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Hitachi Freedom Storage™ 5800/Thunder 9200™

Hitachi Path Manager for Windows NT®/Windows 2000®

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Document Revision Level

Revision	Date	Description
MK-90DF512-0	November 2000	Initial Release.
MK-90DF512-1	March 2001	Supersedes and replaces MK-90DF512-0.
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Document Revision Level

The following source documents were used to produce this 5800/9200 user guide:

Hitachi Path Manager for Windows NT/Windows 2000 User's Manual, Revision 9.

DF500 Storage Subsystem Hitachi Path Manager for Windows NT/Windows 2000 Release Note, Revision 5.

DF350/DF400 Storage Subsystem Hitachi Path Manager for Windows NT/Windows 2000 Release Note, Revision 5.

Changes in this Revision

- Revised the installation procedures in section 4.3 Installing the Hitachi Path Manager on A Windows Host System.
- Added "System Parameter Settings" sections for the 9200 and the 5800 in Chapter 2 System Configuration Requirements.

Preface

The Hitachi Path Manager software resides on a Windows NT host system that is attached to a Hitachi Disk Array Subsystem. It uses redundant paths between the server and disk storage to enhance performance and availability. The Hitachi Path Manager provides a failover function which permits applications to run without interruption when path errors occur. This function does not modify the application software.

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List of Tables

Chapter 1 Introducing the Hitachi Path Manager

The Hitachi Path Manager software, which resides in the host server with the disk device driver for the Hitachi Disk Array Subsystem, uses redundant paths between the host server and disk storage in a Hitachi Disk Array Subsystem to enhance performance and data availability. These connections comprise many different components through which data flows during input and output processes. Redundancy and the ability to switch between these components provides many different paths for the data to travel.

The Hitachi Path Manager provides failover functionality. In most cases, host servers are configured with multiple host adapters and SCSI connections to a Hitachi Disk Array Subsystem that provides internal component redundancy. With dual clusters and multiple host interface adapters, the Hitachi Disk Array Subsystem provides more flexibility in the number of input-output paths that are available. When there is a failure, the Hitachi Path manager reroutes input-output operations from the failed path to the remaining paths. This prevents a bus adapter on the host server, external SCSI cable, or cluster or host interface adapter on the Hitachi Disk Array Subsystem from disrupting data access. In the event of failure in one input-output path, current operations are automatically switched to another input-output path. This automatic switching in the event of failure is called *failover*.

This document includes the following information:

- System Configuration Requirements
- Defining Failover
- Installing of Hitachi Path Manager on a Windows Host
- Using Commands
- Path Repair Procedure

Chapter 2 System Configuration Requirements

The minimum configuration specifications and requirements are listed for the following Hitachi Data Systems disk array subsystems:

- 9200 Disk Array Subsystem
- 5800 Disk Array Subsystem

2.1 9200 Disk Array Subsystem

The following 9200 disk array subsystem information is included in this section:

- Specifications
- Requirements
- Configuration
- System Parameter Settings

2.1.1 Specifications

Table 2.1 9200 Specifications

9200 Specifications		Quantity
Host PC	Windows NT 4.0 with Service Pack 3 or later or Windows 2000	1
Host Bus Adapters	Adaptec AHA2944UW SCSI adapter or Adaptec AHA29160 SCSI adapter or Symbios SYM8751D SCSI adapter or Qlogic QLA2100F/QLA2200F Fibre Channel adapter (see #3 in **Note 1** below) or Emulex LP7000E/LP80000/LP850 Fibre Channel adapter	2
Microprogram Version	Dual Controller System SCSI: 0503 or later Fibre Channel: 0553 or later (See #4 in **Note 1** below)	1
Interface Adapter	SCSI or Fibre Channel	2
I/F Cables	SCSI or Fibre Channel	2

The software fits on a single floppy disk. (For specific installation information, see Installing Hitachi Path Manager on a Windows Host on page 15.)

2.1.2 Requirements

Note 1: Please note the following:

1. In MSCS of the Windows NT environment, Hitachi Path Manager does not support the OS boot from the internal SCSI disk of the PCI slot. If you use MSCS on Windows NT, use the internal boot disk of the internal SCSI board (On-Board SCSI) or fibre environment of the PCI slot.
2. Use the same type of HBA in one server; if different types are used, the path failover process will not execute normally.
3. In the MSCS environment, set the following item of the HBA configuration:

