

# **HITACHI**

# **Gigabit Fibre Channel Adapter**

# **USER'S GUIDE**

**(SUSE Linux Enterprise Server driver Edition)**

Revision 16

Mar. 2020

## **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.

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## 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.

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## 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.

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## 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.

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## 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.

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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.

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## Notation

### ☐ Symbols

Meanings of symbols used in this manual are as follows:

 <b>WARNING</b>	This indicates the presence of a potential risk that might cause death or severe injury.
 <b>CAUTION</b>	This indicates the presence of a potential risk that might cause relatively mild or moderate injury.
<b>NOTICE</b>	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 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)
- SUSE Linux Enterprise Server 15  
(Hereinafter, referred to as SLES15)
- SUSE Linux Enterprise Server 12  
(Hereinafter, referred to as SLES12)
- SUSE Linux Enterprise Server 11  
(Hereinafter, referred to as SLES11)

# Information on Support and Service

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## 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.







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## 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**

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### **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**

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### **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**

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### **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**

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### **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

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### **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

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### **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

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### **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.

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## NOTICE

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### 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.

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## **First Aid for Electric Shock**

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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

## **Install driver on Linux**

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

### **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 media" of the following procedure.

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# Installing SLES 11

## 1. Example: SUSE Linux Enterprise Server 11

### (1) Make hfcldd driver media

Please get the image file "dud-htc-hfcldd-<driver version>.iso" in the following directory of CD-ROM media (Hitachi Gigabit FC Adapter Driver CD for Linux) appended to this product. Image file is ISO format. Write the image to CD-R to using the appropriate writing software.

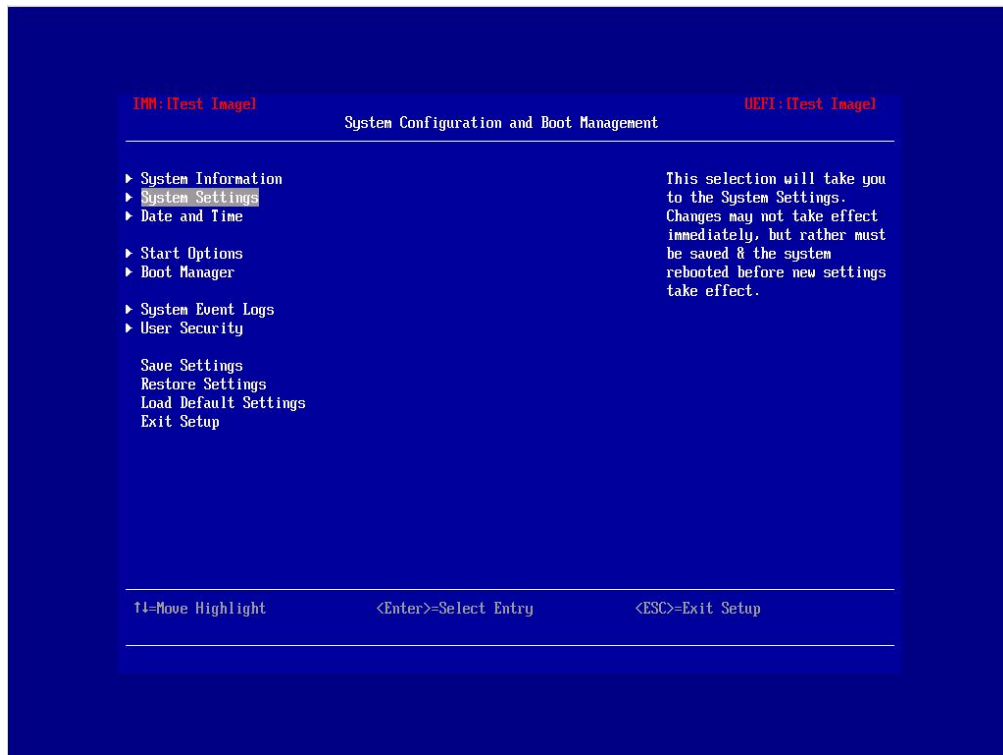
```
/linux/x86_64/<sles11*>/cd_media/<kernel_version>
```

### (2) Please insert SUSE Linux Enterprise Server installation media in a USB DVD-ROM drive, and turn on the server.

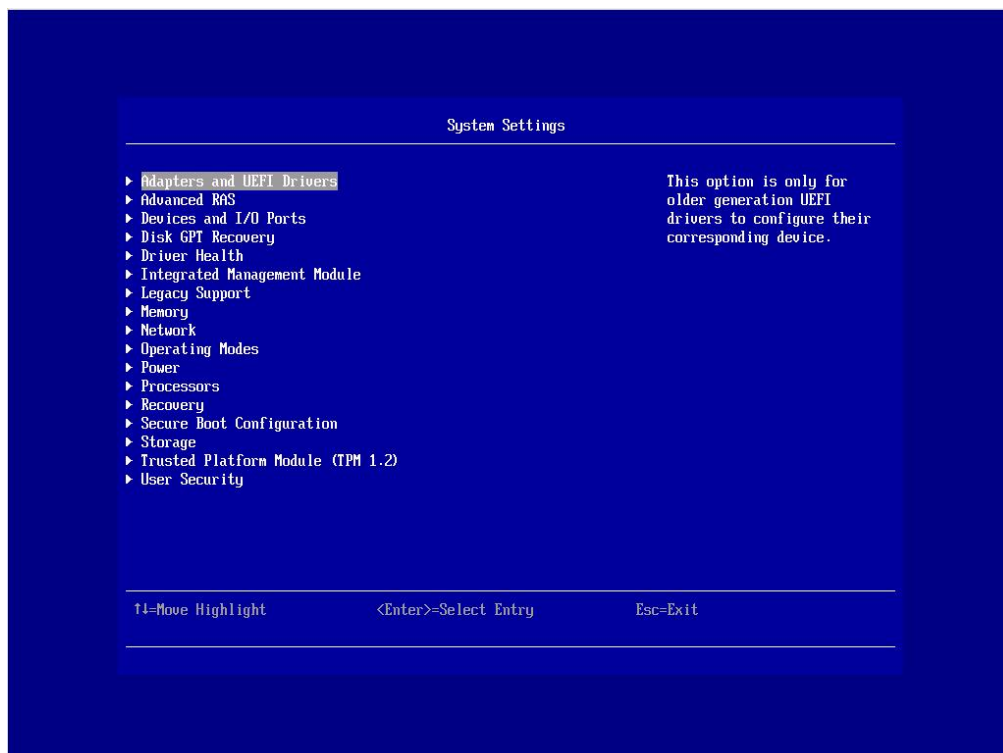
### (3) Since the message, "Connecting Boot Devices and Adapters --" is displayed, press F1 key.



- (4) When the screen, "System Configuration and Boot Management" is displayed, choose "System Settings" and press the Enter key.

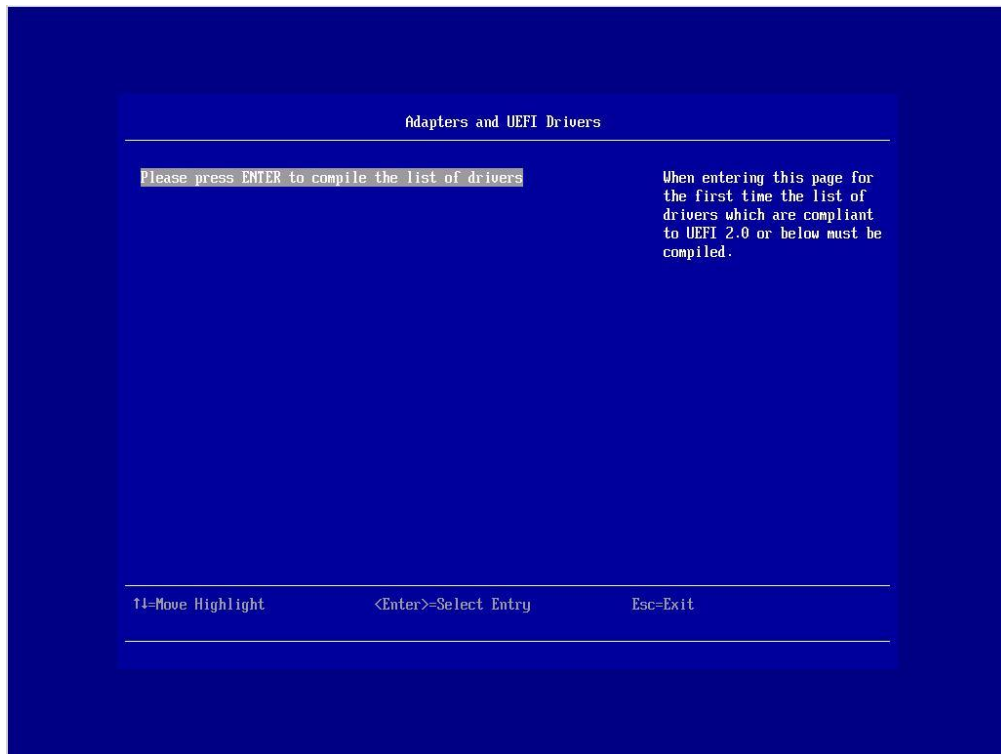


- (5) When "System Settings" screen is displayed, please choose "Adapters and UEFI Drivers" and press the Enter key.

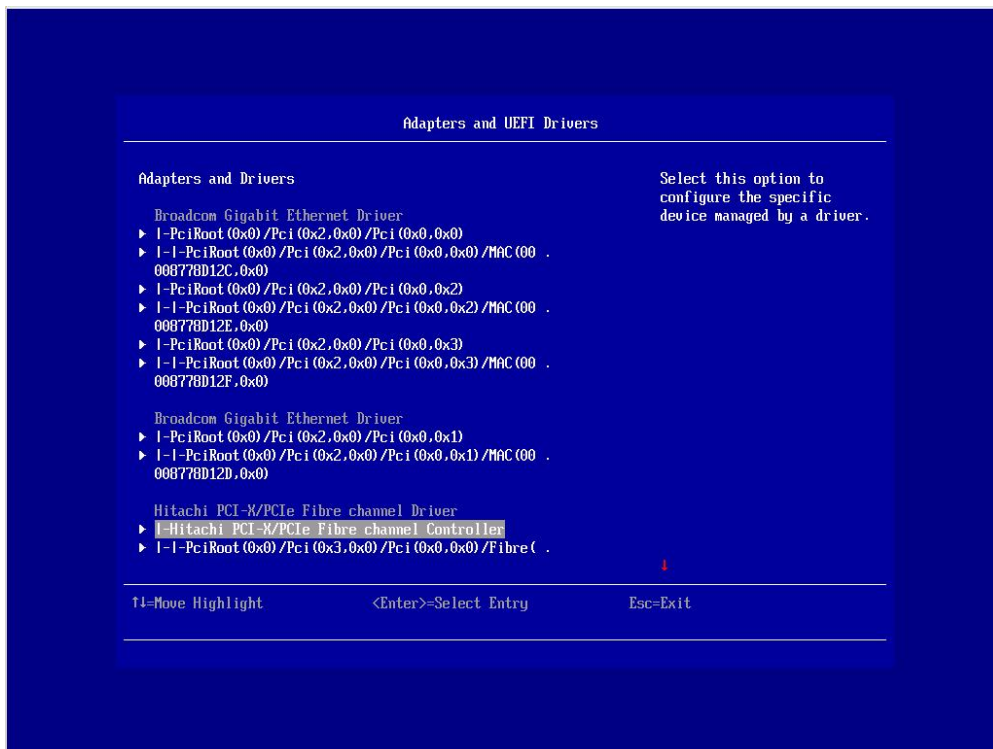




(6) When "Adapters and UEFI Drivers" screen is displayed, please press the Enter key.



