IBM System Storage

N7000 Series Hardware and Service Guide

GC26-7953-04

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Note:
Before using this information and the product it supports, be sure to read the general information in "Notices" on page 101.

Safety and environmental notices

This section contains information about:

Safety notices and labels

When using this product, observe the danger, caution, and attention notices contained in this guide. The notices are accompanied by symbols that represent the severity of the safety condition.

The following sections define each type of safety notice and provide examples.

The following notices and statements are used in IBM® documents. They are listed below in order of increasing severity of potential hazards. Follow the links for more detailed descriptions and examples of the danger, caution, and attention notices in the sections that follow.

- **Note:** These notices provide important tips, guidance, or advice.
- **"Attention notices" on page vii:** These notices indicate potential damage to programs, devices, or data.
- **"Caution notices" on page vi:** These statements indicate situations that can be potentially hazardous to you.
- **"Danger notices":** These statements indicate situations that can be potentially lethal or extremely hazardous to you. Safety labels are also attached directly to products to warn of these situations.
- In addition to these notices, "Labels" on page vi may be attached to the product to warn of potential hazards.

Danger notices

A danger notice calls attention to a situation that is potentially lethal or extremely hazardous to people. A lightning bolt symbol accompanies a danger notice to represent a dangerous electrical condition. A sample danger notice follows.

DANGER

An electrical outlet that is not correctly wired could place hazardous voltage on metal parts of the system or the devices that attach to the system. It is the responsibility of the customer to ensure that the outlet is correctly wired and grounded to prevent an electrical shock. (D004)

A comprehensive danger notice provides instructions on how to avoid shock hazards when servicing equipment. Unless instructed otherwise, follow the procedures in the following danger notice.

DANGER

When working on or around the system, observe the following precautions:

Electrical voltage and current from power, telephone, and communication cables are hazardous. To avoid a shock hazard:

- **Connect power to this unit only with the IBM provided power cord. Do not use the IBM provided power cord for any other product.**
- **Do not open or service any power supply assembly.**
- **Do not connect or disconnect any cables or perform installation, maintenance, or reconfiguration of this product during an electrical storm.**
- **The product might be equipped with multiple power cords. To remove all hazardous voltages, disconnect all power cords.**
- **Connect all power cords to a properly wired and grounded electrical outlet. Ensure outlet supplies proper voltage and phase rotation according to the system rating plate.**
- **Connect any equipment that will be attached to this product to properly wired outlets.**
- **When possible, use one hand only to connect or disconnect signal cables.**
- **Never turn on any equipment when there is evidence of fire, water, or structural damage.**
- **Disconnect the attached power cords, telecommunications systems, networks, and modems before you open the device covers, unless instructed otherwise in the installation and configuration procedures.**
- **Connect and disconnect cables as described below when installing, moving, or opening covers on this product or attached devices.**

To Disconnect:

1. **Turn off everything (unless instructed otherwise).**
2. **Remove power cords from the outlet.**
3. **Remove signal cables from connectors.**
4. **Remove all cables from devices.**

To Connect:

1. **Turn off everything (unless instructed otherwise).**
2. **Attach all cables to devices.**
3. **Attach signal cables to the connectors.**
4. **Attach power cords to the outlets.**
5. **Turn on the devices.**

(D005)

Labels

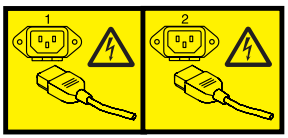
As an added precaution, safety labels are often installed directly on products or product components to warn of potential hazards.

The actual product safety labels may differ from these sample safety labels:

(L001)

DANGER

Hazardous voltage, current, or energy levels are present inside any component that has this label attached. Do not open any cover or barrier that contains this label.



(L003)

DANGER

Multiple power cords. The product might be equipped with multiple power cords. To remove all hazardous voltages, disconnect all power cords.

Caution notices

A caution notice calls attention to a situation that is potentially hazardous to people because of some existing condition. A caution notice can be accompanied by different symbols, as in the examples below:

If the symbol is...	It means....
	A hazardous electrical condition with less severity than electrical danger.
	A generally hazardous condition not represented by other safety symbols.
 Class I	A hazardous condition due to the use of a laser in the product. Laser symbols are always accompanied by the classification of the laser as defined by the U. S. Department of Health and Human Services (for example, Class I, Class II, and so forth).

Attention notices

An attention notice indicates the possibility of damage to a program, device, or system, or to data. An exclamation point symbol may accompany an attention notice, but is not required. A sample attention notice follows:

Attention: Do not bend a fibre cable to a radius less than 5 cm (2 in.); you can damage the cable. Tie wraps are not recommended for optical cables because they can be easily overtightened, causing damage to the cable.

Laser safety

When using an NVRAM5 or NVRAM6 active-active (cluster) copper-fiber converter, the storage system must be installed in a restricted access location.

CAUTION:
This product contains a Class 1M laser. Do not view directly with optical instruments. (C028)

This equipment contains Class 1 laser products, and complies with FDA radiation Performance Standards, 21 CFR Subchapter J and the international laser safety standard IEC 825-2.

CAUTION:
Data processing environments can contain equipment transmitting on system links with laser modules that operate at greater than Class 1 power levels. For this reason, never look into the end of an optical fiber cable or open receptacle. (C027)

Attention: In the United States, use only SFP or GBIC optical transceivers that comply with the FDA radiation performance standards, 21 CFR Subchapter J. Internationally, use only SFP or GBIC optical transceivers that comply with IEC standard 825–1. Optical products that do not comply with these standards may produce light that is hazardous to the eyes.

Usage restrictions

The optical ports of the modules must be terminated with an optical connector or with a dust plug.

Rack safety

Rack installation

DANGER

Observe the following precautions when working on or around your IT rack system:

- **Heavy equipment - personal injury or equipment damage might result if mishandled.**
- **Always lower the leveling pads on the rack cabinet.**
- **Always install stabilizer brackets on the rack cabinet.**
- **To avoid hazardous conditions due to uneven mechanical loading, always install the heaviest devices in the bottom of the rack cabinet. Always install servers and optional devices starting from the bottom of the rack cabinet.**
- **Rack-mounted devices are not to be used as shelves or work spaces. Do not place objects on top of rack-mounted devices.**

- **Each rack cabinet might have more than one power cord. Be sure to disconnect all power cords in the rack cabinet when directed to disconnect power during servicing.**
- **Connect all devices installed in a rack cabinet to power devices installed in the same rack cabinet. Do not plug a power cord from a device installed in one rack cabinet into a power device installed in a different rack cabinet.**
- **An electrical outlet that is not correctly wired could place hazardous voltage on the metal parts of the system or the devices that attach to the system. It is the responsibility of the customer to ensure that the outlet is correctly wired and grounded to prevent an electrical shock.**

(R001 part 1 of 2

CAUTION:

- **Do not install a unit in a rack where the internal rack ambient temperatures will exceed the manufacturer's recommended ambient temperature for all your rack-mounted devices.**
- **Do not install a unit in a rack where the air flow is compromised. Ensure that air flow is not blocked or reduced on any side, front, or back of a unit used for air flow through the unit.**
- **Consideration should be given to the connection of the equipment to the supply circuit so that overloading of the circuits does not compromise the supply wiring or overcurrent protection. To provide the correct power connection to a rack, refer to the rating labels located on the equipment in the rack to determine the total power requirement of the supply circuit.**
- *(For sliding drawers.)* **Do not pull out or install any drawer or feature if the rack stabilizer brackets are not attached to the rack. Do not pull out more than one drawer at a time. The rack might become unstable if you pull out more than one drawer at a time.**
- *(For fixed drawers)* **This drawer is a fixed drawer and should not be moved for servicing unless specified by manufacturer. Attempting to move the drawer partially or completely out of the rack may cause the rack to become unstable or cause the drawer to fall out of the rack.**

(R001 part 2 of 2)

Rack relocation (19″ rack)

CAUTION:
Removing components from the upper positions in the rack cabinet improves rack stability during relocation. Follow these general guidelines whenever you relocate a populated rack cabinet within a room or building:

- **Reduce the weight of the rack cabinet by removing equipment starting at the top of the rack cabinet. When possible, restore the rack cabinet to the configuration of the rack cabinet as you received it. If this configuration is not known, you must do the following:**
  - **Remove all devices in the 32U position and above.**
  - **Ensure that the heaviest devices are installed in the bottom of the rack cabinet.**
  - **Ensure that there are no empty U-levels between devices installed in the rack cabinet below the 32U level.**
  - **If the rack cabinet you are relocating is part of a suite of rack cabinets, detach the rack cabinet from the suite.**
  - **Inspect the route that you plan to take when moving the rack to eliminate potential hazards.**
  - **Verify that the route that you choose can support the weight of the loaded rack cabinet. Refer to the documentation that came with your rack cabinet for the weight of a loaded rack cabinet.**
  - **Verify that all door openings are at least 760 x 2030 mm (30 x 80 in.).**
  - **Ensure that all devices, shelves, drawers, doors, and cables are secure.**
  - **Ensure that the four leveling pads are raised to their highest position.**
  - **Ensure that there is no stabilizer bracket installed on the rack cabinet during movement.**
  - **Do not use a ramp inclined at more than ten degrees.**
  - **Once the rack cabinet is in the new location, do the following:**
    - **Lower the four leveling pads.**
    - **Install stabilizer brackets on the rack cabinet.**
    - **If you removed any devices from the rack cabinet, repopulate the rack cabinet from the lowest position to the highest position.**
  - **If a long distance relocation is required, restore the rack cabinet to the configuration of the rack cabinet as you received it. Pack the rack cabinet in the original packaging material, or equivalent. Also, lower the leveling pads to raise the casters off of the pallet and bolt the rack cabinet to the pallet.**

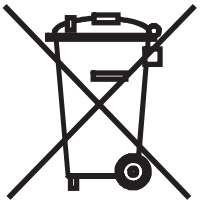
(R002)

Product recycling and disposal

This unit must be recycled or discarded according to applicable local and national regulations. IBM encourages owners of information technology (IT) equipment to responsibly recycle their equipment when it is no longer needed. IBM offers a variety of product return programs and services in several countries to assist equipment owners in recycling their IT products. Information on IBM product recycling offerings can be found on IBM's Internet site at:

www.ibm.com/ibm/environment/products/index.shtml

Esta unidad debe reciclarse o desecharse de acuerdo con lo establecido en la normativa nacional o local aplicable. IBM recomienda a los propietarios de equipos de tecnología de la informacion (TI) que reciclen responsablemente sus equipos cuando éstos ya no les sean utiles. IBM dispone de una serie de programas y servicios de devolucion de productos en varios países, a fin de ayudar a los propietarios de equipos a reciclar sus productos de TI. Se puede encontrar informacion sobre las ofertas de reciclado de productos de IBM en el sitio web de IBM www.ibm.com/ibm/environment/products/index.shtml.



Notice: This mark applies only to countries within the European Union (EU) and Norway.

Appliances are labelled in accordance with European Directive 2002/96/EC concerning waste electrical and electronic equipment (WEEE). The Directive determines the framework for the return and recycling of used appliances as applicable throughout the European Union. This label is applied to various products to indicate that the product is not to be thrown away, but rather reclaimed upon end of life per this Directive.

注意: このマークは EU 諸国およびノルウェーにおいてのみ適用されます。

この機器には、EU 諸国に対する廃電気電子機器指令 2002/96/EC(WEEE) のラベルが貼られています。この指令は、EU 諸国に適用する使用済み機器の回収とリサイクルの骨子を定めています。このラベルは、使用済みになった時に指令に従って適正な処理をする必要があることを知らせるために種々の製品に貼られています。

Remarque : Cette marque s'applique uniquement aux pays de l'Union Européenne et à la Norvège.

L'étiquette du système respecte la Directive européenne 2002/96/EC en matière de Déchets des Equipements Electriques et Electroniques (DEEE), qui détermine les dispositions de retour et de recyclage applicables aux systèmes utilisés à travers l'Union européenne. Conformément à la directive, ladite étiquette précise que le produit sur lequel elle est apposée ne doit pas être jeté mais être récupéré en fin de vie.

In accordance with the European WEEE Directive, electrical and electronic equipment (EEE) is to be collected separately and to be reused, recycled, or recovered at end of life. Users of EEE with the WEEE marking per Annex IV of the WEEE Directive, as shown above, must not dispose of end of life EEE as unsorted municipal waste, but use the collection framework available to customers for the return, recycling and recovery of WEEE. Customer participation is important to minimize any potential effects of EEE on the environment and human health due to the potential presence of hazardous substances in EEE. For proper collection and treatment, contact your local IBM representative.

Battery return program

This product may contain sealed lead acid, nickel cadmium, nickel metal hydride, lithium, or lithium ion battery. Consult your user manual or service manual for specific battery information. The battery must be recycled or disposed of properly. Recycling facilities may not be available in your area. For information on disposal of batteries outside the United States, contact your local waste disposal facility or go to the following Web site:

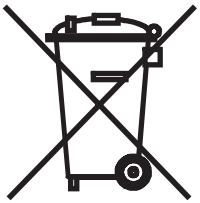
www.ibm.com/ibm/environment/products/batteryrecycle.shtml

In the United States, IBM has established a return process for reuse, recycling, or proper disposal of used IBM sealed lead acid, nickel cadmium, nickel metal hydride, and other battery packs from IBM Equipment. For information on proper disposal of these batteries, contact IBM at 1-800-426-4333. Please have the IBM part number listed on the battery available prior to your call.

For Taiwan:

廢電池請回收

For the European Union:



Note: This mark applies only to countries within the European Union (EU).

Batteries or packaging for batteries are labeled in accordance with European Directive 2006/66/EC concerning batteries and accumulators and waste batteries and accumulators. The Directive determines the framework for the return and recycling of used batteries and accumulators as applicable throughout the European Union. This label is applied to various batteries to indicate that the battery is not to be thrown away, but rather reclaimed upon end of life per this Directive.

In accordance with the European Directive 2006/66/EC, batteries and accumulators are labeled to indicate that they are to be collected separately and recycled at end of life. The label on the battery may also include a chemical symbol for the metal concerned in the battery (Pb for lead, Hg for mercury and Cd for cadmium). Users of batteries and accumulators must not dispose of batteries and accumulators as unsorted municipal waste, but use the collection framework available to customers for the return, recycling and treatment of batteries and accumulators. Customer participation is important to minimize any potential effects of batteries and accumulators on the environment and human health due to the potential presence of hazardous substances. For proper collection and treatment, contact your local IBM representative.

Fire suppression systems

A fire suppression system is the responsibility of the customer. The customer's own insurance underwriter, local fire marshal, or a local building inspector, or both, should be consulted in selecting a fire suppression system that provides the correct level of coverage and protection. IBM designs and manufactures equipment to internal and external standards that require certain environments for reliable operation. Because IBM does not test any equipment

for compatibility with fire suppression systems, IBM does not make compatibility claims of any kind nor does IBM provide recommendations on fire suppression systems.

Contents

Figures

Tables

About this document

This guide describes how to connect and manage IBM System Storage™ N7700 (model numbers 2866-A11, 2866-A21, 2866-G11, and 2866-G21) and IBM System Storage N7900 (model numbers 2867-A11, 2867-A21, 2867-G11, and 2867-G21) systems. Throughout this document, they will be referred to generically as *N7000 series systems*.

For information about installation and setup, see the *Installation and Setup Instructions* that came with your system.

For information about error messages and troubleshooting, see the *IBM System Storage N series Platform Monitoring Guide*.

Compliance ID 2866-NAS covers MT/models 2866-A11, 2866-A21, 2866-G11, and 2866-G21. Compliance ID 2867-NAS covers MT/models 2867-A11, 2867-A21, 2867-G11, and 2867-G21.

Who should read this document

This guide is for qualified system administrators and service personnel who are familiar with IBM storage systems. It addresses setup, operation, and servicing of the 2866/2867 model A11/A21/G11/G21. This document is intended to provide information to customers, operators, administrators, installers, and service personnel.

Supported features

IBM System Storage N series storage systems and expansion boxes are driven by NetApp® Data ONTAP® software. Some features described in the product software documentation are neither offered nor supported by IBM. Please contact your local IBM representative or reseller for further details.

Information about supported features can also be found at the following Web site:

www.ibm.com/storage/support/nas/

A listing of currently available N series products and features can be found at the following Web site:

www.ibm.com/storage/nas/

How this document is organized

This document contains the following chapters:

- Chapter 1, “Preparing for the installation,” on page 1 provides an overview of the entire system installation process, hardware specifications, and the appropriate documentation references for the procedures.
- Chapter 2, “Connecting an N7000 series system,” on page 9 describes how to connect N7700 and N7900 systems.
- Chapter 3, “Configuring an N7000 series system,” on page 19 describes how to configure an N7700 and N7900 system.
- Chapter 4, “Monitoring your system,” on page 23 describes how to monitor your system based on the N7700 and N7900 system LEDs.
- Chapter 5, “Replacing N7000 series system devices,” on page 31 describes how to replace devices in your N7700 and N7900 systems.
- Appendix A, “Recommended power line sizes,” on page 79 discusses how to determine the power line lengths running from your N7700 and N7900 systems to the power source.
- Appendix B, “FRU/CRU and power cord list for N series products,” on page 81 lists the feature codes for the power cords for the N7700 and N7900 systems.
- Appendix C, “Optional adapter cards,” on page 85 describes the optional PCI cards supported for the N7700 and N7900 systems.
- Appendix D, “IBM System Storage N series documentation,” on page 95 lists the documents in the IBM System Storage N series hardware and Data ONTAP product libraries, as well as other related documents.

Getting information, help, and service

If you need help, service, or technical assistance or just want more information about IBM products, you will find a wide variety of sources available from IBM to assist you. This section contains information about where to go for additional information about IBM and IBM products, what to do if you experience a problem with your IBM System Storage N series product, and whom to call for service, if it is necessary.

The following applies in Taiwan:

IBM Taiwan Product Service Contact Info:
IBM Taiwan Corporation
3F, No 7, Song Ren Rd., Taipei Taiwan
Tel: 0800-016-888

台灣IBM 產品服務聯絡方式：
台灣國際商業機器股份有限公司
台北市松仁路7號3樓
電話：0800-016-888

Before you call

Before you call, make sure that you have taken these steps to try to solve the problem yourself:

- Check all cables to make sure that they are connected.
- Check the power switches to make sure that the system is turned on.
- Use the troubleshooting information in your system documentation and use the diagnostic tools that come with your system.
- Check the IBM support Web site for known problems and limitations.

Using the documentation

Information about the N series product and Data ONTAP software is available in printed documents and a documentation CD that comes with your system. The same documentation is available as PDF files on the IBM NAS support Web site:

www.ibm.com/storage/support/nas/

Web sites

IBM maintains pages on the World Wide Web where you can get the latest technical information and download device drivers and updates.

- For NAS product information, go to the following Web site:
  www.ibm.com/storage/nas/
- For NAS support information, go to the following Web site:
  www.ibm.com/storage/support/nas/
- For AutoSupport information, go to the following Web site:
  www.ibm.com/storage/support/nas/
- You can order publications through the IBM Publications Ordering System at the following Web site:
  www.elink.ibmlink.ibm.com/public/applications/publications/cgibin/pbi.cgi/

Hardware service and support

You can receive hardware service through IBM Integrated Technology Services. Visit the following Web site for support telephone numbers:

www.ibm.com/planetwide/

Supported servers and operating systems

IBM N series products attach to many servers and many operating systems. To determine the latest supported attachments, visit the following Web site and access the IBM System Storage N series interoperability matrix:

www.ibm.com/systems/storage/network/interophome.html

Firmware updates

As with all devices, it is recommended that you run the latest level of firmware, which is embedded in Data ONTAP. If there are changes, they will be posted to the following Web site:

www.ibm.com/storage/support/nas/

Note: If you do not see new changes on the Web site, you are running the latest level of firmware.

Verify that the latest level of firmware is installed on your machine before contacting IBM for technical support.

Terminology and conventions used in this document

This guide uses the following terminology, command conventions, format conventions and keyboard conventions:

Terminology

In this and other IBM N series documents, the term *filer* describes IBM N series models (such as the N7700 A11 and A21 and N7900 A11 and A21) that either contain internal disk storage or attach to the disk storage expansion units specifically designed for the IBM N series storage systems. There are three disk storage expansion units specifically designed for the IBM N series filers:

- IBM EXN4000 Fibre Channel disk storage expansion unit
- IBM EXN2000 Fibre Channel disk storage expansion unit
- IBM EXN1000 Serial Advanced Technology Attachment (SATA) storage expansion unit

Note: None of these expansion units are intended to attach to a gateway system.

The term *gateway* describes IBM N series models (such as the N7700 G11 and G21 and N7900 G11 and G21) that *do not* contain internal disk storage or attach to disk storage expansion units. IBM N series gateways attach to external storage devices on a Storage Area Network (SAN).

The terms *system* or *storage system* refer to either a gateway by itself or a filer, either by itself or with additional disk drives.

In addition, this guide uses the following terms:

- *Active-Active configuration* (sometimes referred to as *clustered configuration*) refers to a High Availability system with at least two nodes that share resources to provide redundancy.
- *AT-FCX* refers to the controller module of the serial advanced technology attachment (SATA) storage expansion unit.
- *Device carrier* refers to the container that encases a fan/power supply unit or a disk.
- *Disk* applies to any hard disk drive.
- *Disk shelf* refers to any storage system or expansion unit containing hard disk drives.
- *ESH2* refers to the controller module of the EXN2000 Fibre Channel disk storage expansion unit.
- *ESH4* refers to the controller module of the EXN4000 Fibre Channel disk storage expansion unit.
- *Loop* refers to one or more daisy-chained disk shelves (expansion units) connected to a filer.
- *Motherboard tray* refers to the system controller module that executes the software on an N7700 or N7900. The motherboard tray is at the rear of the N7000 series system.
- *Node* refers to a chassis. There is one node in the A11/G11 models; there are two nodes in the A21/G21 models.

Command conventions

You can enter commands on the system console or from any client that can obtain access to the storage system using a Telnet session. In examples that illustrate commands executed on a UNIX® workstation, the command syntax and output might differ, depending on your version of UNIX.

Formatting conventions

The following table lists different character formats used in this guide to set off special information.

Formatting convention	Type of information
Italic type	• Words or characters that require special attention. • Placeholders for information you must supply. For example, if the guide requires you to enter the `fctest` *adaptername* command, you enter the characters “fctest” followed by the actual name of the adapter. • Book titles in cross-references.
`Monospaced` font	• Command and daemon names. • Information displayed on the system console or other computer monitors. • The contents of files.
`Bold monospaced` font	Words or characters you type. What you type is always shown in lowercase letters, unless your program is case-sensitive and uppercase letters are necessary for it to work properly.

Keyboard conventions

This guide uses capitalization and some abbreviations to refer to the keys on the keyboard. The keys on your keyboard might not be labeled exactly as they are in this guide.

What is in this guide...	What it means...
hyphen (-)	Used to separate individual keys. For example, Ctrl-D means holding down the Ctrl key while pressing the D key.
Enter	Used to refer to the key that generates a carriage return, although the key is named Return on some keyboards.
type	Used to mean pressing one or more keys on the keyboard.
enter	Used to mean pressing one or more keys and then pressing the Enter key.

How to send your comments

Your feedback is important in helping us provide the most accurate and high-quality information. If you have comments or suggestions for improving this document, send us your comments by e-mail to starpubs@us.ibm.com or use the Readers' Comments form at the back of this publication. Be sure to include the following:

- Exact publication title
- Form number (for example, GC26-1234-02)
- Page numbers to which you are referring

If the Reader Comment Form in the back of this manual is missing, you can direct your mail to:

International Business Machines Corporation
Information Development
Department GZW
9000 South Rita Road
Tucson, Arizona 85744-0001 U.S.A.

When you send information to IBM, you grant IBM a nonexclusive right to use or distribute the information in any way it believes appropriate without incurring any obligation to you.

Chapter 1. Preparing for the installation

This chapter provides an overview of the entire IBM System Storage N7700 and N7900 system installation process, hardware specifications, and the appropriate documentation references for the procedures. Refer to the *Installation and Setup Instructions* that came with your system for further information about installing your equipment.

