Solarflare SFN5162F MR Dual Port 10 GbE SFP+
Adapter for IBM System x
Solarflare SFN6122F LL Dual Port 10 GbE SFP+
Adapter for IBM System x

IBM

Installation and User's Guide

Solarflare SFN5162F MR Dual Port 10 GbE SFP+
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Solarflare SFN6122F LL Dual Port 10 GbE SFP+
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IBM

Installation and User's Guide

Note: Before using this information and the product it supports, read the general information in Appendix B, "Notices," on page 29, the *Safety Information* and *Environmental Notices and User Guide* documents on the IBM *Documentation* CD, and the *Warranty Information* document that comes with the adapter.

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་སྟེར་བལྟ་དགོས།

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مەزكۆر مەھسۇلاتنى ئورنتشتىن بۇرۇن بخەتەرلىك ئۇچۇرلىرىنى ئوقۇپ چىقىڭ.

Bu ürünü kurmadan önce güvenlik bilgilerini okuyun.

Important:

Each caution and danger statement in this document is labeled with a number. This number is used to cross reference the 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 server 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.**

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

Contents

Chapter 1. Introduction

This *Installation and User's Guide* contains instructions for installing the following adapters in an IBM® System x® server:

- **Solarflare SFN5162F MR Dual Port 10 GbE SFP+ Adapter for IBM System x**

  The Solarflare SFN5162F dual-port 10 GbE SFP+ Performant server adapter delivers industry leading performance, providing high throughput, low latency, and high CPU efficiency, which improves the performance of network communications, network-attached storage, and remote file system access.

  The unique hardware-accelerated virtualized NIC (vNIC) architecture provides dramatic scalability, enabling high throughput, and low latency benefits to a wide range of network-intensive applications. Each vNIC provides an independent channel between the network adapter and host software, allowing network I/O processing to be distributed efficiently over multiple CPU cores.

- **Solarflare SFN6122F LL Dual Port 10 GbE SFP+ Adapter for IBM System x**

  The Solarflare SFN6122F dual-port 10 GbE SFP+ Onload server adapter delivers deterministic, ultra-low latency, high throughput, and reduced latency "jitter" even as message loads increase. This adapter supports the OpenOnload application acceleration middleware which bypasses the network stack in the operating system kernel by dedicating a vNIC to each accelerated application, reducing the processing associated with networking and improving core scaling.

  The SFN6122F application acceleration is based on industry standard APIs and protocols, so 10 Gb Ethernet accelerated performance is achieved without modifications to applications, proprietary protocols, or specialized networks. The SFN6122F adapter also provides the lowest CPU utilization and power consumption, enabling increased performance and scalability for financial services and other enterprise data centers.

The adapters come with a one-year limited warranty. For information about your warranty, see the *Warranty Information* document that comes with the adapter.

If firmware and documentation updates are available, you can download them from the IBM website. The adapter might have features that are not described in the documentation that comes with the adapter, and the documentation might be updated occasionally to include information about those features, or technical updates might be available to provide additional information that is not included in the adapter documentation. To check for updates, go to http://www.ibm.com/supportportal/.

For service or assistance, see Appendix A, "Getting help and technical assistance," on page 25.

The IBM Documentation CD

The *IBM Documentation* CD contains documentation for your adapter in Portable Document Format (PDF) and includes the IBM Documentation Browser to help you find information quickly.

Hardware and software requirements

The *IBM Documentation* CD requires the following minimum hardware and software:

- Microsoft Windows NT 4.0 (with Service Pack 3 or later), Windows 2000, or Red Hat Linux.
- 100 MHz microprocessor.
- 32 MB of RAM.
- Adobe Acrobat Reader 3.0 (or later) or xpdf, which comes with Linux operating systems. Acrobat Reader software is included on the CD, and you can install it when you run the Documentation Browser.

Using the Documentation Browser

Use the Documentation Browser to browse the contents of the CD, read brief descriptions of the documents, and view documents, using Adobe Acrobat Reader or xpdf. The Documentation Browser automatically detects the regional settings in use in your computer and displays the documents in the language for that region (if available). If a document is not available in the language for that region, the English-language version is displayed.

Use one of the following procedures to start the Documentation Browser:
- If Autostart is enabled, insert the CD into the CD drive. The Documentation Browser starts automatically.
- If Autostart is disabled or is not enabled for all users, use one of the following procedures:
  - If you are using a Windows operating system, insert the CD into the CD drive and click **Start --> Run**. In the **Open** field, type

    `e:\win32.bat`

    where *e* is the drive letter of the CD drive, and click **OK**.
  - If you are using Red Hat Linux, insert the CD into the CD drive; then, run the following command from the /mnt/cdrom directory:

    `sh runlinux.sh`

Select your adapter from the **Product** menu. The **Available Topics** list displays all the documents for your adapter. Some documents might be in folders. A plus sign (+) indicates each folder or document that has additional documents under it. Click the plus sign to display the additional documents.