   Enable Target Reset: YES

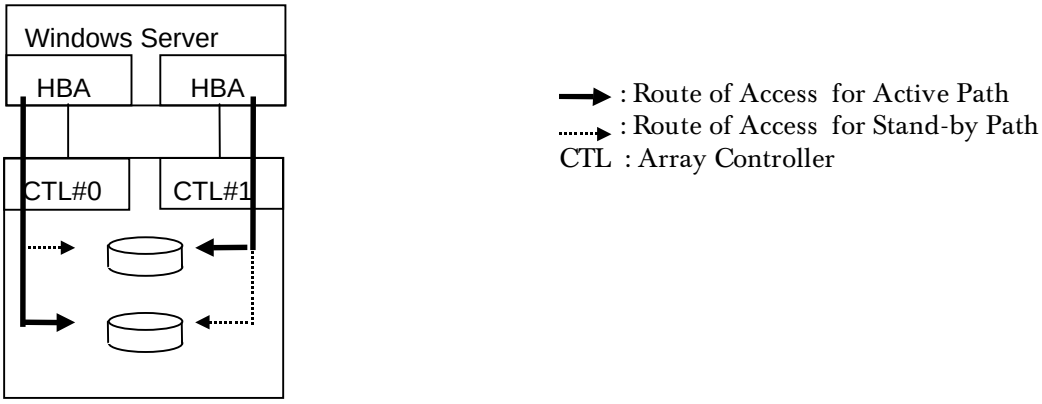
4. If you use the MSCS environment, DO NOT use LP7000E.

Note 2: If you use Hitachi Path Manager with HUB under the MSCS environment, set the unique Roop ID of each connected server/disk subsystem.

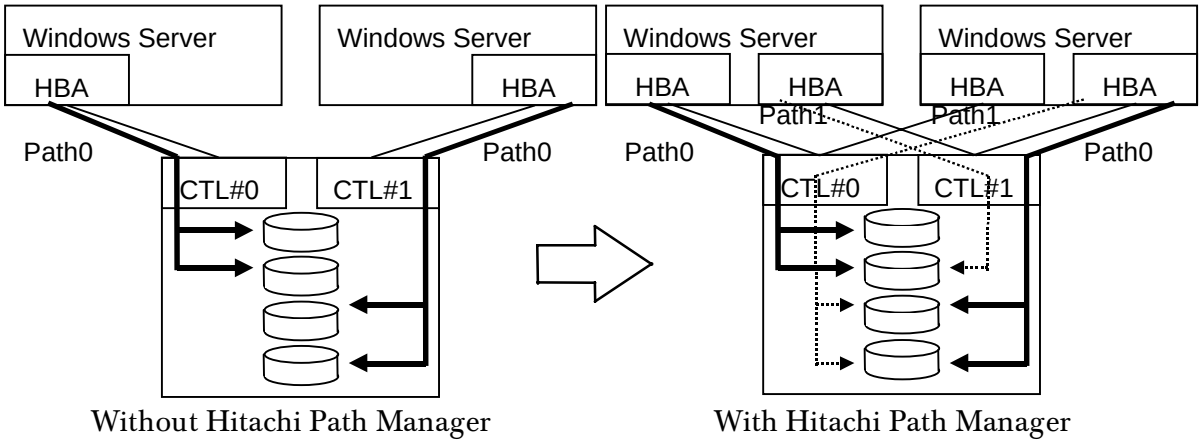
2.1.3 Configuration

The system configuration information is as follows:

Single Server Environment



Cluster (MSCS) Environment



Note:

1. In a Non-MSCS environment, Hitachi Path Manager issues I/O to the Default Controller. Set the appropriate Default Controller for each LU.
2. In an MSCS environment, Hitachi Path Manager issues I/O to the Path 0 side. Set the Default Controller to the Path 0 side for each LU.

2.1.4 System Parameter Settings

To set the system parameters, refer to the following:

- Dual Type
- Dual Share Mode
- Host Connection Mode
- Port Type

2.1.4.1 Dual Type

Set "Dual Active Mode" in the **System Startup Attribute**.

2.1.4.2 Dual Share Mode

Set "Used" in the **Data Share Mode**.

2.1.4.3 Host Connection Mode

Set "ON" in the "Report inquiry page 83h" of "Host Connection Mode2" for all controllers/ports.

Note: If you use Hitachi Path Manager with MSCS, set "Standard Mode" of "Host Connection Mode 1".

