IBM System Storage

N5000 Series Hardware and Service Guide

GC26-7785-06

IBM System Storage

N5000 Series Hardware and Service Guide

GC26-7785-06

Note:
Before using this information and the product it supports, be sure to read the general information in "Notices" on page 105.

The following paragraph does not apply to any country (or region) where such provisions are inconsistent with local law.

INTERNATIONAL BUSINESS MACHINES CORPORATION PROVIDES THIS PUBLICATION "AS IS" WITHOUT WARRANTY OF ANY KIND, EITHER EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. Some states (or regions) do not allow disclaimer of express or implied warranties in certain transactions; therefore, this statement may not apply to you.

Order publications through your IBM representative or the IBM branch office serving your locality.

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

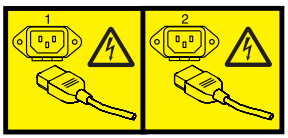
As an added precaution, safety labels are often installed directly on products or product components to warn of potential hazards.

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 cluster (active-active) 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.**

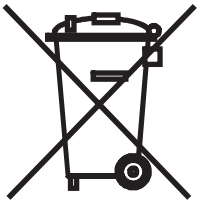
(R002)

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/prp.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/prp.shtml.



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

This appliance is 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 California:

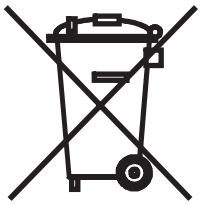
Perchlorate Material - special handling may apply. See www.dtsc.ca.gov/hazardouswaste/perchlorate.

The foregoing notice is provided in accordance with California Code of Regulations Title 22, Division 4.5 Chapter 33. Best Management Practices for Perchlorate Materials. This product/part may include a lithium manganese dioxide battery which contains a perchlorate substance.

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 the following IBM System Storage™ N5000 series systems:

- N5200 (model numbers 2864-A10, 2864-A20, 2864-G10, and 2864-G20)
- N5300 (model numbers 2869-A10, 2869-A20, 2869-G10, and 2869-G20)
- N5500 (model numbers 2865-A10, 2865-A20, 2865-G10, and 2865-G20)
- N5600 (model numbers 2868-A10, 2868-A20, 2868-G10, and 2868-G20)

Note: Throughout this document, the N5200, N5300, N5500 and N5600 systems are referred to generically as *N5000 series systems* unless information applies only to a specific product, in which case the specific machine name is used.

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 Error Messages and Troubleshooting Guide*.

Compliance ID 2864-NAS covers MT/models 2864-A10, 2864-A20, 2864-G10, and 2864-G20. Compliance ID 2865-NAS covers MT/models 2865-A10, 2865-A20, 2865-G10, and 2865-G20. Compliance ID 2868-NAS covers MT/models 2868-A10, 2868-A20, 2868-G10, and 2868-G20. Compliance ID 2869-NAS covers MT/models 2869-A10, 2869-A20, 2869-G10, and 2869-G20.

Who should read this document

This guide is for qualified system administrators and service personnel who are familiar with IBM storage systems. This document is for customer use. It addresses setup, operation, and servicing of the 2864, 2865, 2868, and 2869 models A10/A20/G10/G20. 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 N5000 series system," on page 11 describes how to connect an N5000 series system.
- Chapter 3, "Configuring an N5000 series system," on page 21 describes how to configure an N5000 series system.
- Chapter 4, "Monitoring your system," on page 25 describes how to monitor your system based on the LEDs for your N5000 series system.
- Chapter 5, "Replacing N5000 series system devices," on page 37 describes how to replace devices in your N5000 series system.
- Appendix A, "Recommended power line sizes," on page 79 discusses how to determine the power line lengths running from your N5000 series system 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 N5000 series systems.
- Appendix C, "Optional adapter cards (N5200 and N5500)," on page 85 describes the optional adapter cards supported for N5200 and N5500 systems.
- Appendix D, "Optional adapter cards (N5300 and N5600)," on page 93 describes the optional adapter cards supported for N5300 and N5600 systems.
- Appendix E, "IBM System Storage N series documentation," on page 99 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/storage/support/nas/

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.

Conventions and terminology 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 systems (such as the N5200, N5300, N5500, and N5600 A-10 and A-20) that either contain internal disk storage or attach to the disk storage expansion units specifically designed for the IBM N series 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 is intended to attach to a gateway.

The term *gateway* describes IBM N series models 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:

- *AT-FCX* refers to the controller module of the serial advanced technology attachment (SATA) storage expansion unit (EXN1000).
- *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.
- *Device carrier* refers to the container that encases a fan/power supply unit or a disk.
- *Disk* applies to any hard disk drive.
- *ESH2* refers to the controller module of the fibre-channel disk storage expansion unit (EXN2000).
- *ESH4* refers to the controller module of the fibre-channel disk storage expansion unit (EXN4000).
- *Loop* refers to one or more daisy-chained expansion units connected to a filer.
- *Motherboard tray* refers to the system controller module that executes the software on an N5000 series system. The motherboard tray is at the rear-right of the N5000 series system.
- *Node* refers to a chassis. There is one node in the A10/G10 models; there are two nodes in the A20/G20 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 N5000 series 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* for your N5000 series system and expansion unit
- *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 Cluster Installation and Management Guide* or *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

CAUTION:
The N5000 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

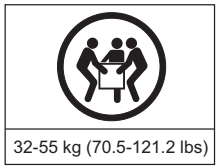
This section identifies the shipment contents and the rules and regulations you need to observe for the proper installation of your N5000 series system. It also provides an overview of the entire system installation process and the appropriate documentation references for the procedures.

For detailed information, see the following topics:

- "Hardware specifications" on page 3
- "Checking shipment package contents" on page 6
- "Rules for installing the system in a rack" on page 7
- "Guide to the installation process " on page 8

Hardware specifications

The following table lists 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. N5000 series physical characteristics and environmental requirements

Physical characteristics		
Weight	2864-A10, 2864-G10, 2865-A10, 2865-G10, 2868-A10, 2868-G10, 2869-A10, 2869-G10	75 lbs (34 kg)
	2864-A20, 2864-G20, 2865-A20, 2865-G20, 2868-A20, 2868-G20, 2869-A20, 2869-G20	150 lbs (68 kg)
Rack units	2864-A10, 2864-G10, 2865-A10, 2865-G10, 2868-A10, 2868-G10, 2869-A10, 2869-G10	3U
	2864-A20, 2864-G20, 2865-A20, 2865-G20, 2868-A20, 2868-G20, 2869-A20, 2869-G20	6U
Height	2864-A10, 2864-G10, 2865-A10, 2865-G10, 2868-A10, 2868-G10, 2869-A10, 2869-G10	5.12 in. (13 cm)
	2864-A20, 2864-G20, 2865-A20, 2865-G20, 2868-A20, 2868-G20, 2869-A20, 2869-G20	10.6 in. (26 cm)
Width		17.7 in. (44.9 cm)
Depth		61 cm (24 in) without cable management tray 76.2 cm (30 in) with cable management tray

Table 1. N5000 series physical characteristics and environmental requirements (continued)

Clearance dimensions		
Front-cooling	All versions	6 in. (15.3 cm)
Rear-cooling	All versions	12 in. (30.5 cm)
Rear-maintenance	All versions	12 in. (30.5 cm)
Environmental requirements **Note:** Operating at the extremes of the following environmental requirements might increase the risk of device failure.		
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 65° F (-40° C to 65° C)
Relative humidity		5 to 95% noncondensing
Recommended operating temperature relative humidity range		40 to 55%
Maximum wet bulb temperature		28° C (82° F)
Maximum altitude		3050 m (10,000 ft.)
Acoustic level		54 dBA @ 23° C 5.4 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. N5200 electrical requirements

Input voltage	**100 to 120V**		**200 to 240V**		**-40 to -60V**	
	Worst-case	Typical single PSU/ system	Worst-case	Typical single PSU/ system	Worst-case	Typical single PSU/ system
Input current measured, A	3.39	1.2/2.4	1.77	0.71/1.40	8.2	2.85/5.70
Input power measured, W	336	118/236	329	115/229	328	113/226

Table 2. N5200 electrical requirements (continued)

Input voltage	**100 to 120V**		**200 to 240V**		**-40 to -60V**	
Thermal dissipation, BTU/hr	1144	402.5/805	1122	392/783	1118	286/771
Inrush peak, A	38	37	40	40	n/a	n/a
Maximum electrical power	10 A		5 A		n/a	n/a
Input power frequency, Hz	50 to 60				n/a	n/a

Table 3. N5300 electrical requirements

Input voltage	**100 to 120V**		**200 to 240V**		**-40 to -60V**	
	Worst-case	Typical single PSU/ system	Worst-case	Typical single PSU/ system	Worst-case	Typical single PSU/ system
Input current measured, A	3.66	1.7/3.4	1.9	0.95/1.9	7.94	3.7/7.4
Input power measured, W	363	169/228	358	165/330	318	148/296
Thermal dissipation, BTU/hr	1238	576/1152	1221	564/1127	1084	506/1011
Inrush peak, A	38	37	40	40	n/a	n/a
Maximum electrical power	10 A		5 A		n/a	n/a
Input power frequency, Hz	50 to 60				n/a	n/a

Table 4. N5500 electrical requirements

Input voltage	**100 to 120V**		**200 to 240V**		**-40 to -60V**	
	Worst-case	Typical single PSU/ system	Worst-case	Typical single PSU/ system	Worst-case	Typical single PSU/ system
Input current measured, A	3.88	1.7/3.4	2.04	0.95/1.9	9.49	4.0/8.0
Input power measured, W	386	164/328	384	164/327	380	160/319

Table 4. N5500 electrical requirements (continued)

Input voltage	**100 to 120V**		**200 to 240V**		**-40 to -60V**	
Thermal dissipation, BTU/hr	1317	560/1119	1309	559/1116	1295	545/1089
Inrush peak, A	38	37	40	40	n/a	n/a
Maximum electrical power	10 A		5 A		n/a	n/a
Input power frequency, Hz	50 to 60				n/a	n/a

Table 5. N5600 electrical requirements

Input voltage	**100 to 120V**		**200 to 240V**		**-40 to -60V**	
	Worst-case	Typical single PSU/ system	Worst-case	Typical single PSU/ system	Worst-case	Typical single PSU/ system
Input current measured, A	4.03	1.85/3.7	2.06	1.05/2.1	10.57	4.7/9.4
Input power measured, W	400	181/362	387	178/355	423	188/376
Thermal dissipation, BTU/hr	1365	617/1233	1320	606/1212	1442	642/1283
Inrush peak, A	38	37	40	40	n/a	n/a
Maximum electrical power	10 A		5 A		n/a	n/a
Input power frequency, Hz	50 to 60				n/a	n/a

Checking shipment package contents

Make sure that your shipment package includes the following items, in addition to the *IBM System Storage N5000 Series Hardware and Service Guide*.

- Single-controller system (2864/2865/2868/2869-A10/G10)
  - 1 single-controller system 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
- 4 SFPs

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

A rail kit for mounting the single-controller system in a standard IBM 19–inch rack may also be present.

- Dual-controller system (2864/2865/2868/2869-A20/G20)
  - 1 dual-controller system containing the power supplies and any options you ordered
  - 2 console adapter cables, RJ-45 to DB-9
  - 2 cable management trays
  - 2 wrist ESD straps
  - 1 serial null modem cable
  - 1 set of IBM publications
  - 4 power cords
  - 8 SFPs

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

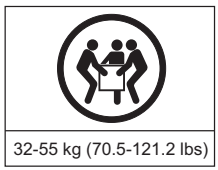
  A rail kit for mounting the dual-controller system in a standard IBM 19–inch rack may also be present.

Rules for installing the system in a rack

Attention: The rack installation instructions provided in this document and in the Installation and Setup Instructions for your N series product apply specifically to the installation of the N series product in an IBM 19-inch rack. IBM service personnel cannot install the N series product in a non-IBM rack.

If the N series product is being installed in a non-IBM rack, the rails shipped with the N series product may or may not work with the non-IBM rack. Physical installation of the N series product in a non-IBM rack is the customer's responsibility.

You need to observe the following rules and restrictions when installing an N5000 series system in a standard IBM 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.

  CAUTION:
  The N5000 series system is extremely heavy. To avoid injuring yourself or damaging the system, you must work with at least two other people when you install the system in the rack.

- Install the N5000 series system at the bottom of your configuration, so that loops extend above your system.

  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)

- When installing expansion unit units in a rack, do not exceed the maximum storage limit for your N5000 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 filer installation process.

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

Note: The initial hardware installation of an N5000 series gateway is performed by IBM. Additional installation services can be performed by IBM through an IBM services offering. Contact your IBM representative for more information.

Table 6. Filer installation process procedures

Stage	Procedure	Is the procedure required?	Procedure is performed by...		For instructions, see...
			Filer	**Gateway**	
1	Install the N5000 series system in a standard IBM 19-inch rack.	Yes	Customer	IBM	The *Installation and Setup Instructions* for your N5000 series system
2	Connect the N5000 series system to the IP (Internet Protocol) network.	Yes	Customer	Customer	"Connecting your system to an IP network" on page 11, or the *Installation and Setup Instructions* that came with your system
3	**Filer:** Connect the N5000 series storage system to expansion units.	Yes	Customer	n/a	"Connecting a filer to expansion units" on page 13, or the *Installation and Setup Instructions* that came with your system
	Gateway: Connect the N5000 series system to the back-end storage.	Yes	n/a	Customer	Refer to the documentation for your external storage for additional information.
4	Connect the N5000 series system to a power source.	Yes	Customer	Customer	"Connecting your system to a power source" on page 12, or the *Installation and Setup Instructions* that came with your system
5	Configure the N5000 series system.	Yes	Customer	Customer	The *IBM System Storage N series Data ONTAP Software Setup Guide* for your version of Data ONTAP, or the *Installation and Setup Instructions* that came with your system
6	Connect the N5000 series system to a third-party device.	No	Customer	Customer	"Connecting your system to storage" on page 13

Chapter 2. Connecting an N5000 series system

This chapter describes how to connect an N5000 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.

Connecting your system to an IP network

Each node of your N5000 series system connects to an IP network. If you have an active-active (clustered) system, both nodes need to connect to the network. For information that describes how to connect your N5000 series system, refer to the *Installation and Setup Instructions* that came with your system.

The N5000 series system has four onboard Ethernet ports, labelled e0a thru e0d, as shown in Figure 1. Up to three Network Interface Cards (NICs) can be plugged into the PCI slots to provide additional Ethernet ports.

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.

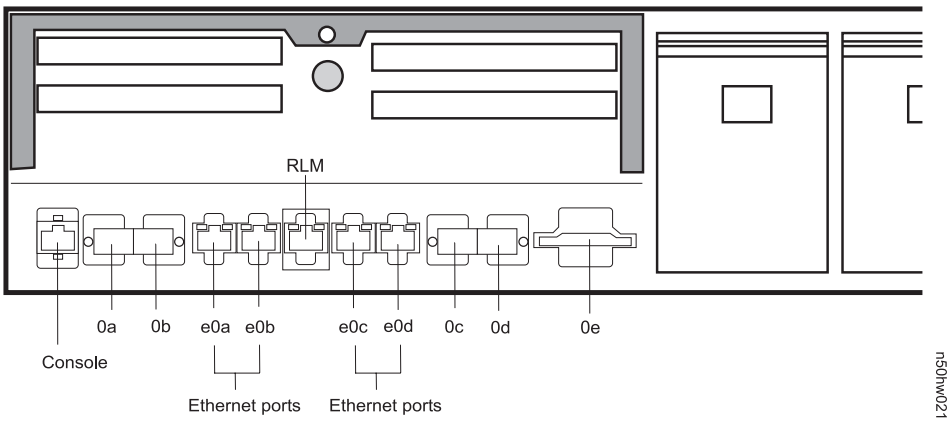


Figure 1. Onboard port locations (Ethernet)

Note: The SCSI connector (0e) is not present on the N5300 or N5600 system.

For information about monitoring the Ethernet port LEDs, see "Ethernet port LEDs" on page 31.

Connecting your system to a power source

The N5000 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 N5000 series system to a power source, see the *Installation and Setup Instructions* that came with your system.

Connecting your system to storage

The N5000 series system has four onboard Fibre Channel ports, labelled 0a thru 0d, as shown in Figure 2. Up to three HBAs can be plugged into the PCI slots to provide additional Fibre Channel ports. 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.

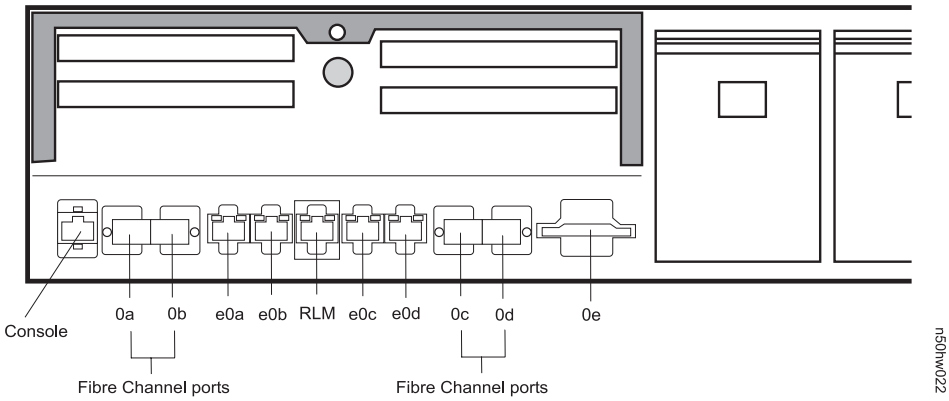


Figure 2. Onboard port locations (Fibre Channel)

Note: The SCSI connector (0e) is not present on the N5300 or N5600 system.

Connecting a filer to expansion units

You must connect at least one expansion unit to your N5000 seriesfiler. 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.

Notes:

1. For the N5200 and N5500, the 4Gb speed setting is supported for connected EXN4000 expansion units when the connections from the N5200 or N5500 system to the first EXN4000 in a loop are made using a Quad-port 4 Gbps FC HBA for Disk (FC 1027). For additional information about the Quad-port 4 Gbps FC HBA for Disk (FC 1027), see Appendix C, “Optional adapter cards (N5200 and N5500),” on page 85.