When you select a document, a description of the document is displayed under **Topic Description**. To select more than one document, press and hold the Ctrl key while you select the documents. Click **View Book** to view the selected document or documents in Acrobat Reader or xpdf. If you selected more than one document, all the selected documents are opened in Acrobat Reader or xpdf.

To search all the documents, type a word or word string in the **Search** field and click **Search**. The documents in which the word or word string is displayed are listed in order of the most occurrences. Click a document to view it, and press Ctrl+F to use the Acrobat search function, or press Alt+F to use the xpdf search function within the document.

Click **Help** for detailed information about using the Documentation Browser.

Related documentation

This *Installation and User's Guide* contains setup, installation, configuration, and troubleshooting instructions for the adapter.

In addition to this *Installation and User's Guide*, the following related documentation is provided with the adapter:

- *Safety Information*

  This document is in Portable Document Format (PDF) on the IBM *Documentation* CD. It contains translated versions of caution and danger statements. Each caution and danger statement in this document is labeled with a number. This number is used to cross reference the English language caution or danger statement with translated versions of the caution or danger statement in the *Safety Information* document.

- *IBM Environmental Notices and User Guide*

  This multilingual document contains translated environmental notices for this product.

- IBM *Important Notices* document

  This printed document contains important safety and environmental notices for the adapter.

- IBM *Warranty Information* document

  This printed document contains warranty information for the adapter.

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 that comes with the adapter. Each statement is numbered for reference to the corresponding statement in your language 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 might 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

The adapter features are described in the following table.

Table 1. Adapter features

Feature	Description
Virtual NIC support	The core of Solarflare technology. Protected VNIC interfaces can be instantiated for each running guest operating system or application, giving it a direct pipeline to the Ethernet network. This architecture provides the most efficient way to maximize network and CPU efficiency. The Solarflare Ethernet controller supports up to 1024 vNIC interfaces per port.
PCI Express	Implements PCI Express 2.0.
PCI Single-Root-IOV capable	127 virtual functions per port. Flexible deployment of 1024 channels between virtual and physical functions. Support Alternate Routing ID (ARI).
10-gigabit Ethernet	Supports the ability to design a cost effective, high performance 10 Gigabit Ethernet solution.
Receive Side Scaling (RSS)	IPv4 and IPv6 RSS raises the utilization levels of multi-core servers dramatically by distributing I/O load across all CPUs and cores.
IP/UDP/TCP checksum offload	Calculation and validation for the checksums found in IP, TCP and UDP headers. This feature saves a significant amount of valuable CPU cycles.
Jumbo frame support	Support for up to 9216 byte jumbo frames.
MSI-X support 1024	MSI-X interrupt support enables higher levels of performance. Can also work with MSI or legacy line based interrupts.
Ultra low latency	Cut through architecture. < 6µs end to end latency with standard kernel drivers, < 3µs with Onload drivers.
Remote boot	Support for PXE boot 2.1 and iSCSI Boot provides flexibility in cluster design and diskless servers.
IP flow filtering	Enables the hardware to steer packets based on IP, TCP and UDP header contents to a VNIC.
MAC address filtering	Enables the hardware to steer packets based on the MAC address to a VNIC.

The Solarflare SFN5162F MR Dual Port 10 GbE SFP+ Adapter for IBM System x specifications are described in the following table.

Table 2. Solarflare SFN5162F adapter specifications

Feature	Description
Controller silicon	SFC9020
Power	4.9 W typical
PCI Express	8 lanes Gen2 (5.0GT/s), 127 SR-IOV virtual functions per port
Virtual NIC support	1024 vNIC interfaces per port
Supports OpenOnload	No
Network ports	2 x SFP+ (10G/1G)
Operating range	0° to 55°C
Physical dimensions	Length: 5.3 in. (13.4 cm), Width: 2.7 in. (6.9 cm)

The Solarflare SFN6122F LL Dual Port 10 GbE SFP+ Adapter for IBM System x specifications are described in the following table.

Table 3. Solarflare SFN6122F adapter specifications

Feature	Description
Controller silicon	SFC9020x
Power	5.9 W typical
PCI Express	8 lanes Gen2 (5.0GT/s), 127 SR-IOV virtual functions per port
Virtual NIC support	1024 vNIC interfaces per port
Supports OpenOnload	Yes
Network ports	2 x SFP+ (10G/1G)
Operating range	0° to 55°C
Physical dimensions	Length: 5.3 in. (13.4 cm), Width: 2.7 in. (6.9 cm)

Inventory checklist

The adapter option package includes the following items:

- One of the following adapters:
    - Solarflare SFN5162F MR Dual Port 10 GbE SFP+ Adapter for IBM System x
    - Solarflare SFN6122F LL Dual Port 10 GbE SFP+ Adapter for IBM System x
- Low-profile expansion slot bracket
- IBM *Documentation* CD (includes the *Installation and User's Guide*, *Safety Information* , and *Environmental Notices and User Guide* documents)
- IBM *Important Notices* document
- IBM *Warranty Information* document
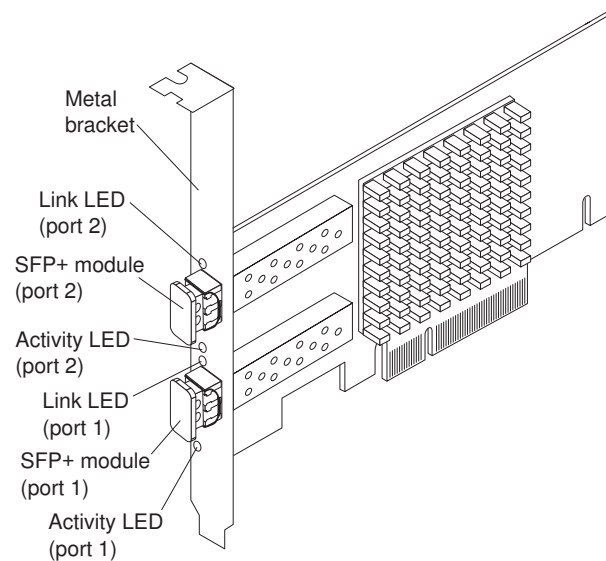
Device driver support

The following device drivers are supported:

- Microsoft Windows Server 2008 R2
- Microsoft Windows Server 2012
- SUSE LINUX Enterprise Server 11 for x86
- SUSE LINUX Enterprise Server 11 for AMD64 / EM64T
- SUSE LINUX Enterprise Server 11 with Xen for AMD64 / EM64T
- Red Hat Enterprise Linux 5 Server Edition
- Red Hat Enterprise Linux 5 Server x64 Edition
- Red Hat Enterprise Linux 5 Server with Xen x64 Edition
- Red Hat Enterprise Linux 6 Server Edition
- Red Hat Enterprise Linux 6 Server x64 Edition
- VMware vSphere 5.0
- VMware vSphere 5.1

The Solarflare accelerated network middleware, OpenOnload and EnterpriseOnload, is supported on all the non-virtualized Linux variants in the previous list, and is available for the Solarflare SFN6122F adapter for IBM System x.

Adapter components

The major components of the dual-port adapter are shown in the following illustration.

Metal
bracket

Link LED
(port 2)

SFP+ module
(port 2)

Activity LED
(port 2)

Link LED
(port 1)

SFP+ module
(port 1)

Activity LED
(port 1)

LED states

There are two LEDs on the Solarflare network adapter transceiver modules. The LED states are described in the following table.

Table 4. LED states

Adapter type	LED description	State
SFP+	Link	Green (solid) at all speeds
	Activity	Flashing green when network traffic is present
		LEDs are off when there is no link present

Supported speeds and modes

Solarflare network adapters support SFP+ standards. The currently inserted SFP+ module (transceiver) determines the supported speeds, typically SFP+ modules support only a single speed. Some SFP+ adapters support dual speed optical modules that can operate at either 1 Gbps or 10 Gbps. However, these modules do not auto-negotiate link speed and operate at the maximum (10 G) link speed unless specifically configured to operate at a lower speed (1 G).

The following table summarizes the speeds supported by the adapters.

Table 5. Adapter supported speeds and modes

Supported modes	Auto-negotiated speed	Speed	Comment
Direct-attach SFP+ cable	No	10 G	
SFP+ optical module (10 G)	No	10 G	
SFP+ optical module (10 G / 1 G)	No	10 G or 1 G	Dual speed modules run at the maximum speed (10 G) unless explicitly configured to the lower speed (1 G).

Chapter 2. Installing the adapter

This chapter provides information about installing the adapter in a server.

Installation guidelines

Before you install the adapter in the server, read the following information:

- Read the safety information that begins on page iii and the guidelines in "Handling static-sensitive devices" on page 10. This information will help you work safely.

  Attention: Installing the wrong firmware or device-driver update might cause the adapter or the server to malfunction. Before you install a firmware or device-driver update, read any readme and change history files that are provided with the downloaded update. These files contain important information about the update and the procedure for installing the update, including any special procedure for updating from an early firmware or device-driver version to the latest version.

- Make sure that you are using the latest versions of adapter device drivers and firmware code and basic input/output system (BIOS) or UEFI code for the server. To download the most recent device drivers and firmware updates, go to http://www.ibm.com/supportportal/. Follow the instructions that are included with the download procedure.

- Observe good housekeeping in the area where you are working. Place removed covers and other parts in a safe place.

- Do not attempt to lift an object that you think is too heavy for you. If you have to lift a heavy object, observe the following precautions:
  - Make sure that you can stand safely without slipping.
  - Distribute the weight of the object equally between your feet.
  - Use a slow lifting force. Never move suddenly or twist when you lift a heavy object.
  - To avoid straining the muscles in your back, lift by standing or by pushing up with your leg muscles.

- Have a small Phillips screwdriver available.

- When you are finished working on the server, reinstall all safety shields, guards, labels, and ground wires.

