

HITACHI

Gigabit Fibre Channel Adapter

USER'S GUIDE

(Linux/VMware driver Edition)

Revision 73.0

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HITACHI

Read this manual well and keep it near the system so that you can refer to it as needed.
Before starting operation, familiarize yourself with the safety instructions.

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Information

- The BladeSymphony server name has been changed to Hitachi Compute Blade. If you are using BladeSymphony based server products, substitute references to Hitachi Compute Blade with BladeSymphony.
- The Hitachi Virtualization Manager (HVM) name has been changed to Hitachi logical partitioning manager (LPAR manager, or LP). If you are using HVM based logical partitioning feature, substitute references to Hitachi logical partitioning manager (LPAR manager, or LP) with HVM.

Important Notes

- It is strictly forbidden to reprint or duplicate part or all of this manual without the permission of the publisher.
- The contents of this manual are subject to change without notice.
- Despite our meticulous care to ensure the accuracy of the contents, should you find any errors or questionable issues, or if you have opinions to share with us, please contact your dealer.
- Note that we shall not be liable for the consequences of operating this product in ways not stated in this manual.

Reliability of the System Equipment

The system equipment you purchased is designed for general office work. Avoid using it for applications requiring high reliability that may seriously affect human life or property. We shall not assume any responsibility for any accidents resulting from such use of the product.

Examples of inappropriate applications of system equipment intended for general office work are:

- Control of a chemical plant, control of medical devices, and control of emergency communications, all of which require high reliability.

You need a different system for such high reliability applications. Please consult our sales department for the appropriate system.

Regulatory Compliance Notices

☐ **Federal Communications Commission (FCC) Compliance**

This equipment has been tested and found to comply with the limits for a Class a digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference

in which case the user will be required to correct the interference at personal expense. The user is cautioned that changes or modifications not expressly approved by the manufacturer could void the user's right to operate the equipment.

☐ **EN55022 Compliance**

Warning: This is a class a product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

☐ **Class a Emission Statement (Korea)**

이 기기는 업무용(A급)으로 전자파적합등록을
한 기기이오니 판매자 또는 사용자는 이 점을
주의하시기 바라며, 가정외의 지역에서 사용하는
것을 목적으로 합니다.

☐ **Canadian Compliance Statement**

This Class A digital apparatus complies with Canadian ICES-003.

Cet appareil numérique de la classe A est conforme à la norme NMB-003 du Canada.

☐ **Product recycling and disposal (EU and Norway) (Waste Electrical and Electronic Equipment Directive 2002/96/EC [WEEE])**

The following mark on Products indicates that these Products are to be collected separately and to be recycled or discarded according to applicable local and national regulations. For further information regarding return, collection, recycle or disposal, please contact your sales company where you purchased the Products.



The above mark is not printed on the following Products but these Products are also subject to electrical and electronic equipment (EEE). These un-marked Products are, as well as marked Products, to be collected separately and to be recycled or discarded according to applicable local and national regulations. For further information, please contact your sales company where you purchased the Products.

| No. | Products code | Products name |
|-----|--------------------------------|------------------------------|
| 1 | GVX-CC64G*BX, GVX-CC64G* | Fibre Channel Board |
| 2 | GVX-CC9FCCMB2BX, GVX-CC9FCCMB2 | Combo Card For FCSW module |
| 3 | GVX-CC9IOCOMBBX, GVX-9IOCOMB | Combo Card For I/O module T3 |
| 4 | GGX-CC9M4G2X1EX, GGX-CC9M4G2X1 | FC mezzanine card |

Note: The above regulation/markings applies only to countries within the European Union (EU) and Norway.

Export control

To export this product, check the export control-related regulations and follow the necessary procedures. If you have any questions, contact our sales representative.

Note that the same handling is required for peripheral equipment and pre-installed software shipped with this product.

Notes on Deleting Data when Disposing of or Transferring the System Equipment

Personal computers and system equipment are used for various purposes at the office and home. Important data of customers are recorded in the hard disks in these computers and system equipment.

You must erase these important data contents when transferring or disposing of the system equipment.

However, it is not easy to erase data written on the hard disk.

When you “erase data”, you generally do one or more of the following:

- Discard data in the “Recycle Bin”.
- “Delete” data.
- Erase data using the “Empty Recycle Bin” command.
- Perform initialization (formatting) of the hard disk using software utilities.
- Recover the factory defaults using a recovery CD.

The above operations only change the file management information of data recorded on the hard disk; actually the data is just blocked from view.

That is, although the data appears to have been erased, it was just made unavailable under an operating system such as Windows. The actual data remains on the hard disk and may be read using special data recovery software. Consequently, important data on the hard disk of the system equipment can be read and used for unexpected applications by malicious people.

To avoid unauthorized access to important data on the hard disk when disposing of or transferring the system equipment, it is extremely important for you to erase all data recorded on the hard disk at your own risk. When you erase the data, we recommend that you purchase and use a dedicated software or service, or corrupt the data on the hard disk physically or magnetically using a hammer or strong magnet to make it unreadable.

Transferring the system equipment without deleting software on the hard disk (operating system, applications, etc.) may be against software licensing agreements. Check your software licensing agreements carefully.

Registered Trademarks and Trademarks

Microsoft, Windows, and Windows Server are registered trademarks or trademarks of Microsoft Corp. in and outside the U.S.

Pentium and Xeon are trademarks or registered trademarks of Intel Corporation in and outside the U.S.

Linux is a registered trademark or trademark of Linus Torvalds in and outside the U.S.

Red Hat is a registered trademark or trademark of Red Hat, Inc. in and outside the U.S.

All other registered trademarks or trademarks in this manual are the property of their respective owners





Introduction

Thank you for purchasing Hitachi Gigabit Fibre Channel Adapter. This manual describes procedures for the use of Hitachi Gigabit Fibre Channel Adapter such as installation, connection, and handling.

Notation

☐ Symbols

Meanings of symbols used in this manual are as follows:

| | |
|--|---|
|  WARNING | This indicates the presence of a potential risk that might cause death or severe injury. |
|  CAUTION | This indicates the presence of a potential risk that might cause relatively mild or moderate injury. |
| NOTICE | This indicates the presence of a potential risk that might cause damage to the equipment and/or damage to surrounding properties. |
|  | This indicates notes not directly related to injury or severe damage to the equipment. |
|  | This indicates advice on how to make the best use of the equipment. |

Abbreviations for Operating Systems (OS)

In this manual, the following abbreviations are used for OS name:

- Red Hat Enterprise Linux 8 Server
(Hereinafter, referred to as Red Hat Enterprise Linux 8 or RHEL8)
- Red Hat Enterprise Linux 7 Server
(Hereinafter, referred to as Red Hat Enterprise Linux 7 or RHEL7)
- Red Hat Enterprise Linux 6 Server
(Hereinafter, referred to as Red Hat Enterprise Linux 6 or RHEL6)
- Red Hat Enterprise Linux Advanced Platform
Red Hat Enterprise Linux 5 Server
(Hereinafter, referred to as Red Hat Enterprise Linux 5 or RHEL5)
- Red Hat Enterprise Linux AS 4
Red Hat Enterprise Linux ES 4
(Hereinafter, referred to as Red Hat Enterprise Linux 4 or RHEL4)
- Red Hat Enterprise Linux AS 3
(Hereinafter, referred to as Red Hat Enterprise Linux 3 or RHEL3)

- VMware vSphere® ESXi™ 6.7
(Hereinafter, referred to as ESXi 6.7)
- VMware vSphere® ESXi™ 6.5
(Hereinafter, referred to as ESXi 6.5)
- VMware vSphere® ESXi™ 6.0
(Hereinafter, referred to as ESXi 6.0)
- VMware vSphere® ESXi™ 5.5
(Hereinafter, referred to as ESXi 5.5)
- VMware vSphere® ESXi™ 5.1
(Hereinafter, referred to as ESXi 5.1)
- VMware vSphere® ESXi™ 5.0
(Hereinafter, referred to as ESXi 5.0)
- VMware® ESX™ 4.* or VMware® ESXi™ 4.*
(Hereinafter, referred to as ESX 4.* or ESXi 4.*)

Information on Support and Service

Missing Parts on Delivery

The product is checked by local support personnel when it is delivered.

In some cases, no checkout work is performed or no local support personnel visit you when the product is delivered. If you find any missing part or if you have any questions on the delivered product in such cases, contact your sales.

When You Need Help

- 1 Refer to the manual.**
Refer to manuals. Also refer to other printed manuals provided with the product.
- 2 Contact us by phone.**
Contact the reseller where you have purchased the product.

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Precautions for Safe Use

Notes related to safety issues are marked as shown below.



This is a safety alert symbol. It calls attention to a potential safety hazard to humans. In order to avoid possible injury or death, follow the message provided after this symbol.



WARNING

This symbol indicates the presence of a potential risk that might cause death or severe injury.



CAUTION

This symbol indicates the presence of a potential risk that might cause relatively mild or moderate injury.

NOTICE

This symbol indicates the presence of a potential risk that might cause severe damage to the equipment and/or damage to surrounding properties.



This pictogram (\triangle) indicates a precaution. The figure inside the triangle (\triangle) indicates the type of hazard.

The example on the left indicates a shock hazard.



This pictogram (\otimes) indicates an action that you must not take. The pictogram (\otimes) is placed over a figure that depicts the “must-not” item involved.

The example on the left indicates “Do not disassemble”.



This pictogram (\odot) indicates an action to take. The figure inside the circle (\odot) shows the action to take.

The example on the left tells you to “Unplug the power cord from the outlet”.

Common precautions concerning safety

Please follow these safety instructions:

When operating the equipment, follow the instructions and procedures provided in the manual.

Be sure to follow notes, cautionary statements and advice indicated on the equipment or in the manual.

Failure to follow those instructions may lead to injury, fire or damage to the equipment.

Operations and actions to perform

Do not perform operations or actions other than those described in the manual.

Should you find any problem with the equipment, turn off the power, unplug the power cord from the electrical outlet, and then contact your dealer or call for maintenance personnel.

Pay attention

The equipment and the manual carry notes, cautionary statements and advice that have been fully examined and reviewed. However, unforeseeable situations may occur.

When operating the equipment, always stay alert.

WARNING



Abnormal heat, smoke, abnormal noise, or abnormal smell

Should you find anything abnormal occurring, turn off the power and unplug all the power cords of the equipment (maximum of 5) from the electrical outlets. Using the power cord after such occurrences may lead to electric shock or fire.

Do not place any objects around the electrical outlet to allow users to unplug the power cord immediately.



Do not repair, remodel or disassemble

Do not attempt to repair, remodel or disassemble the equipment on your own, except for expansion work to be performed in accordance with the instructions in this manual. Work performed by unqualified persons may lead to electric shock, fire, or burns. There are many high-voltage areas inside the power unit. It might be hazardous if you touch these areas.



Insertion of foreign objects into the equipment

Do not allow clips, pins or any other metal items or flammable items to enter the equipment through a vent or by any other means. Continuing to operate the equipment with foreign objects may lead to electric shock or fire.



Removal of cover or bracket

Unless otherwise instructed, turn off the power, unplug all power cords of the equipment from the electrical outlets, and disconnect all cables from the equipment before removing covers or brackets. Even if you turn off the power to the equipment, some circuits are live and unexpected contact may cause a fire.

Do not use the equipment with the cover removed. It may also result in electric shock or equipment failure.



Handling of the power outlet

Use a grounding 2-pole plug-in power outlet. Outlets of any other types would cause electric shock or fire.

In order to prevent electric shock, use a ground wire to connect the outlet's grounding electrode to a ground terminal installed by a qualified electrician. Omission of this connecting step may cause electric shock in the event of a power failure.



Do not place objects on the equipment

Do not place a vase, potted plant or any other container with water in it or small metal items like pins and clips on the equipment. Operating the equipment with conductive objects such those mentioned above may lead to electric shock, smoke, or fire.



Handling of heavy loads

The equipment is heavy. Be careful when moving it. Otherwise, handling of this equipment may hurt your arms or lumbar.

To move or lift heavy loads such as this product, use tools or perform the task with the help of at least one other person. Otherwise handling of heavy loads could cause injury.

WARNING



Handling of the power cables

Always use the power cables shipped with the equipment, and follow the instructions below: Failure to follow the correct handling practices may lead to damage to the power cables to expose the copper wires, or overheating due to short-circuiting or partial disconnection, which may cause electric shock or fire.

Do not place any object on the power cables.

Do not pull the cables.

Do not apply pressure on the power cables.

Do not fold the power cables.

Do not work upon the power cables.

Do not use the power cables near heat-generating appliances.

Do not bundle the power cables.

Do not subject the power cables to ultraviolet or strong visible light continuously.

Do not use the power cables past their service life.

Do not expose the power cables to alkali, acid, fat and oil, or humidity.

Do not use the power cables in a high-temperature environment.

Do not use the power cables above their specified rating.

Do not use the power cables for other devices



Not designed to operate near volatile liquid

Do not use volatile liquids such as nail polish remover near the equipment. Such volatile liquids could cause a fire if they enter inside the equipment and are ignited.



Handling of the power plug

When inserting the power plug into the electrical outlet or removing it, be sure to hold the plug section. Do not pull the cable; it may partially break the wire, heat the broken part and lead to a fire.

If a long downtime is planned, remove the power plug from the outlet. The equipment is live even when not in use, and any damaged components may cause a fire.

Be sure to handle the power plug with dry hands when inserting or removing it from the outlet. Handling it with wet hands may cause an electric shock.



Impact from falling

Do not let the plug fall or hit it against another object. It may cause internal deformation and deterioration. Operating the equipment under such defective conditions may lead to electric shock or fire.



Applicable power source

The equipment uses 200 VAC. Do not operate the equipment with a voltage other than that specified. It may lead to internal breakage or electric shock or fire due to overheating and deterioration (depending on the voltage magnitude).

WARNING



Contact failure and tracking of the power plug

Comply with the following instructions for handling of the power plug. Otherwise, tracking or contact failure may cause a fire.

Make sure that the power plug is fully and securely inserted into the electrical outlet.

Before inserting the power plug, check that there is no dust or water on the plug. If any dust or water is found, wipe it off with a dry cloth and then insert it.

Check that the outlet can firmly hold the plug.



Handling of batteries

The following actions must be avoided. Inappropriate handling may cause the battery to overheat, burst, and leak, resulting in injury, smoke or fire.

Disassembling the battery

Heating beyond 100°C

Incinerating

Wetting

Using batteries other than those specified



Storage location for batteries

Keep batteries out of the reach of young children. There is a danger that they might swallow them. Should a battery ever be swallowed, take care to secure a breathing path for the child and immediately call for medical assistance.



Disposal of batteries

To dispose of batteries, consult your dealer or follow the relevant regulations and rules of your country.



Storing batteries

When storing batteries, apply adhesive tape on the terminals for insulation. If the batteries are stored without insulation, the terminals can contact each other to cause a short-circuit and overheat or burst, leading to injury or fire.



Multiple connections to a single outlet not allowed

Do not connect multiple power cables to a single electrical outlet. Overheating of the power cables or outlet may cause fire and trip the circuit breaker, stopping the operation of other devices on the same circuit.

WARNING



Not designed to operate in a humid or dusty environment

Do not use the equipment near a place where water is used such as sink, in a humid basement, or in a dusty place. Such conditions may lower electric insulation, leading to electric shock or fire.



Not designed to operate in a high-temperature environment

Do not install the equipment in a place subject to high temperatures and do not cover it with insulating material. It may cause a fire.



Moving between two locations with a significant temperature gap

When you move the equipment from one location to another, a significant temperature gap between the two locations may cause condensation on the surface or inside the equipment. Using the equipment when condensation is present may lead to electric shock or fire. Leave the equipment at the new location for several hours before you start using it.



Addition and connection of peripheral devices or optional components

To add or connect peripheral devices or optional components to the equipment, remove the power plug from the outlet and disconnect all cables from the equipment unless otherwise instructed. Use only peripheral devices and optional components which are explicitly listed as supported devices in the manual, and always follow the instructions in the manual.

Using devices other than those mentioned above would cause a failure of the peripheral devices or optional components, smoke, or fire due to the difference in connection specifications.



Vents

Vents on the equipment aim to prevent internal temperature rise. Do not block the vents by placing any objects in front of or against them. Otherwise the internal temperature may rise, leading to smoke, fire or failure.

Keep vents clear of dust by periodically checking and cleaning them.



Plastic bags for packaging

To avoid the risk of suffocation, do not leave plastic bags (such as air bubble cushioning for packaging) within the reach of young children.



Handling the power supply module

The power supply module has a high-voltage area in it. Do not open the cover. It may result in electric shock or equipment failure.



Handling of the product

Install the product on a fixed rack. Do not lean against the product or stand on it. Do not install the product in a place with weak floors and walls. Do not subject the product to excessive vibration. It could fall and cause a failure.

CAUTION



Contact with contact pins

Do not touch the contact pins of connectors with your hand or any metal item. Do not place any objects such as wire among the pins. Do not place the equipment in a place where there are metal pieces. Otherwise, contact failure may cause a malfunction.

When you have to touch the card, take care not to hurt yourself. You can wear cotton gloves.



Addition and replacement of parts in the equipment

Increasing the number of built-in options for a system device or replacing them must be entirely conducted by maintenance personnel. Avoid removing the cover from the device and avoid installing or removing built-in options. The system device contains parts mounted at high density, which suggests that unskilled work will lead to injury or device failure. If you need to add or replace options, you should contact your dealer or call the maintenance personnel.



Contact with metal edges

When moving the equipment or adding parts, take care not to hurt yourself on the metal or plastic edges. You can wear cotton gloves.



Using at an unstable place

Do not place the equipment on an inclined ground or at a narrow or unstable place. The equipment may fall and cause an injury.



Use for purposes other than the stated purpose

Do not use the equipment for any other purpose other than its intended use. It may malfunction or fall and cause an injury.



Consumables

Only use specified consumables. Using consumables other than those specified may not only reduce reliability of the product but also cause malfunction, electric shock or fire.



Eye fatigue

Provide luminance of 300 to 1000 lux for viewing the display. Take a break of 10 to 15 minute every hour. Viewing the display for a long time results in eye fatigue.



Cover for the power supply module

The power supply module, and its cover and handle are heated while that module is run. Take care when replacing a failed module or in other cases. You might get burned.



Laser beam

On this product, a Class 1 laser product is installed. Do not look directly at the laser beam. Do not look at the laser beam using an optical device.

Under the laser module cover, a laser beam is being emitted. Do not remove the cover of an unused board.

CAUTION



Signal cables

When wiring cables, take care not to trip over the cables. It could cause injury or failure of devices connected to the equipment. It could also cause loss of valuable data.

Do not place heavy items on the cables. Avoid wiring cables close to a thermal appliance. It may cause damage to cable sheaths, resulting in failure of the connected devices.



Improper battery type

Improper type of battery used can cause explosion.

Replace the battery with a proper one as recommended by the manufacturer.

Dispose of the worn-out battery according to the manufacturer's instructions.



Aluminum electrolytic capacitors

An aluminum electrolytic capacitor has a limited service life. Do not use it past its service life. Otherwise, leakage or depletion of the electrolyte may cause smoke or electric shock. To avoid such hazardous situations, replace limited-life parts once they are past their designated service life.



Handling of the system equipment

Addition or replacement of optional components must be performed by maintenance personnel.

Do not attempt to remove the cover of the equipment. Do not attempt to install or remove optional components. Parts implemented in the system equipment are high-density, and highly complex. Operation or maintenance by inexperienced persons may lead to injury or equipment failure.

When you need to add or replace optional components, contact your dealer or call maintenance personnel.



Installing the equipment onto a rack

To mount or remove the system equipment onto or from the rack cabinet, do not strain yourself to do so alone. Instead, always get help from at least one other person or use tools. If the system equipment has to be mounted on 31U and above of the rack cabinet or it is already mounted there, do not attempt to mount or remove it. Call maintenance personnel.

Defective mounting may cause the system equipment to fall, resulting in an injury or equipment failure.

To perform any operation with the equipment pulled out from the rack cabinet, be sure to mount a stabilizer to the rack cabinet. Applying excessive force could cause the rack cabinet to fall, resulting in an injury or equipment failure.

If a stabilizer is not mounted, call maintenance personnel.



High Temperature at the 10GBASE-R Transceiver

The 10GBASE-R transceiver in the 10Gbps LAN switch module increases in temperature during operation. To remove the transceiver, therefore, allow at least approximately 5 minutes after the power supply for the 10Gbps LAN switch module is stopped from the management module. Failure to do so may cause you to get burned.

NOTICE



Backing up data

Always create backup copies of important data on the hard disk to auxiliary storage. If the hard disk fails, all data stored on it will be lost.



Not designed to operate outdoors

Do not operate the equipment outdoors. It could cause a failure.



Disposal of the equipment

For disposal by a business operator

Check the industrial waste disposal regulations for your country and follow the necessary procedures.

For disposal by an individual

To dispose of this equipment, consult your dealer or follow the relevant regulations.



Radio interference

When installed next to other electronic equipment, the equipment may interfere with each other. In particular, with a television set or a radio in the vicinity, some noise may occur on the equipment. If this happens, do the following:

Place the equipment as far away as possible from the TV or radio.

Change the orientation of the antenna of the TV or radio.

Plug the electronic equipment into separate electrical outlets.



Anti-earthquake measures

Strong vibration such as that generated by an earthquake could cause the equipment to move and fall, resulting in serious accidents.

In order to prevent disastrous outcomes, consult a maintenance company or an expert business for developing counter-seismic measures and implement them accordingly.



Handling the hard disk

The hard disk is a precision instrument. Handle it carefully when you use it. Inappropriate handling may result in hard disk failure.

When carrying the system equipment or hard disk, handle it carefully and do not vibrate or hit it. Before handling the hard disk, remove static electricity or wear cotton gloves.

Before moving the system equipment, turn off the power, remove the power plug from the electrical outlet, and wait at least 30 seconds.



Rat control

Rats can cause the following damage to a computer system:

Breakage of cable sheaths

Corrosion, contact failure, or soiled parts inside the equipment

In order to prevent the above damage, consult a maintenance company or an expert business for developing rat control measures and implement them accordingly.

NOTICE



Implementing a disk array

You must not change the disk array during system operations. Otherwise, the system would lose all data.

If you select [New Configuration], the hard disk will lose all data.



Power operation

Follow the prescribed procedure for power operation. Power input or output not according to the prescribed procedure may cause problems to the system equipment.



Faulty disk

If you attempt to replace a faulty disk using an incorrect procedure, data on the disk may be corrupted. Before starting disk replacement work, back up the data.

Replacing a hard disk without failure will corrupt the data on it. Do not remove any hard disk other than the faulty disk.



Connecting a cable to the management module

When you connect the management module over a network, the system will incur an error if a device assigned with the same IP address as for the BMC on the management module or server blade exists on the network.

After the end of a network configuration, connect a cable to the management module.



N + M cold standby function

When the N+M cold standby function is enabled, Pre-configuration is automatically executed and the status LED (CND) on the server blade lights solid green after the POWER LED on the front panel lights solid orange. Confirm that the POWER LED of the front panel lights solid orange to show Pre-configuration is completed before executing step 3 described above.

Make sure to use the same LPAR manager firmware version as the active partition for the standby partition. Otherwise, N+M failover may fail.

Do not move the EFI Shell to the highest booting priority in the EFI Setup menu. If the EFI Shell is on the top of the boot option, the OS will not successfully boot after N+M switching and fallback.

For a Xeon server blade, executing the Pre-configure automatically changes the SAN booting priority to the lowest of the priority settings.

If you change the LPAR configuration (processors, memory, or device assignment), make sure to implement [F9]: "Save Configuration" on the LPAR manager Menu screen. For details, refer to "Saving Settings on the LPAR manager Screen".

When a switching alert is issued by the BSM command execution, the active partition is forcibly powered off.

First Aid for Electric Shock

First aid is the help you can provide before you can get professional medical help. For serious conditions, it is vitally important to take the victim to a doctor as soon as possible. Have someone call an ambulance at once while you apply first aid.

Break the victim's contact with the source of electricity in the quickest safe way possible. Turn off the main switch of the power distribution panel immediately and ground the circuits. Remove the victim from contact with the current, using a dry wooden pole, a dry rope or dry clothing. Do not touch the victim before contact with the current is broken.

Warning labels

Warning labels can be found at the following locations on the system equipment.

<Hitachi Compute Blade system equipment>

1

How to Use the Manuals

This section describes the manuals provided with Hitachi Gigabit Fibre Channel Adapter.

Manual Organization

HITACHI Gigabit Fibre Channel Adapter USER'S GUIDE has several edition published in parts.

The contents of the User's Guide are shown below.

| Edition | Contents |
|---|---|
| HITACHI Gigabit Fibre Channel Adapter USER'S GUIDE (Hardware Edition) | Describes overview of Hitachi Gigabit Fibre Channel Adapter and procedures for the use of Hitachi Gigabit Fibre Channel Adapter such as installation, connection, handling and checking of operation. |
| HITACHI Gigabit Fibre Channel Adapter USER'S GUIDE (BIOS/EFI Edition) | Describes list of Option parameters of onboard BIOS and EFI. Also provides error log information of onboard BIOS and EFI. |
| HITACHI Gigabit Fibre Channel Adapter USER'S GUIDE (Windows Driver Edition) | Describes procedures how to install and update Windows driver. Also provides error log information and list of driver parameters. |
| HITACHI Gigabit Fibre Channel Adapter USER'S GUIDE (Linux/VMware Driver Edition) | This manual. Describes procedures how to install and update Linux/VMware driver. Also provides error log information and list of driver parameters. |
| HITACHI Gigabit Fibre Channel Adapter USER'S GUIDE (Support Matrix Edition) | Details driver version and functions combinations that are supported by driver on each OS. This document also includes onboard firmware support matrix. |
| HITACHI Gigabit Fibre Channel Adapter USER'S GUIDE (Utility Software Edition) | Describes list of parameters and operations of utility software to set and modify various parameters. |
| HITACHI Gigabit Fibre Channel Adapter USER'S GUIDE (Utility Software Edition - VMware) | Describes Installation and Usage of CIM utilities, CIM client and CIM provider to manage Hitachi Gigabit Fibre Channel for VMware ESXi5.0 or later |

2

Before use

This section describes precautions to operate Linux or VMware driver for Hitachi Gigabit Fibre Channel Adapter.

Precautions

- Please download the latest driver from Hitachi web site or get the driver from the driver CD which supplied with Hitachi Compute Blade system.
- Root privilege is required to install the driver.
- Please apply the following versions to connect Tape Library (LTO).

| OS | Driver Version |
|-------------------------------------|----------------------|
| Red Hat Enterprise Linux 3 (IA32) | 1.0.6.136 or later |
| Red Hat Enterprise Linux 3 (IA64) | 2.0.6.136 or later |
| Red Hat Enterprise Linux 3 (x86_64) | 4.0.6.136 or later |
| Red Hat Enterprise Linux 4 (IA32) | 1.1.6.136 or later |
| Red Hat Enterprise Linux 4 (IA64) | 2.1.6.136 or later |
| Red Hat Enterprise Linux 4 (x86_64) | 4.1.6.136 or later |
| Red Hat Enterprise Linux 5 | x.5.10.482 or later |
| Red Hat Enterprise Linux 6 | x.6.17.2018 or later |
| Red Hat Enterprise Linux 7 or later | x.7.18.3116 or later |
| VMware ESX Server | Not supported |

- Please apply the following versions when use LPAR manager (logical partitioning manager).

| OS | Driver Version |
|-------------------------------------|----------------------|
| Red Hat Enterprise Linux 4 (IA32) | 1.1.8.356 or later |
| Red Hat Enterprise Linux 4 (IA64) | 2.1.7.260 or later |
| Red Hat Enterprise Linux 4 (x86_64) | 4.1.8.356 or later |
| Red Hat Enterprise Linux 5 | x.5.10.482 or later |
| Red Hat Enterprise Linux 6 | x.6.17.2018 or later |
| Red Hat Enterprise Linux 7 or later | x.7.18.3130 or later |

- If you use the additional WWN for N+M Cold Standby or the virtual WWN for LPAR manager in your system, WWN using in your system is different from the original WWN. Refer to user's manual supplied with Hitachi Compute Blade system how to set or confirm WWN in your system.
- The error log (number 0x16) may be collected when you connect the adapter to ES800 and set initiator mode of ES800 for remote mirror feature. This error log shows the adapter receives PLOGI interrupt, but there is no impact on the operation of the driver.

- When you use 16Gbps FC adapter on VMware and connect to disk devices via FC-switch, Link down and up of the FC interface may cause the adapter to fail discovering the disk devices. In this case, you can rediscover the disk devices with a following procedure.

1. How to detect the problem

The problem has been occurred if all of the following conditions are true.

- Using 16Gbps FC adapter and connecting to disk devices via FC-switch.
- Connection type of the adapter has been one of the following types.
 - "Point to Point [Auto]"
 - "Point to Point [Point to Point]"

Connection type of the adapter can be determined by executing a following command on an ESXi host.

Example)

```
# cat /proc/scsi/hfcldd/X
```

Hitachi FIVE-FX(16Gbps) based Fibre Channel to PCIe HBA

```
... <snip> ...
Host# = X, Unique id = 1
vmhba# = Y
... <snip> ...

Current Information
Connection Type = Point to Point [ Auto ]
```

NOTE: where X of "/proc/scsi/hfcldd/X" is Host# of this adapter. Relationship between Host# and vmhba# can be determined by the result above.

(c) The driver version is 4.xx.18.2428 or earlier.

2. How to rediscover the disk devices

The disk devices can be rediscovered by executing a following command on an ESXi host.

Example)

```
# esxcli storage san fc reset -A vmhbaY
```

NOTE: where Y of "vmhbaY" is the vmhba# of this adapter.

- When you use serial console, vast amount of messages may affect the system performance since syslog is output to the serial console. You can make Linux driver stop outputting several warning messages using the following option.

Add the 'hfc_message_enable=0' option to the '/etc/modules.conf' file in RHEL3 and '/etc/modprobe.conf' file in RHEL4 and RHEL5.

Example)

```
options hfcldd hfc_automap=1 hfc_message_enable=0
```

After setting the option above, update the RAMDISK image.

```
# cd /boot (ia32 or x86_64) or cd /boot/efi/efi/redhat(ia64)
```

```
# /sbin/mkinitrd -f <image-file-name>.img <kernel version>
```

Note that if you set HBA parameter by executing Set Auto Map Parameter menu using hfcddutil utility, the option may be deleted. In case the option above is deleted, rewrite the option and update the the RAMDISK image.

- When you install Linux driver or VMware Driver(ESX3.x, ESX4.x, ESXi4.x are targets), hfcmknod daemon is installed on your sytasm. Hfcmknod daemon is required for normal operation of Hitachi Gigabit Fibre Channel Adapter. When you install the driver,hfcmknod daemon is set to autorun setting that suited for runlevel. Please do not change the autorun setting of hfcmknod daemon. You can confirm and change the autorun setting of hfcmknod daemon executing 'chkconfig' command.

Example)

```
# chkconfig --list | grep hfcmknod  
hfcmknod      0:off 1:on 2:on 3:on 4:on 5:on 6:off
```

- The maximum which Linux driver and VMware driver support.

| # | Item | Maximum | | |
|---|---------------------------------|--------------|---------------------------|---------------|
| | | RHEL6 Driver | Linux Driver except RHEL6 | VMware Driver |
| 1 | The number of targets / FC port | 256 | 256 | 256 |
| 2 | The maximum LU number / target | 2048 | 256 | 256 (*1) |
| 3 | Maximum LU number | 2047 | 255 | 255 |

(*1) The maximum LU number per a host is 256.

- Zoning has the following effects:
 - Can keep security high when a large number of servers and storages are connected to FC switch.
 - Can limit an influence range in the configuration change of the FC switch.
 - Can keep the failure in the zoning range.

When this product is connected to FC switch, we strongly recommend that zoning is set to connect FC port of the adapter and the FC port of the storage as a single initiator and single target.

3

Install driver on Linux

This chapter describes how to install, update and roll back the driver on Linux.

Precautions

Before installation, be sure to confirm the supported kernel version. Check your Linux kernel version by typing,

```
# uname -r
```

For the supported kernel version, refer to HITACHI Gigabit Fibre Channel Adapter USER'S GUIDE (Support Matrix Edition) for details.

If you update the kernel, refer to 'Driver installation procedure when updating Linux kernel' for details.

- Drivers are stored in the different directory depending on the System revision of CD-ROM.

SYSREV under 03-xx :

```
/linux/<ia32, ia64 or x86_64>/<rhel3, rhel4 or rhel5>/fd_media/
```

: Driver for SAN boot on RHEL3, RHEL4 or RHEL5.

```
/linux/<ia32, ia64 or x86_64>/<rhel3, rhel4 or rhel5>/
```

: Driver rpm packages for the installation and update on RHEL3, RHEL4 or RHEL5.

Utility software rpm package.

```
/vmware/<VMware version>/
```

: Driver for SAN boot and rpm packages for the installation and update on VMware.

Utility software rpm package.

SYSREV 03-xx or later :

```
/linux/<ia32, ia64 or x86_64>/<rhel_major_version>/fd_media/
```

: Driver for SAN boot on RHEL3, RHEL4 or RHEL5.

```
/linux/<ia32 or x86_64>/<rhel_major_version>/<rhel_minor_version>/cd_media/
```

: Driver for SAN boot on RHEL6 or later.

```
/linux/<ia32, ia64 or x86_64>/<rhel_major_version>/
```

: Driver rpm packages for the installation and update on RHEL3 or later.

Utility software rpm package.

```
/hfc_media/vmware/<VMware version>/
```

: Driver for SAN boot and rpm packages for the installation and update on VMware.

Utility software rpm package.

When the installation procedure refers the directory, add '/hfc_media/' to the top if you use the system revision 03-xx or later of the CD.

Install driver to SAN with Hitachi Gigabit Fibre Channel Adapter

In order to install OS to SAN, it is necessary to perform "(1) Make hfcldd driver media" of the following procedure. Please prepare hfcldd driver media.

3. RHEL3, RHEL4 or RHEL5

(1) Make hfcldd driver media

Please get six files (*) in the following directory of "Gigabit Fibre Channel Adapter for Windows/Linux/VMware" CD-ROM media appended to this product, and copy them to CD-ROM.

```
/hfc_media/linux/<platform> /<rhel*>/fd_media/<kernel_version>  
<platform>:          ia32, ia64 or x86_64  
<rhel*>:              rhel3, rhel4 or rhel5  
<kernel version>:    Kernel Version
```

(*) In the case of RHEL3, the number of files is five.

The following procedure is an example of installing RHEL4 (ia64) to SAN.

- (2) Insert CD-ROM of "Red Hat Enterprise Linux 4 Disk 1" media in CD-ROM drive, and turn on the power supply of the blade.
- (3) Confirm whether HBA BIOS is enabled. When HBA BIOS is enabled, LUN for the installation is recognized and the following screens are displayed.

