IBM Flex System Fabric CN4093 10Gb Converged Scalable Switch

User's Guide

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User's Guide

Note: Before using this information and the product it supports, read the general information in Appendix B, “Notices,” on page 35, the *Safety Information* and *Environmental Notices and User Guide* documents on the IBM *Notices for Network Devices* CD, and the *Warranty Information* document that comes with the product.

First Edition, October 2012

Contents

Safety

Before installing this product, read the Safety Information.

قبل تركيب هذا المنتج، يجب قراءة الملاحظات الآمنية

Antes de instalar este produto, leia as Informações de Segurança.

在安装本产品之前，请仔细阅读 Safety Information (安全信息)。

安裝本產品之前，請先閱讀「安全資訊」。

Prije instalacije ovog produkta obavezno pročitajte Sigurnosne Upute.

Před instalací tohoto produktu si přečtěte příručku bezpečnostních instrukcí.

Læs sikkerhedsforskrifterne, før du installerer dette produkt.

Lees voordat u dit product installeert eerst de veiligheidsvoorschriften.

Ennen kuin asennat tämän tuotteen, lue turvaohjeet kohdasta Safety Information.

Avant d'installer ce produit, lisez les consignes de sécurité.

Vor der Installation dieses Produkts die Sicherheitshinweise lesen.

Πριν εγκαταστήσετε το προϊόν αυτό, διαβάστε τις πληροφορίες ασφάλειας (safety information).

לפני שתתקינו מוצר זה, קראו את הוראות הבטיחות.

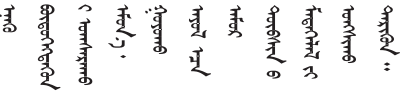
A termék telepítése előtt olvassa el a Biztonsági előírásokat!

Prima di installare questo prodotto, leggere le Informazioni sulla Sicurezza.

製品の設置の前に、安全情報をお読みください。

본 제품을 설치하기 전에 안전 정보를 읽으십시오.

Пред да се инсталира овој продукт, прочитајте информацијата за безбедност.



Les sikkerhetsinformasjonen (Safety Information) før du installerer dette produktet.

Przed zainstalowaniem tego produktu, należy zapoznać się z książką "Informacje dotyczące bezpieczeństwa" (Safety Information).

Antes de instalar este produto, leia as Informações sobre Segurança.

Перед установкой продукта прочтите инструкции по технике безопасности.

Pred inštaláciou tohto zariadenia si pečítaje Bezpečnostné predpisy.

Pred namestitvijo tega proizvoda preberite Varnostne informacije.

Antes de instalar este producto, lea la información de seguridad.

Läs säkerhetsinformationen innan du installerar den här produkten.

ཐོན་རྫས་འདི་བདེ་སྐྱོང་མ་བྱས་གོང་། ་སྐོར་གྱི་ཡིད་གཟབ་
བྱ་འདུ་མིན་ཡོད་པའི་འོད་སྣེར་བལྟ་དགོས།

Bu ürünü kurmadan önce güvenlik bilgilerini okuyun.

.مەزكۇر مەھسۇلاتنى ئورنىتىشتىن بۇرۇن بىخەتەرلىك ئۇچۇرلىرىنى ئوقۇپ چىقىڭ

Youq mwngz yungh canjbinj neix gaxgonq, itdingh aeu doeg aen canjbinj soengq cungj vahgangj ancien siusik.

Safety statements

Important:

Each caution and danger statement in this document is labeled with a number. This number is used to cross reference an English-language caution or danger statement with translated versions of the caution or danger statement in the *Safety Information* document.

For example, if a caution statement is labeled “Statement 1,” translations for that caution statement are in the *Safety Information* document under “Statement 1.”

Be sure to read all caution and danger statements in this document before you perform the procedures. Read any additional safety information that comes with the system or optional device before you install the device.

Statement 1:

DANGER

Electrical current from power, telephone, and communication cables is hazardous.

To avoid a shock hazard:

- **Do not connect or disconnect any cables or perform installation, maintenance, or reconfiguration of this product during an electrical storm.**
- **Connect all power cords to a properly wired and grounded electrical outlet.**
- **Connect to properly wired outlets any equipment that will be attached to this product.**
- **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 in the following table when installing, moving, or opening covers on this product or attached devices.**

To Connect:	**To Disconnect:**
1. Turn everything OFF.	1. Turn everything OFF.
2. First, attach all cables to devices.	2. First, remove power cords from outlet.
3. Attach signal cables to connectors.	3. Remove signal cables from connectors.
4. Attach power cords to outlet.	4. Remove all cables from devices.
5. Turn device ON.	

Statement 3:

CAUTION:
When laser products (such as CD-ROMs, DVD drives, fiber optic devices, or transmitters) are installed, note the following:

- **Do not remove the covers. Removing the covers of the laser product could result in exposure to hazardous laser radiation. There are no serviceable parts inside the device.**
- **Use of controls or adjustments or performance of procedures other than those specified herein might result in hazardous radiation exposure.**

DANGER

Some laser products contain an embedded Class 3A or Class 3B laser diode. Note the following.

Laser radiation when open. Do not stare into the beam, do not view directly with optical instruments, and avoid direct exposure to the beam.

UL Regulatory Information

This device is for use only with Listed IBM Flex System Enterprise Chassis.

Chapter 1. The IBM Flex System Fabric CN4093 10Gb Converged Scalable Switch

This *User's Guide* provides information and instructions for installing, updating the firmware, and solving problems for an IBM® Flex System Fabric CN4093 10Gb Converged Scalable Switch. For information about configuration and management of the converged switch, see the *Command Reference* for the IBM Flex System Fabric CN4093 10Gb Converged Scalable Switch and the product release notes.

The Pure Flex System Fabric CN4093 Converged Scalable Switch provides support for L2 and L3 switching, Converged Enhanced Ethernet (PFC, ETS, DCBX), Fibre Channel over Ethernet (FCoE), NPV Gateway and Full Fabric Fibre Channel Forwarder (FCF).

The base model of this scalable switch provides fourteen internal 10 Gb Ethernet/FCoE ports, two external 1Gb/10Gb Ethernet/FCoE ports and six external flexible ports, usable for either 10 Gb Ethernet/FCoE or 4/8 Gb Fibre Channel. With the optional licensing for pay-as-you-grow scalability, you easily and cost-effectively can enable additional internal 10 Gb Ethernet/FCoE ports, external 10 Gb/40 Gb Ethernet/FCoE ports and external flexible ports, usable for either 10 Gb Ethernet/FCoE or 4/8 Gb Fibre Channel.

This *User's Guide* contains information and instructions for installing the switch, updating the firmware, and solving problems.

For information about the types of compatible devices available for IBM products, contact your IBM marketing representative or authorized reseller. For a list of supported optional devices, see http://www.ibm.com/servers/eserver/serverproven/compat/us/.

You can obtain up-to-date information about the switch at http://www.ibm.com/supportportal/.

Notes:

1. The illustrations in this document might differ slightly from your hardware.
2. The screens that are described or referenced in this document might differ slightly from the screens that are displayed by your system. Screen content varies according to the type of IBM chassis and the firmware versions and options that are installed.

Related documentation

This *User's Guide* contains setup and installation instructions for the switch and general information about the switch, including how to configure, update, and troubleshoot the switch, and how to get help. The most recent version of this *User's Guide* and all other related documents are at http://publib.boulder.ibm.com/infocenter/flexsys/information/index.jsp

- *IBM Networking OS Application Guide* for the switch module
- *IBM Networking OS Menu-Based CLI Command Reference* for the switch module
- *IBM Networking OS ISCLI—Industry Standard CLI Command Reference* for the switch module
- *IBM Networking OS BBI Quick Guide* for the switch module
- *IBM Networking OS Release Notes* for the switch module

Notices and statements in this document

The caution and danger statements in this document are also in the multilingual *Safety Information* document, which is on the IBM *Documentation* CD. Each statement is numbered for reference to the corresponding statement in the *Safety Information* document.

The following notices and statements are used in this document:

- **Note:** These notices provide important tips, guidance, or advice.
- **Important:** These notices provide information or advice that might help you avoid inconvenient or problem situations.
- **Attention:** These notices indicate potential damage to programs, devices, or data. An attention notice is placed just before the instruction or situation in which damage could occur.
- **Caution:** These statements indicate situations that can be potentially hazardous to you. A caution statement is placed just before the description of a potentially hazardous procedure step or situation.
- **Danger:** These statements indicate situations that can be potentially lethal or extremely hazardous to you. A danger statement is placed just before the description of a potentially lethal or extremely hazardous procedure step or situation.

Features and specifications

For detailed information about the switch hardware and firmware features, specifications, and standards, see the switch *Application Guide.* See the documentation that came with your IBM chassis for information about the environmental conditions and specifications that are supported by the system.

