Lenovo

ThinkSystem SR650 V3
Hardware Maintenance Guide

Machine Types: 7D75, 7D76, 7D77

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

Thirteenth Edition (August 2024)

Contents

Safety

Before installing this product, read the Safety Information.

قبل تركيب هذا المنتج، يجب قراءة الملاحظات الآمنية

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

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

安裝本產品之前，請先閱讀「安全資訊」。

Prije instalacije ovog produkta obavezno pročitajte Sigurnosne Upute.

Před instalací tohoto produktu si přečtěte příručku bezpečnostních instrukcí.

Læs sikkerhedsforskrifterne, før du installerer dette produkt.

Lees voordat u dit product installeert eerst de veiligheidsvoorschriften.

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

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

Vor der Installation dieses Produkts die Sicherheitshinweise lesen.

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

לפני שתתקינו מוצר זה, קראו את הוראות הבטיחות.

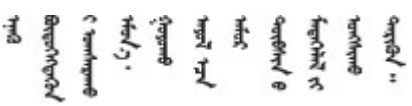
A termék telepítése előtt olvassa el a Biztonsági előírásokat!

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

製品の設置の前に、安全情報をお読みください。

본 제품을 설치하기 전에 안전 정보를 읽으십시오.

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



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

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

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

Перед установкой продукта прочтите инструкции по технике безопасности.

Pred inštaláciou tohto zariadenia si pečítaje Bezpečnostné predpisy.

Pred namestitvijo tega proizvoda preberite Varnostne informacije.

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

Läs säkerhetsinformationen innan du installerar den här produkten.

ཐོན་རྫས་འདི་བདེ་སྒྲིག་མ་བྱས་གོང་། ་སྔོར་གྱི་ཡིད་གཟབ་བྱ་འདུ་མིན་ཡོད་པའི་འོད་ཛེར་བལྟ་དགོས།

Bu ürünü kurmadan önce güvenlik bilgilerini okuyun.

مەزكۇر مەھسۇلاتنى ئورنىتىشتىن بۇرۇن بىخەتەرلىك ئۇچۇرلىرىنى ئوقۇپ چىقىڭ.

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

Safety inspection checklist

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

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

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

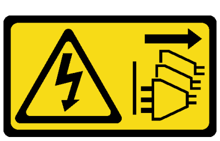
CAUTION:
This equipment must be installed or serviced by trained personnel, as defined by the NEC, IEC 62368-1 & IEC 60950-1, the standard for Safety of Electronic Equipment within the Field of Audio/Video, Information Technology and Communication Technology. Lenovo assumes that you are qualified in 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. If your working condition necessitates the server being powered off or you intend to power off, make sure that the power cord is disconnected.

   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.

Note: Under certain circumstances, powering off the server is not a prerequisite. Refer to the precautions before conducting any tasks.

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. Hardware replacement procedures

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

Installation Guidelines

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

Before installing optional devices, read the following notices carefully:

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

- Read the safety information and guidelines to ensure your safety at work:
  - A complete list of safety information for all products is available at:

    https://pubs.lenovo.com/safety_documentation/
  - The following guidelines are available as well: “Working inside the server with the power on” on page 4 and “Handling static-sensitive devices” on page 4.
- Make sure the components you are installing are supported by your server.
  - For a list of supported optional components for the server, see https://serverproven.lenovo.com.
  - For the option package contents, see https://serveroption.lenovo.com/.
- For more information about ordering parts:
  1. Go to **http://datacentersupport.lenovo.com** and navigate to the support page for your server.
  2. Click **Parts**.
  3. Enter the serial number to view a listing of parts for your server.
- When you install a new server, download and apply the latest firmware. This will help ensure that any known issues are addressed, and that your server is ready to work with optimal performance. Go to https://datacentersupport.lenovo.com/products/servers/thinksystem/sr650v3/downloads/driver-list/ to download firmware updates for your server.

  Important: Some cluster solutions require specific code levels or coordinated code updates. If the component is part of a cluster solution, verify the latest Best Recipe code level menu for cluster supported firmware and driver before you update the code.
- If you replace a part, such as an adapter, that contains firmware, you might also need to update the firmware for that part. For more information about updating firmware, see “Update the firmware” in *User Guide* or *System Configuration Guide*.
- It is good practice to make sure that the server is working correctly before you install an optional component.
- Keep the working area clean, and place removed components on a flat and smooth surface that does not shake or tilt.
- Do not attempt to lift an object that might be too heavy for you. If you have to lift a heavy object, read the following precautions carefully:
  - Make sure that you can stand steadily without slipping.
  - Distribute the weight of the object equally between your feet.

  - Use a slow lifting force. Never move suddenly or twist when you lift a heavy object.
  - To avoid straining the muscles in your back, lift by standing or by pushing up with your leg muscles.
- Back up all important data before you make changes related to the disk drives.
- Have a small flat-blade screwdriver, a small Phillips screwdriver, a Torx T8 screwdriver, and a Torx T30 screwdriver available.
- To view the error LEDs on the system board assembly and internal components, leave the power on.
- You do not have to turn off the server to remove or install hot-swap power supplies, hot swap fans, or hot-plug USB devices. However, you must turn off the server before you perform any steps that involve removing or installing adapter cables, and you must disconnect the power source from the server before you perform any steps that involve removing or installing a riser card.
- When replacing power supply units or fans, make sure to refer to redundancy rules for these components.
- Blue on a component indicates touch points, where you can grip to remove a component from or install it in the server, open or close a latch, and so on.
- Except PSU, orange on a component or an orange 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. (Orange can also indicate touch points on hot-swap components.) See the instructions for removing or installing a specific hot-swap component for any additional procedures that you might have to perform before you remove or install the component.
- PSU with a release tab is a hot-swap PSU.
- The red strip on the drives, adjacent to the release latch, indicates that the drive can be hot-swapped if the server and operating system support hot-swap capability. This means that you can remove or install the drive while the server is still running.

  Note: See the system specific instructions for removing or installing a hot-swap drive for any additional procedures that you might need to perform before you remove or install the drive.
- After finishing working on the server, make sure you reinstall all safety shields, guards, labels, and ground wires.

Safety inspection checklist

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

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

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

CAUTION:
This equipment must be installed or serviced by trained personnel, as defined by the NEC, IEC 62368-1 & IEC 60950-1, the standard for Safety of Electronic Equipment within the Field of Audio/Video, Information Technology and Communication Technology. Lenovo assumes that 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. If your working condition necessitates the server being powered off or you intend to power off, make sure that the power cord is disconnected.

   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.

   Note: Under certain circumstances, powering off the server is not a prerequisite. Refer to the precautions before conducting any tasks.
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**.

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

System reliability guidelines

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

Make sure the following requirements are met:

- When the server comes with redundant power, a power supply must be installed in each power-supply bay.
- Adequate space around the server must be spared to allow server cooling system to work properly. Leave approximately 50 mm (2.0 in.) of open space around the front and rear of the server. Do not place any object in front of the fans.
- For proper cooling and airflow, refit the server cover before you turn the power on. Do not operate the server for more than 30 minutes with the server cover removed, for it might damage server components.

- Cabling instructions that come with optional components must be followed.
- A failed fan must be replaced within 48 hours after malfunction.
- A removed hot-swap fan must be replaced within 30 seconds after removal.
- A removed hot-swap drive must be replaced within two minutes after removal.
- A removed hot-swap power supply must be replaced within two minutes after removal.
- Every air baffle that comes with the server must be installed when the server starts (some servers might come with more than one air baffle). Operating the server with a missing air baffle might damage the processor.
- All processor sockets must contain either a socket cover or a processor with heat sink.
- When more than one processor is installed, fan population rules for each server must be strictly followed.

Working inside the server with the power on

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

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

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

Handling static-sensitive devices

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

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

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

- Keep the device from others' reach to prevent possible damages.

Technical rules

This topic provides technical rules for the server.

- "Memory module installation rules and order" on page 5
- "PCIe slots and PCIe adapters" on page 12
- "Thermal rules" on page 19

Memory module installation rules and order

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

Your server has 32 memory slots with 16 channels. For a list of supported memory options, see:

https://serverproven.lenovo.com

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:

https://dcsc.lenovo.com/#/memory_configuration

Memory modules and processors layout

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

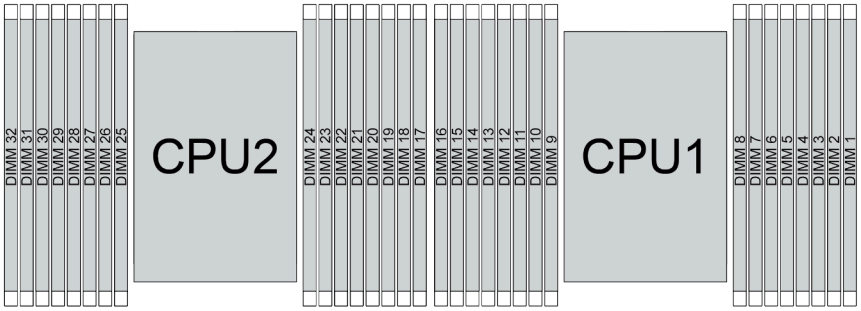

Figure 1. Memory modules and processors layout

Table 1. Memory slot and channel identification

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

Table 1. Memory slot and channel identification (continued)

Controller	iMC3				iMC2				iMC0				iMC1			
Channel	CH1		CH0		CH1		CH0		CH0		CH1		CH0		CH1	
Slot No.	0	1	0	1	0	1	0	1	1	0	1	0	1	0	1	0
DIMM No.	32	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17

- Slot No.: DIMM slot number in each memory channel. Each memory channel has two DIMM slots: slot 0 (furthest from the processor) and slot 1 (closest to the processor).
- DIMM No.: DIMM slot number on the system board assembly. Each processor has 16 DIMM slots.

Memory module installation guideline

- For the installation rules and population sequence, see "TruDDR5 DIMMs installation order" on page 6.
- At least one DIMM is required for each processor. Install at least eight DIMMs per processor for good performance.
- When you replace a DIMM, the server provides automatic DIMM enablement capability without requiring you to use the Setup Utility to enable the new DIMM manually.

TruDDR5 DIMMs installation order

This section contains information of how to install TruDDR5 DIMMs (RDIMMs, 9x4 RDIMMs, 10x4 RDIMMs, or 3DS RDIMMs) properly.

For RDIMMs, 10x4 RDIMMs and 3DS RDIMMs, the following two memory modes are available. For 9x4 RDIMMs, only independent mode is available.

- **"Independent mode installation order"** on page 6
- **"Mirroring mode installation order"** on page 10

Independent mode installation order

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

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

- There should be at least one TruDDR5 DIMM per processor.
- Memory population must be identical between processors.
- All TruDDR5 memory modules must operate at the same speed in the same system.
- Memory modules from different vendors are supported.
- x8 DIMMs and x4 DIMMs cannot be mixed in a system.
- All memory modules to be installed must be of the same type.
  - 9x4 RDIMM cannot be mixed with non-9x4 RDIMMs in a system.
  - 3DS RDIMM cannot be mixed with non-3DS RDIMMs in a system.
- All memory modules in a system must have the same number of ranks, except for below conditions:
  - Single-rank RDIMMs can be mixed with dual-rank RDIMMs when there are 16 DIMMs populated for each processor.
  - Quad-rank 3DS RDIMMs can be mixed with octal-rank 3DS RDIMMs when there are 16 DIMMs populated for each processor.

Note: System hang on POST may occur on a server operating in this configuration. In this case, contact Lenovo service to replace the failed DIMM for proper operation.

  - See “Independent memory mode with mixing ranks” on page 9 for more information on the installation sequence when installing memory modules with different ranks.

- The 4800 MHz 48 GB and 96 GB RDIMMs are supported only by the 4th Gen (Sapphire Rapids, SPR) XCC processors.
- The 24 Gb DRAM (48 GB/96 GB) RDIMMs cannot be mixed with 16 Gb DRAM (16 GB/32 GB/64 GB) RDIMMs in a system.
- Before installing 24 Gb DRAM RDIMMs in a system with SPR XCC processors, make sure to apply the UEFI firmware version ESE120K or later to the server first and remove all existing 16 Gb DRAM RDIMMs.

For optimal performance, you are recommended to install DIMMs in “Standard DIMM installation order” on page 7. The “Optional DIMM installation order” on page 9 is used only for special requirements.

- “Standard DIMM installation order” on page 7
- “Optional DIMM installation order” on page 9

Standard DIMM installation order

The following tables show the standard orders of populating memory modules for independent mode.

Table 2. Standard installation order for one processor

Total DIMMs	Processor 1															
	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
1 DIMM[1]										7						
2 DIMMs[2]			14							7						
4 DIMMs[2]			14				10			7				3		
6 DIMMs[1,2]			14		12		10			7				3		1
8 DIMMs[1,2,3,4,5]	16		14		12		10			7		5		3		1
12 DIMMs[2,6]	16		14	13	12		10	9	8	7		5	4	3		1
16 DIMMs[2,3,4,6,7,8]	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1

Notes:

1. The DIMM configurations support 5600 MHz 24 GB, 48 GB, and 96 GB RDIMMs.
2. The DIMM configurations support the Sub NUMA Clustering (SNC) feature, which can be enabled via UEFI. SNC is not supported if DIMM population does not follow the sequence indicated by the table above.
3. The DIMM configurations support Software Guard Extensions (SGX). See “Enable Software Guard Extensions (SGX)” in *User Guide* or *System Configuration Guide* to enable this feature.
4. The DIMM configurations support 4800 MHz 96 GB RDIMMs.
5. The DIMM configuration supports 4800 MHz 48 GB RDIMMs.
6. The DIMM configurations support 5600 MHz 96 GB RDIMMs.
7. Rank mixing is supported between single-rank and dual-rank RDIMMs, or between quad-rank and octal-rank 3DS RDIMMs when there are 16 DIMMs populated for each processor. See “Independent memory mode with mixing ranks” on page 9 for more information on the installation sequence when installing memory modules with different ranks.

8. Mixing of DDR5 4800 MHz 128 GB and 256 GB 3DS RDIMMs is supported when there are 16 DIMMs populated for each processor.

Table 3. Standard installation order for two processors

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

Notes:

1. The DIMM configurations support 5600 MHz 24 GB, 48 GB, and 96 GB RDIMMs.
2. The DIMM configurations support the Sub NUMA Clustering (SNC) feature, which can be enabled via UEFI. SNC is not supported if DIMM population does not follow the sequence indicated by the table above.
3. The DIMM configurations support Software Guard Extensions (SGX). See “Enable Software Guard Extensions (SGX)” in *User Guide* or *System Configuration Guide* to enable this feature.
4. The DIMM configurations support 4800 MHz 96 GB RDIMMs.
5. The DIMM configuration supports 4800 MHz 48 GB RDIMMs.
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7. Rank mixing is supported between single-rank and dual-rank RDIMMs, or between quad-rank and octal-rank 3DS RDIMMs when there are 16 DIMMs populated for each processor. See “Independent memory mode with mixing ranks” on page 9 for more information on the installation sequence when installing memory modules with different ranks.
8. Mixing of DDR5 4800 MHz 128 GB and 256 GB 3DS RDIMMs is supported when there are 16 DIMMs populated for each processor.

Optional DIMM installation order

The following table shows the optional orders of populating memory modules for independent mode.

Table 4. Optional installation order

Processor	Total DIMMs	Optional installation order
Processor 1	1 DIMM	• Slot 12 • Slot 10 • Slot 5
	2 DIMMs[1,2]	• Slots 10, 3
	6 DIMMs[1]	• Slots 16, 14, 10, 7, 5, 3 • Slots 16, 12, 10, 5, 3, 1 • Slots 16, 14, 12, 7, 5, 1
	12 DIMMs[1,3]	• Slots 16, 15, 14, 12, 11, 10, 7, 6, 5, 3, 2, 1
Processors 1 and 2	2 DIMMs	• Slots 26, 10 • Slots 21, 5 • Slots 28, 12
	4 DIMMs[1,2]	• Slots 26, 19, 10, 3
	12 DIMMs[1]	• Slots 32, 30, 26, 23, 21, 19, 16, 14, 10, 7, 5, 3 • Slots 32, 28, 26, 21, 19, 17, 16, 12, 10, 5, 3, 1 • Slots 32, 30, 28, 23, 21, 17, 16, 14, 12, 7, 5, 1
	24 DIMMs[1,3]	• Slots 32, 31, 30, 28, 27, 26, 23, 22, 21, 19, 18, 17, 16, 15, 14, 12, 11, 10, 7, 6, 5, 3, 2, 1

Notes:

1. The DIMM configurations support the Sub NUMA Clustering (SNC) feature, which can be enabled via UEFI. SNC is not supported if DIMM population does not follow the sequence indicated by the table above.
2. The DIMM configuration does not support 5600 MHz 24 GB, 48 GB, and 96 GB RDIMMs.
3. The DIMM configuration does not support 5600 MHz 24 GB and 48 GB RDIMMs.

Independent memory mode with mixing ranks

Follow the memory module installation sequence in this section when installing memory modules with different ranks in independent memory mode.

- Single-rank RDIMMs can be mixed with dual-rank RDIMMs when there are 16 DIMMs populated for each processor.
- Mixing of DDR5 4800 MHz 128 GB and 256 GB 3DS RDIMMs is supported when there are 16 DIMMs populated for each processor.
- Quad-rank 3DS RDIMMs can be mixed with octal-rank 3DS RDIMMs when there are 16 DIMMs populated for each processor.
- If a memory channel has two DIMMs with different ranks, populate the DIMM with a higher number of ranks in slot 0 (furthest from the processor) first.

DIMM slot installation sequence for one processor

When installing DIMMs with different ranks with only one processor (Processor 1) installed, follow the sequence below and install higher rank DIMMs first; then, install the lower rank DIMMs into the remaining slots.

Table 5. DIMM slot installation sequence for one processor

Processor 1																
DIMM slot	**16**	**15**	**14**	**13**	**12**	**11**	**10**	**9**	**8**	**7**	**6**	**5**	**4**	**3**	**2**	**1**
Sequence	8	16	7	15	4	12	3	11	9	1	10	2	13	5	14	6

DIMM slot installation sequence for two processors

When installing DIMMs with different ranks with two processors installed, follow the sequence below and install higher rank DIMMs first; then, install the lower rank DIMMs into the remaining slots.

Table 6. DIMM slot installation sequence for two processors

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

Mirroring mode installation order

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.

In mirroring mode, each memory module in a pair must be identical in size and architecture. The channels are grouped in pairs with each channel receiving the same data. One channel is used as a backup of the other, which provides redundancy.

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

- All memory modules to be installed must be of the same type with the same capacity, frequency, voltage, and ranks.
- Mirroring can be configured across channels in the same iMC, and the total TruDDR5 memory size of the primary and secondary channels must be the same.
- 9x4 RDIMMs do not support mirroring mode.
- Partial Memory Mirroring is a sub-function of memory mirroring. It requires following the memory installation order of memory mirroring mode.

With one processor

The following table shows the sequence of populating memory modules for mirroring mode when only one processor is installed.

Table 7. Mirroring mode with one processor

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

Table 7. Mirroring mode with one processor (continued)

16 DIMMs[1,2]	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1

Notes:

1. The DIMM configurations support the Sub NUMA Clustering (SNC) feature, which can be enabled via UEFI. SNC is not supported if DIMM population does not follow the sequence indicated by the table above.
2. 5600 MHz 24 GB and 48 GB RDIMMs are supported in 8 DIMMs mirroring mode, and all other RDIMMs are supported in 8 and 16 DIMMs mirroring mode.

Two processors

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

Table 8. Mirroring mode with two processors

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

1. The DIMM configurations support the Sub NUMA Clustering (SNC) feature, which can be enabled via UEFI. SNC is not supported if DIMM population does not follow the sequence indicated by the table above.
2. 5600 MHz 24 GB and 48 GB RDIMMs are supported in 16 DIMMs mirroring mode, and all other RDIMMs are supported in 16 and 32 DIMMs mirroring mode.

PCIe slots and PCIe adapters

This topic provides installation rules for PCIe adapters.

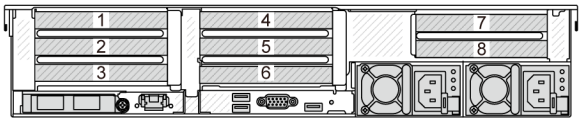
Slot configurations without DWCM

The following tables list the PCIe slot configurations for each server view without a Direct Water Cooling Module (DWCM).

*E: empty

PCIe slots

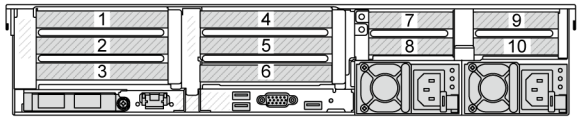
Figure 2. Rear view with 8 PCIe slots



Riser 1/2	x16/x8/x8 (Gen 4/5)	x16/x16/E (Gen 4/5)	E/x16/x16	**Riser 3**	x16/x16 (Gen 4/5)	x8/x8 (Gen 4/5)
Slot 1/4	PCIe x16	PCIe x16	Empty	**Slot 7**	PCIe x16	PCIe x8
Slot 2/5	PCIe x8	PCIe x16	PCIe x16 (Gen 4/5)	**Slot 8**	PCIe x16	PCIe x8
Slot 3/6	PCIe x8	Empty	PCIe x16 (Gen 4)			

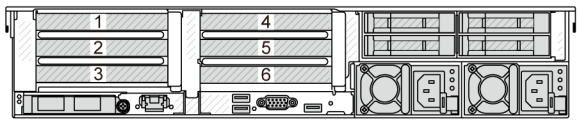
PCIe slots

Figure 3. Rear view with 10 PCIe slots



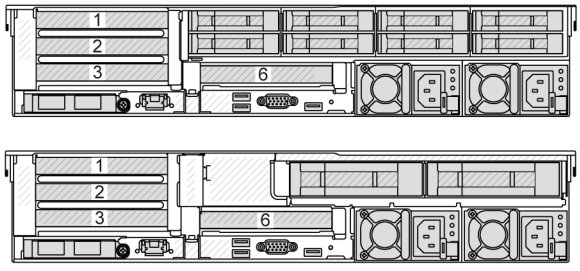
Riser 1/2	x16/x8/x8 (Gen 4/5)	x16/x16/E (Gen 4/5)	E/x16/x16	**Riser 3/4**	x16/x8 (Gen 4 for riser 3)	x16/x8 (Gen 5 for riser 4)
Slot 1/4	PCIe x16	PCIe x16	Empty	**Slot 7/9**	PCIe4 x8	PCIe5 x8
Slot 2/5	PCIe x8	PCIe x16	PCIe x16 (Gen 4/5)	**Slot 8/10**	PCIe4 x8	PCIe5 x8
Slot 3/6	PCIe x8	Empty	PCIe x16 (Gen 4)			

Figure 4. Rear view with 6 PCIe slots

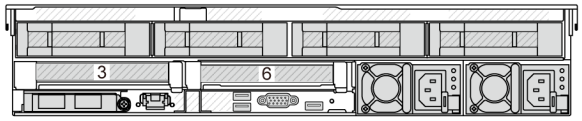
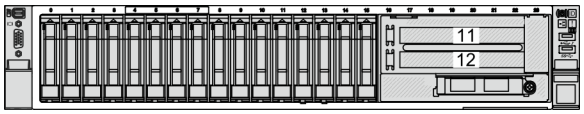


Riser 1/2	x16/x8/x8 (Gen 4/5)	x16/x16/E (Gen 4/5)	E/x16/x16			
Slot 1/4	PCIe x16	PCIe x16	Empty			
Slot 2/5	PCIe x8	PCIe x16	PCIe x16 (Gen 4/5)			
Slot 3/6	PCIe x8	Empty	PCIe x16 (Gen 4)			

Figure 5. Rear view with 4 PCIe slots



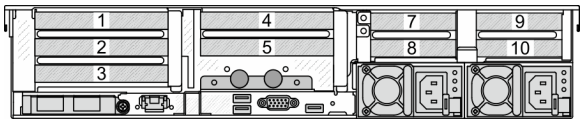
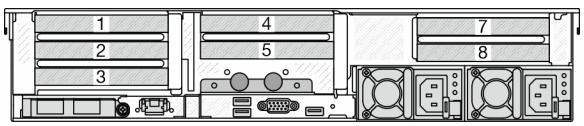
Riser 1	x16/x8/x8 (Gen 4/5)	x16/x16/E (Gen 4/5)	E/x16/x16	**Riser 2**	x16 (Gen 4)	
Slot 1	PCIe x16	PCIe x16	Empty	**Slot 6**	PCIe x16	
Slot 2	PCIe x8	PCIe x16	PCIe x16 (Gen 4/5)			
Slot 3	PCIe x8	Empty	PCIe x16 (Gen 4)			

PCIe slots						
Figure 6. Rear view with 2 PCIe slots 						
Riser 1	x16 (Gen 4)	**Riser 2**	x16 (Gen 4)			
Slot 3	PCIe x16	**Slot 6**	PCIe x16			
Figure 7. Front view with 2 PCIe slots 						
Riser 5	x16/x16 (Gen4)					
Slot 11	PCIe x16					
Slot 12	PCIe x16					

Slot configurations with DWCM

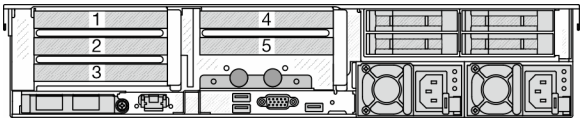
The following tables list the PCIe slot configurations for each server view with a DWCM.

*E: empty

PCIe slots						
Figure 8. Rear view with 9 PCIe slots 						
Riser 1/2	x16/x8/x8 (Gen 4/5)	x16/x16/E (Gen 4/5)	E/x16/x16	**Riser 3/4**	x16/x8 (Gen 4 for riser 3)	x16/x8 (Gen 5 for riser 4)
Slot 1/4	PCIe x16	PCIe x16	Empty	**Slot 7/9**	PCIe4 x8	PCIe5 x8
Slot 2/5	PCIe x8	PCIe x16	PCIe x16 (Gen 4/5)	**Slot 8/10**	PCIe4 x8	PCIe5 x8
Slot 3	PCIe x8	Empty	PCIe x16 (Gen 4)			
Figure 9. Rear view with 7 PCIe slots 						

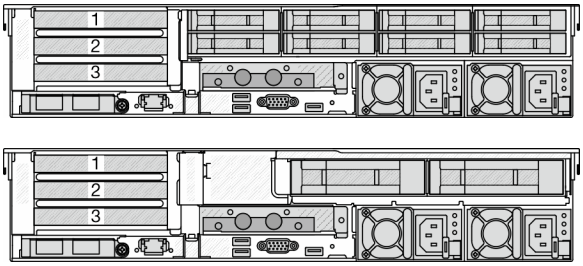
PCIe slots						
Riser 1/2	x16/x8/x8 (Gen 4/5)	x16/x16/E (Gen 4/5)	E/x16/x16	**Riser 3**	x16/x16 (Gen 4/5)	x8/x8 (Gen 4/5)
Slot 1/4	PCIe x16	PCIe x16	Empty	**Slot 7**	PCIe x16	PCIe x8
Slot 2/5	PCIe x8	PCIe x16	PCIe x16 (Gen 4/5)	**Slot 8**	PCIe x16	PCIe x8
Slot 3	PCIe x8	Empty	PCIe x16 (Gen 4)			

Figure 10. Rear view with 5 PCIe slots



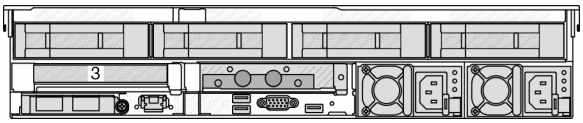
Riser 1/2	x16/x8/x8 (Gen 4/5)	x16/x16/E (Gen 4/5)	E/x16/x16			
Slot 1/4	PCIe x16	PCIe x16	Empty			
Slot 2/5	PCIe x8	PCIe x16	PCIe x16 (Gen 4/5)			
Slot 3	PCIe x8	Empty	PCIe x16 (Gen 4)			

Figure 11. Rear view with 3 PCIe slots



Riser 1	x16/x8/x8 (Gen 4/5)	x16/x16/E (Gen 4/5)	E/x16/x16			
Slot 1	PCIe x16	PCIe x16	Empty			
Slot 2	PCIe x8	PCIe x16	PCIe x16 (Gen 4/5)			
Slot 3	PCIe x8	Empty	PCIe x16 (Gen 4)			

Figure 12. Rear view with 1 PCIe slots



PCIe slots						
Riser 1	x16 (Gen 4)					
Slot 3	PCIe x16					

Notes:
- The server supports Gen 4 and Gen 5 PCIe riser cards, but not both in the same system.
- Gen 4 riser cards support Gen 4 and Gen 5 PCIe adapters (except Gen 5 retimer cards), but not both in the same system.
- Gen 5 riser cards support Gen 4 and Gen 5 PCIe adapters, but not both in the same system.
- Slots 2 and 5 on the E/x16/x16 riser card cannot support retimer cards.
- **7mm drive cage installation rules**:
  - For server models with 8 PCIe slots or 10 PCIe slots, a 2FH+7mm SSD drive cage can be installed on slot 3 or slot 6, but not both at the same time.
  - For server models with an 8 x 2.5-inch/2 x 3.5-inch rear drive cage, one of the 7mm drive cages can be installed:
    - 2FH+7mm SSD drive cage: slot 3
    - 7mm SSD drive cage: slot 6
  - For server models with a 4 x 3.5-inch rear drive cage or a GPU installed, a low-profile 7mm drive cage can be installed only on slot 6.
  - For server models with a 4 x 2.5-inch rear drive cage, no 7mm drive cage is supported.
- **Serial port module installation rules:**
  - For server models with 8 PCIe slots, 10 PCIe slots, or a 4 x 2.5-inch rear drive cage:
    - If both riser 1 and riser 2 use the x16/x16/E riser card and a 7mm drive cage is installed on slot 6, then a serial port module can be installed on slot 3. If no 7mm drive cage is installed, then a serial port module can be installed on slot 6.
    - If riser 1 uses the x16/x16/E riser card but riser 2 is not installed or not the x16/x16/E riser card, a serial port module can be installed on slot 3 when no 7mm drive cage is installed.
    - If riser 1 does not use the x16/x16/E riser card but riser 2 uses the x16/x16/E riser card, a serial port module can be installed on slot 6 when no 7mm drive cage is installed.
    - If both riser 1 and riser 2 do not use the x16/x16/E riser card, no serial port module is supported.
  - For server models with an 8 x 2.5-inch/2 x 3.5-inch rear drive cage:
    - If riser 1 uses the x16/x16/E riser card, a serial port module can be installed on slot 3 and a 7mm SSD cage can be installed on slot 6.
    - If riser 1 does not use the x16/x16/E riser card, a 7mm drive cage and a serial port module cannot be installed at the same time. If no 7mm drive cage is installed, then a serial port module can be installed on slot 6.
  - For server models with a 4 x 3.5-inch rear drive cage, a 7mm drive cage and a serial port module cannot be installed at the same time. If no 7mm drive cage is installed, then a serial port module can be installed on slot 6.
  - For server models with a double-wide GPU, the serial port module can be installed only on slot 6 when no 7mm drive cage is installed.

Supported PCIe adapters and slot priorities

The following table lists the recommended slot installation priority for common PCIe adapters.

PCIe adapter	Maximum supported	Suggested slot priority
GPU adapter[1]		
Double-wide GPU: RTX 6000 Ada	2	• 1 CPU: 2 • 2 CPUs: 2, 5
Other double-wide GPUs	3	• 1 CPU: 2, 7 • 2 CPUs: 2, 5, 7

PCIe adapter	Maximum supported	Suggested slot priority
Single-wide GPU: T400, T1000	8	• 1 CPU: 1, 2, 3, 7 • 2 CPUs: 1, 4, 2, 5, 7, 8, 3, 6
Single-wide GPU: A2	8	• 1 CPU: 1, 2, 3, 7, 8, 12 • 2 CPUs: 1, 4, 7, 8, 2, 5, 6, 3, 11, 12
Single-wide GPU: L4	8	• 1 CPU: 1, 2, 3, 7 • 2 CPUs: 1, 4, 7, 8, 2, 5, 6, 3
PCIe Retimer card		
ThinkSystem PCIe Gen 4 x16 Retimer Adapter ThinkSystem SR630/SR650 V3 PCIe Gen 5 x16 Retimer Adapter	4	• 1 CPU: 1, 2, 3 • 2 CPUs: 1, 2, 4, 5, 3, 6
Internal custom form factor (CFF) RAID/HBA/Expander		
5350-8i, 9350-8i, 9350-16i	1	Not installed in PCIe slots. The CFF RAID/HBA/Expander adapter is supported only in the 2.5-inch drive bay chassis, which is installed between the front backplane and the system board assembly.
440-16i, 940-16i		
ThinkSystem 48 port 12Gb Internal Expander		
Internal standard form factor (SFF) RAID/HBA adapter [2]		
4350-8i, 5350-8i	4	• 1 CPU: 2, 3, 1 • 2 CPUs: 2, 3, 5, 6, 1, 4
4350-16i	2	
440-8i, 540-8i, 940-8i	4	
440-16i, 540-16i, 940-16i	2	
940-32i	1	
9350-8i	4	• 1 CPU: – With other SFF RAID adapters: 2, 3, 1 – Without other SFF RAID adapters: 3, 2, 1 • 2 CPUs: – With other SFF RAID adapters: 2, 3, 5, 6, 1, 4 – Without other SFF RAID adapters: 3, 2, 5, 6, 1, 4
9350-16i	2	
External RAID/HBA adapter		
440-8e, 440-16e	12	• 1 CPU: 1, 2, 3, 7, 8, 12 • 2 CPUs: 1, 4, 7, 8, 2, 5, 3, 6, 9, 10, 11, 12
940-8e	4	• 1 CPU: 1, 2, 3, 7, 8, 12 • 2 CPUs: 1, 4, 7, 8, 2, 5, 3, 6, 9, 10, 11, 12
FC HBA adapter		
All supported FC HBA adapters	12	• 1 CPU: 1, 2, 3, 7, 8, 12 • 2 CPUs: 1, 4, 7, 8, 2, 5, 3, 6, 9, 10, 11, 12
NIC adapter		

PCIe adapter	Maximum supported	Suggested slot priority
ThinkSystem NVIDIA BlueField-2 25GbE SFP56 2-Port PCIe Ethernet DPU w/BMC & Crypto	1	• 1 CPU: 1, 2, 3 • 2 CPUs: 1, 4, 2, 5, 3, 6
ThinkSystem AMD X3522 10/25GbE DSFP28 2-port PCIe Ethernet Adapter	6	• 1 CPU: 1, 2, 3 • 2 CPUs: 1, 4, 2, 5, 3, 6
ThinkSystem Broadcom 57504 10/25GbE SFP28 4-port PCIe Ethernet Adapter ThinkSystem Broadcom 57508 100GbE QSFP56 2-port PCIe 4 Ethernet Adapter V2 ThinkSystem Mellanox ConnectX-6 Dx 100GbE QSFP56 2-port PCIe Ethernet Adapter Mellanox MCX623106AC-CDAT Dx 100GbE QSFP56 2-port PCIe NIC -CSP I4	6	• 1 CPU: 1, 2, 3, 7, 12 • 2 CPUs: 1, 4, 2, 5, 7, 8, 3, 6, 11, 12
ThinkSystem Intel E810-DA4 10/25GbE SFP28 4-port PCIe Ethernet Adapter	10	• 1 CPU: 1, 2, 3, 7, 8, 12 • 2 CPUs: 1, 4, 7, 8, 2, 5, 3, 6, 11, 12
All other supported NIC adapters	12	• 1 CPU: 1, 2, 3, 7, 8, 12 • 2 CPUs: 1, 4, 7, 8, 2, 5, 3, 6, 9, 10, 11, 12
InfiniBand adapter		
Mellanox ConnectX-6 HDR100 IB/100GbE VPI 1-port x16 PCIe 3.0 HCA w/ Tall Bracket Mellanox ConnectX-6 HDR100 IB/100GbE VPI 2-port x16 PCIe 3.0 HCA w/ Tall Bracket ThinkSystem Mellanox ConnectX-6 HDR IB/ 200GbE Single Port x16 PCIe Adapter (without auxiliary adapter) ThinkSystem Nvidia ConnectX-7 NDR200/ HDR QSFP112 2-port PCIe Gen5 x16 InfiniBand Adapter ThinkSystem NVIDIA ConnectX-7 NDR400 OSFP 1-port PCIe Gen5 Adapter	6	• 1 CPU: 1, 2, 3, 7, 12 • 2 CPUs: 1, 4, 2, 5, 7, 8, 3, 6, 11, 12

Notes:

1. Rules for GPU adapters:
   - All installed GPU adapters must be identical. For thermal requirement on GPUs, see "Thermal rules" on page 19.
   - The air baffles for GPU adapters vary according to the GPU type. For detailed information, see "GPU replacement" on page 97.
   - If GPU adapters are installed, no middle drive cage, rear drive cage, or PCIe SSD cards are supported.
   - Only a maximum of six T400 and T1000 GPU adapters are not supported. The T400 and T1000 GPU adapters are not supported on a Gen 5 riser card.

- If a double-wide GPU adapter is installed in slot 2, 5 or 7, the adjacent slot 1, 4, or 8 respectively is not available.
- When there are three or more SFF RAID/HBA adapters installed, only a maximum of two double-wide GPU adapters are supported.

2. Rules for the internal SFF RAID/HBA adapters:
   - RAID 940 series or 9350 series adapters require a RAID flash power module.
   - The RAID 940-8i or RAID 940-16i adapter supports Tri-mode. When Tri-mode is enabled, the server supports SAS, SATA and U.3 NVMe drives at the same time. NVMe drives are connected via a PCIe x1 link to the controller.

     Note: To support Tri-mode with U.3 NVMe drives, **U.3 x1 mode** must be enabled for the selected drive slots on the backplane through the XCC Web GUI. Otherwise, the U.3 NVMe drives cannot be detected. For more information, see "U.3 NVMe drive can be detected in NVMe connection, but cannot be detected in Tri-mode" on page 683.
   - The virtual RAID on CPU (VROC) key and Tri-mode are not supported at the same time.
   - ThinkSystem AMD X3522 10/25GbE DSFP28 2-port PCIe Ethernet Adapter must be installed on x16 slot for weight reason.

Thermal rules

This topic provides thermal rules the server.

Thermal rules for server without DWCM

This topic provides thermal rules for the server without a Direct Water Cooling Module (DWCM).

Abbreviations used in tables below are defined as follows:
- Max.Temp.: Maximum ambient temperature at sea level
- FIO = riser 5 + front OCP
- 4LP = riser 3/4
- S/S: SAS/SATA
- Any: AnyBay
- E: entry
- S: standard
- P: performance
- SW: single-wide
- DW: double-wide
- NA: not applicable
- Y: yes
- N: no

Notes:
- Performance heat sinks and performance fans are needed for the server having 195 W processors 6434/6434H/6534 or rear 4LP riser.
- Standard heat sinks and standard fans are needed for the server having 165 W 5515+ processors.

- Performance heat sinks are needed for the server having a GPU adapter installed on the front riser.
- Performance fans are needed for the server having any of the following components:
  - front PCIe and OCP adapters
  - OCP module installed in the chassis with 12 x 3.5-inch front drives
  - rear 7mm NVMe drives installed in the chassis with 12 x 3.5-inch front drives
  - internal CFF RAID/HBA/expander
  - parts with active optical cable (AOC) installed in storage configurations
  - ThinkSystem 96GB TruDDR5 4800MHz (2Rx4) RDIMM
  - ThinkSystem 128GB TruDDR5 4800MHz (4Rx4) 3DS RDIMM v1
  - ThinkSystem 256GB TruDDR5 4800MHz (8Rx4) 3DS RDIMM v1
  - the following special network cards installed in storage configurations
    - Mellanox ConnectX-6 HDR100 IB/100GbE VPI 1-port x16 PCIe 3.0 HCA w/ Tall Bracket L1/SBB with Active Fiber cables
    - Mellanox ConnectX-6 HDR100 IB/100GbE VPI 2-port x16 PCIe 3.0 HCA w/ Tall Bracket L1/SBB with Active Fiber cables
    - Mellanox ConnectX-6 HDR IB/200GbE Single Port x16 PCIe Adapter w/ Tall Bracket with Active Fiber cables
    - Mellanox MCX623106AC-CDAT Dx 100GbE QSFP56 2-port PCIe NIC -CSP I4
    - ThinkSystem Mellanox ConnectX-6 Dx 100GbE QSFP56 2-port PCIe Ethernet Adapter with Active Fiber cables
    - ThinkSystem NVIDIA BlueField-2 25GbE SFP56 2-Port PCIe Ethernet DPU w/BMC & Crypto
    - ThinkSystem NVIDIA ConnectX-7 NDR400 OSFP 1-port PCIe Gen5 Adapter with Active Fiber cables
    - ThinkSystem NVIDIA ConnectX-7 NDR200/HDR QSFP112 2-port PCIe Gen5 x16 InfiniBand Adapter with Active Fiber cables
    - ThinkSystem Broadcom 57508 100GbE QSFP56 2-port PCIe 4 Ethernet Adapter V2 with Active Fiber cables
    - ThinkSystem Broadcom 57454 10GBASE-T 4-port OCP Ethernet Adapter
    - ThinkSystem Broadcom 57416 10GBASE-T 2-port OCP Ethernet Adapter
    - ThinkSystem Broadcom 57508 100GbE QSFP56 2-Port OCP Ethernet Adapter
- ThinkSystem 256GB TruDDR5 4800MHz (8Rx4) 3DS RDIMM v1 is supported only on servers installed with the following components at a maximum ambient temperature of 25°C:
  - 8 x 2.5"/16 x 2.5"/8 x 3.5" front drive bay
  - processors with TDP less than or equal to 250 W
  - 2U entry or standard heat sinks
  - performance fans
- When ThinkSystem 256GB TruDDR5 4800MHz (8Rx4) 3DS RDIMM v1 is installed, the server supports a maximum of six HHHL GPU adapters in slot 1/2/4/5/7/8, and does not support FHFL GPU adapters.
- The ambient temperature is limited to 30°C or lower when any of the following types of RDIMMs are used:
  - 5600 MHz RDIMMs with capacity greater than or equal to 96 GB
  - ThinkSystem 96GB TruDDR5 4800MHz (2Rx4) RDIMM
  - ThinkSystem 128GB TruDDR5 4800MHz (4Rx4) 3DS RDIMM v1
  - 4800 MHz 256 GB RDIMMs (except ThinkSystem 256GB TruDDR5 4800MHz (8Rx4) 3DS RDIMM v1)
- The server without a DWCM does not support the 8593Q processor.

Standard configurations

This section provides thermal information for standard configurations.

Front drive bays	Max. Temp.	CPU TDP (watts)	Heat sink	Air baffle	Fan type	Max. DIMM Qty.
8 x 2.5" 16 x 2.5" 8 x 3.5"	45°C	125 <= TDP <= 185	T-shape (P)	S	P	32
	40°C	<= 205	T-shape (P)	S	P	32

Front drive bays	Max. Temp.	CPU TDP (watts)	Heat sink	Air baffle	Fan type	Max. DIMM Qty.
	35°C	125 <= TDP <= 185	2U (E)	S	S	32
	35°C	<= 250	2U (S)	S	S	32
	35°C	270 <= TDP <= 330	T-shape (P)	S	P	32
	30°C	350	T-shape (P)	S	P	32

Notes:

1. The DIMM supporting has the following conditions:
   - When the capacity of each RDIMM is less than or equal to 64 GB, standard fans are used.
   - When the capacity of each RDIMM is greater than 64 GB, performance fans are used.
2. The maximum ambient temperatures of 45°C and 40°C are supported under the following conditions:
   - The capacity of each RDIMM must be less than or equal to 64 GB.
   - The server supports only low profile PCIe cards with performance dropping.
   - The following processors are not used:
     – 195 W processors 6434/6434H/6534
     – 165 W processor 5515+

Storage configurations with SPR processors

This section provides thermal information for storage configurations with 4th Gen (Sapphire Rapids, SPR) processors.

Front drive bays	Middle drive bays	Rear drive bays	Max. Temp.	CPU TDP (watts)	Heat sink	Air baffle	Fan type	Max. DIMM Qty.
24 x 2.5"	NA	NA	30°C	125 <= TDP <= 185	2U (E)	S	S	32
			30°C	195 <= TDP <= 205	2U (S)	S	S	32
			30°C	225 <= TDP <= 250	2U (S)	S	P	32
			30°C	270 <= TDP <= 330	T-shape (P)	S	P	32
			25°C	350	T-shape (P)	S	P	32
	NA	4 x 2.5" S/S 2 x 3.5" S/S 4 x 2.5" NVMe	30°C	<= 250	T-shape (P)	S	P	32
			25°C	270 <= TDP <= 300	T-shape (P)	S	P	32

Front drive bays	Middle drive bays	Rear drive bays	Max. Temp.	CPU TDP (watts)	Heat sink	Air baffle	Fan type	Max. DIMM Qty.
	8 x 2.5" NVMe	NA	30°C	<= 250	T-shape (P)	NA	P	32
			25°C	270 <= TDP <= 300	T-shape (P)	NA	P	32
	8 x 2.5" S/S 4 x 3.5" S/S	4 x 2.5" S/S 8 x 2.5" S/S	30°C	<= 250	T-shape (P)	NA	P	32
			25°C	270 <= TDP <= 300	T-shape (P)	NA	P	32
	8 x 2.5" NVMe	4 x 2.5" NVMe	25°C	<= 300	T-shape (P)	NA	P	32
12 x 3.5"	NA	NA	30°C	125 <= TDP <= 185	2U (E)	S	S	32
			30°C	195 <= TDP <= 205	2U (S)	S	S	32
			30°C	225 <= TDP <= 250	2U (S)	S	P	32
			30°C	270 <= TDP <= 330	T-shape (P)	S	P	32
			25°C	350	T-shape (P)	S	P	32
	NA	2 x 3.5" S/S 4 x 3.5" S/S 4 x 2.5" S/S 4 x 2.5" NVMe	30°C	<= 250	T-shape (P)	S	P	32
			25°C	270 <= TDP <= 300	T-shape (P)	S	P	32
	8 x 2.5" NVMe	NA	30°C	<= 250	T-shape (P)	NA	P	32
			25°C	270 <= TDP <= 300	T-shape (P)	NA	P	32
	4 x 3.5" S/S	4 x 3.5" S/S 4 x 2.5" S/S	30°C	<= 250	T-shape (P)	NA	P	32
			25°C	270 <= TDP <= 300	T-shape (P)	NA	P	32

Notes:

1. The DIMM supporting has the following conditions:
   - When the capacity of each RDIMM is less than or equal to 32 GB, standard fans are used.
   - When the capacity of each RDIMM is greater than 32 GB, performance fans are used.

- The ambient temperature is limited to 25°C or lower when ThinkSystem 128GB TruDDR5 4800MHz (4Rx4) 3DS RDIMM v1 is used in 8 x 2.5" AnyBay + 16 x 2.5" SAS/SATA, 16 x 2.5" AnyBay + 8 x 2.5" SAS/SATA, or 24 x 2.5" AnyBay configurations.
- The ambient temperature is limited to 30°C or lower when ThinkSystem 128GB TruDDR5 4800MHz (4Rx4) 3DS RDIMM v1 is used in 12 x 3.5" configurations under the following conditions:
  - No middle or rear drive bay is installed.
  - Standard or Entry heat sinks are used.
  - Processor TDP is less than or equal to 250 W.
- The ambient temperature is limited to 25°C or lower when ThinkSystem 96GB TruDDR5 4800MHz (2Rx4) RDIMM is installed in the following configurations:
  - 12 x 3.5" configurations including processors with TDP less than or equal to 300 W
  - 12 x 3.5" + middle/rear drive bay configurations including processors with TDP less than or equal to 270 W
- ThinkSystem 96GB TruDDR5 4800MHz (2Rx4) RDIMM is not supported in 12 x 3.5" configurations including processors with TDP greater than 300 W.

2. For the chassis with 12 x 3.5-inch front drives, a part with AOC is not supported in slot 3.
3. For better performance, it is not recommended to block the air vent on the top cover of a server with storage configuration.
4. When the ambient temperature is 30°C, Gen 5 NVMe rear or middle drive bays do not support the drives larger than 3.84 TB.
5. The ambient temperature is limited to 25°C or lower when the following NVMe SSDs are installed in the front 12 x 3.5" SAS/SATA + middle 8 x 2.5" NVMe or front 12 x 3.5" SAS/SATA + rear 4 x 2.5" NVMe configuration:
   - ThinkSystem 2.5" U.2 P5336 61.44TB Read Intensive NVMe PCIe 4.0 x4 HS SSD
   - ThinkSystem 2.5" U.2 P5336 30.72TB Read Intensive NVMe PCIe 4.0 x4 HS SSD
   - ThinkSystem 2.5" U.2 P5336 15.36TB Read Intensive NVMe PCIe 4.0 x4 HS SSD

Storage configurations with EMR processors

This section provides thermal information for storage configurations with 5th Gen (Emerald Rapids, EMR) processors.

Front drive bays	Middle drive bays	Rear drive bays	Max. Temp.	CPU TDP (watts)	Heat sink	Air baffle	Fan type	Max. DIMM Qty.
24 x 2.5"	NA	NA	30°C	125 <= TDP <= 185	2U (E)	S	P	32
			30°C	185 < TDP <= 250	2U (S)	S	P	32
			30°C	270 <= TDP <= 330	T-shape (P)	S	P	32
			25°C	350	T-shape (P)	S	P	32

Front drive bays	Middle drive bays	Rear drive bays	Max. Temp.	CPU TDP (watts)	Heat sink	Air baffle	Fan type	Max. DIMM Qty.
	NA	4 x 2.5" S/S 2 x 3.5" S/S 4 x 2.5" NVMe	30°C	<= 250	T-shape (P)	S	P	32
			25°C	270 <= TDP <= 300	T-shape (P)	S	P	32
	8 x 2.5" NVMe	NA	30°C	<= 250	T-shape (P)	NA	P	32
			25°C	270 <= TDP <= 300	T-shape (P)	NA	P	32
	8 x 2.5" S/S 4 x 3.5" S/S	4 x 2.5" S/S 8 x 2.5" S/S	30°C	<= 250	T-shape (P)	NA	P	32
			25°C	270 <= TDP <= 300	T-shape (P)	NA	P	32
	8 x 2.5" NVMe	4 x 2.5" NVMe	25°C	<= 300	T-shape (P)	NA	P	32
12 x 3.5"	NA	NA	30°C	125 <= TDP <= 185	2U (E)	S	P	32
			30°C	185 < TDP <= 250	2U (S)	S	P	32
			30°C	270 <= TDP <= 330	T-shape (P)	S	P	32
			25°C	350	T-shape (P)	S	P	32
	NA	2 x 3.5" S/S 4 x 3.5" S/S 4 x 2.5" S/S 4 x 2.5" NVMe	30°C	<= 250	T-shape (P)	S	P	32
			25°C	270 <= TDP <= 300	T-shape (P)	S	P	32
	8 x 2.5" NVMe	NA	30°C	<= 250	T-shape (P)	NA	P	32
			25°C	270 <= TDP <= 300	T-shape (P)	NA	P	32
	4 x 3.5" S/S	4 x 3.5" S/S 4 x 2.5" S/S	30°C	<= 250	T-shape (P)	NA	P	32
			25°C	270 <= TDP <= 300	T-shape (P)	NA	P	32

Notes:

1. The DIMM supporting has the following conditions:

- The ambient temperature is limited to 25°C or lower when ThinkSystem 128GB TruDDR5 4800MHz (4Rx4) 3DS RDIMM v1 is used in 8 x 2.5" AnyBay + 16 x 2.5" SAS/SATA, 16 x 2.5" AnyBay + 8 x 2.5" SAS/SATA, or 24 x 2.5" AnyBay configurations.
- The ambient temperature is limited to 30°C or lower when ThinkSystem 128GB TruDDR5 4800MHz (4Rx4) 3DS RDIMM v1 is used in 12 x 3.5" configurations under the following conditions:
  - No middle or rear drive bay is installed.
  - Standard or Entry heat sinks are used.
  - Processor TDP is less than or equal to 250 W.

2. For the chassis with 12 x 3.5-inch front drives, a part with AOC is not supported in slot 3.
3. In 12 x 3.5" configurations, the server supports the maximum temperature of 30°C for processors with TDP greater than 300 W and less than or equal to 330 W and 25°C for 350 W processors only when the capacity of DIMM is less than or equal to 48 GB.
4. For better performance, it is not recommended to block the air vent on the top cover of a server with storage configuration.
5. When the ambient temperature is 30°C or higher, Gen 5 NVMe rear or middle drive bays do not support the drives larger than 3.84 TB.
6. The ambient temperature is limited to 25°C or lower when the following NVMe SSDs are installed in the front 12 x 3.5" SAS/SATA + middle 8 x 2.5" NVMe or front 12 x 3.5" SAS/SATA + rear 4 x 2.5" NVMe configuration:
   - ThinkSystem 2.5" U.2 P5336 61.44TB Read Intensive NVMe PCIe 4.0 x4 HS SSD
   - ThinkSystem 2.5" U.2 P5336 30.72TB Read Intensive NVMe PCIe 4.0 x4 HS SSD
   - ThinkSystem 2.5" U.2 P5336 15.36TB Read Intensive NVMe PCIe 4.0 x4 HS SSD

GPU configurations without FIO

This section provides thermal information for GPU configurations without FIO.
- Single-wide GPU: NVIDIA A2, T1000, T400, L4
- Double-wide GPU: NVIDIA A16, A30, A40, A100, A800, H100, H800, L40, L40S, RTX A2000, RTX A4500, RTX A6000, RTX 6000 Ada, H100 NVL; AMD Instinct MI210

Front drive bays	Max. Temp.	CPU TDP (watts)	Heat sink	Air baffle	Fan type	Max. GPU Qty.		Max. DIMM Qty.
						SW	DW	
8 x 2.5"	30°C	125 <= TDP <= 185	2U (E)	S	P	8	NA	32
	30°C	225 <= TDP <= 250	2U (S)	S	P	8	NA	32
	30°C	270 <= TDP <= 350	T-shape (P)	S	P	8	NA	32
	30°C	<= 350	T-shape (P)	GPU	P	NA	3	32
8 x 3.5" 16 x 2.5"	30°C	125 <= TDP <= 185	2U (E)	S	P	8	NA	32
	30°C	225 <= TDP <= 250	2U (S)	S	P	8	NA	32

Front drive bays	Max. Temp.	CPU TDP (watts)	Heat sink	Air baffle	Fan type	Max. GPU Qty.		Max. DIMM Qty.
						SW	DW	
	30°C	270 <= TDP <= 300	T-shape (P)	S	P	8	NA	32
	30°C	<= 300	T-shape (P)	GPU	P	NA	3	32
	25°C	300 < TDP <= 350	T-shape (P)	S	P	8	NA	32
	25°C	300 < TDP <= 350	T-shape (P)	GPU	P	NA	3	32
24 x 2.5"	25°C	125 <= TDP <= 185	2U (E)	S	P	6	NA	32
	25°C	225 <= TDP <= 250	2U (S)	S	P	6	NA	32
	25°C	270 <= TDP <= 300	T-shape (P)	S	P	6	NA	32
	25°C	<= 300	T-shape (P)	GPU	P	NA	2	32

Notes:

1. For the chassis with 16 x 2.5-inch front drives, a maximum of two A40, H100, H800, or L40S GPU adapters are supported in PCIe slot 2 and slot 5 at a maximum ambient temperature of 30°C.
2. The 24 x 2.5" GPU configurations do not support A40 and H100 NVL GPU adapters.
3. A maximum of three RTX A2000 and RTX 6000 Ada GPU adapters are supported by the chassis with 24 x 2.5-inch front drives.
4. The H100 NVL GPU adapter is supported at a maximum ambient temperature of 25°C.

GPU Configurations with FIO

This section provides thermal information for the GPU configurations with FIO.

- Single-wide GPU: NVIDIA A2, T1000, T400, L4
- Double-wide GPU: NVIDIA A16, A30, A40, A100, A800, H100, H800, L40, L40S, RTX A2000, RTX A4500, RTX A6000, RTX 6000 Ada, H100 NVL; AMD Instinct MI210

Front drive bays	Max. Temp.	CPU TDP (watts)	Heat sink	Air baffle	Fan type	Max. GPU Qty.			Max. DIMM Qty.
						T1000/ T400	A2/L4	DW	
8 x 2.5" + FIO	30°C	<= 300	T-shape (P)	S	P	8	10	NA	32
	25°C	300 < TDP <= 350	T-shape (P)	S	P	8	10	NA	32
	30°C	<= 300	T-shape (P)	GPU	P	NA	NA	2	32
	25°C	300 < TDP <= 350	T-shape (P)	GPU	P	NA	NA	2	32

Front drive bays	Max. Temp.	CPU TDP (watts)	Heat sink	Air baffle	Fan type	Max. GPU Qty.			Max. DIMM Qty.
						T1000/ T400	A2/L4	DW	
16 x 2.5" + FIO	25°C	<= 300	T-shape (P)	S	P	8	10	NA	32
	25°C	<= 300	T-shape (P)	GPU	P	NA	NA	2	32

Notes:

1. The front riser (riser 5) supports only passive SW GPU adapters.
2. The 16 x 2.5" + FIO GPU configurations do not support A40 and H100 NVL GPU adapters.
3. The H100 NVL GPU adapter is supported at a maximum ambient temperature of 25°C.

None-GPU Configurations with FIO or 4LP

This section provides thermal information for non-GPU configurations with FIO or rear 4LP riser.

Front drive bays	Max. Temp.	CPU TDP (watts)	Heat sink	Air baffle	Fan type	Max. DIMM Qty.
8 x 2.5" + FIO	35°C	125 <= TDP <= 185	2U (E)	S	P	32
	35°C	205 <= TDP <= 250	2U (S)	S	P	32
	35°C	270 <= TDP <= 330	T-shape (P)	S	P	32
	30°C	350	T-shape (P)	S	P	32
16 x 2.5" + FIO	30°C	125 <= TDP <= 185	2U (E)	S	P	32
	30°C	205 <= TDP <= 250	2U (S)	S	P	32
	30°C	270 <= TDP <= 330	T-shape (P)	S	P	32
	25°C	350	T-shape (P)	S	P	32
8 x 2.5" + 4LP	35°C	<= 330	T-shape (P)	S	P	32
16 x 2.5" + 4LP	30°C	350	T-shape (P)	S	P	32

Note: The ambient temperature must be limited to 25°C or lower when ThinkSystem 128GB TruDDR5 4800MHz (4Rx4) 3DS RDIMM v1 is installed in the 8 x 2.5" SAS/SATA + 8 x 2.5" AnyBay + FIO configuration or 16 x 2.5" AnyBay + FIO configuration.

Configuration with 2U winged heat sinks

This section provides thermal information for the currently available configuration with 2U winged heat sinks.

Front drive bays	Max. Temp.	CPU	Air baffle	Fan type	Max. DIMM Qty.
8 x 2.5" NVMe Gen5	30°C	6558Q	NA	P	32 x 5600 MHz 16 GB DIMM

Notes:

1. The 8 x 2.5" backplane is installed in the position of backplane 2. For the position of backplane 2, see “Install the 2.5-inch front drive backplane” on page 85.
2. For the 8 x 2.5" NVMe configuration, the drive capacity must be less than or equal to 7.68 TB.
3. For other configuration requests with 2U winged heat sink for 6558Q, 6458Q or 8470Q liquid cooling processors, reach Lenovo sales representative to investigate through Lenovo special bid process.

Thermal rules for server with DWCM

This topic provides thermal rules for the server with a Direct Water Cooling Module (DWCM).

Abbreviations used in tables below are defined as follows:

- Max.Temp.: Maximum ambient temperature at sea level
- FIO = riser 5 + front OCP
- 4LP = riser 3/4
- S/S: SAS/SATA
- Any: AnyBay
- E: entry
- S: standard
- P: performance
- SW: single-wide
- DW: double-wide
- NA: not applicable
- Y: yes
- N: no

Notes:

- Performance fans are needed for the server having any of the following components:
  - front PCIe and OCP adapters
  - OCP module installed in the chassis with 12 x 3.5-inch front drives
  - rear 7mm NVMe drives installed in the chassis with 12 x 3.5-inch front drives
  - internal CFF RAID/HBA/expander
  - parts with active optical cable (AOC) installed in storage configurations
  - ThinkSystem 96GB TruDDR5 4800MHz (2Rx4) RDIMM
  - ThinkSystem 128GB TruDDR5 4800MHz (4Rx4) 3DS RDIMM v1
  - ThinkSystem 256GB TruDDR5 4800MHz (8Rx4) 3DS RDIMM v1
  - the following special network cards installed in storage configurations
    - Mellanox ConnectX-6 HDR100 IB/100GbE VPI 1-port x16 PCIe 3.0 HCA w/ Tall Bracket L1/SBB with Active Fiber cables
    - Mellanox ConnectX-6 HDR100 IB/100GbE VPI 2-port x16 PCIe 3.0 HCA w/ Tall Bracket L1/SBB with Active Fiber cables
    - Mellanox ConnectX-6 HDR IB/200GbE Single Port x16 PCIe Adapter w/ Tall Bracket with Active Fiber cables
    - Mellanox MCX623106AC-CDAT Dx 100GbE QSFP56 2-port PCIe NIC -CSP I4

  - ThinkSystem Mellanox ConnectX-6 Dx 100GbE QSFP56 2-port PCIe Ethernet Adapter with Active Fiber cables
  - ThinkSystem NVIDIA BlueField-2 25GbE SFP56 2-Port PCIe Ethernet DPU w/BMC & Crypto
  - ThinkSystem NVIDIA ConnectX-7 NDR400 OSFP 1-port PCIe Gen5 Adapter with Active Fiber cables
  - ThinkSystem NVIDIA ConnectX-7 NDR200/HDR QSFP112 2-port PCIe Gen5 x16 InfiniBand Adapter with Active Fiber cables
  - ThinkSystem Broadcom 57508 100GbE QSFP56 2-port PCIe 4 Ethernet Adapter V2 with Active Fiber cables
  - ThinkSystem Broadcom 57454 10GBASE-T 4-port OCP Ethernet Adapter
  - ThinkSystem Broadcom 57416 10GBASE-T 2-port OCP Ethernet Adapter
  - ThinkSystem Broadcom 57508 100GbE QSFP56 2-Port OCP Ethernet Adapter
- The ambient temperature is limited to 30°C or lower when any of the following types of RDIMMs are used:
  - 5600 MHz RDIMMs with capacity greater than or equal to 96 GB
  - ThinkSystem 96GB TruDDR5 4800MHz (2Rx4) RDIMM
  - ThinkSystem 128GB TruDDR5 4800MHz (4Rx4) 3DS RDIMM v1
  - 4800 MHz 256 GB RDIMMs (except ThinkSystem 256GB TruDDR5 4800MHz (8Rx4) 3DS RDIMM v1)

Standard configurations

This section provides thermal information for standard configurations with a DWCM.

Front drive bays	Max. Temp.	CPU TDP (watts)	Air baffle	Fan type	Max. DIMM Qty.
8 x 2.5" 16 x 2.5" 8 x 3.5"	35°C	All supported	S	S	32

Note: The ambient temperature is limited to 25°C when ThinkSystem 256GB TruDDR5 4800MHz (8Rx4) 3DS RDIMM v1 is used.

Storage configurations

This section provides thermal information for storage configurations with a DWCM.

Front drive bays	Middle drive bays	Rear drive bays	Max. Temp.	Air baffle	Fan type	Max. DIMM Qty.
16 x 2.5" S/S + 8 x 2.5" Any 8 x 2.5" S/S + 16 x 2.5" Any 24 x 2.5" S/S 24 x 2.5" Any	NA	NA	35°C	S	S	32
	NA	4 x 2.5" S/S 2 x 3.5" S/S	35°C	S	P	32
	8 x 2.5" NVMe	NA	30°C	NA	P	32
	8 x 2.5" S/S 4 x 3.5" S/S	4 x 2.5" S/S 8 x 2.5" S/S	35°C	NA	P	32
24 x 2.5" S/S 24 x 2.5" Any	NA	4 x 2.5" NVMe	30°C	S	P	32

Front drive bays	Middle drive bays	Rear drive bays	Max. Temp.	Air baffle	Fan type	Max. DIMM Qty.
24 x 2.5" NVMe	8 x 2.5" NVMe	4 x 2.5" NVMe	30°C	NA	P	32
12 x 3.5" S/S 12 x 3.5" Any	NA	NA	35°C	S	S	32
	NA	2 x 3.5" S/S 4 x 3.5" S/S 4 x 2.5" S/S	35°C	S	P	32
	8 x 2.5" NVMe	NA	30°C	NA	P	32
	4 x 3.5" S/S	4 x 3.5" S/S 4 x 2.5" S/S	35°C	NA	P	32
12 x 3.5" S/S	NA	4 x 2.5" NVMe	30°C	S	P	32

Notes:

1. When the capacity of each RDIMM is less than 64 GB, standard fans are used.
2. When the capacity of each RDIMM is greater than or equal to 64 GB, performance fans are used.
3. Storage configurations with a DWCM does not support ThinkSystem 256GB TruDDR5 4800MHz (8Rx4) 3DS RDIMM v1.
4. The ambient temperature is limited to 25°C or lower when the following NVMe SSDs are installed in the front 12 x 3.5" SAS/SATA + middle 8 x 2.5" NVMe or front 12 x 3.5" SAS/SATA + rear 4 x 2.5" NVMe configuration:
   - ThinkSystem 2.5" U.2 P5336 61.44TB Read Intensive NVMe PCIe 4.0 x4 HS SSD
   - ThinkSystem 2.5" U.2 P5336 30.72TB Read Intensive NVMe PCIe 4.0 x4 HS SSD
   - ThinkSystem 2.5" U.2 P5336 15.36TB Read Intensive NVMe PCIe 4.0 x4 HS SSD

GPU configurations without FIO and 4LP

This section provides thermal information for GPU configurations without FIO and 4LP.

- Single-wide GPU: NVIDIA A2, T1000, T400, L4
- Double-wide GPU: NVIDIA A16, A30, A40, A100, A800, H100, H800, L40, L40S, RTX A2000, RTX A4500, RTX A6000, RTX 6000 Ada, H100 NVL; AMD Instinct MI210

Front drive bays	Max. Temp.	CPU TDP (watts)	Air baffle	Fan type	Max. GPU Qty.		Max. DIMM Qty.
					SW	DW	
8 x 2.5" 8 x 3.5" 16 x 2.5"	35°C	All supported	S	P	8	NA	32
	35°C	All supported	GPU	P	NA	3	32
24 x 2.5"	35°C	All supported	S	P	6	NA	32
	35°C	All supported	GPU	P	NA	3	32

Notes:

1. The ambient temperature must be limited to 30°C or lower in the following cases:
   - Three A40 GPU adapters are installed in 24 x 2.5" configurations.
   - Three 300 W GPU adapters are installed in 8 x 3.5" or 16 x 2.5" configurations.

- The H100 NVL GPU adapter is installed.

