



RA8000 / ESA12000 Fibre Channel
Solution Software for Windows NT[®] - Intel

Installation Reference Guide

AA-RFA9B-TE

387387-002

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Revision Record

This Revision Record provides a concise publication history of this manual. It lists the manual revision levels, release dates, and summary of changes.

The following revision history lists all revisions of this publication and their effective dates. The publication part number is included in the Revision Level column, with the last entry denoting the latest revision. This publication supports StorageWorks RA8000/ESA12000 Fibre Channel Subsystem for the Windows NT - Intel Operating System.

<u>Revision Level</u>	<u>Date</u>	<u>Summary of Changes</u>
AA-RFA9A-TE / 387387-001	November 1998	Original Release with Fibre Channel Hub (V8.3) Support
AA-RFA9B-TE / 387387-002	April 1999	Fibre Channel Switch (V8.4) Support Added

About This Guide

This section identifies the audience of this guide and describes the contents and structure. In addition, this section includes a list of associated documents and the conventions used in this guide.

This guide supports StorageWorks V8.3 (FC hub) and V8.4 (FC Switch) Solution Software, and contains the procedures to perform the following tasks:

- Configure the KGPSA adapter, and install the KGPSA adapter driver
- Run the Fibre Channel Software Setup and Install StorageWorks RAID Windows NT device driver
- Install the StorageWorks Command Console Client to configure the RAID HSG80 controller for Windows NT operation, and create virtual disks
- Install the Fibre Channel Switch Client and Agent
- Complete you configuration on Windows NT
- Install and Configure the StorageWorks Command Console Agent to communicate over a network.

Intended Audience

This guide is intended for administrators of the RA8000 Fibre Channel Subsystem. Installing the Fibre Channel Subsystem requires a general understanding of Intel servers, basic hardware installation procedures, networks, Windows NT and RAID terminology.

Document Structure

This guide contains the following chapters:

Chapter 1: Preparing Your Windows NT Host for Use with the RA8000

This chapter contains instructions for configuring your host adapter and installing the KGPSA Adapter device driver and RAID WNT device driver in your host system.

Chapter 2: Installing SWCC Client and Creating Your First Virtual Disk

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

Chapter 3: Installing the StorageWorks Command Console for the Fibre Channel Switch

This chapter contains instructions for installing the StorageWorks Command Console Client and Agent software required to support the Fibre Channel Switch.

Chapter 4: Completing Your Storage Configuration under Windows NT

This chapter contains instructions for completing your configuration under Windows NT.

Chapter 5: Communicating Over a Network

This chapter introduces you to Command Console's agent and provides instructions on how to establish communication over a network. The instructions include how to install and configure the agent and how to add storage subsystem host servers to the network using Command Console Client.

Appendix A: Creating Your Storage Configuration with the CLI

This chapter 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 stripe mirrorsets; identifying a storage set as a unit to the host; and verifying and recording the final configuration.

Appendix B: Planning Your Storage Configuration

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

Appendix C: Valid ALPA Settings

This appendix provides a table of the valid Arbitrated Loop Physical Addresses available for hard addressing the fibre channel arbitrated loop.

Related Documents

Document Title	Order Number
<i>StorageWorks Command Console V2.1 (HSG80) User's Guide</i>	387405-003/AA-RFA2C-TE
<i>Command Line Interpreter (HSG80) Reference Manual</i>	387402-001/EK-HSG80-RG.A01
<i>RA8000 and ESA12000 Storage Subsystems User's Guide</i>	387404-001/EK-SMCPR-UG
<i>RAID Array 8000/ESA12000 Fibre Channel Storage System for Windows NT Intel - Quick Setup Guide (ACS V8.3 for Fibre Channel Hub)</i>	387386-002/AA-RFA7B-TE
<i>RAID Array 8000/ESA12000 Fibre Channel Storage System for Windows NT Intel - Quick Setup Guide (ACS V8.4 for Fibre Channel Switch)</i>	387386-002/AA-RHH5A-TE
<i>RA8000/ESA12000 Fibre Channel Solutions Software V8.3 for Windows NT Intel - Release Notes</i>	387393-002/AA-RFA8C-TE
<i>RA8000/ESA12000 Fibre Channel Solutions Software V8.4 for Windows NT Intel - Release Notes</i>	136259-001/AA-RH0QA-TE
<i>RA8000/ESA12000 FC-AL Configurations for Windows NT Intel - Application Notes</i>	136260-001/AA-RH0RA-TE
<i>RA8000/ESA12000 FC-AL High Availability Configurations for Windows NT Intel - Application Notes</i>	136261-001/AA-RH0SA-TE
<i>RA8000/ESA12000 Fibre Channel Fabric Configurations for Windows NT Intel - Application Notes</i>	136262-001/AA-RHH6A-TE
<i>RAID Array 8000/ESA12000 Fibre Channel Cluster Solutions for Windows NT - User's Guide</i>	101471-001/EK-NTC8K-IG.B01

Conventions

This guide uses the following documentation conventions:

Style	Meaning
boldface type	For emphasis and user input.
<i>italic type</i>	For emphasis, manual titles, utilities, menus, screens, and filenames.
plain monospace type	Screen text.

RAID Advisory Board Description	RAID HSG80 Solutions Usage
RAID 0	STRIPESet
RAID 1	MIRRORset
RAID 0+1	STRIPED MIRRORset
RAID 3/5	RAIDset

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 Web Site

The Compaq Web Site has information on this product as well as the latest drivers and Flash ROM images. You can access the Compaq Web Site by logging on to the Internet at :

<http://www.compaq.com>

Telephone Numbers

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

For Compaq technical support:

In the United States and Canada, call 1-800-386-2172

1

Preparing Your Windows NT Host(s) for Use with the RA8000

This chapter describes how to install the KGPSA Adapter device driver, the Fibre Channel software, and StorageWorks RAID Windows NT device driver in your host server(s).

The steps to prepare *each* Windows NT host server in your configuration for use with the RA8000 storage system, are as follows:

- Install the KGPSA Adapter Device Driver
- Run the Fibre Channel Software Setup and Install the RAID Windows NT Device Driver

1.1 Installing the KGPSA Adapter Device Driver

NOTES

Your adapter package provides the required adapter-specific software on a floppy. Use only the adapters and drivers supplied with the adapter kit since these are tested and certified to function with the RA8000 HSG80 Controller.

The KGPSA Adapter Device Driver *must* be installed as the *first* step in preparing your server(s). Otherwise, improper KGPSA driver registry settings will result

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

1. From the Windows NT Start Menu, select Settings, then open *Control Panel*.
2. Open *SCSI Adapters* from the *Control Panel*.
3. Select *Drivers* tab and then click on *Add*.
4. Select *Have Disk*.
5. Insert the floppy diskette labeled *KGPSA NT DEVICE DRIVER AND DOWNLOAD UTILITY* into the floppy diskette drive.
6. Specify the path to the NT driver, type: **A:\I386**, and then click *OK*.
7. Select *Emulex LP6000/LP7000/LP8000, PCI-Fibre Channel Adapter* from the *SCSI Adapter List* and then click *OK*.
8. Answer *No* to the *Restart?* question, and proceed to Section 1.2.

1.2 Run the Fibre Channel Software Setup Program and Install the RAID Windows NT Device Driver

The Fibre Channel Software and RAID Windows NT Device Driver (HSZDisk.sys) software is installed on your host server from the StorageWorks Command Console (SWCC) 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 software installation program provides two main options (reference Figure 1-1):

- Solution Software for ACS v8.4 with FC Switch
 - Solution Software for ACS v8.3 with FC Hub
1. Click on the Solution Software option appropriate to your ACS version.

Figure 1-1 Solution Software (ACS Version) Selection Menu



2. From the Fibre Channel Solution Software menu that appears, select *Install FC Software/HSZDisk Driver*.

The Fibre Channel Software performs as follows:

- Automatically installs the HSZdisk V4.2 SCSI Class driver.
- Automatically sets registry for proper operational use of the KGPSA Fibre Channel host adapter with the StorageWorks RAID Array 8000 / ESA12000 Fibre Channel Subsystem
- Enables "Extended Configuration" settings to be specified in a Fibre Channel Switch (FC-SW) topology
- Enables Arbitrated Loop Physical Address (ALPA) settings to be specified for the KGPSA adapter in a Fibre Channel Arbitrated Loop (FC-AL) topology
- Copies lp6nds35 V4.10x1 miniport driver to the %systemroot%\system32\drivers folder
- Checks for SCSI related error log events since the last system boot
- Reports SCSI driver revision information

HSZDisk Class Driver

The HSZDisk class driver works with COMPAQ's HSZ/HSG-family of RAID controllers to enhance Windows NT's on-line storage availability and fault-tolerance.

HSZDisk works in single-host and cluster environments to maintain optimum subsystem performance during storageset error recovery conditions (*Example*: the failure of a RAID 3/5 or mirror-set drive member).

HSZDisk also works in single-host and cluster environments to assist the subsystem during controller failover and failback operations. In Windows NT cluster environments, HSZDisk works to facilitate HSZ/HSG-based storageset migration during host failover and failback events.

HSZDisk will only service HSZ and HSG based storage devices and will not affect the operation or performance of other storage devices on the system. The driver makes use of the Windows NT's system event log and will post error and informational events when required. If the driver loads successfully during boot time, it will post an informational message in the log reporting that it claimed available HSZ and HSG-based storagesets.

Fibre Channel Software Setup utility supports driver un-installation with Windows NT 4.0. HSZDisk may be uninstalled using the Add/Remove program applet from the control panel. However, you should not uninstall the driver unless you have disconnected the subsystem from the server(s). HSZ/HSG-family RAID controllers should never be installed without HSZDisk.sys configured.

KGPSA Driver Support

The KGPSA is the PCI Fibre Channel adapter that is supported with the StorageWorks RA8000 and ESA12000 Fibre Channel RAID System. Because the Fibre Channel Software Setup utility modifies existing KGPSA registry settings, the driver from the supplied floppy is installed prior to running the HszInstal utility (reference Section 1.1, *Installing the KGPSA Adapter Device Driver*).

HszInstall changes the KGPSA driver registry settings and copies an updated version of the driver to the driver's directory to ensure proper operational use of the KGPSA Fibre Channel host adapter with the StorageWorks RA8000/ESA12000 Fibre Channel Subsystem. These registry settings are required for both single host and NT Cluster configurations.

Fibre Channel Software Setup also requires you to select an Arbitrated Loop Physical Address (ALPA) when configured in a FC-AL Topology. StorageWorks supports up to 4 servers on the same arbitrated Loop and recommends using the low numbers ALPAs for each NT Server (or KGPSA adapter). Each server must have a unique ALPA. The recommendation is as follows:

NT Server	ALPA Assignment
Server 1	1
Server 2	2
Server 3	4
Server 4	8

Note that ALPA assignments are not applicable to a Fibre Channel Switch configuration. Refer to appendix C for a complete list of valid ALPA settings.

Extended Configuration Setting

The *Extended Configuration Setting* option should be selected when five or more Windows NT servers have exclusive access to the same HSG80 host port on an RA8000/ESA12000 Fibre Channel system. Each NT server that comprises this configuration must have this option selected. Selecting this option will adjust registry settings for your KGPSA host bus adapter to operate in an "Extended Configuration" environment.

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 RAID controller for Windows NT operation, and creating your first virtual disk.

NOTE

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

2.1 Introduction

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

Procedure summary:

- 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 NT operation
- Create your first virtual disk

To create your first virtual disk, use the serial port:

Serial Port Connection – This method is required to create your first virtual disk. This chapter shows you how to create a virtual disk over the serial port using Command Console Client software. The serial port method provides a local, direct connection to your array.

A note on other communication methods:

You can also connect and communicate with your RA8000 Fibre Channel Subsystem over a network or the SCSI bus. If you are planning to configure and monitor your RA8000 Fibre Channel Subsystem over a network or the SCSI bus, you must create at least one virtual disk on your subsystem using the serial port to establish a connection.

SCSI Bus – A local connection method allows you to connect to your RA8000 Fibre Channel Subsystem over the SCSI bus.

Network Connection – You can communicate with your RA8000 Fibre Channel Subsystem over a TCP/IP network. Refer to Chapter 5 for details.

2.2 Installing StorageWorks Command Console Client

NOTE

If you are upgrading to a new version of Command Console Client, run the uninstall program and remove the old version before installing the new version.

The minimum requirements to run StorageWorks Command Console Client are:

PC Requirements	Intel 486, 66 MHz, 16 MB memory, 2 MB free disk space, and CD-ROM drive
Operating System	Microsoft Windows 95, Windows NT 3.51 or 4.0

The Command Console Client software is installed on your host system from the StorageWorks Command Console 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 two options (reference Figure 2-1):

- Solution Software for ACS v8.4 with FC Switch
- Solution Software for ACS v8.3 with FC Hub

Click on the Solution Software option appropriate to your ACS version.

Figure 2–1 Solution Software (ACS Version) Selection Menu



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

2.3 Launching Command Console Client

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

Figure 2-2 Command Console Client's Start Menu



The four choices Client provides you with at startup are:

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

NOTE

The HSZ80 Storage Window option is not applicable to this document.