Major components of the switch

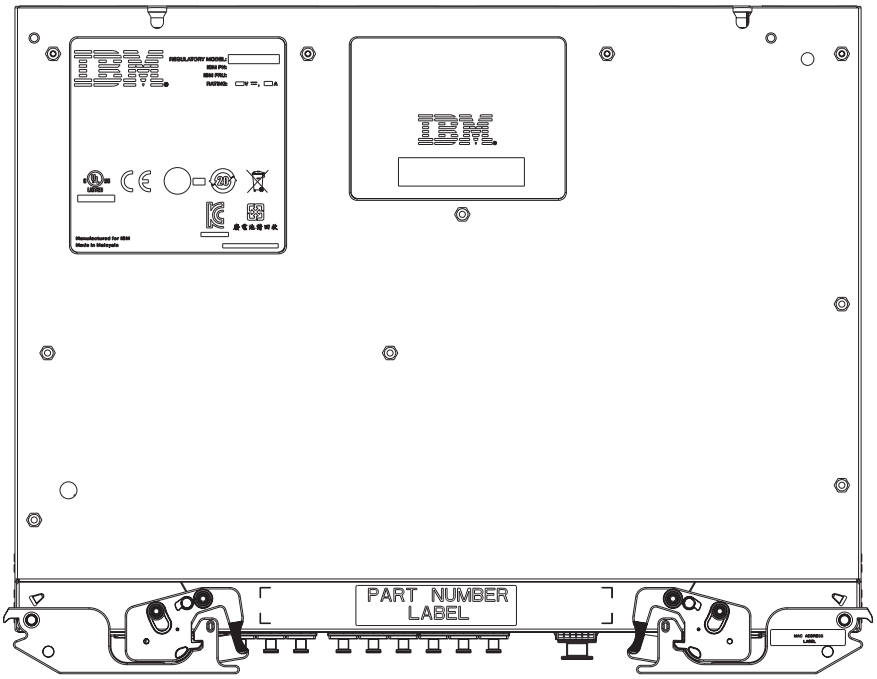
The switch has the following components:

- Forty-two 10 Gb Ethernet internal ports and twenty-two external ports. External ports are arranged as two (small form-factor pluggable plus) SFP+ ports, twelve SFP+ Omni Ports, and two Quad Small Form-Factor Pluggable Plus (QSFP+) ports.
- Each Omni Port is capable of running in 10 Gb Ethernet or 4/8 Gb FC mode with auto-negotiation capability.
- Support for Converged Enhanced Ethernet (CEE) and Fibre Channel over Ethernet (FCoE) over all Ethernet ports including Omni Ports (in Ethernet mode).
- Support for the Full Fabric FCF (Fibre Channel Forwarder) and NPV gateway.
- Support for full fabric FC services including Name Server, hardware-based Zoning.
- Support for IBM vNIC (virtual network interface card) Virtual Fabric Adapter with Single Root I/O Virtualization (SR-IOV) capability.
- The 10 Gb Ethernet switch supports single compute node port capability (14 ports). Dual compute node port capability (28 ports) and triple compute node port capability (42 ports) are available with optional licenses. See “Acquiring feature licenses” on page 27 for information on how to upgrade the switch with optional licenses.

You can manage and configure the switch through the following interfaces:

- A SSHv2/Telnet connection to the embedded command-line interface (CLI)
- A terminal emulation program connection to the serial port interface
- A Web browser-based interface (https/http) connection to the switch

Record information about the switch in the following table. The product name and serial number are on the identification label on the sides of the switch. The media access control (MAC) address is on a separate label.



You will need this information when you register the switch with IBM. You can register the switch at http://www.ibm.com/support/mysupport/.

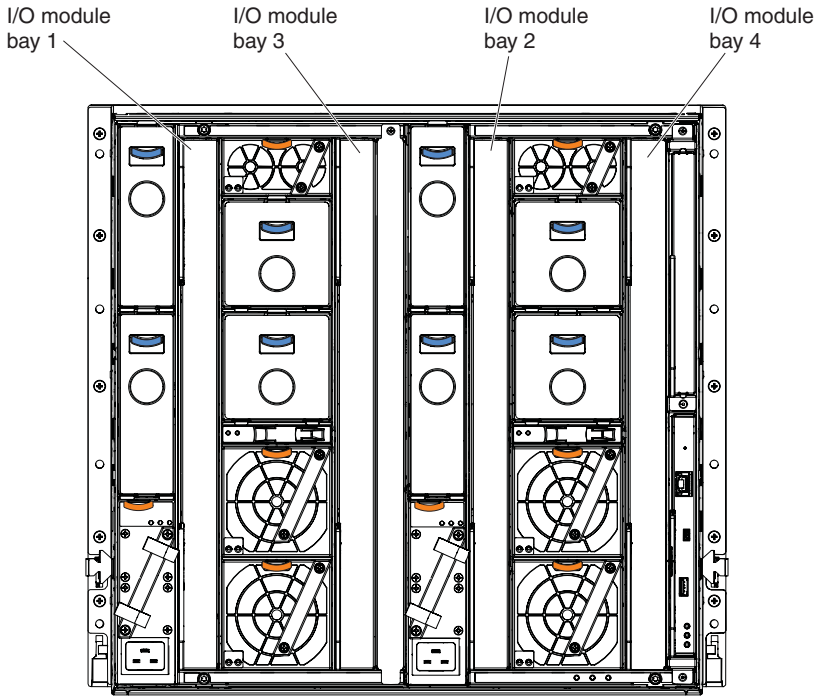
Product name	IBM Flex System Fabric CN4093 10 Gb Converged Scalable Switch
Model number	_____
Serial number	_____
Part number	_____
Media access control (MAC) address for switch	_____
MAC addresses for other components	_____
	_____
	_____

Chapter 2. Installing the switch

This chapter provides instructions for installing a switch in the IBM Flex System chassis and for removing a switch from the IBM Flex System chassis. See the documentation for your IBM Flex System chassis for information about I/O bay locations and the components that can be installed in them that is specific to your IBM Flex System chassis type.

You can install up to four I/O modules in the IBM Flex System chassis, including Ethernet switches, Fibre Channel switches, Infiniband, and pass-thru modules.

The following illustration shows an example of a IBM Flex System chassis (rear-view) with the I/O bays identified.



An IBM Flex System network adapter must be installed in each compute node with which you want to communicate. To enable the switch to communicate with a compute node, at least one switch must be installed in the IBM Flex System chassis. For details about network adapter installation, configuration, and use, see the documentation that comes with the IBM Flex System network adapter.

Installing a second switch enables a redundant path and a separate connection from the compute node to the external Ethernet network.

The IBM Flex System chassis supports a maximum of four IBM CN4093 10 Gb Converged Scalable Switches. The IBM Flex System chassis supports a maximum of 28 network adapters.

Notes:

- I/O bays 1 and 2 support any standard IBM Flex System switch or pass-thru module. When you install an I/O network adapter in the left-most fabric connector

on the compute node, these I/O bays support any switch with the same type of network interface that is used by the corresponding network adapter.

- I/O bays 3 and 4 support any standard IBM Flex System switch or pass-thru module. When you install an I/O network adapter in the right-most fabric connector on the compute node, these I/O bays support any switch with the same type of network interface that is used by the corresponding network adapter.
- The compute nodes or IBM Flex System chassis that are described or shown in this document might be different from your compute node or IBM Flex System chassis. For additional information, see the documentation that comes with your IBM Flex System chassis.
- When the switch is installed in a IBM Flex System chassis, the internal ports operate at 10 Gbps. The external ports can operate at 1/4/8/10 Gbps, depending on the port configuration and the transceiver module installed.

Installation guidelines

Before you install the switch in the IBM Flex System chassis, read the following information:

- Read the safety information that begins on page v, “Handling static-sensitive devices” on page 7, and the safety statements in the IBM Flex System chassis documentation. This information provides a safe working environment.
- Observe good housekeeping in the area where you are working. Place removed covers and other parts in a safe place.
- Blue on a component indicates touch points, where you can grip the component to remove it from or install it in the compute node or IBM Flex System chassis, open or close a latch, and so on.
- Orange on a component or an orange label on or near a component on the switch, compute node, or IBM Flex System chassis indicates that the component can be hot-swapped, which means that if the IBM Flex System chassis and operating system support hot-swap capability, you can remove or install the component while the IBM Flex System chassis is running. (Orange can also indicate touch points on hot-swap components.) See the instructions for removing or installing a specific hot-swap component for any additional procedures that you might have to perform before you remove or install the component.
- You do not have to turn off the IBM Flex System chassis to install or replace any of the hot-swap modules on the front or rear of the IBM Flex System chassis.
- When you install a switch in the IBM Flex System chassis, you must also install a compatible I/O network adapter in the compute node to support the switch.
- When you are finished working on the compute node or IBM Flex System chassis, reinstall all safety shields, guards, labels, and ground wires.
- For a list of supported optional devices for the IBM Flex System chassis and other IBM products, see http://www.ibm.com/servers/eserver/serverproven/compat/us/.

System reliability guidelines

To help ensure proper cooling, performance, and system reliability, make sure that the following requirements are met:

- Each of the bays on the rear of the IBM Flex System chassis contains either a module or a filler module.
- A removed hot-swap module is replaced with an identical module or filler module within 1 minute of removal.

- A removed hot-swap compute node is replaced with another compute node or filler node within 1 minute of removal.
- The ventilation areas on the sides of the compute node are not blocked.
- You have followed the reliability guidelines in the documentation that comes with the IBM Flex System chassis.

Cable requirements for the switch are described in the IBM *Configuration and Options Guide* at http://www.ibm.com/servers/eserver/xseries/cog/.