2. The ambient temperature must be limited to 25°C or lower in the following cases:
   - Three H100/H800/L40S GPU adapters are installed in 24 x 2.5" configurations.
   - The server is equipped with ThinkSystem 256GB TruDDR5 4800MHz (8Rx4) 3DS RDIMM v1.
3. The 24 x 2.5" configurations do not support the H100 NVL GPU adapter and ThinkSystem 256GB TruDDR5 4800MHz (8Rx4) 3DS RDIMM v1.

GPU Configurations with FIO

This section provides thermal information for the GPU configurations with FIO.

- Single-wide GPU: NVIDIA A2, T1000, T400, L4
- Double-wide GPU: NVIDIA A16, A30, A40, A100, A800, H100, H800, L40, L40S, RTX A2000, RTX A4500, RTX A6000, RTX 6000 Ada, H100 NVL; AMD Instinct MI210

Front drive bays	Max. Temp.	CPU TDP (watts)	Air baffle	Fan type	Max. GPU Qty.			Max. DIMM Qty.
					T1000/ T400	A2/L4	DW	
8 x 2.5" + FIO	35°C	All supported	GPU	P	NA	NA	3	32
16 x 2.5" + FIO	30°C	All supported	S	P	8	10	NA	32

Notes:

1. The front riser (riser 5) supports only passive SW GPU adapters.
2. The ambient temperature must be limited to 30°C or lower in the following cases:
   - Three 300 W GPU adapters are installed in 8 x 2.5"+ FIO configurations.
   - Three A40 GPU adapters are installed in 16 x 2.5" + FIO configurations.
   - The H100 NVL GPU adapter is installed.
3. The ambient temperature must be limited to 25°C or lower when three H100/H800/L40S GPU adapters are installed in 16 x 2.5" + FIO configurations.
4. The 16 x 2.5" + FIO configurations do not support the H100 NVL GPU adapter and ThinkSystem 256GB TruDDR5 4800MHz (8Rx4) 3DS RDIMM v1.

Non-GPU Configurations with FIO or 4LP

This section provides thermal information for non-GPU configurations with FIO or rear 4LP riser.

Front drive bays	Max. Temp.	CPU TDP (watts)	Air baffle	Fan type	Max. DIMM Qty.
8 x 2.5" + FIO/4LP 16 x 2.5" + FIO/4LP	35°C	All supported	S	P	32

Note: The non-GPU configurations with FIO do not support ThinkSystem 256GB TruDDR5 4800MHz (8Rx4) 3DS RDIMM v1.

Power on and power off the server

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

Power on the server

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

Power button location and power LED locations are specified in:

- "Server components" in *User Guide* or *System Configuration Guide*
- "Troubleshooting by system LEDs and diagnostics display" on page 642.

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.

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/.

For information about powering off the server, see "Power off the server" on page 32.

Power off the server

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

Power button location and power LED locations are specified in:

- "Server components" in *User Guide* or *System Configuration Guide*
- "Troubleshooting by system LEDs and diagnostics display" on page 642.

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 32.

Server replacement

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

Remove the server from rack

Follow instructions in this section to remove the server from the rack.

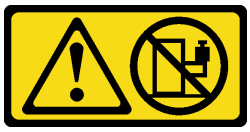
S036

18 - 32 kg (39 - 70 lb)

32 - 55 kg (70 - 121 lb)

CAUTION:
Use safe practices when lifting.

R006



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

CAUTION:

- **Potential stability hazards exist. The rack might tip over and cause serious personal injury.**
- **Before extending the rack to the installation position, read the "Installation Guidelines" on page 1. Do not put any load on the slide-rail mounted equipment in the installation position. Do not leave the slide-rail mounted equipment in the installation position.**

About this task

Attention:

- Read "Installation Guidelines" on page 1 and "Safety inspection checklist" on page 2 to ensure that you work safely.
- Power off the server and peripheral devices and disconnect the power cords and all external cables. See "Power off the server" on page 32.
- 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.

CAUTION:
Make sure to have three people operate the server removal procedures to prevent injury.

Procedure

Step 1. Loosen the two thumbscrews located on the front of the server to disengage it from the rack.

Rack front

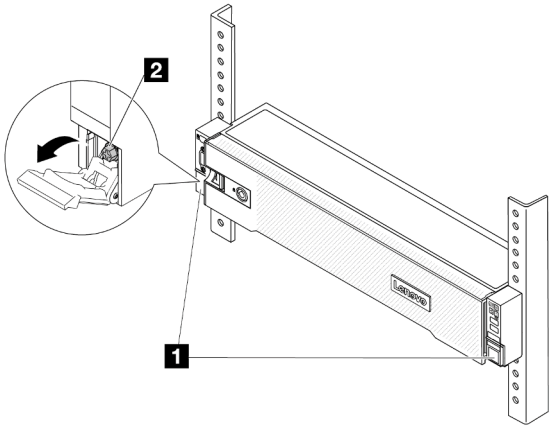


Figure 13. Disengaging server from the rack

1	Rack latch
2	Screw

Step 2. Hold the mounting ears on the front of the server; then, slide the server all the way out until it stops.

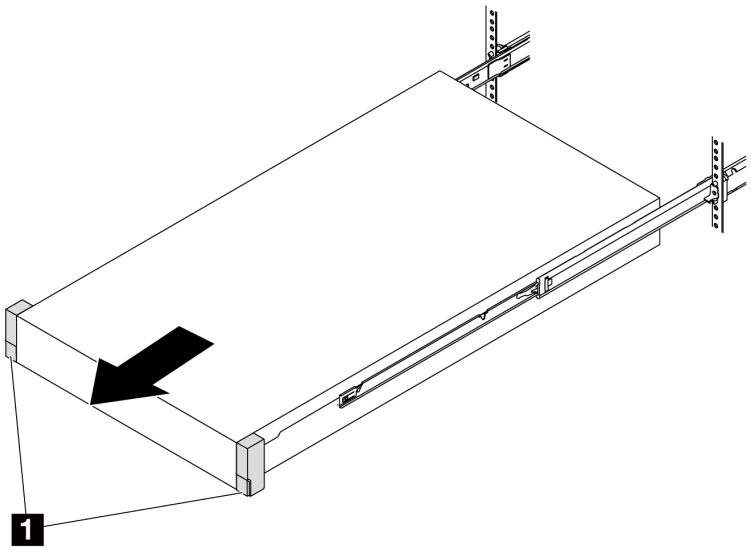


Figure 14. Pulling out the server

1	Rack latch (Mounting ear)

Step 3. Remove the server from the rack.

CAUTION:
Make sure three people are lifting the sever by holding the lift points

Rack front

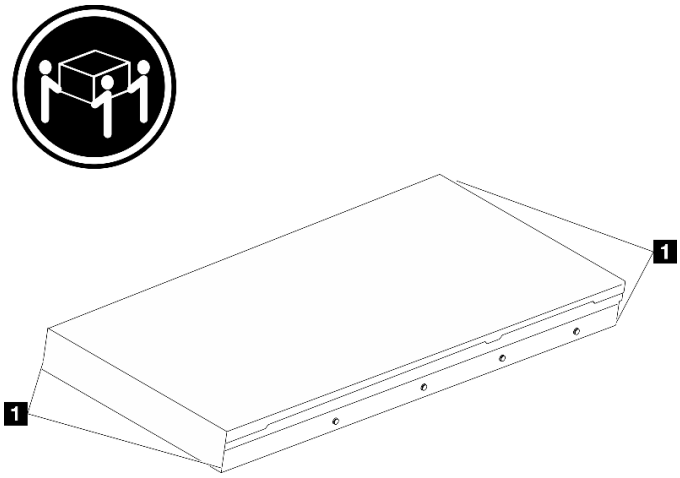


Figure 15. Lifting up the server

1	Lift point

Rack Front

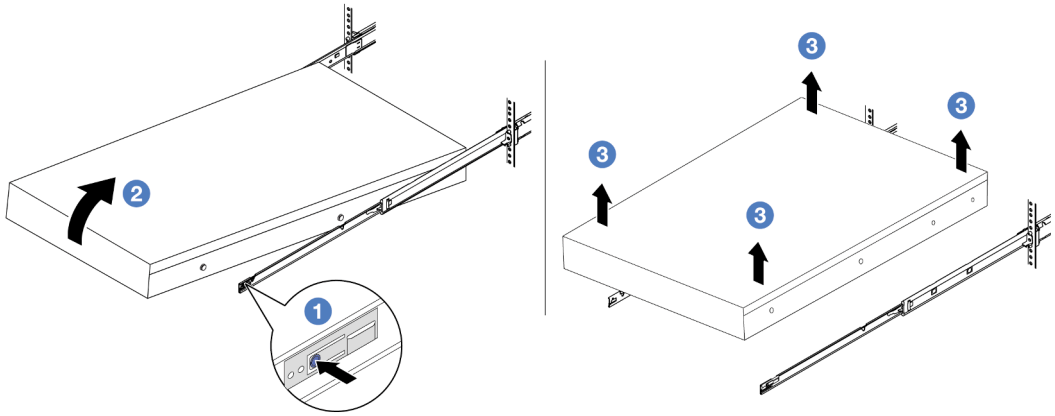


Figure 16. Removing the server from the rack.

1	Release tab

a. (1) Press the release tabs to disengage the rails from the server.

b. (2) Carefully lift up the front end of the server slightly to detach the nailheads from the slots on the rails.

c. (3) Lift up the server to remove it from the rails completely. Place the server on a flat and sturdy surface.

After you finish

Carefully lay the server on a flat, static-protective surface.

Demo video

Watch the procedure on YouTube

Install the server to rack

Follow instructions in this section to install the server to the rack.

S036

18 - 32 kg (39 - 70 lb)

32 - 55 kg (70 - 121 lb)

CAUTION:
Use safe practices when lifting.

R006

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

CAUTION:

- **Potential stability hazards exist. The rack might tip over and cause serious personal injury.**
- **Before extending the rack to the installation position, read the “Installation Guidelines” on page 1. Do not put any load on the slide-rail mounted equipment in the installation position. Do not leave the slide-rail mounted equipment in the installation position.**

About this task

Attention:

- Read “Installation Guidelines” on page 1 and “Safety inspection checklist” on page 2 to ensure that you work safely.
- Power off the server and peripheral devices and disconnect the power cords and all external cables. See “Power off the server” on page 32.
- 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.

CAUTION:
Make sure to have three people operate the server installation procedures to prevent injury.

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

- Go to https://datacentersupport.lenovo.com/products/servers/thinksystem/sr650v3/downloads/driver-list/ to see the latest firmware and driver updates for your server.
- Go to “Update the firmware” in *User Guide* or *System Configuration Guide* for more information on firmware updating tools.

Procedure

Step 1. From the front of the rack, pull the rails all the way out until they stop

Attention: You can only install the server successfully when the rails are fully extended.

Rack front

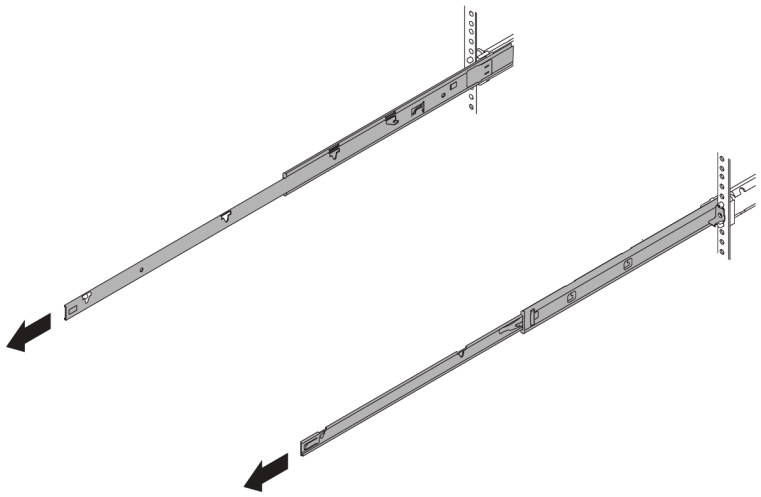


Figure 17. Pulling out the rails

Step 2. Carefully lift up the server with three people.

CAUTION:
Make sure three people are lifting the sever by holding the lift points

Rack front

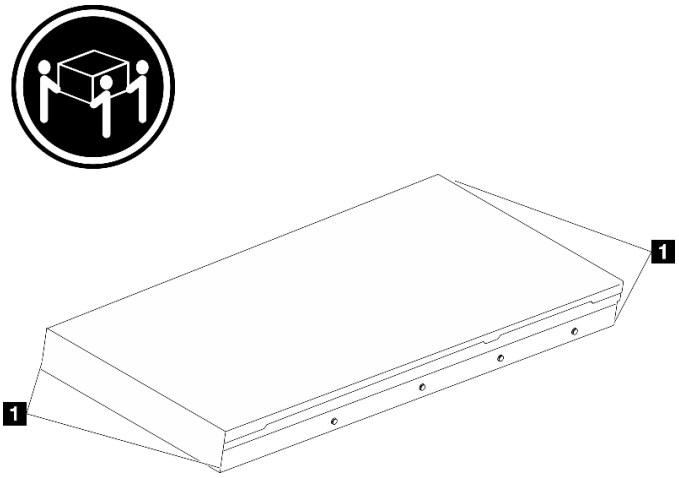


Figure 18. Lifting up the server

1	Lift point

Step 3. From the front of the rack, install server into the rails.

Attention: You can only install the server successfully when the rails are fully extended.

Rack front

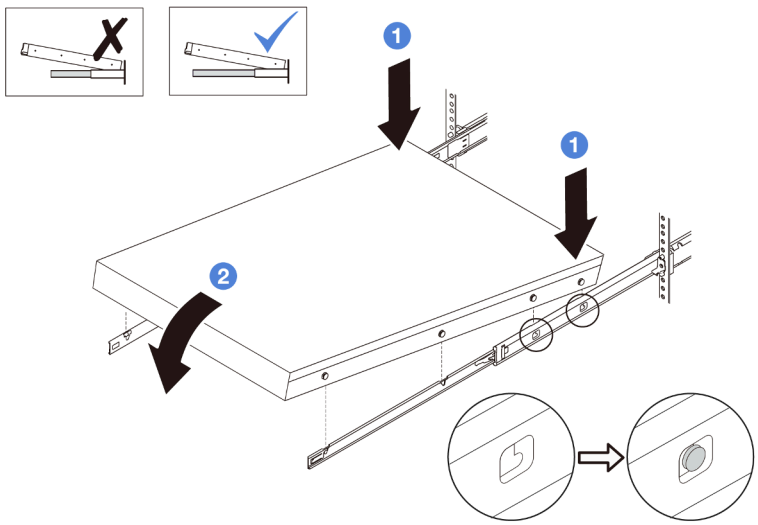


Figure 19. Installing the server into the rails

a. 1 Tilt the server and slowly lower its rear end; then, push the rails toward the server and make sure the farthest nailheads on server's left and right side go into the slots on the rail.

b. 2 Slowly lower the server down and make sure the other 3 nailheads on server's left and right sides slip into corresponding slots.

Note: Inspect the sides of the rails to make sure the nailheads are placed in the slots.

Step 4. Slide the server into rack.

a. 1 Push up the latches on the rails.

b. 2 Push the server all the way into the rack until both latches lock into position with a click.

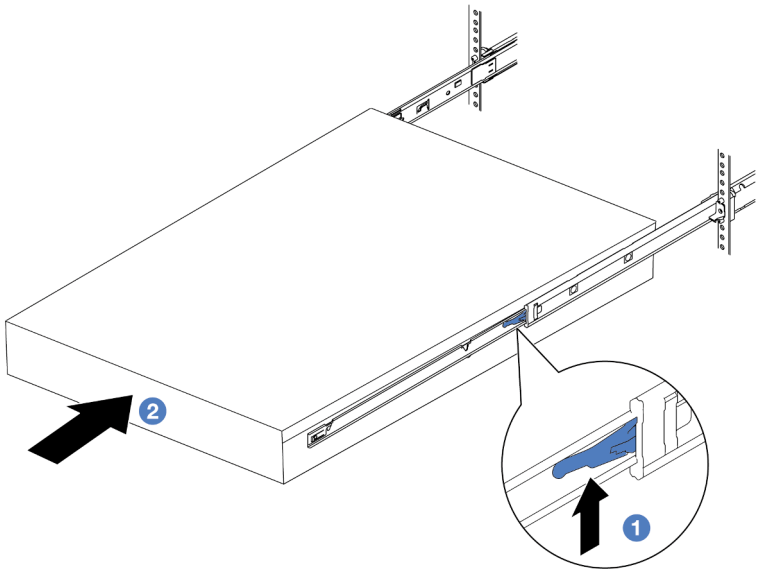


Figure 20. Installing the server into the rack

1	Latch

Step 5. (Optional) Secure the server to the rack.

a. Install one M6 screw to each of the rails to secure the server to the rear of the rack.

Rack rear

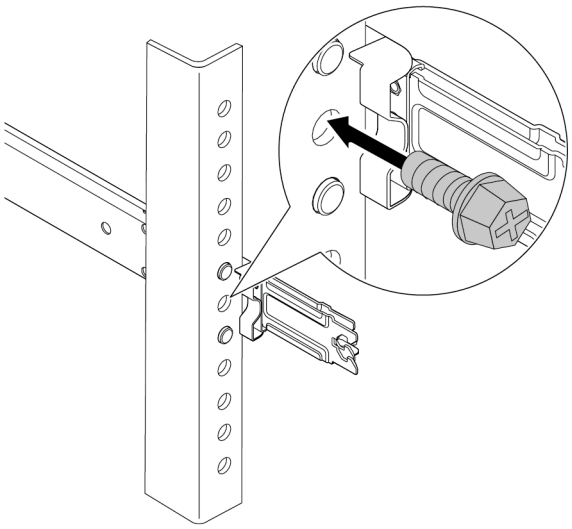


Figure 21. Securing the server to the rear of the rack

b. Secure the server to the front of the rack. Fasten the two thumbscrews located on the front of the server.

Rack front

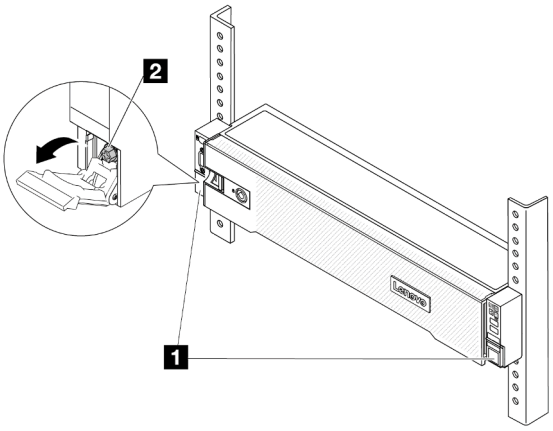


Figure 22. Securing the server to the front of the rack

1	Rack latch
2	Screw

After you finish

1. Reconnect the power cords and any cables that you removed.
2. Power on the server and any peripheral devices. See “Power on the server” on page 32.
3. Update the server configuration. See “Complete the parts replacement” on page 320.

Demo video

Watch the procedure on YouTube

Hot-swap drive replacement

Use this information to remove and install a hot-swap drive. You can remove or install a hot-swap drive without turning off the server, which helps you avoid significant interruption to the operation of the system.

- “Remove a hot-swap drive” on page 41
- “Install a hot-swap drive” on page 42

Notes:

- The term “hot-swap drive” refers to all the supported types of hot-swap hard disk drives, hot-swap solid-state drives, and hot-swap NVMe drives.
- Use any documentation that comes with the drive and follow those instructions in addition to the instructions in this topic. Ensure that you have all the cables and other equipment that are specified in the documentation that comes with the drive.
- The electromagnetic interference (EMI) integrity and cooling of the server are protected by having all drive bays covered or occupied. The vacant bays are either covered by an EMI-protective panel or occupied by

drive fillers. When installing a drive, save the removed drive filler in case that you later remove the drive and need the drive filler to cover the place.

- To avoid damage to the drive connectors, ensure that the top cover is in place and fully closed whenever you install or remove a drive.

Remove a hot-swap drive

Use this information to remove a hot-swap drive.

About this task

Attention:

- Read "Installation Guidelines" on page 1 and "Safety inspection checklist" on page 2 to ensure that you work safely.
- Before you remove or make changes to drives, drive controllers (including controllers that are integrated on the system board assembly), drive backplanes or drive cables, back up all important data that is stored on drives.
- Before you remove any component of a RAID array (drive, RAID card, etc.), back up all RAID configuration information.
- If one or more NVMe solid-state drives are to be removed, it is recommended to disable them beforehand via the operating system.
- To ensure that there is adequate system cooling, do not operate the server for more than two minutes without either a drive or a drive filler installed in each bay.

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

Procedure

Step 1. If the security bezel is installed, remove it first. See "Remove the security bezel" on page 290.

Step 2. Slide the release latch to unlock the drive handle.

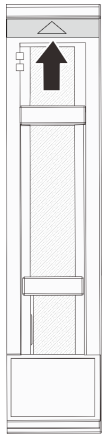


Figure 23. 2.5-inch hot-swap drive

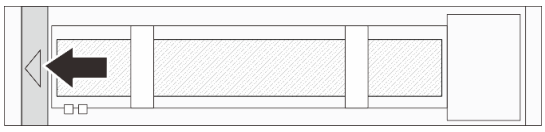


Figure 24. 3.5-inch hot-swap drive

Step 3. Grasp the handle and slide the drive out of the drive bay.

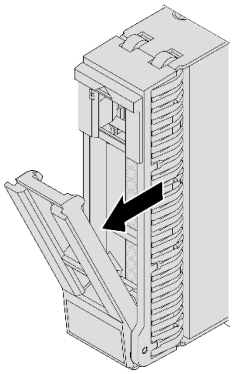


Figure 25. 2.5-inch hot-swap drive

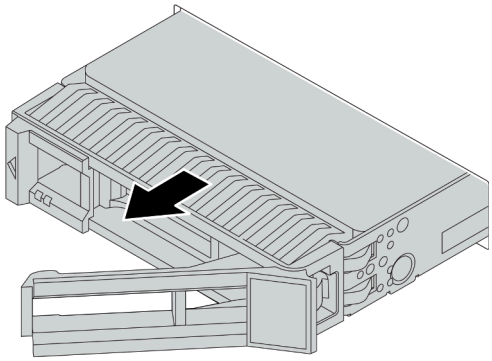


Figure 26. 3.5-inch hot-swap drive

After you finish

1. Install a new drive or drive filler to cover the drive bay. See “Install a hot-swap drive” on page 42.
2. If you are instructed to return the component or optional device, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Demo video

Watch the procedure on YouTube

Install a hot-swap drive

Use this information to install a hot-swap drive.

About this task

Attention:

- Read “Installation Guidelines” on page 1 and “Safety inspection checklist” on page 2 to ensure that you work safely.
- To avoid damage to the drive connectors, make sure that the server top cover is in place and fully closed whenever you install or remove a drive.
- To make sure that there is adequate system cooling, do not operate the server for more than two minutes without either a drive or a drive bay filler installed in each bay.
- Before you make changes to drives, drive controllers (including controllers that are integrated on the system board assembly), drive backplanes, or drive cables, back up all important data that is stored on drives.
- Before you remove any component of a RAID array (drive, RAID card, etc.), back up all RAID configuration information.

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

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

- Go to https://datacentersupport.lenovo.com/products/servers/thinksystem/sr650v3/downloads/driver-list/ to see the latest firmware and driver updates for your server.

- Go to “Update the firmware” in *User Guide* or *System Configuration Guide* for more information on firmware updating tools.

Procedure

Step 1. Touch the static-protective package that contains the new part to any unpainted surface on the outside of the server. Then, take the new part out of the package and place it on a static-protective surface.

Step 2. Install the drive in the drive bay.

a. 1 Ensure that the drive tray handle is in the open position. Slide the drive into the drive bay until it snaps into position.

b. 2 Close the drive tray handle to lock the drive in place.

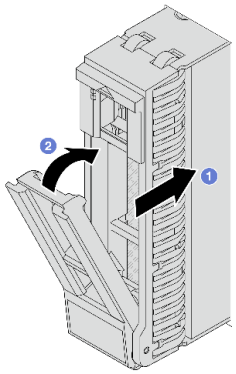


Figure 27. 2.5-inch hot-swap drive

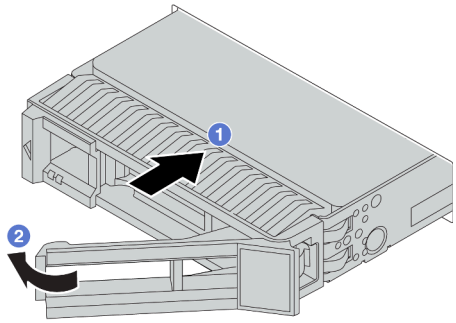


Figure 28. 3.5-inch hot-swap drive

Step 3. Check the drive status LED to verify that the drive is operating correctly.

a. If the yellow drive status LED is lit continuously, that drive is faulty and must be replaced.

b. If the green drive activity LED is flashing, the drive is being accessed.

Step 4. Continue to install additional hot-swap drives if necessary.

After you finish

1. Reinstall the security bezel if you have removed it. See “Install the security bezel” on page 291.
2. If the server is configured for RAID operation through a ThinkSystem RAID adapter, you might have to reconfigure your disk arrays after you install drives. See the ThinkSystem RAID adapter documentation for additional information about RAID operation and complete instructions for using ThinkSystem RAID adapter.

Demo video

Watch the procedure on YouTube

Air baffle replacement

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

The air baffle varies by the server hardware configuration. Refer to “Thermal rules” on page 19 to select the appropriate air baffle for your server. This topic uses the standard air baffle as an example for illustration. For information about the GPU air baffle, see “GPU replacement” on page 97.

- “Remove the air baffle” on page 44
- “Install the air baffle” on page 46

Figure 29. Standard air baffle

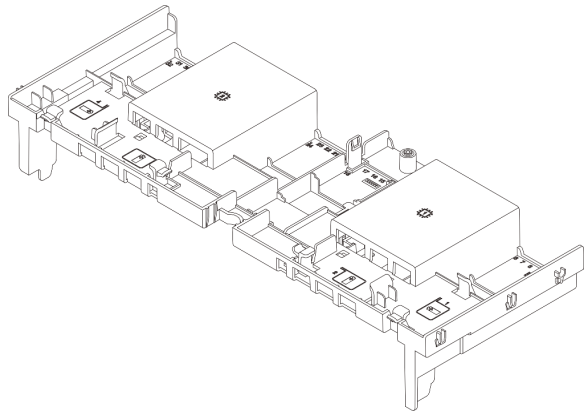
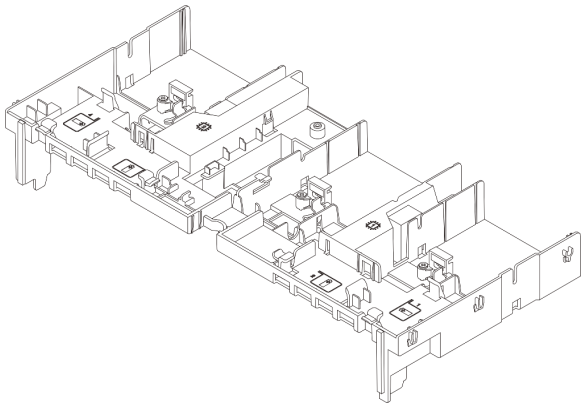


Figure 30. GPU air baffle



Remove the air baffle

Follow instructions in this section to remove the air baffle.

About this task

S033

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

S017

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

Attention:

- Read “Installation Guidelines” on page 1 and “Safety inspection checklist” on page 2 to ensure that you work safely.
- Power off the server and peripheral devices and disconnect the power cords and all external cables. See “Power off the server” on page 32.

Procedure

Note: The illustrated air baffle is the standard air baffle. The removal procedure is the same for the GPU air baffle.

Step 1. Make preparation for the task.

a. If the server is installed in a rack, slide the server out on its rack slide rails to gain access to the top cover, or remove the server from the rack. See "Remove the server from rack" on page 32.

b. Remove the top cover. See "Remove the top cover" on page 318.

c. If there is a RAID flash power module installed on the air baffle, disconnect the cable of the RAID flash power module first.

d. If there is an M.2 drive installed on the air baffle, disconnect M.2 backplane cables from the system board assembly.

e. If there is a GPU installed on the air baffle, remove the GPU first. See "Remove a GPU adapter" on page 99.

Step 2. Grasp the air baffle and carefully lift it out of the chassis.

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

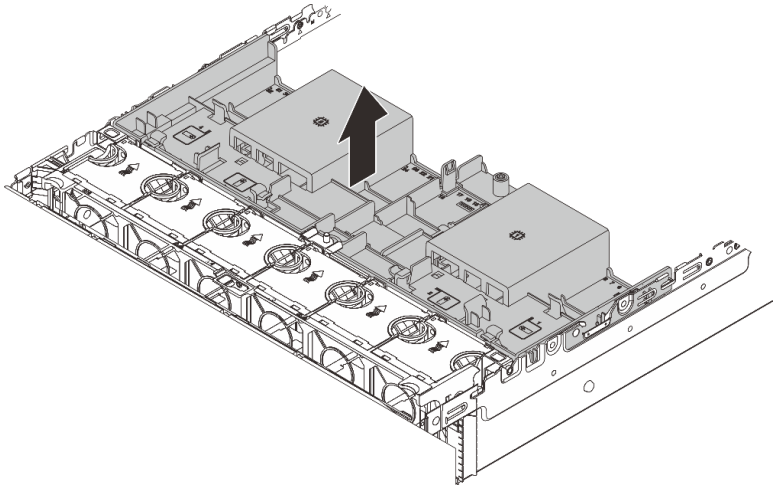


Figure 31. Removing the air baffle

Step 3. (Optional) Remove the filler from the air baffle if you are using the T-shape performance heat sink or Direct Water Cooling Module (DWCM) and need to change to 2U standard or entry heat sink.

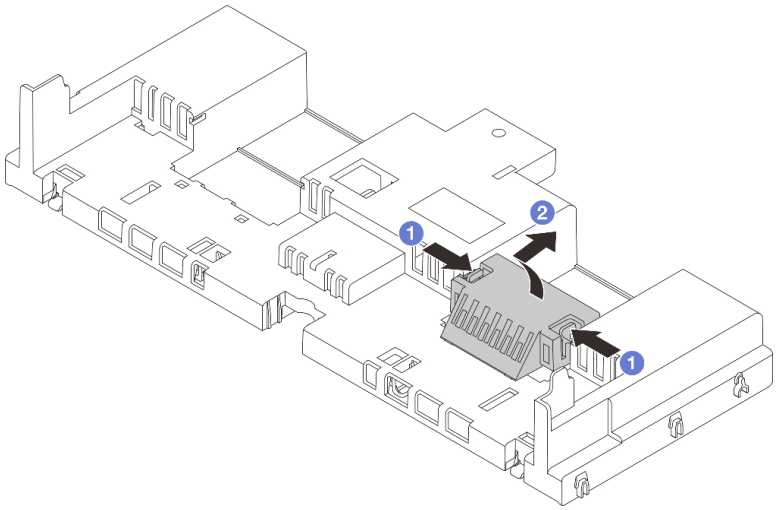


Figure 32. Air baffle filler removal

After you finish

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

Demo video

Watch the procedure on YouTube

Install the air baffle

Follow instructions in this section to install the air baffle.

About this task

S033

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

S017

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

Attention:

- Read “Installation Guidelines” on page 1 and “Safety inspection checklist” on page 2 to ensure that you work safely.
- For proper cooling and airflow, reinstall the air baffle before you turn on the server. Operating the server with the air baffle removed might damage server components.

Procedure

Note: The illustrated air baffle is a standard air baffle. The installation method is the same for the GPU air baffle.

Step 1. Refer to “Thermal rules” on page 19 to select the appropriate air baffle for your server.

Step 2. (Optional) If the T-shape performance heat sink or Direct Water Cooling Module (DWCM) is installed, install the air baffle filler to fill the gap between the heat sink and the air baffle.

Note: The following illustration shows the air baffle upside down.

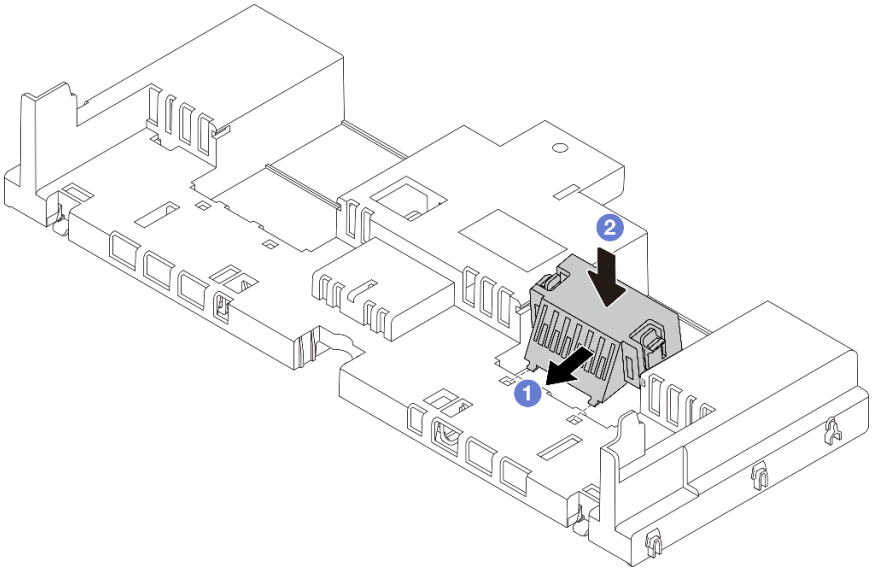


Figure 33. Air baffle filler installation

Step 3. Align the tabs on both sides of the air baffle with the corresponding slots on both sides of the chassis. Then, lower the air baffle into the chassis and press the air baffle down until it is securely seated.

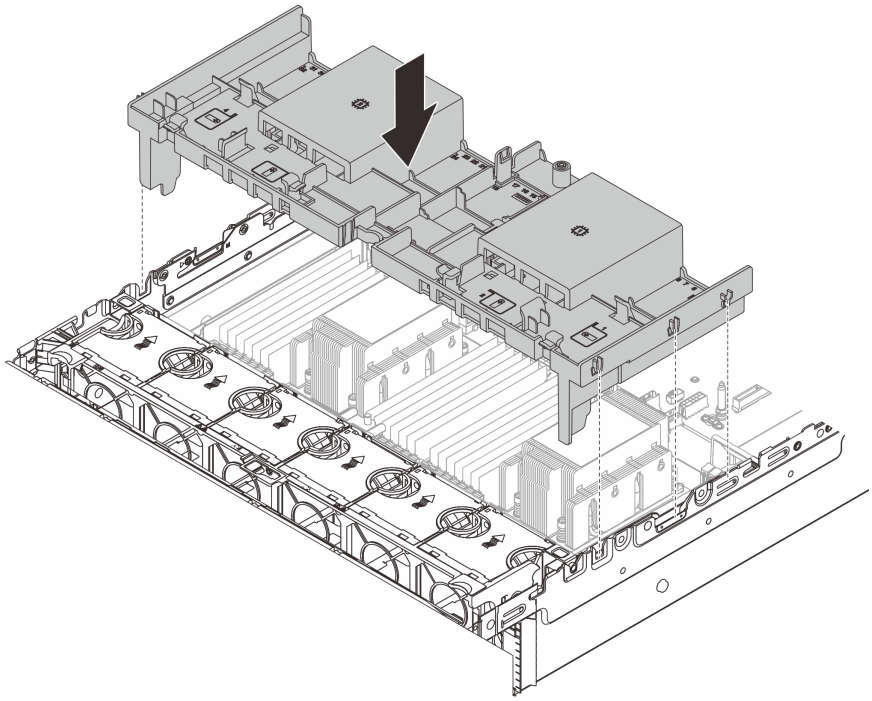


Figure 34. Installation of the standard air baffle

After you finish

1. Reconnect cables of RAID flash power modules if you have disconnected them. See Chapter 2 “Internal cable routing” on page 323.
2. Reconnect cables of the M.2 backplane if you have disconnected them. See Chapter 2 “Internal cable routing” on page 323.
3. If you have removed a GPU adapter, reinstall it. See “Install a GPU adapter” on page 102.
4. Complete the parts replacement. See “Complete the parts replacement” on page 320.

Demo video

Watch the procedure on YouTube

CMOS battery (CR2032) replacement

Use this information to remove and install the CMOS battery.

- “Remove the CMOS battery” on page 48
- “Install the CMOS battery” on page 50

Remove the CMOS battery

Use this information to remove the CMOS battery.

About this task

The following tips describe information that you must consider when removing the CMOS battery.

- Lenovo has designed this product with your safety in mind. The lithium CMOS battery must be handled correctly to avoid possible danger. If you replace the CMOS battery, you must adhere to local ordinances or regulations for battery disposal.
- If you replace the original lithium battery with a heavy-metal battery or a battery with heavy-metal components, be aware of the following environmental consideration. Batteries and accumulators that contain heavy metals must not be disposed of with normal domestic waste. They will be taken back free of charge by the manufacturer, distributor, or representative, to be recycled or disposed of in a proper manner.
- To order replacement batteries, call your support center or business partner. For Lenovo support telephone numbers, see https://datacentersupport.lenovo.com/supportphonelist for your region support details.

Note: After you replace the CMOS battery, you must reconfigure the server and reset the system date and time.

S004

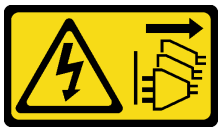
CAUTION:
When replacing the lithium battery, use only Lenovo specified part number or an equivalent type of battery recommended by the manufacturer. If your system has a module containing a lithium battery, replace it only with the same module type made by the same manufacturer. The battery contains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

Do not:

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

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

S002



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

Attention:

- Read “Installation Guidelines” on page 1 and “Safety inspection checklist” on page 2 to ensure that you work safely.
- Power off the server and peripheral devices and disconnect the power cords and all external cables. See “Power off the server” on page 32.

Procedure

Step 1. Make preparation for the task.

a. If the server is installed in a rack, slide the server out on its rack slide rails to gain access to the top cover, or remove the server from the rack. See “Remove the server from rack” on page 32.

b. Remove the top cover. See “Remove the top cover” on page 318.

c. Remove any parts and disconnect any cables that might impede your access to the CMOS battery.

Step 2. Locate the CMOS battery. See “System-board-assembly connector” in the *User Guide*..

Step 3. Remove the CMOS battery.

Note: Before you remove or install the CMOS battery from or into the socket, differentiate between the positive and negative ends.

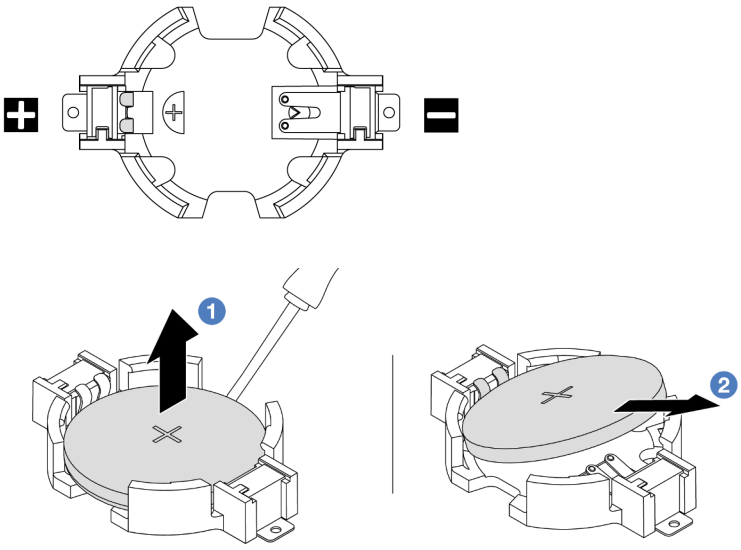


Figure 35. CMOS battery removal

Attention: Do not tilt or push the CMOS battery by using excessive force. Failing to remove the CMOS battery properly might damage the socket on the system board assembly. Any damage to the socket might require replacing the system board assembly.

a. 1 Pry the CMOS battery from the socket with a flat-blade screwdriver.

b. 2 Carefully take the CMOS battery out of the socket.

After you finish

1. Install a new one. See “Install the CMOS battery” on page 50.
2. Dispose of the CMOS battery as required by local ordinances or regulations.

Demo video

Watch the procedure on YouTube

Install the CMOS battery

Use this information to install the CMOS battery.

About this task

The following tips describe information that you must consider when installing the CMOS battery.

- Lenovo has designed this product with your safety in mind. The lithium CMOS battery must be handled correctly to avoid possible danger. If you replace the CMOS battery, you must adhere to local ordinances or regulations for battery disposal.
- If you replace the original lithium battery with a heavy-metal battery or a battery with heavy-metal components, be aware of the following environmental consideration. Batteries and accumulators that contain heavy metals must not be disposed of with normal domestic waste. They will be taken back free of charge by the manufacturer, distributor, or representative, to be recycled or disposed of in a proper manner.
- To order replacement batteries, call your support center or business partner. For Lenovo support telephone numbers, see https://datacentersupport.lenovo.com/supportphonelist for your region support details.

Note: After you install the CMOS battery, you must reconfigure the server and reset the system date and time.

S002

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

Attention:

- Read “Installation Guidelines” on page 1 and “Safety inspection checklist” on page 2 to ensure that you work safely.
- Power off the server and peripheral devices and disconnect the power cords and all external cables. See “Power off the server” on page 32.

Procedure

Step 1. Touch the static-protective package that contains the new part to any unpainted surface on the outside of the server. Then, take the new part out of the package and place it on a static-protective surface.

Step 2. Install the CMOS battery. Ensure that the CMOS battery is seated in place.

Note: Before you install the battery into the socket, make sure that the positive side faces upward.

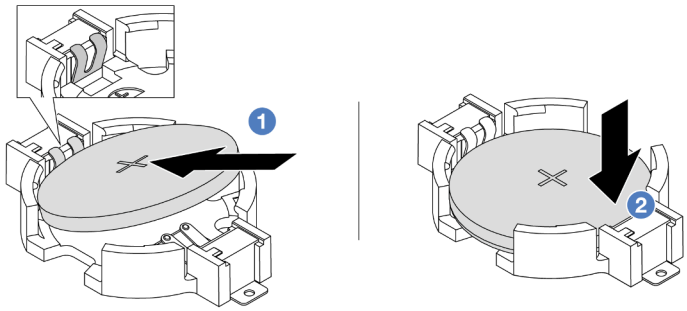


Figure 36. CMOS battery installation

a. 1 Tilt the battery and insert it to the positive end on the socket, and make sure that the battery goes tight to the metal clip.

b. 2 Press the battery down until it clicks into the socket.

After you finish

1. Complete the parts replacement. See “Complete the parts replacement” on page 320.
2. Use the Setup Utility to set the date, time, and any passwords.

   Note: After you install the CMOS battery, you must reconfigure the server and reset the system date and time.

Demo video

Watch the procedure on YouTube

Front adapter cage replacement

Follow instructions in this section to remove and install the front adapter cage, including the riser 5 cage at the top and the front OCP cage at the bottom.

- “Remove the front adapter cage” on page 52
- “Install the front adapter cage” on page 57

Remove the front adapter cage

Follow instructions in this section to remove the front adapter cage, including the riser 5 cage at the top and the front OCP cage at the bottom.

About this task

Attention:

- Read “Installation Guidelines” on page 1 and “Safety inspection checklist” on page 2 to ensure that you work safely.
- Power off the server and peripheral devices and disconnect the power cords and all external cables. See “Power off the server” on page 32.
- 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.

- Before you remove any component of a RAID array (drive, RAID card, etc.), back up all RAID configuration information.

Procedure

Step 1. Make preparation for the task.

a. If the server is installed in a rack, slide the server out on its rack slide rails to gain access to the top cover, or remove the server from the rack. See “Remove the server from rack” on page 32.

b. Remove the top cover. See “Remove the top cover” on page 318.

c. If your server comes with a riser 1 assembly, remove it first. See “Remove a rear riser assembly” on page 272. Then disconnect the cables from the rear OCP interposer card.

d. Remove the air baffle. See Remove the air baffle.

e. Remove the system fan cage. See “Remove the system fan cage” on page 311.

f. Record the cable connections, and disconnect all cables from the system board assembly.

Notes:

- If you need to disconnect cables from the system board assembly, disengage all latches or release tabs on cable connectors first. Failing to release the tab before removing the cables will damage the cable sockets on the system board assembly. Any damage to the cable sockets might require replacing the system board assembly.
- The connectors on your system board assembly might look different from those in the illustration, but the removal procedure is the same.
  1. Press the release tab to release the connector.
  2. Disengage the connector from the cable socket.

Step 2. Remove the front adapter assembly.

Note: The number of cables varies according to the configuration.

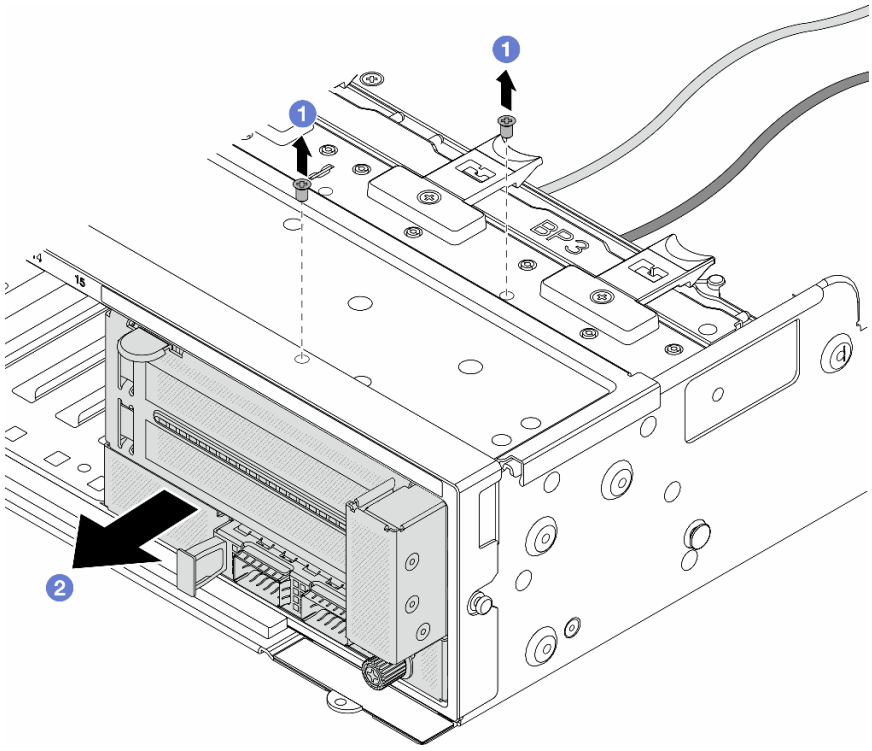


Figure 37. Removing the front adapter assembly

a. 1 Remove the screws that secure the assembly.

b. 2 Slide the assembly out of the front chassis.

Step 3. Lift the riser 5 assembly up off the front OCP assembly, and disconnect cables from the front OCP interposer card.

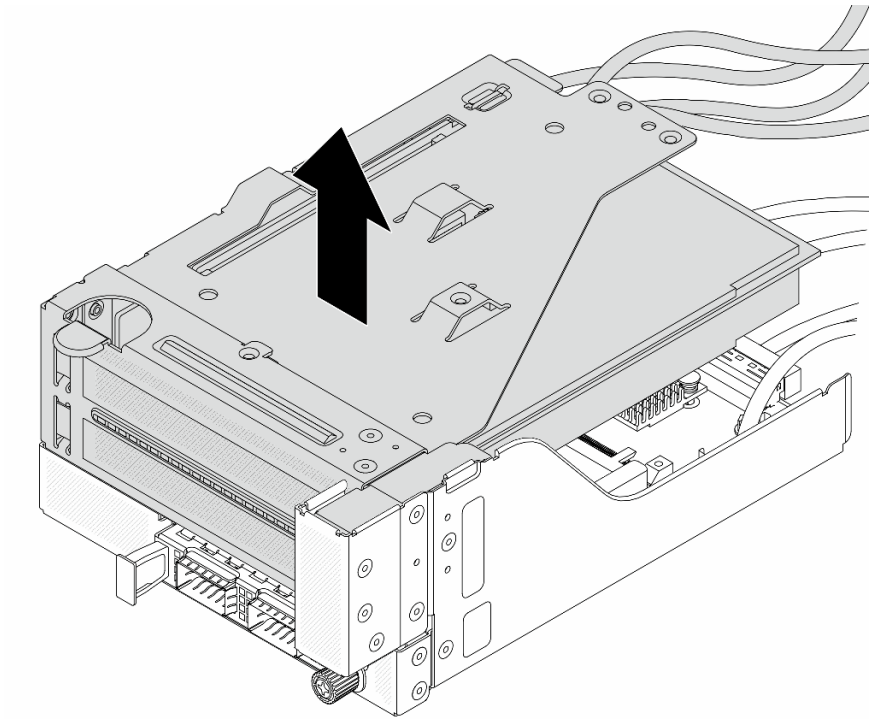


Figure 38. Lifting the riser 5 assembly

Step 4. Remove the PCIe adapter from the riser 5 cage.

Note: For ThinkSystem AMD X3522 10/25GbE DSFP28 2-port PCIe Ethernet Adapter, remove the screw that secures the adapter first.

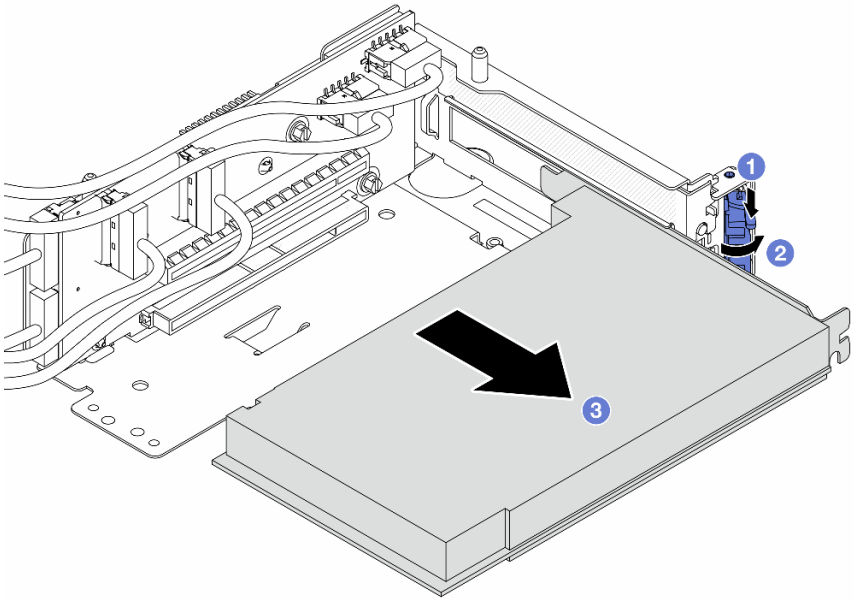


Figure 39. Removing the PCIe adapter from the riser 5 cage

a. 1 Press the retainer clip downward.

b. 2 Rotate the retention latch to the open position.

c. 3 Grasp the PCIe adapter by its edges and carefully pull it out of the PCIe slot.

Step 5. Disconnect the cables from the riser card, and remove the riser card from the riser 5 cage.

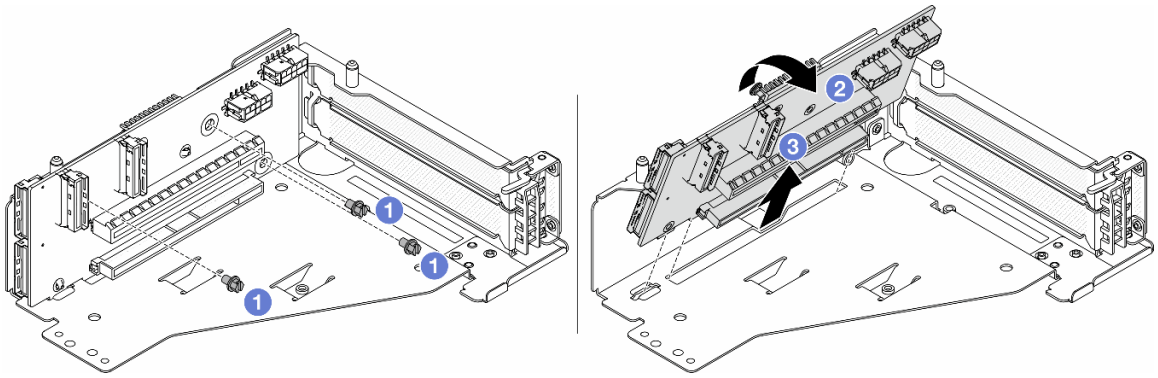


Figure 40. Removing the riser card from the riser 5 cage

a. 1 Remove the screws that secure the riser card.
b. 2 Rotate the riser card from the top to disengage it from the screw holes on the riser cage.
c. 3 Lift the riser card out of the riser cage.

Step 6. Remove the OCP module from the front OCP cage.

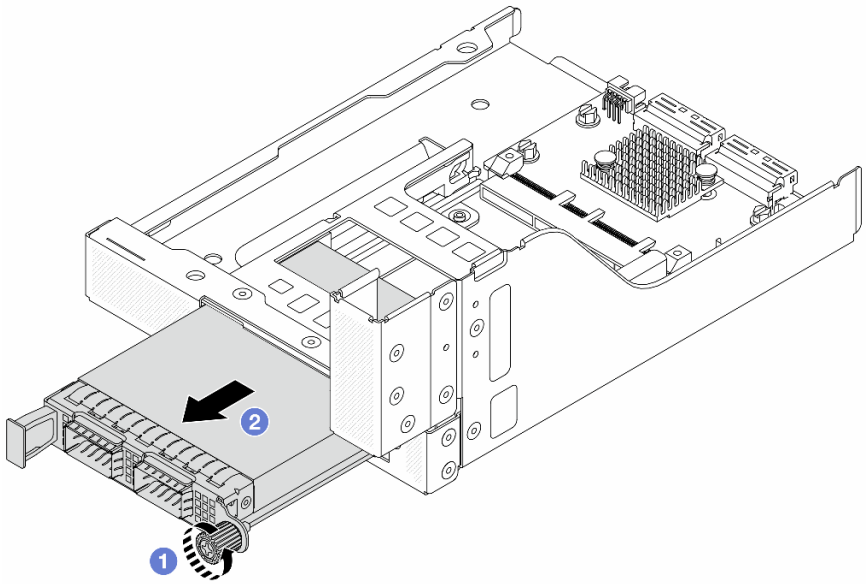


Figure 41. Removing the OCP module

a. 1 Loosen the thumbscrew that secures the OCP module.
b. 2 Pull out the OCP module.

Step 7. Remove the front OCP interposer card.

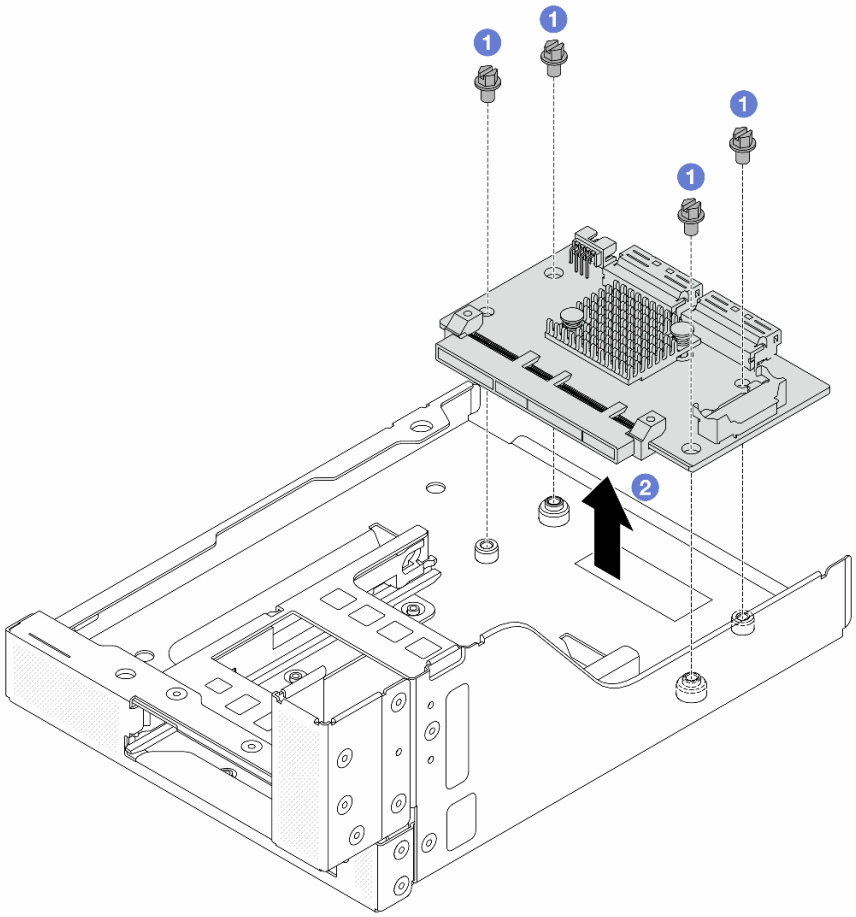


Figure 42. Removing the front OCP interposer card

a. 1 Loosen the screws that secure the front OCP interposer card.

b. 2 Lift the front OCP interposer card up off the front OCP cage.

After you finish

1. Install the new front adapter cage. See “Install the front adapter cage” on page 57.
2. If you are instructed to return the component or optional device, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Demo video

Watch the procedure on YouTube

Install the front adapter cage

Follow instructions in this section to install the front adapter cage, including the riser 5 cage at the top and the front OCP cage at the bottom.

About this task

Attention:

- Read “Installation Guidelines” on page 1 and “Safety inspection checklist” on page 2 to ensure that you work safely.
- Power off the server and peripheral devices and disconnect the power cords and all external cables. See “Power off the server” on page 32.
- Prevent exposure to static electricity, which might lead to system halt and loss of data, by keeping static-sensitive components in their static-protective packages until installation, and handling these devices with an electrostatic-discharge wrist strap or other grounding system.

Procedure

Step 1. Touch the static-protective package that contains the new part to any unpainted surface on the outside of the server. Then, take the new part out of the package and place it on a static-protective surface.

Step 2. Install the front OCP interposer card on the front OCP cage, and connect cables to the card. See Chapter 2 “Internal cable routing” on page 323.

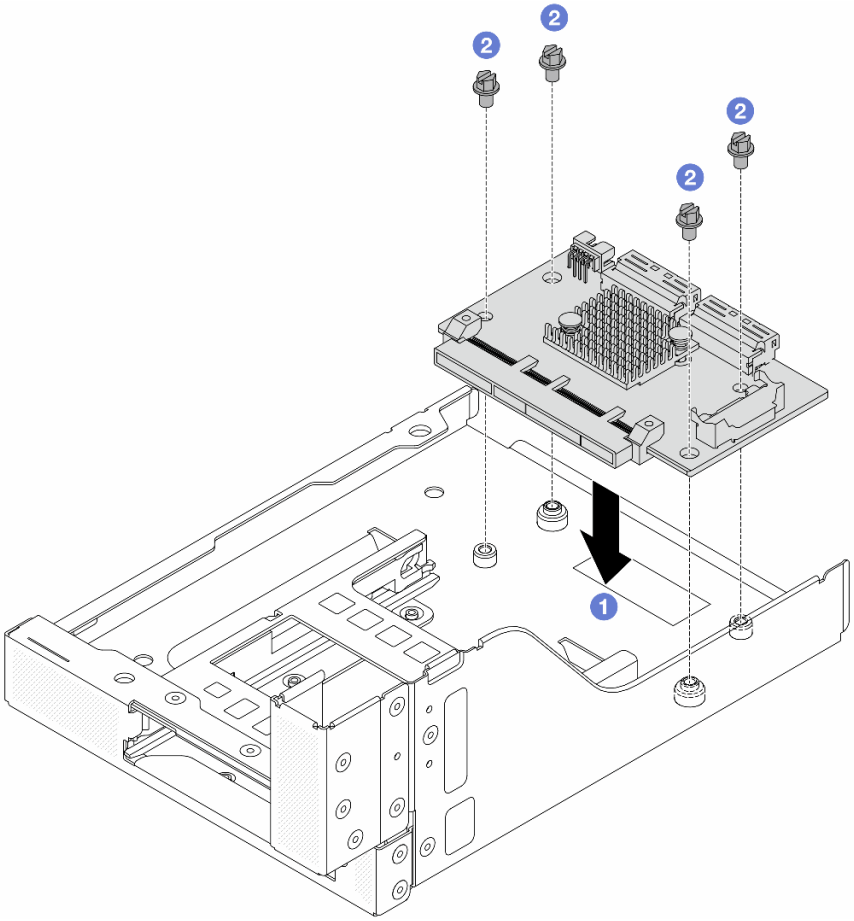


Figure 43. Installing the front OCP interposer card

a. 1 Lower the front OCP interposer card onto the front OCP cage.

b. 2 Tighten the screws to secure the front OCP interposer card.

Step 3. Install the OCP module.

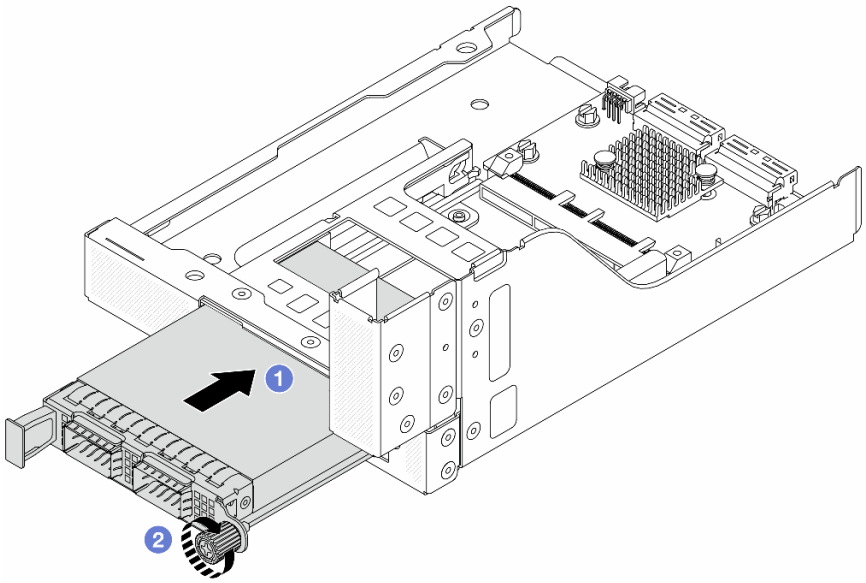


Figure 44. Installing the OCP module

a. 1 Push the OCP module into the slot until it is fully seated.

b. 2 Tighten the thumbscrew to secure the OCP module.

Step 4. Install the riser card and connect the cables to the riser card. See Chapter 2 “Internal cable routing” on page 323.

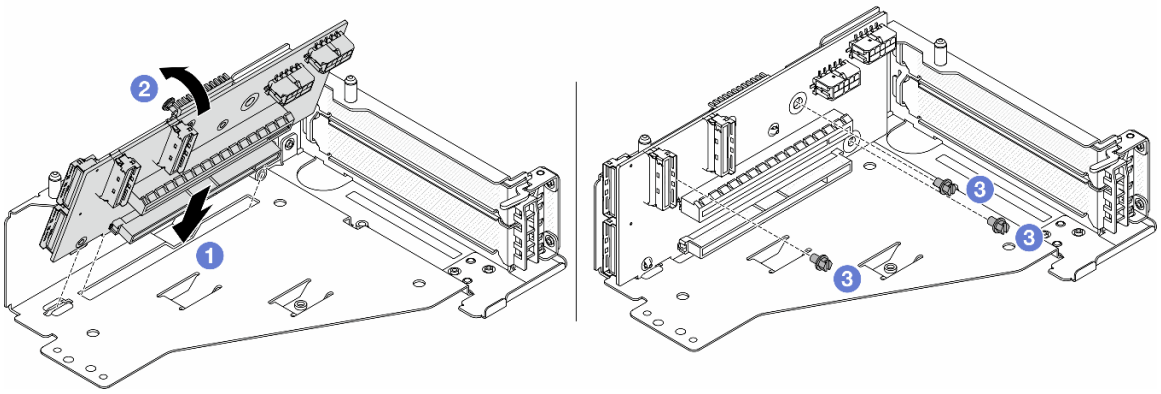


Figure 45. Installing the riser card

a. 1 Insert the riser card into the slots in the riser cage.

b. 1 Push the top of the riser card towards the riser cage so that the holes in the riser card engage with the holes on the riser cage.

c. 2 Install the screws to secure the riser card into place.

Step 5. Install the PCIe adapter to the riser 5 cage.

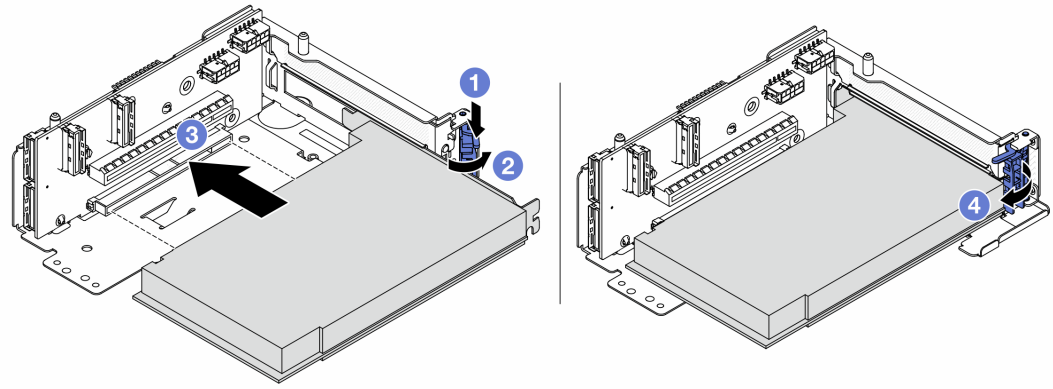


Figure 46. Installing the PCIe adapter to the riser 5 cage

a. 1 Press the retainer clip downward.

b. 2 Rotate the PCIe adapter retention latch to the open position.

c. 3 Align the PCIe adapter with the PCIe slot on the riser card. Carefully press the PCIe adapter straight into the slot until it is securely seated and its bracket also is secured.

d. 4 Close the retention latch.

Note: For ThinkSystem AMD X3522 10/25GbE DSFP28 2-port PCIe Ethernet Adapter, install the screw to secure the adapter before closing the retention latch if the server needs to be shipped.

Step 6. Install the riser 5 assembly on the front OCP assembly.