Refer to HITACHI Gigabit Fibre Channel Adapter USER'S GUIDE (Utility Software Edition) for the procedure how to set HBA BIOS to enable when it is disabled.

```
Hitachi Fibre Channel Adapter ROM BIOS Version F1.06.23  
Copyright (C)HITACHI,Ltd 2004,2005. All rights reserved.  
  
Press <Ctrl-R> to Enter BIOS  
  
HBA# : D-ID : WWPN : LUN : Manufact : Product  
HBA#00 0000E4 50060E80 00C27991 00 HITACHI DF600F  
  
HBA#01: BIOS is Disable  
  
HBA BIOS Installed!
```

- (4) When the screen of EFI Boot Manager is output, select "EFI Shell Built-in" with $\uparrow \downarrow$ key, and press Enter. (*1)

```
EFI Boot Manager ver 1.10 [14.62]

Please select a boot option

Red Hat Enterprise Linux AS
EFI Shell [Built-in]
Windows Server 2003, Enterprise
Windows Server 2003, Enterprise
Windows Server 2003, Enterprise
Linux FPP Reboot Heatrun
Boot option maintenance menu

Use ^ and v to change option(s). Use Enter to select an option
```

- (5) When "Shell>" input prompt was output, input `elilo linux dd console=ttyS0,19200`, and press Enter. (*1)

```
Use ^ and v to change option(s). Use Enter to select an option
Loading.: EFI Shell [Built-in]
EFI Shell version 1.10 [14.62]
Device mapping table
fs0 : Acpi(PNP0A03,2)/Pci(1|0)/Fibre(WWN50060E8000C27991,Lun0)/HD(Part1,Sig2B56EA8B-4AD
3-4002-8597-99BC0B82BC30)
fs1 : Acpi(PNP0A03,0)/Pci(2|0)/Usb(0, 0)/CDROM(Entry0)
fs2 : Acpi(PNP0A03,0)/Pci(2|0)/Usb(1, 0)
blk0 : Acpi(PNP0A03,2)/Pci(1|0)/Fibre(WWN50060E8000C27991,Lun0)
blk1 : Acpi(PNP0A03,2)/Pci(1|0)/Fibre(WWN50060E8000C27991,Lun0)/HD(Part1,Sig2B56EA8B-4AD
3-4002-8597-99BC0B82BC30)
Shell> Acpi(PNP0A03,2)/Pci(1|0)/Fibre(WWN50060E8000C27991,Lun0)/HD(Part2,Sig297A9E08-39B
B-4319-8047-AA35DE3F5F2B)
blk3 : Acpi(PNP0A03,0)/Pci(2|0)/Usb(0, 0)
blk4 : Acpi(PNP0A03,0)/Pci(2|0)/Usb(0, 0)/CDROM(Entry0)
blk5 : Acpi(PNP0A03,0)/Pci(2|0)/Usb(1, 0)
```

(*1) Procedures in (4)-(5) are in the case of IA-64. When "boot" prompt is displayed, input **linux dd** in the cases of IA-32 and x86_64.

- (6) When "Do you have a driver disk?" message is displayed, select "yes".

```
Welcome to Red Hat Enterprise Linux

+-----+ Driver disk +-----+
|
| Do you have a driver disk?
|
| +-----+           +-----+
| | Yes |           | No |
| +-----+           +-----+
|
+-----+

<Tab>/<Alt-Tab> between elements | <Space> selects | <F12> next screen
```

- (7) When "Insert Driver Disk" message is displayed, exchange the hfcldd driver disk made by (1) for CD-ROM of CD-ROM drive, and select "OK".

```
Welcome to Red Hat Enterprise Linux

+-----+ Insert Driver Disk +-----+
|
| Insert your driver disk into /dev/sda
| and press "OK" to continue.
|
| +-----+      +-----+
| | OK |      | Back |
| +-----+      +-----+
|
+-----+

<Tab>/<Alt-Tab> between elements | <Space> selects | <F12> next screen
```

- (8) After this, the messages of "Loading driver disk..." and "Loading hfcldd drive..." are outputted and the HBA driver is read. The driver is not correctly read when the message doesn't appear, and confirm whether the hfcldd driver media can be correctly made, please.

```
+-----+ Loading SCSI driver +-----+
|
| Loading hfcldd driver...█
|
+-----+
```

- (9) When "More Driver Disks?" message is outputted, select "No".

```
Welcome to Red Hat Enterprise Linux

+-----+ More Driver Disks? +-----+
|
| Do you wish to load any more
| driver disks?
|
| +-----+      +-----+
| | Yes █      | No |
| +-----+      +-----+
|
+-----+

<Tab>/<Alt-Tab> between elements | <Space> selects | <F12> next screen
```


- (10) When the screen of Fig. A3-8 is displayed, set the language. Select English and OK, and press the ENTER key.

```
Welcome to Red Hat Enterprise Linux

+-----+ Choose a Language +-----+
|
| What language would you like to use
| during the installation process?
|
| Catalan #
| Chinese(Simplified) #
| Chinese(Traditional) #
| Croatian #
| Czech #
| Danish #
| Dutch #
| English #
|
| +-----+
| | OK |
| +-----+
|
+-----+

<Tab>/<Alt-Tab> between elements | <Space> selects | <F12> next screen
```

- (11) When the following screen is displayed, exchange CD-ROM of the USB CD-ROM drive for "Red Hat Enterprise Linux 4 Install Disc 1", select OK, and press the ENTER key.

```
Welcome to Red Hat Enterprise Linux

+-----+ Installation Method +-----+
|
| What type of media contains the
| packages to be installed?
|
| Local CDROM
| Hard drive
| NFS image
| FTP
| HTTP
|
| +-----+ +-----+
| | OK | | Back |
| +-----+ +-----+
|
+-----+

<Tab>/<Alt-Tab> between elements | <Space> selects | <F12> next screen
```

(12) When "CD Found" message is outputted, select "Skip".

```
Welcome to Red Hat Enterprise Linux

+-----+ CD Found +-----+
|
| To begin testing the CD media before
| installation press OK.
|
| Choose Skip to skip the media test
| and start the installation.
|
| +---+ +---+
| | OK | | Skip |
| +---+ +---+
|
+-----+

<Tab>/<Alt-Tab> between elements | <Space> selects | <F12> next screen
```

(13) The following screen is displayed, and the installation of Red Hat Enterprise Linux is begun. Please install it according to the installation manual of Red Hat Linux after this.

```
Red Hat Enterprise Linux AS (C) 2003 Red Hat, Inc.

+-----+ Red Hat Enterprise Linux AS +-----+
|
| Welcome to Red Hat Enterprise Linux AS!
|
| This installation process is outlined in detail in the
| Official Red Hat Enterprise Linux AS Installation Guide
| available from Red Hat, Inc. If you have access to this
| manual, you should read the installation section before
| continuing.
|
| If you have purchased Official Red Hat Enterprise Linux
| AS, be sure to register your purchase through our web
| site, http://www.redhat.com/.
|
| +---+ +---+
| | OK | | Back |
| +---+ +---+
|
+-----+

<Tab>/<Alt-Tab> between elements | <Space> selects | <F12> next screen
```

Please refer to Confirm the driver version for the confirm method of the driver version etc. after reboot.

Continuously, please install Driver and Utility software according to 'Driver and Utility software installation procedure'.

4. RHEL6

In order to install OS to SAN in Hitachi Compute Blade system, it is necessary to perform "(1) Make hfcldd driver media" of the following procedure. Please prepare hfcldd driver media.

In Hitachi Compute Rack Series, it is not necessary to perform "(1) Make hfcldd driver media". Please use "Hitachi Compute Rack Driver Kit" CD-ROM as hfcldd driver media.

(1) Make hfcldd driver media

Please get the image file "dd.iso" in the following directory of CD-ROM media appended to this product or from Hitachi web site. Image file is ISO format. Write the image to CD-R to using the appropriate writing software.

```
/linux/<platform> /<rhel6>/cd_media/<kernel_version>  
<platform>:          ia32 or x86_64  
<rhelx*>:             rhel6  
<kernel version>:    Kernel Version
```

Insert CD-ROM of "Red Hat Enterprise Linux 6 Disk 1" media in CD-ROM drive, and turn on the power supply of the blade.

(2) Choice of the installation type

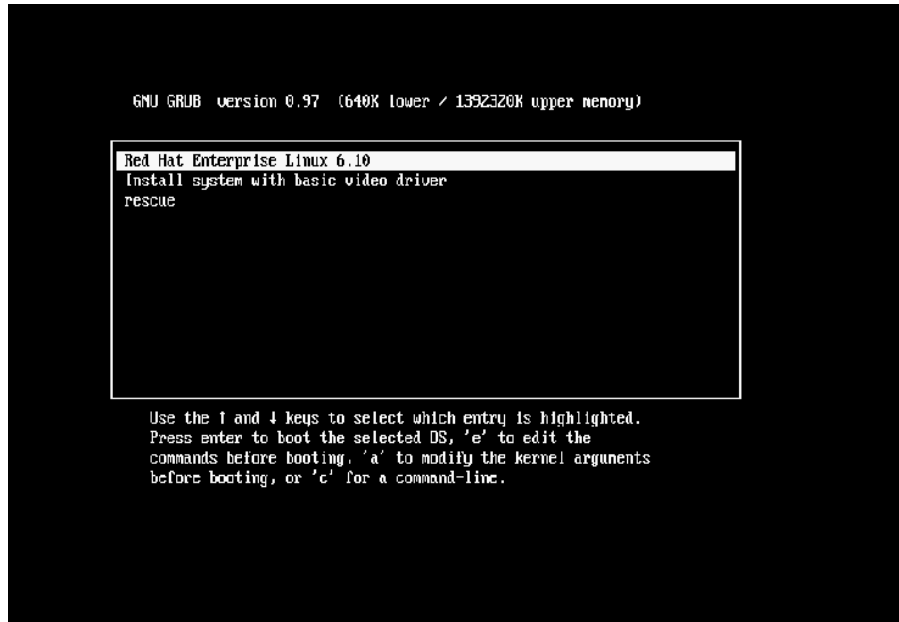
【Legacy BIOS Mode】

The screen of "Welcome to Red Hat Enterprise Linux 6" is output. Please select "Install system with basic video driver" and push the Tab key.



【UEFI Mode】

The screen of "GNU GRUB" is output. Please select "Red Hat Enterprise Linux 6.X " and push the 'a' key.



(3) Optional input

【Legacy BIOS Mode】

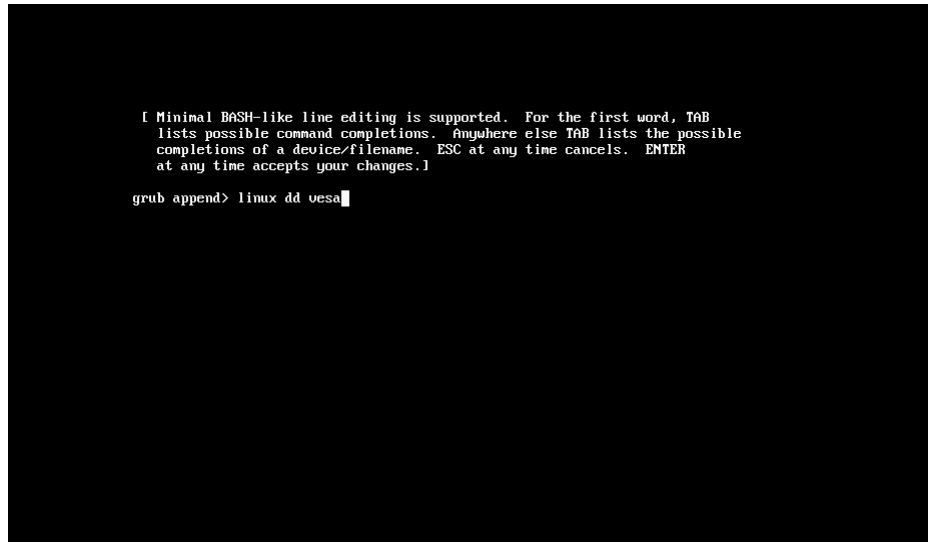
The command "> vmlinuz initrd=initrd.img xdriver=vesa nomodeset" is displayed. Please add "dd" and push the Enter key.



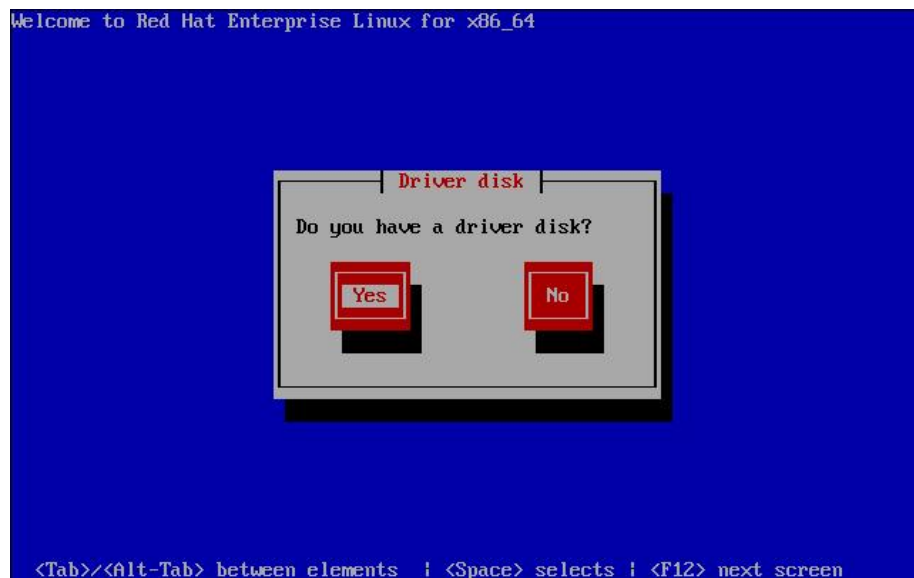
【UEFI Mode】

The command "grub append>" is displayed.

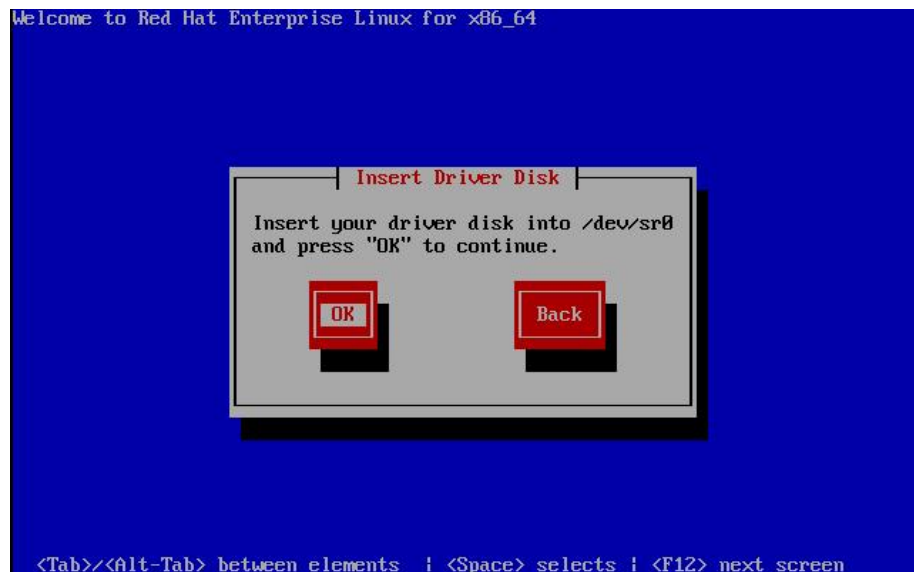
Please add "linux dd vesa" and push the Enter key.



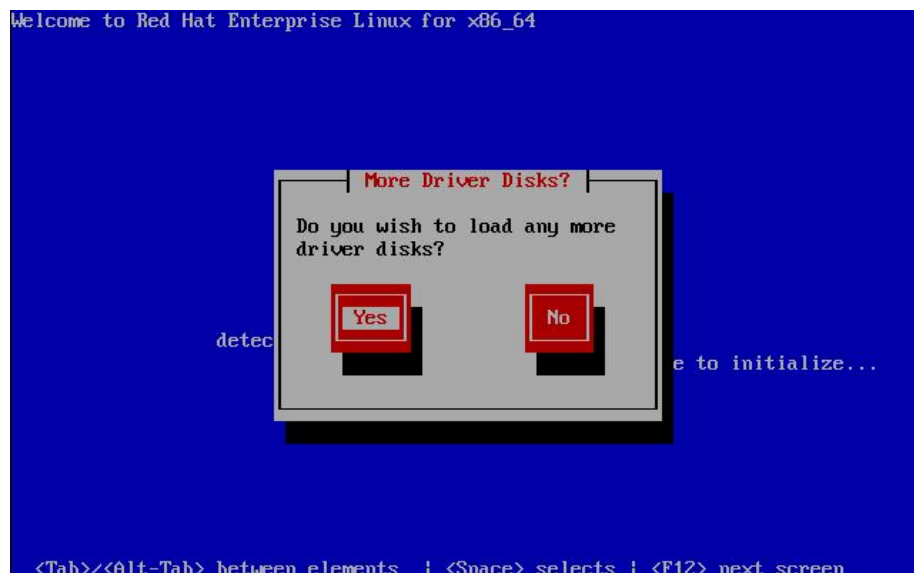
(4) When "Do you have a driver disk?" message is displayed, select "yes".



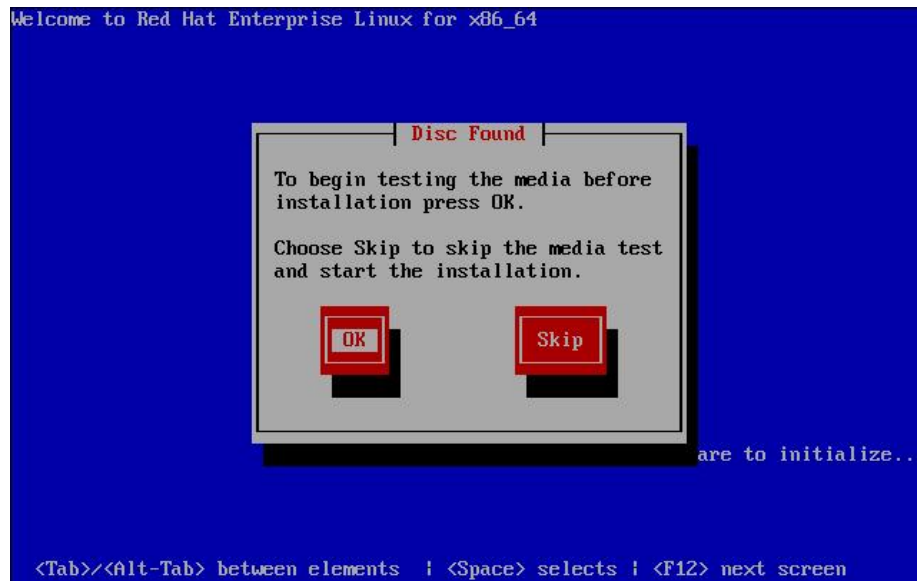
- (5) When "Insert Driver Disk" message is displayed, exchange the hfcldd driver disk made by (1) for CD-ROM of CD-ROM drive, and select "OK".



- (6) After this, the messages of "detecting hardware..." and "waiting for hardware to initialize..." are outputted and the HBA driver is read. The driver is not correctly read when the message doesn't appear, and confirm whether the hfcldd driver media can be correctly made, please.
- (7) When "More Driver Disks?" message is outputted, exchange RedHat Enterprise Linux 6 media exchanged by (5) for CD-ROM of CD-ROM drive, and select "NO"

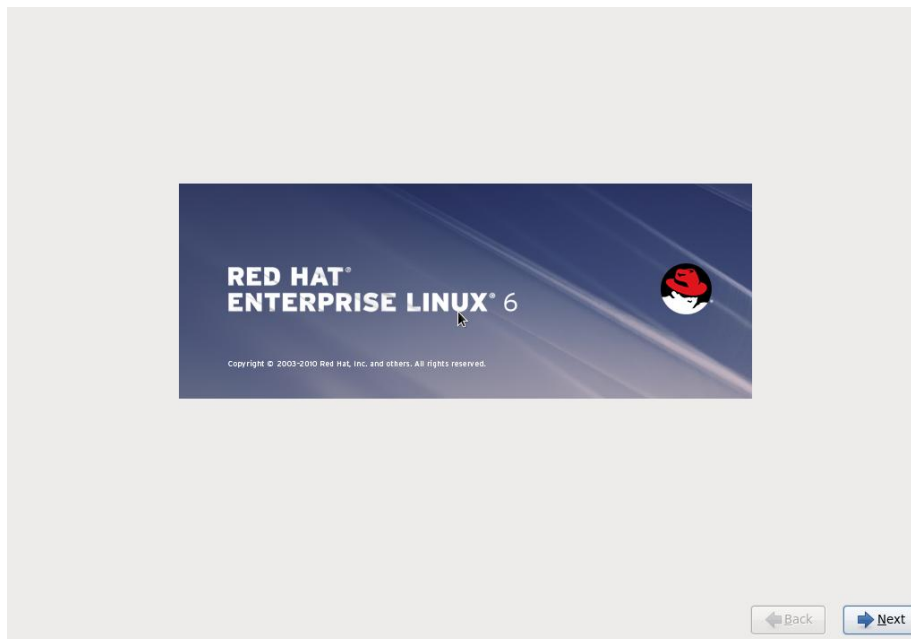


(8) When " Disc Found " message is outputted, select "Skip".



(9) The following screen is displayed, and the installation of Red Hat Enterprise Linux is begun.

(10) Please install it according to the installation manual of Red Hat Linux after this.



Please refer to Confirm the driver version for the confirm method of the driver version etc. after reboot.

Continuously, please install Driver and Utility software according to 'Driver and Utility software installation procedure'.

5. RHEL7 or later

In order to install OS to SAN in Hitachi Compute Blade system, it is necessary to perform "(1) Make hfcldd driver media" of the following procedure. Please prepare hfcldd driver media.

In Hitachi Compute Rack Series, it is not necessary to perform "(1) Make hfcldd driver media". Please use "Hitachi Compute Rack Driver Kit" CD-ROM as hfcldd driver media.

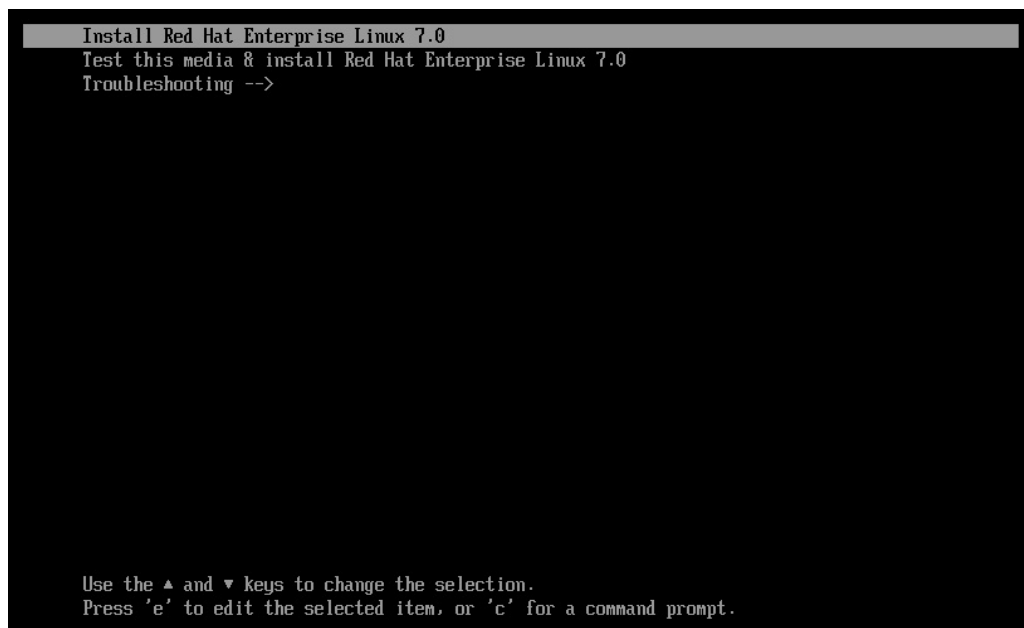
(1) Make hfcldd driver media

Please get the image file "dd.iso" in the following directory of CD-ROM media appended to this product or from Hitachi web site. Image file is ISO format. Write the image to CD-R to using the appropriate writing software.

```
/linux/x86_64/<rhel_major_version>/<rhel_minor_version>/cd_media/<kernel_version>
```

Insert CD/DVD-ROM of Red Hat Enterprise Linux media in CD/DVD-ROM drive, and turn on the power supply of the blade.

(2) Select "Install Red Hat Enterprise Linux x.x" and push "e" key.



- (3) Boot command line editor is displayed.
Please add "inst.dd" at the end of the line contains "linuxefi" and push Ctrl-x key.

```
setparams 'Install Red Hat Enterprise Linux 7.0'

linuxefi /images/pxeboot/vmlinuz inst.stage2=hd:LABEL=RHEL-7.0\x20Server.x86_64 quiet inst\
.dd_
initrdefi /images/pxeboot/initrd.img
```

Press Ctrl-x to start, Ctrl-c for a command prompt or Escape to discard edits and return to the menu. Pressing Tab lists possible completions.

- (4) When "Driver disk device selection" message is displayed, exchange Red Hat Enterprise Linux media for hfcldd driver disk (dd.iso), prepared at (1).
Press "r" and the Enter key to confirm that the media is successfully exchanged.
And then, press "1" and the Enter key.

```
[ 4.340823] ERST: Can not request iomem region <0x          b92c9000-0x
[ 5.509698] i8042: No controller found
[ 5.532211] tpm_tis 00:09: A TPM error (?) occurred attempting to read a pcr
[ 9.337435] megasas:IOC Init cmd success
[ 9.421558] megasas: INIT adapter done
DD: Checking devices

Page 1 of 1
Driver disk device selection
      DEVICE      TYPE          LABEL          UUID
1)  sr0          iso9660      RHEL-7.0 Server.x86_64 2014-05-07-03-58-46-00

# to select, 'r'-refresh, 'n'-next page, 'p'-previous page or 'c'-continue: r

Page 1 of 1
Driver disk device selection
      DEVICE      TYPE          LABEL          UUID
1)  sr0          iso9660      CDROM          2014-08-05-13-58-39-00

# to select, 'r'-refresh, 'n'-next page, 'p'-previous page or 'c'-continue: 1
```

- (5) When "Select drivers to install" message is displayed, press "1" and the Enter key. Confirm that the checkbox at the left side of the line contains "kmod-hfcldd", is checked like "[x]". And then, press "c" and the Enter key.

```
[ 4.340823] ERST: Can not request iomem region <0x          b92c9000-0x
[ 5.509698] i8042: No controller found
[ 5.532211] tpm_tis 00:09: A TPM error (7) occurred attempting to read a pcr
[ 9.337435] megasas:IOC Init cmd success
[ 9.421558] megasas: INIT adapter done
DD: Checking devices

Page 1 of 1
Driver disk device selection
      DEVICE      TYPE          LABEL          UUID
1)  sr0          iso9660        RHEL-7.0 Server.x86_64 2014-05-07-03-58-46-00

# to select, 'r'-refresh, 'n'-next page, 'p'-previous page or 'c'-continue: r

Page 1 of 1
Driver disk device selection
      DEVICE      TYPE          LABEL          UUID
1)  sr0          iso9660        CDROM          2014-08-05-13-58-39-00

# to select, 'r'-refresh, 'n'-next page, 'p'-previous page or 'c'-continue: 1
DD: Checking device /dev/sr0
DD: Processing DD repo /media/DD//rpms/x86_64 on /dev/sr0

Page 1 of 1
Select drivers to install
1) [ ] /media/DD//rpms/x86_64/kmod-hfcldd-4.7.18.3006-1.el7.x86_64.rpm

# to toggle selection, 'n'-next page, 'p'-previous page or 'c'-continue: 1

Page 1 of 1
Select drivers to install
1) [x] /media/DD//rpms/x86_64/kmod-hfcldd-4.7.18.3006-1.el7.x86_64.rpm

# to toggle selection, 'n'-next page, 'p'-previous page or 'c'-continue: c
```

- (6) "DD: Extracting files from ..." message is displayed and the HBA driver is loaded. When "Driver disk device selection" message is displayed again, exchange hfcldd driver disk (dd.iso) for Red Hat Enterprise Linux media. (Note 1)
Press "r" and the Enter key to confirm that the media is successfully exchanged. And then, press "c" and the Enter key.

```
[ 9.421558] megasas: INIT adapter done
DD: Checking devices

Page 1 of 1
Driver disk device selection
  DEVICE      TYPE      LABEL      UUID
  1) sr0       iso9660    RHEL-7.0 Server.x86_64 2014-05-07-03-58-46-00

# to select, 'r'-refresh, 'n'-next page, 'p'-previous page or 'c'-continue: r

Page 1 of 1
Driver disk device selection
  DEVICE      TYPE      LABEL      UUID
  1) sr0       iso9660    CDROM       2014-08-05-13-58-39-00

# to select, 'r'-refresh, 'n'-next page, 'p'-previous page or 'c'-continue: 1
DD: Checking device /dev/sr0
DD: Processing DD repo /media/DD/rpms/x86_64 on /dev/sr0

Page 1 of 1
Select drivers to install
  1) [ l ] /media/DD/rpms/x86_64/kmod-hfcldd-4.7.18.3006-1.el7.x86_64.rpm

# to toggle selection, 'n'-next page, 'p'-previous page or 'c'-continue: 1

Page 1 of 1
Select drivers to install
  1) [ x l ] /media/DD/rpms/x86_64/kmod-hfcldd-4.7.18.3006-1.el7.x86_64.rpm

# to toggle selection, 'n'-next page, 'p'-previous page or 'c'-continue: c
DD: Extracting files from /media/DD/rpms/x86_64/kmod-hfcldd-4.7.18.3006-1.el7.x86_64.rpm

Page 1 of 1
Driver disk device selection
  DEVICE      TYPE      LABEL      UUID
  1) sr0       iso9660    CDROM       2014-08-05-13-58-39-00

# to select, 'r'-refresh, 'n'-next page, 'p'-previous page or 'c'-continue: r

Page 1 of 1
Driver disk device selection
  DEVICE      TYPE      LABEL      UUID
  1) sr0       iso9660    RHEL-7.0 Server.x86_64 2014-05-07-03-58-46-00
  2) sdc1      ntfs      M-eM-^[M-^N-eM->M-) 3A620FCC620F8BB7
  3) sdc2      vfat      7410-CE57
  4) sdc4      ntfs      F4BE1648BE160430

# to select, 'r'-refresh, 'n'-next page, 'p'-previous page or 'c'-continue: c
```

(Note 1)As the following Figure, the WARNING message is output when the driver is loaded in the environment of RHEL 7.3.

The messages is not affected to install RHEL7.3, so please ignore it.

```
(Page 1 of 1) Select drivers to install
1) [ x l ] /media/DD-16/rpms/x86_64/kmod-hfcldd-4.7.21.4252-1.el7.x86_64.rpm
# to toggle selection, or 'c'-continue: c
DD: Extracting: kmod-hfcldd
DD: WARNING: DD repo content not a file: /media/DD-16/rpms/x86_64/repodata
```

- (7) Please continue installation process according to the installation manual of Red Hat Enterprise Linux after here. To confirm the driver version after reboot, please refer to "Confirm the driver version".

Continuously, please install Driver and Utility software according to 'Driver and Utility software installation procedure'.

Driver and Utility software installation procedure (Including the installation to the internal disk)

Installing RHEL3 or RHEL4 driver

- (1) Get driver install package from CD-ROM

The installation files are stored in the following directories.

RHEL3: /linux/ia32/rhel3, /linux/ia64/rhel3, /linux/x86_64/rhel3

RHEL4: /linux/ia32/rhel4, /linux/ia64/rhel4, /linux/x86_64/rhel4

Please copy them according to the following procedure.

(The following example shows installation procedure on RHEL4, IA-32).

- (a) The device driver version is earlier than x.x.7.348

RPM Package Name:

| | | |
|---|--|------------------------------------|
| 1 | hfcldd-<driver version>-<release version>.<machine type> . rpm | Device driver, Utility software |
|---|--|------------------------------------|

```
# mount /media/cdrom
```

```
# cd to the directory which you want to copy the rpm file.
```

```
For example, 'cd /tmp'
```

```
# cp /media/cdrom/linux/ia64/rhel4/hfcldd-1.1.7.300-1.i386.rpm .
```

- (b) The device driver version is x.x.8.350 or later

RPM Package Name :

| | | |
|---|--|------------------|
| 1 | hfcldd-<driver version>-<release version>.<machine type>.rpm | Device driver |
| 2 | hfcldd-tools-<driver version>-<release version>.<machine type>.rpm | Utility software |

```
# mount /media/cdrom
```

```
# cp /media/cdrom/linux/ia32/rhel4/hfcldd-1.1.8.350-1.i386.rpm /tmp/.
```

```
# cp /media/cdrom/linux/ia32/rhel4/hfcldd-tools-1.1.8.350-1.i386.rpm /tmp/.
```

- (2) Confirm /etc/modprobe.conf (modules.conf in RHEL3)

```
# cat /etc/modules.conf
```

Please input the above.

If "alias scsi_hostadapterX hfcldd_conf" and "alias scsi_hostadapterY hfcldd" lines are commented out, please release them.

- (3) Install the hfcldd RPM package

- (a) The device driver version is earlier than x.x.8.350

```
# cd /tmp
# rpm -ivh --force hfcldd-1.1.7.300-1.i386.rpm
```

(b) The device driver version is x.x.8.350 or later

Please install two RPM packages according to the following procedures.

```
# cd /tmp
# rpm -ivh --force hfcldd-1.1.8.350-1.i386.rpm hfcldd-tools-1.1.8.350-1.i386.rpm
```

Note 1) Type 'su' to root before installation.

Note 2) When executing the installation of the package by one line in (3)-(b), the order by which the packages are specified is arbitrary. For instance,

```
# rpm -ivh --force hfcldd-tools-1.1.8.350-1.i386.rpm hfcldd-1.1.8.350-1.i386.rpm
```

Since the installation order is secured, driver and tools are correctly installed even if you specify tool rpm package first.

Please execute it in the following order when executing the installation of packages by two lines in (3)-(b).

```
# rpm -ivh --force hfcldd-1.1.8.350-1.i386.rpm
# rpm -ivh --force hfcldd-tools-1.1.8.350-1.i386.rpm
```

Note 3) When installing the driver, hfcldd.o and hfcldd_conf.o (hfcldd.ko and hfcldd_conf.ko in case of RHEL4) are stored in /lib/modules/<kernel version>/kernel/drivers/scsi.

For instance, when the driver modules (hfcldd.o, hfcldd_conf.o) of the same name exist under /lib/modules/<kernel version>/updates or /lib/modules/<kernel version>/kernel/drivers/addon, driver module names are changed automatically into hfcldd_o.backup and hfcldd_conf.o.backup.

Note 4) When installing the driver, the installation shell script is stored in the following directory.

(a) The device driver version is earlier than x.x.8.350

```
/tmp/hfcldd/hfcinst.sh
```

(b) The device driver version is x.x.8.350 or later

```
/tmp/hfcldd/hfcinst.sh
```

```
/tmp/hfcldd-tools/hfcinst_tools.sh
```

The above-mentioned installer is needed in "3.2.5 Driver installation procedure when updating Linux kernel".

Note 5) This rpm command creates the /boot/<kernel version>.img for the updated ramdisk image and /boot/<kernel version>.img.backup to preserve the original ramdisk image.

Be sure to change the ramdisk image name if needed. You can create the ramdisk image by typing the following commands.

```
# cd /boot (IA-32) or cd /boot/efi/efi/redhat (IA-64)
# /sbin/mkinitrd -f <image-file-name>.img <kernel version>
```

Note 6) This procedure shows an example when the boot loader is grub.

Note 7) Please do not use RPM option -U or -F etc. There is a possibility of becoming the system hanging up, and failing the system start-up because the driver unloading processing to the kernel to be standing up now is executed.

Note 8) In the SAN boot environment that uses HDLM, it is necessary to update the RAMDISK image file for HDLM. Please refer to the HDLM user's guide when you use the SAN boot environment that uses HDLM.

(4) Confirm Install log

(a) The device driver version is earlier than x.x.8.350

The log is stored in/tmp/hfcldd_install.log.

Please confirm whether the message of "Install Success" is output.

For example,

```
Boot directory      : boot
Configuration file  : modprobe.conf
Kernel version     : 2.6.9-34.ELsmp
Host Type          : i686
---- Install @Hitachi Fibre Channel Adapter Driver
    install -d -o root -g root /lib/modules/2.6.9-34.ELsmp/kernel/drivers/scsi/
    install -o root -g root drivers/2.6.9-34.ELsmp/hfcldd.ko /lib/modules/2.6.9-
34.ELsmp/kernel/drivers/scsi/
    - backup current hfcldd files to *.backup
    install -o root -g root drivers/2.6.9-34.ELsmp/hfcldd_conf.ko /lib/modules/2.6.9-
34.ELsmp/kernel/drivers/scsi/
    Modify /etc/modprobe.conf; old file is /etc/modprobe.conf.backup
    Install tools and scripts to /opt/hitachi/drivers/hba abd /etc/init.d
    Migrate from /etc/modprobe.conf to /etc/hfcldd.conf
<error> : unable to load key module!! (/etc/hfcmpkeymd)
    Update /lib/modules/2.6.9-34.ELsmp/modules.dep
    /sbin/depmod -a
    Update boot image file /boot/initrd-2.6.9-34.ELsmp.img
    old boot image file --> /boot/initrd-2.6.9-34.ELsmp.img.backup
    /sbin/mkinitrd -f /boot/initrd-2.6.9-34.ELsmp.img 2.6.9-34.ELsmp
    check loaded modules
#####
    A module named hfcldd* already exists
    Skip insmod. Need reload a module again or reboot to update
#####
---- Install Success
```

(Note) <error>: unable to load key module!! (/etc/hfcmpkeymd)

The above-mentioned error is not in the problem.

