



# ThinkSystem SR850 V3 User Guide



**Machine Type:** 7D96, 7D97, and 7D98

## Note

Before using this information and the product it supports, be sure to read and understand the safety information and the safety instructions, which are available at:

[https://pubs.lenovo.com/safety\\_documentation/](https://pubs.lenovo.com/safety_documentation/)

In addition, be sure that you are familiar with the terms and conditions of the Lenovo warranty for your server, which can be found at:

<http://datacentersupport.lenovo.com/warrantylookup>

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## Safety

Before installing this product, read the Safety Information.

قبل تركيب هذا المنتج، يجب قراءة الملاحظات الأمنية

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

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

安裝本產品之前，請先閱讀「安全資訊」。

Prije instalacije ovog produkta obavezno pročitajte Sigurnosne Upute.

Před instalací tohoto produktu si přečtěte příručku bezpečnostních instrukcí.

Læs sikkerhedsforskrifterne, før du installerer dette produkt.

Lees voordat u dit product installeert eerst de veiligheidsvoorschriften.

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

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

Vor der Installation dieses Produkts die Sicherheitshinweise lesen.

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

לפני שתתקינו מוצר זה, קראו את הוראות הבטיחות.

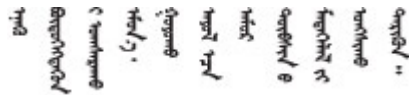
A termék telepítése előtt olvassa el a Biztonsági előírásokat!

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

製品の設置の前に、安全情報をお読みください。

본 제품을 설치하기 전에 안전 정보를 읽으십시오.

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



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

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

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

Перед установкой продукта прочтите инструкции по технике безопасности.

Pred inštaláciou tohto zariadenia si pečítajte 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་ཁུངས་འདི་བདེ་སྤྱོད་མ་བྱས་གོང་། རྒྱ་རྒྱུ་ཡིད་གཟབ་  
བྱ་འདྲ་མིན་ཡོད་པའི་འོད་ཟེར་བལྟ་དགོས།

Bu ürünü kurmadan önce güvenlik bilgilerini okuyun.

مەزكۇر مەھسۇلاتنى ئورنىتىشتىن بۇرۇن بىخەتەرلىك ئۇچۇرلىرىنى ئوقۇپ چىقىڭ.

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

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## Safety inspection checklist

Use the information in this section to identify potentially unsafe conditions with your server. As each machine was designed and built, required safety items were installed to protect users and service technicians from injury.

**Note:** The product is not suitable for use at visual display workplaces according to §2 of the Workplace Regulations.

**Note:** The set-up of the server is made in the server room only.

### CAUTION:

**This equipment must be installed or serviced by trained personnel, as defined by the NEC, IEC 62368-1 & IEC 60950-1, the standard for Safety of Electronic Equipment within the Field of Audio/Video, Information Technology and Communication Technology. Lenovo assumes you are qualified in the servicing of equipment and trained in recognizing hazards energy levels in products. Access to the equipment is by the use of a tool, lock and key, or other means of security, and is controlled by the authority responsible for the location.**

**Important:** Electrical grounding of the server is required for operator safety and correct system function. Proper grounding of the electrical outlet can be verified by a certified electrician.

Use the following checklist to verify that there are no potentially unsafe conditions:

1. Make sure that the power is off and the power cord is disconnected.
2. Check the power cord.
  - Make sure that the third-wire ground connector is in good condition. Use a meter to measure third-wire ground continuity for 0.1 ohm or less between the external ground pin and the frame ground.
  - Make sure that the power cord is the correct type.

To view the power cords that are available for the server:

- a. Go to:



<http://dcsc.lenovo.com/#/>

- b. Click **Preconfigured Model** or **Configure to order**.
- c. Enter the machine type and model for your server to display the configurator page.
- d. Click **Power → Power Cables** to see all line cords.
  - Make sure that the insulation is not frayed or worn.
3. Check for any obvious non-Lenovo alterations. Use good judgment as to the safety of any non-Lenovo alterations.
4. Check inside the server for any obvious unsafe conditions, such as metal filings, contamination, water or other liquid, or signs of fire or smoke damage.
5. Check for worn, frayed, or pinched cables.
6. Make sure that the power-supply cover fasteners (screws or rivets) have not been removed or tampered with.



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## Chapter 1. Introduction

The ThinkSystem SR850 V3 server (Types 7D96, 7D97, and 7D98) is a 2U rack server designed for high-volume network transaction processing. This high-performance, multi-core server is ideally suited for networking environments that require superior microprocessor performance, input/output (I/O) flexibility, and high manageability.

Figure 1. ThinkSystem SR850 V3



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## Features

Performance, ease of use, reliability, and expansion capabilities were key considerations in the design of your server. These design features make it possible for you to customize the system hardware to meet your needs today and provide flexible expansion capabilities for the future.

Your server implements the following features and technologies:

- **Features on Demand**

If a Features on Demand feature is integrated in the server or in an optional device that is installed in the server, you can purchase an activation key to activate the feature. For information about Features on Demand, see:

<https://fod.lenovo.com/lkms>

- **Lenovo XClarity Controller (XCC)**

The Lenovo XClarity Controller is the common management controller for Lenovo ThinkSystem server hardware. The Lenovo XClarity Controller consolidates multiple management functions in a single chip on the server system board (system board assembly). Some of the features that are unique to the Lenovo XClarity Controller are enhanced performance, higher-resolution remote video, and expanded security options.

The server supports Lenovo XClarity Controller 2 (XCC2). For additional information about Lenovo XClarity Controller 2 (XCC2), refer to <https://pubs.lenovo.com/lxcc-overview/>.

- **UEFI-compliant server firmware**

Lenovo ThinkSystem firmware is Unified Extensible Firmware Interface (UEFI) compliant. UEFI replaces BIOS and defines a standard interface between the operating system, platform firmware, and external devices.

Lenovo ThinkSystem servers are capable of booting UEFI-compliant operating systems, BIOS-based operating systems, and BIOS-based adapters as well as UEFI-compliant adapters.

**Note:** The server does not support Disk Operating System (DOS).

- **Active Memory**

The Active Memory feature improves the reliability of memory through memory mirroring. Memory mirroring mode replicates and stores data on one or two DIMMs within the channel (DIMM configuration

must match between the mirrored channels). If a failure occurs, the memory controller switches from the primary memory DIMMs to the backup DIMMs.

- **Large system-memory capacity**

The server supports up to 64 TruDDR5 memory DIMMs operating at up to 4800 MHz. For more information about the specific types and maximum amount of memory, see “[Technical specifications](#)” on [page 3](#).

- **Lightpath Diagnostics**

Lightpath Diagnostics provides LEDs to help you diagnose problems. For more information about the Lightpath Diagnostics, see “[Troubleshooting by system LEDs and diagnostics display](#)” on [page 375](#).

- **Mobile access to Lenovo Service Information website**

The server provides a QR code on the system service label, which is on the cover of the server, that you can scan using a QR code reader and scanner with a mobile device to get quick access to the Lenovo Service Information website. The Lenovo Service Information website provides additional information for parts installation, replacement videos, and error codes for server support.

- **Active Energy Manager**

Lenovo XClarity Energy Manager is a power and temperature management solution for data centers. You can monitor and manage the power consumption and temperature of Converged, NeXtScale, System x, and ThinkServer servers, and improve energy efficiency using Lenovo XClarity Energy Manager.

- **Redundant networking connection**

The Lenovo XClarity Controller provides failover capability to a redundant Ethernet connection with the applicable application installed. If a problem occurs with the primary Ethernet connection, all Ethernet traffic that is associated with the primary connection is automatically switched to the optional redundant Ethernet connection. If the applicable device drivers are installed, this switching occurs without data loss and without user intervention.

- **Redundant cooling**

The redundant cooling by the fans in the server enables continued operation if one of the fans fails.

- **ThinkSystem RAID support**

The ThinkSystem RAID adapter provides hardware redundant array of independent disks (RAID) support to create configurations, supporting RAID levels 0, 1, 5, 6, 10, 50, and 60.

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## Tech Tips

Lenovo continually updates the support website with the latest tips and techniques that you can use to solve issues that your server might encounter. These Tech Tips (also called retain tips or service bulletins) provide procedures to work around issues or solve problems related to the operation of your server.

To find the Tech Tips available for your server:

1. Go to <http://datacentersupport.lenovo.com> and navigate to the support page for your server.
2. Click on **How To's** from the navigation pane.
3. Click **Article Type** → **Solution** from the drop-down menu.

Follow the on-screen instructions to choose the category for the problem that you are having.

---

## Security advisories

Lenovo is committed to developing products and services that adhere to the highest security standards in order to protect our customers and their data. When potential vulnerabilities are reported, it is the

responsibility of the Lenovo Product Security Incident Response Team (PSIRT) to investigate and provide information to our customers so they may put mitigation plans in place as we work toward providing solutions.

The list of current advisories is available at the following site:

[https://datacentersupport.lenovo.com/product\\_security/home](https://datacentersupport.lenovo.com/product_security/home)

## Specifications

Summary of the features and specifications of the server. Depending on the model, some features might not be available, or some specifications might not apply.

Refer to the below table for specifications categories and the content of each category.

Specification category	Technical specifications	Mechanical specifications	Environmental specifications
<b>Content</b>	<ul style="list-style-type: none"> <li>• Processor</li> <li>• Memory</li> <li>• M.2 Drive</li> <li>• Storage expansion</li> <li>• Expansion slots</li> <li>• Integrated functions and I/O connectors</li> <li>• Network</li> <li>• RAID adapter</li> <li>• Host bus adapter</li> <li>• System fan</li> <li>• Electrical input</li> <li>• Minimal configuration for debugging</li> <li>• Operating systems</li> </ul>	<ul style="list-style-type: none"> <li>• Dimension</li> <li>• Weight</li> </ul>	<ul style="list-style-type: none"> <li>• Acoustical noise emissions</li> <li>• Ambient temperature management</li> <li>• Environmental</li> </ul>

## Technical specifications

Summary of the technical specifications of server. Depending on the model, some features might not be available, or some specifications might not apply.

Processor
<p>Supports multi-core Intel Xeon processors, with integrated memory controller and Intel Mesh UPI (Ultra Path Interconnect) topology.</p> <ul style="list-style-type: none"> <li>• Up to four 4th Gen Intel Xeon scalable processors with minimal requirement of two installed on the system board assembly</li> <li>• Designed for LGA 4677 sockets</li> <li>• Scalable up to 60 cores</li> <li>• Supports 4 UPI links per processor supporting 12.8 GT/s, 14.4 GT/s and 16 GT/s speeds</li> </ul> <p>For a list of supported processors, see <a href="http://datacentersupport.lenovo.com">http://datacentersupport.lenovo.com</a>.</p>

## Memory

See “[Memory module installation rules and order](#)” on page 50 for detailed information about memory configuration and setup.

- 64 dual inline memory module (DIMM) slots that support up to 64 DRAM DIMMs
- Memory module type:
  - TruDDR5 4800MHz RDIMM: 16 GB (1Rx8), 32 GB (1Rx4, 2Rx8), 64 GB (2Rx4), 96 GB (2Rx4)
  - TruDDR5 4800MHz Value RDIMM: 32 GB (1Rx4), 64 GB (2Rx4)
  - TruDDR5 4800MHz 3DS RDIMM: 128 GB (4Rx4), 256 GB (8Rx4)
- Speed:

**Note:** Operating speed depends on processor model and UEFI settings.

- 4800 MT/s for 1 DIMM per channel
- 4400 MT/s for 2 DIMMs per channel
- Minimum memory: 32 GB
- Maximum memory: 16 TB

For a list of supported memory modules, see <https://serverproven.lenovo.com>.

## M.2 Drive

The server support up to two internal M.2 drives with the following capacity:

- SATA M.2 drive:
  - 128 GB
  - 240 GB
  - 480 GB
  - 960 GB
- NVMe M.2 drive:
  - 480 GB
  - 960 GB

The following form factors are supported:

- 42 mm (2242)
- 60 mm (2260)
- 80 mm (2280)
- 110 mm (22110)

For a list of supported M.2 drives, see <https://serverproven.lenovo.com>.

## Storage expansion

### The server model with 2.5-inch drives supports:

- Up to twenty-four 2.5-inch hot-swap SAS/SATA/NVMe drives
- Up to two 7mm SATA/NVMe drives

### Notes:

- When an M.2 backplane is installed and connected to the NVMe 11 connector, the maximum number of supported NVMe drives is twenty-two drives.
- NVMe drives support VROC.
- Tri-mode adapters support RAID with U.3 drives.
- When the following components are installed in the system, the maximum number of supported drives is sixteen.
  - DRAM DIMMs with capacity larger than 128 GB
  - ConnectX-7 NDR200 QSFP 2-port adapter or ConnectX-7 NDR400 QSFP 1-port adapter with Active Optical Cable

For a list of supported drives, see <https://serverproven.lenovo.com>.

## Expansion slots

- Up to twelve PCIe slots (depending on the server model):
  - Slot 3-14
- Up to two OCP slots:
  - Slot 1-2

**Note:** When a ThinkSystem Intel I350 1GbE RJ45 4-port OCP Ethernet Adapter is installed, no other OCP module can be installed.

## Graphics processing unit (GPU)

The server supports the following GPU configurations:

- Up to four single-wide, LP GPUs
- Up to two double-wide, FHFL GPUs

For a list of supported GPUs, see <https://serverproven.lenovo.com>.

### Integrated functions and I/O connectors

- Lenovo XClarity Controller (XCC), which provides service processor control and monitoring functions, video controller, and remote keyboard, video, mouse, and remote drive capabilities.
  - The server supports Lenovo XClarity Controller 2 (XCC2). For additional information about Lenovo XClarity Controller 2 (XCC2), refer to <https://pubs.lenovo.com/lxcc-overview/>.
- Front connectors:
  - One USB 3.1 Gen 1 (5 Gbps) connector
  - One USB 2.0 connector with XCC system management function
  - One VGA connector
  - One external diagnostics handset connector (optional)
  - Front I/O module
    - System ID button/LED
    - System error LED
    - Network Activity LED
    - Power button/LED
- Rear connectors:
  - Two OCP slots
  - One XCC system management port
  - Three USB 3.1 Gen 1 (5 Gbps) connectors
  - One serial port (optional)
  - One VGA connector

### Network

Two or four Ethernet connectors on each OCP module (optional)

### Rear button

NMI button



## RAID adapter

Onboard NVMe ports with software RAID support (Intel VROC NVMe RAID)

- Intel VROC Standard: requires an activation key and supports RAID levels 0, 1, and 10
- Intel VROC Premium: requires an activation key and supports RAID levels 0, 1, 5, and 10

Hardware RAID 0, 1, 10

- ThinkSystem RAID 540-16i PCIe Gen4 12Gb Adapter
- ThinkSystem RAID 540-8i PCIe Gen4 12Gb Adapter

Hardware RAID 0, 1, 10, 5

- ThinkSystem RAID 5350-8i PCIe 12Gb Adapter

Hardware RAID 0, 1, 10, 5, 50, 6, 60

- ThinkSystem RAID 940-32i 8GB Flash PCIe Gen4 12Gb Adapter
- ThinkSystem RAID 940-16i 4GB Flash PCIe Gen4 12Gb Adapter
- ThinkSystem RAID 940-16i 8GB Flash PCIe Gen4 12Gb Adapter
- ThinkSystem RAID 940-8i 4GB Flash PCIe Gen4 12Gb Adapter
- ThinkSystem RAID 940-8e 4GB Flash PCIe Gen4 12Gb Adapter

Hardware RAID 0, 1, 10, 5, 50, 6, 60, 1 Triple, 10 Triple

- ThinkSystem RAID 9350-16i 4GB Flash PCIe 12Gb Adapter
- ThinkSystem RAID 9350-8i 2GB Flash PCIe 12Gb Adapter

For more information about the RAID/HBA adapters, see [Lenovo ThinkSystem RAID Adapter and HBA Reference](#).

## Host bus adapter

- ThinkSystem 440-8i SAS/SATA PCIe Gen4 12Gb Internal HBA
- ThinkSystem 440-16i SAS/SATA PCIe Gen4 12Gb Internal HBA
- ThinkSystem 440-8e SAS/SATA PCIe Gen4 12Gb External HBA
- ThinkSystem 440-16e SAS/SATA PCIe Gen4 12Gb External HBA
- ThinkSystem 4350-8i SAS/SATA PCIe Gen3 12Gb Internal HBA
- ThinkSystem 4350-16i SAS/SATA PCIe Gen3 12Gb Internal HBA

For more information about the RAID/HBA adapters, see [Lenovo ThinkSystem RAID Adapter and HBA Reference](#).

## System fan

The server supports one of the following fan types:

- Six 60 mm x 38 mm single-rotor fans
- Six 60 mm x 56 mm dual-rotor fans

**Note:** Do not mix single-rotor and dual-rotor fans in the same unit of server.

## Electrical input

The server supports up to two power supplies with N+N redundancy with oversubscription. Following is the list of supported types:

- CFFv4
  - 1100-watt Platinum, input power 115 Vac / 230 Vdc / 240 Vdc
  - 1100-watt Titanium, input power 115 Vac / 230 Vdc / 240 Vdc
  - 1800-watt Platinum, input power 230 Vac / 240 Vdc
  - 1800-watt Titanium, input power 230 Vac / 240 Vdc
  - 2400-watt Platinum, input power 230 Vac / 240 Vdc
  - 2600-watt Titanium, input power 230 Vac / 240 Vdc
- CRPS (Chinese Mainland Only)
  - 1300-watt Platinum, input power 115 Vac / 230 Vac / 240 Vdc
  - 2700-watt Platinum, input power 230 Vac / 240 Vdc
  - 1600-watt, input power 336 Vdc
  - 1600-watt, input power -48 Vdc

**Important:** Power supplies and redundant power supplies in the server must be with the same power rating, wattage or level.

### CAUTION:

- **240 Vdc input (input range: 180-300 V dc) is supported in Chinese Mainland ONLY.**
- **Power supply with 240 Vdc input cannot support hot-plugging power cord function. Before removing the power supply with dc input, please turn off server or disconnect dc power sources at the breaker panel or by turning off the power source. Then, remove the power cord.**

**Note:** The actual power efficiency depends on system configuration.

## Minimal configuration for debugging

- Two processors in socket 1 and 2
- Two DRAM memory modules in slots 10 and 26
- Two power supply units
- Six system fans
- One 2.5-inch drive, one M.2 drive, or one 7mm drive (if OS is needed for debugging)

## Operating systems

Supported and certified operating systems:

- Microsoft Windows Server
- VMware ESXi
- Red Hat Enterprise Linux
- SUSE Linux Enterprise Server

References:

- Complete list of available operating systems: <https://lenovopress.lenovo.com/osig>.
- OS deployment instructions, see “Deploy the operating system” on page 371.

## Mechanical specifications

Summary of the mechanical specifications of server. Depending on the model, some features might not be available, or some specifications might not apply.

Dimension
2 U server
<ul style="list-style-type: none"><li>• Height: 86.5 mm (3.41 inches)</li><li>• Width:<ul style="list-style-type: none"><li>– With rack handles: 482 mm (18.98 inches)</li><li>– Without rack handles: 434.4 mm (17.10 inches)</li></ul></li><li>• Depth: 865 mm (34.06 inches)</li></ul>
Weight
Up to 40 kg (88.18 lb), depending on the server configuration

## Environmental specifications

Summary of the environmental specifications of server. Depending on the model, some features might not be available, or some specifications might not apply.

## Acoustical noise emissions

The server has the following acoustic noise emissions declaration:

- Sound power level ( $L_{WAd}$ )
  - Idling:
    - Typical: 6.8 Bel
    - Storage rich: 6.8 Bel
    - GPU: 7.8 Bel
  - Operating:
    - Typical: 8.0 Bel
    - Storage rich: 8.0 Bel
    - GPU: 9.0 Bel
- Sound pressure level ( $L_{pAm}$ ):
  - Idling:
    - Typical: 52.3 dBA
    - Storage rich: 52.3 dBA
    - GPU: 61.9 dBA
  - Operating:
    - Typical: 64.9 dBA
    - Storage: 64.9 dBA
    - GPU: 72.1 dBA

### Notes:

- These sound levels were measured in controlled acoustical environments according to procedures specified by ISO7779 and are reported in accordance with ISO 9296.
- The declared acoustic sound levels are based on the specified configurations, which may change depending on configuration/conditions.
  - Typical configuration: four processors with TDP 205W, thirty-two 64GB RDIMMs, eight SAS hard disk drives, RAID 940-8i, Intel X710-T2L 10GBASE-T 2-port OCP, two 1100-watt power supply units.
  - GPU configuration: four processors with TDP 165W, two NVIDIA A100 GPUs, thirty-two 64GB RDIMMs, twenty-four SAS hard disk drives, RAID 940-16i, Intel X710-T2L 10GBASE-T 2-port OCP, two 1800-watt power supply units.
  - Storage rich configuration: four processors with TDP 205W, thirty-two 64GB RDIMMs, twenty-four SAS hard disk drives, RAID 940-8i, Intel X710-T2L 10GBASE-T 2-port OCP, two 2600-watt power supply units.
- 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. 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 employee's location in relation to the equipment. Further, compliance with such government regulations depends on a variety of additional factors, including the duration of employees' exposure and whether employees wear hearing protection. Lenovo recommends that you consult with qualified experts in this field to determine whether you are in compliance with the applicable regulations.

## Ambient temperature management

Adjust ambient temperature when specific components are installed:

- Keep ambient temperature to 45°C or lower when one or more of the following components are installed.
  - Processor with TDP less than or equal to 165W
  - Memory module with 64 GB or lower capacity
- Keep ambient temperature to 35°C or lower when one or more of the following components are installed.
  - Processors with TDP greater than 165W and less than or equal to 250W
  - ConnectX-7 NDR200 QSFP 2-port adapter without Active Optical Cable
  - ConnectX-7 NDR400 QSFP 1-port adapter without Active Optical Cable
- Keep ambient temperature to 30°C or lower when one or more of the following components are installed.
  - Processors with TDP greater than 250W
  - Single-wide GPU adapter and processor with TDP 270W<sup>1</sup>
  - Memory module with capacity 96 GB or 128 GB<sup>2</sup>
  - ConnectX-6 Dx 100GbE QSFP56 2-port adapter with Active Optical Cable<sup>2</sup>
  - ConnectX-6 HDR/200GbE QSFP56 2-port adapter with Active Optical Cable<sup>2</sup>
  - ConnectX-7 NDR200 QSFP 2-port adapter with Active Optical Cable<sup>2</sup>
  - ConnectX-7 NDR400 QSFP 1-port adapter with Active Optical Cable<sup>2</sup>
- Keep ambient temperature to 28°C or lower when single-wide GPU adapter and processor with TDP 165W are installed.<sup>3</sup>
- Keep ambient temperature to 25°C or lower when one or more of the following components are installed.
  - Double-wide GPU adapter and processor with TDP 165W<sup>3</sup>
  - Memory module with capacity 256 GB<sup>1</sup>

### Note:

<sup>1</sup> The maximum number of supported 2.5-inch drives is eight.

<sup>2</sup> The maximum number of supported 2.5-inch drives is sixteen.

<sup>3</sup> The maximum number of supported 2.5-inch drives is four.

## Environment

ThinkSystem SR850 V3 complies with ASHRAE Class A2 specifications with most configurations, and depending on the hardware configuration, also complies with ASHRAE Class A3, and Class A4 specifications. System performance may be impacted when operating temperature is outside ASHRAE A2 specification.

Depending on the hardware configuration, ThinkSystem SR850 V3 server also complies with ASHRAE Class H1 specification. System performance may be impacted when operating temperature is outside ASHRAE H1 specification.

- Air temperature:
  - Operating
    - ASHRAE Class H1: 5°C to 25°C (41°F to 77°F); the maximum ambient temperature decreases by 1°C for every 500 m (1640 ft) increase in altitude above 900 m (2,953 ft).
    - ASHRAE Class A2: 10°C to 35°C (50°F to 95°F); the maximum ambient temperature decreases by 1°C for every 300 m (984 ft) increase in altitude above 900 m (2,953 ft).
    - ASHRAE Class A3: 5°C to 40°C (41°F to 104°F); the maximum ambient temperature decreases by 1°C for every 175 m (574 ft) increase in altitude above 900 m (2,953 ft).
    - ASHRAE Class A4: 5°C to 45°C (41°F to 113°F); the maximum ambient temperature decreases by 1°C for every 125 m (410 ft) increase in altitude above 900 m (2,953 ft).
  - Server off: 5°C to 45°C (41°F to 113°F)
  - Shipment/storage: -40°C to 60°C (-40°F to 140°F)
- Maximum altitude: 3,050 m (10,000 ft)
- Relative Humidity (non-condensing):
  - Operating
    - ASHRAE Class H1: 8% to 80%; maximum dew point: 17°C (62.6°F)
    - ASHRAE Class A2: 8% to 80%; maximum dew point: 21°C (70°F)
    - ASHRAE Class A3: 8% to 85%; maximum dew point: 24°C (75°F)
    - ASHRAE Class A4: 8% to 90%; maximum dew point: 24°C (75°F)
  - Shipment/storage: 8% to 90%
- Particulate contamination

**Attention:** Airborne particulates and reactive gases acting alone or in combination with other environmental factors such as humidity or temperature might pose a risk to the server. For information about the limits for particulates and gases, see [“Particulate contamination” on page 12](#).

**Note:** The server is designed for standard data center environment and recommended to be placed in industrial data center.

## 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 1. Limits for particulates and gases

Contaminant	Limits
Reactive gases	<p>Severity level G1 as per ANSI/ISA 71.04-1985<sup>1</sup>:</p> <ul style="list-style-type: none"> <li>• The copper reactivity level shall be less than 200 Angstroms per month (<math>\text{\AA}/\text{month} \approx 0.0035 \mu\text{g}/\text{cm}^2\text{-hour}</math> weight gain).<sup>2</sup></li> <li>• The silver reactivity level shall be less than 200 Angstroms per month (<math>\text{\AA}/\text{month} \approx 0.0035 \mu\text{g}/\text{cm}^2\text{-hour}</math> weight gain).<sup>3</sup></li> <li>• The reactive monitoring of gaseous corrosivity must be conducted approximately 5 cm (2 in.) in front of the rack on the air inlet side at one-quarter and three-quarter frame height off the floor or where the air velocity is much higher.</li> </ul>
Airborne particulates	<p>Data centers must meet the cleanliness level of ISO 14644-1 class 8.</p> <p>For data centers without airside economizer, the ISO 14644-1 class 8 cleanliness might be met by choosing one of the following filtration methods:</p> <ul style="list-style-type: none"> <li>• The room air might be continuously filtered with MERV 8 filters.</li> <li>• Air entering a data center might be filtered with MERV 11 or preferably MERV 13 filters.</li> </ul> <p>For data centers with airside economizers, the choice of filters to achieve ISO class 8 cleanliness depends on the specific conditions present at that data center.</p> <ul style="list-style-type: none"> <li>• The deliquescent relative humidity of the particulate contamination should be more than 60% RH.<sup>4</sup></li> <li>• Data centers must be free of zinc whiskers.<sup>5</sup></li> </ul>
<p><sup>1</sup> ANSI/ISA-71.04-1985. <i>Environmental conditions for process measurement and control systems: Airborne contaminants</i>. Instrument Society of America, Research Triangle Park, North Carolina, U.S.A.</p> <p><sup>2</sup> The derivation of the equivalence between the rate of copper corrosion growth in the thickness of the corrosion product in <math>\text{\AA}/\text{month}</math> and the rate of weight gain assumes that <math>\text{Cu}_2\text{S}</math> and <math>\text{Cu}_2\text{O}</math> grow in equal proportions.</p> <p><sup>3</sup> The derivation of the equivalence between the rate of silver corrosion growth in the thickness of the corrosion product in <math>\text{\AA}/\text{month}</math> and the rate of weight gain assumes that <math>\text{Ag}_2\text{S}</math> is the only corrosion product.</p> <p><sup>4</sup> 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.</p> <p><sup>5</sup> Surface debris is randomly collected from 10 areas of the data center on a 1.5 cm diameter disk of sticky electrically conductive tape on a metal stub. If examination of the sticky tape in a scanning electron microscope reveals no zinc whiskers, the data center is considered free of zinc whiskers.</p>	

## Management options

The XClarity portfolio and other system management options described in this section are available to help you manage the servers more conveniently and efficiently.

## Overview

Options	Description
Lenovo XClarity Controller	<p>Baseboard management controller (BMC)</p> <p>Consolidates the service processor functionality, Super I/O, video controller, and remote presence capabilities into a single chip on the server system board (system board assembly).</p> <p><b>Interface</b></p> <ul style="list-style-type: none"> <li>• CLI application</li> <li>• Web GUI interface</li> <li>• Mobile application</li> <li>• Redfish API</li> </ul> <p><b>Usage and downloads</b></p> <p><a href="https://pubs.lenovo.com/lxcc-overview/">https://pubs.lenovo.com/lxcc-overview/</a></p>
Lenovo XCC Logger Utility	<p>Application that reports the XCC events to local OS system log.</p> <p><b>Interface</b></p> <ul style="list-style-type: none"> <li>• CLI application</li> </ul> <p><b>Usage and downloads</b></p> <ul style="list-style-type: none"> <li>• <a href="https://pubs.lenovo.com/lxcc-logger-linux/">https://pubs.lenovo.com/lxcc-logger-linux/</a></li> <li>• <a href="https://pubs.lenovo.com/lxcc-logger-windows/">https://pubs.lenovo.com/lxcc-logger-windows/</a></li> </ul>
Lenovo XClarity Administrator	<p>Centralized interface for multi-server management.</p> <p><b>Interface</b></p> <ul style="list-style-type: none"> <li>• Web GUI interface</li> <li>• Mobile application</li> <li>• REST API</li> </ul> <p><b>Usage and downloads</b></p> <p><a href="https://pubs.lenovo.com/lxca/">https://pubs.lenovo.com/lxca/</a></p>
Lenovo XClarity Essentials toolset	<p>Portable and light toolset for server configuration, data collection, and firmware updates. Suitable both for single-server or multi-server management contexts.</p> <p><b>Interface</b></p> <ul style="list-style-type: none"> <li>• <b>OneCLI:</b> CLI application</li> <li>• <b>Bootable Media Creator:</b> CLI application, GUI application</li> <li>• <b>UpdateXpress:</b> GUI application</li> </ul> <p><b>Usage and downloads</b></p> <p><a href="https://pubs.lenovo.com/lxce-overview/">https://pubs.lenovo.com/lxce-overview/</a></p>



Options	Description
Lenovo XClarity Provisioning Manager	<p>UEFI-based embedded GUI tool on a single server that can simplify management tasks.</p> <p><b>Interface</b></p> <ul style="list-style-type: none"> <li>• Web interface (BMC remote access)</li> <li>• GUI application</li> </ul> <p><b>Usage and downloads</b></p> <p><a href="https://pubs.lenovo.com/lxpm-overview/">https://pubs.lenovo.com/lxpm-overview/</a></p> <p><b>Important:</b> Lenovo XClarity Provisioning Manager (LXPM) supported version varies by product. All versions of Lenovo XClarity Provisioning Manager are referred to as Lenovo XClarity Provisioning Manager and LXPM in this document, unless specified otherwise. To see the LXPM version supported by your server, go to <a href="https://pubs.lenovo.com/lxpm-overview/">https://pubs.lenovo.com/lxpm-overview/</a>.</p>
Lenovo XClarity Integrator	<p>Series of applications that integrate the management and monitoring functionalities of the Lenovo physical servers with the software used in a certain deployment infrastructure, such as VMware vCenter, Microsoft Admin Center, or Microsoft System Center while delivering additional workload resiliency.</p> <p><b>Interface</b></p> <ul style="list-style-type: none"> <li>• GUI application</li> </ul> <p><b>Usage and downloads</b></p> <p><a href="https://pubs.lenovo.com/lxci-overview/">https://pubs.lenovo.com/lxci-overview/</a></p>
Lenovo XClarity Energy Manager	<p>Application that can manage and monitor server power and temperature.</p> <p><b>Interface</b></p> <ul style="list-style-type: none"> <li>• Web GUI Interface</li> </ul> <p><b>Usage and downloads</b></p> <p><a href="https://datacentersupport.lenovo.com/solutions/Invo-lxem">https://datacentersupport.lenovo.com/solutions/Invo-lxem</a></p>
Lenovo Capacity Planner	<p>Application that supports power consumption planning for a server or rack.</p> <p><b>Interface</b></p> <ul style="list-style-type: none"> <li>• Web GUI Interface</li> </ul> <p><b>Usage and downloads</b></p> <p><a href="https://datacentersupport.lenovo.com/solutions/Invo-lcp">https://datacentersupport.lenovo.com/solutions/Invo-lcp</a></p>

## Functions

Options		Functions							
		Multi-system mgmt	OS deployment	System configuration	Firmware updates <sup>1</sup>	Event/alert monitoring	Inventory/logs	Power mgmt	Power planning
Lenovo XClarity Controller				√	√ <sup>2</sup>	√	√ <sup>4</sup>		
Lenovo XCC Logger Utility						√			
Lenovo XClarity Administrator		√	√	√	√ <sup>2</sup>	√	√ <sup>4</sup>		
Lenovo XClarity Essentials toolset	OneCLI	√		√	√ <sup>2</sup>	√	√		
	Bootable Media Creator			√	√ <sup>2</sup>		√ <sup>4</sup>		
	UpdateXpress			√	√ <sup>2</sup>				
Lenovo XClarity Provisioning Manager			√	√	√ <sup>3</sup>		√ <sup>5</sup>		
Lenovo XClarity Integrator		√	√ <sup>6</sup>	√	√	√	√	√ <sup>7</sup>	
Lenovo XClarity Energy Manager		√				√		√	
Lenovo Capacity Planner									√ <sup>8</sup>

### Notes:

1. Most options can be updated through the Lenovo tools. Some options, such as GPU firmware or Omni-Path firmware require the use of supplier tools.
2. The server UEFI settings for option ROM must be set to **Auto** or **UEFI** to update firmware using Lenovo XClarity Administrator, Lenovo XClarity Essentials, or Lenovo XClarity Controller.
3. Firmware updates are limited to Lenovo XClarity Provisioning Manager, Lenovo XClarity Controller, and UEFI updates only. Firmware updates for optional devices, such as adapters, are not supported.
4. The server UEFI settings for option ROM must be set to **Auto** or **UEFI** for detailed adapter card information, such as model name and firmware levels, to be displayed in Lenovo XClarity Administrator, Lenovo XClarity Controller, or Lenovo XClarity Essentials.
5. Limited inventory.
6. The Lenovo XClarity Integrator deployment check for System Center Configuration Manager (SCCM) supports Windows operating system deployment.
7. Power management function is supported only by Lenovo XClarity Integrator for VMware vCenter.
8. It is highly recommended that you check the power summary data for your server using Lenovo Capacity Planner before purchasing any new parts.

## Chapter 2. Server components

This section contains information about each of the components associated with the server.

### Front view

This section contains information about the controls, LEDs, and connectors on the front of the server.

### Front view of the sever model with 2.5-inch drives

This section contains information on the front view of the sever model with 2.5-inch drives.

#### Front view of the sever model with 2.5-inch drives

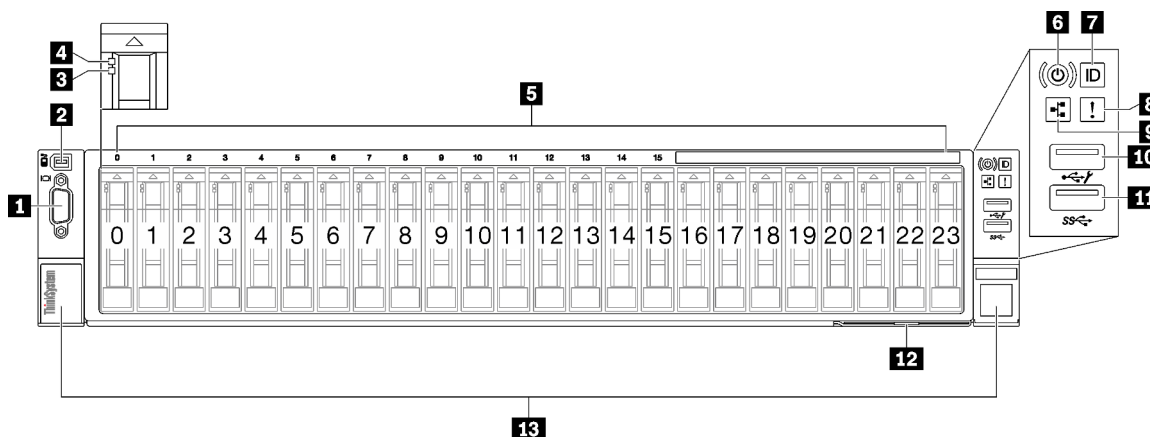


Figure 2. Front view of the sever model with 2.5-inch drives

Table 2. Components on the front view of the sever model with 2.5-inch drives

<b>1</b> VGA connector	<b>8</b> System error LED (yellow)
<b>2</b> External diagnostics handset connector	<b>9</b> Network activity LED (green)
<b>3</b> Drive status LED (yellow)	<b>10</b> USB 2.0 connector with Lenovo XClarity Controller management
<b>4</b> Drive activity LED (green)	<b>11</b> USB 3.1 Gen 1 (5 Gbps) connector
<b>5</b> 2.5-inch drive bays	<b>12</b> Pull-out information tab
<b>6</b> Power button/LED (green)	<b>13</b> Rack release latches
<b>7</b> System ID button/LED (blue)	

#### **1** VGA connector

Connect a monitor to this connector.

#### **2** External diagnostics handset connector

Connect the external diagnostics handset to this connector. See [“External diagnostics handset”](#) on page 386 for more details.

### **3 Drive status LED (yellow)**

The drive status LED indicates the following status:

- The LED is lit: the drive has failed.
- The LED is flashing slowly (once per second): the drive is being rebuilt.
- The LED is flashing rapidly (three times per second): the drive is being identified.

### **4 Drive activity LED (green)**

Each hot-swap drive comes with an activity LED. When this LED is flashing, it indicates that the drive is in use.

### **5 2.5-inch drive bays**

Install 2.5-inch drives to these bays. See [“Install a 2.5-inch hot-swap drive” on page 77](#) .

### **6 Power button/LED (green)**

Press this button to turn the server on and off manually. The states of the power LED are as follows:

Status	Color	Description
Off	None	Power is not present, or the power supply has failed.
Fast blinking (about four flashes per second)	Green	<ul style="list-style-type: none"><li>• The server is off, but the XClarity Controller is initializing, and the server is not ready to be powered on.</li><li>• System-board-assembly power has failed.</li></ul>
Slow blinking (about one flash per second)	Green	The server is off and is ready to be powered on (standby state).
Solid on	Green	The server is on and running.

### **7 System ID button/LED (blue)**

Use this system ID button and the blue system ID LED to visually locate the server. Each time you press the system ID button, the state of the system ID LED changes. The LED can be changed to on, blinking, or off. You can also use the Lenovo XClarity Controller or a remote management program to change the state of the system ID LED to assist in visually locating the server among other servers.

### **8 System error LED (yellow)**

The system error LED helps you to determine if there are any system errors.

Status	Color	Description	Action
On	Yellow	<p>An error has been detected on the server. Causes might include one or more of the following errors:</p> <ul style="list-style-type: none"> <li>• The temperature of the server reached the non-critical temperature threshold.</li> <li>• The voltage of the server reached the non-critical voltage threshold.</li> <li>• A fan has been detected to be running at low speed.</li> <li>• The power supply has a critical error.</li> <li>• The power supply is not connected to the power.</li> </ul>	Check the Event log to determine the exact cause of the error.
Off	None	The server is off or the server is on and is working correctly.	None.

### 9 Network Activity LED (green)

The network activity LED helps you identify the network connectivity and activity.

Status	Color	Description
On	Green	The server is connected to a network.
Blinking	Green	The network is connected and active.
Off	None	The server is disconnected from the network.

### 10 USB 2.0 connector with Lenovo XClarity Controller management

Connect a USB 2.0 device, such as a mouse, keyboard, or other devices, to this connector.

**Note:** This is the only USB port that supports USB automation update of the firmware and RoT security module.

Connection to Lenovo XClarity Controller is primarily intended for users with a mobile device running the Lenovo XClarity Controller mobile application. When a mobile device is connected to this USB port, an Ethernet over USB connection is established between the mobile application running on the device and the Lenovo XClarity Controller.

Select **Network** in **BMC Configuration** to view or modify settings.

Four types of settings are available:

- **Host only mode**

In this mode, the USB port is always solely connected to the server.

- **BMC only mode**

In this mode, the USB port is always solely connected to Lenovo XClarity Controller.

- **Shared mode: owned by BMC**

In this mode, connection to the USB port is shared by the server and Lenovo XClarity Controller, while the port is switched to Lenovo XClarity Controller.

- **Shared mode: owned by host**

In this mode, connection to the USB port is shared by the server and Lenovo XClarity Controller, while the port is switched to the server.

### 11 USB 3.1 Gen 1 (5 Gbps) connector

The USB 3.1 Gen 1 (5 Gbps) connector can be used to attach a USB-compatible device, such as a USB keyboard, USB mouse, or USB storage device.

### 12 Pull-out information tab

This tab contains network information such as MAC address and XCC network access label.

### 13 Rack release latches

Press on the latch on both sides to disengage the server from the rack and slide it out.

## Rear view

The rear of the server provides access to several components, including the power supplies, PCIe risers, and Ethernet port.

The ThinkSystem SR850 V3 rear view varies by model. Refer to the rear view specific to each model to identify the components.

- [“Rear view of the sever model with three PCIe risers” on page 20](#)
- [“Rear view of the sever model with four PCIe risers” on page 23](#)

## Rear view of the sever model with three PCIe risers

This section contains information on the rear view of the sever model with three PCIe risers.

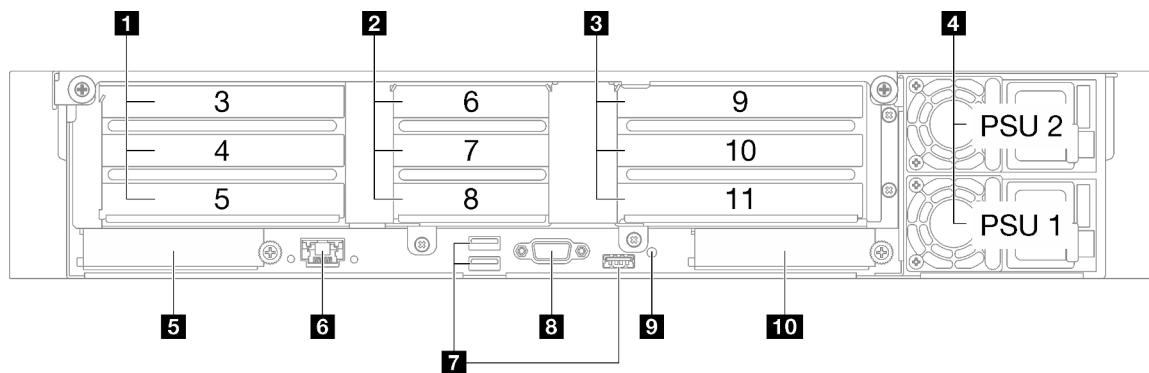


Figure 3. Rear view of the sever model with three PCIe risers

Table 3. Components on the rear view of the sever model with three PCIe risers

1 PCIe riser 1 (PCIe slot 3-5)	6 XCC system management port (1 GB RJ-45)
2 PCIe riser 2 (PCIe slot 6-8)	7 USB 3.1 Gen 1 (5 Gbps) connectors (total of three connectors)
3 PCIe riser 3 (PCIe slot 9-11)	8 VGA connector
4 Power supply units	9 NMI button
5 OCP slot 1 (PCIe slot 1)	10 OCP slot 2 (PCIe slot 2)

### 1 PCIe riser 1 (PCIe slot 3-5)

Install PCIe adapters into these slots. See the following table for PCIe slots corresponding to the PCIe risers.

PCIe slot	x8/x16/x16 PCIe G4 Riser 1/3 FHFL	7mm/x16 PCIe G4 Riser 1 FHHL	x16/x16 PCIe G5 Riser 1/3 FHFL	7mm/x16 PCIe G5 Riser 1 FHHL
3	x16 (Gen4 x8)	7mm drive cage	N/A	7mm drive cage
4	x16 (Gen4 x16) *		x16 (Gen5 x16) *	
5	x16 (Gen4 x16)	x16 (Gen4 x16)	x16 (Gen5 x16)	x16 (Gen5 x16)

**Note:** \* Slot 4 supports a double-wide, FHFL GPU installed in slot 3 and 4.

### 2 PCIe riser 2 (PCIe slot 6-8)

Install PCIe adapters into these slots. See the following table for PCIe slots corresponding to the PCIe risers.

PCIe slot	x16/x8/x8 PCIe G4 Riser 2/A/B/C HHHH	x16/x8/Serial PCIe G4 Riser 2/C HHHH	x16/x8/x8 PCIe G5 Riser 2/A/B/C HHHH	x16/x8/Serial PCIe G5 Riser 2/C HHHH
6	x16 (Gen4 x16)	x16 (Gen4 x16)	x16 (Gen5 x16)	x16 (Gen5 x16)
7	x16 (Gen4 x8)	x16 (Gen4 x8)	x16 (Gen5 x8)	x16 (Gen5 x8)
8	x16 (Gen4 x8)	Serial port bay	x16 (Gen4 x8)	Serial port bay

### 3 PCIe riser 3 (PCIe slot 9-11)

Install PCIe adapters into these slots. See the following table for PCIe slots corresponding to the PCIe risers.

PCIe slot	x8/x16/x16 PCIe G4 Riser 1/3 FHFL	x16/x16 PCIe G5 Riser 1/3 FHFL
9	x16 (Gen4 x8)	N/A
10	x16 (Gen4 x16) *	x16 (Gen5 x16) *
11	x16 (Gen4 x16)	x16 (Gen5 x16)

**Note:** \* Slot 10 supports a double-wide, FHFL GPU installed in slot 9 and 10.

### 4 Power supply units

Install power supply units to these bays, connect them to power cords. Make sure the power cords are connected properly. Following are the power supplies supported by this system:

- CFFv4
  - 1100-watt Platinum, input power 115 Vac / 230 Vdc / 240 Vdc
  - 1100-watt Titanium, input power 115 Vac / 230 Vdc / 240 Vdc
  - 1800-watt Platinum, input power 230 Vac / 240 Vdc
  - 1800-watt Titanium, input power 230 Vac / 240 Vdc
  - 2400-watt Platinum, input power 230 Vac / 240 Vdc
  - 2600-watt Titanium, input power 230 Vac / 240 Vdc
- CRPS (Chinese Mainland Only)
  - 1300-watt Platinum, input power 115 Vac / 230 Vac / 240 Vdc
  - 2700-watt Platinum, input power 230 Vac / 240 Vdc

- 1600-watt, input power 336 Vdc
- 1600-watt, input power -48 Vdc

### 5 OCP slot 1

The OCP slot supports the following:

- The system may support a 2-port or a 4-port OCP module for network connections. Port numbering are shown in the illustrations below.

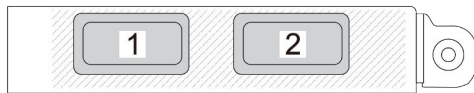


Figure 4. Port numbering — 2-port OCP module

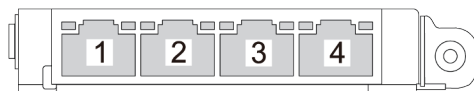


Figure 5. Port numbering — 4-port OCP 3.0 module

- The system may support a management NIC adapter. Install the management NIC adapter into the OCP slot in place of the OCP module to function as a redundant XCC system management port.

### 6 XCC system management port (1 GB RJ-45)

The server has a 1 GB RJ-45 connector dedicated to Lenovo XClarity Controller (XCC) functions. Through the system management port, you can access the Lenovo XClarity Controller directly by connecting your laptop to the management port using an Ethernet cable. Make sure that you modify the IP settings on the laptop so that it is on the same network as the server default settings. A dedicated management network provides additional security by physically separating the management network traffic from the production network.

See the following for more information:

- [“Set the network connection for the Lenovo XClarity Controller” on page 363](#)
- [“XCC system management port LEDs” on page 385](#)

### 7 USB 3.1 Gen 1 (5 Gbps) connectors

The USB 3.1 Gen 1 (5 Gbps) connectors are direct connect interfaces (DCIs) for debugging, which can be used to attach a USB-compatible device, such as a USB keyboard, USB mouse, or USB storage device.

### 8 VGA connector

Connect a monitor to this connector.

### 9 NMI button

Press this button to force a nonmaskable interrupt to the processor. You might have to use a pen or the end of a straightened paper clip to press the button. You can also use it to force a blue-screen memory dump. Use this button only when you are directed to do so by Lenovo Support.



## 10 OCP slot 2

The system may support a 2-port or a 4-port OCP module for network connections. Port numbering are shown in the illustrations below.

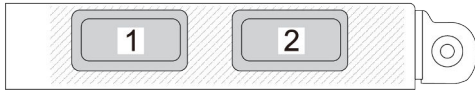


Figure 6. Port numbering — 2-port OCP module

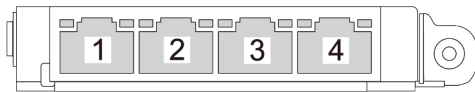


Figure 7. Port numbering — 4-port OCP 3.0 module

## Rear view of the sever model with four PCIe risers

This section contains information on the rear view of the sever model with four PCIe risers.

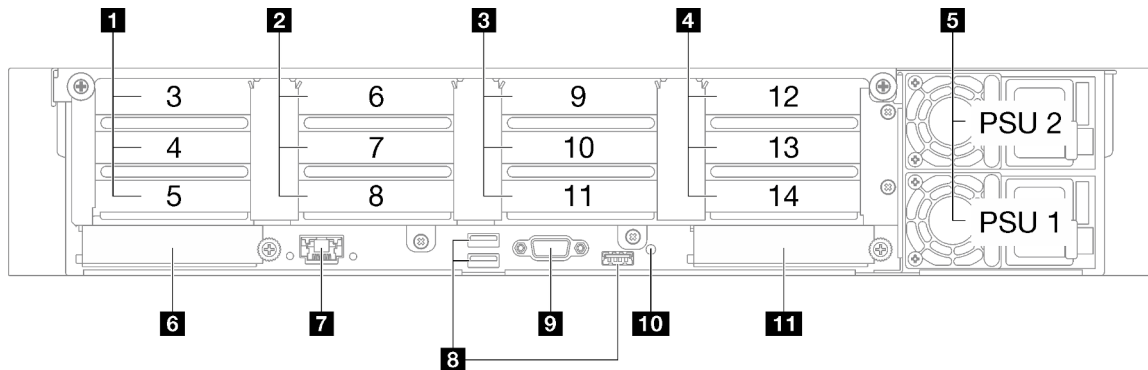


Figure 8. Rear view of the sever model with four PCIe risers

Table 4. Components on the rear view of the sever model with four PCIe risers

<b>1</b> PCIe riser A (PCIe slot 3-5)	<b>7</b> XCC system management port (1 GB RJ-45)
<b>2</b> PCIe riser B (PCIe slot 6-8)	<b>8</b> USB 3.1 Gen 1 (5 Gbps) connectors (total of three connectors)
<b>3</b> PCIe riser C (PCIe slot 9-11)	<b>9</b> VGA connector
<b>4</b> PCIe riser D (PCIe slot 12-14)	<b>10</b> NMI button
<b>5</b> Power supply units	<b>11</b> OCP slot 2
<b>6</b> OCP slot 1	

### 1 PCIe riser A (PCIe slot 3-5)

Install PCIe adapters into these slots. See the following table for PCIe slots corresponding to the PCIe risers.

PCIe slot	x16/x8/x8 PCIe G4 Riser 2/A/B/C HHHH	x16/x8/x8 PCIe G5 Riser 2/A/B/C HHHH
3	x16 (Gen4 x16)	x16 (Gen5 x16)
4	x16 (Gen4 x8)	x16 (Gen5 x8)
5	x16 (Gen4 x8)	x16 (Gen4 x8)

#### 2 PCIe riser B (PCIe slot 6-8)

Install PCIe adapters into these slots. See the following table for PCIe slots corresponding to the PCIe risers.

PCIe slot	x16/x8/x8 PCIe G4 Riser 2/A/B/C HHHH	x16/x8/x8 PCIe G5 Riser 2/A/B/C HHHH
6	x16 (Gen4 x16)	x16 (Gen5 x16)
7	x16 (Gen4 x8)	x16 (Gen5 x8)
8	x16 (Gen4 x8)	x16 (Gen4 x8)

#### 3 PCIe riser C (PCIe slot 9-11)

Install PCIe adapters into these slots. See the following table for PCIe slots corresponding to the PCIe risers.

PCIe slot	x16/x8/x8 PCIe G4 Riser 2/A/B/C HHHH	x16/x8/Serial PCIe G4 Riser 2/C HHHH	x16/x8/x8 PCIe G5 Riser 2/A/B/C HHHH	x16/x8/Serial PCIe G5 Riser 2/C HHHH
9	x16 (Gen4 x16)	x16 (Gen4 x16)	x16 (Gen5 x16)	x16 (Gen5 x16)
10	x16 (Gen4 x8)	x16 (Gen4 x8)	x16 (Gen5 x8)	x16 (Gen5 x8)
11	x16 (Gen4 x8)	Serial port bay	x16 (Gen4 x8)	Serial port bay

#### 4 PCIe riser D (PCIe slot 12-14)

Install PCIe adapters into these slots. See the following table for PCIe slots corresponding to the PCIe risers.

PCIe slot	x8/x16/x16 PCIe G4 Riser D HHHH	x8/x16/x16 PCIe G5 Riser D HHHH
12	x16 (Gen4 x8)	x16 (Gen5 x8)
13	x16 (Gen4 x16)	x16 (Gen5 x16)
14	x16 (Gen4 x16)	x16 (Gen4 x16)

#### 5 Power supply units

Install power supply units to these bays, connect them to power cords. Make sure the power cords are connected properly. Following are the power supplies supported by this system:

- CFFv4
  - 1100-watt Platinum, input power 115 Vac / 230 Vdc / 240 Vdc
  - 1100-watt Titanium, input power 115 Vac / 230 Vdc / 240 Vdc
  - 1800-watt Platinum, input power 230 Vac / 240 Vdc
  - 1800-watt Titanium, input power 230 Vac / 240 Vdc
  - 2400-watt Platinum, input power 230 Vac / 240 Vdc
  - 2600-watt Titanium, input power 230 Vac / 240 Vdc
- CRPS (Chinese Mainland Only)

- 1300-watt Platinum, input power 115 Vac / 230 Vac / 240 Vdc
- 2700-watt Platinum, input power 230 Vac / 240 Vdc
- 1600-watt, input power 336 Vdc
- 1600-watt, input power -48 Vdc

## 6 OCP slot 1

The OCP slot supports the following:

- The system may support a 2-port or a 4-port OCP module for network connections. Port numbering are shown in the illustrations below.

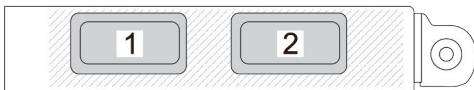


Figure 9. Port numbering — 2-port OCP module

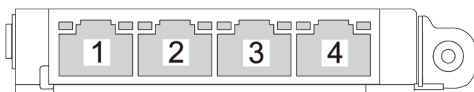


Figure 10. Port numbering — 4-port OCP 3.0 module

- The system may support a management NIC adapter. Install the management NIC adapter into the OCP slot in place of the OCP module to function as a redundant XCC system management port.

## 7 XCC system management port (1 GB RJ-45)

The server has a 1 GB RJ-45 connector dedicated to Lenovo XClarity Controller (XCC) functions. Through the system management port, you can access the Lenovo XClarity Controller directly by connecting your laptop to the management port using an Ethernet cable. Make sure that you modify the IP settings on the laptop so that it is on the same network as the server default settings. A dedicated management network provides additional security by physically separating the management network traffic from the production network.

See the following for more information:

- [“Set the network connection for the Lenovo XClarity Controller” on page 363](#)
- [“XCC system management port LEDs” on page 385](#)

## 8 USB 3.1 Gen 1 (5 Gbps) connectors

The USB 3.1 Gen 1 (5 Gbps) connectors are direct connect interfaces (DCIs) for debugging, which can be used to attach a USB-compatible device, such as a USB keyboard, USB mouse, or USB storage device.

## 9 VGA connector

Connect a monitor to this connector.

## 10 NMI button

Press this button to force a nonmaskable interrupt to the processor. You might have to use a pen or the end of a straightened paper clip to press the button. You can also use it to force a blue-screen memory dump. Use this button only when you are directed to do so by Lenovo Support.

## 11 OCP slot 2

The system may support a 2-port or a 4-port OCP module for network connections. Port numbering are shown in the illustrations below.



Figure 11. Port numbering – 2-port OCP module

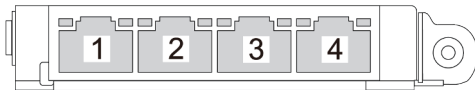


Figure 12. Port numbering – 4-port OCP 3.0 module

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## Top view

This section contains information on the top view of the server.

The ThinkSystem SR850 V3 top view varies by model. Refer to the top view specific to each model to identify the components.

- [“Top view of the sever model with three PCIe risers” on page 26](#)
- [“Top view of the sever model with four PCIe risers” on page 27](#)

### Top view of the sever model with three PCIe risers

This section contains information on the top view of the server model with three PCIe risers.

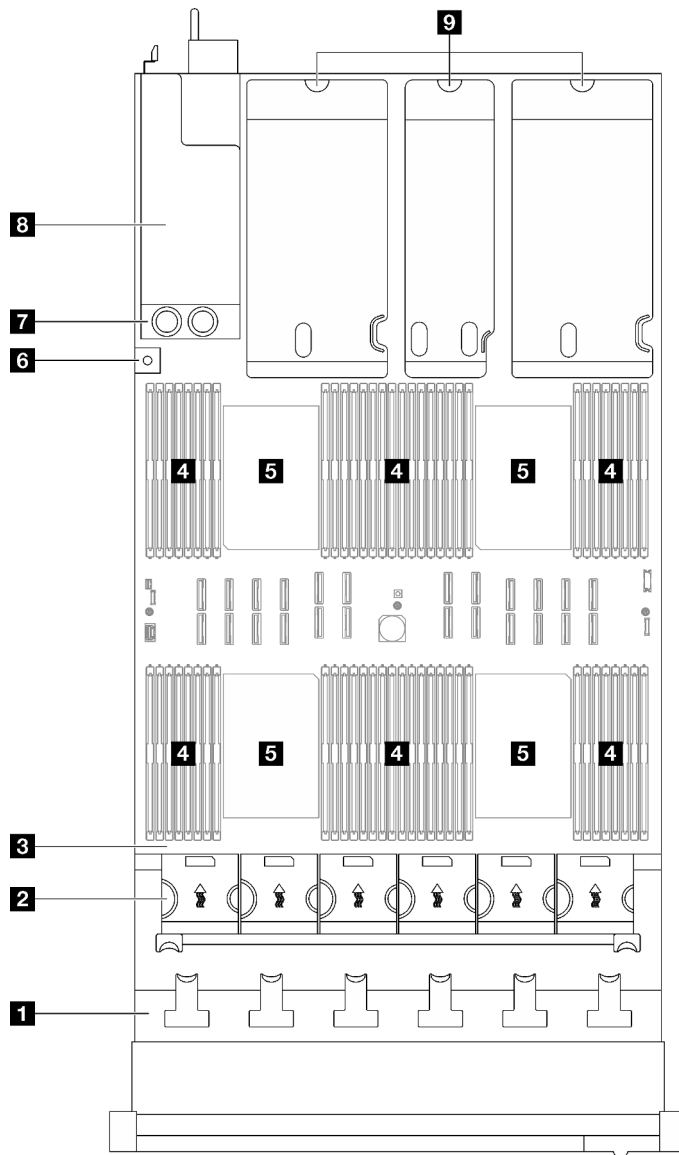


Figure 13. Top view of the sever model with three PCIe risers

Table 5. Components on the top view of the sever model with three PCIe risers

<b>1</b> Drive backplanes	<b>6</b> Intrusion switch
<b>2</b> Fan cage and fans	<b>7</b> Power distribution board
<b>3</b> System board assembly	<b>8</b> Power supply bays
<b>4</b> Memory modules	<b>9</b> PCIe risers
<b>5</b> Processors	

**Note:** The illustration shows the location of certain parts. Some parts may not be supported at the same time within certain configuration(s).

## Top view of the sever model with four PCIe risers

This section contains information on the top view of the sever model with four PCIe risers.

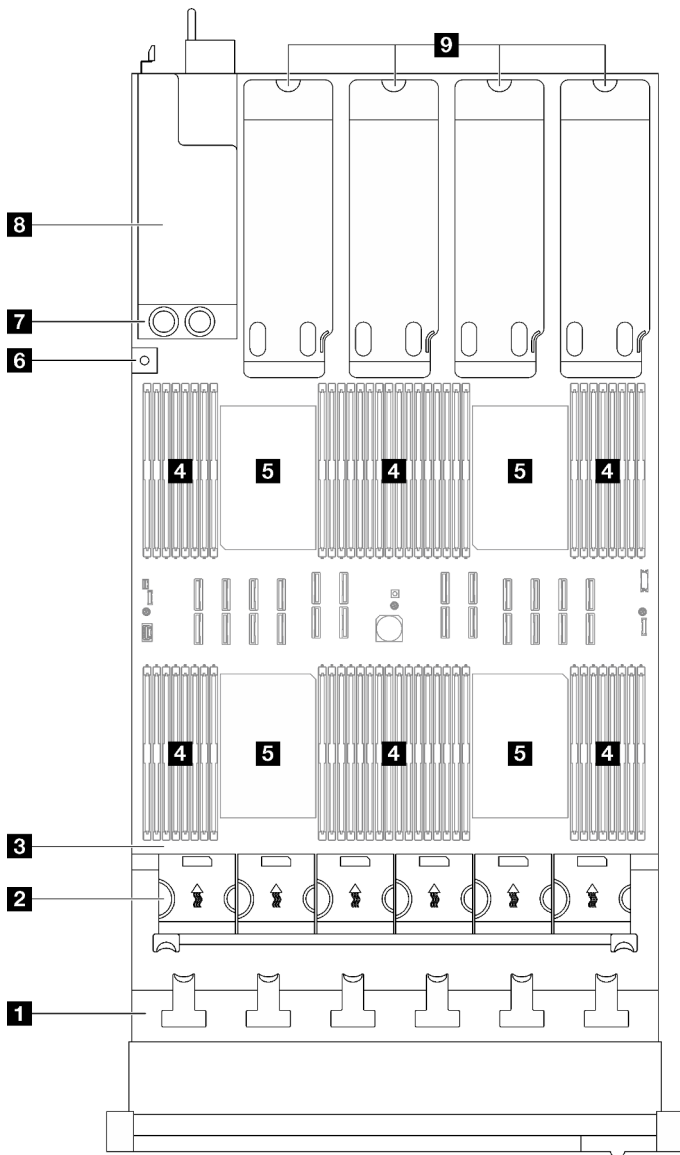


Figure 14. Top view of the sever model with four PCIe risers

Table 6. Components on the top view of the sever model with four PCIe risers

<b>1</b> Drive backplanes	<b>6</b> Intrusion switch
<b>2</b> Fan cage and fans	<b>7</b> Power distribution board
<b>3</b> System board assembly	<b>8</b> Power supply bays
<b>4</b> Memory modules	<b>9</b> PCIe risers
<b>5</b> Processors	

**Note:** The illustration shows the location of certain parts. Some parts may not be supported at the same time within certain configuration(s).

## Front I/O module

The front I/O module of the server provides controls, connectors, and LEDs. The front I/O module varies by model.

The following illustrations show the front I/O module for different server models. To locate the front I/O module, see [Chapter 2 “Server components” on page 17](#).

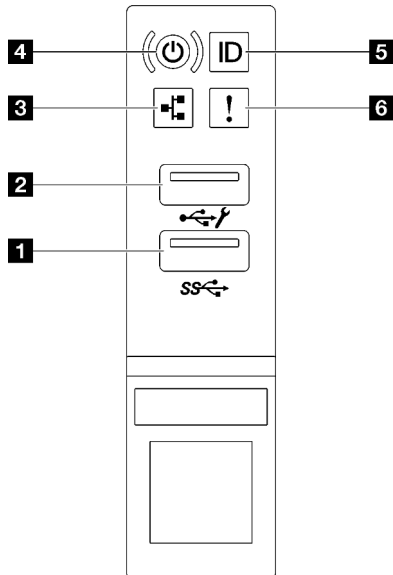


Figure 15. Front I/O module

Table 7. Components on the front I/O module

<b>1</b> USB 3.1 Gen 1 (5 Gbps) connector	<b>4</b> Power button/LED (green)
<b>2</b> USB 2.0 connector with Lenovo XClarity Controller management	<b>5</b> System ID button/LED (blue)
<b>3</b> Network Activity LED (green)	<b>6</b> System error LED (yellow)

### **1** USB 3.1 Gen 1 (5 Gbps) connector

The USB 3.1 Gen 1 (5 Gbps) connector can be used to attach a USB-compatible device, such as a USB keyboard, USB mouse, or USB storage device.

### **2** USB 2.0 connector with Lenovo XClarity Controller management

Connect a USB 2.0 device, such as a mouse, keyboard, or other devices, to this connector.

**Note:** This is the only USB port that supports USB automation update of the firmware and RoT security module.

Connection to Lenovo XClarity Controller is primarily intended for users with a mobile device running the Lenovo XClarity Controller mobile application. When a mobile device is connected to this USB port, an Ethernet over USB connection is established between the mobile application running on the device and the Lenovo XClarity Controller.

Select **Network** in **BMC Configuration** to view or modify settings.

Four types of settings are available:

- **Host only mode**  
In this mode, the USB port is always solely connected to the server.
- **BMC only mode**  
In this mode, the USB port is always solely connected to Lenovo XClarity Controller.
- **Shared mode: owned by BMC**  
In this mode, connection to the USB port is shared by the server and Lenovo XClarity Controller, while the port is switched to Lenovo XClarity Controller.
- **Shared mode: owned by host**  
In this mode, connection to the USB port is shared by the server and Lenovo XClarity Controller, while the port is switched to the server.

#### **3 Network Activity LED (green)**

The network activity LED helps you identify the network connectivity and activity.

Status	Color	Description
On	Green	The server is connected to a network.
Blinking	Green	The network is connected and active.
Off	None	The server is disconnected from the network.

#### **4 Power button/LED (green)**

Press this button to turn the server on and off manually. The states of the power LED are as follows:

Status	Color	Description
Off	None	Power is not present, or the power supply has failed.
Fast blinking (about four flashes per second)	Green	<ul style="list-style-type: none"><li>• The server is off, but the XClarity Controller is initializing, and the server is not ready to be powered on.</li><li>• System-board-assembly power has failed.</li></ul>
Slow blinking (about one flash per second)	Green	The server is off and is ready to be powered on (standby state).
Solid on	Green	The server is on and running.

#### **5 System ID button/LED (blue)**

Use this system ID button and the blue system ID LED to visually locate the server. Each time you press the system ID button, the state of the system ID LED changes. The LED can be changed to on, blinking, or off. You can also use the Lenovo XClarity Controller or a remote management program to change the state of the system ID LED to assist in visually locating the server among other servers.

#### **6 System error LED (yellow)**

The system error LED helps you to determine if there are any system errors.



Status	Color	Description	Action
On	Yellow	<p>An error has been detected on the server. Causes might include one or more of the following errors:</p> <ul style="list-style-type: none"> <li>• The temperature of the server reached the non-critical temperature threshold.</li> <li>• The voltage of the server reached the non-critical voltage threshold.</li> <li>• A fan has been detected to be running at low speed.</li> <li>• The power supply has a critical error.</li> <li>• The power supply is not connected to the power.</li> </ul>	Check the Event log to determine the exact cause of the error.
Off	None	The server is off or the server is on and is working correctly.	None.

---

## System-board-assembly layout

The illustrations in this section provide information about the connectors, switches, and jumpers that are available on the system board assembly.

The following illustration shows the layout of the system board assembly which contains the firmware and RoT security module, system I/O board, and processor board.

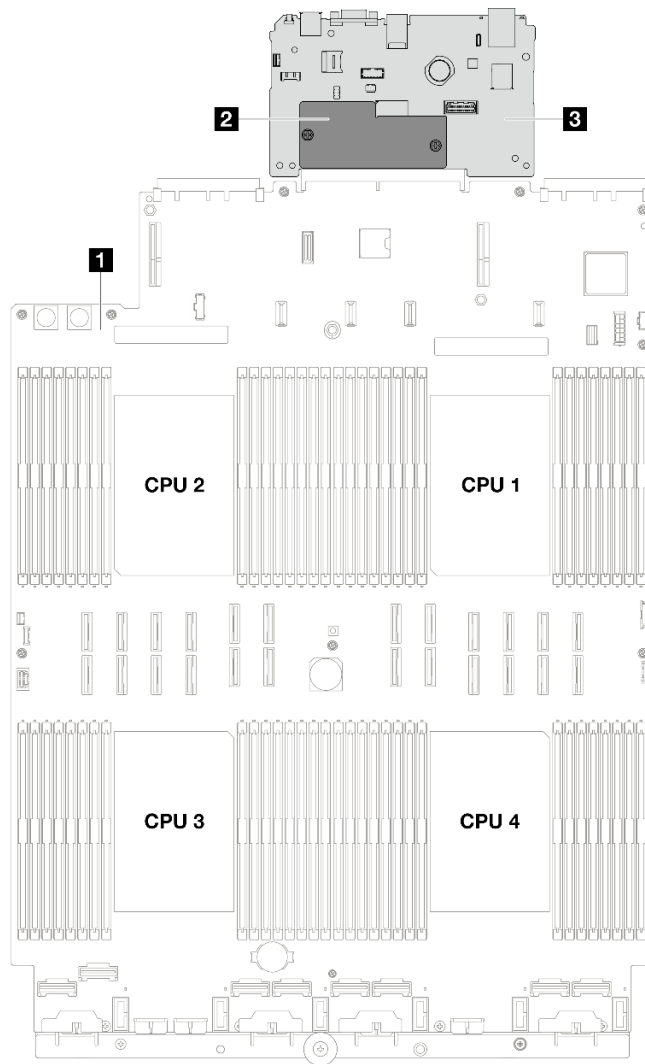


Figure 16. System-board-assembly layout

1 Processor board	2 Firmware and RoT security module	3 System I/O board
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For more information about the LEDs that are available on the system board assembly, see [“System-board-assembly LEDs”](#) on page 380.

## System-board-assembly connectors

The following illustrations show the internal connectors on the system board assembly.

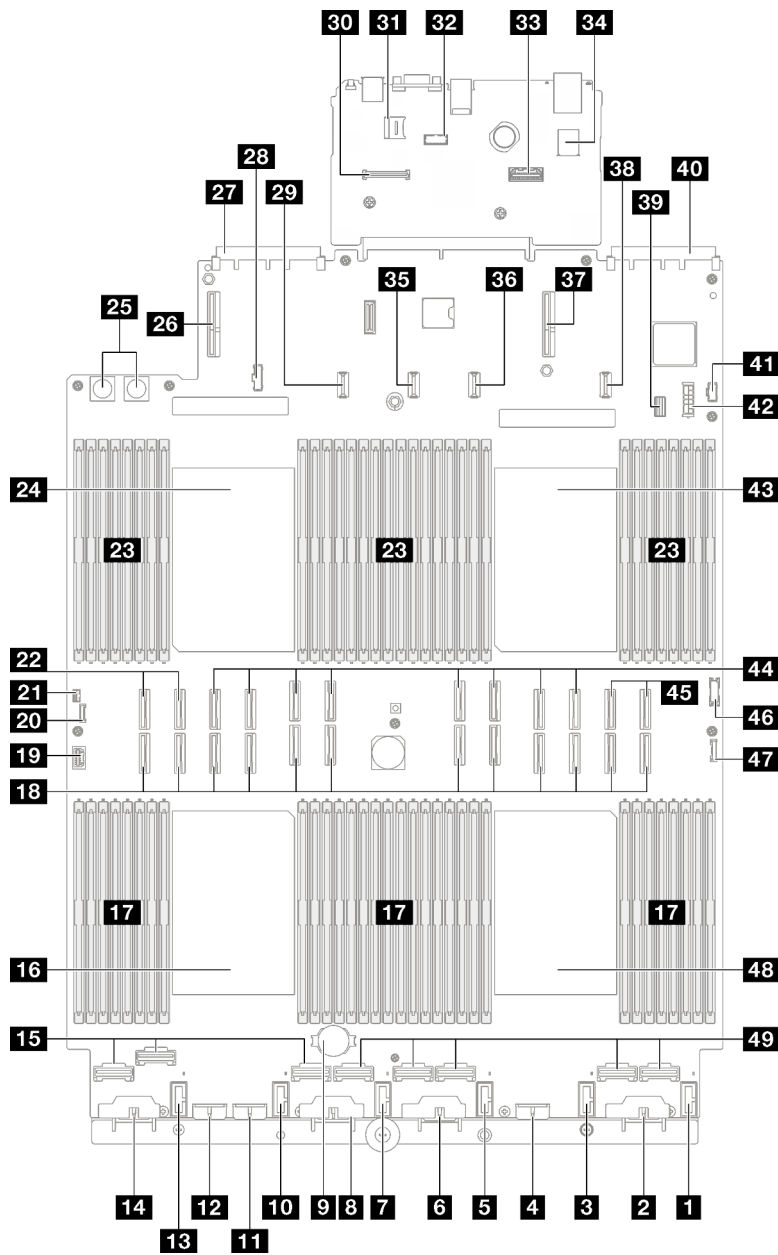


Figure 17. System-board-assembly connectors

Table 8. System-board-assembly connectors

<b>1</b> Fan 6 connector	<b>26</b> PCIe riser 3/D connector
<b>2</b> Backplane 6 power connector	<b>27</b> OCP slot 2 connector
<b>3</b> Fan 5 connector	<b>28</b> Power distribution board sideband connector
<b>4</b> Backplane 5 power connector	<b>29</b> PCIe riser C power connector
<b>5</b> Fan 4 connector	<b>30</b> Firmware and RoT security module connector
<b>6</b> Backplane 4 power connector	<b>31</b> MicroSD socket
<b>7</b> Fan 3 connector	<b>32</b> Serial port connector

Table 8. System-board-assembly connectors (continued)

<b>8</b> Backplane 3 power connector	<b>33</b> Second management Ethernet connector
<b>9</b> 3V battery (CR2032)	<b>34</b> Internal USB connector
<b>10</b> Fan 2 connector	<b>35</b> PCIe riser 2 power connector
<b>11</b> Backplane 7 power connector	<b>36</b> PCIe riser B power connector
<b>12</b> Backplane 2 power connector	<b>37</b> PCIe riser 1 connector
<b>13</b> Fan 1 connector	<b>38</b> PCIe riser A power connector
<b>14</b> Backplane 1 power connector	<b>39</b> 7mm drive/M.2 signal connector
<b>15</b> NVMe 1-3 connector (left to right)	<b>40</b> OCP slot 1 connector
<b>16</b> Processor 3	<b>41</b> M.2 power connector
<b>17</b> Memory module slot 33-64 (left to right)	<b>42</b> 7mm drive power connector
<b>18</b> P 1-12 connector (left to right)	<b>43</b> Processor 1
<b>19</b> VGA connector	<b>44</b> P 13-20 connector (left to right)
<b>20</b> External diagnostic handset connector	<b>45</b> NVMe 11-12 connector (left to right)
<b>21</b> Intrusion switch connector	<b>46</b> Front USB connector
<b>22</b> NVMe 9-10 connector (left to right)	<b>47</b> Front I/O connector
<b>23</b> Memory module slot 1-32 (right to left)	<b>48</b> Processor 4
<b>24</b> Processor 2	<b>49</b> NVMe 4-8 connector (left to right)
<b>25</b> Power distribution board connector	

## System-board-assembly switches

The following illustrations show the location of the switches, jumpers, and buttons on the server.

### Important:

- Before you change any switch settings or move any jumpers, turn off the server; then, disconnect all power cords and external cables. Review the following information:
  - [https://pubs.lenovo.com/safety\\_documentation/](https://pubs.lenovo.com/safety_documentation/)
  - “Installation Guidelines” on page 47
  - “Handling static-sensitive devices” on page 50
  - “Power off the server” on page 64
- Any system-board-assembly switch or jumper block that is not shown in the illustrations in this document are reserved.

**Note:** If there is a clear protective sticker on the top of the switch blocks, you must remove and discard it to access the switches.

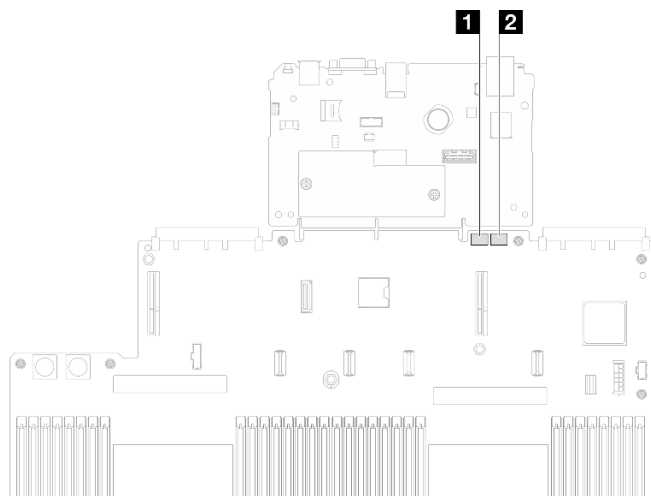


Figure 18. System-board-assembly switches

<b>1</b> SW3	<b>2</b> SW4
--------------	--------------

### SW3 switch block

The following table describes the functions of the SW3 switch block on the system board assembly.

Table 9. System-board-assembly SW3 switch block description

Switch number	Default position	Description
1	Off	Reserved
2	Off	Changing this switch to the On position to resets the RTC. A momentary toggle is all that is required. To avoid excessive CMOS battery drain, do not leave this switch in the On position.
3	Off	Changing this switch to the On position overrides the power-on password. Changing the position of this switch does not affect the administrator password check if an administrator password is set.
4	Off	Changing the switch to the On position to enable ME boots to recovery.
5	Off	Reserved
6	Off	Reserved
7	Off	Reserved
8	Off	Reserved

### SW4 switch block

The following table describes the functions of the SW4 switch block on the system board assembly.

Table 10. System-board-assembly SW4 switch block description

Switch number	Default position	Description
1	Off	When the switch is in the default Off position, the server will boot by using the primary XClarity Controller firmware. Change this switch to the On position, to enable the server to boot by using a backup of the XClarity Controller firmware.
2	Off	Changing this switch to the On position to bypass the operational firmware image and performs a BMC firmware update, if the normal firmware update procedure results in an inoperative BMC. <b>Note:</b> Use this switch only if the normal firmware update procedure fails and the operational firmware image is corrupted. Use of this switch disables normal baseboard management controller operation.
3	Off	Reserved
4	Off	Changing the switch to the On position resets the XClarity Controller.
5	Off	Reserved
6	Off	Reserved
7	Off	Reserved
8	Off	Reserved

---

## System LEDs and diagnostics display

See the following section for information on available system LEDs and diagnostics display.

For more information, refer to [“Troubleshooting by system LEDs and diagnostics display”](#) on page 375.

---

## Chapter 3. Parts list

Identify each of the components that is available for your server with the parts list.

For more information about ordering parts:

1. Go to <http://datacentersupport.lenovo.com> and navigate to the support page for your server.
2. Click **Parts**.
3. Enter the serial number to view a listing of parts for your server.

It is highly recommended that you check the power summary data for your server using Lenovo Capacity Planner before purchasing any new parts.

**Note:** Depending on the model, your server might look slightly different from the illustration.

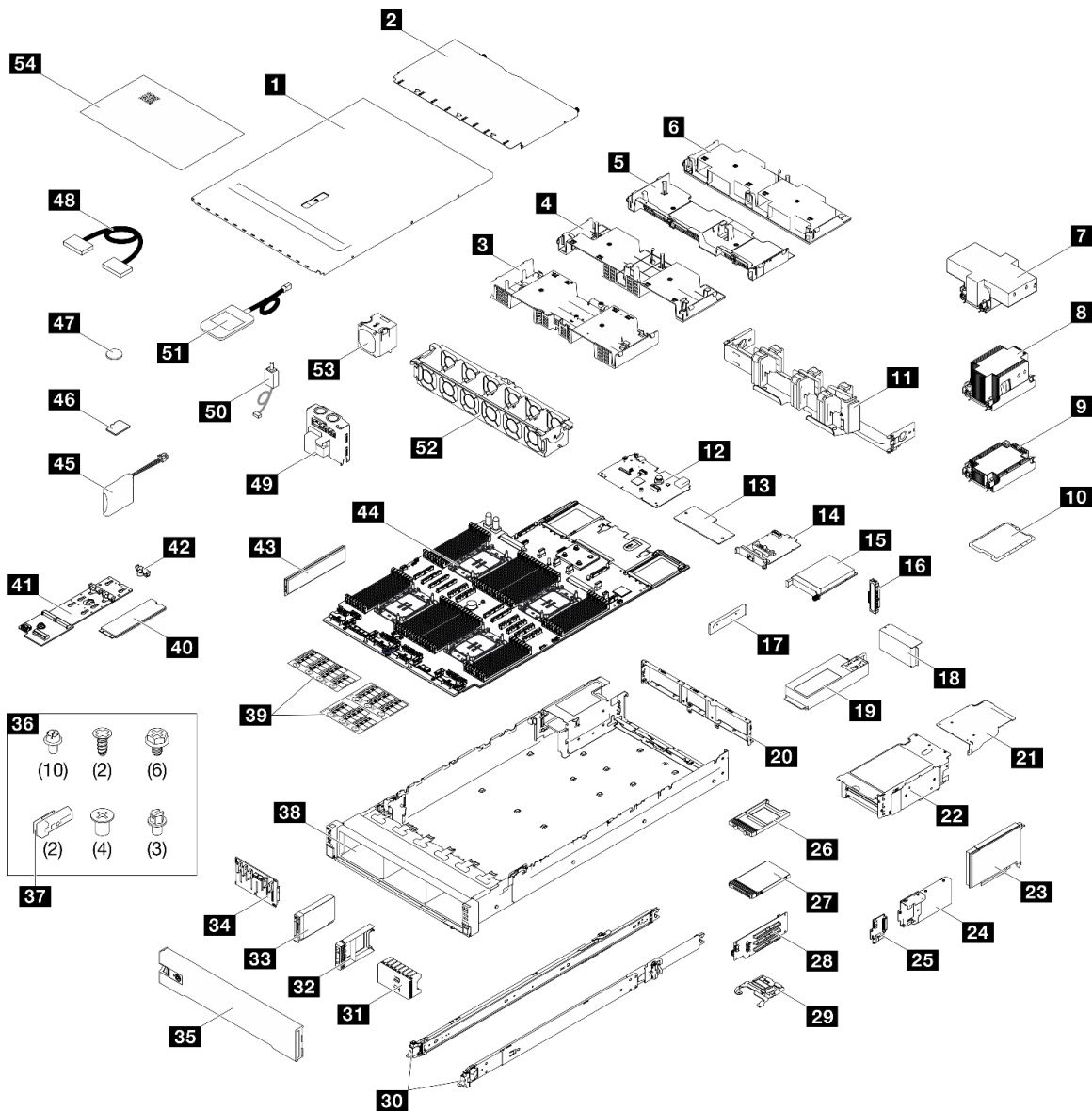


Figure 19. Server components

The parts listed in the following table are identified as one of the following:

- **T1:** Tier 1 customer replaceable unit (CRU). Replacement of Tier 1 CRUs is your responsibility. If Lenovo installs a Tier 1 CRU at your request with no service agreement, you will be charged for the installation.
- **T2:** Tier 2 customer replaceable unit (CRU). You may install a Tier 2 CRU yourself or request Lenovo to install it, at no additional charge, under the type of warranty service that is designated for your server.
- **F:** Field replaceable unit (FRU). FRUs must be installed only by trained service technicians.
- **C:** Consumable and Structural parts. Purchase and replacement of consumable and structural parts (components, such as a filler or bezel) is your responsibility. If Lenovo acquires or installs a structural component at your request, you will be charged for the service.



Table 11. Parts list

Index	Description	Type
<p>For more information about ordering parts:</p> <ol style="list-style-type: none"> <li>1. Go to <a href="http://datacentersupport.lenovo.com">http://datacentersupport.lenovo.com</a> and navigate to the support page for your server.</li> <li>2. Click <b>Parts</b>.</li> <li>3. Enter the serial number to view a listing of parts for your server.</li> </ol>		
<b>1</b>	Front top cover	T1
<b>2</b>	Rear top cover	T1
<b>3</b>	Air baffle (front)	T1
<b>4</b>	Air baffle (rear, 2U standard PHM)	T1
<b>5</b>	Air baffle (rear, 1U standard PHM)	T1
<b>6</b>	Air baffle (rear, 2U performance PHM)	T1
<b>7</b>	2U performance heat sink and processor carrier	F
<b>8</b>	2U standard heat sink and processor carrier	F
<b>9</b>	1U standard heat sink and processor carrier	F
<b>10</b>	Processor	F
<b>11</b>	Cable management arm	T2
<b>12</b>	System I/O board	F
<b>13</b>	Firmware and RoT security module	F
<b>14</b>	Management NIC adapter	T1
<b>15</b>	OCP module	T1
<b>16</b>	OCP module filler	C
<b>17</b>	Power supply bracket (CRPS)	T1
<b>18</b>	PCIe riser cage filler	C
<b>19</b>	Power supply unit	T1
<b>20</b>	Rear wall	F
<b>21</b>	PCIe riser extender	T2
<b>22</b>	PCIe riser cage	T2
<b>23</b>	PCIe adapter	T1
<b>24</b>	7mm drive cage	T2
<b>25</b>	7mm drive backplanes	T1
<b>26</b>	7mm drive filler	C
<b>27</b>	7mm drive	T1
<b>28</b>	PCIe riser card	T2
<b>29</b>	PCIe retainer	T1
<b>30</b>	Slide rail kit	T2
<b>31</b>	2.5-inch drive filler (8-bay)	C

Table 11. Parts list (continued)

Index	Description	Type
<b>32</b>	2.5-inch drive filler (1-bay)	C
<b>33</b>	2.5-inch hot-swap drive	T1
<b>34</b>	2.5-inch drive backplane	T1
<b>35</b>	Security bezel	T1
<b>36</b>	Mechanical parts kit (power supply key and screws)	T1
<b>37</b>	Power supply key (CFFv4)	T1
<b>38</b>	Chassis	F
<b>39</b>	Labels kit (PCIe riser cables)	T1
<b>40</b>	M.2 drive	T1
<b>41</b>	M.2 drive backplane	T1
<b>42</b>	M.2 drive retainer	T1
<b>43</b>	Memory module	T1/F <sup>1</sup>
<b>44</b>	Processor board	F
<b>45</b>	Flash power module	T1
<b>46</b>	MicroSD card	F
<b>47</b>	CMOS battery (CR2032)	C
<b>48</b>	Cable <sup>2</sup>	T1
<b>49</b>	Power distribution board	T2
<b>50</b>	Intrusion switch	T1
<b>51</b>	External diagnostics handset	T1
<b>52</b>	Fan cage	T1
<b>53</b>	Fan	T1
<b>54</b>	System service label	T1

**Notes:**

- <sup>1</sup> For memory modules in memory module slot 1-32 when 2U performance PHM are installed.
- <sup>2</sup> For PCIe riser cable replacement, make sure to order the **39** Labels kit (PCIe riser cables).

---

## Power cords

Several power cords are available, depending on the country and region where the server is installed.

To view the power cords that are available for the server:

1. Go to:  
<http://dcsc.lenovo.com/#/>
2. Click **Preconfigured Model** or **Configure to order**.
3. Enter the machine type and model for your server to display the configurator page.
4. Click **Power** → **Power Cables** to see all line cords.

**Notes:**

- For your safety, a power cord with a grounded attachment plug is provided to use with this product. To avoid electrical shock, always use the power cord and plug with a properly grounded outlet.
- Power cords for this product that are used in the United States and Canada are listed by Underwriter's Laboratories (UL) and certified by the Canadian Standards Association (CSA).
- For units intended to be operated at 115 volts: Use a UL-listed and CSA-certified cord set consisting of a minimum 18 AWG, Type SVT or SJT, three-conductor cord, a maximum of 15 feet in length and a parallel blade, grounding-type attachment plug rated 15 amperes, 125 volts.
- For units intended to be operated at 230 volts (U.S. use): Use a UL-listed and CSA-certified cord set consisting of a minimum 18 AWG, Type SVT or SJT, three-conductor cord, a maximum of 15 feet in length and a tandem blade, grounding-type attachment plug rated 15 amperes, 250 volts.
- For units intended to be operated at 230 volts (outside the U.S.): Use a cord set with a grounding-type attachment plug. The cord set should have the appropriate safety approvals for the country in which the equipment will be installed.
- Power cords for a specific country or region are usually available only in that country or region.



---

## Chapter 4. Unboxing and setup

Information in this section assists you on unboxing and setting up the server. When unboxing the server, check if the items in the package are correct, and learn where to find information of server serial number and Lenovo XClarity Controller access. Make sure to follow the instructions in [“Server setup checklist” on page 45](#) when setting up the server.

---

### Server package contents

When you receive your server, verify that the shipment contains everything that you expected to receive.

The server package includes the following items:

- Server
- Rail installation kit\*. Installation guide is provided in the package.
- Cable management arm\*. Installation guide is provided in the package.
- Material box, including items such as power cords\*, accessory kit, and printed documents.

#### Notes:

- Some of the items listed are available on select models only.
- Items marked with asterisk(\*) are optional.

If any item is missing or damaged, contact your place of purchase. Ensure that you retain your proof of purchase and packing material. They might be required to receive warranty service.

---

### Identify the server and access the Lenovo XClarity Controller

This section contains instruction on how to identify your server and where to find the Lenovo XClarity Controller access information.

#### Identifying your server

When you contact Lenovo for help, the machine type, model, and serial number information help support technicians to identify your server and provide faster service.

The illustration below shows the location of the ID label which contains the model number, machine type, and serial number of the server. You can also add other system information labels to the front of the server in the customer label spaces.

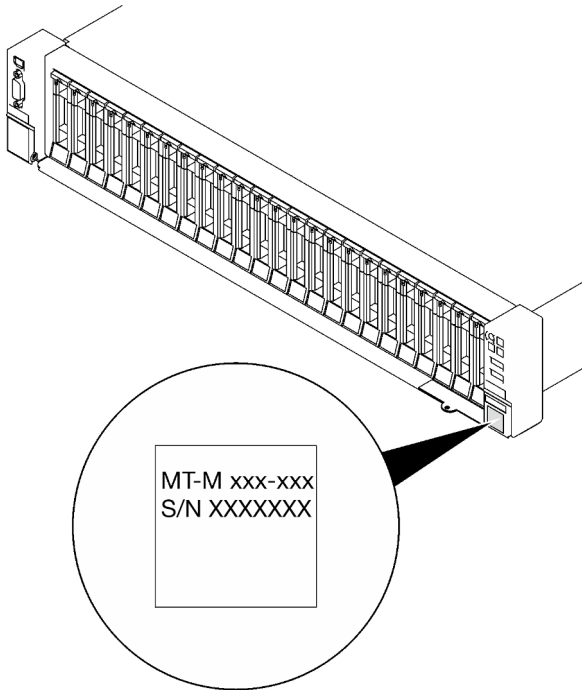


Figure 20. Location of the ID label

#### Lenovo XClarity Controller network access label

In addition, the Lenovo XClarity Controller network access label is attached to the pull-out information tab located near the lower right corner in the front of the chassis, with MAC address accessible with a pull.

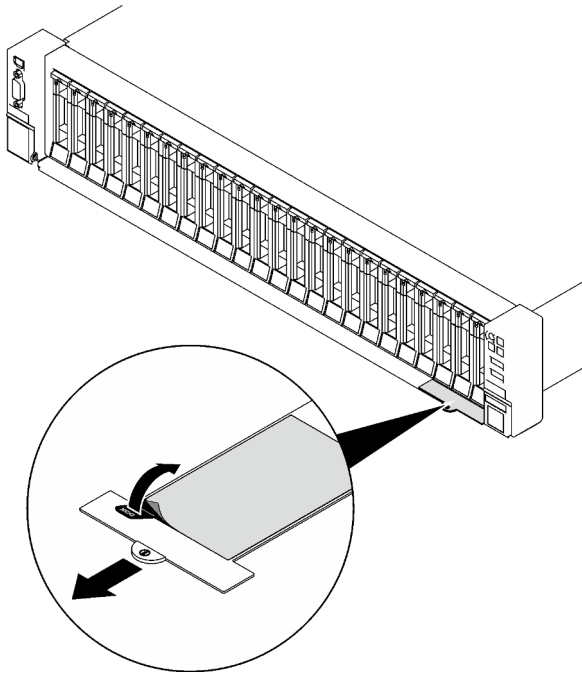


Figure 21. Lenovo XClarity Controller network access label on the pull-out information tab

## Service Label and QR code

In addition, the system Service Label is located on the surface of the front top cover, provides a quick response (QR) code for mobile access to service information. You can scan the QR code with a mobile device using a QR code reader application and get quick access to the Service Information web page. The Service Information web page provides additional information for parts installation and replacement videos, and error codes for server support.

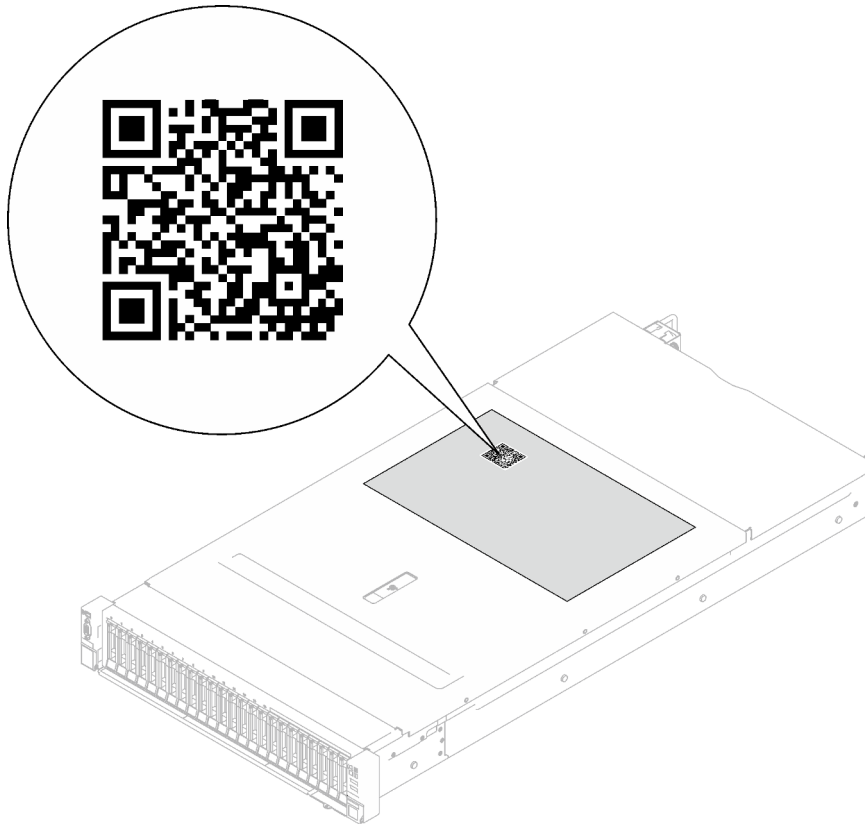


Figure 22. Service Label and QR code

---

## Server setup checklist

Use the server setup checklist to ensure that you have performed all tasks that are required to set up your server.

The server setup procedure varies depending on the configuration of the server when it was delivered. In some cases, the server is fully configured and you just need to connect the server to the network and an AC power source, and then you can power on the server. In other cases, the server needs to have hardware options installed, requires hardware and firmware configuration, and requires an operating system to be installed.

The following steps describe the general procedure for setting up a server.

### Setup the server hardware

Complete the following procedures to setup the server hardware.

1. Unpack the server package. See [“Server package contents” on page 43](#).

2. Install any required hardware or server options. See the related topics in [Chapter 5 “Hardware replacement procedures” on page 47](#).
3. If necessary, install the rail and CMA to a standard rack cabinet. Follow the instruction in *Rail Installation Guide* and *CMA Installation Guide* that comes with the rail installation kit.
4. If necessary, install the server into a standard rack cabinet. See [“Install the server to rails” on page 69](#).
5. Connect all external cables to the server. See [Chapter 2 “Server components” on page 17](#) for connectors locations.

Typically, you will need to connect the following cables:

- Connect server to the power source
  - Connect server to the data network
  - Connect the server to the storage device
  - Connect the server to the management network
6. Power on the server.

Power button location and power LED are specified in:

- [Chapter 2 “Server components” on page 17](#)
- [“Troubleshooting by system LEDs and diagnostics display” on page 375](#)

The server can be turned on (power LED on) in any of the following ways:

- You can press the power button.
- The server can restart automatically after a power interruption.
- The server can respond to remote power-on requests sent to the Lenovo XClarity Controller.

**Note:** You can access the management processor interface to configure the system without powering on the server. Whenever the server is connected to power, the management processor interface is available. For details about accessing the management server processor, see “Opening and Using the XClarity Controller Web Interface” section in the XCC documentation compatible with your server at <https://pubs.lenovo.com/lxccc-overview/>.

7. Validate the server. Make sure that the power LED, Ethernet connector LED, and network LED are lit with green light, which means the server hardware was set up successfully.

See [“Troubleshooting by system LEDs and diagnostics display” on page 375](#) for more information on the LED indications.

## Configure the system

Complete the following procedures to configure the system. For detailed instructions, refer to [Chapter 7 “System configuration” on page 363](#).

1. Set the network connection for the Lenovo XClarity Controller to the management network.
2. Update the firmware for the server, if necessary.
3. Configure the firmware for the server.

The following information is available for RAID configuration:

- <https://lenovopress.lenovo.com/lp0578-lenovo-raid-introduction>
  - <https://lenovopress.lenovo.com/lp0579-lenovo-raid-management-tools-and-resources>
4. Install the operating system.
  5. Back up the server configuration.
  6. Install the applications and programs for which the server is intended to be used.



---

## Chapter 5. Hardware replacement procedures

This section provides installation and removal procedures for all serviceable system components. Each component replacement procedure references any tasks that need to be performed to gain access to the component being replaced.

---

### Installation Guidelines

Before installing components in your server, read the installation guidelines.

Before installing optional devices, read the following notices carefully:

**Attention:** Prevent exposure to static electricity, which might lead to system halt and loss of data, by keeping static-sensitive components in their static-protective packages until installation, and handling these devices with an electrostatic-discharge wrist strap or other grounding system.

- Read the safety information and guidelines to ensure your safety at work:
  - A complete list of safety information for all products is available at:  
[https://pubs.lenovo.com/safety\\_documentation/](https://pubs.lenovo.com/safety_documentation/)
  - The following guidelines are available as well: “Working inside the server with the power on” on page 49 and “Handling static-sensitive devices” on page 50.
- Make sure the components you are installing are supported by your server.
  - For a list of supported optional components for the server, see <https://serverproven.lenovo.com>.
  - For the option package contents, see <https://serveroption.lenovo.com/>.
- For more information about ordering parts:
  1. Go to <http://datacentersupport.lenovo.com> and navigate to the support page for your server.
  2. Click **Parts**.
  3. Enter the serial number to view a listing of parts for your server.
- When you install a new server, download and apply the latest firmware. This will help ensure that any known issues are addressed, and that your server is ready to work with optimal performance. Go to <https://datacentersupport.lenovo.com/tw/en/products/servers/thinksystem/sr850v3/7d96/downloads/driver-list/> to download firmware updates for your server.

**Important:** Some cluster solutions require specific code levels or coordinated code updates. If the component is part of a cluster solution, verify the latest Best Recipe code level menu for cluster supported firmware and driver before you update the code.

- If you replace a part, such as an adapter, that contains firmware, you might also need to update the firmware for that part. For more information about updating firmware, see “Update the firmware” on page 365.
- It is good practice to make sure that the server is working correctly before you install an optional component.
- Keep the working area clean, and place removed components on a flat and smooth surface that does not shake or tilt.
- Do not attempt to lift an object that might be too heavy for you. If you have to lift a heavy object, read the following precautions carefully:
  - Make sure that you can stand steadily without slipping.
  - Distribute the weight of the object equally between your feet.

- Use a slow lifting force. Never move suddenly or twist when you lift a heavy object.
- To avoid straining the muscles in your back, lift by standing or by pushing up with your leg muscles.
- Back up all important data before you make changes related to the disk drives.
- Have a small flat-blade screwdriver, a small Phillips screwdriver, and a T8 torx screwdriver available.
- To view the error LEDs on the system board (system board assembly) and internal components, leave the power on.
- You do not have to turn off the server to remove or install hot-swap power supplies, hot swap fans, or hot-plug USB devices. However, you must turn off the server before you perform any steps that involve removing or installing adapter cables, and you must disconnect the power source from the server before you perform any steps that involve removing or installing a riser card.
- When replacing power supply units or fans, make sure to refer to redundancy rules for these components.
- Blue on a component indicates touch points, where you can grip to remove a component from or install it in the server, open or close a latch, and so on.
- Orange on a component or a orange on or near a component indicates that the component can be hot-swapped if the server and operating system support hot-swap capability, which means that you can remove or install the component while the server is still running. (Orange can also indicate touch points on hot-swap components.) See the instructions for removing or installing a specific hot-swap component for any additional procedures that you might have to perform before you remove or install the component.
- The Red strip on the drives, adjacent to the release latch, indicates that the drive can be hot-swapped if the server and operating system support hot-swap capability. This means that you can remove or install the drive while the server is still running.

**Note:** See the system specific instructions for removing or installing a hot-swap drive for any additional procedures that you might need to perform before you remove or install the drive.

- After finishing working on the server, make sure you reinstall all safety shields, guards, labels, and ground wires.

## Safety inspection checklist

Use the information in this section to identify potentially unsafe conditions with your server. As each machine was designed and built, required safety items were installed to protect users and service technicians from injury.

**Note:** The product is not suitable for use at visual display workplaces according to §2 of the Workplace Regulations.

**Note:** The set-up of the server is made in the server room only.

### CAUTION:

**This equipment must be installed or serviced by trained personnel, as defined by the NEC, IEC 62368-1 & IEC 60950-1, the standard for Safety of Electronic Equipment within the Field of Audio/Video, Information Technology and Communication Technology. Lenovo assumes you are qualified in the servicing of equipment and trained in recognizing hazards energy levels in products. Access to the equipment is by the use of a tool, lock and key, or other means of security, and is controlled by the authority responsible for the location.**

**Important:** Electrical grounding of the server is required for operator safety and correct system function. Proper grounding of the electrical outlet can be verified by a certified electrician.

Use the following checklist to verify that there are no potentially unsafe conditions:

1. Make sure that the power is off and the power cord is disconnected.

## 2. Check the power cord.

- Make sure that the third-wire ground connector is in good condition. Use a meter to measure third-wire ground continuity for 0.1 ohm or less between the external ground pin and the frame ground.
- Make sure that the power cord is the correct type.

To view the power cords that are available for the server:

### a. Go to:

<http://dcsc.lenovo.com/#/>

### b. Click **Preconfigured Model** or **Configure to order**.

c. Enter the machine type and model for your server to display the configurator page.

d. Click **Power** → **Power Cables** to see all line cords.

- Make sure that the insulation is not frayed or worn.

## 3. Check for any obvious non-Lenovo alterations. Use good judgment as to the safety of any non-Lenovo alterations.

## 4. Check inside the server for any obvious unsafe conditions, such as metal filings, contamination, water or other liquid, or signs of fire or smoke damage.

## 5. Check for worn, frayed, or pinched cables.

## 6. Make sure that the power-supply cover fasteners (screws or rivets) have not been removed or tampered with.

## System reliability guidelines

Review the system reliability guidelines to ensure proper system cooling and reliability.

Make sure the following requirements are met:

- A power supply must be installed in each power-supply bay.
- Adequate space around the server must be spared to allow server cooling system to work properly. Leave approximately 50 mm (2.0 in.) of open space around the front and rear of the server. Do not place any object in front of the fans.
- For proper cooling and airflow, refit the server cover before you turn the power on. Do not operate the server for more than 30 minutes with the server cover removed, for it might damage server components.
- Cabling instructions that come with optional components must be followed.
- A failed fan must be replaced within 48 hours after malfunction.
- A removed hot-swap fan must be replaced within 30 seconds after removal.
- A removed hot-swap drive must be replaced within two minutes after removal.
- A removed hot-swap power supply must be replaced within two minutes after removal.
- Every air baffle that comes with the server must be installed when the server starts (some servers might come with more than one air baffle). Operating the server with a missing air baffle might damage the processor.
- All processor sockets must contain either a socket cover or a processor with heat sink.
- When more than one processor is installed, fan population rules for each server must be strictly followed.

## Working inside the server with the power on

You might need to keep the power on with the server cover removed to look at system information on the display panel or to replace hot-swap components. Review these guidelines before doing so.

**Attention:** The server might stop and data loss might occur when internal server components are exposed to static electricity. To avoid this potential problem, always use an electrostatic-discharge wrist strap or other grounding systems when working inside the server with the power on.

- Avoid loose-fitting clothing, particularly around your forearms. Button or roll up long sleeves before working inside the server.
- Prevent your necktie, scarf, badge rope, or hair from dangling into the server.
- Remove jewelry, such as bracelets, necklaces, rings, cuff links, and wrist watches.
- Remove items from your shirt pocket, such as pens and pencils, in case they fall into the server as you lean over it.
- Avoid dropping any metallic objects, such as paper clips, hairpins, and screws, into the server.

## Handling static-sensitive devices

Review these guidelines before you handle static-sensitive devices to reduce the possibility of damage from electrostatic discharge.

**Attention:** Prevent exposure to static electricity, which might lead to system halt and loss of data, by keeping static-sensitive components in their static-protective packages until installation, and handling these devices with an electrostatic-discharge wrist strap or other grounding system.

- Limit your movement to prevent building up static electricity around you.
- Take additional care when handling devices during cold weather, for heating would reduce indoor humidity and increase static electricity.
- Always use an electrostatic-discharge wrist strap or other grounding system, particularly when working inside the server with the power on.
- While the device is still in its static-protective package, touch it to an unpainted metal surface on the outside of the server for at least two seconds. This drains static electricity from the package and from your body.
- Remove the device from the package and install it directly into the server without putting it down. If it is necessary to put the device down, put it back into the static-protective package. Never place the device on the server or on any metal surface.
- When handling a device, carefully hold it by the edges or the frame.
- Do not touch solder joints, pins, or exposed circuitry.
- Keep the device from others' reach to prevent possible damages.

---

## Memory module installation rules and order

Memory modules must be installed in a specific order based on the memory configuration that you implement and the number of processors and memory modules installed in the server.

### Supported memory types

For information on the types of memory module supported by this server, see “Memory” section in [“Technical specifications” on page 3](#).

Information about optimizing memory performance and configuring memory is available at the Lenovo Press website:

<https://lenovopress.lenovo.com/servers/options/memory>

In addition, you can take advantage of a memory configurator, which is available at the following site:

[https://dcsc.lenovo.com/#/memory\\_configuration](https://dcsc.lenovo.com/#/memory_configuration)

Specific information about the required installation order of memory modules in your server based on the system configuration and memory mode that you are implementing is shown below.

## Memory modules and processors layout

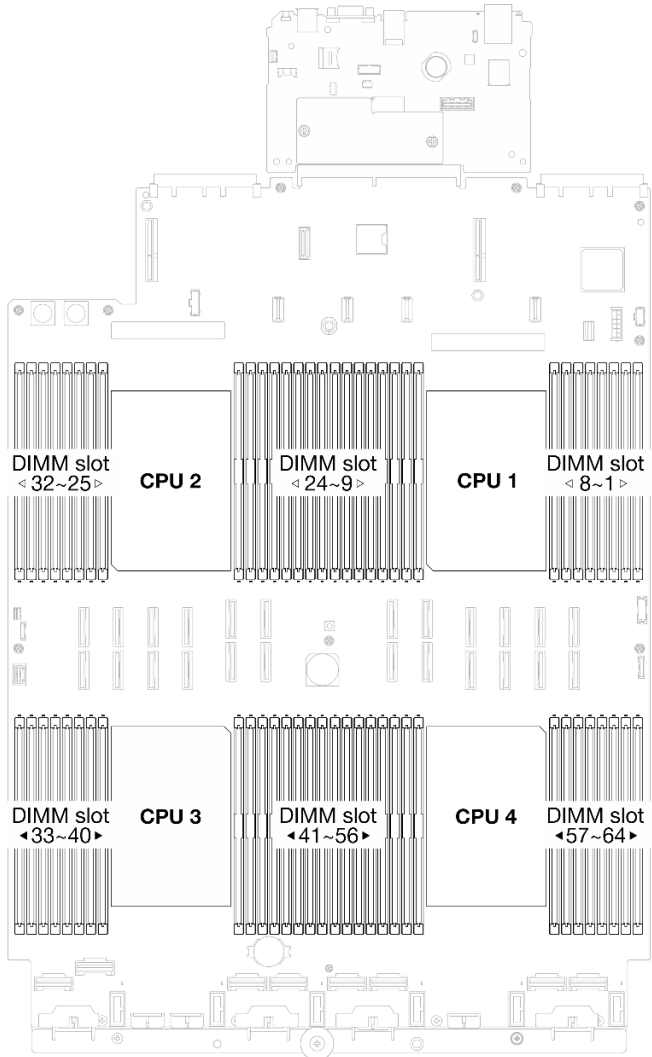


Figure 23. Memory modules and processors layout

The memory-channel configuration table below shows the relationship between the processors, memory controllers, memory channels, and memory module slot numbers.

Table 12. Memory slot and channel identification

Processor	CPU 1															
Controller	iMC1				iMC0				iMC2				iMC3			
Channel	CH1		CH0		CH1		CH0		CH0		CH1		CH0		CH1	
Slot No.	0	1	0	1	0	1	0	1	1	0	1	0	1	0	1	0
DIMM No.	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
Processor	CPU 2															
Controller	iMC1				iMC0				iMC2				iMC3			
Channel	CH1		CH0		CH1		CH0		CH0		CH1		CH0		CH1	
Slot No.	0	1	0	1	0	1	0	1	1	0	1	0	1	0	1	0

Table 12. Memory slot and channel identification (continued)

<b>DIMM No.</b>	32	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17
<b>Processor</b>	<b>CPU 3</b>															
<b>Controller</b>	iMC3				iMC2				iMC0				iMC1			
<b>Channel</b>	CH1		CH0		CH1		CH0		CH0		CH1		CH0		CH1	
<b>Slot No.</b>	0	1	0	1	0	1	0	1	1	0	1	0	1	0	1	0
<b>DIMM No.</b>	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48
<b>Processor</b>	<b>CPU 4</b>															
<b>Controller</b>	iMC3				iMC2				iMC0				iMC1			
<b>Channel</b>	CH1		CH0		CH1		CH0		CH0		CH1		CH0		CH1	
<b>Slot No.</b>	0	1	0	1	0	1	0	1	1	0	1	0	1	0	1	0
<b>DIMM No.</b>	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64

### Memory module installation guideline

- At least one DIMM is required for each processor. Install at least eight DIMMs per processor for good performance.
- When you replace a DIMM, the server provides automatic DIMM enablement capability without requiring you to use the Setup Utility to enable the new DIMM manually.

### Independent memory mode installation order

Independent memory mode provides the highest level of memory performance, but lacks failover protection. The DIMM installation order for independent memory mode varies based on the number of processors and memory modules installed in the server.

Follow the rules below when installing memory modules in independent mode:

- There should be at least one DDR5 DIMM per processor.
- All DDR5 memory modules must operate at the same speed in the same system.
- Memory population must be identical between processors.
- Memory modules from different vendors are supported.

**Note:** When ThinkSystem 128GB TruDDR5 4800MHz (4Rx4) 3DS RDIMM v1 and/or ThinkSystem 256GB TruDDR5 4800MHz (8Rx4) 3DS RDIMM v1 is installed in a system, no other memory module types can be installed.

- In each memory channel, populate the slot farthest from the processor (slot 0) first.
- All memory modules must be DDR5 memory modules.
- x8 memory modules and x4 memory modules cannot be mixed in a system.
- Mixing 16Gbit (16 GB, 32 GB, 64 GB, 128 GB, 256 GB) and 24Gbit (96 GB) memory module is not allowed in a system.
- 96 GB memory module must be identically populated in the system and only supported on Intel Xeon Platinum processor.
- 96 GB memory module can only support 1DPC (8 DIMMs per processor) and 2DPC (16 DIMMs per processor) configurations.
- All memory modules to be installed must be of the same type.
  - Value RDIMM cannot be mixed with non-value RDIMMs in a system.

- 3DS RDIMM cannot be mixed with non-3DS RDIMMs in a system.
- All memory modules in a system must have the same number of ranks.

### With two processors

The following table shows the sequence of populating memory modules for independent mode when two processors are installed.

Table 13. Independent mode with two processors

Total DIMMs	Processor 1															
	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
2 DIMMs							10									
4 DIMMs*							10							3		
8 DIMMs*			14				10			7				3		
12 DIMMs*	16		14				10			7		5		3		
16 DIMMs*	16		14		12		10			7		5		3		1
24 DIMMs*	16		14	13	12		10	9	8	7		5	4	3		1
32 DIMMs*	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
Total DIMMs	Processor 2															
	32	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17
2 DIMMs							26									
4 DIMMs*							26							19		
8 DIMMs*			30				26			23				19		
12 DIMMs*	32		30				26			23		21		19		
16 DIMMs*	32		30		28		26			23		21		19		17
24 DIMMs*	32		30	29	28		26	25	24	23		21	20	19		17
32 DIMMs*	32	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17

**Note:** DIMM configurations that support the Sub NUMA Clustering (SNC) feature, which can be enabled via UEFI. SNC is not supported if DIMM population does not follow the sequence indicated by the table above.

### With three processors

The following table shows the sequence of populating memory modules for independent mode when three processors are installed.

Table 14. Independent mode with three processors

Total DIMMs	Processor 1															
	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
3 DIMMs							10									
6 DIMMs*							10							3		
12 DIMMs*			14				10			7				3		
18 DIMMs*	16		14				10			7		5		3		



Table 14. Independent mode with three processors (continued)

24 DIMMs*	16		14		12		10			7		5		3		1	
36 DIMMs*	16		14	13	12		10	9		8	7		5	4	3		1
48 DIMMs*, <sup>2</sup>	16	15	14	13	12	11	10	9		8	7	6	5	4	3	2	1
<b>Total DIMMs</b>	<b>Processor 2</b>																
	<b>32</b>	<b>31</b>	<b>30</b>	<b>29</b>	<b>28</b>	<b>27</b>	<b>26</b>	<b>25</b>		<b>24</b>	<b>23</b>	<b>22</b>	<b>21</b>	<b>20</b>	<b>19</b>	<b>18</b>	<b>17</b>
3 DIMMs							26										
6 DIMMs*							26								19		
12 DIMMs*			30				26			23					19		
18 DIMMs*	32		30				26			23		21		19			
24 DIMMs*	32		30		28		26			23		21		19			17
36 DIMMs*	32		30	29	28		26	25		24	23		21	20	19		17
48 DIMMs*, <sup>2</sup>	32	31	30	29	28	27	26	25		24	23	22	21	20	19	18	17
<b>Total DIMMs</b>	<b>Processor 3</b>																
	<b>33</b>	<b>34</b>	<b>35</b>	<b>36</b>	<b>37</b>	<b>38</b>	<b>39</b>	<b>40</b>		<b>41</b>	<b>42</b>	<b>43</b>	<b>44</b>	<b>45</b>	<b>46</b>	<b>47</b>	<b>48</b>
3 DIMMs										42							
6 DIMMs*			35							42							
12 DIMMs*			35				39			42					46		
18 DIMMs*			35		37		39			42					46		48
24 DIMMs*	33		35		37		39			42		44		46			48
36 DIMMs*	33		35	36	37		39	40		41	42		44	45	46		48
48 DIMMs*, <sup>2</sup>	33	34	35	36	37	38	39	40		41	42	43	44	45	46	47	48

**Note:** DIMM configurations that support the Sub NUMA Clustering (SNC) feature, which can be enabled via UEFI. SNC is not supported if DIMM population does not follow the sequence indicated by the table above.

### With four processors

The following table shows the sequence of populating memory modules for independent mode when four processors are installed.

Table 15. Independent mode with four processors

<b>Total DIMMs</b>	<b>Processor 1</b>															
	<b>16</b>	<b>15</b>	<b>14</b>	<b>13</b>	<b>12</b>	<b>11</b>	<b>10</b>	<b>9</b>		<b>8</b>	<b>7</b>	<b>6</b>	<b>5</b>	<b>4</b>	<b>3</b>	<b>2</b>

Table 15. Independent mode with four processors (continued)

4 DIMMs							10									
8 DIMMs*							10						3			
16 DIMMs*			14				10			7			3			
24 DIMMs*	16		14				10			7		5	3			
32 DIMMs*	16		14		12		10			7		5	3		1	
48 DIMMs*	16		14	13	12		10	9	8	7		5	4	3		1
64 DIMMs*	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
<b>Total DIMMs</b>	<b>Processor 2</b>															
	<b>32</b>	<b>31</b>	<b>30</b>	<b>29</b>	<b>28</b>	<b>27</b>	<b>26</b>	<b>25</b>	<b>24</b>	<b>23</b>	<b>22</b>	<b>21</b>	<b>20</b>	<b>19</b>	<b>18</b>	<b>17</b>
4 DIMMs							26									
8 DIMMs*							26							19		
16 DIMMs*			30				26			23				19		
24 DIMMs*	32		30				26			23		21		19		
32 DIMMs*	32		30		28		26			23		21		19		17
48 DIMMs*	32		30	29	28		26	25	24	23		21	20	19		17
64 DIMMs*	32	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17
<b>Total DIMMs</b>	<b>Processor 3</b>															
	<b>33</b>	<b>34</b>	<b>35</b>	<b>36</b>	<b>37</b>	<b>38</b>	<b>39</b>	<b>40</b>	<b>41</b>	<b>42</b>	<b>43</b>	<b>44</b>	<b>45</b>	<b>46</b>	<b>47</b>	<b>48</b>
4 DIMMs										42						
8 DIMMs*			35							42						
16 DIMMs*			35				39			42				46		
24 DIMMs*			35		37		39			42				46		48
32 DIMMs*	33		35		37		39			42		44		46		48
48 DIMMs*	33		35	36	37		39	40	41	42		44	45	46		48
64 DIMMs*	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48
<b>Total DIMMs</b>	<b>Processor 4</b>															
	<b>49</b>	<b>50</b>	<b>51</b>	<b>52</b>	<b>53</b>	<b>54</b>	<b>55</b>	<b>56</b>	<b>57</b>	<b>58</b>	<b>59</b>	<b>60</b>	<b>61</b>	<b>62</b>	<b>63</b>	<b>64</b>
4 DIMMs										58						
8 DIMMs*			51							58						
16 DIMMs*			51				55			58				62		
24 DIMMs*			51		53		55			58				62		64
32 DIMMs*	49		51		53		55			58		60		62		64
48 DIMMs*	49		51	52	53		55	56	57	58		60	61	62		64
64 DIMMs*	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64

**Note:** DIMM configurations that support the Sub NUMA Clustering (SNC) feature, which can be enabled via UEFI. SNC is not supported if DIMM population does not follow the sequence indicated by the table above.

## Memory mirroring mode installation order

Memory-mirroring mode provides full memory redundancy while reducing the total system memory capacity in half. Memory channels are grouped in pairs with each channel receiving the same data. If a failure occurs, the memory controller switches from the DIMMs on the primary channel to the DIMMs on the backup channel. The DIMM installation order for memory mirroring varies based on the number of processors and DIMMs installed in the server.

Memory mirroring guidelines:

- Memory mirroring reduces the maximum available memory by half of the installed memory. For example, if the server has 64 GB of installed memory, only 32 GB of addressable memory is available when memory mirroring is enabled.
- Each DIMM must be identical in size and architecture.
- DIMMs on each memory channel must be of equal density.
- If two memory channels have DIMMs, mirroring occurs across two DIMMs (channels 0/1 will both contain the primary/secondary memory caches).
- If three memory channels have DIMMs, mirroring occurs across all three DIMMs (channels 0/1, channels 1/2, and channels 2/0 will all contain primary/secondary memory caches).
- Partial Memory Mirroring is a sub-function of memory mirroring. It requires following the memory installation order of memory mirroring mode.

### With two processors

The following table shows the DIMM population sequence for memory mirroring mode when two processors are installed.

Table 16. Memory mirroring with two processors

Total DIMMs	Processor 1															
	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
16 DIMMs	16		14		12		10			7		5		3		1
32 DIMMs	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
Total DIMMs	Processor 2															
	32	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17
16 DIMMs	32		30		28		26			23		21		19		17
32 DIMMs	32	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17

### With three processors

The following table shows the DIMM population sequence for memory mirroring mode when three processors are installed.

Table 17. Memory mirroring with three processors

Total DIMMs	Processor 1															
	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
24 DIMMs	16		14		12		10			7		5		3		1
48 DIMMs	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
Total DIMMs	Processor 2															
	32	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17

Table 17. Memory mirroring with three processors (continued)

24 DIMMs	32		30		28		26		23		21		19		17	
48 DIMMs	32	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17
<b>Total DIMMs</b>	<b>Processor 3</b>															
	<b>33</b>	<b>34</b>	<b>35</b>	<b>36</b>	<b>37</b>	<b>38</b>	<b>39</b>	<b>40</b>	<b>41</b>	<b>42</b>	<b>43</b>	<b>44</b>	<b>45</b>	<b>46</b>	<b>47</b>	<b>48</b>
24 DIMMs	33		35		37		39		42		44		46		48	
48 DIMMs	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48

### With four processors

The following table shows the DIMM population sequence for memory mirroring mode when four processors are installed.

Table 18. Memory mirroring with four processors

<b>Total DIMMs</b>	<b>Processor 1</b>															
	<b>16</b>	<b>15</b>	<b>14</b>	<b>13</b>	<b>12</b>	<b>11</b>	<b>10</b>	<b>9</b>	<b>8</b>	<b>7</b>	<b>6</b>	<b>5</b>	<b>4</b>	<b>3</b>	<b>2</b>	<b>1</b>
32 DIMMs	16		14		12		10		7		5		3		1	
64 DIMMs	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
<b>Total DIMMs</b>	<b>Processor 2</b>															
	<b>32</b>	<b>31</b>	<b>30</b>	<b>29</b>	<b>28</b>	<b>27</b>	<b>26</b>	<b>25</b>	<b>24</b>	<b>23</b>	<b>22</b>	<b>21</b>	<b>20</b>	<b>19</b>	<b>18</b>	<b>17</b>
32 DIMMs	32		30		28		26		23		21		19		17	
64 DIMMs	32	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17
<b>Total DIMMs</b>	<b>Processor 3</b>															
	<b>33</b>	<b>34</b>	<b>35</b>	<b>36</b>	<b>37</b>	<b>38</b>	<b>39</b>	<b>40</b>	<b>41</b>	<b>42</b>	<b>43</b>	<b>44</b>	<b>45</b>	<b>46</b>	<b>47</b>	<b>48</b>
32 DIMMs	33		35		37		39		42		44		46		48	
64 DIMMs	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48
<b>Total DIMMs</b>	<b>Processor 4</b>															
	<b>49</b>	<b>50</b>	<b>51</b>	<b>52</b>	<b>53</b>	<b>54</b>	<b>55</b>	<b>56</b>	<b>57</b>	<b>58</b>	<b>59</b>	<b>60</b>	<b>61</b>	<b>62</b>	<b>63</b>	<b>64</b>
32 DIMMs	49		51		53		55		58		60		62		64	
64 DIMMs	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64

## Drive backplane installation rules and order

This section contains information on the drive backplane installation rules and order.

### Notes:

- When one or more of the following components are installed in the system, the maximum number of supported drive backplanes is two.
  - ThinkSystem Mellanox ConnectX-6 Dx 100GbE QSFP56 2-port PCIe Ethernet Adapter
  - ThinkSystem Nvidia ConnectX-7 NDR200/HDR QSFP112 2-Port PCIe Gen5 x16 InfiniBand Adapter
  - ThinkSystem NVIDIA ConnectX-7 NDR400 OSFP 1-Port PCIe Gen5 Adapter
  - ThinkSystem 96GB TruDDR5 4800MHz (2Rx4) RDIMM
  - ThinkSystem 128GB TruDDR5 4800MHz (4Rx4) 3DS RDIMM v1

- ThinkSystem 128GB TruDDR5 4800MHz (4Rx4) 3DS RDIMM v2
- When one of the following components is installed in the system, the maximum number of supported drive backplanes is one.
  - ThinkSystem 256GB TruDDR5 4800MHz (8Rx4) 3DS RDIMM v1
  - ThinkSystem 256GB TruDDR5 4800MHz (8Rx4) 3DS RDIMM v2

The server supports up to three 2.5-inch drive backplanes with the following corresponding drive backplane numbers.

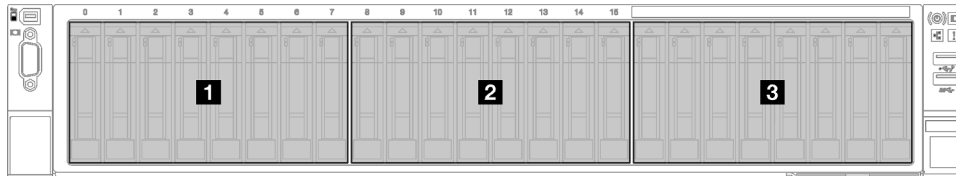


Figure 24. 2.5-inch drive backplane numbering

Table 19. 2.5-inch drive backplane and corresponding drive bays

Backplane	Drive bay	Supported backplanes	Supported drives
<b>1</b> Backplane 1	0 to 7	<ul style="list-style-type: none"> <li>• 2.5-inch AnyBay 8-bay drive backplane</li> <li>• 2.5-inch SAS/SATA 8-bay drive backplane</li> </ul>	<ul style="list-style-type: none"> <li>• 2.5-inch SAS/SATA/NVMe drives</li> <li>• 2.5-inch SAS/SATA drives</li> </ul>
<b>2</b> Backplane 2	8 to 15		
<b>3</b> Backplane 3	16 to 23		

**Note:** 2.5-inch AnyBay 8-bay drive backplanes support 2.5-inch SAS/SATA/NVMe drives.

Table 20. 2.5-inch drive backplane installation order

Installation priority	Backplane type	Backplane placement priority
1	2.5-inch AnyBay 8-bay drive backplane	1, 3, 2
2	2.5-inch SAS/SATA 8-bay drive backplane	1, 2, 3

## PCIe riser and adapter installation rules and order

PCIe risers and adapters must be installed in a specific order in the server.

Refer to the corresponding PCIe riser and adapter installation rules and order for related server model:

- [“PCIe riser and adapter installation rules and order \(server model with three PCIe risers\)”](#) on page 59
- [“PCIe riser and adapter installation rules and order \(server model with four PCIe risers\)”](#) on page 62

## PCIe riser and adapter installation rules and order (server model with three PCIe risers)

Use the information in this topic to understand installation rules and order for PCIe risers and PCIe adapters in the server with three PCIe risers.

### Notes:

- PCIe Gen4 risers contain PCIe Gen4 slots only.

- PCIe Gen5 risers contain PCIe Gen4 and Gen5 slots.
- Performance may degrade when a x16 PCIe card is installed in a x8 lane PCIe slot.
- Legacy option ROM boot is only supported on the PCIe adapters installed in the following PCIe slots:
  - With PCIe Gen4 risers installed: PCIe slot 1, 2, 3, 5, 8, 9, and 11
  - With PCIe Gen5 risers installed: PCIe slot 1, 2, 5, 8, and 11
- The available PCIe slots will depend on the riser and number of processors installed.
  - With PCIe Gen4 risers installed:
    - With two processors installed: PCIe slot 3, 5, 8, 9, and 11
    - With three processors installed: PCIe slot 3, 5, 7, 8, 9, 10, and 11
    - With four processors installed: PCIe slot 3 to 11
  - With PCIe Gen5 risers installed:
    - With two processors installed: PCIe slot 5, 8, and 11
    - With three processors installed: PCIe slot 5, 7, 8, 10, and 11
    - With four processors installed: PCIe slot 4, 5, 6, 7, 8, 10, and 11
- PCIe slot 3 and 4 are unavailable when one of the following PCIe risers is installed:
  - 7mm/x16 PCIe G4 Riser 1 FHHL
  - 7mm/x16 PCIe G5 Riser 1 FHHL
- PCIe slot 3 and 9 are unavailable when the following PCIe riser is installed:
  - x16/x16 PCIe G5 Riser 1/3 FHFL
- PCIe slot 8 is unavailable when one of the following PCIe risers is installed:
  - x16/x8/Serial PCIe G4 Riser 2/C HHHL
  - x16/x8/Serial PCIe G5 Riser 2/C HHHL
- When a ThinkSystem 256GB TruDDR5 4800MHz (8Rx4) 3DS RDIMM v1 is installed in the system, the maximum number of the following PCIe risers is one.
  - x8/x16/x16 PCIe G4 Riser 1/3 FHFL (can only be installed in riser 1)
  - x16/x16 PCIe G5 Riser 1/3 FHFL (can only be installed in riser 1)
- When a ThinkSystem Intel E810-DA4 10/25GbE SFP28 4-Port OCP Ethernet Adapter is installed in the system, no other OCP module can be installed.
- When one of the following components is installed in the system, no other Gen3 RAID/HBA adapter can be installed:
  - ThinkSystem Intel E810-DA4 10/25GbE SFP28 4-Port PCIe Ethernet Adapter
  - ThinkSystem Intel E810-DA2 10/25GbE SFP28 2-Port PCIe Ethernet Adapter
  - ThinkSystem Intel E810-DA2 10/25GbE SFP28 2-Port OCP Ethernet Adapter
  - ThinkSystem Intel E810-DA4 10/25GbE SFP28 4-Port OCP Ethernet Adapter

#### PCIe riser installation rules and order

Installation priority	PCIe riser type	Riser location priority
1	7mm/x16 PCIe G4 Riser 1 FHHL	Riser 1
2	7mm/x16 PCIe G5 Riser 1 FHHL	Riser 1
3	x16/x16 PCIe G5 Riser 1/3 FHFL	Riser 1, riser 3

Installation priority	PCIe riser type	Riser location priority
4	x8/x16/x16 PCIe G4 Riser 1/3 FHFL	Riser 1, riser 3
5	<ul style="list-style-type: none"> <li>x16/x8/Serial PCIe G4 Riser 2/C HHLH</li> <li>x16/x8/Serial PCIe G5 Riser 2/C HHLH</li> </ul>	Riser 2
6	<ul style="list-style-type: none"> <li>x16/x8/x8 PCIe G4 Riser 2/A/B/C HHLH</li> <li>x16/x8/x8 PCIe G5 Riser 2/A/B/C HHLH</li> </ul>	Riser 2

### PCIe adapter installation rules and order

Installation priority	Component	PCIe slot priority
1	32i Gen4 RAID adapter	5, 11, 8, 7, 9, 3
2	<ol style="list-style-type: none"> <li>16i RAID adapter</li> <li>16i HBA adapter</li> <li>8i RAID adapter</li> <li>8i HBA adapter</li> </ol>	<ul style="list-style-type: none"> <li>Without double-wide GPU installed: 5, 11, 8, 7, 9, 3</li> <li>With double-wide GPU installed: 8, 7, 6</li> </ul>
3	ThinkSystem Nvidia PCIe Gen4 x16 Passive Aux Kit	4
4	ThinkSystem NVIDIA ConnectX-7 NDR400 OSFP 1-Port PCIe Gen5 Adapter	5, 11, 10, 4, 6
5	Double-wide GPU	10, 4
6	Single-wide GPU	10, 4, 3, 9
7	<ol style="list-style-type: none"> <li>ThinkSystem Nvidia ConnectX-7 NDR200/ HDR QSFP112 2-Port PCIe Gen5 x16 InfiniBand Adapter</li> <li>ThinkSystem Mellanox ConnectX-6 Dx 100GbE QSFP56 2-port PCIe Ethernet Adapter</li> <li>ThinkSystem Broadcom 57508 100GbE QSFP56 2-port PCIe 4 Ethernet Adapter</li> <li>ThinkSystem Mellanox ConnectX-6 Lx 10/ 25GbE SFP28 2-Port PCIe Ethernet Adapter</li> </ol>	5, 11, 10, 4, 6
8	10/25GbE SFP28 4-Port PCIe Ethernet Adapter	5, 11, 10, 4, 9, 3
9	<ol style="list-style-type: none"> <li>10/25GbE SFP28 2-port PCIe Ethernet Adapter</li> <li>10GBase-T Ethernet Adapter</li> <li>RJ45 Ethernet Adapter</li> <li>PCIe Fibre Channel Adapter</li> <li>FC HBA adapter</li> </ol>	5, 11, 8, 7, 10, 4, 6, 9, 3
10	External RAID/HBA adapter	5, 11, 8, 7, 10, 4
11	ThinkSystem Intel E810-DA4 10/25GbE SFP28 4-Port OCP Ethernet Adapter	1

Installation priority	Component	PCIe slot priority
12	Management NIC adapter	1
13	OCP module	1, 2

## PCIe riser and adapter installation rules and order (server model with four PCIe risers)

Use the information in this topic to understand installation rules and order for PCIe risers and PCIe adapters in the sever with four PCIe risers.

### Notes:

- PCIe Gen4 risers contain PCIe Gen4 slots only.
- PCIe Gen5 risers contain PCIe Gen4 and Gen5 slots.
- Performance may degrade when a x16 PCIe card is installed in a x8 lane PCIe slot.
- Legacy option ROM boot is only supported on the PCIe adapters installed in the PCIe slot 1, 2, 4, 5, 6, 9, 12, and 14
- The available PCIe slots will depend on the number of processors installed:
  - With two processors installed: PCIe slot 4, 5, 6, 9, 12, and 14
  - With three processors installed: PCIe slot 4, 5, 6, 9, 10, 11, 12, 13, and 14
  - With four processors installed: PCIe slot 3 to 14
- PCIe slot 11 is unavailable when one of the following PCIe risers is installed:
  - x16/x8/Serial PCIe G4 Riser 2/C HHHL
  - x16/x8/Serial PCIe G5 Riser 2/C HHHL
- When a ThinkSystem 256GB TruDDR5 4800MHz (8Rx4) 3DS RDIMM v1 is installed in the system, the maximum number of the following PCIe risers is three.
  - x16/x8/x8 PCIe G4 Riser 2/A/B/C HHHL
  - x16/x8/x8 PCIe G5 Riser 2/A/B/C HHHL
- When a ThinkSystem 256GB TruDDR5 4800MHz (8Rx4) 3DS RDIMM v1 is installed in the system, the following PCIe risers can not be installed:
  - x8/x16/x16 PCIe G4 Riser D HHHL
  - x8/x16/x16 PCIe G5 Riser D HHHL
- When a ThinkSystem Intel E810-DA4 10/25GbE SFP28 4-Port OCP Ethernet Adapter is installed in the system, no other OCP module can be installed.
- When one of the following components is installed in the system, no other Gen3 RAID/HBA adapter can be installed:
  - ThinkSystem Intel E810-DA4 10/25GbE SFP28 4-Port PCIe Ethernet Adapter
  - ThinkSystem Intel E810-DA2 10/25GbE SFP28 2-Port PCIe Ethernet Adapter
  - ThinkSystem Intel E810-DA2 10/25GbE SFP28 2-Port OCP Ethernet Adapter
  - ThinkSystem Intel E810-DA4 10/25GbE SFP28 4-Port OCP Ethernet Adapter



### PCIe riser installation rules and order

Installation priority	PCIe riser type	Riser location priority
1	x16/x8/Serial PCIe G4 Riser 2/C HHHH	Riser C
2	x16/x8/Serial PCIe G5 Riser 2/C HHHH	Riser C
3	x16/x8/x8 PCIe G5 Riser 2/A/B/C HHHH	Riser A, riser B, riser C
4	x16/x8/x8 PCIe G4 Riser 2/A/B/C HHHH	Riser A, riser B, riser C
5	<ul style="list-style-type: none"> <li>x8/x16/x16 PCIe G4 Riser D HHHH</li> <li>x8/x16/x16 PCIe G5 Riser D HHHH</li> </ul>	Riser D

### PCIe adapter installation rules and order

Installation priority	Component	PCIe slot priority
1	<ol style="list-style-type: none"> <li>16i RAID adapter</li> <li>16i HBA adapter</li> <li>8i RAID adapter</li> <li>8i HBA adapter</li> </ol>	5, 14, 11, 8, 6, 12, 9, 3
2	<ol style="list-style-type: none"> <li>ThinkSystem NVIDIA ConnectX-7 NDR400 OSFP 1-Port PCIe Gen5 Adapter</li> <li>ThinkSystem Nvidia ConnectX-7 NDR200/ HDR QSFP112 2-Port PCIe Gen5 x16 InfiniBand Adapter</li> <li>ThinkSystem Mellanox ConnectX-6 Dx 100GbE QSFP56 2-port PCIe Ethernet Adapter</li> <li>ThinkSystem Broadcom 57508 100GbE QSFP56 2-port PCIe 4 Ethernet Adapter</li> <li>ThinkSystem Mellanox ConnectX-6 Lx 10/25GbE SFP28 2-Port PCIe Ethernet Adapter</li> </ol>	14, 6, 9, 13, 3
3	<ol style="list-style-type: none"> <li>10/25GbE SFP28 2-port PCIe Ethernet Adapter</li> <li>10GBase-T Ethernet Adapter</li> </ol>	5, 14, 6, 9, 4, 12, 10, 13, 11, 7, 3, 8 <b>Notes:</b> The following PCIe adapters are not supported in slot 9. <ul style="list-style-type: none"> <li>ThinkSystem Intel X710-T4L 10GBase-T 4-Port PCIe Ethernet Adapter</li> <li>ThinkSystem Broadcom 57454 10GBASE-T 4-port PCIe Ethernet Adapter</li> </ul>
4	RJ45 Ethernet Adapter	5, 14, 6, 4, 12, 10, 13, 11, 7, 3, 8
5	<ol style="list-style-type: none"> <li>PCIe Fibre Channel Adapter</li> <li>FC HBA adapter</li> </ol>	5, 14, 6, 9, 4, 12, 10, 13, 11, 7, 3, 8
6	External RAID/HBA adapter	5, 14, 4, 10, 13, 11, 7, 8
7	ThinkSystem Intel E810-DA4 10/25GbE SFP28 4-Port OCP Ethernet Adapter	1

Installation priority	Component	PCIe slot priority
8	Management NIC adapter	1
9	OCP module	1, 2

---

## Power on and power off the server

Follow the instructions in this section to power on and power off the server.

### Power on the server

After the server performs a short self-test (power status LED flashes quickly) when connected to input power, it enters a standby state (power status LED flashes once per second).

Power button location and power LED are specified in:

- [Chapter 2 “Server components” on page 17](#)
- [“Troubleshooting by system LEDs and diagnostics display” on page 375](#)

The server can be turned on (power LED on) in any of the following ways:

- You can press the power button.
- The server can restart automatically after a power interruption.
- The server can respond to remote power-on requests sent to the Lenovo XClarity Controller.

For information about powering off the server, see [“Power off the server” on page 64](#).

### Power off the server

The server remains in a standby state when it is connected to a power source, allowing the Lenovo XClarity Controller to respond to remote power-on requests. To remove all power from the server (power status LED off), you must disconnect all power cables.

Power button location and power LED are specified in:

- [Chapter 2 “Server components” on page 17](#)
- [“Troubleshooting by system LEDs and diagnostics display” on page 375](#)

To place the server in a standby state (power status LED flashes once per second):

**Note:** The Lenovo XClarity Controller can place the server in a standby state as an automatic response to a critical system failure.