Handling static-sensitive devices

Attention: Static electricity can damage the IBM Flex System chassis and other electronic devices. 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, observe the following precautions:

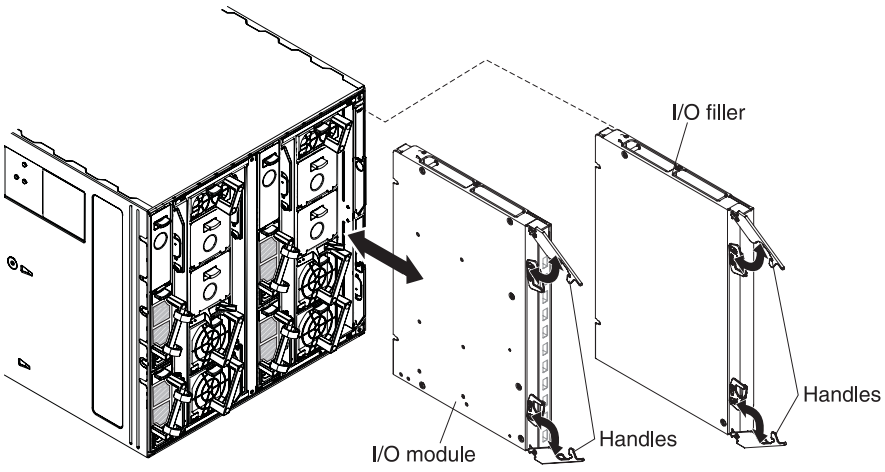
- Limit your movement. Movement can cause static electricity to build up around you.
- Handle the device carefully, holding it by its edges or its frame.
- Do not touch solder joints, pins, or exposed printed circuitry.
- Do not leave the device where others can handle and damage it.
- While the device is still in its static-protective package, touch it to an *unpainted* metal surface of the IBM Flex System chassis or an *unpainted* metal surface on any other grounded rack component in the rack that you are installing the device in for at least 2 seconds. This drains static electricity from the package and from your body.
- Remove the device from its package and install it directly into the IBM Flex System chassis without setting down the device. If it is necessary to set down the device, put it back into its static-protective package. Do not place the device on the IBM Flex System chassis or on a metal surface.
- Take additional care when you handle devices during cold weather. Heating reduces indoor humidity and increases static electricity.
- Some types of IBM Flex System chassis come with electrostatic discharge (ESD) connectors. If your unit is equipped with an ESD connector, see the documentation that comes with the IBM Flex System chassis for using the ESD connector.

Installing a switch

Note: The following illustration shows how to install a switch in an IBM Flex System chassis. The appearance of your IBM Flex System chassis might be different; see the documentation for your IBM Flex System chassis for additional information.

Use the following instructions to install a switch in the IBM Flex System chassis. You can install a switch while the IBM Flex System chassis is powered on. For redundancy support, you must install I/O modules of the same type in I/O bays 1 and 2, and I/O modules of the same type in bays 3 and 4 of the chassis.

To install a switch, complete the following steps:



1. Read the safety information that begins on page v and “Installation guidelines” on page 6.
2. Verify that the switch is compatible with the chassis. For a list of supported optional devices for the IBM Flex System chassis and other IBM products, see http://www.ibm.com/servers/eserver/serverproven/compat/us/.
3. Select I/O bay in which to install the switch.

   Note: For details about I/O bay requirements and bay locations, see the documentation for the IBM Flex System chassis.
4. Remove the filler module from the selected bay. Store the filler module for future use.
5. If you have not already done so, touch the static-protective package that contains the switch to an *unpainted* metal surface of the IBM Flex System chassis or an *unpainted* metal surface on any other grounded rack-component for at least 2 seconds.
6. Remove the switch from its static-protective package.
7. Make sure that the release levers on the switch are in the open position (perpendicular to the switch).
8. Slide the switch into the applicable I/O bay until it stops.
9. Push the release levers on the front of the switch to the closed position. After you insert and lock the switch, it is turned on, and a power-on self-test (POST) occurs to verify that the switch is operating correctly. There may be a slight delay before the switch is powered on.

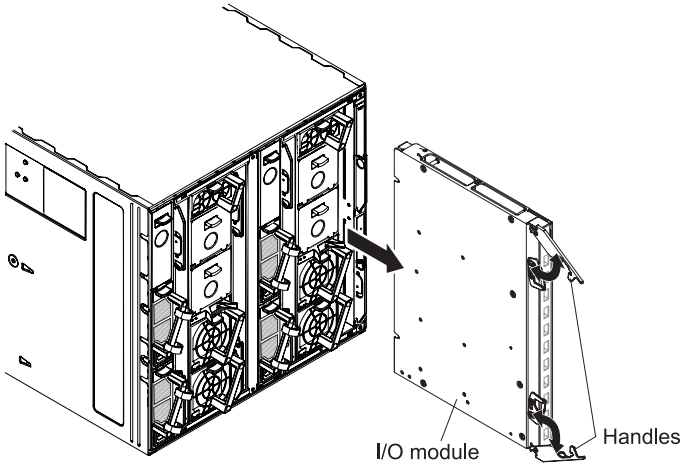
   Note: The switch takes approximately 100 seconds to complete the POST. During POST, the Power LED continuously flashes. Once POST has successfully completed, the Power LED remains on and the Error LED is off.
10. Make sure that the LEDs on the switch indicate that it is operating correctly (see “Information LEDs” on page 17).
11. If you have another switch to install, repeat step 4 through step 10; otherwise, go to the next step.
12. Install the SFP+, QSFP+ modules, or DACs in the switch. For information and instructions, see “Installing and removing SFP+ and QSFP+ modules and DACs” on page 10 and the documentation that comes with the cables and transceivers.

13. Attach any cables that are required by the switch. For additional information about cabling the switch, see “Cabling the switch and the SFP+ and QSFP+ modules” on page 13, the documentation that comes with the cables. For the locations of the connectors on the IBM Flex System chassis, see the documentation that comes with the IBM Flex System chassis. Then, continue with the next step.
14. Make sure that the external ports on the switch are enabled through one of the Chassis Management Module (CMM) interfaces, such as, the Web-based interface or the CLI.

Removing or replacing a switch

Note: The following illustration shows how to remove and replace a switch from a IBM Flex System chassis. The appearance of your IBM Flex System chassis might be different; see the documentation for your IBM Flex System chassis for additional information.

To replace a switch, complete the following steps:



1. Read the safety information that begins on page v, and “Installation guidelines” on page 6.
2. Disconnect any cables from the switch before you remove the switch. Disconnecting these cables disrupts the network connection from the external port to any connected external devices. If you plan to replace the switch with another switch, you can use the existing cable, provided that it remains securely attached to the network. For additional information about cabling the switch, see “Cabling the switch and the SFP+ and QSFP+ modules” on page 13, the documentation that comes with the cables, and the optional network devices to which the cables have been connected.
3. Pull the release latches out from the switch. The switch moves out of the bay approximately 0.6 cm (0.25 inch).
4. Slide the switch out of the bay and set it aside in a static-free location.
5. Place either another switch or a filler module in the bay.

   Important: Complete this step within 1 minute. (For more information, see steps 9 and 10 on page 8.)
6. If you placed a switch in the bay, reconnect the other cables that you disconnected. Attach any additional cables that are required by the switch. For additional information about cabling the switch, see “Cabling the switch and the

SFP+ and QSFP+ modules" on page 13, the documentation that comes with the cables, and the optional network devices to which the cables have been connected. For the locations of the connectors on the IBM Flex System chassis, see the documentation that comes with the IBM Flex System chassis. Then, continue with "Installing and removing SFP+ and QSFP+ modules and DACs."

Installing and removing SFP+ and QSFP+ modules and DACs

The switch supports the 4/8/10 Gb small-form-factor pluggable (SFP+) module, the 1 Gb small-form-factor pluggable (SFP) module, and a QSFP+ module. The SFP+ , SFP, and QSFP+ modules are laser products that convert electrical signals to optical signals.

For additional information about the location of the switch, the network interface requirements, and expansion options, see the documentation for your IBM Flex System chassis.

Notes:

1. The illustrations in this document might differ slightly from your hardware.
2. While the information in this section describes the 10 Gb small-form-factor pluggable (SFP+) module, it also applies to the 1 Gb small-form-factor pluggable (SFP) module and the 4/8 Gbps SFP+ module.
3. The switch also supports MSA-compliant copper direct-attach cables (DAC), up to 5 m (16.5 ft.) in length.

Handling a SFP+ or QSFP+ module

Before you install a SFP+ or QSFP+ module, read the following information:

- The module housing of the SFP+ has an integral guide key that is designed to prevent you from inserting the module incorrectly.
- Use minimal pressure when you insert the module into the port. Forcing the module into the port can cause damage to the module or the module port.
- You can insert or remove the module while the IBM Flex System chassis is turned on.
- You must first insert the module into the port before you can connect the cables.
- You must remove the cable from the SFP+ module before you remove the SFP+ module from the switch.

  Statement 3:

CAUTION:
When laser products (such as CD-ROMs, DVD drives, fiber optic devices, or transmitters) are installed, note the following:

- **Do not remove the covers. Removing the covers of the laser product could result in exposure to hazardous laser radiation. There are no serviceable parts inside the device.**
- **Use of controls or adjustments or performance of procedures other than those specified herein might result in hazardous radiation exposure.**

DANGER

Some laser products contain an embedded Class 3A or Class 3B laser diode. Note the following.

Laser radiation when open. Do not stare into the beam, do not view directly with optical instruments, and avoid direct exposure to the beam.

