

# *Compaq StorageWorks*

## **Enterprise/Modular Storage RAID Array Fibre Channel Cluster for Windows NT/Windows 2000**

Installation Guide

First Edition (June 2001)  
Part Number: EK-NTC8K-IG.C01/101471-002  
**Compaq Computer Corporation**

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# Contents

## About this Guide

Forward . . . . .	iii
Product Overview . . . . .	iii
Audience . . . . .	iv
Associated Documents . . . . .	v
Text Conventions . . . . .	v
Getting Help . . . . .	vi
Compaq Technical Support . . . . .	vi
Compaq Authorized Reseller . . . . .	vii

## Chapter 1

### Fibre Channel Windows NT/Windows 2000

#### Cluster Configuration Guidelines

Enterprise/Modular Storage RAID Array Fibre Channel Cluster for Windows NT/Windows 2000 Roadmap . . . . .	1-1
--	-----

## Chapter 2

### Fibre Channel Windows NT/Windows 2000 Cluster Configuration Guidelines

Enterprise/Modular Storage RAID Array . . . . .	2-1
Servers . . . . .	2-2
Fibre Channel Host Bus Adapter. . . . .	2-2
Cables . . . . .	2-2
Fibre Channel Storage Hubs and Switches . . . . .	2-2
Enterprise/Modular Storage RAID Array Cluster Configurations . . . . .	2-3
Fibre Channel Arbitrated Loop Configuration Limits. . . . .	2-4
Single Windows NT/Windows 2000 Cluster Fibre Channel Configuration . . . . .	2-4
Two-Cluster Fibre Channel Configuration. . . . .	2-6

Windows NT/Windows 2000 Cluster Fibre Channel Switch Configurations . . . . . 2-8

*Chapter 3*

**Installing Software for a Fibre Channel Cluster**

Designating Servers as Host A and Host B . . . . . 3-1  
Software Setup Summary for a Fibre Channel Cluster . . . . . 3-1  
Preparing the Enterprise/Modular Storage RAID Array Hosts for a FC Cluster . . . . . 3-2  
    Preparing the Enterprise/Modular Storage RAID Array Subsystem . . . . . 3-2  
    Preparing Host A with Host B Powered Down . . . . . 3-2  
    Preparing Host B (Host A can remain powered up) . . . . . 3-3  
Preparing the Enterprise/Modular Storage RAID Array for an FC Cluster . . . . . 3-3  
    Verifying FC Storage Settings for FC-AL Topology . . . . . 3-3  
    Adding a Second Enterprise/Modular Storage RAID Array to a Fibre Channel Loop . . . . . 3-5  
Verifying Storage Unit Access for A Cluster Configuration . . . . . 3-6  
    Preparing Both Host Servers for a FC Cluster . . . . . 3-6  
    Installing the Fibre Channel Host Bus Adapter Device Driver . . . . . 3-6

*Chapter 4*

**Assigning/De-assigning Drive Letters  
for Windows 2000**

Temporarily De-assigning Drive Letters on your Windows 2000 System . . . . . 4-1  
Running the Fibre Channel Software Setup Utility . . . . . 4-3  
Verifying Successful HsxDisk filter Driver Installation . . . . . 4-4  
Reassigning or Creating the NTFS Partition Drive Letter . . . . . 4-5  
    Preparing Host A . . . . . 4-5  
    Preparing Host B . . . . . 4-5  
Installing and Configuring Cluster Software on Both Host Servers . . . . . 4-5

*Chapter 5*

**Assigning/De-assigning Drive Letters  
for Windows NT**

Temporarily De-assigning Drive Letters . . . . . 5-1  
    Temporarily Removing Drive Letter Assignments . . . . . 5-2  
Running the Fibre Channel Software Setup Utility . . . . . 5-4  
Verifying Successful HszDisk Class Driver Installation . . . . . 5-6  
Reassigning or Creating the NTFS Partition Drive Letter . . . . . 5-7  
    Preparing Host A . . . . . 5-9  
    Preparing Host B . . . . . 5-9  
Installing and Configuring Cluster Software on Both Host Servers . . . . . 5-10

*Appendix A*

**Troubleshooting**

Verifying Device Driver Initialization . . . . . A-1  
Verify the Windows NT/Windows 2000 Registry Device Driver Parameters. . . . . A-3  
Verifying Connectivity to the Fibre Channel Arbitrated Loop . . . . . A-4

*Appendix B*

**Valid ALPA Settings**



# Figures

Figure 1. Enterprise/Modular Storage RAID Array System Fibre Channel Cluster Concept . . . . .	iv
Figure 2-1. Cable Connection – Storage RAID Array to Fibre Channel Hub . . . . .	2-3
Figure 2-2. Single Cluster Fibre Channel Configuration . . . . .	2-5
Figure 2-3. Single Cluster Fibre Channel Configuration with Secure Path . . . . .	2-6
Figure 2-4. Two-Cluster Fibre Channel Configuration . . . . .	2-7
Figure 2-5. Two-Cluster Fibre Channel Configuration with Secure Path . . . . .	2-8
Figure 2-6. Two Windows NT/Windows 2000 Clusters – Fibre Channel Switch . . . . .	2-10
Figure 3-1. Controllers Settings for Second Enterprise/Modular Storage RAID Array System . .	3-5
Figure 4-1. Disk Management window showing the current partitions . . . . .	4-2
Figure 4-2. Change Drive Letter and Paths dialog box . . . . .	4-3
Figure 4-3. Change Letter confirmation box . . . . .	4-3
Figure 5-1. Current Partitions . . . . .	5-2
Figure 5-2. Assign Drive Letter . . . . .	5-3
Figure 5-3. Drive Letter Confirmation . . . . .	5-3
Figure 5-4. No Drive Letter Assignments . . . . .	5-4
Figure 5-5. Selecting an FC Arbitrated Loop Physical Address . . . . .	5-6
Figure 5-6. Partition Appearance - (post HszDisk driver installation) . . . . .	5-7
Figure 5-7. Driver Letter Availability . . . . .	5-8
Figure 5-8. All the Drive Letters Reassigned . . . . .	5-9
Figure A-1. Device Driver Initialization Event Log Entry . . . . .	A-2
Figure A-2. Verifying FC-AL Connectivity RAID Array Subsystem . . . . .	A-7



# Tables

Table 1 Associated Documents . . . . .	v
Table 3-1 Recommended HSG80 and FC Host Adapter Settings . . . . .	3-4
Table A-1 LP6NDS35 Device Driver Parameters . . . . .	A-3
Table B-1 Valid Arbitrated Loop Physical Address (ALPA) Settings . . . . .	B-1



## About this Guide

This guide provides step-by-step instructions for installation of the RAID Array RA/MA8000 and ESA/EMA12000 (Enterprise/Modular Storage RAID Array) Fibre Channel Cluster for Windows NT/Windows 2000.

### Forward

Fiber Channel technology employs several physical topologies for *node* connectivity. Two of these topologies, the Fibre Channel Arbitrated Loop (FC-AL) and the Fibre Channel Switch Fabric (FC-SW) are well suited for Windows NT cluster configurations.

These Fibre Channel topologies simplify cluster configurations by eliminating many of the pitfalls that restrict the SCSI parallel bus when configured with multiple initiators. Issues such as bus termination, unfair arbitration, restrictive cable lengths and device addressability are alleviated using the FC-AL topology. In short, the use of FC-AL or FC-SW in a cluster configuration is much more intuitive and practical for the NT Cluster solution.

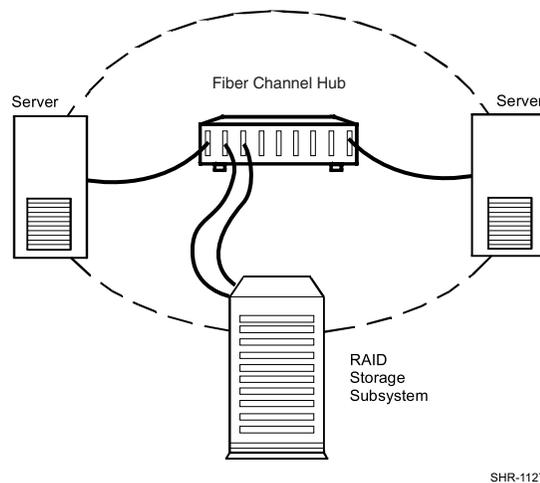
This guide discusses the basic Fibre Channel NT cluster configurations and software installation requirements to support the Compaq StorageWorks RAID Array Subsystems.

### Product Overview

A Windows NT/Windows 2000 Fibre Channel cluster enables two host servers configured with the Windows NT/Windows 2000 cluster software to share a Fibre Channel storage subsystem through a FC-AL. Should a failure on a server occur, the failure is detected and the storage I/O is re-routed through to the functioning server. This process, called failover,

**xii** Enterprise/Modular Storage RAID Array Fibre Channel Cluster for Windows NT/Windows 2000

requires no resource downtime - ensuring the high availability of data. The failed component(s) can be warm-swapped or serviced while functioning components remain active.



SHR-1127

Figure 1. Enterprise/Modular Storage RAID Array System Fibre Channel Cluster Concept

## Audience

This guide is intended for administrators and system integrators of Windows NT/Windows 2000-based host servers and StorageWorks Fibre Channel RAID systems equipment. Setting up a Fibre Channel cluster requires a general understanding of server networks, RAID storage concepts, Windows NT/Windows 2000 Cluster software and Fibre Channel hardware configurations. Contact your service representative if you need installation assistance.