- Start an orderly shutdown using the operating system (if supported by your operating system).
- Press the power button to start an orderly shutdown (if supported by your operating system).
- Press and hold the power button for more than 4 seconds to force a shutdown.

When in a standby state, the server can respond to remote power-on requests sent to the Lenovo XClarity Controller. For information about powering on the server, see [“Power on the server” on page 64](#).

---

## Server replacement

Follow instructions in this section to remove and install the server.

# Remove the server from rails

## About this task

### S036



18 - 32 kg (39 - 70 lb)



32 - 55 kg (70 - 121 lb)

**CAUTION:**  
Use safe practices when lifting.

### R006



**CAUTION:**  
Do not place any object on top of a rack-mounted device unless that rack-mounted device is intended for use as a shelf.

### S037

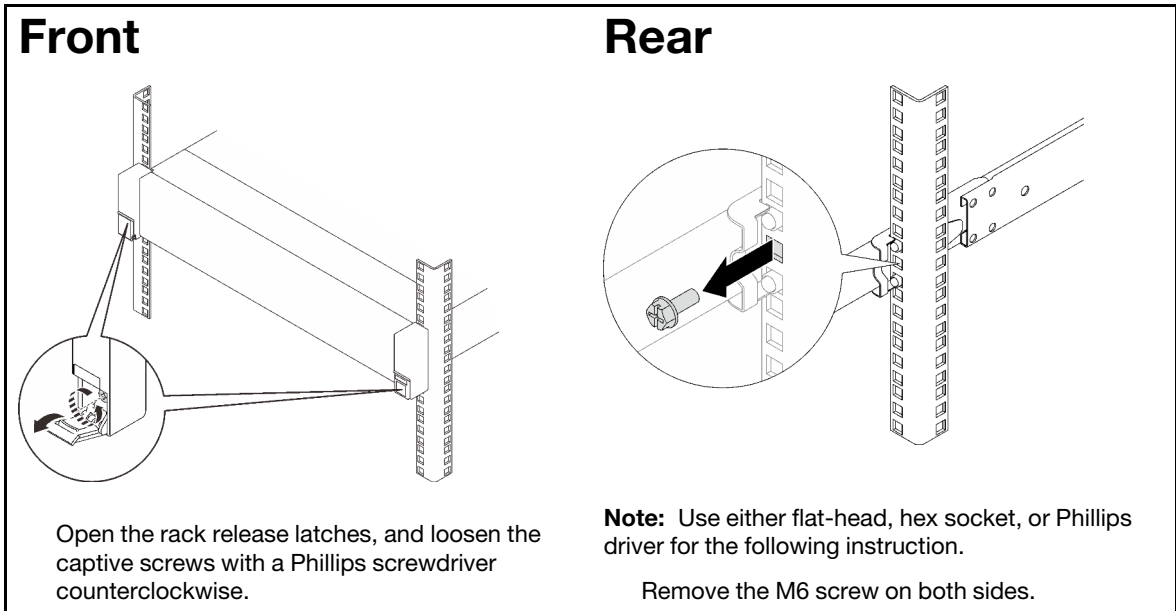


**CAUTION:**  
The weight of this part or unit is more than 55 kg (121.2 lb). It takes specially trained persons, a lifting device, or both to safely lift this part or unit.








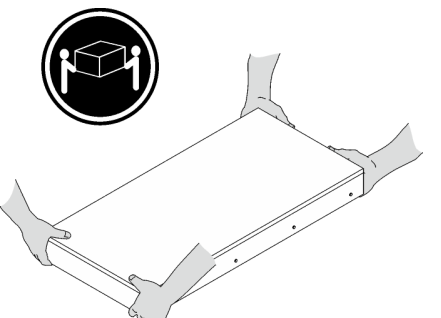
### **Attention:**

- Read [“Installation Guidelines” on page 47](#) and [“Safety inspection checklist” on page 48](#) to ensure that you work safely.
- Power off the server and peripheral devices and disconnect the power cords and all external cables. See [“Power off the server” on page 64](#).
- Prevent exposure to static electricity, which might lead to system halt and loss of data, by keeping static-sensitive components in their static-protective packages until installation, and handling these devices with an electrostatic-discharge wrist strap or other grounding system.

Step 1. Disengage the sever if it has been secured to the rack.



Step 2. Lift the server and place it on a table. Two lifting options are available:

  <p>18-32 kg 39-70 lb</p> <p>For two-person lift, remove the following components beforehand:</p> <ul style="list-style-type: none"> <li>• All the power supply units</li> <li>• All the storage drives</li> </ul>	  <p>32-55 kg 70-121 lb</p>   <p>55-100 kg 121-220 lb</p>  <p>Otherwise, lift the server with three people or a lifting device.</p>
	<p><b>CAUTION:</b> Make sure two people are lifting the server with hands positioned as illustrated.</p>

Step 3. Remove the server along with the inner rails.

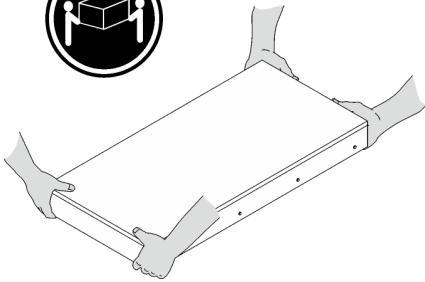


For two-person lift, remove the following components beforehand:

- All the power supply units
- All the storage drives

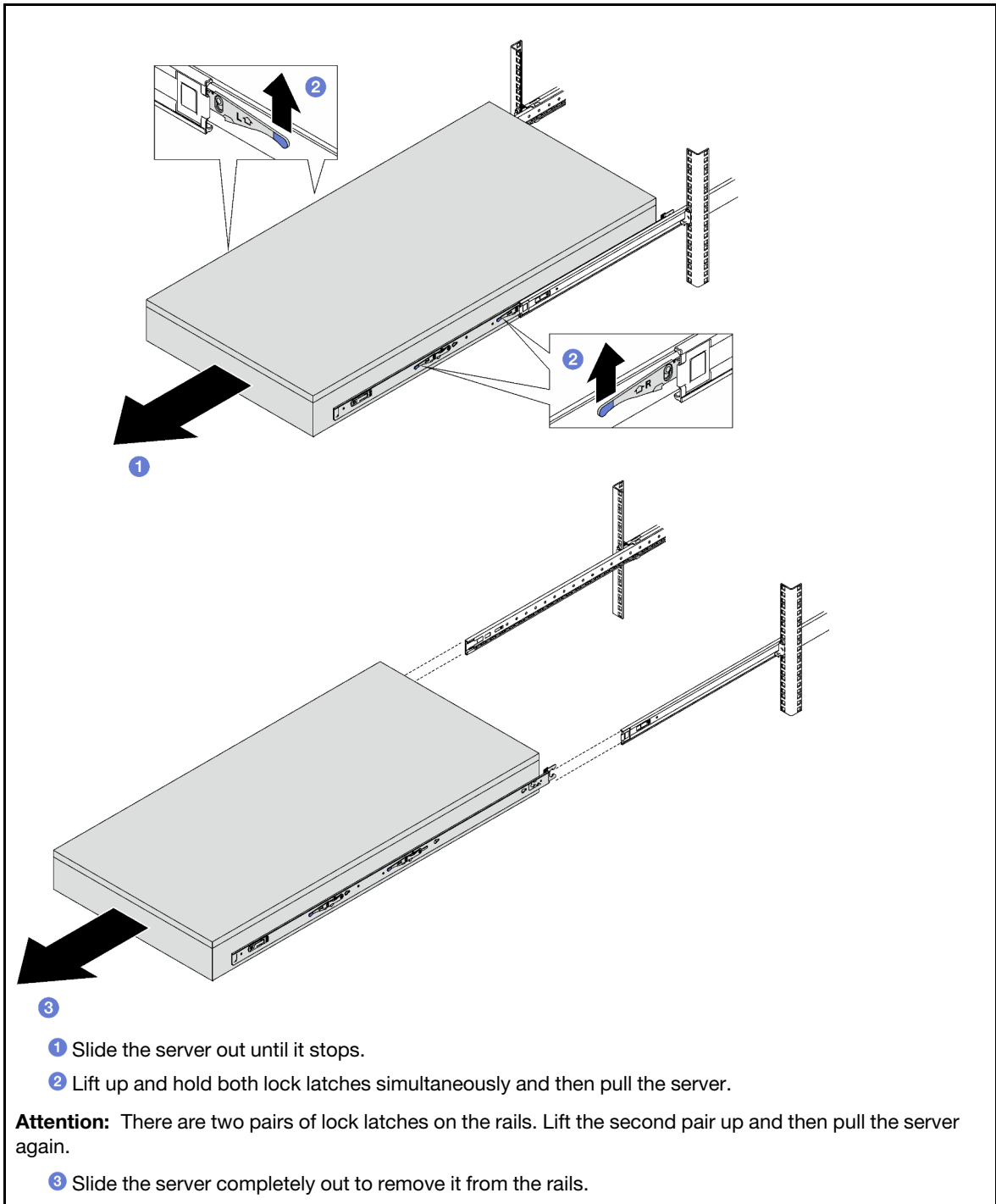


Otherwise, lift the server with three people or a lifting device.

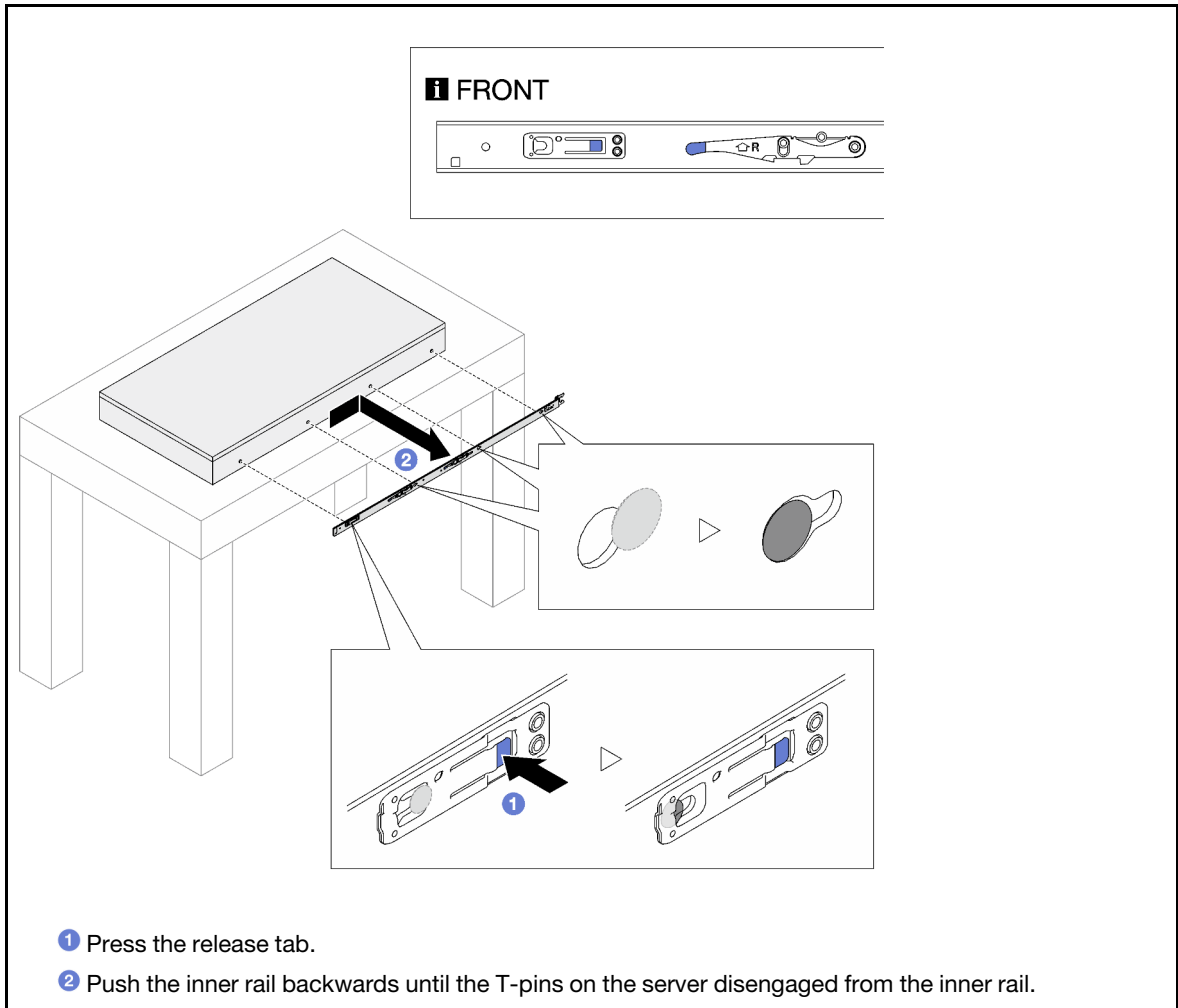


**CAUTION:**

**Make sure two people are lifting the server with hands positioned as illustrated.**



Step 4. Remove the inner rail from the server.



Step 5. Repeat the previous step on the other rail.

## Install the server to rails

### About this task

#### S036



18 - 32 kg (39 - 70 lb)



32 - 55 kg (70 - 121 lb)

**CAUTION:**  
Use safe practices when lifting.

**R006**



**CAUTION:**  
Do not place any object on top of a rack-mounted device unless that rack-mounted device is intended for use as a shelf.

**S037**




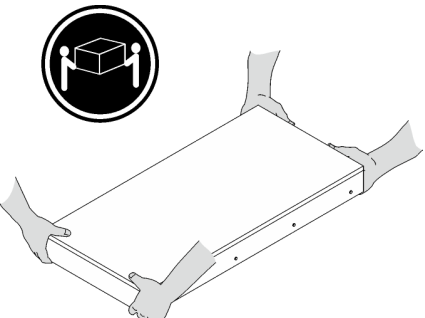


**CAUTION:**  
The weight of this part or unit is more than 55 kg (121.2 lb). It takes specially trained persons, a lifting device, or both to safely lift this part or unit.

**Attention:**

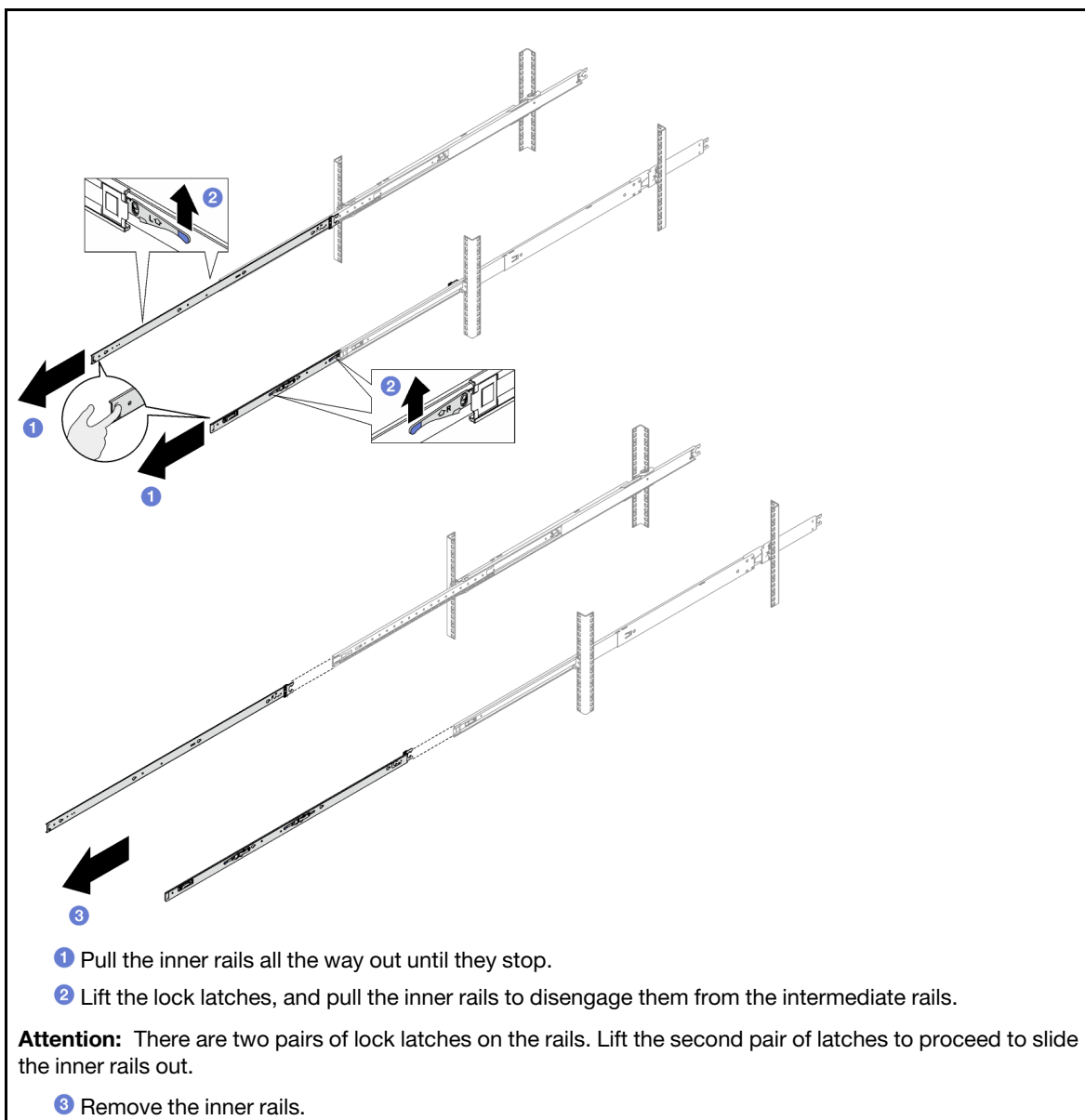
- Read “Installation Guidelines” on page 47 and “Safety inspection checklist” on page 48 to ensure that you work safely.
- Power off the server and peripheral devices and disconnect the power cords and all external cables. See “Power off the server” on page 64.
- Prevent exposure to static electricity, which might lead to system halt and loss of data, by keeping static-sensitive components in their static-protective packages until installation, and handling these devices with an electrostatic-discharge wrist strap or other grounding system.

Step 1. Lift the server and place it on a table. Two lifting options are available:

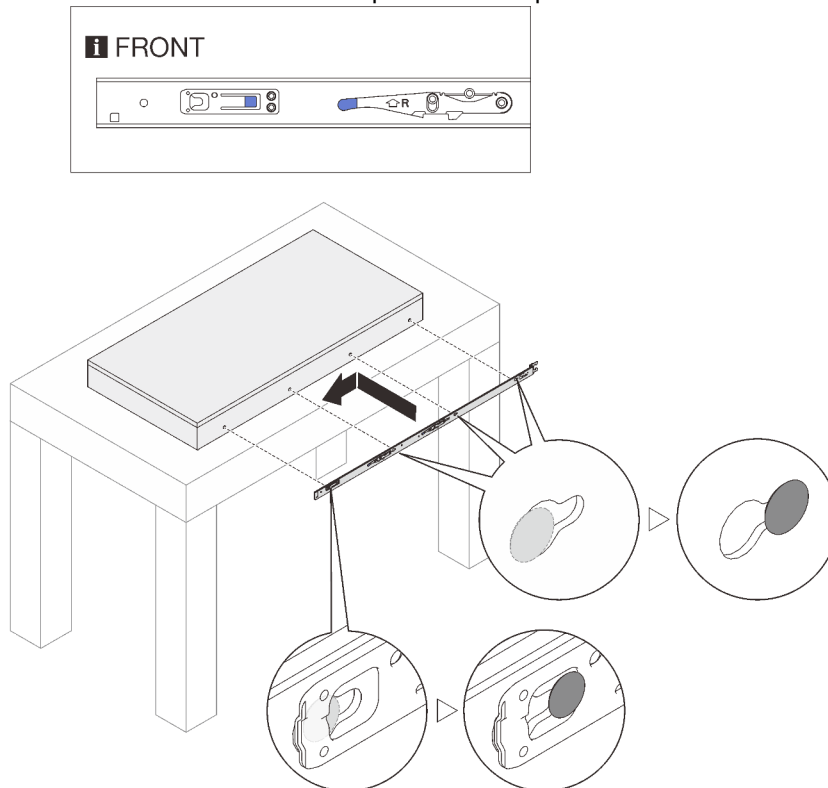
 <p>18-32 kg 39-70 lb</p> <p>For two-person lift, remove the following components beforehand:</p> <ul style="list-style-type: none"> <li>• All the power supply units</li> <li>• All the storage drives</li> </ul>	 <p>32-55 kg 70-121 lb</p>  <p>55-100 kg 121-220 lb</p> <p>Otherwise, lift the server with three people or a lifting device.</p>
 <p><b>CAUTION:</b> Make sure two people are lifting the server with hands positioned as illustrated.</p>	

Step 2. Remove the inner rails from the intermediate rails.



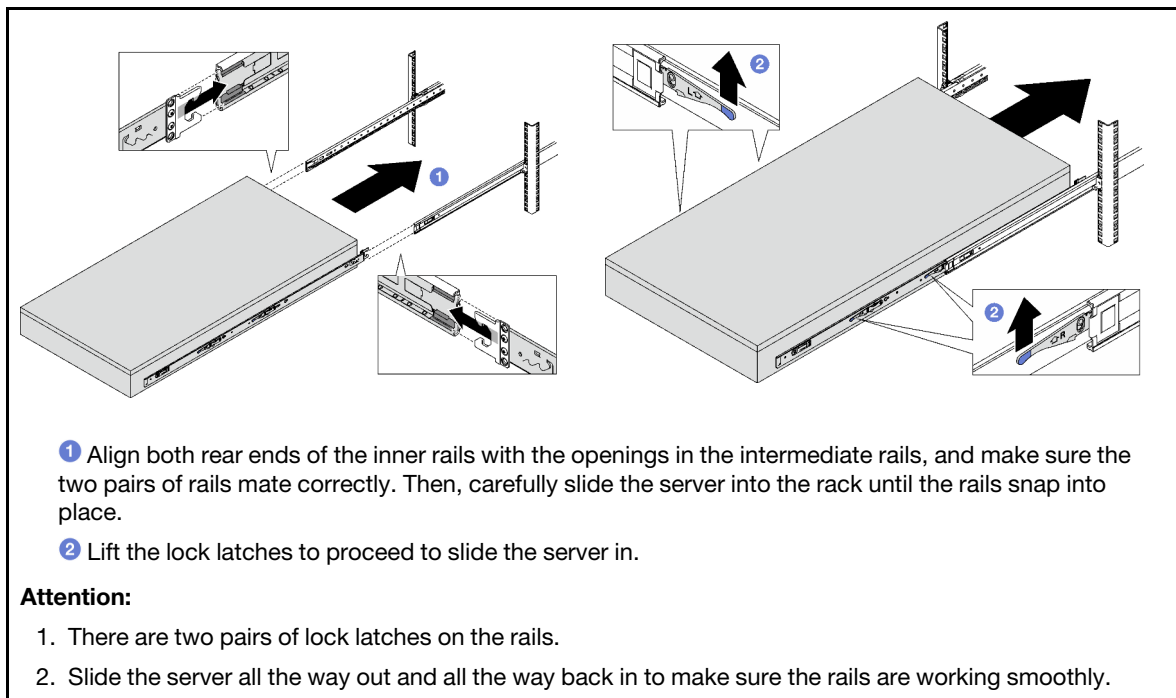


Step 3. Align the slots on the inner rail with the corresponding T-pins on the side of the server; then, slide the inner rail forwards until the T-pins lock into place with the inner rail.



Step 4. Repeat the previous step on the other rail.

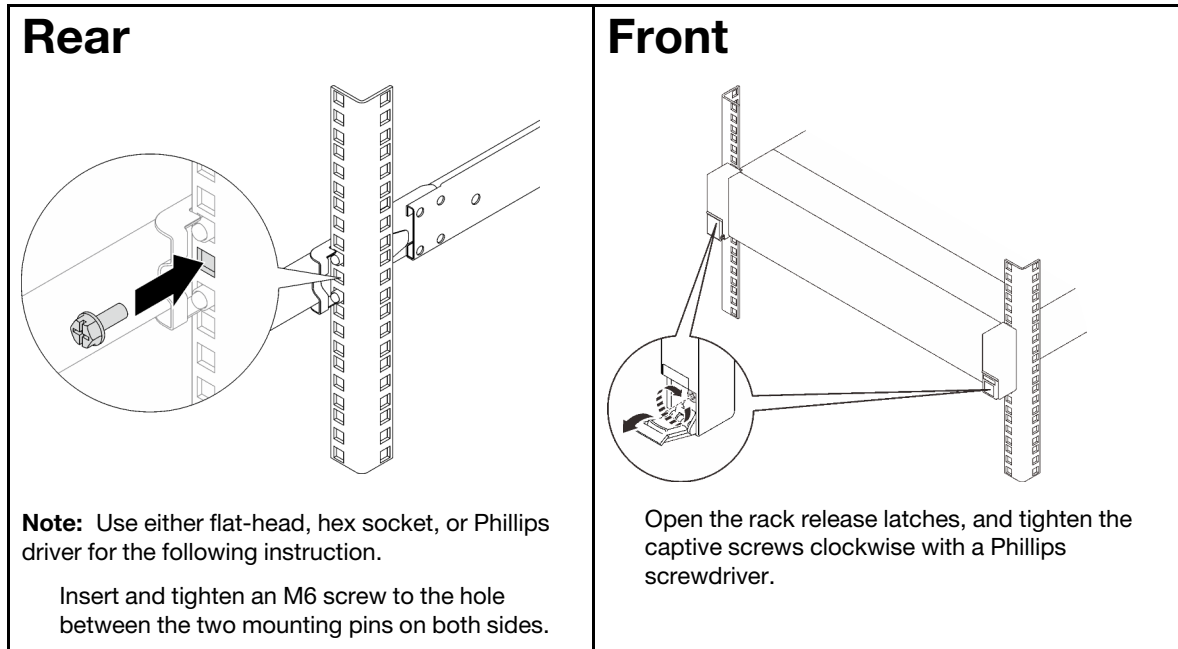
Step 5. Install the server to the rack.



Step 6. Reinstall all the components that were removed previously.

Step 7. (Optional) Secure the server to the rack.

**Attention:** Make sure to secure the screws when shipping on rack.



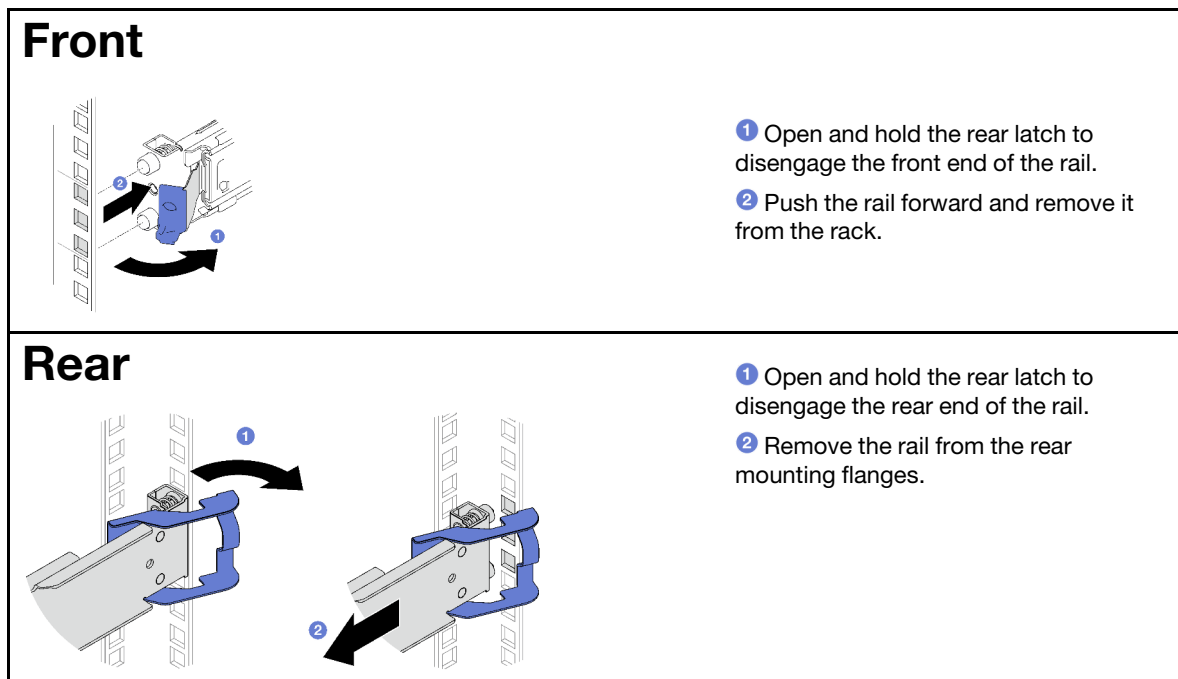
### After you finish

Complete the parts replacement. See [“Complete the parts replacement” on page 233](#).

### Remove the rails from the rack

Step 1. Remove the server from rails. See [“Remove the server from rails” on page 65](#).

Step 2. Remove the rails from the rack.



## After you finish

Install a replacement unit. See the instructions in *Rail Installation Guide* that comes with the rail kit.

---

## 2.5-inch hot-swap drive and backplane replacement

Follow instructions in this section to remove and install a 2.5-inch hot-swap drive and a backplane.

### Remove a 2.5-inch hot-swap drive

Follow instructions in this section to remove a 2.5-inch hot-swap drive.

#### About this task

##### Attention:

- Read [“Installation Guidelines” on page 47](#) and [“Safety inspection checklist” on page 48](#) to ensure that you work safely.
- To make sure that there is adequate system cooling, do not operate the server for more than two minutes without either a drive or a filler installed in each bay.
- If one or more NVMe solid-state drives are to be removed, it is recommended to disable them beforehand via the operating system.
- Before you remove or make changes to drives, drive controllers (including controllers that are integrated on the system board assembly), drive backplanes or drive cables, back up all important data that is stored on drives.
- Before you remove any component of a RAID array (drive, RAID card, etc.), back up all RAID configuration information.

**Note:** Make sure you have the drive bay fillers available if some drive bays will be left empty after the removal.

#### Procedure

- Step 1. ① Slide the release latch to unlock the drive handle.
- Step 2. ② Rotate the drive handle to the open position.
- Step 3. ③ Grasp the handle and slide the drive out of the drive bay.

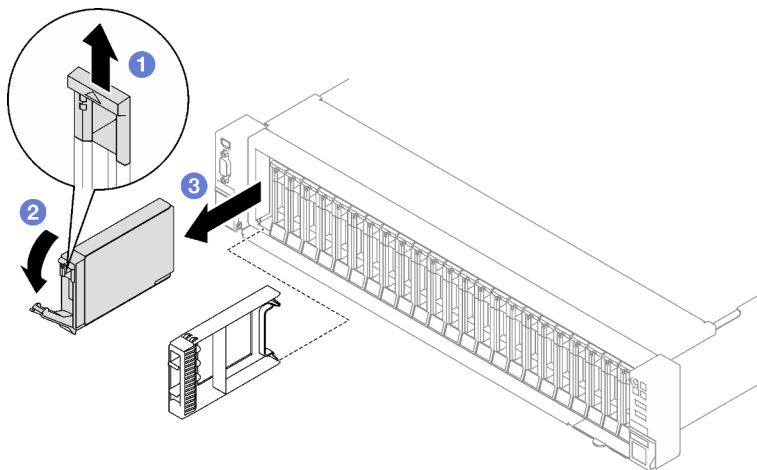


Figure 25. 2.5-inch hot-swap drive removal

## After you finish

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

### Demo video

[Watch the procedure on YouTube](#)

## Remove a 2.5-inch drive backplane

Follow instructions in this section to remove a 2.5-inch drive backplane.

### About this task

#### Attention:

- Read [“Installation Guidelines” on page 47](#) and [“Safety inspection checklist” on page 48](#) to ensure that you work safely.
- Power off the server and peripheral devices and disconnect the power cords and all external cables. See [“Power off the server” on page 64](#).
- If the server is installed in a rack, slide the server out on its rack slide rails to gain access to the top cover, or remove the server from the rack. See [“Remove the server from rails” on page 65](#).

### Procedure

Step 1. Make preparation for this task.

- a. Remove the front top cover. See [“Remove the front top cover” on page 225](#).
- b. Remove all of the fans. See [“Remove a fan” on page 106](#).
- c. Remove the fan cage. See [“Remove the fan cage” on page 107](#).
- d. Remove all of the 2.5-inch hot-swap drives and the drive bay fillers (if any) from the drive bays. See [“Remove a 2.5-inch hot-swap drive” on page 74](#). Place the drives on a static protective surface.
- e. Disconnect the power and signal cables from the 2.5-inch drive backplane.

Step 2. Remove the 2.5-inch drive backplane.

- a. ① Lift and hold the two retention latches on the top of the backplane.
- b. ② Rotate the backplane from the top to disengage it from the retention latches; then, carefully lift the backplane out of the server.

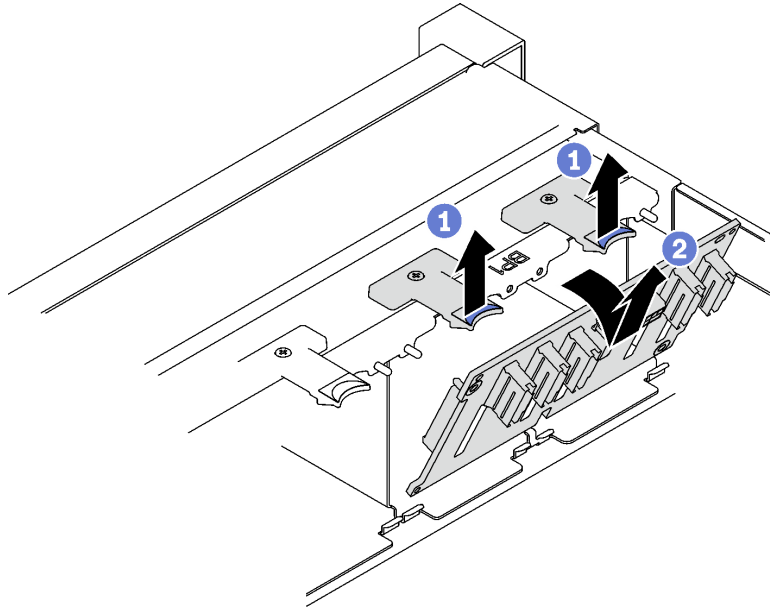


Figure 26. 2.5-inch drive backplane removal

## After you finish

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

## Demo video

[Watch the procedure on YouTube](#)

## Install a 2.5-inch drive backplane

Follow instructions in this section to install a 2.5-inch drive backplane.

## About this task

### Attention:

- Read [“Installation Guidelines” on page 47](#) and [“Safety inspection checklist” on page 48](#) to ensure that you work safely.
- Touch the static-protective package that contains the component to any unpainted metal surface on the server; then, remove it from the package and place it on a static-protective surface.
- The server supports up to three 2.5-inch drive backplanes with the following corresponding drive backplane numbers.

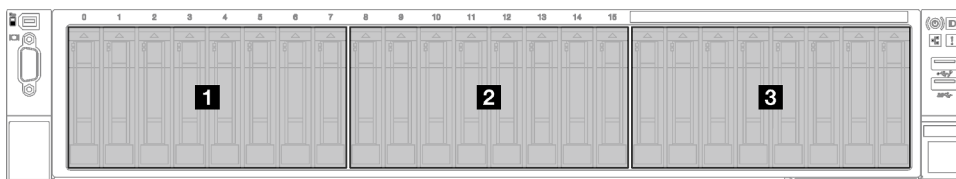


Figure 27. 2.5-inch drive backplane numbering

## Procedure

- Step 1. ① Align the tabs on the bottom of the 2.5-inch drive backplane with the slots on the chassis, and insert them into the slots.
- Step 2. ② Push the top of the backplane forward until it clicks into place.

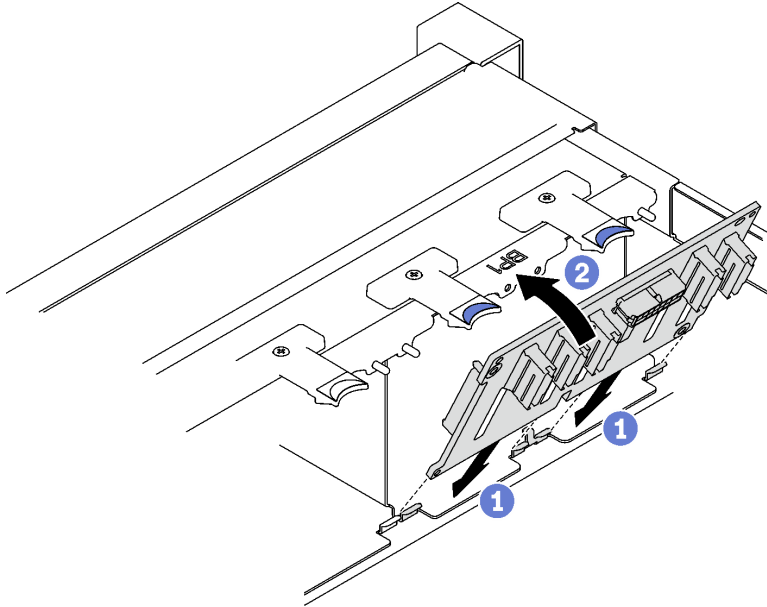


Figure 28. 2.5-inch drive backplane installation

## After you finish

1. Reconnect the power and signal cables to the 2.5-inch drive backplane.
2. Reinstall the fan cage. See [“Install the fan cage” on page 109](#).
3. Reinstall the fans. See [“Install a fan” on page 111](#).
4. Reinstall the 2.5-inch hot-swap drives or drive bay fillers (if any) into the drive bays. See [“Install a 2.5-inch hot-swap drive” on page 77](#).
5. Complete the parts replacement. See [“Complete the parts replacement” on page 233](#).
6. If you have installed 2.5-inch drive backplane with U.3 NVMe drives for Trimode. Enable U.3 x1 mode for the selected drive slots on the backplane through the XCC web GUI. See [“U.3 NVMe drive can be detected in NVMe connection, but cannot be detected in Tri-mode” on page 408](#).

## Demo video

[Watch the procedure on YouTube](#)

## Install a 2.5-inch hot-swap drive

Follow instructions in this section to install a 2.5-inch hot-swap drive.

## About this task

### Attention:

- Read [“Installation Guidelines” on page 47](#) and [“Safety inspection checklist” on page 48](#) to ensure that you work safely.

- Touch the static-protective package that contains the component to any unpainted metal surface on the server; then, remove it from the package and place it on a static-protective surface.
- Make sure you save the data on your drive, especially if it is part of a RAID array, before you remove it from the server.
- To make sure that there is adequate system cooling, do not operate the server for more than two minutes without either a drive or a drive bay filler installed in each bay.
- Before you make changes to drives, drive controllers (including controllers that are integrated on the system board assembly), drive backplanes, or drive cables, back up all important data that is stored on drives.
- Before you remove any component of a RAID array (drive, RAID card, etc.), back up all RAID configuration information.

**Firmware and driver download:** You might need to update the firmware or driver after replacing a component.

- Go to <https://datacentersupport.lenovo.com/tw/en/products/servers/thinksystem/sr850v3/7d96/downloads/driver-list/> to see the latest firmware and driver updates for your server.
- Go to “[Update the firmware](#)” on [page 365](#) for more information on firmware updating tools.

## Procedure

Step 1. If the drive bay contains a filler, pull the release lever on the filler and slide it out of the bay.

Step 2. Install the 2.5-inch hot-swap drive.

- 1 Make sure that the drive handle is in the open position. Then, align the drive with the guide rails in the bay, and gently slide the drive into the bay until it stops.
- 2 Rotate the drive handle to the fully closed position until the handle latch clicks.

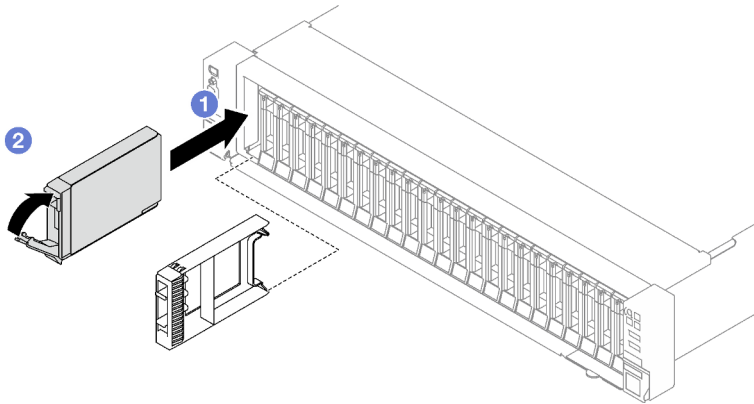


Figure 29. 2.5-inch hot-swap drive installation

## After you finish

1. Check the drive status LED to verify that the drive is operating correctly.
  - If the yellow drive status LED of a drive is lit continuously, that drive is faulty and must be replaced.
  - If the green drive activity LED is flashing, the drive is being accessed.
2. If the server is configured for RAID operation through a ThinkSystem RAID adapter, you might have to reconfigure your disk arrays after you install drives. See the ThinkSystem RAID adapter documentation for additional information about RAID operation and complete instructions for using ThinkSystem RAID adapter.



3. If you have installed 2.5-inch drive backplane with U.3 NVMe drives for Trimode. Enable U.3 x1 mode for the selected drive slots on the backplane through the XCC web GUI. See [“U.3 NVMe drive can be detected in NVMe connection, but cannot be detected in Tri-mode” on page 408](#).

### Demo video

[Watch the procedure on YouTube](#)

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## 7mm drive and drive cage replacement

Follow instructions in this section to remove and install a 7mm drive and the drive cage.

### Remove a 7mm drive

Follow instructions in this section to remove a 7mm drive.

### About this task

#### Attention:

- Read [“Installation Guidelines” on page 47](#) and [“Safety inspection checklist” on page 48](#) to ensure that you work safely.
- To make sure that there is adequate system cooling, do not operate the solution for more than two minutes without either a drive or a filler installed in each bay.
- Before you make changes to drives, drive controllers (including controllers that are integrated on the system board assembly), drive backplanes, or drive cables, back up all important data that is stored on drives.
- Before you remove any component of a RAID array (drive, RAID card, etc.), back up all RAID configuration information.

**Note:** Make sure you have the drive bay fillers available if some drive bays will be left empty after the removal.

- Step 1. ① Slide the release latch to unlock the drive handle.
- Step 2. ② Rotate the drive handle to the open position.
- Step 3. ③ Grasp the handle and slide the drive out of the drive bay.

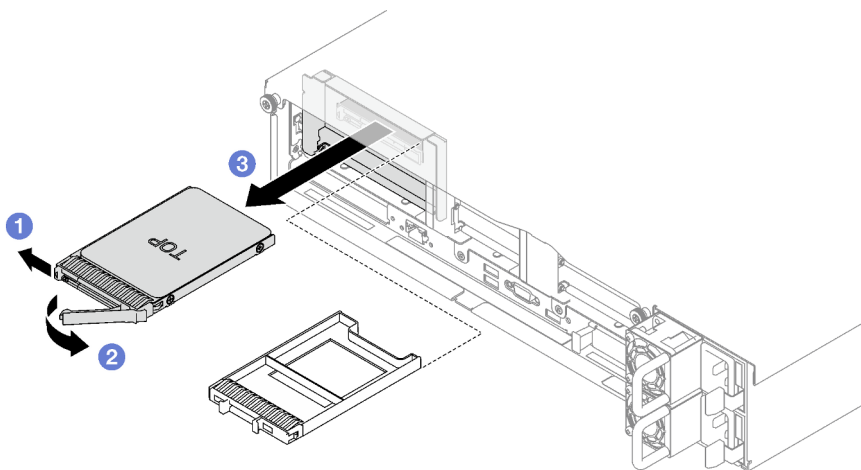


Figure 30. 7mm drive removal

## After you finish

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

### Demo video

[Watch the procedure on YouTube](#)

## Remove the 7mm drive cage

Follow instructions in this section to remove the 7mm drive cage.

### About this task

#### Attention:

- Read [“Installation Guidelines” on page 47](#) and [“Safety inspection checklist” on page 48](#) to ensure that you work safely.
- Power off the server and peripheral devices and disconnect the power cords and all external cables. See [“Power off the server” on page 64](#).
- If the server is installed in a rack, remove it from the rack. See [“Remove the server from rails” on page 65](#).

### Procedure

Step 1. Make preparation for this task.

- a. Remove the front top cover. See [“Remove the front top cover” on page 225](#).
- b. Remove the rear top cover. See [“Remove the rear top cover” on page 227](#).
- c. Remove all of the 7mm drives and the drive bay fillers (if any) from the drive bays. See [“Remove a 7mm drive” on page 79](#). Place the drives on a static protective surface.
- d. Slightly lift the PCIe riser, and disconnect the power and signal cables from the 7mm drive backplanes.
- e. Remove the PCIe riser where the 7mm drive cage has been installed. See [“Remove a PCIe riser” on page 145](#).

Step 2. Remove the 7mm drive cage.

- a. ① Remove the two screws from the top of the PCIe riser.
- b. ② Remove the screw that secures the drive cage to the PCIe riser.
- c. ③ Rotate the drive cage to remove it from the PCIe riser.

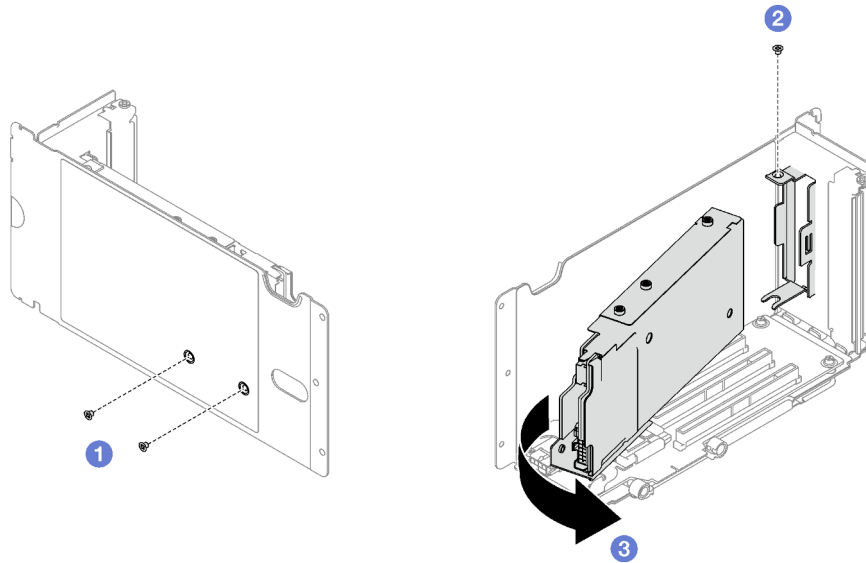


Figure 31. 7mm drive cage removal

- Step 3. If necessary, remove the two 7mm drive backplanes from the drive cage.
- a. ① Remove the two screws from the upper backplane; then, tilt the upper backplane at an angle and remove it from the lower backplane.
  - b. ② Remove the screw from the lower backplane; then, slide the lower backplane out of the drive cage.

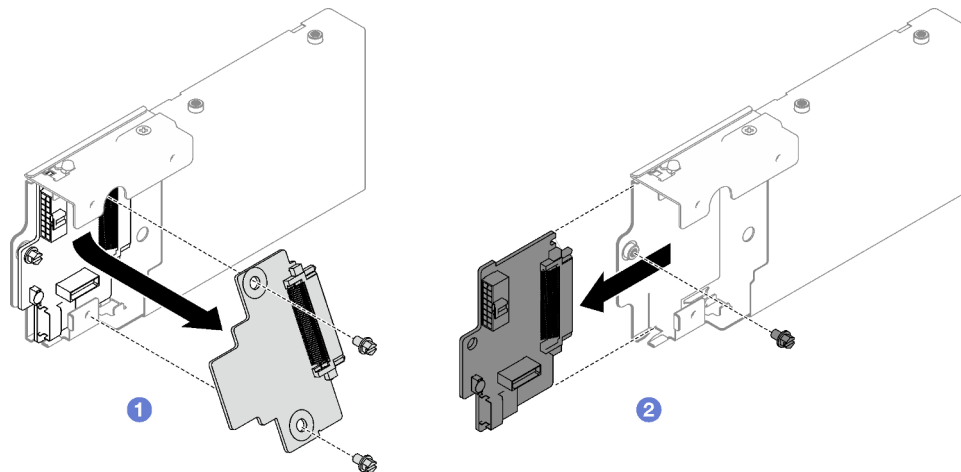


Figure 32. 7mm drive backplane removal

## After you finish

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

## Demo video

[Watch the procedure on YouTube](#)

## Install the 7mm drive cage

Follow instructions in this section to install the 7mm drive cage.

### About this task

#### Attention:

- Read “[Installation Guidelines](#)” on page 47 and “[Safety inspection checklist](#)” on page 48 to ensure that you work safely.
- Touch the static-protective package that contains the component to any unpainted metal surface on the server; then, remove it from the package and place it on a static-protective surface.

### Procedure

Step 1. If necessary, install the two 7mm drive backplanes to the drive cage.

- 1 Slide the lower backplane into the drive cage; then, install the screw to secure the lower backplane to the drive cage.
- 2 Tilt the upper backplane at an angle and insert it into the drive cage; then, install the two screws to secure the upper backplane to the lower backplane.

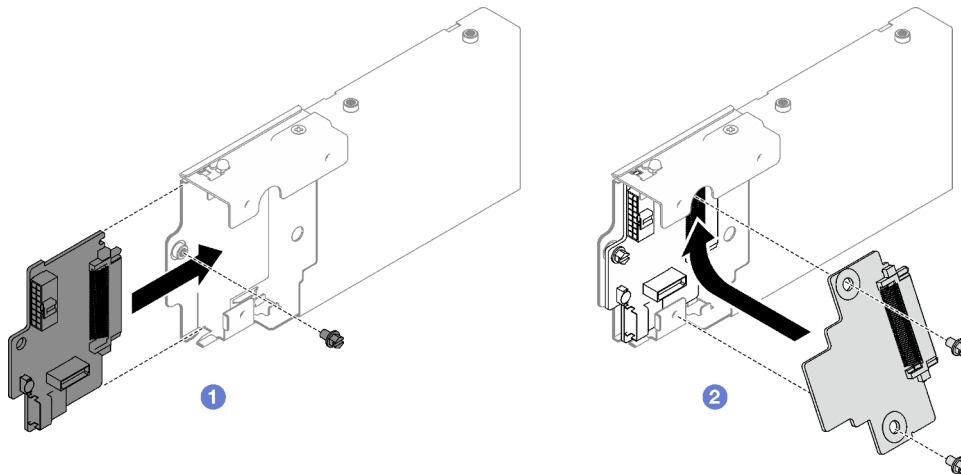


Figure 33. 7mm drive backplane installation

Step 2. Install the 7mm drive cage.

- 1 Align the drive cage with the slot on the PCIe riser.
- 2 Rotate the other end of the drive cage inwards.
- 3 Install the screw to secure the drive cage to the PCIe riser.
- 4 Install the two screws on the top of the PCIe riser.

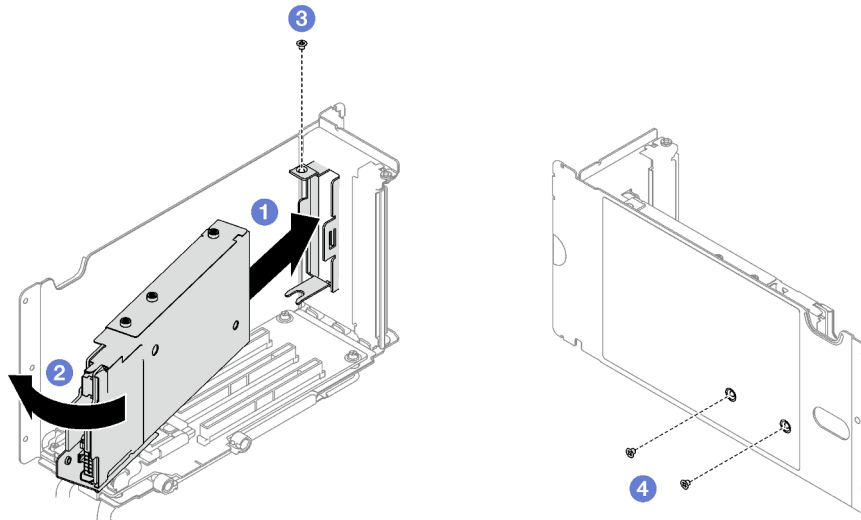


Figure 34. 7mm drive cage installation

## After you finish

1. Reconnect the power and signal cables to the 7mm drive backplanes.
2. Reinstall the PCIe riser. See [“Install a PCIe riser” on page 152](#).
3. Reinstall the 7mm drives or the drive bay fillers (if any) into the drive bays. See [“Install a 7mm drive” on page 83](#).
4. Complete the parts replacement. See [“Complete the parts replacement” on page 233](#).

## Demo video

[Watch the procedure on YouTube](#)

## Install a 7mm drive

Follow instructions in this section to install a 7mm drive.

## About this task

### Attention:

- Read [“Installation Guidelines” on page 47](#) and [“Safety inspection checklist” on page 48](#) to ensure that you work safely.
- Touch the static-protective package that contains the component to any unpainted metal surface on the server; then, remove it from the package and place it on a static-protective surface.
- Make sure you save the data on your drive, especially if it is part of a RAID array, before you remove it from the server.
- To make sure that there is adequate system cooling, do not operate the server for more than two minutes without either a drive or a drive bay filler installed in each bay.
- Before you make changes to drives, drive controllers (including controllers that are integrated on the system board assembly), drive backplanes, or drive cables, back up all important data that is stored on drives.
- Before you remove any component of a RAID array (drive, RAID card, etc.), back up all RAID configuration information.

**Firmware and driver download:** You might need to update the firmware or driver after replacing a component.

- Go to <https://datacentersupport.lenovo.com/tw/en/products/servers/thinksystem/sr850v3/7d96/downloads/driver-list/> to see the latest firmware and driver updates for your server.
- Go to “Update the firmware” on page 365 for more information on firmware updating tools.

## Procedure

Step 1. If the drive bay contains a filler, pull the release lever on the filler and slide it out of the bay.

Step 2. Install the 7mm drive.

1. Make sure that the drive handle is in the open position. Then, align the drive with the guide rails in the bay, and gently slide the drive into the bay until it stops.
2. Rotate the drive handle to the fully closed position until the handle latch clicks.

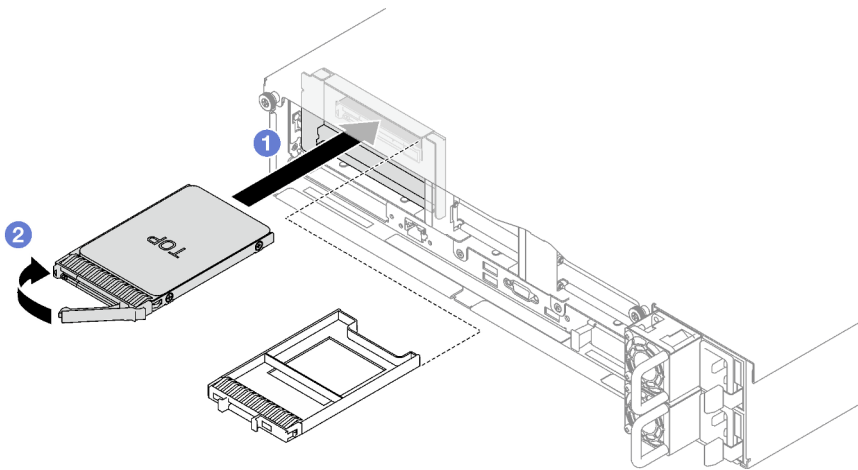


Figure 35. 7mm drive installation

## After you finish

1. Check the drive status LED to verify that the drive is operating correctly.
  - If the yellow drive status LED of a drive is lit continuously, that drive is faulty and must be replaced.
  - If the green drive activity LED is flashing, the drive is being accessed.
2. If the server is configured for RAID operation through a ThinkSystem RAID adapter, you might have to reconfigure your disk arrays after you install drives. See the ThinkSystem RAID adapter documentation for additional information about RAID operation and complete instructions for using ThinkSystem RAID adapter.

## Demo video

[Watch the procedure on YouTube](#)

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## Air baffle replacement

Follow instructions in this section to remove and install the air baffle.

### Remove the front air baffle

Follow instructions in this section to remove the front air baffle.

## About this task

### Attention:

- Read [“Installation Guidelines” on page 47](#) and [“Safety inspection checklist” on page 48](#) to ensure that you work safely.
- Power off the server and peripheral devices and disconnect the power cords and all external cables. See [“Power off the server” on page 64](#).
- If the server is installed in a rack, remove it from the rack. See [“Remove the server from rails” on page 65](#).
- If you intend to install memory modules in the server, you must first remove the air baffle from the server.

### Procedure

- Step 1. Remove the front top cover. See [“Remove the front top cover” on page 225](#).
- Step 2. If a flash power module is installed on the front air baffle, disconnect the flash power module cable from the extension cable.

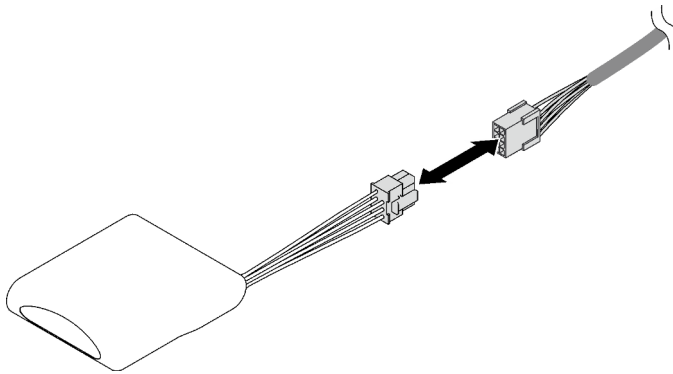


Figure 36. Flash power module cable disconnection

- Step 3. If the M.2 backplane is installed on the front air baffle, disconnect the M.2 backplane cables from the M.2 backplane.
  - **SATA/NVMe M.2 backplane**
    1. ① Loosen the screw that secures the M.2 backplane cables.
    2. ② Disconnect the cables from the M.2 backplane.

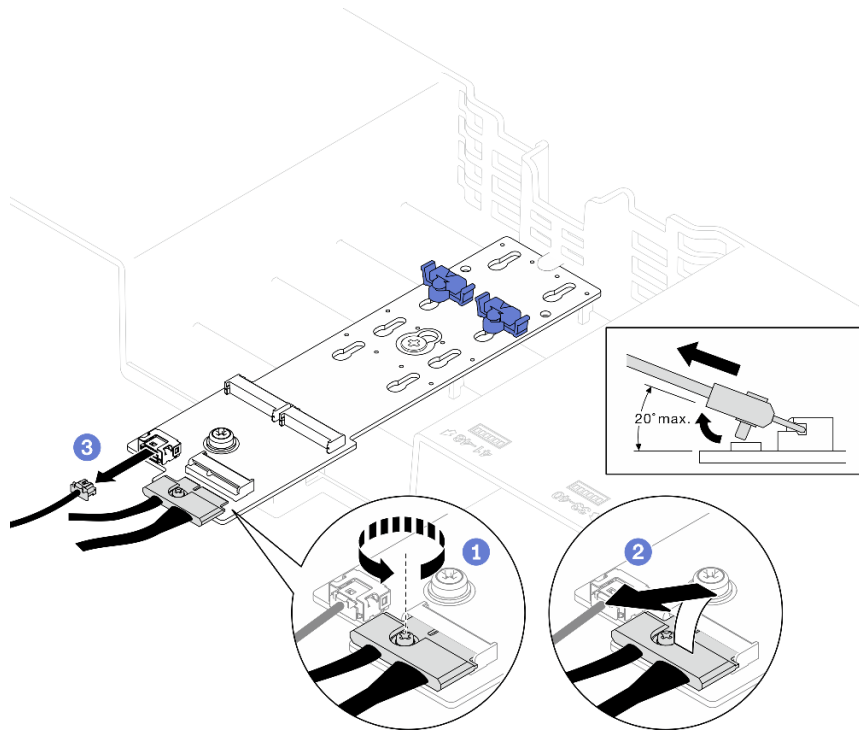


Figure 37. SATA/NVMe M.2 backplane cable disconnection

- **SATA/x4 NVMe M.2 backplane**

Disconnect the M.2 backplane cables from the M.2 backplane.

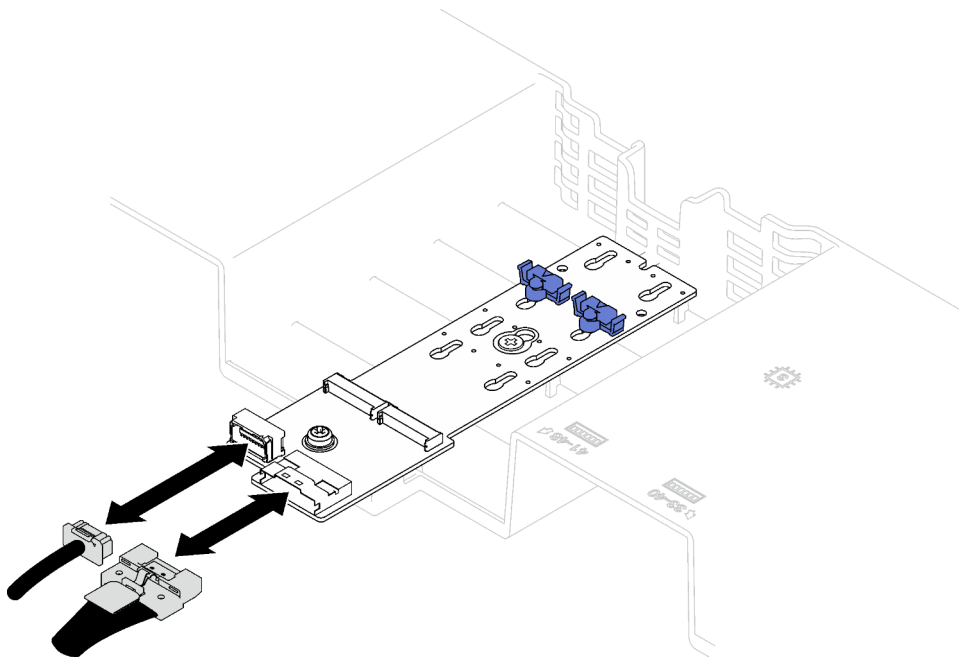


Figure 38. SATA/x4 NVMe M.2 backplane cable disconnection

- Step 4. Lift the cables routed through the front air baffle and set them aside.
- Step 5. Grasp the front air baffle and carefully lift it out of the chassis.



**Attention:** For proper cooling and airflow, reinstall the front air baffle and the rear air baffle before you turn on the server. Operating the server with the air baffle removed might damage server components.

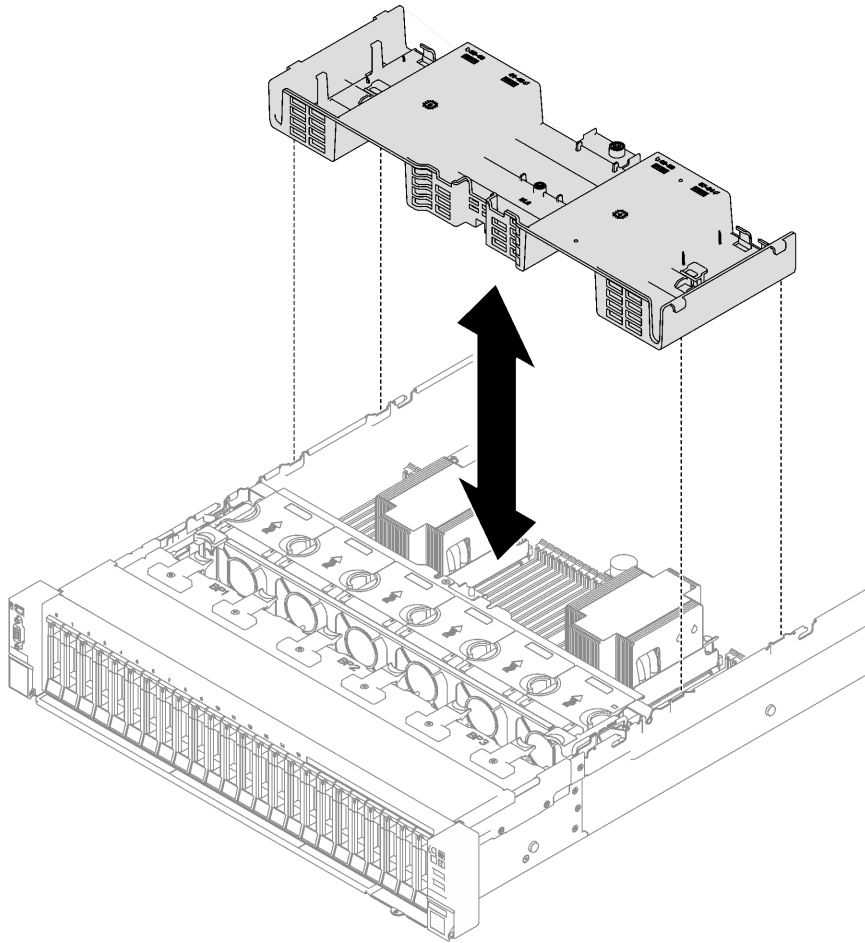


Figure 39. Front air baffle removal

## After you finish

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

## Demo video

[Watch the procedure on YouTube](#)

## Install the front air baffle

Follow instructions in this section to install the front air baffle.

## About this task

**Attention:** Read [“Installation Guidelines” on page 47](#) and [“Safety inspection checklist” on page 48](#) to ensure that you work safely.

## Procedure

Step 1. Align the front air baffle tabs with the front air baffle slots on both sides of the chassis; then, lower the front air baffle into the server until it is securely seated.

**Note:** Close the retaining clip on each end of the memory module connector before installing the front air baffle for proper cooling.

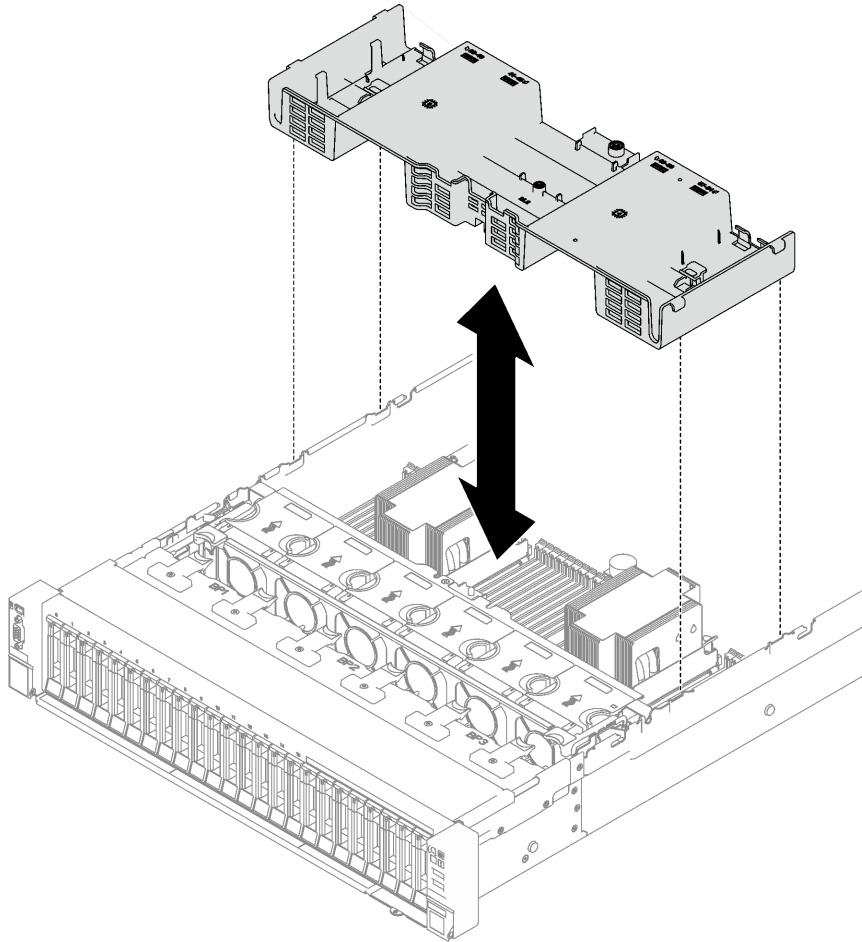


Figure 40. Front air baffle installation

Step 2. Slightly press the front air baffle down until it is securely seated.

## After you finish

1. Route the cables through the front air baffle.
2. If needed, reconnect the M.2 backplane cables to the M.2 backplane.
  - **SATA/NVMe M.2 backplane**
    - a. ① Connect the M.2 backplane cables to the M.2 backplane.
    - b. ② Fasten the screw to secure the M.2 backplane cables to the M.2 backplane.

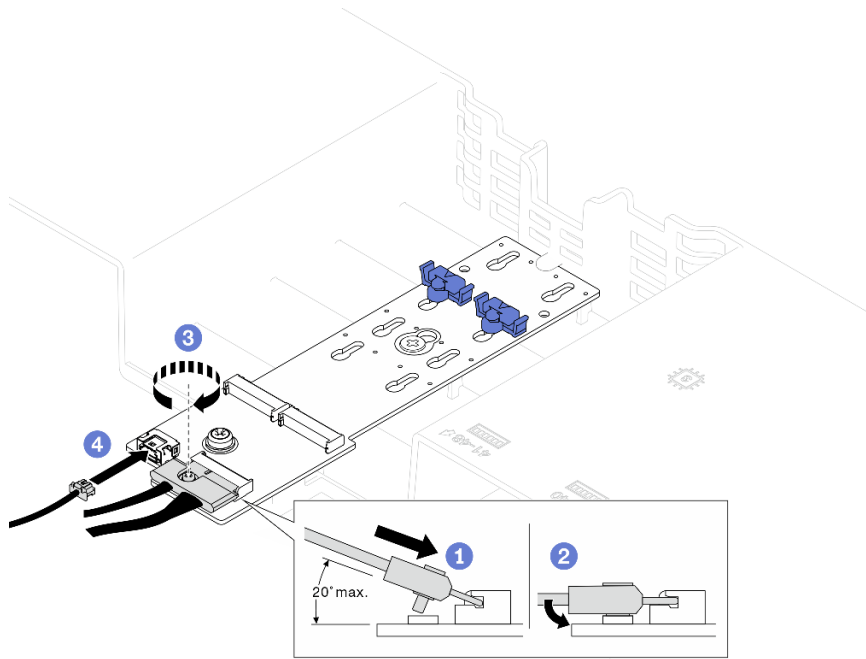


Figure 41. SATA/NVMe M.2 backplane cable connection

- **SATA/x4 NVMe M.2 backplane**

Reconnect the M.2 backplane cables from the M.2 backplane.

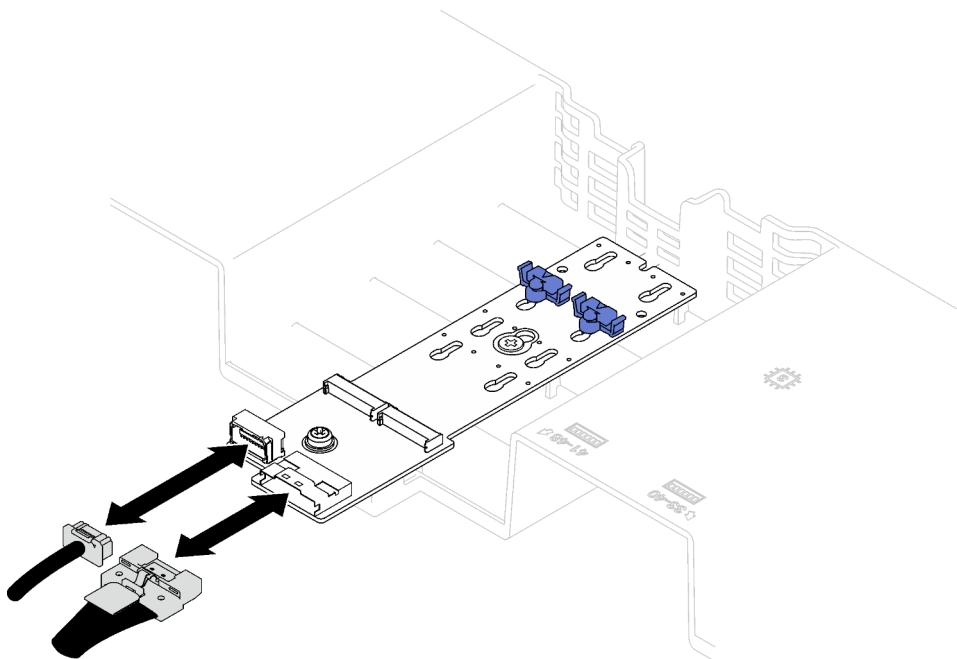


Figure 42. SATA/x4 NVMe M.2 backplane cable connection

3. If needed, reconnect the flash power module cable to the extension cable.

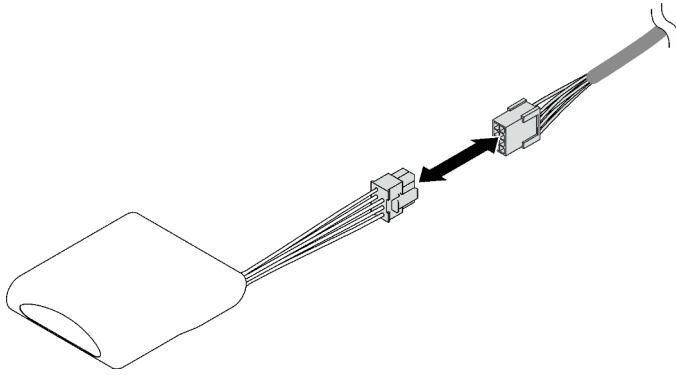


Figure 43. Flash power module cable connection

4. Complete the parts replacement. See [“Complete the parts replacement” on page 233](#).

### Demo video

[Watch the procedure on YouTube](#)

## Remove the rear air baffle

Follow instructions in this section to remove the rear air baffle.

### About this task

#### Attention:

- Read [“Installation Guidelines” on page 47](#) and [“Safety inspection checklist” on page 48](#) to ensure that you work safely.
- Power off the server and peripheral devices and disconnect the power cords and all external cables. See [“Power off the server” on page 64](#).
- If the server is installed in a rack, remove it from the rack. See [“Remove the server from rails” on page 65](#).
- If you intend to install memory modules in the server, you must first remove the air baffle from the server.

### Procedure

- Step 1. Make preparation for this task.
  - a. Remove the front top cover. See [“Remove the front top cover” on page 225](#).
  - b. Remove the FHFL risers if necessary. See [“Remove a PCIe riser” on page 145](#).
- Step 2. If a flash power module is installed on the front air baffle, disconnect the flash power module cable from the extension cable.

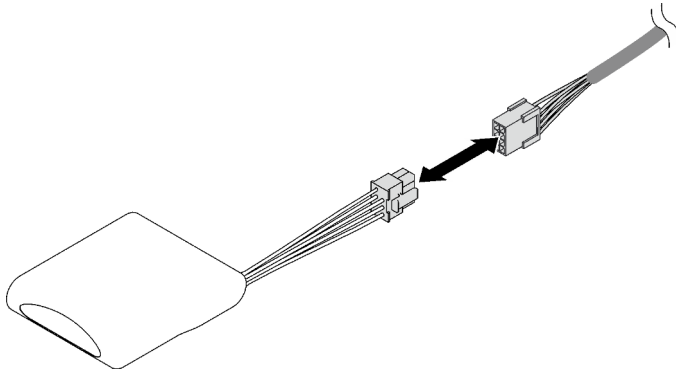


Figure 44. Flash power module cable disconnection

Step 3. If the M.2 backplane is installed on the front air baffle, disconnect the M.2 backplane cables from the M.2 backplane.

- **SATA/NVMe M.2 backplane**

1. ① Loosen the screw that secures the M.2 backplane cables.
2. ② Disconnect the cables from the M.2 backplane.

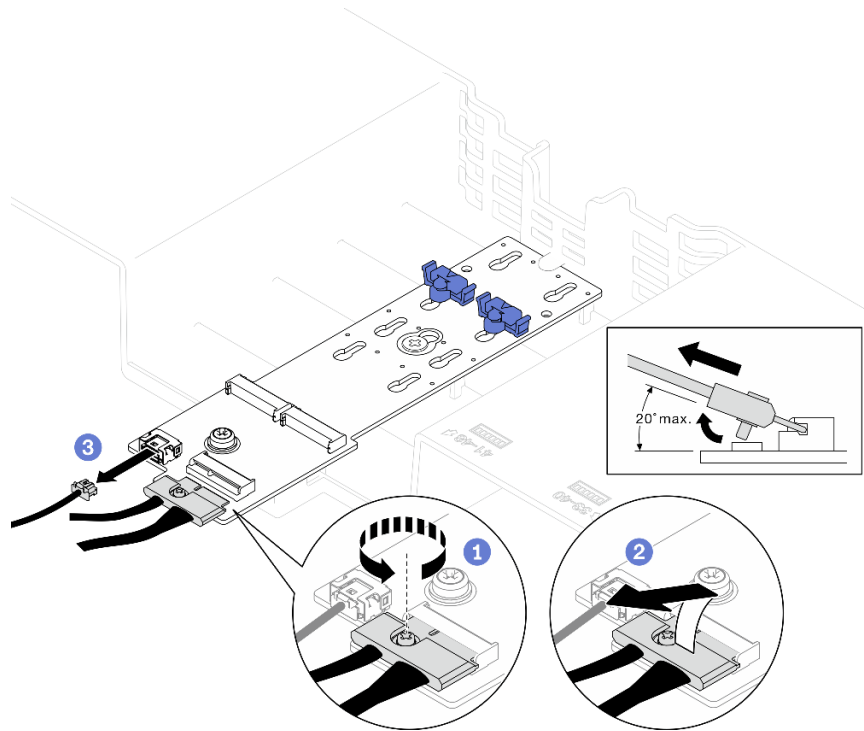


Figure 45. SATA/NVMe M.2 backplane cable disconnection

- **SATA/x4 NVMe M.2 backplane**

Disconnect the M.2 backplane cables from the M.2 backplane.

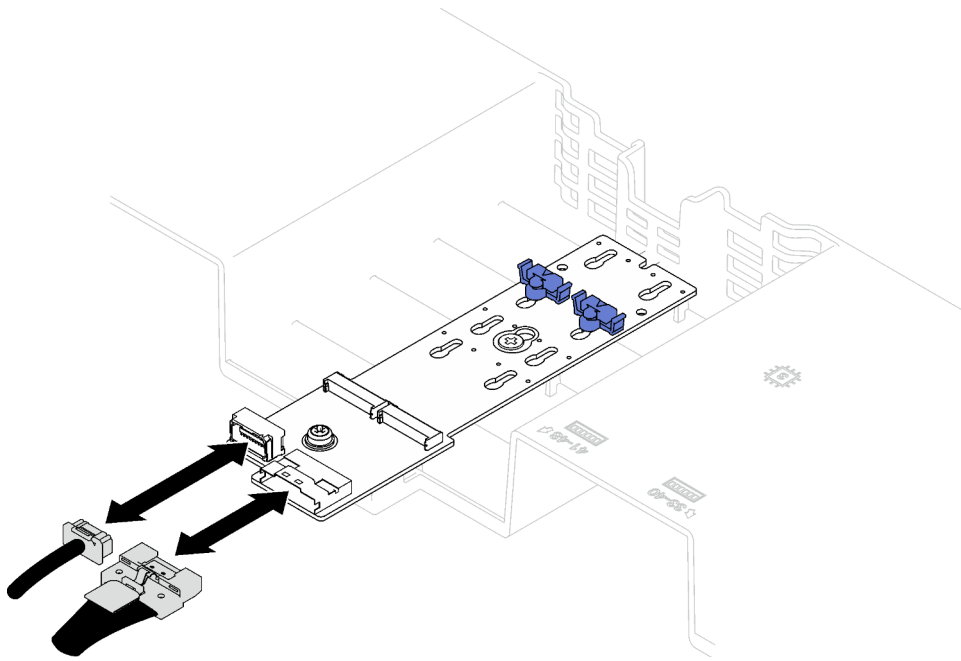


Figure 46. SATA/x4 NVMe M.2 backplane cable disconnection

Step 4. Disconnect all PCIe riser cables from the system board assembly.

Step 5. Remove the rear air baffle.

- a. 1 Slightly push the right and left blue tabs inward toward the center of the server.
- b. 2 Lift the rear air baffle and remove it from the chassis.

**Attention:** For proper cooling and airflow, reinstall the front air baffle and the rear air baffle before you turn on the server. Operating the server with the air baffle removed might damage server components.

**Note:** The rear air baffle might look different from the illustration.

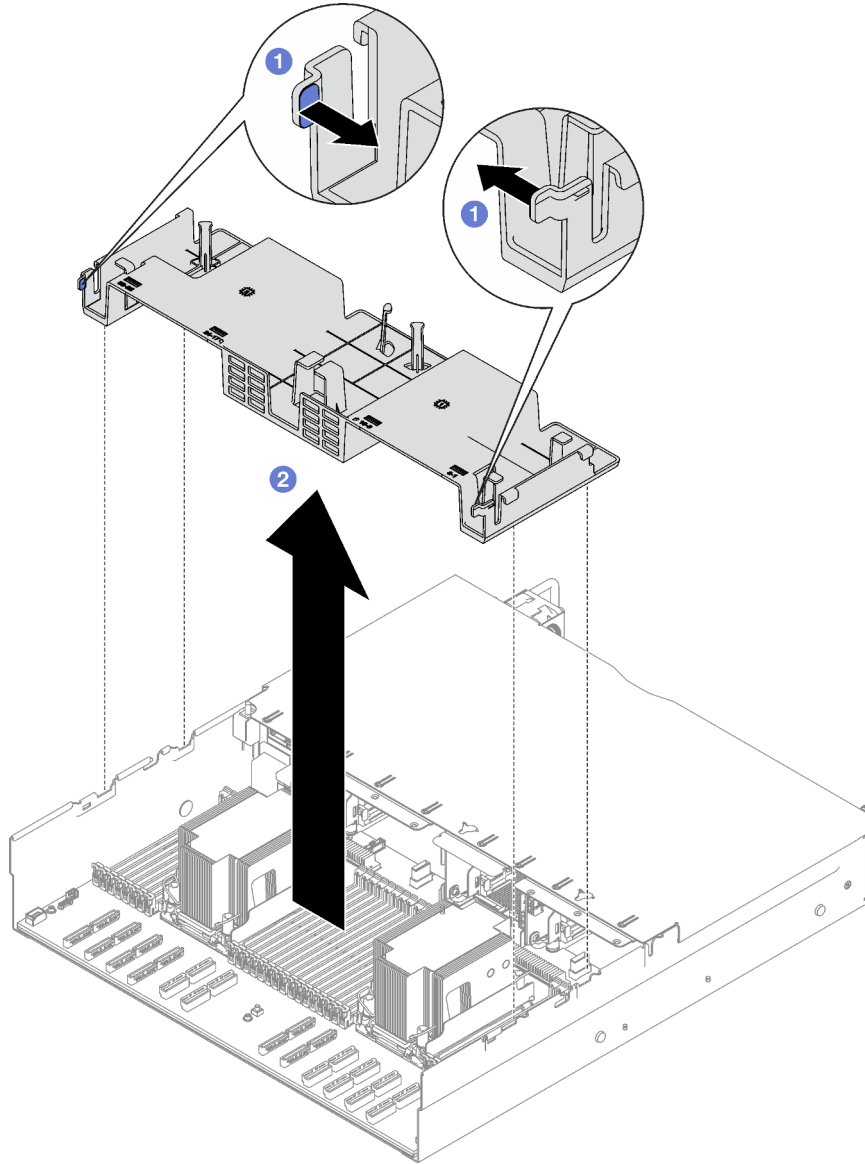


Figure 47. Rear air baffle removal

## After you finish

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

## Demo video

[Watch the procedure on YouTube](#)

## Install the rear air baffle

Follow instructions in this section to install the rear air baffle.

### About this task

**Attention:** Read “[Installation Guidelines](#)” on page 47 and “[Safety inspection checklist](#)” on page 48 to ensure that you work safely.

### Procedure

Step 1. Align the rear air baffle tabs with the rear air baffle slots on both sides of the chassis; then, lower the rear air baffle into the server.

#### Notes:

- Close the retaining clip on each end of the memory module connector before installing the rear air baffle for proper cooling.
- The rear air baffle might look different from the illustration.

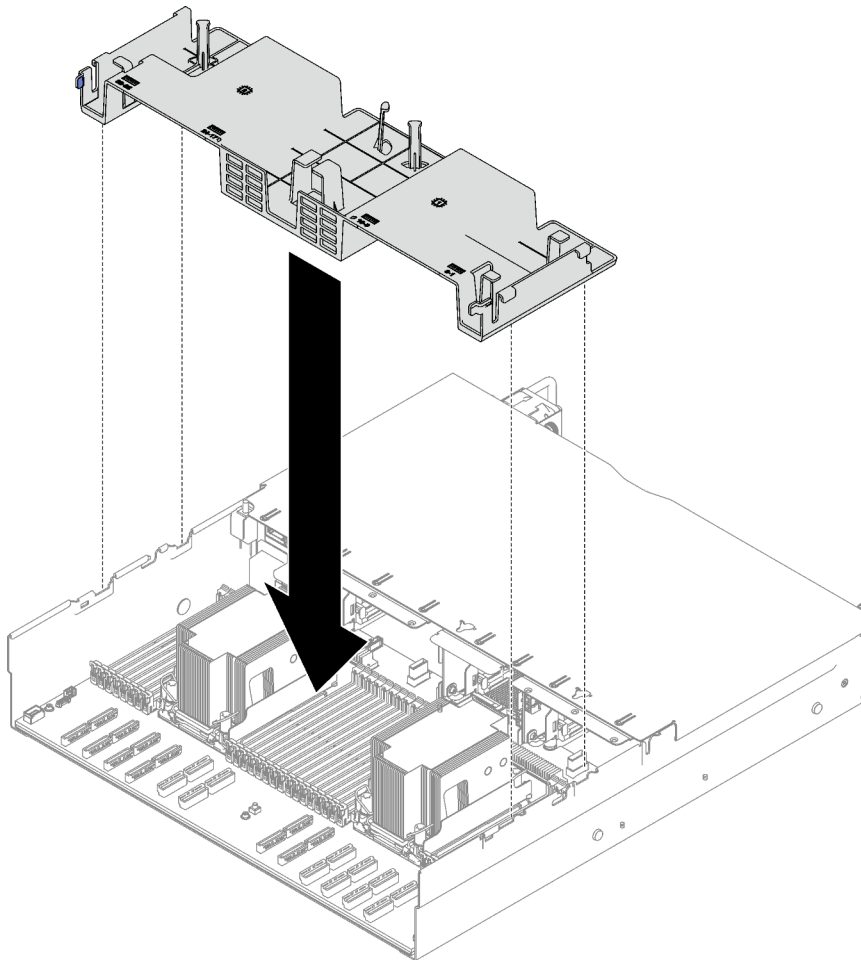


Figure 48. Rear air baffle installation

Step 2. Slightly press the rear air baffle down until it is securely seated.

### After you finish



1. Reinstall the FHFL risers if necessary. See [“Install a PCIe riser” on page 152](#).
2. Reconnect the PCIe riser cables to the system board assembly and route the cables through the rear air baffle. See [“PCIe riser cable routing” on page 341](#) for more details.
3. If needed, reconnect the M.2 backplane cables to the M.2 backplane.
  - **SATA/NVMe M.2 backplane**
    - a. ① Connect the M.2 backplane cables to the M.2 backplane.
    - b. ② Fasten the screw to secure the M.2 backplane cables to the M.2 backplane.

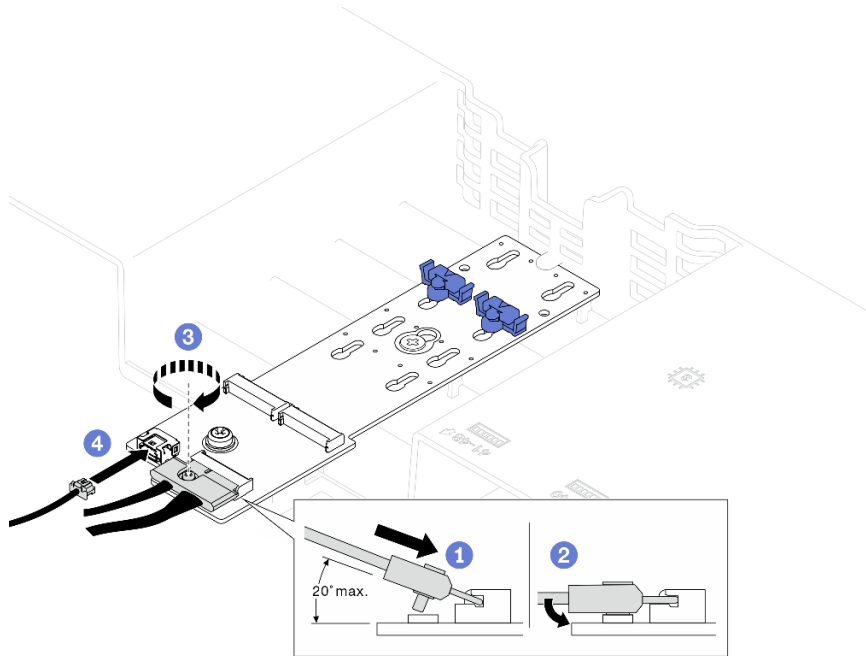


Figure 49. SATA/NVMe M.2 backplane cable connection

- **SATA/x4 NVMe M.2 backplane**

Reconnect the M.2 backplane cables from the M.2 backplane.

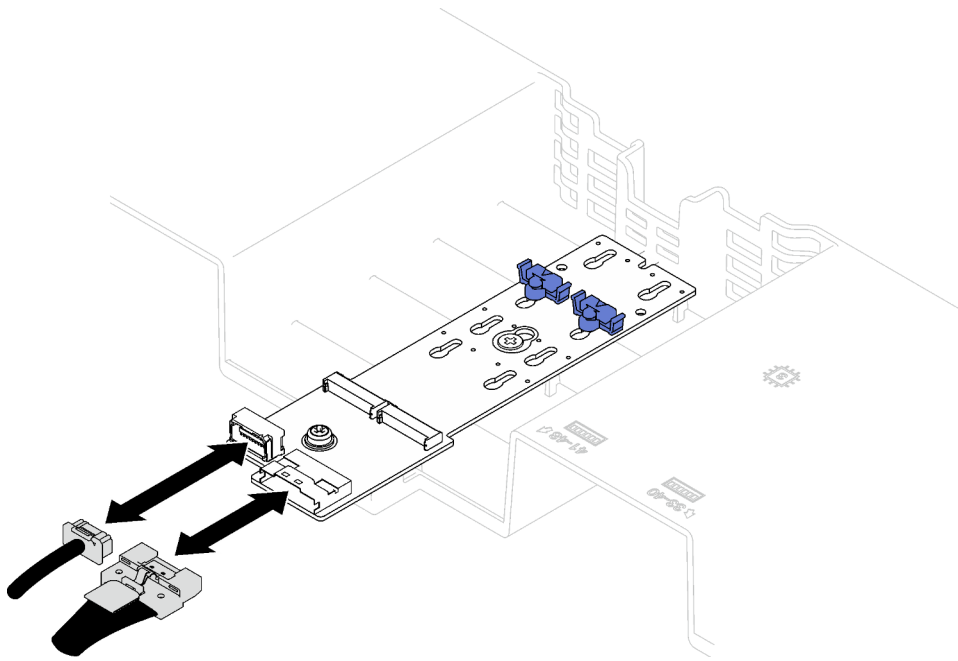


Figure 50. SATA/x4 NVMe M.2 backplane cable connection

4. If needed, reconnect the flash power module cable to the extension cable.

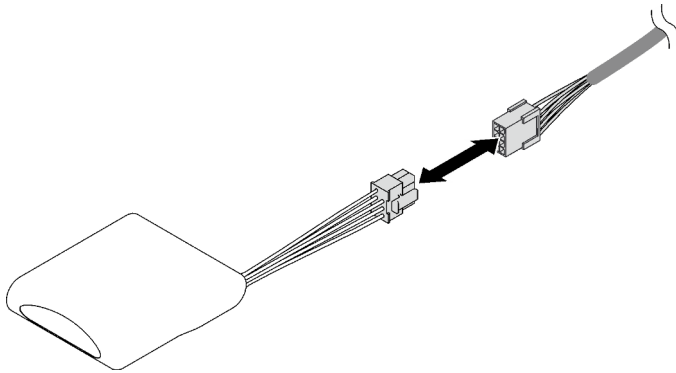


Figure 51. Flash power module cable connection

5. Complete the parts replacement. See [“Complete the parts replacement”](#) on page 233.

#### Demo video

[Watch the procedure on YouTube](#)

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## CMOS battery (CR2032) replacement

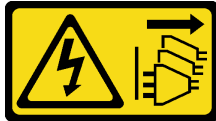
Follow instructions in this section to remove and install the CMOS battery (CR2032).

### Remove the CMOS battery (CR2032)

Follow instructions in this section to remove the CMOS battery (CR2032).

- Lenovo has designed this product with your safety in mind. The lithium battery must be handled correctly to avoid possible danger. If you replace the battery, you must adhere to the following instructions.
- If you replace the original lithium battery with a heavy-metal battery or a battery with heavy-metal components, be aware of the following environmental consideration. Batteries and accumulators that contain heavy metals must not be disposed of with normal domestic waste. They will be taken back free of charge by the manufacturer, distributor, or representative, to be recycled or disposed of in a proper manner.
- After you replace the battery, you must reconfigure the server and reset the system date and time.

#### S002



#### **CAUTION:**

The power-control button on the device and the power switch on the power supply do not turn off the electrical current supplied to the device. The device also might have more than one power cord. To remove all electrical current from the device, ensure that all power cords are disconnected from the power source.

#### S004



#### **CAUTION:**

When replacing the lithium battery, use only Lenovo specified part number or an equivalent type of battery recommended by the manufacturer. If your system has a module containing a lithium battery, replace it only with the same module type made by the same manufacturer. The battery contains lithium and can explode if not properly used, handled, or disposed of.

*Do not:*

- Throw or immerse into water
- Heat to more than 100°C (212°F)
- Repair or disassemble

Dispose of the battery as required by local ordinances or regulations.

#### S005



#### **CAUTION:**

The battery is a lithium ion battery. To avoid possible explosion, do not burn the battery. Exchange it only with the approved part. Recycle or discard the battery as instructed by local regulations.

### About this task

**Attention:**

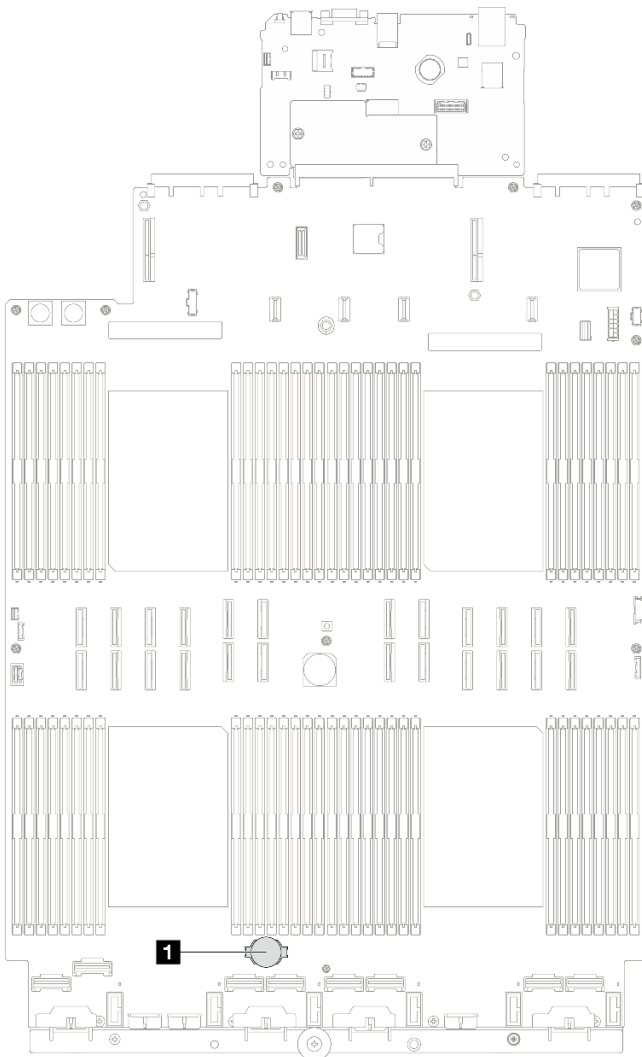
- Read [“Installation Guidelines” on page 47](#) and [“Safety inspection checklist” on page 48](#) to ensure that you work safely.
- Power off the server and peripheral devices and disconnect the power cords and all external cables. See [“Power off the server” on page 64](#).
- If the server is installed in a rack, slide the server out on its rack slide rails to gain access to the top cover, or remove the server from the rack. See [“Remove the server from rails” on page 65](#).

**Procedure**

Step 1. Make preparation for this task.

- a. Remove the front top cover. See [“Remove the front top cover” on page 225](#).
- b. Remove all of the fans. See [“Remove a fan” on page 106](#).
- c. Remove the fan cage. See [“Remove the fan cage” on page 107](#).
- d. Remove the front air baffle. See [“Remove the front air baffle” on page 84](#).

Step 2. Locate the CMOS battery on the system board assembly.



*Figure 52. CMOS battery location*

## 1 CMOS battery

Step 3. Differentiate between the positive and negative sides of the CMOS battery.

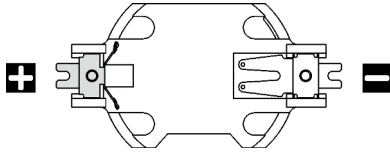


Figure 53. Positive (+) and negative (-) sides of the CMOS battery

Step 4. Remove the CMOS battery.

### Attention:

- Failing to remove the CMOS battery properly might damage the socket on the system board assembly. Any damage to the socket might require replacing the system board assembly.
- Do not tilt or push the CMOS battery by using excessive force.
  - a. 1 From the negative end, lever the CMOS battery from the socket with a slotted screwdriver.
  - b. 2 Remove the CMOS battery out of the socket.

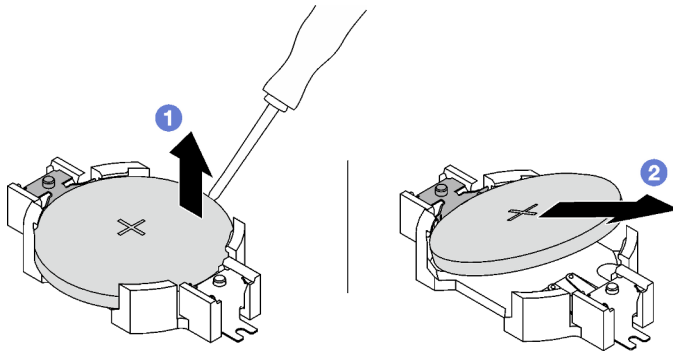


Figure 54. CMOS battery removal

## After you finish

Dispose the component with compliance to local regulations.

### Demo video

[Watch the procedure on YouTube](#)

## Install the CMOS battery (CR2032)

Follow instructions in this section to install the CMOS battery (CR2032).

### S002



**CAUTION:**

The power-control button on the device and the power switch on the power supply do not turn off the electrical current supplied to the device. The device also might have more than one power cord. To remove all electrical current from the device, ensure that all power cords are disconnected from the power source.

**S004****CAUTION:**

When replacing the lithium battery, use only Lenovo specified part number or an equivalent type of battery recommended by the manufacturer. If your system has a module containing a lithium battery, replace it only with the same module type made by the same manufacturer. The battery contains lithium and can explode if not properly used, handled, or disposed of.

*Do not:*

- Throw or immerse into water
- Heat to more than 100°C (212°F)
- Repair or disassemble

Dispose of the battery as required by local ordinances or regulations.

**S005****CAUTION:**

The battery is a lithium ion battery. To avoid possible explosion, do not burn the battery. Exchange it only with the approved part. Recycle or discard the battery as instructed by local regulations.

**About this task**

**Attention:** Read [“Installation Guidelines” on page 47](#) and [“Safety inspection checklist” on page 48](#) to ensure that you work safely.

**Important:** The following notes describe information that you must consider when you are replacing the CMOS battery in the server:

- You must replace the CMOS battery with a lithium CMOS battery of the same type from the same manufacturer.
- After you replace the CMOS battery, you must reconfigure the server and reset the system date and time.

**Procedure**

Step 1. Follow any special handling and installation instructions that come with the CMOS battery.

**Attention:** Touching the CMOS battery on a metal surface, such as the side of the server, when you replace the CMOS battery can cause it to fail.

Step 2. Locate the CMOS battery socket on the system board assembly.

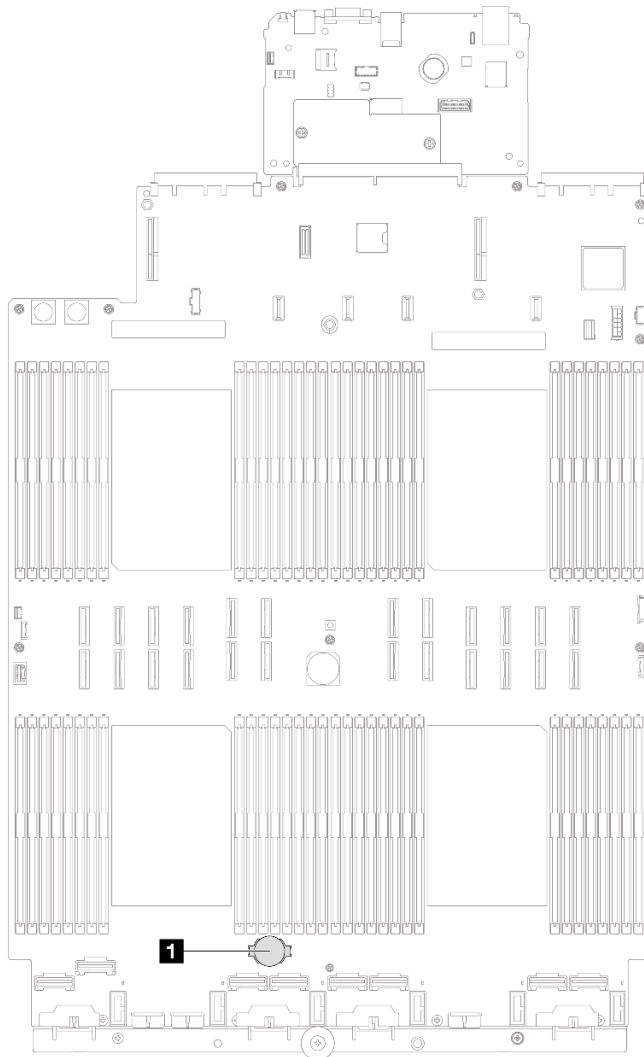


Figure 55. CMOS battery socket location

**1** CMOS battery socket

Step 3. Orient the CMOS battery so that the positive (+) side faces upward.

Step 4. Install the CMOS battery.

- a. **1** Tilt the CMOS battery and insert it to the positive end on the socket, and make sure that the CMOS battery goes tight to the metal clip.
- b. **2** Press the CMOS battery down until it clicks into the socket.

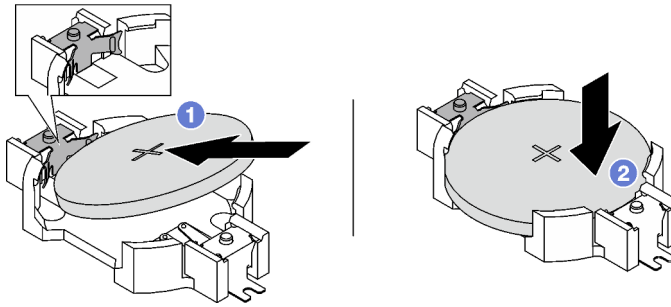


Figure 56. CMOS battery installation

## After you finish

1. Reinstall the fan cage. See “Install the fan cage” on page 109.
2. Reinstall the fans. See “Install a fan” on page 111.
3. Complete the parts replacement. See “Complete the parts replacement” on page 233.
4. Reconfigure the server and reset the system date and time.

## Demo video

[Watch the procedure on YouTube](#)

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## External diagnostics handset replacement

Follow instructions in this section to remove or install the external diagnostics handset.

### Remove the external diagnostics handset

Follow instructions in this section to remove the external diagnostics handset.

### About this task

To avoid possible danger, read and follow the following safety statement.

- **S014**



#### CAUTION:

Hazardous voltage, current, and energy levels might be present. Only a qualified service technician is authorized to remove the covers where the label is attached.

- **S017**



#### CAUTION:

Hazardous moving fan blades nearby. Keep fingers and other body parts away.



- **S033**



**CAUTION:**

**Hazardous energy present. Voltages with hazardous energy might cause heating when shorted with metal, which might result in spattered metal, burns, or both.**

**Attention:**

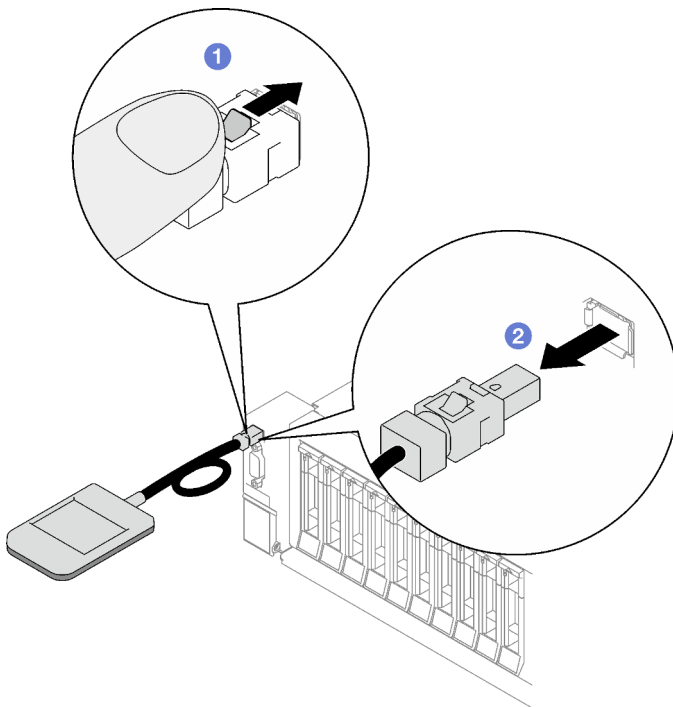
- Read [“Installation Guidelines” on page 47](#) and [“Safety inspection checklist” on page 48](#) to ensure that you work safely.
- Power off the server and peripheral devices and disconnect the power cords and all external cables. See [“Power off the server” on page 64](#).

**Procedure**

Step 1. ① Press the plastic clip on the plug forward.

Step 2. ② Pull to disconnect the cable from the server.

*Figure 57. Disconnecting the external diagnostics handset cable*



**After you finish**

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

**Demo video**

[Watch the procedure on YouTube](#)

## Install the external diagnostics handset

Follow instructions in this section to install the external diagnostics handset.

### About this task

To avoid possible danger, read and follow the following safety statement.

- **S014**



**CAUTION:**

Hazardous voltage, current, and energy levels might be present. Only a qualified service technician is authorized to remove the covers where the label is attached.

- **S017**



**CAUTION:**

Hazardous moving fan blades nearby. Keep fingers and other body parts away.

- **S033**



**CAUTION:**

Hazardous energy present. Voltages with hazardous energy might cause heating when shorted with metal, which might result in spattered metal, burns, or both.

**Attention:**

- Read [“Installation Guidelines” on page 47](#) and [“Safety inspection checklist” on page 48](#) to ensure that you work safely.
- Touch the static-protective package that contains the component to any unpainted metal surface on the server; then, remove it from the package and place it on a static-protective surface.

### Procedure

Step 1. Align the connector on the cable with that on the server and push it in.

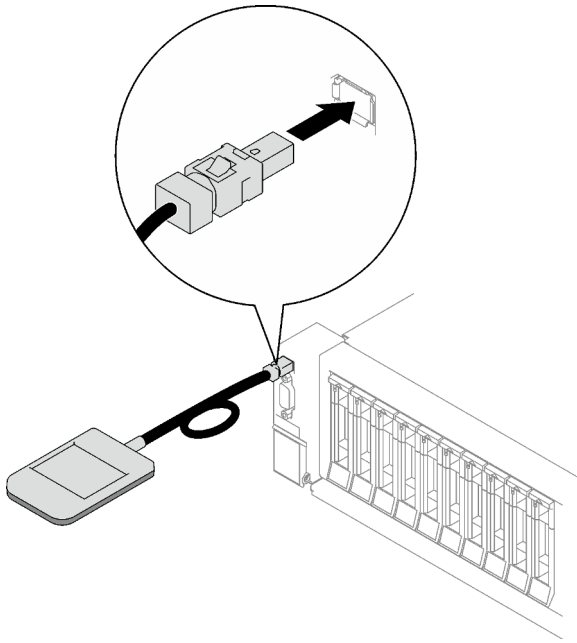


Figure 58. Connecting the external diagnostics handset cable

Step 2. Attach the external diagnostics handset to a metal surface with the magnetic bottom.

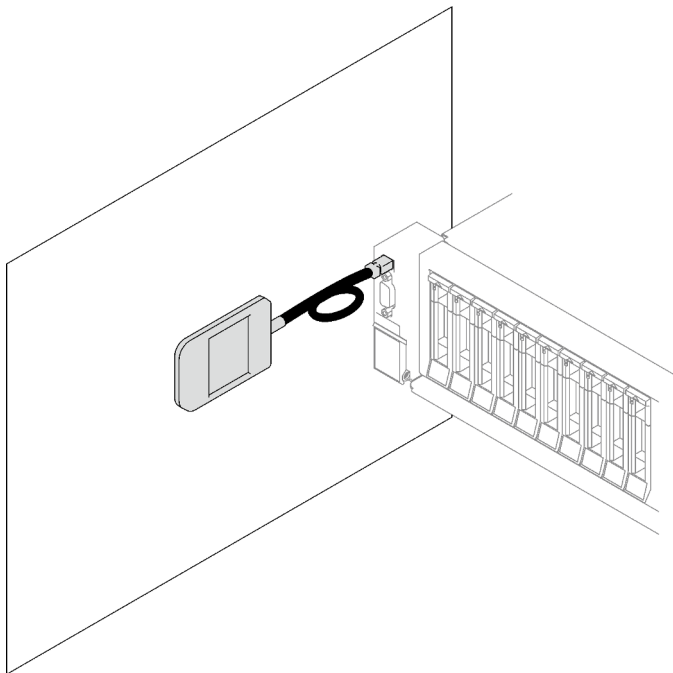


Figure 59. Attaching the external diagnostics handset to a metal surface

### After you finish

Complete the parts replacement. See [“Complete the parts replacement” on page 233](#).

### Demo video

[Watch the procedure on YouTube](#)

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## Fan and fan cage replacement

Follow instructions in this section to remove or install a fan and the fan cage.

### Remove a fan

Follow instructions in this section to remove a fan.

#### About this task

##### S002



##### **CAUTION:**

The power-control button on the device and the power switch on the power supply do not turn off the electrical current supplied to the device. The device also might have more than one power cord. To remove all electrical current from the device, ensure that all power cords are disconnected from the power source.

##### S014



##### **CAUTION:**

Hazardous voltage, current, and energy levels might be present. Only a qualified service technician is authorized to remove the covers where the label is attached.

##### S017



##### **CAUTION:**

Hazardous moving fan blades nearby. Keep fingers and other body parts away.

##### S033



##### **CAUTION:**

Hazardous energy present. Voltages with hazardous energy might cause heating when shorted with metal, which might result in spattered metal, burns, or both.

**Attention:**

- Read “[Installation Guidelines](#)” on page 47 and “[Safety inspection checklist](#)” on page 48 to ensure that you work safely.
- Power off the server and peripheral devices and disconnect the power cords and all external cables. See “[Power off the server](#)” on page 64.
- If the server is installed in a rack, remove it from the rack. See “[Remove the server from rails](#)” on page 65.

**Procedure**

Step 1. Remove the front top cover. See “[Remove the front top cover](#)” on page 225.

Step 2. Remove the fan.

- a. ① Pinch and hold the orange touch points on the top of the fan.
- b. ② Lift the fan out of the chassis.

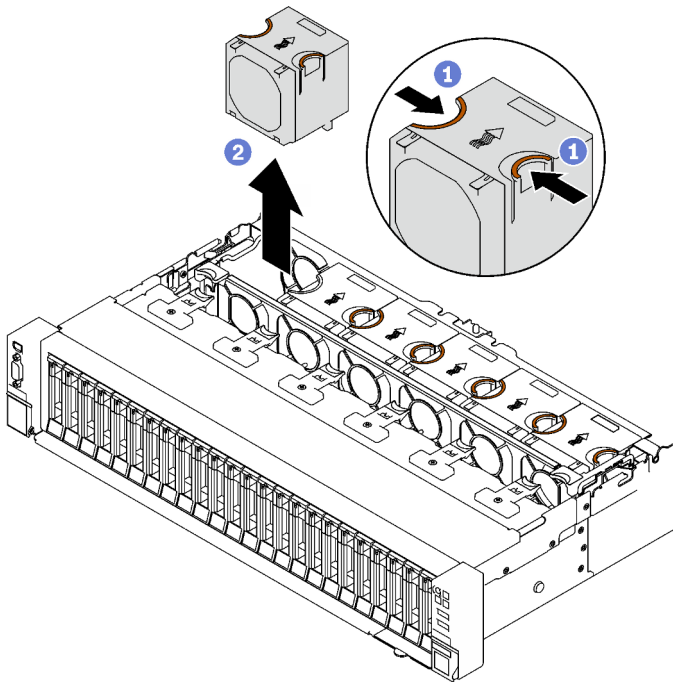


Figure 60. Fan removal

**After you finish**

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

**Demo video**

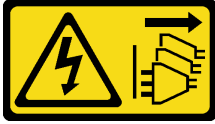
[Watch the procedure on YouTube](#)

**Remove the fan cage**

Follow instructions in this section to remove the fan cage.

**About this task**

## S002



### **CAUTION:**

The power-control button on the device and the power switch on the power supply do not turn off the electrical current supplied to the device. The device also might have more than one power cord. To remove all electrical current from the device, ensure that all power cords are disconnected from the power source.

## S017



### **CAUTION:**

Hazardous moving fan blades nearby. Keep fingers and other body parts away.

### **Attention:**

- Read [“Installation Guidelines” on page 47](#) and [“Safety inspection checklist” on page 48](#) to ensure that you work safely.
- Power off the server and peripheral devices and disconnect the power cords and all external cables. See [“Power off the server” on page 64](#).
- If the server is installed in a rack, remove it from the rack. See [“Remove the server from rails” on page 65](#).

## **Procedure**

Step 1. Make preparation for this task.

- a. Remove the front top cover. See [“Remove the front top cover” on page 225](#).
- b. Remove all of the fans. See [“Remove a fan” on page 106](#).

Step 2. Remove the fan cage.

- a. ① Rotate the two release latches on the fan cage up to disengage it from the chassis.
- b. ② Hold the handles, and lift the fan cage out of the chassis.

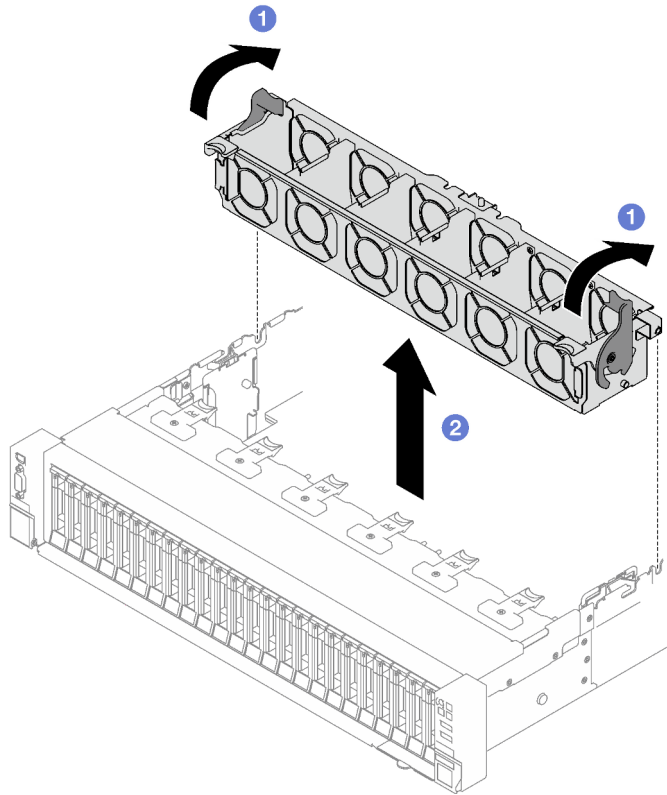


Figure 61. Fan cage removal

## After you finish

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

### Demo video

[Watch the procedure on YouTube](#)

## Install the fan cage

Follow instructions in this section to install the fan cage.

### About this task

#### S002



#### **CAUTION:**

The power-control button on the device and the power switch on the power supply do not turn off the electrical current supplied to the device. The device also might have more than one power cord. To remove all electrical current from the device, ensure that all power cords are disconnected from the power source.

## S017



### CAUTION:

**Hazardous moving fan blades nearby. Keep fingers and other body parts away.**

### Attention:

- Read [“Installation Guidelines” on page 47](#) and [“Safety inspection checklist” on page 48](#) to ensure that you work safely.
- Touch the static-protective package that contains the component to any unpainted metal surface on the server; then, remove it from the package and place it on a static-protective surface.

### Procedure

- Step 1. ① Align the guide slots on the fan cage with the guide pins on the chassis, and lower it into the chassis.
- Step 2. ② Rotate the two release latches down until they stop.

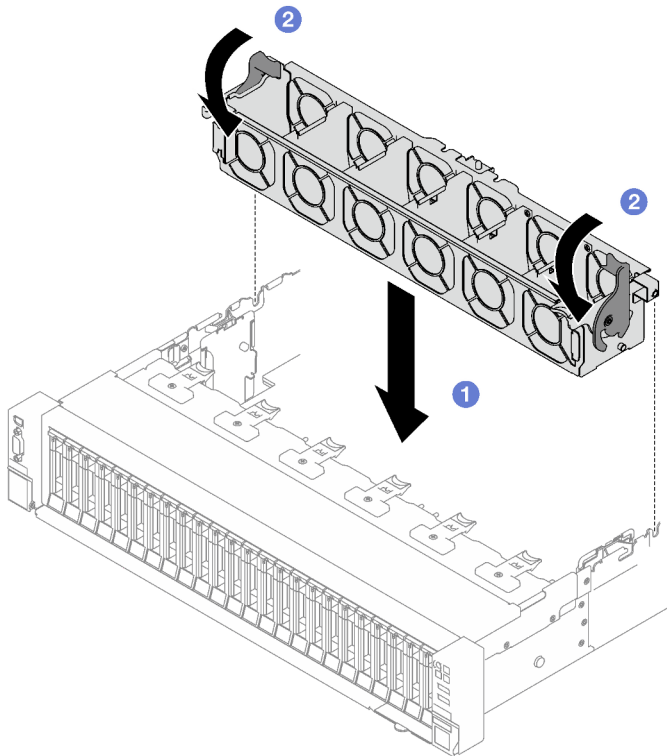


Figure 62. Fan cage installation

### After you finish

1. Reinstall the fans. See [“Install a fan” on page 111](#).
2. Complete the parts replacement. See [“Complete the parts replacement” on page 233](#).



## Demo video

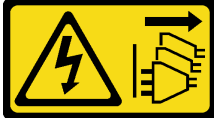
[Watch the procedure on YouTube](#)

## Install a fan

Follow instructions in this section to install a fan.

### About this task

#### S002



#### CAUTION:

The power-control button on the device and the power switch on the power supply do not turn off the electrical current supplied to the device. The device also might have more than one power cord. To remove all electrical current from the device, ensure that all power cords are disconnected from the power source.

#### S014



#### CAUTION:

Hazardous voltage, current, and energy levels might be present. Only a qualified service technician is authorized to remove the covers where the label is attached.

#### S017



#### CAUTION:

Hazardous moving fan blades nearby. Keep fingers and other body parts away.

#### S033



#### CAUTION:

Hazardous energy present. Voltages with hazardous energy might cause heating when shorted with metal, which might result in spattered metal, burns, or both.

#### Attention:

- Read [“Installation Guidelines” on page 47](#) and [“Safety inspection checklist” on page 48](#) to ensure that you work safely.
- Do not mix single rotor fan and dual rotor fan in the same unit of server.
- Touch the static-protective package that contains the component to any unpainted metal surface on the server; then, remove it from the package and place it on a static-protective surface.

## Procedure

Step 1. Make sure the fan cage is installed in the chassis. See [“Install the fan cage” on page 109](#).

Step 2. Align the fan to the fan slot in the fan cage; then, insert the fan into the fan cage and press it until it clicks into place.

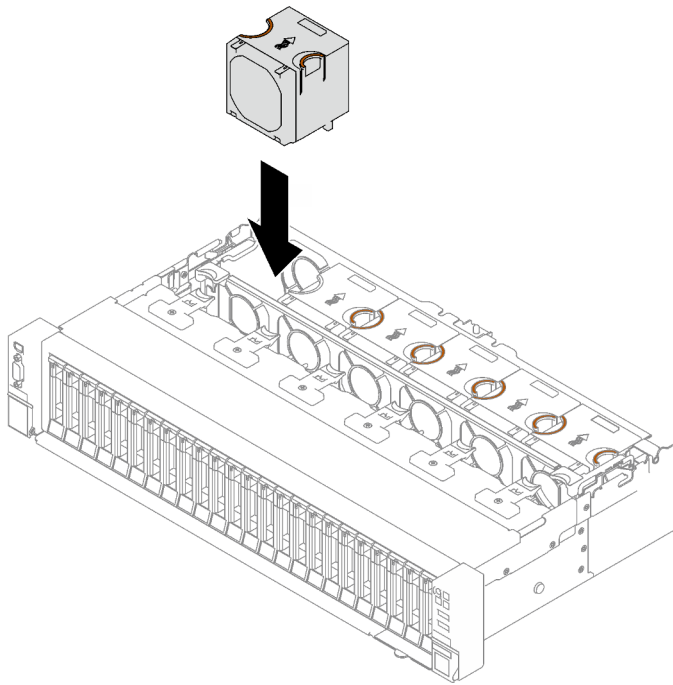


Figure 63. Fan installation

## After you finish

Complete the parts replacement. See [“Complete the parts replacement” on page 233](#).

## Demo video

[Watch the procedure on YouTube](#)

---

## Flash power module replacement

Follow instructions in this section to remove and install a flash power module.

## Remove a flash power module

Follow instructions in this section to remove a flash power module.

## About this task

**Attention:**

- Read “[Installation Guidelines](#)” on page 47 and “[Safety inspection checklist](#)” on page 48 to ensure that you work safely.
- Power off the server and peripheral devices and disconnect the power cords and all external cables. See “[Power off the server](#)” on page 64.
- If the server is installed in a rack, remove it from the rack. See “[Remove the server from rails](#)” on page 65.

**Procedure**

Step 1. Remove the front top cover. See “[Remove the front top cover](#)” on page 225.

Step 2. Disconnect the flash power module cable from the extension cable.

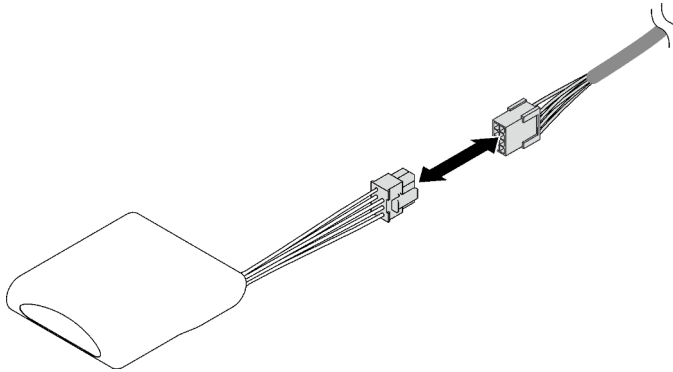


Figure 64. Flash power module cable disconnection

Step 3. Remove the flash power module.

- 1 Gently pivot the retaining clip as shown.
- 2 Lift the flash power module up and remove it from the holder.

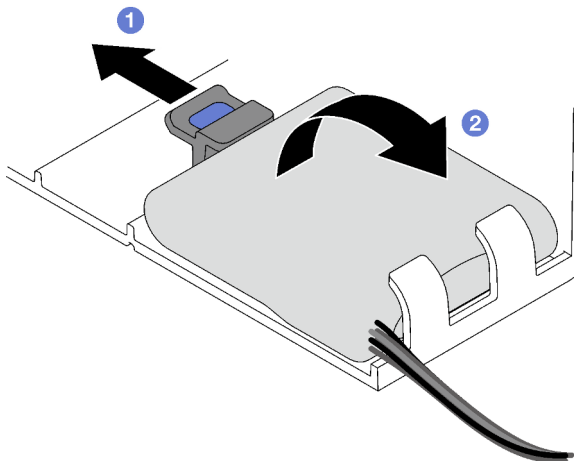


Figure 65. Flash power module removal

**After you finish**

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

## Demo video

[Watch the procedure on YouTube](#)

## Install a flash power module

Follow instructions in this section to install a flash power module.

### About this task

#### Attention:

- Read [“Installation Guidelines” on page 47](#) and [“Safety inspection checklist” on page 48](#) to ensure that you work safely.
- Touch the static-protective package that contains the component to any unpainted metal surface on the server; then, remove it from the package and place it on a static-protective surface.

### Procedure

Step 1. Locate the flash power module slot on the front air baffle.

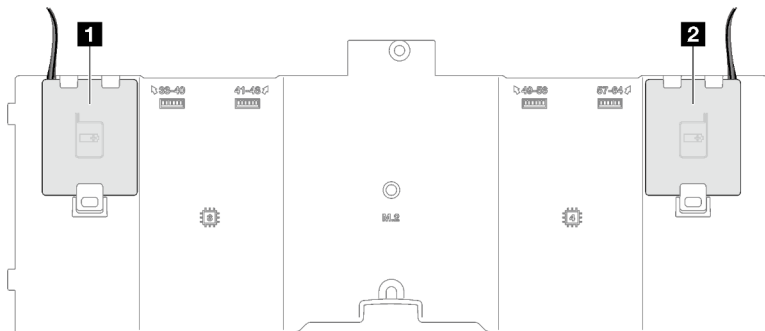


Figure 66. Flash power module slot location

<b>1</b> Flash power module slot 1	<b>2</b> Flash power module slot 2
------------------------------------	------------------------------------

Step 2. Install the flash power module.

- 1 Note the orientation of the flash power module; then, gently insert the flash power module into the retaining clips at one side as shown.
- 2 Press the flash power module down on the other side until it snaps into place.

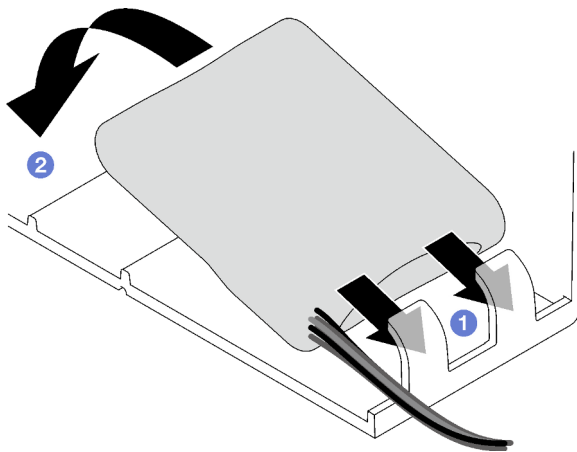


Figure 67. Flash power module installation

Step 3. Connect the flash power module cable to the extension cable.

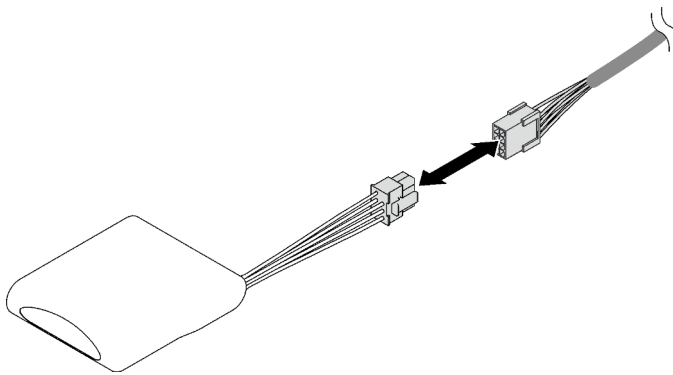


Figure 68. Flash power module cable connection

## After you finish

Complete the parts replacement. See [“Complete the parts replacement” on page 233](#).

### Demo video

[Watch the procedure on YouTube](#)

---

## GPU adapter replacement

Follow instructions in this section to remove and install a GPU adapter.

### Remove a GPU adapter

Follow instructions in this section to remove a GPU adapter.

### About this task

#### Attention:

- Read [“Installation Guidelines” on page 47](#) and [“Safety inspection checklist” on page 48](#) to ensure that you work safely.

- Power off the server and peripheral devices and disconnect the power cords and all external cables. See [“Power off the server” on page 64](#).
- If the server is installed in a rack, remove it from the rack. See [“Remove the server from rails” on page 65](#).

Depending on the configuration, follow the corresponding procedures to remove a single-wide or a double-wide GPU adapter.

- [“Remove a single-wide GPU adapter” on page 116](#).
- [“Remove a double-wide GPU adapter” on page 117](#).

## Remove a single-wide GPU adapter

### Procedure

Step 1. Make preparation for this task.

- a. Remove the front top cover. See [“Remove the front top cover” on page 225](#).
- b. Remove the rear top cover. See [“Remove the rear top cover” on page 227](#).
- c. Remove the PCIe riser where the single-wide GPU adapter has been installed. See [“Remove a PCIe riser” on page 145](#).

Step 2. Remove the single-wide GPU adapter.

- a. ① Disconnect the power cable from the GPU adapter.
- b. ② Gently lift the PCIe retainer on the PCIe riser card and slide it to the unlocked position.
- c. ③ Remove the screw that secure the GPU adapter to the PCIe riser.
- d. ④ Grasp the GPU adapter by its edges and carefully pull it out of the PCIe slot.

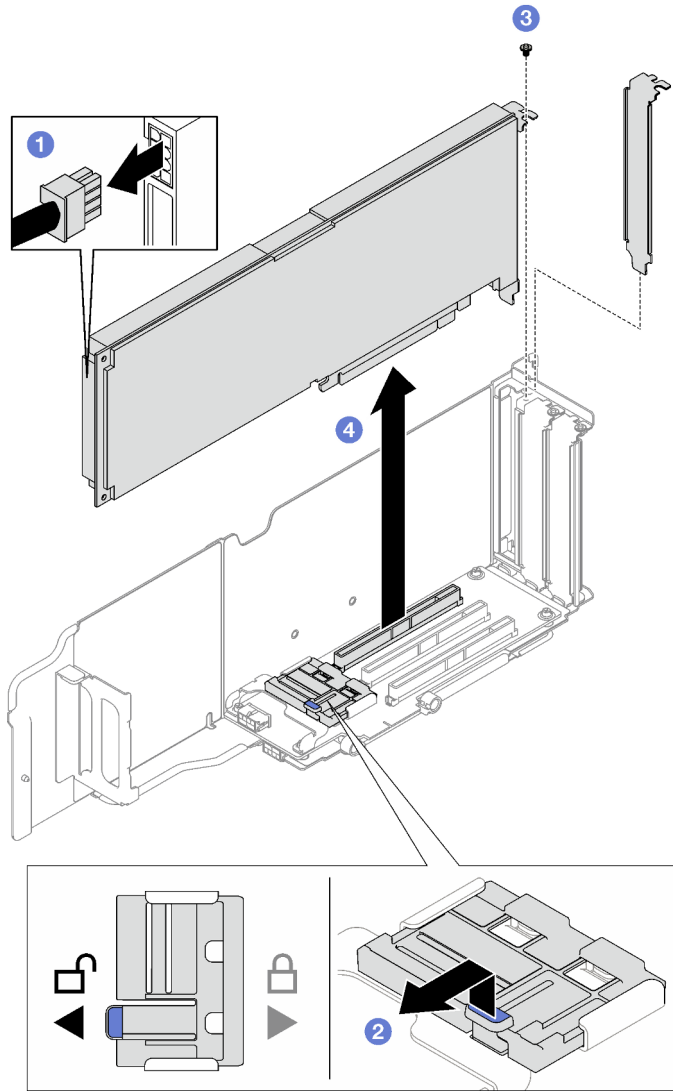


Figure 69. Single-wide GPU adapter removal

## After you finish

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

## Remove a double-wide GPU adapter

### Procedure

Step 1. Make preparation for this task.

- a. Remove the front top cover. See [“Remove the front top cover”](#) on page 225.
- b. Remove the rear top cover. See [“Remove the rear top cover”](#) on page 227.
- c. Remove the PCIe riser where the double-wide GPU adapter has been installed. See [“Remove a PCIe riser”](#) on page 145.

Step 2. Remove the double-wide GPU adapter.

- a. ① Disconnect the power cable from the GPU adapter.

- b. ② Gently lift the PCIe retainer on the riser card and slide it to the unlocked position.
- c. ③ Remove the two screws that secure the GPU adapter to the PCIe riser.
- d. ④ Grasp the GPU adapter by its edges and carefully pull it out of the PCIe slot.

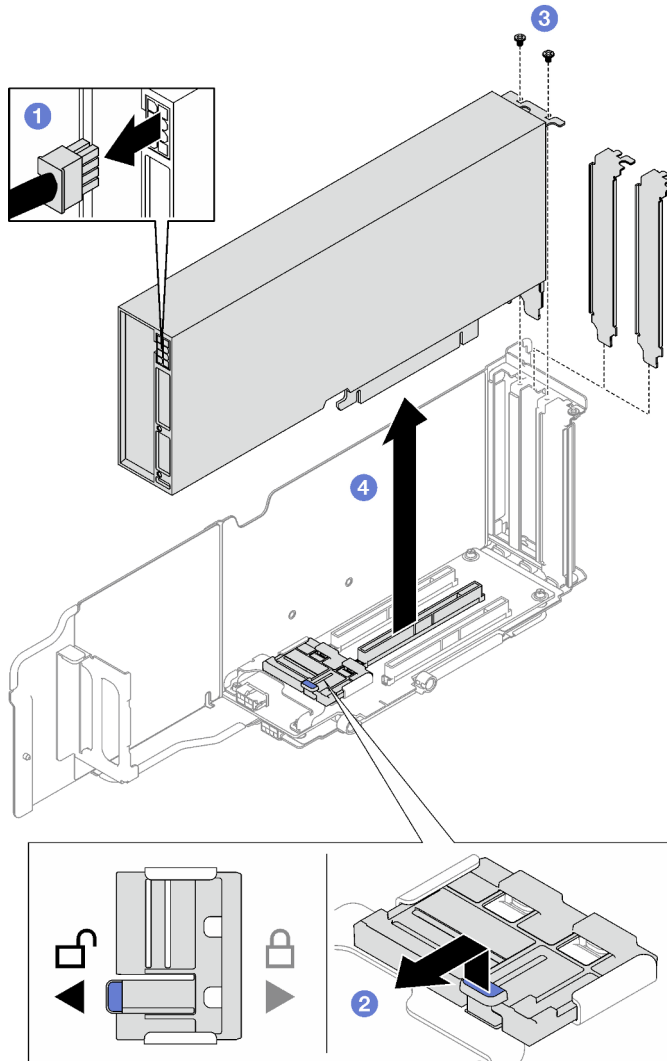


Figure 70. Double-wide GPU adapter removal

## After you finish

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

## Demo video

[Watch the procedure on YouTube](#)

## Install a GPU adapter

Follow instructions in this section to install a GPU adapter.

## About this task



**Attention:**

- Read “Installation Guidelines” on page 47 and “Safety inspection checklist” on page 48 to ensure that you work safely.
- Touch the static-protective package that contains the component to any unpainted metal surface on the server; then, remove it from the package and place it on a static-protective surface.

**Notes:** To prevent potential thermal issues, change the **Misc** setting in the BIOS from **Option3** (default value) to **Option1** if the following two conditions are met:

- The server is equipped with a GPU adapter.
- The UEFI firmware version is RSE110I or later.

For the method of changing the **Misc** setting, see <https://support.lenovo.com/us/en/solutions/TT1832>.

Depending on the configuration, follow the corresponding procedures to install a single-wide or a double-wide GPU adapter.

- “Install a single-wide GPU adapter” on page 119.
- “Install a double-wide GPU adapter” on page 120.

**Install a single-wide GPU adapter****Procedure**

- Step 1. ① Align the GPU adapter with the slot on the riser card; then, carefully press the GPU adapter straight into the slot until it is securely seated.
- Step 2. ② Gently lift the PCIe retainer on the riser card and slide it to the locked position.
- Step 3. ③ Fasten the screw that secure the GPU adapter to the PCIe riser.
- Step 4. ④ Connect the power cable to the GPU adapter.

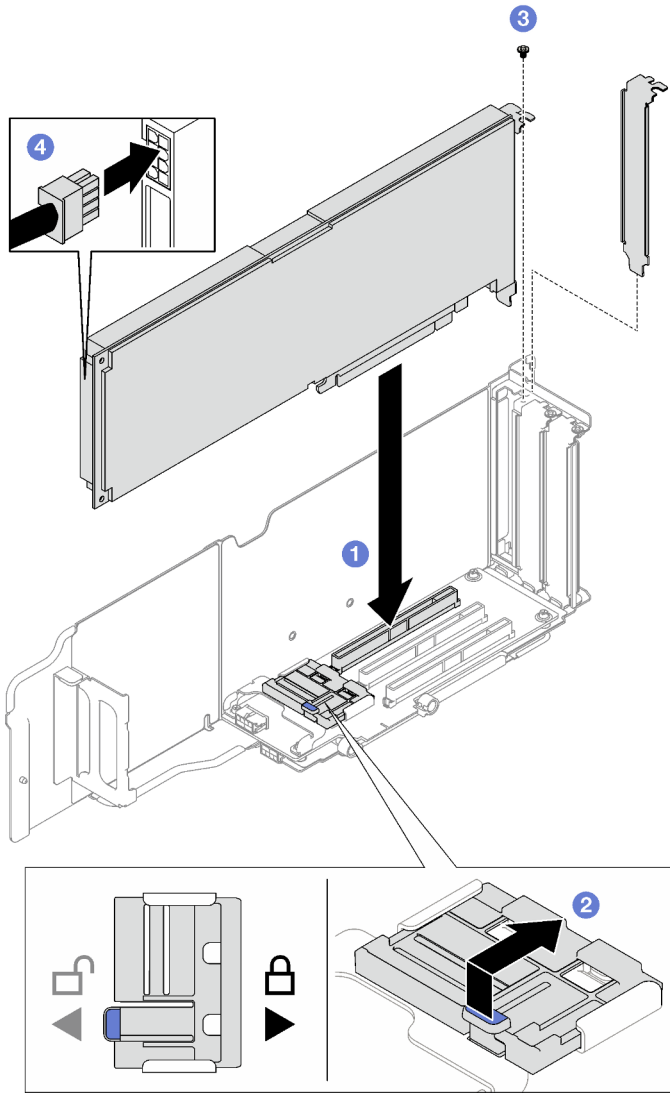


Figure 71. Single-wide GPU adapter installation

## After you finish

1. Reinstall the PCIe riser. See [“Install a PCIe riser” on page 152](#).
2. Complete the parts replacement. See [“Complete the parts replacement” on page 233](#).