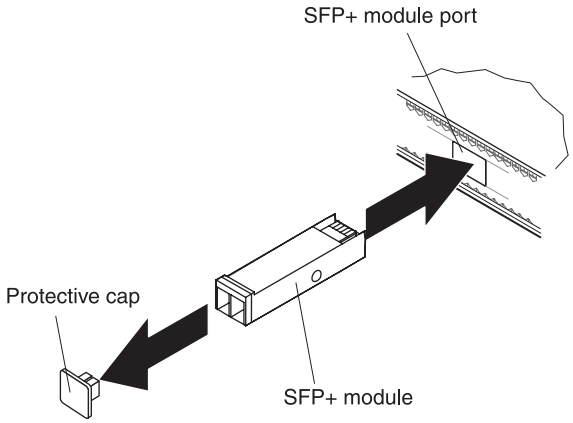
Class 1 Laser Product
Laser Klasse 1
Laser Klass 1
Luokan 1 Laserlaite
Appareil À Laser de Classe 1

Installing an SFP+ module

The SFP+ module provides two fiber-optic cable connectors for connecting to external ports. To install an SFP+ module, complete the following steps:

1. Read the safety information that begins on page v and “Installation guidelines” on page 6.
2. If you have not already done so, touch the static-protective package that contains the SFP+ module to an *unpainted* metal surface of the IBM Flex System chassis or an *unpainted* metal surface on any other grounded rack component in the rack in which you are installing the switch for at least 2 seconds.
3. Read the information in “Handling a SFP+ or QSFP+ module” on page 10.
4. Remove the SFP+ module from its static-protective package.
5. Remove the protective cap, if one is installed, from the SFP+ module port where you are installing the SFP+ module and store it in a safe place.

   Attention: To avoid damage to the cable or the SFP+ module, make sure that you do not connect the fiber optic cable *before* you install the SFP+ module.
6. Insert the SFP+ module into the SFP+ module port until it clicks into place.



7. Connect the fiber optic cable (see “Connecting the SFP+ or QSFP+ module cable” on page 14) and any cables that you disconnected earlier.

Installing a QSFP+ module

The QSFP+ ports accept supported QSFP+ modules. The QSFP+ module provides an MTP cable connector for connecting to external ports.

To install a QSFP+ module in a QSFP+ port, complete the following steps.

Note: To avoid damage to the cable or the QSFP+ module, do not connect the cable before you install the module.

1. Remove the safety cap and pull the locking lever into the down (unlocked) position.
2. Insert the module into the port until it clicks into place. Use minimal pressure when you insert the module into the port. Do not use excessive force when you insert the module; you can damage the module or the QSFP+ port.

   The module has a mechanical guide key to prevent you from inserting the module incorrectly.
3. Pull up the locking lever to lock the module into place.
4. Connect the fiber-optic cable.

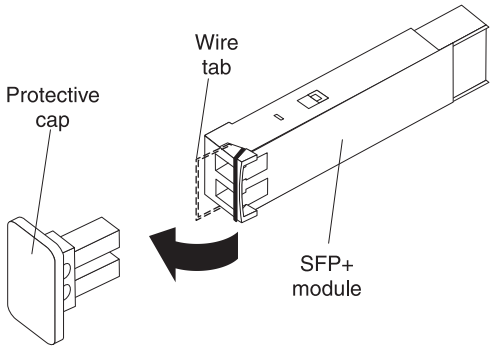
   To remove a QSFP+ module, disconnect the fiber-optic cable, and pull down the locking lever to release the module. After you remove the module, replace the safety cap.

Removing a SFP+ or QSFP+ module

To remove an SFP+ or QSFP+ module, complete the following steps:

1. Read the safety information that begins on page v and “Installation guidelines” on page 6.
2. Read the information in “Handling a SFP+ or QSFP+ module” on page 10.
3. Remove the fiber optic cable from the modules that you want to replace. For more information about removing the cable, see “Disconnecting the SFP+ or QSFP+ module cable” on page 15.

   Attention: To avoid damage to the cable or the modules, make sure that you disconnect the fiber-optic cable *before* you remove the SFP+ or QSFP+ modules.
4. Unlock the module by pulling the wire tab straight out, as shown in the following illustration.



5. Grasp the wire tab on the module and pull it out of the port.
6. Replace the protective cap on the module and the SFP+ or QSFP+ module port.
7. Place the module into a static-protective package.

Cabling the switch and the SFP+ and QSFP+ modules

This section describes transceivers and cables supported by the switch.

The supported SFP+ and QSFP+ modules, cables, and upgrades for the switch are as follows:

- Transceivers:
  - 10GBase-SR SFP+ (MMFiber) transceiver (part number: 44W4408)
  - 10GBase-SR SFP+ (MMFiber) transceiver (part number: 46C3447)
  - IBM Systems Networking SFP+ LR transceiver (part number: 90Y9412)
  - 1000Base-SX SFP (MMFiber) transceiver (part number: 81Y1622)
  - 1000Base-T SFP transceiver 4 (part number: 81Y1618)
  - 1000Base-LX SFP LX transceiver (part number: 90Y9424)
  - IBM System Networking QSFP+ 40Gbase-SR transceiver (part number: 49Y7884)
    (Requires either cable 90Y3519 or cable 90Y3521)
  - IBM 8 Gb SFP+ SW optical transceiver (part number: 44X1964)
- Cables
  - 1m IBM passive Direct Attach Cable (DAC) SFP+ (part number: 90Y9427)
  - 3m IBM passive DAC SFP+ (part number: 90Y9430)
  - 5m IBM passive DAC SFP+ (part number: 90Y9433)
  - 1m 40Gb QSFP+ to 4 x 10Gb SFP+ (part number: 49Y7886)
  - 3m 40Gb QSFP+ to 4 x 10Gb SFP+ (part number: 49Y7887)
  - 5m 40Gb QSFP+ to 4 x 10Gb SFP+ (part number: 49Y7888)
  - 10m IBM MTP Fiber Optical (part number: 90Y3519)
    (requires transceiver, part number: 49Y7884)
  - 30m IBM MTP Fiber Optical (part number: 90Y3521)
    (requires transceiver, part number: 49Y7884)
  - 1m QSFP+ to QSFP+ DAC ** (part number: 49Y7890)
  - 3m QSFP+ to QSFP+ DAC ** (part number: 49Y7891)
- Features on Demand Upgrades
  - Upgrade 1 - IBM Flex System Fabric CN4093 Converged Switch - adds 2 x 40 Gb ports (part number: 00D5845)

– Upgrade 2 - IBM Flex System Fabric CN4093 Converged Switch - adds six Omni Ports (part number: 00D5847)

Note: The illustrations in this document might differ slightly from your hardware.

Connecting the serial console cable

To connect the serial console cable to the switch, connect the serial cable to the RS-232 serial console port of the switch and the other end of the cable to the console device.

Note: You must use one of the two cables provided in the Serial Access Cable option (see “Cabling the switch and the SFP+ and QSFP+ modules” on page 13.

If your attached console device uses a standard RS-232 DB9 connection, attach serial cable PN 43X0509. If your attached console device uses a RJ-45 connection, attach serial cable PN 90Y9339 and a user supplied RJ-45 coupler and adapter cable. Your adapter cable depends on the pin out required by your console device. Pin out of the 90Y9339 cable is as follows:

Table 1. Pin out for 90Y9339 cable

Pin #	Function	Direction
1	N/C	-
2	RXD	In
3	TXD	Out
4	GND	-
5	GND	-
6	N/C	-
7	N/C	-
8	N/C	-

For additional information, see “Accessing the switch through the serial-port interface” on page 22.

Disconnecting the serial console cable

To disconnect the serial console cable, grasp the connector and gently pull the cable from the switch.

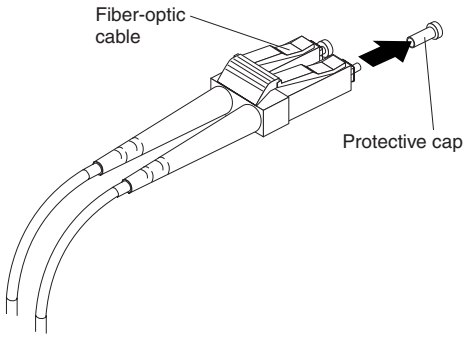
Connecting the SFP+ or QSFP+ module cable

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

- Do not route the cable along a folding cable-management arm.
- When you attach the cable 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 the device is extended or become pinched when the device is retracted.
- Route the cable away from places where it can be snagged by other devices in the rack.
- 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. Make sure that the cable is well supported.

To connect the SFP+ or QSFP+ module cable, complete the following steps:

1. Remove the protective caps from the end of the fiber optic cable.



2. Gently slide the fiber optic cable into the SFP+ or QSFP+ module until it clicks into place.
3. Check the LEDs on the switch. When the switch is operating correctly, the green link LED is lit. For information about the status of the switch LEDs, see "Locating the information panels, LEDs, and external ports."

Disconnecting the SFP+ or QSFP+ module cable

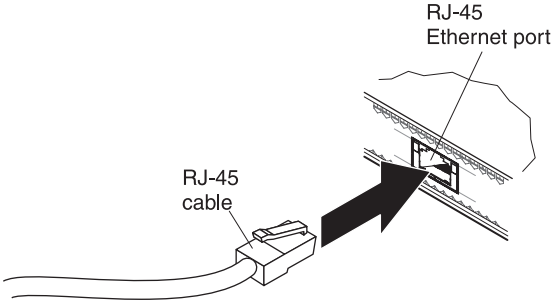
To disconnect the SFP+ or QSFP+ module cable, complete the following steps:

1. Squeeze the release tabs and gently pull the fiber optic cable from the module.
2. Replace the protective caps on the ends of the fiber optic cable.

Connecting the RJ-45 cable

The RJ-45 cable can be connected to the external management port.

To connect the RJ-45 connector to the switch, push the RJ-45 cable connector into the port connector until it clicks into place.