2.1.4.4 Port Type

If you use Hitachi Path Manager with MSCS, set "Select" in the following:

- Reset/LIP Mode (Single transfer)
- Reset/LIP Mode (Processing transfer)
- LIP Port All Set Mode
- Target Reset (Spread reset to other ports) Mode

2.2 5800 Disk Array Subsystem

The following 5800 disk array subsystem information is included in this section:

- Specifications
- Requirements
- Configuration
- System Parameter Settings

2.2.1 Specifications

Table 2.2 5800 Specifications

5800 Specifications		Quantity
Host PC	Windows NT 4.0 with Service Pack 3 or later or Windows 2000	1
Host Bus Adapters	Adaptec AHA2944UW SCSI adapter or Adaptec AHA29160 SCSI adapter or Symbios SYM8751D SCSI adapter or Qlogic QLA2100F/QLA2200F Fibre Channel adapter (see #3 in **Note 1** below) or Emulex LP7000E/LP80000/LP850 Fibre Channel adapter	2
Microprogram Version	Dual Controller System SCSI: x407/H or later Fibre Channel: x457 or later (See #4 in **Note 1** below) x = 0: without SNMP x = 4: with SNMP	1
Interface Adapter	SCSI or Fibre Channel	2
I/F Cables	SCSI or Fibre Channel	2

The software fits on a single floppy disk. (For specific installation information, see Installing Hitachi Path Manager on a Windows Host on page 15.)

2.2.2 Requirements

Note 1: Please note the following:

1. In MSCS of the Windows NT environment, Hitachi Path Manager does not support the OS boot from the internal SCSI disk of the PCI slot. If you use MSCS on Windows NT, use the internal boot disk of the internal SCSI board (On-Board SCSI) or fibre environment of the PCI slot.
2. Use the same type of HBA in one server; if different types are used, the path failover process will not execute normally.
3. In the MSCS environment, set the following item of the HBA configuration:

   Enable Target Reset: YES

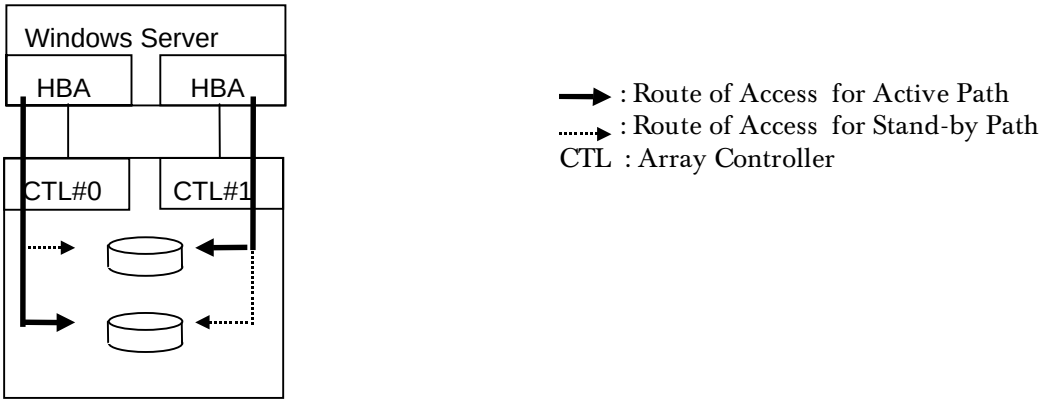
4. If you use the MSCS environment, DO NOT use LP7000E.

Note 2: Hitachi Path Manager does not support the HUB environment under the MSCS environment. Connect to the disk array subsystem directly or via Fibre Switch.

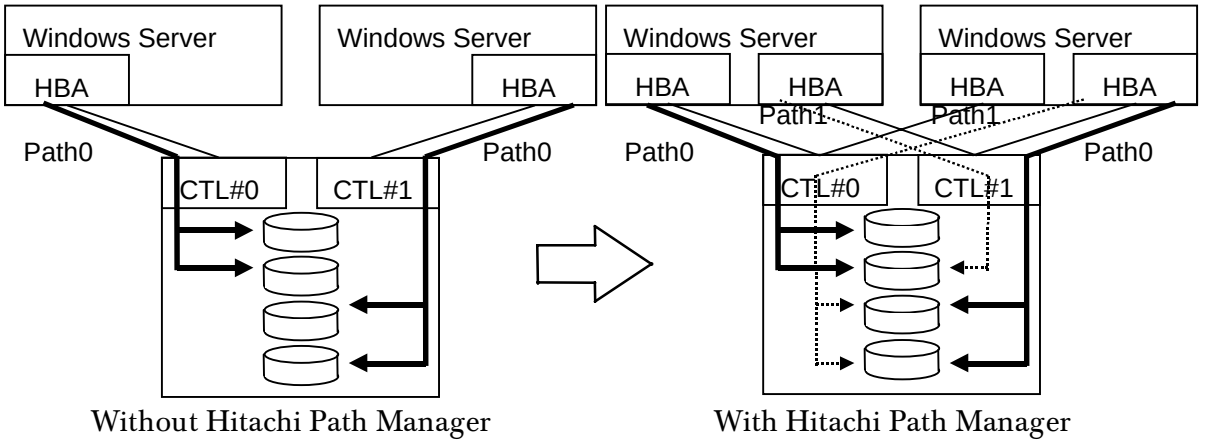
2.2.3 Configuration

The system configuration information is as follows:

Single Server Environment



Cluster (MSCS) Environment



Note:

3. In a Non-MSCS environment, Hitachi Path Manager issues I/O to the Default Controller. Set the appropriate Default Controller for each LU.
4. In an MSCS environment, Hitachi Path Manager issues I/O to the Path 0 side. Set the Default Controller to the Path 0 side for each LU.