## Associated Documents

In addition to this guide, the following documentation is useful to the reader:

**Table 1 Associated Documents**

Document Title	Order Number
Command Console V 2.1 for RAID Array 8000/ESA12000 User's Guide	AA-RFA2C-TE/387405-003
Quick Setup Guide RA8000/ESA12000 Fibre Channel Storage Subsystem for Windows NT - Intel ACS V8.4 for Fibre Channel Switch	AA-RHH5A-TE
RA8000 and ESA12000 Storage Subsystem User's Guide	EK-SMCPR-UG
<i>The RAIDBOOK—A Source for RAID Technology</i> RAID Advisory Board <i>Fibre Channel Storage Hub</i> <i>12 Installation Guide</i>	340662-001
Fibre Channel Switch User's Guide	AA-RHBYA-TE
Enterprise/Modular Storage RAID Array FC-AL HA Configurations for Windows NT/Windows 2000 - Intel Application Notes	AA-RHOSE-TE
SAN Configurations for MA6000 MA/RA8000 EMA/ESA12000 on Windows NT/Windows 2000 - Intel Application Note	AA-RHH6D-TE

## Text Conventions

This document uses the following conventions:

<b>Keys</b>	Keys appear in boldface. A plus sign (+) between two keys indicates that they should be pressed simultaneously.
USER INPUT	User input appears in a different typeface and in uppercase
<i>FILENAMES</i>	File names appear in uppercase italics.

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

## Getting Help

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

### Compaq Technical Support

A technical support specialist can help you diagnose a problem or guide you through the warranty process.

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

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

Outside North America, call the nearest Compaq Technical Support Phone Center. Telephone numbers for world wide Technical Support Centers are listed on the Compaq website. Access the Compaq website at <http://www.compaq.com>.

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

- Technical support registration number (if applicable)
- Product serial numbers
- Product model names and numbers
- Applicable error messages
- Add-on boards or hardware

- Third-party hardware or software
- Operating system type and revision level
- Detailed, specific questions

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



# Chapter 1

## Fibre Channel Windows NT/Windows 2000 Cluster Configuration Guidelines

This section contains a roadmap to serve as your master guide for establishing a Fibre Channel cluster between two Windows NT/Windows 2000 host servers and a shared Enterprise/Modular Storage RAID Array Subsystem. This roadmap presides over all other documentation supplied with your equipment, and refers to those resources as more technical depth is required.

**NOTE:** Depending on your current system environment, you may not need to perform all the tasks on this roadmap.

### Enterprise/Modular Storage RAID Array Fibre Channel Cluster for Windows NT/Windows 2000 Roadmap

Step	Perform This Procedure...	Described In...
1	Unpack and Setup the RAID Subsystem	See instructions supplied on the shipping box.
2	Cable the RAID Subsystem Fibre Channel Cluster Components	<i>RAID SCSI Connection Kit, EK-SMCPUI-IG.B01</i> <i>Model 4300 Family Ultra3 LVD Disk Enclosure Addendum for Use with the MA8000/EMA12000 Storage System EK-U3LVD-AA.A01</i>

**1-2** Enterprise/Modular Storage RAID Array Fibre Channel Cluster for Windows NT/Windows 2000

<b>Step</b>	<b>Perform This Procedure...</b>	<b>Described In...</b>
3	Install RAID Manager (SWCC) Software and Create the RAID StorageSets	<i>Command Console Version 2.3 (HSG80) User's Guide AA-RFA2G-TE</i>
4	Prepare the Enterprise/Modular Storage RAID Array for a Cluster	<i>See Chapter 3 of this manual.</i>
5	Perform Software Setups Required for a Cluster, including... Assign/Deassign Drive Letters Prepare Host A for a Cluster Prepare Host B for a Cluster Install and Configure Cluster Software	<i>See Chapters 4 and 5 of this manual.</i>

After these steps have been successfully completed in sequence, your Enterprise/Modular Storage RAID Array FC cluster for Windows NT/Windows 2000 will be operational.

## *Chapter 2*

# **Fibre Channel Windows NT/Windows 2000 Cluster Configuration Guidelines**

This chapter presents the fibre channel cluster configuration guidelines. It includes the following topics:

- “Enterprise/Modular Storage RAID Array,” page 2-1
- “Servers,” page 2-2
- “Fibre Channel Host Bus Adapter,” page 2-2
- “Cables,” page 2-2
- “Fibre Channel Storage Hubs and Switches,” page 2-2
- “Enterprise/Modular Storage RAID Array Cluster Configurations,” page 2-3
- “Fibre Channel Arbitrated Loop Configuration Limits,” page 2-4
- “Single Windows NT/Windows 2000 Cluster Fibre Channel Configuration,” page 2-4
- “Windows NT/Windows 2000 Cluster Fibre Channel Switch Configurations,” page 2-8

## **Enterprise/Modular Storage RAID Array**

The RAID Array 8000 (RA8000) and Enterprise Storage Array 12000 (ESA12000) are Fibre Channel RAID systems that support Storage Area Network (SAN) constructs using Fibre Channel Switch and Arbitrated Loop topologies.

## 2-2 Enterprise/Modular Storage RAID Array Fibre Channel Cluster for Windows NT/Windows 2000

These storage systems can be configured in high availability configurations using Microsoft Cluster Server and Compaq's Secure Path Software. These high availability Windows NT/Windows 2000 software products coupled with standard fault tolerant features supported by the Enterprise/Modular Storage RAID Array provide a no-single-point-of-failure solution.

## Servers

The Enterprise/Modular Storage RAID Array are supported in a Microsoft Windows NT/Windows 2000 Cluster by a wide range of servers including Compaq ProLiant, and Multivendor Intel servers. Reference the Microsoft cluster hardware compatibility list available from the Microsoft Web site at <http://www.microsoft.com/hcl/default.asp> for a complete list of supported servers submitted by Compaq for the Enterprise/Modular Storage RAID Array systems.

## Fibre Channel Host Bus Adapter

The KGPSA is a Microsoft certified cluster Fibre Channel adapter supported with the Enterprise/Modular Storage RAID Array. The KGPSA supports both Fibre Channel Arbitrated Loop and Fibre Channel Switch topologies. It is supplied with a GLM fiber-optic module for connectivity to your Fibre Channel hub or switch.

## Cables

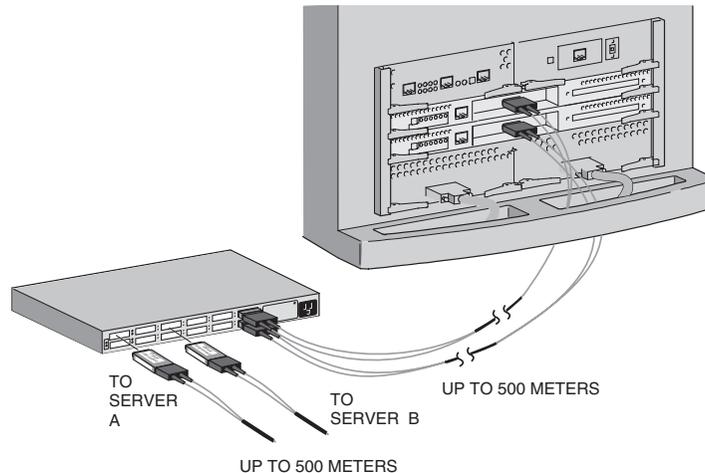
The media supported by the Enterprise/Modular Storage RAID Array system is a 50-micron multimode fibre optic cable. The maximum cable length is 500 meters from the host bus adapter to the Fibre Channel hub or switch and an additional 500 meters from the Fibre Channel hub to the Storage Array. At least one Fibre Channel hub or Fibre Channel switch is required for each MSCS configuration.

## Fibre Channel Storage Hubs and Switches

The Compaq Fibre Channel Storage Hub 7 or the Fibre Channel Storage Hub 12 is the supported hubs for the Enterprise/Modular Storage RAID Array. These are active hubs that provide the necessary Fibre Channel Loop connectivity for the required MSCS configuration. Refer to your *The RAIDBOOK - A Source for RAID Technology RAID Advisory Board Fibre Channel Storage Hub 12 Installation Guide (340662-001)* for details on hub configuration and setup.

The Compaq Fibre Channel Storage Switch is a 16 port Fibre Channel switch supported with the Enterprise/Modular Storage RAID Array. Refer to your *Fibre Channel Switch Installation Guide (AA-RHYA-TE)* for details on switch configuration and setup

All fiber optic cables that originate from the Fibre Channel host bus adapter and your Enterprise/Modular Storage RAID Array subsystem must connect to either a hub or a switch. Reference Figure 1-1.



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Figure 2-1. Cable Connection – Storage RAID Array to Fibre Channel Hub

## Enterprise/Modular Storage RAID Array Cluster Configurations

The Enterprise/Modular Storage RAID Array operate in a Storage Area Network (SAN) using Fibre Channel Switch or Arbitrated Loop topologies. This section highlights some of the possible Windows NT/Windows 2000 Cluster configurations that can be realized using either of these Fibre Channel topologies. Use the configuration maximums outlined in this section to determine the viability of Windows NT/Windows 2000 Cluster configurations that are not shown.

**NOTE:** Refer to the Compaq StorageWorks Application note, Enterprise/Modular Storage RAID Array FC-AL High Availability Configurations for Windows NT/Windows 2000, for a comprehensive review of High Availability MSCS FC-AL configurations.

The Enterprise/Modular Storage RAID Array can be used in various configurations in a Fibre Channel Arbitrated Loop (FC-AL) topology. The following list highlights Fibre Channel Arbitrated Loop configuration limits with emphasis on MSCS Configurations.

## Fibre Channel Arbitrated Loop Configuration Limits

- Up to four servers or two MSCS clusters are supported on a FC loop.
- A maximum of two Fibre Channel Loops can be configured per one Enterprise/Modular Storage RAID Array system.
- Up to two Enterprise/Modular Storage RAID Array s are supported on one FC loop.
- A maximum cable length of 500 meters is supported using 50 micron multimode fiber optic cable.
- The Fibre Channel 7 port hub or 12 port hubs are supported on a FC Loop.
- The Enterprise/Modular Storage RAID Array configured in multiple-bus mode requires the installation of Secure Path V2.1 software on each Windows NT/Windows 2000 server.
- The Enterprise/Modular Storage RAID Array must be configured using FC-AL hard addressing mode.

## Single Windows NT/Windows 2000 Cluster Fibre Channel Configuration

A single Windows NT/Windows 2000 cluster Fibre Channel configuration requires that all Fibre Channel components reside on the same Fibre Channel Loop. This cluster configuration allocates all storage partitions to one Windows NT/Windows 2000 Cluster and supports a maximum of two Enterprise/Modular Storage RAID Array systems on one Fibre Channel loop. Figure 1-2 illustrates a single Windows NT/Windows 2000 Cluster Fiber Channel configuration with one Enterprise/Modular Storage RAID Array Fibre Channel system.

