



**Hitachi Freedom Storage™
Lightning 9900™ V Series
LUN Manager User's Guide**

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Document Revision Level

Revision	Date	Description
MK-92RD105-P	April 2002	Preliminary Release
MK-92RD105-0	April 2002	Initial Release
MK-92RD105-1	July 2002	Revision 1, supersedes and replaces MK-92RD105-0
MK-92RD105-2	October 2002	Revision 2, supersedes and replaces MK-92RD105-1
MK-92RD105-3	January 2003	Revision 3, supersedes and replaces MK-92RD105-2
MK-92RD105-4	April 2003	Revision 4, supersedes and replaces MK-92RD105-3
MK-92RD105-5	July 2003	Revision 5, supersedes and replaces MK-92RD105-4
MK-92RD105-6	November 2003	Revision 6, supersedes and replaces MK-92RD105-5
MK-92RD105-7	January 2004	Revision 7, supersedes and replaces MK-92RD105-6
MK-92RD105-08	May 2004	Revision 8, supersedes and replaces MK-92RD105-7

Source Documents for this Revision

- Lum45d5 (RSD source document)
- Lum45d5a (RSD source document)
- Lum45d5b (RSD source document)

Changes in this Revision

- Replaced screen shot of LUN Manager Main panel, LUN Manager tab (Figure 3.1)
- Replaced screen shot of LUN Manager Main panel, Port tab (Figure 3.7)
- Added screen shot of LUN Manager Main panel, User Authentication tab (Figure 3.11)

Referenced Documents

- *Hitachi Lightning 9900™ V Series User and Reference Guide* (MK-92RD100)
- *Hitachi Lightning 9900™ V Series Remote Console - Storage Navigator User's Guide* (MK-92RD101)

Preface

The *Hitachi Lightning 9900™ V Series LUN Manager User's Guide* describes and provides instructions for performing LUN Manager operations on the Lightning 9900™ V Series subsystem using the Storage Navigator Java™ applet program.

This document assumes that:

- The user has a background in data processing and understands direct-access storage device subsystems and their basic functions,
- The user is familiar with the Hitachi Lightning 9900™ V Series disk array subsystem,
- The user has read and understands the *Hitachi Lightning 9900™ V Series Hitachi Remote Console - Storage Navigator User's Guide* (MK-92RD101), and
- The user is familiar with the operating system (e.g., Windows®, Solaris™, Red Hat® Linux®) and web browser (e.g., Internet Explorer®, Netscape® Navigator, Mozilla™) on the system hosting the 9900V Storage Navigator-LUN Manager remote console software.

Note: The term “9900V” refers to the entire Hitachi Lightning 9900™ V Series subsystem family (9980V, 9970V), unless otherwise noted. For further information on the 9900V subsystem, please contact your Hitachi Data Systems account team, or visit Hitachi Data Systems online at <http://www.hds.com>.

Note: The use of the LUN Manager software and all other Hitachi Data Systems products is governed by the terms of your license agreement(s) with Hitachi Data Systems.

Note: The LUN Manager panels shown in this document were captured on a Windows® system with the Internet Explorer® web browser, and may display differently on other operating systems and browsers. Please refer to the *9900V Remote Console - Storage Navigator User's Guide* (MK-92RD101) for further information on UNIX® operating systems and browsers.

Microcode Level

This document revision applies to 9900V microcode version 21-08-0x and higher.

Comments

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Thank you! (All comments become the property of Hitachi Data Systems Corporation.)

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Chapter 1 Overview of LUN Manager and LUN Security

1.1 Overview of LUN Manager

The LUN Manager feature of the Lightning 9900™ V Series (9900V) subsystem enables the user to define the SCSI-to-LUN paths for the 9900V logical units (LUs) and configure the 9900V ports and LUN security. Each 9900V LU can be mapped for access from multiple ports, providing alternate paths for path failover and nonstop data availability. LUN Manager allows the user to reconfigure the 9900V LUs at any time to accommodate system configuration changes and/or optimize subsystem performance.

LUN Manager is used to configure the command device for Command Control Interface (CCI) operations and apply command device security. LUN Manager also enables the user to set the port modes and fibre topology. The 9900V fibre-channel ports support a high-speed and a high-speed (2-port) mode that increases throughput. This is configured using LUN Manager.

This document describes and provides instructions for performing LUN Manager operations using the licensed 9900V Hitachi Storage Navigator software. The 9900V Storage Navigator software communicates directly with the 9900V subsystems via a local-area network (LAN). The Storage Navigator software displays detailed LUN Manager information and allows the user to perform LUN Manager operations on the 9900V subsystem.

Caution: Some LUN Manager operations may compromise data integrity. The user is responsible for verifying that the proper operations are performed on the proper devices.

Note: The use of the LUN Manager software and all other Hitachi Data Systems products is governed by the terms of your license agreement(s) with Hitachi Data Systems.

The 9900V disk subsystem provides the following types of ports:

- **Fibre Channel:** Fibre channel (FC) is a protocol that enables data transfers over a fibre-channel network. Fibre channel is suitable for SANs (storage area networks).
- **NAS:** NAS is a type of storage device that is installed inside of a storage subsystem and which is attached to a LAN. NAS contains an embedded operating system and a file system to enable file sharing by multi-platform host servers. If you want to use the 9900V disk subsystem as a NAS storage device, host servers should be attached to 9900V NAS ports.

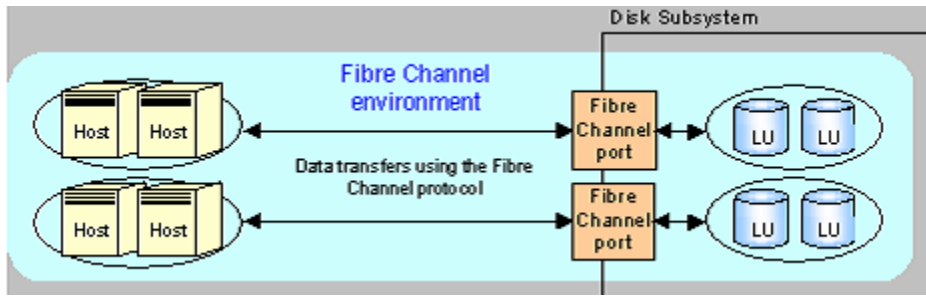


Figure 1.1 Fibre-Channel Environment

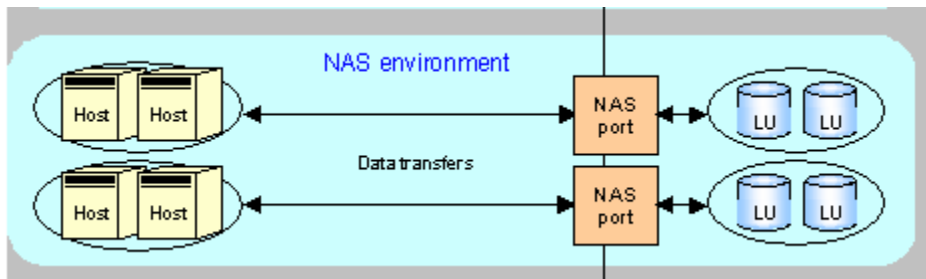


Figure 1.2 NAS Environment

1.1.1 Using NetApp® gFiler™ NAS Gateway With LUN Manager

If you are configuring LUNs for use with NetApp® gFiler™ NAS gateway, the following restrictions and recommendations apply:

- LUN 0 must be configured for each channel adapter port accessible to a gFiler™. Data ONTAP™ uses LUN 0 to gather information about the other LUNs configured on the port.
- The maximum number of LUNs allowed for each channel adapter port is 256.
- Redundant paths to a particular LUN are created by sharing the LUN between two channel adapter ports on 9900V. If two channel adapter ports share access to a LUN, all of the following must be true:
 - All of the LUNs that are accessible from one port must also be accessible from the other port.
 - The LU numbers used to map the LUNs must be the same on each of the shared ports, or data corruption can occur.
 - In a single gateway configuration, only one gateway can have access to the two channel adapter ports. In a clustered gateway configuration, only the nodes in that clustered gateway configuration can have access to the two channel adapter ports.

1.2 Overview of LUN Security

To protect mission-critical data in your disk subsystem from unauthorized access, you should implement LUN security. LUN security allows you to prevent unauthorized open-systems hosts from either seeing or accessing the data on the secured LU. If LUN security is applied to a particular port, that port can only be accessed from within its own host group (also known as a host storage domain). Figure 1.3 illustrates LUN security applied to port CL1-A.

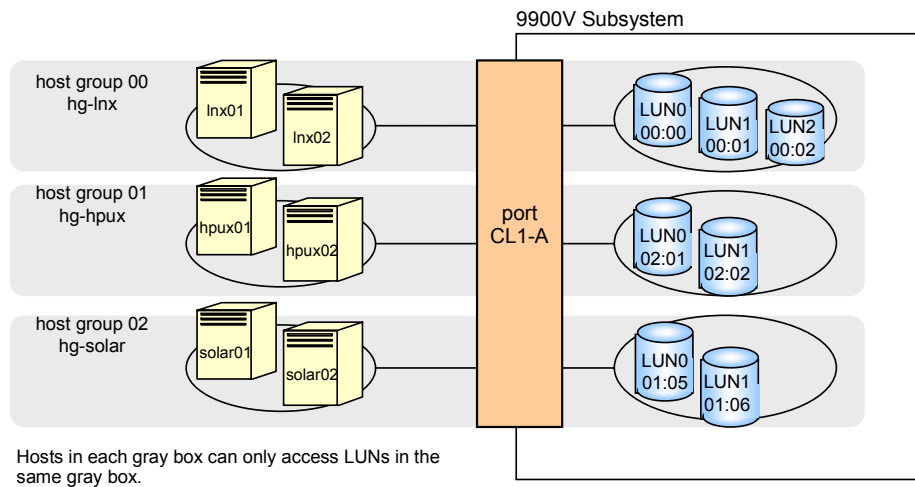


Figure 1.3 Host Access to LUNs With LUN Security

If LUN security is not applied, hosts connected to a particular port will be able to access all of the LUs connected to the same port. Figure 1.4 illustrates host access without LUN security.

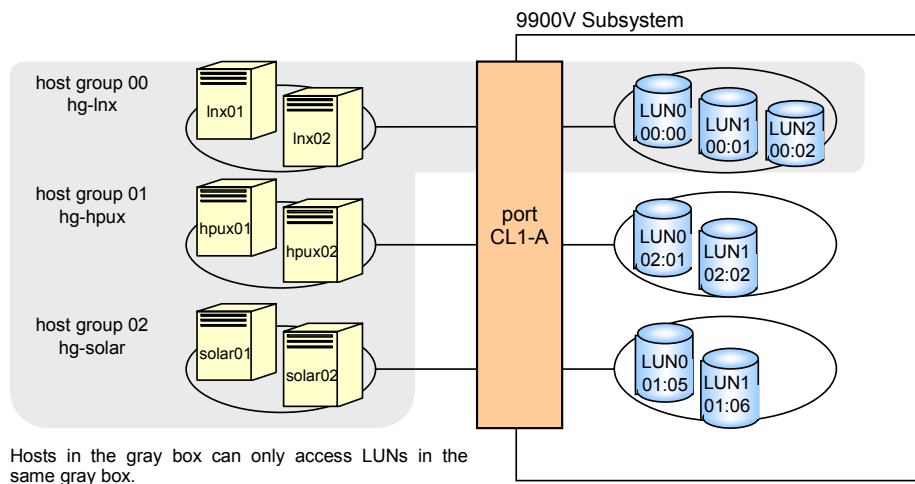


Figure 1.4 Host Access to LUNs Without LUN Security

By default, **host group 0** is the only host group reserved for each port. If you use the LUN Manager panel to view a list of host groups in a port, host group 0 usually appears at the top of the list and is indicated by the number “00” (see Figure 4.2 for more details on host groups).

The default name of a host group consists of the port name, a hyphen, and the host group number. For example, the default name for host group 0 on port 1A is **1A-G00**. The name can be changed.

By default, LUN security is *not* applied. For details on applying LUN security, see section 4.4.

1.2.1 Using LUN Security With NetApp™ gFiler™ NAS Gateway

If you are using LUN Manager in conjunctions with a NetApp™ gFiler™ NAS Gateway, NetApp™ recommends that you use both LUN security and switch zoning. LUN security ensures that incorrect switch zoning will not allow the gateway access to LUNs that it does not own. This is important, because access to a LUN that the gateway does not own can corrupt the LUN.

Chapter 2 Preparing for LUN Manager Operations

2.1 Preparing the 9900V Subsystem and Storage Navigator Computer(s)

Before launching LUN Manager, you must take several preliminary steps. These include the following:

- Install the 9900V subsystem.
- Install the computer(s) that you intend to use as Storage Navigators, and connect them to the 9900V internal LAN.
- Enable LUN Manager on each subsystem where you intend to use the option.

For detailed instructions, please refer to *Hitachi Freedom Storage™ Lightning 9900™ V Series User and Reference Guide* (MK-92RD100) and *Hitachi Freedom Storage™ Lightning 9900™ V Series Remote Console - Storage Navigator User's Guide* (MK-92RD101).

2.2 Launching LUN Manager

To use LUN Manager, first log on to the primary SVP. For detailed instructions on the login process, see *Hitachi Freedom Storage™ Lightning 9900™ V Series Remote Console - Storage Navigator User's Guide* (MK-92RD101).

If you successfully log on to the primary SVP, the Storage Navigator main panel opens (see Figure 2.1). The option buttons are displayed on the left side of the panel. Select the **LUN Manager/LUN Security** button () to open the LUN Manager main panel (see Figure 3.1). The LUN Manager tab is the default view.

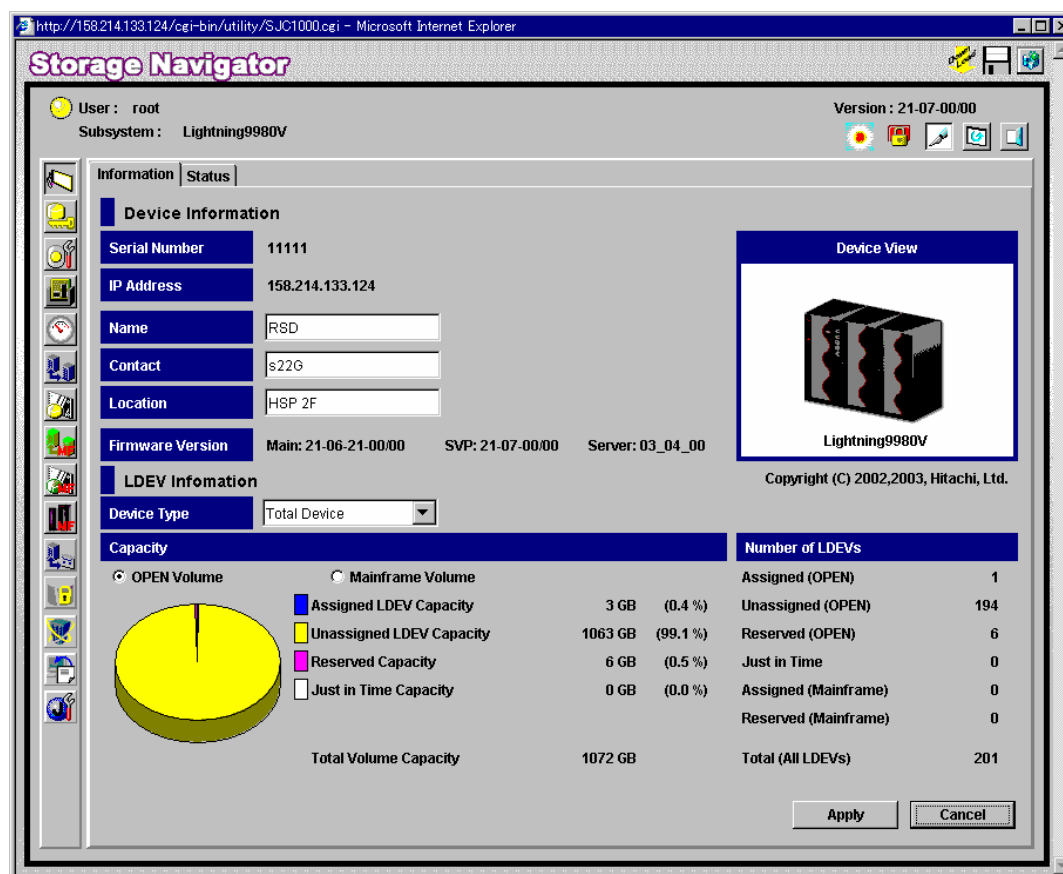


Figure 2.1 Storage Navigator Main Panel, Information Tab

2.3 Changing to Modify Mode

If you are going to implement any changes for LUN Manager, you must be in **Modify** mode. The subsystem information icons (see Figure 2.2) are on the upper right corner. These icons are described in detail in *Hitachi Freedom Storage™ Lightning 9900™ V Series Remote Console - Storage Navigator* (MK-92RD101). If you want to change from **View** mode to **Modify** mode and back, two of the icons are important :

- Exclusive lock icons indicate the operation mode of all currently logged-in users. If all users are operating in **View** mode, the **Unlocked** icon () is displayed. If a user is operating in **Modify** mode, or if subsystem maintenance or SNMP operations are being performed, the **Locked** icon () is displayed.
- **Mode-Changing** buttons allow users to change the operation mode between **View** mode () and **Modify** mode (). **Note:** Only one user at a time can be in **Modify** mode.

To change between **View** and **Modify** modes:

1. You must have administrator or write access for the option that you want to use. For details on assigning user access, see *Hitachi Freedom Storage™ Lightning 9900™ V Series Remote Console - Storage Navigator* (MK-92RD101).
2. Verify that the subsystem is unlocked. If all users are operating in **View** mode, the **Unlocked** icon () and the **View Mode** icon () are displayed (see Figure 2.2). If a user is operating in **Modify** mode, or if subsystem maintenance is being performed, the **Locked** icon () is displayed, and you cannot change to **Modify** mode.
3. Select the **Mode Changing** icon () , which should be in **View** mode. A confirmation message displays (see Figure 2.3). Select **OK**.
4. The **Mode Changing** icon changes from **View** mode to **Modify** mode () . The **Locked** icon () displays (see Figure 2.4).
5. Change back to **View** mode once you have applied the change. Select the **Mode Changing** icon () . The confirmation message displays (see Figure 2.3).
6. Select **OK**, and you are returned to **View** mode.



Figure 2.2 Icons Showing Unlocked Status and View Mode

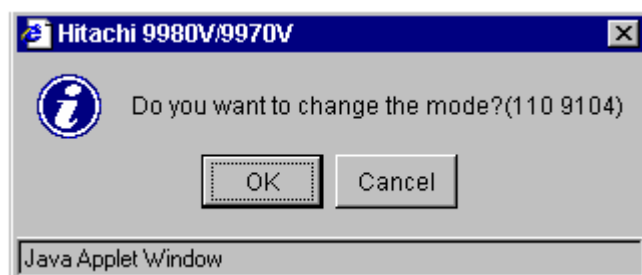


Figure 2.3 Mode Changing Confirmation Message



Figure 2.4 Icons Showing Locked Status and Modify Mode

Chapter 3 LUN Manager Panels

3.1 LUN Manager Tab

The **LUN Manager** tab on the LUN Manager main panel (see Figure 3.1) allows you define LU paths, apply LUN security, and define command devices. The **Apply** button implements the setting(s) that have been made on this panel. The **Cancel** button cancels the setting(s) that have been made on this panel.

Note: The screens shown in this document include only the LUN Manager portion of the Storage Navigator panel. The option buttons (along the left side of the panel) and the subsystem information icons (top right corner of the panel) are not shown.

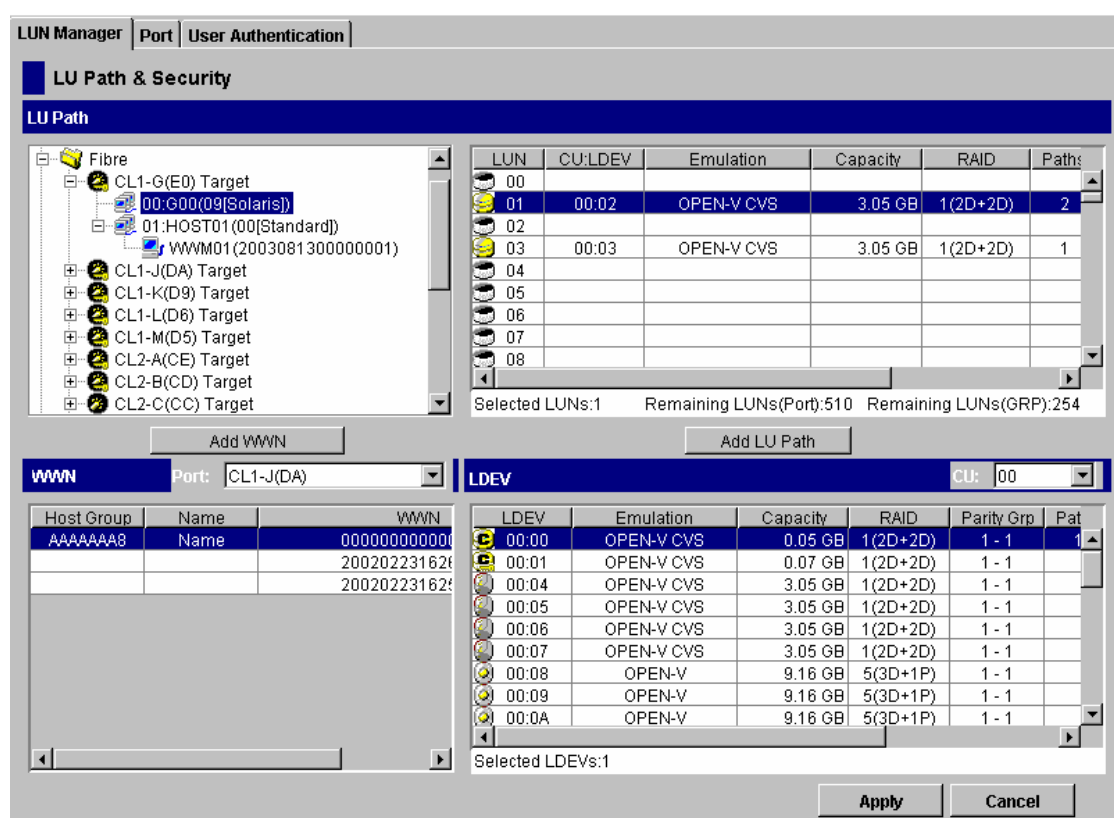


Figure 3.1 LUN Main Panel, LUN Manager Tab (Fibre Port Selected)

3.1.1 LU Path Outline on the LUN Manager Tab

The **LU Path** outline (upper left corner of **LUN Manager** tab; see Figure 3.2) displays the subsystem ports and the connected hosts.

The Subsystem folder is at the top of the LU Path outline, and has the following subfolders:

- Fibre-channel ports (see section 3.1.1.1 for a discussion of the **Fibre** folder)

If LUN security is not applied, all host groups except for the first group (host group 0) are grayed out. If you double-click a grayed-out host group, the contents of the **LU Path** table (on the upper right corner of the LUN Manager panel; see Figure 3.4) will also be grayed out.

When you select a host group in the outline view, the **LU Path** table shows information about each of the LUNs in the selected group. For details on creating host groups and host modes, see section 4.2.2.

3.1.1.1 Fibre Folder

If you double-click the **Fibre** folder, the fibre-channel ports in the disk subsystem appear as icons. On the right side of each icon are the port name, the port address, and the port attribute (i.e., whether the port is an initiator port, a target port, an RCU target port, or an external port). **Note:** The **Fibre** folder does not display if the disk subsystem does not contain any fibre-channel adapters.

