



ThinkEdge SE450 Setup Guide



Machine Type: 7D8T

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/

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.

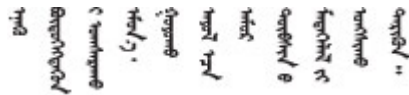
A termék telepítése előtt olvassa el a Biztonsági előírásokat!

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་། སྐྱོར་གྱི་ཡིད་གཟབ་
བྱ་འདྲ་མིན་ཡིད་པའི་འོད་ཟེར་བལྟ་དགོས།

Bu ürünü kurmadan önce güvenlik bilgilerini okuyun.

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canjbinj soengq cungj vahgangj ancien siusik.

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.

Notes:

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

Chapter 1. Introduction

ThinkEdge SE450 (Type 7D8T) is a new [edge server](#) offering. It is specifically designed to meet the needs of [edge computing](#), edge AI, hybrid cloud, and workloads at the edge locations. ThinkEdge SE450 is a rugged compact sized edge solution with a focus on smart connectivity, business security and manageability for the harsh environment. Built for long life and dependable performance to support your demanding IoT workloads at the Edge. Compact and rugged it is designed for the non-datacenter environment, ideal for remote locations such as retail, manufacturing and factory locations.



Figure 1. Product_name

The server comes with a limited warranty. For details about the warranty, see: <https://support.lenovo.com/us/en/solutions/ht503310>

For details about your specific warranty, see: <http://datacentersupport.lenovo.com/warrantylookup>

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:

Note: Some of the items listed are available on select models only.

- Server
- Rail installation kit (optional). Detailed instructions for installing the rail installation kit are provided in the package with the rail installation kit.
- Material box, including items such as power cords, rack installation template, and accessory kit.

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.

This server implements the following features and technologies:

- **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.

Some of the features that are unique to the Lenovo XClarity Controller are enhanced performance, higher-resolution remote video, and expanded security options. For additional information about the Lenovo XClarity Controller, refer to the XCC documentation compatible with your server at:

<https://pubs.lenovo.com/lxcc-overview/>

Important: Lenovo XClarity Controller (XCC) supported version varies by product. All versions of Lenovo XClarity Controller are referred to as Lenovo XClarity Controller and XCC in this document, unless specified otherwise. To see the XCC version supported by your server, go 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).

- **Large system-memory capacity**

The server supports synchronous dynamic random-access memory (SDRAM) registered dual inline memory modules (DIMMs) with error correcting code (ECC), and persistent memory modules (PMEM). For more information about the specific types and maximum amount of memory, see “Specifications” on page 3.

- **Large data-storage capacity**

This server supports up to two 15mm SAS/SATA/NVMe or four 7mm SATA/NVMe trayless drives, and two optional 2.5-inch 15mm SAS/SATA/NVMe hot-swap drives.

- **Front operator panel**

Front operator panel provides LEDs to help you diagnose problems. For more information about the front operator panel, see “Front operator panel” on page 20.

- **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, ThinkServer, ThinkSystem and ThinkEdge servers, and improve energy efficiency using Lenovo XClarity Energy Manager.

- **Redundant cooling and optional power capabilities**

The server supports a maximum of two hot-swap power supply units and six internal fans, which provide redundancy for a typical configuration. The redundant cooling by the fans in the server enables continued operation if one of the fans fails.

- **ThinkSystem RAID support**

The system provides redundant array of independent disks (RAID) support of level 0, 1, and 10.

- **Integrated Trusted Platform Module (TPM)**

This integrated security chip performs cryptographic functions and stores private and public secure keys. It provides the hardware support for the Trusted Computing Group (TCG) specification.

- **Lenovo XClarity Controllers System Lockdown Mode**

System lockdown will be enforced under specific circumstances to protect the server from information breach, particularly when the server is transported by non-certified carriers to remote environments. See [Lenovo XClarity Controller System Lockdown Mode](#) for details.

- **Zero-touch deployment**

Zero-touch deployment software allows remote deployment, particularly when the server is transported by non-certified carriers to remote environments with no certified personnels to set it up in person.

Specifications

The following information is a 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.

Table 1. Specifications

Specification	Description
Dimension	2U server 300mm chassis <ul style="list-style-type: none"> • Depth: <ul style="list-style-type: none"> – Without bezel: 298.8 mm (11.76 inches) – With bezel: 407.3 mm (16.04 inches) • Height: 86.5 mm (3.41 inches) • Width: <ul style="list-style-type: none"> Without rack latches: 444.6 mm (17.50 inches) With rack latches: 480.5 mm (18.92 inches) 360mm chassis <ul style="list-style-type: none"> • Depth: <ul style="list-style-type: none"> – Without bezel: 358.8 mm (14.13 inches) – With bezel: 467.3 mm (18.40 inches) • Height: 86.5 mm (3.41 inches) • Width: <ul style="list-style-type: none"> Without rack latches: 444.6 mm (17.50 inches) With rack latches: 480.5 mm (18.92 inches)
Weight (Varies with configuration)	Maximum: <ul style="list-style-type: none"> • 300mm chassis: 14.84 kg (32.71 lbs) • 360mm chassis: 17.45 kg (38.47 lbs)
Processor (Varies with configuration)	Supports multi-core Intel Xeon processors, with integrated memory controller and Intel Mesh UPI (Ultra Path Interconnect) topology. <ul style="list-style-type: none"> • One processor socket • Designed for LGA 4189 sockets • Scalable up to 36 cores • Supports 6 UPI links at 10.4 GT/s Heat sink: <ul style="list-style-type: none"> • 1U heat sink supports processors with wattage up to 165 watt. • 2U heat sink supports processors with wattage up to 205 watt.

Table 1. Specifications (continued)

<p>Memory</p>	<p>See “Memory module installation rules and order” on page 40 for detailed information about memory configuration and setup.</p> <ul style="list-style-type: none"> • Slots: 10 two-way interleaved slots • Memory module types: <ul style="list-style-type: none"> – Double-data-rate 4 (TruDDR4) error correcting code (ECC) 3200 MT/s registered DIMM (RDIMM) or 3DS RDIMM – 3DS RDIMM – Persistent Memory (PMEM) • Capacity (depending on the model) <ul style="list-style-type: none"> – RDIMM: 16 GB, 32 GB, and 64 GB – 3DS RDIMM: 128 GB – PMEM: 128 GB and 256 GB <p>Note: PMEMs can be mixed with DRAM DIMMs with capacity of more than 16 GB. See “PMEM rules” on page 44 for more information.</p> <ul style="list-style-type: none"> • Total Capacity: <ul style="list-style-type: none"> – Minimum: 16 GB – Maximum: <ul style="list-style-type: none"> – RDIMM: 512 GB – 3DS RDIMM: 1024 GB – PMEM + RDIMM in Memory Mode: 1280 GB <p>For a list of supported memory modules, see https://serverproven.lenovo.com.</p>
<p>Storage expansion</p>	<ul style="list-style-type: none"> • Two SATA/NVMe M.2 drives • Trayless drives: <ul style="list-style-type: none"> – Zero to two 15mm trayless SAS/SATA/NVMe¹ drives (Drive 0, 1) or – Zero to four 7mm trayless SATA/NVMe¹ drives (Drive 0, 1, 2, 3) • Hot-swap (optional)²: two 2.5-inch SAS/SATA/NVMe drive bays with front access (Drive 4, 5) <p>¹ Only non-SED NVMe drives are supported.</p> <p>² Only non-SED drives are supported.</p>
<p>RAID</p>	<p>The following options are available for RAID 0, 1, 10:</p> <ul style="list-style-type: none"> • ThinkSystem 4350-8i SAS/SATA 12Gb Adapter (JBOD mode only) (PCIe Slot 6) • ThinkSystem RAID 5350-8i PCIe 12Gb Adapter (PCIe Slot 6) • Intel Virtual RAID On CPU (VROC) for non-SED SATA/NVMe drives • Intel Volume Management Device (VMD) for non-SED NVMe drives
<p>Network</p>	<ul style="list-style-type: none"> • One of the following OCP 3.0 Ethernet adapters <ul style="list-style-type: none"> – Intel I350-T4 PCIe 1GbE 4-port RJ45 – Intel X710-T2L 10GBASE-T 2-port – Intel E810-DA2 10/25GbE SFP28 2-port – Mellanox ConnectX-6 Lx 10/25GbE SFP28 2-port

Table 1. Specifications (continued)

<p>Expansion slots (Varies with configuration)</p>	<p>Up to seven slots:</p> <ul style="list-style-type: none"> • Slot 1 to 2: M.2 Drive 0 and 1 • Slot 3 to 4 (Riser 2): Supports the following: <ul style="list-style-type: none"> – Single-width PCI Express 4.0 x8/x16 (Slot 3, 4) – Single-width PCI Express 4.0 x16/x16 (Slot 3, 4) – Single/double-width PCI Express 4.0 x16 (Slot 4) – Two 2.5-inch hot-swap SAS/SATA/NVMe drives (Drive 4, 5) • Slot 5 to 6 (Riser 1): Supports the following: <ul style="list-style-type: none"> – Single-width PCI Express 4.0 x16/x8 (Slot 5, 6) – Single-width PCI Express 4.0 x16/x16 (Slot 5, 6) – Single/double-width PCI Express 4.0 x16 (Slot 5) <p style="text-align: center;">Note: RAID adapter must be installed in Slot 6.</p> • Slot 7: OCP 3.0 Ethernet adapter
<p>Integrated functions</p>	<ul style="list-style-type: none"> • Lenovo XClarity Controller (XCC), which provides service processor control and monitoring functions, video controller, and remote keyboard, video, mouse, and remote drive capabilities. • One XCC system management port on the front to connect to a systems-management network. This connector is dedicated to the Lenovo XClarity Controller functions and runs at 1 GB speed. • Two universal serial bus (USB) 3.1 ports on the front
<p>Fans</p>	<p>Six (60 mm x 60 mm x 56 mm) trayless system fans with N+1 redundancy support</p>
<p>Operating System</p>	<p>Supported and certified operating systems include:</p> <ul style="list-style-type: none"> • Microsoft Windows Server • VMware ESXi • Red Hat Enterprise Linux • SUSE Linux Enterprise Server <p>References:</p> <ul style="list-style-type: none"> • Complete list of available operating systems: https://lenovopress.lenovo.com/osig. • OS deployment instructions: “Deploy the operating system” on page 165.

Table 1. Specifications (continued)

<p>Electrical input</p>	<p>This server supports up to two units of CFF V4 (reverse fan) power supplies. N+1 redundancy is supported when two units are installed. Following is the list of supported types:</p> <ul style="list-style-type: none"> • 1100-watt Platinum, input power 100-240 Vac • 1100-watt Titanium, input power 100-240 Vac • 1800-watt Platinum, input power 200-240 Vac • 1100-watt -48V dc <p>CAUTION:</p> <ul style="list-style-type: none"> • 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.
<p>Minimal configuration for debugging</p>	<ul style="list-style-type: none"> • One processor • One DRAM DIMM in slot 2 • One power supply • Two 15mm trayless drives with RAID (If OS is needed for debugging) • Six system fans (Fan 1 to 6)
<p>Ambient temperature management</p>	<p>Adjust ambient temperature when specific components are installed:</p> <ul style="list-style-type: none"> • Keep the ambient temperature to 35°C or lower when: <ul style="list-style-type: none"> – One or more 2.5-inch U.3 7400 PRO 3.84 TB Read Intensive NVMe PCIe 4.0 x4 trayless drives are installed – One or more 2.5-inch U.3 7450 PRO 3.84 TB Read Intensive NVMe PCIe 4.0 x4 trayless drives are installed • Keep the ambient temperature to 40°C or lower when: <ul style="list-style-type: none"> – NVIDIA A40 or L40 GPU is installed – One or more Persistent memory modules are installed – One of the following 2.5-inch drives is installed in Riser 2: <ul style="list-style-type: none"> – U.3 7400 PRO 3.84TB Read Intensive NVMe PCIe 4.0 x4 Hot-swap drive – U.3 7450 MAX 3.2TB Mixed Use NVMe PCIe 4.0 x4 Hot-swap drive – U.3 7450 PRO 3.84TB Read Intensive NVMe PCIe 4.0 x4 Hot-swap drive – U.2 Multi Vendor 3.2TB Mixed Use NVMe PCIe 4.0 x4 Hot-swap drive – The system comes in the following configuration: <ul style="list-style-type: none"> – 360mm chassis – Two risers installed with 0, 1, 2 or 3 half-length adapters installed – Eight 128GB DIMMs are installed <p>Note: When four half length adapters are installed in this configuration, ambient temperature requirement is 45°C or lower.</p>

Table 1. Specifications (continued)

<p>Acoustical noise emissions</p>	<p>The server has the following acoustic noise emissions declaration:</p> <ul style="list-style-type: none"> • Sound pressure level (LpAm) <ul style="list-style-type: none"> – Idling: 43.3 dBA (Minimal), 47.4 dBA (Typical), 47.4 dBA (GPU rich) – Operating: 55.3 dBA (Minimal), 55.3 dBA (Typical), 65.2 dBA (GPU rich) <p>Notes:</p> <ul style="list-style-type: none"> • 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 following configurations, which may change depending on configuration/conditions <ul style="list-style-type: none"> – Minimal: 300mm Chassis, 1x 185W/32cores CPU, 8x 16GB RDIMM, 4x 960G SATA SSD, 2x M.2 5300 SATA 480GB, 2x Intel E810-DA2, 2 x 1100W PSU – Typical: 300mm Chassis, 1x 185W/32cores CPU, 8x 16GB RDIMM, 2x U.2 P5500 1.92TB NVMe, 2x M.2 5300 SATA 480GB, 2x NVIDIA A2 16GB PCIe Gen4 Passive GPU, 1x Mellanox CX6 LX 10/25G, 2 x 1100W PSU – GPU rich: 360mm Chassis, 1x 165W/28 cores CPU, 8x 16GB RDIMM, 2x U.2 P5500 1.92TB NVMe, 2x M.2 5300 SATA 480GB, 2x NVIDIA A30 24GB PCIe Gen4 Passive GPU, 1x Mellanox CX6 LX 10/25G, 2 x 1800W PSU
<p>Environment</p>	<p>ThinkEdge SE450 complies with ASHARE Class A3 specifications. Depending on the hardware configuration, some models comply with ASHARE Class A4 specifications. System performance may be impacted when operating temperature is outside AHSARE A3 specification.</p> <ul style="list-style-type: none"> • Air temperature: <ul style="list-style-type: none"> – Operating <ul style="list-style-type: none"> – ASHARE 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). – ASHARE 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). – ASHARE 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). – NEBS Level 3¹: <ul style="list-style-type: none"> • Operating Temperature: 5°C to 40°C. Humidity: 5%~85% RH, Non-condensing. • Maximum rate of change(°C /hr) should ≤ 20 Humidity transition rate should ≤10%/hr. • High Altitude Operating temperature 1829m (6000ft) to 3960m (13000ft): 5-35°C

1. Configuration:

- Chassis: 300mm chassis
- Processor: 28-core 165W with standard 2U heat sink
- Memory: eight 64GB 3200MHz RDIMMs
- M.2: Two 480GB M.2 drives with SATA-RAID
- Internal storage: Four 960GB SATA drives
- PCIe adapters: Intel N810-DA2 (Slot 5), Intel ACC100 (Slot 3, 4, 6)
- No OCP
- 2x 1100W -48VDC power supplies

Table 1. Specifications (continued)

	<ul style="list-style-type: none"> • Short Term Operating Temp²: -5°C to 55°C. <ul style="list-style-type: none"> – Server off: -10°C to 60°C (°F to °F) – Shipment/storage: -40°C to 70°C (-40°F to 158°F)
Environment	<ul style="list-style-type: none"> • Maximum altitude: 3,000 m (10,000 ft) • Relative Humidity (non-condensing): <ul style="list-style-type: none"> – Operating <ul style="list-style-type: none"> – 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) – NEBS Level 3: 5%~85% RH, Non-condensing • Particulate contamination <p>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” in <i>SE450 Maintenance Manual</i>.</p> <p>Notes:</p> <ul style="list-style-type: none"> • The server is designed for standard data center environment and recommended to be placed in industrial data center. • SE450 supports use of a dust filter that is installed inside the security bezel. The dust filler has a Minimum Efficiency Rating Value (MERV) of 2, per ASHRAE Standard 52.2-2017.

2. Short-term conditions: period of no more than 96 consecutive hours and a total of not more than 15 days in 1 year. (This refers to a total of 360 hours in any given year, but no more than 15 occurrences during that 1- year period.)

Shock and vibration specifications

The following information is a summary of the shock and vibration specifications of the server. Depending on the model, some features might not be available, or some specifications might not apply.

Table 2. Shock and vibration specifications

SE450 system configuration	Vibration (when server is in operation)	Shock (when server is in operation)	Environmental criteria (NEBs GR63)	
300mm and 360mm	0.21Grms, 5-500 Hz, 15 min/axis	15G, 3ms, half-sine, $\pm X$, $\pm Y$, $\pm Z$	Office vibration	Earthquake test
			0.21Grms, 5-100 Hz, 30 min/axis	GR63 earthquake zone 4

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 3. Limits for particulates and gases

Contaminant	Limits
Reactive gases	<p>Severity level G1 as per ANSI/ISA 71.04-1985¹:</p> <ul style="list-style-type: none"> • The copper reactivity level shall be less than 200 Angstroms per month ($\text{\AA}/\text{month} \approx 0.0035 \mu\text{g}/\text{cm}^2\text{-hour}$ weight gain).² • The silver reactivity level shall be less than 200 Angstroms per month ($\text{\AA}/\text{month} \approx 0.0035 \mu\text{g}/\text{cm}^2\text{-hour}$ weight gain).³ • 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.
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"> • The room air might be continuously filtered with MERV 8 filters. • Air entering a data center might be filtered with MERV 11 or preferably MERV 13 filters. <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"> • The deliquescent relative humidity of the particulate contamination should be more than 60% RH.⁴ • Data centers must be free of zinc whiskers.⁵
<p>¹ 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>² The derivation of the equivalence between the rate of copper corrosion growth in the thickness of the corrosion product in $\text{\AA}/\text{month}$ and the rate of weight gain assumes that Cu_2S and Cu_2O grow in equal proportions.</p> <p>³ The derivation of the equivalence between the rate of silver corrosion growth in the thickness of the corrosion product in $\text{\AA}/\text{month}$ and the rate of weight gain assumes that Ag_2S is the only corrosion product.</p> <p>⁴ 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>⁵ 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.</p> <p>Interface</p> <ul style="list-style-type: none">• CLI application• Web GUI interface• Mobile application• REST API <p>Usage and downloads</p> <p>https://pubs.lenovo.com/lxcc-overview/</p>
Lenovo XClarity Administrator	<p>Centralized interface for multi-server management.</p> <p>Interface</p> <ul style="list-style-type: none">• Web GUI interface• Mobile application• REST API <p>Usage and downloads</p> <p>http://sysmgmt.lenovofiles.com/help/topic/com.lenovo.lxca.doc/aug_product_page.html</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>Interface</p> <ul style="list-style-type: none">• OneCLI: CLI application• Bootable Media Creator: CLI application, GUI application• UpdateXpress: GUI application <p>Usage and downloads</p> <p>https://pubs.lenovo.com/lxce-overview/</p>

Options	Description
Lenovo XClarity Provisioning Manager	<p>UEFI-based embedded GUI tool on a single server that can simplify management tasks.</p> <p>Interface</p> <ul style="list-style-type: none"> • Web interface (BMC remote access) • GUI application <p>Usage and downloads</p> <p>https://pubs.lenovo.com/lxpm-overview/</p> <p>Important: 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 https://pubs.lenovo.com/lxpm-overview/.</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>Interface</p> <p>GUI application</p> <p>Usage and downloads</p> <p>https://pubs.lenovo.com/lxci-overview/</p>
Lenovo XClarity Energy Manager	<p>Application that can manage and monitor server power and temperature.</p> <p>Interface</p> <ul style="list-style-type: none"> • Web GUI Interface <p>Usage and downloads</p> <p>https://datacentersupport.lenovo.com/solutions/Invo-lxem</p>
Lenovo Capacity Planner	<p>Application that supports power consumption planning for a server or rack.</p> <p>Interface</p> <ul style="list-style-type: none"> • Web GUI Interface <p>Usage and downloads</p> <p>https://datacentersupport.lenovo.com/solutions/Invo-lcp</p>

Functions

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

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

See this topic to learn about components in the server.

Important product information

This section provides information to help you locate the following:

- **Machine type and model information:** 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 model number and serial number are on the ID label. The following illustration shows the location of the ID label containing the machine type, model, and serial number.
- **FCC ID and IC Certification information:** The FCC and IC Certification information is identified by a label located on the edge server as shown in the following illustration.

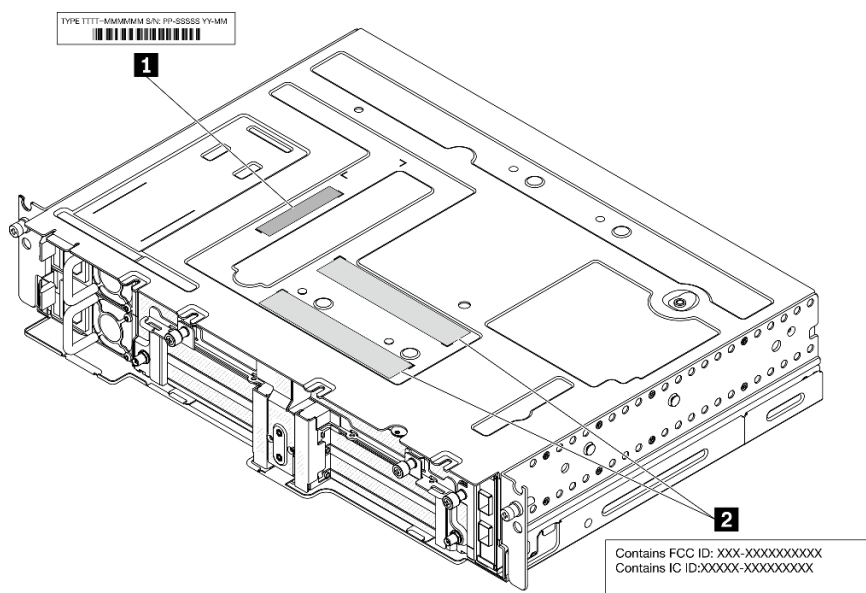


Figure 2. Location of the ID label and FCC ID/IC label

Table 4. ID label and FCC ID/IC label

1 ID label (machine type and model information)	2 FCC ID and IC Certification label
--	--

Network access tag

The network access tag can be found on the front of the server. You can pull way the network access tag to paste your own label for recording some information such as the hostname, the system name and the inventory bar code. Please keep the network access tag for future reference.

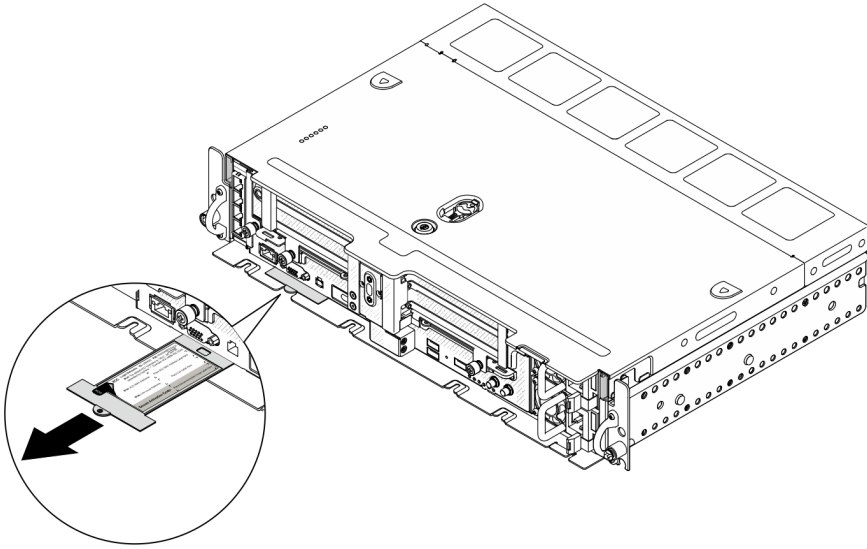


Figure 3. Location of the network access tag

QR code

In addition, the system Service Card that is located on the top cover of the server, provides a quick reference (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 4. SE450 QR code

Front view

See this topic to learn about the controls, LEDs, and connectors on the front of the server.

- [“Front view” on page 17](#)
- [“I/O fillers” on page 20](#)

Front view

Note: All the slot/bay numbers in this topic are listed from top to bottom.

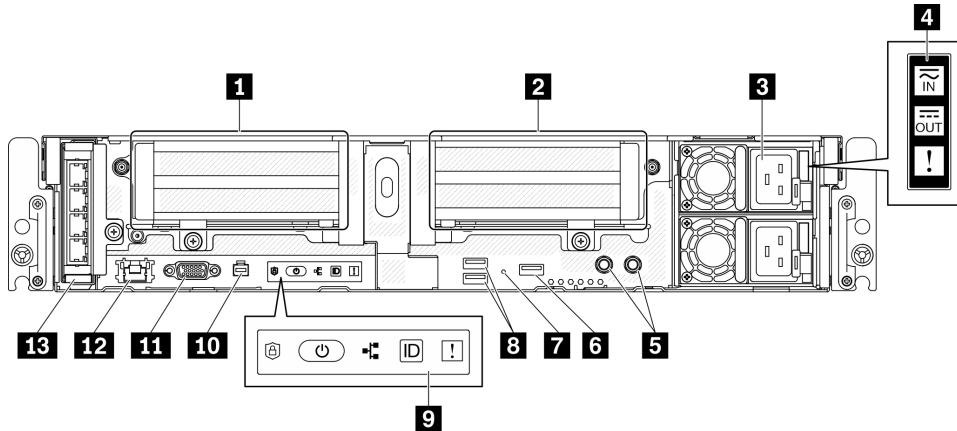


Figure 5. Front view

Table 5. Components on the front view

1	“Riser 1” on page 17 (PCIe slot 5 and 6)	8	“USB 3.0 connectors (1 and 2)” on page 19
2	“Riser 2” on page 18 (PCIe Slot 3 and 4 / Hot-swap Drive 4 and 5)	9	“Front operator panel” on page 19
3	“Power supply units” on page 18 (Bay 2 and 1)	10	“External diagnostic handset connector” on page 19
4	“Power supply LEDs” on page 18	11	“VGA connector” on page 19
5	“Threaded studs for grounding” on page 18	12	“XClarity Controller (XCC) network connector” on page 19
6	“USB 2.0 with Lenovo XClarity Controller management” on page 18	13	“OCP 3.0 adapter” on page 19 (PCIe Slot 7)
7	“NMI button” on page 19		

1 Riser 1 (PCIe slot 5 and 6)

Supports the following:

- Single-width PCI Express 4.0 x16/x8 (Slot 5, 6)
- Single-width PCI Express 4.0 x16/x16 (Slot 5, 6)
- Single/double-width PCI Express 4.0 x16 (Slot 5)

Note: RAID adapter must be installed in Slot 6.

2 Riser 2 (PCIe Slot 3 and 4 / Hot-swap Drive 4 and 5)

Supports the following:

- Single-width PCI Express 4.0 x8/x16 (Slot 3, 4)
- Single-width PCI Express 4.0 x16/x16 (Slot 3, 4)
- Single/double-width PCI Express 4.0 x16 (Slot 4)
- Two 2.5-inch hot-swap SAS/SATA/NVMe drives (Drive 4, 5)

3 Power supply units (bay 2 and 1)

This server supports up to two units of CFF V4 (reverse fan) power supplies. N+1 redundancy is supported when two units are installed. Following is the list of supported types:

- 1100-watt Platinum, input power 100-240 Vac
- 1100-watt Titanium, input power 100-240 Vac
- 1800-watt Platinum, input power 200-240 Vac
- 1100-watt -48V dc

4 Power supply LEDs

• Power input LED (green)

- **Off:** The power supply is disconnected from the ac power source or a power problem occurs.
- **Green:** The power supply is connected to the ac power source.

• Power output LED (green)

- **Green:** The server is on and the power supply is working normally.
- **Blinking green:** The power supply is in zero-output mode (standby). When the server power load is low, one of the installed power supplies enters into the standby state while the other one delivers entire load. When the power load increases, the standby power supply will switch to active state to provide sufficient power to the server.

To disable zero-output mode, start the Setup utility, go to System Settings > Power > Zero Output and select Disable. If you disable zero-output mode, both power supplies will be in the active state.

- **Off:** The server is powered off, or the power supply is not working properly. If the server is powered on but the power output LED is off, replace the power supply.

• Power supply error LED (yellow)

- **Off:** The power supply is working.
- **Yellow:** The power supply has failed. To resolve the issue, replace the power supply.

5 Threaded studs for grounding

Connect the grounding wires to these lugs.

6 USB 2.0 with Lenovo XClarity Controller management

Connection to XClarity Controller is primarily intended for users with a mobile device running the 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 XClarity Controller. Select Network in BMC Configuration to view or modify settings.

Only one mode is supported:

- **BMC only mode**

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

7 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.

8 USB 3.0 connectors (1 and 2)

Connect a USB device, such as a mouse, keyboard, or other devices, to either of these connectors.

9 Front operator panel

See [“Front operator panel” on page 20](#) for details.

10 External diagnostic handset connector

Connect the External diagnostic handset to this connector for system diagnostics and trouble shooting. See [“External LCD diagnostics handset” on page 22](#) for details.

11 VGA connector

Connect a monitor to this connector. The maximum video resolution is 1920 x 1200 at 60 Hz.

12 XClarity Controller (XCC) network connector

Use this connector to manage the server, by using a dedicated management network. If you use this connector, the Lenovo XClarity Controller cannot be accessed directly from the production network. A dedicated management network provides additional security by physically separating the management network traffic from the production network. You can use the Setup utility to configure the server to use a dedicated systems-management network or a shared network.

13 OCP 3.0 adapter (Slot 7)

The OCP 3.0 Ethernet adapter provides two or four extra Ethernet connectors for network connections. See the following for port numbering:

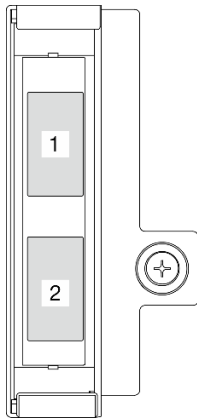


Figure 6. Port numbering: 2-port OCP 3.0 adapter

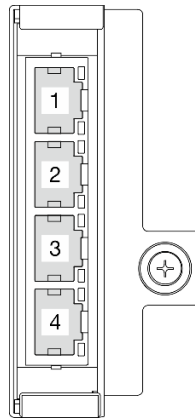


Figure 7. Port numbering: 4-port OCP 3.0 adapter

One of the Ethernet connectors on the OCP 3.0 Ethernet adapter can also function as a management connector with shared management capacity. If the shared management connector fails, traffic can automatically switch over to another connector on the adapter.

I/O fillers

Install the I/O fillers when the connectors are not used. The connectors could be damaged without proper protection of the fillers.

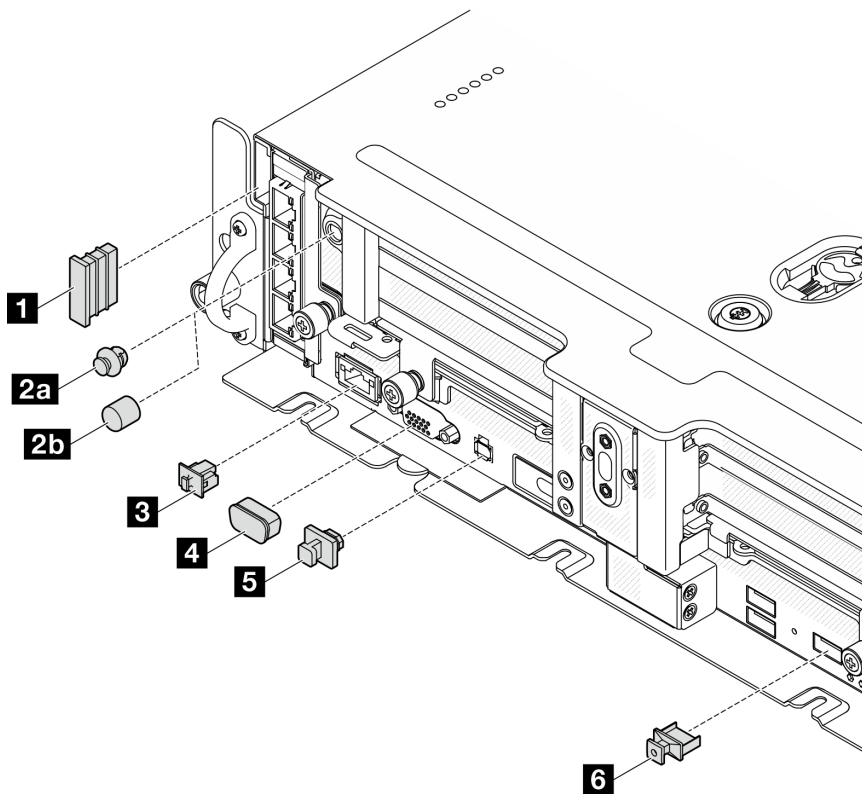


Figure 8. I/O fillers

1 Security bezel filler (x2)	4 VGA cover (x1)
2a Antenna port filler (x2) or 2b antenna cover (x2)*	5 External diagnostic handset connector filler (x1)
3 RJ-45 filler (x1)	6 USB Type-A filler (x3)

*Depending on the configuration, install the antenna port fillers or the antenna covers on the front of the server. ThinkEdge SE450 uses the antenna port fillers only.

Front operator panel

Front operation information panel contains power controls indicator LEDs.

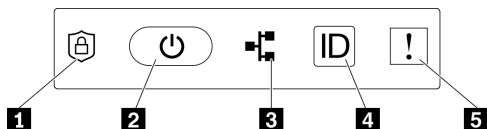


Figure 9. Front operator panel

Table 6. Front operator panel controls and indicators

1 “ThinkShield Activation LED (green)” on page 21	4 “Identification button/LED (blue)” on page 21
2 “Power button/LED (green)” on page 21	5 “System-error LED (yellow)” on page 21
3 “Network activity LED (green)” on page 21	

1 ThinkShield Activation LED (green)

The states of ThinkShield Activation LED are as following:

Solid on: ThinkShield is activated.

Flashing: ThinkShield is not activated and needs to be activated.

Off: ThinkShield is not available in this unit.

See “[Activate the system](#)” on page 157 to activate the system.

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:

Off: Power is not present or the power adapter, or the LED itself has failed.

Flashing rapidly (4 times per second): The server is off and not ready to be turned on. The power button is disabled in this status. This will last approximately 5 to 10 seconds after power source is connected.

Flashing slowly (once per second): The server is off and ready to be turned on. Press the power button to turn on the server.

On: The server is turned on.

3 Network activity LED (green)

When this LED is blinking, it indicates that the server is transmitting to or receiving signals from the Ethernet LAN.

4 Identification button/LED (blue)

Use this blue LED to visually locate the server among other servers. This LED is also used as a presence detection button. You can use Lenovo XClarity Administrator to light this LED remotely.

Use this blue LED to visually locate the server among other servers. This LED is also used as a presence detection button. You can use Lenovo XClarity Administrator to light this LED remotely. The states of the identification LED are as follows:

Off: Presence detection off.

Flashing rapidly (4 times per second): (on XCC firmware version 3.10 or later) The server is not activated yet and has no power permission.

Flashing slowly (once per second): Presence detection is on.

On: Presence detection is on.

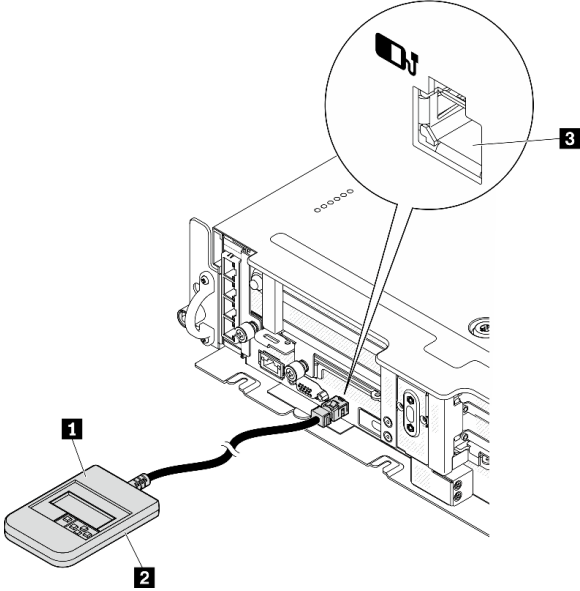
5 System-error LED (yellow)

When this yellow LED is lit, it indicates that one or more system errors have occurred. This LED can be controlled by the XCC. Detailed information is available on the External LCD diagnostics handset (see “[External LCD diagnostics handset](#)” on page 22).

External LCD diagnostics handset

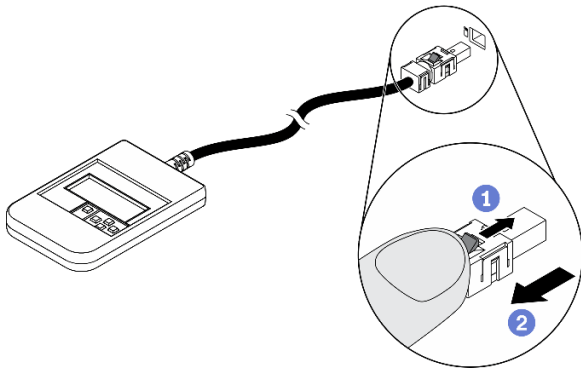
The external LCD diagnostics handset is an external device that is connected to the server with a cable, and it allows quick access to system information such as errors, system status, firmware, network, and health information.

Location of the external LCD diagnostics handset

Location	Callouts
<p>The external LCD diagnostics handset is connected to the server with an external cable.</p> 	<p>1 External LCD diagnostics handset</p> <p>2 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.</p> <p>3 External diagnostics connector This connector is located on the front of the server, and is used to connect an external LCD diagnostics handset.</p>

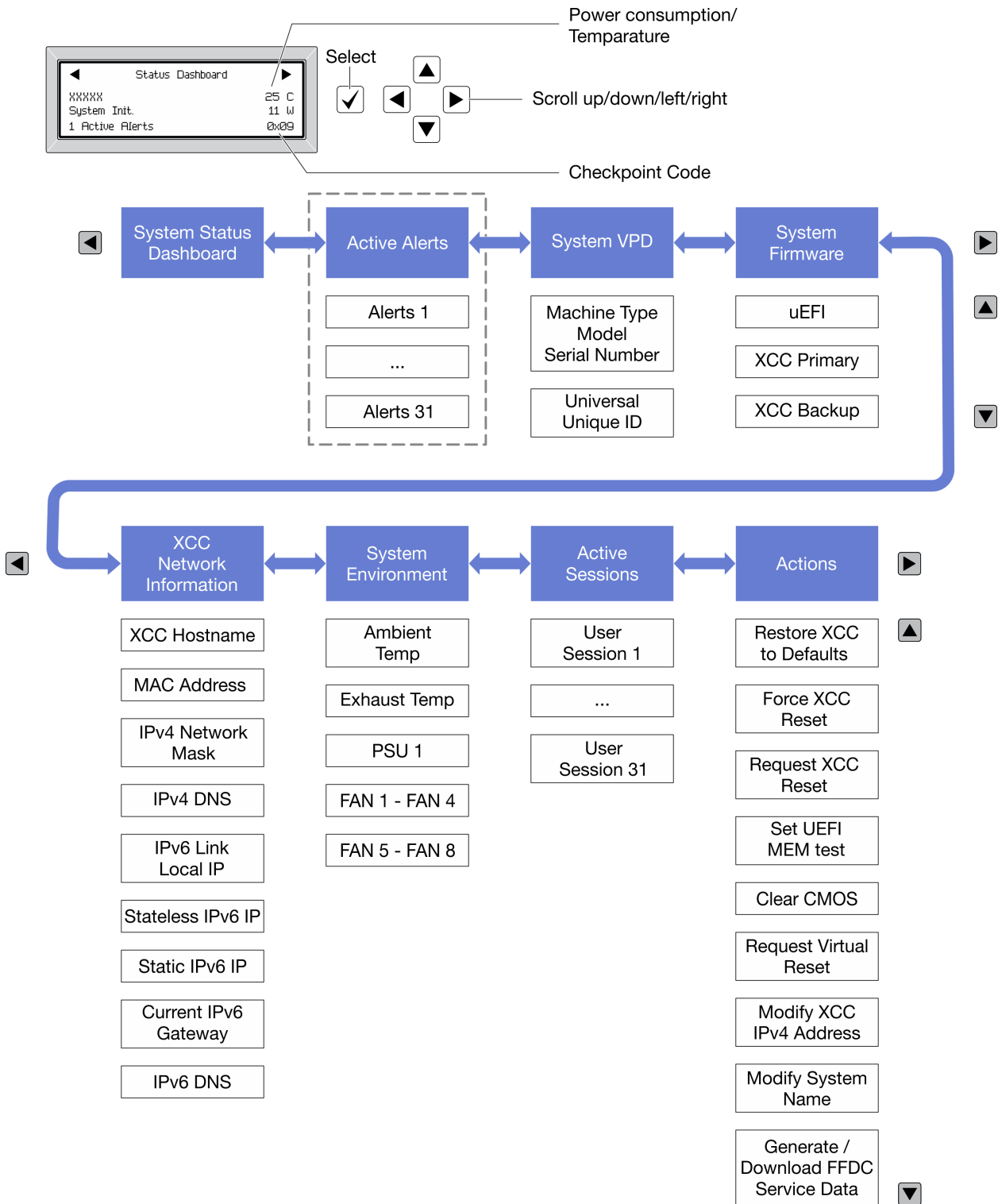
Note: When unplugging the external handset, see the following instructions: **1** Press the plastic clip on the plug forward.

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.



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"> 1 System name 2 System status 3 Active alert quantity 4 Temperature 5 Power consumption 6 Checkpoint code 	<p>The screenshot shows a 'Status Dashboard' with the following content: <ul style="list-style-type: none"> 1: System name (xxxxxx) 2: System status (System Init.) 3: Active alert quantity (1 Active Alerts) 4: Temperature (25 C) 5: Power consumption (11 W) 6: Checkpoint code (0x09) </p>

Active Alerts

Sub Menu	Example
Home screen: Active error quantity Note: 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
Detail screen: <ul style="list-style-type: none"> • Error message ID (Type: Error/Warning/Information) • Occurrence time • Possible sources of the error 	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"> • Machine type and serial number • Universal Unique ID (UUID) 	Machine Type: xxxx Serial Num: xxxxxx Universal Unique ID: xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx

System Firmware

Sub Menu	Example
UEFI <ul style="list-style-type: none"> Firmware level (status) Build ID Version number Release date 	UEFI (Inactive) Build: D0E101P Version: 1.00 Date: 2019-12-26
XCC Primary <ul style="list-style-type: none"> Firmware level (status) Build ID Version number Release date 	XCC Primary (Active) Build: DVI399T Version: 4.07 Date: 2020-04-07
XCC Backup <ul style="list-style-type: none"> Firmware level (status) Build ID Version number Release date 	XCC Backup (Active) Build: D8BT05I Version: 1.00 Date: 2019-12-30

XCC Network Information

Sub Menu	Example
<ul style="list-style-type: none"> XCC hostname MAC address IPv4 Network Mask IPv4 DNS IPv6 Link Local IP Stateless IPv6 IP Static IPv6 IP Current IPv6 Gateway IPv6 DNS <p>Note: 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">• Ambient temperature• Exhaust temperature• PSU status• Spinning speed of fans by RPM	Ambient Temp: 24 C Exhaust Temp: 30 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">• Restore XCC to Defaults• Force XCC Reset• Request XCC Reset• Set UEFI Memory Test• Clear CMOS• Request Virtual Reseat• Modify XCC Static IPv4 Address/Net mask/Gateway• Modify System Name• Generate/Download FFDC Service Data	Request XCC Reset? This will request the BMC to reboot itself. Hold √ for 3 seconds

Top view

See this topic to learn about the components visible from the top of the server.

300mm chassis

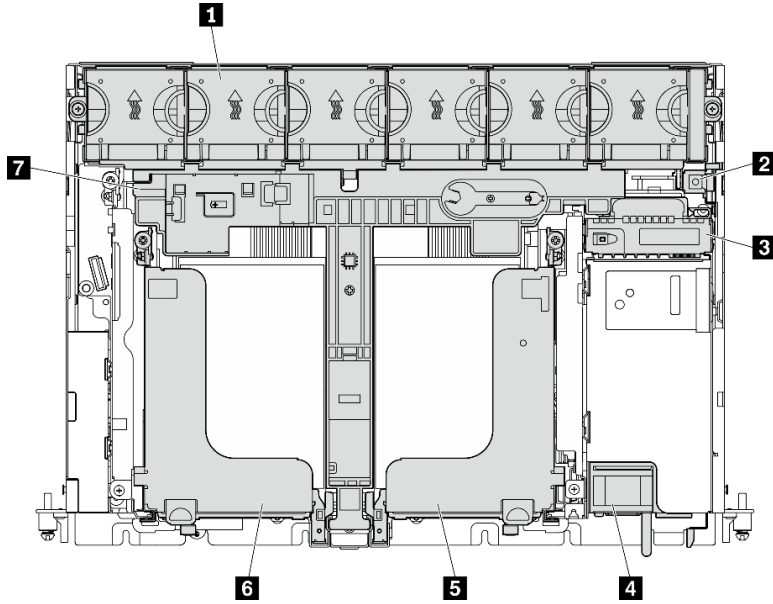


Figure 10. Top view - 300mm

Table 7. Top view - 300mm

1 Fan cage and fans (1 to 6)	5 Riser 2
2 Intrusion switch	6 Riser 1
3 Power backplane	7 Air baffle for 300mm chassis
4 Power supply units	

360mm chassis

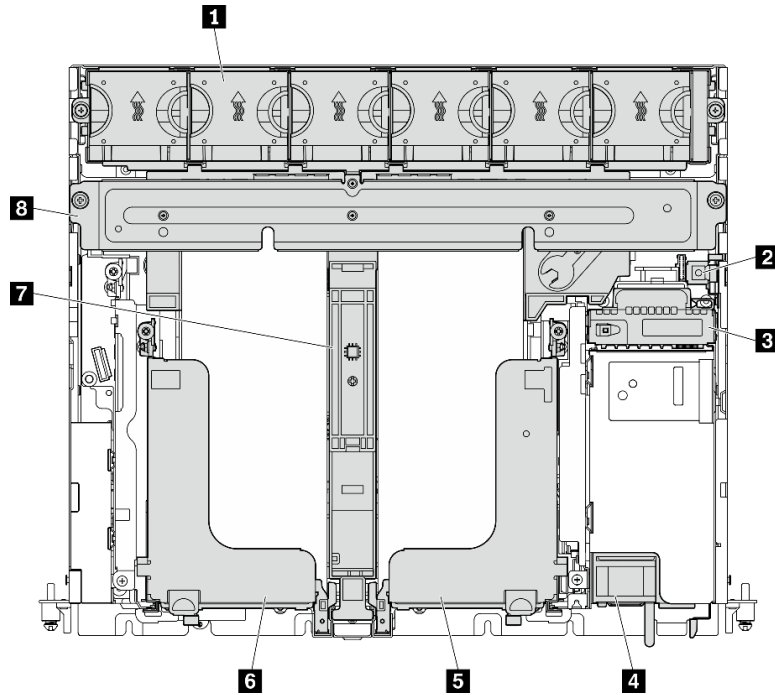


Figure 11. Top view - 360 mm

Table 8. Top view - 360mm

1 Fan cage and fans (1 to 6)	5 Riser 2
2 Intrusion switch	6 Riser 1
3 Power backplane	7 Air baffle for 360mm chassis
4 Power supply units	8 Supporting bracket

System LEDs

There are three sets of system LEDs on this server for various scenario. See this topic for details.