## Install a double-wide GPU adapter

### Procedure

- Step 1. ① Align the GPU adapter with the slot on the PCIe riser card; then, carefully press the GPU adapter straight into the slot until it is securely seated.
- Step 2. ② Gently lift the PCIe retainer on the PCIe riser card and slide it to the locked position.
- Step 3. ③ Fasten the two screws that secure the GPU adapter to the PCIe riser.
- Step 4. ④ Connect the power cable to the GPU adapter.

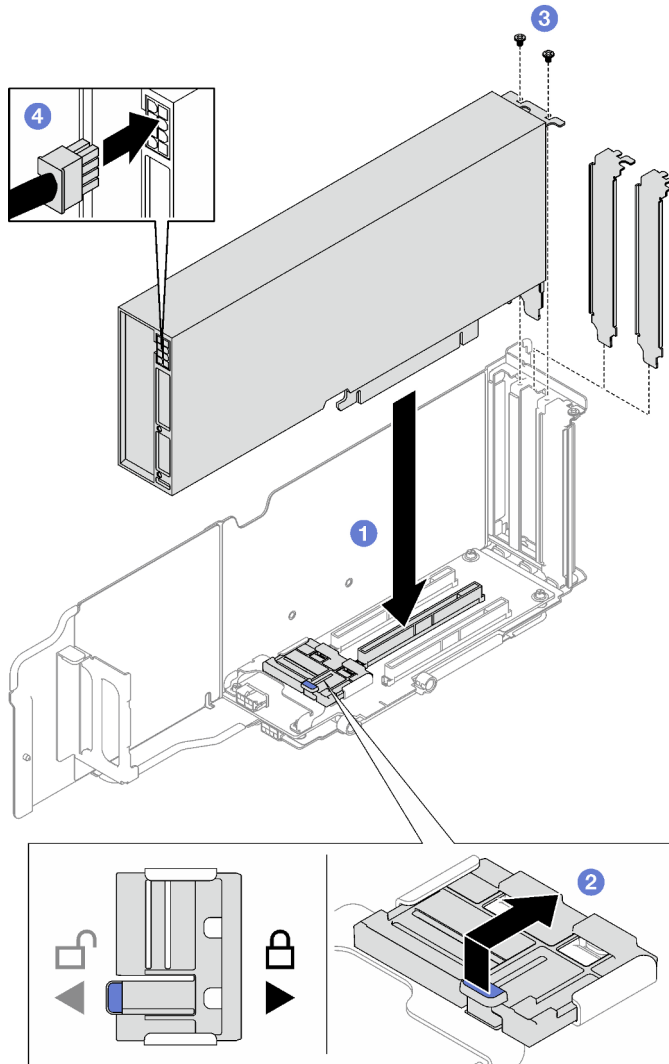


Figure 72. Double-wide GPU adapter installation

### After you finish

1. Reinstall the PCIe riser. See [“Install a PCIe riser”](#) on page 152.
2. Complete the parts replacement. See [“Complete the parts replacement”](#) on page 233.

### Demo video

[Watch the procedure on YouTube](#)

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## Intrusion switch replacement

Follow instructions in this section to remove and install the intrusion switch.

### Remove the intrusion switch

Follow instructions in this section to remove the intrusion switch.

### About this task

**Attention:**

- Read “[Installation Guidelines](#)” on page 47 and “[Safety inspection checklist](#)” on page 48 to ensure that you work safely.
- Power off the server and peripheral devices and disconnect the power cords and all external cables. See “[Power off the server](#)” on page 64.
- If the server is installed in a rack, remove it from the rack. See “[Remove the server from rails](#)” on page 65.

**Procedure**

Step 1. Make preparation for this task.

- a. Remove the front top cover. See “[Remove the front top cover](#)” on page 225.
- b. Remove the rear top cover. See “[Remove the rear top cover](#)” on page 227.
- c. Remove the rear air baffle. See “[Remove the rear air baffle](#)” on page 90.

Step 2. Remove the intrusion switch.

- a. ① Disconnect the intrusion switch cable from the system board assembly.
- b. ② Pull the intrusion switch out of the intrusion switch bracket.

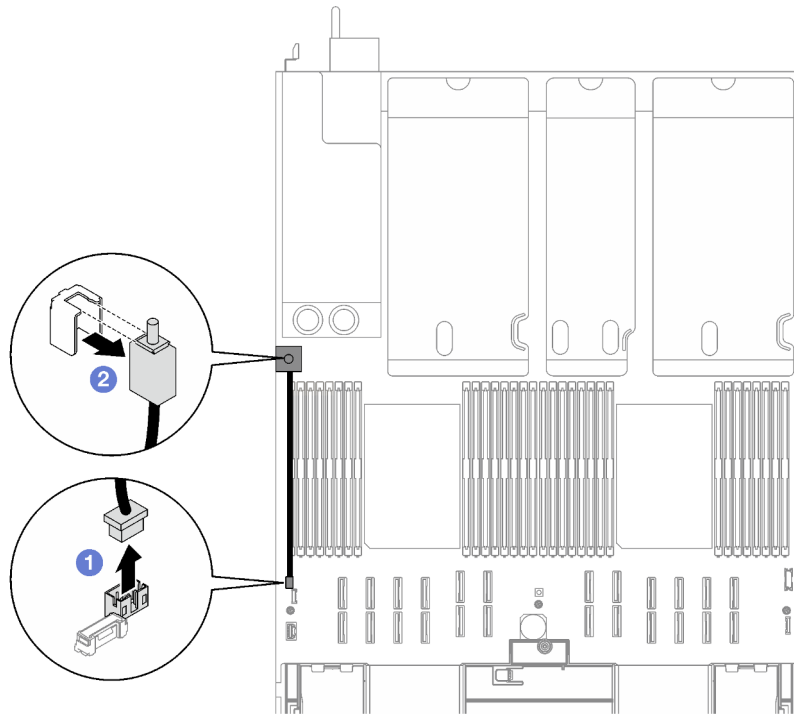


Figure 73. Intrusion switch removal

**After you finish**

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

**Demo video**

[Watch the procedure on YouTube](#)

## Install the intrusion switch

Follow instructions in this section to install the intrusion switch.

### About this task

#### Attention:

- Read [“Installation Guidelines” on page 47](#) and [“Safety inspection checklist” on page 48](#) to ensure that you work safely.
- Touch the static-protective package that contains the component to any unpainted metal surface on the server; then, remove it from the package and place it on a static-protective surface.

### Procedure

- Step 1. ① Push the intrusion switch into the intrusion switch bracket. Make sure the intrusion switch is fully seated in the bracket.
- Step 2. ② Connect the intrusion switch cable to the system board assembly.

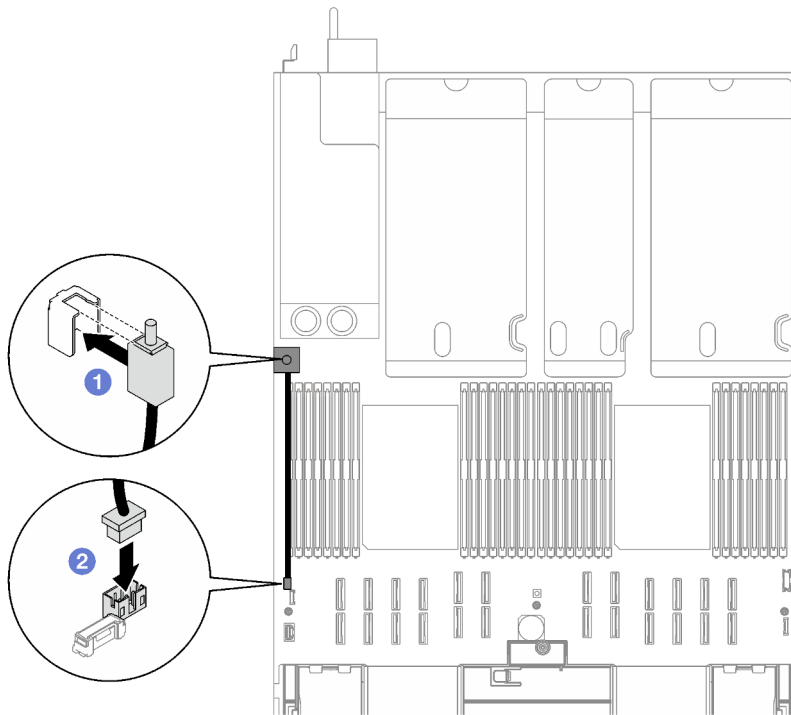


Figure 74. Intrusion switch installation

### After you finish

Complete the parts replacement. See [“Complete the parts replacement” on page 233](#).

#### Demo video

[Watch the procedure on YouTube](#)

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## M.2 backplane and M.2 drive replacement

Follow instructions in this section to remove and install the M.2 backplane and an M.2 drive.

### Remove an M.2 drive

Follow instructions in this section to remove an M.2 drive.

#### About this task

##### Attention:

- Read [“Installation Guidelines” on page 47](#) and [“Safety inspection checklist” on page 48](#) to ensure that you work safely.
- Power off the server and peripheral devices and disconnect the power cords and all external cables. See [“Power off the server” on page 64](#).
- If the server is installed in a rack, remove it from the rack. See [“Remove the server from rails” on page 65](#).
- If one or more NVMe solid-state drives are to be removed, it is recommended to disable them beforehand via the operating system.
- Before you make changes to drives, drive controllers (including controllers that are integrated on the system board assembly), drive backplanes, or drive cables, back up all important data that is stored on drives.
- Before you remove any component of a RAID array (drive, RAID card, etc.), back up all RAID configuration information.

#### Procedure

Step 1. Remove the front top cover. See [“Remove the front top cover” on page 225](#).

Step 2. Remove the M.2 drive.

- a. ① Press the retainer from the both sides.
- b. ② Slide the retainer away from the M.2 drive
- c. ③ Rotate the rear end of the M.2 drive to an angle.
- d. ④ Remove the M.2 drive from the M.2 backplane.

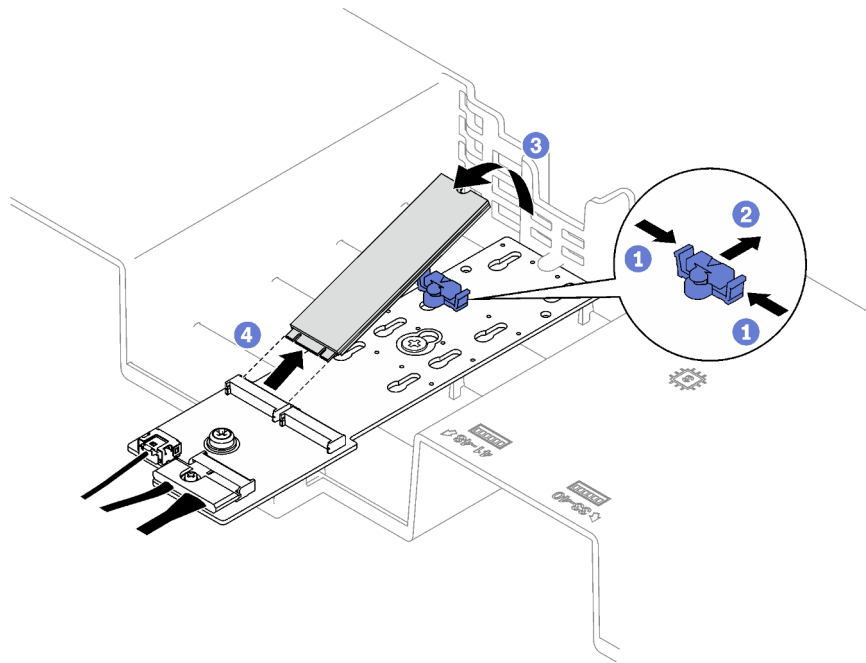


Figure 75. M.2 drive removal

## After you finish

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

### Demo video

[Watch the procedure on YouTube](#)

## Remove the M.2 backplane

Follow instructions in this section to remove the M.2 backplane.

### About this task

#### Attention:

- Read [“Installation Guidelines” on page 47](#) and [“Safety inspection checklist” on page 48](#) to ensure that you work safely.
- Power off the server and peripheral devices and disconnect the power cords and all external cables. See [“Power off the server” on page 64](#).
- If the server is installed in a rack, remove it from the rack. See [“Remove the server from rails” on page 65](#).
- Before you remove or make changes to drives, drive controllers (including controllers that are integrated on the system board assembly), drive backplanes or drive cables, back up all important data that is stored on drives.

### Procedure

Step 1. Make preparation for this task.

- a. Remove the front top cover. See [“Remove the front top cover” on page 225](#).

- b. Remove the rear top cover. See [“Remove the rear top cover” on page 227](#).
- c. Remove all of the M.2 drives. See [“Remove an M.2 drive” on page 124](#).
- d. Depending on the server model, remove the following PCIe riser.
  - If the server is installed with three PCIe risers, remove the PCIe riser 1. See [“Remove a PCIe riser” on page 145](#).
  - If the server is installed with four PCIe risers, remove the PCIe riser A. See [“Remove a PCIe riser” on page 145](#).

Step 2. Disconnect the M.2 backplane cables from the system board assembly.

Step 3. Remove the M.2 backplane.

- a. ① Remove the screw that secures the middle of the M.2 backplane to the front air baffle.
- b. ② Remove the screw that secures the end of the M.2 backplane to the front air baffle
- c. ③ Slide the M.2 backplane backward and lift it out of the front air baffle.

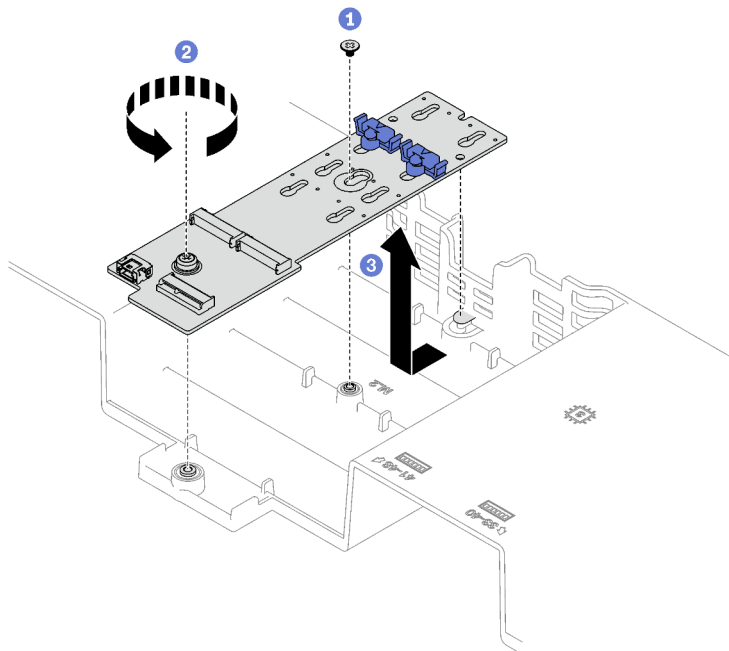


Figure 76. M.2 backplane removal

Step 4. If needed, disconnect the M.2 backplane cables from the M.2 backplane.

- **SATA/NVMe or NVMe M.2 backplane**
  1. ① Loosen the screw on the signal cable.
  2. ② Tilt the connector and remove it.
  3. ③ Remove the power cable.



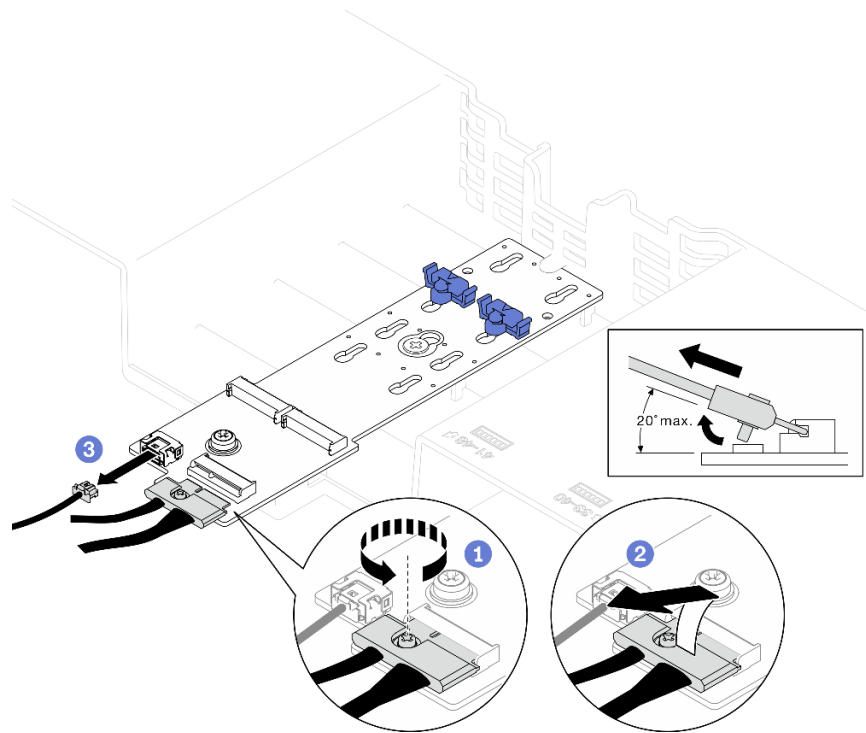


Figure 77. SATA/NVMe or NVMe M.2 backplane cable disconnection

- **SATA/x4 NVMe M.2 backplane**

Disconnect the M.2 backplane cables from the M.2 backplane.

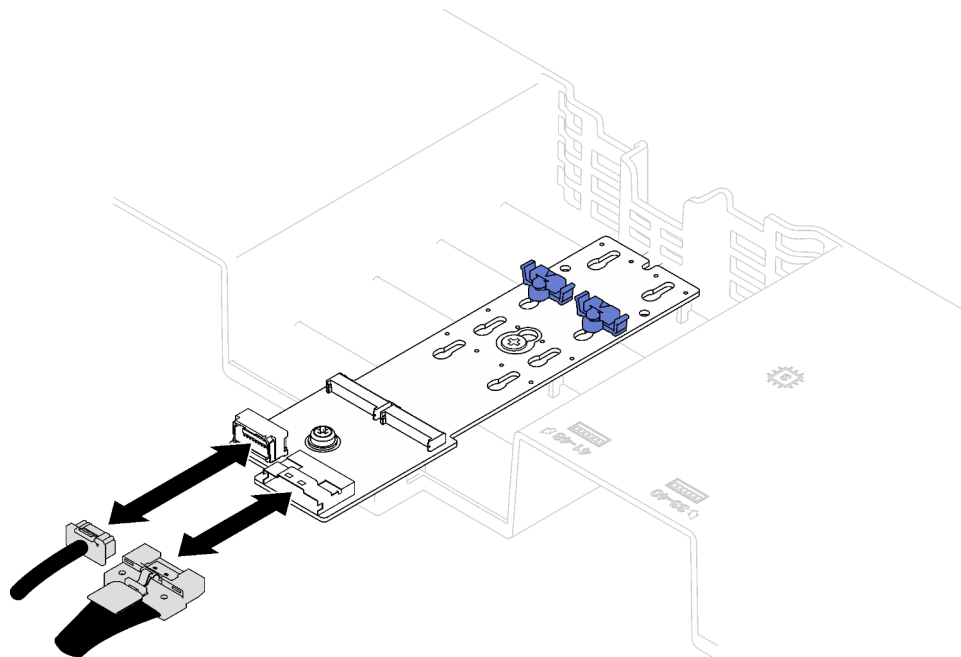


Figure 78. SATA/x4 NVMe M.2 backplane cable disconnection

## After you finish

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

### Demo video

[Watch the procedure on YouTube](#)

## Install the M.2 backplane

Follow instructions in this section to install the M.2 backplane.

### About this task

#### Attention:

- Read “[Installation Guidelines](#)” on page 47 and “[Safety inspection checklist](#)” on page 48 to ensure that you work safely.
- Touch the static-protective package that contains the component to any unpainted metal surface on the server; then, remove it from the package and place it on a static-protective surface.

### Procedure

Step 1. If needed, connect the M.2 backplane cables to the M.2 backplane.

- **SATA/NVMe or NVMe M.2 backplane**

1. ① Tilt the connector at an angle of 20 degrees or lower, and insert it until its bottom surface reaches the ramp.
2. ② Press the connector down flat.
3. ③ Tighten the screw on the signal cable.
4. ④ Connect the power cable.

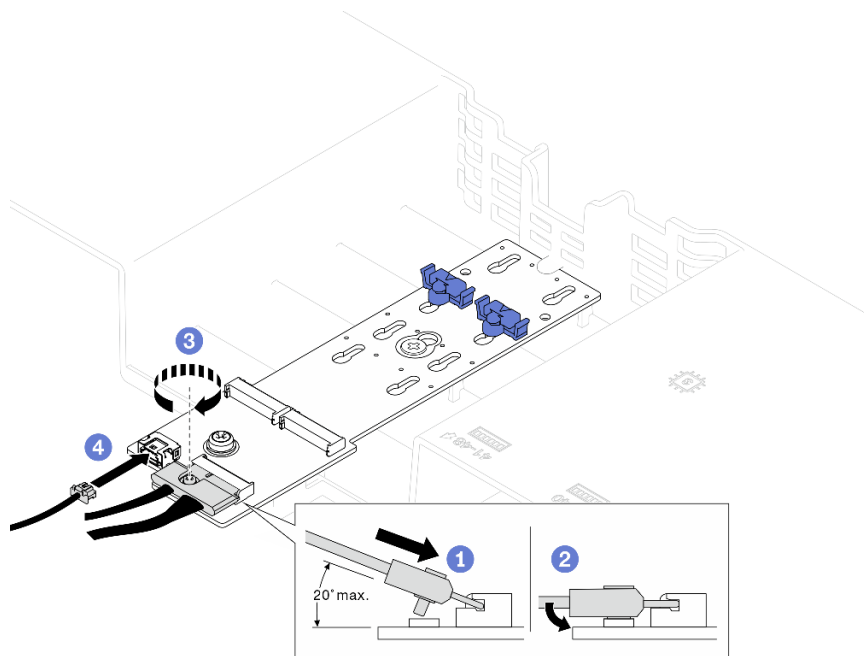


Figure 79. SATA/NVMe or NVMe M.2 backplane cable connection

- **SATA/x4 NVMe M.2 backplane**

Connect the M.2 backplane cables from the M.2 backplane.

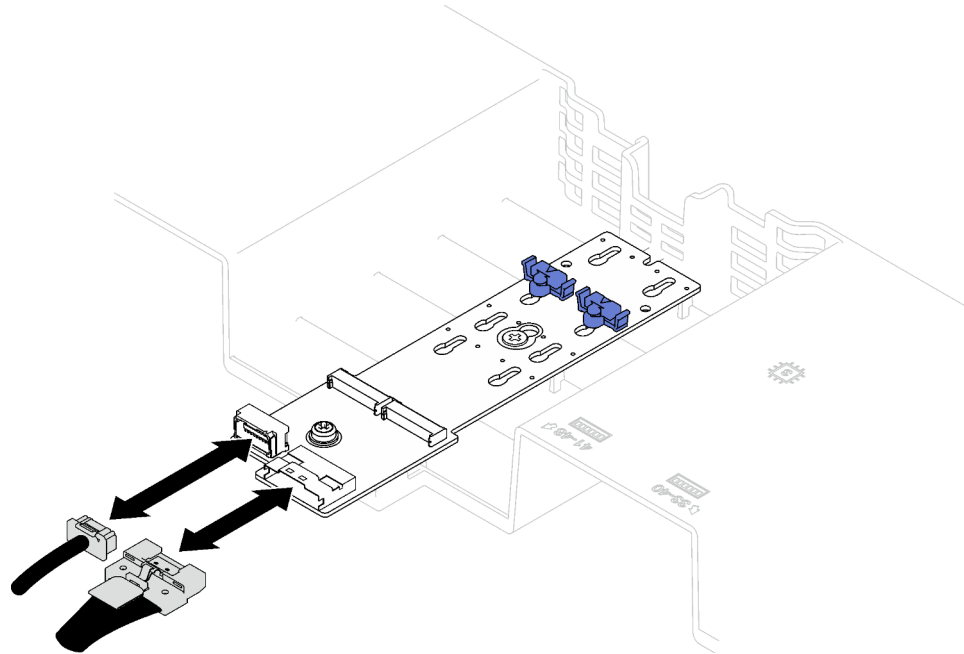


Figure 80. SATA/x4 NVMe M.2 backplane cable connection

Step 2. Install the M.2 backplane.

- 1 Lower the M.2 backplane into the front air baffle; then, slide the M.2 backplane forward until it is seated in place.
- 2 Install the screw that secures the end of the M.2 backplane to the front air baffle
- 3 Install the screw that secures the middle of the M.2 backplane to the front air baffle.

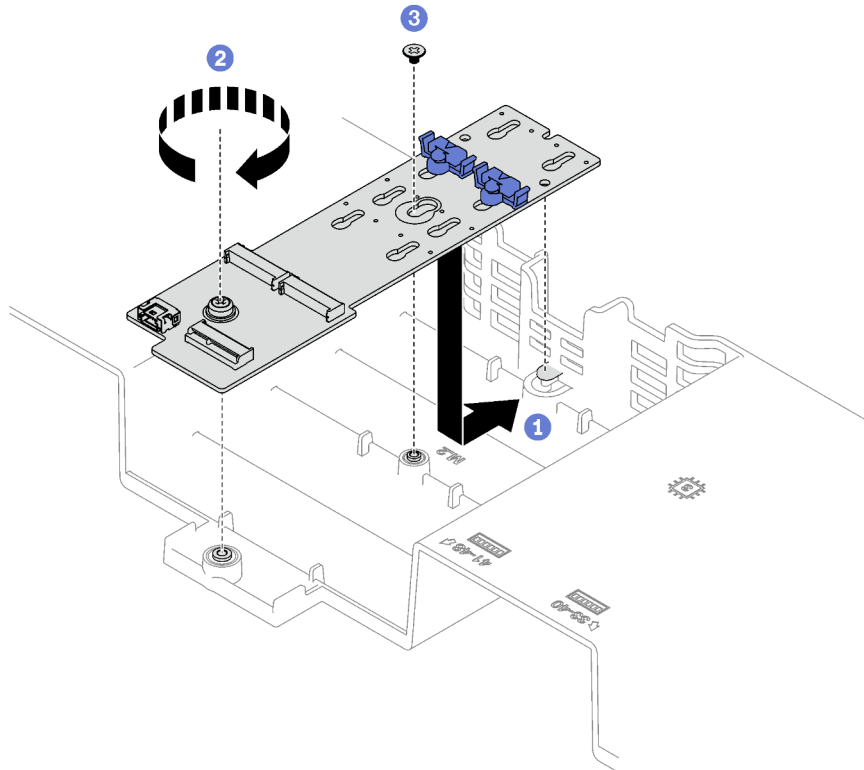


Figure 81. M.2 backplane installation

Step 3. Connect the M.2 backplane cables to the M.2 power connector and the signal connector on the system board assembly. See [“M.2 backplane cable routing” on page 337](#) for more details.

### After you finish

1. Reinstall the PCIe riser. See [“Install a PCIe riser” on page 152](#).
2. Reinstall the M.2 drives. See [“Install an M.2 drive” on page 131](#).
3. Complete the parts replacement. See [“Complete the parts replacement” on page 233](#).

### Demo video

[Watch the procedure on YouTube](#)

### Adjust a retainer on the M.2 backplane

Use this information to adjust a retainer on the M.2 backplane.

### About this task

The M.2 backplane retainer can be adjusted to accommodate three physical M.2 drive sizes.

### Procedure

- Step 1. ① Press both sides of the retainer.
- Step 2. ② Move the retainer toward the connector until it is in the large opening of the keyhole.
- Step 3. ③ Take the retainer out of the keyhole; then, insert the retainer into the correct keyhole.
- Step 4. ④ Press both sides of the retainer.

Step 5. 5 Slide the retainer back until the retainer locking nubs are in the holes.

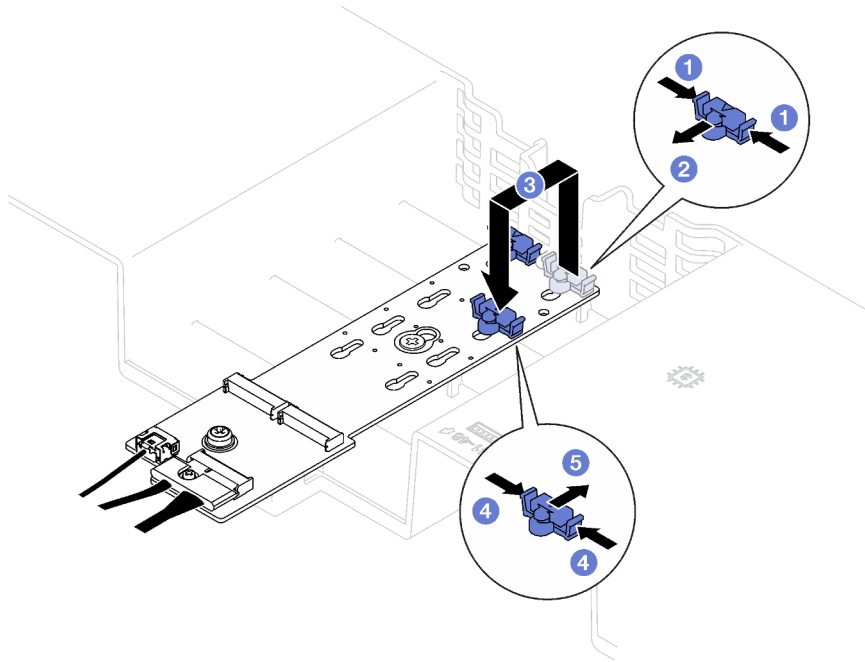


Figure 82. M.2 backplane retainer adjustment

## Install an M.2 drive

Follow instructions in this section to install an M.2 drive.

### About this task

#### Attention:

- Read [“Installation Guidelines” on page 47](#) and [“Safety inspection checklist” on page 48](#) to ensure that you work safely.
- Touch the static-protective package that contains the component to any unpainted metal surface on the server; then, remove it from the package and place it on a static-protective surface.

### Procedure

- Step 1. If necessary, adjust the retainer on the M.2 backplane to accommodate the particular size of the M.2 drive you wish to install. See [“Adjust a retainer on the M.2 backplane” on page 130](#).
- Step 2. Locate the connector on the M.2 backplane.

#### Notes:

- The M.2 backplane might look different from the illustration.
- Install the M.2 drive in slot 0 first.

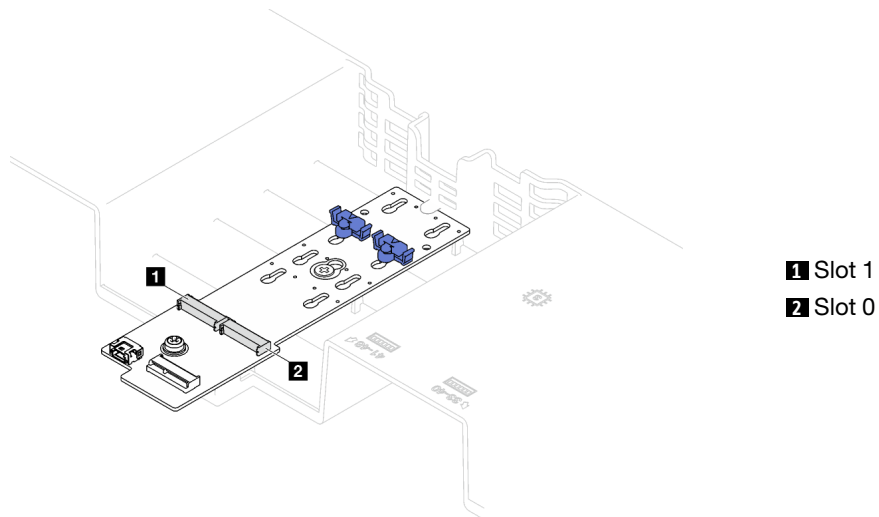


Figure 83. M.2 drive slots

Step 3. Install the M.2 drive.

- a. 1 Hold the M.2 drive at an angle, and insert it into the M.2 slot.
- b. 2 Lower the M.2 drive.
- c. 2 Slide the retainer toward the M.2 drive to secure it in place.

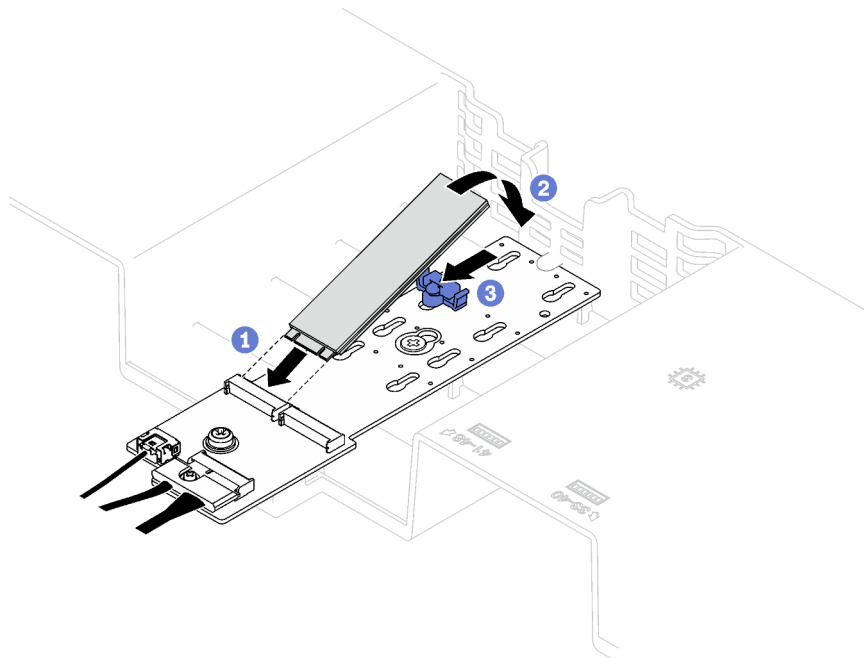


Figure 84. M.2 drive installation

## After you finish

Complete the parts replacement. See [“Complete the parts replacement”](#) on page 233.

## Demo video

[Watch the procedure on YouTube](#)

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## Management NIC adapter replacement

Follow instructions in this section to remove and install the management NIC adapter.

### Remove the management NIC adapter

Follow instructions in this section to remove the management NIC adapter.

#### About this task

##### Attention:

- Read [“Installation Guidelines” on page 47](#) and [“Safety inspection checklist” on page 48](#) to ensure that you work safely.
- Power off the server and peripheral devices and disconnect the power cords and all external cables. See [“Power off the server” on page 64](#).
- If the server is installed in a rack, remove it from the rack. See [“Remove the server from rails” on page 65](#).

#### Procedure

Step 1. Make preparation for this task.

- a. Access the Lenovo XClarity Controller; then, select **Network** in **BMC Configuration** and disable **Ethernet Port 2**.
- b. Remove the front top cover. See [“Remove the front top cover” on page 225](#).
- c. Remove the rear top cover. See [“Remove the rear top cover” on page 227](#).
- d. Depending on the server model, remove the following PCIe riser.
  - If the server is installed with three PCIe risers, remove the PCIe riser 1. See [“Remove a PCIe riser” on page 145](#).
  - If the server is installed with four PCIe risers, remove the PCIe riser A. See [“Remove a PCIe riser” on page 145](#).

Step 2. Disconnect the cable from the management NIC adapter.

Step 3. Remove the management NIC adapter.

- a. ① Loosen the screw that secures the management NIC adapter.
- b. ② Press and hold the blue latch.
- c. ③ Push the management NIC adapter by the latch out from the chassis.

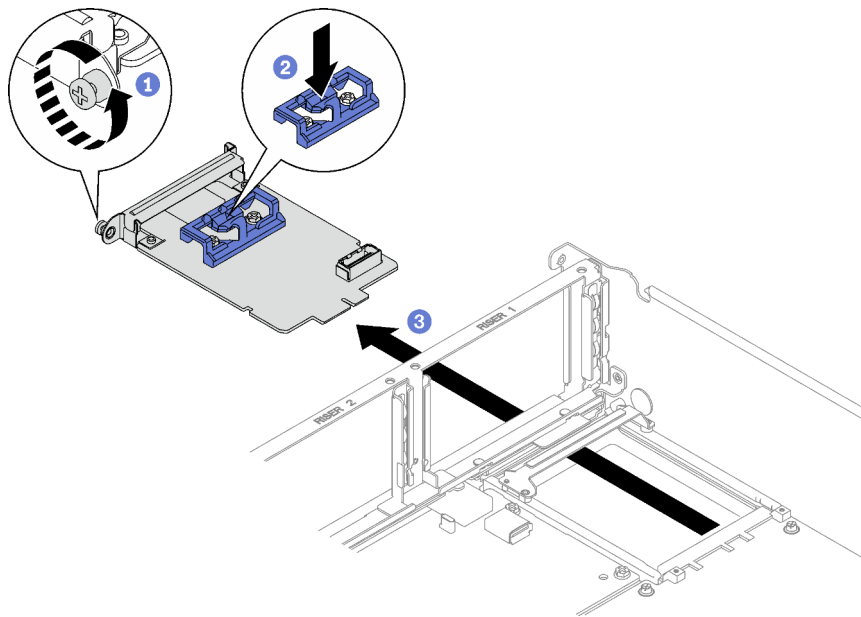


Figure 85. Management NIC adapter removal

## After you finish

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

## Demo video

[Watch the procedure on YouTube](#)

## Install the management NIC adapter

Follow instructions in this section to install the management NIC adapter.

## About this task

### Attention:

- Read “[Installation Guidelines](#)” on page 47 and “[Safety inspection checklist](#)” on page 48 to ensure that you work safely.
- Touch the static-protective package that contains the component to any unpainted metal surface on the server; then, remove it from the package and place it on a static-protective surface.

**Firmware and driver download:** You might need to update the firmware or driver after replacing a component.

- Go to <https://datacentersupport.lenovo.com/tw/en/products/servers/thinksystem/sr850v3/7d96/downloads/driver-list/> to see the latest firmware and driver updates for your server.
- Go to “[Update the firmware](#)” on page 365 for more information on firmware updating tools.

## Procedure

Step 1. If a filler is installed, remove it from the chassis first.

Step 2. Install the management NIC adapter.



- a. ① Slide the management NIC adapter into the slot until it clicks into place.
- b. ② Tighten the screw to secure the management NIC adapter.

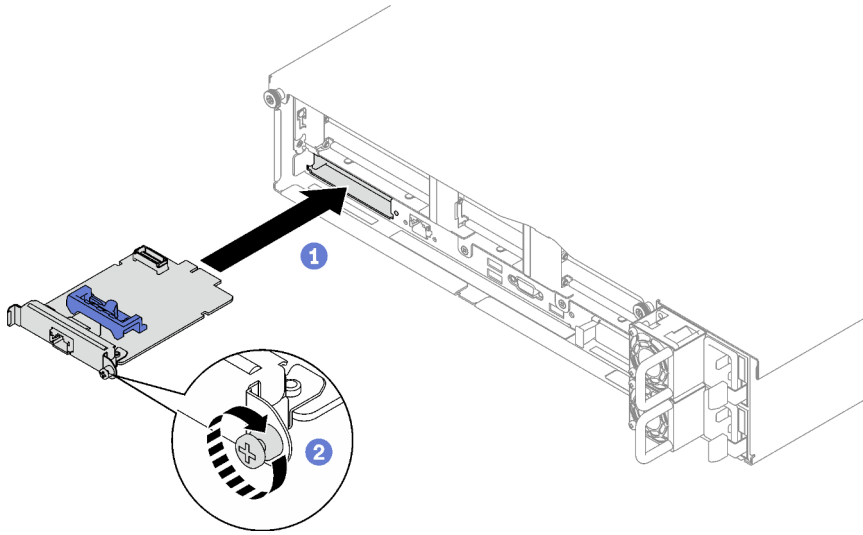


Figure 86. Management NIC adapter installation

Step 3. Connect the cable to the Management NIC adapter.

### After you finish

1. Reinstall the PCIe riser. See [“Install a PCIe riser” on page 152](#).
2. Complete the parts replacement. See [“Complete the parts replacement” on page 233](#).
3. Access the Lenovo XClarity Controller; then, select **Network** in **BMC Configuration** and enable **Ethernet Port 2**.

### Demo video

[Watch the procedure on YouTube](#)

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## Memory module replacement

Use the following procedures to remove and install a memory module.

### Remove a memory module

Use this information to remove a memory module.

### About this task

#### Attention:

- Read [“Installation Guidelines” on page 47](#) and [“Safety inspection checklist” on page 48](#) to ensure that you work safely.
- Power off the server and peripheral devices and disconnect the power cords and all external cables. See [“Power off the server” on page 64](#).

- Make sure to remove or install memory module 20 seconds after disconnecting power cords from the system. It allows the system to be completely discharged of electricity and safe for handling memory module.
- If the server is installed in a rack, remove it from the rack. See [“Remove the server from rails” on page 65](#).
- If you are not installing a replacement memory module to the same slot, make sure you have memory module filler available.
- Memory modules are sensitive to static discharge and require special handling. Refer to the standard guidelines for [“Handling static-sensitive devices” on page 50](#).

**Important:** Remove or install memory modules for one processor at a time.

## Procedure

**Attention:** Make sure to remove or install memory module 20 seconds after disconnecting power cords from the system. It allows the system to be completely discharged of electricity and safe for handling memory module.

Step 1. Locate the required memory module slot on the system board assembly.

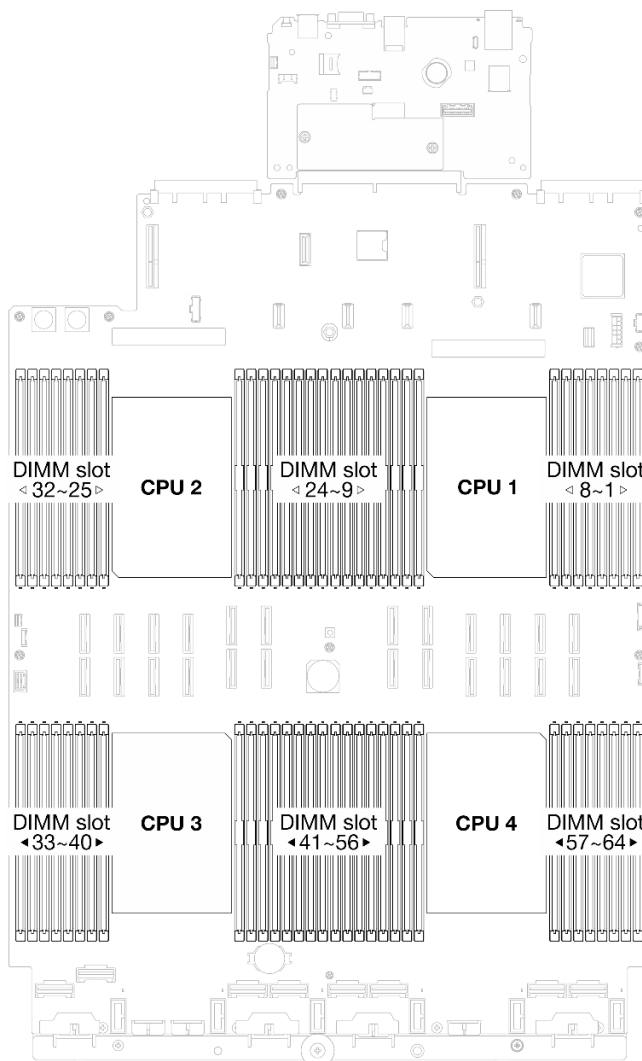


Figure 87. Memory modules and processors layout

Step 2. Make preparation for this task.

- a. To replace a front memory module (memory module 33-64), remove the following:
  1. Remove the front top cover. See [“Remove the front top cover” on page 225](#).
  2. Remove the front air baffle. See [“Remove the front air baffle” on page 84](#).
- b. To replace a rear memory module (memory module 1-32), remove the following:
  1. Remove the front top cover. See [“Remove the front top cover” on page 225](#).
  2. Remove the FHFL risers if necessary. See [“Remove a PCIe riser” on page 145](#).
  3. Remove the rear air baffle. See [“Remove the rear air baffle” on page 90](#).
  4. If the 2U performance PHM are installed, remove it to access the memory module slots. See [“Remove a processor and heat sink” on page 187](#)

**Note:** This procedure must be executed by a trained technician.

Step 3. Remove the memory module from the slot.

**Attention:** To avoid breaking the retaining clips or damaging the memory module slots, handle the clips gently.

- a. ① Gently open the retaining clip on each end of the memory module slot.
- b. ② Grasp the memory module at both ends and carefully lift it out of the slot.

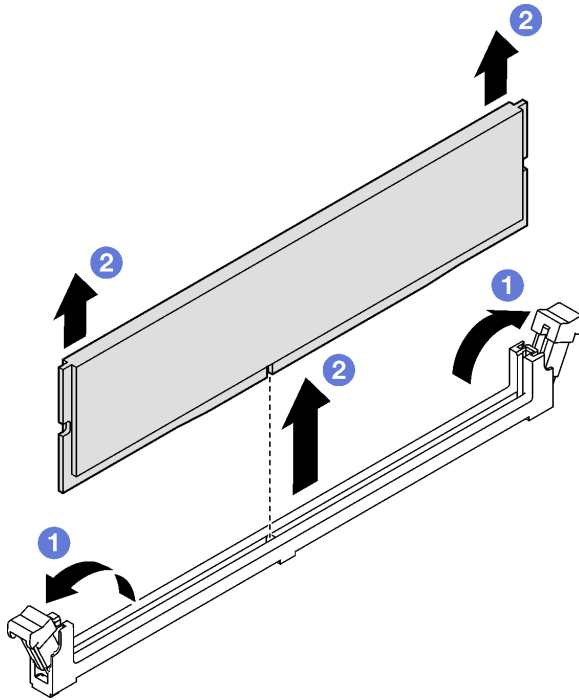


Figure 88. Memory module removal

### After you finish

1. A memory module slot must be installed with a memory module or a memory module filler. See [“Install a memory module” on page 138](#).
2. If you are instructed to return the component or optional device, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

## Demo video

[Watch the procedure on YouTube](#)

## Install a memory module

Follow instructions in this section to install a memory module.

### About this task

See [“Memory module installation rules and order” on page 50](#) for detailed information about memory configuration and setup.

#### Attention:

- Read [“Installation Guidelines” on page 47](#) and [“Safety inspection checklist” on page 48](#) to ensure that you work safely.
- Make sure to remove or install memory module 20 seconds after disconnecting power cords from the system. It allows the system to be completely discharged of electricity and safe for handling memory module.
- Make sure to adopt one of the supported configurations listed in [“Memory module installation rules and order” on page 50](#).
- Memory modules are sensitive to static discharge and require special handling. Refer to the standard guidelines at [“Handling static-sensitive devices” on page 50](#):
  - Always wear an electrostatic-discharge strap when removing or installing memory modules. Electrostatic-discharge gloves can also be used.
  - Never hold two or more memory modules together so that they do not touch each other. Do not stack memory modules directly on top of each other during storage.
  - Never touch the gold memory module connector contacts or allow these contacts to touch the outside of the memory module connector housing.
  - Handle memory modules with care: never bend, twist, or drop a memory module.
  - Do not use any metal tools (such as jigs or clamps) to handle the memory modules, because the rigid metals may damage the memory modules.
  - Do not insert memory modules while holding packages or passive components, which can cause package cracks or detachment of passive components by the high insertion force.

#### Important:

- Remove or install memory modules for one processor at a time.
- Before installing 24 Gb DRAM RDIMMs, make sure to update the UEFI firmware to the latest version first, then remove all existing 16 Gb DRAM RDIMMs.

**Firmware and driver download:** You might need to update the firmware or driver after replacing a component.

- Go to <https://datacentersupport.lenovo.com/tw/en/products/servers/thinksystem/sr850v3/7d96/downloads/driver-list/> to see the latest firmware and driver updates for your server.
- Go to [“Update the firmware” on page 365](#) for more information on firmware updating tools.

## Procedure

**Attention:** Make sure to remove or install memory module 20 seconds after disconnecting power cords from the system. It allows the system to be completely discharged of electricity and safe for handling memory module.

Step 1. Locate the required memory module slot on the system board assembly.

**Note:** Ensure that you observe the installation rules and sequence order in [“Memory module installation rules and order” on page 50.](#)

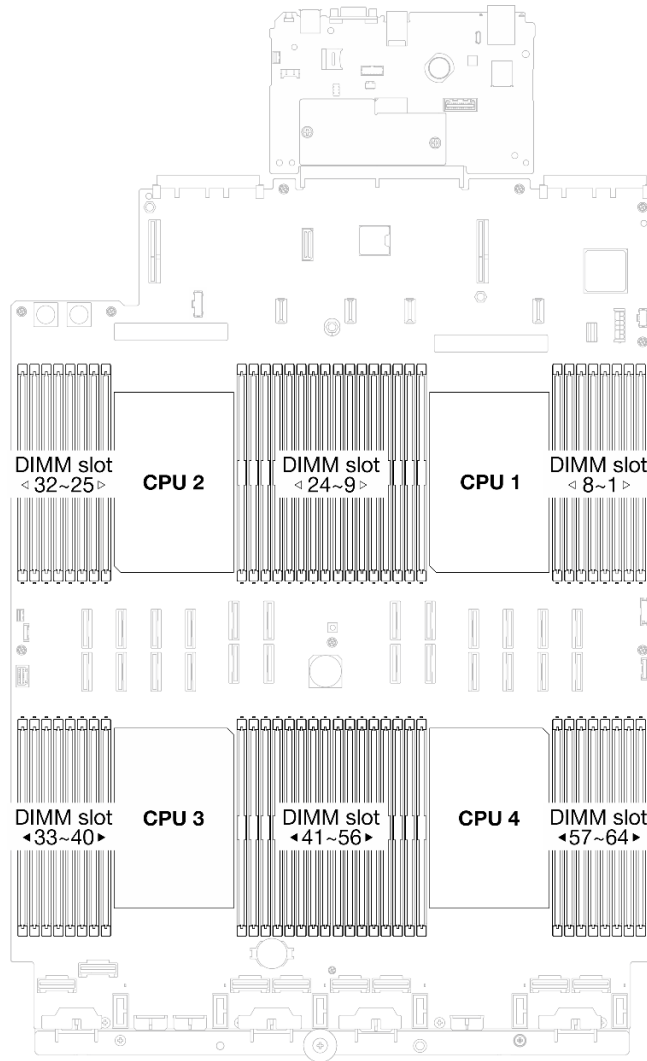


Figure 89. Memory modules and processors layout

Step 2. Touch the static-protective package that contains the memory module to any unpainted surface on the outside of the server. Then, take the memory module out of the package and place it on a static-protective surface.

Step 3. Install the memory module into the slot.

- a. ① Gently open the retaining clip on each end of the memory module slot.
- b. ② Align the memory module with the slot, and gently place the memory module on the slot with both hands.
- c. ③ Firmly press both ends of the memory module straight down into the slot until the retaining clips snap into the locked position.

**Attention:**

- To avoid breaking the retaining clips or damaging the memory module slots, open and close the clips gently.
- If there is a gap between the memory module and the retaining clips, the memory module has not been correctly inserted. In this case, open the retaining clips, remove the memory module, and then reinsert it.

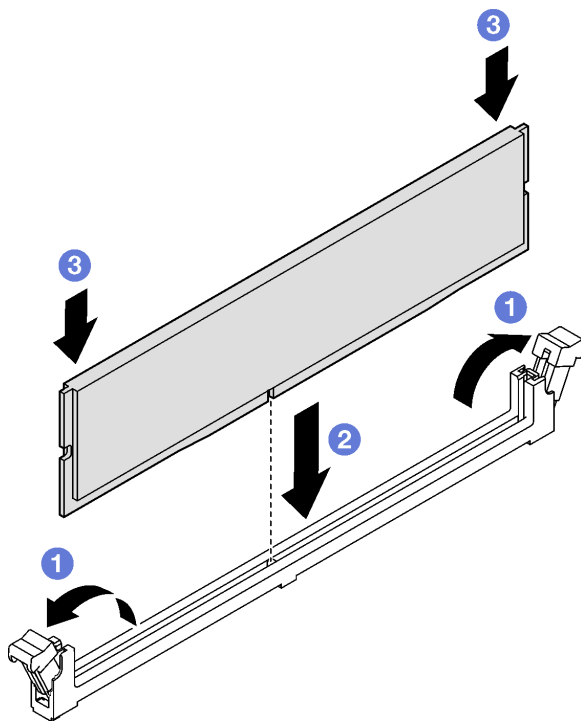


Figure 90. Memory module installation

**After you finish**

1. Reinstall the 2U performance PHM if necessary. See [“Install a processor and heat sink” on page 192](#).

**Note:** This procedure must be executed by a trained technician.

2. Reinstall the FHFL risers if necessary. See [“Install a PCIe riser” on page 152](#).
3. Complete the parts replacement. See [“Complete the parts replacement” on page 233](#).

**Demo video**

[Watch the procedure on YouTube](#)

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## MicroSD card replacement (trained technician only)

Follow instructions in this section to remove and install the MicroSD card.

**Important:** This task must be operated by trained technicians that are certified by Lenovo Service. Do not attempt to remove or install the part without proper training and qualification.

### Remove the MicroSD card

Follow instructions in this section to remove the MicroSD card. This procedure must be executed by a trained technician.

#### About this task

##### Attention:

- Read [“Installation Guidelines” on page 47](#) and [“Safety inspection checklist” on page 48](#) to ensure that you work safely.
- Power off the server and peripheral devices and disconnect the power cords and all external cables. See [“Power off the server” on page 64](#).
- If the server is installed in a rack, remove it from the rack. See [“Remove the server from rails” on page 65](#).

#### Procedure

Step 1. Make preparation for this task.

- a. Remove the front top cover. See [“Remove the front top cover” on page 225](#).
- b. Remove the rear top cover. See [“Remove the rear top cover” on page 227](#).
- c. Depending on the server model, remove the following PCIe riser(s).
  - If the server is installed with three PCIe risers, remove the PCIe riser 2 and 3. See [“Remove a PCIe riser” on page 145](#).
  - If the server is installed with four PCIe risers, remove the PCIe riser C. See [“Remove a PCIe riser” on page 145](#).

Step 2. Remove the MicroSD card.

- a. ① Slide the socket lid to the open position.
- b. ② Lift open the socket lid.
- c. ③ Remove the MicroSD card from the socket.

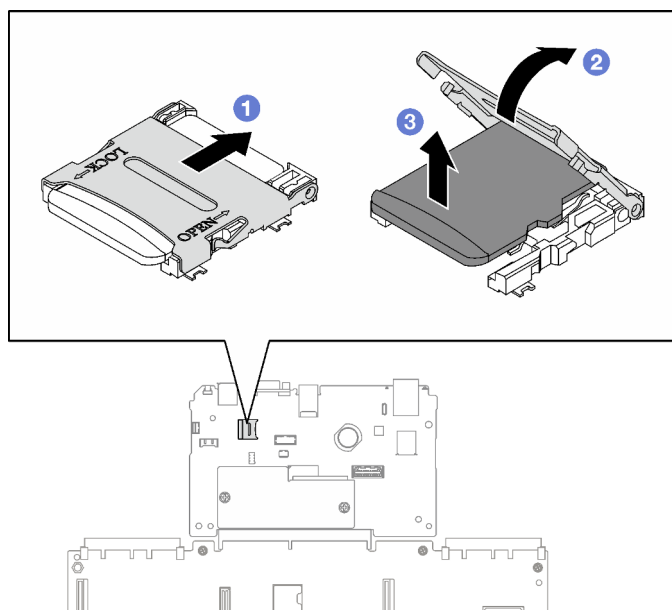


Figure 91. MicroSD card removal

## After you finish

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

## Demo video

[Watch the procedure on YouTube](#)

## Install the MicroSD card

Follow instructions in this section to install the MicroSD card. This procedure must be executed by a trained technician.

## About this task

### Attention:

- Read [“Installation Guidelines” on page 47](#) and [“Safety inspection checklist” on page 48](#) to ensure that you work safely.
- Touch the static-protective package that contains the component to any unpainted metal surface on the server; then, remove it from the package and place it on a static-protective surface.

## Procedure

- Step 1. ① Place the MicroSD card into the socket.
- Step 2. ② Close the socket lid.
- Step 3. ③ Slide the socket lid to the lock position.



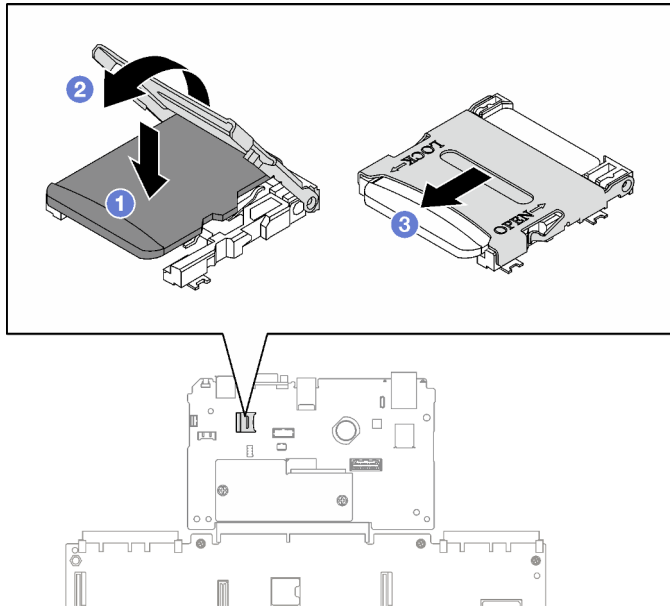


Figure 92. MicroSD card installation

## After you finish

1. Reinstall the PCIe riser(s). See [“Install a PCIe riser” on page 152](#).
2. Complete the parts replacement. See [“Complete the parts replacement” on page 233](#).

## Demo video

[Watch the procedure on YouTube](#)

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## OCP module replacement

Follow instructions in this section to remove and install an OCP module.

### Remove an OCP module

Follow instructions in this section to remove an OCP module.

### About this task

#### Attention:

- Read [“Installation Guidelines” on page 47](#) and [“Safety inspection checklist” on page 48](#) to ensure that you work safely.
- Power off the server and peripheral devices and disconnect the power cords and all external cables. See [“Power off the server” on page 64](#).

### Procedure

- Step 1. ① Loosen the thumbscrew.
- Step 2. ② Grasp the handle and slide the OCP module out.

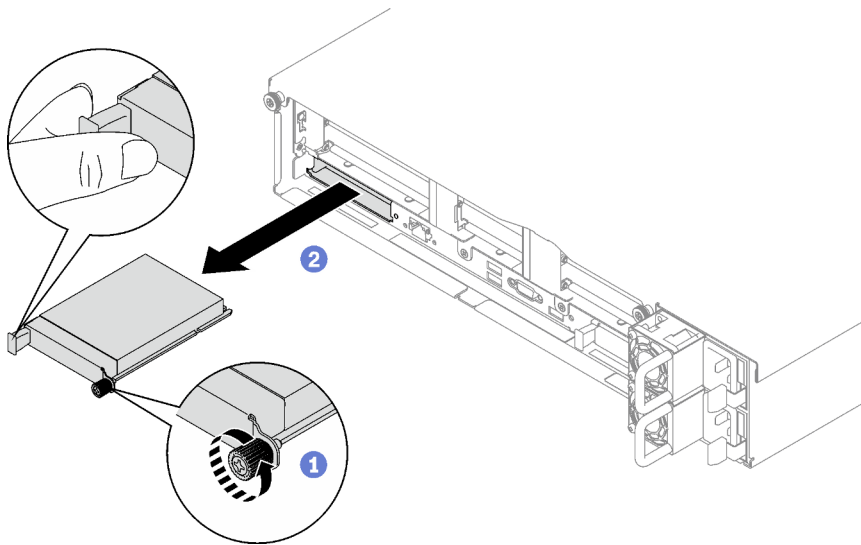


Figure 93. OCP module removal

## After you finish

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

### Demo video

[Watch the procedure on YouTube](#)

## Install an OCP module

Follow instructions in this section to install an OCP module.

### About this task

#### Attention:

- Read [“Installation Guidelines” on page 47](#) and [“Safety inspection checklist” on page 48](#) to ensure that you work safely.
- Touch the static-protective package that contains the component to any unpainted metal surface on the server; then, remove it from the package and place it on a static-protective surface.

**Firmware and driver download:** You might need to update the firmware or driver after replacing a component.

- Go to <https://datacentersupport.lenovo.com/tw/en/products/servers/thinksystem/sr850v3/7d96/downloads/driver-list/> to see the latest firmware and driver updates for your server.
- Go to [“Update the firmware” on page 365](#) for more information on firmware updating tools.

### Procedure

Step 1. If the OCP is covered with a OCP filler, remove the filler from the chassis first.

Step 2. Install the OCP module.

- 1 Slide the OCP module into the slot until it is fully seated.
- 2 Tighten the thumbscrew to secure the OCP module.

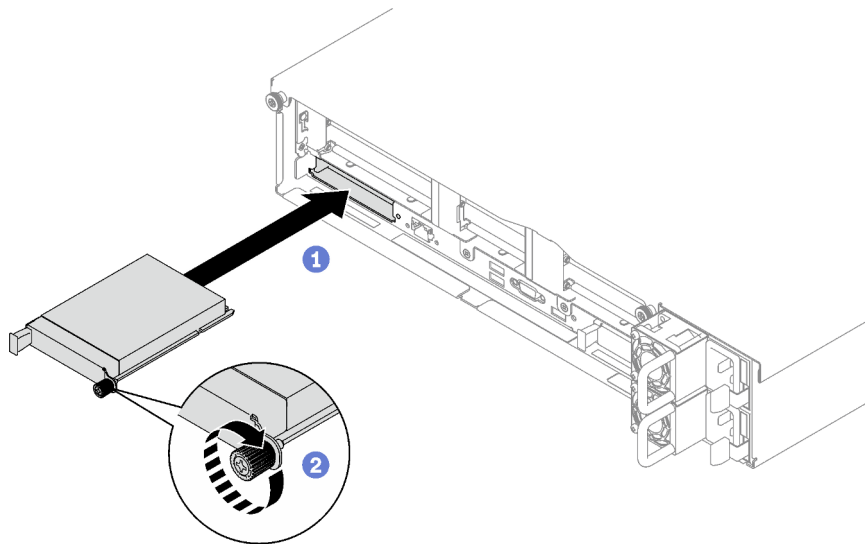


Figure 94. OCP module installation

## After you finish

Complete the parts replacement. See [“Complete the parts replacement” on page 233](#).

## Demo video

[Watch the procedure on YouTube](#)

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## PCIe riser and PCIe adapter replacement

Follow instructions in this section to remove and install a PCIe riser and a PCIe adapter.

### Remove a PCIe riser

Follow instructions in this section to remove a PCIe riser.

### About this task

#### Attention:

- Read [“Installation Guidelines” on page 47](#) and [“Safety inspection checklist” on page 48](#) to ensure that you work safely.
- Power off the server and peripheral devices and disconnect the power cords and all external cables. See [“Power off the server” on page 64](#).
- If the server is installed in a rack, slide the server out on its rack slide rails to gain access to the top cover, or remove the server from the rack. See [“Remove the server from rails” on page 65](#).

#### Notes:

- Depending on the configuration, follow the corresponding procedures below for proper removal procedure:
  - [“Remove a PCIe LP riser” on page 146](#)
  - [“Remove a PCIe FHHL riser” on page 147](#)
  - [“Remove a PCIe FHFL riser” on page 148](#)

- The PCIe riser location might look different from the illustrations in this topic.

## Remove a PCIe LP riser

### Procedure

Step 1. Make preparation for this task.

- Remove the front top cover. See [“Remove the front top cover” on page 225](#).
- Remove the rear top cover. See [“Remove the rear top cover” on page 227](#).
- If the serial port module is installed, slightly lift the PCIe riser, and disconnect the serial port cable from the system board assembly.

Step 2. Disconnect the signal cables from the system board assembly. See [“PCIe riser cable routing” on page 341](#) for more information.

Step 3. If applicable, disconnect the power cable from the PCIe riser.

Step 4. Grasp and lift the PCIe riser out of the chassis.

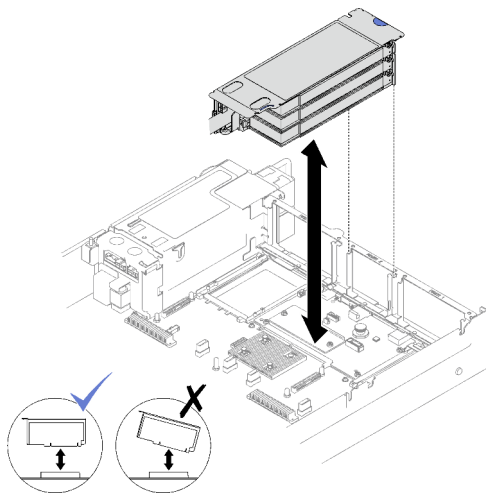


Figure 95. PCIe LP riser removal (without power connector)

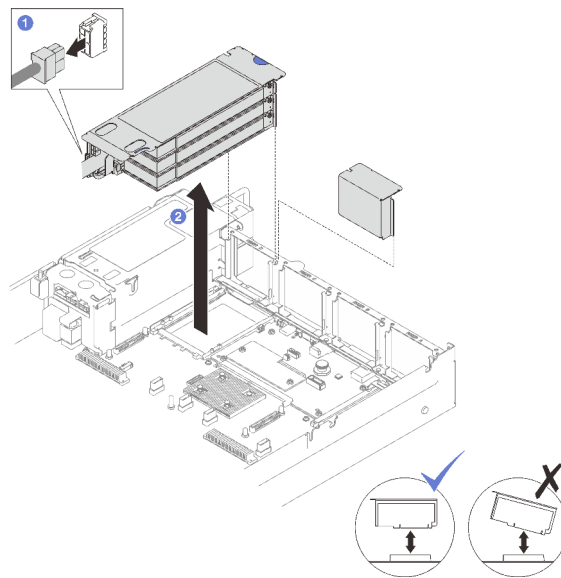


Figure 96. PCIe LP riser removal (with power connector)

Step 5. Record the cable connections and disconnect all internal cables from the PCIe adapters.

### After you finish

- If no PCIe riser is going to be installed to the chassis, install a riser filler into the chassis.
- If you plan to replace a PCIe adapter, see [“Remove a PCIe adapter” on page 149](#).
- If you are instructed to return the component or optional device, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

### Demo video

[Watch the procedure on YouTube](#)

## Remove a PCIe FHHL riser

### Procedure

Step 1. Make preparation for this task.

- a. Remove the front top cover. See [“Remove the front top cover” on page 225](#).
- b. Remove the rear top cover. See [“Remove the rear top cover” on page 227](#).
- c. If the 7mm drive cage is installed, slightly lift the PCIe riser, and disconnect the power and signal cables from the 7mm drive backplanes.

Step 2. Disconnect the signal cables from the system board assembly. See [“PCIe riser cable routing” on page 341](#) for more information.

Step 3. Remove the PCIe riser.

- a. ① Disconnect the power cable from the PCIe riser.
- b. ② Grasp and lift the PCIe riser out of the chassis.

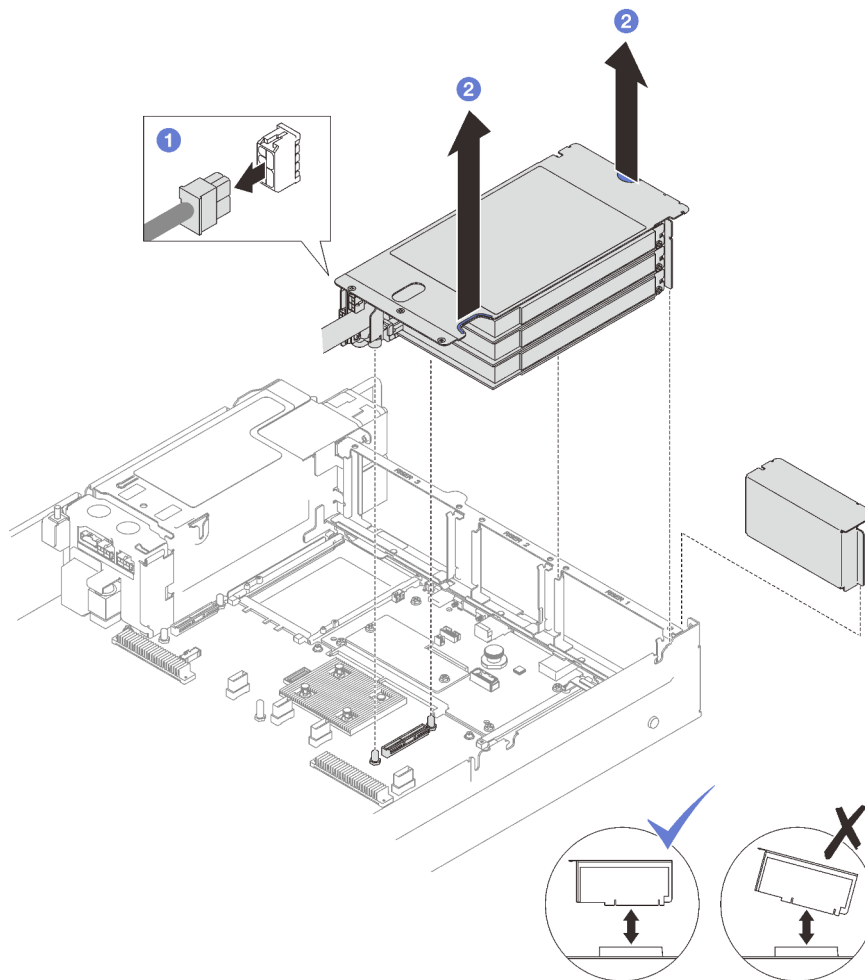


Figure 97. PCIe FHHL riser removal

Step 4. Record the cable connections and disconnect all internal cables from the PCIe adapters.

### After you finish

1. If no PCIe riser is going to be installed to the chassis, install a riser filler into the chassis.

2. If you plan to replace a PCIe adapter, see [“Remove a PCIe adapter” on page 149](#).
3. If you are instructed to return the component or optional device, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

## Demo video

[Watch the procedure on YouTube](#)

## Remove a PCIe FHFL riser

### Procedure

Step 1. Make preparation for this task.

- a. Remove the front top cover. See [“Remove the front top cover” on page 225](#).
- b. Remove the rear top cover. See [“Remove the rear top cover” on page 227](#).
- c. If the 7mm drive cage is installed, slightly lift the PCIe riser, and disconnect the power and signal cables from the 7mm drive backplanes.

Step 2. Disconnect the signal cables from the system board assembly. See [“PCIe riser cable routing” on page 341](#) for more information.

Step 3. Remove the PCIe riser.

- a. ❶ Disconnect the power cable from the PCIe riser.
- b. ❷ Gently pivot the tab on the rear air baffle outward toward the front of the server.
- c. ❸ Grasp and lift the PCIe riser out of the chassis.

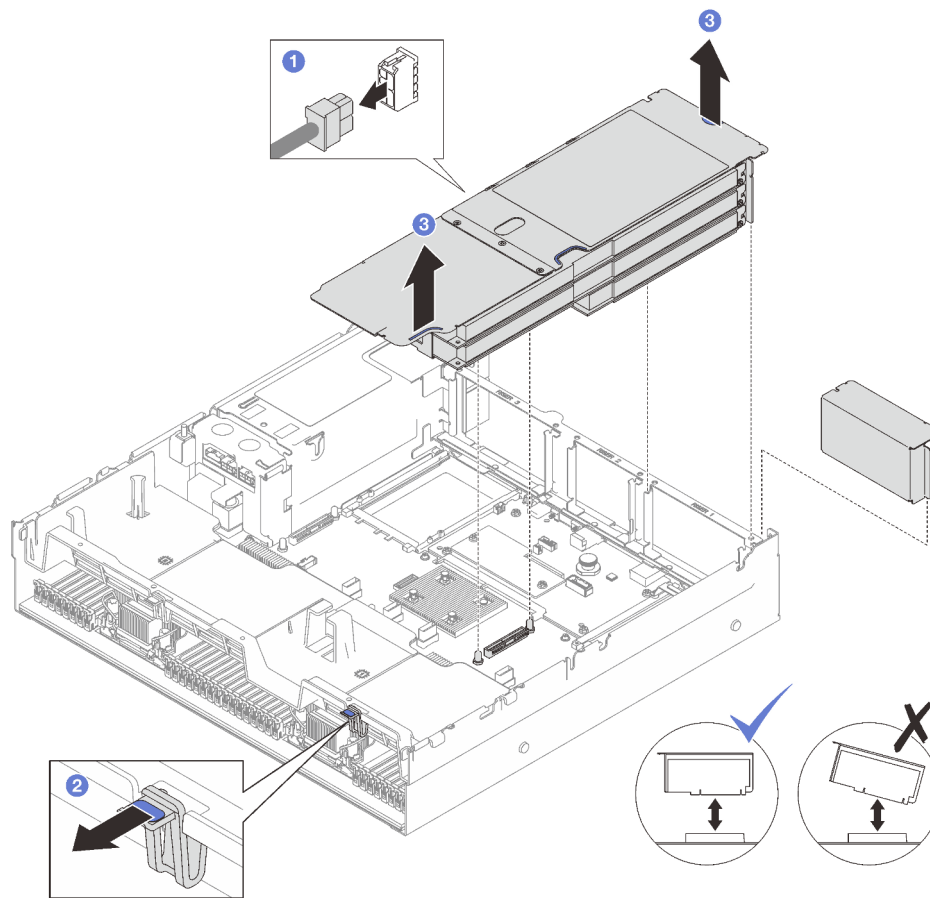


Figure 98. PCIe FHFL riser removal

Step 4. Record the cable connections and disconnect all internal cables from the PCIe adapters.

### After you finish

1. If no PCIe riser is going to be installed to the chassis, install a riser filler into the chassis.
2. If you plan to replace a PCIe adapter, see [“Remove a PCIe adapter” on page 149](#).
3. If you are instructed to return the component or optional device, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

### Demo video

[Watch the procedure on YouTube](#)

## Remove a PCIe adapter

Follow instructions in this section to remove a PCIe adapter.

### About this task

#### Attention:

- Read [“Installation Guidelines” on page 47](#) and [“Safety inspection checklist” on page 48](#) to ensure that you work safely.

- Power off the server and peripheral devices and disconnect the power cords and all external cables. See [“Power off the server” on page 64](#).
- If the server is installed in a rack, remove it from the rack. See [“Remove the server from rails” on page 65](#).

## Procedure

Step 1. Make preparation for this task.

- a. Remove the front top cover. See [“Remove the front top cover” on page 225](#).
- b. Remove the rear top cover. See [“Remove the rear top cover” on page 227](#).
- c. Remove the PCIe riser where the PCIe adapter has been installed. See [“Remove a PCIe riser” on page 145](#).

Step 2. Remove the PCIe adapter.

- a. ① Remove the screw that secures the PCIe adapter to the PCIe riser.
- b. ② Grasp the PCIe adapter by its edges and carefully pull it out of the PCIe slot.

**Note:** The PCIe riser might look different from the illustration.

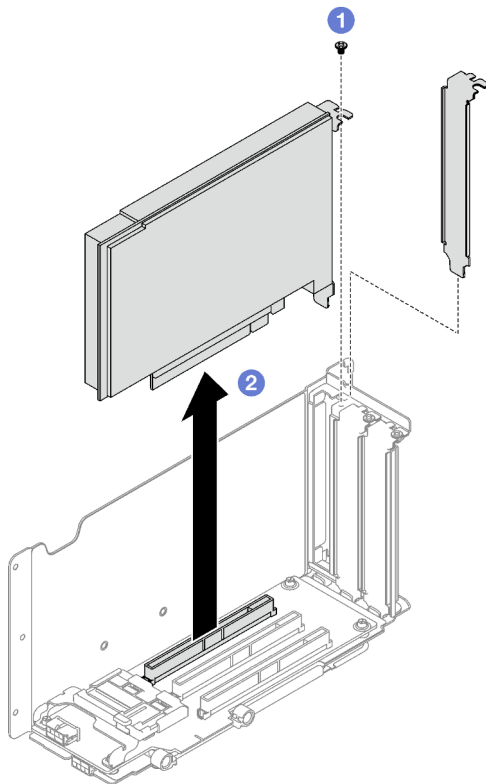


Figure 99. PCIe adapter removal

## After you finish

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

## Demo video

[Watch the procedure on YouTube](#)



## Install a PCIe adapter

Follow instructions in this section to install a PCIe adapter.

### About this task

#### Attention:

- Read [“Installation Guidelines” on page 47](#) and [“Safety inspection checklist” on page 48](#) to ensure that you work safely.
- Touch the static-protective package that contains the component to any unpainted metal surface on the server; then, remove it from the package and place it on a static-protective surface.

### Procedure

Step 1. If a adapter filler has been installed, remove the screw that secures it, and remove the filler.

Step 2. Install the PCIe adapter.

- 1 Align the PCIe adapter with the slot on the PCIe riser card, and insert it in.
- 2 Fasten the screw to secure the PCIe adapter to the PCIe riser.

**Note:** The PCIe riser might look different from the illustration.

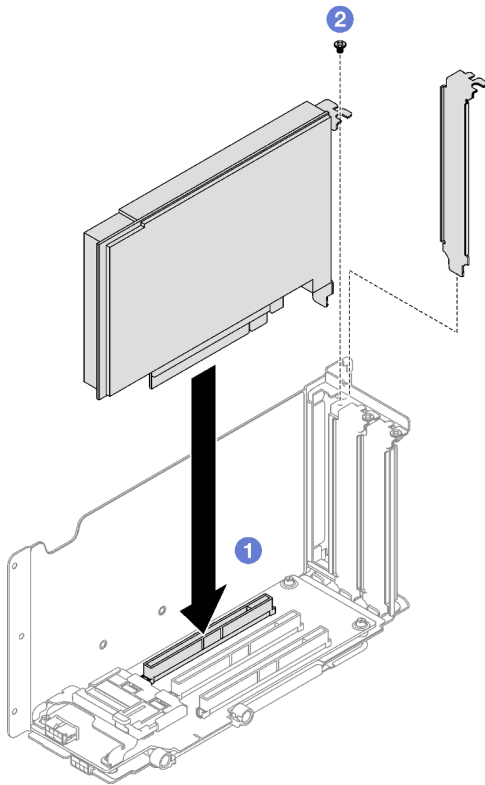


Figure 100. PCIe adapter installation

### After you finish

1. Reinstall the PCIe riser. See [“Install a PCIe riser” on page 152](#).
2. Complete the parts replacement. See [“Complete the parts replacement” on page 233](#).

## Demo video

[Watch the procedure on YouTube](#)

## Install a PCIe riser

Follow instructions in this section to install a PCIe riser.

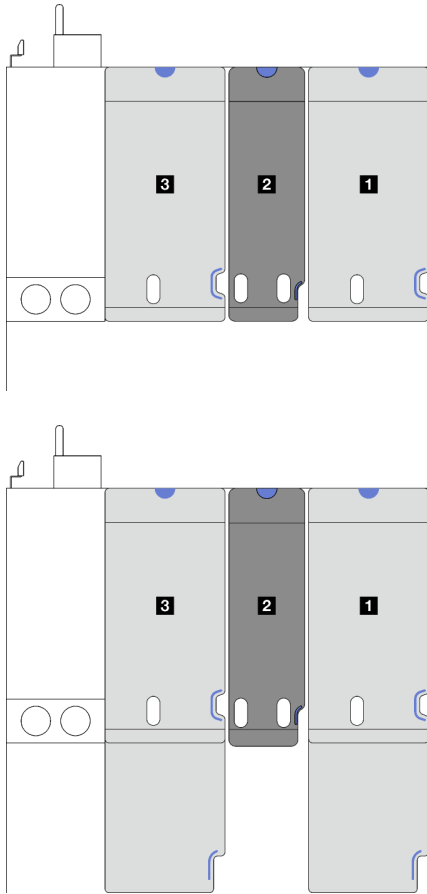
### About this task

#### Attention:

- Read [“Installation Guidelines” on page 47](#) and [“Safety inspection checklist” on page 48](#) to ensure that you work safely.
- Touch the static-protective package that contains the component to any unpainted metal surface on the server; then, remove it from the package and place it on a static-protective surface.

#### Notes:

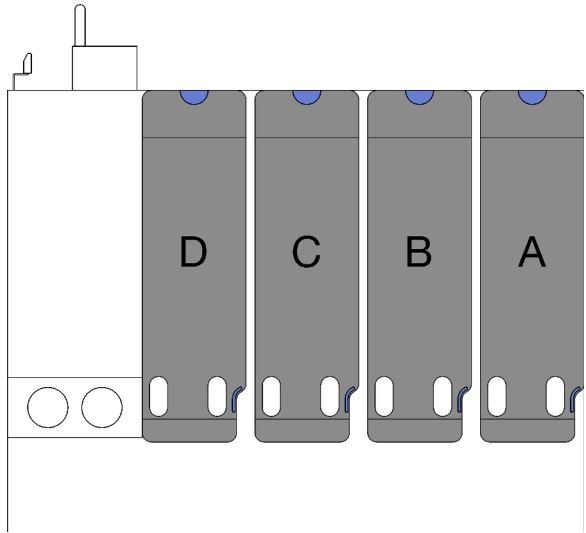
- Depending on the PCIe riser type and location, follow the corresponding procedures below for proper installation procedure:
  - The server is installed with three PCIe risers:
    - [“Install a PCIe LP riser” on page 154](#)
    - [“Install a PCIe FHHL riser” on page 155](#)
    - [“Install a PCIe FHFL riser” on page 156](#)



**1** and **3** PCIe FHHL or FHFL riser  
**2** PCIe LP riser (without power cable)

**Figure 101. PCIe riser type and location for the server models with three PCIe risers**

- The server is installed with four PCIe risers:
  - [“Install a PCIe LP riser” on page 154](#)



**A, B, and C** PCIe LP riser  
(without power cable)  
**D** PCIe LP riser (with power  
cable)

Figure 102. PCIe riser type and location for the server model with four PCIe risers

- The PCIe riser location might look different from the illustrations in this topic.

## Install a PCIe LP riser

### Procedure

- Step 1. If applicable, reconnect the serial port cable to the system board assembly. See [“System-board-assembly connectors” on page 32.](#)
- Step 2. Align the rear of the PCIe riser with the corresponding rail guides in the rear of the chassis; then, carefully press the PCIe riser straight down into the chassis until it is fully seated.
- Step 3. If applicable, connect the power cable to the PCIe riser .

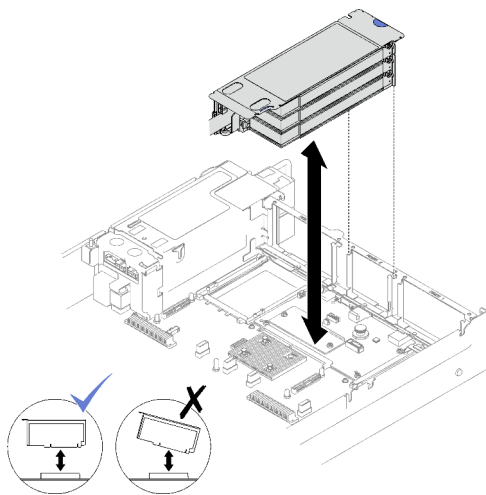


Figure 103. PCIe LP riser installation (without power connector)

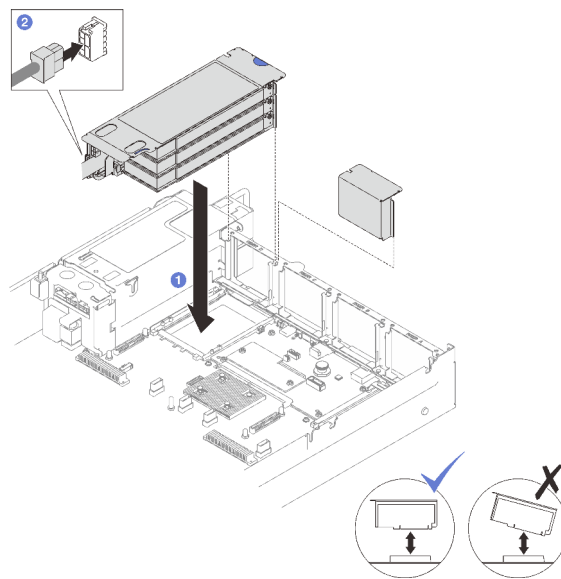


Figure 104. PCIe LP riser installation (with power connector)

## After you finish

1. Reconnect the signal cables to the system board assembly. See “[PCIe riser cable routing](#)” on page 341 for more information.
2. Reconnect the cables to the PCIe adapters.
3. Complete the parts replacement. See “[Complete the parts replacement](#)” on page 233.

## Demo video

[Watch the procedure on YouTube](#)

## Install a PCIe FHHL riser

### Procedure

- Step 1. If applicable, reconnect the power and signal cables to the 7mm drive backplanes.
- Step 2. ① Align the rear of the PCIe riser with the corresponding rail guides in the rear of the chassis; then, carefully press the PCIe riser straight down into the chassis until it is fully seated.
- Step 3. ② Connect the power cable to the PCIe riser.

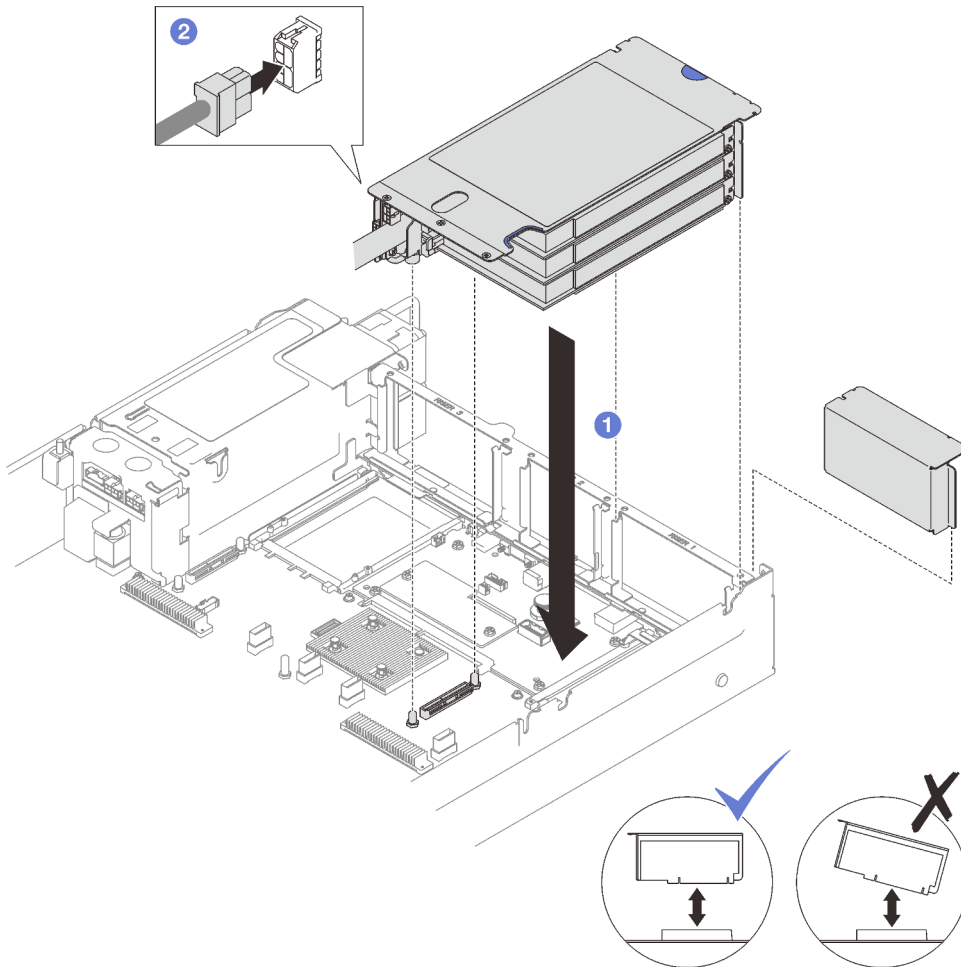


Figure 105. PCIe FHHL riser installation

## After you finish

1. Reconnect the signal cables to the system board assembly. See [“PCIe riser cable routing”](#) on page 341 for more information.
2. Reconnect the cables to the PCIe adapters.
3. Complete the parts replacement. See [“Complete the parts replacement”](#) on page 233.

### Demo video

[Watch the procedure on YouTube](#)

## Install a PCIe FHFL riser

### Procedure

- Step 1. If applicable, reconnect the power and signal cables to the 7mm drive backplanes.
- Step 2. ① Align the rear of the PCIe riser with the corresponding rail guides in the rear of the chassis; then, carefully press the PCIe riser straight down into the chassis until it is fully seated.
- Step 3. ② Connect the power cable to the PCIe riser.

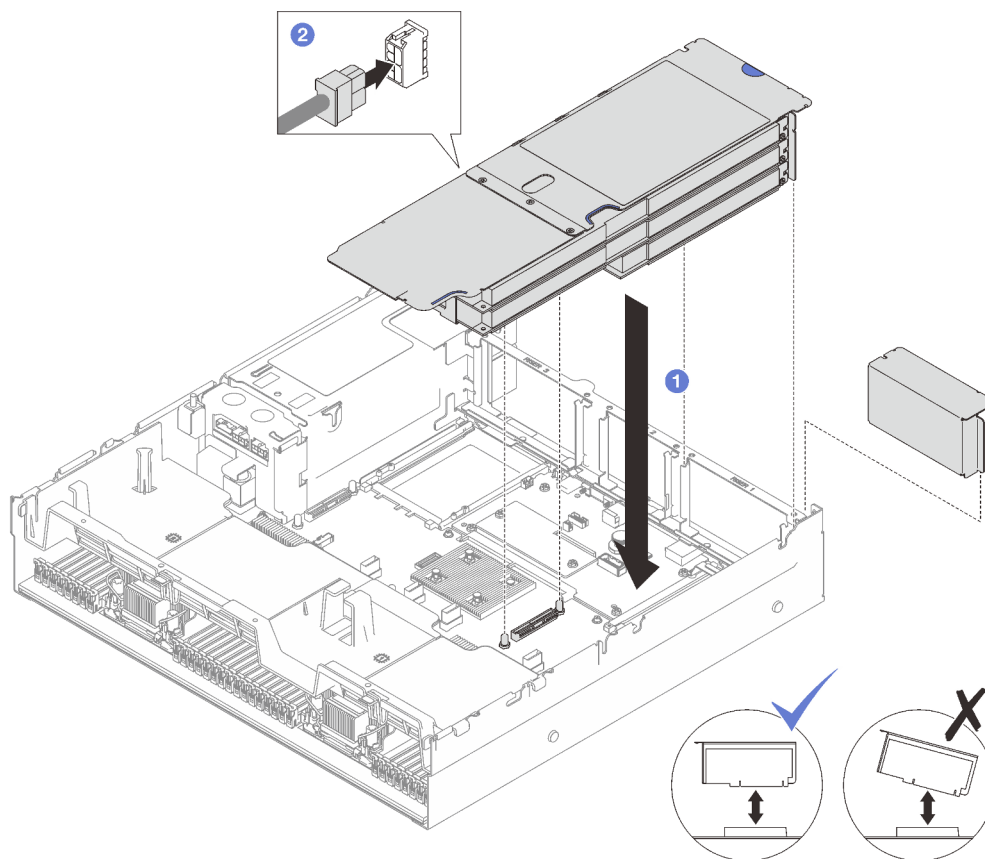


Figure 106. PCIe FHFL riser installation

### After you finish

1. Reconnect the signal cables to the system board assembly. See [“PCIe riser cable routing”](#) on page 341 for more information.
2. Reconnect the cables to the PCIe adapters.
3. Complete the parts replacement. See [“Complete the parts replacement”](#) on page 233.

## Demo video

[Watch the procedure on YouTube](#)

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## PCIe riser card replacement

Follow instructions in this section to remove and install a PCIe riser card.

### Remove a PCIe riser card

Follow instructions in this section to remove a PCIe riser card.

### About this task

#### Attention:

- Read [“Installation Guidelines” on page 47](#) and [“Safety inspection checklist” on page 48](#) to ensure that you work safely.
- Power off the server and peripheral devices and disconnect the power cords and all external cables. See [“Power off the server” on page 64](#).
- If the server is installed in a rack, remove it from the rack. See [“Remove the server from rails” on page 65](#).

#### Notes:

- If you are removing a riser card from the 7mm/x16 PCIe G4 Riser 1 FHHL, see [“Remove three-slot riser card from riser with 7mm drive cage” on page 159](#).
- The PCIe riser might look different from the illustrations in this topic.

### Procedure

Step 1. Make preparation for this task.

- a. Remove the front top cover. See [“Remove the front top cover” on page 225](#).
- b. Remove the rear top cover. See [“Remove the rear top cover” on page 227](#).
- c. Remove the PCIe riser where the PCIe card has been installed. See [“Remove a PCIe riser” on page 145](#).
- d. Remove the 7mm drives and the drive cage if necessary. See [“Remove a 7mm drive” on page 79](#) and [“Remove the 7mm drive cage” on page 80](#).
- e. Remove the serial port module if necessary. See [“Remove the serial port module” on page 206](#).
- f. Remove all of the PCIe adapters or GPU adapters. See [“Remove a PCIe adapter” on page 149](#) or [“Remove a GPU adapter” on page 115](#).

Step 2. Unfasten the two screws to remove the cable cover from the PCIe riser.

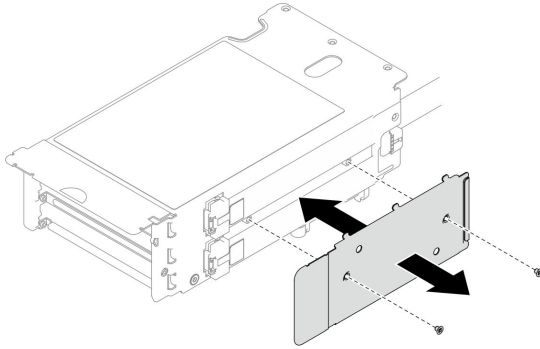


Figure 107. Cable cover removal

Step 3. Disconnect the cable(s) from the outside of the PCIe riser.

**Note:** Depending on the configuration, disconnect one cable or two cables from the outside of the PCIe riser.

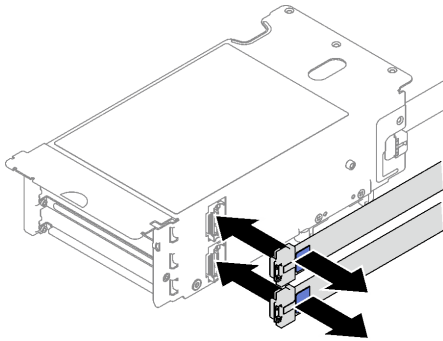


Figure 108. Cable disconnection

Step 4. Remove the PCIe riser card.

- a. 1 Remove the three screws from the PCIe retainer.
- b. 2 Remove the PCIe retainer from the PCIe riser card.
- c. 3 Disconnect the cable(s) from the PCIe riser card.

**Note:** Depending on the configuration, disconnect one cable or two cables from the PCIe riser card.

- d. 4 Remove the two screws from the PCIe riser card.
- e. 5 Remove the PCIe riser card from the PCIe riser cage.



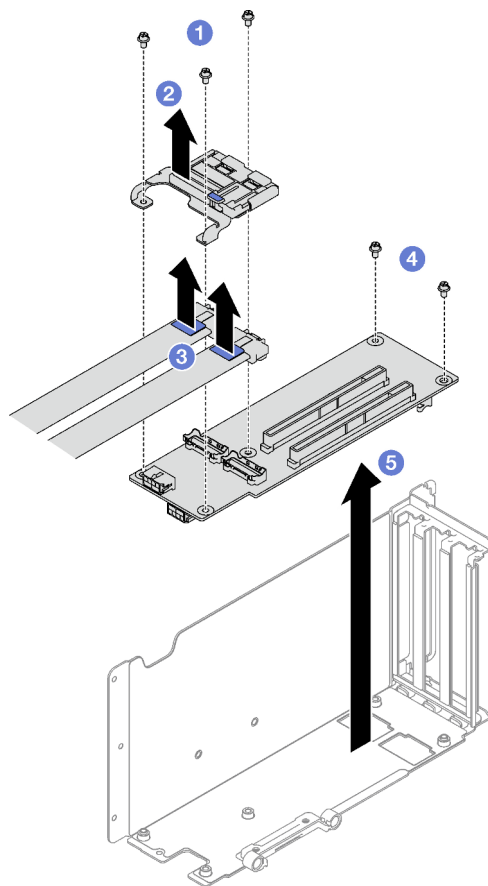


Figure 109. PCIe riser card removal

## After you finish

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

## Demo video

[Watch the procedure on YouTube](#)

## Remove three-slot riser card from riser with 7mm drive cage

### Procedure

- Step 1. Make preparation for this task.
  - a. Remove the front top cover. See [“Remove the front top cover”](#) on page 225.
  - b. Remove the rear top cover. See [“Remove the rear top cover”](#) on page 227.
  - c. Remove the PCIe riser where the PCIe riser card has been installed. See [“Remove a PCIe riser”](#) on page 145.
  - d. Remove the 7mm drives and the drive cage. See [“Remove a 7mm drive”](#) on page 79 and [“Remove the 7mm drive cage”](#) on page 80.
  - e. Remove all of the PCIe adapters or GPU adapters. See [“Remove a PCIe adapter”](#) on page 149 or [“Remove a GPU adapter”](#) on page 115.
- Step 2. Remove the PCIe riser card.

- a. 1 Remove the three screws from the PCIe retainer.
- b. 2 Remove the PCIe retainer from the PCIe riser card.
- c. 3 Remove the two screws from the PCIe riser card.
- d. 4 Remove the PCIe riser card from the PCIe riser cage.

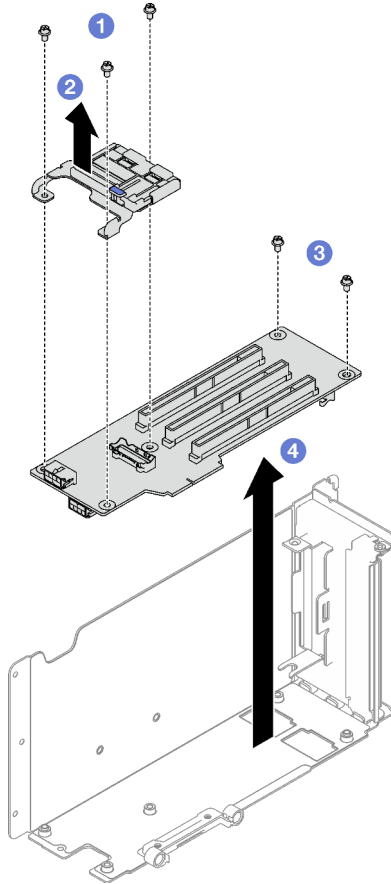


Figure 110. PCIe riser card removal

## After you finish

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

## Demo video

[Watch the procedure on YouTube](#)

## Install a PCIe riser card

Follow instructions in this section to install a PCIe riser card.

## About this task

### Attention:

- Read [“Installation Guidelines” on page 47](#) and [“Safety inspection checklist” on page 48](#) to ensure that you work safely.

- Touch the static-protective package that contains the component to any unpainted metal surface on the server; then, remove it from the package and place it on a static-protective surface.

**Notes:**

- If you are installing a riser card to the 7mm/x16 PCIe G4 Riser 1 FHHL, see [“Install three-slot riser card to riser with 7mm drive cage” on page 164.](#)
- The PCIe riser might look different from the illustrations in this topic.

**Procedure**

Step 1. If necessary, attach the labels onto the PCIe riser cables as illustrated.

**Note:** Depending on the configuration, see [“PCIe riser cable routing \(server model with three PCIe risers\)” on page 341](#) or [“PCIe riser cable routing \(server model with four PCIe risers\)” on page 354](#) to identify the corresponding labels for the cables.

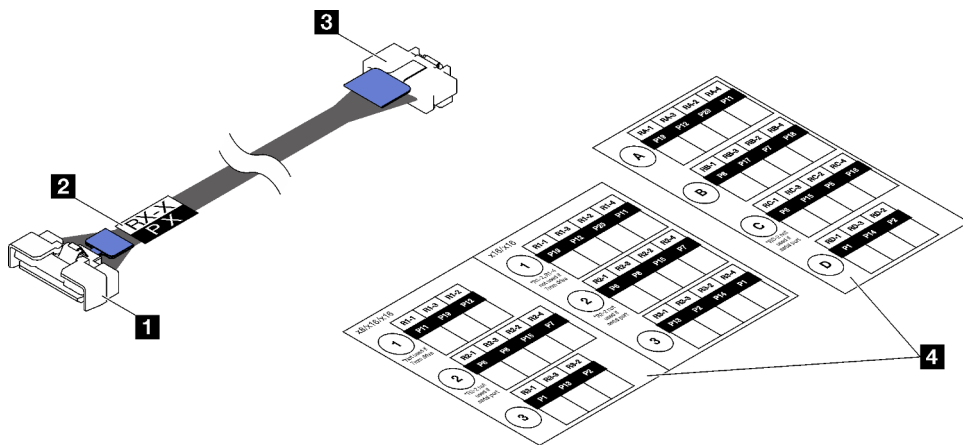


Figure 111. PCIe riser cable

<b>1</b> Straight-end of cable (connects to system board assembly)	<b>3</b> Right-angle end of cable (connects to riser card)
<b>2</b> Label (located near straight-end of cable)	<b>4</b> Label sheet for PCIe riser cable (from labels kit)

1. **1** Attach the white space portion of the label near the straight-end of the PCIe riser cable.
2. **2** Wrap the label around the cable and attach it onto the white space portion.

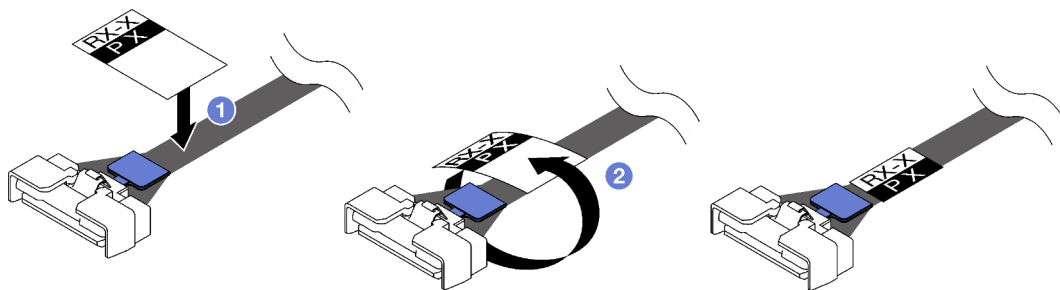


Figure 112. Label application

Step 2. If necessary, unfasten the two screws to remove the cable cover from the PCIe riser first.

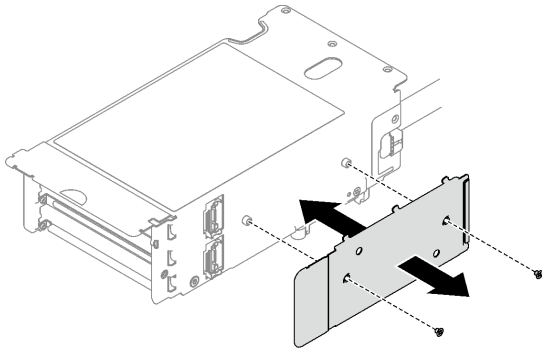


Figure 113. Cable cover removal

Step 3. Install the PCIe riser card.

- a. ① Align the PCIe riser card with the screw holes on the PCIe riser cage.
- b. ② Fasten the two screws to secure the PCIe riser card to the PCIe riser cage.
- c. ③ Connect the cable(s) to the PCIe riser card.

**Notes:** Depending on the configuration, connect one cable or two cables to the PCIe riser card.

- One cable:
  - 7mm/x16 PCIe G5 Riser 1 FHHL (connect the cable to the bottom connector)
  - x16/x8/Serial PCIe G4 Riser 2/C HHHL (connect the cable to the top connector)
  - x16/x8/Serial PCIe G5 Riser 2/C HHHL (connect the cable to the top connector)
  - x8/x16/x16 PCIe G4 Riser 1/3 FHFL
  - x8/x16/x16 PCIe G4 Riser D HHHL
  - x8/x16/x16 PCIe G5 Riser D HHHL
- Two cables:
  - x16/x8/x8 PCIe G4 Riser 2/A/B/C HHHL
  - x16/x8/x8 PCIe G5 Riser 2/A/B/C HHHL
  - x16/x16 PCIe G5 Riser 1/3 FHFL

- d. ④ Align the PCIe retainer with the screw holes on the PCIe riser card.
- e. ⑤ Fasten the three screws to secure the PCIe retainer to the PCIe riser card.

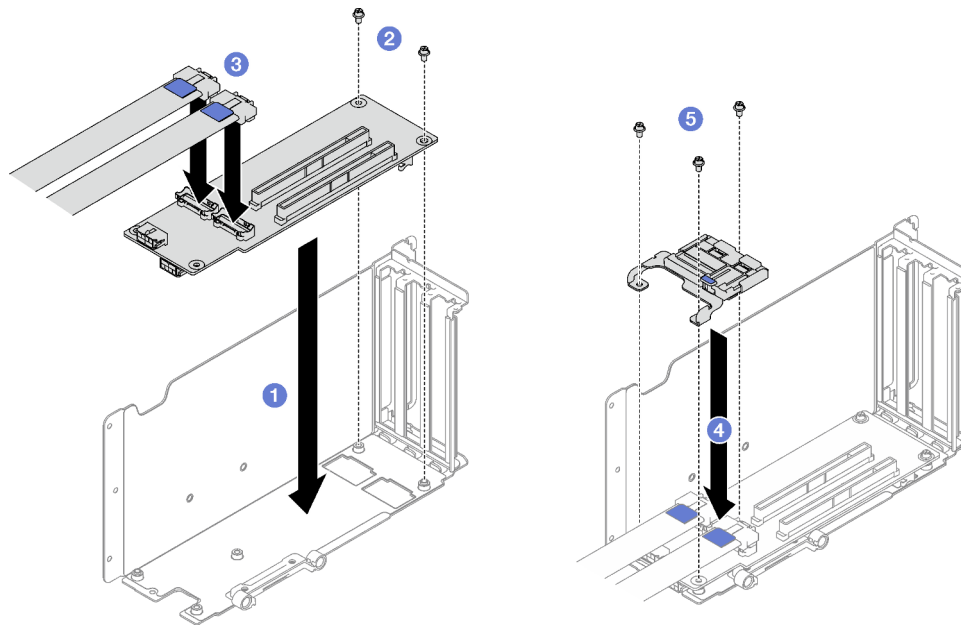


Figure 114. PCIe riser card installation

Step 4. Connect the cable(s) to the outside of the PCIe riser.

**Notes:** Depending on the configuration, connect one cable or two cables to the PCIe riser card.

- One cable:
  - 7mm/x16 PCIe G5 Riser 1 FHHL (connect the cable to the bottom connector)
- Two cables:
  - x16/x8/Serial PCIe G4 Riser 2/C HHHL
  - x16/x8/Serial PCIe G5 Riser 2/C HHHL
  - x8/x16/x16 PCIe G4 Riser 1/3 FHFL
  - x8/x16/x16 PCIe G4 Riser D HHHL
  - x8/x16/x16 PCIe G5 Riser D HHHL
  - x16/x8/x8 PCIe G4 Riser 2/A/B/C HHHL
  - x16/x8/x8 PCIe G5 Riser 2/A/B/C HHHL
  - x16/x16 PCIe G5 Riser 1/3 FHFL

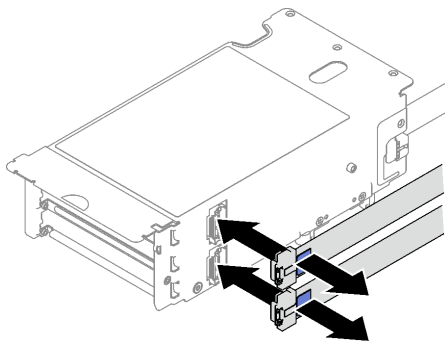


Figure 115. Cable connection

Step 5. Fasten the two screws to secure the cable cover to the PCIe riser.

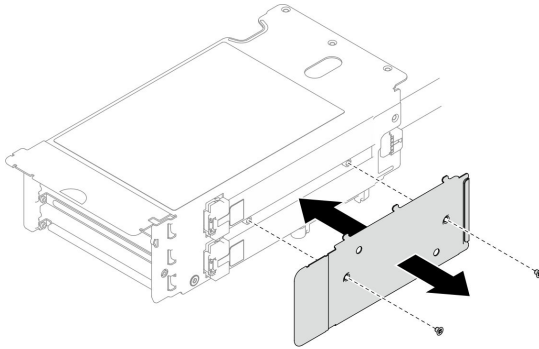


Figure 116. Cable cover installation

## After you finish

1. Reinstall the 7mm drive cage and the 7mm drives if necessary. See [“Install the 7mm drive cage” on page 82](#) and [“Install a 7mm drive” on page 83](#).
2. Reinstall the serial port module if necessary. See [“Install the serial port module” on page 207](#).
3. Reinstall the PCIe adapters or GPU adapters. See [“Install a PCIe adapter” on page 151](#) or [“Install a GPU adapter” on page 118](#).
4. Reinstall the PCIe riser. See [“Install a PCIe riser” on page 152](#).
5. Reconnect the required cables.
6. Complete the parts replacement. See [“Complete the parts replacement” on page 233](#).

## Demo video

[Watch the procedure on YouTube](#)

## Install three-slot riser card to riser with 7mm drive cage

### Procedure

- Step 1. Install the PCIe riser card.
- a. ① Align the PCIe riser card with the screw holes on the PCIe riser cage.
  - b. ② Fasten the two screws to secure the PCIe riser card to the PCIe riser cage.
  - c. ③ Align the PCIe retainer with the screw holes on the PCIe riser card.
  - d. ④ Fasten the three screws to secure the PCIe retainer to the PCIe riser card.

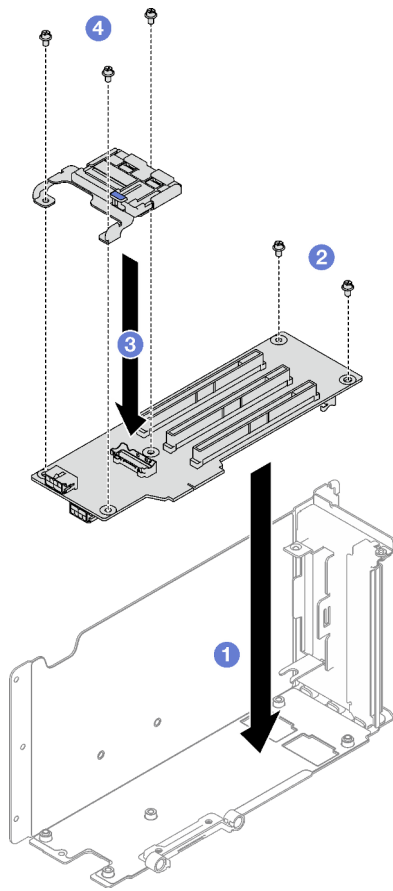


Figure 117. PCIe riser card installation

## After you finish

1. Reinstall the 7mm drive cage and 7mm drives. See [“Install the 7mm drive cage”](#) on page 82 and [“Install a 7mm drive”](#) on page 83.
2. Reinstall the PCIe adapters. See [“Install a PCIe adapter”](#) on page 151.
3. Reinstall the PCIe riser. See [“Install a PCIe riser”](#) on page 152.
4. Reconnect the required cables.
5. Complete the parts replacement. See [“Complete the parts replacement”](#) on page 233.

## Demo video

[Watch the procedure on YouTube](#)

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## PCIe retainer replacement

Follow instructions in this section to remove and install a PCIe retainer.

### Remove a PCIe retainer

Follow instructions in this section to remove a PCIe retainer.

### About this task

**Attention:**

- Read [“Installation Guidelines” on page 47](#) and [“Safety inspection checklist” on page 48](#) to ensure that you work safely.
- Power off the server and peripheral devices and disconnect the power cords and all external cables. See [“Power off the server” on page 64](#).
- If the server is installed in a rack, remove it from the rack. See [“Remove the server from rails” on page 65](#).

**Note:** The PCIe riser might look different from the illustration.

**Procedure**

Step 1. Make preparation for this task.

- a. Remove the front top cover. See [“Remove the front top cover” on page 225](#).
- b. Remove the rear top cover. See [“Remove the rear top cover” on page 227](#).
- c. Remove the PCIe riser where the PCIe retainer has been installed. See [“Remove a PCIe riser” on page 145](#).
- d. Remove the 7mm drives and the drive cage if necessary. See [“Remove a 7mm drive” on page 79](#) and [“Remove the 7mm drive cage” on page 80](#).
- e. Remove the serial port module if necessary. See [“Remove the serial port module” on page 206](#).
- f. Remove all of the PCIe adapters or GPU adapters. See [“Remove a PCIe adapter” on page 149](#) or [“Remove a GPU adapter” on page 115](#).

Step 2. Remove the PCIe retainer.

- a. ① Remove the three screws from the PCIe retainer.
- b. ② Remove the PCIe retainer from the PCIe riser card.

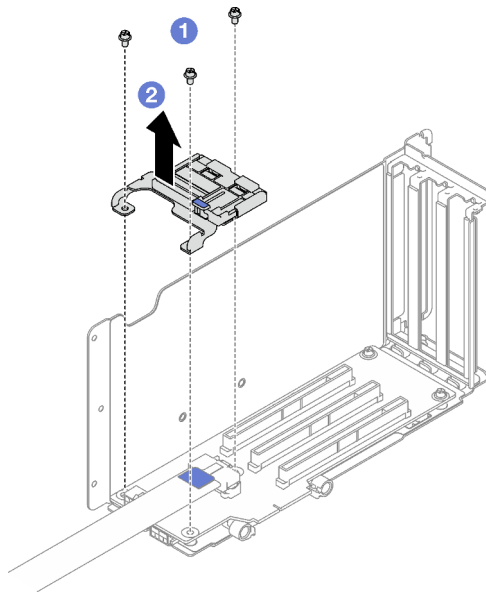


Figure 118. PCIe retainer removal

**After you finish**



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

### Demo video

[Watch the procedure on YouTube](#)

## Install a PCIe retainer

Follow instructions in this section to install a PCIe retainer.

### About this task

#### Attention:

- Read [“Installation Guidelines” on page 47](#) and [“Safety inspection checklist” on page 48](#) to ensure that you work safely.
- Touch the static-protective package that contains the component to any unpainted metal surface on the server; then, remove it from the package and place it on a static-protective surface.

**Note:** The PCIe riser might look different from the illustration.

### Procedure

- Step 1. ① Align the PCIe retainer with the screw holes on the PCIe riser card.
- Step 2. ② Fasten the three screws to secure the PCIe retainer to the PCIe riser card.

**Note:** The PCIe riser might look different from the illustration.

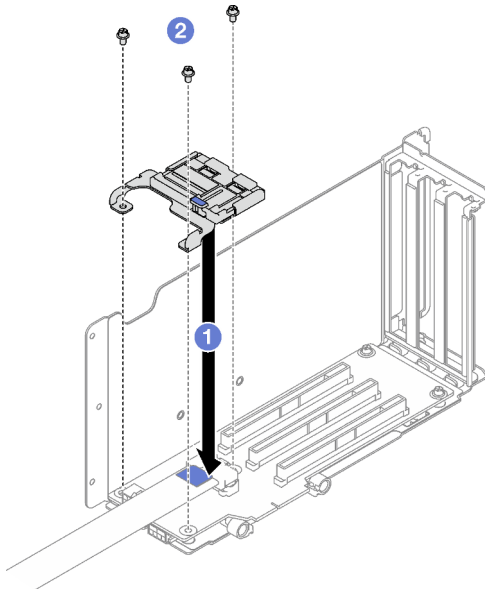


Figure 119. PCIe retainer installation

### After you finish

1. Reinstall the 7mm drive cage and the 7mm drives if necessary. See [“Install the 7mm drive cage” on page 82](#) and [“Install a 7mm drive” on page 83](#).

2. Reinstall the serial port module if necessary. See [“Install the serial port module” on page 207](#).
3. Reinstall the PCIe adapters or GPU adapters. See [“Install a PCIe adapter” on page 151](#) or [“Install a GPU adapter” on page 118](#).
4. Reinstall the PCIe riser. See [“Install a PCIe riser” on page 152](#).
5. Complete the parts replacement. See [“Complete the parts replacement” on page 233](#).

## Demo video

[Watch the procedure on YouTube](#)

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## PCIe riser extender replacement

Follow instructions in this section to remove and install a PCIe riser extender.

### Remove a PCIe riser extender

Follow instructions in this section to remove a PCIe riser extender.

### About this task

#### Attention:

- Read [“Installation Guidelines” on page 47](#) and [“Safety inspection checklist” on page 48](#) to ensure that you work safely.
- Power off the server and peripheral devices and disconnect the power cords and all external cables. See [“Power off the server” on page 64](#).
- If the server is installed in a rack, remove it from the rack. See [“Remove the server from rails” on page 65](#).

### Procedure

Step 1. Make preparation for this task.

- a. Remove the front top cover. See [“Remove the front top cover” on page 225](#).
- b. Remove the rear top cover. See [“Remove the rear top cover” on page 227](#).
- c. Remove the PCIe FHFL riser. See [“Remove a PCIe riser” on page 145](#).
- d. Remove all of the PCIe adapters or GPU adapters. See [“Remove a PCIe adapter” on page 149](#) or [“Remove a GPU adapter” on page 115](#).

Step 2. Remove the PCIe riser extender.

- a. ❶ Remove the four screws from the PCIe riser.
- b. ❷ Remove the PCIe riser extender from the PCIe riser.

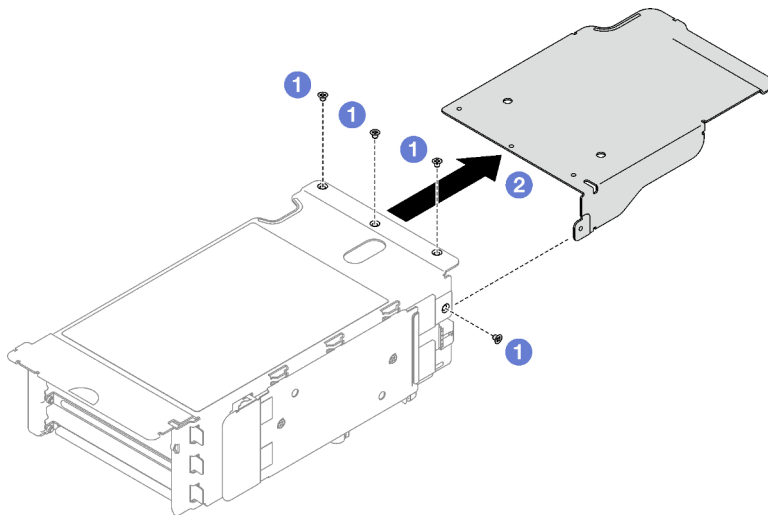


Figure 120. PCIe riser extender removal

## After you finish

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

## Demo video

[Watch the procedure on YouTube](#)

## Install a PCIe riser extender

Follow instructions in this section to install a PCIe riser extender.

## About this task

### Attention:

- Read [“Installation Guidelines” on page 47](#) and [“Safety inspection checklist” on page 48](#) to ensure that you work safely.
- Touch the static-protective package that contains the component to any unpainted metal surface on the server; then, remove it from the package and place it on a static-protective surface.

## Procedure

- Step 1. ① Align the PCIe riser extender with the four screw holes on the PCIe riser.
- Step 2. ② Fasten the four screws to secure the PCIe riser extender to the PCIe riser.

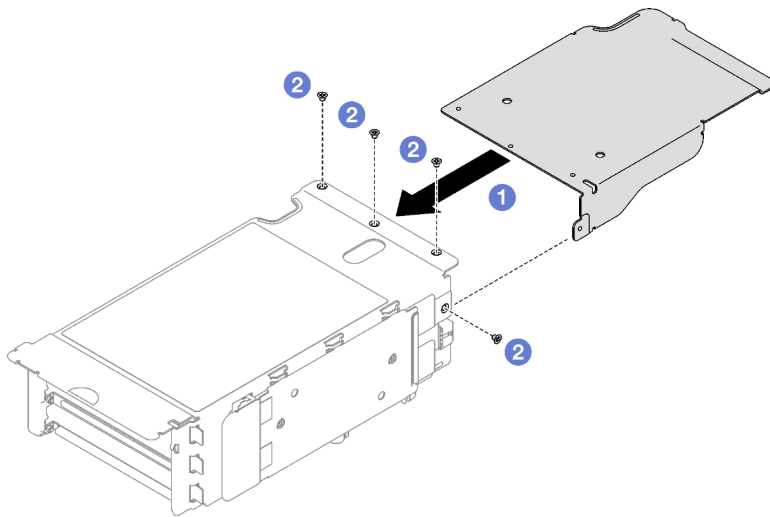


Figure 121. PCIe riser extender installation

## After you finish

1. Reinstall the PCIe adapters or GPU adapters. See [“Install a PCIe adapter” on page 151](#) or [“Install a GPU adapter” on page 118](#).
2. Reinstall the PCIe FHFL riser. See [“Install a PCIe riser” on page 152](#).
3. Complete the parts replacement. See [“Complete the parts replacement” on page 233](#).

## Demo video

[Watch the procedure on YouTube](#)

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## Power distribution board replacement

Follow instructions in this section to remove or install the power distribution board.

### Remove the power distribution board

Follow instructions in this section to remove the power distribution board.

### About this task

#### Attention:

- Read [“Installation Guidelines” on page 47](#) and [“Safety inspection checklist” on page 48](#) to ensure that you work safely.
- Power off the server and peripheral devices and disconnect the power cords and all external cables. See [“Power off the server” on page 64](#).
- If the server is installed in a rack, remove it from the rack. See [“Remove the server from rails” on page 65](#).

### Procedure

Step 1. Make preparation for this task.

- a. Remove the front top cover. See [“Remove the front top cover” on page 225](#).
- b. Remove the rear top cover. See [“Remove the rear top cover” on page 227](#).

Step 2. Remove the power distribution board.

- a. ① Gently pull and disengage every installed power supply unit.
- b. ② Disconnect the sideband and power cables from the power distribution board.
- c. ③ Grasp and lift the power distribution board to remove it.

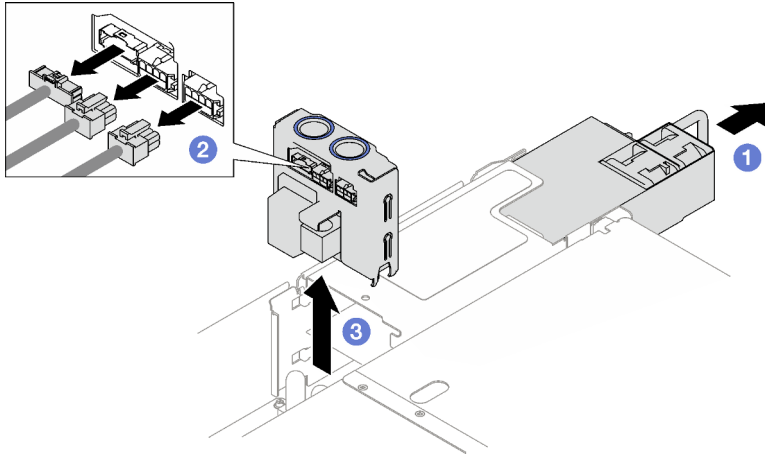


Figure 122. Power distribution board removal

### After you finish

1. If you are instructed to return the component or optional device, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.
2. If you plan to recycle the component:
  - a. Remove the four screws that secure the power distribution board to the bracket.
  - b. Separate the power distribution board from the bracket.

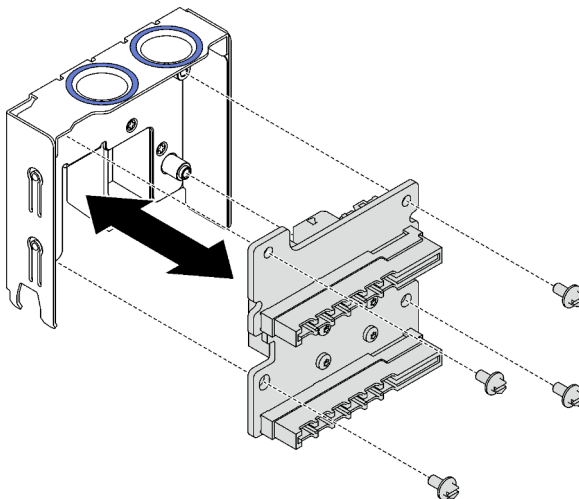


Figure 123. Power distribution board disassembly

- c. Recycle the component in compliance with local regulations.

### Demo video

[Watch the procedure on YouTube](#)

## Install the power distribution board

Follow instructions in this section to install the power distribution board.

### About this task

#### Attention:

- Read [“Installation Guidelines” on page 47](#) and [“Safety inspection checklist” on page 48](#) to ensure that you work safely.
- Touch the static-protective package that contains the component to any unpainted metal surface on the server; then, remove it from the package and place it on a static-protective surface.

### Procedure

- Step 1. ① Align the bottom connectors on the power distribution board to the corresponding connectors on the system board assembly; then, push the power distribution board in until it is firmly seated.
- Step 2. ② Connect the sideband and power cables to the power distribution board.
- Step 3. ③ Engage the power supply units, and make sure they sit firmly in place.

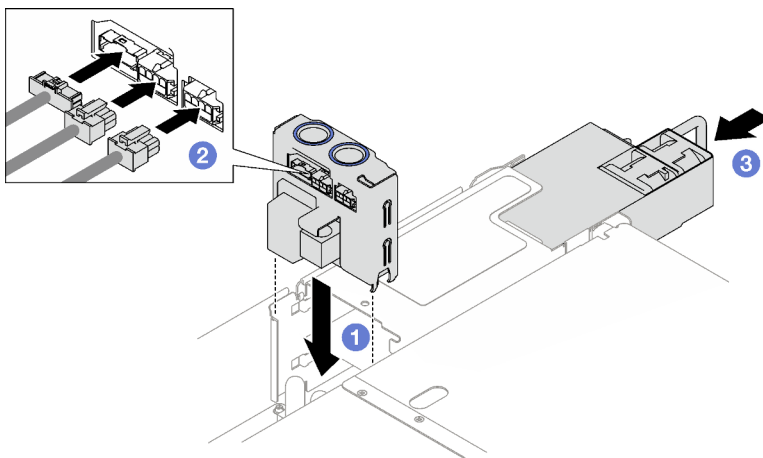


Figure 124. Power distribution board installation

### After you finish

Complete the parts replacement. See [“Complete the parts replacement” on page 233](#).

#### Demo video

[Watch the procedure on YouTube](#)

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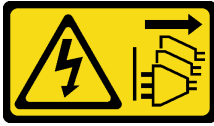
## Power supply unit replacement

Follow instructions in this section to remove or install a power supply unit.

### Remove a hot-swap power supply unit

Follow instructions in this section to remove a hot-swap power supply unit.

## S002



### CAUTION:

The power-control button on the device and the power switch on the power supply do not turn off the electrical current supplied to the device. The device also might have more than one power cord. To remove all electrical current from the device, ensure that all power cords are disconnected from the power source.

## S029



For -48V dc power supply, electrical current from power cords is hazardous.  
To avoid a shock hazard:

- To connect or disconnect -48V dc power cords when you need to remove/install redundancy power supply unit(s).

### To Connect:

1. Turn OFF subject dc power source(s) and equipment (s) that are attached to this product.
2. Install the power supply unit(s) into the system housing.
3. Attach dc power cord(s) to the product.
  - Ensure correct polarity of -48 V dc connections: RTN is + and -Vin (typical -48 V) dc is -. Earth ground should be connected very well.
4. Connect dc power cord(s) to subject power source (s).
5. Turn ON all the power source(s).

### To Disconnect:

1. Disconnect or turn off the subject dc power source(s) (at the breaker panel) before removing the power supply unit(s).
2. Remove the subject dc cord(s) and make sure the wire terminal of power cord(s) is insulated.
3. Unplug the subject power supply unit(s) from the system housing.

## S035



### CAUTION:

Never remove the cover on a power supply or any part that has this label attached. Hazardous voltage, current, and energy levels are present inside any component that has this label attached. There are no

serviceable parts inside these components. If you suspect a problem with one of these parts, contact a service technician.

## About this task

**Attention:** Read [“Installation Guidelines” on page 47](#) and [“Safety inspection checklist” on page 48](#) to ensure that you work safely.

### CAUTION:

- **240 V dc input (input range: 180-300 V dc) is supported in Chinese Mainland ONLY.**
- **Power supply with 240 V dc input cannot support hot-plugging power cord function. Before removing the power supply with dc input, please turn off server or disconnect dc power sources at the breaker panel or by turning off the power source. Then, remove the power cord.**

## Procedure

Step 1. Disconnect both ends of the power cord and keep it in an ESD-safe place.

Step 2. Remove the power supply unit.

- a. ① Press and hold the orange release tab.
- b. ② Grasp the handle, and pull the power supply unit out of the server.



**Notes:**

- A CFFv4 power supply is used as an example for illustration. The replacement procedure for CRPS power supply is similar.
- The color of the CRPS handle might be different from the illustration.

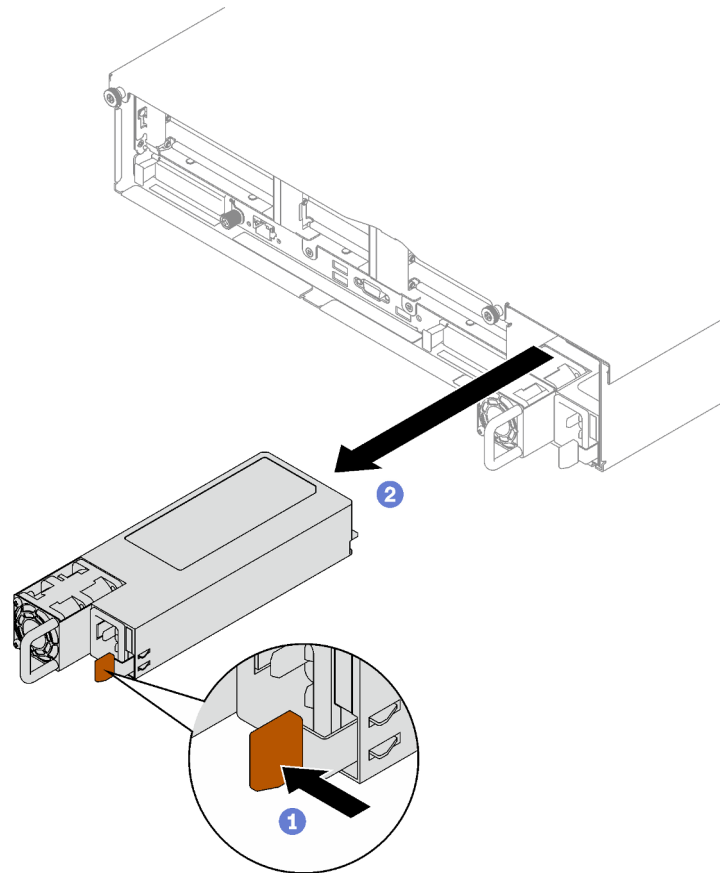


Figure 125. Power supply unit removal

**After you finish**

1. Install a power supply as soon as possible. See [“Install a hot-swap power supply unit” on page 175](#).
2. If you are instructed to return the component or optional device, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

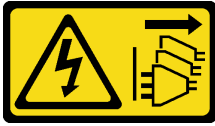
**Demo video**

[Watch the procedure on YouTube](#)

**Install a hot-swap power supply unit**

Follow instructions in this section to install a hot-swap power supply unit.

**S002**



**CAUTION:**

The power-control button on the device and the power switch on the power supply do not turn off the electrical current supplied to the device. The device also might have more than one power cord. To remove all electrical current from the device, ensure that all power cords are disconnected from the power source.

**S029**



**For -48V dc power supply, electrical current from power cords is hazardous.  
To avoid a shock hazard:**

- **To connect or disconnect -48V dc power cords when you need to remove/install redundancy power supply unit(s).**

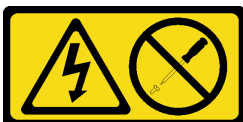
**To Connect:**

1. Turn OFF subject dc power source(s) and equipment (s) that are attached to this product.
2. Install the power supply unit(s) into the system housing.
3. Attach dc power cord(s) to the product.
  - Ensure correct polarity of -48 V dc connections: RTN is + and -Vin (typical -48 V) dc is -. Earth ground should be connected very well.
4. Connect dc power cord(s) to subject power source (s).
5. Turn ON all the power source(s).

**To Disconnect:**

1. Disconnect or turn off the subject dc power source(s) (at the breaker panel) before removing the power supply unit(s).
2. Remove the subject dc cord(s) and make sure the wire terminal of power cord(s) is insulated.
3. Unplug the subject power supply unit(s) from the system housing.

**S035**



**CAUTION:**

Never remove the cover on a power supply or any part that has this label attached. Hazardous voltage, current, and energy levels are present inside any component that has this label attached. There are no serviceable parts inside these components. If you suspect a problem with one of these parts, contact a service technician.

## About this task

### Attention:

- Read “[Installation Guidelines](#)” on page 47 and “[Safety inspection checklist](#)” on page 48 to ensure that you work safely.
- Touch the static-protective package that contains the component to any unpainted metal surface on the server; then, remove it from the package and place it on a static-protective surface.

### Procedure

Step 1. Make preparation for the task.

- a. Make sure the power supply unit to be installed is of the same wattage as the installed ones. Otherwise, complete the following steps:
  1. Turn off the server and peripheral devices.
  2. Disconnect the power cords and all external cables.
  3. Remove all the installed power supply units.
  4. Make sure all the power supply units to be installed are of the same wattage. Do not mix power supply units of different wattages in the same unit of server.
- b. If more than one units are to be installed, start with the lowest available power supply bay.

Step 2. Make sure the label on the power supply is facing up; then, grasp the handle and slide it into the power supply bay until it clicks into place.

### Notes:

- A CFFv4 power supply is used as an example for illustration. The replacement procedure for CRPS power supply is similar.
- The color of the CRPS handle might be different from the illustration.

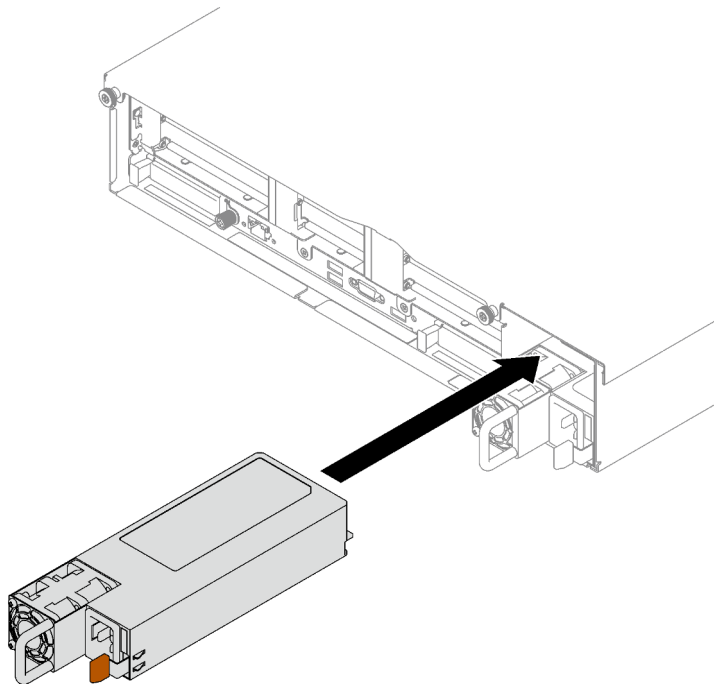


Figure 126. Power supply unit installation

## After you finish

1. Pull the handle to see if the power supply unit is properly installed. If it slides out, reinstall it.
2. Connect the power cord to the power supply unit, and make sure it's properly connected to the power.
3. Complete the parts replacement. See [“Complete the parts replacement” on page 233](#).
4. If the server is turned off, turn on the server. Ensure that both the power input LED and the power output LED on the power supply are lit, indicating that the power supply is operating properly.

### Demo video

[Watch the procedure on YouTube](#)

---

## Power supply bracket (CRPS) replacement

Follow instructions in this section to remove or install a power supply bracket (CRPS).

### Remove a power supply bracket (CRPS)

Follow instructions in this section to remove a power supply bracket (CRPS).

#### S002



#### CAUTION:

The power-control button on the device and the power switch on the power supply do not turn off the electrical current supplied to the device. The device also might have more than one power cord. To remove all electrical current from the device, ensure that all power cords are disconnected from the power source.

#### S029



**DANGER**

For -48V dc power supply, electrical current from power cords is hazardous.  
To avoid a shock hazard:

- To connect or disconnect -48V dc power cords when you need to remove/install redundancy power supply unit(s).

**To Connect:**

1. Turn OFF subject dc power source(s) and equipment (s) that are attached to this product.
2. Install the power supply unit(s) into the system housing.
3. Attach dc power cord(s) to the product.
  - Ensure correct polarity of -48 V dc connections: RTN is + and -Vin (typical -48 V) dc is -. Earth ground should be connected very well.
4. Connect dc power cord(s) to subject power source (s).
5. Turn ON all the power source(s).

**To Disconnect:**

1. Disconnect or turn off the subject dc power source(s) (at the breaker panel) before removing the power supply unit(s).
2. Remove the subject dc cord(s) and make sure the wire terminal of power cord(s) is insulated.
3. Unplug the subject power supply unit(s) from the system housing.

**S035****CAUTION:**

**Never remove the cover on a power supply or any part that has this label attached. Hazardous voltage, current, and energy levels are present inside any component that has this label attached. There are no serviceable parts inside these components. If you suspect a problem with one of these parts, contact a service technician.**

**About this task****Attention:**

- Read [“Installation Guidelines” on page 47](#) and [“Safety inspection checklist” on page 48](#) to ensure that you work safely.
- Power off the server and peripheral devices and disconnect the power cords and all external cables. See [“Power off the server” on page 64](#).
- If the server is installed in a rack, remove it from the rack. See [“Remove the server from rails” on page 65](#).

**Procedure**

Step 1. Make preparation for this task.

- a. Remove the power supply units. See [“Remove a hot-swap power supply unit” on page 172](#).
- b. Remove the front top cover. See [“Remove the front top cover” on page 225](#).
- c. Remove the rear top cover. See [“Remove the rear top cover” on page 227](#).
- d. Depending on the server model, remove the following PCIe riser:
  - If the server is installed with three PCIe risers, remove the PCIe riser 3. See [“Remove a PCIe riser” on page 145](#).
  - If the server is installed with four PCIe risers, remove the PCIe riser D. See [“Remove a PCIe riser” on page 145](#).

Step 2. Remove the power supply bracket.

- a. ① Remove the inner screw that secure the power supply bracket to the chassis.

- b. ② Remove the outer screw that secure the power supply bracket to the chassis.
- c. ③ Slide the power supply bracket away to disengage and remove it from the power supply bay.

**Note:** Hold the power supply bracket in place while removing or installing the two screws.

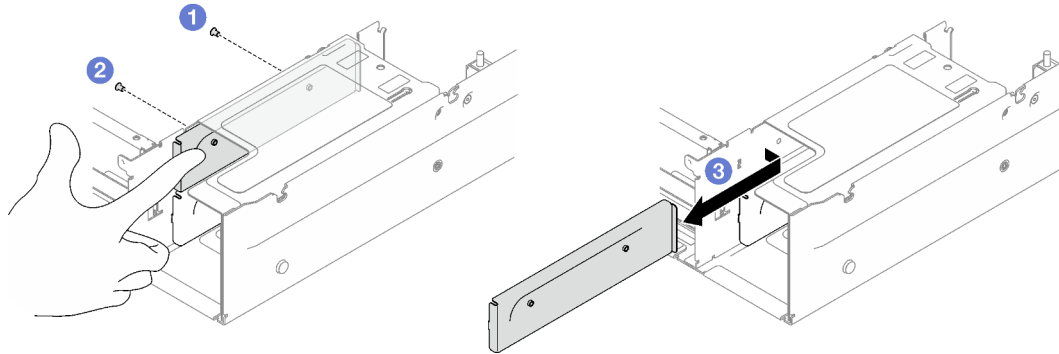


Figure 127. Power supply bracket removal

## After you finish

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

## Demo video

[Watch the procedure on YouTube](#)

## Install a power supply bracket (CRPS)

Follow instructions in this section to install a power supply bracket (CRPS).