Figure 3.2 shows the Fibre folder:

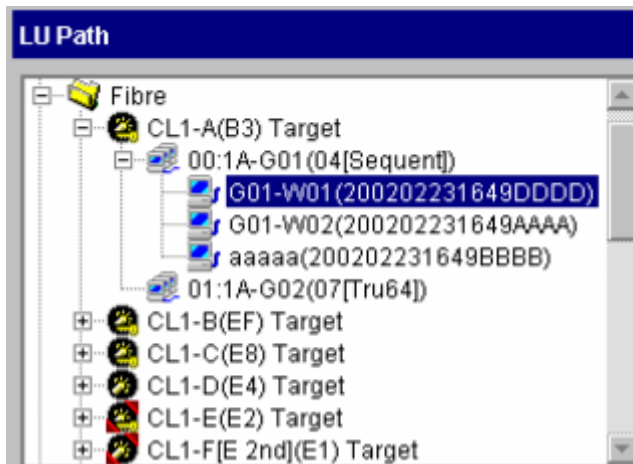


Figure 3.2 LU Path Outline, Fibre Folder Selected

The icons for the fibre-channel ports are as follows:

-  indicates a short-wave port in standard mode, with LUN security not applied.
-  indicates a short-wave port in standard mode. The addition of a key to the icon indicates that LUN security is applied to the port.
-  indicates a long-wave port in standard mode, with LUN security not applied.
-  indicates a long-wave port in standard mode. The addition of a key to the icon indicates that LUN security is applied to the port.
-  indicates a short-wave port in high-speed or high-speed (2-port) mode, with LUN security not applied.
-  indicates a short-wave port in high-speed or high-speed (2-port) mode. The addition of a key to the icon indicates that LUN security is applied to the port.
-  indicates a long-wave port in high-speed or high-speed (2-port) mode, with LUN security not applied.
-  indicates a long-wave port in high-speed or high-speed (2-port) mode. The addition of a key to the icon indicates that LUN security is applied to the port.

When you double-click a port icon in the outline view, one or more host group icons () display. Host groups are identified by host group number, host group name and host mode.

When you double-click a host group icon, one or more host bus adapters (HBAs) display (). Fibre-channel HBAs are identified by nickname and worldwide name (WWN). For details on changing the nickname or WWN of host bus adapters, see section 4.3.2.

3.1.1.2 NAS Folder

If you double-click the NAS folder, NAS ports in the disk subsystem appear as icons, with two port names to the right of each icon. The name of the channel adapter is to the right of the port names, enclosed by parentheses. **Note:** The NAS folder does not display unless the 9900V has at least one NAS channel adapter. Figure 3.3 shows the NAS folder.

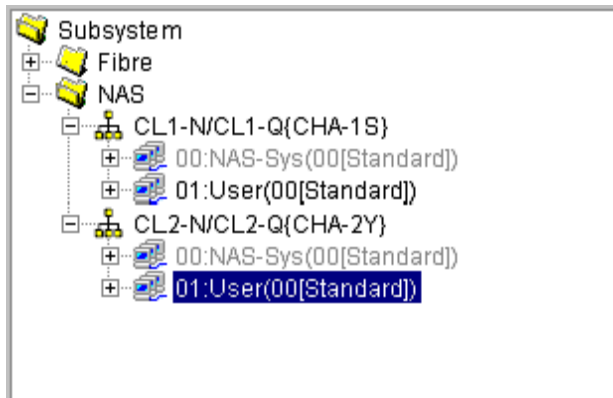


Figure 3.3 NAS Folder

The following are NAS port icons:

-  indicates that you can assign paths from this NAS port to logical volumes.
-  indicates that you cannot assign paths from this NAS port to logical volumes, due to a hardware failure or some other reasons.

When you double-click a NAS port, the following host groups appear:

- **NAS-Sys:** When you select this host group, the table on the right displays information about paths to system LUs. The table contents are grayed out and cannot be changed. This host group is numbered 00.
- **User:** When you select this host group, the LU Path table (see Figure 3.4) displays information about paths to user LUs. This host group is numbered 01.

3.1.2 LU Path Table on the LUN Manager Tab

The LU Path table (see Figure 3.2) (upper right corner of LUN Manager tab) displays the LU path information.

LUN	CU:LDEV	Emulation	Capacity	RAID	Paths
 00	00:00	OPEN-3 CVS	0.04 GB	1(2D+2D)	5
 01					
 02	00:02	OPEN-3 *3	6.87 GB	1(2D+2D)	5
 03					
 04					
 05					
 06					
 07	00:07	OPEN-3	2.29 GB	1(2D+2D)	3
 08					
 09	00:09	OPEN-3	2.29 GB	5(3D+1P)	2
Selected LUNs:2 Remaining LUNs(Port):504 Remaining LUNs(GRP):252					

Figure 3.4 LU Path Table (on the LUN Manager Tab)

The LU Path table has the following features:

- The LUN column displays the logical unit numbers (LUNs) that are assigned to logical volumes. If no paths are defined, the other columns on the right are left blank. The icon will be one of the following:
 -  indicates a logical volume to which an LU path is defined.
 -  indicates an expanded LU. For more information on LUN Expansion see *Hitachi Freedom Storage™ Lightning 9900™ V Series LUN Expansion (LUSE)/Virtual LVI/LUN (VLL) User's Guide* (MK-92RD104).
 -  indicates a command device.
 -  indicates a secured command device.
 -  indicates a LUN to which no LU path is defined.
 -  indicates a volume to which Virtual LVI/LUN (CVS) has been applied. For more information on Virtual LVI/LUN, see *Hitachi Freedom Storage™ Lightning 9900™ V Series LUN Expansion (LUSE)/Virtual LVI/LUN (VLL) User's Guide* (MK-92RD104).
- The CU:LDEV column indicates the control unit (CU) image number and logical device (LDEV) number, which are used to identify an LDEV. If an LDEV number ends in #, the LDEV is a Hi-Copy volume.
- The Emulation column displays the emulation type for each LDEV.

Note: Virtual LVI/LUN volumes are indicated by CVS to the right of the emulation type (e.g., OPEN-3 CVS).

Note: LUSE volumes are indicated by an asterisk (*) and a number to the right of the emulation type (e.g., OPEN-9*3 is a LUSE volume consisting of three OPEN-9 LUs).

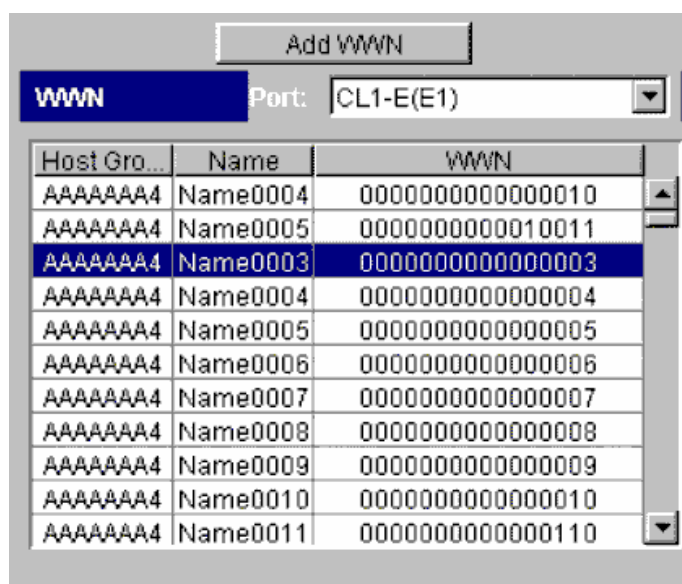
- The **Capacity** column displays the size of each LDEV.
- The **RAID** column displays the RAID level for each LDEV. **Note:** Hi-Copy volumes are indicated by - instead of a RAID level.
- The **Paths** column displays the number of alternate paths, if any, for each LDEV.
- The **Access Attribute** column indicates the access level for the LDEV (e.g., read/write). For more information on setting LDEV access, please see *Hitachi Freedom Storage™ Lightning 9900™ V Series Open LDEV Guard User's Guide* (MK-93RD158).
- The **Selected LUNs** field displays the number of LUNs that have been selected in the LU Path table.
- The **Remaining LUNs (Port)** field displays the number of LUNs to which no LU path has been defined. This indicates the number of LU paths that you can add to the port specified in the outline view.
- The **Remaining LUNs (GRP)** field displays the number of LUNs to which no LU path has been defined. This indicates the number of LU paths that you can add to the host group specified in the outline view.

3.1.3 Port Table on the LUN Manager Tab

The **Port** table (lower left corner of **LUN Manager** tab) shows information about the host bus adapters that are connected to 9900V ports.

3.1.3.1 Port Table for WWNs

If you have selected a fibre-channel port in the LU Path outline (refer to Figure 3.2), you will see the Port table for WWNs (see Figure 3.5).



Host Gro...	Name	WWN
AAAAAAA4	Name0004	0000000000000010
AAAAAAA4	Name0005	0000000000010011
AAAAAAA4	Name0003	0000000000000003
AAAAAAA4	Name0004	0000000000000004
AAAAAAA4	Name0005	0000000000000005
AAAAAAA4	Name0006	0000000000000006
AAAAAAA4	Name0007	0000000000000007
AAAAAAA4	Name0008	0000000000000008
AAAAAAA4	Name0009	0000000000000009
AAAAAAA4	Name0010	0000000000000010
AAAAAAA4	Name0011	0000000000000110

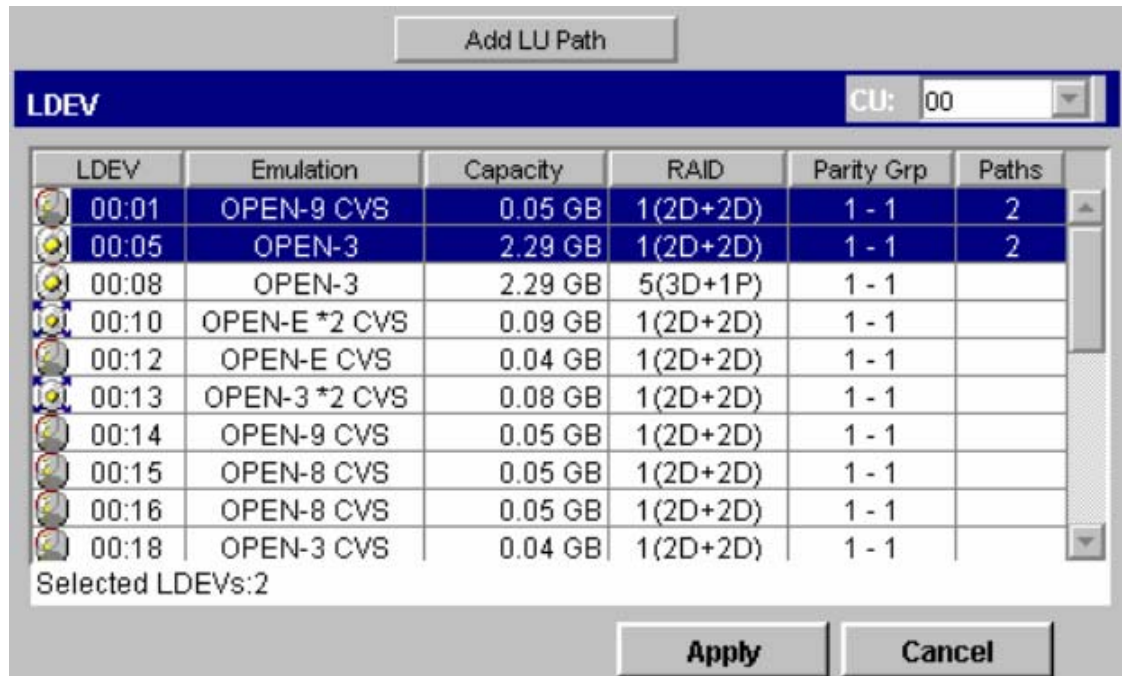
Figure 3.5 Port Table for WWNs (on the LUN Manager Tab)

The **Port Table for WWNs** has the following features:

- The **Add WWN** button registers host bus adapters in a host group. Before using this button, you must first select a fibre-channel host group in the **LU Path** outline (upper left of **LUN Manager** tab; refer to Figure 3.2), and then select a host bus adapter in this table.
- The **Port** drop-down box shows the selected port. The port's fibre address is displayed to the right of the port name and enclosed by parentheses.
- The **Host Group** column shows the host groups that are attached to the subsystem.
- The **Name** column indicates the nicknames that are assigned to the host bus adapters.
- The **WWN** column indicates the worldwide names of the host bust adapters.

3.1.4 LDEV Table on the LUN Manager Tab

The LDEV table (see Figure 3.6) (lower right corner of **LUN Manager** tab) displays information about the LDEVs that are in the subsystem.



CU: 00

LDEV	Emulation	Capacity	RAID	Parity Grp	Paths
00:01	OPEN-9 CVS	0.05 GB	1(2D+2D)	1 - 1	2
00:05	OPEN-3	2.29 GB	1(2D+2D)	1 - 1	2
00:08	OPEN-3	2.29 GB	5(3D+1P)	1 - 1	
00:10	OPEN-E *2 CVS	0.09 GB	1(2D+2D)	1 - 1	
00:12	OPEN-E CVS	0.04 GB	1(2D+2D)	1 - 1	
00:13	OPEN-3 *2 CVS	0.08 GB	1(2D+2D)	1 - 1	
00:14	OPEN-9 CVS	0.05 GB	1(2D+2D)	1 - 1	
00:15	OPEN-8 CVS	0.05 GB	1(2D+2D)	1 - 1	
00:16	OPEN-8 CVS	0.05 GB	1(2D+2D)	1 - 1	
00:18	OPEN-3 CVS	0.04 GB	1(2D+2D)	1 - 1	

Selected LDEVs:2

Apply Cancel

Figure 3.6 LDEV Table (on the LUN Manager Tab)

The **LDEV** table has the following features:

- The **Add LU Path** button defines LU paths to logical volumes. Before using this button, you must select LUNs in the **LU Path** table (upper right corner of **LUN Manager** tab) and also select logical volumes in the **LDEV** table (described below).
- The **CU** drop-down box displays the selected CU image.
- The **LDEV** column displays an icon, the CU number, and LDEV ID. If an LDEV number ends in #, the LDEV is a Hi-Copy volume. The icons are:
 -  indicates a normal logical volume.
 -  indicates an expanded LU.
 -  indicates a command device.
 -  indicates a secured command device.
 -  indicates a volume to which Virtual LVI/LUN (CVS) has been applied. For more information on Virtual LVI/LUN, see *Hitachi Freedom Storage™ Lightning 9900™ V Series LUN Expansion (LUSE)/Virtual LVI/LUN (VLL) User's Guide* (MK-92RD104).
- The **Emulation** column displays the emulation types for each LDEV.

Note: Virtual LVI/LUN volumes are indicated by **CVS** (custom volume size) to the right of the emulation type (e.g., OPEN-3 CVS).

Note: LUSE volumes are indicated by an asterisk (*) and number to the right of the emulation type (e.g., OPEN-9*3 is a LUSE volume consisting of three OPEN-9 LUs).
- The **Capacity** column displays the size of each logical volume.
- The **RAID** column displays the RAID level for each logical volume. **Note:** Hi Copy volumes are indicated by - instead of a RAID level.
- The **Parity Grp** column displays names of parity groups. A parity group name beginning with E (for “external”) indicates that the parity group consists of one or more Hi-Copy volumes.
- The **Paths** column displays the number of alternate paths, if any.
- The **Access Attribute** column indicates the access level for the LDEV (e.g., read/write). For more information on setting LDEV access, please see *Hitachi Freedom Storage™ Lightning 9900™ V Series Open LDEV Guard User's Guide* (MK-93RD158).
- The **Selected LDEVs** field displays the number of LDEVs selected.

3.2 Port Tab

The **Port** tab on the LUN Manager main panel (see Figure 3.7) allows you to configure the 9900V ports. **Note:** The option buttons (along the left side of the panel) and the subsystem information icons (in the top right corner of the panel) have been omitted from the screen shot.

Note: You cannot use the **Port** tab to make settings on NAS ports.

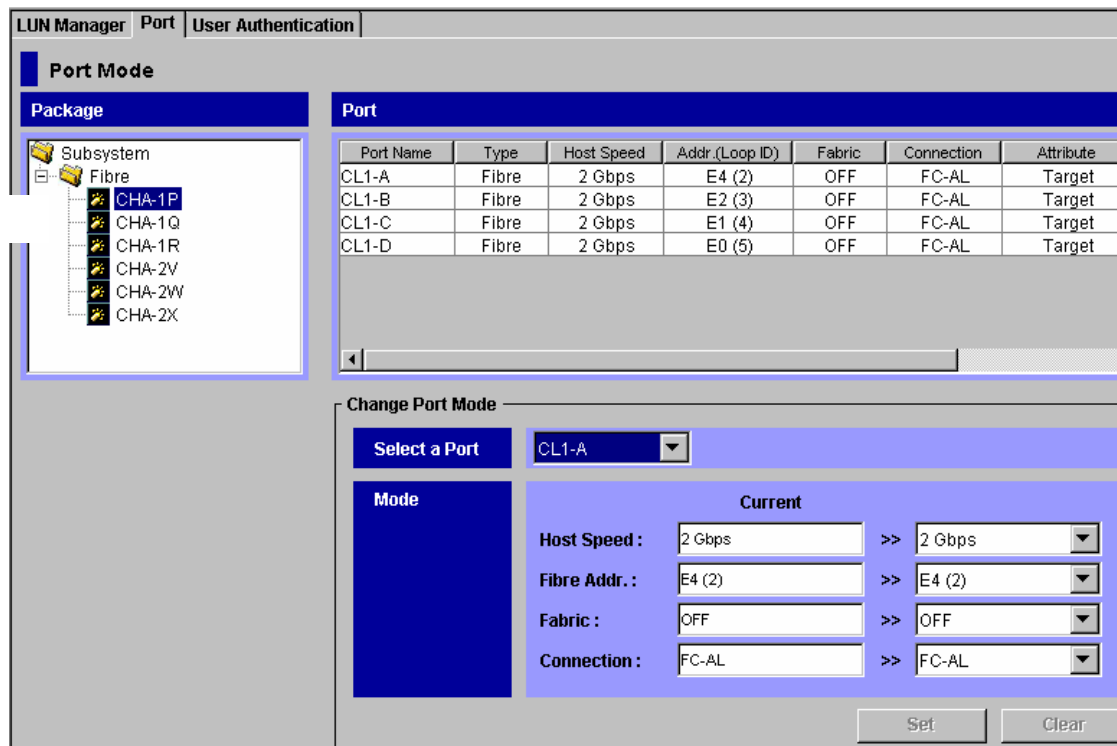


Figure 3.7 LUN Main Panel, Port Tab (Fibre Folder Selected)

3.2.1 Package Outline on the Port Tab

The **Package** outline (see Figure 3.8) (upper left corner of **Port** tab) displays the channel packages installed in the 9900V subsystem.

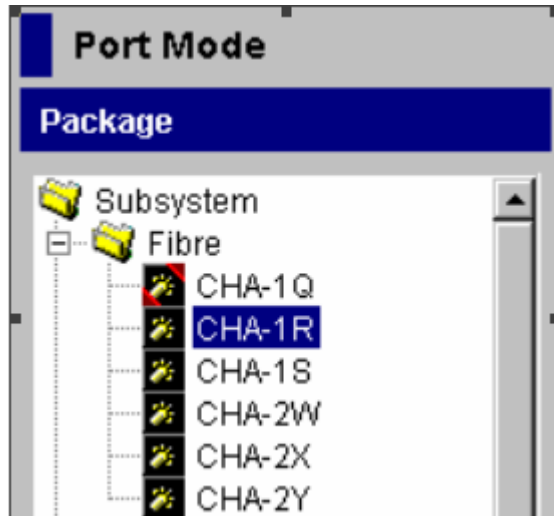


Figure 3.8 Package Outline (on the Port Tab)

The **Package** outline has the following features:

- When you double-click the **Fibre** folder, the folder opens and lists channel adapter (CHA) packages.
- The **Fibre** icons will be one of the following:
 -  indicates a short-wave CHA package in standard mode.
 -  indicates a long-wave CHA package in standard mode.
 -  indicates a short-wave CHA package in high-speed or high-speed (2-port) mode.
 -  indicates a long-wave CHA package in high-speed or high-speed (2-port) mode.

3.2.2 Port Table on the Port Tab

The **Port** table (upper right corner of **Port** tab; see Figure 3.9) displays information about the ports in the selected channel adapter package. You can use the options in the **Change Port Mode** group box (see Figure 3.10) to change information in this table.

3.2.2.1 Port Table for Fibre Ports

If you have selected a fibre-channel adapter, you will see Figure 3.9:

Port Name	Type	Host Speed	Addr.(Loop ID)	Fabric	Connection	Attribute	WWN
CL1-N	Fibre	2 Gbps	D4 (11)	ON	FC-AL	Target	000000000000000C
CL1-P	Fibre	1 Gbps	D3 (12)	ON	FC-AL	Target	000000000000000D
CL1-Q	Fibre	1 Gbps	D2 (13)	ON	FC-AL	Target	000000000000000E
CL1-R	Fibre	1 Gbps	D1 (14)	ON	FC-AL	Target	000000000000000F

Figure 3.9 Port Table for Fibre Ports

The **Port** table for fibre ports has the following features:

- The **Port Name** column displays the port name.
- The **Type** column displays the port type. **Fibre** indicates a fibre-channel port. (LUN Manager does not display mainframe ports.)
- The **Host Speed** column allows you to specify the data transfer speed for fibre-channel ports in gigabits per second (Gbps). If **Auto** is selected, the disk subsystem automatically sets the data transfer speed to 1 Gbps or 2 Gbps.
- **Addr. (Loop ID)** displays addresses of ports.
- The **Fabric** column indicates whether a fabric switch is used.
- The **Connection** column allows you to specify the topology. The default is **FC-AL**.
Note: Certain fabric switches require you to specify point-to-point topology. If your system uses a fabric switch, refer to the documentation for the fabric switch.
- The **Attribute** column indicates whether the port is an initiator port, a target port, an RCU target port, or an external port.
- The **WWN** column displays the WWNs of the host bus adapters.

3.2.3 Change Port Mode Box on the Port Tab

The **Change Port Mode** box (lower right corner of **Port** tab; see Figure 3.10) allows you to change the port information displayed in the **Port** table (refer to Figure 3.9).

3.2.3.1 Change Port Mode Box for Fibre Ports

If you have selected a fibre-channel port, you will see Figure 3.10:

Change Port Mode

Select a Port: CL1-F[E 2nd]

Mode

Current

Host Speed :	1 Gbps	>>	1 Gbps
Fibre Addr. :	AD (35)	>>	AD (35)
Fabric :	ON	>>	ON
Connection :	FC-AL	>>	FC-AL

Set Clear

Apply Cancel

Figure 3.10 Change Port Mode Box for Fibre Ports

The **Change Port Mode** box for fibre ports has the following features:

- The **Select a Port** drop-down box allows you to select a port for configuration.
- The **Host Speed** text box on the left displays the data transfer speed for the selected port, in gigabits per second (Gbps). The drop-down list on the right allows you specify the data transfer speed for the selected port. If **Auto** is selected, the disk subsystem automatically sets the data transfer speed to 1 Gbps or 2 Gbps. For instructions on changing the host speed, see section 4.6.1.
- The **Fibre Addr.** text box on the left displays the address of the selected port. The drop-down list on the right allows you specify the address of the selected port. For instructions on changing the host address, see section 4.6.2.
- The **Fabric** text box on the left indicates whether a fabric switch is used. **ON** indicates that you are using a fabric switch and **OFF** indicates that you are not using a fabric switch. The drop-down list on the right allows you specify whether a fabric switch is used. For instructions on changing to a fabric switch, see section 4.6.3.