- **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.

2.4 Establishing a Serial Connection to the HSG Storage Window

To create your first virtual disk, establish a serial cable connection from one of the PC's COM ports to the storage subsystem's CTR TOP or CTR BOTTOM configuration port (refer to Appendix A, Section A.2.1, 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 *HSG80 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).

Figure 2-3 Connection Selection Dialog Box

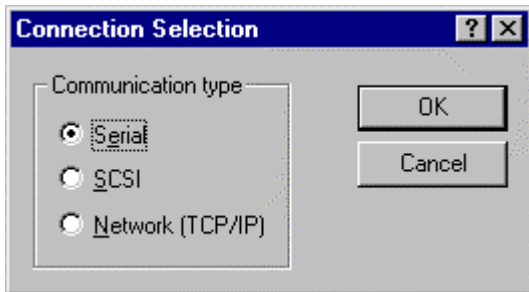
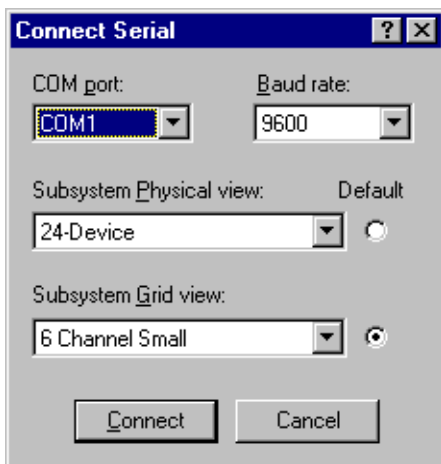


Figure 2-4 Connect Serial Dialog Box for Storage Window

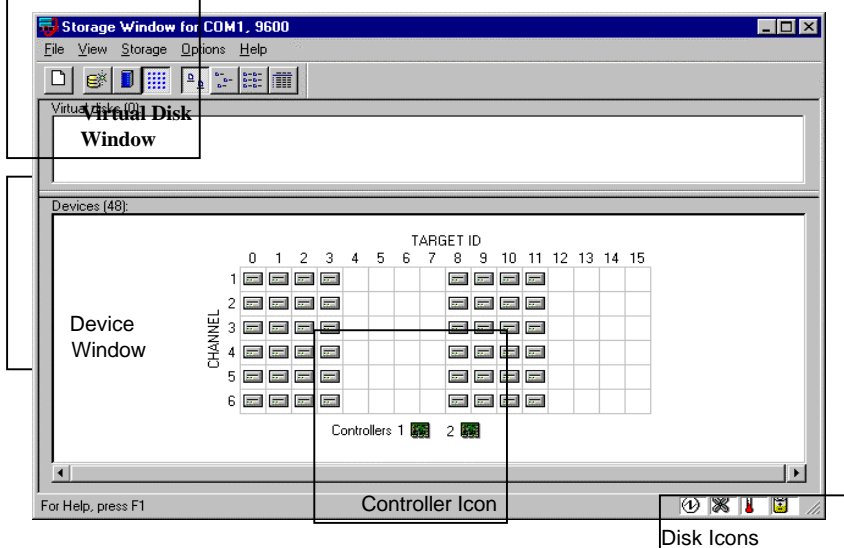


- On the *Connect Serial* dialog box, from the drop-down menu, select the PC COM port your HSG80 controller is connected to, then select the baud rate (controller default is 9600). Then click the *Connect* button to display the Storage Window (Figure 2-5). You are now connected to your storage subsystem. 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 Fibre Channel Subsystem. On startup, Command Console finds installed drives and displays them in a grid by channel and SCSI ID number.

Figure 2-5 Storage Window



2.5 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, there is approximately a 90 second delay while the controller reinitializes.

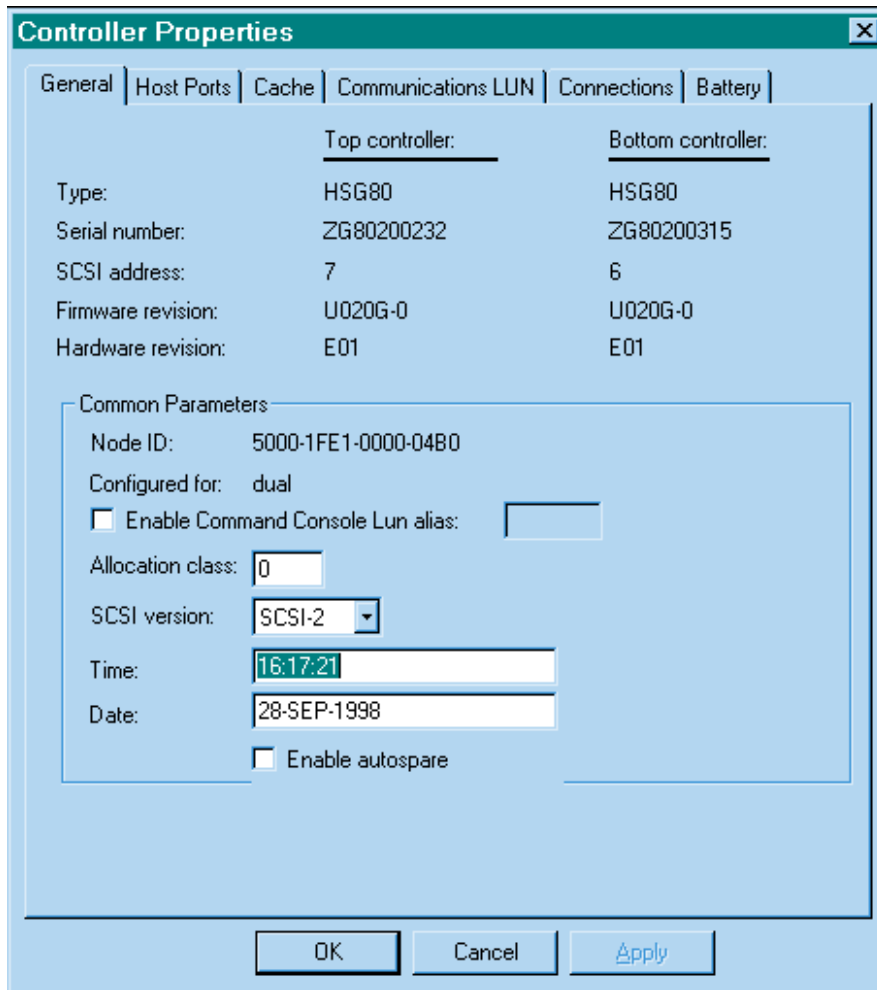
1. Access the controller's property sheets by double-clicking the controllers icon in the Storage Window. When you double-click on a controller's icon the *General* controller properties sheet displays (Figure 2-6). The controller has five property sheets. Each sheet is accessed by clicking on its tab.

Confirm the following:

- Allocation class is 0
- SCSI Version is SCSI-2

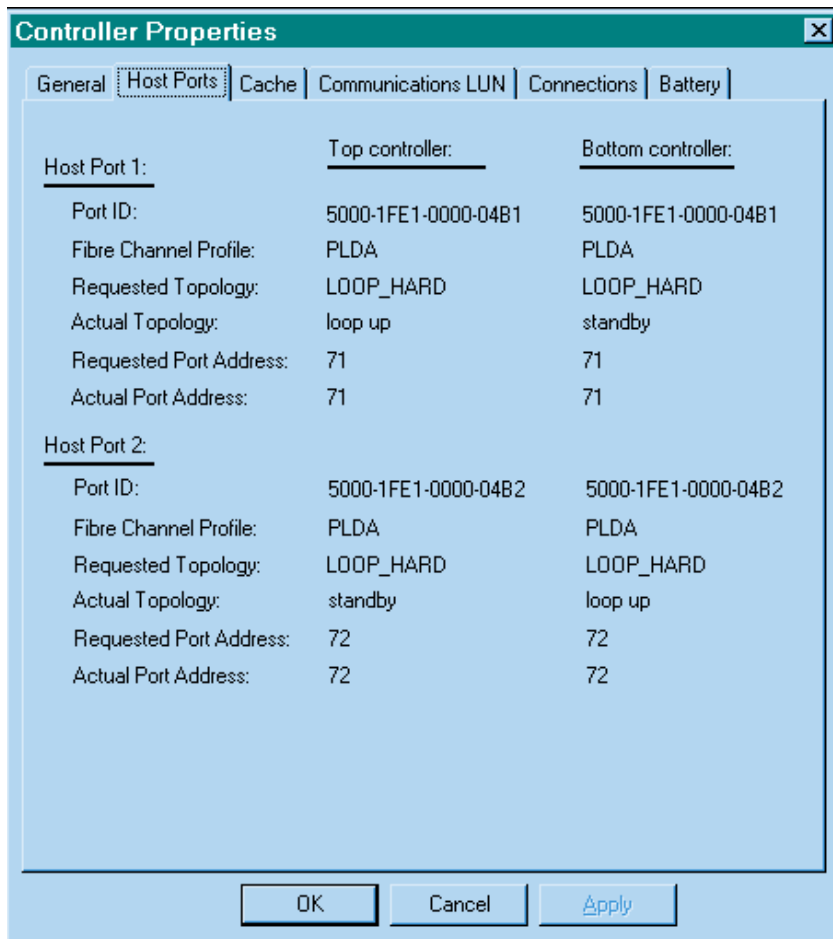
(You can also set time and date general properties)

Figure 2-6 General Controller Properties Tab



- Click the *Host Ports* tab to display the host port operating parameters. For FC hub configurations, (ACS V8.3), verify that the “Requested Topology” and “Actual Topology” settings appear as shown in Figure 2-7.

Figure 2-7 “Host Ports” Controller Properties Tab, with Hub Topologies Shown



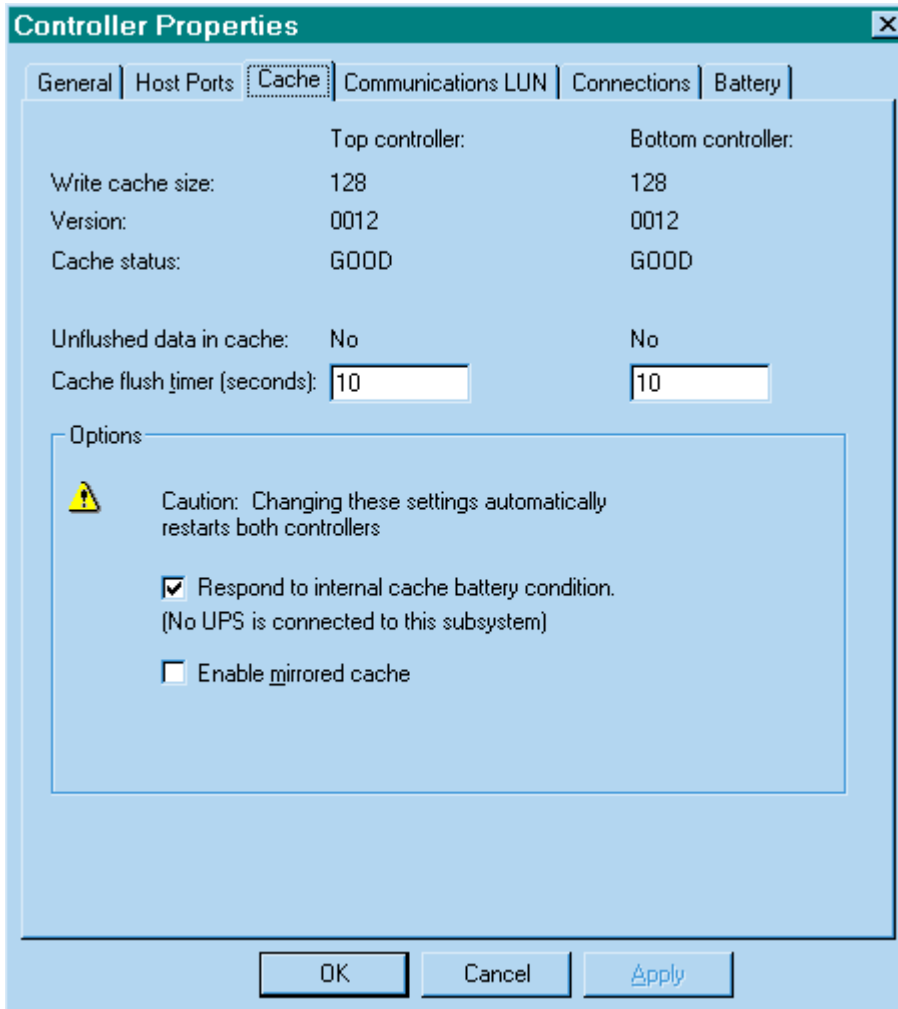
For FC switch configurations, (ACS V8.4), verify that the “Requested Topology” fields read FABRIC”, and the “Actual Topology” field reads “fabric up”. (The “Requested Port” and “Actual Port” Address fields will not exist, and the words “REMOTE COPY = none” appears at the bottom of the window). For more details regarding host port settings, reference the HSG80 User’s Guide.

