Flex System PCIe Expansion Node Installation and Service Guide

Note

Before using this information and the product it supports, read the general information in Appendix B "Notices" on page 59; and read the *Safety Information* and the *Systems Environmental Notices and User Guide* on the *Documentation CD*.

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.

ᠡᠨᠡ ᠵᠦᠢᠯ ᠢ ᠠᠰᠢᠭᠯᠠᠬᠤ ᠠᠴᠠ ᠡᠮᠦᠨᠡ ᠠᠶᠤᠯ ᠦᠭᠡᠢ ᠠᠵᠢᠯᠯᠠᠭᠠᠨ ᠤ ᠮᠡᠳᠡᠭᠡ

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་སྐྱོད་མ་བྱས་གོང་། སྐོར་གྱི་ཡིད་གཟབ་
བྱ་འདུ་མིན་ཡོད་པའི་འོད་སྦྲེར་བསྐྱ་དགོས།

Bu ürünü kurmadan önce güvenlik bilgilerini okuyun.

مەزكۇر مەھسۇلاتنى ئورنتىشتىن بۇرۇن بىخەتەرلىك ئۇچۇرلىرىنى ئوقۇپ چىقىڭ.

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

Safety statements

These statements provide the caution and danger information that is used in this documentation.

Important: Each caution and danger statement in this documentation 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 documentation before you perform the procedures. Read any additional safety information that comes with your 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.

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

Statement 12

CAUTION:
The following label indicates a hot surface nearby.

Statement 21

CAUTION:
Hazardous energy is present when the blade is connected to the power source. Always replace the blade cover before installing the blade.

UL regulatory information

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

Attention: This product is suitable for use on an IT power distribution system whose maximum phase-to phase-voltage is 240 V under any distribution fault condition.

Chapter 1. Introduction

The Flex System PCIe Expansion Node can provide PCI express expansion to a host compute node in an Flex System.

The PCIe Expansion Node supports up to two additional I/O expansion adapters for a host compute node and up to four additional PCIe adapters.

The PCIe Expansion Node provides the following:

- Two slots for two I/O expansion adapters
- Two slots for up to two full-height full-length or full-height half-length PCIe adapters
- Two expansion connections for up to two low-profile PCIe adapters

Note: A single 4-connector auxiliary power cable is provided with full-length PCIe adapters that require more power than can be supplied with the two 2-connector auxiliary power cables that you might have received with your PCIe Expansion Node. Be sure to use the cable that comes with your adapter. For a list of supported adapters, see http://www.ibm.com/systems/info/x86servers/serverproven/compat/us/ ServerProven: http://www-03.ibm.com/systems/info/x86servers/serverproven/compat/us/.

The PCIe Expansion Node has two slots for full-length PCIe adapters and two slots for low-profile PCIe adapters.

Note: Low profile adapters can be used in the full-length slots if extension brackets are used to secure the adapter in the slot.

This documentation provides the following information about setting up and troubleshooting the PCIe Expansion Node:
- Installing a PCIe Expansion Node in the Flex System Enterprise Chassis
- Installing optional devices
- Diagnosing problems
- Installing, removing, and replacing components

The PCIe Expansion Node comes with a limited warranty. For information about the terms of the warranty, see the *Warranty Information* document for your PCIe Expansion Node. This document is available on the IBM *Documentation* CD.

The Flex System PCIe Expansion Node is supported in the Flex System Enterprise Chassis only. You can obtain up-to-date information about the PCIe Expansion Node at http://www.ibm.com/systems/.

The PCIe Expansion Node might have features that are not described in the documentation that comes with the product. The documentation might be updated occasionally to include information about those features. Technical updates might also be available to provide additional information that is not included in the PCIe Expansion Node documentation. To obtain the latest and most up-to-date documentation for this product, go to http://pic.dhe.ibm.com/infocenter/flexsys/information/index.jsp.

You can subscribe to information updates that are specific to your compute node at http://www.ibm.com/ support/mynotifications.

Features and specifications

Use this table to view specific information about the PCIe Expansion Node, such as PCIe Expansion Node hardware features and the dimensions of the PCIe Expansion Node.

The following table is a summary of the features and specifications of the PCIe Expansion Node.

Table 1. Features and specifications

Integrated functions:
- The PCIe Expansion Node attaches to a compute node through the interposer cable to allow the addition of expansion PCIe adapters such as:
  - Solid-state drives
  - Graphics accelerators
  - PCIe storage expansion, including host bus adapters and RAID adapters
- Supports standard PCIe adapters, including:
  - 1x, 2x, 4x, 8x, and 16x PCIe lane widths[1]
  - Generation 1, generation 2, and generation 3 complaint adapters [2]
  - Standard height adapters: 106.7 mm (4.20 in)
  - Low-profile adapters: 64.4 mm (2.536 in)
  - Half-length adapters: 167.65 mm (6.6 in)
  - Full-length adapters: 312 mm (12.283 in).

  Note: When shorter than full-length adapters are used in the full-length slots, extension brackets must be used to securely retain the adapter in the full-height riser.
- Supports PCIe standards 1.1 and 2.0
- Supports PCIe adapters greater than 75 W. The PCIe Expansion Node system board includes two standard 2x3, six-pin power connectors with more than 75 W each for additional power.
- Light path diagnostics

Optional devices:
- Supports up to four installed PCIe adapters:
  - Up to four low-profile adapters (low-profile adapters equipped with the correct extension bracket will fit in the full-height slots)
  - Up to two full-height adapters or one full-height double-wide adapter
- The PCIe Expansion Node supports two additional I/O adapters

Electrical input: Receives 12 V dc power from the chassis midplane (+12.2 V nominal, +/- 3%)

Size:
- Height: 55.5 mm (2.18 in)
- Depth: 492 mm (19.37 in)
- Width: 217.35 (8.55 in)
- Maximum weight: 6.82 kg (13.84 lb)

Declared sound power level: When the M2090 adapter is added to the PCIe Expansion Node and installed in the Flex System Enterprise Chassis, the acoustical sound power levels will increase from 7.5 bels to 8.6 bels for the single chassis.

Environment: The PCIe Expansion Node complies with ASHRAE class A3 specifications.

- Power on [3]:
  - Temperature: 5°C - 40°C (41°F - 104°F) [5, 11]
  - Humidity, non-condensing: -12°C dew point (10.4°F) and 8% - 85% relative humidity [7,8]
  - Maximum dew point: 24°C (75°F)
  - Maximum altitude: 3048 m (10,000 ft)
  - Maximum rate of temperature change: 5°C/hr (41°F/hr) [6]
- Power off [4]:
  - Temperature: 5°C to 45°C (41°F - 113°F)
  - Relative humidity: 8% - 85%
  - Maximum dew point: 27°C (80.6°F)
- Storage (non-operating):
  - Temperature: 1°C to 60°C (33.8°F - 140°F)
  - Altitude: 3050 m (10,006 ft)
  - Relative humidity: 5% - 80%
  - Maximum dew point: 29°C (84.2°F)
- Shipment (non-operating) [9]:
  - Temperature: -40°C to 60°C (-40°F - 140°F)
  - Altitude: 10,700 m (35,105 ft)
  - Relative humidity: 5% - 100%
  - Maximum dew point: 29°C (84.2°F) [10]

Notice: Government regulations (such as those prescribed by OSHA or European Community Directives) may govern noise level exposure in the workplace and may apply to you and your server installation. This IBM system is available with an optional acoustical door feature that can help reduce the sound emitted from this system. The actual sound pressure levels in your installation depend upon a variety of factors, including the number of racks in the installation; the size, materials, and configuration of the room; the noise levels from other equipment; the room ambient temperature, and employees' location in relation to the equipment. Further, compliance with such government regulations also depends upon a variety of additional factors, including the duration of employees' exposure and whether employees wear hearing protection. IBM recommends that you consult with qualified experts in this field to determine whether you are in compliance with the applicable regulations.

1. PCIe mechanical connectors limit larger lane add-in cards from being inserted into smaller mechanical connectors.
2. Generation 3 compliant cards operate using generation 2 compliance.

Table 1. Features and specifications (continued)

3. PCIe Expansion Node is powered on.

4. PCIe Expansion Node is removed from original shipping container and is installed but not in use, for example, during repair, maintenance, or upgrade.

5. A3 - Derate maximum allowable temperature 1°C/175 m above 950 m.

6. 5°C/hr for data centers employing tape drives and 20°C/hr for data centers employing disk drives.

7. The minimum humidity level for class A3 is the higher (more moisture) of the -12 °C dew point and the 8% relative humidity. These intersect at approximately 25°C. Below this intersection (~25C) the dew point (-12 °C) represents the minimum moisture level, while above it relative humidity (8%) is the minimum.

8. Moisture levels lower than 0.5°C DP, but not lower -10 °C DP or 8% relative humidity, can be accepted if appropriate control measures are implemented to limit the generation of static electricity on personnel and equipment in the data center. All personnel and mobile furnishings and equipment must be connected to ground via an appropriate static control system. The following items are considered the minimum requirements:

   a. Conductive materials (conductive flooring, conductive footwear on all personnel that go into the datacenter, all mobile furnishings and equipment will be made of conductive or static dissipative materials).

   b. During maintenance on any hardware, a properly functioning wrist strap must be used by any personnel who contacts IT equipment.

9. The equipment acclimation period is 1 hour per 20 °C of temperature change from the shipping environment to the operating environment.

10. Condensation is acceptable, but not rain.

11. For some PCIe adapters, the M2090 adapter for example, when running in A3 conditions greater than 35 C, the performance of the adapter might be reduced to keep the adapter within thermal limits.

Major components of the PCIe Expansion Node

Use this information to help locate the main components of the PCIe Expansion Node.

The following illustration identifies the main components of the PCIe Expansion Node.
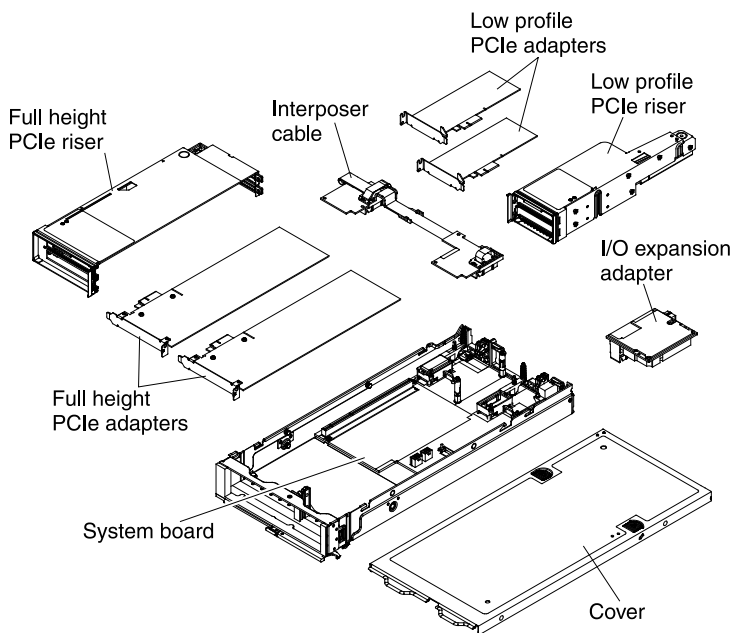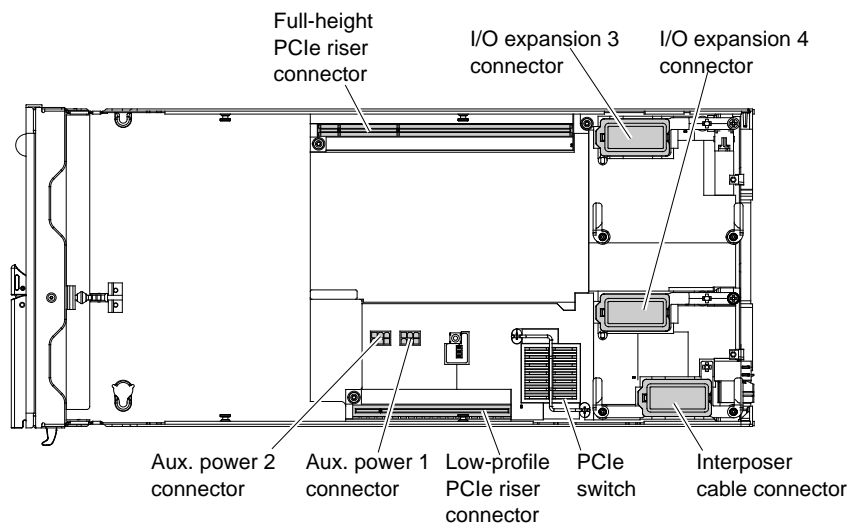
System board

The system board executes all the major logic functions of the PCIe Expansion Node.

The system board includes the following components:

- PCIe switch - controls all routing of PCIe lane traffic between the compute node and the PCIe adapters that are installed in the PCIe Expansion Node
- PCIe riser connectors - two card-edge connectors that connect the system board to the full-height and low-profile PCIe risers
- I/O adapter connectors - two expansion ports for I/O adapters
- Interposer cable connector - allows communication between the compute node host and the PCIe Expansion Node
- Auxiliary power connectors - two 2x3 six-pin power connectors for connecting auxiliary dc power to the PCIe adapters that are installed in the PCIe Expansion Node

Full-height PCIe riser connector | I/O expansion 3 connector | I/O expansion 4 connector

Aux. power 2 connector | Aux. power 1 connector | Low-profile PCIe riser connector | PCIe switch | Interposer cable connector

Interposer cable

The interposer cable connects the PCIe Expansion Node to a supported host compute node.

The interposer cable consists of two circuit cards and a flex cable to provide the physical connection between the compute node and the PCIe Expansion Node. Each compute node and PCIe Expansion Node contain an interposer cable connector on the right rear corner of the system board. When the PCIe Expansion Node is installed, the interposer cable is connected to the interposer cable connectors on the associated compute node and PCIe Expansion Node system boards. The interposer cable extends the PCIe bus, the management interface, and sideband control signaling to the PCIe Expansion Node.

See "System board connectors" on page 8 for the location of the interposer connector.

Full-height PCIe riser

The PCIe risers connect the PCIe adapters to the PCIe Expansion Node system board. The full-height PCIe riser has two slots for full-height PCIe adapters and is encased in a mechanical structure that supports the adapters.

The full-height PCIe riser supports two PCIe 16x connectors with 16x PCIe lanes to each connector. The full-height PCIe riser accepts full height full length, full height half length, and low profile adapters (when the low profile adapters are using a full height spine).

Note: The full-height PCIe riser must be removed from the PCIe Expansion Node to install the PCIe adapters; then, with the adapters installed in the riser, the riser is reinstalled in the PCIe Expansion Node.

See "System board connectors" on page 8 for the location of the full-height PCIe riser connector.

See "PCIe adapter slots" on page 8 for more information about the PCIe Expansion Node adapter slots.

For a list of supported optional devices, see http://www.ibm.com/systems/info/x86servers/serverproven/compat/us/ for your compute nodes machine type and model number.

For current information about the PCIe adapters that are available for your compute node, see http://publib.boulder.ibm.com/infocenter/flexsys/information/topic/com.ibm.acc.networkdevices.doc/network.html.

Low-profile PCIe riser

The PCIe risers connect the PCIe adapters to the PCIe Expansion Node system board. The low-profile PCIe riser has two slots for low-profile PCIe adapters and is encased in a mechanical structure that supports the adapters.

The low-profile PCIe riser supports two PCIe 8x connectors with 8x PCIe lanes to each connector. The low-profile PCIe riser accepts low-profile adapters only.

Note: The low-profile PCIe riser must be removed from the PCIe Expansion Node to install the PCIe adapters; then, with the adapters installed in the riser, the riser is reinstalled in the PCIe Expansion Node.