2.2.4 System Parameter Settings

To set the system parameters, refer to the following:

- Dual Configuration
- Dual Type
- Dual Share Mode
- Controller Serial Number (SERIAL NO)
- Option (OPTION, ENHANCE OPTION)
- Special Connect

2.2.4.1 Dual Configuration

Set "DUAL MODE" in **Dual Configuration**.

Panel Display

```
DUAL CONFIG
  DUAL MODE
```

2.2.4.2 Dual Type

Set "DUAL ACTIVE" in **Dual Type**.

Panel Display

```
DUAL TYPE
  DUAL ACTIVE
```

2.2.4.3 Dual Share Mode

Set "ON" in **Data Share Mode**.

Panel Display

```
DATA SHARE MODE
  ON
```

2.2.4.4 Controller Serial Number (SERIAL NO)

Hitachi Path Manager recognizes the controller serial number; it is therefore able to discriminate between multiple systems. Set a voluntary number; the serial number is not a default setting.

Panel Display

```
SERIAL NO
                    ????
```

Note: If two or more 5800s are connected, set the serial number of each unique system.

2.2.4.5 Option (OPTION, ENHANCE OPTION)

Set the option code 0000 and the enhance option code 20000000.

Panel Display

```
OPTION
                    0000
```

```
ENHANCE OPTION
              20000000
```

2.2.4.6 Special Connect

If you use Hitachi Path Manager with MSCS, set the following setting of the optional function of the 5800.

Set "OPEN SYSTEM" on "SPECIAL CONNECT".

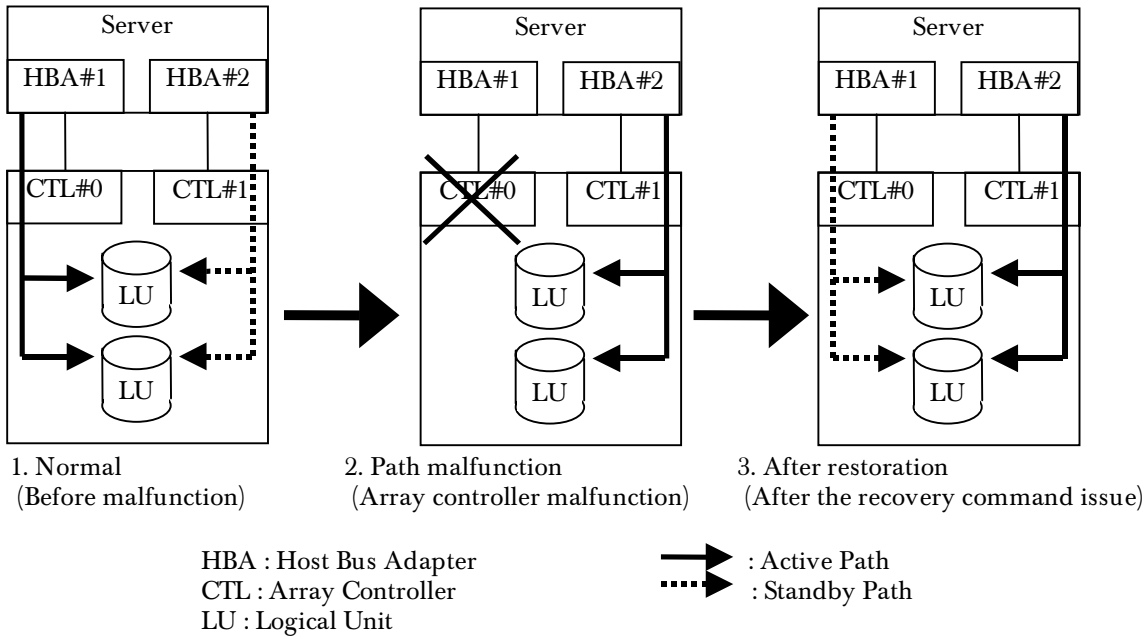
```
SPECIAL CONNECT
OPEN SYSTEM
```

Set "OTHER LIP ON" on "ALL PORT LIP" of "LIP MODE".

```
ALL PORT LIP
OTHER LIP ON
```

Chapter 3 Defining Failover

This function can be explained in three sections (see the diagram below):



1. Normal

   This function does not support the Load Balance function. One controller (HBA#1) always manages the I/O operation (Active Path) while the other Standby Path waits for failover action.