Handling static-sensitive devices

Attention: Static electricity can damage the server 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 damage from electrostatic discharge, observe the following precautions:

- Limit your movement. Movement can cause static electricity to build up around you.
- The use of a grounding system is recommended. For example, wear an electrostatic-discharge wrist strap, if one is available. Always use an electrostatic-discharge wrist strap or other grounding system when you work inside the server with the power on.
- Handle the device carefully, holding it by its edges or its frame.
- Do not touch solder joints, pins, or exposed 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 on the outside of the server 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 server 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 server cover or on a metal surface.
- Take additional care when you handle devices during cold weather. Heating reduces indoor humidity and increases static electricity.

Installing the adapter

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.**

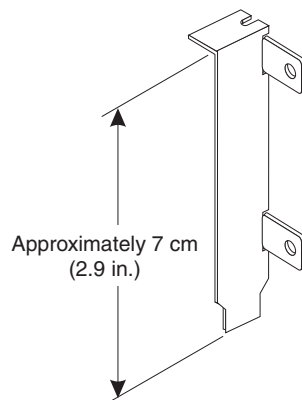| To Connect:	To Disconnect:
1. Turn everything OFF.	1. Turn everything OFF.
2. First, attach all cables to devices.	2. First, remove power cords from outlet.
3. Attach signal cables to connectors.	3. Remove signal cables from connectors.
4. Attach power cords to outlet.	4. Remove all cables from devices.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

Before you install the adapter, make sure that the preinstalled expansion slot bracket is the correct size for the server in which you are installing the adapter.

Note: The expansion-slot opening is measured along the longest dimension and might be oriented horizontally in some servers.

The adapter comes with a preinstalled expansion-slot bracket that is approximately 11 cm (4.3 in.) long. If the opening for the PCIe expansion slot is approximately 10 cm (4.0 in.) long, you will use the preinstalled bracket.
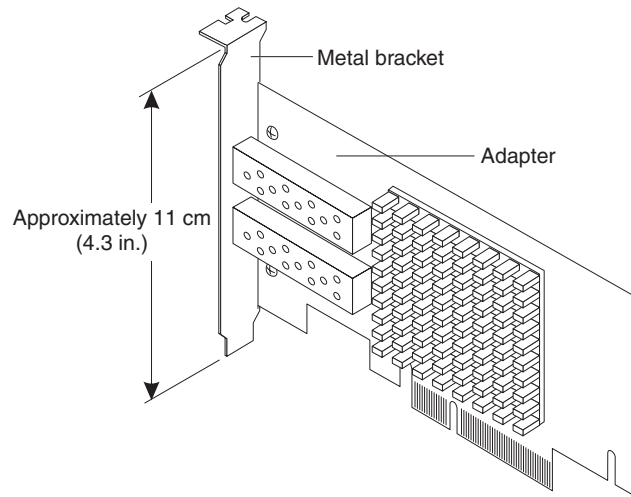

The option package also contains a low-profile expansion-slot bracket that is approximately 7 cm (2.9 in.) long. If the opening for the PCIe expansion slot is approximately 6 cm (2.3 in.) long, you must replace the preinstalled bracket with the low-profile bracket. You will do this in step 5 in the following procedure.

To install the adapter in the server, complete the following steps:

1. Read the safety information that begins on page iii, and "Handling static-sensitive devices" on page 10.

2. Turn off the server and peripheral devices and disconnect the power cords.

3. Remove the server cover. For more information, see the *Installation and User's Guide* that comes with the server.

4. Touch the static-protective package that contains the adapter to any unpainted surface on the outside of the server; then, grasp the adapter by the top edge or upper corners and remove it from the package and inspect it for damage. Contact your IBM sales representative or IBM reseller if the adapter appears to be damaged.

5. If you have to remove the preinstalled expansion-slot bracket and replace it with the low-profile bracket, complete the following steps; otherwise, go to step 6 on page 13.

   a. Orient the adapter as shown in the following illustration.
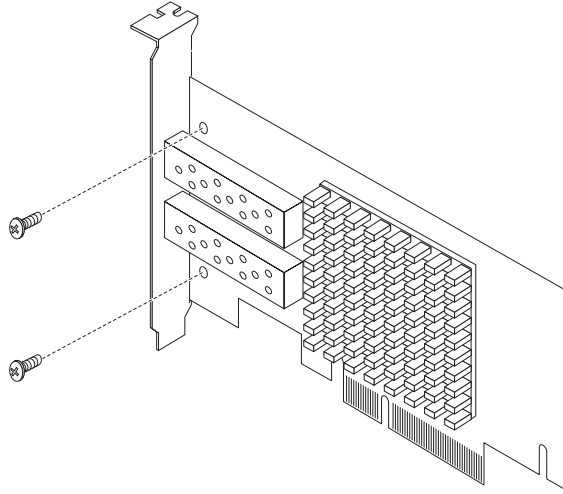
b. Use a small Phillips screwdriver to carefully remove the two screws that hold the bracket onto the adapter.

c. Lift the bracket from the adapter and store the bracket in a safe place for possible reuse.

d. Align the low-profile bracket so that the tabs are on the rear of the adapter and the holes on the tabs align with the holes on the adapter. Make sure that you do not slide the bracket past the ends of the grounding "finger" tabs on the SFP+ module cages.

e. From the front side of the adapter, attach the bracket to the adapter, using the two screws that you removed in step 5b.