This chapter discusses the following topics:

Required manuals, tools and equipment

You need the following manuals in addition to this manual:

- *Installation and Setup Instructions* that came with your system (and expansion unit, if applicable)
- *IBM System Storage N series Data ONTAP Software Setup Guide* for your version of Data ONTAP, if applicable
- *IBM System Storage N series Data ONTAP Active-Active Configuration Guide* for your version of Data ONTAP, if applicable

You need to supply the following tools and equipment:

- Ethernet LAN cables
- Fibre Channel cables
- Console (for example, a PC or laptop)
- #2 Phillips screwdriver and slotted screwdriver
- Grounding leash and ESD strap
- 7-mm nut driver

Handling static-sensitive devices

Attention: The N7000 series system uses electronic components that are sensitive to static electricity. Static discharge from your clothing or other fixtures around you can damage these components. Put on an antistatic ESD strap and grounding leash to free yourself of static electricity before touching any electronic components.

Attention: Static electricity can damage electronic devices and your system. To avoid damage, keep static-sensitive devices in their static-protective packages until you are ready to install them.

To reduce the possibility of electrostatic discharge (ESD), observe the following precautions:

- Limit your movement. Movement can cause static electricity to build up around you.
- Handle the device carefully, holding it by its edges or its frame.
- Do not touch solder joints, pins, or exposed printed circuitry.
- Do not leave the device where others can handle and possibly damage the device.
- While the device is still in its static-protective package, touch it to an unpainted metal part of the system unit for at least two seconds. This drains static electricity from the package and from your body.
- Remove the device from its package and install it directly into your system unit without setting it down. If it is necessary to set the device down, place it in its static-protective package. Do not place the device on your system unit cover or on a metal table. Take additional care when handling devices during cold weather because heating reduces indoor humidity and increases static electricity.

Planning and organizing the installation

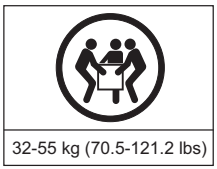
This section identifies the shipment contents and the rules and regulations you need to observe for the proper installation of your N7000 series system. It also provides an overview of the entire system installation process and the appropriate documentation references for the procedures.

For detailed information, see the following topics:

- "Hardware specifications"
- "Checking shipment package contents" on page 5
- "Rules for installing the N7000 series system in a rack" on page 6
- "Guide to the installation process" on page 7

Hardware specifications

The following tables list the characteristics and requirements for your hardware.



DANGER

The weight of this part or unit is between 32 and 55 kg (70.5 and 121.2 lb). It takes three persons to safely lift this part or unit. (C010)

Attention: Remove the power supplies and fan units from the chassis before attempting to lift the system.

Table 1. N7000 series system physical characteristics and environmental requirements

Physical characteristics			
	Weight	2866-A11, 2866-G11, 2867-A11, 2867-G11	54.8 kg (121 lb)
		2866-A21, 2866-G21, 2867-A21, 2867-G21	109.6 kg (242 lb)
	Rack units	2866-A11, 2866-G11, 2867-A11, 2867-G11	6U
		2866-A21, 2866-G21, 2867-A21, 2867-G21	12U
	Height	2866-A11, 2866-G11, 2867-A11, 2867-G11	263 mm (10.4 in)
		2866-A21, 2866-G21, 2867-A21, 2867-G21	526 mm (20.8 in)
	Width		446 mm (17.6 in)
	Depth		695 mm (27.4 in) without cable management tray 782 mm (30.8 in) with cable management tray
Clearance dimensions			
	Front-cooling	All versions	6 in. (15.2 cm)
	Front-maintenance	All versions	25 in. (63.5 cm)
	Rear-cooling	All versions	12 in. (30.5 cm)
	Rear-maintenance	All versions	40 in. (102 cm)
Environmental requirements **Note:** Operating at the extremes of the following environmental requirements might increase the risk of device failure.			

Table 1. N7000 series system physical characteristics and environmental requirements (continued)

	Operating temperature maximum range	50° F to 104° F (10° C to 40° C)
	Operating temperature recommended range	68° F to 77° F (20° C to 25° C)
	Nonoperating temperature range	-40° F to 149° F (-40° C to 65° C)
	Relative humidity	10 to 90% noncondensing
	Recommended operating temperature relative humidity range	40 to 55%
	Maximum wet bulb temperature	28° C (82° F)
	Maximum altitude	2133 m (7,000 ft.)
	Acoustic level	49 dBA @ 23° C 5 bels @ 23° C

In the following tables, *worst-case* indicates a system running with one PSU and high fan speed. *Typical* indicates a system running two PSUs on two circuits.

Table 2. N7700 electrical requirements

Input voltage	**100 to 120V**		**200 to 240V**	
	Worst-case	Typical single PSU/system	Worst-case	Typical single PSU/system
Input current measured, A	9.26	2.75/5.4	4.6	1.4/2.8
Input power measured, W	922	266/531	882	255/509
Thermal dissipation, BTU/hr	3144	906/1812	3008	869/1737
Inrush peak, A	11.6	11.2	22.8	22.8
Maximum electrical power	12 A		6 A	
Input power frequency, Hz	50 to 60			

Table 3. N7900 electrical requirements

Input voltage	**100 to 120V**		**200 to 240V**	
	Worst-case	Typical single PSU/system	Worst-case	Typical single PSU/system
Input current measured, A	9.72	2.8/5.6	4.84	1.45/2.9

Table 3. N7900 electrical requirements (continued)

Input voltage	**100 to 120V**		**200 to 240V**	
Input power measured, W	966	274/548	928	266/532
Thermal dissipation, BTU/hr	3293	935/1870	3166	908/1816
Inrush peak, A	11.6	11.2	22.8	22.8
Maximum electrical power	12 A		6 A	
Input power frequency, Hz	50 to 60			

Checking shipment package contents

Make sure that your shipment package includes the following items.

- N7700 single-controller system (2866-A11/G11)
  - 1 N7700 single-controller system (2866-A11/G11) containing the power supplies and any options you ordered
  - 1 console adapter cable, RJ-45 to DB-9
  - 1 cable management tray
  - 1 ESD wrist strap
  - 1 serial null modem cable
  - 1 set of IBM publications
  - 2 power cords
  - 8 SFPs (SFPs might be installed in the N7000 series system as shipped.)

  There will also be envelopes with the software EULA and license keys.

  A rail kit for mounting the N7700 in a standard 19–inch rack may also be present.
- N7700 dual-controller system (2866-A21/G21)
  - 1 N7700 dual-controller system (2866-A21/G21) containing the power supplies and any options you ordered
  - 2 console adapter cables, RJ-45 to DB-9
  - 2 cable management trays
  - 2 ESD wrist straps
  - 1 serial null modem cable
  - 1 set of IBM publications
  - 4 power cords
  - 16 SFPs (SFPs might be installed in the N7000 series system as shipped.)

  There will also be envelopes with the software EULA and license keys.

A rail kit for mounting the N7700 in a standard 19–inch rack may also be present.

- N7900 single-controller system (2867-A11/G11)
  - 1 N7900 single-controller system (2867-A11/G11) containing the power supplies and any options you ordered
  - 1 console adapter cable, RJ-45 to DB-9
  - 1 cable management tray
  - 1 ESD wrist strap
  - 1 serial null modem cable
  - 1 set of IBM publications
  - 2 power cords
  - 8 SFPs (SFPs might be installed in the N7000 series system as shipped.)

  There will also be envelopes with the software EULA and license keys.

  A rail kit for mounting the N7000 series system in a standard 19–inch rack may also be present.
- N7900 dual-controller system (2867-A21/G21)
  - 1 N7900 dual-controller system (2867-A21/G21) containing the power supplies and any options you ordered
  - 2 console adapter cable, RJ-45 to DB-9
  - 2 cable management trays
  - 2 ESD wrist straps
  - 1 serial null modem cable
  - 1 set of IBM publications
  - 4 power cords
  - 16 SFPs (SFPs might be installed in the N7000 series system as shipped.)

  There will also be envelopes with the software EULA and license keys.

  A rail kit for mounting the N7000 series system in a standard 19–inch rack may also be present.

Rules for installing the N7000 series system in a rack

You need to observe the following rules and restrictions when installing an N7000 series system in a standard 19-inch (48.26 cm) equipment rack with mounting rails:

DANGER

The weight of this part or unit is between 32 and 55 kg (70.5 and 121.2 lb). It takes three persons to safely lift this part or unit. (C010)

Attention: Remove the power supplies and fan units from the chassis before attempting to lift the system.

- You must work with two other people.

  DANGER

  The N7000 series system unit is extremely heavy. To avoid injuring yourself or damaging the unit, you must work with at least two other people when you install the unit in the rack. Remove the power supplies and fan units from the chassis before attempting to lift the unit.

- Install the N7000 series system at the lowest point in the rack cabinet.

  DANGER

  To avoid hazardous conditions due to uneven mechanical loading, always install the heaviest devices in the bottom of the rack cabinet. Always install servers and optional devices starting from the bottom of the rack cabinet. (R001 part 1 of 2)

  For additional rack safety notices, refer to "Rack safety" on page viii.

- When installing expansion unit units in a rack, do not exceed the maximum storage limit for your N7000 series system.
- Make sure that the ID on the back panel of each expansion unit matches the ID specified on its label.
- Always install the expansion units fully loaded. Do not remove disk drives to reduce the weight.

Guide to the installation process

The following table provides a guide to the N7000 series system installation process.

Refer to the *Installation and Setup Instructions* that came with your system and expansion unit for complete installation details.

Note: The initial installation of an N7000 series system is performed by IBM.

Table 4. Installation process procedures

Stage	Procedure	Is the procedure required?	Procedure is performed by...		For instructions, see...
			Filer	Gateway	
1	IBM Service will install the N7000 series system in a freestanding rack, if required.	Yes	IBM	IBM	The *Installation and Setup Instructions* that came with your system
2	Connect the N7000 series system to the customer-provided IP (Internet Protocol) network.	Yes	IBM	Customer	"Connecting your N7000 series system to an IP network" on page 9, or the *Installation and Setup Instructions* that came with your system
3	**Filer:** Connect the N7000 filer system to expansion units.	Yes	IBM	n/a	"Connecting a filer to expansion units" on page 11, or the *Installation and Setup Instructions* that came with your system
	Gateway: Connect the N7000 gateway system to the back-end storage.	Yes	n/a	Customer	The *IBM System Storage N series Data ONTAP Gateway Integration Guide* for your back-end storage and version of Data ONTAP
4	Connect the N7000 series system to a power source.	Yes	IBM	Customer	"Connecting your N7000 series system to a power source" on page 10, or the *Installation and Setup Instructions* that came with your system
5	Configure the system.	Yes	IBM	Customer	The *IBM System Storage N series Software Setup Guide* for your version of Data ONTAP, or the *Installation and Setup Instructions* that came with your system
6	Connect the N7000 series system to a third-party device.	No	Customer	Customer	"Connecting your N7000 series system to storage" on page 11

Chapter 2. Connecting an N7000 series system

This chapter describes how to connect an N7000 series system in the following topics:

Handling fiber-optic cables

Before you use fiber-optic cables, read the following precautions.

Attention: To avoid damage to the fiber-optic cables, follow these guidelines:

- Do not route the cable along a folding cable-management arm.
- When attaching to a device on slide rails, leave enough slack in the cable so that it does not bend to a radius of less than 38 mm (1.5 in.) when extended or become pinched when retracted.
- Route the cable away from places where it can be snagged by other devices in the rack cabinet.
- Do not overtighten the cable straps or bend the cables to a radius of less than 38 mm (1.5 in.).
- Do not put excess weight on the cable at the connection point. Be sure that the cable is well supported.

CAUTION:
Data processing environments can contain equipment transmitting on system links with laser modules that operate at greater than Class 1 power levels. For this reason, never look into the end of an optical fiber cable or open receptacle. (C027)

Connecting your N7000 series system to an IP network

Each node of your N7000 series system connects to an IP network. If you have an active-active system, both nodes need to connect to the network. For information that describes how to connect your N7000 series system, refer to the *Installation and Setup Instructions* that came with your system.

The N7000 series system has six onboard Ethernet ports, labelled e0a thru e0f, as shown in Figure 1. Additional Network Interface Cards (NICs) can be plugged into the PCI slots to provide additional Ethernet ports. See Appendix C, “Optional adapter cards,” on page 85.

The integrated Ethernet RJ-45 twisted-pair connectors are compatible with the IEEE 802.3 Ethernet network 10/100/1000 BASE-TX link. When connecting to the Ethernet port, connect a twisted-pair (CAT-5 or better) cable to the RJ-45 Ethernet port located on the back of the system drawer.

If you are connecting to a copper NIC, use RJ-45 CAT-5 or better copper cables.

If you are connecting to a fiber NIC, use (50- or 62.5-micron) fiber-optic cables with LC connectors.

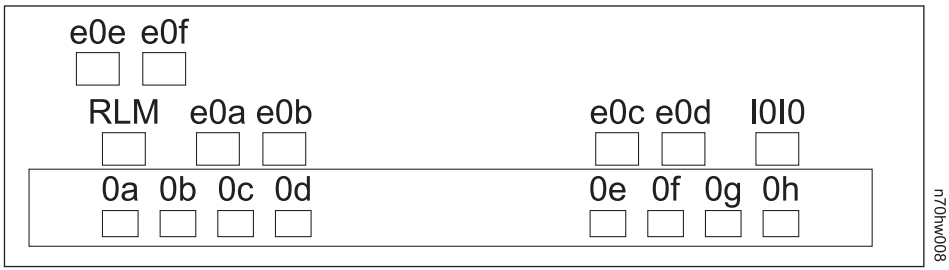


Figure 1. N7000 series system rear ports

For information about monitoring the Ethernet port LEDs, see “Ethernet port LEDs” on page 26.

Connecting your N7000 series system to a power source

The N7000 series systems are shipped with redundant power supplies, referred to as PSU1 and PSU2. Each power supply has its own AC power cord. You should have separate circuit breakers for each power supply to ensure power redundancy.

For information on connecting your N7000 series system to a power source, see the *Installation and Setup Instructions* that came with your system.

Connecting your N7000 series system to storage

The N7000 series system has eight onboard Fibre Channel ports, labelled 0a thru 0h, as shown in Figure 1 on page 10. Additional HBAs can be plugged into the PCI slots to provide additional Fibre Channel ports. See Appendix C, "Optional adapter cards," on page 85. Attach the (50- or 62.5-micron) fiber-optic cables with LC connectors to the Fibre Channel ports.

Note: SFPs must be firmly seated in the FC ports before making connections.

Connecting a filer to expansion units

You must connect at least one expansion unit to your N7700 or N7900 filer. Fiber-optic cables must be used for the connection from the filer to the first expansion unit.

Attention: Make sure that all expansion unit 1Gb/2Gb(/4Gb) switches are set to the 2Gb or 4Gb, if supported, position. If necessary, refer to the documents that came with the expansion unit for information about checking and changing the switch setting.

For information that describes how to connect your N7700 or N7900 filer to expansion units using the onboard Fibre Channel ports, see the *Installation and Setup Instructions* that came with your system.

Attention: If you are using optional adapter cards instead of the onboard Fibre Channel ports to connect your filer to expansion units, see the cabling instructions described in "Cabling your system using a Fibre Channel expansion adapter."

Attention: Dual-path Fibre Channel cabling is supported for the N7700 and N7900 filers. Dual-path cabling is designed to improve reliability, availability and serviceability of the expansion units attached to the storage controller by creating two redundant paths from each storage controller to each loop of the expansion units. For more information about using dual-path cabling, see the *Installation and Setup Instructions* that came with your system.

Cabling your system using a Fibre Channel expansion adapter

This section describes how to cable your filer storage system using a Dual-port optical Fibre Channel expansion adapter for expansion unit (disk shelf) storage.

This section describes the following tasks:

- "Cabling a single storage system controller" on page 12
- "Cabling an active-active pair" on page 14

For additional information about optional adapter cards, see Appendix C, "Optional adapter cards," on page 85.

Important: If you are not using the onboard ports for storage, then you must set your onboard ports to Target mode, as described in the *IBM System Storage N series Data ONTAP Block Access Management Guide* for your version of Data ONTAP.

Note: The illustrations in the following sections show storage system connections to EXN2000 or EXN4000 expansion units. In EXN1000 expansion units, the positions of the In and Out ports are reversed from those of the EXN2000 and EXN4000.

Cabling a single storage system controller:

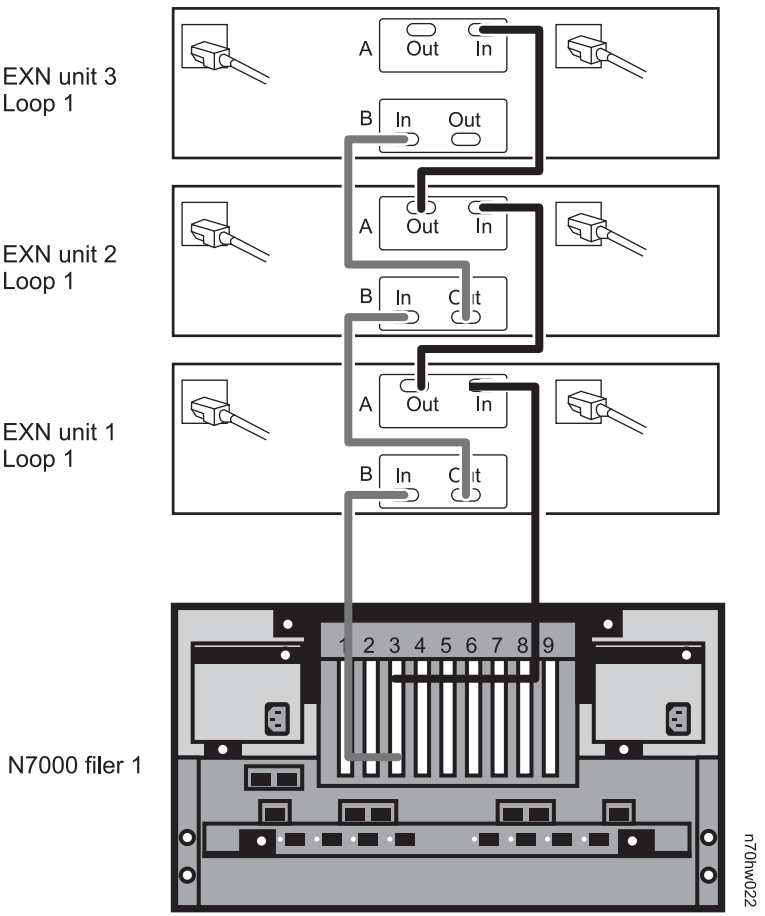


Figure 2. Cabling a single storage system controller

1. Cable Path A as described in the following substeps:
   a. Connect one end of the expansion unit cable to Port a of the Fibre Channel expansion adapter, and then connect the other end of the cable to the In port of ESH2/ESH4 or AT-FCX A on expansion unit 1.
   b. Connect the Out port of ESH2/ESH4 or AT-FCX A to the In port of ESH2/ESH4 or AT-FCX A on expansion unit 2.
   c. Repeat substep 1b for the remaining expansion units in the loop.
2. Cable Path B as described in the following substeps:
   a. Connect one end of the expansion unit cable to Port b of the Fibre Channel expansion adapter, and then connect the other end of the cable to the In port of ESH2/ESH4 or AT-FCX B on expansion unit 1.
   b. Connect the Out port of ESH2/ESH4 or AT-FCX B to the In port of ESH2/ESH4 or AT-FCX B on expansion unit 2.
   c. Repeat substep 2b for the remaining expansion units in the loop.
3. Repeat Steps 1 and 2 for any remaining expansion adapters.

Cabling an active-active pair:

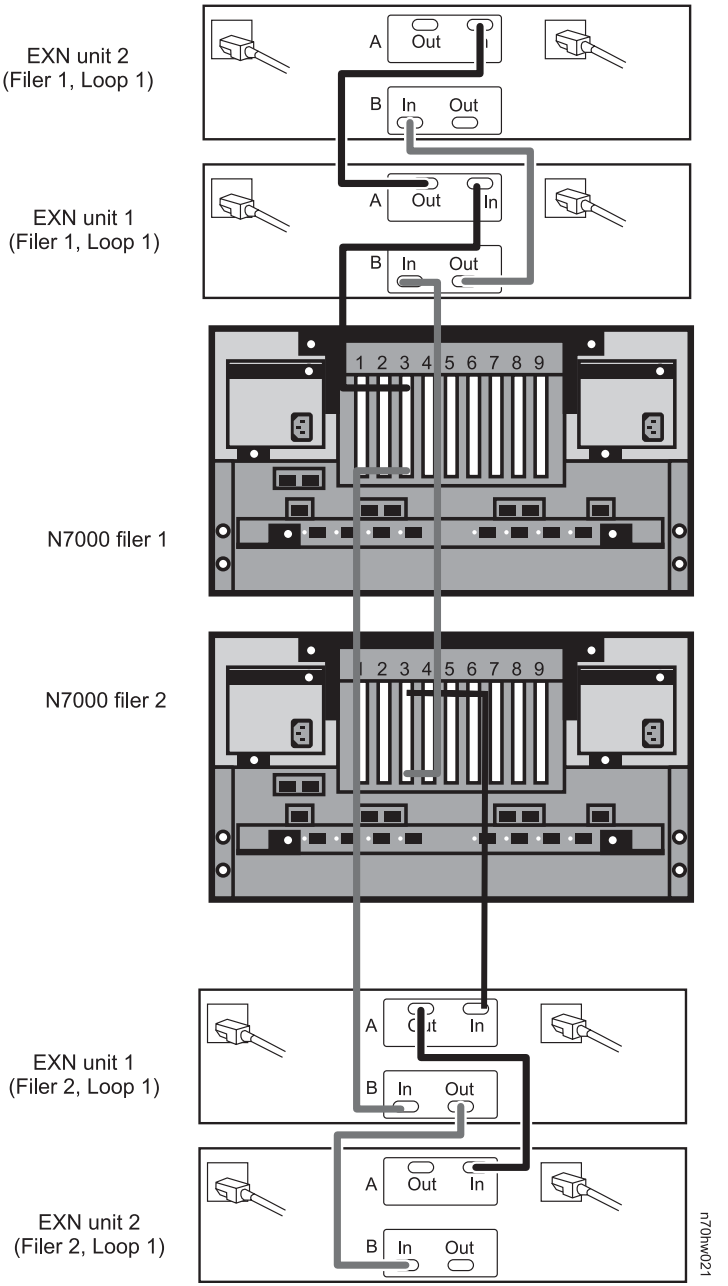


Figure 3. Cabling an active-active pair

1. Cable the dual-port expansion adapter Port a, to the expansion unit 1 Channel A ESH2/ESH4 or AT-FCX Input port.
2. Cable the expansion unit 1 Channel A ESH2/ESH4 or AT-FCX Output port to the expansion unit 2 Channel A ESH2/ESH4 or AT-FCX Input port. Label this cable with a solid-colored label.
3. Repeat Step 2, connecting output to input, for the remaining expansion units in the loop.

   Do not plug any cables in the ESH2/ESH4 or AT-FCX Output port of the last unit. The expansion units are self-terminating.

   Note: The AT-FCX and ESH2/ESH4 modules are self-terminating. The ESH2/ESH4 does not have a terminate switch.
4. Repeat Step 1 through Step 3 for the partner node.
5. Cable the dual-port expansion adapter Port b, of the local node, to the partner expansion unit 1 Channel B ESH2/ESH4 or AT-FCX Input port.
6. Cable the local expansion unit 1 Channel B ESH2/ESH4 or AT-FCX Output port to the local expansion unit 2 Channel B ESH2/ESH4 or AT-FCX Input port. Label this cable with a striped label.
7. Repeat Step 6, connecting Channel B output to input, for any remaining expansion units in the disk pool.
8. Repeat Step 5 through Step 7 for the partner node.

Connecting a gateway to external storage

You must use fiber-optic cables to connect a gateway to external storage on a Fibre Channel SAN.

See the *Interoperability Matrix* at the following Web site for supported devices for your N7000 series system.

www.ibm.com/systems/storage/network/interophome.html

Refer to the documentation for your external storage for additional information.