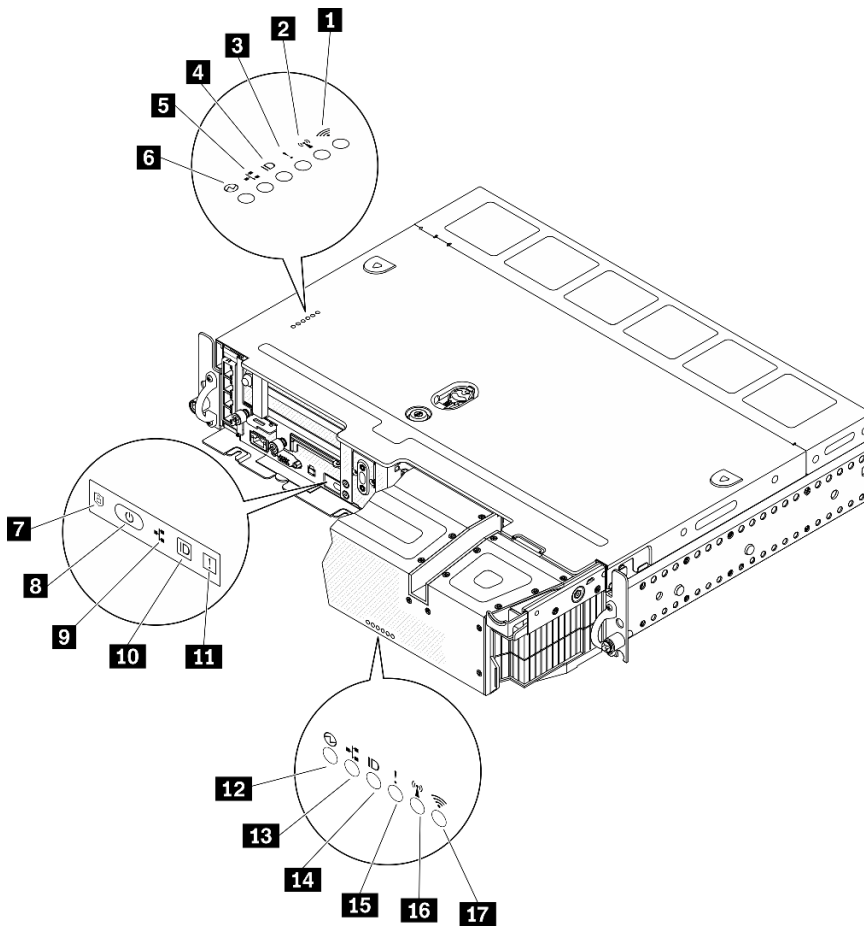


Figure 12. System LEDs

Table 9. System LEDs

LEDs visible from		
Top cover and wall-mount	Server Front view	Security bezel
1 (Reserved)	7 “ThinkShield activation LED (green)” on page 31	12 “Power LED (green)” on page 31
2 (Reserved)	8 “Power button/LED (green)” on page 31	13 “Network activity LED (green)” on page 31
3 “System-error LED (yellow)” on page 30	9 “Network activity LED (green)” on page 31	14 “Identification LED (blue)” on page 31
4 “Identification LED (blue)” on page 31	10 “Identification button/LED (blue)” on page 31	15 “System-error LED (yellow)” on page 30
5 “Network activity LED (green)” on page 31	11 “System-error LED (yellow)” on page 30	16 (Reserved)
6 “Power LED (green)” on page 31		17 (Reserved)

3 11 14 System-error LED (yellow)

When this yellow LED is lit, it indicates that one or more system errors have occurred.

4 10 14 Identification button/LED (blue)

Locate this server among a group of servers with this button. The LED can also be lit with Lenovo XClarity Administrator remotely. Following are the states of the identification LED:

- **Off:** Presence detection is off.
- **On:** Presence detection is on.
- **Flashing rapidly (4 times per second):** (on XCC firmware version 3.10 or later) The server is not activated yet and has no power permission. See Activation guide to activate the system.
- **Flashing slowly (once per second):** Presence detection on.

5 9 13 Network activity LED (green)

When this LED is flashing, it indicates that the server is transmitting to or receiving signals from the Ethernet LAN.

6 8 12 Power button/LED (green)

Press this button to turn the server on and off manually. Following are the states of the LED:

- **Off:** No power supply unit is properly installed or connected, or the LED itself has failed.
- **Flashing rapidly (four times per second):** The server is turned off and not ready to be turned on yet. The power button is disabled. This will last approximately five to ten seconds after power supply units are properly installed and connected.
- **Flashing slowly (once per second):** The server is power off but ready to be turned on. Press the power button to turn on the server.
- **On:** The server is turned on.

7 ThinkShield activation LED

The states of ThinkShield Activation LED are as following:

Solid on: ThinkShield is activated.

Flashing: ThinkShield is not activated and needs to be activated.

Off: ThinkShield is not available in this unit.

See “[Activate the system](#)” on page 157 to activate the system.

Parts list

Use the parts list to identify each of the components that are available for your server.

For more information about ordering the parts shown in the [Figure 13 “Server components ”](#) on page 32:

<https://datacentersupport.lenovo.com/tw/en/products/servers/thinkedge/se450thinkedge/7d8t/parts/display/compatible>

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

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

- **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.
- **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.
- **Field replaceable unit (FRU):** FRUs must be installed only by trained service technicians.

- **Consumable and Structural parts:** Purchase and replacement of consumable and structural parts (components, such as a cover or bezel) is your responsibility. If Lenovo acquires or installs a structural component at your request, you will be charged for the service.

Server components

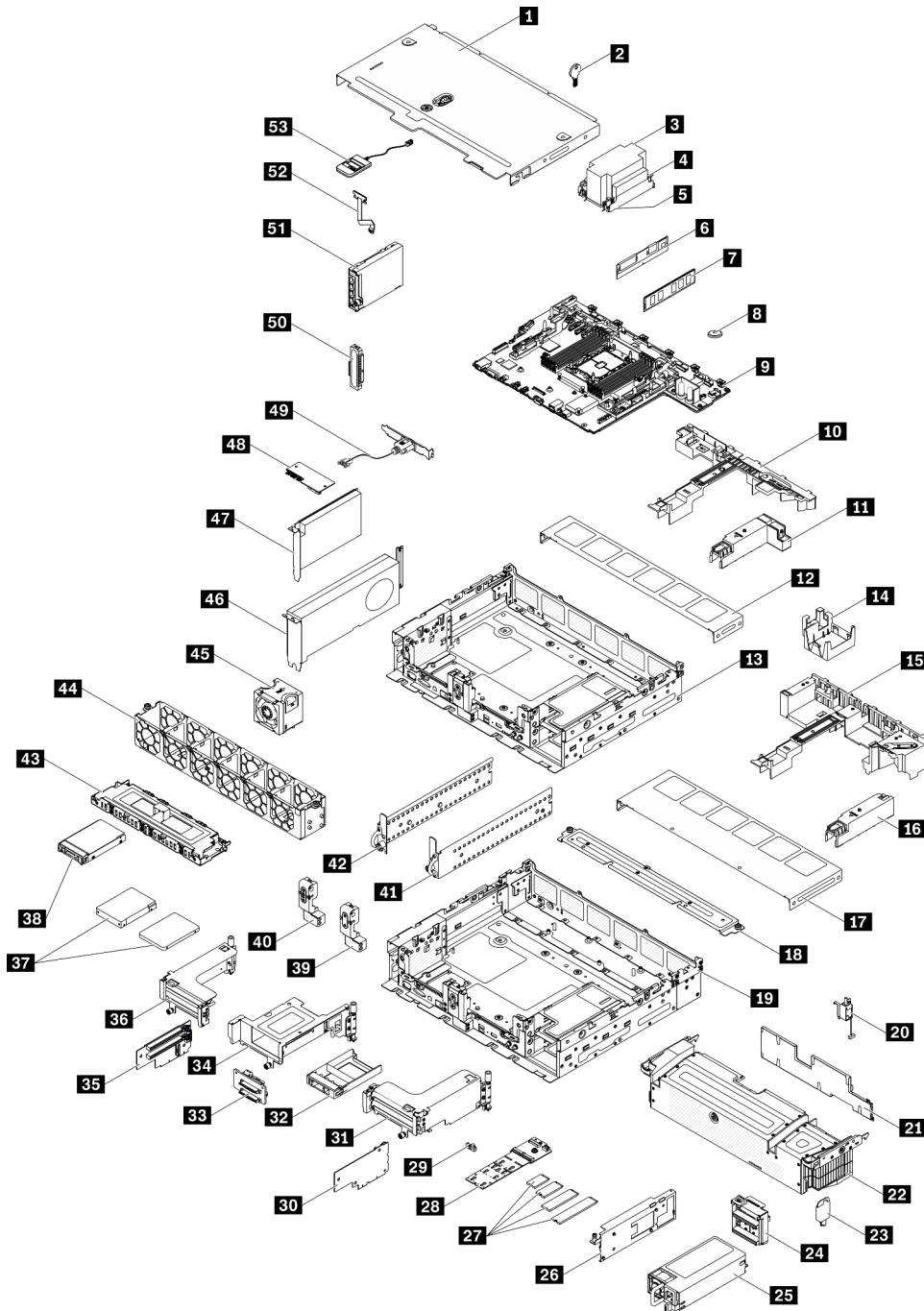


Figure 13. Server components

Table 10. Parts listing

Index	Description	Tier 1 CRU	Tier 2 CRU	FRU	Consumable and Structural part
<p>For more information about ordering the parts shown in Figure 13 “Server components ” on page 32:</p> <p>https://datacentersupport.lenovo.com/tw/en/products/servers/thinkedge/se450thinkedge/7d8t/parts/display/compatible</p> <p>It is highly recommended that you check the power summary data for your server using Lenovo Capacity Planner before purchasing any new parts.</p>					
1	Top cover	√			
2	Top cover key			√	
3	Heat sink			√	
4	Heat sink Torx T30 nut			√	
5	Processor			√	
6	Persistent Memory Module (PMEM)	√			
7	DRAM DIMM	√			
8	CMOS battery (CR3032)	√			
9	System board			√	
10	Air baffle (300mm chassis)	√			
11	Heat sink filler (300mm chassis)	√			
12	Fan cover (300mm chassis)	√			
13	300mm chassis			√	
14	GPU filler (360mm chassis)	√			
15	Air baffle (360mm chassis)	√			
16	Heat sink filler (300mm chassis)	√			
17	Fan cover (360mm chassis)	√			
18	Support bracket (360mm chassis)	√			
19	360mm chassis			√	
20	Intrusion switch and cable	√			
21	Security bezel dust filter	√			
22	Security bezel	√			
23	Security bezel key	√			
24	Power backplane	√			
25	Power supply unit	√			
26	M.2 backplane adapter	√			
27	M.2 drives	√			

Table 10. Parts listing (continued)

Index	Description	Tier 1 CRU	Tier 2 CRU	FRU	Consumable and Structural part
28	M.2 backplane	√			
29	M.2 retainer	√			
30	Riser card for Riser 2			√	
31	Riser 2		√		
32	2.5-inch drive filler	√			
33	AnyBay backplane			√	
34	Riser 2 AnyBay drive cage		√		
35	Riser card for Riser 1			√	
36	Riser 1		√		
37	7mm/15mm trayless drives			√	
38	2.5-inch hot-swap drives	√			
39	Security bezel cable module filler	√			
40	Security bezel cable module		√		
41	EIA bracket, left	√			
42	EIA bracket, right	√			
43	7mm/15mm trayless drive cage	√			
44	Fan cage	√			
45	Fan	√			
46	Full-length double-width PCIe adapter		√		
47	Half-length half-width PCIe adapter	√			
48	Firmware and TPM 2.0 Security Module			√	
49	Serial port module	√			
50	OCP 3.0 Ethernet adapter filler			√	
51	OCP 3.0 Ethernet adapter		√		
52	Wall mount LED cable		√		
53	External LCD diagnostics handset	√			

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 3. Server hardware setup

To set up the server, install any options that have been purchased, cable the server, configure and update the firmware, and install the operating system.

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:

1. Unpack the server package. See [“Server package contents” on page 1](#).
2. Set up the server hardware.
 - a. Install any required hardware or server options.
 - b. If necessary, install the server into a standard rack cabinet by using the rail kit shipped with the server. See the *Rack Installation Instructions* that comes with optional rail kit.
 - c. Connect the Ethernet cables and power cords to the server. See [“Front view” on page 17](#) to locate the connectors. See [“Cable the server” on page 114](#) for cabling best practices.
 - d. Power on the server. See [“Power on the server” on page 115](#).

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 version compatible with your server at <https://pubs.lenovo.com/lxcc-overview/>.

- e. Validate that the server hardware was set up successfully. See [“Validate server setup” on page 115](#).
3. Configure the system.
 - a. Connect the Lenovo XClarity Controller to the management network. See [“Set the network connection for the Lenovo XClarity Controller” on page 159](#).
 - b. Update the firmware for the server, if necessary. See [“Update the firmware” on page 160](#).
 - c. Configure the firmware for the server. See [“Configure the firmware” on page 164](#).

The following information is available for RAID configuration:

- <https://lenovopress.com/lp0578-lenovo-raid-introduction>
 - <https://lenovopress.com/lp0579-lenovo-raid-management-tools-and-resources>
- d. Install the operating system. See [“Deploy the operating system” on page 165](#).
 - e. Back up the server configuration. See [“Back up the server configuration” on page 166](#).
 - f. Install the applications and programs for which the server is intended to be used.

Installation Guidelines

Use the installation guidelines to install components in your server.

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/
 - The following guidelines are available as well: “[Handling static-sensitive devices](#)” on page 39 and “[Working inside the server with the power on](#)” on page 40.
- 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>.
- 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 [ThinkEdge SE450 Drivers and Software](#) 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, make sure to verify the latest Best Recipe code level for the cluster supported firmware and driver before updating firmware.

- 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.
- Make sure that you have an adequate number of properly grounded electrical outlets for the server, monitor, and other devices.
- 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 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.
- 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.
- Terra-cotta on a component or an terra-cotta label 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. (Terra-cotta 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.

System reliability guidelines

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

Make sure the following requirements are met:

- When the server comes with redundant power, a power adapter must be installed in each power-adapter 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 since 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 adapter 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.

Handling static-sensitive devices

See this topic to learn how to handle static-sensitive devices.

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.

Working inside the server with the power on

Guidelines to work inside the server with the power on.

Attention: The server might stop and loss of data 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 long 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.

Memory module installation rules and order

Memory modules must be installed in a specific order based on the memory configuration that is implemented in the server.

Note: Make sure to follow the population combinations in this topic. Otherwise, some of the memory modules might not be recognized by the system.

The following memory configurations are available:

- **DRAM DIMMs**
 - [“Independent mode” on page 41](#)
 - [“Memory mirroring mode” on page 42](#)
- **PMEM + DRAM DIMMs** (see [“PMEM rules” on page 44](#) for the rules and configuration options)
 - [“App Direct Mode” on page 50](#)
 - [“Memory Mode” on page 51](#)

See the following for memory module location and mapping to channel and iMC.

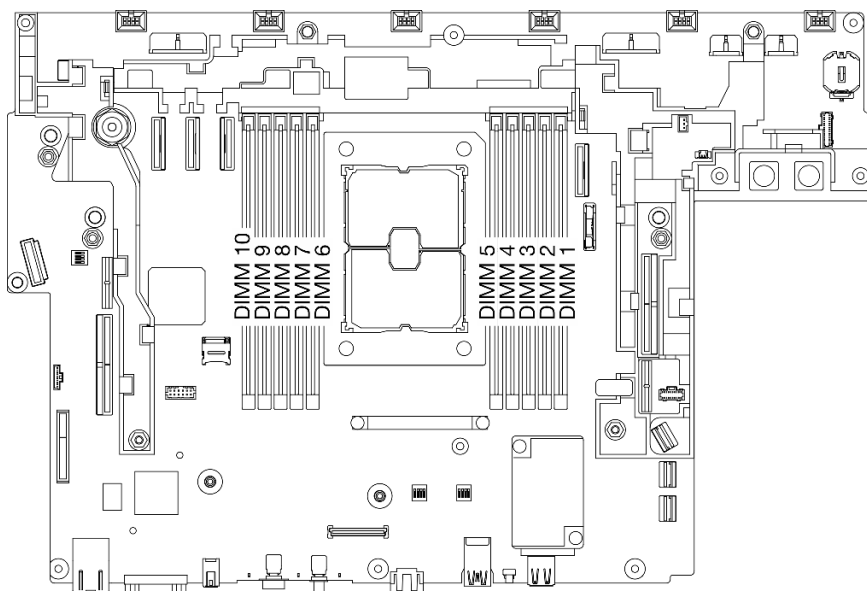


Figure 14. Memory module locations on the system board

Table 11. Memory module slot, channel and iMC mapping

Rear												
iMC	iMC2		iMC3			Pro- cessor	iMC1			iMC0		iMC
Chan- nel	1	0	1	0	0		0	0	1	0	1	Chan- nel
Slot	10	9	8	7	6		5	4	3	2	1	Slot
Front												

DRAM DIMM installation order

Memory modules must be installed in a specific order based on the memory configuration that you implement on your server.

The following memory configurations are available:

- [“Independent mode” on page 41](#)
- [“Memory mirroring mode” on page 42](#)

For information about memory modes, see [“Memory configuration” on page 165](#)

Independent mode

In independent memory mode, memory channels can be populated with DIMMs in any order and you can populate all channels for each processor in any order with no matching requirements. 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.

Following are the independent mode guidelines:

- Individual memory channels can run at different DIMM timings, but all channels must run at the same interface frequency.
- Populate memory channel 0 first.

- Memory channel 1 is empty or identically populated as memory channel 0.
- Memory channel 2 is empty or identically populated as memory channel 1.
- In each memory channel, populate slot 0 first.
- If a memory channel has two DIMMs, populate the DIMM with a higher number of ranks in slot 0.

Table 12. Memory population in independent mode

Total	* Optimal performance of this configuration requires that all the installed DIMMs are of the same capacity.										Total
	Processor 1										
	iMC2		iMC3			iMC1			iMC0		
	CH1 (F)	CH0 (E)	CH1 (H)	CH0 (G)		CH0 (C)		CH1 (D)	CH0 (A)	CH1 (B)	
DIMMs	10	9	8	7	6	5	4	3	2	1	DIMMs
1									2		1
2*							4		2		2*
2								3	2		2
4*		9		7			4		2		4*
4		9	8					3	2		4
6*	10	9		7			4		2	1	6*
8	10	9	8	7			4	3	2	1	8

Memory mirroring mode

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.

Following are the 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).

Table 13. Memory population in memory mirroring mode

Total	Processor 1										Total
	iMC2		iMC3			iMC1			iMC0		
	CH1 (F)	CH0 (E)	CH1 (H)	CH0 (G)		CH0 (C)		CH1 (D)	CH0 (A)	CH1 (B)	
	DIMMs	10	9	8	7	6	5	4	3	2	
8	10	9	8	7			4	3	2	1	8

PMEM and DRAM DIMM installation order

See this topic to learn how to install PMEMs and DRAM DIMMs properly.

When PMEMs and DRAM DIMMs are mixed in the system, the following modes are supported:

- “App Direct Mode” on page 50
- “Memory Mode” on page 51

See the following topics to learn how to set up and configure PMEMs.

- “PMEM rules” on page 44
- “Setting up the system for PMEM for the first time” on page 44
- “PMEM Management options” on page 44
- “Adding or replacing PMEMs in App Direct Mode” on page 48

PMEM rules

Make sure to meet the following requirements when applying PMEMs in the system.

- All the PMEMs that are installed must be of the same part number.
- All the DRAM DIMMs that are installed must be of the same type, rank, and capacity with minimum capacity of 16 GB. It is recommended to use Lenovo DRAM DIMMs with the same part number.

Setting up the system for PMEM for the first time

Complete the following steps when installing PMEMs to the system for the first time.

1. Determine the mode and combination (see “App Direct Mode” on page 50 or “Memory Mode” on page 51).
2. Consider “PMEM rules” on page 44 and acquire the PMEMs and DRAM DIMMs that meet the requirements.
3. Remove all the memory modules that are presently installed (see “Remove a memory module” in *Maintenance Manual*).
4. Follow the adopted combination to install all the PMEMs and DRAM DIMMs (see “Install a memory module” on page 92).
5. Disable security on all the installed PMEMs (see “PMEM Management options” on page 44).
6. Make sure the PMEM firmware is the latest version. If not, update it to the latest version (see https://sysmgt.lenovofiles.com/help/topic/com.lenovo.lxca.doc/update_fw.html).
7. Configure the PMEMs so that the capacity is available for use (see “PMEM Management options” on page 44).

PMEM Management options

PMEMs can be managed with the following tools:

- **Lenovo XClarity Provisioning Manager (LXPM)**

To open LXPM, power on the system and press the key specified in the on-screen instructions as soon as the logo screen appears. If a password has been set, enter the password to unlock LXPM.

Go to **UEFI Setup** → **System Settings** → **Intel Optane PMEMs** to configure and manage PMEMs.

For more details, see “UEFI setup” section in the LXPM documentation compatible with your server at [Lenovo XClarity Provisioning Manager portal page](#).

Note: If the text-based interface of Setup Utility opens instead of LXPM, go to **System Settings** → <F1> **Start Control** and select **Tool Suite**. Then, reboot the system, and as soon as the logo screen appears,

press the key specified in the on-screen instructions to open LXPM. (For more information, see the “Startup” section in the LXPM documentation compatible with your server at <https://pubs.lenovo.com/lxpm-overview/>.)

- **Setup Utility**

To enter Setup Utility:

1. Power on the system and press the key specified in the on-screen instructions to open LXPM.
(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 **UEFI Settings** → **System Settings**, click on the pull-down menu on the upper right corner of the screen, and select **Text Setup**.
3. Reboot the system, and as soon as the logo screen appears, press the key specified in the on-screen instructions.

Go to **System Configuration and Boot Management** → **System Settings** → **Intel Optane PMEMs** to configure and manage PMEMs.

- **Lenovo XClarity Essentials OneCLI**

Some management options are available in commands that are executed in the path of Lenovo XClarity Essentials OneCLI in the operating system. See https://pubs.lenovo.com/lxce-onecli/download_use_onecli to learn how to download and use Lenovo XClarity Essentials OneCLI.

Following are the available management options:

- **Intel Optane PMEMs details**

Select this option to view the following details concerning each of the installed PMEMs:

- Number of Intel Optane PMEMs detected
- Total raw capacity
- Total memory capacity
- Total App Direct capacity
- Total unconfigured capacity
- Total inaccessible capacity
- Total reserved capacity

Alternatively, view PMEM details with the following command in OneCLI:

```
OneCli.exe config show IntelOptanePMEM  
--bmc USERID:PASSWORD@10.104.195.86
```

Notes:

- *USERID* stands for XCC user ID.
- *PASSWORD* stands for XCC user password.
- *10.104.195.86* stands for IP address.

- **Goals**

- **Memory Mode [%]**

Select this option to define the percentage of PMEM capacity that is invested in system memory, and hence decide the PMEM mode:

- **0%:** App Direct Mode
- **100%:** Memory Mode

Go to **Goals** → **Memory Mode [%]**, input the memory percentage, and reboot the system.

Notes:

- Before changing from one mode to another:
 1. Make sure the capacity of installed PMEM and DRAM DIMMs meets system requirements for the new mode (see “PMEM rules” on page 44).
 2. Back up all the data and delete all the created namespaces. Go to **Namespaces → View/Modify/Delete Namespaces** to delete the created namespaces.
 3. Perform secure erase on all the installed PMEMs. Go to **Security → Press to Secure Erase** to perform secure erase.
- After the system is rebooted and the input goal value is applied, the displayed value in **System Configuration and Boot Management → Intel Optane PMEMs → Goals** will go back to the following default selectable options:

- **Scope:** [Platform]
- **Memory Mode [%]:** 0
- **Persistent Memory Type:** [App Direct]

These values are selectable options for PMEM settings, and do not represent the current PMEM status.

In addition, you can take advantage of a memory configurator, which is available at the following site: http://1config.lenovo.com/#/memory_configuration

Alternatively, set PMEM Goals with the following commands in OneCLI:

1. Set create goal status.

```
onecli.exe config set IntelOptanePMEM.CreateGoal Yes
--imm USERID:PASSWORD@10.104.195.86
```

2. Define the PMEM capacity that is invested in system volatile memory.

```
onecli.exe config set IntelOptanePMEM.MemoryModePercentage 100
--imm USERID:PASSWORD@10.104.195.86
```

Where *100* stands for the percentage of capacity that is invested in system volatile memory.

3. Set the PMEM mode.

```
onecli.exe config set IntelOptanePMEM.PersistentMemoryType "App Direct"
--imm USERID:PASSWORD@10.104.195.86
```

Where *App Direct* stands for the PMEM mode.

– Persistent Memory Type

In App Direct Mode, the PMEMs that are connected to the same processor are by default interleaved (displayed as **App Direct**), while memory banks are used in turns. To set them as not interleaved in the Setup Utility, go to **Intel Optane PMEMs → Goals → Persistent Memory Type [(PMEM mode)]**, select **App Direct Not Interleaved** and reboot the system.

Note: Setting PMEM App Direct capacity to not interleaved will turn the displayed App Direct regions from one region per processor to one region per PMEM.

• Regions

After the memory percentage is set and the system is rebooted, regions for the App Direct capacity will be generated automatically. Select this option to view the App Direct regions per processor.

• Namespaces

App Direct capacity of PMEMs requires the following steps before it is truly available for applications.

1. Namespaces must be created for region capacity allocation.
2. Filesystem must be created and formatted for the namespaces in the operating system.

Each App Direct region can be allocated into one namespace. Create namespaces in the following operating systems:

- Windows: Use *powershell* command. To create a namespace, use Windows Server 2019 or later versions.
- Linux: Use *ndctl* command.
- VMware: Reboot the system, and VMware will create namespaces automatically.

After creating namespaces for App Direct capacity allocation, make sure to create and format filesystem in the operating system so that the App Direct capacity is accessible for applications.

- **Security**

- Enable Security

Attention: By default, PMEM security is disabled. Before enabling security, make sure all the country or local legal requirements regarding data encryption and trade compliance are met. Violation could cause legal issues.

PMEMs can be secured with passphrases. Two types of passphrase protection scope are available for PMEM:

- **Platform:** Choose this option to run security operation on all the installed PMEM units at once. A platform passphrase is stored and automatically applied to unlock PMEMs before operating system starts running, but the passphrase still has to be disabled manually for secure erase.

Alternatively, enable/disable platform level security with the following commands in OneCLI:

- Enable security:

1. Enable security.

```
onecli.exe config set IntelOptanePMEM.SecurityOperation "Enable Security"  
--imm USERID:PASSWORD@10.104.195.86
```

2. Set the security passphrase.

```
onecli.exe config set IntelOptanePMEM.SecurityPassphrase "123456"  
--imm USERID:PASSWORD@10.104.195.86
```

Where *123456* stands for the passphrase.

3. Reboot the system.

- Disable security:

1. Disable security.

```
onecli.exe config set IntelOptanePMEM.SecurityOperation "Disable Security"  
--imm USERID:PASSWORD@10.104.195.86
```

2. Enter passphrase.

```
onecli.exe config set IntelOptanePMEM.SecurityPassphrase "123456"  
--imm USERID:PASSWORD@10.104.195.86
```

3. Reboot the system.

- **Single PMEM:** Choose this option to run security operation on one or more selected PMEM units.

Notes:

- Single PMEM passphrases are not stored in the system, and security of the locked units needs to be disabled before the units are available for access or secure erase.

- Always make sure to keep records of the slot number of locked PMEMs and corresponding passphrases. In the case the passphrases are lost or forgotten, the stored data cannot be backed up or restored, but you can contact Lenovo service for administrative secure erase.
- After three failed unlocking attempts, the corresponding PMEMs enter “exceeded” state with a system warning message, and the PMEM unit can only be unlocked after the system is rebooted.

To enable passphrase, go to **Security → Press to Enable Security**.

– Secure Erase

Notes:

- Password is required to perform Secure Erase when security enabled.
- Before executing secure erase, make sure ARS (Address Range Scrub) is done on all PMEMs or on the specific PMEMs selected. Otherwise, secure erase cannot be started on all PMEMs or the specific PMEM selected, and the following text message will pop out:

The passphrase is incorrect for single or multiple or all Intel Optane PMEMs selected, or maybe there is namespace on the selected PMEMs. Secure erase operation is not done on all Intel Optane PMEMs selected.

Secure erase cleanses all the data that is stored in the PMEM unit, including encrypted data. This data deletion method is recommended before returning or disposing a malfunctioning unit, or changing PMEM mode. To perform secure erase, go to **Security → Press to Secure Erase**.

Alternatively, perform platform level secure erase with the following command in OneCLI:

```
OneCli.exe config set IntelOptanePMEM.SecurityOperation "Secure Erase Without Passphrase"
--bmc USERID:PASSWORD@10.104.195.86
```

• **PMEM Configuration**

PMEM contains spared internal cells to stand in for the failed ones. When the spared cells are exhausted to 0%, there will be an error message, and it is advised to back up data, collect service log, and contact Lenovo support.

There will also be a warning message when the percentage reaches 1% and a selectable percentage (10% by default). When this message appears, it is advised to back up data and run PMEM diagnostics (see the “Diagnostics” section in the LXPM documentation compatible with your server at <https://pubs.lenovo.com/lxpm-overview/>). To adjust the selectable percentage that the warning message requires, go to **Intel Optane PMEMs → PMEM Configuration**, and input the percentage.

Alternatively, change the selectable percentage with the following command in OneCLI:

```
onecli.exe config set IntelOptanePMEM.PercentageRemainingThresholds 20
--imm USERID:PASSWORD@10.104.195.86
```

Where 20 is the selectable percentage.

Where 20 is the selectable percentage.

Adding or replacing PMEMs in App Direct Mode

Complete the following steps before adding or replacing PMEMs in App Direct Mode.

1. Back up stored data in PMEM namespaces.
2. Disable PMEM security with one of the following options:

- **LXPM**

Go to **UEFI Setup → System Settings → Intel Optane PMEMs → Security → Press to Disable Security**, and input passphrase to disable security.

- **Setup Utility**

Go to **System Configuration and Boot Management** → **System Settings** → **Intel Optane PMEMs** → **Security** → **Press to Disable Security**, and input passphrase to disable security.

3. Delete namespaces with command corresponding to the operating system that is installed:

- **Linux** command:

```
ndctl destroy-namespace all -f
```

- **Windows** Powershell command

```
Get-PmemDisk | Remove-PmemDisk
```

4. Clear Platform Configuration Data (PCD) and Namespace Label Storage Area (LSA) with the following ipmctl command (for both Linux and Windows).

```
ipmctl delete -pcd
```

Notes: See the following links to learn how to download and use ipmctl in different operating systems:

- Windows: <https://datacentersupport.lenovo.com/us/en/videos/YTV101407>

- Linux: <https://datacentersupport.lenovo.com/us/en/solutions/HT508642>

5. Reboot the system.

App Direct Mode

In this mode, PMEMs act as independent and persistent memory resources directly accessible by specific applications, and DRAM DIMMs act as system memory.

Table 14. Memory population in App Direct Mode

Configuration			Processor 1									
			iMC2		iMC3			iMC1		iMC0		
			CH1 (F)	CH0 (E)	CH1 (H)	CH0 (G)		CH0 (C)		CH1 (D)	CH0 (A)	CH1 (B)
DRAM	PMEM	Inter-leaved	10	9	8	7	6	5	4	3	2	1
4	4	Inter-leaved	P	D	P	D			D	P	D	P
6	1	Not inter-leaved	D	D		D			D	P	D	D
8	1	Not inter-leaved	D	D	D	D		P	D	D	D	D

- **D:** DRAM DIMMs with 16 GB or larger capacity
- **P:** DC Persistent Memory Module (PMEM)

Memory Mode

In this mode, PMEMs act as volatile system memory, while DRAM DIMMs act as cache.

Table 15. Memory population in Memory Mode

Configuration		Processor 1									
		iMC2		iMC3			iMC1		iMC0		
		CH1 (F)	CH0 (E)	CH1 (H)	CH0 (G)		CH0 (C)		CH1 (D)	CH0 (A)	CH1 (B)
DRAM	PMEM	10	9	8	7	6	5	4	3	2	1
4	4	P	D	P	D			D	P	D	P

Install server hardware options

This section includes instructions for performing initial installation of optional hardware. Each component installation procedure references any tasks that need to be performed to gain access to the component being replaced.

Installation procedures are presented in the optimum sequence to minimize work.

Attention: To ensure the components you install work correctly without problems, read the following precautions carefully.

- 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>.
- Always 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 [ThinkEdge SE450 Drivers and Software](#) to download firmware updates for your server.
- It is good practice to make sure that the server is working correctly before you install an optional component.
- Follow the installation procedures in this section and use appropriate tools. Incorrectly installed components can cause system failure from damaged pins, damaged connectors, loose cabling, or loose components.

Install a hot-swap power supply unit

See this topic to learn how to install a hot-swap power supply unit.

About this task

To avoid potential danger, make sure to read the following safety information.

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.

S009



CAUTION:

To avoid personal injury, disconnect the fan cables before removing the fan from the device.

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.

Procedure

- Step 1. Grasp the handle on the power supply unit, and slide it into the power-supply bay until it clicks into place.

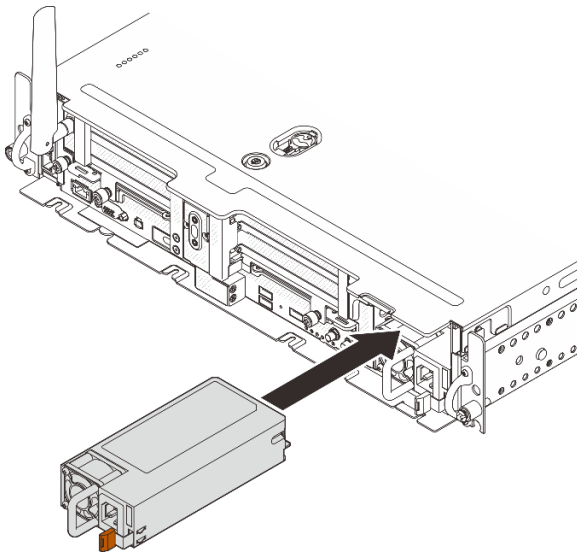


Figure 15. Installing a hot-swap power supply unit

Remove the security bezel

See this topic to learn how to remove the security bezel.

About this task

Attention:

- Go over to ensure that you work with safety.
- Turn off the server and peripheral devices and disconnect the power cords and all external cables (see [“Power off the server” on page 115](#)).
- 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.

Procedure

Step 1. Unlock the security bezel with the corresponding key. It is stored at the location as illustrated.

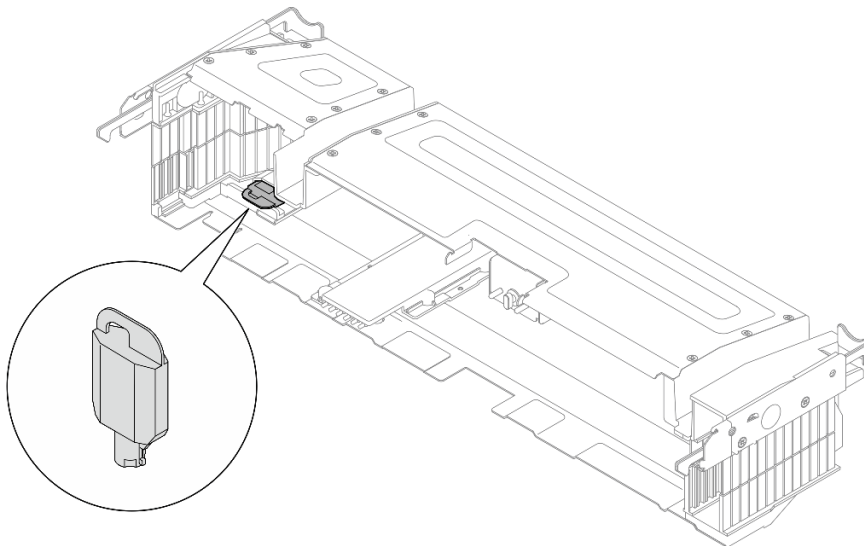


Figure 16. Security bezel key storage location

Step 2. Remove the security bezel.

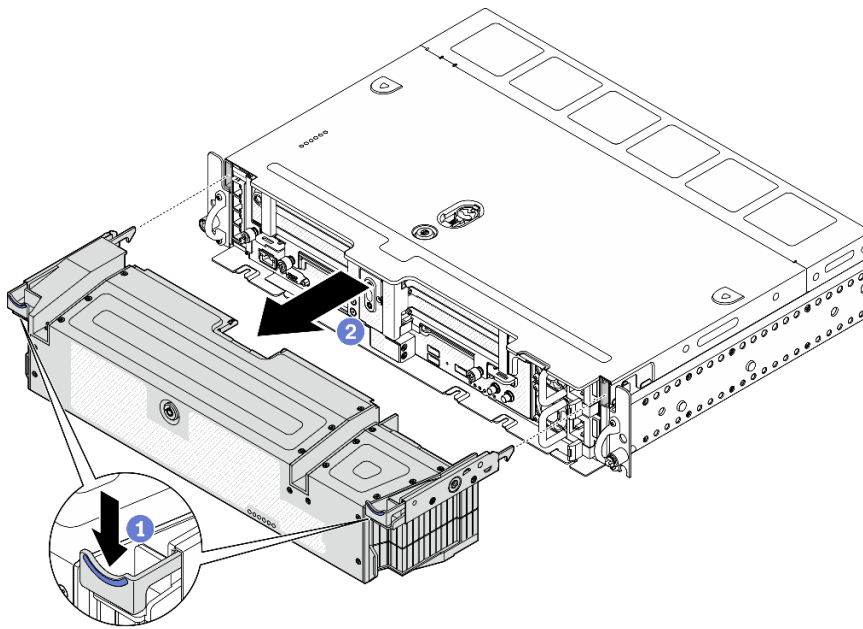


Figure 17. Removing the security bezel

- 1 Press and hold the release latches on both sides.
- 2 Slide the security bezel away from the chassis.

Remove the top covers

See this topic to learn how to remove the top cover and the fan cover.

About this task

Attention:

- Go over to ensure that you work with safety.
- Turn off the server and peripheral devices and disconnect the power cords and all external cables (see [“Power off the server” on page 115](#)).
- 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.

Procedure

Step 1. Remove the top cover.

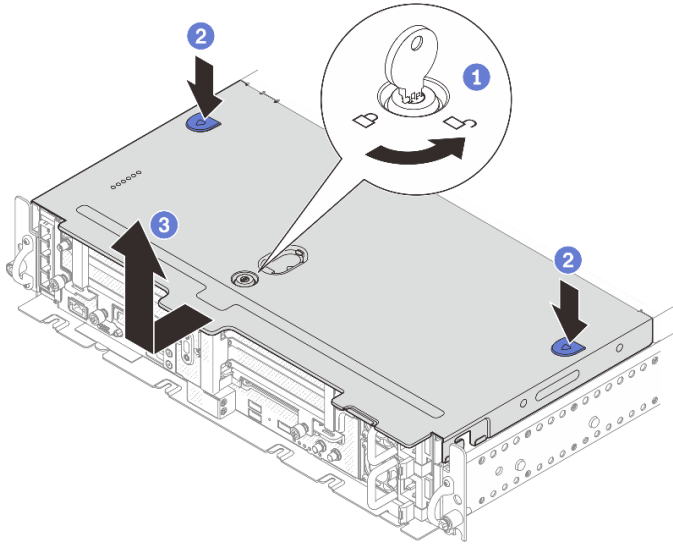


Figure 18. Removing the top cover

- 1 Unlock the top cover with the key that is stored in the key holder on the top cover.
- 2 Press and hold on the two buttons to disengage the top cover.
- 3 Slide the top cover slightly backward and remove it.

Note: If the two blue buttons cannot be pressed down, try slide the cover forward and press the buttons again.

Step 2. Press on the release buttons on both sides, and slid the fan cover slightly forward to remove it.

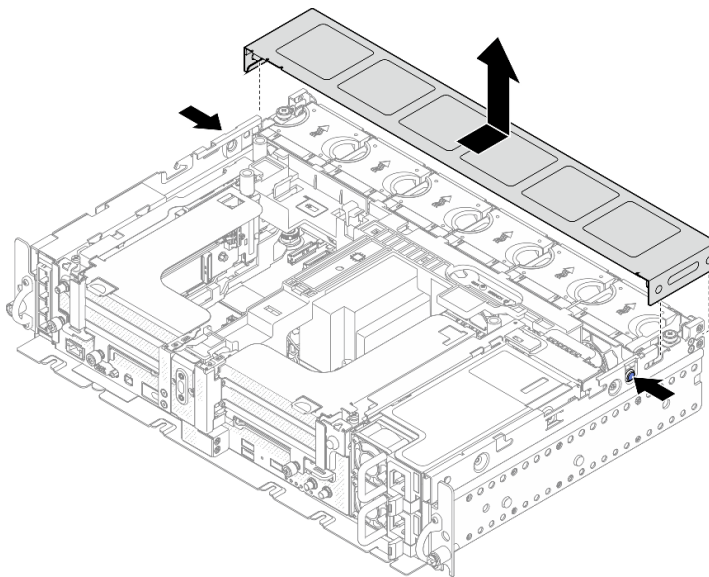


Figure 19. Remove the fan cover (300mm)

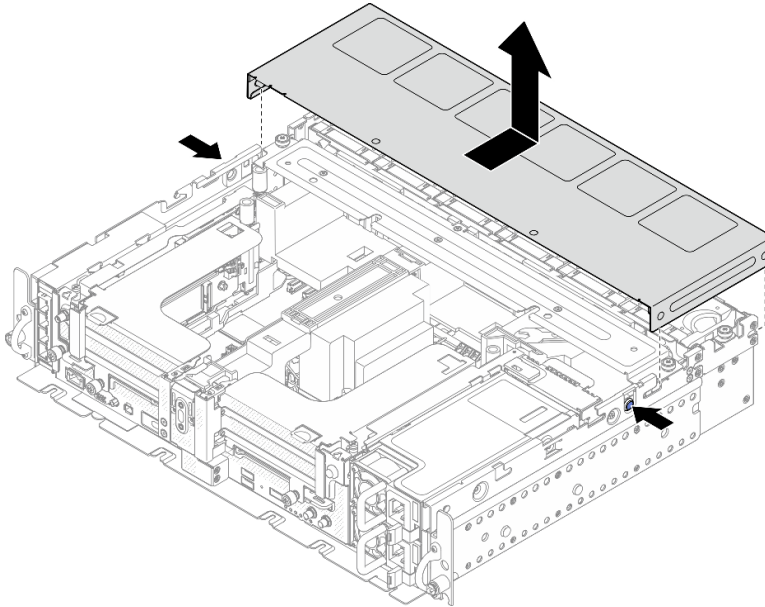


Figure 20. Remove the fan cover (360mm)

Remove the air baffle

See this topic to learn how to remove the air baffle.

About this task

Attention:

- Go over to ensure that you work with safety.
- Turn off the server and peripheral devices and disconnect the power cords and all external cables (see [“Power off the server” on page 115](#)).
- 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.

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

- **S012**



CAUTION:
Hot surface nearby.

Procedure

Step 1. Proceed to the topic corresponding to the server configuration.

- [“Remove the air baffle for 300mm chassis” on page 57](#)
- [“Remove the air baffle for 360mm chassis with half-length adapters” on page 57](#)
- [“Remove the air baffle for 360mm chassis with full-length adapters” on page 58](#)

Remove the air baffle for 300mm chassis

Step 1. Lift the air baffle to remove it.

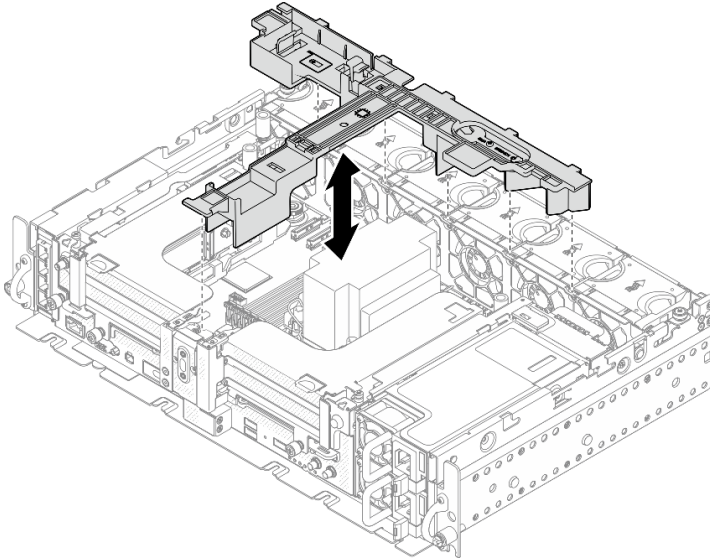


Figure 21. Removing the air baffle

Remove the air baffle for 360mm chassis with half-length adapters

Step 1. Remove the one captive screw and two thumbscrews that secure the supporting bracket to the chassis.