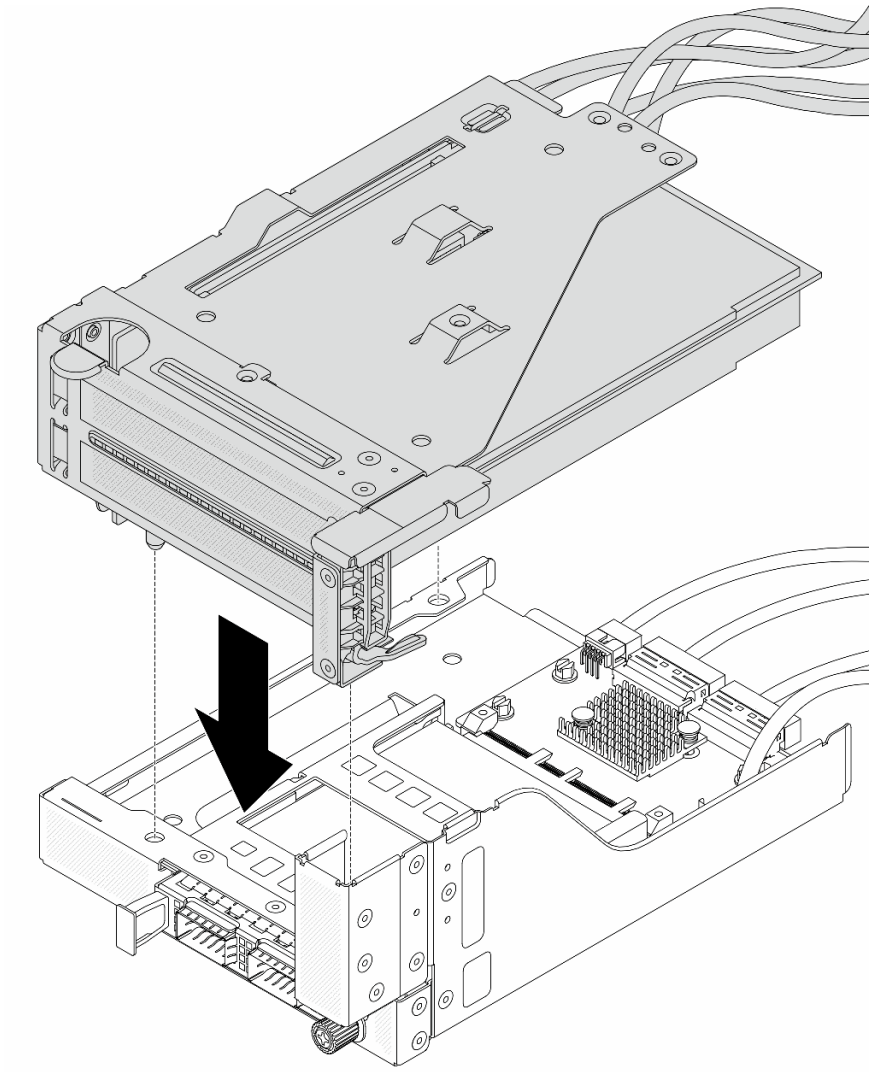


Figure 47. Installing the riser 5 assembly on the front OCP assembly

Step 7. Install the front adapter assembly.

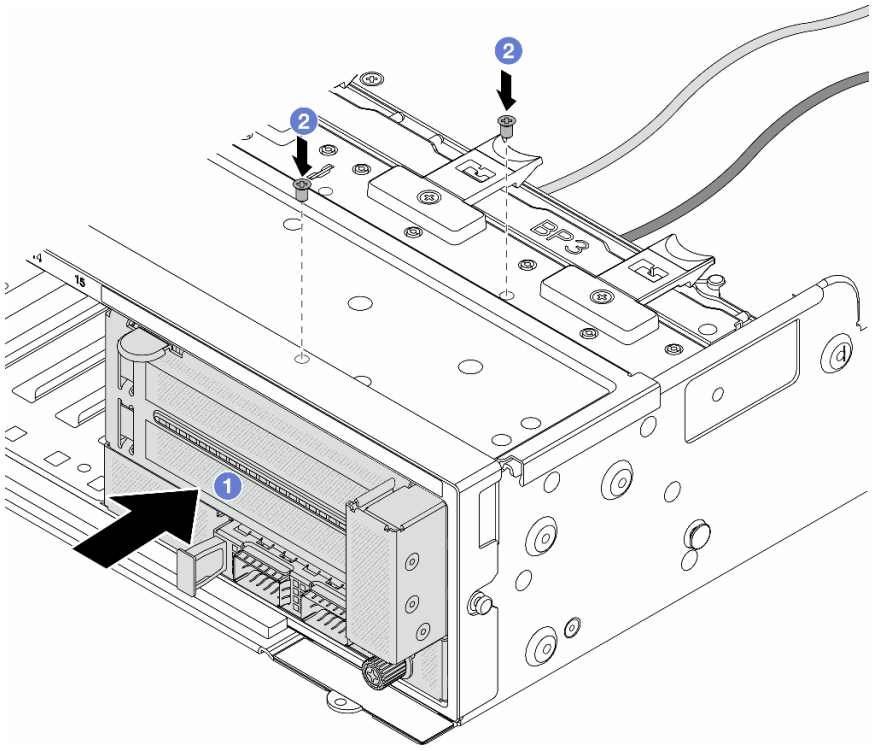


Figure 48. Installing the front adapter assembly

a. 1 Insert the front adapter assembly into the front chassis.

b. 2 Install the screws to secure the front adapter assembly in place.

Step 8. Connect the cables to the system board assembly and the rear OCP interposer card. See Chapter 2 “Internal cable routing” on page 323.

Step 9. Install the system fan cage. See “Install the system fan cage” on page 312.

Step 10. Install the air baffle. See “Install the air baffle” on page 46.

Step 11. Install the riser 1 assembly if you have removed it. See “Install a rear riser assembly” on page 284.

After you finish

Complete the parts replacement. See “Complete the parts replacement” on page 320.

Demo video

Watch the procedure on YouTube

Front OCP module and OCP interposer card replacement

Some server models support the front OCP module. The front OCP module and the front and rear OCP interposer cards are codependent. Follow instructions in this section to remove and install the front OCP module and the front and rear OCP interposer cards.

- “Front OCP module replacement” on page 63
- “OCP interposer card replacement” on page 65

Front OCP module replacement

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

- “Remove the front OCP module” on page 63
- “Install the front OCP module” on page 64

Remove the front OCP module

Follow instructions in this section to remove the front OCP module.

Attention:

- Read “Installation Guidelines” on page 1 and “Safety inspection checklist” on page 2 to ensure that you work safely.
- Power off the server and peripheral devices and disconnect the power cords and all external cables. See “Power off the server” on page 32.
- Prevent exposure to static electricity, which might lead to system halt and loss of data, by keeping static-sensitive components in their static-protective packages until installation, and handling these devices with an electrostatic-discharge wrist strap or other grounding system.

Procedure

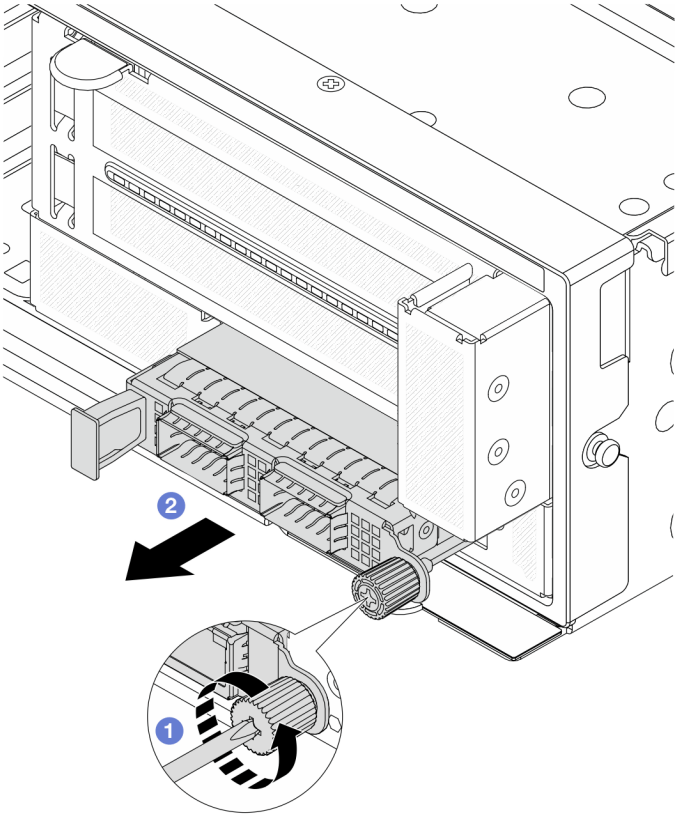


Figure 49. Removing the front OCP module

Step 1. 1 Loosen the thumbscrew that secures the OCP module. Use a screwdriver if needed.

Step 2. 2 Pull out the OCP module.

After you finish

1. Install a new front OCP module or an OCP module filler. See “Install the front OCP module” on page 64.
2. If you are instructed to return the component or optional device, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Demo video

Watch the procedure on YouTube

Install the front OCP module

Follow instructions in this section to install the front OCP module.

About this task

Attention:

- Read “Installation Guidelines” on page 1 and “Safety inspection checklist” on page 2 to ensure that you work safely.
- Power off the server and peripheral devices and disconnect the power cords and all external cables. See “Power off the server” on page 32.
- Prevent exposure to static electricity, which might lead to system halt and loss of data, by keeping static-sensitive components in their static-protective packages until installation, and handling these devices with an electrostatic-discharge wrist strap or other grounding system.

Procedure

Step 1. Touch the static-protective package that contains the new part to any unpainted surface on the outside of the server. Then, take the new part out of the package and place it on a static-protective surface.

Step 2. Remove the OCP module filler if there is.

Step 3. Install the front OCP module.

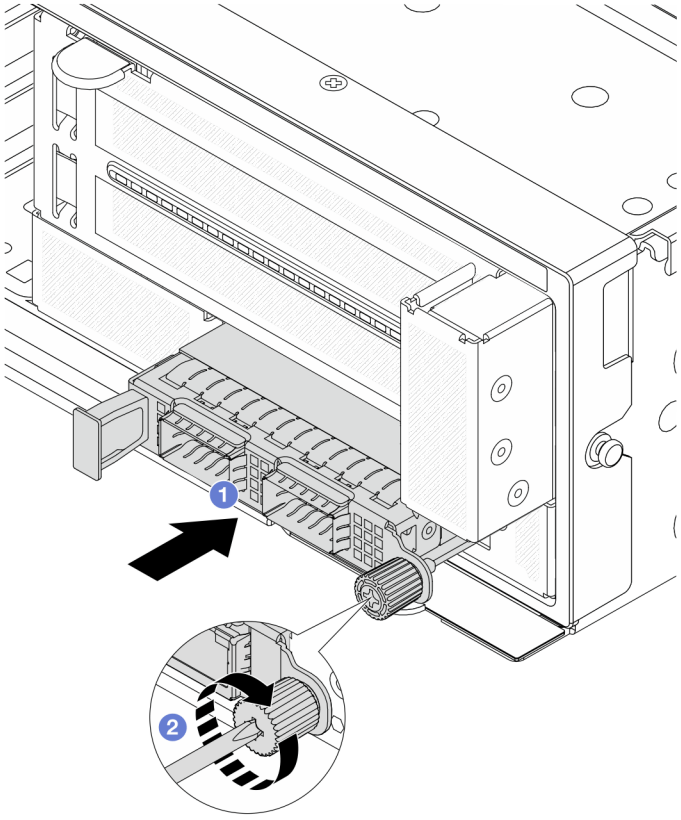


Figure 50. Installing the front OCP module

a. 1 Push the OCP module into the slot until it is fully seated.

b. 2 Tighten the thumbscrew to secure the OCP module. Use a screwdriver if needed.

Note: Ensure that the OCP module is fully seated and the thumbscrew is securely tightened. Otherwise, the OCP module will not get full connection and may not function.

After you finish

Complete the parts replacement. See “Complete the parts replacement” on page 320.

Demo video

Watch the procedure on YouTube

OCP interposer card replacement

Follow instructions in this section to remove and install the front and rear OCP interposer cards.

Remove the front OCP interposer card

Follow instructions in this section to remove the front OCP interposer card.

About this task

Attention:

- Read “Installation Guidelines” on page 1 and “Safety inspection checklist” on page 2 to ensure that you work safely.
- Power off the server and peripheral devices and disconnect the power cords and all external cables. See “Power off the server” on page 32.
- Prevent exposure to static electricity, which might lead to system halt and loss of data, by keeping static-sensitive components in their static-protective packages until installation, and handling these devices with an electrostatic-discharge wrist strap or other grounding system.

Procedure

Step 1. Make preparation for the task.

a. If the server is installed in a rack, slide the server out on its rack slide rails to gain access to the top cover, or remove the server from the rack. See “Remove the server from rack” on page 32.

b. Remove the top cover. See “Remove the top cover” on page 318.

c. If your server comes with a riser 1 assembly, remove it first. See “Remove a rear riser assembly” on page 272. Then disconnect the cables from the rear OCP interposer card.

d. Remove the air baffle. See Remove the air baffle.

e. Remove the system fan cage. See “Remove the system fan cage” on page 311.

f. Record the cable connections, and disconnect all cables from the system board assembly.

Notes:

- If you need to disconnect cables from the system board assembly, disengage all latches or release tabs on cable connectors first. Failing to release the tab before removing the cables will damage the cable sockets on the system board assembly. Any damage to the cable sockets might require replacing the system board assembly.
- The connectors on your system board assembly might look different from those in the illustration, but the removal procedure is the same.
  1. Press the release tab to release the connector.
  2. Disengage the connector from the cable socket.

Step 2. Remove the front adapter assembly.

Note: The number of cables varies according to the configuration.

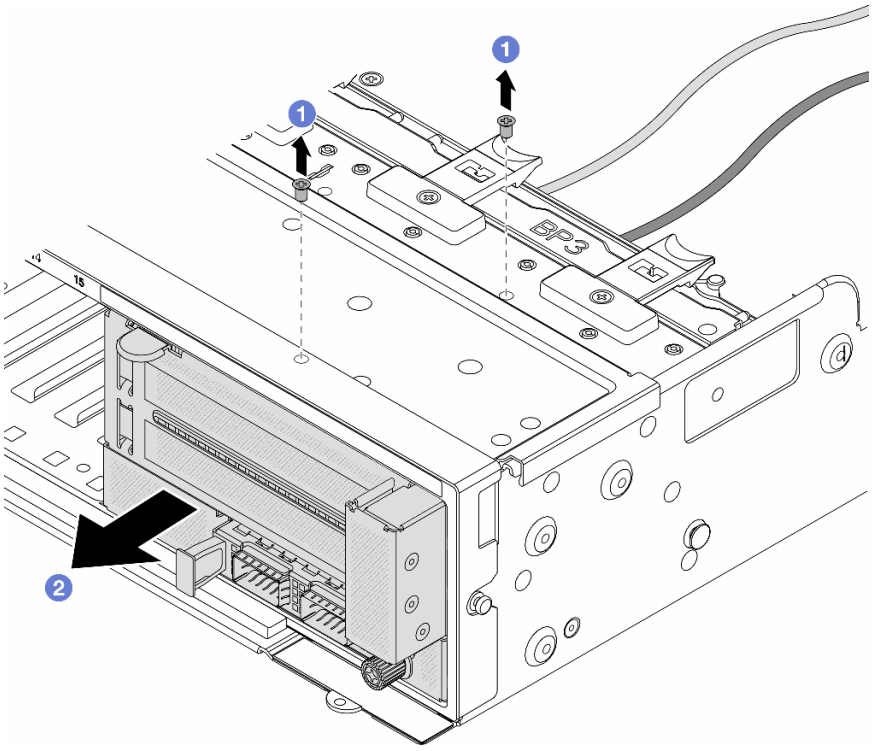


Figure 51. Removing the front adapter assembly

a. 1 Remove the screws that secure the assembly.

b. 2 Slide the assembly out of the front chassis.

Step 3. Lift the riser 5 assembly up off the front OCP assembly, and disconnect cables from the front OCP interposer card.

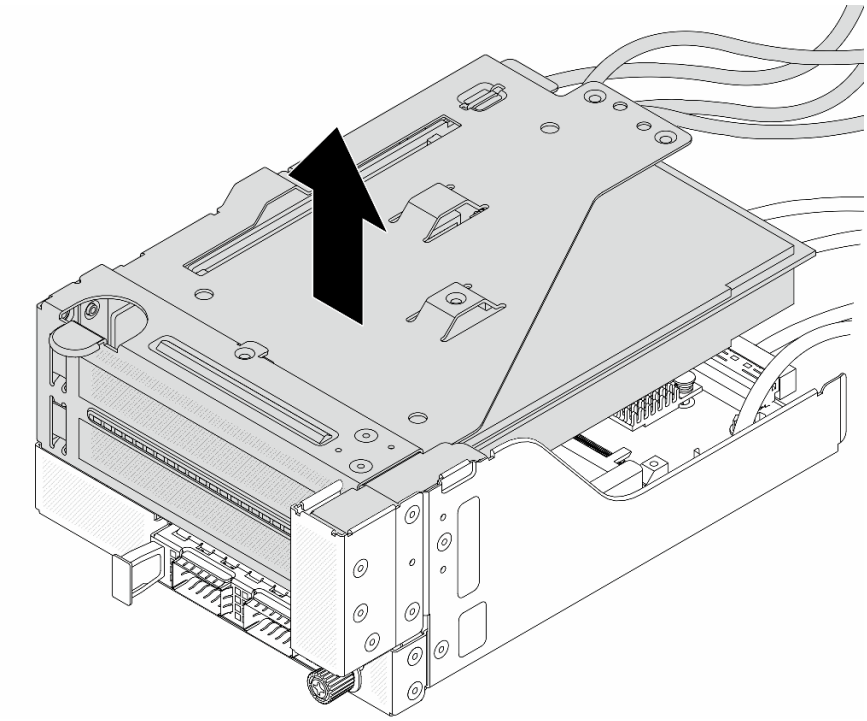


Figure 52. Lifting the riser 5 assembly

Step 4. Remove the OCP module from the front OCP cage.

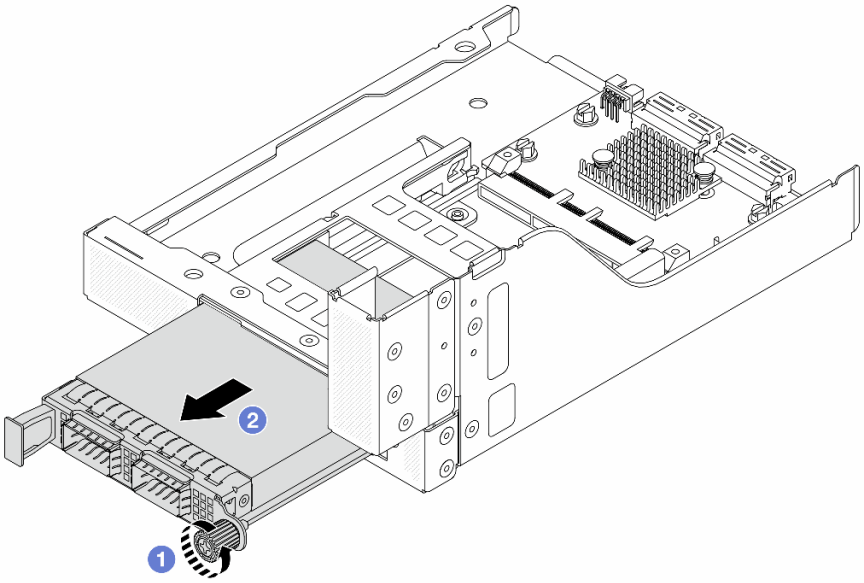


Figure 53. Removing the OCP module

a. 1 Loosen the thumbscrew that secures the OCP module.
b. 2 Pull out the OCP module.

Step 5. Remove the front OCP interposer card.

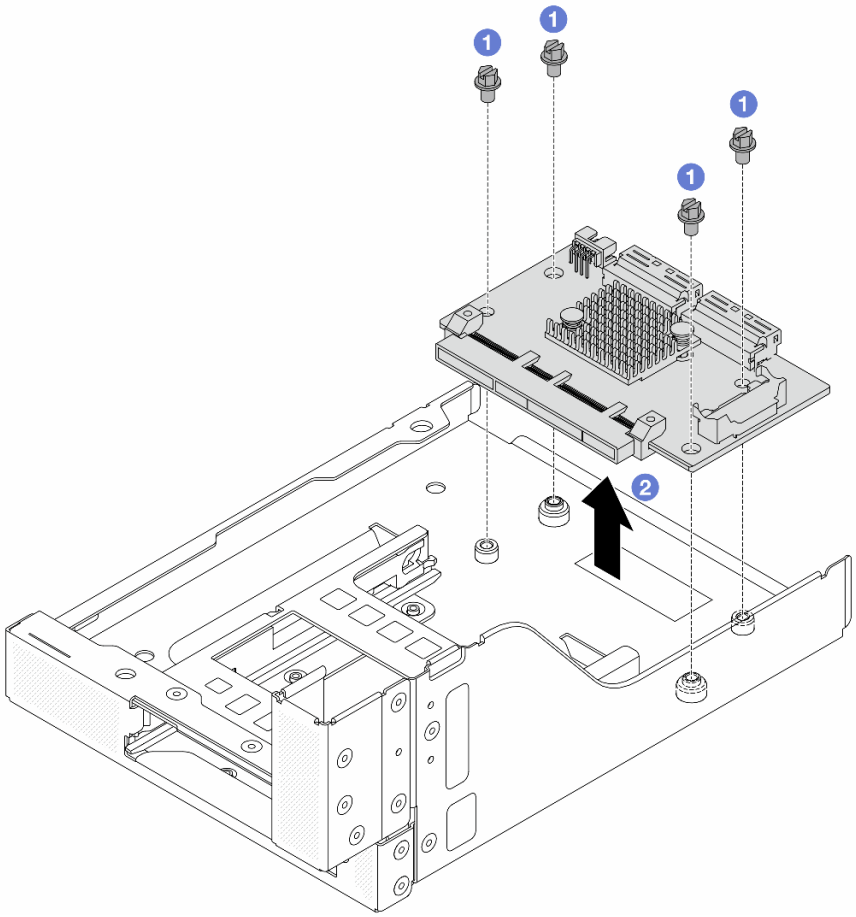


Figure 54. Removing the front OCP interposer card

a. 1 Loosen the screws that secure the front OCP interposer card.

b. 2 Lift the front OCP interposer card up off the front OCP cage.

After you finish

1. Install a new front OCP interposer card. See “Install the front OCP interposer card” on page 69.
2. If you are instructed to return the component or optional device, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Demo video

Watch the procedure on YouTube

Install the front OCP interposer card

Follow instructions in this section to install the front OCP interposer card.

About this task

Attention:

- Read “Installation Guidelines” on page 1 and “Safety inspection checklist” on page 2 to ensure that you work safely.

- Power off the server and peripheral devices and disconnect the power cords and all external cables. See "Power off the server" on page 32.
- Prevent exposure to static electricity, which might lead to system halt and loss of data, by keeping static-sensitive components in their static-protective packages until installation, and handling these devices with an electrostatic-discharge wrist strap or other grounding system.

Procedure

Step 1. Touch the static-protective package that contains the new part to any unpainted surface on the outside of the server. Then, take the new part out of the package and place it on a static-protective surface.

Step 2. Install the front OCP interposer card on the front OCP cage, and connect cables to the card. See Chapter 2 "Internal cable routing" on page 323.

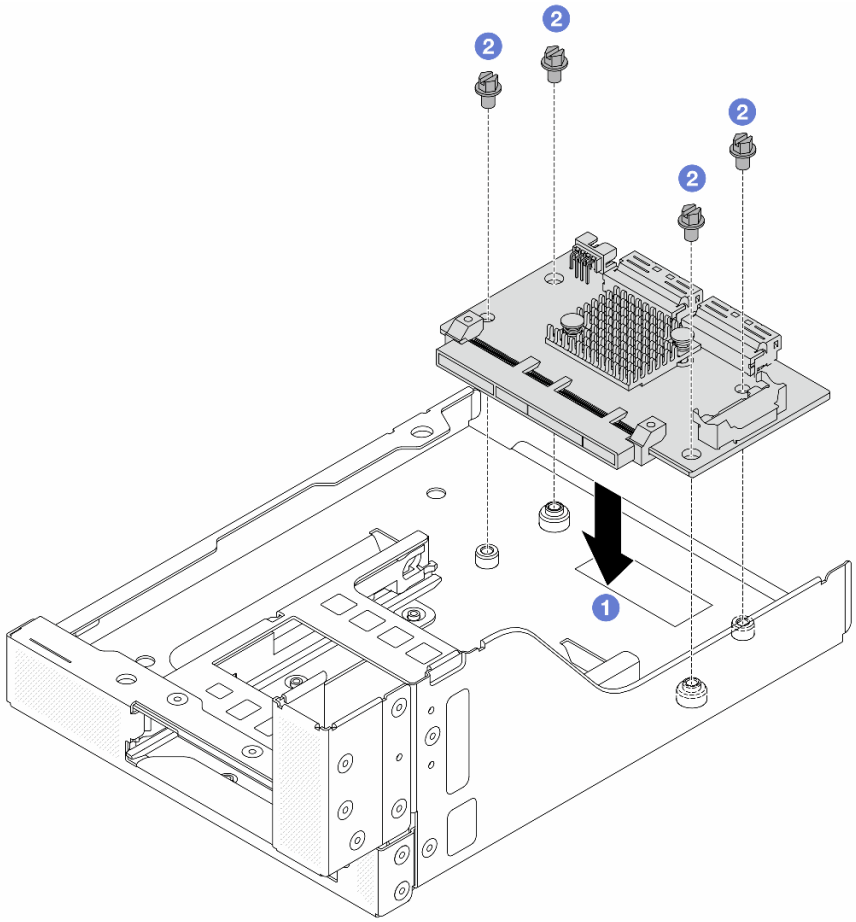


Figure 55. Installing the front OCP interposer card

a. 1 Lower the front OCP interposer card onto the front OCP cage.

b. 2 Tighten the screws to secure the front OCP interposer card.

Step 3. Install the OCP module.

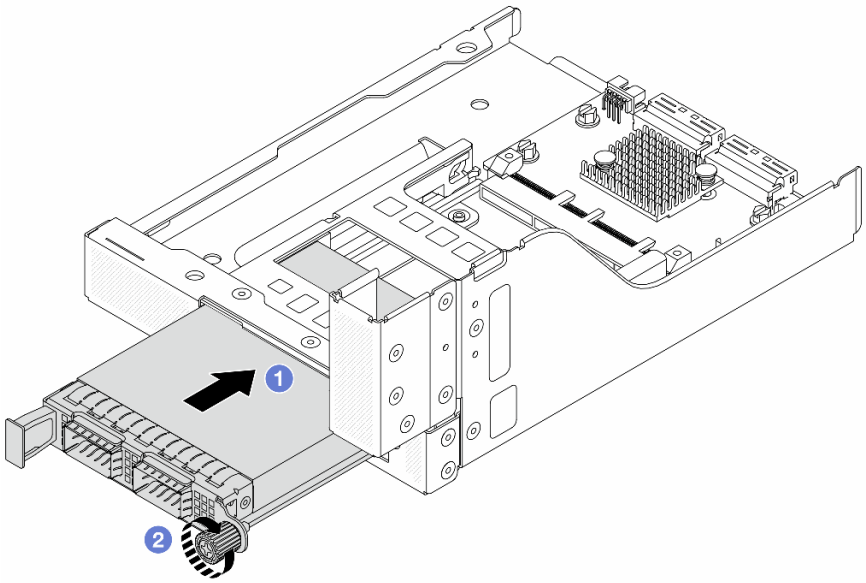


Figure 56. Installing the OCP module

a. 1 Push the OCP module into the slot until it is fully seated.

b. 2 Tighten the thumbscrew to secure the OCP module.

Step 4. Install the riser 5 assembly on the front OCP assembly.

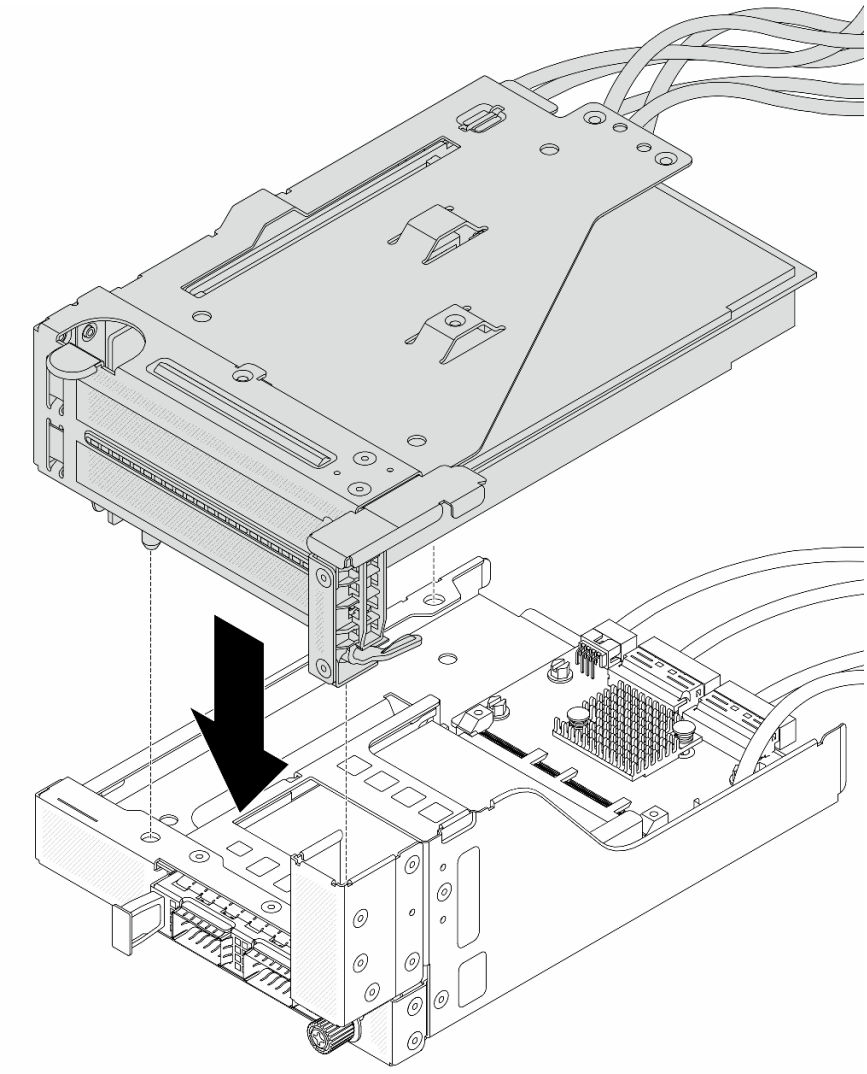


Figure 57. Installing the riser 5 assembly on the front OCP assembly

Step 5. Install the front adapter assembly.

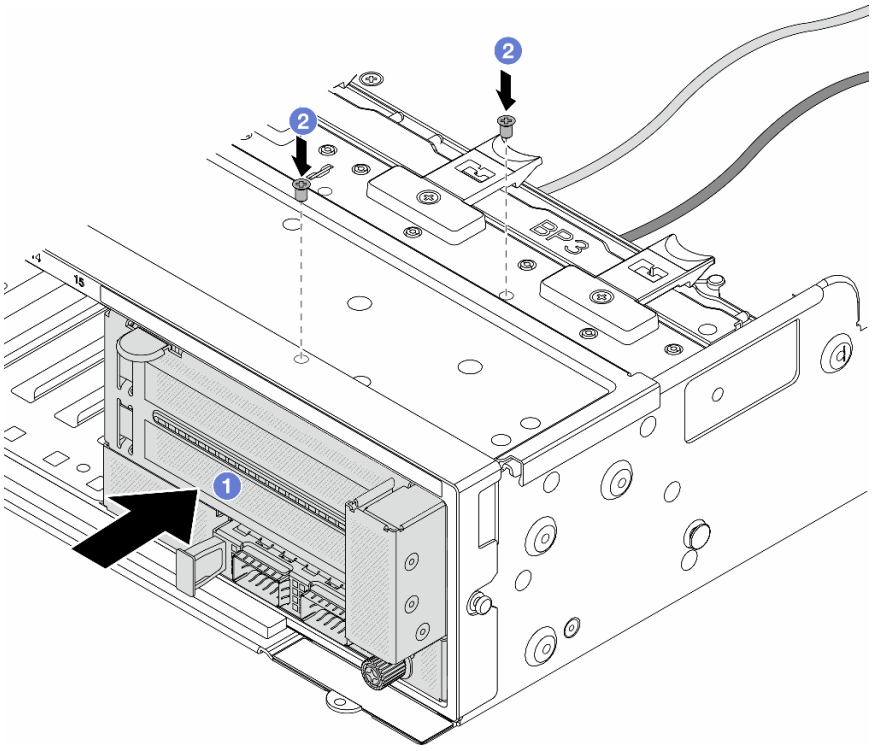


Figure 58. Installing the front adapter assembly

a. 1 Insert the front adapter assembly into the front chassis.

b. 2 Install the screws to secure the front adapter assembly in place.

Step 6. Connect the cables to the system board assembly and the rear OCP interposer card. See Chapter 2 “Internal cable routing” on page 323.

Step 7. Install the system fan cage. See “Install the system fan cage” on page 312.

Step 8. Install the air baffle. See “Install the air baffle” on page 46.

Step 9. Install the riser 1 assembly if you have removed it. See “Install a rear riser assembly” on page 284.

After you finish

Complete the parts replacement. See “Complete the parts replacement” on page 320.

Demo video

Watch the procedure on YouTube

Remove the rear OCP interposer card

Follow instructions in this section to remove the rear OCP interposer card.

About this task

Attention:

- Read “Installation Guidelines” on page 1 and “Safety inspection checklist” on page 2 to ensure that you work safely.

- Power off the server and peripheral devices and disconnect the power cords and all external cables. See “Power off the server” on page 32.
- Prevent exposure to static electricity, which might lead to system halt and loss of data, by keeping static-sensitive components in their static-protective packages until installation, and handling these devices with an electrostatic-discharge wrist strap or other grounding system.

Procedure

Step 1. Make preparation for the task.

a. If the server is installed in a rack, slide the server out on its rack slide rails to gain access to the top cover, or remove the server from the rack. See “Remove the server from rack” on page 32.

b. Remove the top cover. See “Remove the top cover” on page 318.

c. If your server comes with a riser 1 assembly, remove it first. See “Remove a rear riser assembly” on page 272. Then disconnect the cables from the rear OCP interposer card.

Step 2. Remove the rear OCP interposer card.

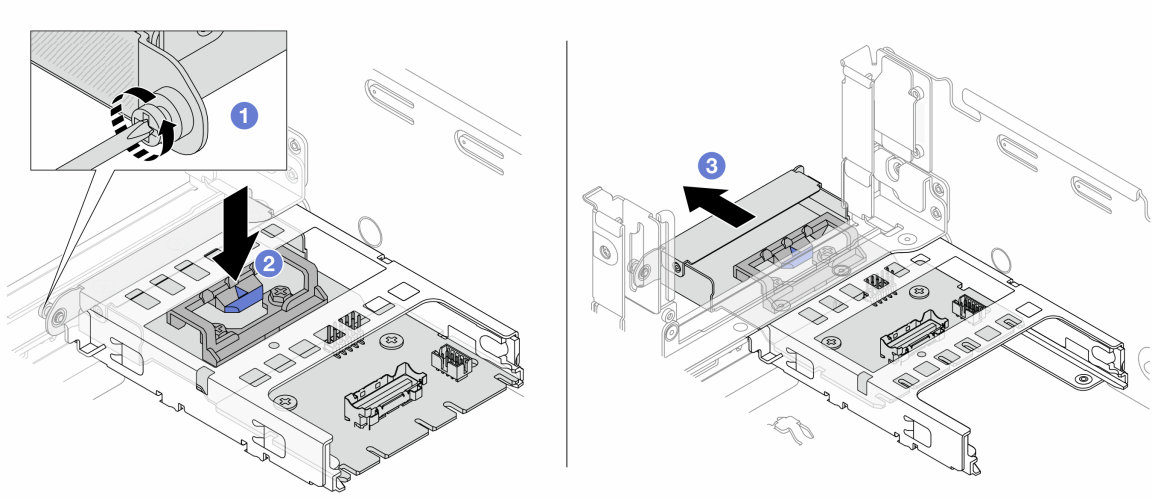


Figure 59. Removing the rear OCP interposer card

a. 1 Loosen the thumbscrew that secures the rear OCP interposer card.

b. 2 Press and hold the blue latch.

c. 3 Pull out the rear OCP interposer card.

After you finish

1. Install a new rear OCP interposer card. See “Install the rear OCP interposer card” on page 74.
2. If you are instructed to return the component or optional device, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Demo video

Watch the procedure on YouTube

Install the rear OCP interposer card

Follow instructions in this section to install the rear OCP interposer card.

About this task

Attention:

- Read “Installation Guidelines” on page 1 and “Safety inspection checklist” on page 2 to ensure that you work safely.
- Power off the server and peripheral devices and disconnect the power cords and all external cables. See “Power off the server” on page 32.
- Prevent exposure to static electricity, which might lead to system halt and loss of data, by keeping static-sensitive components in their static-protective packages until installation, and handling these devices with an electrostatic-discharge wrist strap or other grounding system.

Procedure

Step 1. Touch the static-protective package that contains the new part to any unpainted surface on the outside of the server. Then, take the new part out of the package and place it on a static-protective surface.

Step 2. Install the rear OCP interposer card.

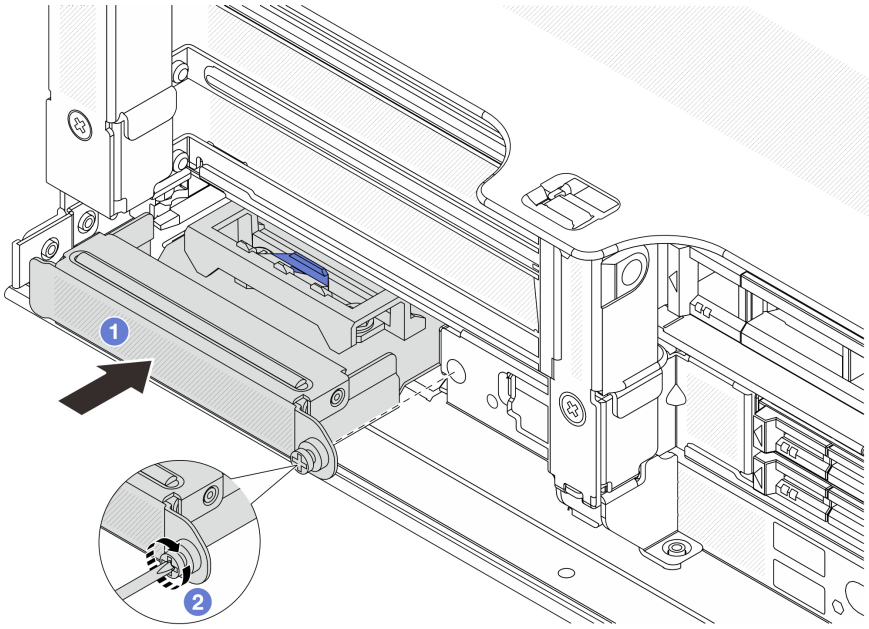


Figure 60. Installing the rear OCP interposer card

a. 1 Push the rear OCP interposer card into the slot until it is fully seated.

b. 2 Tighten the thumbscrew to secure the card.

Note: Ensure that the card is fully seated and the thumbscrew is securely tightened. Otherwise, the card will not get full connection and may not function.

Step 3. Connect the cables to the rear OCP interposer card. See Chapter 2 “Internal cable routing” on page 323.

Step 4. Install the riser 1 assembly if you have removed it. See “Install a rear riser assembly” on page 284.

After you finish

Complete the parts replacement. See “Complete the parts replacement” on page 320.

Demo video

Watch the procedure on YouTube

Front PCIe adapter and riser card replacement

Follow instructions in this section to remove and install the front PCIe adapter and riser 5 card.

- "Remove the front PCIe adapter and riser card" on page 76
- "Install the front PCIe adapter and riser card" on page 79

Remove the front PCIe adapter and riser card

Follow instructions in this section to remove the front PCIe adapter and riser 5 card.

About this task

Attention:

- Read "Installation Guidelines" on page 1 and "Safety inspection checklist" on page 2 to ensure that you work safely.
- Power off the server and peripheral devices and disconnect the power cords and all external cables. See "Power off the server" on page 32.
- 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.
- Before you remove any component of a RAID array (drive, RAID card, etc.), back up all RAID configuration information.

Procedure

Step 1. Make preparation for the task.

a. If the server is installed in a rack, slide the server out on its rack slide rails to gain access to the top cover, or remove the server from the rack. See "Remove the server from rack" on page 32.

b. Remove the top cover. See "Remove the top cover" on page 318.

c. If your server comes with a riser 1 assembly, remove it first. See "Remove a rear riser assembly" on page 272. Then disconnect the cables from the rear OCP interposer card.

d. Remove the air baffle. See Remove the air baffle.

e. Remove the system fan cage. See "Remove the system fan cage" on page 311.

f. Record the cable connections, and disconnect all cables from the system board assembly.

Notes:

- If you need to disconnect cables from the system board assembly, disengage all latches or release tabs on cable connectors first. Failing to release the tab before removing the cables will damage the cable sockets on the system board assembly. Any damage to the cable sockets might require replacing the system board assembly.
- The connectors on your system board assembly might look different from those in the illustration, but the removal procedure is the same.
  1. Press the release tab to release the connector.
  2. Disengage the connector from the cable socket.

Step 2. Remove the front adapter assembly.

Note: The number of cables varies according to the configuration.

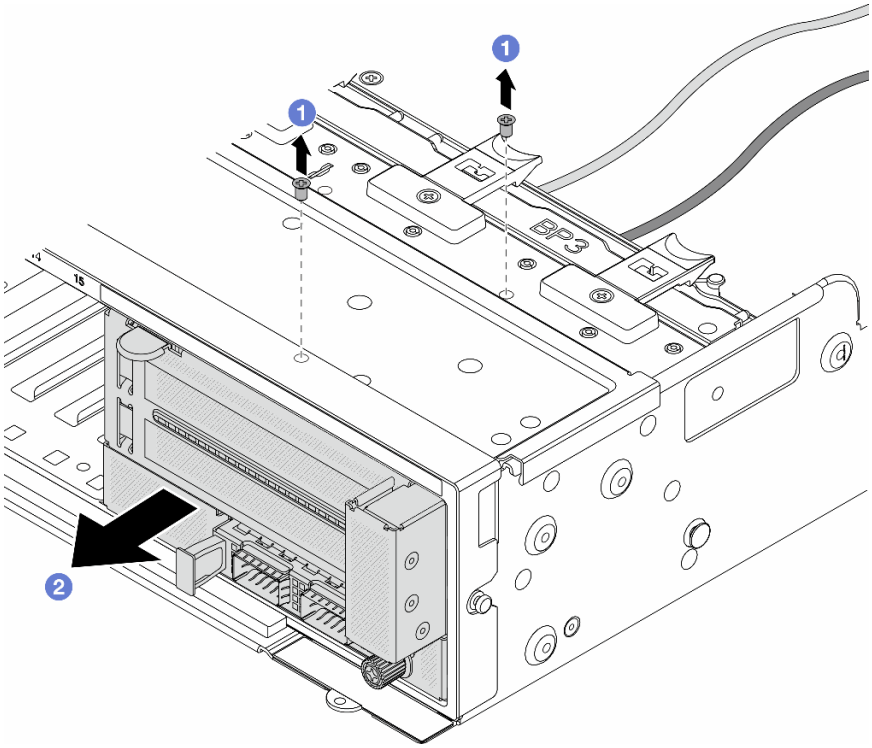


Figure 61. Removing the front adapter assembly

a. 1 Remove the screws that secure the assembly.

b. 2 Slide the assembly out of the front chassis.

Step 3. Lift the riser 5 assembly up off the front OCP assembly, and disconnect cables from the front OCP interposer card.

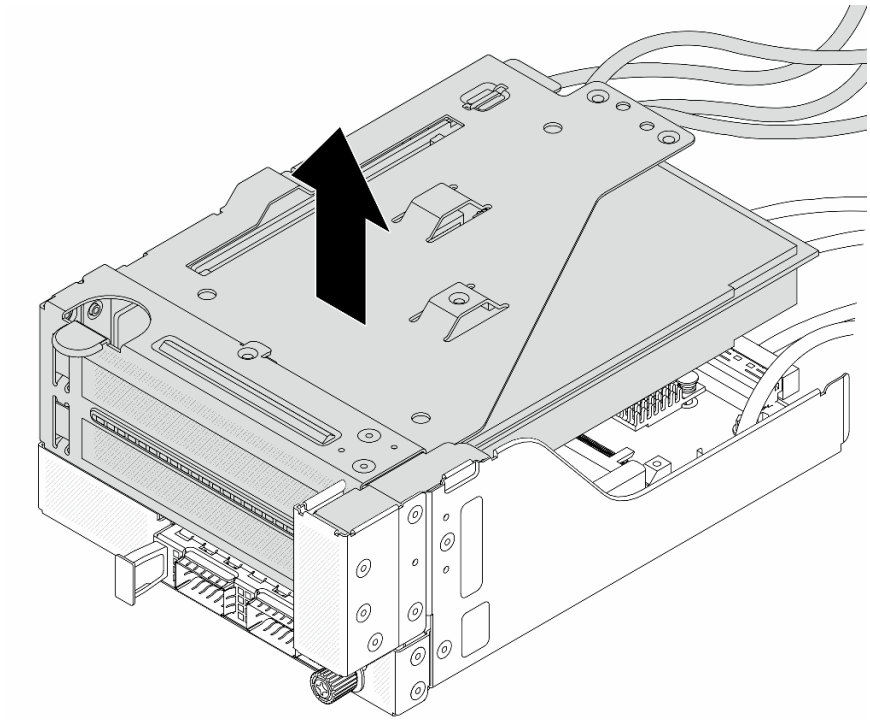


Figure 62. Lifting the riser 5 assembly

Step 4. Remove the PCIe adapter from the riser 5 cage.

Note: For ThinkSystem AMD X3522 10/25GbE DSFP28 2-port PCIe Ethernet Adapter, remove the screw that secures the adapter first.

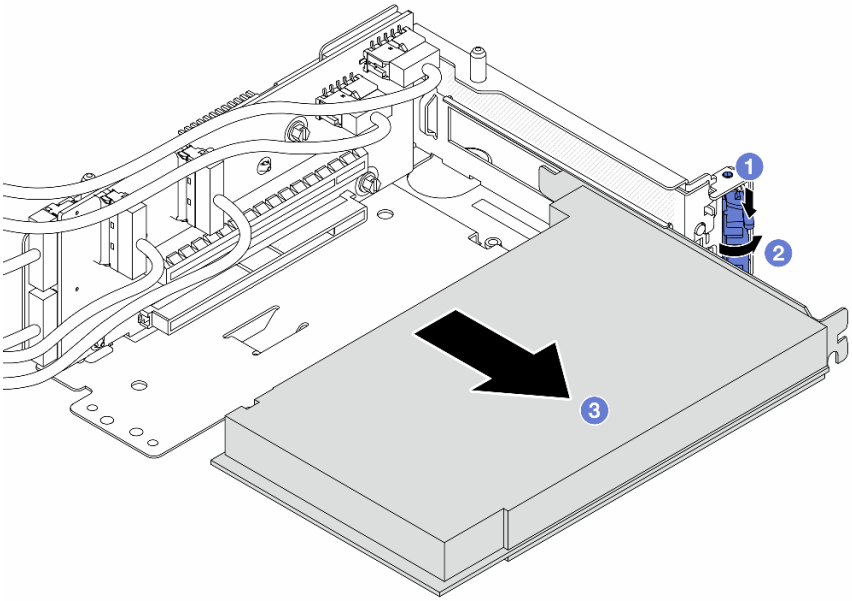


Figure 63. Removing the PCIe adapter from the riser 5 cage

a. 1 Press the retainer clip downward.

b. 2 Rotate the retention latch to the open position.

c. 3 Grasp the PCIe adapter by its edges and carefully pull it out of the PCIe slot.

Step 5. Disconnect the cables from the riser card, and remove the riser card from the riser 5 cage.

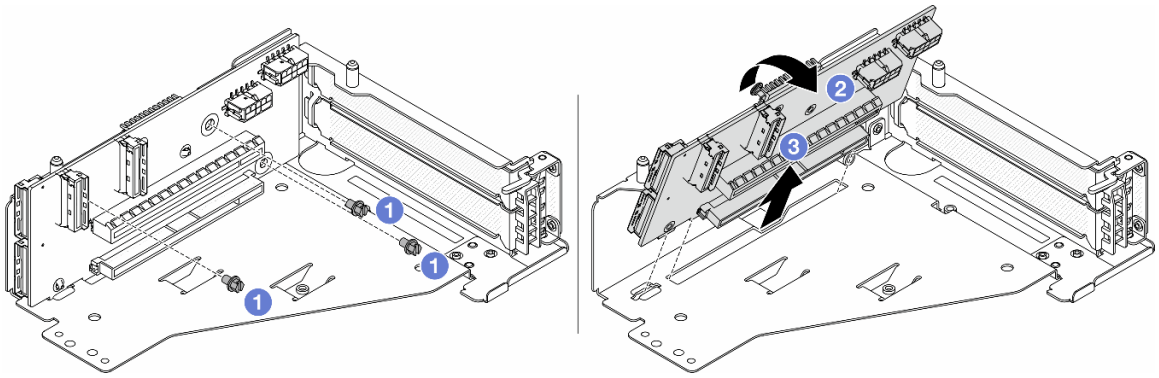


Figure 64. Removing the riser card from the riser 5 cage

a. 1 Remove the screws that secure the riser card.
b. 2 Rotate the riser card from the top to disengage it from the screw holes on the riser cage.
c. 3 Lift the riser card out of the riser cage.

After you finish

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

Demo video

Watch the procedure on YouTube

Install the front PCIe adapter and riser card

Follow instructions in this section to install the front PCIe adapter and riser 5 card.

About this task

Attention:

- Read “Installation Guidelines” on page 1 and “Safety inspection checklist” on page 2 to ensure that you work safely.
- Power off the server and peripheral devices and disconnect the power cords and all external cables. See “Power off the server” on page 32.
- 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.
- For PCIe adapter installation rules, see “PCIe slots and PCIe adapters” on page 12.
- For ThinkSystem AMD X3522 10/25GbE DSFP28 2-port PCIe Ethernet Adapter installed on the front riser card, make sure that the XCC firmware version is ESX330M or later.

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

- Go to https://datacentersupport.lenovo.com/products/servers/thinksystem/sr650v3/downloads/driver-list/ to see the latest firmware and driver updates for your server.
- Go to “Update the firmware” in *User Guide* or *System Configuration Guide* for more information on firmware updating tools.

Procedure

Step 1. Touch the static-protective package that contains the new part to any unpainted surface on the outside of the server. Then, take the new part out of the package and place it on a static-protective surface.

Step 2. Install the riser card and connect the cables to the riser card. See Chapter 2 “Internal cable routing” on page 323.

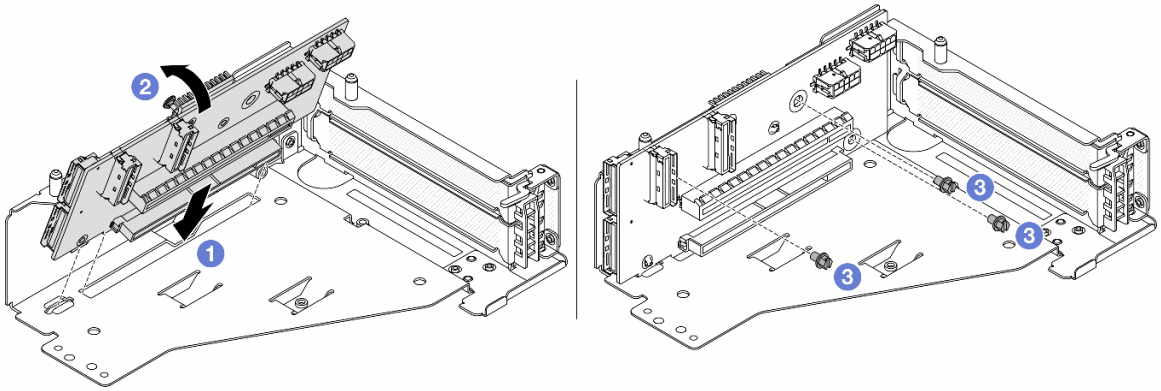


Figure 65. Installing the riser card

a. 1 Insert the riser card into the slots in the riser cage.

b. 1 Push the top of the riser card towards the riser cage so that the holes in the riser card engage with the holes on the riser cage.

c. 2 Install the screws to secure the riser card into place.

Step 3. Install the PCIe adapter to the riser 5 cage.

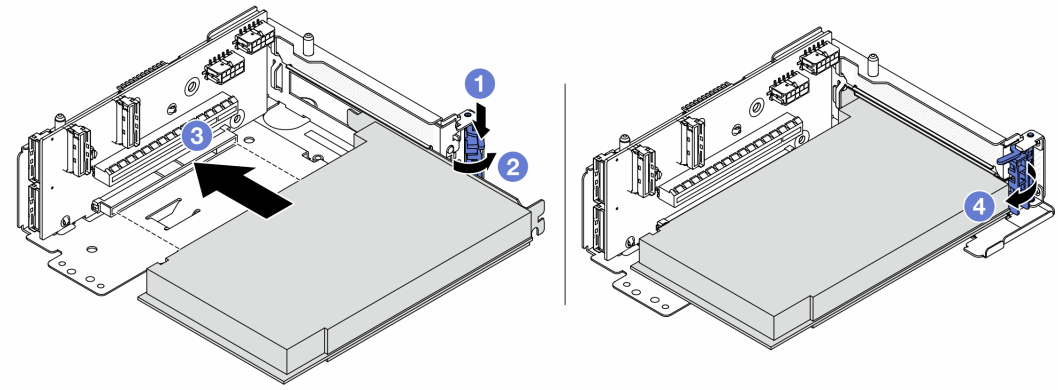


Figure 66. Installing the PCIe adapter to the riser 5 cage

a. 1 Press the retainer clip downward.

b. 2 Rotate the PCIe adapter retention latch to the open position.

c. 3 Align the PCIe adapter with the PCIe slot on the riser card. Carefully press the PCIe adapter straight into the slot until it is securely seated and its bracket also is secured.

d. 4 Close the retention latch.

Note: For ThinkSystem AMD X3522 10/25GbE DSFP28 2-port PCIe Ethernet Adapter, install the screw to secure the adapter before closing the retention latch if the server needs to be shipped.

Step 4. Install the riser 5 assembly on the front OCP assembly.

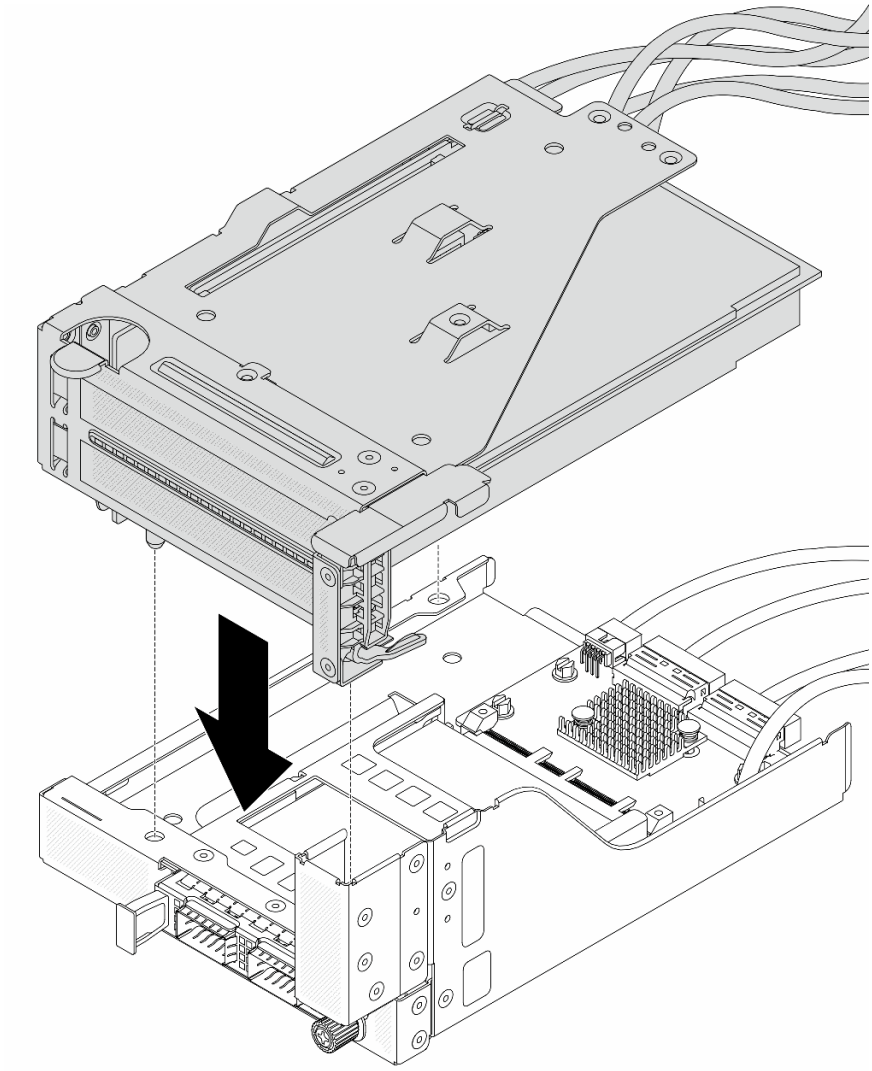


Figure 67. Installing the riser 5 assembly on the front OCP assembly

Step 5. Install the front adapter assembly.

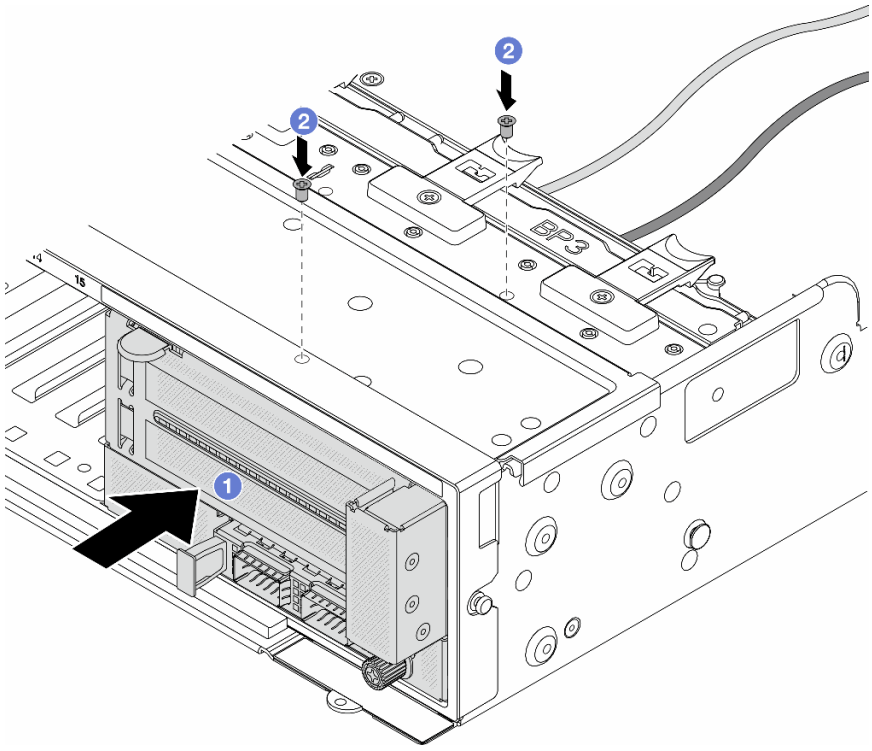


Figure 68. Installing the front adapter assembly

a. 1 Insert the front adapter assembly into the front chassis.

b. 2 Install the screws to secure the front adapter assembly in place.

Step 6. Connect the cables to the system board assembly and the rear OCP interposer card. See Chapter 2 “Internal cable routing” on page 323.

Step 7. Install the system fan cage. See “Install the system fan cage” on page 312.

Step 8. Install the air baffle. See “Install the air baffle” on page 46.

Step 9. Install the riser 1 assembly if you have removed it. See “Install a rear riser assembly” on page 284.

After you finish

Complete the parts replacement. See “Complete the parts replacement” on page 320.

Demo video

Watch the procedure on YouTube

Front drive backplane replacement

Use this information to remove and install a front drive backplane.

- “Remove the 2.5-inch front drive backplane” on page 83
- “Install the 2.5-inch front drive backplane” on page 85
- “Remove the 3.5-inch front drive backplane” on page 88
- “Install the 3.5-inch front drive backplane” on page 90

Remove the 2.5-inch front drive backplane

Use this information to remove the front 2.5-inch drive backplane.

About this task

Attention:

- Read “Installation Guidelines” on page 1 and “Safety inspection checklist” on page 2 to ensure that you work safely.
- Power off the server and peripheral devices and disconnect the power cords and all external cables. See “Power off the server” on page 32.
- Before you remove or make changes to drives, drive controllers (including controllers that are integrated on the system board assembly), drive backplanes or drive cables, back up all important data that is stored on drives.
- Before you remove any component of a RAID array (drive, RAID card, etc.), back up all RAID configuration information.
- If one or more NVMe solid-state drives are to be removed, it is recommended to disable them beforehand via the operating system.
- To ensure that there is adequate system cooling, do not operate the server for more than two minutes without either a drive or a drive filler installed in each bay.

Procedure

Step 1. Make preparation for the task.

a. Remove all the installed drives and fillers (if any) from the drive bays. See “Remove a hot-swap drive” on page 41.

b. If the server is installed in a rack, slide the server out on its rack slide rails to gain access to the top cover, or remove the server from the rack. See “Remove the server from rack” on page 32.

c. Remove the top cover. See “Remove the top cover” on page 318.

d. Remove the system fan cage for easier operation. See “Remove the system fan cage” on page 311.

e. Remove the air baffle if needed. See “Remove the air baffle” on page 44.

Step 2. Remove the 2.5-inch drive backplane.

Note: Depending on the specific type, your backplane might look different from the illustration. Some cables might need to be removed or moved to the side to remove the backplane. If needed, record the cable connections on the backplane and then disconnect the cables from the backplane first.

- **8-bay drive backplane**

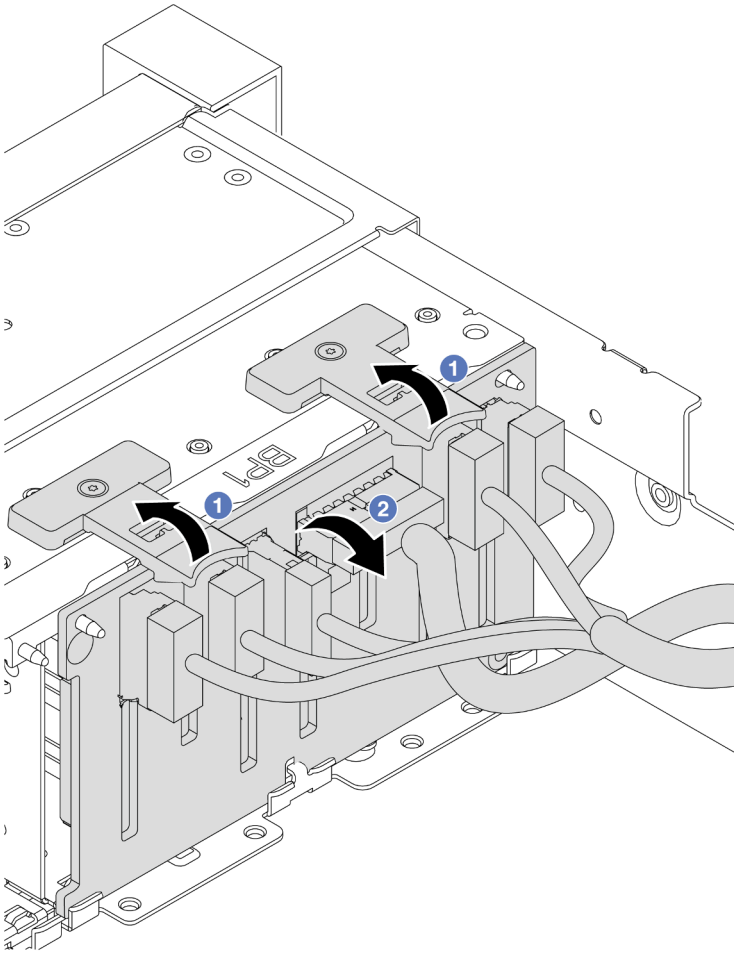


Figure 69. Removing the 8-bay drive backplane

1. 1 Lift the release tabs.
2. 2 Rotate the backplane from the top to disengage it from the two pins on the chassis.

- **24-bay drive backplane with expander**

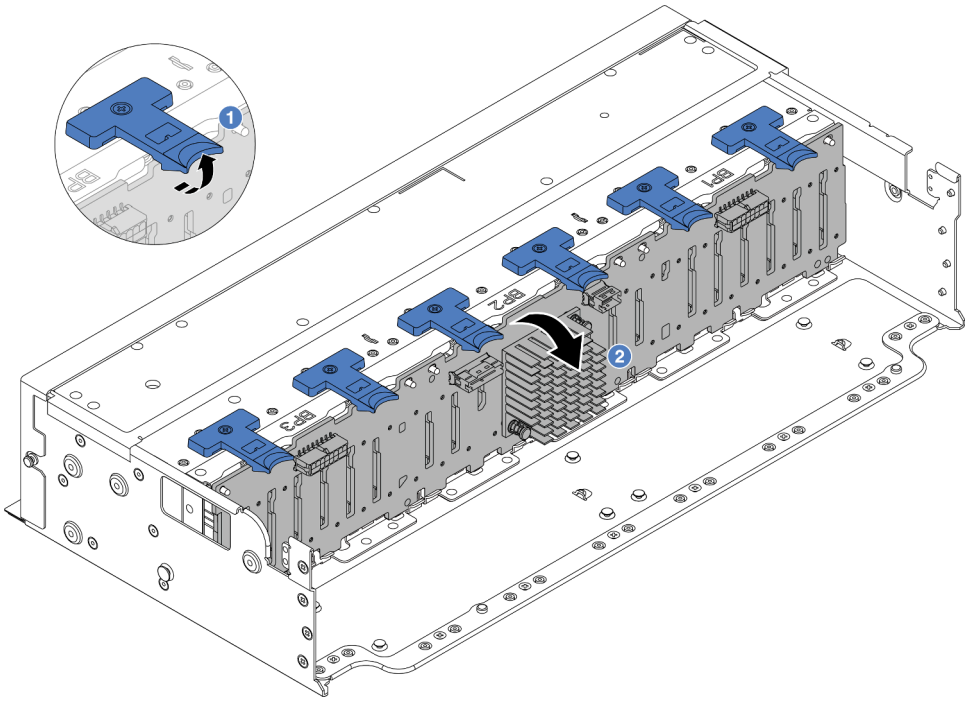


Figure 70. Removing the 24-bay drive backplane with expander

1. 1 Lift all the six release tabs.
2. 2 Rotate the backplane from the top to disengage it from the pins on the chassis.

After you finish

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

Demo video

Watch the procedure on YouTube

Install the 2.5-inch front drive backplane

Use this information to install the 2.5-inch front drive backplane.

