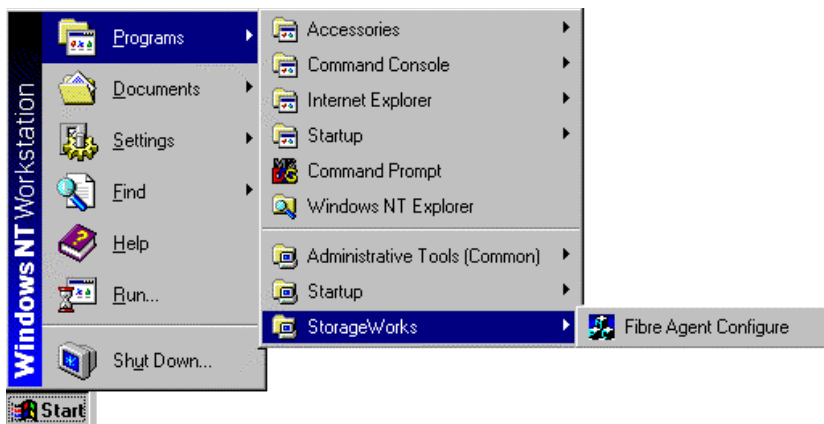


Figure 3-1 Launching the Fibre Channel Agent Configuration Utility

2. When the StorageWorks Command Console Fibre Agent Configuration window appears, click on the *Clients* tab as shown in Figure 3-2.

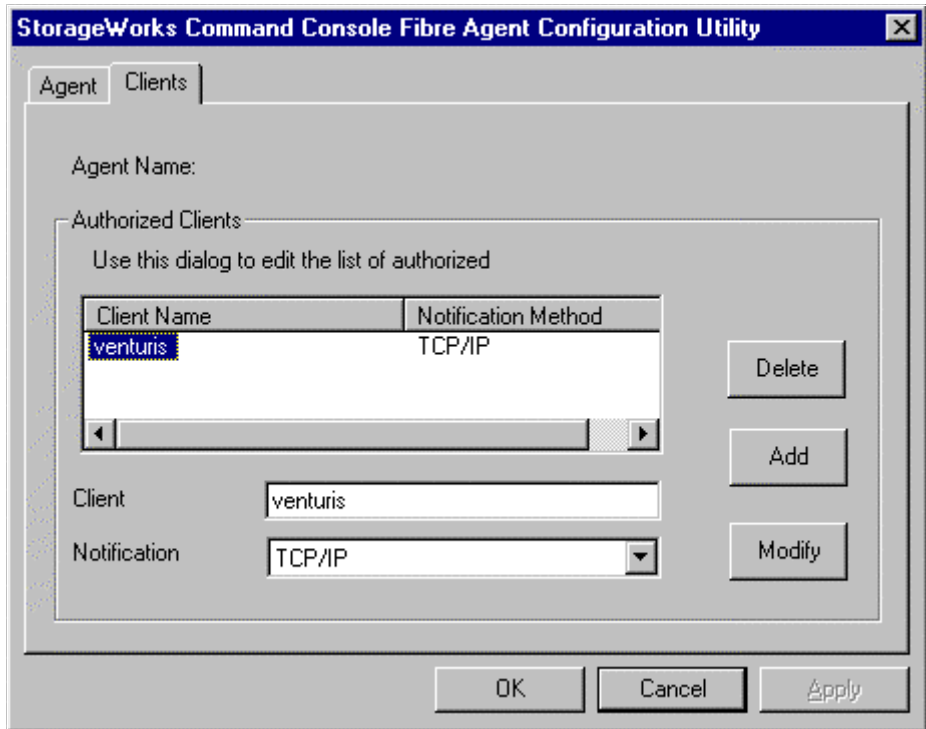


Figure 3-2 SWCC Fibre Channel Agent Configuration Window - *Clients* tab selected

3. Type the Client's name in the window named *Client*.
4. Select the *Notification Scheme*: TCP/IP and/or SNMP or none.  
For a definition of the notification schemes, please read the section "Client Notification Options," located in this chapter.
5. Click Add to add the Client system entry to the Client list.
6. Click OK or Apply to confirm your addition. If you click OK, you will leave the configuration program after you are asked to restart the Agent. If you click Apply, you will stay in the configuration program after you are asked to restart the Agent.
7. The software asks if you want to restart Click *Yes*. The Agent is restarted.

## Modifying a Client System Entry

This section contains instructions on how to modify a Client system entry on Windows 2000:

1. Click the Fibre Agent Configure entry in *Start|Programs|StorageWorks*. The StorageWorks Command Console Fibre Agent Configuration window appears.
2. Click the *Clients* tab. The Clients window appears.
3. Select the Client that you want to modify in the Client list.
4. Change the notification scheme: TCP/IP and/or SNMP or none.

For a definition of the notification schemes, please read the section, “Client Notification Options,” located in this chapter.

5. Click *Modify Client*.
6. Click *OK* or *Apply* to confirm your changes. If you click *OK*, you will leave the configuration program after you are asked to restart the Agent. If you click *Apply*, you will stay in the configuration program after you are asked to restart the Agent.
7. At the prompt asking you to restart the Agent, Click *Yes*. The Agent is restarted.

## Deleting a Client System Entry

This section contains instructions on how to delete a Client system entry on Windows 2000.

1. Click the Fibre Agent Configure entry in *Start|Programs|StorageWorks*. The StorageWorks Command Console Fibre Agent Configuration window appears.
2. Click the *Clients* tab. The Clients window appears.
3. Select the Client system entry to delete in the list.
4. Click *Delete Client*. The Client system entry is deleted.
5. Click *OK* or *Apply* to confirm your deletion. If you click *OK*, you will leave the configuration program after you are asked to restart the Agent. If you click *Apply*, you will stay in the configuration program after you are asked to restart the Agent.
6. At the prompt asking you to restart the Agent, Click *Yes*. The Agent is restarted.

## Changing the Polling Interval

This section contains instructions on how to change the polling interval of the Agent:

1. Click the Fibre Agent Configure entry in *Start|Programs|StorageWorks*. The StorageWorks Command Console Fibre Agent Configuration utility window appears (Figure 3-3).
2. Enter an interval for the agent to poll each element in the fabric. The default is 5 minutes; however, you can enter an interval from 1 to 60 minutes.
3. At the prompt asking you to restart the Agent, Click *Yes*. The Agent is restarted.