2. Path Malfunction

   When one controller (HBA#1) malfunctions, the other controller (HBA#2) accepts the I/O operation. This failover action is executed automatically.

3. After the path which malfunctioned is repaired, you need to execute the command for the recovering path (see "Path Repair Procedure" on page 33). The repaired path is then available and is now the standby path. In failover only, both paths do not accept I/O access.

Chapter 4 Installing Hitachi Path Manager on a Windows Host

This chapter provides instructions to install and set up the Hitachi Path Manager on a Windows host system attached to an Hitachi Disk Array Subsystem.

Note: You must have Windows NT 4.0 Service Pack 3 or later installed on your system.

This section includes the following:

- Configuring Host Adapters for the Windows Hitachi Path Manager
- Configuring the Disk Array Subsystem
- Installing the Hitachi Path Manager on a Windows Host System
- Rebooting the PC After Changing Disk Partitions
- Removing the Hitachi Path Manager from a Windows Host System

4.1 Configuring Host Adapters for the Windows Hitachi Path Manager

Before you install and use the Hitachi Path Manager, you must configure your SCSI adapters. For SCSI adapters that attach boot devices, ensure the BIOS for the adapter is *enabled*. For all other adapters that attach non-boot devices, ensure the BIOS for the adapter is *disabled*.

Note: When the adapter shares the SCSI bus with other adapters, the BIOS must be *disabled*.

4.2 Configuring the Disk Array Subsystem

Confirm and set the systems parameters according to the Release Note for each disk array subsystem.

- Hitachi Path Manager supports up to 32 SCSI ports.
- Hitachi Path Manager can control up to 128 LUNs.

Note: When you create a new LU on Windows 2000, reboot the system afterwards. Do not use the dynamic reconfiguration.

4.3 Installing the Hitachi Path Manager on A Windows Host System

Note 1: You must log on as an Administrator to install the Hitachi Path Manager.

Note 2: The Device Manager of Windows 2000 cannot display the disk device; the disk device is not recognized in the Device Manager. If this device is displayed, an error message is displayed.

To install the Hitachi Path Manager, you must have one (1) MB of disk space available, and you must have Windows NT 4.0 Service Pack 3 or later installed on your system.

Perform the following steps to install the Hitachi Path Manager driver and application programs on your system:

1. Log on as the administrator user.
2. Insert the Hitachi Path Manager installation CD-ROM into the CD drive.
3. The CD-ROM is a Windows AutoPlay CD; however, should it fail to start automatically, choose **Run** from within the Start menu and enter **D:\Startup.exe** in the text box, where D: is the installation CD-ROM drive letter. Once you agree to the clickwrap license and review the Welcome Message, select the product type 5800 or 9200. Next click on the Software Tab and select the appropriate target operating system, Windows NT or Windows 2000. Select the Setup program icon and double-click, the Hitachi Path Manager setup screen will be displayed.
4. Click on **Next**. The User Information screen displays.
5. Enter your name and your company name.
6. Click on **Next**. The Choose Destination Location screen displays.
7. Click on **Next**. The Setup Complete screen displays.
8. Click on **Finish**. The Hitachi Path Manager program prompts you to start your computer again.
9. Click on **Yes** to start your computer again. When you log on again, you will see a **Path Manager** entry in your Program menu containing the following files:
   - Path management
   - Read me file

End of procedure

4.4 Rebooting the PC after Changing Disk Partitions

The Hitachi Path Manager automatically recognizes the devices (disk partitions) which are connected when a PC boot occurs. However, after the boot, Hitachi Path Manager does not dynamically recognize a disk partition that is created using the Windows Disk Administrator unless you reboot. After creating or deleting a disk partition, you must reboot the PC.

Note: The devices on the storage array must be preformatted before they can be recognized and used on the Hitachi Path Manager and Windows.

4.5 Removing the Hitachi Path Manager from a Windows Host System

To remove the Hitachi Path Manager from a Windows host system, follow these steps:

1. Open the **Control Panel** and select **Add/Remove Programs**.
2. Click on **Path Manager** from within the scroll box
3. Click **Add/Remove** (on Windows NT) or **Change/Remove** (on Windows 2000).

Note: If the following messages are displayed during the removal procedure, install and remove the Hitachi Path Manager again.

- Internal error, unable to load or call external DLL. Please contact your vendor for more information.
- Unable to locate the installation log file "E:\xxx\Uninst.isu." Uninstallation will not continue.