6. **To install the adapter in a PCIe slot on the system board**, complete the following steps. For more information, see the *Installation and User's Guide* that comes with the server.

a. Depending on the server model, you might have to remove the expansion-slot cover, release the bracket lever, or open the adapter retention clip for the selected PCIe slot. To remove the expansion-slot cover, you might have to remove the expansion-slot screw. Place the removed parts in a safe place.

b. Insert the adapter into the connector, aligning the edge connector on the adapter with the connector on the system board.

c. Press the edge of the connector on the adapter firmly into the connector on the system board. Make sure that the adapter snaps into the connector securely.

Attention: When you install an adapter, make sure that the adapter is correctly seated on the system board before you turn on the server. An incorrectly seated adapter might cause damage to the system board or the adapter.

d. To secure the adapter in place, replace the expansion-slot screw if you removed it, return the bracket lever to the closed position, or close the adapter retention clip.

e. Go to step 10 on page 14.

7. **To install the adapter on a PCIe riser-card assembly**, complete the following steps. For more information, see the *Installation and User's Guide* that comes with the server.

a. Remove the PCI riser-card assembly from the server.

b. If required for your server, open the retention latch.

c. Insert the adapter into the riser-card assembly, aligning the edge connector on the adapter with the connector on the riser-card assembly.

d. Press the edge of the connector firmly into the riser-card assembly. Make sure that the adapter snaps into the riser-card assembly securely.

Attention: When you install an adapter, make sure that the adapter is correctly seated in the riser-card assembly and that the riser-card assembly is securely seated in the riser-card connector on the system board before you turn on the server. An incorrectly seated adapter might cause damage to the system board, the riser-card assembly, or the adapter.
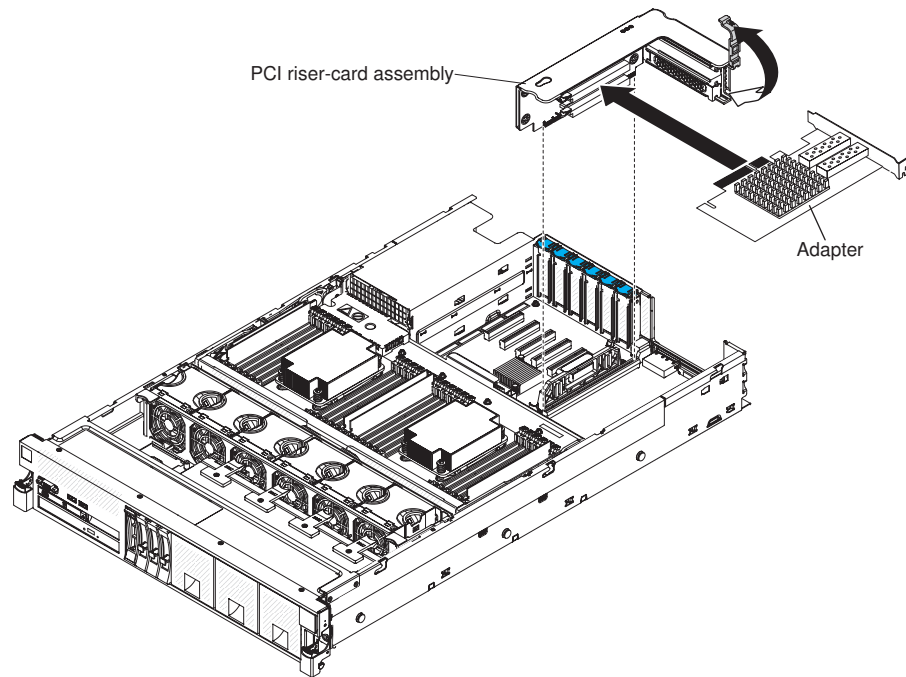
e. If required for your server, close the retention latch to secure the adapter in place.

f. Align the PCI riser-card assembly with the PCI slot connector on the system board and align it with the slot on the chassis; then, lower it into the server and press down firmly until the PCI riser-card assembly is seated correctly in the connector on the system board.

8. Replace the server cover.

9. Reconnect the power cords.

10. The adapter can be connected to the network by using either a direct-attach SFP+ cable or a fiber-optic cable. To attach the cables, see "Connecting direct-attach SFP+ cables to the adapter" on page 15 or "Connecting fiber-optic cables to the adapter" on page 16.

11. After you attach the cables, turn on all external devices; then, turn on the server. To make sure that the adapter is functioning correctly, check the green LEDs on the front bracket of the adapter. For more information, see "LED states" on page 7.

Note: The adapter is self-configuring. If your server requires manual configuration to enable the adapter, bus-master slot, and interrupt request (IRQ) level, use the Setup utility. For more information about the Setup utility, see the *Installation and User's Guide* that comes with the server.

For detailed information about installing the device drivers and configuring the adapter on the supported operating systems, see the *Solarflare Server Adapter User Guide* at https://support.solarflare.com/.