- The **Connection** text box on the left indicates the topology, which can be either **FC-AL** or **P-to-P** (point-to-point). The drop-down list on the right allows you specify the topology. **Note:** Certain fabric switches require you to specify point-to-point topology. If your system uses a fabric switch, refer to the documentation for the fabric switch to determine whether your change requires point-to-point topology. For instructions on changing the fibre-channel topology, see section 4.6.3.
- The **Set** button displays the changes in the Port table. The changes are not applied to the subsystem until you select the **Apply** button (below).
- The **Clear** button cancels the selected settings.
- The **Apply** button implements the changes in the subsystem.
- The **Cancel** button cancels the changes.

3.3 User Authentication Tab

The User Authentication tab (see Figure 3.11) is not currently available. Contact your Hitachi Data Systems account representative regarding future availability.

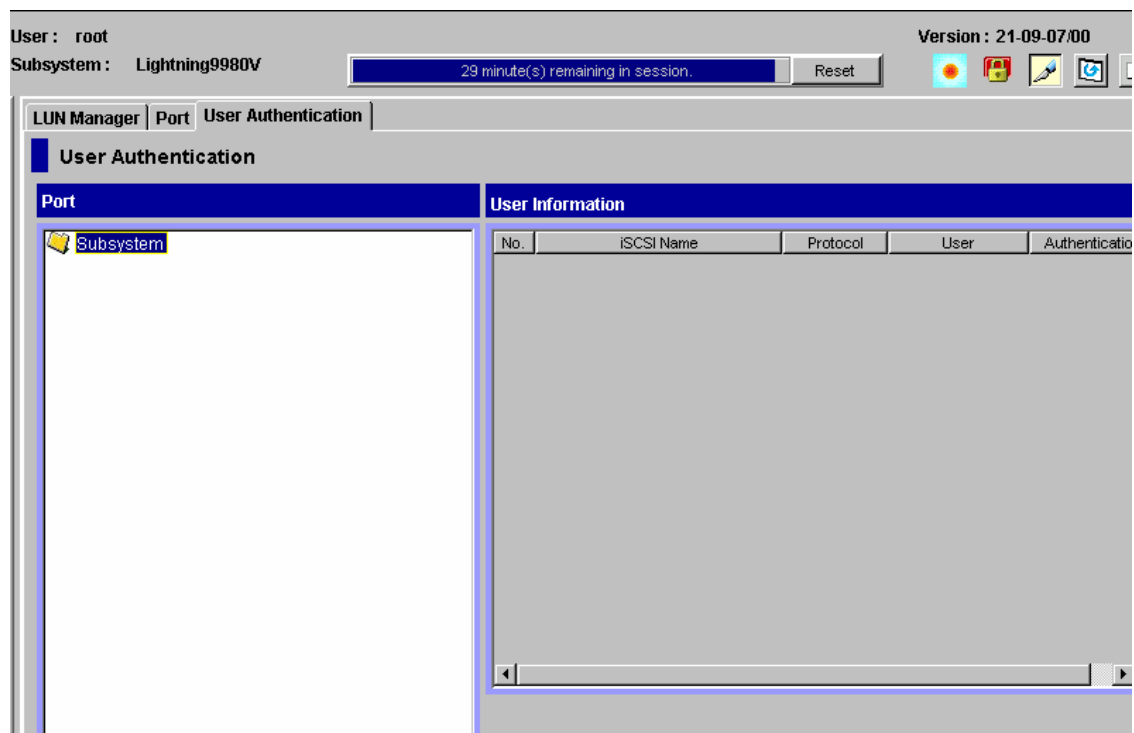


Figure 3.11 User Authentication tab

Chapter 4 Performing LUN Manager Operations

LUN Manager operations include the following:

- Defining LU paths (see section 4.2),
- Changing LU paths (see section 4.3),
- Using LUN security (see section 4.4),
- Configuring command devices (see section 4.5), and
- Configuring fibre-channel ports (see section 4.6).

4.1 Overview of Logical Volume and LU Path Configuration

4.1.1 Fibre-Channel

After open-system hosts and the disk subsystem are physically connected, you must use LUN Manager to establish I/O paths between the hosts and the logical volumes. These LU paths define which hosts are able to access which logical volumes. Before defining LU paths, you must classify server hosts by host groups. Host groups have the following characteristics:

- Host groups are used to segregate hosts by operating system. For example, if you have a Windows® host and a Linux® host attached to the same subsystem, you must create a Windows® host group and a Linux® host group, then register the host bus adapters in the corresponding host group.
- All hosts in a host group must be connected to the same port.
- Up to 256 LU paths can be defined for one host group. The maximum number of LUNs per physical port is 512, but you cannot put more than 256 LUNs in a LUN group, so any one host should never be able to see more than 256 LUNs per port (see Table 4.1).
- Up to 128 host groups and 255 WWNs can be assigned to one fibre-channel port (see Table 4.1).
- Up to 8,192 host groups can be created for one disk subsystem.

Table 4.1 Maximum Host Groups, WWNs, and LUNs per Fibre Port

Port	Number of Host Groups	Maximum WWNs	Maximum LUNs
1	1	255	256
1	2	255	512
1	:	255	512
1	:	255	512
1	128 (maximum)	255	512

Note: The supported features for different platforms may vary. Please refer to the appropriate 9900V configuration guide for specific details (e.g., *Hitachi Freedom Storage™ Lightning 9900™ V Series HP-UX® Configuration Guide, MK-92RD122*).

After server hosts are classified into host groups, you must link the host groups to logical volumes. In Figure 4.1 and Figure 4.2, the **hg-lnx** host group is associated with logical volumes 00:00, 00:01, and 00:02. The LU identified by the CU-LDEV number **00:00** is accessible from the two hosts that belong to that host storage domain. The LUs associated with the **hg-lnx** group are addressed by numbers 0 to 2.

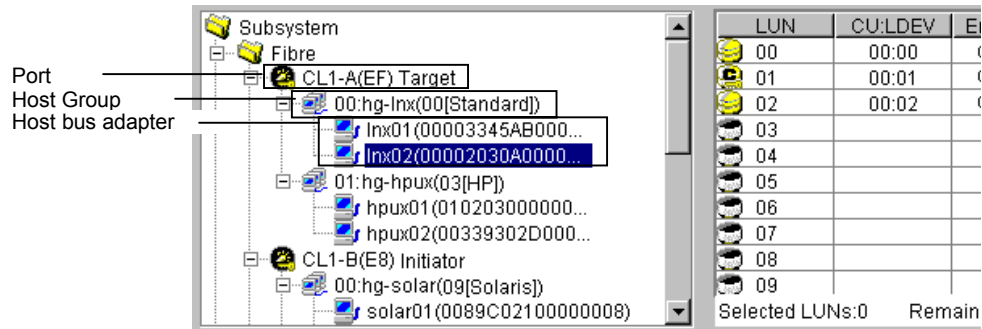


Figure 4.1 Fibre-Channel Port, Host Group, and HBA Configuration

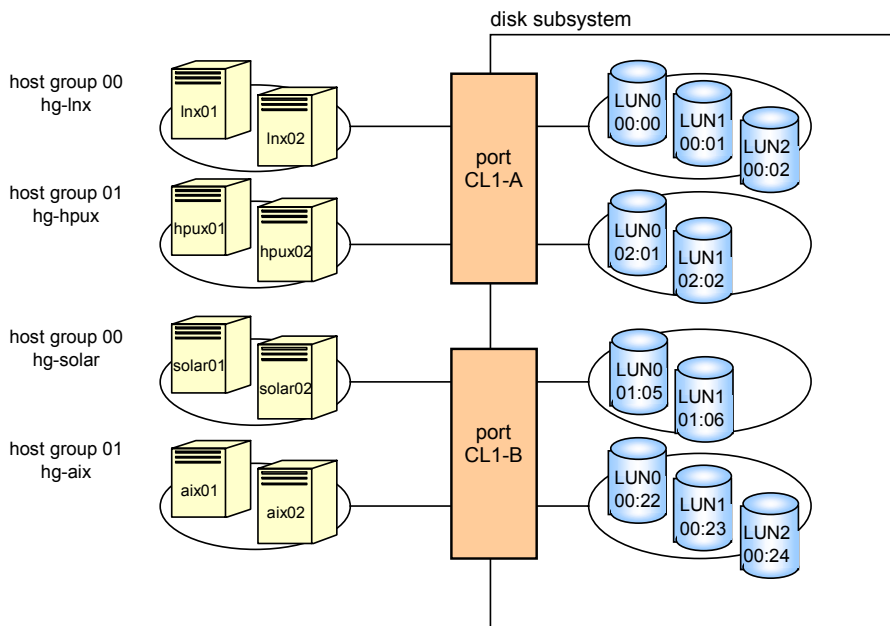


Figure 4.2 Fibre-Channel Host Group Configuration

4.1.2 Hitachi Lightning NAS Blade

In a NAS environment, hosts attached to a NAS port are automatically registered in a host group (a host storage domain) named **User**. LUs are classified into system LUs or user LUs. System LUs contain system information necessary for managing the NAS environment and can only be manipulated by Hitachi service representatives. User LUs contain data that can be accessed by ordinary network users. When configuring a NAS system, you need to define paths between hosts and user LUs. Paths are always defined between a user LU and a group of two ports.

- Up to 256 LU paths can be defined for one NAS port.
- You cannot define LU paths to logical volumes that do not have read/write access.
- You cannot define an LU path to LUN On Demand volumes.
- You cannot define an LU path to volumes reserved by Hitachi CruiseControl.

The **LUN Manager** tab displays two host groups (**User** and **NAS-Sys**) below each NAS port. When you define LU paths, you can use the **User** host group, but not the **NAS-Sys** host group. Figure 4.3 shows a sample configuration, where two paths are defined to the user LU 00:00 (LUN 00). One path comes from the CL1-N port and the other path comes from the CL1-Q port, so hosts can access the user LU even if one path fails.

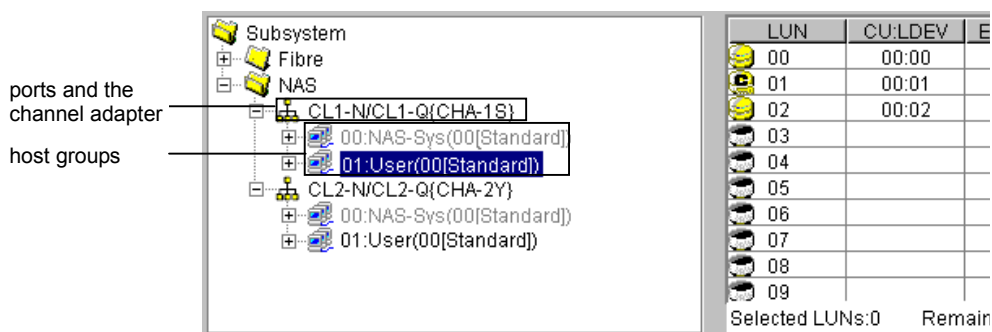


Figure 4.3 NAS Host Group Configuration

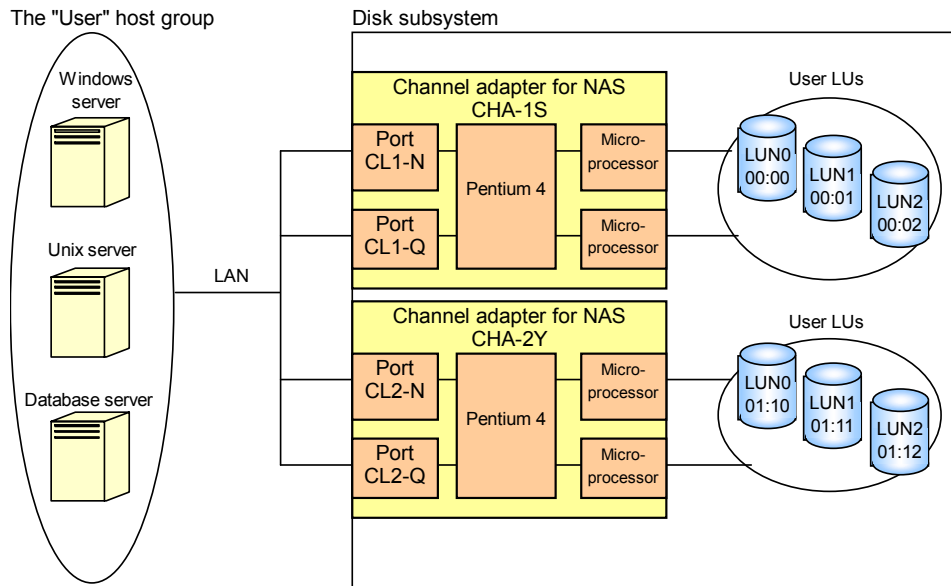


Figure 4.4 LU Path Configuration in a NAS Environment

4.2 Defining LU Paths

The steps for defining LU paths are:

- Finding the worldwide names of the fibre-channel host bus adapters (fibre-channel only) (see section 4.2.1)
- Creating host groups (fibre-channel only) (see section 4.2.2)
- Registering hosts in host groups (fibre-channel only) (see section 4.2.3)
- Associating host groups with LUs (see section 4.2.4)
- Viewing a list of concatenated parity groups (see section 4.2.5)

Note: You cannot define LU paths to the following types of volumes:

- Volumes reserved for Hitachi CruiseControl
- Just In Time (On-Demand) volumes

4.2.1 Finding the WWNs of the Fibre-Channel HBAs (Fibre-Channel Only)

Platform-specific instructions for finding the WWN of a fibre-channel HBA are found in the following sections, as follows:

- Windows NT® and Windows® 2000: see section 4.2.1.1
- Solaris™: see section 4.2.1.2
- AIX®, IRIX®, and Sequent®: see section 4.2.1.3
- HP-UX®: see section 4.2.1.4

The worldwide name is a unique identifier for a particular open-system host, consisting of a 64 bit physical address (the IEEE 48-bit format with 12-bit extension and 4-bit prefix).

After you have installed and configured the subsystem, you must obtain the WWN from each fibre-channel host that you want to use for LUN security. Hitachi Data Systems supports different fibre-channel adapters for different open-systems platforms. Sections 4.2.1.1 through 4.2.1.4 describe how to find the WWN for specific fibre-channel hosts. Please read the instructions carefully to ensure that the correct adapter is installed on the correct open-systems platform.

4.2.1.1 Finding the WWN for Windows NT® or Windows® 2000

Hitachi Data Systems currently supports the Emulex® fibre-channel adapter in a Windows NT® or Windows® 2000 environment, and will support other adapters in the future. For further information on fibre-channel adapter support, or if you are using a fibre-channel adapter other than Emulex®, please contact the Hitachi Data Systems Support Center for instructions on finding the WWN (see section 5.2).

To find the WWN in a Windows NT® or Windows® 2000 environment with an Emulex® Mini-Port Driver:

Note: Although these instructions are written for a Windows NT® environment, similar instructions apply in a Windows® 2000 environment.

1. Verify that the fibre adapters and the fibre-channel device drivers are installed.
2. Log in to the Windows NT® or Windows® 2000 host with administrator access.
3. Open the LightPulse™ Utility/NT panel (see Figure 4.5). If you do not have a shortcut to the utility, you can find the utility by searching for the file “lputilnt.exe”.
4. On the LightPulse™ Utility/NT panel, the installed adapter(s) are displayed in list box on the left of the panel. Verify that the installed adapter(s) are displayed.
5. On the LightPulse™ Utility/NT panel, in the **Category** list box, choose the **Configuration Data** option, and in the **Region** list box choose the **16 World-Wide Name** option. The WWN of the selected adapter is displayed in the list box on the right of the panel.

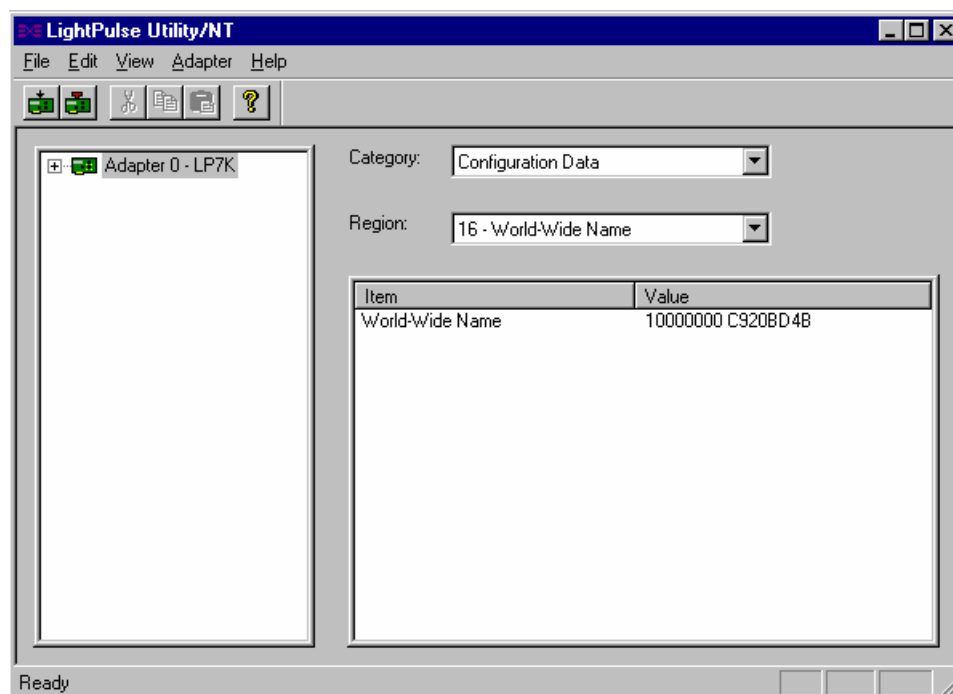


Figure 4.5 LightPulse Utility/NT Panel

4.2.1.2 Finding the WWN for Sun™ Solaris™

Hitachi Data Systems currently supports the JNI® fibre-channel adapter in a Sun™ Solaris™ environment. This document will be updated as needed to cover future adapter-specific information as those adapters are supported. For further information on fibre-channel adapter support, or if you are using a fibre-channel adapter other than JNI®, please contact the Hitachi Data Systems Support Center for instructions for finding the WWN.

To find the WWN in a Sun™ Solaris™ environment:

1. Verify that the fibre adapters and the fibre-channel device drivers are installed.
2. Login to the Sun™ Solaris™ host with root access.
3. To list the installed fibre-channel device(s) and their WWN(s) (see Figure 4.6), type:
dmesg |grep Fibre
4. Verify that the fibre-channel adapter(s) listed are correct, and record the listed WWN(s).

# dmesg grep Fibre	← Enter the dmesg command.
:	
fcaw1: JNI Fibre Channel Adapter model FCW	
fcaw1: Fibre Channel WWN: 200000e0694011a4	← Record the WWN.
fcaw2: JNI Fibre Channel Adapter model FCW	
fcaw2: Fibre Channel WWN: 200000e06940121e	← Record the WWN.
#	

Figure 4.6 Sun™ Solaris™ Worldwide Name

4.2.1.3 Finding the WWN for AIX®, IRIX®, or Sequent®

To find the WWN in an AIX®, IRIX®, or Sequent® environment, use the fibre switch that is connected to the host. The method of finding the WWN of the connected server on each port using the fibre switch depends on the type of change. For instructions on finding the WWN, refer to the manual of the corresponding change.

4.2.1.4 Finding the WWN for HP-UX®

To find the WWN in an HP-UX® environment (see Figure 4.7):

1. Verify that the fibre adapters and the fibre-channel device drivers are installed.
2. Log in to the HP-UX® host with root access.
3. At the command line prompt type:
`/usr/sbin/ioscan -fnC lan`
4. This will list the attached fibre-channel devices and their device file names. Record the fibre-channel device file name (for example, `/dev/fcms0`).
5. Use the `fcmsutil` command along with the fibre-channel device name to list the WWN for that fibre-channel device. For example, to list the WWN for the device with the device file name `/dev/fcms0`, type:
`/opt/fcms/bin/fcmsutil /dev/fcms0`
Note: When the A5158 fibre-channel adapter is used, to find the device name type:
`/usr/sbin/ioscan -fnC fc`
6. Record the fibre-channel device file name (for example, `/dev/td0`). **Note:** When the A5158 fibre-channel adapter is used, you would list the WWN for the device with the device file name as follows:
`/opt/fcms/bin/fcmsutil <device file name>`
7. Record the WWN, and repeat the above steps for each fibre-channel device that you want to use.

```

# /usr/sbin/ioscan -fnC lan
Class      I  H/W Path  Driver      S/W State  H/W Type  Description
=====
lan        0  8/0.5    fcT1_cntl   CLAIMED    INTERFACE  HP Fibre Channel Mass Storage
Cntl
                                /dev/fcms0
                                ⚡ ⚡ ⚡ Device file name.
lan        4  8/4.5    fcT1_cntl   CLAIMED    INTERFACE  HP Fibre Channel Mass Storage
Cntl
                                /dev/fcms4
                                ⚡ ⚡ ⚡ Device file name.
lan        5  8/8.5    fcT1_cntl   CLAIMED    INTERFACE  HP Fibre Channel Mass Storage
Cntl
                                /dev/fcms5
                                ⚡ ⚡ ⚡ Device file name.
lan        6  8/12.5   fcT1_cntl   CLAIMED    INTERFACE  HP Fibre Channel Mass Storage
Cntl
                                /dev/fcms6
                                ⚡ ⚡ ⚡ Device file name.
lan        1  10/8/1/0  btlan4      CLAIMED    INTERFACE  PCI(10110009) -- Built-in #1
lan        2  10/8/2/0  btlan4      CLAIMED    INTERFACE  PCI(10110009) -- Built-in #2
lan        3  10/12/6   lan2        CLAIMED    INTERFACE  Built-in LAN
                                /dev/diag/lan3 /dev/ether3 /dev/lan3
# # fcmsutil /dev/fcms0
Local N_Port_ID is = 0x000001
N_Port Node World Wide Name = 0x10000060B0C08294
N_Port Port World Wide Name = 0x10000060B0C08294
Topology = IN_LOOP
Speed = 1062500000 (bps)
HPA of card = 0xFFB40000
EIM of card = 0xFFFA000D
Driver state = READY
Number of EDB's in use = 0
Number of OIB's in use = 0
Number of Active Outbound Exchanges = 1
Number of Active Login Sessions = 2
#

```

⚡ Enter the ioscan command.

⚡ Enter the fcmsutil command.

⚡ Record the WWN.

Figure 4.7 HP-UX® Worldwide Name

4.2.2 Creating Host Groups (Fibre-Channel Only)

You can connect multiple server hosts of different platforms to a single port, but you must group server hosts connected to the disk subsystem by host groups, which are segregated by platform. For example, if both HP-UX® hosts and Windows® hosts are connected to a single port, you must first create a separate host group for each platform, then register the hosts to the corresponding host group.

The following procedure describes how to create a host group. The procedure for registering hosts to a host group is described in section 4.2.3.