### S002



### **CAUTION:**

The power-control button on the device and the power switch on the power supply do not turn off the electrical current supplied to the device. The device also might have more than one power cord. To remove all electrical current from the device, ensure that all power cords are disconnected from the power source.

### S029





**DANGER**

**For -48V dc power supply, electrical current from power cords is hazardous.  
To avoid a shock hazard:**

- **To connect or disconnect -48V dc power cords when you need to remove/install redundancy power supply unit(s).**

**To Connect:**

1. Turn OFF subject dc power source(s) and equipment (s) that are attached to this product.
2. Install the power supply unit(s) into the system housing.
3. Attach dc power cord(s) to the product.
  - Ensure correct polarity of -48 V dc connections: RTN is + and -Vin (typical -48 V) dc is -. Earth ground should be connected very well.
4. Connect dc power cord(s) to subject power source (s).
5. Turn ON all the power source(s).

**To Disconnect:**

1. Disconnect or turn off the subject dc power source(s) (at the breaker panel) before removing the power supply unit(s).
2. Remove the subject dc cord(s) and make sure the wire terminal of power cord(s) is insulated.
3. Unplug the subject power supply unit(s) from the system housing.

**S035**



**CAUTION:**

**Never remove the cover on a power supply or any part that has this label attached. Hazardous voltage, current, and energy levels are present inside any component that has this label attached. There are no serviceable parts inside these components. If you suspect a problem with one of these parts, contact a service technician.**

**About this task**

**Attention:**

- Read [“Installation Guidelines” on page 47](#) and [“Safety inspection checklist” on page 48](#) to ensure that you work safely.
- Touch the static-protective package that contains the component to any unpainted metal surface on the server; then, remove it from the package and place it on a static-protective surface.

**Procedure**

- Step 1. ① Slide the power supply bracket into the power supply bay and make sure the power supply bracket is inserted into the place.
- Step 2. ② Install the outer screw to secure the power supply bracket to the chassis.
- Step 3. ③ Install the inner screw to secure the power supply bracket to the chassis.

**Note:** Hold the power supply bracket in place while removing or installing the two screws.

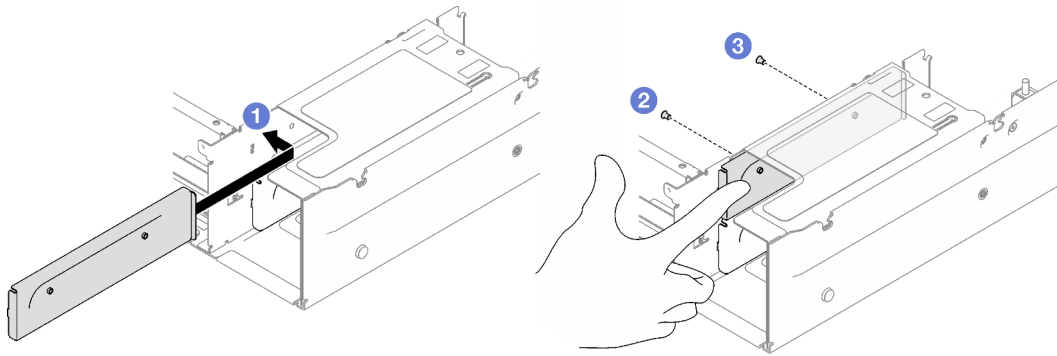


Figure 128. Power supply bracket installation

## After you finish

1. Reinstall the PCIe riser. See “Install a PCIe riser” on page 152.
2. Reinstall the power supply units. See “Install a hot-swap power supply unit” on page 175.
3. Complete the parts replacement. See “Complete the parts replacement” on page 233.

## Demo video

[Watch the procedure on YouTube](#)

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## Power supply key (CFFv4) replacement

Follow instructions in this section to remove or install a power supply key (CFFv4).

### Remove a power supply key (CFFv4)

Follow instructions in this section to remove a power supply key (CFFv4).

#### S002



#### **CAUTION:**

The power-control button on the device and the power switch on the power supply do not turn off the electrical current supplied to the device. The device also might have more than one power cord. To remove all electrical current from the device, ensure that all power cords are disconnected from the power source.

#### S029







**DANGER**

**For -48V dc power supply, electrical current from power cords is hazardous.  
To avoid a shock hazard:**

- **To connect or disconnect -48V dc power cords when you need to remove/install redundancy power supply unit(s).**

**To Connect:**

1. Turn OFF subject dc power source(s) and equipment (s) that are attached to this product.
2. Install the power supply unit(s) into the system housing.
3. Attach dc power cord(s) to the product.
  - Ensure correct polarity of -48 V dc connections: RTN is + and -Vin (typical -48 V) dc is -. Earth ground should be connected very well.
4. Connect dc power cord(s) to subject power source (s).
5. Turn ON all the power source(s).

**To Disconnect:**

1. Disconnect or turn off the subject dc power source(s) (at the breaker panel) before removing the power supply unit(s).
2. Remove the subject dc cord(s) and make sure the wire terminal of power cord(s) is insulated.
3. Unplug the subject power supply unit(s) from the system housing.

**S035**



**CAUTION:**

**Never remove the cover on a power supply or any part that has this label attached. Hazardous voltage, current, and energy levels are present inside any component that has this label attached. There are no serviceable parts inside these components. If you suspect a problem with one of these parts, contact a service technician.**

**About this task**

**Attention:**

- Read [“Installation Guidelines” on page 47](#) and [“Safety inspection checklist” on page 48](#) to ensure that you work safely.
- Power off the server and peripheral devices and disconnect the power cords and all external cables. See [“Power off the server” on page 64](#).
- If the server is installed in a rack, remove it from the rack. See [“Remove the server from rails” on page 65](#).

**Procedure**

Step 1. Make preparation for this task.

- a. Remove the power supply units. See [“Remove a hot-swap power supply unit” on page 172](#).
- b. Remove the front top cover. See [“Remove the front top cover” on page 225](#).
- c. Remove the rear top cover. See [“Remove the rear top cover” on page 227](#).

- d. Remove the power distribution board. See [“Remove the power distribution board”](#) on page 170.

Step 2. Remove the power supply key.

- a. ① Remove the screw that secures the power supply key to the chassis.
- b. ② Slide the power supply key away to disengage and remove it from the power supply bay.

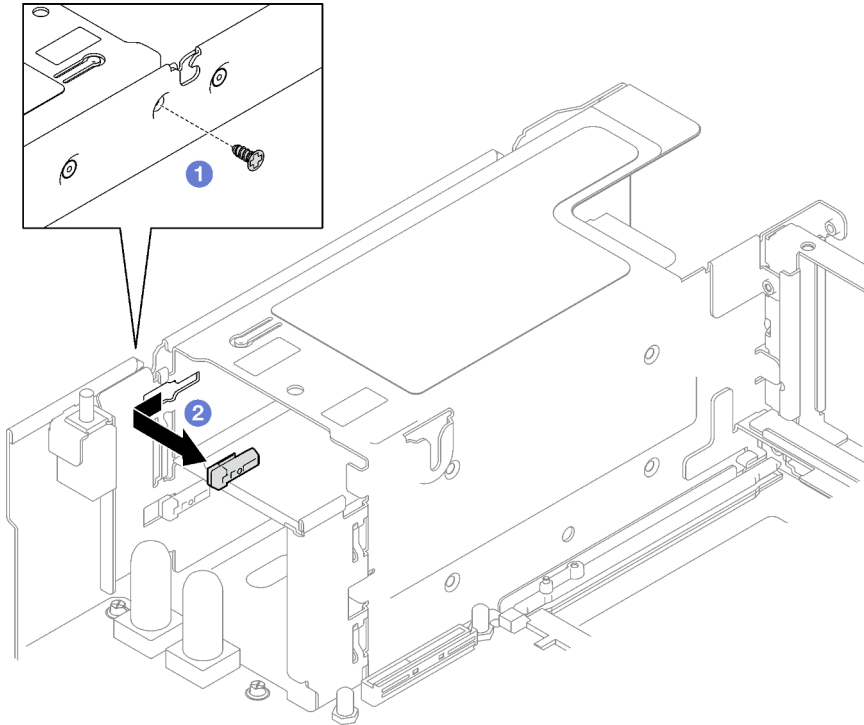


Figure 129. Power supply key removal

## After you finish

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

## Demo video

[Watch the procedure on YouTube](#)

## Install a power supply key (CFFv4)

Follow instructions in this section to install a power supply key.

### S002



**CAUTION:**

The power-control button on the device and the power switch on the power supply do not turn off the electrical current supplied to the device. The device also might have more than one power cord. To remove all electrical current from the device, ensure that all power cords are disconnected from the power source.

#### S029



**For -48V dc power supply, electrical current from power cords is hazardous.**

**To avoid a shock hazard:**

- **To connect or disconnect -48V dc power cords when you need to remove/install redundancy power supply unit(s).**

#### **To Connect:**

1. Turn OFF subject dc power source(s) and equipment (s) that are attached to this product.
2. Install the power supply unit(s) into the system housing.
3. Attach dc power cord(s) to the product.
  - Ensure correct polarity of -48 V dc connections: RTN is + and -Vin (typical -48 V) dc is -. Earth ground should be connected very well.
4. Connect dc power cord(s) to subject power source (s).
5. Turn ON all the power source(s).

#### **To Disconnect:**

1. Disconnect or turn off the subject dc power source(s) (at the breaker panel) before removing the power supply unit(s).
2. Remove the subject dc cord(s) and make sure the wire terminal of power cord(s) is insulated.
3. Unplug the subject power supply unit(s) from the system housing.

#### S035



#### **CAUTION:**

**Never remove the cover on a power supply or any part that has this label attached. Hazardous voltage, current, and energy levels are present inside any component that has this label attached. There are no serviceable parts inside these components. If you suspect a problem with one of these parts, contact a service technician.**

#### **About this task**

#### **Attention:**

- Read [“Installation Guidelines” on page 47](#) and [“Safety inspection checklist” on page 48](#) to ensure that you work safely.

- Touch the static-protective package that contains the component to any unpainted metal surface on the server; then, remove it from the package and place it on a static-protective surface.

## Procedure

- Step 1. ① Slide the power supply key into the power supply bay and make sure the power supply key is inserted into the place.
- Step 2. ② Fasten the screw to secure the power supply key to the chassis.

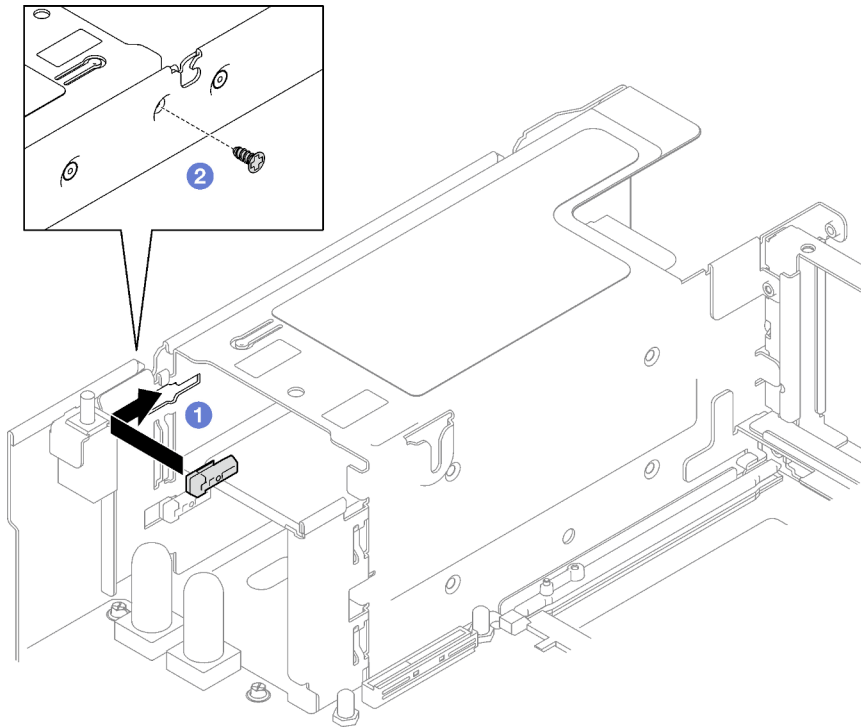


Figure 130. Power supply key installation

## After you finish

1. Reinstall the power distribution board. See [“Install the power distribution board”](#) on page 172.
2. Reinstall the power supply units. See [“Install a hot-swap power supply unit”](#) on page 175.
3. Complete the parts replacement. See [“Complete the parts replacement”](#) on page 233.

## Demo video

[Watch the procedure on YouTube](#)

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## Processor and heat sink replacement (trained technician only)

Follow the instruction in this section to replace an assembled processor and heat sink, known as a processor-heat-sink module (PHM), a processor, or a heat sink.

**Important:** This task must be operated by trained technicians that are certified by Lenovo Service. Do not attempt to remove or install the part without proper training and qualification.

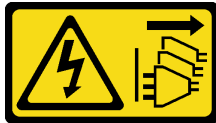
**Attention:** Before reusing a processor or heat sink, make sure you use Lenovo proven alcohol cleaning pad and thermal grease.

## Remove a processor and heat sink

This task has instructions for removing an assembled processor and heat sink, known as a processor-heat-sink module (PHM). This task requires a Torx T30 driver. This procedure must be executed by a trained technician.

### About this task

#### S002



#### **CAUTION:**

The power-control button on the device and the power switch on the power supply do not turn off the electrical current supplied to the device. The device also might have more than one power cord. To remove all electrical current from the device, ensure that all power cords are disconnected from the power source.

#### **Attention:**

- Read [“Installation Guidelines” on page 47](#) and [“Safety inspection checklist” on page 48](#) to ensure that you work safely.
- Power off the server and peripheral devices and disconnect the power cords and all external cables. See [“Power off the server” on page 64](#).
- Prevent exposure to static electricity, which might lead to system halt and loss of data, by keeping static-sensitive components in their static-protective packages until installation, and handling these devices with an electrostatic-discharge wrist strap or other grounding system.
- Each processor socket must always contain a cover or a PHM. When removing or installing a PHM, protect empty processor sockets with a cover.
- Do not touch the processor socket or processor contacts. Processor-socket contacts are very fragile and easily damaged. Contaminants on the processor contacts, such as oil from your skin, can cause connection failures.
- Do not allow the thermal grease on the processor or heat sink to come in contact with anything. Contact with any surface can compromise the thermal grease, rendering it ineffective. Thermal grease can damage components, such as the electrical connectors in the processor socket.
- Remove and install only one PHM at a time. If the system supports multiple processors, install the PHMs starting with the first processor socket.

**Note:** The heat sink, processor, and processor carrier for your system might be different from those shown in the illustrations.

The following illustration shows the components of the PHM.

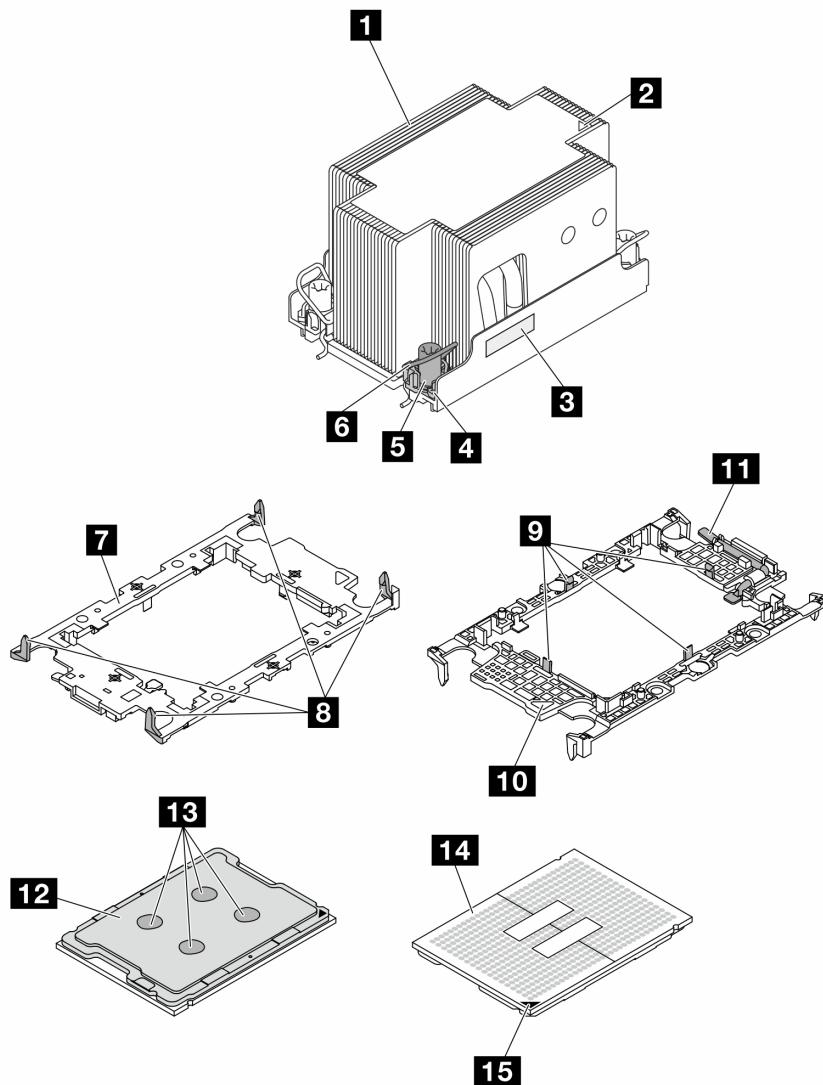


Figure 131. PHM components

<b>1</b> Heat sink	<b>9</b> Clips to secure processor in carrier
<b>2</b> Heat sink triangular mark	<b>10</b> Processor ejector handle
<b>3</b> Processor identification label	<b>11</b> Carrier triangular mark
<b>4</b> Nut and wire bail retainer	<b>12</b> Processor heat spreader
<b>5</b> Torx T30 nut	<b>13</b> Thermal grease
<b>6</b> Anti-tilt wire bail	<b>14</b> Processor contacts
<b>7</b> Processor carrier	<b>15</b> Processor triangular mark
<b>8</b> Clips to secure carrier to heat sink	

## Procedure

Step 1. Make preparation for this task.

- a. To replace a front PHM (processor 3 or processor 4), remove the following:
  1. Remove the front top cover. See “Remove the front top cover” on page 225.
  2. Remove the front air baffle. See “Remove the front air baffle” on page 84.
- b. To replace a rear PHM (processor 1 or processor 2), remove the following:
  1. Remove the front top cover. See “Remove the front top cover” on page 225.
  2. Remove the FHFL risers if necessary. See “Remove a PCIe riser” on page 145.
  3. Remove the rear air baffle. See “Remove the rear air baffle” on page 90.

Step 2. Remove the PHM from the system board assembly.

**Notes:**

- Do not touch the contacts on the bottom of the processor.
  - Keep the processor socket clean from any object to prevent possible damages.
- a. ① Fully loosen the Torx T30 nuts on the PHM *in the removal sequence shown* on the heat-sink label.
  - b. ② Rotate the anti-tilt wire bails inward.
  - c. ③ Carefully lift the PHM from the processor socket. If the PHM cannot be fully lifted out of the socket, further loosen the Torx T30 nuts and try lifting the PHM again.

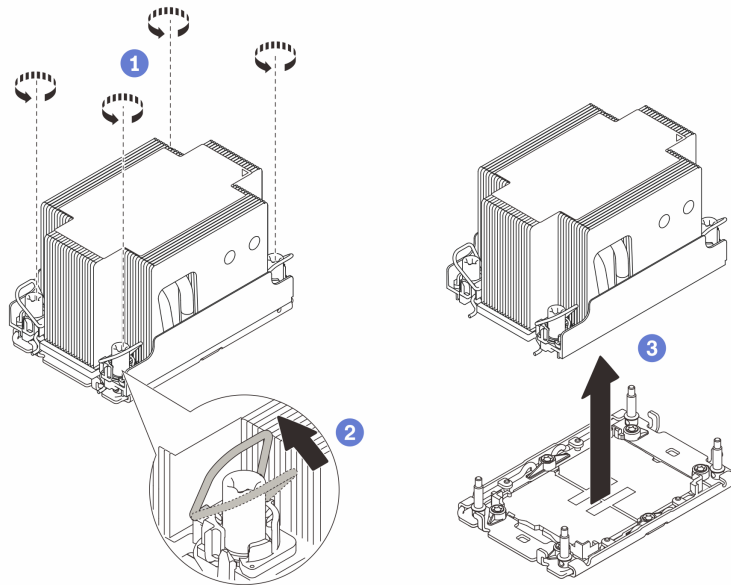


Figure 132. 2U Standard PHM removal

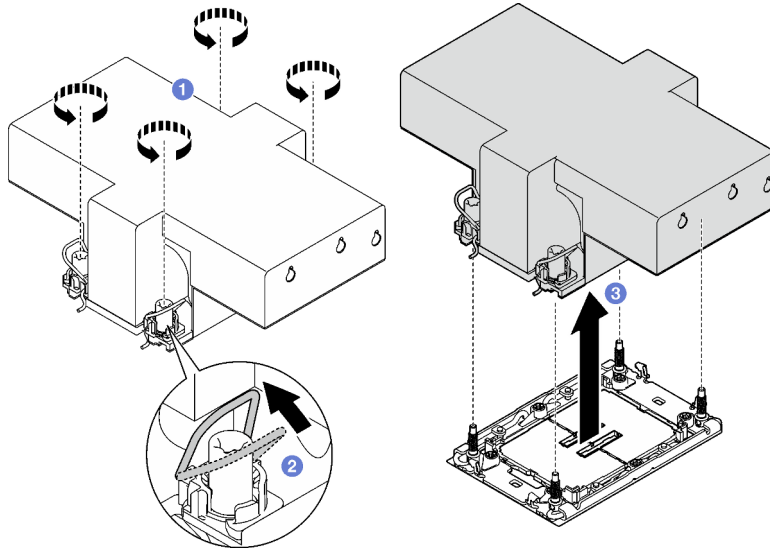


Figure 133. 2U performance PHM removal

## After you finish

1. Each processor socket must always contain a cover or a PHM. Protect empty processor sockets with a cover or install a new PHM.
2. If you are removing the PHM as part of a system board assembly replacement, set the PHM aside.
3. If you are reusing the processor or heat sink, separate the processor from its retainer. See [“Separate the processor from carrier and heat sink” on page 190](#).
4. If you are instructed to return the component or optional device, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

## Demo video

[Watch the procedure on YouTube](#)

## Separate the processor from carrier and heat sink

This task has instructions for separating a processor and its carrier from an assembled processor and heat sink, known as a processor-heat-sink module (PHM). This procedure must be executed by a trained technician.

## About this task

### Attention:

- Read [“Installation Guidelines” on page 47](#) and [“Safety inspection checklist” on page 48](#) to ensure that you work safely.
- Power off the server and peripheral devices and disconnect the power cords and all external cables. See [“Power off the server” on page 64](#).
- Prevent exposure to static electricity, which might lead to system halt and loss of data, by keeping static-sensitive components in their static-protective packages until installation, and handling these devices with an electrostatic-discharge wrist strap or other grounding system.
- Do not touch the processor contacts. Contaminants on the processor contacts, such as oil from your skin, can cause connection failures.



- Do not allow the thermal grease on the processor or heat sink to come in contact with anything. Contact with any surface can compromise the thermal grease, rendering it ineffective. Thermal grease can damage components, such as the electrical connectors in the processor socket.

**Note:** The heat sink, processor, and processor carrier for your system might be different from those shown in the illustrations.

## Procedure

Step 1. Separate the processor from the heat sink and carrier.

- 1 Lift the handle to release the processor from the carrier.
- 2 Hold the processor by its edges; then, lift the processor from the heat sink and carrier.
- 3 Without putting the processor down, wipe the thermal grease from the top of the processor with an alcohol cleaning pad; then, place the processor on a static protective surface with the processor-contact side up.

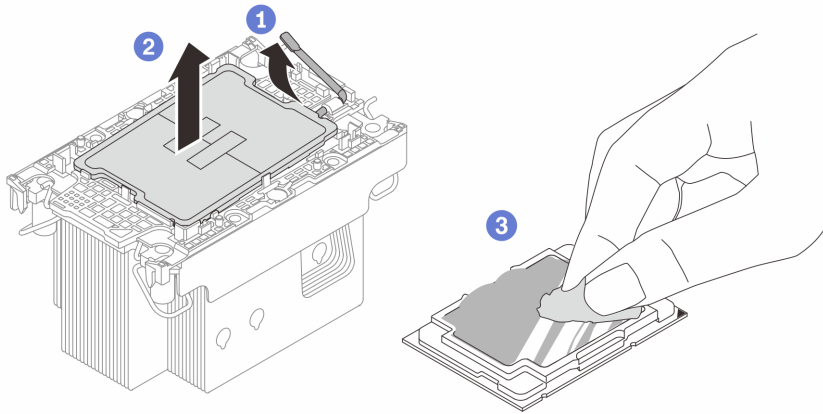


Figure 134. Separating a processor from the heat sink and carrier

**Note:** Do not touch the contacts on the processor.

Step 2. Separate the processor carrier from the heat sink.

- 1 Release the retaining clips from the heat sink.
- 2 Lift the carrier from the heat sink.
- 3 Wipe the thermal grease from the bottom of the heat sink with an alcohol cleaning pad.

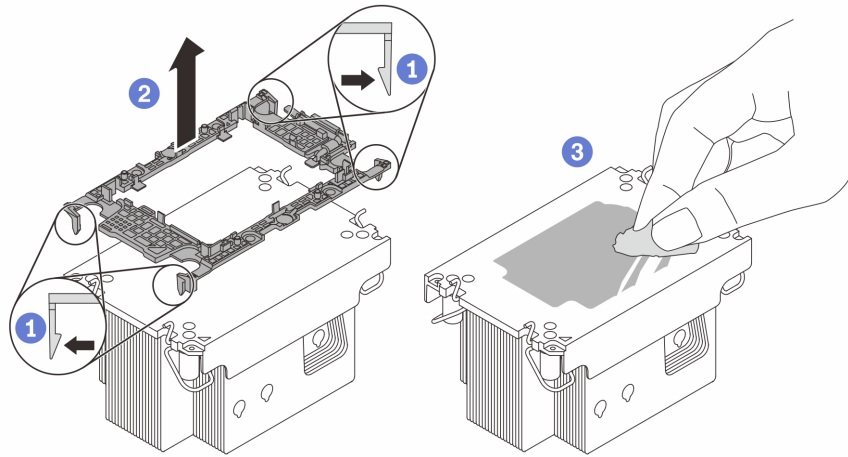


Figure 135. Separating a processor carrier from the heat sink

**Note:** The processor carrier will be discarded and replaced with a new one.

### After you finish

1. Install the PHM. See [“Install a processor and heat sink” on page 192](#).
2. If you are instructed to return the component or optional device, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

### Demo video

[Watch the procedure on YouTube](#)

## Install a processor and heat sink

This task has instructions for installing an assembled processor and heat sink, known as a processor-heat-sink module (PHM). This task requires a Torx T30 driver. This procedure must be executed by a trained technician.

### About this task

#### Attention:

- Read [“Installation Guidelines” on page 47](#) and [“Safety inspection checklist” on page 48](#) to ensure that you work safely.
- Power off the server and peripheral devices and disconnect the power cords and all external cables. See [“Power off the server” on page 64](#).
- Prevent exposure to static electricity, which might lead to system halt and loss of data, by keeping static-sensitive components in their static-protective packages until installation, and handling these devices with an electrostatic-discharge wrist strap or other grounding system.
- Each processor socket must always contain a cover or a PHM. When removing or installing a PHM, protect empty processor sockets with a cover.
- Do not touch the processor socket or processor contacts. Processor-socket contacts are very fragile and easily damaged. Contaminants on the processor contacts, such as oil from your skin, can cause connection failures.

- Do not allow the thermal grease on the processor or heat sink to come in contact with anything. Contact with any surface can compromise the thermal grease, rendering it ineffective. Thermal grease can damage components, such as the electrical connectors in the processor socket.
- Remove and install only one PHM at a time. If the system supports multiple processors, install the PHMs starting with the first processor socket.

**Notes:**

- The heat sink, processor, and processor carrier for your system might be different from those shown in the illustrations.
- PHMs are keyed for the socket where they can be installed and for their orientation in the socket.
- See <https://serverproven.lenovo.com> for a list of processors supported for your server. All processors must have the same speed, number of cores, and frequency.
- Before you install a new PHM or replacement processor, update your system firmware to the latest level. See “[Update the firmware](#)” on [page 365](#).

The following illustration shows the components of the PHM.

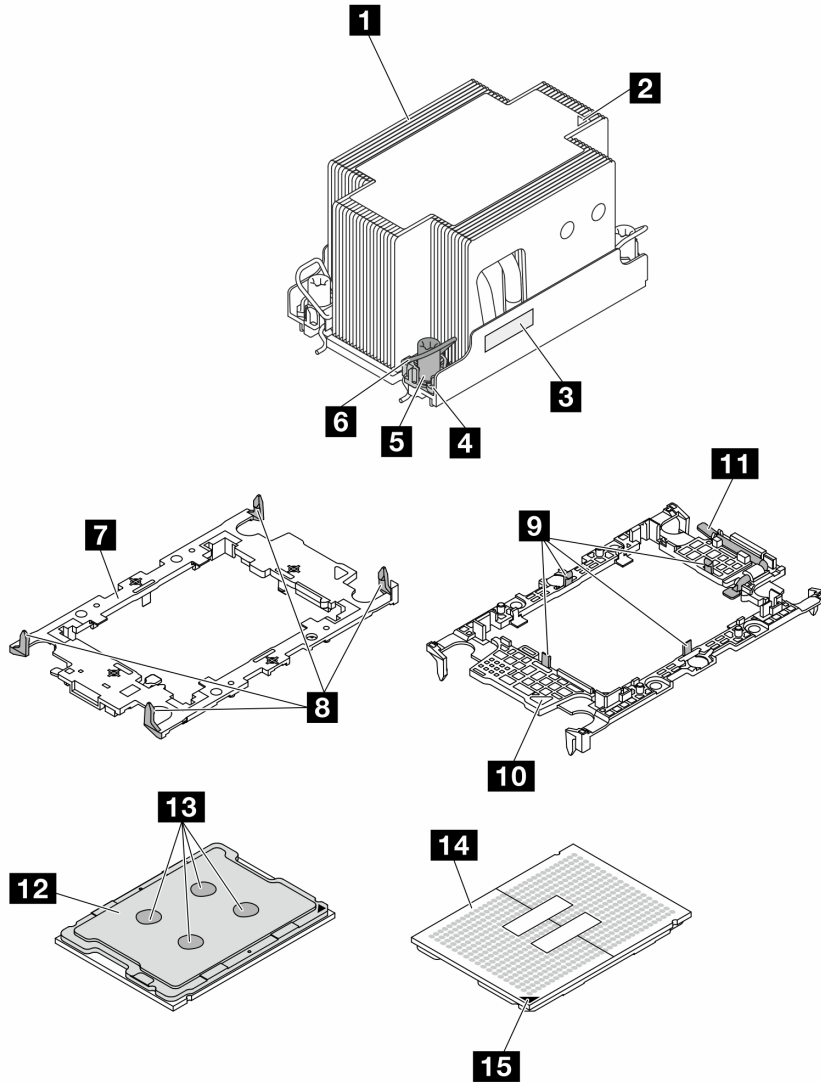


Figure 136. PHM components

<b>1</b> Heat sink	<b>9</b> Clips to secure processor in carrier
<b>2</b> Heat sink triangular mark	<b>10</b> Processor ejector handle
<b>3</b> Processor identification label	<b>11</b> Carrier triangular mark
<b>4</b> Nut and wire bail retainer	<b>12</b> Processor heat spreader
<b>5</b> Torx T30 nut	<b>13</b> Thermal grease
<b>6</b> Anti-tilt wire bail	<b>14</b> Processor contacts
<b>7</b> Processor carrier	<b>15</b> Processor triangular mark
<b>8</b> Clips to secure carrier to heat sink	

**Firmware and driver download:** You might need to update the firmware or driver after replacing a component.

- Go to <https://datacentersupport.lenovo.com/tw/en/products/servers/thinksystem/sr850v3/7d96/downloads/driver-list/> to see the latest firmware and driver updates for your server.
- Go to “Update the firmware” on page 365 for more information on firmware updating tools.

## Procedure

Step 1. Record the processor identification label.

- If you are replacing a processor and reusing the heat sink, remove the processor identification label from the heat sink and replace it with the new label that comes with the replacement processor.
- If you are replacing a heat sink and reusing the processor, remove the processor identification label from the old heat sink and place it on the new heat sink in the same location.

**Note:** If you are unable to remove the label and place it on the new heat sink, or if the label is damaged during transfer, write the processor serial number from the processor identification label on the new heat sink in the same location as the label would be placed using a permanent marker.

Step 2. Install the processor in the new carrier.

### Notes:

- If you are replacing the processor and reusing the heat sink, use the new carrier that comes with the new processor.
- If you are replacing the heat sink and reusing the processor, and if the new heat sink comes with two processor carriers, make sure to use the same type of carrier as the one you discarded.
  1. ① Make sure the handle on the carrier is in the closed position.
  2. ② Align the processor on the new carrier so that the triangular marks align; then, insert the marked end of the processor into the carrier.
  3. ③ Hold the inserted end of the processor in place; then, pivot the unmarked end of the carrier down and away from the processor.
  4. ④ Press the processor and secure the unmarked end under the clip on the carrier.
  5. ⑤ Carefully pivot the sides of the carrier down and away from the processor.
  6. ⑥ Press the processor and secure the sides under the clips on the carrier.

**Note:** To prevent the processor from falling out of the carrier, keep the processor-contact side up and hold the processor-carrier assembly by the sides of the carrier.

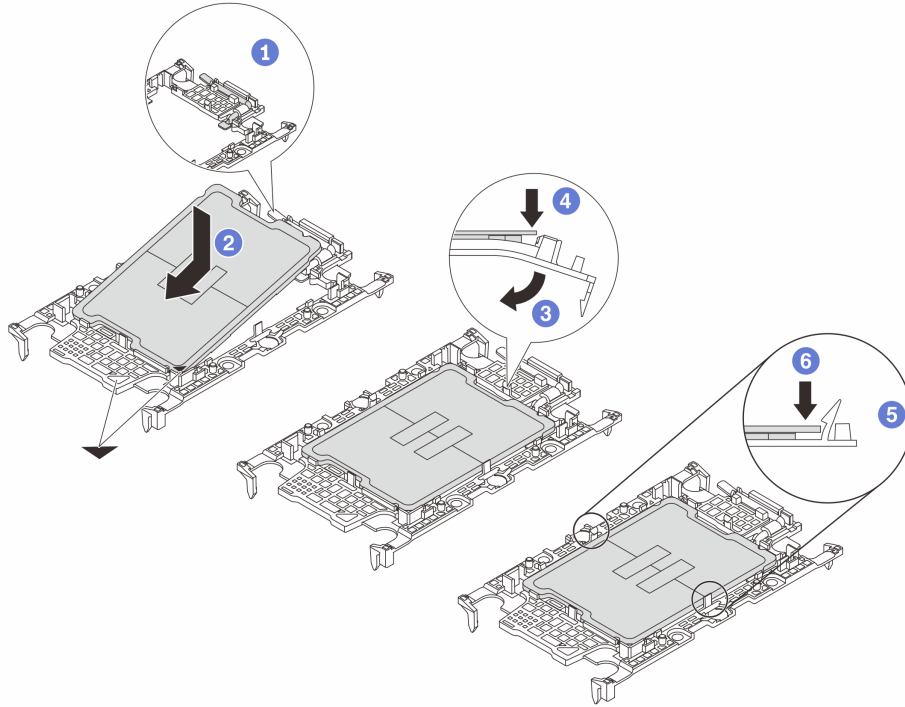


Figure 137. Processor carrier installation

Step 3. Apply thermal grease.

- If you are replacing the heat sink and reusing the processor, a new heat sink comes with thermal grease and you do not need to apply new thermal grease.

**Note:** To ensure the best performance, check the manufacturing date on the new heat sink and make sure it does not exceed two years. Otherwise, wipe off the existing thermal grease and apply new thermal grease.

- If you are replacing the processor and reusing the heat sink, do the following steps to apply thermal grease:
  1. If there is any old thermal grease on the heat sink, wipe off the thermal grease with an alcohol cleaning pad.
  2. Carefully place the processor and carrier in the shipping tray with the processor-contact side down. Make sure the triangular mark on the carrier is oriented in the shipping tray as shown below.
  3. Apply the thermal grease on the top of the processor with syringe by forming four uniformly spaced dots, while each dot consists of about 0.1 ml of thermal grease.

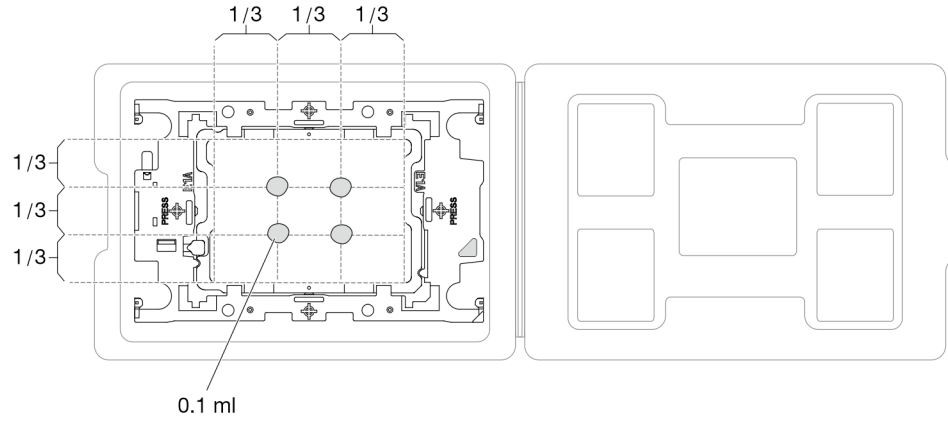


Figure 138. Thermal grease application with processor in shipping tray

Step 4. Assemble the processor and heat sink.

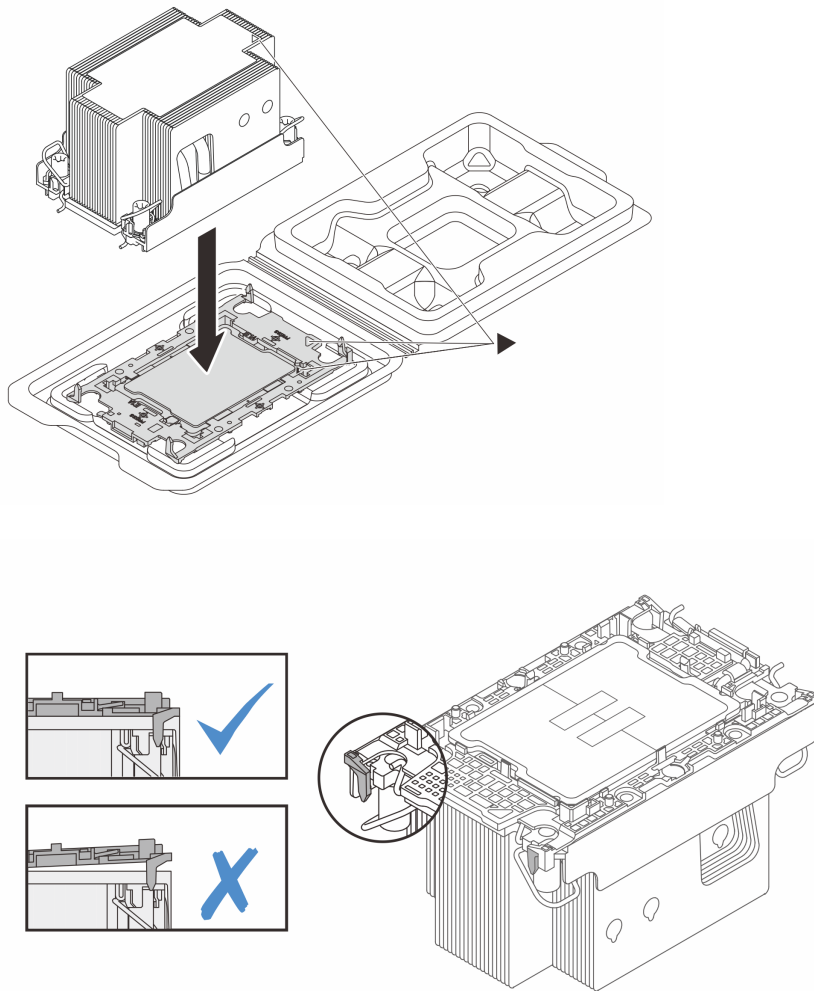


Figure 139. Assembling the PHM with processor in shipping tray

- a. Align the triangular mark on the heat sink label with the triangular mark on the processor carrier and processor.
- b. Install the heat sink onto the processor-carrier.
- c. Press the carrier into place until the clips at all four corners engage. Visually inspect to make sure that there is no gap between the processor carrier and the heat sink.

Step 5. Install the processor-heat-sink module into the processor socket.

**Notes:**

- Do not touch the contacts on the bottom of the processor.
  - Keep the processor socket clean from any object to prevent possible damages.
- a. ① Rotate the anti-tilt wire bails inward.
  - b. ② Align the triangular mark and four Torx T30 nuts on the PHM with the triangular mark and threaded posts of the processor socket; then, insert the PHM into the processor socket.
  - c. ③ Rotate the anti-tilt wire bails outward until they engage with the hooks in the socket.



- d. 4 Fully tighten the Torx T30 nuts **in the installation sequence shown** on the heat-sink label. Tighten the screws until they stop; then, visually inspect to make sure that there is no gap between the screw shoulder beneath the heat sink and the processor socket. (For reference, the torque required for the fasteners to fully tighten is 0.9 newton-meters, 8 inch-pounds).

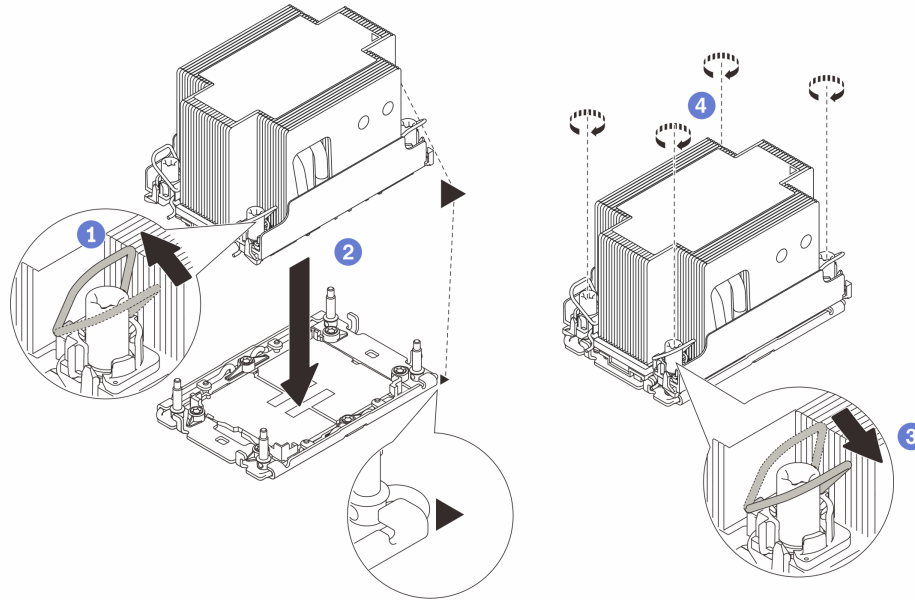


Figure 140. 2U Standard PHM installation

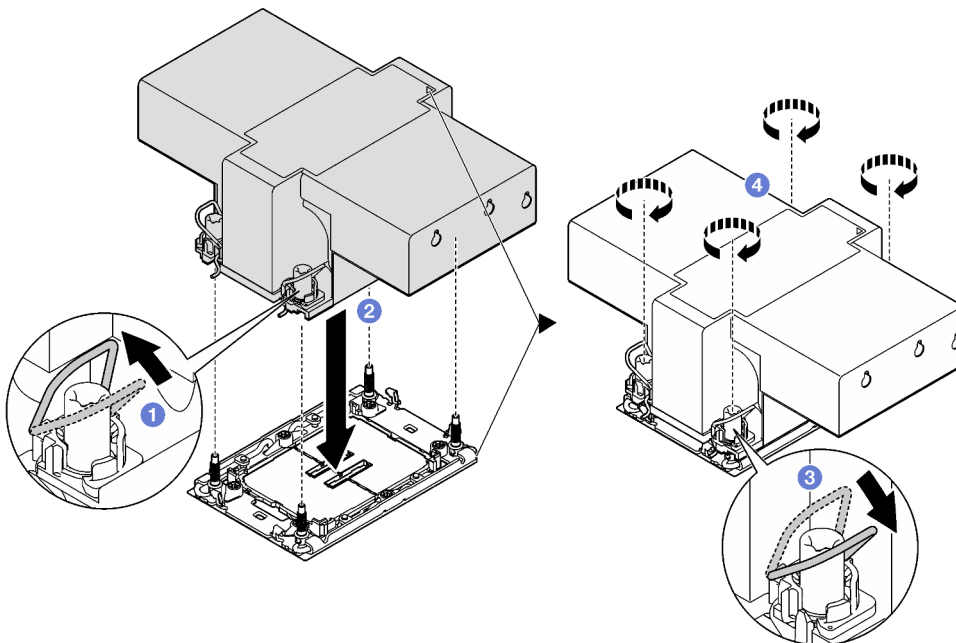


Figure 141. 2U performance PHM installation

### After you finish

1. Reinstall the FHFL risers if necessary. See [“Install a PCIe riser”](#) on page 152.

2. Complete the parts replacement. See [“Complete the parts replacement” on page 233](#).

### Demo video

[Watch the procedure on YouTube](#)

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## Rear wall replacement (trained technician only)

Follow instructions in this section to remove or install the rear wall.

**Important:** This task must be operated by trained technicians that are certified by Lenovo Service. Do not attempt to remove or install the part without proper training and qualification.

### Remove the rear wall

Follow instructions in this section to remove the rear wall. This procedure must be executed by a trained technician.

### About this task

#### Attention:

- Read [“Installation Guidelines” on page 47](#) and [“Safety inspection checklist” on page 48](#) to ensure that you work safely.
- Power off the server and peripheral devices and disconnect the power cords and all external cables. See [“Power off the server” on page 64](#).
- If the server is installed in a rack, remove it from the rack. See [“Remove the server from rails” on page 65](#).

### Procedure

Step 1. Make preparation for this task.

- a. Remove the front top cover. See [“Remove the front top cover” on page 225](#).
- b. Remove the rear top cover. See [“Remove the rear top cover” on page 227](#).
- c. Remove all of the PCIe risers. See [“Remove a PCIe riser” on page 145](#).

Step 2. Remove the rear wall.

- a. ① Remove the six screws that secure the rear wall to the chassis.
- b. ② Slide the rear wall backward and lift it out of the chassis.

**Note:** The rear wall might look slightly different from the illustration.

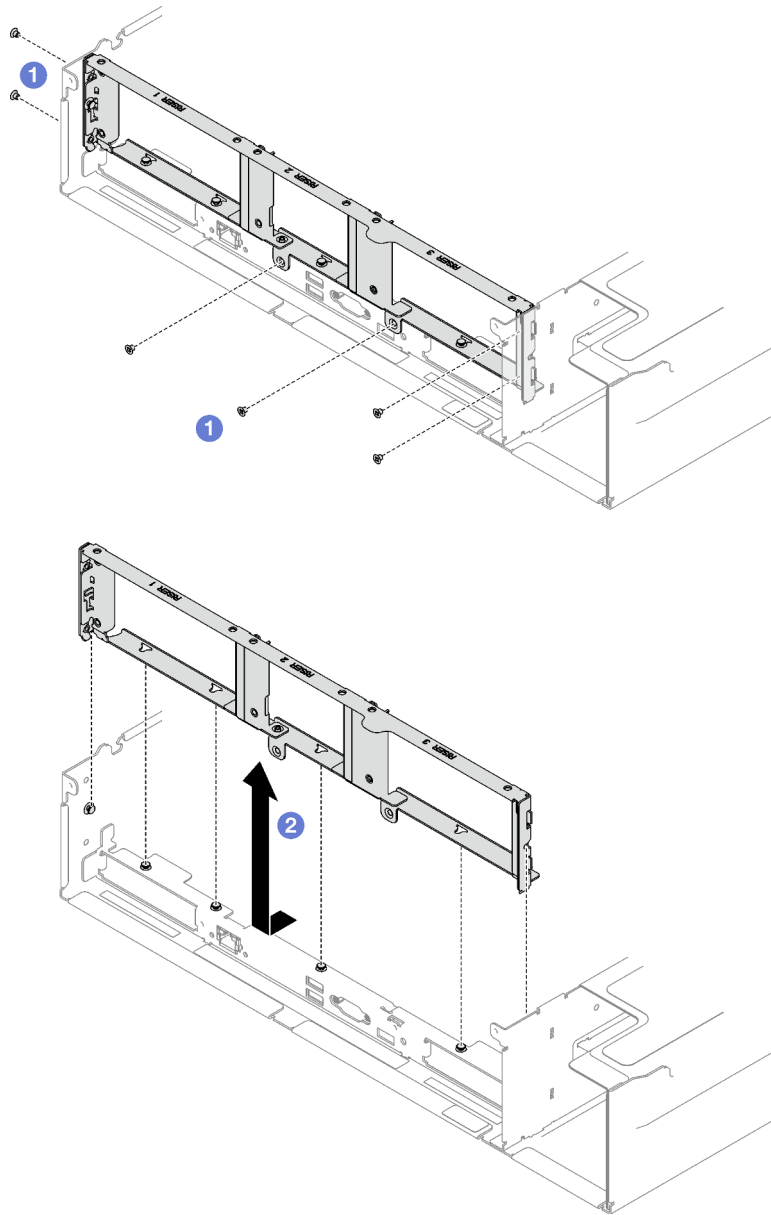


Figure 142. Rear wall removal

### After you finish

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

### Demo video

[Watch the procedure on YouTube](#)

## Install the rear wall

Follow instructions in this section to install the rear wall. This procedure must be executed by a trained technician.

### About this task

#### Attention:

- Read [“Installation Guidelines” on page 47](#) and [“Safety inspection checklist” on page 48](#) to ensure that you work safely.
- Touch the static-protective package that contains the component to any unpainted metal surface on the server; then, remove it from the package and place it on a static-protective surface.

### Procedure

- Step 1. ① Lower the rear wall and align it with the six alignment pins on the chassis; then, slide the rear wall forward toward the front of the server until it is seated in place.
- Step 2. ② Fasten the six screws to secure the rear wall to the chassis.

**Note:** The rear wall might look slightly different from the illustration.

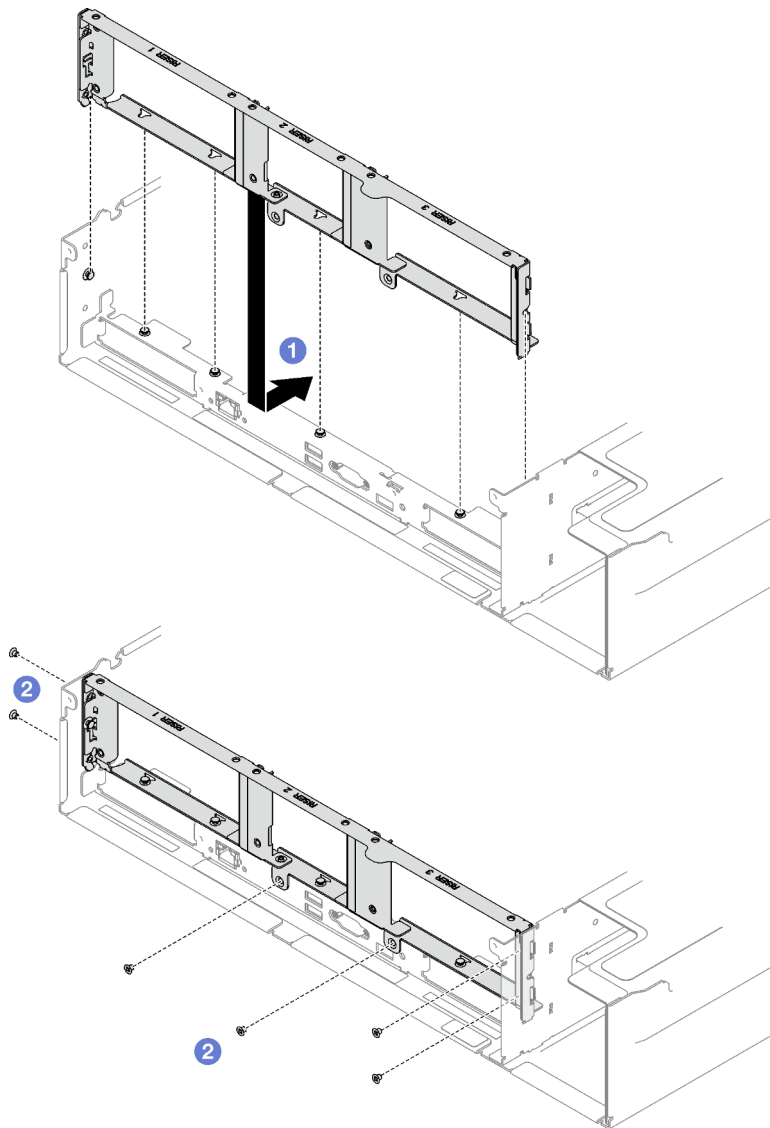


Figure 143. Rear wall installation

## After you finish

1. Reinstall the PCIe risers. See [“Install a PCIe riser”](#) on page 152.
2. Complete the parts replacement. See [“Complete the parts replacement”](#) on page 233.

## Demo video

[Watch the procedure on YouTube](#)

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## Security bezel replacement

Follow instructions in this section to remove and install the security bezel.

## Remove the security bezel

Follow instructions in this section to remove the security bezel.

### About this task

**Attention:** Read [“Installation Guidelines” on page 47](#) and [“Safety inspection checklist” on page 48](#) to ensure that you work safely.

### Procedure

Step 1. Insert and rotate the key clockwise to unlock the security bezel.

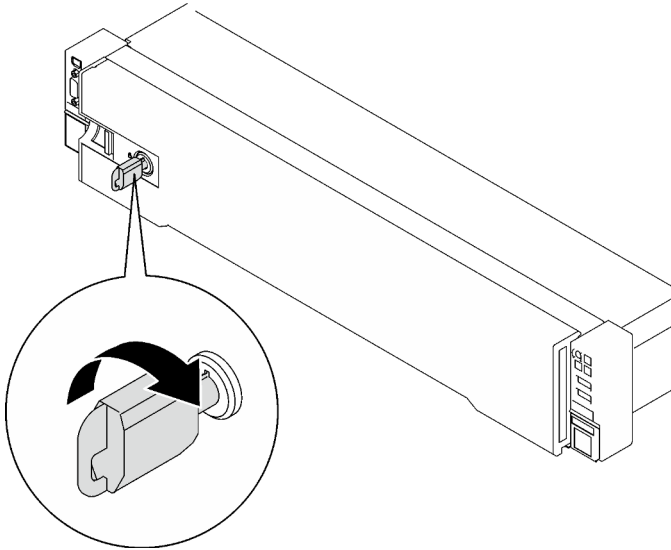


Figure 144. Unlocking the security bezel

Step 2. Press on the release latch, and rotate the security bezel away to remove it from the chassis.

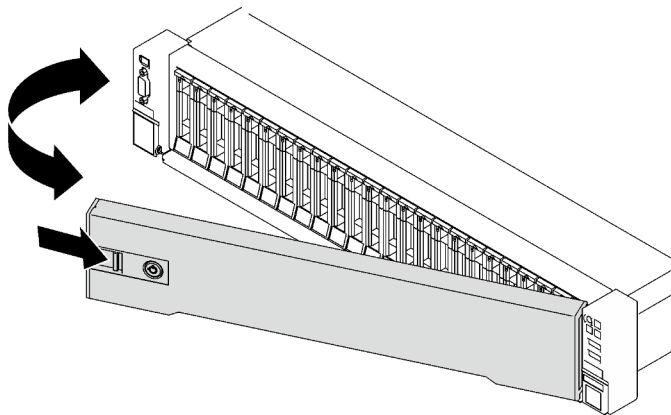


Figure 145. Security bezel removal

### After you finish

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

## Demo video

[Watch the procedure on YouTube](#)

## Install the security bezel

Follow instructions in this section to install the security bezel.

### About this task

**Attention:** Read “[Installation Guidelines](#)” on page 47 and “[Safety inspection checklist](#)” on page 48 to ensure that you work safely.

### Procedure

Step 1. Insert the tabs on the security bezel into the slots on the right rack handle; then, press and hold the release latch, and rotate the security bezel towards the chassis until the other side clicks into place.

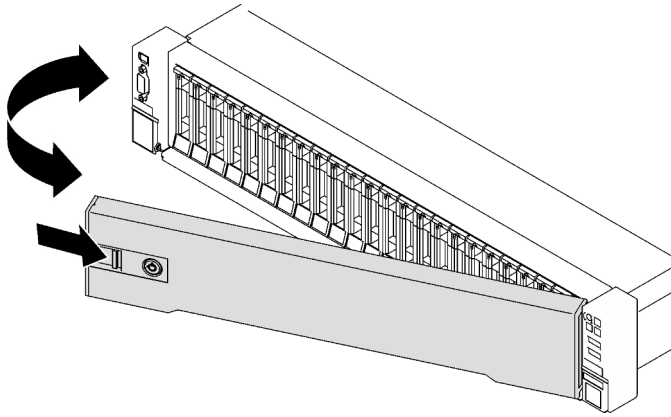


Figure 146. Security bezel installation

Step 2. Insert and rotate the key counterclockwise to lock the security bezel.

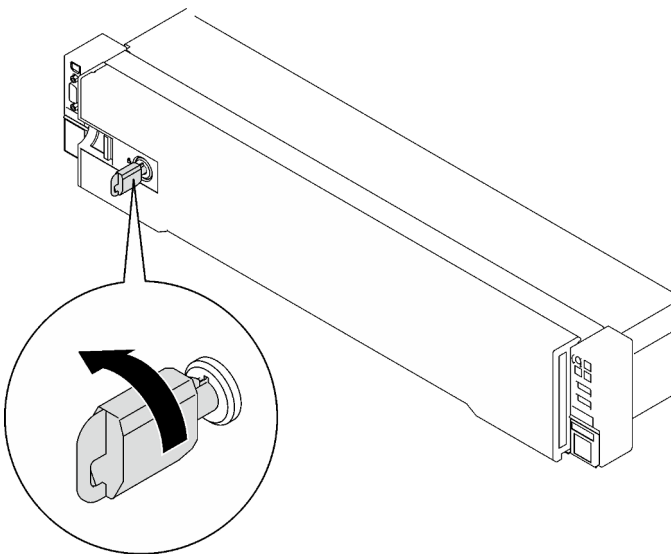


Figure 147. Locking the security bezel

## After you finish

Complete the parts replacement. See [“Complete the parts replacement” on page 233](#).

### Demo video

[Watch the procedure on YouTube](#)

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## Serial port module replacement

Follow instructions in this section to remove and install the serial port module.

### Remove the serial port module

Follow instructions in this section to remove the serial port module.

### About this task

#### Attention:

- Read [“Installation Guidelines” on page 47](#) and [“Safety inspection checklist” on page 48](#) to ensure that you work safely.
- Power off the server and peripheral devices and disconnect the power cords and all external cables. See [“Power off the server” on page 64](#).
- If the server is installed in a rack, remove it from the rack. See [“Remove the server from rails” on page 65](#).

### Procedure

Step 1. Make preparation for this task.

- a. Remove the front top cover. See [“Remove the front top cover” on page 225](#).
- b. Remove the rear top cover. See [“Remove the rear top cover” on page 227](#).
- c. Disconnect the serial port cable from the system board assembly.
- d. Remove the PCIe riser where the serial port module has been installed. See [“Remove a PCIe riser” on page 145](#).

Step 2. Remove the serial port module.

- a. ① Unfasten the screw that secures the serial port module to the PCIe riser.
- b. ② Remove the serial port module from the PCIe riser.



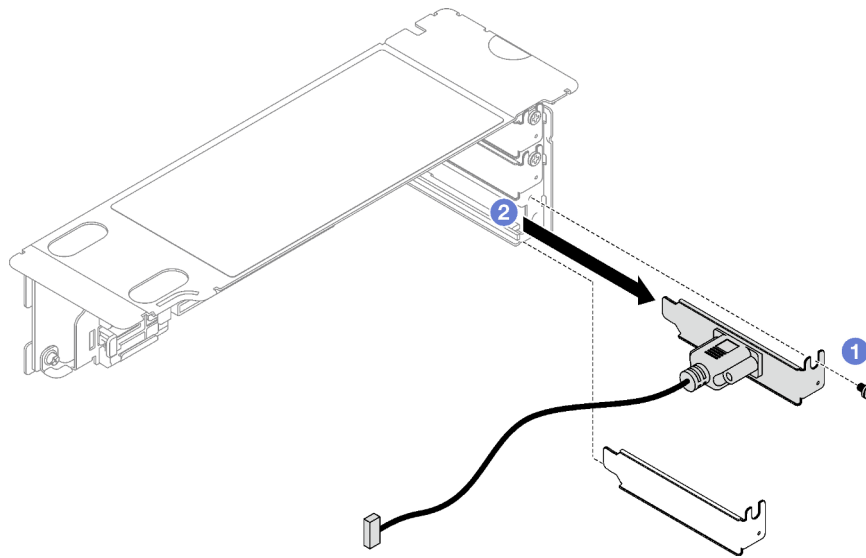


Figure 148. Serial port module removal

## After you finish

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

## Demo video

[Watch the procedure on YouTube](#)

## Install the serial port module

Follow instructions in this section to install the serial port module.

## About this task

### Attention:

- Read [“Installation Guidelines” on page 47](#) and [“Safety inspection checklist” on page 48](#) to ensure that you work safely.
- Touch the static-protective package that contains the component to any unpainted metal surface on the server; then, remove it from the package and place it on a static-protective surface.

## Procedure

- Step 1. ① Insert the serial port module into the PCIe riser.
- Step 2. ② Fasten the screw to secure the serial port module to the PCIe riser.

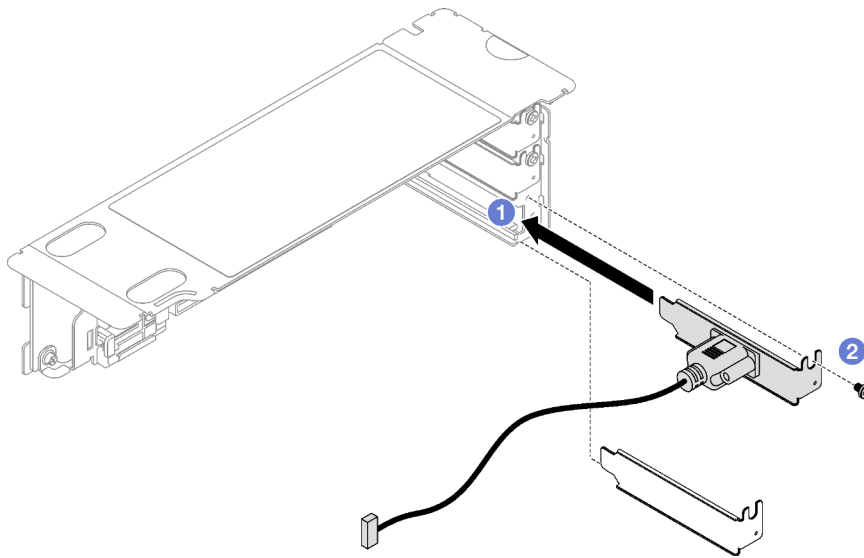


Figure 149. Serial port module installation

Step 3. Connect the serial port cable to the serial port connector on the system board assembly.

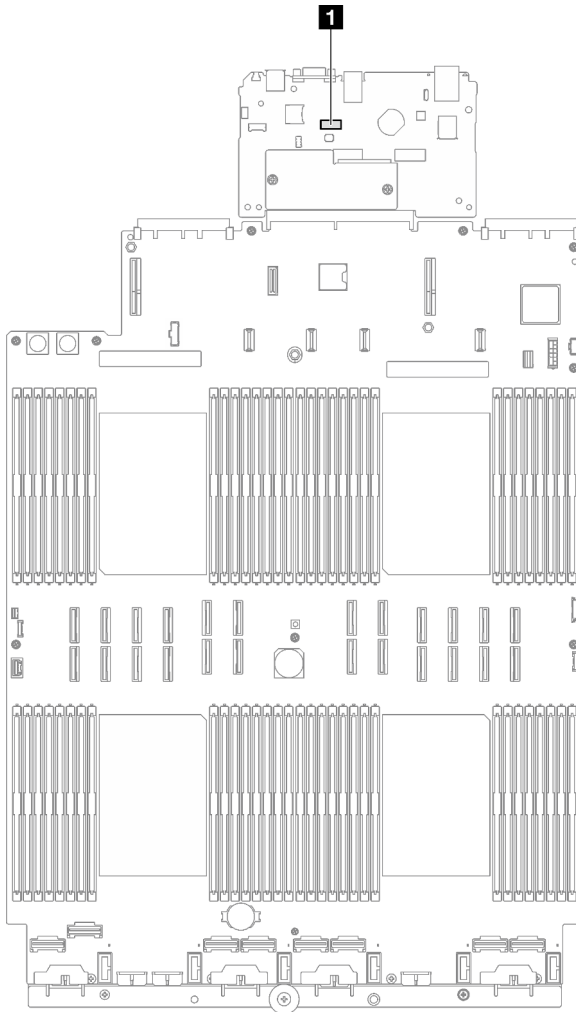


Figure 150. Serial port connector location

**1** Serial port connector

## After you finish

1. Reinstall the PCIe riser. See [“Install a PCIe riser” on page 152](#).
2. Complete the parts replacement. See [“Complete the parts replacement” on page 233](#).
3. To enable the serial port module on Linux or Microsoft Windows, do one of the followings according to the installed operating system:

**Note:** If the Serial over LAN (SOL) or Emergency Management Services (EMS) feature is enabled, the serial port will be hidden on Linux and Microsoft Windows. Therefore, it is required to disable SOL and EMS to use the serial port on operating systems for serial devices.

- For Linux:

Open the ipmitool and enter the following command to disable the Serial over LAN (SOL) feature:

```
-I lanplus -H IP -U USERID -P PASSWORD sol deactivate
```

- For Microsoft Windows:

- a. Open the ipmitool and enter the following command to disable the SOL feature:

```
-I lanplus -H IP -U USERID -P PASSWORD sol deactivate
```

- b. Open Windows PowerShell and enter the following command to disable the Emergency Management Services (EMS) feature:

```
Bcdedit /ems off
```

- c. Restart the server to ensure that the EMS setting takes effect.

## Demo video

[Watch the procedure on YouTube](#)

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## System board assembly replacement (trained technician only)

Follow instructions in this section to remove and install the system board assembly.

**Important:** This task must be operated by trained technicians that are certified by Lenovo Service. Do not attempt to remove or install the part without proper training and qualification.

### CAUTION:

**Hazardous moving parts. Keep fingers and other body parts away.**



### CAUTION:



**The heat sinks and processors might be very hot. Turn off the server and wait several minutes to let the server cool before removing the server cover.**

The following illustration shows the layout of the system board assembly which contains the firmware and RoT security module, system I/O board, and processor board.

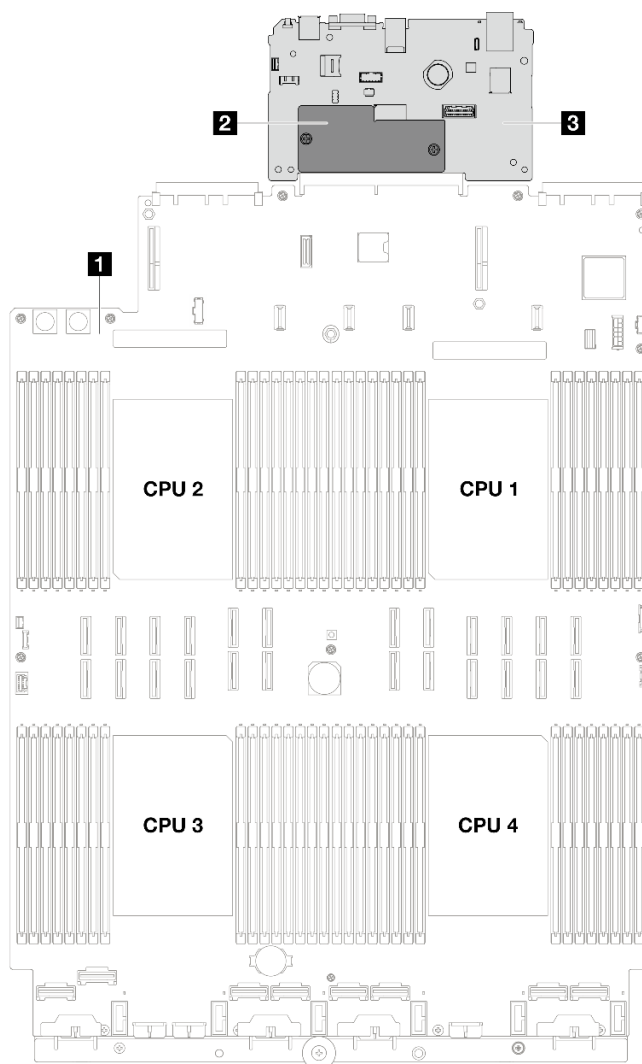


Figure 151. System-board-assembly layout

<b>1</b> Processor board	<b>2</b> Firmware and RoT security module	<b>3</b> System I/O board
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## Remove the firmware and RoT security module

Follow instructions in this section to remove the ThinkSystem V3 Firmware and Root of Trust Security Module (firmware and RoT security module).

### About this task

**Important:** This task must be operated by trained technicians that are certified by Lenovo Service. Do not attempt to remove or install the part without proper training and qualification.

#### Attention:

- Read [“Installation Guidelines” on page 47](#) and [“Safety inspection checklist” on page 48](#) to ensure that you work safely.
- Power off the server and peripheral devices and disconnect the power cords and all external cables. See [“Power off the server” on page 64](#).

- If the server is installed in a rack, slide the server out on its rack slide rails to gain access to the top cover, or remove the server from the rack. See “[Remove the server from rails](#)” on page 65.
- Prevent exposure to static electricity, which might lead to system halt and loss of data, by keeping static-sensitive components in their static-protective packages until installation, and handling these devices with an electrostatic-discharge wrist strap or other grounding system.
- After replacing the firmware and RoT security module, update the firmware to the specific version supported by the server. Make sure that you have the required firmware or a copy of the pre-existing firmware before you proceed.

## Procedure

Step 1. Make preparation for this task.

- Perform OneCLI commands to back up the UEFI settings. See [https://pubs.lenovo.com/lxce-onecli/onecli\\_r\\_save\\_command](https://pubs.lenovo.com/lxce-onecli/onecli_r_save_command).
- Perform both OneCLI commands and XCC actions to back up the XCC settings. See [https://pubs.lenovo.com/lxce-onecli/onecli\\_r\\_save\\_command](https://pubs.lenovo.com/lxce-onecli/onecli_r_save_command) and [https://pubs.lenovo.com/xcc2/NN1ia\\_c\\_backupthexcc.html](https://pubs.lenovo.com/xcc2/NN1ia_c_backupthexcc.html).
- Remove the front top cover. See “[Remove the front top cover](#)” on page 225.
- Remove the rear top cover. See “[Remove the rear top cover](#)” on page 227.
- Depending on the server model, remove the following PCIe risers.
  - If the server is installed with three PCIe risers, remove the PCIe riser 2 and 3. See “[Remove a PCIe riser](#)” on page 145.
  - If the server is installed with four PCIe risers, remove the PCIe riser B and C. See “[Remove a PCIe riser](#)” on page 145.

Step 2. Remove the firmware and RoT security module.

- ① Loosen the two screws on the firmware and RoT security module.
- ② Lift the firmware and RoT security module out of the system I/O board.

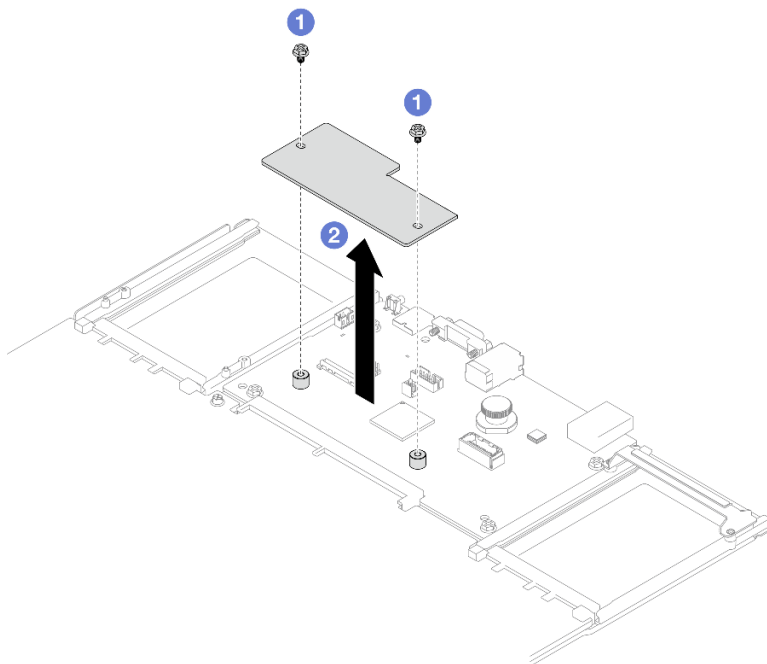


Figure 152. Firmware and RoT security module removal

## After you finish

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

### Demo video

[Watch the procedure on YouTube](#)

## Install the firmware and RoT security module

Follow instructions in this section to install the ThinkSystem V3 Firmware and Root of Trust Security Module (firmware and RoT security module).

### About this task

**Important:** This task must be operated by trained technicians that are certified by Lenovo Service. Do not attempt to remove or install the part without proper training and qualification.

#### Attention:

- Read [“Installation Guidelines” on page 47](#) and [“Safety inspection checklist” on page 48](#) to ensure that you work safely.
- Power off the server and peripheral devices and disconnect the power cords and all external cables. See [“Power off the server” on page 64](#).
- Prevent exposure to static electricity, which might lead to system halt and loss of data, by keeping static-sensitive components in their static-protective packages until installation, and handling these devices with an electrostatic-discharge wrist strap or other grounding system.

### Procedure

- Step 1. Touch the static-protective package that contains the new part to any unpainted surface on the outside of the server; then, take the new part out of the package and place it on a static-protective surface.
- Step 2. Install the firmware and RoT security module.
  - a. ① Lower the firmware and RoT security module onto the system I/O board and ensure that the connector on the module is correctly inserted into the slot on the system I/O board.
  - b. ② Tighten the two screws to secure the firmware and RoT security module in place.

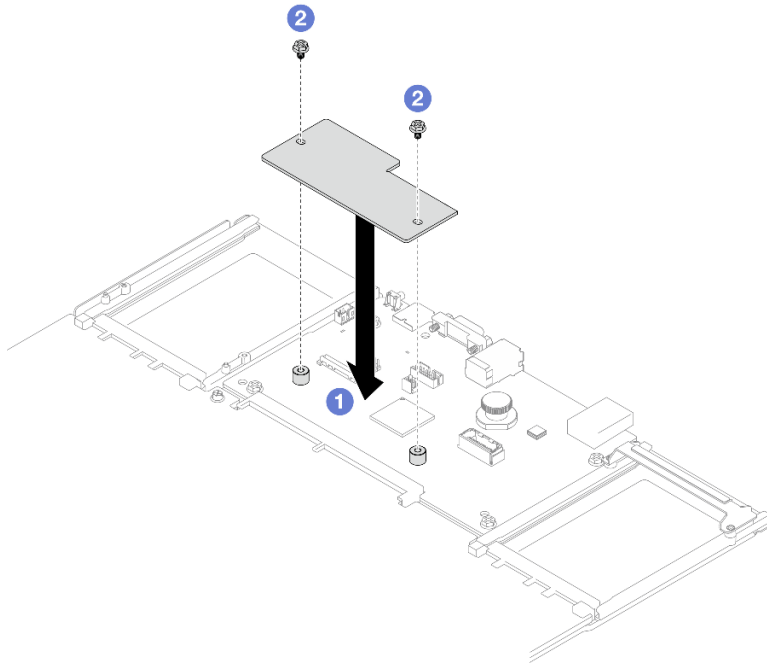


Figure 153. Firmware and RoT security module installation

## After you finish

1. Reinstall the PCIe risers. See “Install a PCIe riser” on page 152.
2. Complete the parts replacement. See “Complete the parts replacement” on page 233.
3. Update the UEFI, XCC and LXPM firmware to the specific version supported by the server. See <https://glosse4lenovo.lenovo.com/wiki/glosse4lenovo/view/How%20To/System%20related/How%20to%20do%20RoT%20Module%20FW%20update%20on%20ThinkSystem%20V3%20machines/>.
4. Perform OneCLI commands to restore the UEFI settings. See [https://pubs.lenovo.com/lxce-onecli/onecli\\_r\\_restore\\_command](https://pubs.lenovo.com/lxce-onecli/onecli_r_restore_command).
5. Perform both OneCLI commands and XCC actions to restore the XCC settings. See [https://pubs.lenovo.com/lxce-onecli/onecli\\_r\\_restore\\_command](https://pubs.lenovo.com/lxce-onecli/onecli_r_restore_command) and [https://pubs.lenovo.com/xcc2/NN1ia\\_c\\_restorethxcc.html](https://pubs.lenovo.com/xcc2/NN1ia_c_restorethxcc.html).
6. If there is a software (SW) key, for example, XCC FoD key, installed in the system, inject the key again to ensure that the key functions properly. See <https://lenovopress.lenovo.com/redp4895.pdf>.

**Note:** If you need to replace the processor board together with the firmware and RoT security module, update the VPD before injecting the key. See [Update the Vital Product Data \(VPD\)](#).

7. Optionally, do the following if needed:
  - Hide TPM. See “Hide/observe TPM” on page 222.
  - Update the TPM firmware. See “Update the TPM firmware” on page 223.
  - Enable UEFI Secure Boot. See “Enable UEFI Secure Boot” on page 224.

## Demo video

[Watch the procedure on YouTube](#)

## Remove the system I/O board or processor board

Follow instructions in this section to remove the system I/O board or processor board.



## About this task

### Important:

- Removing and installing this component requires trained technicians. **Do not** attempt to remove or install it without proper training.
- When removing the memory modules, label the slot number on each memory module, remove all the memory modules from the system board assembly, and set them aside on a static-protective surface for reinstallation.
- **When disconnecting cables, make a list of each cable and record the connectors the cable is connected to, and use the record as a cabling checklist after installing the new system board assembly.**

### Attention:

- Read [“Installation Guidelines” on page 47](#) and [“Safety inspection checklist” on page 48](#) to ensure that you work safely.
- Power off the server and peripheral devices and disconnect the power cords and all external cables. See [“Power off the server” on page 64](#).
- If the server is installed in a rack, remove it from the rack. See [“Remove the server from rails” on page 65](#).

## Procedure

Step 1. Make preparation for this task.

- a. Record all system configuration information, such as Lenovo XClarity Controller IP addresses, vital product data, and the machine type, model number, serial number, Universally Unique Identifier, and asset tag of the server.
- b. Save the system configuration to an external device with Lenovo XClarity Essentials.
- c. Save the system event log to external media.
- d. Remove the power supply units. See [“Remove a hot-swap power supply unit” on page 172](#)
- e. Remove the front top cover. See [“Remove the front top cover” on page 225](#).
- f. Remove the rear top cover. See [“Remove the rear top cover” on page 227](#).
- g. Remove the front air baffle. See [“Remove the front air baffle” on page 84](#).
- h. Remove the fans and the fan cage. See [“Remove a fan” on page 106](#) and [“Remove the fan cage” on page 107](#).
- i. Remove the PCIe risers. See [“Remove a PCIe riser” on page 145](#).
- j. Remove the rear air baffle. See [“Remove the rear air baffle” on page 90](#).
- k. Remove the intrusion switch. See [“Remove the intrusion switch” on page 121](#).
- l. Remove the OCP modules if necessary. See [“Remove an OCP module” on page 143](#).
- m. Remove the power distribution board. See [“Remove the power distribution board” on page 170](#).
- n. Remove the PHMs. See [“Remove a processor and heat sink” on page 187](#).
- o. Make sure to label the slot number on each memory module, remove all the memory modules from the system board assembly, and set them aside on a static-protective surface for reinstallation. See [“Remove a memory module” on page 135](#).

**Important:** It is advised to print out the layout of memory module slots for reference.

Step 2. Disconnect all the cables from the system board assembly. As you disconnect the cables, make a list of each cable and record the connectors the cables are connected to, and use the record as a cabling checklist after installing the new system board assembly.

Step 3. Remove the system board assembly.

- a. ① Pull up the rear plunger to release the system board assembly.
- b. ② Grasp the front lifting handle and the rear plunger; then, slide the system board assembly toward the front of the chassis.
- c. ③ Hold the front lifting handle and the rear plunger; then, lift the system board assembly out of the chassis.

**Note:** The lifting handle only serves the purpose of removing system board assembly. Do not attempt to lift the whole server with it.

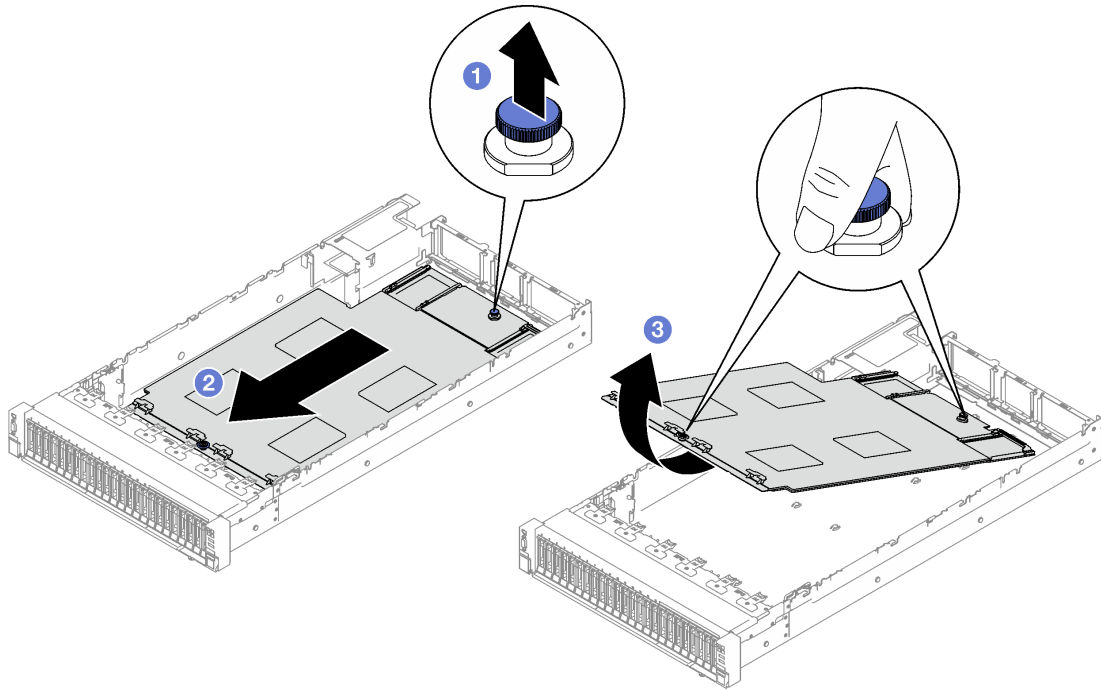


Figure 154. System board assembly removal

Step 4. (Optional) If you are going to replace the system I/O board, remove the firmware and RoT security module and the MicroSD card from the system I/O board. See [“Remove the firmware and RoT security module” on page 211](#) and [“Remove the MicroSD card” on page 141](#).

Step 5. Separate the system I/O board from the processor board.

**Note:** To prevent the contact of the I/O board from damage, pinch and lift the plunger on the I/O board upward a little and pull out the I/O board outward. During the entire pulling action, ensure that the I/O board remains as horizontal as possible.

- a. ① Remove the four screws that secure the system I/O board.
- b. ② Lift and hold the rear plunger; then, slide the system I/O board towards the rear end of the chassis to disengage it from the processor board.

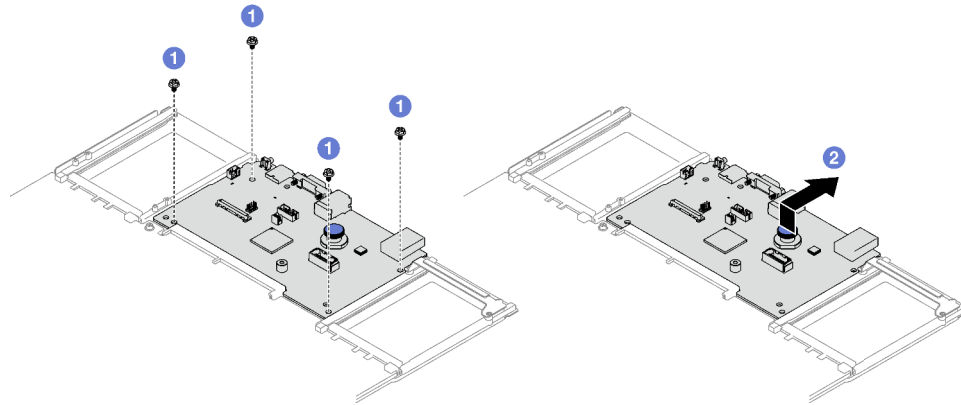


Figure 155. System I/O board removal

## After you finish

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

**Important:** Before you return the processor board, make sure that you install the processor socket covers from the new processor board. To replace a processor socket cover:

- a. Take a socket cover from the processor socket assembly on the new processor board and orient it correctly above the processor socket assembly on the removed processor board.
  - b. Gently press down the socket cover legs to the processor socket assembly, pressing on the edges to avoid damage to the socket pins. You might hear a click on the socket cover when it is securely attached.
  - c. **Make sure** that the socket cover is securely attached to the processor socket assembly.
2. If you plan to recycle the component, see [“Disassemble the system board assembly for recycle” on page 411](#).

## Demo video

[Watch the procedure on YouTube](#)

## Install the system I/O board or processor board

Follow instructions in this section to install the system I/O board or processor board.

## About this task

**Important:** Removing and installing this component requires trained technicians. **Do not** attempt to remove or install it without proper training.

### Attention:

- Read [“Installation Guidelines” on page 47](#) and [“Safety inspection checklist” on page 48](#) to ensure that you work safely.
- Touch the static-protective package that contains the component to any unpainted metal surface on the server; then, remove it from the package and place it on a static-protective surface.

**Firmware and driver download:** You might need to update the firmware or driver after replacing a component.

- Go to <https://datacentersupport.lenovo.com/tw/en/products/servers/thinksystem/sr850v3/7d96/downloads/driver-list/> to see the latest firmware and driver updates for your server.
- Go to “Update the firmware” on page 365 for more information on firmware updating tools.

## Procedure

Step 1. Depending on your need, do one of the following:

- If you are going to replace the system I/O board and reuse the processor board, install a new system I/O board onto the processor board.
  - If you are going to replace the processor board and reuse the system I/O board, install the existing system I/O board onto a new processor board.
- a. ① Align the system I/O board with the connector on the processor board, and use both hands to push the system I/O board and slightly insert it into the connector.
  - b. ② Lower the system I/O board onto the supporting sheet metal. Make sure the blue plunger engages with the supporting sheet metal.
  - c. ③ Install the screws to fix the system I/O board into place.

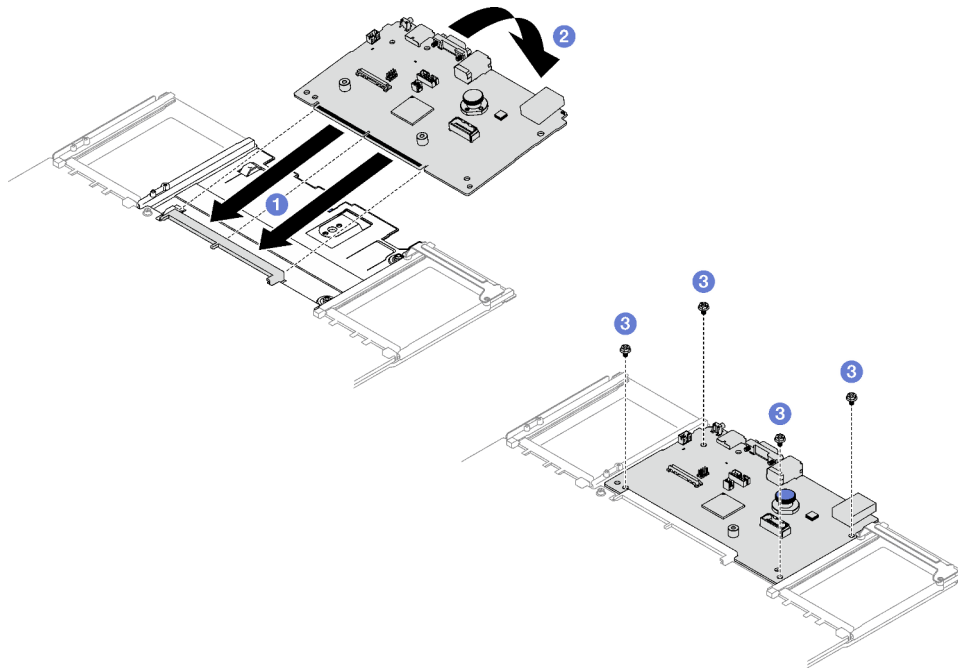
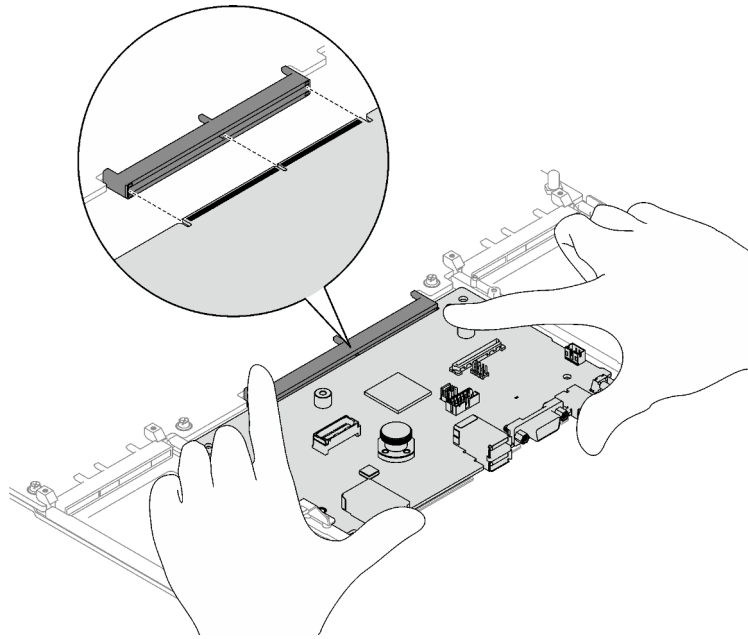


Figure 156. System I/O board installation

**Note:** To prevent the contact of the system I/O board from damage, ensure that the system I/O board is aligned correctly with the connector on the processor board, and remains as horizontal as possible during the insertion.



- Step 2. If you installed a new system I/O board onto the processor board, install the firmware and RoT security module and the MicroSD card that were removed from the old system I/O board onto the new system I/O board. See [“Install the firmware and RoT security module” on page 213](#) and [“Install the MicroSD card” on page 142](#).
- Step 3. Place the system board assembly inside the chassis.
- a. ① Hold the front lifting handle and the rear plunger on the system board assembly; then, insert the rear end of the system board assembly into the rear of the chassis
  - b. ② Lower the front end of the system board assembly into the chassis.
  - c. ③ Slide the system board assembly toward the rear of the chassis until it clicks into place. Make sure that the rear connectors on the new system board assembly are inserted into the corresponding holes in the rear panel.

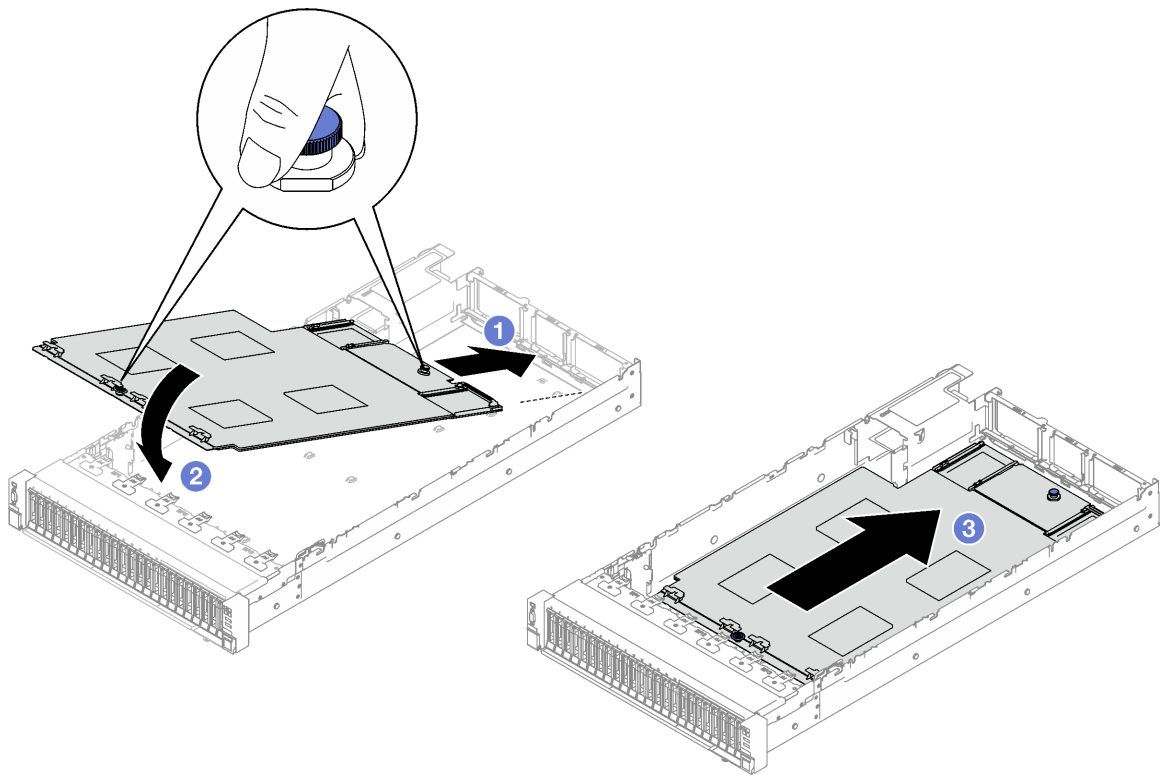


Figure 157. System board assembly installation

## After you finish

1. Reconnect all the cables to the system board assembly. See [Chapter 6 “Internal cable routing” on page 235](#).
2. Reinstall the memory modules. See [“Install a memory module” on page 138](#).
3. Reinstall the PHMs. See [“Install a processor and heat sink” on page 192](#).
4. Reinstall the power distribution board. See [“Install the power distribution board” on page 172](#).
5. Reinstall the intrusion switch. See [“Install the intrusion switch” on page 123](#).
6. Reinstall the OCP modules if necessary. See [“Install an OCP module” on page 144](#).
7. Reinstall the rear air baffle. See [“Install the rear air baffle” on page 94](#).
8. Reinstall the PCIe risers. See [“Install a PCIe riser” on page 152](#).
9. Reinstall the front air baffle. See [“Install the front air baffle” on page 87](#).
10. Reinstall the fans and the fan cage assembly. See [“Install a fan” on page 111](#) and [“Install the fan cage” on page 109](#).
11. Reinstall the rear top cover. See [“Install the rear top cover” on page 228](#).
12. Reinstall the front top cover. See [“Install the front top cover” on page 230](#).
13. Reinstall the power supply units. See [“Install a hot-swap power supply unit” on page 175](#).
14. Ensure that all components have been reassembled correctly and that no tools or loose screws are left inside the server.
15. If the sever was installed in a rack, reinstall the server into the rack. See [“Install the server to rails” on page 69](#).
16. Reconnect the power cords and any cables that you removed.
17. Power on the server and any peripheral devices. See [“Power on the server” on page 64](#).

18. Update the vital product data (VPD). See [“Update the Vital Product Data \(VPD\)” on page 221](#). Machine type number and serial number can be found on the ID label, see [“Identify the server and access the Lenovo XClarity Controller” on page 43](#).
19. Optionally, enable UEFI Secure Boot. See [“Enable UEFI Secure Boot” on page 224](#).

### Demo video

[Watch the procedure on YouTube](#)

## Update the Vital Product Data (VPD)

Use this topic to update the Vital Product Data (VPD).


- **(Required)** Machine type
- **(Required)** Serial number
- **(Required)** System model
- (Optional) Asset tag
- (Optional) UUID

### Recommended tools:

- Lenovo XClarity Provisioning Manager
- Lenovo XClarity Essentials OneCLI commands

### Using Lenovo XClarity Provisioning Manager

#### Steps:

1. Start the server and press the key according to the on-screen instructions. The Lenovo XClarity Provisioning Manager interface is displayed by default.
2. Click  on the top right corner of the Lenovo XClarity Provisioning Manager main interface.
3. Click **Update VPD**; then, follow on-screen instructions to update the VPD.

### Using Lenovo XClarity Essentials OneCLI commands

- Updating **machine type**  
`onecli config set SYSTEM_PROD_DATA.SysInfoProdName <m/t_model> [access_method]`
- Updating **serial number**  
`onecli config set SYSTEM_PROD_DATA.SysInfoSerialNum <s/n> [access_method]`
- Updating **system model**  
`onecli config set SYSTEM_PROD_DATA.SysInfoProdIdentifier <system model> [access_method]`  
`onecli config set SYSTEM_PROD_DATA.SysInfoProdIdentifierEx <system model> --override [access_method]`
- Updating **asset tag**  
`onecli config set SYSTEM_PROD_DATA.SysEncloseAssetTag <asset_tag> [access_method]`
- Updating **UUID**  
`onecli config createuuid SYSTEM_PROD_DATA.SysInfoUUID [access_method]`

Variable	Description
<m/t_model>	The server machine type and model number. Type xxxxyyy, where xxxx is the machine type and yyy is the server model number.

<s/n>	<p>The serial number on the server.</p> <p>Type zzzzzzz, where zzzzzzz is the serial number.</p>
<system model>	<p>The system model on the server.</p> <p>Type system yyyyyyyy, where yyyyyyy is the product identifier.</p>
<asset_tag>	<p>The server asset tag number.</p> <p>Type aaaaaaaaaaaaaaaaaaaaaaaaaaaaaa, where aaaaaaaaaaaaaaaaaaaaaaaaaaaaaa is the asset tag number.</p>
[access_method]	<p>The access method that you select to access the target server.</p> <ul style="list-style-type: none"> <li>• Online KCS (unauthenticated and user restricted): You can directly delete [access_method] from the command.</li> <li>• Online authenticated LAN: In this case, specify below LAN account information at the end of the OneCLI command: --bmc-username &lt;user_id&gt; --bmc-password &lt;password&gt;</li> <li>• Remote WAN/LAN: In this case, specify below XCC account information and IP address at the end of the OneCLI command: --bmc &lt;bmc_user_id&gt;:&lt;bmc_password&gt;@&lt;bmc_external_IP&gt;</li> </ul> <p><b>Notes:</b></p> <ul style="list-style-type: none"> <li>- &lt;bmc_user_id&gt; The BMC account name (1 of 12 accounts). The default value is USERID.</li> <li>- &lt;bmc_password&gt; The BMC account password (1 of 12 accounts).</li> </ul>

## Hide/observe TPM

TPM is enabled by default to encrypt data transfer for system operation. Optionally, you can disable TPM using Lenovo XClarity Essentials OneCLI.

To disable TPM, do the following:

1. Download and install Lenovo XClarity Essentials OneCLI.

To download Lenovo XClarity Essentials OneCLI, go to the following site:

<https://datacentersupport.lenovo.com/solutions/HT116433>

2. Run the following command:

```
OneCli.exe config set TrustedComputingGroup.HideTPMfromOS "Yes" --imm <userid>:<password>@<ip_address> --override
```

where:

- <userid>:<password> are the credentials used to access the BMC (Lenovo XClarity Controller interface) of your server. The default user ID is USERID, and the default password is PASSWORD (zero, not an uppercase o)
- <ip\_address> is the IP address of the BMC.

Example:



```
D:\onecli>OneCli.exe config set TrustedComputingGroup.HideTPMfromOS "Yes" --imm USERID:PASSWORD=1@10.245.39.79 --override

Lenovo XClarity Essentials OneCLI 1xce_onecli01p-2.3.0
Licensed Materials - Property of Lenovo
(C) Copyright Lenovo Corp. 2013-2018 All Rights Reserved
If the parameters you input includes password, please Note that:
* The password must consist of a sequence of characters from `0-9a-zA-Z_+.$%@!^&*()= ` set
* Use `"` to quote when password parameters include special characters
* Do not use reserved characters in path name when parameter contains path
Invoking SET command ...
Connected to BMC at IP address 10.245.39.79 by IPMI
TrustedComputingGroup.HideTPMfromOS=Yes
Success.
```

3. Reboot the system.

If you want to enable TPM again, run the following command and reboot the system:

```
OneCli.exe config set TrustedComputingGroup.HideTPMfromOS "No" --imm <userid>:<password>@<ip_address> --override
```

Example:

```
D:\onecli3>OneCli.exe config set TrustedComputingGroup.HideTPMfromOS "No" --imm USERID:PASSWORD=1@10.245.39.79 --override

Lenovo XClarity Essentials OneCLI 1xce_onecli01h-3.0.1
(C) Lenovo 2013-2020 All Rights Reserved

OneCLI License Agreement and OneCLI Legal Information can be found at the following location:
"D:\onecli3\Lic"

[Is]Certificate check finished [100%][=====]
Invoking SET command ...
Connected to BMC at IP address 10.245.39.79 by IPMI
TrustedComputingGroup.HideTPMfromOS=No
Configure successfully, please reboot system.
Succeed.
```

## Update the TPM firmware

Optionally, you can update the TPM firmware using Lenovo XClarity Essentials OneCLI.

**Note:** TPM firmware update is irreversible. After update, the TPM firmware cannot be downgraded to earlier versions.

### TPM firmware version

Follow the procedure below to see the TPM firmware version:

From Lenovo XClarity Provisioning Manager

1. Start the server and press the key specified in the on-screen instructions to display the Lenovo XClarity Provisioning Manager interface. (For more information, see the “Startup” section in the LXPM documentation compatible with your server at <https://pubs.lenovo.com/lxpm-overview/>.)
2. If the power-on Administrator password is required, enter the password.
3. From the UEFI Setup page, click **System Settings** → **Security** → **Trusted Platform Module** → **TPM 2.0** → **TPM Firmware Version**.

### Update the TPM firmware

To update the TPM firmware, do the following:

1. Download and install Lenovo XClarity Essentials OneCLI.

To download Lenovo XClarity Essentials OneCLI, go to the following site:

<https://datacentersupport.lenovo.com/solutions/HT116433>

2. Run the following command:

```
OneCli.exe config set TrustedComputingGroup.DeviceOperation "Update to TPM 2.0 firmware version <x.x.x.x>" --bmc <userid>:<password>@<ip_address>
```

where:

- `<x.x.x.x>` is the target TPM version.  
e.g. TPM 2.0 (7.2.1.0) -> TPM 2.0 (7.2.2.0):

```
OneCli.exe config set TrustedComputingGroup.DeviceOperation "Update to TPM 2.0 firmware version 7.2.2.0" --bmc  
<userid>:<password>@<ip_address>
```

- `<userid>:<password>` are the credentials used to access the BMC (Lenovo XClarity Controller interface) of your server. The default user ID is USERID, and the default password is PASSWORD (zero, not an uppercase o).
- `<ip_address>` is the IP address of the BMC.

## Enable UEFI Secure Boot

Optionally, you can enable UEFI Secure Boot.

There are two methods available to enable UEFI Secure Boot:

- From Lenovo XClarity Provisioning Manager

To enable UEFI Secure Boot from Lenovo XClarity Provisioning Manager:

1. Start the server and press the key specified in the on-screen instructions to display the Lenovo XClarity Provisioning Manager interface. (For more information, see the “Startup” section in the LXPM documentation compatible with your server at <https://pubs.lenovo.com/lxpm-overview/>.)
2. If the power-on Administrator password is required, enter the password.
3. From the UEFI Setup page, click **System Settings** → **Security** → **Secure Boot**.
4. Enable Secure Boot and save the settings.

**Note:** If disabling UEFI secure boot is needed, select Disable in step 4.

- From Lenovo XClarity Essentials OneCLI

To enable UEFI Secure Boot from Lenovo XClarity Essentials OneCLI:

1. Download and install Lenovo XClarity Essentials OneCLI.

To download Lenovo XClarity Essentials OneCLI, go to the following site:

<https://datacentersupport.lenovo.com/solutions/HT116433>

2. Run the following command to enable Secure Boot:

```
OneCli.exe config set SecureBootConfiguration.SecureBootSetting Enabled --bmc <userid>:<password>@<ip_<br>address>
```

where:

- `<userid>:<password>` are the credentials used to access the BMC (Lenovo XClarity Controller interface) of your server. The default user ID is USERID, and the default password is PASSWORD (zero, not an uppercase o)
- `<ip_address>` is the IP address of the BMC.

For more information about the Lenovo XClarity Essentials OneCLI `set` command, see:

[https://pubs.lenovo.com/lxce-onecli/onecli\\_r\\_set\\_command](https://pubs.lenovo.com/lxce-onecli/onecli_r_set_command)

**Note:** If disabling UEFI secure boot is needed, run the following command:

```
OneCli.exe config set SecureBootConfiguration.SecureBootSetting Disabled --bmc <userid>:<password>@<ip_<br>address>
```

---

## Top cover replacement

Follow instructions in this section to remove and install the top cover.

### Remove the front top cover

Follow instructions in this section to remove the front top cover.

#### About this task

##### S014



**CAUTION:**

**Hazardous voltage, current, and energy levels might be present. Only a qualified service technician is authorized to remove the covers where the label is attached.**

##### S033



**CAUTION:**

**Hazardous energy present. Voltages with hazardous energy might cause heating when shorted with metal, which might result in spattered metal, burns, or both.**

**Attention:**

- Read [“Installation Guidelines” on page 47](#) and [“Safety inspection checklist” on page 48](#) to ensure that you work safely.
- Power off the server and peripheral devices and disconnect the power cords and all external cables. See [“Power off the server” on page 64](#).
- If the server is installed in a rack, remove it from the rack. See [“Remove the server from rails” on page 65](#).

#### Procedure

Step 1. If the front top cover is locked, unlock it with a screwdriver (direction **2**).

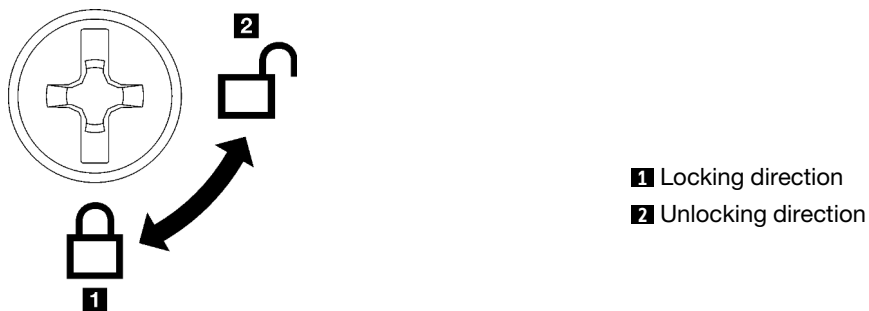


Figure 158. Front top cover locking/unlocking direction

Step 2. Remove the front top cover.

- a. 1 Press the blue button on the front top cover release latch.
- b. 2 Rotate the end of the latch up until it is in vertical position.
- c. 3 Lift the front top cover to remove it.

**Attention:**

- Service label is located on the surface of the front top cover.
- For proper cooling and air flow, install the front and rear top covers before powering on the server. Operating the server with the top covers removed might damage server components.

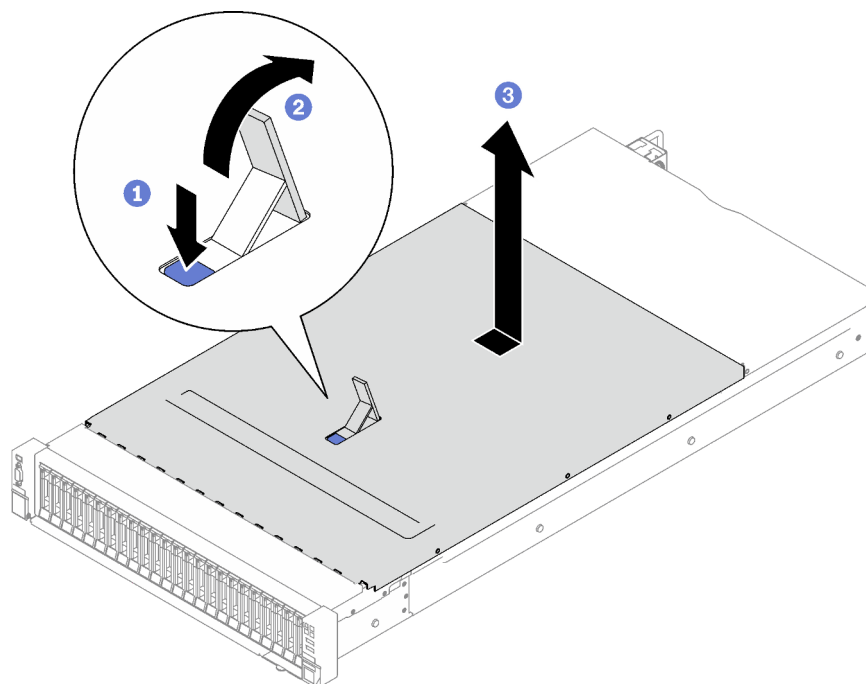


Figure 159. Front top cover removal

**After you finish**

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

### Demo video

[Watch the procedure on YouTube](#)

## Remove the rear top cover

Follow instructions in this section to remove the rear top cover.

### About this task

#### S014



#### CAUTION:

Hazardous voltage, current, and energy levels might be present. Only a qualified service technician is authorized to remove the covers where the label is attached.

#### S033



#### CAUTION:

Hazardous energy present. Voltages with hazardous energy might cause heating when shorted with metal, which might result in spattered metal, burns, or both.

#### Attention:

- Read [“Installation Guidelines” on page 47](#) and [“Safety inspection checklist” on page 48](#) to ensure that you work safely.
- Power off the server and peripheral devices and disconnect the power cords and all external cables. See [“Power off the server” on page 64](#).
- If the server is installed in a rack, remove it from the rack. See [“Remove the server from rails” on page 65](#).

## Procedure

Step 1. Remove the front top cover. See [“Remove the front top cover” on page 225](#).

Step 2. Remove the rear top cover.

- a. ① Loosen the two thumbscrews on the rear of the server.
- b. ② Slide the rear top cover towards the rear of the server and lift to remove it.

**Attention:** For proper cooling and air flow, install the front and rear top covers before powering on the server. Operating the server with the top covers removed might damage server components.

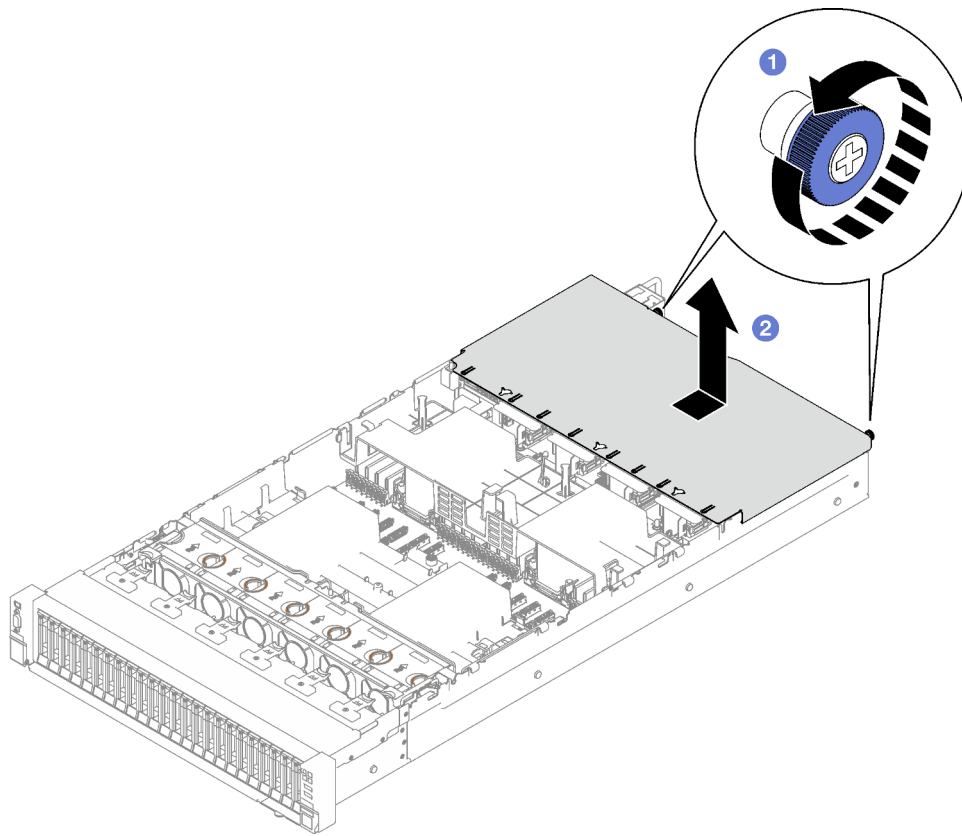


Figure 160. Rear top cover removal

## After you finish

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

### Demo video

[Watch the procedure on YouTube](#)

## Install the rear top cover

Follow instructions in this section to install the rear top cover.

### S014



#### **CAUTION:**

**Hazardous voltage, current, and energy levels might be present. Only a qualified service technician is authorized to remove the covers where the label is attached.**

### S033



**CAUTION:**

**Hazardous energy present. Voltages with hazardous energy might cause heating when shorted with metal, which might result in spattered metal, burns, or both.**

**About this task**

**Attention:**

- Read [“Installation Guidelines” on page 47](#) and [“Safety inspection checklist” on page 48](#) to ensure that you work safely.
- Make sure that all cables, adapters, and other components are installed and seated correctly and that you have not left loose tools or parts inside the server.
- Make sure that all internal cables are correctly routed. See [Chapter 6 “Internal cable routing” on page 235](#).

**Procedure**

Step 1. ① Align the rear top cover guide pins with the guide holes on the chassis; then place the rear top cover on top of the server and slide it towards the front of the server until it engages with the chassis.

Step 2. ② Secure the two thumbscrews on the rear of the server.

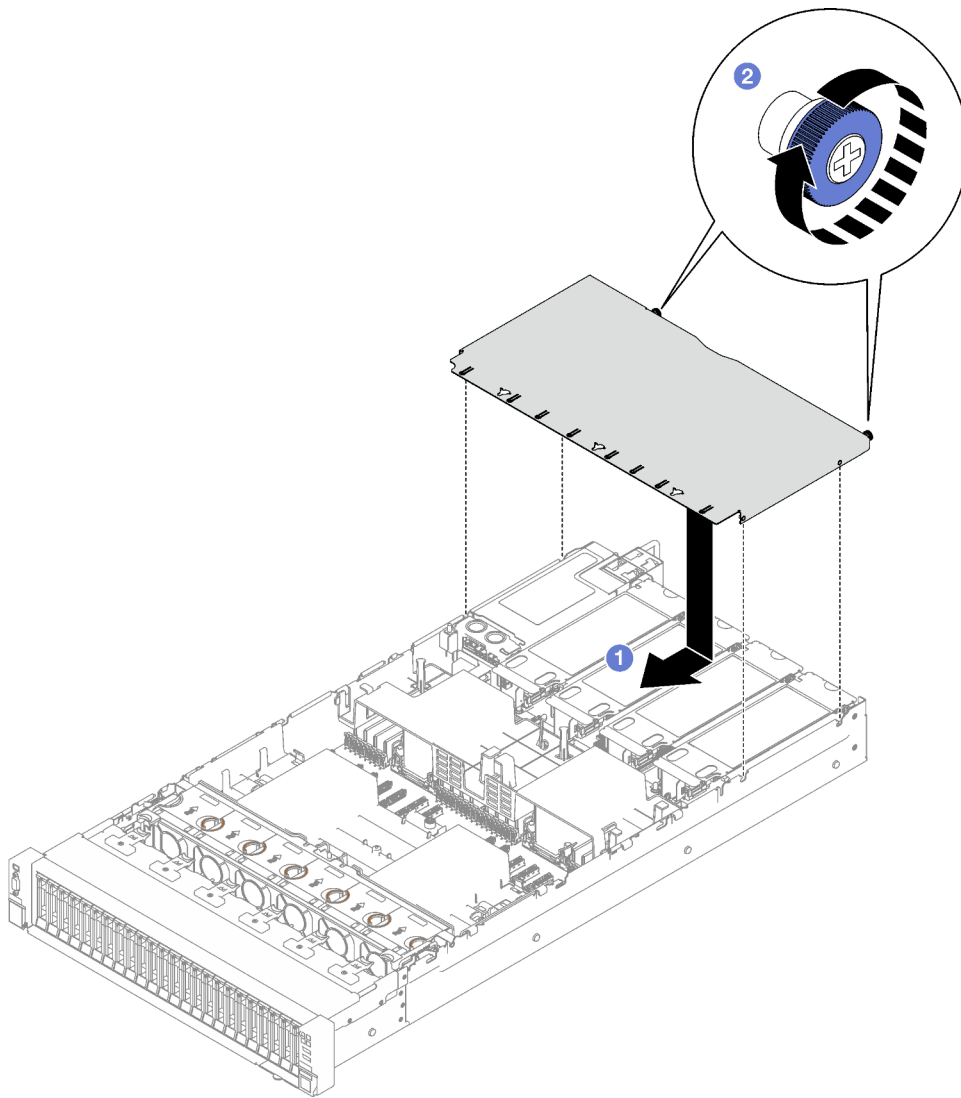


Figure 161. Rear top cover installation

### After you finish

1. Reinstall the front top cover. See [“Install the front top cover” on page 230](#)
2. Complete the parts replacement. See [“Complete the parts replacement” on page 233](#).

### Demo video

[Watch the procedure on YouTube](#)

## Install the front top cover

Follow instructions in this section to install the front top cover.

### About this task

#### **S014**





**CAUTION:**

Hazardous voltage, current, and energy levels might be present. Only a qualified service technician is authorized to remove the covers where the label is attached.

**S033**



**CAUTION:**

Hazardous energy present. Voltages with hazardous energy might cause heating when shorted with metal, which might result in spattered metal, burns, or both.

**Attention:**

- Read [“Installation Guidelines” on page 47](#) and [“Safety inspection checklist” on page 48](#) to ensure that you work safely.
- Make sure that all cables, adapters, and other components are installed and seated correctly and that you have not left loose tools or parts inside the server.
- Make sure that all internal cables are correctly routed. See [Chapter 6 “Internal cable routing” on page 235](#).

**Note:** If you are installing a new front top cover, attach the service label to the surface of the new front top cover if necessary.

**Procedure**

- Step 1. ① Align the front top cover guide pins with the guide holes on the chassis; then place the front top cover on top of the server with both sides aligned.
- Step 2. ② Rotate the latch down until it stops.

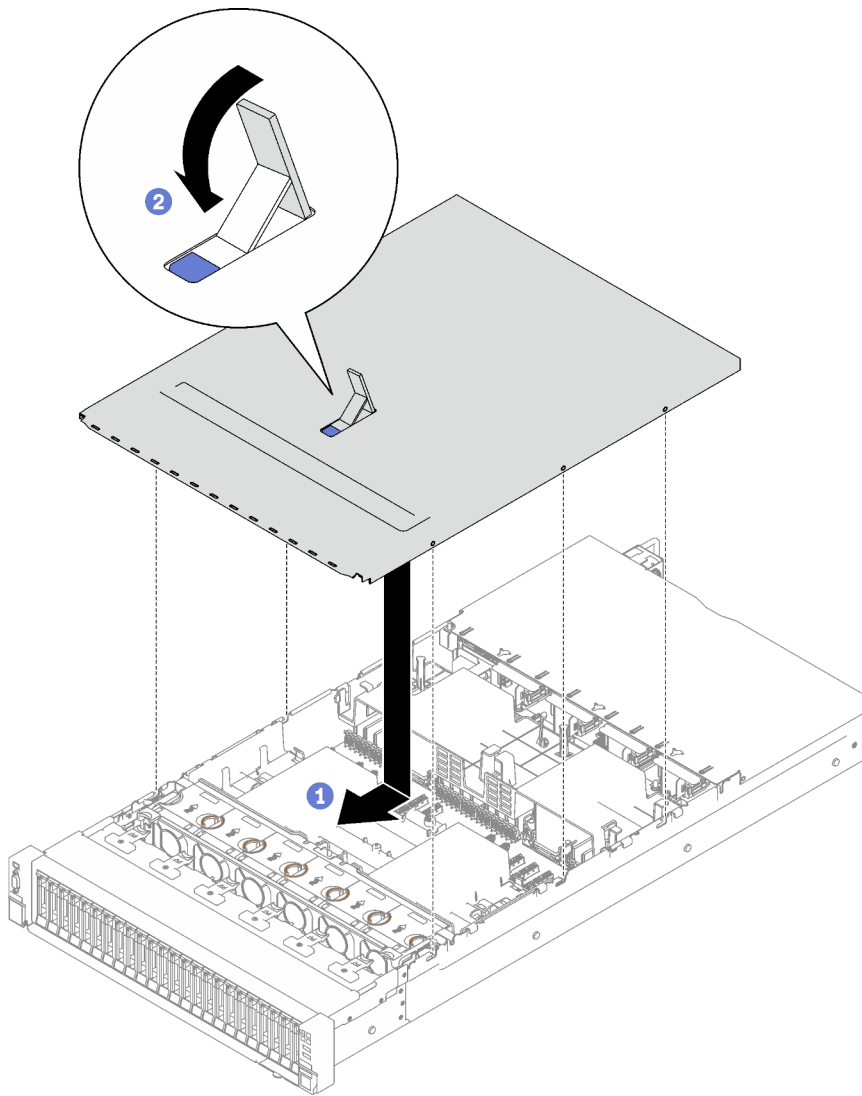
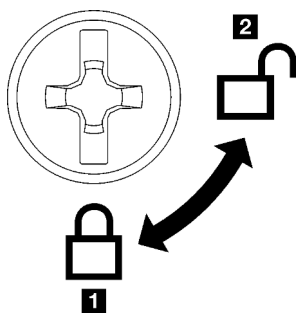


Figure 162. Front top cover installation

Step 3. (Optional) Lock the front top cover with a screw driver (direction **1**).



- 1** Locking direction
- 2** Unlocking direction

Figure 163. Front top cover locking/unlocking direction

## After you finish

Complete the parts replacement. See [“Complete the parts replacement” on page 233](#).

### Demo video

[Watch the procedure on YouTube](#)

---

## Complete the parts replacement

Go through the checklist to complete parts replacement

To complete the parts replacement, do the following:

1. Ensure that all components have been reassembled correctly and that no tools or loose screws are left inside your server.
2. Properly route and secure the cables in the server. Refer to the cable connecting and routing information for each component.
3. Reinstall the front air baffle and the rear air baffle. See [“Install the front air baffle” on page 87](#) and [“Install the rear air baffle” on page 94](#).
4. Reinstall the rear top cover and the front top cover. See [“Install the rear top cover” on page 228](#) and [“Install the front top cover” on page 230](#).
5. If applicable, reinstall the security bezel. See [“Install the security bezel” on page 205](#).
6. If the server was installed in a rack, reinstall the server into the rack. See [“Install the server to rails” on page 69](#).
7. Reconnect the power cords and any cables that you removed.
8. Power on the server and any peripheral devices. See [“Power on the server” on page 64](#).
9. Update the server configuration.
  - Download and install the latest device drivers: <http://datacentersupport.lenovo.com>.
  - Update the system firmware. See [“Update the firmware” on page 365](#).
  - Update the UEFI configuration. See <https://pubs.lenovo.com/uefi-overview/>.
  - Reconfigure the disk arrays if you have installed or removed a hot-swap drive or a RAID adapter. See <https://pubs.lenovo.com/lxpm-overview/> for the LXPM documentation compatible with your server.

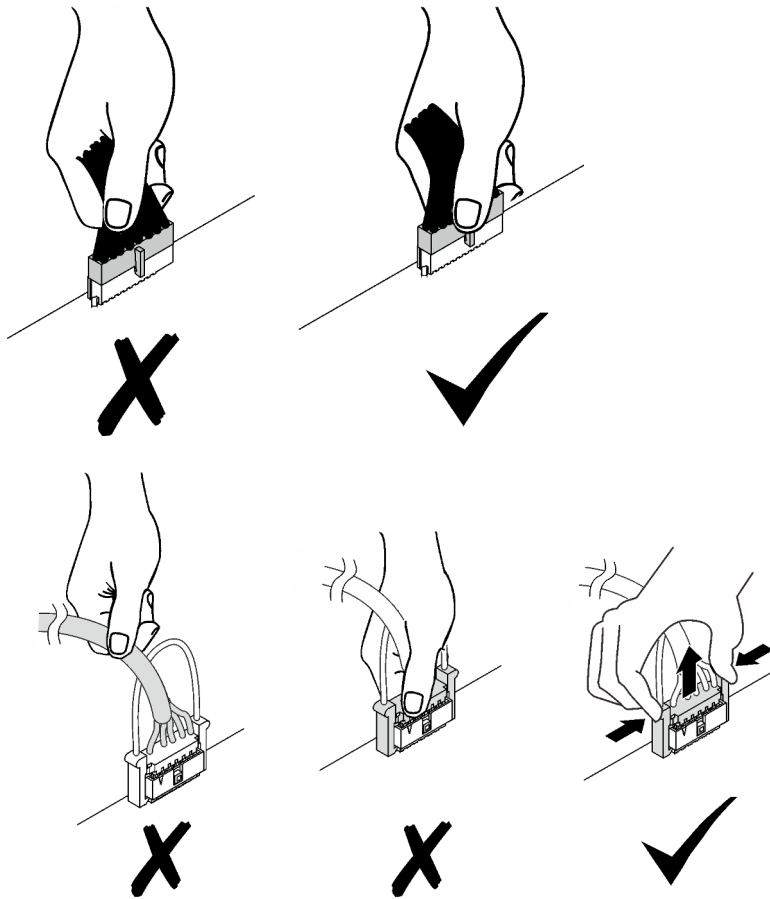


---

## Chapter 6. Internal cable routing

See this section to do cable routing for specific components.

**Note:** Disengage all latches, release tabs, or locks on cable connectors when you disconnect cables from the system board assembly. Failing to release them before removing the cables will damage the cable sockets on the system board assembly, which are fragile. Any damage to the cable sockets might require replacing the system board assembly.



---

### Identifying connectors

See this section to locate and identify the connectors on the electric boards.

### Drive backplane connectors

See this section to locate the connectors on the drive backplanes.

Two types of drive backplanes are supported in this server:

- [“8x 2.5-inch SAS/SATA backplane” on page 236](#)
- [“8x 2.5-inch SAS/SATA/NVMe backplane” on page 236](#)

### 8x 2.5-inch SAS/SATA backplane

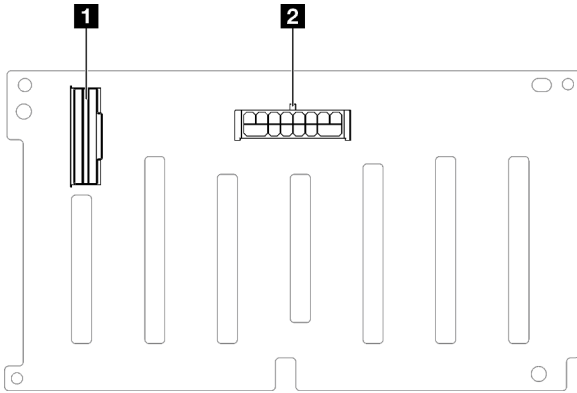


Figure 164. 8x 2.5-inch SAS/SATA backplane connectors

<b>1</b> SAS/SATA	<b>2</b> Power connector
-------------------	--------------------------

### 8x 2.5-inch SAS/SATA/NVMe backplane

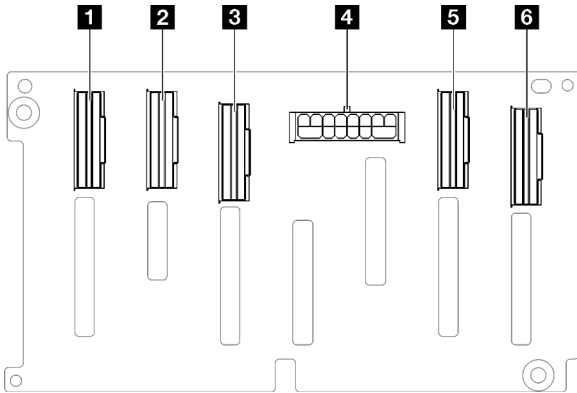


Figure 165. 8x 2.5-inch SAS/SATA/NVMe backplane connectors

<b>1</b> NVMe 6-7	<b>4</b> Power connector
<b>2</b> NVMe 4-5	<b>5</b> NVMe 2-3
<b>3</b> SAS/SATA	<b>6</b> NVMe 0-1

## PCIe riser card connectors

See this section to locate the connectors on the PCIe riser card.

The server supports the following PCIe riser cards.

- See [“Two-slot PCIe Gen5 riser card” on page 237](#) for the following PCIe risers:
  - x16/x16 PCIe G5 Riser 1/3 FHFL
  - 7mm/x16 PCIe G5 Riser 1 FHHL
- See [“Three-slot PCIe Gen4 riser card \(with power connector\)” on page 237](#) for the following PCIe risers:
  - x8/x16/x16 PCIe G4 Riser 1/3 FHFL
  - 7mm/x16 PCIe G4 Riser 1 FHHL

- x8/x16/x16 PCIe G4 Riser D HHHL
- See “[Three-slot PCIe Gen5 riser card \(with power connector\)](#)” on page 238 for the following PCIe riser:
  - x8/x16/x16 PCIe G5 Riser D HHHL
- See “[Three-slot PCIe Gen4 riser card \(without power connector\)](#)” on page 238 for the following PCIe risers:
  - x16/x8/x8 PCIe G4 Riser 2/A/B/C HHHL
  - x16/x8/Serial PCIe G4 Riser 2/C HHHL
- See “[Three-slot PCIe Gen5 riser card \(without power connector\)](#)” on page 239 for the following PCIe risers:
  - x16/x8/x8 PCIe G5 Riser 2/A/B/C HHHL
  - x16/x8/Serial PCIe G5 Riser 2/C HHHL

**Two-slot PCIe Gen5 riser card**

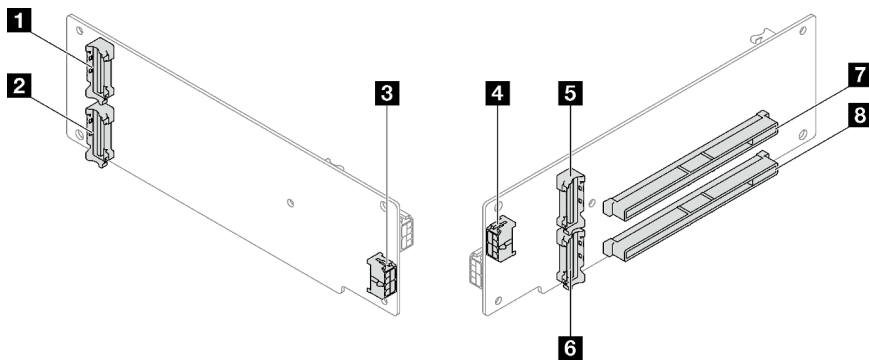


Figure 166. Two-slot PCIe Gen5 riser card connectors

<b>1</b> R3 connector	<b>5</b> R4 connector
<b>2</b> R1 connector	<b>6</b> R2 connector
<b>3</b> Riser power connector	<b>7</b> PCIe x16 (Gen5 x16) slot
<b>4</b> GPU power connector	<b>8</b> PCIe x16 (Gen5 x16) slot

**Three-slot PCIe Gen4 riser card (with power connector)**

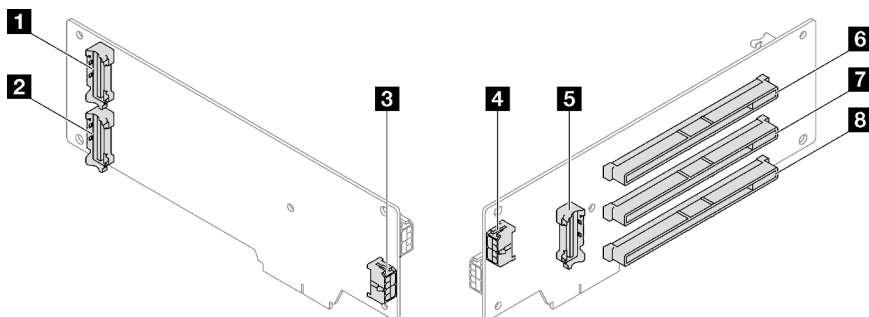


Figure 167. Three-slot PCIe Gen4 riser card connectors (with power connector)

<b>1</b> R3 connector	<b>5</b> R2 connector
<b>2</b> R1 connector	<b>6</b> PCIe x16 (Gen4 x8) slot

<b>3</b> Riser power connector	<b>7</b> PCIe x16 (Gen4 x16) slot
<b>4</b> GPU power connector	<b>8</b> PCIe x16 (Gen4 x16) slot

### Three-slot PCIe Gen5 riser card (with power connector)

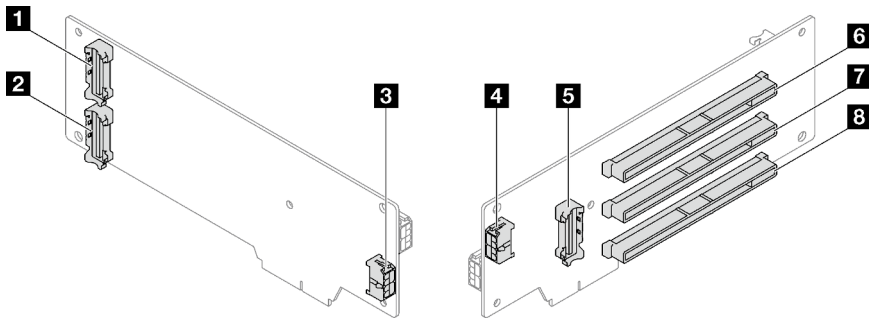


Figure 168. Three-slot PCIe Gen5 riser card connectors (with power connector)

<b>1</b> R3 connector	<b>5</b> R2 connector
<b>2</b> R1 connector	<b>6</b> PCIe x16 (Gen5 x8) slot
<b>3</b> Riser power connector	<b>7</b> PCIe x16 (Gen5 x16) slot
<b>4</b> GPU power connector	<b>8</b> PCIe x16 (Gen4 x16) slot

### Three-slot PCIe Gen4 riser card (without power connector)

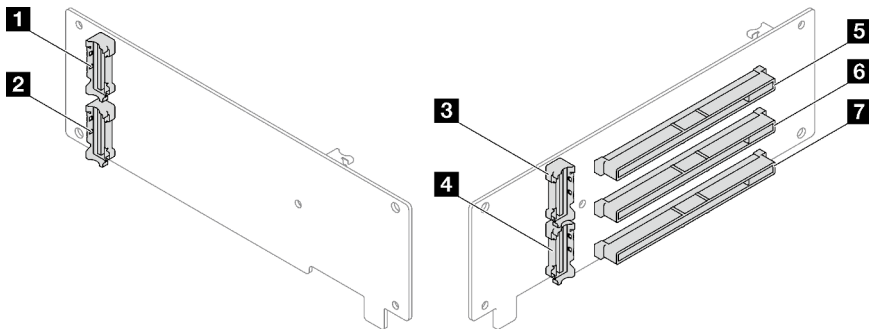


Figure 169. Three-slot PCIe Gen4 riser card connectors (without power connector)

<b>1</b> R3 connector	<b>5</b> PCIe x16 (Gen4 x16) slot
<b>2</b> R1 connector	<b>6</b> PCIe x16 (Gen4 x8) slot
<b>3</b> R4 connector	<b>7</b> PCIe x16 (Gen4 x8) slot
<b>4</b> R2 connector	



### Three-slot PCIe Gen5 riser card (without power connector)

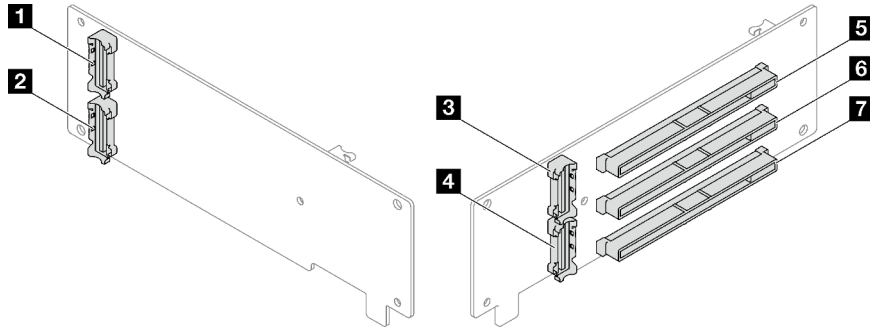


Figure 170. Three-slot PCIe Gen5 riser card connectors (without power connector)

<b>1</b> R3 connector	<b>5</b> PCIe x16 (Gen5 x16) slot
<b>2</b> R1 connector	<b>6</b> PCIe x16 (Gen5 x8) slot
<b>3</b> R4 connector	<b>7</b> PCIe x16 (Gen4 x8) slot
<b>4</b> R2 connector	

### Power distribution board connectors

See this section to locate the connectors on the power distribution board.

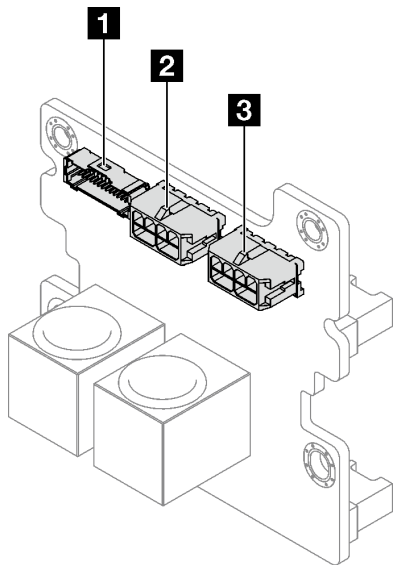


Figure 171. Power distribution board connectors

<b>1</b> Power distribution board sideband connector	<b>3</b> PCIe riser 3/D power connector
<b>2</b> PCIe riser 1 power connector	

### System-board-assembly connectors for cable routing

The following illustrations show the internal connectors on the system board assembly that are used for internal cable routing.