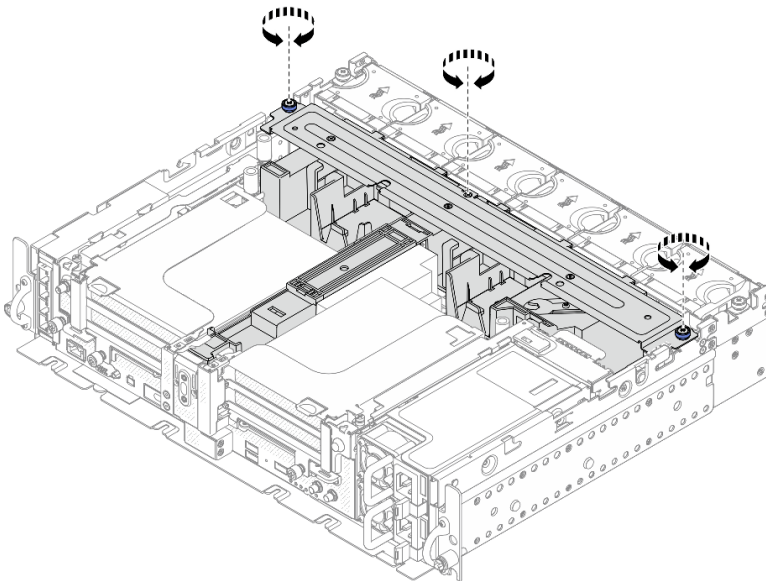


Figure 22. Releasing the air baffle assembly

Step 2. Lift the air baffle along with the supporting bracket to remove the air baffle assembly.

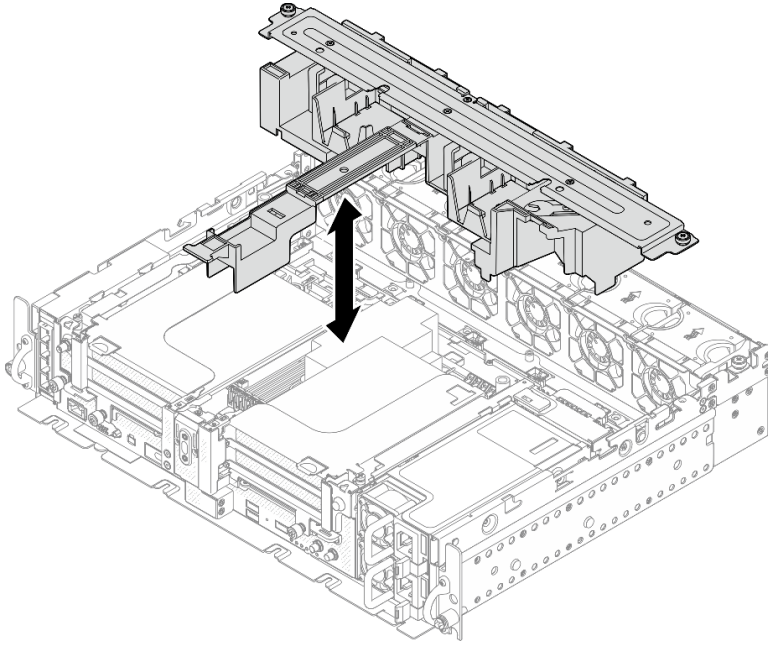


Figure 23. Removing the air baffle assembly

Remove the air baffle for 360mm chassis with full-length adapters

Step 1. Remove the supporting bracket.

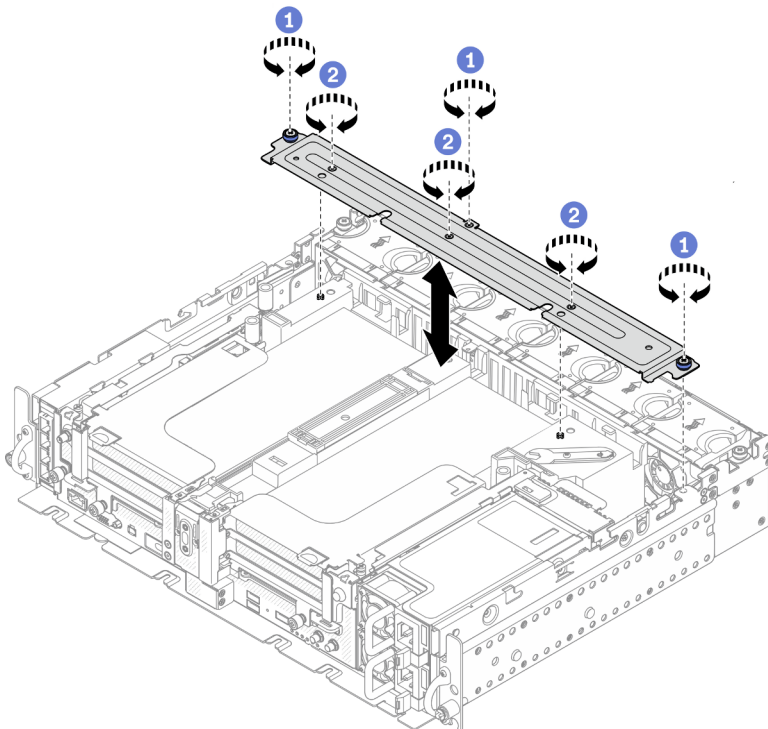


Figure 24. Removing the supporting bracket

- 1 Loosen the one captive screw and two thumbscrews that secure the bracket to the chassis.
- 2 Loosen the other three screws, and remove the bracket from the air baffle.

Step 2. Disconnect the GPU power cables from the adapters.

Note: If there is a plan of replacing GPU power cables, make sure to remove the fan cage first (see “Remove the fans and the fan cage” on page 60).

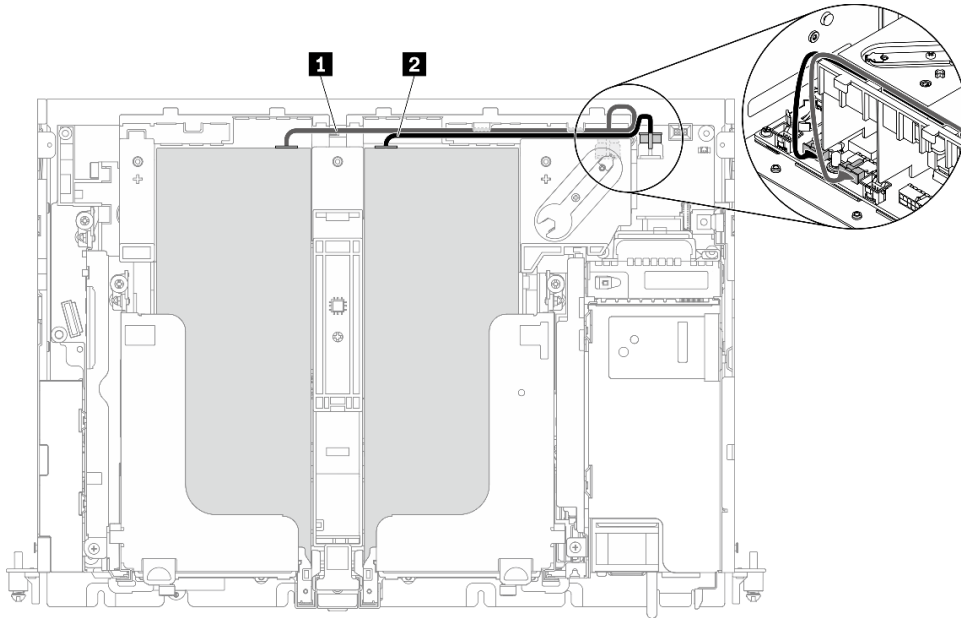


Figure 25. Cable routing for GPU power cables

Table 16. Cable routing for GPU power cables

	From	To
1	GPU in Slot 5, Riser 1	GPU power connector 2
2	GPU in Slot 4, Riser 2	GPU power connector 1

Step 3. Loosen the four captive screws; then lift and remove both PCIe riser assemblies.

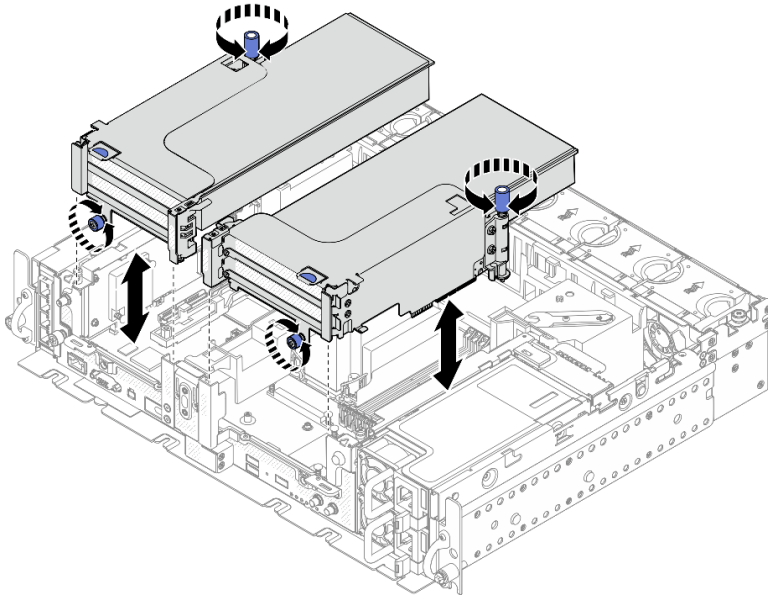


Figure 26. Removing PCIe riser assemblies with full-length adapters

Step 4. Lift the air baffle and remove it from the chassis.

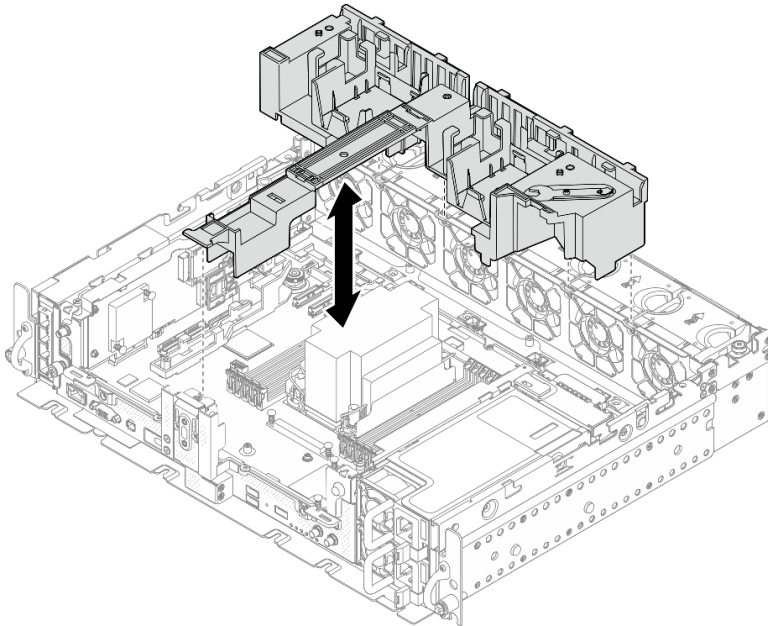


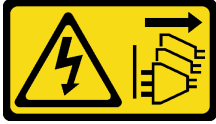
Figure 27. Removing the 360mm air baffle with full-length adapters

Remove the fans and the fan cage

See this topic to learn how to remove the fans and 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:

- Go over to ensure that you work with safety.
- Turn off the server and peripheral devices and disconnect the power cords and all external cables (see [“Power off the server” on page 115](#)).
- 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.

Procedure

Step 1. Make preparations for this task.

1. If applicable, remove the security bezel (see [“Remove the security bezel” on page 53](#)).
2. Remove the top covers (see [“Remove the top covers” on page 54](#)).
3. Remove the air baffle (see [“Remove the air baffle” on page 56](#)).

Step 2. Proceed to remove a fan or the whole fan cage.

- [“Remove a fan” on page 61](#)
- [“Remove the fan cage assembly” on page 62](#)

Remove a fan

Step 1. Remove a fan.

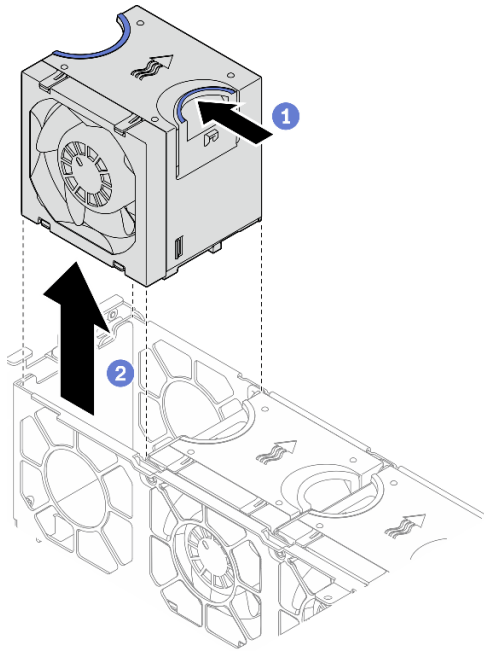


Figure 28. Removing a fan

- 1 Pinch and hold on the blue touch points on the top of the fan.
- 2 Lift the fan to remove it.

Remove the fan cage assembly

Step 1. Loosen the two captive screws on the sides of the fan cage assembly, and lift it to remove it from the chassis.

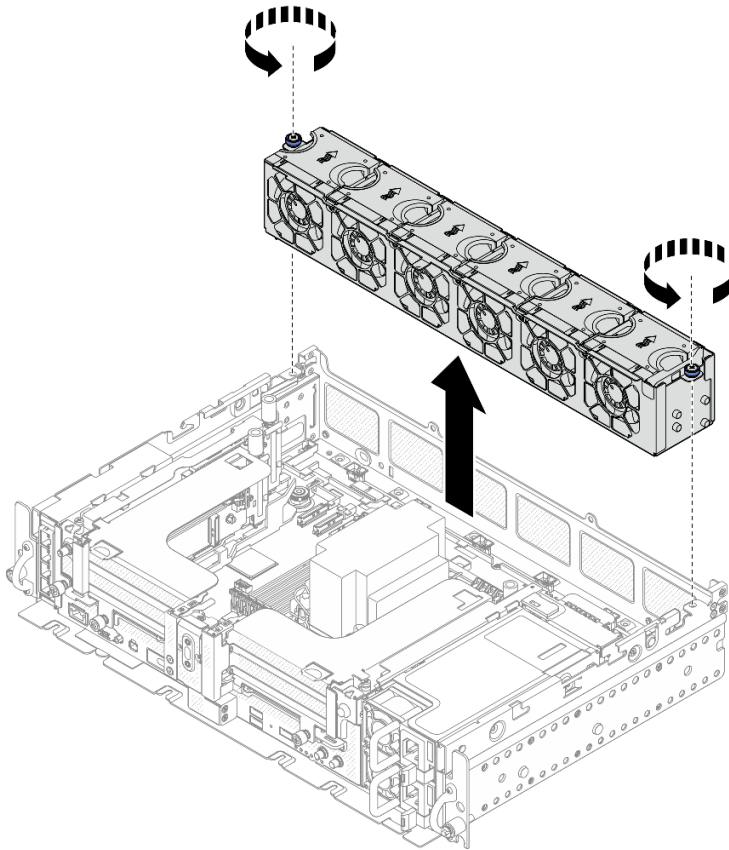


Figure 29. Removing the fan cage assembly

Remove the M.2 boot adapter and drives

See this topic to learn how to remove the M.2 boot adapter and drives.

About this task

Attention:

- Go over to ensure that you work with safety.
- Turn off the server and peripheral devices and disconnect the power cords and all external cables (see [“Power off the server” on page 115](#)).
- 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.

Procedure

Note: Depending on the configuration, the M.2 boot adapter and backplane might look slightly different from the illustration in this section.

Step 1. Make preparations for this task.

1. If applicable, remove the security bezel (see [“Remove the security bezel” on page 53](#)).
2. Remove the top covers (see [“Remove the top covers” on page 54](#)).
3. Remove the air baffle (see [“Remove the air baffle” on page 56](#)).

Step 2. Loosen the captive screw, and push the M.2 boot adapter slightly forward to detach it from the system board. Then, lift the M.2 boot adapter.

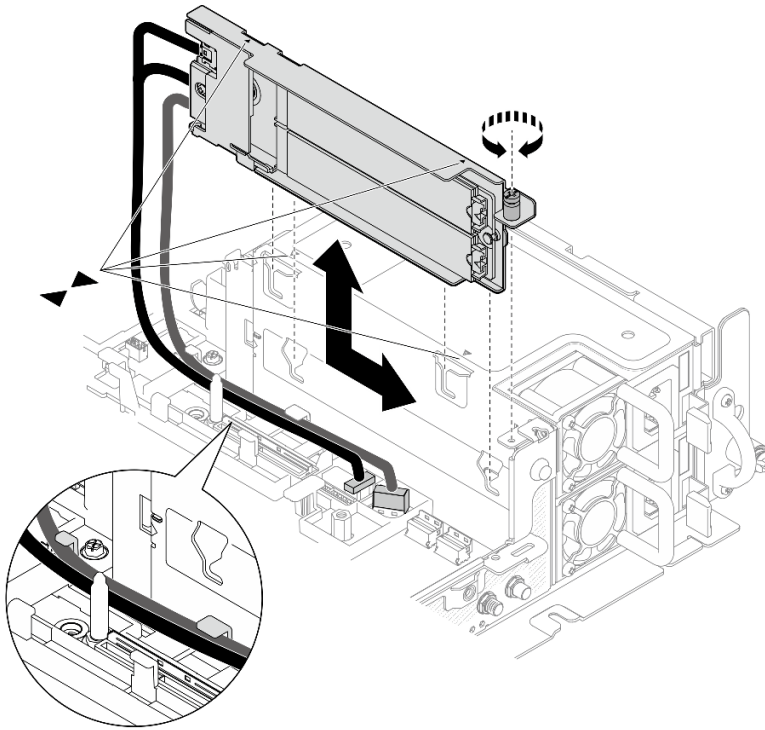
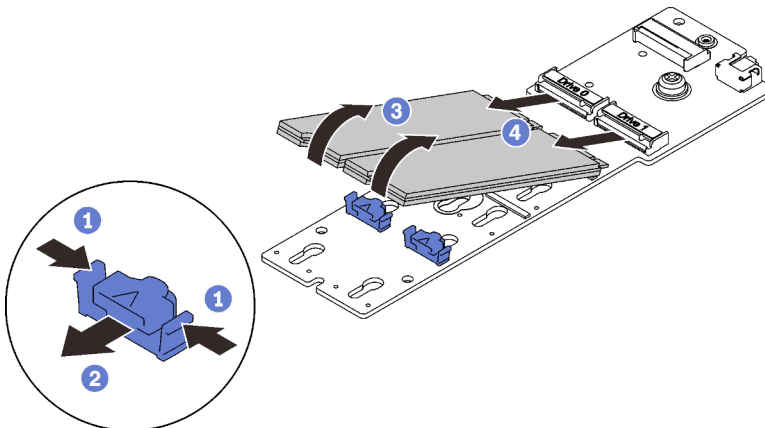


Figure 30. Removing the M.2 boot adapter

Step 3. Remove the M.2 drives from the backplane.

Figure 31. Removing the M.2 drives



- 1 Pinch and hold on the retainer clip.
- 2 Slightly push the retainer clip left to disengage the M.2 drives.
- 3 Pivot the rear side of the M.2 drives away from the backplane.
- 4 Remove the M.2 drives.

Step 4. If necessary, remove the M.2 backplane.
a. Disconnect the M.2 cable.

SATA/NVMe 2-Bay backplane

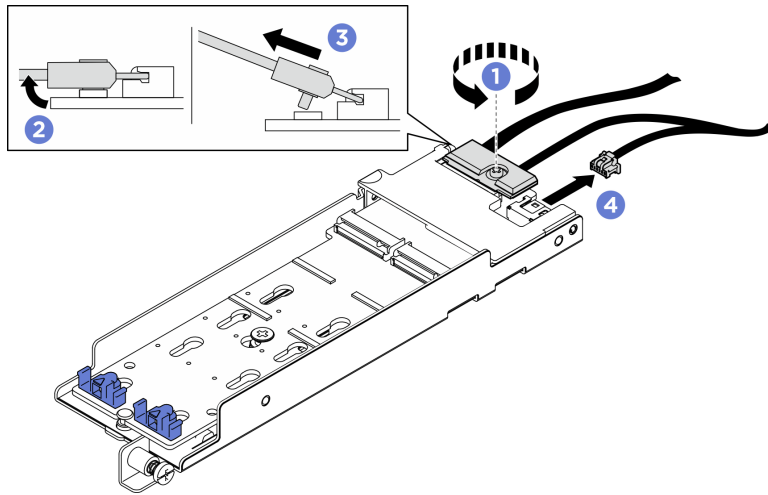


Figure 32. Disconnecting the M.2 cable

- 1 Loosen the screw on the signal cable.
- 2 Tilt the connector.
- 3 Remove the connector.
- 4 Remove the power cable.

B540i-2i SATA/NVMe backplane

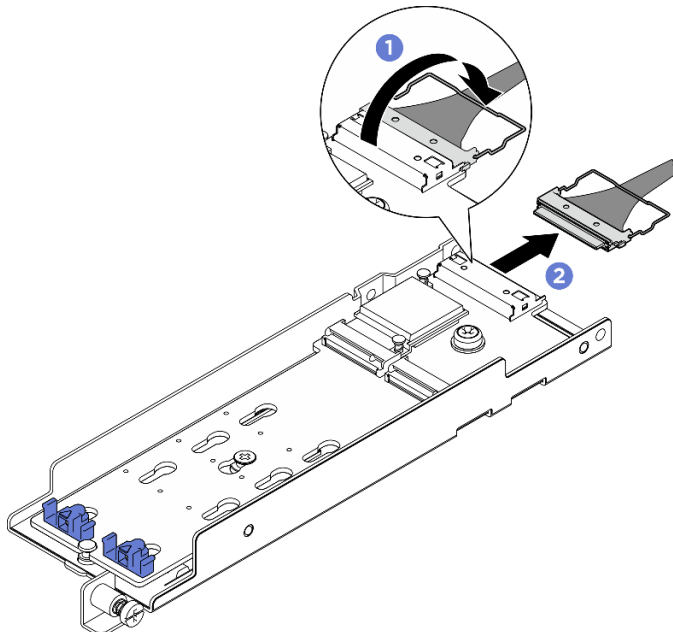


Figure 33. Disconnecting the M.2 cable

- 1 Unhook the wire bail on the cable from the connector..
- 2 Disconnect the cable from the M.2 backplane.

After this task is completed

- Install replacement units of M.2 drives (see [“Install the M.2 drives and boot adapter” on page 94](#)).
- 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.

[Watch the procedure on YouTube](#)

Remove the PCIe riser assemblies and adapters

See this topic to learn how to remove the PCIe riser assemblies and adapters.

About this task

Procedure

Step 1. Proceed to the corresponding topic to the type of PCIe riser assembly to be removed.

- Riser assemblies with half-length adapters:
 - [“Riser assembly with AnyBay drive cage” on page 67](#)
 - [“Riser assemblies with full-length adapters” on page 68](#)

Remove riser assemblies with half-length adapters

Step 1. Disconnect all the cables from the adapters and system board.

Step 2. Loosen the two captive screws; then, lift the riser assembly to remove it from the chassis.

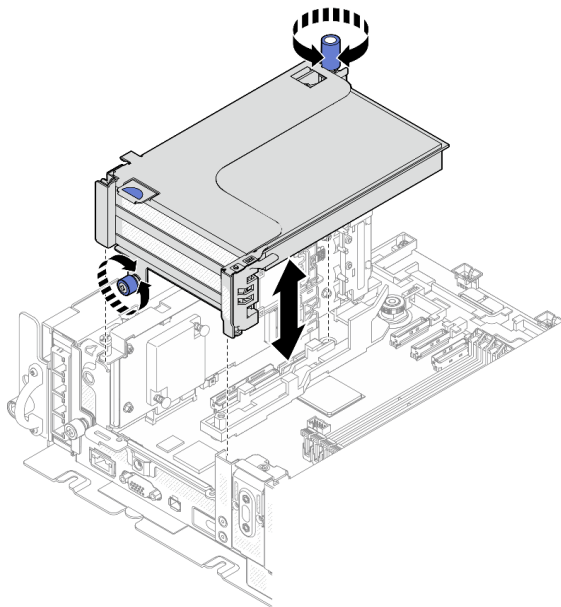


Figure 34. Removing PCIe riser 1

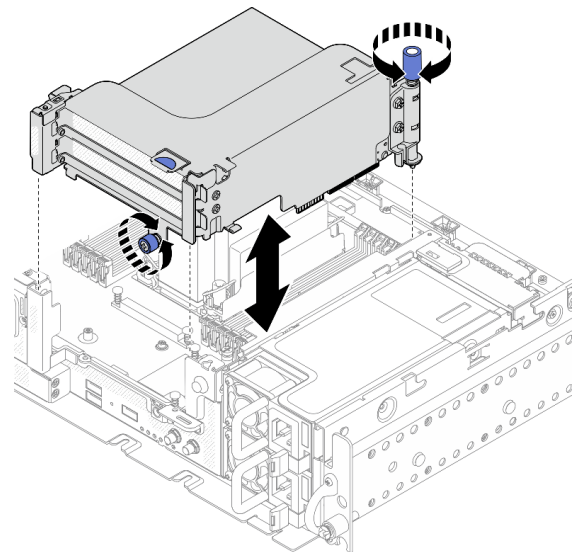


Figure 35. Removing PCIe riser 2

Step 3. Open the retainer, and remove the screws that secure the adapter to the riser.

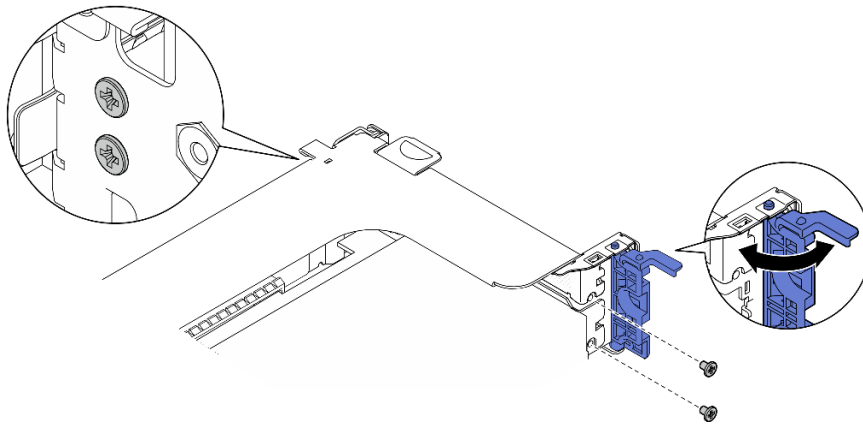


Figure 36. Removing the retaining screws

Step 4. Press on the latch to disengage the adapter from the riser, and remove the adapter.

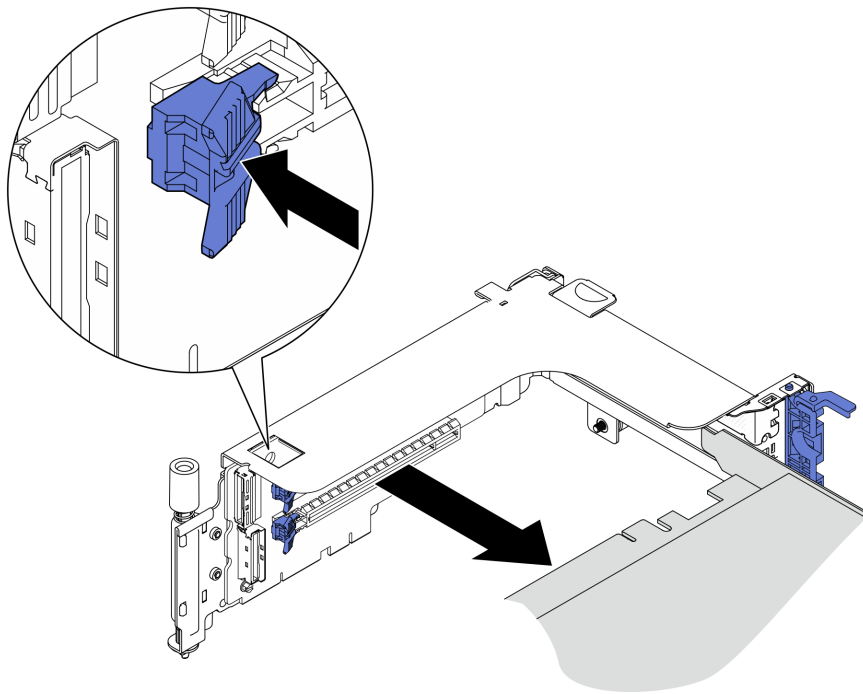


Figure 37. Removing an adapter from the riser

[Watch the procedure on YouTube](#)

Remove PCIe riser 2 with AnyBay drive cage

Procedure

- Step 1. Remove the power and signal cables from the AnyBay drive cage.
- Step 2. Loosen the two captive screws; then, lift the riser assembly to remove it from the chassis.

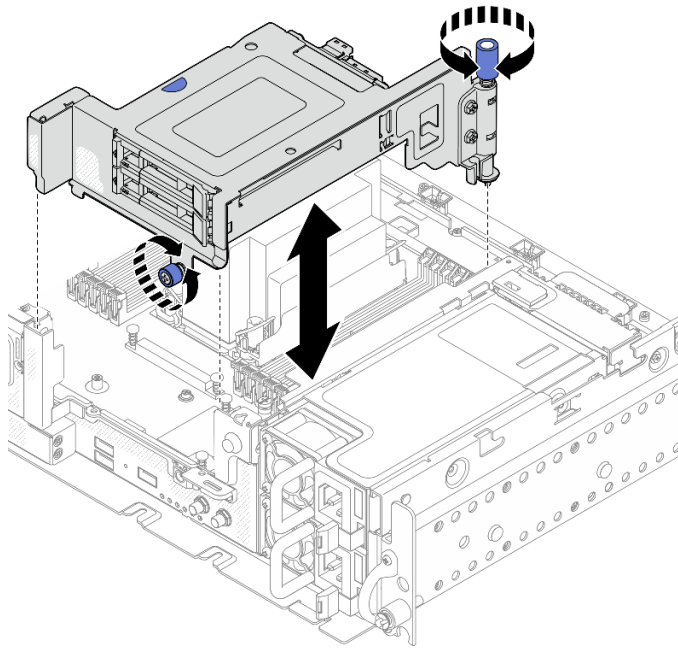


Figure 38. Removing PCIe riser 2 with drive cage

- Step 3. Gently rotate the release latch away to unlock the drive handle; then, grasp and pull the handle to remove the drive from the drive bay.

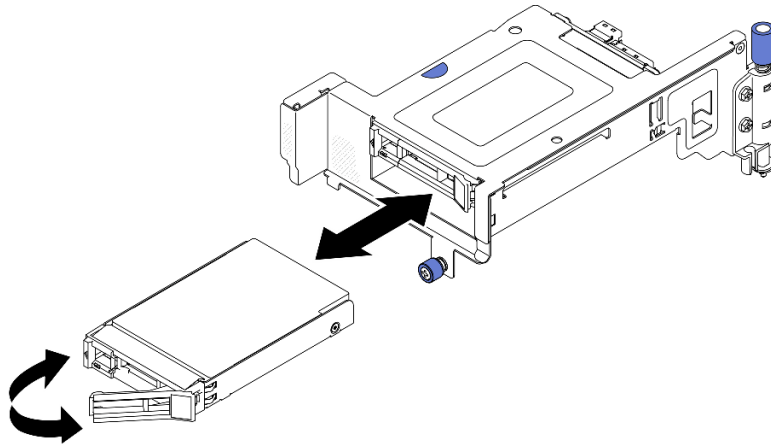


Figure 39. Removing the hot-swap drives

[Watch the procedure on YouTube](#)

Remove PCIe riser assemblies with full-length adapters

- Step 1. Remove the supporting bracket.

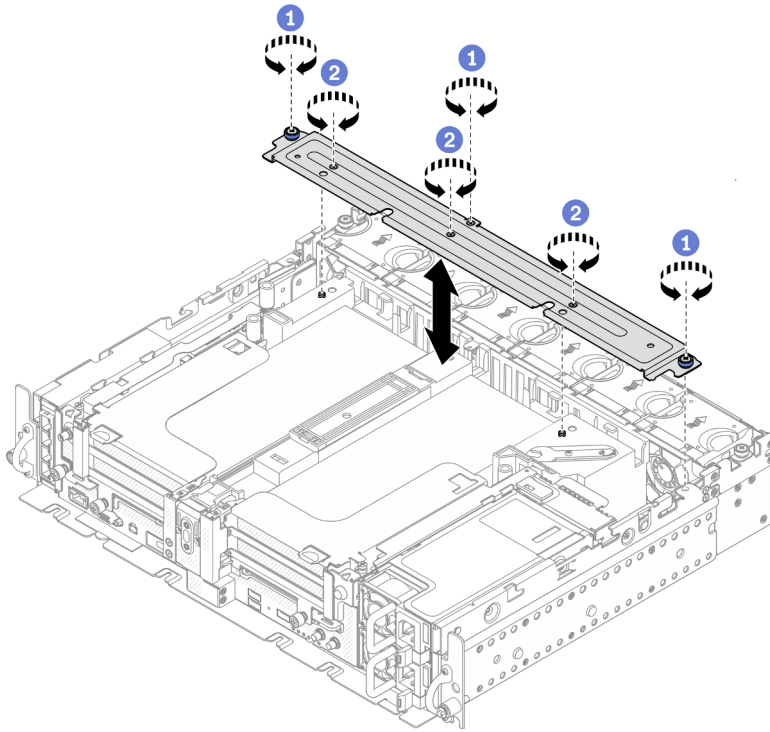


Figure 40. Removing the supporting bracket

- 1 Loosen the one captive screw and two thumbscrews that secure the bracket to the chassis.
- 2 Loosen the other three screws, and remove the bracket from the air baffle.

Step 2. Disconnect the GPU power cables from the adapters.

Note: If there is a plan of replacing GPU power cables, make sure to remove the fan cage first (see [“Remove the fans and the fan cage”](#) on page 60).

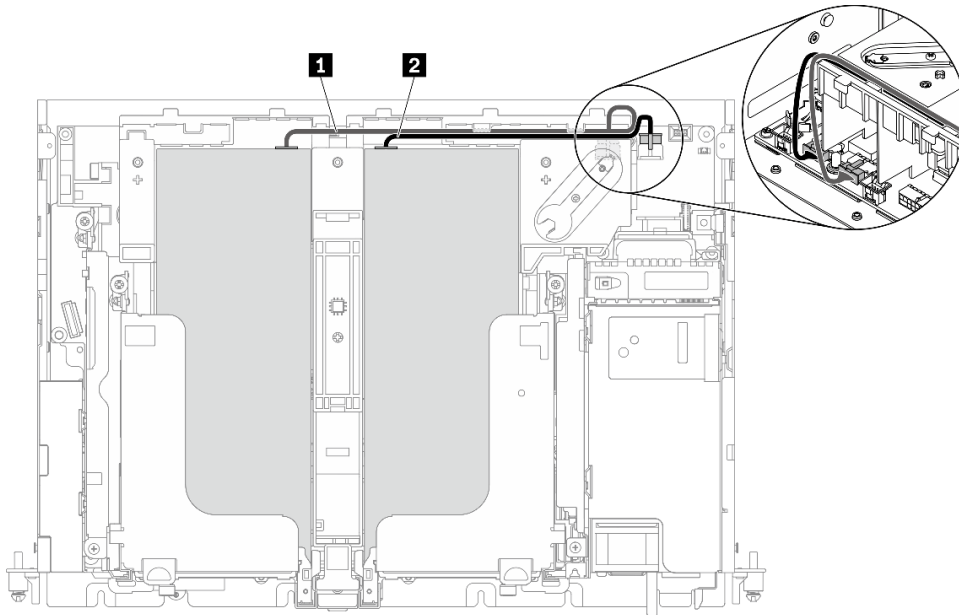


Figure 41. Cable routing for GPU power cables

Table 17. Cable routing for GPU power cables

	From	To
1	GPU in Slot 5, Riser 1	GPU power connector 2
2	GPU in Slot 4, Riser 2	GPU power connector 1

Step 3. Loosen the four captive screws; then lift and remove both PCIe riser assemblies.

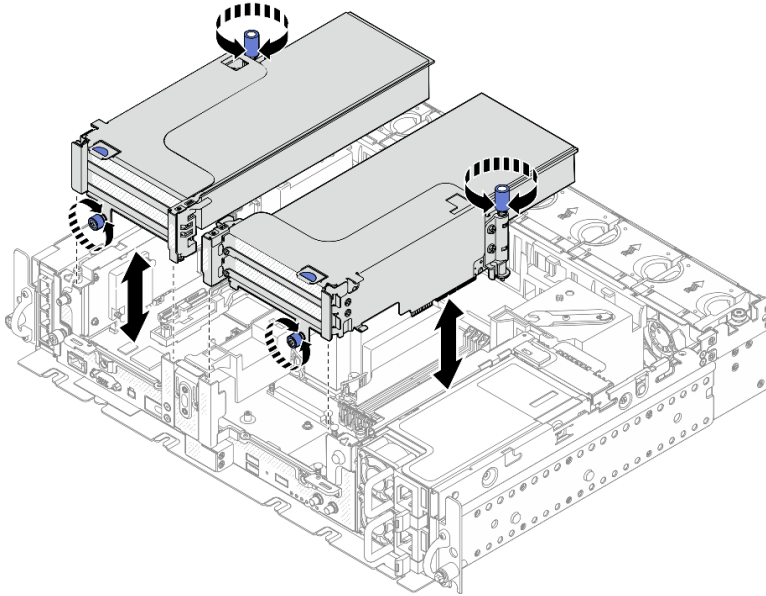


Figure 42. Removing PCIe riser assemblies with full-length adapters

Step 4. Open the retainer, and remove the screws that secure the adapter to the riser.

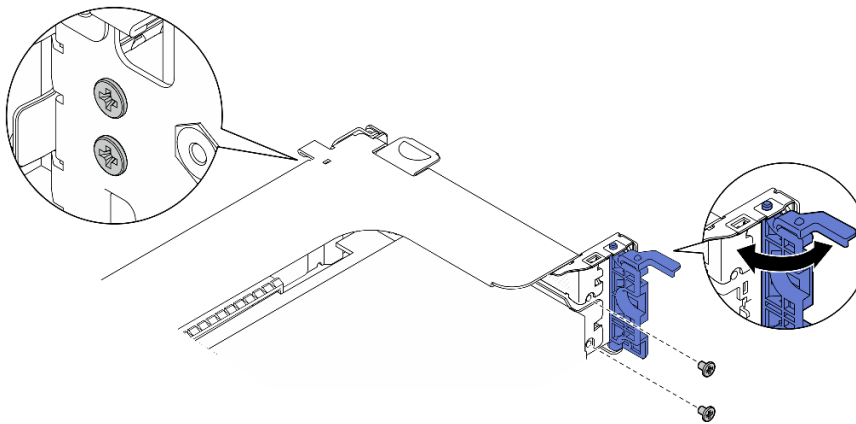


Figure 43. Removing the retaining screws

Step 5. Press on the latch to disengage the adapter from the riser, and remove the adapter.

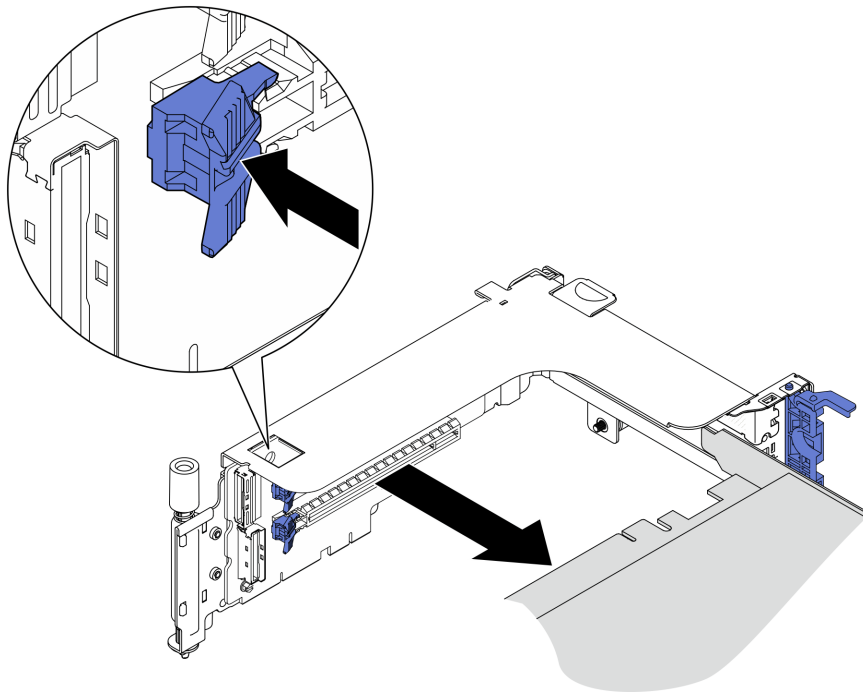


Figure 44. Removing an adapter from the riser

Step 6. If necessary, lift the air baffle and remove it from the chassis.

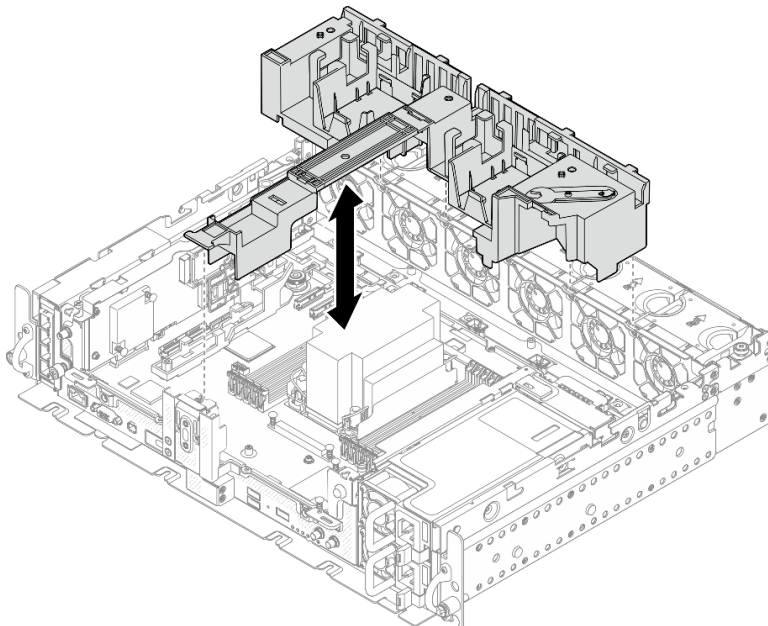


Figure 45. Removing the 360mm air baffle (with full-length adapters)

Remove the drive cage and trayless drives

See this topic to learn how to remove the drive cage and trayless drives.

About this task

Attention:

- Go over to ensure that you work with safety.
- Turn off the server and peripheral devices and disconnect the power cords and all external cables (see [“Power off the server” on page 115](#)).
- 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.

Procedure

Step 1. Loosen the two captive screws to disengage the drive cage, and remove it.

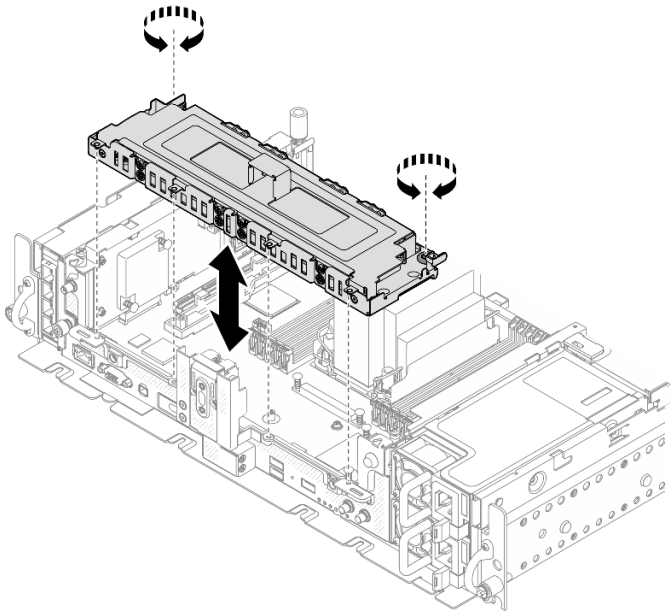


Figure 46. Removing the drive cage

Step 2. Disengage the cables from the drive cage. Then, loosen the two captive screws that secure the cover to the cage, and remove the cover.

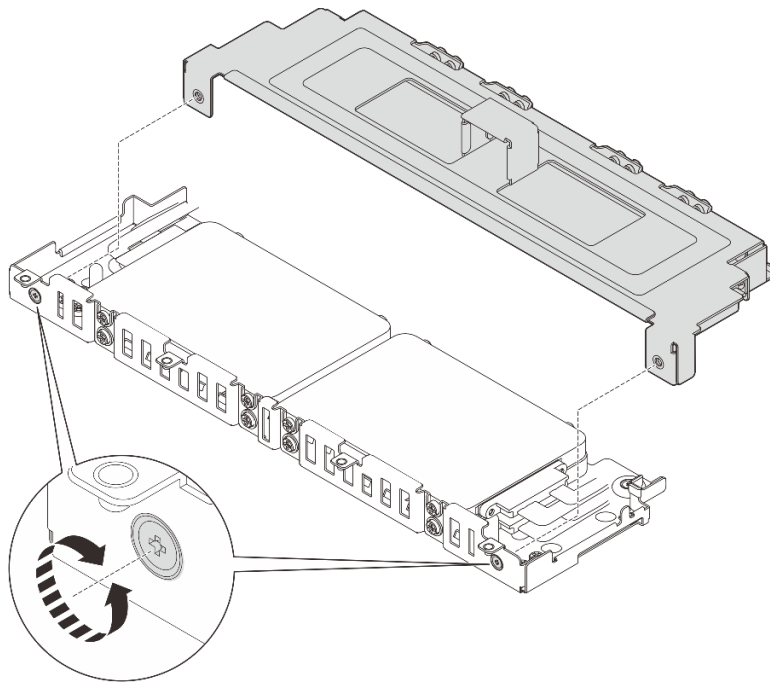


Figure 47. Removing the drive cage cover

Step 3. To remove the drives from the drive cage, proceed to the topic corresponding to the system configuration.

- [“Remove the 7mm trayless drives” on page 73](#)
- [“Remove the 15mm trayless drives” on page 75](#)

Remove the 7mm trayless drives

Procedure

Step 1. Lift the two upper drives and remove them.