To create a host group:

1. Change to **Modify** mode (refer to section 2.3 if you need instructions). Select the **LUN Manager** button () to open the **LUN Manager/Port** panel. The **LUN Manager** tab is the default view (refer to Figure 3.1).
2. In the **LU Path** outline (upper left corner of **LUN Manager** tab), find the port for which you want to create a host group, and verify that LUN security has been applied to that port. **Note:** If the icon has a key on it, LUN security has been applied. See section 4.4 for instructions for applying or removing LUN security.
3. Right-click the port, and then select **Add New Host Group** from the pop-up menu (see Figure 4.8) to display the Add New Host Group panel (see Figure 4.9).
4. Enter the host group name in the **Group Name** box. You may want to name host groups by platform (e.g., use **wnt** for the Windows NT® host group). The following parameters apply to host group names:
 - A name can consist of up to eight ASCII characters (letters, numerals, and symbols). The following symbols cannot be used for nicknames: \ / : , ; * ? “ < > |
 - Space characters cannot be used for the first or last character in a nickname.
 - Nicknames are case-sensitive (e.g., **wnt** and **Wnt** are different nicknames).
5. Select the appropriate host mode from the **Host Mode** drop-down list. See Table 4.2 for a list of host modes. **Caution:** Do not select **Reserve** from the drop-down list. **Reserve** indicates that the host mode is not currently supported.
6. Select **OK**. The changes are shown in *blue bold italics*, but are not yet applied to the subsystem.
7. If you want to apply the changes to the subsystem, select **Apply**, and then select **OK** on the confirmation message (see Figure 4.10). If you want to cancel the changes and not apply them to the subsystem, select **Cancel**, and then select **OK** on the confirmation message (see Figure 4.11).

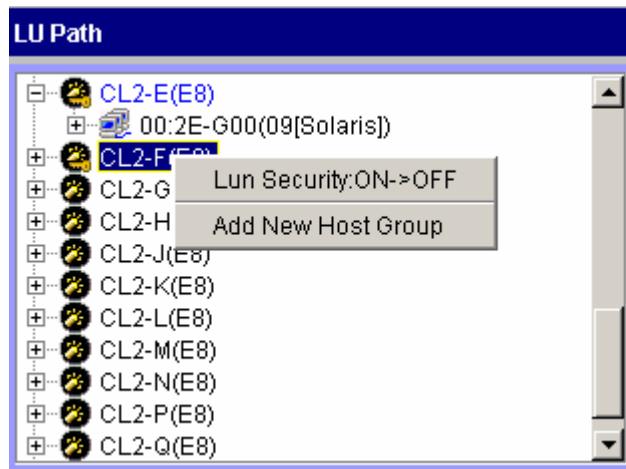


Figure 4.8 Add New Host Group Pop-Up Menu

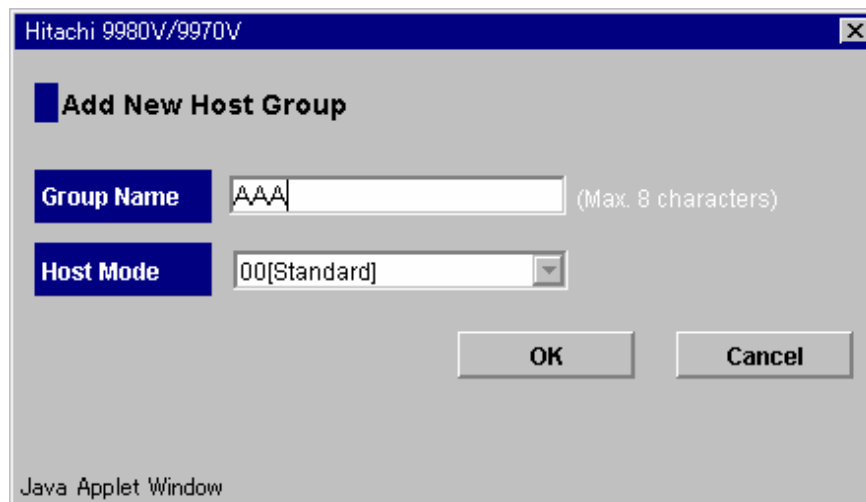


Figure 4.9 Add New Host Group Panel

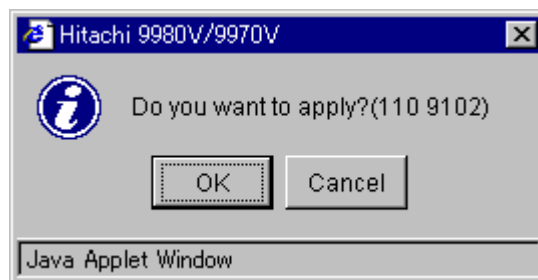


Figure 4.10 Apply Confirmation Message

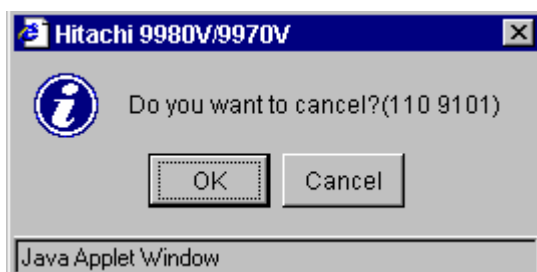


Figure 4.11 Cancel Confirmation Message

Table 4.2 Host Modes for the 9900V Ports

Host Mode	Host Platforms
00 Standard	Red Hat Linux®, IRIX®
01 Reserved	<i>Do not select this host mode.</i>
02 Reserved	<i>Do not select this host mode.</i>
03 HP®	HP-UX®
04 Sequent®	DYNIX/ptx®
05 OpenVMS®	OpenVMS®
06 Reserved	<i>Do not select this host mode.</i>
07 Tru64™	Tru64™
08 Reserved	<i>Do not select this host mode.</i>
09 Solaris™	Solaris™
0A NetWare®	NetWare®
0B Reserved	<i>Do not select this host mode.</i>
0C Windows®	Windows® 2000, Windows NT®. (See Note below.)
0D Reserved	<i>Do not select this host mode.</i>
0E Reserved	<i>Do not select this host mode.</i>
0F AIX®	AIX®
10-1F Reserved	<i>Do not select these host modes.</i>
2C Windows® Extension	Used to register Windows® server hosts in the host group (See Note below.)

Note: If you register Windows® server hosts in a host group, the host mode should be either 0C (Windows®) or 2C (Windows® Extension). You should use 2C (Windows® Extension) if you are considering creating LUSE volumes, because you cannot create a LUSE volume if the host mode of a host group is 0C (Windows®) and an LU path is defined between the host group and a logical volume. For detailed information about LUSE, please refer to *Hitachi Lightning 9900™ V Series LUN Expansion (LUSE) and Virtual LVI/LUN (VLL) User's Guide* (MK-92RD104).

4.2.3 Registering Hosts in Host Groups (Fibre-Channel Only)

4.2.3.1 Fibre-Channel Host Groups

If the **Port** table for WWNs (lower left corner of **LUN Manager** tab; refer to Figure 3.5) includes a host that you want to register, you can register the host by dragging the host from the **Port** table for WWNs to the desired host group in the **LU Path** outline.

When registering a host, you can assign a nickname to the host bus adapter to enable easier identification of each host bus adapter in the LUN Manager panel. Although WWNs are also used to identify each host bus adapter, the nickname that you assign can be more useful. You can use the nickname that you can more readily identify, such as the host installation site or the host owners. A nickname can consist of up to eight ASCII characters (letters, numerals, and symbols). The following parameters apply to host nicknames:

- The following symbols cannot be used for nicknames: \ / : , ; * ? “ < > |
- Space characters cannot be used for the first or last character in a nickname.
- Nicknames are case-sensitive (e.g., **hitachi** and **Hitachi** are different nicknames).

To manually register a host in a fibre-channel host group:

1. Change to **Modify** mode (refer to section 2.3 if you need instructions). Select the **LUN Manager** button () to open the **LUN Manager/Port** panel. The **LUN Manager** tab is the default view (refer to Figure 3.1).
2. In the **LU Path** outline (upper left corner of **LUN Manager** tab), find the fibre-channel port for which you want to create a host group, and verify that LUN security has been applied to that port. **Note:** If the icon has a key on it, LUN security has been applied. See section 4.4 for instructions for applying or removing LUN security.
3. If the desired host has ever been connected via a cable to another port in the subsystem, take the following steps:
 - a) In the **Port** table for WWNs (lower left corner of **LUN Manager** tab), select the port to which the desired host is (or was) connected using the **Port** drop-down list.
 - b) Drag the desired host bus adapter to the host group in the **LU Path** outline.
 - c) If you want to assign a nickname to the host bus adapter, enter the nickname in the **Name** box on the Add New WWN panel (see Figure 4.13), and then click **OK**.
Note: If two or more HBAs are selected, two or more Add New WWN panels (see Figure 4.13) appear one after another to let you assign a nickname to each HBA. If you do not need to assign nicknames to HBAs, select **The remaining WWNs do not need names**, and then click **OK**.

4. If the desired host has never been connected via a cable to any port in the subsystem, take the following steps:
 - a) In the **LU Path** outline, right-click the host group and then select **Add New WWN** from the pop-up menu (see Figure 4.12) to open the Add New WWN panel (see Figure 4.14).
 - b) On the Add New WWN panel (see Figure 4.14) click the arrow to the right of the WWN drop-down box, and select the desired host bus adapter from the list. If the list does not include the desired host bus adapter, enter the desired WWN in the **WWN** drop-down box.
 - c) If necessary, enter a name for the host bus adapter.
 - d) Select **OK**. The specified WWN and name appear below the selected host group in *blue bold italics*, but the changes are not yet implemented.
5. If you want to apply the changes to the subsystem, select **Apply**, and then select **OK** on the confirmation message. If you want to cancel the changes and not apply them to the subsystem, select **Cancel**, and then select **OK** on the confirmation message.

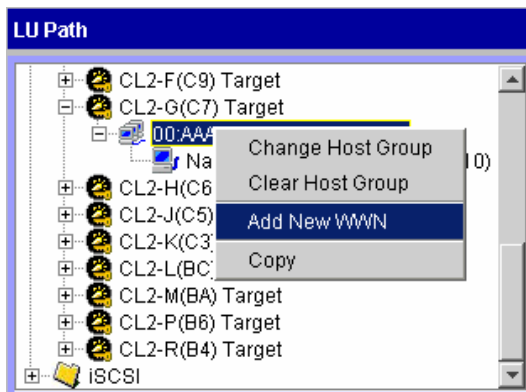


Figure 4.12 Add New WWN Pop-Up Menu

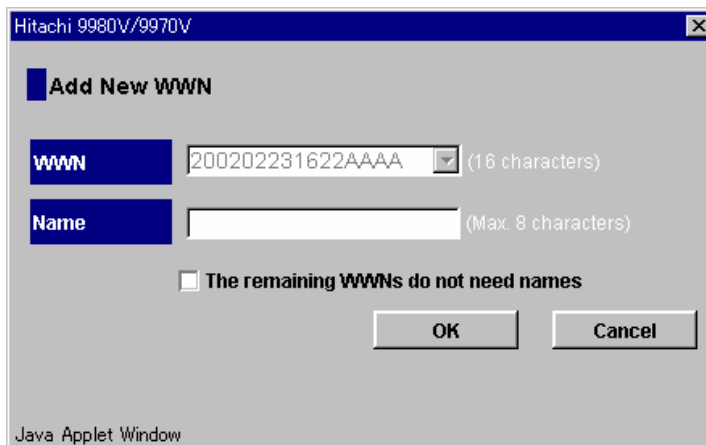
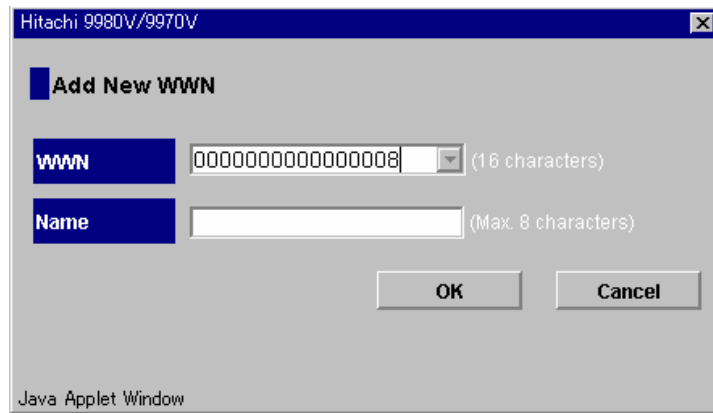


Figure 4.13 Add New WWN Panel (Host Previously Connected to Subsystem)



The image shows a Java Applet Window titled "Hitachi 9980V/9970V". Inside the window, there is a section titled "Add New WWN". Below this title, there are two input fields. The first field is labeled "WWN" and contains the text "0000000000000000" followed by a dropdown arrow and the text "(16 characters)". The second field is labeled "Name" and is empty, followed by the text "(Max. 8 characters)". At the bottom right of the panel, there are two buttons: "OK" and "Cancel". At the bottom left of the window, it says "Java Applet Window".

Figure 4.14 Add New WWN Panel (Host Not Previously Connected to Subsystem)

4.2.4 Associating Host Groups to Logical Volumes

LUN Manager allows you define LU paths by associating host groups with logical volumes. For example, if you associate a group of three hosts with logical volumes, LU paths are defined between the three hosts and the logical volumes.

To define LU paths by associating host groups with logical volumes:

1. Change to **Modify** mode (refer to section 2.3 if you need instructions). Select the **LUN Manager** button () to open the **LUN Manager/Port** panel. The **LUN Manager** tab is the default view (refer to Figure 3.1).
2. Display the LDEVs in the LU Path table (upper right corner of the **LUN Manager** tab), as follows:
 - For fibre-channel, in the **LU Path** outline (upper left corner of **LUN Manager** tab), select the **Fibre** folder, then select a host group, and then select a CU number.
 - For NAS, in the **LU Path** outline (upper left corner of **LUN Manager** tab), select the **NAS** folder, then select the **User** host group.
3. Select one or more logical volumes in the **LDEV** table (lower right corner of **LUN Manager** tab), and then drag the volumes to the **LU Path** table. Select one or more LUNs to which no LU path is defined (indicated by the  icon), and then release the mouse button.
4. The Check Paths confirmation message (see Figure 4.15) will display. Select **OK** to confirm the changes, or select **Cancel** to cancel the changes. **Note:** The settings are reflected in the **LU Path** table in *blue bold italics*, but not yet implemented.
5. If you want to apply the changes to the subsystem, select **Apply**, and then select **OK** on the confirmation message. If you want to cancel the changes and not apply them to the subsystem, select **Cancel**, and then select **OK** on the confirmation message.

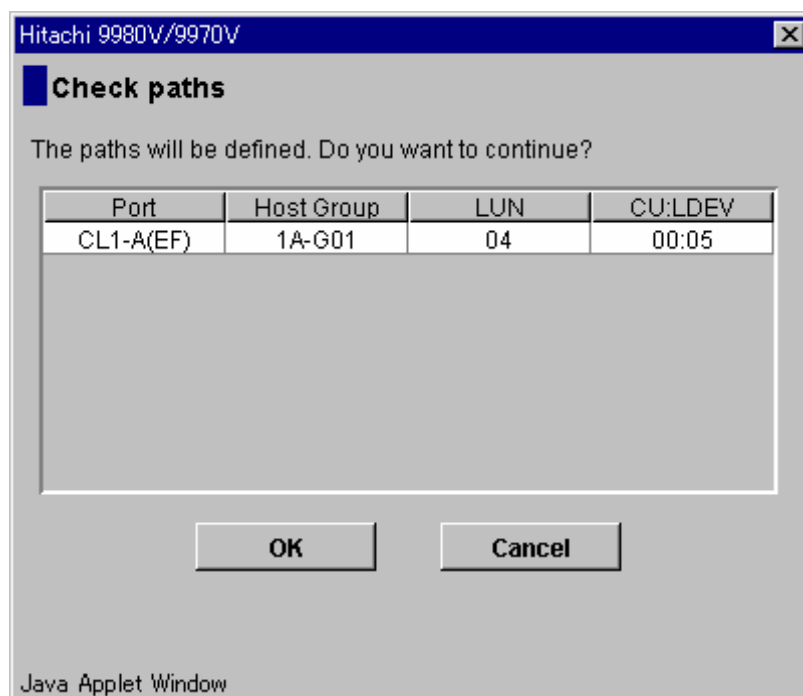


Figure 4.15 Check Paths Confirmation Message

4.2.5 Viewing a List of Concatenated Parity Groups

The 9900V subsystem supports concatenation of parity groups. If parity groups are concatenated, a logical volume can be dispersed across the concatenated parity groups, which can provide faster access to data. **Note:** Only Hitachi Data Systems service representatives can concatenate parity groups.

To view a list of concatenated parity groups:

1. In the **LDEV** table (lower right corner of **LUN Manager** tab), select and then right-click a logical volume.
2. Check to see if the **Concatenation List** command appears in the pop-up menu (see Figure 4.16).
 - If the **Concatenation List** command appears, select **Concatenation List** to look at the Concatenation List panel (see Figure 4.17) and see how the parity groups are concatenated.
 - If the **Concatenation List** command does not appear, there are no concatenated parity groups.

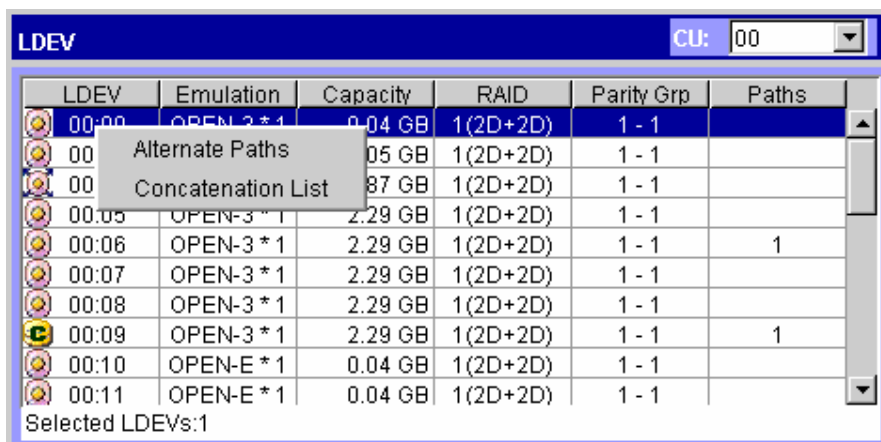


Figure 4.16 Concatenation List Pop-Up Menu

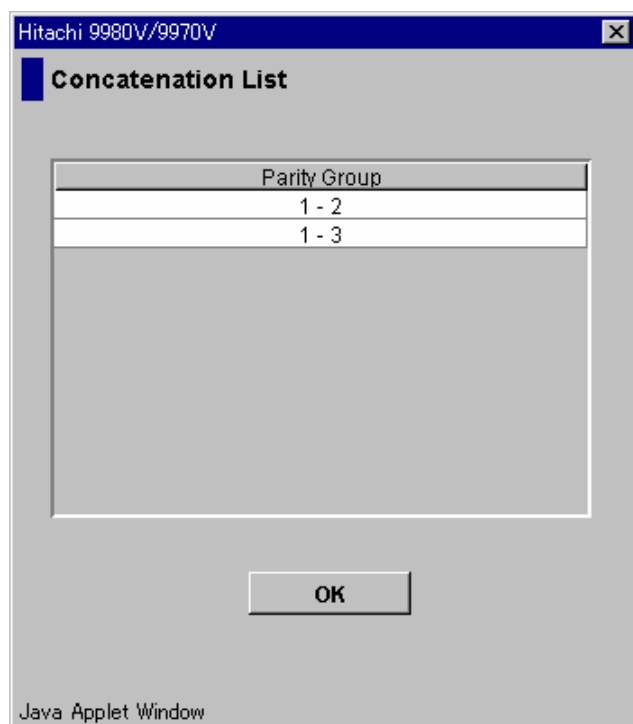


Figure 4.17 Concatenation List Panel

4.3 Changing the LU Path Settings

You can make the following changes to LU Path settings:

- Deleting LU paths (see section 4.3.1),
- Changing WWNs and nicknames of fibre-channel host bus adapters (see section 4.3.2),
- Deleting host bus adapters from host groups (see section 4.3.3),
- Deleting old WWNs from the WWN table (see section 4.3.4),
- Changing the name or host mode of a host group (see section 4.3.5),
- Deleting host groups (see section 4.3.6),
- Initializing host group 0 (see section 4.3.7),
- Viewing a list of alternate paths (see section 4.3.8), and
- Defining alternate paths (see section 4.3.7).

4.3.1 Deleting LU Paths

Caution: Do not delete LU paths when host I/O is in progress.

To delete LU paths:

1. Change to **Modify** mode (refer to section 2.3 if you need instructions). Select the **LUN Manager** button () to open the **LUN Manager/Port** panel. The **LUN Manager** tab is the default view (refer to Figure 3.1).
2. In the **LU Path** table (upper right corner of **LUN Manager** tab), select one or more LUNs to which volumes are assigned. **Note:** If volumes are assigned, the columns to the right of the **LUN** column will display data.
3. Right-click the selection, and then select **Release LU Path** from the pop-up menu (see Figure 4.18).
4. Select **OK** on the confirmation message (see Figure 4.15) to confirm the changes, or select **Cancel** to cancel the changes. **Note:** The settings are reflected in the **LU Path** table in *blue bold italics*, but not yet implemented.
5. If you want to apply the changes to the subsystem, select **Apply**, and then select **OK** on the confirmation message. If you want to cancel the changes and not apply them to the subsystem, select **Cancel**, and then select **OK** on the confirmation message.

LUN	CU:LDEV	Emulation	Capacity	RAID	Paths
00	01:40	OPEN-L * 1	33.94GB	1(2D+2D)	1
01	01:41	OPEN-L * 1	33.94GB	1(2D+2D)	1
02		Command Device:OFF->ON	33.94GB	1(2D+2D)	1
03		Release LU Path	33.94GB	1(2D+2D)	1
04	01:50	OPEN-L * 1	33.94GB	1(2D+2D)	1
05	01:51	OPEN-L * 1	33.94GB	1(2D+2D)	1
06	01:52	OPEN-L * 1	33.94GB	1(2D+2D)	1
07	01:53	OPEN-L * 1	33.94GB	1(2D+2D)	1
08	01:60	OPEN-L * 1	33.94GB	1(2D+2D)	1
09	01:61	OPEN-L * 1	33.94GB	1(2D+2D)	1

Selected LUNs:1 Remaining LUNs(Port):480 Remaining LUNs(GRP):224

Figure 4.18 Release LU Path Pop-Up Menu

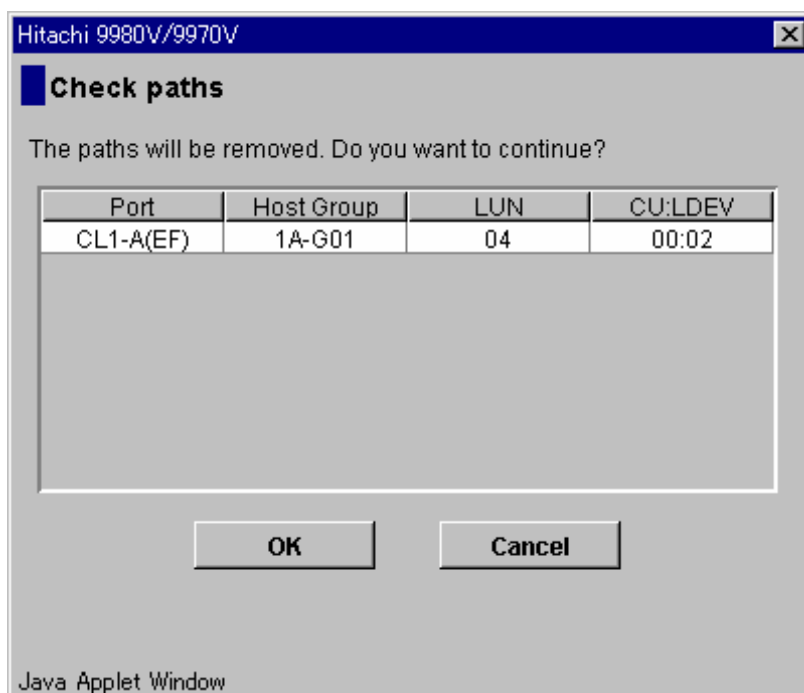


Figure 4.19 Release LU Path Confirmation Message

4.3.2 Changing WWNs and Nicknames of Fibre-Channel Host Bus Adapters

To change the WWN and/or the nickname of a fibre-channel host bus adapter:

1. Change to **Modify** mode (refer to section 2.3 if you need instructions). Select the **LUN Manager** button () to open the **LUN Manager/Port** panel. The **LUN Manager** tab is the default view (refer to Figure 3.1).
2. In the LU Path outline (upper left corner of LUN Manager tab), verify that LUN security has been applied to the port you want to change. **Note:** If the icon has a key on it, LUN security has been applied. For instructions on how to apply and remove LUN security, see section 4.4.
3. In the LU Path outline detail, select a fibre-channel port, and then select and right-click an HBA.
4. Select **Change WWN & Name** from the pop-up menu (see Figure 4.20) to display the Change WWN & Name Panel (see Figure 4.21).
 - If you want to change the WWN, either enter a new WWN or select another WWN in the **WWN** drop-down box.
 - If you want to change the nickname, enter a new nickname in the **Name** box.
5. If you want to reflect the change in this panel to other ports, select the **Apply this change to other ports, too** check box. For example, if the same WWN or nickname is located below ports CL1-A and CL2-A in the outline view, if you select the WWN or nickname from below one of the ports and change the name to *hba1*, the WWNs adapter below the other port will also be renamed *hba1*.