Connecting direct-attach SFP+ cables to the adapter

To attach a direct-attach SFP+ cable to the adapter, complete the following steps:

1. Orient the connector end of the direct-attach cable so that the gold-edge connector faces the retention tab on the adapter port (see the illustration).

Direct-attach SFP+ cable
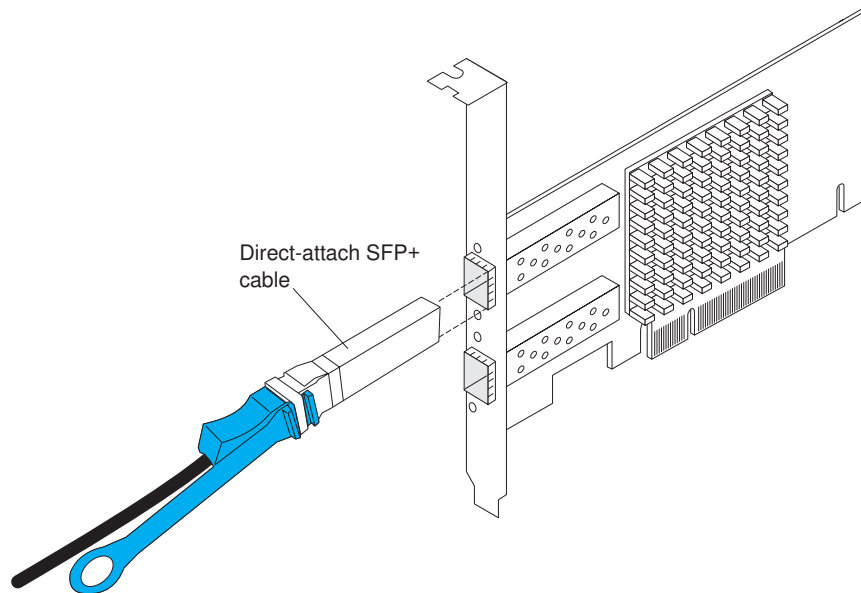
2. Push the cable connector straight into the adapter port until it clicks into place.

Connecting fiber-optic cables to the adapter

The following sections describe installing SFP+ modules and fiber-optic cables.

Working with SFP+ modules and fiber-optic cables

An enhanced small-form-factor pluggable (SFP+) module converts electrical signals to optical signals. One end of a fiber-optic cable is inserted into the SFP+ module, and the other end of the fiber-optic cable is connected to a network device.

Handling SFP+ modules

Before you install or remove SFP+ modules and fiber-optic cables, read the following information:

- The SFP+ module housing has an integral guide key that is designed to prevent you from inserting the SFP module incorrectly.
- Use minimal pressure when you insert an SFP+ module into a fiber-optic port. Forcing the SFP+ module into a port can cause damage to the SFP+ module or to the port.
- You can insert or remove the SFP+ module while the port is powered on.
- You must insert the SFP+ module into a port before you connect the fiber-optic cable.
- You must remove the fiber-optic cable from the SFP+ module before you remove the SFP+ module from the port.

Handling fiber-optic cables

Attention: To avoid damage to a fiber-optic cable, 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 use plastic cable ties in place of the provided cable straps.
- Do not overtighten the cable straps or bend the cable 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.

Installing an SFP+ module and connecting the fiber-optic cable

Note: SFP+ modules and fiber-optic cables are laser products.
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.**

To install an SFP+ module and connect a fiber-optic cable, complete the following steps:

1. Remove the SFP+ module from its static-protective package and keep the protective cap in place.

2. Insert the SFP+ module in the adapter port until it clicks into place.

   Note: The SFP+ module is inserted in the port with the cap on and the wire tab closed.
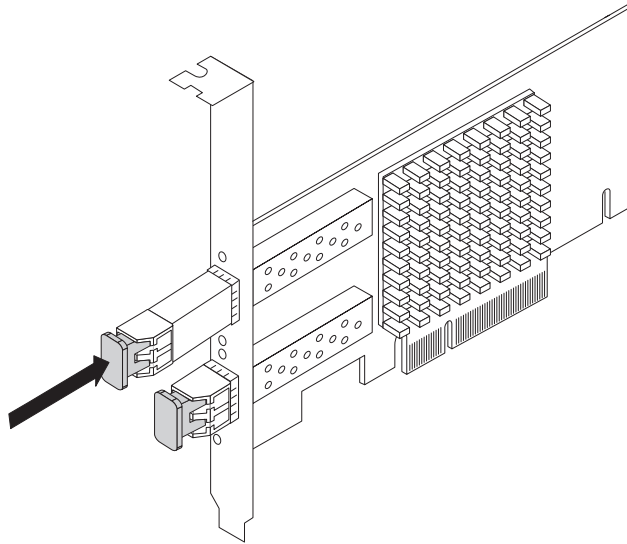
3. Remove the protective caps from the end of a fiber-optic cable and from the SFP+ module on the adapter (see "Handling fiber-optic cables" on page 16).