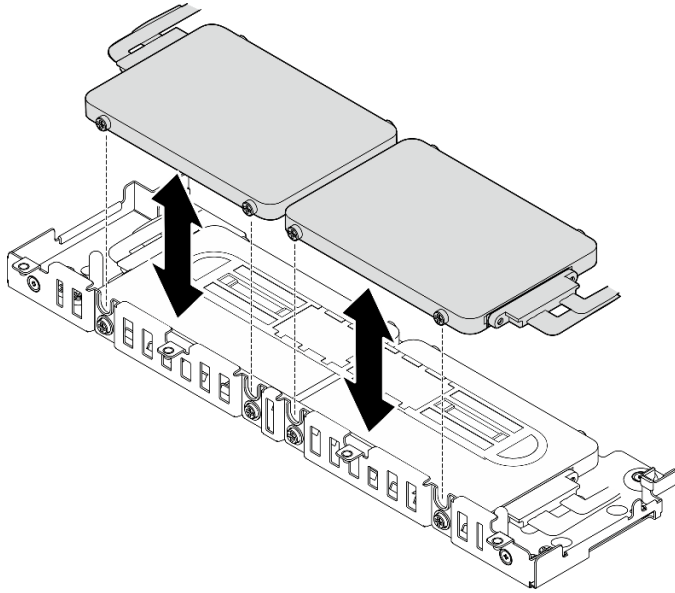


Figure 48. Removing 7mm trayless drives

Step 2. Remove the drive spacer.

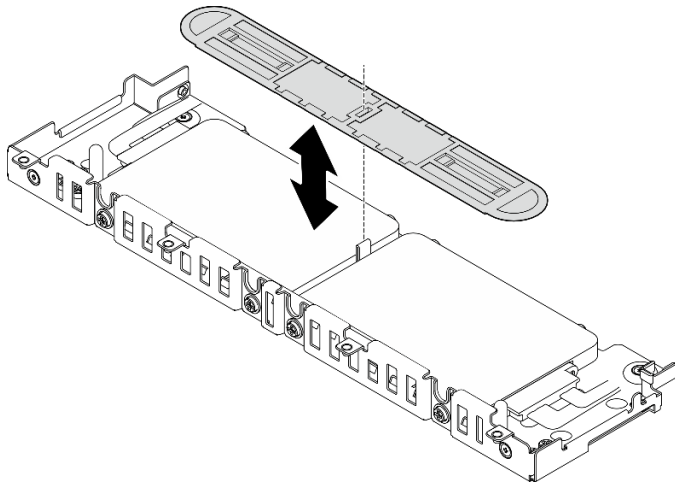


Figure 49. Removing the drive spacer

Note: Make sure to keep the spacer for future use. In the case that there is not immediate need of the spacer, store it on the bottom of the drive cage.

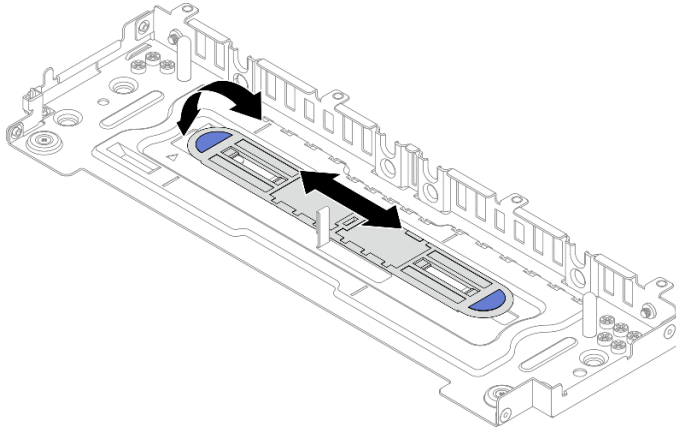


Figure 50. Spacer storage

Step 3. Slide the two lower drives out from the drive cage to remove them.

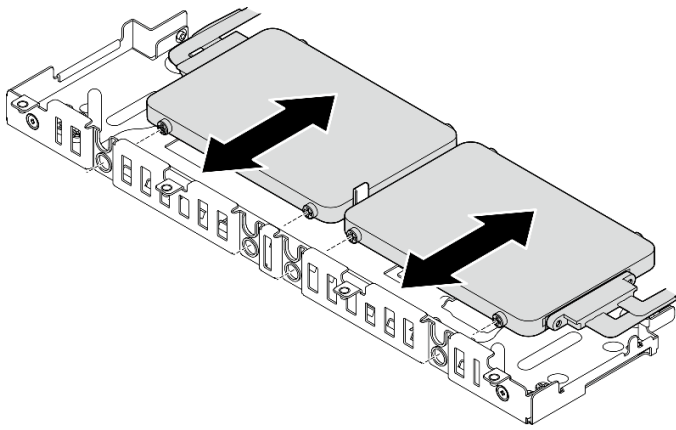


Figure 51. Removing 7mm trayless drives

Remove the 15mm trayless drives Procedure

Step 1. Slide the two drives out from the drive cage to remove them.

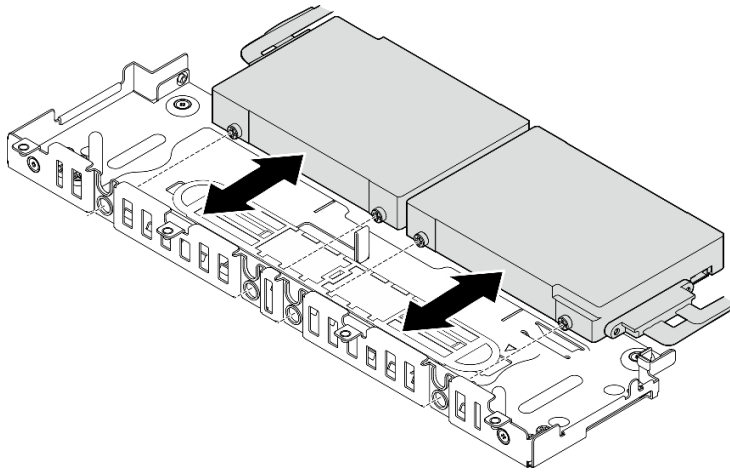


Figure 52. Removing 15mm hot-swap drives

Install the OCP Ethernet adapter

See this topic to learn how to install the OCP adapter.

About this task

Note: Make sure PCIe connector 4 and 5 are available, as they are required for OCP Ethernet adapter.

Watch the procedure. A video of this procedure is available from the following link:

- https://www.youtube.com/playlist?list=PLYV5R7hVcs-DV_Ja2E7I6T-lwN_IrnJRk

Procedure

Step 1. Align the pointed ends of the triangles on the OCP cage and cable connector; then, secure the OCP cable with two screws.

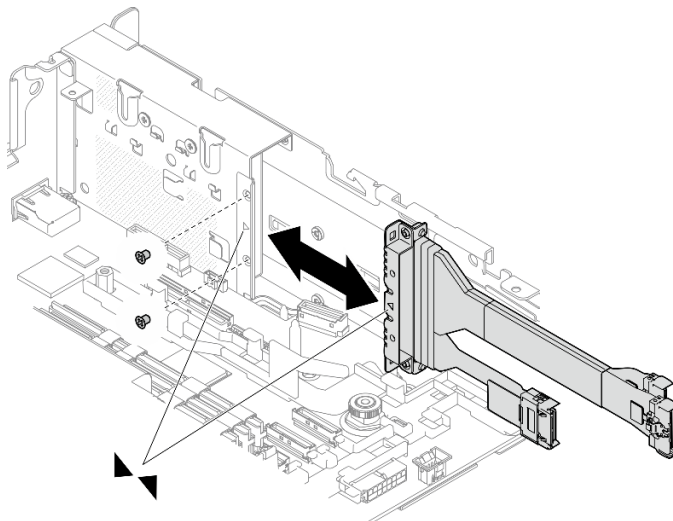


Figure 53. Installing the cable to the OCP adapter

Step 2. Connect the other end to the system board.

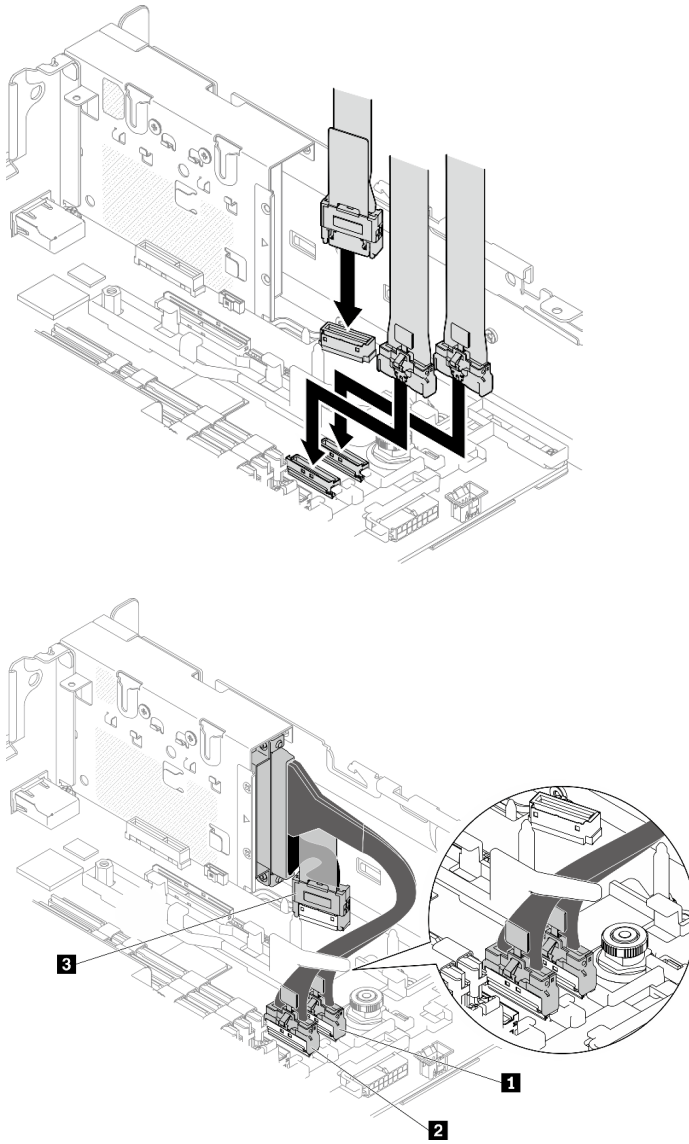


Figure 54. Cable routing for the OCP 3.0 Ethernet adapter

Table 18. Cable routing for the OCP 3.0 adapter

	From	To
1	OCP 3.0 Ethernet adapter	PCIe connector 4
2		PCIe connector 5
3		OCP connector

Step 3. Slide the OCP Ethernet adapter into the chassis, and tighten the captive screw to secure the adapter.

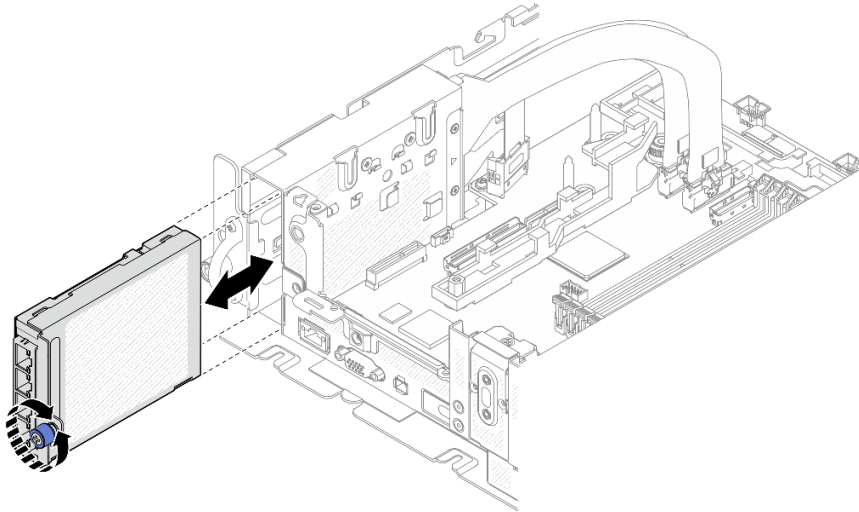


Figure 55. Installing the OCP Ethernet adapter

Install the PCIe adapters and riser assemblies

See this topic to learn how to install the PCIe adapters and riser assemblies.

About this task

1. Before installing the PCIe riser assemblies, make sure to complete installation and cable routing of trayless drives and the drive cage.
2. Make sure the required PCIe cables for the planned configuration are connected to the risers. See [“Cable routing for PCIe riser assemblies and hot-swap drives” on page 136](#).
3. Full-length adapters are supported in the configurations with 1U heat sink installed in 360mm chassis. Make sure the adapter to be installed is supported in the selected configuration.
4. Proceed to the corresponding topic to the type of PCIe adapters to be installed.
 - [“Install half-length adapters and riser assemblies” on page 78](#)
 - [“Install PCIe Riser 2 with AnyBay drive cage” on page 82](#)
 - [“Install full-length adapters and riser assemblies \(360mm chassis\)” on page 83](#)

Install half-length adapters and riser assemblies

Procedure

Step 1. If necessary, install the PCIe riser-card to the riser.

- **Riser 1**

Secure the riser card to the riser with three screws.

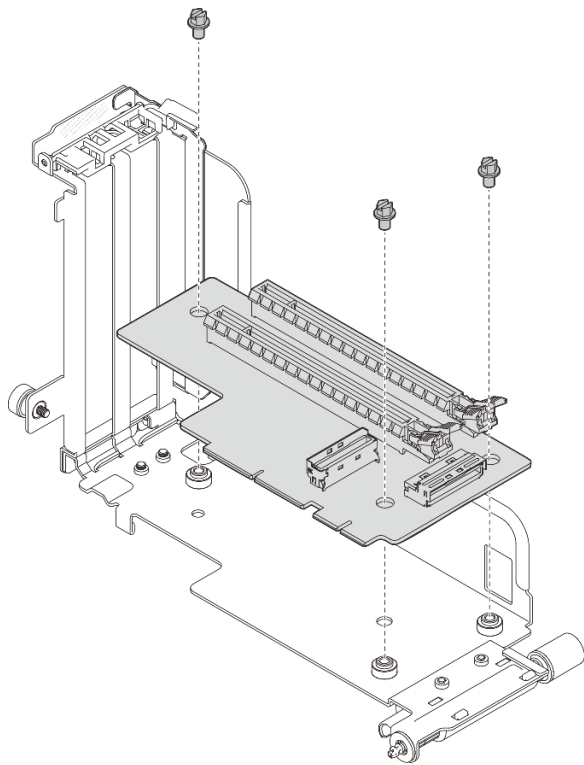


Figure 56. Installing the riser-card to Riser 1

- **Riser 2**

Secure the riser card to the riser with four screws.

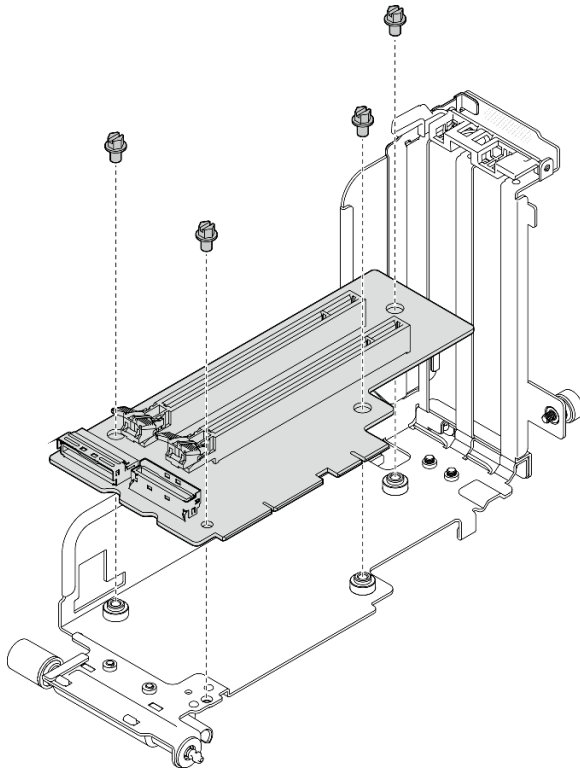


Figure 57. Installing the riser-card to Riser 2

Step 2. Align the adapter with the connector in the riser assembly, and push it in until the latch clicks in the lock position.

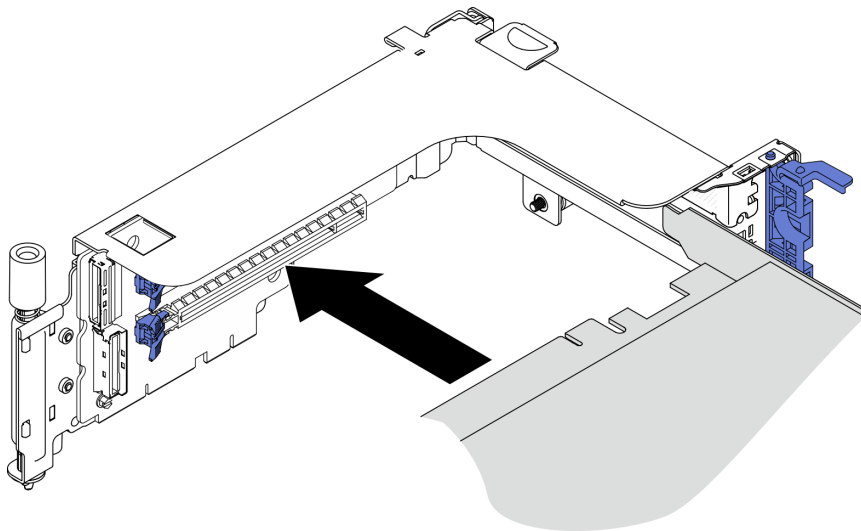


Figure 58. Installing an adapter to the riser

Step 3. Secure the adapter with screws and close the retaining latch. Two spare screws are available on the side of the riser.

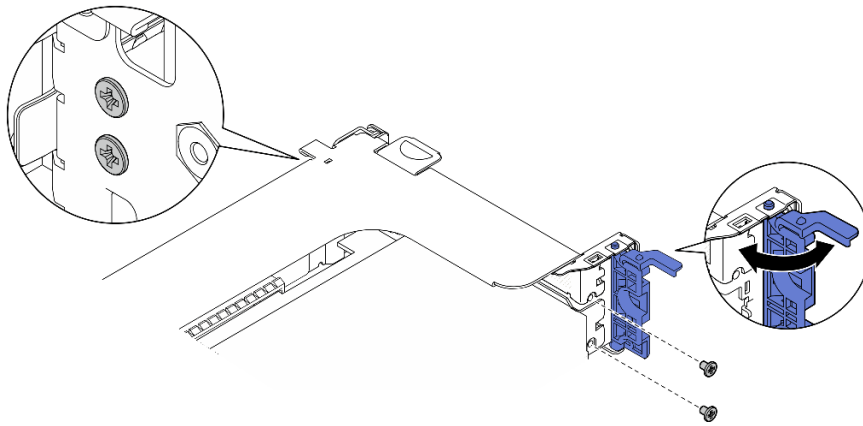


Figure 59. Securing an adapter to the riser

- Step 4. Lower the riser assembly until it is firmly seated; then, tighten the two captive screws to secure it to the chassis.

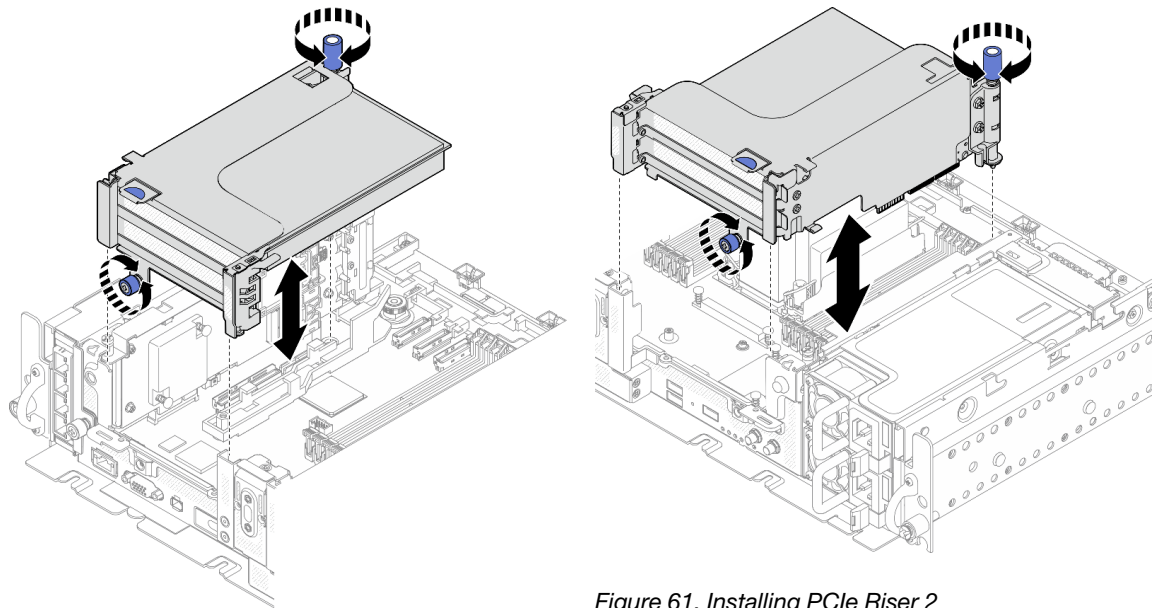


Figure 60. Installing PCIe Riser 1

Figure 61. Installing PCIe Riser 2

- Step 5. Repeat the same procedure on the other riser assembly.

If the other riser is Riser 2 with AnyBay drive cage, proceed to [“Install PCIe Riser 2 with AnyBay drive cage” on page 82](#).

- Step 6. If one RAID adapter is installed in Slot 6, connect the SAS cable to the RAID adapter. See [“15mm SAS/SATA drives with hardware RAID adapter” on page 119](#) or [“7mm SAS/SATA drives with hardware RAID adapter” on page 123](#) for details.

- Step 7. Proceed to the PCIe riser cable routing plan corresponding to the planned configuration. See [“Cable routing for PCIe riser assemblies and hot-swap drives” on page 136](#).

Note: x16 + x16 configuration does not require riser cables.

[>Watch the procedure on YouTube](#)

Install PCIe Riser 2 with AnyBay drive cage

Procedure

Step 1. If necessary, secure the AnyBay drive backplane to the riser cage with two screws.

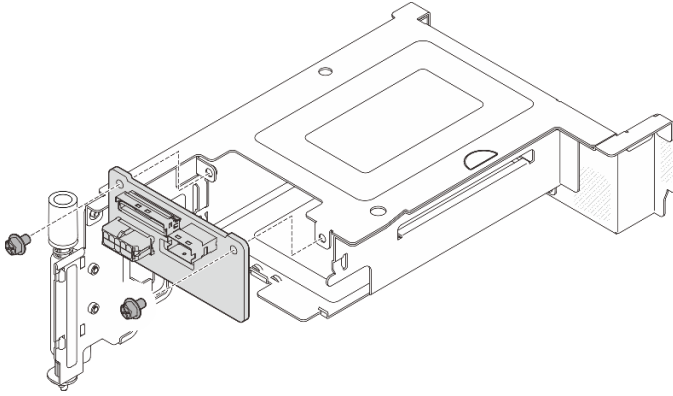


Figure 62. Installing the AnyBay backplane to the drive cage

Step 2. Gently rotate the release latch away to unlock the drive handle; then, slide the drive into the drive bay until it stops, and rotate the handle back to the locked position.

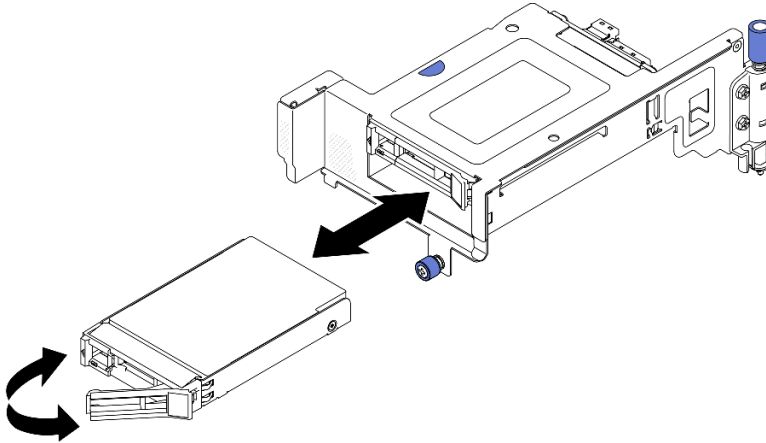


Figure 63. Installing the hot-swap drives

Step 3. Lower the riser assembly until it is firmly seated; then, tighten the two captive screws to secure it to the chassis.

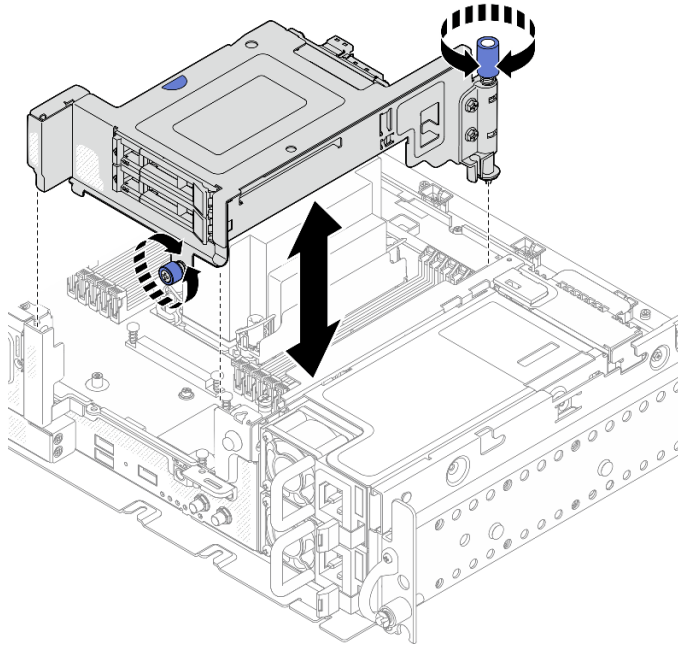


Figure 64. Installing PCIe riser 2 with AnyBay drive cage

Step 4. Proceed to the PCIe riser cable routing plan corresponding to the planned configuration. See [“Cable routing for PCIe riser assemblies and hot-swap drives” on page 136.](#)

[>Watch the procedure on YouTube](#)

Install full-length adapters and riser assemblies (360mm chassis)

- Full-length adapters are supported in the configurations with 1U heat sink installed in 360mm chassis. Make sure the adapter to be installed is supported in the selected configuration.
- Double-width full-length GPU adapter is supported in PCIe Slot 4, Slot 5. (Installation order: Slot 4 >> 5.)
- ThinkSystem Intel Flex 170 16GB Gen4 Passive GPU is supported in PCIe slots in the following configurations:
 - x16/x16 + x8/x16: Slot 3
 - x16/x8 + AnyBay: Slot 6
 - x16/x8 + x8/x16: Slot 6, Slot 3 (Installation order: Slot 6 >> 3)
 - x16/x16 + x16/x16: Slot 3

Procedure

Step 1. If necessary, install the PCIe riser-card to the riser.

- **Riser 1**

Secure the riser card to the riser with three screws.

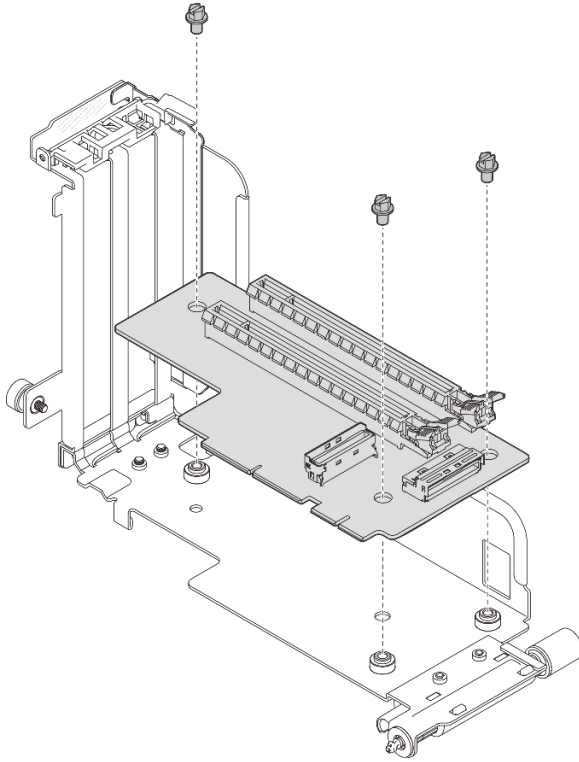


Figure 65. Installing the riser-card to Riser 1

- **Riser 2**

Secure the riser card to the riser with four screws.

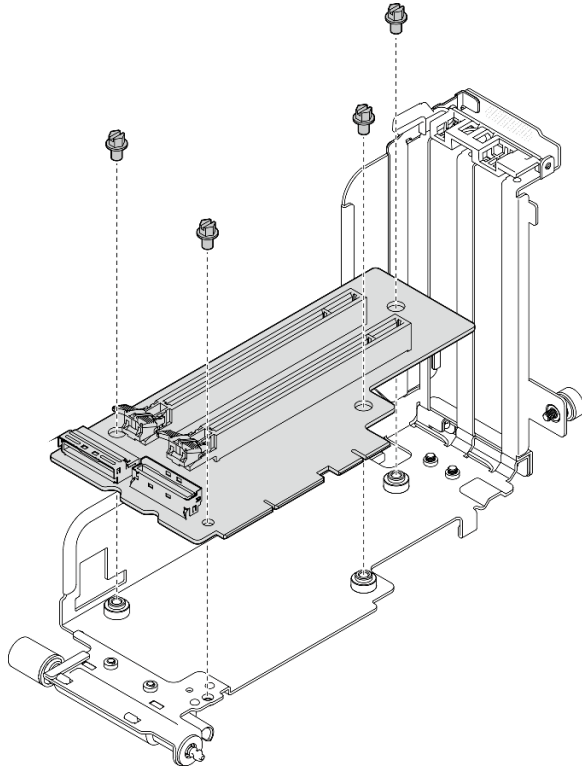


Figure 66. Installing the riser-card to Riser 2

- Step 2. Make sure the GPU power cables are connected to the system board.
- Step 3. Make sure the air baffle is installed before installing the PCIe riser assemblies.

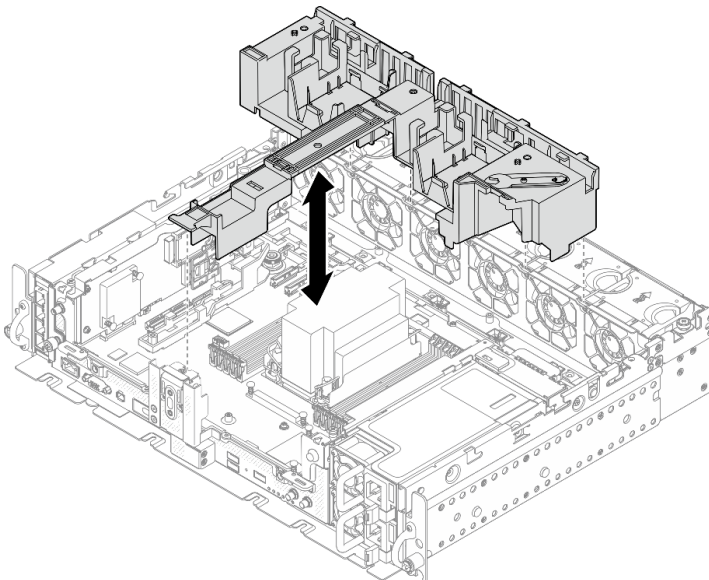


Figure 67. Installing the air baffle

Notes:

- If the heat sink is 1U, make sure the heat sink filler is installed to the air baffle.

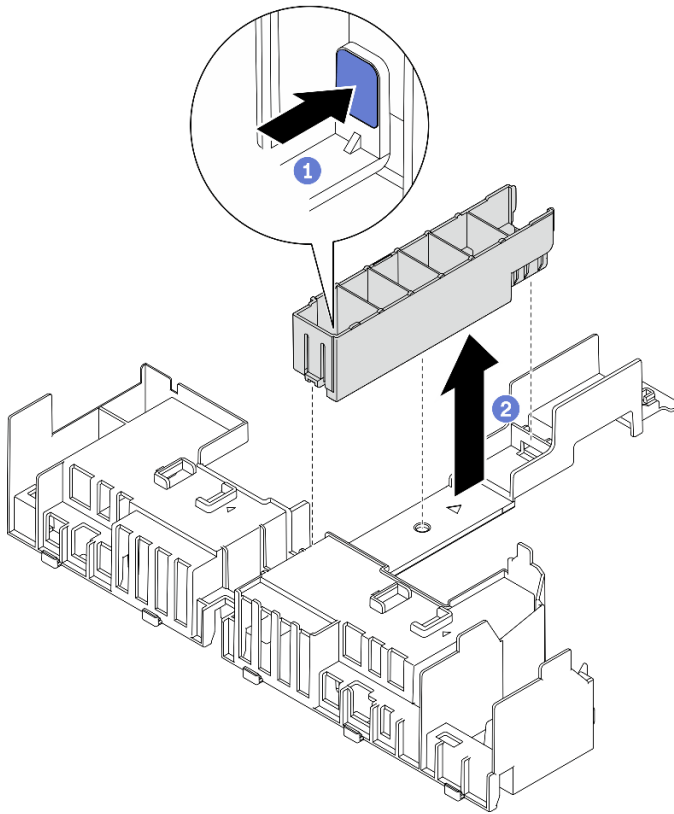


Figure 68. Installing the heat sink filler

Step 4. Align the adapter with the connector in the riser assembly, and push it in until the latch clicks in the lock position.

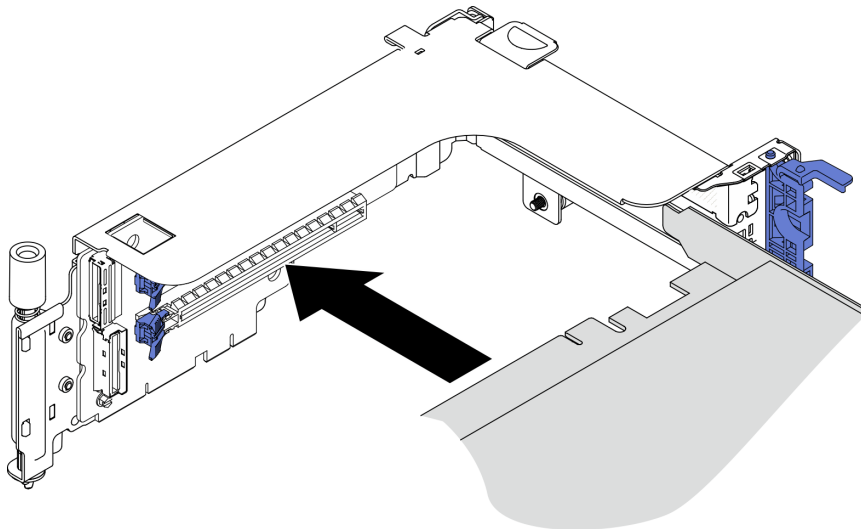


Figure 69. Installing an adapter to the riser

Step 5. Secure the adapter with screws and close the retaining latch. Two spared screws are available on the side of the riser.

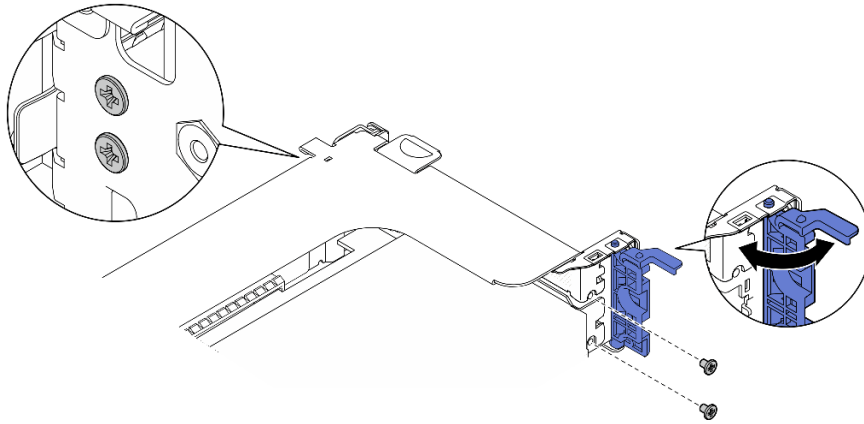


Figure 70. Securing an adapter to the riser

Step 6. Connect the GPU power cabled to the adapters.

Step 7. Lower the riser assembly until it is firmly seated; then, tighten the two captive screws to secure it to the chassis.

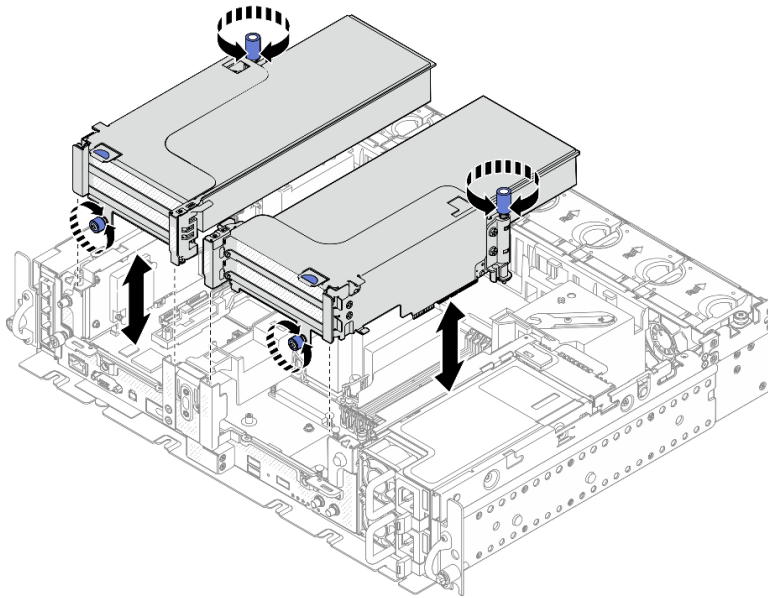


Figure 71. Installing the riser assemblies

Step 8. Route the GPU power cables as illustrated.

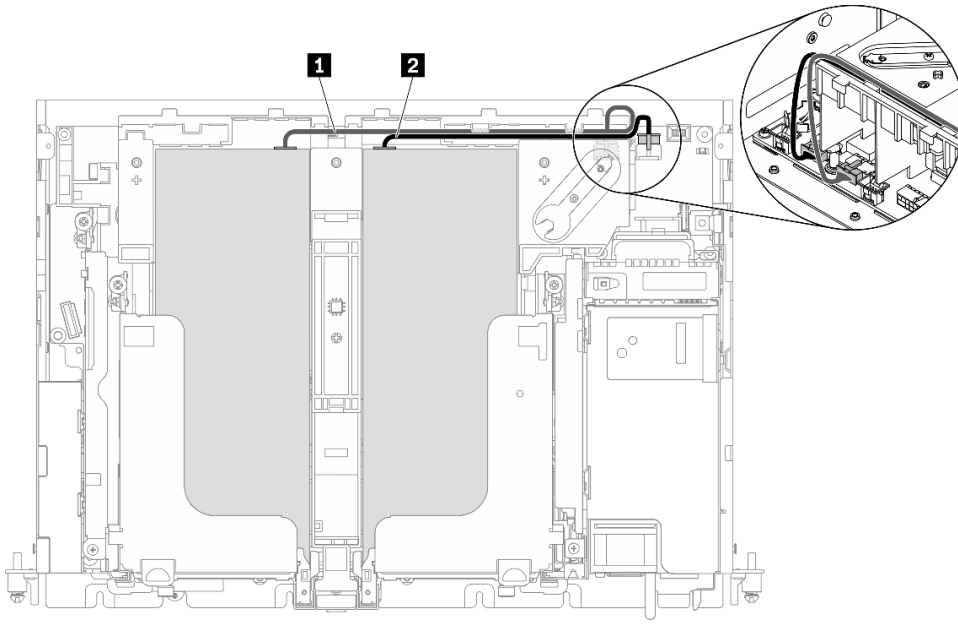


Figure 72. Cable routing for full-length GPU power cables

Notes:

- Make sure **1** goes on top of **2**.
- Make sure to secure the power cables along the channel on the air baffle.

Table 19. Power cable routing for adapters

	From	To
1	GPU in Slot 5 or Slot 6, Riser 1	GPU power connector 2
2	GPU in Slot 4 or Slot 3, Riser 2	GPU power connector 1

Step 9. Install the supporting bracket.

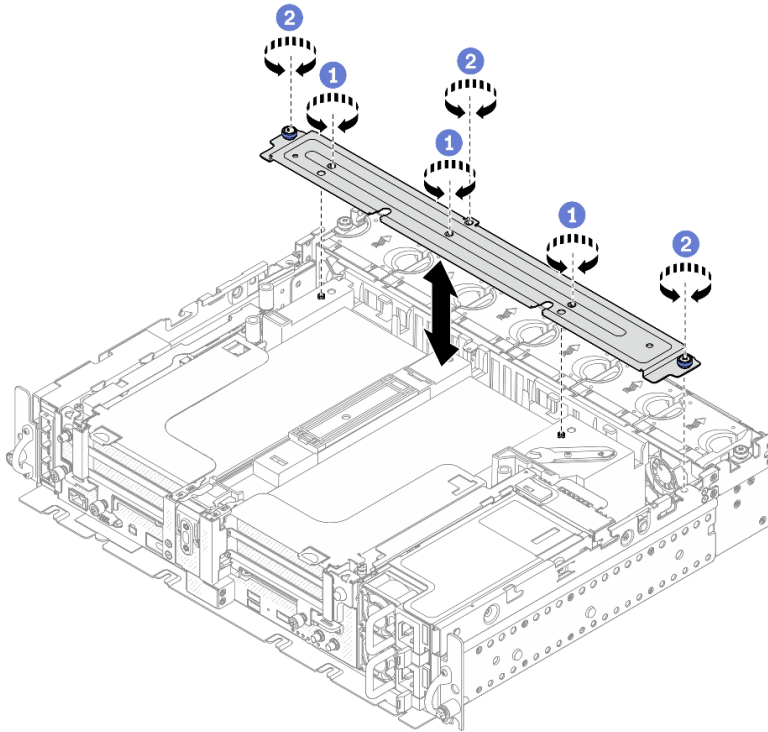


Figure 73. Installing the supporting bracket

- 1 Tighten the three screws in the middle to secure the supporting bracket from the air baffle.
- 2 Tighten the one captive screw and two thumbscrews to secure the bracket to the chassis.

Install the intrusion switch with cable

See this topic to learn how to install the intrusion switch with cable.

About this task

Procedure

- Step 1. Make sure the power backplane sideband cable is disengaged from the cable clip. If not, disengage it from the cable clip.

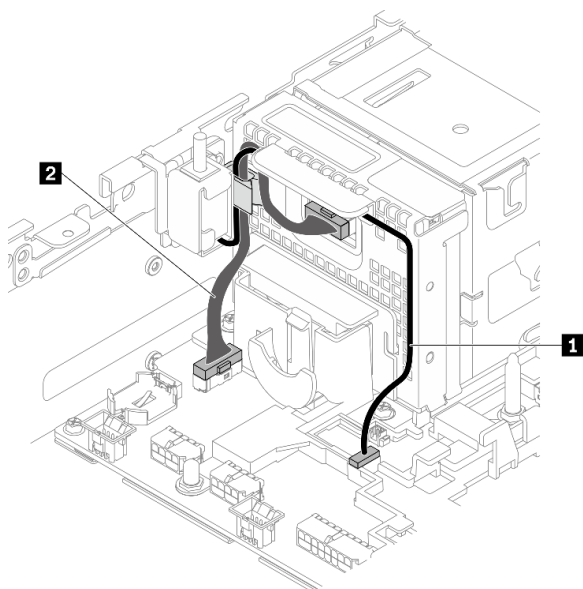


Figure 74. Cable routing for the power backplane and the intrusion switch

Table 20. Cable routing for the power backplane and the intrusion switch

	From	To
1 Intrusion switch cable	Intrusion switch	Intrusion switch connector
2 Power backplane sideband cable	Power backplane	Power backplane sideband connector

Step 2. Align the intrusion switch with the guide slot and shoulder pin on the chassis; then, secure the intrusion switch with a screw.

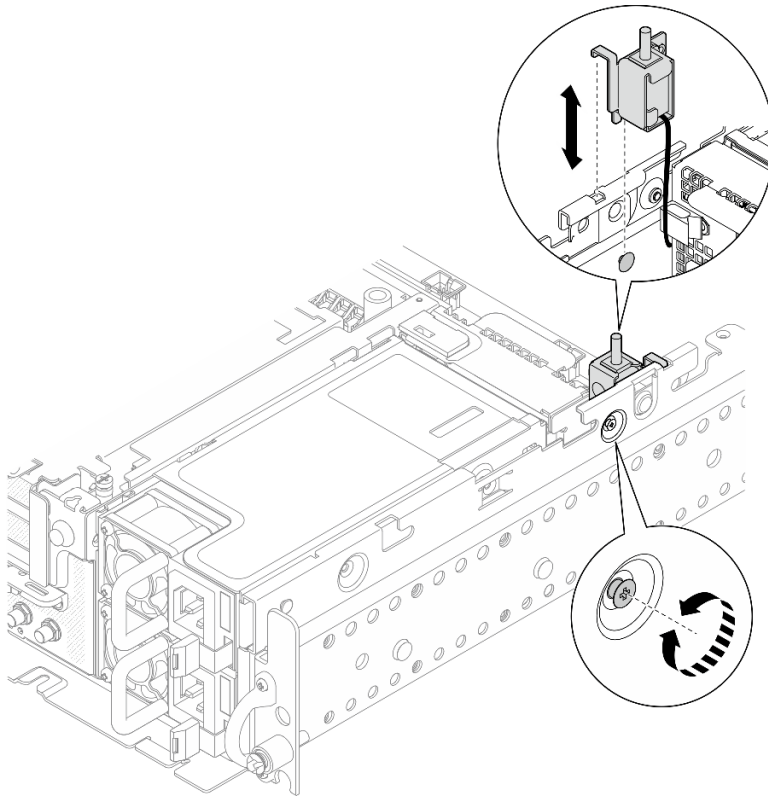


Figure 75. Installing the intrusion switch with cable

- Step 3. Route the intrusion switch with cable through the cable clip, and connect it to the connector on the system board.
- Step 4. Secure the power backplane sideband cable in the cable clip.