Connecting your N7000 series system to a third-party device

You can connect third-party devices to your N7000 series system through an optical Fibre Channel interface using any Fibre Channel port on the back of the chassis.

The N7000 series systems only support third-party devices with an optical Fibre Channel interface. See the *Interoperability Matrix* at the following Web site for supported devices for your N7000 series system:

www.ibm.com/systems/storage/network/interophome.html

Refer to the documentation that comes with the third-party device for connection information.

Rules for connecting the third-party devices

Observe the following rules for connecting the third-party devices:

- Use a fiber-optic cable that is:
  - Appropriate to the Fibre Channel connection on your N7000 series system
  - Of an approved length for the third-party device

  Note: See the documentation for the third-party device.
- Check the *Interoperability Matrix* at the following Web site to verify support for your third-party device:

  www.ibm.com/systems/storage/network/interophome.html

  An unsupported tape backup device might cause the N7000 series system to halt.
- For additional information about Fibre Channel cables, see the following Web site:

  www.ibm.com/storage/support/nas/

Connecting your N7000 series system to an ASCII terminal console

The ASCII terminal console enables you to monitor the boot process, helps you configure your N7000 series system after it boots, and enables you to perform system administration.

ASCII terminal console wiring

The following table lists the RJ-45 connection pinout for the ASCII terminal console wiring.

Table 5. RJ-45 connection pinout for the ASCII terminal wiring

Pin number	Signal
1	Connected to pin 8
2	Not connected
3	TXD (from system)
4	GND
5	GND
6	RXD (to system)
7	Not connected

Table 5. RJ-45 connection pinout for the ASCII terminal wiring (continued)

Pin number	Signal
8	Connected to pin 1

DB-9 to RJ-45 console adapter pin connections

You use the DB-9 to RJ-45 console adapter to connect the ASCII terminal console to your N7000 series system. Its purpose is to convert the RJ-45 pinout on the N7000 series system to the DB-9 pinout, like those on other IBM products, and all PCs.

The following table lists the console adapter pin number connections between the PC-style DB-9 male connector and the RJ-45 connection on your N7000 series system.

Table 6. Console adapter pin number connections

RJ-45	Signal	DB-9 male
1 [not connected]		
2 [not connected]		
3 (connected to pin 3 on DB-9)	TXD	3 (connected to pin 3 on RJ-45)
4 (connected to pin 5 on DB-9)	GND	5 (connected to pin 4 on RJ-45)
5 [not connected]		
6 (connected to pin 2 on DB-9)	RXD	2 (connected to pin 6 on RJ-45)
7 [not connected]		[not connected] 1
8 [not connected]		[not connected] 4
		[not connected] 6 through 9

Connecting to an ASCII terminal console

To connect an ASCII terminal console to the N7000 series system, complete the following steps.

1. Set the following communications parameters to the same values for both the N7000 series system and ASCII terminal.

Table 7. Communication parameters

Parameter	Setting
Baud	9600
Data bit	8
Parity	None

Table 7. Communication parameters (continued)

Parameter	Setting
Stop bits	1
Flow control	None

Note: See your terminal documentation for information about changing your ASCII console terminal settings.

2. Connect the DB-9 null modem cable to the DB-9 to RJ-45 adapter cable, and then connect the RJ-45 end to the console port on the N7000 series system and the other end to the ASCII terminal.

Chapter 3. Configuring an N7000 series system

This chapter describes how to configure an N7000 series system in the following topics:

Configuring the N7000 series system

Gather and record information about each N7000 series system node in "System setup information worksheet."

For information regarding how to boot your system for the first time, refer to the *Installation and Setup Instructions* that came with your system.

For N7000 systems, initial startup and configuration tasks must be performed by IBM.

Note: For additional information about N7000 gateway systems, see the documentation listed in "Data ONTAP 7.2 gateway systems library" on page 97.

System setup information worksheet

You need the following information to complete the setup script.

Table 8. N7000 series system setup worksheet

Hostname:							
Network Configuration Information		**e0a**	**e0b**	**e0c**	**e0d**	**e0e**	**e0f**
	IP addresses: First 3 #s _____._____._____						
	Netmask:						
	Media type/speed (100tx-fd, 100tx, auto [100/1000])						
	Flow control (none, receive, send, full):						
	Enable jumbo frames?						
IP address or name of default gateway:							

Table 8. N7000 series system setup worksheet (continued)

IP address or name of administration host: (Leave blank for root access to /etc from any NFS client)	
Where is the NAS system located? (Text string)	
Do you want to run DNS resolver?	
Do you want to run NIS client?	
Would you like to configure the RLM LAN interface [y]?	
RLM IP address	
RLM Netmask	
RLM Gateway IP address	
Would you like to enable DHCP on the RLM LAN interface [y]?	
Enter the name or IP address of the mail host:	

Configuring the Fibre Channel port

The N7000 series system motherboard tray provides eight independent Fibre Channel ports, identified as 0a, 0b, 0c, 0d, 0e, 0f, 0g, and 0h in Figure 4. SFPs must be firmly seated in all ports before connecting cables.

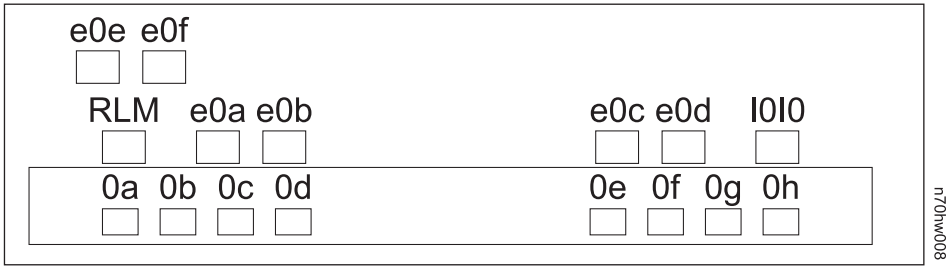


Figure 4. N7000 series system rear ports

The Fibre Channel ports can operate in target or initiator mode. Fibre Channel ports do not support mixed initiator/target mode. The default mode for the ports is initiator mode. You do not need to configure the ports to use them in initiator mode.

The Fibre Channel ports should be used in initiator mode to communicate with tape backup devices, such as in a TapeSAN backup configuration.

Fibre Channel ports on HBAs cannot be configured in target mode. They can only be used in initiator mode.

N7000 series system active-active configurations

N7000 series system active-active configurations must be cabled to switches that support public loop topology. To connect an N7000 series system to a fabric topology that includes switches that only support point-to-point topology, such as McDATA Director class switches, you must connect the active-active to an edge switch and use this switch as a bridge to the fabric. For information about specific switch models supported and fabric configuration guidelines, see the *IBM System Storage N series FCP Configuration Guide* at the following Web site:

www.ibm.com/storage/support/nas/

Configuring for initiator mode

To configure the N7000 series system back to initiator mode, complete the following steps.

1. Set the specified onboard ports to operate in initiator mode by entering the following command:

   ```
   fcadmin config -t initiator adapter
   ```

   where *adapter* is the port number. You can specify more than one port.

   Example: The following example sets onboard ports 0c and 0d to initiator mode.

   ```
   fcadmin config -t initiator 0c 0d
   ```

2. Reboot the system by entering the following command:

   ```
   reboot
   ```

3. Verify that the Fibre Channel ports are online and configured in the correct state for your configuration by entering the following command:

   ```
   fcadmin config
   ```

   Example: The following output example shows four ports configured as Fibre Channel targets and four ports configured as initiators.

   ```
   N7000a> fcadmin config
                    Local
   Adapter Type     State                 Status
   ------------------------------------------------
     0a    target     CONFIGURED            online
     0b    target     CONFIGURED            online
     0c    initiator  CONFIGURED            online
     0d    initiator  CONFIGURED            online
     0e    target     CONFIGURED            online
   ```

```
0f   target     CONFIGURED            online
0g   initiator  CONFIGURED            online
0h   initiator  CONFIGURED            online
```

For information on converting the onboard ports to target mode and configuring your SAN, see the *IBM System Storage N series Data ONTAP Block Access Management Guide* for your version of Data ONTAP.

Configuring and using the RLM

The following table provides a list of manuals for configuring and using the RLM. You can view the manuals at www.ibm.com/storage/nas.

Table 9. Manuals for configuring and using the RLM

Manual Title	Information Needed
Installation and Setup Instructions that came with your system	Describes the system cabling.
IBM System Storage N series Diagnostics Guide	Lists and describes the diagnostic tests for a new or existing RLM.
IBM System Storage N series Data System Administration Guide for your version of Data ONTAP	Describes RLM configuration and use. Includes instructions about updating RLM firmware.
IBM System Storage N Series Platform Monitoring Guide	Lists RLM error messages and gives corrective action for the error.

Chapter 4. Monitoring your system

This chapter identifies the location of the various LEDs on your N7000 series system and explains how to interpret LEDs for basic monitoring.

This chapter discusses the following topics:

Monitoring the front operation panel

The front operation panel has three LEDs, which indicate whether your system is active and functioning normally or whether there are problems with the hardware. You can also identify any hardware failure associated with the front operation panel of the N7000 series system from the error messages displayed on your system console.

Location of LEDs

Figure 5 shows the locations of the LEDs on the front panel of the N7000 series system.

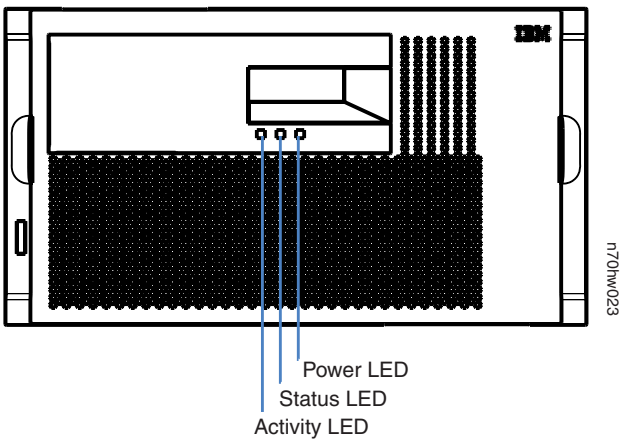


Figure 5. Front panel subassembly LED locations

Note: See "Interpreting the front panel LEDs" for an explanation of what the LEDs mean.

Interpreting the front panel LEDs

Use the following table to interpret the front panel LEDs on an N7000 series system.

Table 10. N7000 series system front panel LED descriptions

LED label	Status indicator	Description
Activity	Green	The system is operating and is active.
	Blinking	The system is actively processing data.
	Off	No activity is detected.
Status	Green	The system is operating normally.
	Amber	The system halted or a fault occurred. The fault is displayed in the LCD. **Note:** This LED remains lit during boot, while the operating system loads.

Table 10. N7000 series system front panel LED descriptions (continued)

LED label	Status indicator	Description
Power	Green	The system is receiving power.
	Off	The system is not receiving power.

Monitoring the rear panel LEDs

The LEDs on the rear of the system are used to monitor the onboard ports.

For information about monitoring the LEDs for your optional Fibre Channel HBAs, GbE adapter cards, or TCP Offload Engine (TOE) network interface cards (NICs), refer to the *IBM System Storage N series Platform Monitoring Guide*.

Location of LEDs

Figure 6 shows the location of the following onboard port LEDs:

- "Fibre Channel port LEDs" on page 26
- "Ethernet port LEDs" on page 26
- RLM LEDs

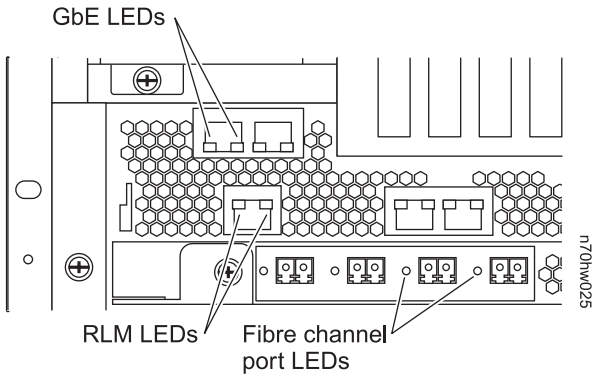


Figure 6. Onboard port LED locations

Table 11. Onboard port LEDs

Port type	LED type	Status indicator	Description
Fibre Channel	LNK (Green)	Off	No link with the Fibre Channel is established.
		On/blinking	A link is established and communication is happening.
GbE and RLM	LNK (Green)	On	A valid network connection is established.
		Off	There is no network connection.
	ACT (Amber)	On	There is data activity.
		Off	There is no network activity present.

Fibre Channel port LEDs

Your N7000 series system has onboard Fibre Channel ports on the back of the chassis. The LEDs are on each side of the onboard Fibre Channel port on the back of your system, as shown in Figure 6 on page 25.

Your system can also use Fibre Channel Host Bus Adapters (HBA). You can configure HBA ports to function in one of two modes: Initiator and Target.

For information about monitoring the LEDs for your optional Fibre Channel HBAs, refer to the *IBM System Storage N series Error Message and Troubleshoooting Guide*.

Ethernet port LEDs

Your N7000 series system has onboard Ethernet ports on the back of the chassis. The LEDs are on the corners above each onboard Ethernet port on the back of your system, as shown in Figure 6 on page 25.

For information about monitoring the LEDs for your optional GbE adapter cards, refer to the *IBM System Storage N series Platform Monitoring Guide*.

NVRAM6 adapter LEDs

The NVRAM6 adapter is also the active-active interconnect adapter when your system is in an active-active configuration. The NVRAM6 adapter is supported in all N7000 series system active-active configurations except MetroCluster.

Figure 7 on page 27 shows the LED locations for your NVRAM6 adapter. There are two sets of LEDs by each port that operate when you use NVRAM6 as an active-active interconnect adapter. There is also an internal red LED that you can see through the faceplate.

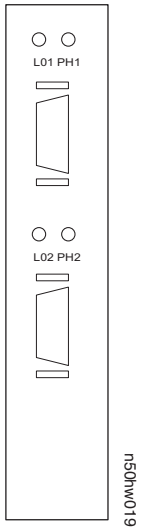


Figure 7. NVRAM6 LED locations

Interpreting the NVRAM6 adapter LEDs

Use the following table to interpret the LEDs for an NVRAM6 adapter.

Table 12. NVRAM6 LED descriptions

LED type	Indicator	Status	Description
Internal	Red	Blinking	There is valid data in the NVRAM6. **Attention:** This might occur if your system did not shut down properly, as in the case of a power failure or panic. The data is replayed when the system boots up again.
PH1	Green	On	The physical connection is working.
		Off	No physical connection.
LO1	Yellow	On	The logical connection is working.
		Off	No logical connection.

NVRAM6 copper-fiber converter LEDs

The NVRAM6 copper-fiber converter enables you to use fiber cabling to cable your systems in an active-activeconfiguration.

Figure 8 shows the LED locations for your NVRAM6 copper-fiber converter.

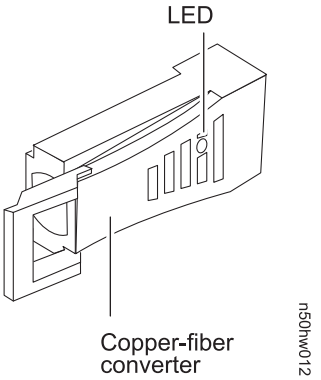


Figure 8. NVRAM6 copper-fiber converter LED locations

Interpreting the copper-fiber converter LEDs

Use the following table to interpret the LEDs for an NVRAM6 copper-fiber converter.

Table 13. NVRAM6 copper-fiber converter LED descriptions

Indicator	Status	Description
Green	On	Normal operation.
Green/Amber	On	Power is present but link is down.
Green	Flickering or off	Power is present but link is down.

Monitoring the power supply

The N7000 series system power supply has two LEDs. The LEDs indicate whether the power supply is functioning normally or whether there are problems with the hardware. You can also identify any hardware failure associated with the power supplies from the error messages displayed on your system console.

A normal functioning power supply shows a green LED. A power supply fault turns the LED to amber.

Location of LEDs

Each power supply is encased in a device carrier and housed at the rear of your N7000 series system. Figure 9 on page 29 shows the location of the power supply LEDs.

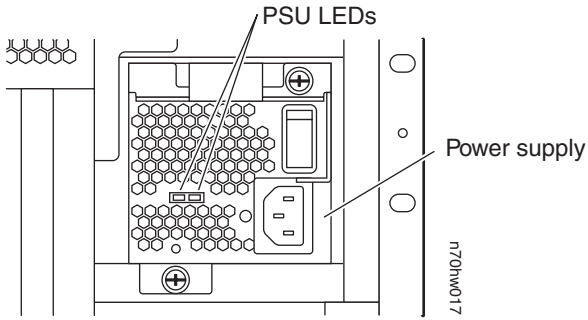


Figure 9. Power supply (PSU) LED locations

Interpreting power supply LEDs

Use the following table to interpret the LEDs on your system power supplies.

Table 14. Power supply LED descriptions

Amber (AC IN)	Green (PWR)	Description
On	On	The AC power source is good and is powering the system.
On	Off	There is AC power present, but the power supply is not operational.
On	Blinking	There is AC power present, but the power supply is not enabled.
Off	Off	There is no power to this power supply.

Monitoring the fans

To monitor the fans, check the console error messages and look at the Status LED on each fan module. To replace a failed fan module, see “Replacing a fan” on page 45.

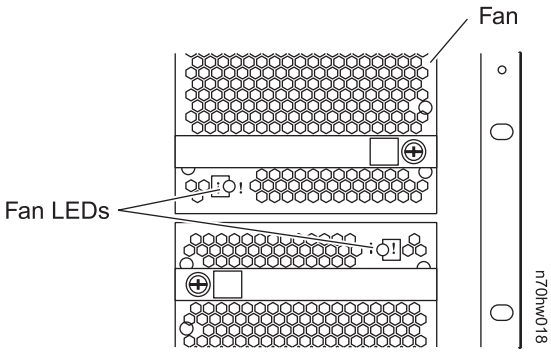


Figure 10. Fan LED locations

Table 15. Fan LED descriptions

LED description	**Description**
Orange blinking	The fan failed.
Off	There is no power to the system *or* the fan is operational.

Chapter 5. Replacing N7000 series system devices

This chapter describes how to replace parts in your N7000 series system, the motherboard tray, and other devices.

This chapter discusses the following topics:

Figure 11 on page 32 shows the locations of components at the front of your N7000 series system.

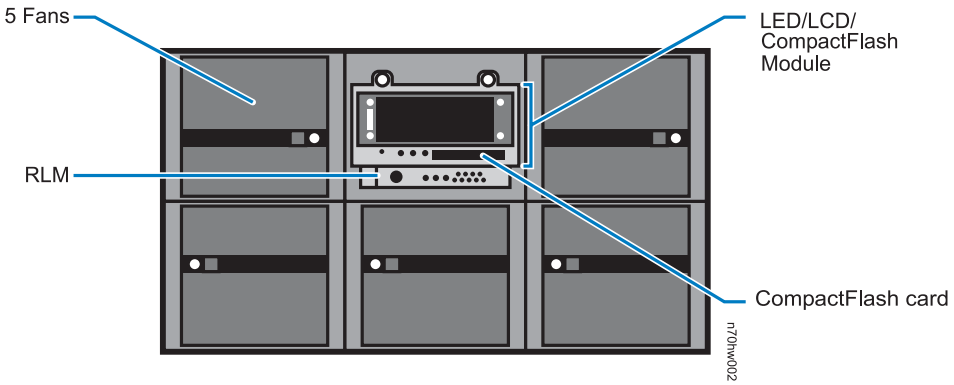


Figure 11. N7000 series system components - Front

Figure 12 shows the locations of components at the rear of your N7000 series system.

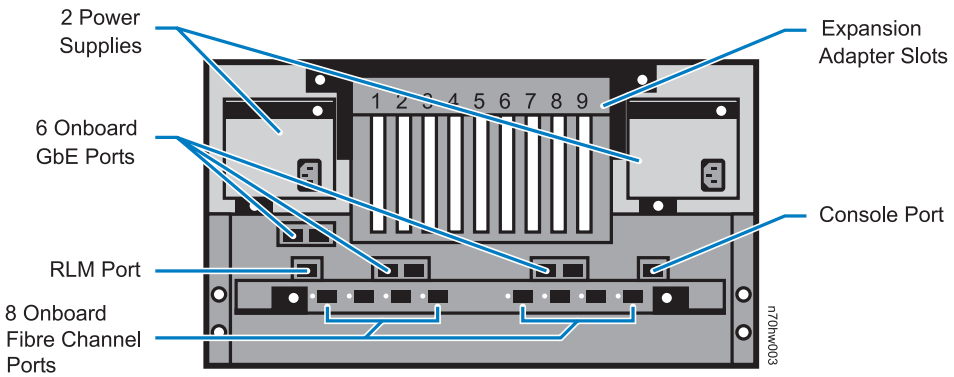


Figure 12. N7000 series system components - Rear

Figure 13 on page 33 shows an exploded view of the components at the rear of your N7000 series system.

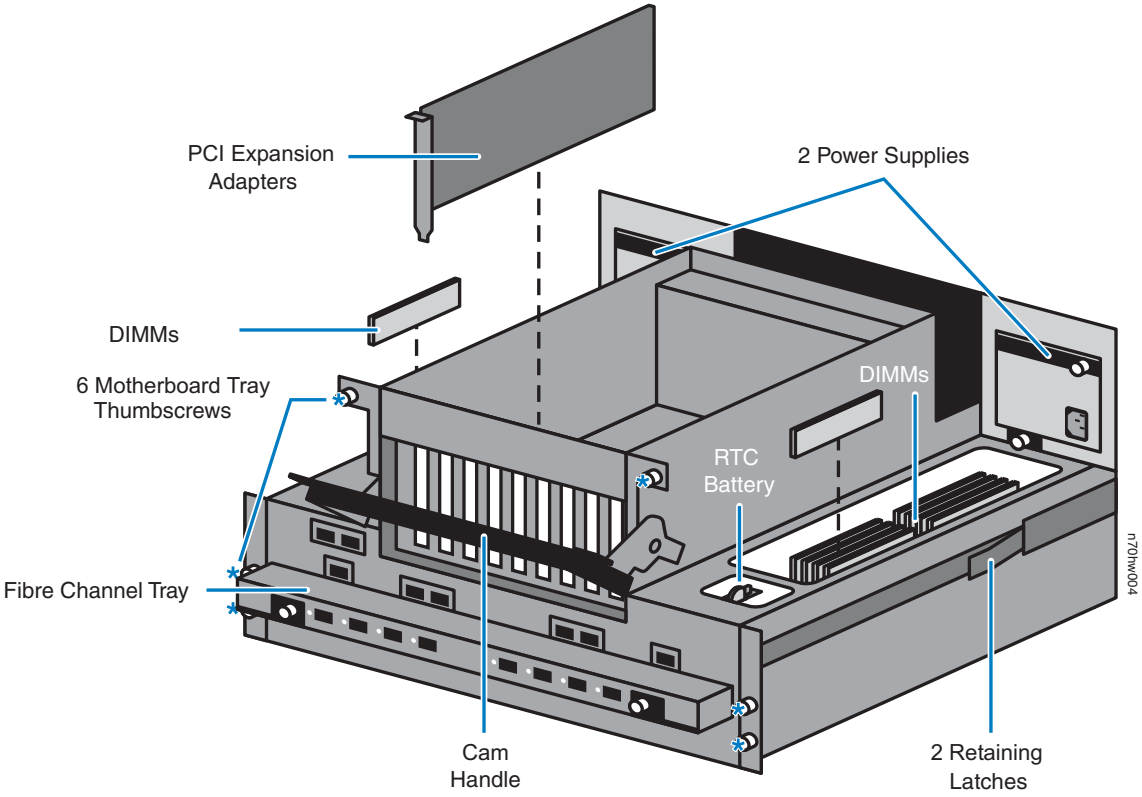


Figure 13. N7000 series system components - Rear (exploded view)

General N7000 series system tasks

This section discusses the following topics:

Powering off the system

You must perform a clean system shutdown to replace system components that are not hot-swappable.