2. For the N5300 and N5600, the 4Gb speed setting is supported for connected EXN4000 expansion units using onboard Fibre Channel port connections. No optional adapter cards are required to use the 4Gb setting on attached EXN4000s.

For information that describes how to connect your N5000 series filer using the onboard Fibre Channel ports to expansion units, 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 N5000 series filer to expansion units, see the cabling instructions described in "Cabling your system using a Fibre Channel expansion adapter."

Multipath Fibre Channel cabling is supported for N5000 series filers. Multipathing 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 multipathing, 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 system using a dual-port optical Fibre Channel expansion adapter for expansion unit storage.

This section describes the following tasks:

- "Cabling a single storage system controller" on page 15
- "Cabling an active-active (clustered) pair" on page 16

For additional information about optional adapter cards, see Appendix C, "Optional adapter cards (N5200 and N5500)," on page 85 or Appendix D, "Optional adapter cards (N5300 and N5600)," on page 93.

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 N5000 series 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:

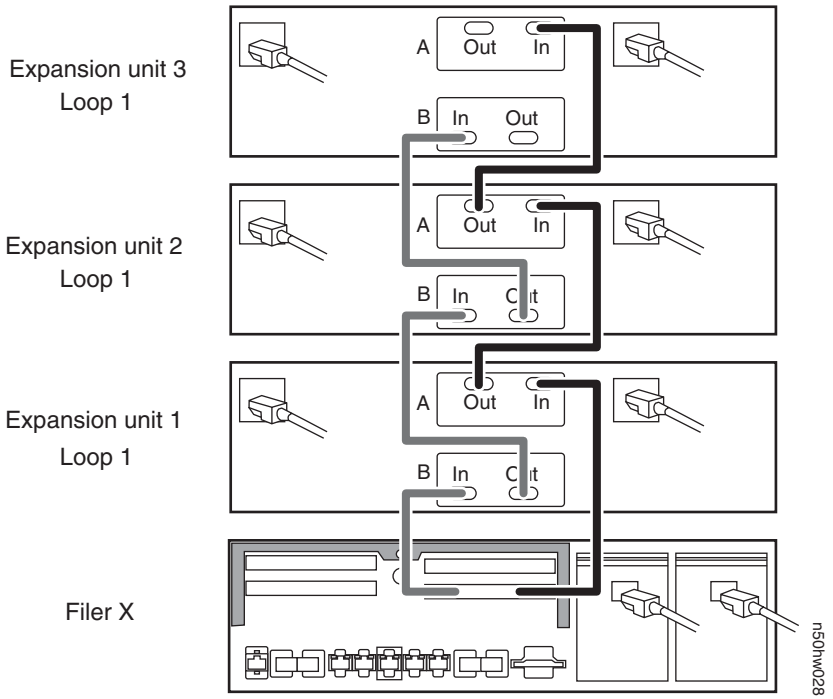


Figure 3. Cabling a single storage system controller

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 (clustered) pair:

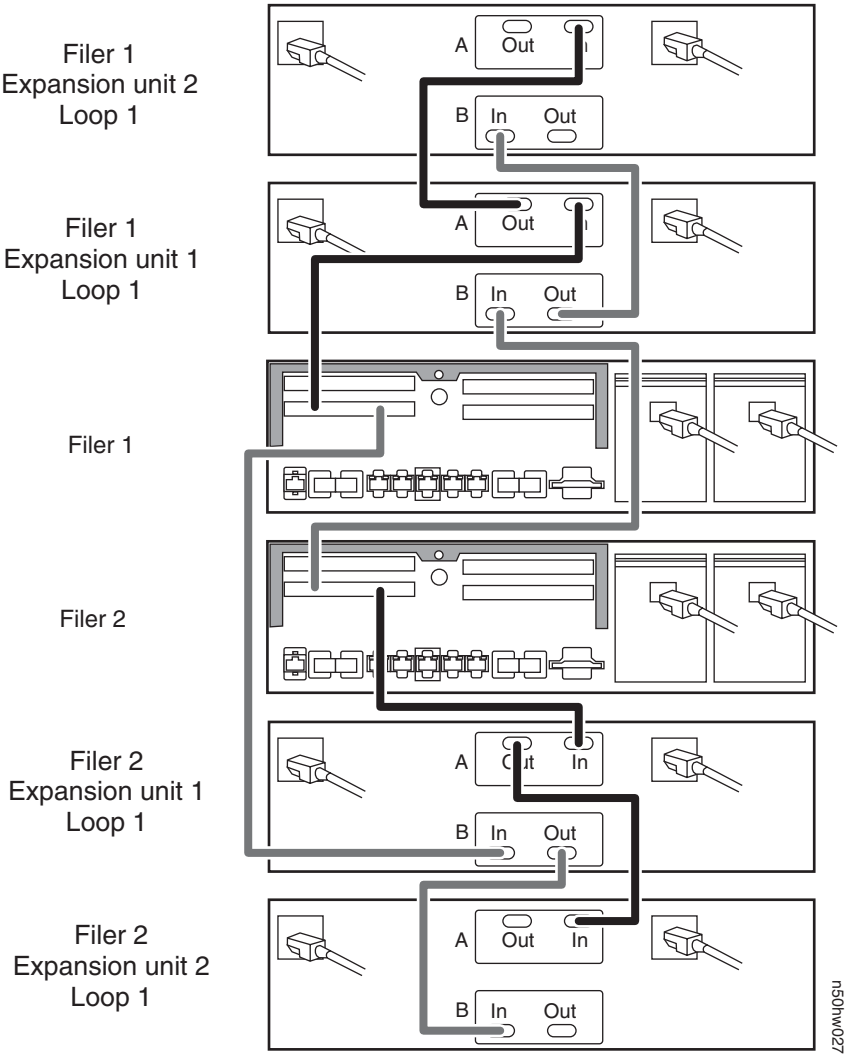


Figure 4. Cabling an active-active (clustered) pair

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 ESH2/ESH4 is self-terminating and does not have a terminate switch. The AT-FCX is self-terminating as long as no cable is plugged into the Out port of the last expansion unit.

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 N5000 series system.

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

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

Connecting to a third-party device

You can connect third-party devices to your N5000 series system through an optical Fibre Channel interface using any Fibre Channel port on the back of the chassis. N5000 series systems do not support connections to a parallel SCSI interface (port 0e, as shown in Figure 2 on page 13).

Note: The parallel SCSI interface is not present on the N5300 or N5600 system.

The N5000 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 N5000 series system.

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

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 N5000 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/storage/support/nas/

  An unsupported tape backup device might cause the N5000 series system to halt.
- For additional information about Fibre Channel cables, see the following Web site:

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

Connecting your system to an ASCII terminal console

The ASCII terminal console enables you to monitor the boot process, helps you configure your N5000 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 7. RJ-45 connection pinout for the ASCII terminal wiring

Pin number	Signal
1	Connected to pin 8
2	Not connected
3	TXD (from N5000 series system)
4	GND
5	GND
6	RXD (to N5000 series system)
7	Not connected
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 N5000 series system. Its purpose is to convert the RJ-45 pinout on the N5000 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 N5000 series system.

Table 8. Console adapter pin number connections

DB-9 male		Connects to	RJ-45	
Pin number	**Signal**		**Pin number**	**Signal**
1	Not connected	-	1	Not connected
4	Not connected	-	2	Not connected
3	TXD	→	3	TXD
5	GND	→	4	GND
6	Not connected	-	5	Not connected
2	RXD	→	6	RXD
7	Not connected	-	7	Not connected
8	Not connected	-	8	Not connected
9	Not connected	-	-	-

Connecting to an ASCII terminal console

To connect an ASCII terminal console to the N5000 series system, complete the following steps.

1. Set the following communications parameters to the same values for both the N5000 series system and ASCII terminal.

Table 9. Communication parameters

Parameter	Setting
Baud	9600
Data bit	8
Parity	None
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 N5000 series system and the other end to the ASCII terminal.

Chapter 3. Configuring an N5000 series system

This chapter describes how to configure an N5000 series system in the following topics:

Configuring the N5000 series system

Gather and record information about each N5000 series system node in "System setup information worksheet."

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

For gateway systems, initial startup and configuration tasks must be performed by IBM. For additional information about gateway systems, see the documentation listed in Appendix E, "IBM System Storage N series documentation," on page 99.

System setup information worksheet

You need the following information to complete the setup script.

Table 10. System setup worksheet

Hostname:				
Network Configuration Information	**e0a**	**e0b**	**e0c**	**e0d**
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:				
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)				

Table 10. System setup worksheet (continued)

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 IP Netmask	
RLM Gateway IP Address	
Would you like to enable DHCP on the RLM LAN interface [y]?	
Please enter the name or IP address of the mail host:	

Configuring the Fibre Channel port

The N5000 series system motherboard tray provides four independent Fibre Channel ports, identified as 0a, 0b, 0c and 0d. SFPs must be firmly seated in all four ports before connecting cables.

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.

N5000 series system active-active (clustered) configurations

N5000 series system active-active (clustered) configurations must be cabled to switches that support public loop topology. To connect an N5000 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 (clustered) configuration 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 N5000 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 two ports configured as Fibre Channel targets and two ports configured as initiators.