3. Click the *Cache* tab to check cache size. (Figure 2-8)

Confirm the following:

- Cache flush_time: (seconds): is 10
- Respond to internal cache battery condition is selected

Figure 2-8 Cache Controller Properties Tab



4. Click the *Communications LUN* tab. (Figure 2-9)

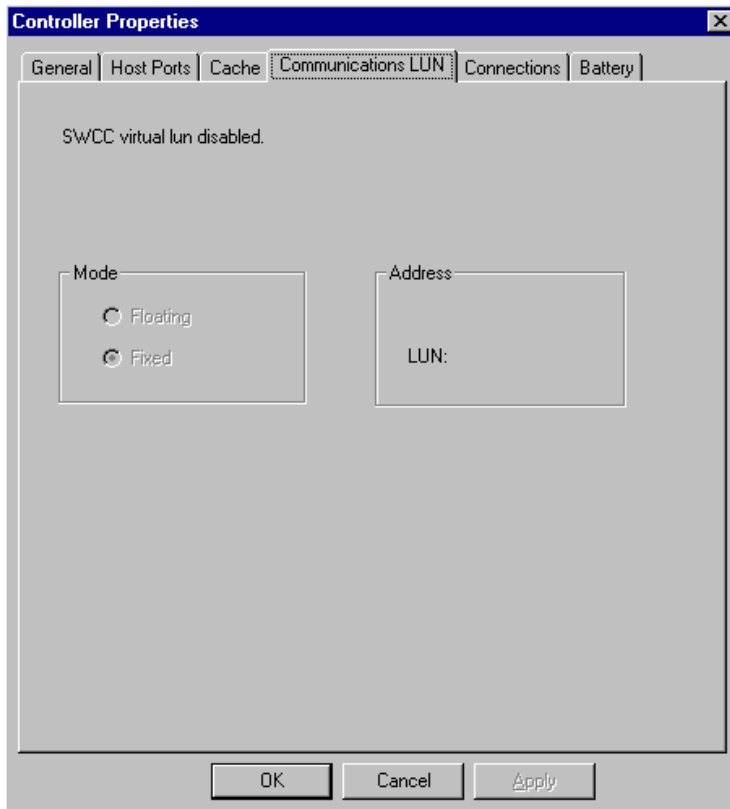
The Communications LUN is not used with Windows NT. It should be *disabled* (grayed out). If the Communications LUN is enabled, you must disable it using the CLI window. First close the Storage Window, and establish a CLI connection as described in Appendix A. To invoke a CLI window from the Command Console Client's START menu, select Command Console V2.1, then the CLI Window option.

The Connection Selection Window (Figure 2-2) 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. Return to the Windows Start Menu and select the *HSG80 Storage Window* option to re-open the storage window.

Figure 2–9 Communications LUN Controller Properties Tab

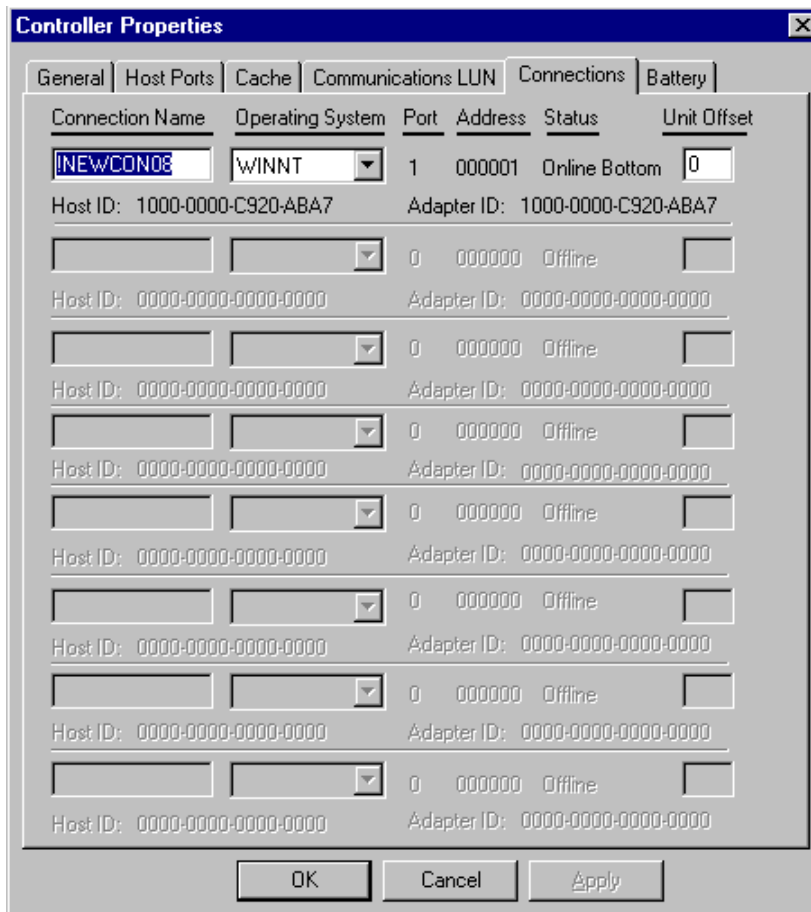


5. Click the *Connections* tab. (Figure 2-10)

Confirm the following:

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

Figure 2-10 Connections Controller Properties Tab

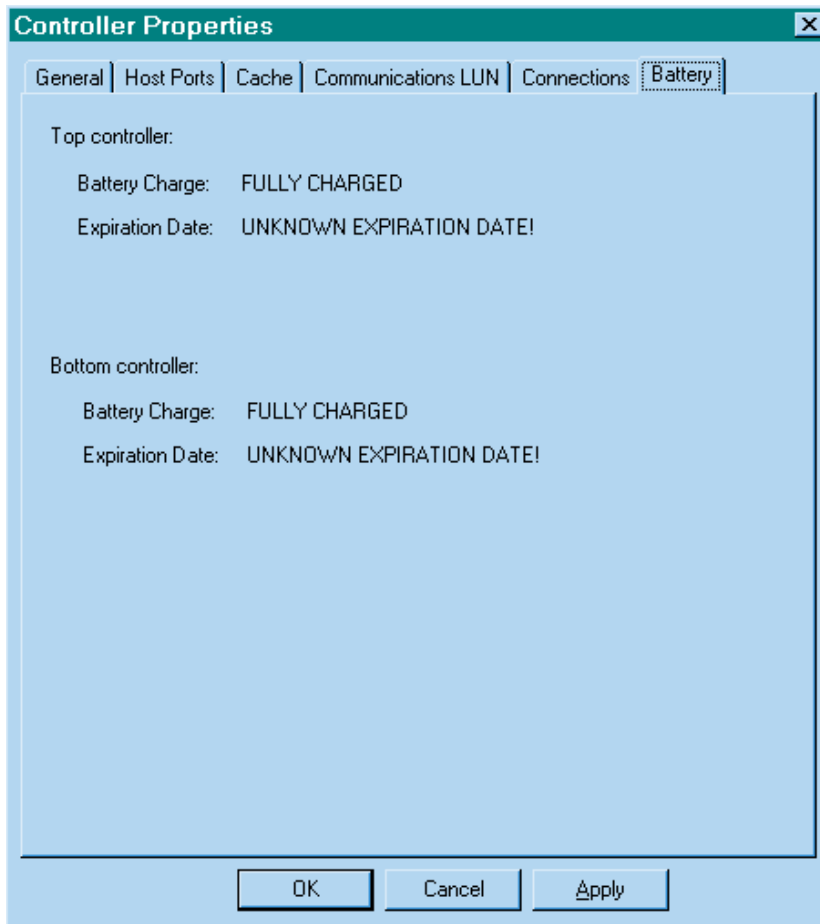


6. Click the *Battery* tab. (Figure 2-11)

NOTE

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

Figure 2–11 Battery Controller Properties Tab



2.6 Creating Your First Virtual Disk

Command Console Client can create a number of different types of logical storage units called virtual disks on your RA8000 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 Client's Virtual Disk Wizard.

Start the Wizard:

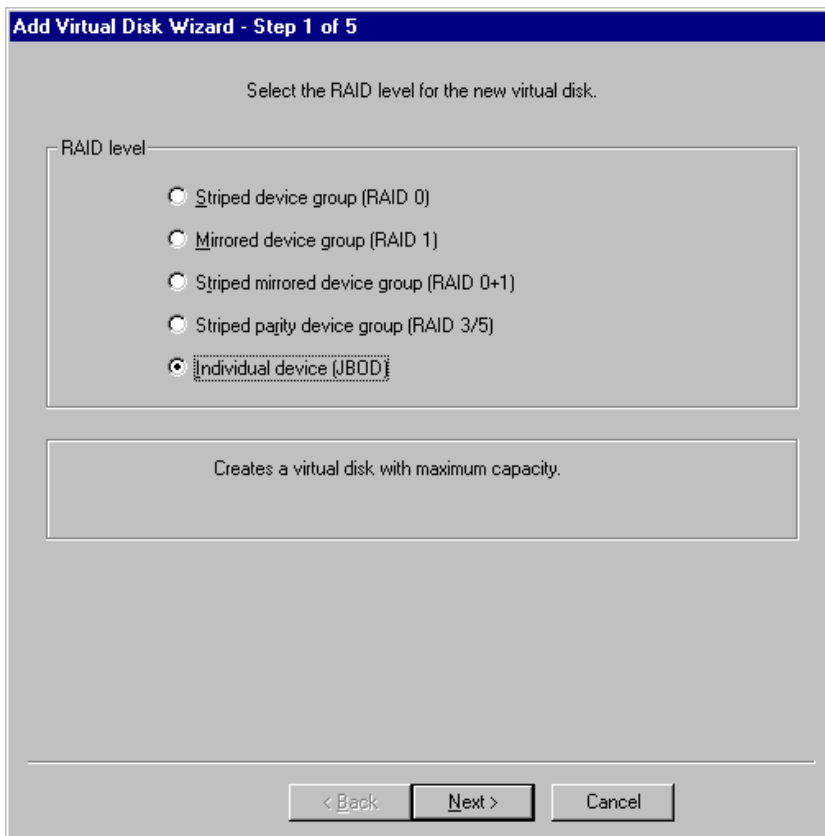
After you have established a serial connection to your RA8000 Fibre Channel Subsystem and have accessed the subsystem's Storage Window, Select *Add Virtual Disk* from the Storage menu to start the Virtual Disk Wizard.



Create the Virtual Disk:

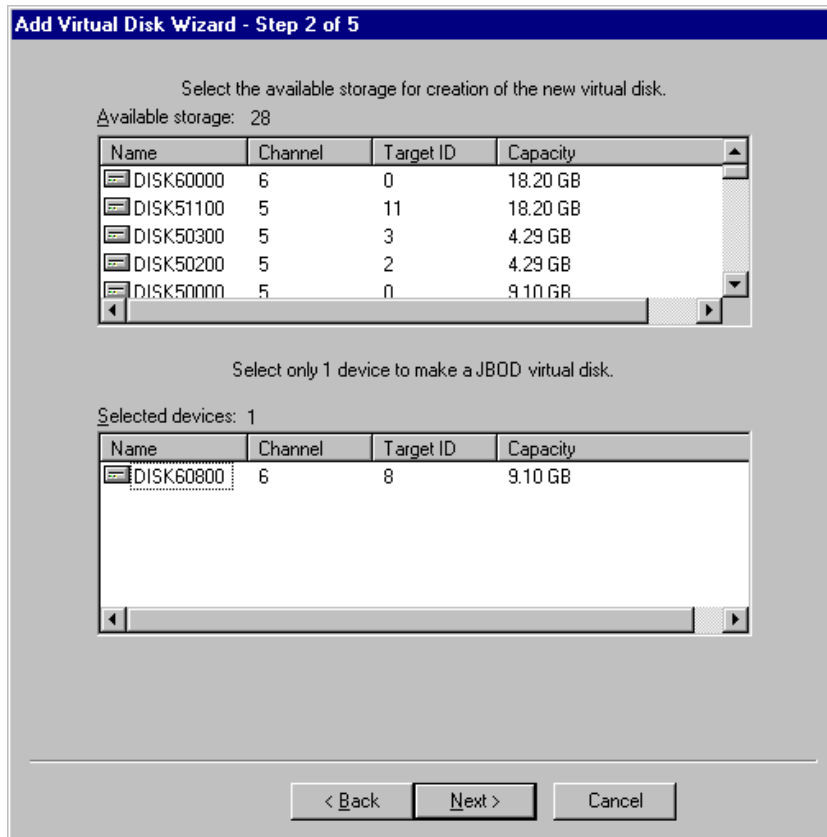
1. Click the radio button of the RAID level you want, then click *Next*.

Figure 2–12 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 *Devices available to create a new virtual disk:* window in the dialog box. As you click them, they are listed in the *Details of selected devices:* window pane.