See "System board connectors" on page 8 for the location of the low-profile PCIe riser connector.

See "PCIe adapter slots" on page 8 for more information about the PCIe Expansion Node adapter slots.

For a list of supported optional devices, see http://www.ibm.com/systems/info/x86servers/serverproven/compat/us/ for your compute nodes machine type and model number.

For current information about the PCIe adapters that are available for your compute node, see http://publib.boulder.ibm.com/infocenter/flexsys/information/topic/com.ibm.acc.networkdevices.doc/network.html.

I/O expansion adapters

The PCIe Expansion Node system board includes two 16x PCIe generation 2 connectors to support up to two I/O expansion adapters.

See "System board connectors" on page 8 for the location of the I/O expansion adapter connectors.

For a list of supported optional devices, see http://www.ibm.com/systems/info/x86servers/serverproven/compat/us/ for your compute nodes machine type and model number.

For current information about the I/O expansion adapters that are available for your compute node, see http://publib.boulder.ibm.com/infocenter/flexsys/information/topic/com.ibm.acc.networkdevices.doc/network.html.
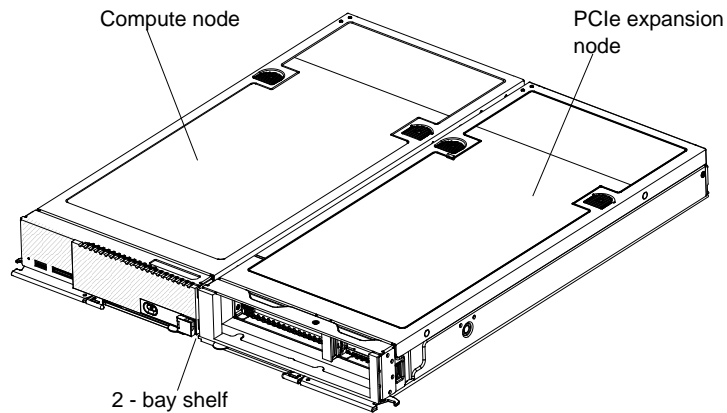
PCIe Expansion Node with compute node host

The PCIe Expansion Node and a compute node host are both physically attached to a 2-bay shelf that is installed and operated as an assembly.

The PCIe Expansion Node connects to the host compute node through the interposer cable and connectors on the PCIe Expansion Node and compute node system boards. The expansion adapters that are installed in the PCIe Expansion Node are available only to the attached compute node.

Attention: The host compute node must have both processors installed before you connect the PCIe Expansion Node. The second processor is required to drive the expansion node PCIe bus.

The following illustration shows the PCIe Expansion Node and the attached host compute node. In the illustration, the compute node is on the left side of the shelf and is always installed in the left side of the Flex System Enterprise Chassis. The PCIe Expansion Node is on the right side of the shelf and is always installed on the right side of the chassis.

See "2-bay shelf" on page 7 for more information about the 2-bay shelf.

See "Attaching the PCIe Expansion Node to a compute node host" on page 13 for procedures to attach a PCIe Expansion Node and a compute node to a 2-bay shelf.
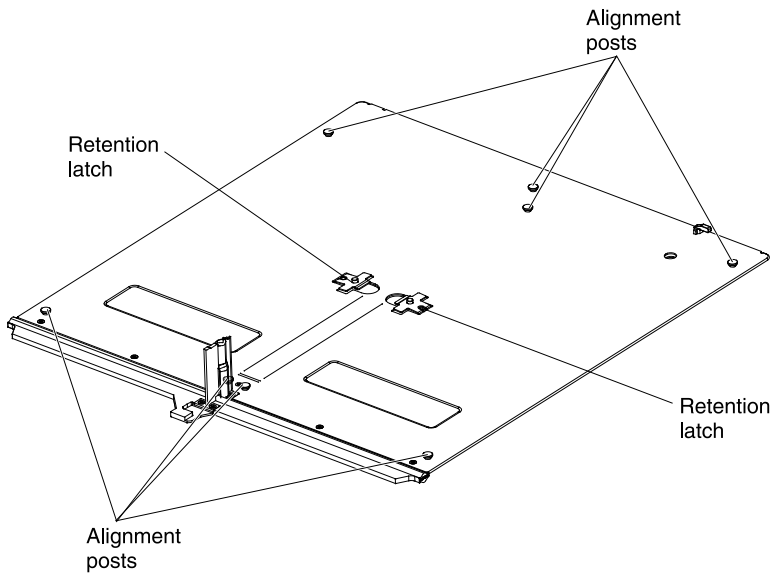
2-bay shelf

The PCIe Expansion Node and a compute node host are assembled using a 2-bay shelf that attaches to the bottom of each node.

The 2-bay shelf has two retention latches located near the center of the shelf and four alignment posts, one on each of the shelf corners. The PCIe Expansion Node and the host compute node are placed onto the alignment posts; then, pushed toward the center of the shelf to latch the units in place.

- The compute node is placed on the left side of the shelf and pushed right toward the center to latch the unit in place.
- The PCIe Expansion Node is placed on the right side of the shelf and pushed left toward the center of the shelf to latch the PCIe Expansion Node in place.

The 2-bay shelf assembly fits onto the shelf supports inside the Flex System Enterprise Chassis and requires the existing 1-bay shelf to be removed prior to installation.

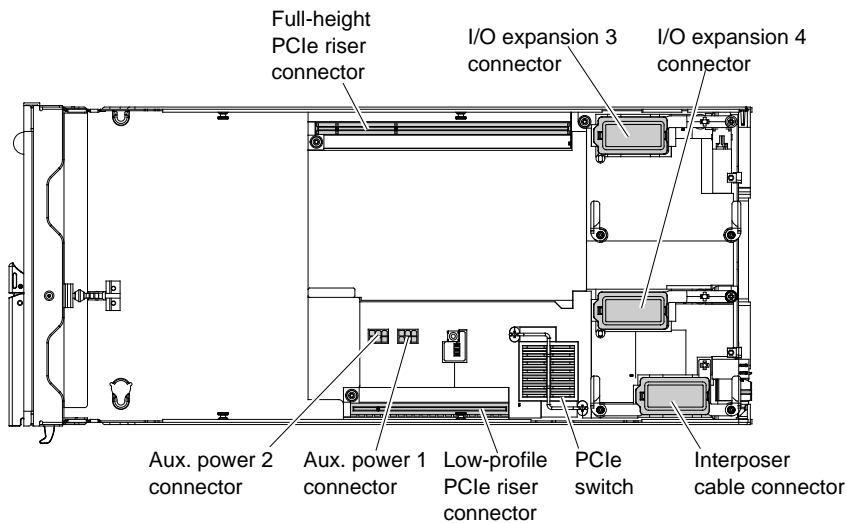The following illustration shows the 2-bay shelf.

Alignment posts

Retention latch

Alignment posts

Retention latch

See "Attaching the PCIe Expansion Node to a compute node host" on page 13 for procedures to attach an expansion node and a compute node to a 2-bay shelf.

System board connectors

Use this information to locate the PCIe Expansion Node system board connectors.

The following illustration shows the system board connectors for optional user-installed devices.

Full-height PCIe riser connector

I/O expansion 3 connector

I/O expansion 4 connector

Aux. power 2 connector

Aux. power 1 connector

Low-profile PCIe riser connector

PCIe switch

Interposer cable connector

PCIe adapter slots

The PCIe Expansion Node has four slots that support optional PCIe adapters.

The adapter slots are located in two PCIe riser assemblies that provide a mechanical structure to support the PCIe adapters and connect the adapters to the system board.

Attention: Each PCIe adapter slot must have either a PCIe adapter or a filler installed.

The full-height PCIe adapter slots are located on the left side of the expansion node and are numbered 1 (lower slot) and 2 (upper slot). The low-profile PCIe adapter slots are located on the right side of the expansion node and are numbered 3 (lower slot) and 4 (upper slot).

The following illustration shows the PCIe Expansion Node adapter slot numbers.
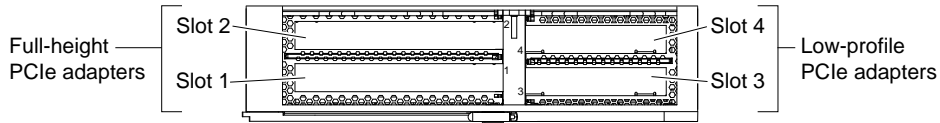
The full-height and low-profile PCIe risers plug into connectors on the PCIe Expansion Node system board. The system board also has two standard 2x3, six-pin auxiliary power connectors to support PCIe adapters that require additional dc power. See "System board connectors" on page 8 for the location of the PCIe riser and auxiliary power connectors.

For a list of supported optional devices, see http://www.ibm.com/systems/info/x86servers/serverproven/compat/us/ for your compute nodes machine type and model number.

For current information about the PCIe adapters that are available for your compute node, see http://publib.boulder.ibm.com/infocenter/flexsys/information/topic/com.ibm.acc.networkdevices.doc/network.html.

Full-height PCIe adapter slots

The full-height PCIe adapter slots accept full-height full-length, full-height half-length, and low-profile PCIe adapters (when the low-profile adapters are using a full height spine).
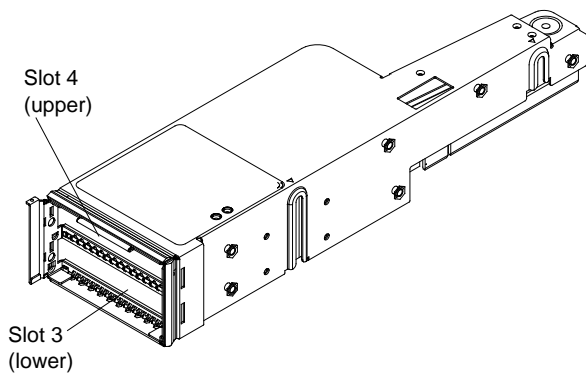
The following illustration shows the location of the full-height PCIe adapter slots.
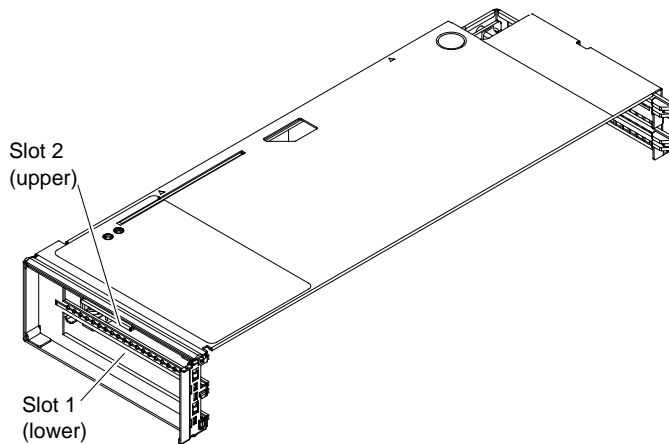
Low-profile PCIe adapter slots

The low-profile adapter slots accept low-profile PCIe adapters only.

The following illustration shows the location of the low-profile PCIe adapter slots.

Slot 4
(upper)

Slot 3
(lower)

Notices and statements in this document

Use this information to understand the most common documentation notices and statements and how they are used.

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 possible 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 hazardous to you. A danger statement is placed just before the description of a potentially lethal or hazardous procedure step or situation.

Chapter 2. Installing the PCIe Expansion Node

Use this information to install the PCIe Expansion Node in the Flex System Enterprise Chassis.

Installation guidelines

Use these guidelines before you install the PCIe Expansion Node or optional devices.

- Before you begin, read "Safety" on page iii and "Handling static-sensitive devices" on page 11. This information will help you work safely.
- Before you install your new PCIe Expansion Node, take the opportunity to download and apply the most recent firmware updates to the associated compute node. This step will help to ensure that any known issues are addressed and that your system is ready to function at maximum levels of performance.
- Observe good housekeeping in the area where you are working. Place removed covers and other parts in a safe place.
- Back up all important data before you make changes to disk drives.
- Before you remove a compute node from the Flex System Enterprise Chassis, you must shut down the operating system and turn off the compute node. You do not have to shut down the chassis itself.
- Blue on a component indicates touch points, where you can grip the component to remove it from or install it in the compute node, open or close a latch, and so on.
- For a list of supported optional devices for the compute node, see http://www.ibm.com/systems/info/x86servers/serverproven/compat/us/.

System reliability guidelines

Use these guidelines to ensure that the PCIe Expansion Node meets the proper cooling and system reliability requirements.

- To ensure proper cooling, do not operate the Flex System Enterprise Chassis without a compute node or filler installed in each bay. See the documentation for your Flex System Enterprise Chassis for additional information.
- Make sure that the ventilation holes on the compute node are not blocked.
- The compute node battery must be operational. If the battery becomes defective, replace it immediately. For instructions, see the compute node *Installation and Service Guide*.

Handling static-sensitive devices

To reduce the possibility of damage from electrostatic discharge, observe these precautions.

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

- When you work on a rack that has an electrostatic discharge (ESD) connector, use a wrist strap, especially when you handle modules, optional devices, or compute nodes. To work correctly, the wrist strap must have a good contact at both ends (touching your skin at one end and firmly connected to the ESD connector on the front or back of the rack).
- 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 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 part of the Flex System Enterprise Chassis or any *unpainted* metal surface on any other grounded rack component in the rack in which you are installing the device 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 compute node 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 compute node cover or on a metal surface.

- Take additional care when you handle devices during cold weather. Heating reduces indoor humidity and increases static electricity.

Removing the cover

Use these instructions to open and remove the cover from the PCIe Expansion Node.

Before you remove the PCIe Expansion Node cover, complete the following steps:

1. Read "Safety" on page iii and "Installation guidelines" on page 11.

2. If the PCIe Expansion Node is installed in a Flex System Enterprise Chassis, remove it (see "Removing a PCIe Expansion Node and attached compute node host" on page 23 for instructions).

3. Carefully lay the PCIe Expansion Node on a flat, static-protective surface, orienting the PCIe Expansion Node with the right side of the unit toward you.
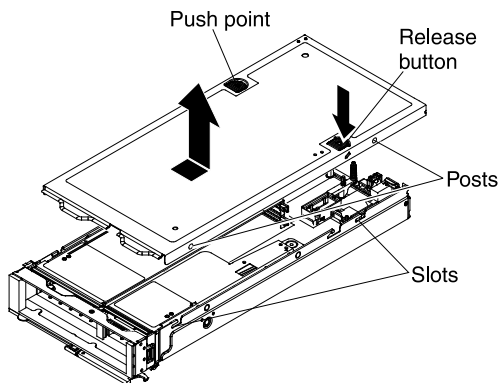
Statement 21

CAUTION:
Hazardous energy is present when the blade is connected to the power source. Always replace the blade cover before installing the blade.

To open and remove the PCIe Expansion Node cover, complete the following steps:

Step 1. Press on the release button and slide the cover toward the rear of the PCIe Expansion Node; then, lift the cover away from the PCIe Expansion Node, as shown in the following illustration.

Step 2. Lay the cover flat or store it for future use.

Attaching the PCIe Expansion Node to a compute node host

Use this information to attach the PCIe Expansion Node to a compute node host using the 2-bay shelf and install optional devices.

Before attaching a PCIe Expansion Node to a compute node host, complete the following steps:

1. Read "Safety" on page iii and "Installation guidelines" on page 11.

2. Verify that the host compute node has two processors installed before you proceed (see the compute node *Installation and Service Guide* for more information). The second processor is required to drive the expansion node PCIe bus.

3. If the compute node is operating, shut down the operating system (see the compute node *Installation and Service Guide* for instructions).

4. Press the power button to turn off the compute node (see the compute node *Installation and Service Guide* for instructions).