Disconnecting the RJ-45 cable

To disconnect the RJ-45 connector, squeeze the release tab and gently pull the cable connector out of the switch-module connector.

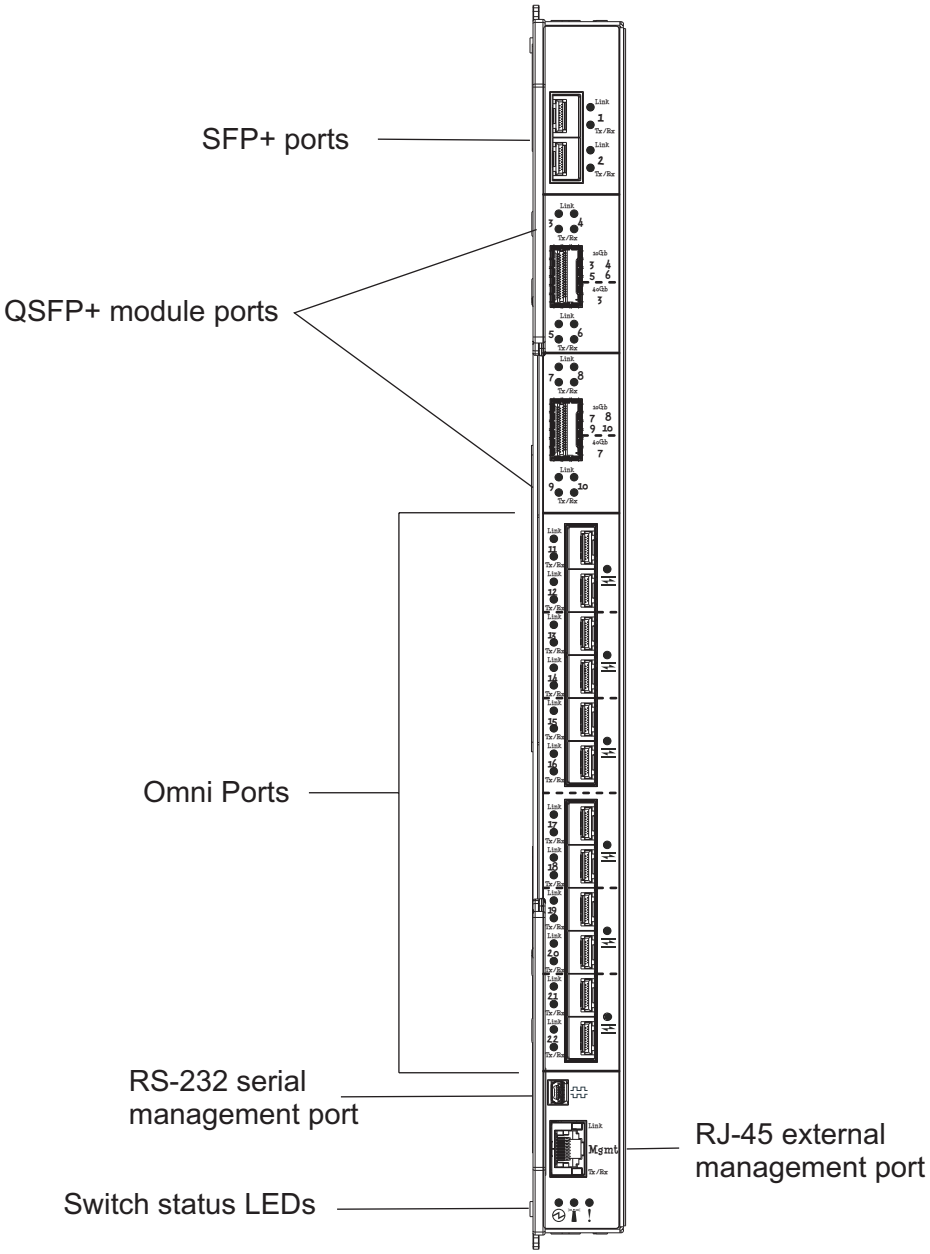
Locating the information panels, LEDs, and external ports

This section describes the information panels and LEDs on the switch and identifies the external ports on the information panels.

Note: The illustrations in this document might differ slightly from your hardware.

Information panel

The front panel of the switch contains information LEDs, two SFP+ module port connectors, two QSFP+ module port connectors, twelve Omni ports, one RS-232 serial port connector, and one Ethernet port connector.



The switch-module information panel contains the following components:

- LEDs that display the following information:
  - The status of the switch (Power, location, and fault)
  - The status of the external connections to the switch

  For further details about LEDs, see “Information LEDs” on page 17.
- Two Ethernet SFP+ port connectors to attach SFP+ modules (EXT1 and EXT2). Two QSFP+ port connectors to attach QSFP+ modules (EXT3, EXT7 or

EXT3-EXT6, EXT7-EXT10 depending on configuration). Twelve Omni Port SFP+ connectors to attach SFP+ modules (EXT11 through EXT22).

Note: These connectors are identified as EXT 1 through EXT22 in the I/O module configuration menus and are labeled 1 though 22 (from top to bottom) on the switch.

- One 9600 baud RS-232 serial port connector for console port use (management purposes) only. This connector is located near the bottom of the switch panel, just above the management (Mgmt) port. Do *not* attach any devices to this connector other than the serial access cable option specified for the switch, as described in "Cabling the switch and the SFP+ and QSFP+ modules" on page 13.
- One 1 Gb RJ-45 Ethernet port connector. Do *not* attach any devices to this connector other than when using an industry standard CAT5 cable. This connector is identified as port EXTM in the I/O-module configuration menus and is labeled Mgmt on the switch.

Information LEDs

The front panel of the switch has two sets of LEDs. The OK and switch error LEDs indicate the switch status. The link (LINK) and activity (TX/RX) Port LEDs indicate the status of the external ports.

Notes:

- A yellow LED on the IBM Flex System chassis is lit when a system error or event has occurred. To identify the error or event, check the IBM Flex System management-module event log or the switch system log.
- During POST, the Power LED continuously flashes. Additionally, all of the status LEDs and the licensed Port LEDs are lit as a visual indication they are working. Once POST has successfully completed, the Power LED remains on and the Error LED is off.
- The blue Location LED is used to identify a ScSE when prompted by the CMM.

Any errors that are detected during POST are written to the system log. For information about the command to read the system log, see the *IBM Command Reference* for the switch.

When POST errors are written to the system log, these errors are also written to the IBM Flex System management-module event log. If a hardware error, such as a current fault occurs, the management module displays it. If a firmware error occurs, the management module displays the `Module did not complete POST` message and a post error code that indicates the test that was running when the error was detected.

Note: You can also use the management module to make sure that the switch is operating correctly. For more information, see the documentation for the IBM Flex System chassis.

Switch status LEDs

The following table provides descriptions of the switch-module status LEDs on the front panel of the switch.

Table 2. Switch status LEDs

Status LED	Description
Power (⏻) LED	This green LED is at the bottom left of the switch on the front panel. • When this LED is lit, it indicates that the switch is on. • When this LED is not lit and the yellow switch error LED is lit, it indicates a critical alert. If the yellow LED is also not lit, it indicates that the switch is off.
Location (lighthouse icon) LED	This blue LED is at the bottom middle of the switch on the front panel. • This LED helps to identify the location of a failed switch and is the result of a chassis user action.
Fault (!) LED	This yellow LED is at the bottom right of the switch on the front panel. • When this LED is lit, it indicates a POST failure or critical alert. **Note:** When this LED is lit, the system-error LED on the IBM Flex System chassis is also lit. • When this LED is not lit and the green LED is lit, it indicates that the switch is working correctly. If the green LED is also not lit, it indicates that the switch is off.

Port status LEDs

The following table provides descriptions of the port status LEDs on the front panel of the switch.

Table 3. Port status LEDs

Status LED	Description
Link LEDs *(Ports 1 through 22, Mgmt)*	This green LED indicates whether the corresponding port link is up or down. • When this LED is not lit, it indicates that there is no signal on the corresponding port. • When this LED is lit, there is an active connection (or link) between the corresponding port and the device that is using this connection. • When this LED is flashing, the corresponding port is connected and online.
Tx/Rx LEDs *(Ports 1 through 22, Mgmt)*	This green LED flashes to indicate the corresponding port link is transmitting and receiving.
Mode LEDs *(Ports 11 through 22)*	This green LED indicates how each corresponding Omni Port pair (for example, 11/12) is configured. • When this LED is not lit, it indicates the port pair is configured for Ethernet mode. • When this LED is lit, it indicates the port pair is configured for FC mode. • When this LED is flashing, it indicates one or both of the installed devices is not compatible with the mode configured (Ethernet/FC) for the port pair.

Configuring the switch

The switch has an internal Ethernet path to the management module, twenty two external Ethernet data ports, an external management port, and a serial console port. The switch supports two remote-access modes for management through Ethernet connections. You can select the mode that is best suited for your IBM Flex System environment.

- **Default mode:** The default mode uses the internal path to the management module only. In this mode, the remote-access link to the management console must be attached to the Ethernet connector on the management module. The Internet protocol (IP) addresses and SNMP parameters of the switch can be automatically assigned by the IBM Director Flex System Deployment wizard (when available), or you must assign them through the IBM Flex System Management and Configuration program. This mode enables you to provide a secure LAN for management of the IBM Flex Systems subsystems that is separate from the data network. See “Establishing a TCP/IP session through the management module” on page 20 for more information.
- **External management mode:** External management mode allows for the use of alternate management entities to control and configure the switch. You must enable external management in order to manage the switch using either the dedicated external management port (EXTM) or any of the external data ports (EXT1-EXT22, in-band switch management). This mode can be used instead of or in addition to access through the Chassis Management module. This mode can be enabled only through the Chassis Management Module configuration interface. When this mode is enabled, the external SFP+ and QSFP+ ports support both management and data traffic.