(b) The device driver is x.x.8.350 or later

The installation log is stored in /tmp/hfcldd_install.log.

Confirm whether the message of "---- Install Success" is output in two places.

```
# less hfcldd_install.log
Boot directory      : boot
Configuration file  : modprobe.conf
Kernel version     : 2.6.9-55.ELsmp
Host Type          : i686
---- Install @Hitachi Fibre Channel Adapter Driver -18:08:10 JST
install -d -o root -g root /lib/modules/2.6.9-55.ELsmp/kernel/drivers/scsi/
install -o root -g root drivers/2.6.9-55.ELsmp/hfcldd.ko /lib/modules/2.6.9-
55.ELsmp/kernel/drivers/scsi/
- backup current hfcldd files to *.backup
install -o root -g root drivers/2.6.9-55.ELsmp/hfcldd_conf.ko /lib/modules/2.6.9-
55.ELsmp/kernel/drivers/scsi/
Modify /etc/modprobe.conf; old file is /etc/modprobe.conf.backup
Update /lib/modules/2.6.9-55.ELsmp/modules.dep
/sbin/depmod -a 2.6.9-55.ELsmp
Update boot image file /boot/initrd-2.6.9-55.ELsmp.img
old boot image file --> /boot/initrd-2.6.9-55.ELsmp.img.backup
/sbin/mkinitrd -f /boot/initrd-2.6.9-55.ELsmp.img 2.6.9-55.ELsmp
check loaded modules
#####
A module named hfcldd* already exists
Skip insmod. Need reload a module again or reboot to update
#####
---- Install Success
Boot directory      : boot
Kernel version     : 2.6.9-55.ELsmp
Host Type          : i686
---- Install @Utilities for Hitachi Fibre Channel Adapter Driver -18:08:16 JST
Install tools and scripts to /opt/hitachi/drivers/hba and /etc/init.d
Replace /opt/hitachi/drivers/hba/hfcddutil as hfcmputil
Migrate from /etc/modprobe.conf to /etc/hfcldd.conf
Update boot image file /boot/initrd-2.6.9-55.ELsmp.img
old boot image file --> /boot/initrd-2.6.9-55.ELsmp.img.backup
/sbin/mkinitrd -f /boot/initrd-2.6.9-55.ELsmp.img 2.6.9-55.ELsmp
check loaded modules
---- Install Success
```

(5) Confirm /etc/modprobe.conf (modules.conf in RHEL3)

Be sure that the following lines are added to /etc/modprobe.conf.
alias scsi_hostadapterX hfcldd_conf
alias scsi_hostadapterX+1 hfcldd
(X:0,1,2...)

(Note)

Please apply scsi_hostadapter # again in order of hfcldd_conf hfcldd so as not to overlap with other numbers when scsi_hostadapter # overlaps. Please update the RAMDISK image according to the following procedures when you apply the rediscount.

```
# cd /boot (For IA-32. )
# cd /boot/efi/efi/redhat (For IA-64. )
```

```
# /sbin/mkinitrd -f <image-file-name>.img <kernel version>
```

(6) Execute reboot

Please reboot to load a new driver.

```
# reboot
```

Installing RHEL5 driver

- (1) Get driver install package from CD-ROM

The installation files are stored in the following directories.

RHEL5: /linux /ia32/rhel5

/linux /ia64/rhel5, /linux /x86_64/rhel5

Copy them according to the following procedure.

(The following is an example of RHEL5, IA-32)

RPM Package Name :

| | | |
|---|---|------------------|
| 1 | hfcldd-<driver version>-<release version>.<kernel version>.<machine type>.rpm | Device driver |
| 2 | hfcldd-tools-<driver version>-<release version>.<kernel version>.<machine type>.rpm | Utility software |

```
# mount /media/cdrom
```

```
# cp /media/cdrom/hfc_media/linux/ia32/rhel5/hfcldd-PAE-1.5.10.492-7.2.6.18_8.el5.i686.rpm /tmp/.
```

```
# cp /media/cdrom/hfc_media/linux/ia32/rhel5/hfcldd-tools-PAE-1.5.10.492-7.2.6.18_8.el5.i686.rpm /tmp/.
```

Note 1) Current RHEL5 driver RPM package supports Driver Update Model, so that any version of RHEL5 kernel can build kernel image with driver in this RPM package.

However, kernel versions shown in Section 1.2 are only supported by Hitachi.

Note 2) Kernel version in RPM package name shows the kernel version when driver is built. It does not show supported kernel version.

- (2) Confirm /etc/modprobe.conf

```
# cat /etc/modules.conf
```

If "alias scsi_hostadapterX hfcldd_conf" and "alias scsi_hostadapterY hfcldd" lines are commented out, please release them.

- (3) install the hfcldd RPM package

Please install two RPM packages according to the following procedures.

```
# cd /tmp
```

```
# rpm -ivh --force hfcldd-PAE-1.5.10.492-7.2.6.18_8.el5.i686.rpm hfcldd-tools-PAE-1.5.10.492-7.2.6.18_8.el5.i686.rpm
```

Note 1) Type 'su' to root before installation.

Note 2) When you install two RPM packages by one line, the order is arbitrary. For instance, if you specify package name with the following order,


```
# rpm -ivh --force hfcldd-tools-PAE-1.5.10.492-7.2.6.18_8.el5.i686.rpm hfcldd-PAE-1.5.10.492-7.2.6.18_8.el5.i686.rpm
```

You can successfully install driver since the installation order is protected.

However, be sure to install hfcldd driver package before installing tool package when you install these packages separately.

```
# rpm -ivh --force hfcldd-PAE-1.5.10.492-7.2.6.18_8.el5.i686.rpm
# rpm -ivh --force hfcldd-tools-PAE-1.5.10.492-7.2.6.18_8.el5.i686.rpm
```

Note 3) When driver is installed, symbolic links are created from the newly installed driver to `/lib/modules/<kernel version>`. These links enable all kernel versions to load the same driver at booting.

For example, if kernel version 2.6.18-8.el5 and 2.6.18-53.el5 are installed, driver itself is stored in `/lib/modules/2.6.18-8.el5/extra/hitachi/hfcldd` and symbolic link is created to `/lib/modules/2.6.18-53.el5/weak-updates/hitachi/hfcldd` as follows;

```
hfcldd_conf.ko-> /lib/modules/2.6.18-8.el5
                /extra/hitachi/hfcldd/hfcldd_conf.ko
```

```
hfcldd.ko->/lib/modules/2.6.18-8.el5/extra/hitachi/hfcldd/hfcldd.ko
```

Note 4) If hfcldd drivers are already installed in directory `/lib/modules/<kernel version>/updates`, previously installed driver name are changed to `hfcldd.ko.backup`, `hfcldd_conf.ko.backup` automatically.

Note 5) This rpm command updates kernel ramdisk image.

Note 6) Utility software is stored in `/opt/hitachi/drivers/hba`.

Note 7) Do not specify `-U` or `-F` option when execute rpm command. Specifying these options cause unloading driver to the current running kernel. It may cause system hung-up or break the system

Note 8) When booting from SAN using HDLM, RAMDISK image file is required to update for HDLM. Please refer to the HDLM user's guide when booting from SAN using HDLM.

(4) Confirm Install log

The installation log is stored in /tmp/hfcldd_install.log.

Confirm the message "---- Install Success" is displayed.

```
# less hfcldd_install.log
  Boot directory      : boot
  Configuration file  : modprobe.conf
  Kernel version     : 2.6.18-8.el5
  Host Type          : x86_64
---- Install @Hitachi Fibre Channel Adapter Driver - Tue Dec 11 15:26:55 JST 2007
      hraslog.ko is not installed
      Modify /etc/modprobe.conf; old file is /etc/modprobe.conf.backup
---- Install Success
```

(5) Confirm /etc/modprobe.conf

Be sure that the following lines are added to /etc/modprobe.conf.

```
alias scsi_hostadapterX hfcldd_conf
```

```
alias scsi_hostadapterX+1 hfcldd
```

```
(X:0,1,2...)
```

(Note)

Please renumber scsi_hostadapter X for hfcldd and hfcldd_conf not to overlap with other scsi_hostadapter numbers. Scsi_hostadapter X for hfcldd_conf should be smaller than hfcldd. If you renumber scsi_hostadapter, you need to update kernel RAMDISK image according to the following procedure.

```
# cd /boot (For IA-32. )
```

```
# cd /boot/efi/efi/redhat (For IA-64. )
```

```
# /sbin/mkinitrd -f <image-file-name>.img <kernel version>
```

(6) Reboot the system

Please reboot to load a new driver.

```
# reboot
```

(7) When you use HA Logger Kit for Linux (RASLOG feature)

If you use RASLOG feature of the HA Logger Kit for Linux provided by Support Service Symphony, you have to register the driver error information to the error DB of RASLOG. Execute the following command.

```
# hraser -a /opt/hitachi/drivers/hba/hfcldd_err
```

Installing RHEL6 driver

(1) Get driver install package from CD-ROM

In Hitachi Compute Blade system, the install package files are stored in "Gigabit Fibre Channel Adapter for Windows/Linux/VMware" CD-ROM.

In Hitachi Compute Rack Series, the install package files are stored in "Hitachi Compute Rack Driver Kit" CD-ROM.

The directories in CD-ROM are as follows.

Hitachi Compute Blade system:

/hfc_media/linux/ia32/rhel6,
/hfc_media/linux/x86_64/rhel6

Hitachi Compute Rack Series:

/hitachi_utilities/hfcldd/ia32
/hitachi_utilities/hfcldd/x86_64

Copy them according to the following procedure.

(The following is an example of IA-32 in Hitachi Compute Blade system)

RPM Package Name :

| | | |
|---|---|------------------|
| 1 | hfcldd-<driver version>-<release version>.el6. <machine type>.rpm | Device driver |
| 2 | hfcldd-tools-<driver version>-<release version>.el6. <machine type>.rpm | Utility software |

```
# mount /media/cdrom  
# cp /media/cdrom/hfc_media/linux/ia32/rhel6/hfcldd-1.6.17.2018-5.el6.i686.rpm  
/tmp/.  
# cp /media/cdrom/hfc_media/linux/ia32/rhel6/hfcldd-tools-1.6.17.2018-  
5.el6.i686.rpm /tmp/.
```

Note 1) Current RHEL6 driver RPM package supports Driver Update Program,
so that any version of RHEL6 kernel can build kernel image with driver in this
RPM package.

(2) install the hfcldd RPM package

Please install two RPM packages according to the following procedures.

```
# cd /tmp  
# rpm -ivh --force hfcldd-1.6.17.2018-5.el6.i686.rpm hfcldd-tools-1.6.17.2018-  
5.el6.i686.rpm
```

Note 1) Type 'su' to root before installation.

Note 2) When you install two RPM packages by one line, the order is arbitrary.
For instance, if you specify package name with the following order,

```
# rpm -ivh --force hfcldd-tools-1.6.17.2018-5.el6.i686.rpm hfcldd-1.6.17.2018-  
5.el6.i686.rpm
```

You can successfully install driver since the installation order is protected.

However, be sure to install hfcldd driver package before installing tool package
when you install these packages separately.

```
# rpm -ivh --force hfcldd-1.6.17.2018-5.el6.i686.rpm
# rpm -ivh --force hfcldd-tools-1.6.17.2018-5.el6.i686.rpm
```

Note 3) When driver is installed, symbolic links are created from the newly installed driver to `/lib/modules/<kernel version>`. These links enable all kernel versions to load the same driver at booting.

For example, if kernel version 2.6.32-131.0.15.el6.i686 and 2.6.32-131.0.20.el6.i686 are installed,
driver itself is stored in `/lib/modules/2.6.32-131.0.15.el6.i686/extra/hfcldd`
and symbolic link is created to `/lib/modules/2.6.32-131.0.20.el6.i686/weak-updates/hfcldd` as follows;
`hfcldd_conf.ko-> /lib/modules/2.6.32-131.0.15.el6.i686 /extra/hfcldd/hfcldd_conf.ko`
`hfcldd.ko->/lib/modules/2.6.32-131.0.15.el6.i686/extra/ hfcldd/hfcldd.ko`

Note 4) If hfcldd drivers are already installed in directory `/lib/modules/<kernel version>/updates`, previously installed driver name are changed to `hfcldd.ko.backup`, `hfcldd_conf.ko.backup` automatically.

Note 5) This rpm command updates kernel ramdisk image.

Note 6) Utility software is stored in `/opt/hitachi/drivers/hba`.

Note 7) Do not specify `-U` or `-F` option when execute rpm command. Specifying these options cause unloading driver to the current running kernel. It may cause system hung-up or break the system

Note 8) When booting from SAN using HDLM, RAMDISK image file is required to update for HDLM. Please refer to the HDLM user's guide when booting from SAN using HDLM.

Note 9) When you use HA Logger Kit for Linux (RASLOG feature)

If you use RASLOG feature of the HA Logger Kit for Linux provided by Support Service Symphony, automatically update the error information to the error DB of RASLOG when updated the driver. The following message is output.

```
# rpm -ivh --force hfcldd-1.6.17.2018-5.el6.i686.rpm hfcldd-tools-1.6.17.2018-5.el6.i686.rpm
Preparing... ##### [100%]
 1:hfcldd ##### [ 50%]
 2:hfcldd-tools ##### [100%]
KALA3100-I The analysis of the Error definition file started.
KALA3101-I The analysis of the Error definition file ended.
KALA3104-I Creation of the Error definition DB started.
KALA3105-I Creation of the Error definition DB ended.
```

Note 10) When you installed HA Logger Kit for Linux (RASLOG feature) after you installed the rpm package for driver.

When you installed HA Logger Kit for Linux (RASLOG feature) after you installed the rpm package for driver, you have to register the driver error information to the error DB of RASLOG. Please execute the following command.

```
# hraser -a /opt/hitachi/drivers/hba/hfcldd_err
```

(3) Confirm Install log

The version.txt is stored in /opt/hitachi/drivers/hba
Confirm the message "Version 1.6.17.****" is displayed.

```
# more version.txt

* Version 4.6.17.2018          Thu Jul  7 2011
```

(4) Reboot the system

Please reboot to load a new driver.

```
# reboot
```

Installing RHEL7 or later driver

(1) Get driver install package from CD-ROM

In Hitachi Compute Blade system, the install package files are stored in "Gigabit Fibre Channel Adapter for Windows/Linux/VMware" CD-ROM.

In Hitachi Compute Rack Series, the install package files are stored in "Hitachi Compute Rack Driver Kit" CD-ROM.

The directories in CD-ROM are as follows.

Hitachi Compute Blade system:

```
/hfc_media/linux/x86_64/<rhel major version>/<rhel minor version>
```

Hitachi Compute Rack Series:

```
/hitachi_utilities/hfcldd/x86_64
```

Copy them according to the following procedure.

(The following is an example of x86_64, RHEL7 in Hitachi Compute Blade system)

RPM Package Name :

| | | |
|---|---|------------------|
| 1 | hfcldd-<driver version>-<release version>.el7. <machine type>.rpm | Device driver |
| 2 | hfcldd-tools-<driver version>-<release version>.el7. <machine type>.rpm | Utility software |

```
# mount /media/cdrom
```

```
# cp /media/cdrom/hfc_media/linux/x86_64/rhel7/rhel7.x/hfcldd-4.7.18.3006-1.el7.x86_64.rpm /tmp/.
```

```
# cp /media/cdrom/hfc_media/linux/x86_64/rhel7/rhel7.x/hfcldd-tools-4.7.18.3006-1.el7.x86_64.rpm /tmp/.
```

Note 1) Please refer "HITACHI Gigabit Fibre Channel Adapter USER'S GUIDE(Support Matrix Edition)" to check official supported kernel version.

(2) install the hfcldd RPM package

Please install two RPM packages according to the following procedures.

```
# cd /tmp
```

```
# rpm -ivh --force hfcldd-4.7.18.3006-1.el7.x86_64.rpm hfcldd-tools-4.7.18.3006-1.el7.x86_64.rpm
```

Note 1) Type 'su' to root before installation.

Note 2) When you install two RPM packages by one line, the order is arbitrary.
For instance, if you specify package name with the following order,

```
# rpm -ivh --force hfcldd-tools-4.7.18.3006-1.el7.x86_64.rpm hfcldd-4.7.18.3006-1.el7.x86_64.rpm
```

You can successfully install driver since the installation order is protected.

However, be sure to install hfcldd driver package before installing tool package when you install these packages separately.

```
# rpm -ivh --force hfcldd-4.7.18.3006-1.el7.x86_64.rpm
```

```
# rpm -ivh --force hfcldd-tools-4.7.18.3006-1.el7.x86_64.rpm
```

Note 3) When driver is installed, symbolic links are created from the newly installed driver to /lib/modules/<kernel version>. These links enable all kernel versions to load the same driver at booting.

For example, if kernel version 3.10.0-123.el7.x86_64 and 3.10.0-123.22.0.el7.x86_64 are installed,

driver itself is stored in /lib/modules/3.10.0-123.el7.x86_64/extra/hfcldd

and symbolic link is created to /lib/modules/3.10.0-123.22.0.el7.x86_64/weak-updates/hfcldd as follows;

```
hfcldd_conf.ko-> /lib/modules/3.10.0-123.el7.x86_64/extra/hfcldd/hfcldd_conf.ko
```

```
hfcldd.ko->/lib/modules/3.10.0-123.el7.x86_64/extra/hfcldd/hfcldd.ko
```

Note 4) If hfcldd drivers are already installed in directory /lib/modules/<kernel version>/updates, previously installed driver name are changed to hfcldd.ko.backup, hfcldd_conf.ko.backup automatically.

Note 5) This rpm command updates kernel ramdisk image.

Note 6) Utility software is stored in /opt/hitachi/drivers/hba.

Note 7) Do not specify -U or -F option when execute rpm command. Specifying these options cause unloading driver to the current running kernel. It may cause system hung-up or break the system

Note 8) When booting from SAN using HDLM, RAMDISK image file is required to update for HDLM. Please refer to the HDLM user's guide when booting from SAN using HDLM.

Note 9) When you use HA Logger Kit for Linux (RASLOG feature)

If you use RASLOG feature of the HA Logger Kit for Linux provided by Support Service Symphony, automatically update the error information to the error DB of RASLOG when updated the driver. The following message is output.

```
# rpm -ivh --force hfcldd-4.7.18.3004-1.el7.x86_64.rpm hfcldd-tools-4.7.18.3004-1.el7.x86_64.rpm
Preparing... ##### [100%]
 1:hfcldd ##### [ 50%]
 2:hfcldd-tools ##### [100%]
KALA3100-I The analysis of the Error definition file started.
KALA3101-I The analysis of the Error definition file ended.
KALA3104-I Creation of the Error definition DB started.
KALA3105-I Creation of the Error definition DB ended.
```

Note 10) When you installed HA Logger Kit for Linux (RASLOG feature) after you installed the rpm package for driver.

When you installed HA Logger Kit for Linux (RASLOG feature) after you installed the rpm package for driver, you have to register the driver error information to the error DB of RASLOG. Please execute the following command.

```
# hraser -a /opt/hitachi/drivers/hba/hfcldd_err
```

(3) Confirm Install log

The version.txt is stored in /opt/hitachi/drivers/hba

Confirm the message "Version *.*.*.*****" is displayed.

```
# more version.txt

* Version 4.7.18.3006      Mon Aug  4 2014
```

(4) Reboot the system

Please reboot to load a new driver.

```
# reboot
```

Confirm the driver version

Be sure that all of the installed Hitachi FC HBA cards were recognized by Linux. (*)

```
# ls /proc/scsi/hfcldd
```

0 1 (Scsi host numbers of the recognized HBA cards are displayed)

```
# cat /proc/scsi/hfcldd/<scsi host number>
```

Hitachi PCI to Fibre Channel Host Bus Adapter
Driver version 1.1.7.300 Firmware version 104000
 ↙
 hfcldd driver version

(*) In the case of RHEL7 or later,

```
# cat /sys/class/scsi_host/host*/hfcldd_proc
```

The installed driver version is same as <driver version> part of file name hfcldd-1.1.7.300-1.i386.rpm and is described in 'version.txt' at /opt/hitachi/drivers/hba directory, too.

Update driver

Please install driver again according to the procedure of "Driver and Utility software installation procedure (Including the installation to the internal disk)". When the driver version is downgraded, the procedure is the same as the procedure of "Driver and Utility software installation procedure (Including the installation to the internal disk)".

Uninstall driver

Do not uninstall driver when booting from SAN.

Uninstalling driver may cause system hung-up or break the system

Otherwise, follow the procedure shown in section below.

Uninstalling driver (RHEL3 or RHEL4)

Execute the following procedures. (The following are examples of RHEL4 IA-32.)

(1) Uninstall rpm packages

(a) If the device driver version is x.x.7.348 or earlier.

```
# rpm -e hfcldd-1.1.7.300-1.i386
```


(b) If the device driver version is x.x.8.350 or later

Please uninstall two packages according to the following procedures.

```
# rpm -e hfcldd-tools-1.1.8.350-1.i386 hfcldd-1.1.8.350-1.i386
```

(For example, uninstalling hfcldd-1.1.8.350-1.i386.rpm, hfcldd-tools-1.1.8.350-1.i386.rpm)

Note 1) Type 'su' to root before executing

Note 2) When you uninstall two RPM packages by one line, the order is arbitrary. For instance, if you specify package name with the following order,

```
# rpm -e --force hfcldd-1.1.8.350-1.x86_64 hfcldd-tools-1.1.8.350-1.x86_64
```

You can successfully uninstall driver since uninstallation order is protected.

However, be sure to uninstall tool package before uninstalling hfcldd package when you uninstall these packages separately.

Note 3) Uninstalling rpm packages cause updating kernel ramdisk image.

(2) Confirm uninstall log

The log is stored in /tmp/hfcldd_install.log.

Please confirm whether the message of "Uninstall Success" is displayed.

For example,

```
# less /tmp/hfcldd_install.log
---- Uninstall @Hitachi Fibre Channel Adapter Driver
      rm -f /lib/modules/2.4.21-20.ELsmp/kernel/drivers/scsi/hfcldd.o
      Modify /etc/modules.conf
      /sbin/mkinitrd -f /boot/initrd-2.4.21-20.ELsmp.img 2.4.21-20.ELsmp
      hfcpathd stop
      hfcmkmod stop
---- deleted /dev/hfcldd0
---- deleted /dev/hfcldd1
      end
      remove tools from /opt/hitachi/drivers/hba
      /sbin/rmmmod hfcldd_conf
      /sbin/rmmmod hfcldd
---- Uninstall Success
```

(3) Reboot

Reboot only if the device driver version is x.x.8.350 or later.

```
# reboot
```

(4) Confirm uninstallation log

Confirm /hfcldd directory no more exists in /proc/scsi

```
# ls /proc/scsi
```

Uninstalling driver (RHEL5)

(1) Uninstall rpm packages

```
# rpm -e hfcldd-PAE-1.5.10.492-7.2.6.18_8.el5.i686 hfcldd-tools-PAE-1.5.10.492-7.2.6.18_8.el5.i686
```

Note 1) Type 'su' to root before executing

Note 2) Be sure to uninstall tool package before uninstalling hfcldd package when you uninstall these packages separately.

Note 3) Uninstalling rpm packages cause updating kernel ramdisk image.

(2) Confirm uninstall log

The log is stored in /tmp/hfcldd_install.log.

Confirm "Uninstall Success" message is displayed.

For example,

```
----- Uninstall  @Hitachi Fibre Channel Adapter Driver - Tue Dec 11 17:20:30
JST 2007
          Modify /etc/modprobe.conf
----- Uninstall Success
```

(3) Reboot

Reboot only if the device driver version is x.x.8.350 or later.

```
# reboot
```

(4) Confirm uninstallation log

Confirm /hfcldd directory no more exists in /proc/scsi

```
# ls /proc/scsi
```

Uninstalling driver (RHEL6)

(1) Uninstall rpm packages

```
# rpm -e hfcldd-1.6.17.2018-5.el6.i686 hfcldd-tools-1.6.17.2018-5.el6.i686
```

Note 1) Type 'su' to root before executing

Note 2) Be sure to uninstall tool package before uninstalling hfcldd package when you uninstall these packages separately.

Note 3) Uninstalling rpm packages cause updating kernel ramdisk image.

(2) Confirm uninstall log

The log is stored in /tmp/hfcldd_install.log.

Confirm "Uninstall Success" message is displayed.

For example,

```
----- Uninstall @Hitachi Fibre Channel Adapter Driver - ...  
        Modify /etc/modprobe.d/hfcldd_param.conf  
----- Uninstall Success
```

(3) Reboot

```
# reboot
```

(4) Confirm uninstallation log

Confirm /hfcldd directory no more exists in /proc/scsi

```
# ls /proc/scsi
```

Uninstalling driver (RHEL7 or later)

When the adapter is used for booting OS, the device driver can't be uninstalled. Even though the adapter is used only for data, the device driver is not uninstalled when the device driver is being loaded. When updating the device driver, install RPM packages, without uninstall the device driver.

(1) Uninstall rpm packages

```
# rpm -e hfcldd-4.7.18.3006-1.el7.x86_64 hfcldd-tools-4.7.18.3006-1.el7.x86_64
```

Note 1) Type 'su' to root before executing

Note 2) Be sure to uninstall tool package before uninstalling hfcldd package when you uninstall these packages separately.

Note 3) Uninstalling rpm packages cause updating kernel ramdisk image.

(2) Confirm uninstall log

The log is stored in /tmp/hfcldd_install.log.

Confirm "Uninstall Success" message is displayed.

For example,

```
----- Uninstall @Hitachi Fibre Channel Adapter Driver - ...
----- Uninstall Success
```

(3) Reboot

```
# reboot
```

(4) Confirm uninstallation log

Confirm /sys/class/scsi_host/host*/hfcldd_proc directory no more exists in /sys/class/scsi_host

```
# more /sys/class/scsi_host/host*/hfcldd_proc
```

When the device driver is being loaded, the device driver is not deleted and /sys/class/scsi_host/host*/hfcldd_proc may persists. It's possible to delete the device driver by the following procedure in that case. When the adapter is used for booting OS, since it becomes impossible to boot, please never perform the following device driver deletion procedure.

- Device driver deletion procedure

RHEL7 : RHEL7.4 or ealier

```
# rm /lib/modules/3.10.0-229.el7.x86_64/extra/hfcldd/*.ko
```

```
# /sbin/depmod -a <kernel version>
```

```
# mkinitrd -f /boot/initramfs-<kernel version>.img <kernel version>
```

RHEL7 : RHEL7.5 or later

```
# rm /lib/modules/3.10.0-693.21.1.el7.x86_64/extra/hfcldd/*.ko
```

```
# /sbin/depmod -a <kernel version>
```

```
# mkinitrd -f /boot/initramfs-<kernel version>.img <kernel version>
```

RHEL8 : RHEL8.1 or later

```
# rm /lib/modules/4.18.0-147.el8.x86_64/extra/hfcldd/*.ko
```

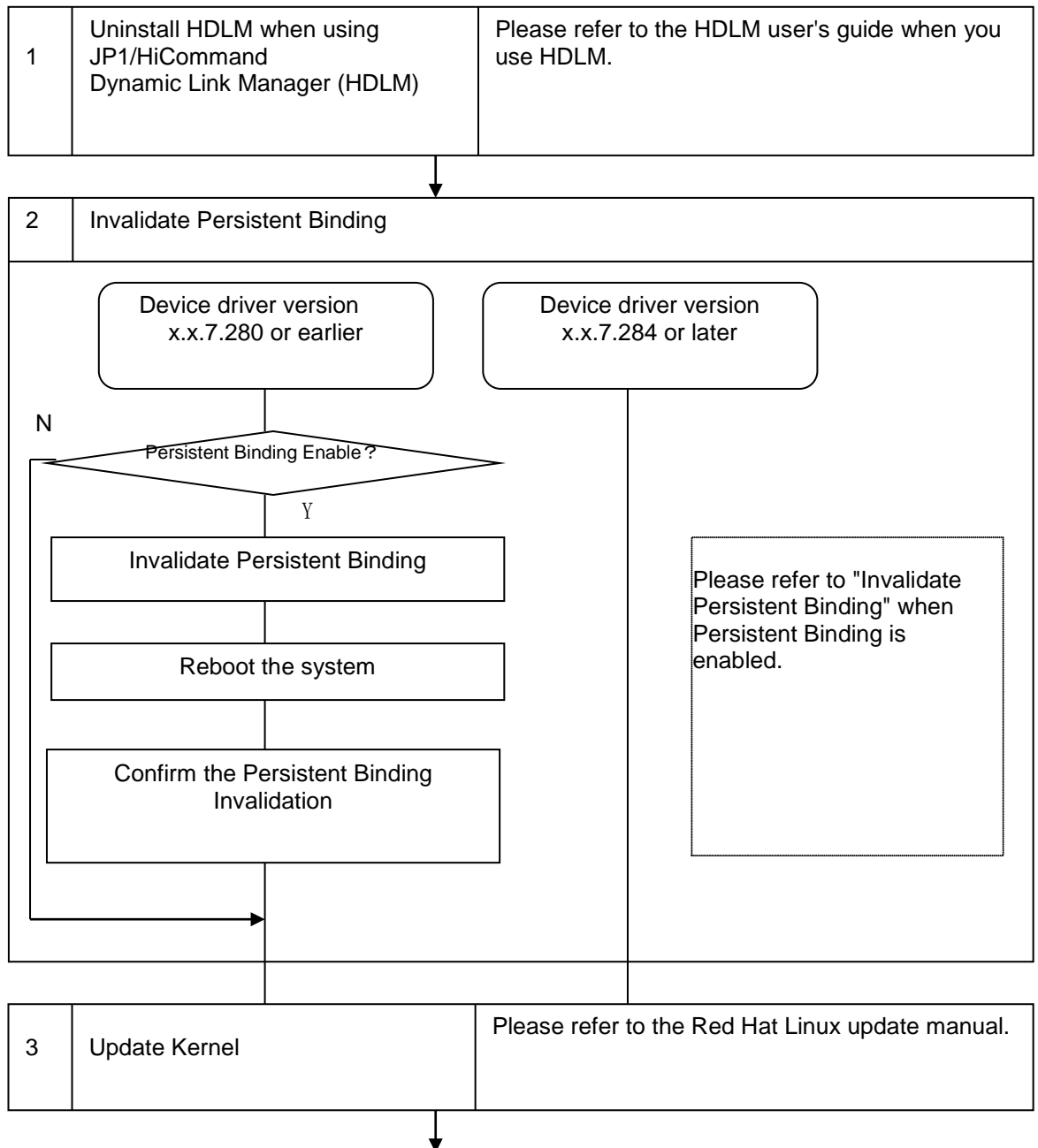
```
# /sbin/depmod -a <kernel version>
```

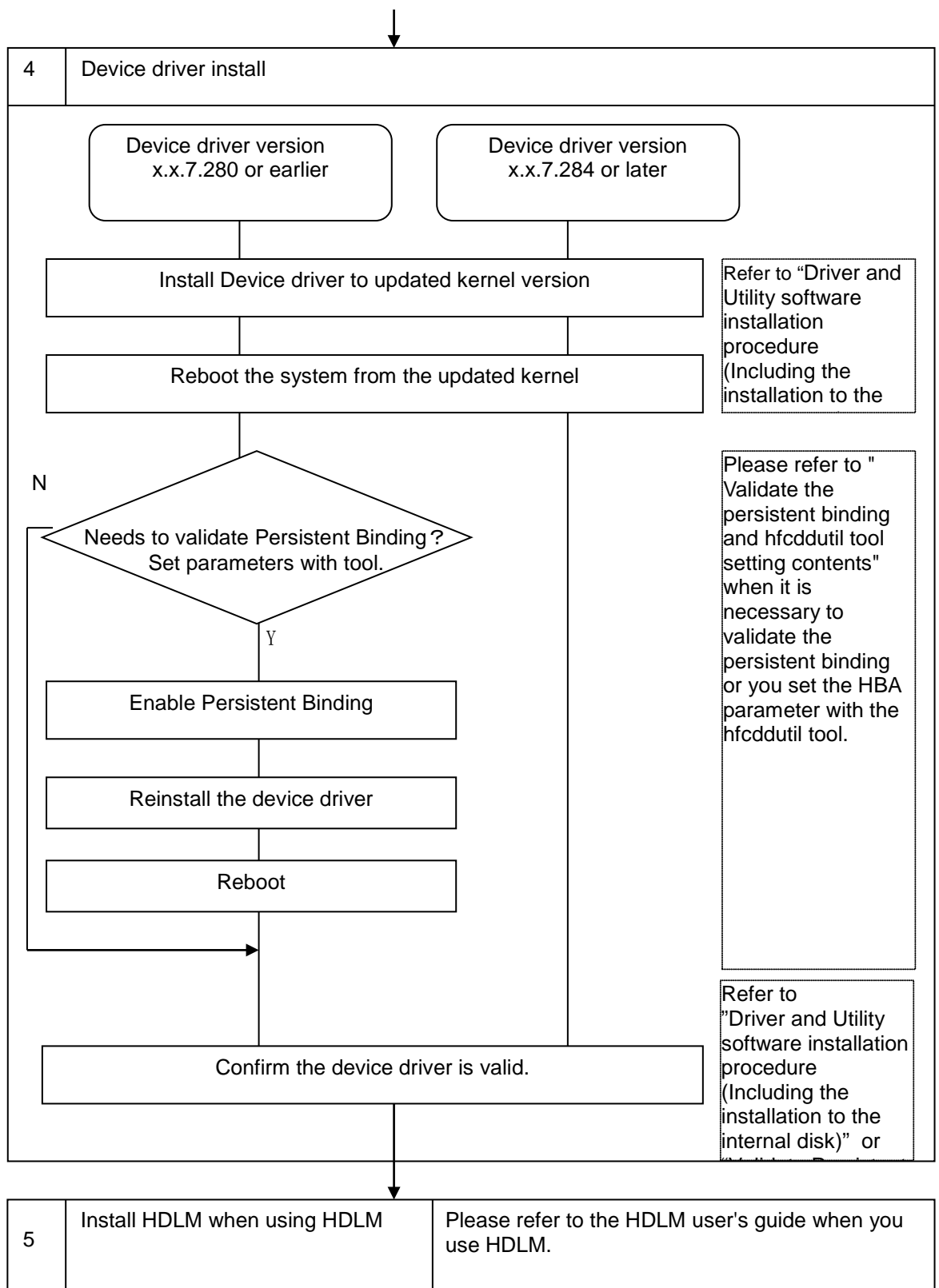
```
# mkinitrd -f /boot/initramfs-<kernel version>.img <kernel version>
```

Driver installation procedure when updating Linux kernel

Outline of installation procedure

The outline of the procedure is as follows. In RHEL5, Driver Update Model feature allows one kernel module (driver) to support any RHEL5 kernel version so that you do not need the following procedure.





Invalidate Persistent Binding

Driver may not recognize disk subsystem after updating kernel if you set Persistent Binding information in running system.

Disable Persistent Binding information if you set Persistent Binding.

(Turn "Auto Map" parameter on).

The order of recognizing devices (/dev/sdx) might change when you invalidate Persistent Binding. Keep correspondence relationship between target device and /dev/sdx by using the LABEL definition or LVM, etc.

(1) Disable Persistent Binding.

(The Auto Map parameter should be on)

Note: After changing the Auto Map parameter, executing "mkinitrd" command is required.

(2) Please confirm Persistent Binding is disabled after rebooting.

more /proc/scsi/hfcldd/x

/proc/scsi/hfcldd/x example:

```
Hitachi PCI to Fibre Channel Host Bus Adapter
Driver version 2.1.6.136  Firmware version 103500
Package_ID 0x82
Special file name : hfcldd0
.....
FC persistent binding information
automap is ON (find configuration automatically)
```

Install driver

(1) Get driver install package from CD-ROM

The installation files are stored in the following directories.

RHEL3: /linux/ia32/rhel3, /linux/ia64/rhel3, /linux/x86_64/rhel3

RHEL4: /linux/ia32/rhel4, /linux/ia64/rhel4, /linux/x86_64/rhel4

SLES10: /linux/x86_64/sles10

Please copy them according to the following procedure, (The following is an example of RHEL4, IA-64).