Figure 2-13 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. Enter the size of the virtual disk you want to create in the box, then click *Add*. If you want to create multiple partitions, complete all steps for this partition. Then, access the wizard again, and enter the same choices to create another partitioned disk. When finished, click *Next*.

Figure 2–14 Add Virtual Disk Wizard - Step 3 of 5

Add Virtual Disk Wizard - Step 3 of 5

Set the capacity for the new virtual disk.

Based on the RAID level and devices you have selected, the capacity available for the new virtual disk is displayed below.

Selected RAID level: JBOD (individual device)

Set virtual disk capacity

Specify a capacity within this range:

Minimum capacity:	1 MB
Maximum capacity:	9097.82 MB
Capacity for virtual disk:	<input type="text" value="9097.82"/> MB

< Back **Next >** Cancel

4. Enter the virtual disk name (Windows NT 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*.

Figure 2–15 Add Virtual Disk Wizard - Step 4 of 5

Add Virtual Disk Wizard - Step 4 of 5

Set the options to be used when creating this new virtual disk.

Virtual Disk Name

Name (i.e.,D0 - D199) :

Enable writeback cache Maximum cached transfer: blocks

Enable readahead cache

Host access ID:

Save controller configuration to virtual disk

Replacement policy:

Read source:

Strip size (in blocks):

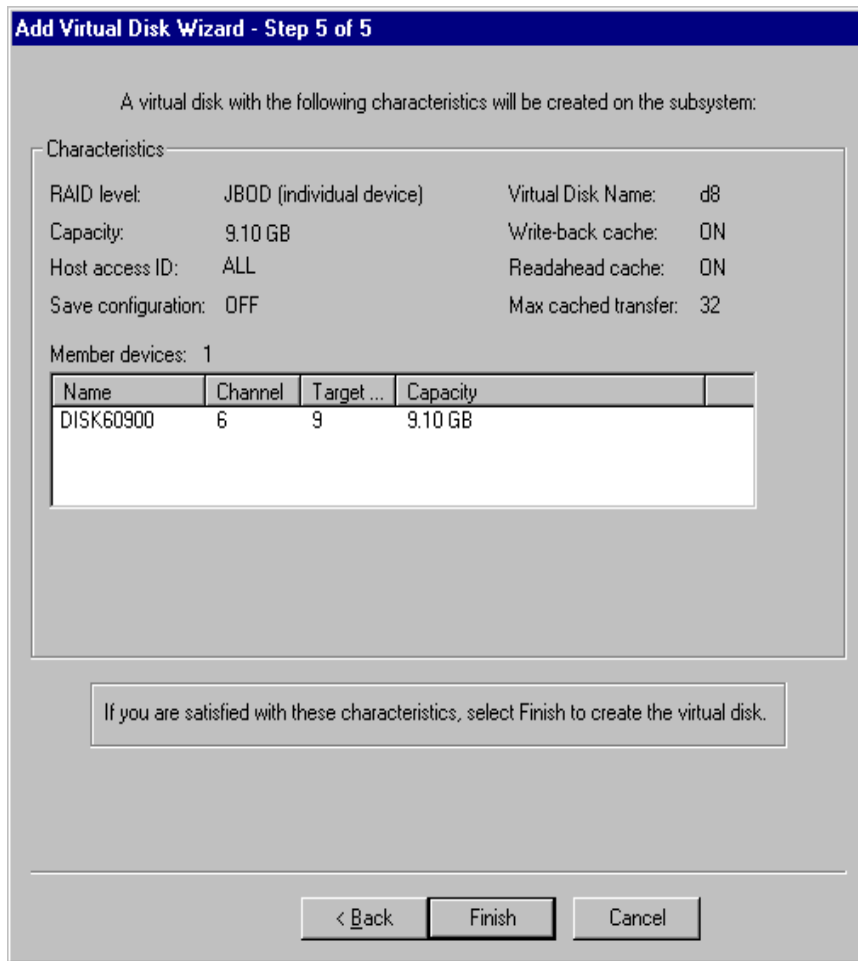
Copy speed:

Reconstruction rate:

< Back Next > Cancel

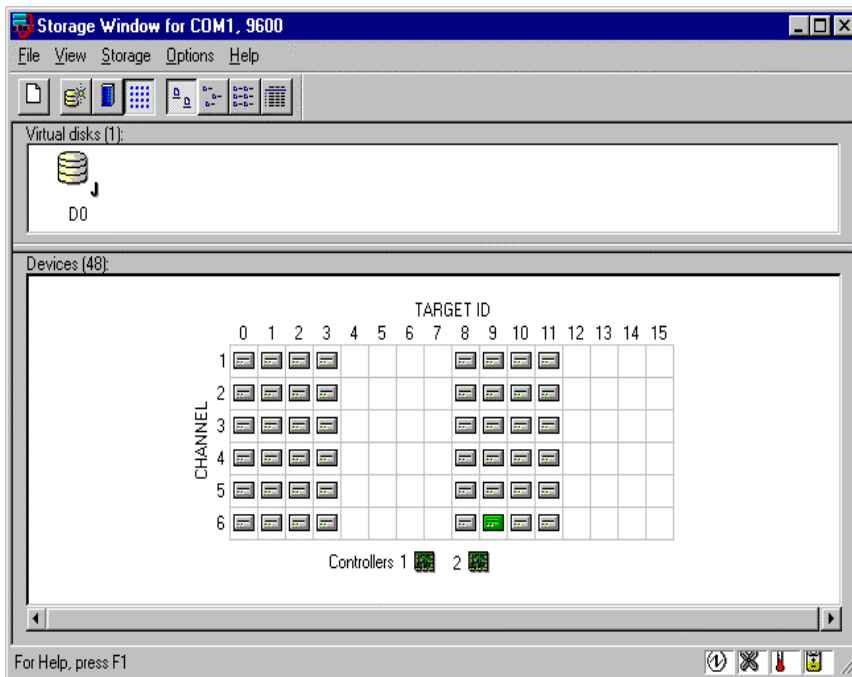
5. The final Virtual Disk Wizard window, Step 5, recaps the choices you have made in steps 1 through 4. If you are satisfied with your choices, click *Finish*.

Figure 2–16 Add Virtual Disk - Wizard Step 5 of 5



6. When you click *Finish*, the storage set will start initialization.
7. You can view the virtual disk(s) you have created by returning to the Storage Window (refer back to Section 2.4 if you need help). Figure 2-17 illustrates what the Virtual Disk Window in the Storage Window looks like.

Figure 2-17 Storage Window Virtual Disk Window



NOTE

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

3

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 support operation of the Fibre Channel switch in a Windows NT environment. (This chapter is not applicable to fibre channel hub installation).

3.1 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). Please reference the Quick Setup 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 reboot the switch to implement changes.

3.2 Installing the Fibre Channel Switch Client

This chapter contains instructions on how to install the Fibre Channel Switch Client on Windows 98, Windows 95, and Windows NT version 4.0 (Alpha and Intel) 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. For this software release, the Fibre Channel Switch Client will only provide information about your switches.

CAUTION

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

- Verify that you have installed Command Console Client version 2.1 or version 2.0. 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 `fcswitch.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.

3.2.1 Beginning the Fibre Channel Switch Client Installation

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

1. Place the *Compaq StorageWorks Fibre Channel Switch* CD, (part no. AG-RHC1A-TE, 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*.

3.2.2 Completing the Fibre Channel Switch Client Installation

1. Click *N*ext to continue. The Command Console License Agreement window appears.
2. 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.
3. Click *O*K. The Fibre Channel Switch Client is installed into the directory in which the Command Console Client is located (C:\Program Files\swcc). In most cases, the Fibre Channel Switch Client will be installed into the following directory:

C:\Program Files\swcc\FibreWindow

4. 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 shown that a switch has been added). AES starts when your system is booted.

Windows NT:

To stop or restart AES, click the *S*ervices icon located under the Control Panel. “*AsyncEventSvc*” 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

Windows 98, Windows 95:

To stop or restart AES, click the *A*sync *E*vent *S*ervice icon located under the Control Panel. To disable the automatic start of AES when your system boots, deselect the *A*utomatic *S*tart *U*pon *B*oot option, and then click *A*pply.

3.2.3 Removing the Fibre Channel Switch Client from Windows NT

When you remove the Fibre Channel Switch Client, you will remove the Fabric window. The Command Console Client will still be on your computer. The following procedure tells you how to remove the Fibre Channel Switch Client on Windows 98, Windows 95, and Windows NT.

1. Click *S*ettings under the *S*tart menu, then click *C*ontrol *P*anel.
2. Double-click the *A*dd/*R*emove *P*rograms icon in the Control Panel. The Add/Remove Program Properties window appears.
3. Highlight *S*torageWorks*F*ibre*A*pplet located in the window, and then click *A*dd/*R*emove. The computer removes the Fibre Channel Switch Client.

3.3 Installing the Fibre Channel Switch Agent

This chapter contains instructions for installing the Fibre Channel Switch Agent on Windows NT version 4.0. 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 NT version 4.0 operating system are separated into two sections: “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.

CAUTION

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 must be done locally. Do not attempt to install the Agent over the network.
- For the Alpha computers running Windows NT, verify that you have only Windows NT service pack 3 (*My Computer*|Help|About).
- Verify that you have the Windows NT 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 Windows NT SNMP service is available on your Windows NT installation CD-ROM. To check, double-click *Services* in *Start*|Settings|Control Panel. After SNMP service has been installed, re-install Windows NT service pack 3.
- For the Intel computers running Windows NT, verify that you have Windows NT service pack 3 or 4 (*My Computer*|Help|About).

3.3.1 Beginning the Fibre Channel Switch Agent Installation

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

1. Place the *Compaq StorageWorks Fibre Channel Switch* CD, (part number AG-RHC1A-TE, 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\agent*
4. Double-click on *Setup*.

3.3.2 Completing the Fibre Channel Switch Agent Installation

1. Click *N*ext to continue. The Command Console License Agreement window appears.
2. Click *N*ext to continue. The Command Console Setup window appears.
3. Select the destination directory for the Agent software, then click *N*ext. The default is the following: *C:\Program Files\swcc\FibreAgent*
The Folder Selection window appears.
4. Type a name for the folder, then click *N*ext. The default name 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 installation 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 *N*ext 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 *N*ext. 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. The following table lists the definitions of the notification schemes:

Notification Scheme	Function
Transmission Control Protocol/ Internet Protocol (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.

3.3.3 Removing the Fibre Channel Switch Agent from Windows NT

The following instructions tell you how to remove the Agent:

1. Click *Settings* under the *Start* menu, then click *Control Panel*. Double-click *Services*, and select *SWCC Fibre Agent*.
2. Click *Stop* to stop the Agent.
3. Click the *Add/Remove Programs* icon in the Control Panel. The *Add/Remove Program Properties* window appears.
4. Select *StorageWorkFibreAgent* located in the window, and click *Add/Remove*. The computer asks:

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 `client.ini` and `storage.ini` files for the Fibre Channel Switch Agent are usually in the same directory as the `FibreAgent.cfg` file

File Name	File Type
FibreAgent.cfg	Configuration File
client.ini	Client List File
storage.ini	Parameter File

3.4 Configuring the Fibre Channel Switch Agent on Windows NT

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

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

3.4.1 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. The following table lists the definitions of the notification schemes:

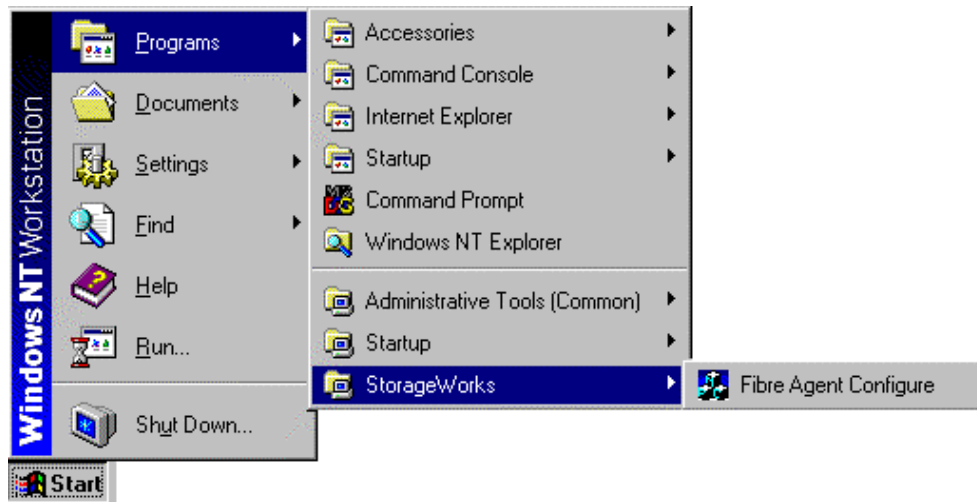
Notification Scheme	Function
Transmission Control Protocol/ Internet Protocol (TCP/IP)	Is the Client's notification scheme. If you do not select TCP/IP, the Client will only display a subsystem change when you refresh the Fabric window.
Simple Network Management Protocol (SNMP)	Must have an SNMP-compatible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