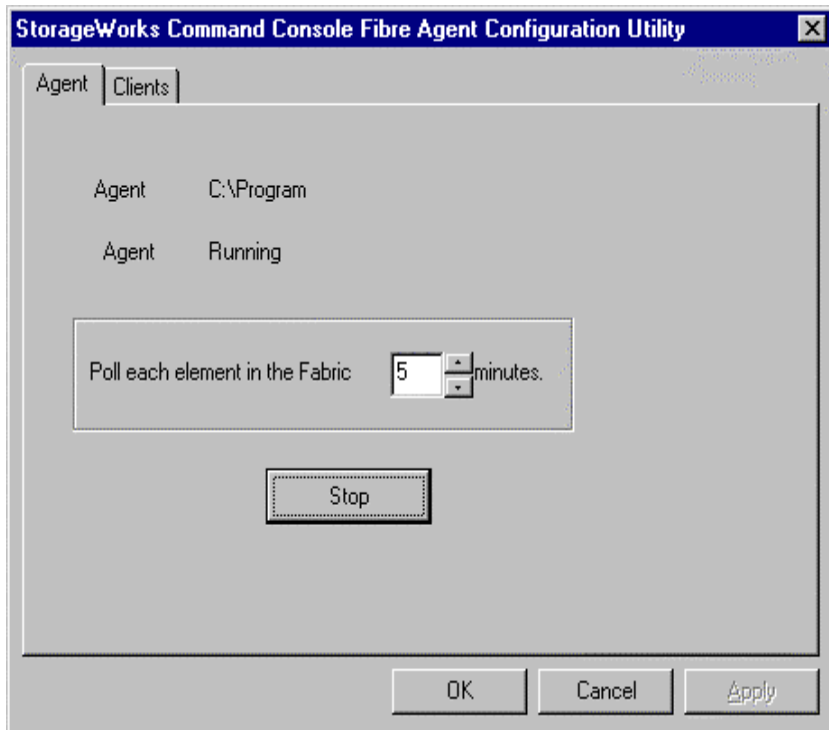


Figure 3-3 SWCC Fibre Channel Agent Configuration Window—*Agent* tab selected

## Stopping and Starting the Fibre Channel Switch Agent

This section contains instructions on how to stop and then start the Fibre Channel Switch Agent:

1. Click the Fibre Agent Configure entry in *Start|Programs|StorageWorks*. The StorageWorks Command Console Fibre Agent Configuration utility window appears (Figure 3-3).
2. Click the *Agent* tab. The agent window appears. You are given the Agent's location and its status.
3. Click *Stop Agent* to stop the Agent or click *Start Agent* to start the Agent.

## Connecting to the Fibre Channel Switch using the SWCC Client

1. From the **START** menu, select Command Console, then StorageWorks Command Console (Figure 3-4).

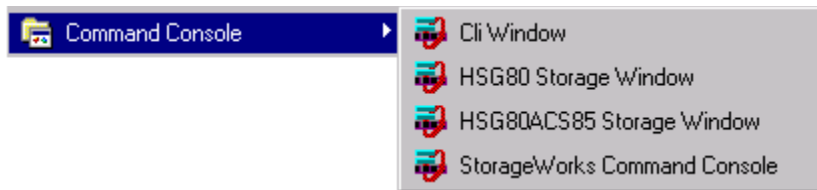


Figure 3-4 Launching the StorageWorks Command Console Navigation Window

2. At the Command Console Navigation Window, use the *File* pull-down menu to select the *Add System* option, as shown in Figure 3-5.





Figure 3-5 Selecting the *Add System* Option from the SWCC Navigation Window

3. In the Add System Window (Figure 3-6), enter the name or the TCP/IP address of the Client host system on which you are running the software, then click Apply.

**NOTE:** The Client host name or address entered here must be the same as the host name added to the agent, as described in the Section “Adding a Client System Entry.”

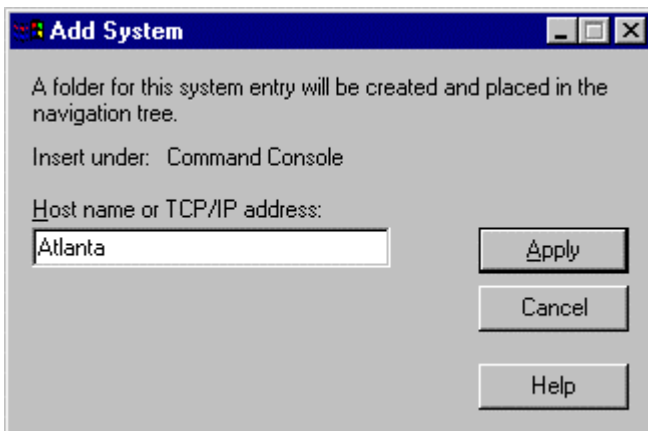


Figure 3-6 The *Add System* Window

The Client name (or TCP/IP address) entered appears as a folder in the Command Console Navigation Window, indicating that the client is communicating with the Agent across the network.

4. Click on the + icon next to the Client host system folder.

The Fibre Channel Network is displayed, along with the Fabric Window icon, as shown in Figure 3-7.

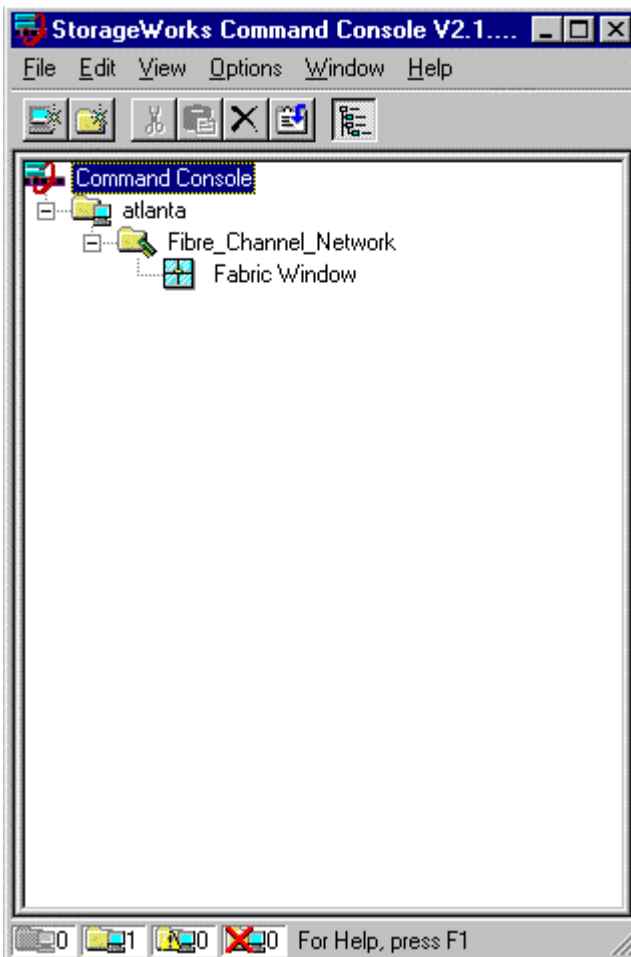


Figure 3-7 “Atlanta” client host added (folder open)

5. Double click on the Fabric Window icon to launch the Fibre Channel Switch Client. The Add Fabric Window appears (Figure 3-8).