A single cluster supports the use of both HSG80 fibre channel host ports. This allows you to create an additional eight storage units. A single Windows NT/Windows 2000 Cluster configuration, when configured with multiple Storage Arrays and expansion storage cabinets, can accommodate more than two terabytes of data.

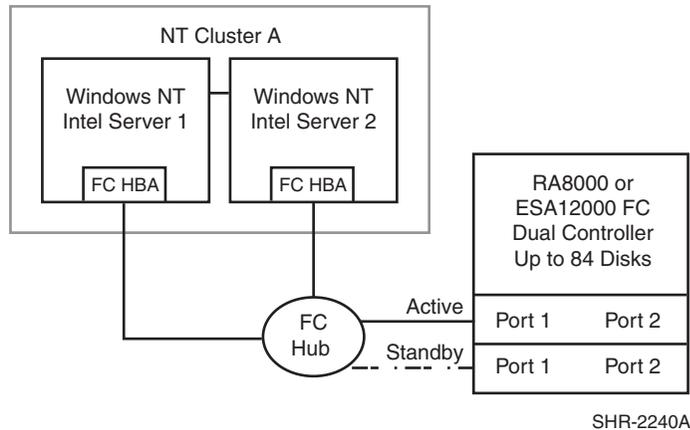


Figure 2-2. Single Cluster Fibre Channel Configuration

The Configuration in Figure 2-2 features the following attributes:

- One Windows NT/Windows 2000 Cluster (MSCS)
- Single Fibre Channel Loop
- Up to 84 UltraSCSI drives with optional expansion enclosures
- Dual-redundant HSG80 RAID controllers operating in transparent failover mode
- Scalable to add a second Enterprise/Modular Storage RAID Array and both HSG80 host ports

Adding a redundant I/O path to your Enterprise/Modular Storage RAID Array system enhances the previous configuration by increasing data throughput, load balancing your storage and eliminating the I/O bus as a single-point-of-failure. This high availability and no-single-point-of-failure configuration requires Compaq's Secure Path for Windows NT/Windows 2000 value-added software and requires you to change the operating mode of your Enterprise/Modular Storage RAID Array to multiple-bus failover mode. Figure 1-3 illustrates a Fibre Channel Windows NT/Windows 2000 Cluster configuration with a redundant I/O path.

## 2-6 Enterprise/Modular Storage RAID Array Fibre Channel Cluster for Windows NT/Windows 2000

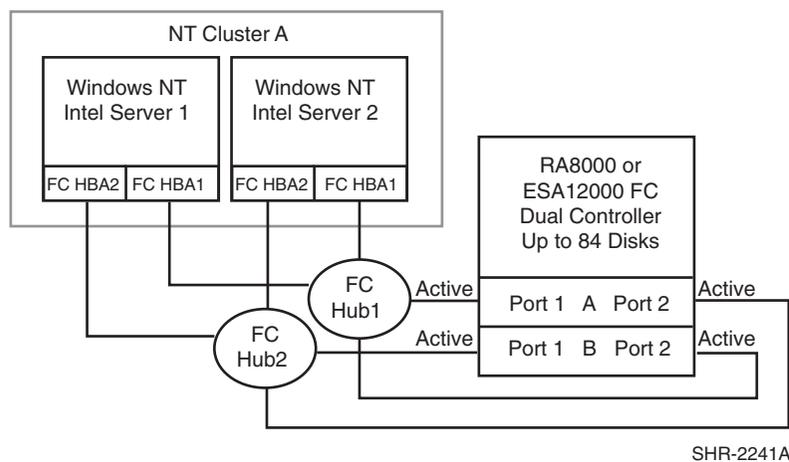


Figure 2-3. Single Cluster Fibre Channel Configuration with Secure Path

The Configuration in Figure 1-3 features the following attributes:

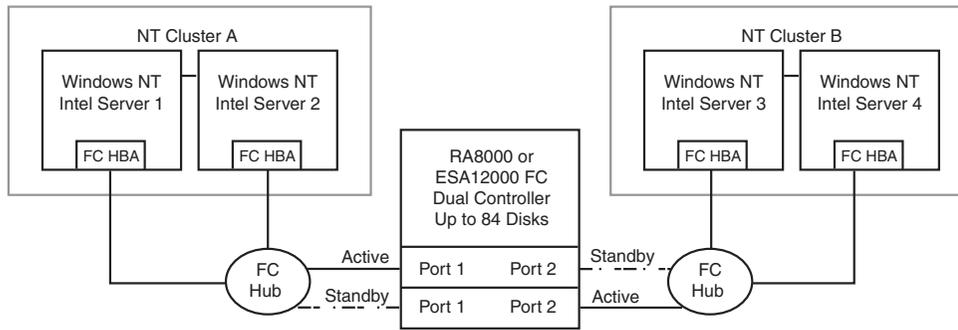
- One Windows NT/Windows 2000 Cluster (MSCS)
- Secure Path V2.1
- Two Fibre Channel Loops
- 2x the data transfer rate compared to Figure 1-2
- I/O load balance capability across data paths and servers
- Up to 84 UltraSCSI drives with optional expansion enclosures
- Dual-redundant HSG80 RAID controllers operating in Multibus mode

### Two-Cluster Fibre Channel Configuration

A two-cluster Fibre Channel configuration allows two Windows NT/Windows 2000 Clusters to share one Enterprise/Modular Storage RAID Array subsystem by utilizing both HSG80 host ports. This configuration requires you to partition your Fibre Channel storage across two separate Windows NT/Windows 2000 clusters. This is accomplished by utilizing both Fibre Channel host ports on each of your HSG80 controllers. Storage partitions configured on one HSG80 host port are exclusive to one Windows NT/Windows 2000 cluster while storage partitions on the other HSG80 host port are exclusive to the other Windows NT/Windows 2000 cluster. The two-cluster Fibre Channel configuration

promotes an expansive use of your Fibre Channel storage capabilities and provides greater accessibility of your data by segmenting your storage requirements across multiple Windows NT/Windows 2000 Clusters.

**NOTE:** Refer to the *Compaq StorageWorks HSG80 Array Controller CLI Reference Guide (EK-G60CL-RA)* for details on creating storage units that are exclusive to a host connection.



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Figure 2-4. Two-Cluster Fibre Channel Configuration

The Configuration in Figure 1-4 features the following attributes:

- Two Windows NT/Windows 2000 Clusters (MSCS)
- Two Fibre Channel Loops
- Dual-redundant HSG80 RAID controllers operating in transparent failover mode
- Up to 84 UltraSCSI drives with optional expansion enclosures
- Up to 128 LUNs total. 64LUNs per cluster with 2 active controller host ports

The configuration in Figure 2-5 builds on the previous Windows NT/Windows 2000 cluster configuration by adding a redundant I/O path from each server to the Enterprise/Modular Storage RAID Array. This configuration requires Secure Path software and changing the Enterprise/Modular Storage RAID Array to run in multiple-bus failover mode. This configuration significantly improves I/O performance by utilizing all HSG80 host ports. Secure Path also gives you the added benefits of load balancing your storage and eliminates the I/O bus as a single point of failure.

**NOTE:** Refer to the Compaq Secure Path documentation for detail instructions on configuring Windows NT/Windows 2000 clusters with Secure Path.

## 2-8 Enterprise/Modular Storage RAID Array Fibre Channel Cluster for Windows NT/Windows 2000

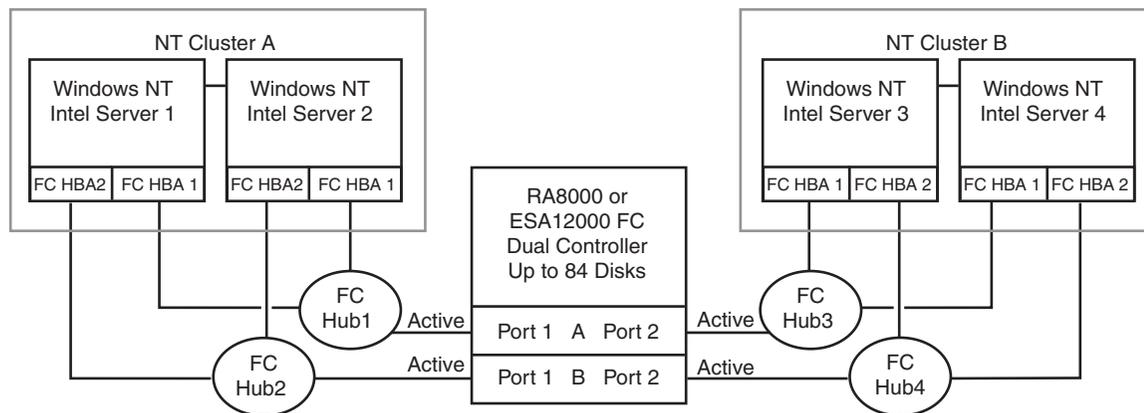


Figure 2-5. Two-Cluster Fibre Channel Configuration with Secure Path

The Configuration in Figure 2-5 features the following attributes:

- Two Windows NT/Windows 2000 Clusters (MSCS)
- Secure Path V3.1
- Four Fibre Channel Loops
- 2x the data transfer rate compared to Figure 2-4
- I/O load balance capability across data paths
- Up to 84 UltraSCSI drives with optional expansion enclosures
- Dual-redundant HSG80 RAID controllers operating in multiple-bus failover mode

## Windows NT/Windows 2000 Cluster Fibre Channel Switch Configurations

The Fibre Channel Switch topology offers greater configuration flexibility and more server and storage connectivity than the Arbitrated Loop topology. The potential Windows NT/Windows 2000 Cluster configurations are too numerous to illustrate. Use the following configuration rules to determine the viability of an Windows NT/Windows 2000 Cluster configuration.

**NOTE:** Refer to the Compaq StorageWorks Application note, Enterprise/Modular Storage RAID Array FC-Fabric Configurations for Windows NT/Windows 2000, for an overview of Fibre Channel Switch Fabric configuration guidelines.