5. If the compute node is installed in a Flex System Enterprise Chassis, remove it (see the compute node *Installation and Service Guide* for instructions).

Statement 21

CAUTION:
Hazardous energy is present when the blade is connected to the power source. Always replace the blade cover before installing the blade.

To attach a PCIe Expansion Node and compute node host, complete the following steps.

Step 1.   Place the 2-bay shelf on a flat, static-protective surface with the right side of the shelf oriented towards you.

Step 2.   Orient the alignment slots on the bottom of the compute node with the alignment posts on the left side of the 2-bay shelf. Lower the compute node onto the posts; then, slide the compute node towards the center of the shelf until the retention latch clicks into place.
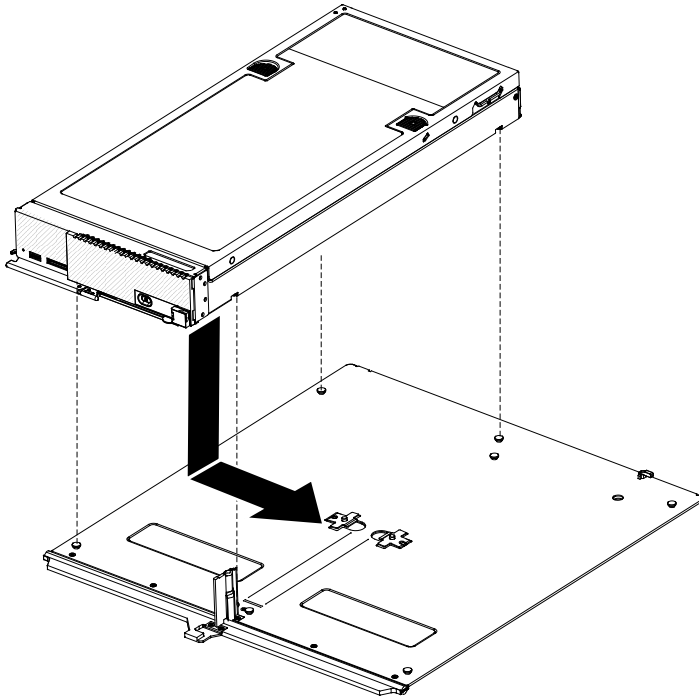
Step 3.   Orient the alignment slots on the bottom of the PCIe Expansion Node with the alignment posts on the right side of the 2-bay shelf. Lower the PCIe Expansion Node onto the posts; then, slide the PCIe Expansion Node towards the center of the shelf until the retention latch clicks into place.
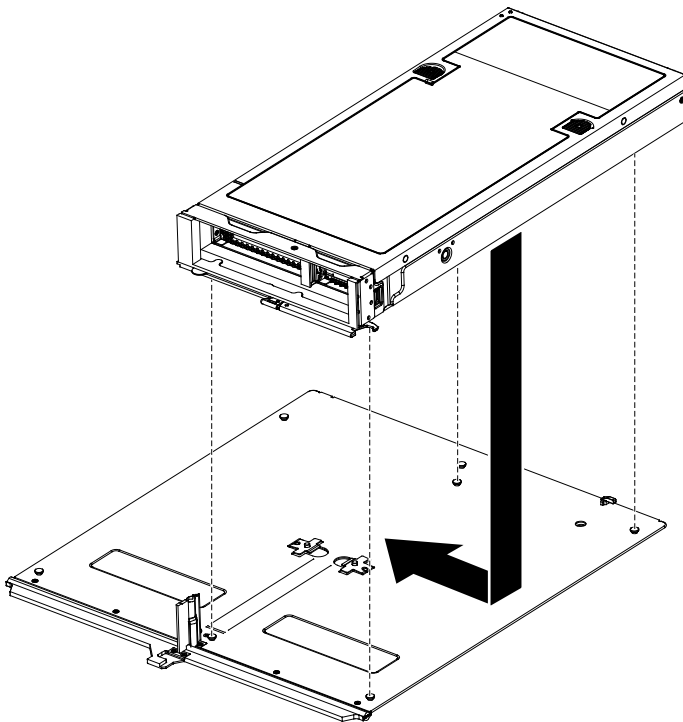
Step 4.   Remove the PCIe Expansion Node cover, if installed (see "Removing the cover" on page 12 for instructions).

Step 5.   Remove the compute node cover, if installed (see the compute node *Installation and Service Guide* for instructions).

Step 6.   Remove the compute node I/O expansion adapters, if installed (see the compute node *Installation and Service Guide* for instructions).

Step 7.   Remove the I/O expansion adapters from the PCIe Expansion Node, if installed (see "Removing an I/O expansion adapter" on page 40 for instructions).

Step 8.   Remove the plastic covers from the interposer connector in the PCIe Expansion Node and the compute node, if installed.

Step 9.   Orient the end of the interposer cable with the attached cable guide to the interposer connector in the compute node. Fit the cable guide over the chassis and press on the blue touch point to seat the interposer cable in the connector.
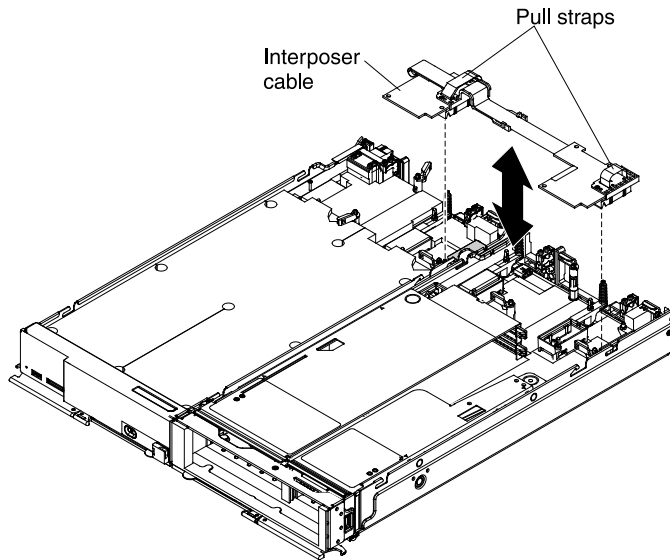
Step 10. Orient the free end of the interposer cable to the interposer connector in the PCIe Expansion Node and press the blue touch point to seat the interposer cable in the connector.

Step 11. Install the compute node I/O expansion adapters, if any were removed (see the compute node *Installation and Service Guide* for instructions).

Step 12. Install the compute node cover (see the compute node *Installation and Service Guide* for instructions).

After attaching the PCIe Expansion Node and compute node host on the 2-bay shelf and connecting the PCIe Expansion Node to the compute node, complete the following steps:

1. Install optional devices in the PCIe Expansion Node:

    a. To install a full-height adapter, see "Installing a full-height adapter" on page 15

    b. To install a low-profile adapter, see "Installing a low-profile adapter" on page 17

    c. To install an I/O expansion adapter, see "Installing an I/O expansion adapter" on page 19

2. Close the PCIe Expansion Node cover and install the assembly in the Flex System Enterprise Chassis (see "Completing the installation" on page 20 for instructions).

Installing a full-height adapter

Use this information to install an adapter in the PCIe Expansion Node full-height PCIe riser.

Before installing a full-height adapter, complete the following steps:

1. Read "Safety" on page iii and "Installation guidelines" on page 11.

2. If the PCIe Expansion Node is installed in a Flex System Enterprise Chassis, remove it (see "Removing a PCIe Expansion Node and attached compute node host" on page 23 for instructions).

3. Remove the PCIe Expansion Node cover, if one is installed (see "Removing the cover" on page 12).
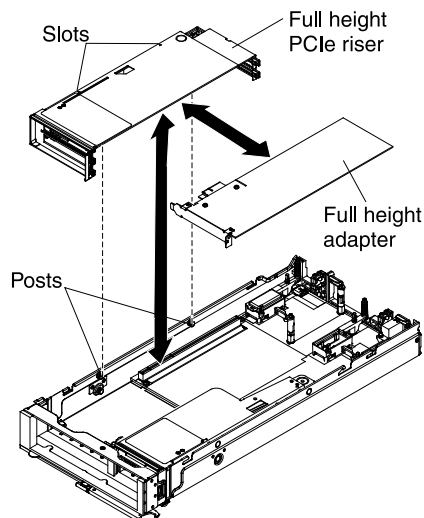
Statement 21

CAUTION:
Hazardous energy is present when the blade is connected to the power source. Always replace the blade cover before installing the blade.

To install an adapter in the PCIe Expansion Node full-height PCIe riser, complete the following steps:

Step 1.   If the full-height PCIe riser has a high-power PCIe adapter installed with an auxiliary dc power cable, disconnect the auxiliary power cable from the system board (see "System board connectors" on page 8 for connector locations).

Step 2.   Grasp the full-height PCIe riser by the blue touch points and pull the PCIe riser straight up to disconnect the riser from the system board connector; then, lift the full-height PCIe riser out of the PCIe Expansion Node.
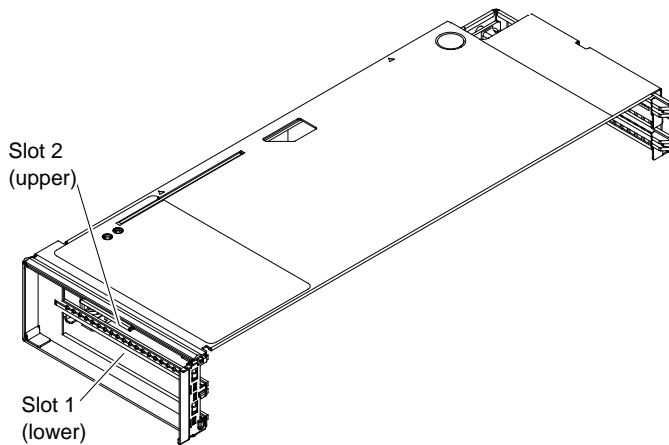

Step 3.   Carefully lay the full-height PCIe riser on it's left side on a flat, static-protective surface with the adapter slots facing up.

Step 4.   Remove the filler from the slot where the adapter will be installed.

   Note: If you are installing a double-width full-height adapter, you must remove both fillers from slots 1 and 2. When a double-width adapter is installed in slot 2, slot 1 will not have a filler.

Step 5.   Touch the static-protective package that contains the adapter to any *unpainted* metal surface on the Flex System Enterprise Chassis or any *unpainted* metal surface on any other grounded rack component; then, remove the adapter from the package.

Step 6.   Orient the adapter with the slot in the PCIe riser; then, press the adapter into the slot.

   Note: The full-height PCIe riser has two connectors for PCIe adapters. The lower connector is for adapter slot 1 and the upper connector is for adapter slot 2.

Slot 2
(upper)

Slot 1
(lower)

Step 7. Firmly press on the PCIe adapter to seat the adapter in the connector.

Important: Each adapter slot must have either an adapter or a filler installed.

Step 8. With the adapter installed, orient the alignment slots on the left side of the full-height PCIe riser to the alignment posts inside the PCIe Expansion Node and slide the PCIe riser over the posts.

Step 9. Firmly press on the blue touch points to seat the full-height PCIe riser in the system board connector.

Step 10. If the installed adapters have auxiliary dc power cables, connect the auxiliary power cables to the system board (see "System board connectors" on page 8 for connector locations).

After installing a full-height adapter, complete the following steps:

1. Install additional PCIe adapters or I/O expansion adapters as needed:

   a. To install a low-profile adapter, see "Installing a low-profile adapter" on page 17

   b. To install an I/O expansion adapter, see "Installing an I/O expansion adapter" on page 19

2. Close the PCIe Expansion Node cover and install the assembly in the Flex System Enterprise Chassis (see "Completing the installation" on page 20 for instructions).

Installing a low-profile adapter

Use this information to install an adapter in the PCIe Expansion Node low-profile PCIe riser.

Before installing a low-profile adapter, complete the following steps:

1. Read "Safety" on page iii and "Installation guidelines" on page 11.

2. If the PCIe Expansion Node is installed in a Flex System Enterprise Chassis, remove it (see "Removing a PCIe Expansion Node and attached compute node host" on page 23 for instructions).

3. Remove the PCIe Expansion Node cover, if one is installed (see "Removing the cover" on page 12).
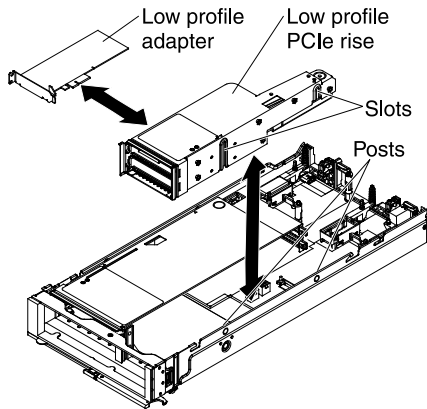
Statement 21

CAUTION:
Hazardous energy is present when the blade is connected to the power source. Always replace the blade cover before installing the blade.
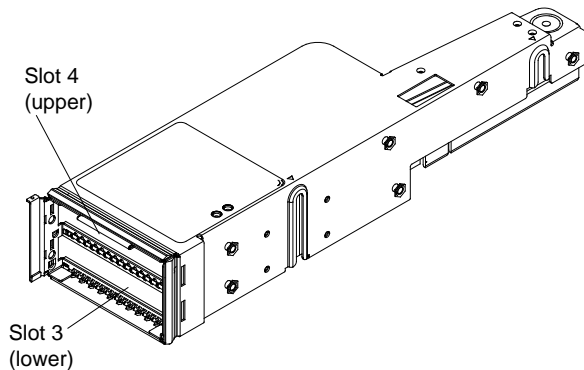
To install an adapter in the PCIe Expansion Node low-profile PCIe riser, complete the following steps:

Step 1. Grasp the low-profile PCIe riser by the blue touch points and pull the riser straight up to disconnect the riser from the system board connector; then, lift the low-profile PCIe riser out of the PCIe Expansion Node.

Step 2. Carefully lay the low-profile PCIe riser on it's right side on a flat, static-protective surface with the adapter slots facing up.

Step 3. Remove the filler from the slot where the adapter will be installed.

Step 4. Touch the static-protective package that contains the adapter to any *unpainted* metal surface on the Flex System Enterprise Chassis or any *unpainted* metal surface on any other grounded rack component; then, remove the adapter from the package.

Step 5. Orient the adapter with the slot in the PCIe riser; then, press the adapter into the slot.

Note: The low-profile PCIe riser has two connectors for PCIe adapter cards. The lower connector is for adapter slot 3 and the upper connector is for adapter slot 4.

Step 6. Firmly press on the adapter to seat the adapter in the connector.

Important: Each adapter slot must have either an adapter or a filler installed.

Step 7. With the adapter installed, orient the alignment slots on the right side of the low-profile PCIe riser to the alignment posts inside the PCIe Expansion Node and slide the riser over the posts.

Step 8. Firmly press on the blue touch points to seat the low-profile PCIe riser in the system board connector.

After installing a low-profile adapter, complete the following steps:

1. Install additional PCIe adapters or I/O expansion adapters as needed:

   a. To install a full-height adapter, see "Installing a full-height adapter" on page 15

b. To install an I/O expansion adapter, see "Installing an I/O expansion adapter" on page 19

2. Close the PCIe Expansion Node cover and install the assembly in the Flex System Enterprise Chassis (see "Completing the installation" on page 20 for instructions).

Installing an I/O expansion adapter

Use this information to install an I/O expansion adapter in the PCIe Expansion Node.

Before installing an I/O expansion adapter, complete the following steps:

1. Read "Safety" on page iii and "Installation guidelines" on page 11.

2. If the PCIe Expansion Node is installed in a Flex System Enterprise Chassis, remove it (see "Removing a PCIe Expansion Node and attached compute node host" on page 23 for instructions).