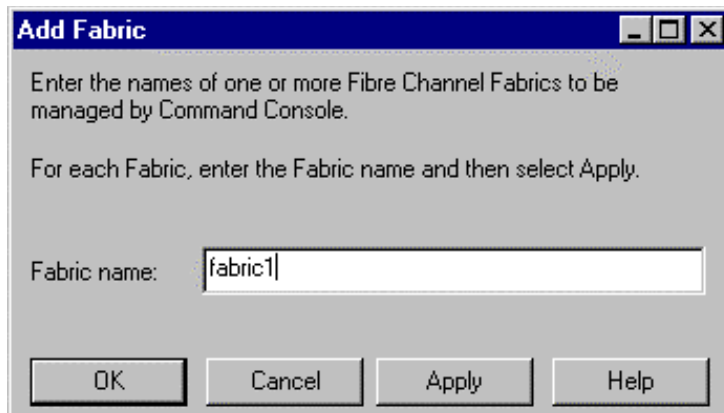


Figure 3-8 Add fabric window

6. Enter a name for the Fabric Network, (Example: fabric1), and click *Apply*.

The Fabric Window for your Client host system will appear, as shown in Figure 3-9.

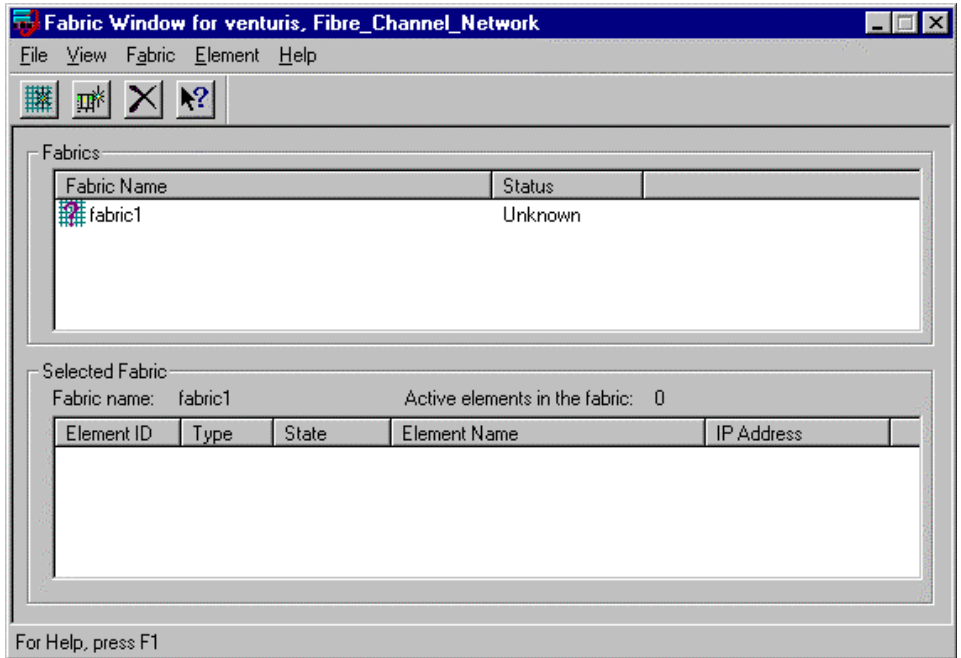


Figure 3-9 Fabric Window for Client Host, Fibre Channel Network

7. In the Fabrics box of the Fabric Window, click on the Fabric icon (Example: fabric1).

The Add Element box will appear, as shown in Figure 3-10.

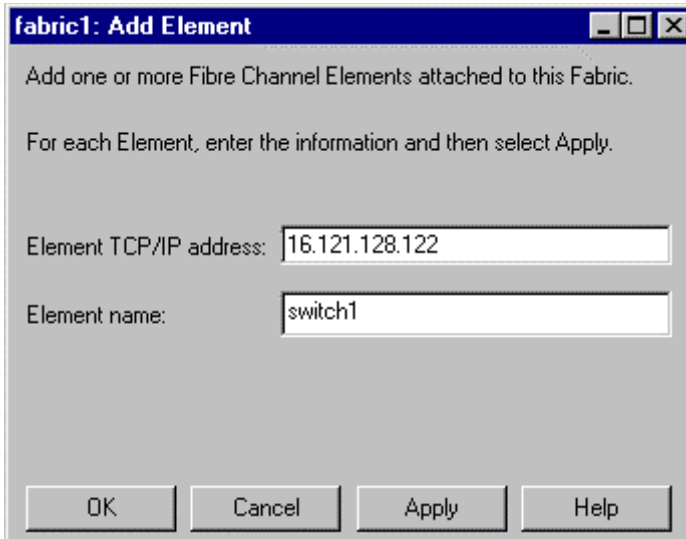


Figure 3-10 Adding a Fibre Channel element to the fabric

8. In the first field, enter the TCP/IP address of your Fibre Channel Switch. This must be the same address entered in Section “Initial Fibre Channel Switch Configuration” Tab to the second field and enter a name for your switch (Example: switch1) then click *Apply*.

The switch address and name entered appears in the Fabric Window, as shown in Figure 3-11.