  This mode enables the use of additional switch IP addresses on different IP subnets than the management modules. This is useful when the switches are to be managed and controlled as part of the overall network infrastructure, while secure management of other IBM Flex System subsystems is maintained through the management module. See “Enabling management through external ports” on page 21 for additional instructions about configuring the switch for this mode of operation.

The RS-232 console port provides an alternative path to manage and configure the switch for local access.

Important:

- Before you configure the switch, make sure that the management modules in the IBM Flex System chassis are correctly configured. For more information about configuring the CMM, see the following documents:
  - *IBM Flex System Chassis Management Module Installation Guide*
  - *IBM Flex System Chassis Management Module User’s Guide*
- The default IP address of the switch is 192.168.70.120, 192.168.70.121, 192.168.70.122, or 192.168.70.123 depending on the switch bay where it is installed.
- If you change the IP address of the switch and restart the IBM Flex System chassis, the switch maintains this new IP address as its default value.
- The management module and the switch can communicate with each other only if they are on the same IP subnet.
- When you use the management-module Web interface to update the switch configuration, the management-module firmware saves the new configuration in

its internal nonvolatile random-access memory (NVRAM). If the switch restarts, the management module applies the saved configuration to the switch.

If the switch restarts and the management module cannot apply the saved configuration, the switch defaults to using the configuration that it had previously saved. If the IP subnet address of the switch does not match the IP subnet address of the management module, you can no longer manage the switch from the management module.

- For switch communication with a remote management station, such as an IBM Director management server, through the management-module external Ethernet port, the switch internal-network interface and the management-module external interface must be on the same IP subnet.

For specific details about configuring the switch and preparing for system installation, see the documentation listed in “Related documentation” on page 1.

Notes:

- Unless otherwise stated, references to the management module apply only to the IBM Flex System Chassis Management Module, which is the only type of management module that supports the switch.
- Throughout this document, the management-module Web-based user interface is also known as the IBM Flex System management-module Web interface.
- Throughout this document, the user name is also known as the login name or user ID for logging on to interfaces or programs.
- The screens that are described or referenced in this document might differ slightly from the screens that are displayed by your system. Screen content varies according to the type of IBM Flex System chassis and the firmware versions and options that are installed.

Establishing a TCP/IP session through the management module

To establish a TCP/IP session for the switch through the IBM Flex System Chassis Management Module (CMM), complete the following steps:

1. Log on to the IBM Flex System Chassis Management Module (CMM) CLI as described in the *User's Guide* or *Command Line Interface Reference Guide* for the CMM. If necessary, obtain the IP address of the management module from your system administrator.

   Note: The **User ID** and **Password** fields are case-sensitive. Type your information in uppercase letters only. To maintain system security, change your password after you log on for the first time. The default User ID is `USERID`, and the default password is `PASSW0RD` (where the sixth character is the number zero, not the letter O).

2. Set the environment to the bay where you installed the switch:

   ```
   system> env -T system:switch[1]
   ```

3. Execute the

   ```
   ifconfig
   ```

   command to configure the IP parameters you want to use to manage the switch through CMM. For example,

   ```
   ifconfig -i 192.168.70.1 -s 255.255.255.0 -g 192.168.70.100
   ```

4. You should now be able to ping the switch from the CMM using this address:

```
system:switch[1]> ping -i 192.168.70.1
   Reply from 192.168.70.1: bytes=64 time=0.198ms
   Reply from 192.168.70.1: bytes=64 time=0.213ms
   Reply from 192.168.70.1: bytes=64 time=0.228ms
   Reply from 192.168.70.1: bytes=64 time=0.168ms
```

5. Using either the management module or a management station connected to the management module, you can establish a SSH/Telnet or Web session (HTTPs/HTTP) using this address.

   Note: SSH and HTTPs are enabled by default. Telnet and HTTP can be enabled once you have initially logged into the switch.

The Web interface application and the SSHv2/Telnet client software provide different ways to access the same internal-switching firmware and configure it.

- If your system application requires that you use the Web interface application, see “Accessing the switch through the switch browser-based interface” on page 23 for additional information.
- If your system application requires that you use the SSHv2/Telnet client software, see “Accessing the switch through the SSHv2/Telnet interface” on page 22 for additional information.

Enabling management through external ports

To access and manage the switch through external interfaces, you must enable the external ports and the ability to manage the switch through them. Use the information in the following table to configure your ports.

External management (-em)	External ports (-ep)	Description
Disabled	Disabled	The switch must be managed through the management module. No traffic is allowed on external ports.
Disabled	Enabled	The switch must be managed through the management module. Data traffic is allowed on external ports.
Enabled	Disabled	The switch can be managed through the management module or a compute node. No traffic is allowed on external ports.
Enabled	Enabled	The switch can be managed through the management module, a compute node, or a management station that is connected through an external port. Data traffic is allowed on external ports.

To enable management through external ports, complete the following steps:

1. Log on to the IBM Flex System Chassis Management Module (CMM) CLI as described in the *User's Guide* or *Command Line Interface Reference Guide* for the CMM. If necessary, obtain the IP address of the management module from your system administrator.
2. Set the environment to the bay where you installed the switch:

```
system> env -T system:switch[1]
```

3. Execute the ifconfig command to enable data ports and external management:

```
ifconfig -ep enabled -em enabled
```

4. You should now be able to manage the switch using its data ports or external management port.

Note: The definition of external management means other than by the chassis management module. To externally manage the switch, additional IP interfaces must be configured. For more information see the *Menu-Based CLI Command Reference* for the switch.

Accessing the switch through the SSHv2/Telnet interface

The switch supports a command-line interface (CLI) that you can use to configure and control the switch over the network through the SSHv2/Telnet client software. You can use the CLI to perform many basic network-management functions. In addition, you can configure the switch for management through an SNMP-based network-management system. The following sections describe how to use the SSHv2/Telnet interface to access the switch.

Connecting to the switch

If you know the IP address for the switch and you have an existing network connection, you can use the SSHv2/Telnet client software from an external management station or the management module to access and control the switch. The management station and the switch must be on the same IP subnet. If you have to obtain the IP address for the switch or establish a network connection, contact your system or network administrator. Be sure to use the correct IP address in the required command, as specified in "Accessing the main menu."

Accessing the main menu

To connect to the switch through the SSHv2/Telnet interface, refer to your client software for specific instructions on how to invoke a session. For example, using the Microsoft Telnet Client, you would complete the following steps:

1. From a DOS command-line prompt, type `telnet x` and press Enter.

   where *x* is the IP address for the switch.

2. If you do not have an assigned user account, enter the default login credentials when prompted (username=USERID, password=PASSW0RD (where the sixth character is the number zero, not the letter O)).

Important: When configuring the switch using its management interfaces, note that the **apply** command changes the currently active configuration. If you want your change to persist beyond the next reboot of the switch, you must enter the **save** command. This command stores the current switch configuration and all changes in nonvolatile memory.

For more information about configuring through the CLI, see the *Command Reference* for the switch.

Accessing the switch through the serial-port interface

The serial port provides basic communication RS-232 serial-data transfer through a terminal emulation program (such as Hyperterminal). Because messages from the power-on self-test (POST) and all initialization information are transmitted through the serial port, you can use the serial port to log in to the switch and access and configure the internal switching firmware.

To log in to the switch, complete the following steps:

1. Connect one end of the specifically designed serial cable that comes with your device into the RS-232 port and connect the other end to the management station.

   For additional information, see “Connecting the serial console cable” on page 14.
2. On the management station, open a console window and make sure that the serial port is configured with the following settings:
   - 9600 baud
   - 8 data bits
   - No parity
   - 1 stop bit
   - No flow control
3. If you do not have an assigned user account, enter the default login credentials when prompted (username=USERID, password=PASSW0RD (where the sixth character is the number zero, not the letter O)).

The serial port is compatible with the standard 16550 Universal Asynchronous Receiver/Transmitter (UART) protocol. The RS-232 serial port is enabled by default.

Accessing the switch through the switch browser-based interface

Before you can access and start the browser-based interface, make sure that you have completed the following procedures:

- Install the switch in the IBM Flex System chassis.
- Make sure that the switch firmware is installed on the switch.
- Configure at least one IP interface on the switch. Refer to “Establishing a TCP/IP session through the management module” on page 20 for more information.
- Enable frames and the JavaScript program in your Web browser.

The following hardware and software are required for the Web interface:

- A frame-capable Web-browser program, such as Internet Explorer (version 7.0 or later), Mozilla Firefox (version 8.0 or later), or Google Chrome (version 16.0 or later)
- A computer or workstation with network access to the switch

To start the browser-based interface, complete the following steps:

1. Start a Web browser. The Web-browser window opens.
2. In the **URL** field, enter the IP address of the switch, in the following format:

   http://*xxx.xxx.xxx.xxx*. The login window opens.
3. Enter the switch user ID and password and click **OK**. The default user ID is `USERID`. The default password is `PASSW0RD (with a zero)`.

Note: The passwords that are used to access the switch are case-sensitive. To increase system security, change the password after you log on for the first time.