Note: Selecting the **Apply this change to other ports, too** check box will *not* affect ports with any of the following characteristics:

 - LUN security is OFF, or
 - A host bus adapter, host group, or WWN connected to that port already has the same name.
6. If you want to make the specified changes, select **OK** in the Change WWN & Name Panel.
 - If the **Apply this change to other ports, too** checkbox is *not* selected, the Change WWN & Name Panel closes. The settings are reflected in the LU Path outline, but not yet implemented.
 - If the **Apply this change to other ports, too** checkbox is selected, the Check WWNs panel (see Figure 4.22) will display and list all of the host bus adapters that will be changed. Select **OK** to continue.
7. The settings are reflected in the LU Path outline in **blue bold italics**, but not yet implemented.
8. If you do not want to make the specified changes, select **Cancel** in the Change WWN & Name Panel. If you want to apply the changes to the subsystem, select **Apply**, and then select **OK** on the confirmation message. If you want to cancel the changes and not apply them to the subsystem, select **Cancel**, and then select **OK** on the confirmation message.

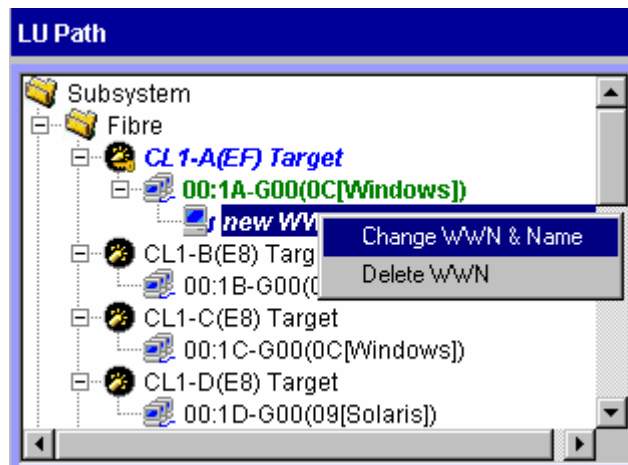


Figure 4.20 Change WWN & Name Pop-Up Menu

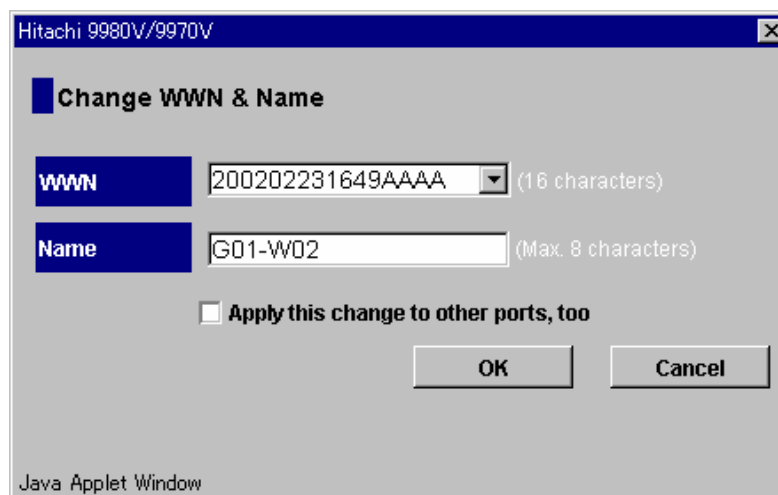


Figure 4.21 Change WWN & Name Panel

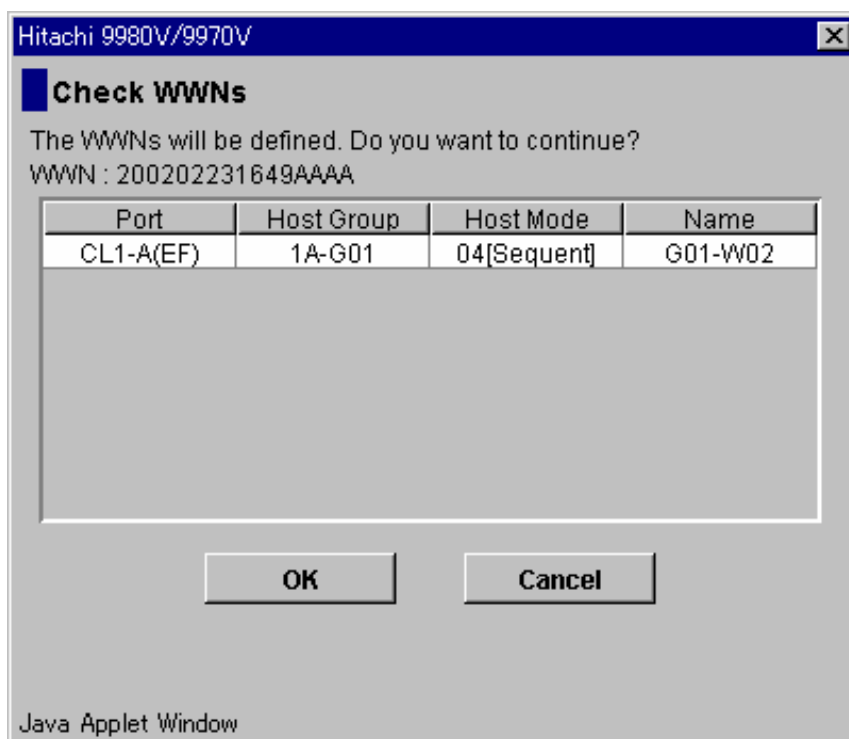


Figure 4.22 Check WWNs Panel

4.3.3 Deleting Host Bus Adapters from Host Groups

Note: You cannot perform this operation on host groups for NAS ports.

To delete a host bus adapter (HBA) from a host group:

1. Change to **Modify** mode (refer to section 2.3 if you need instructions). Select the **LUN Manager** button () to open the **LUN Manager/Port** panel. The **LUN Manager** tab is the default view (refer to Figure 3.1).
2. In the **LU Path** outline (upper left corner of **LUN Manager** tab), select and right-click the desired HBA.
 - If you select a fibre-channel HBA, you will see the **Delete WWN** pop-up menu (see Figure 4.23).
3. Select **Delete WWN** from the pop-up menu.
4. Select **OK** on the confirmation message (see Figure 4.24) to confirm the changes, or select **Cancel** to cancel the changes. **Note:** The settings are reflected in the **LU Path** table in *blue bold italics*, but are not yet implemented.
5. If you want to apply the changes to the subsystem, select **Apply**, and then select **OK** on the confirmation message.
6. If you want to cancel the changes and not apply them to the subsystem, select **Cancel**, and then select **OK** on the confirmation message.

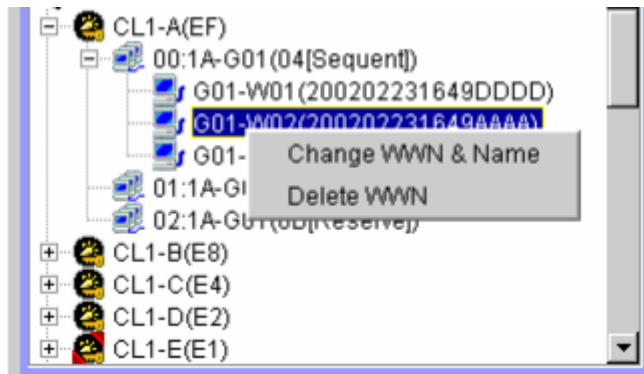


Figure 4.23 Delete WWN Pop-Up Menu

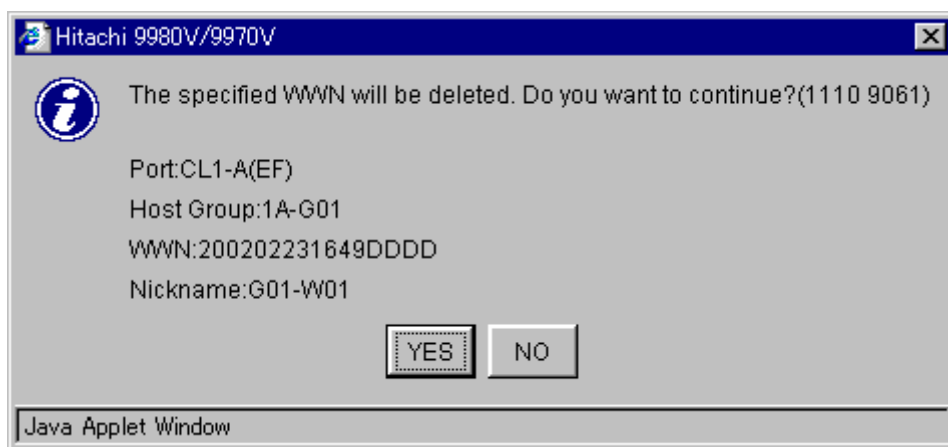


Figure 4.24 Delete WWN Confirmation Message

4.3.4 Deleting Old WWNs From the WWN Table

When you disconnect a host that has been connected to the 9900V subsystem, the WWN for that host will remain in the **WWN** table on the **LUN Manager** tab. You can then use LUN Manager to remove the WWN(s) that are no longer in use on the 9900V subsystem.

To delete a WWN from the **WWN** table:

1. Change to **Modify** mode (refer to section 2.3 if you need instructions). Select the **LUN Manager** button () to open the **LUN Manager/Port** panel. The **LUN Manager** tab is the default view (refer to Figure 3.1).
2. In the Port Table for WWNs (lower left of the LUN Manager tab; refer to Figure 3.9), locate the WWN(s) that are not registered in any host group. (The **Host Group** column is blank for a WWN that is not registered in any host group.)
3. Select and right-click on the WWN(s) that you want to delete, and select the **Erase WWN** command.
4. If you want to apply the changes to the subsystem, select **Apply**, and then select **OK** on the confirmation message.
5. If you want to cancel the changes and not apply them to the subsystem, select **Cancel**, and then select **OK** on the confirmation message.

4.3.5 Changing the Name or Host Mode of a Host Group

WARNING: Before changing the host mode of a host group, you should first back up the data on the affected port. The operation should not be destructive, but data integrity cannot be guaranteed without a backup.

Note: You cannot perform this operation on host groups for NAS ports.

To change the name and/or host mode of a host group:

1. Change to **Modify** mode (refer to section 2.3 if you need instructions). Select the **LUN Manager** button () to open the **LUN Manager/Port** panel. The **LUN Manager** tab is the default view (refer to Figure 3.1).
2. In the **LU Path** outline (upper left corner of **LUN Manager** tab), select then right-click a host group.
3. Select **Change Host Group** from the pop-up menu (see Figure 4.25) to display the **Change Host Group** Confirmation Message (see Figure 4.26).
4. If you want to change the name of the host group, enter a new name in the **Group Name** box.
5. If you want to change the host mode, select the new host mode from the **Host Mode** drop-down list.
6. Select **OK** on the **Change Host Group** panel to confirm the changes, or select **Cancel** to cancel the changes. **Note:** The settings are reflected in the **LU Path** table in *blue bold italics*, but not yet implemented.
7. If you want to apply the changes to the subsystem, select **Apply**, and then select **OK** on the confirmation message. If you want to cancel the changes and not apply them to the subsystem, select **Cancel**, and then select **OK** on the confirmation message.

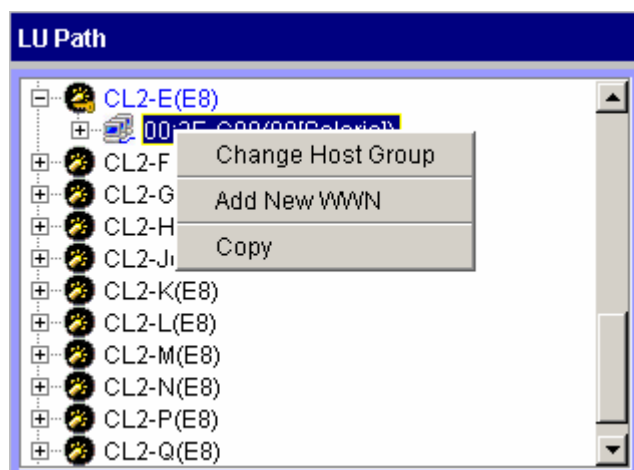


Figure 4.25 Change Host Group Pop-Up Menu

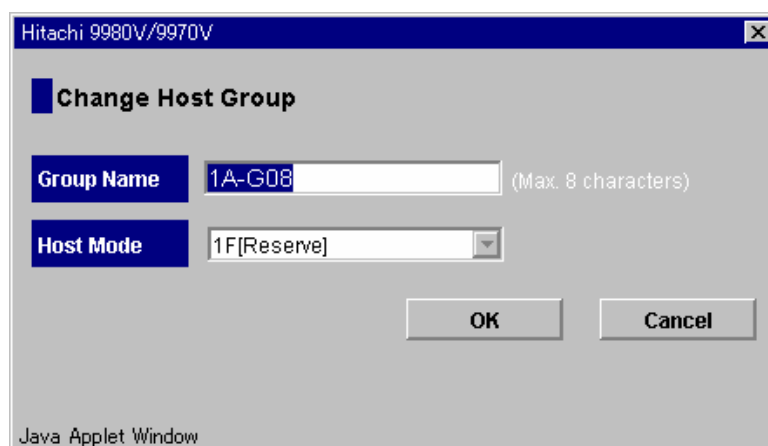


Figure 4.26 Change Host Group Panel

4.3.6 Deleting Host Groups

Caution: Host group 0 (zero) cannot be deleted. If you want to remove all the WWNs and LU paths from host group 0, you must initialize the host group (see section 4.3.7).

Note: You cannot perform this operation on host groups for NAS ports.

To delete a host group:

1. In the LU Path outline, select and right-click the desired host group, and then select **Delete Host Group** from the pop-up menu (see Figure 4.27).
2. The Delete Host Group Confirmation message will display (see Figure 4.28). If you want to delete the host group, select **Yes**. **Note:** The settings will be reflected in the LU Path table in *blue bold italics*, but are not yet implemented. If you do not want to delete the host group, select **No**.
3. If you want to apply the changes to the subsystem, select **Apply**, and then select **OK** on the confirmation message. If you want to cancel the changes and not apply them to the subsystem, select **Cancel**, and then select **OK** on the confirmation message.

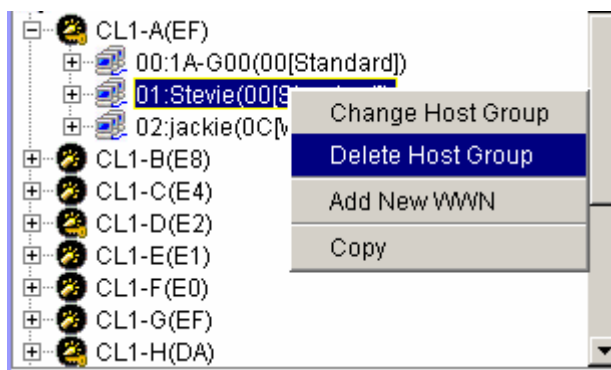


Figure 4.27 Delete WWN Pop-Up Menu

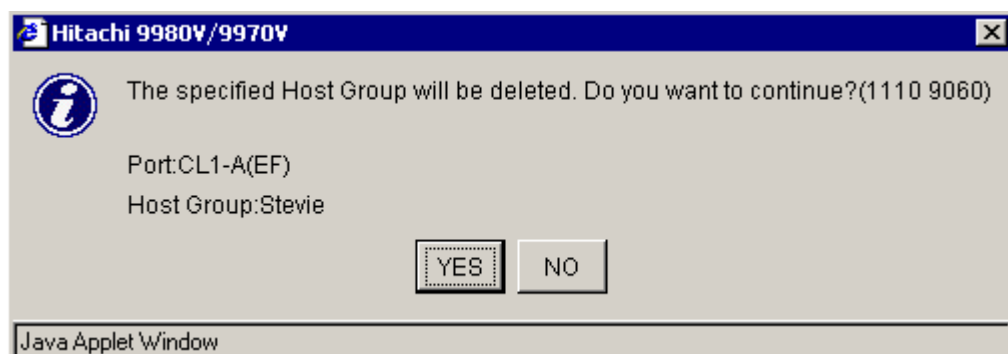


Figure 4.28 Delete Host Group Confirmation Message

4.3.7 Initializing Host Group 0 (Zero)

Initializing host group zero (0) will remove all WWNs and LU paths and return the host group to its initial configuration. This procedure will also initialize the host group name, e.g., if you initialize host group 0 for the port CL1-A, the name of the host group 0 will change to *1A-G00*.

Note: You cannot perform this operation on host groups for NAS ports.

To initialize a host group:

1. In the **LU Path** outline, select and right-click the host group 0, which is preceded by the number **00**.
2. Select **Clear Host Group** from the pop-up menu (see Figure 4.29) The **Clear Host Group Confirmation** message will display (see Figure 4.30).
3. Select **Yes** to clear the contents of host group 0. Select **No** to cancel. **Note:** The settings are reflected in the **LU Path** table in *blue bold italics*, but not yet implemented.
4. If you want to apply the changes to the subsystem, select **Apply**, and then select **OK** on the confirmation message. If you want to cancel the changes and not apply them to the subsystem, select **Cancel**, and then select **OK** on the confirmation message.

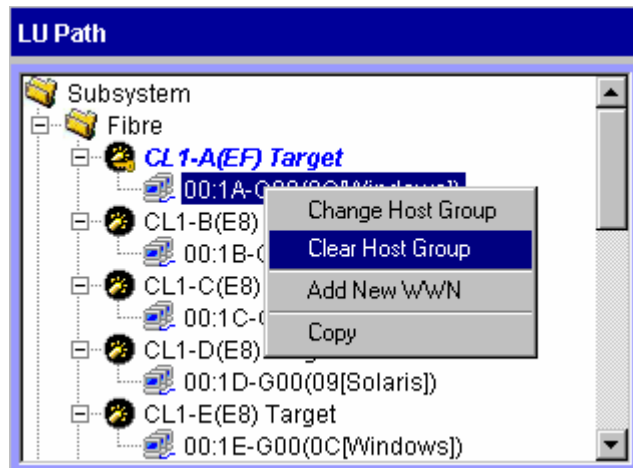


Figure 4.29 Clear Host Group Pop-Up Menu

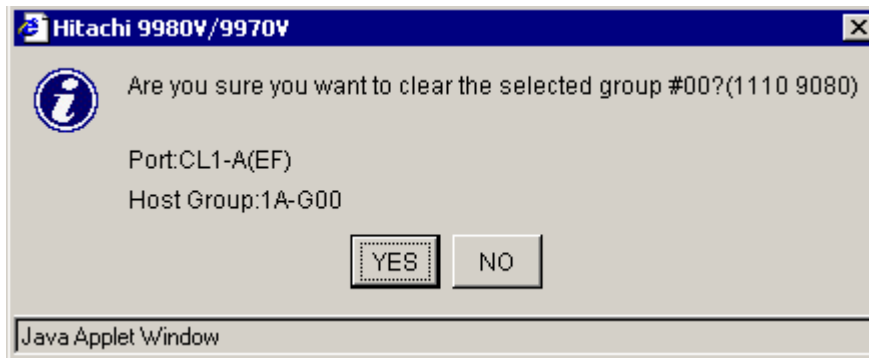


Figure 4.30 Clear Host Group Confirmation Message

4.3.8 Viewing a List of Alternate Paths

To view a list of alternate paths:

1. Change to **Modify** mode (refer to section 2.3 if you need instructions). Select the **LUN Manager** button () to open the **LUN Manager/Port** panel. The **LUN Manager** tab is the default view (refer to Figure 3.1).
2. Do one of the following:
 - In the **LU Path** table (upper right corner of **LUN Manager** tab), select a LUN, right-click the selected LUN, and then select **Alternate Paths** from the pop-up menu (see Figure 4.31). **Note:** If nothing is displayed in the table cells to the right of a LUN, no path is defined to the LU. Therefore, no alternative path is defined to the LU.
 - In the **LDEV** table (lower right corner of **LUN Manager** tab), select a logical volume (i.e., an LDEV), right-click the selected volume, and then select **Alternate Paths** from the pop-up menu (see Figure 4.31). **Note:** If nothing is displayed in the **Paths** column of a row in the **LDEV** table, no alternate paths are defined to the LDEV corresponding to that table row.
3. If there are alternate paths to this LUN, the Alternate Paths panel will display (see Figure 4.33). Each table row indicates an alternate path.

LUN	CU:LDEV	Emulation	Capacity	RAID	Paths
 00	00:0F	OPEN-9 * 1	6.87 GB	5(3D+1P)	1
 01	00:04	OPEN-9 * 6	41.26 GB	5(3D+1P)	1
 0					
 0					
 0					
 0					
 06					
 07					
 08					
 09					

Selected LUNs:1 Remaining LUNs(Port):503 Remaining LUNs(GRP):254

Figure 4.31 Alternate Paths Pop-Up Menu (for the LU Path table)

LDEV						CU: 00
LDEV	Emulation	Capacity	RAID	Parity Grp	Paths	
00:00	OPEN-9 * 1	6.87 GB	5(3D+1P)	1 - 1	2	
00:01	OPEN-9 * 1	6.87 GB	5(3D+1P)	1 - 1	2	
00:02	OPEN-9 * 1	6.87 GB	5(3D+1P)	1 - 1	2	
00:03	OPEN-9 * 1	6.87 GB	5(3D+1P)	1 - 1	2	
00:05	OPEN-9 * 1	6.87 GB	5(3D+1P)	1 - 1	2	
00:06	OPEN-9 * 1	6.87 GB	5(3D+1P)	1 - 1	1	
00:07	OPEN-9 * 1	6.87 GB	5(3D+1P)	1 - 1	2	
00:0D	OPEN-9 * 1	6.87 GB	5(3D+1P)	1 - 1	1	
00:0E	OPEN-9 * 1	6.87 GB	5(3D+1P)	1 - 1		
00:10	OPEN-9 * 1	6.87 GB	5(3D+1P)	1 - 1		
Selected LDEVs:1						

Figure 4.32 Alternate Paths Pop-Up Menu (for the LDEV table)

Hitachi 9980V/9970V			
Alternate Paths			
CU:LDEV 02:00			
Port	GroupID	Host Group	LUN
CL1-A(B3)	00	1A-G01	00
CL1-A(B3)	01	1A-G02	00
OK			

Figure 4.33 Alternate Paths Panel

4.3.9 Defining Alternate Paths

If one LU path fails, alternate paths allow you to switch to another path. If you want to use alternate paths, you must copy LU paths from one port to another. For example, if you want to define an alternative for the LU path from the CL1-A port to the logical volume 00:01, you need to copy the LU path from the CL1-A port to another port.