(7) Please choose "I-Hitachi PCI-X/PCle Fibre channel Controller" and press the Enter key.



(8) Please refer to "Procedure to set a Boot Function to Enable" of "HITACHI Gigabit Fibre Channel Adapter USER'S GUIDE (BIOS/EFI Edition)" and do the procedure.

- (9) When the menu screen for boot is displayed, please choose "Installation" and press the e key.

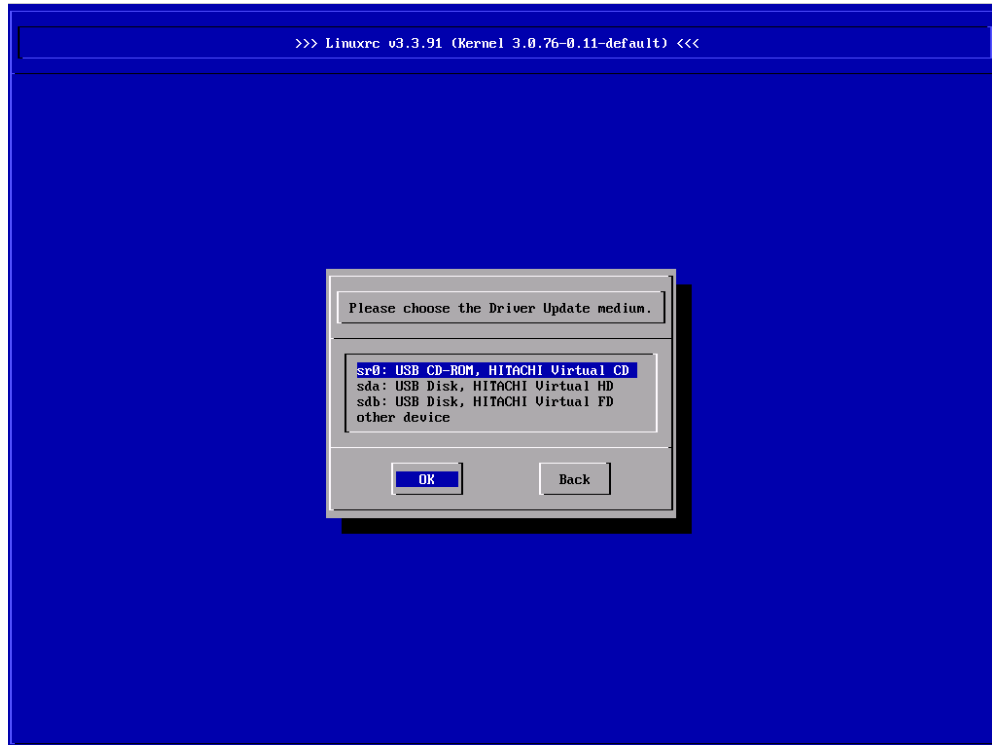


- (10) When the edit display of the "Installation" entry is displayed, please add "dud=1" to the end of the "linuxefi" line, and press the F10 key.

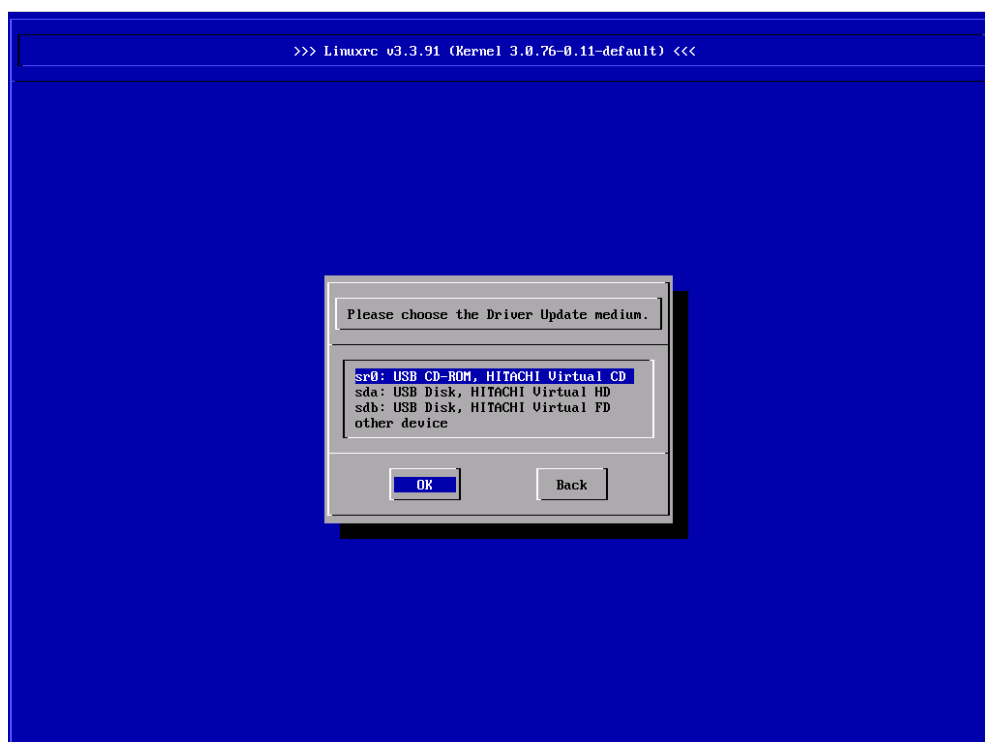


- (11) "Please choose the Driver Update medium." message is displayed, then change the hfcldd driver disk (dud-htc-hfcldd-<driver version>.iso) prepared at (1) to "SUSE Linux Enterprise Server installation" media.

And please choose a USB DVD-ROM drive (example: sr0), and press Enter key.



- (12) When "Please choose the Driver Update medium." message is displayed again, please insert DVD-ROM of SUSE Linux Enterprise Server installation media exchanged by (11) in the DVD drive, choose "Back", and press the Enter key.



(13) When the following screen is displayed, please install OS according to the installation manual of SUSE Linux Enterprise Server, and move on to "Install SUSE driver".



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## Installing SLES 12

### 2. Example: SUSE Linux Enterprise Server 12 for SAP Applications

#### (1) Make hfcldd driver media

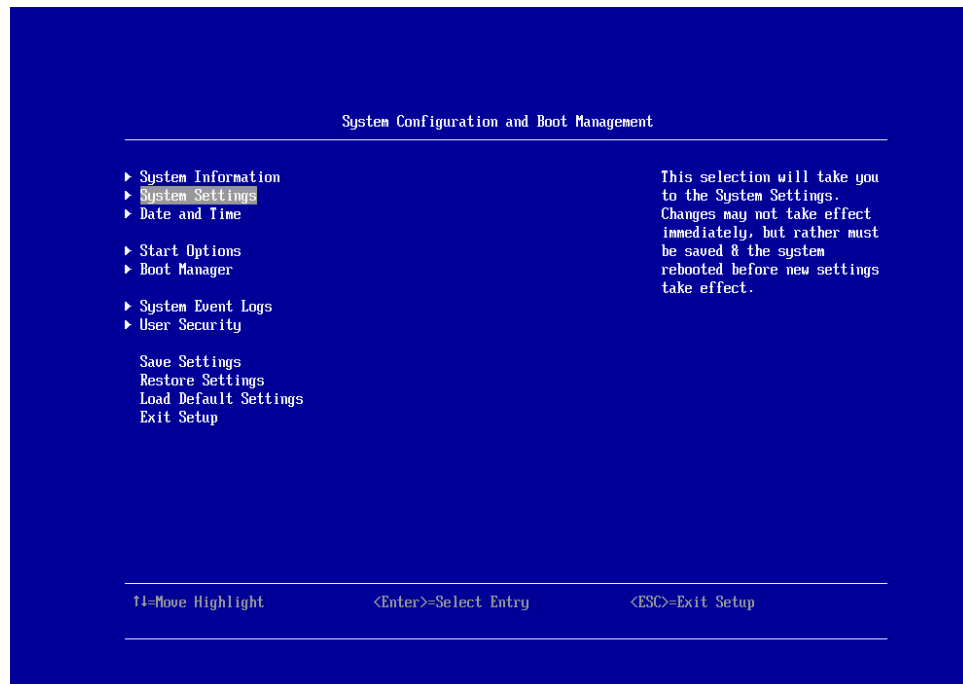
Please get the image file "dud-htc-hfcldd-<driver version>.iso" in the following directory of CD-ROM media (Hitachi Gigabit FC Adapter Driver CD for Linux) appended to this product. Image file is ISO format. Write the image to CD-R to using the appropriate writing software.

```
/linux/x86_64/<sles12*>/cd_media/<kernel_version>
```

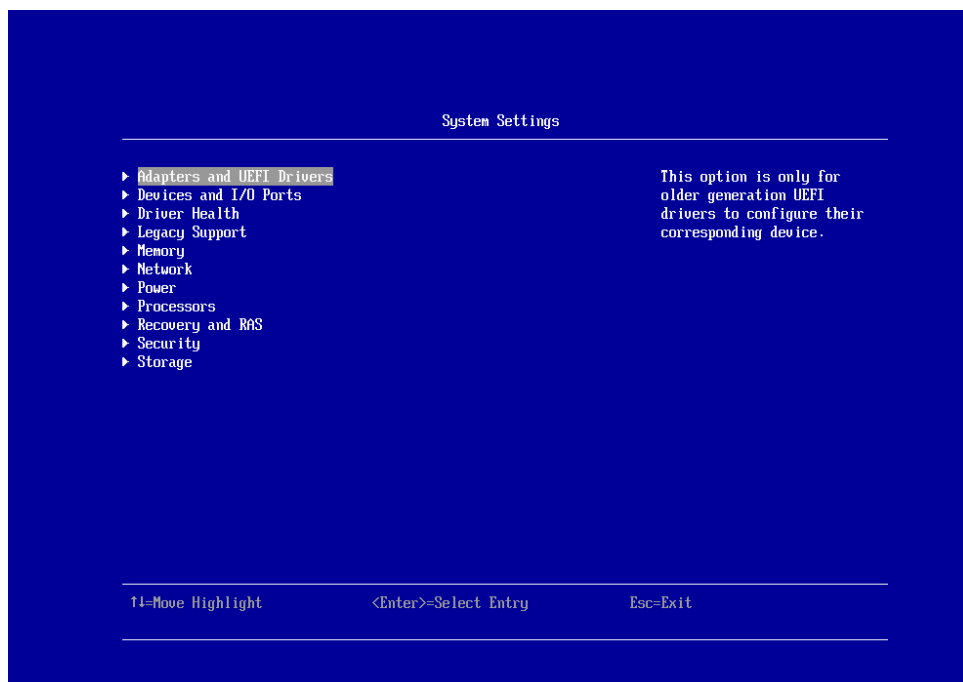
- (2) Please insert SUSE Linux Enterprise Server installation media in a USB DVD-ROM drive, and turn on the server.
- (3) Since the message, "Connecting Boot Devices and Adapters --" is displayed, press F1 key.