Perform the steps described in one of the following sections, depending on whether you have an active/active configuration or a single-controller configuration.

- "Shutting down a node in an active/active configuration"
- "Shutting down a node in a single-controller configuration" on page 35

Shutting down a node in an active/active configuration

Attention: On gateway systems, first note the system ID from the system configuration file before shutting down the target gateway controller.

1. Check the status of the target node by entering the following command at the system console of either node:

   ```
   cf status
   ```

2. Take one of the following actions, based on the results of the **cf status** command:
   - If clustering is enabled and neither node is in takeover mode, go to step 3.
   - If clustering is enabled and the partner node took over the target node, go to step 5 on page 35.
   - If clustering is enabled and the target node took over the partner node, correct the problem, run the **cf giveback** command, and go back to step 1.
3. Take over the target node by entering the following command from the partner node's console:

   ```
   cf takeover
   ```

   Stop the target node from rebooting by pressing Ctrl-C when you see the following message:

   ```
   Starting AUTOBOOT press Ctrl-C to abort
   ```

   Attention: If your system has the AUTOBOOT variable set to False, the system halts at the LOADER prompt. Skip to Step 5 on page 35.
4. Shut down the node by entering the following command from the local node console, and then wait for the LOADER prompt to appear before proceeding further:

   ```
   halt
   ```

   If your system has the AUTOBOOT variable set to False, the LOADER prompt is already visible.

   Attention: You must perform a clean system shutdown to replace components inside your system. The NVRAM6 adapter has a red LED that turns off when your system is shut down. If this LED is flashing red after you enter the halt command, reboot your system and try halting it again.

5. Put on a grounding leash and turn off power to the system by switching off both power supplies.
6. Remove the power cords, as described in "Removing the power cords" on page 36.

Shutting down a node in a single-controller configuration

Attention: On gateway systems, first note the system ID from the system configuration file before shutting down the gateway controller.

1. Shut down by entering the following command from the system console:

   ```
   halt
   ```

   Wait for the Loader prompt to appear before proceeding further.

   Attention: You must perform a clean system shutdown to replace components inside your system. The NVRAM6 adapter has a red LED that turns off when your system is shut down. If this LED is flashing red after you enter the **halt** command, reboot your system and try halting it again.
2. Put on a grounding leash and turn off power to the system by switching off both power supplies.
3. Remove the power cords, as described in "Removing the power cords" on page 36.

Rebooting the controller and running diagnostics

Perform the following steps to reboot the controller and run diagnostics.

1. Reconnect the controller to the power source, if needed, and turn the power supplies on.
2. Press Ctrl-C to interrupt boot process.
3. Enter the following command at the LOADER prompt to boot diagnostics:

   ```
   boot_diags
   ```
4. Select `mb` from the menu, and then select the comprehensive motherboard test from the test menu. Examine the results and make any necessary changes, then exit Diagnostics.
5. Boot the system by entering the following command from the LOADER prompt:

   ```
   boot_ontap
   ```

   Attention: Your system may reboot automatically one time during the reboot process. This reboot automatically reconfigures the ports on the Fibre Channel tray.

   Attention: If your system is an active/active configuration, you must enable it again. Use the **cf giveback** command from the partner node's console to reenable your active/active configuration.

Removing and replacing the bezel

To remove the bezel, complete the following steps:

1. From the front of the system, grasp the bezel at the two blue half-circle touch points.
2. Pull the bezel gently towards you.

To replace the bezel, complete the following steps:

1. From the front of the system, set the bezel on the posts at each corner of the front of the chassis.
2. Push the bezel gently towards the system to snap it into place.

Opening and closing the motherboard tray

Attention: You do not have to remove the motherboard tray to replace field-replaceable unit (FRU) components on the tray. However, the system and rack should be on a stable surface where the chassis and motherboard tray are supported and the system cannot tip when the motherboard tray is pulled away from the chassis.

To open the motherboard tray, complete the following steps:

1. Turn off power to the system, as described in "Powering off the system" on page 33.
2. Loosen the six thumbscrews that secure the motherboard tray to the chassis.
3. Open the motherboard tray by pulling the cam handle down and sliding the tray out of the system until it catches.

To close the motherboard tray, complete the following steps:

1. With the system powered off, push in the retaining latches on the side of the chassis and slide the motherboard tray into the chassis.
2. Push the cam handle until the motherboard tray snaps shut inside the chassis.
3. Tighten the thumbscrews on the cam handle and chassis frame.

Removing the power cords

To remove the power cords, complete the following steps for each power cord:

1. Verify that the system is powered off.
2. Press the release tab on the clip.
3. Open the retaining clip and slide off the power cord.
4. Unplug the power cord from the power source.

Replacing the cable management tray

This section discusses the following topics:

- "Removing the cable management tray"
- "Installing the cable management tray" on page 39

Removing the cable management tray

To remove the cable management tray, complete the following steps:

1. If the system is powered on, power it off as described in "Powering off the system" on page 33
2. Unplug all the cables from the back of the motherboard tray.

   Note: Do not remove the cables from the cable clips; that way, when you reinstall the cable management tray, the cables are already aligned with the correct ports on the system.

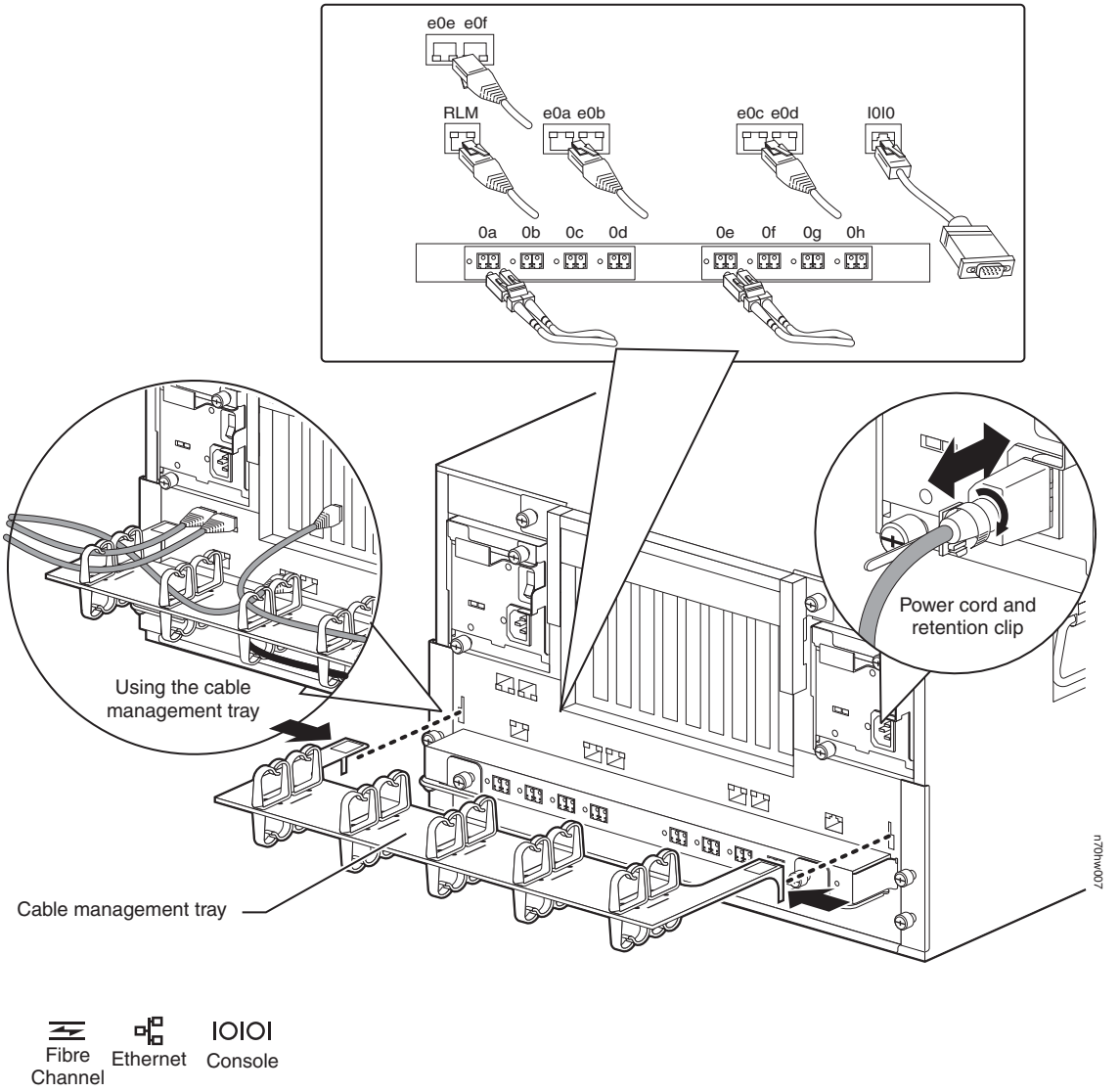


Figure 14. Removing the cable management tray

3. Grasp the cable management tray by the side, gently push on the sides of the tray to unhook it, and then pull the tray off the back of the motherboard tray and set it aside.

Installing the cable management tray

1. Align the edges of the cable management tray with the slots on the back of the system.

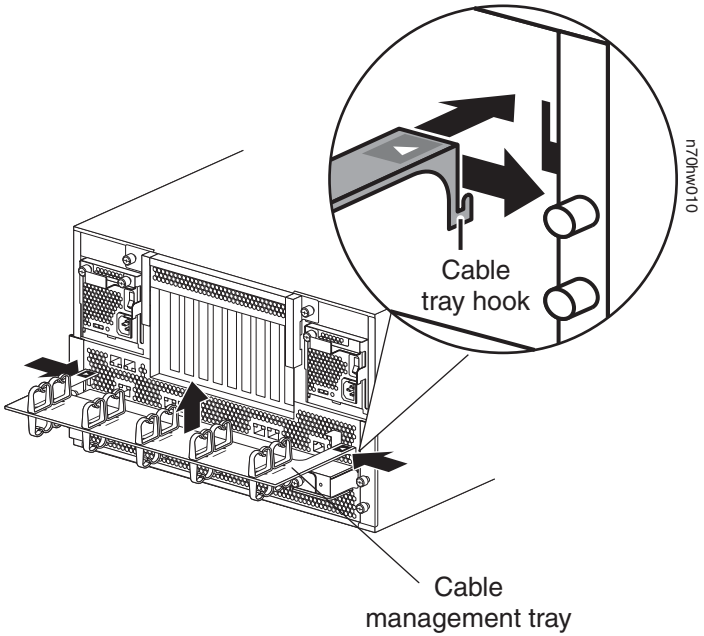


Figure 15. Installing the cable management tray

2. Hook one end of the cable management tray into the chassis one end at a time, and the push it into the slots on the back of the system. You might need to pinch the edges of the cable management tray to insert it into the slots.
3. Make sure the tray is seated properly. Repeat Steps 1 and 2 if it is not seated.
4. After you have installed the cable management tray, do the following:
   a. Cable your system as needed.
   b. Feed the individual cables into the cable retaining clips on the cable management tray. Cables from the PCI cards in the motherboard tray should go through the upper retaining clips on the cable management tray. Cables from the Fibre Channel tray should go through the clips on the underside of the cable management tray.
5. Turn on the power to boot the system. Make sure that you run diagnostics on the entire system, as described in "Rebooting the controller and running diagnostics" on page 35. See the *IBM System Storage N series Diagnostics Guide* for more information.

Replacing the Fibre Channel tray

Note: The Fibre Channel tray is not a hot-swappable component.

This section discusses the following topics:

- "Removing the Fibre Channel tray"
- "Installing the Fibre Channel tray" on page 41
- "Completing the replacement process" on page 41

Removing the Fibre Channel tray

1. Shut down the system, as described in "Powering off the system" on page 33. Make sure that you are properly grounded.
2. Unplug the cabling from the system, and remove the cable management tray as described in "Removing the cable management tray" on page 37. Make note of cable locations to help you reconnect them to the system.
3. Loosen the thumbscrews on both ends of the Fibre Channel tray, and then swing the thumbscrew retainer bars away from the Fibre Channel tray. This pulls the tray slightly out of the chassis. See Figure 16.

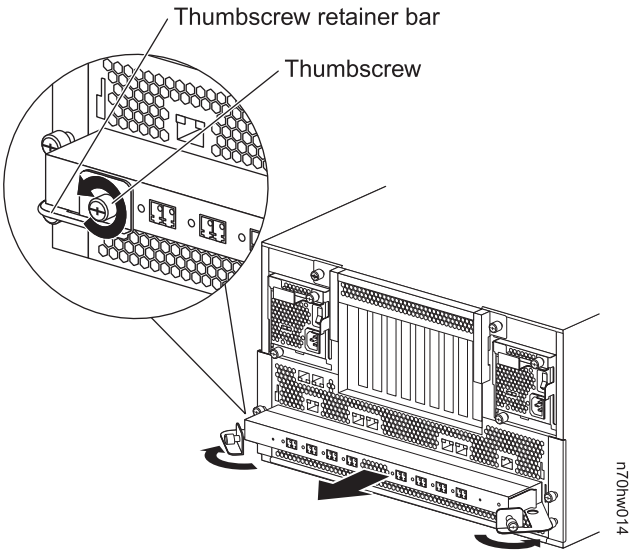


Figure 16. Removing the Fibre Channel tray

4. Slide the Fibre Channel tray out of the chassis and set it aside. Make sure that you support the bottom of the tray with your free hand when removing it from the chassis. Make sure that you place it on an antistatic surface.

5. Remove the SFP modules from the ports on the Fibre Channel tray and set them aside. You will install them in the new Fibre Channel tray.
6. Go to "Installing the Fibre Channel tray."

Installing the Fibre Channel tray

1. Align the replacement tray with the Fibre Channel tray opening at the back of the chassis, and carefully slide the tray into the chassis. Make sure that the tray does not bind during the process.
2. Seat the tray by firmly and evenly pushing the corners of the tray. Make sure that the tray is properly seated.
3. Swing the thumbscrew retainer bars into place over the corners of the Fibre Channel tray. The bars should swing easily into place. If they do not, reseat the tray. Tighten the thumbscrews.
4. Install the SFP modules into the ports on the Fibre Channel tray.
5. Reinstall the cable management tray and reconnect the cables. See your notes for cable locations. Make sure that you attach the power supply retaining clip to the power supply cord, and slide it firmly against the shoulder of the power supply plug.
6. Turn on the power to the boot the system. Make sure that you run diagnostics on the entire system, as described in "Rebooting the controller and running diagnostics" on page 35. See the *IBM System Storage N series Diagnostics Guide* for more information.

   Attention: Depending on your system requirements, you might need to upgrade or downgrade the firmware on the new motherboard. Contact your technical support representative for guidance, prior to upgrading or downgrading firmware on the new motherboard.
7. Go to "Completing the replacement process."

Completing the replacement process

Return the failed part to IBM. Contact IBM Service and Support at 1-800-IBM-SERV (1-800-426-7378) for more information on the return procedure.

Replacing the motherboard tray

This section discusses the following topics:

Removing the motherboard tray and components

Note: The motherboard tray is not a hot-swappable component.

To remove the motherboard tray and its components, perform the following steps:

1. Shut down the system, as described in "Powering off the system" on page 33.
2. Remove the Fibre Channel tray, as described in "Removing the Fibre Channel tray" on page 40.
3. Remove the motherboard tray by performing the following steps:
   a. Loosen the six thumbscrews on the cam handle and chassis frame. Then open the system by pulling the cam handle downward and sliding the motherboard tray out of the chassis until it catches. See Figure 17.

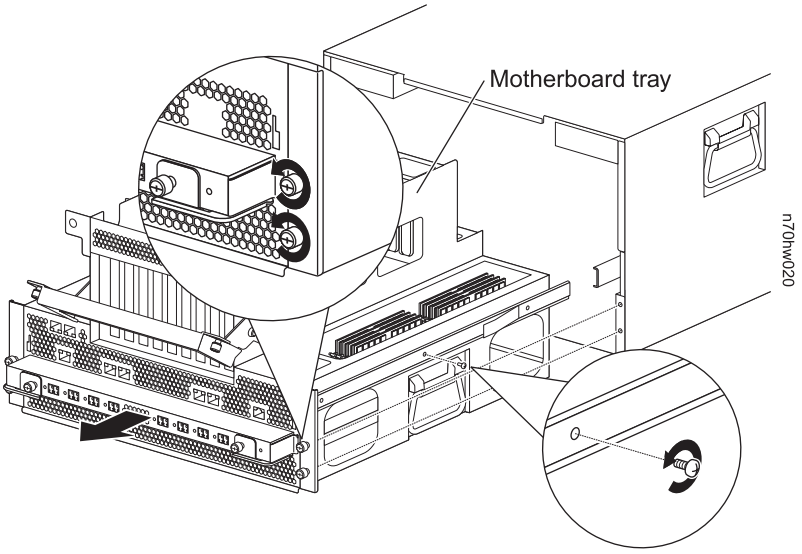


Figure 17. Removing the motherboard tray

   b. Remove the motherboard tray from the chassis by completing the following substeps:
      1) Press the locking tabs on the sides of the motherboard tray, and then gently pull it out about an inch.
      2) Grasp the handles on the sides of the motherboard tray, slide it out of the chassis, and set it on a stable, antistatic surface.
   c. Remove the slide rails from the sides of the motherboard tray. Set the six screws and rails in a safe place; you need them for the replacement motherboard tray.
4. Remove the DIMMs as described in "Removing a DIMM" on page 57.

Note: Note the bank where the DIMMs are located. You need to install the DIMMs in the same bank on the new motherboard tray only if your system is not fully populated by DIMMs.

5. Remove the PCI adapters as described in "Removing a PCI adapter" on page 47, and then go to "Installing the motherboard tray and components."

Installing the motherboard tray and components

To install the motherboard tray and its components, perform the following steps:

1. Install the DIMMs as described in "Installing a DIMM" on page 59.

   Note: Make sure that you install the DIMMs into the correct banks on the new motherboard tray, based on your notes from "Removing the motherboard tray and components" on page 41.

2. Install the PCI adapters as described in "Installing the PCI adapters" on page 48.
3. Install the motherboard tray by performing the following steps:
   a. Attach the slide rails that you removed from the old motherboard tray to the sides of the replacement motherboard tray.
   b. Align the rails on the motherboard tray with those on the system chassis. Gently guide the motherboard tray onto the rails, gently pushing the motherboard tray in as far as it will go. Make sure that the motherboard tray does not bind when sliding it forward.
   c. Press the locking tabs on the slides and gently push the motherboard tray until it is almost flush with the chassis.
   d. Push the cam handle up to the locked position.
   e. Tighten the six thumbscrews around the outside of the motherboard to secure it to the chassis.
4. Install the Fibre Channel tray as described in "Installing the Fibre Channel tray" on page 41.
5. Turn on the power to boot the system. Make sure that you run diagnostics on the entire system, as described in "Rebooting the controller and running diagnostics" on page 35. See the *IBM System Storage N series Diagnostics Guide* for more information.
6. Continue with "Completing the replacement process."

Completing the replacement process

Return the failed part to IBM. Contact IBM Service and Support at 1-800-IBM-SERV (1-800-426-7378) for more information on the return procedure.

Replacing the LED/LCD/CompactFlash module

Note: The LED/LCD/CompactFlash module is not a hot-swappable component.

This section discusses the following topics:

- "Removing the LED/LCD/CompactFlash module"
- "Installing the LED/LCD/CompactFlash module" on page 45
- "Completing the replacement process" on page 45

Removing the LED/LCD/CompactFlash module

1. Shut down the system, as described in "Powering off the system" on page 33.
2. Ground yourself to the system chassis using the grounding leash, and then remove the bezel from the front of the system, as described in "Removing and replacing the bezel" on page 36.
3. Loosen the two thumbscrews on the top corners of the module, and then pull out the LED/LCD/CompactFlash module. See Figure 18.

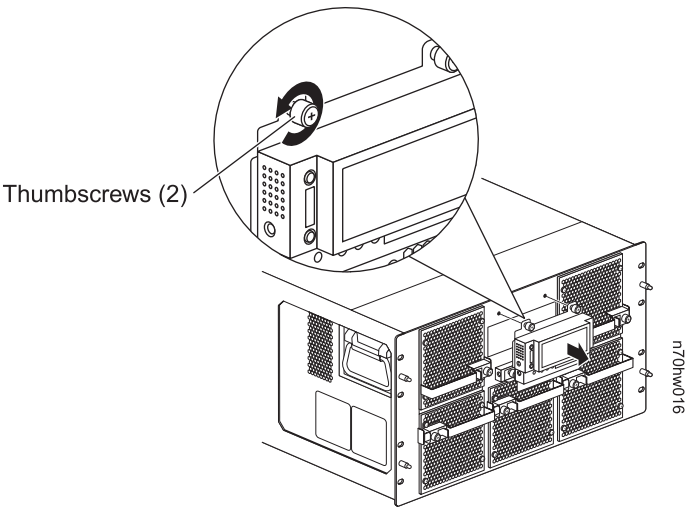


Figure 18. Removing the LED/LCD/CompactFlash module

4. Flip the ejector lever on the LCD display module up, push the lever to eject the CompactFlash card, remove it and set it aside.

Attention: The Data ONTAP software is installed on the CompactFlash card of the old CPU module. The CompactFlash card on the replacement CPU module may be blank or at the wrong operating system level. To get the correct version of Data ONTAP onto the replacement CPU module, you need to move the CompactFlash card from the old CPU module to the replacement CPU module.

Note: The CompactFlash card in this module is a separate field-replaceable unit (FRU). See "Replacing a CompactFlash card in an active/active system" on page 66 or "Replacing a CompactFlash card in a single-controller system" on page 74, as applicable to your configuration.

5. Go to "Installing the LED/LCD/CompactFlash module."

Installing the LED/LCD/CompactFlash module

1. Seat the CompactFlash card by pushing it firmly into the CompactFlash reader. The CompactFlash card should be squarely seated and should not move when you wiggle it. Reseat the CompactFlash card, if necessary.
2. Flip the ejector lever on the CompactFlash module so that it is laying flat.
3. Align the edges of the LED/LCD/CompactFlash module with the opening in the chassis.
4. Slide the module in as far as it can go, and push on the edges of the module to make sure that it is properly seated.
5. Tighten the thumbscrews on the module to secure it to the chassis.
6. Replace the front bezel by snapping it back onto the system chassis. Plug the system back in, turn on the power and boot it, as described in "Rebooting the controller and running diagnostics" on page 35. See the *IBM System Storage N series Diagnostics Guide* for more information.
7. Go to "Completing the replacement process."

Completing the replacement process

Return the failed part to IBM. Contact IBM Service and Support at 1-800-IBM-SERV (1-800-426-7378) for more information on the return procedure.

Replacing a fan

Attention: N7000 series system power supplies and fans are hot-swappable components. You must replace a hot-swappable component within two minutes of its removal from the chassis.

This section discusses the following topics:

- "Completing the replacement process" on page 47

Removing a fan

1. Make sure that you are properly grounded before replacing the fan. Remove the bezel and locate the fan that needs replacing. See Figure 19.

   Note: You can identify it by the flashing LED on the fan FRU, or through messages on the LCD or console.

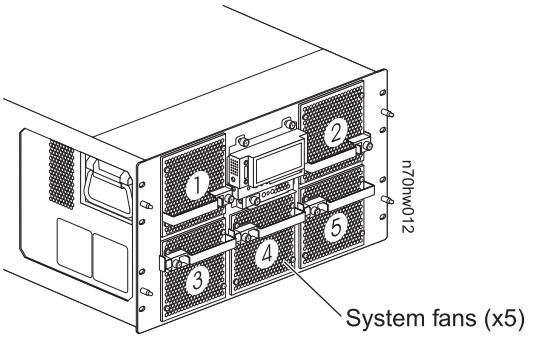


Figure 19. N7000 series system fans

2. Loosen the thumbscrew on the target fan handle.
3. Press the release tab on the target fan module, and then pull the handle toward you to remove the fan from the chassis. Make sure that you support the fan with your free hand. See Figure 20.