(a) Device driver version is x.x.8.348 or earlier.

RPM Package Name:

| | | |
|---|--|------------------------------------|
| 1 | hfcldd-<driver version>-<release version>.<machine type>.rpm | Device driver, Utility software |
|---|--|------------------------------------|

```
# mount /media/cdrom
```

```
# cp /media/cdrom/linux/ia64/rhel4/hfcldd-1.1.7.300-1.i386.rpm /tmp/.
```

(b) Device driver version is x.x.8.350 or later

RPM Package Name:

| | | |
|---|--|------------------|
| 1 | hfcldd-<driver version>-<release version>.<machine type>.rpm | Device driver |
| 2 | hfcldd-tools-<driver version>-<release version>.<machine type>.rpm | Utility software |

```
# mount /media/cdrom
```

```
# cp /media/cdrom/linux/ia32/rhel4/hfcldd-1.1.8.350-1.i386.rpm /tmp/.
```

```
# cp /media/cdrom/linux/ia32/rhel4/hfcldd-tools-1.1.8.350-1.i386.rpm
```

```
/tmp/.
```

(2) Confirm /etc/modprobe.conf in RHEL4 (modules.conf in RHEL3)

```
# cat /etc/modules.conf
```

Please input the above.

Please release all comment out of "alias scsi_hostadapterX hfcldd_conf" and "alias scsi_hostadapterY hfcldd" , if any.

(3) Install hfcldd RPM package

(a) Device driver version is x.x.7.348 or earlier

```
# cd /tmp
```

```
# rpm -ivh --force hfcldd-1.1.7.300-1.i386.rpm
```

(b) Device driver version is x.x.8.350 or later

Please install two RPM packages according to the following procedures.

```
# cd /tmp
```

```
# rpm -ivh --force hfcldd-1.1.8.350-1.i386.rpm hfcldd-tools-1.1.8.350-1.i386.rpm
```


Note 1) Type 'su' to root before installing driver.

Note 2) When you install two RPM packages by one line, the order is arbitrary.
For instance, if you specify package name with the following order,

```
# rpm -ivh --force hfcldd-tools-1.1.8.350-1.i386.rpm hfcldd-1.1.8.350-1.i386.rpm
```

You can successfully install driver since the installation order is protected.

However, be sure to install hfcldd driver package before installing tool package when you install these packages separately.

```
# rpm -ivh --force hfcldd-1.1.8.350-1.i386.rpm
```

```
# rpm -ivh --force hfcldd-tools-1.1.8.350-1.i386.rpm
```

Note 3) When you installing drivers, hfcldd.ko and hfcldd_conf.ko are stored in

/lib/modules/<kernel version>/kernel/drivers/scsi.

If the driver (hfcldd.ko, hfcldd_conf.ko) have already installed under /lib/modules/<kernel version>/kernel/drivers/scsi, these modules are renamed automatically to hfcldd.ko.backup and hfcldd_conf.ko.backup.

Note 4) Install script is stored in the following directory.

(a) The device driver version is x.x.8.348 or earlier

/tmp/hfcldd/hfcinst.sh

(b) The device driver version is x.x.8.350 or later

/tmp/hfcldd/hfcinst.sh (RHEL3, RHEL4, SLES10)

/tmp/hfcldd-tools/hfcinst_tools.sh (RHEL3, RHEL4)

Note 5) Do not specify -U or -F option when execute rpm command.
Specifying these options cause unloading driver to the current running kernel. It may cause system hung-up or break the system

(4) Installation of device driver on kernel to be updated

(a) Device driver version is x.x.7.348 or earlier

```
# cd /tmp/hfcldd
```

```
# ./hfcinst.sh install <kernel version>
```

<kernel version> : update target kernel version

(Example: 2.6.9-34.ELsmp)

(b) Device driver version is x.x.8.350 or later

Install driver;

(RHEL3, RHEL4)

```
# cd /tmp/hfcldd
```

```
# ./hfcinst.sh install <kernel version>
```

Install tools

(RHEL3, RHEL4)

```
# cd /tmp/hfcldd-tools
```

```
# ./hfcinst_tools.sh install <kernel version>
```

* <kernel version> : update target kernel version

(Example: 2.6.9-34.ELsmp)

(5) Confirm Installation

Be sure that the following line was added to configuration file

- /etc/modules.conf (RHEL3)

```
alias scsi_hostadapterX hfcldd_conf
```

```
alias scsi_hostadapterX+1 hfcldd
```

(X:0,1,2...)

- /etc/modprobe.conf (RHEL4)

```
alias scsi_hostadapterX hfcldd_conf
```

```
alias scsi_hostadapterX+1 hfcldd
```

(X:0,1,2...)

(Note) Please renumber scsi_hostadapter X for hfcldd and hfcldd_conf not to overlap with other scsi_hostadapter numbers. Scsi_hostadapter X for hfcldd_conf should be smaller than hfcldd. If you renumber scsi_hostadapter, you need to update kernel RAMDISK image according to the following procedure.

```
# cd /boot (For IA-32. )
```

```
# cd /boot/efi/efi/redhat (For IA-64. )
```

```
# /sbin/mkinitrd -f <image-file-name>.img <kernel version>
```

```
- /etc/sysconfig/kernel (SLES10)
```

```
INITRD_MODULES="ata_piix processor thermal fan reiserfs edd lpfc hfcldd_conf  
hfcldd"
```

(6) Reboot system and boot OS with updated kernel version.

```
# reboot
```

(7) Confirm the device driver

Please confirm the installation result according to the following procedures.

(a) Confirm whether all installed adapters are recognized.

```
# ls /proc/scsi/hfcldd
```

```
0 1 ..... (Scsi host numbers of the recognized HBA cards are displayed)
```

(b) Confirm the version of the device driver installed.

```
# more /proc/scsi/hfcldd/<scsi host number>
```

(5) When you use HA Logger Kit for Linux (RASLOG feature)

The driver x.5.10.482 or later supports RASLOG feature of the HA Logger Kit for Linux provided by Support Service Symphony. If you use RASLOG feature, you have to register the driver error information to the error DB of RASLOG. Execute the following command.

```
# hraser -a /opt/hitachi/drivers/hba/hfcldd_err
```

Validate Persistent Binding and hfcddutil tool setting contents

(1) Enable Persistent Binding information

Please make Persistent Binding enabled (Auto Map parameter should be off) referring to Chapter 10.2 when you use Persistent Binding.

(2) Reinstall rpm package

Please reinstall the rpm package to take over various HBA parameters and Persistent Binding information set in the previous kernel version.

```
# cd /tmp
```

```
# rpm -ivh --force hfcldd-2.1.7.300-1.ia64.rpm
```

(3) Reboot

```
# reboot
```

(4) Confirm hfcddutil tool setting content

Confirm that Persistent Binding and the HBA parameter setting are took over by executing the following command.

```
# ls /proc/scsi/hfcldd
```

```
0 1 ..... (Scsi host numbers of the recognized HBA cards are displayed)
```

```
# more /proc/scsi/hfcldd/<scsi host number>
```

Please install HDLM referring to the HDLM user's guide when you use HDLM.

Install HBAAPI vender library

Installing HBAAPI vender library (RHEL4 and RHEL3)

You need to install HBAAPI vender library when using Hitachi Device Manager.
Please install the HBAAPI vender library after installing the latest device driver.

- * Type 'su' to root before installing HBAAPI vender library.
- * Stop all applications that use the HBBAPI vender library before installing HBAAPI vender library, and restart applications after installing HBAAPI vender library.

(1) Get driver install package from CD-ROM.

RPM Package Name:

hfchbaapi-<library version>-<release version>.<machine type>.rpm

(CD-ROM)

mount /media/cdrom

cd to the directory which you want to copy the rpm file.

For example, 'cd /tmp'

cp /media/cdrom/linux/ia64/rhel4/hfchbaapi-2.1.1.20-1.ia64.rpm .

For example, installing hfchbaapi-2.1.1.20-1.ia64.rpm

(2) Install HBAAPI vender library.

rpm -ivh --force hfchbaapi-2.1.1.20-1.ia64.rpm

(3) Confirm /etc/hba.conf

cat /etc/hba.conf

Be sure that the following line was added to /etc/hba.conf.

hfcldd /usr/lib/libhfchbaapi.so

(4) Confirm the HBAAPI vender library version.

cd /tmp/hfchbaapi

./hfchbaapiinst.sh version

The version is same as < library version > part of file name hfchbaapi-2.1.1.20-1.ia64.rpm

Installing HBAAPI vendor library (RHEL5)

(1) Get driver install package from CD-ROM.

If you installed tool package, HBAAPI vendorlibrary is stored in
/opt/hitachi/drivers/hba/libhfchbaapi.so

(2) Install HBAAPI vender library.

```
# cd /opt/hitachi/drivers/hba/
```

```
# ./hfchbaapiinst.sh install
```

* Type 'su' to root before installing HBAAPI vender library.

(3) Confirm /etc/hba.conf

```
# cat /etc/hba.conf
```

Be sure that the following line is added to /etc/hba.conf.

```
hfcldd /usr/lib/libhfchbaapi.so
```

(4) Confirm the HBAAPI vender library version.

```
# cd /opt/hitachi/drivers/hba/
```

```
# ./hfchbaapiinst.sh version
```

Uninstalling HBAAPI vendor library (RHEL4 and RHEL3)

- * Type 'su' to root before installing HBAAPI vender library.
- * Stop all applications that use the HBBAPI vender library before installing HBAAPI vender library, and restart applications after installing HBAAPI vender library.

(1) Uninstall HBAAPI vender library.

```
# rpm -e hfchbaapi-2.1.1.20-1.ia64
```

For example, uninstalling hfchbaapi-2.1.1.20-1.ia64.rpm

or

```
# cd /opt/hitachi/drivers/hba
```

```
# ./hfchbaapiinst.sh uninstall
```

(2) Confirm /etc/hba.conf

```
# cat /etc/hba.conf
```

Be sure that the following line is removed from /etc/hba.conf.

```
hfcldd /usr/lib/libhfchbaapi.so
```

Uninstalling HBAAPI vendor library (RHEL5)

- * Type 'su' to root before installing HBAAPI vender library.
- * Stop all applications that use the HBBAPI vender library before installing HBAAPI vender library, and restart applications after installing HBAAPI vender library.

```
# cd /opt/hitachi/drivers/hba/
```

```
# ./hfchbaapiinst.sh uninstall
```

* Type 'su' to root before uninstalling HBAAPI vender library.

Notes at the time of renewal of RAMDISK

Note at the time of installing, updating or uninstalling the driver

You have to update the RAMDISK image(*) when installing, updating or uninstalling the driver. Update appropriate RAMDISK image with reference to the setting file of the boot loader such as grub.conf or elilo.conf.

(*) A RAMDISK image file is different with OS's. In the case of RHEL3, RHEL4, and RHEL5, it is /boot/initrd-<kernel version>.img. In the case of RHEL6 or later, it is /boot/initramfs-<kernel version>.img.

Note on using HDLM

When updating a RAMDISK image and the boot disk consists of LVM, please check that the filter lines described to lvm.conf indicates only scsi devices.

Since there are statements which specifies HDLM devices as the filter lines of lvm.conf in the case of the environment which constituted the boot disk in the SAN boot environment by LVM which uses HDLM, please cancel the HDLM devices and specify only SCSI devices.

When updating a RAMDISK image and HDLM is being used by RHEL6, please check the description of "hdlm_dracut" defined as /etc/opt/DynamicLinkManager/hdlm.conf. When there is the description of "hdlm_dracut=y", change into "hdlm_dracut=n". You have to update the RAMDISK image of the HDLM when your OS is booted from SAN using HDLM.

When the driver is already loaded and HDLM is being used on RHEL7, please make the RAMDISK image file for HDLM. And when you carry out a reinstallation or kernel upgrading installation, please remake the RAMDISK image file for HDLM.

Refer to HDLM User's Guide for details.

Update RAMDISK image

Update the RAMDISK image executing the following commands.

```
# cd /boot : In cases of IA-32 and x86_64
```

```
(# cd /boot/efi/efi/redhat : In case of IA-64)
```

```
# /sbin/mkinitrd -f initrd-<kernel version>.img <kernel version>
```

4

Install driver on VMware

This chapter describes how to install, update and uninstall the driver on VMware.

Precautions

With the release of ESXi 5.5 and vSphere 5.5, VMware has introduced a new driver model called native driver. The fibre channel adapter which is supporting a native driver is 8Gbps/16Gbps FC adapter on ESXi 6.0 or later.

| Driver model | Drive name | Supported OS | devices |
|-----------------|------------|---|----------------------------------|
| vmklinux driver | hfcldd | ESX 4.* /ESXi 4.*/ ESXi5.0/ESXi5.1/ESXi5.5/ ESXi6.0 | 4Gbps/8Gbps/16Gbps FC adapter |
| native driver | hfcndd | ESXi6.0/ESXi6.5/ESXi6.7 | 8Gbps/16Gbps FC adapter |

For the supported kernel versions and functions, refer to HITACHI Gigabit Fibre Channel Adapter USER'S GUIDE (Support Matrix Edition) for details.

You can download Hitachi Driver CD at the VMware download center.
<http://downloads.vmware.com/d/>

Driver CD image file names are follows;

VMware ESXi 6.0

Two types of Driver CD are available for VMware ESXi6.0.

- 1) vmklinux driver
HTI-hfcldd-<c.d>-<build number>.zip
- 2) native driver
HTI-hfcndd-<c.d>-<build number>.zip

VMware ESXi 6.5/ESXi 6.7

One type of Driver CD is available for VMware ESXi6.5/ESXi6.7.

- 2) native driver
HTI-hfcndd-<c.d>-<build number>.zip

If you need to install a driver for 4Gbps FC adapter, please use type 1) Driver CD.
If you need to install a driver for 8Gbps or 16Gbps FC adapter, please use type 2) Driver CD. When type 1) and type 2) were installed both, a native driver is loaded.

If you update the VMware product, refer the appropriate upgrade guide posted on a VMware website. If you update the target product with Hitachi Custom Image including a driver of type 1) and type 2), a vmklinux driver is loaded for 4Gbps FC adapter and a native

driver is loaded for 8Gbps/16Gbps FC adapter.

VMware ESXi 5.X

HTI-hfcldd-<c.d>-<build number>.zip

VMware ESX Server 3.x, VMware ESX 4.X, and ESXi 4.X

vmware-esx-drivers-scsi-hfcldd_<driver version>-<build number>.iso

Two types of Driver CD are available for VMware ESX4.0 and ESX4.1.
If you need to install or update on ESX 4.1, please use type 2) Driver CD below.

- 1) Driver CD only for ESX4.0
- 2) Driver CD for both ESX4.0 and ESX4.1

If you update the VMware product, refer the appropriate upgrade guide posted on a VMware website. If the type 1) driver is installed on your system, you can upgrade from ESX 4.0 to ESX 4.1 according to the procedure of Upgrade guide and use the driver already installed. But if you update newer driver after upgrading from ESX4.0 to ESX4.1, you have to use type 2) Driver CD.

OS installation procedure to SAN with Hitachi Gigabit Fibre Channel Adapter

VMware ESX Server 3.x

☐ Precautions

Before installation, confirm the followings.

- (1) The server meets the requirement of ESX Server.
- (2) Hitachi Gigabit Fibre Channel Adapter is properly mounted.
- (3) Obtain the image file of VMware Driver Install CD.

VMware ESX Server 3.0.x or VMware ESX Server 3.5 Update1,Update2

Obtain VMware Driver Install CD from CD-ROM provided with Hitachi Gigabit Fibre Channel Adapter.

VMware Driver Install CD image file name: esxupdatecd.<driver version>.iso

VMware ESX Server 3.5 Update3 or later

Download the VMware Driver Install CD image file from the VMware website.

VMware Driver Install CD image file name: esx350-hfcldd-350.<driver version>-<build number>.iso

Image file is ISO format. Write the image to CD-R to make the VMware Driver Install CD using the appropriate writing software.

- (4) Prepare VMware ESX Server CD.

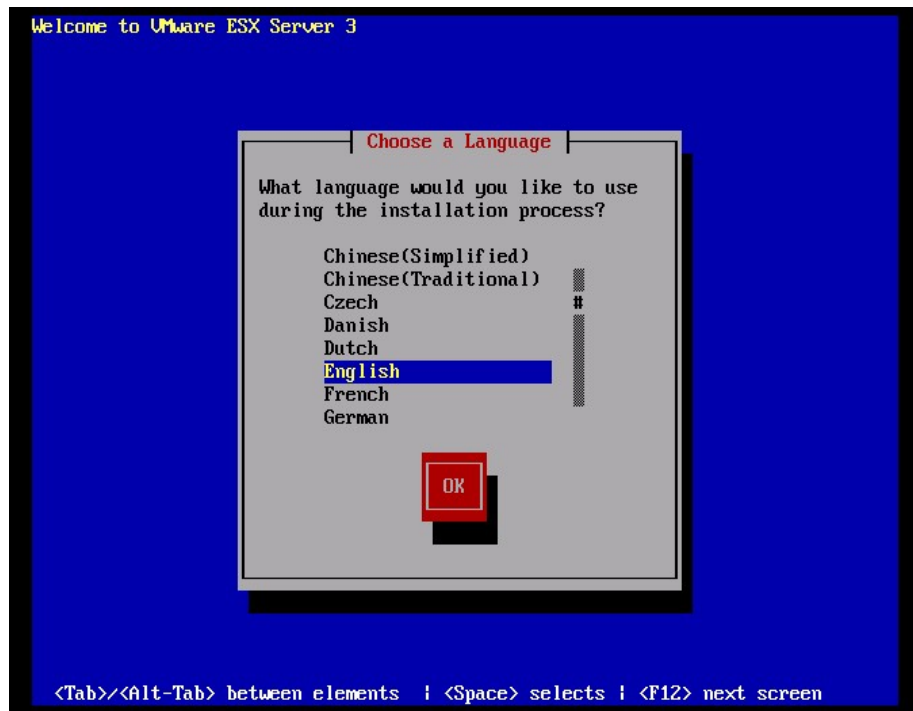
We explain the installation method by graphical mode though VMware ESX Server can be installed by graphical or the text mode. The installation destination is assumed to be SAN.

❑ Install ESX Server

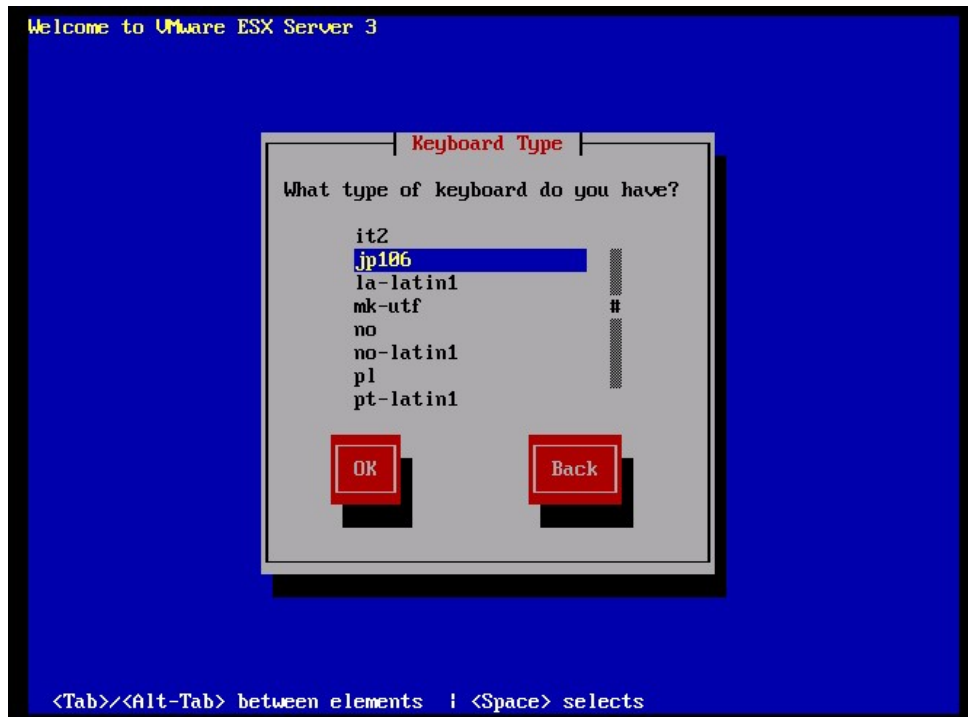
- (1) Please insert VMware Driver Install CD in CD-ROM drive, and turn on the power supply of the machine. Please select CD-ROM Drive by setting the boot device when the boot process starts.
- (2) The screen that the installation mode is selected is displayed. Please press <Enter> without inputting anything when you install it in a graphical mode, and press <Enter> after you input [esx text] when you install in the text mode. The installation is executed in a graphical mode this time, and press <Enter> key without inputting anything.



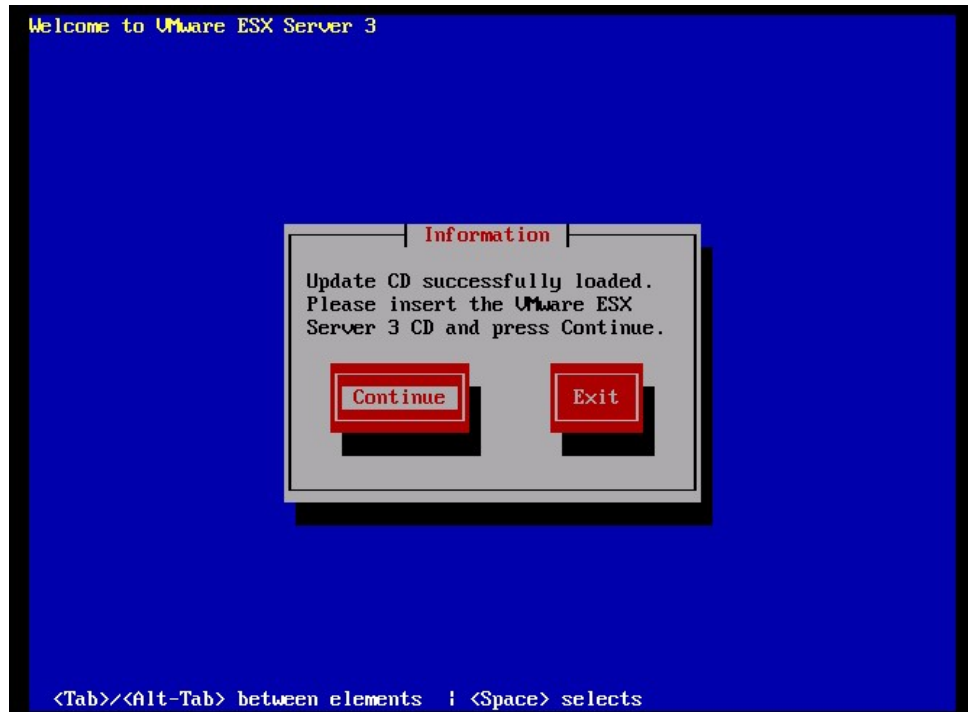
- (3) Please select English as a language used and press OK.



- (4) Please select the kind of the connected keyboard and press OK.



- (5) Please take out VMware Driver Install CD of CD-ROM drive, and press [Continue] after inserting VMware ESX Server CD.



- (6) "Installation and Upgrade Guide"
(http://www.vmware.com/pdf/vi3_installation_guide.pdf)
Please install VMware ESX Server referring to Chapter 5 Installing VMware ESX Server Software.
- (7) When the installation of the package is completed, [ESX Server 3 Installer Complete] screen is displayed. Please take out CD-ROM, press [Finish], and complete the installation. Reboot starts automatically.



☐ Confirmation of device driver

Please confirm it according to the same procedure described in "Confirm the driver version".

VMware ESX 4.0

☐ Precautions

Before installation, confirm the followings.

- (1) The server meets the requirement of ESX Server.
- (2) Hitachi Gigabit Fibre Channel Adapter is properly mounted.
- (3) Obtain the image file of VMware Driver CD.

Download the VMware Driver CD image file from the VMware website.

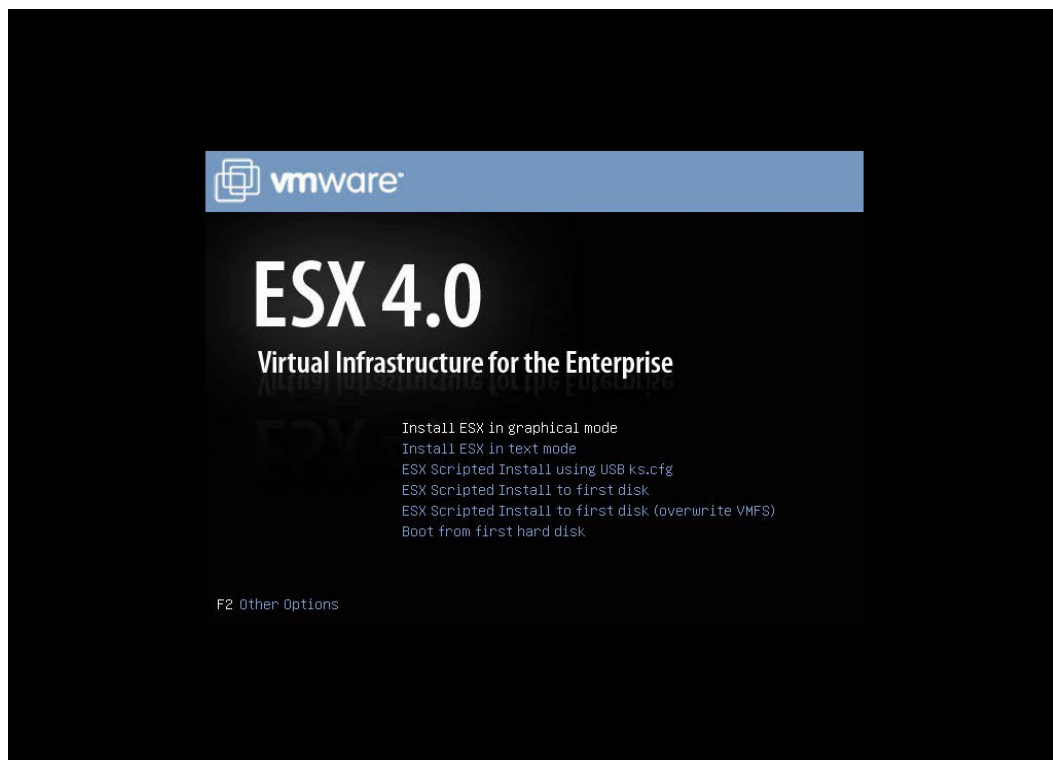
VMware Driver CD image file name: vmware-esx-drivers-scsi-hfcldd_<driver version>-<build number>.iso

Image file is ISO format. Write the image to CD-R to make the VMware Driver CD using the appropriate writing software.

- (4) Prepare ESX installation DVD.

☐ Install ESX Server

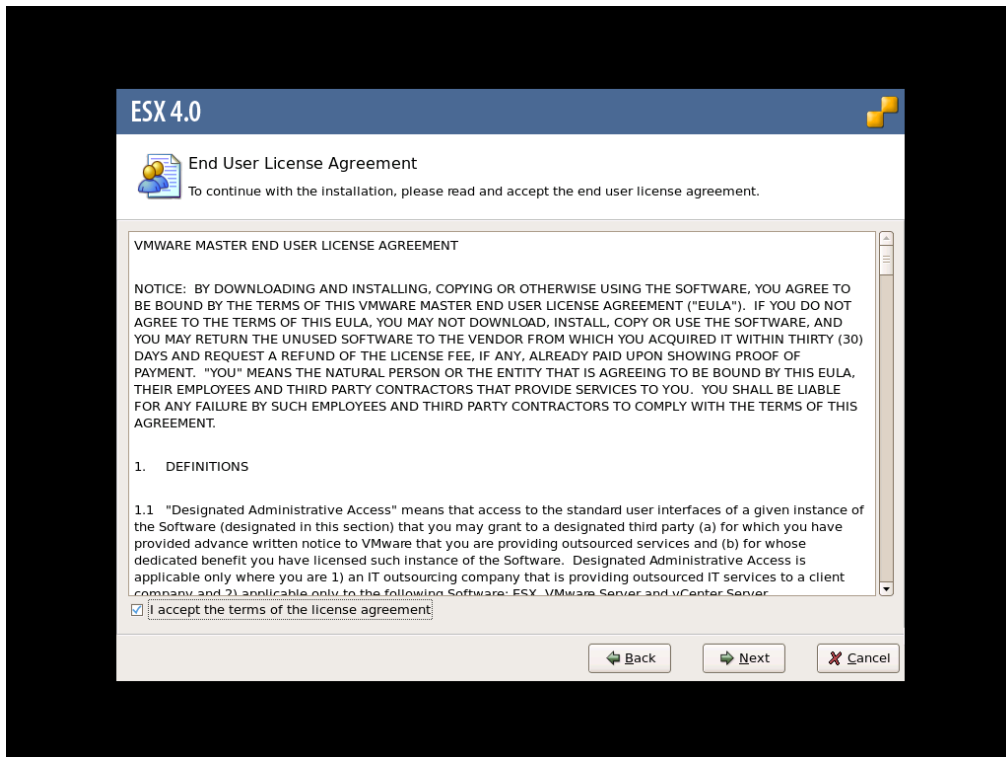
- (1) Insert VMware Driver CD in DVD-ROM drive, and turn on the power supply of the machine. Select DVD-ROM drive by setting the boot device when the boot process starts.
- (2) Select installation mode. Press <Enter> without inputting anything when you install it in a graphical mode, and press <Enter> after you input [esx text] when you install in the text mode. The following example is an installation on a graphical mode.



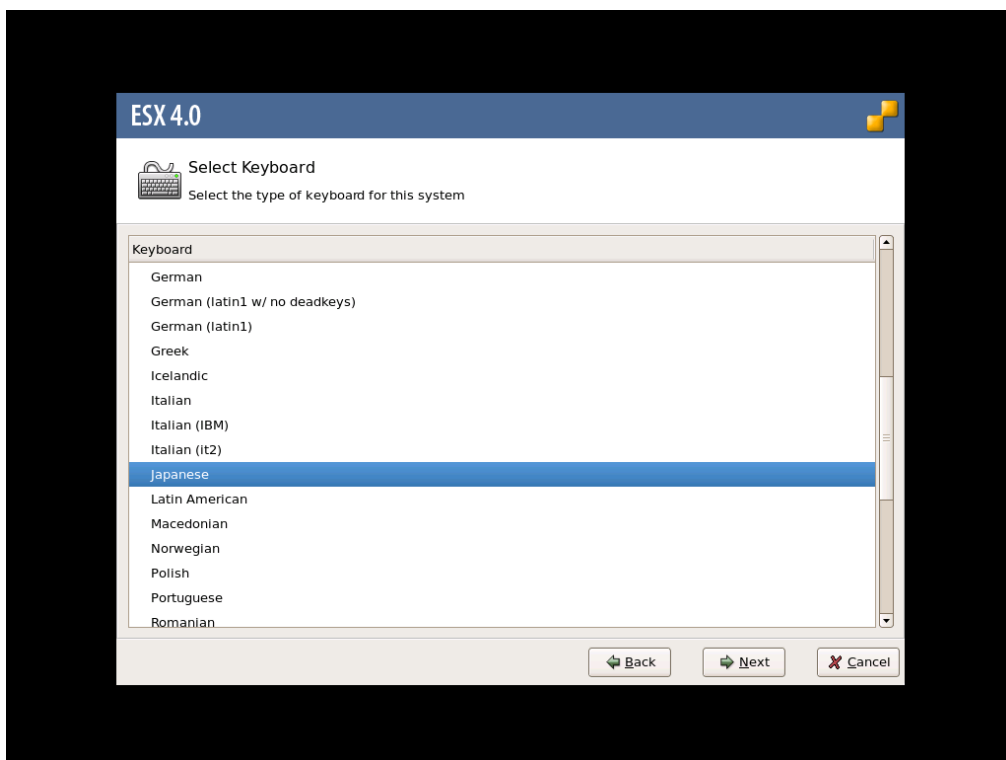
(3) Click Next when the following screen is appeared.



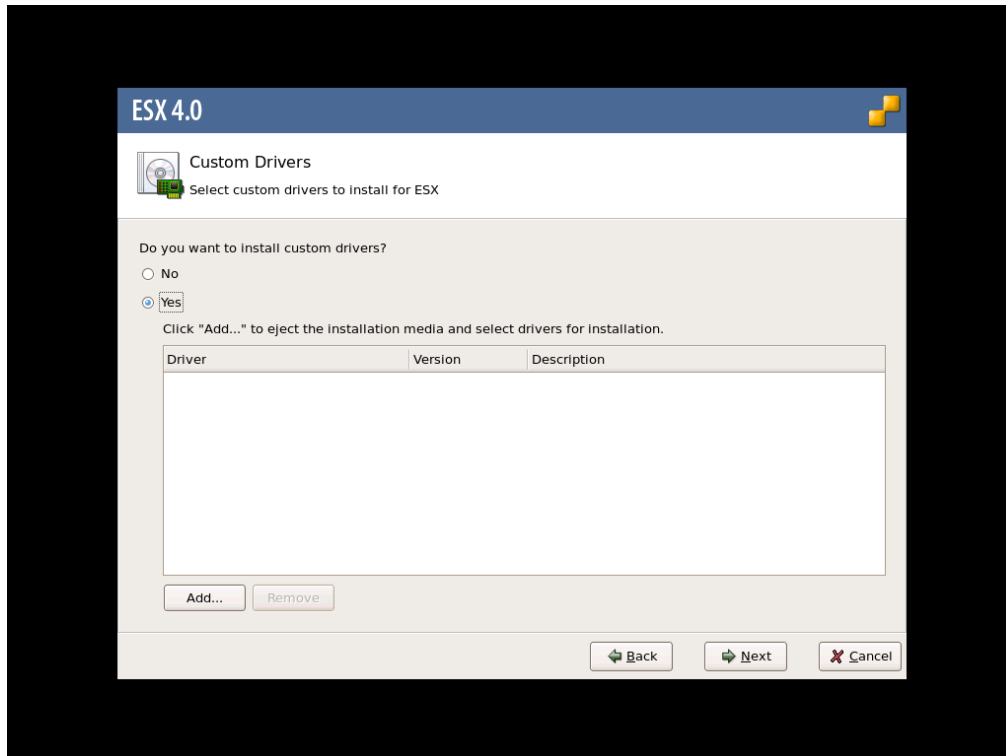
(4) Check the license agreement and click Next.



(5) Select keyboard type.

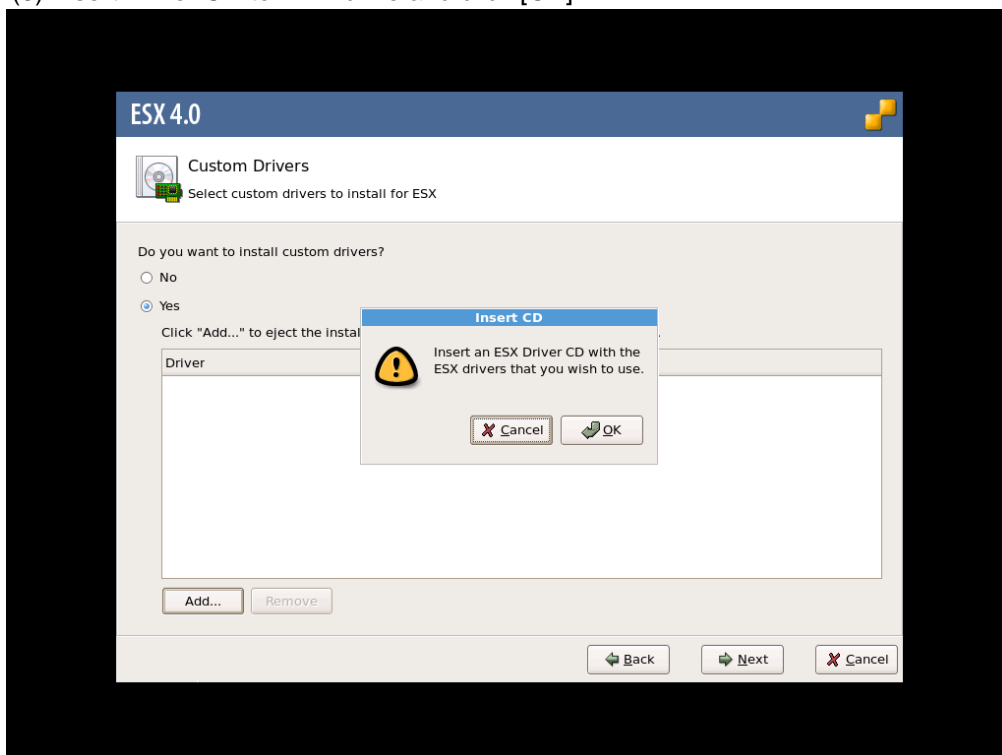


(6) The following screen to select custom driver is displayed. Select [Yes].