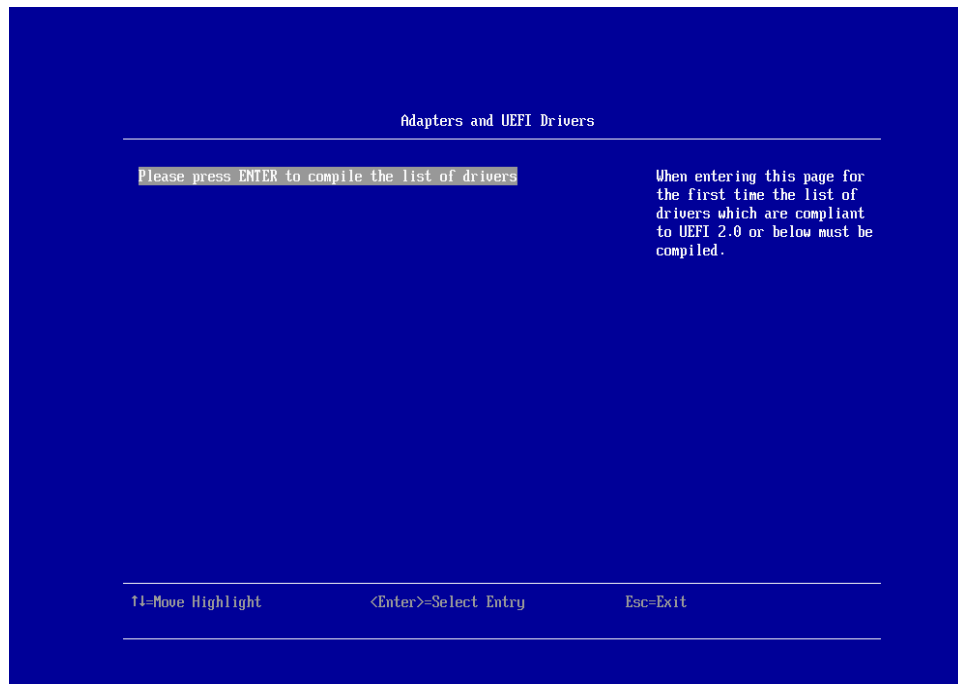
- (4) When the screen, "System Configuration and Boot Management" is displayed, choose "System Settings" and press the Enter key.



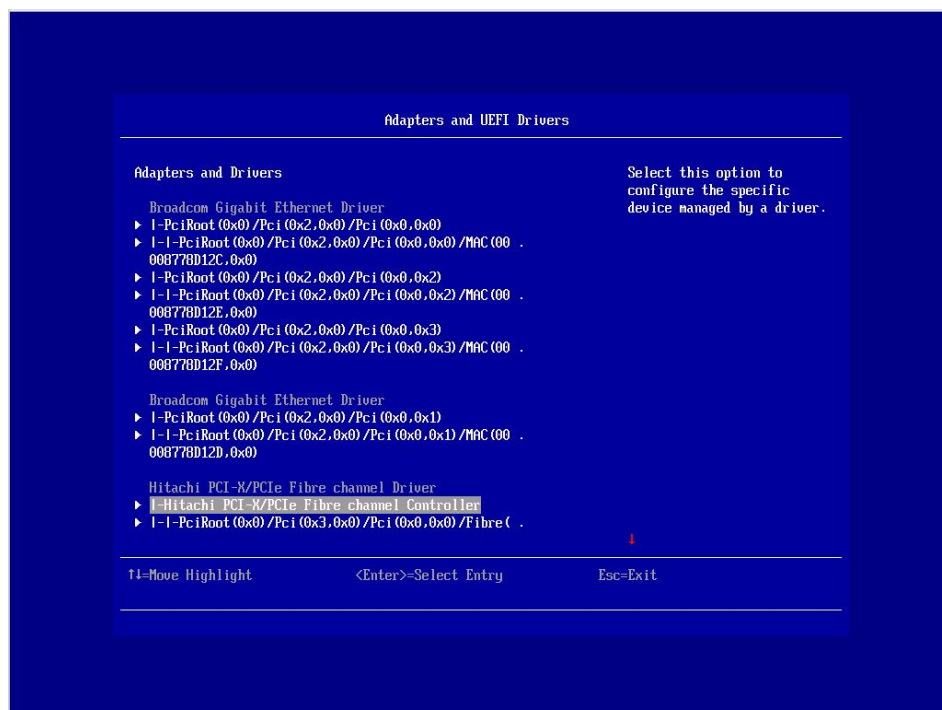
- (5) When "System Settings" screen is displayed, please choose "Adapters and UEFI Drivers" and press the Enter key.



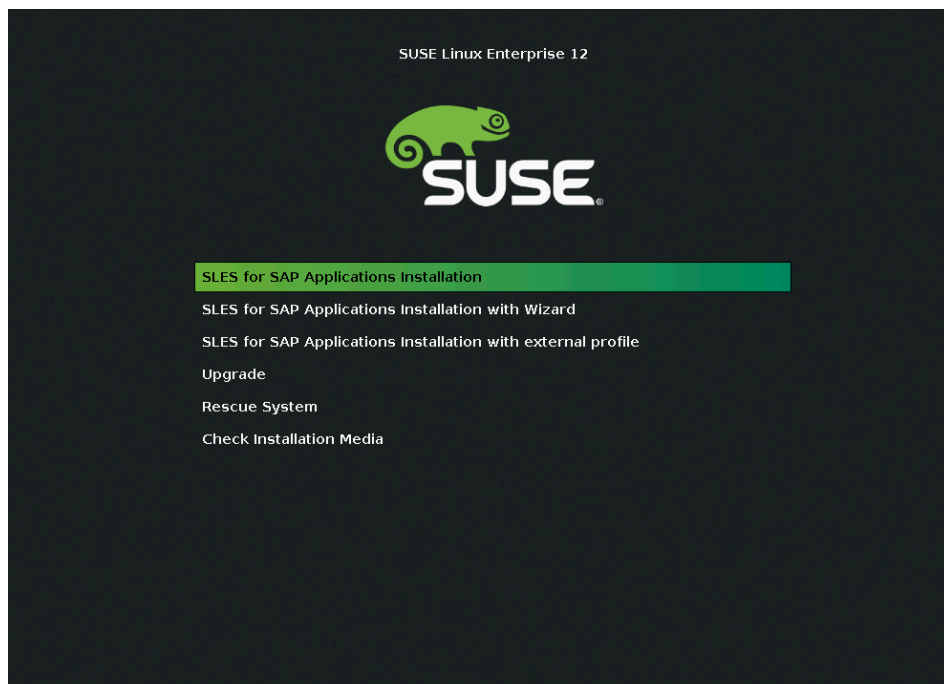
- (6) When "Adapters and UEFI Drivers" screen is displayed, please press the Enter key.



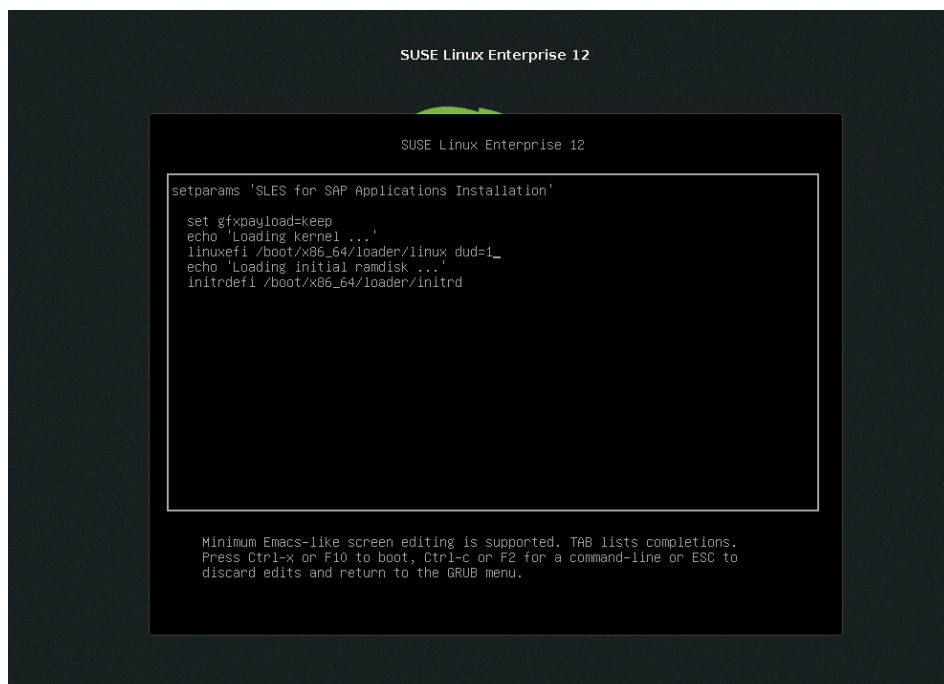
- (7) Please choose "I-Hitachi PCI-X/PCIe Fibre channel Controller" and press the Enter key.



- (8) Please refer to "Procedure to set a Boot Function to Enable" of "HITACHI Gigabit Fibre Channel Adapter USER'S GUIDE (BIOS/EFI Edition)" and do the procedure.
- (9) When the menu screen for boot is displayed, please choose "Installation" and press the e key.



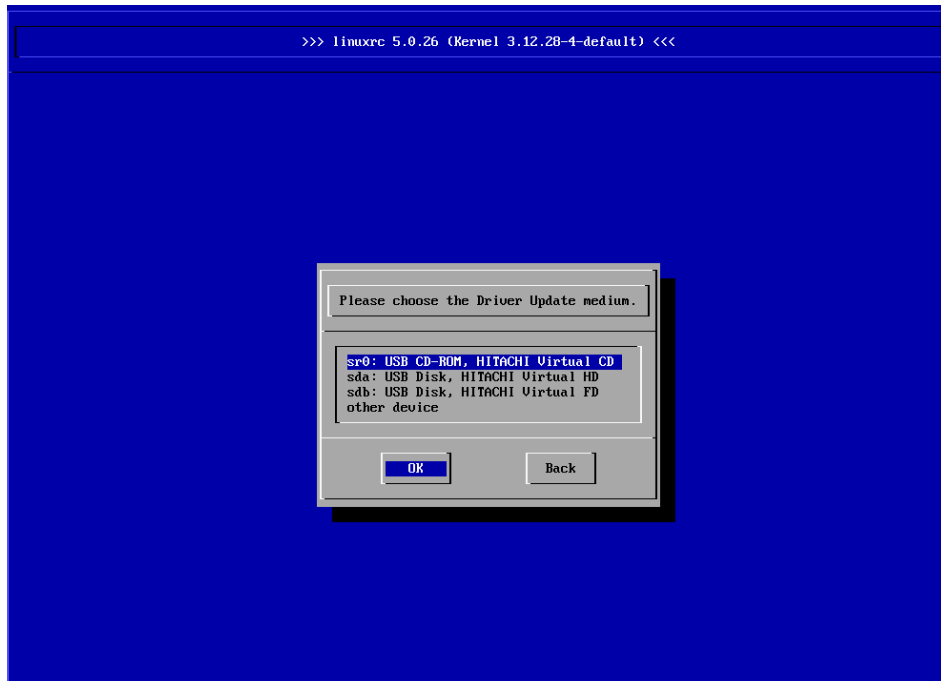
- (10) When the edit display of the "Installation" entry is displayed, please add "dud=1" to the end of the "linuxefi" line, and press the F10 key.