### Fibre Channel Switch Configuration Rules

Any combination of Windows NT/Windows 2000 servers and Enterprise/Modular Storage RAID Array Fibre Channel Storage Systems can be configured on the Compaq StorageWorks Fibre Channel switch providing that the following rules are met:

A maximum of 8 Windows NT/Windows 2000 servers can have access to one Enterprise/Modular Storage RAID Array HSG80 controller port. Five or more servers (up to 8) connected to one HSG80 controller port is considered an *Extended Configuration*. See the note below for more information concerning an Extended Configuration.

There are no limits of Enterprise/Modular Storage RAID Array on a Fibre Channel Storage Switch when configured in Transparent Failover mode. A maximum of four Enterprise/Modular Storage RAID Array s (with one HSG80 controller pair) can be configured on the Fibre Channel switch when configured in multiple-bus failover mode and using Secure Path V2.2.

The maximum number of FC HBAs per server is 4 (or total allowed in the server if less than 4.)

500 meters per optical cable segment, 1 kilometer distance between server and storage.

**NOTE:** Extended Configuration - If you configure 5 or more (up to 8) Windows NT/Windows 2000 servers for access to a single HSG80 controller host port on an Enterprise/Modular Storage RAID Array Fibre Channel storage system, you must select the "Extended Configuration" check box in the StorageWorks Fibre Channel Software Setup utility custom installation setup. Each Windows NT/Windows 2000 server that comprises this configuration must have the option selected.

**2-10 Enterprise/Modular Storage RAID Array Fibre Channel Cluster for Windows NT/Windows 2000**

Figure 2-6 shows two Windows NT/Windows 2000 Clusters configured on a Fibre Channel Switch. Three Enterprise/Modular Storage RAID Array s configured in transparent failover mode are also connected to the switch. Each cluster has access to each Enterprise/Modular Storage RAID Array via storage access control primitives.

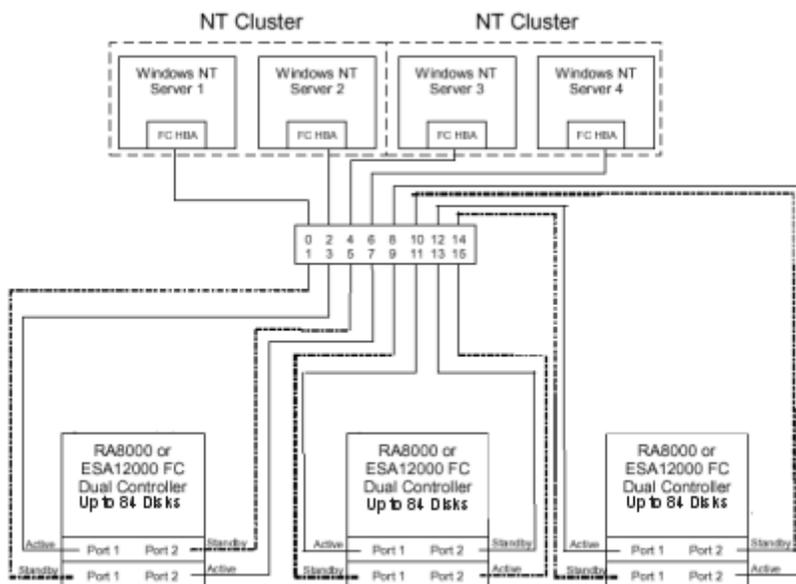


Figure 2-6. Two Windows NT/Windows 2000 Clusters – Fibre Channel Switch

The Configuration in Figure Figure 2-6 features the following attributes:

- Switch Fabric configuration using all 16 Switch Ports
- Two Windows NT/Windows 2000 Clusters (MSCS)
- Three Enterprise/Modular Storage RAID Array s with storage units partition across both Windows NT/Windows 2000 Clusters
- Dual-redundant HGS80 controllers running in Transparent failover mode
- Up to 252 UltraSCSI drives with optional expansion enclosures

## *Chapter 3*

# **Installing Software for a Fibre Channel Cluster**

This chapter describes the procedures and order to install software on a Fibre Channel Cluster. It includes the following topics:

- “Designating Servers as Host A and Host B,” page 3-1
- “Software Setup Summary for a Fibre Channel Cluster,” page 3-1
- “Preparing the Enterprise/Modular Storage RAID Array Hosts for a FC Cluster,” page 3-2

## **Designating Servers as Host A and Host B**

Performing the installation of an Windows NT/Windows 2000 Cluster requires a series of software procedures to be performed one host server at a time. Therefore, the servers must be clearly designated as Host A and Host B prior to the setup process. If both servers are new, either one can be designated as Host A, and the other, Host B.

However, if you are adding a second server (only) to an existing RAID subsystem environment, this documentation assumes it will be designated as Host B, and the existing server as Host A.

Server designation must remain constant through the configuration process.

## **Software Setup Summary for a Fibre Channel Cluster**

The software setup procedures required for a cluster are presented in this section in the order that they must occur, which is as follows:

### 3-2 Enterprise/Modular Storage RAID Array Fibre Channel Cluster for Windows NT/Windows 2000

- Prepare the fibre channel RAID subsystem for a cluster.
- Prepare Host A for a cluster.
- Prepare Host B for a cluster.
- Install and configure Windows NT/Windows 2000 Cluster software on *both* host servers.

After completing these four main procedures in sequence, as described in “Preparing the Enterprise/Modular Storage RAID Array Hosts for a FC Cluster,” page 3-2 through “Installing and Configuring Cluster Software on Both Host Servers,” page 5-10 you will have successfully established a Fibre Channel cluster between the shared Enterprise/Modular Storage RAID Array subsystem and the two host servers.

## Preparing the Enterprise/Modular Storage RAID Array Hosts for a FC Cluster

The procedures for preparing the Enterprise/Modular Storage RAID Array and each host server for a cluster are provided below. Detailed procedures are contained later in this section.

### Preparing the Enterprise/Modular Storage RAID Array Subsystem

1. Verify that your storage subsystem and FC host bus adapter settings are correct for your Windows NT/Windows 2000 Cluster configuration and Fibre Channel Topology.
2. Verify that your storage units are accessible to the servers in your Windows NT/Windows 2000 Cluster configuration.
3. Restart the Enterprise/Modular Storage RAID Array subsystem if you have made changes to the HSG80 controllers.

### Preparing Host A with Host B Powered Down

1. Install the KGPSA Fibre channel host bus adapter device driver.
2. [If Needed] Temporarily de-assign drive letters on all NTFS partition on your Enterprise/Modular Storage RAID Array. This step is required only when you have created NTFS partitions on your Enterprise/Modular Storage RAID Array system **before** installing the HSZDISK class driver. The HSZDISK class driver is installed during step 3.

3. Run the Fibre Channel Software Setup Utility for Transparent Failover.
4. Restart the server (Host A).
5. [If Needed] Reassign previous NTFS Partition Drive Letters from step 2.

### **Preparing Host B (Host A can remain powered up)**

1. Install the KGPSA Fibre Channel Host Adapter Device Driver.
2. [If needed] Temporarily de-assign drive letters on all NTFS partition on your Enterprise/Modular Storage RAID Array. This step is required only when you have created NTFS partitions on your Enterprise/Modular Storage RAID Array system **before** installing the HSZDISK class driver. The HSZDISK class driver is installed during step 3.
3. Run the Fibre Channel Software Setup Utility
4. Restart the server (Host B).
5. [If Needed] Reassign previous NTFS Partition Drive Letters from step 2.

## **Preparing the Enterprise/Modular Storage RAID Array for an FC Cluster**

Your RA8000 Fibre Channel system is preconfigured with specific parameters based on either the Fibre Channel Arbitrated Loop or Switch Fabric topology. You may need to change these parameters when implementing certain Windows NT/Windows 2000 Cluster configurations in a Fibre Channel Arbitrated Loop. This section will review the required steps to make these changes.

### **Verifying FC Storage Settings for FC-AL Topology**

You will need to verify that your Fibre Channel storage system and host bus adapters are configured with the required settings to support your Windows NT/Windows 2000 Fibre Channel Cluster.

Your HSG80 RAID system is preset to a port topology of LOOP\_HARD and your HSG80 hosts ports are preset to ALPA (Arbitrated Loop Physical Address) settings 71 and 72. These settings are recommended for Windows NT/Windows 2000 cluster configurations. If your HSG80 RAID controller is not configured with these settings then you will need to make the appropriate corrections. Refer to the *Compaq StorageWorks HSG80 ACS Array Controller V8.6 CLI Reference Guide* for details on changing these setting.

### 3-4 Enterprise/Modular Storage RAID Array Fibre Channel Cluster for Windows NT/Windows 2000

Your fibre channel hosts adapters (KGPSAs) require specific settings for your Windows NT/Windows 2000 Cluster configuration. This is accomplished by running the Fibre Channel Software Setup Utility. Refer to “Preparing Both Host Servers for a FC Cluster,” page 3-6 for more information.

Compaq recommends using the settings in Table 3-1 for your Windows NT/Windows 2000 Cluster configuration when configured for FC-AL topology.

**Table 3-1 Recommended HSG80 and FC Host Adapter Settings**

FC-AL Component	FC Topology	ALPA Setting
FC Host Adapter - Server 1 (Windows NT/Windows 2000 Cluster A)	FC-AL	1 (recommended)
FC Host Adapter - Server 2 (Windows NT/Windows 2000 Cluster A)	FC-AL	2 (recommended)
FC Host Adapter - Server 3 (Windows NT/Windows 2000 Cluster B)	FC-AL	4 (recommended)
FC Host Adapter - Server 4 (Windows NT/Windows 2000 Cluster B)	FC-AL	8 (recommended)
<b>Enterprise/Modular Storage RAID Array Subsystem</b>		
HSG80 host port 1	Loop Hard	71 (preset)
HSG80 host port 2	Loop Hard	72 (preset)
<b>Second Enterprise/Modular Storage RAID Array Subsystem (Optional)</b>		
HSG80 host port 1	Loop Hard	73 (recommended)
HSG80 host port 2	Loop Hard	74 (recommended)

## Adding a Second Enterprise/Modular Storage RAID Array to a Fibre Channel Loop

Your Windows NT/Windows 2000 Fibre Channel Cluster configuration may include an additional Enterprise/Modular Storage RAID Array on the same Fibre Channel loop. Adding an additional subsystem will require you to change the AL\_PA settings for host port 1 and host port 2 to AL\_PA settings 73 and 74 respectively. See Example 1 on changing your AL\_PA settings and refer to Figure 3-1.