Chapter 5 Using MSCS with Hitachi Path Manager

Hitachi Path Manager supports MSCS for Windows NT 4.0 and Windows 2000. If you configure the cluster environment with MSCS, follow these conditions:

Note: We recommend that you repair the malfunction part immediately; if the failure occurs again, the entire system will fail.

Note: You need to install the MSCS after installing Hitachi Path Manager.

1. When you use an MSCS environment with the Hitachi Path Manager Load Balancing version, Hitachi Path Manager executes the I/O process to the reserved path.
2. When you use Hitachi Path Manager with an MSCS environment, you cannot change the active path from Online to Offline.

Chapter 6 Using Commands

The Hitachi Path Manager provides commands which enable you to display the status of adapters that are used to access managed devices, or to display the status of devices that the device driver manages. You can also set individual path conditions either to online or offline, or set all paths that are connected to an adapter or bus either to online or offline. This chapter describes these commands.

Note: No graphic user interface (GUI) is used with this product. Use the command line to enter these commands.

This section includes the following:

- Command Syntax Conventions
- Datapath Query Adapter
- Datapath Query Device
- Datapath Set Adapter
- Datapath Set Device

6.1 Command Syntax Conventions

The following syntax conventions are used for the Hitachi Path Manager commands:

- Use the word **datapath** to begin all Hitachi Path Manager commands.
- Use the word **query** to display information.
- Use the word **set** to change the state of the datapath.
- All commands apply to either an **adapter** or a **device**. This will be the last word in the command.

Note: You must log on as an Administrator user to use these commands.

Table 3 provides an alphabetical list of these commands, a brief description, and where to go in this chapter for more information.

Table 6.1 Commands

Command	Description	Page Number
Datapath query adapter	Displays information about adapters.	22
Datapath query device	Displays information about devices	23
Datapath set adapter	Sets all device paths that are attached to an adapter.	26
Datapath set device	Sets the path of a device.	27

6.2 Datapath Query Adapter

The **datapath query adapter** command displays information about a single adapter or all adapters. After the Windows server completes startup, use this command to confirm that Hitachi Path Manager can use all the paths.

6.2.1 Syntax

`datapath query adapter [`*adapter_number*`]`

6.2.2 Parameters

adapter_number

The adapter number for which you want information displayed. If you do not enter an adapter number, information about all adapters is displayed.

6.2.3 Examples

`datapath query adapter`

This example might provide the following output:

```
Adpt #   Adapter Name    State   Mode  Select Errors  Paths Active


    0  Scsi Port0 Bus0  NORMAL  ACTIVE  36098      0      4      4

    1  Scsi Port1 Bus0  DEGRAD  ACTIVE   2124      6      4      2
```

The following table defines the terms used in the previous example:

Table 6.2 Adapter Terms and Definitions

Term	Definition
Adpt #	The number of the adapter.
Adapter Name	The name of the adapter.
State	The condition of the named adapter. It can be either: **NORMAL** Adapter is in use. **DEGRADED** One or more paths are not functioning. **FAILED** The adapter is no longer being used by the Hitachi Path Manager.
Mode	The mode of the named adapter. It is either **ACTIVE** or **OFFLINE**.
Select	The number of times this adapter was selected for input or output.
Errors	The number of errors on a path that is attached to this adapter.
Paths	The number of paths that are attached to this adapter. Note: On Windows, this is the number of physical and logical devices that are attached to this adapter.
Active	The number of functional paths that are attached to this adapter. The number of functional paths is equal to the number of paths minus any that are failed or offline.

6.3 Datapath Query Device

The **datapath query device** command displays information about a single device or all devices. If you do not enter a device number, information about all devices is displayed. After the Windows server completes startup, use this command to confirm that Hitachi Path Manager can use all the devices.

6.3.1 Syntax

`datapath query device [`*device_number*`]`

6.3.2 Parameters

device_number

The device number for which you want information displayed. If you do not enter a device number, information about all devices is displayed.