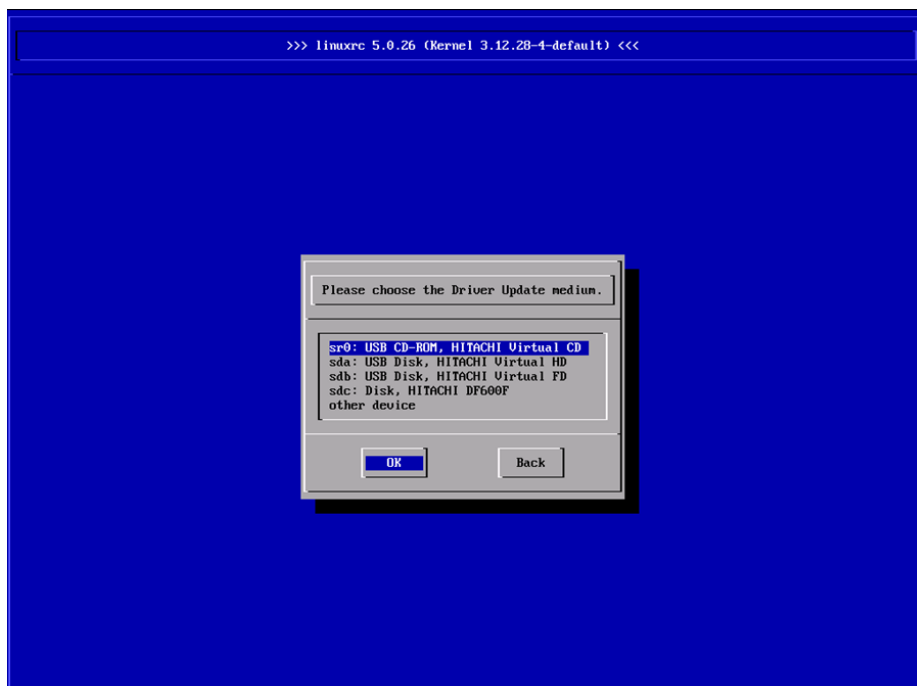


- (11) "Please choose the Driver Update medium." message is displayed, then change the hfcldd driver disk (dud-htc-hfcldd-<driver version>.iso) prepared at (1) to "SUSE Linux Enterprise Server installation" media.

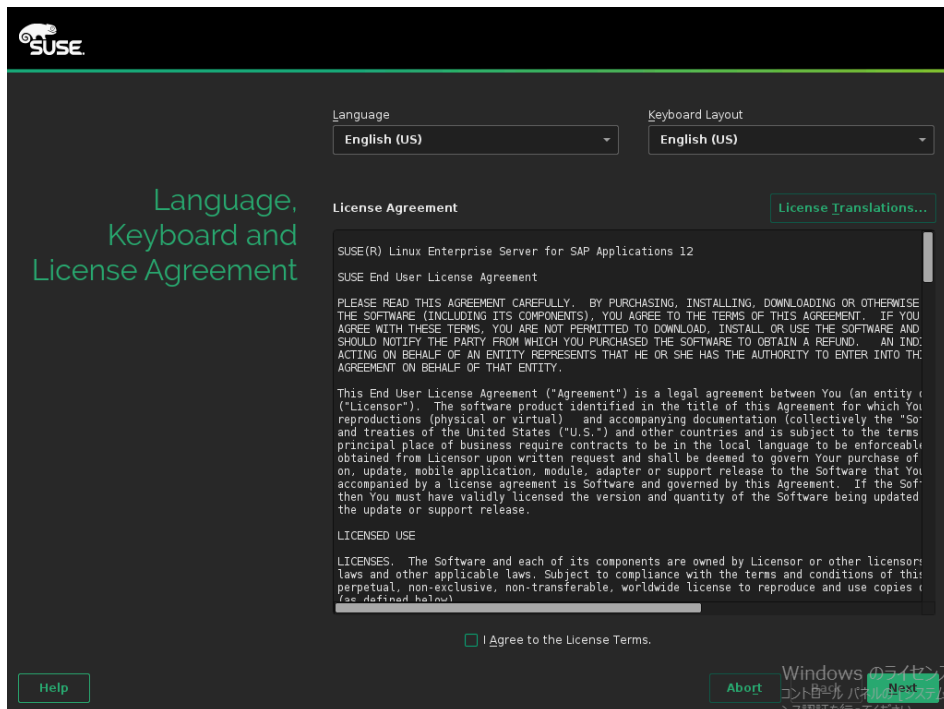
And please choose a USB DVD-ROM drive (example: sr0), and press Enter key.



- (12) When "Please choose the Driver Update medium." message is displayed again, please insert DVD-ROM of SUSE Linux Enterprise Server installation media exchanged by (11) in the DVD drive, choose "Back", and press the Enter key.



- (13) When the following screen is displayed, please install OS according to the installation manual of SUSE Linux Enterprise Server, and move on to "Install SUSE driver".



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## Installing SLES 15

### 3. Example: SUSE Linux Enterprise Server 15 for SAP Applications

#### (1) Make hfcldd driver media

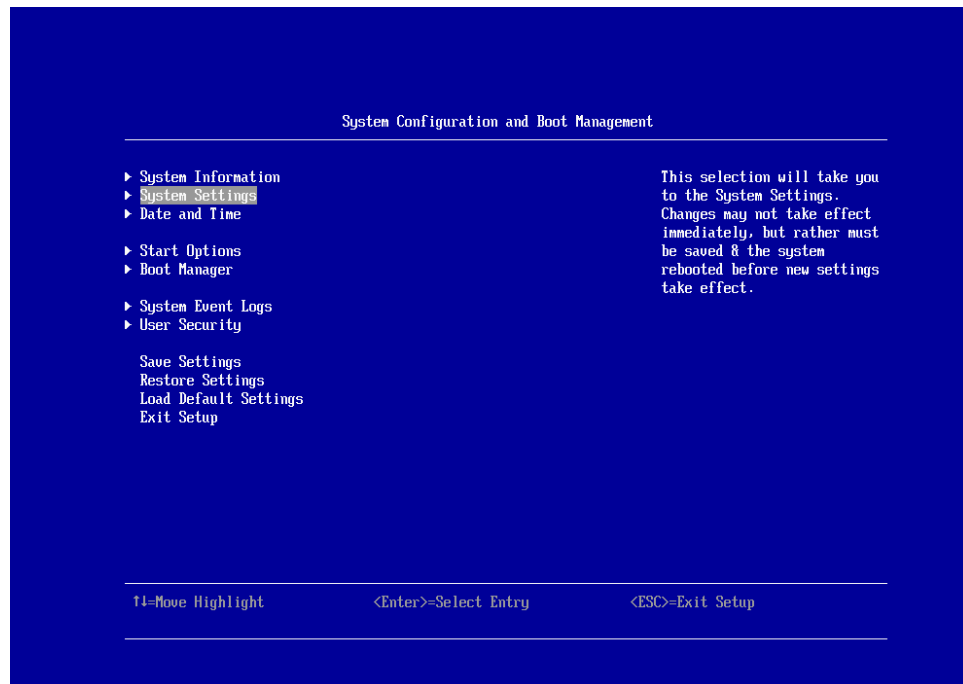
Please get the image file "dud-htc-hfcldd-<driver version>.iso" in the following directory of CD-ROM media (Hitachi Gigabit FC Adapter Driver CD for Linux) appended to this product. Image file is ISO format. Write the image to CD-R to using the appropriate writing software.

```
/linux/x86_64/<sles15*>/cd_media/<kernel_version>
```

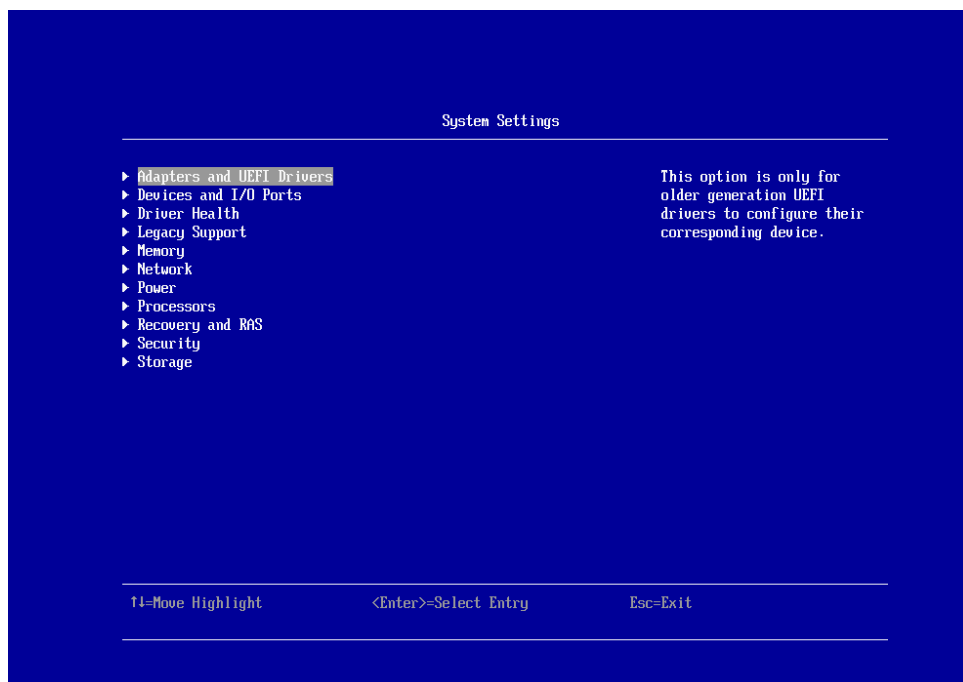
- (2) Please insert SUSE Linux Enterprise Server installation media in a USB DVD-ROM drive, and turn on the server.
- (3) Since the message, "Connecting Boot Devices and Adapters --" is displayed, press F1 key.