### Example 1 – Changing arbitrated loop physical address settings

```
HSG80>Set This_Controller Port_1_AL_PA=73
```

```
HSG80>Set This_Controller Port_2_AL_PA=74
```

**NOTE:** You must restart both of your HSG80 controllers if you change the port topology or AL\_PA settings.

```

haz HyperTerminal
File Edit View Call Transfer Help

>show this

Controller:
HSG8C Z6B09C0557 Software V0213-0, Hardware B01
WDE_ID = 50C0 1F01 0000 2D70
ALLOCATION CLASS = 0
PORT VERSION = SCPT 2
Configured for dual-redundancy with SCV8J001-1
To dual-redundant configuration
Device Port SCSI address /
Type NOT SET
Command Console LUN is Disabled
Host PORT 1:
Reported PORT_ID = 50C0 1F01 0000 2D71
PORT_1_PROFILE = FLEA
PORT_1_TOPOLOGY = LOOP_HARD (loop up)
PORT_1_AL_PA = 73 (30 negotiated)
Host PORT 2:
Reported PORT_ID = 50C0 1F01 0000 2D72
PORT_2_PROFILE = FLEA
PORT_2_TOPOLOGY = LOOP_HARD (standby)
PORT_2_AL_PA = 74 (30 negotiated)
Cache:
64 megabyte write cache, version C011
Cache is GOCD
Corrected 0.05.06 VT100 99C0 84N-1 25 11 11 12:41:00 10/1/00 splur Paul.scho

```

Figure 3-1. Controllers Settings for Second Enterprise/Modular Storage RAID Array System

## Verifying Storage Unit Access for A Cluster Configuration

In an Windows NT/Windows 2000 cluster configuration, you need to enable multiple host access to all storage units that will be shared by both Windows NT/Windows 2000 cluster servers. You can either specify the hosts connection names of the two cluster servers when using the StorageWorks Command Console or you can enable access to all hosts on a per LUN basis using the Command Line Interface (CLI). To enable access to the servers comprising your Windows NT/Windows 2000 cluster, refer to Example 2.

### Example 2 – Enabling access for specific Windows NT/Windows 2000 Cluster Servers

```
HSG80>Set D0 Enable_Access_Path = NTSERVER1, NTSERVER2
```

Compaq recommends enabling access to all connections if the only hosts on the loop are your Windows NT/Windows 2000 Cluster servers. To enable access to all hosts on the loop, issue the CLI command shown in Example 3. You will need to perform this command for every LUN that will be shared among the two cluster servers.

### Example 3 – Enabling access for all FC loop connections

```
HSG80>Set D0 Enable_Access_Path = ALL
```

## Preparing Both Host Servers for a FC Cluster

Perform all of the steps in this section on Host A, while Host B is powered down. When finished, power up Host B and repeat all of the steps on Host B.

**NOTE:** Follow normal procedures to **POWER DOWN Host B** before preparing Host A for a cluster.

## Installing the Fibre Channel Host Bus Adapter Device Driver

The Fibre Channel Host Adapter device driver is provided with your fibre channel host adapter. Install the fibre channel host bus adapter device driver for your server platform as described in Chapter 1 of the *HSG80 ACS Solution Software Version 8.6 for Windows NT or Windows 2000 Installation Guide (AA-RFA9E-TE)*.

## Chapter 4

# Assigning/De-assigning Drive Letters for Windows 2000

This chapter discusses assigning and de-assigning drive letters on your Windows system. It includes the following topics:

- “Temporarily De-assigning Drive Letters on your Windows 2000 System,” page 4-1
- “Running the Fibre Channel Software Setup Utility,” page 4-3
- “Verifying Successful HsxDisk filter Driver Installation,” page 4-4
- “Reassigning or Creating the NTFS Partition Drive Letter,” page 4-5
- “Installing and Configuring Cluster Software on Both Host Servers,” page 4-5

## Temporarily De-assigning Drive Letters on your Windows 2000 System

**NOTE:** This section is required only when you have created NTFS partitions on your Enterprise Storage RAID Array system before the installation of the HsxDisk driver. For instructions on how to create NTFS partitions, refer to “Software Setup Summary for a Fibre Channel Cluster,” page 3-1.

**Temporarily remove NTFS drive letter assignments** for all partitions on the Enterprise/Modular Storage RAID Array. Do not remove drive letters for any drives that are not configured on your Enterprise/Modular Storage RAID Array Fibre Channel system. To temporarily remove drive letter assignments, perform the following procedure:

1. Start the Disk Management program.

Figure 4-1 shows the Disk Management window displaying current partitions.

#### 4-2 Enterprise/Modular Storage RAID Array Fibre Channel Cluster for Windows NT/Windows 2000

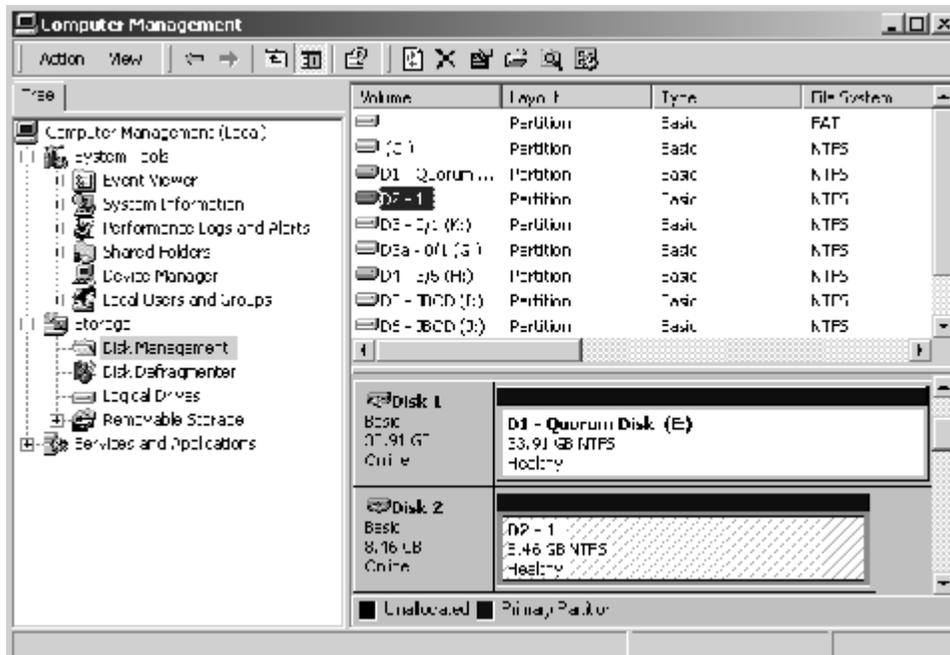


Figure 4-1. Disk Management window showing the current partitions

2. Label your partitions if they are not already labeled, in order to distinguish each one.
3. Record the drive letters currently associated with each of the partition labels.
4. Click on an NTFS partition that exists on your Enterprise/Modular Storage RAID Array system.
5. Click on the desired partition, choose Change Drive Letter and Path...

The Change Drive Letter dialog box appears, similar to Figure 4-2.

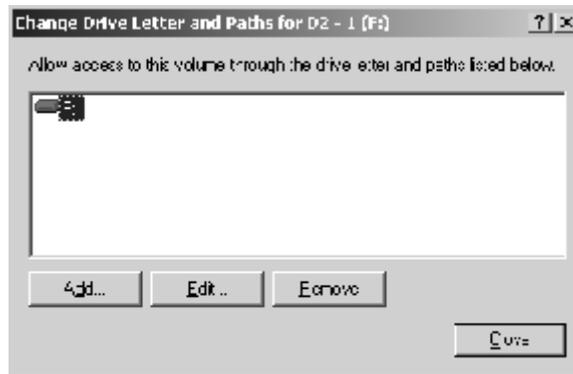


Figure 4-2. Change Drive Letter and Paths dialog box

6. Click the **Remove** button (as shown in Figure 3-3)

---

**CAUTION:** Do not remove the drive letters for any drive that is not connected to your Enterprise/Modular Storage RAID Array.

---

A confirmation dialog box appears as shown in Figure 4-3.



Figure 4-3. Change Letter confirmation box

## Running the Fibre Channel Software Setup Utility

The Fibre Channel Software Setup Utility serves various purposes, including:

- Installing the HsxDisk filter driver.
- Setting Fibre Channel Host Bus adapter registry settings.
- Querying for Arbitrated Loop addresses.
- Establishing Extended Configuration settings.
- Checking the event log for specific error conditions.

- Reviewing driver revision levels.

**NOTE:** For additional information on running the Fibre Channel Software Setup, refer to *HSG80 ACS Solution Software Version 8.6 for Windows NT or Windows 2000 Installation Guide (AA-RFA9E-TE)*.

Locate the CD-ROM disk labeled *RA/MA8000 ESA/EMA12000 Solution Software for Windows NT/Windows 2000* and select the solution for your specific configuration by performing the following steps: (This example shows the steps for the Arbitrated Loop Configuration.)

1. Insert the CD-ROM into your CD-ROM drive.
2. Select the solution software for your specific configuration.
3. Run the Fibre Channel Software Setup program.
4. Follow the migration wizard to complete the installation.

If you chose the Solution Software for FC Hub selection, the FC Software Setup Utility will install the required 2000 driver registry parameters and prompt you to select an Arbitrated Loop Physical Address (ALPA) for each of your FC Host Adapters. Compaq recommends using ALPA 1 for Host A and ALPA 2 for Host B for the FC Host Adapters. Refer to Appendix B for the preferred list of ALPA addresses.

5. Restart the system.

## Verifying Successful HsxDisk filter Driver Installation

After the host server is restarted, verify that the HsxDisk class driver installed successfully by performing the following procedure:

1. Open the *Event Viewer* from *Computer Management*.
2. Locate an information icon in the *Event Viewer* window with HsxDisk for the *Source*.
3. Double click on the HsxDisk entry and an entry detail screen displays.
4. The message in the detail screen indicates whether the HsxDisk driver was successfully installed. Upon successful HsxDisk driver installation, proceed to *NTFS Partition Drive Letter Reassignment or Creation*, if no drive letters have been created.