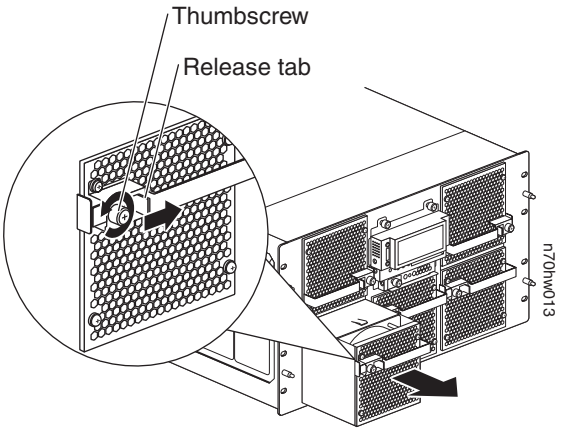


Figure 20. Removing the fan module

Note: You must replace the fan within two minutes of removal from the chassis. System air flow is disrupted and the system shuts down after two minutes to avoid overheating.

4. Go to "Installing a fan."

Installing a fan

1. Align the replacement fan with the fan opening in the chassis, and gently slide it into the chassis as far as it can go.

   Note: The fan modules are keyed and can only be installed one way. If the fan module does not fit properly, flip the module 180 degrees and reinstall it.

2. Finish seating the fan by pushing firmly on the edges of the fan housing. When properly seated, the locking tab engages the handle.
3. Tighten the thumbscrew on the replacement fan handle.
4. Replace the bezel, as described in "Removing and replacing the bezel" on page 36. Then run diagnostics on the replacement fan at the next reboot. See the *IBM System Storage N series Diagnostics Guide* for more information about running specific diagnostic tests.
5. Go to "Completing the replacement process."

Completing the replacement process

Return the failed part to IBM. Contact IBM Service and Support at 1-800-IBM-SERV (1-800-426-7378) for more information on the return procedure.

Replacing a PCI adapter

This section discusses the following topics:

- "Removing a PCI adapter"
- "Installing the PCI adapters" on page 48

Removing a PCI adapter

1. Do one of the following:
   - If you are removing one PCI adapter, identify the PCI adapter and continue with step 2.
   - If you are removing PCI adapters as part of the motherboard replacement process, locate and record the locations of all the PCI adapters, including the NVRAM6 adapter, and then continue with step 2.

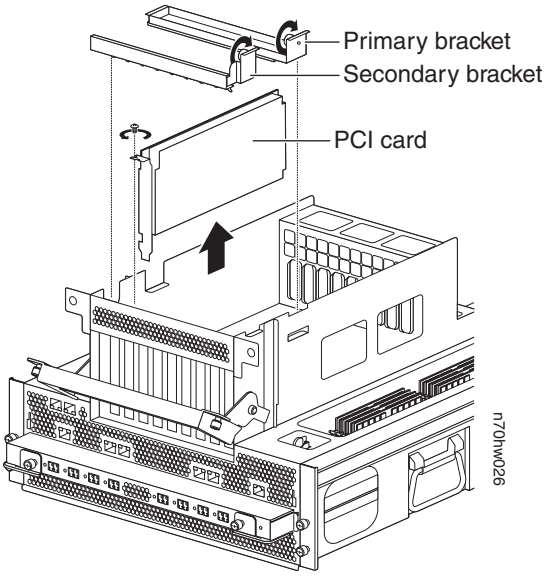


Figure 21. Removing the PCI adapters

2. Loosen the thumbscrew on the primary PCI retaining bracket, located in the middle and at the top of the motherboard tray, and then lift the retaining bracket up and off the chassis frame.
3. Loosen the thumbscrew on the secondary PCI retaining bracket, located at the back of the motherboard tray, and then lift the retaining bracket up and off the chassis frame.
4. Remove the selected PCI adapter by grasping it by the upper corners of the adapter, and gently rocking it out of the socket. Set it aside on an antistatic surface. Make a note of which slot the adapter was in. You need this information when reinstalling the PCI adapters.
5. Repeat step 4 for each PCI adapter, including the NVRAM6 adapter.
6. Go to "Installing the PCI adapters."

Installing the PCI adapters

1. Do one of the following:
   - If you are replacing one PCI adapter, identify the target PCI adapter slot and continue with step 2.
   - If you are installing a new PCI adapter, refer to Appendix C, "Optional adapter cards," on page 85 for information about the target slots to use for your particular PCI adapter. Continue with step 2.
   - If you are installing all the PCI adapters as part of the motherboard replacement process, identify the target slot for each PCI adapter, including the NVRAM6 adapter, using your notes from "Removing a PCI adapter" on page 47. Continue with step 2.

2. Align the PCI adapter with the slot, lower it into the socket, and gently seat it into the socket. Be sure that you properly align the adapter in the slots and to exert even pressure on the adapter when seating it in the socket.
3. Repeat Step 2 for all remaining PCI adapters.
4. Install the primary and secondary PCI retaining brackets.

Replacing an NVRAM6 adapter

Note: The NVRAM6 adapter is not a hot-swappable component.

The NVRAM6 adapter is a PCI adapter that provides nonvolatile memory to your system and acts as a memory buffer for your system. It also serves as the interconnect adapter when your system is in a standard high-availability configuration (A21 or G21).

This section discusses the following topics:

- "Removing an NVRAM6 adapter"
- "Installing an NVRAM6 adapter in a single-controller configuration" on page 54
- "Installing an NVRAM6 adapter in an active/active configuration" on page 52
- "Completing the replacement process" on page 55

Removing an NVRAM6 adapter

1. Shut down the system, as described in "Powering off the system" on page 33.
2. Ground yourself to the system chassis using the grounding leash, turn off the power to your system, unplug the power cords from the power source, and then remove the power cords.
3. Remove the cables and any media adapters from the NVRAM6 adapter.

   If your system is in a high-availability configuration (A21 or G21) that uses fiber interconnect cables, remove each media converter by pulling the handle so that the latches open, and then gently remove the media converter IB connector from your NVRAM6 adapter port, as shown in Figure 22 on page 50.

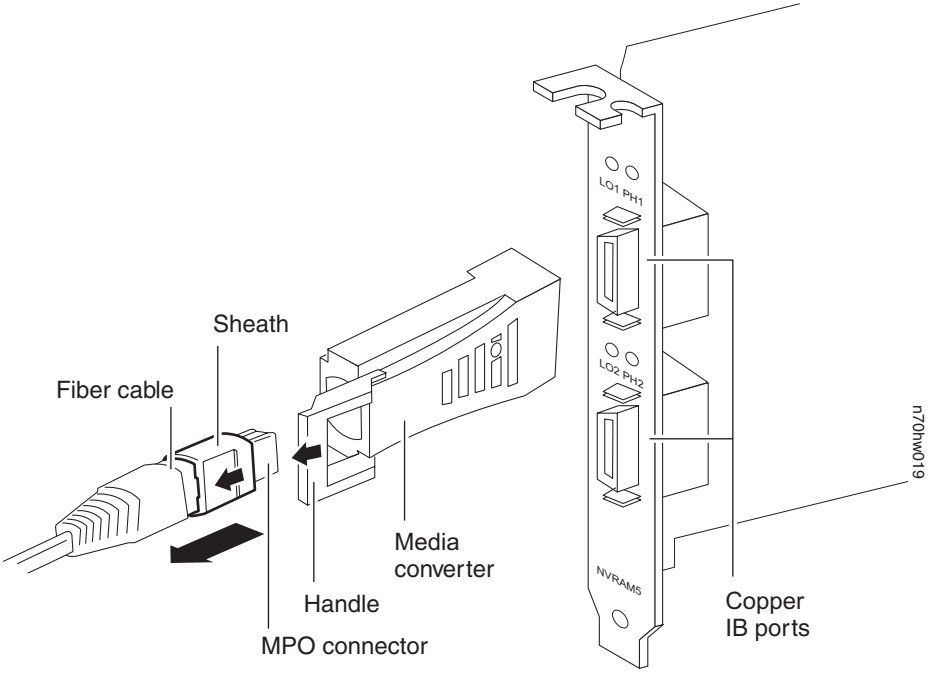


Figure 22. Removing the media converter IB connector from a fiber cable

If your system is in a high-availability configuration (A21 or G21) that uses copper interconnect cables, remove each cable by carefully pressing the latches of the top cable and slowly pulling the IB connector from the NVRAM6 adapter port, as shown in Figure 23 on page 51.

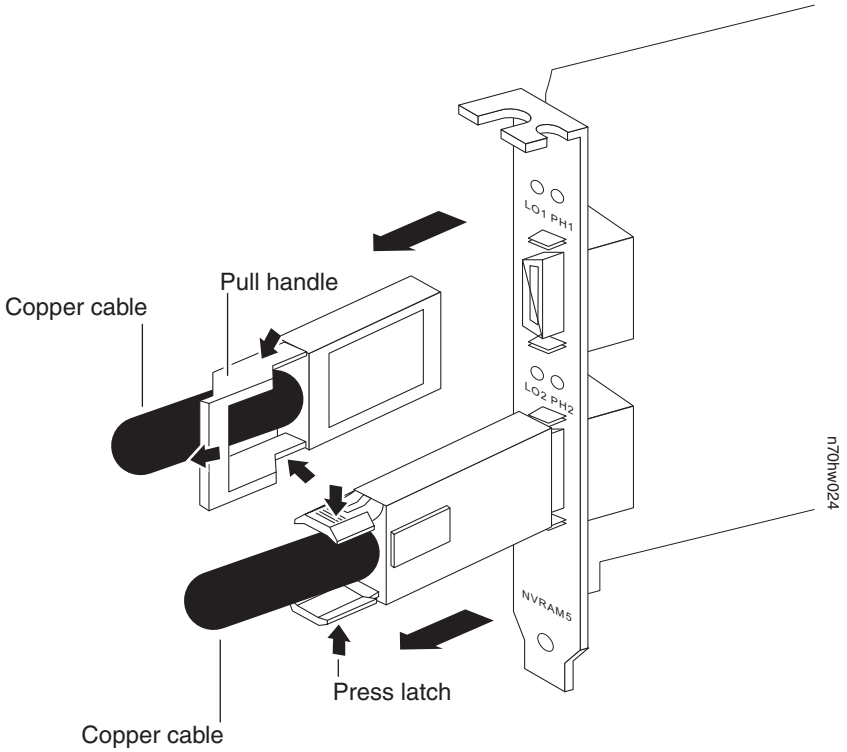


Figure 23. Removing the IB connector from a copper cable

4. Using "Opening and closing the motherboard tray" on page 36 as a reference, open the motherboard tray.

   Note: You do not have to remove the motherboard to replace field-replaceable unit (FRU) components on the motherboard tray. However, your system must be on a stable surface where the chassis and motherboard tray are supported, so that your system cannot tip when you pull the motherboard tray away from the chassis.

5. With the motherboard tray extended back, remove the NVRAM6 adapter by completing the following substeps, using Figure 24 on page 52 for reference:
   a. Loosen the thumbscrew on the primary PCI retaining bracket, located in the middle and at the top of the motherboard tray, and then lift the retaining bracket up and off the chassis frame.
   b. Loosen the thumbscrew on the secondary PCI retaining bracket, located at the back of the motherboard tray, and then lift the retaining bracket up and off the chassis frame.

c. Remove the NVRAM6 adapter by grasping it by its upper corners, and gently rocking it out of the socket. Set it aside on an antistatic surface.

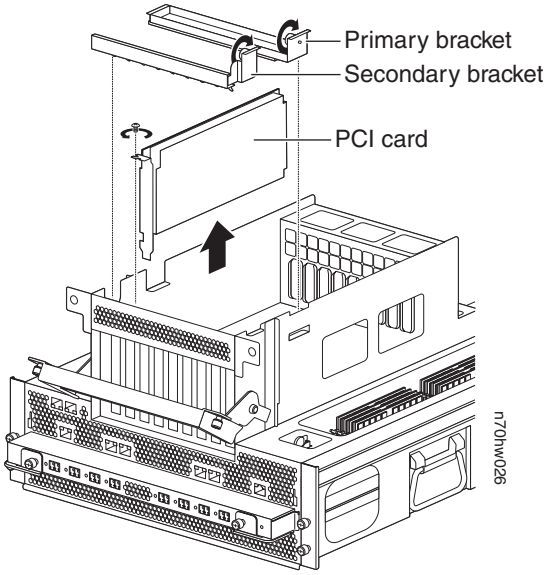


Figure 24. Removing the NVRAM6 adapter

6. Go to "Installing an NVRAM6 adapter in an active/active configuration" or "Installing an NVRAM6 adapter in a single-controller configuration" on page 54, as applicable to your configuration.

Installing an NVRAM6 adapter in an active/active configuration

1. With the motherboard tray extended out, install the NVRAM6 adapter in the appropriate slot. Be sure that you properly align the adapter in the slot and exert even pressure on the adapter when seating it in the socket.

   If the NVRAM6 adapter is installed in a fabric-attached MetroCluster system (A11 or G11), install it in slot 2.

   If the NVRAM6 adapter is installed in a high-availability configuration (A21 or G21), install it in slot 1.
2. Reinstall and tighten the primary and secondary brackets inside the system.
3. Gently push the motherboard tray back into the system. The cam handle begins to engage when the motherboard tray is almost seated. Raise the cam handle to seat the motherboard tray all the way inside the system.
4. Tighten the thumbscrews on the cam handle and chassis frame.
5. Reinstall the cable management tray and recable the system, as needed.

Attention: When recabling the NVRAM6 adapter in a high-availability configuration (A21 or G21), remember to reinstall the media converters (if you are using fiber cables) or copper cables.

6. Reassign disks to the failed node by completing the following substeps:
   a. Turn on the power to the system and reboot the failed node. Press Ctrl-C to go to the Special Boot Menu.
   b. Select Maintenance mode from the boot menu.
   c. Check the old system ID, new system ID, and all disks, by entering the following command from the failed node:

      ```
      disk show -v
      ```

      Note: The old system ID is in parentheses following the host name of the failed node.
   d. Enter the following command from the partner node:

      ```
      priv set advanced
      ```
   e. Reassign disk ownership for filer systems or LUN ownership for gateways from the partner node, using the system ID information obtained in the previous step:

      ```
      disk reassign [-o old_system_name | -s old_system_ID] -d new_system_ID
      ```

      Attention: Do not run this command from the target node in Maintenance mode.
7. Check that the disks (or gateway LUNs) were assigned correctly by entering the following command from the partner node:

   ```
   disk show -v
   ```

   Results: Disks are shown as assigned to the system and should show the new system ID for the failed node.
8. Check the status of your disk aggregates and volumes by entering the following command:

   ```
   aggr status
   ```
9. Halt the failed node and boot diagnostics by entering the following commands at the prompt:

   ```
   halt
   boot_diags
   ```
10. Run diagnostics on the NVRAM6 adapter. See the *IBM System Storage N series Diagnostics Guide* for more information.
11. Exit diagnostics, reboot the node, and give back the node, if applicable, by entering the following commands:

    ```
    exit
    boot_ontap
    ```

If autogiveback is set to on, the node is automatically given back when you boot.

If autogiveback is set to off, reboot the node and enter `cf giveback` from the partner node.

12. Go to "Completing the replacement process" on page 55.

Installing an NVRAM6 adapter in a single-controller configuration

1. With the motherboard tray extended out, install the NVRAM6 adapter in slot 2. Be sure that you properly align the adapter in the slot and exert even pressure on the adapter when seating it in the socket.
2. Reinstall and tighten the primary and secondary brackets inside the system.
3. Gently push the motherboard tray back into the system. The cam handle begins to engage when the motherboard tray is almost seated. Raise the cam handle to seat the motherboard tray all the way inside the system.
4. Tighten the thumbscrews on the cam handle and chassis frame.
5. Reinstall the cable management tray and recable the system, as needed.
6. Reassign disks (or gateway LUNs) to your system before you boot your software:
   a. Reboot the system and press Ctrl-C to interrupt the boot process.
   b. Select Maintenance mode from the boot menu.
   c. Check the old system ID, new system ID, and all disks, by entering the following command:

      ```
      disk show -v
      ```

      Note: The old system ID is in parentheses following the host name.
   d. Reassign disk ownership for filer systems or LUN ownership for gateways using the system ID information obtained in the previous step by entering the following command:

      ```
      disk reassign -o old_system_name -d new_system_ID
      ```
7. Check that the disks (or gateway LUNs) were assigned correctly by entering the following command:

   ```
   disk show -v
   ```

   Results: Disks are shown as assigned to the system.
8. Check the status of your disk aggregates and volumes by entering the following command:

   ```
   aggr status
   ```

   Results: All online disk aggregates and traditional volumes are displayed.

9. Stop the system and boot diagnostics by entering the following commands at the prompt:

   ```
   halt
   boot_diags
   ```

10. Run diagnostics on the NVRAM6 adapter. See the *IBM System Storage N series Diagnostics Guide* for more information.
11. Exit diagnostics and reboot the system, if applicable, by entering the following commands:

    ```
    exit
    boot_ontap
    ```

12. Go to "Completing the replacement process."

Completing the replacement process

Return the failed part to IBM. Contact IBM Service and Support at 1-800-IBM-SERV (1-800-426-7378) for more information on the return procedure.

Replacing a power supply

Attention: N7000 series system power supplies and fans are hot-swappable components. You must replace a hot-swappable component within two minutes of its removal from the chassis.

This section discusses the following topics:

- "Removing a power supply"
- "Installing a power supply" on page 56
- "Completing the replacement process" on page 57

Attention: There are 2 power supply options available for the N7000 series system. If you have to replace a power supply, be sure you replace it with a power supply of the same type. Do not mix power supply types within a single system.

Removing a power supply

1. Make sure that you are properly grounded, then turn off the target power supply and remove the power cord by completing the following substeps, using Figure 25 on page 56 for reference:

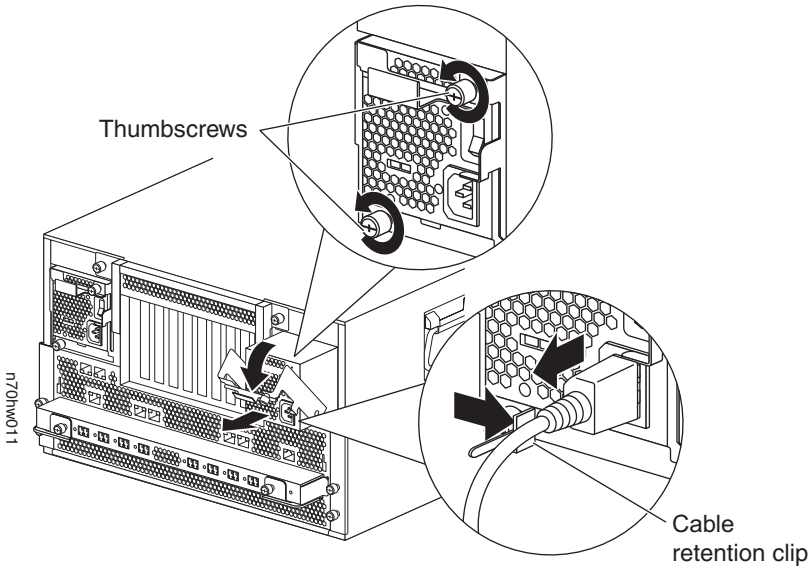


Figure 25. Removing the power supply

a. Pinch the tab on the locking mechanism of the cable retainer clip, and open the retainer clip.
b. Slide the retainer clip off the cable.
c. Unplug the power cord from the power supply and the power source.

2. Loosen the two thumbscrews on the power supply and then lower the cam handle and slide the power supply out of the chassis. Make sure that you support the power supply with your free hand.

   Attention: You must replace the power supply within two minutes of removal from the chassis. System air flow is disrupted and the system shuts down after two minutes to avoid overheating.

3. Go to "Installing a power supply."

Installing a power supply

1. Align the edges of the power supply with the opening in the system chassis and gently push the power supply into the chassis until the cam handle begins to rise.
2. Push on the edges of the power supply to seat it all the way into the chassis, and then push the cam handle to the closed position.
3. Tighten the two thumbscrews on the power supply.
4. Reconnect the power supply to the power source, secure the power cord to the power supply using the cable retaining clip, and then turn it on.

5. Run diagnostics on the power supply at next reboot. See the *IBM System Storage N series Diagnostics Guide* for more information.
6. Go to "Completing the replacement process."

Completing the replacement process

Return the failed part to IBM. Contact IBM Service and Support at 1-800-IBM-SERV (1-800-426-7378) for more information on the return procedure.

Replacing DIMMs

Note: The DIMMs are not hot-swappable components.

This section discusses the following topics:

Removing a DIMM

1. Make sure that you are grounded, and then shut down and open the system, as described in "Powering off the system" on page 33 and "Opening and closing the motherboard tray" on page 36.
2. Locate the DIMM that you want to remove. See Figure 26 on page 58 for DIMM locations.

   Note: If you are removing DIMMs as part of the motherboard replacement process, be sure to note the bank where the DIMMs are located. You need to install the DIMMs in the same bank on the new motherboard tray only if your system is not fully populated by DIMMs.

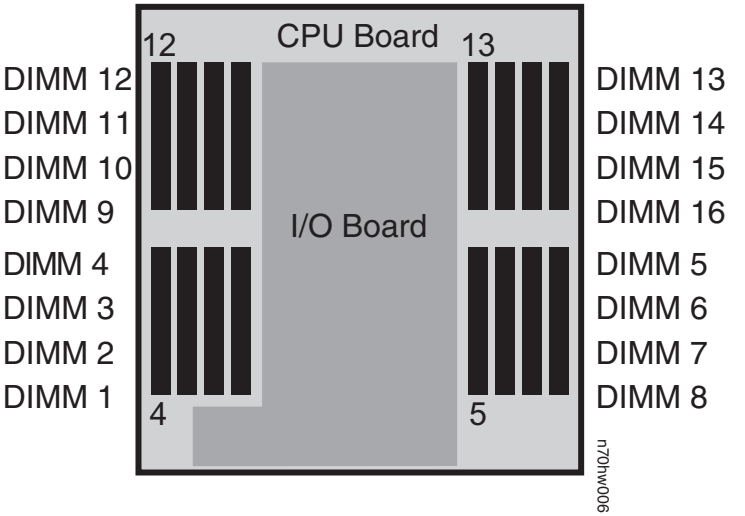


Figure 26. DIMM layout

3. Push apart the latches on either side of the DIMM to release the DIMM from its slot, as shown in Figure 27, and then lift it out of the slot.

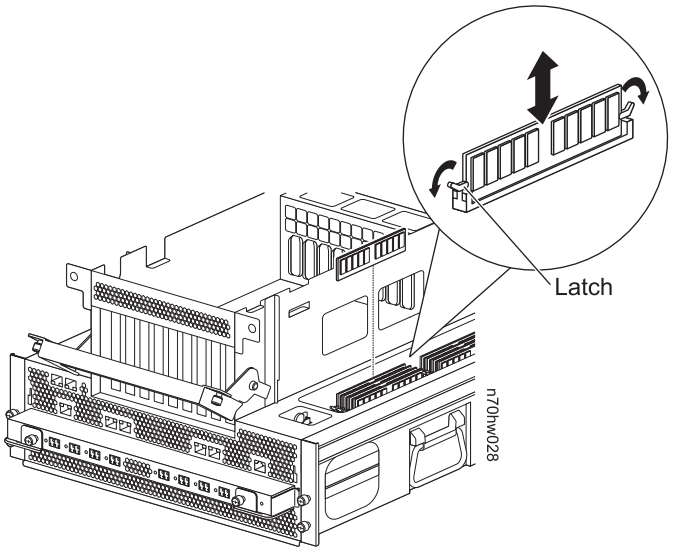


Figure 27. Removing the DIMMs

4. Repeat steps 3 and 4 for each additional DIMM you are removing.
5. Go to "Installing a DIMM" on page 59.

Installing a DIMM

1. Remove the motherboard tray, if necessary, as described in “Removing the motherboard tray and components” on page 41.
2. While grounded, remove the replacement DIMM from the antistatic shipping bag and set it down in a safe place.
3. Locate the slot where you are installing the new DIMM. Figure 28 on page 60 shows the locations of the DIMM slots.