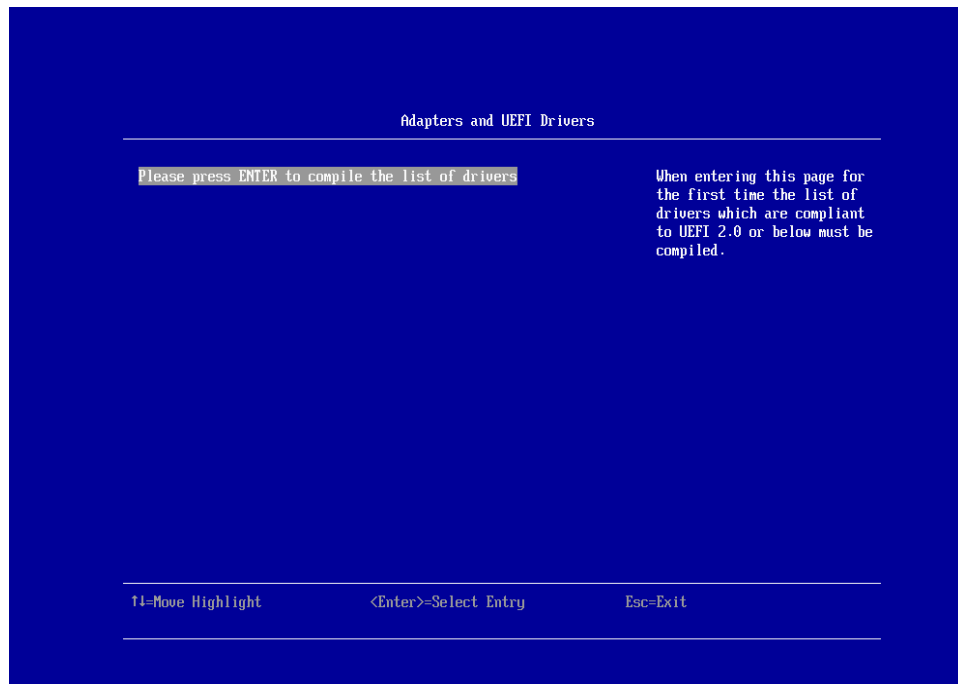
- (4) When the screen, "System Configuration and Boot Management" is displayed, choose "System Settings" and press the Enter key.



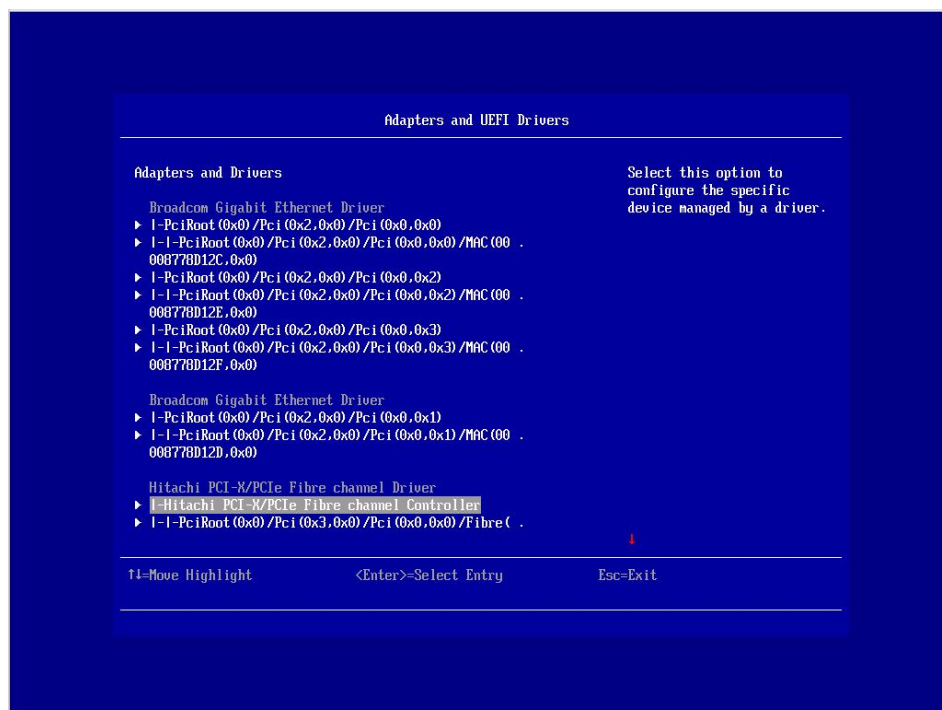
- (5) When "System Settings" screen is displayed, please choose "Adapters and UEFI Drivers" and press the Enter key.



- (6) When "Adapters and UEFI Drivers" screen is displayed, please press the Enter key.

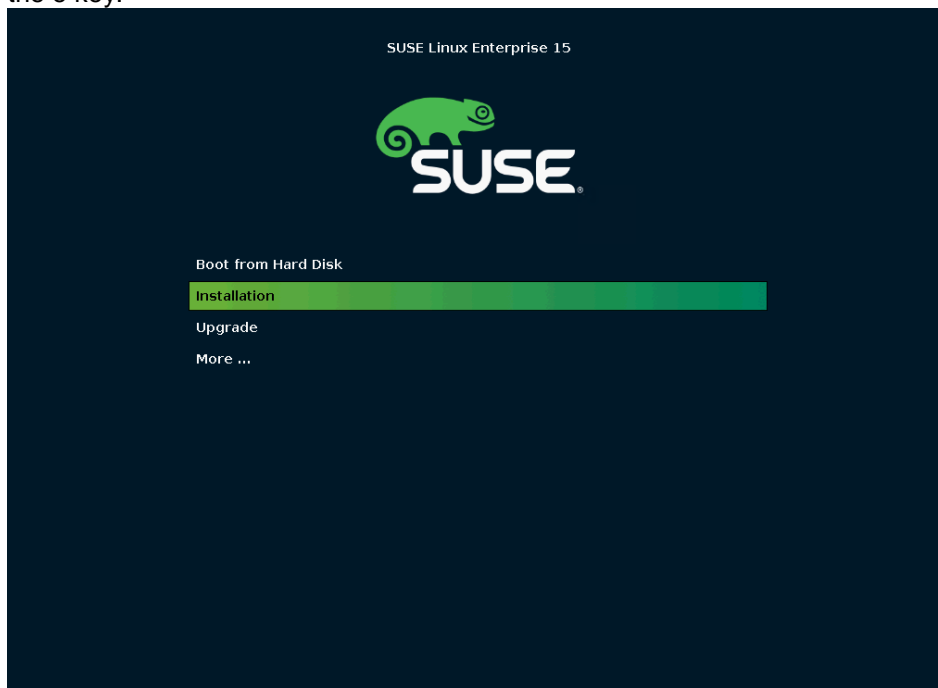


- (7) Please choose "I-Hitachi PCI-X/PCIe Fibre channel Controller" and press the Enter key.

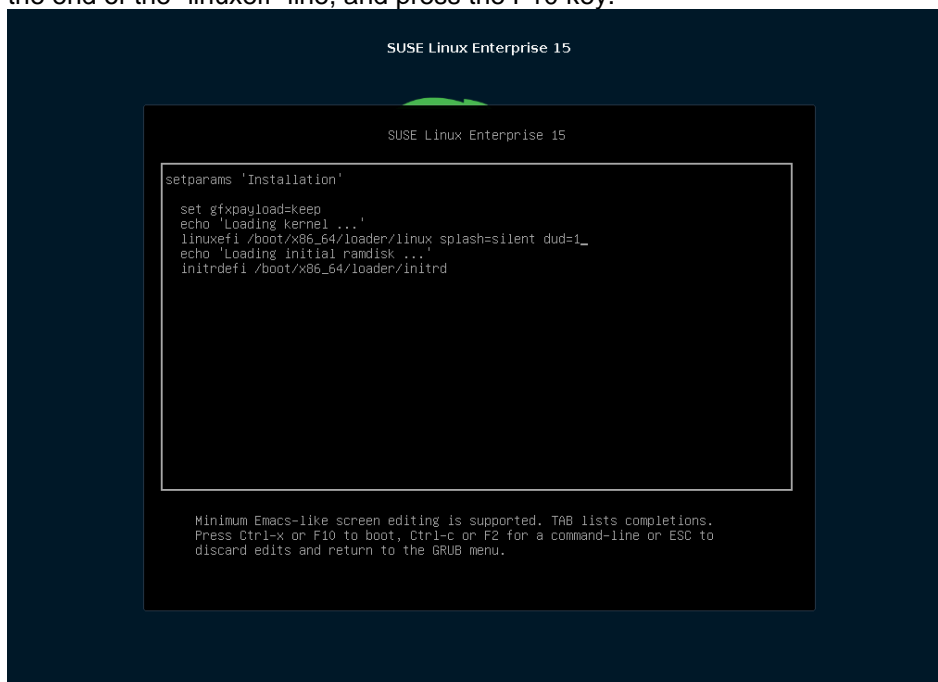


- (8) Please refer to "Procedure to set a Boot Function to Enable" of "HITACHI Gigabit Fibre Channel Adapter USER'S GUIDE (BIOS/EFI Edition)" and do the procedure.

- (9) When the menu screen for boot is displayed, please choose "Installation" and press the e key.

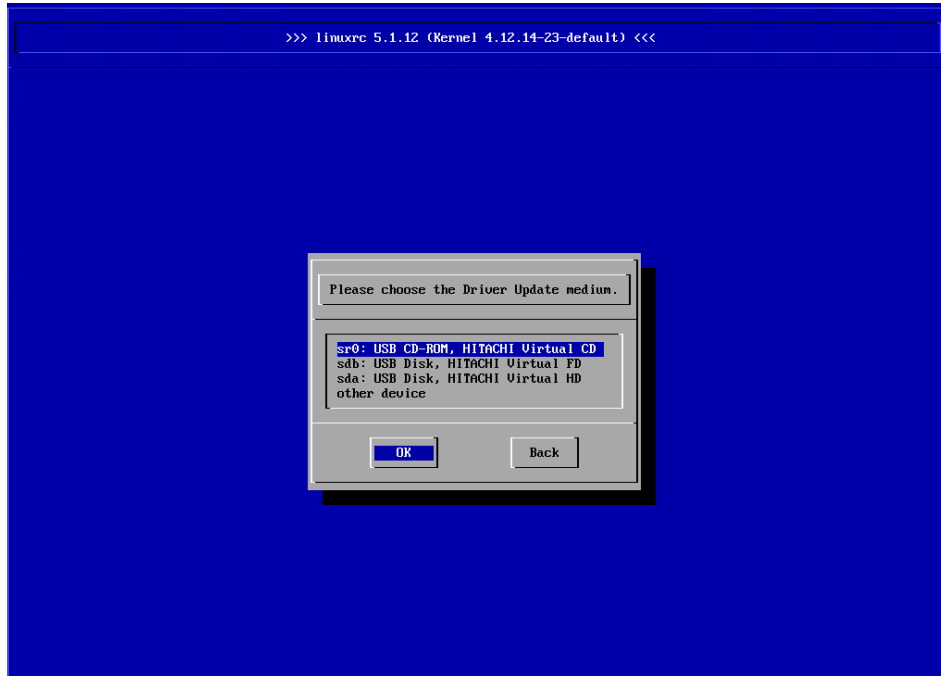


- (10) When the edit display of the "Installation" entry is displayed, please add "dud=1" to the end of the "linuxefi" line, and press the F10 key.