   ```
   n5000a> fcadmin config
                     Local
   Adapter Type      State                 Status
   ------------------------------------------------
     0a    target    CONFIGURED            online
     0b    target    CONFIGURED            online
     0c    initiator CONFIGURED            online
     0d    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 11. RLM configuration manuals

Manual Title	Information Provided
Installation and Setup Instructions that came with your system	Describes the system and RLM cabling.
IBM System Storage N series Diagnostics Guide	Lists and describes the diagnostic tests for a new or existing RLM.

Table 11. RLM configuration manuals (continued)

Manual Title	Information Provided
IBM System Storage N series Data ONTAP System Administration Guide for your version of Data ONTAP	Describes RLM configuration and use.
IBM System Storage N series Error Messages and Troubleshooting 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 N5000 series system and explains how to interpret LEDs for basic monitoring.

Note: For information about monitoring the LEDs for optional adapter cards, refer to the *IBM System Storage N series Error Messages and Troubleshooting Guide*.

This chapter discusses the following topics:

Note: The quick reference card in the slide-out tray in the middle of your N5000 series system describes the functions of each LED on your system and the suggested course of action.

Using the quick reference card

Your system ships with a quick reference card located in the middle of the chassis.

Check LEDs: Check all system LEDs to determine whether any components are not functioning properly. The following illustration is a replica of the part of the quick reference card that shows LED locations and explanations.

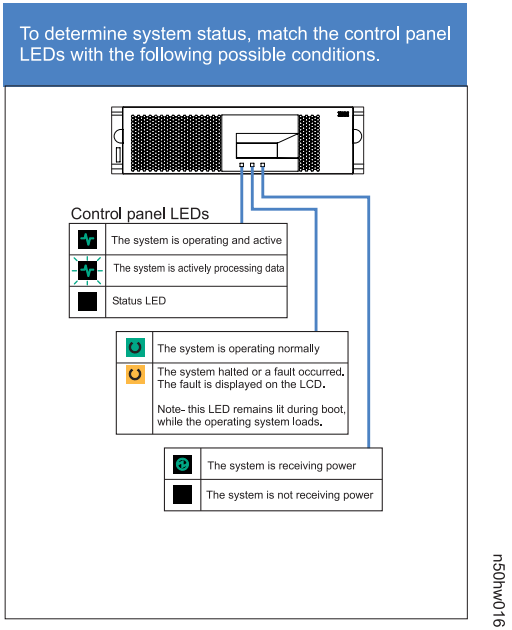


Figure 5. Replica of Step 3 of the quick reference card

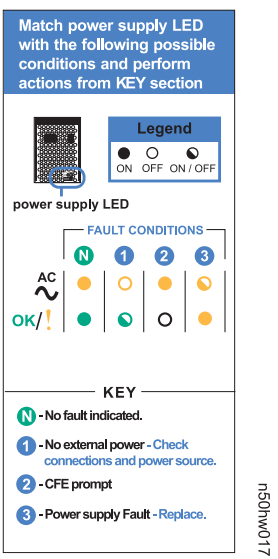


Figure 6. Replica of Step 4 of the quick reference card

FRU/CRU map: Use the FRU/CRU map to identify replaceable units in your system.

Note: FRU/CRU procedures are documented in Chapter 5, “Replacing N5000 series system devices,” on page 37. You can also go to the following Web site for FRU/CRU documentation.

www.ibm.com/storage/nas/

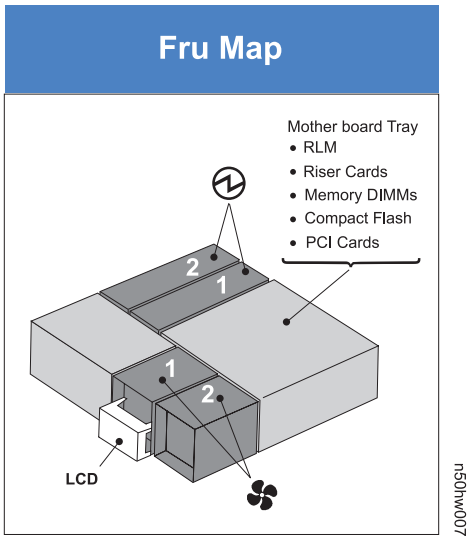


Figure 7. FRU map

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 N5000 series system from the error messages displayed on your system console.

Location of LEDs

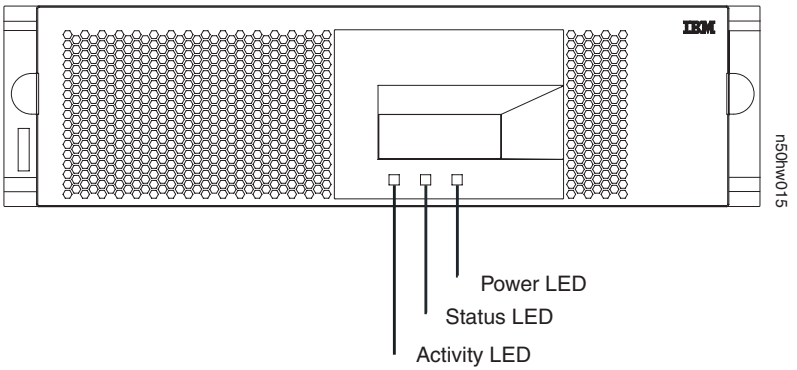


Figure 8. Front panel subassembly LED locations

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

Interpreting the front panel LEDs

The following illustration is of the first sheet of the quick reference cards that come with your N5000 series system. It shows the normal and fault conditions that the LEDs indicate and recommends a corrective action.

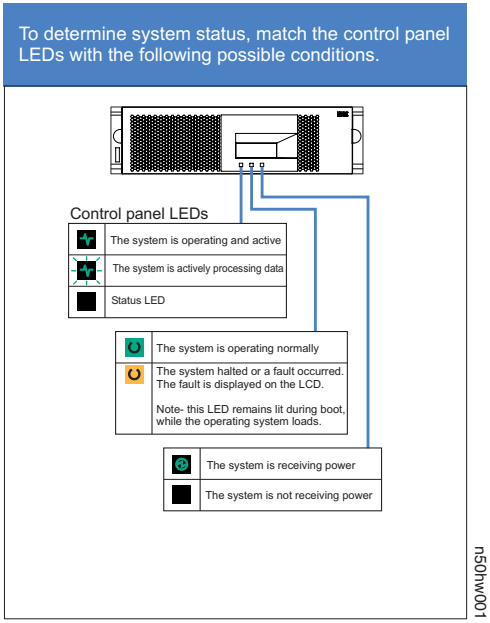


Figure 9. LED indications of normal and fault conditions

Use the following table to interpret the front panel LEDs on an N5000 series system.

Table 12. N5000 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.
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.

Location of LEDs

The following illustration shows the location of the following onboard port LEDs:

- Fibre Channel port LEDs
- GbE port LEDs
- RLM LEDs

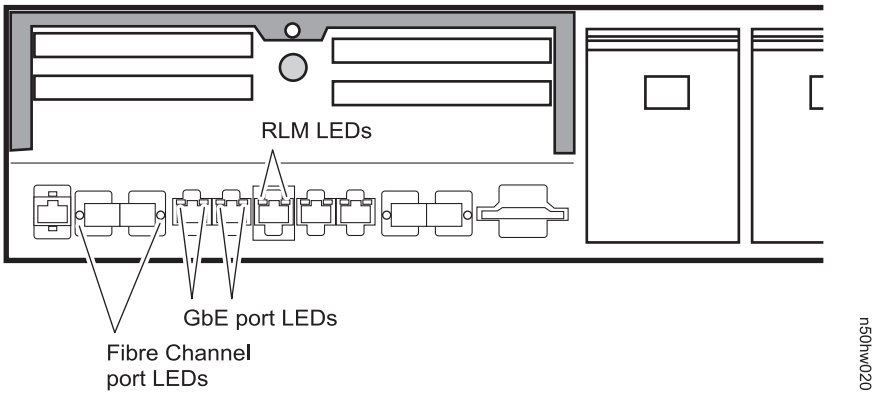


Figure 10. Onboard port LED locations

Fibre Channel port LEDs

Your N5000 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 10.

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

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

Interpreting Fibre Channel onboard port LEDs

Use the following table to interpret the LEDs on your system onboard Fibre Channel ports.

Table 13. Fibre Channel onboard LED descriptions

Green	Amber	Description
On	On	Power
Off	Flashing	Loss of synch
Off	On	Signal acquired
On	Off	Ready
Flashing	Flashing	Adapter firmware error

Ethernet port LEDs

Your N5000 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 10 on page 30.

For information about monitoring the LEDs for your optional GbE adapter cards, refer to the *IBM System Storage N series Error Messages and Troubleshooting Guide*.

Interpreting the onboard GbE LEDs

Use the following table to interpret the onboard GbE LEDs.

Table 14. Onboard GbE LEDs

Link LED (green)	Activity LED (amber)	State
Off	Off	Network connection is not present.
On	Off	Network connection is present but there is no data input or output occurring.
On	On/blinking	Network connection is present and there is data input and output is occurring.

Interpreting RLM LEDs

Use the following table to interpret the RLM LEDs on the rear panel of your N5000 series system.

Table 15. RLM LED descriptions

Link LED (green)	Activity LED (amber)	State
Off	Off	Network connection is not present.
On	Off	Network connection is present but there is not data input or output occurring.
On	On/blinking	Network connection is present and data input and output is occurring.

NVRAM5 and NVRAM6 adapter LEDs

NVRAM5 adapters are shipped in all N5200 and N5500 systems. NVRAM6 adapters are shipped in all N5300 and N5600 systems.

The NVRAM5 or NVRAM6 adapter is also the active-active configuration (cluster) interconnect adapter when your system is in an active-active (clustered) configuration.

Figure 11 shows the LED locations for your NVRAM5 or NVRAM6 adapter. There are two sets of LEDs by each port that operate when you use the NVRAM5 or NVRAM6 as an active-active configuration (cluster) interconnect adapter. There is also an internal red LED that you can see through the faceplate.

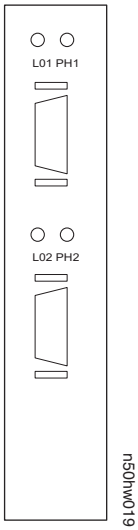


Figure 11. NVRAM5 and NVRAM6 LED locations

Interpreting the NVRAM5 and NVRAM6 adapter LEDs

Use the following table to interpret the LEDs for an NVRAM5 or NVRAM6 adapter.

Table 16. NVRAM5 and NVRAM6 LED descriptions

LED type	Indicator	Status	Description
Internal	Red	Blinking	There is valid data in the NVRAM5 or 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.

NVRAM5 and NVRAM6 copper-fiber converter LEDs

NVRAM5 and NVRAM6 copper-fiber converters enable you to use fiber cabling to cable your systems in an active-active (clustered) configuration.

Figure 12 shows the LED locations for your NVRAM5 or NVRAM6 copper-fiber converter.

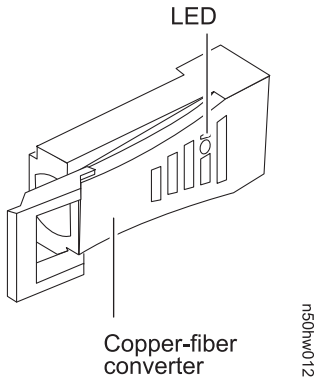


Figure 12. NVRAM5 or NVRAM6 copper-fiber converter LED locations

Interpreting the copper-fiber converter LEDs

Use the following table to interpret the LEDs for an NVRAM5 and NVRAM6 copper-fiber converter.

Table 17. NVRAM5 and 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 N5000 series system power supply has four 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 N5000 series system. Figure 13 shows the location of the power supply LEDs.

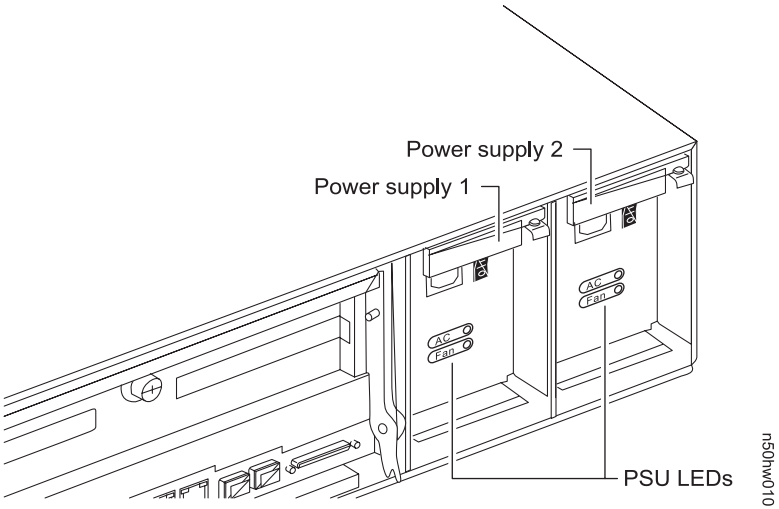


Figure 13. Power supply (PSU) LED locations

Interpreting power supply LEDs

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

Table 18. Power supply LED descriptions

LED type	Amber (ACN)	Green (Status)	Description
	On	On	The AC power source is good and is powering the system.
	On	Blinking green	The AC power source is good and the power supply is in standby mode.
	On	Off	The AC power source is good but no power is reaching the power supply, or the power supply has failed.
	Off	Off	There is no power to this power supply.

Monitoring the fans

The fan modules are referred to as fan 1 or fan 2 To monitor the fans, check the console error messages and look at the Status LED on each fan module cam handle. A failed fan LED is solid amber, indicating that the fan has failed or no power is reaching the fan module. To replace a failed fan module, see "Replacing the fan module" on page 53.

Chapter 5. Replacing N5000 series system devices

This chapter describes how to replace parts in your N5000 series system, the motherboard tray, and other devices.

This chapter discusses the following topics:

Replacing the motherboard tray

This section describes:

Removing the motherboard

Removing the motherboard consists of the following tasks:

Figure 14 on page 38 shows the location of the components in the N5200 and N5500 that you must remove before you replace the motherboard.

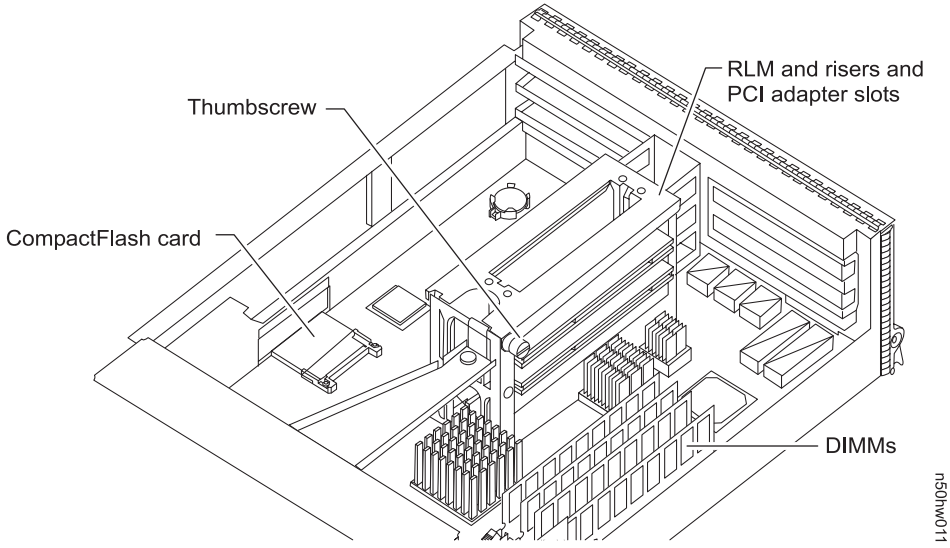


Figure 14. Motherboard layout (N5200 and N5500)

Figure 15 on page 39 shows the location of the components in the N5300 and N5600 that you must remove before you replace the motherboard.

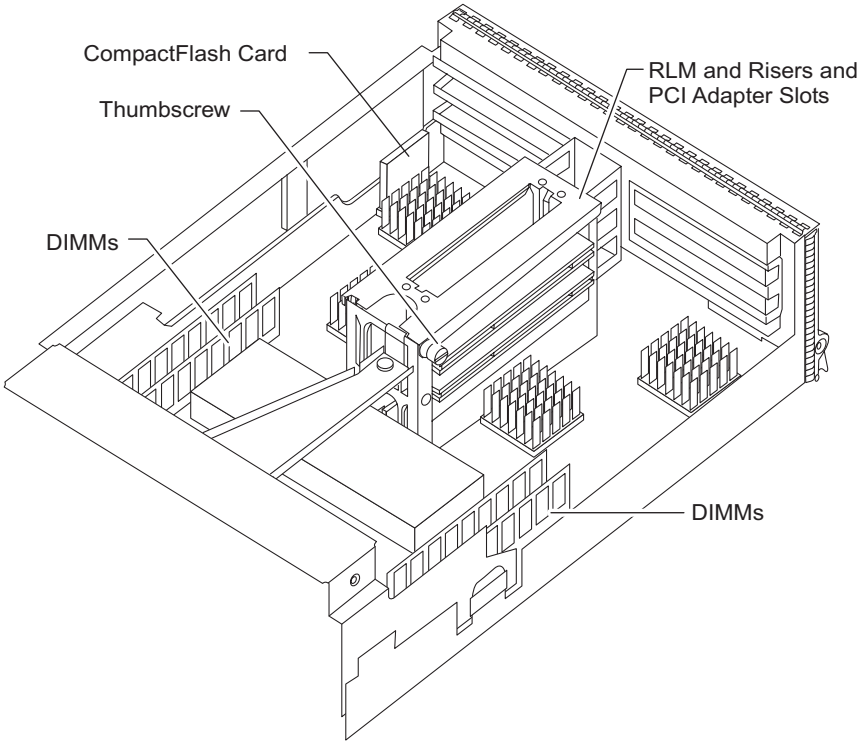


Figure 15. Motherboard layout (N5300 and N5600)

Attention: If your system is part of a clustered (active-active) configuration, enter the following command from Node B to save Node A's onboard Fibre Channel port configuration information:

```
partner fcadmin config
```

Copy and save the screen display to a safe location for the steps in "Restoring the onboard port configuration (SAN clusters only)" on page 43.

Opening the system

To open the system, complete the following steps:

1. Perform a clean system shutdown by entering the following command from the system console:

   ```
   halt
   ```

   Attention: You must perform a clean system shutdown to replace components inside your system.
2. Ground yourself to the system chassis using the grounding leash.
3. Turn off the power to your system and unplug the power cords from the power source.

4. Remove the power cords from both PSUs.
5. Remove the cable management tray by completing the following substeps, using Figure 16 for reference:

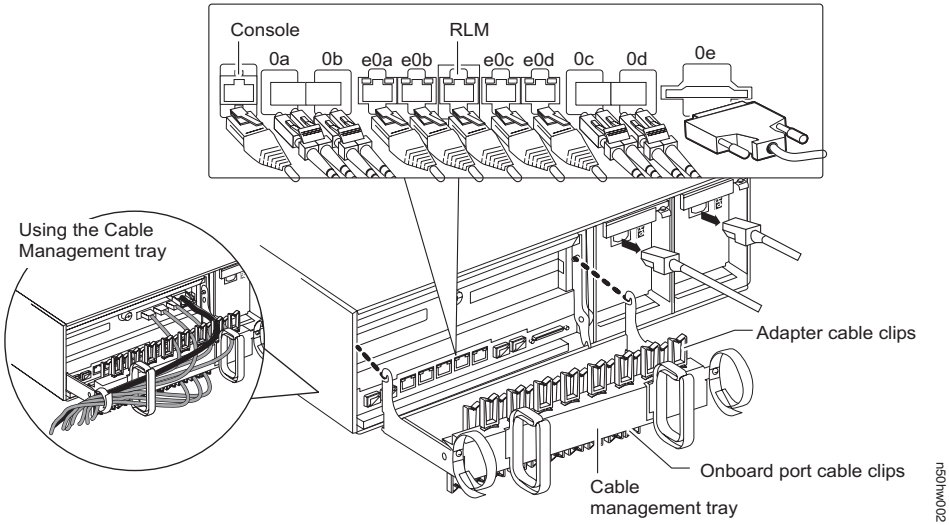


Figure 16. Cable management tray

   a. Unplug all the cables from the back of the motherboard tray.

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

   b. Grasp the cable management tray by the side, gently push one side of the tray so that the arm slides across and off the retaining pin, and then lift it off the back of the motherboard tray and set it aside.

6. Loosen the thumbscrew on the cam handle, as shown in Figure 17 on page 41.
7. Using Figure 17 on page 41 for reference, open the motherboard tray by pulling the cam handle downward and sliding the tray out of the system until it catches. Make sure that you support the bottom of the motherboard tray with your free hand.

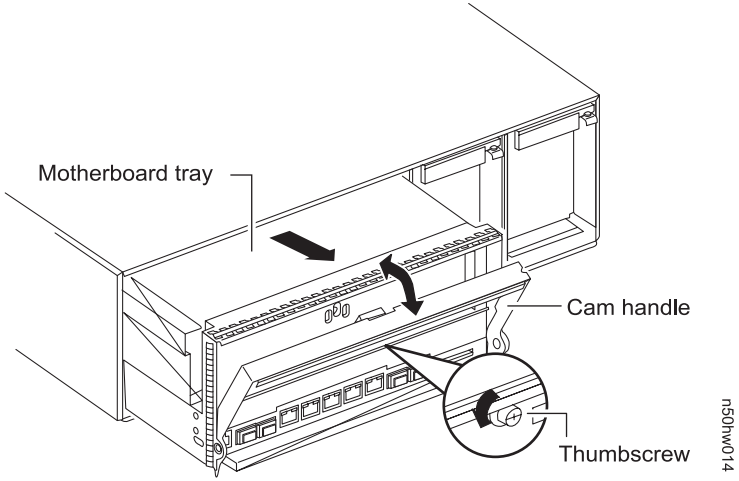


Figure 17. Motherboard tray

8. Release the motherboard tray from the system by gently lifting the retaining latch under the motherboard tray, sliding the motherboard tray all the way out of the system, and then placing the motherboard tray on a stable, grounded surface.
9. If you need to replace the motherboard on your N5000 series system, you must first remove from the motherboard all FRUs. such as the PCI adapters, risers, and the Remote LAN Module (RLM). See "Removing the FRUs from the motherboard."

Removing the FRUs from the motherboard

To remove the PCI adapters, risers, and the Remote LAN Module (RLM), refer to the following sections:

- "Replacing a Remote LAN Module" on page 55
- "Removing a PCI card" on page 44
- "Removing a PCI riser" on page 46
- "Removing an SDRAM DIMM" on page 50
- "Removing the CompactFlash card in N5200 and N5500 systems" on page 70 or "Removing the CompactFlash card in N5300 and N5600 systems" on page 71, depending on your machine

Installing the replacement motherboard

You must complete the following tasks when installing the replacement motherboard on your system:

- "Reinstalling the FRUs on the replacement motherboard" on page 42
- "Closing the system" on page 42
- "Testing the system" on page 42

- "Completing the replacement process" on page 44

Reinstalling the FRUs on the replacement motherboard

You must complete the following FRU reinstallation tasks, and then continue with "Closing the system."

- "Installing the CompactFlash card in N5200 and N5500 systems" on page 71 or "Installing the CompactFlash card in the N5300 and N5600 systems" on page 73, depending on your machine
- "Installing an SDRAM DIMM" on page 52
- "Installing a PCI riser" on page 46
- "Installing a PCI card" on page 45
- "Installing and testing an RLM" on page 56

Closing the system

To close the system, complete the following steps:

1. Align the end of the tray with the motherboard tray opening in the system.
2. Gently push the motherboard tray back into the system chassis. The cam handle begins to engage when the motherboard tray is properly seated all the way inside the chassis.
3. Firmly push the cam handle to finish seating the motherboard tray in the system, and then lift the cam handle to the closed position.
4. Tighten the thumbscrew on the cam handle.
5. Reinstall the cable management tray and recable the system, as needed.
6. Download and install the most current version of firmware for your system from the following Web site:

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

   Note: Installing a new motherboard changes the World-Wide Port Name (WWPN) and World-Wide Node Name (WWNN) values associated with each onboard Fibre Channel port. If your configuration uses switch-based zoning, you must adjust the switch zoning to reflect the new WWPN and WWNN values. If your configuration includes a gateway system, you must also adjust the WWPN values in the host or volume groups associated with arrays on the storage subsystem.
7. Go to "Testing the system."

Testing the system

After you update the motherboard firmware, you should run diagnostics on the motherboard and motherboard FRUs. If the system passes the diagnostic tests, you can boot the system and bring it back online.

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

1. **For the N5200 and N5500:** Turn on the system, if necessary, and press the **Delete** key during boot to interrupt the boot process.

   For the N5300 and N5600: Turn on the system, if necessary, and press Ctrl-C during boot to interrupt the boot process.
2. Enter system diagnostics by entering the following command at the prompt:

   ```
   boot_diags
   ```
3. Enter the following command to begin the diagnostics tests on the new motherboard:

   ```
   run mb
   ```
4. Run all motherboard diagnostics by entering 1 from the menu selection.

   Note: You can run specific motherboard tests by entering the number for the test at the menu prompt. See the *IBM System Storage N series Diagnostics Guide* for more information.

Restoring the onboard port configuration (SAN clusters only)

When you replace the motherboard of a system in a cluster, the failed system is shut down and the partner system takes over. If you have systems that are FCP-licensed and cabled to a Fibre Channel fabric, you must restore the configuration of the onboard Fibre Channel ports before you perform the first giveback, otherwise you might experience a disruption in service.

The onboard Fibre Channel ports on a replacement motherboard are not preconfigured. If you do not configure the onboard Fibre Channel ports before the first giveback, Data ONTAP restores the original onboard Fibre Channel port configuration and then automatically reboots the system during the giveback. SAN hosts that are failing back to the repaired system might lose access to their LUNs during the reboot.

Note: See the description of the command fcadmin in the *IBM System Storage N series Data ONTAP Commands: Manual Page Reference, Volume 1* for your version of Data ONTAP for more information about Fibre Channel port configuration.

1. Turn on the system with the new motherboard and press Ctrl-C to interrupt the boot process.
2. From the boot menu, select Maintenance mode boot.
3. Program the onboard ports with information you obtained in "Removing the motherboard" on page 37 by entering the following commands:
   - Set ports to Target mode: `fcadmin config -t target adapter_name ...`
   - Set ports to Initiator mode: `fcadmin config -t initiator adapter_name ...`

- Set ports to the unconfigured state: `fcadmin config -t unconfig adapter_name ...`

where `adapter_name` is the port number (for example, 0c). You can specify more than one port.

4. Before you exit Maintenance mode and reboot the system, recable the target and initiator ports depending on your configuration.
   - Connect the Target ports to the Fibre Channel fabric.
   - Connect Initiator ports to the local and partner disk shelves and/or the TapeSAN fabric.
5. Exit Maintenance mode by entering the following command:

   ```
   halt
   ```
6. Reboot the system.
7. After the system reboots, perform the giveback by entering the following command on console of the takeover (partner) system:

   ```
   cf giveback
   ```

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 PCI cards and risers

This section describes:

Removing a PCI card

1. Open the system, following the steps provided in "Opening the system" on page 39.
2. Remove the PCI adapters by completing the following substeps, using Figure 18 on page 45 (which shows an N5300 or N5600) for reference:

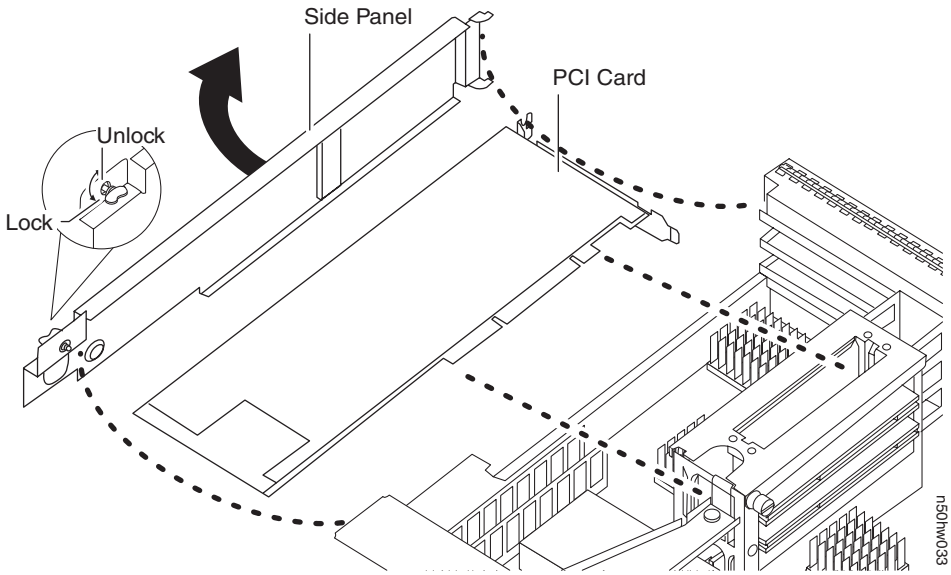


Figure 18. Removing PCI adapters

a. Turn the motherboard tray on its side, locate the locking wing nut, and then push down and turn the locking wing nut one quarter turn.
b. Swing the side panel away from the motherboard tray.
c. Remove the PCI adapters, close and lock the side panel back into the chassis, and then set the motherboard tray aside, on its bottom.

Installing a PCI card

1. Shut down and open the system, if necessary, as described in "Opening the system" on page 39.
2. Open the system chassis side panels, if necessary, and install any PCI adapters. Be sure that you properly align the adapter in the slots and exert even pressure on the adapter when seating it in the socket.
3. Close and lock the side panels. When locking the side panels, push down on the locking wing nut and turn it a quarter turn.
4. Align the end of the motherboard tray with the motherboard tray opening in the system.
5. Gently push the motherboard tray back into the system chassis. The cam handle begins to engage when the motherboard tray is properly seated all the way inside the chassis.
6. Firmly push the cam handle to finish seating the motherboard tray in the system, and then lift the cam handle to the closed position.
7. Tighten the thumbscrew on the cam handle.
8. Reinstall the cable management tray and recable the system, as needed.

Removing a PCI riser

1. Shut down and open the system as described in "Opening the system" on page 39.
2. Remove any applicable PCI adapters from the target riser, as described in "Removing a PCI card" on page 44.
3. Remove the risers by completing the following substeps, using Figure 19 for reference:

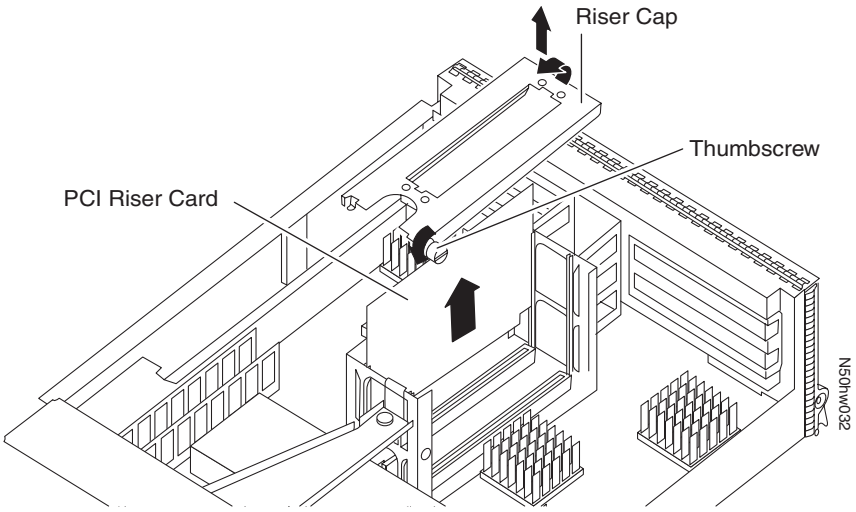


Figure 19. PCI riser

   a. Loosen the riser cap thumbscrew, swing the riser cap towards the I/O connectors to unhook the latching tabs, and then lift the riser cap to remove it.
   b. Grasp the edges of the first riser and rock it out of the chassis. Repeat the process for the second riser.
   c. Replace the riser cap and slide the top back onto the riser housing. The end tabs should align properly when sliding the top back onto the housing.
   d. Secure the top of the riser housing with the thumbscrew.
4. Go to "Installing a PCI riser."

Installing a PCI riser

1. Open the riser housing, if necessary.

   Attention: There are three sockets where the Remote LAN Module (RLM) and risers are installed. The middle socket is reserved for the RLM and the two outside sockets are reserved for the risers.

2. Align the first riser with the guide slots on the inside of the riser housing, and then slide the riser all the way down, so that it is seated on top of the adapter socket.
3. Firmly push down on the corners of the riser, fully seating it in the socket.
4. Examine the riser to make sure that it is seated squarely and completely in the socket. The riser must be seated squarely. If it is not, repeat Steps 2 through 3 to reinstall it.
5. Repeat Steps 2 through 4 for the other riser, if applicable.
6. Reinstall the riser housing cap.
7. Open the system chassis side panels, if necessary, and reinstall the PCI adapters, and then close and lock the side panels. When locking the side panels, push down on the locking wing nut and turn it a quarter turn.
8. Align the end of the motherboard tray with the motherboard tray opening in the system.
9. Gently push the motherboard tray back into the system chassis. The cam handle begins to engage when the motherboard tray is properly seated all the way inside the chassis.
10. Firmly push the cam handle to finish seating the motherboard tray in the system, and then lift the cam handle to the closed position.
11. Tighten the thumbscrew on the cam handle.
12. Reinstall the cable management tray and recable the system, as needed.

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 LCD module

Replacing the LCD module in IBM N5000 series systems consists of the following tasks:

- "Removing the LCD module"
- "Installing the LCD module" on page 48
- "Completing the replacement process" on page 48

Removing the LCD module

To remove the LCD module, complete the following steps, using Figure 20 on page 48 for reference:

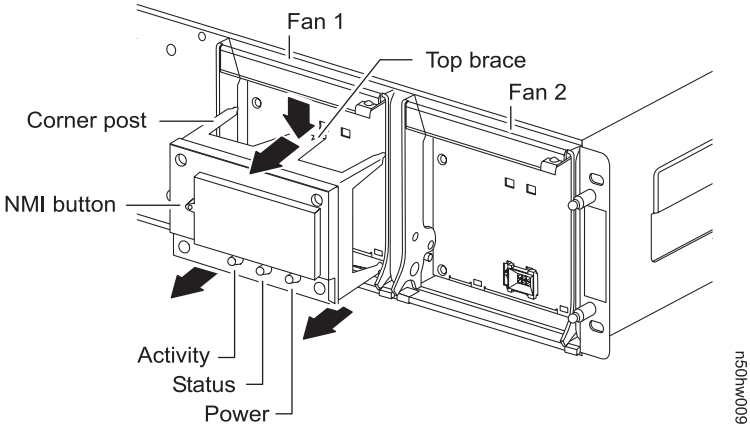


Figure 20. LCD module

1. Ground yourself to the system chassis using the grounding leash, and then remove the bezel. The LCD module is mounted on the fan module labeled fan 1.
2. Grasp the LCD module from the front and gently squeeze the top brace of the module. This releases the locking tabs that hold the LCD module in the fan module.
3. Pull the LCD module straight out from the fan module.

Installing the LCD module

To install the LCD module, complete the following steps:

1. Ground yourself to the system chassis using the grounding leash, and then remove the bezel, if necessary.
2. Align the support posts and top brace of the LCD module with the openings in the front of the fan module, squeeze the top brace of the module, and then push the LCD module into the fan module.
3. Make sure that the LCD module is properly seated by wiggling it and observing the Status and Power LEDs on the module. If they flicker or are not lit, repeat Step 2.
4. Reinstall the bezel.

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 SDRAM DIMMs

This section describes the following tasks for replacing the SDRAM DIMMs:

- "Removing an SDRAM DIMM" on page 50
- "Installing an SDRAM DIMM" on page 52
- "Completing the replacement process" on page 53

Supported DIMM memory configurations

The following table lists the supported memory configurations for your system.

Table 19. Supported DIMM memory configurations

System model	Standard memory configuration	Slot locations
N5600	4 x 2-GB DIMMs – 8 GB	1, 2, 3, and 4
N5500	4 x 1-GB DIMMs – 4 GB	1, 2, 3, and 4
N5300	4 x 1-GB DIMMs – 4 GB	1, 2, 3, and 4
N5200	2 x 1-GB DIMMs – 2 GB	1 and 2

Note: Slots 3 and 4 are not supported for the N5200.

DIMM locations

Figure 21 shows the location of the DIMM slots in the N5200 and N5500 systems.

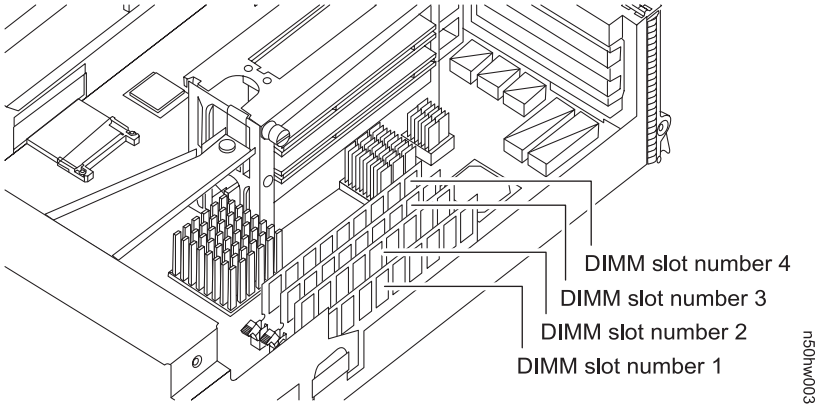


Figure 21. DIMM slot locations (N5200 and N5500)

Figure 22 on page 50 shows the location of the DIMM slots in the N5300 and N5600 systems.

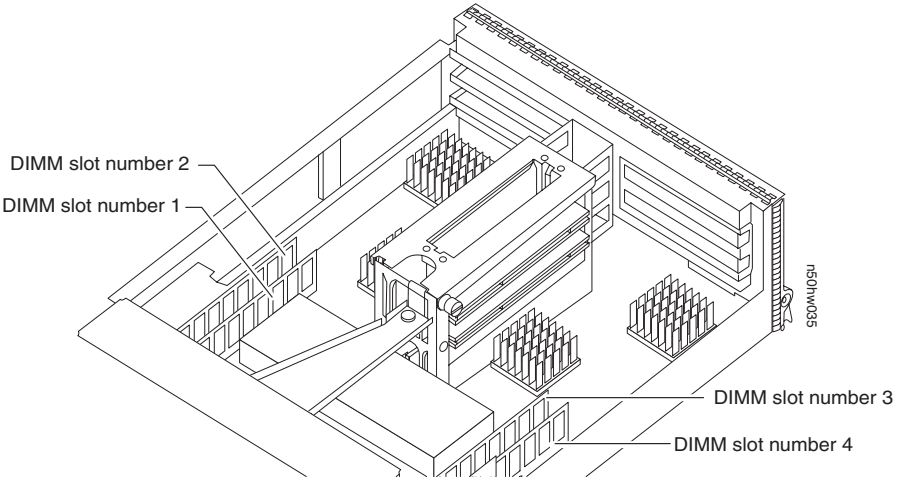


Figure 22. DIMM slot locations (N5300 and N5600)

Removing an SDRAM DIMM

To remove an SDRAM DIMM, complete the following steps:

1. Open the system, following the steps provided in "Opening the system" on page 39.
2. If necessary, remove any PCI adapters that might be directly over the DIMMs by completing the following substeps, using Figure 23 on page 51 (which shows an N5300 or N5600) for reference:

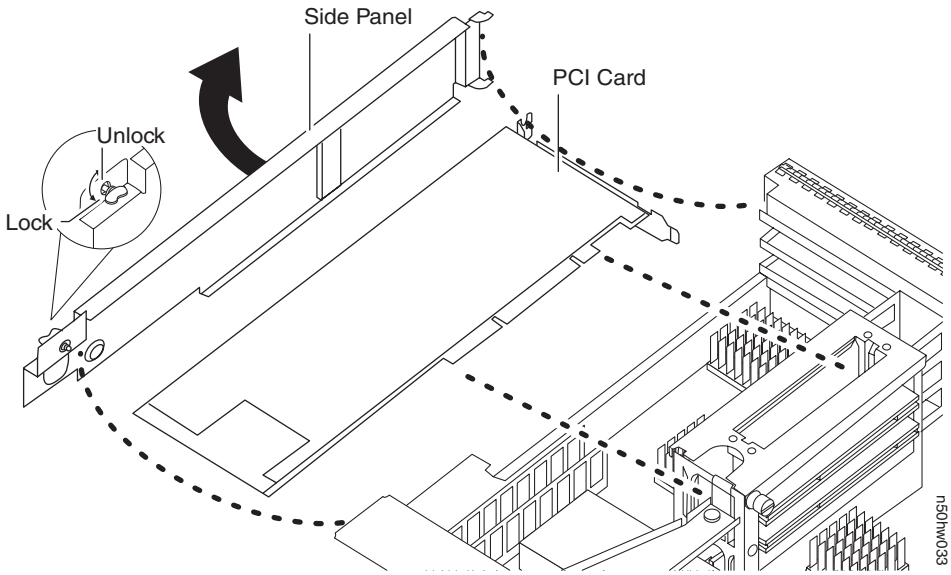


Figure 23. Removing PCI adapters

a. Turn the motherboard tray on its side, locate the locking wing nut, and then push down and turn the locking wing nut one quarter turn.
b. Swing the side panel away from the motherboard tray.
c. Remove the PCI adapters, close and lock the side panel back into the chassis, and then set the motherboard tray aside, on its bottom.

3. Locate the DIMM you want to remove, push apart the latches on either side of the DIMM to release the DIMM from its slot, and then lift it out of the slot.

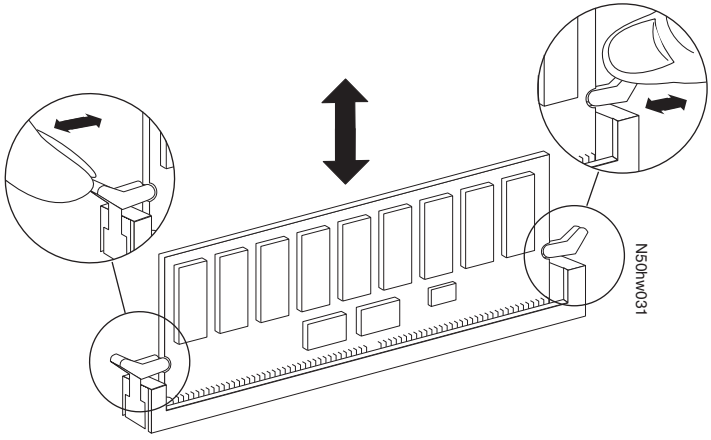


Figure 24. Removing a DIMM

4. Pull the DIMM straight out of the slot and place it in an antistatic bag.

Installing an SDRAM DIMM

To install an SDRAM DIMM, complete the following steps:

1. Remove the motherboard tray, if necessary, as described in "Removing an SDRAM DIMM" on page 50.
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.
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. Reinstall the PCI adapters, if necessary, and then close and lock the side panel of the motherboard tray. Make sure that you align the side panel with the notches in the chassis frame.
7. Reinstall the motherboard tray by completing the following substeps:
   a. Align the end of the tray with the motherboard tray opening in the system.
   b. Gently push the motherboard tray back into the system. The cam handle begins to engage when the motherboard tray is properly seated all the way inside the system.

c. Firmly push the cam handle to finish seating the motherboard tray in the system, and then lift the cam handle to the closed position.
d. Tighten the thumbscrew beneath the cam handle.

8. Reinstall the cable management tray and recable the system, as needed.
9. Recable the system, if necessary, reconnect the power cables to the power supplies, and then turn on the power to the system.
10. 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 fan module

This section describes:

Removing a fan module

To remove a fan module, complete the following steps, using the following figures for reference:

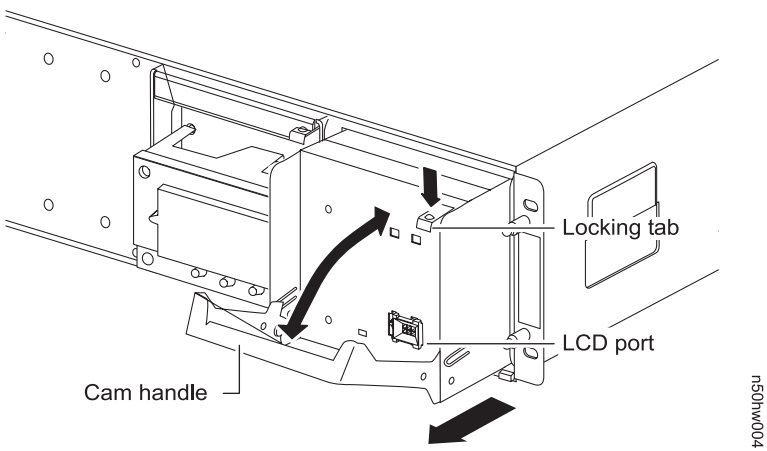


Figure 25. Fan module

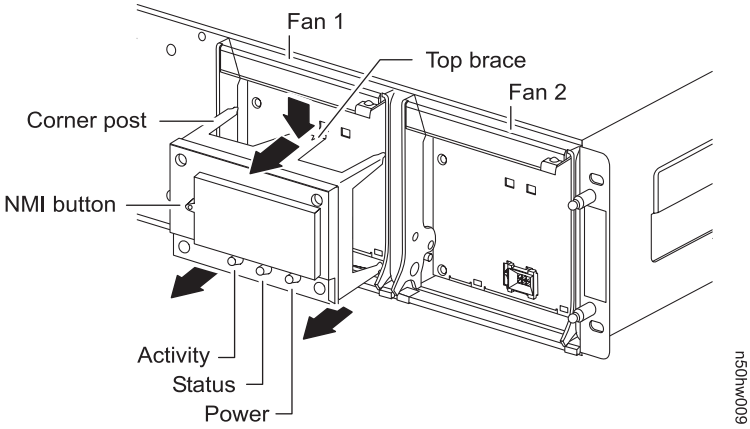


Figure 26. LCD module

1. Ground yourself to the system chassis using the grounding leash, and then remove the bezel.
2. Identify the fan module, referred to as fan 1 or fan 2, that you must replace. Check the console error messages and look at the Status LED on each fan module cam handle. A failed fan LED is solid amber, indicating that the fan has failed or no power is reaching the fan module.

   If the failed fan module is the right-most fan module, go to step 3.

   If the failed fan module is the left-most fan module containing the system LCD module, complete the following substeps:

   a. Grasp the front of the LCD module and gently squeeze the top brace of the module.
   b. Gently pull the LCD module away from the fan module.
   c. Go to step 3.
3. Release the fan module cam handle and swing the cam handle downward. The fan module moves a little bit away from the chassis.
4. Pull the fan module straight out from the chassis, making sure that you support it with your free hand, so that it does not swing out of the chassis.

   Attention: The fan modules are short. Always support the bottom of the module with your free hand so that it does not suddenly drop free from the chassis and injure you.
5. Set the fan module aside.

Installing the fan module

To install the fan module, complete the following steps:

1. Ground yourself to the chassis using the grounding leash, and then remove the bezel, if necessary.

2. Insert the replacement fan module into the chassis by aligning it with the opening and sliding it into the chassis.
3. Push firmly on the fan module housing to ensure that it is seated all the way into the chassis. The cam handle rises slightly when the module is completely seated.
4. Swing the cam handle up until it is flush with the top of the fan module housing. It engages the metal locking tab at the top of the fan module housing when fully seated.

   If the replacement fan module is the right-most module, go to step 5.

   If the replacement fan module is the left-most module, complete the following substeps:

   a. Remove the LCD port cover from the LCD port, if applicable.
   b. Align the LCD connector with the LCD port and firmly push the LCD module into place.
   c. Make sure that the LCD module is properly seated by wiggling it and observing the Status and Power LEDs on the module. If they flicker or are not lit, repeat step 4b.
   d. Go to step 5.
5. Reinstall the bezel.
6. Run diagnostics on the replacement fan module during the next scheduled system downtime. See the *IBM System Storage N series Diagnostics Guide* for more information.

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 Remote LAN Module

This section describes the following tasks:

- "Removing an RLM"
- "Installing and testing an RLM" on page 56
- "Completing the replacement process" on page 59

For additional information about the RLM, see "Configuring and using the RLM" on page 23.

Removing an RLM

To remove a Remote LAN Module (RLM), complete the following steps:

1. Open the system, following the steps provided in "Opening the system" on page 39.

2. Locate the RLM, in the center of the riser housing, pinch the retaining tabs on the RLM, and then lift the RLM straight out of the socket and the housing. Set the RLM aside on an antistatic mat.

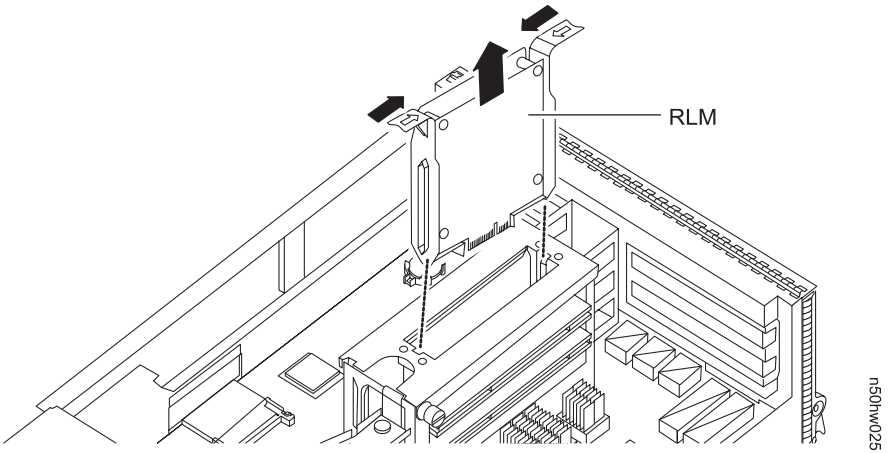


Figure 27. RLM socket housing

Installing and testing an RLM

Installing and testing the RLM consists of the following tasks:

- "Installing the RLM"
- "Testing the RLM" on page 58
- "Testing and booting the system" on page 59

Installing the RLM

To install an RLM, complete the following steps:

1. Open the system, if necessary, following the steps provided in "Opening the system" on page 39.
2. Align the edges of the RLM with the guide slots on the edges of the riser housing, lower the RLM into place in the housing, and then press it into the socket by using your thumbs in the top center of the RLM. Make sure that you press down at the places indicated by the sticker on the RLM housing.
3. Reinstall the motherboard tray by completing the following substeps:
   a. Align the end of the motherboard tray with the motherboard tray opening in the system chassis, and gently push the motherboard tray back into the system chassis. The cam handle begins to engage when the motherboard tray is properly seated all the way inside the chassis.
   b. Firmly push the cam handle to finish seating the motherboard tray in the system, lift the cam handle to the closed position, and then tighten the thumbscrew on the cam handle.

4. Reinstall the cable management tray.

   If you are replacing an existing RLM, recable the system, as needed.

   If you are installing an RLM for the first time, plug one end of the RJ-45 cable into the RLM port, and then plug the other end into a 10/100 Ethernet network port.

5. Check the link LED on the RLM port to ensure that it is green and that the link is active.

   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.

6. Boot the system.

   If you are replacing an existing RLM, run diagnostics, as described in "Testing and booting the system" on page 59.

   If you are installing an RLM 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 that you to configure and activate AutoSupport. If you have not configured and activated AutoSupport, do so. See the *IBM System Storage N series Data ONTAP System Administration Guide* for your version of Data ONTAP for AutoSupport setup information.

7. Check the status and settings of the RLM by entering the following command from the system console:

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

   Example:

```
mysystem-1> rlm status

Remote LAN Manager
                Part Number:        110-00030
                Revision:           32
                Serial Number:      2P6256
                Firmware Version:   1.0.10 Mon Jan 17 16:27:58 PST 2005
                Mgmt MAC Address:   00:A0:98:01:9A:F8
                Using DHCP          no
                IP Address:         172.22.136.61
                Netmask:            255.255.224.0
                Gateway:            172.22.128.1
```

8. 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 (CLI) 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.

To test the RLM, complete the following steps:

1. Log in to 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 admin-host>
   ```

   Attention: 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 admin-host> rlm status
   ```

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

   ```
   RLM admin-host> 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 "Testing and booting the system."

Testing and booting the system

After you recable your system and connect it to the power source, 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 the system and press the Delete key during boot.
2. Enter system diagnostics from the CFE prompt by entering the following command at the prompt:

   ```
   CFE> boot_diags
   ```
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 an NVRAM5 adapter (N5200 and N5500 only)

The NVRAM5 adapter is a PCI adapter supported in the N5200 and N5500 systems that provides nonvolatile memory to the system and acts as a memory buffer for the system. It also serves as the active-active configuration (cluster) interconnect adapter when your system is in a standard active-active (clustered) configuration.

This section describes:

Removing an NVRAM5 adapter

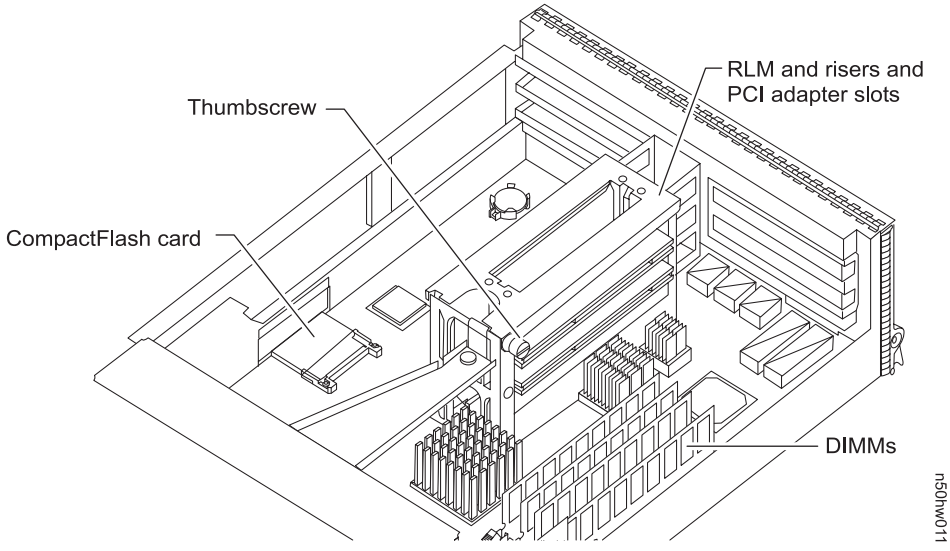


Figure 28. Motherboard layout

1. Open the system, following the steps provided in "Opening the system" on page 39.

   Attention: You must perform a clean system shutdown to replace components inside your system. The NVRAM5 has a red LED that turns off when the system has been shut down. If this LED is flashing red after you enter the `halt` command, reboot your system and try halting the system again.
2. If your system is in an active-active (clustered) configuration that uses optical interconnect cables, remove the copper-fiber converter by pulling the handle so that the latches open, and then gently remove the copper-fiber converter IB connector from your NVRAM5 adapter port, as shown in Figure 29 on page 61:

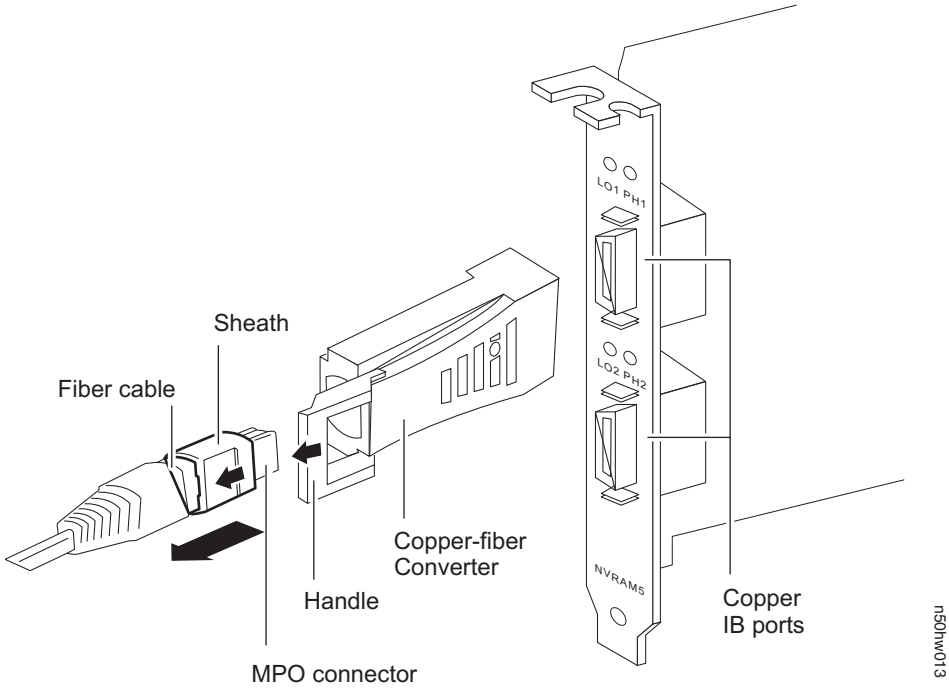


Figure 29. Copper-fiber converter

If your system is an active-active (clustered) configuration that uses copper interconnect cables, remove the cable by carefully pulling back the latch of the top adapter and slowly pulling the IB connector from the NVRAM5 adapter port or by pressing the latches of the top cable and slowly pull the IB connector from the NVRAM5 adapter port, as shown in Figure 30 on page 62.

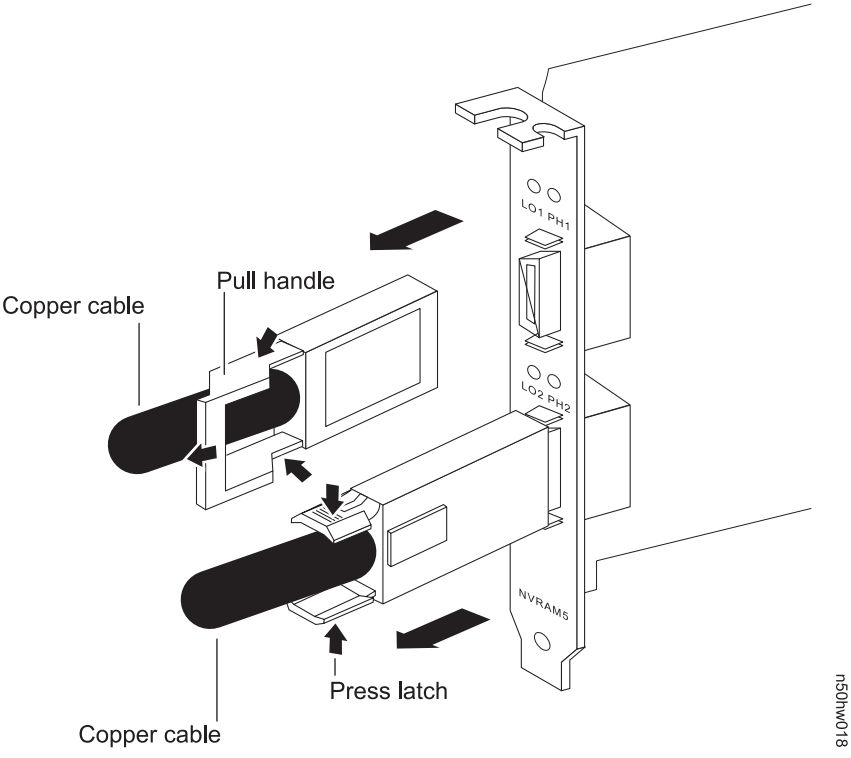


Figure 30. IB connector

3. Remove the NVRAM5 adapter by completing the following substeps, using Figure 31 on page 63 for reference:

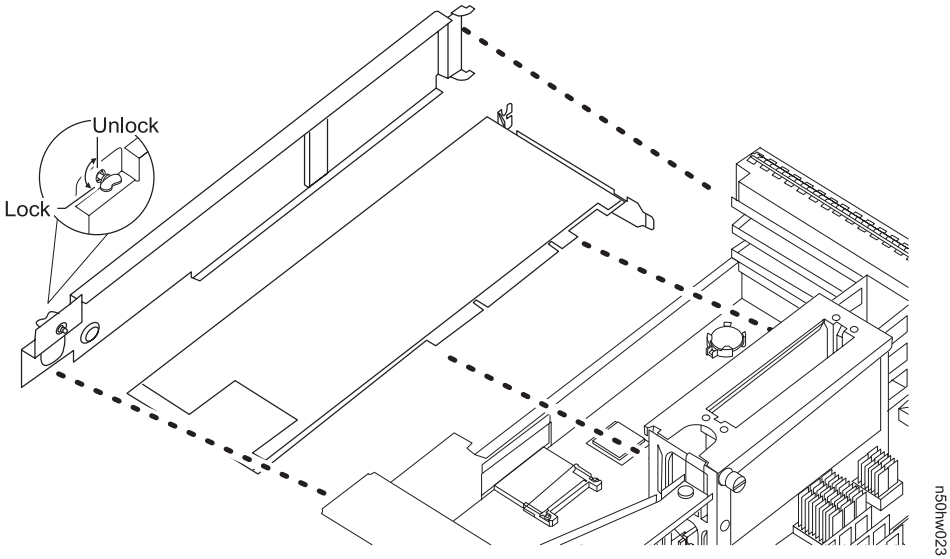


Figure 31. Accessing the NVRAM5 adapter

a. Turn the motherboard tray on its side, locate the locking wing nut, and then push down and turn the locking wing nut one quarter turn.
b. Swing the side panel away from the motherboard tray.
c. Locate and remove the NVRAM5 adapter, close and lock the side panel back into the chassis, and then set the motherboard tray aside, on its bottom.

4. Go to "Installing an NVRAM5 adapter."

Installing an NVRAM5 adapter

1. If necessary, open the system, following the steps provided in "Opening the system" on page 39.
2. Open the system chassis side panels, if necessary, and reinstall any NVRAM5 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 NVRAM5 adapter is installed in a stand-alone or fabric-attached MetroCluster system (A10 or G10) system, install it in slot 1.

   If the NVRAM5 adapter is installed in an active-active (clustered) configuration, install it in slot 3.
3. Close and lock the side panels. When locking the side panels, push down on the locking wing nut and turn it a quarter turn.
4. Align the end of the motherboard tray with the motherboard tray opening in the system.