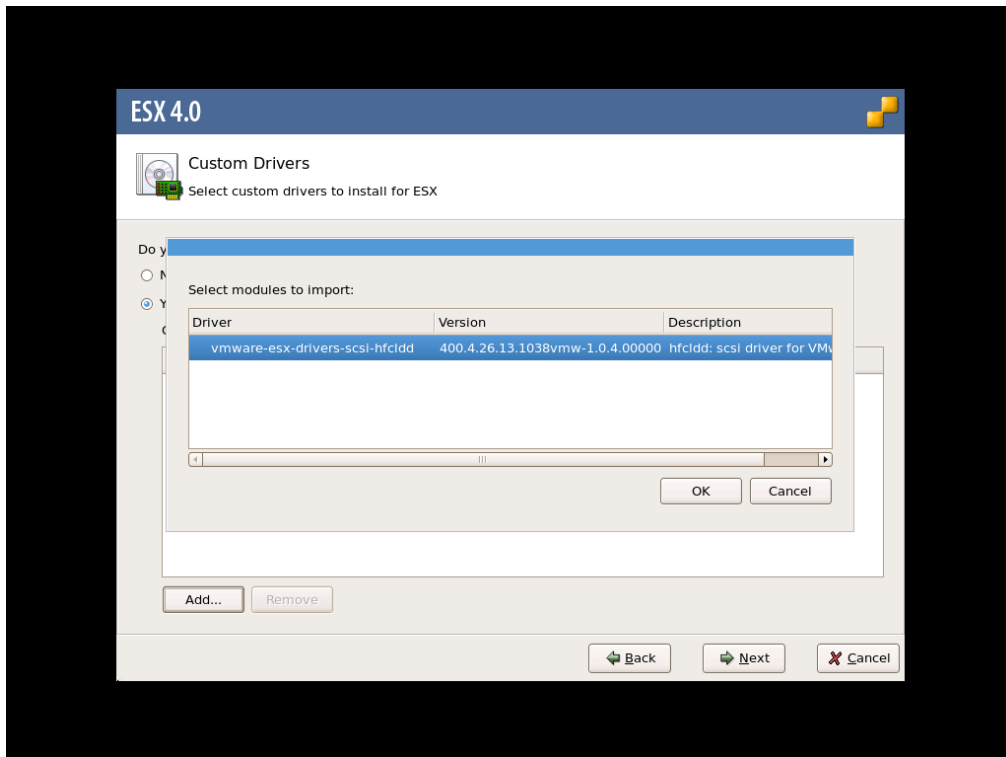


(7) Select [Add] then the media is ejected.

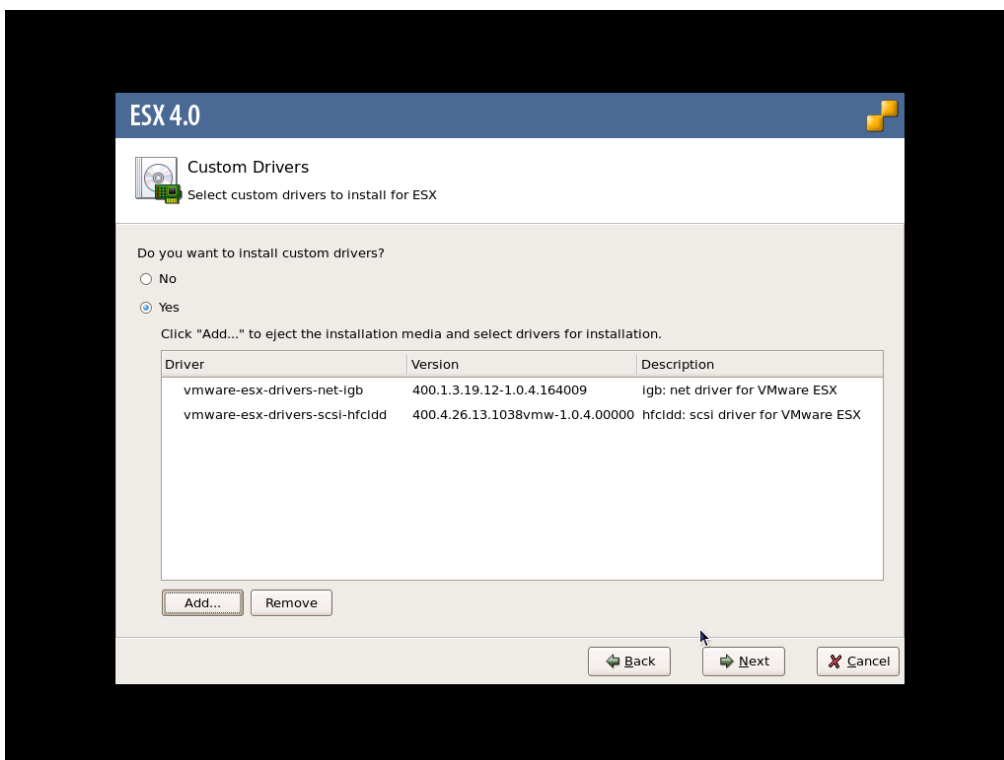
(8) Insert Driver CD to DVD drive and click [OK].



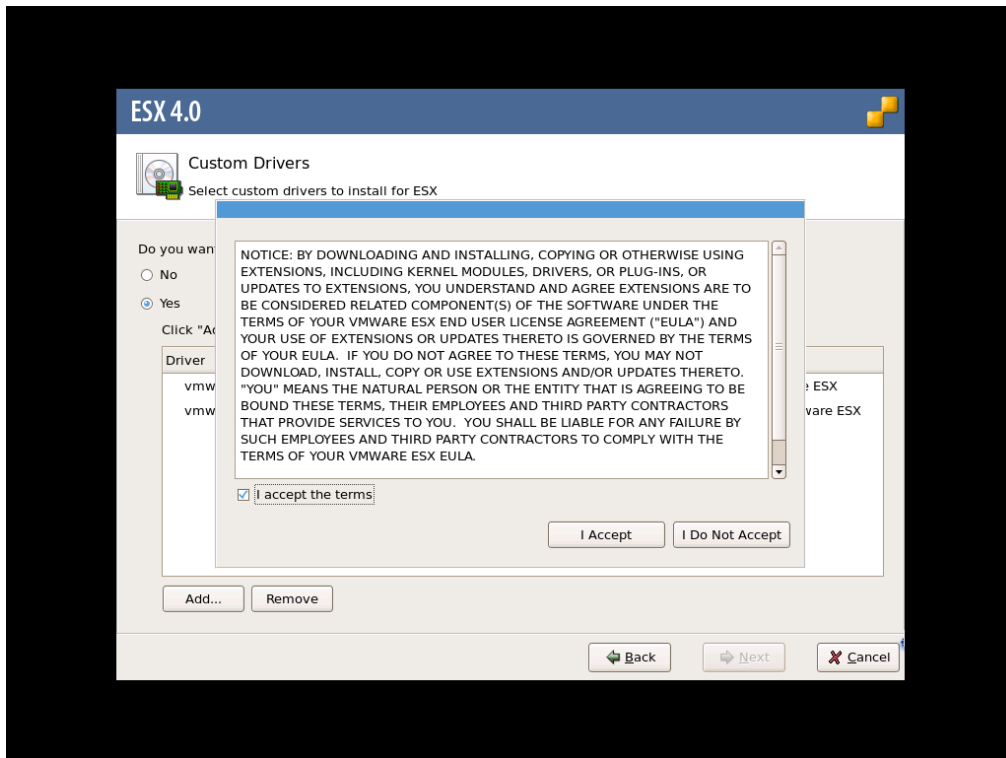
(9) Select the driver module to be imported.



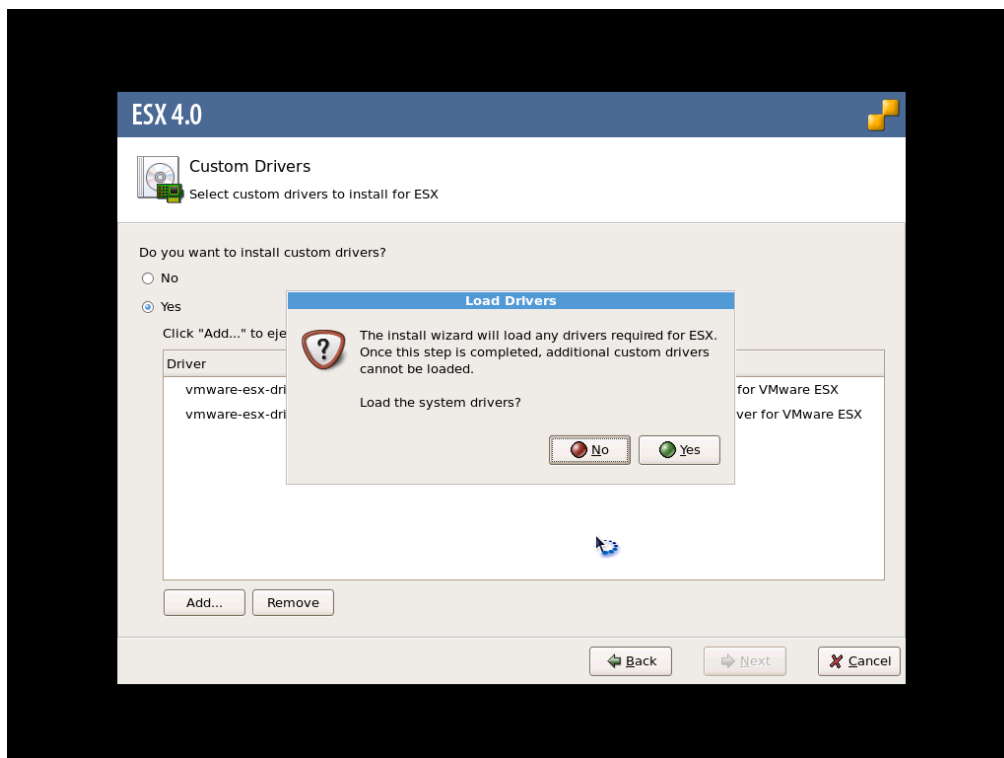
(10) If you have another drivers to be imported, repeat the procedure from (7) to (9) again. If no other drivers to be imported, click [NEXT].



(11) Check license agreement and click [I Accept].

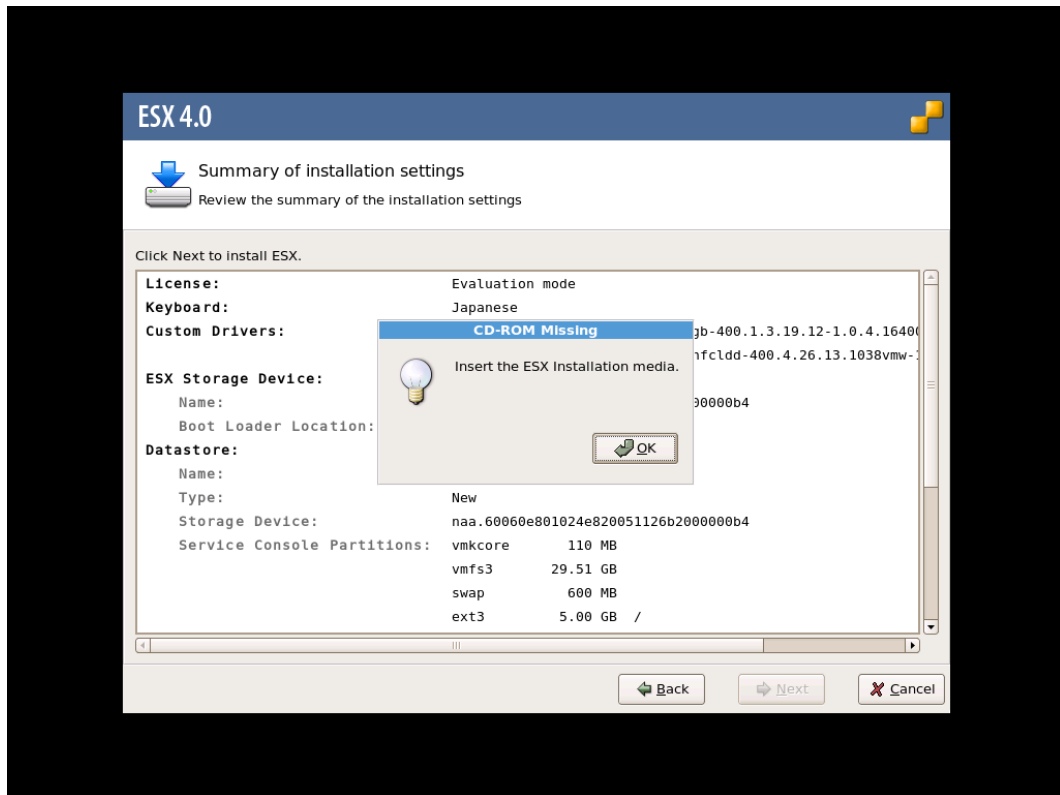


(12) Click [Yes] when the following message is appeared.



(13)ESX install starts after loading the selected driver modules. Complete the installation with reference to VMware ESX install guide and vCenter install guide posted on VMware Web site.

Exchange Driver CD and ESX installation DVD when the following message is appeared during installation.



VMware ESX 4.1

Please install ESX 4.1 according to the same procedure described in "VMware ESX 4.0".

VMware ESXi 4.x

You can not add the driver during installation. Please use Hitachi customized ESXi installer which the driver of Hitachi Gigabit Fibre Channel Adapter has been already injected for installation.

VMware ESXi 5.x and ESXi 6.x

You can install the driver as the same procedure on ESXi 4.x.

Install driver to the internal disk device

Please install the device driver according to the following procedures when you install the Hitachi Gigabit Fibre Channel Adapter after installing VMware ESX Server in the internal disk, or in the external disk with the other companies HBA.

VMware ESXi 6.x

Two types of Driver CD are available for VMware ESXi6.0.

- 1) vmklinux driver
HTI-hfcldd-<c.d>-<build number>.zip
- 2) native driver
HTI-hfcndd-<c.d>-<build number>.zip

One type of Driver CD is available for VMware ESXi6.5/ESXi6.7

- 2) native driver
HTI-hfcndd-<c.d>-<build number>.zip

If you need to install a driver for 4Gbps FC adapter, please use type 1) Driver CD.

If you need to install a driver for 8Gbps or 16Gbps FC adapter, please use type 2) Driver CD.

Download the Driver CD from the VMware download center. Installation procedure is described in README.txt contained in driver CD.

<mount point>/doc/README.txt

VMware ESXi 5.x

Download the driver CD from the VMware download center. Installation procedure is described in README.txt contained in driver CD.

<mount point>/doc/README.txt

VMware ESX 4.x and ESXi 4.x

Download the driver CD from the VMware download center. Set ESX 4.* or ESXi 4.* into maintenance mode and Install OS according to the procedure described in README.txt contained in driver CD.

<mount point>/doc/README.txt

If you install ESX 4.1 or ESXi 4.1, you have to use an appropriate driver CD which supports ESX 4.1 or ESXi 4.1.

VMware ESX Server 3.x

Install the driver according to the following procedure in this section.

Preparation

Please confirm the following before you start the installation.

- (1) Hitachi Gigabit Fibre Channel Adapter is properly mounted.
- (2) P.ON the server in which VMware ESX Server is installed.
- (3) Press < Alt><F2 > key on the server of VMware ESX Server to display the service console screen.
- (4) Log in the service console.
- (5) Obtain the RPM package and copy it to the /tmp directory.

VMware ESX Server 3.0.x, VMware ESX Server 3.5 Update1 or Update2

Obtain the RPM package from CD-ROM appended to this product, and copy it to an arbitrary folder. The RPM package is stored in /vmware/esx directory, and copy it according to the following procedure, please.

RPM package name:

VMware-esx-drivers-scsi-hfcldd-<driver version>-<build number>.i386.rpm

```
# mount /mnt/cdrom
```

```
# cp /mnt/cdrom/vmware/esx/VMware-esx-drivers-scsi-hfcldd  
-1.20.6.144-32039.i386.rpm /tmp/.
```

(Note) Root privilege is required.

VMware ESX Server 3.5 Update3 or later.

The driver rpm package is not contained CD-ROM provided with Hitachi Gigabit Fibre Channel Adapter. Download the driver install CD from VMware Web site and copy it to the /tmp directory.

Driver Install CD name :

esx350-hfcldd-350.<driver version>-<build number>.iso

```
# mount -t iso9660 -o loop esx350-hfcldd-350.<driver version>  
-<build number>.iso <mount point>  
# cp <mount point>/VMupdates/RPMS/VMware-esx-drivers-scsi-  
hfcldd-<driver version>-<build number>.i386.rpm /tmp/.
```

(Note) Root privilege is required.

Install driver

- (1) Install RPM package.

```
# cd /tmp
```

```
# rpm -ivh VMware-esx-drivers-scsi-hfcldd-1.20.6.144-32039.i386.rpm
```

(Note 1) The root authority is necessary.

(Note 2) Install hfcldd.o to /usr/lib/vmware/vmkmmod/ and
/usr/lib/vmware-debug/vmkmmod/, when installing driver

(2) Updating PCI device information and RAMDISK

Execute the following commands, and update PCI device information and RAMDISK.

```
# esxcfg-boot -p
```

(3) System rebooting

```
# reboot
```

Confirm the driver version

- (1) Please press < Alt><F2 > key on the server that installs VMware ESX Server in order to display the service console screen.
- (2) Please input the account name and the password, and log in the service console.
- (3) Please confirm whether the device driver of the installed adapter is loaded.

```
# vmkload_mod -l
```

| Name | R/O Addr | Length | R/W Addr | Length | ID | Loaded |
|-----------|----------|---------|-----------|---------|----|--------|
| vmkapimod | 0x7b4000 | 0x1000 | 0x1dfeef0 | 0x1000 | 1 | Yes |
| vmklinux | 0x7b5000 | 0x18000 | 0x1e8ade8 | 0x3e000 | 2 | Yes |
| hfcldd | 0x7cd000 | 0x48000 | 0x1ed3088 | 0xb000 | 3 | Yes |
| e1000 | 0x815000 | 0x1e000 | 0x1ee6f78 | 0x5000 | 4 | Yes |
| tcpip | 0x833000 | 0x3b000 | 0x1ef8950 | 0x1b000 | 5 | Yes |
| cosShadow | 0x86e000 | 0x3b000 | 0x1f15968 | 0x1b000 | 6 | Yes |
| migration | 0x8a9000 | 0xe000 | 0x1f32980 | 0x1000 | 7 | Yes |
| lvmdriver | 0x8b7000 | 0xc000 | 0x1f33b10 | 0x2000 | 8 | Yes |
| nfsclient | 0x8c3000 | 0x11000 | 0x1f375f8 | 0x1000 | 9 | Yes |
| vmfs3 | 0x8d4000 | 0x23000 | 0x1f3a8e0 | 0x1000 | 10 | Yes |
| vmfs2 | 0x8f7000 | 0x11000 | 0x1f3e708 | 0x11000 | 11 | Yes |

(Note) The root authority is necessary.

- (4) Confirm whether the installed adapter is recognized.

```
# ls /proc/scsi/hfcldd  
0 1 ..... (Scsi host numbers of the recognized HBA cards are displayed)
```

(Note) The figure is displayed only for the number of installed adapter ports.
The displayed value changes by the presence of other SCSI adapters and Fibre Channel adapters installed by the system, and it doesn't start from 0.

- (5) Please confirm the version of the installed device driver. The version of the device driver is < driver version > part of the RPM package name.

```
VMware-esx-drivers-scsi-hfcldd-<driver version>-<build number>.i386.rpm
```

```
# cat /proc/scsi/hfcldd/X (X specifies either of the figure displayed by (4).)
```

```
/proc/scsi/hfcldd/x example:
```

```
Hitachi PCI to Fibre Channel Host Bus Adapter
```

```
Driver version 1.20.6.144 Firmware version 134500
```

```
Package_ID 0x8a
```

```
.....
```

Update driver

VMware ESXi 5.x and ESXi 6.x

Download the driver CD from the VMware download center. Update procedure is described in README.txt contained in driver CD.

<mount point>/doc/README.txt

VMware ESX Server 3.5 Update 3 or later, and VMware ESX 4.x and ESXi 4.x

Download the driver CD from the VMware download center. Set the maintenance mode on ESXi/ESX host and update the driver according to the procedure described in README.txt contained in driver CD.

<mount point>/doc/README.txt

VMware ESX Server 3.x

Install the driver according to the following procedure.

(1) Preparation

Please download the latest driver RPM package for VMware, and copy it to /tmp directory.

(2) Installation of RPM package

```
# cd /tmp
```

```
# rpm -ivh VMware-esx-drivers-scsi-hfcldd-1.20.6.144-32039.i386.rpm
```

(Note 1) The root authority is necessary.

(Note 2) Installs hfcldd.o to /usr/lib/vmware/vmkmmod/ and

/usr/lib/vmware-debug/vmkmmod/, when installing driver.

(3) Updating RAMDISK

Execute the following commands, and update RAMDISK.

```
# esxcfg-boot -b
```

(4) System rebooting

```
# reboot
```

- (5) Confirm it according to the same procedure as “Confirm the driver version” .

VMware ESX Server 3.5 Update3 or later.

The driver rpm package is not contained CD-ROM provided with Hitachi Gigabit Fibre Channel Adapter. Download the driver install CD from VMware Web site and copy it to the /tmp directory.

Driver Install CD name :

VMware ESX Server 3.0.x, VMware ESX Server 3.5 Update1 or Update2

Obtain the RPM package from CD-ROM appended to this product, and copy it to an arbitrary folder. The RPM package is stored in /vmware/esx directory, and copy it according to the following procedure, please.

RPM package name:

VMware-esx-drivers-scsi-hfcldd-<driver version>-<build number>.i386.rpm

```
# mount /mnt/cdrom
```

```
# cp /mnt/cdrom/vmware/esx/VMware-esx-drivers-scsi-hfcldd  
-1.20.6.144-32039.i386.rpm /tmp/.
```

(Note) Root privilege is required.

VMware ESX Server 3.5 Update3 or later.

The driver rpm package is not contained CD-ROM provided with Hitachi Gigabit Fibre Channel Adapter. Download the driver install CD from VMware Web site and copy it to the /tmp directory.

Driver Install CD name :

esx350-hfcldd-350.<driver version>-<build number>.iso

```
# mount -t iso9660 -o loop esx350-hfcldd-350.<driver version>-<build  
number>.iso <mount point>  
# cp <mount point>/VMupdates/RPMS/VMware-esx-drivers-scsi-hfcldd-  
<driver version>-<build number>.i386.rpm /tmp/.
```

(Note) Root privilege is required.

Install and uninstall utility software

VMware ESXi 5.x and ESXi 6.x

You are required to install CIM provider on the host and CIM client on the remote host. You can operate various function executing CIM client on the remote host.

For detailed operations and functions, refer to HITACHI Gigabit Fibre Channel Adapter USER'S GUIDE (Utility Software Edition - VMware).

VMware ESXi 4.x

Utility tools are not supported on ESXi 4.1.

VMware ESX Server 3.5 Update 3 or later, and VMware ESX 4.x

You can execute the utility software described below on VMware ESX Server 3.X and VMware ESX 4.X.

Install utility software

Install the utility software according to the following procedures.

Please skip step (3), if you are using VMware ESX Server 3.5 or later.

(1) Obtaining of RPM package

Obtain the RPM package from CD-ROM appended to this product or Hitachi web site, and copy it to an arbitrary folder.

RPM package name (VMware ESX Server 3.x) :

hfcldd-vmware-<driver version>-<release version>.i386.rpm

RPM package name (VMware ESX Server 4.x) :

hfcldd-vmware-tools-<driver version>-<release version>.x86_64.rpm

mount /mnt/cdrom

cp /mnt/cdrom/vmware/<esx version>/<RPM package name> /tmp/.

(Note) The root authority is necessary.

(2) Installation of RPM package

cd /tmp

rpm -ivh --force hfcldd-vmware-1.20.6.144-0.i386.rpm

(Note) The root authority is necessary.

(3) Confirmation of installation log

The installation log is stored in /tmp/hfcldd_install.log.

Confirm whether the message of "---- Install Success" is outputted.

(4) System rebooting

reboot

Uninstall utility software

Please uninstall the utility software according to the following procedures. Please skip step (2), if you are using VMware ESX Server 3.5 or later.

(1) Uninstallation of RPM package

VMware ESX Server 3.x :

```
# rpm -e hfcldd-vmware--<driver version>--<release version>.i386
```

VMware ESX Server 4.x :

```
# rpm -e hfcldd-vmware-tools-<driver version>-<release version>.x86_64
```

(Note) The root authority is necessary.

(2) Confirmation of the uninstallation log

When uninstalling, the log is stored in /tmp/hfcldd_install.log. Confirm whether the message of "---- Uninstall Success" is output.

5

Set Parameters for Hitachi Gigabit Fibre Channel Adapter

User can change various driver parameters on the Hitachi Gigabit Fibre Channel Adapter. Usually these parameters do not need to be changed.

Driver parameters on Linux

Refer to 'HITACHI Gigabit Fibre Channel Adapter USER'S GUIDE (Utility Software Edition)' for the command line of hfcmgr and hfcutil, the set values and the detailed explanation of each driver parameter.

Driver parameters on VMware

How to set driver parameters

VMware ESXi 5.x and ESXi 6.x

You can set or modify parameters executing CIM client on the remote host. Specify option name instead of parameter name itself when executing CIM client.

For detailed definitions and operations, refer to HITACHI Gigabit Fibre Channel Adapter USER'S GUIDE (Utility Software Edition - VMware).

VMware ESX Server 3.5 Update 3 or later, and VMware ESX 4.x and ESXi 4.x

You can set parameters using esxcfg-module executing on console OS on ESX host or vicfg-module command, a part of the vSphere Command Line interface (vSphere CLI) which handles ESX/ESXi host from remote client.

Change the parameter name to those for VMware (ESXi 4.0 or later) when you set the parameter.

Parameters are applied to all ports installed on ESX/ESXi host.

For details of vSphere Command-Line interface, refer to the manuals on VMware web site.

The table below illustrates the command available to ESX/ESXi host.

| OS | Available commands | |
|----------|--------------------|--------------|
| | ESX Host | vSphere CLI |
| ESX3.x | esxcfg-module | vicfg-module |
| ESX4.x | esxcfg-module | vicfg-module |
| ESXi 4.x | N/A | vicfg-module |

Set the value in the available range. If you set the value out of the available range, the setting is discarded and the default value is set.

[Execution example of esxcfg-module]

If you set Queue Depth as 16, execute the following command.

```
# esxcfg-module -s "hfc_queue_depth=16" hfcidd.o
# reboot
```

[Execution example of vicfg-module]

If you set Queue Depth as 16, execute the following command.

```
# vicfg-module --server <ip address> --username root --password password -s
"hfc_queue_depth=16" hfcidd.o
```

After executing the command above, reboot ESX or ESXi host.

[Execution example when setting multiple parameters]

- esxcfg-module

```
# esxcfg-module -s "hfc_queue_depth=16 hfc_mck_retry=0" hfcidd.o
```

- vicfg-module

```
# vicfg-module --server <ip address> --username root --password password -s
"hfc_queue_depth=16 hfc_mck_retry=0" hfcidd.o
```

After executing the command above, reboot ESX or ESXi host.

| No. | Parameter | Parameter name | Default value | Available setting value |
|-----|---------------------------|-------------------|--|--|
| 1 | Max Transfer Size | hfc_max_transfer | 16MB | 1: 1MB 4: 4MB 8: 8MB 16: 16MB 32: 32MB |
| 2 | Link Down Time | hfc_link_down | ESX3.x: 30 ESX4.x: 15 ESXi4.x 15 | 0-60(sec) |
| 3 | Reset Delay Time | hfc_reset_delay | 7(sec) | 0-60(sec) |
| 4 | Machine Check Retry Count | hfc_mck_retry | 8(times) | 0-10(times) |
| 5 | Reset Timeout | hfc_reset_timeout | 20(sec) | 0-60(sec) |
| 6 | Abort Timeout | hfc_abort_timeout | 8(sec) | 0-60(sec) |
| 7 | Queue Depth | hfc_queue_depth | 32 | 1-256 |
| 8 | Interrupt Type | hfc_msi_enable | 0 | 0: (Legacy Int) 1: (MSI) 2: (MSI-X) |

Persistent bindings feature

VMware driver does not support Persistent Binding feature.

6

Error log information

The Hitachi Gigabit Fibre Channel Adapter provides the functions to gather the failure information (error log) when the various failures occurred.

Linux

Linux driver collects the various error log information using the daemon process (klogd) which outputs the kernel messages. Accordingly, klogd and syslogd must be executed to collect log information.

Though the output destination of log information is usually /var/log/messages, the output destination can be changed depending on the klogd and syslogd settings. Confirm these settings in advance.

If you use RASLOG feature of the HA Logger Kit for Linux provided by Support Service Symphony, you have to initiate RASLOG feature. Refer to the installation guides for details of the RASLOG.

The following version of the driver supports the script 'hfcrasinfo'. If your driver supports hfcrasinfo, execute the hfcrasinfo command. Doing so, you can collect syslog and other driver information at the same time.

RHEL6 or later: Driver version equals to x.6.17.2018 or higher.
RHEL5: Driver version equals to x.5.10.492 or higher.
RHEL4: Driver version equals to x.1.10.492 or higher.
RHEL3: Driver version equals to x.0.7.344 or higher.

Log level

The following table shows the log levels that the Hitachi Gigabit Fibre Channel Adapter use.

A log level value of KERN_INFO(6) or higher should be used.

| Log level | Message content |
|-----------------|--|
| KERN_ERR(3) | Message when Adapter detects error |
| KERN_WARNING(4) | Message when the error at the level without the problem in operation is detected |
| KERN_INFO(6) | Message to inform of output and configuration change of Adapter information |

To confirm the present log level, execute the following command.

```
# cat /proc/sys/kernel/printk
```

Error log information

❑ Display of title only

The title information for the error log output by the adapter driver is output by the following command:

- In case RASLOG feature is not installed;

```
#cat /var/log/messages | grep HFC_
```

Oct 15 18:58:57 Linux7 kernel: hfclddX:HFC_ERR6 Temporary FC Link error (ErrNo:0xXX)

(Date) (Logical device name) (Error name or error title) (Error number)

- In case RASLOG feature is installed;

```
#cat /var/log/messages | grep HFC_
```

Oct 15 18:58:57 Linux7 kernel: hfclddX, KALBE6xx-I HFC_ERR6 Temporary FC Link error

(Date) (Logical device name) (Error number) (Error name or error title)

“KALB” of “KALByyxx” shows that HBA driver collects this error and “xx” means error number.