4. Insert one end of a fiber-optic cable into the SFP+ module on the adapter and connect the other end to a network device. Most connectors and ports are keyed for proper orientation.
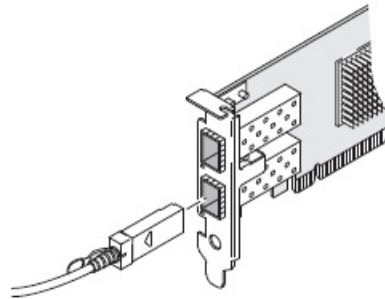

Fiber-optic cable
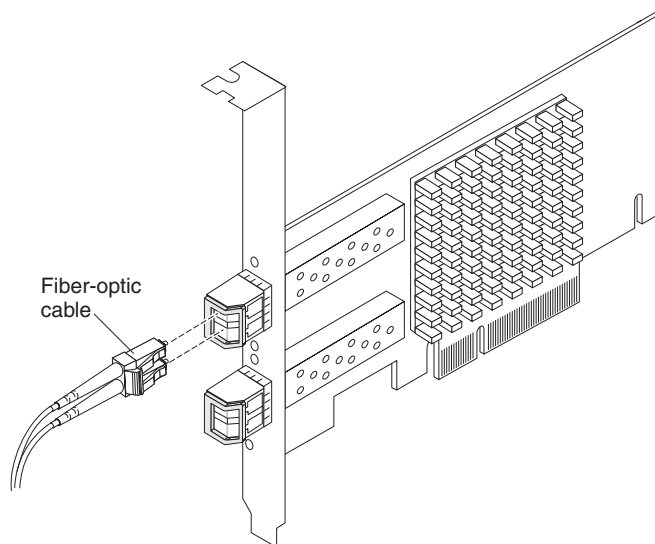
Removing cables and SFP+ modules

The following sections describe how to remove cables and SFP+ modules.

Removing a direct-attach SFP+ cable

To remove a direct-attach SFP+ cable from the adapter, complete the following steps:

1. Pull straight back on the cable release ring to release the cable retention tab.

2. Slide the cable free from the adapter port.

Removing a fiber-optic cable

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.

Attention: To avoid damaging the fiber-optic cable and SFP+ module, make sure that you observe the following precautions:

- Press and hold the lever to release the latches before you remove the cable from the SFP+ module.
- Make sure that the levers are in the released position when you remove the cable.

To remove a fiber-optic cable from the adapter port, complete the following steps:

1. On the end of the fiber-optic cable that connects into the SFP+ module, press down and hold the lever to release the latches, as shown in the following illustration.
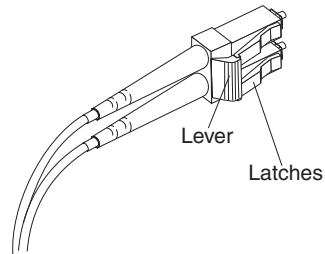
2. While pressing down the cable lever, carefully pull on the connector to remove the cable from the SFP+ module, as shown in the following illustration.
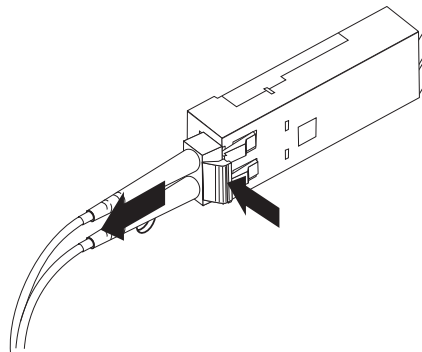
3. Replace the protective caps on the cable ends and the SFP+ module.

Removing an SFP+ module

To remove an SFP+ module from the adapter, complete the following steps:

1. Carefully remove the fiber-optic cable from the adapter port (see "Removing a fiber-optic cable" on page 19).

2. If the SFP+ module has a pull tab, remove the SFP+ module from the port by using the pull tab. If the SFP+ module has a wire tab, unlock the SFP+ module latch by pulling the wire tab outward 90°; then, grasp the wire tab and pull the SFP+ module out of the port.
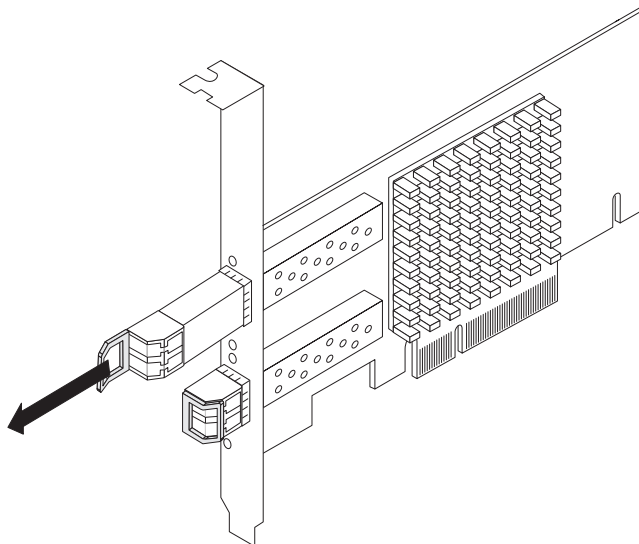
3. Replace the protective cap on the SFP+ module and place the SFP+ module in a static-protective package.