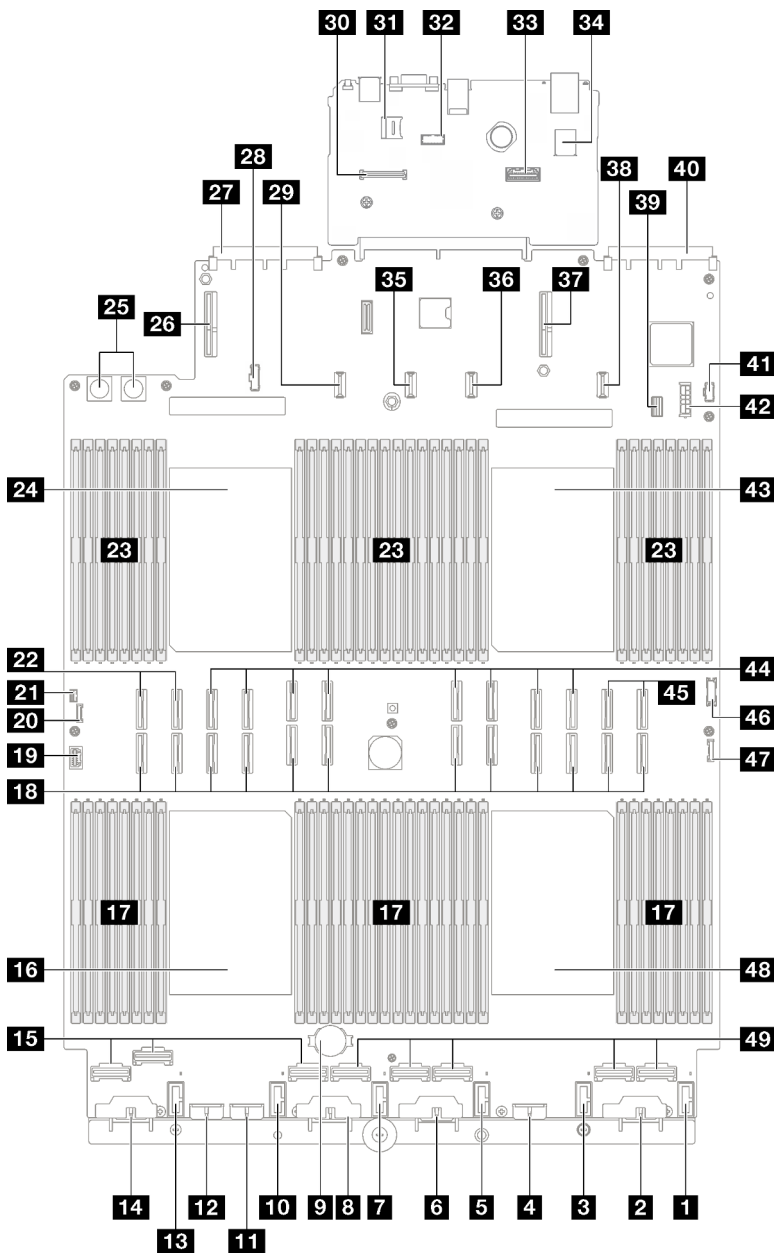


Figure 172. System-board-assembly connectors

Table 21. System-board-assembly connectors

<b>1</b> Fan 6 connector	<b>26</b> PCIe riser 3/D connector
<b>2</b> Backplane 6 power connector	<b>27</b> OCP slot 2 connector
<b>3</b> Fan 5 connector	<b>28</b> Power distribution board sideband connector
<b>4</b> Backplane 5 power connector	<b>29</b> PCIe riser C power connector
<b>5</b> Fan 4 connector	<b>30</b> Firmware and RoT security module connector
<b>6</b> Backplane 4 power connector	<b>31</b> MicroSD socket
<b>7</b> Fan 3 connector	<b>32</b> Serial port connector

Table 21. System-board-assembly connectors (continued)

<b>8</b> Backplane 3 power connector	<b>33</b> Second management Ethernet connector
<b>9</b> 3V battery (CR2032)	<b>34</b> Internal USB connector
<b>10</b> Fan 2 connector	<b>35</b> PCIe riser 2 power connector
<b>11</b> Backplane 7 power connector	<b>36</b> PCIe riser B power connector
<b>12</b> Backplane 2 power connector	<b>37</b> PCIe riser 1 connector
<b>13</b> Fan 1 connector	<b>38</b> PCIe riser A power connector
<b>14</b> Backplane 1 power connector	<b>39</b> 7mm drive/M.2 signal connector
<b>15</b> NVMe 1-3 connector (left to right)	<b>40</b> OCP slot 1 connector
<b>16</b> Processor 3	<b>41</b> M.2 power connector
<b>17</b> Memory module slot 33-64 (left to right)	<b>42</b> 7mm drive power connector
<b>18</b> P 1-12 connector (left to right)	<b>43</b> Processor 1
<b>19</b> VGA connector	<b>44</b> P 13-20 connector (left to right)
<b>20</b> External diagnostic handset connector	<b>45</b> NVMe 11-12 connector (left to right)
<b>21</b> Intrusion switch connector	<b>46</b> Front USB connector
<b>22</b> NVMe 9-10 connector (left to right)	<b>47</b> Front I/O connector
<b>23</b> Memory module slot 1-32 (right to left)	<b>48</b> Processor 4
<b>24</b> Processor 2	<b>49</b> NVMe 4-8 connector (left to right)
<b>25</b> Power distribution board connector	

## 2.5-inch drive backplane cable routing

Follow the instructions in this section to learn how to do cable routing for the 2.5-inch drive backplane.

Refer to the corresponding cable routing guide for related server model:

- [“2.5-inch drive backplane cable routing \(server model with three PCIe risers\)” on page 241](#)
- [“2.5-inch drive backplane cable routing \(server model with four PCIe risers\)” on page 296](#)

### 2.5-inch drive backplane cable routing (server model with three PCIe risers)

Follow the instructions in this section to learn how to do 2.5-inch drive backplane cable routing for the server model with three PCIe risers.

Before starting power cable routing for the 2.5-inch drive backplanes, remove the following components:

1. Remove the fans. See [“Remove a fan” on page 106](#).
2. Remove the fan cage. See [“Remove the fan cage” on page 107](#).

## Power cable routing

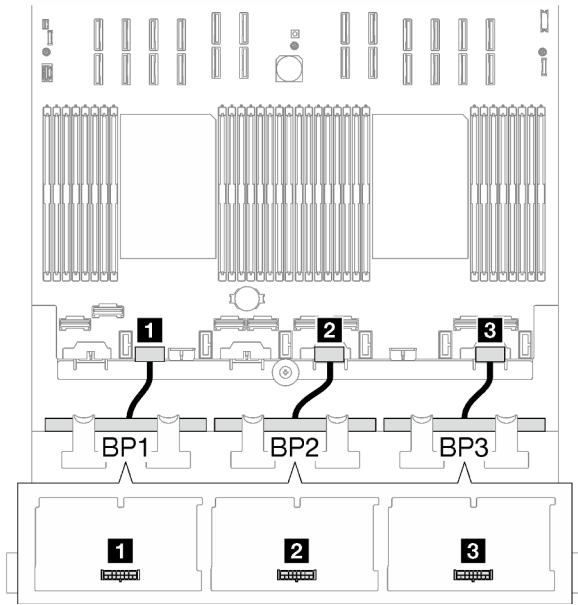


Figure 173. Power cable routing for the 2.5-inch drive backplanes

Cable	From	To
<b>1</b>	Backplane 1: Power connector	System board assembly: BP2 PWR connector
<b>2</b>	Backplane 2: Power connector	System board assembly: BP4 PWR connector
<b>3</b>	Backplane 3: Power connector	System board assembly: BP6 PWR connector

## Signal cable routing

Refer to the corresponding cable routing guide for related types of backplane:

- [“SAS/SATA backplane combinations” on page 242](#)
- [“AnyBay backplane combinations” on page 253](#)

## SAS/SATA backplane combinations

Follow the instructions in this section to learn how to do signal cable routing for the combinations with SAS/SATA backplanes.

This configuration contains the following combinations:

- [“1 x SAS/SATA backplane” on page 242](#)
- [“2 x SAS/SATA backplanes” on page 247](#)
- [“3 x SAS/SATA backplanes” on page 250](#)

**Note:** The illustrations in this section use the HL PCIe riser as an example for PCIe riser 1 and 3, the routing is the same for the FL PCIe riser.

### 1 x SAS/SATA backplane

Follow the instructions in this section to learn how to do cable routing for one SAS/SATA backplane.

### Notes:

- For more information about the power cable routing, see [“2.5-inch drive backplane cable routing \(server model with three PCIe risers\)” on page 241](#).
- When routing the cables, ensure that all cables are routed appropriately through the cable guides and cable clips.
- Make sure to choose the cables based on the generation of RAID adapters that you plan to install:
  - HL PCIe riser 1 and 3:
    - **Gen3 RAID/HBA adapters** (9350-16i, 4350-16i, 9350-8i, 5350-8i, 4350-8i): Mini-SAS x4\*2 to SlimSAS x8 cable
    - **Gen4 RAID/HBA adapters** (940-32i, 940-16i, 540-16i, 440-16i, 940-8i, 540-8i, 440-8i): SlimSAS x8 to SlimSAS x8 cable
  - FL PCIe riser 1 and 3:
    - **Gen4 RAID/HBA adapters** (940-32i, 940-16i, 540-16i, 440-16i, 940-8i, 540-8i, 440-8i): SlimSAS x8 to SlimSAS x8 cable
  - HL PCIe riser 2:
    - **Gen3 RAID/HBA adapters** (9350-16i, 4350-16i, 9350-8i, 5350-8i, 4350-8i): Mini-SAS x4\*2 to SlimSAS x8 cable
    - **Gen4 RAID/HBA adapters** (940-16i, 540-16i, 440-16i, 940-8i, 540-8i, 440-8i): SlimSAS x8 to SlimSAS x8 cable

This configuration contains the following storage controller combinations:

- [“8i/16i RAID/HBA adapter” on page 243](#)
- [“32i RAID adapter” on page 245](#)

### **8i/16i RAID/HBA adapter**

Based on the location of the RAID/HBA adapter, select the corresponding routing path for SAS/SATA cable from the following table.

Table 22. SAS/SATA cable routing

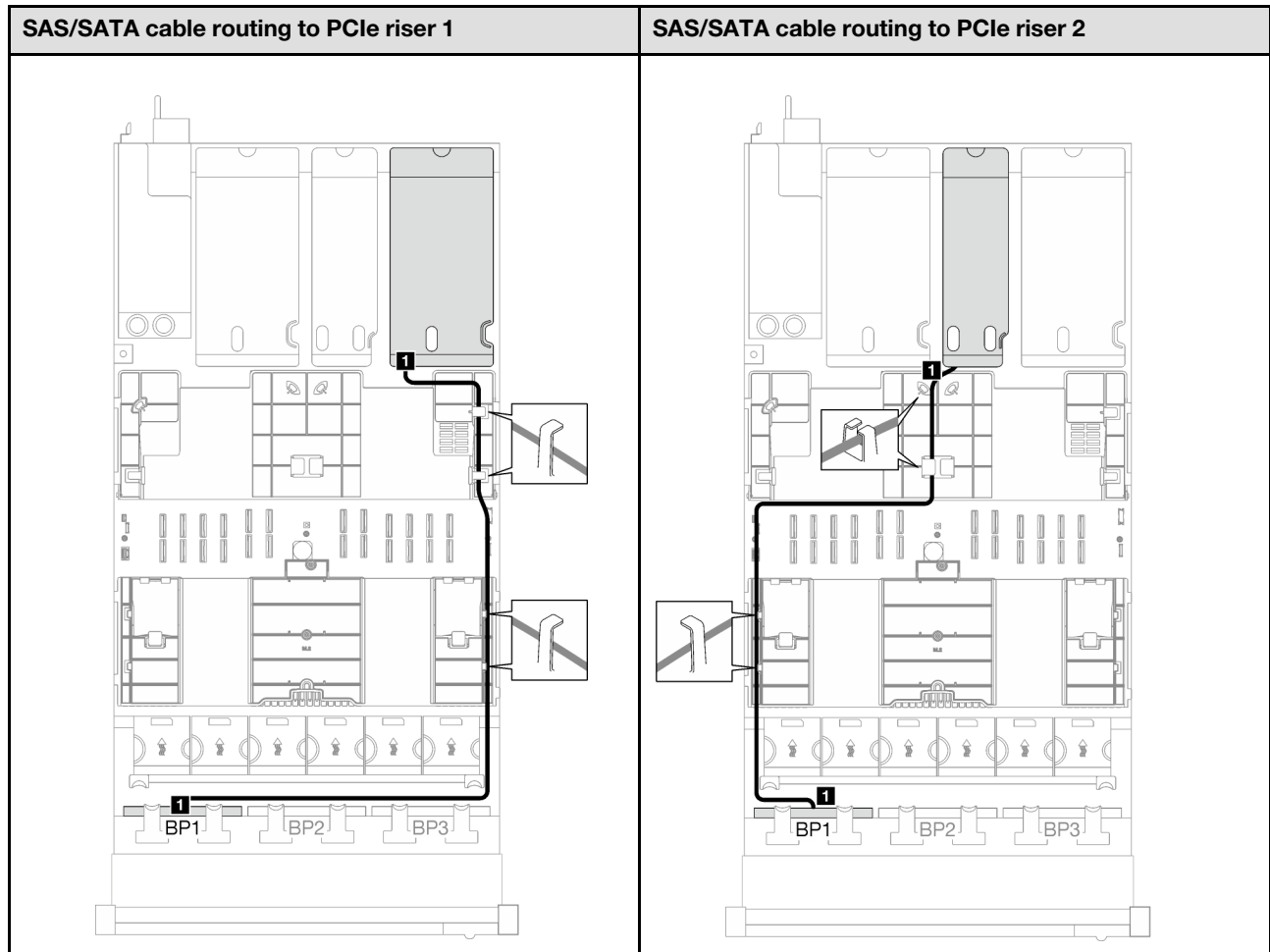
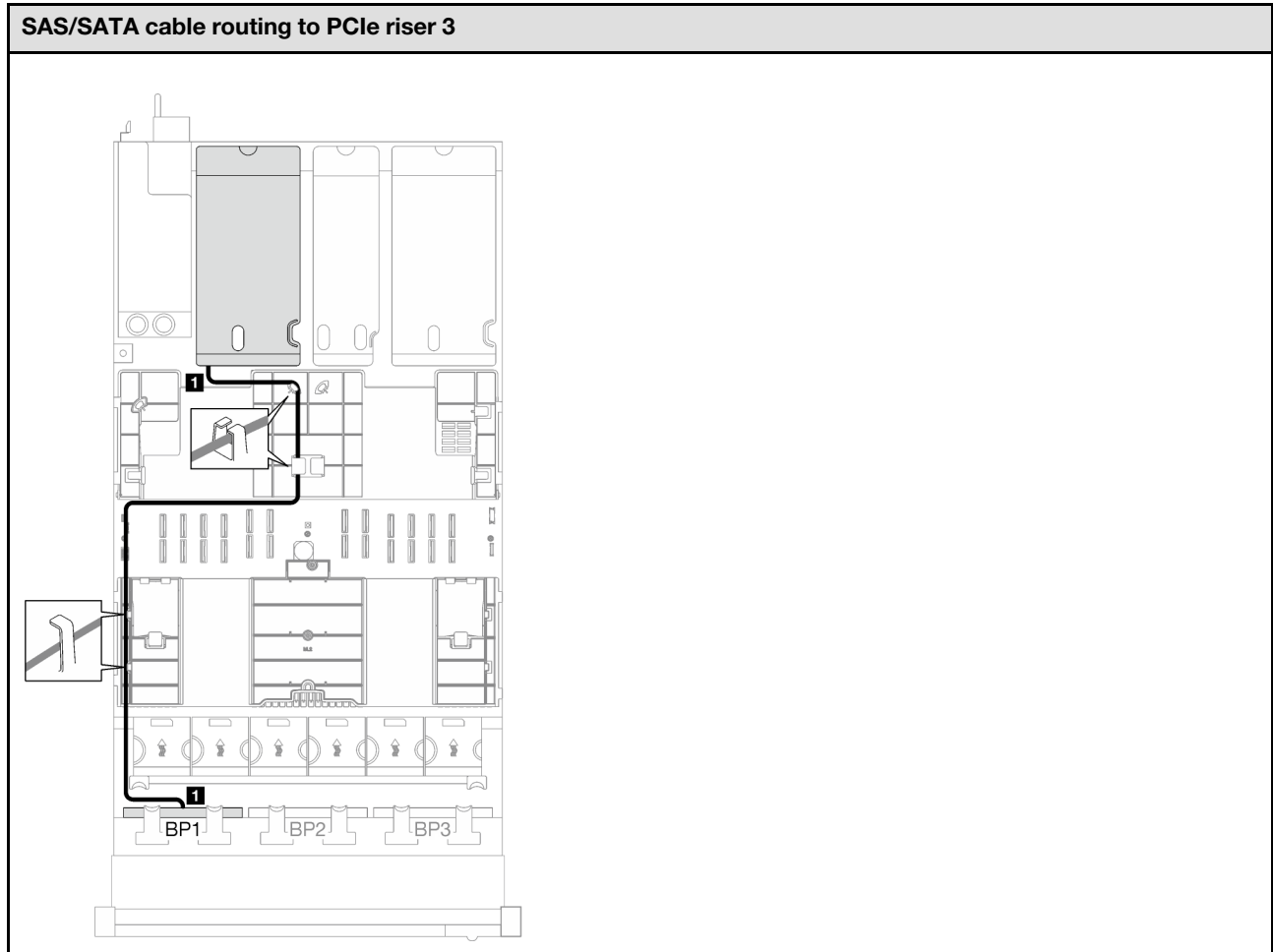


Table 22. SAS/SATA cable routing (continued)

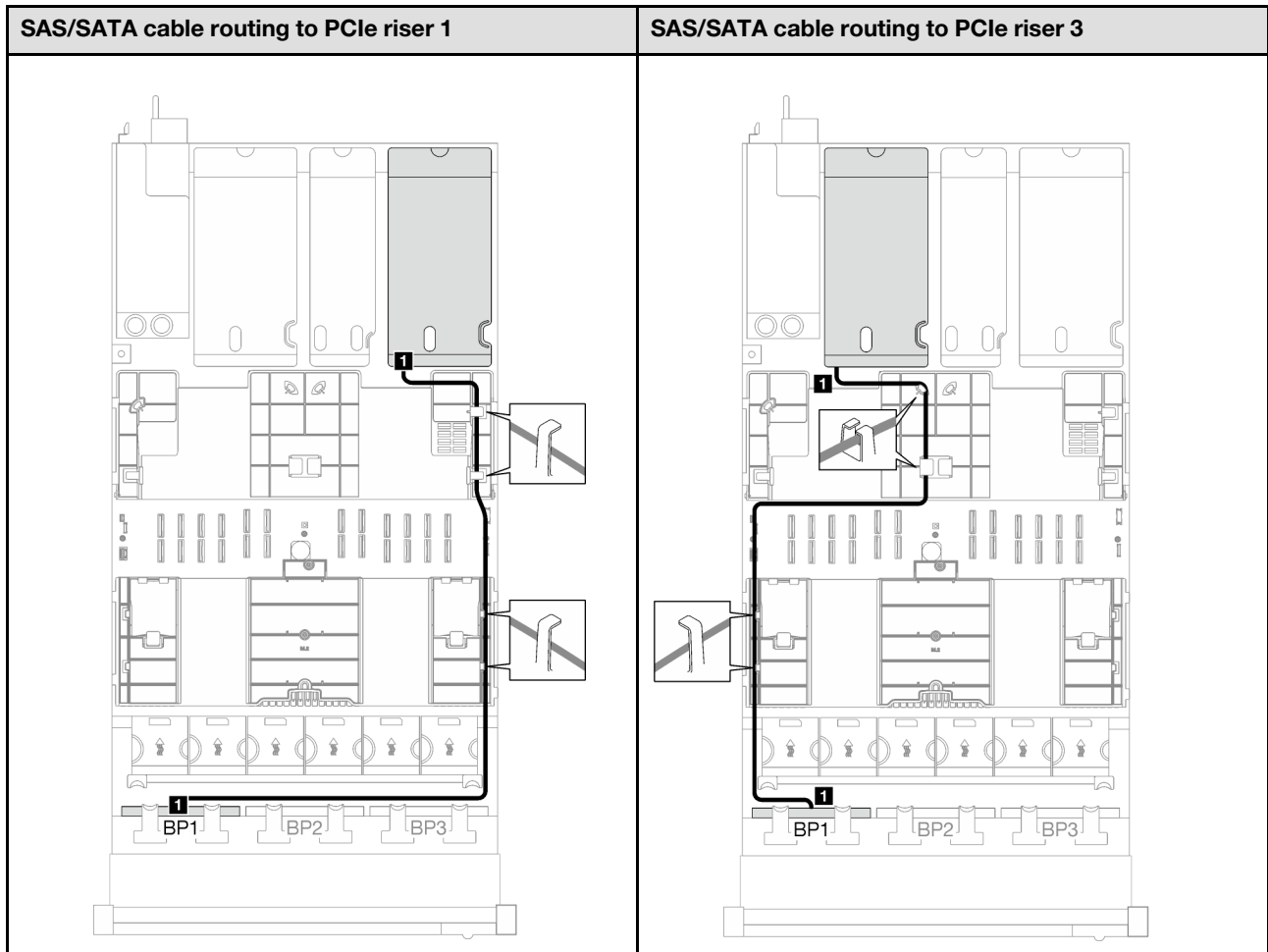


Cable	From	To
1	Backplane 1: SAS/SATA	8i/16i adapter: <ul style="list-style-type: none"> <li>• Gen4: C0</li> <li>• Gen3: C0, C1</li> </ul>

**32i RAID adapter**

Based on the location of the RAID adapter, select the corresponding routing path for SAS/SATA cable from the following table.

Table 23. SAS/SATA cable routing



Cable	From	To
<b>1</b>	Backplane 1: SAS/SATA	32i adapter: C0



## 2 x SAS/SATA backplanes

Follow the instructions in this section to learn how to do cable routing for two SAS/SATA backplanes.

### Notes:

- For more information about the power cable routing, see [“2.5-inch drive backplane cable routing \(server model with three PCIe risers\)” on page 241](#).
- When routing the cables, ensure that all cables are routed appropriately through the cable guides and cable clips.
- Make sure to choose the cables based on the generation of RAID adapters that you plan to install:
  - HL PCIe riser 1 and 3:
    - **Gen3 RAID/HBA adapters** (9350-16i, 4350-16i, 9350-8i, 5350-8i, 4350-8i): Mini-SAS x4\*2 to SlimSAS x8 cable
    - **Gen4 RAID/HBA adapters** (940-32i, 940-16i, 540-16i, 440-16i, 940-8i, 540-8i, 440-8i): SlimSAS x8 to SlimSAS x8 cable
  - FL PCIe riser 1 and 3:
    - **Gen4 RAID/HBA adapters** (940-32i, 940-16i, 540-16i, 440-16i, 940-8i, 540-8i, 440-8i): SlimSAS x8 to SlimSAS x8 cable
  - HL PCIe riser 2:
    - **Gen3 RAID/HBA adapters** (9350-16i, 4350-16i, 9350-8i, 5350-8i, 4350-8i): Mini-SAS x4\*2 to SlimSAS x8 cable
    - **Gen4 RAID/HBA adapters** (940-16i, 540-16i, 440-16i, 940-8i, 540-8i, 440-8i): SlimSAS x8 to SlimSAS x8 cable

This configuration contains the following storage controller combinations:

- [“16i RAID/HBA adapter” on page 247](#)
- [“32i RAID adapter” on page 249](#)

### 16i RAID/HBA adapter

Based on the location of the RAID/HBA adapter, select the corresponding routing path for SAS/SATA cable from the following table.

Table 24. SAS/SATA cable routing

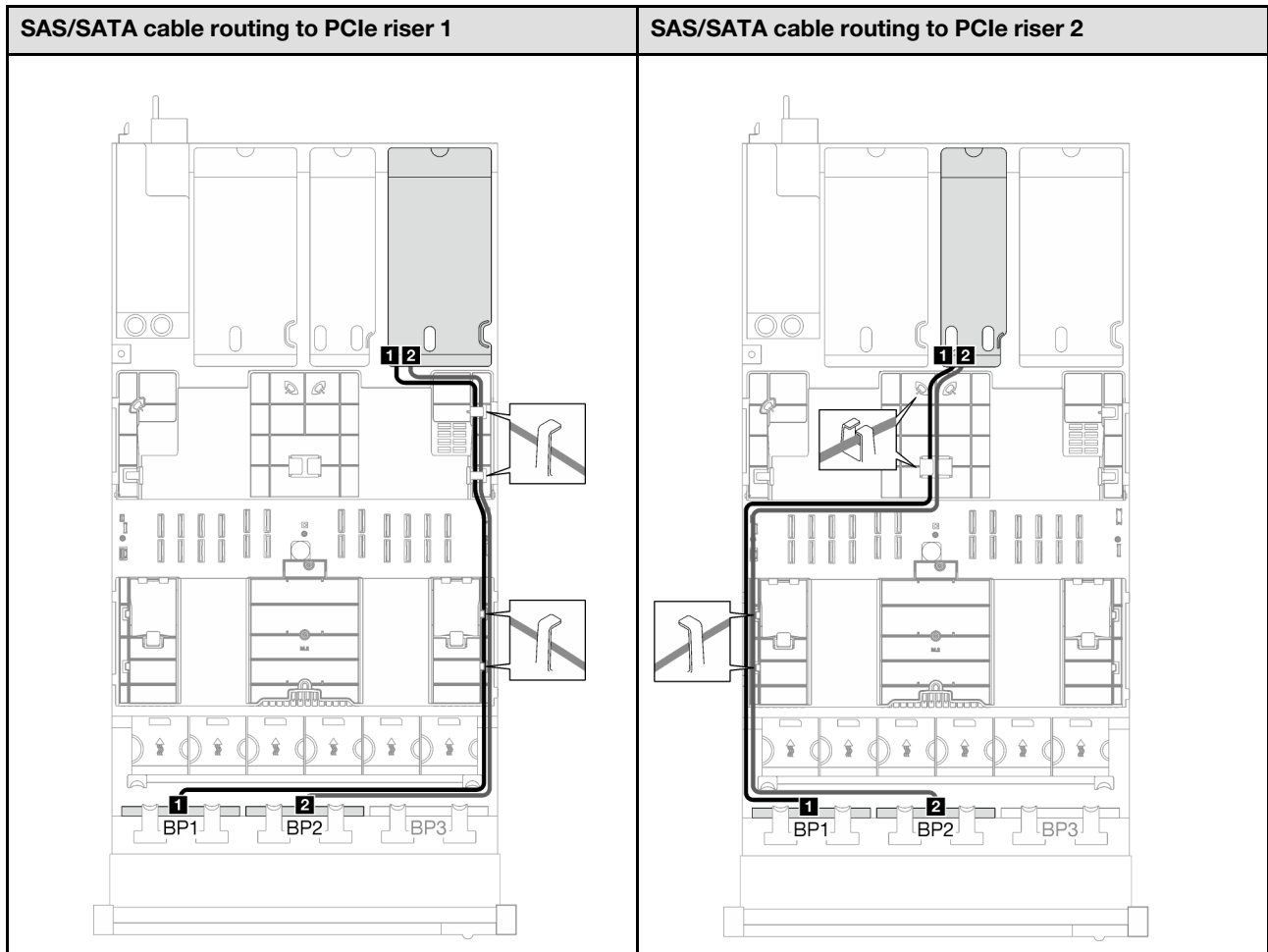
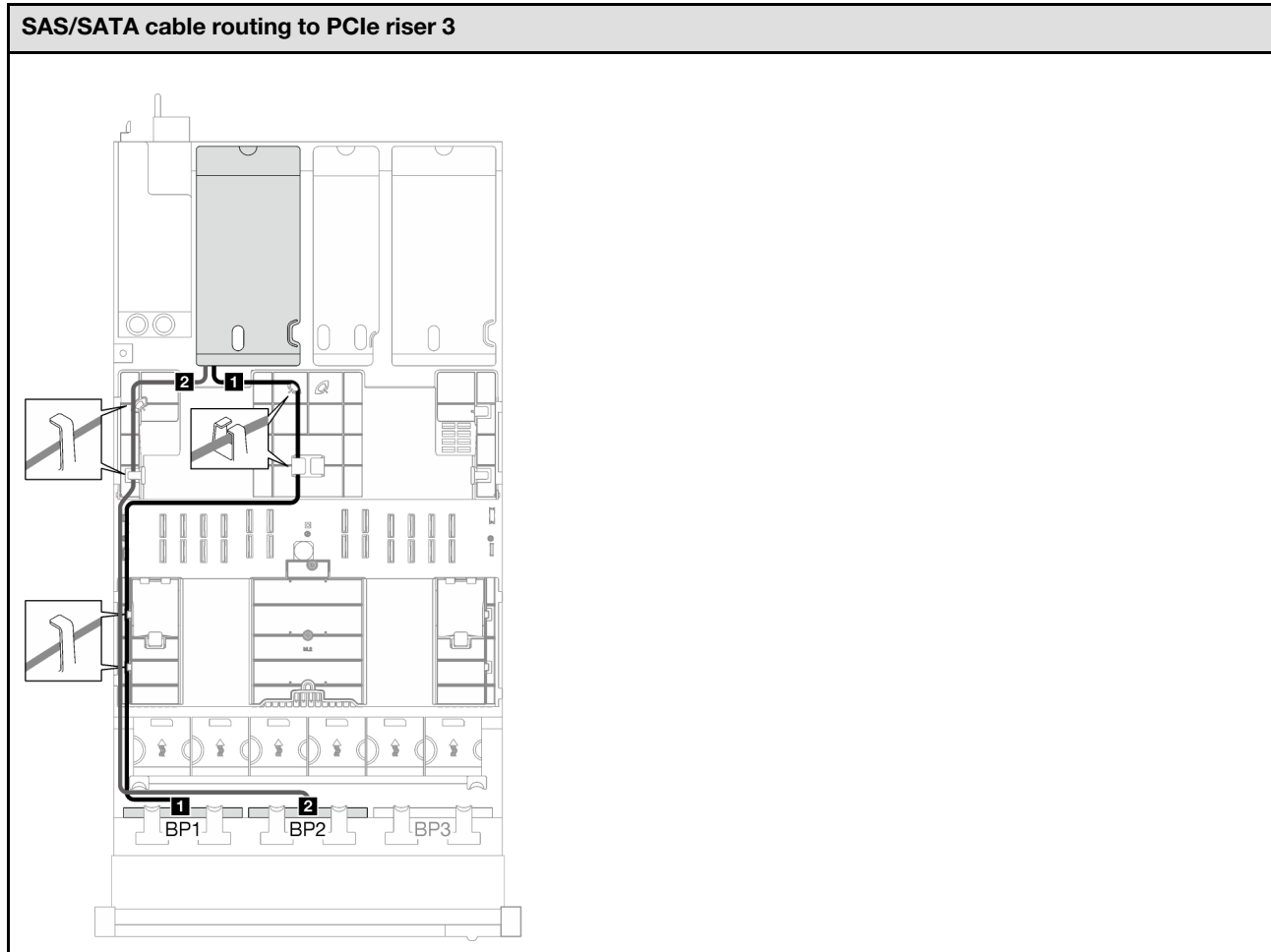


Table 24. SAS/SATA cable routing (continued)

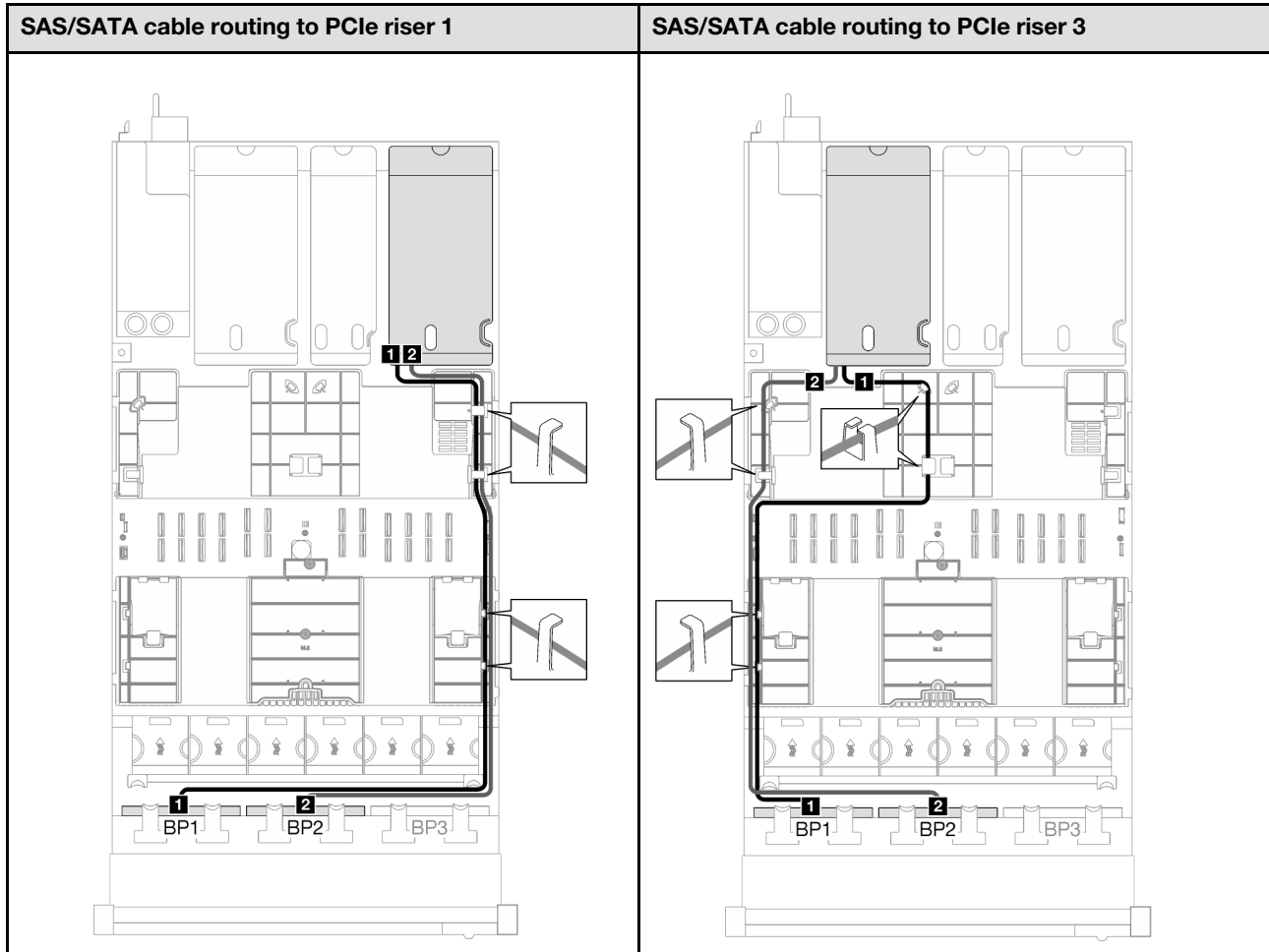


Cable	From	To
<b>1</b>	Backplane 1: SAS/SATA	16i adapter: <ul style="list-style-type: none"> <li>• Gen4: C0</li> <li>• Gen3: C0, C1</li> </ul>
<b>2</b>	Backplane 2: SAS/SATA	16i adapter: <ul style="list-style-type: none"> <li>• Gen4: C1</li> <li>• Gen3: C2, C3</li> </ul>

### 32i RAID adapter

Based on the location of the RAID adapter, select the corresponding routing path for SAS/SATA cable from the following table.

Table 25. SAS/SATA cable routing



Cable	From	To
<b>1</b>	Backplane 1: SAS/SATA	32i adapter: C0
<b>2</b>	Backplane 2: SAS/SATA	32i adapter: C1

### 3 x SAS/SATA backplanes

Follow the instructions in this section to learn how to do cable routing for three SAS/SATA backplanes.

#### Notes:

- For more information about the power cable routing, see [“2.5-inch drive backplane cable routing \(server model with three PCIe risers\)”](#) on page 241.
- When routing the cables, ensure that all cables are routed appropriately through the cable guides and cable clips.
- Make sure to choose the cables based on the generation of RAID adapters that you plan to install:
  - HL PCIe riser 1 and 3:
    - **Gen3 RAID/HBA adapters** (9350-16i, 4350-16i, 9350-8i, 5350-8i, 4350-8i): Mini-SAS x4\*2 to SlimSAS x8 cable
    - **Gen4 RAID/HBA adapters** (940-32i, 940-16i, 540-16i, 440-16i, 940-8i, 540-8i, 440-8i): SlimSAS x8 to SlimSAS x8 cable

- FL PCIe riser 1 and 3:
  - **Gen4 RAID/HBA adapters** (940-32i, 940-16i, 540-16i, 440-16i, 940-8i, 540-8i, 440-8i): SlimSAS x8 to SlimSAS x8 cable
- HL PCIe riser 2:
  - **Gen3 RAID/HBA adapters** (9350-16i, 4350-16i, 9350-8i, 5350-8i, 4350-8i): Mini-SAS x4\*2 to SlimSAS x8 cable
  - **Gen4 RAID/HBA adapters** (940-16i, 540-16i, 440-16i, 940-8i, 540-8i, 440-8i): SlimSAS x8 to SlimSAS x8 cable

This configuration contains the following storage controller combinations:

- [“8i + 16i RAID/HBA adapter” on page 251](#)
- [“32i RAID adapter” on page 252](#)

### 8i + 16i RAID/HBA adapter

Based on the location of the RAID/HBA adapter, select the corresponding routing path for SAS/SATA cable from the following table.

Table 26. SAS/SATA cable routing

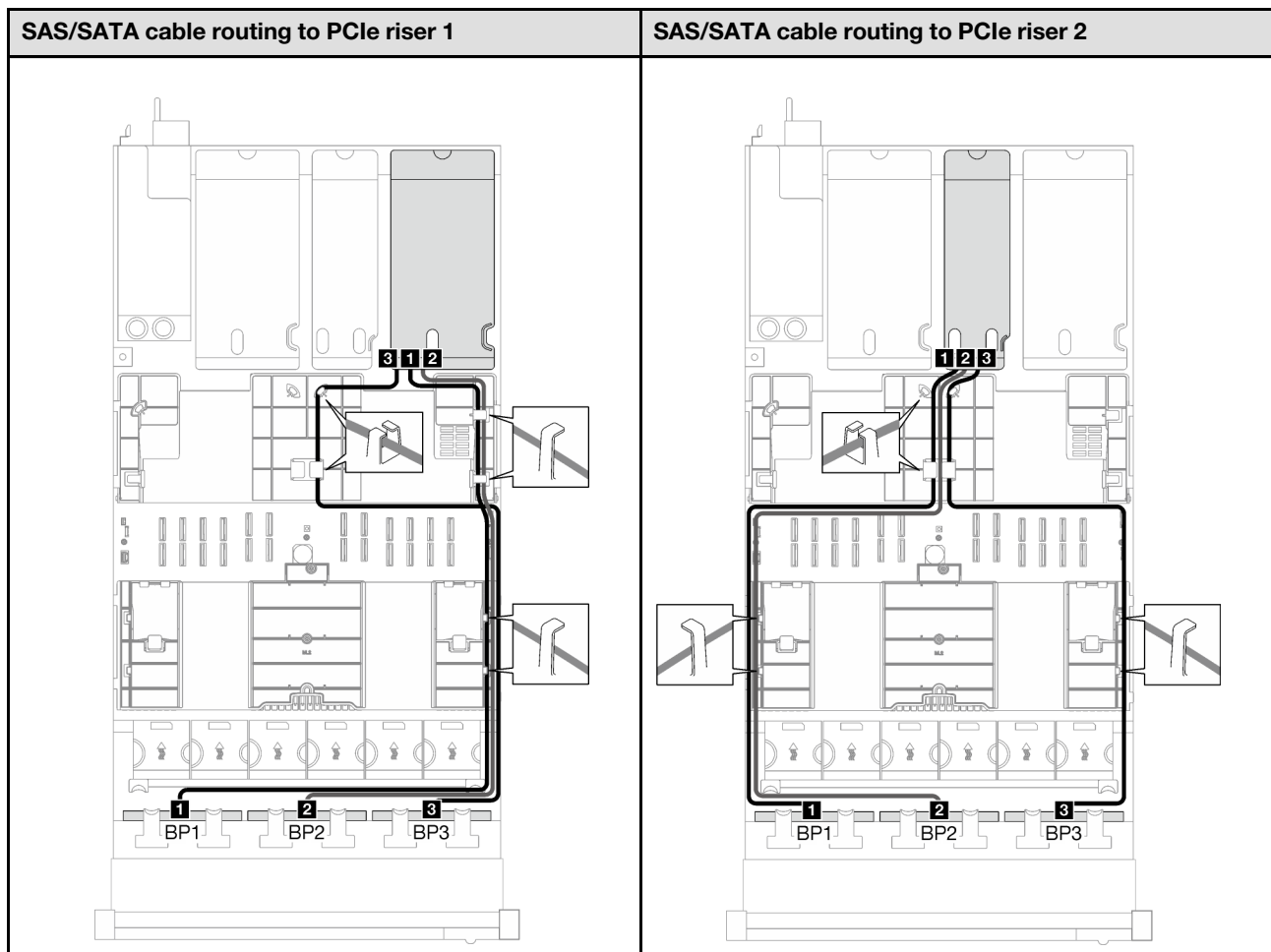
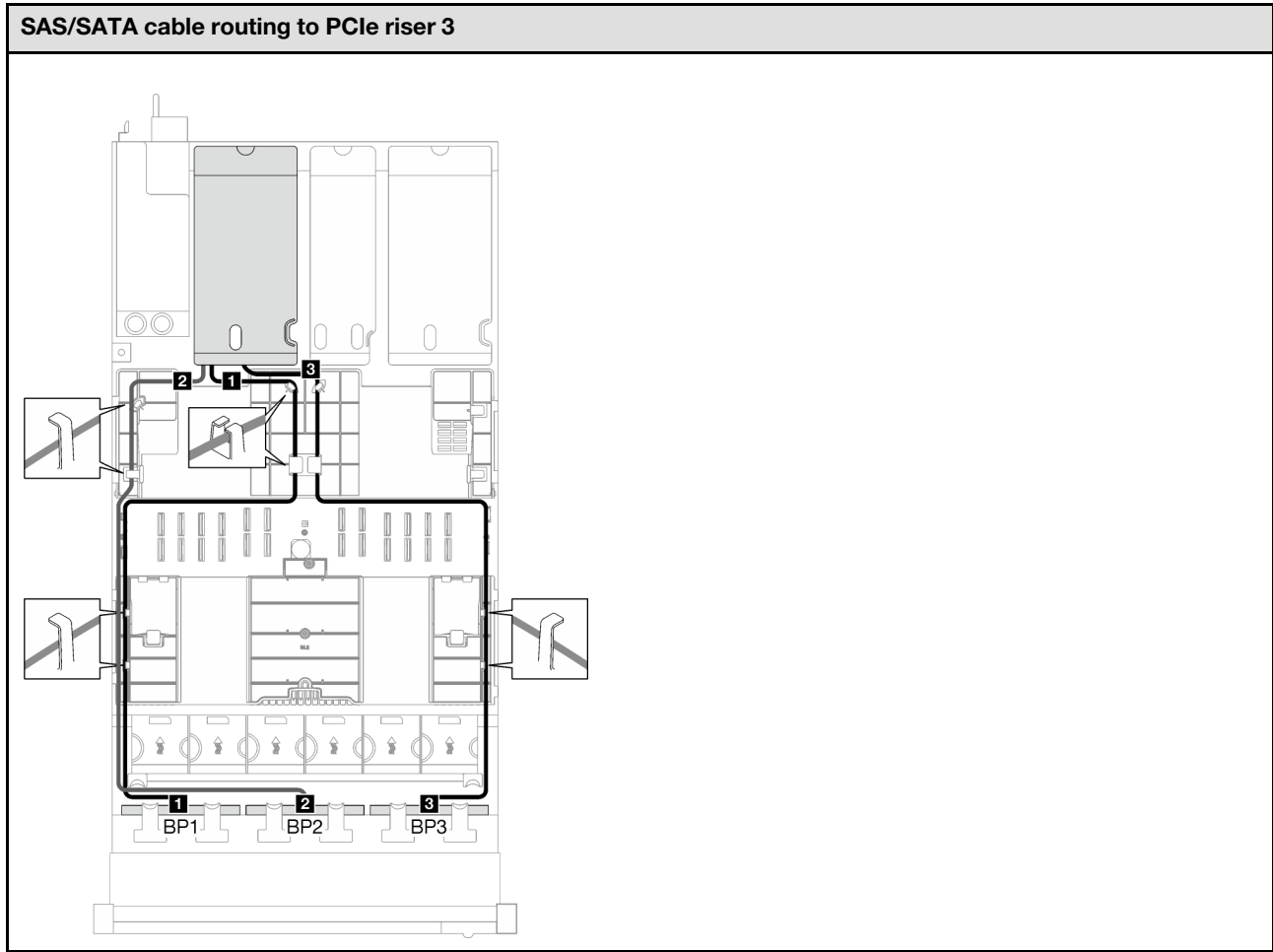


Table 26. SAS/SATA cable routing (continued)

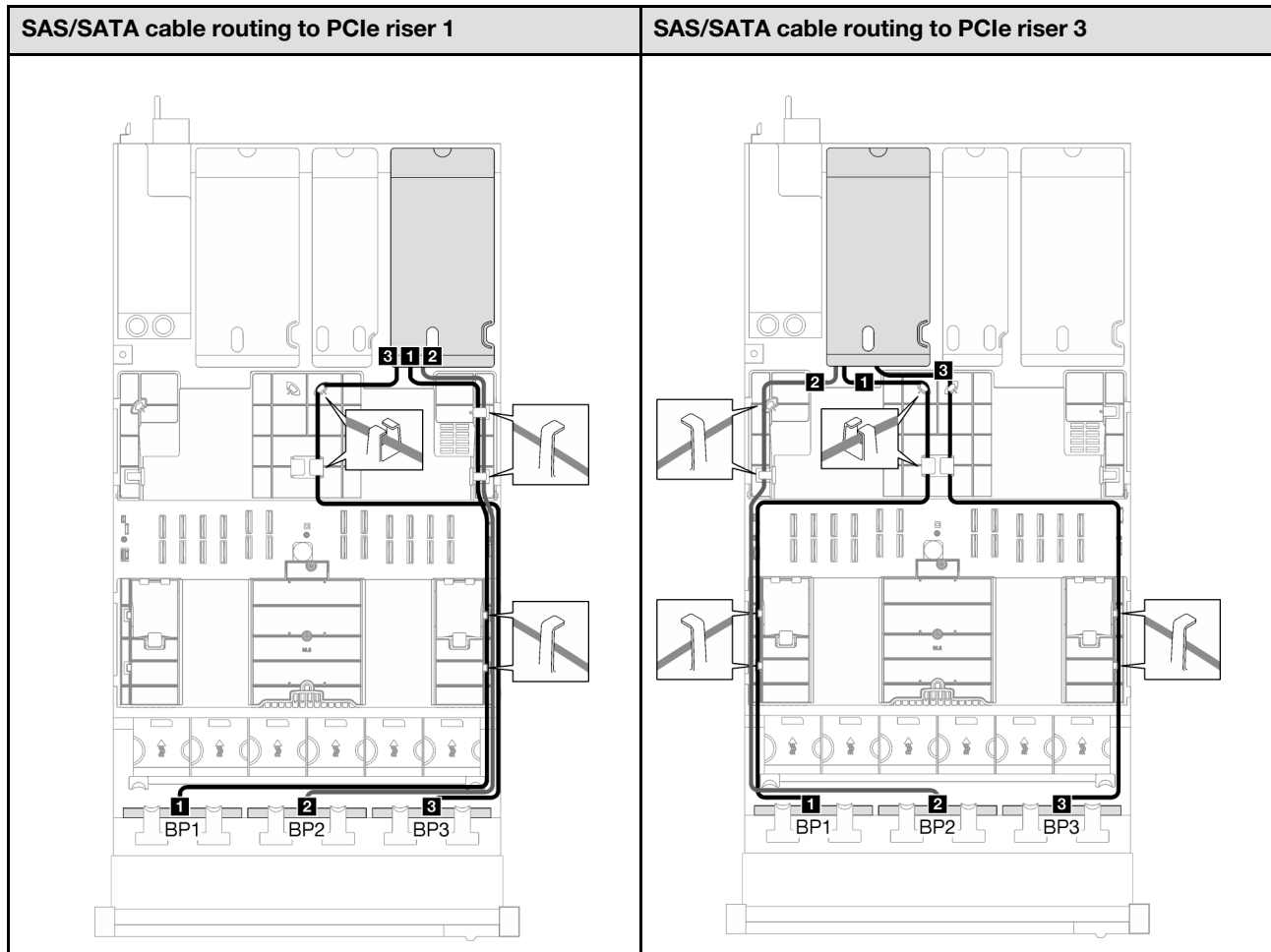


Cable	From	To
<b>1</b>	Backplane 1: SAS/SATA	16i adapter: <ul style="list-style-type: none"> <li>• Gen4: C0</li> <li>• Gen3: C0, C1</li> </ul>
<b>2</b>	Backplane 2: SAS/SATA	16i adapter: <ul style="list-style-type: none"> <li>• Gen4: C1</li> <li>• Gen3: C2, C3</li> </ul>
<b>3</b>	Backplane 3: SAS/SATA	8i adapter: <ul style="list-style-type: none"> <li>• Gen4: C0</li> <li>• Gen3: C0, C1</li> </ul>

**32i RAID adapter**

Based on the location of the RAID adapter, select the corresponding routing path for SAS/SATA cable from the following table.

Table 27. SAS/SATA cable routing



Cable	From	To
<b>1</b>	Backplane 1: SAS/SATA	32i adapter: C0
<b>2</b>	Backplane 2: SAS/SATA	32i adapter: C1
<b>3</b>	Backplane 3: SAS/SATA	32i adapter: C2

### AnyBay backplane combinations

Follow the instructions in this section to learn how to do signal cable routing for the combinations with AnyBay backplanes.

This configuration contains the following combinations:

- “1 x AnyBay backplane” on page 254
- “1 x AnyBay + 1 x SAS/SATA backplanes” on page 262
- “1 x AnyBay + 2 x SAS/SATA backplanes” on page 267
- “2 x AnyBay backplanes” on page 272
- “2 x AnyBay + 1 x SAS/SATA backplanes” on page 280
- “3 x AnyBay backplanes” on page 286

**Note:** The illustrations in this section use the HL PCIe riser as an example for PCIe riser 1 and 3, the routing is the same for the FL PCIe riser.

### 1 x AnyBay backplane

Follow the instructions in this section to learn how to do cable routing for one AnyBay backplane.

#### Notes:

- For more information about the power cable routing, see [“2.5-inch drive backplane cable routing \(server model with three PCIe risers\)” on page 241](#).
- When routing the cables, ensure that all cables are routed appropriately through the cable guides and cable clips.
- Make sure to choose the cables based on the generation of RAID adapters that you plan to install:
  - HL PCIe riser 1 and 3:
    - **Gen3 RAID/HBA adapters** (9350-16i, 4350-16i, 9350-8i, 5350-8i, 4350-8i): Mini-SAS x4\*2 to SlimSAS x8 cable
    - **Gen4 RAID/HBA adapters** (940-32i, 940-16i, 540-16i, 440-16i, 940-8i, 540-8i, 440-8i): SlimSAS x8 to SlimSAS x8 cable
  - FL PCIe riser 1 and 3:
    - **Gen4 RAID/HBA adapters** (940-32i, 940-16i, 540-16i, 440-16i, 940-8i, 540-8i, 440-8i): SlimSAS x8 to SlimSAS x8 cable
  - HL PCIe riser 2:
    - **Gen3 RAID/HBA adapters** (9350-16i, 4350-16i, 9350-8i, 5350-8i, 4350-8i): Mini-SAS x4\*2 to SlimSAS x8 cable
    - **Gen4 RAID/HBA adapters** (940-16i, 540-16i, 440-16i, 940-8i, 540-8i, 440-8i): SlimSAS x8 to SlimSAS x8 cable

This configuration contains the following storage controller combinations:

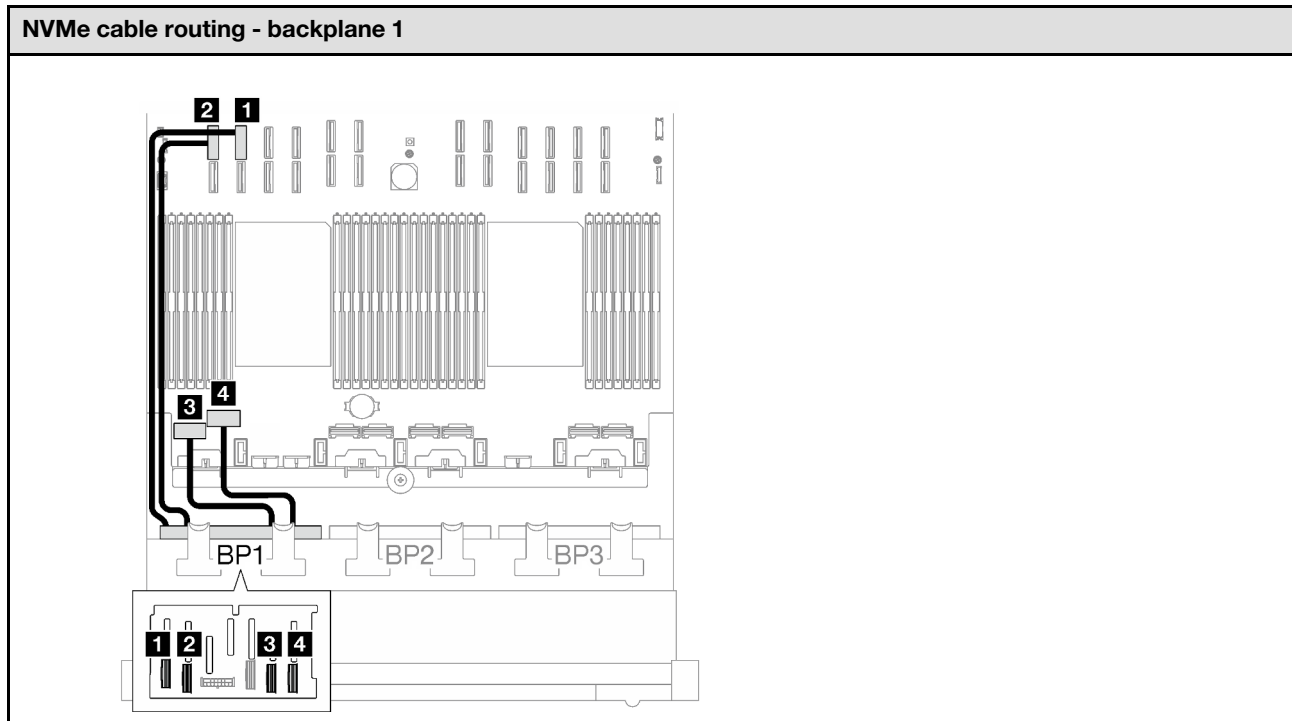
- [“No RAID/HBA adapter” on page 254](#)
- [“8i/16i RAID/HBA adapter” on page 255](#)
- [“8i/16i RAID adapter \(Tri-mode\)” on page 259](#)
- [“32i RAID adapter” on page 261](#)

### No RAID/HBA adapter

**Note:** The AnyBay backplane is used as a pure NVMe backplane when no RAID/HBA adapters are installed.



Table 28. NVMe cable routing



Cable	From	To	Cable length
<b>1</b>	Backplane 1: NVMe 0-1	System board assembly: NVMe 10 connector	420 mm
<b>2</b>	Backplane 1: NVMe 2-3	System board assembly: NVMe 9 connector	420 mm
<b>3</b>	Backplane 1: NVMe 4-5	System board assembly: NVMe 1 connector	150 mm
<b>4</b>	Backplane 1: NVMe 6-7	System board assembly: NVMe 2 connector	150 mm

### 8i/16i RAID/HBA adapter

Based on the location of the RAID/HBA adapter, select the corresponding routing path for SAS/SATA cable from the following table.

Table 29. SAS/SATA cable routing

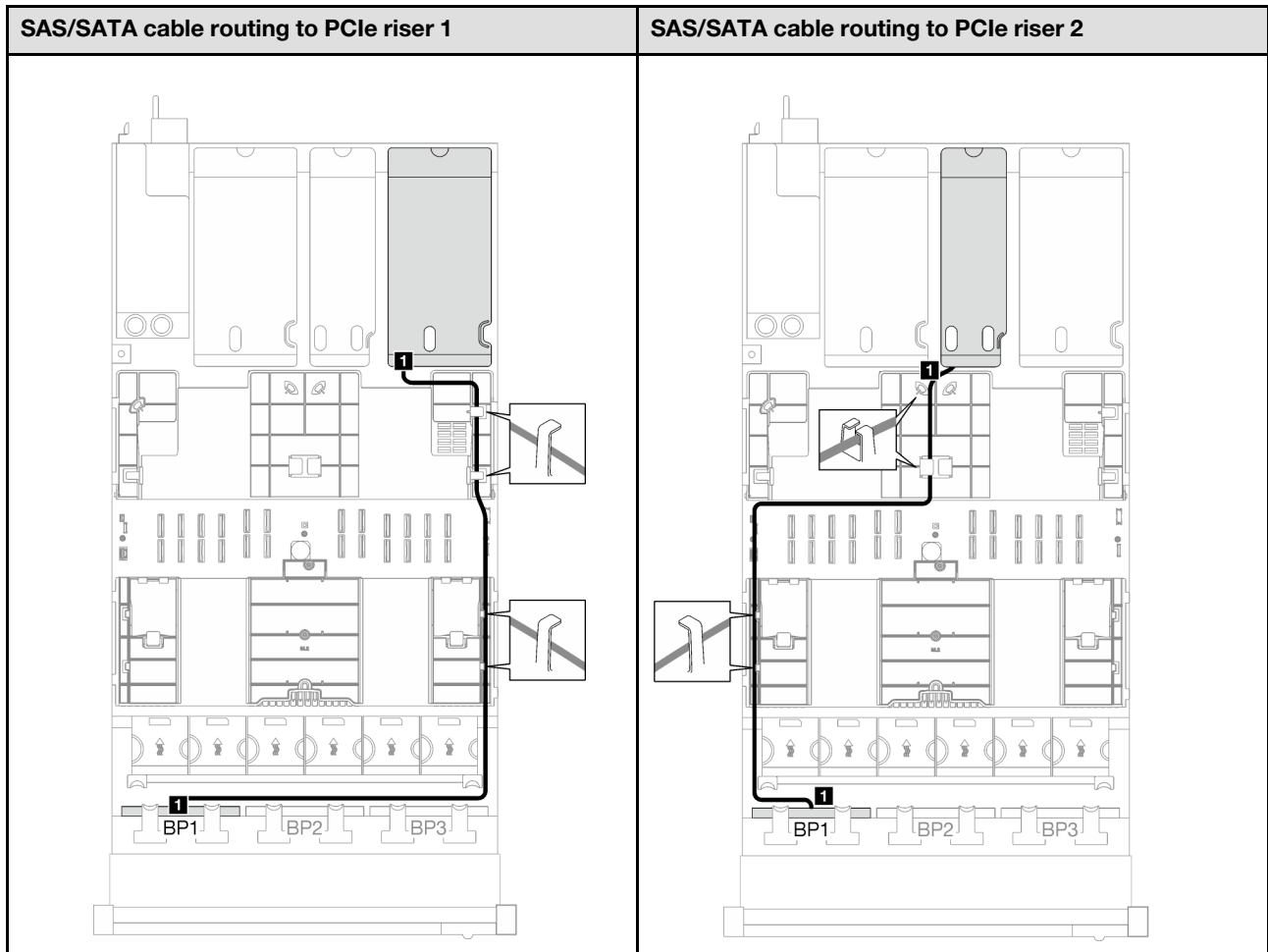
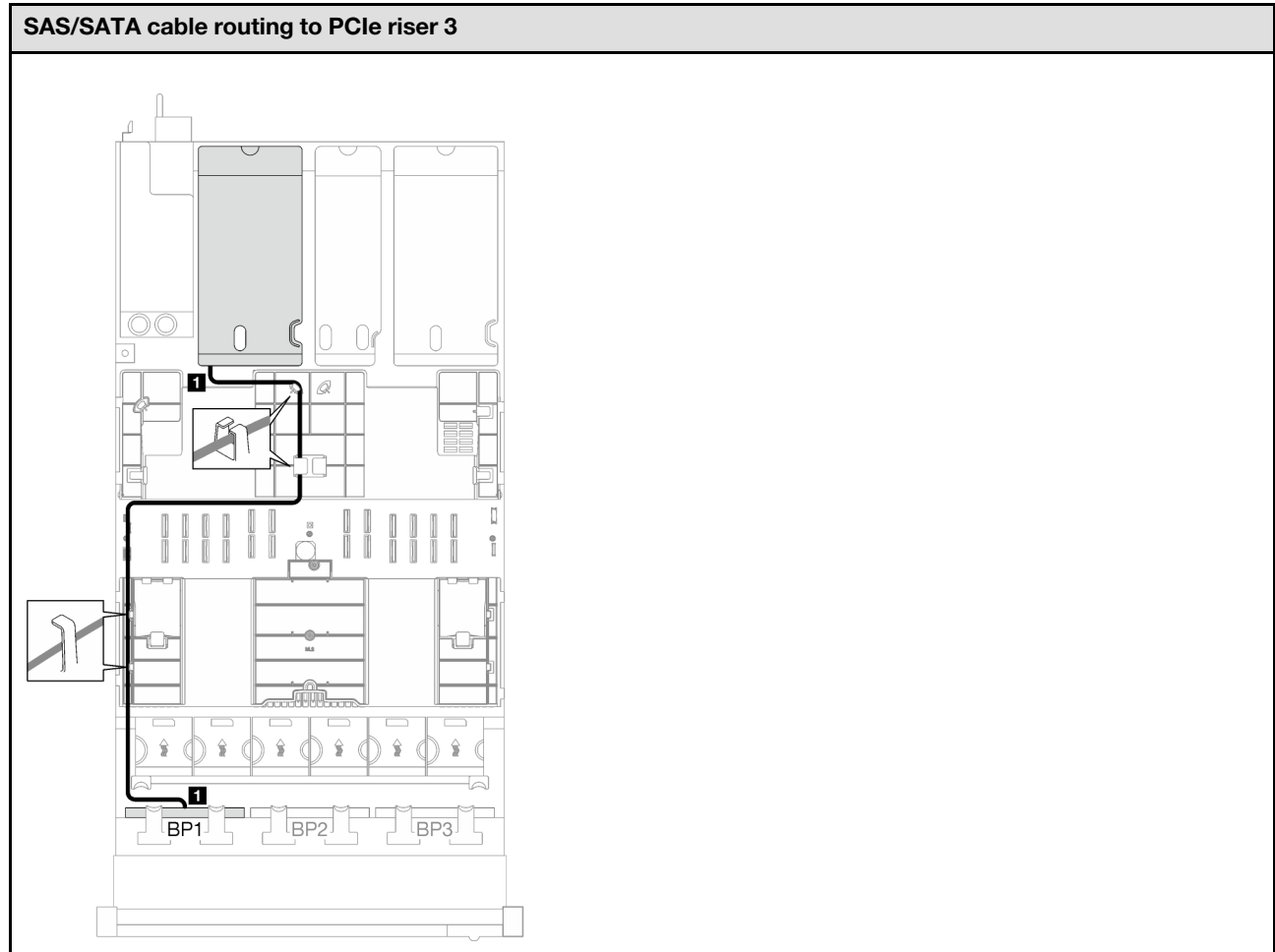
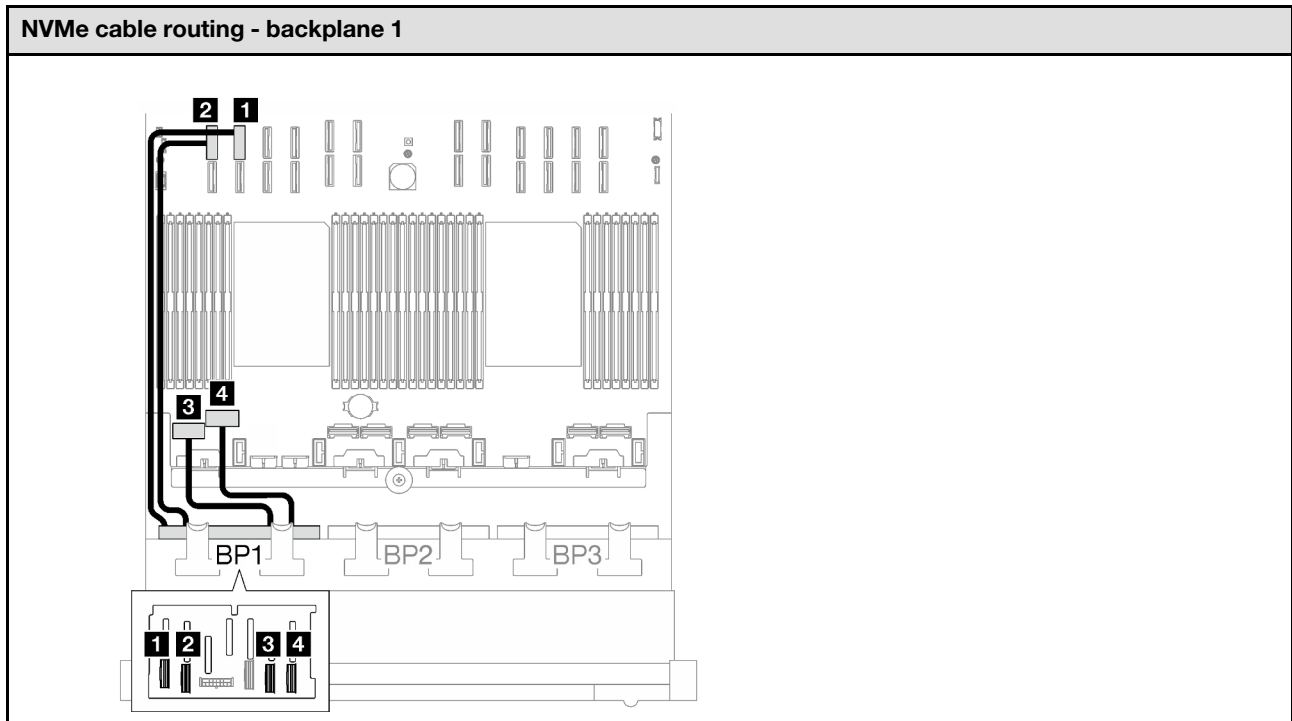


Table 29. SAS/SATA cable routing (continued)



Cable	From	To
1	Backplane 1: SAS/SATA	8i/16i adapter: <ul style="list-style-type: none"> <li>• Gen4: C0</li> <li>• Gen3: C0, C1</li> </ul>

Table 30. NVMe cable routing



Cable	From	To	Cable length
<b>1</b>	Backplane 1: NVMe 0-1	System board assembly: NVMe 10 connector	420 mm
<b>2</b>	Backplane 1: NVMe 2-3	System board assembly: NVMe 9 connector	420 mm
<b>3</b>	Backplane 1: NVMe 4-5	System board assembly: NVMe 1 connector	150 mm
<b>4</b>	Backplane 1: NVMe 6-7	System board assembly: NVMe 2 connector	150 mm

### 8i/16i RAID adapter (Tri-mode)

Based on the location of the RAID adapter, select the corresponding routing path for SAS/SATA cable from the following table.

Table 31. SAS/SATA cable routing

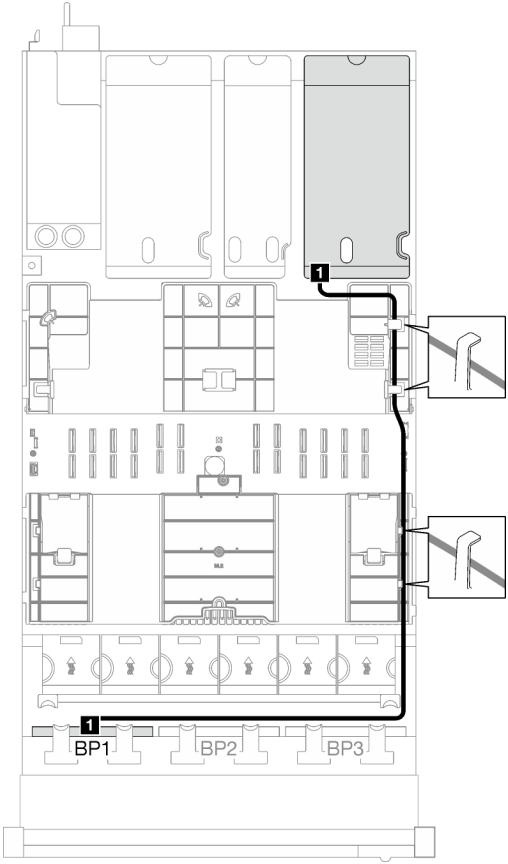
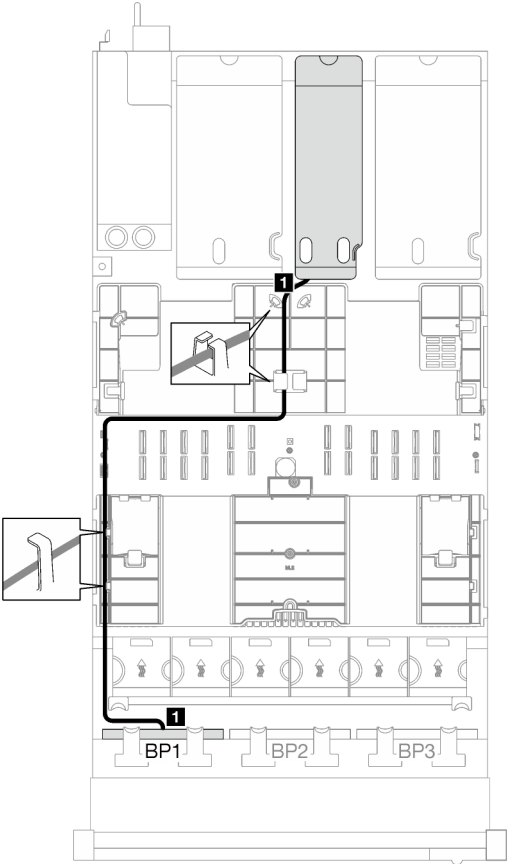
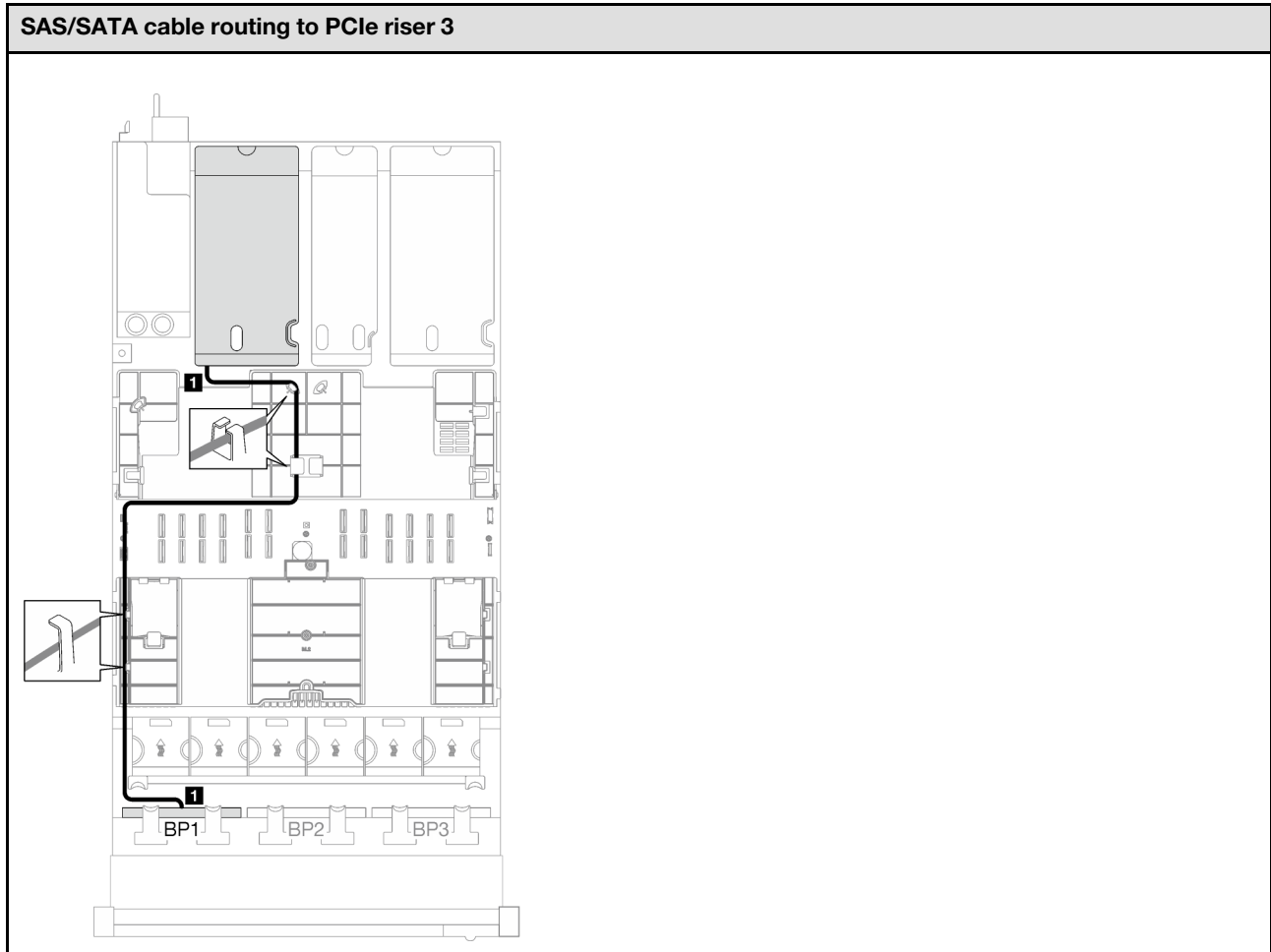
SAS/SATA cable routing to PCIe riser 1	SAS/SATA cable routing to PCIe riser 2
	

Table 31. SAS/SATA cable routing (continued)

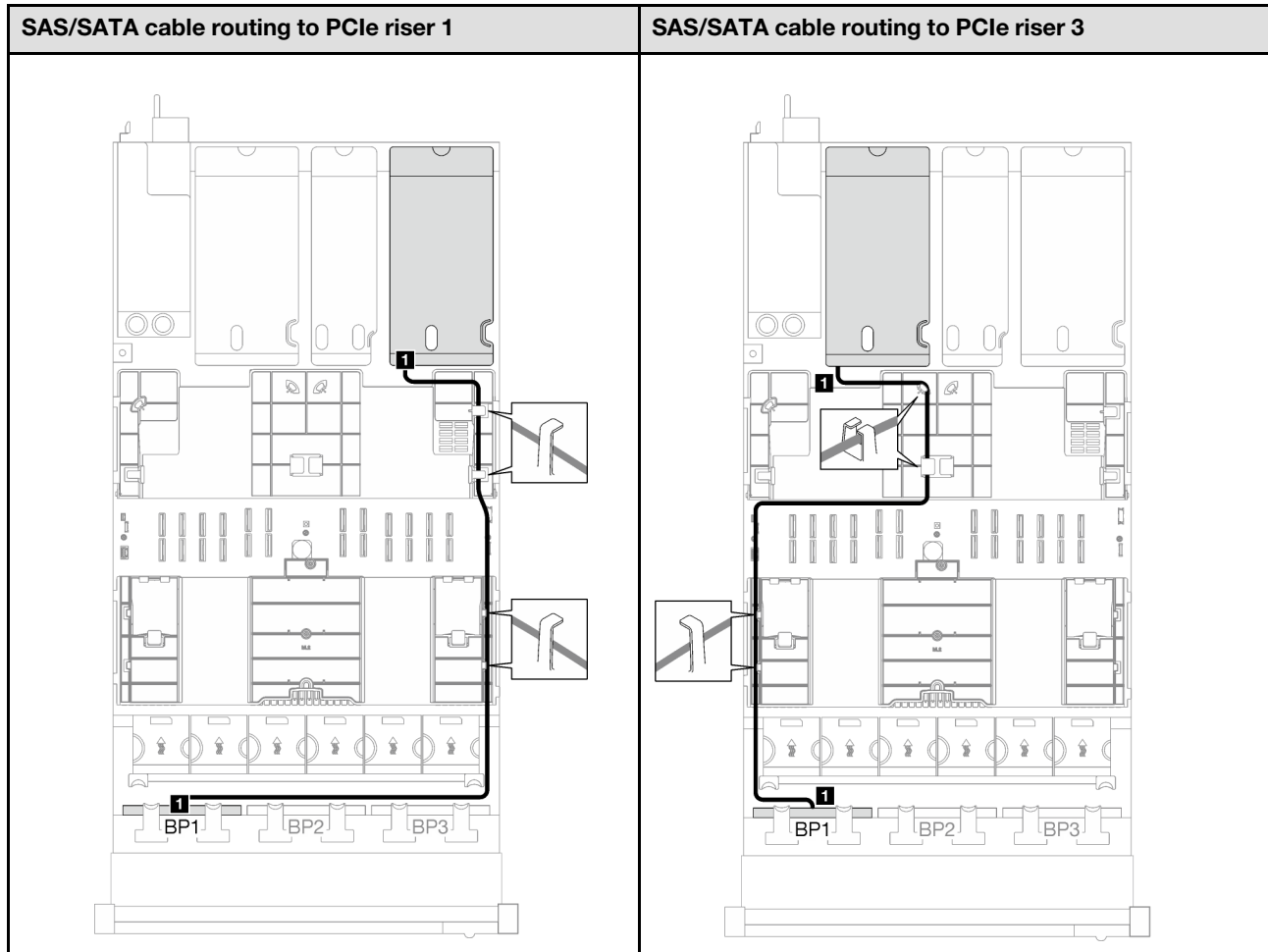


Cable	From	To
<b>1</b>	Backplane 1: SAS/SATA	8i/16i adapter: C0

### 32i RAID adapter

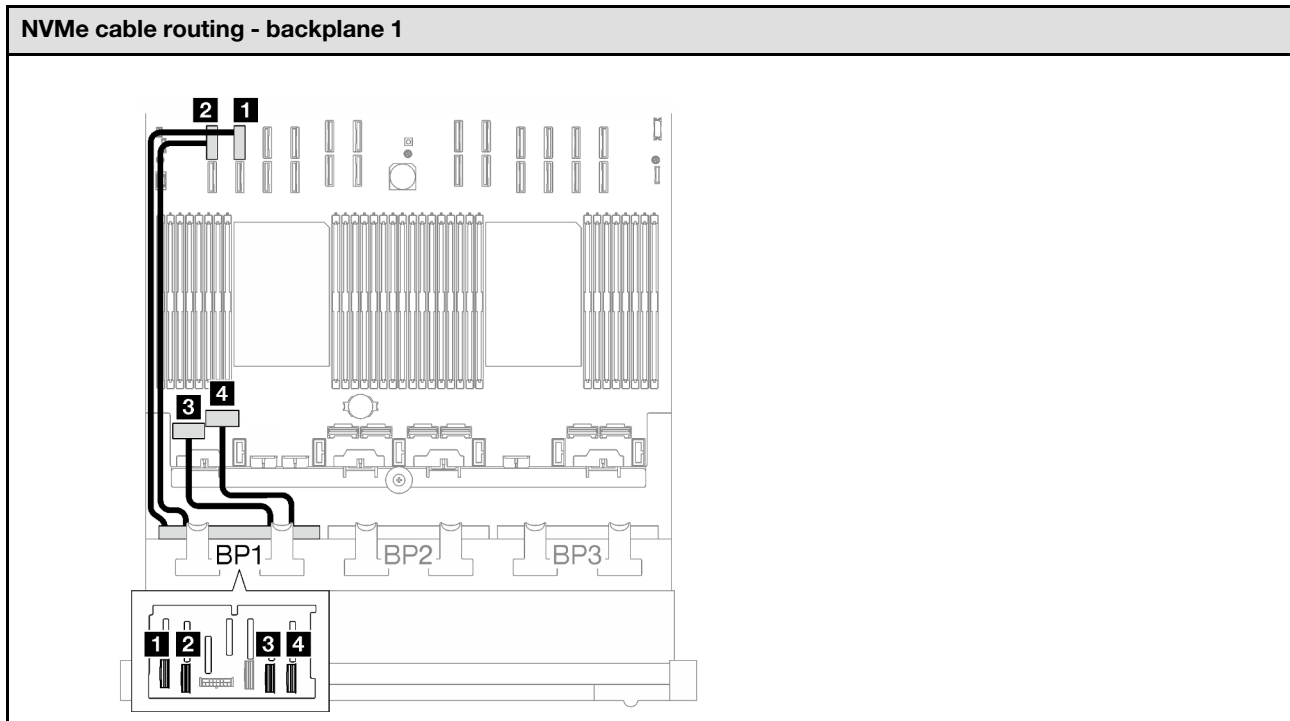
Based on the location of the RAID adapter, select the corresponding routing path for SAS/SATA cable from the following table.

Table 32. SAS/SATA cable routing



Cable	From	To
1	Backplane 1: SAS/SATA	32i adapter: C0

Table 33. NVMe cable routing



Cable	From	To	Cable length
<b>1</b>	Backplane 1: NVMe 0-1	System board assembly: NVMe 10 connector	420 mm
<b>2</b>	Backplane 1: NVMe 2-3	System board assembly: NVMe 9 connector	420 mm
<b>3</b>	Backplane 1: NVMe 4-5	System board assembly: NVMe 1 connector	150 mm
<b>4</b>	Backplane 1: NVMe 6-7	System board assembly: NVMe 2 connector	150 mm

### 1 x AnyBay + 1 x SAS/SATA backplanes

Follow the instructions in this section to learn how to do cable routing for one AnyBay backplane and one SAS/SATA backplane.

#### Notes:

- For more information about the power cable routing, see [“2.5-inch drive backplane cable routing \(server model with three PCIe risers\)”](#) on page 241.
- When routing the cables, ensure that all cables are routed appropriately through the cable guides and cable clips.
- Make sure to choose the cables based on the generation of RAID adapters that you plan to install:
  - HL PCIe riser 1 and 3:
    - **Gen3 RAID/HBA adapters** (9350-16i, 4350-16i, 9350-8i, 5350-8i, 4350-8i): Mini-SAS x4\*2 to SlimSAS x8 cable
    - **Gen4 RAID/HBA adapters** (940-32i, 940-16i, 540-16i, 440-16i, 940-8i, 540-8i, 440-8i): SlimSAS x8 to SlimSAS x8 cable



- FL PCIe riser 1 and 3:
  - **Gen4 RAID/HBA adapters** (940-32i, 940-16i, 540-16i, 440-16i, 940-8i, 540-8i, 440-8i): SlimSAS x8 to SlimSAS x8 cable
- HL PCIe riser 2:
  - **Gen3 RAID/HBA adapters** (9350-16i, 4350-16i, 9350-8i, 5350-8i, 4350-8i): Mini-SAS x4\*2 to SlimSAS x8 cable
  - **Gen4 RAID/HBA adapters** (940-16i, 540-16i, 440-16i, 940-8i, 540-8i, 440-8i): SlimSAS x8 to SlimSAS x8 cable

This configuration contains the following storage controller combinations:

- [“16i RAID/HBA adapter” on page 263](#)
- [“32i RAID adapter” on page 266](#)

### 16i RAID/HBA adapter

Based on the location of the RAID/HBA adapter, select the corresponding routing path for SAS/SATA cable from the following table.

Table 34. SAS/SATA cable routing

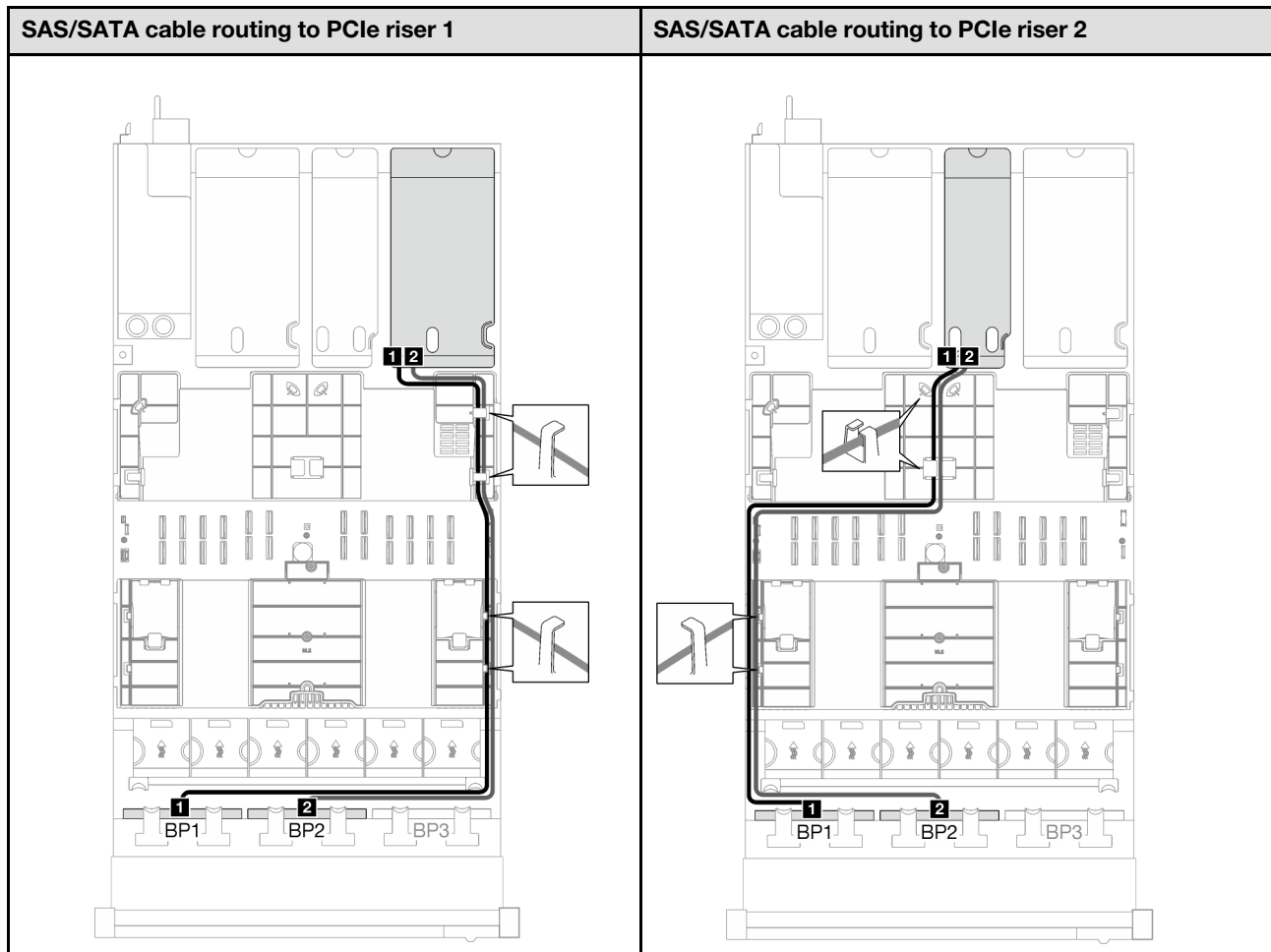
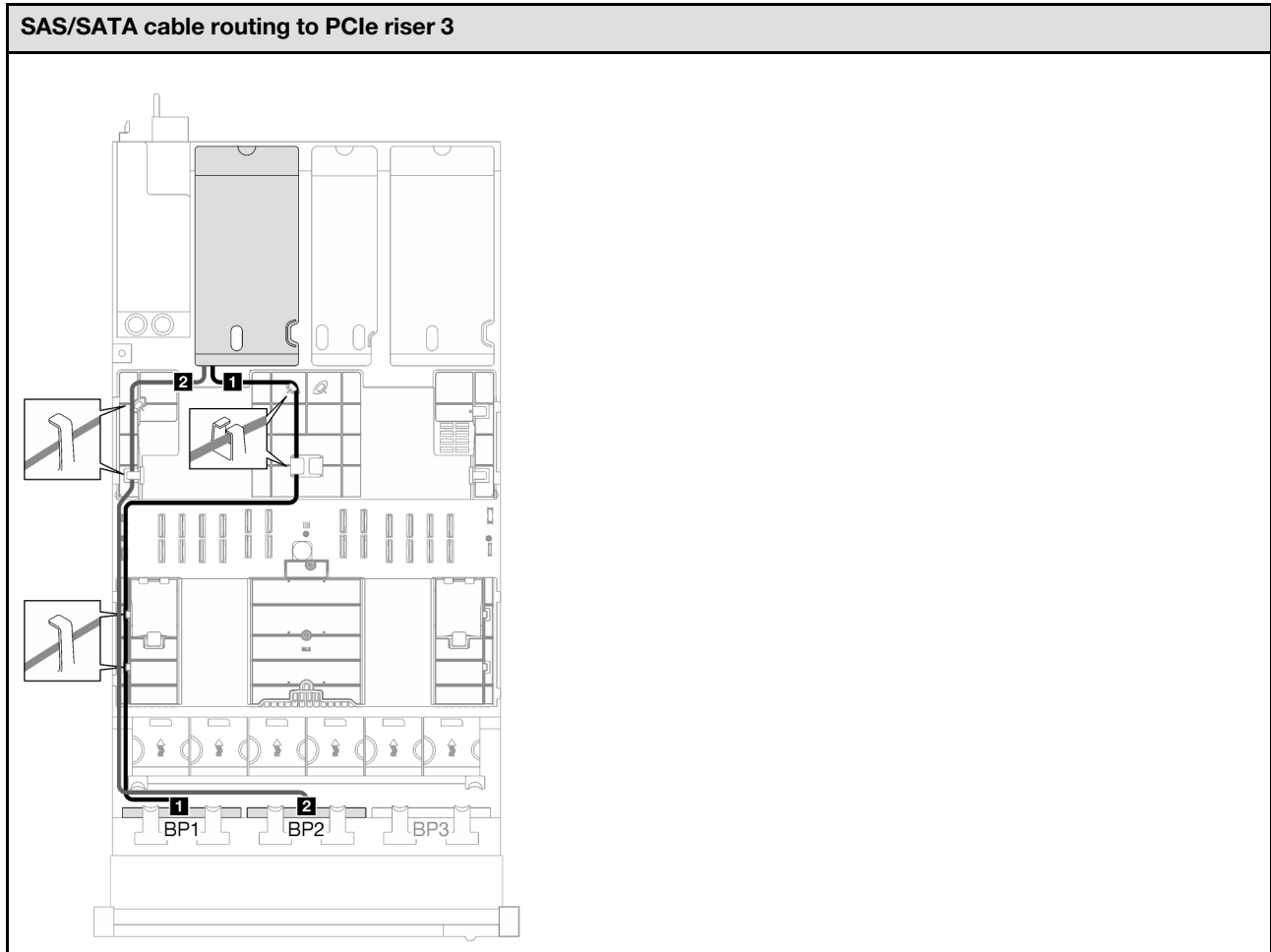
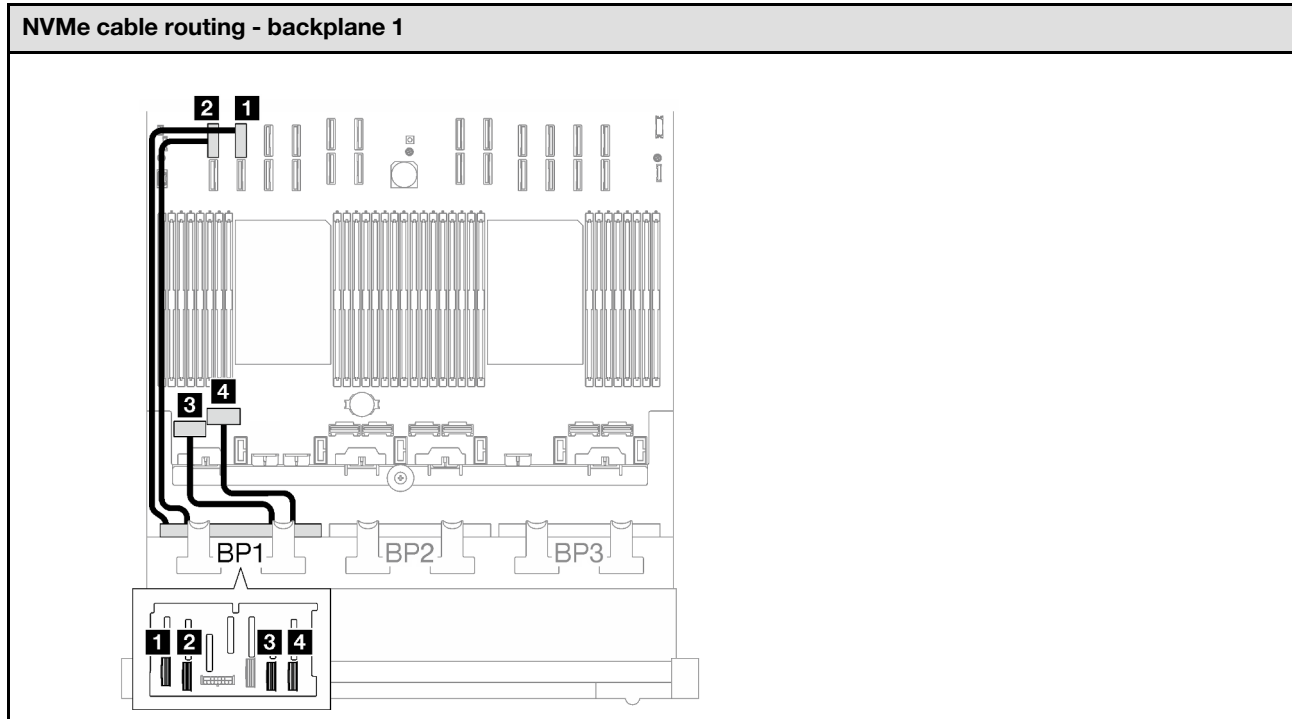


Table 34. SAS/SATA cable routing (continued)



Cable	From	To
<b>1</b>	Backplane 1: SAS/SATA	16i adapter: <ul style="list-style-type: none"> <li>• Gen4: C0</li> <li>• Gen3: C0, C1</li> </ul>
<b>2</b>	Backplane 2: SAS/SATA	16i adapter: <ul style="list-style-type: none"> <li>• Gen4: C1</li> <li>• Gen3: C2, C3</li> </ul>

Table 35. NVMe cable routing

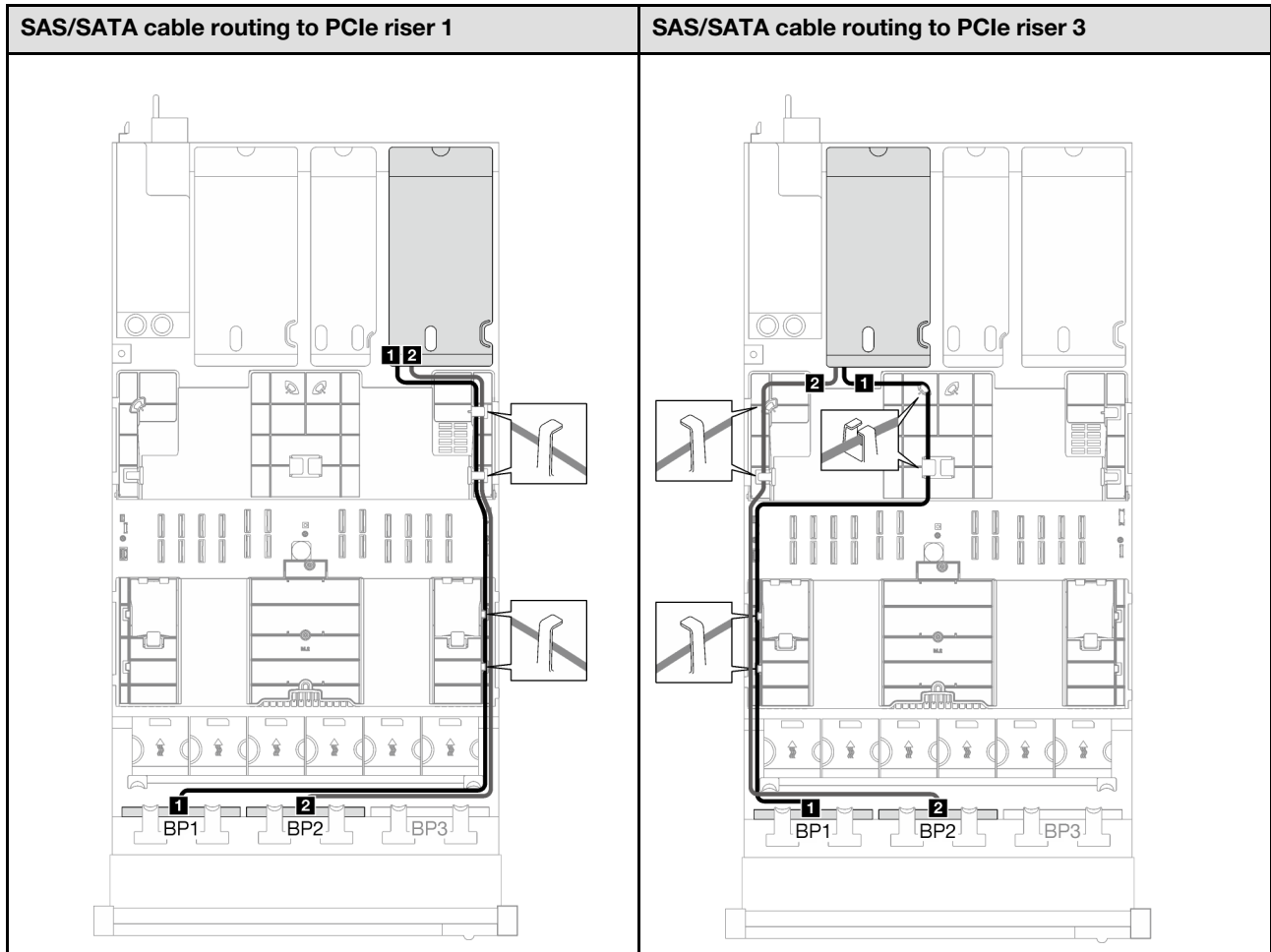


Cable	From	To	Cable length
<b>1</b>	Backplane 1: NVMe 0-1	System board assembly: NVMe 10 connector	420 mm
<b>2</b>	Backplane 1: NVMe 2-3	System board assembly: NVMe 9 connector	420 mm
<b>3</b>	Backplane 1: NVMe 4-5	System board assembly: NVMe 1 connector	150 mm
<b>4</b>	Backplane 1: NVMe 6-7	System board assembly: NVMe 2 connector	150 mm

### 32i RAID adapter

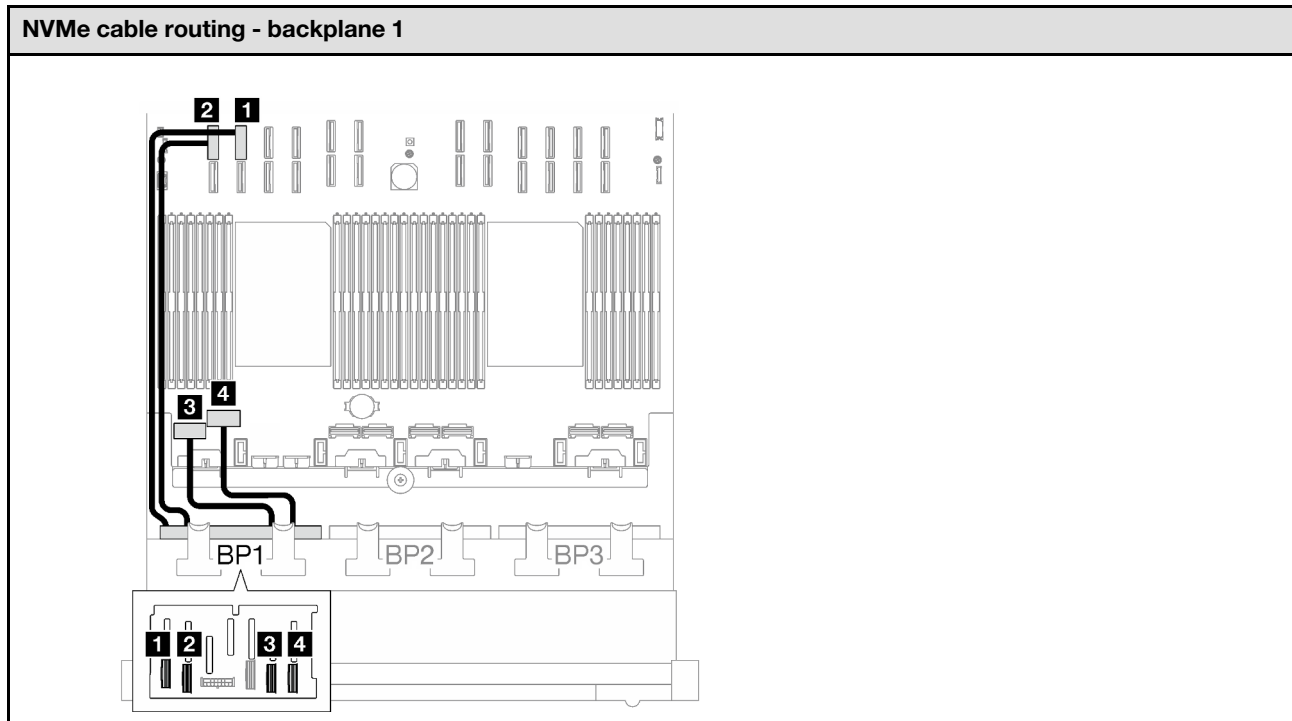
Based on the location of the RAID adapter, select the corresponding routing path for SAS/SATA cable from the following table.

Table 36. SAS/SATA cable routing



Cable	From	To
<b>1</b>	Backplane 1: SAS/SATA	32i adapter: C0
<b>2</b>	Backplane 2: SAS/SATA	32i adapter: C1

Table 37. NVMe cable routing



Cable	From	To	Cable length
<b>1</b>	Backplane 1: NVMe 0-1	System board assembly: NVMe 10 connector	420 mm
<b>2</b>	Backplane 1: NVMe 2-3	System board assembly: NVMe 9 connector	420 mm
<b>3</b>	Backplane 1: NVMe 4-5	System board assembly: NVMe 1 connector	150 mm
<b>4</b>	Backplane 1: NVMe 6-7	System board assembly: NVMe 2 connector	150 mm

### 1 x AnyBay + 2 x SAS/SATA backplanes

Follow the instructions in this section to learn how to do cable routing for one AnyBay backplane and two SAS/SATA backplanes.

#### Notes:

- For more information about the power cable routing, see [“2.5-inch drive backplane cable routing \(server model with three PCIe risers\)” on page 241](#).
- When routing the cables, ensure that all cables are routed appropriately through the cable guides and cable clips.
- Make sure to choose the cables based on the generation of RAID adapters that you plan to install:
  - HL PCIe riser 1 and 3:
    - **Gen3 RAID/HBA adapters** (9350-16i, 4350-16i, 9350-8i, 5350-8i, 4350-8i): Mini-SAS x4\*2 to SlimSAS x8 cable
    - **Gen4 RAID/HBA adapters** (940-32i, 940-16i, 540-16i, 440-16i, 940-8i, 540-8i, 440-8i): SlimSAS x8 to SlimSAS x8 cable

- FL PCIe riser 1 and 3:
  - **Gen4 RAID/HBA adapters** (940-32i, 940-16i, 540-16i, 440-16i, 940-8i, 540-8i, 440-8i): SlimSAS x8 to SlimSAS x8 cable
- HL PCIe riser 2:
  - **Gen3 RAID/HBA adapters** (9350-16i, 4350-16i, 9350-8i, 5350-8i, 4350-8i): Mini-SAS x4\*2 to SlimSAS x8 cable
  - **Gen4 RAID/HBA adapters** (940-16i, 540-16i, 440-16i, 940-8i, 540-8i, 440-8i): SlimSAS x8 to SlimSAS x8 cable

This configuration contains the following storage controller combinations:

- “8i + 16i RAID/HBA adapter” on page 268
- “32i RAID adapter” on page 270

### 8i + 16i RAID/HBA adapter

Based on the location of the RAID/HBA adapter, select the corresponding routing path for SAS/SATA cable from the following table.

Table 38. SAS/SATA cable routing

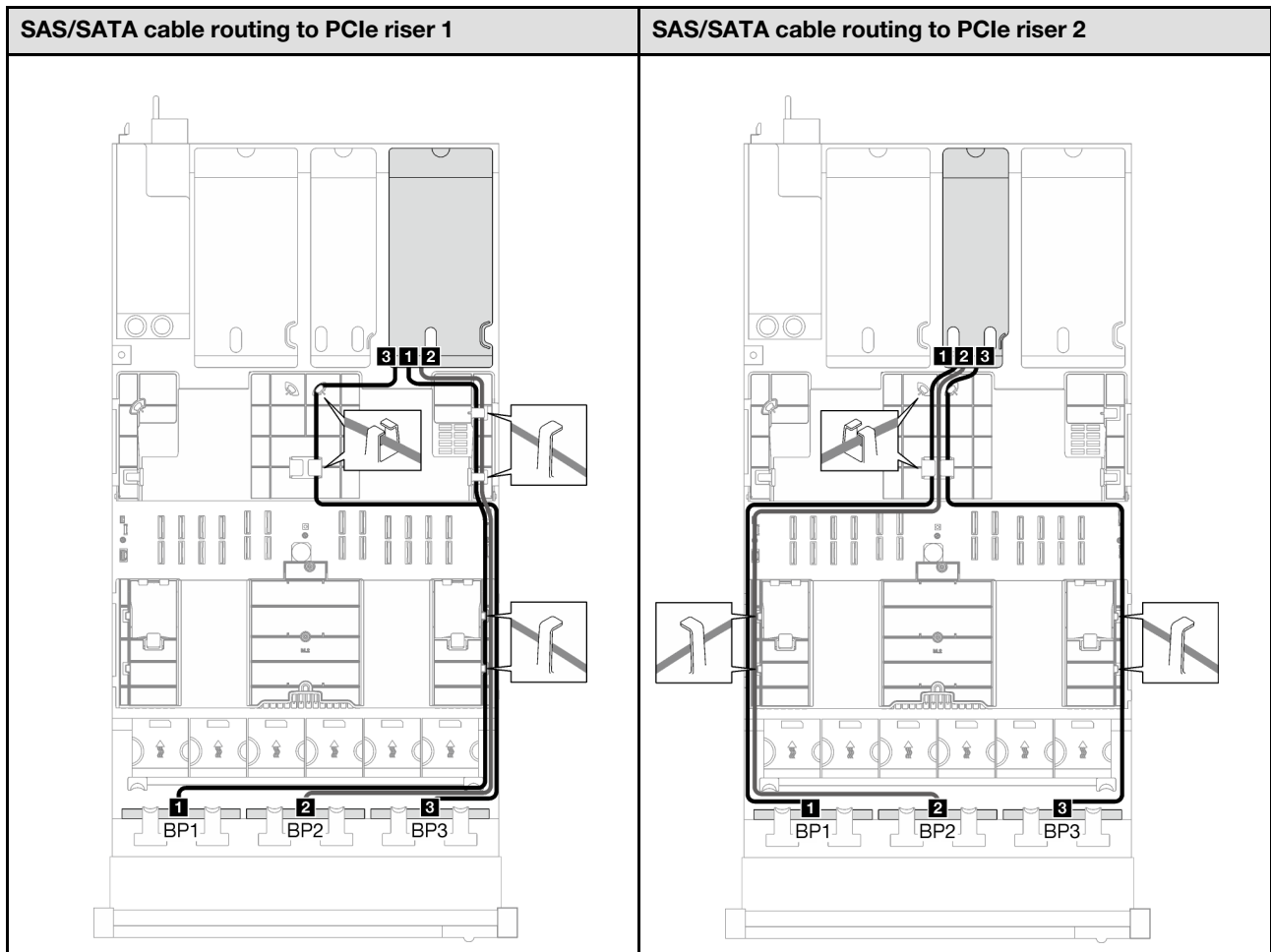
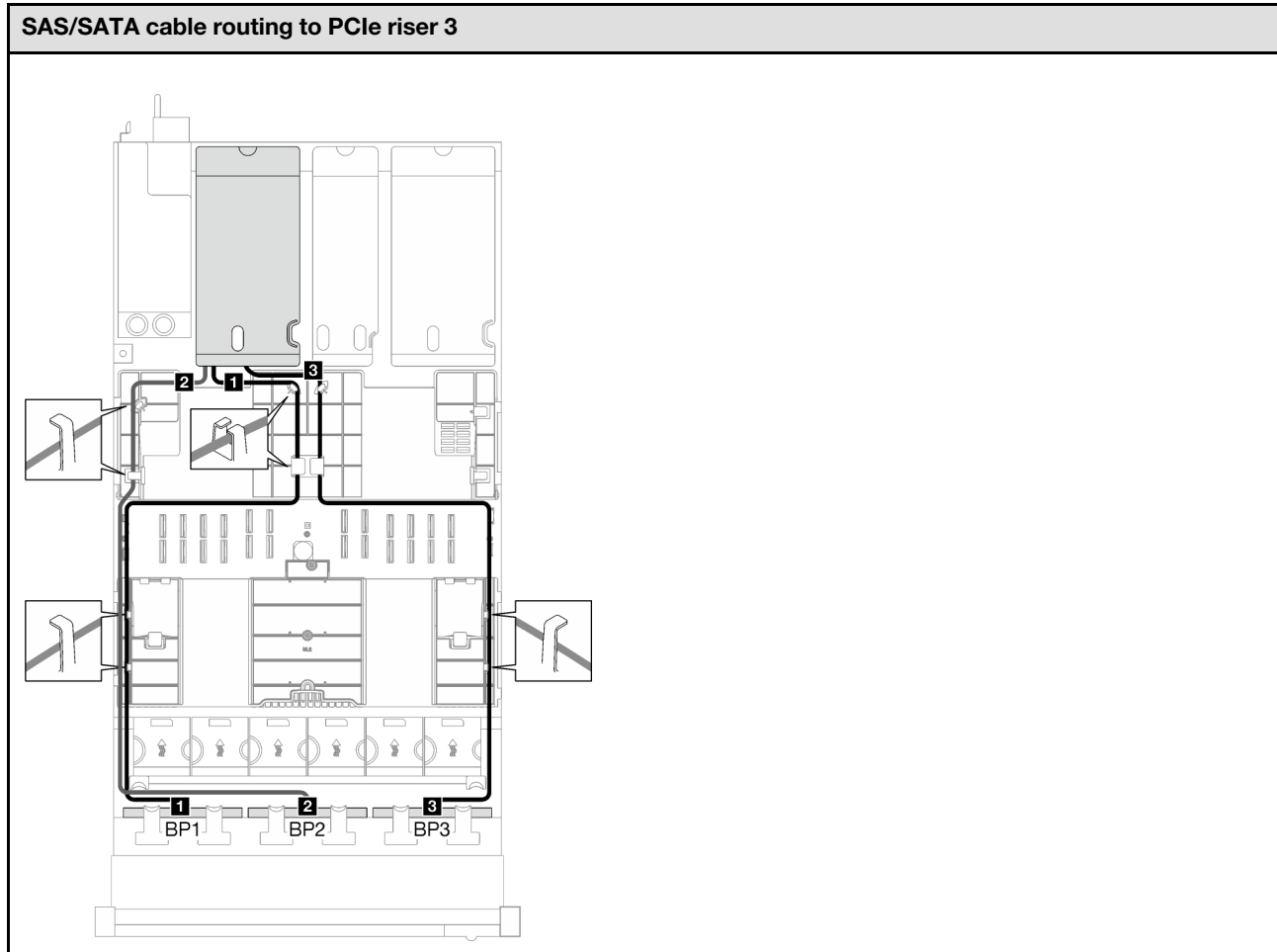
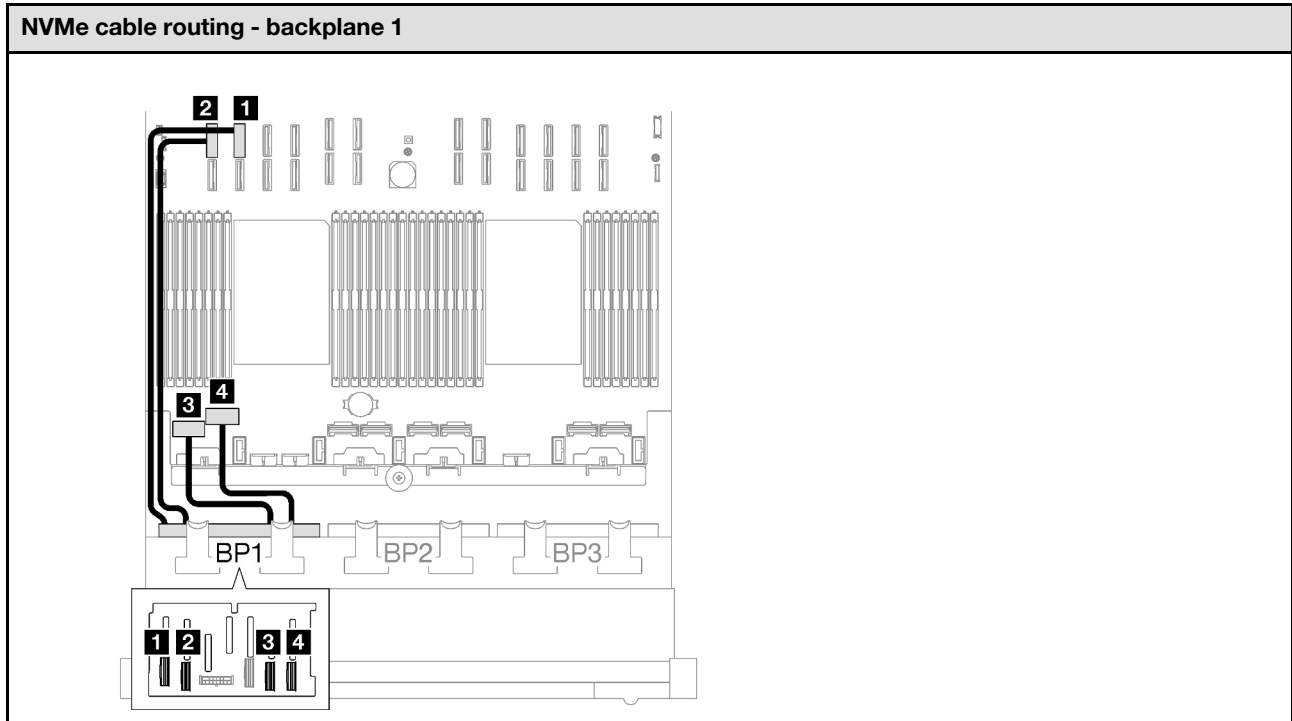


Table 38. SAS/SATA cable routing (continued)



Cable	From	To
<b>1</b>	Backplane 1: SAS/SATA	16i adapter: <ul style="list-style-type: none"> <li>• Gen4: C0</li> <li>• Gen3: C0, C1</li> </ul>
<b>2</b>	Backplane 2: SAS/SATA	16i adapter: <ul style="list-style-type: none"> <li>• Gen4: C1</li> <li>• Gen3: C2, C3</li> </ul>
<b>3</b>	Backplane 3: SAS/SATA	8i adapter: <ul style="list-style-type: none"> <li>• Gen4: C0</li> <li>• Gen3: C0, C1</li> </ul>

Table 39. NVMe cable routing



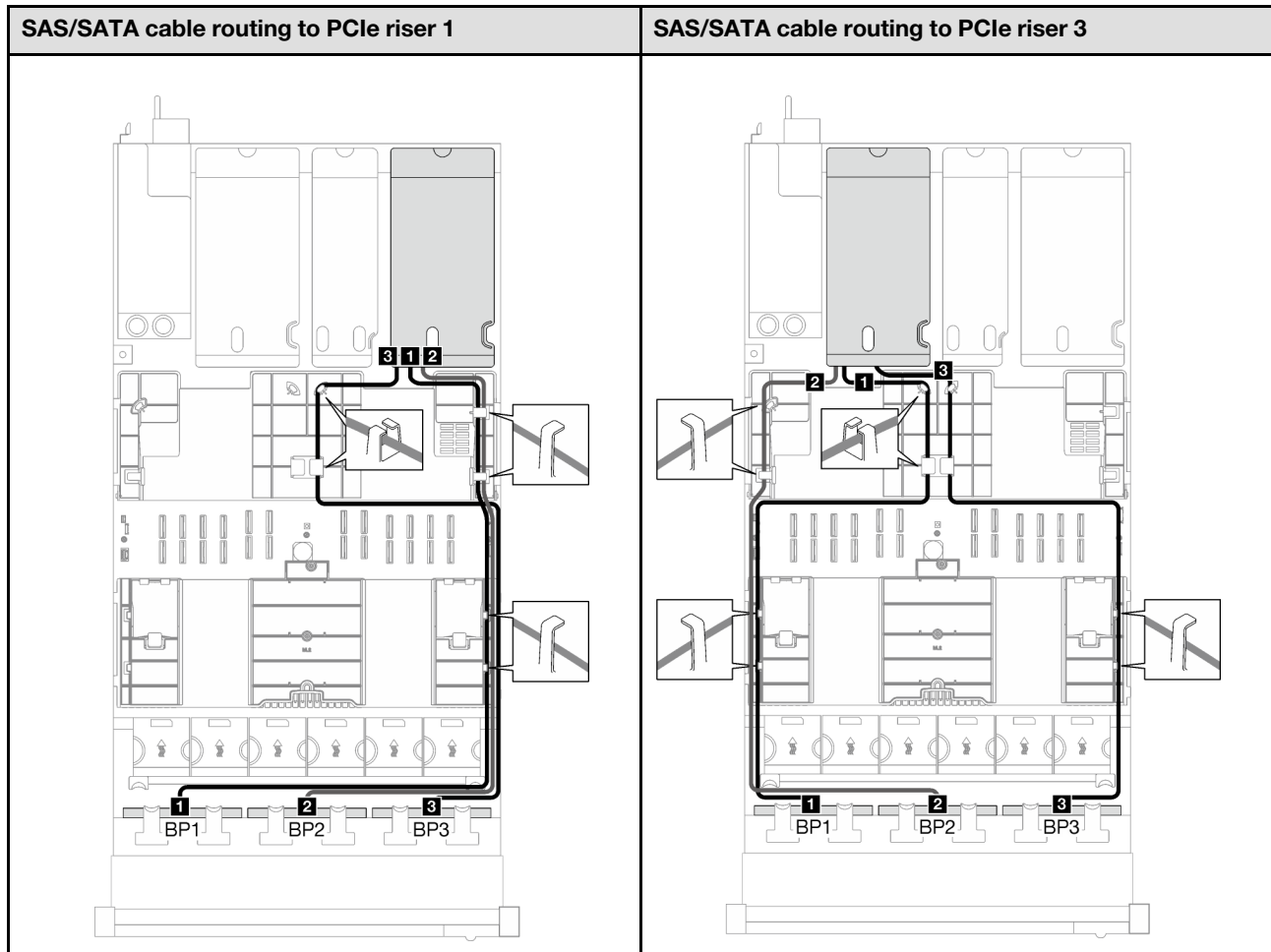
Cable	From	To	Cable length
<b>1</b>	Backplane 1: NVMe 0-1	System board assembly: NVMe 10 connector	420 mm
<b>2</b>	Backplane 1: NVMe 2-3	System board assembly: NVMe 9 connector	420 mm
<b>3</b>	Backplane 1: NVMe 4-5	System board assembly: NVMe 1 connector	150 mm
<b>4</b>	Backplane 1: NVMe 6-7	System board assembly: NVMe 2 connector	150 mm

### 32i RAID adapter

Based on the location of the RAID adapter, select the corresponding routing path for SAS/SATA cable from the following table.

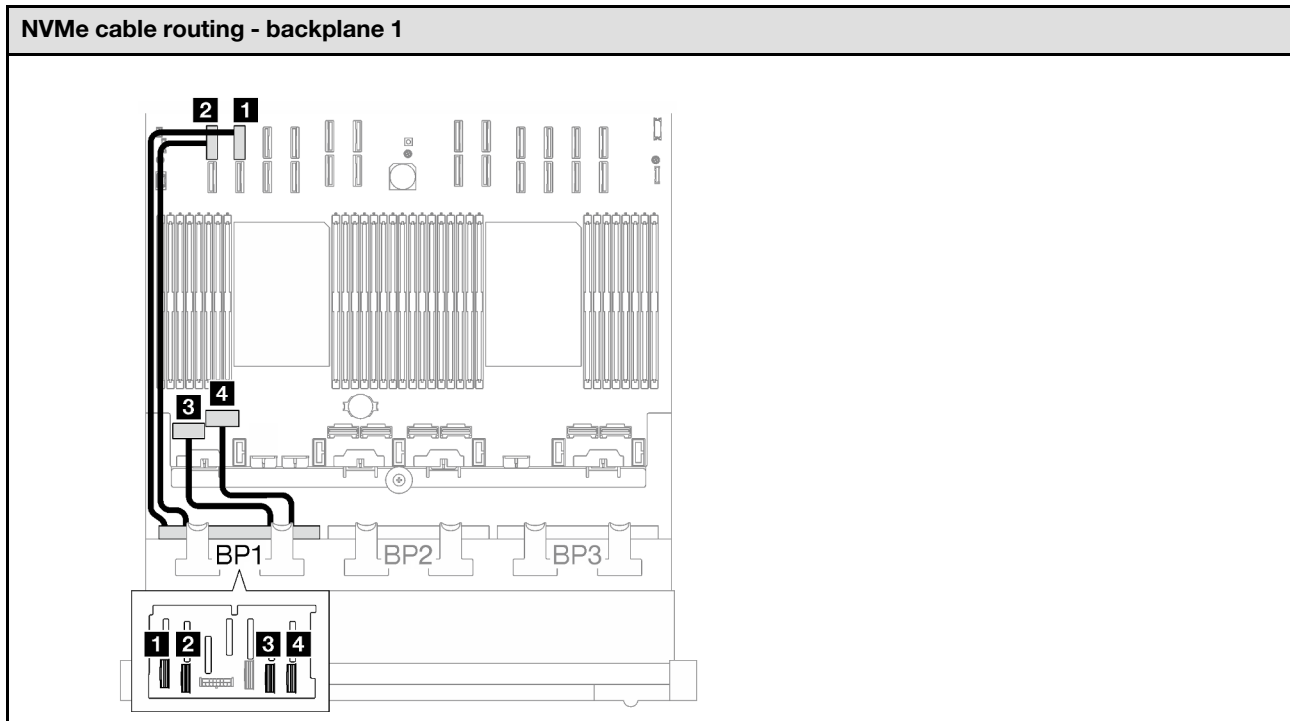


Table 40. SAS/SATA cable routing



Cable	From	To
<b>1</b>	Backplane 1: SAS/SATA	32i adapter: C0
<b>2</b>	Backplane 2: SAS/SATA	32i adapter: C1
<b>3</b>	Backplane 3: SAS/SATA	32i adapter: C2

Table 41. NVMe cable routing



Cable	From	To	Cable length
<b>1</b>	Backplane 1: NVMe 0-1	System board assembly: NVMe 10 connector	420 mm
<b>2</b>	Backplane 1: NVMe 2-3	System board assembly: NVMe 9 connector	420 mm
<b>3</b>	Backplane 1: NVMe 4-5	System board assembly: NVMe 1 connector	150 mm
<b>4</b>	Backplane 1: NVMe 6-7	System board assembly: NVMe 2 connector	150 mm

## 2 x AnyBay backplanes

Follow the instructions in this section to learn how to do cable routing for two AnyBay backplanes.

### Notes:

- For more information about the power cable routing, see [“2.5-inch drive backplane cable routing \(server model with three PCIe risers\)”](#) on page 241.
- When routing the cables, ensure that all cables are routed appropriately through the cable guides and cable clips.
- Make sure to choose the cables based on the generation of RAID adapters that you plan to install:
  - HL PCIe riser 1 and 3:
    - **Gen3 RAID/HBA adapters** (9350-16i, 4350-16i, 9350-8i, 5350-8i, 4350-8i): Mini-SAS x4\*2 to SlimSAS x8 cable
    - **Gen4 RAID/HBA adapters** (940-32i, 940-16i, 540-16i, 440-16i, 940-8i, 540-8i, 440-8i): SlimSAS x8 to SlimSAS x8 cable
  - FL PCIe riser 1 and 3:

- **Gen4 RAID/HBA adapters** (940-32i, 940-16i, 540-16i, 440-16i, 940-8i, 540-8i, 440-8i): SlimSAS x8 to SlimSAS x8 cable
- HL PCIe riser 2:
  - **Gen3 RAID/HBA adapters** (9350-16i, 4350-16i, 9350-8i, 5350-8i, 4350-8i): Mini-SAS x4\*2 to SlimSAS x8 cable
  - **Gen4 RAID/HBA adapters** (940-16i, 540-16i, 440-16i, 940-8i, 540-8i, 440-8i): SlimSAS x8 to SlimSAS x8 cable

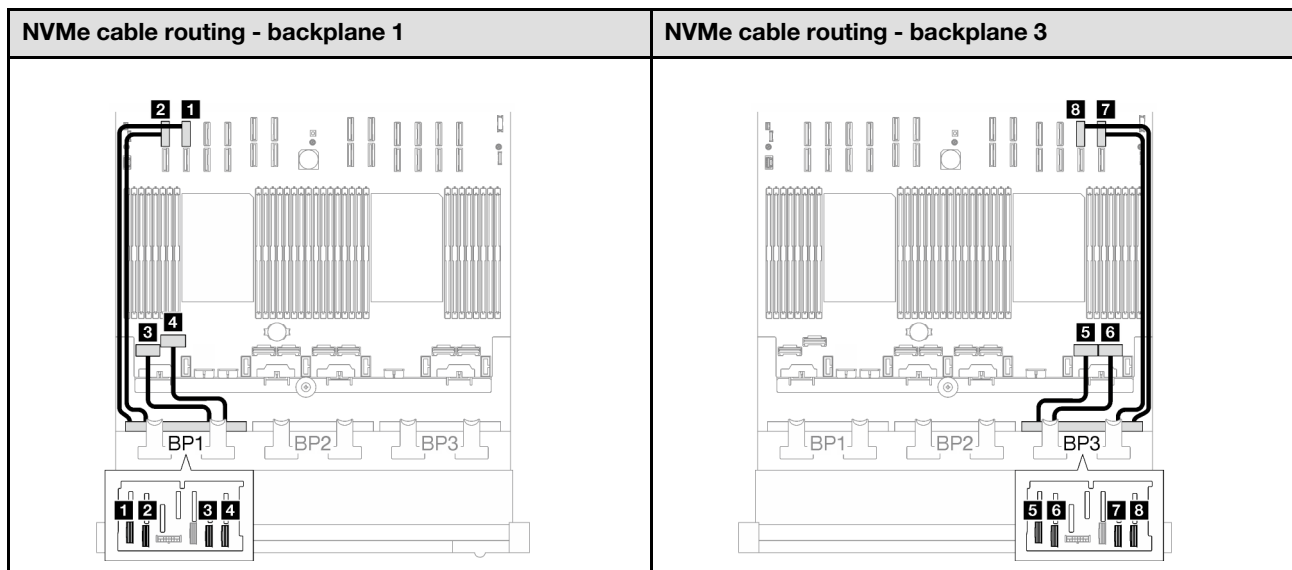
This configuration contains the following storage controller combinations:

- “No RAID/HBA adapter” on page 273
- “16i RAID/HBA adapter” on page 274
- “16i RAID adapter (Tri-mode)” on page 277
- “32i RAID adapter” on page 279

### No RAID/HBA adapter

**Note:** The AnyBay backplanes are used as pure NVMe backplanes when no RAID/HBA adapters are installed.

Table 42. NVMe cable routing



Cable	From	To	Cable length
<b>1</b>	Backplane 1: NVMe 0-1	System board assembly: NVMe 10 connector	420 mm
<b>2</b>	Backplane 1: NVMe 2-3	System board assembly: NVMe 9 connector	420 mm
<b>3</b>	Backplane 1: NVMe 4-5	System board assembly: NVMe 1 connector	150 mm
<b>4</b>	Backplane 1: NVMe 6-7	System board assembly: NVMe 2 connector	150 mm
<b>5</b>	Backplane 3: NVMe 0-1	System board assembly: NVMe 7 connector	150 mm

Cable	From	To	Cable length
<b>6</b>	Backplane 3: NVMe 2-3	System board assembly: NVMe 8 connector	150 mm
<b>7</b>	Backplane 3: NVMe 4-5	System board assembly: NVMe 12 connector	420 mm
<b>8</b>	Backplane 3: NVMe 6-7	System board assembly: NVMe 11 connector	420 mm

### 16i RAID/HBA adapter

Based on the location of the RAID/HBA adapter, select the corresponding routing path for SAS/SATA cable from the following table.

Table 43. SAS/SATA cable routing

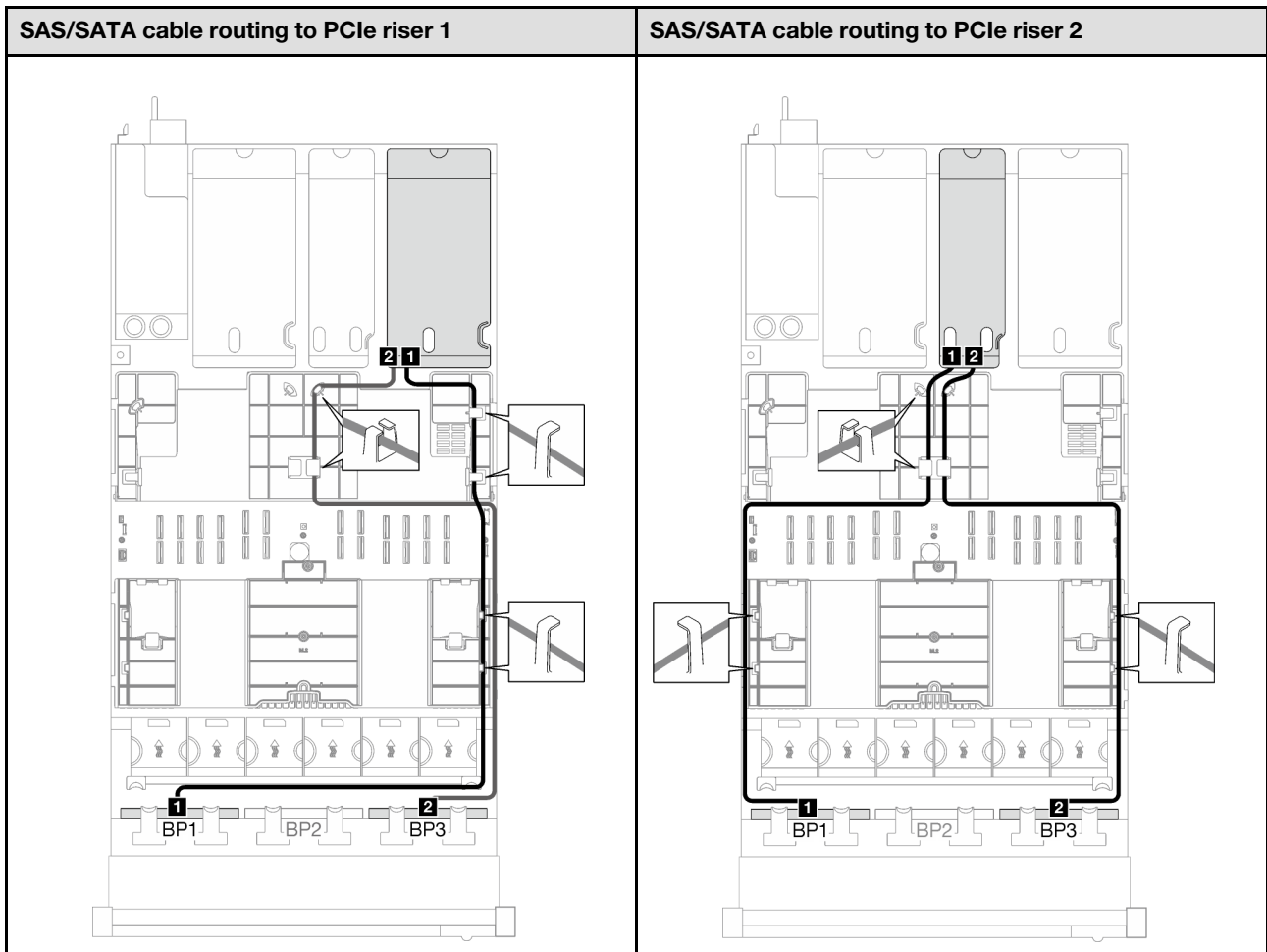
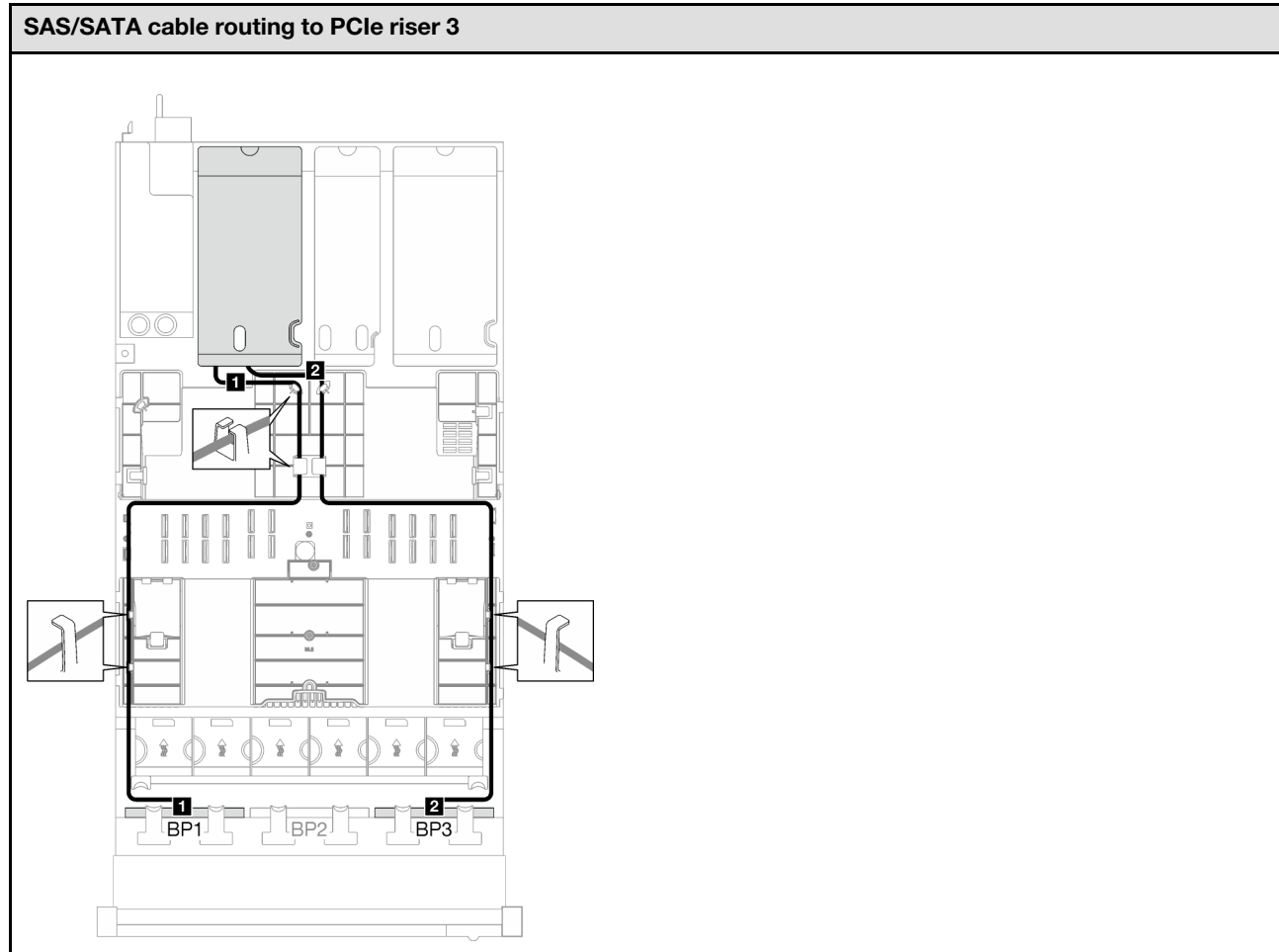
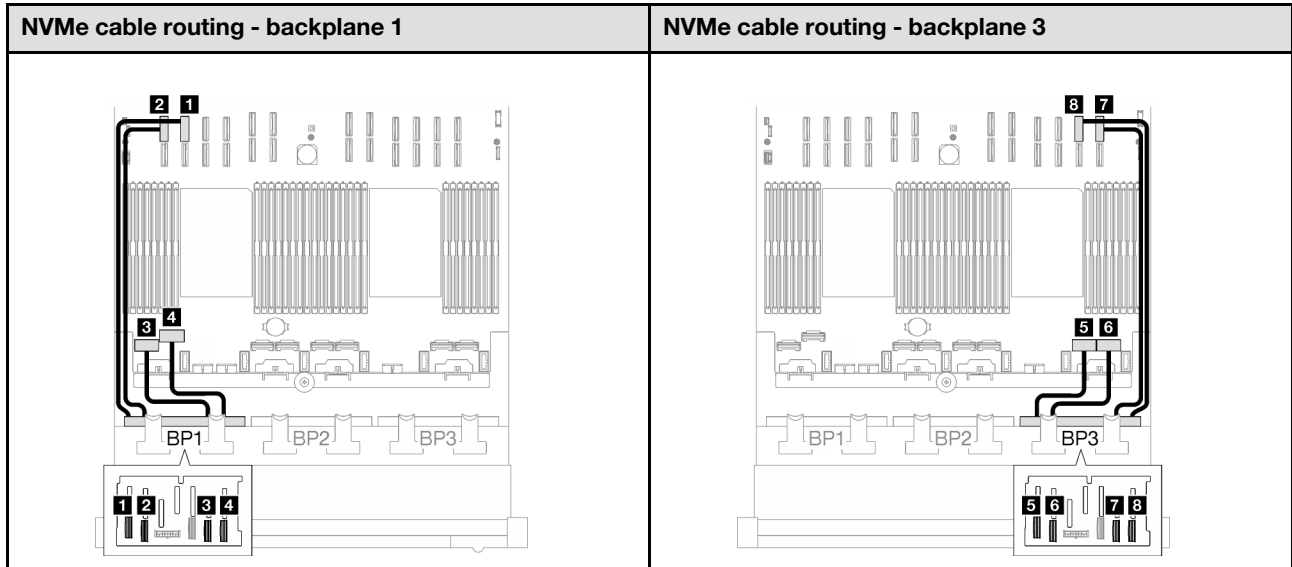


Table 43. SAS/SATA cable routing (continued)



Cable	From	To
<b>1</b>	Backplane 1: SAS/SATA	16i adapter: <ul style="list-style-type: none"> <li>• Gen4: C0</li> <li>• Gen3: C0, C1</li> </ul>
<b>2</b>	Backplane 3: SAS/SATA	16i adapter: <ul style="list-style-type: none"> <li>• Gen4: C1</li> <li>• Gen3: C2, C3</li> </ul>

Table 44. NVMe cable routing



Cable	From	To	Cable length
<b>1</b>	Backplane 1: NVMe 0-1	System board assembly: NVMe 10 connector	420 mm
<b>2</b>	Backplane 1: NVMe 2-3	System board assembly: NVMe 9 connector	420 mm
<b>3</b>	Backplane 1: NVMe 4-5	System board assembly: NVMe 1 connector	150 mm
<b>4</b>	Backplane 1: NVMe 6-7	System board assembly: NVMe 2 connector	150 mm
<b>5</b>	Backplane 3: NVMe 0-1	System board assembly: NVMe 7 connector	150 mm
<b>6</b>	Backplane 3: NVMe 2-3	System board assembly: NVMe 8 connector	150 mm
<b>7</b>	Backplane 3: NVMe 4-5	System board assembly: NVMe 12 connector	420 mm
<b>8</b>	Backplane 3: NVMe 6-7	System board assembly: NVMe 11 connector	420 mm

### 16i RAID adapter (Tri-mode)

Based on the location of the RAID adapter, select the corresponding routing path for SAS/SATA cable from the following table.