❑ Error names and titles

| Error name | Classification | Error title |
|-------------|----------------|-------------------------------------|
| HFC_ERR1 | Error | Permanent FC Adapter Hardware error |
| HFC_ERR2 | Error | Temporary FC Adapter Hardware error |
| HFC_ERR3 | Error | Permanent FC Adapter Firmware error |
| HFC_ERR4 | Warning | Temporary FC Adapter Firmware error |
| HFC_ERR5 | Error | Permanent FC Link error |
| HFC_ERR6 | Warning | Temporary FC Link error |
| HFC_ERR9 | Information | FC Adapter Driver error |
| HFC_ERRA | Information | FC Adapter Interrupt time-out |
| HFC_ERRB | Warning | FC Adapter Link Down |
| HFC_ERRC | Information | FC Adapter Diagnostics error |
| HFC_ERRD | Error | FC Adapter PCI error |
| HFC_ERRF | Error | FC Adapter Initialize error |
| HFC_ERR10 | Information | FC Adapter Firmware version error |
| HFC_EVNT1 | Information | FC Adapter Link Up |
| HFC_EVNT2 | Information | FC Adapter Link Changed |
| HFC_EVNT3 | Warning | FC Adapter Driver Warning Event |
| HFC_EVNT4 | Information | FC Adapter Driver Request Log |
| HFC_OPTERR0 | Error | Invalid Optical Module install |

❑ Error numbers

Error number List (2/4/8Gbps Fibre Channel Adapter)

| No. | ErrNo | Error name | Contents | Remarks |
|-----|-------|------------|--|----------------|
| 1 | 01 | — | — | Missing number |
| 2 | 02 | — | — | Missing number |
| 3 | 03 | — | — | Missing number |
| 4 | 04 | HFC_ERR9 | SCSI command was executed when status is HFC_OFFLINE | |
| 5 | 05 | HFC_ERR9 | lov_cnt more than specified value | |
| 6 | 06 | — | — | Missing number |
| 7 | 07 | — | — | Missing number |
| 8 | 08 | HFC_ERR9 | The last entry of seg_info is F=0. | |
| 9 | 09 | — | — | Missing number |
| 10 | 0A | — | — | Missing number |
| 11 | 0B | HFC_EVNT3 | It is login response at the interrupt level and ww_name is a disagreement. | |
| 12 | 0C | HFC_ERR6 | It is login response at the interrupt level and XCC=82. (over the retry) | |
| 13 | 0D | HFC_ERR6 | It is login response at the interrupt level and XCC=82. (Retrying failed) | |
| 14 | 0E | HFC_ERR6 | In the login response at the interrupt level, XCC=83 or FSB=00. (Excluding AL_PA and new target) | (*3) |
| 15 | 0F | HFC_EVNT3 | It is the pdisc response at the interrupt level and ww_name is a disagreement. | |
| 16 | 10 | HFC_ERR6 | It is the pdisc response at the interrupt level and XCC=82. (over the retry) | |
| 17 | 11 | HFC_ERR6 | It is the pdisc response at the interrupt level and XCC=82. (Retrying failed) | |
| 18 | 12 | HFC_ERR6 | In the pdisc response at the interrupt level, XCC=83 or FSB=00 | |
| 19 | 13 | — | — | Missing number |
| 20 | 14 | HFC_ERRB | Detected Link Down interruption | |
| 21 | 15 | HFC_EVNT1 | Detected Link Up interruption | |
| 22 | 16 | HFC_EVNT2 | Detected PLOGI interruption | (*4) |
| 23 | 17 | HFC_EVNT2 | Detected LOGO interruption | (*1) (*4) |
| 24 | 18 | HFC_EVNT2 | Detected SCN/RSCN interruption | (*4) |
| 25 | 19 | — | — | Missing number |
| 26 | 1A | — | — | Missing number |
| 27 | 1B | — | — | Missing number |
| 28 | 1C | HFC_EVNT3 | Detected the unanticipated interruption | |
| 29 | 1D | HFC_EVNT3 | Xrb valid flag is "0". | |
| 30 | 1E | — | — | Missing number |
| 31 | 1F | — | — | Missing number |
| 32 | 20 | HFC_ERR6 | It is Target_Reset and is XCC#80 or FSB#00. | |
| 33 | 21 | HFC_ERR6 | It is Abort_Task_Set and is XCC#80 or FSB#00. | |
| 34 | 22 | HFC_ERR6 | It is normal SCSI start and is XCC#80 or FSB#00. | |
| 35 | 23 | — | — | Missing number |

| No. | ErrNo | Error name | Contents | Remarks |
|-----|-------|------------|--|-------------------|
| 36 | 24 | HFC_ERRA | Detected Time-Out in the scsi command operation. | |
| 37 | 25 | — | — | Missing number |
| 38 | 26 | HFC_ERRA | Detected Time-Out of Abort_Task_Set. | |
| 39 | 27 | — | — | Missing number |
| 40 | 28 | — | — | Missing number |
| 41 | 29 | HFC_ERRA | Time-out was detected at Target_Reset | |
| 42 | 2A | HFC_EVNT4 | Detected Time-Out in mailbox procedure at interrupt level | |
| 43 | 2B | HFC_ERR2 | Detected MCKINT | Collecting mcklog |
| 44 | 2C | HFC_ERR4 | Detected MCKINT (MPCHK) | Collecting mcklog |
| 45 | 2D | HFC_ERR4 | Detected MCKINT (T-OUT3) | Collecting mcklog |
| 46 | 2E | — | — | Missing number |
| 47 | 2F | — | — | Missing number |
| 48 | 30 | — | — | Missing number |
| 49 | 31 | HFC_ERR1 | CHECK-STOP occurred | |
| 50 | 32 | HFC_ERRD | PCI SERR | |
| 51 | 33 | HFC_ERRD | PCI PERR | |
| 52 | 34 | HFC_ERRD | PCI SPERR | |
| 53 | 35 | HFC_ERRF | Check error of initial value of H/W status | |
| 54 | 36 | HFC_ERRF | POST error | |
| 55 | 37 | HFC_ERR9 | Failed Adap_info allocation | |
| 56 | 38 | HFC_ERR9 | Failed Fw_init table allocation | |
| 57 | 39 | HFC_ERR9 | Failed Xob table allocation | |
| 58 | 3A | HFC_ERR9 | Failed Xrb table allocation | |
| 59 | 3B | HFC_ERR9 | Failed Mailbox table allocation | |
| 60 | 3C | HFC_ERR9 | Failed FS_AC area C allocation | |
| 61 | 3D | HFC_ERR9 | Failed Soft_log_area table allocation | |
| 62 | 3E | HFC_ERR9 | Failed Trace area allocation | |
| 63 | 3F | — | — | Missing number |
| 64 | 40 | — | — | Missing number |
| 65 | 41 | — | — | Missing number |
| 66 | 42 | — | — | Missing number |
| 67 | 43 | — | — | Missing number |
| 68 | 44 | — | — | Missing number |
| 69 | 45 | — | — | Missing number |
| 70 | 46 | — | — | Missing number |
| 71 | 47 | — | — | Missing number |
| 72 | 48 | — | — | Missing number |
| 73 | 49 | — | — | Missing number |
| 74 | 4A | — | — | Missing number |
| 75 | 4B | — | — | Missing number |
| 76 | 4C | — | — | Missing number |
| 77 | 4D | — | — | Missing number |
| 78 | 4E | — | — | Missing number |
| 79 | 4F | HFC_ERR9 | Failed to register the interrupt processing to kernel | |
| 80 | 50 | HFC_EVNT3 | Adapter number was overlapped | |
| 81 | 51 | HFC_EVNT4 | Detected the time-out during waiting the mailbox completion. | (*2) |
| 82 | 52 | HFC_ERR6 | Detected an error at the mailbox completion. | (*2) |
| 83 | 53 | — | — | Missing number |
| 84 | 54 | — | — | Missing number |

| No. | ErrNo | Error name | Contents | Remarks |
|-----|-------|------------|---|----------------|
| 85 | 55 | HFC_ERR9 | Failed the allocation of Seg_info array structures | |
| 86 | 56 | HFC_ERR9 | Failed the allocation of Seg_info array bitmap | |
| 87 | 57 | HFC_ERR9 | Allocated area was not aligned to the designated boundary | |
| 88 | 58 | HFC_EVNT3 | Allocated FS_ACC area was not aligned to the designated boundary | |
| 89 | 59 | HFC_ERR6 | Nameserver rejects requests | |
| 90 | 5A | HFC_ERR9 | Allocated Payload area was not aligned to the designated boundary | |
| 91 | 5B | HFC_ERR9 | Allocated Response area was not aligned to the designated boundary | |
| 92 | 5C | HFC_EVNT4 | All 'F' was read when reading the address '0' PCI memory | |
| 93 | 5D | — | — | Missing number |
| 94 | 5E | HFC_ERRC | Failed data copy from user space | |
| 95 | 5F | HFC_ERRC | Failed data copy in user space | |
| 96 | 60 | HFC_ERRC | Failed Memory allocation | |
| 97 | 61 | HFC_ERRC | Failed to acquire DMA handle | |
| 98 | 62 | HFC_ERRC | Failed DMA memory page mapping | |
| 99 | 63 | — | — | Missing number |
| 100 | 64 | — | — | Missing number |
| 101 | 65 | — | — | Missing number |
| 102 | 66 | — | — | Missing number |
| 103 | 67 | — | — | Missing number |
| 104 | 68 | HFC_ERR9 | Execution of unjustified IOCTL | |
| 105 | 69 | — | — | Missing number |
| 106 | 6A | HFC_EVNT3 | The unsupported INT occurred. (Mask is not opened.) | |
| 107 | 6B | — | — | Missing number |
| 108 | 6C | HFC_ERR9 | Failed to allocate trace area | |
| 109 | 6D | HFC_ERR9 | Failed to allocate Init_table_list | |
| 110 | 6E | HFC_ERR9 | Failed to allocate mem_info_list | |
| 111 | 6F | HFC_ERR9 | Failed to allocate mem_info | |
| 112 | 70 | HFC_ERR9 | The failure occurred when conversion from 32 bit to 64 bit is executed on X86_64 API interface. | |
| 113 | 71 | HFC_ERRF | The Capabilities List value is invalid. (Excluding one.) | |
| 114 | 72 | HFC_ERRF | The Capabilities pointer value is invalid. (Excluding 0x40.) | |
| 115 | 73 | HFC_ERRF | The Capabilities List ID value is invalid. (Excluding three.) | |
| 116 | 74 | HFC_ERRF | Failed to acquire VPD information (time-out) | |
| 117 | 75 | HFC_ERRF | The checksum value is unjustified. | |
| 118 | 76 | — | — | Missing number |
| 119 | 77 | HFC_ERRC | DIAG(POST) failure | (*2) |
| 120 | 78 | HFC_ERRC | DIAG(POST) time-out | (*2) |
| 121 | 79 | — | — | Missing number |
| 122 | 7A | — | — | Missing number |
| 123 | 7B | HFC_ERR6 | It is GID-FT of the interrupt level and XCC=82. (over the retry) | |
| 124 | 7C | HFC_ERR6 | It is GID-FT of the interrupt level and XCC=82. (Retrying Failed) | |
| 125 | 7D | HFC_ERR6 | It is GID-FT of the interrupt level and is XCC=83 or FSB#00. | |

| No. | ErrNo | Error name | Contents | Remarks |
|-----|-------|------------|--|----------------|
| 126 | 7E | HFC_ERR6 | It is MIH-LOG response of the interrupt level and is XCC#80 or FSB#00. | |
| 127 | 7F | HFC_ERRA | SCSI command time-out | |
| 128 | 80 | HFC_EVNT3 | In the TMT check, it is neither Target Reset nor Abort Task Set | |
| 129 | 81 | HFC_ERR6 | It is GID_PN of the interrupt level and XCC=82. (over the retry) | |
| 130 | 82 | HFC_ERR6 | It is GID_PN of the interrupt level and XCC=82. (..retrying.. failure) | |
| 131 | 83 | HFC_ERR6 | It is GID_PN of the interrupt level and is XCC=83 or FSB#00. | |
| 132 | 84 | HFC_ERR6 | It is GPN_ID of the interrupt level and XCC=82. (over the retry) | |
| 133 | 85 | HFC_ERR6 | It is GPN_ID of the interrupt level and XCC=82. (Retrying failed) | |
| 134 | 86 | HFC_ERR6 | It is GPN_ID of the interrupt level and is XCC=83 or FSB#00. | |
| 135 | 87 | - | - | |
| 136 | 88 | HFC_ERR6 | It is Link Initialize response and is XCC=83 or FSB#00. | |
| 137 | 89 | HFC_ERR6 | It is Link Initialize response and XCC=82. (Retrying failed) | |
| 138 | 8A | HFC_ERR6 | It is Link Initialize response and is XCC=83 or FSB#00. | |
| 139 | 8B | - | - | Missing number |
| 140 | 8C | - | - | Missing number |
| 141 | 8D | HFC_EVNT4 | A pertinent command remains in XOB at the SCSI command time-out. | |
| 142 | 8E | HFC_EVNT2 | The adapter port is isolated by executing command. | |
| 143 | 8F | HFC_EVNT2 | The adapter port is isolated by exceeding error threshold | |
| 144 | 90 | HFC_ERR9 | The assignment of the adapter number is wrong. (There is no adapter0 assignment.) | |
| 145 | 91 | HFC_ERR9 | The assignment of the adapter number is wrong. (But adapter numbers more than one is correctly specified this adapter number assignment is wrong.) | |
| 146 | 92 | HFC_ERR9 | The assignment of the adapter number is wrong. (The adapter is not specified though Persistent Binding is specified.) | |
| 147 | 93 | HFC_EVNT3 | Write command terminated with error | |
| 148 | 94 | - | - | Missing number |
| 149 | 95 | - | - | Missing number |
| 150 | 96 | - | - | Missing number |
| 151 | 97 | - | - | Missing number |
| 152 | 98 | - | - | Missing number |
| 153 | 99 | - | - | Missing number |
| 154 | 9A | HFC_ERR9 | The PCI memory space mapping is impossible. | |
| 155 | 9B | HFC_ERR9 | Failed the adapter detection. (There is no effective adapter.) | |

| No. | ErrNo | Error name | Contents | Remarks |
|-----|-------|-------------|---|--------------------------|
| 156 | 9C | HFC_OPTERR0 | The unsupported optical transceiver is installed. | |
| 157 | 9D | HFC_ERR5 | Detected the trouble of the adapter transceiver. | |
| 158 | 9E | HFC_ERR5 | Detected the trouble of the optical transceiver. | |
| 159 | 9F | HFC_ERR5 | The optical transceiver has come off. | |
| 160 | A0 | HFC_EVT4 | Detected memory 1bit error in 4Gbps Fibre Channel Adapter. | |
| 161 | A1 | | | |
| 162 | A2 | HFC_ERR9 | Detected an error on MMIO-HG area in LPAR mode. | |
| 163 | A3 | HFC_ERR9 | MMIO-HG area in LPAR mode failed to be assigned. | |
| 164 | A4 | HFC_ERR2 | Memory 1bit error was detected in 8Gbps Fibre Channel Adapter. (Exceeded threshold) | Threshold is nine times. |
| 165 | A5 | HFC_ERR2 | PCI IP code SRAM 1bit error was detected (Exceeded threshold) | Threshold is four times. |
| 166 | A6 | HFC_EVT4 | Start Firmware Online Update | |
| 167 | A7 | HFC_EVT4 | Complete Firmware Online Update | |
| 168 | A8 | HFC_ERR9 | Program Check at Target Reset was detected | |
| 169 | A9 | HFC_ERR9 | Program Check at LUN_Reset and Abort_Task_Set was detected | |
| 170 | AA | HFC_ERR9 | Program Check at normal SCSI response was detected | |
| 171 | AB | HFC_ERR9 | Program Check at Mailbox response (Interrupt level) was detected | |
| 172 | AC | | | |
| 173 | AD | HFC_ERR9 | Program Check at asynchronous Mailbox interruption was detected | |
| 174 | AE | – | – | Missing number |
| 175 | AF | HFC_EVT4 | Adapter was changed into other one by the change of the physical server by LPAR manager. | |
| 176 | B0 | HFC_EVT3 | Failed to register interrupt process to kernel (MSI-X) | |
| 177 | B1 | HFC_EVT4 | Invalid interruption was generated by LPAR manager at LPAR mode | |
| 178 | B2 | HFC_EVT4 | Interruption was received from invalid LPAR at LPAR mode | |
| 179 | B3 | HFC_EVT3 | Failed to initiate watchdog timer at processing Mailbox response | |
| 180 | B4 | HFC_EVT3 | Failed to initiate watchdog timer at executing tools | |
| 181 | B5 | HFC_EVT3 | Failed to start the watchdog timer in the Mailbox indicating that F/W initializes the Fibre Channel link. | |
| 182 | B6 | HFC_EVT3 | Failed to start the watchdog timer in the Mailbox indicating that F/W executes the GIDFT process. | |
| 183 | B7 | HFC_EVT3 | Failed to start the watchdog timer in the Mailbox indicating that F/W executes the GIDPN process. | |
| 184 | B8 | HFC_EVT3 | Failed to start the watchdog timer in the Mailbox indicating that F/W executes the LOGIN process. | |

| No. | ErrNo | Error name | Contents | Remarks |
|-----|-------|------------|--|----------------|
| 185 | B9 | HFC_EVNT3 | Failed to start the watchdog timer in the Mailbox indicating that F/W executes the PDISC process. | |
| 186 | BA | HFC_EVNT3 | Failed to start the watchdog timer in the Mailbox indicating that F/W executes the MIHLOG process. | |
| 187 | BB | HFC_EVNT3 | Detected the conflict on starting watchdog timer | |
| 188 | BC | HFC_EVNT3 | Installed RASLOG have been unloaded. | |
| 189 | BD | HFC_EVNT3 | Failed to retry RASLOG | |
| 190 | BE | HFC_EVNT4 | Invalid command packet address was received | |
| 191 | BF | HFC_EVNT3 | Failed to register kernel thread | |
| 192 | C0 | - | - | |
| 193 | C1 | - | - | Missing number |
| 194 | C2 | - | - | Missing number |
| 195 | C3 | HFC_ERR9 | Failed to execute "pci_set_dma_mask" function. | |
| 196 | C4 | HFC_ERR9 | Detected the invalid data in the MMIO-HG in LPAR mode. | |
| 197 | C5 | HFC_ERR9 | Failed to allocate the resource of Fibre Channel Adapter. | |
| 198 | C6 | HFC_ERR9 | Failed to execute "scsi_add_host" function. | |
| 199 | C7 | HFC_ERR9 | Failed to execute "_hraslogserv" function (return code = 1). | |
| 200 | C8 | HFC_ERR9 | Installed RASLOG was uninstalled | |
| 201 | C9 | HFC_EVNT3 | Failed to read FLASH-ROM | |
| 202 | CA | HFC_ERR9 | Detected the errors in executing "pci_resource_flags" function. | |
| 203 | CB | HFC_ERR9 | Detected the errors in executing "pci_resource_start" function. | |
| 204 | CC | HFC_ERR9 | Detected the errors in executing "pci_resource_regions" function. | |
| 205 | CD | HFC_ERR9 | Detected the errors in executing "ioremap" function. | |
| 206 | CE | HFC_ERR9 | The Package Code is invalid | |
| 207 | CF | HFC_ERR9 | The Package Code or port number is invalid. | |
| 208 | D0 | HFC_ERR9 | Failed to initialize at shared mode | |
| 209 | D1 | HFC_ERR9 | Linkspeed parameter at configuration file is invalid | |
| 210 | D2 | HFC_ERR9 | Failed to allocate DMA area | |
| 211 | D3 | HFC_EVNT2 | The adapter is recovered from isolated status | |
| 212 | D4 | HFC_EVNT2 | Port is isolated by user command | |
| 213 | D5 | HFC_EVNT2 | Port is isolated with exceeding error threshold | |
| 214 | D6 | HFC_EVNT3 | Error threshold parameter at configuration file is invalid | |
| 215 | D7 | HFC_ERRF | AddWWPN or VFCWWPN is invalid | |
| 216 | D8 | HFC_EVNT3 | Failed to create virtual port | |
| 217 | D9 | HFC_EVNT3 | PCIe Link_Width register inconsistency was detected | |

| No. | ErrNo | Error name | Contents | Remarks |
|-----|-------|------------|---|----------------|
| 218 | DA | HFC_ERR2 | PCle Link_Width register inconsistency was detected (Fatal) | |
| 219 | DB | – | – | Missing number |
| 220 | DC | – | – | Missing number |
| 221 | DD | – | – | Missing number |
| 222 | DE | – | – | Missing number |
| 223 | DF | – | – | Missing number |
| 224 | F0 | – | Driver log that continues to softlog and mcklog. | |

- (*1) There may exist an event log of ErrNo:0x17 when the driver is installed or the server is rebooted in case of the cascade composition.
Please set a value that is larger than the displayed value to "LOGIN DELAY TIME" according to "HITACHI Gigabit Fibre Channel Adapter USER'S GUIDE(Utility Software Edition)" when this event is generated.
The set value has the possibility that the event log of ErrNo:0x17 is generated even if it depends on the composition, and this setting is done. Please set a bigger value to the value of "LOGIN DELAY TIME" in that case.
- (*2) Mailbox procedure: Procedure that the driver of Hitachi Gigabit Fibre Channel Adapter directs the firmware the execution of processing other than the SCSI start. This start is a synchronous command, and one end response becomes a pair for one start. The command executed by this start is as follows.
- a) Link establishment instruction in FC interface.
 - b) Frame transmission instruction of login etc.
 - c) Trouble information (log) collection instruction
- (*3) There is a possibility that the event log of ErrNo:0x0E is generated when the server reboots, when the port of the adapter on the server is not registered in the LUN security and the LUN security of the port of the connected disk device is made effective. In that case, please confirm the following.
- a) Each port of the disk device that should be connected with the port of the adapter that outputted the event log must be done in the zoning in the same zone in FC-Switch.
 - b) Do not let the port of the disk device that should not be connected with the port of the adapter that outputted the event log be done in the zoning in the same zone in FC-Switch.
 - c) The port of the adapter that outputted the event log must be registered in the LUN security of the port of all the disk devices connected in the same zone in FC-Switch with the port.
- (*4) When the adapter port is not separated from the rest of the ports, such as using Access Gateway mode in FC-switch, the adapter port interferes with each other unlike the adapter ports are in usual Zoning. Because of this reason, Linkdown of the other adapter port or the server reboot may make the driver log unnecessary errors. When you need to stop an unnecessary logs, There is a driver parameter which stops unnecessary errors. For detail, see 'HITACHI Gigabit Fibre Channel Adapter USER'S GUIDE (Utility Software Edition)'.

Error number List (16Gbps Fibre Channel Adapter)

| No. | ErrNo | Error name | Contents | Remarks |
|-----|-------|------------|--|----------------|
| 1 | 01 | — | — | Missing number |
| 2 | 02 | — | — | Missing number |
| 3 | 03 | — | — | Missing number |
| 4 | 04 | HFC_ERR9 | SCSI command was executed when status is HFC_OFFLINE | |
| 5 | 05 | HFC_ERR9 | lov_cnt more than specified value | |
| 6 | 06 | — | — | Missing number |
| 7 | 07 | — | — | Missing number |
| 8 | 08 | HFC_ERR9 | The last entry of seg_info is F=0. | |
| 9 | 09 | — | — | Missing number |
| 10 | 0A | — | — | Missing number |
| 11 | 0B | HFC_EVNT3 | It is login response at the interrupt level and ww_name is a disagreement. | |
| 12 | 0C | HFC_ERR6 | It is login response at the interrupt level and XCC=82. (over the retry) | |
| 13 | 0D | HFC_ERR6 | It is login response at the interrupt level and XCC=82. (Retrying failed) | |
| 14 | 0E | HFC_ERR6 | In the login response at the interrupt level, XCC=83 or FSB=00. (Excluding AL_PA and new target) | (*3) |
| 15 | 0F | HFC_EVNT3 | It is the pdisc response at the interrupt level and ww_name is a disagreement. | |
| 16 | 10 | HFC_ERR6 | It is the pdisc response at the interrupt level and XCC=82. (over the retry) | |
| 17 | 11 | HFC_ERR6 | It is the pdisc response at the interrupt level and XCC=82. (Retrying failed) | |
| 18 | 12 | HFC_ERR6 | In the pdisc response at the interrupt level, XCC=83 or FSB=00 | |
| 19 | 13 | — | — | Missing number |
| 20 | 14 | HFC_ERRB | Detected Link Down interruption | |
| 21 | 15 | HFC_EVNT1 | Detected Link Up interruption | |
| 22 | 16 | HFC_EVNT2 | Detected PLOGI interruption | (*4) |
| 23 | 17 | HFC_EVNT2 | Detected LOGO interruption | (*1) (*4) |
| 24 | 18 | HFC_EVNT2 | Detected SCN/RSCN interruption | (*4) |
| 25 | 19 | — | — | Missing number |
| 26 | 1A | HFC_EVNT3 | At the link initialization processing after after MCK recovery or Link Up reception, an abnormal response at Mailbox is detected. "FSB!=0 or retry over" | |
| 27 | 1B | HFC_EVNT3 | Received Link Up | |
| 28 | 1C | HFC_EVNT3 | Detected the unanticipated interruption | |
| 29 | 1D | HFC_EVNT3 | Xrb valid flag is "0". | |
| 30 | 1E | — | — | Missing number |
| 31 | 1F | — | — | Missing number |
| 32 | 20 | HFC_ERR6 | It is Target_Reset and is XCC#80 or FSB#00. | |
| 33 | 21 | HFC_ERR6 | It is Abort_Task_Set and is XCC#80 or FSB#00. | |
| 34 | 22 | HFC_ERR6 | It is normal SCSI start and is XCC#80 or FSB#00. | |
| 35 | 23 | — | — | Missing number |

| No. | ErrNo | Error name | Contents | Remarks |
|-----|-------|------------|--|-------------------|
| 36 | 24 | HFC_ERRA | Detected Time-Out in the scsi command operation. | |
| 37 | 25 | — | — | Missing number |
| 38 | 26 | HFC_ERRA | Detected Time-Out of Abort_Task_Set. | |
| 39 | 27 | — | — | Missing number |
| 40 | 28 | — | — | Missing number |
| 41 | 29 | HFC_ERRA | Time-out was detected at Target_Reset | |
| 42 | 2A | HFC_EVNT4 | Detected Time-Out in mailbox procedure at interrupt level | |
| 43 | 2B | HFC_ERR2 | Detected MCKINT | Collecting mcklog |
| 44 | 2C | HFC_ERR4 | Detected MCKINT (MPCHK) | Collecting mcklog |
| 45 | 2D | HFC_ERR4 | Detected MCKINT (T-OUT3) | Collecting mcklog |
| 46 | 2E | HFC_EVNT2 | performed temporary optical off | |
| 47 | 2F | HFC_EVNT3 | Check stopped core part of HBA | |
| 48 | 30 | — | — | Missing number |
| 49 | 31 | HFC_ERR1 | CHECK-STOP occurred | |
| 50 | 32 | HFC_ERRD | PCI SERR | |
| 51 | 33 | HFC_ERRD | PCI PERR | |
| 52 | 34 | HFC_ERRD | PCI SPERR | |
| 53 | 35 | HFC_ERRF | Check error of initial value of H/W status | |
| 54 | 36 | HFC_ERRF | POST error | |
| 55 | 37 | HFC_ERR9 | Failed Adap_info allocation | |
| 56 | 38 | HFC_ERR9 | Failed Fw_init table allocation | |
| 57 | 39 | HFC_ERR9 | Failed Xob table allocation | |
| 58 | 3A | HFC_ERR9 | Failed Xrb table allocation | |
| 59 | 3B | HFC_ERR9 | Failed Mailbox table allocation | |
| 60 | 3C | HFC_ERR9 | Failed FS_AC area C allocation | |
| 61 | 3D | HFC_ERR9 | Failed Soft_log_area table allocation | |
| 62 | 3E | HFC_ERR9 | Failed Trace area allocation | |
| 63 | 3F | — | — | Missing number |
| 64 | 40 | — | — | Missing number |
| 65 | 41 | — | — | Missing number |
| 66 | 42 | — | — | Missing number |
| 67 | 43 | — | — | Missing number |
| 68 | 44 | — | — | Missing number |
| 69 | 45 | — | — | Missing number |
| 70 | 46 | — | — | Missing number |
| 71 | 47 | — | — | Missing number |
| 72 | 48 | — | — | Missing number |
| 73 | 49 | — | — | Missing number |
| 74 | 4A | — | — | Missing number |
| 75 | 4B | — | — | Missing number |
| 76 | 4C | — | — | Missing number |
| 77 | 4D | — | — | Missing number |
| 78 | 4E | — | — | Missing number |
| 79 | 4F | HFC_ERR9 | Failed to register the interrupt processing to kernel | |
| 80 | 50 | HFC_EVNT3 | Adapter number was overlapped | |
| 81 | 51 | HFC_EVNT4 | Detected the time-out during waiting the mailbox completion. | (*2) |
| 82 | 52 | HFC_ERR6 | Detected an error at the mailbox completion. | (*2) |
| 83 | 53 | — | — | Missing number |
| 84 | 54 | — | — | Missing number |

| No. | ErrNo | Error name | Contents | Remarks |
|-----|-------|------------|---|----------------|
| 85 | 55 | HFC_ERR9 | Failed the allocation of Seg_info array structures | |
| 86 | 56 | HFC_ERR9 | Failed the allocation of Seg_info array bitmap | |
| 87 | 57 | HFC_ERR9 | Allocated area was not aligned to the designated boundary | |
| 88 | 58 | HFC_EVNT3 | Allocated FS_ACC area was not aligned to the designated boundary | |
| 89 | 59 | HFC_ERR6 | Nameserver rejects requests | |
| 90 | 5A | HFC_ERR9 | Allocated Payload area was not aligned to the designated boundary | |
| 91 | 5B | HFC_ERR9 | Allocated Response area was not aligned to the designated boundary | |
| 92 | 5C | HFC_EVNT4 | All 'F' was read when reading the address '0' PCI memory | |
| 93 | 5D | — | — | Missing number |
| 94 | 5E | HFC_ERRC | Failed data copy from user space | |
| 95 | 5F | HFC_ERRC | Failed data copy in user space | |
| 96 | 60 | HFC_ERRC | Failed Memory allocation | |
| 97 | 61 | HFC_ERRC | Failed to acquire DMA handle | |
| 98 | 62 | HFC_ERRC | Failed DMA memory page mapping | |
| 99 | 63 | — | — | Missing number |
| 100 | 64 | — | — | Missing number |
| 101 | 65 | — | — | Missing number |
| 102 | 66 | — | — | Missing number |
| 103 | 67 | — | — | Missing number |
| 104 | 68 | HFC_ERR9 | Execution of unjustified IOCTL | |
| 105 | 69 | — | — | Missing number |
| 106 | 6A | HFC_EVNT3 | The unsupported INT occurred. (Mask is not opened.) | |
| 107 | 6B | — | — | Missing number |
| 108 | 6C | HFC_ERR9 | Failed to allocate trace area | |
| 109 | 6D | HFC_ERR9 | Failed to allocate Init_table_list | |
| 110 | 6E | HFC_ERR9 | Failed to allocate mem_info_list | |
| 111 | 6F | HFC_ERR9 | Failed to allocate mem_info | |
| 112 | 70 | HFC_ERR9 | The failure occurred when conversion from 32 bit to 64 bit is executed on X86_64 API interface. | |
| 113 | 71 | HFC_ERRF | The Capabilities List value is invalid. (Excluding one.) | |
| 114 | 72 | HFC_ERRF | The Capabilities pointer value is invalid. (Excluding 0x40.) | |
| 115 | 73 | HFC_ERRF | The Capabilities List ID value is invalid. (Excluding three.) | |
| 116 | 74 | HFC_ERRF | Failed to acquire VPD information (time-out) | |
| 117 | 75 | HFC_ERRF | The checksum value is unjustified. | |
| 118 | 76 | — | — | Missing number |
| 119 | 77 | HFC_ERRC | DIAG(POST) failure | (*2) |
| 120 | 78 | HFC_ERRC | DIAG(POST) time-out | (*2) |
| 121 | 79 | — | — | Missing number |
| 122 | 7A | — | — | Missing number |
| 123 | 7B | HFC_ERR6 | It is GID-FT of the interrupt level and XCC=82. (over the retry) | |
| 124 | 7C | HFC_ERR6 | It is GID-FT of the interrupt level and XCC=82. (Retrying Failed) | |
| 125 | 7D | HFC_ERR6 | It is GID-FT of the interrupt level and is XCC=83 or FSB#00. | |

| No. | ErrNo | Error name | Contents | Remarks |
|-----|-------|------------|--|----------------|
| 126 | 7E | HFC_ERR6 | It is MIH-LOG response of the interrupt level and is XCC#80 or FSB#00. | |
| 127 | 7F | HFC_ERRA | SCSI command time-out | |
| 128 | 80 | HFC_EVNT3 | In the TMT check, it is neither Target Reset nor Abort Task Set | |
| 129 | 81 | HFC_ERR6 | It is GID_PN of the interrupt level and XCC=82. (over the retry) | |
| 130 | 82 | HFC_ERR6 | It is GID_PN of the interrupt level and XCC=82. (..retrying.. failure) | |
| 131 | 83 | HFC_ERR6 | It is GID_PN of the interrupt level and is XCC=83 or FSB#00. | |
| 132 | 84 | HFC_ERR6 | It is GPN_ID of the interrupt level and XCC=82. (over the retry) | |
| 133 | 85 | HFC_ERR6 | It is GPN_ID of the interrupt level and XCC=82. (Retrying failed) | |
| 134 | 86 | HFC_ERR6 | It is GPN_ID of the interrupt level and is XCC=83 or FSB#00. | |
| 135 | 87 | - | - | |
| 136 | 88 | HFC_ERR6 | It is Link Initialize response and is XCC=83 or FSB#00. | |
| 137 | 89 | HFC_ERR6 | It is Link Initialize response and XCC=82. (Retrying failed) | |
| 138 | 8A | HFC_ERR6 | It is Link Initialize response and is XCC=83 or FSB#00. | |
| 139 | 8B | - | - | Missing number |
| 140 | 8C | - | - | Missing number |
| 141 | 8D | HFC_EVNT4 | A pertinent command remains in XOB at the SCSI command time-out. | |
| 142 | 8E | HFC_EVNT2 | The adapter port is isolated by executing command. | |
| 143 | 8F | HFC_EVNT2 | The adapter port is isolated by exceeding error threshold | |
| 144 | 90 | HFC_ERR9 | The assignment of the adapter number is wrong. (There is no adapter0 assignment.) | |
| 145 | 91 | HFC_ERR9 | The assignment of the adapter number is wrong. (But adapter numbers more than one is correctly specified this adapter number assignment is wrong.) | |
| 146 | 92 | HFC_ERR9 | The assignment of the adapter number is wrong. (The adapter is not specified though Persistent Binding is specified.) | |
| 147 | 93 | HFC_EVNT3 | Write command terminated with error | |
| 148 | 94 | - | - | Missing number |
| 149 | 95 | - | - | Missing number |
| 150 | 96 | HFC_ERRF | POST fails in some cores | |
| 151 | 97 | - | - | Missing number |
| 152 | 98 | - | - | Missing number |
| 153 | 99 | - | - | Missing number |
| 154 | 9A | HFC_ERR9 | The PCI memory space mapping is impossible. | |
| 155 | 9B | HFC_ERR9 | Failed the adapter detection. (There is no effective Adapter.) | |

| No. | ErrNo | Error name | Contents | Remarks |
|-----|-------|-------------|---|-------------------------|
| 156 | 9C | HFC_OPTERR0 | The unsupported optical transceiver is installed. | |
| 157 | 9D | HFC_ERR5 | Detected the trouble of the adapter transceiver. | |
| 158 | 9E | HFC_ERR5 | Detected the trouble of the optical transceiver. | |
| 159 | 9F | HFC_ERR5 | The optical transceiver has come off. | |
| 160 | A0 | — | — | Missing number |
| 161 | A1 | | | |
| 162 | A2 | HFC_ERR9 | Detected an error on MMIO-HG area in LPAR mode. | |
| 163 | A3 | HFC_ERR9 | MMIO-HG area in LPAR mode failed to be assigned. | |
| 164 | A4 | HFC_ERR2 | Memory 1bit error was detected in 16Gbps Fibre Channel Adapter. (Exceeded threshold) | Threshold is 15 times. |
| 165 | A5 | HFC_ERR2 | PCI IP code SRAM 1bit error was detected (Exceeded threshold) | Threshold is six times. |
| 166 | A6 | HFC_EVNT4 | Start Firmware Online Update | |
| 167 | A7 | HFC_EVNT4 | Complete Firmware Online Update | |
| 168 | A8 | HFC_ERR9 | Program Check at Target Reset was detected | |
| 169 | A9 | HFC_ERR9 | Program Check at LUN_Reset and Abort_Task_Set was detected | |
| 170 | AA | HFC_ERR9 | Program Check at normal SCSI response was detected | |
| 171 | AB | HFC_ERR9 | Program Check at Mailbox response (Interrupt level) was detected | |
| 172 | AC | | | |
| 173 | AD | HFC_ERR9 | Program Check at asynchronous Mailbox interruption was detected | |
| 174 | AE | HFC_EVNT4 | The change of the physical server of LPAR manager failed. | |
| 175 | AF | HFC_EVNT4 | Adapter was changed into other one by the change of the physical server by LPAR manager. | |
| 176 | B0 | HFC_EVNT3 | Failed to register interrupt process to kernel (MSI-X) | |
| 177 | B1 | HFC_EVNT4 | Invalid interruption was generated by LPAR manager at LPAR mode | |
| 178 | B2 | HFC_EVNT4 | Interruption was received from invalid LPAR at LPAR mode | |
| 179 | B3 | HFC_EVNT3 | Failed to initiate watchdog timer at processing Mailbox response | |
| 180 | B4 | HFC_EVNT3 | Failed to initiate watchdog timer at executing tools | |
| 181 | B5 | HFC_EVNT3 | Failed to start the watchdog timer in the Mailbox indicating that F/W initializes the Fibre Channel link. | |
| 182 | B6 | HFC_EVNT3 | Failed to start the watchdog timer in the Mailbox indicating that F/W executes the GIDFT process. | |
| 183 | B7 | HFC_EVNT3 | Failed to start the watchdog timer in the Mailbox indicating that F/W executes the GIDPN process. | |
| 184 | B8 | HFC_EVNT3 | Failed to start the watchdog timer in the Mailbox indicating that F/W executes the LOGIN process. | |

| No. | ErrNo | Error name | Contents | Remarks |
|-----|-------|------------|--|----------------|
| 185 | B9 | HFC_EVNT3 | Failed to start the watchdog timer in the Mailbox indicating that F/W executes the PDISC process. | |
| 186 | BA | HFC_EVNT3 | Failed to start the watchdog timer in the Mailbox indicating that F/W executes the MIHLOG process. | |
| 187 | BB | HFC_EVNT3 | Detected the conflict on starting watchdog timer | |
| 188 | BC | HFC_EVNT3 | Installed RASLOG have been unloaded. | |
| 189 | BD | HFC_EVNT3 | Failed to retry RASLOG | |
| 190 | BE | HFC_EVNT4 | Invalid command packet address was received | |
| 191 | BF | HFC_EVNT3 | Failed to register kernel thread | |
| 192 | C0 | - | - | |
| 193 | C1 | - | - | Missing number |
| 194 | C2 | - | - | Missing number |
| 195 | C3 | HFC_ERR9 | Failed to execute "pci_set_dma_mask" function. | |
| 196 | C4 | HFC_ERR9 | Detected the invalid data in the MMIO-HG in LPAR mode. | |
| 197 | C5 | HFC_ERR9 | Failed to allocate the resource of Fibre Channel Adapter. | |
| 198 | C6 | HFC_ERR9 | Failed to execute "scsi_add_host" function. | |
| 199 | C7 | HFC_ERR9 | Failed to execute "_hraslogserv" function (return code = 1). | |
| 200 | C8 | HFC_ERR9 | Installed RASLOG was uninstalled | |
| 201 | C9 | HFC_EVNT3 | Failed to read FLASH-ROM | |
| 202 | CA | HFC_ERR9 | Detected the errors in executing "pci_resource_flags" function. | |
| 203 | CB | HFC_ERR9 | Detected the errors in executing "pci_resource_start" function. | |
| 204 | CC | HFC_ERR9 | Detected the errors in executing "pci_resource_regions" function. | |
| 205 | CD | HFC_ERR9 | Detected the errors in executing "ioremap" function. | |
| 206 | CE | HFC_ERR9 | The Package Code is invalid | |
| 207 | CF | HFC_ERR9 | The Package Code or port number is invalid. | |
| 208 | D0 | HFC_ERR9 | Failed to initialize at shared mode | |
| 209 | D1 | HFC_ERR9 | Linkspeed parameter at configuration file is invalid | |
| 210 | D2 | HFC_ERR9 | Failed to allocate DMA area | |
| 211 | D3 | HFC_EVNT2 | The adapter is recovered from isolated status | |
| 212 | D4 | HFC_EVNT2 | Port is isolated by user command | |
| 213 | D5 | HFC_EVNT2 | Port is isolated with exceeding error threshold | |
| 214 | D6 | HFC_EVNT3 | Error threshold parameter at configuration file is invalid | |
| 215 | D7 | HFC_ERRF | AddWWPN or VFCWWPN is invalid | |
| 216 | D8 | HFC_EVNT3 | Failed to create virtual port | |
| 217 | D9 | HFC_EVNT3 | PCIe Link_Width register inconsistency was detected | |

| No. | ErrNo | Error name | Contents | Remarks |
|-----|-------|------------|---|----------------|
| 218 | DA | HFC_ERR2 | PCIe Link_Width register inconsistency was detected (Fatal) | |
| 219 | DB | HFC_EVNT2 | Detected an error by Mailbox responses other than link initialization processing | |
| 220 | DC | HFC_EVNT2 | Detected an error by asynchronous Mailbox responses other than link initialization processing | |
| 221 | DD | HFC_ERRF | Original WWN is invalid | |
| 222 | DE | – | – | Missing number |
| 223 | DF | – | – | Missing number |
| 224 | F0 | – | Driver log that continues to softlog and mcklog. | |

- (*1) There may exist an event log of ErrNo:0x17 when the driver is installed or the server is rebooted in case of the cascade composition.
Please set a value that is larger than the displayed value to "LOGIN DELAY TIME" according to "HITACHI Gigabit Fibre Channel Adapter USER'S GUIDE(Utility Software Edition)" when this event is generated.
The set value has the possibility that the event log of ErrNo:0x17 is generated even if it depends on the composition, and this setting is done. Please set a bigger value to the value of "LOGIN DELAY TIME" in that case.
- (*2) Mailbox procedure: Procedure that the driver of Hitachi Gigabit Fibre Channel Adapter directs the firmware the execution of processing other than the SCSI start. This start is a synchronous command, and one end response becomes a pair for one start. The command executed by this start is as follows.
- a) Link establishment instruction in FC interface.
 - b) Frame transmission instruction of login etc.
 - c) Trouble information (log) collection instruction
- (*3) There is a possibility that the event log of ErrNo:0x0E is generated when the server reboots, when the port of the adapter on the server is not registered in the LUN security and the LUN security of the port of the connected disk device is made effective. In that case, please confirm the following.
- a) Each port of the disk device that should be connected with the port of the adapter that outputted the event log must be done in the zoning in the same zone in FC-Switch.
 - b) Do not let the port of the disk device that should not be connected with the port of the adapter that outputted the event log be done in the zoning in the same zone in FC-Switch.
 - c) The port of the adapter that outputted the event log must be registered in the LUN security of the port of all the disk devices connected in the same zone in FC-Switch with the port.
- (*4) When the adapter port is not separated from the rest of the ports, such as using Access Gateway mode in FC-switch, the adapter port interferes with each other unlike the adapter ports are in usual Zoning. Because of this reason, Linkdown of the other adapter port or the server reboot may make the driver log unnecessary errors. When you need to stop an unnecessary logs, There is a driver parameter which stops unnecessary errors. For detail, see 'HITACHI Gigabit Fibre Channel Adapter USER'S GUIDE (Utility Software Edition)'.