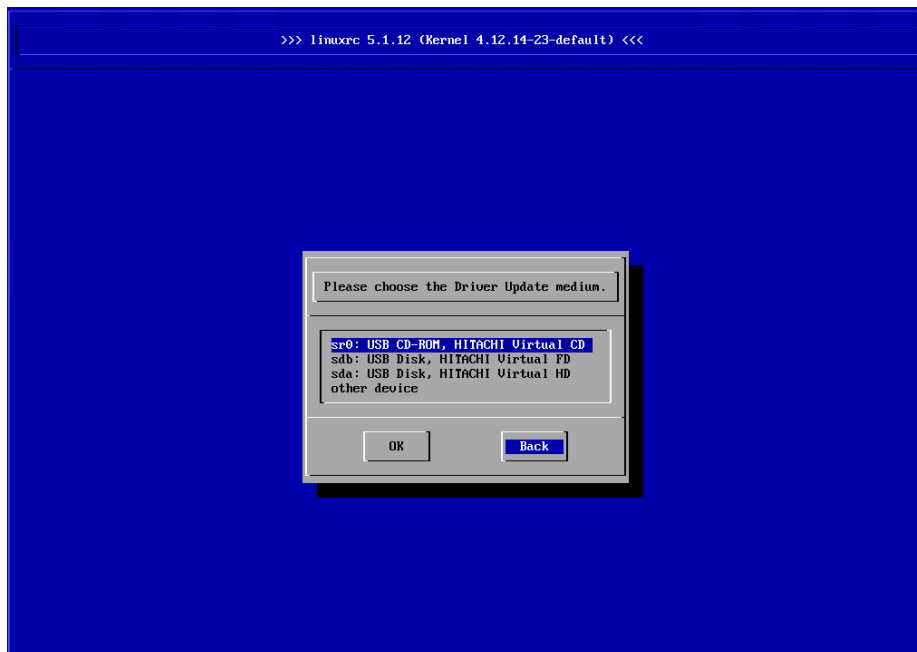


- (11) "Please choose the Driver Update medium." message is displayed, then change the hfcldd driver disk (dud-htc-hfcldd-<driver version>.iso) prepared at (1) to "SUSE Linux Enterprise Server installation" media.

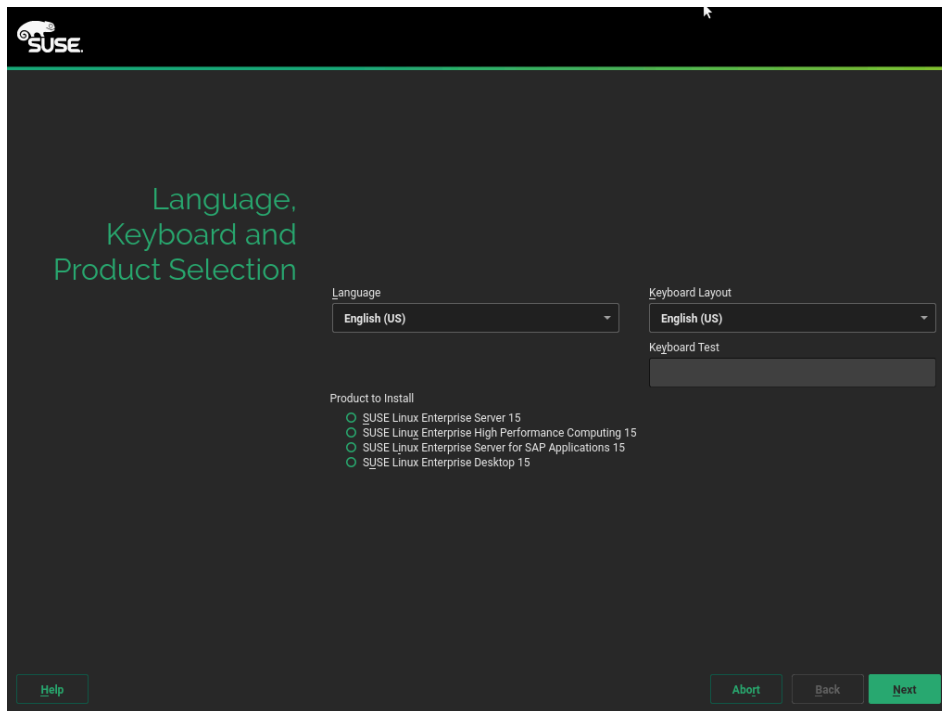
And please choose a USB DVD-ROM drive (example: sr0), and press Enter key.



- (12) When "Please choose the Driver Update medium." message is displayed again, please insert DVD-ROM of SUSE Linux Enterprise Server installation media exchanged by (11) in the DVD drive, choose "Back", and press the Enter key.



(13)When the following screen is displayed, please install OS according to the installation manual of SUSE Linux Enterprise Server, and move on to "Install SUSE driver".





# Install SUSE driver

## Installing SUSE driver

### SLES 11

(1) Get the RPM packages

For Hitachi Compute Blade system, the RPM packages are stored in "Hitachi Gigabit FC Adapter Driver CD for Linux" CD-ROM and its directory is as follows.

```
/hfc_media/linux/x86_64/<sles11*>/
```

#	RPM package name	Description
1	htc-hfcldd-kmp-default-<driver version>_<build kernel version>-<release version>.<sles11*>.<machine type>.rpm	Driver
2	htc-hfcldd-tools-<driver version>-<release version>.<sles11*>.<machine type>.rpm	Utility

(The following is an example of SLES11 SP3, x86\_64)

Copy the RPM packages into /tmp following the procedure below, after mount CD-ROM on the /media/cdrom directory.

```
# cp /media/hfc_media/linux/x86_64/sles11sp3/*.rpm /tmp/
```

(2) Install the RPM packages

Install two RPM packages, driver and utility. You can install the two RPM packages either with one command or one by one.

The following is an example of the driver version 4.11.17.2166 to explain the procedure.

Only super user can install RPM packages.

```
# cd /tmp
```

Note 1) If you haven't login as super user, type 'su' to switch to super user before executing the 'cd' command.

To install two packages together with one command :

```
# rpm -ivh --force htc-hfcldd-kmp-default-4.11.17.2166-1.sles11sp3.x86_64.  
rpm htc-hfcldd-tools-4.11.17.2166-1.sles11sp3.x86_64.rpm
```

To install two packages one by one :

```
# rpm -ivh --force htc-hfcldd-kmp-default-4.11.17.2166-1.sles11sp3.  
x86_64.rpm  
# rpm -ivh --force htc-hfcldd-tools-4.11.17.2166-1.sles11sp3.x86_64.rpm
```

Note 2) When you install the RPM packages one by one, the driver has to be installed before the utility. Otherwise the installation will fail.

Note 3) Utility is stored in /opt/hitachi/drivers/hba.

Note 4) Do not specify -U or -F option when executing rpm command.  
Specifying these options may cause a system hung-up or a system crash.

Note 5) Be sure to install the both RPM packages, driver and utility. If no utility is installed, the error log required for failure analysis cannot be collected.

(3) Confirm the driver version

Check the version.txt stored in /opt/hitachi/drivers/hba, and confirm that the driver's version is same as the RPM package.

[Example: Install log]

```
# more /opt/hitachi/drivers/hba/version.txt  
  
* Version 4.11.17.2166      Fri Nov  2 2012
```

(4) Load the driver

Reboot the system to load the new driver.

```
# reboot
```

## SLES 12

(1) Get the RPM packages

For Hitachi Compute Blade system, the RPM packages are stored in "Hitachi Gigabit FC Adapter Driver CD for Linux" CD-ROM and its directory is as follows.

```
/hfc_media/linux/x86_64/<sles12*>/
```

#	RPM package name	Description
1	htc-hfcldd-kmp-default-<driver version>_<build kernel version>-<release version>.<sles12*>.<machine type>.rpm	Driver
2	htc-hfcldd-tools-<driver version>-<release version>.<sles12*>.<machine type>.rpm	Utility

(The following is an example of SLES12, x86\_64)

Copy the RPM packages into /tmp following the procedure below, after mount CD-ROM on the /media/cdrom directory.

```
# cp /media/hfc_media/linux/x86_64/sles12/*.rpm /tmp/
```

## (2) Install the RPM packages

Install two RPM packages, driver and utility. You can install the two RPM packages either with one command or one by one.  
The following is an example of the driver version 4.12.18.3146 to explain the procedure.

Only super user can install RPM packages.

```
# cd /tmp
```

Note 1) If you haven't login as super user, type 'su' to switch to super user before executing the 'cd' command.

To install two packages together with one command :

```
# rpm -ivh --force htc-hfcldd-kmp-default-4.12.18.3146_3.12.28_4-1.sles12.x86_64.rpm htc-hfcldd-tools-4.12.18.3146-1.sles12.x86_64.rpm
```

The rpm packages which are version 4.12.22.4340 or later are signed by GPG key. To import the public key for verifying the rpm packages before installing them.

```
# cp /media/hfc_media/linux/x86_64/sles12sp4_signed/RPM-GPG-ITPD-KEY /tmp/
```

```
# cd /tmp
```

```
# rpm --import RPM-GPG-ITPD-KEY
```

```
# rpm -ivh --force htc-hfcldd-kmp-default-4.12.22.4340_4.12.14_94.41-1.2.sles12sp4.x86_64.rpm htc-hfcldd-tools-4.12.22.4340-1.2.sles12sp4.x86_64.rpm
```

To install two packages one by one :

```
# rpm -ivh --force htc-hfcldd-kmp-default-4.12.18.3146_3.12.28_4-1.sles12.x86_64.rpm
```

```
# rpm -ivh --force htc-hfcldd-tools-4.12.18.3146-1.sles12.x86_64.rpm
```

Note 2) When you install the RPM packages one by one, the driver has to be installed before the utility. Otherwise the installation will fail.

Note 3) Utility is stored in /opt/hitachi/drivers/hba.

Note 4) Do not specify -U or -F option when executing rpm command.  
Specifying these options may cause a system hung-up or a system crash.

Note 5) Be sure to install the both RPM packages, driver and utility. If no utility is installed, the error log required for failure analysis cannot be collected.

## (3) Confirm the driver version

Check the version.txt stored in /opt/hitachi/drivers/hba, and confirm that the driver's version is same as the RPM package.

[Example: Install log]

```
# more /opt/hitachi/drivers/hba/version.txt

* Version 4. 12. 18. 3146          Tue Oct   13 2015
```

(4) Load the driver

Reboot the system to load the new driver.

```
# reboot
```

## SLES 15

(1) Get the RPM packages

For Hitachi Compute Blade system, the RPM packages are stored in "Hitachi Gigabit FC Adapter Driver CD for Linux" CD-ROM and its directory is as follows.

```
/hfc_media/linux/x86_64/<sles15*>/
```

#	RPM package name	Description
1	htc-hfcldd-kmp-default-<driver version>_<build kernel version>-<release version>.<sles15*>.<machine type>.rpm	Driver
2	htc-hfcldd-tools-<driver version>-<release version>.<sles15*>.<machine type>.rpm	Utility

(The following is an example of SLES15 SP1, x86\_64)

Copy the RPM packages and the public key into /tmp following the procedure below, after mount CD-ROM on the /media/cdrom directory.

```
# cp /media/hfc_media/linux/x86_64/sles15sp1/*.rpm /tmp/
```

```
# cp /media/hfc_media/linux/x86_64/sles15sp1/RPM-GPG-ITPD-KEY /tmp/
```

(2) Install the RPM packages

Install two RPM packages, driver and utility. You can install the two RPM packages either with one command or one by one.

The following is an example of the driver version 4.15.22.4342 to explain the procedure.

Only super user can install RPM packages.

```
# cd /tmp
```

Note 1) If you haven't login as super user, type 'su' to switch to super user before executing the 'cd' command.