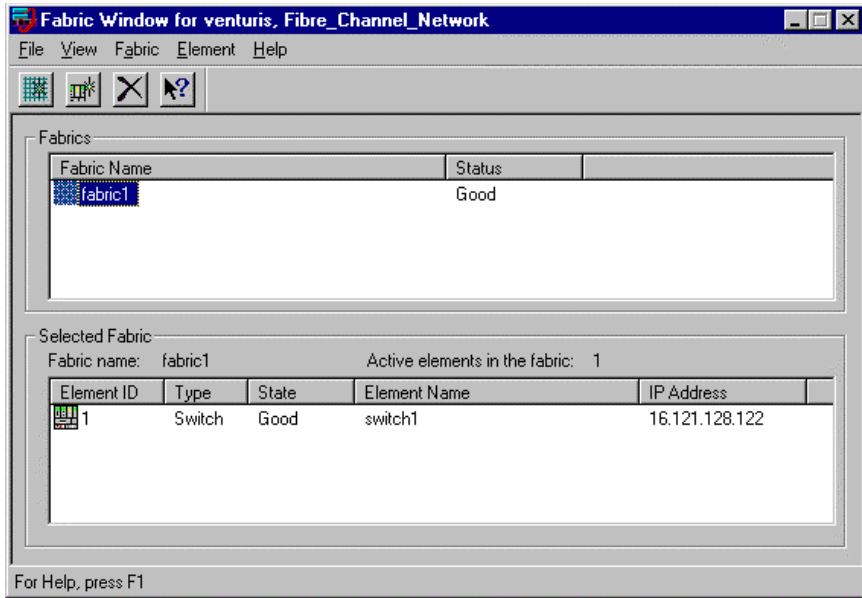


Figure 3-11 Fabric window shows switch name and address

- To launch the Switch Management Application, double click on the Element ID icon (located in the Selected Fabric half of the Fabric Window).

When the Fibre Channel Switch image appears (Figure 3-12), it indicates that you are now ready to configure and monitor the switch as described in your *Fibre Channel Switch User's Guide*. You may see a different image depending on which switch you actually have.



Figure 3-12 Fibre Channel switch Image





# Chapter 4

## Completing Your Storage Configuration under Windows 2000 Datacenter Server

This chapter contains instructions for completing your configuration under Windows 2000 Datacenter Server.

### Completing Your Configuration under Windows 2000 Datacenter Server

In order for Windows 2000 Datacenter to recognize new RA8000/ESA12000 or MA8000/EMA12000 Fibre Channel subsystem devices or changes to existing configurations, you must start your system to restart Windows 2000 Datacenter.

#### Verifying that HSxDISK.SYS Loaded

**NOTE:** If Secure Path is loaded, skip this step and proceed to section titled “Completing a New RAID Array Configuration.”

**NOTE:** On Windows NT 4.0, HSxDisk is HSZDisk. On Windows 2000, HSxDisk is HSXDisk.

Prior to running the Disk Management utilities, verify that HSxDisk recognizes the volumes that you created in the RA8000/ESA12000 or MA8000/EMA12000 Fibre Channel system as follows:

Open the *Event Viewer* in the *Administrative Tools* group. Look for an entry for HSxDisk in the Event Viewer window.

- Check the Event View to verify that HSxDisk successfully loaded.
- If no entry for the HSxDisk appears in the Event View window, reinstall HSxDisk (see Chapter 1 for more information).
- If an entry for HSxDisk appears with a 1 in the *Event* column, HSxDisk did not load because it did not find any logical drives. Ensure that you have added logical units correctly.

### **Completing a New RAID Array Configuration**

This section summarizes the steps needed to complete your storage configuration with the Disk Management utilities. For additional information on Disk Management utilities, please refer to your Windows 2000 Datacenter documentation. Before you begin, remember to safeguard critical data. Back up your system using normal backup procedures before altering device partitions.

#### ***Verifying your Configuration***

1. Check that there is an entry in the Disk Management utilities display for each of your RA8000/ESA12000 or MA8000/EMA12000 Fibre Channel subsystem volumes. If there is not, you should go back and recheck your configuration.
2. Check that the capacity shown matches the size of the physical disk on the RA8000/ESA12000 or MA8000/EMA12000 Fibre Channel subsystem. If it does not match, recheck the logical configuration for the RA8000/ESA12000 or MA8000/EMA12000 Fibre Channel system and its members.

**NOTE:** The Disk Management utilities display the “usable” capacity of a RAIDset and MIRRORset, not the combined total of the physical members.

#### ***Creating Partitions***

Create and format all the partitions using the Disk Management utilities. During the creation process, you will also be assigning drive letters.

## **Changes to RAID Array Configuration**

**NOTE:** To safeguard critical data, backup your system using normal backup procedures before altering device partitions.

When making changes to an existing RAID Array configuration, any existing disk partitions to be changed (or removed) must first be deleted using the Windows NT or Windows 2000 Disk Administrator. After they have been deleted, you may use the RA8000/ESA12000 or MA8000/EMA12000 Fibre Channel subsystem CLI to create new storagesets.

### ***Removing Disk Partitions***

1. From the Disk Management utilities, click the partition you wish to delete.
2. Access the Partition menu and choose Delete.
3. Continue selecting and deleting the partitions until you have deleted all the partitions you wish. When finished, click on Commit Changes Now. You may now reconfigure the RA8000/ESA12000 or MA8000/EMA12000 Fibre Channel subsystem using the CLI.
4. Restart your system so Windows 2000 Datacenter will recognize the changes.



# Chapter 5

## Communicating Over a Network

This chapter describes how to install and configure Command Console Agent. The topics covered are:

- Establishing communication over a network,
- Adding storage subsystem host servers to the network using Command Console Client.

**NOTE:** For more information, use the online help in the SWCC Storage and CLI Windows.

### Introduction

To communicate with your RA8000/ESA12000 or MA8000/EMA12000 Fibre Channel Subsystem over a network, two software applications are required: a Client and an Agent. Command Console Client is a graphical user interface which installs and runs on a Windows 2000 host, while Command Console Agent installs and runs unseen in the background on the storage subsystem's host computer. Client was installed in Chapter 2, "Installing Command Console Client and Creating Your First Virtual Disk." Agent is installed in this chapter. Together the two provide the software link required for communication over a network.

### Agent

Agent runs on a host system as a server application. To establish communication over a network, you must install Agent on the host system where the storage subsystem is connected.

Agent provides the software interface between the host storage subsystem and any number of Command Console Client sessions running on either the host or remote system. This allows you to configure and monitor your storage subsystem from many locations.

Agent also provides access protection and asynchronous fault notification. You can configure Agent to use TCP notification to Command Console Client or SNMP notification to an SNMP-compatible monitoring application.

## Client

Command Console Client is the control interface for your RA8000/ESA12000 or MA8000/EMA12000 Fibre Channel system. Before you can communicate with your storage subsystem over a network, the client address must be added to the agent database.