## **Reassigning or Creating the NTFS Partition Drive Letter**

### **Preparing Host A**

If you have not yet created any NTFS partitions on the Enterprise/Modular Storage RAID Array system, create them now by running the Disk Management utility on Host A. This action prepares Host A for a cluster. Then, return to “Preparing Both Host Servers for a FC Cluster,” page 3–6, to repeat the preceding software setups on Host B.

### **Preparing Host B**

The shared drive letters must be identical on both host servers in a cluster environment. Reassign the same drive letters to Host B that you assigned to Host A.

## **Installing and Configuring Cluster Software on Both Host Servers**

The Enterprise/Modular Storage RAID Array, Host A and Host B must be prepared for a Fibre Channel cluster before installing Windows 2000 Cluster software. You are now ready to install and configure Windows 2000 Cluster software on both of your host servers, as described in the manual provided with your cluster software. Additional support can be found at <http://www.microsoft.com>.



# Chapter 5

## Assigning/De-assigning Drive Letters for Windows NT

This chapter discusses assigning and de-assigning drive letters on your Windows NT system. It includes the following topics:

- “Temporarily De-assigning Drive Letters,” page 5-1
- “Running the Fibre Channel Software Setup Utility,” page 5-4
- “Verifying Successful HszDisk Class Driver Installation,” page 5-6
- “Reassigning or Creating the NTFS Partition Drive Letter,” page 5-7
- “Installing and Configuring Cluster Software on Both Host Servers,” page 5-10

### Temporarily De-assigning Drive Letters

This section is required only when you have created NTFS partitions on your Enterprise/Modular Storage RAID Array system before the installation of the HszDisk class driver. If you have not created NTFS partitions, proceed to “Software Setup Summary for a Fibre Channel Cluster,” page 3-1.

The inclusion of the HszDisk class driver when NTFS partitions exist on your Enterprise/Modular Storage RAID Array system causes Windows NT to reassign the drive letters. HszDisk inserts all NTFS partitions on your Enterprise/Modular Storage RAID Array ahead of any local (non-shared bus) partitions. Windows NT would, for example, reassign drive letter C from your system disk to the first NTFS formatted storage set partition, Disk 0).

## 5-2 Enterprise/Modular Storage RAID Array Fibre Channel Cluster for Windows NT/Windows 2000

Since drive letter reassignments by the HszDisk class driver could invalidate your drive mappings, **you must temporarily remove NTFS drive letter assignments** for all partitions on the Enterprise/Modular Storage RAID Array prior to installing the HszDisk driver. Do not remove drive letters for any drives that are not configured on your Enterprise/Modular Storage RAID Array Fibre Channel system.

### Temporarily Removing Drive Letter Assignments

1. Start the Disk Administrator. Figure 3-2 shows the Disk Administrator window displaying current partitions.

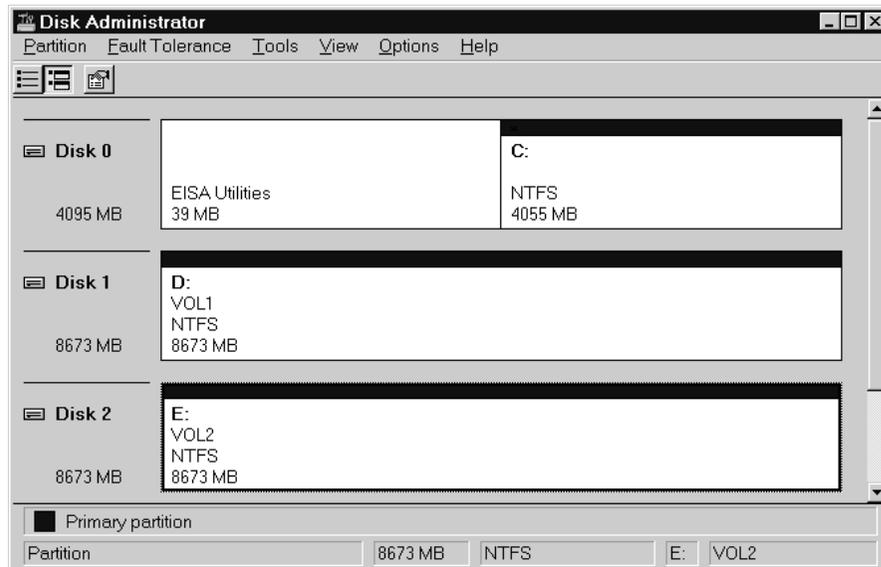


Figure 5-1. Current Partitions

2. Label your partitions if they are not already labeled, so that you can distinguish each one.
3. Record the drive letters currently associated with each of the partition labels.
4. Click on an NTFS partition that exists on your Enterprise/Modular Storage RAID Array system.
5. Select *Tools > Assign Drive Letter*.

The Assign Drive Letter dialog box appears, similar to Figure 3-3.



Figure 5-2. Assign Drive Letter

6. Click the *Do not assign a drive letter* radio button (as shown in Figure 5-2) and then click **OK**.

---

**CAUTION:** Do not remove the drive letters for any drive that is not connected to your Enterprise/Modular Storage RAID Array.

---

A confirmation dialog box appears as shown in Figure 3-5.

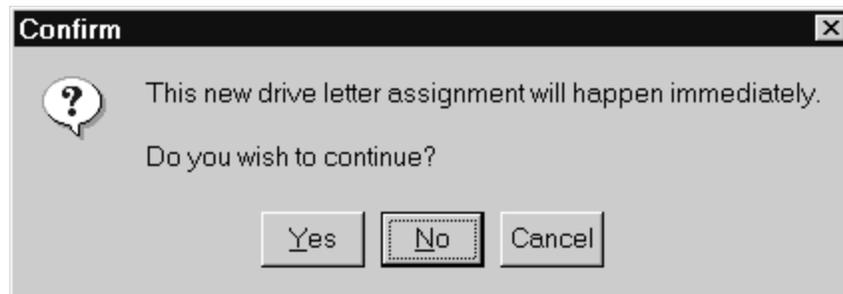


Figure 5-3. Drive Letter Confirmation

7. Click **Yes**. The partition now appears without a drive letter designator similar to the screen shown in Figure 5-4.

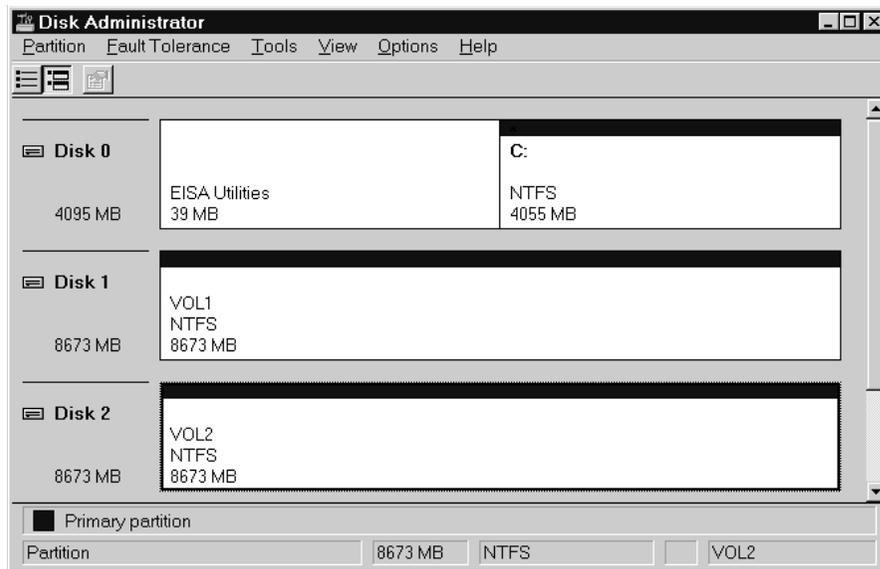


Figure 5-4. No Drive Letter Assignments

8. Repeat Steps 4 through 7 for each of your partitions except the local and start partitions.

## Running the Fibre Channel Software Setup Utility

The Fibre Channel Software Setup Utility serves various purposes, including:

- Installing the HszDisk Class driver.
- Setting Fibre Channel Host Bus adapter registry settings.
- Querying for Arbitrated Loop addresses.
- Establishing Extended Configuration settings.
- Checking the event log for specific error conditions.
- Reviewing driver revision levels.

**NOTE:** For additional information on running the Fibre Channel Software Setup, refer to *Enterprise/Modular Storage RAID Array Fibre Channel Solution Software V8.5B for Windows NT on X86 Platforms Installation Reference Guide (AA-RFA9E-TE)*.

Locate the CD-ROM disk labeled *Enterprise Storage RAID Array Solution Software for Windows NT* and select the solution for your specific configuration.

Perform the following steps: (This example shows the steps for the Arbitrated Loop Configuration.)

1. Insert the CD-ROM into your CD-ROM drive.
2. Select the solution software (FC-AL or FC-SW) for your specific configuration.
3. Run the Fibre Channel Software Setup program.
4. Follow the migration wizard to complete the installation.

**NOTE:** The KGPSA host bus adapter and device driver must be installed on your server as described in your adapter guide before setting the ALPA.

If you chose the Solution Software for FC Hub selection, the FC Software Setup Utility will install the required Windows NT driver registry parameters and prompt you to select an Arbitrated Loop Physical Address (ALPA) for each of your FC Host Adapters. Compaq recommends using ALPA 1 for Host A and ALPA 2 for Host B for the FC Host Adapters. Refer to Figure 3-7 for an example of selecting an ALPA address. Refer to Table3-1 for the preferred list of ALPA addresses.



Figure 5-5. Selecting an FC Arbitrated Loop Physical Address

5. Restart the system.

## Verifying Successful HszDisk Class Driver Installation

After the host server is restarted, verify that the HszDisk class driver installed successfully by performing the following procedure:

1. Open the *Event Viewer* from the *Administrative Tools* group.
2. Locate an information icon in the *Event Viewer* window with HszDisk for the *Source*.
3. Double click on the HszDisk entry and an entry detail screen appears.