6.3.3 Examples

`datapath query device`

This example might provide the following output:

```
Dev#:   0    Device Name: Disk0 Part0     TYPE: xxxxx     SERIAL: 12340000

==============================================

 Path#               Adapter/Hard Disk    State     Mode    Select    Errors
                                           OPEN   NORMAL        43         0
     0      Scsi Port2 Bus0/Disk1 Part0    OPEN   NORMAL
                                                                43         0
     1      Scsi Port3 Bus0/Disk3 Part0


Dev#:   1    Device Name: Disk1 Part0     TYPE: xxxxx     SERIAL: 12340000

==============================================

 Path#               Adapter/Hard Disk    State     Mode    Select    Errors
                                           OPEN   NORMAL    219643         0
     0      Scsi Port2 Bus0/Disk1 Part0    OPEN   NORMAL
                                                               220565         0
     1      Scsi Port3 Bus0/Disk3 Part0


Dev#:   2    Device Name: Disk2 Part0     TYPE: xxxxx     SERIAL: 12340000

==============================================

 Path#               Adapter/Hard Disk    State     Mode    Select    Errors
                                           OPEN   NORMAL        31         1
     0      Scsi Port2 Bus0/Disk2 Part0    DEAD  OFFLINE
                                                                43         0
     1      Scsi Port3 Bus0/Disk4 Part0


Dev#:   3    Device Name: Disk3 Part0     TYPE: xxxxx     SERIAL: 12340000

==============================================

 Path#               Adapter/Hard Disk    State     Mode    Select    Errors
                                           OPEN   NORMAL      1210         0
     0      Scsi Port2 Bus0/Disk2 Part0    DEAD   NORMAL
                                                                 210        20
     1      Scsi Port3 Bus0/Disk4 Part0
```

The following table defines the terms in the previous example:

Table 6.3 Device Terms and Definitions

Term	Definition
Dev#	The number of this device.
Name	The name of this device.
Type	The device product ID from Inquiry data.
Serial	The logical unit (LUN) serial number for this device.
Path#	The path number.
State	The condition of the named device. **OPEN** Path is in use. **CLOSE** Path is not being used. **DEAD** Path is no longer being used. It was either removed by the Hitachi Path Manager due to errors, or manually removed using the datapath command.
Mode	The mode of the named device. It is either **NORMAL** or **OFFLINE**.
Select	The number of times this path was selected for input or output.
Errors	The number of errors on a path that is attached to this device.

The following table shows the relationship between State and Mode:

Table 6.4 Device State and Mode Descriptions

State	Mode	Contents
CLOSE	NORMAL	Path is not being used.
OPEN	NORMAL	Path is in use.
DEAD	NORMAL	Path is not longer being used. It was removed by Path Manager due to I/O errors.
DEAD	OFFLINE	Path is no longer being used. It was manually removed using the **datapath** command.

6.4 Datapath Set Adapter

The **datapath set adapter** command sets all device paths that are attached to an adapter either to online or offline.

Note: This command will not remove the last path to a device.

6.4.1 Syntax

`datapath set adapter` *adapter_number* {online|offline}

6.4.2 Parameters

adapter_number

The adapter number that you want to change.

`online`

Set adapter online.

`offline`

Set adapter offline.

6.4.3 Examples

```
datapath set adapter 0 online
```

Note: This command will not remove the last path to a device.

6.5 Datapath Set Device

The **datapath set device** command sets the path of a device either to online or offline.

6.5.1 Syntax

`datapath set device` *device_number* `path` *path_number* {online|offline}

6.5.2 Parameters

`device_number`

The device number that you want to change.

path_number

The path number that you want to change.

`online`

Set path online.

`offline`

Remove the path from service.

Note: You cannot remove the last path to a device from service. This prevents data access failure.

6.5.3 Examples

```
datapath set device 0 path 0 online
```

Chapter 7 Troubleshooting

This section contains troubleshooting procedures for the following:

- Hitachi Path Manager Installation
- Hitachi Path Manager Execution

7.1 Hitachi Path Manager Installation

If you have difficulty installing the Hitachi Path Manager program, follow these procedures:

Table 7.1 Hitachi Path Manager Installation Troubleshooting Procedures

Error Number	Description	Procedure
Error 101	Setup is unable to find a hard disk location to store temporary files. Make at least 500KB of free disk space available and try the installation again.	• Verify that the system has sufficient free space. • Release Write Protection of the temporary holder.
Error 111	There is not a sufficient amount of memory available to run setup. Close all other applications to free additional memory. Run setup again.	Close an additional application and retry the setup procedure. If this error occurs again, restart the system. **Note:** On systems with sufficient extended memory, if setup.exe fails to launch, execute **setup.exe** with the **-z** switch to disable this memory check routine.
Error 301	Setup was unable to start the installation program.	Verify that there is sufficient free space on the target disk.
Error 420	Setup is unable to coy the installation support file to a temporary location.	Verify that there is sufficient free space on the target disk.
Error 421	Setup is unable to copy the installation support file **_user1cab** to a temporary location. Create additional space and try again.	• Verify that the system has sufficient free space. • Verify the validity of the Write Protection setting.
Error 422	Setup is unable to expand the installation support file.	Verify that there is sufficient free space on the temporary domain.
Error xxx	For any error except those listed in this table.	Please contact Hitachi Data Systems Customer Support.

7.2 Hitachi Path Manager Execution

In the event of system failure, please contact Hitachi Data Systems Customer Support with the following data.