## Before You Start

- You will need password protection for Agent's host system. You must specify a password during Agent's Configuration Step 1 of 3.
- You will also need the IP name of Command Console Client's host system and you need a name for the storage subsystems connected to Agent's host system.
- You need to have installed TCP/IP services on your Windows 2000 server.
- If you are using SCSI-2 mode, you need to have created a "communications" virtual disk on your RA8000/ESA12000 or MA8000/EMA12000 Fibre Channel Subsystem using Command Console Client and a serial port connection in SCSI-2 mode (refer to Chapter 1). If you are using SCSI-3 mode, this step is not necessary.
- You need to have assigned a Windows 2000 drive letter to the "communications" virtual disk using the Disk Administrator (Refer to Chapter 4) if your HSG80 controller is in SCSI 2 mode.

## Configuring the HS Series Agent

As part of the installation process, the Agent program automatically prompts you to configure Agent. Agent is configured in three steps:

- Enter a password.
- Enter/modify Client data.
- Name the storage subsystem and enter/modify storage subsystem data.

After Agent is installed and configured you can re-configure Agent by selecting *HS Series Agent* from the **START** Menu (Figure 5-1).



Figure 5-1: Start Menu

### Enter a Password (Step 1 of 3)

1. On the *NT Agent Configuration Utility* screen, click Continue to display NT Agent Configuration Step 1 of 3 Screen (Figure 5-2).
2. Enter a password in the *New* and *Verification text* boxes, then click *Next*.

 A screenshot of the "NT Agent Configuration Step 1 of 3" dialog box. The title bar is green with white text. The main area has a light blue background. Text in the center reads: "The Agent requires a password for access. Please enter a password between 4 and 16 characters inclusive." Below this are two text input fields: "New" and "Verification". To the right of the "Verification" field is a "Help" button. At the bottom, there are three buttons: "< Back", "Next >", and "Cancel".

Figure 5-2: NT Agent Configuration —Step 1 of 3

### Enter/Modify Client Data (Step 2 of 3)

In the *NT Agent Configuration Step 2 of 3* Screen (Figure 5-3), enter the name or IP address of Client's host system. Choose TCP/IP (for Command Console Client) or SNMP notification. Set the Access Privileges. Use the buttons on the right of the screen to add, delete or modify a Client. Clients binded to Agent are shown in the *Clients* windowpane. When you are finished, click *Next*.

**NT Agent Configuration Step 2 of 3**

Add Client Host Names to the list to allow those Hosts access to the Agent over the network.

Clients

vienna

Selected Client

Notification Schemes

TCP/IP  SNMP

Access Privileges

Overall Status  
 Detailed Status  
 Configuration

Add Client  
Delete Client  
Modify Client  
Help

< Back   Next >   Cancel

Figure 5-3: NT Agent Configuration — Step 2 of 3 (for client)

### Enter Storage Subsystem Data (Step 3 of 3)

On the *NT Agent Configuration Step 3 of 3* Screen (Figure 5-4), assign and enter the name of your storage subsystem, enter its Windows 2000 drive letter, and set the monitoring interval in seconds. Use the buttons on the right to add, delete or modify a subsystem. Storage subsystems binded to Agent are shown in the *Storage Subsystems* windowpane. When you are done, click *Finish*.



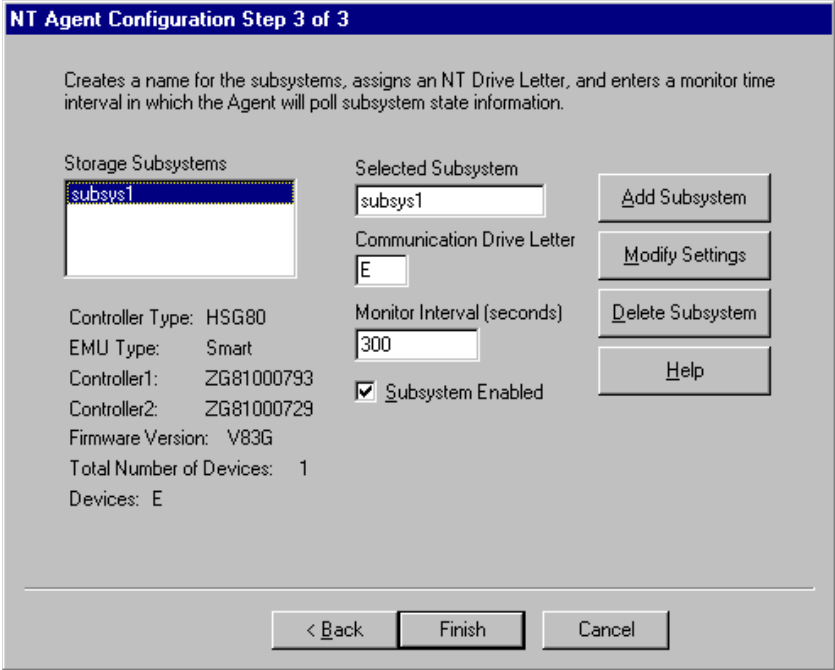


Figure 5-4: NT Agent Configuration - Step 3 of 3

### Run Agent Service

After you have configured Agent, the program prompts you with the message *Would you like to start the NT Agent Service now?* (Figure 5-5). Click *Yes* to run Agent.

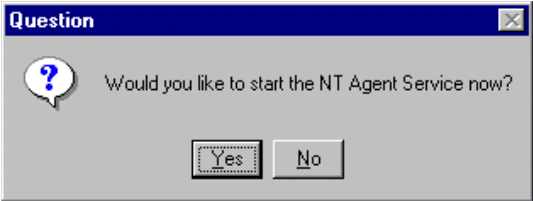


Figure 5-5: Starting Agent Dialog Box

## Adding Storage Subsystems and Their Hosts to the Network

Storage subsystems and their host systems are added to the network using Command Console Client. Command Console Client can be installed locally in the storage subsystem's host system or in a remotely located PC connected to the network. Client installs and runs only on Windows NT or Windows 2000 PCs. To complete the network link, proceed as follows:

1. Install Command Console Client in the system you will use to configure and monitor your RAID Array.
2. Make sure that you have properly installed and configured an agent on the storage subsystem host system.
3. Select StorageWorks Command Console from the *Command Console Start Menu* (Figure 5-6). After a short wait, Client will display the *Navigation Window* (Figure 5-7). The Navigation Window lets you monitor and manage storage subsystems over the network.