About this task

The server supports up to three 2.5-inch drive backplanes of below types. Depending on the backplane type and quantity, the installation location of the backplanes varies.

- 2.5-inch SAS/SATA 8-bay backplane
- 2.5-inch AnyBay 8-bay backplane
- 2.5-inch NVMe 8-bay backplane
- 2.5-inch 24-bay backplane with expander

Note: The AnyBay backplane and NVMe backplane listed above use the same physical circuit board. The difference is which connectors on the backplane are cabled: NVMe and SAS/SATA, or just NVMe.

The following table lists the supported backplane combinations. Install the backplane according to your server configuration.

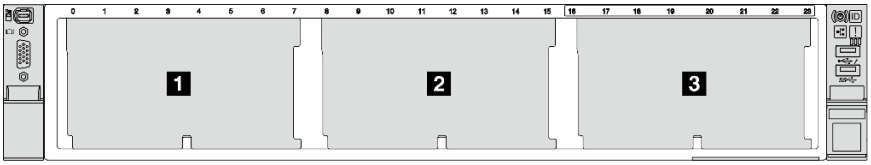


Figure 71. Drive backplane numbering

Back-plane quantity	Backplane 1	Backplane 2	Backplane 3
1	• 8-bay SAS/SATA • 8-bay NVMe • 8-bay AnyBay		
2	8-bay SAS/SATA	8-bay SAS/SATA	
	8-bay NVMe	8-bay NVMe	
	8-bay AnyBay	8-bay AnyBay	
	8-bay SAS/SATA	• 8-bay NVMe • 8-bay AnyBay	
	8-bay AnyBay	8-bay NVMe	
3	8-bay SAS/SATA	8-bay SAS/SATA	8-bay SAS/SATA
	8-bay NVMe	8-bay NVMe	8-bay NVMe
	8-bay AnyBay	8-bay AnyBay	8-bay AnyBay
	8-bay SAS/SATA	8-bay SAS/SATA	• 8-bay AnyBay • 8-bay NVMe
	8-bay SAS/SATA	8-bay NVMe	8-bay NVMe
1	24-bay backplane with expander		

Attention:

- Read “Installation Guidelines” on page 1 and “Safety inspection checklist” on page 2 to ensure that you work safely.
- To avoid damage to the drive connectors, make sure that the server top cover is in place and fully closed whenever you install or remove a drive.
- To make sure that there is adequate system cooling, do not operate the server for more than two minutes without either a drive or a drive bay filler installed in each bay.
- Before you remove or make changes to drives, drive controllers (including controllers that are integrated on the system board assembly), drive backplanes or drive cables, back up all important data that is stored on drives.

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

- Go to https://datacentersupport.lenovo.com/products/servers/thinksystem/sr650v3/downloads/driver-list/ to see the latest firmware and driver updates for your server.
- Go to “Update the firmware” in *User Guide* or *System Configuration Guide* for more information on firmware updating tools.

Procedure

Step 1. Touch the static-protective package that contains the new part to any unpainted surface on the outside of the server. Then, take the new part out of the package and place it on a static-protective surface.

Step 2. Install the 2.5-inch drive front backplane.

Note: Depending on the specific type, your backplane might look different from the illustration.

- **8-bay drive backplane**

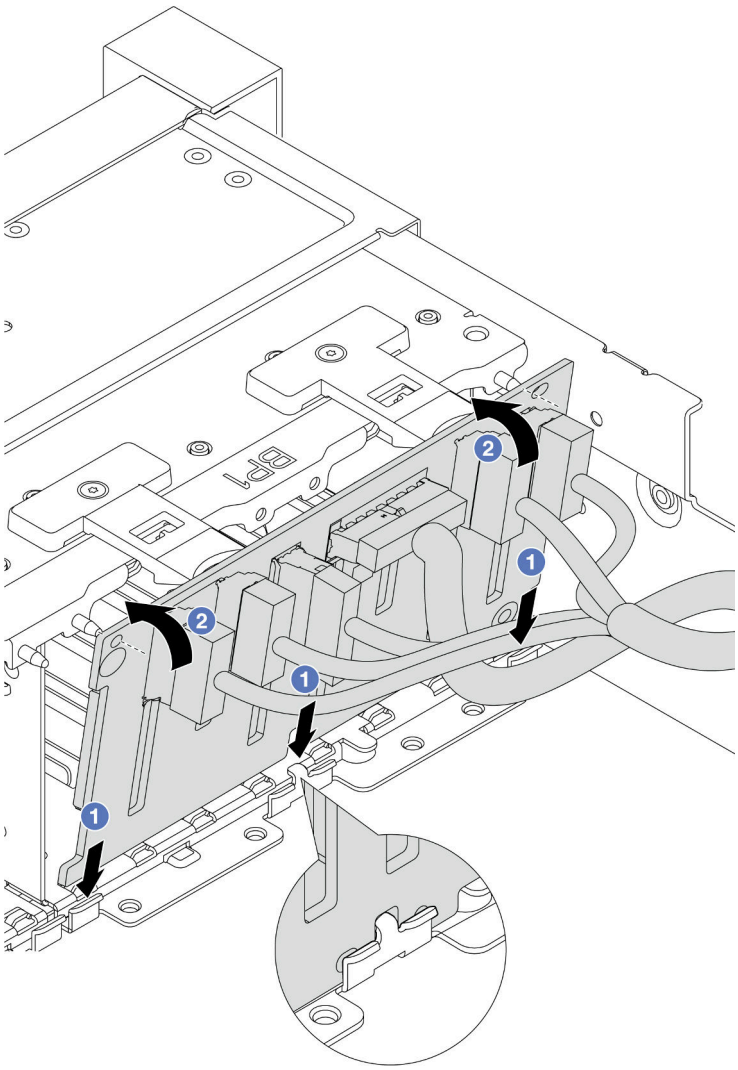


Figure 72. Installing the 8-bay drive backplane

1. ① Align the bottom of the backplane with the slots on of the chassis.

2. ❷ Rotate the backplane to the vertical position and align the holes in the backplane with the pins on the chassis and press the backplane into position. The release tabs will secure the backplane in place.

- **24-bay drive backplane with expander**

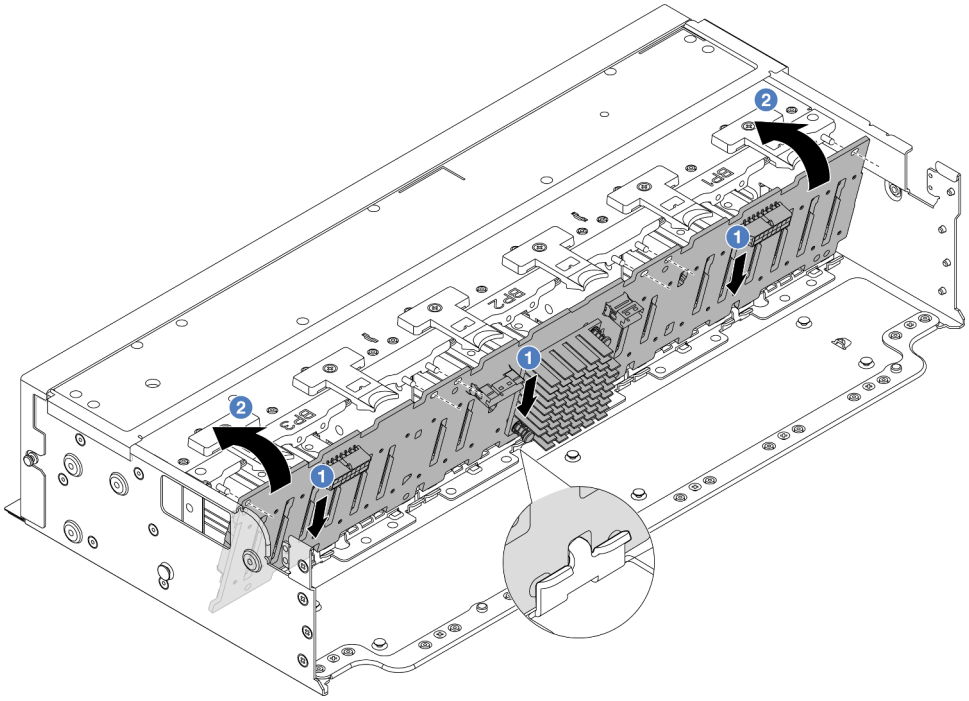


Figure 73. Installing the 24-bay drive backplane with expander

1. ❶ Align the bottom of the backplane with the slots on of the chassis.
2. ❷ Rotate the backplane to the vertical position and align the holes in the backplane with the pins on the chassis and press the backplane into position. The release tabs will secure the backplane in place.

Step 3. If you have disconnected cables from the backplane, reconnect cables back to the backplane, and then connect the cables to the system board assembly or RAID adapters. See Chapter 2 “Internal cable routing” on page 323.

After you finish

1. Reinstall all the drives and fillers (if any) into the drive bays. See “Install a hot-swap drive” on page 42.
2. Reinstall the fan cage. See “Install the system fan cage” on page 312.
3. Reinstall the air baffle if you have removed it. See “Install the air baffle” on page 46.
4. Complete the parts replacement. See “Complete the parts replacement” on page 320.

Demo video

Watch the procedure on YouTube

Remove the 3.5-inch front drive backplane

Use this information to remove the 3.5-inch front drive backplane.

About this task

The server supports the following types of 3.5-inch front drive backplanes:

- 3.5-inch SAS/SATA 8-bay backplane
- 3.5-inch SAS/SATA 12-bay backplane
- 3.5-inch AnyBay 12-bay backplane
- 3.5-inch 12-bay backplane with expander

The following uses the 3.5-inch SAS/SATA 12-bay backplane as an example for illustration. The procedure is the same for the other backplanes.

Attention:

- Read “Installation Guidelines” on page 1 and “Safety inspection checklist” on page 2 to ensure that you work safely.
- Power off the server and peripheral devices and disconnect the power cords and all external cables. See “Power off the server” on page 32.
- Before you remove or make changes to drives, drive controllers (including controllers that are integrated on the system board assembly), drive backplanes or drive cables, back up all important data that is stored on drives.
- Before you remove any component of a RAID array (drive, RAID card, etc.), back up all RAID configuration information.
- If one or more NVMe solid-state drives are to be removed, it is recommended to disable them beforehand via the operating system.
- To ensure that there is adequate system cooling, do not operate the server for more than two minutes without either a drive or a drive filler installed in each bay.

Procedure

Step 1. Make preparation for the task.

a. Remove all the installed drives and fillers (if any) from the drive bays. See “Remove a hot-swap drive” on page 41.

b. If the server is installed in a rack, slide the server out on its rack slide rails to gain access to the top cover, or remove the server from the rack. See “Remove the server from rack” on page 32.

c. Remove the top cover. See “Remove the top cover” on page 318.

d. Remove the system fan cage for easier operation. See “Remove the system fan cage” on page 311.

e. Remove the air baffle if needed. See “Remove the air baffle” on page 44.

Step 2. Remove the 3.5-inch drive backplane.

Note: Depending on the specific type, your backplane might look different from the illustration. Some cables might need to be removed or moved to the side to remove the backplane. If needed, record the cable connections on the backplane and then disconnect the cables from the backplane first.

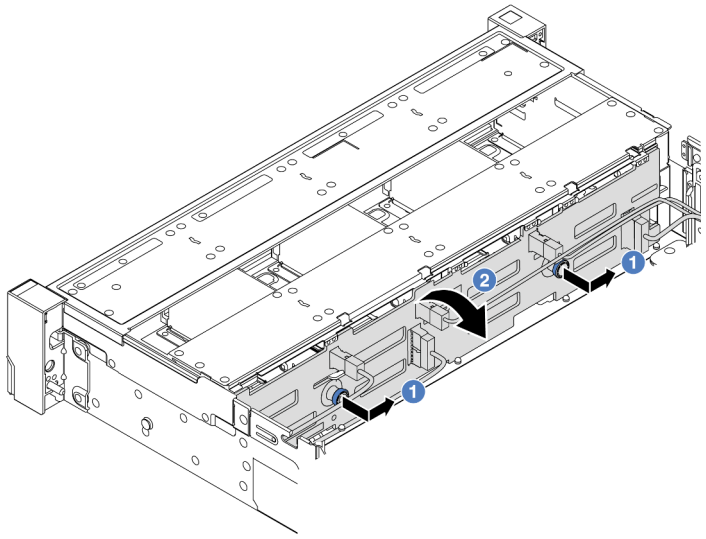


Figure 74. 3.5-inch drive backplane removal

a. 1 Pull out the plungers and slightly slide the backplane to the side as shown.

b. 2 Rotate the backplane down to release it from the four hooks on the chassis. Then, carefully lift the backplane out of the chassis.

After you finish

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

Demo video

Watch the procedure on YouTube

Install the 3.5-inch front drive backplane

Use this information to install the 3.5-inch front drive backplane.

About this task

The server supports the following types of 3.5-inch front drive backplanes:

- 3.5-inch SAS/SATA 8-bay backplane
- 3.5-inch SAS/SATA 12-bay backplane
- 3.5-inch AnyBay 12-bay backplane
- 3.5-inch 12-bay backplane with expander

The following uses the 3.5-inch SAS/SATA 12-bay backplane as an example for illustration. The procedure is the same for the other backplanes.

Attention:

- Read “Installation Guidelines” on page 1 and “Safety inspection checklist” on page 2 to ensure that you work safely.

- To avoid damage to the drive connectors, make sure that the server top cover is in place and fully closed whenever you install or remove a drive.
- To make sure that there is adequate system cooling, do not operate the server for more than two minutes without either a drive or a drive bay filler installed in each bay.
- Before you remove or make changes to drives, drive controllers (including controllers that are integrated on the system board assembly), drive backplanes or drive cables, back up all important data that is stored on drives.

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

- Go to https://datacentersupport.lenovo.com/products/servers/thinksystem/sr650v3/downloads/driver-list/ to see the latest firmware and driver updates for your server.
- Go to "Update the firmware" in *User Guide* or *System Configuration Guide* for more information on firmware updating tools.

Procedure

Step 1. Touch the static-protective package that contains the new part to any unpainted surface on the outside of the server. Then, take the new part out of the package and place it on a static-protective surface.

Step 2. Install the 3.5-inch drive backplane.

Note: Depending on the specific type, your backplane might look different from the illustration.

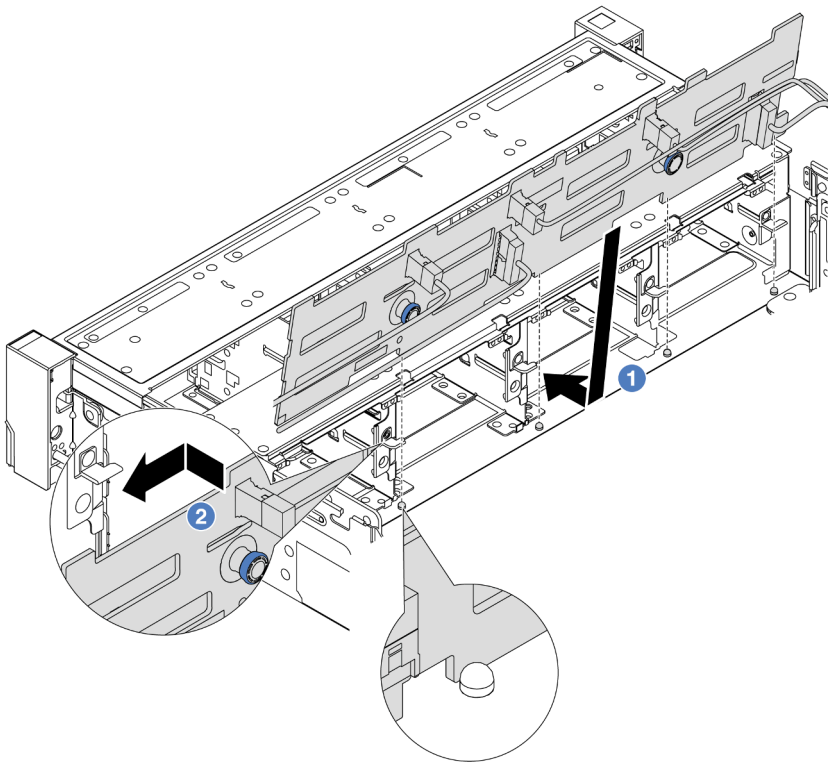


Figure 75. 3.5-inch drive backplane installation

a. 1 Align the backplane with the chassis and lower it into the chassis. Then, put the backplane into place with it leaning backward slightly.

b. 2 Rotate the backplane to vertical position to ensure that the four hooks on the chassis pass through the corresponding holes in the backplane. Then, slide the new backplane as shown until it is secured into place.

Step 3. If you have disconnected cables from the backplane, reconnect cables back to the backplane, and then connect the cables to the system board assembly or RAID adapters. See Chapter 2 “Internal cable routing” on page 323.

After you finish

1. Reinstall all the drives and fillers (if any) into the drive bays. See “Install a hot-swap drive” on page 42.
2. Reinstall the fan cage. See “Install the system fan cage” on page 312.
3. Reinstall the air baffle if you have removed it. See “Install the air baffle” on page 46.
4. Complete the parts replacement. See “Complete the parts replacement” on page 320.

Demo video

Watch the procedure on YouTube

Front I/O module replacement

Use this information to remove and install the front I/O module.

The front I/O module varies by model. The front I/O module for most models is on right rack latch. The front I/O module on media bay is supported only in the following server models:

- Server models with eight 2.5-inch front drive bays
- Server models with sixteen 2.5-inch front drive bays

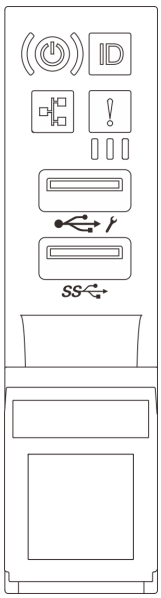


Figure 76. Front I/O module (on rack latch)

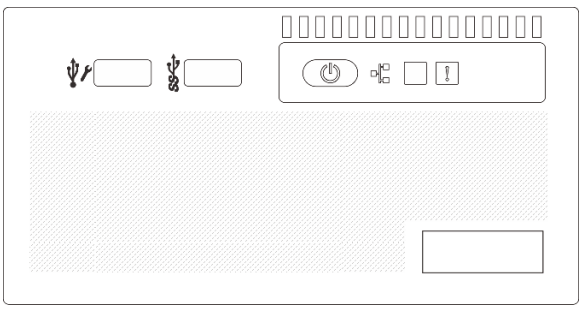


Figure 77. Front I/O module (on media bay)

To replace the front I/O module on the rack latch, see “Rack latches replacement” on page 222.

To replace the front I/O module on the media bay:

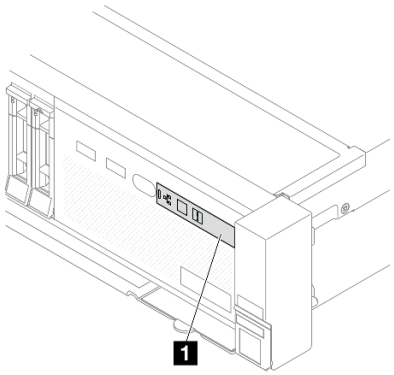
- “Remove the front I/O module” on page 93
- “Install the front I/O module” on page 95

Remove the front I/O module

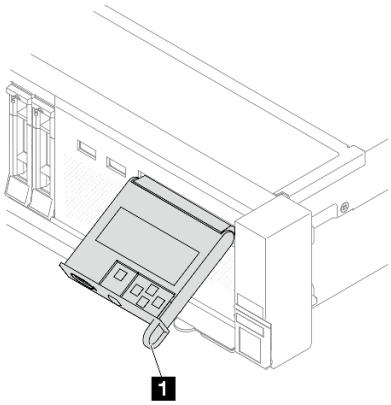
Use this information to remove the front I/O module.

About this task

Depending on the server model, the server might come with one of the following front operator panels:



1 Front operator panel without an LCD display



1 Front operator panel with an LCD display (called integrated diagnostics panel)

Attention:

- Read “Installation Guidelines” on page 1 and “Safety inspection checklist” on page 2 to ensure that you work safely.
- Power off the server and peripheral devices and disconnect the power cords and all external cables. See “Power off the server” on page 32.
- Prevent exposure to static electricity, which might lead to system halt and loss of data, by keeping static-sensitive components in their static-protective packages until installation, and handling these devices with an electrostatic-discharge wrist strap or other grounding system.

Procedure

Step 1. Make preparation for the task.

a. If the security bezel is installed, remove it. See “Remove the security bezel” on page 290.

b. If the server is installed in a rack, slide the server out on its rack slide rails to gain access to the top cover, or remove the server from the rack. See “Remove the server from rack” on page 32.

c. Remove the top cover. See “Remove the top cover” on page 318.

d. Remove the air baffle. See “Remove the air baffle” on page 44.

Step 2. Disconnect the cables of the front I/O module from the system board assembly.

Notes:

- If you need to disconnect cables from the system board assembly, disengage all latches or release tabs on cable connectors first. Failing to release the tab before removing the cables will damage the cable sockets on the system board assembly. Any damage to the cable sockets might require replacing the system board assembly.
- The connectors on your system board assembly might look different from those in the illustration, but the removal procedure is the same.
  1. Press the release tab to release the connector.
  2. Disengage the connector from the cable socket.

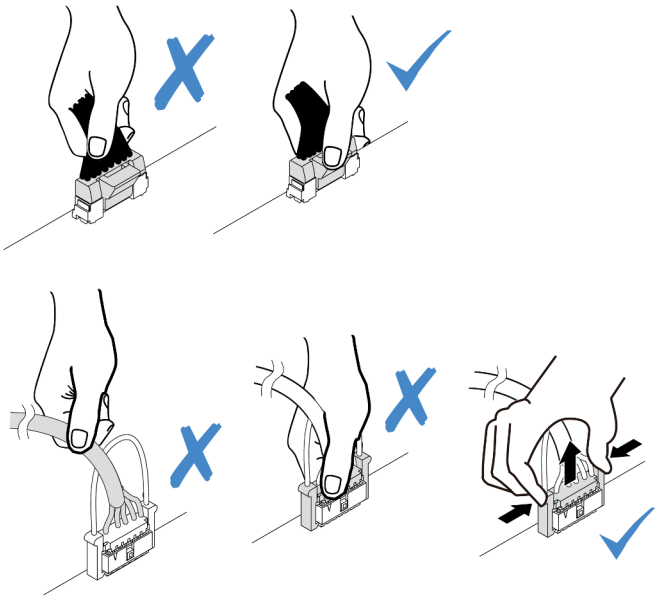


Figure 78. Disconnecting cables from the system board assembly

Step 3. Remove the front I/O module from the front chassis.

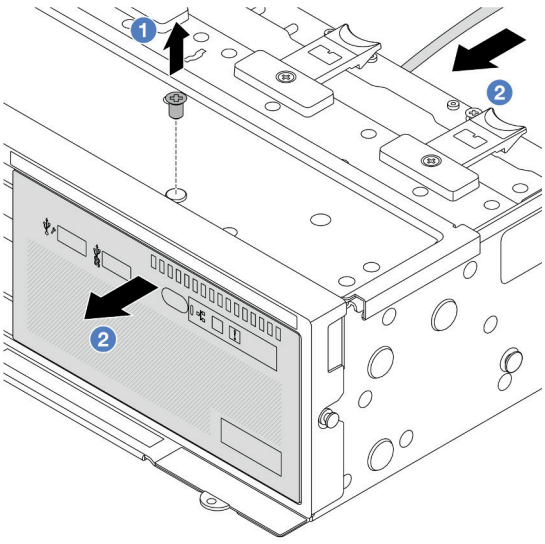


Figure 79. Front I/O module without the LCD display

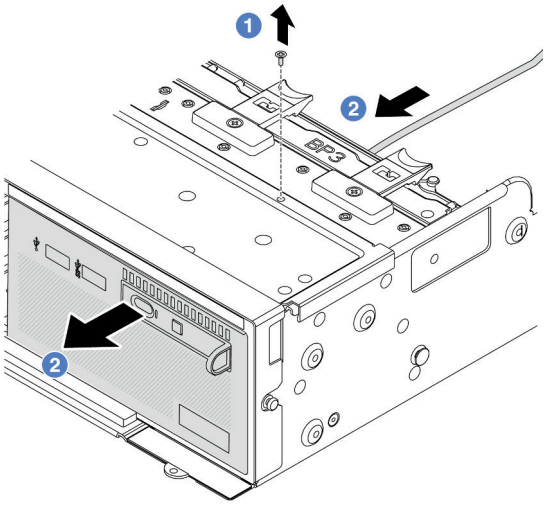


Figure 80. Front I/O module with the LCD display (integrated diagnostics panel)

a. 1 Remove the screw that secures the front I/O module.

b. 2 Slide the media bay out of the front chassis.

Step 4. (Optional) If you are replacing the integrated diagnostics panel, remove the diagnostics panel from the front I/O module.

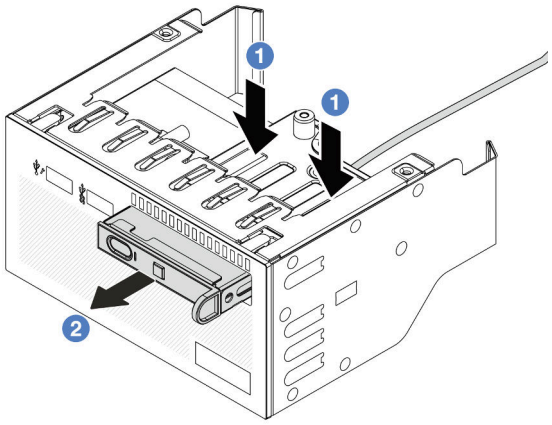


Figure 81. Diagnostics panel removal

a. 1 Press down the clips as shown.

b. 2 Pull the diagnostics panel by its handle to get it out of its assembly.

After you finish

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

Demo video

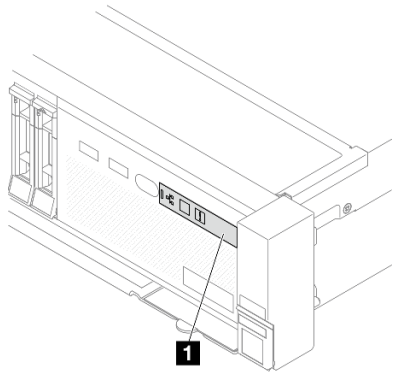
Watch the procedure on YouTube

Install the front I/O module

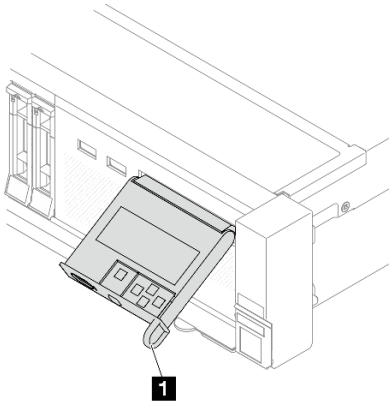
Use this information to install the front I/O module.

About this task

Depending on the server model, the server might come with one of the following front operator panels:



1 Front operator panel without an LCD display



1 Front operator panel with an LCD display (called integrated diagnostics panel)

Attention:

- Read "Installation Guidelines" on page 1 and "Safety inspection checklist" on page 2 to ensure that you work safely.
- Power off the server and peripheral devices and disconnect the power cords and all external cables. See "Power off the server" on page 32.
- Prevent exposure to static electricity, which might lead to system halt and loss of data, by keeping static-sensitive components in their static-protective packages until installation, and handling these devices with an electrostatic-discharge wrist strap or other grounding system.

Procedure

Step 1. Touch the static-protective package that contains the new part to any unpainted surface on the outside of the server. Then, take the new part out of the package and place it on a static-protective surface.

Step 2. (Optional) If you are replacing the integrated diagnostics panel, insert the diagnostics panel into the front I/O module. Ensure that the panel is fully seated into the assembly.

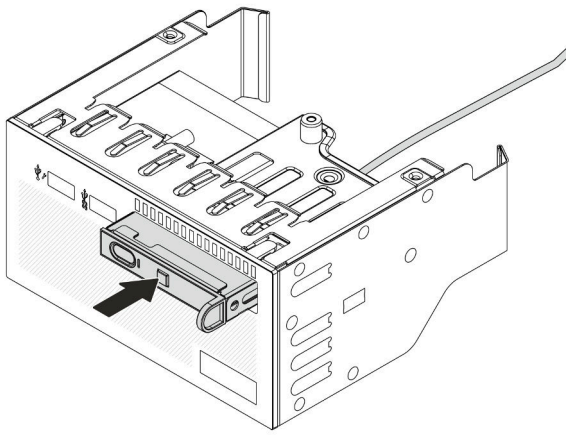


Figure 82. Diagnostics panel installation

Step 3. Install the front I/O module.

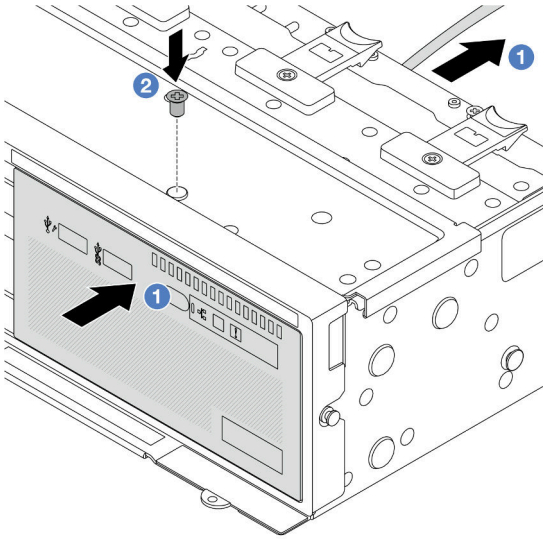


Figure 83. Front I/O module without the LCD display

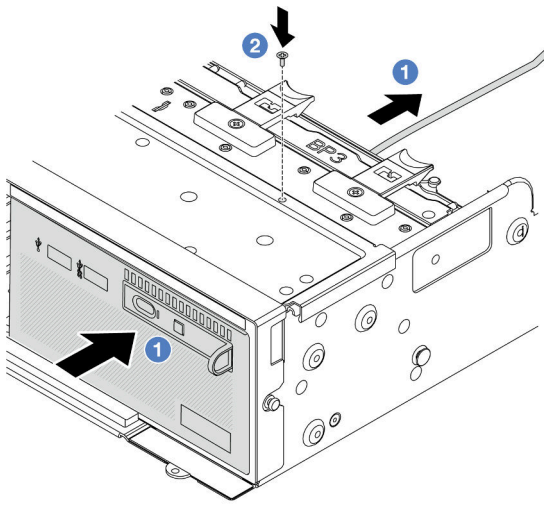


Figure 84. Front I/O module with the LCD display (integrated diagnostics panel)

a. (1) Insert the front I/O module into the front chassis.

b. (2) Install the screw to secure the front I/O module in place.

After you finish

1. Connect the cables of the front I/O module to the system board assembly. See Chapter 2 “Internal cable routing” on page 323.
2. Complete the parts replacement. See “Complete the parts replacement” on page 320.

Demo video

Watch the procedure on YouTube

GPU replacement

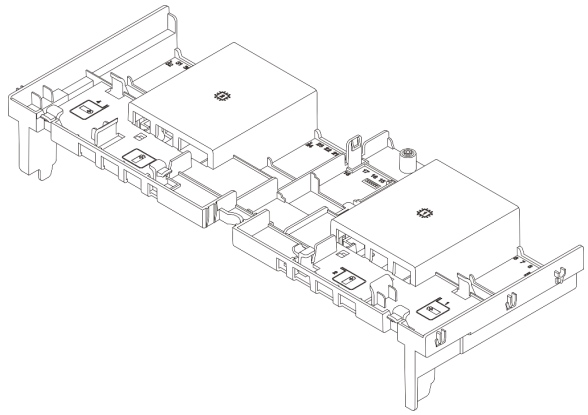
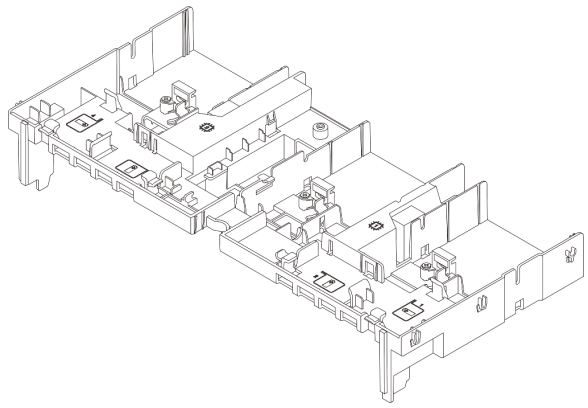
Use this information to remove and install a GPU adapter.

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

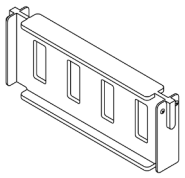
- The server is equipped with a GPU adapter.
- The UEFI firmware version is ESE122T or later.

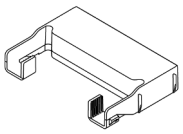
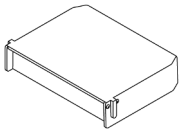
For the method of changing the **Misc** setting, see https://support.lenovo.com/us/en/solutions/TT1832.

- “Remove a GPU adapter” on page 99
- “Install a GPU adapter” on page 102

Air baffle	Supported GPU adapters
 *Figure 85. Standard air baffle*	Half length, single-wide GPUs
 *Figure 86. GPU air baffle*	• Full length, full height, single-wide GPUs • Full length, full height, double-wide GPUs

Depending on your usage scenario, you might need to install one of below GPU air baffle filler or add-on GPU air baffle:

GPU air baffle filler/Add-on air baffle	Scenario
 *Figure 87. GPU air baffle filler*	When the GPU air baffle is used, but a riser card is not installed with a GPU adapter, install this filler on the GPU air baffle.

 *Figure 88. Add-on GPU air baffle*	If a single-wide FHFL GPU adapter is to be installed on slot 1, 4, or 7, but the adjacent slot (2, 5, or 8) is left empty or installed with a half-length adapter, install this add-on air baffle on the GPU air baffle first. **Note:** If the adjacent slot (2, 5, or 8) is installed with a low-profile Ethernet adapter that use an active optical cable (AOC), the power of the AOC cable must be limited to 2.5 W or lower.
 *Figure 89. Add-on GPU air baffle*	If the riser card (E/x16/x16) is used and a single-wide FHFL GPU adapter is installed on slot 2 or 5, install this add-on air baffle on the GPU air baffle after installing the GPU adapter.

Remove a GPU adapter

Use this information to remove a GPU adapter.

About this task

Attention:

- Read “Installation Guidelines” on page 1 and “Safety inspection checklist” on page 2 to ensure that you work safely.
- Power off the server and peripheral devices and disconnect the power cords and all external cables. See “Power off the server” on page 32.
- 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.
- Depending on the specific type, your GPU adapter might look different from the illustration in this topic.

Procedure

Step 1. Make preparation for the task.

a. If the server is installed in a rack, slide the server out on its rack slide rails to gain access to the top cover, or remove the server from the rack. See “Remove the server from rack” on page 32.

b. Remove the top cover. See “Remove the top cover” on page 318.

c. For easier operation, remove the adjacent riser assembly if needed. See “Remove a rear riser assembly” on page 272.

Step 2. Remove the riser assembly that has the GPU adapter installed.

- **GPU adapter on riser 1 or 2 assembly**

  Note: The following uses riser 1 assembly as an example for illustration. The replacement procedure is the same for riser 2 assembly.

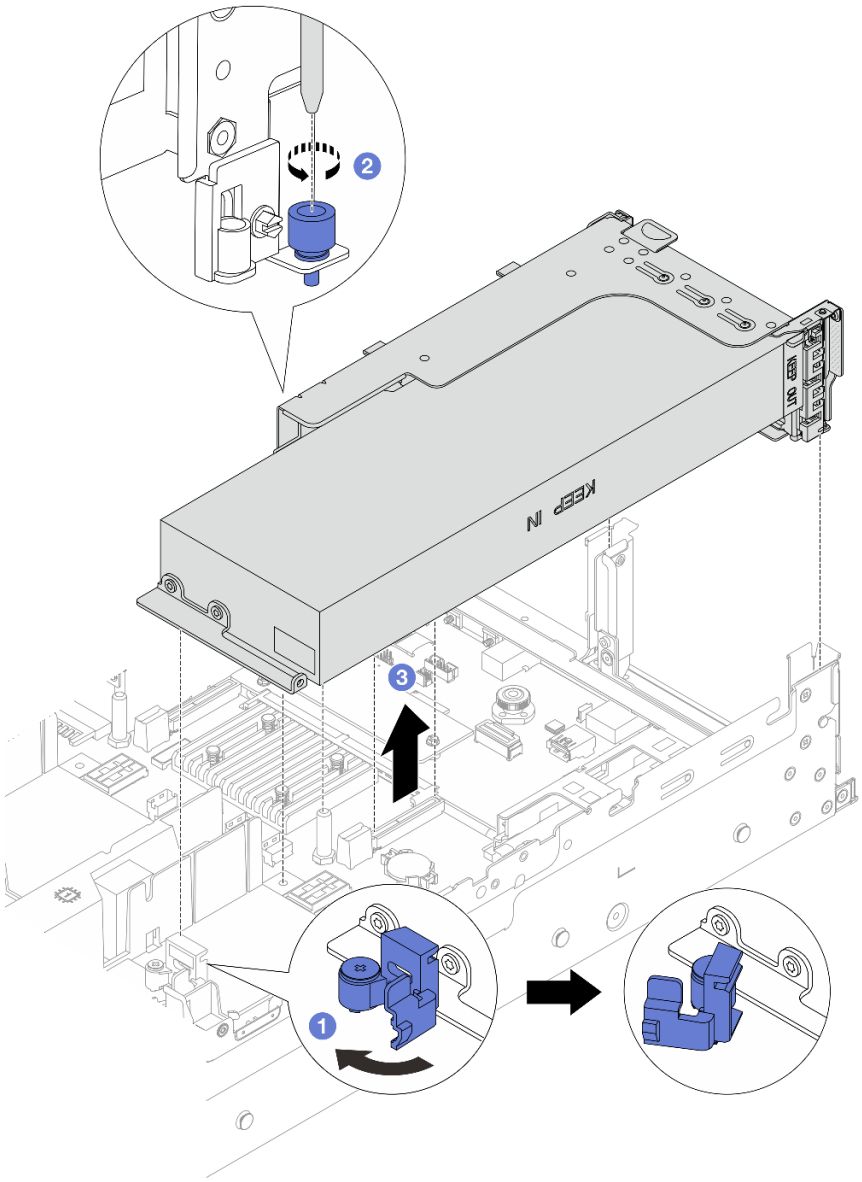


Figure 90. Removing the riser assembly

1. 1 Open the blue latch on the GPU air baffle.
2. 2 Loosen the screw that secures the riser assembly.
3. 3 Grasp the riser assembly by its edges and carefully lift it straight up and off the chassis.

- **GPU adapter on riser 3 assembly**
  1. Open the blue latch on the GPU air baffle, slightly lift the riser assembly up, and remove the air baffle.
  2. Disconnect the GPU power cable and riser 3 cables from the system board assembly.

     Notes:

     – If you need to disconnect cables from the system board assembly, disengage all latches or release tabs on cable connectors first. Failing to release the tab before removing the

cables will damage the cable sockets on the system board assembly. Any damage to the cable sockets might require replacing the system board assembly.

- The connectors on your system board assembly might look different from those in the illustration, but the removal procedure is the same.
  a. Press the release tab to release the connector.
  b. Disengage the connector from the cable socket.

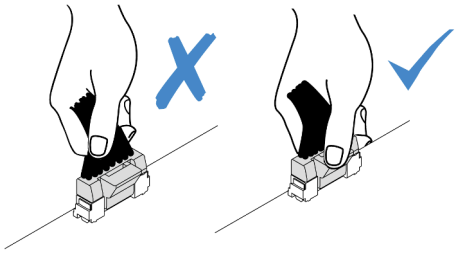


Figure 91. Disconnecting cables from the system board assembly

3. Grasp the riser assembly by its edges and carefully lift it straight up and off the chassis. See "Remove a rear riser assembly" on page 272.

Step 3. If the GPU adapter is on riser 1 or 2 assembly, disconnect the power cable from the riser card.

Step 4. Remove the GPU adapter from the riser bracket.

Note: The following uses riser 1 or 2 assembly as an example for illustration. The procedure is the same for riser 3 assembly.

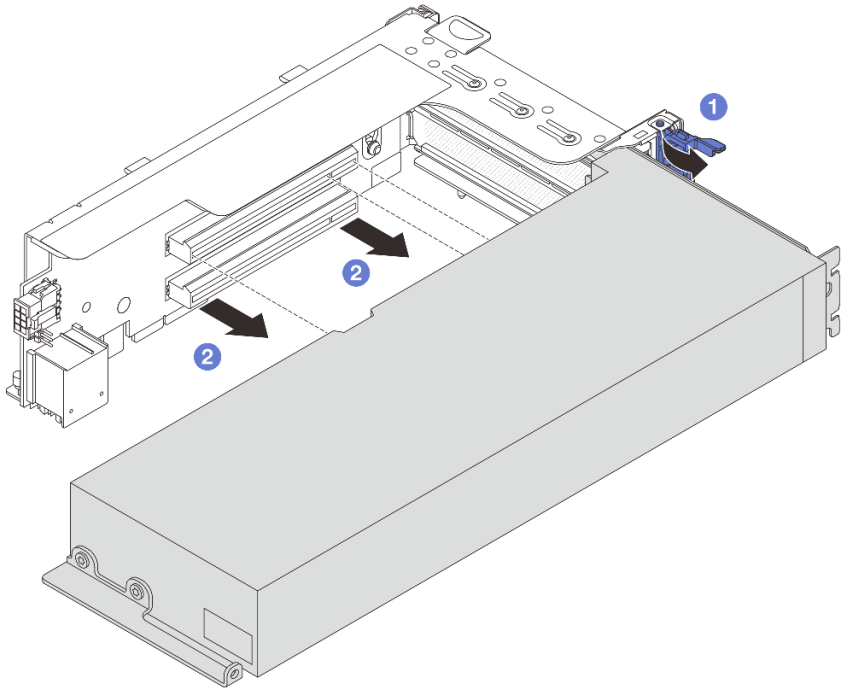


Figure 92. Removing the GPU adapter

a. 1 Rotate the GPU adapter retention latch to the open position.

b. 2 Grasp the GPU adapter by its edges and carefully pull it out of the PCIe slot.

After you finish

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

Demo video

Watch the procedure on YouTube

Install a GPU adapter

Use this information to install a GPU adapter.

About this task

Higher GPU power requires higher PSU power. Use Lenovo Capacity Planner to calculate the required power capacity for what is configured for the server. More information about Lenovo Capacity Planner is available at:

https://datacentersupport.lenovo.com/solutions/lnvo-lcp

Attention:

- Read “Installation Guidelines” on page 1 and “Safety inspection checklist” on page 2 to ensure that you work safely.
- Power off the server and peripheral devices and disconnect the power cords and all external cables. See “Power off the server” on page 32.
- 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.
- GPU adapters are supported on some server models with requirements. See “Thermal rules” on page 19.
- All installed GPU adapters must be identical.

Procedure

Step 1. Touch the static-protective package that contains the new part to any unpainted surface on the outside of the server. Then, take the new part out of the package and place it on a static-protective surface.

Step 2. Locate the appropriate PCIe slot for the new GPU adapter. See “PCIe slots and PCIe adapters” on page 12

Step 3. Install the GPU adapter into the PCIe slot on the riser card.

Note: The following uses riser 1 or 2 assembly as an example for illustration. The procedure is the same for riser 3 assembly.

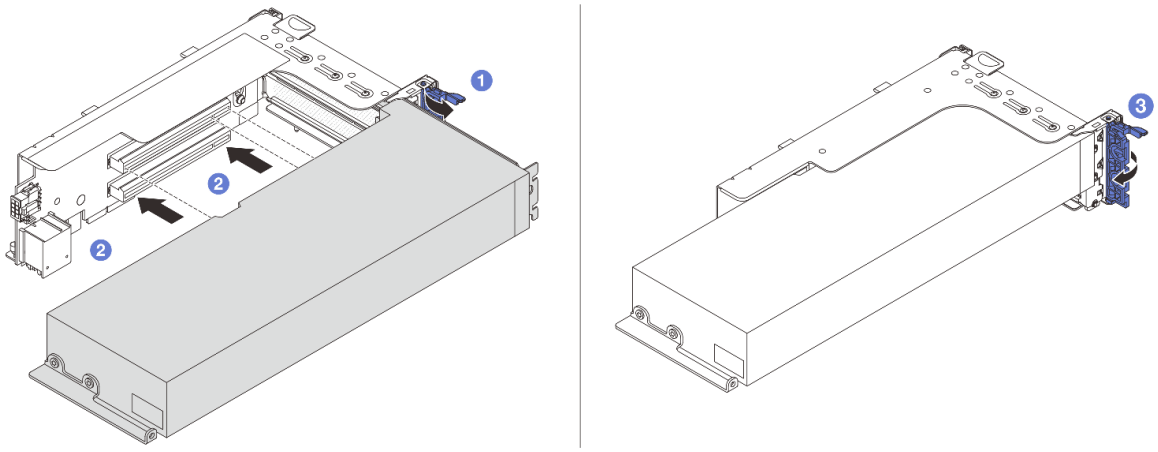


Figure 93. Installing the GPU adapter

a. 1 Open the blue latch on the riser cage.

b. 2 Align the GPU adapter with the PCIe slot on the riser card. Then, carefully press the GPU adapter straight into the slot until it is securely seated.

c. 3 Close the blue latch.

Step 4. Install the riser assembly with the GPU adapter.

- **GPU adapter on riser 1 or 2 assembly**
  1. Install the GPU air baffle.

     (Optional) If a single-wide FHFL GPU adapter is to be installed on slot 1, 4, or 7, but the adjacent slot will be left empty or installed with a half-length adapter, install an add-on air baffle 1 on the GPU air baffle first.

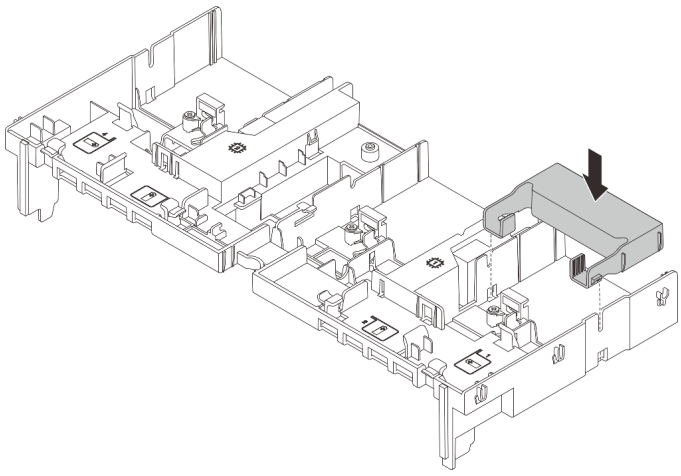


Figure 94. Installing an add-on air baffle 1

  2. Connect the GPU power cable. See Chapter 2 “Internal cable routing” on page 323.
  3. Install the riser assembly with the GPU adapter.

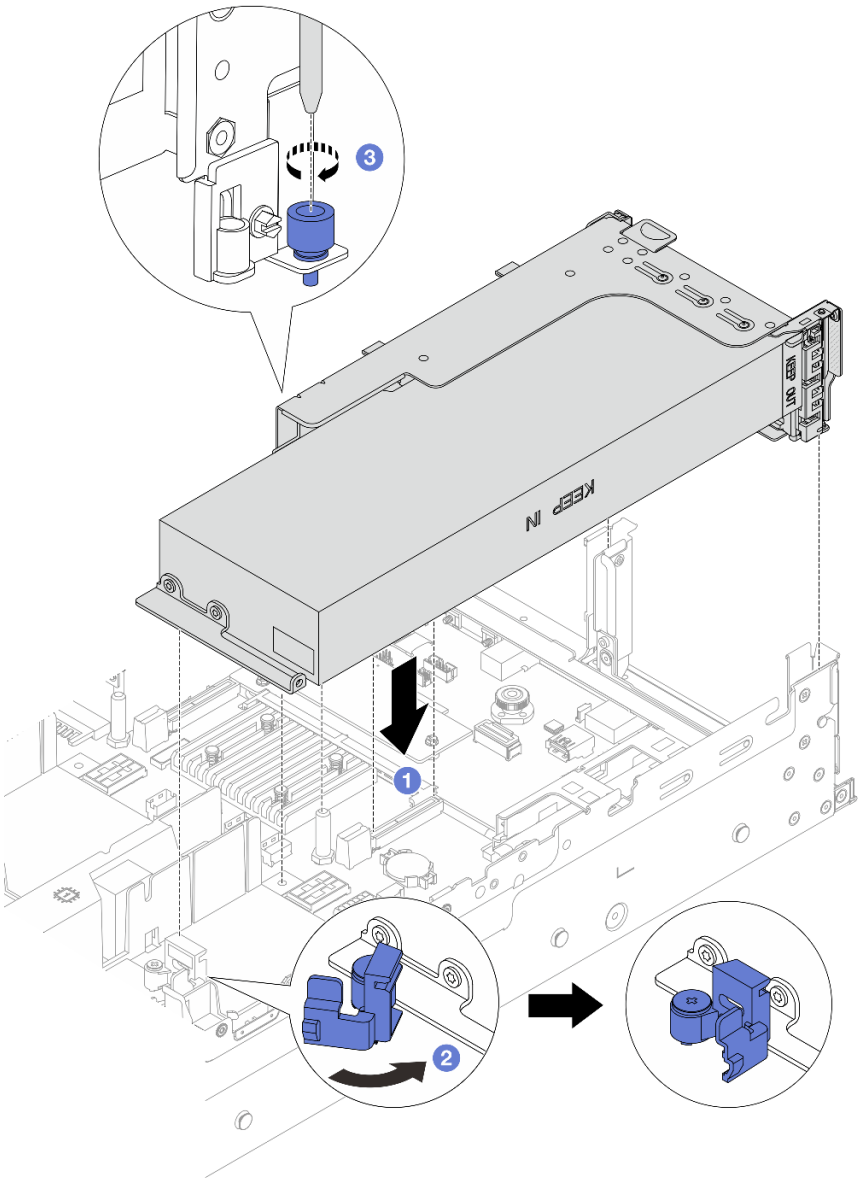


Figure 95. Installing the riser assembly

a. 1 Align the riser card with the PCIe slot on the system board assembly. Carefully press the riser card straight into the slot until it is securely seated.

b. 2 Open the blue latch on the GPU air baffle and fix the end of the GPU adapter. Then, close the blue latch.

c. 3 Tighten the screw to fix the riser cage.

4. (Optional) If the riser card (E/x16/x16) is used and a single-wide FHFL GPU adapter is installed on slot 2 or 5, install an add-on air baffle on the GPU air baffle after installing the GPU adapter.

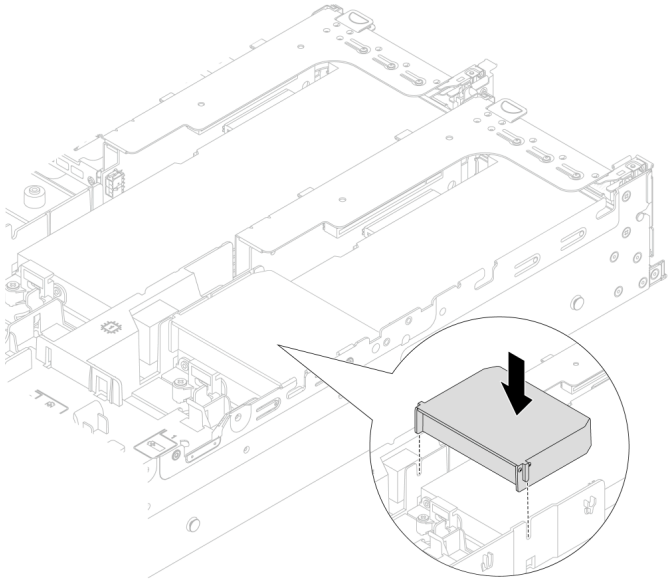


Figure 96. Installing an add-on air baffle 2

- **GPU adapter on riser 3 assembly**
  1. Connect cables from the riser 3 and GPU adapter to the system board assembly. See Chapter 2 “Internal cable routing” on page 323.
  2. Install the GPU air baffle.
  3. Install riser 3 assembly. See “Install a rear riser assembly” on page 284.
  4. Open the blue latch on the GPU air baffle and fix the end of the GPU adapter. Then, close the blue latch.

Step 5. (Optional) If a riser card is not installed with a GPU adapter, install a filler on the GPU air baffle.

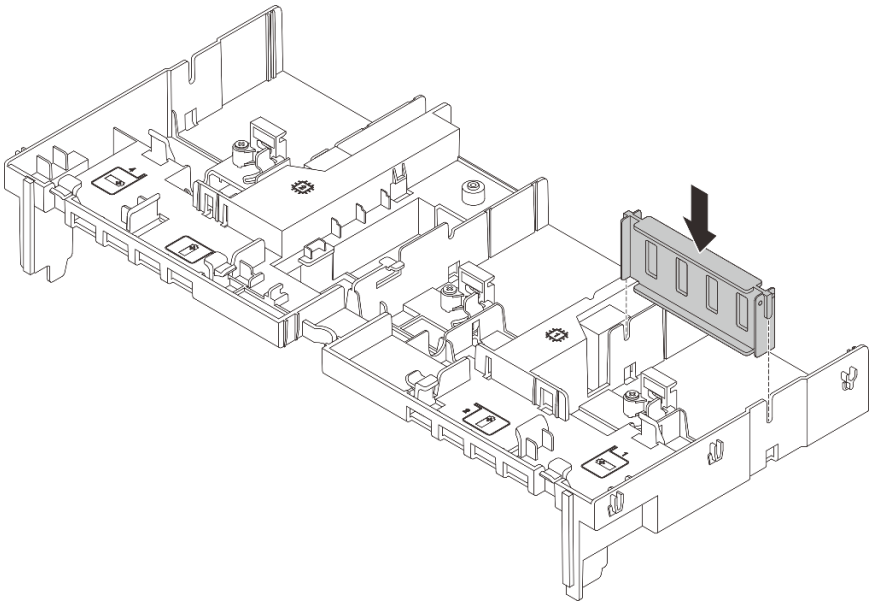


Figure 97. Installing the GPU air baffle filler

After you finish

Complete the parts replacement. See “Complete the parts replacement” on page 320.

Demo video

Watch the procedure on YouTube

Heat sink Torx T30 nut replacement

Use this information to remove and install a heat sink Torx T30 nut.

Remove a heat sink Torx T30 nut

This task has instructions for removing a PEEK (Polyether ether ketone) Torx T30 nut on the heat sink.

About this task

Attention:

- Read “Installation Guidelines” on page 1 and “Safety inspection checklist” on page 2 to ensure that you work safely.
- Power off the server and peripheral devices and disconnect the power cords and all external cables. See “Power off the server” on page 32.
- Prevent exposure to static electricity, which might lead to system halt and loss of data, by keeping static-sensitive components in their static-protective packages until installation, and handling these devices with an electrostatic-discharge wrist strap or other grounding system.
- Do not touch the processor contacts. Contaminants on the processor contacts, such as oil from your skin, can cause connection failures.

Note: The heat sink, processor, and processor carrier for your system might be different from those shown in the illustrations.

Procedure

Step 1. Make preparation for the task.

a. If the server is installed in a rack, slide the server out on its rack slide rails to gain access to the top cover, or remove the server from the rack. See “Remove the server from rack” on page 32.

b. Remove the top cover. See “Remove the top cover” on page 318.

c. If your server comes with an air baffle or a middle cage, remove it first.

- “Remove the air baffle” on page 44
- “Remove the middle drive cage and drive backplanes” on page 193

d. Remove the system fan cage if needed. “Remove the system fan cage” on page 311.

e. Remove the PHM. See “Remove a processor and heat sink” on page 205.

Step 2. Remove the Torx T30 nut.

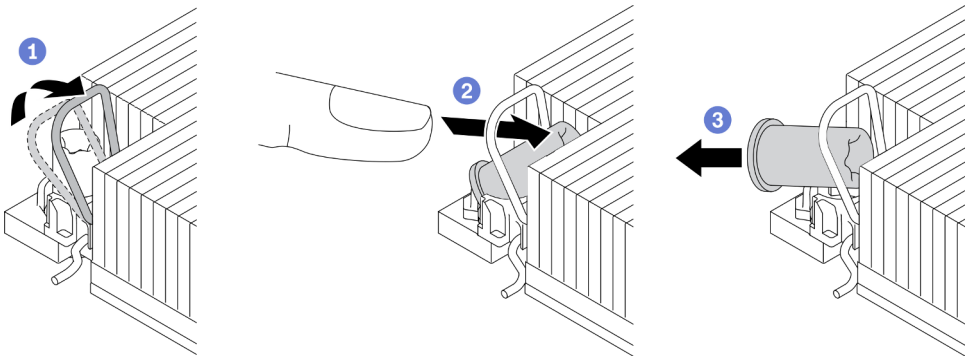


Figure 98. Removing a Torx T30 nut from the heat sink

Note: Do not touch the gold contacts on the bottom of the processor.

a. 1 Rotate the anti-tilt wire bail inwards.

b. 2 Push the upper edge of the Torx T30 nut towards the center of the heat sink until it disengages.

c. 3 Remove the Torx T30 nut.

Attention: Visually inspect the removed Torx T30 nut, if the nut is cracked or damaged, make sure no debris or broken pieces are left inside your server.

After you finish

1. Install a new Torx T30 nut. See "Install a heat sink Torx T30 nut" on page 107.
2. If you are instructed to return the component or optional device, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Demo video

Watch the procedure on YouTube

Install a heat sink Torx T30 nut

This task has instructions for installing a PEEK (Polyether ether ketone) Torx T30 nut on the heat sink.

About this task

Attention:

- Read "Installation Guidelines" on page 1 and "Safety inspection checklist" on page 2 to ensure that you work safely.
- Power off the server and peripheral devices and disconnect the power cords and all external cables. See "Power off the server" on page 32.
- Prevent exposure to static electricity, which might lead to system halt and loss of data, by keeping static-sensitive components in their static-protective packages until installation, and handling these devices with an electrostatic-discharge wrist strap or other grounding system.
- Do not touch the processor contacts. Contaminants on the processor contacts, such as oil from your skin, can cause connection failures.

Note: The heat sink, processor, and processor carrier for your system might be different from those shown in the illustrations.

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

- Go to https://datacentersupport.lenovo.com/products/servers/thinksystem/sr650v3/downloads/driver-list/ to see the latest firmware and driver updates for your server.
- Go to "Update the firmware" in *User Guide* or *System Configuration Guide* for more information on firmware updating tools.

Procedure

Step 1. Install the Torx T30 nut.

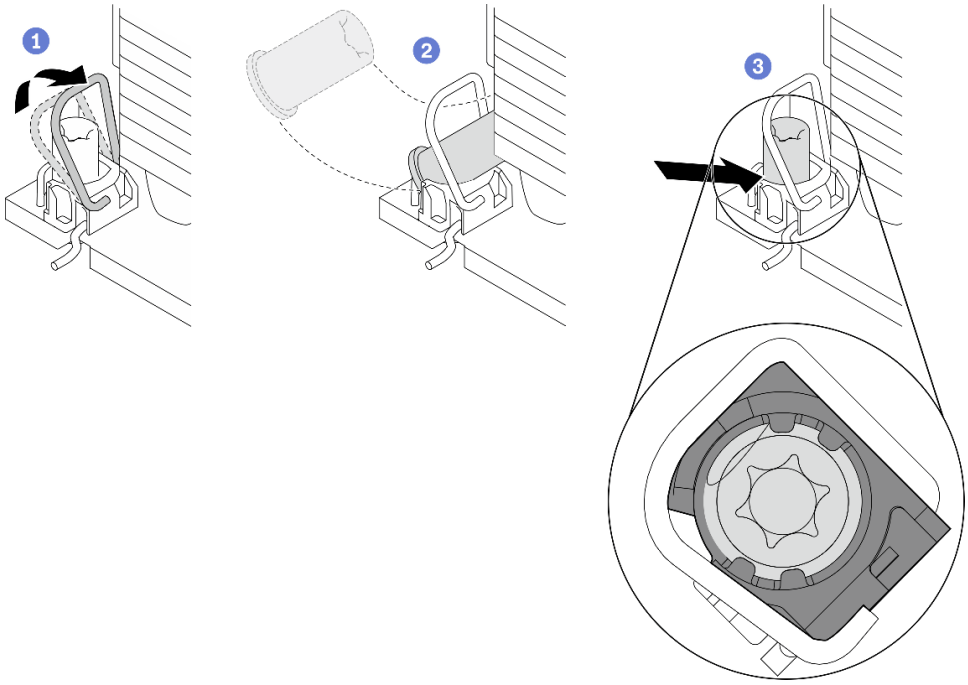


Figure 99. Installing a Torx T30 nut into the heat sink

Note: Do not touch the gold contacts on the bottom of the processor.

a. 1 Rotate the anti-tilt wire bail inwards.

b. 2 Orient the Torx T30 nut under the anti-tilt wire bail; then, align the Torx T30 nut with the socket at an angle as shown.

c. 3 Push the lower edge of the Torx T30 nut into the socket until it clicks into place. Make sure the Torx T30 nut is secured under the four clips in the socket.

After you finish

1. Reinstall the PHM. See "Install a processor and heat sink" on page 212.
2. Complete the parts replacement. See "Complete the parts replacement" on page 320.

Demo video

Watch the procedure on YouTube

Internal RAID/HBA/expander adapter replacement

Use this information to remove and install an internal customer form factor (CFF) RAID adapter, internal CFF HBA adapter, or internal CFF RAID expander adapter.

The server supports RAID/HBA adapters in two form factors:

- Customer form factor (CFF): RAID/HBA adapters in this form factor are supported only when two processors are installed. CFF RAID/HBA adapters are installed between the front backplane and fan cage.
- Standard form factor (SFF): RAID/HBA adapters in this form factor are installed in the PCIe expansion slots, see "Rear PCIe adapter and riser assembly replacement" on page 269.

Remove an internal RAID/HBA/expander adapter

Use this information to remove an internal CFF RAID adapter, internal CFF HBA adapter, or internal CFF RAID expander adapter.

About this task

Attention:

- Read "Installation Guidelines" on page 1 and "Safety inspection checklist" on page 2 to ensure that you work safely.
- Power off the server and peripheral devices and disconnect the power cords and all external cables. See "Power off the server" on page 32.
- 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.
- Before you remove or make changes to drives, drive controllers (including controllers that are integrated on the system board assembly), drive backplanes or drive cables, back up all important data that is stored on drives.
- Before you remove any component of a RAID array (drive, RAID card, etc.), back up all RAID configuration information.

Procedure

Step 1. Make preparation for the task.

a. If the server is installed in a rack, slide the server out on its rack slide rails to gain access to the top cover, or remove the server from the rack. See "Remove the server from rack" on page 32.

b. Remove the top cover. See "Remove the top cover" on page 318.

c. Record the cable connections for cables from or crossing over the adapter; then, disconnect all the cables.

Notes:

- If you need to disconnect cables from the system board assembly, disengage all latches or release tabs on cable connectors first. Failing to release the tab before removing the cables will damage the cable sockets on the system board assembly. Any damage to the cable sockets might require replacing the system board assembly.
- The connectors on your system board assembly might look different from those in the illustration, but the removal procedure is the same.
  1. Press the release tab to release the connector.
  2. Disengage the connector from the cable socket.

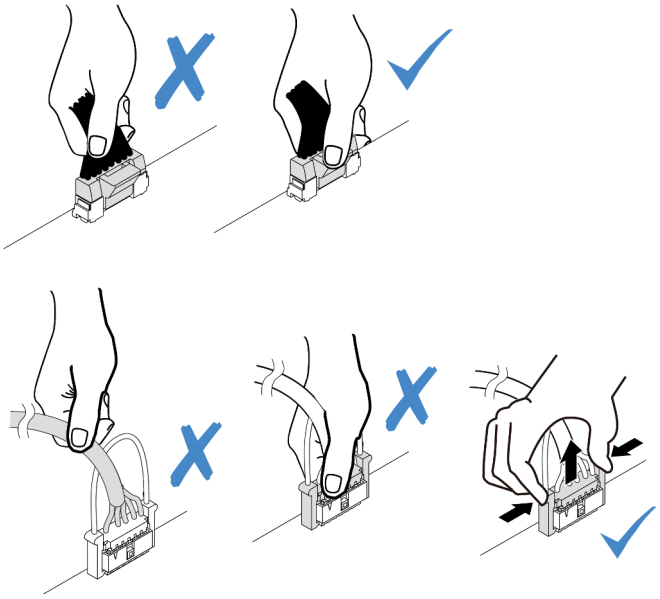


Figure 100. Disconnecting cables from the system board assembly

Step 2. Lift the blue touch point, slightly slide the adapter as shown, and carefully lift it out of the chassis.

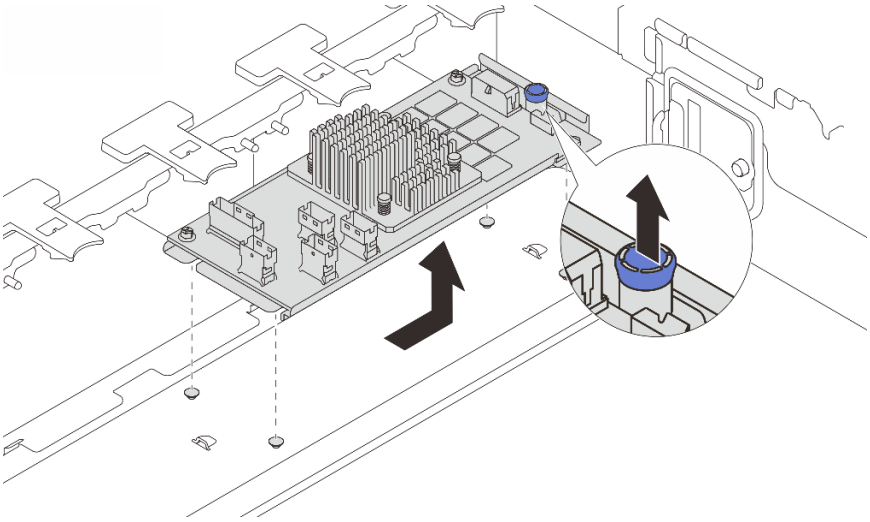


Figure 101. Internal CFF adapter removal

After you finish

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

Demo video

Watch the procedure on YouTube

Install an internal RAID/HBA/expander adapter

Use this information to install an internal CFF RAID adapter, internal CFF HBA adapter, or internal CFF RAID expander adapter.

About this task

Attention:

- Read “Installation Guidelines” on page 1 and “Safety inspection checklist” on page 2 to ensure that you work safely.
- Power off the server and peripheral devices and disconnect the power cords and all external cables. See “Power off the server” on page 32.
- 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.
- Before you remove or make changes to drives, drive controllers (including controllers that are integrated on the system board assembly), drive backplanes or drive cables, back up all important data that is stored on drives.
- The CFF adapter is supported only in the 2.5-inch drive bay chassis.