3. Remove the PCIe Expansion Node cover, if one is installed (see "Removing the cover" on page 12).
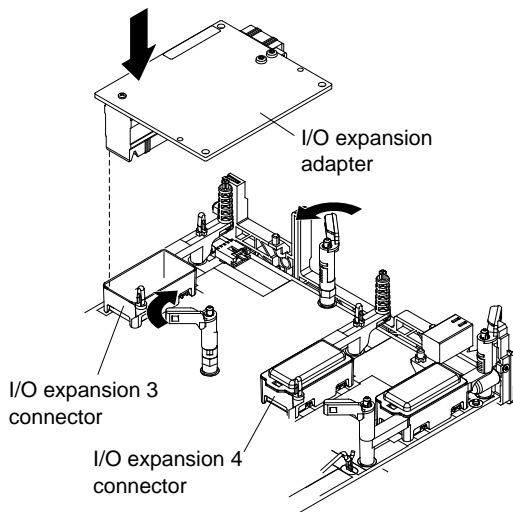
Statement 21

CAUTION:
Hazardous energy is present when the blade is connected to the power source. Always replace the blade cover before installing the blade.

To install an I/O expansion adapter in the PCIe Expansion Node, complete the following steps:

Step 1.   Locate the system board I/O expansion adapter connectors (see "System board connectors" on page 8).

Step 2.   Remove the plastic cover from the I/O expansion connector, if one is present.

Step 3.   Touch the static-protective package that contains the I/O expansion adapter to any *unpainted* metal surface on the Flex System Enterprise Chassis or any *unpainted* metal surface on any other grounded rack component; then, remove the adapter from the package.

Step 4.   Open the retention clips.

I/O expansion adapter

I/O expansion 3 connector

I/O expansion 4 connector

Step 5.   Orient the plug on the I/O expansion adapter to the I/O expansion 3 or I/O expansion 4 connector on the system board; then, press the I/O expansion adapter into the connector.

Step 6.   Firmly press on the I/O expansion adapter to seat the adapter in the connector.

Step 7.   Close the retention clips.

After installing an I/O expansion adapter, complete the following steps:

1. Install additional PCIe adapters as needed:

    a. To install a full-height adapter, see "Installing a full-height adapter" on page 15

    b. To install a low-profile adapter, see "Installing a low-profile adapter" on page 17

2. Close the PCIe Expansion Node cover and install the assembly in the Flex System Enterprise Chassis (see "Completing the installation" on page 20 for instructions).

Completing the installation

Use this information to close the PCIe Expansion Node cover and install the PCIe Expansion Node in an Flex System Enterprise Chassis.

To complete the installation, complete the following tasks.

Installing the cover

Use these instructions to install and close the cover for the PCIe Expansion Node.

Before installing the PCIe Expansion Node cover, read "Safety" on page iii and "Installation guidelines" on page 11.

Attention:

• You cannot insert the PCIe Expansion Node into the Flex System Enterprise Chassis until the cover is installed and closed. Do not attempt to override this protection.

• Before you install the cover, make sure that the interposer cable, full-height riser assembly, and low-profile riser assembly are installed and seated correctly, and that there are no loose tools or parts inside the PCIe Expansion Node.

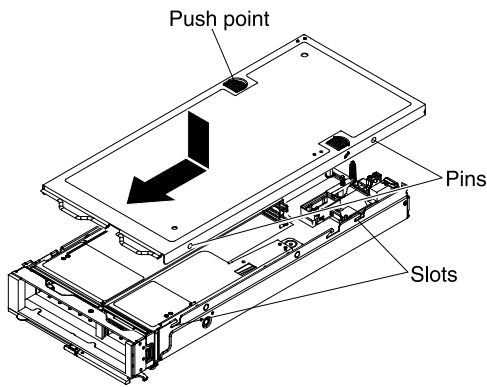• Air baffles (fillers) must be installed in any empty PCIe slots.

Statement 21

CAUTION:
Hazardous energy is present when the blade is connected to the power source. Always replace the blade cover before installing the blade.

To install and close the PCIe Expansion Node cover, complete the following steps.

Step 1.   Lower the cover so that the posts inside the cover fit into the slots in the PCIe Expansion Node, as shown in the illustration.

Push point

Pins

Slots

Step 2.   Slide the cover towards the front of the PCIe Expansion Node, as shown in the illustration, until it clicks into place.

After installing the PCIe Expansion Node cover, complete the following steps:

1. Install the compute node cover (see the compute node *Installation and Service Guide* for instructions).
2. Install the 2-bay shelf assembly into the open chassis bays (see "Installing the PCIe Expansion Node with compute node host" on page 22 for instructions).

Removing a 1-bay shelf

Use these instructions to remove a 1-bay shelf from an Flex System Enterprise Chassis.

Before removing a 1-bay shelf from an Flex System Enterprise Chassis, complete the following steps:

1. Read "Safety" on page iii and "Installation guidelines" on page 11.
2. Remove any compute nodes or fillers that are installed on the 1-bay shelf (see the Flex System Enterprise Chassis*Installation and Service Guide* for instructions).

To remove a 1-bay shelf from an Flex System Enterprise Chassis, complete the following steps.

Step 1.   Pull the blue release latches towards the center of the 1-bay shelf to release the shelf, as shown in the illustration; then, pull the shelf out of the chassis.

Release latch

Release latch
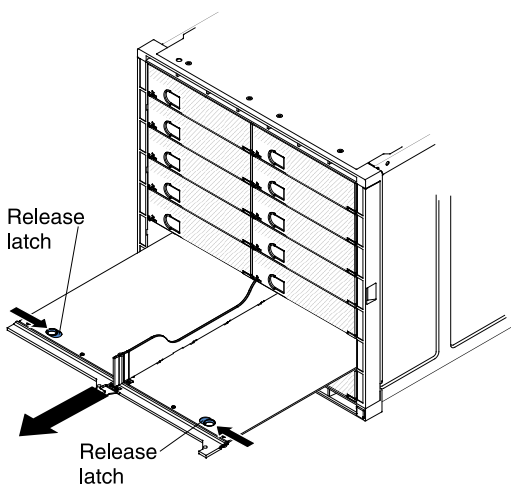
After removing the 1-bay shelf, install the 2-bay shelf assembly containing the PCIe Expansion Node and the compute node into the open chassis bays (see "Installing the PCIe Expansion Node with compute node host" on page 22 for instructions).
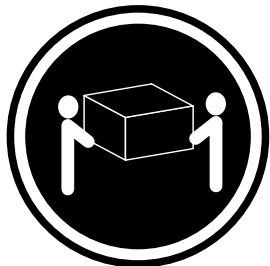
Installing the PCIe Expansion Node with compute node host

Use these instructions to install a PCIe Expansion Node with a compute node host in an Flex System Enterprise Chassis.
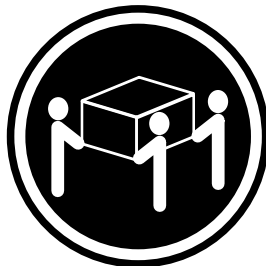
Before installing a PCIe Expansion Node with compute node host in an Flex System Enterprise Chassis, complete the following steps:

1. Read "Safety" on page iii and "Installation guidelines" on page 37.
2. Remove the 1-bay shelf from the Flex System Enterprise Chassis bays where the PCIe Expansion Node will be installed (see "Removing a 1-bay shelf" on page 21 for instructions).

Statement 4

≥ 18 kg (39.7 lb)   ≥ 32 kg (70.5 lb)   ≥ 55 kg (121.2 lb)
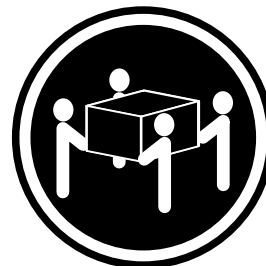
CAUTION:
Use safe practices when lifting.

To install a PCIe Expansion Node with compute node host, complete the following steps:

Step 1.   Place the handles on the compute node and the PCIe Expansion Node in the open position.

Step 2.   Orient the 2-bay shelf assembly containing the compute node and the PCIe Expansion Node with the front of the assembly pointing toward you.
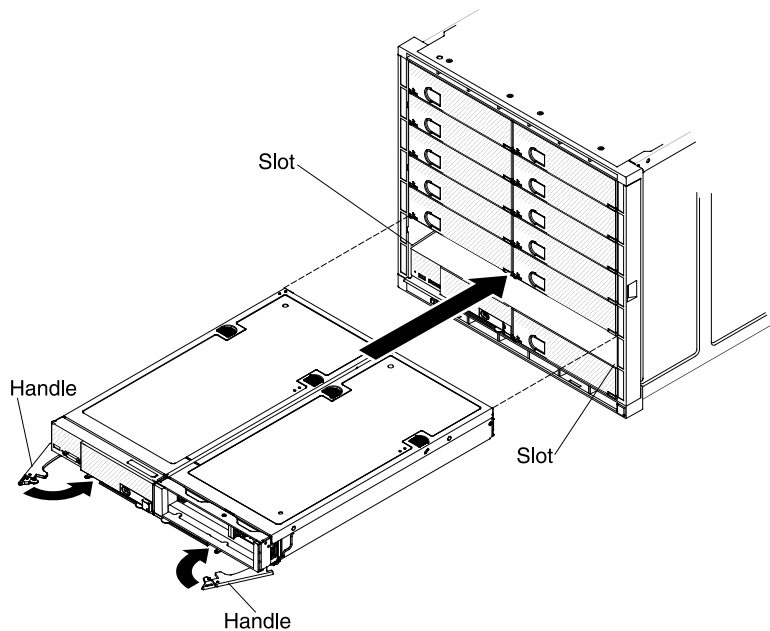
Step 3.   Place the 2-bay shelf assembly onto the shelf supports in the chassis bays; then, slide the shelf assembly all the way into bays.

Step 4.   Close the handles on the compute node and the PCIe Expansion Node to latch the assembly in place.

If you have changed the configuration of the compute node or if you are installing a different compute node from the one that you removed, you must configure the compute node through the Setup utility, and you might have to install the compute node operating system. See "Updating the compute node configuration" on page 23 for more information.

Updating the compute node configuration

When the compute node starts for the first time after you add or remove an optional device, you might receive a message that the configuration has changed.

The Setup utility automatically starts so that you can save the new configuration settings. See the *Installation and Service Guide* for the compute node for more information about the Setup utility.

Some devices have device drivers that you must install. See the documentation that comes with each device for information about installing device drivers.

Removing a PCIe Expansion Node and attached compute node host

Use these instructions to remove a PCIe Expansion Node from a Flex System Enterprise Chassis.

Before you remove a PCIe Expansion Node, complete the following steps:

1. Read "Safety" on page iii and "Installation guidelines" on page 37.
2. If the compute node that the PCIe Expansion Node is connected to is operating, shut down the operating system.
3. Press the power button to turn off the compute node (see the compute node *Installation and Service Guide* for more information).
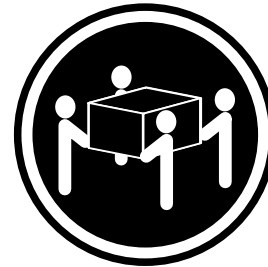
Statement 4
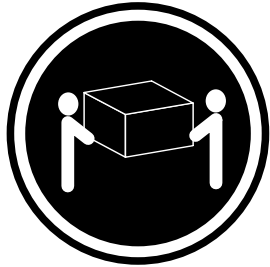
≥ 18 kg (39.7 lb)   ≥ 32 kg (70.5 lb)   ≥ 55 kg (121.2 lb)
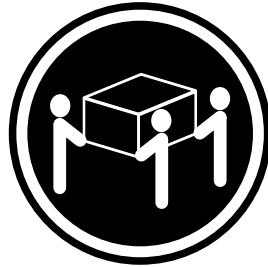
CAUTION:
Use safe practices when lifting.

To remove an attached PCIe Expansion Node from a Flex System Enterprise Chassis, complete the following steps.

Step 1. If there are cables connected to the optional devices that are installed in the PCIe Expansion Node, disconnect them.

Step 2. Open the handles on the compute node and the PCIe Expansion Node as shown in the following illustration.

Handle

Handle
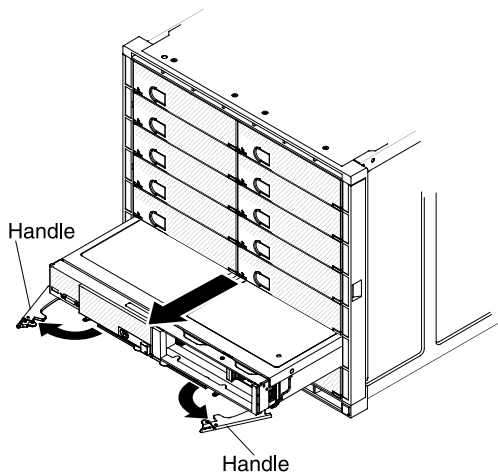
> **Attention:** To maintain proper system cooling, do not operate the Flex System Enterprise Chassis without a compute node or filler installed in each bay.

Step 3. Pull the 2-bay shelf with the attached compute node and the PCIe Expansion Node out of the bay and place the assembly on a flat static-protective surface with the right side of the assembly oriented toward you.

Step 4. Install either a 1-bay shelf with fillers or another compute node within 1 minute.

Step 5. Remove the PCIe Expansion Node cover. See "Removing the cover" on page 12 for instructions.

Step 6. Remove the PCIe Expansion Node I/O expansion adapters, if installed. See "Removing an I/O expansion adapter" on page 40 for instructions.

Step 7. Disconnect the interposer cable from the system board connector. See "Removing the interposer cable" on page 42 for instructions.

Step 8. Lift the right side of the assembly up and stand the assembly on it's left side with the bottom of the 2-bay shelf oriented towards you.
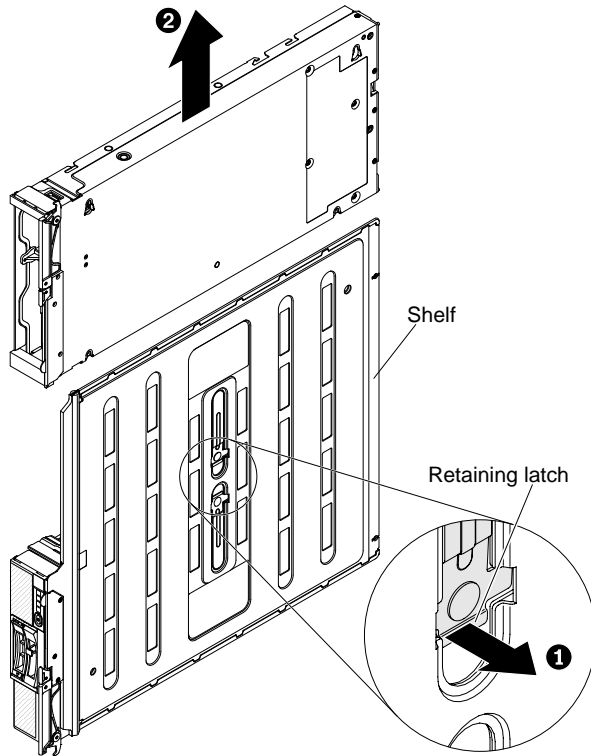

Step 9. On the bottom of the 2-bay shelf, pull out on the retaining latch to release the PCIe Expansion Node and simultaneously slide the unit up to disengage the alignment posts; then, lower the assembly back to the work surface and lift the PCIe Expansion Node off the shelf.

Chapter 3. Parts listing - PCIe Expansion Node

Use this information to locate and identify replaceable components for the PCIe Expansion Node.

For an updated parts listing go to http://www.ibm.com/supportportal/ and search for `system service parts`.