3.4.2 Adding a Client System Entry

To add a Client system entry, follow these instructions:

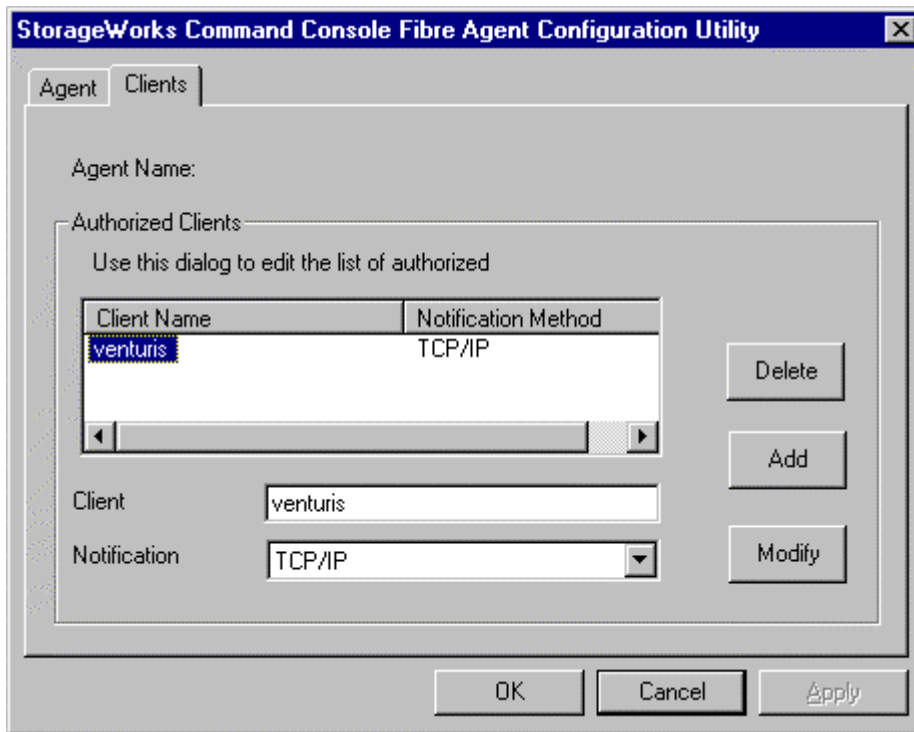
1. Select the Fibre Agent Configure entry in *Start/Programs/StorageWorks*, as shown in Figure 3-1.

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 3-3.

Figure 3–2 SWCC Fibre Channel Agent Configuration Window - *Clients* Tab Selected



1. Type the Client's name.
2. Select the *Notification Scheme*: TCP/IP and/or SNMP or none.
3. For a definition of the notification schemes, please read the section, "Client Notification Options," located at the beginning of this chapter.
4. Click *Add Client* to add the Client system entry to the Client list.
5. 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.
6. The software asks you if you want to restart the Agent.
7. Click *Yes*. The Agent is restarted.

3.4.3 Modifying a Client System Entry

This section contains instructions on how to modify a Client system entry on Windows NT.

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.
5. For a definition of the notification schemes, please read the section, “Client Notification Options,” located at the beginning of this chapter.
6. Click *Modify Client*.
7. 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.
8. The software asks you if you want to restart the Agent.
9. Click *Yes*. The Agent is restarted.

3.4.4 Deleting a Client System Entry

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

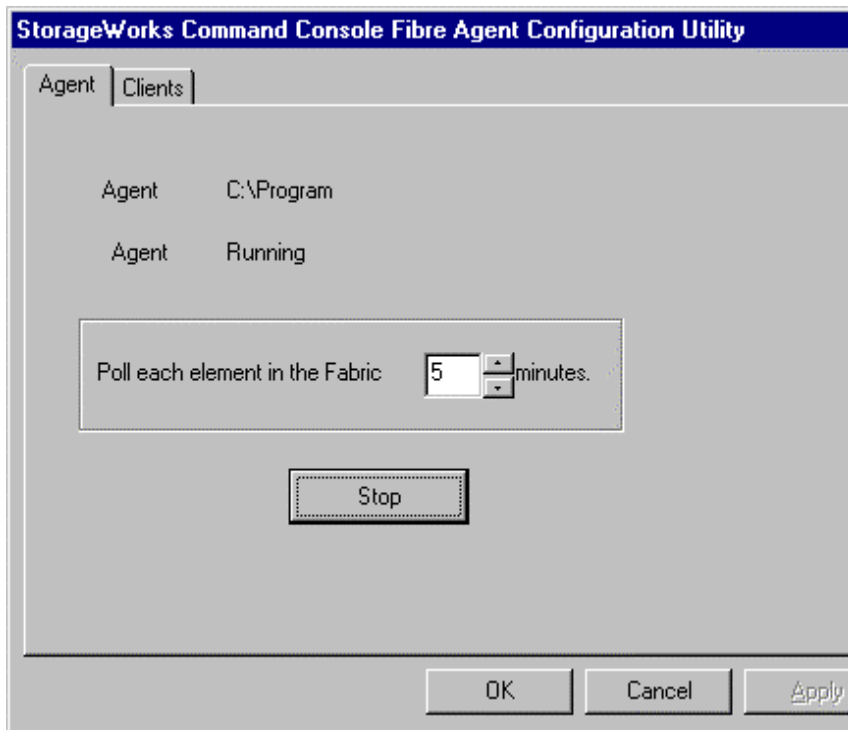
1. Click the Fibre Agent Configure entry in *Start/Programs/StorageWorks*. The StorageWorks Command Console Fibre Agent Configuration window appears.
2. Click the *Clients* tab. The Clients window appears.
3. Select the Client system entry to delete in the list.
4. Click *Delete Client*. The Client system 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. The software asks you if you want to restart the Agent.
7. Click *Yes* to restart the Agent.

3.4.5 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 window appears (Figure 3-3).
2. 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.
3. Click *OK* to confirm your choice. You are asked to restart the Agent
4. Click *Yes* to restart the Agent.

Figure 3–3 SWCC Fibre Channel Agent Configuration Window - Agent Tab Selected



3.4.6 Stopping and Starting the Fibre Channel Switch Agent

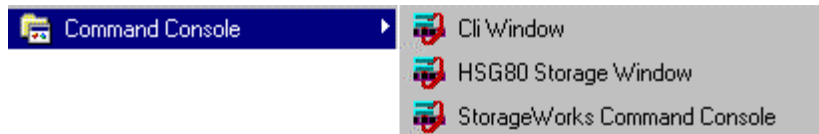
This section contains instructions on how to stop and then start the Fibre Channel Switch Agent:

1. Click the Fibre Agent Configure entry in *Start/Programs/StorageWorks*. The StorageWorks Command Console Fibre Agent Configuration 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.

3.5 Connecting to the Fibre Channel Switch using the SWCC Client

1. From the START menu, select Command Console, then StorageWorks Command Console (reference 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

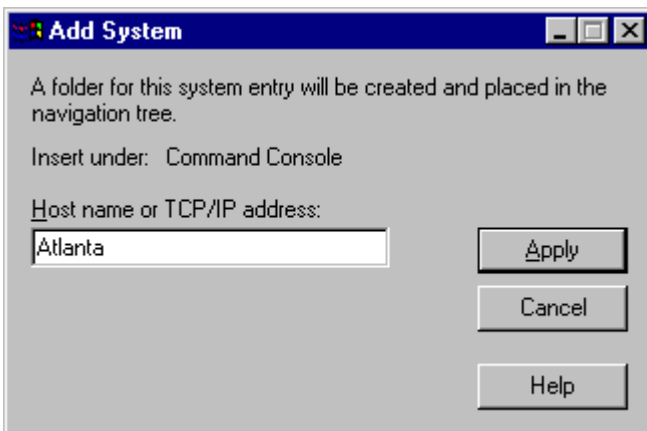


3. In the *Add System* Window (Figure 3–6), enter the name or the TCP/IP address of the Client host system on which you are running the software, then click *Apply*.

NOTE

The Client host name or address entered here must be the same as the host name added to the agent, as described in Section 3.3.2, *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.

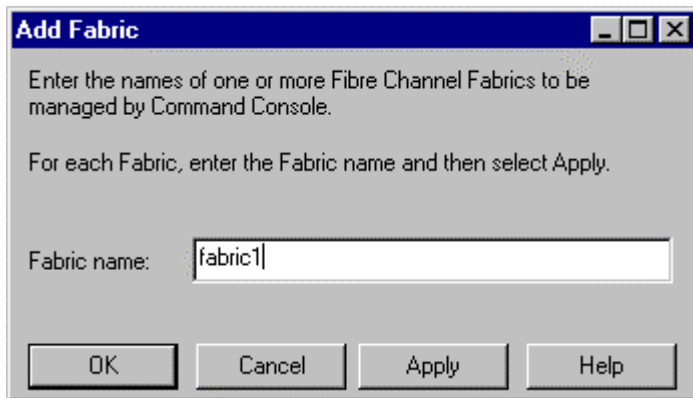
4. Click on the + icon next to the Client host system folder. The Fibre Channel Network is displayed, along with the Fabric Window icon, as shown in Figure 3-7.

Figure 3-7 “Atlanta” Client Host Added (Folder Open)



5. Doubleclick on the Fabric Window icon to launch the Fibre Channel Switch Client. The Add Fabric Window will appear (Figure 3–8).

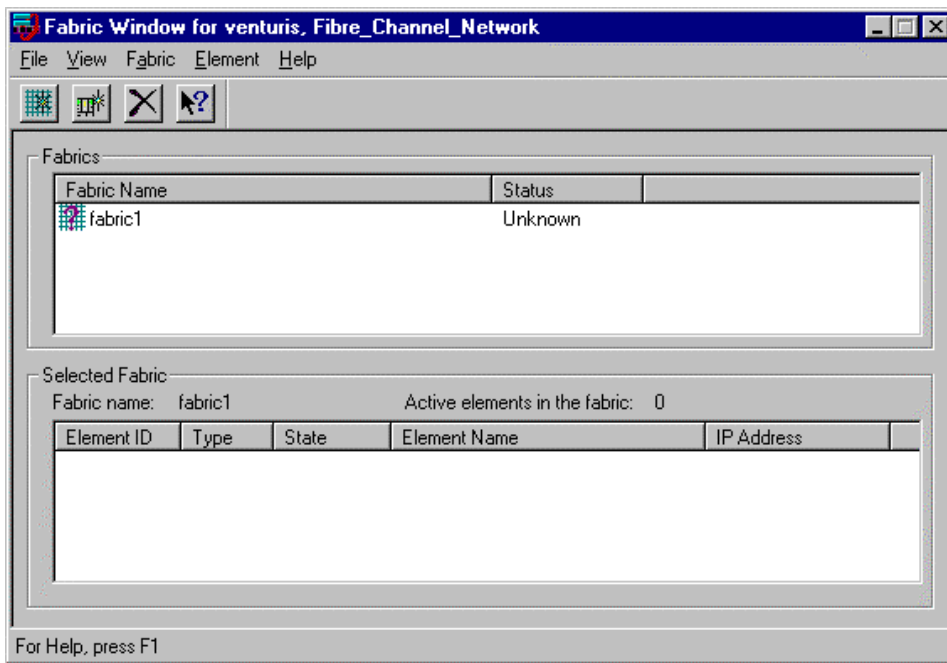
Figure 3–8 Add Fabric Window



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.

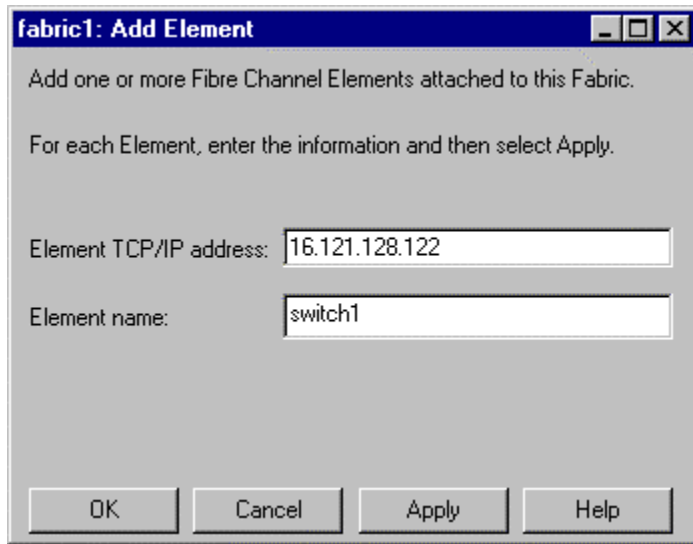
Figure 3-9 Fabric Window for Client Host, Fibre Channel Network



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.