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

- Go to https://datacentersupport.lenovo.com/products/servers/thinksystem/sr650v3/downloads/driver-list/ to see the latest firmware and driver updates for your server.
- Go to “Update the firmware” in *User Guide* or *System Configuration Guide* for more information on firmware updating tools.

Procedure

Step 1. Touch the static-protective package that contains the new part to any unpainted surface on the outside of the server. Then, take the new part out of the package and place it on a static-protective surface.

Note: The adapter is shipped with and preinstalled on a mounting bracket, check and ensure that the adapter is fixed in place. If there are any loosen screws, tighten the screws using a No.1 Phillips torque screwdriver. The maximum torque value is 4.8 ± 0.5 inch-pounds.

Step 2. Align the notches on the mounting bracket with the pins on the chassis, place down the adapter, and slightly slide it as shown to secure it on the chassis.

Note: The illustration shows installing the CFF adapter on the left side (viewed from the front of the server). When the 24 x 2.5-inch drive backplane with expander is installed, the CFF adapter can be installed only on the other side (right side viewed from the front of the server).

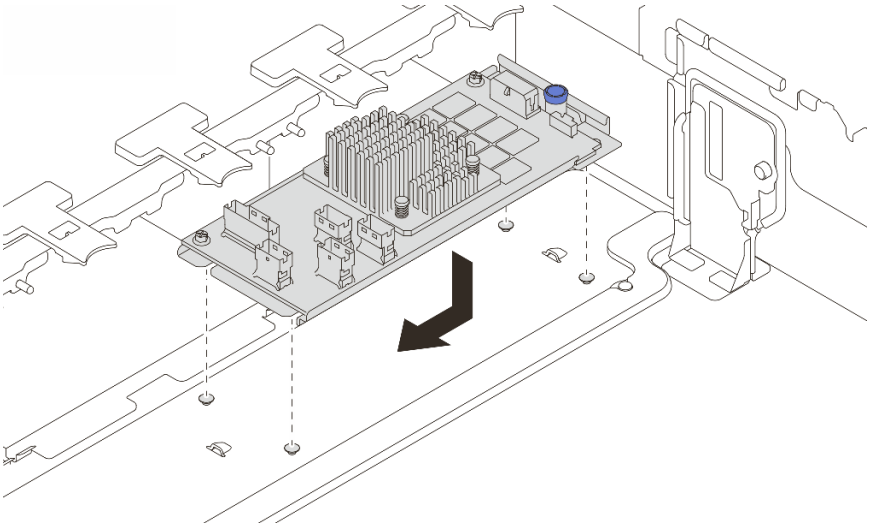


Figure 102. Internal CFF adapter installation

Step 3. Connect cables to the adapter. See Chapter 2 “Internal cable routing” on page 323.

After you finish

Complete the parts replacement. See “Complete the parts replacement” on page 320.

Demo video

Watch the procedure on YouTube

Intrusion switch replacement

Use this information to remove and install the intrusion switch. The intrusion switch informs you that the server cover is not properly installed or closed by creating an event in the system event log (SEL).

Remove the intrusion switch

Use this information to remove the intrusion switch.

About this task

Attention:

- Read “Installation Guidelines” on page 1 and “Safety inspection checklist” on page 2 to ensure that you work safely.
- Power off the server and peripheral devices and disconnect the power cords and all external cables. See “Power off the server” on page 32.
- Prevent exposure to static electricity, which might lead to system halt and loss of data, by keeping static-sensitive components in their static-protective packages until installation, and handling these devices with an electrostatic-discharge wrist strap or other grounding system.

Procedure

Step 1. Make preparation for the task.

a. If the server is installed in a rack, slide the server out on its rack slide rails to gain access to the top cover, or remove the server from the rack. See “Remove the server from rack” on page 32.

b. Remove the top cover. See “Remove the top cover” on page 318.

c. Remove the fan cage from the system board assembly. See “Remove the system fan cage” on page 311.

d. Remove the system fans from the fan cage. See “Remove a system fan” on page 307.

Step 2. Remove the intrusion switch assembly from the fan cage.

Note: The blowup in the illustration shows the fan cage upside down.

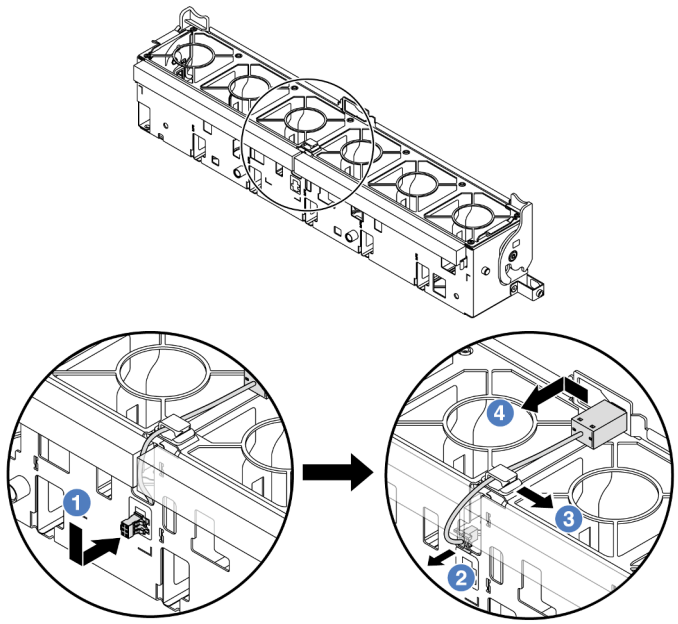


Figure 103. Intrusion switch removal

a. 1 Move the intrusion switch connector in the direction as shown to disengage it from the keyhole.

b. 2 Release the intrusion switch cable from the pre-cut slots on the foam and fan cage bottom.

c. 3 Release the intrusion switch cable from the cable clip.

d. 4 Slide and pull the intrusion switch to remove it from the holder.

After you finish

1. Install a new intrusion switch. See “Install the intrusion switch” on page 114.
2. If you are instructed to return the component or optional device, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Demo video

Watch the procedure on YouTube

Install the intrusion switch

Use this information to install the intrusion switch.

About this task

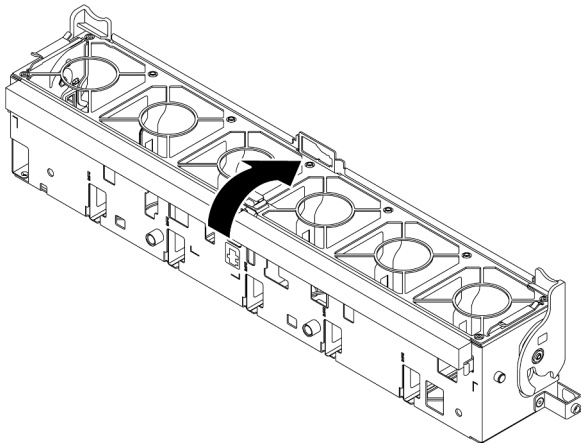
Attention:

- Read “Installation Guidelines” on page 1 and “Safety inspection checklist” on page 2 to ensure that you work safely.
- Power off the server and peripheral devices and disconnect the power cords and all external cables. See “Power off the server” on page 32.
- Prevent exposure to static electricity, which might lead to system halt and loss of data, by keeping static-sensitive components in their static-protective packages until installation, and handling these devices with an electrostatic-discharge wrist strap or other grounding system.

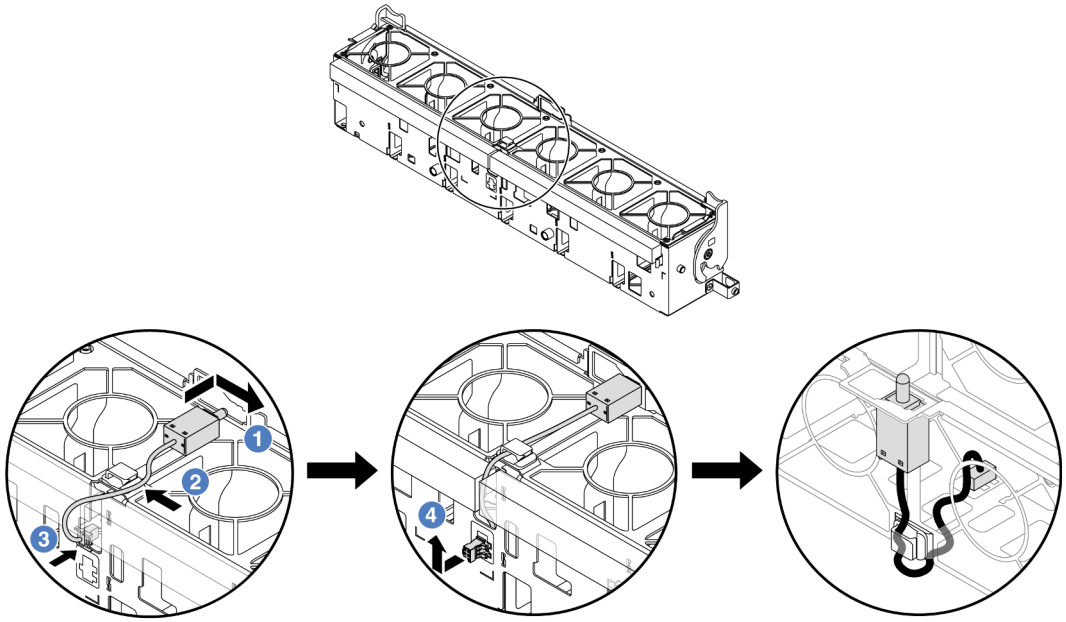
Procedure

Step 1. Touch the static-protective package that contains the new part to any unpainted surface on the outside of the server. Then, take the new part out of the package and place it on a static-protective surface.

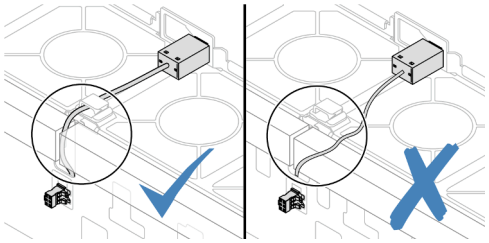
Step 2. Rotate the fan cage by 90 degrees in the direction shown in the picture.



Step 3. Install the intrusion switch onto the fan cage.



Note: Ensure that the intrusion switch cable is routed through the cable clip and the pre-cut slot. Otherwise, the cable may slide under the fan cage, the contact surface between the fan cage and the system board assembly may get uneven, and the fan connection may get loose.



a. (1) Insert the intrusion switch onto the holder on the fan cage and push it in the direction as shown until it is fully seated.

b. (2) Fix the intrusion switch cable into the cable clip.

c. (3) Route the cable into the fan cage through the pre-cut slot on the fan cage bottom.

d. (4) Insert the intrusion switch connector into the connector keyhole, and move it in the shown direction until it is fully seated.

Step 4. Install the fan cage back into the chassis. See “Install the system fan cage” on page 312.

Step 5. Install system fans into the fan cage. “Install a system fan” on page 308.

After you finish

Complete the parts replacement. See “Complete the parts replacement” on page 320.

Demo video

Watch the procedure on YouTube

Lenovo Neptune(TM) Processor Direct Water Cooling Module replacement (trained technicians only)

Follow the instructions in this section to remove and install the Direct Water Cooling Module (DWCM).

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

- "Remove the Lenovo Neptune(TM) Processor Direct Water Cooling Module" on page 116
- "Install the Lenovo Neptune(TM) Processor Direct Water Cooling Module" on page 120

Remove the Lenovo Neptune(TM) Processor Direct Water Cooling Module

Follow the instructions in this section to remove the Direct Water Cooling Module (DWCM).

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

About this task

Safety information for liquid detection sensor module cable

S011

CAUTION:
Sharp edges, corners, or joints nearby.

Attention:

- Read "Installation Guidelines" on page 1 and "Safety inspection checklist" on page 2 to ensure that you work safely.
- Power off the server and peripheral devices and disconnect the power cords and all external cables. See "Power off the server" on page 32.
- 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.

Prepare the following screwdrivers to ensure you can install and remove the corresponding screws properly.

Torque screwdriver type list	Screw Type
Torx T30 head screwdriver	Torx T30 screw

Procedure

Step 1. Make preparations for this task.

a. Remove the quick connect plugs from the manifolds. See "Remove the manifold (in-rack system)" on page 145 or "Remove the manifold (in-row system)" on page 164.

b. Remove the server from the rack, see “Remove the server from rack” on page 32.

c. Remove the top cover. See “Remove the top cover” on page 318.

d. Remove the air baffle or middle drive cage. See “Remove the air baffle” on page 44 or “Remove the middle drive cage and drive backplanes” on page 193.

e. Disconnect the liquid detection sensor module cable of the DWCM from the connector on the system board assembly. See “Direct water cooling module” on page 330.

Step 2. Remove the riser cage.

- **1FH riser cage**

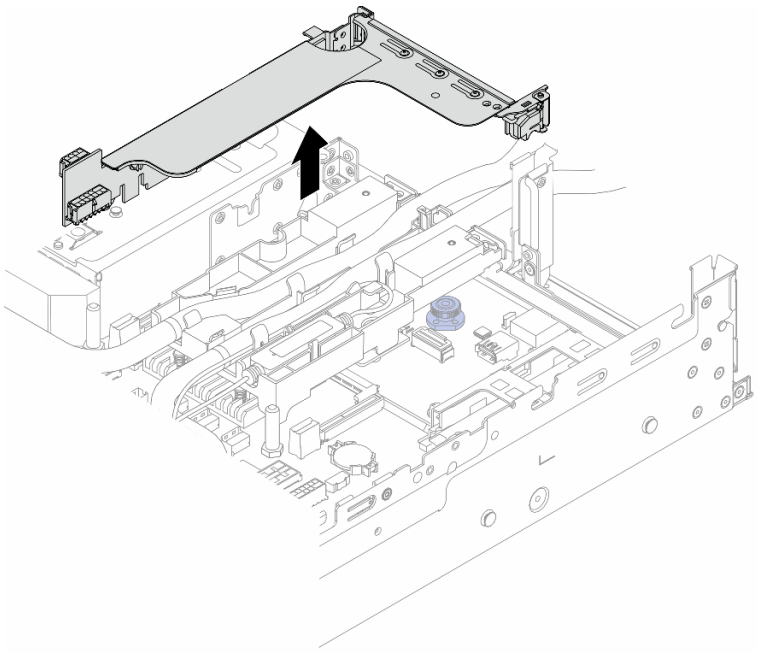


Figure 104. Removing the 1FH riser cage

- **3FH riser cage**

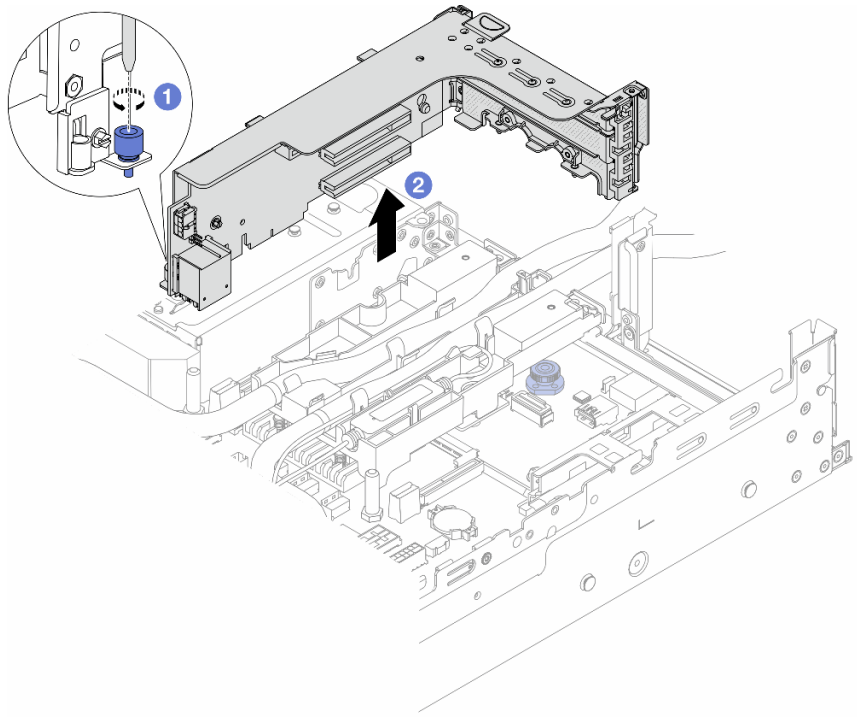


Figure 105. Removing the 3FH riser cage

a. 1 Loosen the screw that secures the riser cage.

b. 2 Grasp the riser cage by its edges and carefully lift it straight up and off the chassis.

Step 3. Disengage the hoses and liquid detection sensor module.

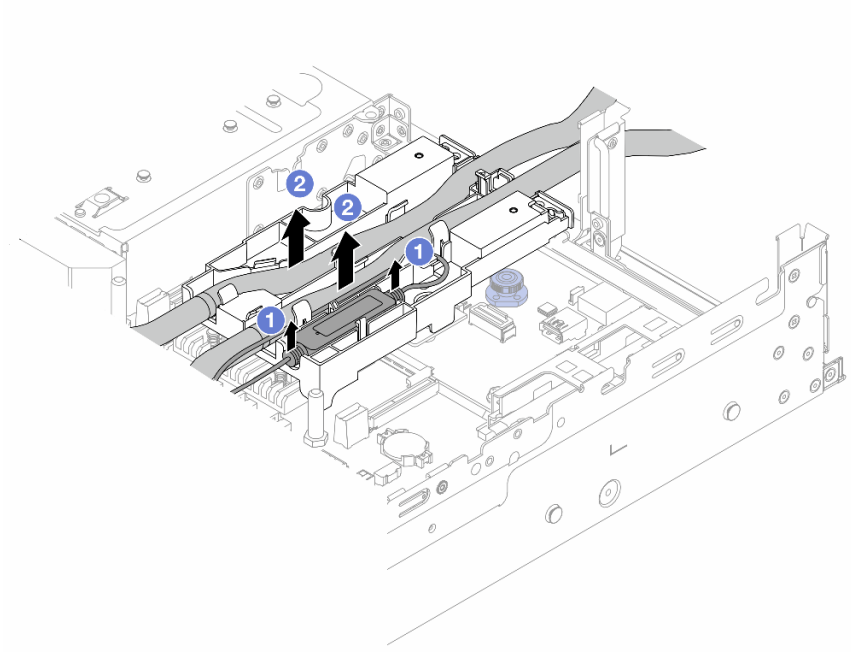


Figure 106. Disengaging the hoses and module

a. 1 Lift the liquid detection sensor module up from the hose holder.

b. 2 Disengage the hoses from the hose holder.

Step 4. Remove the DWCM from the processor board.

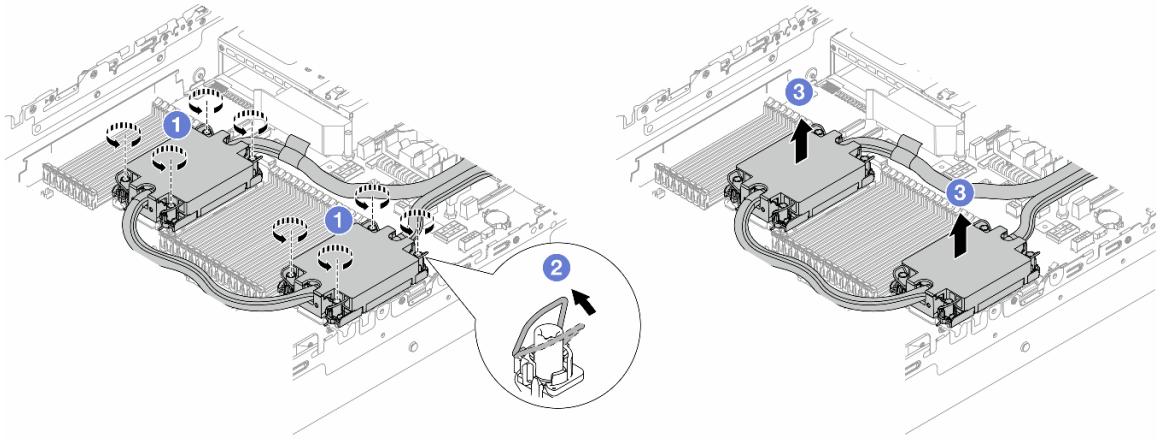


Figure 107. Removing the DWCM

a. 1 Fully loosen the Torx T30 nuts on the cold plate assembly.

b. 2 Rotate the anti-tilt wire bails inward.

c. 3 Carefully lift the DWCM from the processor sockets. If the DWCM cannot be fully lifted out of the socket, further loosen the Torx T30 nuts and try lifting the DWCM again.

Step 5. If there is any old thermal grease on the processors and the cold plates, gently clean the top of the processors and the cold plates with an alcohol cleaning pad.

Step 6. Separate the processor from the DWCM. Refer to "Separate the processor from carrier and heat sink" on page 210.

Step 7. Remove the hose holder.

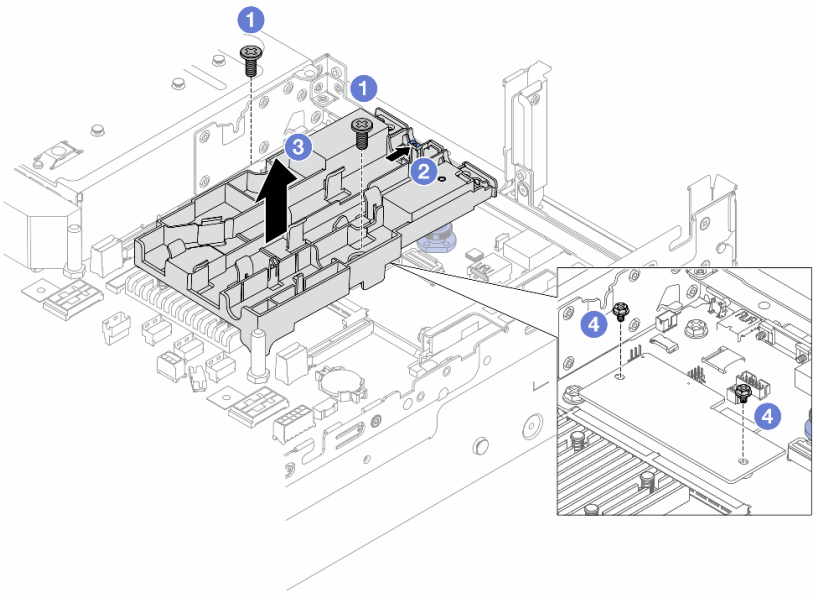


Figure 108. Removing the hose holder

a. 1 Loosen the screws that locks the holder to the system I/O board.
b. 2 Move the blue latch towards the rear of the server.
c. 3 Lift the hose holder out of the chassis.
d. 4 Install the screws to secure the firmware and RoT security module if needed.

After you finish

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

Demo video

Watch the procedure on YouTube

Install the Lenovo Neptune(TM) Processor Direct Water Cooling Module

Follow the instructions in this section to install the Direct Water Cooling Module (DWCM).

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

About this task

S011

CAUTION:
Sharp edges, corners, or joints nearby.

Attention:

- Read “Installation Guidelines” on page 1 and “Safety inspection checklist” on page 2 to ensure that you work safely.
- Power off the server and peripheral devices and disconnect the power cords and all external cables. See “Power off the server” on page 32.
- 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.

CAUTION:
When removing a new DWCM from the shipping box, lift out the cold plate assembly with the shipping tray attached to prevent thermal grease on the cold plate assembly from damage.

Prepare the following screwdrivers to ensure you can install and remove the corresponding screws properly.

Torque screwdriver type list	Screw Type
Torx T30 head screwdriver	Torx T30 screw

Procedure

Step 1. Install the hose holder to the chassis.

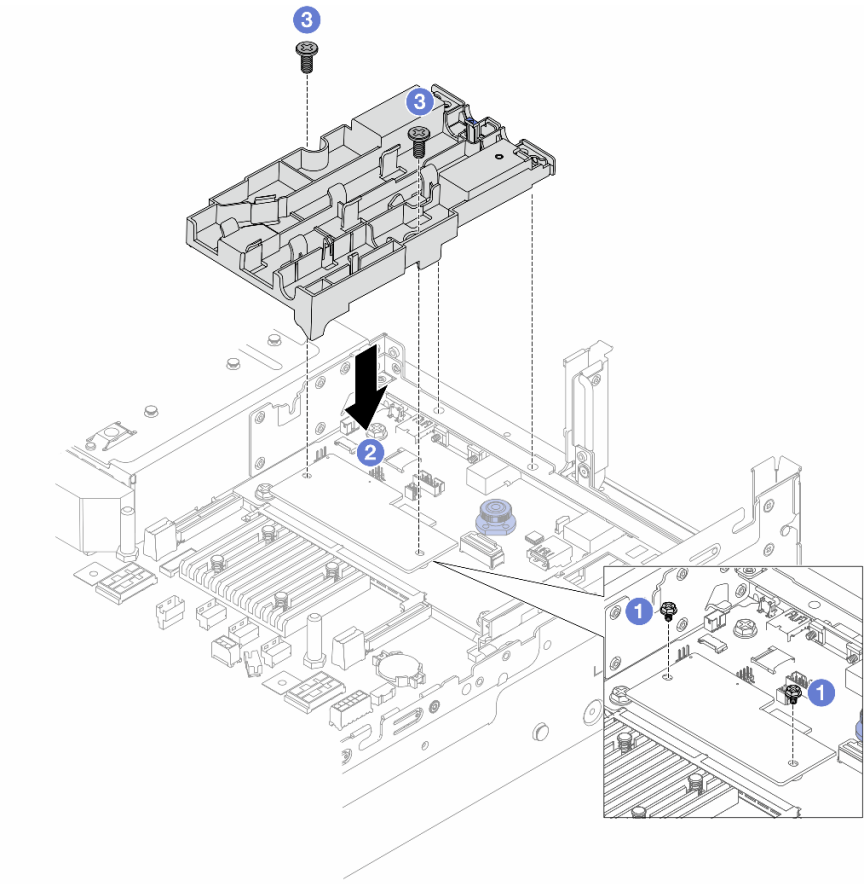


Figure 109. Installing the hose holder

a. 1 Remove the screws that secure the firmware and RoT security module if needed.

b. 2 Align the screw holes on the hose holder with the screw holes on the firmware and RoT security module, and the guiding pins of the holder with the holes on the rear wall.

c. 3 Tighten the screws to secure the hose holder to the system I/O board.

Step 2. Install the processor to the DWCM. See “Install a processor and heat sink” on page 212.

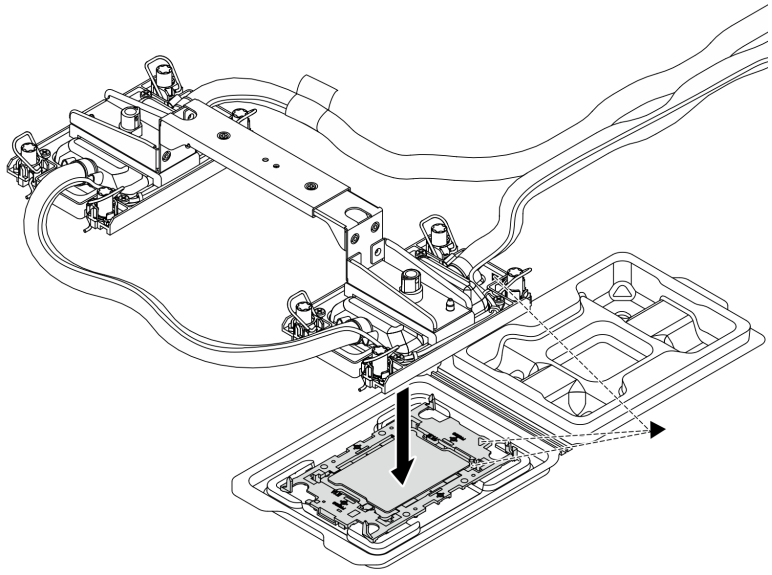


Figure 110. Installing the processor

1. Align the triangular mark on the cold plate assembly label with the triangular mark on the processor carrier and processor.
2. Install the DWCM onto the processor-carrier.
3. Press the carrier into place until the clips at all four corners engage.

Note: If the server has only one processor installed, generally processor 1, it is required to install a cover to the empty socket of processor 2 before proceeding with further installation.

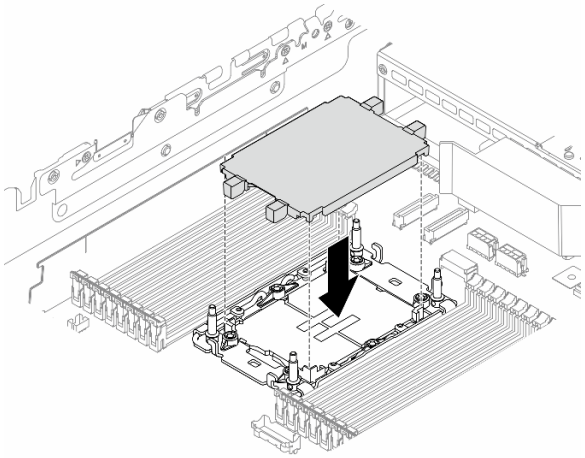


Figure 111. Install the processor socket cover

Step 3. Install the processor-DWCM to the system board assembly.

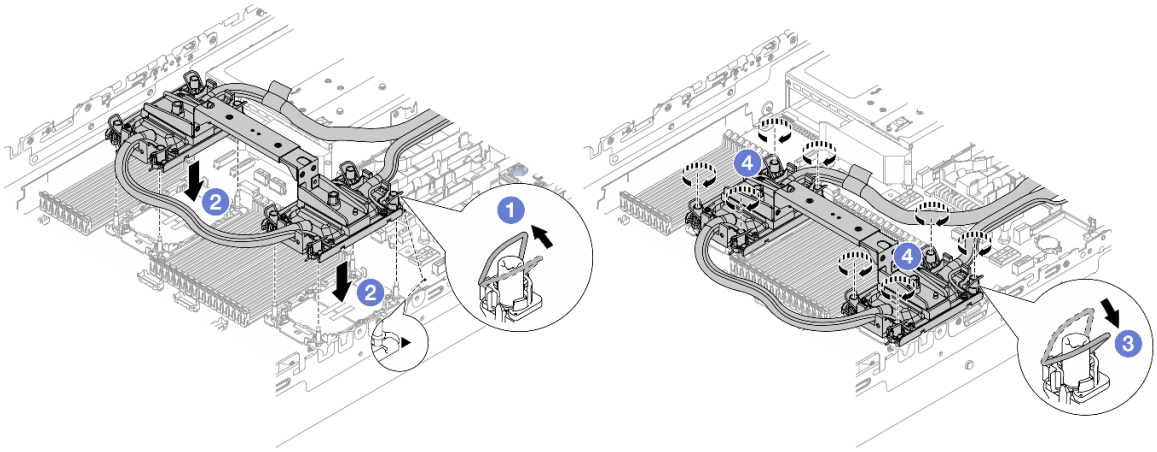


Figure 112. Installing the processor-DWCM

1. 1 Rotate the anti-tilt wire bails inward.
2. 2 Align the triangular mark and four Torx T30 nuts on the cold plate assembly with the triangular mark and threaded posts of the processor socket; then, insert the cold plate assembly into the processor socket.
3. 3 Rotate the anti-tilt wire bails outward until they engage with the hooks in the socket.
4. 4 Fully tighten the Torx T30 nuts *in the installation sequence shown* on the cold plate assembly. Tighten the screws until they stop; then, visually inspect to make sure that there is no gap between the screw shoulder beneath the cold plate assembly and the processor socket. (For reference, the torque required for the fasteners to fully tighten is 0.9-1.3 newton-meters, 8-12 inch-pounds.)

Step 4. Remove the module handle from the DWCM.

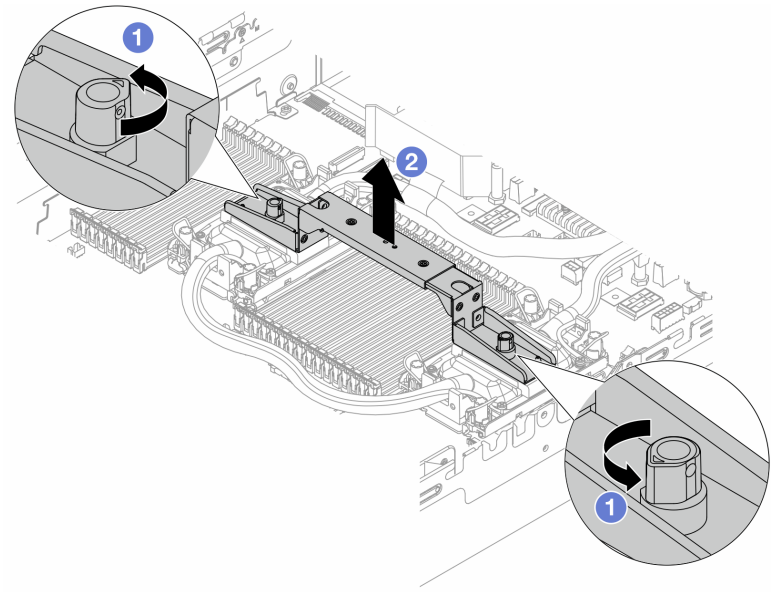


Figure 113. Removing the module handle

a. 1 Rotate the screws as illustrated above to unlock the handle.

b. 2 Separate the handle from the DWCM.

Notes: A new DWCM comes with a handle.

1. To replace an old DWCM with a new one, remove the handle of the new one as illustrated above.
2. To replace processors without changing the DWCM, a handle is not needed. Skip Step 4 on page 124 and proceed with further installation.

Step 5. Install the cold plate covers. Press the cover down as illustrated below.

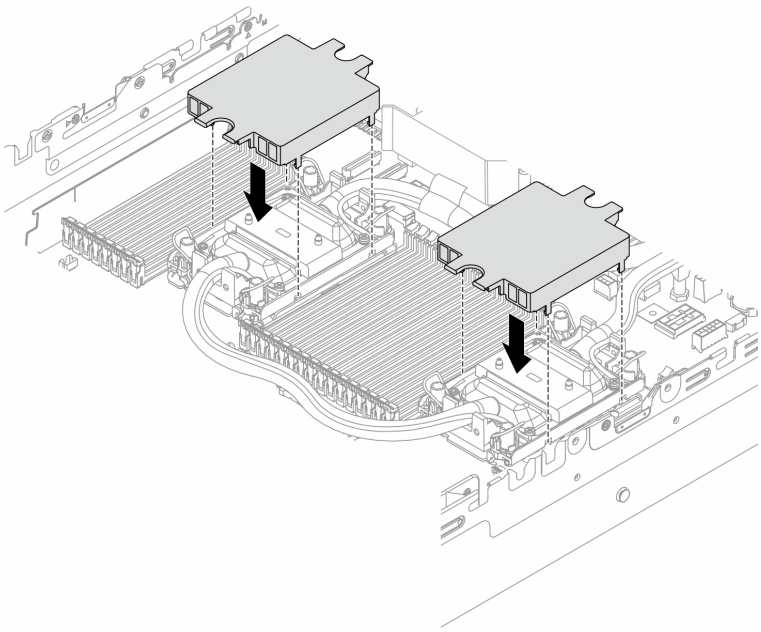


Figure 114. Installing cold plate covers

Step 6. Place the hoses and the liquid detection sensor module on the hose holder.

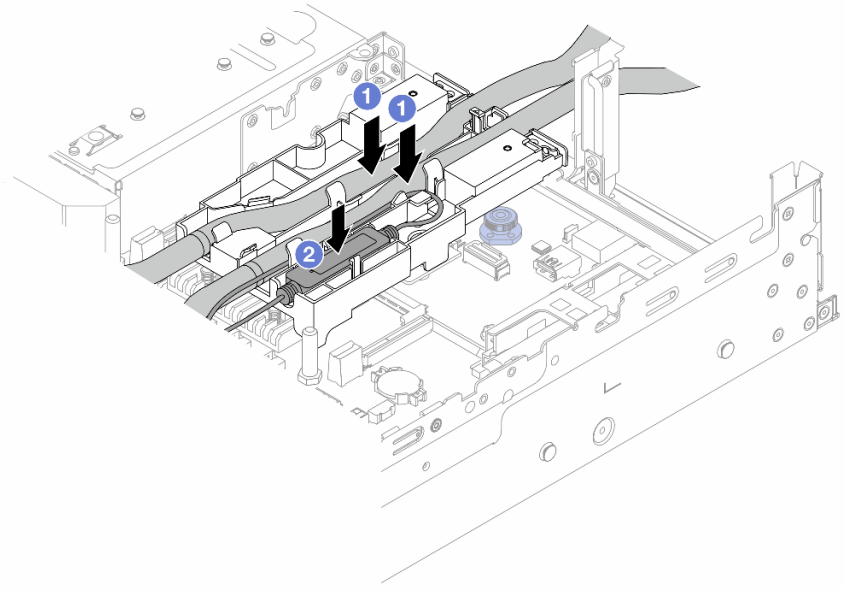


Figure 115. Placing the hoses and module

a. 1 Place the hoses on the hose holder.

b. 2 Place the liquid detection sensor module on the hose holder.

Notes:

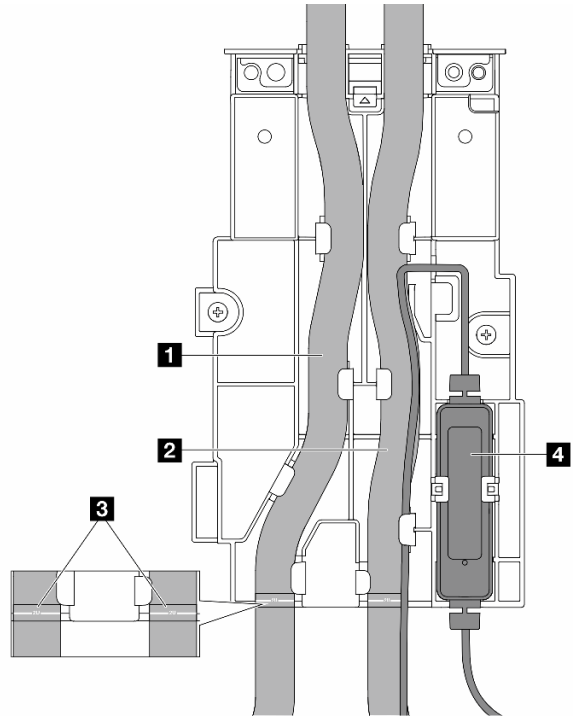


Figure 116. Installation details

- Place the middle part of the hose against the blue latch, and insert the outlet hose 1 and the inlet hose 2 into the holder.
- Check the guiding labels 3 on the hoses before installation, and align the labels with the front edge of the hose holder. Otherwise, the hoses might obstruct open connectors on the system board assembly.
- Insert the liquid detection sensor module 4 to the holder beside the hoses. Make sure that the side with a status LED is up and route the cable as illustrated above.
- For liquid detection sensor module working status, see “LED on the liquid detection sensor module” in *User Guide* or *System Configuration Guide*.

Step 7. Install the riser cage.

- **1FH riser cage**

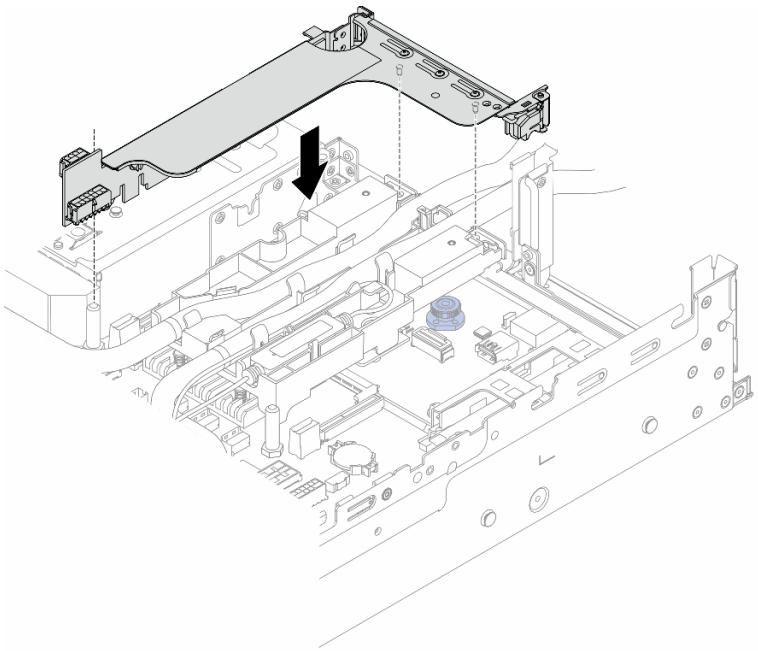


Figure 117. Installing the 1FH riser cage

- **3FH riser cage**

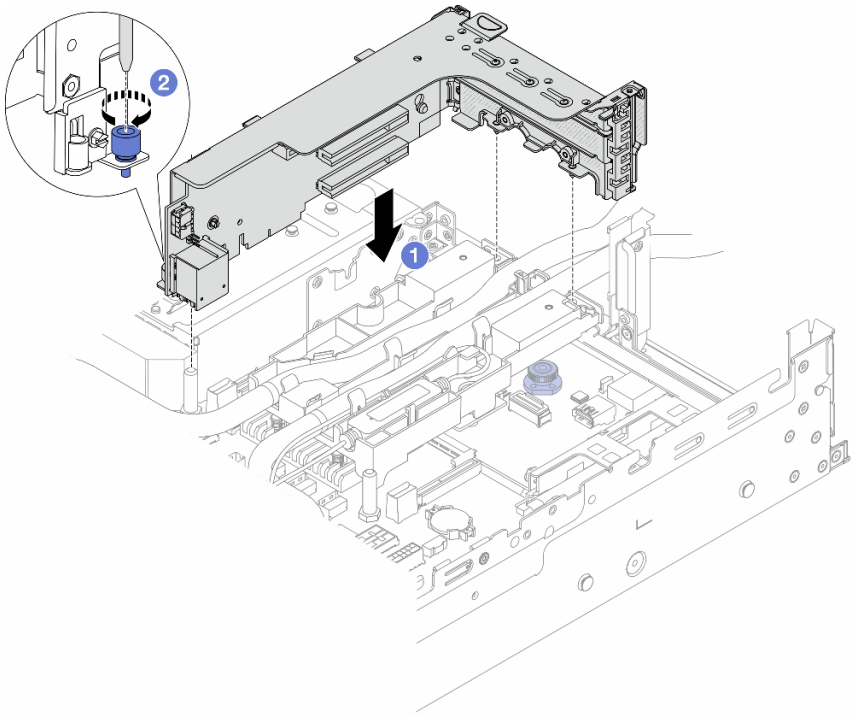


Figure 118. Installing the 3FH riser cage

a. 1 Align the riser card with the riser slot on the system board assembly. Carefully press the riser card straight into the slot until it is securely seated.

b. 2 Tighten the screw to secure the riser cage.

Step 8. Connect the cable of the liquid detection sensor module to the connector on the system board assembly. See "Direct water cooling module" on page 330.

Step 9. Install the air baffle or middle drive cage. See "Install the air baffle" on page 46 or "Install the middle drive backplanes and drive cage" on page 196.

Step 10. Install the top cover. See "Install the top cover" on page 319.

Step 11. Install the server into the rack. See "Install the server to rack" on page 36.

Step 12. Install the quick connect plugs to the manifolds. See "Install the manifold (in-rack system)" on page 152 or "Install the manifold (in-row system)" on page 173.

After you finish

Complete the parts replacement. See "Complete the parts replacement" on page 320.

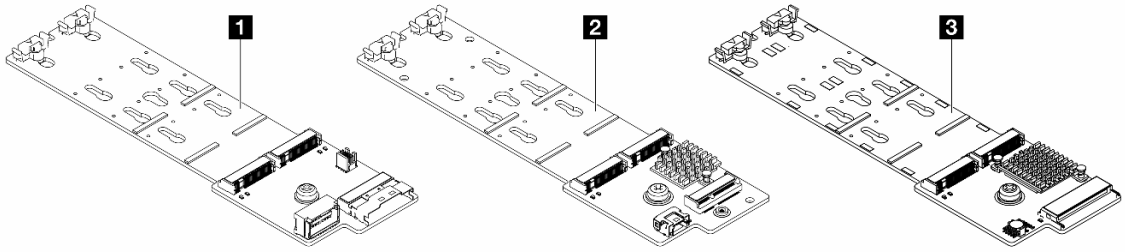
Demo video

Watch the procedure on YouTube

M.2 drive and M.2 drive backplane replacement

Use this information to remove and install the M.2 drive and M.2 drive backplane.

The server supports the following M.2 backplanes. This section uses the M.2 x4 non-RAID SATA/NVMe 2-bay backplane as an example for illustration. The replacement procedure for other M.2 backplanes is similar.



1	M.2 x4 non-RAID SATA/NVMe 2-bay backplane
2	M.2 x1 RAID NVMe 2-bay backplane
3	M.2 RAID SATA/NVME 2-bay backplane

Note: The M.2 x4 non-RAID SATA/NVMe 2-bay backplane is not supported on the 4 x 3.5-inch middle drive cage.

- "Remove an M.2 drive" on page 129
- "Install an M.2 drive" on page 130
- "Remove the M.2 backplane" on page 132
- "Install the M.2 backplane" on page 136

Remove an M.2 drive

Use this information to remove an M.2 drive.

About this task

Attention:

- Read "Installation Guidelines" on page 1 and "Safety inspection checklist" on page 2 to ensure that you work safely.
- Power off the server and peripheral devices and disconnect the power cords and all external cables. See "Power off the server" on page 32.
- 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.
- Before you remove or make changes to drives, drive controllers (including controllers that are integrated on the system board assembly), drive backplanes or drive cables, back up all important data that is stored on drives.
- If one or more NVMe solid-state drives are to be removed, it is recommended to disable them beforehand via the operating system.

Procedure

Step 1. If the server is installed in a rack, slide the server out on its rack slide rails to gain access to the top cover, or remove the server from the rack. See "Remove the server from rack" on page 32.

Step 2. Remove the top cover. See "Remove the top cover" on page 318.

Step 3. Remove the M.2 drive.

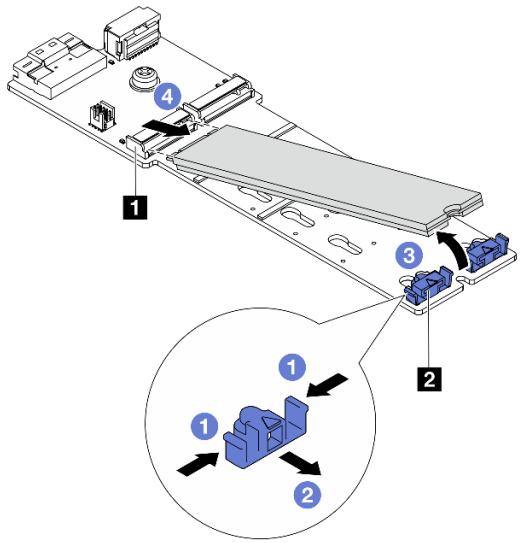


Figure 119. M.2 drive removal

a. Press both sides of the retainer 2.
b. Slide the retainer away from the M.2 drive.
c. Rotate the rear end of M.2 drive to an angle of approximately 30 degrees.
d. Pull the M.2 drive away from the connector 1.

After you finish

1. Install a new M.2 drive. See "Install an M.2 drive" on page 130.
2. If you are instructed to return the component or optional device, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Demo video

Watch the procedure on YouTube

Install an M.2 drive

Use this information to install an M.2 drive.

Attention:

- Read "Installation Guidelines" on page 1 and "Safety inspection checklist" on page 2 to ensure that you work safely.
- Power off the server and peripheral devices and disconnect the power cords and all external cables. See "Power off the server" on page 32.
- 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.
- Before you remove or make changes to drives, drive controllers (including controllers that are integrated on the system board assembly), drive backplanes or drive cables, back up all important data that is stored on drives.

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

- Go to https://datacentersupport.lenovo.com/products/servers/thinksystem/sr650v3/downloads/driver-list/ to see the latest firmware and driver updates for your server.
- Go to "Update the firmware" in *User Guide* or *System Configuration Guide* for more information on firmware updating tools.

Procedure

Step 1. Touch the static-protective package that contains the new part to any unpainted surface on the outside of the server. Then, take the new part out of the package and place it on a static-protective surface.

Step 2. (Optional) Adjust the retainer on the M.2 backplane to accommodate the particular size of the M.2 drive you wish to install.

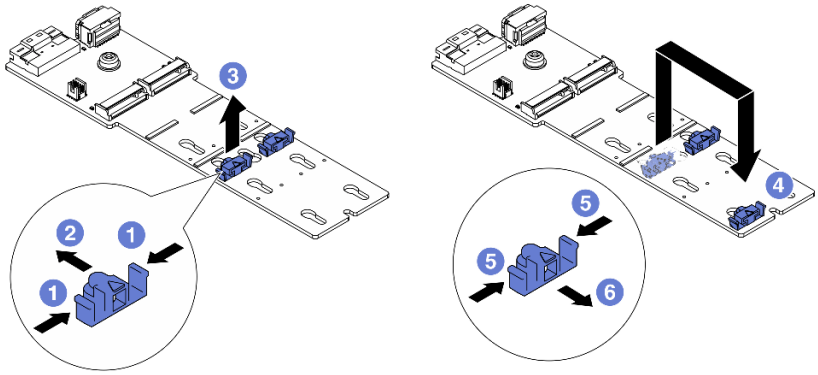


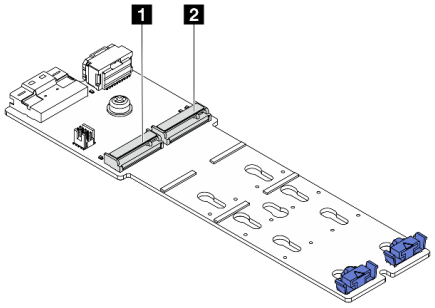
Figure 120. M.2 retainer adjustment

a. 1 Press both sides of the retainer.
b. 2 Move the retainer forward until it is in the large opening of the keyhole.
c. 3 Take the retainer out of the keyhole.
d. 4 Insert the retainer into the correct keyhole.
e. 5 Press both sides of the retainer.
f. 6 Slide the retainer backwards (toward the small opening of the keyhole) until it is seated in place.

Step 3. Locate the connector on the M.2 backplane.

Notes:

- Your M.2 backplane might look different from the following illustrations, but the installation method is the same.
- Some M.2 backplanes support two identical M.2 drives. Install the M.2 drive in slot 0 first.



1 Slot 0
2 Slot 1

Figure 121. M.2 drive slot

Step 4. Install the M.2 drive on the M.2 backplane.

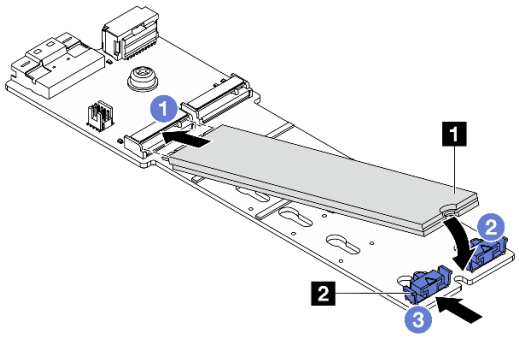


Figure 122. M.2 drive installation

a. 1 Hold the M.2 drive at an angle, and insert it into the M.2 slot.
b. 2 Rotate the M.2 drive down until the notch 1 catches on the lip of the retainer 2.
c. 3 Slide the retainer toward the M.2 drive to secure it in place.

After you finish

Complete the parts replacement. See “Complete the parts replacement” on page 320.

Demo video

Watch the procedure on YouTube

Remove the M.2 backplane

Use this information to remove the M.2 backplane.

About this task

Attention:

- Read “Installation Guidelines” on page 1 and “Safety inspection checklist” on page 2 to ensure that you work safely.

- Power off the server and peripheral devices and disconnect the power cords and all external cables. See “Power off the server” on page 32.
- 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.
- Before you remove or make changes to drives, drive controllers (including controllers that are integrated on the system board assembly), drive backplanes or drive cables, back up all important data that is stored on drives.

Procedure

Step 1. If the server is installed in a rack, slide the server out on its rack slide rails to gain access to the top cover, or remove the server from the rack. See “Remove the server from rack” on page 32.

Step 2. Remove the top cover. See “Remove the top cover” on page 318.

Step 3. Disconnect the M.2 cables from the M.2 backplane.

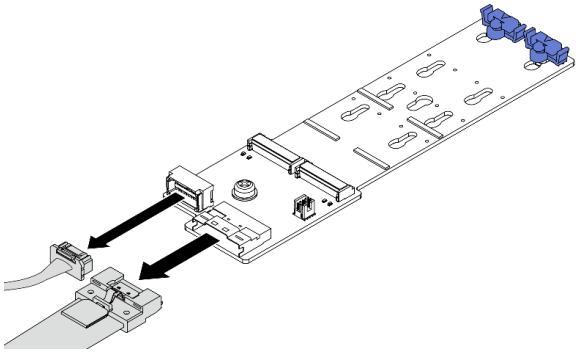


Figure 123. Disconnecting cables from M.2 x4 non-RAID SATA/NVMe 2-bay backplane

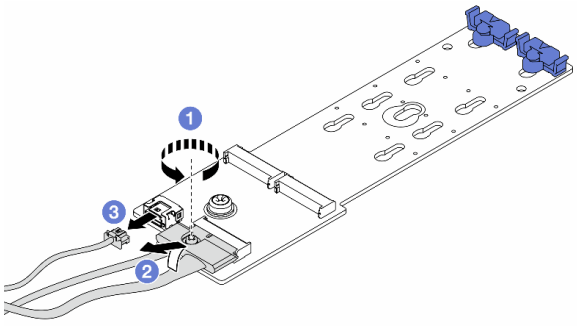


Figure 124. Disconnecting cables from M.2 x1 RAID NVMe 2-bay backplane

1. 1 Loosen the screw on the signal cable.
2. 2 Tilt the connector and remove it.
3. 3 Remove the power cable.

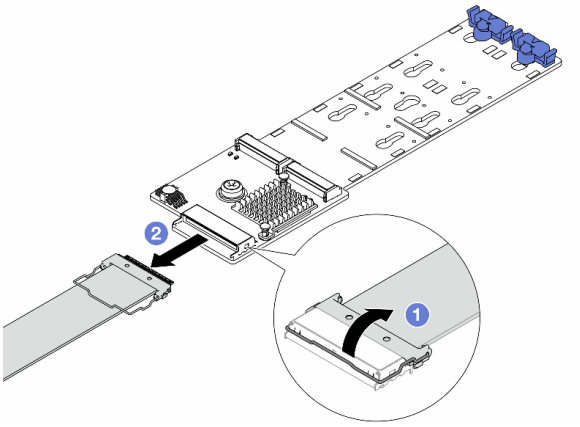


Figure 125. Disconnecting cable from M.2 RAID SATA/NVME 2-bay backplane

1. 1 Pull up the latch on the M.2 cable.
2. 2 Disconnect the M.2 cable from the M.2 backplane.

Step 4. Remove the M.2 backplane.

M.2 backplane on the air baffle

1. Remove the M.2 drive from the M.2 backplane. See “Remove an M.2 drive” on page 129.
2. Remove the M.2 backplane from the air baffle.

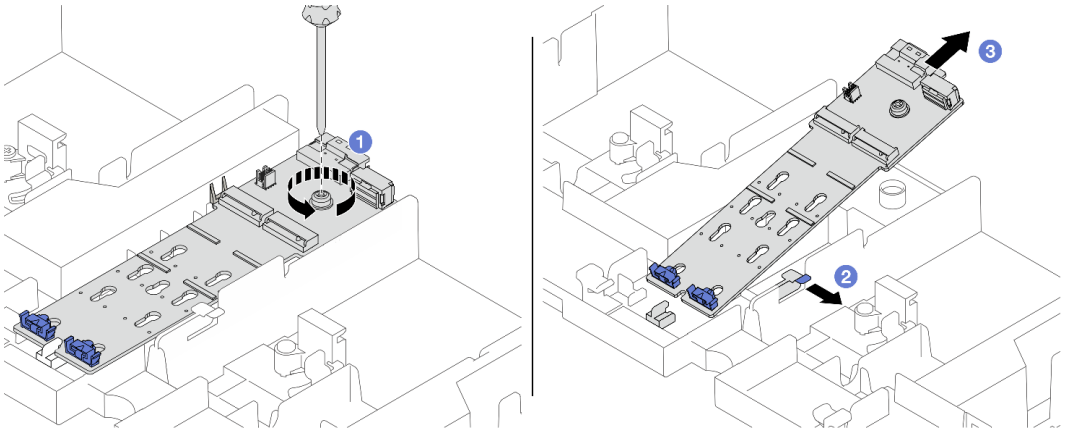


Figure 126. Removing the M.2 backplane from the air baffle

a. 1 Unfasten the screw that secures the M.2 backplane to the air baffle.
b. 2 Slide and hold the retention clip on the air baffle.
c. 3 Remove the M.2 backplane from the air baffle, and release the retention clip.

M.2 backplane on the middle drive cage

1. Open the drive cage handle.

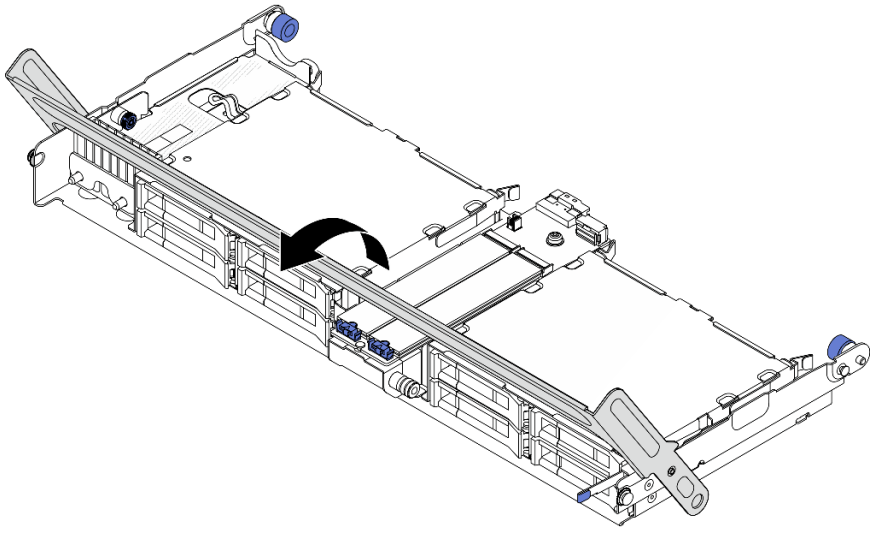


Figure 127. Opening the handle of the middle drive cage

2. Remove the M.2 drive from the M.2 backplane. See “Remove an M.2 drive” on page 129.
3. Remove the M.2 backplane from the middle drive cage.

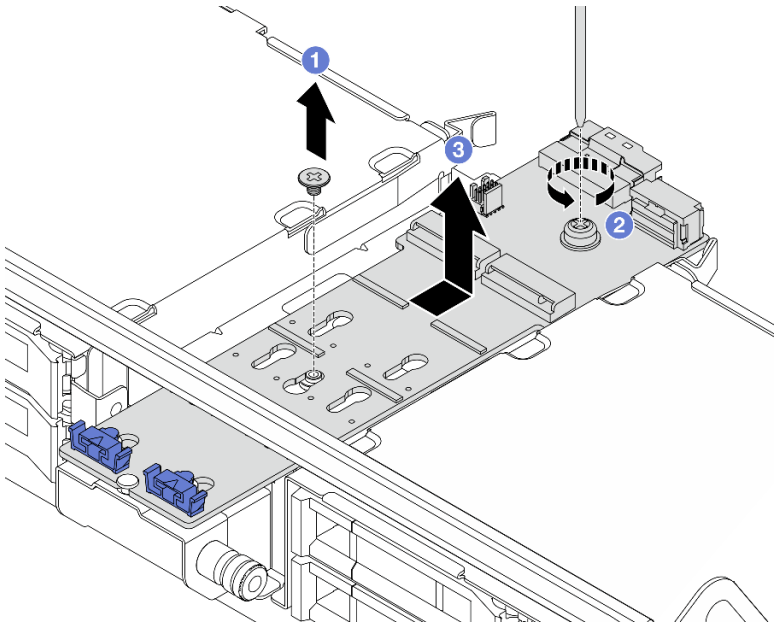


Figure 128. Removing the M.2 backplane from the middle drive cage

a. 1 Unfasten the screw on the middle of M.2 backplane.
b. 2 Unfasten the screw on the end of the M.2 backplane.
c. 3 Remove the M.2 backplane from the middle drive cage.

After you finish

1. Install a new M.2 backplane. See “Install the M.2 backplane” on page 136.

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

Demo video

Watch the procedure on YouTube

Install the M.2 backplane

Use this information to install the M.2 backplane.

About this task

Attention:

- Read “Installation Guidelines” on page 1 and “Safety inspection checklist” on page 2 to ensure that you work safely.
- Power off the server and peripheral devices and disconnect the power cords and all external cables. See “Power off the server” on page 32.
- 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.
- Before you remove or make changes to drives, drive controllers (including controllers that are integrated on the system board assembly), drive backplanes or drive cables, back up all important data that is stored on drives.

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

- Go to https://datacentersupport.lenovo.com/products/servers/thinksystem/sr650v3/downloads/driver-list/ to see the latest firmware and driver updates for your server.
- Go to “Update the firmware” in *User Guide* or *System Configuration Guide* for more information on firmware updating tools.

Procedure

Step 1. Touch the static-protective package that contains the new part to any unpainted surface on the outside of the server. Then, take the new part out of the package and place it on a static-protective surface.

Step 2. Install the M.2 backplane.

M.2 backplane on the air baffle

1. Install the M.2 backplane on the air baffle.

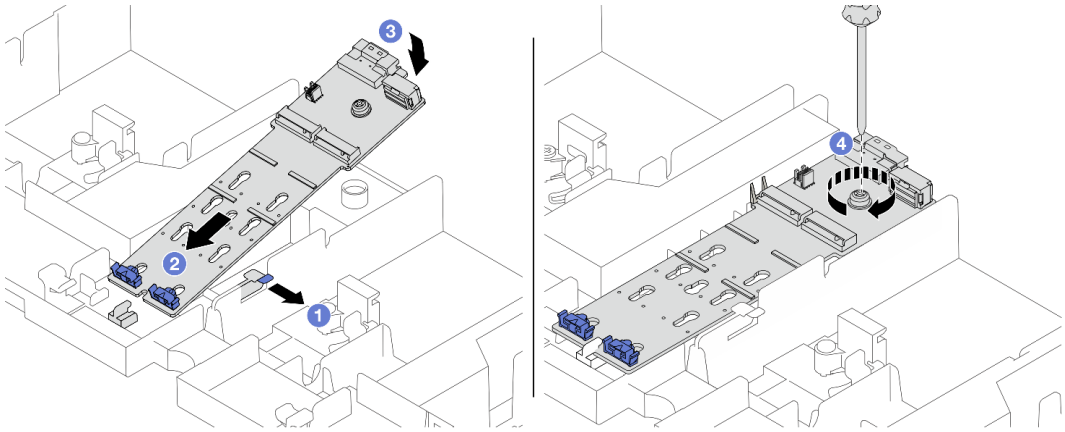


Figure 129. Installing the M.2 backplane on the air baffle

a. Open the retention clip on the air baffle.

b. Align the guide holes on the M.2 backplane with the guide pins on the air baffle, and insert the backplane into the air baffle.

c. Rotate the M.2 backplane downward into place.

d. Tighten the screw to secure the M.2 backplane.

2. Install the M.2 drive on the M.2 backplane. See “Install an M.2 drive” on page 130.

M.2 backplane on the middle drive cage

1. Install the M.2 backplane on the middle drive cage.

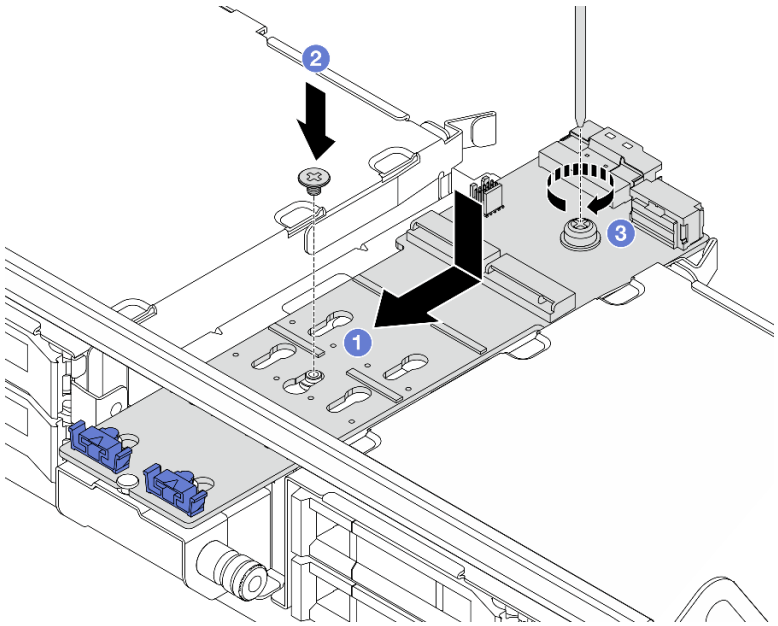


Figure 130. Installing the M.2 backplane on the middle drive cage

a. Align the screws on the M.2 backplane with the screw holes on the drive cage, and insert the backplane into the drive cage.

b. Tighten the screw on the middle of the M.2 backplane.

c. 3 Tighten the screw on the end of the M.2 backplane.

2. Install the M.2 drive on the M.2 backplane. See “Install an M.2 drive” on page 130.
3. Press the latch as shown and close the handle.

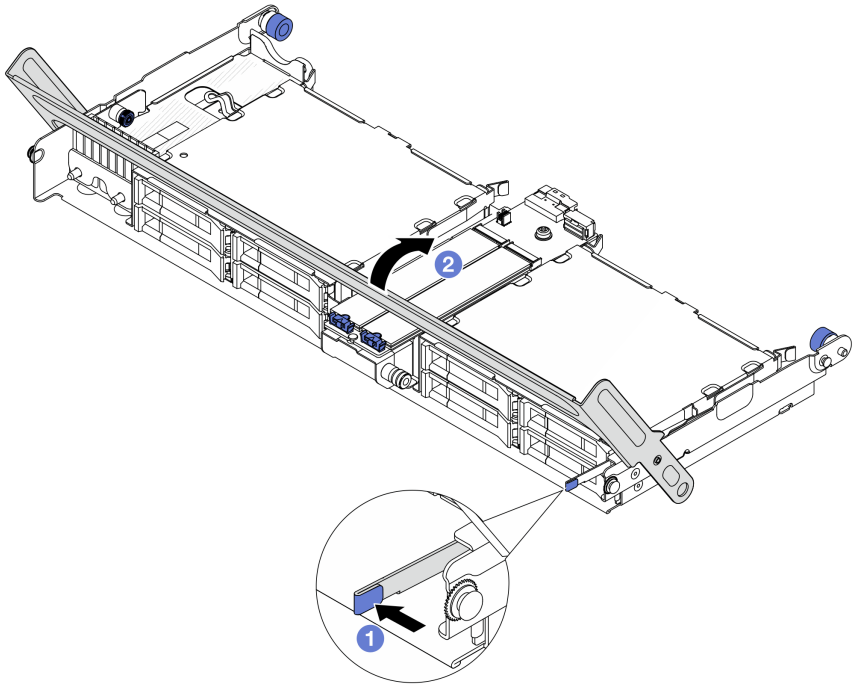


Figure 131. Closing the handle of the middle drive cage

Step 3. Connect the M.2 backplane cables to M.2 backplane.