5. Gently push the motherboard tray back into the system chassis. The cam handle begins to engage when the motherboard tray is properly seated all the way inside the chassis.
6. Firmly push the cam handle to finish seating the motherboard tray in the system, and then lift the cam handle to the closed position.
7. Tighten the thumbscrew on the cam handle.
8. Reinstall the cable management tray and recable the system, as needed.

   Attention: When recabling the NVRAM5 in an active-active (clustered) configuration, remember to reinstall the copper-fiber converter or copper cable adapter.

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.

Note: The NVRAM5 adapter contains a lithium ion battery. The failed part should be returned to IBM. Refer to "Battery return program" on page xii for information regarding the return process.

Replacing an NVRAM6 Adapter (N5300 and N5600 only)

The NVRAM6 adapter is a PCI adapter supported in the N5300 and N5600 system 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.

Attention: When you replace an NVRAM6 adapter, any disk ownership assignments on the system are lost. You must reassign the disks after installing the new NVRAM6 adapter.

This flyer describes how:

Removing an NVRAM6 adapter

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

1. Open the system, following the steps provided in "Opening the system" on page 39.

2. If your system is in an active-active (clustered) configuration that uses optical interconnect cables, remove each copper-fiber media converter by pulling the handle so that the latches open, and then gently removing the copper-fiber media converter from the NVRAM6 adapter port, as shown in Figure 32.

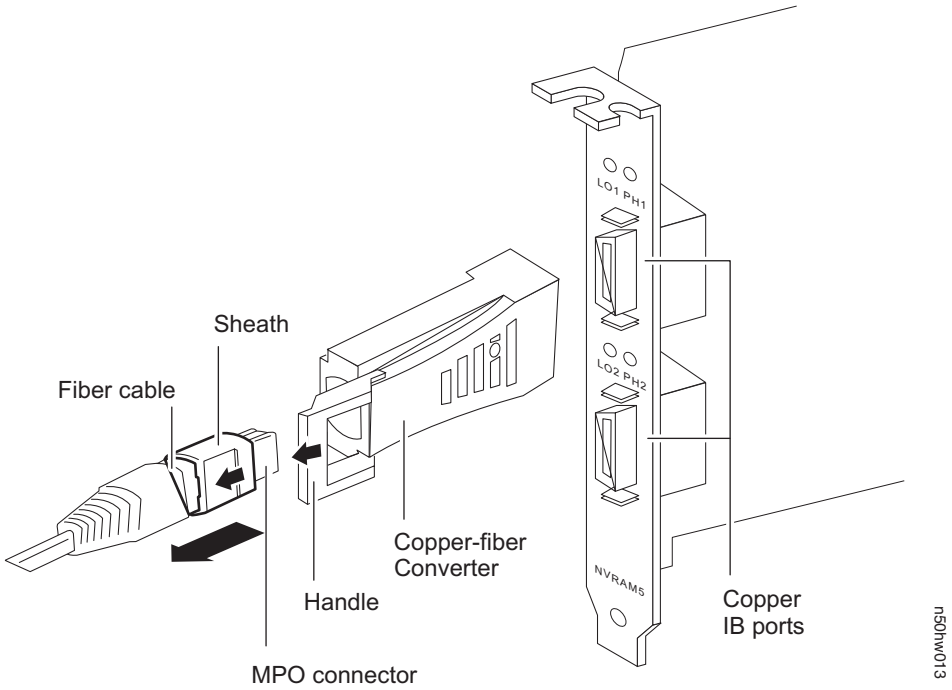


Figure 32. Copper-fiber converter

If your system is an active-active (clustered) configuration that uses copper interconnect cables, remove each cable by carefully pressing the latches on the cable and slowly pull the connector from the NVRAM6 adapter port, as shown in Figure 33 on page 66.

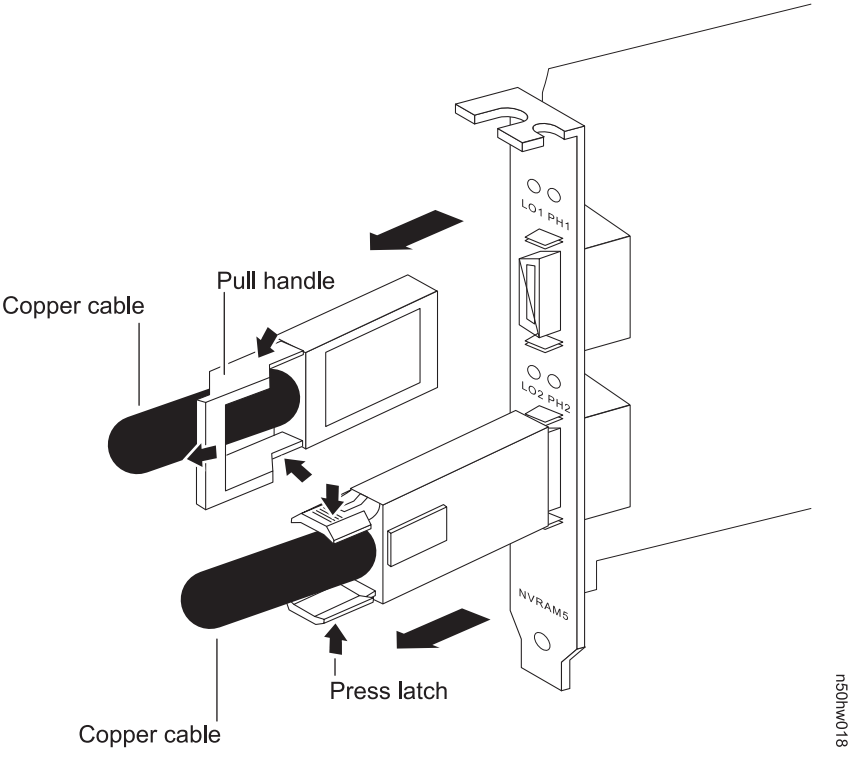


Figure 33. IB connector

3. Remove the NVRAM6 adapter by completing the following substeps, using Figure 34 on page 67 for reference:

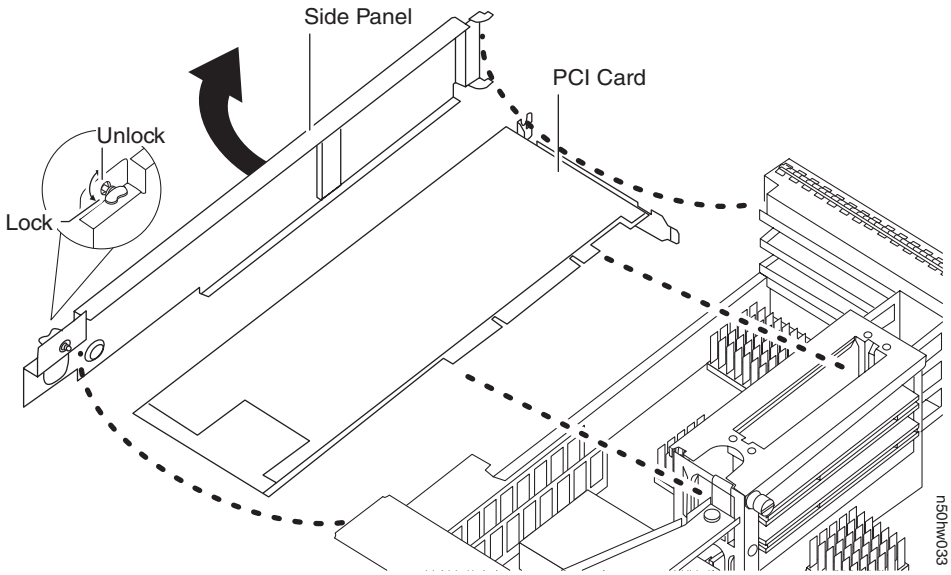


Figure 34. Accessing the NVRAM6 adapter

a. Turn the motherboard tray on its side, locate the locking wing nut, and then push down and turn the locking wing nut one quarter turn.
b. Swing the side panel away from the motherboard tray.
c. Locate and remove the NVRAM6 adapter, close and lock the side panel back into the chassis, and then set the motherboard tray aside, on its bottom.

Note: Use caution when removing or installing any adapter cards in slots 3 and 4 in the N5300 and N5600 system. Slots 3 and 4 are located close to the CompactFlash card, and the CompactFlash card may be damaged if caution is not used when removing or installing adapter cards in these slots.

4. Go to "Installing an NVRAM5 adapter" on page 63.

Installing an NVRAM6 Adapter

1. If necessary, open the system, following the steps provided in "Opening the system" on page 39.
2. Open the system chassis side panels, if necessary, and reinstall 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 stand-alone or fabric-attached MetroCluster system (A10) system, install it in slot 1.

If the NVRAM6 adapter is installed in an active-active (clustered) configuration (A20), install it in slot 3.

Note: Use caution when removing or installing any adapter cards in slots 3 and 4 in the N5300 and N5600 system. Slots 3 and 4 are located close to the CompactFlash card, and the CompactFlash card may be damaged if caution is not used when removing or installing adapter cards in these slots.

3. Close and lock the side panels. When locking the side panels, push down on the locking wing nut and turn it a quarter turn.
4. Align the end of the motherboard tray with the motherboard tray opening in the system.
5. Gently push the motherboard tray back into the system chassis. The cam handle begins to engage when the motherboard tray is properly seated all the way inside the chassis.
6. Firmly push the cam handle to finish seating the motherboard tray in the system, and then lift the cam handle to the closed position.
7. Tighten the thumbscrew on the cam handle.
8. Reinstall the cable management tray and recable the system, as needed.

   Attention: When recabling the NVRAM6 in an active-active (clustered) configuration, remember to reinstall the copper-fiber converter or copper cable adapter.
9. Using the documentation for your external storage as a guide, power on your external storage (EXN expansion units or third-party storage). Then power on your system (using the *Installation and Setup Instructions* that came with your system as a guide) and run diagnostics on your NVRAM by pressing Ctrl-C when you are prompted with the message `Starting Autoboot press CTRL-C to Abort`.

   When the loader prompt appears, enter the following command:

   ```
   boot_diags
   ```

   When the `Enter Diag, Command or Option` prompt appears, enter the following command:

   ```
   nvram
   ```
10. Reassign disks 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 new system ID, all disks, and the old system ID by entering the following command:

       ```
       disk show -v
       ```
    d. Reassign disk ownership, based on the following scenarios:

If you are replacing the NVRAM6 adapter inside a system in a high-availability configuration and you performed a takeover, enter the following command on the partner node, using the system ID information obtained in the previous step.

```
disk reassign -d new_sysid
```

If you are performing the NVRAM6 adapter replacement inside a system in a stand-alone configuration, enter the following command:

```
disk reassign -s old_sysid -d new_sysid
```

e. Shut down your system by entering the following command at the console:

```
halt
```

11. Boot Data ONTAP.

    If your system is in a stand-alone configuration, enter the following command:

    ```
    boot_ontap
    ```

    If your system is in a high-availability configuration and you performed a takeover, the node is waiting for you to perform a giveback operation. Enter the following command on the takeover node:

    ```
    cf giveback
    ```

12. To ensure that the disks were assigned correctly, enter the following command:

    ```
    disk show -v
    ```

    Note: Disks are shown as assigned to the system.

13. 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.

Note: The NVRAM6 adapter contains a lithium ion battery. The failed part should be returned to IBM. Refer to "Battery return program" on page xii for information regarding the return process.

Replacing the CompactFlash card

If you are replacing a CompactFlash card in an N5200 or N5500 system: Follow the procedures provided in "Replacing the CompactFlash card in N5200 and N5500 systems" on page 70 and then continue with "Placing the system files on the CompactFlash card in the N5000 series system" on page 73.

If you are replacing a CompactFlash card in an N5300 or N5600 system: Follow the procedures provided in "Replacing the CompactFlash card in N5300 and N5600 systems" on page 71 and then continue with "Placing the system files on the CompactFlash card in the N5000 series system" on page 73.

Replacing the CompactFlash card in N5200 and N5500 systems

Replacing a CompactFlash card in N5200 and N5500 systems consists of the following tasks:

- "Removing the CompactFlash card in N5200 and N5500 systems"
- "Installing the CompactFlash card in N5200 and N5500 systems" on page 71
- "Placing the system files on the CompactFlash card in the N5000 series system" on page 73
- "Restoring environment variables on the CompactFlash card" on page 75
- "Restoring onboard Fibre Channel port configuration on the CompactFlash card" on page 75
- "Updating the CompactFlash Card in the N5000 series system" on page 76
- "Completing the replacement process" on page 77

Removing the CompactFlash card in N5200 and N5500 systems

To remove the CompactFlash card, complete the following steps:

1. Open the system, following the steps provided in "Opening the system" on page 39.
2. Locate the CompactFlash card on the side of the motherboard tray and gently pull the card straight out of the system.

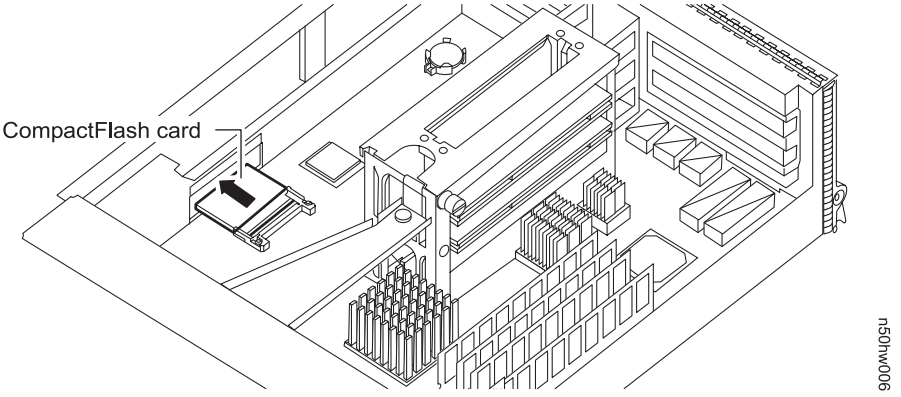


Figure 35. CompactFlash card

3. Set the CompactFlash card aside.

Installing the CompactFlash card in N5200 and N5500 systems

To install the CompactFlash card into the motherboard, complete the following steps:

1. Turn the motherboard tray so that you can easily see the slot on the side where the CompactFlash card is inserted.
2. Align the CompactFlash card, face up, with the CompactFlash connector inside the system chassis. The keying on the CompactFlash card only allows for one way of insertion.
3. Seat the CompactFlash card by pushing it firmly into the CompactFlash connector. The CompactFlash card should be squarely seated and should not move when you wiggle it. Reseat the CompactFlash card, if necessary.
4. Reinstall the motherboard tray by completing the following substeps:
   a. Align the end of the motherboard tray with the opening in the system chassis.
   b. Gently push the motherboard tray into the system chassis. The cam handle begins to engage when the motherboard tray is properly seated all the way inside the system chassis.
   c. Firmly push the cam handle to finish seating the motherboard tray in the system chassis, and then lift the cam handle to the closed position.
   d. Tighten the thumbscrew on the cam handle.
5. Reinstall the cable management tray and recable the system, as needed.
6. Go to "Placing the system files on the CompactFlash card in the N5000 series system" on page 73.

Replacing the CompactFlash card in N5300 and N5600 systems

Replacing a CompactFlash card in N5300 and N5600 systems consists of the following tasks:

Removing the CompactFlash card in N5300 and N5600 systems

1. Reboot the system and press Ctrl-C when you see the following system message:

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

2. At the Bootloader prompt, enter the following command:

   ```
   printenv
   ```

3. Copy and save the screen display to safe location for the steps in "Restoring environment variables on the CompactFlash card" on page 75.

   If your system is a standalone system, go to Step 4.

   If your system is part of a high-availability (also referred to as clusters or active/active pairs) configuration, enter the following command from Node B to save Node A's onboard Fibre Channel port configuration information:

   ```
   partner fcadmin config
   ```

   Copy and save the screen/display to safe location for the steps in "Restoring onboard Fibre Channel port configuration on the CompactFlash card" on page 75.

4. Open the system, following the steps provided in "Opening the system" on page 39.
5. Locate the CompactFlash card on the side of the motherboard tray and gently pull the card straight out of the system.

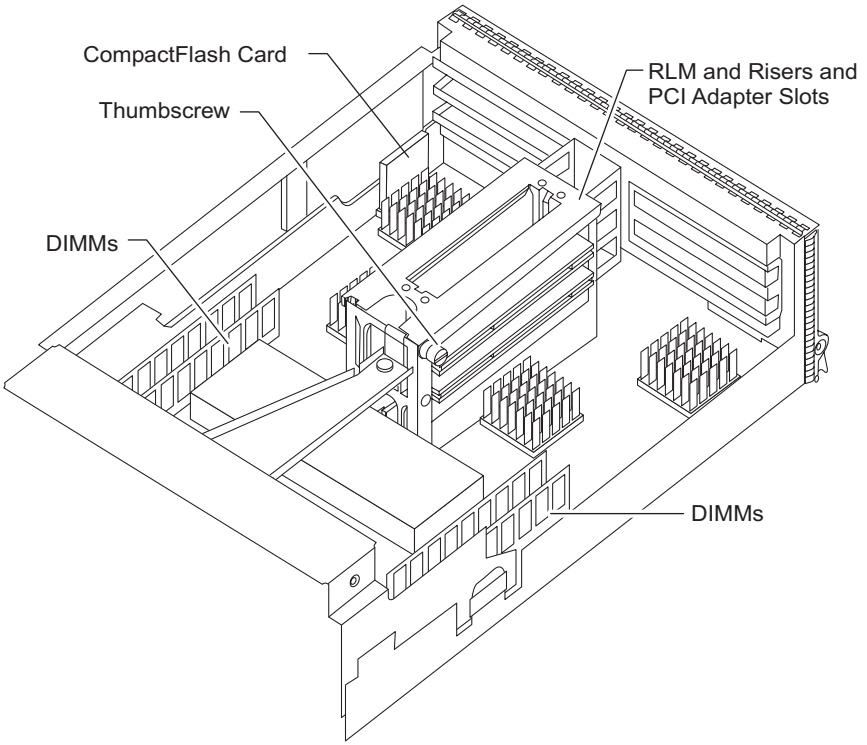


Figure 36. Motherboard layout (N5300 and N5600)

6. Set the CompactFlash card aside.

Installing the CompactFlash card in the N5300 and N5600 systems

1. Align the CompactFlash card with the CompactFlash connector inside the system chassis. The keying on the CompactFlash card only allows for one way of insertion. Insert the CompactFlash card.
2. Seat the CompactFlash card by pushing it firmly into the CompactFlash connector. The CompactFlash card should be squarely seated and should not move. Reseat it if necessary.
3. Reinstall the motherboard tray by completing the following substeps:
   a. Align the end of the motherboard tray with the opening in the system chassis.
   b. Gently push the motherboard tray into the system chassis. The cam handle begins to engage when the motherboard tray is properly seated all the way inside the system chassis.
   c. Firmly push the cam handle to finish seating the motherboard tray in the system chassis, and then lift the cam handle to the closed position.
   d. Tighten the thumbscrew on the cam handle.
4. Go to "Placing the system files on the CompactFlash card in the N5000 series system."