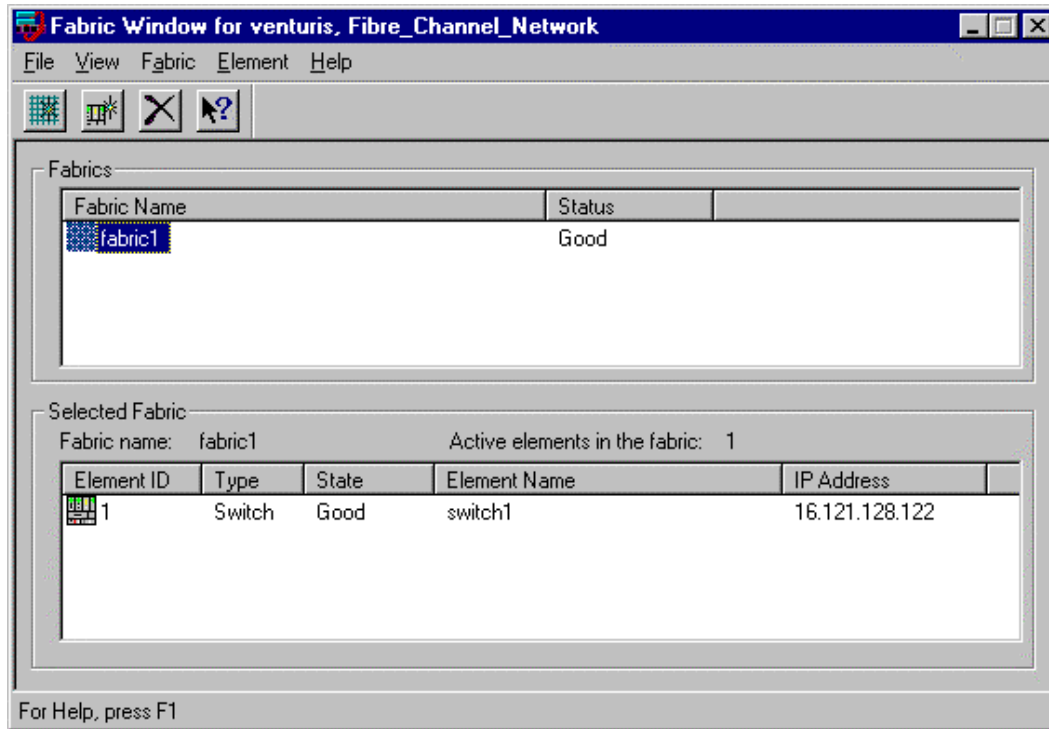
Figure 3–10 Adding a Fibre Channel Element to the Fabric



8. In the first field, enter the TCP/IP address of your Fibre Channel Switch. (This must be the same address entered in Section X.X, *Initial FC 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 will appear in the Fabric Window, as shown in Figure 3-11.

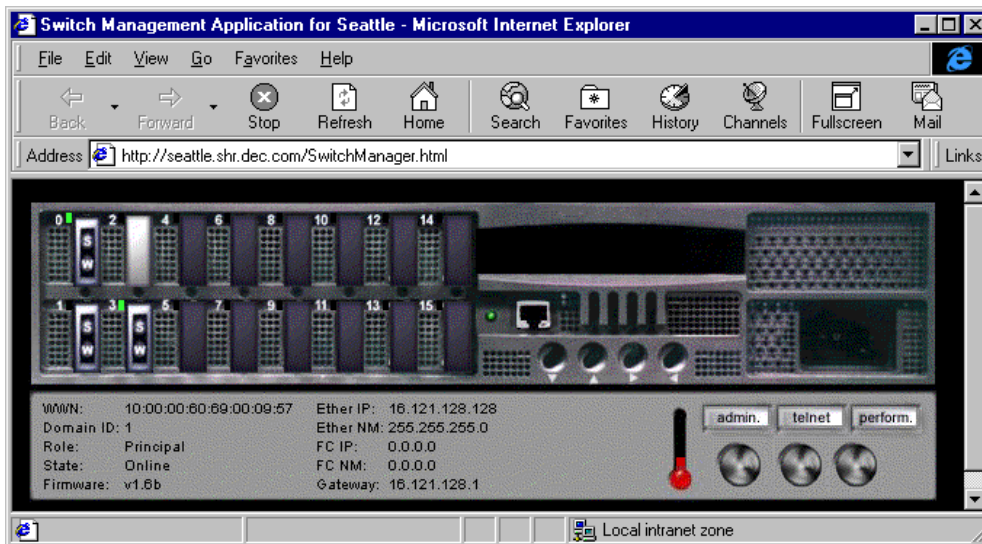
Figure 3-11 Fabric Window shows Switch Name and Address



9. To launch the Switch Management Application, doubleclick 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.

Figure 3–12 Fibre Channel Switch Image



4

Completing Your Storage Configuration under Windows NT

This chapter contains instructions for completing your configuration under Windows NT.

4.1 Completing Your Configuration under Windows NT

In order for Windows NT to recognize new RA8000 Fibre Channel subsystem devices or changes to existing configurations, you must reboot your system to restart Windows NT.

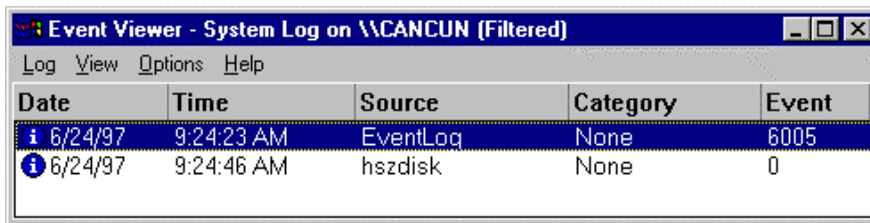
4.1.1 Verifying that HSZDISK.SYS Loaded

Prior to running Disk Administrator, verify that hszdisk recognizes the volumes that you created in the RA8000 Fibre Channel as follows:

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

- If an entry for hszdisk appears with 0 in the *Event* column, as shown in Figure 4-1, the hszdisk loaded successfully and connected to at least one logical volume in the RA8000 Fibre Channel.
- If no entry for the hszdisk appears in the Event View window, reinstall hszdisk.
- If an entry for hszdisk appears with a 1 in the *Event* column, hszdisk did not load because it did not find any logical drives. Ensure that you have added logical units correctly.

Figure 4-1 Successful hszdisk Load



4.1.2 Completing a New RAID Array Configuration

This section summarizes how to use the Windows NT Disk Administrator to complete a new RA8000 Fibre Channel subsystem configuration under Windows NT. For additional information, refer to your Windows NT documentation. Before you begin, remember to safeguard critical data. Back up your system using normal backup procedures before altering device partitions.

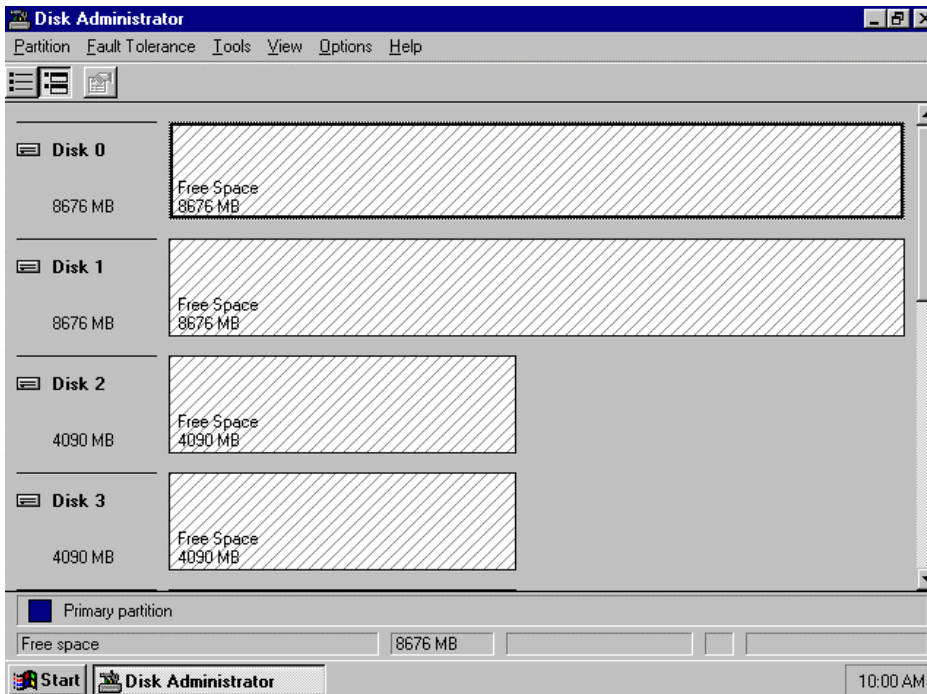
Starting the Disk Administrator

From the Start menu on the NT 4.0 Desktop, select *Programs/Administrative Tools (Common)/Disk Administrator*. Click on *Disk Administrator* to run the Disk Administrator program. A sample Disk Administrator screen is shown in Figure 4-2.

NOTE

The first time you run Disk Administrator after adding new disks, one or more message window(s) may appear asking you to confirm whether you want to have Disk Administrator provide its "signature" on the new disks. Confirm doing so (by clicking on **Yes**) in order to have Disk Administrator recognize these new disks. For more information on this subject, refer to your Windows NT documentation.

Figure 4–2 Disk Administrator Screen Display



Understanding the Disk Administrator Display

Disk Administrator creates a “Bar Chart” display of your disk configuration. The figure shows that Windows NT has named the various devices that were created using the RA8000 Fibre Channel subsystem. Each disk device found by Windows NT is given a name; e.g., Disk 0, Disk 1, etc. There should be an entry shown for each disk (JBOD) or storageset created.

Windows NT assigns disk names based on the order in which the system drivers “find” disks during Windows NT boot. The RA8000 Fibre Channel subsystem uses a special disk class driver (*HSZDISK.SYS*) that connects to all HSG80 disks *before* any other disks present in the system are connected. Therefore, the first entries in the Disk Administrator display should represent all your RA8000 Fibre Channel subsystem logical volumes. The figure also shows the corresponding free space for each entity.

Verifying your configuration

1. Check that there is an entry in the Disk Administrator display for each of your RA8000 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 or the RA8000 Fibre Channel subsystem. If it does not match, recheck the logical configuration for the RA8000 Fibre Channel subsystem and its members.

NOTE

Disk Administrator displays the “usable” capacity of a RAIDset and MIRRORset, not the combined total of the physical members.

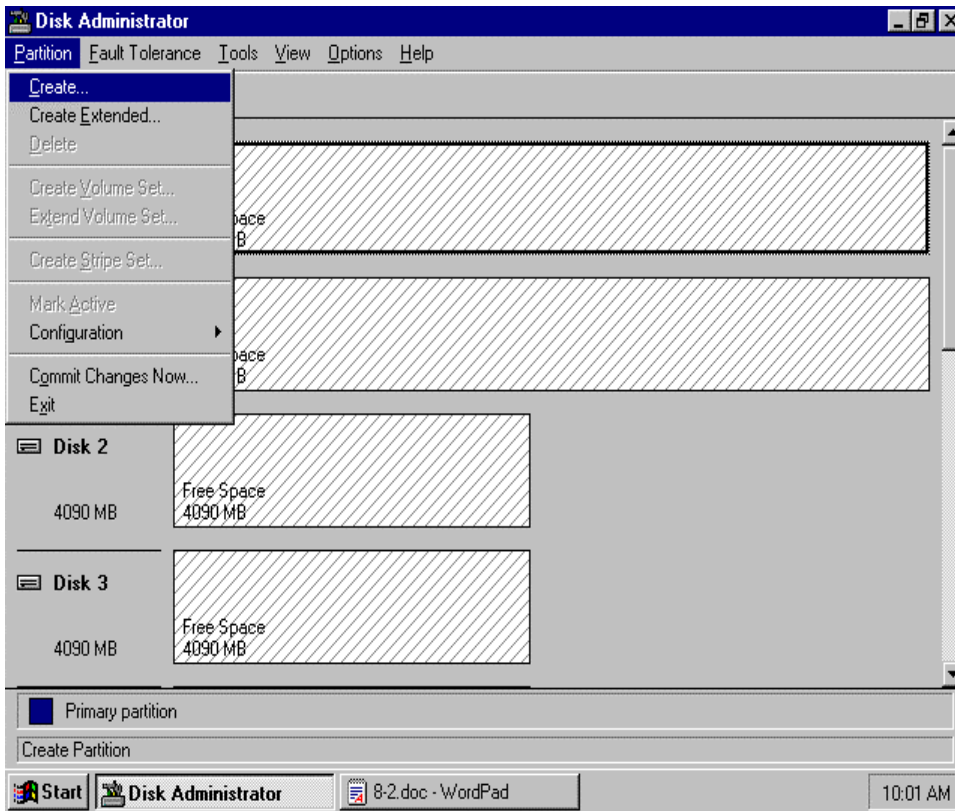
Creating the partitions

1. For each disk shown, click on the partition area that you want to create.
2. From the *Partition* pull-down menu, choose *Create* (see Figure 4-3) to display the *Create Primary Partition* window (see Figure 4-4).