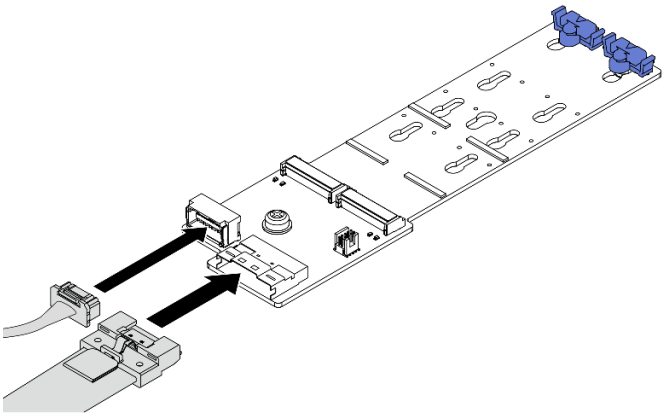


Figure 132. Connecting M.2 cables to M.2 x4 non-RAID SATA/NVMe 2-bay backplane

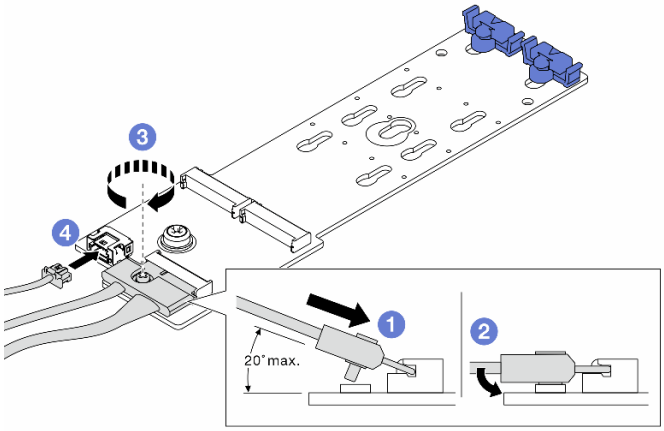


Figure 133. Connecting M.2 cables to M.2 x1 RAID NVMe 2-bay backplane

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

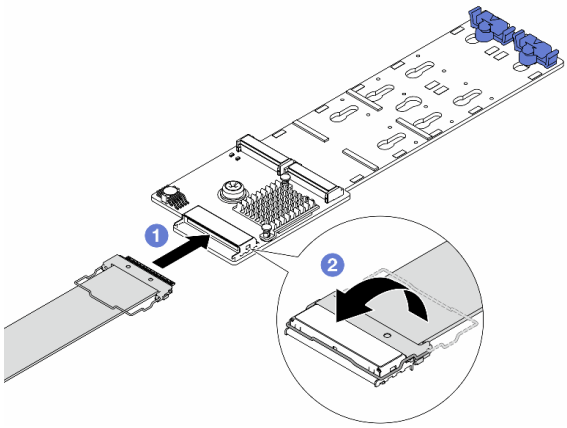


Figure 134. Connecting M.2 cables to M.2 RAID SATA/NVME 2-bay backplane

1. (1) Connect the M.2 cable to the M.2 backplane.
2. (2) Rotate the latch on the cable as illustrated, and press the latch down until it clicks into place.

After you finish

Complete the parts replacement. See “Complete the parts replacement” on page 320.

Demo video

Watch the procedure on YouTube

Management NIC adapter replacement

Follow instructions in this section to remove and install the ThinkSystem V3 Management NIC Adapter Kit (management NIC adapter).

Note: If the ThinkSystem V3 Management NIC Adapter Kit (management NIC adapter) is installed on the server, it will not be displayed on the PCIe card list of system management software, such as XCC, LXPM, and so on.

- “Remove the management NIC adapter” on page 140
- “Install the management NIC adapter” on page 141

Remove the management NIC adapter

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

About this task

Attention:

- Read “Installation Guidelines” on page 1 and “Safety inspection checklist” on page 2 to ensure that you work safely.
- Power off the server and peripheral devices and disconnect the power cords and all external cables. See “Power off the server” on page 32.
- Prevent exposure to static electricity, which might lead to system halt and loss of data, by keeping static-sensitive components in their static-protective packages until installation, and handling these devices with an electrostatic-discharge wrist strap or other grounding system.

Procedure

Step 1. Make preparation for the task.

a. Access the Lenovo XClarity Controller; then, select **Network** in **BMC Configuration** and disable **Ethernet Port 2**.

b. If the server is installed in a rack, slide the server out on its rack slide rails to gain access to the top cover, or remove the server from the rack. See “Remove the server from rack” on page 32.

c. Remove the top cover. See “Remove the top cover” on page 318.

d. If your server comes with a riser 1 assembly, remove it first. See “Remove a rear riser assembly” on page 272.

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

Step 3. Remove the management NIC adapter.

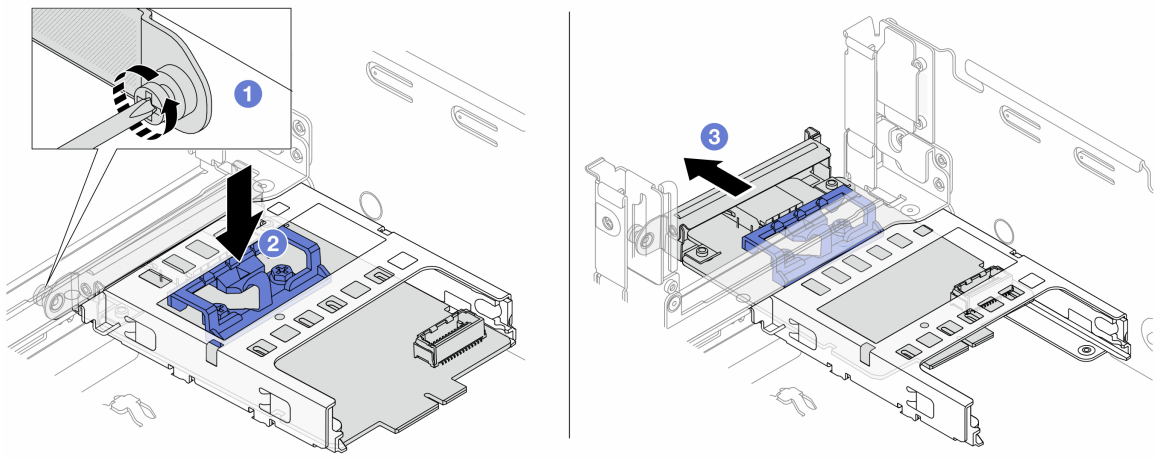


Figure 135. Removing the management NIC adapter

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

After you finish

1. Install a replacement unit or a filler. See "Install the management NIC adapter" on page 141.
2. If you are instructed to return the component or optional device, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Demo video

Watch the procedure on YouTube

Install the management NIC adapter

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

About this task

- Read "Installation Guidelines" on page 1 and "Safety inspection checklist" on page 2 to ensure that you work safely.
- Power off the server and peripheral devices and disconnect the power cords and all external cables. See "Power off the server" on page 32.
- 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.

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

- Go to https://datacentersupport.lenovo.com/products/servers/thinksystem/sr650v3/downloads/driver-list/ to see the latest firmware and driver updates for your server.

- Go to “Update the firmware” in *User Guide* or *System Configuration Guide* for more information on firmware updating tools.

Procedure

Step 1. If a filler is installed, remove it.

Step 2. Install the management NIC adapter.

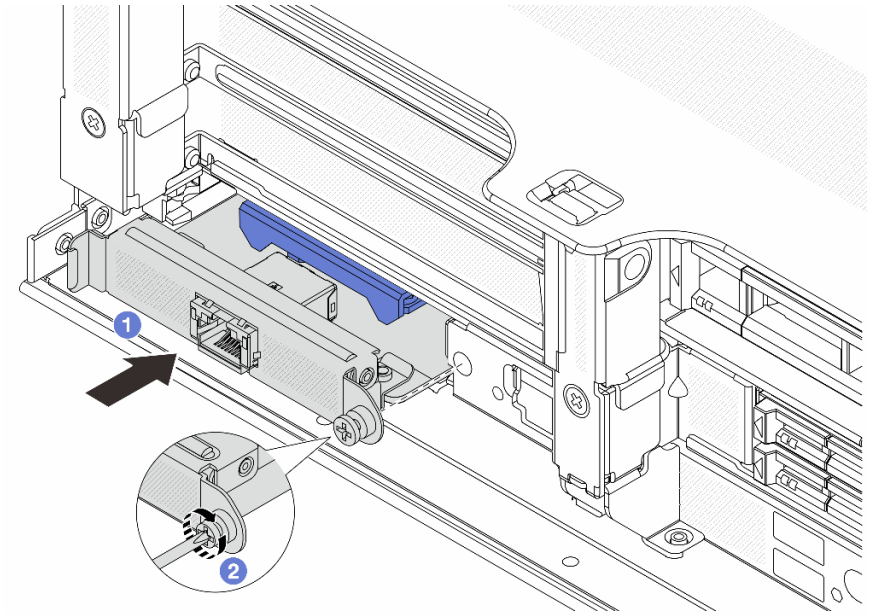


Figure 136. Installing the management NIC adapter

a. 1 Slide the management NIC adapter into the slot until it is fully seated.

b. 2 Tighten the screw to secure the management NIC adapter.

Step 3. Connect the cable to the management NIC adapter. See Chapter 2 “Internal cable routing” on page 323.

Step 4. Install the riser 1 assembly if you have removed it. See “Install a rear riser assembly” on page 284.

After you finish

1. Complete the parts replacement. See “Complete the parts replacement” on page 320.
2. Access the Lenovo XClarity Controller; then, select **Network** in **BMC Configuration** and enable **Ethernet Port 2**.

Demo video

Watch the procedure on YouTube

Manifold replacement (trained technicians only)

Use the following procedures to remove and install the manifolds.

Important:

- This task must be operated by trained technicians that are certified by Lenovo Service. Do not attempt to remove or install the part without proper training and qualification.
- The coolant runs through the cooling system is de-ionized water. For more information about the coolant, see “Water requirements” on page 641.
- The server can be installed in the ThinkSystem Heavy Duty Full Depth Rack Cabinets. For ThinkSystem Heavy Duty Full Depth Rack Cabinets User Guide, see ThinkSystem Heavy Duty Full Depth Rack Cabinets User Guide.
- For more operation and maintenance guidelines on Coolant Distribution Unit (CDU), see Lenovo Neptune DWC RM100 in-rack Coolant Distribution Unit (CDU) Operation & Maintenance Guide.

The illustrations below present the rear views of a rack cabinet; three sets of manifolds and three sets of connection hoses. There are two labels attached to the front of the manifolds, and one label on one end of each hose.

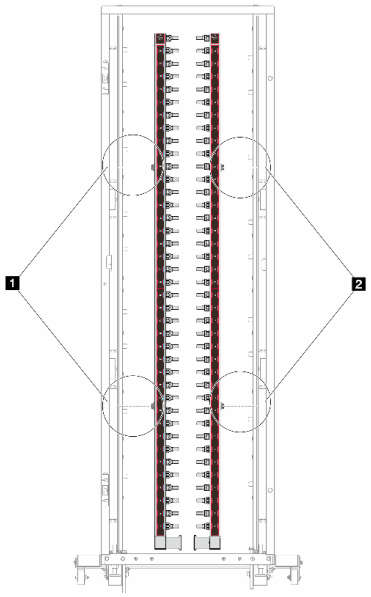


Figure 137. Manifolds in a 42U in-row system

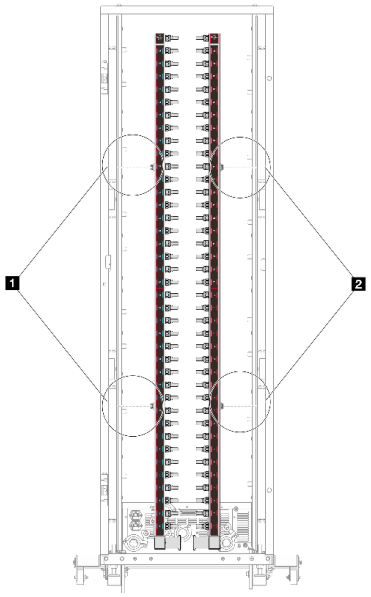


Figure 138. Manifolds in a 42U in-rack system

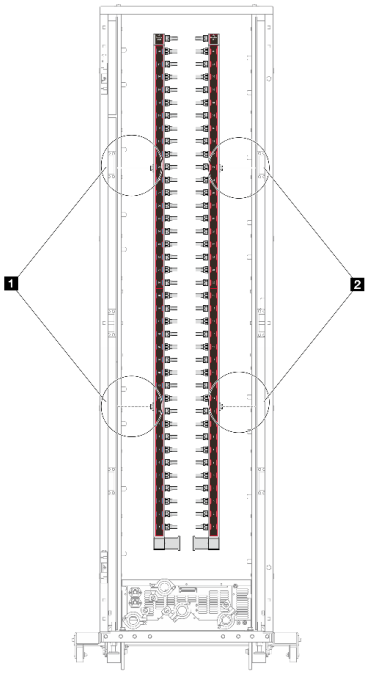


Figure 139. Manifolds in a 48U in-rack system

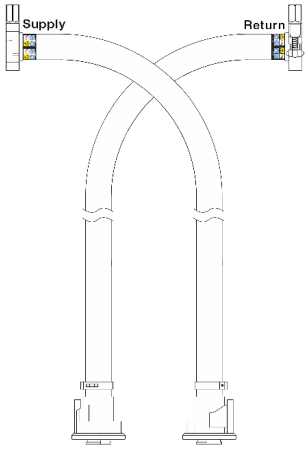


Figure 140. 42U in-row hose kit

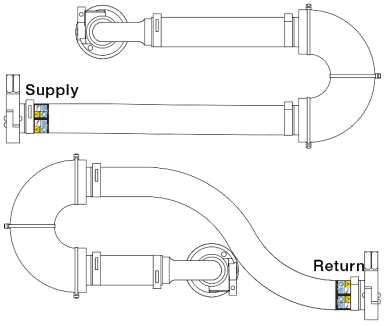


Figure 141. 42U in-rack connection set

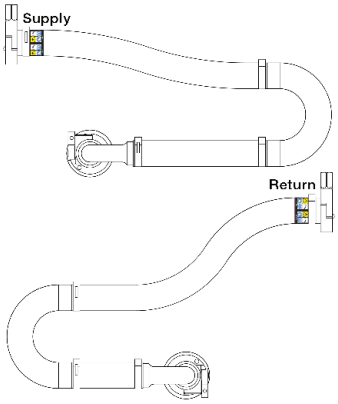


Figure 142. 48U in-rack connection set

- 1 Two left spools on supply manifold
- 2 Two right spools on return manifold
- “Remove the manifold (in-rack system)” on page 145
- “Install the manifold (in-rack system)” on page 152
- “Remove the manifold (in-row system)” on page 164
- “Install the manifold (in-row system)” on page 173

Remove the manifold (in-rack system)

Use this information to remove the manifold in an in-rack direct water cooling system.

About this task

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

CAUTION:
The coolant might cause irritation to the skin and eyes. Avoid direct contact with the coolant.

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.

S011

CAUTION:
Sharp edges, corners, or joints nearby.

S038

CAUTION:
Eye protection should be worn for this procedure.

S040

CAUTION:
Protective gloves should be worn for this procedure.

S042

DANGER

Risk of electric shock due to water or a water solution which is present in this product. Avoid working on or near energized equipment with wet hands or when spilled water is present.

Attention:

- Read “Installation Guidelines” on page 1 and “Safety inspection checklist” on page 2 to ensure that you work safely.
- Power off the server and peripheral devices and disconnect the power cords and all external cables. See “Power off the server” on page 32.
- 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 systems.
- Ensure proper handling procedures are followed when working with any chemically treated coolant used in the rack cooling system. Ensure that material safety data sheets (MSDS) and safety information are provided by the coolant chemical treatment supplier and that proper personal protective equipment (PPE) is available as recommended by the coolant chemical treatment supplier. Protective gloves and eyewear may be recommended as a precaution.
- This task requires two or more people.

Procedure

Step 1. Power off the in-rack CDU and disconnect all power cords.

Step 2. Close both ball valves.

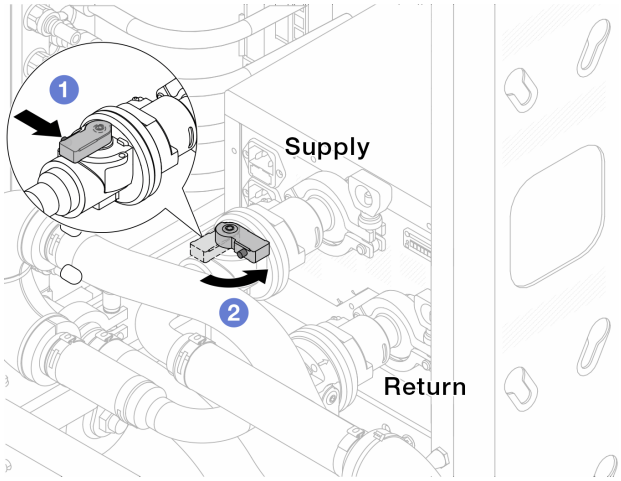


Figure 143. Closing ball valves

a. 1 Press the button on the ball valve switch.

b. 2 Rotate the switch to close the valves as illustrated above.

Step 3. Remove the quick connect plugs to separate the DWCM hoses from the manifold.

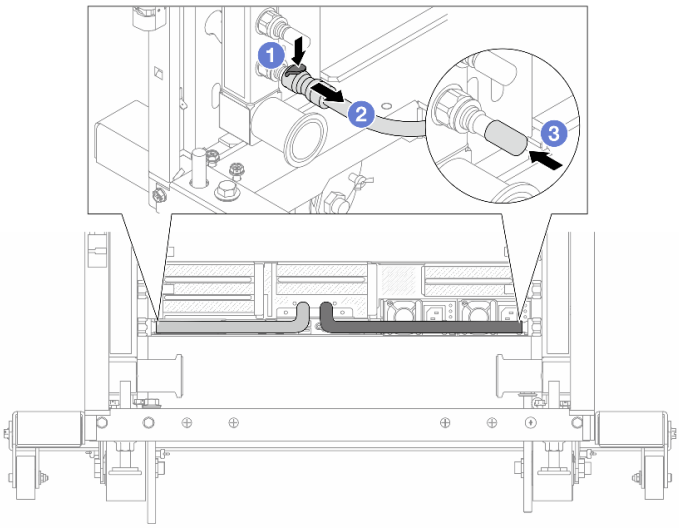


Figure 144. Quick connect plug removal

a. 1 Press the latch down to unlock the hose.
b. 2 Pull the hose off.
c. 3 Re-install the rubber quick connect plug covers to the ports on the manifold.

Step 4. Repeat Step 3 on page 147 to the other manifold.

Step 5. Disengage the connection set from ball valves.

Note: Disengage the return side first, then disengage the supply side.

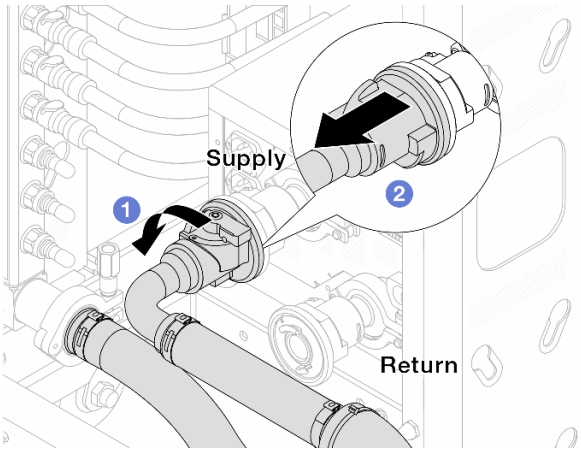


Figure 145. Removing the connection set

a. 1 Rotate the ball valve to the left.
b. 2 Pull the connection set off from ball valve.

Step 6. Remove the return manifold with the connection set attached.

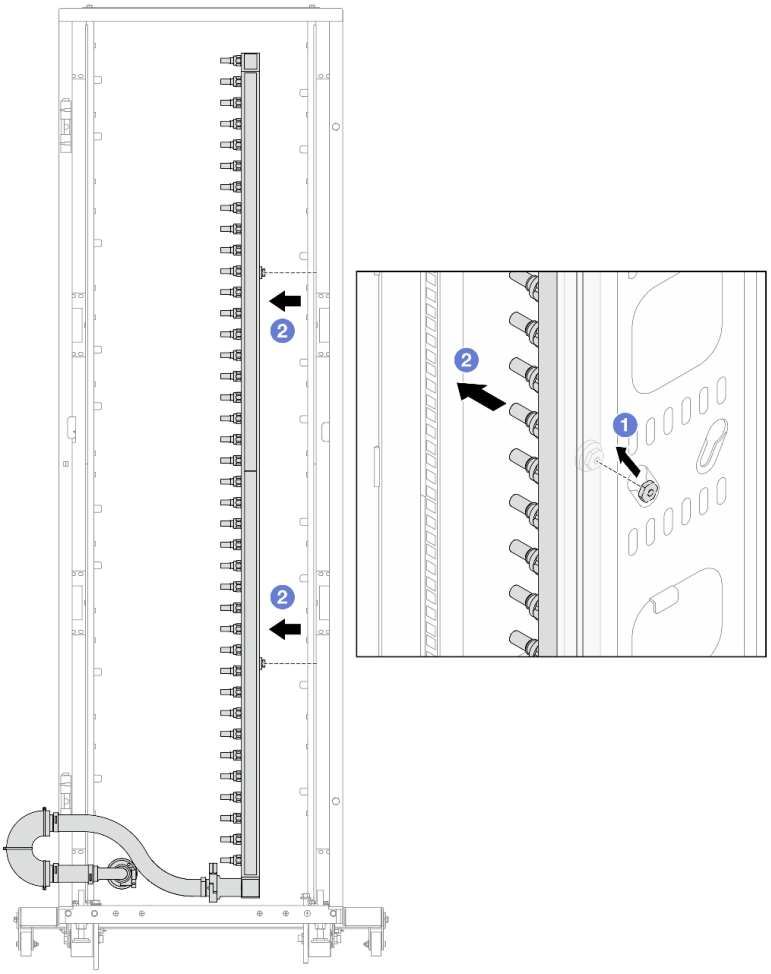


Figure 146. Removing the manifold

a. 1 Hold the manifold with both hands, and lift it upward to relocate the spools from the small openings to large ones on the rack cabinet.

b. 2 Remove the manifold with the connection set attached.

Step 7. Repeat Step 6 on page 147 to the supply manifold.

Notes:

- There is remaining coolant inside the manifold and the connection set. Remove both together and leave the further draining to the next step.
- For more information about the rack cabinet, see ThinkSystem Heavy Duty Full Depth Rack Cabinets User Guide.

Step 8. Install the bleeder kit to the manifold supply side.

Note: This step drains the coolant with the help of a pressure difference inside and outside the supply manifold.

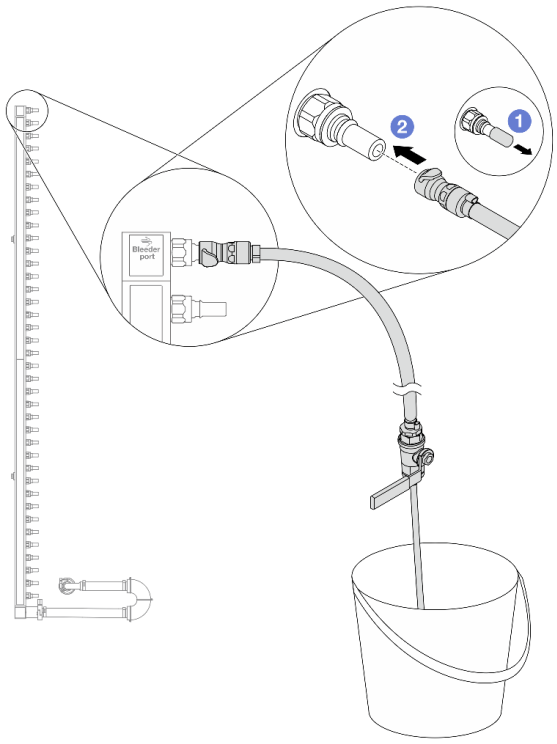


Figure 147. Installing the bleeder kit to the supply side

a. 1 Remove the rubber quick connect plug covers from the ports on the manifold.

b. 2 Plug the bleeder kit to the manifold.

Step 9. Slowly open the bleeder valve to allow a steady stream of coolant to drain. Close the bleeder valve once coolant stops flowing.

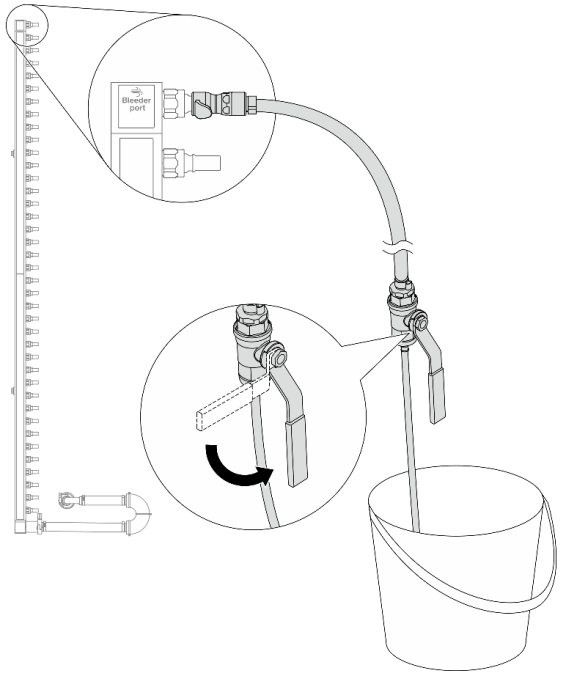


Figure 148. Opening the bleeder valve

Step 10. Install the bleeder kit to the manifold return side.

Note: This step drains the coolant with the help of a pressure difference inside and outside the return manifold.

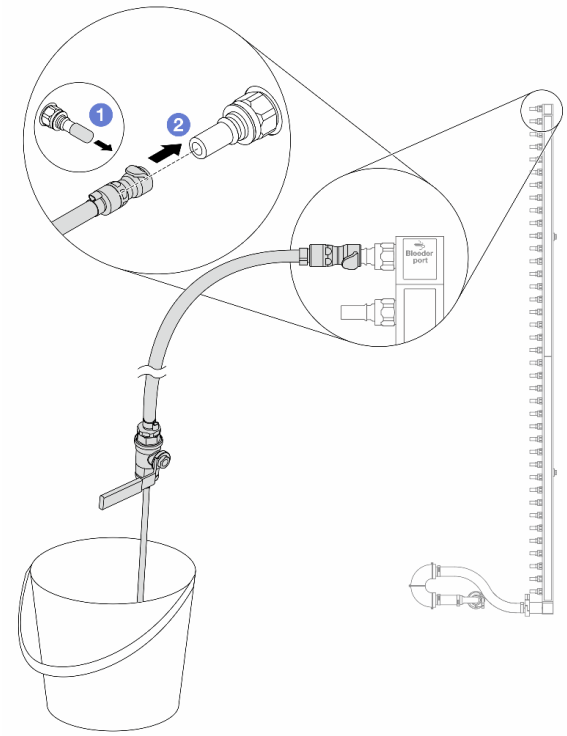


Figure 149. Installing the bleeder kit to the return side

a. 1 Remove the rubber quick connect plug covers from the ports on the manifold.

b. 2 Plug the bleeder kit to the manifold.

Step 11. Slowly open the bleeder valve to allow a steady stream of coolant to drain. Close the bleeder valve once coolant stops flowing.

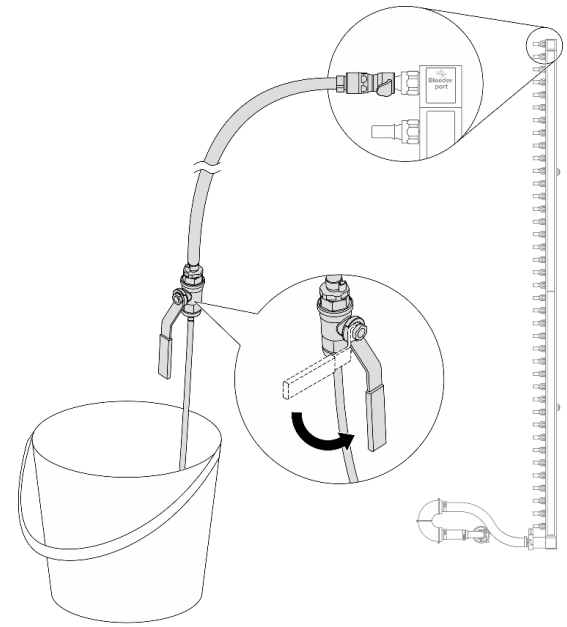


Figure 150. Opening the bleeder valve

Step 12. Separate the return manifold from the connection set in a dry and clean work area, and keep a bucket and absorbent cloths around to collect any coolant that may drain out.

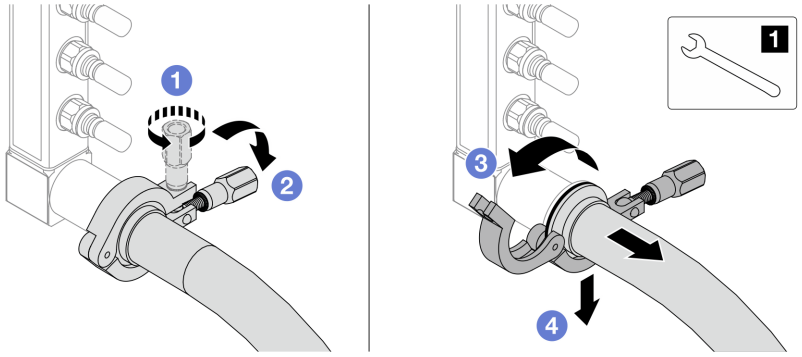


Figure 151. Separating the manifold from the connection set

1 17 mm wrench

a. 1 Loosen the screw that locks the ferrule.
b. 2 Put the screw down.
c. 3 Open the clamp.
d. 4 Remove the ferrule and connection set from the manifold.

Step 13. Repeat Step 12 on page 152 to the supply manifold.

Step 14. For better sanitation, keep the manifold ports and connection sets dry and clean. Re-install quick connect plug covers or any covers that protect connection sets and manifold ports.

Step 15. To remove the server from the rack, see “Remove the server from rack” on page 32.

Step 16. To remove the Direct Water Cooling Module (DWCM), see “Remove the Lenovo Neptune(TM) Processor Direct Water Cooling Module” on page 116.

After you finish

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

Demo video

Watch the procedure on YouTube

Install the manifold (in-rack system)

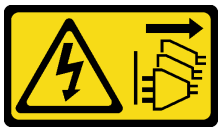
Use this information to install the manifold in an in-rack direct water cooling system.

About this task

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

CAUTION:
The coolant might cause irritation to the skin and eyes. Avoid direct contact with the coolant.

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.

S011

CAUTION:
Sharp edges, corners, or joints nearby.

S038

CAUTION:
Eye protection should be worn for this procedure.

S040

CAUTION:
Protective gloves should be worn for this procedure.

S042

DANGER

Risk of electric shock due to water or a water solution which is present in this product. Avoid working on or near energized equipment with wet hands or when spilled water is present.

Attention:

- Read “Installation Guidelines” on page 1 and “Safety inspection checklist” on page 2 to ensure that you work safely.
- Power off the server and peripheral devices and disconnect the power cords and all external cables. See “Power off the server” on page 32.
- 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 systems.
- Ensure proper handling procedures are followed when working with any chemically treated coolant used in the rack cooling system. Ensure that material safety data sheets (MSDS) and safety information are provided by the coolant chemical treatment supplier and that proper personal protective equipment (PPE) is available as recommended by the coolant chemical treatment supplier. Protective gloves and eyewear may be recommended as a precaution.
- This task requires two or more people.

Procedure

Step 1. Make sure that the in-rack CDU and other devices are not powered on, and that all external cables are disconnected.

Step 2. To install the Direct Water Cooling Module (DWCM), see “Install the Lenovo Neptune(TM) Processor Direct Water Cooling Module” on page 120.

Step 3. To install the server into the rack, see “Install the server to rack” on page 36.

Step 4. Install the manifold.

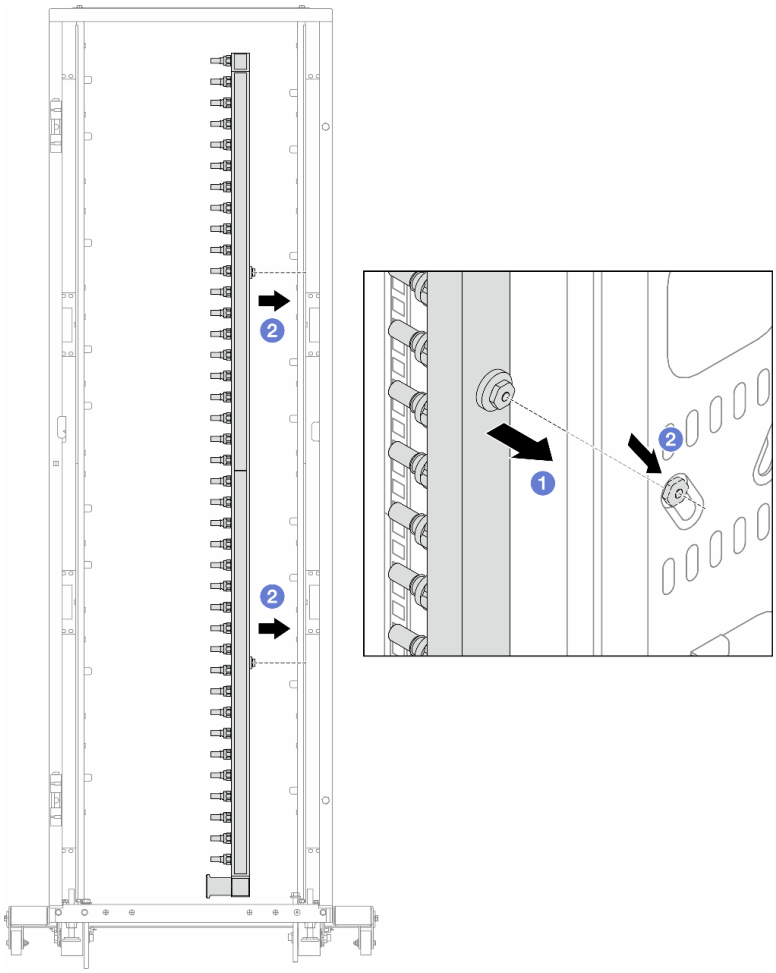


Figure 152. Installing the manifold

a. 1 Hold the manifold with both hands, and mount it onto the rack cabinet.

b. 2 Align the spools with holes, and clutch the cabinet.

Note: For more information about the rack cabinet, see ThinkSystem Heavy Duty Full Depth Rack Cabinets User Guide.

Step 5. Repeat Step 4 on page 154 to the other manifold.

Step 6. Separate ball valves from connection sets.

Note: One end of a connection set comes with a detachable ball valve, and the two parts are connected by a ferrule. Remove the ferrule to separate the ball valve that is bound for CDU in Step 7 on page 156.

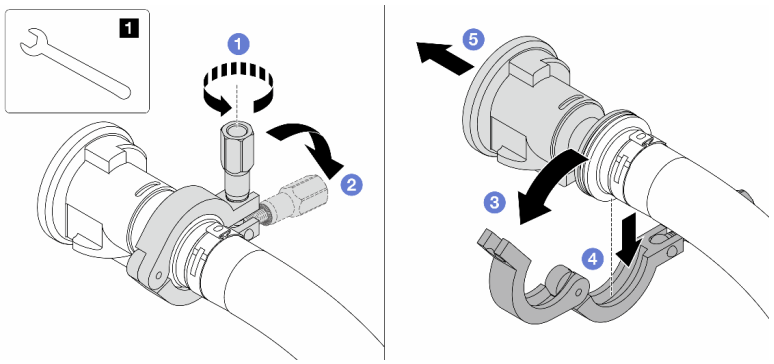


Figure 153. Separating ball valves

1 17 mm wrench

a. 1 Loosen the screw that locks the ferrule.
b. 2 Put the screw down.
c. 3 Open the clamp.
d. 4 Remove the ferrule.
e. 5 Remove the ball valve from connection set.

Step 7. Install ball valves to CDU.

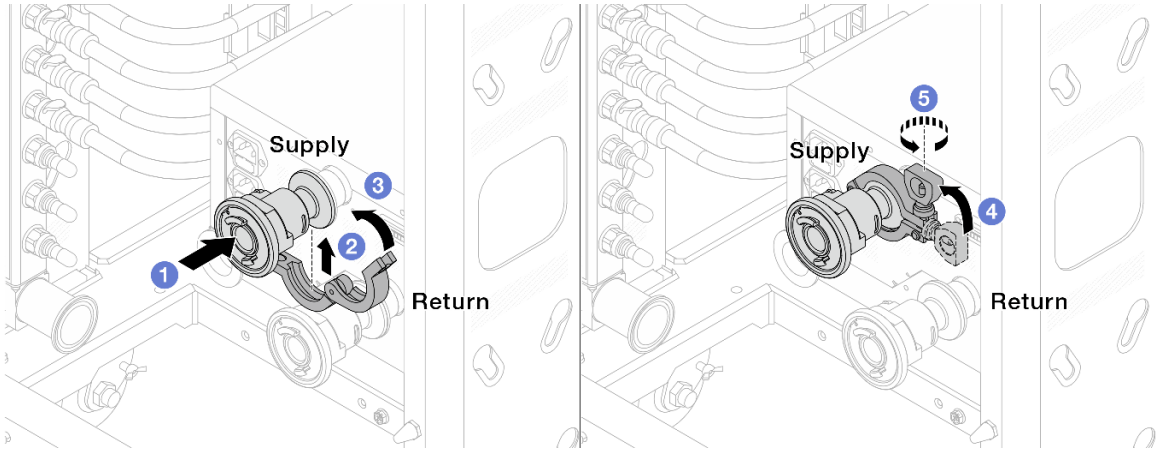


Figure 154. Installing ball valves

a. 1 Connect the ball valves to **Supply** and **Return** ports.
b. 2 Wrap the interface around with the clamp.
c. 3 Close the clamp.
d. 4 Lift the screw upright.
e. 5 Tighten the screw and make sure that it is secured.

Step 8. Install the connection set to manifolds.

Note: Install the supply side first, then install the return side.

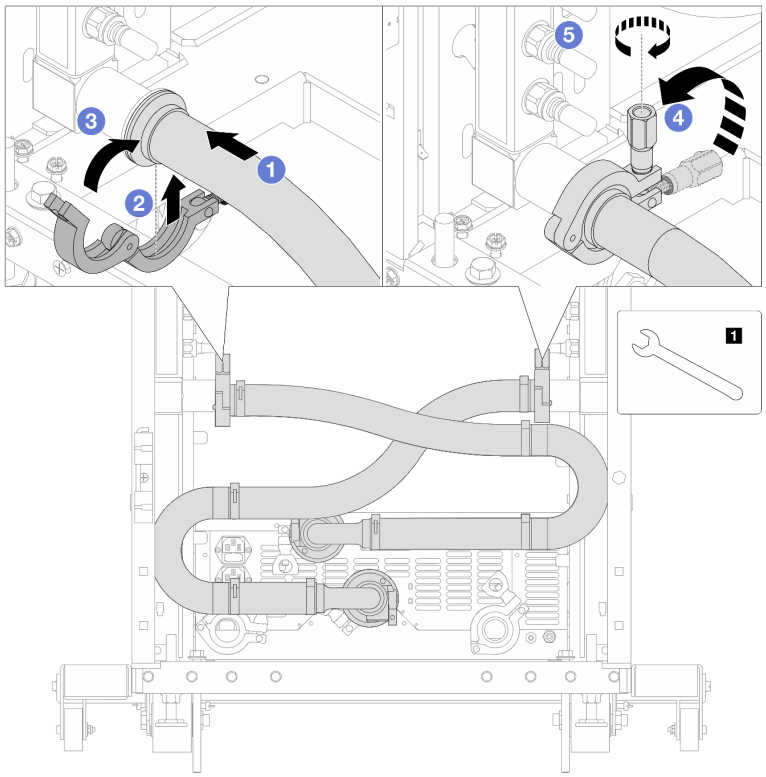


Figure 155. Installing the connection set

1	17 mm wrench

a. 1 Connect the connection set to both manifolds.
b. 2 Wrap the interface around with the clamp.
c. 3 Close the clamp.
d. 4 Lift the screw upright.
e. 5 Tighten the screw and make sure that it is secured.

Step 9. Install the connection set to ball valves.

Note: Install the supply side first, then install the return side.

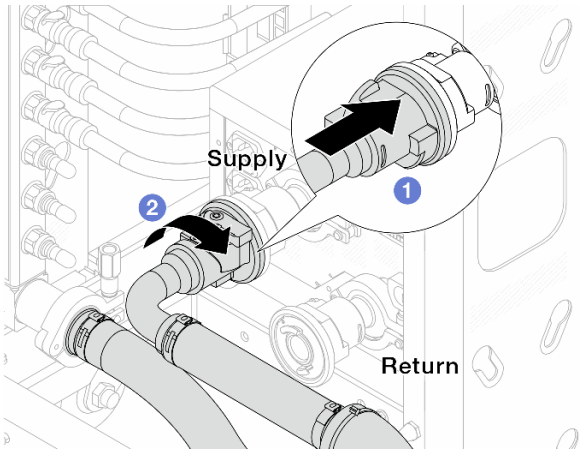


Figure 156. Connecting ball valves

a. 1 Connect ball valves.
b. 2 Rotate to the right to lock the two valves.

Step 10. Prepare the in-rack CDU.

a. Connect the feed hose to inlet port on the front.

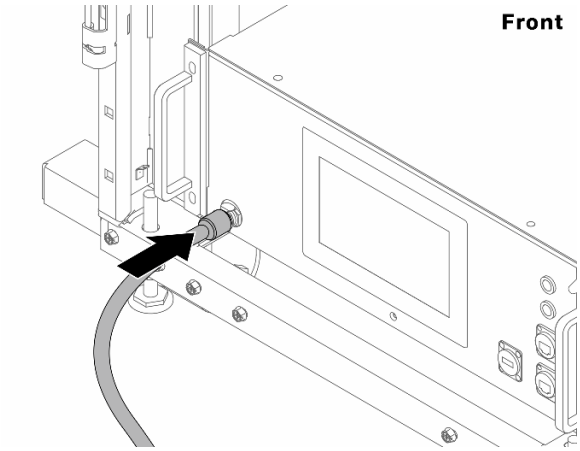


Figure 157. The front of CDU

b. Connect hoses to the drain port and bleeder port on the rear.

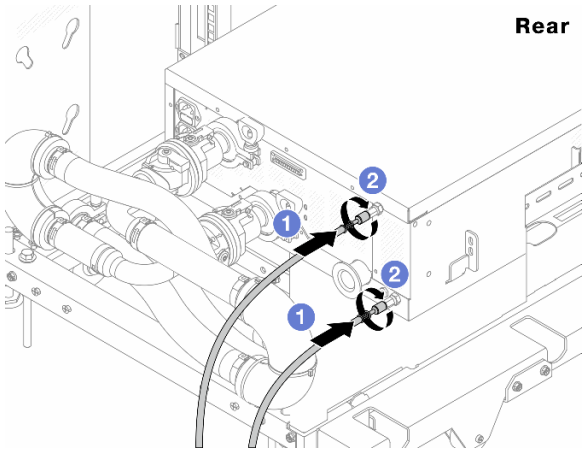


Figure 158. The rear of CDU

1. Connect both drain and bleeder hoses to CDU.
2. Rotate the connectors to the right to secure the connection.

Important:

- For more operation and maintenance guidelines, see Lenovo Neptune DWC RM100 in-rack Coolant Distribution Unit (CDU) Operation & Maintenance Guide.
- For service support, associated warranty and maintenance sizing, contact Lenovo Professional Services team at cdusupport@lenovo.com.

Step 11. Install the quick connect plug to the manifolds.

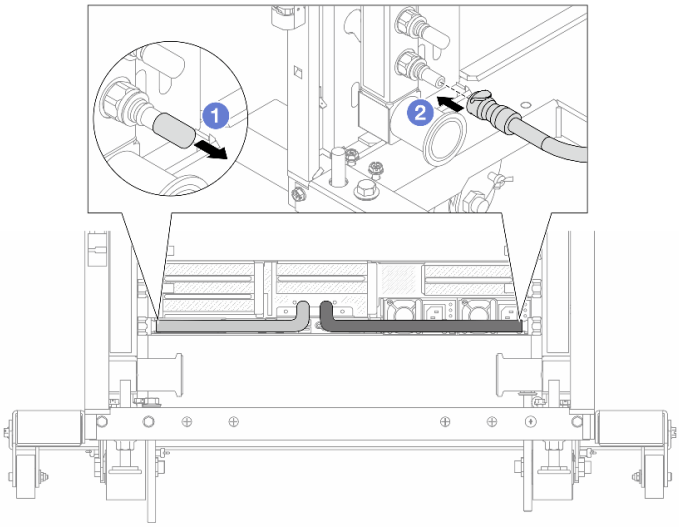


Figure 159. Installing the quick connect plug

a. 1 Remove the rubber quick connect plug covers from the ports on the manifold.

b. 2 Connect the plug to the manifold port.

Step 12. Install the bleeder kit to the manifold supply side.

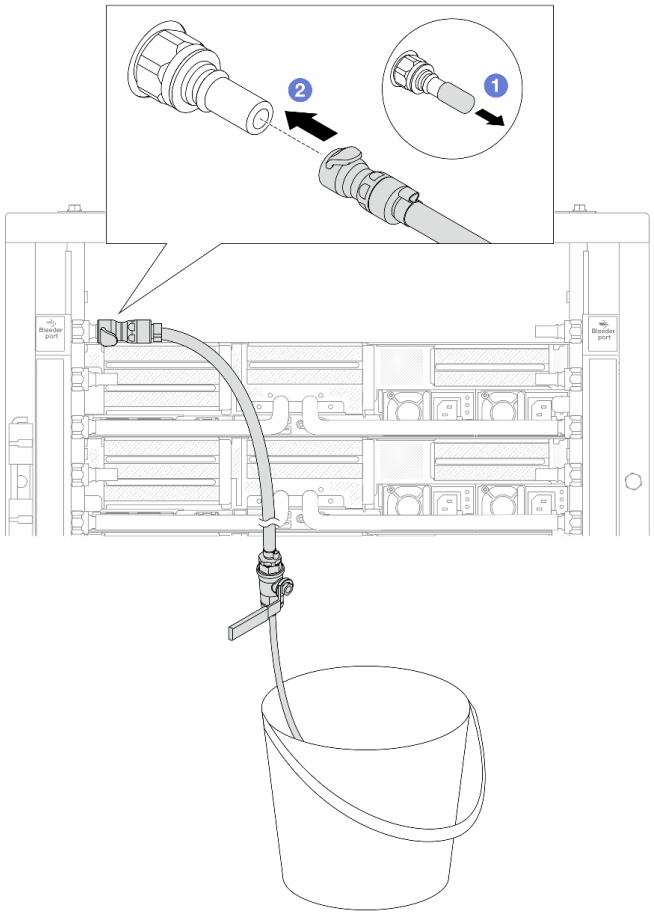


Figure 160. Installing the bleeder kit to the supply side

a. 1 Remove the rubber quick connect plug covers from the ports on the manifold.

b. 2 Plug the bleeder kit to the manifold.

Step 13. To push the air out of the manifolds, open ball valve switches to let coolant fill the system.

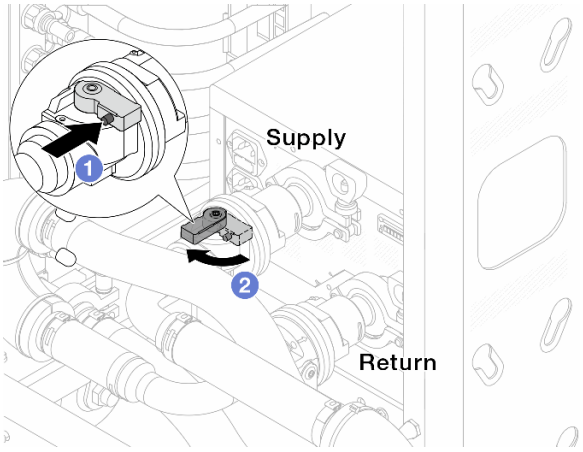


Figure 161. Opening ball valves

a. 1 Press the button on the ball valve switch.

b. ❷ Rotate the switch to fully open the valves as illustrated above.

Attention:

- Pay close attention to the front display of CDU and maintain the system pressure at **one bar**.
- For more information about coolant temperature and system pressure requirements, see “Water requirements” on page 641.

Step 14. Slowly open the bleeder valve to conduct the air out of the hose. Close the bleeder valve once a steady stream of water flows into the bucket or there are only minimal bubbles in the bleeder hose.

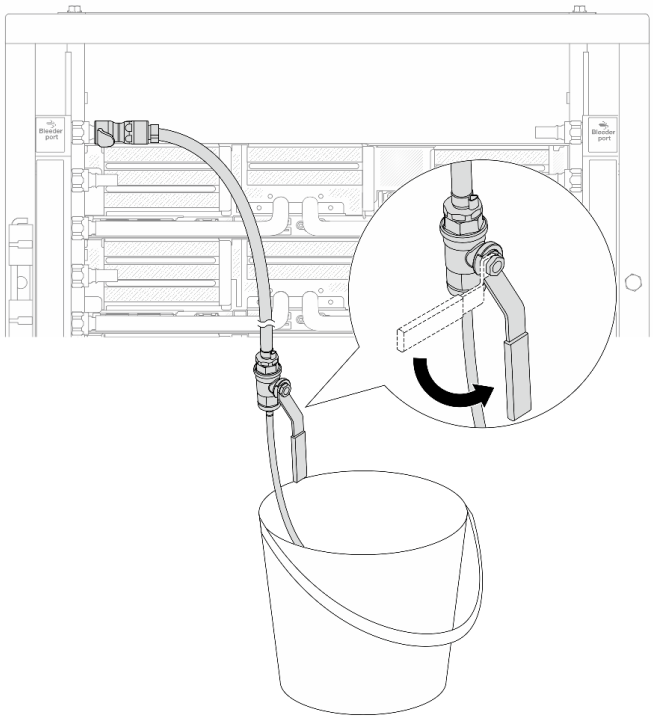


Figure 162. Opening the bleeder valve on the supply side

Step 15. Install the bleeder kit to the manifold return side.

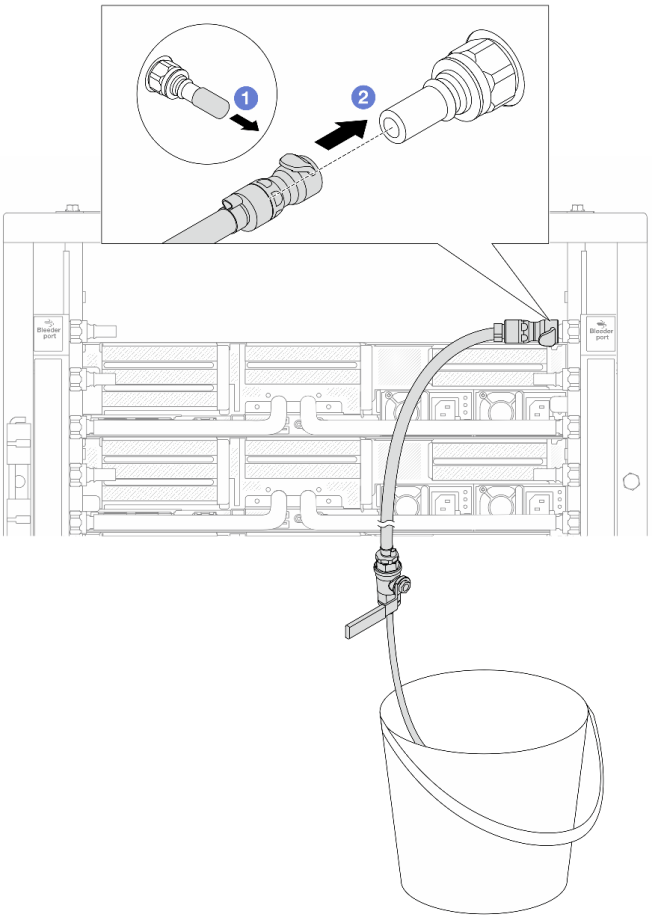


Figure 163. Installing the bleeder kit on the return side

a. 1 Remove the rubber quick connect plug covers from the ports on the manifold.

b. 2 Plug the bleeder kit to the manifold.

Step 16. Slowly open the bleeder valve to conduct the air out of the hose. Close the bleeder valve once a steady stream of water flows into the bucket or there are only minimal bubbles in the bleeder hose.

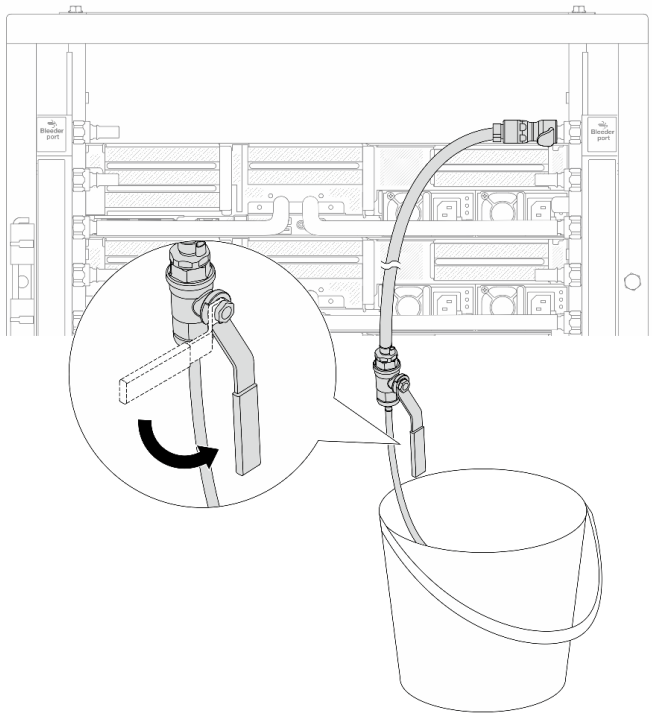


Figure 164. Opening the bleeder valve on the return side

Step 17. (For precaution) To make sure that the air inside is as little as possible, re-install the bleeder kit back to manifold supply side and do it one more time. Close the bleeder valve once a steady stream of water flows into the bucket or there are only minimal bubbles in the bleeder hose.

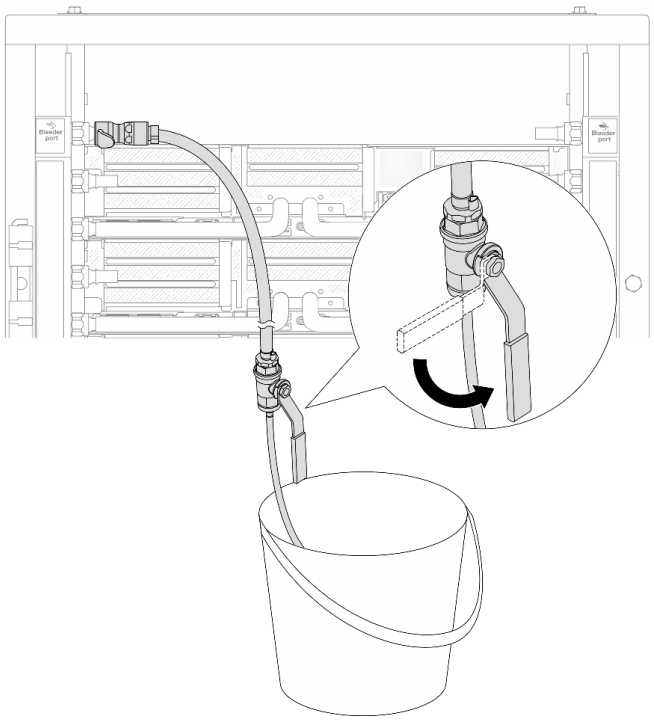


Figure 165. Opening the bleeder valve on the supply side

Step 18. Once completed, pay close attention to the front display of CDU and maintain the system pressure at **one bar**. For more information about coolant temperature and system pressure requirements, see “Water requirements” on page 641.

After you finish

Complete the parts replacement. See “Complete the parts replacement” on page 320.

Demo video

Watch the procedure on YouTube

Remove the manifold (in-row system)

Use this information to remove the manifold in an in-row direct water cooling system.

About this task

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

CAUTION:
The coolant might cause irritation to the skin and eyes. Avoid direct contact with the coolant.

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.

S011

CAUTION:
Sharp edges, corners, or joints nearby.

S038

CAUTION:
Eye protection should be worn for this procedure.

S040

CAUTION:
Protective gloves should be worn for this procedure.

S042

DANGER

Risk of electric shock due to water or a water solution which is present in this product. Avoid working on or near energized equipment with wet hands or when spilled water is present.

Attention:

- Read “Installation Guidelines” on page 1 and “Safety inspection checklist” on page 2 to ensure that you work safely.
- Power off the server and peripheral devices and disconnect the power cords and all external cables. See “Power off the server” on page 32.
- 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 systems.
- Ensure proper handling procedures are followed when working with any chemically treated coolant used in the rack cooling system. Ensure that material safety data sheets (MSDS) and safety information are provided by the coolant chemical treatment supplier and that proper personal protective equipment (PPE) is available as recommended by the coolant chemical treatment supplier. Protective gloves and eyewear may be recommended as a precaution.
- This task requires two or more people.

Procedure

Step 1. Close both ball valves.

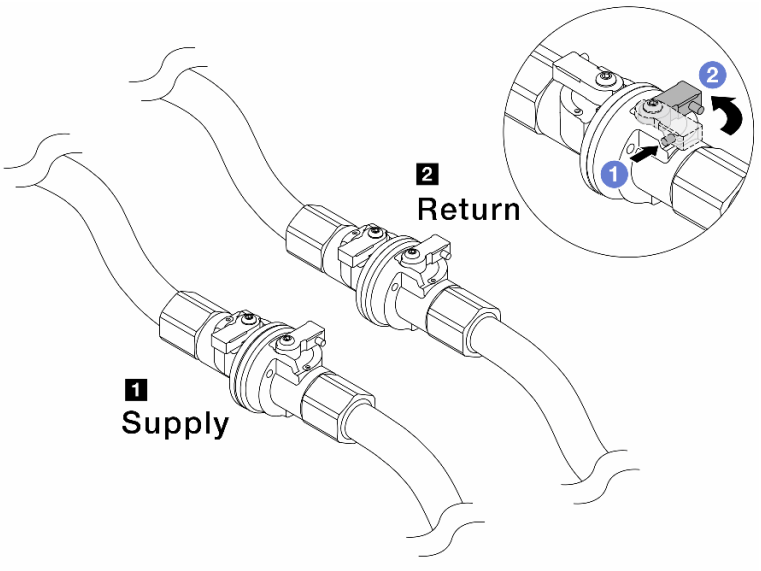


Figure 166. Closing ball valves

Note:

1 Manifold supply connects to facility supply	**2 Manifold return connects to facility return**

a. 1 Press the button on the ball valve switch.

b. 2 Rotate the switches to close the valves as illustrated above.

Step 2. Remove the quick connect plugs to separate the DWCM hoses from the manifold.

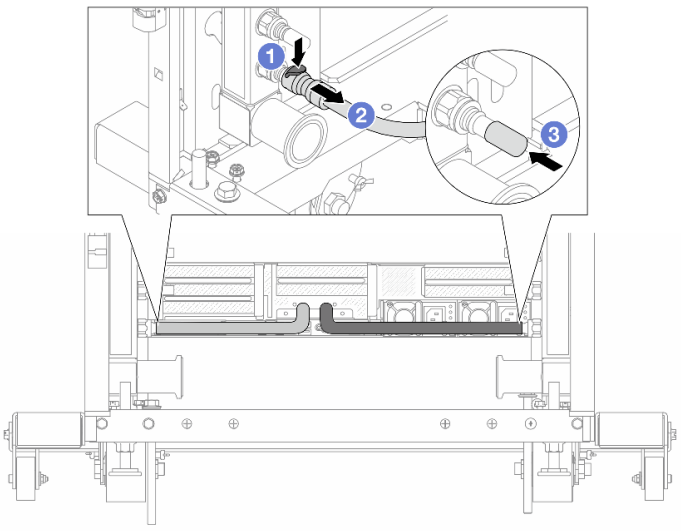


Figure 167. Quick connect plug removal

a. 1 Press the latch down to unlock the hose.
b. 2 Pull the hose off.
c. 3 Re-install the rubber quick connect plug covers to the ports on the manifold.

Step 3. Repeat Step 2 on page 166 to the other manifold.

Step 4. Remove the manifold with the hose kit attached.

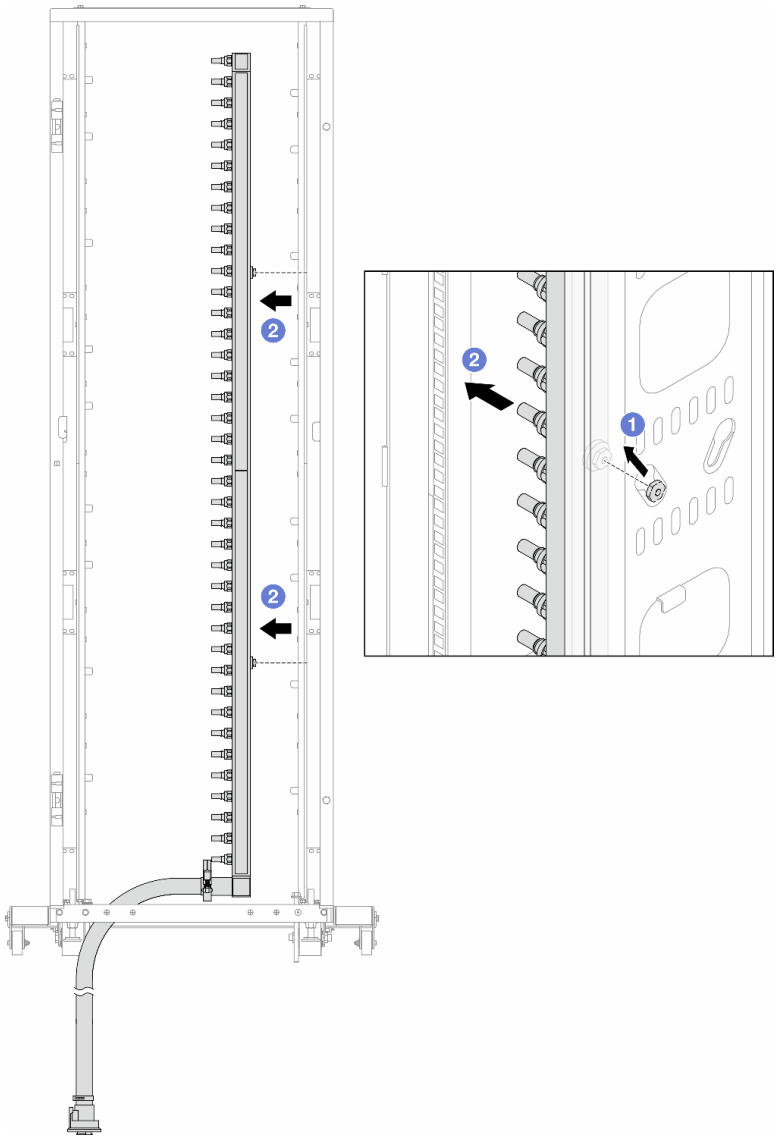


Figure 168. Removing the manifold

a. 1 Hold the manifold with both hands, and lift it upward to relocate the spools from the small openings to large ones on the rack cabinet.

b. 2 Remove the manifold with the hose kit attached.

Step 5. Repeat Step 4 on page 167 to the other manifold.

Notes:

- There is remaining coolant inside the manifold and the hose kit. Remove both together and leave the further draining to the next step.
- For more information about the rack cabinet, see ThinkSystem Heavy Duty Full Depth Rack Cabinets User Guide.

Step 6. Install the bleeder kit to the manifold supply side.

Note: This step drains the coolant with the help of a pressure difference inside and outside the supply manifold.

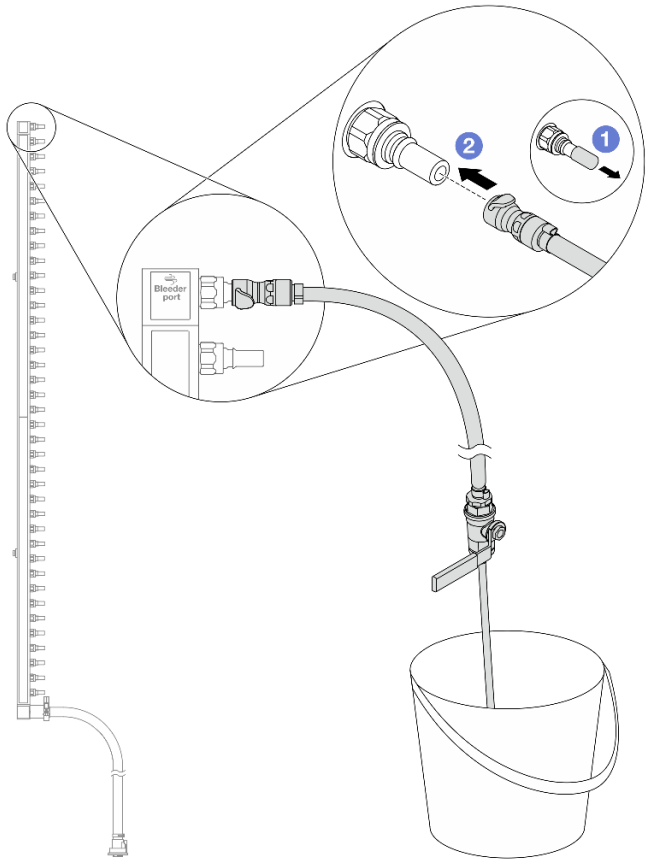


Figure 169. Installing the bleeder kit to the supply side

a. 1 Remove the rubber quick connect plug covers from the ports on the manifold.

b. 2 Plug the bleeder kit to the manifold.

Step 7. Slowly open the bleeder valve to allow a steady stream of coolant to drain. Close the bleeder valve once coolant stops flowing.