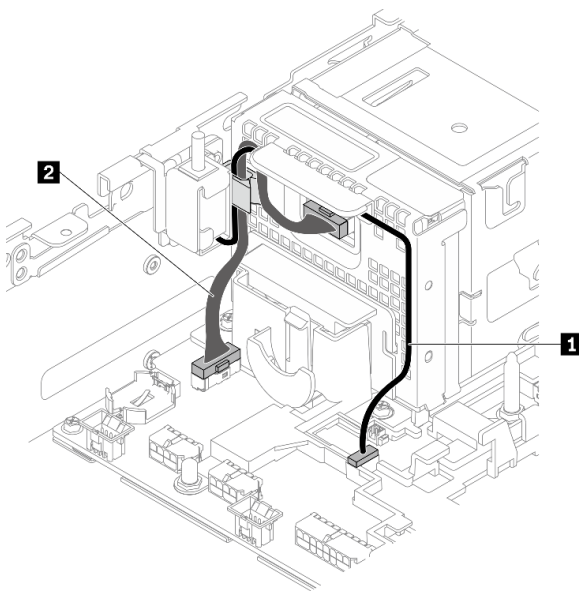


Figure 76. Cable routing for the power backplane and the intrusion switch

Table 21. Cable routing for the power backplane and the intrusion switch

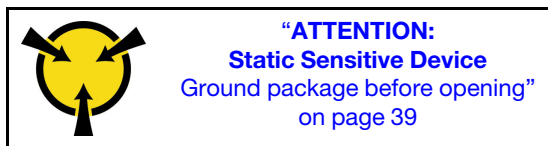
	From	To
1 Intrusion switch cable	Intrusion switch	Intrusion switch connector
2 Power backplane sideband cable	Power backplane	Power backplane sideband connector

Install a memory module

See this topic to learn how to install a memory module.

About this task

See [“Memory module installation rules and order” on page 40](#) for detailed information about memory configuration and setup.



Attention: Memory modules are sensitive to static discharge and require special handling. In addition to the standard guidelines for [“Handling static-sensitive devices” on page 39](#):

- 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 touch. 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 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.
- Make sure to adopt one of the supported configurations that is listed in [“Memory module installation rules and order” on page 40](#).
- In the case of installing PMEMs for the first time, read the rules and instructions in [“PMEM and DRAM DIMM installation order” on page 44](#) carefully, and make sure to adopt a supported configuration.

Procedure

- Step 1. In the case of altering memory configuration, refer to [“Memory module installation rules and order” on page 40](#) to ensure a valid configuration is planned.
- Step 2. If any of the modules to be installed is PMEM, make sure to complete the following procedure before physically installing the module:
 1. Back up stored data in PMEM namespaces.
 2. Disable PMEM security with one of the following options:
 - **LXPM**

Go to **UEFI Setup → System Settings → Intel Optane PMEMs → Security → Press to Disable Security**, and input passphrase to disable security.

- **Setup Utility**

Go to **System Configuration and Boot Management → System Settings → Intel Optane PMEMs → Security → Press to Disable Security**, and input passphrase to disable security.

3. Delete namespaces with command corresponding to the operating system that is installed:

- **Linux** command:

```
ndctl destroy-namespace all -f
```

- **Windows** Powershell command

```
Get-PmemDisk | Remove-PmemDisk
```

4. Clear Platform Configuration Data (PCD) and Namespace Label Storage Area (LSA) with the following ipmctl command (for both Linux and Windows).

```
ipmctl delete -pcd
```

Notes: See the following links to learn how to download and use ipmctl in different operating systems:

- Windows: <https://datacentersupport.lenovo.com/us/en/videos/YTV101407>
- Linux: <https://datacentersupport.lenovo.com/us/en/solutions/HT508642>

5. Reboot the system.

Step 3. Locate the slot to install the memory module in on the system board.

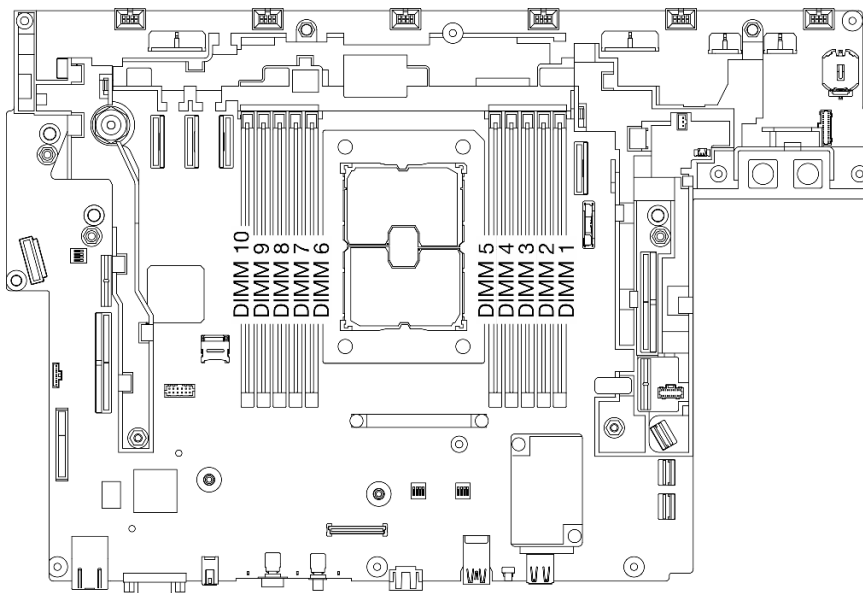


Figure 77. Memory module slots on the system board

Step 4. Install the memory module.

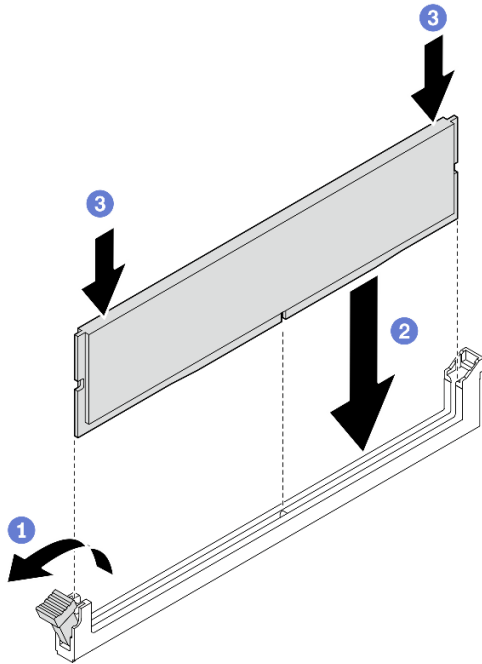


Figure 78. Installing a memory module

- 1 Open the retaining clip.
- 2 Align the memory module with the slot.
- 3 Firmly press both ends of the memory module straight down until the retaining clip snaps into the locked position.

Note: 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.

Install the M.2 drives and boot adapter

See this topic to learn how to install the M.2 drives and boot adapter.

About this task

ThinkEdge SE450 supports the different types of M.2 backplane. Depending on the configuration, one of the following M.2 backplane can be installed:

- ThinkSystem M.2 SATA/NVMe 2-Bay Enablement Kit (SATA/NVMe 2-Bay backplane)
- ThinkSystem M.2 RAID B540i-2i SATA/NVMe Adapter (B540i-2i SATA/NVMe backplane)

If B540i-2i SATA/NVMe backplane is to be installed, make sure to remove the adapter cover before installing the backplane.

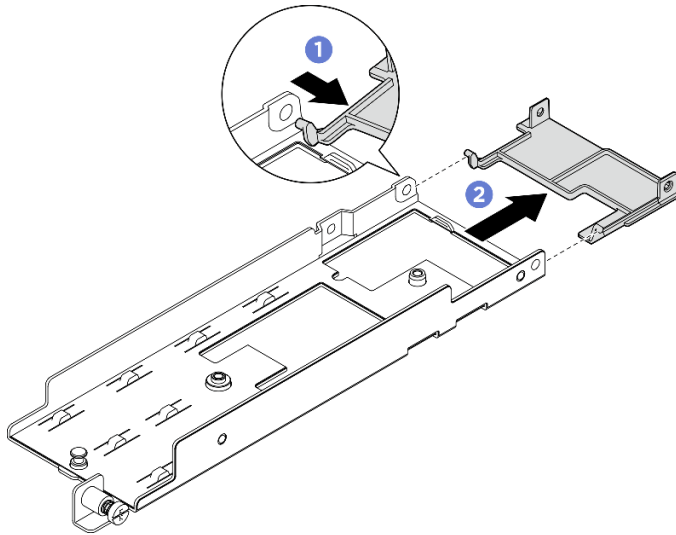


Figure 79. Removing the adapter cover

- 1 Press one side of the adapter cover as illustrated to disengage it from the adapter.
- 2 Remove the cover from the adapter.

Procedure

Note: Depending on the configuration, the M.2 boot adapter and backplane might look slightly different from the illustration in this section.

- Step 1. If necessary, install the replacement backplane to the adapter.
- a. Install the backplane.

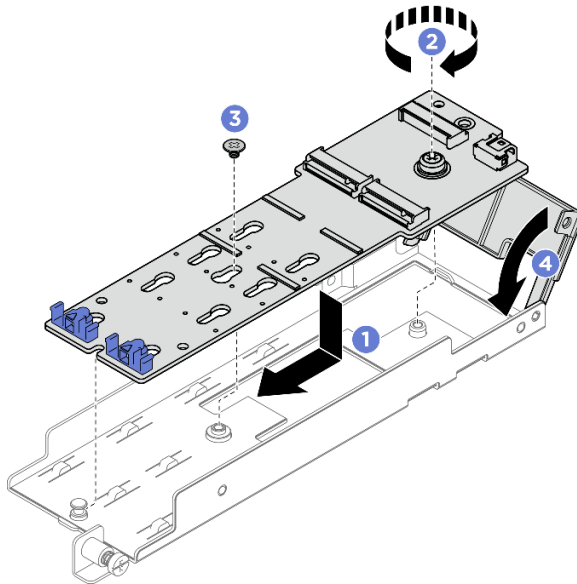


Figure 80. Installing the M.2 backplane

- 1 Align the backplane with the slot in the adapter.

- 2 Tighten the captive screw on the M.2 backplane.
 - 3 Secure the M.2 backplane with a screw.
 - 4 If applicable, close the adapter cover.
- b. Connect the M.2 cable to the backplane.

SATA/NVMe 2-Bay backplane

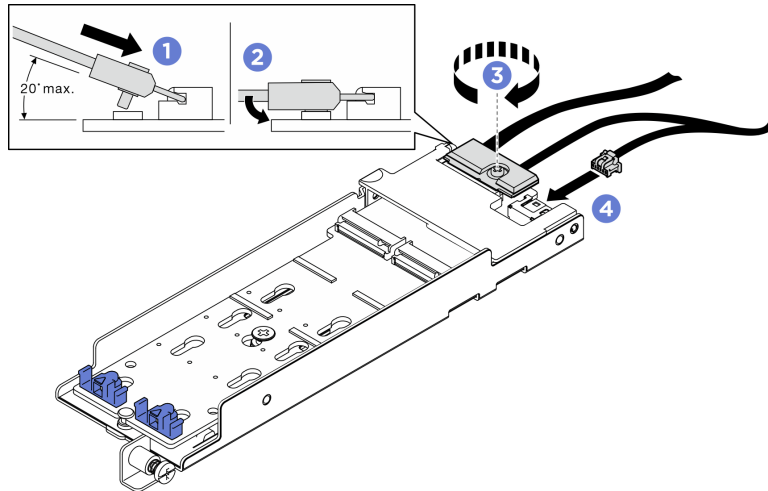


Figure 81. Connecting the M.2 cable

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

B540i-2i SATA/NVMe backplane

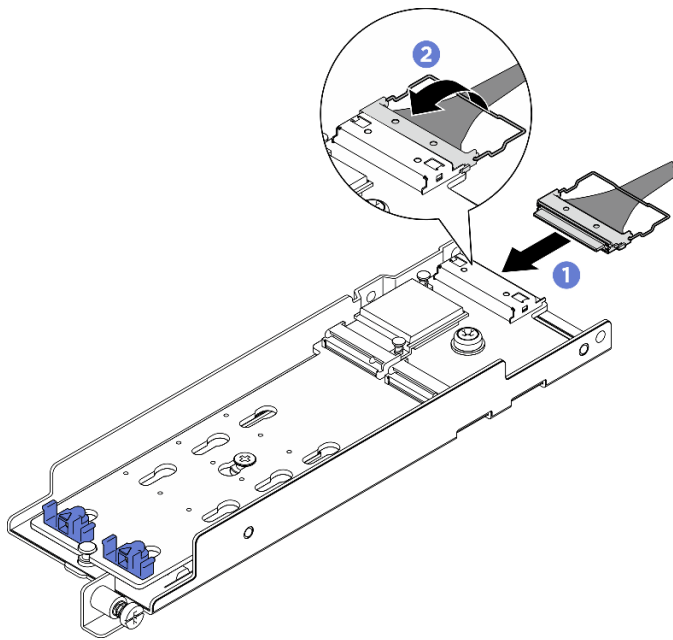


Figure 82. Connecting the M.2 cable

- 1 Connect the cable to the M.2 backplane.
- 2 Hook the wire bail on the cable onto the connector.

Step 2. Install the M.2 drives to the backplane.

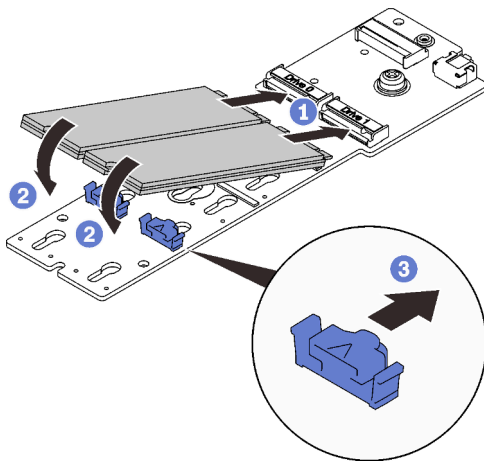


Figure 83. Installing the M.2 drives

- 1 Align the M.2 drives with the connectors.
- 2 Pivot the other end of the M.2 drives toward the backplane.
- 3 Slide the retaining clips forward to secure the drives to the backplane.

Step 3. Contain the cables between the guiding pin and the two cable clips as illustrated. Align the pointed ends of the two triangles on the adapter and the power supply cage, and lower the bracket. Then, slide the adapter backward slightly, and tighten the captive screw to secure the adapter.

Notes:

- If the adapter is without the adapter cover, make sure **NOT TO** let the backplane touch nearby components. Touching nearby components might cause damage to the backplane.
- To spare space for proper installation, make sure to contain the cables with the two cable clips as illustrated before installing the adapter.

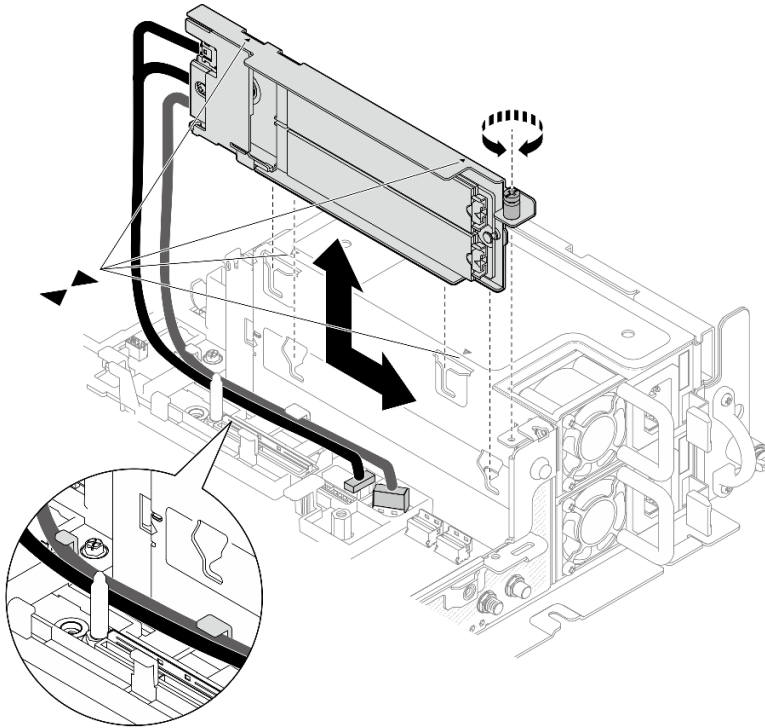


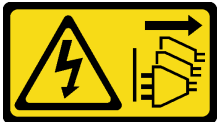
Figure 84. Installing the M.2 boot adapter

Install the fan cage and the fans

See this topic to learn how to install the fan cage and the fans.

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.

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

Procedure

See the topic corresponding to the installation scenario.

- [“Install a fan” on page 99](#)
- [“Install the fan cage” on page 99](#)

Install a fan

Step 1. Align a fan over the fan slot in the fan cage, and insert the fan into the fan slot until it clicks into place. Repeat this procedure until all the fans are installed in the fan cage.

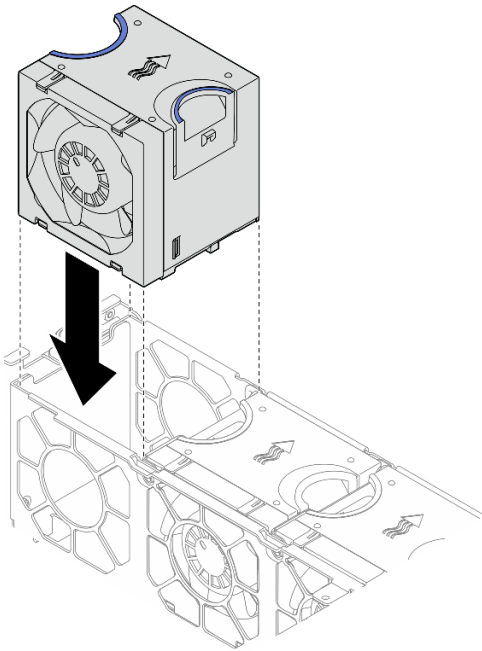


Figure 85. Installing a fan

Install the fan cage

Step 1. Before installing the fan cage, make sure to remove all the fans.

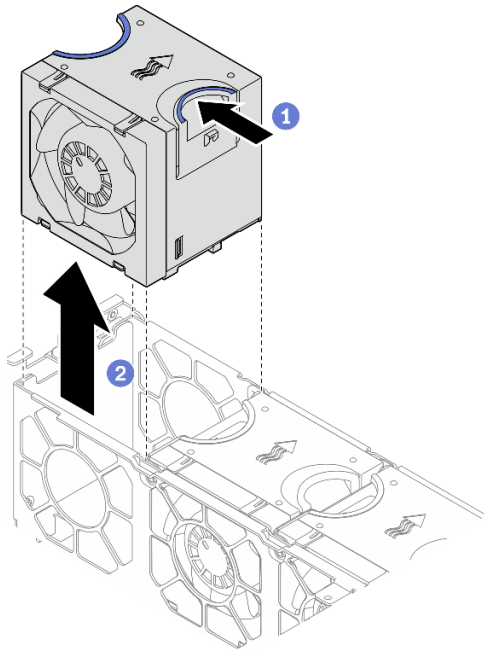


Figure 86. Removing a fan

- 1 Pinch and hold on the blue touch points on the top of the fan.
- 2 Lift the fan to remove it.

Step 2. Align the fan cage to the guides on both sides of the chassis, and lower it into the chassis. Then, tighten the captive screws to secure the fan cage to the chassis.

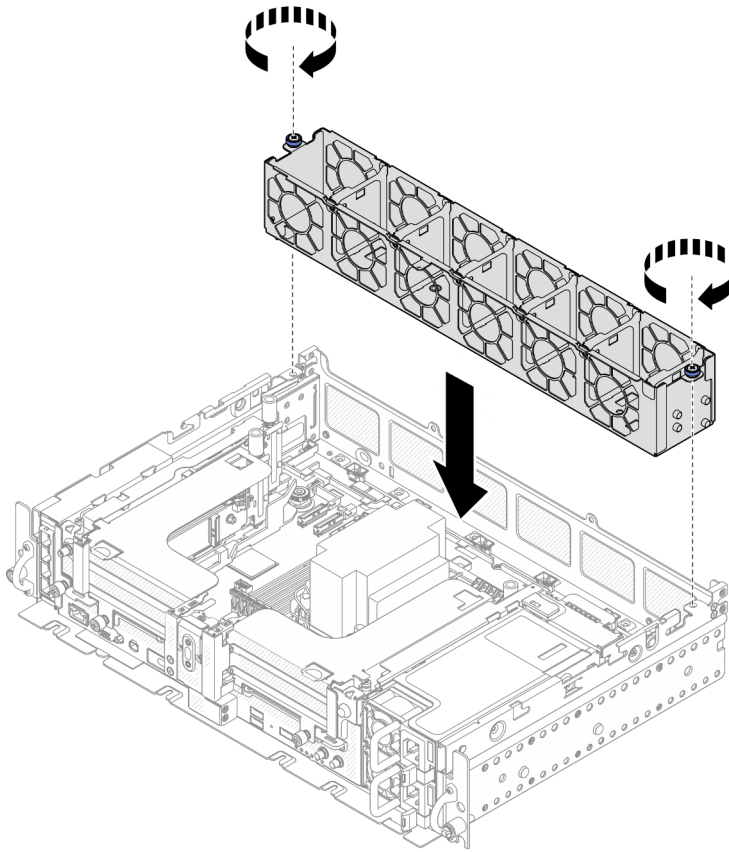


Figure 87. Installing the fan cage

- Step 3. Align a fan over the fan slot in the fan cage, and insert the fan into the fan slot until it clicks into place. Repeat this procedure until all the fans are installed in the fan cage.

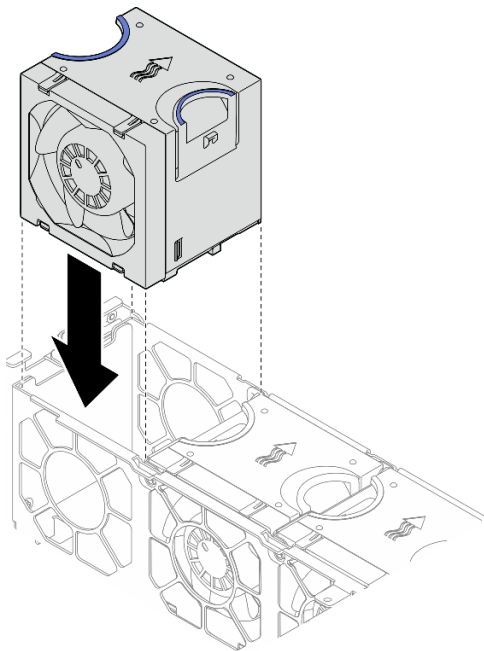


Figure 88. Installing a fan

Install the air baffle

See this topic to learn how to install the air baffle.

About this task

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

- **S012**



CAUTION:
Hot surface nearby.

See to the topic corresponding to the server configuration.

- [“Install the air baffle for 300mm chassis” on page 102](#)
- [“Install the air baffle for 360mm chassis with half-length adapters” on page 104](#)
- [“Install the air baffle for 360mm chassis with full-length adapters” on page 107](#)

Install the air baffle for 300mm chassis

Procedure

Step 1. Make sure the air baffle configuration fits the present system configuration.

Attention: Fillers corresponding to system configuration are required for the airflow that does expected cooling. Make sure to install the proper fillers corresponding to the system configuration.

- If the heat sink is 1U, make sure the heat sink filler is installed to the air baffle.

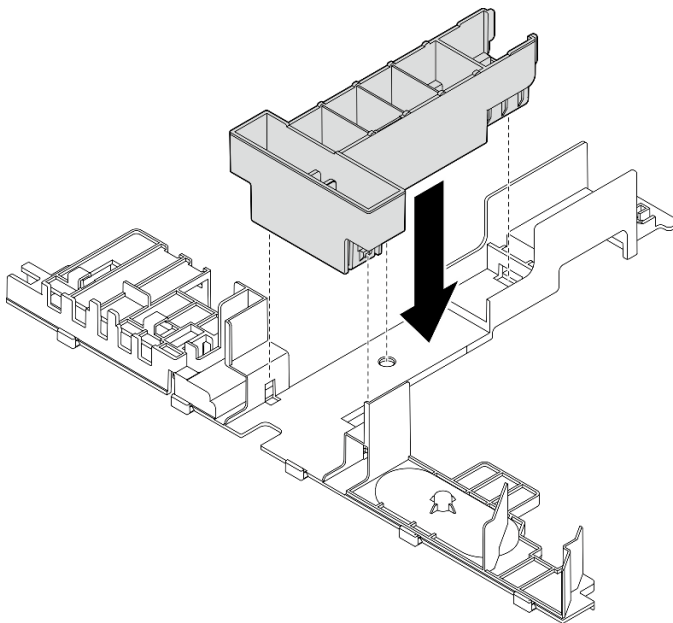


Figure 89. Installing heat sink filler

- If the heat sink is 2U, make sure the heat sink filler is removed from the air baffle.

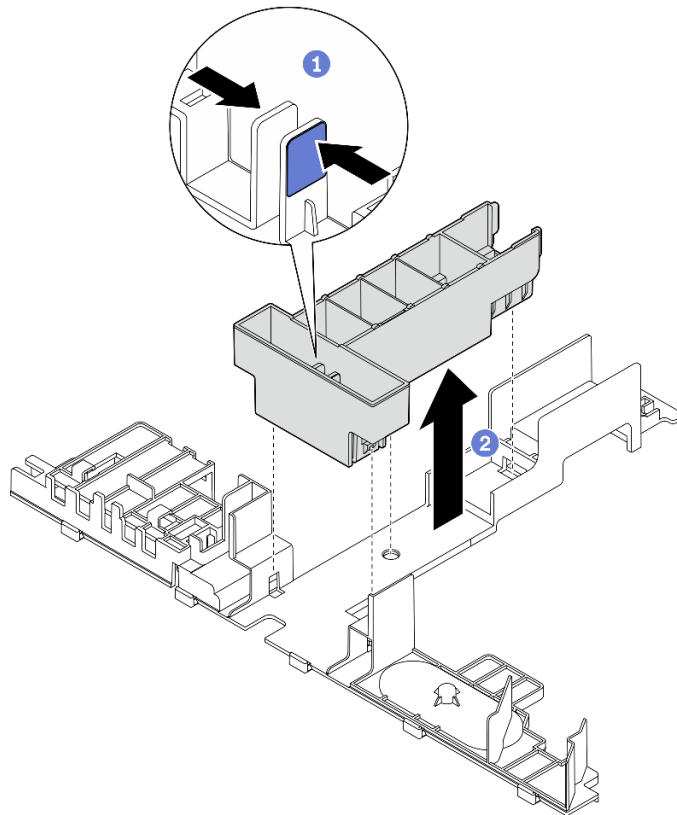


Figure 90. Installing heat sink filler

- 1 Press the release latch on the filler.
- 2 Remove the filler from the air baffle.

Step 2. Lower the air baffle into the chassis and press on it to ensure it is firmly seated.

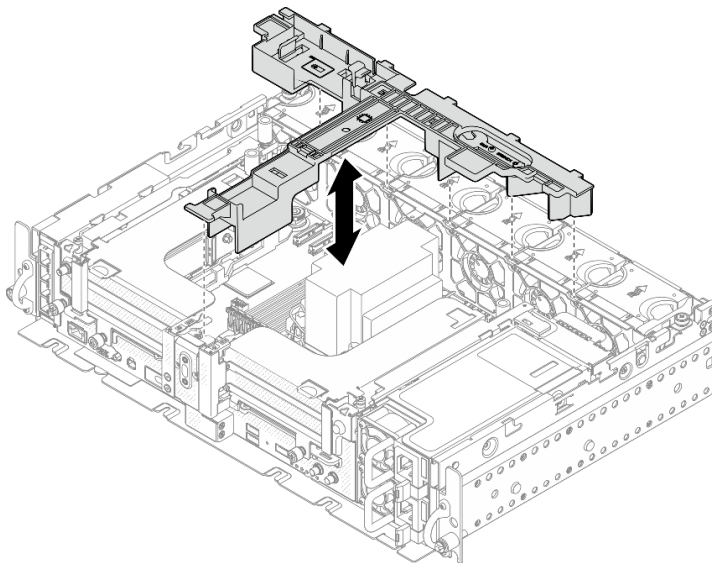


Figure 91. Installing the air baffle

Install the air baffle for 360mm chassis with half-length adapters

Procedure

Step 1. Make sure the air baffle configuration fits the present system configuration.

Attention: Fillers corresponding to system configuration are required for the airflow that does expected cooling. Make sure to install the proper fillers corresponding to the system configuration.

1. Heat sink filler

- If the heat sink is 1U, make sure the heat sink filler is installed to the air baffle.

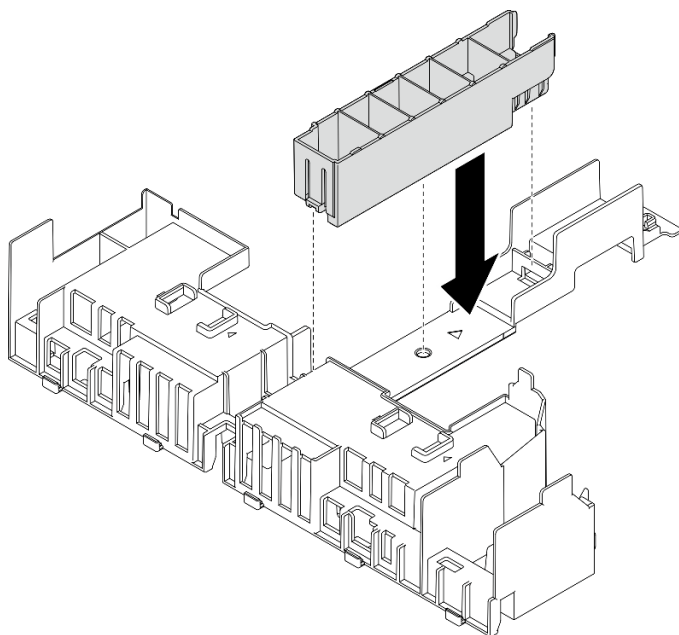


Figure 92. Installing heat sink filler

- If the heat sink is 2U, make sure the heat sink filler is removed from the air baffle.

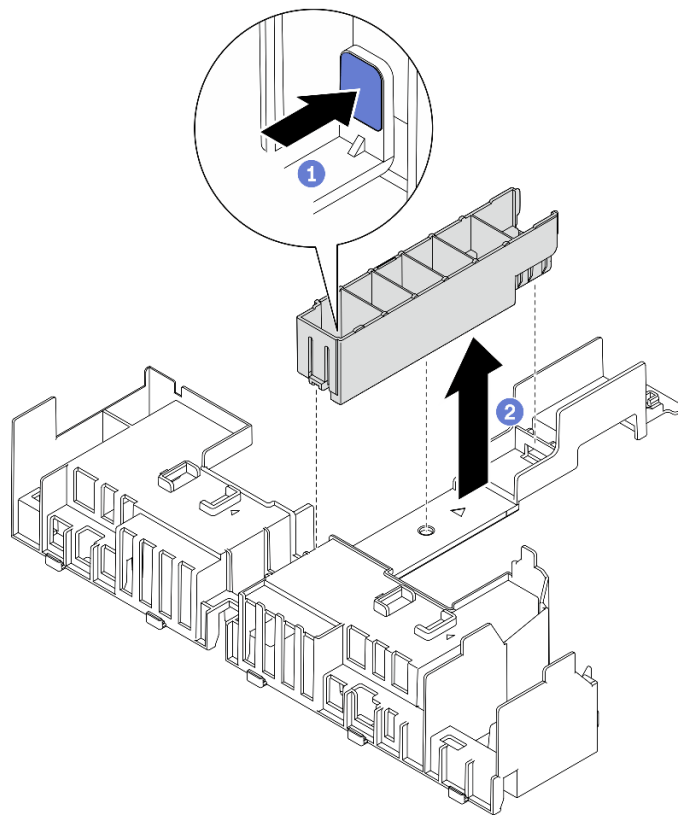


Figure 93. Installing the heat sink filler

- 1 Press the release latch on the filler.
- 2 Remove the filler from the air baffle.

2. GPU fillers

GPU fillers are required when half-length adapters are installed in a 360mm chassis. If no GPU fillers are installed, make sure to install them to the air baffle.

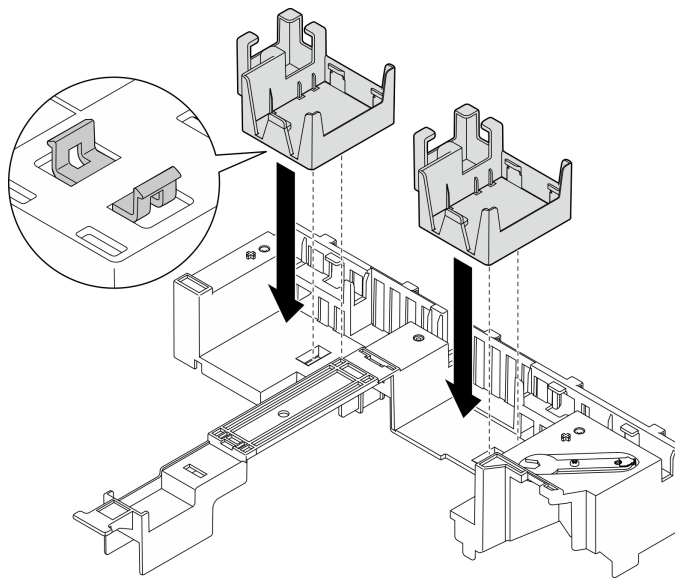


Figure 94. Installing the GPU fillers

3. Supporting bracket

The supporting bracket is required in a 360mm chassis. Secure it to the air baffle with the three captive screws as illustrated.

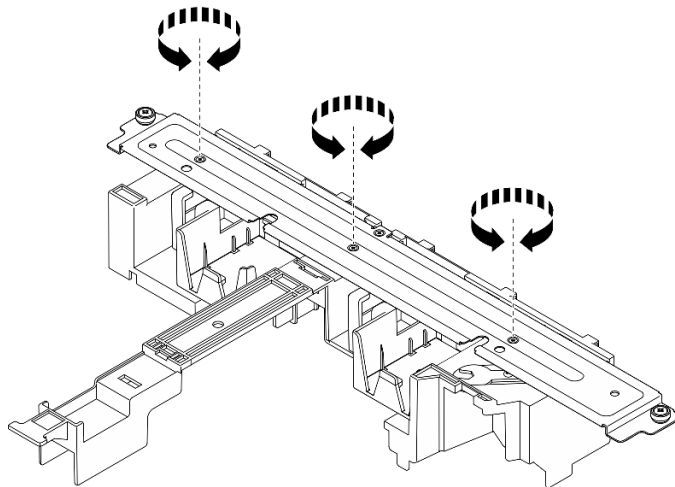


Figure 95. Securing the supporting bracket to the air baffle

Step 2. Lower the air baffle into the chassis and press on it to ensure it is firmly seated.

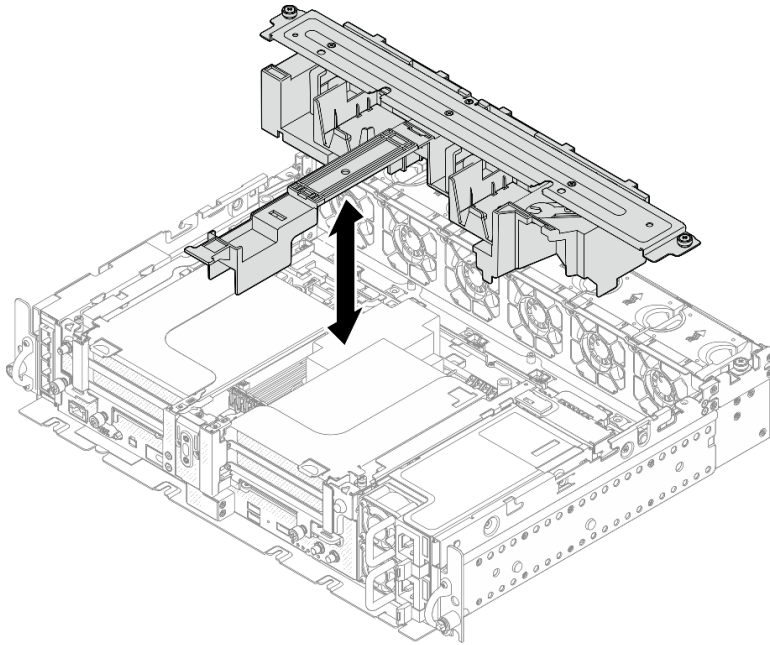


Figure 96. Installing the air baffle

Step 3. Tighten the one captive screw and two thumbscrews to secure the supporting bracket to the chassis.

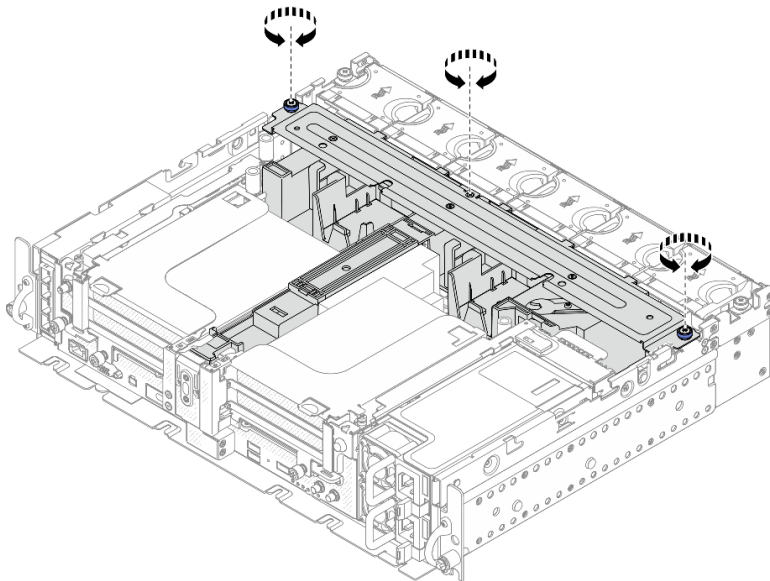


Figure 97. Securing the air baffle assembly

Install the air baffle for 360mm chassis with full-length adapters

Procedure

Step 1. Make sure the air baffle configuration fits the present system configuration.

1. Heat sink filler

- If the heat sink is 1U, make sure the heat sink filler is installed to the air baffle.

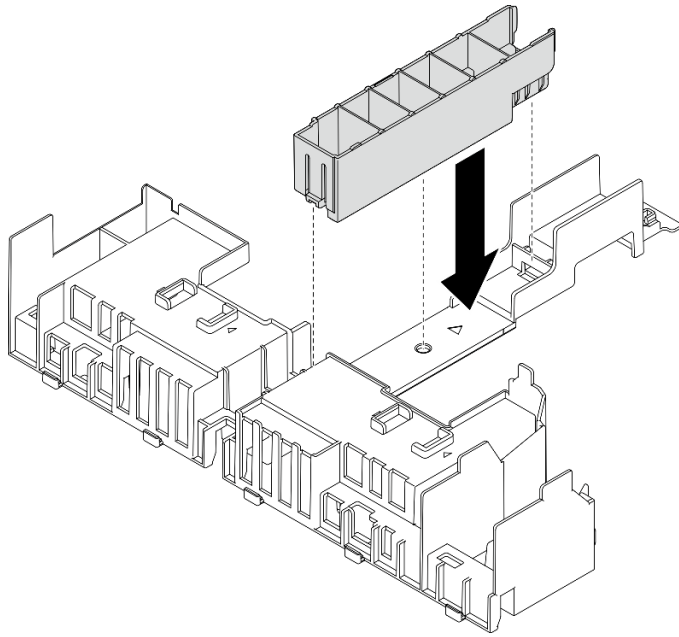


Figure 98. Installing heat sink filler

- If the heat sink is 2U, make sure the heat sink filler is removed from the air baffle.

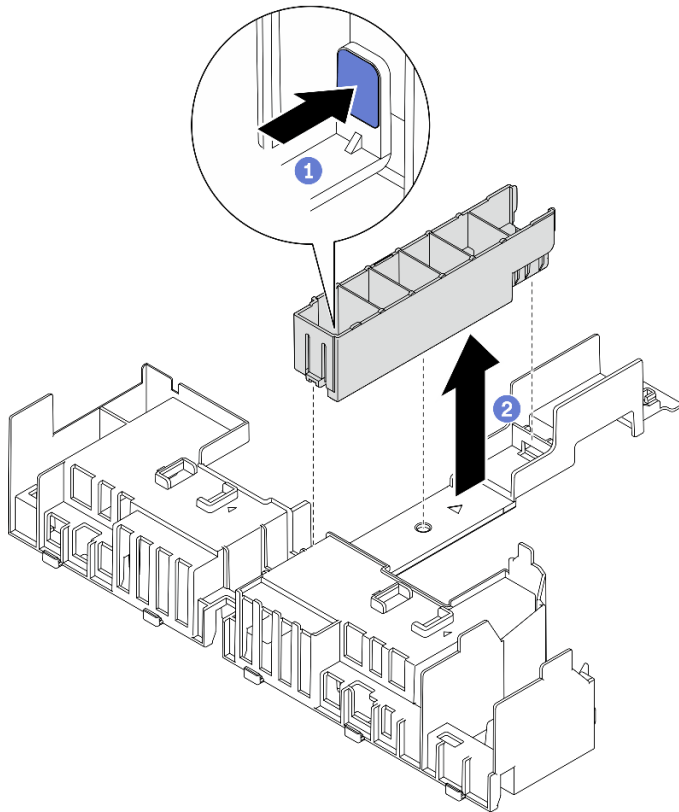


Figure 99. Installing the heat sink filler

- 1 Press the release latch on the filler.

- 2 Remove the filler from the air baffle.

2. Supporting bracket

The supporting bracket must be removed when full-length adapters are to be installed. Loosen the three captive screws to remove the supporting bracket from the air baffle.

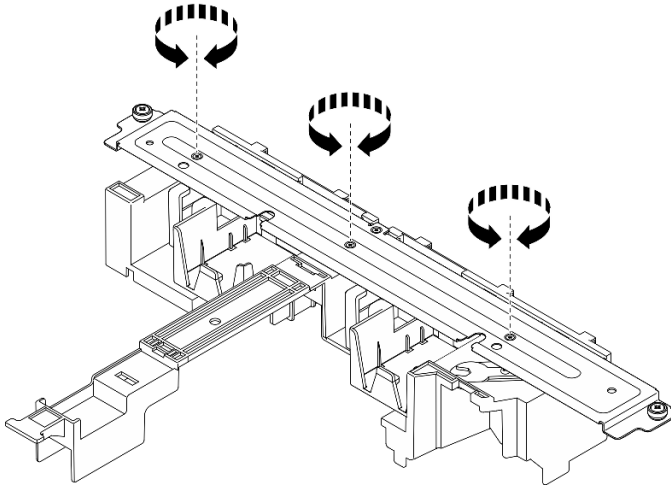


Figure 100. Removing the supporting bracket from the air baffle

3. GPU fillers

GPU fillers must be removed when full-length adapters are to be installed. If GPU fillers are installed in the air baffle, remove them.

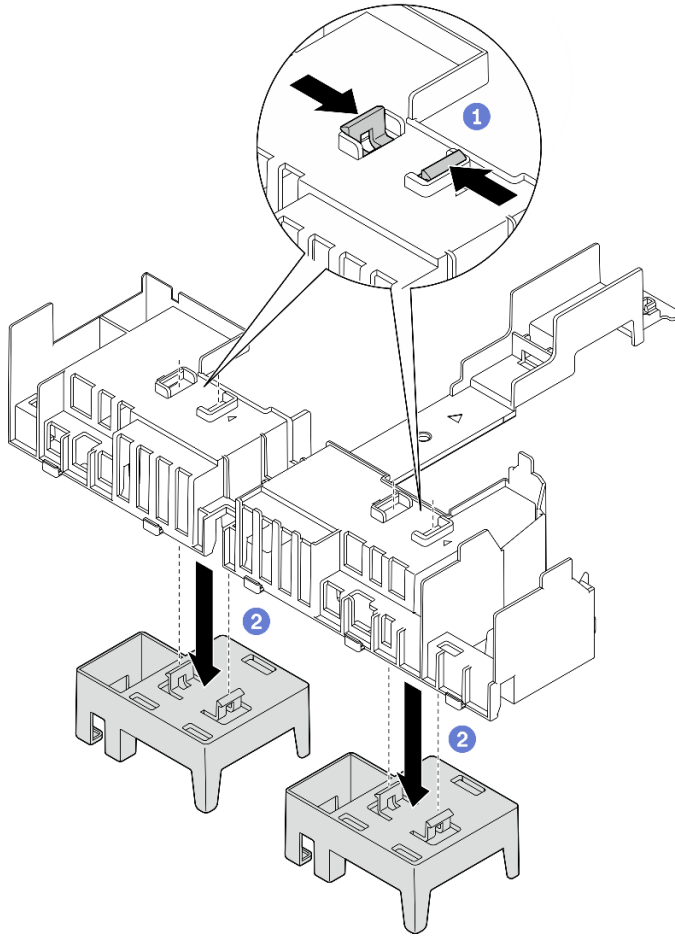


Figure 101. Removing the GPU fillers from the air baffle

- 1 Pinch on the retaining feet of the GPU fillers.
- 2 Remove the GPU fillers from the air baffle.

Step 2. Lower the air baffle into the chassis and press on it to ensure it is firmly seated.

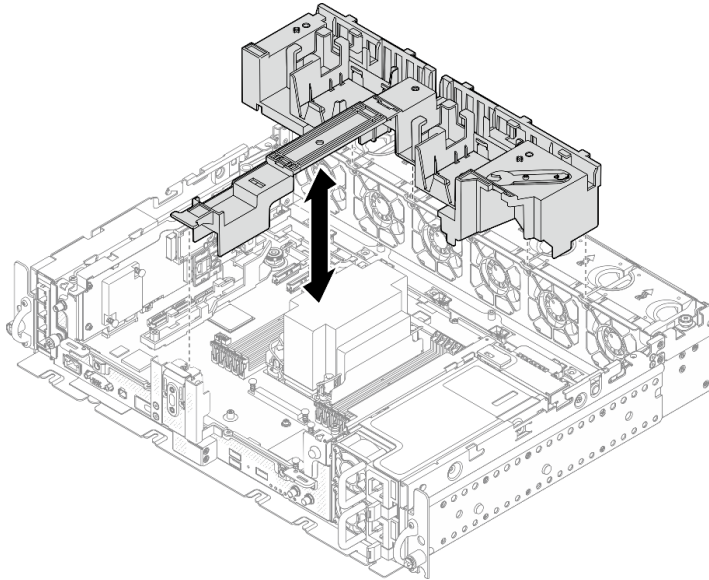


Figure 102. Installing the air baffle

Step 3. Proceed to install the risers with full-length PCIe adapters (see [“Install full-length adapters and riser assemblies \(360mm chassis\)”](#) on page 83).