   Note: If you are removing DIMMs as part of the motherboard replacement process, make sure that you install the DIMMs into the correct banks on the new motherboard tray, based on your notes from “Removing a DIMM” on page 57.

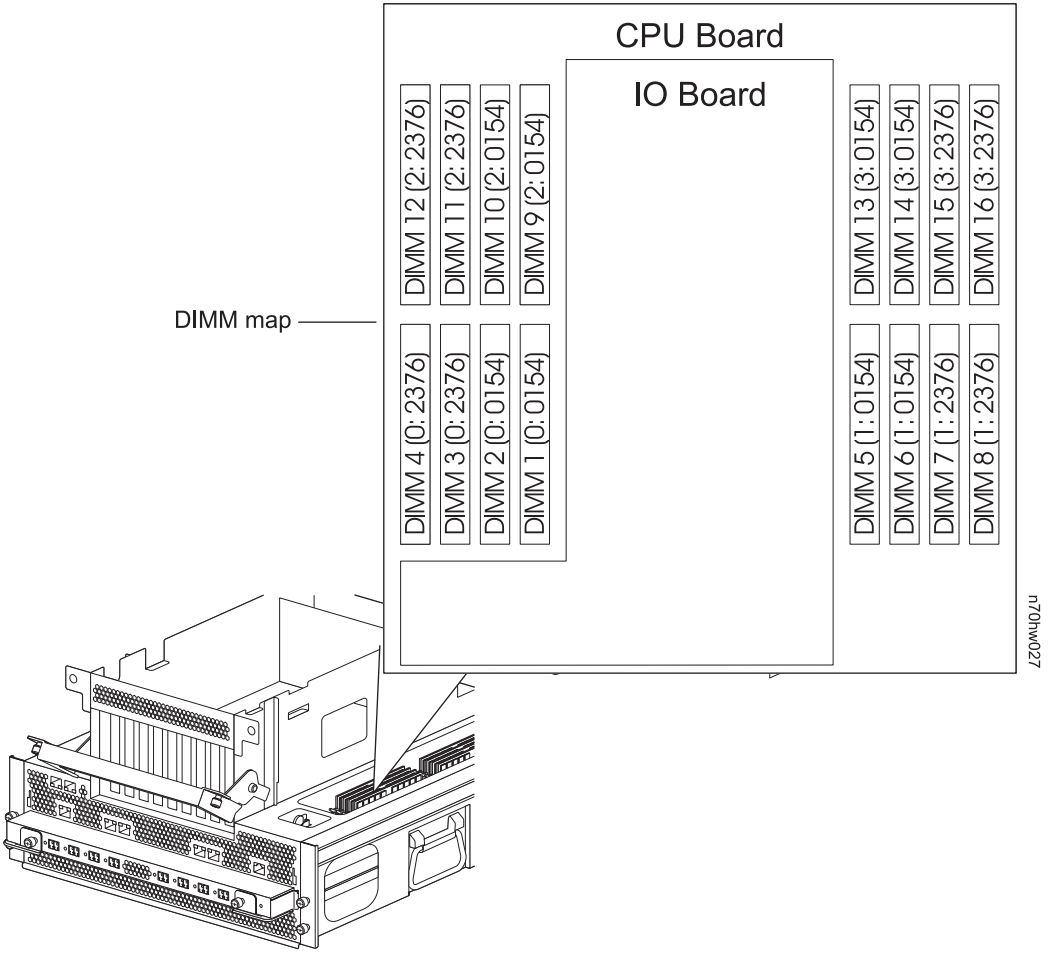


Figure 28. DIMM slots

4. Hold the DIMM by the corners and insert the DIMM straight into the slot. The DIMM fits tightly in the slot, but should go in easily. If not, realign the DIMM with the slot and reinsert it.

   Attention: Visually inspect the DIMM to verify that it is evenly aligned and fully inserted into the slot. The edge connector on the DIMM must make complete contact with the slot.
5. Push carefully, but firmly, on the top edge of the DIMM until the latches snap into place over the notches at the ends of the DIMM.
6. Repeat steps 3 to 5 for each additional DIMM you are replacing.
7. Reinstall the motherboard tray and the cable management tray.
8. Recable the system, reconnect the power cables to the power supplies, and then turn on the power to the system.

9. Reboot the system, and then run diagnostics to ensure that the new DIMM is functioning properly. For more information, see the *IBM System Storage N series Diagnostics Guide*.

Completing the replacement process

Return the failed part to IBM. Contact IBM Service and Support at 1-800-IBM-SERV (1-800-426-7378) for more information on the return procedure.

Replacing the real-time clock (RTC) battery

Note: The real-time clock (RTC) battery is not a hot-swappable component.

This section discusses the following topics:

Removing the RTC battery

1. Make sure that you are properly grounded, and then shut down and open the system, as described in "Powering off the system" on page 33.
2. Open the motherboard tray and locate the RTC battery on the right, rear of the motherboard tray (closest to you, when the tray is open). See Figure 29 on page 62.

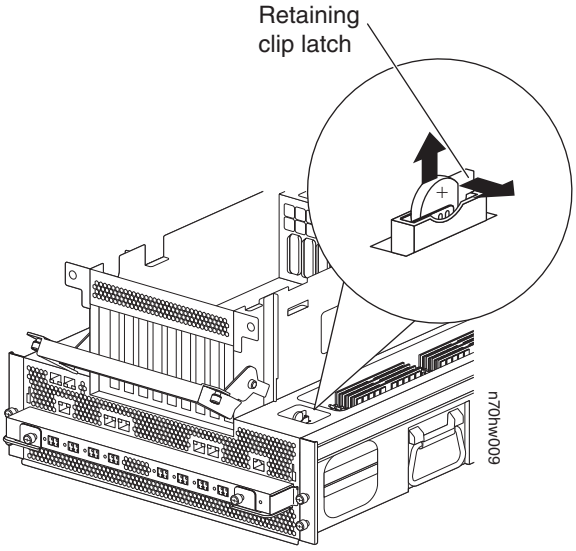


Figure 29. Removing the RTC battery

3. Push the retaining clip latch holding the battery in place and lift the battery out of the socket.
4. Go to "Installing the RTC battery."

Installing the RTC battery

1. While grounded, remove the replacement battery from the antistatic shipping bag and install it by completing the following substeps:
   a. Align the poles of the battery with the posts inside the battery housing. The Positive pole is on the right of the battery socket.

      Attention: The battery does not fit in the battery socket if the battery is facing the wrong direction.

   b. Gently push the battery into the socket, until the retaining clip engages the battery.
2. Close the motherboard tray, recable it as needed, install the cable management tray as needed, and boot the system.
3. Run diagnostics on the RTC battery at reboot. See the *IBM System Storage N series Diagnostics Guide* for more information about running specific diagnostic tests.
4. Go to "Resetting the date and time on the controller."

Resetting the date and time on the controller

You must reset the date and time on the controller or node after replacing the RTC battery and rebooting Data ONTAP.

1. Display the current date on the controller or node by entering the following command:

   ```
   date
   ```

   Attention: If your system is in an active/active configuration, make sure that you display the date and time on the partner node and set the target node to the same date and time.
2. Set the date by entering the following command:

   ```
   date [-u] [[[CC]yy]mmddhhmm>[.<ss>]]
   ```

   - -u sets the date and time to Greenwich Mean Time instead of the local time.
   - *CC* is the first two digits of the current year.
   - *yy* is the second two digits of the current year.
   - *mm* is the current month. If you omit the month, the default is the current month.
   - *dd* is the current day. If you omit the day, the default is the current day.
   - *hh* is the current hour, using a 24-hour clock. mm is the current minute.
   - *ss* is the current second. If you omit the seconds, the default is 0.

   Example: The following command sets the date and time to 22 May 2007 at 9:25 a.m.

   ```
   date 200705220925
   ```

   Note: See the *Data ONTAP System Administration Guide* for more information.
3. Go to "Completing the replacement process."

Completing the replacement process

Return the failed part to IBM. Contact IBM Service and Support at 1-800-IBM-SERV (1-800-426-7378) for more information on the return procedure.

Replacing the RLM

Note: The RLM is not a hot-swappable component.

This section discusses the following topics:

For additional information about the RLM, see “Configuring and using the RLM” on page 22.

Removing a remote LAN module (RLM)

1. Shut down the system, as described in “Powering off the system” on page 33. Make sure that you are properly grounded.
2. Remove the bezel and locate the RLM directly under the CompactFlash® carrier on the LCD module on the front of the chassis.
3. Loosen the thumbscrew on the left side of the RLM carrier, and then swing the retaining arm to the right. See Figure 30.

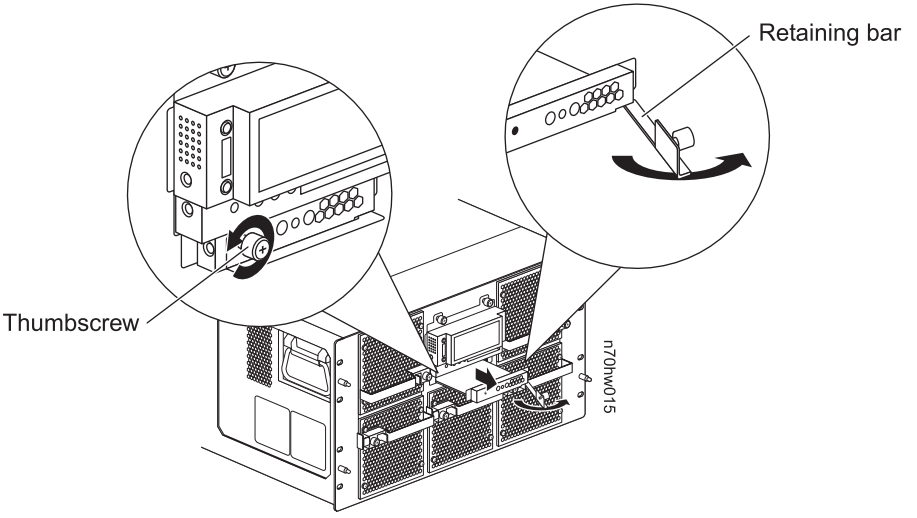


Figure 30. Removing the RLM carrier

4. Slide the RLM out of the carrier and set it aside.
5. Go to “Installing an RLM.”

Installing an RLM

1. Align the replacement RLM with the carrier in the chassis and gently slide it into the system. Make sure that is seated completely in the chassis and then swing the locking arm to the left, and tighten the thumbscrew.
2. Reconnect the system to the power source, if applicable, and then turn it on to boot the system.

   Attention: The network for the RLM should be a 10/100 Ethernet network, or a network that can autonegotiate settings to a 10/100 Ethernet network.

   If you are replacing an existing RLM, run diagnostics, as described in “Running diagnostics” on page 66).

If you are replacing an RLM and activating it on for the first time, enter the following command from the system console to begin the RLM setup script:

```
mysystem-1> rlm setup
```

Example:

```
mysystem-1> rlm setup
The Remote LAN Module (RLM) provides remote management capabilities
including console redirection, logging and power control.
It also extends AutoSupport by sending
additional system event alerts. Your AutoSupport settings are used
for sending these alerts via email over the RLM LAN interface.
Would you like to configure the RLM LAN interface [y]: y
Would you like to enable DHCP on the RLM LAN interface [y]: n
Please enter the IP address for the RLM []: 10.10.123.45
Please enter the netmask for the RLM []: 255.255.224.0
Please enter the IP address for the RLM gateway []: 10.10.123.1
mysystem-1>
```

Attention: The RLM requires AutoSupport to be activated and configured. If AutoSupport is not set up and configured, do so at this time. See the *IBM System Storage N series Data ONTAP System Administration Guide* for your version of Data ONTAP for more information.

3. Check the link LED on the RLM port at the back of the chassis to ensure that it is green and that the link is active.
4. Go to "Testing the RLM" to ensure that you can access the RLM from the administration console.

Testing the RLM

The RLM provides a command-line interface to access its features. You must log in to the RLM over its network interface by using a secure shell client application, such as SSH, OpenSSH, or PuTTY. Insecure connection protocol applications, such as Telnet, are not available. See the *IBM System Storage N series Data ONTAP System Administration Guide* for your version of Data ONTAP for more information about secure shell client applications.

1. Log into the RLM console from a remote host acting as a system console by entering the following command from the administration host prompt:

   ```
   admin-host> ssh user_name@RLM_IP_address
   ```

   Example

   ```
   admin-host> ssh admin@10.10.123.45
   admin@172.22.136.85's password:*********
   RLM mysystem-1>
   ```

Note: Root login is not allowed for the RLM. If you need to log in with root credentials, use *naroot* for root login.

2. Check RLM status by entering the following command from the RLM console:

   ```
   RLM mysystem-1>rlm status
   ```

3. Exit the RLM console by entering the following command:

   ```
   RLM mysystem-1>exit
   ```

4. Connect to the system console using the serial connection or through telnet.
5. Test the RLM AutoSupport functions by sending a test e-mail to AutoSupport with the following command from the system console:

   ```
   mysystem-1>rlm test autosupport
   ```

6. Go to "Running diagnostics."

Running diagnostics

After you reboot your system, you should run diagnostics on the RLM. If the system passes the diagnostic tests, boot the system and bring it back online.

To run diagnostics on the RLM, complete the following steps:

1. Turn on or reboot system. Run diagnostics on your RLM by pressing Ctrl-c when you are prompted with the message `Starting Autoboot press CTRL-C to Abort`.
2. When the LOADER prompt appears, enter `boot_diags`. When you are prompted with the message `Enter Diag, Command or Option`, enter `Agent/RLM`.
3. Select the RLM tests from the main menu, and then run all diagnostics by entering 1.
4. Correct any errors and then boot the system.
5. Go to "Completing the replacement process."

Completing the replacement process

Return the failed part to IBM. Contact IBM Service and Support at 1-800-IBM-SERV (1-800-426-7378) for more information on the return procedure.

Replacing a CompactFlash card in an active/active system

This section discusses the following topics:

- "Restoring onboard Fibre Channel port configuration on the CompactFlash card" on page 73
- "Completing the replacement process" on page 73

Verifying system requirements

Software release information and downloads, including Data ONTAP software, firmware, and diagnostics upgrades, are available on the IBM NAS Web site at:

www.ibm.com/storage/support/nas/

Removing the CompactFlash card

This section describes the following tasks:

- "Shutting down the target node"
- "Retrieving the environment and Fibre Channel port configuration variables" on page 68

Shutting down the target node

1. Check the status of the target node by entering the following command at the system console of either node:

   ```
   cf status
   ```

2. Take one of the following actions, based on the results of the **cf status** command:
   - If clustering is enabled and neither node is in takeover mode, go to Step 3.
   - If clustering is enabled and the partner node took over the target node, enter the **cf giveback** command from the partner node's console and then go to Step 3.
   - If clustering is enabled and the target node took over the partner node, correct the problem, run the **cf giveback** command, and go back to Step 1.
3. Take over the target node by completing the following subprocedure:
   a. Enter the following command from the partner node's console:

      ```
      cf takeover
      ```

   b. Stop the target node from rebooting by pressing Ctrl-C when you see the following message:

      ```
      Starting AUTOBOOT press Ctrl-C to abort
      ```

   c. Go to "Retrieving the environment and Fibre Channel port configuration variables" on page 68.

Retrieving the environment and Fibre Channel port configuration variables

1. Display the system environment variables by entering the following command from the LOADER prompt on the target console:

   ```
   printenv
   ```

2. Copy the environment variable values. You need these variable values for the replacement CompactFlash card.
3. Enter the following command from the partner console:

   ```
   partner fcadmin config
   ```

4. Copy the Fibre Channel port configuration variable values. You need these variable values for the replacement CompactFlash card.
5. Turn off the power to the power supplies and unplug them from the power source.
6. While grounded, remove the bezel and set it aside.
7. Remove the CompactFlash card from the target node by removing the bezel, flipping the ejector lever up on the LCD display module and pushing it to eject the CompactFlash card. Remove the CompactFlash card from the module and set it aside.
8. Go to "Installing and placing system files on the CompactFlash card."

Installing and placing system files on the CompactFlash card

You might receive a blank, formatted CompactFlash card. Before you use it, you must transfer a boot image to it. You can transfer the boot image to the CompactFlash card in one of two ways:

- "Placing system files on the CompactFlash card using Netboot"
- "Placing system files on the CompactFlash card using a PC and card reader/writer" on page 70

Placing system files on the CompactFlash card using Netboot

1. Install the new CompactFlash card in the LCD display module. Make sure that you seat it squarely in the socket and that the card is firmly seated.
2. Flip the ejector level down on the LCD module so that it is lying flat, and then reinstall the bezel.
3. Place a boot image on the server you use for netbooting. You can copy the boot image from the boot directory at /etc/boot/netapp-x86-64, or download it from the following Web site:

   www.ibm.com/storage/support/nas

4. Plug the target node power supplies into the power source and turn them on.

5. Stop the target node from rebooting by pressing Ctrl-C to stop the boot process at the LOADER prompt when you see the following message:

   ```
   Starting AUTOBOOT press Ctrl-C to abort
   ```

6. Configure your network connection.

   If you have DHCP running on your network, enter the following command:

   ```
   ifconfig e0a -auto
   ```

   If you do not have DHCP running, configure the connection by entering the following command:

   ```
   ifconfig e0a -addr=filer_addr -mask=netmask -gw=gateway
   -dns=dns_addr -domain=dns_domain
   ```

   where:

   - `filer_addr` is the IP address of the system.
   - `netmask` is the network mask of the system.
   - `gateway` is the gateway for the system.
   - `dns_addr` is the IP address of a name server on your network.
   - `dns_domain` is the DNS domain name.

7. Netboot your system by entering the following command at the LOADER prompt:

   ```
   netboot URL
   ```

   where *URL* is the location of the remote boot image. It can be either an HTTP or a TFTP network path.

8. Ignore all prompts during reboot until `Waiting for Giveback` appears.
9. Enter the following command from the partner node console:

   ```
   cf giveback
   ```

10. Select 1 from the Special Boot Menu to boot the node normally.

    Note: You may need to press Enter to display the Special Boot Menu.

11. Determine what version of Data ONTAP the system is running by entering the following command on the target node console:

    ```
    version
    ```

12. Start clustering by entering the following command from the partner node console:

    ```
    cf giveback
    ```

13. Download the system files to the CompactFlash card by entering the following command from the prompt:

    ```
    download
    ```

    - If the download is successful, the following message is displayed on the console:

      ```
      Operator requested download completed.
      ```

- If the download fails, the following message is displayed on the console:

  ```
  Failed to open download script file /etc/boot/x86-64/kernel_1024.cmds:
  No such file [download.requestDoneError:error]: Operator requested
  download failed.
  ```

  Complete the following substeps to correct this error:

  a. Run the software install command by entering the following command:

     ```
     software install url -f
     ```

     where *url* is the location of the setup.exe command.

     Attention: Use the following URL syntax if you need to specify a username, password, host, or port to access files on the HTTP server using Basic Access Authentication (RFC2617):

     ```
     http://username:password@host:port/path
     ```

  b. Download the system files to the CompactFlash card by entering the following command from the prompt, but do not reboot the system when prompted to do so:

     ```
     download
     ```

14. Go to "Restoring environment variables on the CompactFlash card" on page 72

Placing system files on the CompactFlash card using a PC and card reader/writer

1. Copy the bootable kernel image (the appropriate *rlse*_setup.exe file) to your system. Copy the boot image from the boot directory at /etc/boot/netapp-x86-64, or download it from the following Web site:

   www.ibm.com/storage/support/nas

   Contact technical support if you cannot get a boot image from these sources.

   Attention: Make sure that you download the file designed for administering for a PC and that it is the correct release of Data ONTAP for your system.

2. Insert the CompactFlash card into the CompactFlash card reader.

   Attention: The CompactFlash card is pre-formatted. Do not format the CompactFlash card.

3. Extract the contents of the *rlse*_setup.exe file to a temporary folder on your PC.

4. Create a folder called x86_64 in the root partition of the CompactFlash card, and then create a subfolder called KERNEL in the x86_64 folder.

5. Move the bootable kernel image into the KERNEL folder in Windows® Explorer. The bootable kernel image is called `netapp_<rlse>-x86-64`. It is located on your PC in the `boot` folder in the files you extracted from *rlse*`_setup.exe`.
6. Rename the `netapp_<rlse>-x86-64` image to `Primary.KRN`.
7. While grounded, install the CompactFlash card with the kernel image in the controller LCD module. Make sure it is firmly seated in the LCD module.
8. Flip the ejector level down on the LCD module so that it is lying flat, and then reinstall the bezel.
9. Enter the following command from the partner node's console:

   ```
   cf giveback -f
   ```
10. Plug the target node power supplies into the power source and turn them on.
11. Press Ctrl-C during reboot at the message: `Press Ctrl-C for the Special Boot Menu`
12. Select 1 from the Special Boot Menu to boot the node normally.
13. Check the status of the cluster by entering the following command:

    ```
    cf status
    ```
14. Download the system files to the CompactFlash card by entering the following command from the prompt: download
    - If the download is successful, the following message is displayed on the console:

      ```
      Operator requested download completed.
      ```
    - If the download fails, the following message is displayed on the console:

      ```
      Failed to open download script file /etc/boot/x86-64/kernel_1024.cmds:
      No such file [download.requestDoneError:error]:
      Operator requested download failed.
      ```

    Complete the following substeps to correct this error:

    a. Run the software install command by entering the following command:

       ```
       software install url -f
       ```

       where *url* is the location of the setup.exe command.

Attention: Use the following URL syntax if you need to specify a username, password, host, or port to access files on the HTTP server using Basic Access Authentication (RFC2617):

```
http://username:password@host:port/path
```

b. Download the system files to the CompactFlash card by entering the following command from the prompt, but do not reboot the system when prompted to do so:

```
download
```

15. Go to "Restoring environment variables on the CompactFlash card."

Restoring environment variables on the CompactFlash card

1. Check the version of the image by entering the following command:

   ```
   version -b
   ```

2. Display the default environment variables by completing the following steps:
   a. Bring the system down to the LOADER prompt.
      - If the system is running, shut it down to the LOADER prompt by rebooting it and pressing Ctrl-C when prompted by the system, and then go to substep b.
      - If the system is at the LOADER prompt, go to substep b.

   b. Display the system environment variables by entering the following command from the LOADER prompt on the console:

      ```
      printenv
      ```

3. Compare the default environment variables with the list you made in "Removing the CompactFlash card" on page 67.
   - If the variable values are the same, go to "Restoring onboard Fibre Channel port configuration on the CompactFlash card" on page 73.
   - If the variable values are different or need modification, complete the following substeps:
     a. Set the values of the individual variables by entering the following command for each changed variable:

        ```
        setenv variable_name variable_value
        ```

     b. Verify the values of the variables by entering the following command from the LOADER prompt:

        ```
        printenv
        ```

4. Boot Data ONTAP after you have modified all variables by entering the following command:

   ```
   boot_ontap
   ```

5. Go to "Restoring onboard Fibre Channel port configuration on the CompactFlash card" on page 73.

Restoring onboard Fibre Channel port configuration on the CompactFlash card

1. Verify the target node Fibre Channel configuration by entering the following command from the partner node console:

   ```
   fcadmin config
   ```

2. Compare the default Fibre Channel variables with the list you made before you removed the CompactFlash card.
   - If the variable values are the same, go to "Completing the replacement process."
   - If the variable values are different, complete the following substeps:
     a. Reboot the target node and press Ctrl-C when `Press Ctrl-C for special boot menu` appears, and then again when `Press Ctrl-C for Maintenance menu to release disks` appears on the screen.
     b. Enter `y` when prompted for confirmation by the system.
     c. Enter one of the following commands for variables you want to change:
        – To program target ports:

          ```
          fcadmin config -t target adapter_name
          ```

        – To program initiator ports:

          ```
          fcadmin config -t initiator adapter_name
          ```

        – To unconfigure ports:

          ```
          fcadmin config -t unconfigure adapter_name
          ```

     d. Halt the target node by entering the following command:

        ```
        halt
        ```

     e. Verify the values of the variables by entering the following command from the LOADER prompt:

        ```
        printenv
        ```

3. Boot Data ONTAP after you have modified all variables by entering the following command:

   ```
   boot_ontap
   ```

4. Go to "Completing the replacement process."

Completing the replacement process

Return the failed part to IBM. Contact IBM Service and Support at 1-800-IBM-SERV (1-800-426-7378) for more information on the return procedure.