NOTE

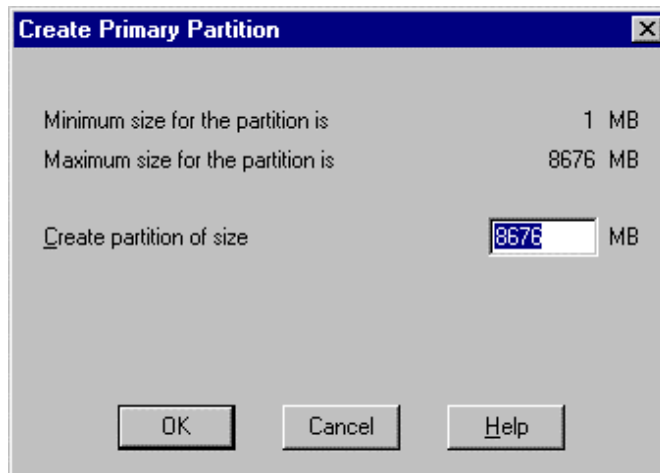
A disk cannot be accessed unless it contains at least 1 valid partition that was created under disk administrator.

Figure 4-3 Partition Pull-down Menu



3. In the *Create Primary Partition* window, enter the size partition you want, then click on *OK*. (Depending upon the partition size you choose, a message window may appear asking you to confirm your selection.)
4. Continue to create new partitions until all disks have been partitioned.

Figure 4-4 Create Primary Partition Window



Making drive letters permanent

The process of creating partitions assigns a logical name (the letter "C," "D," etc.) to each partition. These letter assignments, under Windows NT, will normally "float." As an option, you can make the drive letters permanent. If you want to make the letter assignments permanent, proceed as follows:

1. Access the *Tools* pulldown menu (see Figure 4-5).
2. Select *Drive Letter* then choose *To Assign*. This process must be repeated for each partition (drive letter) that you wish to make "permanent."

Committing the changes

When you have created all your partitions, commit the changes:

1. Access the *Partition* pull-down menu
2. Click on *Commit Changes Now*. A message window appears asking you to confirm the changes. Confirm the changes if they are correct.

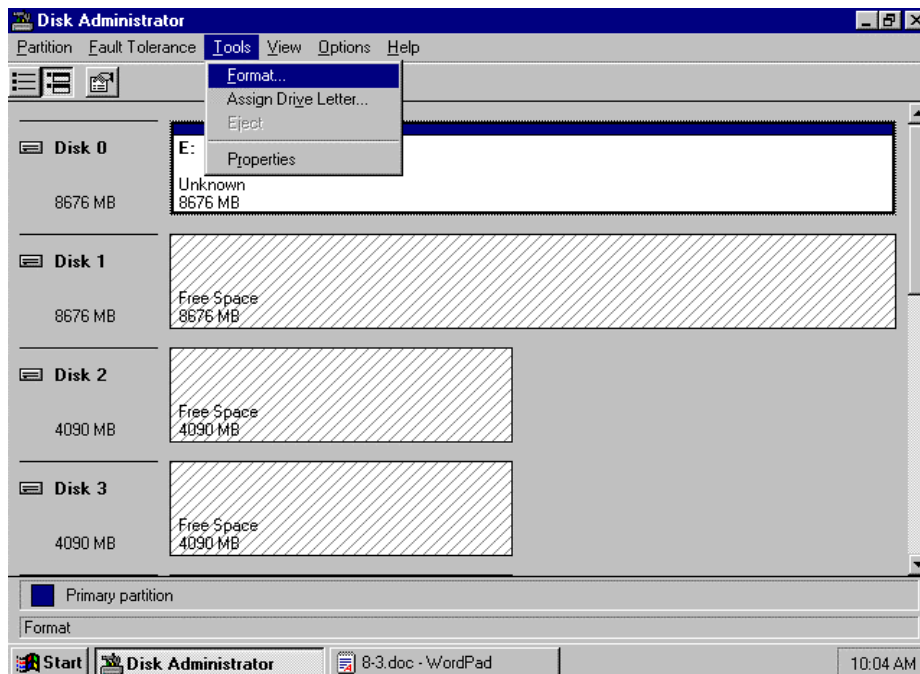
NOTE

A message window will appear following this step asking you if you wish to save a copy of the configuration to a floppy. You may do so at this time, as prompted by the screen display.

Formatting the newly created partitions

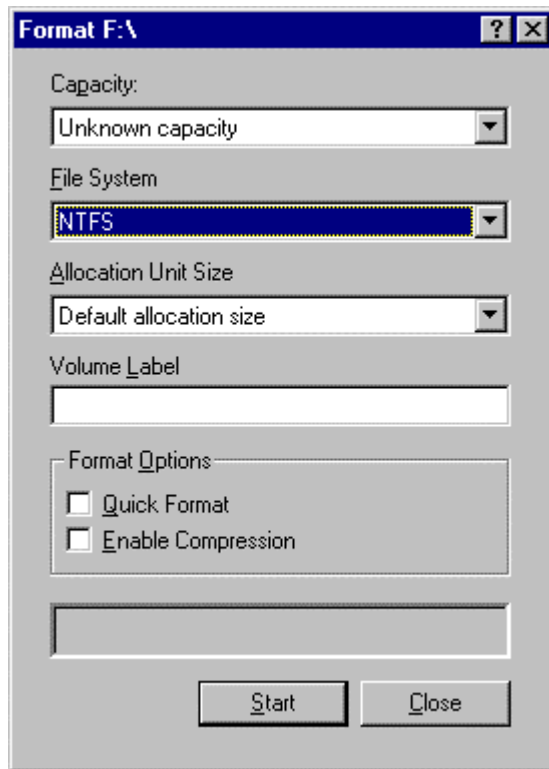
1. While still running Disk Administrator, click on the *Tools* pull-down menu (Figure 4-5), and select *Format* to access the *Format* menu (Figure 4-6). The *Format* menu choices allow you to choose the file system type, *FAT* or *NTFS*, and the *Quick Format* option.

Figure 4-5 Tools Pull-down Choices



2. Select a file system and click *Start* to begin the format process. A message window appears advising you when the formatting is complete.

Figure 4–6 Format Menu



3. Continue to format each new partition until all partitions have been formatted.
4. When all partitions have been formatted, close Disk Administrator. At this point, the configuration has been completed, and is recognized by Windows NT.

4.1.3 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 Disk Administrator. After they have been deleted, you may use the RA8000 Fibre Channel subsystem CLI to create new Stagesets.

Removing disk partitions

1. From *Disk Administrator*, 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 Fibre Channel subsystem using the CLI.
4. Reboot your system so Windows NT will recognize the changes.

5

Communicating Over a Network

This chapter describes how to install and configure Command Console Agent as required to establish communication over a network, and how to add storage subsystem host servers to the network using Command Console Client.

NOTE

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

5.1 Introduction

To communicate with your RA8000 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 NT 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 that the storage subsystem is connected to.

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, allowing 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 Fibre Channel Subsystem. Before you can communicate with your storage subsystem over a network, the client address must be added to the agent database.

5.2 Before You Start

- To run Agent your system resources must meet the minimum requirements listed in Table 5-1.

Table 5-1 Minimum Agent Host System Requirements

Host Feature	Requirement
PC Requirements	Intel 486, 66 MHz, 16 MB memory, 1 MB free disk space, and a CD-ROM drive
Operating System	Microsoft Windows NT 3.51 or NT 5.0
Network Connection	TCP/IP-compatible network card
Controller Compatibility	StorageWorks HSG80 Array controller

- 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 subsystem(s) connected to Agent's host system.
- You need to have installed TCP/IP services on your NT server.
- You need to have created a "communications" virtual disk on your RA8000 Fibre Channel Subsystem using Command Console Client and a serial port connection (Chapter 1).
- You need to have assigned a Windows NT drive letter to the "communications" virtual disk using the Disk Administrator (Chapter 4).

5.3 Installing the Agent

The SWCC Agent software is installed on your host system from the StorageWorks Command Console (SWCC) 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 software installation program provides two main options (reference Figure 5-1):

- Solution Software for ACS v8.4 with FC Switch
- Solution Software for ACS v8.3 with FC Hub

Click on the Solution Software option appropriate to your ACS version.

Figure 5-1 Solution Software ACS Version Selection Menu



From the Fibre Channel Solution Software menu that appears, select *Install Command Console Agent*. The SWCC Agent software will be automatically installed.

5.4 Configuring Agent

As part of the installation process, the Agent program will automatically prompt 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 *HSG NT Agent Configurator* from the *Start Menu* (Figure 5-2).

Figure 5–2 Start Menu



5.4.1 Enter a Password (Step 1 of 3)

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

Figure 5–3 HSG NT Agent Configuration - Step 1 of 3

NT Agent Configuration Step 1 of 3

The Agent requires a password for access. Please enter a password between 4 and 16 characters inclusive.

New

Verification

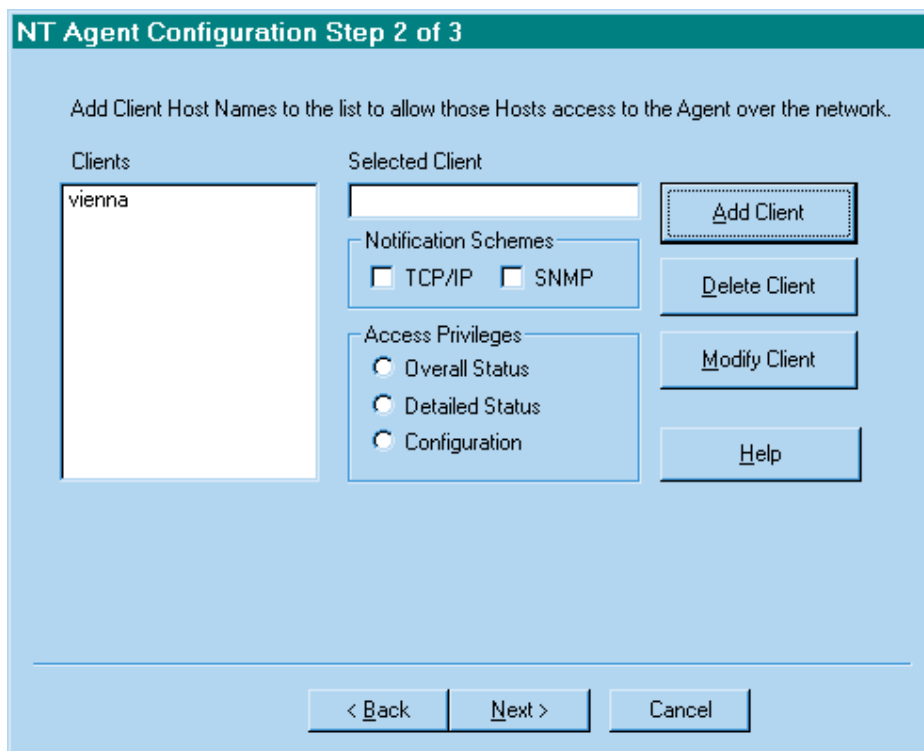
Help

< Back Next > Cancel

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

In the *HSG NT Agent Configuration Step 2 of 3* Screen (Figure 5-4) 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* window pane. When you are finished, click *Next*.

Figure 5-4 HSG NT Agent Configuration - Step 2 of 3 (for Client)



5.4.3 Enter Storage Subsystem Data (Step 3 of 3)

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

Figure 5-5 HSG NT Agent Configuration - Step 3 of 3

NT Agent Configuration Step 3 of 3

Creates a name for the subsystems, assigns an NT Drive Letter, and enters a monitor time interval in which the Agent will poll subsystem state information.

Storage Subsystems
subsys1

Selected Subsystem
subsys1

Communication Drive Letter
E

Monitor Interval (seconds)
300

Subsystem Enabled

Controller Type: HSG80
EMU Type: Smart
Controller1: ZG81000793
Controller2: ZG81000729
Firmware Version: V83G
Total Number of Devices: 1
Devices: E

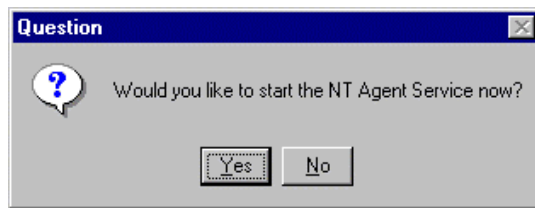
Add Subsystem
Modify Settings
Delete Subsystem
Help

< Back Finish Cancel

5.4.4 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 5-6). Click *Yes* to run Agent.

Figure 5-6 Starting Agent Dialog Box



5.5 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 95 or Windows NT PCs. To complete the network link proceed as follows:

1. Install Command Console Client. (Refer to Chapter 5 in this guide.) 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 5-7). After a short wait, Client will display the *Navigation Window* (Figure 5-8). The Navigation Window lets you monitor and manage storage subsystems over the network.