Note: The illustrations in this document might differ slightly from your hardware.
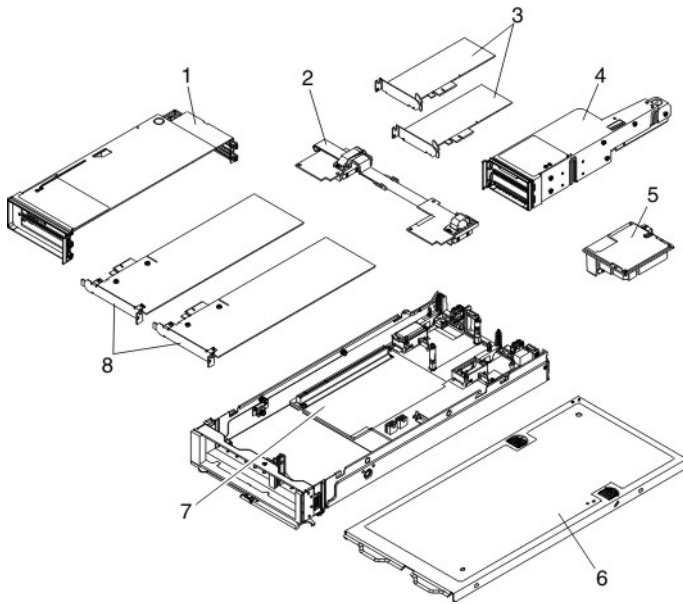
Replaceable components consist of consumable parts, structural parts, field replaceable units (FRUs), and customer replaceable units (CRUs):

- **Consumable parts:** Purchase and replacement of consumable parts (components, such as batteries and printer cartridges, that have depletable life) is your responsibility. If IBM acquires or installs a consumable component at your request, you will be charged for the service.
- **Structural parts:** Purchase and replacement of structural parts (components, such as the top cover, PCIe fillers, and handle) is your responsibility. If IBM acquires or installs a structural component at your request, you will be charged for the service.
- **Field replaceable unit (FRU):** FRUs must be replaced only by a trained service technician, unless they are classified as customer replaceable units (CRUs).
- **Tier 1 customer replaceable unit (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 customer replaceable unit:** 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 PCIe Expansion Node.

For information about the terms of the warranty, see the *Warranty Information* document that comes with the PCIe Expansion Node.

Index	Description	CRU part number (Tier 1)	CRU part number (Tier 2)	FRU part number (trained service technician only)
1	Full-height PCIe riser	90Y8494		
2	Interposer cable	90Y8498		
3	Low-profile PCIe adapters [1]	- [1]		
4	Low-profile PCIe riser	90Y8493		
5	I/O expansion adapters [1]	- [1]		
6	Cover	90Y8491		
7	System board	90Y8495		
8	Full-height PCIe adapters [1]	- [1]		

1. For a list of supported optional devices, see http://www.ibm.com/systems/info/x86servers/serverproven/compat/us/ for your compute nodes machine type and model number.

Consumable and structural parts

Consumable and structural parts are not covered by the IBM Statement of Limited Warranty.

Index	Description	Part number
	Auxiliary power cable	90Y8501
	Filler, full-height PCIe riser	90Y8500
	Filler, low-profile PCIe riser	90Y8499
	Handle kit	00Y2939
	Label kit	90Y8492
	Miscellaneous parts kit	90Y8496

Chapter 4. Troubleshooting

Use this information to diagnose and fix any problems that might occur in your PCIe Expansion Node.

Event messages

Hardware events in the PCIe Expansion Node are detected by the integrated management module (IMM) in the compute node that the expansion node is connected to.

The IMM logs PCIe Expansion Node events in the system-event log in the compute node. In addition, the IMM sends that event to the CMM and to the IBM Flex System Manager management node, if one is installed.

See the documentation that comes with your compute node for information about viewing the event logs.

Light path diagnostics

Light path diagnostics is a system of LEDs on the front panel and on various internal components of the compute node. When an error occurs, LEDs can be lit throughout the compute node and the PCIe Expansion Node to help identify the source of the error.

Internal light path diagnostics for the PCIe Expansion Node can be initiated using two methods. The primary method is the power button on the associated compute node. When the compute node power button is pressed, the light path LEDs in the compute node and in the PCIe Expansion Node illuminate. The alternate method is a push-button switch located on the PCIe Expansion Node system board. The PCIe Expansion Node light path diagnostics button illuminates the light path LEDs if the compute node cannot due to a failure in the compute node or in the interposer cable.

When the PCIe Expansion Node is not installed in the system, a capacitor on the system board is used to energize the light path system. The capacitor circuit can keep all internal light path LEDs illuminated for minimum of 20 seconds of continuous operation.

See the *Installation and Service Guide* for the compute node for more information about using light path diagnostics to troubleshoot the compute node.

See "Light path diagnostics LEDs" on page 29 for locations and descriptions of the PCIe Expansion Node light path LEDs.

Light path diagnostics LEDs

The tables in this section describe the light path diagnostic LEDs in the PCIe Expansion Node and suggested actions to correct detected problems.

See the *Installation and Service Guide* for the compute node for more information about troubleshooting the compute node.

System board

The following illustration shows the location of the light path diagnostics button and LEDs on the PCIe Expansion Node system board. Press the light path diagnostics button to identify faults in the PCIe Expansion Node.
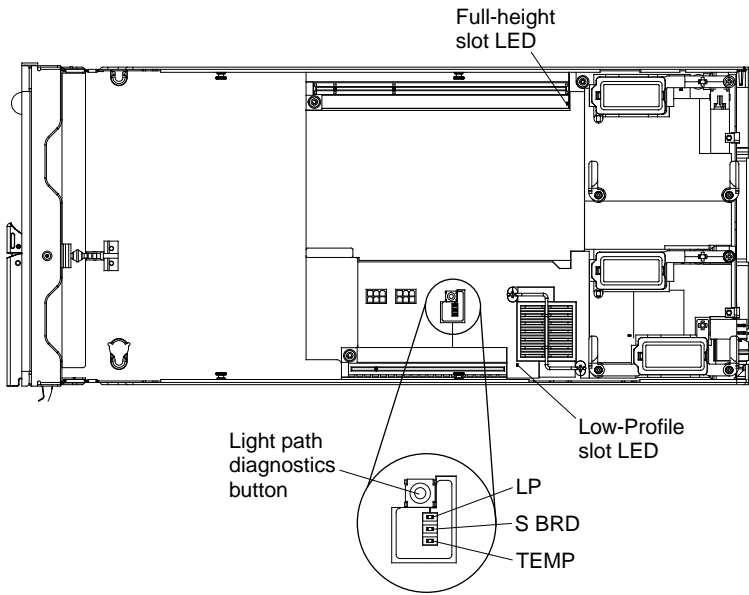
Full-height
slot LED

Light path
diagnostics
button

LP

S BRD

TEMP

Low-Profile
slot LED

Table 2. Light path diagnostics LEDs on the PCIe Expansion Node system board

• **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**	
• **See Chapter 3 "**Parts listing - PCIe Expansion Node**" on page 27 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU) that must be replaced only by a trained service technician.**	
• **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**	

Lit light path diagnostics LED	Description	Action
LP	Light path charge good/power indicator LED (green) illuminates to indicate that the system has a charge available for illuminating the internal light path LEDs	If the power button on the front of the compute node or the PCIe Expansion Node internal light path push button does not illuminate the charge good/power LED, replace the PCIe Expansion Node system board. See "Replacing the system board" on page 53 for instructions.
S BRD	System board LED (amber) illuminates to indicate a fault in one of the monitored components on the expansion node system board.	Possible system board errors: • Undercurrent or overcurrent event • Loss of dc power • Critical PCIe switch error • UEFI failure of a system board component 1. Check the event logs for expansion node system board events and perform the corrective actions indicated. 2. Reseat the full-height PCIe riser, the low-profile PCIe rise, and the interposer cable. 3. Reinstall the node and power it on. If the S BRD LED persists, replace the expansion node system board. See "Replacing the system board" on page 53 for instructions.
TEMP	Over temperature LED (amber) illuminates to indicate a thermal fault in the PCIe Expansion Node	The over temperature LED indicates that a temperature fault has occurred in the PCIe Expansion Node. If this indicator is illuminated, it does not indicate that any specific part needs replacing, only that there was a critical thermal event. 1. Check the event logs for thermal events in the chassis and perform the corrective actions indicated. 2. Check the chassis cooling fans (fans in the rear, air inlets in front). 3. Check the room temperature. 4. Make sure that either a PCIe adapter or a PCIe filler is installed in every slot. 5. Remove and reinstall the node; then, check to see if the thermal event reoccurs. **Note:** Using unsupported PCIe adapters might cause a thermal fault in the expansion node.

Table 2. Light path diagnostics LEDs on the PCIe Expansion Node system board (continued)

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See Chapter 3 "**Parts listing - PCIe Expansion Node**" on page 27 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU) that must be replaced only by a trained service technician.**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**

Lit light path diagnostics LED	Description	Action
Full-height slot LED	Full-height slot LED (amber) illuminates to indicate a fault in the full-height PCIe riser	The full-height PCIe riser is not installed or might not be seated correctly. 1. Install a full-height PCIe riser, if one is not already installed. See "Installing the full-height PCIe riser" on page 51. 2. Remove the full-height PCIe riser and reseat the full-height adapters or slot fillers; then, reseat the full-height PCIe riser. 3. Replace the full-height PCIe riser. See "Removing the full-height PCIe riser" on page 50 and "Installing the full-height PCIe riser" on page 51.
Low-profile slot LED	Low-profile slot LED (amber) illuminates to indicate a fault in the low-profile PCIe riser	The low-profile PCIe riser is not installed or might not be seated correctly. 1. Install a low-profile PCIe riser, if one is not already installed. See "Installing the low-profile PCIe riser" on page 53. 2. Remove the low-profile PCIe riser and reseat the low-profile adapters or slot fillers; then, reseat the low-profile PCIe riser. 3. Replace the low-profile PCIe riser. See "Removing the low-profile PCIe riser" on page 52 and "Installing the low-profile PCIe riser" on page 53.

Full-height PCIe riser

The following illustration shows the location of the light path LEDs on the PCIe Expansion Node full-height PCIe riser.
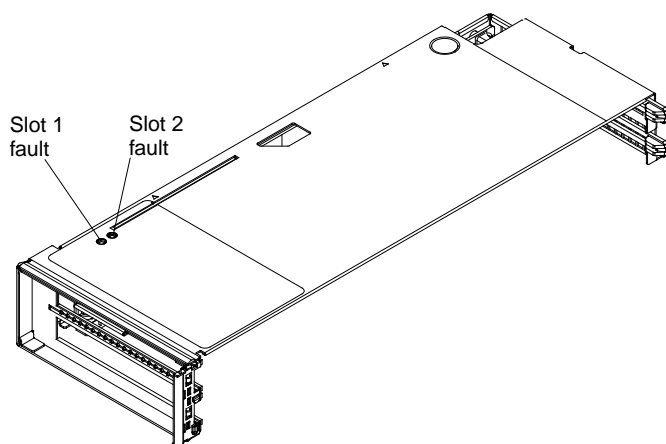
Table 3. Light path diagnostics LEDs on the PCIe Expansion Node full-height PCIe riser

- **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
- **See Chapter 3 "**Parts listing - PCIe Expansion Node**" on page 27 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU) that must be replaced only by a trained service technician.**
- **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**

Lit light path diagnostics LED	Description	Action
Slot 1 fault	PCIe slot 1 LED (amber) illuminates to indicate an adapter fault in full-height PCIe riser slot 1	The compute node is unable to establish a path to the adapter in PCIe slot 1, no adapter or filler is installed in PCIe slot 1, or the PCIe adapter or filler might not be seated correctly. 1. Install an adapter or a filler in PCIe slot 1, if one is not already installed. See "Installing a full-height adapter" on page 45. 2. Reseat the adapter or filler in PCIe slot 1. 3. Replace the adapter in PCIe slot 1. See "Removing a full-height adapter" on page 44 and "Installing a full-height adapter" on page 45.
Slot 2 fault	PCIe slot 2 LED (amber) illuminates to indicate an adapter fault in full-height PCIe riser slot 2	The compute node is unable to establish a path to the adapter in PCIe slot 2, no adapter or filler is installed in PCIe slot 2, or the PCIe adapter or filler might not be seated correctly. 1. Install an adapter or a filler in PCIe slot 2, if one is not already installed. See "Installing a full-height adapter" on page 45. 2. Reseat the adapter or filler in PCIe slot 2. 3. Replace the adapter in PCIe slot 2. See "Removing a full-height adapter" on page 44 and "Installing a full-height adapter" on page 45.

Low-profile PCIe riser

The following illustration shows the location of the light path LEDs on the PCIe Expansion Node low-profile PCIe riser.
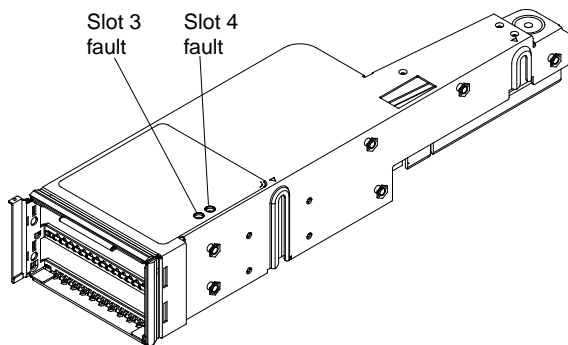
Table 4. Light path diagnostics LEDs on the PCIe Expansion Node low-profile PCIe riser

> - **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**
> - **See Chapter 3 "**Parts listing - PCIe Expansion Node**" on page 27 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU) that must be replaced only by a trained service technician.**
> - **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**

Lit light path diagnostics LED	Description	Action
Slot 3 fault	PCIe slot 3 LED (amber) illuminates to indicate an adapter fault in low-profile PCIe riser slot 3	The compute node is unable to establish a path to the adapter in PCIe slot 3, no adapter or filler is installed in PCIe slot 3, or the PCIe adapter or filler might not be seated correctly. 1. Install an adapter or a filler in PCIe slot 3, if one is not already installed. See "Installing a low-profile adapter" on page 48. 2. Reseat the adapter or filler in PCIe slot 3. 3. Replace the adapter in PCIe slot 3. See "Removing a low-profile adapter" on page 47 and "Installing a low-profile adapter" on page 48.
Slot 4 fault	PCIe slot 4 LED (amber) illuminates to indicate an adapter fault in low-profile PCIe riser slot 4	The compute node is unable to establish a path to the adapter in PCIe slot 4, no adapter or filler is installed in PCIe slot 4, or the PCIe adapter or filler might not be seated correctly. 1. Install an adapter or a filler in PCIe slot 4, if one is not already installed. See "Installing a low-profile adapter" on page 48. 2. Reseat the adapter or filler in PCIe slot 4. 3. Replace the adapter in PCIe slot 4. See "Removing a low-profile adapter" on page 47 and "Installing a low-profile adapter" on page 48.