Table 45. SAS/SATA cable routing

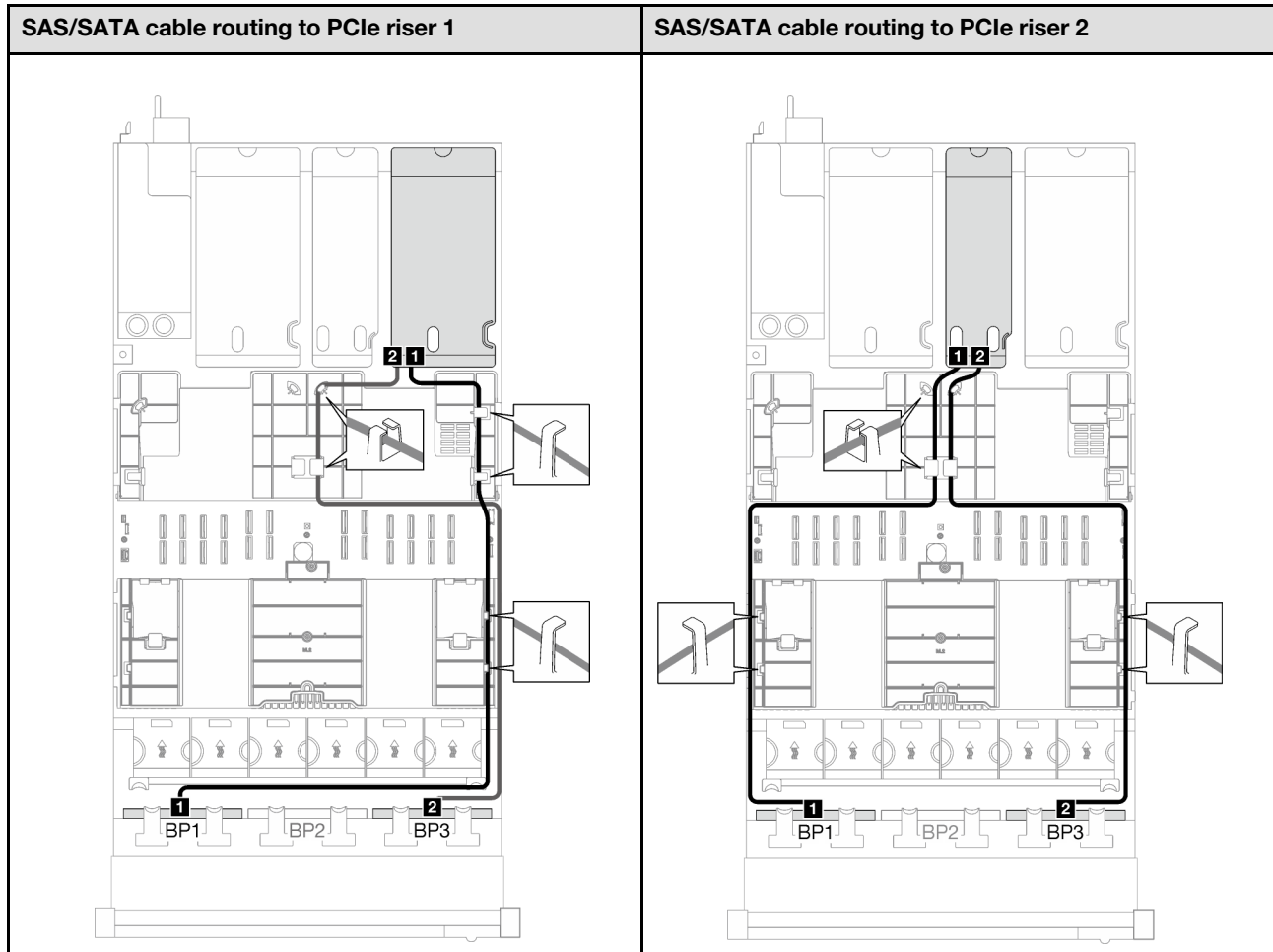
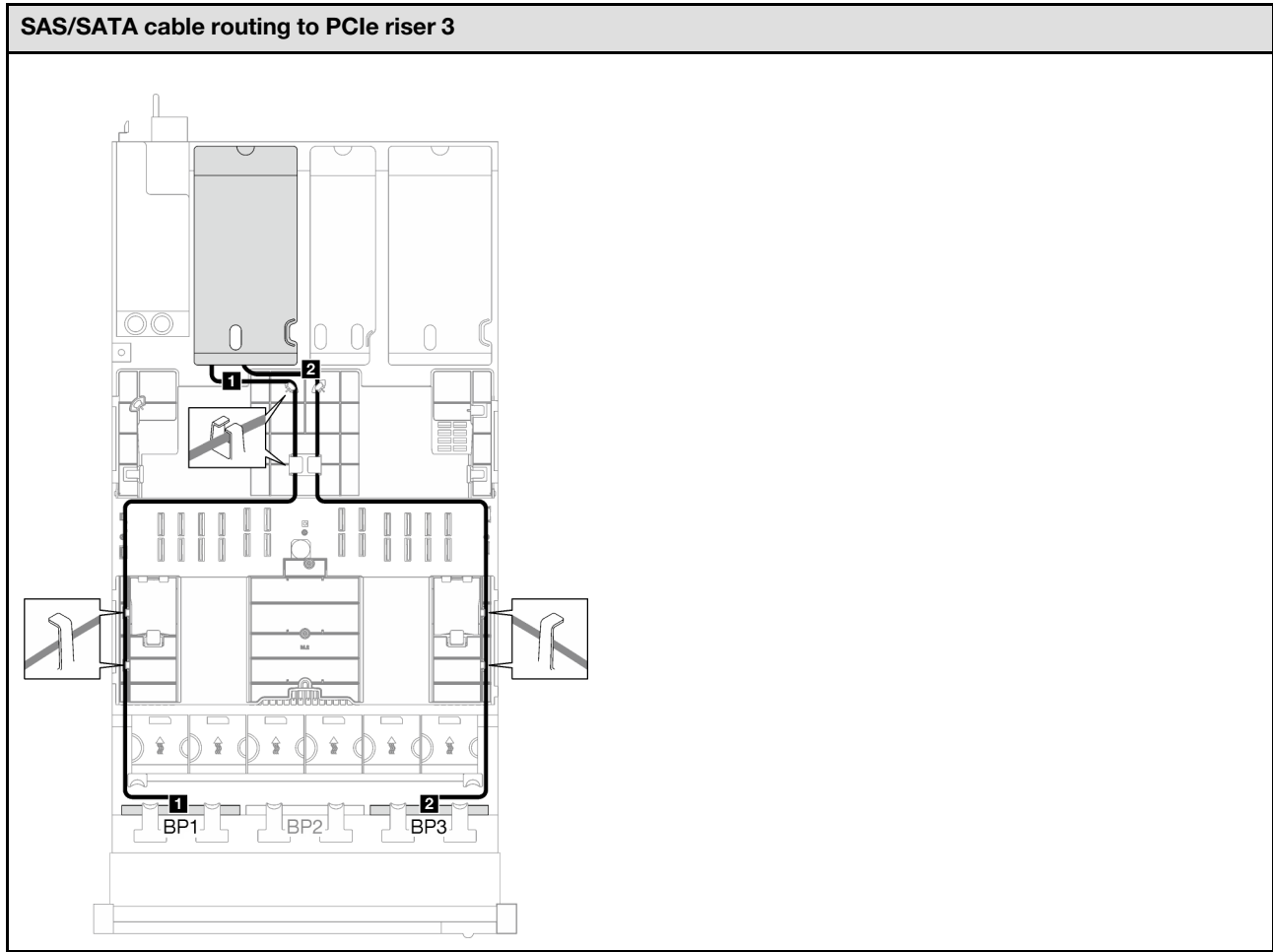


Table 45. SAS/SATA cable routing (continued)



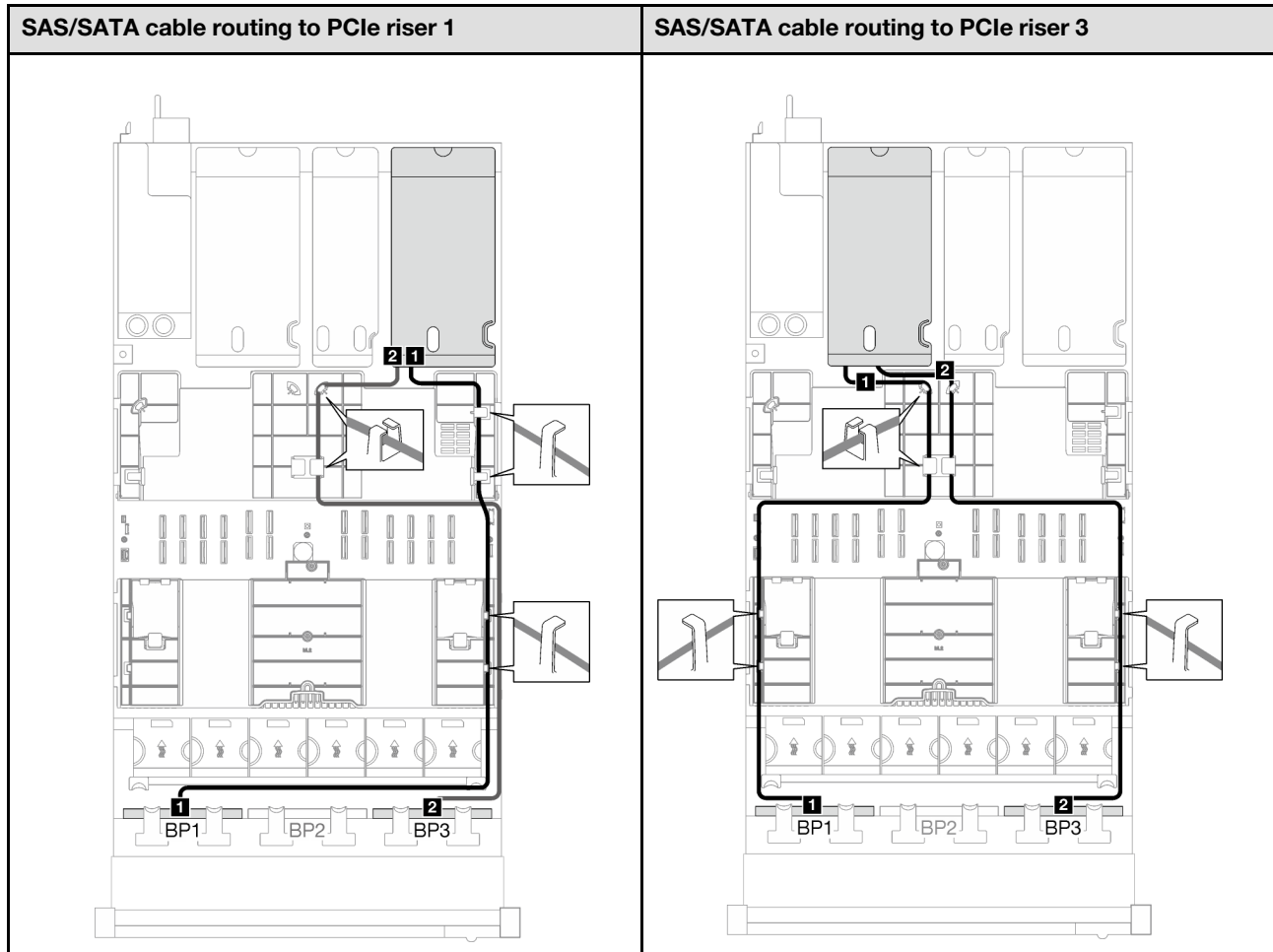
Cable	From	To
<b>1</b>	Backplane 1: SAS/SATA	16i adapter: C0
<b>2</b>	Backplane 3: SAS/SATA	16i adapter: C1



### 32i RAID adapter

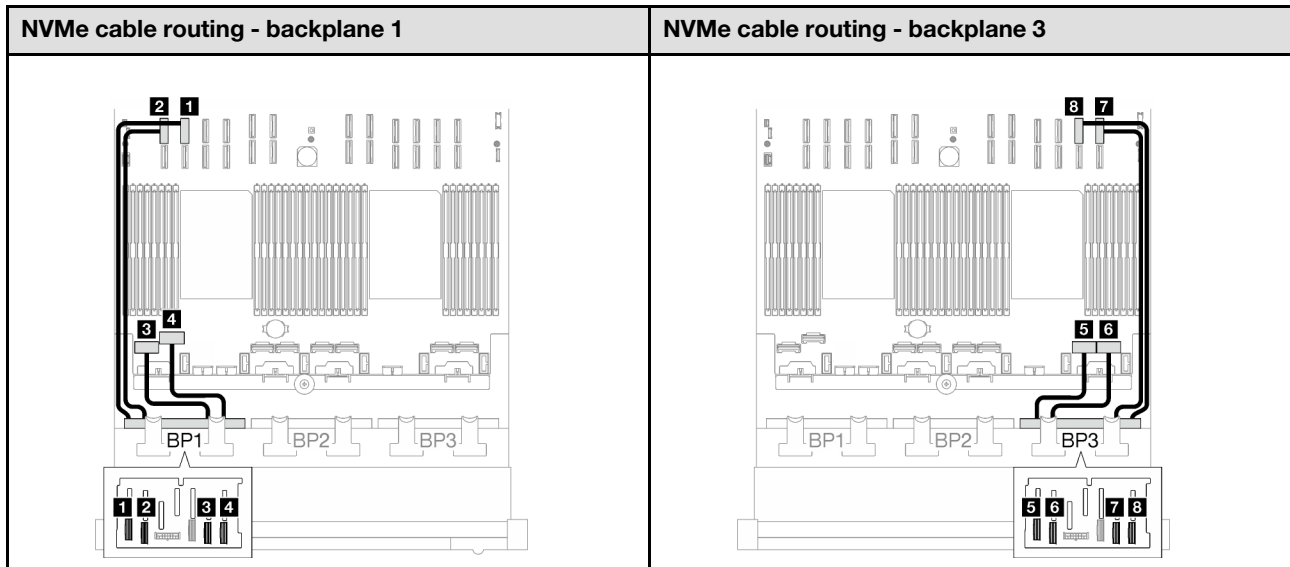
Based on the location of the RAID adapter, select the corresponding routing path for SAS/SATA cable from the following table.

Table 46. SAS/SATA cable routing



Cable	From	To
<b>1</b>	Backplane 1: SAS/SATA	32i adapter: C0
<b>2</b>	Backplane 3: SAS/SATA	32i adapter: C1

Table 47. NVMe cable routing



Cable	From	To	Cable length
<b>1</b>	Backplane 1: NVMe 0-1	System board assembly: NVMe 10 connector	420 mm
<b>2</b>	Backplane 1: NVMe 2-3	System board assembly: NVMe 9 connector	420 mm
<b>3</b>	Backplane 1: NVMe 4-5	System board assembly: NVMe 1 connector	150 mm
<b>4</b>	Backplane 1: NVMe 6-7	System board assembly: NVMe 2 connector	150 mm
<b>5</b>	Backplane 3: NVMe 0-1	System board assembly: NVMe 7 connector	150 mm
<b>6</b>	Backplane 3: NVMe 2-3	System board assembly: NVMe 8 connector	150 mm
<b>7</b>	Backplane 3: NVMe 4-5	System board assembly: NVMe 12 connector	420 mm
<b>8</b>	Backplane 3: NVMe 6-7	System board assembly: NVMe 11 connector	420 mm

### 2 x AnyBay + 1 x SAS/SATA backplanes

Follow the instructions in this section to learn how to do cable routing for two AnyBay backplanes and one SAS/SATA backplane.

#### Notes:

- For more information about the power cable routing, see [“2.5-inch drive backplane cable routing \(server model with three PCIe risers\)”](#) on page 241.
- When routing the cables, ensure that all cables are routed appropriately through the cable guides and cable clips.
- Make sure to choose the cables based on the generation of RAID adapters that you plan to install:
  - HL PCIe riser 1 and 3:

- **Gen3 RAID/HBA adapters** (9350-16i, 4350-16i, 9350-8i, 5350-8i, 4350-8i): Mini-SAS x4\*2 to SlimSAS x8 cable
- **Gen4 RAID/HBA adapters** (940-32i, 940-16i, 540-16i, 440-16i, 940-8i, 540-8i, 440-8i): SlimSAS x8 to SlimSAS x8 cable
- FL PCIe riser 1 and 3:
  - **Gen4 RAID/HBA adapters** (940-32i, 940-16i, 540-16i, 440-16i, 940-8i, 540-8i, 440-8i): SlimSAS x8 to SlimSAS x8 cable
- HL PCIe riser 2:
  - **Gen3 RAID/HBA adapters** (9350-16i, 4350-16i, 9350-8i, 5350-8i, 4350-8i): Mini-SAS x4\*2 to SlimSAS x8 cable
  - **Gen4 RAID/HBA adapters** (940-16i, 540-16i, 440-16i, 940-8i, 540-8i, 440-8i): SlimSAS x8 to SlimSAS x8 cable

This configuration contains the following storage controller combinations:

- [“8i + 16i RAID/HBA adapter” on page 281](#)
- [“32i RAID adapter” on page 284](#)

#### **8i + 16i RAID/HBA adapter**

Based on the location of the RAID/HBA adapter, select the corresponding routing path for SAS/SATA cable from the following table.

Table 48. SAS/SATA cable routing

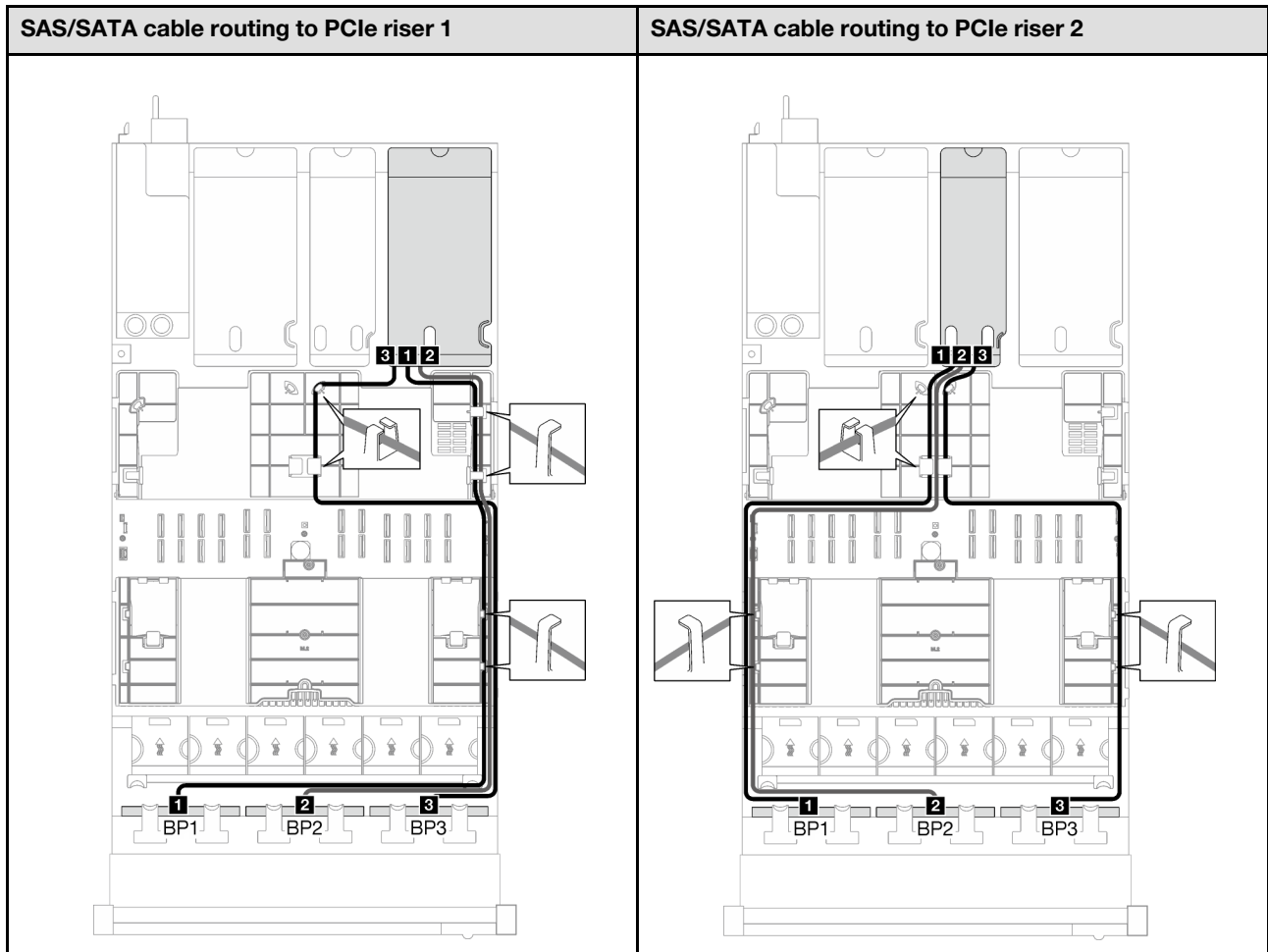
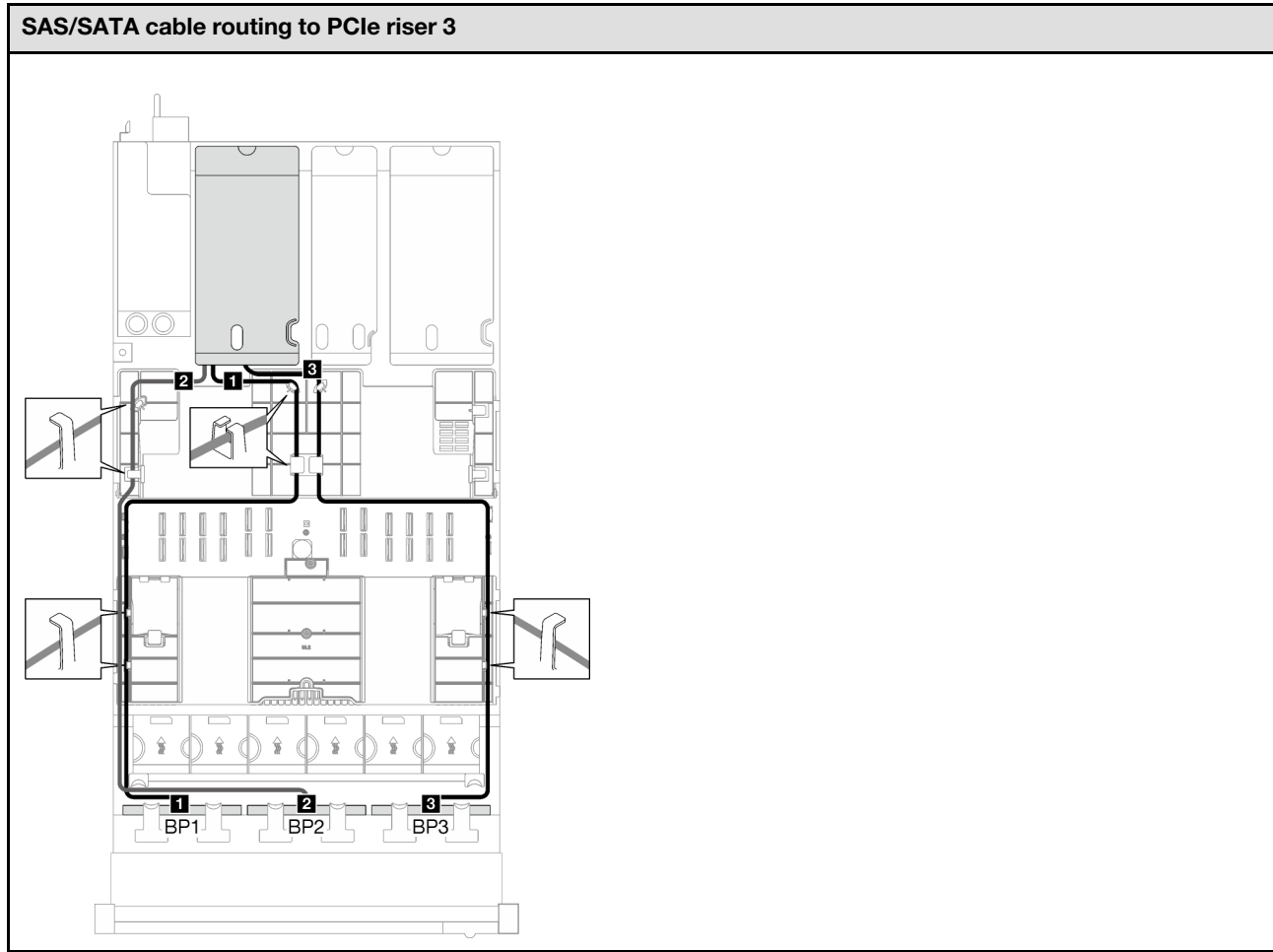
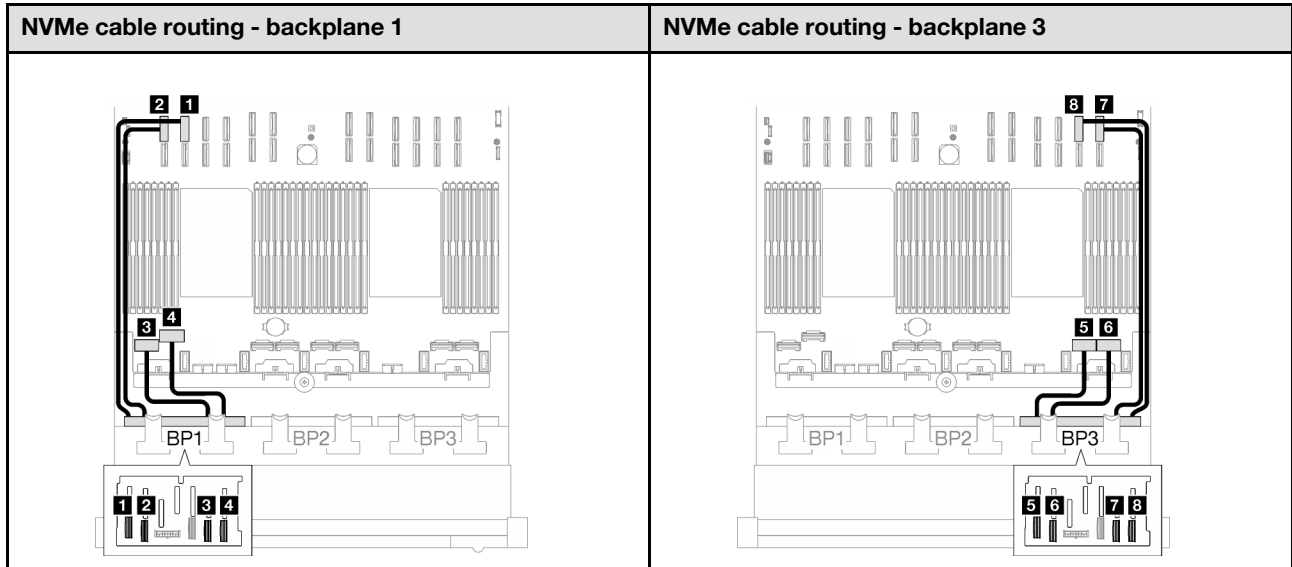


Table 48. SAS/SATA cable routing (continued)



Cable	From	To
<b>1</b>	Backplane 1: SAS/SATA	16i adapter: <ul style="list-style-type: none"> <li>• Gen4: C0</li> <li>• Gen3: C0, C1</li> </ul>
<b>2</b>	Backplane 2: SAS/SATA	16i adapter: <ul style="list-style-type: none"> <li>• Gen4: C1</li> <li>• Gen3: C2, C3</li> </ul>
<b>3</b>	Backplane 3: SAS/SATA	8i adapter: <ul style="list-style-type: none"> <li>• Gen4: C0</li> <li>• Gen3: C0, C1</li> </ul>

Table 49. NVMe cable routing

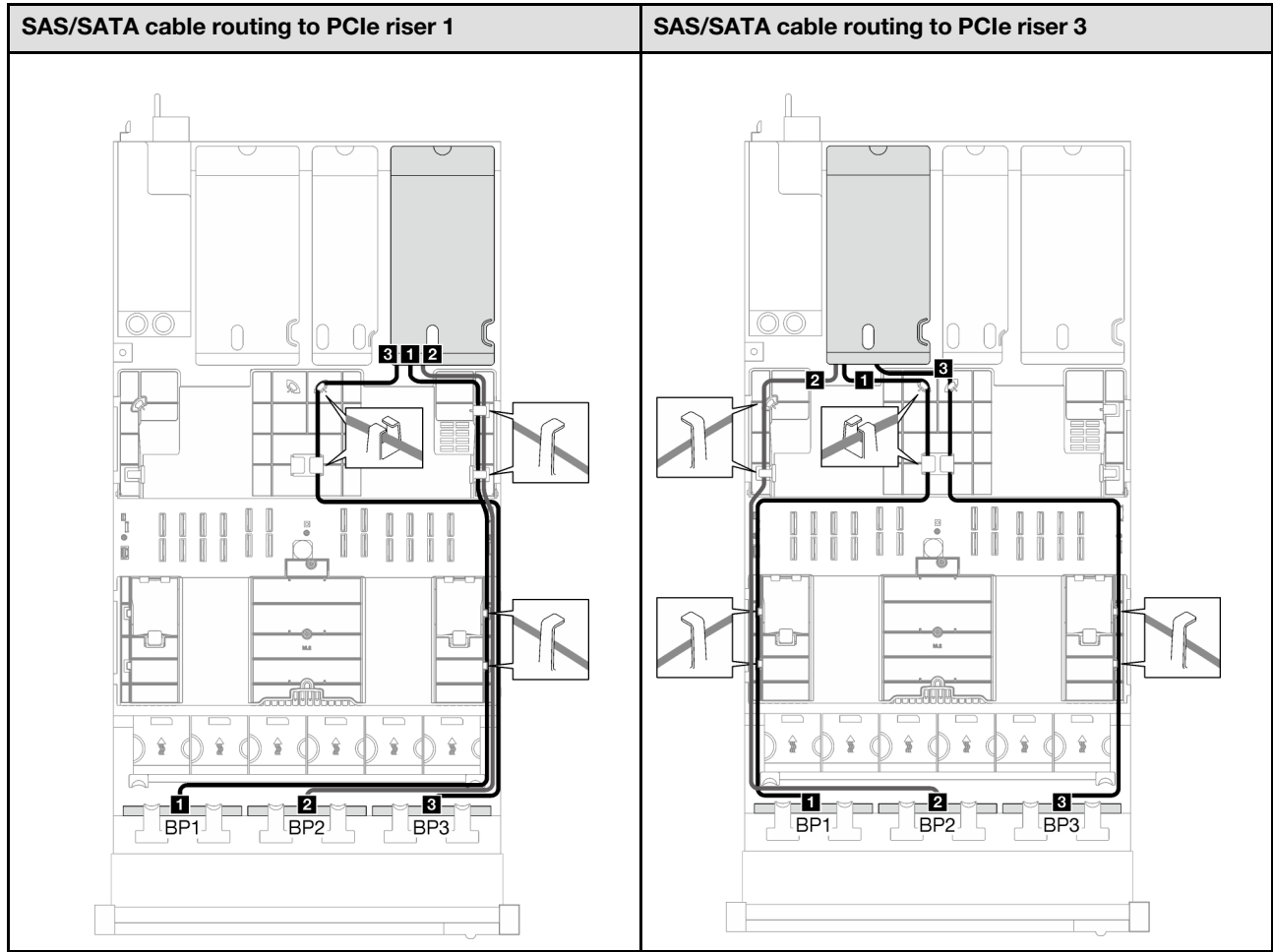


Cable	From	To	Cable length
<b>1</b>	Backplane 1: NVMe 0-1	System board assembly: NVMe 10 connector	420 mm
<b>2</b>	Backplane 1: NVMe 2-3	System board assembly: NVMe 9 connector	420 mm
<b>3</b>	Backplane 1: NVMe 4-5	System board assembly: NVMe 1 connector	150 mm
<b>4</b>	Backplane 1: NVMe 6-7	System board assembly: NVMe 2 connector	150 mm
<b>5</b>	Backplane 3: NVMe 0-1	System board assembly: NVMe 7 connector	150 mm
<b>6</b>	Backplane 3: NVMe 2-3	System board assembly: NVMe 8 connector	150 mm
<b>7</b>	Backplane 3: NVMe 4-5	System board assembly: NVMe 12 connector	420 mm
<b>8</b>	Backplane 3: NVMe 6-7	System board assembly: NVMe 11 connector	420 mm

### 32i RAID adapter

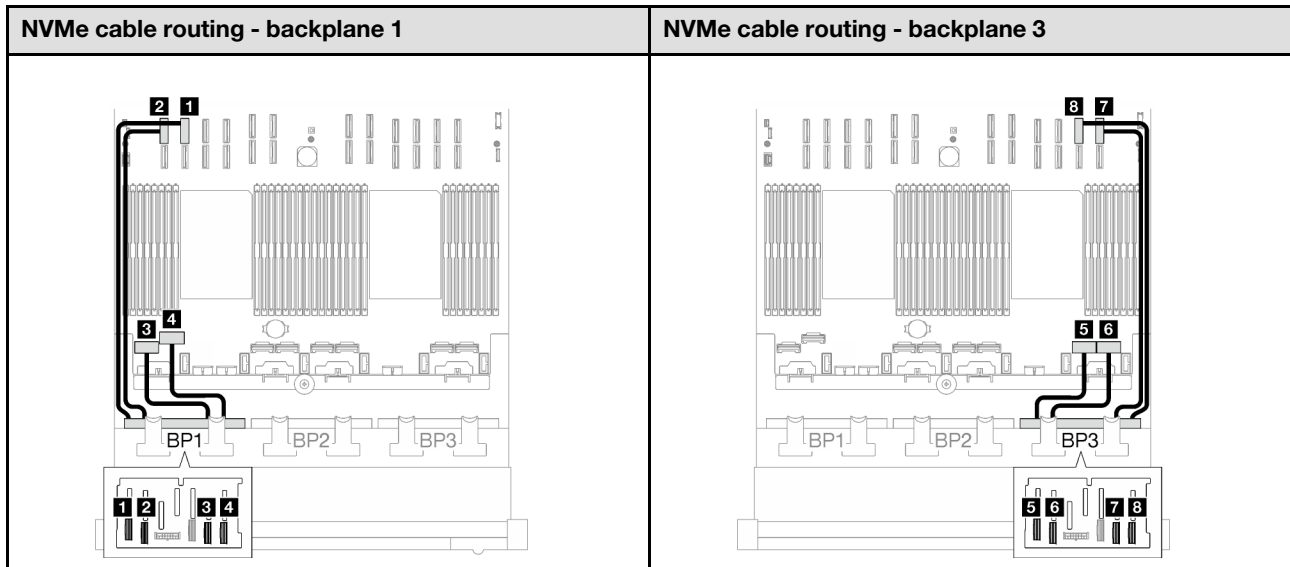
Based on the location of the RAID adapter, select the corresponding routing path for SAS/SATA cable from the following table.

Table 50. SAS/SATA cable routing



Cable	From	To
<b>1</b>	Backplane 1: SAS/SATA	32i adapter: C0
<b>2</b>	Backplane 2: SAS/SATA	32i adapter: C1
<b>3</b>	Backplane 3: SAS/SATA	32i adapter: C2

Table 51. NVMe cable routing



Cable	From	To	Cable length
<b>1</b>	Backplane 1: NVMe 0-1	System board assembly: NVMe 10 connector	420 mm
<b>2</b>	Backplane 1: NVMe 2-3	System board assembly: NVMe 9 connector	420 mm
<b>3</b>	Backplane 1: NVMe 4-5	System board assembly: NVMe 1 connector	150 mm
<b>4</b>	Backplane 1: NVMe 6-7	System board assembly: NVMe 2 connector	150 mm
<b>5</b>	Backplane 3: NVMe 0-1	System board assembly: NVMe 7 connector	150 mm
<b>6</b>	Backplane 3: NVMe 2-3	System board assembly: NVMe 8 connector	150 mm
<b>7</b>	Backplane 3: NVMe 4-5	System board assembly: NVMe 12 connector	420 mm
<b>8</b>	Backplane 3: NVMe 6-7	System board assembly: NVMe 11 connector	420 mm

### 3 x AnyBay backplanes

Follow the instructions in this section to learn how to do cable routing for three AnyBay backplanes.

#### Notes:

- For more information about the power cable routing, see [“2.5-inch drive backplane cable routing \(server model with three PCIe risers\)”](#) on page 241.
- When routing the cables, ensure that all cables are routed appropriately through the cable guides and cable clips.
- Make sure to choose the cables based on the generation of RAID adapters that you plan to install:
  - HL PCIe riser 1 and 3:



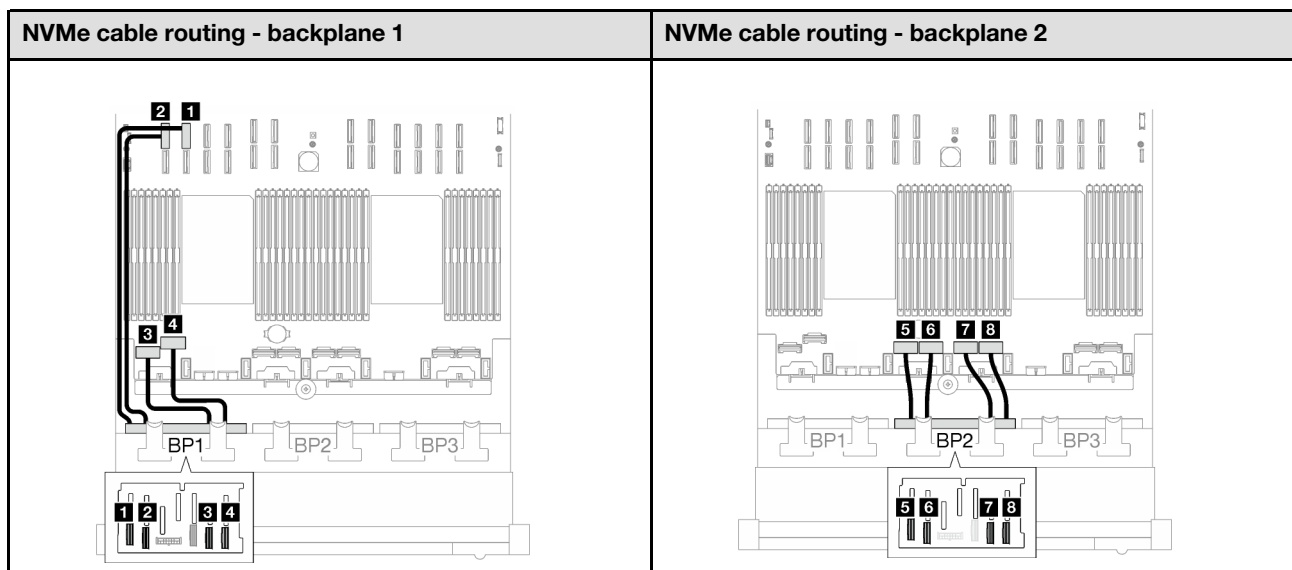
- **Gen3 RAID/HBA adapters** (9350-16i, 4350-16i, 9350-8i, 5350-8i, 4350-8i): Mini-SAS x4\*2 to SlimSAS x8 cable
- **Gen4 RAID/HBA adapters** (940-32i, 940-16i, 540-16i, 440-16i, 940-8i, 540-8i, 440-8i): SlimSAS x8 to SlimSAS x8 cable
- FL PCIe riser 1 and 3:
  - **Gen4 RAID/HBA adapters** (940-32i, 940-16i, 540-16i, 440-16i, 940-8i, 540-8i, 440-8i): SlimSAS x8 to SlimSAS x8 cable
- HL PCIe riser 2:
  - **Gen3 RAID/HBA adapters** (9350-16i, 4350-16i, 9350-8i, 5350-8i, 4350-8i): Mini-SAS x4\*2 to SlimSAS x8 cable
  - **Gen4 RAID/HBA adapters** (940-16i, 540-16i, 440-16i, 940-8i, 540-8i, 440-8i): SlimSAS x8 to SlimSAS x8 cable

This configuration contains the following storage controller combinations:

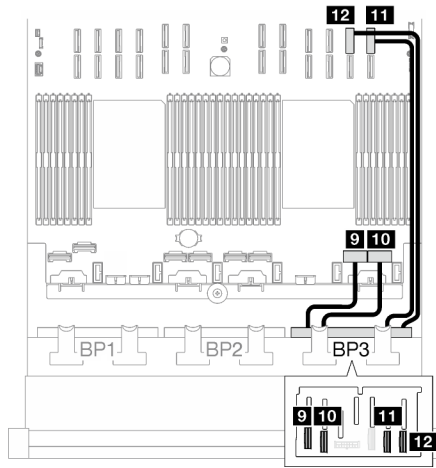
- [“No RAID/HBA adapter” on page 287](#)
- [“8i + 16i RAID/HBA adapter” on page 288](#)
- [“8i + 16i RAID adapter \(Tri-mode\)” on page 292](#)
- [“32i RAID adapter” on page 293](#)

#### No RAID/HBA adapter

**Note:** The AnyBay backplanes are used as pure NVMe backplanes when no RAID/HBA adapters are installed.



### NVMe cable routing - backplane 3



Cable	From	To	Cable length
<b>1</b>	Backplane 1: NVMe 0-1	System board assembly: NVMe 10 connector	420 mm
<b>2</b>	Backplane 1: NVMe 2-3	System board assembly: NVMe 9 connector	420 mm
<b>3</b>	Backplane 1: NVMe 4-5	System board assembly: NVMe 1 connector	150 mm
<b>4</b>	Backplane 1: NVMe 6-7	System board assembly: NVMe 2 connector	150 mm
<b>5</b>	Backplane 2: NVMe 0-1	System board assembly: NVMe 3 connector	150 mm
<b>6</b>	Backplane 2: NVMe 2-3	System board assembly: NVMe 4 connector	150 mm
<b>7</b>	Backplane 2: NVMe 4-5	System board assembly: NVMe 5 connector	150 mm
<b>8</b>	Backplane 2: NVMe 6-7	System board assembly: NVMe 6 connector	150 mm
<b>9</b>	Backplane 3: NVMe 0-1	System board assembly: NVMe 7 connector	150 mm
<b>10</b>	Backplane 3: NVMe 2-3	System board assembly: NVMe 8 connector	150 mm
<b>11</b>	Backplane 3: NVMe 4-5	System board assembly: NVMe 12 connector	420 mm
<b>12</b>	Backplane 3: NVMe 6-7	System board assembly: NVMe 11 connector	420 mm

### 8i + 16i RAID/HBA adapter

Based on the location of the RAID/HBA adapter, select the corresponding routing path for SAS/SATA cable from the following table.

Table 52. SAS/SATA cable routing

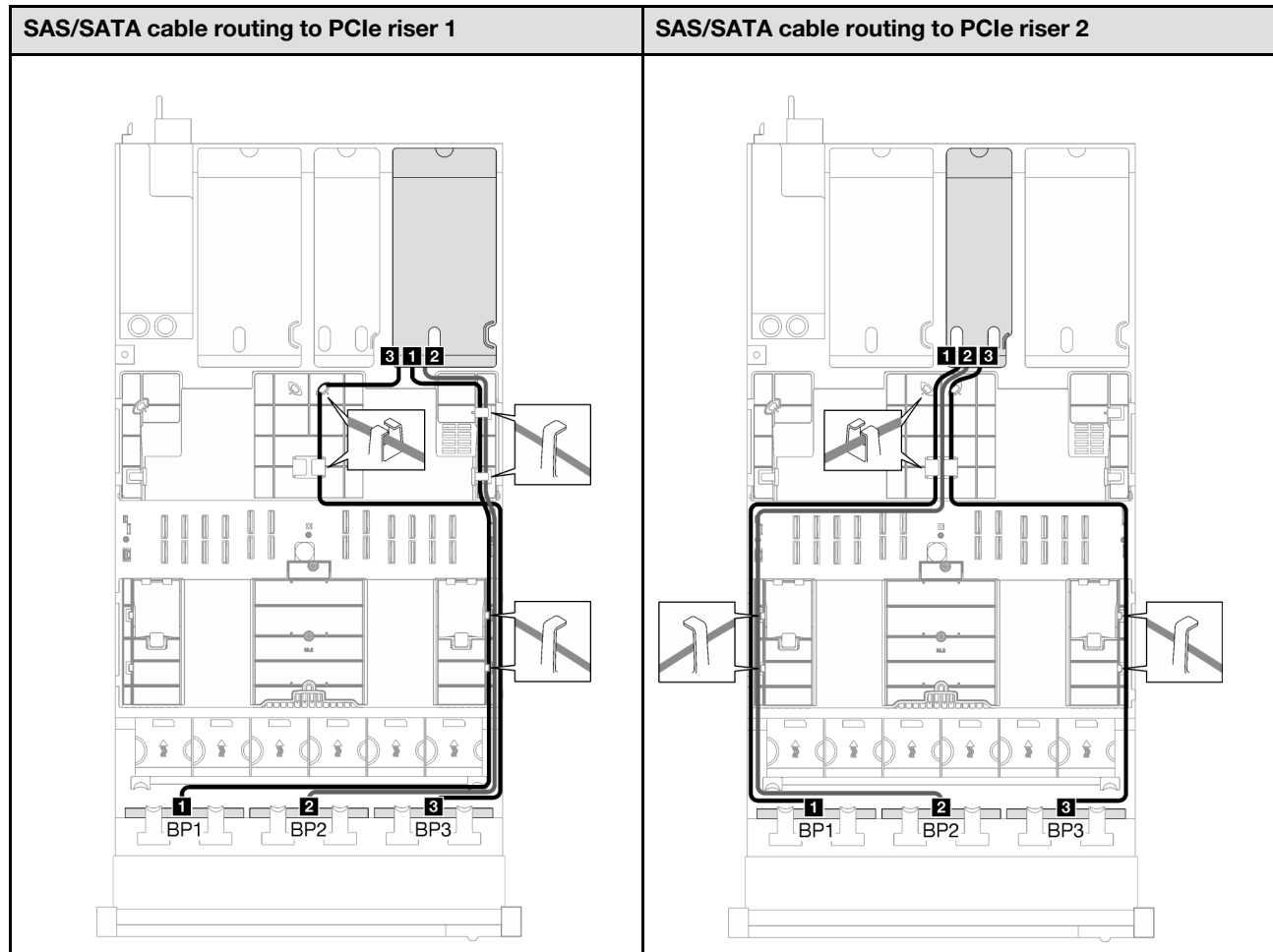
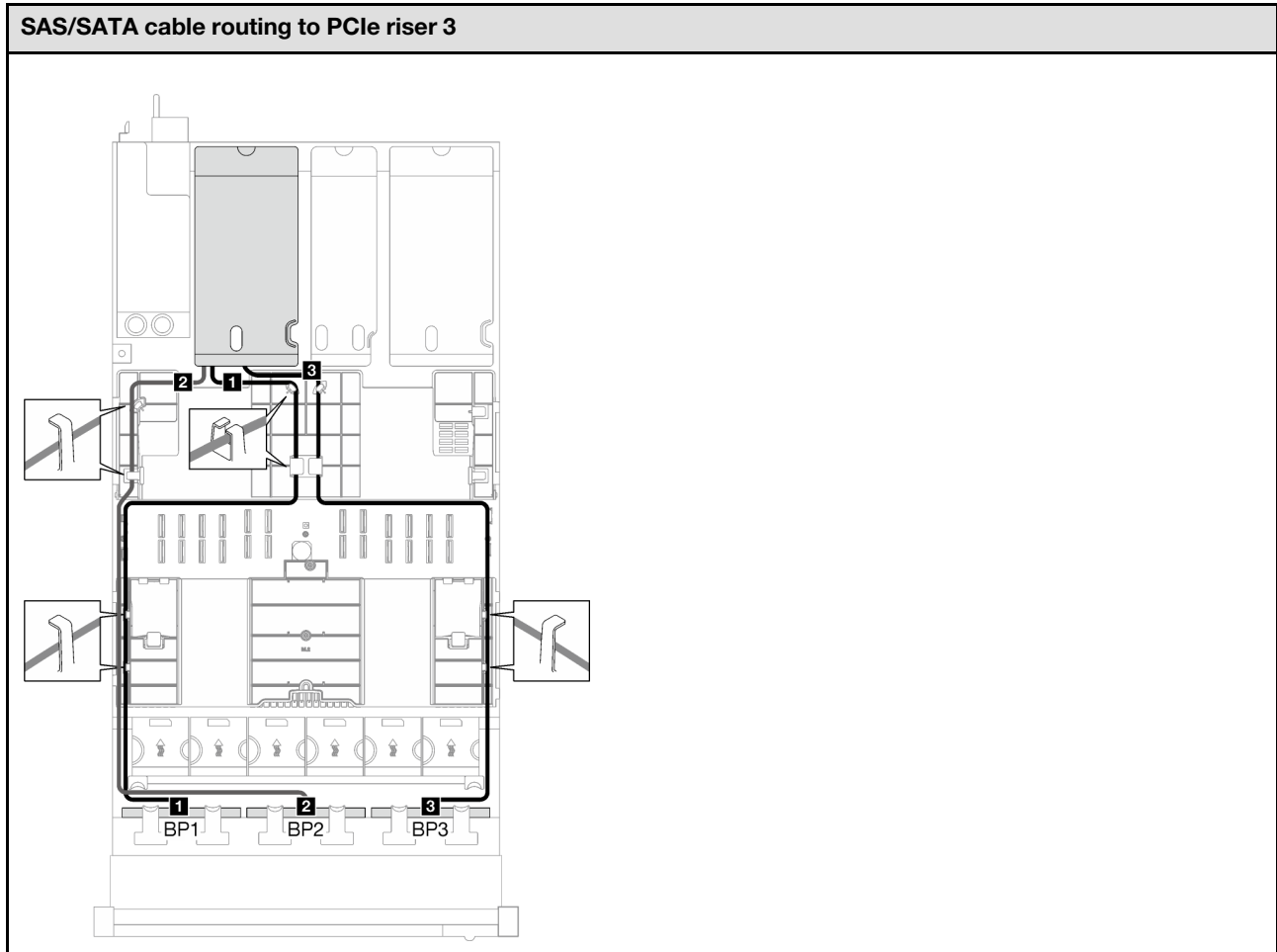
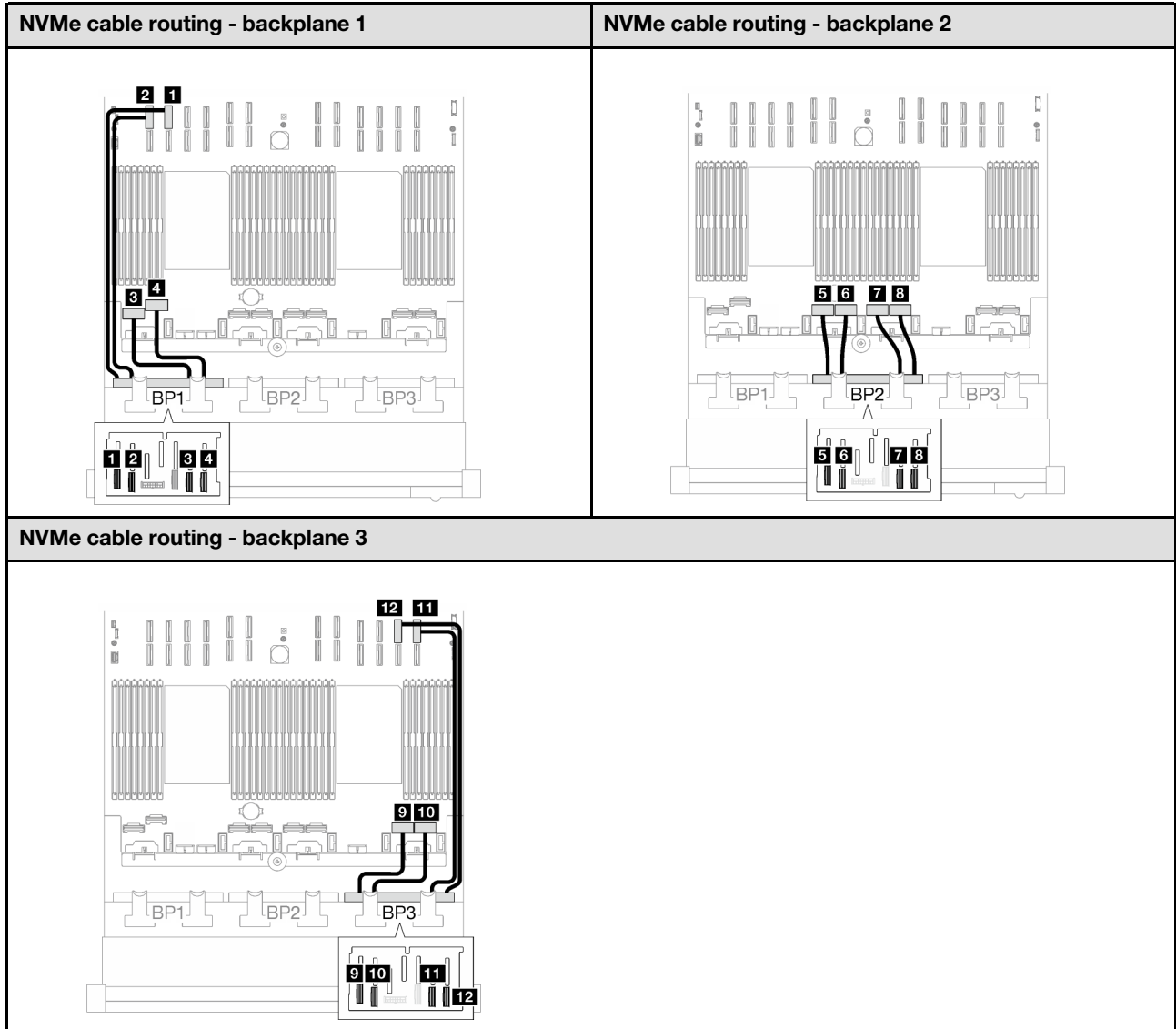


Table 52. SAS/SATA cable routing (continued)



Cable	From	To
<b>1</b>	Backplane 1: SAS/SATA	16i adapter: <ul style="list-style-type: none"> <li>• Gen4: C0</li> <li>• Gen3: C0, C1</li> </ul>
<b>2</b>	Backplane 2: SAS/SATA	16i adapter: <ul style="list-style-type: none"> <li>• Gen4: C1</li> <li>• Gen3: C2, C3</li> </ul>
<b>3</b>	Backplane 3: SAS/SATA	8i adapter: <ul style="list-style-type: none"> <li>• Gen4: C0</li> <li>• Gen3: C0, C1</li> </ul>



Cable	From	To	Cable length
<b>1</b>	Backplane 1: NVMe 0-1	System board assembly: NVMe 10 connector	420 mm
<b>2</b>	Backplane 1: NVMe 2-3	System board assembly: NVMe 9 connector	420 mm
<b>3</b>	Backplane 1: NVMe 4-5	System board assembly: NVMe 1 connector	150 mm
<b>4</b>	Backplane 1: NVMe 6-7	System board assembly: NVMe 2 connector	150 mm
<b>5</b>	Backplane 2: NVMe 0-1	System board assembly: NVMe 3 connector	150 mm
<b>6</b>	Backplane 2: NVMe 2-3	System board assembly: NVMe 4 connector	150 mm
<b>7</b>	Backplane 2: NVMe 4-5	System board assembly: NVMe 5 connector	150 mm

Cable	From	To	Cable length
<b>8</b>	Backplane 2: NVMe 6-7	System board assembly: NVMe 6 connector	150 mm
<b>9</b>	Backplane 3: NVMe 0-1	System board assembly: NVMe 7 connector	150 mm
<b>10</b>	Backplane 3: NVMe 2-3	System board assembly: NVMe 8 connector	150 mm
<b>11</b>	Backplane 3: NVMe 4-5	System board assembly: NVMe 12 connector	420 mm
<b>12</b>	Backplane 3: NVMe 6-7	System board assembly: NVMe 11 connector	420 mm

### 8i + 16i RAID adapter (Tri-mode)

Based on the location of the RAID adapter, select the corresponding routing path for SAS/SATA cable from the following table.

Table 53. SAS/SATA cable routing

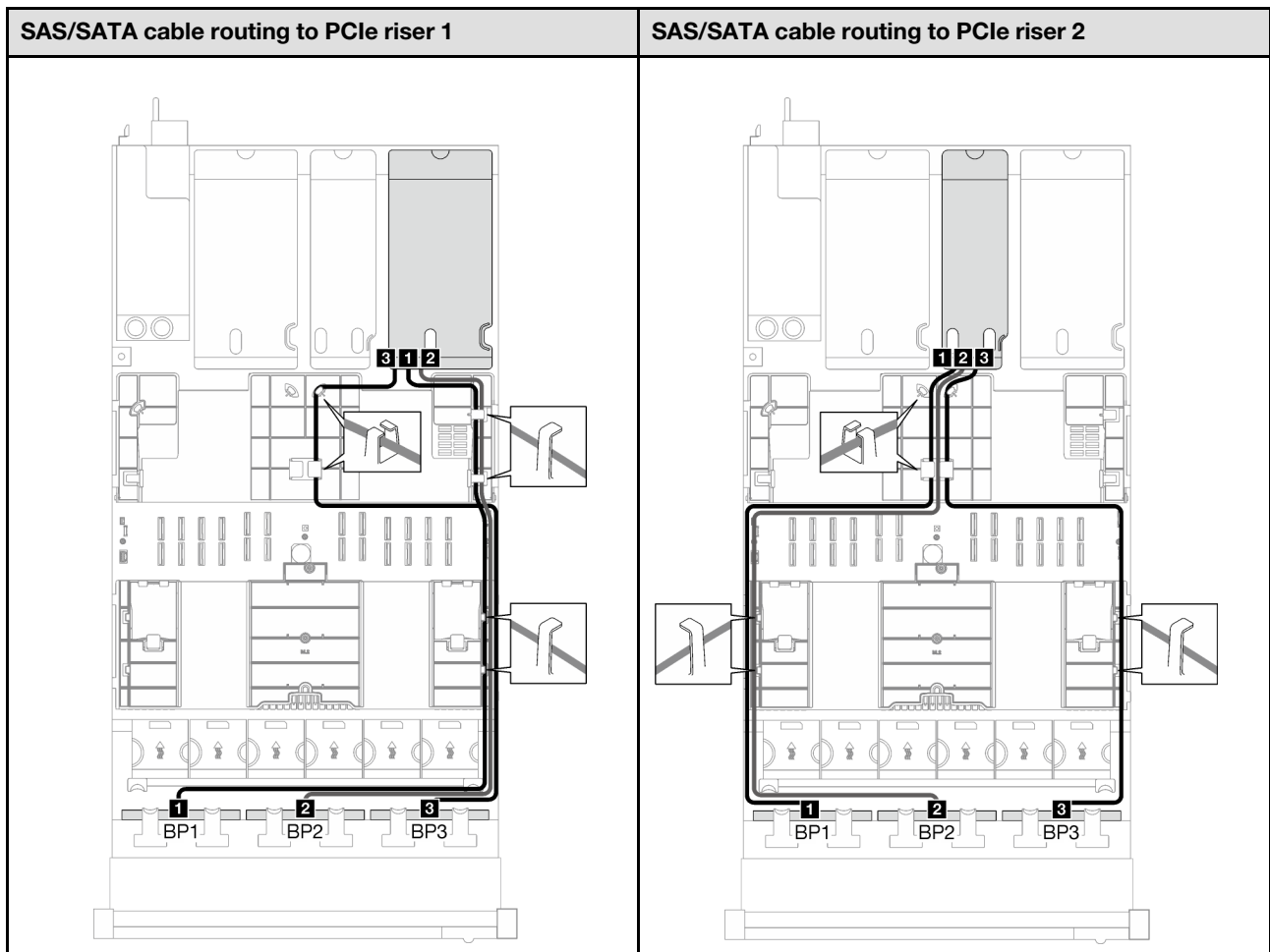
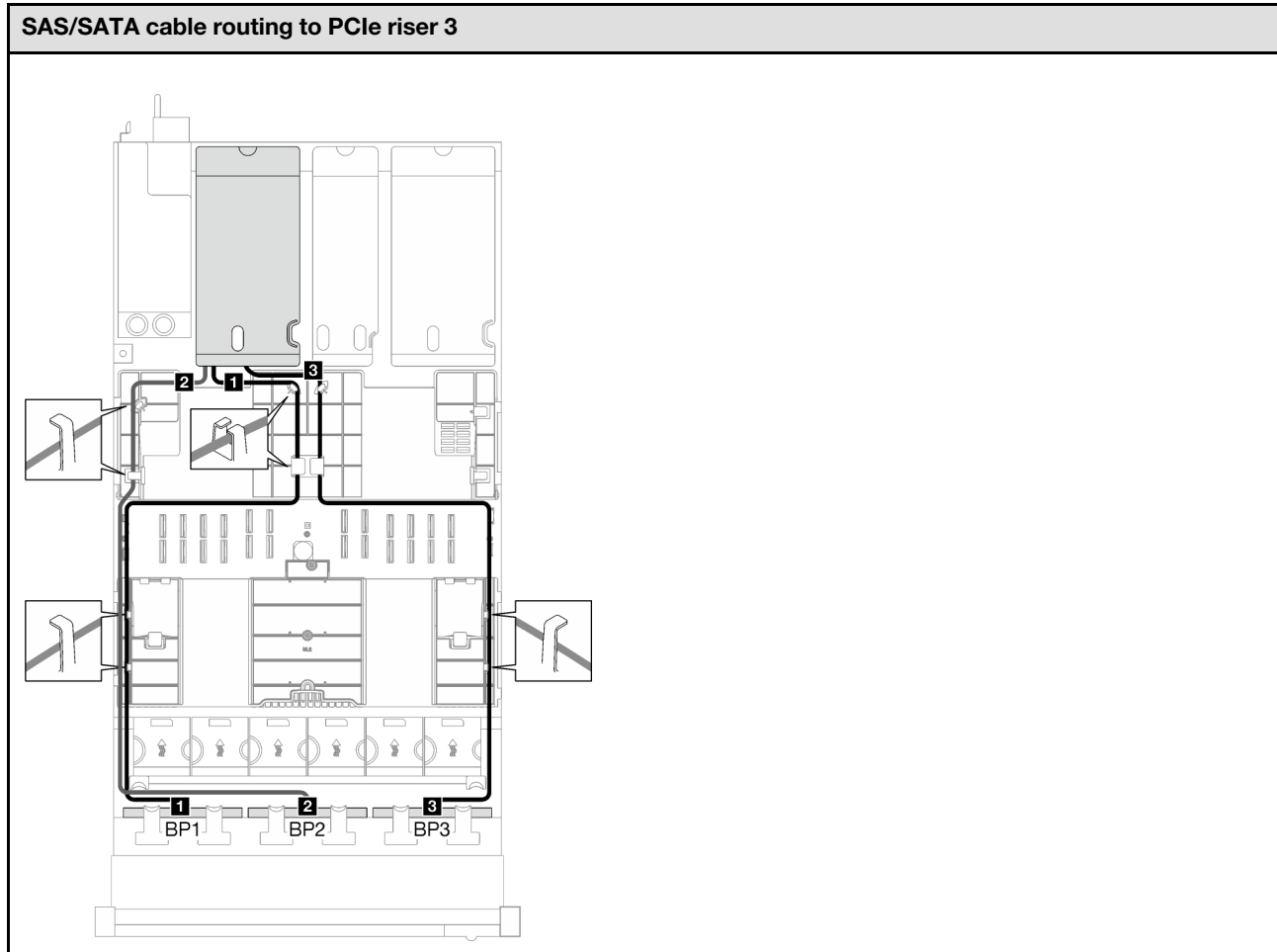


Table 53. SAS/SATA cable routing (continued)

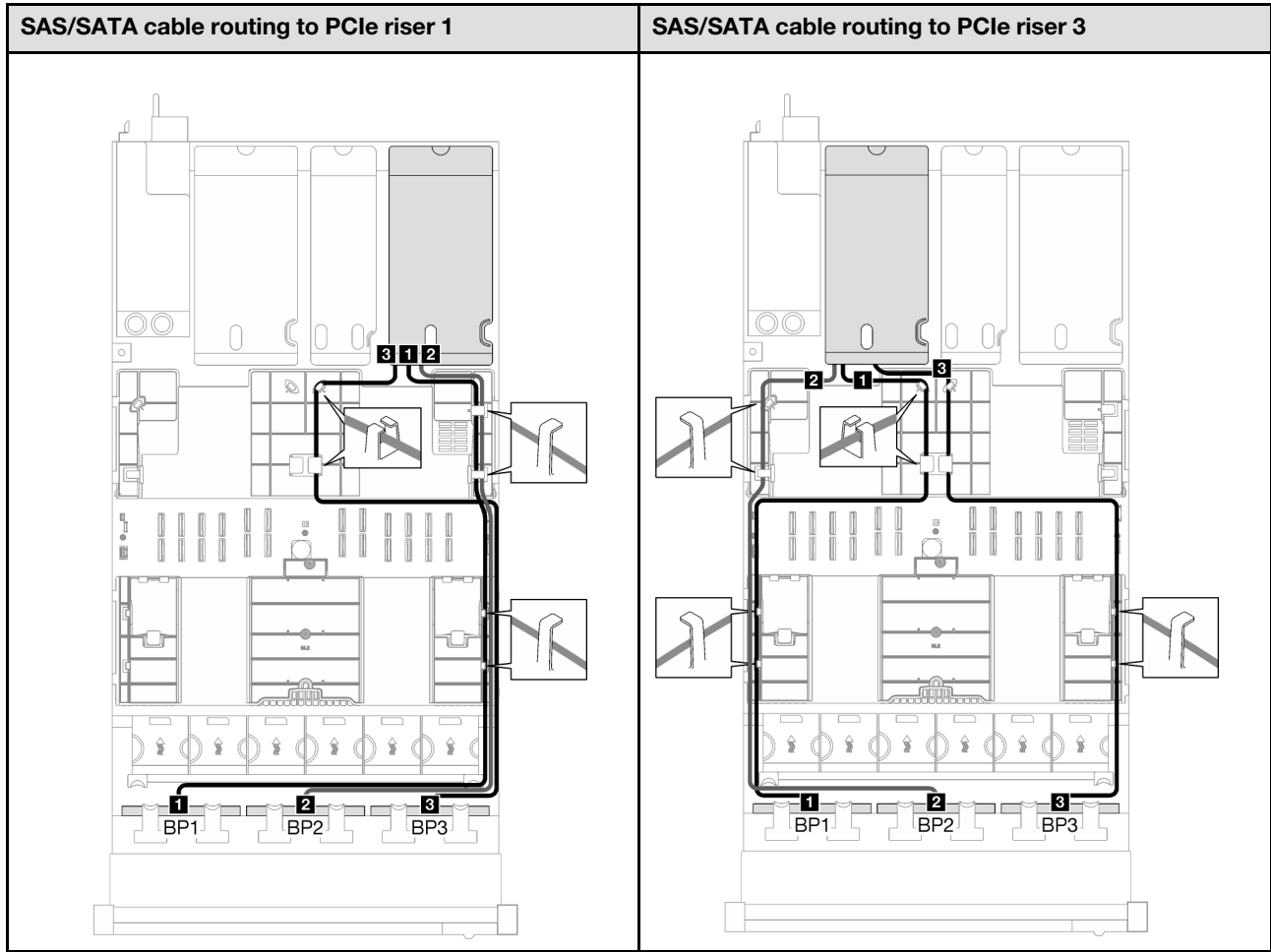


Cable	From	To
<b>1</b>	Backplane 1: SAS/SATA	16i adapter: C0
<b>2</b>	Backplane 2: SAS/SATA	16i adapter: C1
<b>3</b>	Backplane 3: SAS/SATA	8i adapter: C0

### 32i RAID adapter

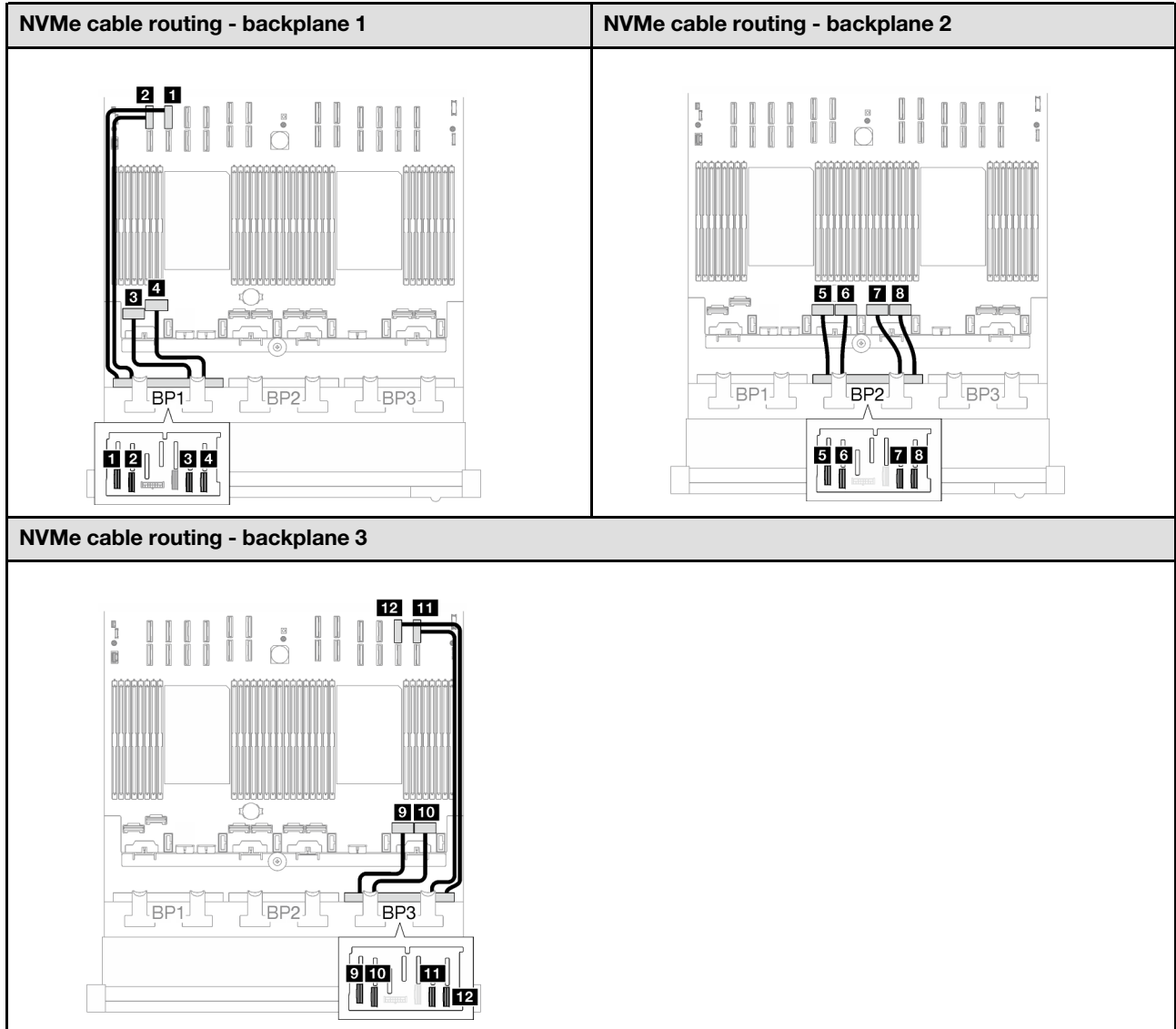
Based on the location of the RAID adapter, select the corresponding routing path for SAS/SATA cable from the following table.

Table 54. SAS/SATA cable routing



Cable	From	To
<b>1</b>	Backplane 1: SAS/SATA	32i adapter: C0
<b>2</b>	Backplane 2: SAS/SATA	32i adapter: C1
<b>3</b>	Backplane 3: SAS/SATA	32i adapter: C2





Cable	From	To	Cable length
<b>1</b>	Backplane 1: NVMe 0-1	System board assembly: NVMe 10 connector	420 mm
<b>2</b>	Backplane 1: NVMe 2-3	System board assembly: NVMe 9 connector	420 mm
<b>3</b>	Backplane 1: NVMe 4-5	System board assembly: NVMe 1 connector	150 mm
<b>4</b>	Backplane 1: NVMe 6-7	System board assembly: NVMe 2 connector	150 mm
<b>5</b>	Backplane 2: NVMe 0-1	System board assembly: NVMe 3 connector	150 mm
<b>6</b>	Backplane 2: NVMe 2-3	System board assembly: NVMe 4 connector	150 mm
<b>7</b>	Backplane 2: NVMe 4-5	System board assembly: NVMe 5 connector	150 mm

Cable	From	To	Cable length
<b>8</b>	Backplane 2: NVMe 6-7	System board assembly: NVMe 6 connector	150 mm
<b>9</b>	Backplane 3: NVMe 0-1	System board assembly: NVMe 7 connector	150 mm
<b>10</b>	Backplane 3: NVMe 2-3	System board assembly: NVMe 8 connector	150 mm
<b>11</b>	Backplane 3: NVMe 4-5	System board assembly: NVMe 12 connector	420 mm
<b>12</b>	Backplane 3: NVMe 6-7	System board assembly: NVMe 11 connector	420 mm

## 2.5-inch drive backplane cable routing (server model with four PCIe risers)

Follow the instructions in this section to learn how to do 2.5-inch drive backplane cable routing for the server model with four PCIe risers.

Before starting power cable routing for the 2.5-inch drive backplanes, remove the following components:

1. Remove the fans. See [“Remove a fan” on page 106](#).
2. Remove the fan cage. See [“Remove the fan cage” on page 107](#).

### Power cable routing

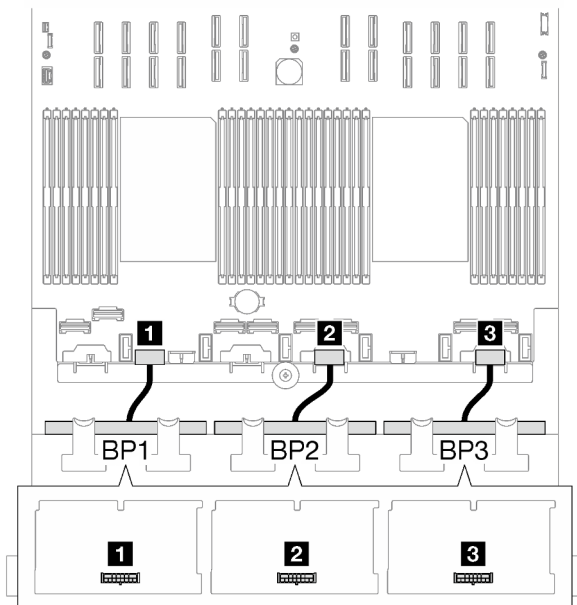


Figure 174. Power cable routing for the 2.5-inch drive backplanes

Cable	From	To
<b>1</b>	Backplane 1: Power connector	System board assembly: BP2 PWR connector
<b>2</b>	Backplane 2: Power connector	System board assembly: BP4 PWR connector
<b>3</b>	Backplane 3: Power connector	System board assembly: BP6 PWR connector

## Signal cable routing

Refer to the corresponding cable routing guide for related types of backplane:

- [“SAS/SATA backplane combinations” on page 297](#)
- [“AnyBay backplane combinations” on page 303](#)

## SAS/SATA backplane combinations

Follow the instructions in this section to learn how to do signal cable routing for the combinations with SAS/SATA backplanes.

This configuration contains the following combinations:

- [“1 x SAS/SATA backplane” on page 297](#)
- [“2 x SAS/SATA backplanes” on page 299](#)
- [“3 x SAS/SATA backplanes” on page 301](#)

### 1 x SAS/SATA backplane

Follow the instructions in this section to learn how to do cable routing for one SAS/SATA backplane.

#### Notes:

- For more information about the power cable routing, see [“2.5-inch drive backplane cable routing \(server model with four PCIe risers\)” on page 296](#).
- When routing the cables, ensure that all cables are routed appropriately through the cable guides and cable clips.
- Make sure to choose the cables based on the generation of RAID adapters that you plan to install:
  - **Gen3 RAID/HBA adapters** (9350-16i, 4350-16i, 9350-8i, 5350-8i, 4350-8i): Mini-SAS x4\*2 to SlimSAS x8 cable
  - **Gen4 RAID/HBA adapters** (940-16i, 540-16i, 440-16i, 940-8i, 540-8i, 440-8i): SlimSAS x8 to SlimSAS x8 cable

### 8i/16i RAID/HBA adapter

Based on the location of the RAID/HBA adapter, select the corresponding routing path for SAS/SATA cable from the following table.

Table 55. SAS/SATA cable routing

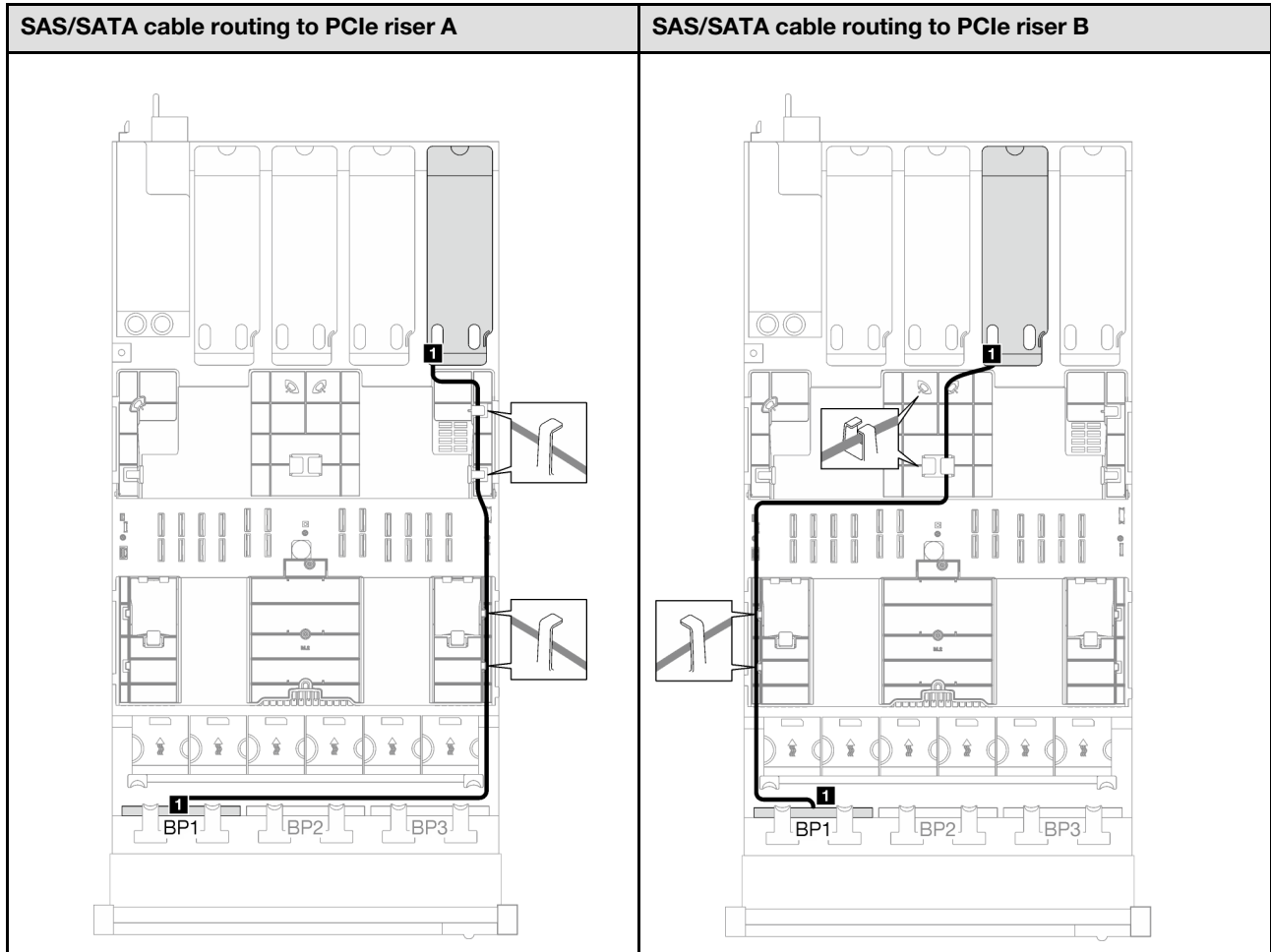
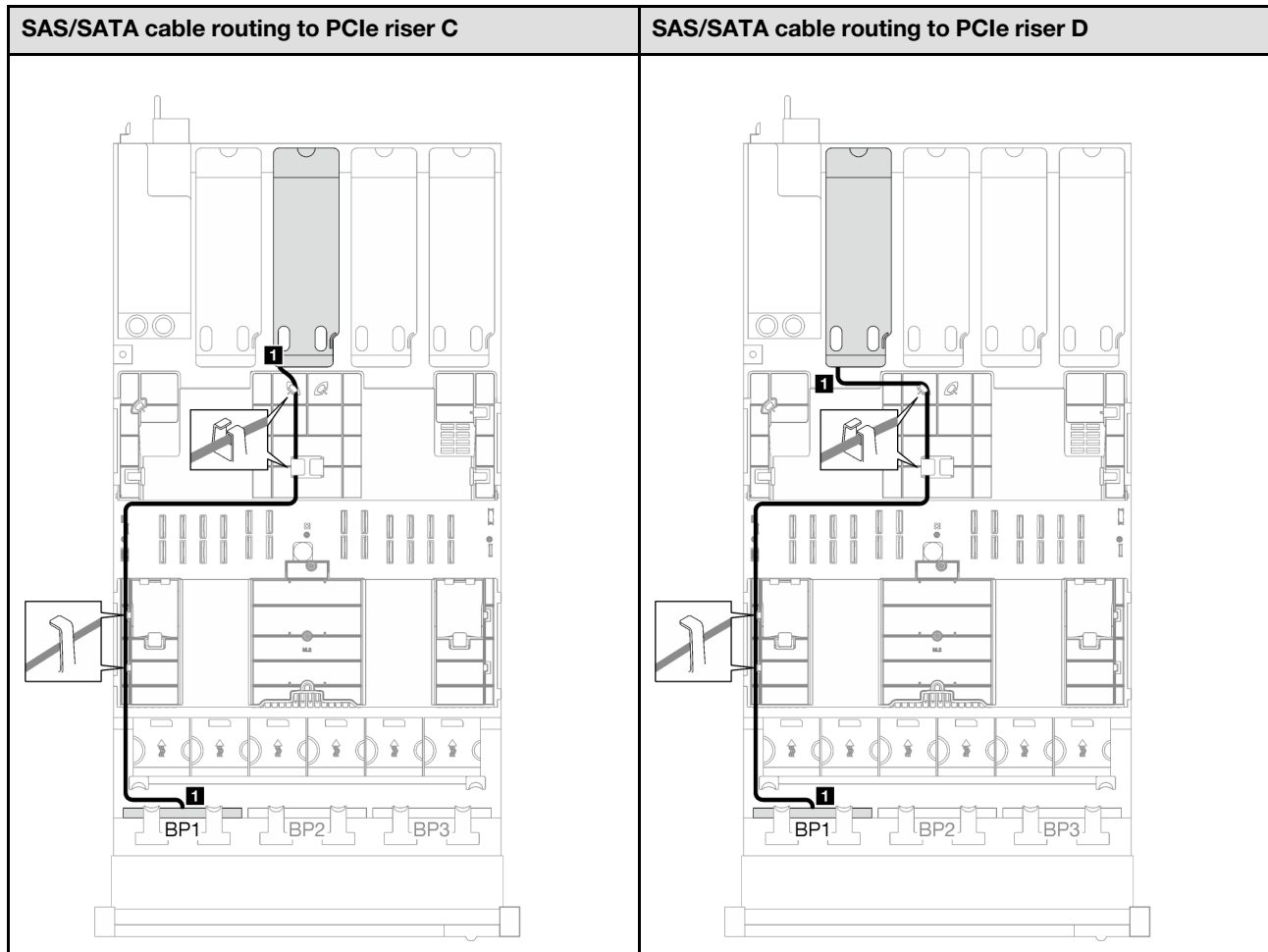


Table 55. SAS/SATA cable routing (continued)



Cable	From	To
1	Backplane 1: SAS/SATA	8i/16i adapter: <ul style="list-style-type: none"> <li>• Gen4: C0</li> <li>• Gen3: C0, C1</li> </ul>

## 2 x SAS/SATA backplanes

Follow the instructions in this section to learn how to do cable routing for two SAS/SATA backplanes.

### Notes:

- For more information about the power cable routing, see [“2.5-inch drive backplane cable routing \(server model with four PCIe risers\)”](#) on page 296.
- When routing the cables, ensure that all cables are routed appropriately through the cable guides and cable clips.
- Make sure to choose the cables based on the generation of RAID adapters that you plan to install:
  - **Gen3 RAID/HBA adapters** (9350-16i, 4350-16i, 9350-8i, 5350-8i, 4350-8i): Mini-SAS x4\*2 to SlimSAS x8 cable
  - **Gen4 RAID/HBA adapters** (940-16i, 540-16i, 440-16i, 940-8i, 540-8i, 440-8i): SlimSAS x8 to SlimSAS x8 cable

## 16i RAID/HBA adapter

Based on the location of the RAID/HBA adapter, select the corresponding routing path for SAS/SATA cable from the following table.

Table 56. SAS/SATA cable routing

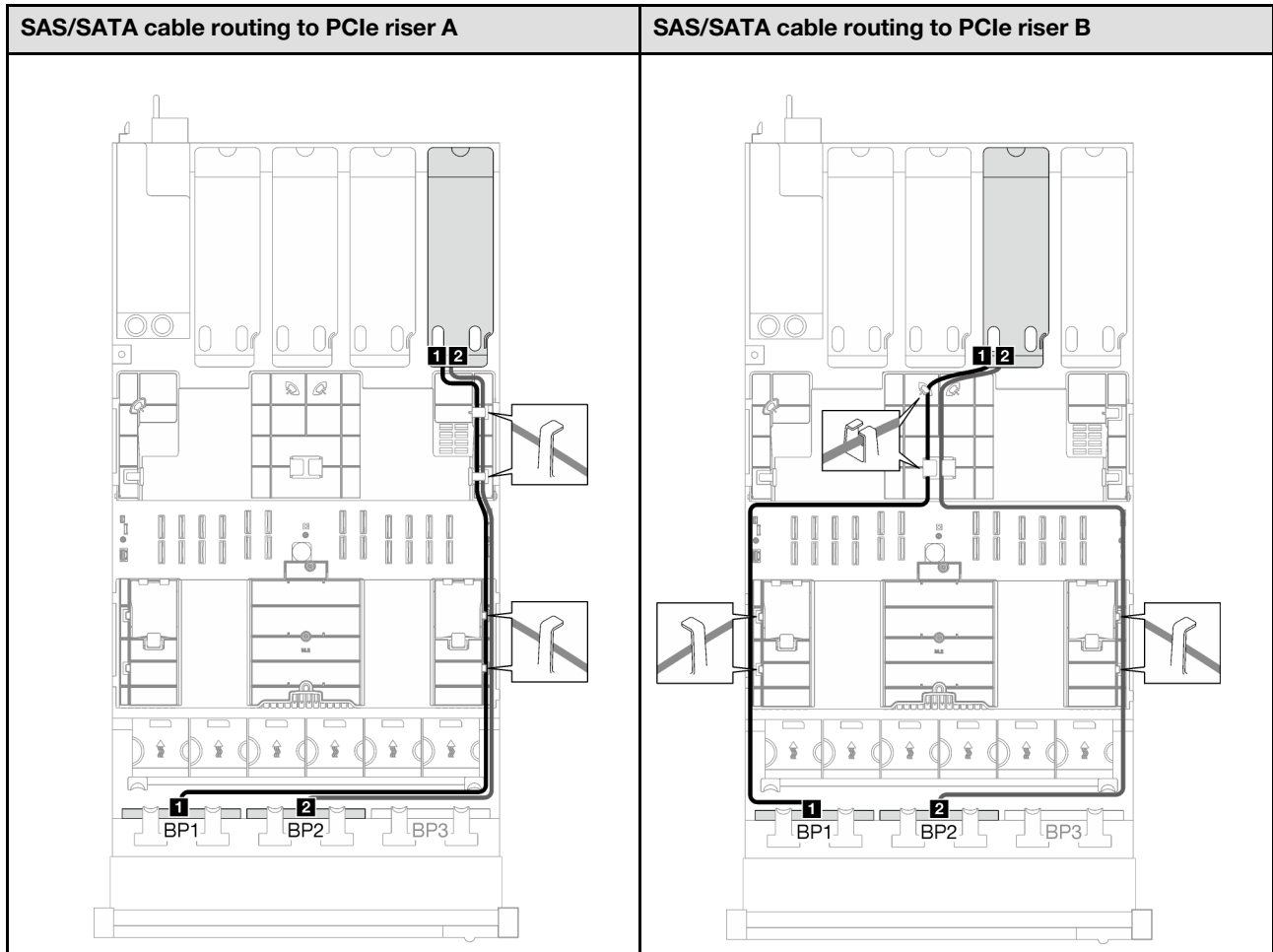
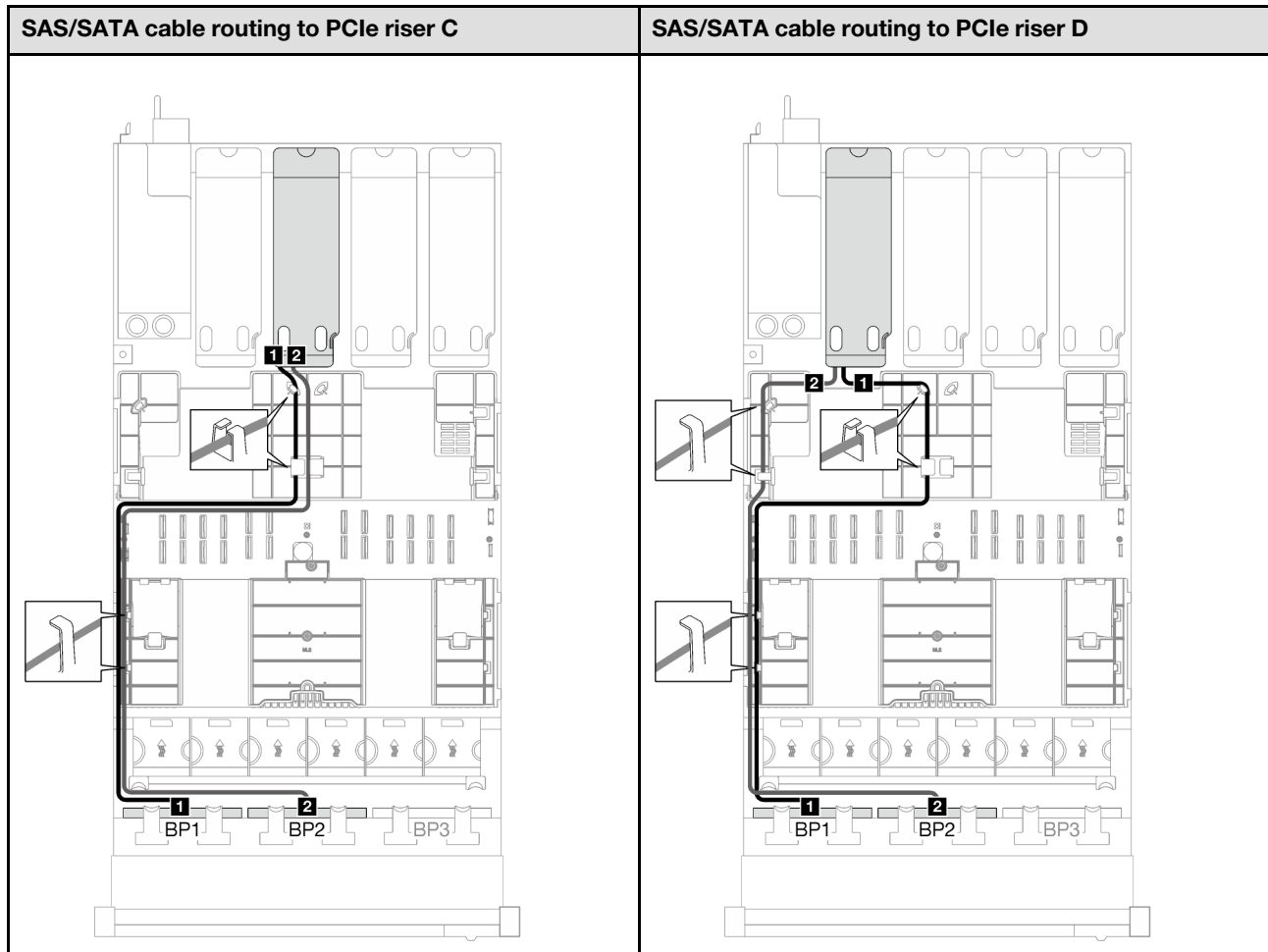


Table 56. SAS/SATA cable routing (continued)



Cable	From	To
<b>1</b>	Backplane 1: SAS/SATA	16i adapter: • Gen4: C0 • Gen3: C0, C1
<b>2</b>	Backplane 2: SAS/SATA	16i adapter: • Gen4: C1 • Gen3: C2, C3

### 3 x SAS/SATA backplanes

Follow the instructions in this section to learn how to do cable routing for three SAS/SATA backplanes.

#### Notes:

- For more information about the power cable routing, see [“2.5-inch drive backplane cable routing \(server model with four PCIe risers\)”](#) on page 296.
- When routing the cables, ensure that all cables are routed appropriately through the cable guides and cable clips.
- Make sure to choose the cables based on the generation of RAID adapters that you plan to install:
  - **Gen3 RAID/HBA adapters** (9350-16i, 4350-16i, 9350-8i, 5350-8i, 4350-8i): Mini-SAS x4\*2 to SlimSAS x8 cable

- **Gen4 RAID/HBA adapters** (940-16i, 540-16i, 440-16i, 940-8i, 540-8i, 440-8i): SlimSAS x8 to SlimSAS x8 cable

**8i + 16i RAID/HBA adapter**

Based on the location of the RAID/HBA adapter, select the corresponding routing path for SAS/SATA cable from the following table.

Table 57. SAS/SATA cable routing

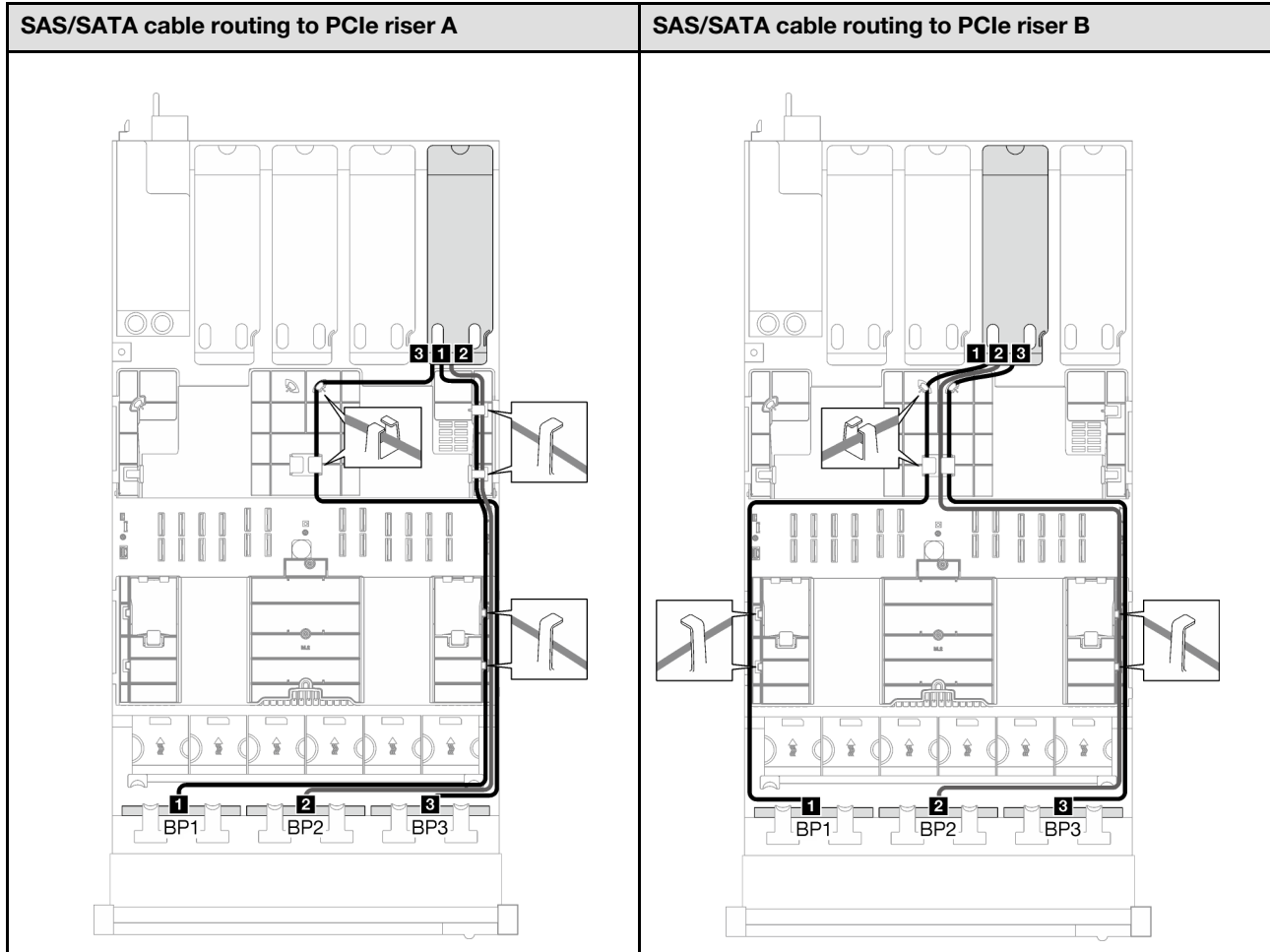
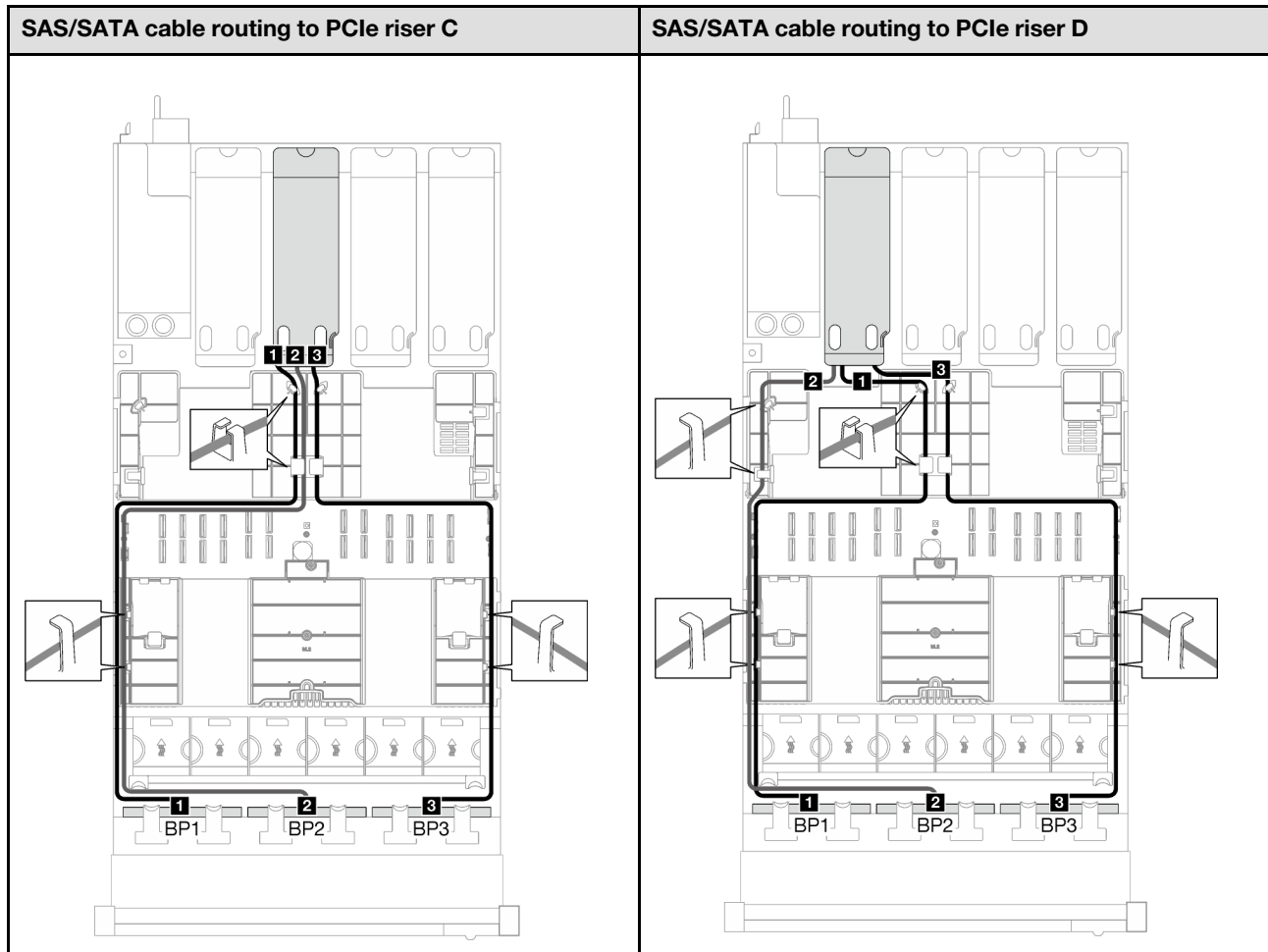




Table 57. SAS/SATA cable routing (continued)



Cable	From	To
<b>1</b>	Backplane 1: SAS/SATA	16i adapter <ul style="list-style-type: none"> <li>• Gen4: C0</li> <li>• Gen3: C0, C1</li> </ul>
<b>2</b>	Backplane 2: SAS/SATA	16i adapter <ul style="list-style-type: none"> <li>• Gen4: C1</li> <li>• Gen3: C2, C3</li> </ul>
<b>3</b>	Backplane 3: SAS/SATA	8i adapter <ul style="list-style-type: none"> <li>• Gen4: C0</li> <li>• Gen3: C0, C1</li> </ul>

### AnyBay backplane combinations

Follow the instructions in this section to learn how to do signal cable routing for the combinations with AnyBay backplanes.

This configuration contains the following combinations:

- “1 x AnyBay backplane” on page 304
- “1 x AnyBay + 1 x SAS/SATA backplanes” on page 310
- “1 x AnyBay + 2 x SAS/SATA backplanes” on page 313

- “2 x AnyBay backplanes” on page 315
- “2 x AnyBay + 1 x SAS/SATA backplanes” on page 322
- “3 x AnyBay backplanes” on page 324

### 1 x AnyBay backplane

Follow the instructions in this section to learn how to do cable routing for one AnyBay backplane.

#### Notes:

- For more information about the power cable routing, see “2.5-inch drive backplane cable routing (server model with four PCIe risers)” on page 296.
- When routing the cables, ensure that all cables are routed appropriately through the cable guides and cable clips.
- Make sure to choose the cables based on the generation of RAID adapters that you plan to install:
  - **Gen3 RAID/HBA adapters** (9350-16i, 4350-16i, 9350-8i, 5350-8i, 4350-8i): Mini-SAS x4\*2 to SlimSAS x8 cable
  - **Gen4 RAID/HBA adapters** (940-16i, 540-16i, 440-16i, 940-8i, 540-8i, 440-8i): SlimSAS x8 to SlimSAS x8 cable

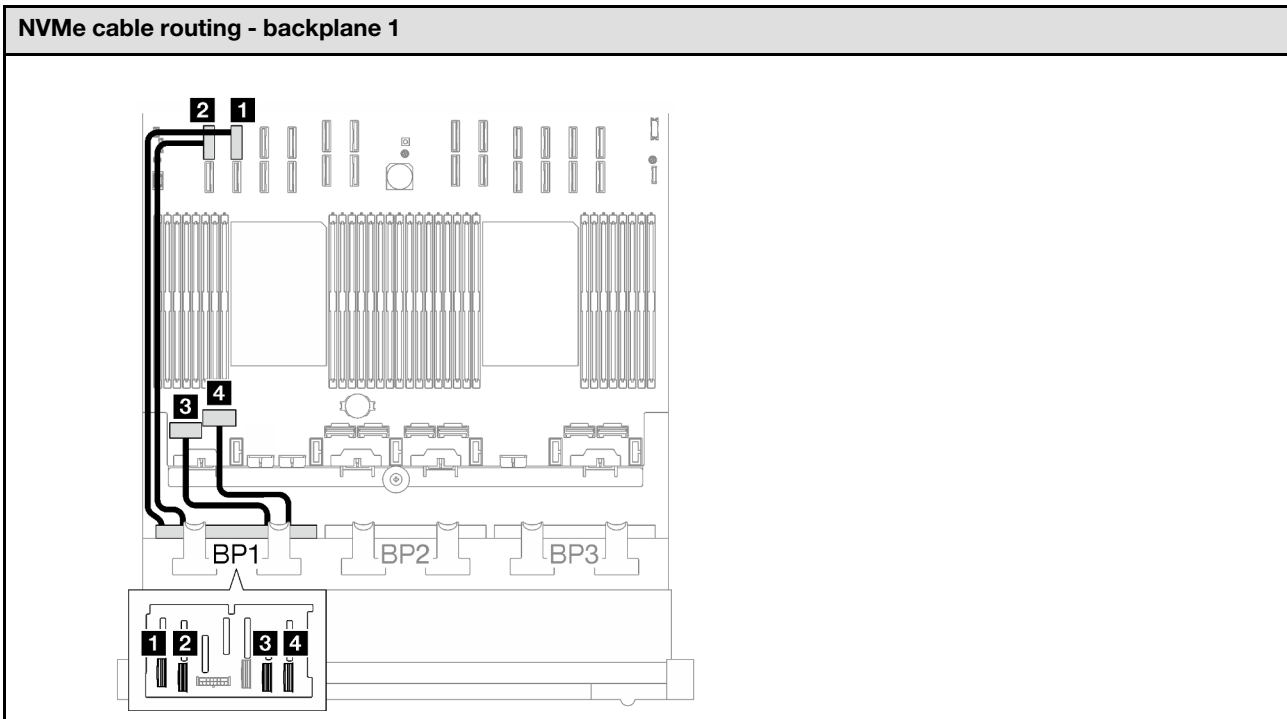
This configuration contains the following storage controller combinations:

- “No RAID/HBA adapter” on page 304
- “8i/16i RAID/HBA adapter” on page 305
- “8i/16i RAID adapter (Tri-mode)” on page 307

#### No RAID/HBA adapter

**Note:** The AnyBay backplane is used as a pure NVMe backplane when no RAID/HBA adapters are installed.

Table 58. NVMe cable routing



Cable	From	To	Cable length
<b>1</b>	Backplane 1: NVMe 0-1	System board assembly: NVMe 10 connector	420 mm
<b>2</b>	Backplane 1: NVMe 2-3	System board assembly: NVMe 9 connector	420 mm
<b>3</b>	Backplane 1: NVMe 4-5	System board assembly: NVMe 1 connector	150 mm
<b>4</b>	Backplane 1: NVMe 6-7	System board assembly: NVMe 2 connector	150 mm

### 8i/16i RAID/HBA adapter

Based on the location of the RAID/HBA adapter, select the corresponding routing path for SAS/SATA cable from the following table.

Table 59. SAS/SATA cable routing

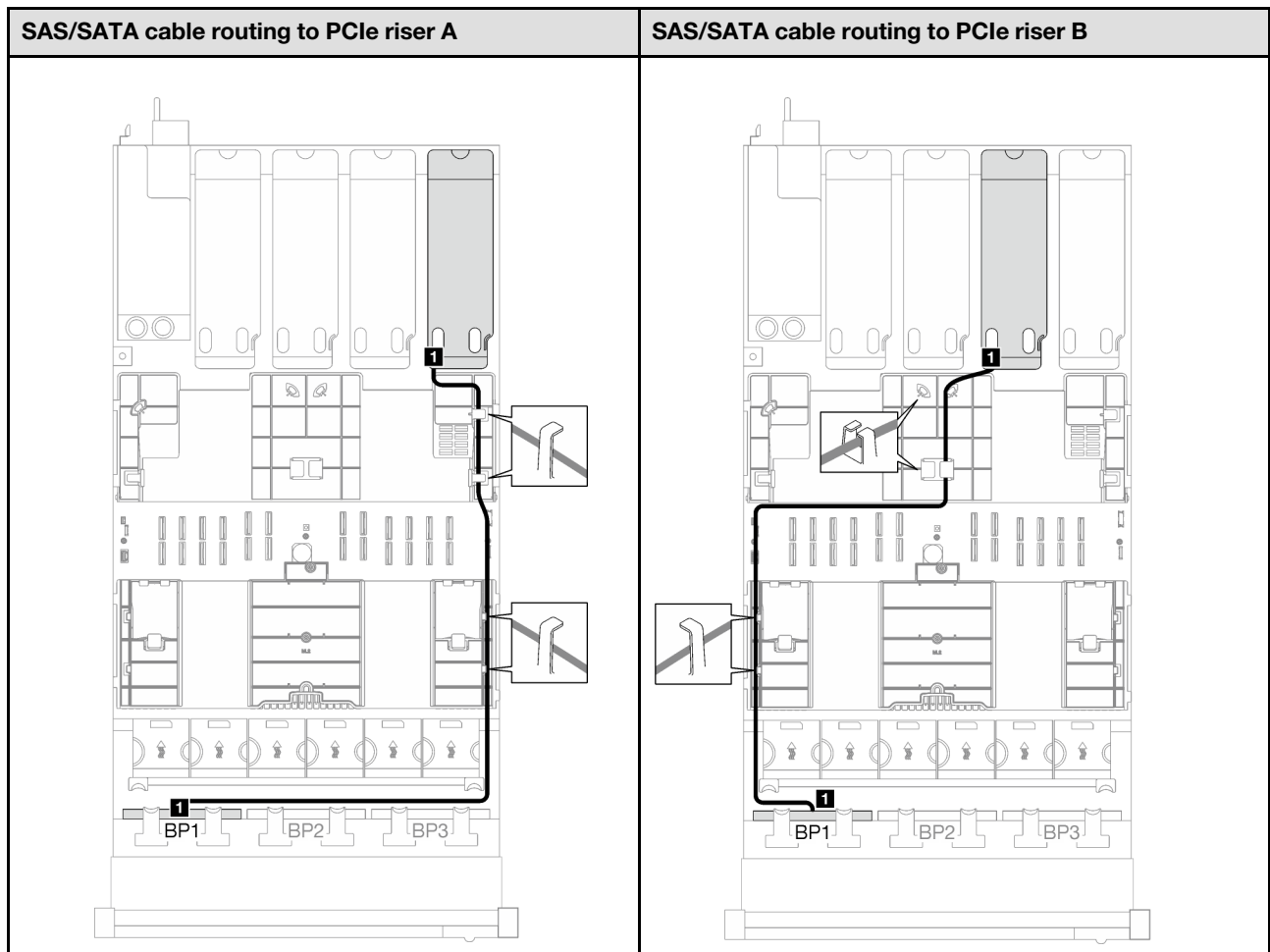
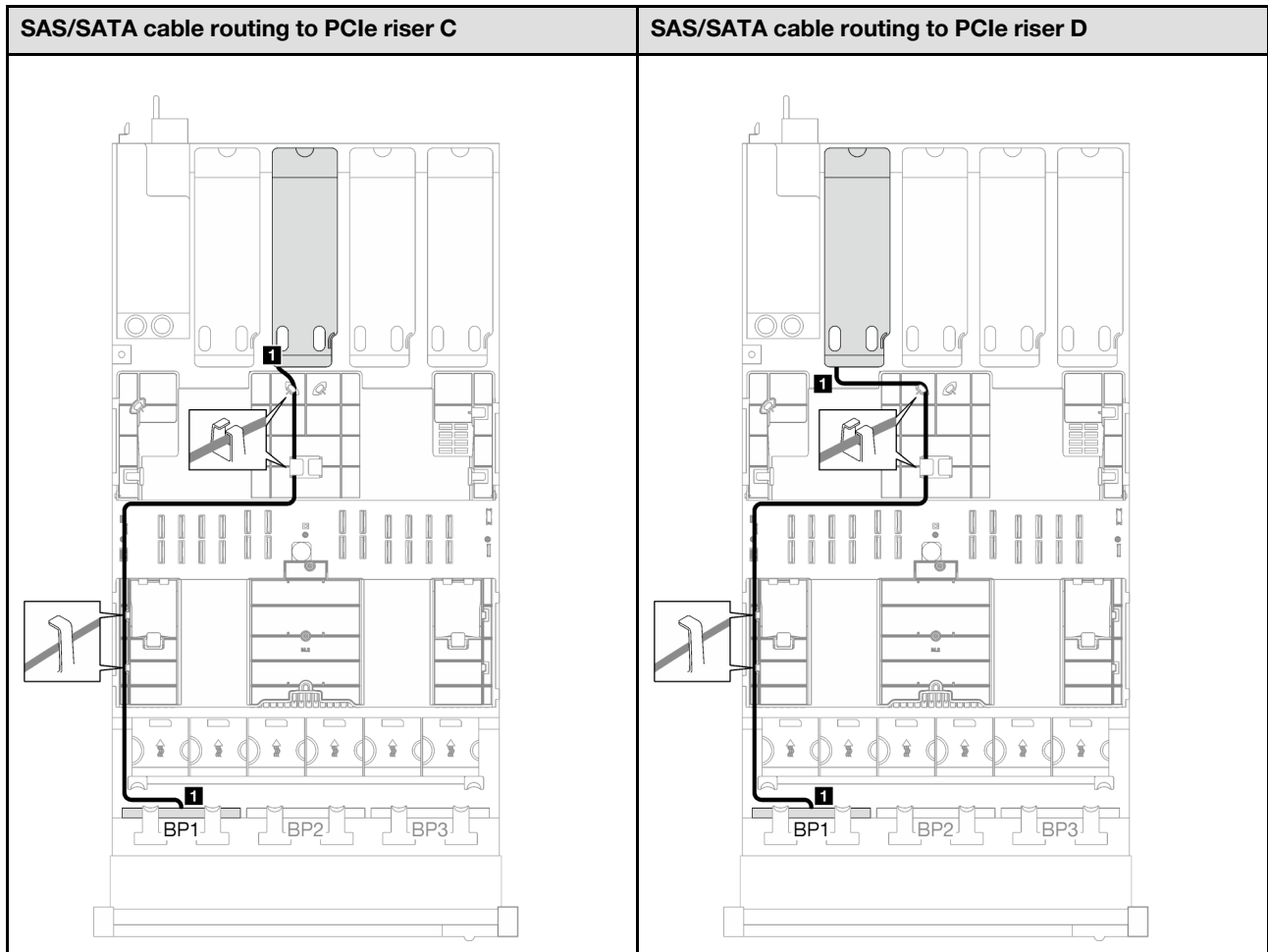
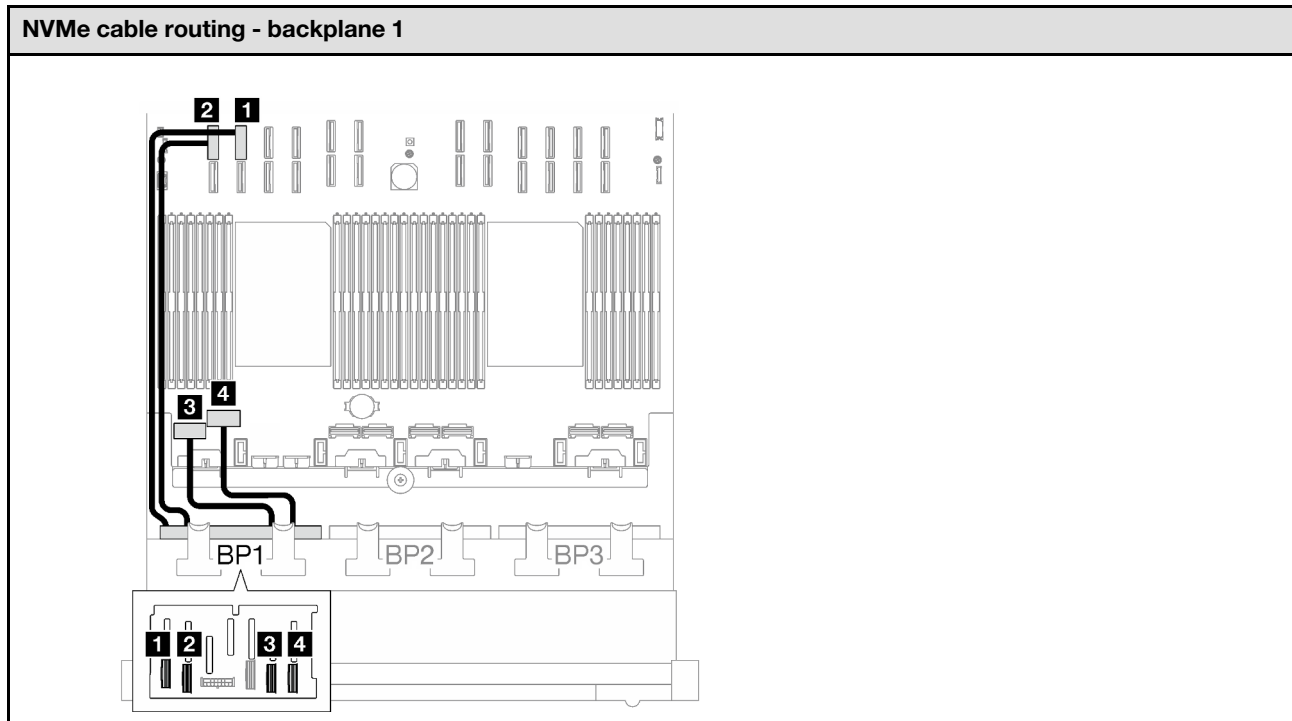


Table 59. SAS/SATA cable routing (continued)



Cable	From	To
1	Backplane 1: SAS/SATA	8i/16i adapter: <ul style="list-style-type: none"> <li>• Gen4: C0</li> <li>• Gen3: C0, C1</li> </ul>

Table 60. NVMe cable routing



Cable	From	To	Cable length
<b>1</b>	Backplane 1: NVMe 0-1	System board assembly: NVMe 10 connector	420 mm
<b>2</b>	Backplane 1: NVMe 2-3	System board assembly: NVMe 9 connector	420 mm
<b>3</b>	Backplane 1: NVMe 4-5	System board assembly: NVMe 1 connector	150 mm
<b>4</b>	Backplane 1: NVMe 6-7	System board assembly: NVMe 2 connector	150 mm

### 8i/16i RAID adapter (Tri-mode)

Based on the location of the RAID adapter, select the corresponding routing path for SAS/SATA cable from the following table.

Table 61. SAS/SATA cable routing

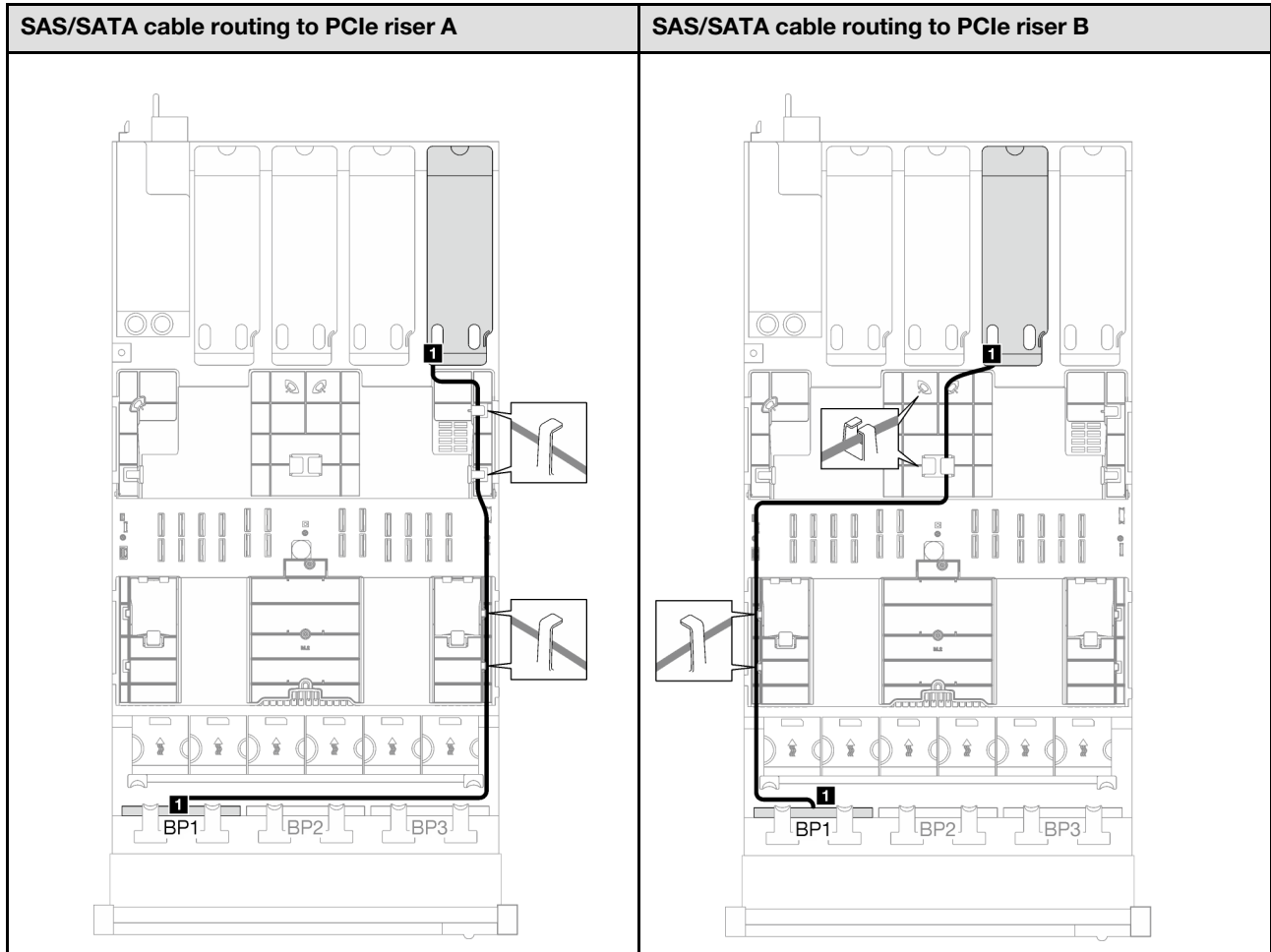
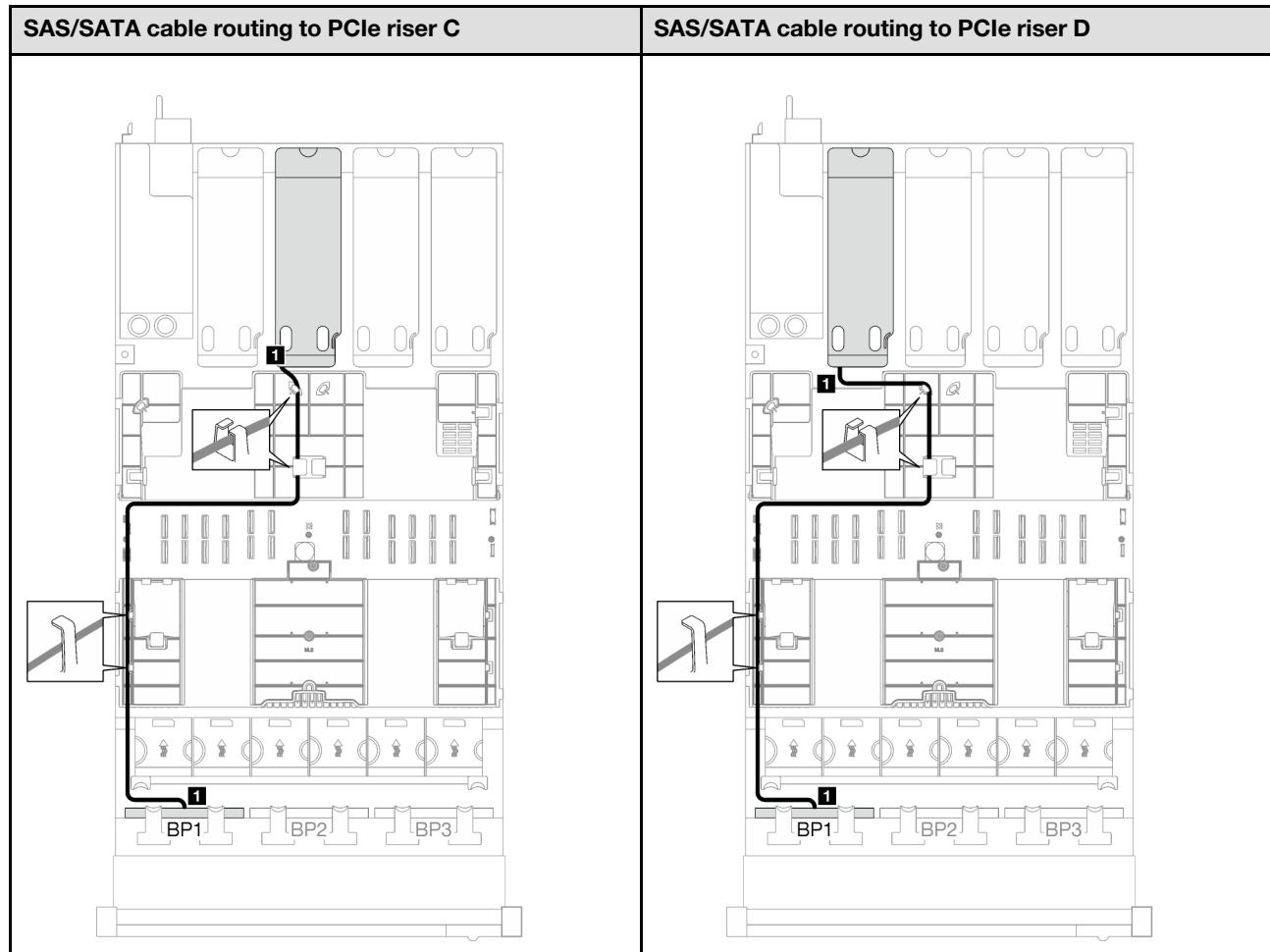


Table 61. SAS/SATA cable routing (continued)



Cable	From	To
1	Backplane 1: SAS/SATA	8i/16i adapter: C0

## 1 x AnyBay + 1 x SAS/SATA backplanes

Follow the instructions in this section to learn how to do cable routing for one AnyBay backplane and one SAS/SATA backplane.

### Notes:

- For more information about the power cable routing, see [“2.5-inch drive backplane cable routing \(server model with four PCIe risers\)”](#) on page 296.
- When routing the cables, ensure that all cables are routed appropriately through the cable guides and cable clips.
- Make sure to choose the cables based on the generation of RAID adapters that you plan to install:
  - **Gen3 RAID/HBA adapters** (9350-16i, 4350-16i, 9350-8i, 5350-8i, 4350-8i): Mini-SAS x4\*2 to SlimSAS x8 cable
  - **Gen4 RAID/HBA adapters** (940-16i, 540-16i, 440-16i, 940-8i, 540-8i, 440-8i): SlimSAS x8 to SlimSAS x8 cable

### 16i RAID/HBA adapter

Based on the location of the RAID/HBA adapter, select the corresponding routing path for SAS/SATA cable from the following table.

Table 62. SAS/SATA cable routing

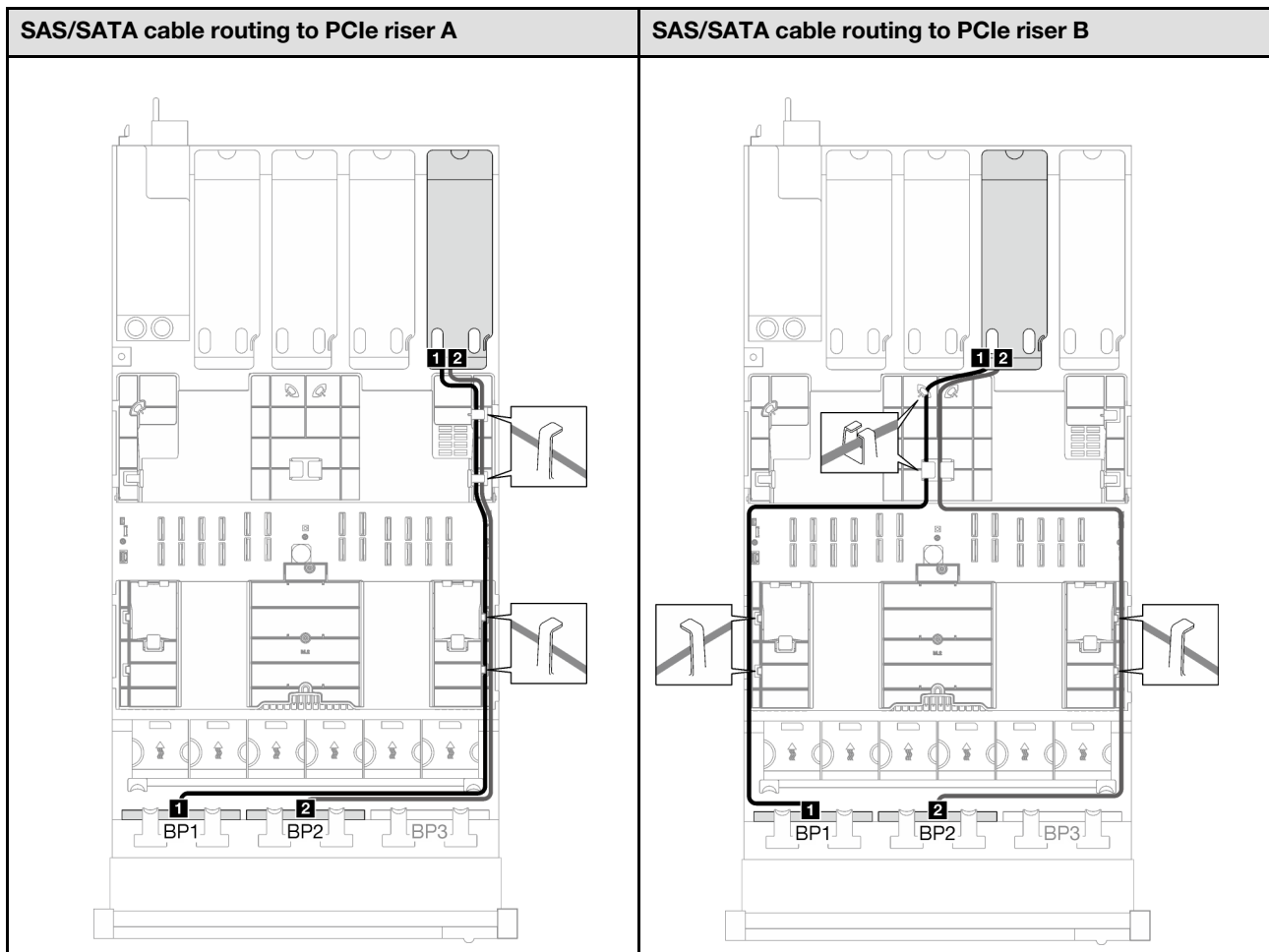
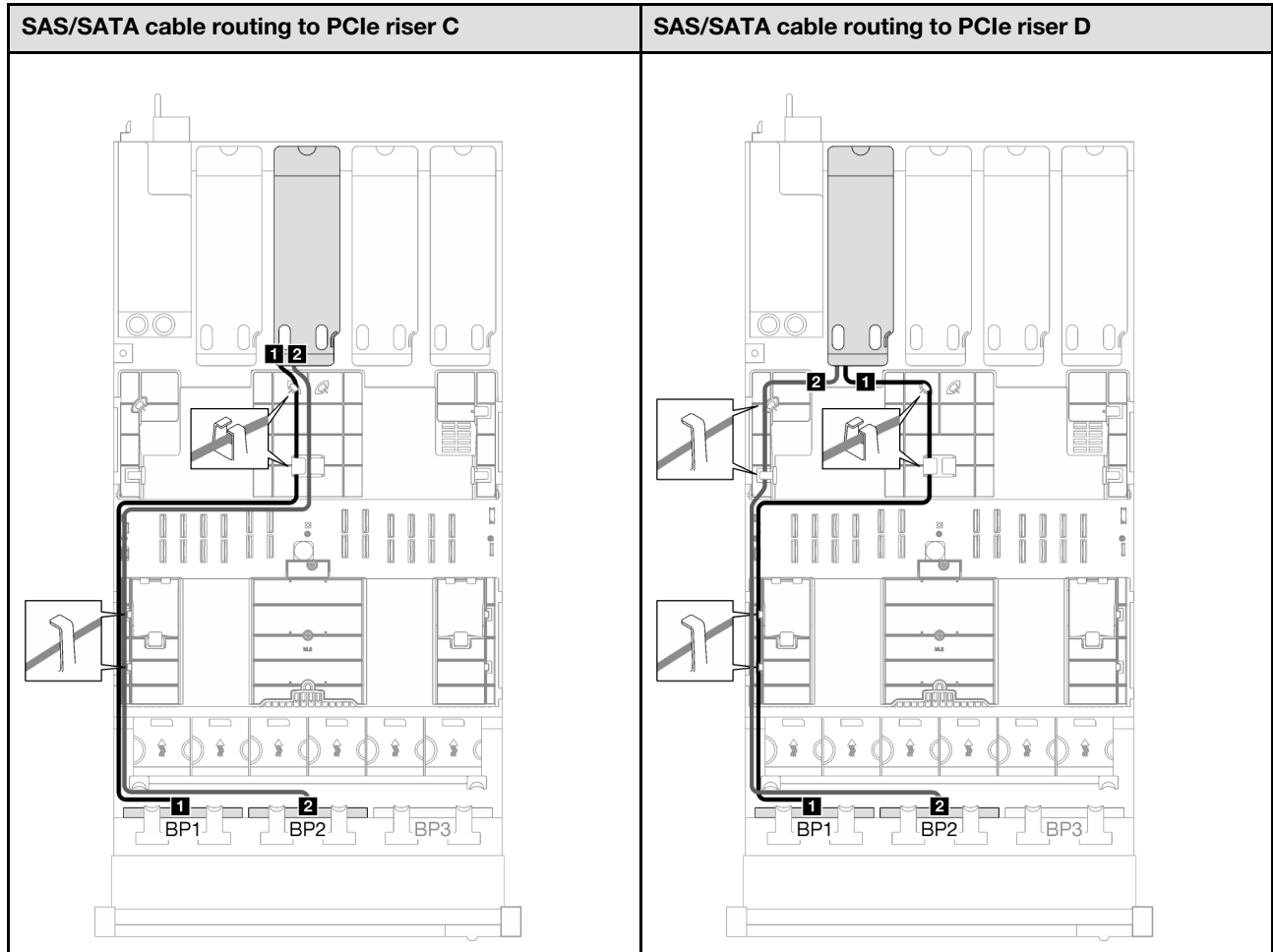


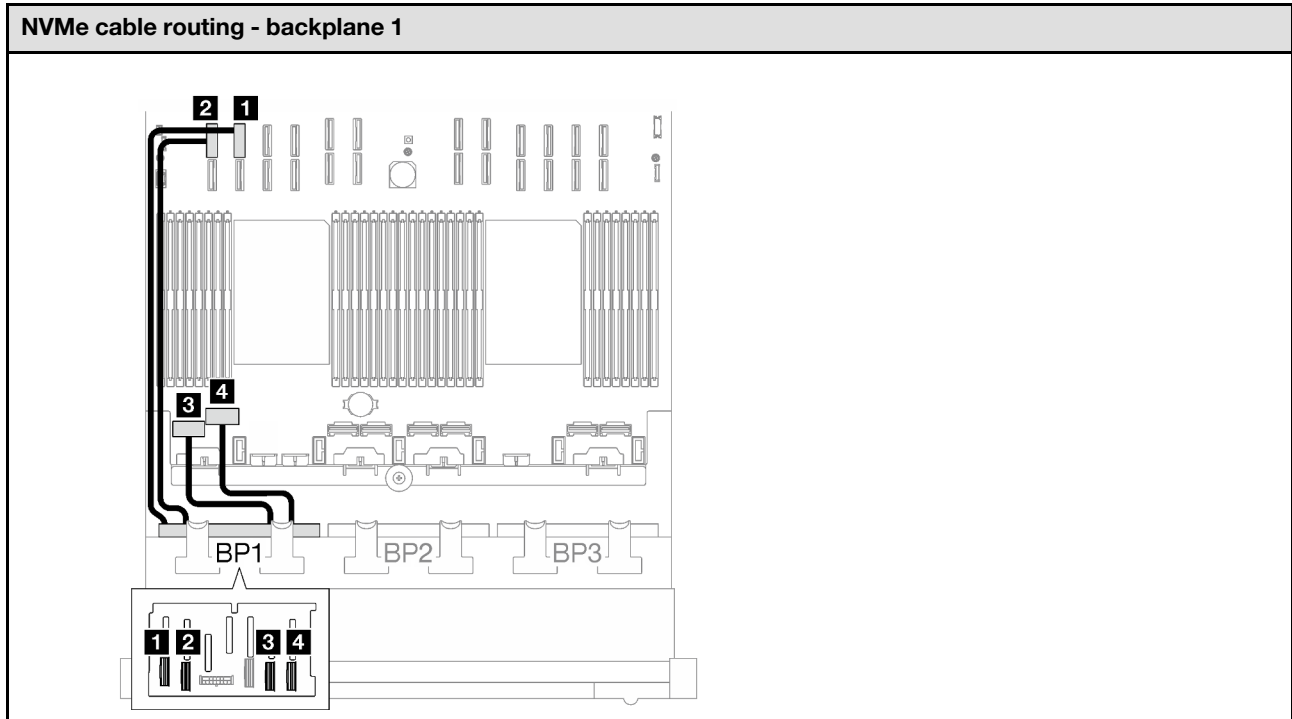


Table 62. SAS/SATA cable routing (continued)



Cable	From	To
<b>1</b>	Backplane 1: SAS/SATA	16i adapter: <ul style="list-style-type: none"> <li>• Gen4: C0</li> <li>• Gen3: C0, C1</li> </ul>
<b>2</b>	Backplane 2: SAS/SATA	16i adapter: <ul style="list-style-type: none"> <li>• Gen4: C1</li> <li>• Gen3: C2, C3</li> </ul>

Table 63. NVMe cable routing



Cable	From	To	Cable length
<b>1</b>	Backplane 1: NVMe 0-1	System board assembly: NVMe 10 connector	420 mm
<b>2</b>	Backplane 1: NVMe 2-3	System board assembly: NVMe 9 connector	420 mm
<b>3</b>	Backplane 1: NVMe 4-5	System board assembly: NVMe 1 connector	150 mm
<b>4</b>	Backplane 1: NVMe 6-7	System board assembly: NVMe 2 connector	150 mm

## 1 x AnyBay + 2 x SAS/SATA backplanes

Follow the instructions in this section to learn how to do cable routing for one AnyBay backplane and two SAS/SATA backplanes.

### Notes:

- For more information about the power cable routing, see [“2.5-inch drive backplane cable routing \(server model with four PCIe risers\)”](#) on page 296.
- When routing the cables, ensure that all cables are routed appropriately through the cable guides and cable clips.
- Make sure to choose the cables based on the generation of RAID adapters that you plan to install:
  - **Gen3 RAID/HBA adapters** (9350-16i, 4350-16i, 9350-8i, 5350-8i, 4350-8i): Mini-SAS x4\*2 to SlimSAS x8 cable
  - **Gen4 RAID/HBA adapters** (940-16i, 540-16i, 440-16i, 940-8i, 540-8i, 440-8i): SlimSAS x8 to SlimSAS x8 cable

### 8i + 16i RAID/HBA adapter

Based on the location of the RAID/HBA adapter, select the corresponding routing path for SAS/SATA cable from the following table.