Placing the system files on the CompactFlash card in the N5000 series system

The CompactFlash card arrives blank. Before you use it, you must transfer the system files to it. You can transfer the system files to the CompactFlash card in one of two ways:

- "Transferring the system files using netboot"
- "Transferring the system files using a PC" on page 74

Attention: This procedure presumes that you have access to a PC running Windows® XP.

Transferring the system files using netboot

1. Per the recommendations in the *IBM System Storage N series Data ONTAP Upgrade Guide* for your version of Data ONTAP, place the system files on the server you use for netbooting. You can copy the system files from the system boot directory, at /etc/boot/netapp-x86, 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 CFE or 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 CFE or LOADER prompt:

   ```
   netboot URL
   ```

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

5. Go to "Restoring environment variables on the CompactFlash card" on page 75.

Transferring the system files using a PC

1. Download `<rlse>_setup_e.exe` to your PC, where `rlse` is the Data ONTAP release number. You can copy the system files from the system boot directory, at /etc/boot/netapp-x86, or download it from the following Web site.

   www.ibm.com/storage/support/nas

   Attention: Make sure that you download the file designed for administering from a PC.

2. Extract the contents of `<rlse>_setup_e.exe` to a temporary folder on your PC.
3. Insert the CompactFlash card into the card writer in your computer.

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

4. Continue the file transfer process by following one of the following two procedures, depending on your N5000 series system:
   - **For an N5200 or N5500:**
     a. Create a folder called X86_ELF in the root partition of the CompactFlash card, and then create a subfolder called KERNEL in the X86_ELF folder.
     b. Copy `netapp-x86` into the KERNEL folder in Windows Explorer.

Note: The file `netapp-x86` may be located in the boot directory that is created during the extraction process.

c. Rename the `netapp-x86` image to `Primary.KRN`.

d. Install the CompactFlash card with the kernel image into the system.

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

- **For an N5300 or N5600:**

a. 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.

b. Copy `netapp-x86-64` into the KERNEL folder in Windows Explorer.

Note: The file `netapp-x86-64` may be located in the boot directory that is created during the extraction process.

c. Rename the `netapp-x86-64` image to Primary.KRN.

d. Install the CompactFlash card with the kernel image into the system.

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

Restoring environment variables on the CompactFlash card

IBM N series systems use the CompactFlash card for storing the Data ONTAP kernel, system diagnostics, and motherboard firmware, and also for storing environment variables.

Attention: If you set any environment variables specific to your N5000 series system, you must redefine those variables during the restoration process.

Use the information you saved when you removed your CompactFlash card to restore your customized variable settings on the CompactFlash card. For information, see the *IBM System Storage N series Data ONTAP System Administration Guide* for your version of Data ONTAP.

If your system is a standalone system, go to "Updating the CompactFlash Card in the N5000 series system" on page 76.

If your system is part of a clustered or active/active configuration, go to "Restoring onboard Fibre Channel port configuration on the CompactFlash card."

Restoring onboard Fibre Channel port configuration on the CompactFlash card

The onboard Fibre Channel port configuration is automatically restored (auto-reconfiguration) when Data ONTAP reboots a node during the first giveback. This might lead to a disruption in service. The following procedure

eliminates any potential service interruption in a high-availability (also referred to as clusters or active/active pairs) configuration.

Note: See the description of the command fcadmin in the *IBM System Storage N series Data ONTAP Commands: Manual Page Reference, Volume 1* for your version of Data ONTAP for more information about onboard Fibre Channel port configuration.

Attention: You do not need to do this procedure in a nonclustered environment.

1. Boot the failing node to Maintenance mode by pressing Ctrl-C during reboot.
2. Program the onboard ports with information you obtained when you removed the CompactFlash cardby entering the following commands:
   - Set ports to Target mode: `fcadmin config -t target adapter_name ...`
   - Set ports to Initiator mode: `fcadmin config -t initiator adapter_name ...`
   - Set ports to the unconfigured state: `fcadmin config -t unconfig adapter_name ...`

   where `adapter_name` is the port number (for example, 0c). You can specify more than one port.
3. Halt the system using the `halt` command, and go to "Updating the CompactFlash Card in the N5000 series system."