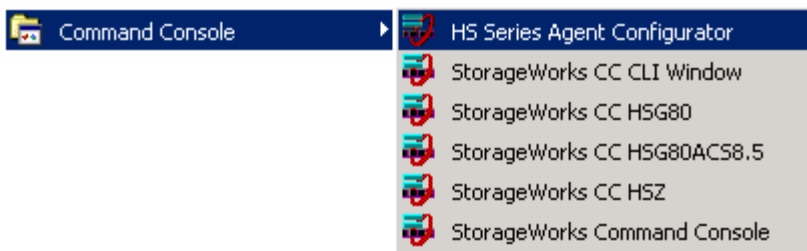


Figure 5-6: Command Console Start Menu

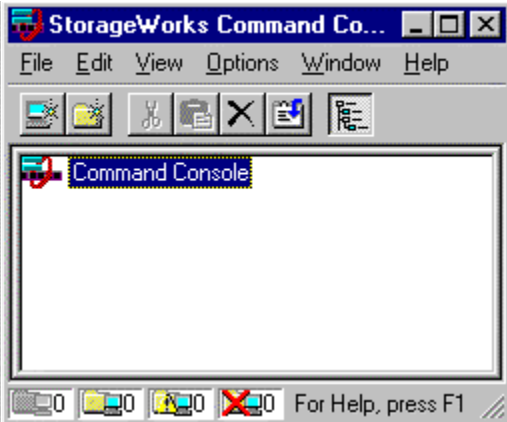


Figure 5-7: Navigation Window

4. From the *Navigation Window's File Menu* (Figure 5-8), select *Add System* to display the *Add System Dialog Box* (Figure 5-9).



Figure 5-8: Navigation Window's File Menu

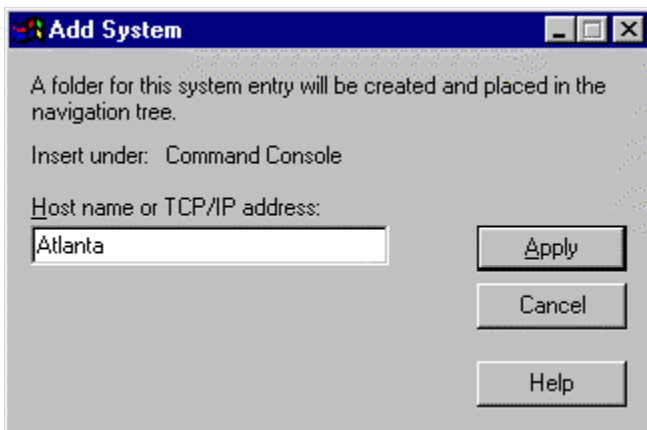


Figure 5-9: Add System Dialog Box

5. Enter the host platform name, as defined in Agent, then click the *Apply* button. Command Console Client searches and then displays the storage subsystem's host system as an icon in the *Navigation Window* (Figure 5-10).

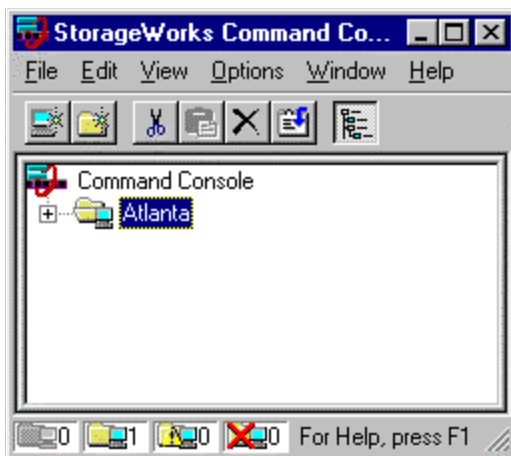


Figure 5-10: Navigation Window Showing Storage Host System "Atlanta"

- Click on the plus sign to expand the host computer icon. When expanded, the Navigation Window displays an icon for the storage subsystem (Figure 5-11). In this example the storage subsystem is named *subsys1*.

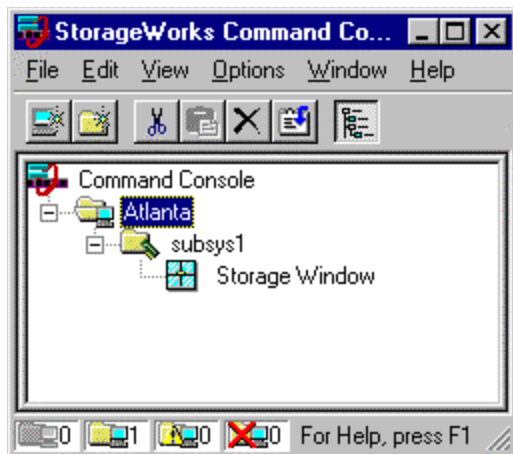


Figure 5-11: Navigation window showing expanded “Atlanta” host icon

Double click on the Storage Window icon to monitor and manage your RA8000/ESA12000 or MA8000/EMA12000.