Table 64. SAS/SATA cable routing

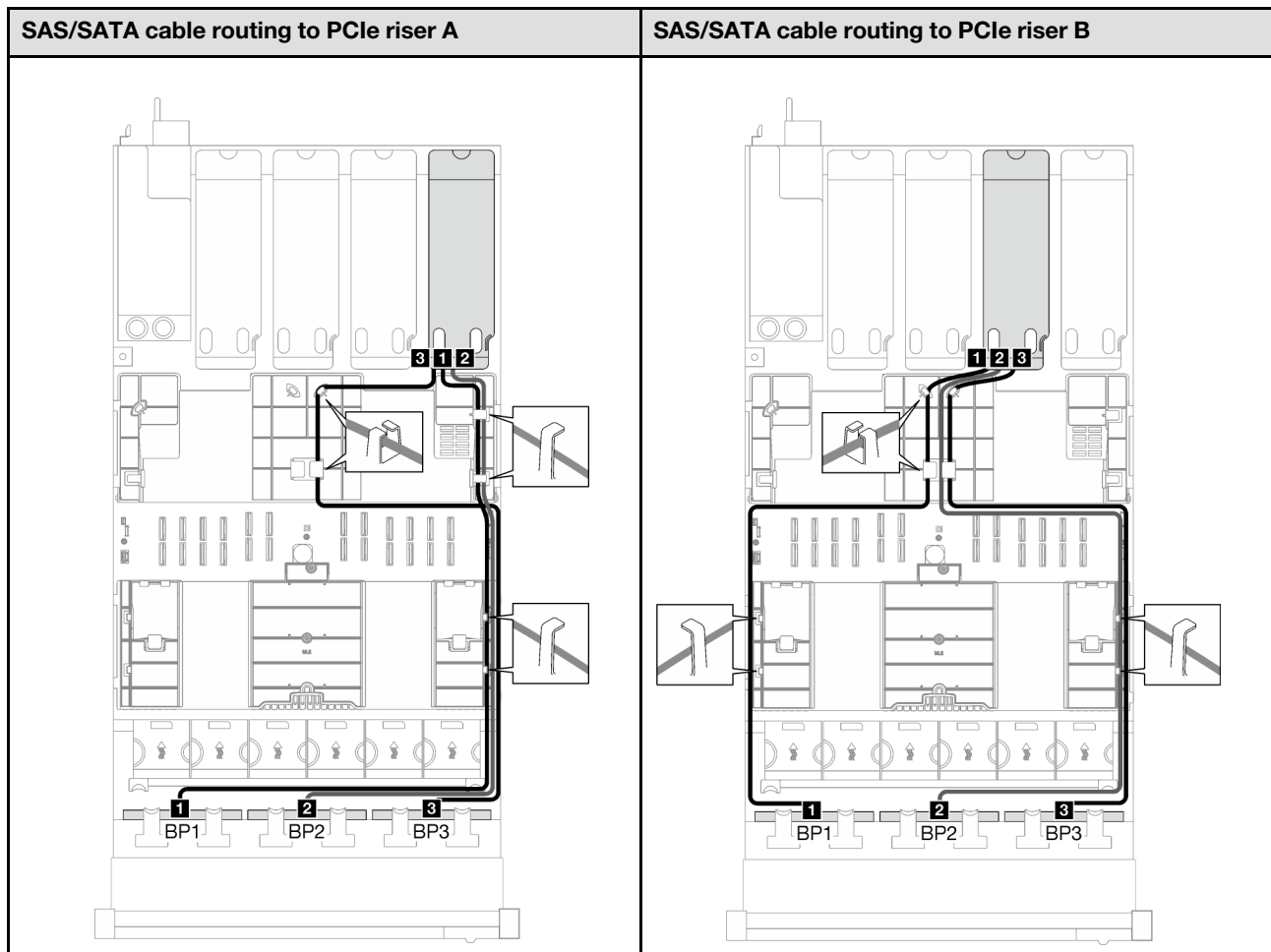
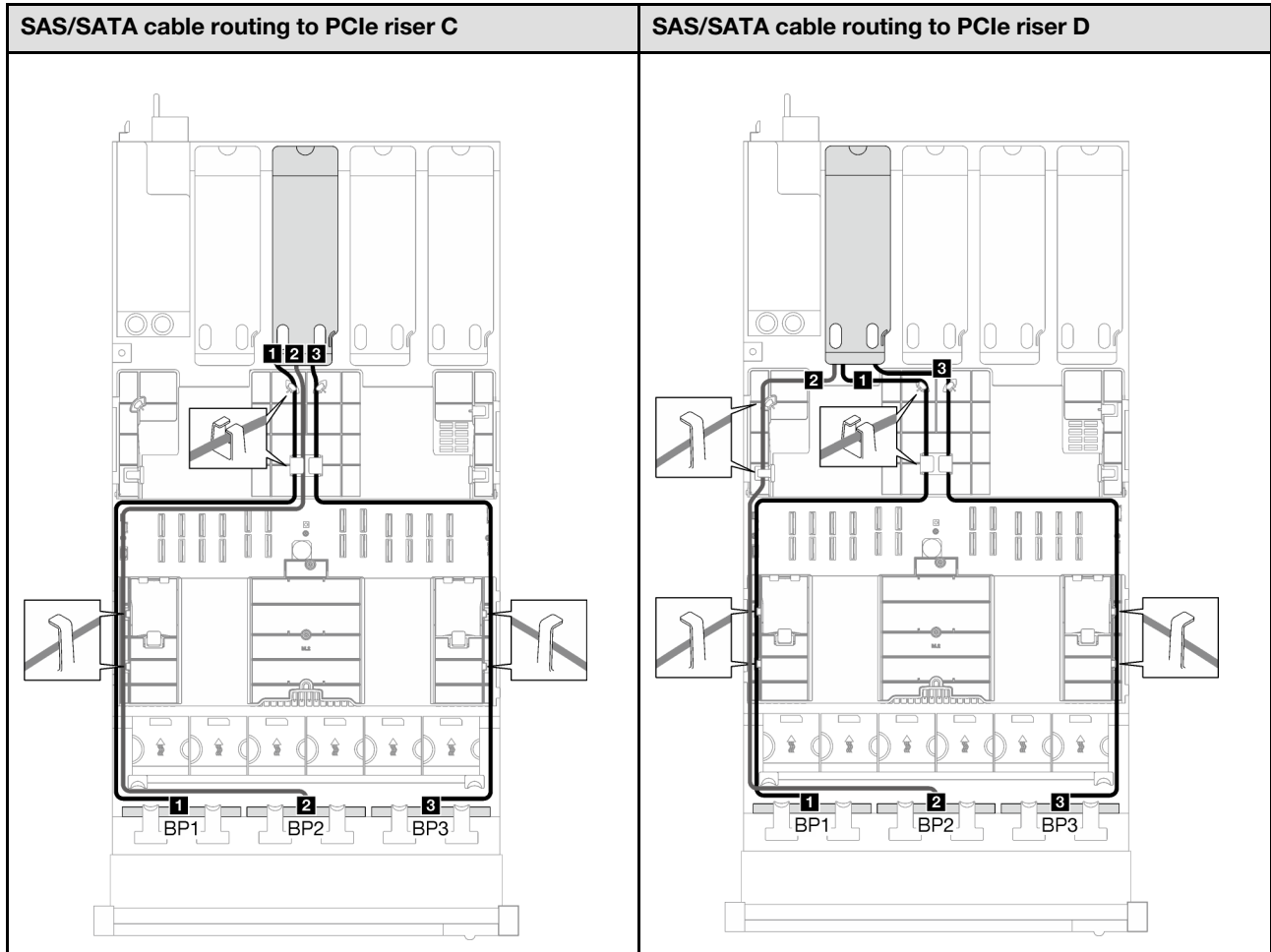
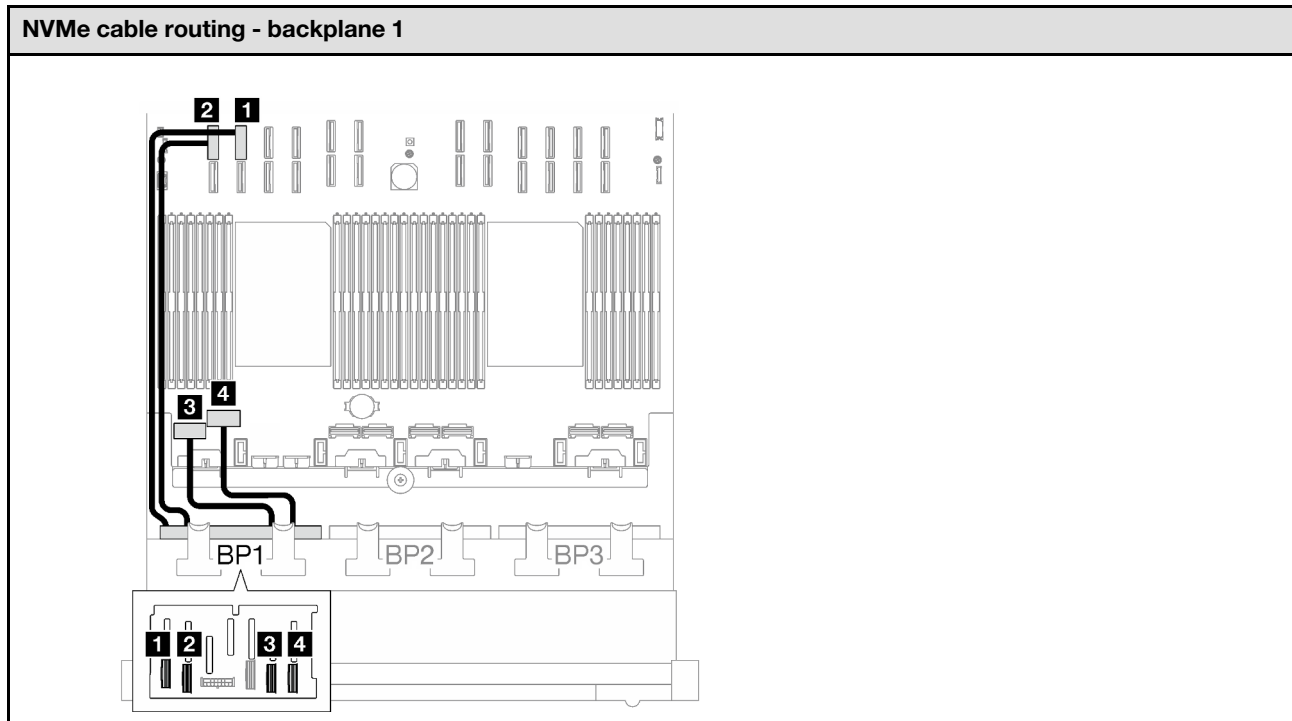


Table 64. SAS/SATA cable routing (continued)



Cable	From	To
<b>1</b>	Backplane 1: SAS/SATA	16i adapter: <ul style="list-style-type: none"> <li>• Gen4: C0</li> <li>• Gen3: C0, C1</li> </ul>
<b>2</b>	Backplane 2: SAS/SATA	16i adapter: <ul style="list-style-type: none"> <li>• Gen4: C1</li> <li>• Gen3: C2, C3</li> </ul>
<b>3</b>	Backplane 3: SAS/SATA	8i adapter: <ul style="list-style-type: none"> <li>• Gen4: C0</li> <li>• Gen3: C0, C1</li> </ul>

Table 65. NVMe cable routing



Cable	From	To	Cable length
<b>1</b>	Backplane 1: NVMe 0-1	System board assembly: NVMe 10 connector	420 mm
<b>2</b>	Backplane 1: NVMe 2-3	System board assembly: NVMe 9 connector	420 mm
<b>3</b>	Backplane 1: NVMe 4-5	System board assembly: NVMe 1 connector	150 mm
<b>4</b>	Backplane 1: NVMe 6-7	System board assembly: NVMe 2 connector	150 mm

## 2 x AnyBay backplanes

Follow the instructions in this section to learn how to do cable routing for two AnyBay backplanes.

### Notes:

- For more information about the power cable routing, see [“2.5-inch drive backplane cable routing \(server model with four PCIe risers\)” on page 296](#).
- When routing the cables, ensure that all cables are routed appropriately through the cable guides and cable clips.
- Make sure to choose the cables based on the generation of RAID adapters that you plan to install:
  - **Gen3 RAID/HBA adapters** (9350-16i, 4350-16i, 9350-8i, 5350-8i, 4350-8i): Mini-SAS x4\*2 to SlimSAS x8 cable
  - **Gen4 RAID/HBA adapters** (940-16i, 540-16i, 440-16i, 940-8i, 540-8i, 440-8i): SlimSAS x8 to SlimSAS x8 cable

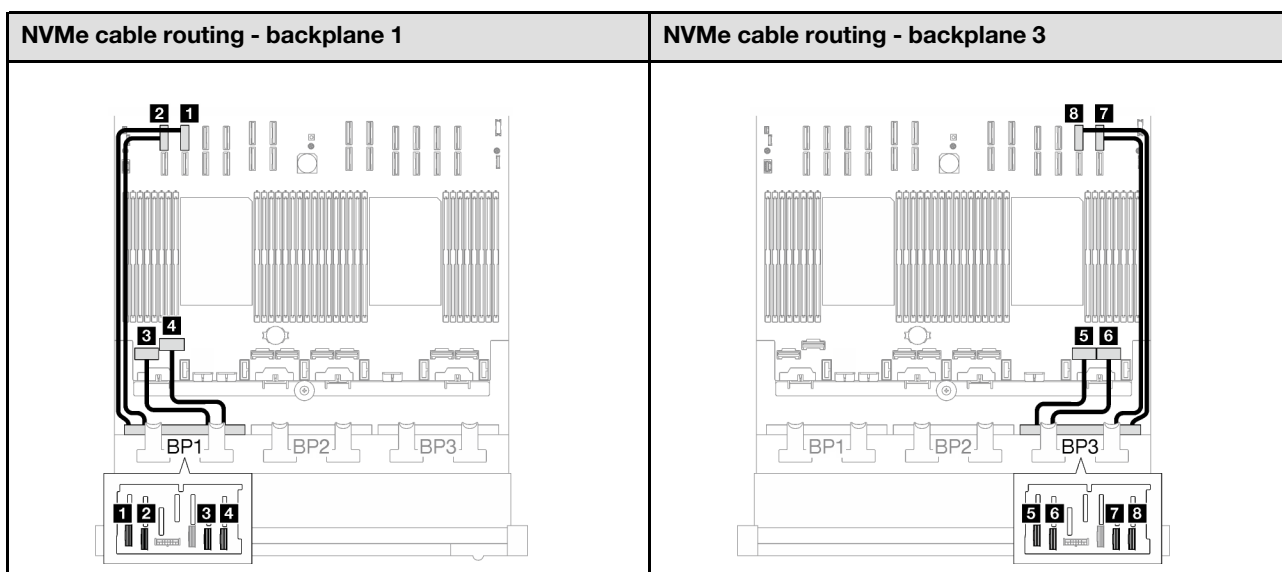
This configuration contains the following storage controller combinations:

- “No RAID/HBA adapter” on page 316
- “16i RAID/HBA adapter” on page 316
- “16i RAID adapter (Tri-mode)” on page 319

### No RAID/HBA adapter

**Note:** The AnyBay backplanes are used as pure NVMe backplanes when no RAID/HBA adapters are installed.

Table 66. NVMe cable routing



Cable	From	To	Cable length
<b>1</b>	Backplane 1: NVMe 0-1	System board assembly: NVMe 10 connector	420 mm
<b>2</b>	Backplane 1: NVMe 2-3	System board assembly: NVMe 9 connector	420 mm
<b>3</b>	Backplane 1: NVMe 4-5	System board assembly: NVMe 1 connector	150 mm
<b>4</b>	Backplane 1: NVMe 6-7	System board assembly: NVMe 2 connector	150 mm
<b>5</b>	Backplane 3: NVMe 0-1	System board assembly: NVMe 7 connector	150 mm
<b>6</b>	Backplane 3: NVMe 2-3	System board assembly: NVMe 8 connector	150 mm
<b>7</b>	Backplane 3: NVMe 4-5	System board assembly: NVMe 12 connector	420 mm
<b>8</b>	Backplane 3: NVMe 6-7	System board assembly: NVMe 11 connector	420 mm

### 16i RAID/HBA adapter

Based on the location of the RAID/HBA adapter, select the corresponding routing path for SAS/SATA cable from the following table.

Table 67. SAS/SATA cable routing

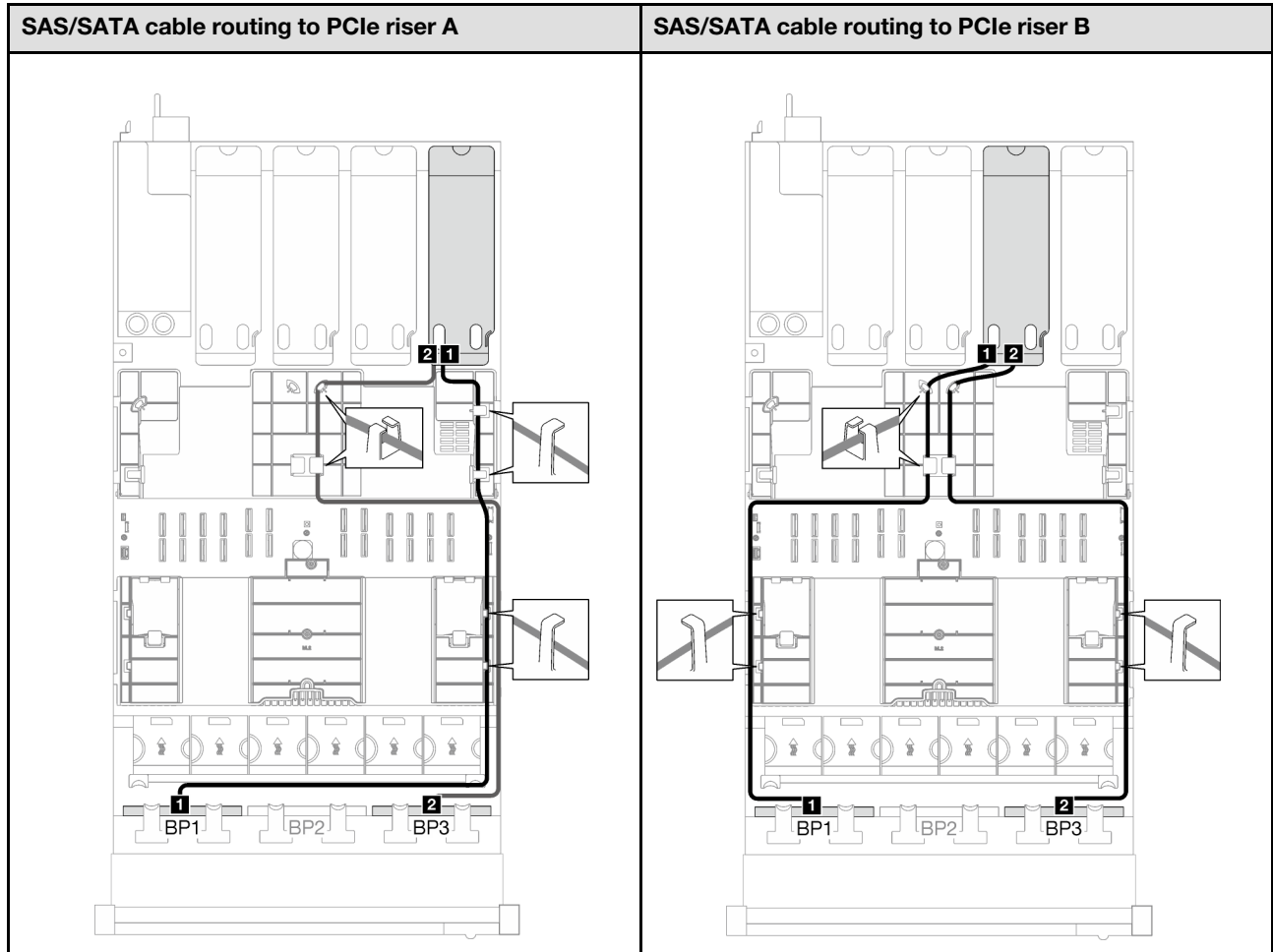
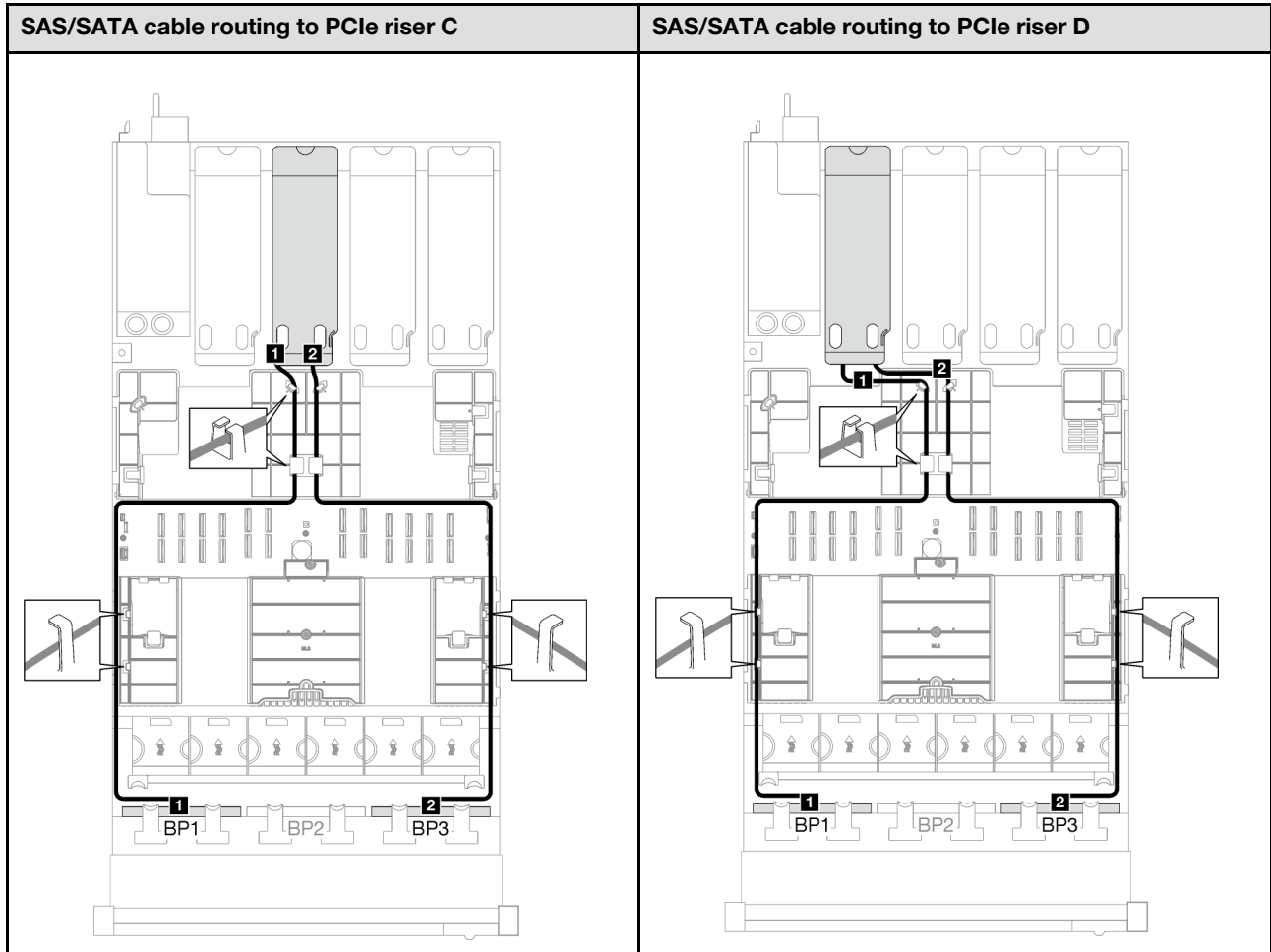


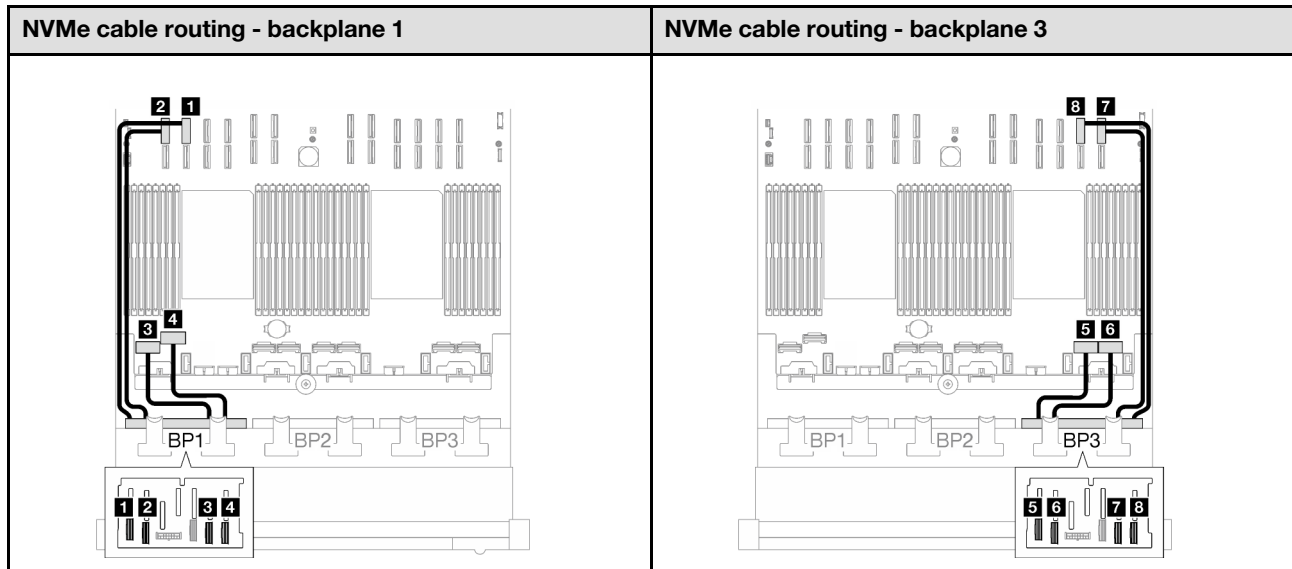
Table 67. SAS/SATA cable routing (continued)



Cable	From	To
<b>1</b>	Backplane 1: SAS/SATA	16i adapter: <ul style="list-style-type: none"> <li>• Gen4: C0</li> <li>• Gen3: C0, C1</li> </ul>
<b>2</b>	Backplane 3: SAS/SATA	16i adapter: <ul style="list-style-type: none"> <li>• Gen4: C1</li> <li>• Gen3: C2, C3</li> </ul>



Table 68. NVMe cable routing



Cable	From	To	Cable length
<b>1</b>	Backplane 1: NVMe 0-1	System board assembly: NVMe 10 connector	420 mm
<b>2</b>	Backplane 1: NVMe 2-3	System board assembly: NVMe 9 connector	420 mm
<b>3</b>	Backplane 1: NVMe 4-5	System board assembly: NVMe 1 connector	150 mm
<b>4</b>	Backplane 1: NVMe 6-7	System board assembly: NVMe 2 connector	150 mm
<b>5</b>	Backplane 3: NVMe 0-1	System board assembly: NVMe 7 connector	150 mm
<b>6</b>	Backplane 3: NVMe 2-3	System board assembly: NVMe 8 connector	150 mm
<b>7</b>	Backplane 3: NVMe 4-5	System board assembly: NVMe 12 connector	420 mm
<b>8</b>	Backplane 3: NVMe 6-7	System board assembly: NVMe 11 connector	420 mm

### 16i RAID adapter (Tri-mode)

Based on the location of the RAID adapter, select the corresponding routing path for SAS/SATA cable from the following table.

Table 69. SAS/SATA cable routing

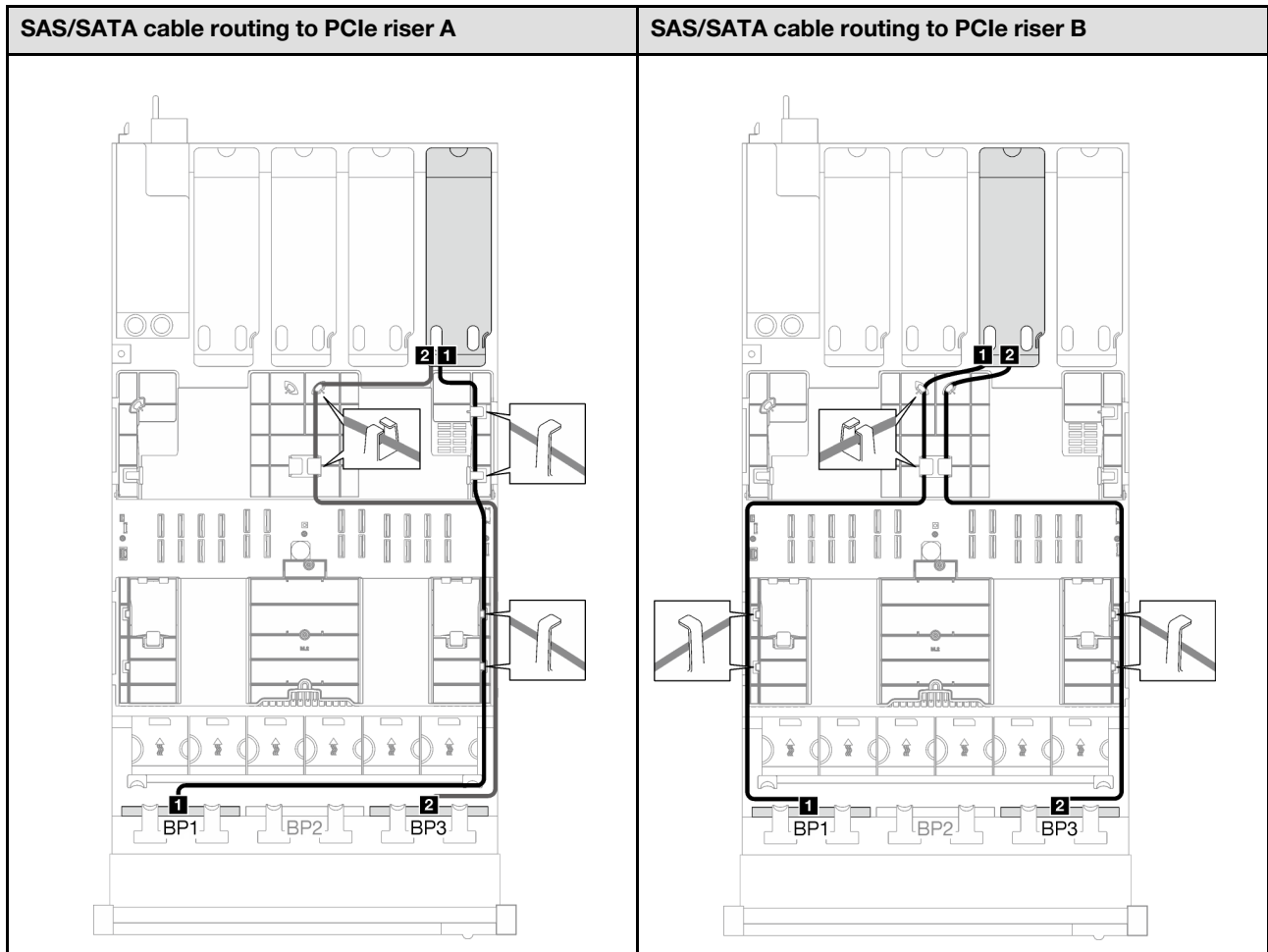
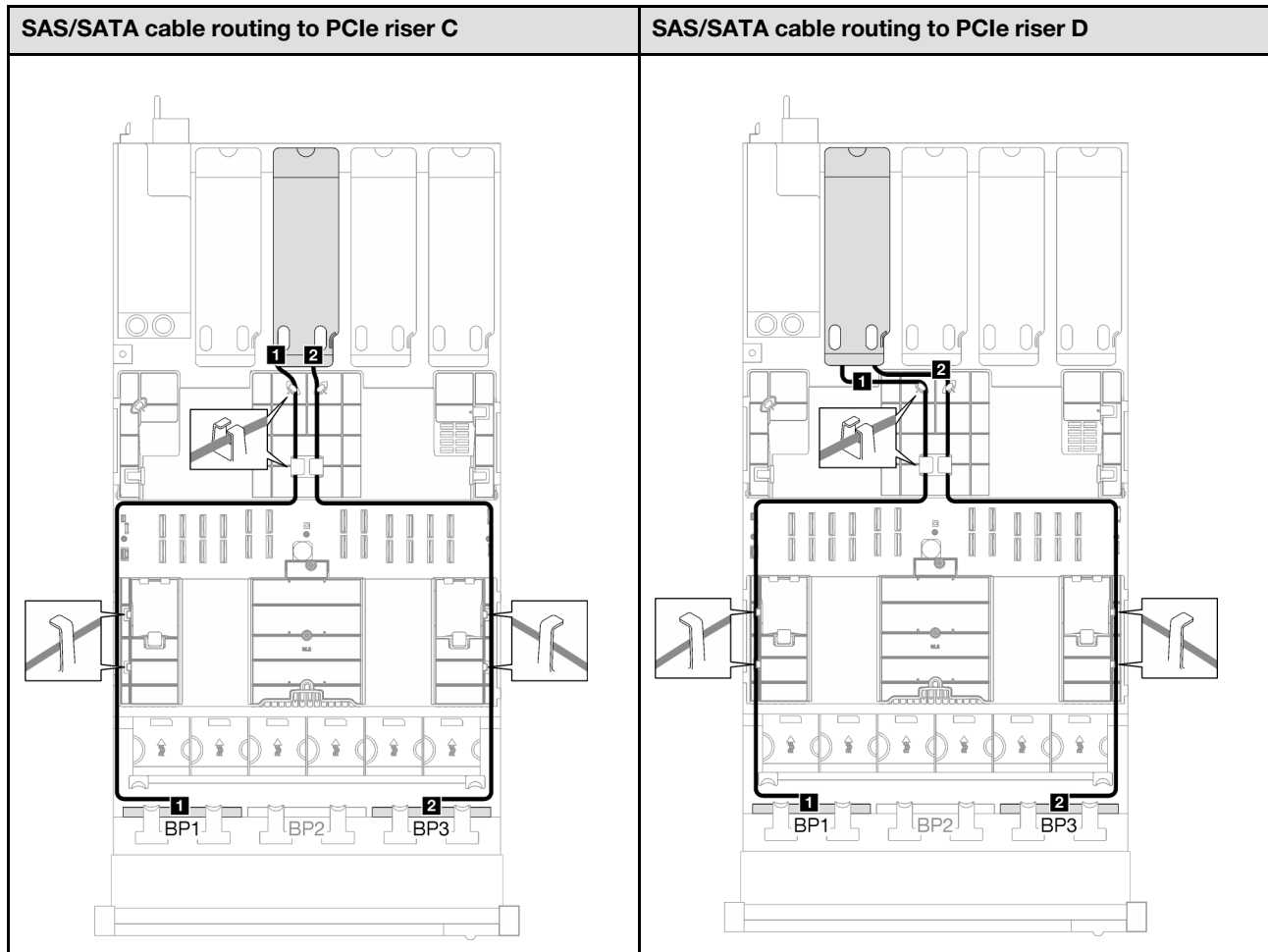


Table 69. SAS/SATA cable routing (continued)



Cable	From	To
<b>1</b>	Backplane 1: SAS/SATA	16i adapter: C0
<b>2</b>	Backplane 3: SAS/SATA	16i adapter: C1

## 2 x AnyBay + 1 x SAS/SATA backplanes

Follow the instructions in this section to learn how to do cable routing for two AnyBay backplanes and one SAS/SATA backplane.

### Notes:

- For more information about the power cable routing, see [“2.5-inch drive backplane cable routing \(server model with four PCIe risers\)”](#) on page 296.
- When routing the cables, ensure that all cables are routed appropriately through the cable guides and cable clips.
- Make sure to choose the cables based on the generation of RAID adapters that you plan to install:
  - **Gen3 RAID/HBA adapters** (9350-16i, 4350-16i, 9350-8i, 5350-8i, 4350-8i): Mini-SAS x4\*2 to SlimSAS x8 cable
  - **Gen4 RAID/HBA adapters** (940-16i, 540-16i, 440-16i, 940-8i, 540-8i, 440-8i): SlimSAS x8 to SlimSAS x8 cable

### 8i + 16i RAID/HBA adapter

Based on the location of the RAID/HBA adapter, select the corresponding routing path for SAS/SATA cable from the following table.

Table 70. SAS/SATA cable routing

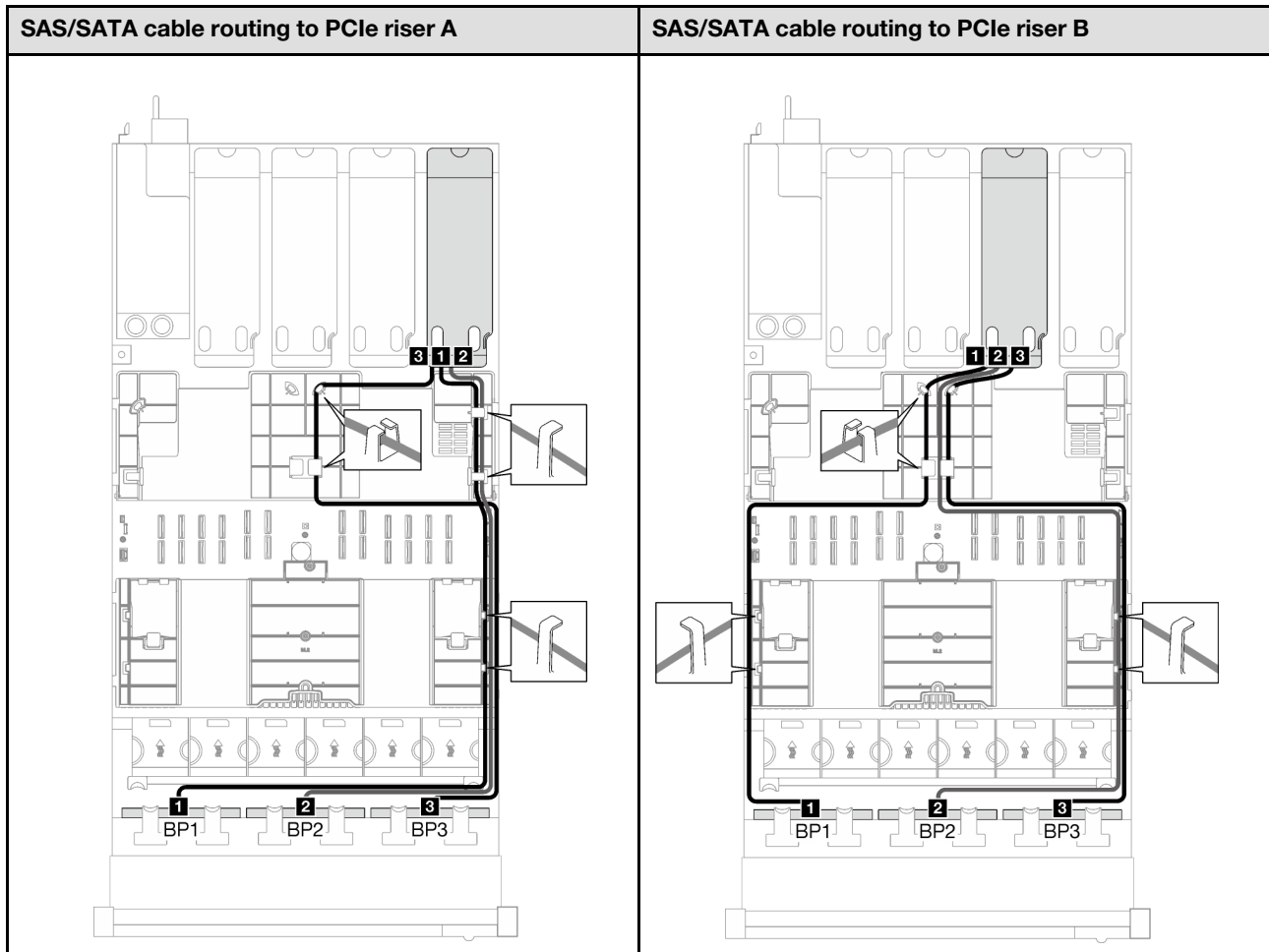
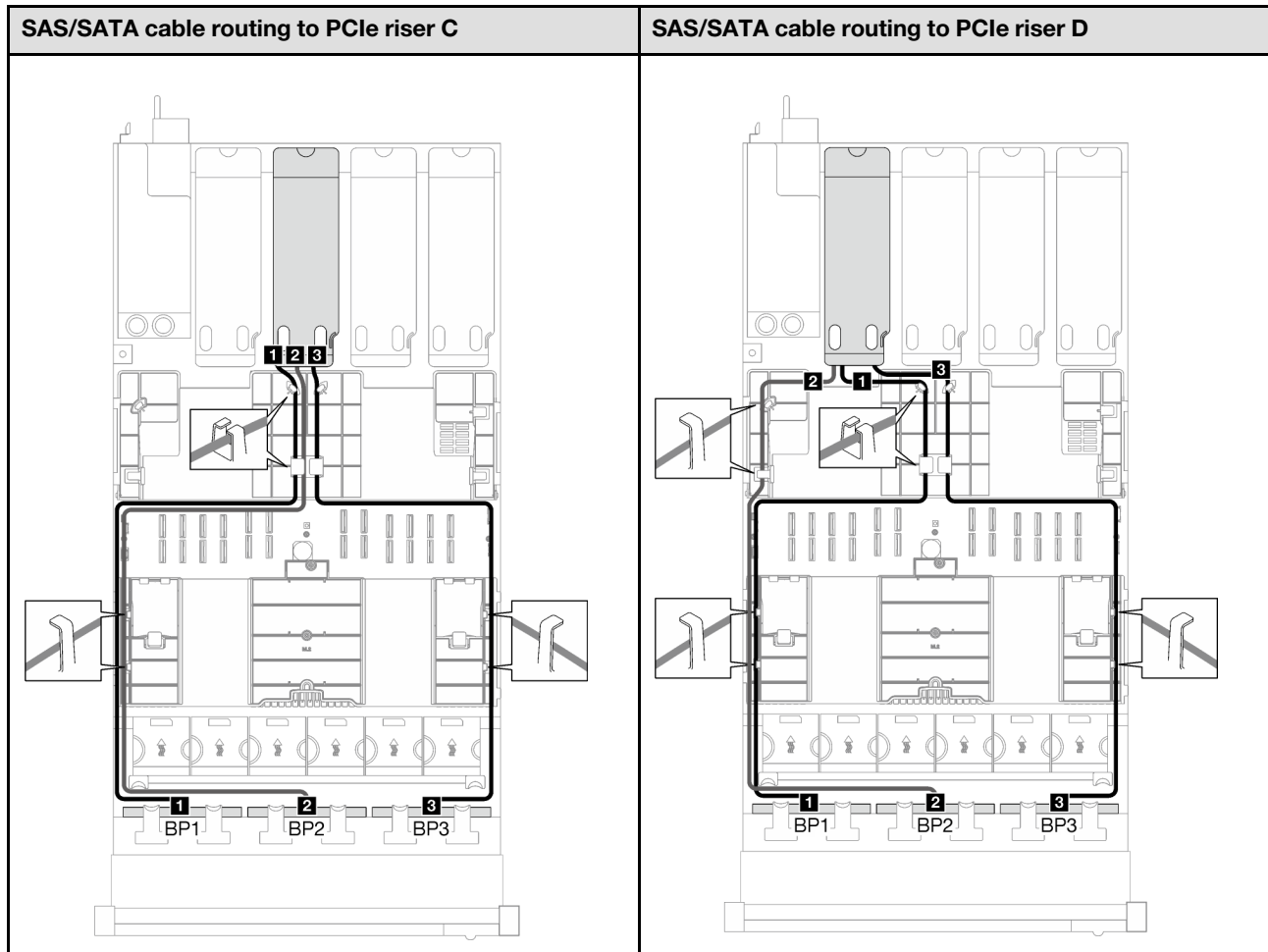
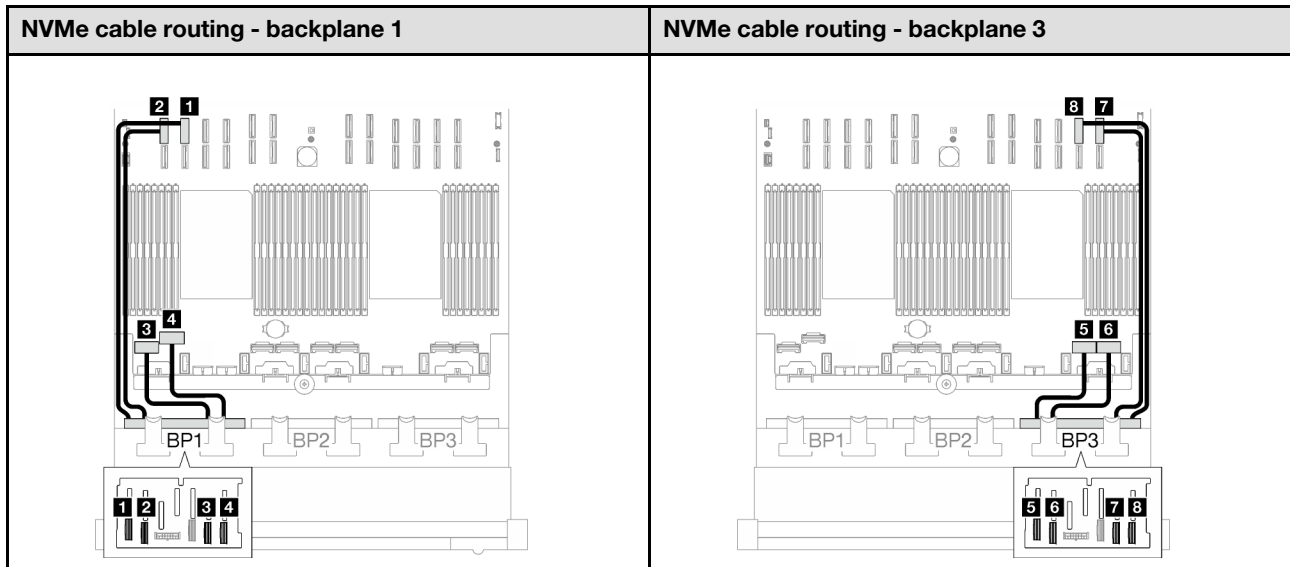


Table 70. SAS/SATA cable routing (continued)



Cable	From	To
<b>1</b>	Backplane 1: SAS/SATA	16i adapter: <ul style="list-style-type: none"> <li>• Gen4: C0</li> <li>• Gen3: C0, C1</li> </ul>
<b>2</b>	Backplane 2: SAS/SATA	16i adapter: <ul style="list-style-type: none"> <li>• Gen4: C1</li> <li>• Gen3: C2, C3</li> </ul>
<b>3</b>	Backplane 3: SAS/SATA	8i adapter: <ul style="list-style-type: none"> <li>• Gen4: C0</li> <li>• Gen3: C0, C1</li> </ul>

Table 71. NVMe cable routing



Cable	From	To	Cable length
<b>1</b>	Backplane 1: NVMe 0-1	System board assembly: NVMe 10 connector	420 mm
<b>2</b>	Backplane 1: NVMe 2-3	System board assembly: NVMe 9 connector	420 mm
<b>3</b>	Backplane 1: NVMe 4-5	System board assembly: NVMe 1 connector	150 mm
<b>4</b>	Backplane 1: NVMe 6-7	System board assembly: NVMe 2 connector	150 mm
<b>5</b>	Backplane 3: NVMe 0-1	System board assembly: NVMe 7 connector	150 mm
<b>6</b>	Backplane 3: NVMe 2-3	System board assembly: NVMe 8 connector	150 mm
<b>7</b>	Backplane 3: NVMe 4-5	System board assembly: NVMe 12 connector	420 mm
<b>8</b>	Backplane 3: NVMe 6-7	System board assembly: NVMe 11 connector	420 mm

### 3 x AnyBay backplanes

Follow the instructions in this section to learn how to do cable routing for three AnyBay backplanes.

#### Notes:

- For more information about the power cable routing, see [“2.5-inch drive backplane cable routing \(server model with four PCIe risers\)”](#) on page 296.
- When routing the cables, ensure that all cables are routed appropriately through the cable guides and cable clips.
- Make sure to choose the cables based on the generation of RAID adapters that you plan to install:
  - **Gen3 RAID/HBA adapters** (9350-16i, 4350-16i, 9350-8i, 5350-8i, 4350-8i): Mini-SAS x4\*2 to SlimSAS x8 cable

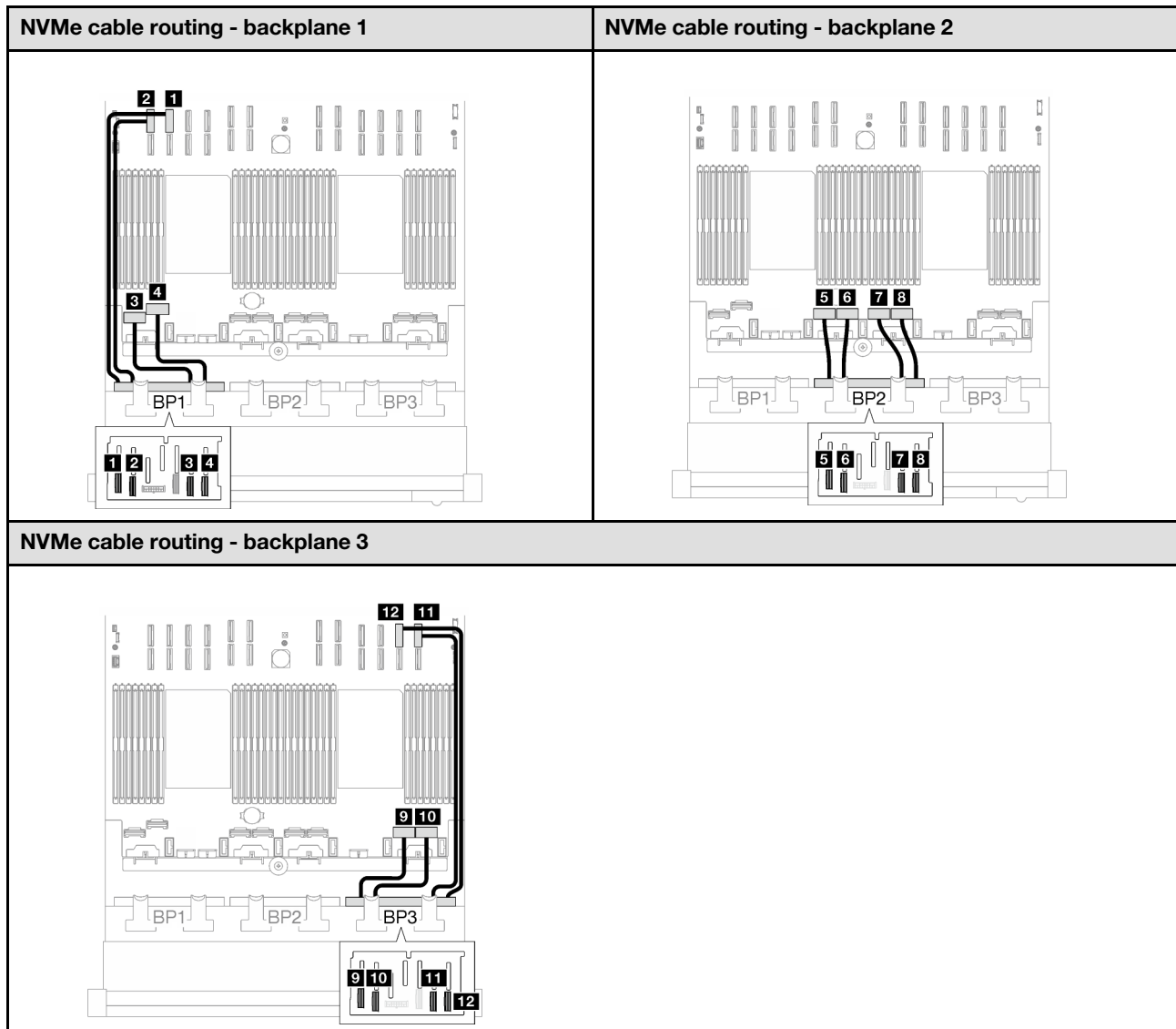
- **Gen4 RAID/HBA adapters** (940-16i, 540-16i, 440-16i, 940-8i, 540-8i, 440-8i): SlimSAS x8 to SlimSAS x8 cable

This configuration contains the following storage controller combinations:

- “No RAID/HBA adapter” on page 325
- “8i + 16i RAID/HBA adapter” on page 326
- “8i + 16i RAID adapter (Tri-mode)” on page 330

### No RAID/HBA adapter

**Note:** The AnyBay backplanes are used as pure NVMe backplanes when no RAID/HBA adapters are installed.



Cable	From	To	Cable length
<b>1</b>	Backplane 1: NVMe 0-1	System board assembly: NVMe 10 connector	420 mm
<b>2</b>	Backplane 1: NVMe 2-3	System board assembly: NVMe 9 connector	420 mm
<b>3</b>	Backplane 1: NVMe 4-5	System board assembly: NVMe 1 connector	150 mm
<b>4</b>	Backplane 1: NVMe 6-7	System board assembly: NVMe 2 connector	150 mm
<b>5</b>	Backplane 2: NVMe 0-1	System board assembly: NVMe 3 connector	150 mm
<b>6</b>	Backplane 2: NVMe 2-3	System board assembly: NVMe 4 connector	150 mm
<b>7</b>	Backplane 2: NVMe 4-5	System board assembly: NVMe 5 connector	150 mm
<b>8</b>	Backplane 2: NVMe 6-7	System board assembly: NVMe 6 connector	150 mm
<b>9</b>	Backplane 3: NVMe 0-1	System board assembly: NVMe 7 connector	150 mm
<b>10</b>	Backplane 3: NVMe 2-3	System board assembly: NVMe 8 connector	150 mm
<b>11</b>	Backplane 3: NVMe 4-5	System board assembly: NVMe 12 connector	420 mm
<b>12</b>	Backplane 3: NVMe 6-7	System board assembly: NVMe 11 connector	420 mm

### 8i + 16i RAID/HBA adapter

Based on the location of the RAID/HBA adapter, select the corresponding routing path for SAS/SATA cable from the following table.



Table 72. SAS/SATA cable routing

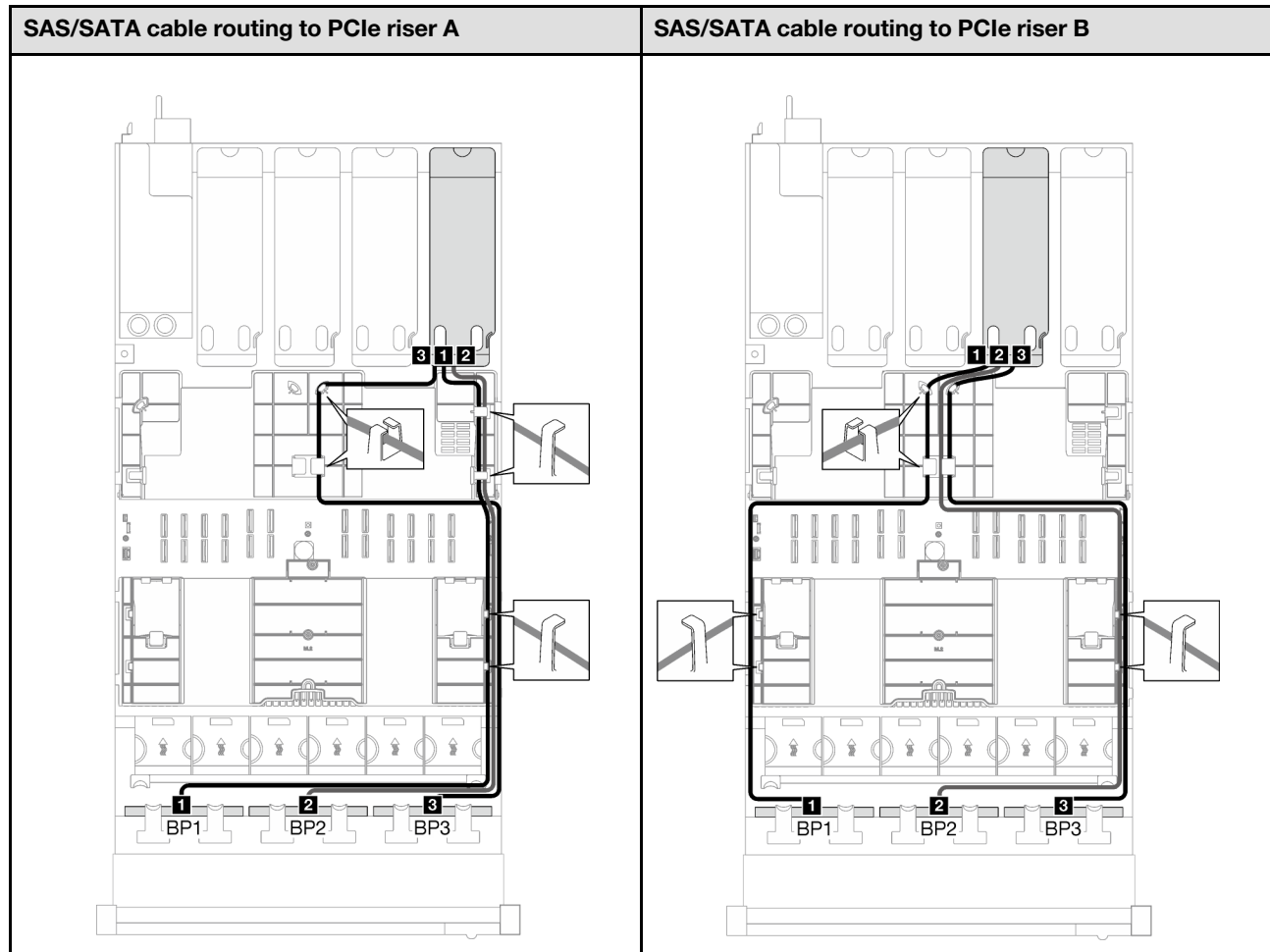
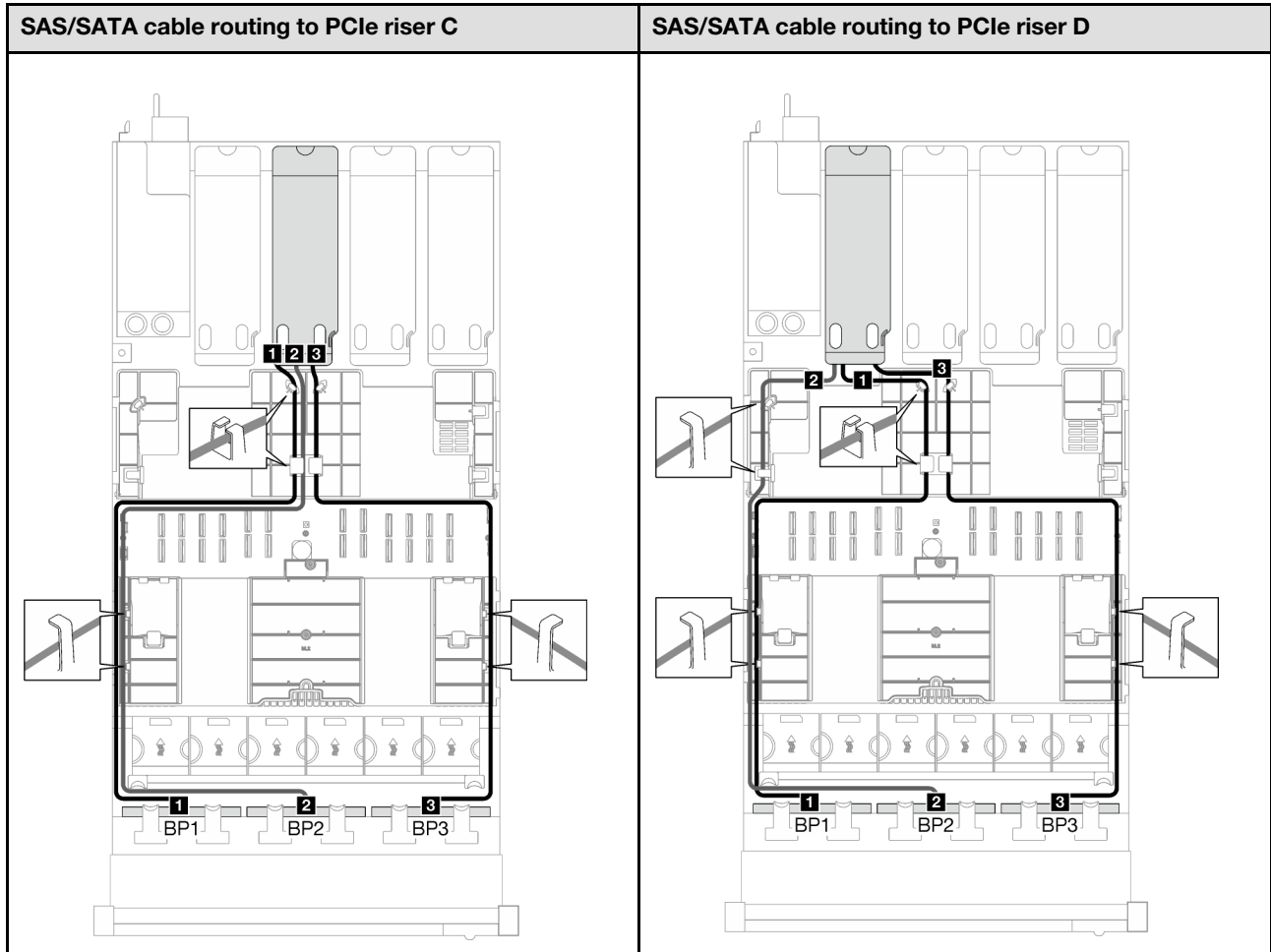
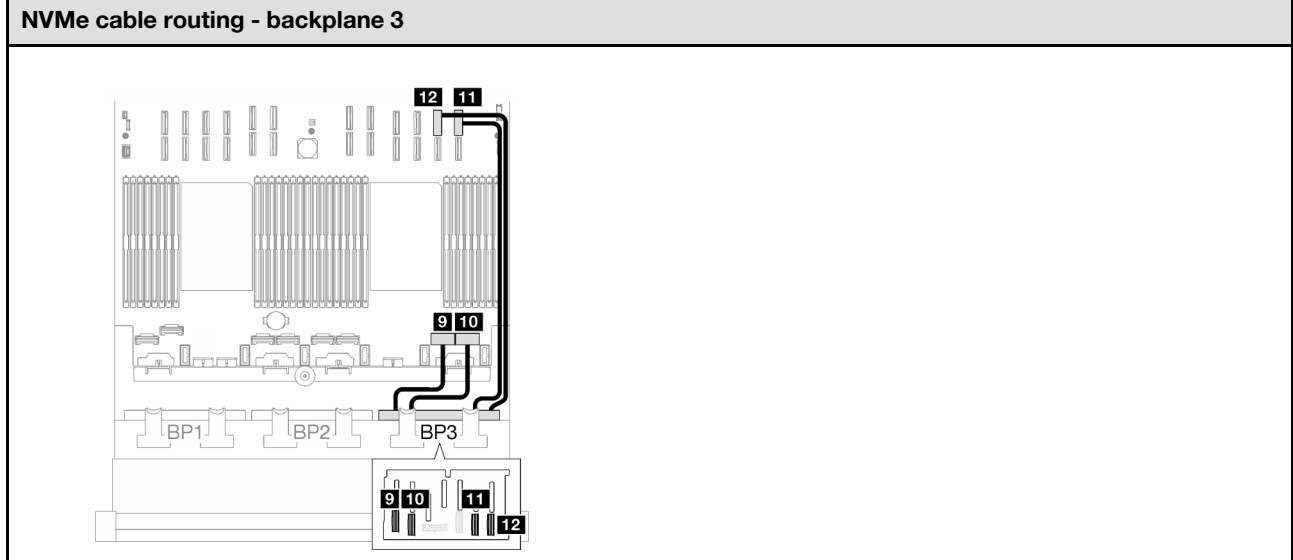
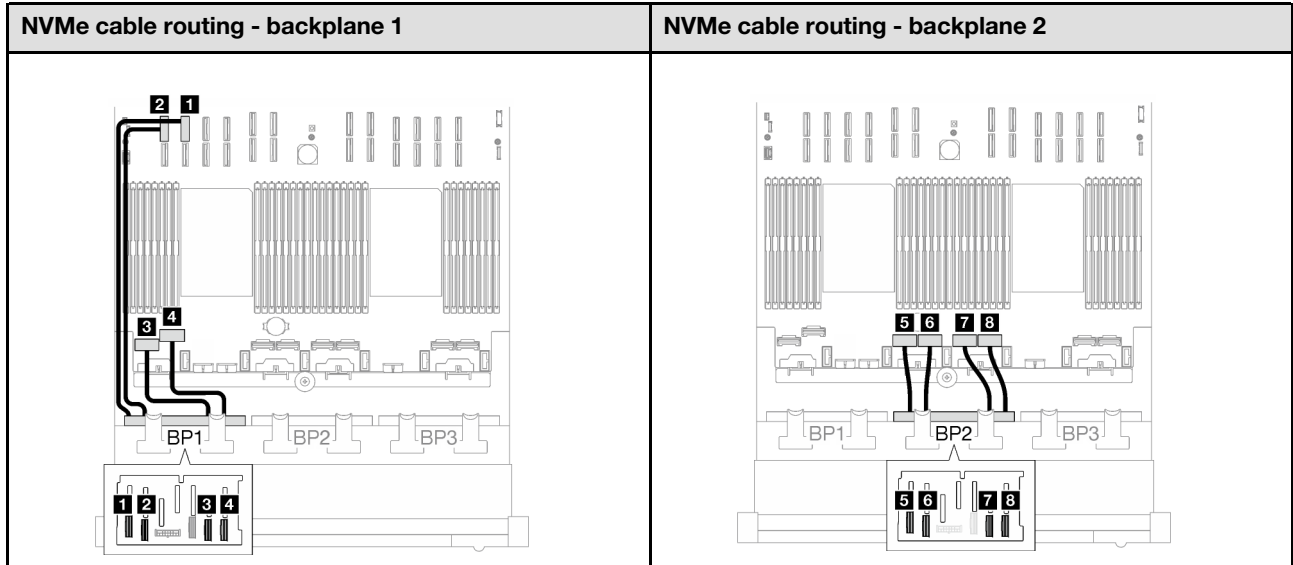


Table 72. SAS/SATA cable routing (continued)



Cable	From	To
<b>1</b>	Backplane 1: SAS/SATA	16i adapter: <ul style="list-style-type: none"> <li>• Gen4: C0</li> <li>• Gen3: C0, C1</li> </ul>
<b>2</b>	Backplane 2: SAS/SATA	16i adapter: <ul style="list-style-type: none"> <li>• Gen4: C1</li> <li>• Gen3: C2, C3</li> </ul>
<b>3</b>	Backplane 3: SAS/SATA	8i adapter: <ul style="list-style-type: none"> <li>• Gen4: C0</li> <li>• Gen3: C0, C1</li> </ul>



Cable	From	To	Cable length
<b>1</b>	Backplane 1: NVMe 0-1	System board assembly: NVMe 10 connector	420 mm
<b>2</b>	Backplane 1: NVMe 2-3	System board assembly: NVMe 9 connector	420 mm
<b>3</b>	Backplane 1: NVMe 4-5	System board assembly: NVMe 1 connector	150 mm
<b>4</b>	Backplane 1: NVMe 6-7	System board assembly: NVMe 2 connector	150 mm
<b>5</b>	Backplane 2: NVMe 0-1	System board assembly: NVMe 3 connector	150 mm
<b>6</b>	Backplane 2: NVMe 2-3	System board assembly: NVMe 4 connector	150 mm
<b>7</b>	Backplane 2: NVMe 4-5	System board assembly: NVMe 5 connector	150 mm

Cable	From	To	Cable length
<b>8</b>	Backplane 2: NVMe 6-7	System board assembly: NVMe 6 connector	150 mm
<b>9</b>	Backplane 3: NVMe 0-1	System board assembly: NVMe 7 connector	150 mm
<b>10</b>	Backplane 3: NVMe 2-3	System board assembly: NVMe 8 connector	150 mm
<b>11</b>	Backplane 3: NVMe 4-5	System board assembly: NVMe 12 connector	420 mm
<b>12</b>	Backplane 3: NVMe 6-7	System board assembly: NVMe 11 connector	420 mm

### 8i + 16i RAID adapter (Tri-mode)

Based on the location of the RAID adapter, select the corresponding routing path for SAS/SATA cable from the following table.

Table 73. SAS/SATA cable routing

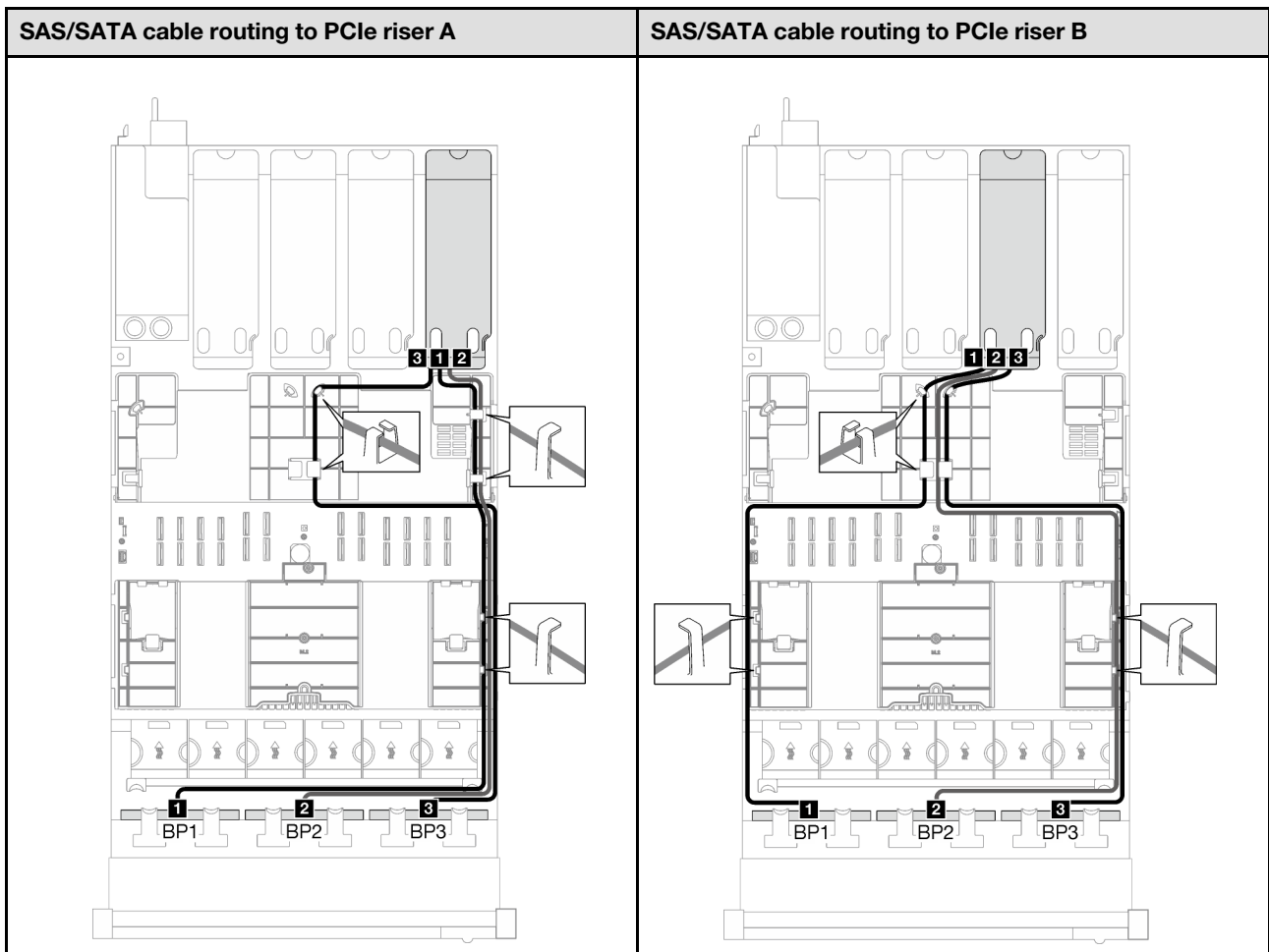
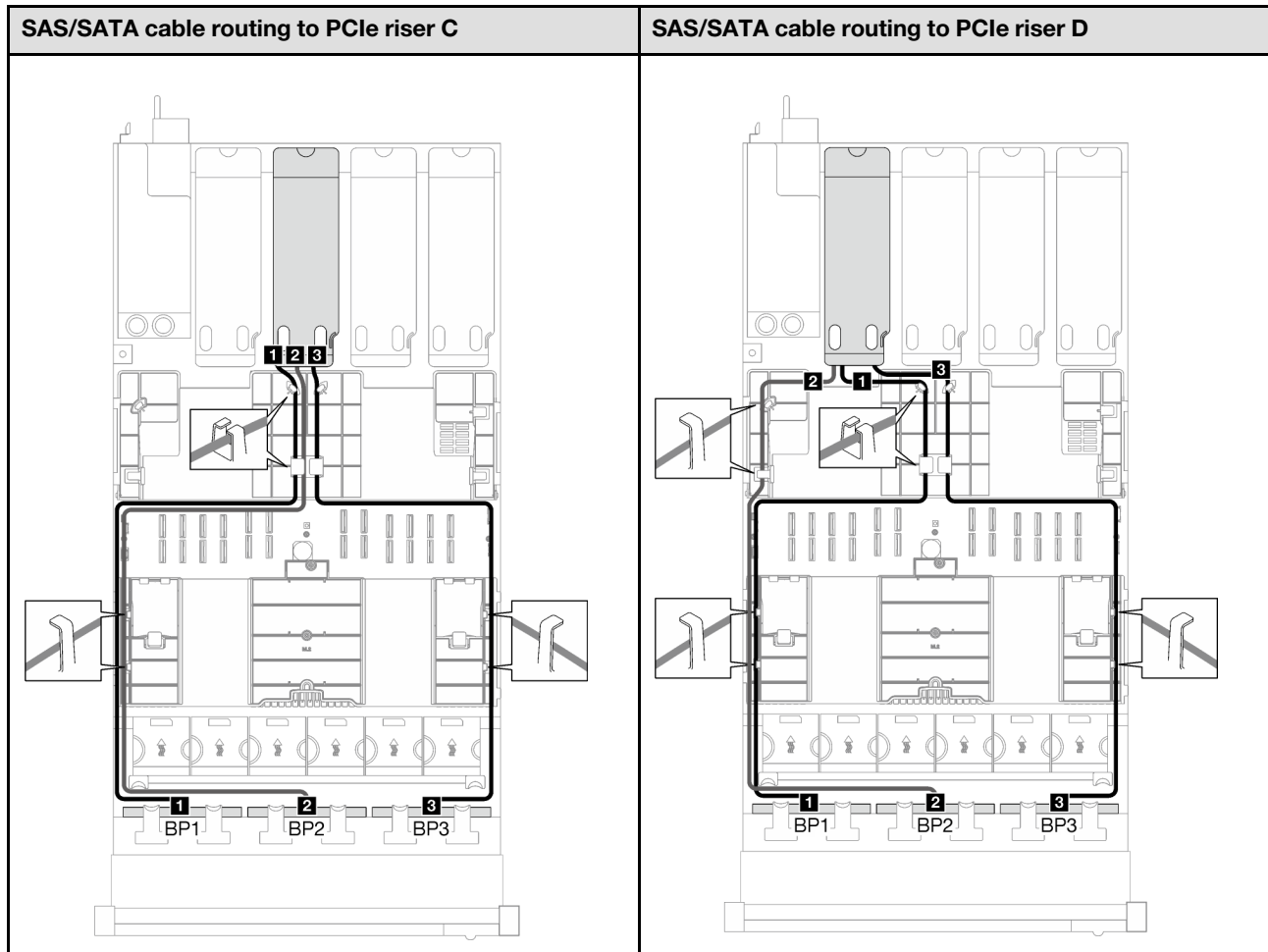


Table 73. SAS/SATA cable routing (continued)



Cable	From	To
<b>1</b>	Backplane 1: SAS/SATA	16i adapter: C0
<b>2</b>	Backplane 2: SAS/SATA	16i adapter: C1
<b>3</b>	Backplane 3: SAS/SATA	8i adapter: C0

## External diagnostics handset and VGA cable routing

Follow the instructions in this section to learn how to do cable routing for the external diagnostics handset and VGA.

**Note:** When routing the cables, ensure that all cables are routed appropriately through the cable guides and cable clips.

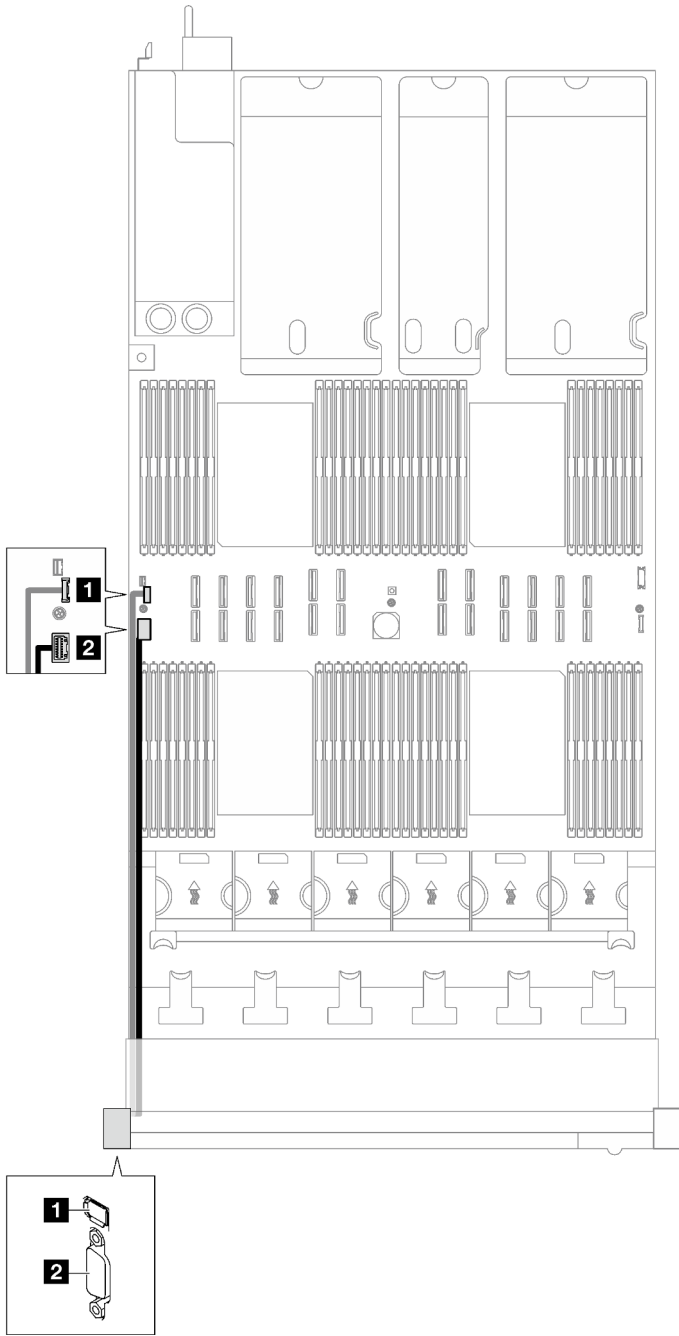


Figure 175. Cable routing for the external diagnostics handset and VGA

Cable	From	To
<b>1</b>	External diagnostic handset cable	System board assembly: External diagnostic handset connector
<b>2</b>	VGA cable	System board assembly: VGA connector

## Flash power module cable routing

Follow the instructions in this section to learn how to do cable routing for the flash power modules.

**Note:** When routing the cables, ensure that all cables are routed appropriately through the cable guides and cable clips.

Choose the routing plan according to the server model.

- “Server model with three PCIe risers” on page 333
- “Server model with four PCIe risers” on page 335

### Server model with three PCIe risers

Table 74. Cable routing for the flash power modules (server model with three PCIe risers)

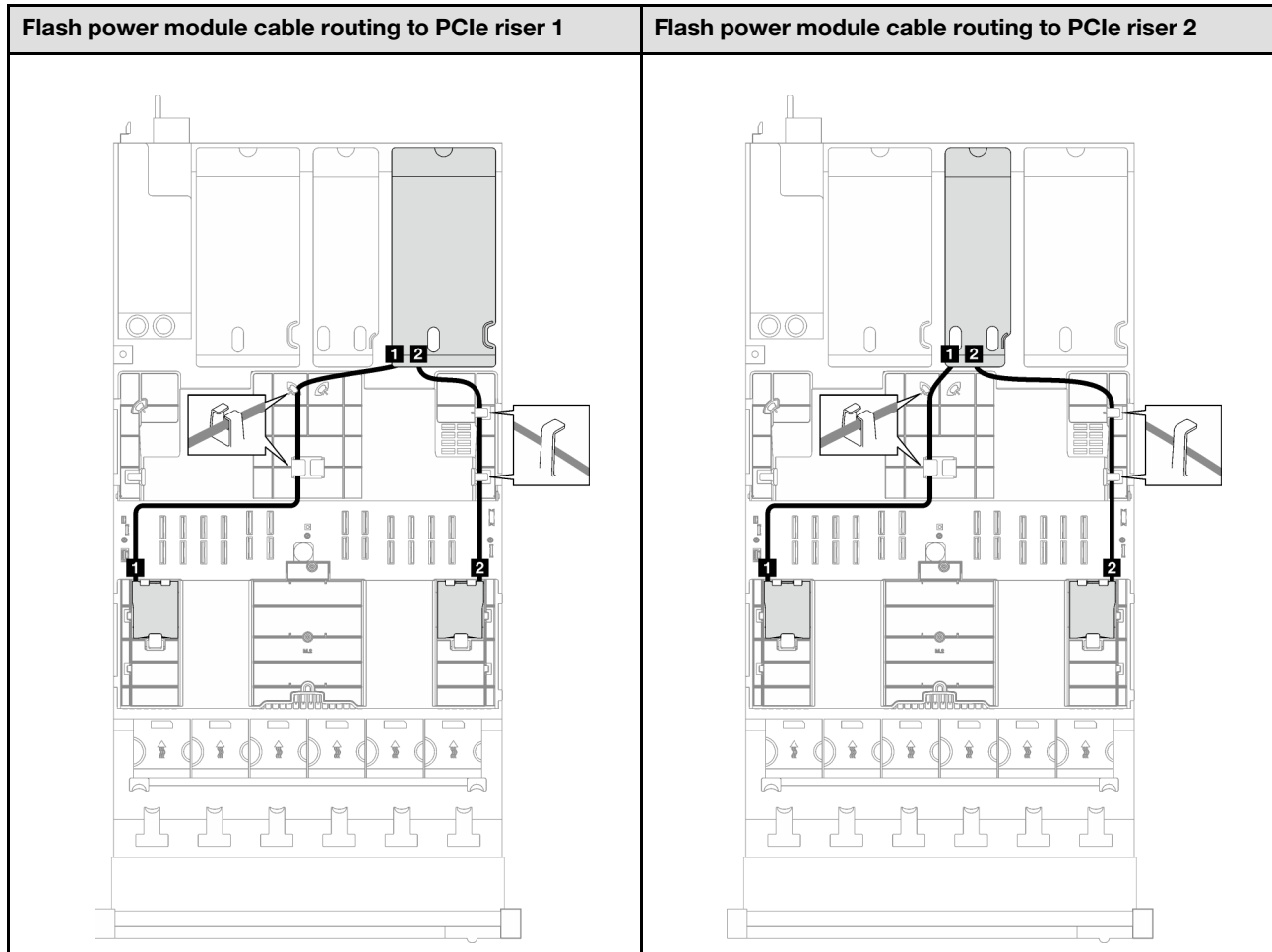
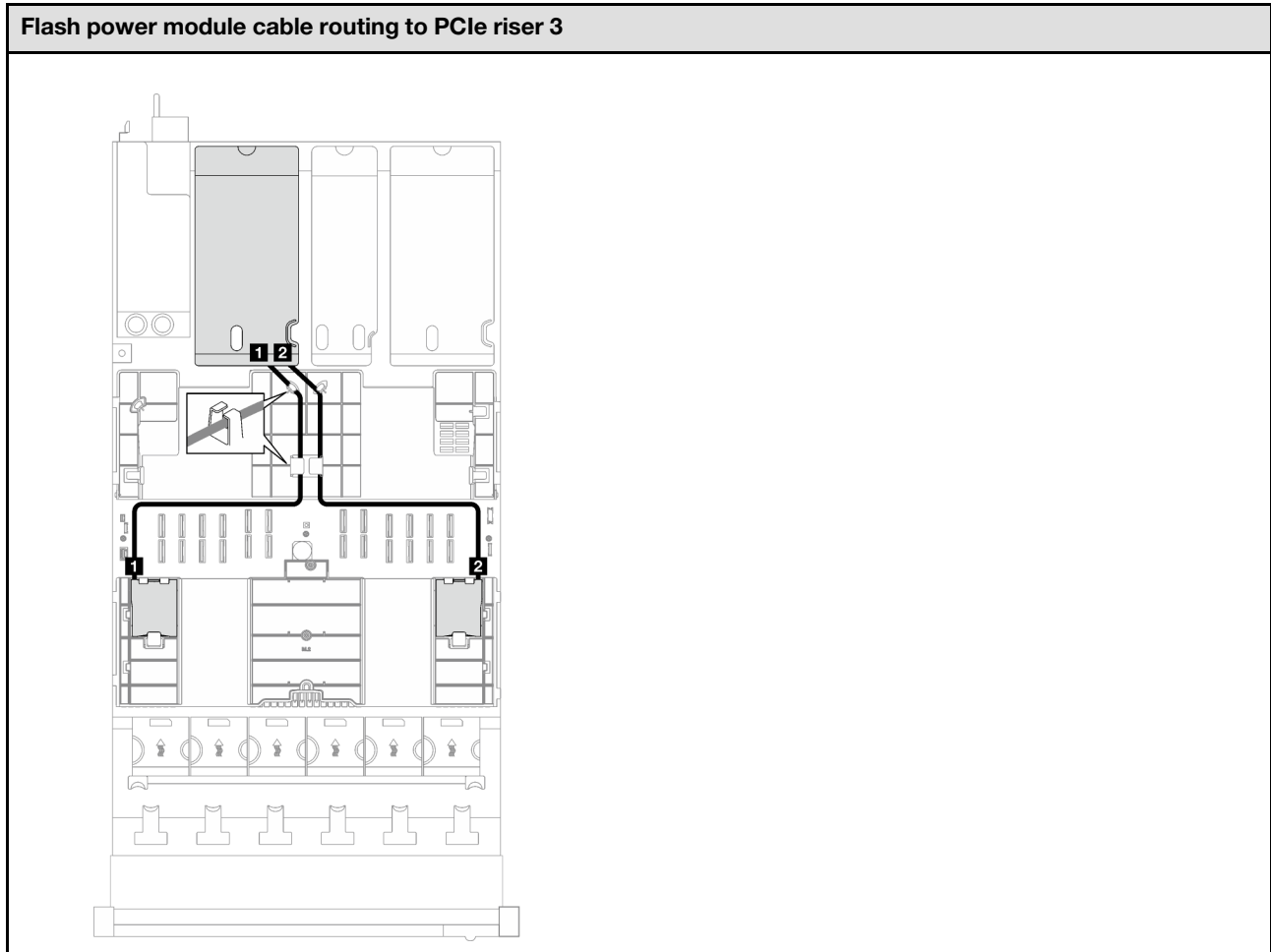


Table 74. Cable routing for the flash power modules (server model with three PCIe risers) (continued)



Cable	From	To
<b>1</b>	Flash power module	RAID adapter installed on PCIe riser
<b>2</b>	Flash power module	RAID adapter installed on PCIe riser



## Server model with four PCIe risers

Table 75. Cable routing for the flash power modules (server model with four PCIe risers)

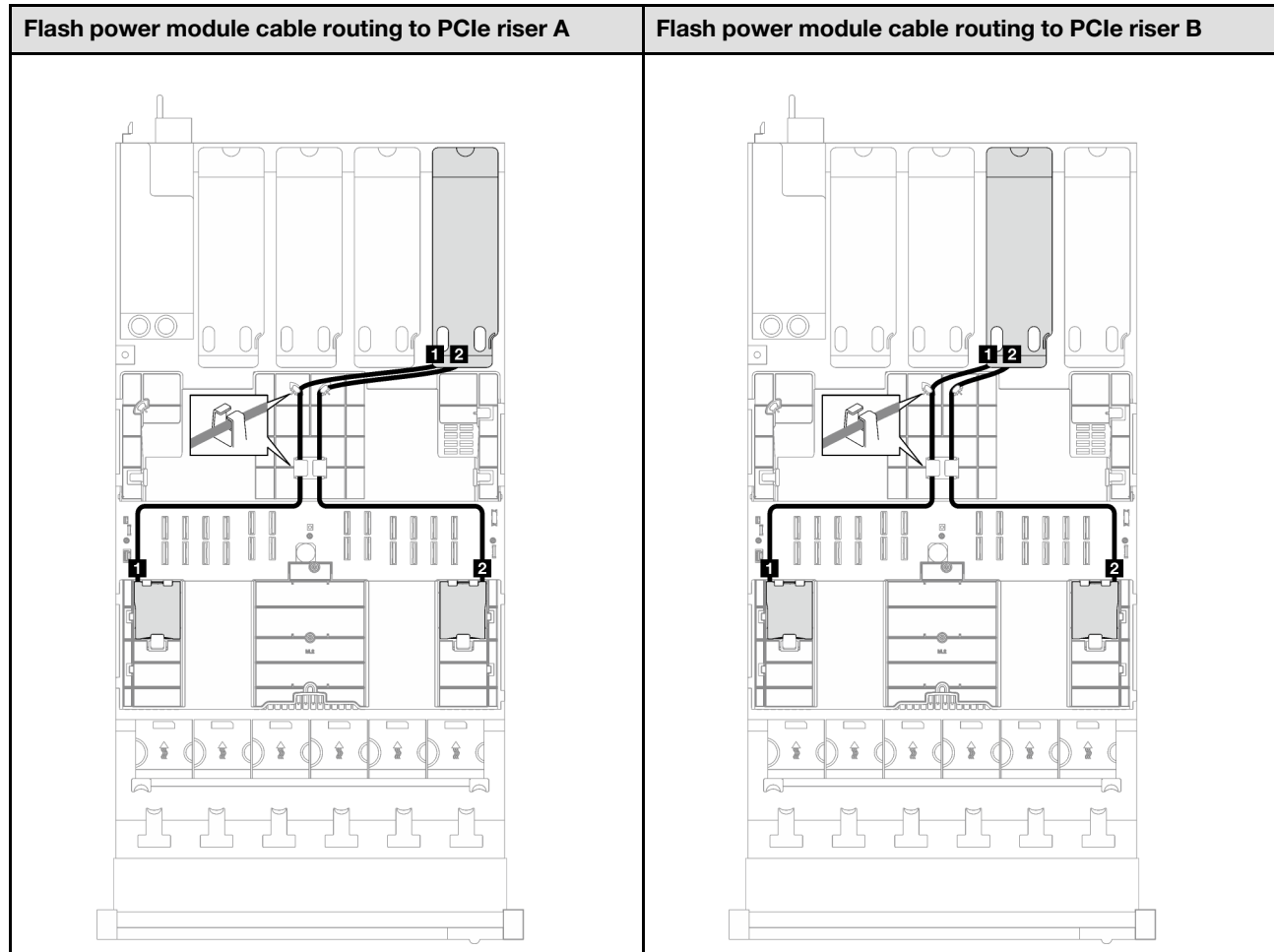
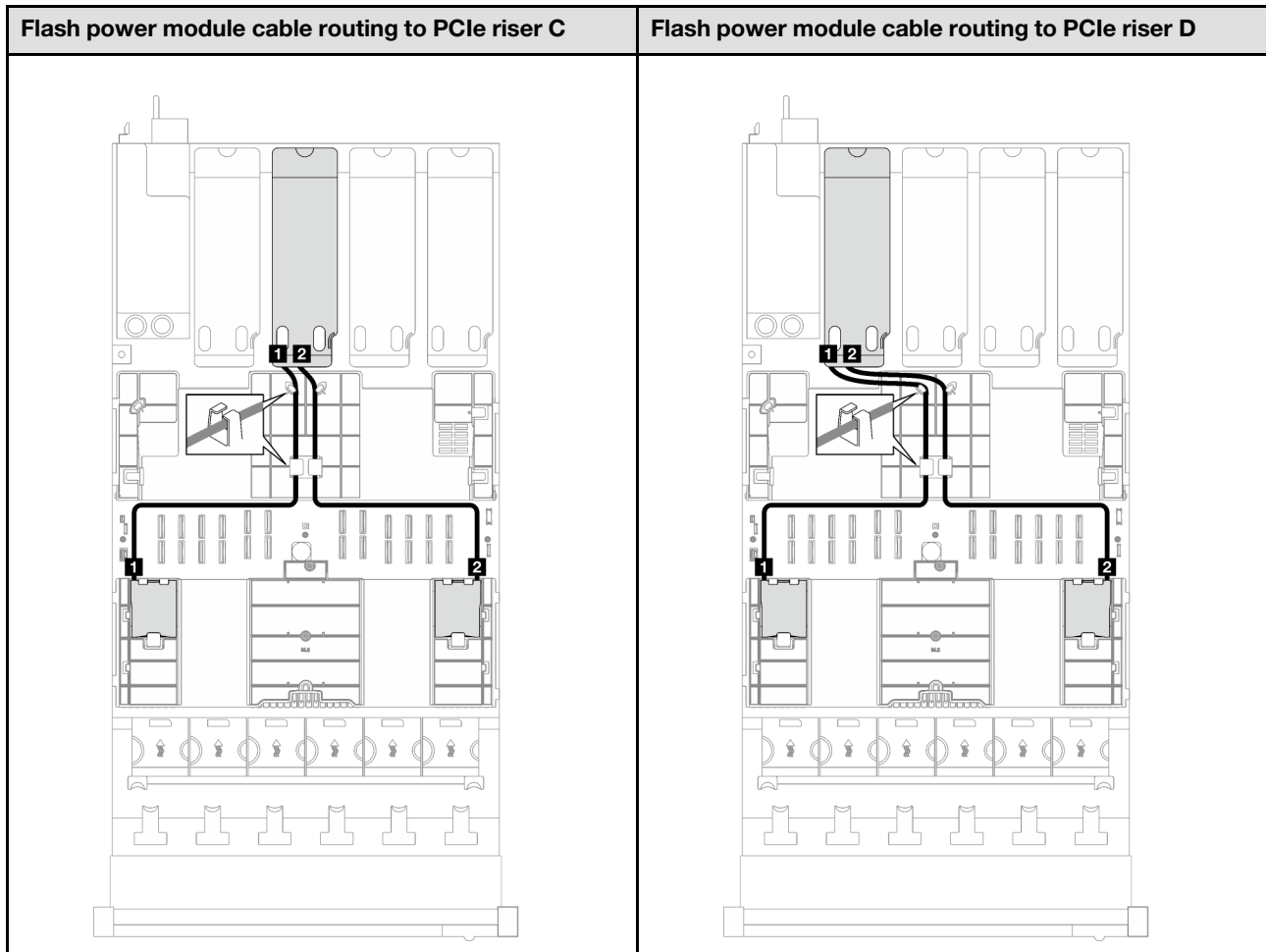


Table 75. Cable routing for the flash power modules (server model with four PCIe risers) (continued)



Cable	From	To
<b>1</b>	Flash power module	RAID adapter installed on PCIe riser
<b>2</b>	Flash power module	RAID adapter installed on PCIe riser

## Front I/O module cable routing

Follow the instructions in this section to learn how to do cable routing for the front I/O module.

**Note:** When routing the cables, ensure that all cables are routed appropriately through the cable guides and cable clips.

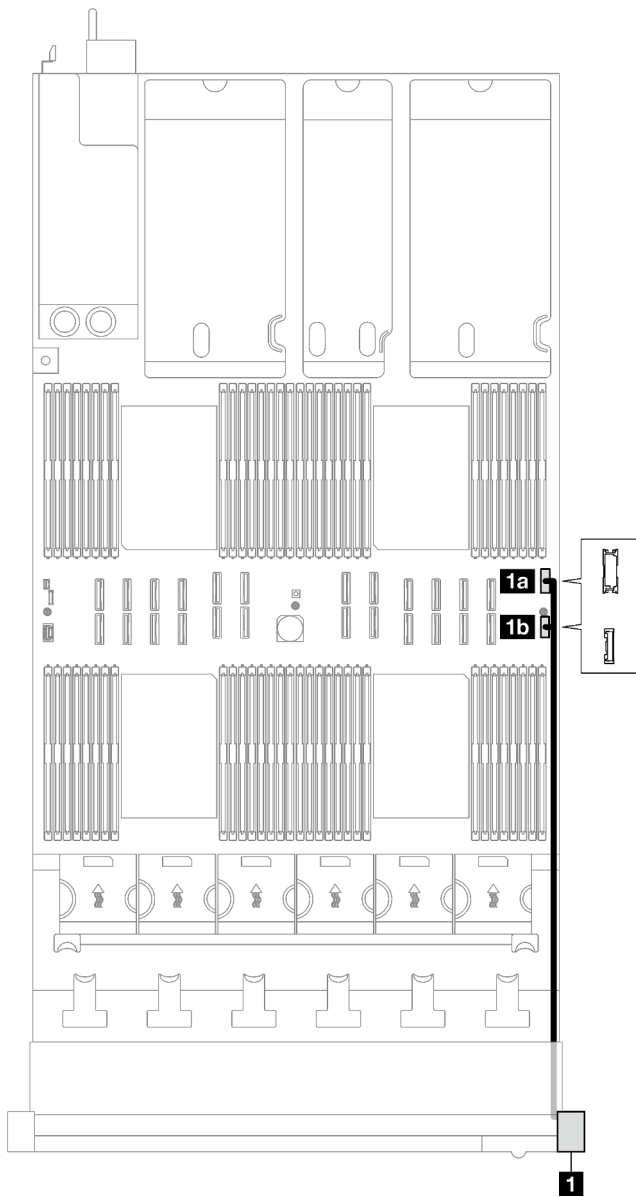


Figure 176. Cable routing for the front I/O module

Cable	From	To
<b>1a</b>	Front I/O module	System board assembly: Front USB connector
<b>1b</b>	Front I/O module	System board assembly: Front I/O connector

## M.2 backplane cable routing

Follow the instructions in this section to learn how to do cable routing for the M.2 backplane.

**Note:** When routing the cables, ensure that all cables are routed appropriately through the cable guides and cable clips.

### SATA/NVMe or NVMe M.2 backplane

**Note:** This configuration supports non-RAID SATA, SATA RAID (VROC), non-RAID NVMe, and NVMe RAID (VROC standard).

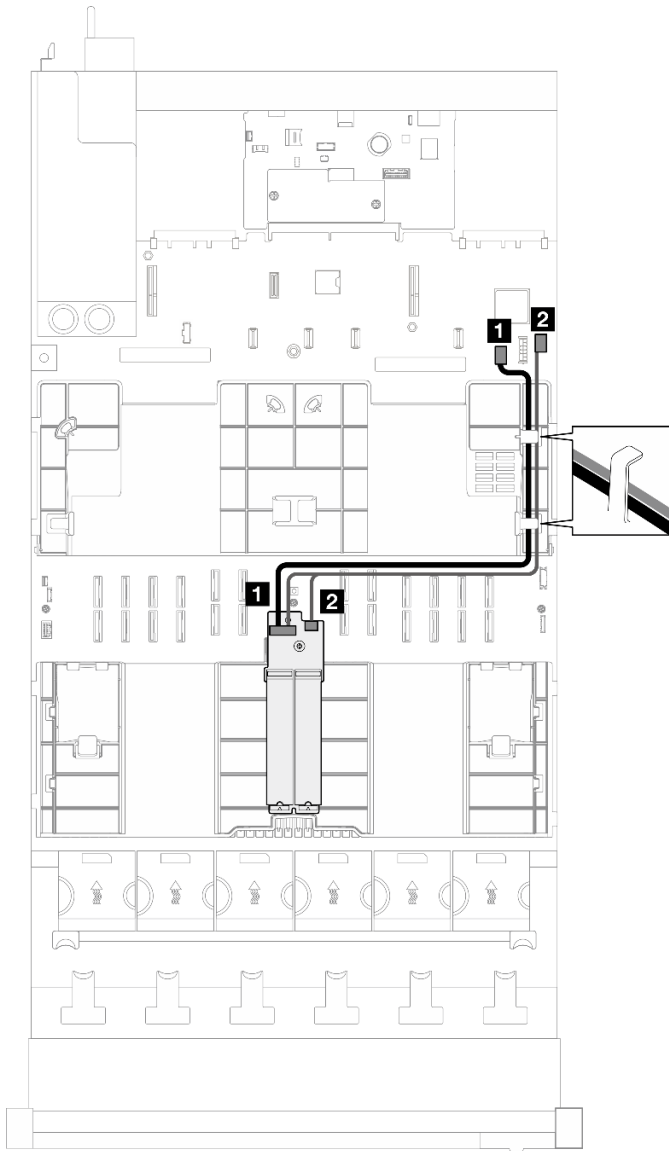


Figure 177. Cable routing for the SATA/NVMe or NVMe M.2 backplane

Cable	From	To
<b>1</b>	M.2 backplane: Signal connector	System board assembly: M.2 signal connector
<b>2</b>	M.2 backplane: Power connector	System board assembly: M.2 power connector

## SATA/x4 NVMe M.2 backplane

**Note:** This configuration supports non-RAID SATA and SATA RAID (VROC).

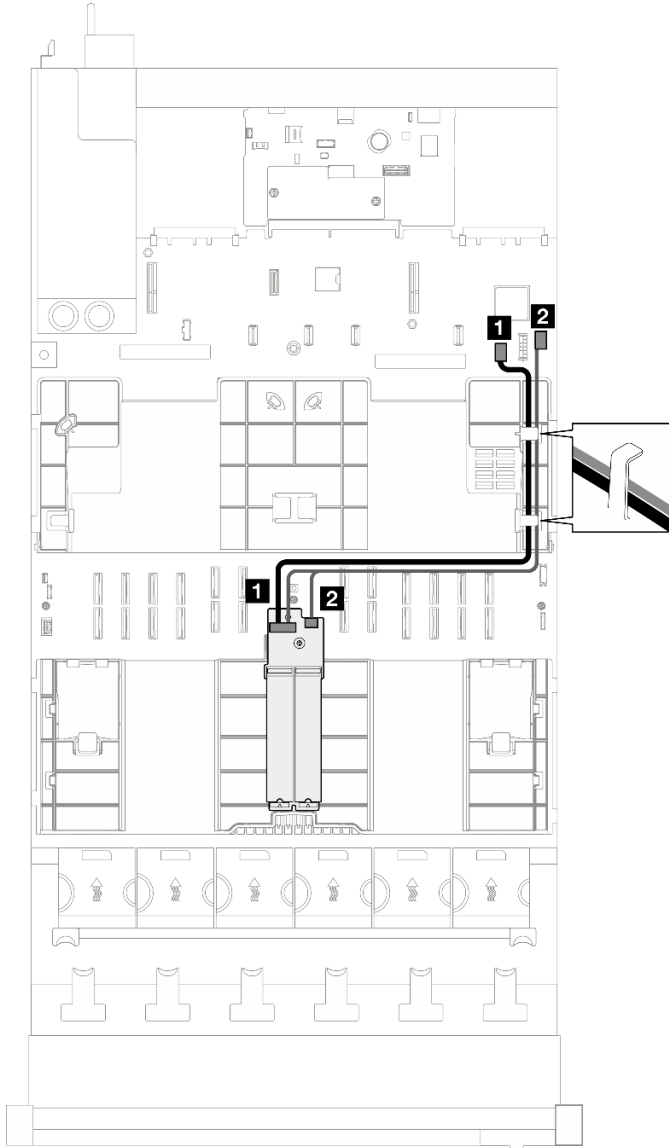


Figure 178. Cable routing for the SATA/x4 NVMe M.2 backplane to PCH

Cable	From	To
<b>1</b>	M.2 backplane: Signal connector	System board assembly: M.2 signal connector
<b>2</b>	M.2 backplane: Power connector	System board assembly: M.2 power connector

**Note:** This configuration supports non-RAID NVMe and NVMe RAID (VROC standard).

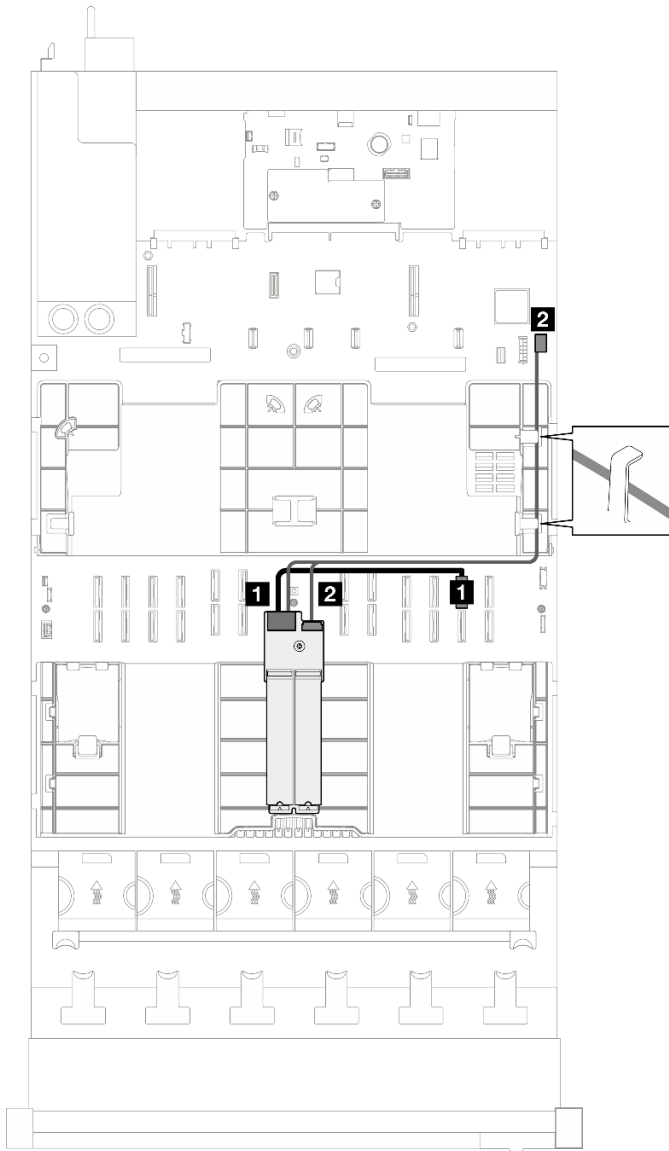


Figure 179. Cable routing for the SATA/x4 NVMe M.2 backplane to processor

Cable	From	To
<b>1</b>	M.2 backplane: Signal connector	System board assembly: NVMe 11 connector
<b>2</b>	M.2 backplane: Power connector	System board assembly: M.2 power connector

## Management NIC adapter cable routing

Follow the instructions in this section to learn how to do cable routing for the management NIC adapter.

**Note:** When routing the cables, ensure that all cables are routed appropriately through the cable guides and cable clips.

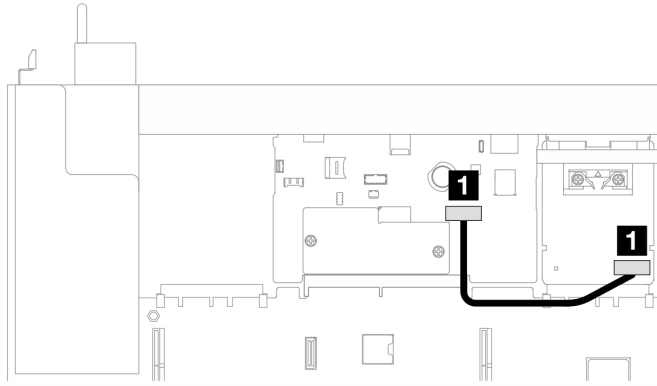


Figure 180. Cable routing for the management NIC adapter

Cable	From	To
<b>1</b>	Management NIC adapter	System board assembly: Second management Ethernet connector

## PCIe riser cable routing

Follow the instructions in this section to learn how to do cable routing for the PCIe risers.

Refer to the corresponding cable routing guide for related server model:

- [“PCIe riser cable routing \(server model with three PCIe risers\)” on page 341](#)
- [“PCIe riser cable routing \(server model with four PCIe risers\)” on page 354](#)

## PCIe riser cable routing (server model with three PCIe risers)

Follow the instructions in this section to learn how to do PCIe riser cable routing for the server model with three PCIe risers.

Choose the routing plan according to the PCIe riser location.

- [“PCIe riser 1 cable routing” on page 341](#)
- [“PCIe riser 2 cable routing” on page 348](#)
- [“PCIe riser 3 cable routing” on page 351](#)

### PCIe riser 1 cable routing

Follow the instructions in this section to learn how to do cable routing for the PCIe riser 1.

#### Notes:

- When routing the cables, ensure that all cables are routed appropriately through the cable guides and cable clips.
- A label on each signal cable indicates the connection source and destination. This information is in the format **RY-X** and **P Z**. Where **Y** indicates the PCIe riser number, **X** indicates the connector on the riser card, and **Z** indicates the connector on the system board assembly.

Choose the routing plan according to the PCIe riser type.

- See [“Two-slot PCIe HL riser 1 cable routing” on page 342](#) for the following PCIe riser:

- x16/x16 PCIe G5 Riser 1/3 FHFL (installed in the riser 1 without riser extender)
- See “[Two-slot PCIe FL riser 1 cable routing](#)” on page 343 for the following PCIe riser:
  - x16/x16 PCIe G5 Riser 1/3 FHFL (installed in the riser 1 with riser extender)
- See “[Two-slot PCIe HL riser 1 \(with 7mm drive cage\) cable routing](#)” on page 345 for the following PCIe riser:
  - 7mm/x16 PCIe G5 Riser 1 FHHL (without riser extender)
- See “[Two-slot PCIe FL riser 1 \(with 7mm drive cage\) cable routing](#)” on page 345 for the following PCIe riser:
  - 7mm/x16 PCIe G5 Riser 1 FHHL (with riser extender)
- See “[Three-slot PCIe HL riser 1 cable routing](#)” on page 346 for the following PCIe riser:
  - x8/x16/x16 PCIe G4 Riser 1/3 FHFL (installed in the riser 1 without riser extender)
- See “[Three-slot PCIe FL riser 1 cable routing](#)” on page 347 for the following PCIe riser:
  - x8/x16/x16 PCIe G4 Riser 1/3 FHFL (installed in the riser 1 with riser extender)

### Two-slot PCIe HL riser 1 cable routing

The following illustration shows cable routing for the two-slot PCIe HL riser 1.

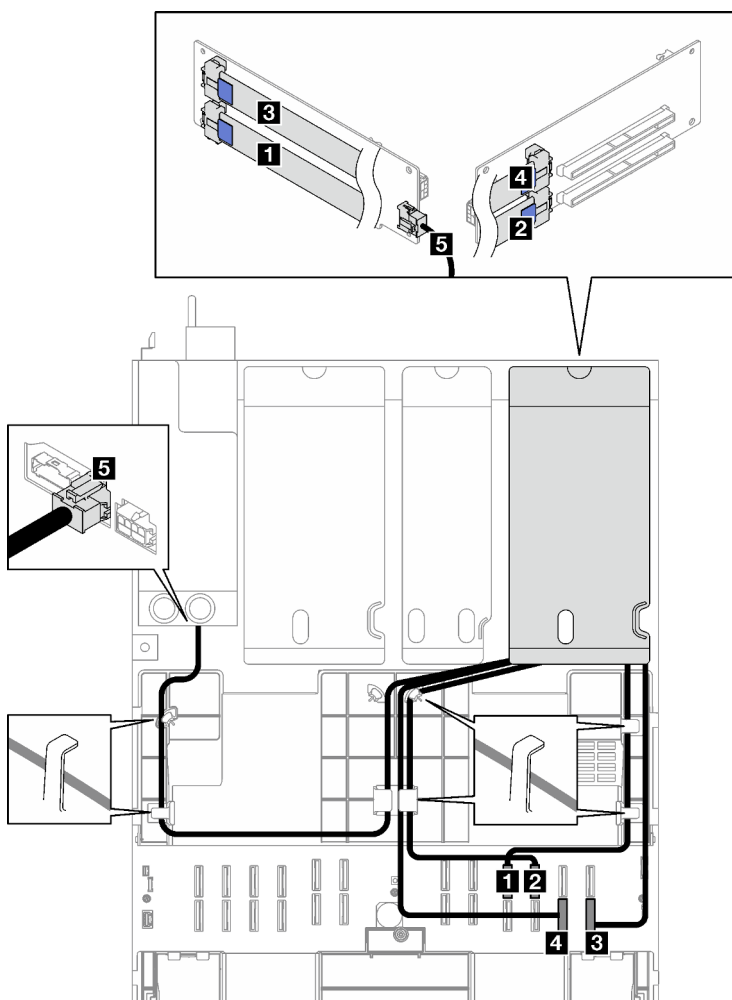


Figure 181. Cable routing for the two-slot PCIe HL riser 1



Cable	From	To	Cable length	Label
<b>1</b>	PCIe riser 1: R1 connector	System board assembly: P 19 connector	540 mm	R1-1
				P 19
<b>2</b>	PCIe riser 1: R2 connector	System board assembly: P 20 connector	420 mm	R1-2
				P 20
<b>3</b>	PCIe riser 1: R3 connector	System board assembly: P 12 connector	540 mm	R1-3
				P 12
<b>4</b>	PCIe riser 1: R4 connector	System board assembly: P 11 connector	420 mm	R1-4
				P 11
<b>5</b>	PCIe riser 1: Riser power connector	Power distribution board: PCIe riser 1 power connector	660 mm	N/A

### Two-slot PCIe FL riser 1 cable routing

The following illustration shows cable routing for the two-slot PCIe FL riser 1.

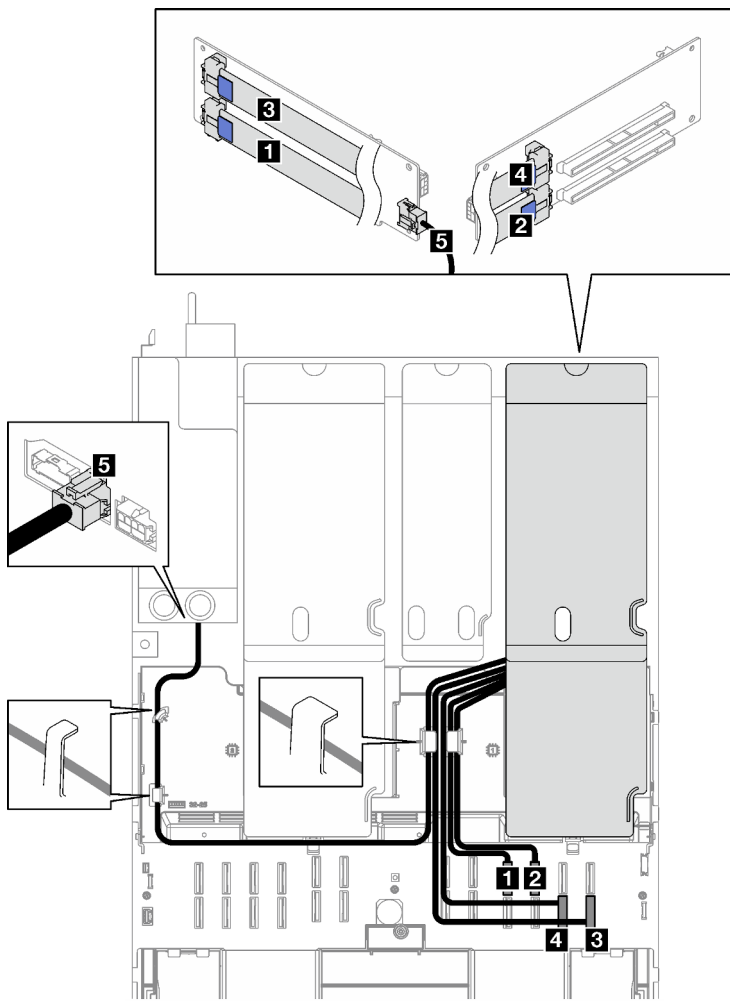


Figure 182. Cable routing for the two-slot PCIe FL riser 1

Cable	From	To	Cable length	Label
<b>1</b>	PCIe riser 1: R1 connector	System board assembly: P 19 connector	500 mm	R1-1
				P 19
<b>2</b>	PCIe riser 1: R2 connector	System board assembly: P 20 connector	420 mm	R1-2
				P 20
<b>3</b>	PCIe riser 1: R3 connector	System board assembly: P 12 connector	500 mm	R1-3
				P 12
<b>4</b>	PCIe riser 1: R4 connector	System board assembly: P 11 connector	420 mm	R1-4
				P 11
<b>5</b>	PCIe riser 1: Riser power connector	Power distribution board: PCIe riser 1 power connector	660 mm	N/A

### Two-slot PCIe HL riser 1 (with 7mm drive cage) cable routing

The following illustration shows cable routing for the two-slot PCIe HL riser 1 (with 7mm drive cage).

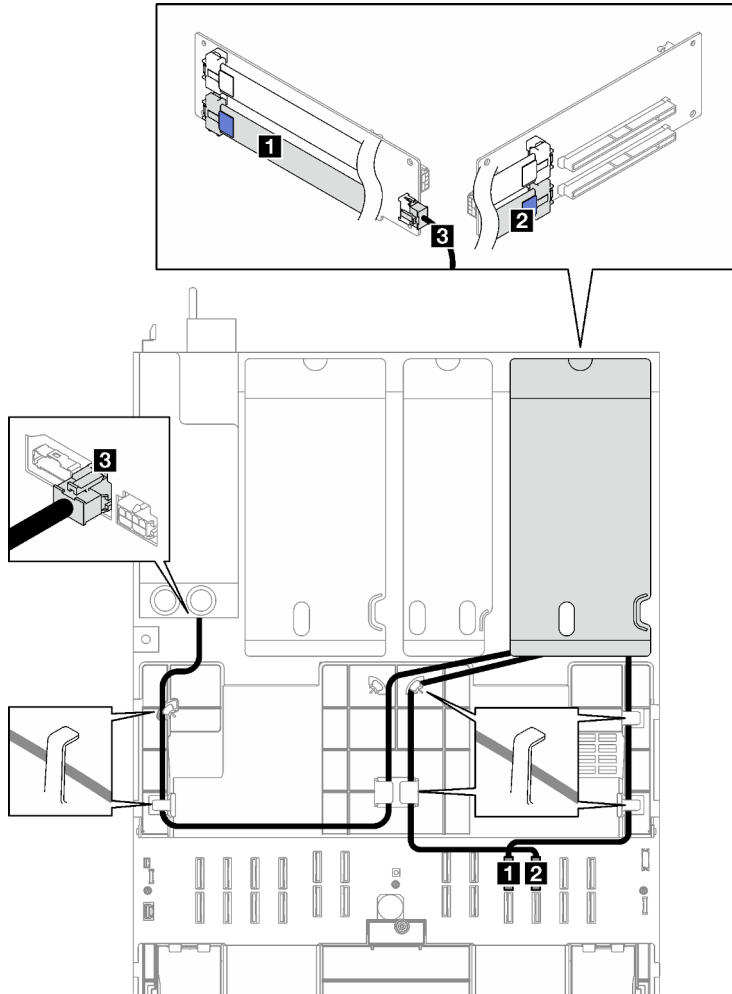


Figure 183. Cable routing for the two-slot PCIe HL riser 1 (with 7mm drive cage)

Cable	From	To	Cable length	Label
<b>1</b>	PCIe riser 1: R1 connector	System board assembly: P 19 connector	540 mm	R1-1
				P 19
<b>2</b>	PCIe riser 1: R2 connector	System board assembly: P 20 connector	420 mm	R1-2
				P 20
<b>3</b>	PCIe riser 1: Riser power connector	Power distribution board: PCIe riser 1 power connector	660 mm	N/A

### Two-slot PCIe FL riser 1 (with 7mm drive cage) cable routing

The following illustration shows cable routing for the two-slot PCIe FL riser 1 (with 7mm drive cage).

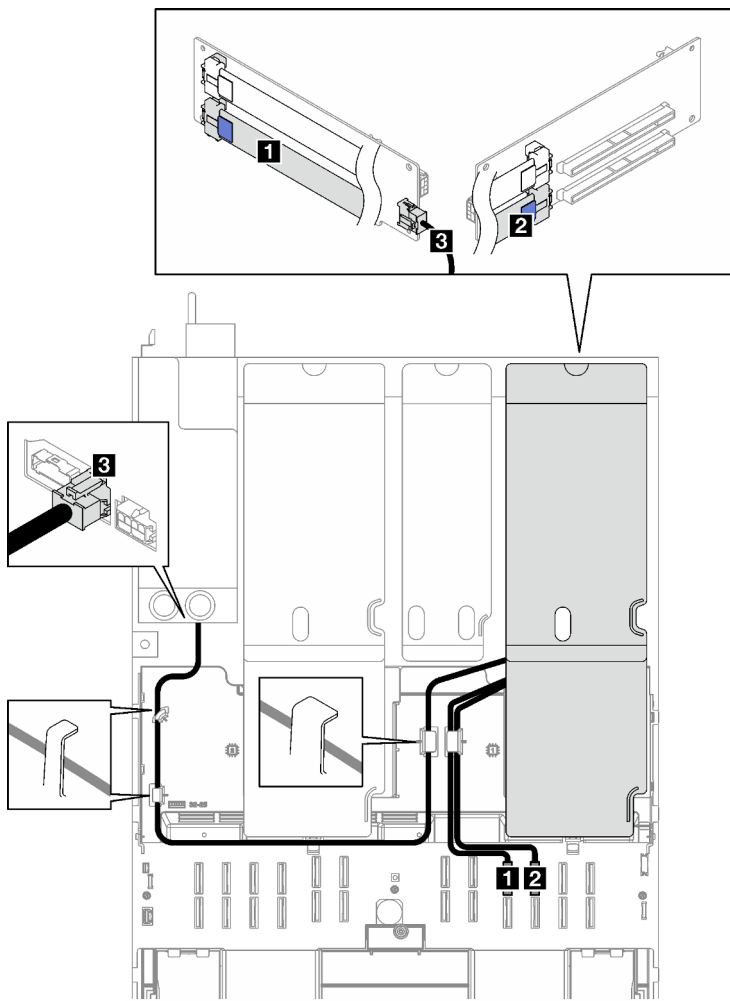


Figure 184. Cable routing for the two-slot PCIe FL riser 1 (with 7mm drive cage)

Cable	From	To	Cable length	Label
<b>1</b>	PCIe riser 1: R1 connector	System board assembly: P 19 connector	500 mm	R1-1
				P 19
<b>2</b>	PCIe riser 1: R2 connector	System board assembly: P 20 connector	420 mm	R1-2
				P 20
<b>3</b>	PCIe riser 1: Riser power connector	Power distribution board: PCIe riser 1 power connector	660 mm	N/A

### Three-slot PCIe HL riser 1 cable routing

The following illustration shows cable routing for the three-slot PCIe HL riser 1.

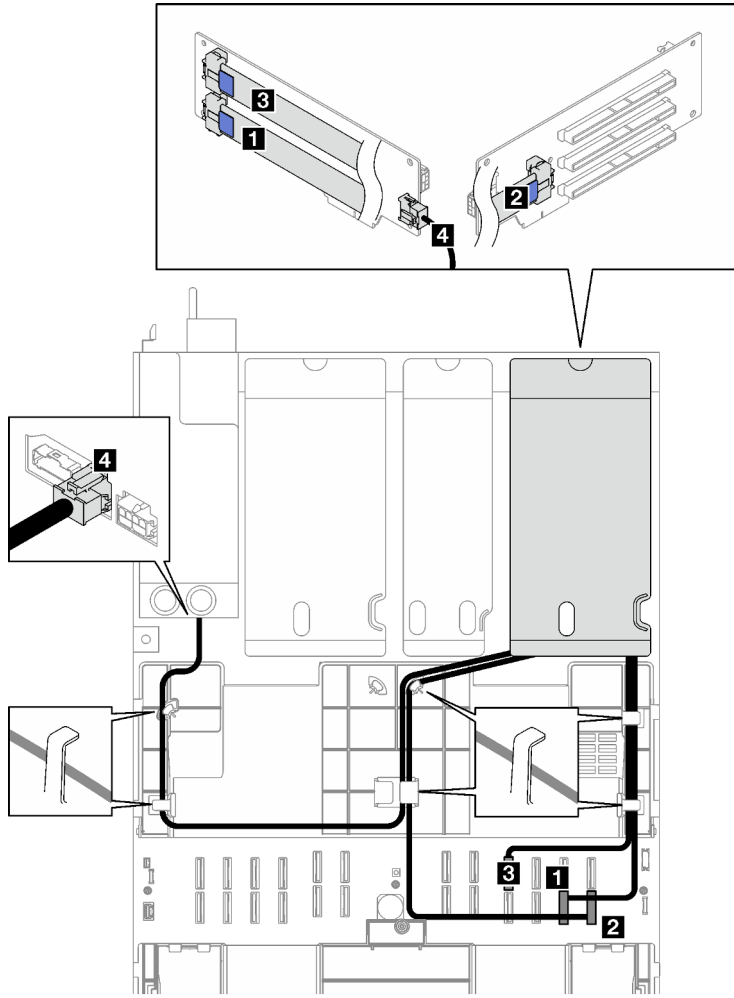


Figure 185. Cable routing for the three-slot PCIe HL riser 1

Cable	From	To	Cable length	Label
<b>1</b>	PCIe riser 1: R1 connector	System board assembly: P 11 connector	540 mm	R1-1
				P 11
<b>2</b>	PCIe riser 1: R2 connector	System board assembly: P 12 connector	420 mm	R1-2
				P 12
<b>3</b>	PCIe riser 1: R3 connector	System board assembly: P 19 connector	540 mm	R1-3
				P 19
<b>4</b>	PCIe riser 1: Riser power connector	Power distribution board: PCIe riser 1 power connector	660 mm	N/A

### Three-slot PCIe FL riser 1 cable routing

The following illustration shows cable routing for the three-slot PCIe FL riser 1.

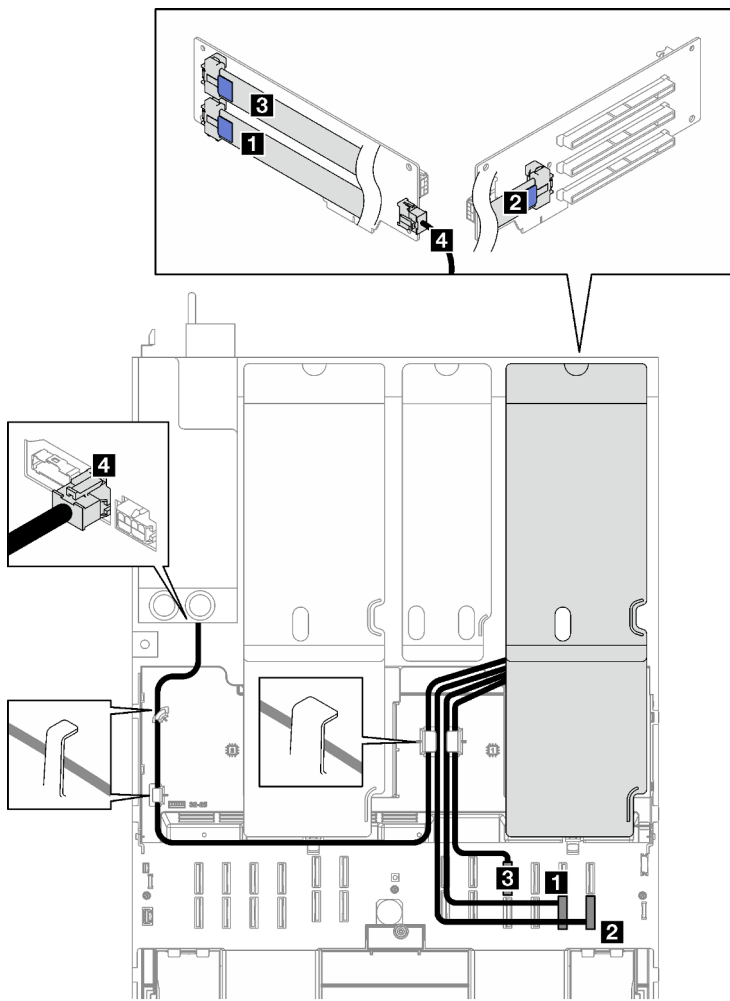


Figure 186. Cable routing for the three-slot PCIe FL riser 1

Cable	From	To	Cable length	Label
<b>1</b>	PCIe riser 1: R1 connector	System board assembly: P 11 connector	500 mm	R1-1
				P 11
<b>2</b>	PCIe riser 1: R2 connector	System board assembly: P 12 connector	420 mm	R1-2
				P 12
<b>3</b>	PCIe riser 1: R3 connector	System board assembly: P 19 connector	500 mm	R1-3
				P 19
<b>4</b>	PCIe riser 1: Riser power connector	Power distribution board: PCIe riser 1 power connector	660 mm	N/A

### PCIe riser 2 cable routing

Follow the instructions in this section to learn how to do cable routing for the PCIe riser 2.

#### Notes:

- When routing the cables, ensure that all cables are routed appropriately through the cable guides and cable clips.
- A label on each signal cable indicates the connection source and destination. This information is in the format **RY-X** and **P Z**. Where **Y** indicates the PCIe riser number, **X** indicates the connector on the riser card, and **Z** indicates the connector on the system board assembly.

Choose the routing plan according to the PCIe riser type.

- See [“Three-slot PCIe riser 2 cable routing” on page 349](#) for the following PCIe risers:
  - x16/x8/x8 PCIe G4 Riser 2/A/B/C HHHL (installed in the riser 2)
  - x16/x8/x8 PCIe G5 Riser 2/A/B/C HHHL (installed in the riser 2)
- See [“Three-slot PCIe riser 2 \(with serial port module\) cable routing” on page 350](#) for the following PCIe risers:
  - x16/x8/Serial PCIe G4 Riser 2/C HHHL (installed in the riser 2)
  - x16/x8/Serial PCIe G5 Riser 2/C HHHL (installed in the riser 2)

### Three-slot PCIe riser 2 cable routing

The following illustration shows cable routing for the three-slot PCIe riser 2.

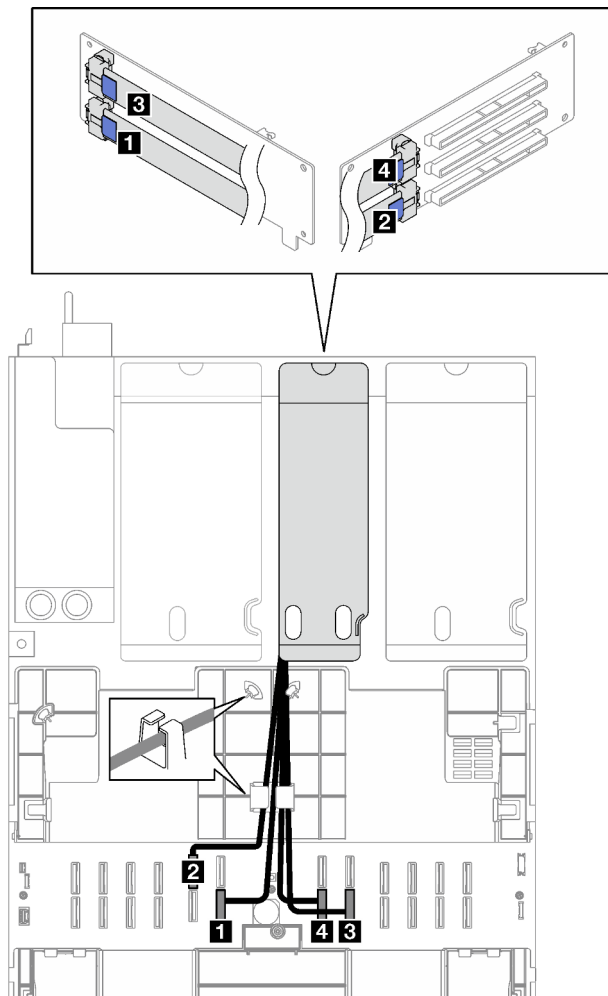


Figure 187. Cable routing for the three-slot PCIe riser 2

Cable	From	To	Cable length	Label
<b>1</b>	PCIe riser 2: R1 connector	System board assembly: P 6 connector	500 mm	R2-1
				P 6
<b>2</b>	PCIe riser 2: R2 connector	System board assembly: P 15 connector	360 mm	R2-2
				P 15
<b>3</b>	PCIe riser 2: R3 connector	System board assembly: P 8 connector	440 mm	R2-3
				P 8
<b>4</b>	PCIe riser 2: R4 connector	System board assembly: P 7 connector	360 mm	R2-4
				P 7

### Three-slot PCIe riser 2 (with serial port module) cable routing

The following illustration shows cable routing for the three-slot PCIe riser 2 (with serial port module).

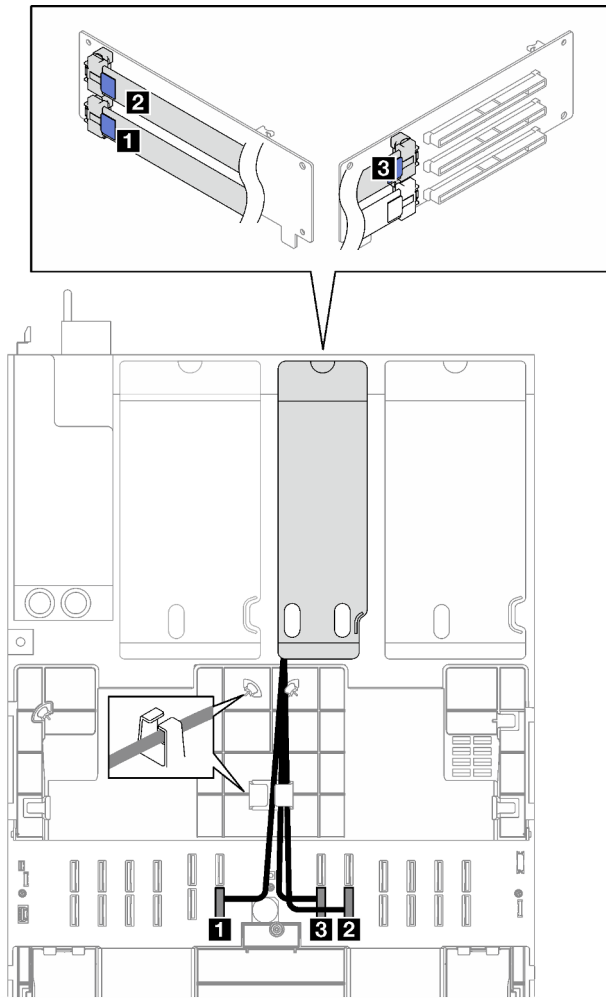


Figure 188. Cable routing for the three-slot PCIe riser 2 (with serial port module)



Cable	From	To	Cable length	Label
<b>1</b>	PCIe riser 2: R1 connector	System board assembly: P 6 connector	500 mm	R2-1
				P 6
<b>2</b>	PCIe riser 2: R3 connector	System board assembly: P 8 connector	440 mm	R2-3
				P 8
<b>3</b>	PCIe riser 2: R4 connector	System board assembly: P 7 connector	360 mm	R2-4
				P 7

### PCIe riser 3 cable routing

Follow the instructions in this section to learn how to do cable routing for the PCIe riser 3.

#### Notes:

- When routing the cables, ensure that all cables are routed appropriately through the cable guides and cable clips.
- A label on each signal cable indicates the connection source and destination. This information is in the format **RY-X** and **P Z**. Where Y indicates the PCIe riser number, **X** indicates the connector on the riser card, and **Z** indicates the connector on the system board assembly.

Choose the routing plan according to the PCIe riser type.

- See [“Two-slot PCIe riser 3 cable routing” on page 351](#) for the following PCIe riser:
  - x16/x16 PCIe G5 Riser 1/3 FHFL (installed in the riser 3)
- See [“Three-slot PCIe riser 3 cable routing” on page 353](#) for the following PCIe riser:
  - x8/x16/x16 PCIe G4 Riser 1/3 FHFL (installed in the riser 3)

#### Two-slot PCIe riser 3 cable routing

The following illustration shows cable routing for the two-slot PCIe riser 3.

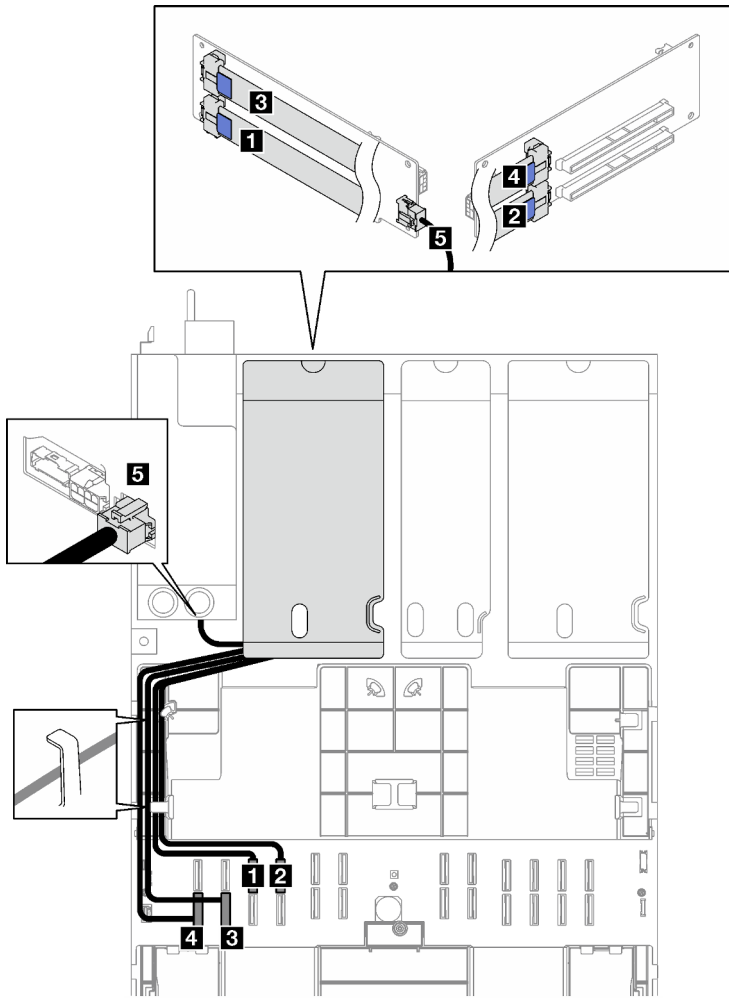


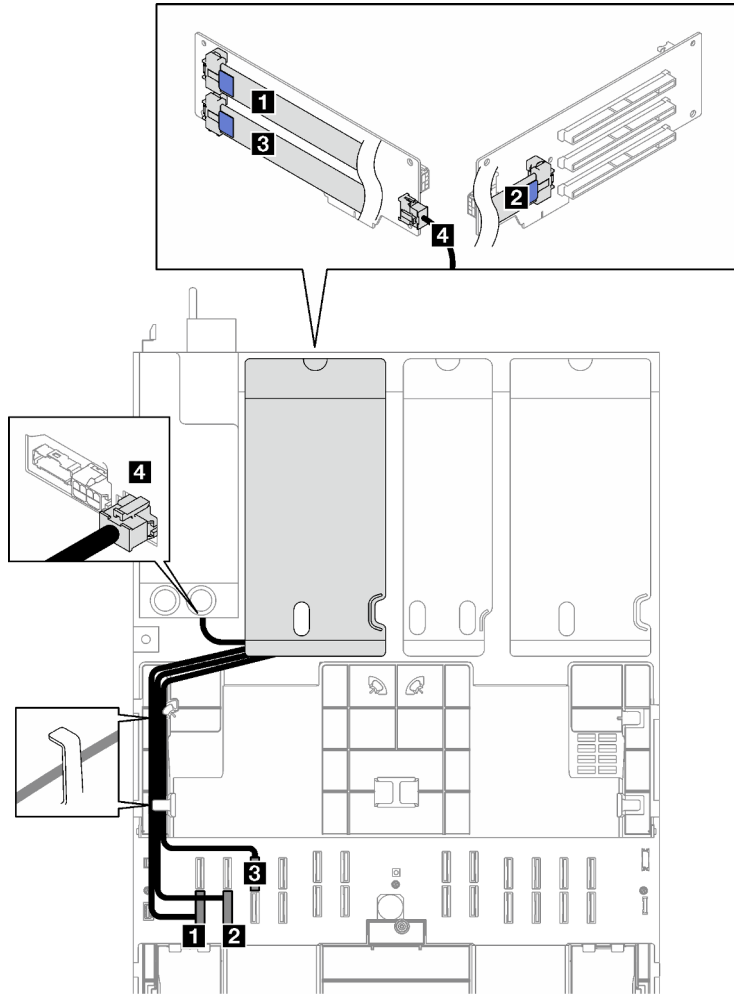
Figure 189. Cable routing for the two-slot PCIe riser 3

Cable	From	To	Cable length	Label
<b>1</b>	PCIe riser 3: R1 connector	System board assembly: P 13 connector	500 mm	R3-1
				P 13
<b>2</b>	PCIe riser 3: R2 connector	System board assembly: P 14 connector	420 mm	R3-2
				P 14
<b>3</b>	PCIe riser 3: R3 connector	System board assembly: P 2 connector	500 mm	R3-3
				P 2
<b>4</b>	PCIe riser 3: R4 connector	System board assembly: P 1 connector	420 mm	R3-4
				P 1
<b>5</b>	PCIe riser 3: Riser power connector	Power distribution board: PCIe riser 3 power connector	100 mm	N/A

### Three-slot PCIe riser 3 cable routing

The following illustration shows cable routing for the three-slot PCIe riser 3.