The message in the detail screen indicates whether the HszDisk class driver was successfully installed.

Upon successful HszDisk class driver installation, proceed to *NTFS Partition Drive Letter Reassignment or Creation*, next, if no drive letters have been created yet.

## Reassigning or Creating the NTFS Partition Drive Letter

**NOTE: (IF PREPARING HOST A)** If you have not yet created any NTFS partitions on the Enterprise/Modular Storage RAID Array system, create them now by running the Disk Administrator utility on Host A. After so doing, you will have successfully prepared Host A for a cluster, and must return to “Preparing Both Host Servers for a FC Cluster”, to repeat the preceding software setups on Host B.

**NOTE: (IF PREPARING HOST B) THE SHARED DRIVE LETTERS MUST BE *identical* on both host servers IN A cluster ENVIRONMENT.** Reassign the same drive letters to Host B that you assigned to Host A, using the following the procedures.

### Reassign Drive Letters

This section describes how to reassign drive letters to NTFS partitions on a host if they were temporarily de-assigned as described in “Preparing Both Host Servers for a FC Cluster,” page 3-6.

1. Start the Disk Administrator which displays all the existing partitions, similar to the window shown in Figure 5-6. (The only partitions with drive letters are the boot partition and any non-disk devices, such as a CD-ROM drive).

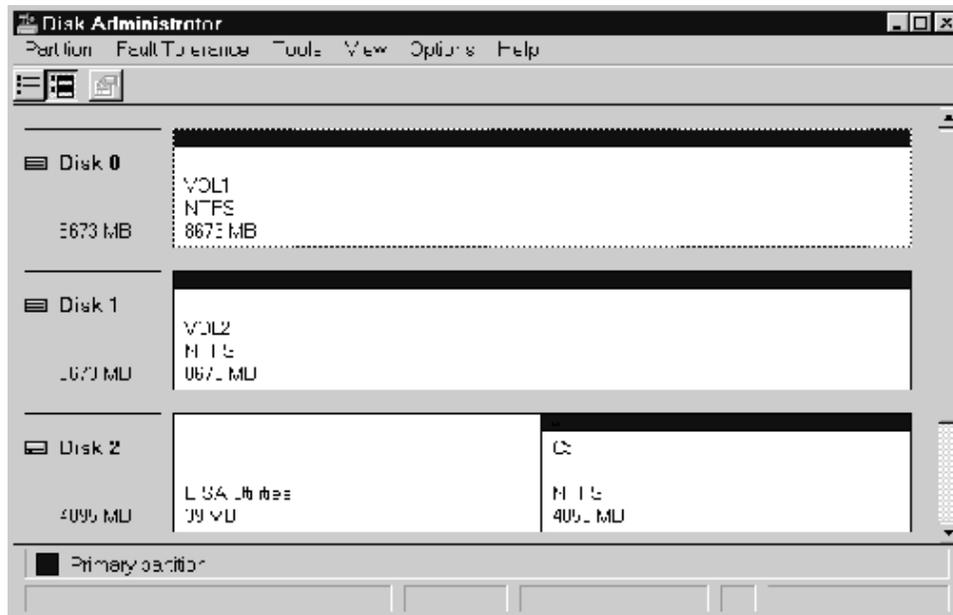


Figure 5-6. Partition Appearance - (post HszDisk driver installation)

2. Highlight a (RAID Array storageset) partition.
3. Select *Tools > Assign Drive Letter*. The Assign Drive Letter window (Figure 5-7) appears displaying the next available drive letter.

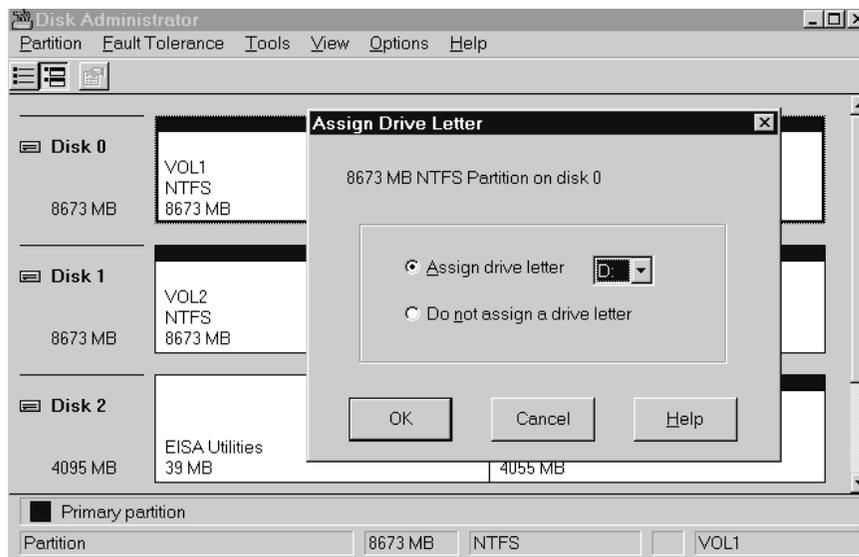


Figure 5-7. Driver Letter Availability

4. Perform one of the following actions:
  - Click **OK** if you want to assign the selected drive letter and go to step 7.
  - Click the *Assign drive letter* radio button and go to the next step.
5. In the Assign Drive Letter window, select another drive letter from the drop down list and click **OK**.

If the letter you want to assign does not appear in the list, Windows may have already assigned that letter to the CD-ROM drive. You can de-assign that letter from the CD-ROM to free it for use.
6. At the confirmation dialog box, click **Yes**. The partition now appears with the specified drive letter designator.
7. Repeat Steps 2 through 6 until you have assigned drive letters to all of the partitions that need one, similar to the window shown in Figure 5-8.

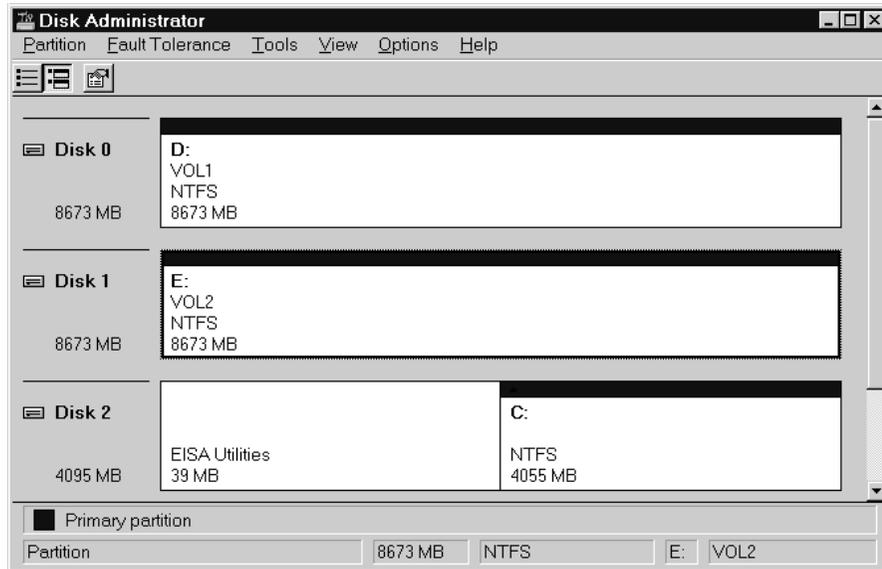


Figure 5-8. All the Drive Letters Reassigned

## Preparing Host A

With the NTFS partition drive letters successfully reassigned, or newly created, as applicable, Host A is prepared for a cluster. To prepare Host B, return to “Preparing Both Host Servers for a FC Cluster,” page 3-6 and repeat all of the preceding steps on Host B.

## Preparing Host B

With the NTFS partition drive letters successfully reassigned, Host B is prepared for a cluster. Proceed to “Installing and Configuring Cluster Software on Both Host Servers,” page 5-10.

## **Installing and Configuring Cluster Software on Both Host Servers**

**NOTE:** The Enterprise/Modular Storage RAID Array, Host A and Host B must be prepared for a Fibre Channel cluster before installing Windows NT Cluster software.

You are now ready to install and configure Windows NT Cluster software on both of your host servers, as described in the manual provided with your cluster software.

# Appendix **A**

## Troubleshooting

This appendix describes how to troubleshoot a Fibre Channel Windows NT/Windows 2000 cluster. Troubleshooting the Enterprise/Modular Storage RAID Array Subsystem Fibre Channel Cluster involves verifying the following characteristics:

- Device Driver Initialization for the FC Host Adapters
- Windows NT/Windows 2000 Registry Device Driver Parameter Settings
- Connectivity of Cluster Components to the FC Arbitrated Loop

### Verifying Device Driver Initialization

A problem with Windows NT/Windows 2000's HAL (Hardware Abstraction Layer) may prevent the KGPSA device driver (LP6NDS35.SYS) from initializing during system boot. The consequence of this problem is that none of your devices connected to your KGPSA adapter will be available and the event log entry, depicted in Figure A-1, will be entered in the system event log.

The Windows NT/Windows 2000 HAL reconfigure the PCI adapter with conflicting resources which causes a problem. A workaround is available that causes the HAL to use the BIOS assigned defaults, and not to reassign PCI resources. The workaround (from Microsoft) involves editing the *Boot.ini* file. In this case, you may need to perform the following actions.

1. Remove the read-only file attribute, (e.g., `attrib -r -h -s c:\boot.ini`).
2. Add the `/PCILOCK` option to the system boot entry,
3. Restart your machine.