Figure 5-7 Command Console Start Menu

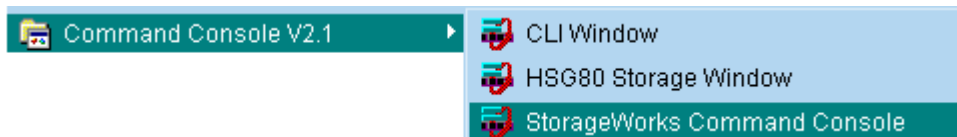
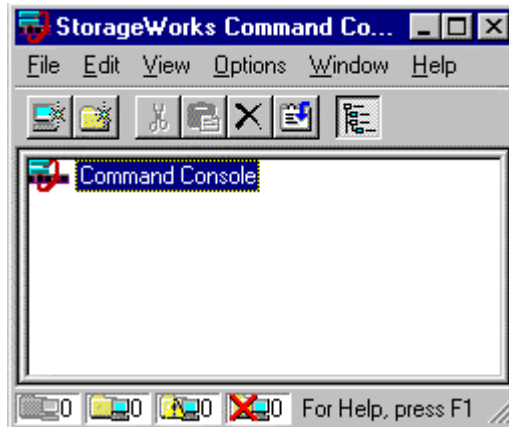


Figure 5–8 Navigation Window



4. From the *Navigation Window's File Menu* (Figure 5-9), select *Add System* to display the *Add System Dialog Box* (Figure 5-10).

Figure 5–9 Navigation Window's File Menu

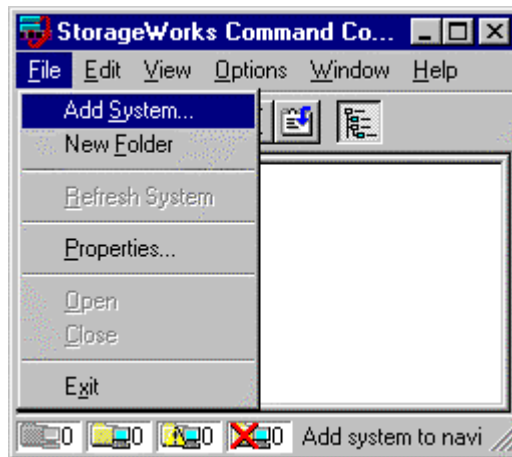
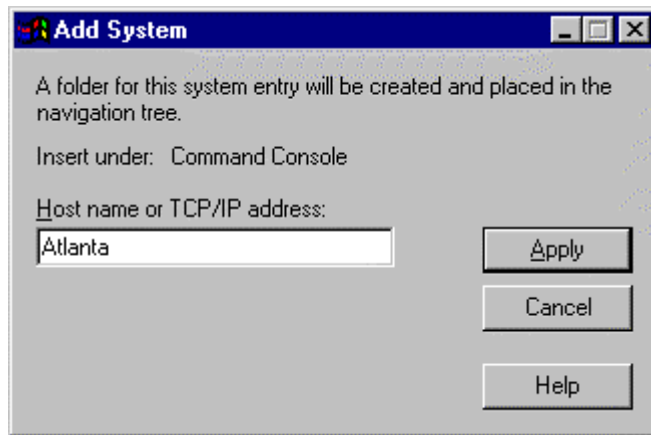
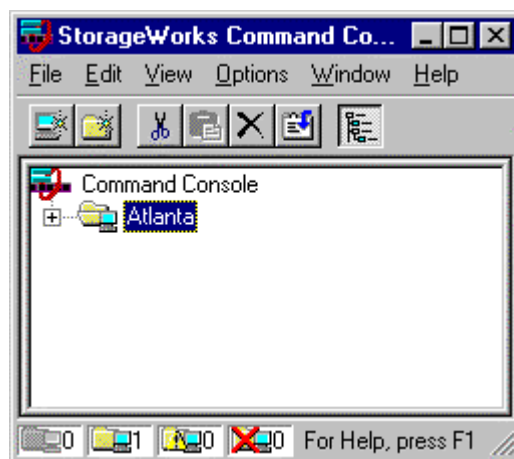


Figure 5–10 Add System Dialog Box



5. Enter the host platform name, as defined in Agent, then click the *Apply* button. Command Console Client searches for, finds; then displays the storage subsystem's host system as an icon in the *Navigation Window* (Figure 5-11).

Figure 5–11 Navigation Window Showing Storage Host System “Atlanta”



6. Click on the plus sign to expand the host computer icon. When expanded, the Navigation Window displays an icon for the storage subsystem (Figure 5-12). In this example the storage subsystem is named *subsys1*. To access the *subsys1*'s Storage System, double-click on the *Storage Window* icon.

Figure 5–12 Navigation Window Showing Expanded “Atlanta” Host Icon



Double-click on the Storage Window icon to open a Storage Window to monitor and manage your RAID Array 8000

NOTE

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



Creating Your Storage Configuration with the CLI

This chapter 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 Chapter 1.

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

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

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

A.1 Configuration Guidelines

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

A.1.1 Controller Device Configuration Guidelines

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

```
ADD MIRRORSET MIRR_1 DISK10000 DISK20000
ADD MIRRORSET MIRR_2 DISK20100 DISK10100
```

A.1.2 Controller Host System Configuration Guidelines

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

Each logical unit number contains the following:

- A letter that indicates the kind of devices in the storage unit. For example, D for disk drives
- A number from 0-7 or 100-107

Each HSG80 controller has two host ports, Port 1 and Port 2, as shown in the following figures. Unit numbers D0-D7 are assigned to Host Port 1, unit numbers D100-D107 are assigned to Host Port 2. You can specify a maximum of 8 host logical units per host port, for a total of 16 host units when access is from two hosts.

NOTE

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

Figure A-1 Single Controller/Single Host

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

- 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.

Figure A-2 Single Controller/Two Hosts

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

- 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.

Figure A-3 Dual Controller/Single Host

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

- 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.

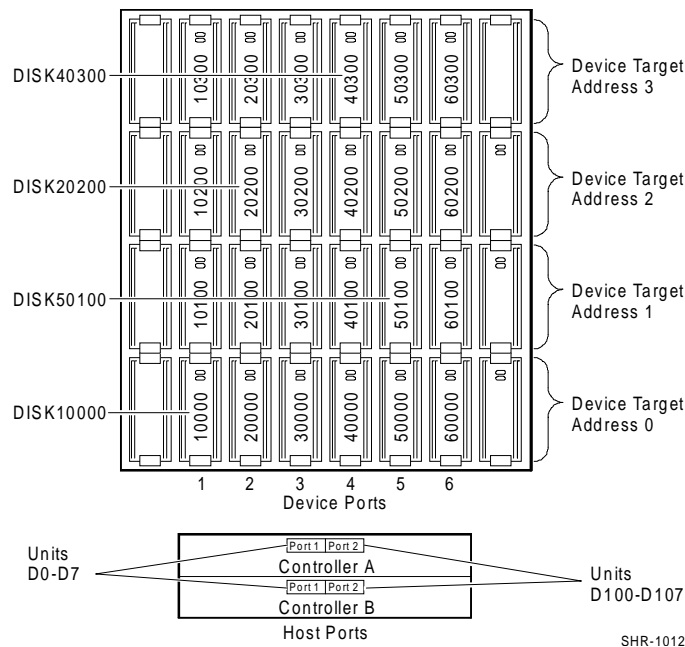
Figure A-4 Dual Controllers/Two Hosts

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

- 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



A.2 Accessing the CLI

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

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

See the *COMPAQ StorageWorks Command Line Interpreter (HSG80) Reference Manual* for detailed descriptions of all CLI commands.

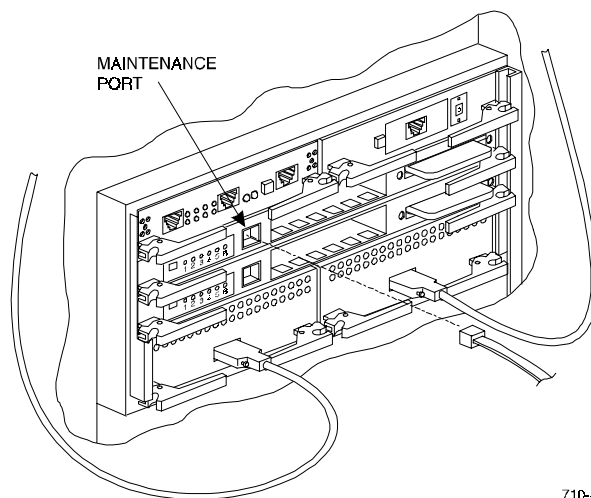
You must make a serial connection to the HSG80 controller to access the CLI.

A.2.1 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 RA8000 Fibre Channel subsystem. 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



71D-45

A.2.2 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> sho this_controller
Controller:
  HSG80 ZG81000793 Software V83G-0, 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 the HSG80 Array Controller ACS V8.3 User's Guide (EK-HSG80-UG.C01) controller configuration chapter for more information.

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

```
set this_controller nocommand_console_lun
```

A.3 Adding Disks to the Configuration

The CONFIG utility locates and adds disks to the controller. Run the CONFIG utility whenever you add new disks to the controller. (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. Figure A-5 shows the mapping of Device Ports, Targets and Host Ports.

A.4 Creating a RAIDset

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

```
HSG80 > ADD RAIDSET DVGRPR0 DISK10000 DISK20000 DISK30000
HSG80 > ADD RAIDSET DVGRPR1 DISK40000 DISK50000 DISK60000
```

In this example, “DVGRPR0” and “DVGRPR1” are the names of the RAIDsets, and they are followed by a list of disks to be included in each RAIDset. The names of the RAID sets are user selectable. Performance of your RAIDsets will be optimized if each RAIDset includes disks from different ports as shown in the example.

A.4.1 Initializing a RAIDset

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

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

```
HSG80 > INITIALIZE DVGRPR0 CHUNKSIZE=DEFAULT
HSG80 > INITIALIZE DVGRPR1 CHUNKSIZE=DEFAULT
```

A.4.2 Adding a RAIDset as a Logical Unit

To make a RAIDset available to the host computer, you must identify it as a host logical unit. For single or dual controllers on a single host, the unit numbers may range from D0 through D7 with a maximum of 8 units. For dual controllers/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 DVGRPR0
HSG80 > ADD UNIT D2 DVGRPR1
```

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

A.4.3 Setting Writeback Cache

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

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

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

A.4.4 Setting Read Ahead Cache

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

```
HSG80 > SET D1 READAHEAD_CACHE
```

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

A.5 Creating a Stripset

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

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

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

A.5.1 Initializing a Stripset

Prior to putting a stripset 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 stripset and makes this space inaccessible to the host.

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

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

A.5.2 Adding a Stripset as a Logical Unit

To make a stripset 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 stripset is the third unit identified on the controller.

A.5.3 Setting Writeback Cache

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

```
HSG80 > SET D3 WRITEBACK_CACHE
```

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

A.6 Creating a Mirrorset

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

```
HSG80 > ADD MIRRORSET 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 mirror sets will be optimized if each mirrorset includes disks from different ports as shown in the example.

A.6.1 Initializing a Mirrorset

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

When you initialize a 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 DVGRPM0
```

A.6.2 Adding a Mirrorset as a Logical Unit

To make a mirrorset available to the host computer, you must identify it as a host logical unit. For single or dual controllers on a single host, the unit numbers may range from D0 through D7 with a maximum of 8 units. For dual controllers/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
```

A.6.3 Setting Writeback Cache

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

```
HSG80 > SET D4 WRITEBACK_CACHE
```

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

A.7 Creating a Striped Mirrorset

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

A.7.1 Creating Mirrorsets

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

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

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

A.7.2 Striping the Mirrorsets

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

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

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

A.7.3 Initializing the Striped Mirrorset

Prior to putting a striped mirrorset(s) into service as a logical unit, you must initialize it. The INITIALIZE command copies controller metadata 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
```

A.7.4 Adding a Striped Mirrorset as a Logical Unit

To make a striped mirrorset available to the host computer, you must identify it as a host logical unit. For single or dual controllers on a single host, the unit numbers may range from D0 through D7 with a maximum of 8 units. For dual controllers/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
```

A.7.5 Setting Writeback Cache

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

```
HSG80 > SET D5 WRITEBACK_CACHE
```

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

A.8 Adding Individual Disks as Logical Units

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

A.8.1 Initializing Individual Disks

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

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
```

A.8.2 Adding as Logical Units

To make an individual disk available to the host computer, you must identify it as a host logical unit. For single or dual controllers on a single host, the unit numbers may range from D0 through D7 with a maximum of 8 units. For dual controllers/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
```

A.9 Adding Devices to the Spareset

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

```
HSG80 > ADD SPARESET DISK60100
```

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

NOTE

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

A.10 Saving Copies of the Configuration

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

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

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

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

```
HSG80 > INITIALIZE DISK1000 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 HSG80 Array Controller ACS V8.3 User's Guide for more information.

A.11 Recording your Configuration

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

First, verify the Logical Units you have configured:

```
HSG80 > SHOW UNITS
```


Next, verify the storagesets you have configured:

HSG80 > **SHOW STORAGESETS**

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

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

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 Fibre Channel subsystem.

B

Planning Your Storage Configuration

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

B.1 Planning Your Configuration

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

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

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

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

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

Table B-1 Configuration Options

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

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



Valid ALPA Settings

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

C.1 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