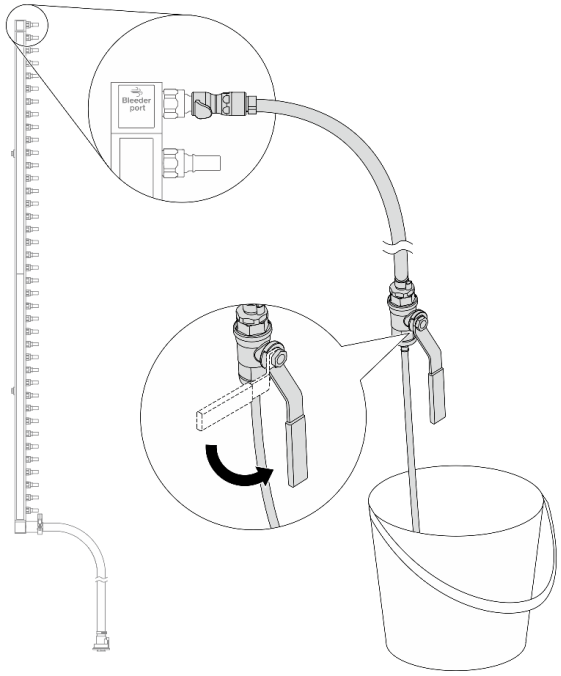


Figure 170. Opening the bleeder valve

Step 8. Install the bleeder kit to the manifold return side.

Note: This step drains the coolant with the help of a pressure difference inside and outside the return manifold.

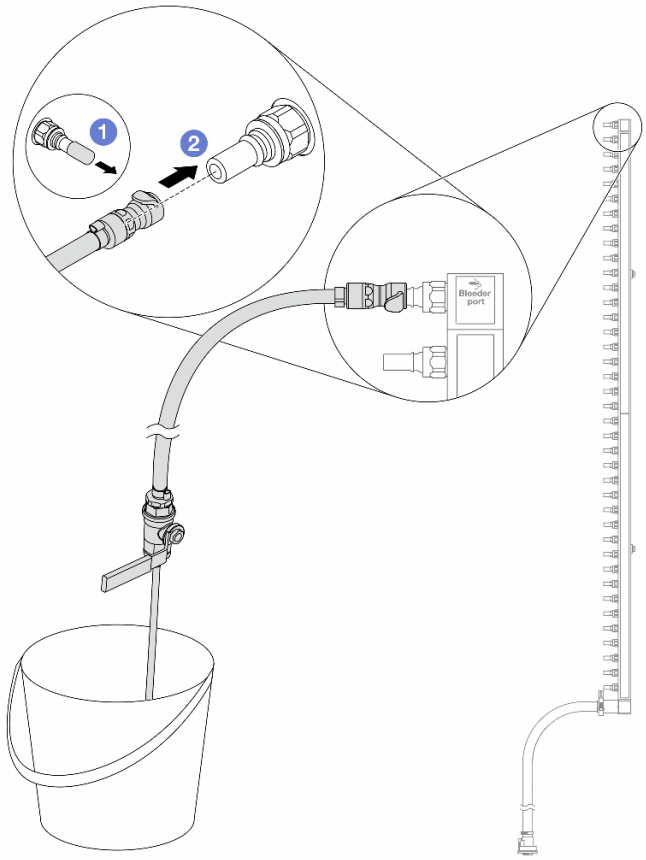


Figure 171. Installing the bleeder kit to the return side

a. 1 Remove the rubber quick connect plug covers from the ports on the manifold.

b. 2 Plug the bleeder kit to the manifold.

Step 9. Slowly open the bleeder valve to allow a steady stream of coolant to drain. Close the bleeder valve once coolant stops flowing.

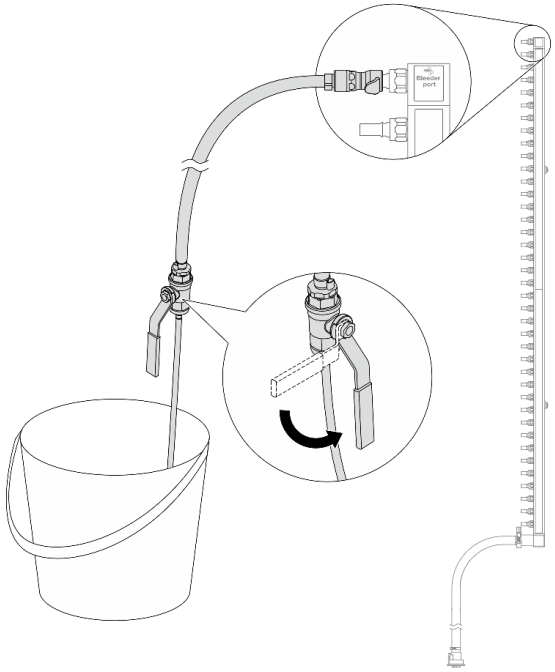


Figure 172. Opening the bleeder valve

Step 10. Separate the manifold from the hose kit in a dry and clean work area, and keep a bucket and absorbent cloths around to collect any coolant that may drain out.

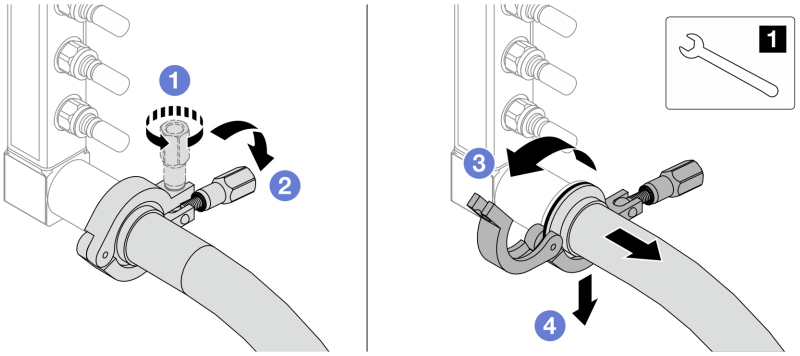


Figure 173. Separating the manifold from the hose kit

1 17 mm wrench

a. 1 Loosen the screw that locks the ferrule.
b. 2 Put the screw down.
c. 3 Open the clamp.
d. 4 Remove the ferrule and hose kit from the manifold.

Step 11. Repeat Step 10 on page 172 to the other manifold.

Step 12. For better sanitation, keep the manifold ports and hose kits dry and clean. Re-install quick connect plug covers or any covers that protect hose kits and manifold ports.

Step 13. To remove the server from the rack, see “Remove the server from rack” on page 32.

Step 14. To remove the Direct Water Cooling Module (DWCM), see “Remove the Lenovo Neptune(TM) Processor Direct Water Cooling Module” on page 116.

After you finish

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

Demo video

Watch the procedure on YouTube

Install the manifold (in-row system)

Use this information to install the manifold in an in-row direct water cooling system.

About this task

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

CAUTION:
The coolant might cause irritation to the skin and eyes. Avoid direct contact with the coolant.

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.

S011

CAUTION:
Sharp edges, corners, or joints nearby.

S038

CAUTION:
Eye protection should be worn for this procedure.

S040

CAUTION:
Protective gloves should be worn for this procedure.

S042

DANGER

Risk of electric shock due to water or a water solution which is present in this product. Avoid working on or near energized equipment with wet hands or when spilled water is present.

Attention:

- Read “Installation Guidelines” on page 1 and “Safety inspection checklist” on page 2 to ensure that you work safely.
- Power off the server and peripheral devices and disconnect the power cords and all external cables. See “Power off the server” on page 32.
- 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 systems.
- Ensure proper handling procedures are followed when working with any chemically treated coolant used in the rack cooling system. Ensure that material safety data sheets (MSDS) and safety information are provided by the coolant chemical treatment supplier and that proper personal protective equipment (PPE) is available as recommended by the coolant chemical treatment supplier. Protective gloves and eyewear may be recommended as a precaution.
- This task requires two or more people.

Procedure

Step 1. To install the Direct Water Cooling Module (DWCM), see “Install the Lenovo Neptune(TM) Processor Direct Water Cooling Module” on page 120.

Step 2. To install the server into the rack, see “Install the server to rack” on page 36.

Step 3. Install the manifold.

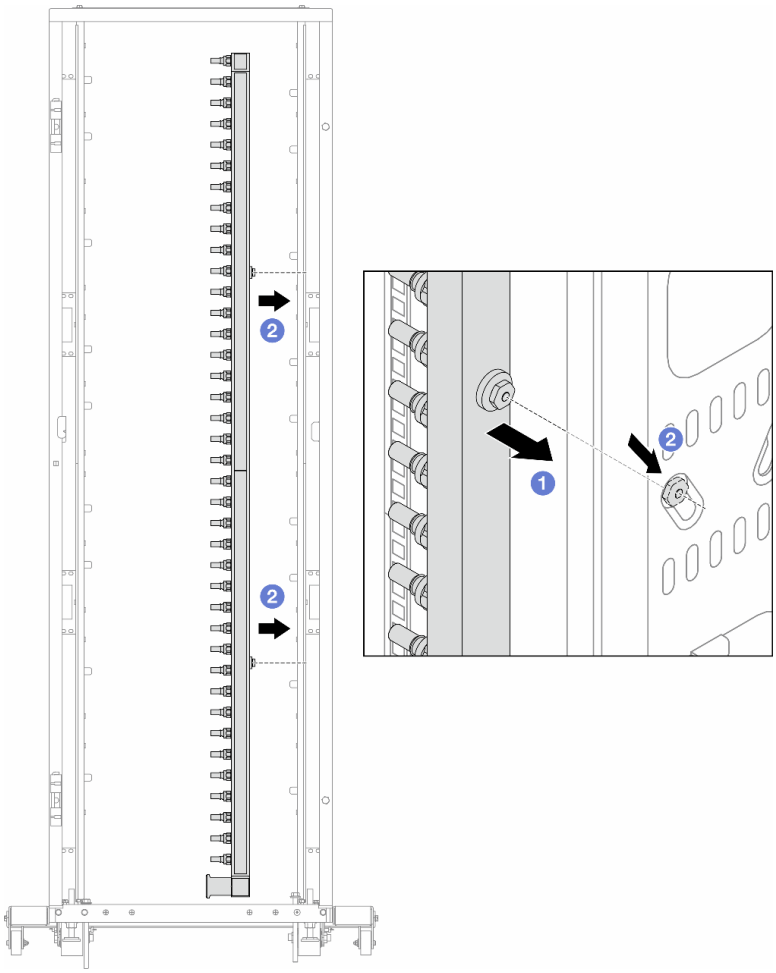


Figure 174. Installing the manifold

a. 1 Hold the manifold with both hands, and mount it onto the rack cabinet.

b. 2 Align the spools with holes, and clutch the cabinet.

Note: For more information about the rack cabinet, see ThinkSystem Heavy Duty Full Depth Rack Cabinets User Guide.

Step 4. Repeat Step 3 on page 174 to the other manifold.

Step 5. Install the quick connect plug to the manifolds.

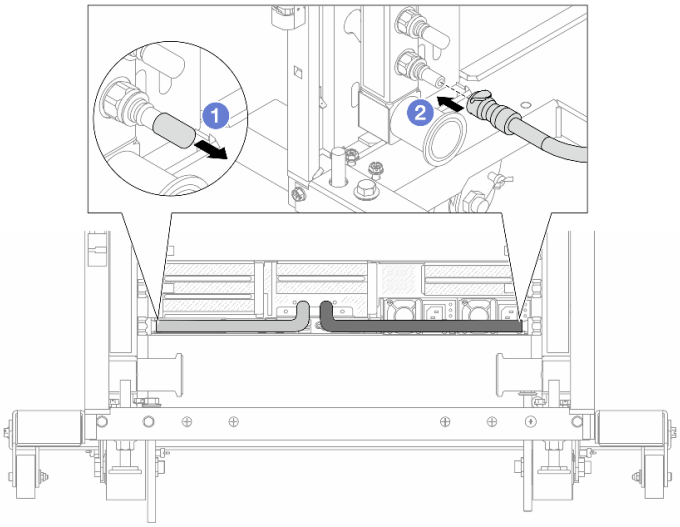


Figure 175. Installing the quick connect plug

a. 1 Remove the rubber quick connect plug covers from the ports on the manifold.

b. 2 Connect the plug to the manifold port.

Step 6. Install the hose kit to the manifold.

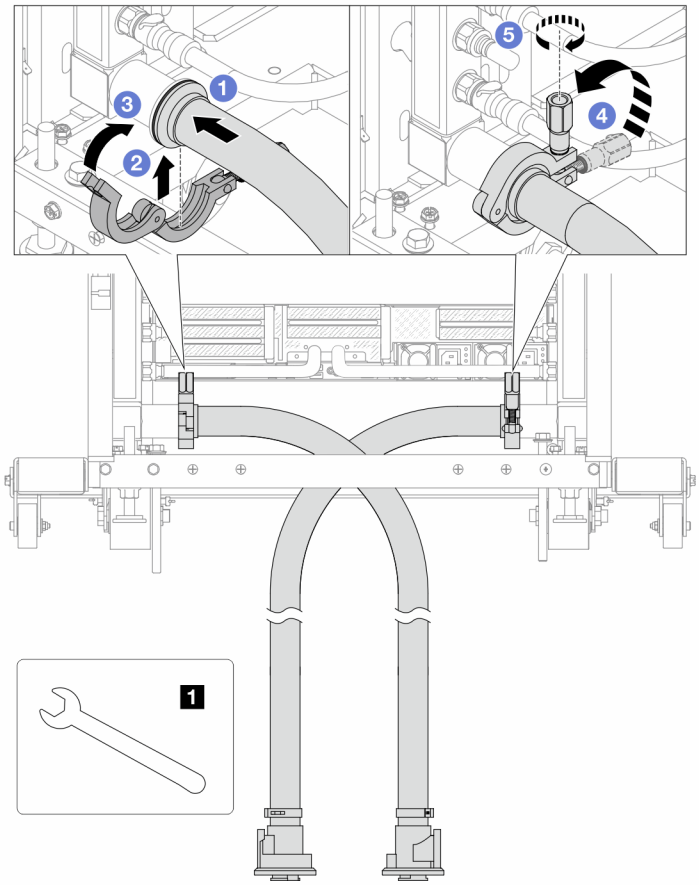


Figure 176. Installing the hose kit

1 17 mm wrench

a. 1 Connect the hose kits to both manifolds.
b. 2 Wrap the interface around with the clamp.
c. 3 Close the clamp.
d. 4 Lift the screw upright.
e. 5 Tighten the screw and make sure that it is secured.

Step 7. Install the bleeder kit to the manifold supply side.

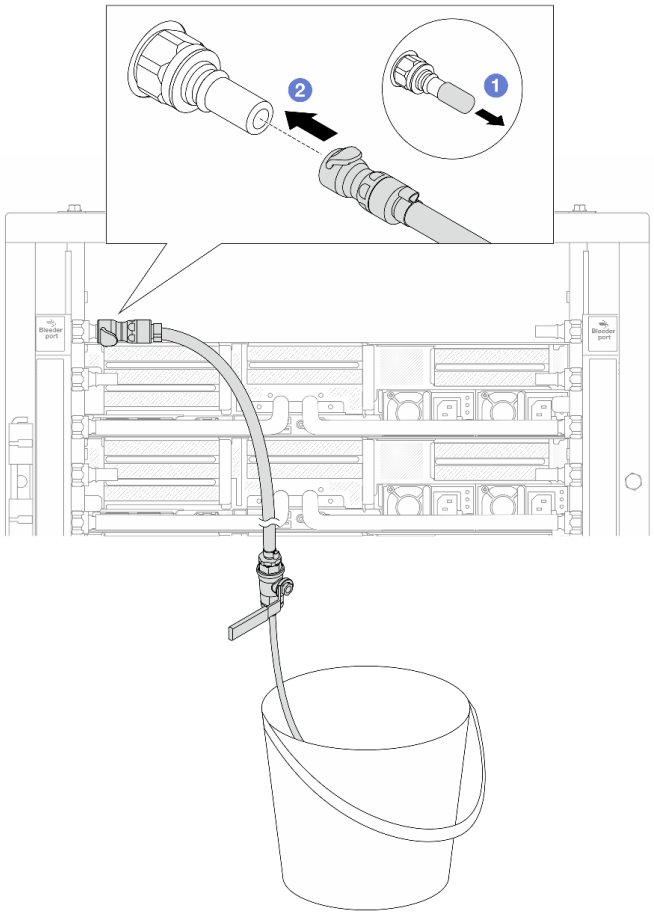


Figure 177. Installing the bleeder kit to the supply side

a. 1 Remove the rubber quick connect plug covers from the ports on the manifold.

b. 2 Plug the bleeder kit to the manifold.

Step 8. To push the air out of the manifold supply side, connect **facility supply** to **manifold return**.

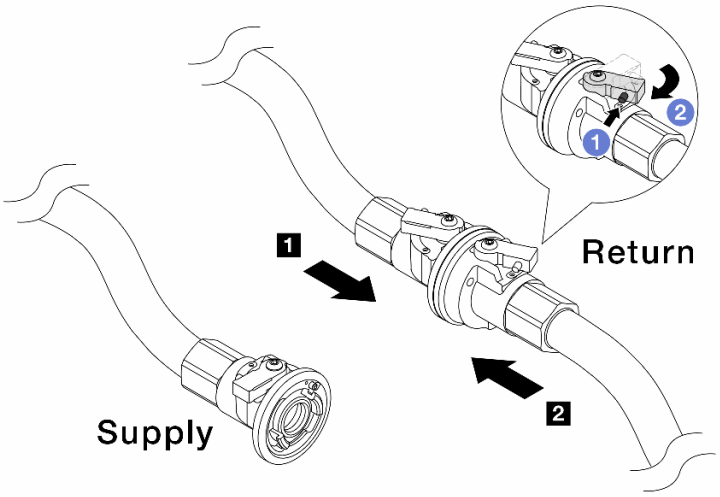


Figure 178. Facility supply to manifold return

a. 1 Press the button on the ball valve switch.

b. 2 Rotate both switches open and stop at around 1/4 of 90 degrees.

Attention:

- Open the ball valves on 1 manifold return side and 2 facility supply side, while keep manifold supply side closed.
- Do not fully open the ball valves, or the water flow gets too rapid to contain.

Step 9. Slowly open the bleeder valve to conduct the air out of the hose. Close the bleeder valve once a steady stream of water flows into the bucket or there are only minimal bubbles in the bleeder hose.

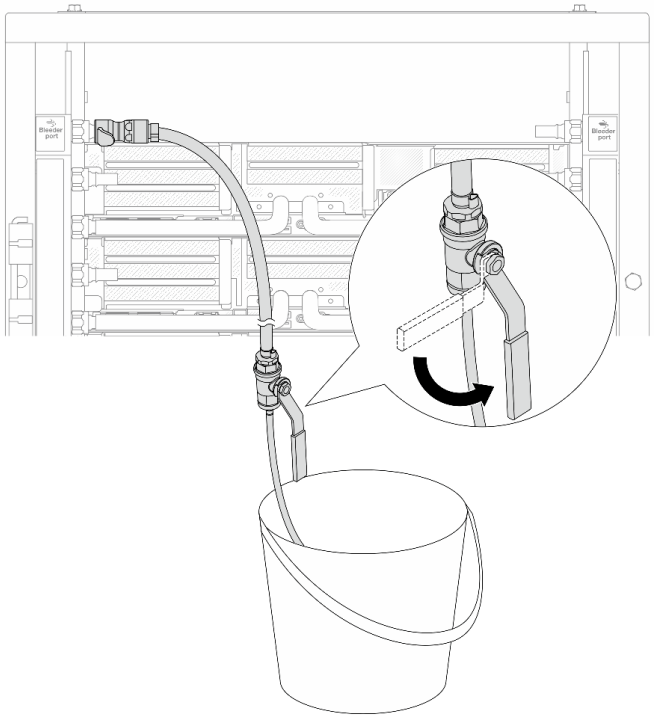


Figure 179. Opening the bleeder valve on the supply side

Step 10. Install the bleeder kit to the manifold return side.

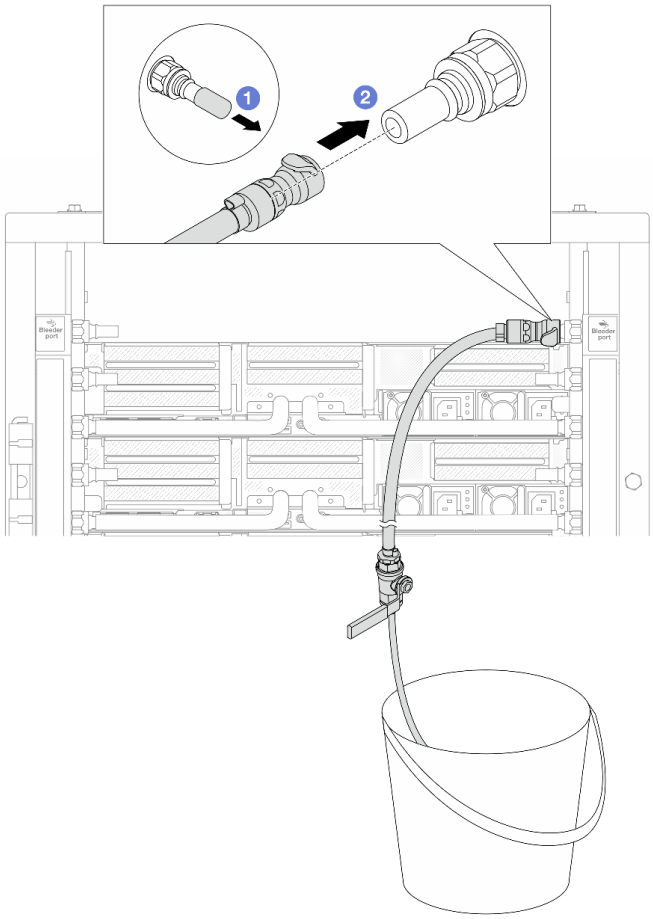


Figure 180. Installing the bleeder kit on the return side

a. 1 Remove the rubber quick connect plug covers from the ports on the manifold.

b. 2 Plug the bleeder kit to the manifold.

Step 11. To push the air out of the manifold return side, connect **facility supply** to **manifold supply**.

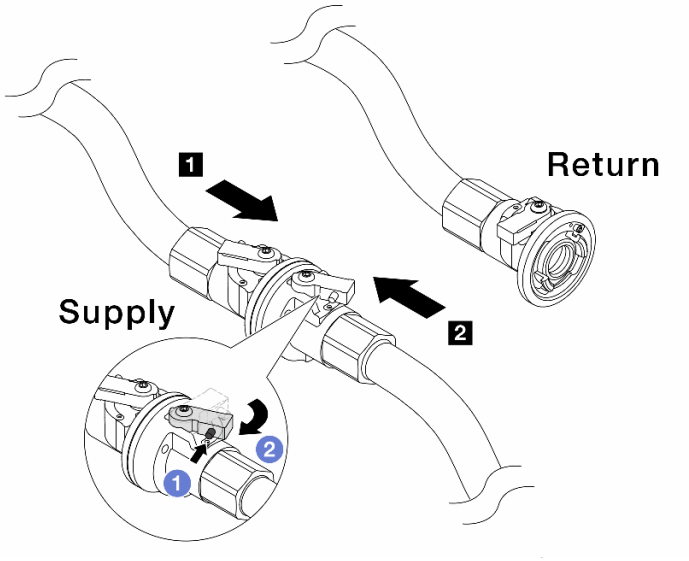


Figure 181. Facility supply to manifold supply

a. 1 Press the button on the ball valve switch.

b. 2 Rotate both switches open and stop at around 1/4 of 90 degrees.

Attention:

- Open the ball valves on 1 manifold supply side and 2 facility supply side, while keep manifold return side closed.
- Do not fully open the ball valves, or the water flow gets too rapid to contain.

Step 12. Slowly open the bleeder valve to conduct the air out of the hose. Close the bleeder valve once a steady stream of water flows into the bucket or there are only minimal bubbles in the bleeder hose.

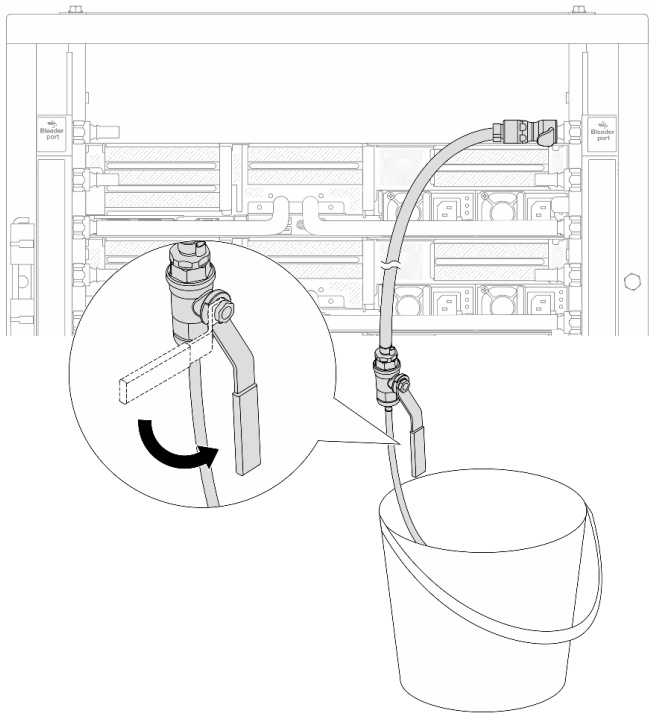


Figure 182. Opening the bleeder valve on the return side

Step 13. (For precaution) To make sure that the air inside is as little as possible, re-install the bleeder kit back to manifold supply side and do it one more time. Close the bleeder valve once a steady stream of water flows into the bucket or there are only minimal bubbles in the bleeder hose.

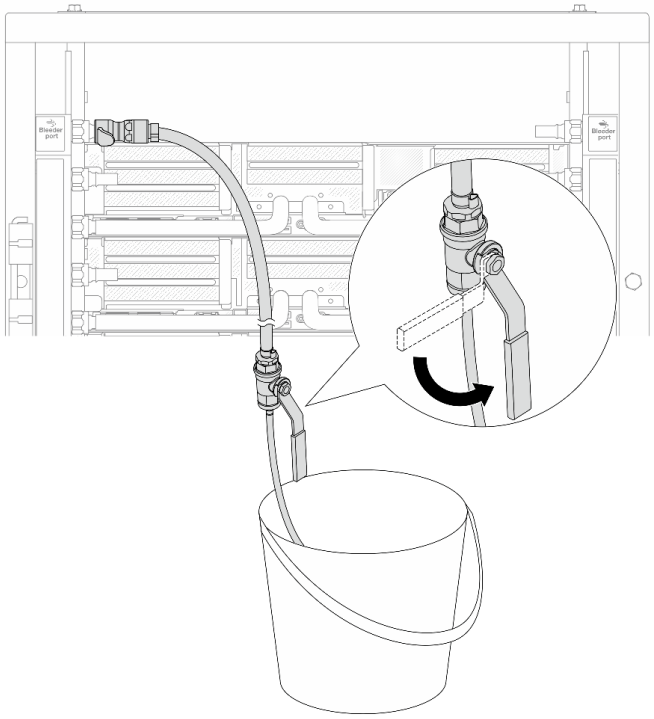


Figure 183. Opening the bleeder valve on the supply side

Step 14. Once completed, connect the supply and return of manifold and facility correspondingly. Fully open all connections on both supply and return sides.

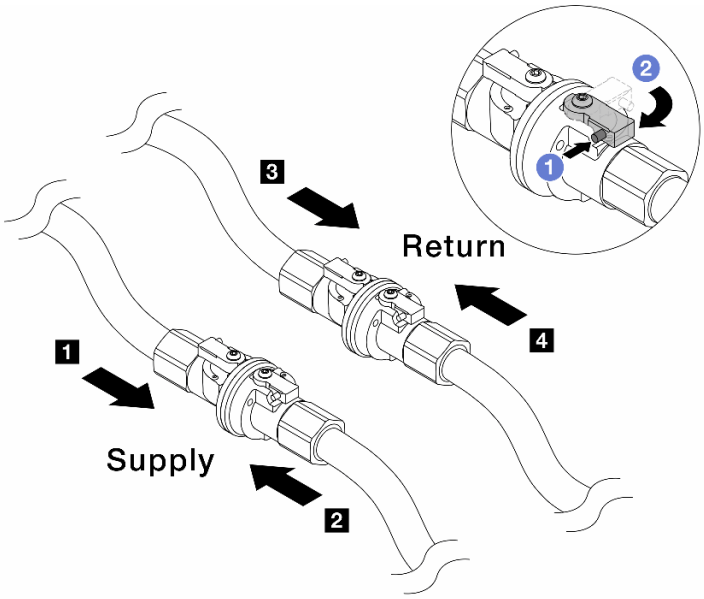


Figure 184. Opening ball valves

Note:

1 Manifold supply connects to 2 facility supply	**3 Manifold return connects to 4 facility return**

a. 1 Press the button on the ball valve switch.

b. 2 Rotate the switch to fully open the valves as illustrated above.

After you finish

Complete the parts replacement. See “Complete the parts replacement” on page 320.

Demo video

Watch the procedure on YouTube

Memory module replacement

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

Remove a memory module

Use this information to remove a memory module.

About this task

Attention:

- Read “Installation Guidelines” on page 1 and “Safety inspection checklist” on page 2 to ensure that you work safely.
- Make sure to remove or install memory module 20 seconds after disconnecting power cords from the system. It allows the system to be completely discharged of electricity and safe for handling memory module.

- Memory modules are sensitive to static discharge and require special handling. Refer to the standard guidelines for “Handling static-sensitive devices” on page 4.
  - Always wear an electrostatic-discharge strap when removing or installing memory modules. Electrostatic-discharge gloves can also be used.
  - Never hold two or more memory modules together so that they do not touch each other. Do not stack memory modules directly on top of each other during storage.
  - Never touch the gold memory module connector contacts or allow these contacts to touch the outside of the memory module connector housing.
  - Handle memory modules with care: never bend, twist, or drop a memory module.
  - Do not use any metal tools (such as jigs or clamps) to handle the memory modules, because the rigid metals may damage the memory modules.
  - Do not insert memory modules while holding packages or passive components, which can cause package cracks or detachment of passive components by the high insertion force.
- In the case of processor board replacement, keep records of the slots in which the modules are installed, and make sure to install them back to the exact same slots after processor board replacement.
- If you are not installing a replacement memory module to the same slot, make sure you have memory module filler available.

Procedure

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

Step 1. Make preparation for the task.

a. Power off the server and peripheral devices and disconnect the power cords and all external cables. See “Power off the server” on page 32.

b. If the server is installed in a rack, slide the server out on its rack slide rails to gain access to the top cover, or remove the server from the rack. See “Remove the server from rack” on page 32.

c. Remove the top cover. See “Remove the top cover” on page 318.

d. If your server comes with an air baffle or a middle cage, remove it. See “Remove the air baffle” on page 44 or “Remove the middle drive cage and drive backplanes” on page 193.

e. Locate the memory module slots and determine which memory module you want to remove from the server.

Step 2. Remove the memory module from the slot.

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

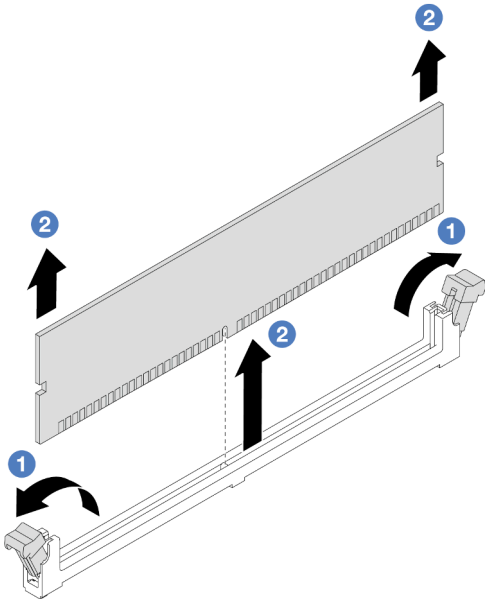


Figure 185. Memory module removal

a. 1 Gently open the retaining clip on each end of the memory module slot.

b. 2 Grasp the memory module at both ends and carefully lift it out of the slot.

After you finish

1. A memory module slot must be installed with a memory module or a memory module filler. See “Install a memory module” on page 187.
2. If you are instructed to return the component or optional device, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Demo video

Watch the procedure on YouTube

Install a memory module

Follow instructions in this section to install a memory module.

About this task

Attention:

- Read “Installation Guidelines” on page 1 and “Safety inspection checklist” on page 2 to ensure that you work safely.
- Make sure to remove or install memory module 20 seconds after disconnecting power cords from the system. It allows the system to be completely discharged of electricity and safe for handling memory module.
- Memory modules are sensitive to static discharge and require special handling. Refer to the standard guidelines at “Handling static-sensitive devices” on page 4:
  - Always wear an electrostatic-discharge strap when removing or installing memory modules. Electrostatic-discharge gloves can also be used.

- Never hold two or more memory modules together so that they do not touch each other. Do not stack memory modules directly on top of each other during storage.
- Never touch the gold memory module connector contacts or allow these contacts to touch the outside of the memory module connector housing.
- Handle memory modules with care: never bend, twist, or drop a memory module.
- Do not use any metal tools (such as jigs or clamps) to handle the memory modules, because the rigid metals may damage the memory modules.
- Do not insert memory modules while holding packages or passive components, which can cause package cracks or detachment of passive components by the high insertion force.

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

- Go to https://datacentersupport.lenovo.com/products/servers/thinksystem/sr650v3/downloads/driver-list/ to see the latest firmware and driver updates for your server.
- Go to "Update the firmware" in *User Guide* or *System Configuration Guide* for more information on firmware updating tools.

Procedure

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

Step 1. Make preparation for the task.

a. Power off the server and peripheral devices and disconnect the power cords and all external cables. See "Power off the server" on page 32.

b. If the server is installed in a rack, slide the server out on its rack slide rails to gain access to the top cover, or remove the server from the rack. See "Remove the server from rack" on page 32.

c. Remove the top cover. See "Remove the top cover" on page 318.

d. If your server comes with an air baffle or a middle cage, remove it. See "Remove the air baffle" on page 44 or "Remove the middle drive cage and drive backplanes" on page 193.

e. Locate the required memory module slot on the system board assembly. Ensure that you observe the installation rules and sequence in "Memory module installation rules and order" on page 5.

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

Step 3. Install the memory module into the slot.

Attention:

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

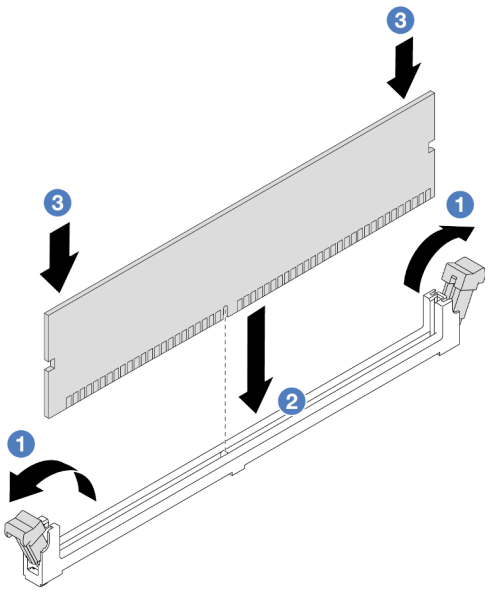


Figure 186. Memory module installation

a. 1 Gently open the retaining clip on each end of the memory module slot.

b. 2 Align the memory module with the slot, and gently place the memory module on the slot with both hands.

c. 3 Firmly press both ends of the memory module straight down into the slot until the retaining clips snap into the locked position.

After you finish

Complete the parts replacement. See “Complete the parts replacement” on page 320.

Demo video

Watch the procedure on YouTube

MicroSD card replacement

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

- “Remove the MicroSD card” on page 189
- “Install the MicroSD card” on page 191

Remove the MicroSD card

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

About this task

Attention:

- Read “Installation Guidelines” on page 1 and “Safety inspection checklist” on page 2 to ensure that you work safely.

- Power off the server and peripheral devices and disconnect the power cords and all external cables. See “Power off the server” on page 32.
- Prevent exposure to static electricity, which might lead to system halt and loss of data, by keeping static-sensitive components in their static-protective packages until installation, and handling these devices with an electrostatic-discharge wrist strap or other grounding system.

Procedure

Step 1. Prepare your server.

a. Remove the top cover. See “Remove the top cover” on page 318.

b. If your server comes with riser assemblies, remove them first, see “Remove a rear riser assembly” on page 272.

c. If your server comes with a rear drive assembly, remove it first. See “Rear drive backplane and drive cage replacement” on page 250.

d. If your server comes with a 7mm rear drive assembly, remove it first. See “Remove the 7mm drive cage” on page 242.

e. Record where the cables are connected to the system board assembly; then, disconnect all the cables.

Attention: Disengage all latches, cable clips, release tabs, or locks on cable connectors beforehand. Failing to release them before removing the cables will damage the cable connectors on the system board assembly. Any damage to the cable connectors may require replacing the system board assembly.

Step 2. Remove the MicroSD card.

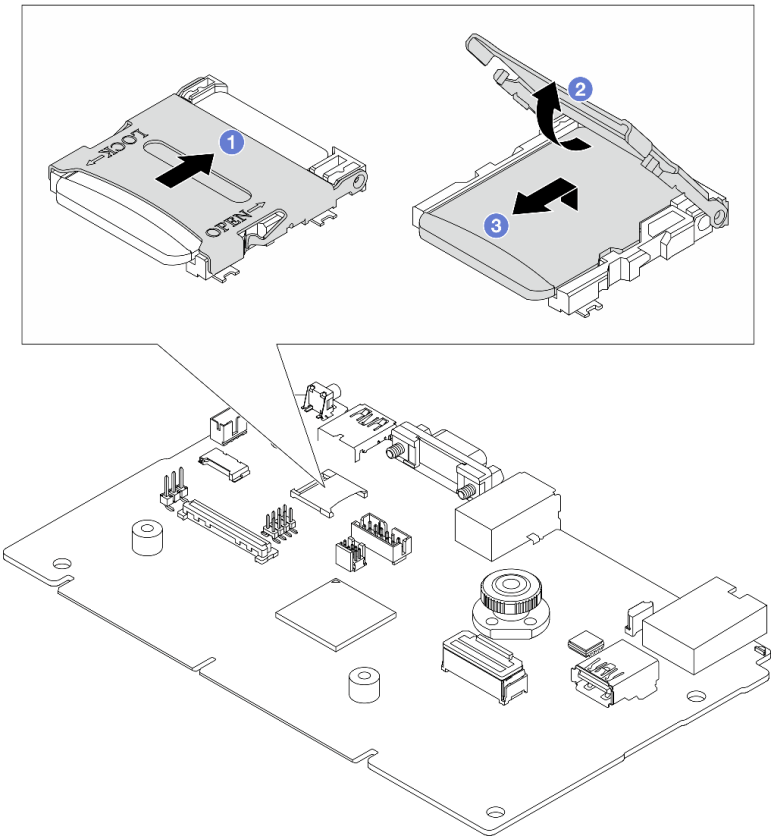


Figure 187. Removing MicroSD card

a. Slide the socket lid to OPEN position.

b. Lift open the socket lid.

c. Remove the MicroSD card from the socket.

Note: After the MicroSD card is removed, the historical data of the firmware and user data uploaded through Remote Disc On Card (RDOC) will be lost, and the firmware rollback function and extended RDOC space will not be supported. To enable the two features, it will need to install a new MicroSD card.

After you finish

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

Demo video

Watch the procedure on YouTube

Install the MicroSD card

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

About this task

Attention:

- Read “Installation Guidelines” on page 1 and “Safety inspection checklist” on page 2 to ensure that you work safely.
- Power off the server and peripheral devices and disconnect the power cords and all external cables. See “Power off the server” on page 32.
- Prevent exposure to static electricity, which might lead to system halt and loss of data, by keeping static-sensitive components in their static-protective packages until installation, and handling these devices with an electrostatic-discharge wrist strap or other grounding system.

Procedure

Step 1. Install the MicroSD card.

Notes:

- If replacing with a new MicroSD card, the firmware historical data and user data stored in the defective MicroSD card will be lost. After a new MicroSD card is installed, subsequent firmware update history will be saved to the new card.
- To update firmware, refer to “Updating Server Firmware” section in Lenovo XClarity Controller 2.

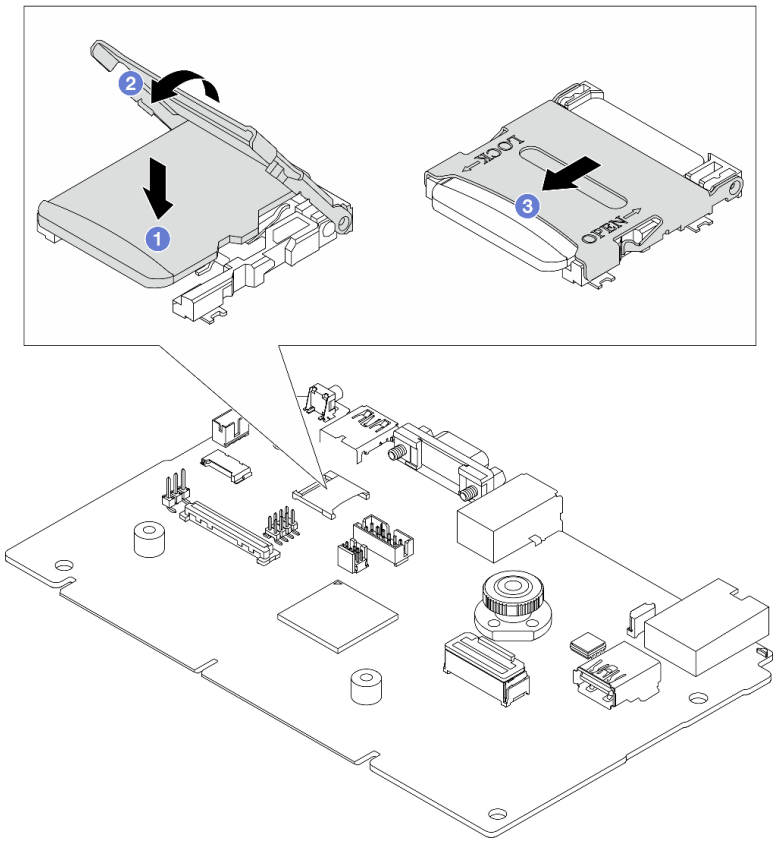


Figure 188. Installing MicroSD card

a. ❶ Place the MicroSD card into the socket.
b. ❷ Close the socket lid.
c. ❸ Slide the socket lid to LOCK position.

After you finish

1. Install any components that you have removed:
   a. “Install a rear riser assembly” on page 284
   b. “Install the 7mm drive cage” on page 248
   c. “Rear drive backplane and drive cage replacement” on page 250
   d. “Install the top cover” on page 319
2. Complete the parts replacement. See “Complete the parts replacement” on page 320.

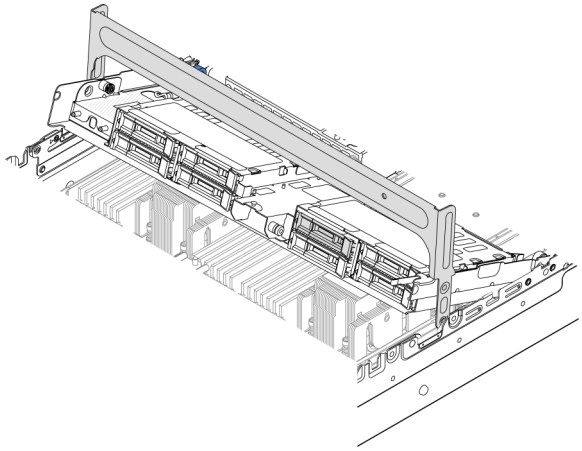
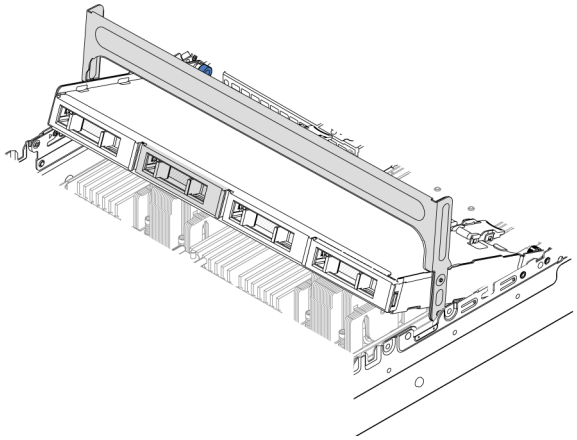
Demo video

Watch the procedure on YouTube

Middle drive cage and drive backplane replacement

Use this information to remove and install the middle drive cages and drive backplanes.

Depending on the server configurations, the server supports one of the following middle drive cages. For detailed information, see “Technical rules” on page 5.

Drive cage type	Backplane type
Middle 2.5-inch 8-bay drive cage 	• Two 2.5-inch SAS/SATA 4-bay backplanes • Two 2.5-inch NVMe 4-bay backplanes
Middle 3.5-inch 4-bay drive cage 	One 3.5-inch SAS/SATA 4-bay backplane

- “Remove the middle drive cage and drive backplanes” on page 193
- “Install the middle drive backplanes and drive cage” on page 196

Remove the middle drive cage and drive backplanes

Use this information to remove the middle drive cage and drive backplanes.

About this task

Attention:

- Read “Installation Guidelines” on page 1 and “Safety inspection checklist” on page 2 to ensure that you work safely.
- Power off the server and peripheral devices and disconnect the power cords and all external cables. See “Power off the server” on page 32.
- 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.

- Before you remove or make changes to drives, drive controllers (including controllers that are integrated on the system board assembly), drive backplanes or drive cables, back up all important data that is stored on drives.
- Before you remove any component of a RAID array (drive, RAID card, etc.), back up all RAID configuration information.
- If one or more NVMe solid-state drives are to be removed, it is recommended to disable them beforehand via the operating system.

Procedure

Step 1. Make preparation for the task.

a. If the server is installed in a rack, slide the server out on its rack slide rails to gain access to the top cover, or remove the server from the rack. See "Remove the server from rack" on page 32.

b. Remove the top cover. See "Remove the top cover" on page 318.

c. Remove the system fan cage for easier operation. See "Remove the system fan cage" on page 311.

d. Disconnect cables from the middle drive backplanes.

Step 2. Remove the middle drive cage.

Note: The illustration shows removing the 2.5-inch middle drive cage. The procedure is the same for removing the 3.5-inch middle drive cage.

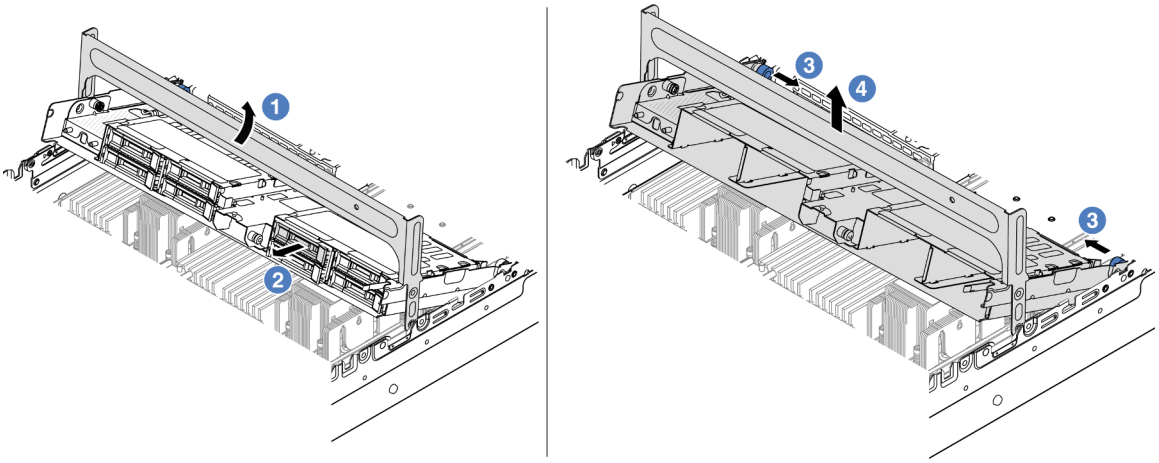


Figure 189. Removing the middle drive cage

a. 1 Rotate the drive cage handle to open it.

b. 2 Remove the drives from the drive cage.

c. 3 Pull and twist plunger pins to release the drive cage.

d. 4 Carefully lift the drive cage up from the chassis.

Step 3. Remove the middle drive backplane.

Note: Depending on the specific type, your backplane might look different from the illustration.

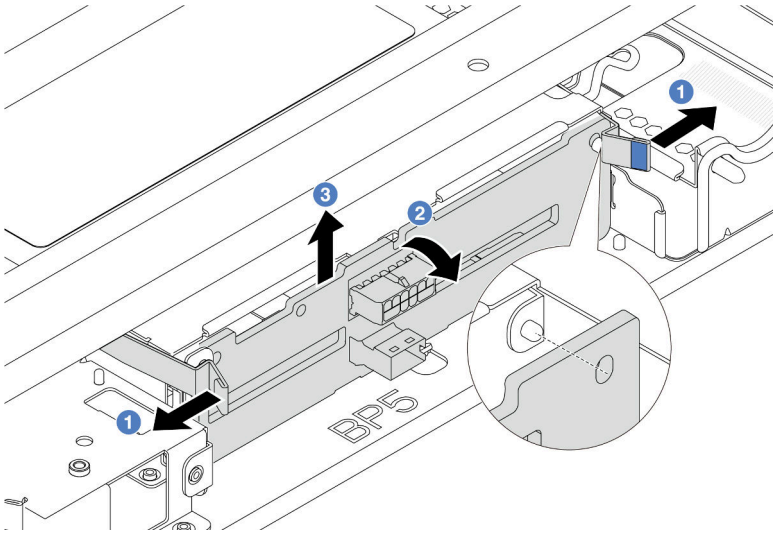


Figure 190. Removing the 2.5-inch middle drive backplane

a. 1 Slightly pivot the release latches outwards in the direction as shown.

b. 2 Rotate the backplane from the top to disengage it from the pins on the drive cage.

c. 3 Carefully lift the backplane out of the drive cage.

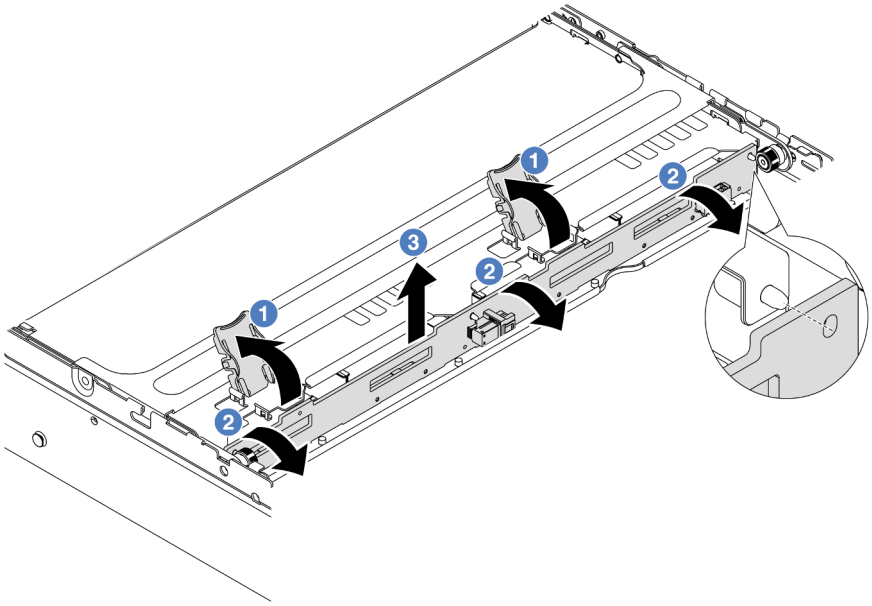


Figure 191. Removing the 3.5-inch middle drive backplane

a. 1 Open the release latches in the direction as shown.

b. 2 Rotate the backplane from the top to disengage it from the pins on the drive cage.

c. 3 Carefully lift the backplane out of the drive cage.

After you finish

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

Demo video

Watch the procedure on YouTube

Install the middle drive backplanes and drive cage

Use this information to install the middle drive backplanes and drive cage.

About this task

Attention:

- Read “Installation Guidelines” on page 1 and “Safety inspection checklist” on page 2 to ensure that you work safely.
- Power off the server and peripheral devices and disconnect the power cords and all external cables. See “Power off the server” on page 32.
- 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.
- The middle drive cage is supported on some server models with thermal requirements. See “Thermal rules” on page 19 to ensure that the server is under permitted ambient temperature and the correct heat sink and system fans are used. If needed, replace your heat sink or system fan first.
  - “Processor and heat sink replacement (trained technician only)” on page 205
  - “System fan replacement” on page 306

Procedure

Step 1. Touch the static-protective package that contains the new part to any unpainted surface on the outside of the server. Then, take the new part out of the package and place it on a static-protective surface.

Step 2. Connect the cables to the drive backplane. See Chapter 2 “Internal cable routing” on page 323.

Step 3. Install the drive backplane into the middle drive cage.

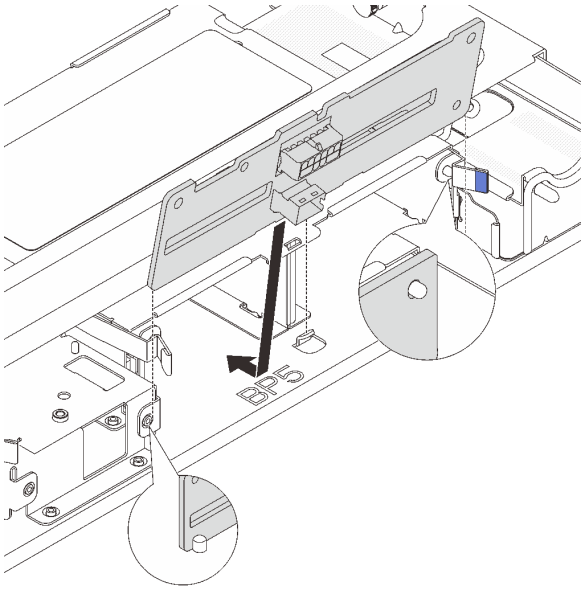


Figure 192. Installing the 2.5-inch middle drive backplane

a. Align the bottom of the backplane with the studs at the bottom of the drive cage, and lower the backplane into the drive cage.

b. Push the top of the backplane forward until it clicks in place. Ensure that the holes in the backplane pass through the pins on the drive cage, and the release latches secure the backplane in position.

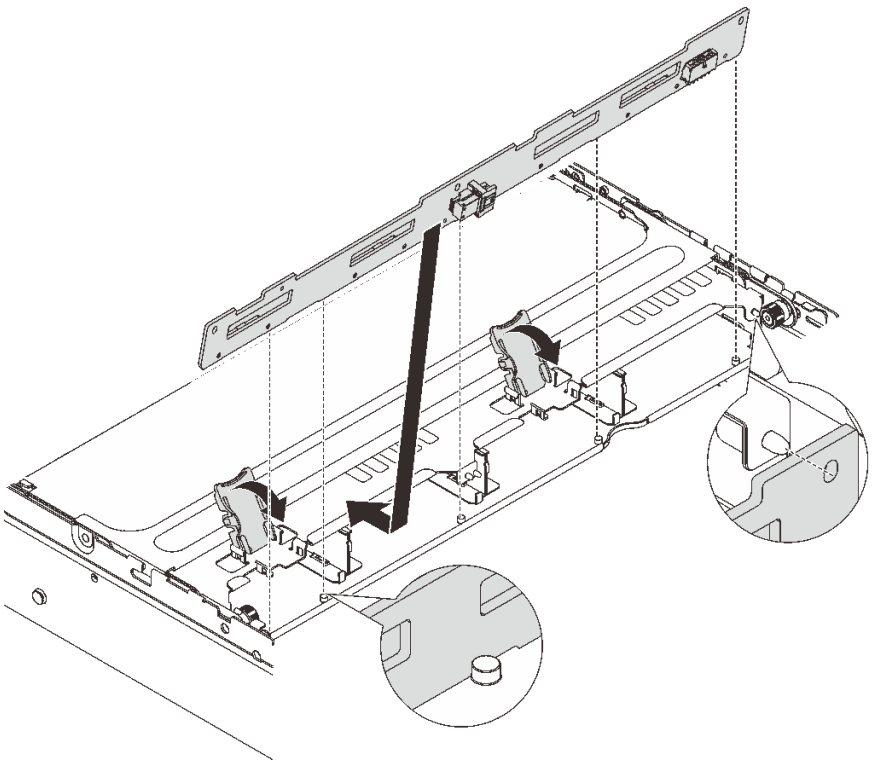


Figure 193. Installing the 3.5-inch middle drive backplane

a. Align the bottom of the backplane with the studs at the bottom of the drive cage, and lower the backplane into the drive cage.

b. Push the top of the backplane forward so that the holes in the backplane pass through the pins on the drive cage, and close the release latches to secure the backplane in position.

Step 4. Install the middle drive cage and drives.

Notes:

- The illustration shows installing the 2.5-inch middle drive cage. The procedure is the same for installing the 3.5-inch middle drive cage.
- If any cables need to go through beneath the middle drive cage, route the cables before installing the cage.

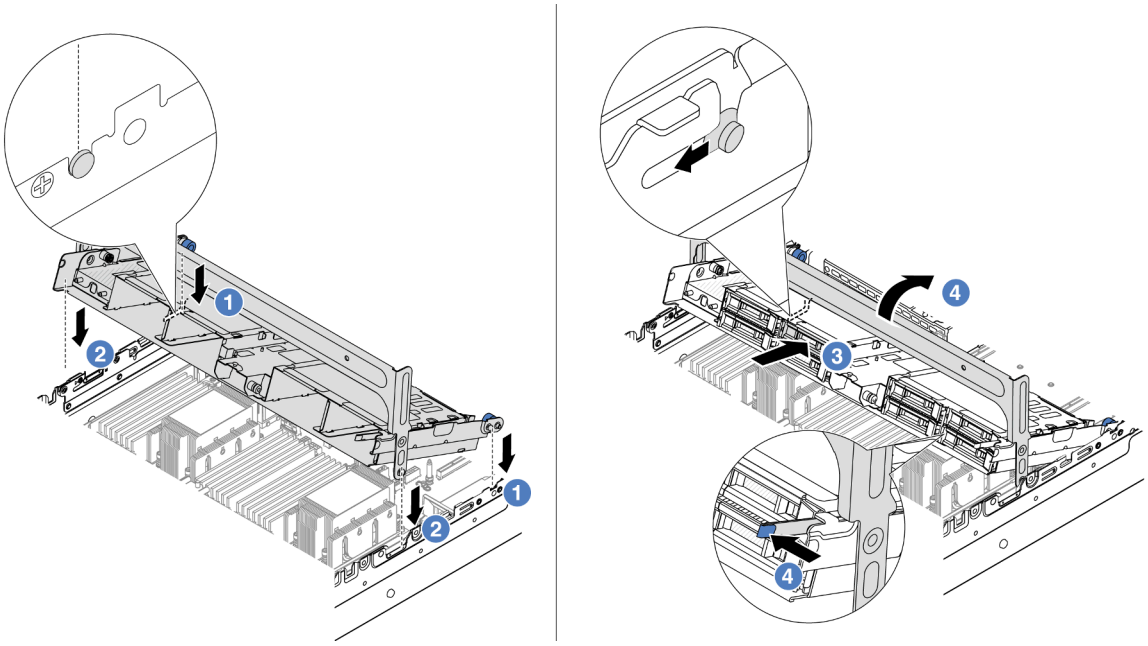


Figure 194. Installing the middle drive cage and drives

a. 1 Align the pins on the middle cage with the corresponding slots on the chassis.

b. 2 Lower the drive cage down into place.

c. 3 Install drives into the middle drive cage.

d. 4 Press the latch as shown and close the handle.

Step 5. Connect cables from the drive backplanes to the system board assembly or RAID/HBA adapters. See Chapter 2 “Internal cable routing” on page 323.

After you finish

Complete the parts replacement. See “Complete the parts replacement” on page 320.

Demo video

Watch the procedure on YouTube

Power supply unit replacement

Use this information to remove and install a power supply unit.

- “Remove a power supply unit” on page 201
- “Install a power supply unit” on page 203

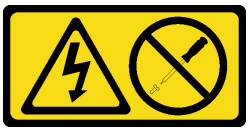
Safety precautions

The section lists safety precautions that apply to AC and DC power supply units respectively. Understand and apply the safety precautions before removing or installing a power supply unit.

Safety precautions for AC power supplies

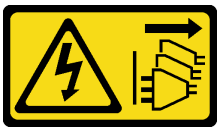
The following tips describe the information that you must consider when you replace an AC power supply.

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.

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.

S001

DANGER

Electrical current from power, telephone, and communication cables is hazardous.
To avoid a shock hazard:

- **Connect all power cords to a properly wired and grounded electrical outlet/source.**
- **Connect any equipment that will be attached to this product to properly wired outlets/sources.**
- **When possible, use one hand only to connect or disconnect signal cables.**
- **Never turn on any equipment when there is evidence of fire, water, or structural damage.**
- **The device 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.**

Safety precautions for DC power supplies

The following tips describe the information that you must consider when you replace a DC power supply.

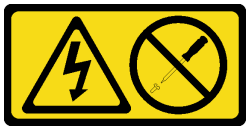
CAUTION:

240 V DC input (input range: 180-300 V) is supported in Chinese Mainland ONLY.

Perform the following steps to safely remove the power cord of one 240 V DC power supply unit. Otherwise, there can be data loss and other damages to the equipment. Damages and losses resulting from inappropriate operations will not be covered by the manufacturer's warranty.

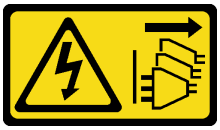
1. **Turn off the server.**
2. **Disconnect the power cord from the power source.**
3. **Disconnect the power cord from the power supply unit.**

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.

S019



CAUTION:
The power-control button on the device does not turn off the electrical current supplied to the device. The device also might have more than one connection to dc power. To remove all electrical current from the device, ensure that all connections to dc power are disconnected at the dc power input terminals.

S029

DANGER

For -48V dc power supply, electrical current from power cords is hazardous.
To avoid a shock hazard:

- **To connect or disconnect -48V dc power cords when you need to remove/install redundancy power supply unit(s).**

To Connect:

1. Turn OFF subject dc power source(s) and equipment (s) that are attached to this product.
2. Install the power supply unit(s) into the system housing.
3. Attach dc power cord(s) to the product.
   - Ensure correct polarity of -48 V dc connections: RTN is + and -Vin (typical -48 V) dc is -. Earth ground should be connected very well.
4. Connect dc power cord(s) to subject power source (s).
5. Turn ON all the power source(s).

To Disconnect:

1. Disconnect or turn off the subject dc power source(s) (at the breaker panel) before removing the power supply unit(s).
2. Remove the subject dc cord(s) and make sure the wire terminal of power cord(s) is insulated.
3. Unplug the subject power supply unit(s) from the system housing.

Remove a power supply unit

Use this information to remove a power supply unit.

About this task

The following describes the information that you must consider when removing a power supply:

Note: If the power supply unit to be removed is the only one installed, the power supply is non-hot-swap and before removing it, you must turn off the server first. To support redundancy mode or hot-swap, install an additional hot-swap power supply.

Attention:

- Read “Installation Guidelines” on page 1 and “Safety inspection checklist” on page 2 to ensure that you work safely.
- Prevent exposure to static electricity, which might lead to system halt and loss of data, by keeping static-sensitive components in their static-protective packages until installation, and handling these devices with an electrostatic-discharge wrist strap or other grounding system.

Procedure

Step 1. If a cable management arm (CMA) is installed, adjust the CMA to gain access to the power supply bay.

a. Press down the stop bracket 1 and rotate it to the open position.

b. Rotate the CMA out of the way to gain access to the power supply.

Note: Your CMA kit might look different from the illustration.

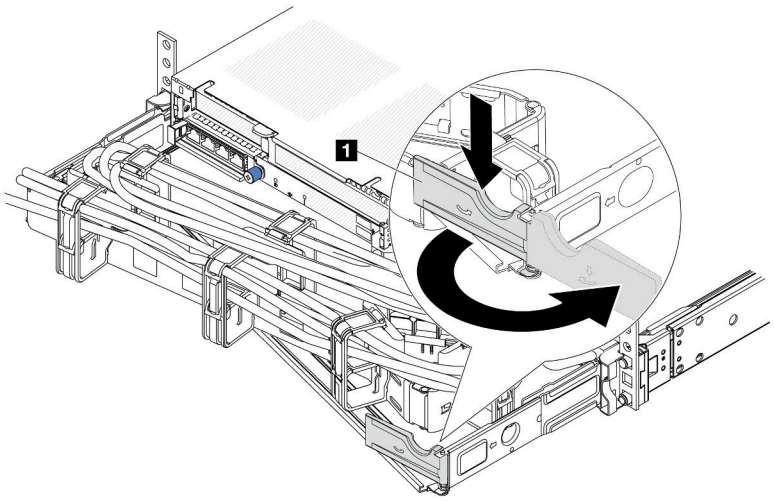


Figure 195. CMA adjustment

Step 2. Disconnect the power cord from the hot-swap power supply and the electrical outlet.

- For AC power input, disconnect both ends of the power cord and keep it in an ESD-safe place.
- For –48V DC power input:
  1. Disconnect the power cords from the electrical outlet.
  2. Use a slotted screwdriver to loosen the captive screws on the power supply terminal block.
  3. Disconnect the power cords from the power supply unit, make the wire terminal insulated, and keep them in an ESD-safe place.

Note: If you are replacing two power supplies, replace them one by one to ensure that the power supply to the server is not interrupted. Do not disconnect the power cord from the secondly replaced power supply until the power output LED for the firstly replaced power supply is lit. For the location of the power output LED, refer to “Power supply LEDs” on page 657.

Step 3. Press the release tab toward the handle and carefully pull the handle at the same time to slide the hot-swap power supply out of the chassis.

Note: If your CMA kit obstructs in the way, slightly pull the power supply upwards when sliding the power supply out of the chassis.

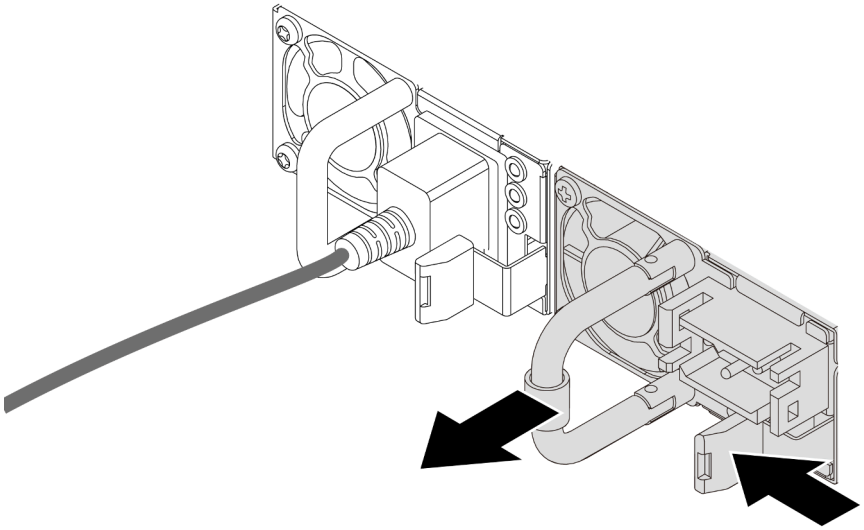


Figure 196. Hot-swap power supply removal

After you finish

1. Install a new power supply or install the power-supply filler to cover the power supply bay. See "Install a power supply unit" on page 203.