Note: Defining alternate paths can require a lot of memory. It is recommended that you apply the changes that you make pursuant to this subsection before you start other operations.

4.3.9.1 Copying Paths Between Fibre-Channel Ports

Caution: If you want to define alternate paths between fibre-channel ports when LUN security is removed, you must re-define the LU path.

1. Change to **Modify** mode (refer to section 2.3 if you need instructions). Select the **LUN Manager** button () to open the **LUN Manager/Port** panel. The **LUN Manager** tab is the default view (refer to Figure 3.1).
2. In the **LU Path** outline (upper left corner of **LUN Manager** tab; refer to Figure 3.2), select the **Fibre** folder, right-click a host group, and then select **Copy** from the pop-up menu (see Figure 4.34). The selected host group turns green (see Figure 4.35).
Note: Both the copy port and the copy-destination port must have LUN security applied, which is indicated by a key on the icon.
3. Locate the port that you want to use as the copy destination. If the port does not have LUN security applied (port icon does not have a key on it), right-click the port, select the **LUN Security: OFF -> ON** command, and select **YES** in the confirmation message. See section 4.4 for further information on applying and removing LUN security.
4. On the LU Path outline (on the upper left corner of the LUN Manager tab; refer to Figure 3.2) double-click the copy-source port (a Fibre Channel port) to display the host groups below the port.
5. If you want to copy all the LU paths defined to a host group, take the following steps:
 - a) Right-click the host group in the LU Path outline.
 - b) Select **Copy** from the pop-up menu (see Figure 4.34).
 - c) The selected host group turns green (see Figure 4.35).
 - d) Right-click the copy-destination port.
 - e) Select **Paste** from the pop-up menu (see Figure 4.36).

6. If you want to copy some but not all of the LU paths defined to a host group, take the following steps:
 - a) Select the host group from the LU Path outline.
 - b) From the LU Path table on the right, select one or more LUNs to which volumes are assigned (If a volume is assigned to a LUN, the columns on the right of the LUN column are not empty).
 - c) Right-click the selection and then select **Copy Paths** from the pop-up menu (see Figure 4.37).
 - d) The selected LUNs turn green.
 - e) Double-click the copy-destination port to display host groups below the port (see Figure 4.38).
 - f) Right-click the host group to which you want to copy the LU paths.
 - g) Select **Paste Paths** from the pop-up menu (see Figure 4.39).
7. The specified host group(s) will be copied to the specified port. The WWNs and the LU paths are also copied. **Note:** The settings are reflected in the **LU Path** table in *blue bold italics*, but not yet implemented (see Figure 4.39).
8. If you want to apply the changes to the subsystem, select **Apply**, and then select **OK** on the confirmation message. If you want to cancel the changes and not apply them to the subsystem, select **Cancel**, and then select **OK** on the confirmation message.

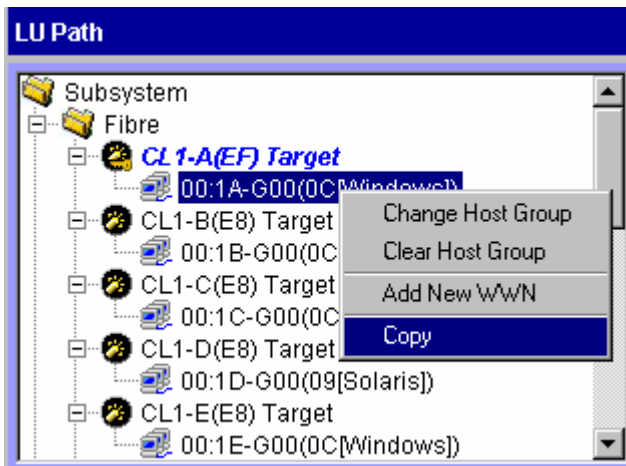


Figure 4.34 Copy Pop-Up Menu

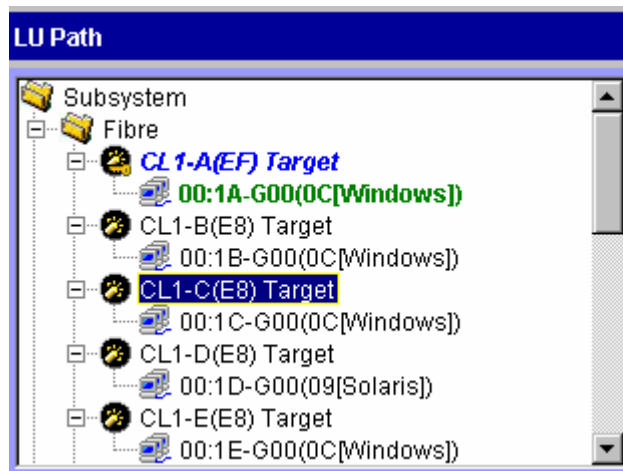


Figure 4.35 Copy Command In Process

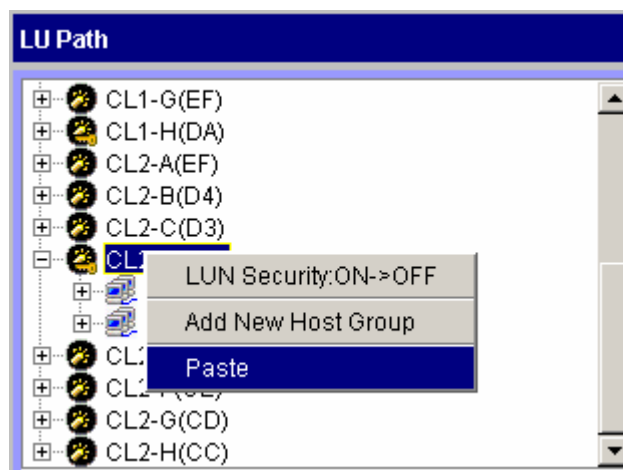


Figure 4.36 Paste Pop-Up Menu

LUN	CU:LDEV	Emulation	Capacity	RAID	Paths
07					
08	00:06	OPEN-V CVS	3.05 GB	1(2D+2D)	1
09	00:09		GB	5(3D+1P)	1
0A					
0B					
0C					
0D					
0E					
0F					
10					
Selected LUNs:2		Remaining LUNs(Port):508		Remaining LUNs(GRP):253	

Figure 4.37 Copy Paths Pop-Up Menu

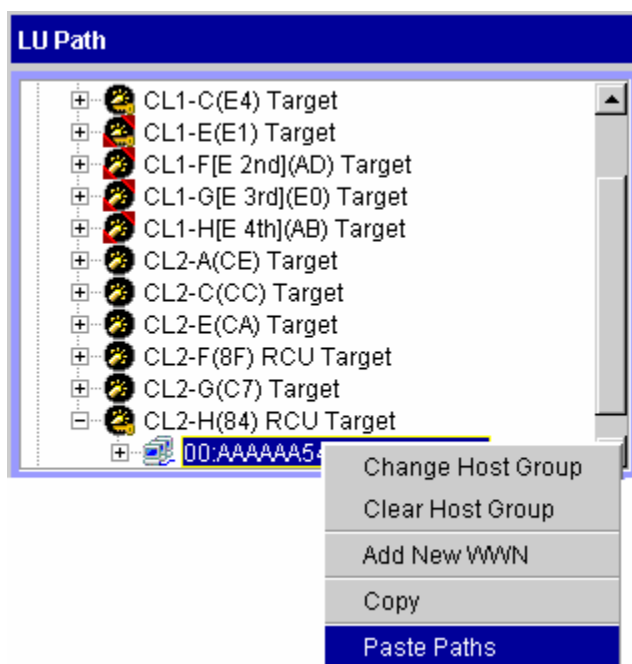


Figure 4.38 Paste Paths Pop-Up Menu

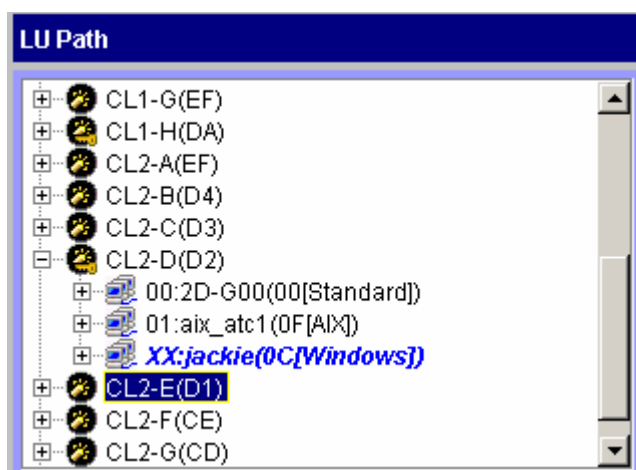


Figure 4.39 Alternate Path Copied to Another Port

4.3.9.2 Copying Paths Between NAS Ports

To define alternate paths between NAS ports:

1. Change to **Modify** mode (refer to section 2.3 if you need instructions). Select the **LUN Manager** button () to open the **LUN Manager/Port** panel. The **LUN Manager** tab is the default view (refer to Figure 3.1).
2. In the **LU Path** outline (upper left corner of **LUN Manager** tab; refer to Figure 3.2), select the **NAS** folder, and then select the **User** host group.
3. In the **LU Path** table (upper right of the **LUN Manager** tab; refer to Figure 3.4), select one or more LUNs to which volumes are assigned (If a volume is assigned to a LUN, the columns on the right of the LUN column are not empty).
4. Right-click the selection, and then select **Copy Paths** from the pop-up menu (see Figure 4.40). The selected LUNs turn green (see Figure 4.41).
5. Double-click the copy-destination NAS port to display the **User** host group below the port (see Figure 4.42).
6. Right-click the **User** host group and then select **Paste Paths** from the pop-up menu (see Figure 4.43).
7. If you want to apply the changes to the subsystem, select **Apply**, and then select **OK** on the confirmation message. If you want to cancel the changes and not apply them to the subsystem, select **Cancel**, and then select **OK** on the confirmation message.

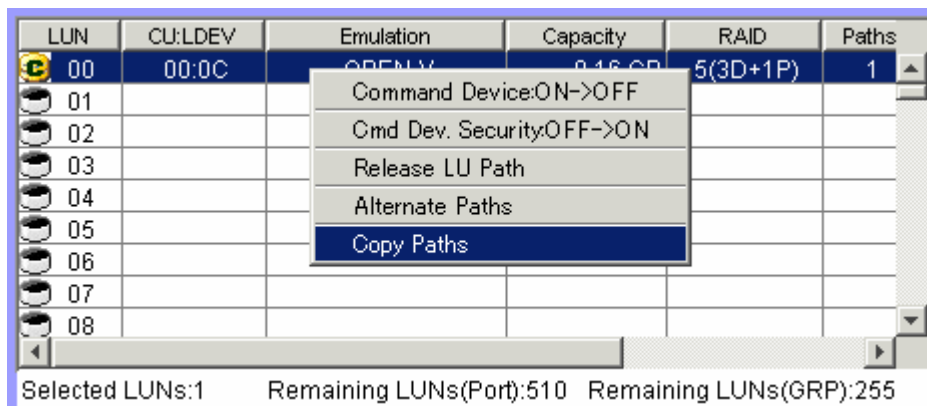


Figure 4.40 Copy Path Popup Command

LUN	CU:LDEV	Emulation	Capacity	RAID	Paths
 00	00:0C	OPEN-V	9.16 GB	5(3D+1P)	1
 01					
 02					
 03					
 04					
 05					
 06					
 07					
 08					

Selected LUNs:0 Remaining LUNs(Port):510 Remaining LUNs(GRP):255

Figure 4.41 LUN Displayed in Green

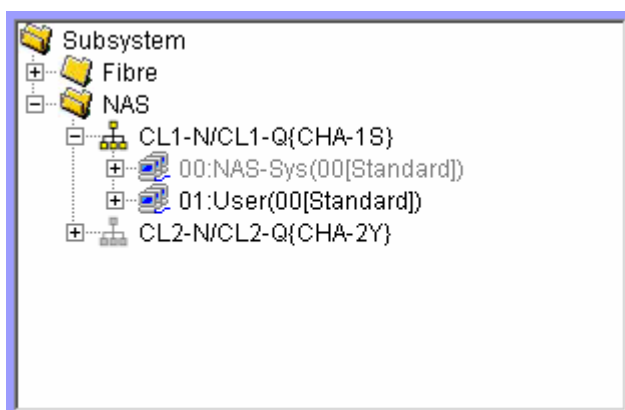


Figure 4.42 User Host Group (NAS Port)

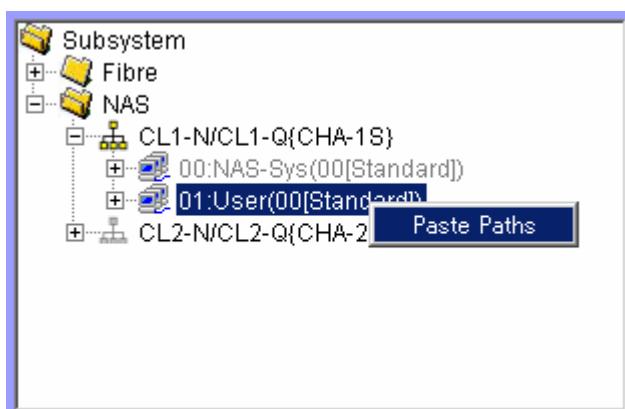


Figure 4.43 Paste Paths Popup Command

4.3.9.3 Copying Paths From a Fibre-Channel Port to a NAS Port

To define alternate paths:

1. Change to **Modify** mode (refer to section 2.3 if you need instructions). Select the **LUN Manager** button () to open the **LUN Manager/Port** panel. The **LUN Manager** tab is the default view (refer to Figure 3.1).
2. In the **LU Path** outline, double-click a fibre-channel port, and then select a host group.
3. In the **LU Path** table (upper right of the LUN Manager tab; refer to Figure 3.4), select one or more LUNs to which volumes are assigned (If a volume is assigned to a LUN, the columns on the right of the LUN column are not empty).
4. Right-click the selection, and then select **Copy Paths** from the pop-up menu (refer to Figure 4.40). The selected LUNs turn green (refer to Figure 4.41).
5. Double-click a copy-destination port to display the **User** host group below the port (refer to Figure 4.42).
6. Right-click on the **User** host group and then select **Paste Paths** from the pop-up menu (refer to Figure 4.43).
7. If you want to apply the changes to the subsystem, select **Apply**, and then select **OK** on the confirmation message. If you want to cancel the changes and not apply them to the subsystem, select **Cancel**, and then select **OK** on the confirmation message.

4.3.9.4 Copying Paths from a NAS Port to a Fibre-Channel Port

1. Change to **Modify** mode (refer to section 2.3 if you need instructions). Select the **LUN Manager** button () to open the **LUN Manager/Port** panel. The **LUN Manager** tab is the default view (refer to Figure 3.1).
2. In the **LU Path** outline (upper left corner of **LUN Manager** tab; refer to Figure 3.2), select the **NAS** folder, double-click on the NAS copy-source port and then select the **User** host group.
3. In the **LU Path** table (upper right of the **LUN Manager** tab; refer to Figure 3.4), select one or more LUNs to which volumes are assigned (If a volume is assigned to a LUN, the columns on the right of the LUN column are not empty).
4. Right-click the selection and then select **Copy Paths** from the pop-up menu. The selected LUNs turn green.
5. In the **LU Path** outline (upper left corner of **LUN Manager** tab; refer to Figure 3.2) select a fibre-channel port as a copy destination. If the port does not have LUN security applied (port icon does not have a key on it), right-click the port, select the **LUN Security: OFF -> ON** command, and select **YES** in the confirmation message. See section 4.4 for further information on applying and removing LUN security.
6. Double-click the fibre-channel port (the copy-destination port) to display host groups below the port.
7. Right-click the host group to which you want to paste paths, and select **Paste Paths** from the pop-up menu (refer to Figure 4.38).
8. If you want to apply the changes to the subsystem, select **Apply**, and then select **OK** on the confirmation message. If you want to cancel the changes and not apply them to the subsystem, select **Cancel**, and then select **OK** on the confirmation message.

4.4 Using LUN Security

LUN security allows you to secure LUs against unauthorized access. By default, LUN security is not applied to any of the ports.

Note: You cannot apply LUN security to an external (Hi-Copy) port.

Note: You cannot apply LUN security to NAS ports.

4.4.1 Applying LUN Security

To apply LUN security to a port:

1. Change to **Modify** mode (refer to section 2.3 if you need instructions). Select the **LUN Manager** button () to open the **LUN Manager/Port** panel. The **LUN Manager** tab is the default view (refer to Figure 3.1).
2. In the **LU Path** outline (upper left corner of **LUN Manager** tab), locate the desired port. When you double-click the **Fibre** folder icon () , the port name and the port address are displayed. The icon will be one of the following:
 -  indicates a short-wave fibre port in standard mode, with LUN security not applied.
 -  indicates a short-wave fibre port in standard mode. The addition of a key to the icon indicates that LUN security is applied to the port.
 -  indicates a long-wave fibre port in standard mode, with LUN security not applied.
 -  indicates a long-wave fibre port in standard mode. The addition of a key to the icon indicates that LUN security is applied to the port.
 -  indicates a short-wave fibre port in high-speed or high-speed (2-port) mode, with LUN security not applied.
 -  indicates a short-wave fibre port in high-speed or high-speed (2-port) mode. The addition of a key to the icon indicates that LUN security is applied to the port.
 -  indicates a long-wave fibre port in high-speed or high-speed (2-port) mode, with LUN security not applied.
 -  indicates a long-wave fibre port in high-speed or high-speed (2-port) mode. The addition of a key to the icon indicates that LUN security is applied to the port.
3. If LUN security has not been applied, select and right-click the port. Select **LUN Security: OFF -> ON** from the pop-up menu (see Figure 4.44).
4. A message appears, asking whether you want to change the LUN security setting (see Figure 4.45).
5. Select **YES**. The changes are not yet applied to the subsystem.
6. If you want to apply the changes to the subsystem, select **Apply**, and then select **OK** on the confirmation message. If you want to cancel the changes and not apply them to the subsystem, select **Cancel**, and then select **OK** on the confirmation message.

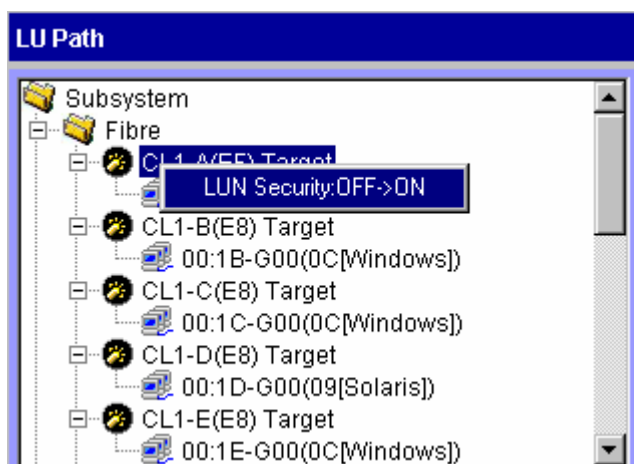


Figure 4.44 Add LUN Security Pop-Up Menu

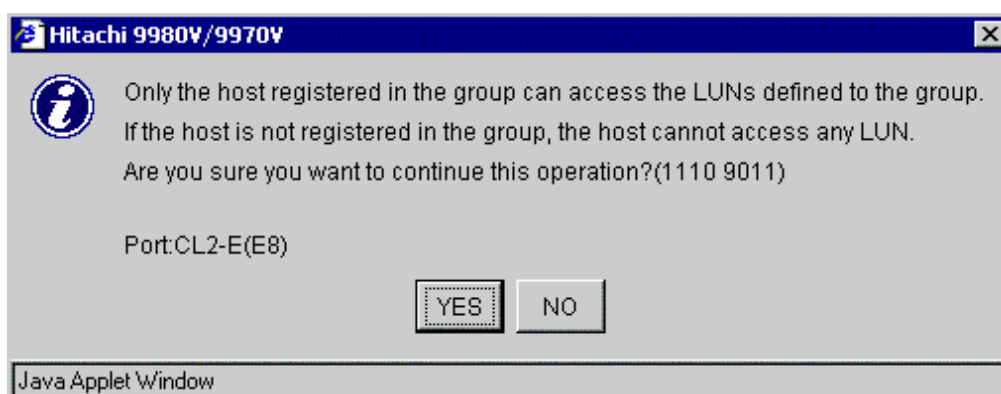


Figure 4.45 Add LUN Security Confirmation Message

4.4.2 Removing LUN Security

Caution: Do not remove LUN security from any port when host I/O is in progress.

To remove LUN security from a port:

1. Change to **Modify** mode (refer to section 2.3 if you need instructions). Select the **LUN Manager** button () to open the **LUN Manager/Port** panel. The **LUN Manager** tab is the default view (refer to Figure 3.1).
2. In the **LU Path** outline (upper left corner of **LUN Manager** tab), locate the desired port. When you double-click the **Port** folder () an icon, the port name and the port address are displayed. The icon will be one of the following:
 -  indicates a short-wave fibre port in standard mode, with LUN security not applied.
 -  indicates a short-wave fibre port in standard mode. The addition of a key to the icon indicates that LUN security is applied to the port.
 -  indicates a long-wave fibre port in standard mode, with LUN security not applied.
 -  indicates a long-wave fibre port in standard mode. The addition of a key to the icon indicates that LUN security is applied to the port.
 -  indicates a short-wave fibre port in high-speed or high-speed (2-port) mode, with LUN security not applied.
 -  indicates a short-wave fibre port in high-speed or high-speed (2-port) mode. The addition of a key to the icon indicates that LUN security is applied to the port.
 -  indicates a long-wave fibre port in high-speed or high-speed (2-port) mode, with LUN security not applied.
 -  indicates a long-wave fibre port in high-speed or high-speed (2-port) mode. The addition of a key to the icon indicates that LUN security is applied to the port.
3. If LUN security has been applied, select and right-click the port. Select **LUN Security: ON -> OFF** from the pop-up menu (see Figure 4.46).
4. A confirmation message appears, informing you that only host group 0 (group #00) will be available if LUN security is removed (see Figure 4.47). Select **YES** to close the message.
5. The icon will change to indicate that LUN security is not applied. The changes are not yet applied to the subsystem.
6. If you want to apply the changes to the subsystem, select **Apply**, and then select **OK** on the confirmation message. If you want to cancel the changes and not apply them to the subsystem, select **Cancel**, and then select **OK** on the confirmation message.

Note: If LUN security is removed from a port, the host groups corresponding to that port except for the host group 0 are grayed out in the **LU Path** outline.