Replacing a CompactFlash card in a single-controller system

Note: In a single-controller system, the CompactFlash card is not a hot-swappable component.

This section discusses the following topics:

Verifying system requirements

Software release information and downloads, including Data ONTAP software, firmware, and diagnostics upgrades, are available on the IBM NAS Web site at:

www.ibm.com/storage/support/nas/

Removing the CompactFlash card

1. Retrieve and save the system environment configurations, as needed, by completing the following steps:
   a. Bring the system down to the LOADER prompt.
      - If the system is running, shut it down to the LOADER prompt by rebooting it and pressing Ctrl-C when prompted by the system, and then go to substep b.
      - If the system is at the LOADER prompt, go to substep b.
   b. Display the system environment variables by entering the following command from the LOADER prompt on the console:

      ```
      printenv
      ```

   c. Copy the environment variable values. You need these variable values for the replacement CompactFlash card.

   Attention: You do not need to retrieve the Fibre Channel port settings on a single-controller system. Fibre Channel port settings are stored in the boot environment and also on disk in the system root volume. When the system is rebooted, Fibre Channel settings will be restored from the saved settings.
2. Perform a clean system shutdown by entering the following command from the system console:

   ```
   halt
   ```

Attention: You must perform a clean shutdown to replace components inside your system.

3. Ground yourself to the system chassis using the grounding leash, turn off the power to the system, unplug the power cords from the power source, and then remove the power cords.
4. Remove the bezel by carefully prying it off the front of the system chassis. Use "Opening and closing the motherboard tray" on page 36 for reference.
5. Flip the ejector lever on the LCD display module up, push the lever to eject the CompactFlash card, remove it and set it aside.

Installing the CompactFlash card

Attention: If you are copying the system files to the CompactFlash card using a PC or laptop with a card writer, you must copy the system files to the CompactFlash card before installing it in the controller. See "Transferring a boot image using a PC or laptop" on page 76 for more information.

1. With the bezel removed from the front of the system, seat the CompactFlash card by pushing it firmly into the CompactFlash reader. The CompactFlash card should be squarely seated and should not move when you wiggle it. Reseat the CompactFlash card, if necessary.
2. Flip the ejector lever on the CompactFlash module so that it is laying flat.
3. Reseat the bezel on the front of the system chassis.
4. Recable the power supplies, as needed.

If your replacement CompactFlash card is a blank, formatted card, go to "Placing a boot image on the CompactFlash card."

If your replacement CompactFlash card has a software image already installed, go to "Updating the CompactFlash card" on page 76.

Placing a boot image on the CompactFlash card

You might receive a blank, formatted CompactFlash card. Before you use it, you must transfer a boot image to it. You can transfer the boot image to the CompactFlash card in one of two ways:

- "Transferring a bootable kernel image using netboot"
- "Transferring a boot image using a PC or laptop" on page 76

Transferring a bootable kernel image using netboot

1. Place a boot image on the server you use for netbooting. You can copy the boot image from the boot directory at /etc/boot/netapp-x86-64, or download it from the following Web site:

   www.ibm.com/storage/support/nas
2. Turn on your system and press Ctrl-C to stop the boot process at the LOADER prompt.

3. Configure your network connection, if needed.

   If you have DHCP running on your network, enter the following command:

   ```
   ifconfig e0a -auto
   ```

   If you do not have DHCP running, configure the connection by entering the following command:

   ```
   ifconfig e0a -addr=filer_addr -mask=netmask -gw=gateway
   -dns=dns_addr -domain=dns_domain
   ```

   where:

   - `filer_addr` is the IP address of the system.
   - `netmask` is the network mask of the system.
   - `gateway` is the gateway for the system.
   - `dns_addr` is the IP address of a name server on your network.
   - `dns_domain` is the DNS domain name.

4. Enter the following command at the LOADER> prompt:

   ```
   netboot URL
   ```

   where `URL` is the location of the remote boot image. It can be either an HTTP or a TFTP network path.

5. Go to "Updating the CompactFlash card."

Transferring a boot image using a PC or laptop

1. Copy the bootable kernel image to your system. Copy the boot image from the boot directory at /etc/boot/netapp-x86-64, or download it from the following Web site:

   www.ibm.com/storage/support/nas

   Contact technical support if you cannot get a boot image from these sources.

2. Insert the CompactFlash card into the CompactFlash card reader.

   Attention: The CompactFlash card is pre-formatted. Do not format the CompactFlash card.

3. Create a folder called x86_64 in the root partition of the CompactFlash card, and then create a subfolder called KERNEL in the x86_64 folder.
4. Move the bootable kernel image into the KERNEL folder in Windows Explorer. The bootable kernel image is called `netapp_<rlse>-x86-64`.
5. Rename the `netapp_<rlse>-x86-64` image to `Primary.KRN`.
6. Install the CompactFlash card with the kernel image into the system.
7. Go to "Updating the CompactFlash card."

Updating the CompactFlash card

1. Turn on power to the system and boot it, if neccesary.

2. Download the boot image to the CompactFlash card by entering the following command:

   ```
   download
   ```

   Attention: If download fails with the following error message, you must run setup to reinstall the proper files on the system that allow you to execute download on the CompactFlash card:

   ```
   Failed to open download script file /etc/boot/x86-64/
   kernel_1024.cmds: No such file
   [download.requestDoneError:error]: Operator requested download
   failed
   ```

3. Check the version of the image by entering the following command:

   ```
   version -b
   ```

   Make sure that the BIOS and Diagnostic images are the same as the old system or are upgraded. If they are not, go to www.ibm.com/storage/support/nas and follow the installation instructions to install the version you need.

4. Display the default environment variables by completing the following steps:
   a. Bring the system down to the LOADER prompt.
      - If the system is running, shut it down to the LOADER prompt by rebooting it and pressing Ctrl-C when prompted by the system, and then go to substep b.
      - If the system is at the LOADER prompt, go to substep b.

   b. Display the system environment variables by entering the following command from the LOADER prompt on the console:

      ```
      printenv
      ```

5. Compare the default environment variables with the list you made in "Removing the CompactFlash card" on page 74.
   - If the variable values are the same, go to Step 6.
   - If the variable values are different or need modification, complete the following substeps:
     a. Set the values of the individual variables by entering the following command for each changed variable:

        ```
        setenv variable_name variable_value
        ```

     b. Verify the values of the variables by entering the following command from the LOADER prompt:

        ```
        printenv
        ```

6. Boot Data ONTAP after you have modified all variables by entering the following command:

   ```
   boot_ontap
   ```

7. Go to "Completing the replacement process" on page 78.

Completing the replacement process

Return the failed part to IBM. Contact IBM Service and Support at 1-800-IBM-SERV (1-800-426-7378) for more information on the return procedure.

Appendix A. Recommended power line sizes

This appendix discusses how to determine the power line lengths running from your N7000 series system to the power source.

Recommended AC power line sizes

Longer AC power feeds need to be properly designed to preserve voltage levels to the equipment. The wiring from the breaker panel to the power strip, which supplies power to your N7000 series system and expansion units, can often exceed 50 feet.

Note: Total AC wire length = breaker to wall or ceiling outlet + extension cable or ceiling drop.

The following table lists the recommended conductor size for 2% voltage drop for a particular distance in feet (taken from the *Radio Engineer's Handbook*).

Table 16. 110V, single phase recommended conductor sizes

110V, single-phase	**20A circuit**	**30A circuit**	**40A circuit**	**50A circuit**
25 feet	12 AWG	10 AWG	8 AWG	8 AWG
50 feet	8 AWG	6 AWG	6 AWG	4 AWG
75 feet	6 AWG	4 AWG	4 AWG	2 AWG

Table 17. 220V, single phase recommended conductor sizes

220V, single-phase	**20A circuit**	**30A circuit**	**40A circuit**	**50A circuit**
25 feet	14 AWG	12 AWG	12 AWG	10 AWG
50 feet	12 AWG	10 AWG	8 AWG	8 AWG
75 feet	10 AWG	8 AWG	6 AWG	6 AWG

The following table list the approximate equivalent wire gauge (American Wire Gauge (AWG) to Harmonized Cordage).

Table 18. American Wire Gage to Harmonized Cordage equivalents

AWG	8	10	12
Harmonized, mm-mm [1]	4.0	2.5	1.5

[1] mm-mm = millimeter squared

Appendix B. FRU/CRU and power cord list for N series products

This appendix contains information about FRU/CRUs and power cords for N series products.

FRU/CRU list for N series products

For the most current FRU/CRU list for your N series product, see the following Web site:

www.ibm.com/storage/support/nas/

Power cord list for N series products

The following list details the power cord feature codes (FCs) for N series products.

FC 9000 (All countries)
Power cord, Rack PDU

- 27 inches
- Rated 250 V/15 A
- Product end uses C14; PDU end uses C13.

FC 9001 Europe and others
Provides power cords for Austria, Belgium, Bolivia, Bulgaria, Chile, Croatia, Czech Republic, Egypt, Estonia, European Union, Finland, France, Germany, Greece, Hungary, Iceland, Indonesia, Latvia, Lebanon, Lithuania, Luxemburg, Morocco, Netherlands, Norway, Peru, Poland, Portugal, Romania, Russia, Slovakia, Slovenia, Spain, Suriname, Sweden, Turkey

- 2.5 m (9 feet), unshielded, rated 250 V/10 A.
- Attached plug EL 211 (CEE 7-VII) designed for 200-240 V ac input.

FC 9002 United Kingdom and others
Provides power cords for United Kingdom, Costa Rica, Cyprus, Guyana, Hong Kong, Ireland, Kuwait, Malta, Oman, Singapore, Sri Lanka

- 2.5 m (9 feet), unshielded, rated 250 V/10 A.
- Attached plug EL 210 (13A fuse) designed for 200-240 V ac input.

FC 9003 Japan
Provides power cords for Japan

- 1.83 m (6 feet), unshielded, rated 125 V/15 A.
- Attached plug EL 302 (JIS C3306) designed for 100-110 V ac input.

FC 9004 U.S., Six Feet (2 m)

Provides power cords for U.S., Canada, Mexico, Belize, Columbia, Ecuador, El Salvador, Guatemala, Honduras, Korea, Nicaragua, Panama, Philippines, Puerto Rico, Saudi Arabia, Thailand, Venezuela

- 1.83 m (6 feet), unshielded, rated 125 V/15 A.
- Attached plug EL 302 (Nema 5-15P) designed for 100-120 V ac input.

FC 9005 Australia, New Zealand

Provides power cords for Australia, New Zealand, Uruguay

- 2.5 m (9 feet), unshielded, rated 250 V/10 A.
- Attached plug EL 206 (AS 3112) designed for 200-240 V ac input.

FC 9006 Switzerland, Liechtenstein

Provides power cords for Switzerland, Liechtenstein

- 2.5 m (9 feet), unshielded, rated 250 V/10 A.
- Attached plug EL 203 (SEV 1011) designed for 200-240 V ac input.

FC 9007 Argentina

Provides power cords for Argentina

- 2.5 m (9 feet), unshielded, rated 250 V/10 A.
- Attached plug EL 219 (IRAM 2073) designed for 200-240 V ac input.

FC 9008 China

Provides power cords for China

- 2.5 m (9 feet), unshielded, rated 250 V/10 A.
- Attached plug EL 602 (GB 2099/GB 1002) designed for 200-240 V ac input.

FC 9009 Denmark

Provides power cords for Denmark

- 2.5 m (9 feet), unshielded, rated 250 V/10 A.
- Attached plug EL 213 (DHCR 107-2-D1) designed for 200-240 V ac input.

FC 9010 India, Pakistan, South Africa

Provides power cords for India, Macau, Pakistan, South Africa

- 2.5 m (9 feet), unshielded, rated 250 V/10 A.
- Attached plug EL 208 (BS 164-1, BS 546) designed for 200-240 V ac input.

FC 9011 Israel

Provides power cords for Israel

- 2.5 m (9 feet), unshielded, rated 250 V/10 A.
- Attached plug EL 212 (SI 32) designed for 200-240 V ac input.

FC 9012 Italy

Provides power cords for Italy

- 2.5 m (9 feet), unshielded, rated 250 V/10 A.
- Attached plug EL 502 (CEI 23-16) designed for 200-240 V ac input.

FC 9013 North America (250 V)

Provides power cords for U.S.

- 1.83 m (6 feet), unshielded, rated 250 V/15 A.
- Attached plug EL 309 (NEMA 6-15P) designed for 200-240 V ac input.

FC 9014 Brazil

Provides power cords for Brazil

- 2.5 m (9 feet), unshielded, rated 250 V/10 A.
- Attached plug EL 211 (NBR 6147/2000) designed for 200-240 V ac input

FC 9015 Taiwan

Provides 125 V power cords for Taiwan

- 2.5 m (9 feet), unshielded, rated 125 V/15 A.
- Attached plug EL 302 (CNS 10917-3) designed for 100-120 V ac input.

FC 9016 Taiwan (250 V)

Provides 250 V power cords for Taiwan

- 1.83 m (6 feet), unshielded, rated 250 V/10 A.
- Attached plug EL 610 (CNS 10917, CNS 690) designed for 250 V ac input.

Appendix C. Optional adapter cards

IBM supports optional adapter cards in the N7000 series models. The N7700 and N7900 support a variety of optional adapter cards. The optional adapter cards are common across all N7000 series models.

The following is the priority order for installing optional adapter cards into the N7700 and N7900:

1. Fibre Channel host bus adapter (HBA) cards (FC 1014, 1015, 1017, 1029, 1032, 1033, 1034, 1035)
2. iSCSI target adapters (FC 1010 and 1011) and Gigabit Ethernet iSCSI target adapters (FC 1021 and 1026)
3. Ethernet network interface cards (FC 1008, 1009, 1012, 1013, 1022, 1023, and 1031)
4. SCSI Ultra320 dual-channel tape adapters (FC 1016 and 1024)

PCI-X Adapters

All N7000 models support the following PCI-X adapters.

Table 19. Optional PCI-X Adapters

Feature Code	Feature Code Description
1008	Single-port 10 Gigabit Ethernet (10 GbE) TOE (optical)
1009	Quad-port Gigabit Ethernet (GbE) TOE (copper)
1010	Dual-port Gigabit Ethernet (GbE) iSCSI target adapter (copper)
1011	Dual-port Gigabit Ethernet (GbE) iSCSI target adapter (optical)
1016	SCSI Ultra320 Dual-Channel tape HBA
1034	SnapMirror over Fibre Channel HBA

For single-node models, the total number of PCI-X adapters cannot exceed three. For dual-node models, the total number of PCI-X adapters cannot exceed six. For dual-node models, adapters must be ordered in pairs, one for each node.

Single-port 10 GbE TOE adapter (FC 1008)

Feature code 1008 is a single-port 10 GbE (10GBASE-SR) fibre short-range (SR) PCI-X adapter with a single LC duplex connector. This adapter supports a maximum distance of 300 meters using 850 nanometer (nm) multi-mode fibre (MMF) media.

For a single-node model (2866-A11, 2867-A11, 2866-G11 and 2867-G11), the maximum number of this adapter is two. For a dual-node model (2866-A21, 2867-A21, 2866-G21 and 2867-G21), the maximum number of this adapter is four.

Since this adapter is a PCI-X adapter, it may only be installed in slots 3 or 9. The slot priority order for this adapter is slot 9, 3. For technical reasons, this TOE adapter is not permitted in slot 4.

Quad-port Gigabit Ethernet TOE adapter (FC 1009)

Feature code 1009 is a quad-port Gigabit Ethernet (1000BASE-T) adapter. The adapter has four copper RJ-45 connections. This adapter supports a maximum distance of 100 meters using Category 5 or better unshielded twisted pair (UTP) four-pair media.

For a single-node model (2866-A11, 2867-A11, 2866-G11 and 2867-G11), the maximum number of this adapter is two. For a dual-node model (2866-A21, 2867-A21, 2866-G21 and 2867-G21), the maximum number of this adapter is four.

Since this adapter is a PCI-X adapter, it may only be installed in slots 3 or 9. The slot priority order for this adapter is slot 9, 3. For technical reasons, this TOE adapter is not permitted in slot 4.

Dual-port GbE iSCSI target adapter (copper) (FC 1010)

Feature code 1010 is a dual-port Gigabit Ethernet iSCSI target adapter. The adapter has two copper RJ-45 connections.

For a single-node model (2866-A11, 2867-A11, 2866-G11 and 2867-G11), the maximum number of this adapter is three. For a dual-node model (2866-A21, 2867-A21, 2866-G21 and 2867-G21), the maximum number of this adapter is six.

Since this adapter is a PCI-X adapter, it may only be installed in slots 3, 4 or 9. The slot priority order for this adapter is 3, 4, 9.

Dual-port GbE iSCSI target adapter (optical) (FC 1011)

Feature code 1011 is a dual-port Gigabit Ethernet iSCSI target adapter. The adapter has two optical LC duplex connectors.

For a single-node model (2866-A11, 2867-A11, 2866-G11 and 2867-G11), the maximum number of this adapter is three. For a dual-node model (2866-A21, 2867-A21, 2866-G21 and 2867-G21), the maximum number of this adapter is six.

Since this adapter is a PCI-X adapter, it may only be installed in slots 3, 4 or 9. The slot priority order for this adapter is 3, 4, 9.

SCSI Ultra320 Dual-Channel LVD tape adapter (FC 1016)

Feature code 1016 is a SCSI Ultra320 dual-channel LVD adapter. This adapter contains two 68-pin VHDCI external connectors (Channel A and Channel B) and two 68-pin VHDCI internal connectors (Channel A and Channel B). Customers are only expected to use the two external connectors.

This feature code includes two SCSI LVD two-meter cables for attaching tape devices to this SCSI HBA. Each cable has two 68-pin VHDCI connectors, one at each end.

For the single-node models (2866-A11, 2867-A11, 2866-G11 and 2867-G11) the maximum number of this adapter is three. For the dual-node models (2866-A21, 2867-A21, 2866-G21 and 2867-G21) the maximum number of this adapter is six.

Since this adapter is a PCI-X adapter, it may only be installed in slots 3, 4 or 9. The slot priority order for this adapter is 4, 9, 3.

SnapMirror over Fibre Channel HBA (FC 1034)

Feature code 1034 is a 4-Gbps PCI-X card used to support SnapMirror over Fibre Channel.

For single-node models, the maximum number of this adapter is two. For dual-node models, the maximum number of this adapter is four.

Since this adapter is a PCI-X adapter, it may only be installed in slots 3, 4 or 9. The slot priority order for this adapter is 3, 4, 9.

Note: This feature requires Data ONTAP 7.2.2 or later.

PCI-Express (PCIe) adapters

N7000 series models support the following PCIe adapters.

Table 20. Optional PCIe adapters

Feature Code	Feature Code Description
1012	Dual-port Gigabit Ethernet adapter (optical)
1013	Dual-port 10/100/1000 Ethernet adapter (copper)
1014	Dual-port 4-Gbps Fibre Channel HBA for disk attachment
1015	Dual-port 4-Gbps Fibre Channel HBA for tape attachment
1017	Dual-port 4-Gbps Fibre Channel target HBA
1021	Dual-port GbE iSCSI target adapter (optical)
1022	Quad-port GbE Ethernet TOE adapter (copper)

Table 20. Optional PCIe adapters (continued)

Feature Code	Feature Code Description
1023	Quad-port GbE Ethernet adapter (copper)
1024	Dual-port SCSI Ultra320 HBA for tape attachment
1026	Dual-port Gigabit Ethernet iSCSI target adapter (copper)
1029	Quad-port 4-Gbps Fibre Channel HBA for disk attachment
1031	Dual-port 10 GbE Ethernet adapter
1032	Dual-port MetroCluster VI HBA (A21/G21 models only)
1033	SnapMirror over Fibre Channel HBA
1035	Quad-port 4-Gbps Fibre Channel HBA for tape and disk attachment

For the single-node models, the total number of PCIe adapters cannot exceed five. For the dual-node models, the total number of PCIe adapters cannot exceed ten.

Dual-port Gigabit Ethernet (GbE) adapter (optical) (FC 1012)

Feature code 1012 is a dual-port Gigabit Ethernet (1000BASE-SX) adapter. This adapter has two LC duplex connectors and supports a maximum distance of 275m using 62.5-micron MMF media and 550 meters using 50-micron MMF media.

For a single-node model (2866-A11, 2867-A11, 2866-G11 and 2867-G11), the maximum number of this adapter is five. For a dual-node model (2866-A21, 2867-A21, 2866-G21 and 2867-G21), the maximum number of this adapter is ten.

This adapter is a PCIe adapter and it may only be installed in slots 1, 2, 5, 6, 7, and 8. For a single node configuration, the slot priority order for this adapter is 5, 6, 7, 8, 1. For a dual-node configuration, the slot priority order is 5, 6, 7, 8, 2.

Dual-port 10/100/1000 Ethernet adapter (copper) (FC 1013)

Feature code 1013 is a dual-port 10/100/1000 Ethernet adapter. This adapter supports 10BASE-T, 100BASE-TX and 1000BASE-T Ethernet standards. This adapter has two RJ-45 connectors and supports a maximum distance of 100 meters using Category 5 or better UTP four-pair media.

For a single-node model (2866-A11, 2867-A11, 2866-G11 and 2867-G11), the maximum number of this adapter is five. For a dual-node model (2866-A21, 2867-A21, 2866-G21 and 2867-G21), the maximum number of this adapter is ten.

This adapter is a PCIe adapter and it may only be installed in slots 1, 2, 5, 6, 7, and 8. For a single node configuration, the slot priority order for this adapter is 5, 6, 7, 8, 1. For a dual-node configuration, the slot priority order is 5, 6, 7, 8, 2.

Dual-port 4-Gbps Fibre Channel HBA for disk attachment (FC 1014)

Feature code 1014 is a dual-port 4-Gbps Fibre Channel HBA. This adapter auto-negotiates to 4, 2 and 1 Gbps. This adapter may only be used for attaching "back-end" storage expansion units (EXN1000, EXN2000, and EXN4000). The Fibre Channel ports on this adapter may NOT be used as FCP target ports.

This adapter has two small form factor (SFF) multi-mode optics with LC-style connectors. This adapter supports the following maximum cable lengths.

Table 21. Dual-port 4-Gbps Fibre Channel HBA for disk (FC 1014) - maximum cable lengths

Link operating speed	50 micron multi-mode fibre	62.5 micron multi-mode fibre
1 Gbps	500 meters	300 meters
2 Gbps	300 meters	150 meters
4 Gbps	150 meters	70 meters

For a single-node model (2866-A11, 2867-A11, 2866-G11 and 2867-G11), the maximum number of this adapter is four. For a dual-node model (2866-A21, 2867-A21, 2866-G21 and 2867-G21), the maximum number of this adapter is eight.

This adapter is a PCIe adapter and it may only be installed in slots 1, 2, 5, 6, 7, and 8. For a single node configuration, the slot priority order for this adapter is 5, 6, 7, 8, 1. For a dual-node configuration, the slot priority order is 5, 6, 7, 8, 2.

Dual-port 4-Gbps Fibre Channel HBA for tape attachment (FC 1015)

Feature code 1015 is a dual-port 4-Gbps Fibre Channel HBA for tape attachment. This adapter auto-negotiates to 4, 2 and 1 Gbps.

This adapter has two SFF multi-mode optics with LC-style connectors. This adapter supports the following maximum cable lengths.

Table 22. Dual-port 4-Gbps Fibre Channel HBA for tape (FC 1015) - maximum cable lengths

Link operating speed	50 micron multi-mode fibre	62.5 micron multi-mode fibre
1 Gbps	500 meters	300 meters
2 Gbps	300 meters	150 meters
4 Gbps	150 meters	70 meters

For a single-node model (2866-A11, 2867-A11, 2866-G11 and 2867-G11), the maximum number of this adapter is three. For a dual-node model (2866-A21, 2867-A21, 2866-G21 and 2867-G21), the maximum number of this adapter is six.