- Time the problem or failure occurred
- Procedures which occurred immediately prior to the problem or failure
- System configuration information

  If you use the 5800 or the 9200 Disk Array Subsystem with the Resource Manager 9200 program, you will save the information (System Parameters and RAID/LU and component status) as text format data. This procedure is described in "File Output of Configuration : System Parameters" and "Outputting Configuration Information to File : RAID/LU and Component Status" of section 3.9: "Outputting Configuration Information to File" within the *Hitachi Freedom Storage™ Thunder 9200™ Resource Manager 9200 User's Guide* (for GUI).

  This Troubleshooting section is divided as follows:

- Windows NT
- Windows 2000

7.2.1 Windows NT

1. System Information
   a) Select the following:

      `Start ➨ Program ➨ Administrative Tools (Common) ➨ Windows NT Diagnostics`

   b) Open the Computer Management panel.
   c) Select the following contents and save as text formatted data by **Save Report** from the **File** menu.
   – Scope: All tabs
   – Detail Level: Complete
   – Destination: File
2. Hitachi Path Manager Version
   d) Select the following:

      `Start ➨ Setting ➨ Control Panel`

   e) Open the **Add/Remove Programs** panel.
   f) Verify the version of Hitachi Path Manager.
3. HBA Driver
   a) Display the properties of the HBA driver file (xxx.sys).
   b) Verify the driver version by selecting the **File version** tab.

4. Event Log
   c) Select the following:

      `Start ➨ Program ➨ Administrative Tools (Common) ➨ Event Viewer`

   d) Select the following:

      `Log ➨ Save as`

   e) Save as the text format data.
5. The result of the Path Manager command
   f) The result of the **datapath query adapter** command and the execution time of the command.
   g) The result of the **datapath query device** command the the execution time of the command.

   Additionally, if you have the command result before this failure, please send that to Hitachi Data Systems Customer Support.

7.2.2 Windows 2000

1. System Information
   a) Open the Computer Management panel by selecting the following:

      `Start ➨ Program ➨ Administrative Tools ➨ Computer Management (Local)`

   b) At **Computer Management (Local)**, select the following:

      `System Tools ➨ System Information`

   c) Select **Save As text File** on **Action** and save the system information.
2. Hitachi Path Manager Version
   a) Select the following:

      `Start ➨ Setting ➨ Control Panel`

   b) Open the **Add/Remove Programs** panel.
   c) Verify the version of Hitachi Path Manager.
3. Event Log
   a) Select the following:

      `Start ➨ Program ➨ Administrative Tools ➨ Event Viewer`

   b) Open **Event Viewer**.
   c) Select the following:

      `Action ➨ Save Log File As`

   d) Save as the text format of the system log.
   e) Select the following:

      `Log ➨ Save as`

   f) Save as the text format data.
   g)

4. The result of the Path Manager command
   a) The result of the **datapath query adapter** command and the execution time of the command.
   b) The result of the **datapath query device** command the the execution time of the command.

   Additionally, if you have the command result before this failure, please send that to Hitachi Data Systems Customer Support.

Chapter 8 Path Repair Procedure

When one path has malfunctioned, failover action is executed automatically. But, after you repair the path, you need to execute the following procedure to recover the failed path.

1. Repair the failed path using the appropriate manual for the 9200.
2. After repairing, you need to change the status of all paths from offline to online by using the “datapath set adapter” command. (Refer to Datapath Set Adapter on page 26.)

   We recommend that you execute this command immediately after the recovery operation; if the surviving path experienced a failure prior to recovery of the repaired path the system will be severely impacted or will experience an outage.
3. Confirm the state of adapter by using “datapath query adapter” command. (Refer to Datapath Query Adapter on page 22.)
4. Use the following procedure when the “Failover” function of the Hitachi Path Manager is used. After a path is repaired it will serve as a standby path in the event the functioning path fails. To verify the repaired path is functioning properly, use the following procedure. This procedure should be performed during the next available maintenance outage to avoid inducing a production outage.
   a) Change the status of the active path from online to offline by issuing the datapath set adapter command. (Refer to Datapath Set Adapter on page 26.) This will force I/O to the repaired path.
   b) Confirm that the repaired path is functioning properly by issuing the datapath query adapter command. (Refer to Datapath Set Adapter on page 26.) Check the SELECT column of the output of the datapath query adapter command. The SELECT column represents the number of times the path has serviced an I/O. If the repaired path continues to malfunction, the STATE column will display DEGRADE or FAILED status. Repair the failure and retry this step.
   c) After the path has been successfully repaired and verified, the user can elect to use the datapath set adapter command to change the repaired path from online to offline to serve as the standby path, or allow the repaired path to function as the primary path.