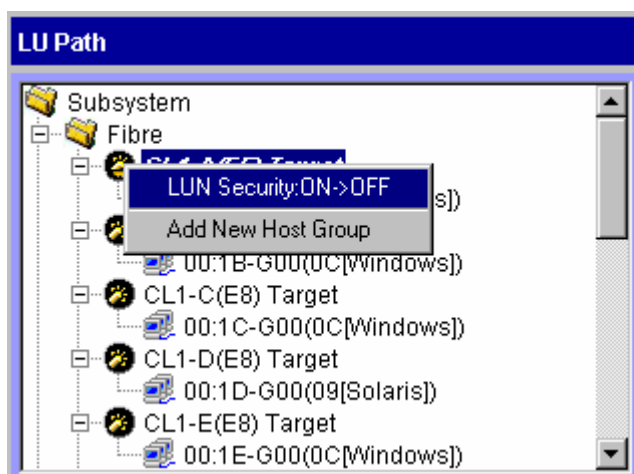


Figure 4.46 Delete LUN Security Pop-Up Menu

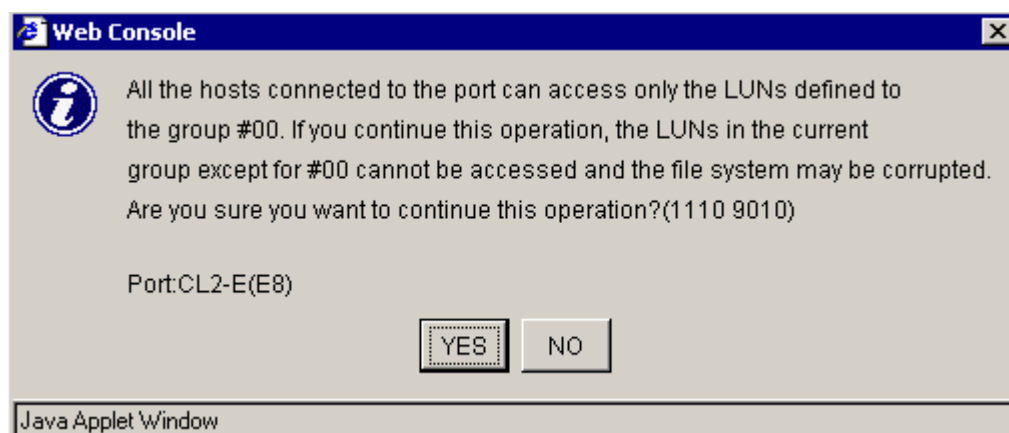


Figure 4.47 Delete LUN Security Confirmation Message

4.5 Configuring the Subsystem for Using Command Control Interface (CCI)

4.5.1 Overview of Command Control Interface

Hitachi Command Control Interface (CCI) enables users to perform Hitachi TrueCopy and Hitachi ShadowImage operations on the Lightning 9900™ V Series subsystem by issuing commands from the UNIX®/PC server host to the 9900 V subsystem. The CCI software interfaces with both the system software and high-availability (HA) software on the UNIX®/PC server host as well as the TrueCopy/ShadowImage software on the 9900V subsystem. The CCI software provides failover and other functions such as backup commands to allow mutual hot standby in cooperation with the failover product on the UNIX®/PC server (e.g., MC/ServiceGuard®, FirstWatch™, or HACMP™).

CCI also supports a scripting function that allows users to define multiple TrueCopy and/or ShadowImage operations in a script (text) file. Using CCI scripting, you can set up and execute a large number of TrueCopy and/or ShadowImage commands in a short period of time while integrating host-based high-availability control over remote copy operations.

Note: For further information on CCI, please see the *Hitachi Lightning 9900™ V Series Command Control Interface (CCI) User and Reference Guide (MK-90RD011)*, or contact your Hitachi Data Systems account team.

If you want to protect a logical device from CCI commands, you must apply command device security to the logical device. If the command device security is applied to a logical device, the device will not be affected by CCI commands even when commands are transferred via a command device to that device.

Note: You cannot use the following volumes as command devices:

- Volumes reserved by CruiseControl
- TrueCopy volumes
- ShadowImage volumes
- Hi-Copy volumes
- Volumes that are set to other than read/write access. For more information on setting LDEV access, please see *Hitachi Freedom Storage™ Lightning 9900™ V Series Open LDEV Guard User's Guide (MK-93RD158)*.

4.5.2 Specifying a Logical Device as a Command Device

To enable the system administrator to execute CCI commands from an open-system host, you must select at least one logical device that will not be manipulated by TrueCopy or ShadowImage, and then specify that device as a command device. CCI commands are issued from a host and received by the command device, which in turn transfers the command to another logical device and causes a TrueCopy or ShadowImage operation to be performed on that logical device.

To specify a logical device as a command device:

1. Change to **Modify** mode (refer to section 2.3 if you need instructions). Select the **LUN Manager** button () to open the **LUN Manager/Port** panel. The **LUN Manager** tab is the default view (refer to Figure 3.1).
2. In the **LU Path** outline (upper left corner of **LUN Manager** tab), double-click a port, and then select a host group.
3. The **LU Path** table (upper right corner of **LUN Manager** tab) displays information about LU paths corresponding to the host group.
4. In the **LU Path** table or the **LDEV** table, select and right-click a LUN that corresponds to the desired logical device. The table will include some or all of the following icons:
 -  indicates a logical volume to which an LU path is defined.
 -  indicates an expanded LU.
 -  indicates a command device.
 -  indicates a secured command device.
 -  indicates a LUN to which no LU path is defined.
 - If nothing is displayed in the **LU Path table**, select a host group  in the outline view.
5. In the **LU Path** table, select and right-click a LUN that is not currently a command device. From the pop-up menu, select **Command Device: OFF -> ON** (see Figure 4.48).
6. A message appears, asking whether you want to use the logical device as a command device (see Figure 4.49).
7. Select **Yes**. **Note:** The icon changes, to indicate a command device, but the changes are not yet applied to the subsystem.
8. If you want to apply the changes to the subsystem, select **Apply**, and then select **OK** on the confirmation message. If you want to cancel the changes and not apply them to the subsystem, select **Cancel**, and then select **OK** on the confirmation message.

LUN	CU:LDEV	Emulation	Capacity	RAID	Paths
00	01:40	OPEN-L * 1	33.94GB	1(2D+2D)	1
01			3.94GB	1(2D+2D)	1
02			3.94GB	1(2D+2D)	1
03	01:43	OPEN-L * 1	33.94GB	1(2D+2D)	1
04	01:50	OPEN-L * 1	33.94GB	1(2D+2D)	1
05	01:51	OPEN-L * 1	33.94GB	1(2D+2D)	1
06	01:52	OPEN-L * 1	33.94GB	1(2D+2D)	1
07	01:53	OPEN-L * 1	33.94GB	1(2D+2D)	1
08	01:60	OPEN-L * 1	33.94GB	1(2D+2D)	1
09	01:61	OPEN-L * 1	33.94GB	1(2D+2D)	1

Selected LUNs:1 Remaining LUNs(Port):480 Remaining LUNs(GRP):224

Figure 4.48 Add Command Device Pop-Up Menu

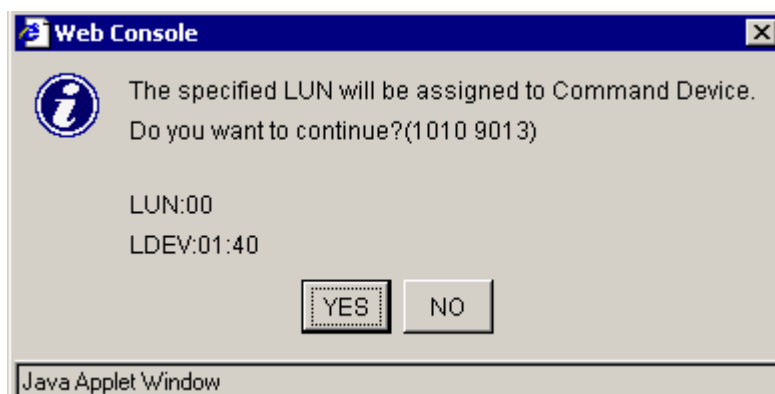


Figure 4.49 Assign Command Device Confirmation Message

4.5.3 Deleting a Command Device

To delete a command device:

1. Change to **Modify** mode (refer to section 2.3 if you need instructions). Select the **LUN Manager** button () to open the **LUN Manager/Port** panel. The **LUN Manager** tab is the default view (refer to Figure 3.1).
2. In the **LU Path** outline (upper left corner of **LUN Manager** tab), double-click a port, and then select a host group.
3. The **LU Path** table (upper right corner of **LUN Manager** tab) displays information about LU paths corresponding to the host group.
4. In the **LU Path** table or the **LDEV** table, select and right-click a LUN that corresponds to the desired logical device. The table will include some or all of the following icons:
 -  indicates a logical volume to which an LU path is defined.
 -  indicates an expanded LU.
 -  indicates a command device.
 -  indicates a secured command device.
 -  indicates a LUN to which no LU path is defined.
 - If nothing is displayed in the **LU Path table**, select a host group  in the outline view.
5. In the **LU Path** table, select and right-click a LUN that is currently a command device. From the pop-up menu, select **Command Device: ON -> OFF** (see Figure 4.50).
6. A message appears, asking whether you want to release the command device attribute for this LUN (see Figure 4.51).
7. Select **Yes**. **Note:** The icon changes, to indicate that the LUN is not a command device, but the changes are not yet applied to the subsystem.
8. If you want to apply the changes to the subsystem, select **Apply**, and then select **OK** on the confirmation message. If you want to cancel the changes and not apply them to the subsystem, select **Cancel**, and then select **OK** on the confirmation message.

LUN	CU:LDEV	Emulation	Capacity	RAID	Paths
00	01:40	OPEN-L * 1	33.94GB	1(2D+2D)	1
00		Command Device:ON->OFF	33.94GB	1(2D+2D)	1
00		Cmd Dev. Security:OFF->ON	33.94GB	1(2D+2D)	1
00		Release LU Path	33.94GB	1(2D+2D)	1
05	01:51	OPEN-L * 1	33.94GB	1(2D+2D)	1
06	01:52	OPEN-L * 1	33.94GB	1(2D+2D)	1
07	01:53	OPEN-L * 1	33.94GB	1(2D+2D)	1
08	01:60	OPEN-L * 1	33.94GB	1(2D+2D)	1
09	01:61	OPEN-L * 1	33.94GB	1(2D+2D)	1

Selected LUNs:2 Remaining LUNs(Port):480 Remaining LUNs(GRP):224

Figure 4.50 Release Command Device Pop-Up Menu (ON ->OFF)

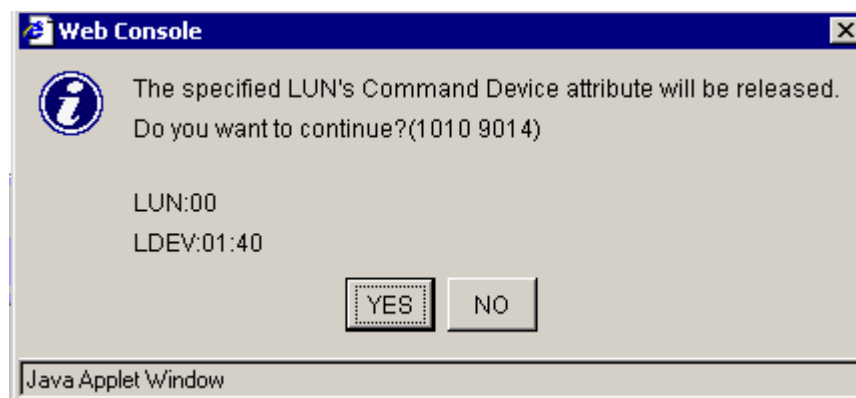


Figure 4.51 Release Command Device Confirmation Message

4.5.4 Enabling Command Device Security

If you want to protect logical volumes from CCI commands, you must apply command device security to the logical volumes. If command device security is applied to a logical device, that device will not be affected by CCI commands issued via command devices from the host(s).

To apply command device security to a logical device:

1. Change to **Modify** mode (refer to section 2.3 if you need instructions). Select the **LUN Manager** button () to open the **LUN Manager/Port** panel. The **LUN Manager** tab is the default view (refer to Figure 3.1).
2. In the **LU Path** outline (upper left corner of **LUN Manager** tab), double-click a port, and then select a host group.
3. The **LU Path** table (upper right corner of **LUN Manager** tab) displays information about LU paths corresponding to the host group.
4. In the **LU Path** table or the **LDEV** table, select and right-click a LUN that corresponds to the desired logical device. The table will include some or all of the following icons:
 -  indicates a logical volume to which an LU path is defined.
 -  indicates an expanded LU.
 -  indicates a command device.
 -  indicates a secured command device.
 -  indicates a LUN to which no LU path is defined.
 - If nothing is displayed in the **LU Path** table, select a host group  in the outline view.
5. In the **LU Path** table, select and right-click a LUN that corresponds to the desired logical device. Select **Cmd. Dev. Security: OFF -> ON** from the pop-up menu (see Figure 4.52). A message appears, asking whether you want to apply command device security (see Figure 4.53).
6. Select **Yes**. A key will be added to the icon, indicating a secured command device, but the changes are not yet applied to the subsystem.
7. If you want to apply the changes to the subsystem, select **Apply**, and then select **OK** on the confirmation message. If you want to cancel the changes and not apply them to the subsystem, select **Cancel**, and then select **OK** on the confirmation message.

LUN	CU:LDEV	Emulation	Capacity	RAID	Paths
00	01:40	OPEN-L * 1	33.94GB	1(2D+2D)	1
00		Command Device:ON->OFF	33.94GB	1(2D+2D)	1
00		Cmd Dev. Security:OFF->ON	33.94GB	1(2D+2D)	1
00		Release LU Path	33.94GB	1(2D+2D)	1
05	01:51	OPEN-L * 1	33.94GB	1(2D+2D)	1
06	01:52	OPEN-L * 1	33.94GB	1(2D+2D)	1
07	01:53	OPEN-L * 1	33.94GB	1(2D+2D)	1
08	01:60	OPEN-L * 1	33.94GB	1(2D+2D)	1
09	01:61	OPEN-L * 1	33.94GB	1(2D+2D)	1

Selected LUNs:2 Remaining LUNs(Port):480 Remaining LUNs(GRP):224

Figure 4.52 Add Command Device Security Pop-Up Menu

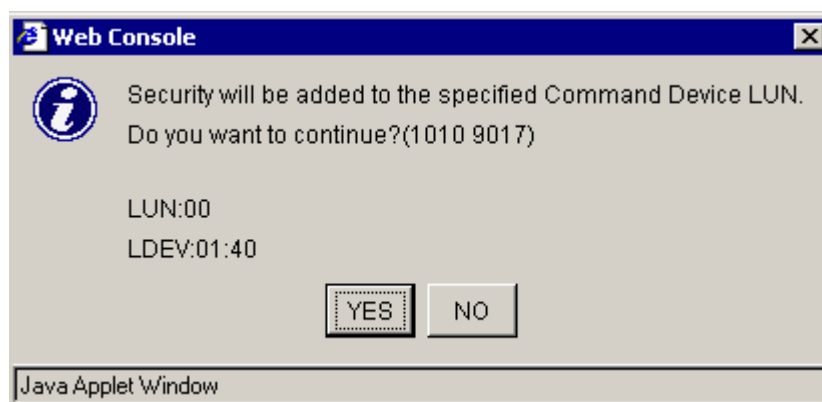


Figure 4.53 Add Command Device Security Confirmation Message

4.5.5 Releasing Command Device Security

To remove command device security to a logical device:

1. Change to **Modify** mode (refer to section 2.3 if you need instructions). Select the **LUN Manager** button () to open the **LUN Manager/Port** panel. The **LUN Manager** tab is the default view (refer to Figure 3.1).
2. In the **LU Path** outline (upper left corner of **LUN Manager** tab), double-click a port, and then select a host group.
3. The **LU Path** table (upper right corner of **LUN Manager** tab) displays information about LU paths corresponding to the host group.
4. In the **LU Path** table or the **LDEV** table, select and right-click a LUN that corresponds to the desired logical device. The table will include some or all of the following icons:
 -  indicates a logical volume to which an LU path is defined.
 -  indicates an expanded LU.
 -  indicates a command device.
 -  indicates a secured command device.
 -  indicates a LUN to which no LU path is defined.
 - If nothing is displayed in the **LU Path table**, select a host group  in the outline view.
5. In the **LU Path** table, select and right-click a LUN that corresponds to the desired logical device. Select **Cmd. Dev. Security: ON -> OFF** from the pop-up menu (see Figure 4.54).
6. A message appears, asking whether you want to apply command device security (see Figure 4.55).
7. Select **Yes**. The icon changes to indicate that command device security is no longer applied, but the changes are not yet applied to the subsystem.
8. If you want to apply the changes to the subsystem, select **Apply**, and then select **OK** on the confirmation message. If you want to cancel the changes and not apply them to the subsystem, select **Cancel**, and then select **OK** on the confirmation message.

LUN	CU:LDEV	Emulation	Capacity	RAID	Paths
00	01:40	OPEN-L * 1	33.94GB	1(2D+2D)	1
Command Device:ON->OFF Cmd Dev. Security:ON->OFF Release LU Path					
01	01:41	OPEN-L * 1	33.94GB	1(2D+2D)	1
02	01:42	OPEN-L * 1	33.94GB	1(2D+2D)	1
03	01:43	OPEN-L * 1	33.94GB	1(2D+2D)	1
04	01:44	OPEN-L * 1	33.94GB	1(2D+2D)	1
05	01:51	OPEN-L * 1	33.94GB	1(2D+2D)	1
06	01:52	OPEN-L * 1	33.94GB	1(2D+2D)	1
07	01:53	OPEN-L * 1	33.94GB	1(2D+2D)	1
08	01:60	OPEN-L * 1	33.94GB	1(2D+2D)	1
09	01:61	OPEN-L * 1	33.94GB	1(2D+2D)	1
Selected LUNs:1 Remaining LUNs(Port):480 Remaining LUNs(GRP):224					

Figure 4.54 Release Command Device Security Pop-Up Menu

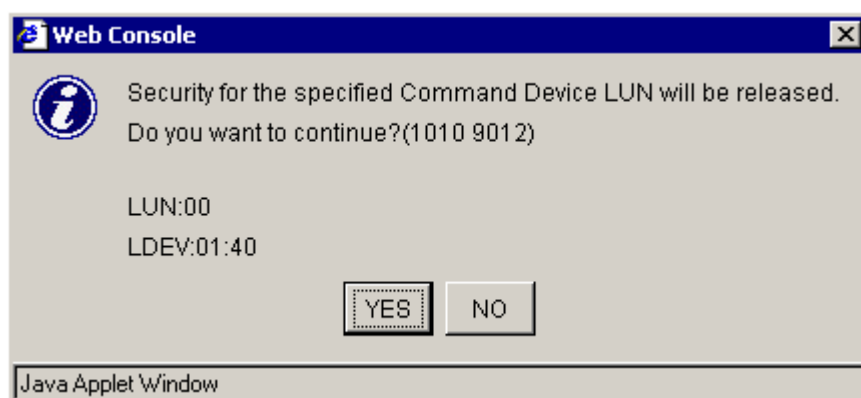


Figure 4.55 Release Command Device Security Confirmation Message

4.6 Configuring Fibre-Channel Ports

To configure the fibre-channel ports on a subsystem, complete the following steps:

- Set the host speed for a fibre-channel port (see section 4.6.1),
- Setting the fibre-channel port address (see section 4.6.2),
- Set the fibre-channel port topology (see section 4.6.3), and
- Set the fibre-channel port for standard, high-speed, or high-speed (2-port) mode (see section 4.6.4).

4.6.1 Setting the Host Speed for Fibre-Channel Ports

You can use host speed as a way to optimize data transfer. Set a higher speed for ports with larger amounts of data transfer, and a slower speed for ports with a smaller amount of data transfer.

To specify the data transfer speed for a fibre-channel port:

1. Change to **Modify** mode (refer to section 2.3 if you need instructions). Select the **LUN Manager** button () to open the **LUN Manager/Port** panel. The **LUN Manager** tab is the default view. Select the **Port** tab (refer to Figure 3.7).
2. In the **Package** outline (upper left corner of **Port** tab), select the **Fibre** folder. The **Port** table (upper right corner of **Port** tab) displays a list of fibre-channel ports in the disk subsystem.
Note: If you specify a channel adapter in the **Package** outline, the **Port** table displays only the ports in the specified channel adapter.
3. Select a port from the **Port** table or the **Select a Port** drop-down list. The **Change Port Mode** box (lower right corner of **Port** tab) displays information about the selected ports.
4. Select the desired data transfer speed from the **Host Speed** drop-down list in the **Mode** area (see Figure 4.56), and then select **Set**.
5. Select **OK** on the Change Port Mode confirmation message (see Figure 4.57) to update the setting, or select **Cancel** to cancel the setting. *Important:* These changes are not yet implemented in the disk subsystem.
6. If you want to apply the changes to the subsystem, select **Apply**, and then select **OK** on the confirmation message. If you want to cancel the changes and not apply them to the subsystem, select **Cancel**, and then select **OK** on the confirmation message.

Change Port Mode

Select a Port: CL1-A

Mode

Current

Host Speed :	2 Gbps	>>	2 Gbps
Fibre Addr. :	EF (0)	>>	1 Gbps
Fabric :	OFF	>>	2 Gbps
Connection :	FC-AL	>>	Auto
		>>	FC-AL

Set Clear

Figure 4.56 Host Speed Drop-Down Box

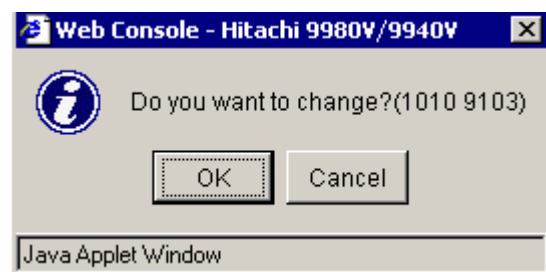


Figure 4.57 Change Host Speed Confirmation Message

4.6.2 Setting the Fibre-Channel Port Address

To set the port address:

1. Change to **Modify** mode (refer to section 2.3 if you need instructions). Select the **LUN Manager** button () to open the **LUN Manager/Port** panel. The **LUN Manager** tab is the default view. Select the **Port** tab (refer to Figure 3.7).
2. In the **Package** outline (upper left corner of **Port** tab), select the **Fibre** folder. The **Port** table (upper right corner of **Port** tab) displays a list of fibre-channel ports in the disk subsystem.
Note: If you specify a channel adapter in the **Package** outline, the **Port** table displays only the ports in the specified channel adapter.
3. Select a port from the **Port** table or the **Select a Port** drop-down list. The **Change Port Mode** box (lower right corner of **Port** tab) displays information about the selected ports.
4. Select an address from the **Fibre Addr.** drop-down list (see Figure 4.58), and then select **Set**. Table 4.3 displays the available fibre port addresses.
5. Select **OK** on the **Change Port Mode** confirmation message to update the setting, or select **Cancel** to cancel the setting. **Important:** These changes are not yet implemented in the disk subsystem.
6. If you want to apply the changes to the subsystem, select **Apply**, and then select **OK** on the confirmation message. If you want to cancel the changes and not apply them to the subsystem, select **Cancel**, and then select **OK** on the confirmation message.