Updating the CompactFlash Card in the N5000 series system

1. Download the system files 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 enable 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.
   ```
2. Check the version of the image by entering the following command:

   ```
   version -b
   ```
3. Reboot the system by entering the following command:

   ```
   reboot
   ```
4. Go to "Completing the replacement process" on page 77.

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 power supplies

This section describes the following tasks for replacing the AC power supplies:

- "Removing a power supply"
- "Installing a power supply" on page 78
- "Completing the replacement process" on page 78

The two power supplies in this system are redundant power supplies, which are hot-swappable and interchangeable. They are located at the back of the system and to the right of the motherboard tray.

Removing a power supply

To remove a power supply, complete the following steps, using Figure 37 for reference:

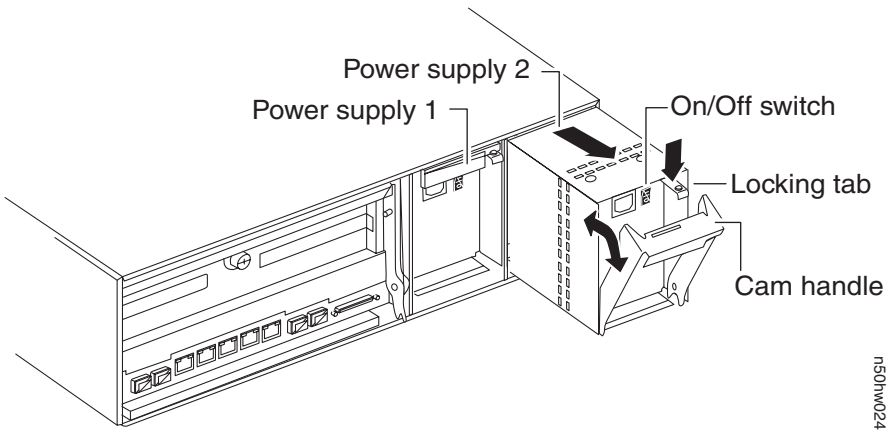


Figure 37. Power supply

1. Identify the power supply you want to replace, based on console error messages or through the LEDs on the power supplies.
2. Ground yourself to the system chassis using the grounding leash, and turn off and unplug the target power supply.
3. Release the power supply cam handle, and lower it toward the bottom of the system.

4. Pull the power supply out of the chassis, making sure that you support the power supply with your free hand.

   Attention: The power supply is heavy. You must remove it from the chassis using both hands, or you can injure yourself when the power supply clears the chassis and swings toward you.

Installing a power supply

To install a power supply, complete the following steps:

1. Ground yourself to the chassis using a grounding leash.
2. Align the power supply with the opening in the chassis, and slide it into the chassis as far as it can go. Make sure that you support the bottom of the power supply with your free hand.
3. Seat the power supply in the chassis by pushing its edges with your fingers. When properly seated, the power supply cam handle begins to swing up, indicating that it is engaged and ready for locking.
4. Swing the power supply cam handle up to the locking position and engage the lock tab. Wiggle the power supply to make sure that it is properly seated.
5. Plug the power cord into the new power supply and turn it on. The power supply might take a few seconds to come online.

   Note: Although it is not required, you might want to run diagnostics on the new power supply at next boot, to verify that it is functioning properly.

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 N5000 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 N5000 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 20. 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 21. 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 22. 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 (N5200 and N5500)

The N5200 and N5500 support a variety of optional adapter cards.

Table 23. Optional adapter cards supported by N5200 and N5500 models

Feature Code	Feature Code Description
1003	Dual-port Gigabit Ethernet adapter (optical)
1004	Dual-port FC HBA for Disk Attachment (filer)
1005	Dual-port FC HBA for Tape
1006	Dual-port FC HBA for Disk Attachment (gateways and MetroCluster filer configurations)
1007	Quad-port 10/100/1000 Ethernet adapter (copper)
1008	Single-port 10 Gigabit Ethernet (10 GbE) (optical)
1010	Dual-port GbE iSCSI target adapter (copper)
1011	Dual-port GbE iSCSI target adapter (optical)
1016	SCSI Ultra320 Dual-Channel LVD Tape Adapter
1018	Dual-port MetroCluster VI FC HBA (Models A20/G20 only)
1019	Dual-port 4-Gbps FC target HBA
1020	Dual-port 10/100/1000 Ethernet adapter (copper)
1027	Quad-port 4-Gbps FC HBA for Disk

The following is the priority order for installing optional adapter cards into the N5200 and N5500:

1. Dual-port FC HBA for disk attachment (FC 1004), Dual-port FC HBA for gateways and Metrocluster configuration (FC 1006), Dual-port 4-Gbps FC Target HBA (FC 1019), and Quad-port 4-Gbps FC HBA for Disk (FC 1027)
2. Gigabit Ethernet iSCSI target adapters (FC 1010 and 1011)
3. Ethernet Network Interface Cards (FC 1003, 1007, 1008, and 1020)
4. SCSI Dual-channel Ultra320 LVD adapter for tape attachment (FC 1016)

For information about monitoring the LEDs for your optional adapter cards, refer to the *IBM System Storage N series Error Messages and Troubleshooting Guide*.

Dual-port Gigabit Ethernet adapter (optical) (FC 1003)

Feature code 1003 is a dual-port Gigabit Ethernet network interface card. The adapter supports 10000BASE-SX network topologies. The adapter has two LC duplex connectors and supports 50- micron and 62.5-micron multi-mode fibre (MMF). The maximum cable distance is 550 m using 50-micron MMF and 275 m using 62.5-micron MMF.

For single-node models (A10 and G10), the maximum number of this adapter is three. For dual-node models (A20 and G20), the maximum number of this adapter is six.

For single-node models (A10 and G10), the slot priority for this adapter is slots 3, 4 and 2. For dual-node models (A20 and G20), the slot priority for this adapter is slots 1, 2 and 4.

Dual-port FC HBA for Disk Attachment (filer) (FC 1004)

Feature code 1004 is a dual-port 2-Gbps Fibre Channel HBA interface for disk storage expansion unit (EXN1000, EXN2000, and EXN4000) attachment. FC 1004 is used on all models of the N5200 and N5500 filers (A10 and A20) for attaching EXN1000, EXN2000, and EXN4000 disk storage expansion units.

This adapter provides two 2-Gbps LC connectors that support 50-micron or 62.5-micron multi-mode fibre. The adapter auto-negotiates to 1 or 2 Gbps.

The maximum cable distances supported are:

Table 24. Dual-port FC HBA for Disk Attachment (filer) - maximum cable lengths

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

For single-node models (A10), the maximum number of this adapter is three. For dual-node models (A20), the maximum number of this adapter is six.

For single-node models (A10), the slot priority order for installing this adapter is slots 2, 3 and 4. For dual-node models (A20), the slot priority order for installing this adapter is slots 2, 1 and 4.

Dual-port FC HBA for Tape (FC 1005)

Feature code 1005 is a dual-port Fibre Channel HBA interface for tape connectivity. This adapter is a 64-bit 133MHx 2 Gbps Fibre Channel adapter. It auto-negotiated to 2 and 1 Gbps. The adapter has two LC style connectors and supports 50-micron and 62.5-micron multi-mode fibre.

This adapter supports the following maximum cable lengths:

Table 25. Dual-port FC HBA for Tape - maximum cable lengths

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

For single-node models (A10 and G10), the maximum number of this adapter is three. For dual-node models (A20 and G20), the maximum number of this adapter is six.

For single-node models (A10 and G10) the slot priority order for this adapter is slots 4, 3 and 2. For dual-node models (A20 and G20) the slot priority order for this adapter is slots 2, 1 and 4.

Dual-port FC HBA for Disk Attachment (gateway and MetroCluster filer) (FC 1006)

Feature code 1006 is a 2-Gbps FC HBA for disk attachment. This adapter provides two 2-Gbps LC connectors that support 50 micron or 62.5 micron multi-mode fibre. The adapter auto-negotiates to 1 or 2 Gbps.

The maximum cable distances supported are:

Table 26. Dual-port FC HBA for Disk Attachment (gateway and MetroCluster filer) - maximum cable lengths

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

This adapter is used for two purposes. This adapter is used on N5200 and N5500 gateway models (G10 and G20) for attaching the N5200 or N5500 storage controllers directly to back-end disk systems or to fibre channel switches, which are then connected to back-end disk systems.

In addition, FC 1006 is used in a fabric MetroCluster environment for attaching dual-node N5200 and N5500 filer models (A20) to the fibre channel switches that are used in a fabric MetroCluster configuration. In a fabric MetroCluster configuration, FC 1018 Dual-port MetroCluster HBA is also required.

For single-node models (G10) the maximum number of this adapter is three. For dual-node models (A20 and G20) the maximum number of this adapter is six.

For single-node models (G10), the slot priority order for installing this adapter is 2, 3 and 4. For dual-node models (A20 and G20), the slot priority order for installing this adapter is 2, 1, and 4.

Quad-port 10/100/1000 Ethernet adapter (copper) (FC 1007)

Feature code 1007 is a quad-port 10/100/1000 Ethernet network interface card. This adapter supports 10BASE-T, 100BASE-TX, and 1000BASE-T network topologies. This adapter has four RJ-45 connectors and supports a maximum cable distance of 100 m using Category 5 or better 4-pair unshielded twisted pair (UTP) media.

For single-node models (A10 and G10), the maximum number of this adapter is two. For dual-node models (A20 and G20), the maximum number of this adapter is four.

For single-node models (A10 and G10), the slot priority order for this adapter is slots 3, 4 and 2. For dual-node models (A20 and G20), the slot priority order for this adapter is slots 1, 2, and 4.

Single-port 10-Gigabit Ethernet (10-GbE) adapter (optical) (FC 1008)

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

For single-node models (A10 and G10), the maximum number of this adapter is two. For dual-node models (A20 and G20), the maximum number of this adapter is four.

For single-node models (A10 and G10), the slot priority order for this adapter is slots 3, 4 and 2. For dual-node models (A20 and G20), the slot priority order for this adapter is slots 1, 2 and 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 single-node models (A10 and G10), the maximum number of this adapter is three. For dual-node models (A20 and G20), the maximum number of this adapter is six.

For single-node models (A10 and G10), the slot priority order for installing this adapter is slots 3, 4 and 2. For dual-node models (A20 and G20), the slot priority order for installing this adapter is slots 1, 2 and 4.

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 single-node models (A10 and G10), the maximum number of this adapter is three. For dual-node models (A20 and G20), the maximum number of this adapter is six.

For single-node models (A10 and G10) the slot priority order for installing this adapter is slots 3, 4 and 2. For dual-node models (A20 and G20), the slot priority order for installing this adapter is slots 1, 2 and 4.

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 single-node models (A10 and G10) the maximum number of this adapter is three. For dual-node models (A20 and G20) the maximum number of this adapter is six.

For single-node models (A10 and G10), the slot priority order for installing this adapter is slots 4, 3, and 2. For dual-node models (A20 and G20), the slot priority order for installing this adapter is slots 2, 1 and 4.

Dual-port MetroCluster VI FC HBA (Models A20/G20 only) (FC 1018)

Feature code 1018 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, two of these adapter cards must be ordered (one for each node of a dual-node cluster).

This adapter must be installed in slot 2.

Dual-port 4-Gbps FC target HBA (FC 1019)

Feature code 1019 is a PCI-X dual-port 4-Gbps HBA for FCP target ports. This adapter may only be used to provide additional FCP target ports; it may not be used to attach storage expansion units. FCP target ports are used by application servers on a Fibre Channel storage area network (SAN) for performing I/O to LUNs on the N5000 series systems using Fibre Channel Protocol (FCP). It auto-negotiates speeds of 1, 2, or 4 Gbps.

Two SFF multmode optical ports with LC connectors support the following cable lengths.

Table 27. Dual-port 4 Gbps FC target HBA - Maximum cable lengths

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

For a single-node model (A10 and G10), the maximum number of this adapter is two. For a dual-node model (A20 and G20), the maximum number of this adapter is four.

For single-node models, the slot priority order for installing this adapter is slots 3, 4 and 2. For dual-node models, the slot priority order for installing this adapter is slots 1, 2 and 4.

Dual-port 10/100/1000 Ethernet adapter (copper) (FC 1020)

Feature code 1020 is a 10/100/1000 Ethernet adapter. It supports 10BASE-T, 100BASE-TX and 1000BASE-T network topologies. The adapter provides two RJ-45 connections and supports a maximum cable length of 100 m using Category 5 or better 4-pair unshielded twisted pair (UTP) media.

For single-node models (A10 and G10), the maximum number of this adapter is three. For dual-node models (A20 and G20), the maximum number of this adapter is six.

For single-node models (A10 and G10), the slot priority order for installing this adapter is slots 3, 4 and 2. For dual-node models (A20 and G20), the slot priority order for installing this adapter is slots 1, 2 and 4.

Quad-port 4-Gbps FC HBA for Disk (FC 1027)

Feature code 1027 is a quad-port 4-Gbps Fibre Channel host bus adapter (HBA). It auto-negotiates to 4, 2, and 1 Gbps. It may only be used for attaching 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 four small form factor (SFP) multi-mode optics with LC style connectors. It supports the following maximum cable lengths:

Table 28. Quad-port 4-Gbps FC HBA for Disk - Maximum cable lengths

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

For single-node models (A10), the maximum number of this adapter is three. For dual-node models (A20), the maximum number of this adapter is six.

Since this is adapter is a PCI-X adapter, it may be installed in any slot not occupied by the NVRAM card. For a single node configuration, the slot priority order for this adapter is 4, 3, 2. For a dual-node configuration, the slot priority order is 2, 1, 4.

Appendix D. Optional adapter cards (N5300 and N5600)

IBM supports the following optional PCIe adapter cards in the N5300 and N5600.

Table 29. Optional adapter cards supported by N5300 and N5600

Feature Code	Feature Code Description
1012	Dual-port Gigabit Ethernet adapter (optical)
1013	Dual-port Gigabit Ethernet adapter (copper)
1014	Dual-port 4 Gbps FC HBA for disk attachment
1015	Dual-port 4 Gbps FC HBA for tape attachment
1017	Dual-port 4 Gbps FC target HBA
1021	Dual-port GbE iSCSI adapter (optical)
1022	Quad-port GbE Ethernet TOE adapter (copper)
1023	Quad-port GbE Ethernet adapter (copper)
1024	Dual-port Ultra 320 SCSI for Tape Attachment
1026	Dual-port GbE iSCSI Target adapter (copper)

The following is the priority order for installing optional adapter cards into the N5300 and N5600:

1. Fibre channel host bus adapter cards (FC 1017 and 1015)
2. Gigabit Ethernet iSCSI adapter cards (FC 1021 and 1026)
3. Ethernet Network Interface cards (FC 1012, 1013, 1022, 1023)
4. Dual-port 4 Gbps FC HBA for tape attachment (FC 1014) and dual-port Ultra 320 SCSI for tape attachment (FC 1024)

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

For information about monitoring the LEDs for your optional adapter cards, refer to the *IBM System Storage N series Error Messages and Troubleshooting Guide*.

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 550m using 50-micron MMF media.

For a single-node model (2868/2869-A10/G10), the maximum number of this adapter is three. For a dual-node model (2868/2869-A20/G20), the maximum number of this adapter is six.

Since this adapter is a PCIe adapter, it may be installed in any slot not occupied by the NVRAM card. For a single node configuration, the slot priority order for this adapter is 3, 4, 2. For a dual-node configuration, the slot priority order is 1, 2, 4.

Dual-port Gigabit 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 100m using Category 5 or better unshielded twisted pair (UTP) four-pair media.

For a single-node model (2868/2869-A10/G10), the maximum number of this adapter is three. For a dual-node model (2868/2869-A20/G20), the maximum number of this adapter is six.

Since this adapter is a PCIe adapter, it may be installed in any slot not occupied by the NVRAM card. For a single node configuration, the slot priority order for this adapter is 3, 4, 2. For a dual-node configuration, the slot priority order is 1, 2, 4.

Dual-port 4 Gbps FC 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 FC 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 30. Dual-port 4 Gbps FC HBA for disk - maximum cable lengths

Link operating speed	50 micron multi-mode fibre	62.5 micron multi-mode fibre
1 Gbps	500m	300m

Table 30. Dual-port 4 Gbps FC HBA for disk - maximum cable lengths (continued)

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

For a single-node model (2868/2869-A10/G10), the maximum number of this adapter is three. For a dual-node model (2868/2869-A20/G20), the maximum number of this adapter is six.

Since this adapter is a PCIe adapter, it may be installed in any slot not occupied by the NVRAM card. For a single node configuration, the slot priority order for this adapter is 4, 3, 2. For a dual-node configuration, the slot priority order is 2, 1, 4.

Dual-port 4 Gbps FC 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 31. Dual-port 4 Gbps FC HBA for tape - maximum cable lengths

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

For a single-node model (2868/2869-A10/G10), the maximum number of this adapter is three. For a dual-node model (2868/2869-A20/G20), the maximum number of this adapter is six.

Since this adapter is a PCIe adapter, it may be installed in any slot not occupied by the NVRAM card. For a single node configuration, the slot priority order for this adapter is 4, 3, 2. For a dual-node configuration, the slot priority order is 2, 1, 4.

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

Dual-port 4 Gbps FC 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 (EXN1000s, EXN2000s, and EXN4000s).

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

Table 32. Dual-port 4 Gbps FCP Target HBA - maximum cable lengths

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

For a single-node model (2868/2869-A10/G10), the maximum number of this adapter is three. For a dual-node model (2868/2869-A20/G20), the maximum number of this adapter is six.

Since this adapter is a PCIe adapter, it may be installed in any slot not occupied by the NVRAM card. For a single node configuration, the slot priority order for this adapter is 4, 3, 2. For a dual-node configuration, the slot priority order is 2, 1, 4.

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

Feature code 1021 is a dual-port Ethernet iSCSI adapter.

For single-node models (2868/2869-A10/G10), the maximum number of this adapter is three. For dual-node models (2868/2869-A20/G20), the maximum number of this adapter is six.

Since this adapter is a PCIe adapter, it may be installed in any slot not occupied by the NVRAM card. For a single node configuration, the slot priority order for this adapter is 3, 4, 2. For a dual-node configuration, the slot priority order is 1, 2, 4.

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 (2868/2869-A10/G10), the maximum number of this adapter is three. For dual-node models (2868/2869-A20/G20), the maximum number of this adapter is six.

Since this adapter is a PCIe adapter, it may be installed in any slot not occupied by the NVRAM card. For a single node configuration, the slot priority order for this adapter is 3, 4, 2. For a dual-node configuration, the slot priority order is 1, 2, 4.

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

Feature code 1023 is a quad-port 10/100/1000 Ethernet adapter. This adapter supports 10BASE-T, 100BASE-TX and 1000BASE-T Ethernet standard. It has four RJ-45 connectors and supports a maximum distance of 100m using Category 5 or better unshielded twisted pair (UTP) four-pair media.

For single-node models (2868/2869-A10/G10), the maximum number of this adapter is three. For dual-node models (2868/2869-A20/G20), the maximum number of this adapter is six.

Since this adapter is a PCIe adapter, it may be installed in any slot not occupied by the NVRAM card. For a single node configuration, the slot priority order for this adapter is 3, 4, 2. For a dual-node configuration, the slot priority order is 1, 2, 4.

Dual-port Ultra 320 SCSI for Tape Attachment (FC 1024)

Feature code 1024 is a dual-port Ultra 320 SCSI host bus adapter (HBA) for tape attachment.

For single-node models (2868/2869-A10/G10), the maximum number of this adapter is three. For dual-node models (2868/2869-A20/G20), the maximum number of this adapter is six.

Since this adapter is a PCIe adapter, it may be installed in any slot not occupied by the NVRAM card. For a single node configuration, the slot priority order for this adapter is 3, 4, 2. For a dual-node configuration, the slot priority order is 2, 1, 4.

Dual-port GbE iSCSI Target adapter (copper) (FC 1026)

Feature code 1026 is a dual-port Ethernet iSCSI adapter.

For single-node models (2868/2869-A10/G10), the maximum number of this adapter is three. For dual-node models (2868/2869-A20/G20), the maximum number of this adapter is six.

Since this adapter is a PCIe adapter, it may be installed in any slot not occupied by the NVRAM card. For a single node configuration, the slot priority order for this adapter is 3, 4, 2. For a dual-node configuration, the slot priority order is 1, 2, 4.

Appendix E. 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 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 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 & 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 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 Software Upgrade Guide*, GC26-7958
- *IBM System Storage N series Data ONTAP 7.2 Gateway Integration Guide for IBM Storage*, GC26-7959
- *IBM System Storage N series Data ONTAP 7.2 Gateway Integration Guide for Hitachi Storage*, GC26-7960
- *IBM System Storage N series Data ONTAP 7.2 Gateway Integration Guide for HP XP Storage*, GC26-7961
- *IBM System Storage N series Data ONTAP 7.2 Gateway Integration Guide for EMC CLARiiON Storage*, GC27-2081
- *IBM System Storage N series Data ONTAP 7.2 Gateway Integration Guide for Fujitsu ETERNUS Storage*, GC27-2082
- *IBM N series Gateway Data ONTAP 7.2 Integration Guide for IBM SAN Volume Controller Storage*, GC27-2061
- *IBM Gateway Data ONTAP 7.2 3PAR Implementation Guide*, GC27-2090
- *IBM Gateway Data ONTAP 7.2 MetroCluster Guide*, GC27-2091
- *IBM Gateway Data ONTAP 7.2 Installation Requirements, Quick Start, & Reference Guide*, GC27-2092

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 Release Notes*, GC26-7837

Other N series and N series-related documents

- *IBM System Storage N series Platform Monitoring Guide*, GC27-2088
- *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 Configuration Guide*, GC26-7835
- *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

Notices

This information was developed for products and services offered in the U.S.A.

IBM may not offer the products, services, or features discussed in this document in other countries. Consult your local IBM representative for information on the products and services currently available in your area. Any reference to an IBM product, program, or service is not intended to state or imply that only that IBM product, program, or service may be used. Any functionally equivalent product, program, or service that does not infringe on any IBM intellectual property right may be used instead. However, it is the user's responsibility to evaluate and verify the operation of any non-IBM product, program, or service.

IBM may have patents or pending patent applications covering subject matter described in this document. The furnishing of this document does not give you any license to these patents. You can send license inquiries, in writing to:

IBM Director of Licensing
IBM Corporation
North Castle Drive
Armonk, N.Y. 10504-1785
U.S.A.

For additional information, visit the web at:
http://www.ibm.com/ibm/licensing/contact/

The following paragraph does not apply to the United Kingdom or any other country where such provisions are inconsistent with local law:
INTERNATIONAL BUSINESS MACHINES CORPORATION PROVIDES THIS PUBLICATION "AS IS" WITHOUT WARRANTY OF ANY KIND, EITHER EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF NON-INFRINGEMENT, MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. Some states do not allow disclaimer of express or implied warranties in certain transactions, therefore, this statement may not apply to you.

This information could include technical inaccuracies or typographical errors. Changes are periodically made to the information herein; these changes will be incorporated in new editions of the publication. IBM may make improvements and/or changes in the product(s) and/or the program(s) described in this publication at any time without notice.

Any references in this information to non-IBM web sites are provided for convenience only and do not in any manner serve as an endorsement of those web sites. The materials at those web sites are not part of the materials for this IBM product and use of those web sites is at your own risk.

IBM may use or distribute any of the information you supply in any way it believes appropriate without incurring any obligation to you.

Any performance data contained herein was determined in a controlled environment. Therefore, the results obtained in other operating environments may vary significantly. Some measurements may have been made on development-level systems and there is no guarantee that these measurements will be the same on generally available systems. Furthermore, some measurement may have been estimated through extrapolation. Actual results may vary. Users of this document should verify the applicable data for their specific environment.

Information concerning non-IBM products was obtained from the suppliers of those products, their published announcements or other publicly available sources. IBM has not tested those products and cannot confirm the accuracy of performance, compatibility or any other claims related to non-IBM products. Questions on the capabilities of non-IBM products should be addressed to the suppliers of those products.

If you are viewing this information in softcopy, the photographs and color illustrations may not appear.

Trademarks

The following terms are trademarks of International Business Machines Corporation in the United States, other countries, or both:

IBM	ServerProven
IBM logo	System Storage

NetApp, the Network Appliance logo, the bolt design, NetApp–the Network Appliance Company, Data ONTAP, DataFabric, FAServer, FilerView, MultiStore, NearStore, NetCache, SecureShare, SnapManager, SnapMirror, SnapMover, SnapRestore, SnapVault, SyncMirror, and WAFL are registered trademarks of Network Appliance, Inc. in the United States, and/or other countries. gFiler, Network Appliance, SnapCopy, Snapshot, and The Evolution of Storage are trademarks of Network Appliance, Inc. in the United States and/or other countries and registered trademarks in some other countries. ApplianceWatch, BareMetal, Camera-to-Viewer, ComplianceClock, ComplianceJournal, ContentDirector, ContentFabric, EdgeFiler, FlexClone,

FlexVol, FPolicy, HyperSAN, InfoFabric, LockVault, Manage ONTAP, NOW, NetApp on the Web, ONTAPI, RAID-DP, RoboCache, RoboFiler, SecureAdmin, Serving Data by Design, SharedStorage, Simulate ONTAP, Smart SAN, SnapCache, SnapDirector, SnapDrive, SnapFilter, SnapLock, SnapMigrator, SnapSuite, SnapValidator, SohoFiler, vFiler, VFM, Virtual File Manager, VPolicy, and Web Filer are trademarks of Network Appliance, Inc. in the United States and other countries. NetApp Availability Assurance and NetApp ProTech Expert are service marks of Network Appliance, Inc. in the United States. Spinnaker Networks, the Spinnaker Networks logo, SpinAccess, SpinCluster, SpinFS, SpinHA, SpinMove, and SpinServer are registered trademarks of Spinnaker Networks, LLC in the United States and/or other countries. SpinAV, SpinManager, SpinMirror, SpinRestore, SpinShot, and SpinStor are trademarks of Spinnaker Networks, LLC in the United States and/or other countries.

Network Appliance is a licensee of the CompactFlash and CF Logo trademarks.

Network Appliance NetCache is certified RealSystem compatible.

Microsoft®, Windows, and Windows NT® are trademarks of Microsoft Corporation in the United States, other countries, or both.

UNIX is a registered trademark of The Open Group in the United States and other countries.

Other company, product, or service names may be trademarks or service marks of others.

Important notes

Processor speeds indicate the internal clock speed of the microprocessor; other factors also affect application performance.

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.

IBM makes no representation or warranties regarding non-IBM products and services that are ServerProven®, including but not limited to the implied warranties of merchantability and fitness for a particular purpose. These products are offered and warranted solely by third parties.

IBM makes no representations or warranties with respect to non-IBM products. Support (if any) for the non-IBM products is provided by the third party, not IBM.

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.

This product has been tested and found to comply with the limits for Class A Information Technology Equipment according to European Standard EN 55022. The limits for Class A equipment were derived for commercial and industrial environments to provide reasonable protection against interference with licensed communication equipment.

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.

European Community contact:
IBM Technical Regulations
Pascalstr. 100, Stuttgart, Germany 70569
Tele: 0049 (0)711 7851176
Fax: 0049 (0)711 785 1283
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

Zulassungsbescheinigung laut dem Deutschen Gesetz über die elektromagnetische Verträglichkeit von Geräten (EMVG) vom 18. September 1998 (bzw. der EMC EG Richtlinie 89/336)

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

Verantwortlich für die Konformitätserklärung nach Paragraph 5 des EMVG ist die: IBM Deutschland Informationssysteme GmbH 70548 Stuttgart.

Informationen in Hinsicht EMVG Paragraph 4 Abs. (1) 4:

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

EN 55022 Klasse A Geräte müssen mit folgendem Warnhinweis versehen werden: "Warnung: dies ist eine Einrichtung der Klasse A. Diese Einrichtung kann im Wohnbereich Funkstörungen verursachen; in diesem Fall kann vom Betreiber verlangt werden, angemessene Maßnahmen durchzuführen und dafür aufzukommen."

Anmerkung: Um die Einhaltung des EMVG sicherzustellen, sind die Geräte wie in den IBM Handbüchern angegeben zu installieren und zu betreiben.

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

此为A级产品，在生活环境中，该产品可能会造成无线电干扰。在这种情况下，可能需要用户对其干扰采取切实可行的措施。

Taiwan Class A warning statement

警告使用者:
這是甲類的資訊產品，在
居住的環境中使用時，可
能會造成射頻干擾，在這
種情況下，使用者會被要
求採取某些適當的對策。

Japan VCCI Class A ITE Electronic Emission Statement

この装置は、情報処理装置等電波障害自主規制協議会（ＶＣＣＩ）の基準に基づくクラスＡ情報技術装置です。この装置を家庭環境で使用すると電波妨害を引き起こすことがあります。この場合には使用者が適切な対策を講ずるよう要求されることがあります。

Korean Class A Electronic Emission Statement

이기기는 업무용으로 전자파 적합등록을 받은 기기
이오니, 판매자 또는 사용자는 이점을 주의하시기
바라며, 만약 잘못 구입하셨을 때에는 구입한 곳에
서 비업무용으로 교환하시기 바랍니다.

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.

Index

F

G

H

I

L

M

U

W

Readers' Comments — We'd Like to Hear from You

IBM System Storage
N5000 Series Hardware and Service Guide

Publication No. GC26-7785-06

We appreciate your comments about this publication. Please comment on specific errors or omissions, accuracy, organization, subject matter, or completeness of this book. The comments you send should pertain to only the information in this manual or product and the way in which the information is presented.

For technical questions and information about products and prices, please contact your IBM branch office, your IBM business partner, or your authorized remarketer.

When you send comments to IBM, you grant IBM a nonexclusive right to use or distribute your comments in any way it believes appropriate without incurring any obligation to you. IBM or any other organizations will only use the personal information that you supply to contact you about the issues that you state on this form.

Comments:

Thank you for your support.

Submit your comments using one of these channels:
- Send your comments to the address on the reverse side of this form.

If you would like a response from IBM, please fill in the following information:

Name	Address
Company or Organization	
Phone No.	E-mail address

Readers' Comments — We'd Like to Hear from You
GC26-7785-06

Cut or Fold
Along Line

Fold and Tape **Please do not staple** Fold and Tape

NO POSTAGE
NECESSARY
IF MAILED IN THE
UNITED STATES

BUSINESS REPLY MAIL

FIRST-CLASS MAIL PERMIT NO. 40 ARMONK, NEW YORK

POSTAGE WILL BE PAID BY ADDRESSEE

International Business Machines Corporation
Information Development
Dept. GZW
9000 South Rita Road
Tuscon, AZ
U.S.A. 85744-0001

Fold and Tape **Please do not staple** Fold and Tape

GC26-7785-06

Cut or Fold
Along Line

Printed in USA

GC26-7785-06