Interposer cable

The following illustration shows the location of the light path LED on the PCIe Expansion Node interposer cable.
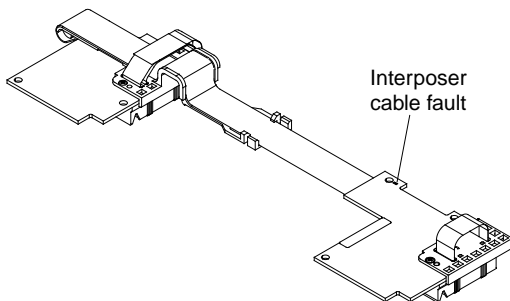

Interposer cable fault

Table 5. Light path diagnostics LED on the PCIe Expansion Node interposer cable

• **Follow the suggested actions in the order in which they are listed in the Action column until the problem is solved.**		
• **See Chapter 3 "**Parts listing - PCIe Expansion Node**" on page 27 to determine which components are customer replaceable units (CRU) and which components are field replaceable units (FRU) that must be replaced only by a trained service technician.**		
• **If an action step is preceded by "(Trained service technician only)," that step must be performed only by a trained service technician.**		

Lit light path diagnostics LED	Description	Action
Interposer cable	Interposer cable LED (amber) illuminates to indicate an interposer cable fault	There is a fault in the interposer cable. 1. Reseat the interposer cable. 2. If the fault persists, replace the interposer cable. See "Removing the interposer cable" on page 42 and "Installing the interposer cable" on page 43.
	Interposer cable LED (amber) flashes to indicate a communication fault	The interposer cable is unable to communicate with the compute node. 1. Reseat the interposer cable. 2. If the fault persists, replace the interposer cable. See "Removing the interposer cable" on page 42 and "Installing the interposer cable" on page 43.

I/O expansion adapters

The I/O expansion adapters might also have an on-board fault LED (amber) that illuminates to indicate a fault in the I/O expansion adapter. Complete the following steps to troubleshoot an I/O expansion adapter fault:

1. Reseat the I/O expansion adapter.
2. If the fault LED persists, replace the I/O expansion adapter. See "Removing an I/O expansion adapter" on page 40 and "Installing an I/O expansion adapter" on page 41.

Chapter 5. Removing and replacing components

Use this information to install, remove, and replace components in the PCIe Expansion Node.

See Chapter 3 "Parts listing - PCIe Expansion Node" on page 27 to determine whether a component is a Tier 1 CRU, Tier 2 CRU, or FRU that must be replaced only by a trained service technician.

For information about the terms of the warranty, see the *Warranty Information* document that comes with the PCIe Expansion Node.

Installation guidelines

Use these guidelines before you install the PCIe Expansion Node or optional devices.

- Before you begin, read "Safety" on page iii and "Handling static-sensitive devices" on page 37. This information will help you work safely.
- Before you install your new PCIe Expansion Node, take the opportunity to download and apply the most recent firmware updates to the associated compute node. This step will help to ensure that any known issues are addressed and that your system is ready to function at maximum levels of performance.
- Observe good housekeeping in the area where you are working. Place removed covers and other parts in a safe place.
- Back up all important data before you make changes to disk drives.
- Before you remove a compute node from the Flex System Enterprise Chassis, you must shut down the operating system and turn off the compute node. You do not have to shut down the chassis itself.
- Blue on a component indicates touch points, where you can grip the component to remove it from or install it in the compute node, open or close a latch, and so on.
- For a list of supported optional devices for the compute node, see http://www.ibm.com/systems/info/x86servers/serverproven/compat/us/.

System reliability guidelines

Use these guidelines to ensure that the PCIe Expansion Node meets the proper cooling and system reliability requirements.

- To ensure proper cooling, do not operate the Flex System Enterprise Chassis without a compute node or filler installed in each bay. See the documentation for your Flex System Enterprise Chassis for additional information.
- Make sure that the ventilation holes on the compute node are not blocked.
- The compute node battery must be operational. If the battery becomes defective, replace it immediately. For instructions, see the compute node *Installation and Service Guide*.

Handling static-sensitive devices

To reduce the possibility of damage from electrostatic discharge, observe these precautions.

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

- When you work on a rack that has an electrostatic discharge (ESD) connector, use a wrist strap, especially when you handle modules, optional devices, or compute nodes. To work correctly, the wrist strap must

have a good contact at both ends (touching your skin at one end and firmly connected to the ESD connector on the front or back of the rack).

- 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 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 part of the Flex System Enterprise Chassis or any *unpainted* metal surface on any other grounded rack component in the rack in which you are installing the device 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 compute node 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 compute node cover or on a metal surface.
- Take additional care when you handle devices during cold weather. Heating reduces indoor humidity and increases static electricity.

Returning a device or component

If you are instructed to return a device or component, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Removing and replacing Tier 1 customer replaceable units (CRUs)

Use this information for removing and replacing Tier 1 CRUs.

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.

Removing the cover

Use these instructions to open and remove the cover from the PCIe Expansion Node.

Before you remove the PCIe Expansion Node cover, complete the following steps:

1. Read "Safety" on page iii and "Installation guidelines" on page 37.
2. If the PCIe Expansion Node is installed in a Flex System Enterprise Chassis, remove it (see "Removing a PCIe Expansion Node and attached compute node host" on page 23 for instructions).
3. Carefully lay the PCIe Expansion Node on a flat, static-protective surface, orienting the PCIe Expansion Node with the right side of the unit toward you.
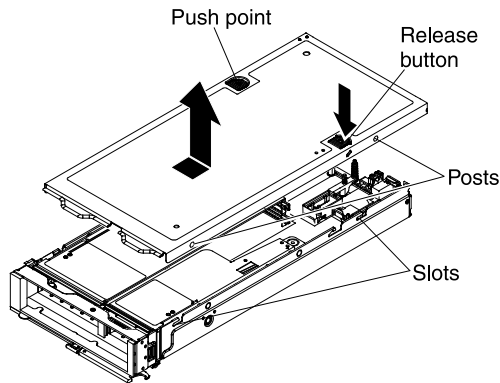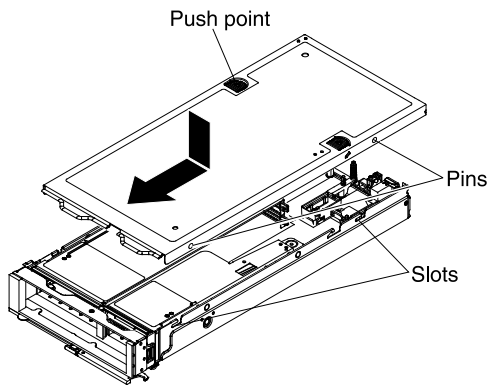
Statement 21

CAUTION:
Hazardous energy is present when the blade is connected to the power source. Always replace the blade cover before installing the blade.

To open and remove the PCIe Expansion Node cover, complete the following steps:

Step 1. Press on the release button and slide the cover toward the rear of the PCIe Expansion Node; then, lift the cover away from the PCIe Expansion Node, as shown in the following illustration.

Step 2. Lay the cover flat or store it for future use.

Installing the cover

Use these instructions to install and close the cover for the PCIe Expansion Node.

Before installing the PCIe Expansion Node cover, read "Safety" on page iii and "Installation guidelines" on page 37.

Attention:

- You cannot insert the PCIe Expansion Node into the Flex System Enterprise Chassis until the cover is installed and closed. Do not attempt to override this protection.
- Before you install the cover, make sure that the interposer cable, full-height riser assembly, and low-profile riser assembly are installed and seated correctly, and that there are no loose tools or parts inside the PCIe Expansion Node.
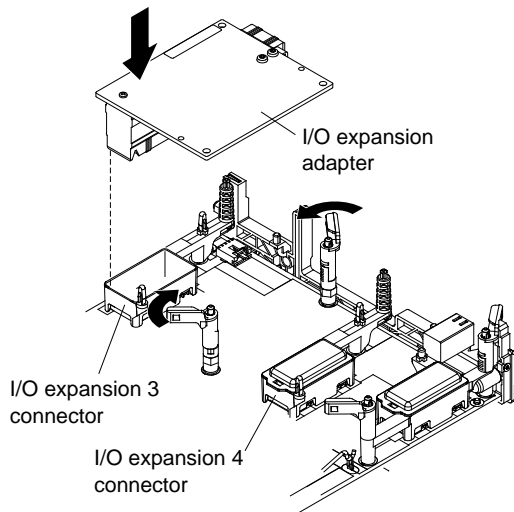- Air baffles (fillers) must be installed in any empty PCIe slots.

Statement 21

CAUTION:
Hazardous energy is present when the blade is connected to the power source. Always replace the blade cover before installing the blade.

To install and close the PCIe Expansion Node cover, complete the following steps.

Step 1. Lower the cover so that the posts inside the cover fit into the slots in the PCIe Expansion Node, as shown in the illustration.

Push point

Pins

Slots

Step 2.   Slide the cover towards the front of the PCIe Expansion Node, as shown in the illustration, until it clicks into place.

After installing the PCIe Expansion Node cover, complete the following steps:

1. Install the compute node cover (see the compute node *Installation and Service Guide* for instructions).

2. Install the 2-bay shelf assembly into the open chassis bays (see "Installing the PCIe Expansion Node with compute node host" on page 22 for instructions).

Removing an I/O expansion adapter

Use these instructions to remove an I/O expansion adapter from the PCIe Expansion Node.

Before you remove an I/O expansion adapter from the PCIe Expansion Node, complete the following steps:

1. Read "Safety" on page iii and "Installation guidelines" on page 37.

2. If the PCIe Expansion Node is installed in a Flex System Enterprise Chassis, remove it (see "Removing a PCIe Expansion Node and attached compute node host" on page 23 for instructions).

3. Carefully lay the PCIe Expansion Node on a flat, static-protective surface with the right side of the unit oriented toward you.

4. Remove the PCIe Expansion Node cover (see "Removing the cover" on page 38 for instructions).
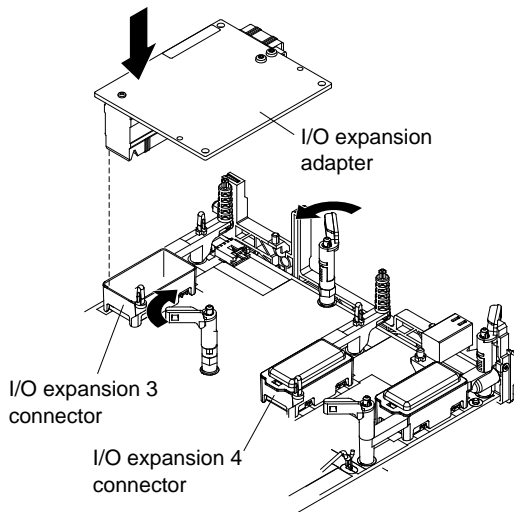
Statement 21

CAUTION:
Hazardous energy is present when the blade is connected to the power source. Always replace the blade cover before installing the blade.

To remove an I/O expansion adapter from the PCIe Expansion Node, complete the following steps.

Step 1.   Locate the system board I/O expansion adapter connectors (see "System board connectors" on page 8).

I/O expansion adapter

I/O expansion 3 connector

I/O expansion 4 connector

Step 2.   Open the retention clips.

Step 3.   Lift the I/O expansion adapter from the connector and remove the adapter from the PCIe Expansion Node. You might find it helpful to rock the adapter back and forth to disengage the adapter.

If you are instructed to return the I/O expansion adapter, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Installing an I/O expansion adapter

Use these instructions to install an I/O expansion adapter in the PCIe Expansion Node.

Before installing an I/O expansion adapter in the PCIe Expansion Node, read "Safety" on page iii and "Installation guidelines" on page 37.
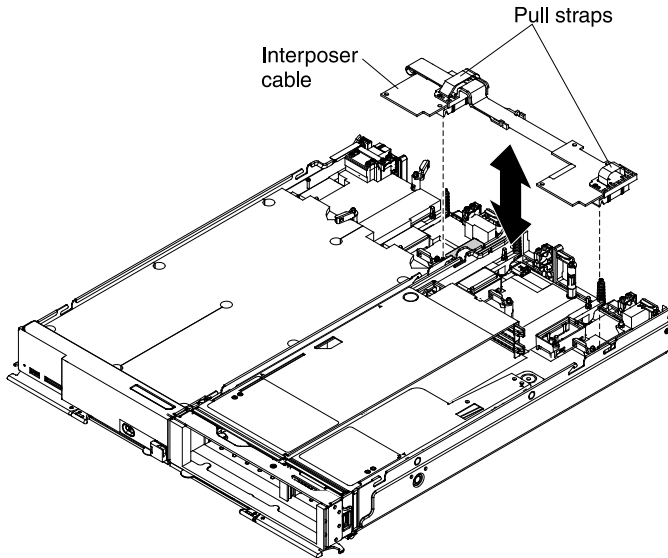
Statement 21

CAUTION:
Hazardous energy is present when the blade is connected to the power source. Always replace the blade cover before installing the blade.

To install an I/O expansion adapter in the PCIe Expansion Node, complete the following steps:

Step 1.   Locate the system board I/O expansion adapter connectors (see "System board connectors" on page 8).

Step 2.   Remove the plastic cover from the I/O expansion connector, if one is present.

Step 3.   Touch the static-protective package that contains the I/O expansion adapter to any *unpainted* metal surface on the Flex System Enterprise Chassis or any *unpainted* metal surface on any other grounded rack component; then, remove the adapter from the package.

Step 4.   Open the retention clips.

I/O expansion
adapter

I/O expansion 3
connector

I/O expansion 4
connector

Step 5. Orient the plug on the I/O expansion adapter to the I/O expansion 3 or I/O expansion 4 connector on the system board; then, press the I/O expansion adapter into the connector.

Step 6. Firmly press on the I/O expansion adapter to seat the adapter in the connector.

Step 7. Close the retention clips.

After installing the I/O expansion adapter, complete the following steps:

1. Install the cover. See "Installing the cover" on page 39 for instructions.

2. Install the PCIe Expansion Node into the chassis. See "Installing the PCIe Expansion Node with compute node host" on page 22 for instructions.

Removing the interposer cable

Use these instructions to remove the interposer cable from a PCIe Expansion Node.

Before you remove the PCIe Expansion Nodeinterposer cable, complete the following steps:

1. Read "Safety" on page iii and "Installation guidelines" on page 37.

2. If the PCIe Expansion Node is installed in a Flex System Enterprise Chassis, remove it (see "Removing a PCIe Expansion Node and attached compute node host" on page 23 for instructions).

3. Remove the PCIe Expansion Node cover (see "Removing the cover" on page 38 for instructions).

4. Remove the PCIe Expansion Node I/O expansion adapters, if installed (see "Removing an I/O expansion adapter" on page 40 for instructions).

5. Remove the compute node cover (see the compute node *Installation and Service Guide* for instructions).

6. Remove the compute node I/O adapters, if installed (see the compute node *Installation and Service Guide* for instructions).

Statement 21

CAUTION:
Hazardous energy is present when the blade is connected to the power source. Always replace the blade cover before installing the blade.

To remove the interposer cable, complete the following steps:

Step 1.   Pull up on the blue strap to disconnect the interposer cable from the compute node connector.

Step 2.   Pull up on the blue strap to disconnect the interposer cable from the PCIe Expansion Node connector.

Step 3.   Lift the interposer cable out of the PCIe Expansion Node.

If you are instructed to return the interposer cable, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Installing the interposer cable

Use these instructions to install the interposer cable in a PCIe Expansion Node.

Before installing the interposer cable, read "Safety" on page iii and "Installation guidelines" on page 37.

Statement 21

CAUTION:
Hazardous energy is present when the blade is connected to the power source. Always replace the blade cover before installing the blade.

To install the interposer cable in a PCIe Expansion Node, complete the following steps:

Step 1.   Orient the end of the interposer cable with the attached cable guide to the interposer connector in the compute node. Fit the cable guide over the chassis and press on the blue pull strap to seat the interposer cable in the connector.