Chapter 3. Troubleshooting

If you are having a problem with the adapter, use the following information to help you determine the cause of the problem and the action to take. Additional troubleshooting and debugging procedures are available in the *Problem Determination and Service Guide* that comes with the server.

Attention: Installing the wrong firmware or device-driver update might cause the adapter to malfunction. Before you install a firmware or device-driver update, read any readme and change history files that are provided with the downloaded update. These files contain important information about the update and the procedure for installing the update, including any special procedure for updating from an early firmware or device-driver version to the latest version.

Make sure that you are using the latest versions of device drivers, firmware code, and BIOS or UEFI code for the server. To download the most recent device drivers, firmware, and BIOS or UEFI boot code updates, go to http://www.ibm.com/support/fixcentral/. Follow the instructions that are included with the download.

To determine whether the problem is caused by the hardware, perform the following tasks:

- Make sure that the adapter is installed in an applicable PCIe slot (x1, x4, or x8).
- Make sure that the adapter is correctly seated in the slot.
- Make sure that the bracket is secured by the retaining bracket, preventing movement in the PCIe slot.
- Make sure that the cables are correctly installed in the SFP+ modules.
- Make sure that the LEDs show the correct state when a cable is connected to a link partner.
- Make sure that there are no CRC or frame errors present.
- If an SFP+ module or a cable might be causing an error, swap the SFP+ modules between the ports. If the problem stays with the port and does not move with the SFP+ module or cable, the link partner might be causing the problem.

To determine whether the problem is caused by the software, perform the following tasks:

- Make sure that the correct device driver is installed. To download or get information about the latest supported device drivers, utilities, and documentation, go to http://www.ibm.com/support/fixcentral/. Follow the instructions that are included with the download. For more information, see the *Installation and User's Guide* for the server.
- Make sure that the BIOS functional firmware and boot code in the adapter are at the latest level.

Replaceable components

Field replaceable units (FRUs) must be replaced only by a trained service technician, unless they are classified as customer replaceable units (CRUs).

Tier 1 CRU: Replacement of Tier 1 CRUs is your responsibility. If IBM installs a Tier 1 CRU at your request without a service contract, you will be charged for the installation.

Tier 2 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 product.

For more information about the terms of the warranty and getting service and assistance, see the *Warranty Information* document that comes with the controller.

Table 6. Field replaceable units for the adapter

Description	CRU part number (Tier 1)
Solarflare SFN5162F MR Dual Port 10 GbE SFP+ Adapter for IBM System x	47C9955
Solarflare SFN6122F LL Dual Port 10 GbE SFP+ Adapter for IBM System x	47C9963

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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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.

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.

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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 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 device 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 device 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 device, IBM may condition provision of repair or replacement of devices or parts on implementation of appropriate remedial measures to mitigate such environmental contamination. Implementation of such remedial measures is a customer responsibility.

Table 7. 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
205/A015
3039 E. Cornwallis Road
P.O. Box 12195
Research Triangle Park, North Carolina 27709-2195

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In the request, be sure to include the publication part number and title.

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This product may not be certified in your country for connection by any means whatsoever to interfaces of public telecommunications networks. Further certification may be required by law prior to making any such connection. Contact an IBM representative or reseller for any questions.

Electronic emission notices

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.

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 conforme à la norme NMB-003 du Canada.

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.

European Union EMC Directive conformance statement

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 nonrecommended modification of the product, including the fitting of non-IBM option cards.

Attention: This is an EN 55022 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.

Responsible manufacturer:
International Business Machines Corp.
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

Deutschsprachiger EU Hinweis:

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

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

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

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

Verantwortlich für die Einhaltung der EMV Vorschriften ist der Hersteller:
International Business Machines Corp.
New Orchard Road
Armonk, New York 10504
914-499-1900

Der verantwortliche Ansprechpartner des Herstellers in der EU ist:
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Technical Regulations, Abteilung M372
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Email: lugi@de.ibm.com

Generelle Informationen:

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

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This is a Class A product based on the standard of the Voluntary Control Council for Interference (VCCI). If this equipment is used in a domestic environment, radio interference may occur, in which case the user may be required to take corrective actions.

Japan Electronics and Information Technology Industries Association (JEITA) statement

高調波ガイドライン適合品

Japanese Electronics and Information Technology Industries Association (JEITA) Confirmed Harmonics Guideline (products less than or equal to 20 A per phase)

Korea Communications Commission (KCC) statement

이 기기는 업무용(A급)으로 전자파적합기기로
서 판매자 또는 사용자는 이 점을 주의하시기
바라며, 가정외의 지역에서 사용하는 것을 목
적으로 합니다.

This is electromagnetic wave compatibility equipment for business (Type A). Sellers and users need to pay attention to it. This is for any areas other than home.

Russia Electromagnetic Interference (EMI) Class A statement

ВНИМАНИЕ! Настоящее изделие относится к классу А.
В жилых помещениях оно может создавать радиопомехи, для
снижения которых необходимы дополнительные меры

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 compliance 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。

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