❑ Detailed log

-Output example-

```
hfcldd1: Firmware version 042000, Driver version 2.0.f2.64, device 09:00.00 IRQ 50
hfcldd1: Adapter wwpn : 5000087000300348
hfcldd1: Parts number : 3HAC45103-A
hfcldd0: HFC_ERRA FC Adapter Interrupt time-out (ErrNo:0x24)
0x0000:[ 00000024 02040000 00c40002 00000000 ]
0x0010:[ 00000003 00000000 80013101 010000c2 ]
0x0020:[ 00011a00 00011800 00000000 00000000 ]
0x0030:[ 00000000 00000000 00000000 00000000 ]
0x0040:[ 00000000 00000000 00000000 00000000 ]
0x0050:[ 00000000 00000000 00000000 00000000 ]
0x0060:[ 00000000 00000000 00000000 00000000 ]
0x0070:[ 00000000 00000000 00000000 00000000 ]
0x0080:[ 82100000 00000000 00000003 00000000 ]
0x0090:[ 31000012 00000000 00000000 00011a00 ]
0x00a0:[ 91000000 00000003 00000000 00011a00 ]
:
0x0390:[ 82108200 91109100 82108200 91109100 ]
0x03a0:[ 82108200 91109100 82108200 91109100 ]
0x03b0:[ 82108200 91109100 82108200 91109100 ]
0x03c0:[ 82108200 91109100 82108200 91109100 ]
0x03d0:[ 82108200 91109100 82108200 91109100 ]
0x03e0:[ 82108200 91109100 82108200 91109100 ]
0x03f0:[ 82108200 91109100 82108200 91109100 ]
```


❑ Error Log Collection script (hfcrainfo)

Executing /opt/hitachi/drivers/hba/hfcrainfo enables you to get log data and related information to analyze the failure of Hitachi Gigabit Fibre Channel Adapter when error occurs.

Root privilege is required to execute this batch file. This script is common among any kernel version of Linux.

Collected log data and information are stored in the directory named 'hfcrainfo-<computer name>-<date>- <time>' and compressed.

Maximum size of the collected information is as follows. The size varies depending on whether "HITACHI Gigabit Fibre Channel Adapter Multi-queue feature" (refer to Multi Queue feature of Hitachi Gigabit Fibre Channel Adapter) is enabled or disabled.

[Maximum size of the collected information]

- (i) In the case of disabling the Multi Queue feature of Hitachi Gigabit Fibre Channel Adapter.

Syslog file size +

Configuration information of the driver and the system (about 3MB) +

adapter port specific information (about 8.5MB) x mounted adapter port number.

- (ii) In the case of enabling the Multi Queue feature of Hitachi Gigabit Fibre Channel Adapter.

Syslog file size +

Configuration information of the driver and the system (about 3MB) +

adapter port specific information (about 8.5MB) x mounted adapter port number x 32.

【Supported driver version】

RHEL6 or later: x.6.17.2018 or later

RHEL5: x.5.10.492 or later

RHEL4: x.1.10.492 or later

RHEL3: x.0.7.344 or later

【Syntax】

hfcrainfo [-f] [-d <directory>] [-H <hostname>]

【Option】

-f: (y/n) Execute the command with omitting the confirmation message.

-d: Output the compressed file to the specified directory.

-H: Change 'hostname' field of the compressed file.

【Collected logs and information】

1) Execution result of the following commands.

```
cat /proc/scsi/hfcldd/*
df
uname -a
ls -al /etc
ls -al /boot (ls -al /boot/efi/efi/redhat on IA-64)
/sbin/lsmmod
/sbin/chkconfig --list
find /lib/modules -name hfcldd* -print
/opt/hitachi/drivers/hba/dddump hfclddx xxxx.txt
(hfclddx : logical device names exists in the /dev/ directory)
/hitachi/drivers/hba/hfcmputil -a (RHEL3/4)
/opt/hitachi/drivers/hba/hfcmputil -c (RHEL3/4)
/opt/hitachi/drivers/hba/hfcmputil -e (RHEL3/4)
/opt/hitachi/drivers/hba/hfcmputil -f (RHEL3/4)
/opt/hitachi/drivers/hba/hfcmputil -w (RHEL3/4)
/opt/hitachi/drivers/hba/hfcmgr -hp (RHEL5 or later)
/opt/hitachi/drivers/hba/hfcmgr -hp -l (RHEL5 or later)
/opt/hitachi/drivers/hba/hfcmgr -hp -t (RHEL5 or later)
/opt/hitachi/drivers/hba/hfcmgr -c (RHEL5 or later)
```

2) Log files

- (1) /var/log/messages
- (2) /var/log/messages.*
- (3) /etc/modules.conf (/etc/modprobe.conf on RHEL4)
- (4) /etc/hfcldd.conf
- (5) /etc/fstab
- (6) /lib/modules/`uname -r`/kernel/drivers/scsi/hfcldd.ko
- (7) /lib/modules/`uname -r`/kernel/drivers/scsi/hfcldd_conf.ko
- (8) /boot/grub/grub.conf (/boot/efi/efi/redhat/elilo.conf on ia-64)
- (9) /tmp/hfcldd_install.log

VMware

VMware driver collects the various error log information using the daemon process (klogd) which outputs the kernel messages. Accordingly, klogd and syslogd must be executed to collect log information.

VMware ESX Server 3.X, and VMware ESX 4.X

In default, the log location of VMkernel messages and alerts is /var/log/vmkernel. You can change the settings of klogd and syslogd and change the log location. Confirm these settings in advance.

VMware ESXi 4.X

In default, the log location of VMkernel messages, alerts and driver error is /var/log/messages. You can change the settings of klogd and syslogd and change the log location. Confirm these settings in advance.

Open vSphere Client and select Server log '/var/log/messages' on system log tab. You can confirm the messages on the log file. However the messages and errors are buffered and the buffer size is limited, all error messages may not be logged.

VMware ESXi 5.X and ESXi 6.x

In default, the log location of VMkernel messages, alerts and driver error is /var/log/vmkernel.log. You can change the settings of klogd and syslogd and change the log location.

Confirm these settings in advance.

Open vSphere Client and select Server log '/var/log/messages' on system log tab. You can confirm the messages on the log file. However the messages and errors are buffered and the buffer size is limited, all error messages may not be logged.

Error log information

☐ Display of title only

The title information for the error log output by the adapter driver is output by the following command.

On VMware ESXi, select 'server log' on system log tab of vSphere Client and perform string search specifying 'HFC_'. You can confirm error titles that the adapter driver logged.

```
#cat /var/log/vmkernel | grep HFC_  
Oct 16 18:16:12 esx-server vmkernel: 0:02:59:19.969 cpu0:1024)<3>hfclddX:  
HFC_ERR6 Temporary FC Link error (ErrNo:0xXX)
```

(Date) (Error name, Error title) (Error Number) (Logical device name)

☐ Error names and titles

The error name and the error title list are the same as Red Hat Linux.

Refer to 'Error names and titles' for details.

❑ **Error numbers**

The error numbers are the same as Red Hat Linux.

Refer to 'Error numbers' for details.

7

Confirm firmware version and board revision

Execute the following procedure to confirm the firmware version and the board revision of the Hitachi Gigabit Fibre Channel Adapter.

Linux

In the case of RHEL7 or later,

(1) # cat /sys/class/scsi_host/host*/hfcldd_proc

In the cases of RHEL3, RHEL4, RHEL5 and RHEL6,

(1) # ls /proc/scsi/hfcldd

0 1

The example above shows that the system identifies two adapter ports whose belongs to two 1port Gigabit Fibre Channel adapters or one 2ports Gigabit Fibre Channel adapter. The numbers (0, 1 in above example) displayed vary may not start from 0 depending on the other adapters mounted on your system.

(2) # cat /proc/scsi/hfcldd/X

(Specify one of the numbers displayed when executing the command at (1))

example

```
Hitachi PCI to Fibre Channel Host Bus Adapter
Driver version 2.1.f7.302 Firmware version 200501
Package_ID      = 0x86  Firmware  version
Special file name = hfcldd0
:
Vender ID       = 1054
Device ID       = 300b
Port name       = 5000087000304684
Node name      = 5000087000304685
DID             = 010b00
adapter ID      = 0000870003046845000087000304685
port number     = 0
manufacturer ID = HITACHI
parts number    = 3HAC51102-A
ec level       = G → board revision
model name      = HFC0402
```

This example shows that the firmware version is 200501, and the board revision is 'G'.

VMware

native driver :

```
(1) # /usr/lib/vmware/vmkmgmt_keyval/vmkmgmt_keyval -a
```

All device information controlled by native driver is displayed.

vmklinux driver :

```
(1) # ls /proc/scsi/hfcldd
0 1
```

The example above shows that the system identifies two adapter ports whose belongs to two 1port Gigabit Fibre Channel adapters or one 2ports Gigabit Fibre Channel adapter. The numbers (0, 1 in above example) displayed vary may not start from 0 depending on the other adapters mounted on your system.

```
(2) # cat /proc/scsi/hfcldd/X
```

(Specify one of the numbers displayed when executing the command at (1))

example

```
Hitachi PCI to Fibre Channel Host Bus Adapter
Driver version 4.28.16.1158 Firmware version 200501
Package_ID      = 0x86  Firmware version
Special file name = hfcldd0
:
Vender ID       = 1054
Device ID       = 300b
Port name       = 5000087000304684
Node name      = 5000087000304685
DID             = 010b00
adapter ID      = 0000870003046845000087000304685
port number     = 0
manufacturer ID = HITACHI
parts number    = 3HAC51102-A
ec level       = G → board revision
model name      = HFC0402
```

This example shows that the firmware version is 200501, and the board revision is 'G'.

8

Update firmware of Hitachi Gigabit Fibre Channel Adapter

Outline of firmware update

The firmware update file contains 1) On-board firmware, 2) Boot code which controls the SAN-boot and 3) Hardware initialization information. The term 'firmware update' stands for the control of the Hitachi Gigabit Channel Adapter is moved from the current firmware to the new firmware contained in the firmware update file.

'Firmware update' is divided into two major operations. One is to store the firmware update file to the FLASH-ROM in Hitachi Gigabit Fibre Channel Adapter. Second is to transfer the FLASH-ROM data into the hardware of the Hitachi Gigabit Fibre Channel Adapter.

There are three operations to access FLASH-ROM.

| Operations | Contents |
|---------------|---|
| FLASH update | Update the firmware data of the FLASH-ROM in Gigabit Fibre Channel Adapter. |
| FLASH backup | Back up the data of FLASH-ROM in Gigabit Fibre Channel Adapter. This operations creates 'firmware backup file'. |
| FLASH restore | Restore the 'firmware backup file' into the FLASH-ROM in Gigabit Fibre Channel Adapter. |

There are two operations to transfer the FLASH-ROM data into the hardware of the Hitachi Gigabit Fibre Channel Adapter.

| Operations | Contents | Activated item | | |
|----------------|---|----------------------|--------------|--|
| | | 1) On-board firmware | 2) Boot code | 3) Hardware initialization information |
| Offline update | Update the FLASH-ROM and turn the Power off of your system. FLASH-ROM data is transferred from FLASH-ROM to the hardware when the system is booted. | ○ | ○ | ○ |
| Online update | Update the FLASH-ROM. Executing the special commands transfers the FLASH-ROM data to the hardware without turning the power off and on. | ○ | | |

The following sections describe the precautions on the firmware update, the procedure how to update FLASH-ROM and the procedure how to transfer the FLASH-ROM data into the hardware.

The firmware online update operation requires that all of the Gigabit Fibre Channel Adapter, the driver and the firmware support the firmware online update feature. Also, you may not update the firmware by online when the version of the current working firmware and update firmware have dependencies.

For details, refer to 'HITACHI Gigabit Fibre Channel Adapter USER'S GUIDE (Support Matrix Edition)'.

Precautions

- If you use the Hitachi Gigabit Fibre Channel Adapter as the shared FC, the firmware cannot be updated from the shared guest when the driver and the firmware do not support corresponding feature. For details, 'HITACHI Gigabit Fibre Channel Adapter USER'S GUIDE (Support Matrix Edition)'.
- You need to switch LPAR mode from LPAR to BASIC when LPAR manager is operating on Xeon server module and from LPAR mode to Exclusive mode when LPAR manager is operating on IPF server module to update the firmware if the driver and the firmware do not support firmware update feature from the guest. Note that you have to re-set LUN security when you switch between BASIC and exclusive or shared LPAR mode since these modes assign the different WWPN and WWNN to the Hitachi Gigabit Fibre Channel Adapter.
- When updating FLASH-ROM, do not close the working window, terminate the command forcibly, turn the power off or reboot the system. There operation causes the disruption of the FLASH-ROM and may lead the failure of the Hitachi Gigabit Fibre Channel Adapter.
- Back up the firmware before updating the firmware.
- When all of the Gigabit Fibre Channel Adapter, the driver and the firmware do not support the firmware online update feature, you need to power off and power on to make the updated firmware work on the Gigabit Fibre Channel Adapter.
- Command details how to back up and update the firmware, refer to 'HITACHI Gigabit Fibre Channel Adapter USER'S GUIDE (Utility Software Edition)' for details. Also you are required the root privilege to execute the command.
- If the failure of Hitachi Gigabit Fibre Channel Adapter occurs when updating FLASH-ROM, the FLASH-ROM may be destroyed and make the Hitachi Gigabit Fibre Channel Adapter unavailable. If the Hitachi Gigabit Fibre Channel Adapter unavailable when executing IO operation, it may be the severe system failure. To avoid this, stop IO operation when updating FLASH-ROM.
- After having updated FLASH-ROM, you should execute offline or online update as soon as possible in order to transfer the data of the FLASH-ROM to the hardware. If the following events occur after having updated FLASH-ROM, the FLASH-ROM data might be automatically transferred to the hardware.
 - (1) The hardware failure of the adapter occurred, and the driver automatically recovered from it.
 - (2) You executed isolate SFP command and recover SFP command for hot-swapping SFP. (RHEL5 or later :hfcmgr -sfp <Device> clear, VMware ESXi5.0 or later: hfcvmutil -is -i <vmbha> clear)

Back up FLASH-ROM

On VMware ESXi 5.0 or later, procedures are the same as below but the command is executed using CIM client on the remote client. For corresponding commands, refer to HITACHI Gigabit Fibre Channel Adapter USER'S GUIDE (Utility Software Edition - VMware).

- (1) Please move to the directory that installs the utility software in the command line and type the following command. The default directory is as follows.

```
# cd /opt/hitachi/drivers/hba
```

- (2) Execute the following command.

☐ RHEL4 or VMware

```
hfcmcup -d <logical device name> -o backup -f <backup target directory>
```

☐ RHEL5 or later

```
hfcmgr -f <logical device name> backup <backup target directory>
```

If you back up the firmware of the all adapters at once, execute the following command.

```
hfcmgr -f all backup <backup target directory>
```

The following example is an example of executing the FLASH back up of the Adapter whose logic device is hfcldd0.

```
# ./hfcmcup -d hfcldd0 -o backup -f /opt/hitachi/drivers/hba
hfcmcup Ver. 1.0.0.1 Copyright(C) 2003,2004. Hitachi, Ltd.
--- The current microcode level for 030400(hfcldd0)
backup is OK?
(Y/N) : y
--- Flash ROM Read-1
--- Flash ROM Read-2
backup finished.
backup file is /opt/hitachi/drivers/hba/54100930.030400.EF.BK
```

Back up file name contains PCI vendor ID, Device ID and the firmware version.

Update FLASH-ROM

This section describes how to update FLASH-ROM. The same procedure is applied when restoring FLASH-ROM. Updating FLASH-ROM stores the firmware update file into the FLASH-ROM in Hitachi Gigabit Fibre Channel Adapter. You need to execute offline update or online update to operations to transfer the FLASH-OM data into the hardware of the Hitachi Gigabit Fibre Channel Adapter.

On VMware ESXi 5.0 or later, procedures are the same as below but the command is executed using CIM client on the remote client. For corresponding commands, refer to HITACHI Gigabit Fibre Channel Adapter USER'S GUIDE (Utility Software Edition - VMware).

Note that if you need to update FLASH-ROM to one of the ports in Hitachi Gigabit Fibre Channel Adapter even if there are two or more ports in your Hitachi Gigabit Fibre Channel Adapter.

(1) Move to the directory that installs the utility software in the command line and type the following command. The default directory is as follows.

```
# cd /opt/hitachi/drivers/hba
```

(2) Execute the following command.

□ RHEL4 or VMware

```
hfcmcup -d <logical device name> -o download -f <update file name>
```

□ RHEL5 or later

```
hfcmgr -f <logical device name> update <update file name>
```

If you update the firmware of the all adapters at once, execute the following command.

```
hfcmgr -f all update <update file name>
```

The following is an example of executing the FLASH-ROM update to the hfcldd0.

```
# ./hfcmcup -d hfcldd0 -o download -f /opt/hitachi/drivers/hba/54100930.040200.E7
hfcmcup Ver. 1.0.0.1 Copyright(C) 2003,2004. Hitachi, Ltd.
hfcldd0 HITACHI FC Adapter
*** NOTICE *** NOTICE *** NOTICE ***

The microcode installation occurs while the
adapter and any attached drives are available
for use. It is recommended that this installation
be scheduled during non-peak production periods.

As with any microcode installation involving
drives, a current backup should be available.

Use 'y' to continue the installation.
Use 'n' or Ctrl-c to cancel the installation.
(Y/N) : y
--- The current microcode level for 030400(hfcldd0)
--- Select microcode file: /tmp/54100930.040200.E7

CURRENT SYSREV:00030400
UPDATE  SYSREV:00040200 ← Confirm the current firmware version
                           and the version of the update file.

Update is OK?
(Y/N) : y
--- Flash ROM Erase
Erasing data... (wait a few minutes)
--- Flash ROM Write
Writing data... (wait a few minutes)
--- Flash ROM Read
Checking data... (wait a few minutes)

Microcode Update finished.
The Update microcode level for 040200(hfcldd0)
```

Note that if hfcmgr terminates with error message 'HFCAPI related application(mcup) terminated.', the error message is added to the log file hfcmcup.log in the same directory as hfcmgr. For details of error messages, refer to 'HITACHI Gigabit Fibre Channel Adapter USER'S GUIDE (Utility Software Edition)'.

Online Update of firmware

The firmware updated or restored into FLASH-ROM by executing procedure described in Update FLASH-ROM does not take control of the Hitachi Gigabit Fibre Channel Adapter by itself. You need to transfer the FLASH-ROM data into the hardware of the Hitachi Gigabit Fibre Channel Adapter.

There are two ways, online and offline, to transfer the FLASH-ROM data into the hardware of the Hitachi Gigabit Fibre Channel Adapter as described in "Outline of firmware update". This section describes about the online update of the firmware.

On VMware ESXi 5.0 or later, procedures are the same as below but the command is executed using CIM client on the remote client. For corresponding commands, refer to HITACHI Gigabit Fibre Channel Adapter USER'S GUIDE (Utility Software Edition - VMware).

Precautions

The outline of the online update is below.

- (1) Execute 'hfcmgr' and initiates the online update of the firmware to the firmware currently working on the hardware of Hitachi Gigabit Fibre Channel Adapter. The firmware received the initiation outputs the error 0xA6, and notifies the user that the online update request is received.
- (2) The firmware currently working on the hardware checks whether the conditions meet the requirements of the online update of the firmware.
- (3) When the hardware and the firmware are ready to update the firmware on the hardware, the firmware reads the on-board firmware from the FLASH-ROM and transfers it to the hardware.
- (4) The firmware outputs the error 0xA7, and notifies the user that the update of the on-board firmware on the hardware has completed.

- Note that the output of the error 0xA6 does not mean the update of the on-board firmware on the hardware has completed. You have to wait until the firmware outputs the error 0xA7 to confirm the completion of the process.
- The firmware can transfer the on-board firmware to the hardware only when the firmware does not handle any IO or other operation. That means that the process of the transferring the on-board firmware from FLASH-ROM never ends while the firmware is too busy. You should initiate the online update of the firmware when the load of the firmware on the target board is low.
- You can update the entire firmware of the hardware on Hitachi Gigabit Fibre Channel Adapter if you initiate the online update of the firmware to one of the ports of the Hitachi Gigabit Fibre Channel Adapter.

Online Update procedure

- (1) Please move to the directory that installs the utility software in the command line and type the following command. The default directory is as follows.

```
# cd /opt/hitachi/drivers/hba
```

- (2) Execute the following command to make firmware check whether the conditions meet the requirements of the online update of the firmware.

☐ RHEL4 or VMware

```
hfcmcres
```

☐ RHEL5 or later

```
hfcmgr -u
```

The following is an example of executing 'hfcmgr -u'.

| Device | BUS/DEV/FUNC | Flash | Current | Update-Status (Flash -> Current) |
|---------|--------------|--------|---------|----------------------------------|
| hfcldd0 | 1 1 0 | 220700 | 220700 | OK |
| hfcldd1 | 2 1 0 | 220700 | 220500 | NG (Waiting) |
| hfcldd2 | 3 1 0 | 120700 | 120700 | NG (unsupport) |
| hfcldd3 | 4 1 0 | 120700 | 120700 | NG (impossible) |
| hfcldd4 | 5 1 0 | 220710 | 220500 | NG (mismatch) |
| hfcldd5 | 6 1 0 | 220700 | 220500 | OK (possible) |

Refer to 'HITACHI Gigabit Fibre Channel Adapter USER'S GUIDE (Utility Software Edition)' for details of the specification of the 'Status (Flash -> Current)'.

Initiate the online update of the firmware.

☐ RHEL4 or VMware

```
hfcmcres -d <logical device name>
```

If you initiate the online update of the firmware to all adapters mounted on the system at once, execute the following command.

```
hfcmcres -d all
```

☐ RHEL5 or later

```
hfcmgr -u <logical device name>
```

If you initiate the online update of the firmware to all adapters mounted on the system at once, execute the following command.

```
hfcmgr -u all
```

Here is the example of executing online update command.

```
# hfcmgr -u all
DEVICE : hfcldd0
FLASH   SYSREV:00220750
CURRENT SYSREV:00220740

FLASH-> CURRENT Update is OK? (Y/N) : y

Update command finished (hfcldd0). please check the F/W update status by hfcmgr -u.

DEVICE : hfcldd1
FLASH   SYSREV:00220750
CURRENT SYSREV:00220740

FLASH-> CURRENT Update is OK? (Y/N) : y

Update command finished (hfcldd1). please check the F/W update status by hfcmgr -u.
```

- (3) Execute the following command to confirm whether the online update of the firmware has completed.

☐ RHEL4 or VMware

```
hfcmcresf
```

☐ RHEL5 or later

```
hfcmgr -u
```

The following is an example of executing 'hfcmgr -u'. At the point when the status changed from 'Waiting' to 'No need' and the version on 'Flash' column equals to the version on 'Current' column, you can identify that the firmware has been transferred to the hardware.

| Device | BUS/DEV/FUNC | Flash | Current | Update-Status(Flash -> Current) |
|---------|--------------|--------|---------|---------------------------------|
| hfcldd0 | 1 1 0 | 220700 | 220700 | OK |
| hfcldd1 | 2 1 0 | 220700 | 220500 | NG (No need) |
| hfcldd2 | 3 1 0 | 120700 | 120700 | NG (unsupport) |
| hfcldd3 | 4 1 0 | 120700 | 120700 | NG (impossible) |
| hfcldd4 | 5 1 0 | 220710 | 220500 | NG (mismatch) |
| hfcldd5 | 6 1 0 | 220700 | 220500 | OK (possible) |

For details of error messages, refer to 'HITACHI Gigabit Fibre Channel Adapter USER'S GUIDE (Utility Software Edition)'.

9

Hot-swap procedure of the optical transceiver

You can replace the optical transceiver (SFP) mounted on Hitachi Gigabit Fibre Channel Adapter while OS is in operation without shutting down the server. It is called SFP hot-swap feature. Some models of Hitachi Gigabit Fibre Channel Adapter products don't have SFP hot-swap feature. Refer to 'HITACHI Gigabit Fibre Channel Adapter USER'S GUIDE (Support Matrix Edition)' for detail.

This section describes the preconditions SFP hot-swap feature.

Preconditions

- The driver may detect various errors including SFP failure (Error ID = 0x9E), Link Down (Error ID = 0x14) or FC interface failure and so on when SFP failure occurs. For details of the error, refer to section 'Error log information'.
- We recommend that you shutdown the server before replacing the optical transceiver to avoid risks, in periodical maintenance or in conditions where shutdown of OS is allowed.
- Only Hitachi-specified SFP is available for Hitachi Gigabit Fibre Channel Adapter.
- The SFP hot-swap operation requires that all of the Gigabit Fibre Channel Adapter, the driver and the firmware support the firmware SFP hot-swap feature.
- This feature is not available when your system operates on LPAR mode of LPAR manager.
- For details of the command to use SFP hot-swap feature, refer to 'HITACHI Gigabit Fibre Channel Adapter USER'S GUIDE (Utility Software Edition)'.
- SFP hot-swap feature may not be available depending on your server configuration.
- For the necessity of SFP replacement, procurement of parts (SFP) and the maintenance operation, contact support section.

10

Backup and restore procedure of the driver parameters when replacing Hitachi Gigabit Fibre Channel Adapter

This chapter explains the prerequisites and the procedures how to back up and restore driver and BIOS parameter settings when replacing Hitachi Gigabit Fibre Channel Adapter.

The procedures how to restore parameter settings of Hitachi Gigabit Fibre Channel Adapter after shutting down the server

This section explains the prerequisites and the following procedures, how to back up and restore parameter settings when replacing Hitachi Gigabit Fibre Channel Adapter after shutting down the server.

1. Record HBA BIOS and the driver parameter settings before replacing the adapter.
2. Set HBA BIOS and the driver parameters after replacing the adapter.
3. Confirm the HBA BIOS and the driver parameters are properly set.

For how to replace Hitachi Gigabit Fibre Channel Adapter, please refer your server's user's guide.

Prerequisites

- We recommend that you back up the parameter settings and preserve them to the file every time you setup the parameters.
- Please note that if you back up the parameters when Hitachi Gigabit Fibre Channel Adapter is in error condition, you may not back up the parameters properly. Also if you apply these parameter settings for the restoration of Hitachi Gigabit Fibre Channel Adapter, Hitachi Gigabit Fibre Channel Adapter may become fault condition.
- You have to install the utility software to back up and restore the parameter settings.
- For prerequisites, please refer the chapter 2, 'Before use' and the chapter 3 'Install Utility Software' in the HITACHI Gigabit Fibre Channel Adapter USER'S GUIDE (Utility Software Edition) .
- Root privilege is required to execute the utility software.

A. Record HBA BIOS and the driver parameter settings before replacing the adapter

(1) Record HBA BIOS settings

If you don't use LPAR manager in your system, you need to record the parameters for HBA BIOS and preserve them to the file.

Refer to the HITACHI Gigabit Fibre Channel Adapter USER'S GUIDE (BIOS/EFI Edition) for the procedures how to confirm the parameter settings of HBA BIOS at BIOS Setup screen.

If you configure LPAR manager in your system, you do not need to execute this procedure.

The equivalent information of HBA BIOS settings (EFI driver settings) is recorded and retained in the server system.

(2) Record the location of the adapter port

Using any of the following procedures, please confirm the PCI slot location (or Bus, Device and Function number) of the adapter port, and record the information.

The PCI slot location corresponds uniquely to Bus, Device and Function number in the system. If HBA is mounted on the same slot before and after replacing the adapter, the same Bus, Device and Function number are assigned.

a) Confirm PCI slot location using System (SVP) console

If SVP on your system can display WWPN of HBA, you can confirm the PCI slot location of the adapter port from system (SVP) console referring WWPN of the adapter port.

Refer to Hitachi Compute Blade User's Guide for the detailed procedures.

Please note that SVP must be installed on your system.

b) If you configure LPAR manager is not configured on your system, you can confirm Bus, Device and Function number executing the following command.

Refer to the HITACHI Gigabit Fibre Channel Adapter USER'S GUIDE (Utility Software Edition).

```
# hfcmgr -dv
```

(3) Record the logical device name of the adapter port

Please record the logical device name of the adapter port referring WWPN of the adapter port. Refer to the 'Display General Information' of HITACHI Gigabit Fibre Channel Adapter USER'S GUIDE (Utility Software Edition) for the procedure how to confirm the logical name.

B. Set HBA BIOS and the driver parameters after replacing the adapter

(1) Set HBA BIOS settings

b-1) If you do not configure LPAR manager on your system, set previous setting to the replaced adapter port. Refer to the HITACHI Gigabit Fibre Channel Adapter USER'S GUIDE (BIOS/EFI Edition) for the procedures how to set the parameters for HBA BIOS.

If you configure LPAR manager on your system, you do not need to execute this procedure.

The equivalent information of HBA BIOS settings (EFI driver settings) is recorded and retained in the server system.

b-2) When you use Persistent Binding feature and also the WWPN of the adapter port changes before and after the replacement, please execute the following procedures.

[Procedures]

- ① Power on the server.
- ② Set 'PERSISTENT BINDING' disabled temporarily at the BIOS Setup screen. Refer to the HITACHI Gigabit Fibre Channel Adapter USER'S GUIDE (BIOS/EFI Edition) for the procedures how to set the parameters for HBA BIOS.
- ③ Reboot the server.
- ④ Execute the procedure, "Update settings bound with WWPN of the adapter port".
- ⑤ Reboot the server.
- ⑥ Set 'PERSISTENT BINDING' enabled again at the BIOS Setup screen. Refer to the HITACHI Gigabit Fibre Channel Adapter USER'S GUIDE (BIOS/EFI Edition) for the procedures how to set the parameters for HBA BIOS.
- ⑦ Reboot the server.

(2) Update settings bound with WWPN of the adapter port.

In some cases, such as when you set the parameter to each port, or when you use persistent binding feature, the driver parameters or the logical device number is stored bound with its corresponding WWPN of the adapter port.

Executing 'hfcmgr -ex' command allows you to check whether these parameters are already set in your system. If the settings bound with their corresponding WWPN exist in your system, you have to update these bindings from old WWPN to new WWPN after replacing the adapter.

When executing 'hfcmgr -ex' command, the previous WWPN bound with parameters before replacement may be displayed. If any WWPN exists, modify WWPN. If no WWPN is displayed, you can safely ignore this operation.

For the details how to execute 'hfcmgr -ex' command, refer to the section, 'Update or Delete WWPN in the configuration file' of HITACHI Gigabit Fibre Channel Adapter USER'S GUIDE (Utility Software Edition).

Notes:

1) If you use N+M Cold Standby or LPAR manager, the special WWPN, registered in the system is using instead of using the physically assigned WWPN of each adapter port.

This special WWPN is not changed before and after the replacement of the adapter, so you can omit executing 'hfcmgr -ex' command.

2) When you do not execute 'hfcmgr -ex' command even if the parameters bound with their corresponding WWPN of the adapter port exist in your system, you may face the following symptoms after replacing the adapter.

A: The different parameter settings are applied.

If the symptom A occurs, the symptom B is also occurs.

B: The different logical device number is applied.

C. Confirm the HBA BIOS and the driver parameters are properly set

(1) Confirm HBA BIOS settings.

If you do not configure LPAR manager on your system, confirm that the previous setting data is restored in the replaced adapter. Refer to the HITACHI Gigabit Fibre Channel Adapter USER'S GUIDE (BIOS/EFI Edition) for the procedures how to confirm the parameters for HBA BIOS.

If you configure LPAR manager on your system, you do not need to execute this procedure.

The equivalent information of HBA BIOS settings (EFI driver settings) is recorded and retained in the server system.

(2) Confirm PCI slot location or PCI Bus, Device and Function number.

Confirm the following C-1) result is equal to C-2) referring to the (2), Record the location of the adapter port in the section A.

C-1) Current PCI slot location or Bus, Device and Function number of the adapter port.

C-2) Previous PCI slot location or Bus, Device and Function number of the adapter port recorded on the section (2), Record the location of the adapter port in the section A.

(3) Confirm the logical name.

Confirm the following C-3) result is equal to C-4) referring to the (2), Record the location of the adapter port in the section A.

C-3) Current logical name of the adapter port.

C-4) Previous logical name recorded on the section (3), Record the logical device name of the adapter port.

The procedure when hot-plugging of Hitachi Gigabit Fibre Channel Adapter

You can replace the Hitachi Gigabit Fibre Channel Adapter while OS is in operation without shutting down the server. It is called hot-plug feature. Some models of Hitachi Gigabit Fibre Channel Adapter products don't have hot-plug feature. Refer to 'HITACHI Gigabit Fibre Channel Adapter USER'S GUIDE (Support Matrix Edition) for detail.

This section describes that the preconditions and backup and restore procedures at hot-plugging of Hitachi Gigabit Fibre Channel Adapter.
For detailed procedure how to replace hot-pluggable devices including Hitachi Gigabit Fibre Channel Adapter on Hitachi Compute Blade 2000, refer to 'Hitachi Compute Blade 2000 Hotplug operation Guide'.

You can set various parameters for HBA BIOS and the driver depending on your server configuration. When you have set these parameters, you need to back up the parameters and restore the parameters after replacing the Hitachi Gigabit Fibre Channel Adapter.

Please execute the following procedures to back up and restore the parameters.

1. Back up HBA BIOS and the driver parameters.
2. Restore HBA BIOS and the driver parameters to the Hitachi Gigabit Fibre Channel Adapter after replacement.
3. Confirm the HBA BIOS and the driver parameters.