Pull straps
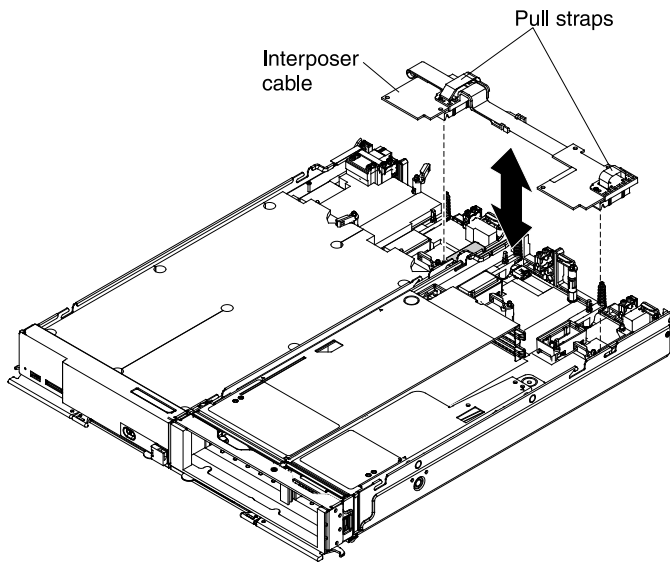
Interposer cable

Step 2. Orient the free end of the interposer cable to the interposer connector in the PCIe Expansion Node and press the blue pull strap to seat the interposer cable in the connector.

After installing the interposer cable, complete the following steps:

1. Install the PCIe Expansion Node I/O expansion adapters, if any were removed. See "Installing an I/O expansion adapter" on page 41 for instructions.

2. Install the PCIe Expansion Node cover. See "Installing the cover" on page 39 for instructions.

3. Install the compute node I/O expansion adapters, if any were removed. See the compute node *Installation and Service Guide* for instructions.

4. Install the compute node cover. See the compute node *Installation and Service Guide* for instructions.

5. Install the PCIe Expansion Node into the chassis. See "Installing the PCIe Expansion Node with compute node host" on page 22 for instructions.

Removing a full-height adapter

Use these instructions to remove an adapter from the PCIe Expansion Node full-height PCIe riser.

Before you remove an adapter from the PCIe Expansion Node full-height PCIe riser, complete the following steps:

1. Read "Safety" on page iii and "Installation guidelines" on page 37.

2. If you are not replacing the adapter, you must have a filler to install in the empty slot. Obtain the correct slot filler before continuing.

3. If the PCIe Expansion Node is installed in a Flex System Enterprise Chassis chassis, remove it (see "Removing a PCIe Expansion Node and attached compute node host" on page 23 for instructions).

4. Carefully lay the PCIe Expansion Node on a flat, static-protective surface with the right side of the unit oriented toward you.

5. Remove the PCIe Expansion Node cover (see "Removing the cover" on page 38 for instructions).
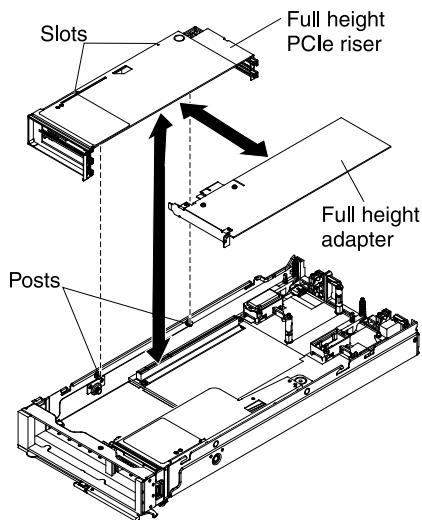
Statement 21

CAUTION:

Hazardous energy is present when the blade is connected to the power source. Always replace the blade cover before installing the blade.

To remove an adapter from the full-height PCIe riser, complete the following steps.

Step 1.   If the installed PCIe adapter is a high-power adapter with an external power cable, disconnect the adapter power cable from the system board (see "System board connectors" on page 8 for connector locations).

Step 2.   Grasp the full-height PCIe riser by the blue touch points and pull the riser straight up to disconnect the riser from the system board connector; then, lift the full-height PCIe riser out of the PCIe Expansion Node.
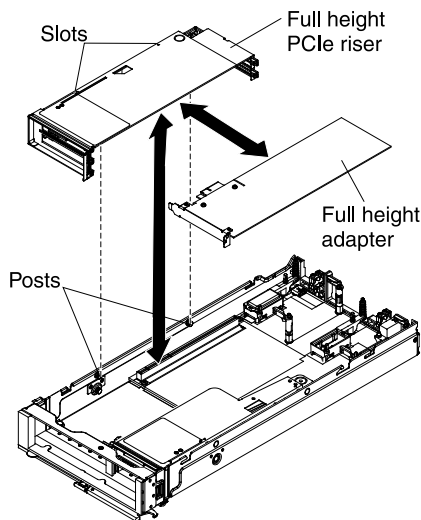
Step 3.   Carefully lay the full-height PCIe riser on it's left side on a flat, static-protective surface with the adapter slots facing up.
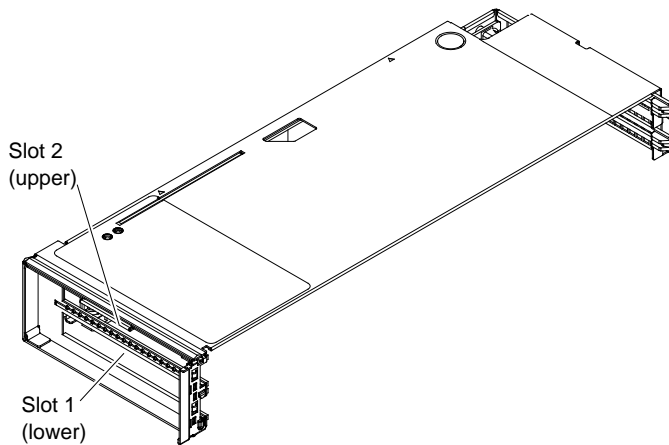
Note: The full-height PCIe riser has two connectors for PCIe adapters. The lower connector is for adapter slot 1 and the upper connector is for adapter slot 2

Step 4.   Pull the adapter out of the slot and remove it from the PCIe riser.

Important: Each adapter slot must have either an adapter or a filler installed. If the adapter will not be immediately replaced, install a filler in the adapter slot.

If you are instructed to return the adapter, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Installing a full-height adapter

Use these instructions to install an adapter in the PCIe Expansion Node full-height PCIe riser.

Before installing an adapter in the PCIe Expansion Node full-height PCIe riser, read "Safety" on page iii and "Installation guidelines" on page 37.

Statement 21

CAUTION:

Hazardous energy is present when the blade is connected to the power source. Always replace the blade cover before installing the blade.

To install an adapter in the PCIe Expansion Node full-height PCIe riser, complete the following steps:

Step 1. If the full-height PCIe riser has a high-power PCIe adapter installed with an auxiliary dc power cable, disconnect the auxiliary power cable from the system board (see "System board connectors" on page 8 for connector locations).

Step 2. Grasp the full-height PCIe riser by the blue touch points and pull the PCIe riser straight up to disconnect the riser from the system board connector; then, lift the full-height PCIe riser out of the PCIe Expansion Node.

Step 3. Carefully lay the full-height PCIe riser on it's left side on a flat, static-protective surface with the adapter slots facing up.

Step 4. Remove the filler from the slot where the adapter will be installed.

Note: If you are installing a double-width full-height adapter, you must remove both fillers from slots 1 and 2. When a double-width adapter is installed in slot 2, slot 1 will not have a filler.

Step 5. Touch the static-protective package that contains the adapter to any *unpainted* metal surface on the Flex System Enterprise Chassis or any *unpainted* metal surface on any other grounded rack component; then, remove the adapter from the package.

Step 6. Orient the adapter with the slot in the PCIe riser; then, press the adapter into the slot.

Note: The full-height PCIe riser has two connectors for PCIe adapters. The lower connector is for adapter slot 1 and the upper connector is for adapter slot 2.

Slot 2
(upper)

Slot 1
(lower)

Step 7. Firmly press on the PCIe adapter to seat the adapter in the connector.

   Important: Each adapter slot must have either an adapter or a filler installed.

Step 8. With the adapter installed, orient the alignment slots on the left side of the full-height PCIe riser to the alignment posts inside the PCIe Expansion Node and slide the PCIe riser over the posts.

Step 9. Firmly press on the blue touch points to seat the full-height PCIe riser in the system board connector.

Step 10. If the installed adapters have auxiliary dc power cables, connect the auxiliary power cables to the system board (see "System board connectors" on page 8 for connector locations).

After installing the adapter, complete the following steps:

1. Install the cover. See "Installing the cover" on page 39 for instructions.

2. Install the PCIe Expansion Node into the chassis. See "Installing the PCIe Expansion Node with compute node host" on page 22 for instructions.

Removing a low-profile adapter

Use these instructions to remove an adapter from the PCIe Expansion Node low-profile PCIe riser.

Before you remove an adapter from the PCIe Expansion Node low-profile PCIe riser, complete the following steps:

1. Read "Safety" on page iii and "Installation guidelines" on page 37.

2. If you are not replacing the adapter, you must have a filler to install in the empty slot. Obtain the correct slot filler before continuing.

3. If the PCIe Expansion Node is installed in a Flex System Enterprise Chassis, remove it (see "Removing a PCIe Expansion Node and attached compute node host" on page 23 for instructions).

4. Carefully lay the PCIe Expansion Node on a flat, static-protective surface with the right side of the unit oriented toward you.

5. Remove the PCIe Expansion Node cover (see "Removing the cover" on page 38 for instructions).
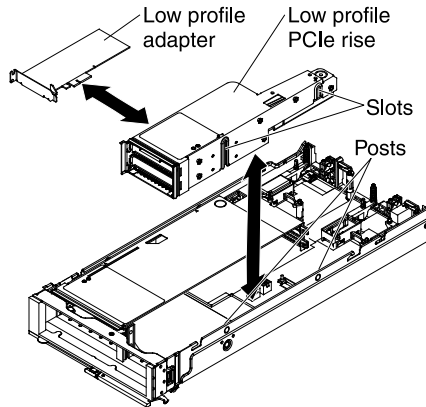
Statement 21

CAUTION:

Hazardous energy is present when the blade is connected to the power source. Always replace the blade cover before installing the blade.
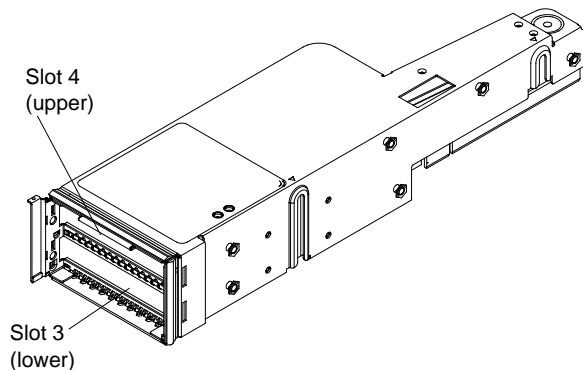
To remove an adapter from the low-profile PCIe riser, complete the following steps.

Step 1. Grasp the low-profile PCIe riser by the blue touch points and pull the riser straight up to disconnect the riser from the system board connector; then, lift the low-profile PCIe riser out of the PCIe Expansion Node.
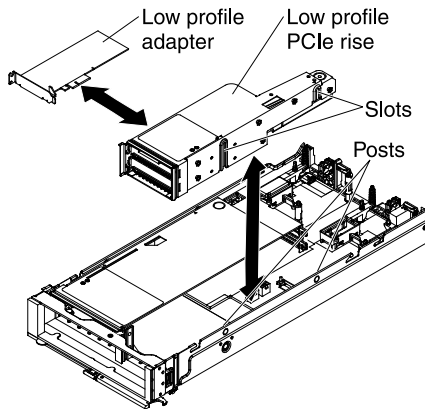
Step 2. Carefully lay the low-profile PCIe riser on it's right side on a flat, static-protective surface with the adapter slots facing up.

Note: The low-profile PCIe riser has two connectors for PCIe adapter cards. The lower connector is for adapter slot 3 and the upper connector is for adapter slot 4.

Step 3. Pull the adapter out of the slot and remove it from the riser.

Important: Each adapter slot must have either an adapter or a filler installed. If the adapter will not be immediately replaced, install a filler in the adapter slot.

If you are instructed to return the adapter, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Installing a low-profile adapter

Use these instructions to install an adapter in the PCIe Expansion Node low-profile PCIe riser.

Before installing an adapter in the PCIe Expansion Node low-profile PCIe riser, read "Safety" on page iii and "Installation guidelines" on page 37
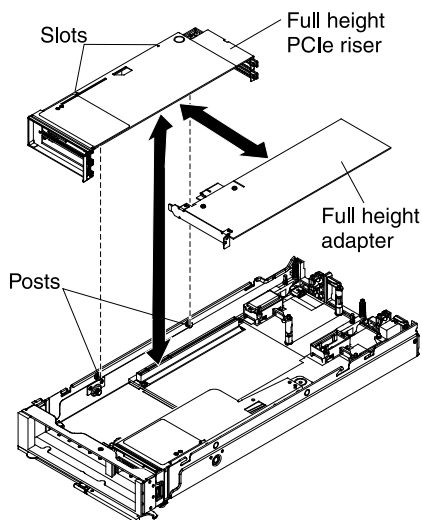
Statement 21

CAUTION:
Hazardous energy is present when the blade is connected to the power source. Always replace the blade cover before installing the blade.

To install an adapter in the PCIe Expansion Node low-profile PCIe riser, complete the following steps:

Step 1.   Grasp the low-profile PCIe riser by the blue touch points and pull the riser straight up to disconnect the riser from the system board connector; then, lift the low-profile PCIe riser out of the PCIe Expansion Node.

Step 2.   Carefully lay the low-profile PCIe riser on it's right side on a flat, static-protective surface with the adapter slots facing up.

Step 3.   Remove the filler from the slot where the adapter will be installed.

Step 4.   Touch the static-protective package that contains the adapter to any *unpainted* metal surface on the Flex System Enterprise Chassis or any *unpainted* metal surface on any other grounded rack component; then, remove the adapter from the package.

Step 5.   Orient the adapter with the slot in the PCIe riser; then, press the adapter into the slot.

> **Note:** The low-profile PCIe riser has two connectors for PCIe adapter cards. The lower connector is for adapter slot 3 and the upper connector is for adapter slot 4.

Step 6.   Firmly press on the adapter to seat the adapter in the connector.

> **Important:** Each adapter slot must have either an adapter or a filler installed.

Step 7.   With the adapter installed, orient the alignment slots on the right side of the low-profile PCIe riser to the alignment posts inside the PCIe Expansion Node and slide the riser over the posts.

Step 8.   Firmly press on the blue touch points to seat the low-profile PCIe riser in the system board connector.

After installing the adapter, complete the following steps:

1. Install the cover. See "Installing the cover" on page 39 for instructions.

2. Install the PCIe Expansion Node into the chassis. See "Installing the PCIe Expansion Node with compute node host" on page 22 for instructions.

Removing the full-height PCIe riser

Use these instructions to remove the full-height PCIe riser from the PCIe Expansion Node.

Before you remove the PCIe Expansion Node full-height PCIe riser, complete the following steps:

1. Read "Safety" on page iii and "Installation guidelines" on page 37.
2. If the PCIe Expansion Node is installed in a Flex System Enterprise Chassis, remove it (see "Removing a PCIe Expansion Node and attached compute node host" on page 23 for instructions).
3. Carefully lay the PCIe Expansion Node on a flat, static-protective surface with the right side of the unit oriented toward you.
4. Remove the PCIe Expansion Node cover (see "Removing the cover" on page 38 for instructions).

Statement 21

CAUTION:
Hazardous energy is present when the blade is connected to the power source. Always replace the blade cover before installing the blade.

Important: The full-height PCIe riser must be installed in the expansion node or the system will not operate. If the riser is not installed, the compute node will not power on.

To remove the full-height PCIe riser, complete the following steps.