Install the top covers

See this topic to learn how to install the top cover and the fan cover.

About this task

Procedure

Step 1. Align the top cover with the guiding slots on both sides of the chassis, and slide it forward slightly.

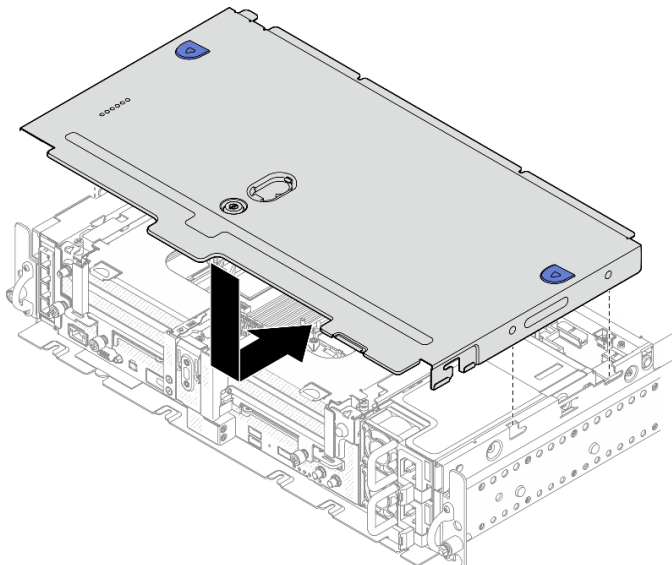


Figure 103. Installing the top cover

Step 2. Align the fan cover with the guiding slots on both sides of the chassis, and slide it backwards slightly to secure it.

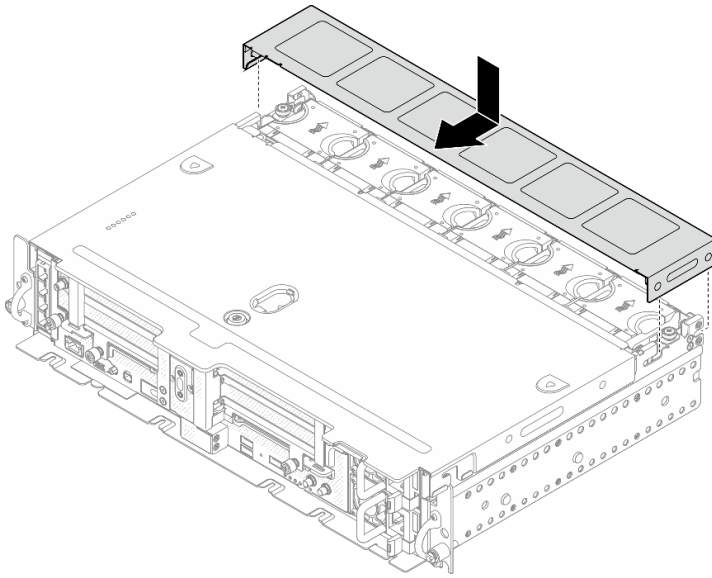


Figure 104. Installing the fan cover (300mm)

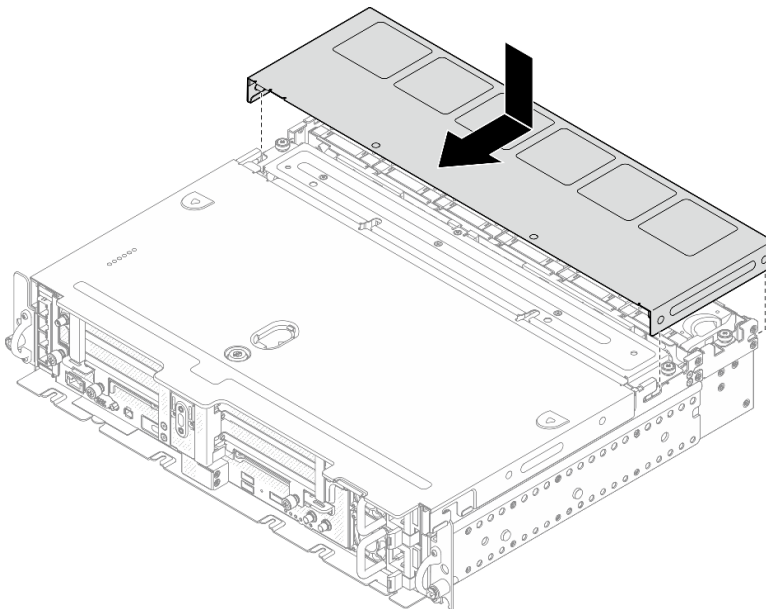


Figure 105. Installing the fan cover (360mm)

Step 3. Lock the top cover with the key, and store the key to the key holder on the top cover for future use.

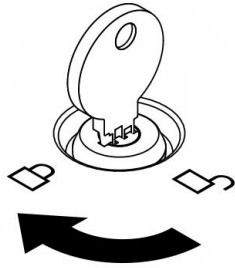


Figure 106. Locking the top cover

Install the security bezel

See this topic to learn how to install the security bezel and the dust filter.

About this task

Procedure

Attention: When installing the security bezel for the first time:

- Make sure the security cable module is installed. If not, install it (see "Install the security bezel cable module" in *Maintenance Manual*).
- The key that is required to lock the security bezel is stored at the location as illustrated.

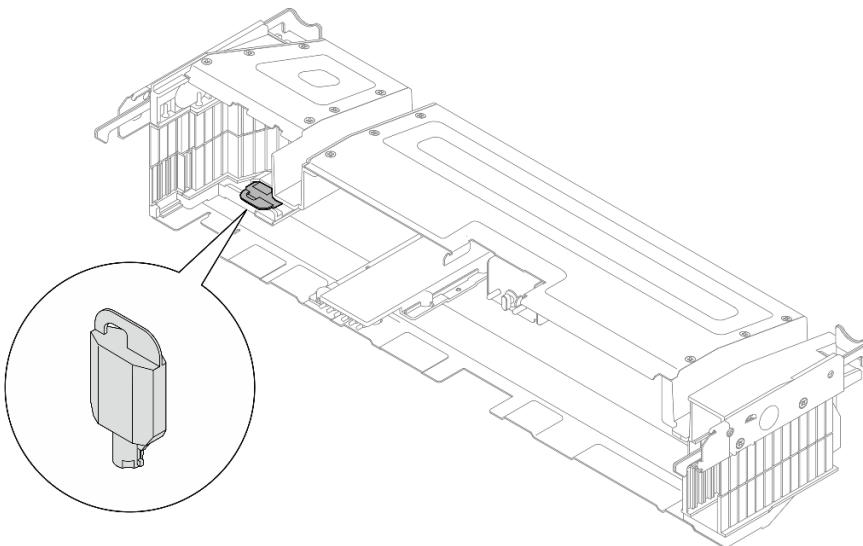


Figure 107. Security bezel key storage location

- Step 1. Align the bottom guide pins of the security bezel with the slots on the chassis, and insert the bezel hooks in the slots on both sides.

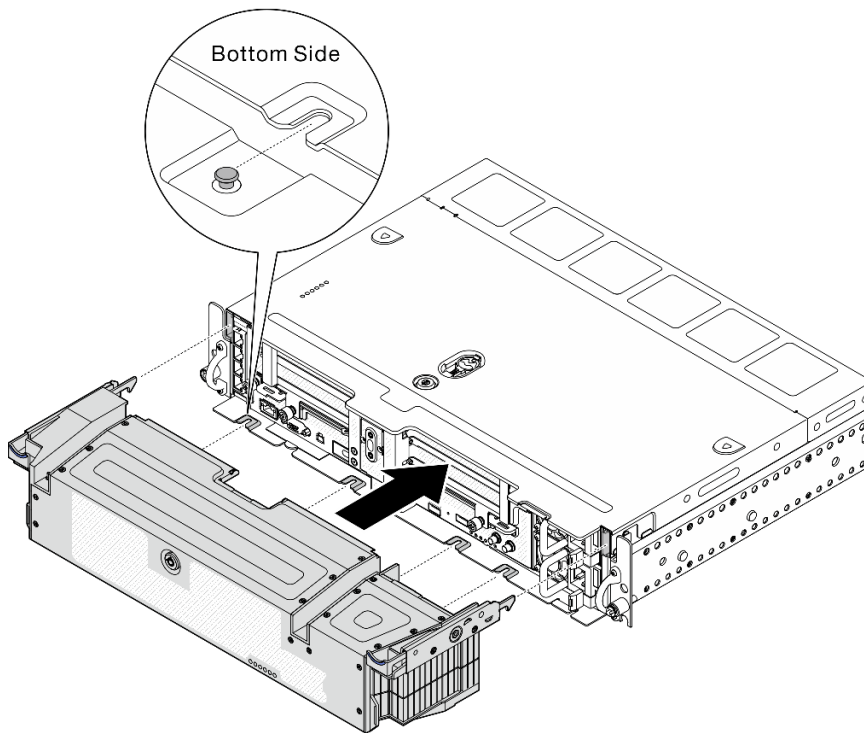


Figure 108. Installing the security bezel

Step 2. Lock the security bezel with the key.

Install the server in a rack

See this topic to learn how to install the server into a rack.

See the corresponding documents for instruction of server installation into the rack:

- [550/600mm Ball Bearing Rail Kit](#)
- [1200mm Friction Rail Kit](#)
- [Friction 2-Post Screw-in Rail Kit v2](#)
- [Wall mount](#)

Cable the server

Attach all external cables to the server. Typically, you will need to connect the server to a power source, to the data network, and to storage. In addition, you will need to connect the server to the management network.

Connect to power

Connect the server to power.

Connect to the network

Connect the server to the network.

Connect to storage

Connect the server to any storage devices.

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).

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 115](#).

Validate server setup

After powering up the server, make sure that the LEDs are lit and that they are green.

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.

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 115](#).

Chapter 4. Internal cable routing

See this topic to learn how to do cable routing that is corresponding to the planned configuration.

Attention: Follow the order when doing cable routing:

1. [“OCP Ethernet adapter” on page 117](#)
2. [Simple swap drives](#)
3. [PCIe adapters](#)
4. [PCIe risers](#)

Cable routing for the OCP 3.0 Ethernet adapter

See this topic to learn how to do cable routing for the OCP 3.0 Ethernet adapter.

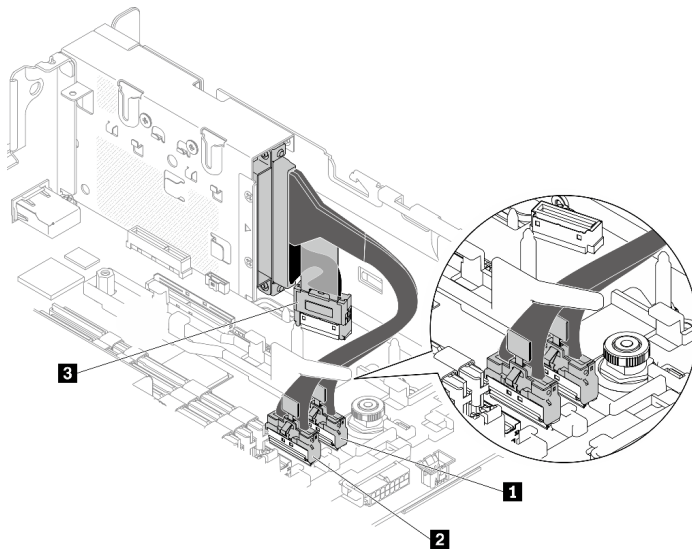


Figure 109. Cable routing for the OCP 3.0 Ethernet adapter

Table 22. Cable routing for the OCP 3.0 adapter

	From	To
1	OCP 3.0 Ethernet adapter	PCIe connector 4
2		PCIe connector 5
3		OCP connector

Proceed to [“Cable routing for GPU/FPGA adapter power” on page 125](#) if necessary.

Cable routing for trayless drives

See this topic to learn how to do the cable routing corresponding to the system configuration.

Based on the configuration, select the corresponding routing plan from the following list.

Table 23. Cable routing for the storage drives

Type of drives	Connected to		
	On-board SATA connector	RAID adapter (SAS/SATA)	On-board PCIe connector (NVMe)
Up to two trayless 15mm drives	“SATA and power cable routing” on page 118	“SAS/SATA and power cable routing” on page 119	“NVMe and power cable routing” on page 120
Up to four trayless 7mm drives	“SATA and power cable routing” on page 121	“SAS/SATA and power cable routing” on page 123	“NVMe and power cable routing” on page 124

15mm trayless drives

See this topic to learn how to do the cable routing corresponding to the system configuration.

- “15mm SATA drives with onboard SW RAID” on page 118
- “15mm SAS/SATA drives with hardware RAID adapter” on page 119
- “15mm NVMe drives” on page 120

15mm SATA drives with onboard SW RAID

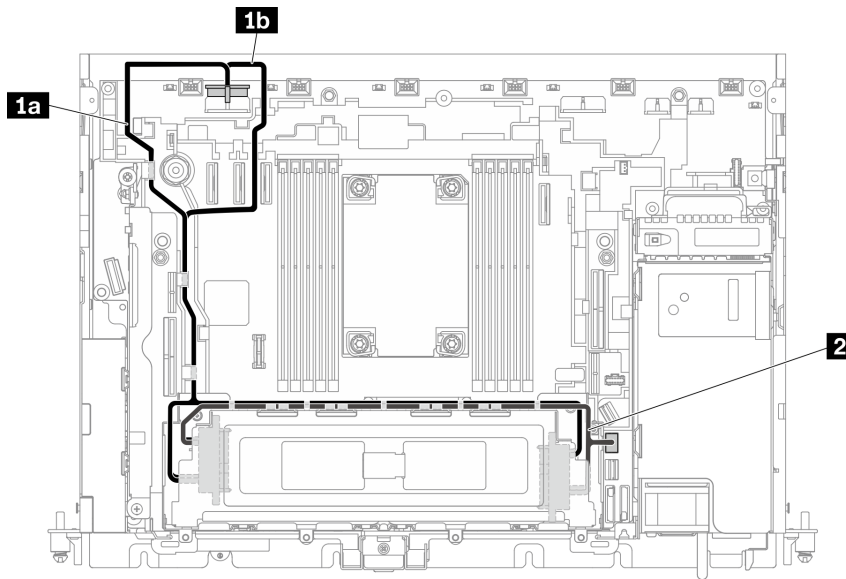


Figure 110. SATA and power cable for 15mm drives

Table 24. SATA and power cable for 15mm drives

	From	To
1	15mm drive (Drive 0)	Drive power connector 2 <ul style="list-style-type: none"> • 1a 300mm chassis • 1b 360mm chassis
2	15mm drives (Drive 0, 1)	SATA connector (0 to 3)

15mm SAS/SATA drives with hardware RAID adapter

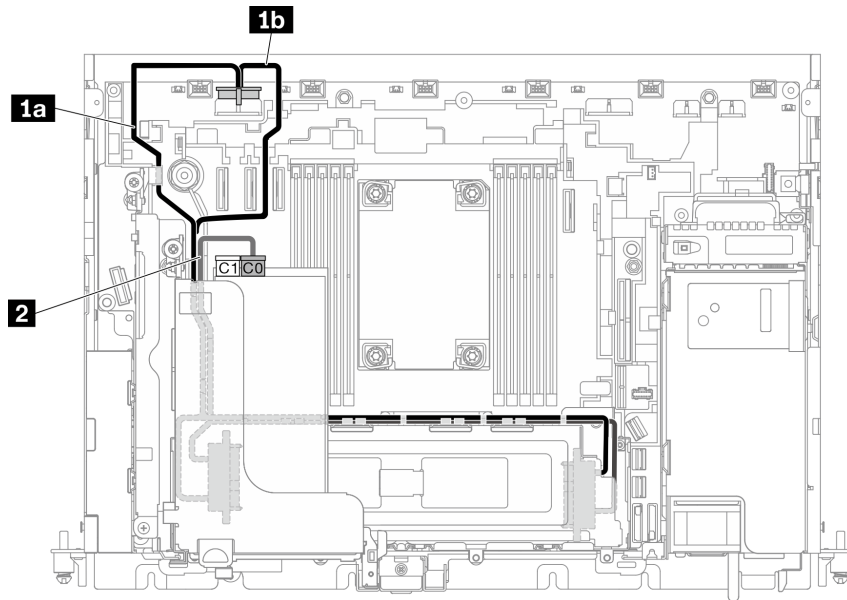


Figure 111. SAS/SATA and power cable for 15mm drives

Notes:

- The RAID adapter must be installed in Slot 6 of Riser 1.
- Connect **1a** or **1b** first, and proceed to install Riser 1 (see [“Install half-length adapters and riser assemblies”](#) on page 78), and connect **2**.

Table 25. SAS/SATA and power cable for 15mm drives

	From	To
1	15mm drives (Drive 0, 1)	Drive power connector 2 <ul style="list-style-type: none"> • 1a 300mm chassis • 1b 360mm chassis
2	15mm drives (Drive 0, 1)	C0 connector on RAID adapter (PCIe Slot 6)

15mm NVMe drives

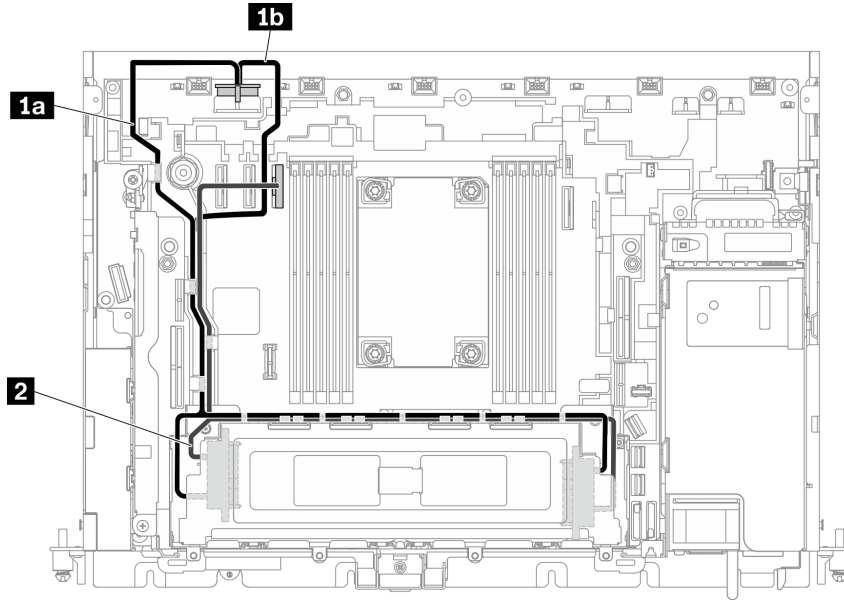


Figure 112. NVMe and power cable for 15mm drives

Table 26. NVMe and power cable for 15mm drives

	From	To
1	15mm drives (Drive 0, 1)	Drive power connector 2 <ul style="list-style-type: none"> • 1a 300mm chassis • 1b 360mm chassis
2	15mm drives (Drive 0, 1)	PCIe connector 3

Note: When routing cables along the side of the drive cage, make sure to route the **2** power cable into the clips before **1** signal cable.

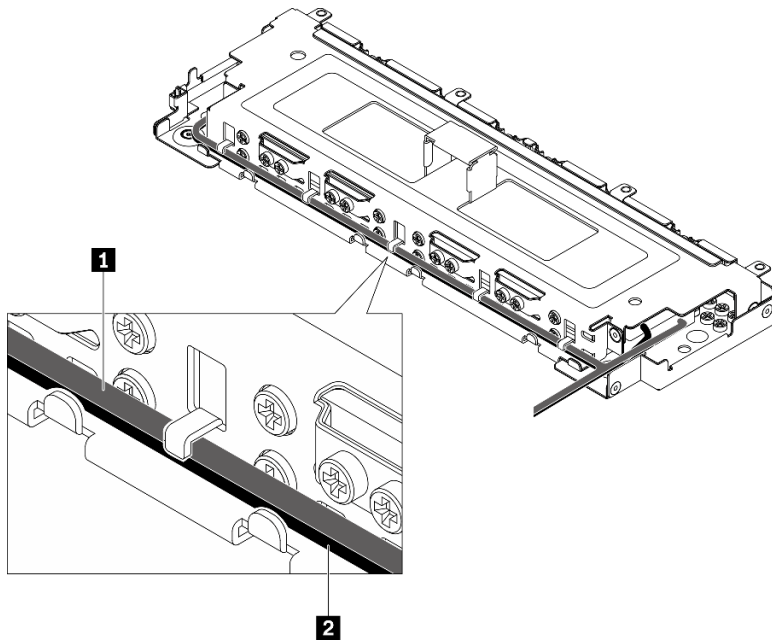


Figure 113. Cable routing along the trayless drive cage

7mm trayless drives

See this topic to learn how to do the cable routing corresponding to the system configuration.

- [“7mm SAS/SATA drives” on page 121](#)
- [“7mm NVMe drives” on page 124](#)

7mm SAS/SATA drives

Follow the cable routing plan corresponding to the planned configuration.

- [“7mm SATA drives without AnyBay drive cage \(onboard SW RAID\)” on page 122](#)
- [“7mm SATA drives with AnyBay drive cage \(onboard SW RAID\)” on page 122](#)
- [“7mm SAS/SATA drives with hardware RAID adapter” on page 123](#)

7mm SATA drives without AnyBay drive cage (onboard SW RAID)

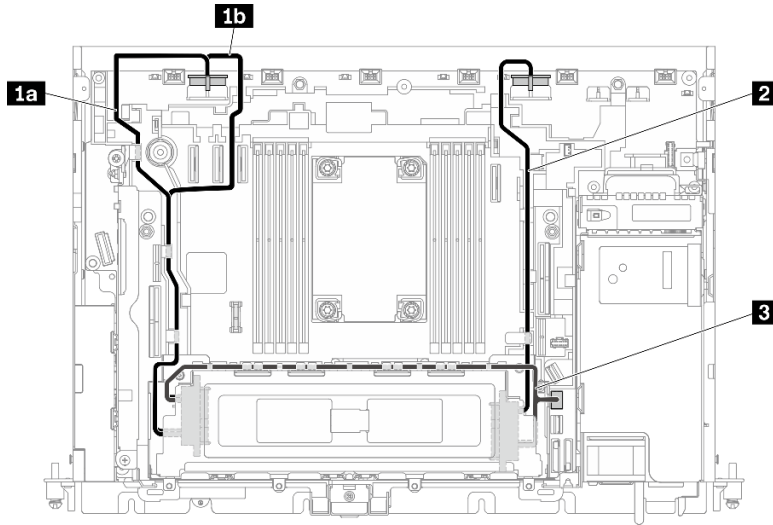


Figure 114. Cable routing for four 7mm drives (SATA, without AnyBay drive cage)

Table 27. Cable routing for four 7mm drives (SATA, without AnyBay drive cage)

	From	To
1	7mm drives (Drive 0, 2)	Drive power connector 2 <ul style="list-style-type: none"> • 1a 300mm chassis • 1b 360mm chassis
2	7mm drives (Drive 1, 3)	Drive power connector 1
3	7mm drives (Drive 0 to 3)	SATA connector (0 to 3)

7mm SATA drives with AnyBay drive cage (onboard SW RAID)

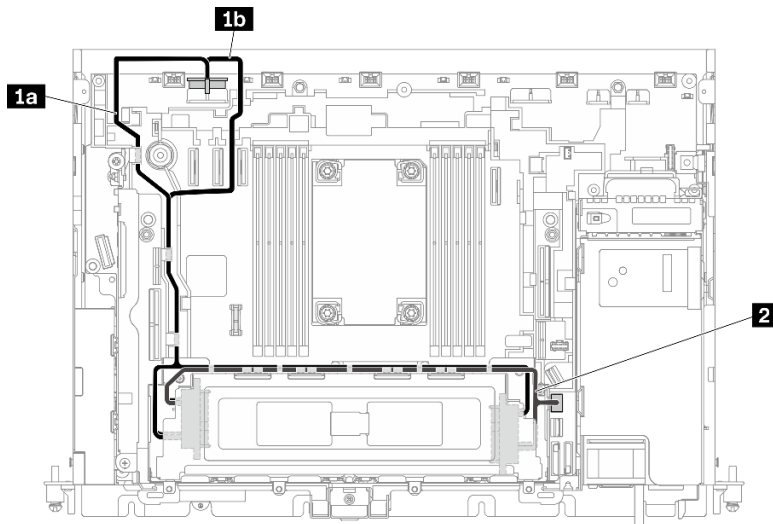


Figure 115. Cable routing for four 7mm drives (SATA, with AnyBay drive cage)

Table 28. Cable routing for four 7mm drives (SATA, with AnyBay drive cage)

	From	To
1	7mm drives (Drive 0 to 3)	Drive power connector 2 <ul style="list-style-type: none"> • 1a 300mm chassis • 1b 360mm chassis
2	7mm drives (Drive 0 to 3)	SATA connector (0 to 3)

7mm SAS/SATA drives with hardware RAID adapter

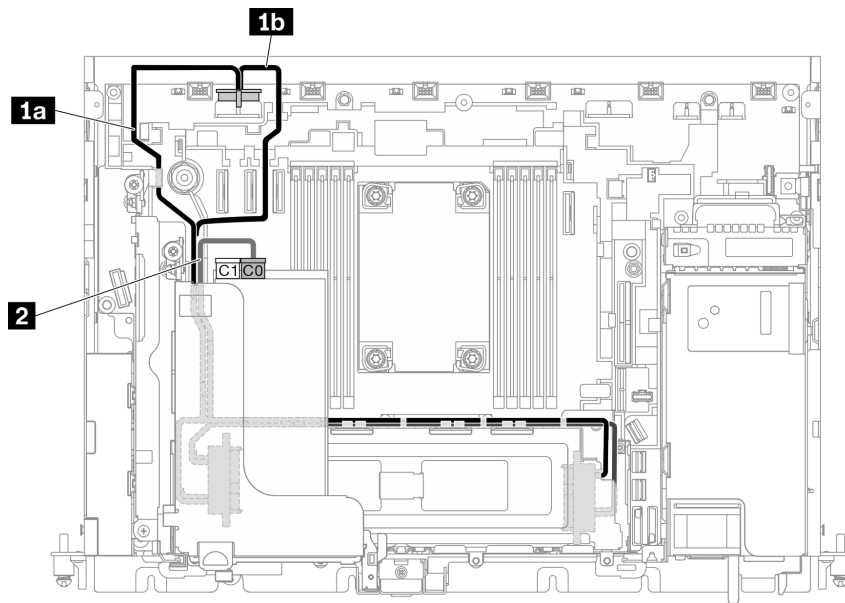


Figure 116. SAS/SATA and power cable for 7mm drives

Notes:

- The RAID adapter must be installed in Slot 6 of Riser 1.
- Connect **1a** or **1b** first, and proceed to install Riser 1 (see “Install half-length adapters and riser assemblies” on page 78), and connect **2**.

Table 29. SAS/SATA and power cable for 7mm drives

	From	To
1	7mm drives (Drive 0 to 3)	Drive power connector 2 <ul style="list-style-type: none"> • 1a 300mm chassis • 1b 360mm chassis
2	7mm drives (Drive 0 to 3)	C0 connector on RAID adapter (PCIe Slot 6)

Note: When routing cables along the side of the drive cage, make sure to route the **2** power cable into the clips before **1** signal cable.

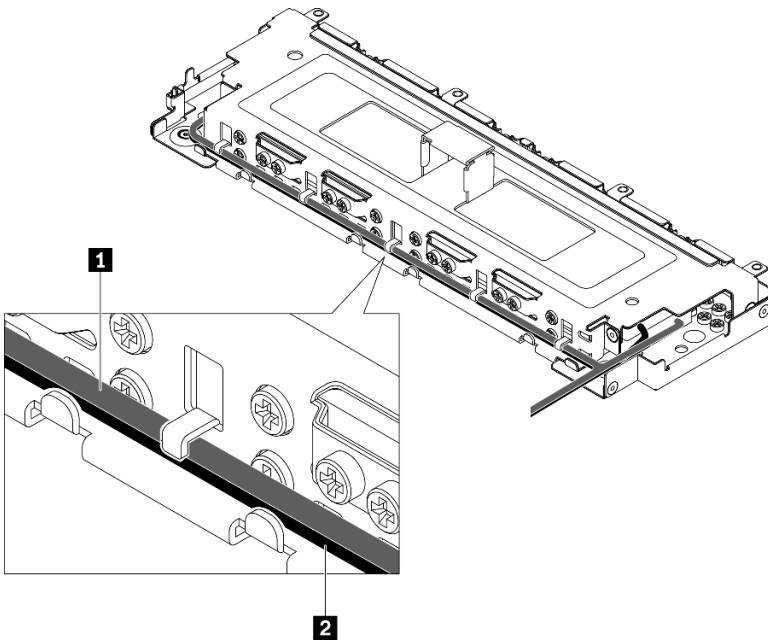


Figure 117. Cable routing along the trayless drive cage

7mm NVMe drives

Follow the cable routing plan corresponding to the planned configuration.

- [“One or two 7mm NVMe drives” on page 124](#)
- [“Three or four 7mm NVMe drives” on page 125](#)

One or two 7mm NVMe drives

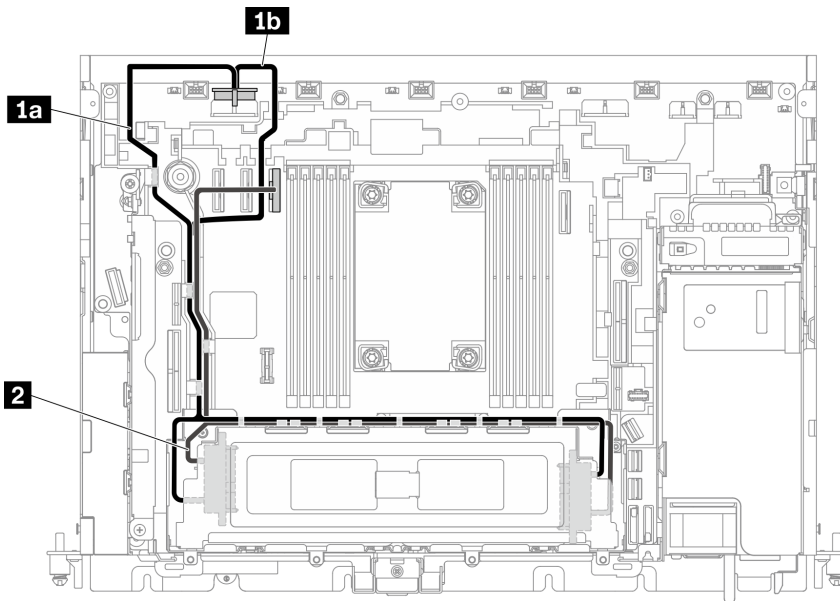


Figure 118. Cable routing for one or two 7mm drives (NVMe)

Table 30. Cable routing for one or two 7mm drives (NVMe)

	From	To
1	7mm drives (Drive 0, 1)	Drive power connector 2 <ul style="list-style-type: none"> • 1a 300mm chassis • 1b 360mm chassis
2	7mm drives (Drive 0, 1)	PCIe connector 3

Three or four 7mm NVMe drives

Note: When adopting this plan, hot-swap drive cage in riser 2 is not supported.

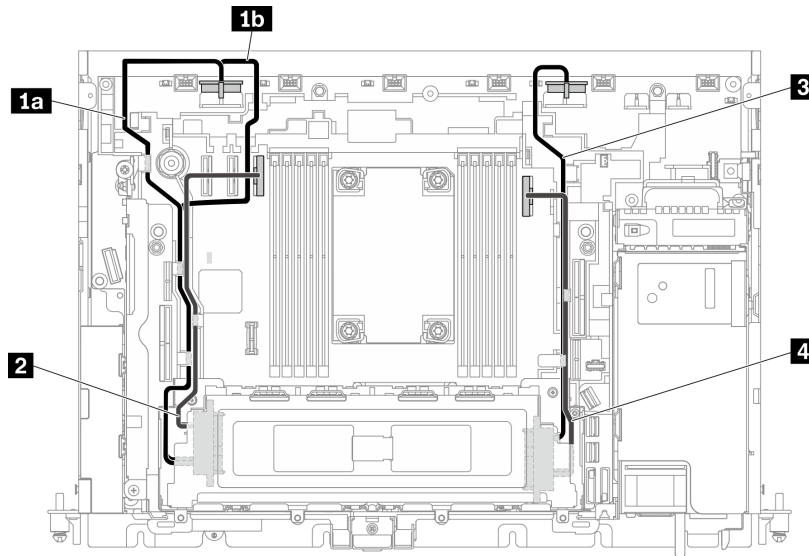


Figure 119. Cable routing for three or four 7mm drives (NVMe)

Table 31. Cable routing for three or four 7mm drives (NVMe)

	From	To
1	7mm drives (Drive 0, 2)	Drive power connector 2 <ul style="list-style-type: none"> • 1a 300mm chassis • 1b 360mm chassis
2		PCIe connector 3
3	7mm drives (Drive 1, 3)	Drive power connector 1
4		PCIe connector 2

Cable routing for GPU/FPGA adapter power

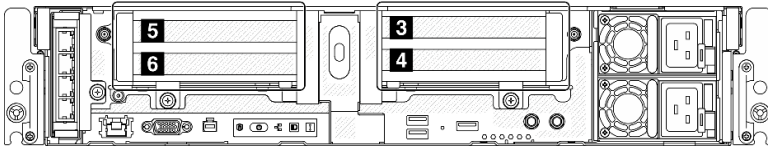
See this topic to learn how to do cable routing for GPU adapter or FPGA adapter power.

See the topic corresponding to the server configuration.

300mm chassis	<ul style="list-style-type: none"> • “FPGA adapter power cable routing” on page 126
360mm chassis	<ul style="list-style-type: none"> • “FPGA adapter power cable routing” on page 130 • “Full-length GPU adapter power cable routing” on page 135

Adapter power cable routing in 300mm chassis

FPGA power cable routing



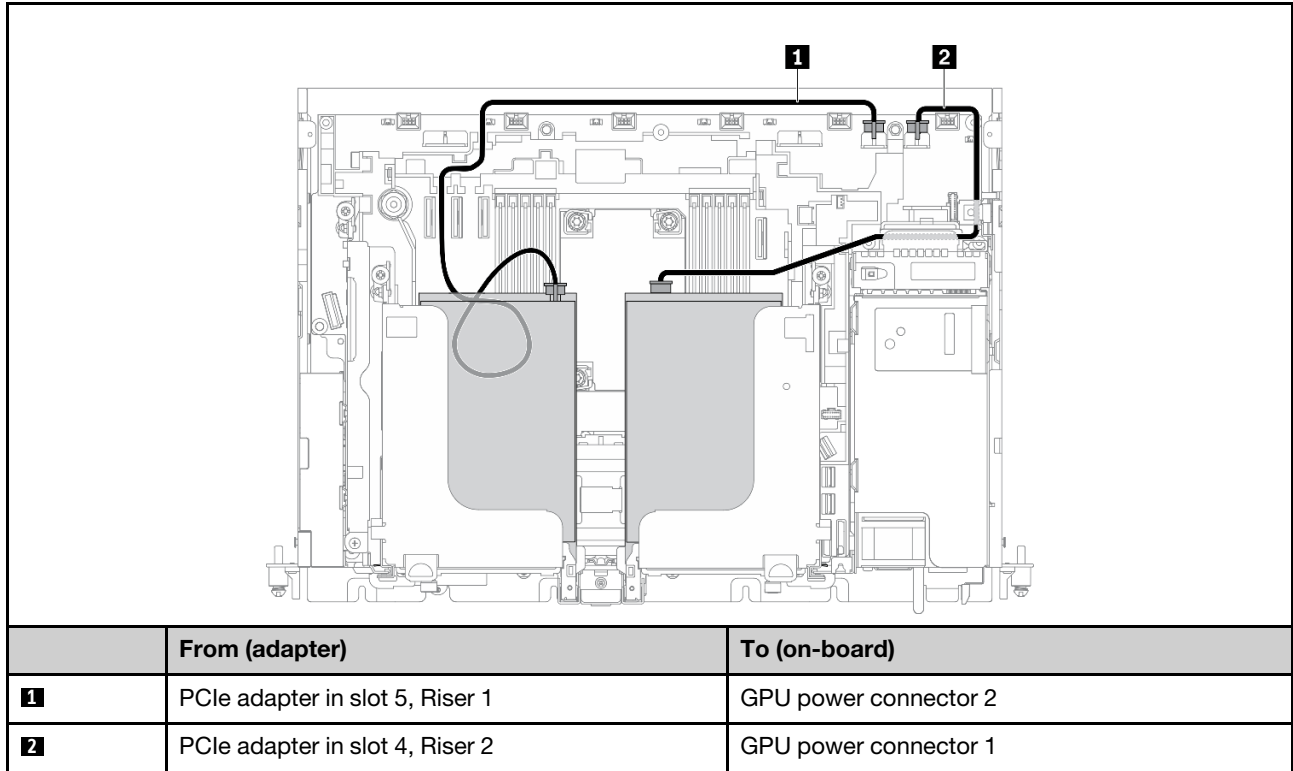
FPGA adapter installation order: Slot 4 >> 3 >> 5 >> 6

Table 32. 300mm chassis configurations

Configuration	Riser 1		Riser 2	
	Slot	Adapter	Slot	Adapter
“x16/x8 + x8/x16” on page 127	Slot 5	x16 PCIe adapter	Slot 3	x8 PCIe adapter
	Slot 6	x8 PCIe adapter	Slot 4	x16 PCIe adapter
“x16/x16 + x16/x16” on page 128	Slot 5	x16 PCIe adapter	Slot 3	x16 PCIe adapter
	Slot 6	x16 PCIe adapter	Slot 4	x16 PCIe adapter
“x16 + x16” on page 127	Slot 5	x16 PCIe adapter	Slot 3	NA
	Slot 6	NA	Slot 4	x16 PCIe adapter
“x16/x16 + x8/x16” on page 128	Slot 5	x16 PCIe adapter	Slot 3	x8 PCIe adapter
	Slot 6	x16 PCIe adapter	Slot 4	x16 PCIe adapter
“x16 + AnyBay” on page 129	Slot 5	x16 PCIe adapter	Slot 3	AnyBay drive cage
	Slot 6	NA	Slot 4	
“x16/x16 + AnyBay” on page 130	Slot 5	x16 PCIe adapter	Slot 3	AnyBay drive cage
	Slot 6	x16 PCIe adapter	Slot 4	
“x16/x8 + AnyBay” on page 129	Slot 5	x16 PCIe adapter	Slot 3	AnyBay drive cage
	Slot 6	x8 PCIe adapter	Slot 4	

[x16/x8 + x8/x16] or [x16 + x16]

Table 33. Power cable routing for FPGA adapters

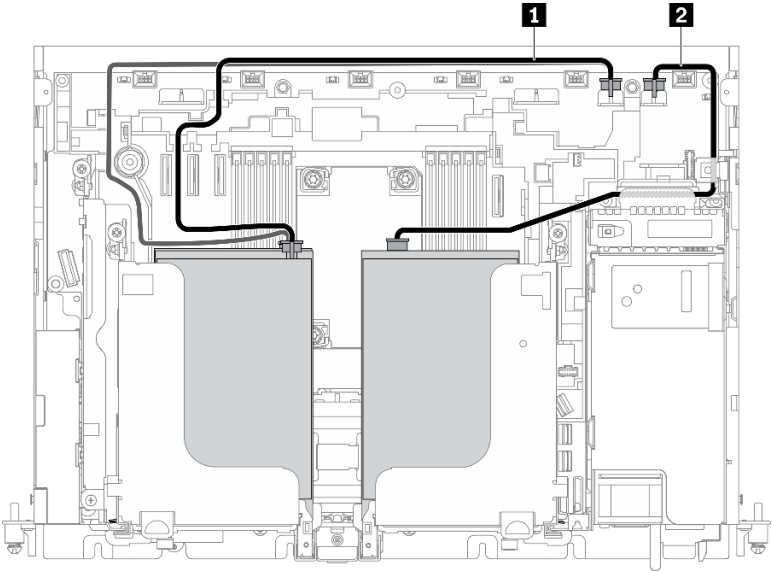


For x16/x8 + x8/x16 configuration, proceed to [“Riser cable routing for x16/x8 + x8/x16”](#) on page 138 to connect the riser cables.

No riser cable is required for x16 + x 16 configuration.

x16/x16 + x16/x16

Table 34. Power cable routing for FPGA adapters

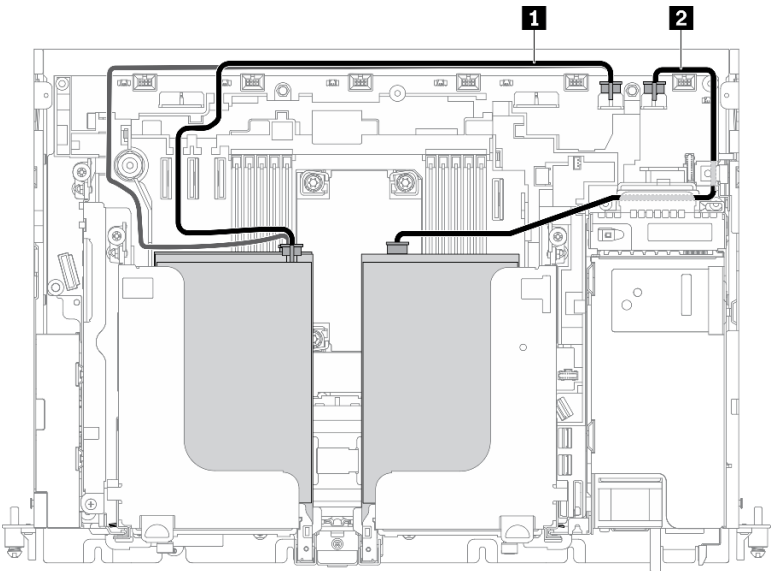


	From (adapter)	To (on-board)
1	PCIe adapters in slot 5 and 6, Riser 1	GPU power connector 2
2	PCIe adapters in slot 3 and 4, Riser 2	GPU power connector 1

Proceed to [“Riser cable routing for x16/x16 + x16/x16” on page 139](#) to connect the riser cables.

x16/x16 + x8/x16

Table 35. Power cable routing for FPGA adapters



	From (adapter)	To (on-board)
--	----------------	---------------

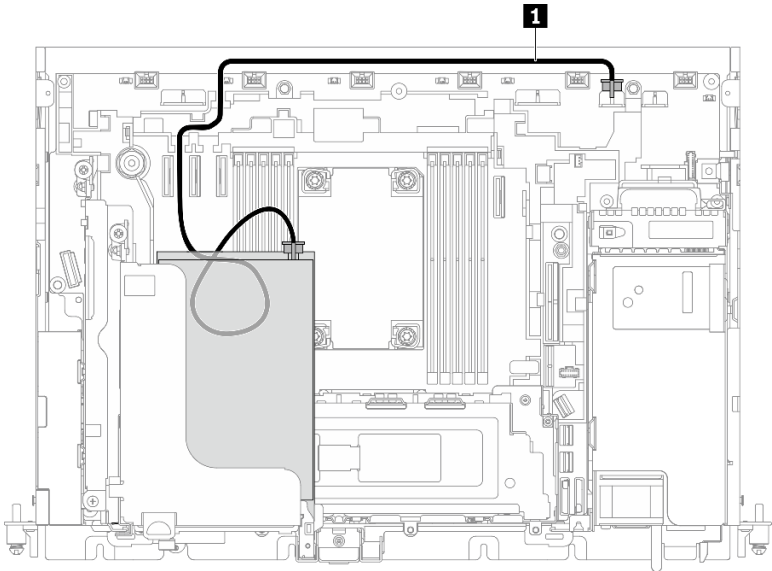
Table 35. Power cable routing for FPGA adapters (continued)

1	PCIe adapters in slot 5 and 6, Riser 1	GPU power connector 2
2	PCIe adapter in slot 4, Riser 2	GPU power connector 1

Proceed to [“Riser cable routing for x16/x16 + x8/x16” on page 143](#) to connect the riser cables.

[x16+ AnyBay] or [x16/x8+ AnyBay]

Table 36. Power cable routing for FPGA adapters

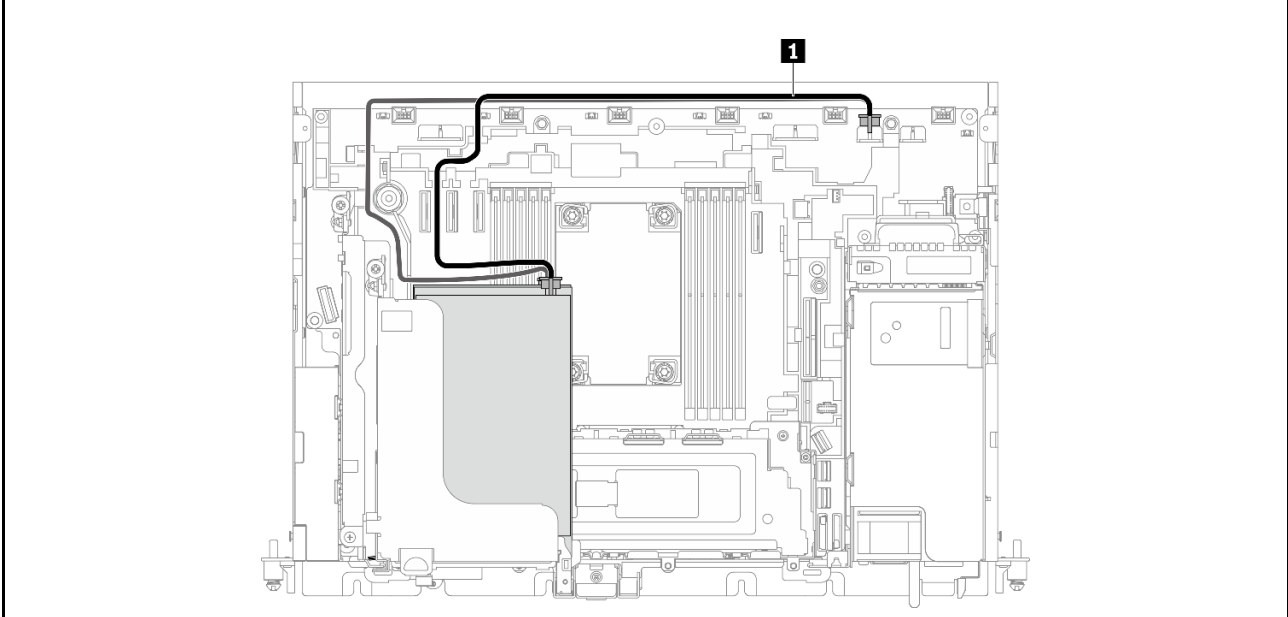
		
	From (adapter)	To (on-board)
1	PCIe adapter in slot 5, Riser 1	GPU power connector 2

Proceed to the corresponding section to connect the riser cables.