To import public key for verifying rpm packages.

```
# rpm --import RPM-GPG-ITPD-KEY
```

To install two packages together with one command :

```
# rpm -ivh --force htc-hfcldd-kmp-default-4.15.22.4342_4.12.14_195-1.sles15sp1.x86_64.rpm htc-hfcldd-tools-4.15.22.4342-1.sles15sp1.x86_64.rpm
```

To install two packages one by one :

```
# rpm -ivh --force htc-hfcldd-kmp-default-4.15.22.4342_4.12.14_195-1.sles15
sp1.x86_64.rpm
# rpm -ivh --force htc-hfcldd-tools-4.15.22.4342-1.sles15sp1.x86_64.rpm
```

Note 2) When you install the RPM packages one by one, the driver has to be installed before the utility. Otherwise the installation will fail.

Note 3) Utility is stored in /opt/hitachi/drivers/hba.

Note 4) Do not specify -U or -F option when executing rpm command.  
Specifying these options may cause a system hung-up or a system crash.

Note 5) Be sure to install the both RPM packages, driver and utility. If no utility is installed, the error log required for failure analysis cannot be collected.

### (3) Confirm the driver version

Check the version.txt stored in /opt/hitachi/drivers/hba, and confirm that the driver's version is same as the RPM package.

[Example: Install log]

```
# more /opt/hitachi/drivers/hba/version.txt

* Version 4. 15. 22. 4342          Tue Dec   3 2019
```

### (4) Load the driver

Reboot the system to load the new driver.

```
# reboot
```

---

## Confirm the driver version

Be sure that all of the installed Hitachi FC HBA cards were recognized by linux.

In case of SLES 11

```
# 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 4. 11. 17. 2166  Firmware version 30045d
  Package_ID           = 0x91
  Special file name     = hfcldd0
  .....
```

In case of SLES 12

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

```
Hitachi FIVE-FX(16Gbps) based Fibre Channel to PCIe HBA
Driver version 4.12.18.3146 Firmware version 40030c
Package_ID           = 0xa0
Special file name     = hfcldd0
.....
```

In case of SLES 15

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

```
Hitachi FIVE-FX(16Gbps) based Fibre Channel to PCIe HBA
Driver version 4.15.22.4342 Firmware version 410600
Package_ID           = 0xa0
Special file name     = hfcldd0
.....
```

Please check the version of installed driver and whether the version is in agreement.

---

## Update the driver

Please install driver again according to the procedure of “Install driver”. When the driver version is downgraded, the procedure is the same as the procedure of “Install driver”.

# Uninstall driver

Do not uninstall driver when booting from SAN.

Uninstalling driver may cause a system hung-up or a system crash

Otherwise, follow the procedure shown in section below.

---

## Uninstalling SUSE Linux Enterprise Server driver

### SLES 11

Uninstall the driver and the utility following the procedures below. (The following are examples of SLES11 SP3 (x86\_64).)

#### (1) Uninstall the RPM packages

Uninstall the two installed RPM packages, driver and utility. You can uninstall the two RPM packages either with one command or one by one.

The following is an example of the driver version 4.11.17.2166 to explain the procedure.

Only super user can uninstall RPM packages.

```
# cd /tmp
```

Note 1) If you haven't login as super user, type 'su' to switch to super user before executing the 'cd' command.

To uninstall two packages together with one command :

```
# rpm -e htc-hfcldd-kmp-default-4.11.17.2166-1.sles11sp3.x86_64  
htc-hfcldd-tools-4.11.17.2166-1.sles11sp3.x86_64
```

To install two packages one by one :

```
# rpm -e htc-hfcldd-tools-4.11.17.2166-1.sles11sp3.x86_64  
# rpm -e htc-hfcldd-kmp-default-4.11.17.2166-1.sles11sp3.x86_64
```

Note 2) When you uninstall the RPM packages one by one, the utility has to be uninstalled before the driver. Otherwise the uninstallation will fail.

Note 3) Kernel ramdisk image is updated by uninstalling the RPM packages.  
See "Notes at the time of renewal of RAMDISK" after uninstallation.

#### (2) Check the uninstall log

Check the messages in /tmp/hfcldd\_uninstall.log, and confirm "Uninstall Success" is recorded.

```
----- Uninstall @Hitachi Fibre Channel Adapter Driver - Tue Nov 6 15:26:55  
JST 2012  
      Modify /etc/modprobe.d/hfcldd_param.conf  
----- Uninstall Success
```

(3) Unload the driver

Reboot the system to unload the driver.

```
# reboot
```

(4) Confirm the driver and utility uninstalled

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

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

## SLES 12

Uninstall the driver and the utility following the procedures below. (The following are examples of SLES12 (x86\_64).)

(1) Uninstall the RPM packages

Uninstall the two installed RPM packages, driver and utility. You can uninstall the two RPM packages either with one command or one by one.

The following is an example of the driver version 4.12.18.3146 to explain the procedure.

Only super user can uninstall RPM packages.

```
# cd /tmp
```

Note 1) If you haven't login as super user, type 'su' to switch to super user before executing the 'cd' command.

To uninstall two packages together with one command :

```
# rpm -e htc-hfcldd-kmp-default-4.12.18.3146_3.12.28_4-1.sles12.x86_64  
htc-hfcldd-tools-4.12.18.3146-1.sles12.x86_64
```

To install two packages one by one :

```
# rpm -e htc-hfcldd-tools-4.12.18.3146-1.sles12.x86_64  
# rpm -e htc-hfcldd-kmp-default-4.12.18.3146_3.12.28_4-1.sles12.x86_64
```

Note 2) When you uninstall the RPM packages one by one, the utility has to be uninstalled before the driver. Otherwise the uninstallation will fail.

Note 3) Kernel ramdisk image is updated by uninstalling the RPM packages. See "Notes at the time of renewal of RAMDISK" after uninstallation.

(2) Check the uninstall log

Check the messages in /tmp/hfcldd\_uninstall.log, and confirm "Uninstall Success" is recorded.

```
----- Uninstall @Hitachi Fibre Channel Adapter Driver - Fri Oct 30 10:02:12  
JST 2015  
      Modify /etc/modprobe.d/hfcldd_param.conf  
----- Uninstall Success
```



(3) Unload the driver

Reboot the system to unload the driver.

```
# reboot
```

(4) Confirm the driver and utility uninstalled

Confirm that don't exists nothing display in  
/sys/class/scsi\_host/host\*/hfcldd\_proc

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

## SLES 15

Uninstall the driver and the utility following the procedures below. (The following are examples of SLES15 SP1(x86\_64).)

(1) Uninstall the RPM packages

Uninstall the two installed RPM packages, driver and utility. You can uninstall the two RPM packages either with one command or one by one.

The following is an example of the driver version 4.15.22.4342 to explain the procedure.

Only super user can uninstall RPM packages.

```
# cd /tmp
```

Note 1) If you haven't login as super user, type 'su' to switch to super user before executing the 'cd' command.

To uninstall two packages together with one command :

```
# rpm -e htc-hfcldd-kmp-default- 4.15.22.4342_4.12.14_195-  
1.sles15sp1.x86_64 htc-hfcldd-tools-4.15.22.4342-1.sles15sp1.x86_64
```

To install two packages one by one :

```
# rpm -e htc-hfcldd-tools-4.15.22.4342-1.sles15sp1.x86_64  
# rpm -e htc-hfcldd-kmp-default-4.15.22.4342_4.12.14_195-1.sles15sp1.x  
86_64
```

Note 2) When you uninstall the RPM packages one by one, the utility has to be uninstalled before the driver. Otherwise the uninstallation will fail.

Note 3) Kernel ramdisk image is updated by uninstalling the RPM packages.  
See "Notes at the time of renewal of RAMDISK" after uninstallation.

(2) Check the uninstall log

Check the messages in /tmp/hfcldd\_uninstall.log, and confirm "Uninstall Success" is recorded.

```
----- Uninstall @Hitachi Fibre Channel Adapter Driver - Tue Nov 26 10:02:12
JST 2019
      Modify /etc/modprobe.d/hfcldd_param.conf
----- Uninstall Success
```

(3) Unload the driver

Reboot the system to unload the driver.

```
# reboot
```

(4) Confirm the driver and utility uninstalled

Confirm that don't exists nothing display in  
/sys/class/scsi\_host/host\*/hfcldd\_proc

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

# 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.

---

## Update RAMDISK image

Update the RAMDISK image executing the following commands.

### SLES 11

```
# cd /boot  
# /sbin/mkinitrd -k <vmlinuz-file-name> -i <initrd-file-name>
```

### SLES 12

```
# /usr/bin/dracut -f /boot/initrd-<kernel-version> <kernel-version>
```

### SLES 15

```
# /usr/bin/dracut -f /boot/initrd-<kernel-version> <kernel-version>
```

# 2

## 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.

All SLES's driver supports the script 'hfcrasinfo'. By executing the hfcrasinfo command, you can collect syslog and other driver information at the same time.

---

### 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:

```
#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)

### ❑ 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 duplicated	
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. (The adapter number is not assigned to this adapter but one or more other adapter is correctly specified.)	
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.)	
156	9C	HFC_OPTERR0	The unsupported optical transceiver is installed.	

No.	ErrNo	Error name	Contents	Remarks
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	PCIe 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 duplicated	
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. (The adapter number is not assigned to this adapter but one or more other adapter is correctly specified.)	
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.)	
156	9C	HFC_OPTERR0	The unsupported optical transceiver is installed.	

No.	ErrNo	Error name	Contents	Remarks
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_ERRR 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 "Multi Queue feature of Hitachi Gigabit Fibre Channel Adapter" is enabled or disabled. Refer to "Multi Queue feature of Hitachi Gigabit Fibre Channel Adapter" section for the details.

[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.

### 【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.

# 3

## Driver parameter setting when SCSI-MQ feature at Linux is enabled

This chapter explains how to enable SCSI-MQ feature supported by SUSE Linux Enterprise Server and how to setup the driver parameter for SCSI-MQ feature.

### SCSI-MQ feature in Linux OS

#### About SCSI-MQ feature

From SLES12SP2 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 SLES12SP2 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
SLES12SP1 or earlier version	Not supported
SLES12SP2 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 feature	
	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 disable 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/grub2/grub.cfg
```

(3) Reboot

```
# reboot
```

(4) Please check whether SCSI-MQ feature setting is enabled or disabled and refer to "Confirm the state of SCSI-MQ feature".

(5) Please set interrupts and 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 SUSE Linux Enterprise Server, 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 Point to Point and Multiple PortID is Disable
  - (ii) Storage direct connection configuration, Connection Type is Point to Point and Multiple PortID is Enable

About Connection 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 execute 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 executing 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\_count "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\_count "Physical cpu number >= 30c

```
# 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".

- (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)" for details.

# 4

## 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.

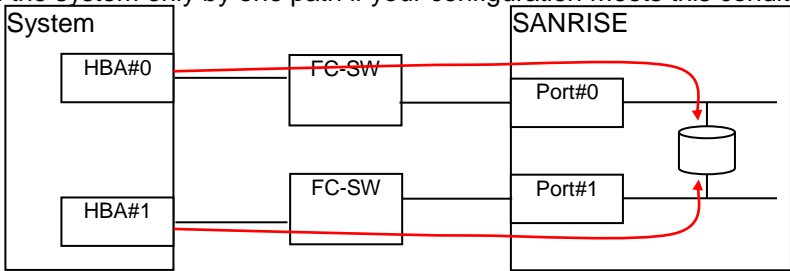
```
# vi /etc/sysconfig/irqbalance
IRQBALANCE_ARGS="-h exact"
```

(2) Restart an irqbalance daemon.