**NOTE:** For more information, use the online help in the SWCC Storage and CLI Windows.



# 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 *Compaq StorageWorks Command Console V2.3 User Guide*.

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

### Configuration Guidelines

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

### 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
```

### Controller Host System Configuration Guidelines

Assign a host logical unit number to each storageset or single disk unit that you want the host to know about in the 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 0-7 or 100-107

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

<b>Controller A</b>	<b>Port 1</b>	Port 2	
	<b>Active</b>	Unused	
EMPTY			
<b>Cache A</b>		EMPTY	

Figure A-1: Single Controller/Single Host

- For single HSG80 controller configurations connected to a single host you can configure up to 8 host logical units on Controller A - Host Port 1. Valid unit numbers are D0-D7. Controller A - Host Port 2 is unused.



<b>Controller A</b>	<b>Port 1 Active</b>	<b>Port 2 Unused</b>	
EMPTY			
<b>Cache A</b>		<b>EMPTY</b>	

Figure A-2: Single Controller/Two Hosts

- For single HSG80 controller configurations connected to two host systems, for one host you can configure up to 8 host logical units on Controller A - Host Port 1. Valid unit numbers are D0–D7. For the other host, you can configure up to 8 host logical units on Controller A - Host Port 2. Valid unit numbers are D100–D107.

<b>Controller A</b>	<b>Port 1 Active</b>	Port 2 Unused	
<b>Controller B</b>	Port 1 Standby	Port 2 Unused	
<b>Cache A</b>		<b>Cache B</b>	

Figure A-3: Dual Controller/Single Host

- For dual-redundant HSG80 controller configurations connected to a single host you can configure up to 8 host logical units on Controller A - Host Port 1. Valid unit numbers are D0–D7. Controller B - Host Port 1 is automatically configured as a standby port for these same 8 units. Controller A - Host Port 2 and Controller B - Host Port 2 are unused.

<b>Controller A</b>	<b>Port 1 Active</b>	Port 2 Standby	
<b>Controller B</b>	Port 1 Standby	<b>Port 2 Active</b>	
<b>Cache A</b>		<b>Cache B</b>	

Figure A-4: Dual Controllers/Two Hosts

- For dual-redundant HSG80 controller configurations connected to two host systems, for one host you can configure up to 8 host logical units on Controller A - Host Port 1. Valid unit numbers are D0–D7. Controller B - Host Port 1 is automatically configured as a standby port for these same 8 units.
- For the other host you can configure up to 8 host logical units on Controller B - Host Port 2. Valid unit numbers are D100–D107. Controller A - Host Port 2 is automatically configured as a standby port for these same 8 units.

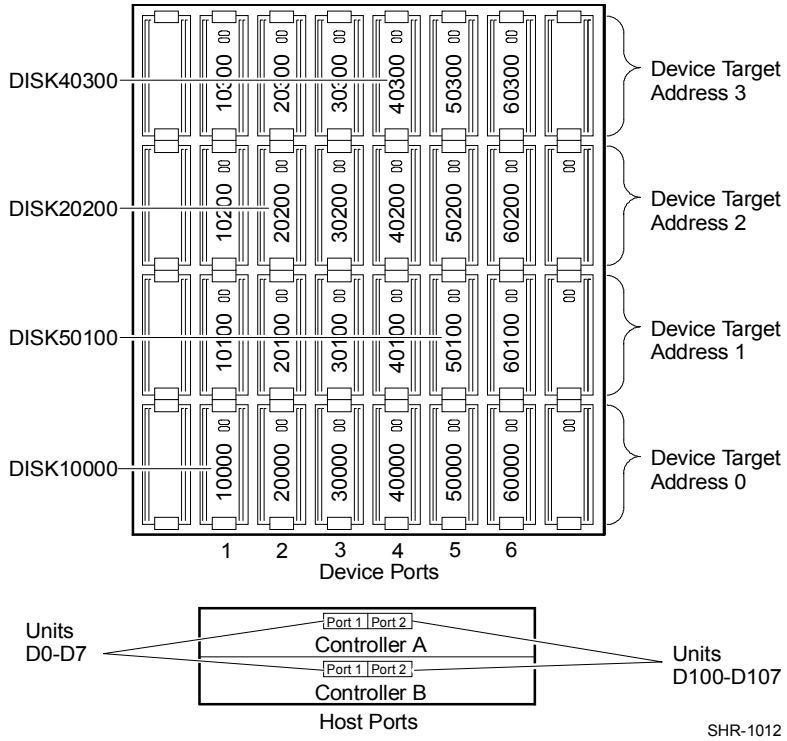


Figure A-5: Mapping of device ports/targets and host ports in a BA370 enclosure (RA8000/ESA12000)

The follow are tables depicting a mapping of device ports/targets and host ports in a Model 4214 or Model 4254 disk enclosure (MA8000/EMA12000).

**NOTE:** ACSV8.5 single bus supports up to 12 disks per shelf.

**Table A-1: 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	DISK 0500	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

**Table A-2: 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	DISK 0500	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

## Accessing the CLI

The Command Line Interpreter (CLI) is a command line user interface to the HSG80 controller. It provides a series of commands 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 controller to access the CLI.

## Connecting the Cable

To connect a maintenance terminal or PC to a HSG80 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 controller (see Figure A-6).
4. Note which serial port you use; you will need that information if using a communications program.

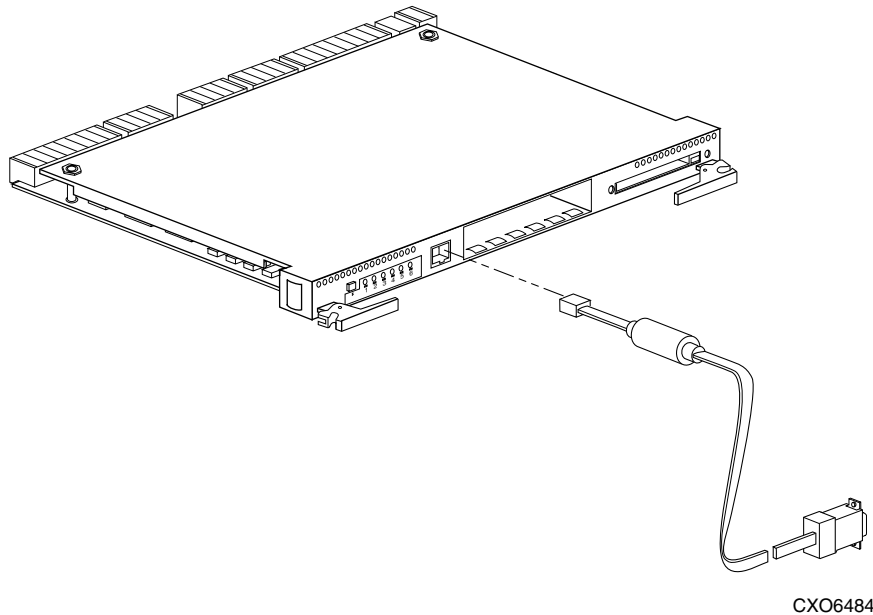


Figure A-6: Making a serial connection to the HSG80 controller

### Establishing Connection with a Host

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 then press the Enter key. You should see the CLI prompt, which looks similar to:

```
HSG80 >
```

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

```
HSG80 > SHOW THIS_CONTROLLER
```

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

```
HSG> show this_controller
```

```
Controller:
```

```
HSG80 ZG81000793 Software V85, Hardware E01  
NODE_ID = 5000-1FE1-0000-2370  
ALLOCATION_CLASS = 0  
SCSI_VERSION = SCSI-2  
Configured for dual-redundancy with ZG81000729  
In dual-redundant configuration  
Device Port SCSI address 7  
Time: 30-SEP-98 12:03:57  
Command Console LUN is disabled
```

```
Host PORT_1:
```

```
Reported PORT_ID = 5000-1FE1-0000-2371  
PORT_1_PROFILE = PLDA  
PORT_1_TOPOLOGY = LOOP_HARD (loop up)  
PORT_1_AL_PA = 71 (negotiated)
```

```
Host PORT_2:
```

```
Reported PORT_ID = 5000-1FE1-0000-2372  
PORT_2_PROFILE = PLDA  
PORT_2_TOPOLOGY = LOOP_HARD (standby)  
PORT_2_AL_PA = 72 (negotiated)
```

```
Cache:
```

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

```
Mirrored Cache:
```

```
64 megabyte write cache, version 0012  
Cache is GOOD  
No Unflushed data in cache
```

```
Battery:
```

```
FULLY CHARGED  
Expires: WARNING: UNKNOWN EXPIRATION DATE!
```

```
NOCACHE_UPS
```

**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 *Compaq StorageWorks HSG80 Array Controller ACS V8.5 Configuration Guide* for more information.

The Communications LUN is not used with Windows NT or Windows 2000. It should be *disabled* (grayed out). If the Communications LUN is enabled, disable it as follows:

```
HSG80 > SET THIS_CONTROLLER NOCOMMAND_CONSOLE_LUN
```

## 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. (Refer to the RA8000/ESA12000 Storage Subsystem User’s Guide regarding installing/adding disks in the StorageWorks enclosure.) 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.

## **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.

## **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
```



## 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/two hosts, the unit numbers may range from D0 through D7 for the first host and from D100 through D107 for the second host with a maximum of 8 units per host. 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.