Preconditions

- We recommend that you back up the parameters and preserve them to the file when you setup the parameters.
- If you back up the parameters when Hitachi Gigabit Fibre Channel Adapter is in error condition, you may not back up the parameters properly. Also if you restore these parameters to the Hitachi Gigabit Fibre Channel Adapter, Hitachi Gigabit Fibre Channel Adapter may not work properly.
- You have to install the utility software to back up and restore the parameters.
- Root privilege is required to execute the utility software.
- For more prerequisites for the hot-plugging of the Hitachi Gigabit Fibre Channel Adapter, refer to 'Hitachi Compute Blade 2000 Hotplug operation Guide'.

Hereinafter, please refer the specified section in 'HITACHI Gigabit Fibre Channel Adapter USER'S GUIDE (Utility Software Edition)'.

A. Back up HBA BIOS and the driver parameters

(1) HBA BIOS

Search the logical device name of the target adapter port with reference to the section 'Search the System Mounted Devices'

Then backup HBA BIOS parameters with reference to the section 'Back up the HBA BIOS Setup Data'.

Write down the WWPN of the target adapter port.

(2) Driver parameters

You do not need to backup the driver parameters.

B. Restore HBA BIOS and the driver parameters

(1) HBA BIOS

b-1) Logical device name may be changed depending on your parameter settings. Execute the following command to recreate the logical device.

```
# /etc/init.d/hfcmknod
```

b-2) Search the logical device name of the replaced adapter port with reference to the section 'Search the System Mounted Devices'

Then restore HBA BIOS parameters with reference to the section 'Restore the HBA BIOS Setup Data'.

In case if you do not have the backup file of HBA BIOS parameters, set previous setting again with reference to the section 'Display or Set the Port Information' and 'Display or Set the Boot Information'.

(2) Driver parameters

If you use the additional WWN for N+M Cold Standby or the virtual WWN for LPAR manager in your system, you do not need to execute the following procedure.

b-1) Update the WWPN with reference to the section 'Update or Delete WWPN in the configuration file' using the logical device name which is searched at (1) b-2).

b-2) Execute the following command to make the driver update the parameter with reference to the section 'Reflect driver parameter to the new Adapter when hot-plugging'.

```
# hfcmgr -ar all
```

C. Confirm the HBA BIOS and the driver parameters

(1) HBA BIOS

c-1) Logical device name may be changed depending on your parameter settings. Execute the following command to recreate the logical device.

```
# /etc/init.d/hfcmknod
```

c-2) Search the logical device name of the replaced adapter port with reference to the section 'Search the System Mounted Devices'

Then confirm that the new settings are the same as the previous settings with reference to the section 'Display or Set the Port Information' and 'Display or Set the Boot Information'.

(2) Driver parameters

Confirm whether the new settings are applied to the adapter port with reference to the section 'Display or Set the Port Information' using the logical device name which is searched at (2) c-2).

11

Driver parameter setting when SCSI-MQ feature at Linux is enabled

This chapter explains how to enable SCSI-MQ feature supported by Red Hat Enterprise Linux and how to setup the driver parameter for SCSI-MQ feature.

SCSI-MQ feature in Linux OS

About SCSI-MQ feature

From RHEL 7.3 SCSI-MQ feature with multiple hardware queues for one SCSI device has been supported. This feature improves the performance by increasing parallelism of I/O to SCSI devices with using multiple hardware queues. The following table shows that multi queue function is supported in RHEL 7.3 or later version. If you enable SCSI-MQ feature on the OS that does not support SCSI-MQ feature, the OS may fail to boot.

| OS version | SCSI-MQ feature |
|----------------------------|-----------------|
| RHEL7.2 or earlier version | Not supported |
| RHEL7.3 or later version | Supported |
| RHEL8 or later version | Supported |

Whether default of SCSI-MQ feature setting is enabled or disabled depends on the kernel version. To confirm whether default of SCSI-MQ feature setting is enabled or disabled, please check with the following procedures.

```
# cat /sys/module/scsi_mod/parameters/use_blk_mq
Y [SCSI-MQ feature is enabled.]
N [SCSI-MQ feature is disabled.]
```


Support requirement of SCSI-MQ feature

When you use the OS's SCSI-MQ feature, please install the driver supporting SCSI-MQ feature in your system.

| FC Type | Driver version supporting SCSI-MQ | |
|-------------------|-----------------------------------|----------------------|
| | earlier x.x.21.4250 | later x.x.21.4252 |
| 8Gbps FC Adapter | Not supported | Not supported |
| 16Gbps FC Adapter | Not supported | Supported |

Procedure for enabling / disabling SCSI-MQ feature

Please setup the following procedures to enable or disable SCSI-MQ feature.

(1) Modifying grub setting

(1-1) Setup enabling SCSI-MQ feature

Describe the following to GRUB setting file /etc/default/grub
vi /etc/default/grub

```
GRUB_CMDLINE_LINUX=" ... scsi_mod.use_blk_mq=y"
```

(1-2) Setup disabling SCSI-MQ feature

Describe the following to GRUB file, /etc/default/grub
vi /etc/default/grub

```
GRUB_CMDLINE_LINUX=" ... scsi_mod.use_blk_mq=n"
```

(2) Update GRUB setting

```
# grub2-mkconfig -o /boot/efi/EFI/redhat/grub.cfg
```

(3) Reboot

```
# reboot
```

(4) Check whether SCSI-MQ feature setting is enabled or disabled and refer to "Confirm the state of SCSI-MQ feature".

(5) Set interrupts IRQ tuning and refer to "The setup to the interrupted CPU of the interrupt handler in Linux".

Confirm the state of SCSI-MQ feature

Please check whether SCSI-MQ feature setting is enabled or disabled according to the following procedures.

```
# cat /sys/class/scsi_host/host*/use_blk_mq
```

1 [SCSI-MQ feature is enabled]

0 [SCSI-MQ feature is disabled]

Multi Queue feature of Hitachi Gigabit Fibre Channel Adapter

About Multi Queue feature of Hitachi Gigabit Fibre Channel Adapter

If you setup SCSI-MQ feature to enabled on Red Hat Enterprise Linux, the OS has more than one hardware queue for one SCSI device and improve the parallelism of I/O in the OS. To correspond to SCSI-MQ feature, Hitachi Gigabit Fibre Channel Adapter Linux driver supports the unique Multi-queue in order to increase the number of the queues in the FC-HBA device driver layer and improve the degree of the parallelism. By enabling this feature, Hitachi Gigabit Fibre Channel Adapter Linux driver creates its own queue. As the result, FC-HBA device driver layer also performs Multi-queue operation to further improve the performance and reduce the CPU usage rate

Support requirement of Multi Queue feature of Hitachi Gigabit Fibre Channel Adapter

This feature becomes be valid practicable at the environment meeting all the following indicated conditions.

- (1) Using 16Gbps FC Adapter
- (2) Unusing NPIV feature
- (3) Unusing LPAR manager
- (4) Either the following connection configuration (i) or (ii)
 - (i) FC-Switch connection configuration, Connection Type is Ponint to Point and Multiple PortID is Disable
 - (ii) Storage direct connection configuration, Connection Type is Point to Point and Multiple PortID is Enable

About Conneciton Type and Multiple PortID refer to HITACHI Gigabit Fibre Channel Adapter USER'S GUIDE (BIOS/EFI Edition) for details.

- (5) Supported SCSI-MQ feature. Please refer to "Support requirement of SCSI-MQ"

Procedure for enabling Multi Queue feature of Hitachi Gigabit Fibre Channel Adapter

If you set the Multi Queue feature of Hitachi Gigabit Fibre Channel Adapter to enabled, please excute the below steps.

- (1) Enable SCSI-MQ feature of OS

Please refer to “Procedure for enabling / disabling SCSI-MQ feature”.

- (2) Set Connection Type and Multiple PortID

Please setup Connection Type and Multiple PortID as below.

[In the case of FC-Switch connection configuration]

Point to Point connection (Connection Type: Point to Point, Multiple PortID: Disable)

[In the case of storage direct connection configuration]

Fabric Emulation connection (Connection Type: Point to Point, Multiple PortID: Enable)

About Connection Type and Multiple PortID refer to HITACHI Gigabit Fibre Channel Adapter USER’S GUIDE (BIOS/EFI Edition) for details.

- (3) Determine the number of the queues of Hitachi Gigabit Fibre Channel Adapter

Please determine the number of the Linux driver queue depending on CPU number.

[Confirm the CPU number]

The CPU number is confirmed by excuting the below command.

```
# more /sys/class/scsi_host/hostX/hfcldd_proc      (X=0,1,...)
```

for example

• • •

Server Information

Socket number = 2

Physical cpu number = 30

Online cpu number = 60

[How to setup the number of queues for Linux driver]

Please setup the following according to the value of "Online cpu number" and "Physical cpu number". "Online cpu number" is always "Physical cpu number" or more.

(a) "Online cpu number < 30"

```
# cd /opt/hitachi/drivers/hba
# ./ hfcmgr -E hfc_mq_num < Online cpu number value >
# ./ hfcmgr -E hfc_vport_count < Online cpu number value- 1>
```

(b) "Online cpu number >= 30" and "Physical cpu number < 30"

```
# cd /opt/hitachi/drivers/hba
# ./ hfcmgr -E hfc_mq_num < Physical cpu number value>
# ./ hfcmgr -E hfc_vport_count <Physical cpu number value - 1>
```

(c) "Online cpu number >= 30" and "Physical cpu number >= 30"

```
# cd /opt/hitachi/drivers/hba
# ./ hfcmgr -E hfc_mq_num 30
# ./ hfcmgr -E hfc_vport_count 29
```

(4) Enable Multi Queue feature of Hitachi Gigabit Fibre Channel Adapter

```
# cd /opt/hitachi/drivers/hba
# ./ hfcmgr -p all mque enable
```

Please refer to HITACHI Gigabit Fibre Channel Adapter USER'S GUIDE (Utility Software Edition)) for details.

(5) Update the RAMDISK image for boot

```
# cd /boot
# mkinitrd -f initram-<kernel version>.img <kernel version>
```

(6) Reboot

```
# reboot
```

Procedure for disabling Multi Queue feature of Hitachi Gigabit Fibre Channel Adapter

If you set the Multi Queue feature of Hitachi Gigabit Fibre Channel Adapter to disabled, please execute the below steps.

- (1) Enable SCSI-MQ feature of OS

Please refer to "Procedure for enabling / disabling SCSI-MQ feature" section.

- (2) Delete the number of the queues of Hitachi Gigabit Fibre Channel Adapter

```
# cd /opt/hitachi/drivers/hba
# ./ hfcmgr -E delete hfc_mq_num
# ./ hfcmgr -E delete hfc_vport_count
```

- (3) Disable Multi Queue feature of Hitachi Gigabit Fibre Channel Adapter

```
# cd /opt/hitachi/drivers/hba
# ./ hfcmgr -p all mque disable
```

Please refer to HITACHI Gigabit Fibre Channel Adapter USER'S GUIDE (Utility Software Edition) for details.

- (4) Update the RAMDISK image for boot

```
# cd /boot
# mkinitrd -f initram-<kernel version>.img <kernel version>
```

- (5) Reboot

```
# reboot
```

Confirm the state of Multi Queue feature of Hitachi Gigabit Fibre Channel Adapter

When you confirm whether the Multi Queue feature of Hitachi Gigabit Fibre Channel Adapter is enabled, please refer to "HITACHI Gigabit Fibre Channel Adapter USER'S GUIDE (Utility Software Edition)" for details.

Notes on using the Multi Queue feature of Hitachi Gigabit Fibre Channel Adapter

When the Multi Queue feature of Hitachi Gigabit Fibre Channel Adapter is enabled, the size of error analysis information collected by Error Log Collection script increases.

Please refer to "Error Log Collection script (hfcrainfo)" section for details.

12

The setup to the interrupted CPU of the interrupt handler in Linux

This chapter explains the setup of the interrupted CPU of the interrupt handler in Linux.

In Linux, the interrupt handlers may concentrate on one CPU, and one CPU may perform the interruption processing.

For example, many of the end interruption of I/O processing also goes up to CPU#0, and CPU#0 performs I/O processing termination processing.

By performing "more /proc/interrupts", the CPU number which processed the interrupt handler and the interrupt handler, and the number of times of processing can be checked.

An example is shown below.

hfcldd_fx_xrb and hfcldd_fx_shr of the example show the interrupt handler of the Linux driver corresponding to 16Gbps FC adapter below, and hfcldd_fx_xrb is an interrupt handler of the end of I/O processing.

Although the number of times of interrupt handler processing of each CPU is shown, this example is that CPU#0 processed many of processing of the interrupt handler.

Performance decrement may be caused when processing of an interrupt handler concentrates on one CPU.

Linux has a smp_affinity function, and by using the smp_affinity function, interrupted CPU of an interrupt handler can be specified, interrupted CPU can be distributed, and it counts upon performance gain.

```
# more /proc/interrupts
          CPU0      CPU1      CPU2      CPU3
0:    6343633         0         0         0 IR-IO-APIC-edge  timer
35:     1817         45        115        17 IR-PCI-MSI-edge  hfcldd_fx_xrb
36:     2167         0         45        32 IR-PCI-MSI-edge  hfcldd_fx_xrb
37:     1762        110         21         0 IR-PCI-MSI-edge  hfcldd_fx_shr
38:       330         0         0         0 IR-PCI-MSI-edge  hfcldd_fx_xrb
39:         0         0         0         0 IR-PCI-MSI-edge  hfcldd_fx_xrb
40:         4         0         0         0 IR-PCI-MSI-edge  hfcldd_fx_shr
```

We describe the procedure of setting the interrupted CPU to below by a smp_affinity function.

Disable SCSI-MQ feature

(1) The check of an interrupt handler (irq) number

Like the above-mentioned example, you can check by "more /proc/interrupts". In the above-mentioned example, the numbers of the interrupt handler (irq) of I/O processing termination processing are the left end number 35, 36, 38, and 39.

(2) A setup of interrupted CPU of an interrupt handler

```
# echo the bitmask of each CPU number >/proc/irq/<irq number>/smp_affinity
```

The example in the case of setting so that the interruption may go up to CPU#0 for the interrupt handler of irq#35, to CPU#1 for the interrupt handler of irq#36, and to CPU#4 for the interrupt handler of irq#38, respectively is described below.

```
# echo 1 > /proc/irq/35/smp_affinity
# echo 2 > /proc/irq/36/smp_affinity
# echo 10 > /proc/irq/38/smp_affinity
```

Even if it performs the above-mentioned procedure, when irqbalance is starting, interrupted CPU will be decided in OS.

Only the interrupt handler corresponding to a specific IRQ number specified in the above-mentioned procedure goes up to CPU by specifying the starting option (--banirq=IRQ number) of irqbalance.

The procedure of specifying the starting option (--banirq=IRQ number) of irqbalance is as follows.

(1) Describe the following to an irqbalance configuration file /etc/sysconfig/irqbalance.

```
# vi /etc/sysconfig/irqbalance:
IRQBALANCE_ARGS="$(awk '/hfcldd/{sub(":", ""); printf "--banirq=" $1 " " }'
/proc/interrupts)"
```

(2) Restart an irqbalance daemon.

```
# service irqbalance restart
```

Enable SCSI-MQ feature

When SCSI-MQ feature and irqbalance are enabled, the optimum interrupt destination CPU setting is done automatically.

The procedure of specifying the starting option (-h exact) of irqbalance is as follows.

(1) Describe the following to an irqbalance configuration file /etc/sysconfig/irqbalance.

```
# vi /etc/sysconfig/irqbalance:
IRQBALANCE_ARGS="-h exact"
```

(2) Restart an irqbalance daemon.

```
# service irqbalance restart
```

13

RHEL6 or later KVM Virtual Fibre Channel

This chapter explains RHEL6 or later KVM virtual Fibre Channel.

Before use

Confirm the version

Use the following version of Gigabit Fibre Channel Adapter's driver.

RHEL7 or later Driver : 4.7.18.3004 or later
RHEL6 Driver : 4.6.18.2592 or later

Moreover, the Fibre Channel Adapter which is supporting the KVM virtual Fibre Channel is only a 16Gbps FC adapter.

Configure the NPIV mode

Execute 'hfcmgr -p' command, and confirm the current NPIV mode.

When "NPIV:disable", "Multiple PortID:enable", or "ConnectionType:FC-AL" is set up, virtual Fibre Channel cannot be defined from KVM.

```
# cd /opt/hitachi/drivers/hba
# ./hfcmgr -p hfcldd0
Time:2013/xx/xx xx:xx:xx

-----
WWPN:500008700057702e Device:hfcldd0 [LinkUp]
-----

Connection Type      : Point to Point[fabric] (Auto)
Multiple PortID      : disable (disable)
Link Speed           : 16 Gbps (Auto)
Max Transfer Size    : 16 MB (-)
~
Logging Mode         : default (-)
Login Target Filter   : pid (-)
NPIV                  : disable(-)
```

Execute the following command for enabling NPIV mode .

```
# ./hfcmgr -p all npiv enable
Time:2013/xx/xx xx:xx:xx

Succeeded.
Update the RAMDISK image for the changes to take effect permanently.
Reboot your system for the changes to take effect.

# ./hfcmgr -p hfcldd0 mpid disable
Time:2013/xx/xx xx:xx:xx

Succeeded.
Reboot your system for the changes to take effect.

# ./hfcmgr -p hfcldd0 ct ptop
Time:2013/xx/xx xx:xx:xx

Succeeded.
Reboot your system for the changes to take effect.
```

In addition, it is necessary to carry two following either out for reflection of operational mode.

(1) Update the RAMDISK image for boot and reboot.

(2) If virtual Fibre Channel validation command (hfcmgr -reset) of server equipment is executed, the virtual Fibre Channel function can be enabled, without rebooting the server.

```
# ./hfcmgr -reset enable
Time:2013/xx/xx xx:xx:xx

Succeeded.
```

Please check that a virtual Fibre Channel is effective ("NPIV:enable"), by executing one of two above-mentioned operations.

```
# cd /opt/hitachi/drivers/hba
# ./hfcmgr -p hfcldd0
Time:2013/xx/xx xx:xx:xx

-----
WWPN:500008700057702e Device:hfcldd0 [LinkUp]
-----

Connection Type      : Point to Point[fabric] (Auto)
Multiple PortID      : disable (disable)
Link Speed           : 16 Gbps (Auto)
Max Transfer Size    : 16 MB (-)
~
Logging Mode         : default (-)
Login Target Filter   : pid (-)
NPIV                 : enable (-)
```

Creation of a virtual fibre channel

A virtual Fibre Channel can be created by executing the following command.

```
# echo 'WWPN:WWNN' > /sys/class/fc_host/hostX/vport_create
```

- X of hostX shows a host number and you can check a host number by executing the following command.

In the case of RHEL6,

```
# more /proc/scsi/hfcldd/1
```

In the case of RHEL7 or later,

```
# more /sys/class/scsi_host/host1/hfcldd_proc
```

```
# more /proc/scsi/hfcldd/1
Hitachi PCI to Fibre Channel Host Bus adapter
Driver version 4.6.18.2478  Firmware version 84400103
Package_ID                = 0xa0
Special file name          = hfcldd1
Major_number               = 248
Minor_number               = 1
Instance_number            = 1
Host# = 1, Unique id       = 1
~~~~~
```

WWPN and WWNN are WWPN and WWNN corresponding to a virtual Fibre Channel.

Since WWPN and WWNN corresponding to a virtual Fibre Channel are generable with Tool libvirt, please install libvirt.

Precaution

- (1) The Gigabit Fibre Channel Adapter which supports virtual fibre channel feature is 16Gbps Gigabit Fibre Channel Adapter or later products. For details, refer to 'HITACHI Gigabit Fibre Channel Adapter USER'S GUIDE (Support Matrix Edition)'.
- (2) You should connect disk devices via FC-switch which supports NPIV feature to use virtual fibre channel feature.
- (3) When the 16Gbps Gigabit Fibre Channel Adapter with virtual fibre channel and the 16Gbps Gigabit Fibre Channel Adapter without virtual fibre channel are in the same server module, you should set the connection type in FC-AL not Auto in the case that the 16Gbps Gigabit Fibre Channel Adapter without virtual fibre channel directly connects the disk device.
- (4) The number of virtual fibre channel which you can configure in one port of Gigabit Fibre Channel Adapter is up to 30.
- (5) You should configure the Fibre Channel Adapter in Link-UP, or you may fail to start

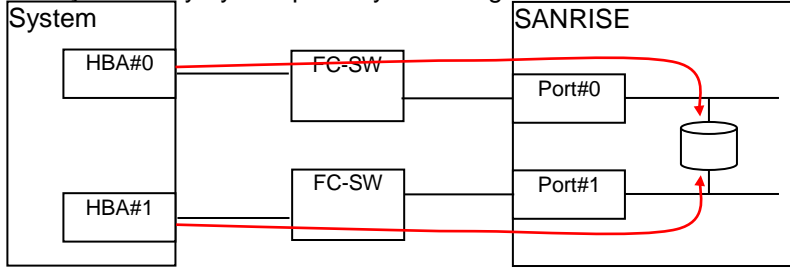
virtual machine.

- (6) When you set LUN security of the disk device per virtual fibre channel, you should register the WWN of virtual fibre channels. You should also register the WWN of the adapter port in the host OS even though you won't connect the adapter port to the LUN. If you don't register the WWN of the adapter port in the host OS, the warning event log(ErrNo.0x0E:LUN security is not registered) will be recorded.
- (7) When LPAR manager is operating on server module, Gigabit Fibre Channel Adapter doesn't support virtual fibre channel feature.

14

Restrictions

RHEL

| # | Restrictions |
|---|---|
| 1 | FC HUB is not supported. |
| 2 | For OS installation, only LU number '0' is available. |
| 3 | <p>Installing OS to the LU which can be identified from one or more path. Use the LUN security function (*1) of the disk device so that the LUN can be referred from the system only by one path if your configuration meets this condition.</p>  <p>The diagram illustrates a storage configuration. On the left, a box labeled 'System' contains two components: 'HBA#0' and 'HBA#1'. Each HBA is connected to a corresponding 'FC-SW' (Fibre Channel Switch) box. These FC-SW boxes are then connected to a larger box on the right labeled 'SANRISE'. Inside the SANRISE box, there are two ports: 'Port#0' and 'Port#1'. Red arrows show the data flow: from HBA#0 to FC-SW, then to Port#0; from HBA#1 to FC-SW, then to Port#1. Both Port#0 and Port#1 are connected to a disk icon, representing a LUN. This setup demonstrates multiple paths from the system to the storage.</p> |
| 4 | If the version of the firmware update tools is 1.2.0.1 or earlier, updating the firmware clears the settings in HBA-BIOS screen. If you need to store the HBA-BIOS settings when updating firmware, use the firmware update tools version 1.2.0.1 or later. |
| 5 | <p>When you use Persistent Binding function in the SAN boot environment, OS can not be booted when WWN of the target port or the card for SAN boot changes by the replacement of the Adapter. It is not possible to boot. Set Persistent Binding disabled to all ports with reference to "SET PERSISTENT BINDINGS ENABLE/DISABLE" in 'HITACHI Gigabit Fibre Channel Adapter USER'S GUIDE (Utility Software Edition)'.</p> <p>When you use GV-CC62G1xx, you need to install the firmware whose version 041100 or later and to install the driver whose version y.0.1.31 or later.</p> |
| 6 | If both GV-CC62G1xx and GV-CC64Gxxx are mounted on the IPF (IA-64) server, OS identifies the GV-CC62G1xx first, OS changes the order of the disk connected the Adapter. To avoid this situation, use the firmware whose version is 2.0.1.31 or later. |
| 7 | When you use GV-CC64Gxxx, you may fail to install to SAN or boot from SAN. To avoid this situation, use the driver whose version is y.0.1.35 or later. |
| 8 | If you install HDvM, the adapter WWPN may be displayed in the reverse order. Use the HBAAPI vendor Library whose version is 1.0.1.10 or later. |
| 9 | When you set "Connection Type", "Link Speed" or "Preferred AL_PA Number" to the inappropriate value by mistake, the boot from the SAN may fail. In this case the parameters are forced to be default value by setting 'Force Default parameters' enabled by BIOS. To use Force Default parameters' feature, use the driver whose version is x.y.2.68' or later. |

| | |
|----|--|
| 10 | <p>The message 'BUG: soft lockup detected on CPU#X!' may be displayed when booting. It does not affect on the driver operation.</p> <p><Message example> Loading hfcldd_conf.ko module Loading hfcldd.ko module hfcldd : Raslog version is raslog-2.0.0-0. BUG: soft lockup detected on CPU#4!</p> <p>Call Trace: [<a000000100013b20>] show_stack+0x40/0xa0 sp=e000000278a1f820 bsp=e000000278a19750 [<a000000100013bb0>] dump_stack+0x30/0x60 sp=e000000278a1f9f0 bsp=e000000278a19738 [<a0000001000e5fe0>] softlockup_tick+0x240/0x280 sp=e000000278a1f9f0 bsp=e000000278a196f8 [<a000000100092df0>] run_local_timers+0x30/0x60 sp=e000000278a1fa00 bsp=e000000278a196e0 [<a000000100092ea0>] update_process_times+0x80/0x100 sp=e000000278a1fa00 bsp=e000000278a196b0 [<a000000100037220>] timer_interrupt+0x180/0x360 sp=e000000278a1fa00 bsp=e000000278a19670 [<a0000001000e6650>] handle_IRQ_event+0x90/0x120 sp=e000000278a1fa00 bsp=e000000278a19630 [<a0000001000e6810>] __do_IRQ+0x130/0x420 sp=e000000278a1fa00 bsp=e000000278a195e0 [<a000000100011630>] ia64_handle_irq+0xf0/0x1a0 sp=e000000278a1fa00 bsp=e000000278a195b0 [<a00000010000c020>] __ia64_leave_kernel+0x0/0x280 sp=e000000278a1fa00 bsp=e000000278a195b0</p> |
| 11 | <p>The message 'hfcldd: no version for "hfc_get_nonpub_symbol_list" found: kernel tainted.' may be displayed when booting. It does not affect on the driver operation.</p> <p>May 27 20:42:12 localhost kernel: SCSI subsystem initialized May 27 20:42:12 localhost kernel: hfcldd: no version for "hfc_get_nonpub_symbol_list" found: kernel tainted. May 27 20:42:12 localhost kernel: hfcldd : Raslog module is not loaded. May 27 20:42:12 localhost kernel: scsi0 : Hitachi PCI to Fibre Channel Host Adapter: device 08:01.00 IRQ 82 May 27 20:42:12 localhost kernel: Firmware version 200720, Driver version 1.5.10.492 May 27 20:42:12 localhost kernel: persistent binding is disabled (00000000ffffb8018) May 27 20:42:12 localhost kernel: hfc10-wwpn=0x5000087000302018 </p> |
| 12 | <p>When you replace SFP by Hot-swap, be sure that the target path has redundancy path and one or more operational path exist to be switched. If no redundancy path exist to be switched, replace the SFP after shutting down the server or confirm that the application program does not use the target path.</p> <p>If use need to replace SFP if it is used as a boot path and no redundancy path exist to be switched, you must shutdown the server and replace the SFP.</p> |

| | |
|----|--|
| 13 | <p>The PCI passthrough function in KVM is not supported.</p> <p>Please do not set intel_iommu or amd_iommu to on in kernel start optional "grub.conf"</p> |
| 14 | RHEL6 or later does not support Persistent Binding feature |
| 15 | In the composition which linked the adapter port and the disk device directly in connection type "loop", although the logs of ErrNo:0x15 which indicates Link Up interruption and the ErrNo:0x14 which indicates Link Down interruption at the time of OS booting are outputted, and the event log of ErrNo:0x0e may be further outputted to syslog, it does not affect on the driver operation. |
| 16 | <p>The ErrNo:0x16 logs may be recorded in the syslog, when the adapter (except 16Gbps) is connected to Hitachi Virtual Storage Platform Gxx0 models or Hitachi Virtual Storage Platform Fxx0 models. However, there is no influence of this phenomenon on using the adapter except recording ErrorNo:0x16 logs in the syslog. ErrorNo:0x16 log is information level.</p> <p>This phenomenon may occur at the following cases.</p> <ul style="list-style-type: none"> • While booting the OS. • After hot-swapping the adapter • After linking up between the adapter port and the connecting device(FC-Switch or disk device). • After linking up between the the FC-Switch and the disk device. • After recovering from hardware failure of the adapter. |
| 17 | <p>When you update the driver after updating to a measured kernel of the CPU vulnerability(*2), please carry out the backup of the all kernel images. The procedures of the backup of the kernel are as follows.</p> <pre>cp /boot/initramfs-<kernel version>.img /boot/<backup file name></pre> <p>Carry it out only when you use the kernel in the following cases.</p> <ul style="list-style-type: none"> • RHEL7 older than RHEL7.5 • RHEL6 older than RHEL6.10 |
| 18 | <p>The kernel update of the following cases does not support it.</p> <ul style="list-style-type: none"> • Updating the kernel from RHEL7.4 or earlier to RHEL7.5 or later. • Updating the kernel from RHEL6.9 or earlier to RHEL6.10 or later. |

(*1) Function to make only logical device (LUN) decided beforehand for system accessible.

(*2) Measured kernels of the CPU vulnerability are in the following.
Supports it from the initial release of all OS versions after RHEL7.5

| OS version | Kernel version |
|------------------|------------------------------|
| RHEL7.1 | Not released |
| RHEL7.2 | 3.10.0-327.64.1.el7 or later |
| RHEL7.3 | 3.10.0-514.44.1.el7 or later |
| RHEL7.4 | 3.10.0-693.21.1.el7 or later |
| RHEL7.5 or later | Initial release |

| OS version | Kernel version |
|--------------------|-----------------|
| RHEL6.9 or earlier | Not released |
| RHEL6.10 or later | Initial release |

VMware

| | Restrictions |
|---|---|
| 1 | FC HUB is not supported. |
| 2 | Tape device is not supported. |
| 3 | Persistent Binding feature is not supported. |
| 4 | Hot plug feature of the Hitachi Gigabit Fibre Channel Adapter is not supported on VMware. |
| 5 | HBAAPI is not supported. |
| 6 | <p>When an adapter failed to recover its hardware failure, it becomes check-stop status after collecting the error log numbered 0x31.</p> <p>If an NPIV-enabled virtual machine has the path using check-stopped adapter, the virtual machine can not be powered on. You need to shut down the virtual machine and power off the system to replace the adapter.</p> <p>If you accidentally power-on such virtual machine, Power-on sequence will never terminate. In this case, power off the system to replace the adapter.</p> <p>For details how to replace adapter, refer to 'Hitachi Compute Blade user's guide'.</p> |
| 7 | <p>On VMware ESXi 4.*,</p> <ol style="list-style-type: none"> (1) You cannot execute utility software. (2) You can confirm the kernel or driver error messages, warnings on the log file. However the messages, errors and warnings are buffered and the buffer size is limited, all error messages may not be logged. |
| 8 | <p>On VMware ESXi 5.0, Kernel log service called 'FileLogger' handles to write messages to the log file. When this FileLogger fails to write messages to the log file, FileLogger may be suspended.</p> <p>This problem may occur in the following conditions.</p> <ul style="list-style-type: none"> - OS is boot from SAN. - Link down state continues for some period. - Switch or disk delays to respond. <p>If this problem happens, kernel messages and the driver error are not logged to the syslog any more.</p> <p>You can identify whether this problem occurs by the existence of the following messages on the log file below.</p> <pre>var/log/.vmsyslogd.err vmsyslog.loggers.file : ERROR] Write to /scratch/log/shell.log failed: No such file or directory vmsyslog.main : ERROR] <shell> failed to write log, disabling</pre> <p>You can restart FileLogger executing the following command.</p> <pre>#esxcli system syslog reload</pre> <p>Even if this problem happens, remote syslog service is not suspended. We strongly recommend that you should configure your system to use remote syslog service.</p> |
| 9 | <p>On VMware ESXi 5.0 or later, reboot ESXi host immediately after installing or updating the driver VIB.</p> <p>If you need to modify parameter or change your configuration, perform your operation after executing reboot described above.</p> <p>If you install or update the driver and then change parameters or configuration before ESXi reboot, changes may be discarded.</p> |

| | |
|----|---|
| 10 | <p>The ErrNo:0x16 logs may be recorded in the syslog, when the adapter (except 16Gbps) is connected to Hitachi Virtual Storage Platform Gxx0 models or Hitachi Virtual Storage Platform Fxx0 models. However, there is no influence of this phenomenon on using the adapter except recording ErrorNo:0x16 logs in the syslog. ErrorNo:0x16 log is information level.</p> <p>This phenomenon may occur at the following cases.</p> <ul style="list-style-type: none"> ▪ While booting the OS ▪ While powering-on the virtual machine ▪ After hot-swapping the adapter ▪ After linking up between the adapter port and the connecting device(FC-Switch or disk device). ▪ After linking up between the the FC-Switch and the disk device. ▪ After recovering from hardware failure of the adapter. |
| 11 | <p>When you install newly a native driver for 8Gbps/16Gbps FC adapter over your existing ESXi 6.0 system, the driver parameter settings by CIM client do not migrate after updating and rebooting the system. Please execute the following step for migration.</p> <ol style="list-style-type: none"> 1) The existing driver parameters are verified. for vmklinux driver. <code>esxcfg-module -g hfcldd</code> Example) <code># esxcfg-module -g hfcldd</code> <code>hfcldd enabled = 1 options = 'hfc_queue_depth=16'</code> 2) install a native driver 3) A driver parameter is set to a native driver. <code>esxcfg-module -s "<existing driver parameters>" hfcndd</code> Example) <code># esxcfg-module -s "hfc_queue_depth=16" hfcndd</code> 4) The driver parameters are verified. for native driver. <code>esxcfg-module -g hfcndd</code> Example) <code># esxcfg-module -g hfcndd</code> <code>hfcndd enabled = 1 options = 'hfc_queue_depth=16'</code> 5) Reboot <p>If you update the VMware product, with Hitachi Custom Image including a native driver, a native driver may be installed newly to 8Gbps/16Gbps FC adapter.. Please execute the above step in this case.</p> |

15

The queue_depth control by the kernel in RHEL6 or later

The function in which the kernel controls the value of the queue_depth is added from RHEL6.

When the number of SCSI commands issued from HBA exceeds the number of commands which a target port can receive, an error called Queue_full occurs.

When this error occurs and the SCSI command continues being issued from HBA at the same pace, a possibility that Queue_full will occur again becomes high.

As a measure for this problem, the kernel of RHEL6 makes the value of Queue_depth small, when it detects Queue_full.

Moreover, after Queue_full occurs along with this function, when it passes for a definite period of time (default 120 seconds) and the SCSI command is successful, the function to return the value of Queue_depth gradually is also newly added.

The initial value of Queue_depth which the Linux driver of a Hitachi Gigabit Fibre Channel Adapter has set up is 32. By using the utility software of Hitachi Gigabit Fibre Channel Adapter Although a Queue_depth value is changeable in 1-256 (refer to HITACHI Gigabit Fibre Channel Adapter USER'S GUIDE (Utility Software Edition)), by the above-mentioned function, The Queue_depth value may have been changed dynamically.

The Queue_depth value in which the kernel is operating can be checked by the following command execution.

```
# more /sys/block/sdN/device/queue_depth
```

When you want to deter the control facility of the Queue_depth value by the above-mentioned kernel, and operate with the initial value of the Queue_depth the Linux driver has set up or the Queue_depth value set up by the utility software of the Hitachi Gigabit Fibre Channel Adapter, it becomes possible by performing the following procedure.

The driver version should be the following.

RHEL6

IA-32 : 1.6.17.2104 or later

X86_64 : 4.6.17.2104 or later

RHEL7 or later

X86_64 : 4.7.18.3004 or later

(1) Parameter setup

```
# cd /opt/hitachi/drivers hba
```

```
# ./hfcmgr -E hfc_ctl_change_qdepth 1 (*1)
```

(2) Renewal of an image file

```
# cd /boot
```

```
# mkinitrd -f initram-<kernel version>.img <kernel version>
```

(3) reboot

```
# reboot
```

(*1) When you return to old environment, please change value '1' of the above-mentioned procedure into '0', and perform the same procedure.

```
# ./hfcmgr -E hfc_ctl_change_qdepth 0
```

HITACHI

Gigabit Fibre Channel Adapter

USER'S GUIDE

(Linux/VMware driver Edition)

Revision 73.0

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