This adapter is a PCIe adapter and it may only be installed in slots 1, 2, 5, 6, 7, and 8. For a single node configuration, the slot priority order for this adapter is 5, 6, 7, 8, 1. For a dual-node configuration, the slot priority order is 5, 6, 7, 8, 2.

This feature code will include a 50-micron optical loopback cable with LC connectors.

Dual-port 4-Gbps Fibre Channel target HBA (FC 1017)

Feature code 1017 is a dual-port 4-Gbps Fibre Channel HBA for FCP target ports. This adapter auto-negotiates to 4, 2 and 1 Gbps. This adapter is used for providing two additional 4-Gbps FCP target ports. It is *not* used for attaching storage expansion units.

This adapter has two SFF multi-mode optics with LC-style connectors. This adapter supports the following maximum cable lengths.

Table 23. Dual-port 4-Gbps Fibre Channel target HBA (FC 1017) - maximum cable lengths

Link operating speed	50 micron multi-mode fibre	62.5 micron multi-mode fibre
1 Gbps	500 meters	300 meters
2 Gbps	300 meters	150 meters
4 Gbps	150 meters	70 meters

For the single-node model (2866-A11, 2867-A11, 2866-G11 and 2867-G11) the maximum number of this adapter is four. For the dual-node model (2866-A21, 2867-A21, 2866-G21 and 2867-G21) the maximum number of this adapter is eight.

This adapter is a PCIe adapter and it may only be installed in slots 1, 2, 5, 6, 7, and 8. For a single node configuration, the slot priority order for this adapter is 5, 6, 7, 8, 1. For a dual-node configuration, the slot priority order is 5, 6, 7, 8, 2.

Dual-port GbE iSCSI target adapter (optical) (FC 1021)

Feature code 1021 is a Gigabit Ethernet iSCSI PCIe TCP/IP offload engine (TOE) adapter that provides two optical LC duplex connectors for connection to iSCSI hosts.

For single-node models (2866/2867-A11/G11), the maximum number of this adapter is five. For dual-node models (2866/2867-A21/G21), the maximum number of this adapter is ten.

This adapter is a PCIe adapter and it may only be installed in slots 1, 2, 5, 6, 7, and 8. For a single node configuration, the slot priority order for this adapter is 5, 6, 7, 8, 1. For a dual-node configuration, the slot priority order is 5, 6, 7, 8, 2.

Quad-port GbE Ethernet TOE adapter (copper) (FC 1022)

Feature code 1022 is a quad-port 10/100/1000 Ethernet TOE adapter.

For single-node models (2866/2867-A11/G11), the maximum number of this adapter is three. For dual-node models (2866/2867-A21/G21), the maximum number of this adapter is six.

This adapter is a PCIe adapter and it may only be installed in slots 1, 2, 5, 6, 7, and 8. For a single node configuration, the slot priority order for this adapter is 5, 6, 7, 8, 1. For a dual-node configuration, the slot priority order is 5, 6, 7, 8, 2.

Quad-port GbE Ethernet adapter (copper) (FC 1023)

Feature code 1023 is a 10/100/1000 Ethernet (10Base-T, 100Base-TX, and 1000Base-T) PCIe feature that provides four RJ-45 connectors. The maximum supported distance is 100 meters using Category 5, or better, unshielded twisted pair (UTP) four-pair media.

For the single-node model (2866-A11, 2867-A11, 2866-G11 and 2867-G11) the maximum number of this adapter is five. For the dual-node model (2866-A21, 2867-A21, 2866-G21 and 2867-G21) the maximum number of this adapter is ten.

This adapter is a PCIe adapter and it may only be installed in slots 1, 2, 5, 6, 7, and 8. For a single node configuration, the slot priority order for this adapter is 5, 6, 7, 8, 1. For a dual-node configuration, the slot priority order is 5, 6, 7, 8, 2.

SCSI Ultra320 HBA for tape attachment (FC 1024)

Feature code 1024 is a SCSI Ultra320 dual-channel host bus adapter (HBA) designed to support connection to a tape device. The adapter includes two 68-pin VHDCI external connectors (Channel A and Channel B). Two SCSI LVD two-meter cables (for connecting to the tape device) are included. These cables have 68-pin VHDCI connectors on each end.

For a single-node model (2866-A11, 2867-A11, 2866-G11 and 2867-G11), the maximum number of this adapter is three. For a dual-node model (2866-A21, 2867-A21, 2866-G21 and 2867-G21), the maximum number of this adapter is six.

This adapter is a PCIe adapter and it may only be installed in slots 1, 2, 5, 6, 7, and 8. For a single node configuration, the slot priority order for this adapter is 5, 6, 7, 8, 1. For a dual-node configuration, the slot priority order is 5, 6, 7, 8, 2.

Dual-port Gigabit Ethernet iSCSI target adapter (copper) (FC 1026)

Feature code 1026 is a gigabit Ethernet iSCSI target PCIe adapter that provides two Ethernet iSCSI ports to be configured as target connections for iSCSI hosts.

For the single-node model (2866-A11, 2867-A11, 2866-G11 and 2867-G11) the maximum number of this adapter is five. For the dual-node model (2866-A21, 2867-A21, 2866-G21 and 2867-G21) the maximum number of this adapter is ten.

This adapter is a PCIe adapter and it may only be installed in slots 1, 2, 5, 6, 7, and 8. For a single node configuration, the slot priority order for this adapter is 5, 6, 7, 8, 1. For a dual-node configuration, the slot priority order is 5, 6, 7, 8, 2.

Quad-port 4-Gbps Fibre Channel HBA for disk attachment (FC 1029)

Feature code 1029 is a PCIe quad-port 4-Gbps HBA for attaching disk expansion units (EXN1000, EXN2000, and EXN4000) to N series storage controllers. This adapter auto-negotiates connections of 1-Gbps, 2-Gbps, or 4-Gbps. Four small form factor (SFF) multimode optical ports with LC connectors support the following cable lengths:

Table 24. Quad-port 4-Gbps Fibre Channel HBA for disk attachment (FC 1029) - maximum cable lengths

Link operating speed	50 micron multi-mode fibre	62.5 micron multi-mode fibre
1 Gbps	500 meters	300 meters
2 Gbps	300 meters	150 meters

Table 24. Quad-port 4-Gbps Fibre Channel HBA for disk attachment (FC 1029) - maximum cable lengths (continued)

Link operating speed	50 micron multi-mode fibre	62.5 micron multi-mode fibre
4 Gbps	150 meters	70 meters

The ports of this adapter may not be used as FCP target ports.

For the single-node model (2866/2867-A11) the maximum number of this adapter is five. For the dual-node model (2866/2867-A21) the maximum number of this adapter is ten.

This adapter is a PCIe adapter and it may only be installed in slots 1, 2, 5, 6, 7, and 8. For a single-node configuration, the slot priority order is 5, 6, 7, 8, 1. For a dual-node configuration, the slot priority order is 5, 6, 7, 8, 2.

Dual-port 10 GbE Ethernet adapter (FC 1031)

Feature code 1031 is a 10-Gb Ethernet PCIe TOE adapter feature that provides dual LC duplex connectors. It supports a maximum distance of 300 meters using 850-nanometer (nm) multimode fiber (MMF) media.

For the single-node model (2866-A11, 2867-A11, 2866-G11 and 2867-G11) the maximum number of this adapter is five. For the dual-node model (2866-A21, 2867-A21, 2866-G21 and 2867-G21) the maximum number of this adapter is ten.

This adapter is a PCIe adapter and it may only be installed in slots 1, 2, 5, 6, 7, and 8. For a single node configuration, the slot priority order for this adapter is 5, 6, 7, 8, 1. For a dual-node configuration, the slot priority order is 5, 6, 7, 8, 2.

Note: This feature requires Data ONTAP 7.2.3 or later.

Dual-port MetroCluster VI HBA (Models A21/G21 only) (FC 1032)

Feature code 1032 is used for fabric MetroCluster installations only. It is required by MetroCluster. In a fabric MetroCluster configuration, the MetroCluster Remote advanced function authorization and IBM 2005-16B Fibre Channel switches are required. In a fabric MetroCluster configuration, the cluster interconnect traffic is carried across the Fibre Channel SAN via this adapter instead of across the normal Infiniband (IB) cluster interconnect cables.

In a fabric MetroCluster configuration (2866/2867-A21/G21), two of these adapter cards must be ordered (one for each node of a dual-node cluster).

This adapter must be installed in slot 1.

Note: This feature requires Data ONTAP 7.2.3 or later.

SnapMirror over Fibre Channel HBA (FC 1033)

Feature code 1033 is a 4-Gbps PCIe card used to support SnapMirror over Fibre Channel.

For single-node models, the maximum number of this adapter is two. For dual-node models, the maximum number of this adapter is four.

This adapter is a PCIe adapter and it may only be installed in slots 5, 6, 7, and 8. For a single-node configuration, the slot priority order is 5, 6, 7, 8. For a dual-node configuration, the slot priority order is 5, 6, 7, 8.

Note: This feature requires Data ONTAP 7.2.2 or later.

Quad-port 4-Gbps Fibre Channel HBA for tape and disk attachment (FC 1035)

Feature code 1035 is a PCIe quad-port 4-Gbps HBA for attaching tape and disk expansion units (EXN1000, EXN2000, and EXN4000) to N series storage controllers. This adapter auto-negotiates connections of 1-Gbps, 2-Gbps, or 4-Gbps. Four small form factor (SFF) multimode optical ports with LC connectors support the following cable lengths:

Table 25. Quad-port 4-Gbps Fibre Channel HBA for tape and disk attachment (FC 1035) - maximum cable lengths

Link operating speed	50 micron multi-mode fibre	62.5 micron multi-mode fibre
1 Gbps	500 meters	300 meters
2 Gbps	300 meters	150 meters
4 Gbps	150 meters	70 meters

The ports of this adapter may not be used as FCP target ports.

For the single-node model (2866/2867-A11) the maximum number of this adapter is five. For the dual-node model (2866/2867-A21) the maximum number of this adapter is ten.

This adapter is a PCIe adapter and it may only be installed in slots 1, 2, 5, 6, 7, and 8. For a single-node configuration, the slot priority order is 5, 6, 7, 8, 1. For a dual-node configuration, the slot priority order is 5, 6, 7, 8, 2.

Appendix D. IBM System Storage N series documentation

The following lists present an overview of the IBM System Storage N series hardware and Data ONTAP product libraries, as well as other related documents.

You can access the documents listed in these tables at the following Web site:

www.ibm.com/storage/support/nas/

N7000 series systems library

- *IBM System Storage N7000 Series Hardware and Service Guide*, GC26-7953
- *IBM System Storage N7000 Series Filer Installation and Setup Instructions*, GC26-7954
- *IBM System Storage N7000 Series Gateway Installation and Setup Instructions*, GC26-7956

N5000 series systems library

- *IBM System Storage N5000 Series Hardware and Service Guide*, GC26-7785
- *IBM System Storage N5000 Series Filer Installation and Setup Instructions*, GC26-7784
- *IBM System Storage N5000 Series Gateway Installation and Setup Instructions*, GC26-7838

N3300 and N3600 storage systems library

- *IBM System Storage N3300 and N3600 Hardware and Service Guide*, GC27-2087
- *IBM System Storage N3300 Installation and Setup Instructions*, GC27-2086
- *IBM System Storage N3600 Installation and Setup Instructions*, GC27-2089

N3700 storage system library

- *IBM System Storage N3700 Hardware and Service Guide*, GA32-0515
- *IBM System Storage N3700 Installation and Setup Instructions*, GA32-0517

EXN1000, EXN2000 and EXN4000 expansion units library

- *IBM System Storage EXN1000 Storage Expansion Unit Hardware and Service Guide*, GC26-7802
- *IBM System Storage EXN1000 Installation and Setup Instructions*, GC26-7786
- *IBM System Storage EXN2000 Storage Expansion Unit Hardware and Service Guide*, GA32-0516
- *IBM System Storage EXN2000 Installation and Setup Instructions*, GC27-2064
- *IBM System Storage EXN4000 Storage Expansion Unit Hardware and Service Guide*, GC27-2080
- *IBM System Storage EXN4000 Installation and Setup Instructions*, GC27-2079

Data ONTAP 7.2 filer library

- *IBM System Storage N series Data ONTAP 7.2.x Release Notes*, GC26-7963
- *IBM System Storage N series Data ONTAP 7.2 Active-Active Configuration Guide*, GC26-7964
- *IBM System Storage N series Data ONTAP 7.2 File Access and Protocols Management Guide*, GC26-7965
- *IBM System Storage N series Data ONTAP 7.2 Storage Management Guide*, GC26-7966
- *IBM System Storage N series Data ONTAP 7.2 Data Protection Online Backup and Recovery Guide*, GC26-7967
- *IBM System Storage N series Data ONTAP 7.2 Data Protection Tape Backup and Recovery Guide*, GC26-7968
- *IBM System Storage N series Data ONTAP 7.2 MultiStore Management Guide*, GC26-7969
- *IBM System Storage N series Data ONTAP 7.2 Network Management Guide*, GC26-7970
- *IBM System Storage N series Data ONTAP 7.2 Commands: Manual Page Reference, Volume 1*, GC26-7971
- *IBM System Storage N series Data ONTAP 7.2 Commands: Manual Page Reference, Volume 2*, GC26-7972
- *IBM System Storage N series Data ONTAP 7.2 Upgrade Guide*, GC26-7976
- *IBM System Storage N series Data ONTAP 7.2 Block Access Management Guide for iSCSI & FCP*, GC26-7973
- *IBM System Storage N series Data ONTAP 7.2 System Administration Guide*, GC26-7974
- *IBM System Storage N series Data ONTAP 7.2 Software Setup Guide*, GC26-7975
- *IBM System Storage N series Data ONTAP 7.2 Core Commands Quick Reference*, GC26-7977

Data ONTAP 7.1 filer library

- *IBM System Storage N series Data ONTAP 7.1.x Release Notes*, GC26-7862
- *IBM System Storage N series Data ONTAP 7.1 Cluster Installation and Management Guide*, GC26-7790
- *IBM System Storage N series Data ONTAP 7.1 File Access and Protocols Management Guide*, GA32-0520
- *IBM System Storage N series Data ONTAP 7.1 Storage Management Guide*, GA32-0521
- *IBM System Storage N series Data ONTAP 7.1 Data Protection Online Backup and Recovery Guide*, GA32-0522
- *IBM System Storage N series Data ONTAP 7.1 Data Protection Tape Backup and Recovery Guide*, GA32-0523
- *IBM System Storage N series Data ONTAP 7.1 MultiStore Management Guide*, GA32-0524
- *IBM System Storage N series Data ONTAP 7.1 Network Management Guide*, GA32-0525
- *IBM System Storage N series Data ONTAP 7.1 Commands: Manual Page Reference, Volume 1*, GA32-0526
- *IBM System Storage N series Data ONTAP 7.1 Commands: Manual Page Reference, Volume 2*, GA32-0527
- *IBM System Storage N series Data ONTAP 7.1 Upgrade Guide*, GC26-7791
- *IBM System Storage N series Data ONTAP 7.1 Block Access Management Guide for iSCSI and FCP*, GA32-0528
- *IBM System Storage N series Data ONTAP 7.1 System Administration Guide*, GA32-0529
- *IBM System Storage N series Data ONTAP 7.1 Software Setup Guide*, GA32-0530
- *IBM System Storage N series Data ONTAP 7.1 Core Commands Quick Reference*, GA32-0531

Data ONTAP 7.2 gateway systems library

- *IBM System Storage N series Data ONTAP 7.2.x Gateway Release Notes*, GC26-7955
- *IBM System Storage N series Data ONTAP 7.2 Gateway Software Setup, Installation, and Management Guide*, GC26-7962
- *IBM System Storage N series Data ONTAP 7.2 Gateway Connecting Your System*, GC26-7990
- *IBM System Storage N series Data ONTAP 7.2 Gateway Planning Guide*, GC26-7957

- *IBM System Storage N series Data ONTAP 7.2 Gateway Upgrade Guide*, GC26-7958
- *IBM System Storage N series Data ONTAP 7.2 Gateway Installation Requirements, Quick Start, and Reference Guide*, GC27-2092
- *IBM System Storage N series Data ONTAP 7.2 Gateway Metrocluster Guide*, GC27-2091
- *IBM System Storage N series Data ONTAP 7.2 Gateway Implementation Guide for IBM Storage*, GC26-7959
- *IBM System Storage N series Gateway Data ONTAP 7.2 Implementation Guide for IBM SAN Volume Controller Storage*, GC27-2061
- *IBM System Storage N series Data ONTAP 7.2 Gateway Implementation Guide for Hitachi Storage*, GC26-7960
- *IBM System Storage N series Data ONTAP 7.2 Gateway Implementation Guide for HP XP Storage*, GC26-7961
- *IBM System Storage N series Data ONTAP 7.2 Gateway Implementation Guide for HP EVA*, GC27-2093
- *IBM System Storage N series Data ONTAP 7.2 Gateway Implementation Guide for EMC CLARiiON Storage*, GC27-2081
- *IBM System Storage N series Data ONTAP 7.2 Gateway Implementation Guide for EMC Symmetrix Storage*, GC27-2094
- *IBM System Storage N series Data ONTAP 7.2 Gateway Implementation Guide for 3PAR Storage*, GC27-2090
- *IBM System Storage N series Data ONTAP 7.2 Gateway Implementation Guide for Fujitsu ETERNUS Storage*, GC27-2082

Data ONTAP 7.1 gateway systems library

- *IBM System Storage N series Gateway Planning Guide*, GC26-7839
- *IBM System Storage N series Gateway Integration Guide for IBM Storage*, GC26-7840
- *IBM System Storage N series Gateway Integration Guide for Hitachi Storage*, GC26-7841
- *IBM System Storage N series Gateway Integration Guide for HP Storage*, GC26-7858
- *IBM System Storage N series Gateway Software Upgrade Guide*, GC26-7859
- *IBM System Storage N series Gateway Software Setup, Installation, and Management Guide*, GC26-7886
- *IBM System Storage N series Gateway 7.1.x Release Notes*, GC26-7837

Other N series and N series-related documents

- *IBM System Storage N Series Platform Monitoring Guide*, GC27-2088 (previously called the *IBM System Storage N series Error Messages and Troubleshooting Guide*, GC26-7984)
- *IBM System Storage N series Diagnostics Guide*, GC26-7789
- *IBM System Storage N series Introduction and Planning Guide*, GA32-0543
- *IBM System Storage N series AutoSupport Overview*, GC26-7854
- *IBM System Storage N series: Changing the cluster cfmode Setting in Fibre Channel SAN Configurations*, GC26-7876
- *IBM System Storage N series Fibre Channel and iSCSI Configuration Guide*, SG24-7496
- *IBM System Storage N series MetroCluster Redbook*, REDP-4243-00
- *IBM System Storage Systems Safety Notices*, G229-9054
- *IBM Storage Solution Rack 2101 Rack Installation and Service Guide: Models 200 and N00*, GC26-7993

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CD-ROM drive speeds list the variable read rate. Actual speeds vary and are often less than the maximum possible.

When referring to processor storage, real and virtual storage, or channel volume, KB stands for approximately 1000 bytes, MB stands for approximately 1 000 000 bytes, and GB stands for approximately 1 000 000 000 bytes.

When referring to hard disk drive capacity or communications volume, MB stands for 1 000 000 bytes, and GB stands for 1 000 000 000 bytes. Total user-accessible capacity may vary depending on operating environments.

Maximum internal hard disk drive capacities assume the replacement of any standard hard disk drives and population of all hard disk drive bays with the largest currently supported drives available from IBM.

Maximum memory may require replacement of the standard memory with an optional memory module.

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Some software may differ from its retail version (if available), and may not include user manuals or all program functionality.

Attention: In compliance with the GNU General Public License (GPL), Version 2, June 1991, a complete machine-readable copy of the source code for the relevant source code portions of the Remote LAN Module (RLM) Firmware that are covered by the GPL, is available from http://now.netapp.com.

Electronic emission notices

The following statements apply to this product. The statements for other products intended for use with this product will appear in their accompanying manuals.

Federal Communications Commission (FCC) Class A Statement

Note: 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 his own expense.

Properly shielded and grounded cables and connectors must be used in order to meet FCC emission limits. IBM is not responsible for any radio or television interference caused by using other than recommended cables and connectors

or by unauthorized changes or modifications to this equipment. Unauthorized changes or modifications could void the user's authority to operate the equipment.

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Industry Canada Class A Emission Compliance Statement

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

Avis de conformité à la réglementation d'Industrie Canada

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

European Union (EU) Electromagnetic Compatibility Directive

This product is in conformity with the protection requirements of EU Council Directive 2004/108/EC on the approximation of the laws of the Member States relating to electromagnetic compatibility. IBM cannot accept responsibility for any failure to satisfy the protection requirements resulting from a non-recommended modification of the product, including the fitting of non-IBM option cards.

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Attention: 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.

Properly shielded and grounded cables and connectors must be used in order to reduce the potential for causing interference to radio and TV communications and to other electrical or electronic equipment. Such cables and connectors are available from IBM authorized dealers. IBM cannot accept responsibility for any interference caused by using other than recommended cables and connectors.

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Pascalstr. 100, Stuttgart, Germany 70569
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e-mail: tjahn@de.ibm.com

Australia and New Zealand Class A statement

Attention: 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.

Germany Electromagnetic Compatibility Directive

Deutschsprachiger EU Hinweis:

Hinweis für Geräte der Klasse A EU-Richtlinie zur Elektromagnetischen Verträglichkeit

Dieses Produkt entspricht den Schutzanforderungen der EU-Richtlinie 2004/108/EG zur Angleichung der Rechtsvorschriften über die elektromagnetische Verträglichkeit in den EU-Mitgliedsstaaten und hält die Grenzwerte der EN 55022 Klasse A ein.

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Deutschland: Einhaltung des Gesetzes über die elektromagnetische Verträglichkeit von Geräten

Dieses Produkt entspricht dem "Gesetz über die elektromagnetische Verträglichkeit von Geräten (EMVG)." Dies ist die Umsetzung der EU-Richtlinie 2004/108/EG in der Bundesrepublik Deutschland.

Zulassungsbescheinigung laut dem Deutschen Gesetz über die elektromagnetische Verträglichkeit von Geräten (EMVG) (bzw. der EMC EG Richtlinie 2004/108/EG) für Geräte der Klasse A

Dieses Gerät ist berechtigt, in übereinstimmung mit dem Deutschen EMVG das EG-Konformitätszeichen - CE - zu führen.

Verantwortlich für die Konformitätserklärung des EMVG ist die IBM Deutschland GmbH, 70548 Stuttgart.

Generelle Informationen:

Das Gerät erfüllt die Schutzanforderungen nach EN 55024 und EN 55022 Klasse A.

People's Republic of China Class A Electronic Emission Statement

中华人民共和国“A类”警告声明

声 明

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Power cords

For your safety, IBM provides a power cord with a grounded attachment plug to use with this IBM product. To avoid electrical shock, always use the power cord and plug with a properly grounded outlet.

IBM power cords used in the United States and Canada are listed by Underwriter's Laboratories (UL) and certified by the Canadian Standards Association (CSA).

For units intended to be operated at 115 volts: Use a UL-listed and CSA-certified cord set consisting of a minimum 18 AWG, Type SVT or SJT, three-conductor cord, a maximum of 15 feet in length and a parallel blade, grounding-type attachment plug rated 15 amperes, 125 volts.

For units intended to be operated at 230 volts (U.S. use): Use a UL-listed and CSA-certified cord set consisting of a minimum 18 AWG, Type SVT or SJT, three-conductor cord, a maximum of 15 feet in length and a tandem blade, grounding-type attachment plug rated 15 amperes, 250 volts.

For units intended to be operated at 230 volts (outside the U.S.): Use a cord set with a grounding-type attachment plug. The cord set should have the appropriate safety approvals for the country in which the equipment will be installed.

IBM power cords for a specific country or region are usually available only in that country or region.

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IBM System Storage
N7000 Series Hardware and Service Guide

Publication No. GC26-7953-04

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