```
# service irqbalance restart
```

# 5

## Restrictions

#	Restrictions
1	FC HUB is not supported.
2	<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> 
3	<p>When you replace SFP by Hot-swap, be sure that the target path has redundant path and one or more operational path exist to be switched. If no redundant 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 it is necessary to replace SFP when it is used as a boot path and no redundant path exist to be switched, you must shutdown the server and replace the SFP.</p>
4	<p>The PCI passthrough function in KVM is not supported.</p> <p>Please do not set intel_iommu or amd_iommu to kernel start optional in "grub.conf".</p>
5	<p>In the configuration 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 output, and the event log of ErrNo:0x0e may be further output to syslog, it does not affect on the driver operation.</p>
6	<p>The ErrNo:0x16 logs may be recorded in the syslog, when the adapter (except 16Gbps) is connected to Hitachi Virtual Storage Platform Gx00 models or Hitachi Virtual Storage Platform Fx00 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"> <li>- While booting the OS.</li> <li>- After hot-swapping the adapter</li> <li>- After linking up between the adapter port and the connecting device (FC-Switch or disk device).</li> <li>- After linking up between the FC-Switch and the disk device.</li> <li>- After recovering from hardware failure of the adapter.</li> </ul>

(\*1) Function to make only logical device (LUN) decided beforehand for system accessible.

# 6

## Driver parameters for SLES11

### Link Down Time Parameter

Notes about the waiting time (Link Down Time) which waits for linkup in order that the driver tries resending of the SCSI command after link down occurred at the time of SLES11 use are explained.

In SLES11, in order that a driver tries resending of the SCSI command after link down occurred, When the change of waiting time (Link Down Time) which waits for linkup is needed, the rewriting of the "dev\_loss\_tmo" parameter can change the waiting time.

The "dev\_loss\_tmo" parameter is set as the optimal value in the general usage in the state immediately after installation. Usually, it is not necessary to change this value.

Please refer to "a display and setup steps of dev\_loss\_tmo" for the procedure of displaying or changing the value of the "dev\_loss\_tmo" parameter.

In other OS's (example: RHEL6), when the change of waiting time (Link Down Time) is needed, it is possible to change waiting time (Link Down Time) by using "-p option of the hfcmgr command", but in SLES11, it is not necessary to use "-p option of the hfcmgr command" at the purpose of specifying waiting time (Link Down Time).

In SLES11, when "-p option of the hfcmgr command" is used, as shown in the following figure, in the default state, the column of Link Down Time is displayed as 0 second.

```
# ./hfcmgr -p hfcldd0
Time: xxxx/xx/xx xx:xx:xx
-----
WWPN:50000870003021e0 Device:hfcldd0 [LinkUp]
-----
Connection Type   : Point to Point[fabric] (Point to Point)
Link Speed        : 1Gbps (1Gbps)
Max Transfer Size : 16 MB (-)
Login Delay Time  : 0 sec (-)
Link Down Time    : 0 sec (-)
Reset Delay Time  : 19 sec (-)
Preferred AL-PA   : 0x01 (-)
Reset Timeout     : 20 sec (-)
Abort Timeout     : 8 sec (-)
Queue Depth       : 32 (-)
Machine Check     : 8 (-)
Allowed           : 5 (-)
Target Reset Mode : off (-)
LUN Reset Delay   : 0 (-)
Interrupt Type    : Legacy Mode (-)
Logging Mode      : default (-)
Login Target Filter : none (-)
```

In the default state, it is set as 0.

---

## Display and setup procedures of dev\_loss\_tmo

[Function] Display of dev\_loss\_tmo

[Syntax]

```
<display> cat /sys/class/fc_remote_ports/rport-xxxx/dev_loss_tmo
```

Since dev\_loss\_tmo exists for every SCSI target, the character string which goes into the portion of "xxxx" with a SCSI target changes.

Please display the dev\_loss\_tmo parameter of each SCSI target to check dev\_loss\_tmo to two or more SCSI targets.

[Function] Setup of dev\_loss\_tmo

[Syntax]

```
<Setup> echo <setup value> > /sys/class/fc_remote_ports/rport-xxxx/dev_loss_tmo
```

Since dev\_loss\_tmo exists for every SCSI target, the character string which goes into the portion of "xxxx" with a SCSI target changes.

Please set the dev\_loss\_tmo parameter of each SCSI target to set up dev\_loss\_tmo to two or more SCSI targets.

The value set up by this method is reset by the initial value (15) after reboot of OS.

Please execute "[Function] Setup of the initial value of dev\_loss\_tmo" to change an initial value.

[Function] Setup of the initial value of dev\_loss\_tmo

[Syntax]

```
<Setup> /opt/hitachi/drivers/hba/hfcmgr -E hfc_dev_loss_tmo <setup value>
```

After hfcmgr command execution, in order to reflect the setting, please update a RAMDISK image in the procedure of "updating procedure of a RAMDISK image."

---

## dev\_loss\_tmo changing by Device mapper multipath

When you use Device mapper multipath in SLES11, Device mapper multipath may update the value of dev\_loss\_tmo automatically after OS starting.

When the actual display of dev\_loss\_tmo differs from the value which you set as dev\_loss\_tmo, please confirm a setup and operation of Device mapper multipath.

The configuration file of Device mapper multipath is /etc/multipath.conf.

The value of dev\_loss\_tmo may be updated by default operation of Device mapper multipath even if it is a case where /etc/multipath.conf does not exist.

---

## fast\_io\_fail\_tmo changing by Device mapper multipath

When you use Device mapper multipath in SLES11, Device mapper multipath may update the value of fast\_io\_fail\_tmo automatically after OS starting.

When the value is set except "off" to fast\_io\_fail\_tmo, instead of dev\_loss\_tmo, the value of fast\_io\_fail\_tmo is used on OS as "waiting time which waits for linkup in order that the driver tries resending of the SCSI command after link down occurred".

When the value is set except "off" to fast\_io\_fail\_tmo, please confirm a setup and operation of Device mapper multipath.

The configuration file of Device mapper multipath is /etc/multipath.conf.

The value of fast\_io\_fail\_tmo may be updated by default operation of Device mapper multipath even if it is a case where /etc/multipath.conf does not exist.

[Function] Display of fast\_io\_fail\_tmo

[Syntax]

```
<Display> cat /sys/class/fc_remote_ports/rport-xxxx/fast_io_fail_tmo
```

Since fast\_io\_fail\_tmo exists for every SCSI target, the character string "xxxx" varies depending on SCSI target ID.

Please display the fast\_io\_fail\_tmo parameter of each SCSI target to check link down time to two or more SCSI targets.

[Function] Setup of fast\_io\_fail\_tmo

[Syntax]

```
<Setup> echo <setup value> > /sys/class/fc_remote_ports/rport-xxxx/fast_io_fail_tmo
```

Since fast\_io\_fail\_tmo exists for every SCSI target, the character string "xxxx" varies depending on SCSI target ID.

Please set the fast\_io\_fail\_tmo parameter of each SCSI target to set up fast\_io\_fail to two or more SCSI targets.

The value set up by this method has a case rewritten by other software than a driver (example: Device mapper multipath).

Example: By changing the configuration file (/etc/multipath.conf) of Device mapper multipath, it is possible to change the value set as fast\_io\_fail\_tmo.

For details, please refer to the manual of Device mapper multipath.

## Notes at the time of Login Delay Time parameter change

Notes about "the waiting time (Login Delay Time) for delaying the login processing to a device" at the time of SLES11 use are explained.

In SLES11, when change of "the waiting time (Login Delay Time) for delaying the login processing to a device" is needed, it is possible to change the waiting time by using "-p option of the hfcmgr command". Please refer to "HITACHI Gigabit Fibre Channel Adapter USER'S GUIDE (Utility Software Edition)" for the details of "-p option of the hfcmgr command."

In SLES11, when "-p option of the hfcmgr command" is used, as shown in the following figure, in the default state, the column of Login Delay Time is displayed as 0 second.

```
# ./hfcmgr -p hfcldd0
Time: xxxx/xx/xx xx:xx:xx
-----
WWPN:50000870003021e0 Device:hfcldd0 [LinkUp]
-----
Connection Type   : Point to Point[fabric] (Point to Point)
Link Speed        : 1Gbps (1Gbps)
Max Transfer Size : 16 MB (-)
Login Delay Time : 0 sec (-)
Link Down Time    : 0 sec (-)
Reset Delay Time  : 19 sec (-)
Preferred AL-PA   : 0x01 (-)
Reset Timeout     : 20 sec (-)
Abort Timeout     : 8 sec (-)
Queue Depth       : 32 (-)
Machine Check     : 8 (-)
Allowed           : 5 (-)
Target Reset Mode : off (-)
LUN Reset Delay   : 0 (-)
Interrupt Type    : Legacy Mode (-)
Logging Mode      : default (-)
Login Target Filter : none (-)
```

In SLES11, when "the waiting time (Login Delay Time) for delaying the login processing to a device" is changed, it is necessary to add to the value of dev\_loss\_tmo/fast\_io\_fail\_tmo. About the method of changing the value of dev\_loss\_tmo/ fast\_io\_fail\_tmo, Please refer to "Display and setup steps of dev\_loss\_tmo", and "fast\_io\_fail\_tmo changing by Device mapper multipath".

Example 1: when Login Delay Time is 2 and fast\_io\_fail\_tmo is "off", please set "the value which added 2 to the value of dev\_loss\_tmo" as dev\_loss\_tmo.

Example 2: when Login Delay Time is 2 and fast\_io\_fail\_tmo is a value except "off", please set "the value which added 2 to the value of fast\_io\_fail\_tmo" as fast\_io\_fail\_tmo.

# 7

## Notes at the time of SLES use

### The command “hfcmgr -t”

Here, at the time of SLES use, explains the notes on the command “hfcmgr -t” in environment which connect to more than LU size of 2TB or connect to more than number of 511 LU.

In SLES11 with driver version 4.11.18.3148 (or higher) and in SLES12 with driver version from 4.12.18.3148 to 4.12.18.3174, executing the command “hfcmgr -t” in the environment which connect to more than LU size of 2TB or connect to more than number of 511LU, there is a possibility that the error log is output and the screen not be correctly output. It shows an example of the error log in below.

“HFC\_ERR9 FC Adapter Driver error (ErrNo:0xaa) \* “.  
This error log does not affect the operation of the driver.

However, we don't recommend to execute the command “hfcmgr -t” in the environment which connect to more than LU size of 2TB or connect to more than number of 511 LU.

\* Error log “HFC\_ERR9 FC Adapter Driver error (ErrNo:0xaa)”  
: HBA firmware detects the invalid parameters

### Connect to FC switch

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.

# **HITACHI**

## **Gigabit Fibre Channel Adapter**

### **USER'S GUIDE**

#### **(SUSE Linux Enterprise Server driver Edition)**

Revision 16

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