Figure 190. Cable routing for the three-slot PCIe riser 3



Cable	From	To	Cable length	Label
<b>1</b>	PCIe riser 3: R1 connector	System board assembly: P 1 connector	500 mm	R3-1
				P 1
<b>2</b>	PCIe riser 3: R2 connector	System board assembly: P 2 connector	420 mm	R3-2
				P 2
<b>3</b>	PCIe riser 3: R3 connector	System board assembly: P 13 connector	500 mm	R3-3
				P 13
<b>4</b>	PCIe riser 3: Riser power connector	Power distribution board: PCIe riser 3 power connector	100 mm	N/A

## PCIe riser cable routing (server model with four PCIe risers)

Follow the instructions in this section to learn how to do PCIe riser cable routing for the server model with four PCIe risers.

Choose the routing plan according to the PCIe riser location.

- [“PCIe riser A cable routing” on page 354](#)
- [“PCIe riser B cable routing” on page 355](#)
- [“PCIe riser C cable routing” on page 357](#)
- [“PCIe riser D cable routing” on page 359](#)

### PCIe riser A cable routing

Follow the instructions in this section to learn how to do cable routing for the PCIe riser A.

#### Notes:

- When routing the cables, ensure that all cables are routed appropriately through the cable guides and cable clips.
- A label on each signal cable indicates the connection source and destination. This information is in the format **RY-X** and **P Z**. Where Y indicates the PCIe riser number, **X** indicates the connector on the riser card, and **Z** indicates the connector on the system board assembly.

This configuration supports the following PCIe risers:

- x16/x8/x8 PCIe G4 Riser 2/A/B/C HHHL (installed in the riser A)
- x16/x8/x8 PCIe G5 Riser 2/A/B/C HHHL (installed in the riser A)

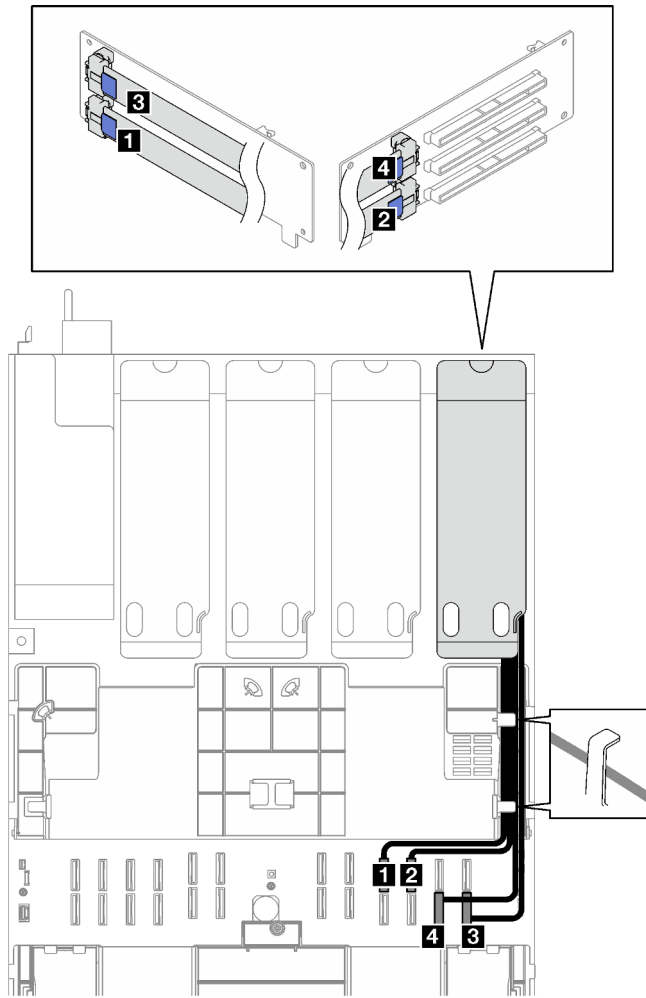


Figure 191. Cable routing for the PCIe riser A

Cable	From	To	Cable length	Label
<b>1</b>	PCIe riser A: R1 connector	System board assembly: P 19 connector	500 mm	RA-1
				P 19
<b>2</b>	PCIe riser A: R2 connector	System board assembly: P 20 connector	420 mm	RA-2
				P 20
<b>3</b>	PCIe riser A: R3 connector	System board assembly: P 12 connector	500 mm	RA-3
				P 12
<b>4</b>	PCIe riser A: R4 connector	System board assembly: P 11 connector	420 mm	RA-4
				P 11

### PCIe riser B cable routing

Follow the instructions in this section to learn how to do cable routing for the PCIe riser B.

#### Notes:

- When routing the cables, ensure that all cables are routed appropriately through the cable guides and cable clips.
- A label on each signal cable indicates the connection source and destination. This information is in the format **RY-X** and **P Z**. Where **Y** indicates the PCIe riser number, **X** indicates the connector on the riser card, and **Z** indicates the connector on the system board assembly.

This configuration supports the following PCIe risers:

- x16/x8/x8 PCIe G4 Riser 2/A/B/C HHL (installed in the riser B)
- x16/x8/x8 PCIe G5 Riser 2/A/B/C HHL (installed in the riser B)

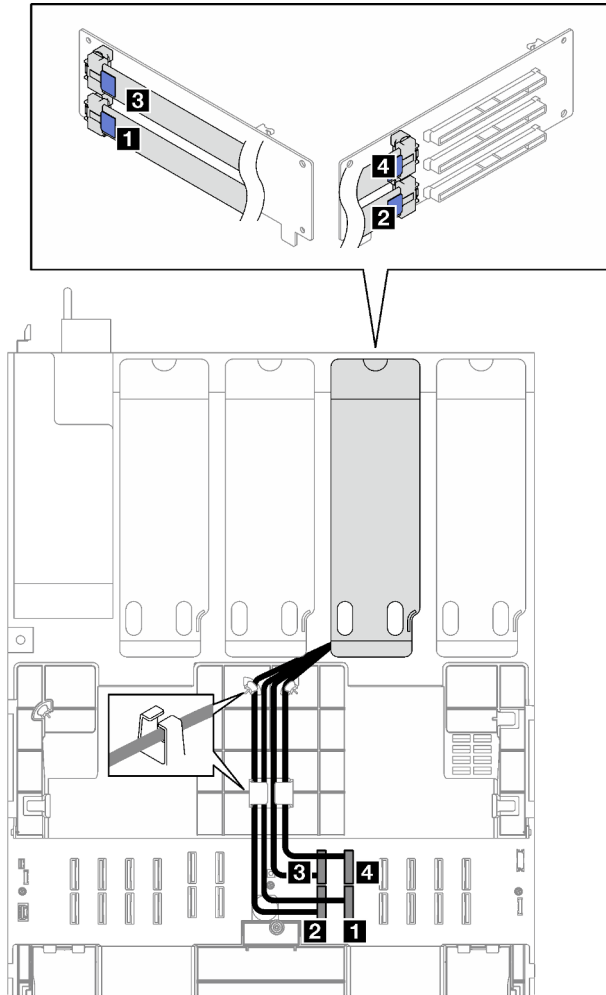


Figure 192. Cable routing for the PCIe riser B

Cable	From	To	Cable length	Label
<b>1</b>	PCIe riser B: R1 connector	System board assembly: P 8 connector	500 mm	RB-1
				P 8
<b>2</b>	PCIe riser B: R2 connector	System board assembly: P 7 connector	360 mm	RB-2
				P 7

Cable	From	To	Cable length	Label
3	PCIe riser B: R3 connector	System board assembly: P 17 connector	440 mm	RB-3
				P 17
4	PCIe riser B: R4 connector	System board assembly: P 18 connector	360 mm	RB-4
				P 18

## PCIe riser C cable routing

Follow the instructions in this section to learn how to do cable routing for the PCIe riser C.

### Notes:

- When routing the cables, ensure that all cables are routed appropriately through the cable guides and cable clips.
- A label on each signal cable indicates the connection source and destination. This information is in the format **RY-X** and **P Z**. Where Y indicates the PCIe riser number, X indicates the connector on the riser card, and Z indicates the connector on the system board assembly.

Choose the routing plan according to the PCIe riser type.

- See [“PCIe riser C cable routing” on page 357](#) for the following PCIe risers:
  - x16/x8/x8 PCIe G4 Riser 2/A/B/C HHHL (installed in the riser C)
  - x16/x8/x8 PCIe G5 Riser 2/A/B/C HHHL (installed in the riser C)
- See [“PCIe riser C \(with serial port module\) cable routing” on page 358](#) for the following PCIe risers:
  - x16/x8/Serial PCIe G4 Riser 2/C HHHL (installed in the riser C)
  - x16/x8/Serial PCIe G5 Riser 2/C HHHL (installed in the riser C)

### PCIe riser C cable routing

The following illustration shows cable routing for the PCIe riser C.

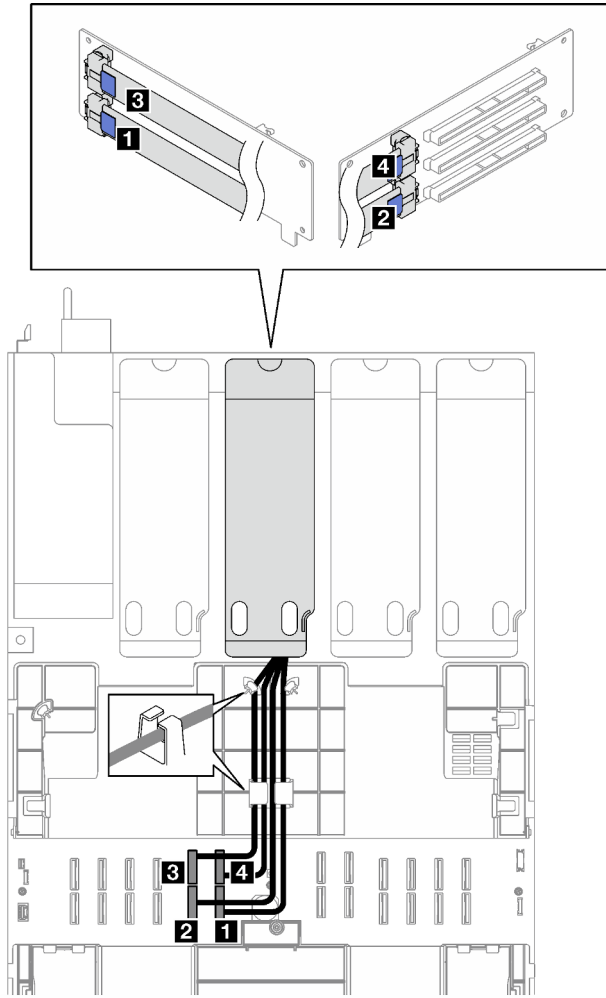


Figure 193. Cable routing for the PCIe riser C

Cable	From	To	Cable length	Label
<b>1</b>	PCIe riser C: R1 connector	System board assembly: P 6 connector	500 mm	RC-1
				P 6
<b>2</b>	PCIe riser C: R2 connector	System board assembly: P 5 connector	360 mm	RC-2
				P 5
<b>3</b>	PCIe riser C: R3 connector	System board assembly: P 15 connector	440 mm	RC-3
				P 15
<b>4</b>	PCIe riser C: R4 connector	System board assembly: P 16 connector	360 mm	RC-4
				P 16

### PCIe riser C (with serial port module) cable routing

The following illustration shows cable routing for the PCIe riser C (with serial port module).



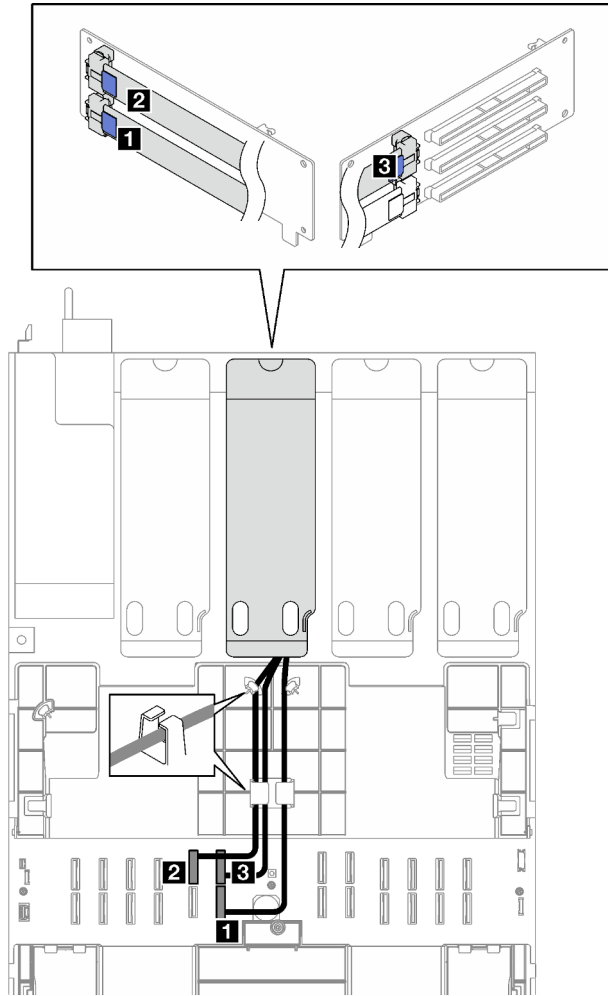


Figure 194. Cable routing for the PCIe riser C (with serial port module)

Cable	From	To	Cable length	Label
<b>1</b>	PCIe riser C: R1 connector	System board assembly: P 6 connector	500 mm	RC-1
				P 6
<b>2</b>	PCIe riser C: R3 connector	System board assembly: P 15 connector	440 mm	RC-3
				P 15
<b>3</b>	PCIe riser C: R4 connector	System board assembly: P 16 connector	360 mm	RC-4
				P 16

### PCIe riser D cable routing

Follow the instructions in this section to learn how to do cable routing for the PCIe riser D.

#### Notes:

- When routing the cables, ensure that all cables are routed appropriately through the cable guides and cable clips.

- A label on each signal cable indicates the connection source and destination. This information is in the format **RY-X** and **P Z**. Where **Y** indicates the PCIe riser number, **X** indicates the connector on the riser card, and **Z** indicates the connector on the system board assembly.

This configuration supports the following PCIe risers:

- x8/x16/x16 PCIe G4 Riser D HHHL
- x8/x16/x16 PCIe G5 Riser D HHHL

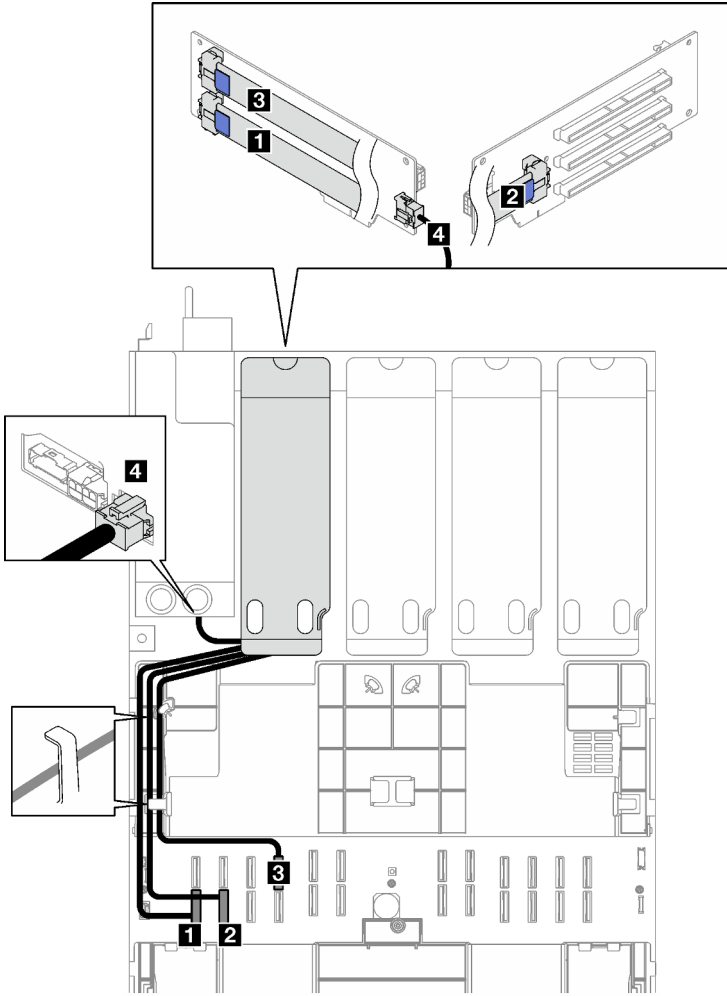


Figure 195. Cable routing for the PCIe riser D

Cable	From	To	Cable length	Label
<b>1</b>	PCIe riser D: R1 connector	System board assembly: P 1 connector	500 mm	RD-1
				P 1
<b>2</b>	PCIe riser D: R2 connector	System board assembly: P 2 connector	420 mm	RD-2
				P 2

Cable	From	To	Cable length	Label
<b>3</b>	PCIe riser D: R3 connector	System board assembly: P 14 connector	500 mm	RD-3
				P 14
<b>4</b>	PCIe riser D: Riser power connector	Power distribution board: PCIe riser D power connector	100 mm	N/A



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## Chapter 7. System configuration

Complete these procedures to configure your system.

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### Set the network connection for the Lenovo XClarity Controller

Before you can access the Lenovo XClarity Controller over your network, you need to specify how Lenovo XClarity Controller will connect to the network. Depending on how the network connection is implemented, you might need to specify a static IP address as well.

The following methods are available to set the network connection for the Lenovo XClarity Controller if you are not using DHCP:

- If a monitor is attached to the server, you can use Lenovo XClarity Provisioning Manager to set the network connection.

Complete the following steps to connect the Lenovo XClarity Controller to the network using the Lenovo XClarity Provisioning Manager.

1. Start the server.
2. Press the key specified in the on-screen instructions to display the Lenovo XClarity Provisioning Manager interface. (For more information, see the “Startup” section in the LXPM documentation compatible with your server at <https://pubs.lenovo.com/lxpm-overview/>.)
3. Go to **LXPM → UEFI Setup → BMC Settings** to specify how the Lenovo XClarity Controller will connect to the network.
  - If you choose a static IP connection, make sure that you specify an IPv4 or IPv6 address that is available on the network.
  - If you choose a DHCP connection, make sure that the MAC address for the server has been configured in the DHCP server.
4. Click **OK** to apply the setting and wait for two to three minutes.
5. Use an IPv4 or IPv6 address to connect Lenovo XClarity Controller.

**Important:** The Lenovo XClarity Controller is set initially with a user name of USERID and password of PASSW0RD (with a zero, not the letter O). This default user setting has Supervisor access. It is required to change this user name and password during your initial configuration for enhanced security.

- If no monitor is attached to the server, you can set the network connection through the Lenovo XClarity Controller interface. Connect an Ethernet cable from your laptop to XCC system management port on your server. For the location of the XCC system management port, see [Chapter 2 “Server components” on page 17](#).

**Note:** Make sure that you modify the IP settings on the laptop so that it is on the same network as the server default settings.

The default IPv4 address and the IPv6 Link Local Address (LLA) is provided on the Lenovo XClarity Controller Network Access label that is affixed to the Pull Out Information Tab. See [“Identify the server and access the Lenovo XClarity Controller” on page 43](#).

- If you are using the Lenovo XClarity Administrator Mobile app from a mobile device, you can connect to the Lenovo XClarity Controller through the Lenovo XClarity Controller USB connector on the server. For the location of the Lenovo XClarity Controller USB connector, see [Chapter 2 “Server components” on page 17](#).

**Note:** The Lenovo XClarity Controller USB connector mode must be set to manage the Lenovo XClarity Controller (instead of normal USB mode). To switch from normal mode to Lenovo XClarity Controller management mode, hold the ID button on the server for at least 3 seconds until its LED flashes slowly (once every couple of seconds). See [Chapter 2 “Server components” on page 17](#) for the location of the ID button.

To connect using the Lenovo XClarity Administrator Mobile app:

1. Connect the USB cable of your mobile device to the Lenovo XClarity Controller USB connector on the server.
2. On your mobile device, enable USB tethering.
3. On your mobile device, launch the Lenovo XClarity Administrator mobile app.
4. If automatic discovery is disabled, click **Discovery** on the USB Discovery page to connect to the Lenovo XClarity Controller.

For more information about using the Lenovo XClarity Administrator Mobile app, see:

[https://pubs.lenovo.com/lxca/lxca\\_usemobileapp](https://pubs.lenovo.com/lxca/lxca_usemobileapp)

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## Set USB port for Lenovo XClarity Controller connection

Before you can access the Lenovo XClarity Controller through the USB port, you need to configure the USB port for Lenovo XClarity Controller connection.

### Server support

To see if your server supports accessing Lenovo XClarity Controller through the USB port, check one of the following:

- Refer to [Chapter 2 “Server components” on page 17](#).



- If there is a wrench icon on the USB port of your server, you can set the management USB port to connect to Lenovo XClarity Controller. It is also the only USB port that supports USB automation update of the firmware and RoT security module.

### Setting the USB port for Lenovo XClarity Controller connection

You can switch the USB port between normal and Lenovo XClarity Controller management operation by performing one of the following steps.

- Hold the ID button for at least 3 second until its LED flashes slowly (once every couple of seconds). See [Chapter 2 “Server components” on page 17](#) for ID button location.
- From the Lenovo XClarity Controller management controller CLI, run the `usbfp` command. For information about using the Lenovo XClarity Controller CLI, see the “Command-line interface” section in the XCC documentation compatible with your server at <https://pubs.lenovo.com/lxcc-overview/>.
- From the Lenovo XClarity Controller management controller web interface, click **BMC Configuration → Network → USB Management Port Assignment**. For information about Lenovo XClarity Controller web interface functions, see the “Description of XClarity Controller functions on web interface” section in the XCC documentation compatible with your server at <https://pubs.lenovo.com/lxcc-overview/>.

### Checking USB port current setting

You can also check the current setting of the USB port using the Lenovo XClarity Controller management controller CLI (`usbfp` command) or the Lenovo XClarity Controller management controller web interface (**BMC Configuration → Network → USB Management Port Assignment**). See the “Command-line

interface” and “Description of XClarity Controller functions on web interface” sections in the XCC documentation compatible with your server at <https://pubs.lenovo.com/lxcc-overview/>.

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## Update the firmware

Several options are available to update the firmware for the server.

You can use the tools listed here to update the most current firmware for your server and the devices that are installed in the server.

- Best practices related to updating firmware is available at the following site:
  - <https://lenovopress.lenovo.com/lp0656-lenovo-thinksystem-firmware-and-driver-update-best-practices>
- The latest firmware can be found at the following site:
  - <https://datacentersupport.lenovo.com/tw/en/products/servers/thinksystem/sr850v3/7d96/downloads/driver-list/>
- You can subscribe to product notification to stay up to date on firmware updates:
  - <https://datacentersupport.lenovo.com/solutions/ht509500>

### Update Bundles (Service Packs)

Lenovo typically releases firmware in bundles called Update Bundles (Service Packs). To ensure that all of the firmware updates are compatible, you should update all firmware at the same time. If you are updating firmware for both the Lenovo XClarity Controller and UEFI, update the firmware for Lenovo XClarity Controller first.

### Update method terminology

- **In-band update.** The installation or update is performed using a tool or application within an operating system that is executing on the server’s core CPU.
- **Out-of-band update.** The installation or update is performed by the Lenovo XClarity Controller collecting the update and then directing the update to the target subsystem or device. Out-of-band updates have no dependency on an operating system executing on the core CPU. However, most out-of-band operations do require the server to be in the S0 (Working) power state.
- **On-Target update.** The installation or update is initiated from an installed operating system executing on the target server itself.
- **Off-Target update.** The installation or update is initiated from a computing device interacting directly with the server’s Lenovo XClarity Controller.
- **Update Bundles (Service Packs).** Update Bundles (Service Packs) are bundled updates designed and tested to provide the interdependent level of functionality, performance, and compatibility. Update Bundles (Service Packs) are server machine-type specific and are built (with firmware and device driver updates) to support specific Windows Server, Red Hat Enterprise Linux (RHEL) and SUSE Linux Enterprise Server (SLES) operating system distributions. Machine-type-specific firmware-only Update Bundles (Service Packs) are also available.

### Firmware updating tools

See the following table to determine the best Lenovo tool to use for installing and setting up the firmware:

Tool	Update Methods Supported	Core System Firmware Updates	I/O Devices Firmware Updates	Drive Firmware Updates	Graphical user interface	Command line interface	Supports Update Bundles (Service Packs)
<b>Lenovo XClarity Provisioning Manager (LXPM)</b>	In-band <sup>2</sup> On-Target	√			√		
<b>Lenovo XClarity Controller (XCC)</b>	In-band <sup>4</sup> Out-of-band Off-Target	√	Selected I/O devices	√ <sup>3</sup>	√		√
<b>Lenovo XClarity Essentials OneCLI (OneCLI)</b>	In-band Out-of-band On-Target Off-Target	√	All I/O devices	√ <sup>3</sup>		√	√
<b>Lenovo XClarity Essentials UpdateXpress (LXCE)</b>	In-band Out-of-band On-Target Off-Target	√	All I/O devices		√		√
<b>Lenovo XClarity Essentials Bootable Media Creator (BoMC)</b>	In-band Out-of-band Off-Target	√	All I/O devices		√ (BoMC application)	√ (BoMC application)	√
<b>Lenovo XClarity Administrator (LXCA)</b>	In-band <sup>1</sup> Out-of-band <sup>2</sup> Off-Target	√	All I/O devices		√		√
<b>Lenovo XClarity Integrator (LXCI) for VMware vCenter</b>	Out-of-band Off-Target	√	Selected I/O devices		√		
<b>Lenovo XClarity Integrator (LXCI) for Microsoft Windows Admin Center</b>	In-band Out-of-band On-Target Off-Target	√	All I/O devices		√		√



Tool	Update Methods Supported	Core System Firmware Updates	I/O Devices Firmware Updates	Drive Firmware Updates	Graphical user interface	Command line interface	Supports Update Bundles (Service Packs)
<b>Lenovo XClarity Integrator (LXCI) for Microsoft System Center Configuration Manager</b>	In-band On-Target	√	All I/O devices		√		√
<b>Notes:</b> <ol style="list-style-type: none"> <li>For I/O firmware updates.</li> <li>For BMC and UEFI firmware updates.</li> <li>Drive firmware update is only supported by the tools and methods below: <ul style="list-style-type: none"> <li>XCC Bare Metal Update (BMU): In-band, and requires system reboot.</li> <li>Lenovo XClarity Essentials OneCLI: <ul style="list-style-type: none"> <li>For drives supported by ThinkSystem V2 and V3 products (legacy drives): In-band, and does not require system reboot.</li> <li>For drives supported only by ThinkSystem V3 products (new drives): Staging to XCC and complete the update with XCC BMU (In-band, and requires system reboot.).</li> </ul> </li> </ul> </li> <li>Bare Metal Update (BMU) only.</li> </ol>							

- **Lenovo XClarity Provisioning Manager**

From Lenovo XClarity Provisioning Manager, you can update the Lenovo XClarity Controller firmware, the UEFI firmware, and the Lenovo XClarity Provisioning Manager software.

**Note:** By default, the Lenovo XClarity Provisioning Manager Graphical User Interface is displayed when you start the server and press the key specified in the on-screen instructions. If you have changed that default to be the text-based system setup, you can bring up the Graphical User Interface from the text-based system setup interface.

For additional information about using Lenovo XClarity Provisioning Manager to update firmware, see:

“Firmware Update” section in the LXPM documentation compatible with your server at <https://pubs.lenovo.com/lxpm-overview/>

- **Lenovo XClarity Controller**

If you need to install a specific update, you can use the Lenovo XClarity Controller interface for a specific server.

**Notes:**

- To perform an in-band update through Windows or Linux, the operating system driver must be installed and the Ethernet-over-USB (sometimes called LAN over USB) interface must be enabled.

For additional information about configuring Ethernet over USB, see:

“Configuring Ethernet over USB” section in the XCC documentation version compatible with your server at <https://pubs.lenovo.com/xcc-overview/>

- If you update firmware through the Lenovo XClarity Controller, make sure that you have downloaded and installed the latest device drivers for the operating system that is running on the server.

For additional information about using Lenovo XClarity Controller to update firmware, see:

“Updating Server Firmware” section in the XCC documentation compatible with your server at <https://pubs.lenovo.com/lxcc-overview/>

- **Lenovo XClarity Essentials OneCLI**

Lenovo XClarity Essentials OneCLI is a collection of command line applications that can be used to manage Lenovo servers. Its update application can be used to update firmware and device drivers for your servers. The update can be performed within the host operating system of the server (in-band) or remotely through the BMC of the server (out-of-band).

For additional information about using Lenovo XClarity Essentials OneCLI to update firmware, see:

[https://pubs.lenovo.com/lxce-onecli/onecli\\_c\\_update](https://pubs.lenovo.com/lxce-onecli/onecli_c_update)

- **Lenovo XClarity Essentials UpdateXpress**

Lenovo XClarity Essentials UpdateXpress provides most of OneCLI update functions through a graphical user interface (GUI). It can be used to acquire and deploy Update Bundles (Service Packs) update packages and individual updates. Update Bundles (Service Packs) contain firmware and device driver updates for Microsoft Windows and for Linux.

You can obtain Lenovo XClarity Essentials UpdateXpress from the following location:

<https://datacentersupport.lenovo.com/solutions/Invo-xpress>

- **Lenovo XClarity Essentials Bootable Media Creator**

You can use Lenovo XClarity Essentials Bootable Media Creator to create bootable media that is suitable for firmware updates, VPD updates, inventory and FFDC collection, advanced system configuration, FoD Keys management, secure erase, RAID configuration, and diagnostics on supported servers.

You can obtain Lenovo XClarity Essentials BoMC from the following location:

<https://datacentersupport.lenovo.com/solutions/Invo-bomc>

- **Lenovo XClarity Administrator**

If you are managing multiple servers using the Lenovo XClarity Administrator, you can update firmware for all managed servers through that interface. Firmware management is simplified by assigning firmware-compliance policies to managed endpoints. When you create and assign a compliance policy to managed endpoints, Lenovo XClarity Administrator monitors changes to the inventory for those endpoints and flags any endpoints that are out of compliance.

For additional information about using Lenovo XClarity Administrator to update firmware, see:

[https://pubs.lenovo.com/lxca/update\\_fw](https://pubs.lenovo.com/lxca/update_fw)

- **Lenovo XClarity Integrator offerings**

Lenovo XClarity Integrator offerings can integrate management features of Lenovo XClarity Administrator and your server with software used in a certain deployment infrastructure, such as VMware vCenter, Microsoft Admin Center, or Microsoft System Center.

For additional information about using Lenovo XClarity Integrator to update firmware, see:

<https://pubs.lenovo.com/lxci-overview/>

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## Configure the firmware

Several options are available to install and set up the firmware for the server.

**Important:** Lenovo does not recommend setting option ROMs to **Legacy**, but you can conduct this setting if necessary. Note that this setting prevents UEFI drivers for the slot devices from loading, which may cause negative side effects to Lenovo software, such as LXCA, OneCLI, and XCC. These side effects include but

are not limited to the inability to determine adapter card details, such as model name and firmware levels. For example, "ThinkSystem RAID 930-16i 4GB Flash" may be displayed as "Adapter 06:00:00". In some cases, the functionality on a specific PCIe adapter may not be enabled properly.

- **Lenovo XClarity Provisioning Manager (LXPM)**

From Lenovo XClarity Provisioning Manager, you can configure the UEFI settings for your server.

**Notes:** The Lenovo XClarity Provisioning Manager provides a Graphical User Interface to configure a server. The text-based interface to system configuration (the Setup Utility) is also available. From Lenovo XClarity Provisioning Manager, you can choose to restart the server and access the text-based interface. In addition, you can choose to make the text-based interface the default interface that is displayed when you start LXPM. To do this, go to **Lenovo XClarity Provisioning Manager → UEFI Setup → System Settings → <F1>Start Control → Text Setup**. To start the server with Graphic User Interface, select **Auto** or **Tool Suite**.

See the following documentations for more information:

- Search for the LXPM documentation version compatible with your server at <https://pubs.lenovo.com/lxpm-overview/>
- *UEFI User Guide* at <https://pubs.lenovo.com/uefi-overview/>

- **Lenovo XClarity Essentials OneCLI**

You can use the config application and commands to view the current system configuration settings and make changes to Lenovo XClarity Controller and UEFI. The saved configuration information can be used to replicate or restore other systems.

For information about configuring the server using Lenovo XClarity Essentials OneCLI, see:

[https://pubs.lenovo.com/lxce-onecli/onecli\\_c\\_settings\\_info\\_commands](https://pubs.lenovo.com/lxce-onecli/onecli_c_settings_info_commands)

- **Lenovo XClarity Administrator**

You can quickly provision and pre-provision all of your servers using a consistent configuration. Configuration settings (such as local storage, I/O adapters, boot settings, firmware, ports, and Lenovo XClarity Controller and UEFI settings) are saved as a server pattern that can be applied to one or more managed servers. When the server patterns are updated, the changes are automatically deployed to the applied servers.

Specific details about updating firmware using Lenovo XClarity Administrator are available at:

[https://pubs.lenovo.com/lxca/server\\_configuring](https://pubs.lenovo.com/lxca/server_configuring)

- **Lenovo XClarity Controller**

You can configure the management processor for the server through the Lenovo XClarity Controller Web interface, the command-line interface, or Redfish API.

For information about configuring the server using Lenovo XClarity Controller, see:

“Configuring the Server” section in the XCC documentation compatible with your server at <https://pubs.lenovo.com/lxcc-overview/>

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## Memory module configuration

Memory performance depends on several variables, such as memory mode, memory speed, memory ranks, memory population and processor.

Information about optimizing memory performance and configuring memory is available at the Lenovo Press website:

<https://lenovopress.lenovo.com/servers/options/memory>

In addition, you can take advantage of a memory configurator, which is available at the following site:

[https://dcsc.lenovo.com/#/memory\\_configuration](https://dcsc.lenovo.com/#/memory_configuration)

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## Enable Software Guard Extensions (SGX)

Intel® Software Guard Extensions (Intel® SGX) operates under the assumption that the security perimeter includes only the internals of the CPU package, and leaves the DRAM untrusted.

Complete the following steps to enable SGX.

- Step 1. **Make sure** to refer to “[Memory module installation rules and order](#)” on page 50, which specifies whether your server supports SGX and lists the memory module population sequence for SGX configuration. (DIMM configuration must be at least 8 DIMMs per socket to support SGX.)
- Step 2. Restart the system. Before the operating system starts up, press the key specified in the on-screen instructions to enter the Setup Utility. (For more information, see the “Startup” section in the LXPM documentation compatible with your server at <https://pubs.lenovo.com/lxpm-overview/>.)
- Step 3. Go to **System settings** → **Processors** → **UMA-Based Clustering** and disable the option.
- Step 4. Go to **System settings** → **Processors** → **Total Memory Encryption (TME)** and enable the option.
- Step 5. Save the changes, then go to **System settings** → **Processors** → **SW Guard Extension (SGX)** and enable the option.

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## RAID configuration

Using a Redundant Array of Independent Disks (RAID) to store data remains one of the most common and cost-efficient methods to increase server's storage performance, availability, and capacity.

RAID increases performance by allowing multiple drives to process I/O requests simultaneously. RAID can also prevent data loss in case of a drive failure by reconstructing (or rebuilding) the missing data from the failed drive using the data from the remaining drives.

RAID array (also known as RAID drive group) is a group of multiple physical drives that uses a certain common method to distribute data across the drives. A virtual drive (also known as virtual disk or logical drive) is a partition in the drive group that is made up of contiguous data segments on the drives. Virtual drive is presented up to the host operating system as a physical disk that can be partitioned to create OS logical drives or volumes.

An introduction to RAID is available at the following Lenovo Press website:

<https://lenovopress.lenovo.com/lp0578-lenovo-raid-introduction>

Detailed information about RAID management tools and resources is available at the following Lenovo Press website:

<https://lenovopress.lenovo.com/lp0579-lenovo-raid-management-tools-and-resources>

### Intel VROC

#### Enabling Intel VROC

Before setting up RAID for NVMe drives, follow the below steps to enable VROC:

1. Restart the system. Before the operating system starts up, press the key specified in the on-screen instructions to enter the Setup Utility. (For more information, see the “Startup” section in the LXPM documentation compatible with your server at <https://pubs.lenovo.com/lxpm-overview/>.)
2. Go to **System settings → Devices and I/O Ports → Intel® VMD technology → Enable/Disable Intel® VMD** and enable the option.
3. Save the changes and reboot the system.

### Intel VROC configurations

Intel offers various VROC configurations with different RAID level and SSD support. See the following for more details.

#### Notes:

- Supported RAID levels varies by model. For the RAID level supported by SR850 V3, see [Technical specifications](#).
- For more information about acquiring and installing the activation key, see <https://fod.lenovo.com/lkms>.

Intel VROC configurations for PCIe NVMe SSDs	Requirements
Intel VROC Standard	<ul style="list-style-type: none"> <li>• Supports RAID levels 0, 1, and 10</li> <li>• Requires an activation key</li> </ul>
Intel VROC Premium	<ul style="list-style-type: none"> <li>• Supports RAID levels 0, 1, 5, and 10</li> <li>• Requires an activation key</li> </ul>
Bootable RAID	<ul style="list-style-type: none"> <li>• RAID 1 only</li> <li>• 5th Gen Intel® Xeon® Scalable processors (formerly codenamed as Emerald Rapids, EMR)</li> </ul>
Intel VROC configurations for SATA SSDs	Requirements
Intel VROC SATA RAID	<ul style="list-style-type: none"> <li>• Supports RAID levels 0, 1, 5, and 10.</li> </ul>

## Deploy the operating system

Several options are available to deploy an operating system on the server.

### Available operating systems

- Microsoft Windows Server
- VMware ESXi
- Red Hat Enterprise Linux
- SUSE Linux Enterprise Server

Complete list of available operating systems: <https://lenovopress.lenovo.com/osig>.

### Tool-based deployment

#### • Multi-server

Available tools:

- Lenovo XClarity Administrator

[https://pubs.lenovo.com/lxca/compute\\_node\\_image\\_deployment](https://pubs.lenovo.com/lxca/compute_node_image_deployment)

- Lenovo XClarity Essentials OneCLI  
[https://pubs.lenovo.com/lxce-onecli/onecli\\_r\\_uxspi\\_proxy\\_tool](https://pubs.lenovo.com/lxce-onecli/onecli_r_uxspi_proxy_tool)
- Lenovo XClarity Integrator deployment pack for SCCM (for Windows operating system only)  
[https://pubs.lenovo.com/lxci-deploypack-sccm/dpsccm\\_c\\_endtoend\\_deploy\\_scenario](https://pubs.lenovo.com/lxci-deploypack-sccm/dpsccm_c_endtoend_deploy_scenario)

- **Single-server**

Available tools:

- Lenovo XClarity Provisioning Manager  
“OS Installation” section in the LXPM documentation compatible with your server at <https://pubs.lenovo.com/lxpm-overview/>
- Lenovo XClarity Essentials OneCLI  
[https://pubs.lenovo.com/lxce-onecli/onecli\\_r\\_uxspi\\_proxy\\_tool](https://pubs.lenovo.com/lxce-onecli/onecli_r_uxspi_proxy_tool)
- Lenovo XClarity Integrator deployment pack for SCCM (for Windows operating system only)  
[https://pubs.lenovo.com/lxci-deploypack-sccm/dpsccm\\_c\\_endtoend\\_deploy\\_scenario](https://pubs.lenovo.com/lxci-deploypack-sccm/dpsccm_c_endtoend_deploy_scenario)

## Manual deployment

If you cannot access the above tools, follow the instructions below, download the corresponding OS *Installation Guide*, and deploy the operating system manually by referring to the guide.

1. Go to <https://datacentersupport.lenovo.com/solutions/server-os>.
2. Select an operating system from the navigation pane and click **Resources**.
3. Locate the “OS Install Guides” area and click the installation instructions. Then, follow the instructions to complete the operation system deployment task.

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## Back up the server configuration

After setting up the server or making changes to the configuration, it is a good practice to make a complete backup of the server configuration.

Make sure that you create backups for the following server components:

- **Management processor**

You can back up the management processor configuration through the Lenovo XClarity Controller interface. For details about backing up the management processor configuration, see:

“Backing up the BMC configuration” section in the XCC documentation compatible with your server at <https://pubs.lenovo.com/lxcc-overview/>.

Alternatively, you can use the `save` command from Lenovo XClarity Essentials OneCLI to create a backup of all configuration settings. For more information about the `save` command, see:

[https://pubs.lenovo.com/lxce-onecli/onecli\\_r\\_save\\_command](https://pubs.lenovo.com/lxce-onecli/onecli_r_save_command)

- **Operating system**

Use your backup methods to back up the operating system and user data for the server.

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## Chapter 8. Problem determination

Use the information in this section to isolate and resolve issues that you might encounter while using your server.

Lenovo servers can be configured to automatically notify Lenovo Support if certain events are generated. You can configure automatic notification, also known as Call Home, from management applications, such as the Lenovo XClarity Administrator. If you configure automatic problem notification, Lenovo Support is automatically alerted whenever a server encounters a potentially significant event.

To isolate a problem, you should typically begin with the event log of the application that is managing the server:

- If you are managing the server from the Lenovo XClarity Administrator, begin with the Lenovo XClarity Administrator event log.
- If you are using some other management application, begin with the Lenovo XClarity Controller event log.

### Web resources

- **Tech tips**

Lenovo continually updates the support website with the latest tips and techniques that you can use to solve issues that your server might encounter. These Tech Tips (also called retain tips or service bulletins) provide procedures to work around issues or solve problems related to the operation of your server.

To find the Tech Tips available for your server:

1. Go to <http://datacentersupport.lenovo.com> and navigate to the support page for your server.
2. Click on **How To's** from the navigation pane.
3. Click **Article Type** → **Solution** from the drop-down menu.

Follow the on-screen instructions to choose the category for the problem that you are having.

- **Lenovo Data Center Forum**

- Check [https://forums.lenovo.com/t5/Datacenter-Systems/ct-p/sv\\_eg](https://forums.lenovo.com/t5/Datacenter-Systems/ct-p/sv_eg) to see if someone else has encountered a similar problem.

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## Event logs

An *alert* is a message or other indication that signals an event or an impending event. Alerts are generated by the Lenovo XClarity Controller or by UEFI in the servers. These alerts are stored in the Lenovo XClarity Controller Event Log. If the server is managed by the Chassis Management Module 2 or by the Lenovo XClarity Administrator, alerts are automatically forwarded to those management applications.

**Note:** For a listing of events, including user actions that might need to be performed to recover from an event, see the *Messages and Codes Reference*, which is available at [https://pubs.lenovo.com/sr850v3/pdf\\_files.html](https://pubs.lenovo.com/sr850v3/pdf_files.html).

### Lenovo XClarity Administrator event log

If you are using Lenovo XClarity Administrator to manage server, network, and storage hardware, you can view the events from all managed devices through the XClarity Administrator.

## Logs

The Event log provides a history of hardware and management conditions that have been detected.

Show: [Error] [Warning] [Info]

All Event Sources [Filter]

All Dates

Severity	Serviceability	Date and Time	System	Event	System Type	Source ID
Warning	Support	Jan 30, 2017, 7:48:07 AM	Chassis114:...	Node Node 08 device	Chassis	Jan 30, 20
Warning	Support	Jan 30, 2017, 7:48:07 AM	Chassis114:...	Node Node 02 device	Chassis	Jan 30, 20
Warning	User	Jan 30, 2017, 7:48:07 AM	Chassis114:...	I/O module IO Module	Chassis	Jan 30, 20
Warning	User	Jan 30, 2017, 7:48:07 AM	Chassis114:...	Node Node 08 incom	Chassis	Jan 30, 20

Figure 196. Lenovo XClarity Administrator event log

For more information about working with events from XClarity Administrator, see:

[https://pubs.lenovo.com/lxca/events\\_vieweventlog](https://pubs.lenovo.com/lxca/events_vieweventlog)

## Lenovo XClarity Controller event log

The Lenovo XClarity Controller monitors the physical state of the server and its components using sensors that measure internal physical variables such as temperature, power-supply voltages, fan speeds, and component status. The Lenovo XClarity Controller provides various interfaces to systems management software and to system administrators and users to enable remote management and control of a server.

The Lenovo XClarity Controller monitors all components of the server and posts events in the Lenovo XClarity Controller event log.

The Event log provides a history of hardware and management conditions that have been detected.

Type: [Error] [Warning] [Info]

All Source All Date

Severity	Source	Event ID	Message	Date
Error	System	0X4000000E00000000	Remote login successful. Login ID: userid from webguis at IP address: 10.104.194.180.	27 Jul 2015, 08:11:04 AM
Warning	System	0X4000000E00000000	Remote login successful. Login ID: userid from webguis at IP address: 10.104.194.180.	27 Jul 2015, 08:11:04 AM
Info	System	0X4000000E00000000	Remote login successful. Login ID: userid from webguis at IP address: 10.104.194.180.	27 Jul 2015, 08:11:04 AM
Info	System	0X4000000E00000000	Remote login successful. Login ID: userid from webguis at IP address: 10.104.194.180.	27 Jul 2015, 08:11:04 AM

Figure 197. Lenovo XClarity Controller event log

For more information about accessing the Lenovo XClarity Controller event log, see:



“Viewing Event Logs” section in the XCC documentation compatible with your server at <https://pubs.lenovo.com/lxcc-overview/>

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## Troubleshooting by system LEDs and diagnostics display

See the following section for information on available system LEDs and diagnostics display.

### Drive LEDs

This topic provides information on drive LEDs.

The following table describes the problems that are indicated by drive activity LED and drive status LED.

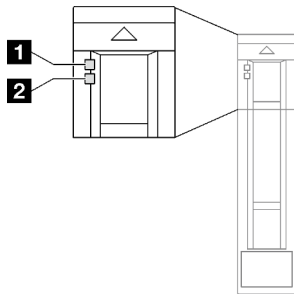


Figure 198. Drive LEDs

Table 76. Drive LEDs

LED	Description
<b>1</b> Drive activity LED (green)	Each hot-swap drive comes with an activity LED. When this LED is flashing, it indicates that the drive is in use.
<b>2</b> Drive status LED (yellow)	The drive status LED indicates the following status: <ul style="list-style-type: none"><li>• The LED is lit: the drive has failed.</li><li>• The LED is flashing slowly (once per second): the drive is being rebuilt.</li><li>• The LED is flashing rapidly (three times per second): the drive is being identified.</li></ul>

### Front I/O module LEDs

The front I/O module of the server provides controls, connectors, and LEDs.

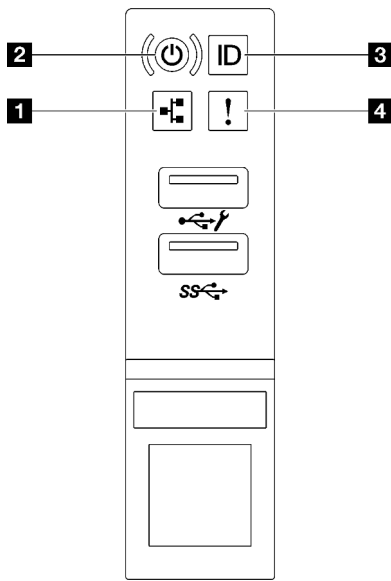


Figure 199. Front I/O module LEDs

Table 77. Front I/O module LEDs

<b>1</b> Network Activity LED (green)	<b>3</b> System ID button/LED (blue)
<b>2</b> Power button/LED (green)	<b>4</b> System error LED (yellow)

### **1** Network Activity LED (green)

The network activity LED helps you identify the network connectivity and activity.

Status	Color	Description
On	Green	The server is connected to a network.
Blinking	Green	The network is connected and active.
Off	None	The server is disconnected from the network.

### **2** Power button/LED (green)

Press this button to turn the server on and off manually. The states of the power LED are as follows:

Status	Color	Description
Off	None	Power is not present, or the power supply has failed.
Fast blinking (about four flashes per second)	Green	<ul style="list-style-type: none"> <li>The server is off, but the XClarity Controller is initializing, and the server is not ready to be powered on.</li> <li>System-board-assembly power has failed.</li> </ul>
Slow blinking (about one flash per second)	Green	The server is off and is ready to be powered on (standby state).
Solid on	Green	The server is on and running.

### **3** System ID button/LED (blue)

Use this system ID button and the blue system ID LED to visually locate the server. Each time you press the system ID button, the state of the system ID LED changes. The LED can be changed to on, blinking, or off.

You can also use the Lenovo XClarity Controller or a remote management program to change the state of the system ID LED to assist in visually locating the server among other servers.

#### 4 System error LED (yellow)

The system error LED helps you to determine if there are any system errors.

Status	Color	Description	Action
On	Yellow	<p>An error has been detected on the server. Causes might include one or more of the following errors:</p> <ul style="list-style-type: none"> <li>• The temperature of the server reached the non-critical temperature threshold.</li> <li>• The voltage of the server reached the non-critical voltage threshold.</li> <li>• A fan has been detected to be running at low speed.</li> <li>• The power supply has a critical error.</li> <li>• The power supply is not connected to the power.</li> </ul>	Check the Event log to determine the exact cause of the error.
Off	None	The server is off or the server is on and is working correctly.	None.

## Power supply LEDs

This topic provides information about various power supply LED status and corresponding action suggestions.

The following minimal configuration is required for the server to start:

- Two processors in socket 1 and 2
- Two DRAM memory modules in slots 10 and 26
- Two power supply units
- Six system fans
- One 2.5-inch drive, one M.2 drive, or one 7mm drive (if OS is needed for debugging)

**Note:** Depending on the power supply type, your power supply might look slightly different from the following illustration.

### CFFv4 power supply LEDs

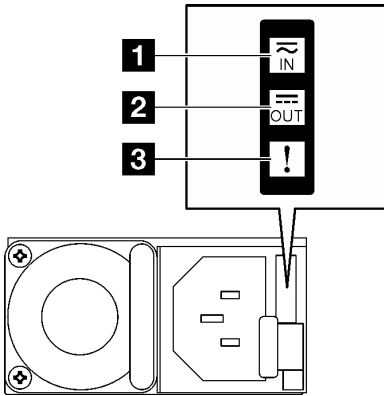


Figure 200. CFFv4 power supply LEDs

Table 78. CFFv4 power supply LEDs

LED	Description
<b>1</b> Input status	<p>The input status LED can be in one of the following states:</p> <ul style="list-style-type: none"> <li>Off: The power supply is disconnected from the AC power source.</li> <li>Green: The power supply is connected to the AC power source.</li> </ul>
<b>2</b> Output status	<p>The output status LED can be in one of the following states:</p> <ul style="list-style-type: none"> <li>Off: The server is powered off, or the power supply is not working properly. If the server is powered on but the output status LED is off, replace the power supply.</li> <li>Slow blinking green (about one flash every two seconds): The power supply is in cold redundancy active mode.</li> <li>Fast blinking green (about 2 flashes each second): The power supply is in cold redundancy sleep mode.</li> <li>Green: The server is on and the power supply is working normally.</li> </ul>
<b>3</b> Fault LED	<ul style="list-style-type: none"> <li>Off: The power supply is working normally</li> <li>Amber: The power supply may have failed. Dump the FFDC log from the system and contact Lenovo back end support team for PSU data log reviewing.</li> </ul>

### CRPS power supply LED

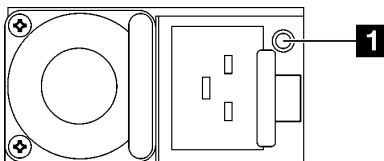


Figure 201. CRPS power supply LED

Table 79. CRPS power supply LED

LED	Description
<p><b>1</b> Power supply status</p>	<p>The power supply status LED can be in one of the following states:</p> <ul style="list-style-type: none"> <li>• Green: The power supply is connected to the AC power source and working normally.</li> <li>• Off: The power supply is disconnected from the AC power source.</li> <li>• Slow blinking green (about one flash every second): The power supply is in PSU standby state with AC present, cold standby state, or always standby state.</li> <li>• Amber: The AC power cord is unplugged, AC power lost (with a second power supply in parallel still in AC power input power), or power supply has failed. To resolve the issue, replace the power supply.</li> <li>• Slow blinking amber (about one flash every second): Power supply warning events where the power supply continues to operate.</li> <li>• Fast blinking green (about 2 flashes each second): Power supply firmware updating.</li> </ul>

## Rear system LEDs

This topic provides information on system LEDs on the rear of the server.

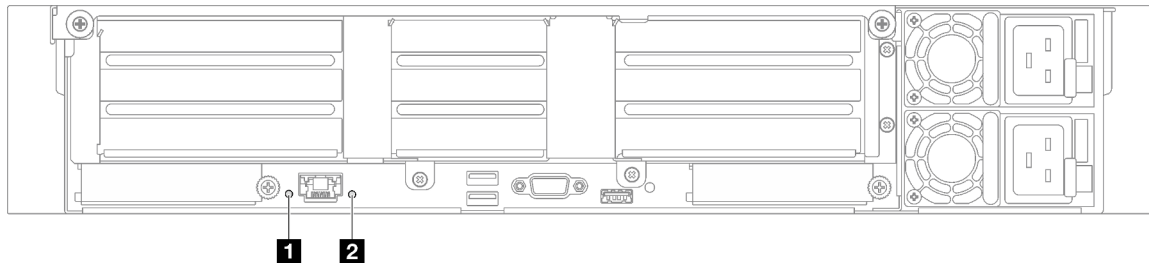


Figure 202. System LEDs on the rear view - server model with three PCIe risers

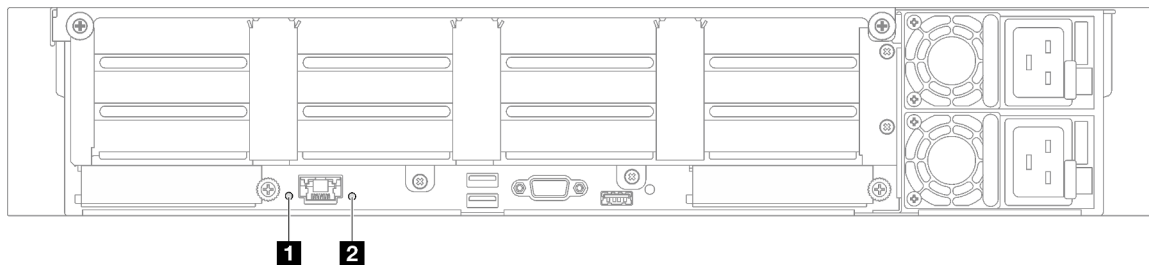


Figure 203. System LEDs on the rear view - server model with four PCIe risers

Table 80. System LEDs on the rear view

LED	Description	Action
<b>1</b> System ID LED (blue)	This LED helps you to visually locate the server.	A system ID button with LED is also located on the front of the server. You can press the system ID button to turn on/off or blink the front and rear ID LEDs.
<b>2</b> System error LED (yellow)	LED on: an error has been detected on the server. Causes might include one or more of the following errors: <ul style="list-style-type: none"> <li>• The temperature of the server reached the non-critical temperature threshold.</li> <li>• The voltage of the server reached the non-critical voltage threshold.</li> <li>• A fan has been detected to be running at low speed.</li> <li>• The power supply has a critical error.</li> <li>• The power supply is not connected to the power.</li> </ul>	Check system logs or internal error LEDs to identify the failed part.

## System-board-assembly LEDs

The following illustrations show the light-emitting diodes (LEDs) on the system board assembly.

Press the power button to light the LEDs on the system board assembly when the power source has been removed from the server.

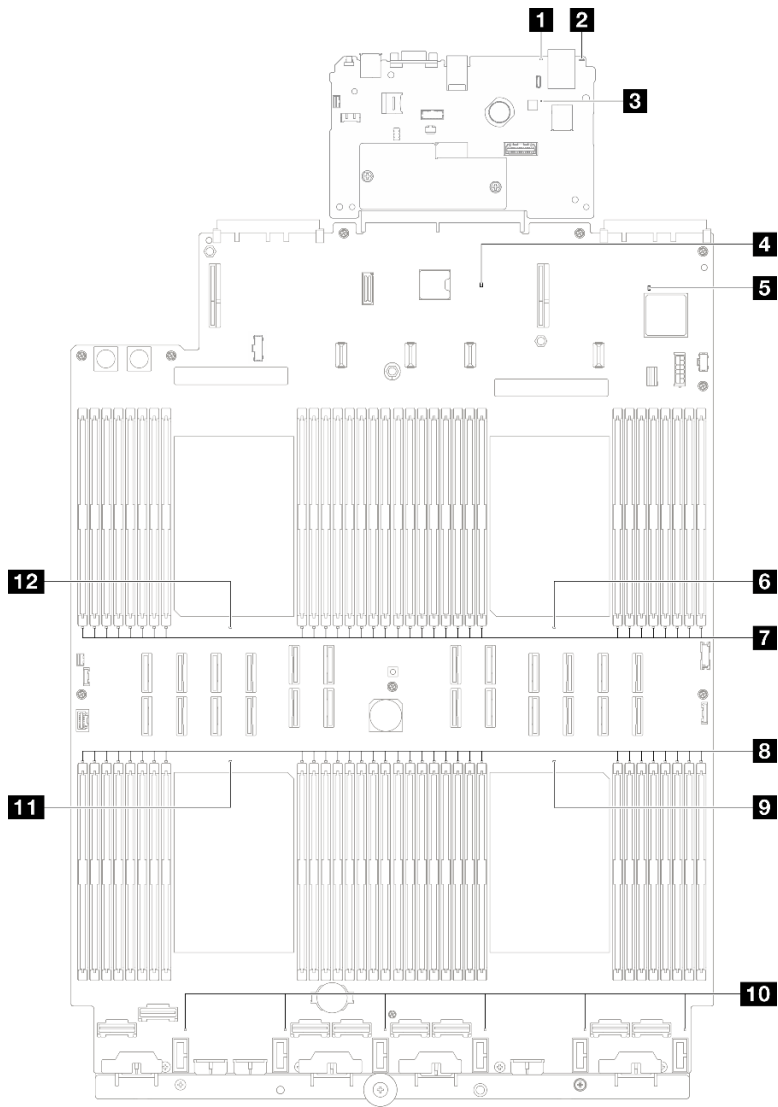


Figure 204. System-board-assembly LEDs

Table 81. System-board-assembly LEDs

LED	Description	Action
<p><b>1</b> System error LED (yellow)</p>	<p>LED on: an error has been detected on the server. Causes might include one or more of the following errors:</p> <ul style="list-style-type: none"> <li>• The temperature of the server reached the non-critical temperature threshold.</li> <li>• The voltage of the server reached the non-critical voltage threshold.</li> <li>• A fan has been detected to be running at low speed.</li> <li>• The power supply has a critical error.</li> <li>• The power supply is not connected to the power.</li> </ul>	<p>Check system logs or internal error LEDs to identify the failed part.</p>
<p><b>2</b> System ID LED (blue)</p>	<p>This LED helps you to visually locate the server.</p>	<p>A system ID button with LED is also located on the front of the server. You can press the system ID button to turn on/off or blink the front and rear ID LEDs.</p>



Table 81. System-board-assembly LEDs (continued)

LED	Description	Action
<p><b>3</b> XCC heartbeat LED (green)</p>	<p>The XCC heartbeat LED helps you identify the XCC status.</p> <ul style="list-style-type: none"> <li>• Blinking (about one flash per second) : XCC is working normally.</li> <li>• Blinking at other speeds or always on: XCC is at the initial phase or is working abnormally.</li> <li>• Off: XCC is not working.</li> </ul>	<ul style="list-style-type: none"> <li>• If the XCC heartbeat LED is always off or always on, do the following: <ul style="list-style-type: none"> <li>– If XCC cannot be accessed: <ol style="list-style-type: none"> <li>1. Re-plug the power cord.</li> <li>2. Check and ensure that the system I/O board and the firmware and RoT security module are installed correctly. (Trained technician only) Reinstall them if needed.</li> <li>3. (Trained technician only) Replace the firmware and RoT security module.</li> <li>4. (Trained technician only) Replace the system I/O board.</li> </ol> </li> <li>– If XCC can be accessed, replace the system I/O board.</li> </ul> </li> <li>• If the XCC heartbeat LED is always blinking fast over 5 minutes, do the following: <ol style="list-style-type: none"> <li>1. Re-plug the power cord.</li> <li>2. Check and ensure that the system I/O board and the firmware and RoT security module are installed correctly. (Trained technician only) Reinstall them if needed.</li> <li>3. (Trained technician only) Replace the firmware and RoT security module.</li> <li>4. (Trained technician only) Replace the system I/O board.</li> </ol> </li> <li>• If the XCC heartbeat LED is always blinking slow for over 5 minutes, do the following: <ol style="list-style-type: none"> <li>1. Re-plug the power cord.</li> <li>2. Check and ensure that the system I/O board and the firmware and RoT security module are installed correctly. (Trained technician only) Reinstall them if needed.</li> <li>3. If the problem remains, contact Lenovo Support.</li> </ol> </li> </ul>
<p><b>4</b> PCH heartbeat LED (green)</p>	<p>The PCH heartbeat LED helps you identify the PCH status.</p> <ul style="list-style-type: none"> <li>• Blinking (about one flash per second): system ME is working normally.</li> <li>• Off: system ME is not working.</li> </ul>	<p>If the PCH heartbeat LED is always off or always on, do the following:</p> <ol style="list-style-type: none"> <li>1. Check and ensure that the system I/O board and the firmware and RoT security module are installed correctly. (Trained technician only) Reinstall them if needed.</li> <li>2. Make sure the UEFI firmware has been flashed to the corresponding platform version.</li> <li>3. Update UEFI and XCC firmware to latest version.</li> <li>4. Check if there is ME error event triggered in system event log. If yes, and the above actions are done, replace the firmware and RoT security module.</li> <li>5. (Trained technician only) If it is still not working, replace the processor board.</li> </ol>

Table 81. System-board-assembly LEDs (continued)

LED	Description	Action
<b>5</b> FPGA heartbeat LED (green)	The FPGA heartbeat LED helps you identify the FPGA status. <ul style="list-style-type: none"> <li>Blinking (about one flash per second): FPGA is working normally.</li> <li>On or off: FPGA is not working.</li> </ul>	If FPGA heartbeat LED is always off or always on, do the following: <ol style="list-style-type: none"> <li>Replace the processor board.</li> <li>If the problem remains, contact Lenovo Support.</li> </ol>
<b>6</b> Processor 1 error LED (Amber)	LED on: an error has occurred to the processor the LED represents.	Replace the processor.
<b>7</b> DIMM 1-32 error LEDs (Amber)	LED on: an error has occurred to the DIMM the LED represents.	For more information, see <a href="#">“Memory problems” on page 396</a> .
<b>8</b> DIMM 33-64 error LEDs (Amber)	LED on: an error has occurred to the DIMM the LED represents.	For more information, see <a href="#">“Memory problems” on page 396</a> .
<b>9</b> Processor 4 error LED (Amber)	LED on: an error has occurred to the processor the LED represents.	Replace the processor.
<b>10</b> Fan 1-6 error LED (Amber)	LED on: an error has occurred to the fan the LED represents.	Replace the fan.
<b>11</b> Processor 3 error LED (Amber)	LED on: an error has occurred to the processor the LED represents.	Replace the processor.
<b>12</b> Processor 2 error LED (Amber)	LED on: an error has occurred to the processor the LED represents.	Replace the processor.

## LEDs on the firmware and RoT security module

This topic provides information on LEDs of the ThinkSystem V3 Firmware and Root of Trust Security Module (firmware and RoT security module)

The following table describes the problems that are indicated by LEDs on the firmware and RoT security module.

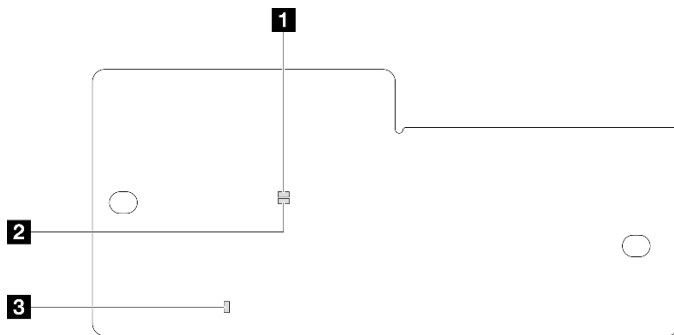


Figure 205. LEDs on the firmware and RoT security module

<b>1</b> AP0 LED (Green)	<b>2</b> AP1 LED (Green)	<b>3</b> Fatal Error LED (Amber)
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Table 82. LEDs description

Scenario	AP0 LED	AP1 LED	Fatal Error LED	FPGA heart-beat LED <sup>note</sup>	XCC heart-beat LED <sup>note</sup>	Actions
RoT security module fatal firmware failure	Off	Off	On	N/A	N/A	Replace the firmware and RoT security module.
	Blink	N/A	On	N/A	N/A	Replace the firmware and RoT security module.
	Blink	N/A	On	On	N/A	Replace the firmware and RoT security module.
No system power (FPGA heartbeat LED off)	Off	Off	Off	Off	Off	If the AC power is on, but the system board assembly does not have power, then: <ol style="list-style-type: none"> <li>1. Check the power supply unit (PSU) or power distribution board (PDB). If the PSU or PDB has any error, replace it.</li> <li>2. If the PSU or PDB is good, do the following:                             <ol style="list-style-type: none"> <li>a. Replace the system I/O board.</li> <li>b. Replace the processor board.</li> </ol> </li> </ol>
XCC firmware recoverable error	Blink	N/A	Off	N/A	N/A	Information only. No action is required.
XCC firmware is recovered from error	On	N/A	Off	N/A	N/A	Information only. No action is required.
UEFI firmware authentication failure	N/A	Blink	Off	N/A	N/A	Information only. No action is required.
UEFI firmware is recovered from authentication failure	N/A	On	Off	N/A	N/A	Information only. No action is required.
System is OK (FPGA heartbeat LED is On)	On	On	Off	On	On	Information only. No action is required.

## XCC system management port LEDs

This topic provides information on LEDs of XCC system management port.

The following table describes the problems that are indicated by LEDs on XCC system management port.

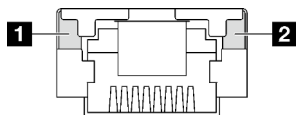


Figure 206. XCC system management port LEDs

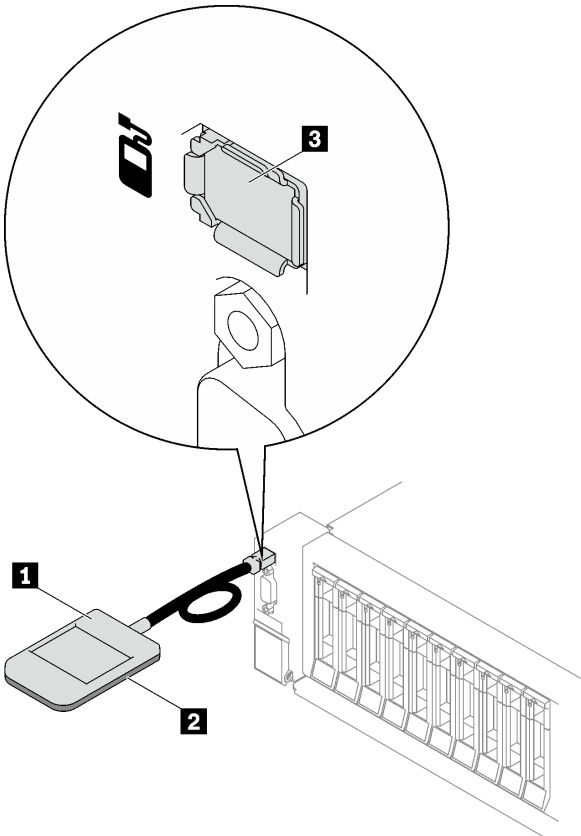
Table 83. XCC system management port LEDs

LED	Description
<b>1</b> XCC system management port (1GB RJ-45) Ethernet port link LED	Use this green LED to distinguish the network connectivity status: <ul style="list-style-type: none"> <li>• Off: The network link is disconnected.</li> <li>• Green: The network link is established.</li> </ul>
<b>2</b> XCC system management port (1 GB RJ-45) Ethernet port activity LED	Use this green LED to distinguish the network activity status: <ul style="list-style-type: none"> <li>• Off: The server is disconnected from a LAN.</li> <li>• Green: The network is connected and active.</li> </ul>

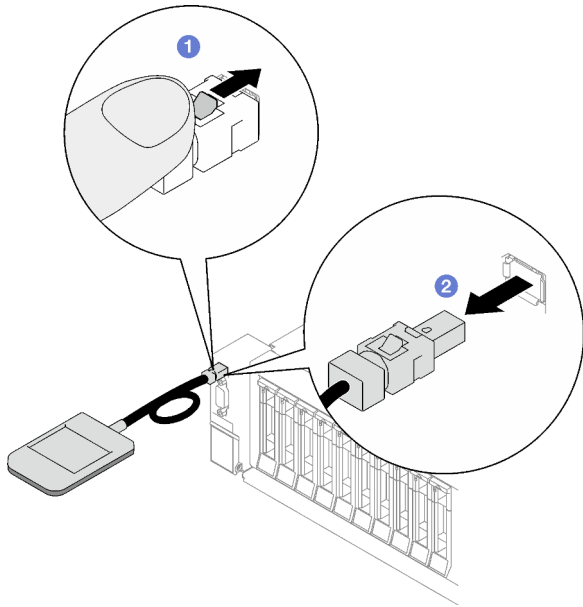
## External diagnostics handset

The external diagnostics handset is an external device that is connected to the server with a cable, and it allows quick access to system information such as errors, system status, firmware, network, and health information.

### Location of the external diagnostics handset

Location	Callouts
<p>The external diagnostics handset is connected to the server with an external cable.</p> 	<b>1</b> External diagnostics handset
	<b>2</b> Magnetic bottom With this component, the diagnostic handset can be attached to the top or side of the rack with hands spared for service tasks.
	<b>3</b> External diagnostics connector This connector is located on the front of the server, and is used to connect an external diagnostics handset.

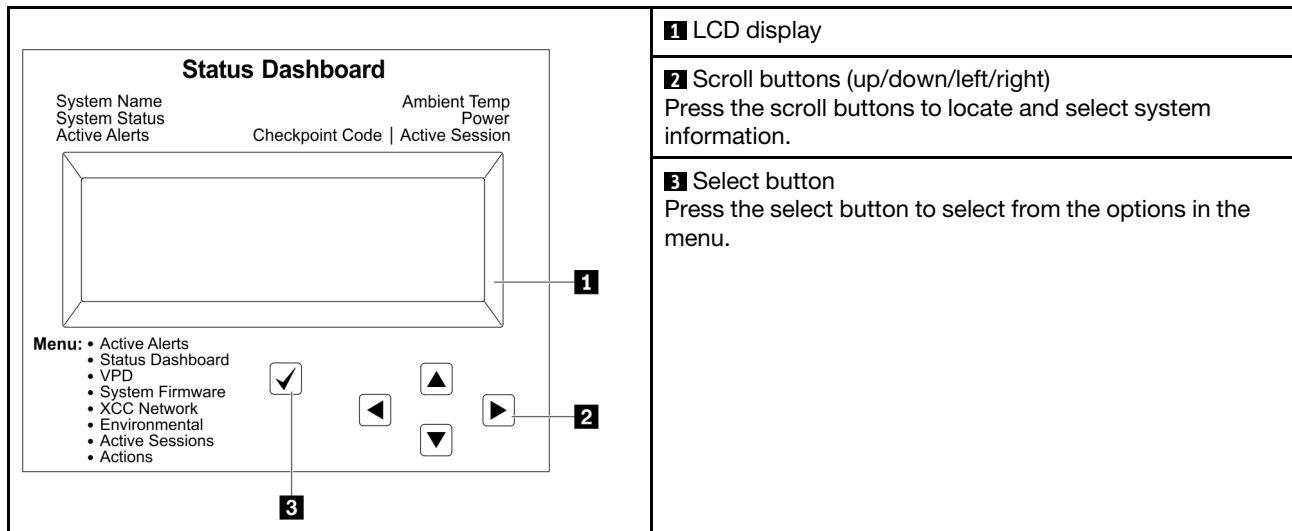
**Note:** When unplugging the external diagnostics handset, see the following instructions:



- 1 Press the plastic clip on the plug forward.
- 2 Hold the clip and remove the cable from the connector.

### Display panel overview

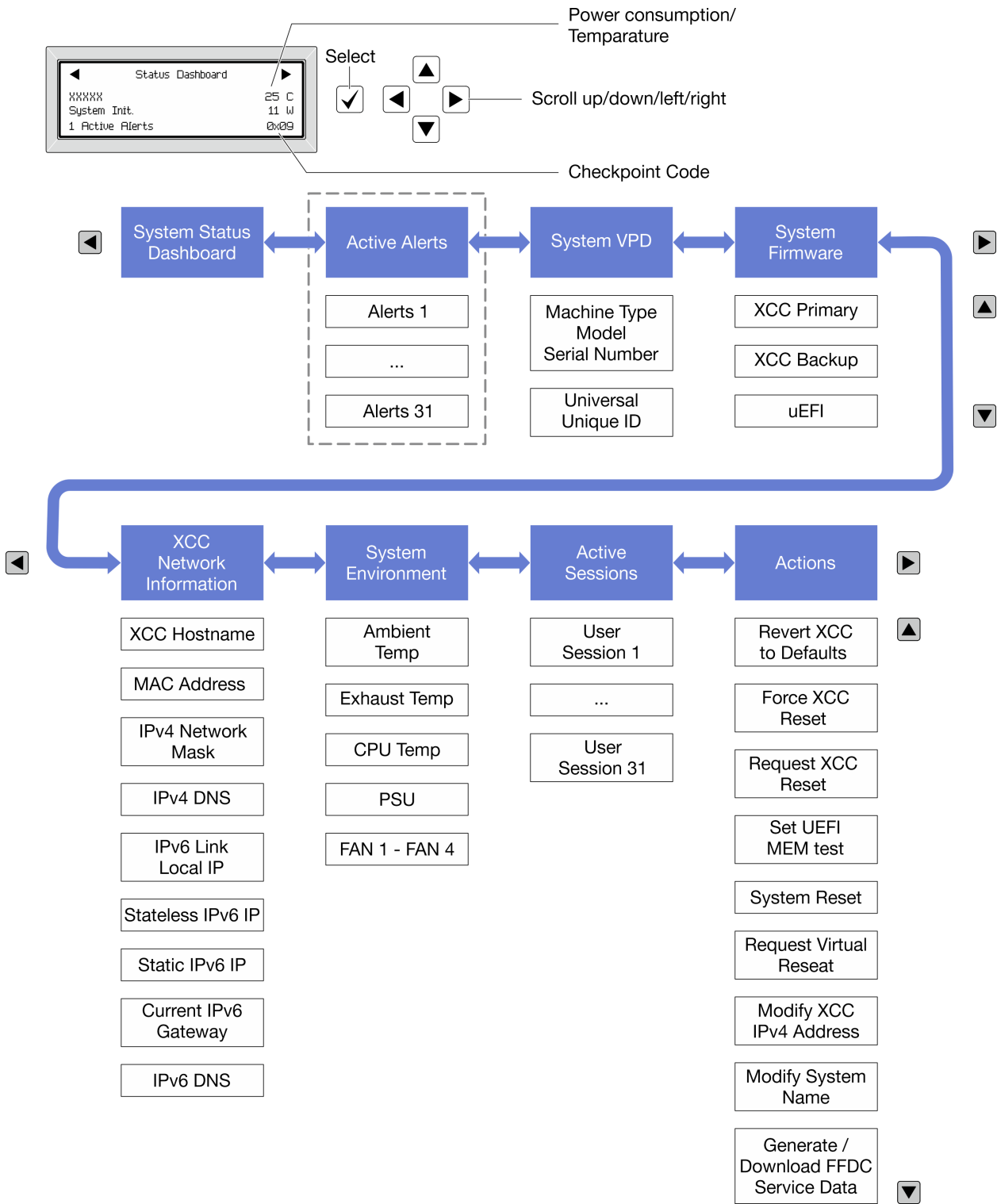
The diagnostics device consists of an LCD display and 5 navigation buttons.



### Option flow diagram

The LCD panel displays various system information. Navigate through the options with the scroll keys.

Depending on the model, the options and entries on the LCD display might be different.



**Full menu list**

Following is the list of available options. Switch between an option and the subordinate information entries with the select button, and switch among options or information entries with the scroll buttons.

Depending on the model, the options and entries on the LCD display might be different.

## Home Menu (System Status Dashboard)

Home Menu	Example
<ul style="list-style-type: none"> <li>1 System name</li> <li>2 System status</li> <li>3 Active alert quantity</li> <li>4 Temperature</li> <li>5 Power consumption</li> <li>6 Checkpoint code</li> </ul>	<p>The screenshot shows a 'Status Dashboard' with the following information:         <ul style="list-style-type: none"> <li>1: System name (xxxxxx)</li> <li>2: System status (System Init.)</li> <li>3: Active alert quantity (1 Active Alerts)</li> <li>4: Temperature (25 C)</li> <li>5: Power consumption (11 W)</li> <li>6: Checkpoint code (0x09)</li> </ul> </p>

## Active Alerts

Sub Menu	Example
Home screen: Active error quantity <b>Note:</b> The “Active Alerts” menu displays only the quantity of active errors. If no errors occur, the “Active Alerts” menu will not be available during navigation.	1 Active Alerts
Details screen: <ul style="list-style-type: none"> <li>• Error message ID (Type: Error/Warning/Information)</li> <li>• Occurrence time</li> <li>• Possible sources of the error</li> </ul>	Active Alerts: 1 Press ▼ to view alert details FQXSPPU009N(Error) 04/07/2020 02:37:39 PM CPU 1 Status: Configuration Error

## System VPD Information

Sub Menu	Example
<ul style="list-style-type: none"> <li>• Machine type and serial number</li> <li>• Universal Unique ID (UUID)</li> </ul>	Machine Type: xxxx Serial Num: xxxxxx Universal Unique ID: xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx

## System Firmware

Sub Menu	Example
XCC Primary <ul style="list-style-type: none"> <li>Firmware level (status)</li> <li>Build ID</li> <li>Version number</li> <li>Release date</li> </ul>	XCC Primary (Active) Build: DVI399T Version: 4.07 Date: 2020-04-07
XCC Backup <ul style="list-style-type: none"> <li>Firmware level (status)</li> <li>Build ID</li> <li>Version number</li> <li>Release date</li> </ul>	XCC Backup (Active) Build: D8BT05I Version: 1.00 Date: 2019-12-30
UEFI <ul style="list-style-type: none"> <li>Firmware level (status)</li> <li>Build ID</li> <li>Version number</li> <li>Release date</li> </ul>	UEFI (Inactive) Build: D0E101P Version: 1.00 Date: 2019-12-26

## XCC Network Information

Sub Menu	Example
<ul style="list-style-type: none"> <li>XCC hostname</li> <li>MAC address</li> <li>IPv4 Network Mask</li> <li>IPv4 DNS</li> <li>IPv6 Link Local IP</li> <li>Stateless IPv6 IP</li> <li>Static IPv6 IP</li> <li>Current IPv6 Gateway</li> <li>IPv6 DNS</li> </ul> <p><b>Note:</b> Only the MAC address that is currently in use is displayed (extension or shared).</p>	XCC Network Information XCC Hostname: XCC-xxxx-SN MAC Address: xx:xx:xx:xx:xx:xx IPv4 IP: xx.xx.xx.xx IPv4 Network Mask: x.x.x.x IPv4 Default Gateway: x.x.x.x



## System Environmental Information

Sub Menu	Example
<ul style="list-style-type: none"> <li>• Ambient temperature</li> <li>• Exhaust temperature</li> <li>• CPU temperature</li> <li>• PSU status</li> <li>• Spinning speed of fans by RPM</li> </ul>	Ambient Temp: 24 C Exhaust Temp: 30 C CPU1 Temp: 50 C PSU1: Vin= 213 w Inlet= 26 C FAN1 Front: 21000 RPM FAN2 Front: 21000 RPM FAN3 Front: 21000 RPM FAN4 Front: 21000 RPM

## Active Sessions

Sub Menu	Example
Quantity of active sessions	Active User Sessions: 1

## Actions

Sub Menu	Example
Several quick actions are available: <ul style="list-style-type: none"> <li>• Revert XCC to Defaults</li> <li>• Force XCC Reset</li> <li>• Request XCC Reset</li> <li>• Set UEFI Memory Test</li> <li>• Request Virtual Reseat</li> <li>• Modify XCC Static IPv4 Address/Net mask/Gateway</li> <li>• Modify System Name</li> <li>• Generate/Download FFDC Service Data</li> </ul>	Request XCC Reset? This will request the BMC to reboot itself. Hold √ for 3 seconds

## General problem determination procedures

Use the information in this section to resolve problems if the event log does not contain specific errors or the server is inoperative.

If you are not sure about the cause of a problem and the power supplies are working correctly, complete the following steps to attempt to resolve the problem:

1. Power off the server.
2. Make sure that the server is cabled correctly.
3. Remove or disconnect the following devices if applicable, one at a time, until you find the failure. Power on and configure the server each time you remove or disconnect a device.
  - Any external devices.
  - Surge-suppressor device (on the server).
  - Printer, mouse, and non-Lenovo devices.
  - Each adapter.

- Hard disk drives.
- Memory modules until you reach the minimal configuration for debugging that is supported for the server.

To determine the minimal configuration for your server, see “Minimal configuration for debugging” in [“Technical specifications” on page 3](#).

#### 4. Power on the server.

If the problem is solved when you remove an adapter from the server, but the problem recurs when you install the same adapter again, suspect the adapter. If the problem recurs when you replace the adapter with a different one, try a different PCIe slot.

If the problem appears to be a networking problem and the server passes all system tests, suspect a network cabling problem that is external to the server.

## Resolving suspected power problems

Power problems can be difficult to solve. For example, a short circuit can exist anywhere on any of the power distribution buses. Usually, a short circuit will cause the power subsystem to shut down because of an overcurrent condition.

Complete the following steps to diagnose and resolve a suspected power problem.

Step 1. Check the event log and resolve any errors related to the power.

**Note:** Start with the event log of the application that is managing the server. For more information about event logs, see [“Event logs” on page 373](#).

Step 2. Check for short circuits, for example, if a loose screw is causing a short circuit on a circuit board.

Step 3. Remove the adapters and disconnect the cables and power cords to all internal and external devices until the server is at the minimal configuration for debugging that is required for the server to start. To determine the minimal configuration for your server, see “Minimal configuration for debugging” in [“Technical specifications” on page 3](#).

Step 4. Reconnect all AC power cords and turn on the server. If the server starts successfully, reseal the adapters and devices one at a time until the problem is isolated.

If the server does not start from the minimal configuration, replace the components in the minimal configuration one at a time until the problem is isolated.

## Resolving suspected Ethernet controller problems

The method that you use to test the Ethernet controller depends on which operating system you are using. See the operating-system documentation for information about Ethernet controllers, and see the Ethernet controller device-driver readme file.

Complete the following steps to attempt to resolve suspected problems with the Ethernet controller.

Step 1. Make sure that the correct device drivers, which come with the server are installed and that they are at the latest level.

Step 2. Make sure that the Ethernet cable is installed correctly.

- The cable must be securely attached at all connections. If the cable is attached but the problem remains, try a different cable.
- If you set the Ethernet controller to operate at 100 Mbps or 1000 Mbps, you must use Category 5 cabling.

- Step 3. Determine whether the hub supports auto-negotiation. If it does not, try configuring the integrated Ethernet controller manually to match the speed and duplex mode of the hub.
- Step 4. Check the Ethernet controller LEDs on the server. These LEDs indicate whether there is a problem with the connector, cable, or hub.

Ethernet controller LED locations are specified in [“Troubleshooting by system LEDs and diagnostics display” on page 375](#).

- The Ethernet link status LED is lit when the Ethernet controller receives a link pulse from the hub. If the LED is off, there might be a defective connector or cable or a problem with the hub.
- The Ethernet transmit/receive activity LED is lit when the Ethernet controller sends or receives data over the Ethernet network. If the Ethernet transmit/receive activity is off, make sure that the hub and network are operating and that the correct device drivers are installed.

- Step 5. Check the Network activity LED on the server. The Network activity LED is lit when data is active on the Ethernet network. If the Network activity LED is off, make sure that the hub and network are operating and that the correct device drivers are installed.

Network activity LED location is specified in [“Troubleshooting by system LEDs and diagnostics display” on page 375](#).

- Step 6. Check for operating-system-specific causes of the problem, and also make sure that the operating system drivers are installed correctly.
- Step 7. Make sure that the device drivers on the client and server are using the same protocol.

If the Ethernet controller still cannot connect to the network but the hardware appears to be working, the network administrator must investigate other possible causes of the error.

---

## Troubleshooting by symptom

Use this information to find solutions to problems that have identifiable symptoms.

To use the symptom-based troubleshooting information in this section, complete the following steps:

1. Check the event log of the application that is managing the server and follow the suggested actions to resolve any event codes.
  - If you are managing the server from the Lenovo XClarity Administrator, begin with the Lenovo XClarity Administrator event log.
  - If you are using some other management application, begin with the Lenovo XClarity Controller event log.

For more information about event logs (see [“Event logs” on page 373](#)).

2. Review this section to find the symptoms that you are experiencing and follow the suggested actions to resolve the issue.
3. If the problem persists, contact support (see [“Contacting Support” on page 417](#)).

## Intermittent problems

Use this information to solve intermittent problems.

- [“Intermittent external device problems” on page 394](#)
- [“Intermittent KVM problems” on page 394](#)
- [“Intermittent unexpected reboots” on page 394](#)

### Intermittent external device problems

Complete the following steps until the problem is solved.

1. Update the UEFI and XCC firmware to the latest versions.
2. Make sure that the correct device drivers are installed. See the manufacturer's website for documentation.
3. For a USB device:
  - a. Make sure that the device is configured correctly.

Restart the server and press the key according to the on-screen instructions to display the LXPM system setup interface. (For more information, see the "Startup" section in the LXPM documentation compatible with your server at <https://pubs.lenovo.com/lxpm-overview/>.) Then, click **System Settings** → **Devices and I/O Ports** → **USB Configuration**.

- b. Connect the device to another port. If using a USB hub, remove the hub and connect the device directly to the server. Make sure that the device is configured correctly for the port.

### Intermittent KVM problems

Complete the following steps until the problem is solved.

#### Video problems:

1. Make sure that all cables and the console breakout cable are properly connected and secure.
2. Make sure that the monitor is working properly by testing it on another server.
3. Test the console breakout cable on a working server to ensure that it is operating properly. Replace the console breakout cable if it is defective.

#### Keyboard problems:

Make sure that all cables and the console breakout cable are properly connected and secure.

#### Mouse problems:

Make sure that all cables and the console breakout cable are properly connected and secure.

### Intermittent unexpected reboots

**Note:** Some uncorrectable errors require that the server reboot so that it can disable a device, such as a memory DIMM or a processor to allow the machine to boot up properly.

1. If the reset occurs during POST and the POST watchdog timer is enabled, make sure that sufficient time is allowed in the watchdog timeout value (POST Watchdog Timer).

To check the POST watchdog time, restart the server and press the key according to the on-screen instructions to display the LXPM system setup interface. (For more information, see the "Startup" section in the LXPM documentation compatible with your server at <https://pubs.lenovo.com/lxpm-overview/>.) Then, click **BMC Settings** → **POST Watchdog Timer**.

2. If the reset occurs after the operating system starts, do one of the followings:
  - Enter the operating system when the system operates normally and set up operating system kernel dump process (Windows and Linux base operating systems will be using different method). Enter the UEFI setup menus and disable the feature, or disable it with the following OneCli command.  
`OneCli.exe config set SystemRecovery.RebootSystemOnNMI Disable --bmc XCC_USER:XCC_PASSWORD@XCC_IPAddress`
  - Disable any automatic server restart (ASR) utilities, such as the Automatic Server Restart IPMI Application for Windows, or any ASR devices that are installed.

3. See the management controller event log to check for an event code that indicates a reboot. See “[Event logs](#)” on page 373 for information about viewing the event log. If you are using Linux base operating system, then capture all logs back to Lenovo support for further investigation.

## Keyboard, mouse, KVM switch or USB-device problems

Use this information to solve problems related to a keyboard, mouse, KVM switch or USB-device problems.

- “[All or some keys on the keyboard do not work](#)” on page 395
- “[Mouse does not work](#)” on page 395
- “[KVM switch problems](#)” on page 395
- “[USB-device does not work](#)” on page 395

### All or some keys on the keyboard do not work

1. Make sure that:
  - The keyboard cable is securely connected.
  - The server and the monitor are turned on.
2. If you are using a USB keyboard, run the Setup utility and enable keyboardless operation.
3. If you are using a USB keyboard and it is connected to a USB hub, disconnect the keyboard from the hub and connect it directly to the server.
4. Replace the keyboard.

### Mouse does not work

1. Make sure that:
  - The mouse cable is securely connected to the server.
  - The mouse device drivers are installed correctly.
  - The server and the monitor are turned on.
  - The mouse option is enabled in the Setup utility.
2. If you are using a USB mouse and it is connected to a USB hub, disconnect the mouse from the hub and connect it directly to the server.
3. Replace the mouse.

### KVM switch problems

1. Make sure that the KVM switch is supported by your server.
2. Make sure that the KVM switch is powered on correctly.
3. If the keyboard, mouse or monitor can be operated normally with direct connection to the server, then replace the KVM switch.

### USB-device does not work

1. Make sure that:
  - The correct USB device driver is installed.
  - The operating system supports USB devices.
2. Make sure that the USB configuration options are set correctly in system setup.

Restart the server and press the key according to the on-screen instructions to display the LXPM system setup interface. (For more information, see the “Startup” section in the LXPM documentation compatible with your server at <https://pubs.lenovo.com/lxpm-overview/>.) Then, click **System Settings → Devices and I/O Ports → USB Configuration**.

3. If you are using a USB hub, disconnect the USB device from the hub and connect it directly to the server.

## Memory problems

See this section to resolve issues related to memory.

### Common memory problems

- [“Multiple memory modules in a channel identified as failing” on page 396](#)
- [“Displayed system memory is less than installed physical memory” on page 396](#)
- [“Invalid memory population detected” on page 397](#)

### Multiple memory modules in a channel identified as failing

**Note:** Each time you install or remove a memory module, you must disconnect the server from the power source; then, wait 10 seconds before restarting the server.

Complete the following procedure to solve the problem.

1. Reseat the memory modules; then, restart the server.
2. Remove the highest-numbered memory module of those that are identified and replace it with an identical known good memory module; then, restart the server. Repeat as necessary. If the failures continue after all identified memory modules are replaced, go to step 4.
3. Return the removed memory modules, one at a time, to their original connectors, restarting the server after each memory module, until a memory module fails. Replace each failing memory module with an identical known good memory module, restarting the server after each memory module replacement. Repeat step 3 until you have tested all removed memory modules.
4. Replace the highest-numbered memory module of those identified; then, restart the server. Repeat as necessary.
5. Reverse the memory modules between the channels (of the same processor), and then restart the server. If the problem is related to a memory module, replace the failing memory module.
6. (Trained technician only) Install the failing memory module into a memory module connector for processor 2 (if installed) to verify that the problem is not the processor or the memory module connector.
7. (Trained technician only) Replace the system board (system board assembly).

### Displayed system memory is less than installed physical memory

Complete the following procedure to solve the problem.

**Note:** Each time you install or remove a memory module, you must disconnect the server from the power source; then, wait 10 seconds before restarting the server.

1. Make sure that:
  - No error LEDs are lit. See [“Troubleshooting by system LEDs and diagnostics display” on page 375](#).
  - No memory module error LEDs are lit on the system board (system board assembly).
  - Memory mirrored channel does not account for the discrepancy.
  - The memory modules are seated correctly.
  - You have installed the correct type of memory module (see [“Memory module installation rules and order” on page 50](#) for requirements).
  - After changing or replacing a memory module, memory configuration is updated accordingly in the Setup Utility.

- All banks of memory are enabled. The server might have automatically disabled a memory bank when it detected a problem, or a memory bank might have been manually disabled.
  - There is no memory mismatch when the server is at the minimum memory configuration.
2. Reseat the memory modules, and then restart the server.
  3. Check the POST error log:
    - If a memory module was disabled by a systems-management interrupt (SMI), replace the memory module.
    - If a memory module was disabled by the user or by POST, reseat the memory module; then, run the Setup Utility and enable the memory module.
  4. Run memory diagnostics. When you start a server and press the key according to the on-screen instructions, the LXPM interface is displayed by default. (For more information, see the “Startup” section in the LXPM documentation compatible with your server at <https://pubs.lenovo.com/lxpm-overview/>.) You can perform memory diagnostics with this interface. From the Diagnostic page, go to **Run Diagnostic → Memory test → Advanced Memory Test**.
  5. Reverse the modules between the channels (of the same processor), and then restart the server. If the problem is related to a memory module, replace the failing memory module.
  6. Re-enable all memory modules using the Setup Utility, and then restart the server.
  7. (Trained technician only) Install the failing memory module into a memory module connector for processor 2 (if installed) to verify that the problem is not the processor or the memory module connector.
  8. (Trained technician only) Replace the system board (system board assembly).

### Invalid memory population detected

If this warning message appears, complete the following steps:

Invalid memory population (unsupported DIMM population) detected. Please verify memory configuration is valid.

1. See “[Memory module installation rules and order](#)” on page 50 to make sure the present memory module population sequence is supported.
2. If the present sequence is indeed supported, see if any of the modules is displayed as “disabled” in Setup Utility.
3. Reseat the module that is displayed as “disabled,” and reboot the system.
4. If the problem persists, replace the memory module.

## Monitor and video problems

Use this information to solve problems related to a monitor or video.

- “[Incorrect characters are displayed](#)” on page 397
- “[Screen is blank](#)” on page 398
- “[Screen goes blank when you start some application programs](#)” on page 398
- “[The monitor has screen jitter, or the screen image is wavy, unreadable, rolling, or distorted](#)” on page 398
- “[The wrong characters appear on the screen](#)” on page 398

### Incorrect characters are displayed

Complete the following steps:

1. Verify that the language and locality settings are correct for the keyboard and operating system.
2. If the wrong language is displayed, update the server firmware to the latest level. See “[Update the firmware](#)” on page 365.

## Screen is blank

**Note:** Make sure that the expected boot mode has not been changed from the UEFI to Legacy or vice versa.

1. If the server is attached to a KVM switch, bypass the KVM switch to eliminate it as a possible cause of the problem: connect the monitor cable directly to the correct connector on the rear of the server.
2. The management controller remote presence function is disabled if you install an optional video adapter. To use the management controller remote presence function, remove the optional video adapter.
3. If the server is installed with the graphical adapters while turning on the server, the Lenovo logo is displayed on the screen after approximately 3 minutes. This is normal operation while the system loads.
4. Make sure that:
  - The server is turned on and there is power supplied to the server.
  - The monitor cables are connected correctly.
  - The monitor is turned on and the brightness and contrast controls are adjusted correctly.
5. Make sure that the correct server is controlling the monitor, if applicable.
6. Make sure that the video output is not affected by corrupted server firmware; See [“Update the firmware” on page 365](#).
7. If the problem remains, contact Lenovo Support.

## Screen goes blank when you start some application programs

1. Make sure that:
  - The application program is not setting a display mode that is higher than the capability of the monitor.
  - You installed the necessary device drivers for the application.

## The monitor has screen jitter, or the screen image is wavy, unreadable, rolling, or distorted

1. If the monitor self-tests show that the monitor is working correctly, consider the location of the monitor. Magnetic fields around other devices (such as transformers, appliances, fluorescents, and other monitors) can cause screen jitter or wavy, unreadable, rolling, or distorted screen images. If this happens, turn off the monitor.

**Attention:** Moving a color monitor while it is turned on might cause screen discoloration.

Move the device and the monitor at least 305 mm (12 in.) apart, and turn on the monitor.

### Notes:

- a. To prevent diskette drive read/write errors, make sure that the distance between the monitor and any external diskette drive is at least 76 mm (3 in.).
- b. Non-Lenovo monitor cables might cause unpredictable problems.
2. Reseat the monitor cable.
3. Replace the components listed in step 2 one at a time, in the order shown, restarting the server each time:
  - a. Monitor cable
  - b. Video adapter (if one is installed)
  - c. Monitor
  - d. (Trained technician only) System board (system board assembly)

## The wrong characters appear on the screen

Complete the following steps until the problem is solved:

1. Verify that the language and locality settings are correct for the keyboard and operating system.



2. If the wrong language is displayed, update the server firmware to the latest level. See [“Update the firmware” on page 365](#).

## Network problems

Use this information to resolve issues related to networking.

- [“Cannot wake server using Wake on LAN” on page 399](#)
- [“Could not log in using LDAP account with SSL enabled” on page 399](#)

### Cannot wake server using Wake on LAN

Complete the following steps until the problem is resolved:

1. If you are using the dual-port network adapter and the server is connected to the network using Ethernet 5 connector, check the system-error log or IMM2 system event log (see [“Event logs” on page 373](#)), make sure:
  - a. Fan 3 is running in standby mode, if Emulex dual port 10GBase-T embedded adapter is installed.
  - b. The room temperature is not too high (see [“Specifications” on page 3](#)).
  - c. The air vents are not blocked.
  - d. The air baffle is installed securely.
2. Reseat the dual-port network adapter.
3. Turn off the server and disconnect it from the power source; then, wait 10 seconds before restarting the server.
4. If the problem still remains, replace the dual-port network adapter.

### Could not log in using LDAP account with SSL enabled

Complete the following steps until the problem is resolved:

1. Make sure that the license key is valid.
2. Generate a new license key and log in again.

## Observable problems

Use this information to solve observable problems.

- [“Server hangs during the UEFI boot process” on page 399](#)
- [“The server immediately displays the POST Event Viewer when it is turned on” on page 400](#)
- [“Server is unresponsive \(POST is complete and operating system is running\)” on page 400](#)
- [“Server is unresponsive \(POST failed and cannot start System Setup\)” on page 401](#)
- [“Voltage planar fault is displayed in the event log” on page 401](#)
- [“Unusual smell” on page 401](#)
- [“Server seems to be running hot” on page 401](#)
- [“Cannot enter legacy mode after installing a new adapter” on page 402](#)
- [“Cracked parts or cracked chassis” on page 402](#)

### Server hangs during the UEFI boot process

If the system hangs during the UEFI boot process with the message UEFI: DXE INIT on the display, make sure that Option ROMs were not configured with a setting of **Legacy**. You can remotely view the current settings for Option ROMs by running the following command using the Lenovo XClarity Essentials OneCLI:

```
onecli config show EnableDisableAdapterOptionROMSupport --bmc xcc_userid:xcc_password@xcc_ipaddress
```

To recover a system that hangs during the boot process with Legacy Option ROM settings, see the following Tech Tip:

<https://datacentersupport.lenovo.com/solutions/ht506118>

If legacy Option ROMs must be used, do not set slot Option ROMs to **Legacy** on the Devices and I/O Ports menu. Instead, set slot Option ROMs to **Auto** (the default setting), and set the System Boot Mode to **Legacy Mode**. Legacy option ROMs will be invoked shortly before the system boots.

### **The server immediately displays the POST Event Viewer when it is turned on**

Complete the following steps until the problem is solved.

1. Correct any errors that are indicated by the system LEDs and diagnostics display.
2. Make sure that the server supports all the processors and that the processors match in speed and cache size.

You can view processor details from system setup.

To determine if the processor is supported for the server, see <https://serverproven.lenovo.com>.

3. (Trained technician only) Make sure that processor 1 is seated correctly.
4. (Trained technician only) Remove processor 2 and restart the server.
5. Replace the following components one at a time, in the order shown, restarting the server each time:
  - a. (Trained technician only) Processor
  - b. (Trained technician only) System board (system board assembly)

### **Server is unresponsive (POST is complete and operating system is running)**

Complete the following steps until the problem is solved.

- If you are in the same location as the compute node, complete the following steps:
  1. If you are using a KVM connection, make sure that the connection is operating correctly. Otherwise, make sure that the keyboard and mouse are operating correctly.
  2. If possible, log in to the compute node and verify that all applications are running (no applications are hung).
  3. Restart the compute node.
  4. If the problem remains, make sure that any new software has been installed and configured correctly.
  5. Contact your place of purchase of the software or your software provider.
- If you are accessing the compute node from a remote location, complete the following steps:
  1. Make sure that all applications are running (no applications are hung).
  2. Attempt to log out of the system and log back in.
  3. Validate the network access by pinging or running a trace route to the compute node from a command line.
    - a. If you are unable to get a response during a ping test, attempt to ping another compute node in the enclosure to determine whether it is a connection problem or compute node problem.
    - b. Run a trace route to determine where the connection breaks down. Attempt to resolve a connection issue with either the VPN or the point at which the connection breaks down.
  4. Restart the compute node remotely through the management interface.
  5. If the problem remains, verify that any new software has been installed and configured correctly.

6. Contact your place of purchase of the software or your software provider.

### **Server is unresponsive (POST failed and cannot start System Setup)**

Configuration changes, such as added devices or adapter firmware updates, and firmware or application code problems can cause the server to fail POST (the power-on self-test).

If this occurs, the server responds in either of the following ways:

- The server restarts automatically and attempts POST again.
- The server hangs, and you must manually restart the server for the server to attempt POST again.

After a specified number of consecutive attempts (automatic or manual), the server reverts to the default UEFI configuration and starts System Setup so that you can make the necessary corrections to the configuration and restart the server. If the server is unable to successfully complete POST with the default configuration, there might be a problem with the system board (system board assembly).

You can specify the number of consecutive restart attempts in System Setup. Restart the server and press the key according to the on-screen instructions to display the LXPM system setup interface. (For more information, see the “Startup” section in the LXPM documentation compatible with your server at <https://pubs.lenovo.com/lxpm-overview/>.) Then, click **System Settings → Recovery and RAS → POST Attempts → POST Attempts Limit**. Available options are 3, 6, 9, and disable.

### **Voltage planar fault is displayed in the event log**

Complete the following steps until the problem is solved.

1. Revert the system to the minimum configuration. See “Specifications” on page 3 for the minimally required number of processors and DIMMs.
2. Restart the system.
  - If the system restarts, add each of the removed items one at a time and restart the system each time until the error occurs. Replace the item for which the error occurs.
  - If the system does not restart, suspect the system board (system board assembly).

### **Unusual smell**

Complete the following steps until the problem is solved.

1. An unusual smell might be coming from newly installed equipment.
2. If the problem remains, contact Lenovo Support.

### **Server seems to be running hot**

Complete the following steps until the problem is solved.

Multiple compute nodes or chassis:

1. Make sure that the room temperature is within the specified range (see “Specifications” on page 3).
2. Make sure that the fans are installed correctly.
3. Update the UEFI and XCC to the latest versions.
4. Make sure that the fillers in the server are installed correctly (see Chapter 5 “Hardware replacement procedures” on page 47 for detailed installation procedures).
5. Use the IPMI command to ramp up the fan speed to the full fan speed to see whether the issue can be resolved.

**Note:** The IPMI raw command should only be used by trained technician and the each system has its own specific PMI raw command.

6. Check the management processor event log for rising temperature events. If there are no events, the compute node is running within normal operating temperatures. Note that you can expect some variation in temperature.

### **Cannot enter legacy mode after installing a new adapter**

Complete the following procedure to solve the problem.

1. Go to **UEFI Setup → Devices and I/O Ports → Set Option ROM Execution Order**.
2. Move the RAID adapter with operation system installed to the top of the list.
3. Select **Save**.
4. Reboot the system and auto boot to operation system.

### **Cracked parts or cracked chassis**

Contact Lenovo Support.

## **Optional-device problems**

Use this information to solve problems related to optional devices.

- [“External USB device is not recognized” on page 402](#)
- [“PCIe adapter is not recognized or is not functioning” on page 402](#)
- [“Insufficient PCIe resources are detected.” on page 403](#)
- [“A Lenovo optional device that was just installed does not work.” on page 403](#)
- [“A Lenovo optional device that worked previously does not work now” on page 403](#)

### **External USB device is not recognized**

Complete the following steps until the problem is resolved:

1. Update the UEFI firmware to the latest version.
2. Make sure that the proper drivers are installed on the compute node. See the product documentation for the USB device for information about device drivers.
3. Use the Setup utility to make sure that the device is configured correctly.
4. If the USB device is plugged into a hub or the console breakout cable, unplug the device and plug it directly into the USB port on the front of the compute node.

### **PCIe adapter is not recognized or is not functioning**

Complete the following steps until the problem is resolved:

1. Update the UEFI firmware to the latest version.
2. Check the event log and resolve any issues related to the device.
3. Validate that the device is supported for the server (see <https://serverproven.lenovo.com>). Make sure that the firmware level on the device is at the latest supported level and update the firmware if applicable.
4. Make sure that the adapter is installed in a correct slot.
5. Make sure that the proper device drivers are installed for the device.
6. Resolve any resource conflicts if running legacy mode (UEFI). Check legacy ROM boot orders and modify the UEFI setting for MM config base.

**Note:** Ensure that you modify the ROM boot order associated with the PCIe adapter to the first execution order.

7. Check <http://datacentersupport.lenovo.com> for any tech tips (also known as retain tips or service bulletins) that might be related to the adapter.
8. Ensure any adapter external connections are correct and that the connectors are not physically damaged.
9. Make sure that the PCIe adapter is installed with the supported operating system.

#### **Insufficient PCIe resources are detected.**

If you see an error message stating “Insufficient PCI Resources Detected,” complete the following steps until the problem is resolved:

1. Press Enter to access System Setup Utility.
2. Select **System Settings → Devices and I/O Ports → MM Config Base**; then, modify the setting to increase the device resources. For example, modify 3 GB to 2 GB or modify 2 GB to 1 GB.
3. Save the settings and restart the system.
4. If the error recurs with the highest device resource setting (1GB), shutdown the system and remove some PCIe devices; then, power on the system.
5. If the reboot failed, repeat step 1 to step 4.
6. If the error recurs, press Enter to access System Setup Utility.
7. Select **System Settings → Devices and I/O Ports → PCI 64-Bit Resource Allocation**, then; modify the setting from **Auto** to **Enable**.
8. If the Boot Device does not support MMIO above 4GB for Legacy Boot, use UEFI Boot Mode or remove/disable some PCIe devices.
9. DC cycle the system and ensure the system is enter UEFI boot menu or the operating system; then, capture the FFDC log.
10. Contact Lenovo technical support.

#### **A Lenovo optional device that was just installed does not work.**

1. Make sure that:
  - The device is supported for the server (see <https://serverproven.lenovo.com>).
  - You followed the installation instructions that came with the device and the device is installed correctly.
  - You have not loosened any other installed devices or cables.
  - You updated the configuration information in system setup. When you start a server and press the key according to the on-screen instructions to display the Setup Utility. (For more information, see the “Startup” section in the LXPM documentation compatible with your server at <https://pubs.lenovo.com/lxpm-overview/>.) Whenever memory or any other device is changed, you must update the configuration.
2. Reseat the device that you have just installed.
3. Replace the device that you have just installed.
4. Reseat the cable connection and check there is no physical damage to the cable.
5. If there is any cable damages, then replace the cable.

#### **A Lenovo optional device that worked previously does not work now**

1. Make sure that all of the cable connections for the device are secure.
2. If the device comes with test instructions, use those instructions to test the device.
3. Reseat the cable connection and check if any physical parts have been damaged.
4. Replace the cable.
5. Reseat the failing device.

6. Replace the failing device.

## Performance problems

Use this information to solve performance problems.

- [“Network performance” on page 404](#)
- [“Operating system performance” on page 404](#)

### Network performance

Complete the following steps until the problem is solved:

1. Isolate which network is operating slowly (such as storage, data, and management). You might find it helpful to use ping tools or operating-system tools such as task manager or resource manager.
2. Check for traffic congestion on the network.
3. Update the NIC device driver, or the storage device controller device driver.
4. Use the traffic-diagnostic tools that are provided by the IO-module manufacturer.

### Operating system performance

Complete the following steps until the problem is solved:

1. If you have recently made changes to the compute node (for example updated device drivers or installed software applications) remove the changes.
2. Check for any networking issues.
3. Check the operating system logs for performance related errors.
4. Check for events related to high temperatures and power issues as the compute node might be throttled to help with cooling. If it is throttled, reduce the workload on the compute node to help improve performance.
5. Check for events related to disabled DIMMs. If you do not have enough memory for the application workload, your operating system will have poor performance.
6. Ensure that the workload is not too high for the configuration.

## Power on and power off problems

Use this information to resolve issues when powering on or powering off the server.

- [“The power button does not work \(server does not start\)” on page 404](#)
- [“Server does not power on” on page 405](#)

### The power button does not work (server does not start)

**Note:** The power button will not function until approximately 1 to 3 minutes after the server has been connected to ac power to allow time for BMC to initialize.

Complete the following steps until the problem is resolved:

1. Make sure that the power button on the server is working correctly:
  - a. Disconnect the server power cords.
  - b. Reconnect the server power cords.
  - c. Reseat the front operator panel cable, and then repeat steps 1a and 2b.
    - If the server starts, reseat the front operator panel.
    - If the problem remains, replace the front operator panel.

2. Make sure that:
  - The power cords are correctly connected to the server and to a working electrical outlet.
  - The LEDs on the power supply do not indicate a problem.
  - The Power button LED is lit on and is flashing slowly.
  - The push force is enough and with button force response.
3. If the power button LED is not lit on or is not flashing correctly, reseal all the power supplies and make sure AC LED on PSU rear side are lit on.
4. If you have just installed an optional device, remove it, and restart the server.
5. If the issue is still observed or without power button LED lit on, implement the minimum configuration to check whether any specific components lock the power permission. Replace the each power supply and check the power button function after installing the each one.
6. If everything is still done and the issue cannot be resolved, collect the failure information with system logs captured to Lenovo support.

### **Server does not power on**

Complete the following steps until the problem is resolved:

1. Check the event log for any events related to the server not powering on.
2. Check for any LEDs that are flashing amber.
3. Check the power LED on the system board (system board assembly).
4. Check if AC power LED is lit on or the amber LED is lit on at the PSU rear side.
5. AC cycle the system.
6. Remove the CMOS battery for at least ten seconds, then, reinstall the CMOS battery.
7. Try to power on the system by IPMI command through XCC or by the power button.
8. Implement the minimum configuration (see [“Technical specifications” on page 3](#)).
9. Reseat all power supplies and make sure that AC LEDs on the PSU rear side are lit.
10. Replace the each power supply and check the power button function after installing the each one.
11. If the issue cannot be resolved by above actions, call service to review the issue symptom and see whether the system board (system board assembly) replacement is necessary.

## **Power problems**

Use this information to resolve issues related to power.

### **System error LED is on and event log "Power supply has lost input" is displayed**

To resolve the problem, ensure that:

1. The power supply is properly connected to a power cord.
2. The power cord is connected to a properly grounded electrical outlet for the server.
3. Make sure that the power supply AC source is stable within the supported range.
4. Swap the power supply to see if the issue follows the power supply, if it follows the power supply, then replace the failing one.
5. Review the event log and see how the problem it is to follow the event log actions to resolved the problems.

## **Serial-device problems**

Use this information to solve problems with serial ports or devices.

- [“Number of displayed serial ports is less than the number of installed serial ports” on page 406](#)
- [“Serial device does not work” on page 406](#)

### **Number of displayed serial ports is less than the number of installed serial ports**

Complete the following steps until the problem is solved.

1. Make sure that:
  - Each port is assigned a unique address in the Setup utility and none of the serial ports is disabled.
  - The serial-port adapter (if one is present) is seated correctly.
2. Reseat the serial port adapter.
3. Replace the serial port adapter.

### **Serial device does not work**

1. Make sure that:
  - The device is compatible with the server.
  - The serial port is enabled and is assigned a unique address.
  - The device is connected to the correct connector (see [“System-board-assembly connectors” on page 32](#)).
2. Reseat the following components:
  - a. Failing serial device.
  - b. Serial cable.
3. Replace the following components:
  - a. Failing serial device.
  - b. Serial cable.
4. (Trained technician only) Replace the system board (system board assembly).

## **Software problems**

Use this information to solve software problems.

1. To determine whether the problem is caused by the software, make sure that:
  - The server has the minimum memory that is needed to use the software. For memory requirements, see the information that comes with the software.

**Note:** If you have just installed an adapter or memory, the server might have a memory-address conflict.

  - The software is designed to operate on the server.
  - Other software works on the server.
  - The software works on another server.
2. If you receive any error messages while you use the software, see the information that comes with the software for a description of the messages and suggested solutions to the problem.
3. Contact your place of purchase of the software.

## **Storage drive problems**

Use this information to resolve issues related to the storage drives.

- [“Server cannot recognize a drive” on page 407](#)
- [“Multiple drives fail” on page 408](#)



- “Multiple drives are offline” on page 408
- “A replacement drive does not rebuild” on page 408
- “Green drive activity LED does not represent actual state of associated drive” on page 408
- “Yellow drive status LED does not represent actual state of associated drive” on page 408
- “U.3 NVMe drive can be detected in NVMe connection, but cannot be detected in Tri-mode” on page 408

### Server cannot recognize a drive

Complete the following steps until the problem is solved.

1. Observe the associated yellow drive status LED. If the LED is lit, it indicates a drive fault.
2. If the status LED is lit, remove the drive from the bay, wait 45 seconds, and reinsert the drive, making sure that the drive assembly connects to the drive backplane.
3. Observe the associated green drive activity LED and the yellow status LED and perform corresponding operations in different situations:
  - If the green activity LED is flashing and the yellow status LED is not lit, the drive is recognized by the controller and is working correctly. Run the diagnostics tests for the drives. When you start a server and press the key according to the on-screen instructions, the LXPM is displayed by default. (For more information, see the “Startup” section in the LXPM documentation compatible with your server at <https://pubs.lenovo.com/lxpm-overview/>.) You can perform drive diagnostics from this interface. From the Diagnostic page, click **Run Diagnostic → Disk Drive Test**.
  - If the green activity LED is flashing and the yellow status LED is flashing slowly, the drive is recognized by the controller and is rebuilding.
  - If neither LED is lit or flashing, check whether the drive backplane is correctly seated. For details, go to step 4.
  - If the green activity LED is flashing and the yellow status LED is lit, replace the drive.
4. Make sure that the drive backplane is correctly seated. When it is correctly seated, the drive assemblies correctly connect to the backplane without bowing or causing movement of the backplane.
5. Reseat the backplane power cable and repeat steps 1 through 3.
6. Reseat the backplane signal cable and repeat steps 1 through 3.
7. Suspect the backplane signal cable or the backplane:
  - Replace the affected backplane signal cable.
  - Replace the affected backplane.
8. Run the diagnostics tests for the drives. When you start a server and press the key according to the on-screen instructions, the LXPM is displayed by default. (For more information, see the “Startup” section in the LXPM documentation compatible with your server at <https://pubs.lenovo.com/lxpm-overview/>.) You can perform drive diagnostics from this interface. From the Diagnostic page, click **Run Diagnostic → Disk Drive Test**.

Based on those tests:

- If the backplane passes the test but the drives are not recognized, replace the backplane signal cable and run the tests again.
- Replace the backplane.
- If the adapter fails the test, disconnect the backplane signal cable from the adapter and run the tests again.
- If the adapter fails the test, replace the adapter.

### Multiple drives fail

Complete the following steps until the problem is solved:

- View the Lenovo XClarity Controller event log for events related to power supplies or vibration issues and resolve those events.
- Make sure that the device drivers and firmware for the drive and server are at the latest level.

**Important:** Some cluster solutions require specific code levels or coordinated code updates. If the device is part of a cluster solution, verify that the latest level of code is supported for the cluster solution before you update the code.

### Multiple drives are offline

Complete the following steps until the problem is solved:

- View the Lenovo XClarity Controller event log for events related to power supplies or vibration issues and resolve those events.
- View the storage subsystem log for events related to the storage subsystem and resolve those events.

### A replacement drive does not rebuild

Complete the following steps until the problem is solved:

1. Make sure that the drive is recognized by the adapter (the green drive activity LED is flashing).
2. Review the SAS/SATA RAID adapter documentation to determine the correct configuration parameters and settings.

### Green drive activity LED does not represent actual state of associated drive

Complete the following steps until the problem is solved:

1. If the green drive activity LED does not flash when the drive is in use, run the diagnostics tests for the drives. When you start a server and press the key according to the on-screen instructions, the LXPM is displayed by default. (For more information, see the “Startup” section in the LXPM documentation compatible with your server at <https://pubs.lenovo.com/lxpm-overview/>.) You can perform drive diagnostics from this interface. From the Diagnostic page, click **Run Diagnostic → Disk Drive Test**
2. If the drive passes the test, replace the backplane.
3. If the drive fails the test, replace the drive.

### Yellow drive status LED does not represent actual state of associated drive

Complete the following steps until the problem is solved:


1. Turn off the server.
2. Reseat the SAS/SATA adapter.
3. Reseat the backplane signal cable and backplane power cable.
4. Reseat the drive.
5. Power on the server and observe the activity of the drive LEDs.

### U.3 NVMe drive can be detected in NVMe connection, but cannot be detected in Tri-mode

In Tri-mode, NVMe drives are connected via a PCIe x1 link to the controller. To support Tri-mode with U.3 NVMe drives, **U.3 x1 mode** must be enabled for the selected drive slots on the backplane through the XCC Web GUI. By default, the backplane setting is **U.2 x4 mode**.

Complete the following steps to enable **U.3 x1 mode**:

1. Log into the XCC Web GUI, and choose **Storage → Detail** from the navigation tree on the left.

2. In the window that is displayed, click the icon  next to **Backplane**.
3. In the dialog box that is displayed, select the target drive slots and click **Apply**.
4. Do a DC power cycle to make the setting take effect.



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## Appendix A. Hardware disassembling for recycle

Follow the instructions in this section to recycle components with compliance with local laws or regulations.

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### Disassemble the system board assembly for recycle

Follow the instructions in this section to disassemble the system board assembly before recycling.

#### About this task

Before disassembling the system board assembly:

1. Remove the firmware and RoT security module from the system I/O board. See [“Remove the firmware and RoT security module” on page 211](#).
2. Separate the system I/O board from the processor board.

**Note:** To prevent the contact of the I/O board from damage, pinch and lift the plunger on the I/O board upward a little and pull out the I/O board outward. During the entire pulling action, ensure that the I/O board remains as horizontal as possible.

- a. ① Remove the four screws that secure the system I/O board.
- b. ② Lift and hold the rear plunger; then, slide the system I/O board towards the rear end of the chassis to disengage it from the processor board.

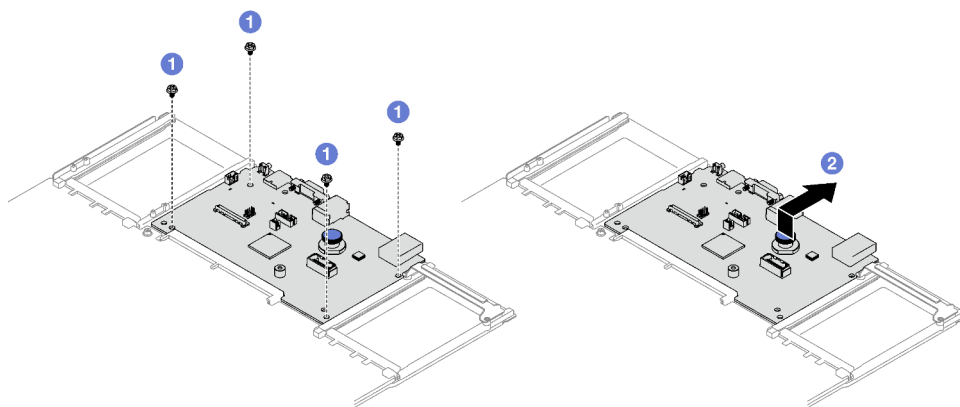


Figure 207. System I/O board removal

3. Refer to local environmental, waste or disposal regulations to ensure compliance.

#### Procedure

Step 1. Remove the following components as illustrated:

- Five guide pins (with 7mm wrench)
- Two low-profile screws (with PH2 screwdriver)
- One plunger (with PH2 screwdriver)
- Two cable guides

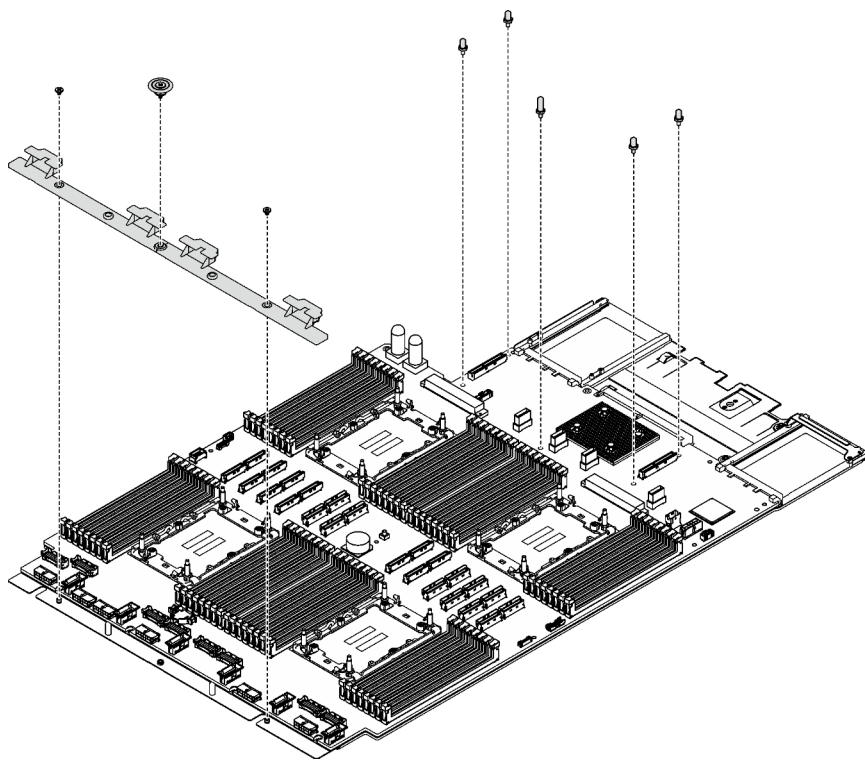


Figure 208. Component removal

Step 2. Remove the following screws as illustrated:

- Four low-profile screws (with PH2 screwdriver)
- Ten slotted screws (with PH1 screwdriver)

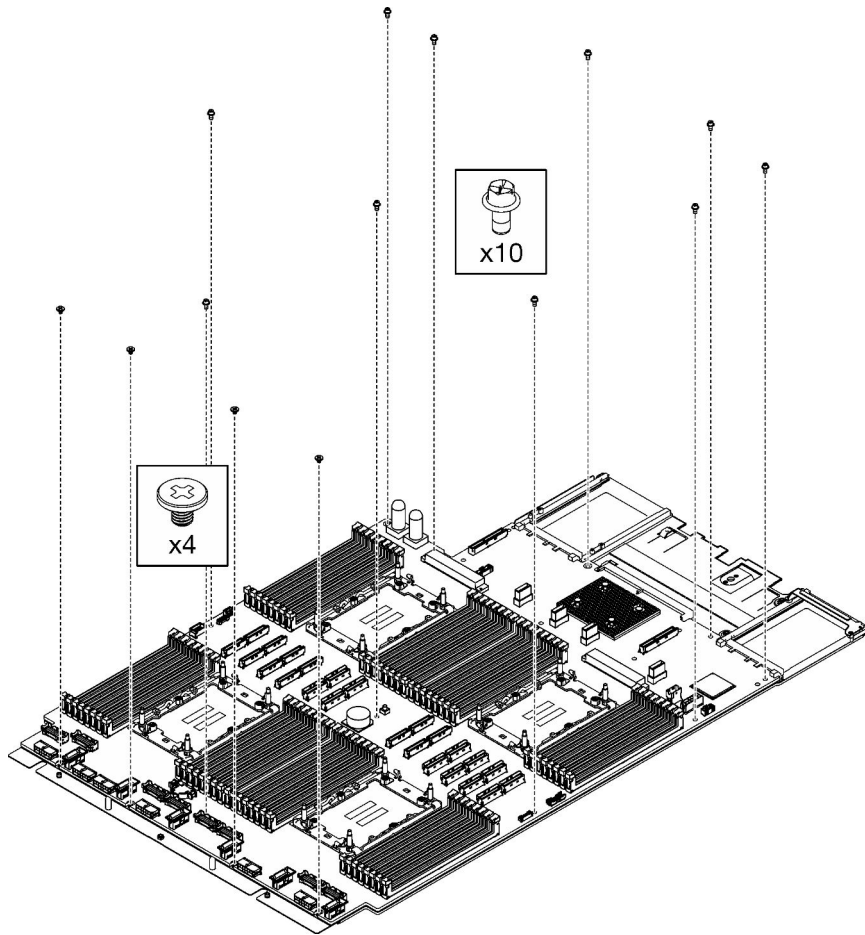
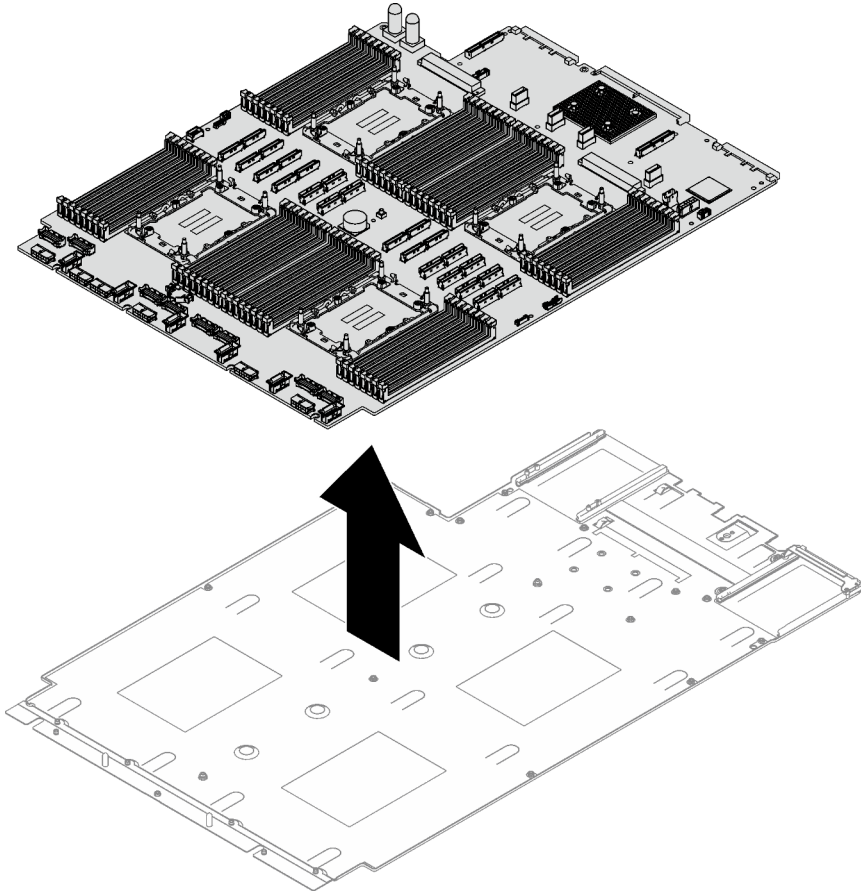


Figure 209. Screw removal

Step 3. Separate the processor board from the supporting sheet metal.



*Figure 210. Processor board disassembly*

### **After you finish**

After disassembling the system board assembly, recycle the unit in compliance with local regulations.



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## Appendix B. 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.

On the World Wide Web, up-to-date information about Lenovo systems, optional devices, services, and support are available at:

<http://datacentersupport.lenovo.com>

**Note:** IBM is Lenovo's preferred service provider for ThinkSystem.

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### Before you call

Before you call, there are several steps that you can take to try and solve the problem yourself. If you decide that you do need to call for assistance, gather the information that will be needed by the service technician to more quickly resolve your problem.

#### Attempt to resolve the problem yourself

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 online help 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.

You can find the product documentation for your ThinkSystem products at the following location:

<https://pubs.lenovo.com/>

You can take these steps to try to solve the problem yourself:

- Check all cables to make sure that they are connected.
- Check the power switches to make sure that the system and any optional devices are turned on.
- Check for updated software, firmware, and operating-system device drivers for your Lenovo product. (See the following links) 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.
  - Drivers and software downloads
    - <https://datacentersupport.lenovo.com/tw/en/products/servers/thinksystem/sr850v3/7d96/downloads/driver-list/>
  - Operating system support center
    - <https://datacentersupport.lenovo.com/solutions/server-os>
  - Operating system installing instructions
    - <https://pubs.lenovo.com/thinksystem#os-installation>
- If you have installed new hardware or software in your environment, check <https://serverproven.lenovo.com> to make sure that the hardware and software are supported by your product.
- Refer to [Chapter 8 “Problem determination” on page 373](#) for instructions on isolating and solving issues.

- Go to <http://datacentersupport.lenovo.com> and check for information to help you solve the problem.

To find the Tech Tips available for your server:

1. Go to <http://datacentersupport.lenovo.com> and navigate to the support page for your server.
2. Click on **How To's** from the navigation pane.
3. Click **Article Type** → **Solution** from the drop-down menu.

Follow the on-screen instructions to choose the category for the problem that you are having.

- Check Lenovo Data Center Forum at [https://forums.lenovo.com/t5/Datacenter-Systems/ct-p/sv\\_eg](https://forums.lenovo.com/t5/Datacenter-Systems/ct-p/sv_eg) to see if someone else has encountered a similar problem.

### Gathering information needed to call Support

If you require warranty service for your Lenovo product, the service technicians will be able to assist you more efficiently if you prepare the appropriate information before you call. You can also go to <http://datacentersupport.lenovo.com/warrantylookup> for more information about your product warranty.

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). Machine type number can be found on the ID label, see “[Identify the server and access the Lenovo XClarity Controller](#)” on page 43.
- Model number
- Serial number
- Current system UEFI and firmware levels
- Other pertinent information such as error messages and logs

As an alternative to calling Lenovo Support, you can go to <https://support.lenovo.com/servicerequest> 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 Lenovo service technicians can start working on your solution as soon as you have completed and submitted an Electronic Service Request.

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## Collecting service data

To clearly identify the root cause of a server issue or at the request of Lenovo Support, you might need collect service data that can be used for further analysis. Service data includes information such as event logs and hardware inventory.

Service data can be collected through the following tools:

- **Lenovo XClarity Provisioning Manager**

Use the Collect Service Data function of Lenovo XClarity Provisioning Manager to collect system service data. You can collect existing system log data or run a new diagnostic to collect new data.

- **Lenovo XClarity Controller**

You can use the Lenovo XClarity Controller web interface or the CLI to collect service data for the server. The file can be saved and sent to Lenovo Support.

- For more information about using the web interface to collect service data, see the “Backing up the BMC configuration” section in the XCC documentation compatible with your server at <https://pubs.lenovo.com/lxcc-overview/>.

- For more information about using the CLI to collect service data, see the “XCC `ffdc` command” section in the XCC documentation compatible with your server at <https://pubs.lenovo.com/lxcc-overview/>.

- **Lenovo XClarity Administrator**

Lenovo XClarity Administrator can be set up to collect and send diagnostic files automatically to Lenovo Support when certain serviceable events occur in Lenovo XClarity Administrator and the managed endpoints. You can choose to send diagnostic files to Lenovo Support using Call Home or to another service provider using SFTP. You can also manually collect diagnostic files, open a problem record, and send diagnostic files to the Lenovo Support.

You can find more information about setting up automatic problem notification within the Lenovo XClarity Administrator at [https://pubs.lenovo.com/lxca/admin\\_setupcallhome](https://pubs.lenovo.com/lxca/admin_setupcallhome).

- **Lenovo XClarity Essentials OneCLI**

Lenovo XClarity Essentials OneCLI has inventory application to collect service data. It can run both in-band and out-of-band. When running in-band within the host operating system on the server, OneCLI can collect information about the operating system, such as the operating system event log, in addition to the hardware service data.

To obtain service data, you can run the `getinfor` command. For more information about running the `getinfor`, see [https://pubs.lenovo.com/lxce-onecli/onecli\\_r\\_getinfor\\_command](https://pubs.lenovo.com/lxce-onecli/onecli_r_getinfor_command).

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## Contacting Support

You can contact Support to obtain help for your issue.

You can receive hardware service through a Lenovo Authorized Service Provider. To locate a service provider authorized by Lenovo to provide warranty service, go to <https://datacentersupport.lenovo.com/serviceprovider> and use filter searching for different countries. For Lenovo support telephone numbers, see <https://datacentersupport.lenovo.com/supportphonenumber> for your region support details.



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## Appendix C. Documents and supports

This section provides handy documents, driver and firmware downloads, and support resources.

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### Documents download

This section provides introduction and download link for handy documents.

#### Documents

Download the following product documentations at:

[https://pubs.lenovo.com/sr850v3/pdf\\_files.html](https://pubs.lenovo.com/sr850v3/pdf_files.html)

- **Rail Installation Guides**
  - Rail installation in a rack
- **User Guide**
  - Complete overview, system configuration, hardware components replacing, and troubleshooting.  
Selected chapters from *User Guide*:
    - **System Configuration Guide** : Server overview, components identification, system LEDs and diagnostics display, product unboxing, setting up and configuring the server.
    - **Hardware Maintenance Guide** : Installing hardware components, cable routing, and troubleshooting.
- **Messages and Codes Reference**
  - XClarity Controller, LXPM, and uEFI events
- **UEFI Manual**
  - UEFI setting introduction

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### Support websites

This section provides driver and firmware downloads and support resources.

#### Support and downloads

- Drivers and Software download website for ThinkSystem SR850 V3
  - <https://datacentersupport.lenovo.com/tw/en/products/servers/thinksystem/sr850v3/7d96/downloads/driver-list/>
- Lenovo Data Center Forum
  - [https://forums.lenovo.com/t5/Datacenter-Systems/ct-p/sv\\_eg](https://forums.lenovo.com/t5/Datacenter-Systems/ct-p/sv_eg)
- Lenovo Data Center Support for ThinkSystem SR850 V3
  - <https://datacentersupport.lenovo.com/products/servers/thinksystem/sr850v3/7d96>
- Lenovo License Information Documents
  - <https://datacentersupport.lenovo.com/documents/Invo-eula>
- Lenovo Press website (Product Guides/Datasheets/White papers)
  - <https://lenovopress.lenovo.com/>

- Lenovo Privacy Statement
  - <https://www.lenovo.com/privacy>
- Lenovo Product Security Advisories
  - [https://datacentersupport.lenovo.com/product\\_security/home](https://datacentersupport.lenovo.com/product_security/home)
- Lenovo Product Warranty Plans
  - <http://datacentersupport.lenovo.com/warrantylookup>
- Lenovo Server Operating Systems Support Center website
  - <https://datacentersupport.lenovo.com/solutions/server-os>
- Lenovo ServerProven website (Options compatibility lookup)
  - <https://serverproven.lenovo.com>
- Operating System Installation Instructions
  - <https://pubs.lenovo.com/thinksystem#os-installation>
- Submit an eTicket (service request)
  - <https://support.lenovo.com/servicerequest>
- Subscribe to Lenovo Data Center Group product notifications (Stay up to date on firmware updates)
  - <https://datacentersupport.lenovo.com/solutions/ht509500>

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## Appendix D. Notices

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## Important notes

Processor speed indicates the internal clock speed of the processor; 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.

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## 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.

Additional electronic emissions notices are available at:

[https://pubs.lenovo.com/important\\_notices/](https://pubs.lenovo.com/important_notices/)



## Taiwan Region BSMI RoHS declaration

單元 Unit	限用物質及其化學符號 Restricted substances and its chemical symbols					
	鉛Lead (Pb)	汞Mercury (Hg)	鎘Cadmium (Cd)	六價鉻 Hexavalent chromium (Cr <sup>6+</sup> )	多溴聯苯 Polybrominated biphenyls (PBB)	多溴二苯醚 Polybrominated diphenyl ethers (PBDE)
機架	○	○	○	○	○	○
外部蓋板	○	○	○	○	○	○
機械組零件	-	○	○	○	○	○
空氣傳動設備	-	○	○	○	○	○
冷卻組零件	-	○	○	○	○	○
內存模組	-	○	○	○	○	○
處理器模組	-	○	○	○	○	○
電纜組零件	-	○	○	○	○	○
電源供應器	-	○	○	○	○	○
儲備設備	-	○	○	○	○	○
印刷電路板	-	○	○	○	○	○

備考1. “超出0.1 wt %”及“超出0.01 wt %”係指限用物質之百分比含量超出百分比含量基準值。  
 Note1: “exceeding 0.1wt%” and “exceeding 0.01 wt%” indicate that the percentage content of the restricted substance exceeds the reference percentage value of presence condition.

備考2. “○”係指該項限用物質之百分比含量未超出百分比含量基準值。  
 Note2: “○” indicates that the percentage content of the restricted substance does not exceed the percentage of reference value of presence.

備考3. “-”係指該項限用物質為排除項目。  
 Note3: The “-” indicates that the restricted substance corresponds to the exemption.

## Taiwan Region import and export contact information

Contacts are available for Taiwan Region import and export information.

委製商/進口商名稱: 台灣聯想環球科技股份有限公司  
 進口商地址: 台北市南港區三重路 66 號 8 樓  
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