- [“Riser cable routing for x16 + AnyBay” on page 147](#)
- [“Riser cable routing for x16/x8 + AnyBay” on page 153](#)

x16/x16 + AnyBay

Table 37. Power cable routing for FPGA adapters

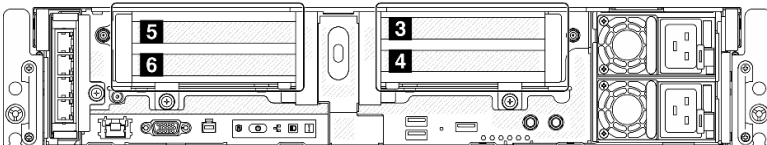


	From (adapter)	To (on-board)
1	PCIe adapters in slot 5 and 6, Riser 1	GPU power connector 2

Proceed to [“Riser cable routing for x16/x16 + AnyBay” on page 149](#) to connect the riser cables.

Adapter power cable routing in 360mm chassis

FPGA adapter power cable routing



FPGA adapter installation order: Slot 4 >> 3 >> 5 >> 6

Table 38. 360mm chassis configurations

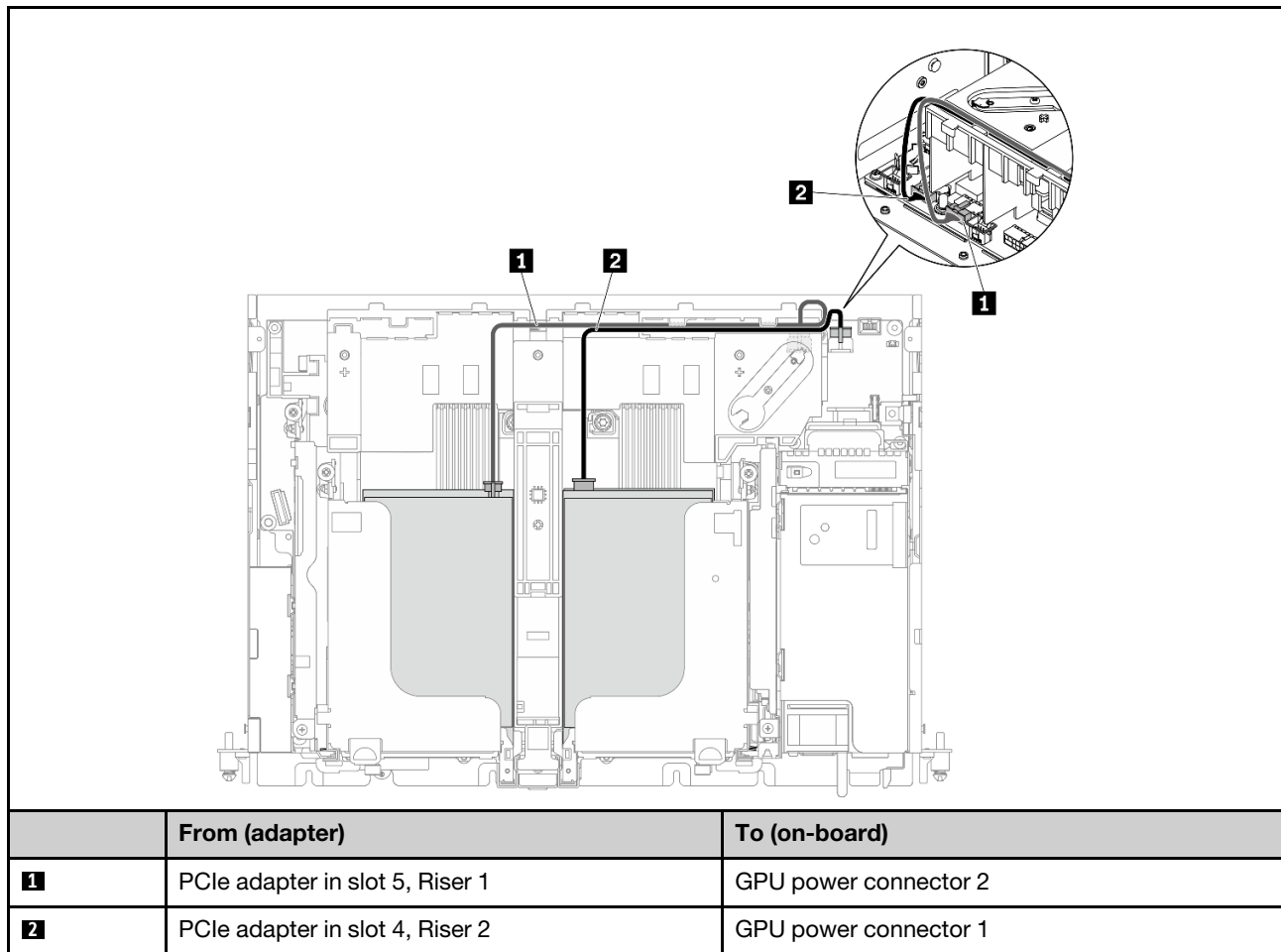
Configuration	Riser 1		Riser 2	
	“x16 + x16” on page 131	Slot 5	x16 PCIe adapter	Slot 3
Slot 6		NA	Slot 4	x16 PCIe adapter
“x16 + AnyBay” on page 132	Slot 5	x16 PCIe adapter	Slot 3	AnyBay drive cage
	Slot 6	NA	Slot 4	
“x16/x16 + x8/x16” on page 133	Slot 5	x16 PCIe adapter	Slot 3	x8 PCIe adapter
	Slot 6	x16 PCIe adapter	Slot 4	x16 PCIe adapter
“x16/x16 + x16” on page 133	Slot 5	x16 PCIe adapter	Slot 3	NA

Table 38. 360mm chassis configurations (continued)

	Slot 6	x16 PCIe adapter	Slot 4	x16 PCIe adapter
“x16/x8 + AnyBay” on page 132	Slot 5	x16 PCIe adapter	Slot 3	AnyBay drive cage
	Slot 6	x8 PCIe adapter	Slot 4	
“x16/x16 + AnyBay” on page 134	Slot 5	x16 PCIe adapter	Slot 3	AnyBay drive cage
	Slot 6	x16 PCIe adapter	Slot 4	
“x16/x8 + x8/x16” on page 131	Slot 5	x16 PCIe adapter	Slot 3	x8 PCIe adapter
	Slot 6	x8 PCIe adapter	Slot 4	x16 PCIe adapter
“x16/x16 + x16/x16” on page 135	Slot 5	x16 PCIe adapter	Slot 3	x16 PCIe adapter
	Slot 6	x16 PCIe adapter	Slot 4	x16 PCIe adapter

[x16 + x16] or [x16/x8 + x8/x16]

Table 39. Power cable routing for FPGA adapters

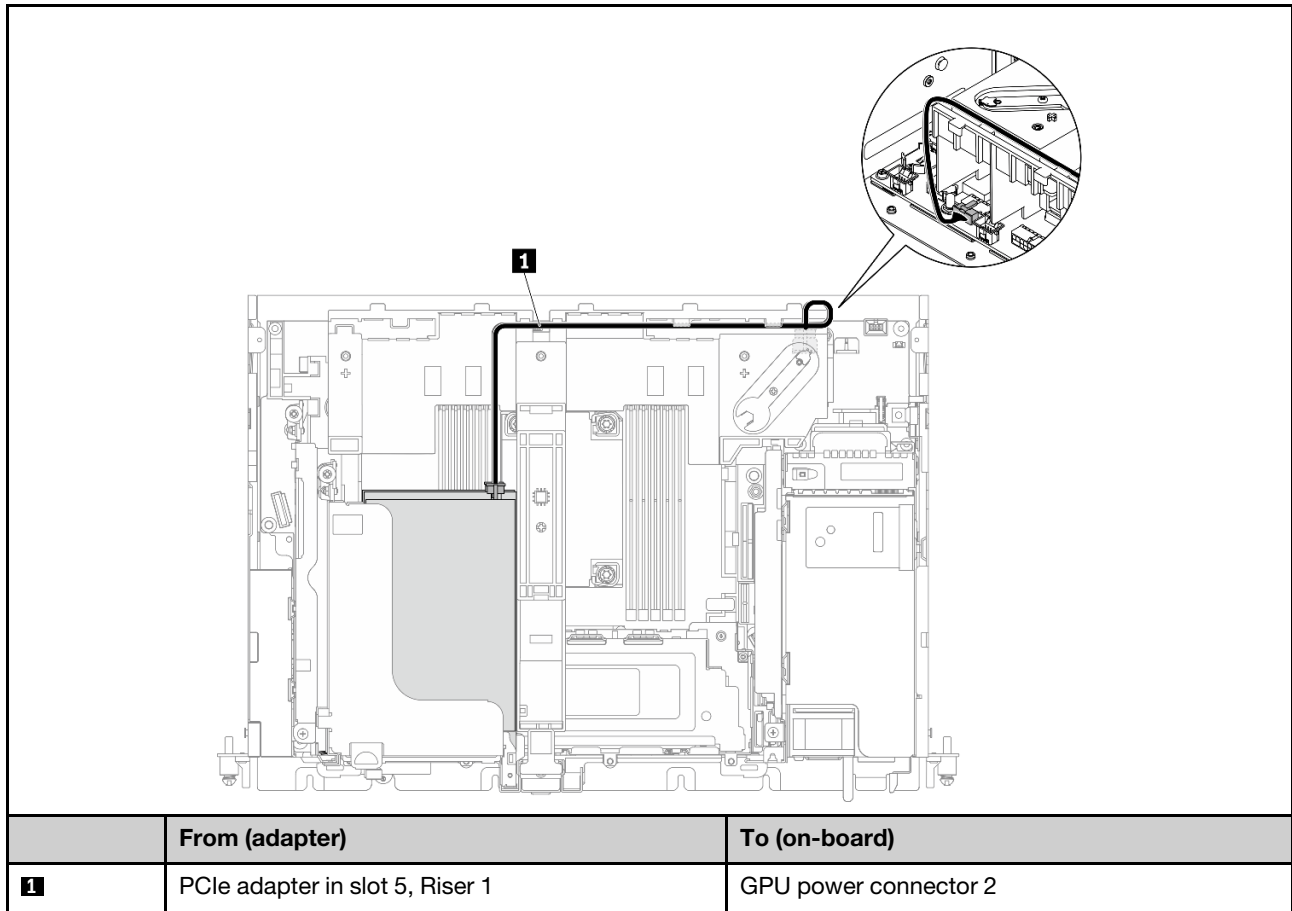


For x16/x8 + x8/x16 configuration, proceed to “Riser cable routing for x16/x8 + x8/x16” on page 138 to connect the riser cables.

No riser cable is required for x16 + x 16 configuration.

[x16 + AnyBay] or [x16/x8 + AnyBay]

Table 40. Power cable routing for FPGA adapters

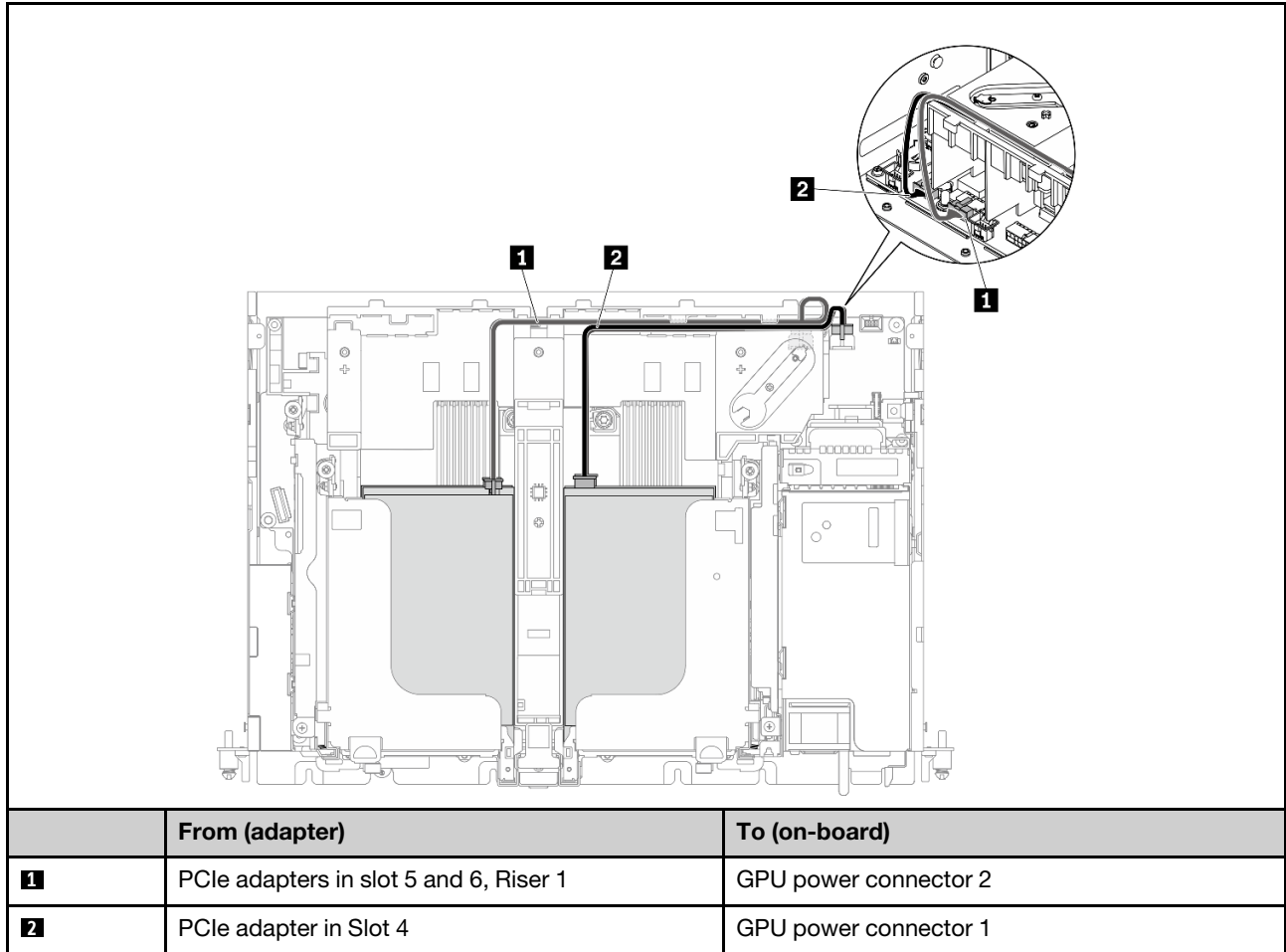


Proceed to the corresponding section to connect the riser cables.

- [“Riser cable routing for x16 + AnyBay” on page 147](#)
- [“Riser cable routing for x16/x8 + AnyBay” on page 153](#)

[x16/x16 + x8/x16] or [x16/x16 + x16]

Table 41. Power cable routing for FPGA adapters

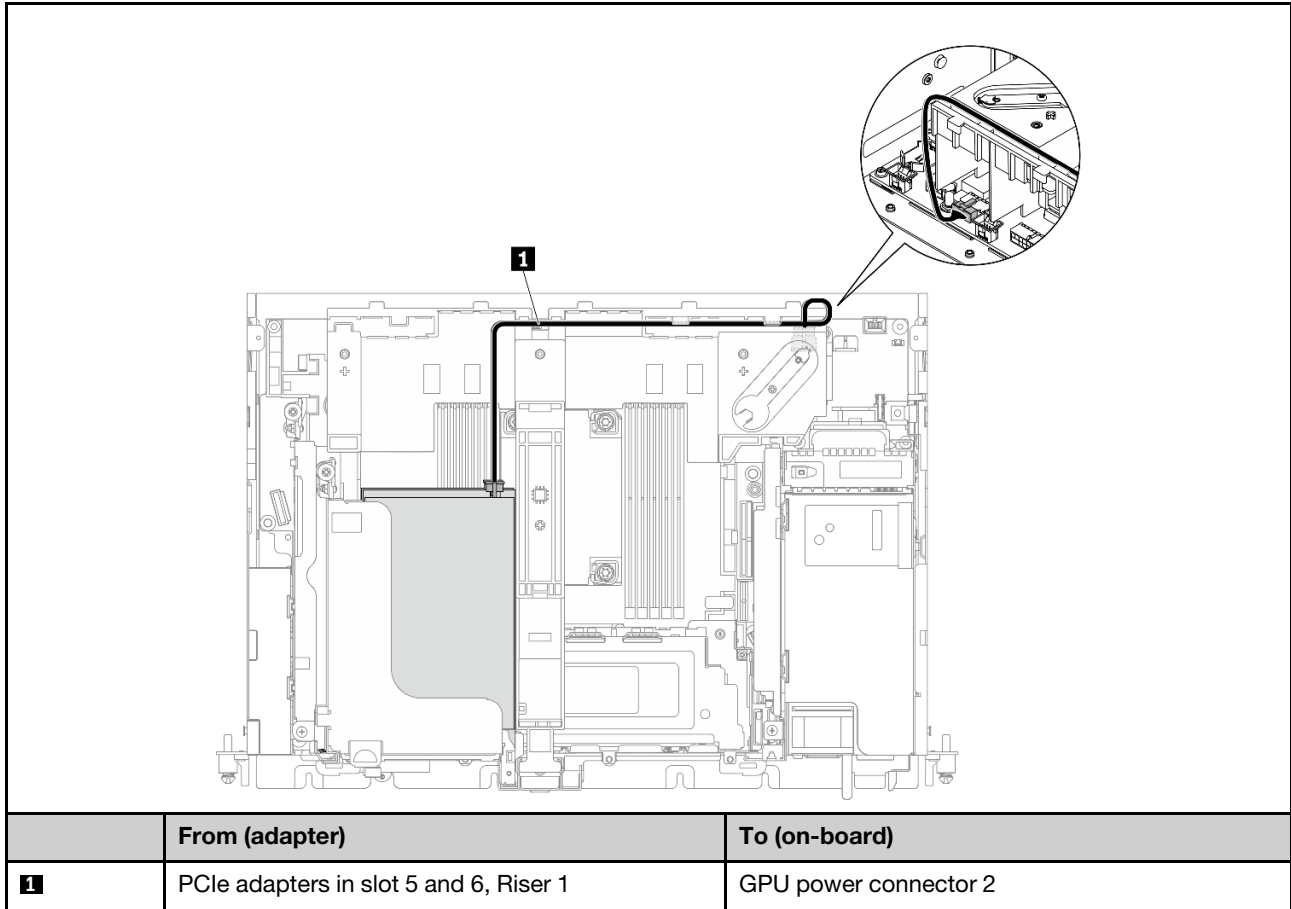


Proceed to the corresponding section to connect the riser cables.

- [“Riser cable routing for x16/x16 + x8/x16” on page 143](#)
- [“Riser cable routing for x16/x16 + x16” on page 142](#)

x16/x16 + AnyBay

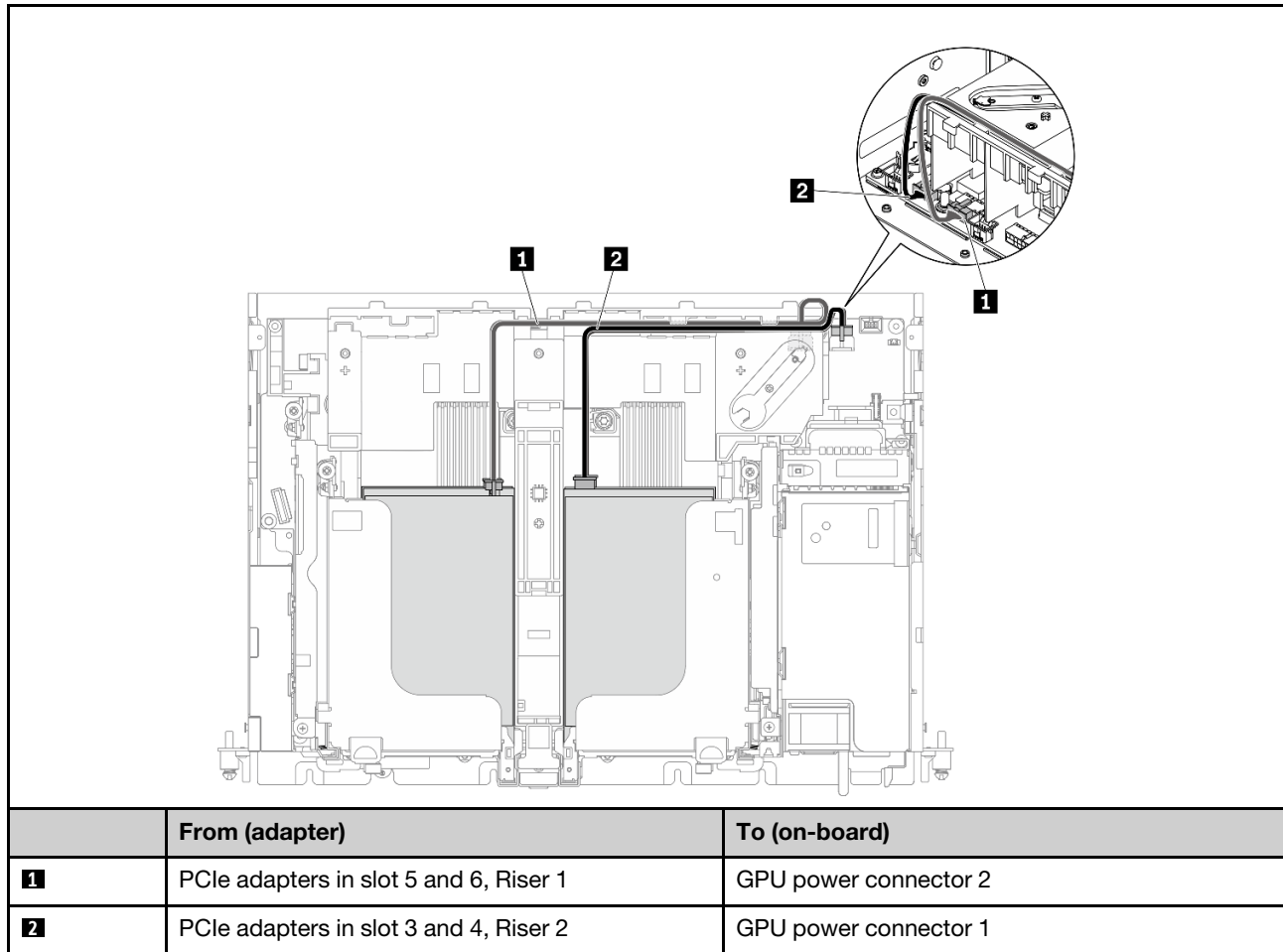
Table 42. Power cable routing for FPGA adapters



Proceed to [“Riser cable routing for x16/x16 + AnyBay”](#) on page 149 to connect the riser cables.

x16/x16 + x16/x16

Table 43. Power cable routing for FPGA adapters



Proceed to [“Riser cable routing for x16/x16 + x16/x16”](#) on page 139 to connect the riser cables.

Full-length GPU power cable routing

- Double-width full-length GPU adapter is supported in PCIe Slot 4, Slot 5. (Installation order: Slot 4 >> 5.)
- ThinkSystem Intel Flex 170 16GB Gen4 Passive GPU is supported in PCIe slots in the following configurations:
 - x16/x16 + x8/x16: Slot 3
 - x16/x8 + AnyBay: Slot 6
 - x16/x8 + x8/x16: Slot 6, Slot 3 (Installation order: Slot 6 >> 3)
 - x16/x16 + x16/x16: Slot 3

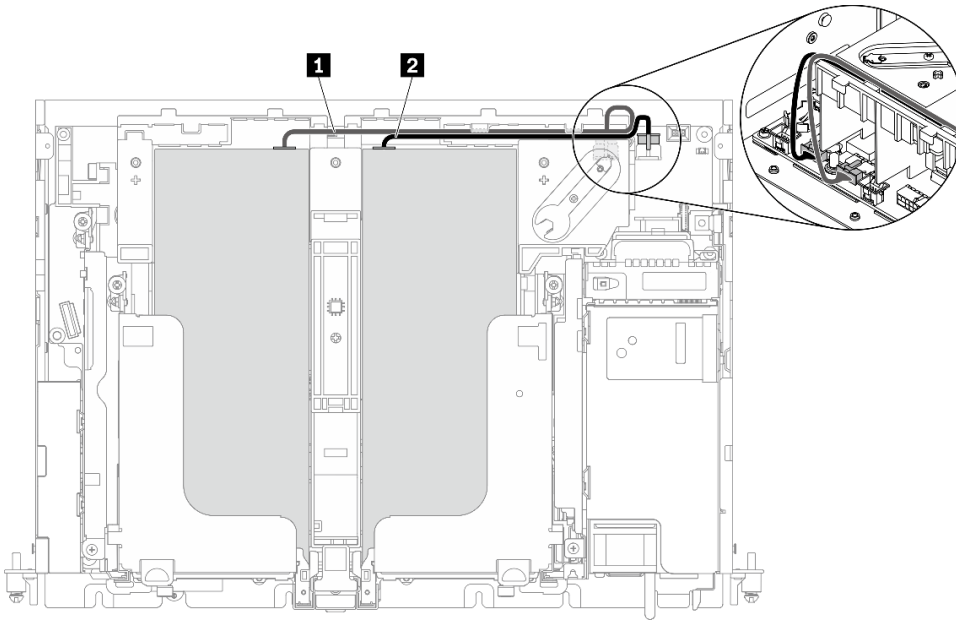


Figure 120. Cable routing for full-length GPU power cables

Notes:

- Make sure **1** goes on top of **2**.
- Make sure to secure the power cables along the channel on the air baffle.

Table 44. Power cable routing for adapters

	From	To
1	GPU in Slot 5 or Slot 6, Riser 1	GPU power connector 2
2	GPU in Slot 4 or Slot 3, Riser 2	GPU power connector 1

Proceed to corresponding section in “[Cable routing for PCIe riser assemblies and hot-swap drives](#)” on page 136 to connect the riser cables.

Cable routing for PCIe riser assemblies and hot-swap drives

See this topic to learn how to do cable routing for the PCIe riser assemblies and hot-swap drives.

Attention: For 300mm chassis, make sure to complete adapter cable routing before proceeding to riser cable routing (see “[Cable routing for GPU/FPGA adapter power](#)” on page 125).

Choose the routing plan from the following table according to the planned configuration.

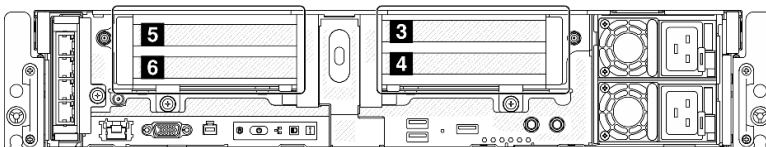


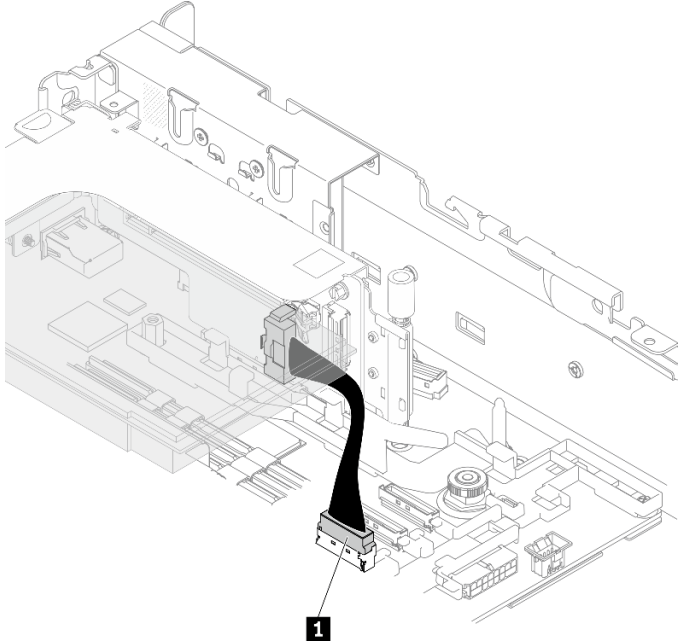
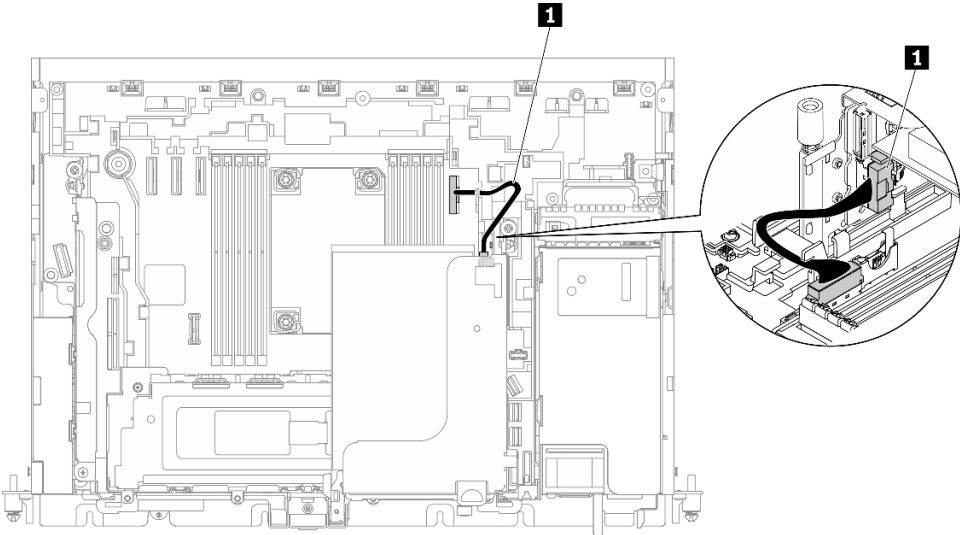
Table 45. Riser configurations and cable routing plans

Configuration	Riser 1		Riser 2	
“x16/x8 + x8x/16” on page 138	Slot 5	x16 PCIe adapter	Slot 3	x8 PCIe adapter
	Slot 6	x8 PCIe adapter	Slot 4	x16 PCIe adapter
“x16/x16 + x16/x16” on page 139	Slot 5	x16 PCIe adapter	Slot 3	x16 PCIe adapter
	Slot 6	x16 PCIe adapter	Slot 4	x16 PCIe adapter
“x16/x16 + x16” on page 142	Slot 5	x16 PCIe adapter	Slot 3	NA
	Slot 6	x16 PCIe adapter	Slot 4	x16 PCIe adapter
x16 + x16 *	Slot 5	x16 PCIe adapter	Slot 3	NA
	Slot 6	NA	Slot 4	x16 PCIe adapter
“x16/x16 + x8/x16” on page 143	Slot 5	x16 PCIe adapter	Slot 3	x8 PCIe adapter
	Slot 6	x16 PCIe adapter	Slot 4	x16 PCIe adapter
“x16/x16 + DW FL GPU” on page 145	Slot 5	x16 PCIe adapter	Slot 4	Double-width full-length GPU adapter
	Slot 6	x16 PCIe adapter		
“DW FL GPU + DW FL GPU” on page 146	Slot 5	Double-width full-length GPU adapter	Slot 4	Double-width full-length GPU adapter
“x16 + AnyBay” on page 147	Slot 5	x16 PCIe adapter	Slot 3	AnyBay drive cage
	Slot 6	NA	Slot 4	
“x16/x16 + AnyBay” on page 149	Slot 5	x16 PCIe adapter	Slot 3	AnyBay drive cage
	Slot 6	x16 PCIe adapter	Slot 4	
“x16/x8 + AnyBay” on page 153	Slot 5	x16 PCIe adapter	Slot 3	AnyBay drive cage
	Slot 6	x8 PCIe adapter	Slot 4	

* No riser cable is required for this configuration.

x16/x8 + x8x/16

Table 46. Cable routing for x16/x8 (Riser 1) + x8/x16 (Riser 2)

Riser 1 (x16/x8)		
		
	From (riser)	To (on-board)
1	Riser-card connector 2 (Vertical)	PCIe connector 3
Riser 2 (x8/x16)		
		
	From (riser)	To (on-board)
1	Riser-card connector 0 (Vertical)	PCIe connector 2

x16/x16 + x16/x16

- Table 47 “x16/x16 + x16/x16 (300mm chassis)” on page 139
- Table 48 “x16/x16 + x16/x16 (360mm chassis)pics” on page 140

Table 47. Cable routing for x16/x16 (Riser 1) + x16/x16 (Riser 2)

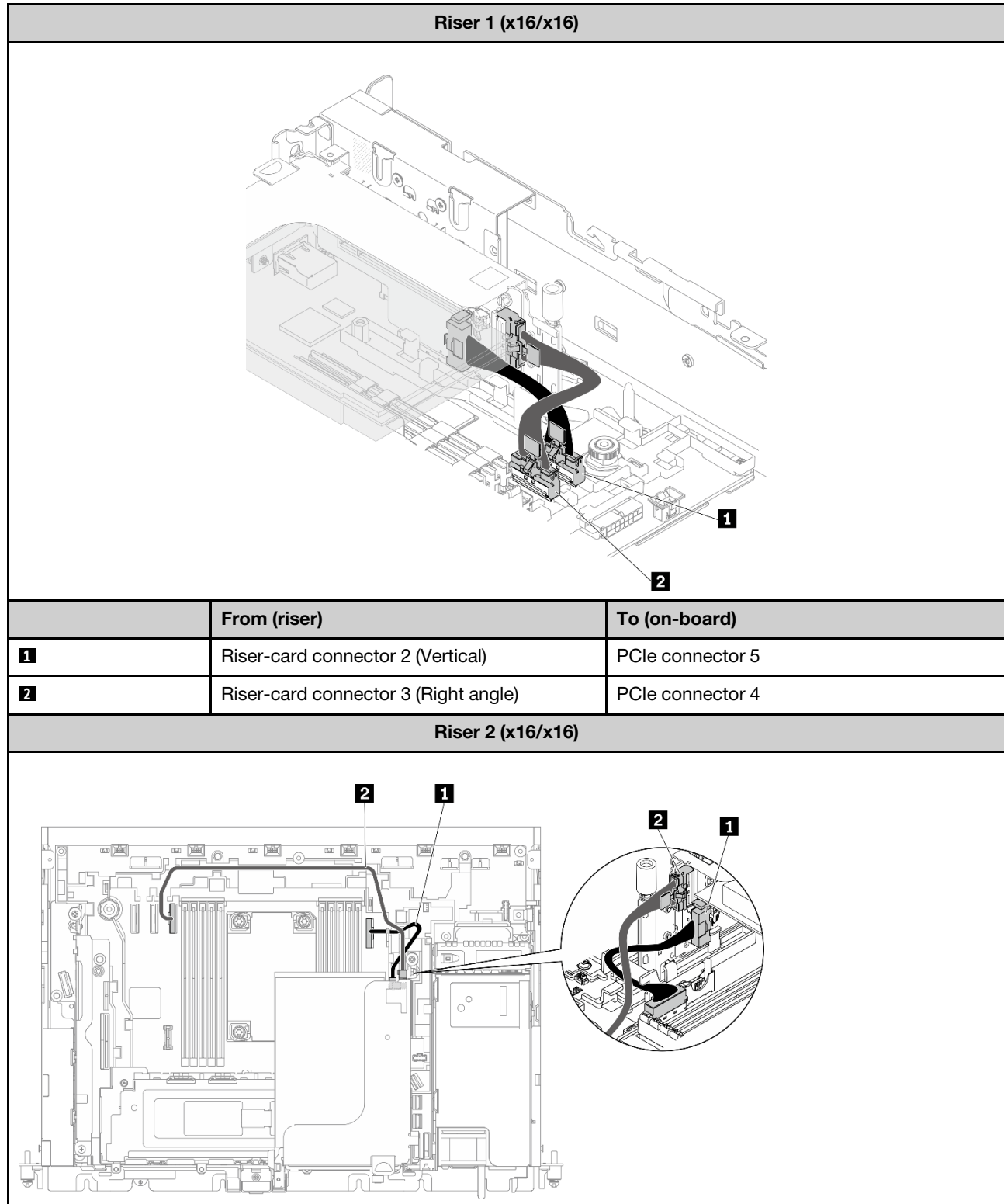


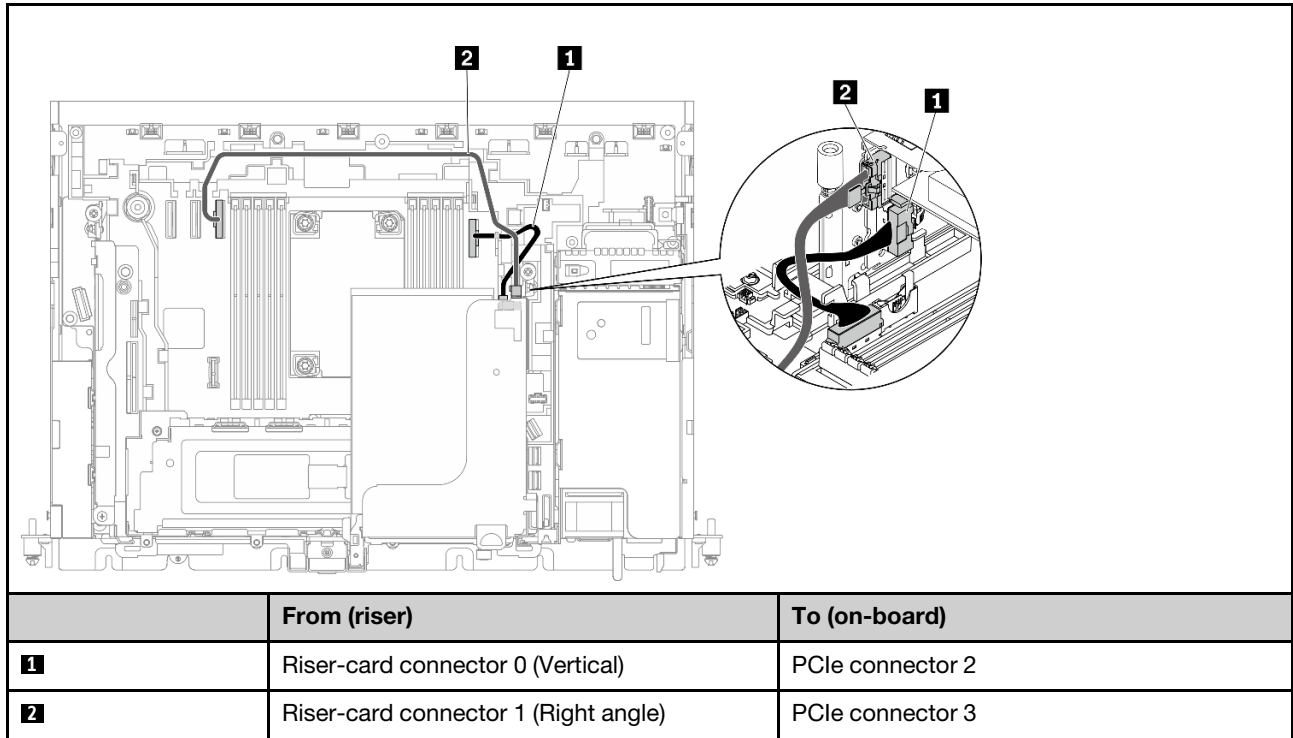
Table 47. Cable routing for x16/x16 (Riser 1) + x16/x16 (Riser 2) (continued)

	From (riser)	To (on-board)
1	Riser-card connector 0 (Vertical)	PCIe connector 2
2	Riser-card connector 1 (Right angle)	PCIe connector 3

Table 48. Cable routing for x16/x16 (Riser 1) + x16/x16 (Riser 2)

Riser 1 (x16/x16)		
	From (riser)	To (on-board)
1	Riser-card connector 2 (Vertical)	PCIe connector 5
2	Riser-card connector 3 (Right angle)	PCIe connector 4
Riser 2 (x16/x16)		

Table 48. Cable routing for x16/x16 (Riser 1) + x16/x16 (Riser 2) (continued)



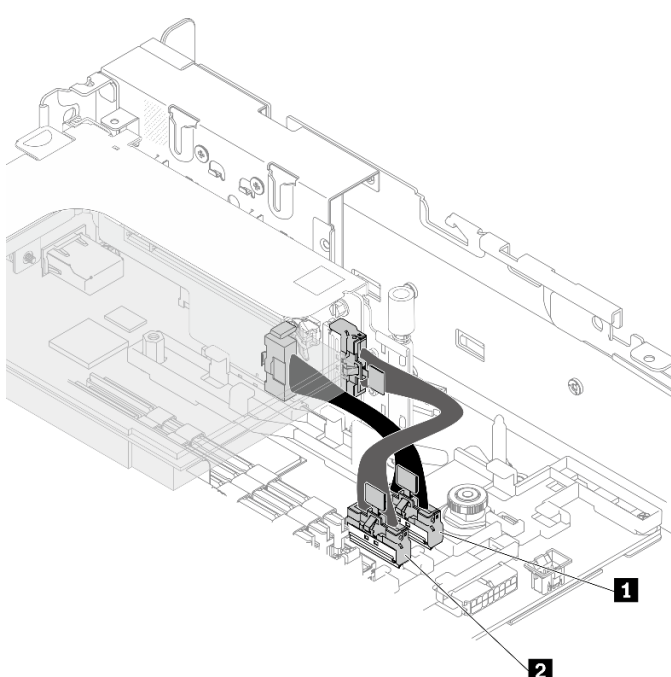
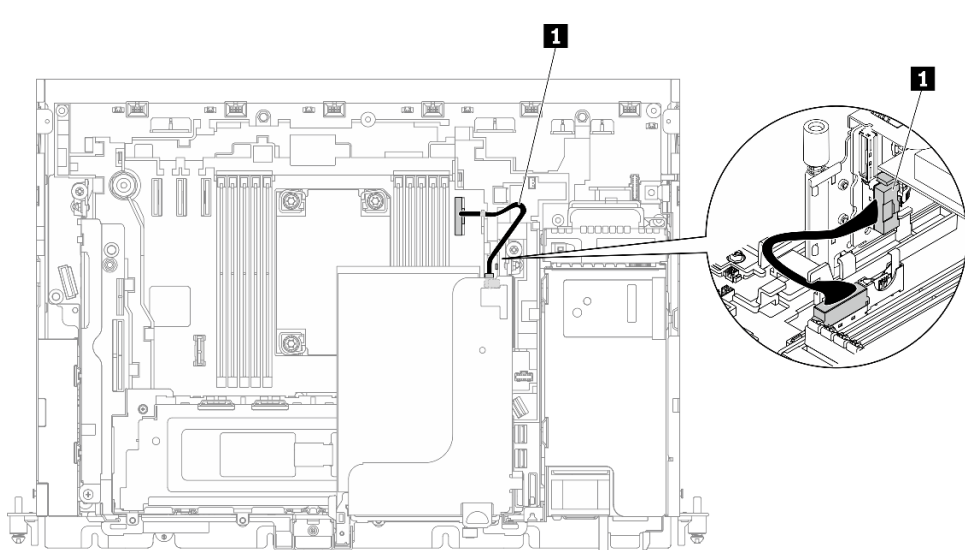
x16/x16 + x16

Table 49. Cable routing for x16/x16 (Riser 1) + x16 (Riser 2)

Riser 1 (x16/x16)		
	From (riser)	To (on-board)
1	Riser-card connector 2 (Vertical)	PCIe connector 5
2	Riser-card connector 3 (Right angle)	PCIe connector 4
Riser 2 (x16)		
No cable is required here.		

x16/x16 + x8/x16

Table 50. Cable routing for x16/x16 (Riser 1) + x8/x16 (Riser 2)

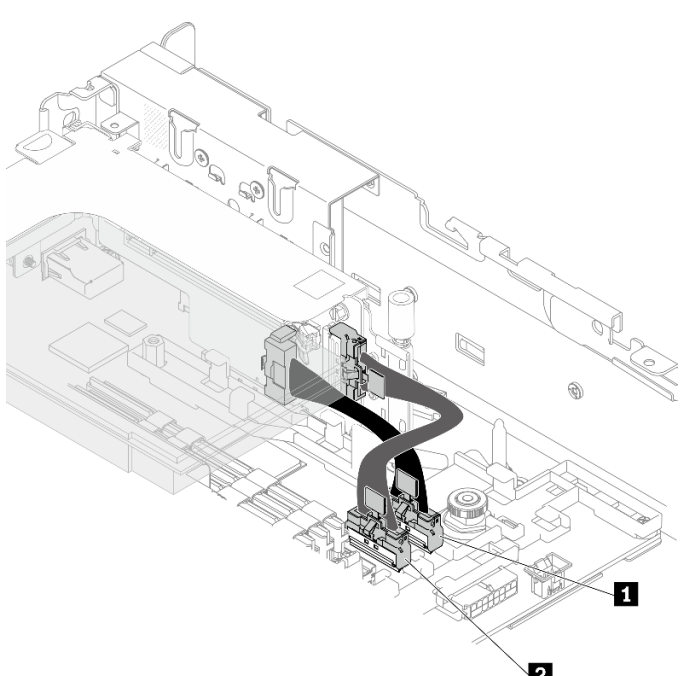
Riser 1 (x16/x16)		
		
	From (riser)	To (on-board)
1	Riser-card connector 2 (Vertical)	PCIe connector 5
2	Riser-card connector 3 (Right angle)	PCIe connector 4
Riser 2 (x8/x16)		
		
	From (riser)	To (on-board)
1	Riser-card connector 0 (Vertical)	PCIe connector 2

x16/x16 + DW FL GPU

No riser cable is required for Riser 2.

Connect the power cables of the double-width full-length GPU adapter installed in Riser 2.

Table 51. Cable routing for x16/x16 (Riser 1) + DW FL GPU

Riser 1 (x16/x16)		
		
	From (riser)	To (on-board)
1	Riser-card connector 2 (Vertical)	PCIe connector 5
2	Riser-card connector 3 (Right angle)	PCIe connector 4
Riser 2 (DW FL GPU)		
No cable is required here.		

DW FL GPU + DW FL GPU

No riser cable is required for this configuration.

Connect the power cables of double-width full-length GPU adapters.