### Example boot.ini

```
[boot loader]
timeout=30
default=multi(0)disk(0)rdisk(0)partition(2)\WINNT
[operating systems]
multi(0)disk(0)rdisk(0)partition(2)\WINNT="Windows NT Server, Enterprise Edition Version
4.00" /pcilock
```

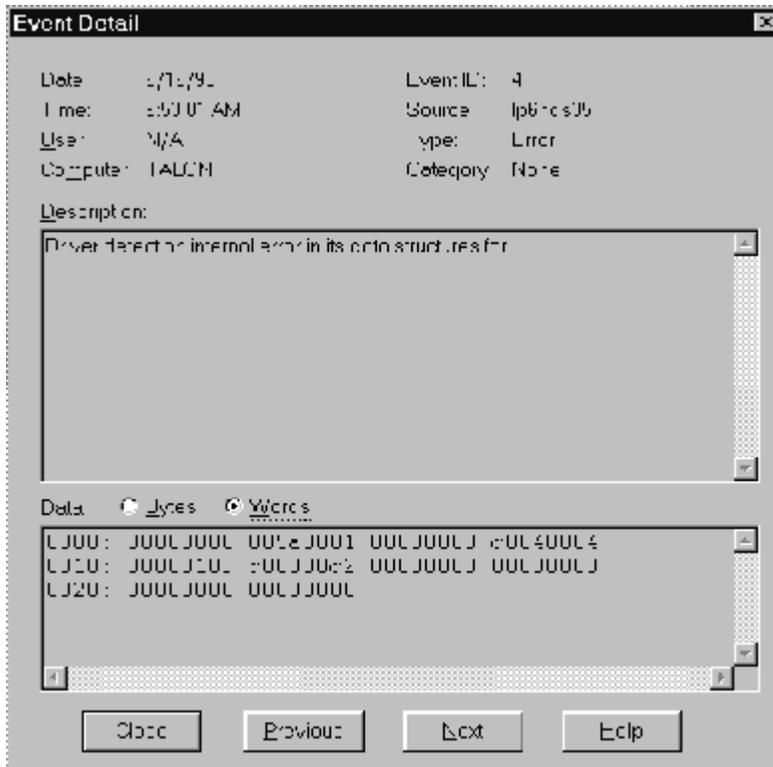


Figure A-1. Device Driver Initialization Event Log Entry

## Verify the Windows NT/Windows 2000 Registry Device Driver Parameters

The KGPSA device driver parameters in the Windows NT/Windows 2000 registry must be set correctly for proper operation of your Enterprise/Modular Storage RAID Array storage subsystem configured in a Windows NT/Windows 2000 cluster. Locate the registry key in your system as depicted in Figure A-2 and review the registry setting values and compare them with the correct values that are listed in Table A-1 (Note, all values are decimal unless noted). If discrepancies are found, run the Fibre Channel Software Setup Utility and select the *Custom* button. Click on the *KGPSA Adapter Driver Setup* option. This will automatically correct the registry settings configured in your system. Reboot your system after completing the Setup.

---

**WARNING:** StorageWorks does not recommend using the Registry Editor to adjust registry settings. Fatal system errors may result. Please use the HSZInstall FC Utility. This utility will properly set the registry settings for the KGPSA adapter.

---

LP6NDS35	CPQKGPSA
HKEY_LOCAL_MACHINE –	HKEY_LOCAL_MACHINE –
- SYSTEM	- SYSTEM
-CurrentControlSet	-CurrentControlSet
- Services	- Services
- Lp6nds35	- CPQKGPSA
- Parameters	- Parameters
Number of Requests=50	
Maximum SGList=33	

---

**Table A-1 LP6NDS35 Device Driver Parameters**

---

Driver Parameter	Correct Value
RetryIoTimeOut	1
RetryInterval	52
EnableDPC	1
QueueTarget	1
QueueDepth	25 (15 for Extended Configurations)

**Table A-1 LP6NDS35 Device Driver Parameters (Continued)**

ResetFF	0
ResetTPRLO	1 (Required for MSCS)
Topology	0 for FC-AL      1 for FC-SW
Simulate Device	0
ELS RetryCount	6
ScanDown	1
HardALPa*	Refer to the following note

**NOTE:** \*StorageWorks recommends using ALPA values 1 and 2 for the host bus adapters in a Fibre Channel Windows NT/Windows 2000 Cluster. The HardAlpa is not applicable for the Fibre Channel Switch Topology. Additional parameters are included when the host is configured with Secure Path Software.

## Verifying Connectivity to the Fibre Channel Arbitrated Loop

This section outlines the procedure to troubleshoot a Fibre Channel Windows NT/Windows 2000 Cluster when one or both servers can not access the Fibre Channel Storage Array. The recommended troubleshooting steps are as follows:

**NOTE:** Before proceeding, verify that your configuration meets minimum requirement revisions as described in your documentation set. These procedures are only relevant for the Fibre Channel Arbitrated Loop.

1. Verify that each HSG80 host port is properly configured and online to the Fibre Channel Loop.
2. Verify that your Windows NT/Windows 2000 Servers are connected and online to the Fibre Channel Loop.
3. Verify that your Fibre Channel storage partitions (units) allow appropriate access for your Windows NT/Windows 2000 Cluster servers.

## 1. Verifying HSG80 settings and connectivity to the Loop

Issue the CLI command `show this_controller` to ensure that your HSG80 host ports are connected to the loop. The port 1 topology and port 2 topology, if used, should be `LOOP_HARD` and indicate a status of **Loop Up** or **Standby**. If one HSG80 controller indicates a Loop Up state, then the other controller will be in a Standby state. If your port topology and state is correct then proceed to Step 2.

If the HSG80 host ports that you have configured are in an **Offline** state, then perform the following steps:

- a. Shutdown and power off both Windows NT/Windows 2000 Servers
- b. Verify that the fiber optic cable is properly seated in the GBIC module in your hub and in the GLM module in your HSG80 controller. Ensure that your Fibre Channel Hub is powered on and the LEDs are illuminated.
- c. Restart both HSG80 controllers.

If your HSG80 controllers continue to indicate an offline state, then refer to the troubleshooting section in your *HSG80 Array Controller ACS Version 8.6 Maintenance and Service Guide* (AK-G80MS-SA) for troubleshooting suggestions.

## 2. Verify that your Windows NT/Windows 2000 Servers (hosts) are connected to the Fibre Channel Loop

To verify that your Windows NT/Windows 2000 servers are connected to the loop, issue the CLI command `show connection`. As shown in Figure A-3, the output of this command shows information about present and previous host connections to the loop.

- The unit address column refers to the Arbitrated Loop Physical Address that you assigned when running the fibre channel software setup.
- The Status Column indicates the host connection (Windows NT/Windows 2000 server) is *On-Line* to either the HSG80 controller that you are connected to (OL this) or the other HSG80 controller (OL other).

## A-6 Enterprise/Modular Storage RAID Array Fibre Channel Cluster for Windows NT/Windows 2000

Compaq recommends to rename the connection-name field to the computer name of your server. This will facilitate your ability to discern loop connections. The recommended method of discerning loop connection names is to boot one server at a time and issue the show connection command. The new On-line connection that is displayed will be the server that you just started.

```
HSG80> show connection
```

Connection	Unit					
Name	Operating system	Controller	Port	Address	Status	Offset
SERVER_A	WINNT	THIS	1	000001	OL other	0
HOST_ID=1000-0000-C920-3C2B		ADAPTER_ID=1000-0000-C920-3C2B				
SERVER_B	WINNT	THIS	1	000002	OL other	0
HOST_ID=1000-0000-C920-3C20		ADAPTER_ID=1000-0000-C920-3C20				

If your Windows NT/Windows 2000 servers are not connect to the Fibre Channel loop, verify the KGPSA driver has started by invoking the Device applet in the Control Panel.

- Check the event log for errors by the KGPSA device driver.
- Check the Fibre Channel cable from your host bus adapter to the Fibre Channel hub.
- Verify the LEDs are illuminated where the Fibre Channel cable is connected to the hub and on the back of the Fibre Channel host bus adapter. If your Host servers are connected to the loop, proceed to Step 3.

### 3. Verifying the Storage Units have access to all host connections

Using the StorageWorks Command Console utility to create your storage partitions will, by default, restrict host access to the storage devices. To check host access, issue the CLI command as shown in Example 1.

#### Example 1 – Viewing Device Unit Information

```
HSG80> Show Units Full
```

If your device units have a host access of **none** or restrict access to a specific host connection name, then modify each device units to allow for **all** host access capabilities. Example 2 shows how to modify device unit D0 to allow unlimited hosts access. You will need to issue this command for each device storage unit.





# Appendix **B**

## Valid ALPA Settings

This appendix provides a table of the valid arbitrated loop physical addresses available for hard addressing the fibre channel arbitrated loop. Table B-1 lists the valid ALPA settings for the Fibre Channel arbitrated loop.

**Table B-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



# Index

## A

ALPA Settings B-1  
Assigning/De-assigning Drive Letters 4-1, 5-1  
Audience v-10

## C

Cable Connection 2-3  
Cables 2-2  
Cluster Configurations 2-3  
Compaq Authorized Reseller v-101  
Compaq Technical Support v-101  
Configuration Guidelines 1-1  
Configuration Limits 2-4  
Configuration Rules 2-9  
Configuration, Single 2-4  
Configuration, Two-cluster 2-6  
Connectivity to the Fibre Channel Arbitrated Loop  
A-4

## D

De-assigning Drive Letters 4-1  
Designating Servers 3-1  
Device Driver Initialization A-1  
Disk Management window 4-2  
Drive Letter, NTFS Partition 4-5  
Drive Letters, assigning 4-1, 5-1  
Driver Parameters A-3

## E

Enterprise Storage RAID Array 2-1

## F

Fibre Channel Cluster Concept v-10  
Fibre Channel Cluster, Installing Software 3-1  
Fibre Channel Host Bus Adapter 2-2  
Fibre Channel Software Setup Utility 4-3  
Fibre Channel Switch Configuration Rules 2-9

## G

Getting Help v-101

## H

Help v-101  
Host Bus Adapter 2-2  
HsxDisk filter Driver Installation 4-4  
Hubs 2-2

## I

Installing Software for a Fibre Channel Cluster  
3-1

## L

Limits, Configuration 2-4

## N

NTFS Partition Drive Letter 4-5

## P

Preparing for a FC Cluster 3-2  
Product Overview v-111

## R

Registry Device A-3  
Roadmap 1-1

***Index-2 Enterprise/Modular Storage RAID Array Fibre Channel Cluster for Windows NT/Windows 2000***

**S**

Servers 2-2

Servers, Designating as Host A and Host B 3-1

Switches 2-2

**T**

Technical Support v-ix

Troubleshooting A-1

**V**

Verifying Device Driver Initialization A-1