Step 1. If the full-height PCIe riser has a high-power adapter PCIe adapter installed with an external power cable, disconnect the adapter power cable from the system board (see "System board connectors" on page 8 for connector locations).

Step 2. Grasp the full-height PCIe riser by the blue touch points and pull the riser straight up to disconnect the riser from the system board connector; then, lift the full-height PCIe riser out of the PCIe Expansion Node.

Step 3. Remove any adapters that are installed in the full-height PCIe riser. See "Removing a full-height adapter" on page 44 for instructions.

If you are instructed to return the full-height PCIe riser, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Installing the full-height PCIe riser

Use these instructions to install the full-height PCIe riser in the PCIe Expansion Node.

Before installing the full-height PCIe riser in the PCIe Expansion Node, read "Safety" on page iii and "Installation guidelines" on page 37.
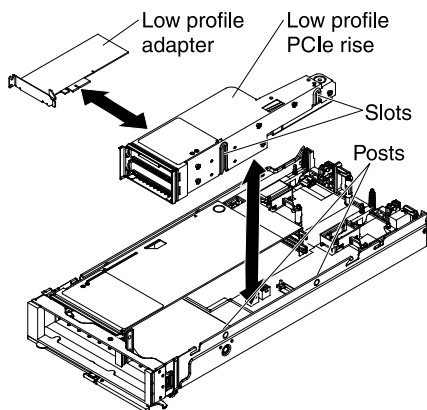
Statement 21

CAUTION:
Hazardous energy is present when the blade is connected to the power source. Always replace the blade cover before installing the blade.

Important: The full-height PCIe riser must be installed in the expansion node or the system will not operate. If the riser is not installed, the compute node will not power on.

To install the PCIe Expansion Node full-height PCIe riser, complete the following steps:

Step 1.   Install the PCIe adapters in the full-height PCIe riser, if any were removed (see "Installing a full-height adapter" on page 45 for instructions).

Step 2.   Orient the alignment slots on the left side of the full-height PCIe rise to the alignment posts inside the PCIe Expansion Node and slide the riser over the posts.
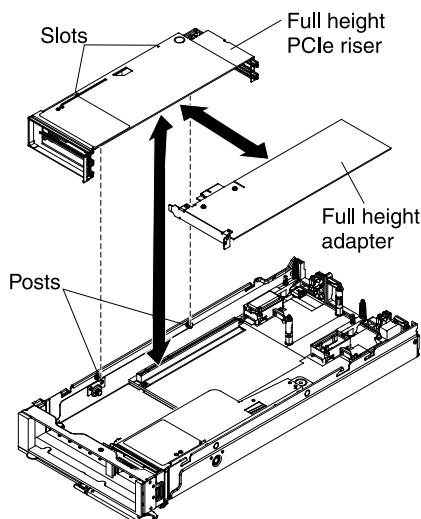
Step 3.   Firmly press on the blue touch points to seat the full-height PCIe riser in the system board connector.

Step 4.   If the full-height PCIe riser has a high-power PCIe adapter installed with an external power cable, connect the adapter power cable to one of the additional power connectors on the system board (see "System board connectors" on page 8 for connector locations).

After installing the full-height PCIe riser, complete the following steps:

1.   Install the cover. See "Installing the cover" on page 39 for instructions.

2. Install the PCIe Expansion Node into the chassis. See "Installing the PCIe Expansion Node with compute node host" on page 22 for instructions.

Removing the low-profile PCIe riser

Use these instructions to remove the low-profile PCIe riser from the PCIe Expansion Node.

Before you remove the PCIe Expansion Node low-profile PCIe riser, complete the following steps:

1. Read "Safety" on page iii and "Installation guidelines" on page 37.

2. If the PCIe Expansion Node is installed in a Flex System Enterprise Chassis, remove it (see "Removing a PCIe Expansion Node and attached compute node host" on page 23 for instructions).

3. Carefully lay the PCIe Expansion Node on a flat, static-protective surface with the right side of the unit oriented toward you.

4. Remove the PCIe Expansion Node cover (see "Removing the cover" on page 38 for instructions).

Statement 21

CAUTION:
Hazardous energy is present when the blade is connected to the power source. Always replace the blade cover before installing the blade.

Important: The low-profile PCIe riser must be installed in the expansion node or the system will not operate. If the riser is not installed, the compute node will not power on.

To remove the low-profile PCIe riser, complete the following steps:

Step 1. Grasp the low-profile PCIe riser by the blue touch points and pull the riser straight up to disconnect the riser from the system board connector; then, lift the low-profile PCIe riser out of the PCIe Expansion Node.

Step 2. Remove any adapters that are installed in the low-profile PCIe riser. See "Removing a low-profile adapter" on page 47 for instructions.

If you are instructed to return the low-profile PCIe riser, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Installing the low-profile PCIe riser

Use these instructions to install the low-profile PCIe riser in the PCIe Expansion Node.

Before installing the PCIe Expansion Node low-profile PCIe riser, read "Safety" on page iii and "Installation guidelines" on page 37.

Statement 21

CAUTION:
Hazardous energy is present when the blade is connected to the power source. Always replace the blade cover before installing the blade.

Important: The low-profile PCIe riser must be installed in the expansion node or the system will not operate. If the riser is not installed, the compute node will not power on.

To install the PCIe Expansion Node low-profile PCIe riser, complete the following steps:

Step 1. Install the PCIe adapters in the low-profile PCIe riser, if any were removed (see "Installing a low-profile adapter" on page 48 for instructions).

Step 2. Orient the alignment slots on the right side of the low-profile PCIe riser to the alignment posts inside the PCIe Expansion Node and slide the PCIe riser over the posts.
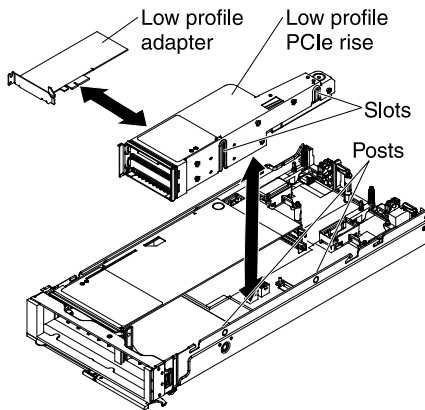
Step 3. Firmly press on the blue touch points to seat the low-profile PCIe riser in the system board connector.

After installing the low-profile PCIe riser, complete the following steps:

1. Install the cover. See "Installing the cover" on page 39 for instructions.
2. Install the PCIe Expansion Node into the chassis. See "Installing the PCIe Expansion Node with compute node host" on page 22 for instructions.

Replacing the system board

Use these instructions to replace the PCIe Expansion Node system board.

Before you replace the PCIe Expansion Node system board, complete the following steps:

1. Read "Safety" on page iii and "Installation guidelines" on page 37.

2. If the PCIe Expansion Node is installed in a Flex System Enterprise Chassis, remove it (see "Removing a PCIe Expansion Node and attached compute node host" on page 23 for instructions).

Statement 21

CAUTION:
Hazardous energy is present when the blade is connected to the power source. Always replace the blade cover before installing the blade.

Note: The PCIe Expansion Node enclosure and system board are replaced as a unit.

To replace the expansion node system board, complete the following steps.

Step 1. Remove the PCIe Expansion Node cover, if installed. (see "Removing the cover" on page 38 for instructions).

Step 2. Remove all of the internal components from the expansion node enclosure and place them on a flat static-protective surface for reuse.

    a. Remove the full-height PCIe riser assembly (see "Removing the full-height PCIe riser" on page 50 for instructions). Do not remove the adapters or fillers that are installed in the riser.

    b. Remove the low-profile PCIe riser assembly (see "Removing the low-profile PCIe riser" on page 52 for instructions). Do not remove the adapters or fillers that are installed in the riser.

    c. Remove the I/O expansion adapters, if installed (see "Removing an I/O expansion adapter" on page 40 for instructions).

    d. Remove the interposer cable, if installed (see "Removing the interposer cable" on page 42 for instructions).

Step 3. If you are instructed to return the expansion node enclosure, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Step 4. Install the following internal components in a new PCIe Expansion Node enclosure:

    a. Install the low-profile PCIe riser assembly (see "Installing the low-profile PCIe riser" on page 53 for instructions).

    b. Install the full-height PCIe riser assembly (see "Installing the full-height PCIe riser" on page 51 for instructions).

After installing the PCIe risers in a new the expansion node enclosure, complete the following steps:

1. Attach the PCIe Expansion Node to the 2-bay shelf, install the interposer cable, and install the I/O expansion adapters, if any were removed (see "Attaching the PCIe Expansion Node to a compute node host" on page 13 for instructions).

2. Close the cover and install the 2-bay shelf assembly into the Flex System Enterprise Chassis (see "Completing the installation" on page 20 for instructions).

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Appendix A. Getting help and technical assistance

If you need help, service, or technical assistance or just want more information about Lenovo products, you will find a wide variety of sources available from Lenovo to assist you.

Use this information to obtain additional information about Lenovo and Lenovo products, and determine what to do if you experience a problem with your Lenovo system or optional device.

Note: This section includes references to IBM web sites and information about obtaining service. IBM is Lenovo's preferred service provider for the System x, Flex System, and NeXtScale System products.

Before you call

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

If you believe that you require warranty service for your Lenovo product, the service technicians will be able to assist you more efficiently if you prepare before you call.

- 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 software, firmware, and operating-system device drivers for your Lenovo product. The Lenovo Warranty terms and conditions state that you, the owner of the Lenovo product, are responsible for maintaining and updating all software and firmware for the product (unless it is covered by an additional maintenance contract). Your 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 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 the service technician. This data will help the service technician 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 (Lenovo 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/Software/Software_support_ (general) 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 the service technicians. The 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 Lenovo provides in the online help or in the Lenovo product documentation. The Lenovo product documentation also describes the diagnostic tests that you can perform. The documentation for most systems, operating systems, and programs 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 Lenovo system and preinstalled software, if any, or optional device is available in the product documentation. 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. Lenovo 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/.

Getting help and information from the World Wide Web

Up-to-date information about Lenovo products and support is available on the World Wide Web.

On the World Wide Web, up-to-date information about Lenovo systems, optional devices, services, and support is available at http://www.ibm.com/supportportal/. The most current version of the product documentation is available in the following product-specific Information Centers:

Flex System products:http://pic.dhe.ibm.com/infocenter/flexsys/information/index.jsp

System x products:http://www.ibm.com/systems/x

NeXtScale System products:http://pic.dhe.ibm.com/infocenter/nxtscale/documentation/index.jsp

How to send DSA data

You can use the 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:

- **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

You can create a personalized support web page by identifying Lenovo products that are of interest to you.

To create a personalized support web page, go to http://www.ibm.com/support/mynotifications. 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 Lenovo products.

For more information about Support Line and other IBM services, see http://www.ibm.com/services/us/en/it-services/gts-it-service-home-page-1.html 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

IBM is Lenovo's preferred service provider for the System x, Flex System and NeXtScale System products.

You can receive hardware service through your Lenovo reseller or from IBM. To locate a reseller authorized by Lenovo to provide warranty service, go to https://www.ibm.com/partnerworld/wps/servlet/ContentHandler/pw_home_pub_index and click **Business Partner Locator**. 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.

Taiwan product service

Use this information to contact 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

Lenovo may not offer the products, services, or features discussed in this document in all countries. Consult your local Lenovo representative for information on the products and services currently available in your area.

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

Trademarks

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Intel and Intel Xeon are trademarks of Intel Corporation in the United States, other countries, or both.

Internet Explorer, Microsoft, and Windows are trademarks of the Microsoft group of companies.

Linux is a registered trademark of Linus Torvalds.

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

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 1 024 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 Lenovo.

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. Lenovo 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.

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

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

Recycling information

Lenovo encourages owners of information technology (IT) equipment to responsibly recycle their equipment when it is no longer needed. Lenovo offers a variety of programs and services to assist equipment owners in recycling their IT products. For information on recycling Lenovo products, go to:http://www.lenovo.com/recycling.

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 Lenovo determines that the levels of particulates or gases in your environment have caused damage to the device, Lenovo 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 6. 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.	

Telecommunication regulatory statement

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 a Lenovo 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. Lenovo 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 might 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. Lenovo cannot accept responsibility for any failure to satisfy the protection requirements resulting from a non-recommended modification of the product, including the installation of option cards from other manufacturers.

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

Lenovo, Einsteinova 21, 851 01 Bratislava, Slovakia

Germany Class A statement

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

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 (früher 89/336/EWG) zur Angleichung der Rechtsvorschriften über die elektromagnetische Verträglichkeit in den EU-Mitgliedsstaaten und hält die Grenzwerte der EN 55022 Klasse A ein.

Um dieses sicherzustellen, sind die Geräte wie in den Handbüchern beschrieben zu installieren und zu betreiben. Des Weiteren dürfen auch nur von der Lenovo empfohlene Kabel angeschlossen werden. Lenovo übernimmt keine Verantwortung für die Einhaltung der Schutzanforderungen, wenn das Produkt ohne Zustimmung der Lenovo verändert bzw. wenn Erweiterungskomponenten von Fremdherstellern ohne Empfehlung der Lenovo gesteckt/eingebaut werden.

Deutschland:

Einhaltung des Gesetzes über die elektromagnetische Verträglichkeit von Betriebsmittein Dieses Produkt entspricht dem „Gesetz über die elektromagnetische Verträglichkeit von Betriebsmitteln" EMVG (früher „Gesetz über die elektromagnetische Verträglichkeit von Geräten"). Dies ist die Umsetzung der EU-Richtlinie 2004/108/EG (früher 89/336/EWG) in der Bundesrepublik Deutschland.

Zulassungsbescheinigung laut dem Deutschen Gesetz über die elektromagnetische Verträglichkeit von Betriebsmitteln, EMVG vom 20. Juli 2007 (früher Gesetz über die elektromagnetische Verträglichkeit von Geräten), bzw. der EMV EG Richtlinie 2004/108/EC (früher 89/336/EWG), für Geräte der Klasse A.

Dieses Gerät ist berechtigt, in Übereinstimmung mit dem Deutschen EMVG das EG-Konformitätszeichen - CE - zu führen. Verantwortlich für die Konformitätserklärung nach Paragraf 5 des EMVG ist die Lenovo (Deutschland) GmbH, Gropiusplatz 10, D-70563 Stuttgart.

Informationen in Hinsicht EMVG Paragraf 4 Abs. (1) 4:**Das Gerät erfüllt die Schutzanforderungen nach EN 55024 und EN 55022 Klasse A.**

Nach der EN 55022: „Dies ist eine Einrichtung der Klasse A. Diese Einrichtung kann im Wohnbereich Funkstörungen verursachen; in diesem Fall kann vom Betreiber verlangt werden, angemessene Maßnahmen durchzuführen und dafür aufzukommen."

Nach dem EMVG: „Geräte dürfen an Orten, für die sie nicht ausreichend entstört sind, nur mit besonderer Genehmigung des Bundesministers für Post und Telekommunikation oder des Bundesamtes für Post und Telekommunikation betrieben werden. Die Genehmigung wird erteilt, wenn keine elektromagnetischen Störungen zu erwarten sind." (Auszug aus dem EMVG, Paragraph 3, Abs. 4). Dieses Genehmigungsverfahren ist nach Paragraph 9 EMVG in Verbindung mit der entsprechenden Kostenverordnung (Amtsblatt 14/93) kostenpflichtig.

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

Japan VCCI Class A statement

この装置は、クラス A 情報技術装置です。この装置を家庭環境で使用すると電波妨害を引き起こすことがあります。この場合には使用者が適切な対策を講ずるよう要求されることがあります。　　　　　VCCI–A

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準用品

Japan Electronics and Information Technology Industries Association (JEITA) Confirmed Harmonics Guidelines with Modifications (products greater than 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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