Initial configuration

The operating firmware on the switch contains default configuration files that are installed during the firmware installation. These initial configuration settings are not in a separate configuration file but are components of the firmware. When you

restore the management module to factory defaults, the original configuration is restored. For more information about configuring and managing the switch, see the *Command Reference* for the switch.

Logging in to the switch

The switch supports user-based security that enables you to prevent unauthorized users from accessing the switch or changing its settings.

To log in to the switch, complete the following steps:

1. At the prompt, type your user name and press Enter. The default user name is `USERID`.
2. Type your password and press Enter. The default password is `PASSW0RD` (where the sixth character is the number zero, not the letter O). The main-menu window opens.

After you log on to the switch, you must set the date and time. See the *Command Reference* for the switch to perform this task and others as needed.

Chapter 3. Updating the firmware and licensing

This chapter describes how to determine the level of the firmware that is installed on the switch, how to obtain the latest level of switch firmware, how to upgrade the firmware, how to acquire additional feature licenses, and how to reset the switch to activate the firmware upgrade.

Determining the level of switch firmware

After you install the switch in the IBM Flex System chassis, make sure that the latest firmware is installed on the switch. To determine the level of the firmware that is installed, complete the following steps:

1. Log on to the IBM Flex System Chassis Management Module (CMM) CLI as described in the switch's *User's Guide* or *CLI Reference Guide* for the CMM. If necessary, obtain the IP address of the management module from your system administrator.
2. Set the environment to the bay where you installed the switch. For example:

   ```
   system> env -T system:switch[1]
   ```

3. Issue the **info** command to display switch firmware information:

   ```
   system:switch[1]> info
     ...
     Boot ROM
             Rel date:       01/17/2012
             Version:        6.9.1.0
             Status: Active
     Main application
             Rel date:       01/17/2012
             Version:        6.9.1.0
             Status: Active
     Main application
             Rel date:       11/18/2011
             Version:        6.9.0.11
             Status: Inactive
   ```

Obtaining the latest level of switch firmware

The latest firmware update for the IBM Flex System Fabric CN4093 10Gb Converged Scalable Switch is available at the following site: http://www.ibm.com/supportportal/.

Note: Changes are made periodically to the IBM Web site. The procedure for locating firmware and documentation might change from what is described in this document.

Upgrading the switch firmware

You can upgrade the switch firmware by using a TFTP or SFTP server application. Typically, this firmware runs as an application under your operating system. Make sure that this firmware is installed on your server; then, download the firmware images from http://www.ibm.com/systems/support/ into a directory on your TFTP/SFTP server. Enable the TFTP/SFTP server and set its default directory to the one where the image is.

To transfer the firmware image files from the TFTP/SFTP server to the switch, you can establish a SSHv2/Telnet session through the management module. Ping the

TFTP/SFTP server to make sure that you have a connection. The Telnet session performs optimally if all three network entities (TFTP/SFTP server, management module, and switch IP addresses) are on the same subnet. Otherwise, you must use a router and configure a gateway address on the switch. Use the management-module interface to configure the IP addresses of the management module external interface (eth0) and the switch so that they are both on the same subnet as the TFTP/SFTP server.

Examples of IP addresses and masks are described in the following table.

Network entity	IP address	Mask
TFTP/SFTP server	192.168.2.178	255.255.255.0
Management module (eth0)	192.168.2.237	255.255.255.0
Switch-module current IP configuration (IF 128)	192.168.2.51	255.255.255.0

Note: With this configuration, you can ping the switch from the TFTP/SFTP server.

Access the switch command line interface (CLI). Refer to “Accessing the switch through the SSHv2/Telnet interface” on page 22 for more information.

To upgrade the switch firmware, complete the following steps:

1. Log in to the switch.
2. At the CLI prompt, type the following command and press Enter.

   ```
   /boot/gtimg imageX TADDR zzzzz
   ```

   where *imagex* is the image to install and *zzzzz* is the operating-system image file name.
3. At the CLI prompt, type the following command and press Enter.

   ```
   /boot/gtimg boot TADDR yyyy
   ```

   Where *yyyy* is the boot image file name.
4. Reset and restart the switch as described in “Resetting and restarting the switch.”

Resetting and restarting the switch

To activate the new image or images, you must reset the switch. To reset the switch, complete the following steps:

1. Log on to the IBM Flex System Chassis Management Module (CMM) CLI as described in the switch's *User's Guide* or *CLI Reference Guide* for the CMM. If necessary, obtain the IP address of the management module from your system administrator.
2. Set the environment to the bay where you installed the switch. For example:

   ```
   system> env -T system:switch[1]
   ```
3. Issue the **reset** command to restart the switch:

   ```
   system:mm[1]> env -T system:switch[1]
   system:switch[1]> reset
   ```
4. Wait approximately 100 seconds for POST to complete.
5. Issue the **info** command for the switch that was just restarted and note the corresponding level of the firmware for the switch. Confirm that the firmware build number reflects the correct firmware release:

```
system:switch[1]> info
 ...
 Boot ROM
         Rel date:       01/18/2012
         Version:        6.9.0.11
         Status: Active
 Main application
         Rel date:       01/18/2012
         Version:        6.9.0.11
         Status: Active
 Main application
         Rel date:       01/21/2012
         Version:        6.8.0.72
         Status: Inactive
```

Acquiring feature licenses

The base option (part number: 00D5823) supports 22 total data ports (14 compute node ports and 8 uplink ports). Licenses are available that enable the use of additional ports on the switch:

- IBM Flex System Fabric CN4093 10 Gb Converged Scalable Switch (Upgrade 1) - Option part number 00D5845. This upgrade feature adds an additional 14 compute node ports and two 40 Gb uplink ports (also usable in 4x10 Gb mode) to the base product.
- IBM Flex System Fabric CN4093 10 Gb Scalable Switch (Upgrade 2) - Option part number 00D5847. This upgrade feature adds an additional 14 compute node ports and 6 uplink ports to the base product.

  Note: Upgrade 1 and Upgrade 2 are independent and can be installed in any order, with or without the other.

The upgrade licenses can be acquired using the IBM System x Features on Demand website http://www.ibm.com/systems/x/fod/.

You can use the website to perform the following tasks:

- Request a new activation key
- Check an authorization code to see what feature it enables and how many remaining times it can be used to create a key
- Retrieve the history of feature activation on a selected device
- Retrieve the history of feature activation on a selected authorization code
- Retrieve a lost authorization code
- Manage your IBM customer number
- Find help for the Features on Demand feature activation process
- Provide feedback to IBM about the Features on Demand process

Note: Your IBM ID and password are required to log into the Features on Demand website. If you are not registered with IBM, go to http://www.ibm.com/systems/x/fod/ and click My IBM registration in the left navigation pane.

Installing feature licenses

Once Features on Demand activation key files have been acquired, they must be installed on the switch. The example below illustrates use of the switch Command Line Interface (CLI), but other interfaces may also be used (such as BBI or SNMP). When installing licenses, please note the following requirements:

- A switch reboot is required to fully activate the license(s).
- Both license key files can be downloaded prior to the switch reset.

Complete the following steps to install feature licenses:

1. Log in to the switch.
2. At the CLI prompt, type the following command and press **Enter**.

   ```
   /oper/swkey/fodkey/enakey
   ```
3. Follow the prompts to enter values including the TFTP/SFTP server IP address, key filename.
4. Once the key file download has completed, reset the switch to activate the license(s).

Chapter 4. Solving problems

This section provides basic troubleshooting information to help you solve some problems that might occur while you are setting up the switch. The *Application Guide* for the switch provides more details about troubleshooting the switch.

If you cannot locate and correct a problem by using the information in this section, see Appendix A, “Getting help and technical assistance,” on page 31.

Running POST

To ensure that it is fully operational, the switch processes a series of tests during power-up or a restart (power-on self-test, or POST). These tests take approximately 100 seconds to complete. The management module reads the test results and displays them for you. During normal operation, these tests are completed without error, and the green OK LED is lit. However, if the switch fails POST, the yellow switch error LED and the system-error LED on the IBM Flex System chassis are lit. An event is stored in the event log in the system status panel of the management module. The specific failure is displayed on the system status I/O module panel of the management module.

Note: For the locations and descriptions of the switch LEDs, see “Locating the information panels, LEDs, and external ports” on page 15.

POST errors

There are two types of errors: noncritical and critical. A noncritical error applies to one port, and the switch is operational. You can continue to operate the switch; however, you must replace it as soon as possible. When critical errors occur, the switch does not operate. To view POST results, complete the following steps:

1. Log on to the management module as described in the *IBM Flex System Chassis Management Module Command-Line Interface Reference Guide*. If necessary, obtain the IP address of the management module from your system administrator. The login window opens.
2. Turn off the power to the switch; then, turn it on again.
3. After POST is completed, the management module displays the results. Refresh the window to view the POST results. If a critical error occurs, replace the switch. If a noncritical error occurs, see the switch error log for additional details.

The following table describes the basic critical and noncritical failures. This abbreviated list is representative; it is not an exhaustive list. An error code is associated with each failure. Error codes are displayed on the Management Module Switch Information window. Be sure to note the applicable error code and corresponding failure. You might have to provide this information when you call for service. For details, see Appendix A, “Getting help and technical assistance,” on page 31.