Table 52. Cable routing for DW FL GPU + DW FL GPU

DW FL GPU + DW FL GPU		
	From (riser)	To (on-board)
1	GPU in Slot 5, Riser 1	GPU power connector 2
2	GPU in Slot 4, Riser 2	GPU power connector 1

x16 + AnyBay

Without hardware RAID adapter (SATA/NVMe)

Table 53. Cable routing for x16 (Riser 1) + AnyBay SATA/NVMe (Riser 2)

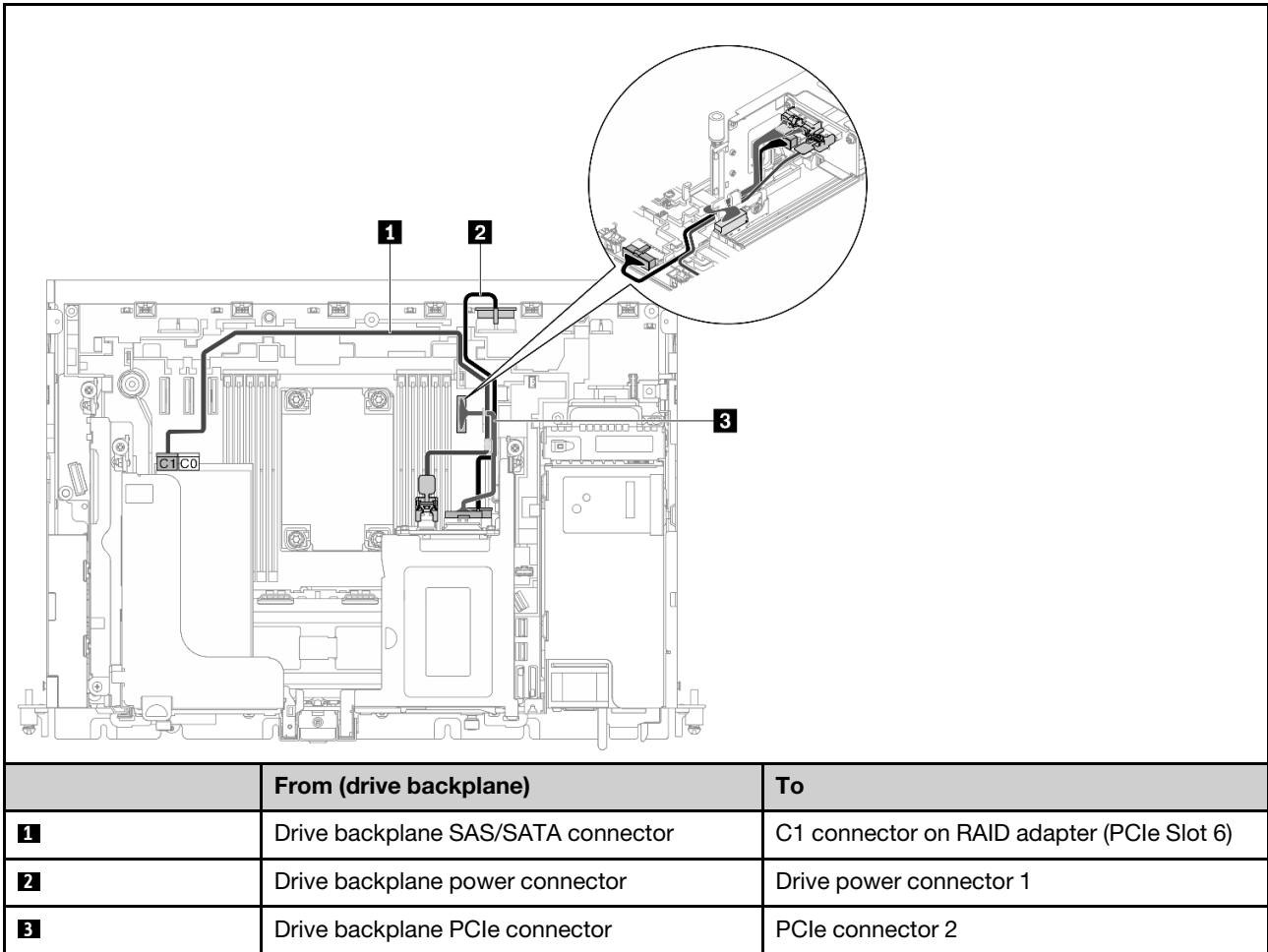
Riser 1 (x16)		
No cable is required here.		
Riser 2 (AnyBay SAS/SATA/NVMe)		
	From (drive backplane)	To (on-board)
1	Drive backplane SAS/SATA connector	SATA connector (4 to 7)
2	Drive backplane power connector	Drive power connector 1
3	Drive backplane PCIe connector	PCIe connector 2

With hardware RAID adapter (SAS/SATA/NVMe)

Table 54. Cable routing for x16 (Riser 1) + AnyBay SAS/SATA/NVMe (Riser 2)

Riser 1 (x16)		
No cable is required here.		
Riser 2 (AnyBay SAS/SATA/NVMe)		

Table 54. Cable routing for x16 (Riser 1) + AnyBay SAS/SATA/NVMe (Riser 2) (continued)



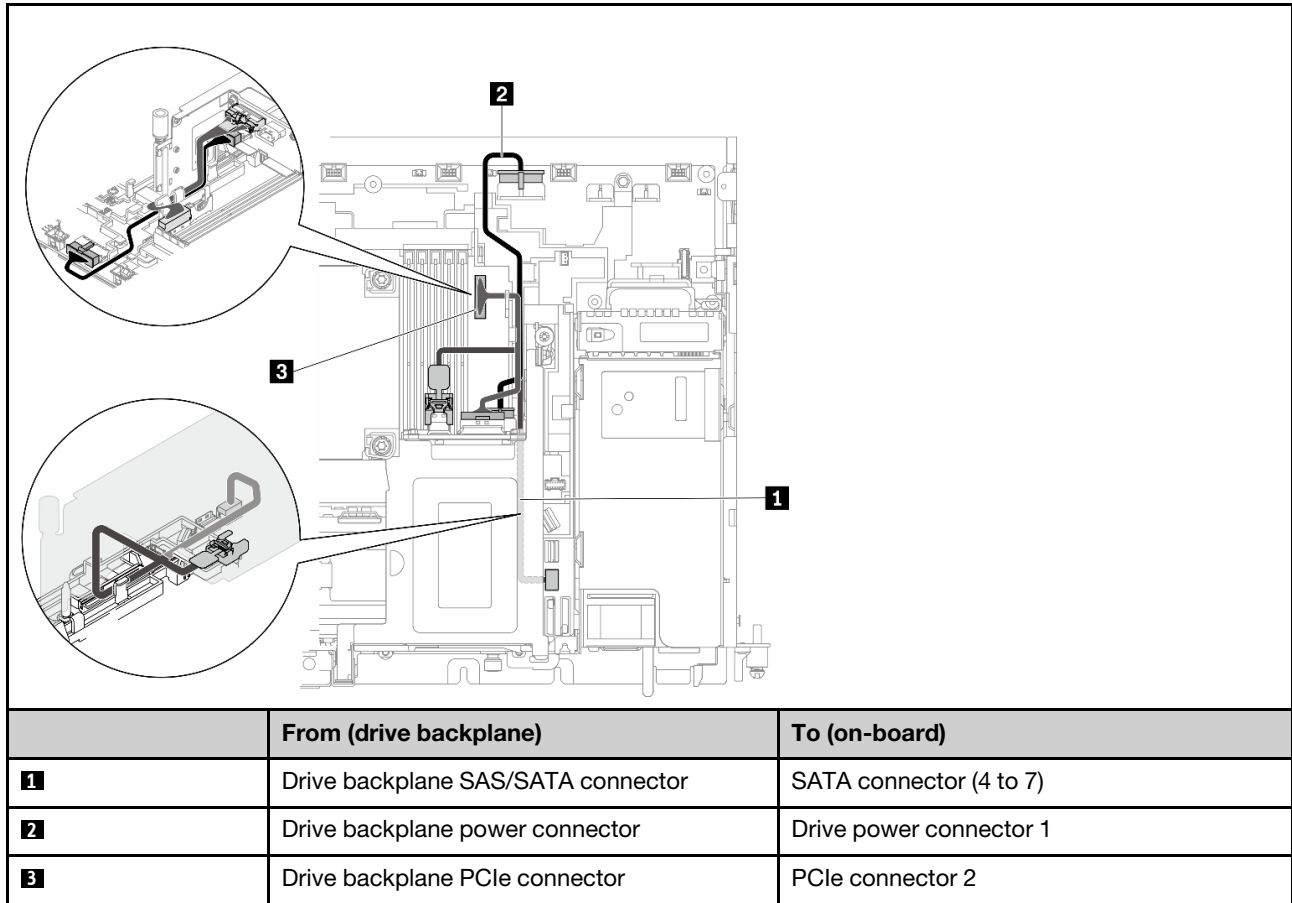
x16/x16 + AnyBay

Without hardware RAID adapter (SATA/NVMe)

Table 55. Cable routing for x16/x16 (Riser 1) + AnyBay SATA/NVMe (Riser 2)

Riser 1 (x16/x16)		
	From (riser)	To (on-board)
1	Riser-card connector 2 (Vertical)	PCIe connector 5
2	Riser-card connector 3 (Right angle)	PCIe connector 4
Riser 2 (AnyBay SATA/NVMe)		

Table 55. Cable routing for x16/x16 (Riser 1) + AnyBay SATA/NVMe (Riser 2) (continued)

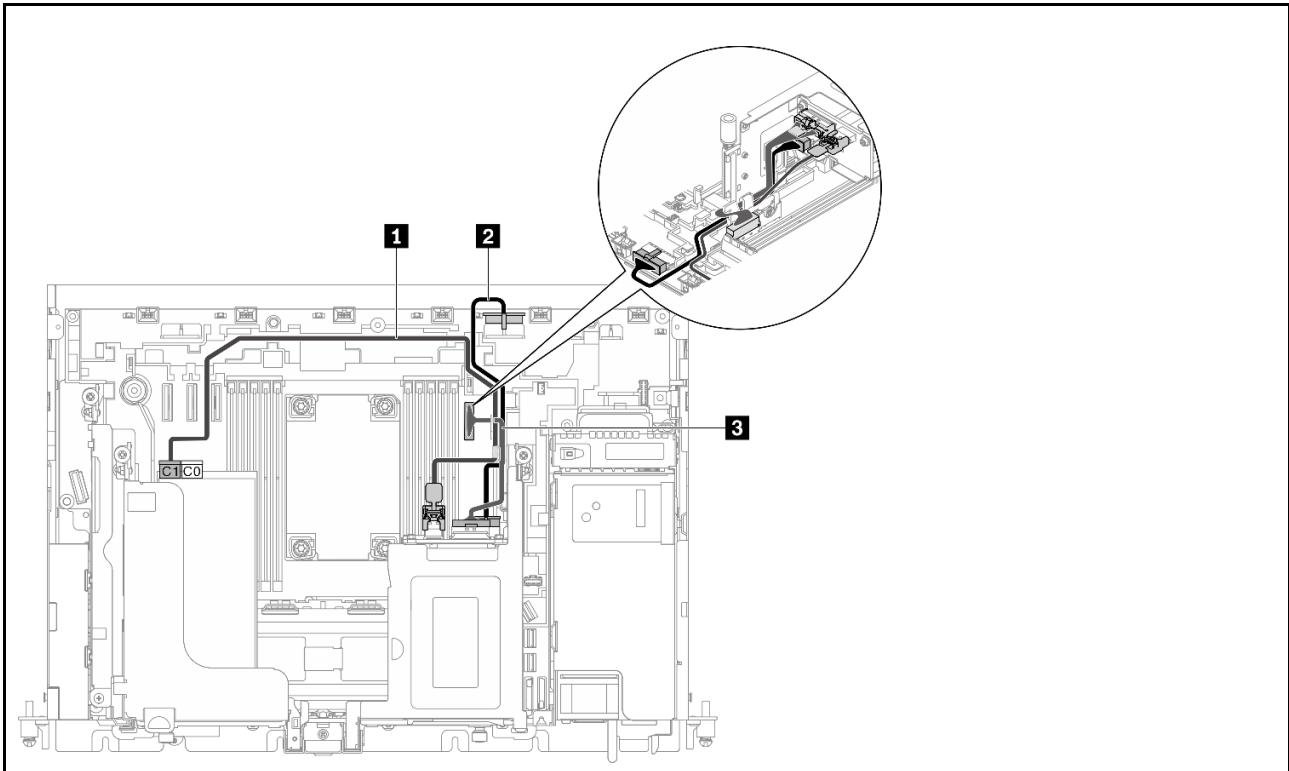


With hardware RAID adapter (SAS/SATA/NVMe)

Table 56. Cable routing for x16/x16 (Riser 1) + AnyBay SAS/SATA/NVMe (Riser 2)

Riser 1 (x16/x16)		
	From (riser)	To (on-board)
1	Riser-card connector 2 (Vertical)	PCIe connector 5
2	Riser-card connector 3 (Right angle)	PCIe connector 4
Riser 2 (AnyBay SAS/SATA/NVMe)		

Table 56. Cable routing for x16/x16 (Riser 1) + AnyBay SAS/SATA/NVMe (Riser 2) (continued)



	From (drive backplane)	To
1	Drive backplane SAS/SATA connector	C1 connector on RAID adapter (PCIe Slot 6)
2	Drive backplane power connector	Drive power connector 1
3	Drive backplane PCIe connector	PCIe connector 2

x16/x8 + AnyBay

Without hardware RAID adapter (SATA/NVMe)

Table 57. Cable routing for x16/x8 (Riser 1) + AnyBay SATA/NVMe (Riser 2)

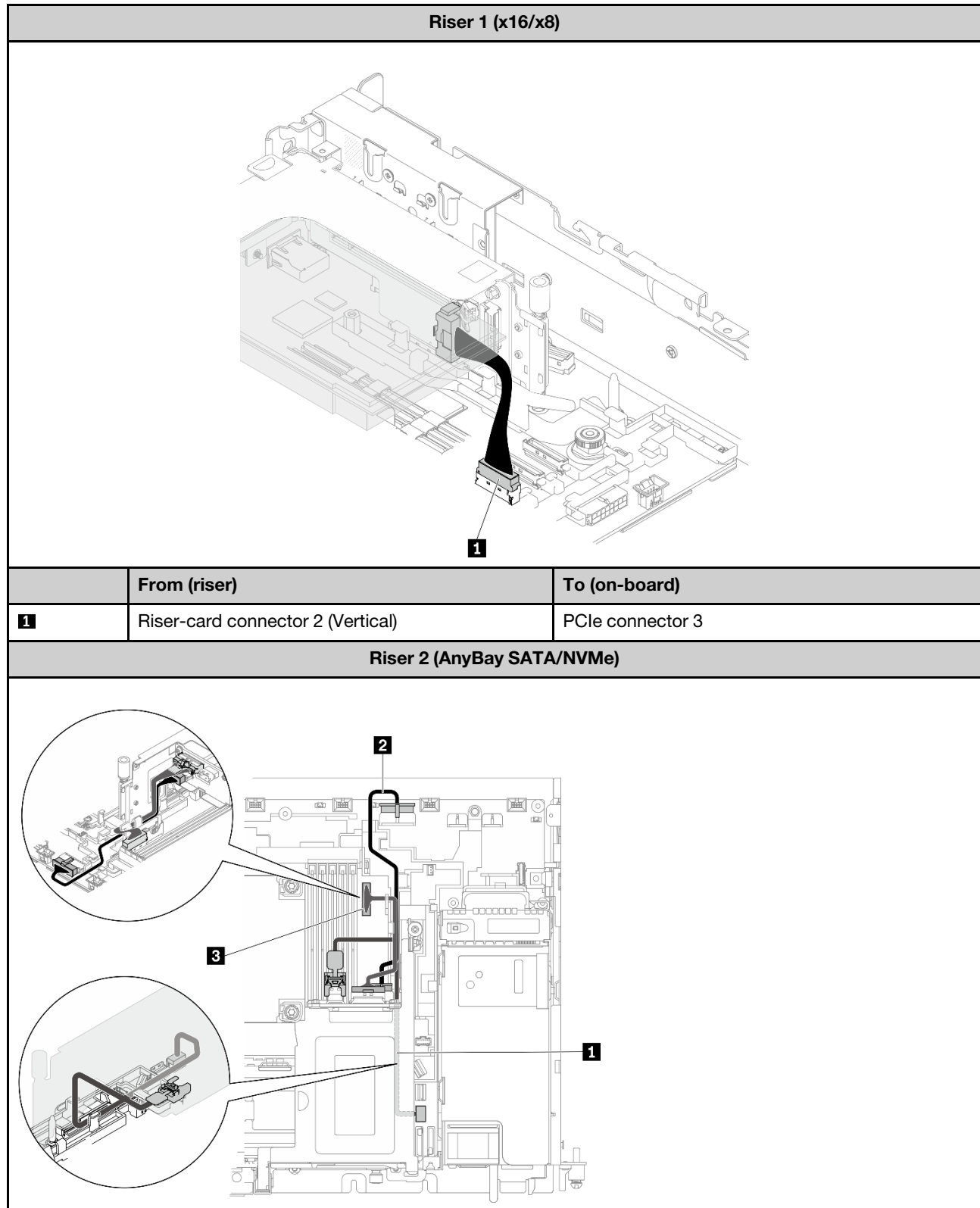


Table 57. Cable routing for x16/x8 (Riser 1) + AnyBay SATA/NVMe (Riser 2) (continued)

	From (drive backplane)	To (on-board)
1	Drive backplane SAS/SATA connector	SATA connector (4 to 7)
2	Drive backplane power connector	Drive power connector 1
3	Drive backplane PCIe connector	PCIe connector 2

With hardware RAID adapter (SAS/SATA/NVMe)

Table 58. Cable routing for x16/x8 (Riser 1) + AnyBay SAS/SATA/NVMe (Riser 2)

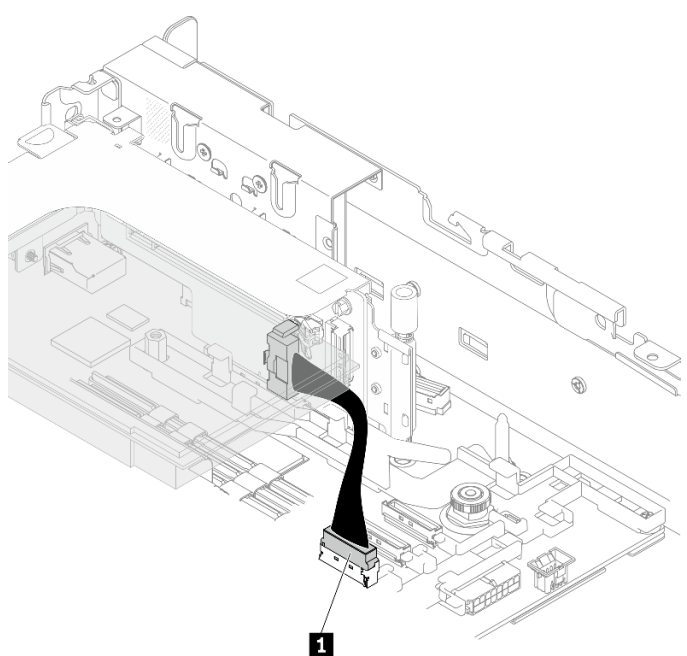
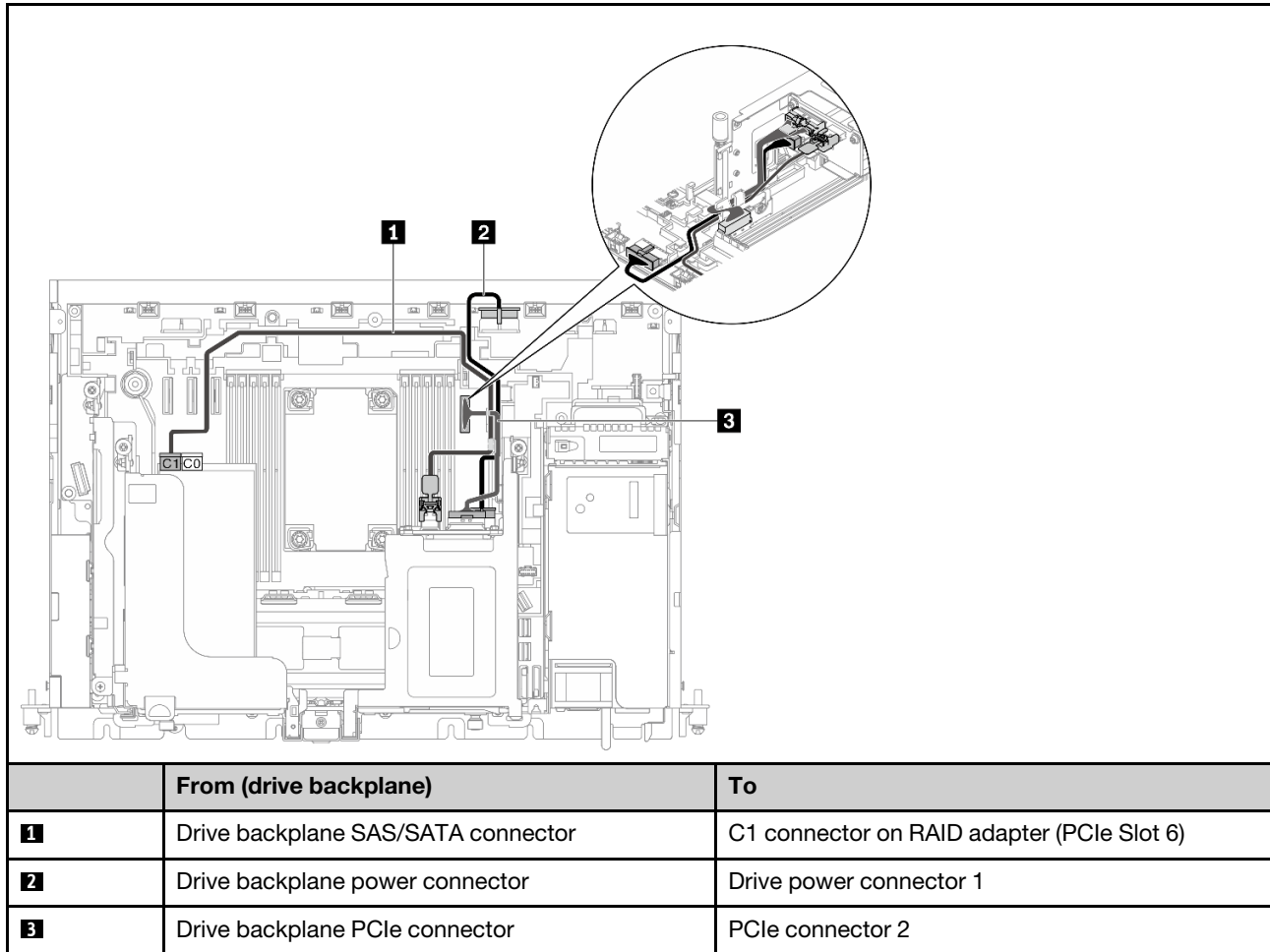
Riser 1 (x16/x8)		
		
	From (riser)	To (on-board)
1	Riser-card connector 2 (Vertical)	PCIe connector 3
Riser 2 (AnyBay SAS/SATA/NVMe)		

Table 58. Cable routing for x16/x8 (Riser 1) + AnyBay SAS/SATA/NVMe (Riser 2) (continued)



Cable routing for the power backplane and intrusion switch

See this topic to learn how to do cable routing for the power backplane and intrusion switch.

Notes:

- Make sure the intrusion switch cable goes in the cable clip first, and is secured to the power backplane.
- Arrange the two cables along the handle of the power backplane.

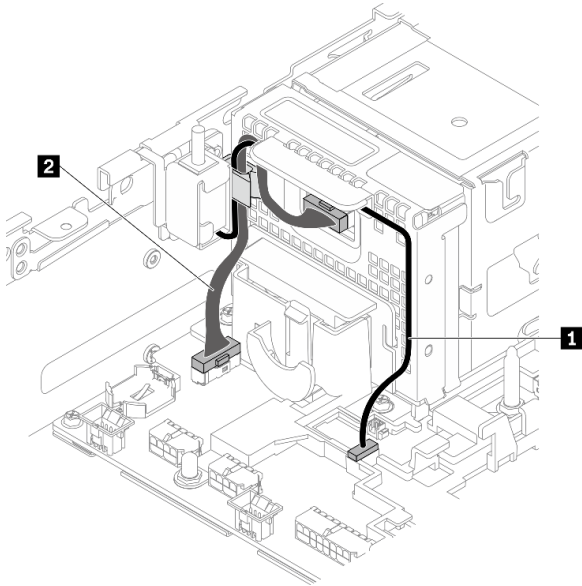


Figure 121. Cable routing for the power backplane and the intrusion switch

Table 59. Cable routing for the power backplane and the intrusion switch

	From	To
1 Intrusion switch cable	Intrusion switch	Intrusion switch connector
2 Power backplane sideband cable	Power backplane	Power backplane sideband connector

Chapter 5. System configuration

Complete these procedures to configure your system.

For ThinkEdge SE450 with Security Pack, automatic data protection is enabled and SED data access would be locked up at tamper events. It is required to claim and activate the system in order to unlock and access data. ThinkEdge SE450 Standard does not lock up data access at all, as SED management and tamper setting are disabled on ThinkEdge SE450 Standard. Before using ThinkEdge SE450 with Security Pack, the following procedures must be completed.

- “Activate the system” on page 157
- “Backup the Self Encryption Drive Authentication Key (SED AK)” on page 158

Activate the system

ThinkEdge Security Pack Enabled is shipped in locked state for security. Before operation, the server needs to be activated to be able to boot up and go fully functional. Complete the steps in this topic to activate the system.

For more information, see *Activation guide*.

Create a Lenovo ID

Use existing Lenovo ID or create a new one to log in the ThinkSystem Key Vault Portal or ThinkShield mobile APP.

- For Lenovo ID setup, see <https://passport.lenovo.com>.
- To log in the Lenovo ThinkSystem Key Vault Portal, see <https://portal.thinkshield.lenovo.com>.

Activation methods

There are two different methods to activate the system. Depending on the environment of the server, decide the most suitable way to activate the system.

1. Mobile App activation

For Mobile App activation method, you will need an Android or iOS based smart phone with cellular data connection and the USB cable that came with the smart phone.

Note: When the smart phone prompts for the USB connection purpose, choose data transfer.

- a. Connect the power cable to your ThinkEdge SE450 with Security Pack.
- b. Download the ThinkShield Edge Mobile Management App from Google Play Store, Apple App Store, Baidu or Lenovo App Store to your Android or iOS based smart phone (search term: “ThinkShield Edge”).
- c. Log-in to the ThinkShield Edge Mobile Management App using your Organization registered ID.
- d. When App instructs to do so, connect USB cable with USB mobile phone charging cable to ThinkEdge SE450 with Security Pack.
- e. Follow the “Activate Device” on-screen instructions to complete secure activation of ThinkEdge SE450.
- f. When activated successfully, ThinkShield Edge Mobile Management App will provide “Device Activated” screen.

For the detailed steps, see https://download.lenovo.com/servers_pdf/thinkshield-mobile-application-user-guide-v6.pdf or <https://support.lenovo.com/tw/en/solutions/ht509033>.

2. Internet connection activation

For Internet connection activation, you will need the Machine Type, Serial Number, and Activation Code.

- a. Connect the power cable to your ThinkEdge SE450 with Security Pack.
- b. Connect the XClarity Controller Management Ethernet port to a network that has access to the internet.

Note: Outbound TCP port 443 (HTTPS) must be open for activation to occur.

- c. Log in to the ThinkShield Key Vault Portal with your Organization registered ID.
- d. To claim the ThinkEdge SE450 with Security Pack, add the device by clicking the orange plus sign next to “Devices” in Device Manager. Enter machine type, serial number, and secure activation code in the corresponding fields.
- e. From the Device Manager, select the server you plan to activate and click activate. The status of the server will change to Ready.
- f. Server will be activated within 15 minutes and power on automatically. After successful activation, the status of the server will change to Active on the ThinkShield Key Vault Portal.

Note: If the server activation is not initiated within 2 hours after the power cable plug in, perform a disconnect then re-connect of the power cable to your ThinkEdge SE450 with Security Pack.

For the detailed steps, see https://download.lenovo.com/servers_pdf/thinkshield-web-application-user-guide-v2.pdf.

Customer's responsibility:

- Keep the Secure Activation Code (provided in flyer).
- Maintain backup of SED AK, see “[Backup the Self Encryption Drive Authentication Key \(SED AK\)](#)” on [page 158](#).
- Move SE450 system to a safe working place for service.
- Prepare the cable of mobile phone.
- Engage IT department so they can help to claim or activate device when required.
- Confirm if the SE450 system is claimed. If not, work with IT department to claim the device.
- Restore SED AK from the back up file and set the password.
- Place SE450 system back to the working place after service.
- Confirm the wireless (network) connectivity is working. Service technician cannot help examine the connection of the device to network.

Backup the Self Encryption Drive Authentication Key (SED AK)

After setting up ThinkEdge SE450 with Security Pack or making changes to the configuration, backing up the Self Encryption Drive Authentication Key (SED AK) is a must operation to prevent data loss in the hardware failure case.

SED Authentication Key (AK) Manager

Find SED Authentication Key (AK) Manager in Lenovo XClarity Controller to change, backup, or recover the SED AK of the server. See https://pubs.lenovo.com/xcc/dw1lm_c_ch1_introduction for more information.

Change the SED AK

- **Generate SED AK from Passphrase:** Set the password and reenter it for the confirmation. Click **Re-generate** to get the new SED AK.
- **Generate a Random SED AK:** Click Re-generate to get a Random SED AK.

Note: If System Lockdown Mode is enabled, generating SED AK function is not available.

Backup the SED AK

Set the password and re-enter it for the confirmation. Click **Start Backup** to back the SED AK; then, download the SED AK file and store it safely for future use.

Note: If you use the backup SED AK file to restore a configuration, the system will ask for the password that you set here.

Recover the SED AK

- **Recover SED AK using Passphrase:** Use the password that set in **Generate SED AK from Passphrase** mode to recover the SED AK.
- **Recover SED AK from Backup file:** Upload the backup file generated in **Backup the SED AK** mode and enter the corresponding backup file password to recover the SED AK.

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 PASSWORD (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 attached to the server, you can set the network connection through the Lenovo XClarity Controller interface. Connect an Ethernet cable from your laptop to Lenovo XClarity Controller connector, which is located at the rear of the server. For the location of the Lenovo XClarity Controller connector, see “Front view” 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.

- 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 front of the server. For the location of the Lenovo XClarity Controller USB connector, see “Front view” 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 blue ID button on the front panel for at least 3 seconds until its LED flashes slowly (once every couple of seconds).

To connect using the Lenovo XClarity Administrator Mobile app:

1. Connect the USB cable of your mobile device to the Lenovo XClarity Administrator USB connector on the front panel.
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:

http://sysmgt.lenovofiles.com/help/topic/com.lenovo.lxca.doc/lxca_usemobileapp.html

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:
 - <http://lenovopress.com/LP0656>
- The latest firmware can be found at the following site:
 - <https://datacentersupport.lenovo.com/tw/en/products/servers/thinkedge/se450thinkedge/7d8t/downloads/driver-list/>
- You can subscribe to product notification to stay up to date on firmware updates:
 - <https://datacentersupport.lenovo.com/tw/en/solutions/ht509500>

UpdateXpress System Packs (UXSPs)

Lenovo typically releases firmware in bundles called UpdateXpress System Packs (UXSPs). 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.
- **UpdateXpress System Packs (UXSPs).** UXSPs are bundled updates designed and tested to provide the interdependent level of functionality, performance, and compatibility. UXSPs 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 UXSPs 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	Graphical user interface	Command line interface	Supports UXSPs
Lenovo XClarity Provisioning Manager (LXPM)	In-band ² On-Target	√		√		
Lenovo XClarity Controller (XCC)	Out-of-band Off-Target	√	Selected I/O devices	√		
Lenovo XClarity Essentials OneCLI (OneCLI)	In-band Out-of-band On-Target Off-Target	√	All I/O devices		√	√
Lenovo XClarity Essentials UpdateXpress (LXCE)	In-band Out-of-band On-Target Off-Target	√	All I/O devices	√		√
Lenovo XClarity Essentials Bootable Media Creator (BoMC)	In-band Out-of-band Off-Target	√	All I/O devices	√ (BoMC application)	√ (BoMC application)	√

Tool	Update Methods Supported	Core System Firmware Updates	I/O Devices Firmware Updates	Graphical user interface	Command line interface	Supports UXSPs
Lenovo XClarity Administrator (LXCA)	In-band ¹ Out-of-band ² Off-Target	√	All I/O devices	√		√
Lenovo XClarity Integrator (LXCI) for VMware vCenter	Out-of-band Off-Target	√	Selected I/O devices	√		
Lenovo XClarity Integrator (LXCI) for Microsoft Windows Admin Center	In-band Out-of-band On-Target Off-Target	√	All I/O devices	√		√
Lenovo XClarity Integrator (LXCI) for Microsoft System Center Configuration Manager	In-band On-Target	√	All I/O devices	√		√
Notes:						
1. For I/O firmware updates.						
2. For BMC and UEFI firmware updates.						

- **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.

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.

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/lxcc-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

- **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 UpdateXpress System Pack (UXSP) update packages and individual updates. UpdateXpress System 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:

http://sysmgmt.lenovofiles.com/help/topic/com.lenovo.lxca.doc/update_fw.html

- **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/>

Configure the firmware

Several options are available to install and set up the firmware for the server.

Important: Do not configure option ROMs to be set to **Legacy** unless directed to do so by Lenovo Support. This setting prevents UEFI drivers for the slot devices from loading, which can cause negative side effects for Lenovo software, such as Lenovo XClarity Administrator and Lenovo XClarity Essentials OneCLI, and to the Lenovo XClarity Controller. The side effects include the inability to determine adapter card details, such as model name and firmware levels. When adapter card information is not available, generic information for the model name, such as "Adapter 06:00:00" instead of the actual model name, such as "ThinkSystem RAID 930-16i 4GB Flash." In some cases, the UEFI boot process might also hang.

- **Lenovo XClarity Provisioning Manager**

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:

- *Lenovo XClarity Provisioning Manager User Guide*
 - Search for the LXPM documentation version compatible with your server at <https://pubs.lenovo.com/lxpm-overview/>
- *UEFI User Guide*
 - <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

- **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:

http://sysmgt.lenovofiles.com/help/topic/com.lenovo.lxca.doc/server_configuring.html

- **Lenovo XClarity Controller**

You can configure the management processor for the server through the Lenovo XClarity Controller Web interface or through the command-line interface.

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/>

Memory configuration

Memory performance depends on several variables, such as memory mode, memory speed, memory ranks, memory population and processor.

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

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

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

http://1config.lenovo.com/#/memory_configuration

For 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, see “Install a memory module” on page 92.

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

http://sysmgmt.lenovofiles.com/help/topic/com.lenovo.lxca.doc/compute_node_image_deployment.html

- Lenovo XClarity Essentials OneCLI

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

- **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
- Lenovo XClarity Integrator deployment pack for SCCM (for Windows operating system only)
https://pubs.lenovo.com/lxci-deploypack-sccm/dpscsm_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.

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

- **Operating system**

Use your backup methods to back up the operating system and user data for the server.

Update the Vital Product Data (VPD)

After initial setup of the system, you can update some Vital Product Data (VPD), such as asset tag and Universal Unique Identifier (UUID).

Update the Universal Unique Identifier (UUID)

Optionally, you can update the Universal Unique Identifier (UUID).

There are two methods available to update the UUID:

- From Lenovo XClarity Provisioning Manager

To update the UUID from Lenovo XClarity Provisioning Manager:

1. Start the server and press the key according to the on-screen instructions. (For more information, see the “Startup” section in the LXPM documentation compatible with your server at <https://>

pubs.lenovo.com/lxpm-overview/.) The Lenovo XClarity Provisioning Manager interface is displayed by default.

2. If the power-on Administrator password is required, enter the password.
3. From the System Summary page, click **Update VPD**.
4. Update the UUID.

- From Lenovo XClarity Essentials OneCLI

Lenovo XClarity Essentials OneCLI sets the UUID in the Lenovo XClarity Controller. Select one of the following methods to access the Lenovo XClarity Controller and set the UUID:

- Operate from the target system, such as LAN or keyboard console style (KCS) access
- Remote access to the target system (TCP/IP based)

To update the UUID 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. Copy and unpack the OneCLI package, which also includes other required files, to the server. Make sure that you unpack the OneCLI and the required files to the same directory.
3. After you have Lenovo XClarity Essentials OneCLI in place, type the following command to set the UUID:

```
onecli config createuuid SYSTEM_PROD_DATA.SysInfoUUID [access_method]
```

Where:

[access_method]

The access method that you select to use from the following methods:

- Online authenticated LAN access, type the command:

```
[--bmc-username <xcc_user_id> --bmc-password <xcc_password>]
```

Where:

xcc_user_id

The BMC/IMM/XCC account name (1 of 12 accounts). The default value is USERID.

xcc_password

The BMC/IMM/XCC account password (1 of 12 accounts).

Example command is as follows:

```
onecli config createuuid SYSTEM_PROD_DATA.SysInfoUUID --bmc-username <xcc_user_id>
--bmc-password <xcc_password>
```

- Online KCS access (unauthenticated and user restricted):

You do not need to specify a value for *access_method* when you use this access method.

Example command is as follows:

```
onecli config createuuid SYSTEM_PROD_DATA.SysInfoUUID
```

Note: The KCS access method uses the IPMI/KCS interface, which requires that the IPMI driver be installed.

- Remote LAN access, type the command:

```
[--bmc <xcc_user_id>:<xcc_password>@<xcc_external_ip>]
```

Where:

xcc_external_ip

The BMC/IMM/XCC external IP address. There is no default value. This parameter is required.

xcc_user_id

The BMC/IMM/XCC account name (1 of 12 accounts). The default value is USERID.

xcc_password

The BMC/IMM/XCC account password (1 of 12 accounts).

Note: BMC, IMM, or XCC external IP address, account name, and password are all valid for this command.

Example command is as follows:

```
onecli config createuuid SYSTEM_PROD_DATA.SysInfoUUID  
--bmc <xcc_user_id>:<xcc_password>@<xcc_external_ip>
```

4. Restart the Lenovo XClarity Controller.
5. Restart the server.

Update the asset tag

Optionally, you can update the asset tag.

There are two methods available to update the asset tag:

- From Lenovo XClarity Provisioning Manager

To update the asset tag 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.
2. If the power-on Administrator password is required, enter the password.
3. From the System Summary page, click **Update VPD**.
4. Update the asset tag information.

- From Lenovo XClarity Essentials OneCLI

Lenovo XClarity Essentials OneCLI sets the asset tag in the Lenovo XClarity Controller. Select one of the following methods to access the Lenovo XClarity Controller and set the asset tag:

- Operate from the target system, such as LAN or keyboard console style (KCS) access
- Remote access to the target system (TCP/IP based)

To update the asset tag 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. Copy and unpack the OneCLI package, which also includes other required files, to the server. Make sure that you unpack the OneCLI and the required files to the same directory.
3. After you have Lenovo XClarity Essentials OneCLI in place, type the following command to set the DMI:

```
onecli config set SYSTEM_PROD_DATA.SysEncloseAssetTag <asset_tag> [access_method]
```

Where:

<asset_tag>

The server asset tag number. Type aaaaaaaaaaaaaaaaaaaaaaaaaaaaaaa, where aaaaaaaaaaaaaaaaaaaaaaaaaaaaaaa is the asset tag number.

[access_method]

The access method that you select to use from the following methods:

- Online authenticated LAN access, type the command:

```
[--bmc-username <xcc_user_id> --bmc-password <xcc_password>]
```

Where:

xcc_user_id

The BMC/IMM/XCC account name (1 of 12 accounts). The default value is USERID.

xcc_password

The BMC/IMM/XCC account password (1 of 12 accounts).

Example command is as follows:

```
onecli config set SYSTEM_PROD_DATA.SysEncloseAssetTag <asset_tag> --bmc-username <xcc_user_id> --bmc-password <xcc_password>
```

- Online KCS access (unauthenticated and user restricted):

You do not need to specify a value for *access_method* when you use this access method.

Example command is as follows:

```
onecli config set SYSTEM_PROD_DATA.SysEncloseAssetTag <asset_tag>
```

Note: The KCS access method uses the IPMI/KCS interface, which requires that the IPMI driver be installed.

- Remote LAN access, type the command:

```
[--bmc <xcc_user_id>:<xcc_password>@<xcc_external_ip>]
```

Where:

xcc_external_ip

The BMC/IMM/XCC IP address. There is no default value. This parameter is required.

xcc_user_id

The BMC/IMM/XCC account (1 of 12 accounts). The default value is USERID.

xcc_password

The BMC/IMM/XCC account password (1 of 12 accounts).

Note: BMC, IMM, or XCC internal LAN/USB IP address, account name, and password are all valid for this command.

Example command is as follows:

```
onecli config set SYSTEM_PROD_DATA.SysEncloseAssetTag <asset_tag> --bmc <xcc_user_id>:<xcc_password>@<xcc_external_ip>
```

4. Reset the Lenovo XClarity Controller to the factory defaults. See “Resetting the BMC to Factory Default” section in the XCC documentation compatible with your server at <https://pubs.lenovo.com/lxcc-overview/>.

Chapter 6. Resolving installation issues

See this topic to learn how to resolve issues that you might have when setting up your system.

Use the information in this section to diagnose and resolve problems that you might encounter during the initial installation and setup of your server.

- [“Server does not power on” on page 171](#)
- [“The server immediately displays the POST Event Viewer when it is turned on” on page 172](#)
- [“Embedded hypervisor is not in the boot list” on page 172](#)
- [“Displayed system memory is less than installed physical memory” on page 172](#)
- [“A Lenovo optional device that was just installed does not work.” on page 173](#)
- [“Voltage planar fault is displayed in the event log” on page 173](#)

Server does not power on

Note: The power-control button will not function until approximately 5 to 10 seconds after the server has been connected to power.

1. If an extra optional device has been just installed, remove it and power on the server again. If the server is powered on this time, it indicates adding this optional device takes more than the system power could afford.
 2. Check the power button LED:
 - If the power button LED is lit, check the system event log.
 - If there is readable system event log without uefi errors, replace the system board (see “System board replacement (trained technician only)” in *Maintenance Manual*).
 - In the following cases, call Lenovo Service.
 - There is readable system event log with uefi errors.
 - There is no readable system event log.
 - If the power button LED is not lit:
 - a. Disconnect and reconnect the power cable.
 - b. Make sure the power supplies are of the same type (the system-error LED would be lit if power supply units do not match), and reseal all the units.
 - c. Check if any power supply error LED is lit (see [“Power supply LEDs” on page 18](#)), and replace the faulty unit if any is found.
- If the problem persists, call Lenovo service.

The following steps are for Lenovo Service only.

1. If there is readable system event log with uefi errors, replace the Root of Trust Module (see “Root of Trust Module replacement (trained technician only)” in *Maintenance Manual*).
2. If there is no readable system event log, but the power button LED is still lit, bring the following replacement units, run diagnostic isolation, and replace the faulty parts.
 - System board (see “System board replacement (trained technician only)” in *Maintenance Manual*)
 - Root of Trust Module (see “Root of Trust Module replacement (trained technician only)” in *Maintenance Manual*)

3. If the power button LED is not lit, bring the following replacement units, run diagnostic isolation, and replace the faulty parts.
 - Power backplane (see “Power backplane replacement (trained technician only)” in *Maintenance Manual*)
 - System board (see “System board replacement (trained technician only)” in *Maintenance Manual*)
 - Root of Trust Module (see “Root of Trust Module replacement (trained technician only)” in *Maintenance Manual*)

The server immediately displays the POST Event Viewer when it is turned on

Complete the following procedure to solve the problem.

1. Correct any errors that are indicated by the light path diagnostics LEDs.
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

Embedded hypervisor is not in the boot list

Complete the following steps until the problem is resolved:

1. Make sure that the optional embedded hypervisor flash device is selected on the boot manager **<F12> Select Boot Device** at startup.
2. Make sure that the embedded hypervisor flash device is seated in the connector correctly.
3. See the documentation that comes with the optional embedded hypervisor flash device to validate that the device is configured correctly.
4. Make sure that other software works on the server.

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 on the operator information panel.
 - No memory module error LEDs are lit on the system board.
 - 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 “PMEM rules” on page 44 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.
 - If PMEMs are installed:
 - a. Refer to “[PMEM rules](#)” on page 44 and see if the displayed memory fits the mode description.
 - b. All the saved data have been backed up, and created namespaces are deleted before any PMEM is replaced or added.
 - c. Go to the Setup Utility, select **System Configuration and Boot Management → Intel Optane PMEMs → Security**, and make sure security of all the PMEM units is disabled.
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 solution and press the key specified in the on-screen instructions, the Lenovo XClarity Provisioning Manager interface is displayed by default. You can perform memory diagnostics with this interface. From the Diagnostic page, go to **Run Diagnostic → Memory test** or **PMEM test**.

Notes: When PMEMs are installed, run diagnostics based on the mode that is set presently:

- App Direct Mode:
 - Run Memory Test for DRAM memory modules.
 - Run PMEM Test for PMEMs.
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.

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 F1 to display the system setup interface. Whenever memory or any other device is changed, you must update the configuration.
2. Reseat the device that you just installed.
3. Replace the device that you just installed.

Voltage planar fault is displayed in the event log

Complete the following procedure to solve the problem.

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 items that you removed one at a time, restarting 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.

Appendix A. Getting help and technical assistance

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

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.

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 Lenovo product documentation also describes the diagnostic tests that you can perform. The documentation for most systems, operating systems, and programs contains troubleshooting procedures and explanations of error messages and error codes. If you suspect a software problem, see the documentation for the operating system or program.

You can find the product documentation for your ThinkSystem products at <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. The Lenovo Warranty terms and conditions state that you, the owner of the Lenovo product, are responsible for maintaining and updating all software and firmware for the product (unless it is covered by an additional maintenance contract). Your service technician will request that you upgrade your software and firmware if the problem has a documented solution within a software upgrade.
- If you have installed new hardware or software in your environment, check <https://serverproven.lenovo.com> to make sure that the hardware and software is supported by your product.
- Go to <http://datacentersupport.lenovo.com> and check for information to help you solve the problem.
 - Check the Lenovo forums at https://forums.lenovo.com/t5/Datacenter-Systems/ct-p/sv_eg to see if someone else has encountered a similar problem.

You can solve many problems without outside assistance by following the troubleshooting procedures that Lenovo provides in the online help or in the Lenovo product documentation. The Lenovo product documentation also describes the diagnostic tests that you can perform. The documentation for most systems, operating systems, and programs contains troubleshooting procedures and explanations of error messages and error codes. If you suspect a software problem, see the documentation for the operating system or program.

Gathering information needed to call Support

If you believe that you require warranty service for your Lenovo product, the service technicians will be able to assist you more efficiently if you prepare before you call. You can also see <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)
- 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.

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 “Downloading service data” section in the XCC documentation version compatible with your server at <https://pubs.lenovo.com/lxcc-overview/>.
- For more information about using the CLI to collect service data, see the “ffdc command” section in the XCC documentation version 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 Center.

You can find more information about setting up automatic problem notification within the Lenovo XClarity Administrator at http://sysmgt.lenovofiles.com/help/topic/com.lenovo.lxca.doc/admin_setupcallhome.html.

- **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.

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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