**NOTE:** After the units are created, run DILX for 10 minutes on all units that are configured with universal disks to delete the 8MB EISA partition. Refer to the CLI Manual for details on running DILX.

## 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.

## 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.

## Creating a Stripese

Use stripesets 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 twenty-four. All members must be single disks. This example creates a three-member stripeset 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 Figure A-5.

### 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
```

### 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/two hosts, the unit numbers may range from D0 through D7 for the first host and from D100 through D17 for the second host with a maximum of 8 units per host. 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.

## 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.

## 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 DVGRPM0 DISK10200 DISK20200
```

In this example, DVGRPM0 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 mirrorsets will be optimized if each mirrorset includes disks from different ports as shown in the example.

## 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 DVGRPM0
```

## 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/two hosts, the unit numbers may range from D0 through D7 for the first host and from D100 through D107 for the second host with a maximum of 8 units per host. Add units by using the ADD UNIT command.

```
HSG80 > ADD UNIT D4 DVGRPM0
```

## **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.

## **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.

### **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.

### **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.

## Initializing the Striped Mirrorset

Prior to putting a striped 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 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 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 DVGRPSM0 CHUNKSIZE=DEFAULT
```

## 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/two hosts, the unit numbers may range from D0 through D7 for the first host and from D100 through D107 for the second host with a maximum of 8 units per host. Add units by using the ADD UNIT command.

```
HSG80 > ADD UNIT D5 DVGRPSM0
```

## 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.

## 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.

## 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.

When you initialize a disk, 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 DISK40100 CHUNKSIZE=DEFAULT
```

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

## 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/two hosts, the unit numbers may range from D0 through D7 for the first host and from D100 through D107 for the second host with a maximum of 8 units per host. Add units by using the ADD UNIT command.

```
HSG80 > ADD UNIT D4 DISK40100
```

```
HSG80 > ADD UNIT D5 DISK50100
```

## Adding Devices to the Spareset

---

**IMPORTANT:** 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 drives 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.

## 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 CLI Reference Guide* for more information.

## 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:

```
LUNUses
D1DVGRPR0
D2DVGRPR1
D3DVGRPS0
D4DISK40100
D5DISK50100
```

Record the information in the following table:





Next, verify the storagesets you have configured:

```
HSG80 > SHOW STORAGESETS
```

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

```
NameStorageSetUsesUsed by
DVGRPS0stripesetDISK10100D3
DISK20100
DISK30100
DVGRPSM0stripesetMIRR_0D5
MIRR_1
DVGRPM0mirrorsetDISK10200D4
DISK20200
MIRR_0mirrorsetDISK30200DVGRPSM0
DISK40200
MIRR_1mirrorsetDISK50200DVGRPSM0
DISK60200
DVGRPR0raidsetDISK10000D1
DISK20000
DISK30000
DVGRPR1raidsetDISK40000D2
DISK50000
DISK60000
SPARESETsparesetDISK60100
FAILESETfailedset
```

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 that you need to know to create your storage configuration.

### Planning Your Configuration

RAID stands for Redundant Array of Independent Disks. Using RAID 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: Configuration Options**

<b>Storage Method</b>	<b>Storageset Type</b>	<b>Number of Devices</b>	<b>Offers</b>
RAID 3/5 A redundant-stripeset combining the optimized data transfers of RAID 3 with the striping of parity of RAID 5.	RAIDset	3 - 24	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 24 mirrorsets per RAID array	Good performance for read requests. High Data Availability
RAID 0 + 1	Striped mirrorsets	2 - 24 mirrorsets	Performance for read requests surpassing that of an unstriped mirrorset since it can achieve load balancing. High Data Availability.

**Table B-1: Configuration Options**

<b>Storage Method</b>	<b>Storageset Type</b>	<b>Number of Devices</b>	<b>Offers</b>
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.





## Valid ALPA Settings

This appendix provides a table of the valid arbitrated loop physical addresses (ALPA) available for hard addressing the Fibre Channel Arbitrated Loop (FC-AL) topology.

### Valid ALPA Settings

Table C-1 lists the valid ALPA settings for hard addressing the Fibre Channel Arbitrated Loop.

**Table C-1: Valid Arbitrated Loop Physical Address (ALPA) Settings**

0x01	0x02	0x04	0x08	0x0F	0x10	0x17	0x18	0x1B
0x1D	0x1E	0x1F	0x23	0x25	0x26	0x27	0x29	0x2A
0x2B	0x2C	0x2D	0x2E	0x31	0x32	0x33	0x34	0x35
0x36	0x39	0x3A	0x3C	0x43	0x45	0x46	0x47	0x49
0x4A	0x4B	0x4C	0x4D	0x4E	0x51	0x52	0x53	0x54
0x55	0x56	0x59	0x5A	0x5C	0x63	0x65	0x66	0x67
0x69	0x6A	0x6B	0x6C	0x6D	0x6E	0x71	0x72	0x73
0x74	0x75	0x76	0x79	0x7A	0x7C	0x80	0x81	0x82
0x84	0x88	0x8F	0x90	0x97	0x98	0x9B	0x9D	0x9E
0x9F	0xA3	0xA5	0xA6	0xA7	0xA9	0xAA	0xAB	0xAC
0xAD	0xAE	0xB1	0xB2	0xB3	0xB4	0xB5	0xB6	0xB9
0xBA	0xBC	0xC3	0xC5	0xC6	0xC7	0xC9	0xCA	0xCB
0xCC	0xCD	0xCE	0xD1	0xD2	0xD3	0xD4	0xD5	0xD6
0xD9	0xDA	0xDC	0xE0	0xE1	0xE2	0xE4	0xE8	0xEF



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