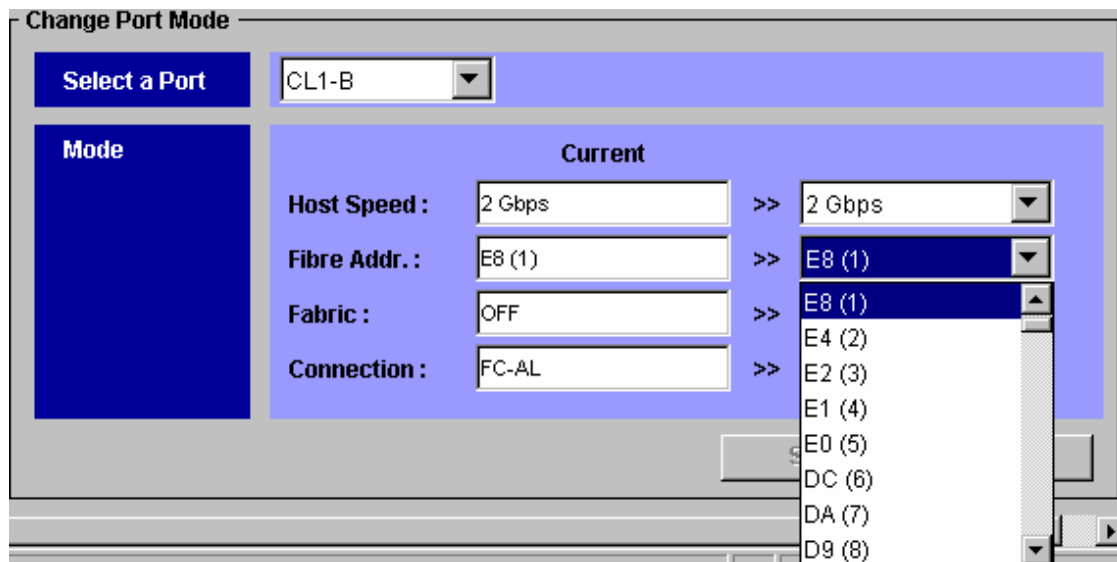


Figure 4.58 Fibre-Addr. Drop-Down Box

Table 4.3 Available Addresses for Fibre-Channel Ports

Port Address (AL-PA)	Loop ID	Port Address (AL-PA)	Loop ID	Port Address (AL-PA)	Loop ID	Port Address (AL-PA)	Loop ID	Port Address (AL-PA)	Loop ID
EF	0	B4	30	76	60	49	90	10	120
E8	1	B3	31	75	61	47	91	0F	121
E4	2	B2	32	74	62	46	92	08	122
E2	3	B1	33	73	63	45	93	04	123
E1	4	AE	34	72	64	43	94	02	124
E0	5	AD	35	71	65	3C	95	01	125
DC	6	AC	36	6E	66	3A	96		
DA	7	AB	37	6D	67	39	97		
D9	8	AA	38	6C	68	36	98		
D6	9	A9	39	6B	69	35	99		
D5	10	A7	40	6A	70	34	100		
D4	11	A6	41	69	71	33	101		
D3	12	A5	42	67	72	32	102		
D2	13	A3	43	66	73	31	103		
D1	14	9F	44	65	74	2E	104		
CE	15	9E	45	63	75	2D	105		
CD	16	9D	46	5C	76	2C	106		
CC	17	9B	47	5A	77	2B	107		
CB	18	98	48	59	78	2A	108		
CA	19	97	49	56	79	29	109		
C9	20	90	50	55	80	27	110		
C7	21	8F	51	54	81	26	111		
C6	22	88	52	53	82	25	112		
C5	23	84	53	52	83	23	113		
C3	24	82	54	51	84	1F	114		
BC	25	81	55	4E	85	1E	115		
BA	26	80	56	4D	86	1D	116		
B9	27	7C	57	4C	87	1B	117		
B6	28	7A	58	4B	88	18	118		
B5	29	79	59	4A	89	17	119		

4.6.3 Setting the Fibre-Channel Topology

The available topology types are:

- **Fabric:** Utilizes a fabric switch to connect a large number of devices (up to 16 million) together. Each device will have the full bandwidth of 100 MB/s (1 Gbps).
- **FC-AL (fibre-channel arbitrated loop):** A shared interface that can connect up to 126 devices (AL-ports) together. The 100 MB/s (1 Gbps) bandwidth is shared among the devices connected to each other (see Figure 4.59).
- **Point-to-Point:** The simplest fibre topology connects two devices directly together.

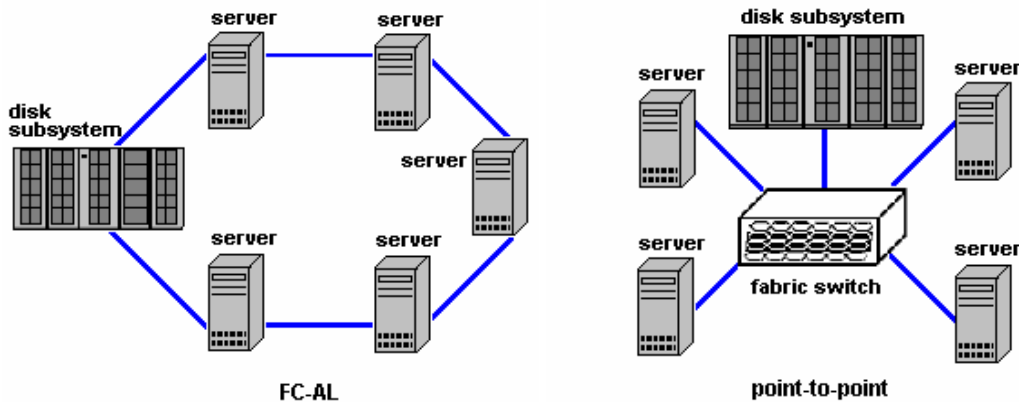


Figure 4.59 FC-AL and Point-to-Point Topologies

When you configure your system, you must specify whether the hosts and the disk subsystem are connected via a fabric switch.

If you use a fabric switch, you must specify FC-AL or point-to-point (FC-AL is the default). Consult the documentation for the fabric switch to learn whether you should use FC-AL or point-to-point. Some fabric switches require you to specify point-to-point to get the system running.

If you are not using a fabric switch, you must specify FC-AL.

To specify the topology:

1. Change to **Modify** mode (refer to section 2.3 if you need instructions). Select the **LUN Manager** button () to open the **LUN Manager/Port** panel. The **LUN Manager** tab is the default view. Select the **Port** tab (refer to Figure 3.7).
2. In the **Package** outline (upper left corner of **Port** tab), select the **Fibre** folder. The **Port** table (upper right corner of **Port** tab) displays a list of fibre-channel ports in the disk subsystem.
Note: If you specify a channel adapter in the **Package** outline, the **Port** table displays only the ports in the specified channel adapter.
3. Select a port from the **Port** table or the **Select a Port** drop-down list. The **Change Port Mode** box (lower right corner of **Port** tab) displays information about the selected ports.
4. If you are using a fabric, select **ON** from the **Fabric** drop-down list in the **Change Port Mode** box (see Figure 4.60). If you are not using a fabric switch, select **OFF** from the **Fabric** drop-down list.
5. Select **FC-AL** or **P-to P (Point-to-Point)** from the **Connection** drop-down list (see Figure 4.61). **Note:** If you are using a fabric switch, consult the documentation for the fabric switch to learn whether you should use FC-AL or point-to-point. If you are not using a fabric switch, you must specify FC-AL.
6. Select **Set**.
7. Select **OK** on the **Change Port Mode** confirmation message (see Figure 4.57 to update the setting, or select **Cancel** to cancel the setting. **Important:** These changes are not yet implemented in the disk subsystem.
8. If you want to apply the changes to the subsystem, select **Apply**, and then select **OK** on the confirmation message. If you want to cancel the changes and not apply them to the subsystem, select **Cancel**, and then select **OK** on the confirmation message.

Change Port Mode

Select a Port: CL1-A

Mode

Current

Host Speed : 2 Gbps >> 2 Gbps

Fibre Addr. : EF (0) >> EF (0)

Fabric : OFF >> OFF

Connection : FC-AL >> ON
OFF

Set Clear

Figure 4.60 Fabric Drop-Down Box

Change Port Mode

Select a Port: CL1-A

Mode

Current

Host Speed : 2 Gbps >> 2 Gbps

Fibre Addr. : EF (0) >> EF (0)

Fabric : OFF >> OFF

Connection : FC-AL >> FC-AL
P-to-P

Set Clear

Figure 4.61 Connection Drop-Down Box

4.6.4 Changing the Fibre PCB Mode Between Standard, High-Speed, and High-Speed (2-port) Mode

In high-speed mode, you will only use one of the four ports. In high-speed (2-port) mode, you will use only two of the four ports. The channel processors and fibre optic processors (FOPs) that would otherwise be reserved for the unused ports are used to balance the workload on the active ports, thereby improving system performance. High-speed and high-speed (2-port) mode are illustrated in Figure 4.62.

By default, all the channel adapter boards are in standard mode. If you want to apply high-speed mode to one or more of the channel adapter boards, you will be using only one of the four ports. For each set of four ports (one active, three inactive), all of the following conditions must be met:

- Each port in the set of four has the same fibre topology option (**On** or **Off**).
- Each port in the set of four has **FC-AL** as the connection option.
- Each port in the set of four uses a different port address.
- Each port in the set of four has the same port type (**Initiator**, **RCU Target**, or **Target**).

Note: A set of four ports that satisfies these conditions is sometimes referred to as a “high-speed mode unit”.

If you want to apply high-speed (2-port) mode to one or more of the channel adapter boards, you will be using only two of the four ports. For each pair of ports (one active, one inactive) all of the following conditions must be met:

- Each port in a pair has the same fibre topology option (**On** or **Off**).
- Each port in a pair has **FC-AL** as the connection option.
- Each port in a pair uses a different port address.
- Each port in a pair has the same port type (**Initiator**, **RCU Target**, or **Target**).

WARNING: Make sure to back up your data before changing the port configuration.

Note: You cannot change the fibre PCB mode while you are online to the host. You will need to reboot the host after changing the mode.

To change between standard, high-speed, and high-speed (2-port) mode:

1. Change to **Modify** mode (refer to section 2.3 if you need instructions). Select the **LUN Manager** button () to open the **LUN Manager/Port** panel. The **LUN Manager** tab is the default view. Select the **Port** tab (refer to Figure 3.7).
2. In the **Package** outline (upper left corner of **Port** tab), select the **Fibre** folder. The outline displays a list of channel adapter (CHA) packages. The icons are:
 -  indicates a short-wave CHA package in standard mode.
 -  indicates a long-wave CHA package in standard mode.
 -  indicates a short-wave CHA package in high-speed or high-speed (2-port) mode.
 -  indicates a long-wave CHA package in high-speed or high-speed (2-port) mode.

3. In the **Package** outline, select and right-click a CHA package.
4. Select the desired mode from the pop-up menu (see Figure 4.63). The current mode will be preceded by a dot.
5. Select **OK** on the Change Port Mode confirmation message to update the setting, or select **Cancel** to cancel the setting. **Important:** The icon will change, but these changes are not yet implemented in the disk subsystem.
6. If you want to apply the changes to the subsystem, select **Apply**, and then select **OK** on the confirmation message. If you want to cancel the changes and not apply them to the subsystem, select **Cancel**, and then select **OK** on the confirmation message.

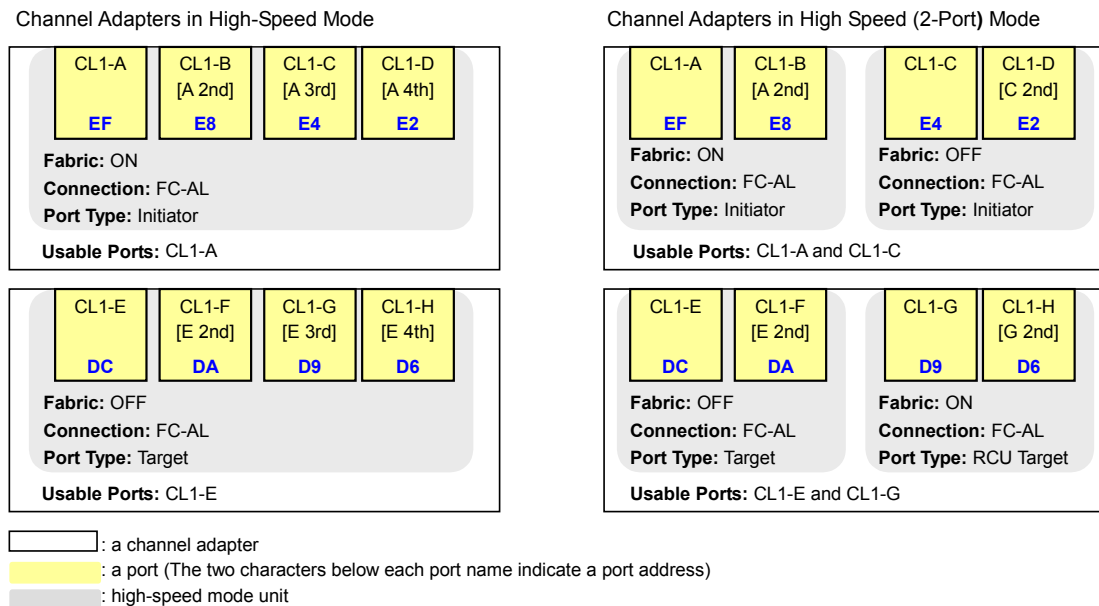


Figure 4.62 High-Speed and High-Speed (2-Port) Mode

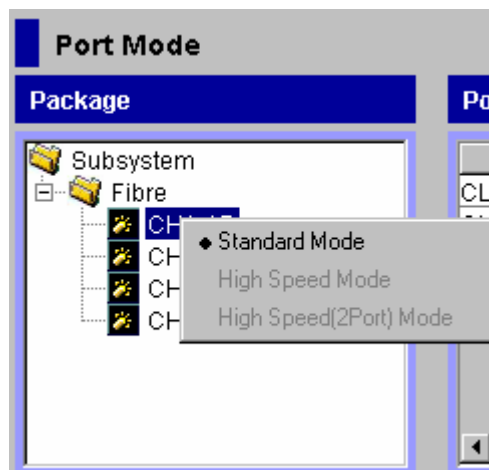


Figure 4.63 Fibre PCB Mode Pop-Up Menu

Table 4.4 Port Serial Numbers and Port Names (4-port PCB) (continues on the following pages)

Port Serial Number	8GSE (2MP)		8HSE/8HLE (4MP)		
	Standard Mode	High-Speed Mode	Standard Mode	High-Speed Mode	High-Speed (2 Port) Mode
0x00	CL1-A	CL1-A	CL1-A	CL1-A	CL1-A
0x01	—	—	CL1-B	CL1-B [A 2nd]	CL1-B [A 2nd]
0x02	CL1-C	CL1-C [A 3rd]	CL1-C	CL1-C [A 3rd]	CL1-C
0x03	—	—	CL1-D	CL1-D [A 4th]	CL1-D [C 2nd]
0x04	CL1-E	CL1-E	CL1-E	CL1-E	CL1-E
0x05	—	—	CL1-F	CL1-F [E 2nd]	CL1-F [E 2nd]
0x06	CL1-G	CL1-G [A 3rd]	CL1-G	CL1-G [E 3rd]	CL1-G
0x07	—	—	CL1-H	CL1-H [E 4th]	CL1-H [G 2nd]
0x08	CL1-J	CL1-J	CL1-J	CL1-J	CL1-J
0x09	—	—	CL1-K	CL1-K [J 2nd]	CL1-K [J 2nd]
0x0A	CL1-L	CL1-L [J 3rd]	CL1-L	CL1-L [J 3rd]	CL1-L
0x0B	—	—	CL1-M	CL1-M [J 4th]	CL1-M [L 2nd]
0x0C	CL1-N	CL1-N	CL1-N	CL1-N	CL1-N
0x0D	—	—	CL1-P	CL1-P [N 2nd]	CL1-P [N 2nd]
0x0E	CL1-Q	CL1-Q [N 3rd]	CL1-Q	CL1-Q [N 3rd]	CL1-Q
0x0F	—	—	CL1-R	CL1-R [N 4th]	CL1-R [Q 2nd]
0x10	CL2-A	CL2-A	CL2-A	CL2-A	CL2-A
0x11	—	—	CL2-B	CL2-B [A 2nd]	CL2-B [A 2nd]
0x12	CL2-C	CL2-C [A 3rd]	CL2-C	CL2-C [A 3rd]	CL2-C
0x13	—	—	CL2-D	CL2-D [A 4th]	CL2-D [C 2nd]
0x14	CL2-E	CL2-E	CL2-E	CL2-E	CL2-E
0x15	—	—	CL2-F	CL2-F [E 2nd]	CL2-F [E 2nd]
0x16	CL2-G	CL2-G [A 3rd]	CL2-G	CL2-G [E 3rd]	CL2-G
0x17	—	—	CL2-H	CL2-H [E 4th]	CL2-H [G 2nd]
0x18	CL2-J	CL2-J	CL2-J	CL2-J	CL2-J
0x19	—	—	CL2-K	CL2-K [J 2nd]	CL2-K [J 2nd]
0x1A	CL2-L	CL2-L [J 3rd]	CL2-L	CL2-L [J 3rd]	CL2-L
0x1B	—	—	CL2-M	CL2-M [J 4th]	CL2-M [L 2nd]
0x1C	CL2-N	CL2-N	CL2-N	CL2-N	CL2-N

Table 4.5 Port Serial Numbers and Port Names (4-port PCB) (continued)

Port Serial Number	8GSE (2MP)		8HSE/8HLE (4MP)		
	Standard Mode	High-Speed Mode		Standard Mode	High-Speed Mode
0x1D	—	—	CL2-P	CL2-P [N 2nd]	CL2-P [N 2nd]
0x1E	CL2-Q	CL2-Q [N 3rd]	CL2-Q	CL2-Q [N 3rd]	CL2-Q
0x1F	—	—	CL2-R	CL2-R [N 4th]	CL2-R [Q 2nd]
0x20	CL1-B	CL1-B [A 2nd]	—	—	—
0x21	—	—	—	—	—
0x22	CL1-D	CL1-D [A 4th]	—	—	—
0x23	—	—	—	—	—
0x24	CL1-F	CL1-F [E 2nd]	—	—	—
0x25	—	—	—	—	—
0x26	CL1-H	CL1-H [E 4th]	—	—	—
0x27	—	—	—	—	—
0x28	CL1-K	CL1-K [J 2nd]	—	—	—
0x29	—	—	—	—	—
0x2A	CL1-M	CL1-M [J 4th]	—	—	—
0x2B	—	—	—	—	—
0x2C	CL1-P	CL1-P [N 2nd]	—	—	—
0x2D	—	—	—	—	—
0x2E	CL1-R	CL1-R [N 4th]	—	—	—
0x2F	—	—	—	—	—
0x30	CL2-B	CL2-B [A 2nd]	—	—	—
0x31	—	—	—	—	—

Table 4.6 Port Serial Numbers and Port Names (4-port PCB) (continued)

Port Serial Number	8GSE (2MP)		8HSE/8HLE (4MP)		
	Standard Mode	High-Speed Mode		Standard Mode	High-Speed Mode
0x32	CL2-D	CL2-D [A 4th]	—	—	—
0x33	—	—	—	—	—
0x34	CL2-F	CL2-F [E 2nd]	—	—	—
0x35	—	—	—	—	—
0x36	CL2-H	CL2-H [E 4th]	—	—	—
0x37	—	—	—	—	—
0x38	CL2-K	CL2-K [J 2nd]	—	—	—
0x39	—	—	—	—	—
0x3A	CL2-M	CL2-M [J 4th]	—	—	—
0x3B	—	—	—	—	—
0x3C	CL2-P	CL2-P [N 2nd]	—	—	—
0x3D	—	—	—	—	—
0x3E	CL2-R	CL2-R [N 4th]	—	—	—
0x3F	—	—	—	—	—

Table 4.7 Port Serial Numbers and Port Names (8-port PCB)

Port Serial Number	16HSF (4MP)	Port Serial Number	16HSF (4MP)
	Standard Mode		Standard Mode
0x00	CL1-A	0x20	CL3-a
0x01	CL1-B	0x21	CL3-b
0x02	CL1-C	0x22	CL3-c
0x03	CL1-D	0x23	CL3-d
0x04	CL1-E	0x24	CL3-e
0x05	CL1-F	0x25	CL3-f
0x06	CL1-G	0x26	CL3-g
0x07	CL1-H	0x27	CL3-h
0x08	CL1-J	0x28	CL3-j
0x09	CL1-K	0x29	CL3-k
0x0A	CL1-L	0x2A	CL3-l
0x0B	CL1-M	0x2B	CL3-m
0x0C	CL1-N	0x2C	CL3-n
0x0D	CL1-P	0x2D	CL3-p
0x0E	CL1-Q	0x2E	CL3-q
0x0F	CL1-R	0x2F	CL3-r
0x10	CL2-A	0x30	CL4-a
0x11	CL2-B	0x31	CL4-b
0x12	CL2-C	0x32	CL4-c
0x13	CL2-D	0x33	CL4-d
0x14	CL2-E	0x34	CL4-e
0x15	CL2-F	0x35	CL4-f
0x16	CL2-G	0x36	CL4-g
0x17	CL2-H	0x37	CL4-h
0x18	CL2-J	0x38	CL4-j
0x19	CL2-K	0x39	CL4-k
0x1A	CL2-L	0x3A	CL4-l
0x1B	CL2-M	0x3B	CL4-m
0x1C	CL2-N	0x3C	CL4-n
0x1D	CL2-P	0x3D	CL4-p
0x1E	CL2-Q	0x3E	CL4-q
0x1F	CL2-R	0x3F	CL4-r

Caution: High-speed and high-speed (2-port) mode cannot be applied to 16HSF PCBs.

Note: (-) indicates that the port is not available.

Chapter 5 Troubleshooting

5.1 Troubleshooting

- For troubleshooting information on the 9900V subsystem, please refer to the *Hitachi Lightning 9900™ V Series User and Reference Guide* (MK-92RD100).
- For troubleshooting information on the Storage Navigator software, please refer to the *Hitachi Lightning 9900™ V Series Remote Console - Storage Navigator User's Guide* (MK-92RD101).
- For information on the 9900V Storage Navigator software error codes, please refer to the *Hitachi Lightning 9900™ V Series Hitachi Remote Console - Storage Navigator Error Codes* (MK-92RD132).

5.2 Calling the Hitachi Data Systems Support Center

If you need to call the Hitachi Data Systems Support Center, make sure to provide as much information about the problem as possible. Include the circumstances surrounding the error or failure, the 9900V Storage Navigator configuration information saved in the floppy diskette(s) by the **FD Dump Tool**, the exact content of any messages displayed on the Storage Navigator, and the severity levels and reference codes of service information messages (SIMs) displayed on the **Status** tab of the Storage Navigator main panel.

The worldwide Hitachi Data Systems Support Centers are:

- Hitachi Data Systems North America/Latin America
San Diego, California, USA
1-800-348-4357
- Hitachi Data Systems Europe
Contact Hitachi Data Systems Local Support
- Hitachi Data Systems Asia Pacific
North Ryde, Australia
011-61-2-9325-3300

Acronyms and Abbreviations

addr	address
AL-PA	arbitrated loop-physical address
CCI	Command Control Interface
CHA	channel adapter
CL	cluster
cmd	command
CU	control unit
CVS	custom volume size (indicates Virtual LVI/LUN device)
FC	fibre channel
FD	floppy disk
GB	gigabyte
Gbps	gigabits per second
grp	group
HBA	host bus adapter
host group	also known as a host storage domain; used to segregate hosts by operating system platform.
IEEE	Institute of Electrical & Electronics Engineers
LAN	local-area network
LDEV	logical device
LU	logical unit
LUN	logical unit number
LUSE	LUN Expansion, also known as LU Size Expansion
LVI	logical volume image (used for mainframe devices)
MB	megabyte
MB/s	megabytes per second
NAS	network-attached storage
PCB	printed circuit board
RAID	redundant array of independent disks
RCU	remote control unit
SAN	storage-area network
SCSI	small computer system interface
SIM	service information message
WWN	worldwide name

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