Diagnostic indicator (in hex)	Failing functional area	Failure criticality
00 - 7F	Base internal functions	Critical
80 - 9F	Internal interface failures	Noncritical
A0 - AF	External interface errors	Noncritical

Diagnostic indicator (in hex)	Failing functional area	Failure criticality
B0 - FE	Reserved	Noncritical
FF	Switch “good” indicator	Operation

Parts listing

Replaceable components are of three types:

- **Tier 1 customer replaceable unit (CRU):** Replacement of Tier 1 CRUs is your responsibility. If IBM installs a Tier 1 CRU at your request, you will be charged for the installation.
- **Tier 2 customer replaceable unit (CRU):** You may install a Tier 2 CRU yourself or request IBM to install it, at no additional charge, under the type of warranty service that is designated for your server.
- **Field replaceable unit (FRU):** FRUs must be installed only by trained service technicians.

For information about the terms of the warranty, see the *Warranty Information* document.

Part	CRU number (Tier 1)
IBM Flex System Fabric CN4093 10 Gb Converged Scalable Switch	00D5826

Appendix A. Getting help and technical assistance

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. Use this information to obtain additional information about IBM and IBM products, determine what to do if you experience a problem with your IBM system or optional device, and determine whom to call for service, if it is necessary.

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 and any optional devices are turned on.
- Check for updated firmware and operating-system device drivers for your IBM product. The IBM Warranty terms and conditions state that you, the owner of the IBM product, are responsible for maintaining and updating all software and firmware for the product (unless it is covered by an additional maintenance contract). Your IBM service technician will request that you upgrade your software and firmware if the problem has a documented solution within a software upgrade.
- If you have installed new hardware or software in your environment, check http://www.ibm.com/systems/info/x86servers/serverproven/compat/us/ to make sure that the hardware and software is supported by your IBM product.
- Go to http://www.ibm.com/supportportal/ to check for information to help you solve the problem.
- Gather the following information to provide to IBM Support. This data will help IBM Support quickly provide a solution to your problem and ensure that you receive the level of service for which you might have contracted.
  - Hardware and Software Maintenance agreement contract numbers, if applicable
  - Machine type number (IBM 4-digit machine identifier)
  - Model number
  - Serial number
  - Current system UEFI and firmware levels
  - Other pertinent information such as error messages and logs
- Go to http://www.ibm.com/support/entry/portal/Open_service_request/ to submit an Electronic Service Request. Submitting an Electronic Service Request will start the process of determining a solution to your problem by making the pertinent information available to IBM Support quickly and efficiently. IBM service technicians can start working on your solution as soon as you have completed and submitted an Electronic Service Request.

You can solve many problems without outside assistance by following the troubleshooting procedures that IBM provides in the online help or in the documentation that is provided with your IBM product. The documentation that comes with IBM systems also describes the diagnostic tests that you can perform. Most systems, operating systems, and programs come with documentation that

contains troubleshooting procedures and explanations of error messages and error codes. If you suspect a software problem, see the documentation for the operating system or program.

Using the documentation

Information about your IBM system and preinstalled software, if any, or optional device is available in the documentation that comes with the product. That documentation can include printed documents, online documents, readme files, and help files. See the troubleshooting information in your system documentation for instructions for using the diagnostic programs. The troubleshooting information or the diagnostic programs might tell you that you need additional or updated device drivers or other software. IBM maintains pages on the World Wide Web where you can get the latest technical information and download device drivers and updates. To access these pages, go to http://www.ibm.com/supportportal/. Also, some documents are available through the IBM Publications Center at http://www.ibm.com/shop/publications/order/.

Getting help and information from the World Wide Web

On the World Wide Web, up-to-date information about IBM systems, optional devices, services, and support is available at http://www.ibm.com/supportportal/. The address for IBM System x® information is http://www.ibm.com/systems/x/. The address for IBM BladeCenter® information is http://www.ibm.com/systems/bladecenter/. The address for IBM IntelliStation® information is http://www.ibm.com/systems/intellistation/.

How to send Dynamic System Analysis data to IBM

Use the IBM Enhanced Customer Data Repository to send diagnostic data to IBM. Before you send diagnostic data to IBM, read the terms of use at http://www.ibm.com/de/support/ecurep/terms.html.

You can use any of the following methods to send diagnostic data to IBM:

- **Standard upload:** http://www.ibm.com/de/support/ecurep/send_http.html
- **Standard upload with the system serial number:** http://www.ecurep.ibm.com/app/upload_hw
- **Secure upload:** http://www.ibm.com/de/support/ecurep/send_http.html#secure
- **Secure upload with the system serial number:** https://www.ecurep.ibm.com/app/upload_hw

Creating a personalized support web page

At http://www.ibm.com/support/mynotifications/, you can create a personalized support web page by identifying IBM products that are of interest to you. From this personalized page, you can subscribe to weekly email notifications about new technical documents, search for information and downloads, and access various administrative services.

Software service and support

Through IBM Support Line, you can get telephone assistance, for a fee, with usage, configuration, and software problems with your IBM products. For information about which products are supported by Support Line in your country or region, see http://www.ibm.com/services/supline/products/.

For more information about Support Line and other IBM services, see http://www.ibm.com/services/, or see http://www.ibm.com/planetwide/ for support telephone numbers. In the U.S. and Canada, call 1-800-IBM-SERV (1-800-426-7378).

Hardware service and support

You can receive hardware service through your IBM reseller or IBM Services. To locate a reseller authorized by IBM to provide warranty service, go to http://www.ibm.com/partnerworld/ and click **Find Business Partners** on the right side of the page. For IBM support telephone numbers, see http://www.ibm.com/planetwide/. In the U.S. and Canada, call 1-800-IBM-SERV (1-800-426-7378).

In the U.S. and Canada, hardware service and support is available 24 hours a day, 7 days a week. In the U.K., these services are available Monday through Friday, from 9 a.m. to 6 p.m.

IBM Taiwan product service

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

IBM Taiwan product service contact information:
IBM Taiwan Corporation
3F, No 7, Song Ren Rd.
Taipei, Taiwan
Telephone: 0800-016-888

Appendix B. Notices

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Important notes

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

CD or DVD drive speed is the variable read rate. Actual speeds vary and are often less than the possible maximum.

When referring to processor storage, real and virtual storage, or channel volume, KB stands for 1024 bytes, MB stands for 1,048,576 bytes, and GB stands for 1,073,741,824 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 can 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 that are available from IBM.

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

Each solid-state memory cell has an intrinsic, finite number of write cycles that the cell can incur. Therefore, a solid-state device has a maximum number of write cycles that it can be subjected to, expressed as “total bytes written” (TBW). A device that has exceeded this limit might fail to respond to system-generated commands or might be incapable of being written to. IBM is not responsible for replacement of a device that has exceeded its maximum guaranteed number of program/erase cycles, as documented in the Official Published Specifications for the device.

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

Particulate contamination

Attention: Airborne particulates (including metal flakes or particles) and reactive gases acting alone or in combination with other environmental factors such as humidity or temperature might pose a risk to the switch module that is described in this document. Risks that are posed by the presence of excessive particulate levels or concentrations of harmful gases include damage that might cause the switch module to malfunction or cease functioning altogether. This specification sets forth limits for particulates and gases that are intended to avoid such damage. The limits must not be viewed or used as definitive limits, because numerous other factors, such as temperature or moisture content of the air, can influence the impact of particulates or environmental corrosives and gaseous contaminant transfer. In the absence of specific limits that are set forth in this document, you must implement practices that maintain particulate and gas levels that are consistent with the protection of human health and safety. If IBM determines that the levels of particulates or gases in your environment have caused damage to the switch module, IBM may condition provision of repair or replacement of switch module or parts on implementation of appropriate remedial measures to mitigate such environmental contamination. Implementation of such remedial measures is a customer responsibility.

Table 4. Limits for particulates and gases

Contaminant	Limits
Particulate	• The room air must be continuously filtered with 40% atmospheric dust spot efficiency (MERV 9) according to ASHRAE Standard 52.2[1]. • Air that enters a data center must be filtered to 99.97% efficiency or greater, using high-efficiency particulate air (HEPA) filters that meet MIL-STD-282. • The deliquescent relative humidity of the particulate contamination must be more than 60%[2]. • The room must be free of conductive contamination such as zinc whiskers.
Gaseous	• Copper: Class G1 as per ANSI/ISA 71.04-1985[3] • Silver: Corrosion rate of less than 300 Å in 30 days

[1] ASHRAE 52.2-2008 - *Method of Testing General Ventilation Air-Cleaning Devices for Removal Efficiency by Particle Size*. Atlanta: American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc.

[2] The deliquescent relative humidity of particulate contamination is the relative humidity at which the dust absorbs enough water to become wet and promote ionic conduction.

[3] ANSI/ISA-71.04-1985. *Environmental conditions for process measurement and control systems: Airborne contaminants*. Instrument Society of America, Research Triangle Park, North Carolina, U.S.A.

Documentation format

The publications for this product are in Adobe Portable Document Format (PDF) and should be compliant with accessibility standards. If you experience difficulties when you use the PDF files and want to request a web-based format or accessible PDF document for a publication, direct your mail to the following address:

Information Development
IBM Corporation
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Research Triangle Park, North Carolina 27709-2195
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When you attach a monitor to the equipment, you must use the designated monitor cable and any interference suppression devices that are supplied with the monitor.

Federal Communications Commission (FCC) 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.

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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 conforme à la norme NMB-003 du Canada.

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Responsible manufacturer:
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New Orchard Road
Armonk, New York 10504
914-499-1900

European Community contact:
IBM Deutschland GmbH
Technical Regulations, Department M372
IBM-Allee 1, 71139 Ehningen, Germany
Telephone: +49 7032 15 2941
Email: lugi@de.ibm.com

Germany Class A statement

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高調波ガイドライン準用品

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中华人民共和国“A类”警告声明

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