   Important: To ensure proper cooling during normal server operation, both of the power supply bays must be occupied. This means that each bay must have a power supply installed; or one has a power supply installed and the other has a power supply filler installed.

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

Demo video

Watch the procedure on YouTube

Install a power supply unit

Use this information to install a power supply.

About this task

The following describes the information that you must consider when installing a power supply:

- The server is shipped with only one power supply by default. In this case, the power supply is non-hot-swap and before removing it, you must turn off the server first. To support redundancy mode or hot-swap, install an additional hot-swap power supply.
- If you are replacing the existing power supply with a new power supply:
  - Use Lenovo Capacity Planner to calculate the required power capacity for what is configured for your server. More information about Lenovo Capacity Planner is available at:

    https://datacentersupport.lenovo.com/solutions/lnvo-lcp
  - Ensure that the devices that you are installing are supported. For a list of supported optional devices for the server, go to:
    https://serverproven.lenovo.com

– Attach the power information label that comes with this option onto the existing label near the power supply.

Figure 197. Example power supply unit label on the top cover

Attention:

- Read "Installation Guidelines" on page 1 and "Safety inspection checklist" on page 2 to ensure that you work safely.
- Prevent exposure to static electricity, which might lead to system halt and loss of data, by keeping static-sensitive components in their static-protective packages until installation, and handling these devices with an electrostatic-discharge wrist strap or other grounding system.

Procedure

Step 1. Touch the static-protective package that contains the new part to any unpainted surface on the outside of the server. Then, take the new part out of the package and place it on a static-protective surface.

Step 2. Slide the new hot-swap power supply into the bay until it snaps into position.

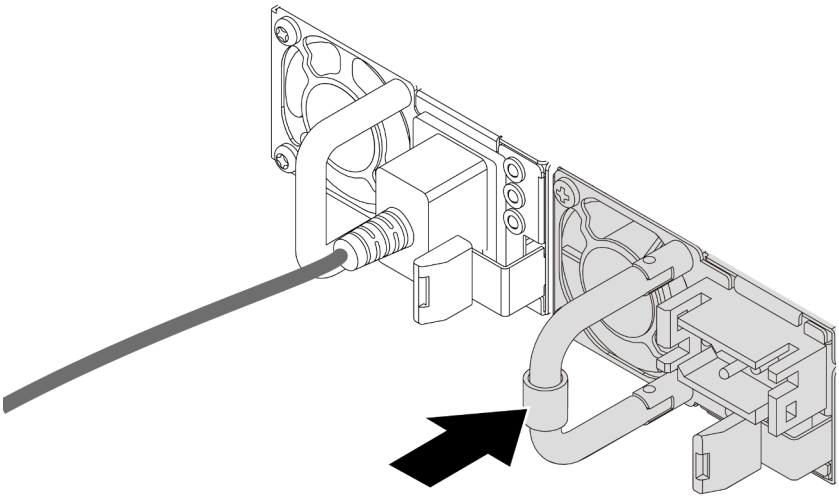


Figure 198. Hot-swap power supply installation

Step 3. Connect the power supply unit to a properly grounded electrical outlet.

- For AC power supply units:
  1. Connect one end of the power cord to the power connector on the power supply unit.
  2. Connect the other end of the power cord to a properly grounded electrical outlet.
- For –48V DC power supply units:
  1. Use a slotted screwdriver to loosen the 3 captive screws on the power supply terminal block.
  2. Check the type label on the power supply block and each power cord.

Type	PSU terminal block	Power cord
Input	-Vin	-Vin
Ground	⏚	GND
Input	RTN	RTN

3. Face the groove side of each power cord pin upwards, plug the pins into corresponding holes on the power block, use the table above for guidance, and ensure that the pins find correct slots.
4. Tighten the captive screws on the power block, and ensure that the screws and cord pins are secured in place and no bare metal parts show.
5. Connect the other end of the cables to a properly grounded electrical outlet, and ensure that the cable ends find correct outlets.

Step 4. Route the cables and ensure that they are not blocking access to other chassis components.

After you finish

1. If you have adjusted the CMA to gain access to the power supply bay, properly readjust the CMA back in place.
2. If the server is turned off, turn on the server. Ensure that both the power input LED and the power output LED on the power supply are lit, indicating that the power supply is operating properly.

Demo video

Watch the procedure on YouTube

Processor and heat sink replacement (trained technician only)

Follow the instruction in this section to replace an assembled processor and heat sink, known as a processor-heat-sink module (PHM), a processor, or a heat sink.

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

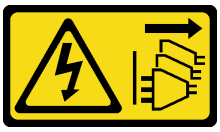
Attention: Before reusing a processor or heat sink, make sure that you use Lenovo proven alcohol cleaning pad and thermal grease.

Remove a processor and heat sink

This task has instructions for removing an assembled processor and heat sink, known as a processor-heat-sink module (PHM). This task requires a Torx T30 screwdriver. This procedure must be executed by a trained technician.

About this task

S002



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

Attention:

- Read “Installation Guidelines” on page 1 and “Safety inspection checklist” on page 2 to ensure that you work safely.
- To transfer Intel® On Demand Suite from the defective processor to the new processor, read the PPIN of the defective processor before powering off the system. For more information, see “Enable Intel® On Demand” in *User Guide*.
- Power off the server and peripheral devices and disconnect the power cords and all external cables. See “Power off the server” on page 32.
- Prevent exposure to static electricity, which might lead to system halt and loss of data, by keeping static-sensitive components in their static-protective packages until installation, and handling these devices with an electrostatic-discharge wrist strap or other grounding system.
- Each processor socket must always contain a cover or a PHM. When removing or installing a PHM, protect empty processor sockets with a cover.
- Do not touch the processor socket or processor contacts. Processor-socket contacts are very fragile and easily damaged. Contaminants on the processor contacts, such as oil from your skin, can cause connection failures.
- Do not allow the thermal grease on the processor or heat sink to come in contact with anything. Contact with any surface can compromise the thermal grease, rendering it ineffective. Thermal grease can damage components, such as the electrical connectors in the processor socket.
- Remove and install only one PHM at a time. If the system supports multiple processors, install the PHMs starting with the first processor socket.

Note: The heat sink, processor, and processor carrier for your system might be different from those shown in the illustrations.

The following illustration shows the components of the PHM.

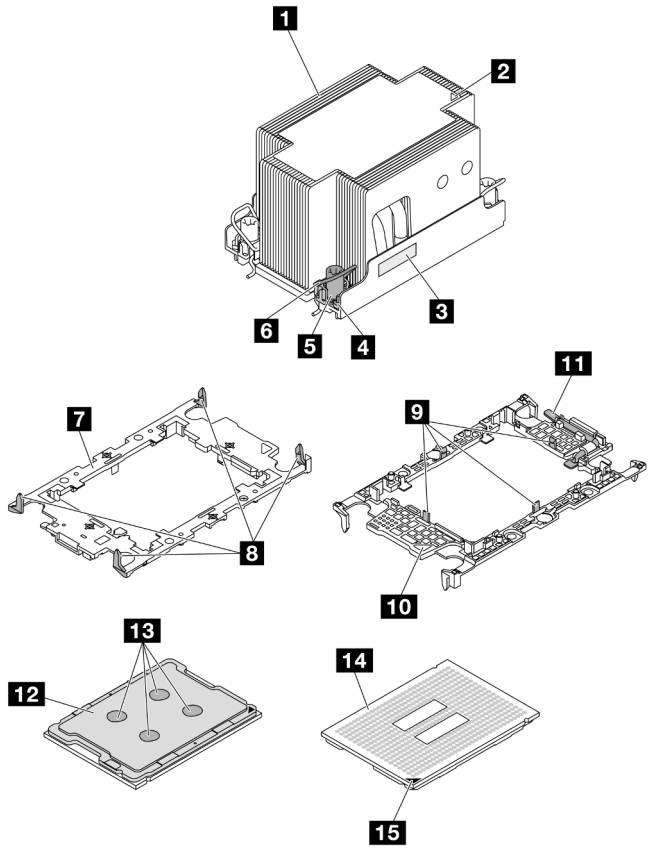


Figure 199. PHM components

1 Heat sink	9 Clips to secure processor in carrier
2 Heat sink triangular mark	10 Carrier triangular mark
3 Processor identification label	11 Processor ejector handle
4 Nut and wire bail retainer	12 Processor heat spreader
5 Torx T30 nut	13 Thermal grease
6 Anti-tilt wire bail	14 Processor contacts
7 Processor carrier	15 Processor triangular mark
8 Clips to secure carrier to heat sink	

Procedure

Step 1. Make preparations for this task.

a. If the server is installed in a rack, slide the server out on its rack slide rails to gain access to the top cover, or remove the server from the rack. See “Remove the server from rack” on page 32.

b. Remove the top cover. See “Remove the top cover” on page 318.

c. If your server comes with an air baffle or a middle cage, remove it first.

- “Remove the air baffle” on page 44
- “Remove the middle drive cage and drive backplanes” on page 193

d. Remove the system fan cage. “Remove the system fan cage” on page 311.

Step 2. Remove the PHM from the system board assembly.

Notes:

- Do not touch the contacts on the bottom of the processor.
- Keep the processor socket clean from any object to prevent possible damages.
- The procedure of replacing an entry PHM is the same as that of replacing a standard PHM.

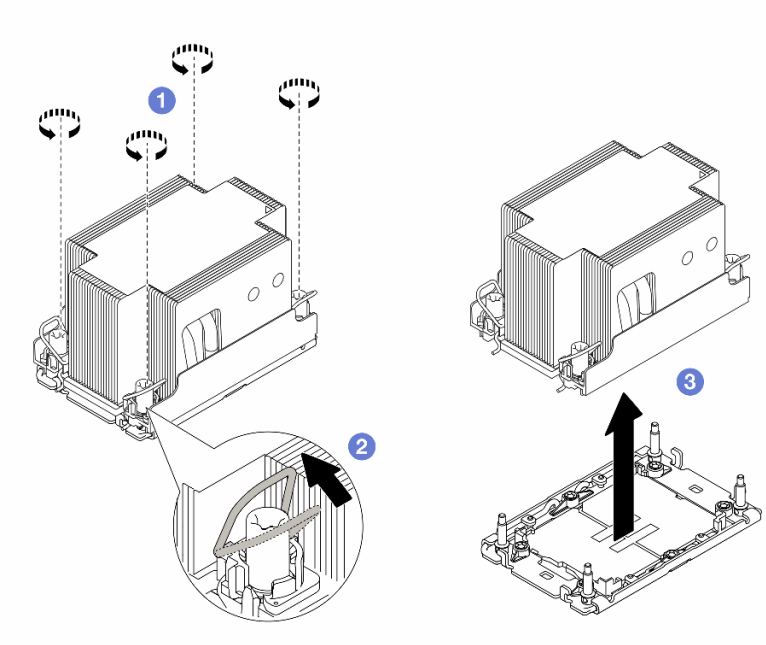


Figure 200. Removing a standard PHM

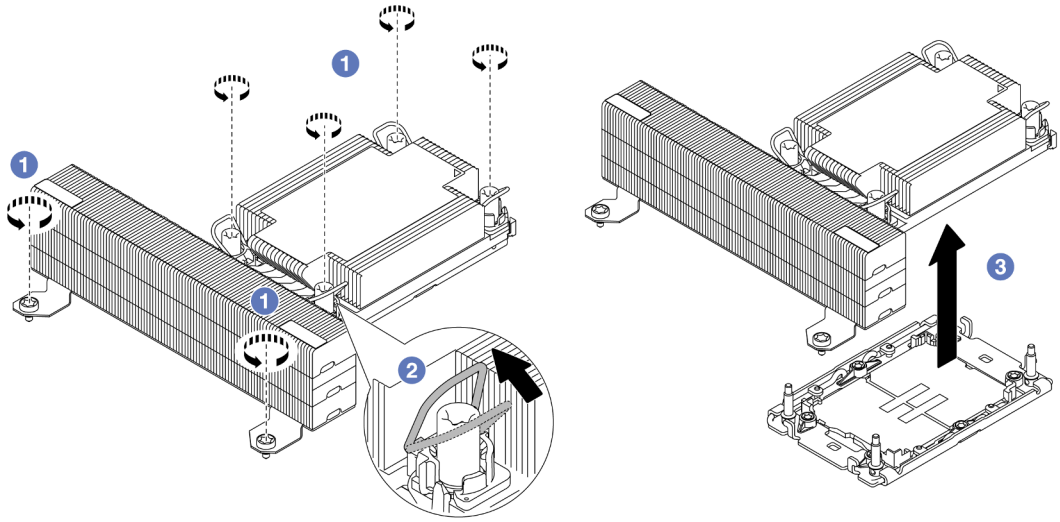


Figure 201. Removing a T-shape performance PHM

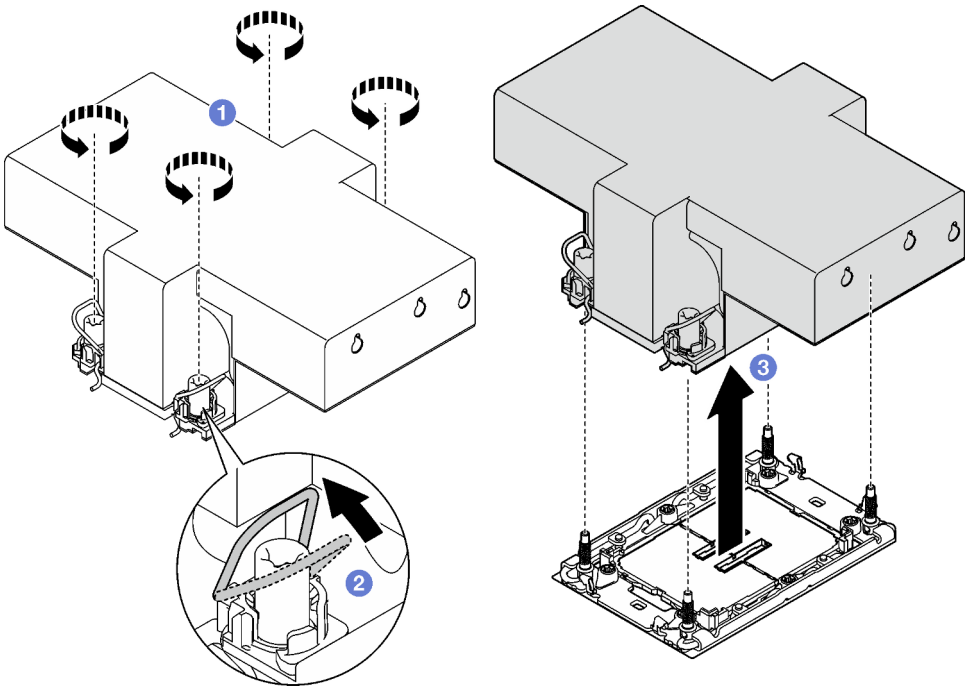


Figure 202. Removing a winged PHM

a. 1 Fully loosen the Torx T30 nuts on the PHM ***in the removal sequence shown*** on the heat-sink label.

b. 2 Rotate the anti-tilt wire bails inward.

c. 3 Carefully lift the PHM from the processor socket. If the PHM cannot be fully lifted out of the socket, further loosen the Torx T30 nuts and try lifting the PHM again.

After you finish

- Each processor socket must always contain a cover or a PHM. Protect empty processor sockets with a cover or install a new PHM.
- If you are not going to install a PHM back, cover the processor socket with the socket cover and install a PHM filler.

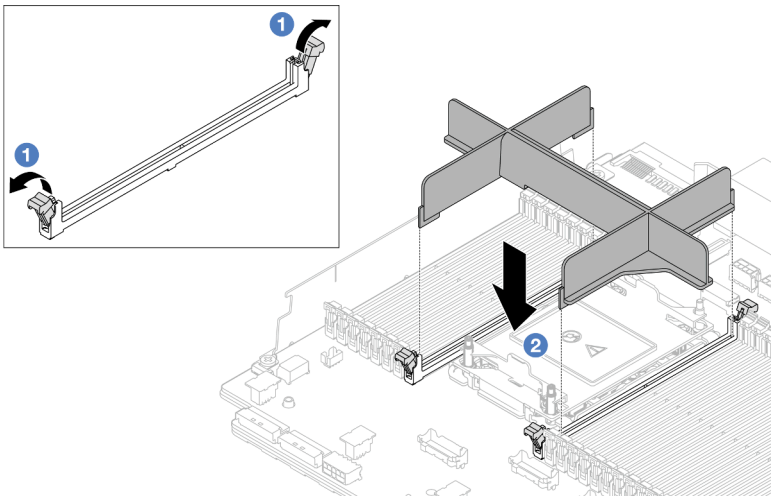


Figure 203. Installing a PHM filler

1. Gently open the retaining clip on each end of the memory module slots next to the left and right sides of the processor.
2. Align the PHM filler with the slots, and place the PHM filler on the slots with both hands. Firmly press the PHM filler straight down into the slots until the retaining clips snap into the locked position.

- If you are removing the PHM as part of a system board assembly replacement, set the PHM aside.
- If you are reusing the processor or heat sink, separate the processor from its retainer. See "Separate the processor from carrier and heat sink" on page 210.
- 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.
- To transfer Intel® On Demand Suite from the defective processor to the new processor, see "Enable Intel® On Demand" in *User Guide*.

Demo video

Watch the procedure on YouTube

Separate the processor from carrier and heat sink

This task has instructions for separating a processor and its carrier from an assembled processor and heat sink, known as a processor-heat-sink module (PHM). This procedure must be executed by a trained technician.

About this task

Attention:

- Read "Installation Guidelines" on page 1 and "Safety inspection checklist" on page 2 to ensure that you work safely.
- Power off the server and peripheral devices and disconnect the power cords and all external cables. See "Power off the server" on page 32.
- Prevent exposure to static electricity, which might lead to system halt and loss of data, by keeping static-sensitive components in their static-protective packages until installation, and handling these devices with an electrostatic-discharge wrist strap or other grounding system.
- Do not touch the processor contacts. Contaminants on the processor contacts, such as oil from your skin, can cause connection failures.

- Do not allow the thermal grease on the processor or heat sink to come in contact with anything. Contact with any surface can compromise the thermal grease, rendering it ineffective. Thermal grease can damage components, such as the electrical connectors in the processor socket.

Note: The heat sink, processor, and processor carrier for your system might be different from those shown in the illustrations.

Procedure

Step 1. Separate the processor from the heat sink and carrier.

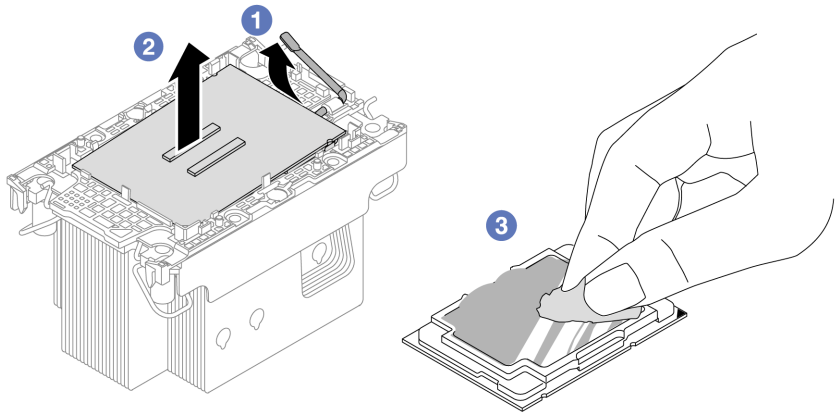


Figure 204. Separating a processor from the heat sink and carrier

Note: Do not touch the contacts on the processor.

a. 1 Lift the handle to release the processor from the carrier.

b. 2 Hold the processor by its edges; then, lift the processor from the heat sink and carrier.

c. 3 Without putting the processor down, wipe the thermal grease from the top of the processor with an alcohol cleaning pad; then, place the processor on a static protective surface with the processor-contact side up.

Step 2. Separate the processor carrier from the heat sink.

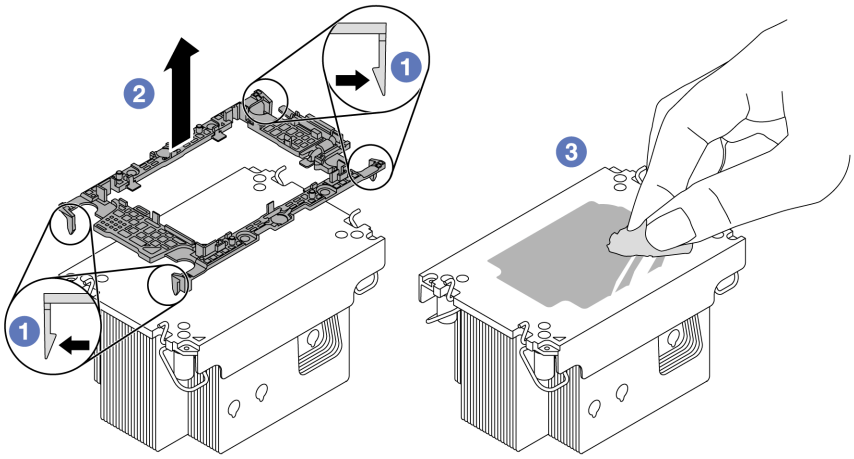


Figure 205. Separating a processor carrier from the heat sink

Note: The processor carrier will be discarded and replaced with a new one.

a. (1) Release the retaining clips from the heat sink.

b. (2) Lift the carrier from the heat sink.

c. (3) Wipe the thermal grease from the bottom of the heat sink with an alcohol cleaning pad.

After you finish

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

Demo video

Watch the procedure on YouTube

Install a processor and heat sink

This task has instructions for installing an assembled processor and heat sink, known as a processor-heat-sink module (PHM). This task requires a Torx T30 screwdriver. This procedure must be executed by a trained technician.

About this task

Attention:

- Read “Installation Guidelines” on page 1 and “Safety inspection checklist” on page 2 to ensure that you work safely.
- Power off the server and peripheral devices and disconnect the power cords and all external cables. See “Power off the server” on page 32.
- Prevent exposure to static electricity, which might lead to system halt and loss of data, by keeping static-sensitive components in their static-protective packages until installation, and handling these devices with an electrostatic-discharge wrist strap or other grounding system.
- Each processor socket must always contain a cover or a PHM. When removing a PHM, protect empty processor sockets with a cover.

- Do not touch the processor socket or processor contacts. Processor-socket contacts are very fragile and easily damaged. Contaminants on the processor contacts, such as oil from your skin, can cause connection failures.
- Do not allow the thermal grease on the processor or heat sink to come in contact with anything. Contact with any surface can compromise the thermal grease, rendering it ineffective. Thermal grease can damage components, such as the electrical connectors in the processor socket.
- Remove and install only one PHM at a time. If the system supports multiple processors, install the PHMs starting with the first processor socket.

Notes:

- The heat sink, processor, and processor carrier for your system might be different from those shown in the illustrations.
- PHMs are keyed for the socket where they can be installed and for their orientation in the socket.
- See https://serverproven.lenovo.com for a list of processors supported for your server. All processors must have the same speed, number of cores, and frequency.
- Before you install a new PHM or replacement processor, update your system firmware to the latest level. See “Update the firmware” in *User Guide* and *System Configuration Guide*.

The following illustration shows the components of the PHM.

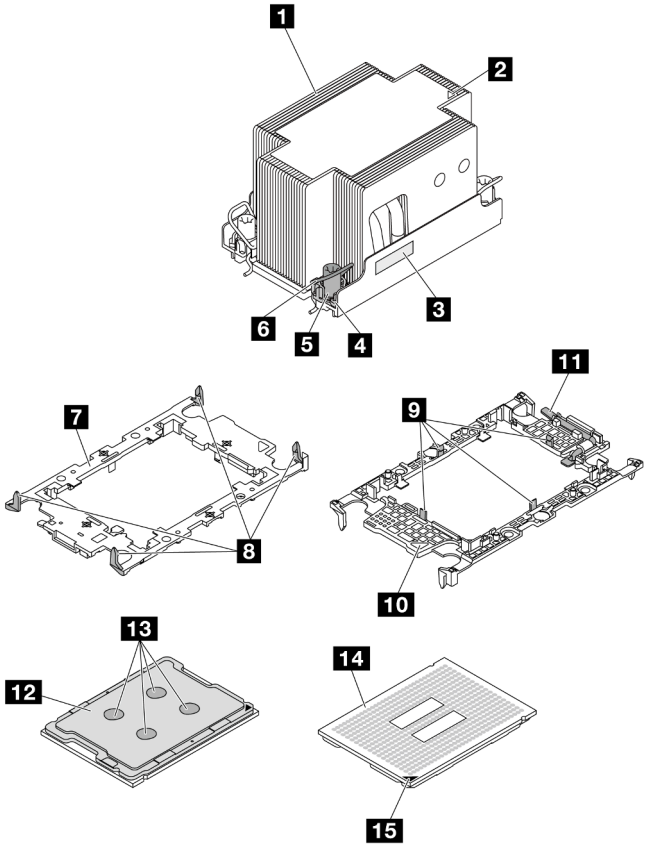


Figure 206. PHM components

1 Heat sink	9 Clips to secure processor in carrier
2 Heat sink triangular mark	10 Carrier triangular mark
3 Processor identification label	11 Processor ejector handle
4 Nut and wire bail retainer	12 Processor heat spreader
5 Torx T30 nut	13 Thermal grease
6 Anti-tilt wire bail	14 Processor contacts
7 Processor carrier	15 Processor triangular mark
8 Clips to secure carrier to heat sink	

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

- Go to https://datacentersupport.lenovo.com/products/servers/thinksystem/sr650v3/downloads/driver-list/ to see the latest firmware and driver updates for your server.
- Go to "Update the firmware" in *User Guide* or *System Configuration Guide* for more information on firmware updating tools.

Procedure

Step 1. Record the processor identification label.

- If you are replacing a processor and reusing the heat sink, remove the processor identification label from the heat sink and replace it with the new label that comes with the replacement processor.
- If you are replacing a heat sink and reusing the processor, remove the processor identification label from the old heat sink and place it on the new heat sink in the same location.

  Note: If you are unable to remove the label and place it on the new heat sink, or if the label is damaged during transfer, write the processor serial number from the processor identification label on the new heat sink in the same location as the label would be placed using a permanent marker.

Step 2. Install the processor in the new carrier.

- If you are replacing the processor and reusing the heat sink, use the new carrier that comes with the new processor.
- If you are replacing the heat sink and reusing the processor, and if the new heat sink comes with two processor carriers, make sure to use the same type of carrier as the one you discarded.

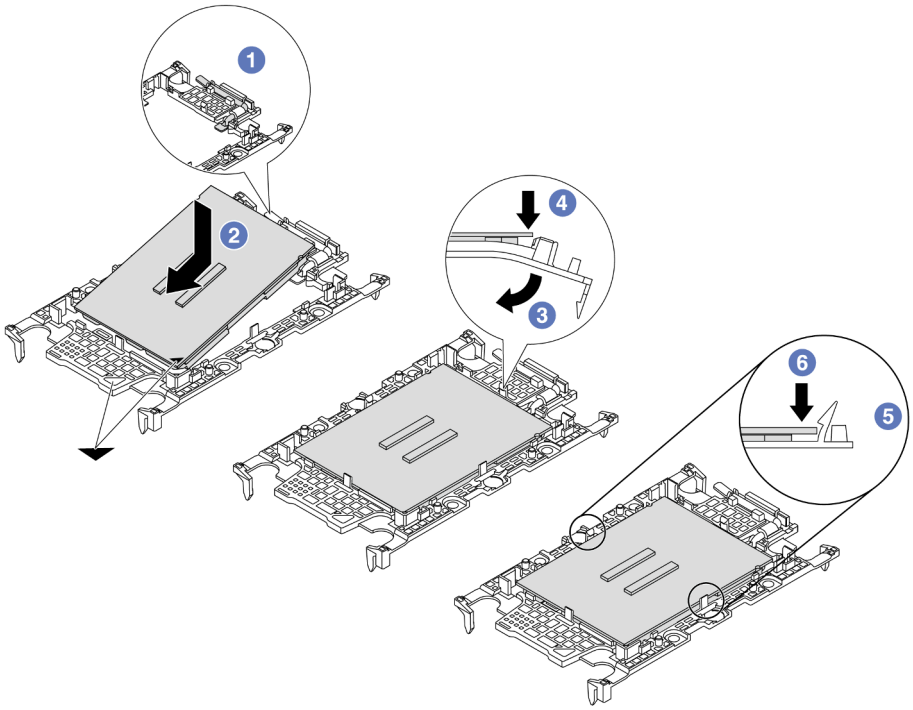


Figure 207. Installing a processor carrier

1. 1 Make sure the handle on the carrier is in the closed position.
2. 2 Align the processor on the new carrier so that the triangular marks align; then, insert the marked end of the processor into the carrier.
3. 3 Hold the inserted end of the processor in place; then, pivot the unmarked end of the carrier down and away from the processor.
4. 4 Press the processor and secure the unmarked end under the clip on the carrier.
5. 5 Carefully pivot the sides of the carrier down and away from the processor.
6. 6 Press the processor and secure the sides under the clips on the carrier.

   Note: To prevent the processor from falling out of the carrier, keep the processor-contact side up and hold the processor-carrier assembly by the sides of the carrier.

Step 3. Apply thermal grease.

- If you are replacing the heat sink and reusing the processor, a new heat sink comes with thermal grease and you do not need to apply new thermal grease.

  Note: To ensure the best performance, check the manufacturing date on the new heat sink and make sure it does not exceed two years. Otherwise, wipe off the existing thermal grease and apply new thermal grease.
- If you are replacing the processor and reusing the heat sink, do the following steps to apply thermal grease:
  1. If there is any old thermal grease on the heat sink, wipe off the thermal grease with an alcohol cleaning pad.

2. Carefully place the processor and carrier in the shipping tray with the processor-contact side down. Make sure the triangular mark on the carrier is oriented in the shipping tray as shown below.
3. Apply the thermal grease on the top of the processor with syringe by forming four uniformly spaced dots, while each dot consists of about 0.1 ml of thermal grease.

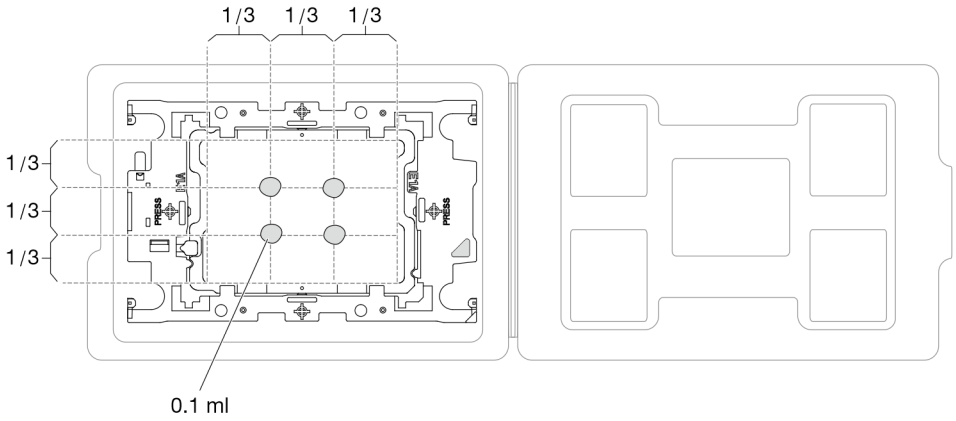


Figure 208. Thermal grease application with processor in shipping tray

Step 4. Assemble the processor and heat sink.

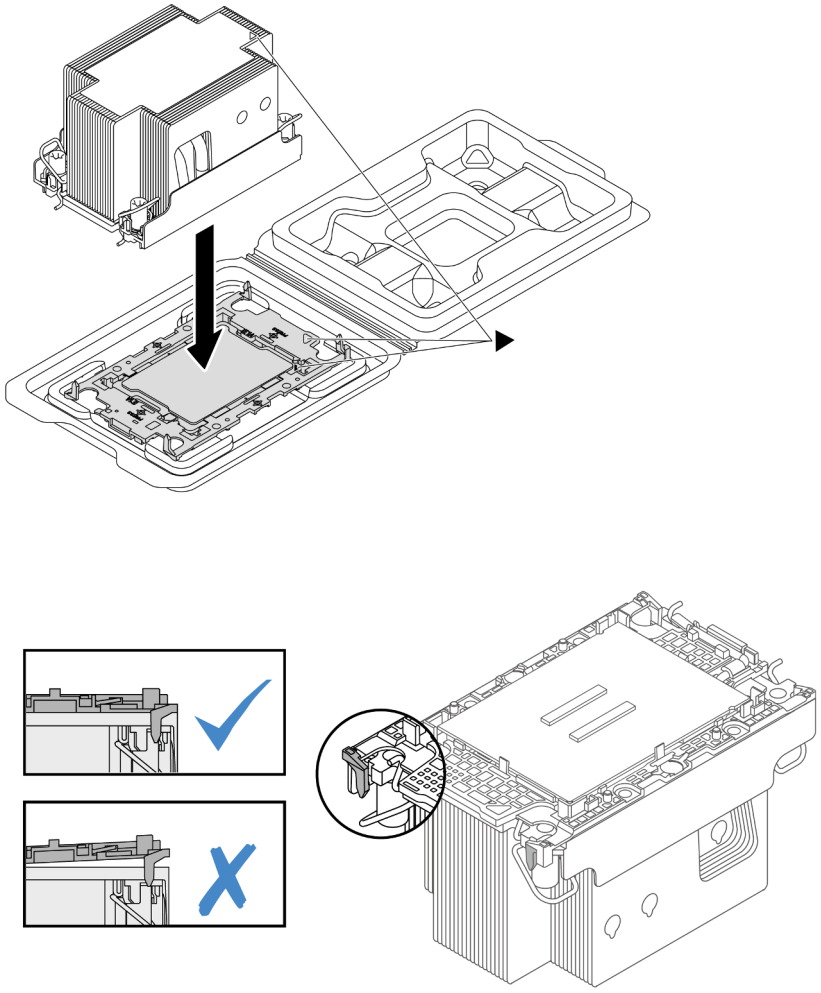


Figure 209. Assembling the PHM with processor in shipping tray

a. Align the triangular mark on the heat sink label with the triangular mark on the processor carrier and processor.

b. Install the heat sink onto the processor-carrier.

c. Press the carrier into place until the clips at all four corners engage. Visually inspect to make sure that there is no gap between the processor carrier and the heat sink.

Step 5. Install the processor-heat-sink module into the processor socket.

Notes:

- Do not touch the contacts on the bottom of the processor.
- If the processor socket is covered with a PHM filler and socket cover, remove them first. Keep the processor socket clean from any object to prevent possible damages.

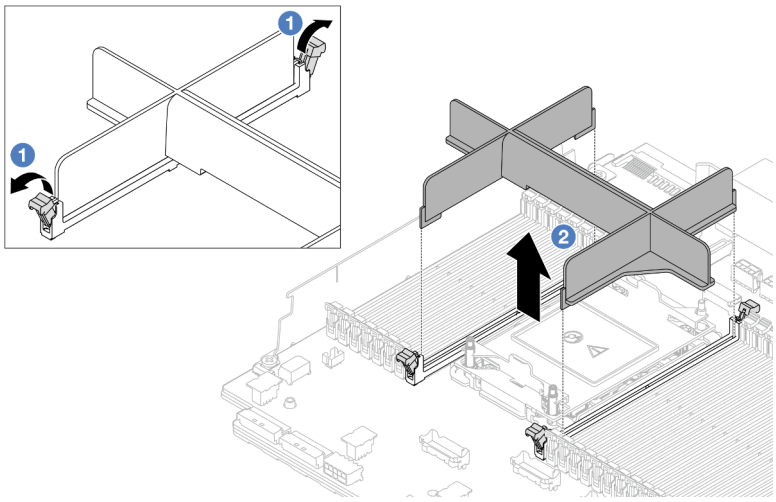


Figure 210. Removing a PHM filler

- The procedure of replacing an entry PHM is the same as that of replacing a standard PHM.

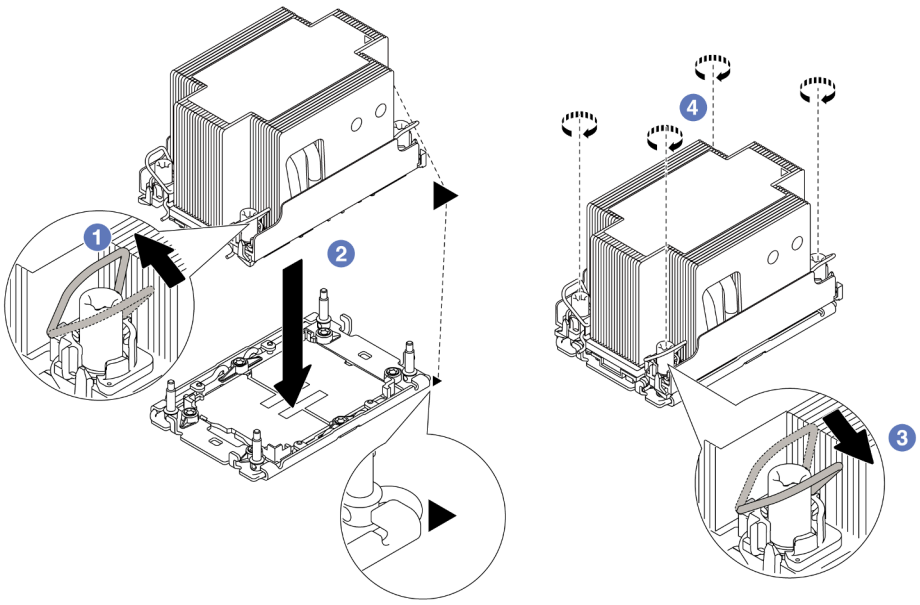


Figure 211. Installing a standard PHM

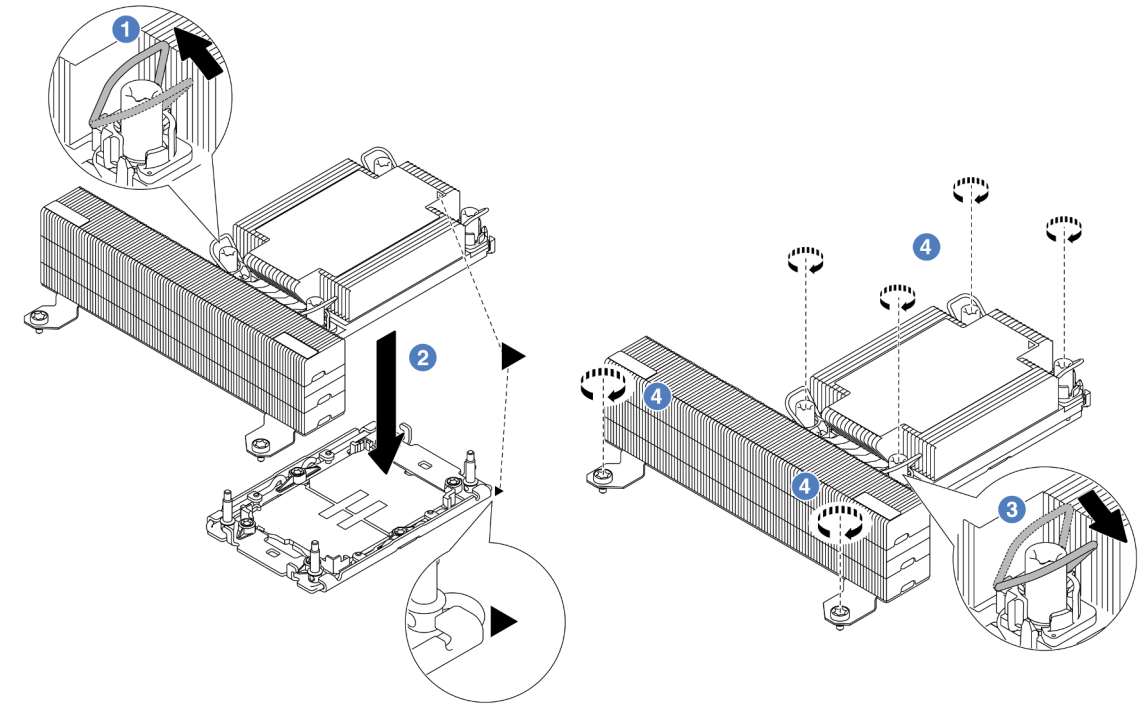


Figure 212. Installing a T-shape performance PHM

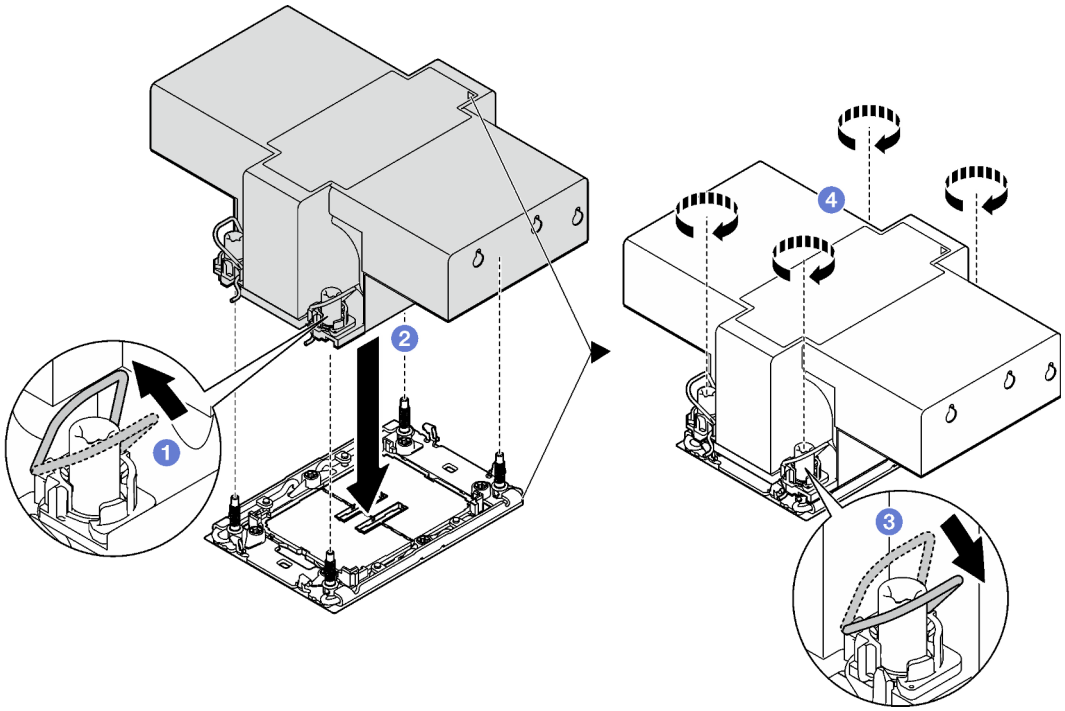


Figure 213. Installing a winged heat sink

a. 1 Rotate the anti-tilt wire bails inward.

b. 2 Align the triangular mark and four Torx T30 nuts on the PHM with the triangular mark and threaded posts of the processor socket; then, insert the PHM into the processor socket.

c. 3 Rotate the anti-tilt wire bails outward until they engage with the hooks in the socket.

d. 4 Fully tighten the Torx T30 nuts ***in the installation sequence shown*** on the heat-sink label. Tighten the screws until they stop; then, visually inspect to make sure that there is no gap between the screw shoulder beneath the heat sink and the processor socket. (For reference, the torque required for the fasteners to fully tighten is 0.9-1.3 newton-meters, 8-12 inch-pounds).

After you finish

1. Complete the parts replacement. See “Complete the parts replacement” on page 320.
2. To enable Intel® On Demand Suite to the new processor, or to transfer Intel® On Demand Suite from the defective processor to the new processor, refer to “Enable Intel® On Demand” in *User Guide*.

Demo video

Watch the procedure on YouTube

PSU air baffle replacement

Use this information to remove and install a power-supply-unit (PSU) air baffle.

Notes: The PSU air baffle is needed in the following configurations:

- storage configurations or 16 x 2.5" + FIO configurations with two processors and 2U entry or 2U standard heat sinks
- standard or GPU configurations with two processors (TDP > 150 W) and 2U entry or 2U standard heat sinks

FIO = riser 5 + front OCP

- “Remove a PSU air baffle” on page 220
- “Install a PSU air baffle” on page 221

Remove a PSU air baffle

Use this information to remove a PSU air baffle.

About this task

S033

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

Attention: Read “Installation Guidelines” on page 1 and “Safety inspection checklist” on page 2 to ensure that you work safely.

Power off the server and peripheral devices and disconnect the power cords and all external cables. See “Power off the server” on page 32.

Procedure

Step 1. Make preparation for the task.

a. If the server is installed in a rack, slide the server out on its rack slide rails to gain access to the top cover, or remove the server from the rack. See “Remove the server from rack” on page 32.

b. Remove the top cover. See “Remove the top cover” on page 318.

c. Disconnect the cables adjacent to the PSU air baffle. For proper operation guidelines, see Chapter 2 “Internal cable routing” on page 323.

Step 2. Remove the PSU air baffle.

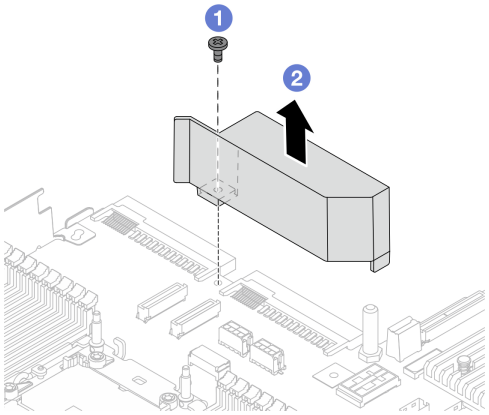


Figure 214. Removing the PSU air baffle

a. 1 Loosen the screw on the air baffle.

b. 2 Lift the air baffle out of the chassis.

After you finish

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

Install a PSU air baffle

Use this information to install a PSU air baffle.

About this task

S033

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

Attention: Read “Installation Guidelines” on page 1 and “Safety inspection checklist” on page 2 to ensure that you work safely.

Power off the server and peripheral devices and disconnect the power cords and all external cables. See “Power off the server” on page 32.

Procedure

Step 1. Install the PSU air baffle.

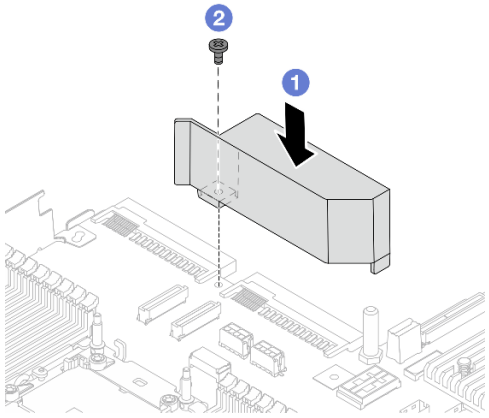


Figure 215. Installing the PSU air baffle

a. 1 Align the screw holes on the air baffle and the chassis, and put the air baffle down.

b. 2 Tighten the screw and ensure that the air baffle is secured in place.

Step 2. Properly route and secure the cables in the server. Refer to detailed cable routing information for each component in Chapter 2 “Internal cable routing” on page 323.

After you finish

Complete the parts replacement. See “Complete the parts replacement” on page 320.

Rack latches replacement

Follow the instructions in this section to remove and install the rack latches.

Notes:

- Depending on the model, the left rack latch might be assembled with a VGA connector and the right rack latch might be assembled with the front I/O module.
- This section uses the right rack latch as an example for illustration. The replacement procedure for the left rack latch is similar.

- “Remove the rack latches” on page 222
- “Install the rack latches” on page 225

Remove the rack latches

Follow the instructions in this section to remove the rack latches.

About this task

Attention:

- Read “Installation Guidelines” on page 1 and “Safety inspection checklist” on page 2 to ensure that you work safely.
- Power off the server and peripheral devices and disconnect the power cords and all external cables. See “Power off the server” on page 32.
- Prevent exposure to static electricity, which might lead to system halt and loss of data, by keeping static-sensitive components in their static-protective packages until installation, and handling these devices with an electrostatic-discharge wrist strap or other grounding system.

Procedure

Step 1. Make preparation for the task.

a. If the server is installed in a rack, slide the server out on its rack slide rails to gain access to the top cover, or remove the server from the rack. See “Remove the server from rack” on page 32.

b. If the server is installed with the security bezel, remove it first. See “Remove the security bezel” on page 290.

c. Remove the top cover. See “Remove the top cover” on page 318.

d. Remove the air baffle. See “Remove the air baffle” on page 44.

e. Remove the system fan cage. See “Remove the system fan cage” on page 311.

Step 2. Disconnect the cable on the rack latch from the system board assembly.

Notes:

- If you need to disconnect cables from the system board assembly, disengage all latches or release tabs on cable connectors first. Failing to release the tab before removing the cables will damage the cable sockets on the system board assembly. Any damage to the cable sockets might require replacing the system board assembly.
- The connectors on your system board assembly might look different from those in the illustration, but the removal procedure is the same.
  1. Press the release tab to release the connector.
  2. Disengage the connector from the cable socket.

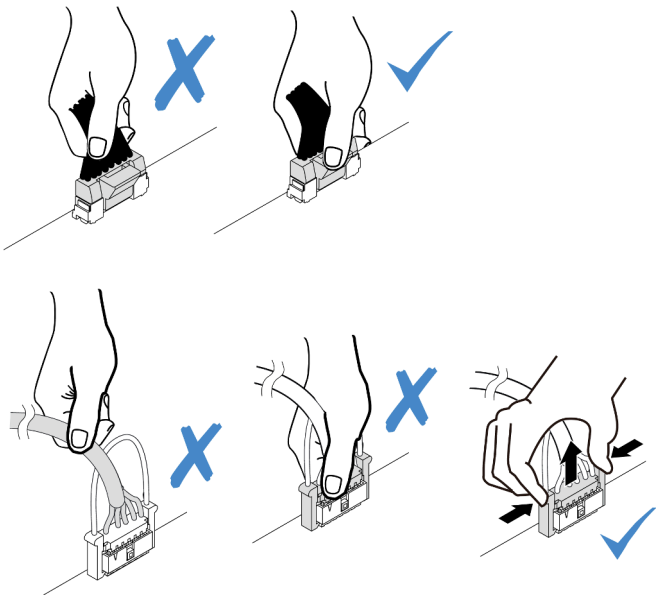


Figure 216. Disconnecting cables from the system board assembly

Step 3. Remove the cable retainer.

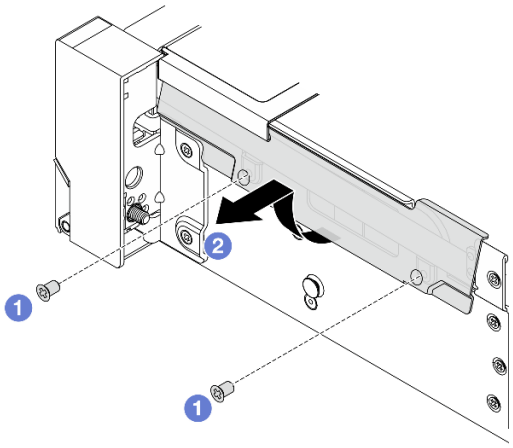


Figure 217. Removing the cable retainer

a. 1 Remove the screws that secure the cable retainer on the side of the server.
b. 2 Rotate the lower part of the cable retainer and remove it from the chassis.

Step 4. Remove the screws that secure the rack latch.

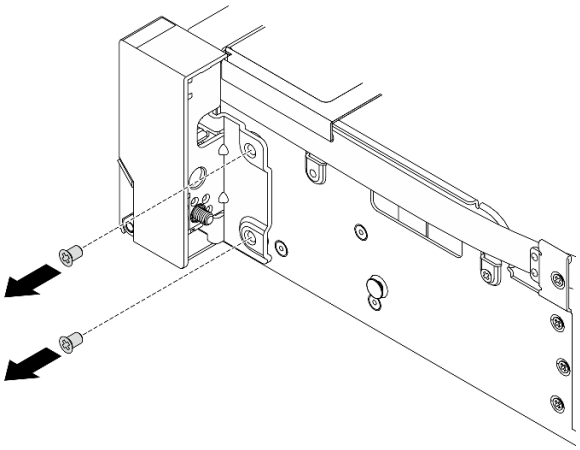


Figure 218. Removing the screws

Step 5. Slide the rack latch forward slightly and then remove the rack latch from the chassis.

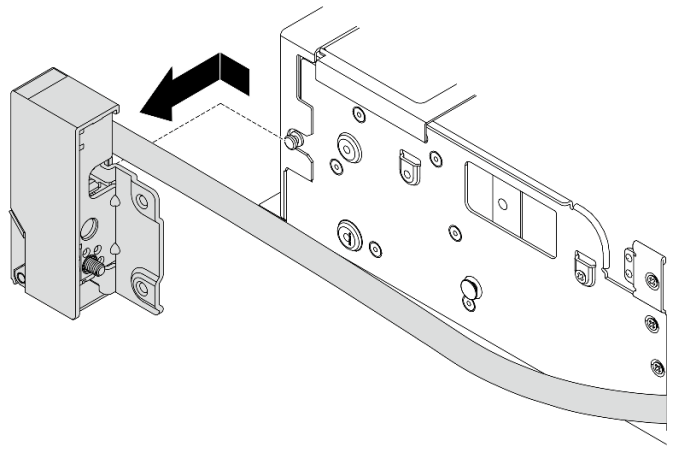


Figure 219. Removing the rack latch

After you finish

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

Demo video

Watch the procedure on YouTube

Install the rack latches

Follow the instructions in this section to install the rack latches.

About this task

Attention:

- Read “Installation Guidelines” on page 1 and “Safety inspection checklist” on page 2 to ensure that you work safely.
- Power off the server and peripheral devices and disconnect the power cords and all external cables. See “Power off the server” on page 32.
- Prevent exposure to static electricity, which might lead to system halt and loss of data, by keeping static-sensitive components in their static-protective packages until installation, and handling these devices with an electrostatic-discharge wrist strap or other grounding system.

Procedure

Step 1. Touch the static-protective package that contains the new part to any unpainted surface on the outside of the server. Then, take the new part out of the package and place it on a static-protective surface.

Step 2. Align the rack latch with the pin on the chassis. Then, press the rack latch onto the chassis and slightly slide it backward.

Note: To avoid damage to the cable, make sure that the cable is properly routed and does not cover the screw holes, as shown below.

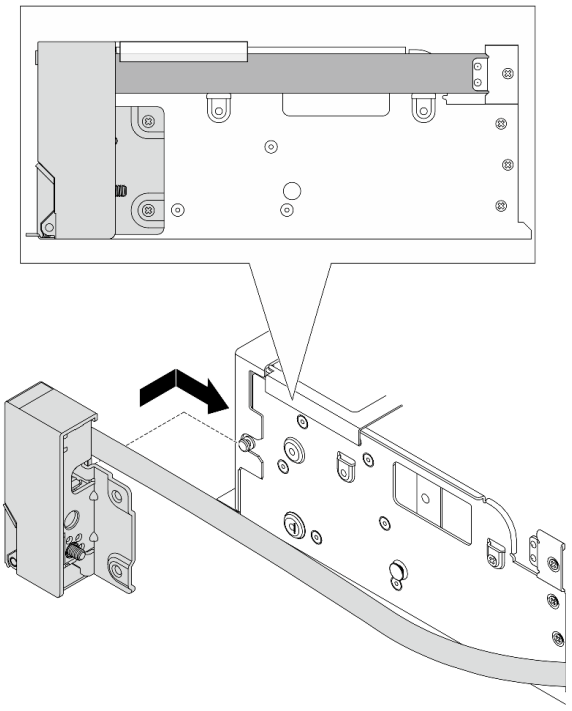


Figure 220. Installing the rack latch

Step 3. Install the screws to secure the rack latch on the side of the server.

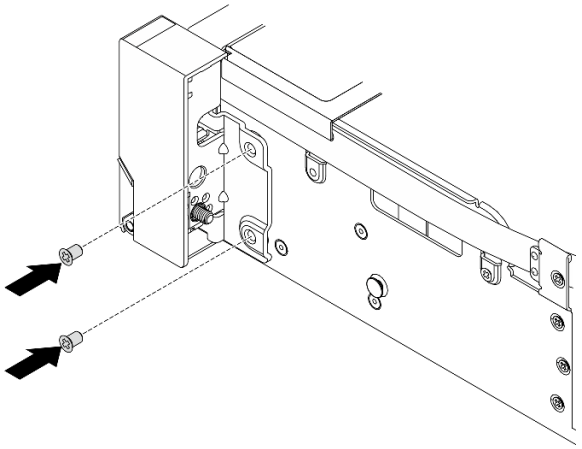


Figure 221. Installing the screws

Step 4. Install the cable retainer.

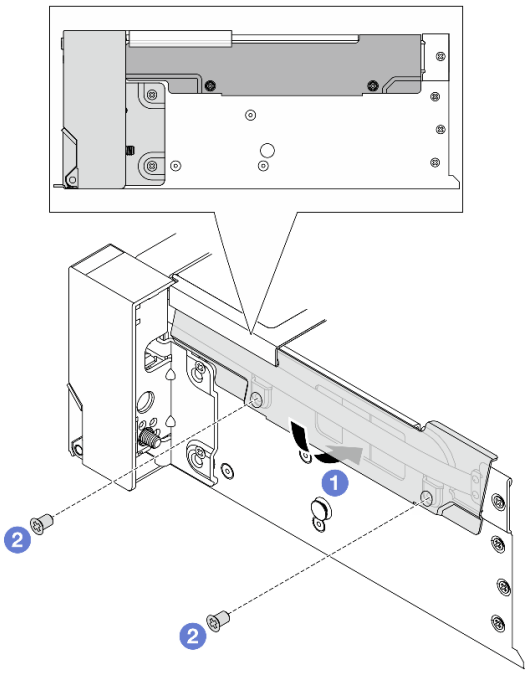


Figure 222. Installing the cable retainer

a. 1 Insert the upper part of the cable retainer into the chassis, and then rotate the lower part to install the rack latch in place.

b. 2 Install the screws to secure the cable retainer.

Step 5. Connect the cable on the rack latch to the system board assembly. See Internal cable routing.

After you finish

1. Install the system fan cage. See “Install the system fan cage” on page 312.
2. Install the air baffle. See “Install the air baffle” on page 46.
3. Complete the parts replacement. See “Complete the parts replacement” on page 320.

Demo video

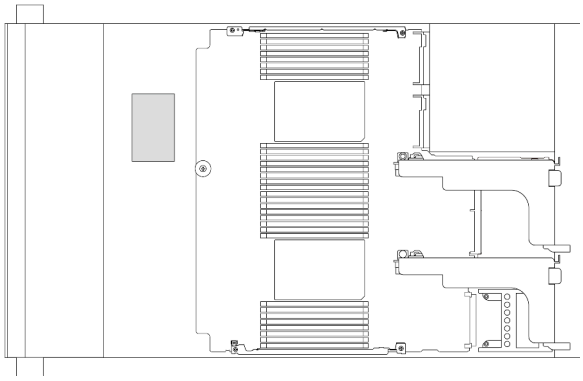
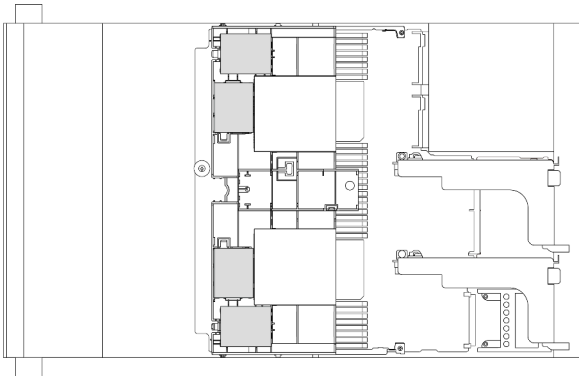
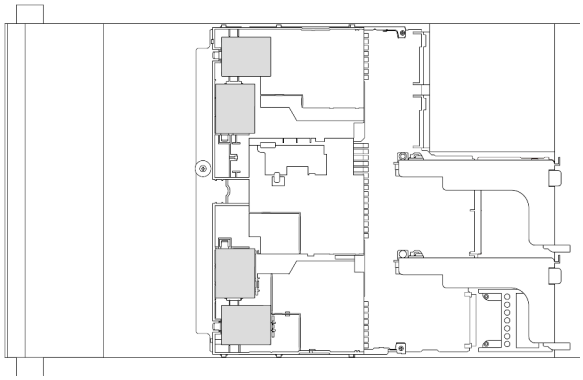
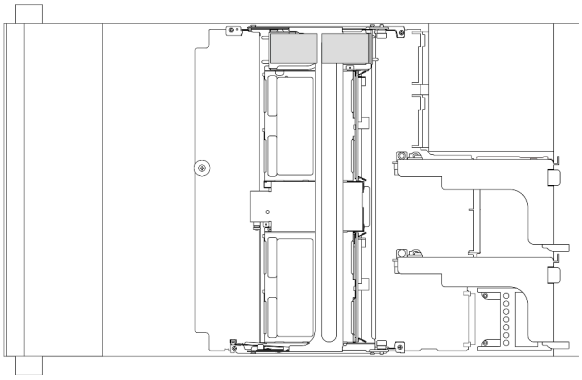
Watch the procedure on YouTube

RAID flash power module replacement

The RAID flash power module protects the cache memory on the installed RAID adapter. Use this information to remove and install a RAID flash power module (also called supercap).

The location of RAID flash power modules varies by the server hardware configurations.

Table 9. Location of RAID flash power modules

Figure 223. On the chassis 	*Figure 224. On standard air baffle* 
Figure 225. On GPU air baffle 	*Figure 226. On the 2.5-inch middle drive cage* 

- “Remove a RAID flash power module from the chassis” on page 228
- “Install a RAID flash power module on the chassis” on page 230
- “Remove a RAID flash power module from the air baffle” on page 232
- “Install a RAID flash power module on the air baffle” on page 233
- “Remove a RAID flash power module from the middle 2.5-inch drive cage” on page 234
- “Install a RAID flash power module on the middle drive cage” on page 235

Remove a RAID flash power module from the chassis

Use this information to remove a RAID flash power module (supercap) from the chassis.

About this task

Attention:

- Read “Installation Guidelines” on page 1 and “Safety inspection checklist” on page 2 to ensure that you work safely.
- Power off the server and peripheral devices and disconnect the power cords and all external cables. See “Power off the server” on page 32.

- 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.
- Before you remove any component of a RAID array (drive, RAID card, etc.), back up all RAID configuration information.

Procedure

Step 1. Make preparation for the task.

a. If the server is installed in a rack, slide the server out on its rack slide rails to gain access to the top cover, or remove the server from the rack. See "Remove the server from rack" on page 32.

b. Remove the top cover. See "Remove the top cover" on page 318.

c. Disconnect the cable of the RAID flash power module.

Step 2. Remove the RAID flash power module.

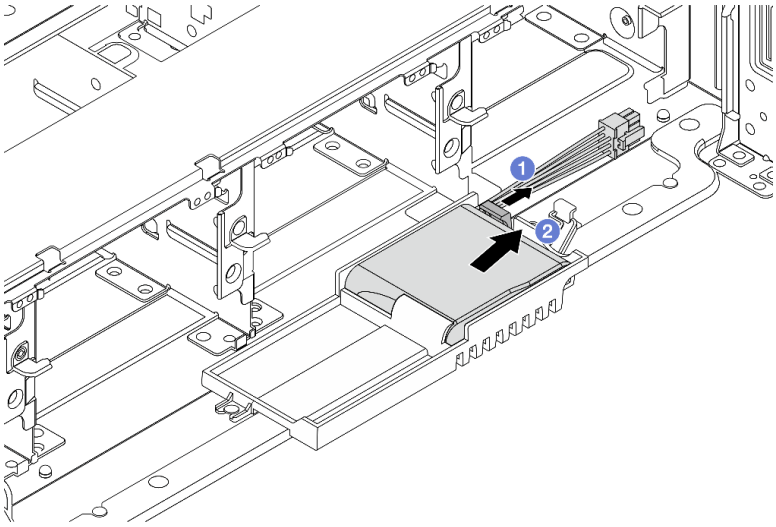


Figure 227. RAID flash power module removal

a. 1 Open the retention clip on the supercap holder.

b. 2 Take the RAID flash power module out of the holder.

Step 3. Remove the supercap holder as shown if necessary.

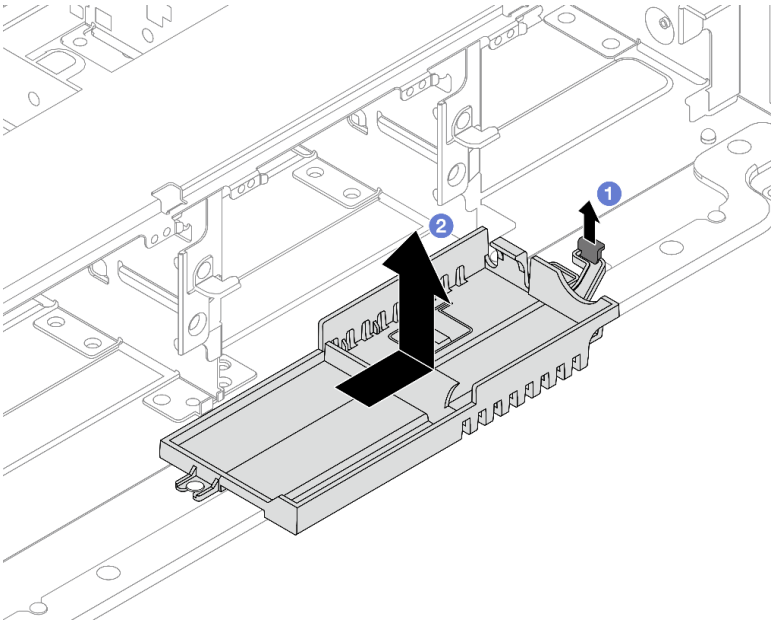


Figure 228. Supercap holder removal

a. 1 Lift the latch.
b. 2 Slide the supercap holder in the shown direction and lift it out of the chassis.

After you finish

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

Install a RAID flash power module on the chassis

Use this information to install a RAID flash power module (also called supercap) on the chassis.

About this task

Attention:

- Read "Installation Guidelines" on page 1 and "Safety inspection checklist" on page 2 to ensure that you work safely.
- Power off the server and peripheral devices and disconnect the power cords and all external cables. See "Power off the server" on page 32.
- Prevent exposure to static electricity, which might lead to system halt and loss of data, by keeping static-sensitive components in their static-protective packages until installation, and handling these devices with an electrostatic-discharge wrist strap or other grounding system.

Procedure

Step 1. Touch the static-protective package that contains the new part to any unpainted surface on the outside of the server. Then, take the new part out of the package and place it on a static-protective surface.

Step 2. Install the supercap holder if you have removed.

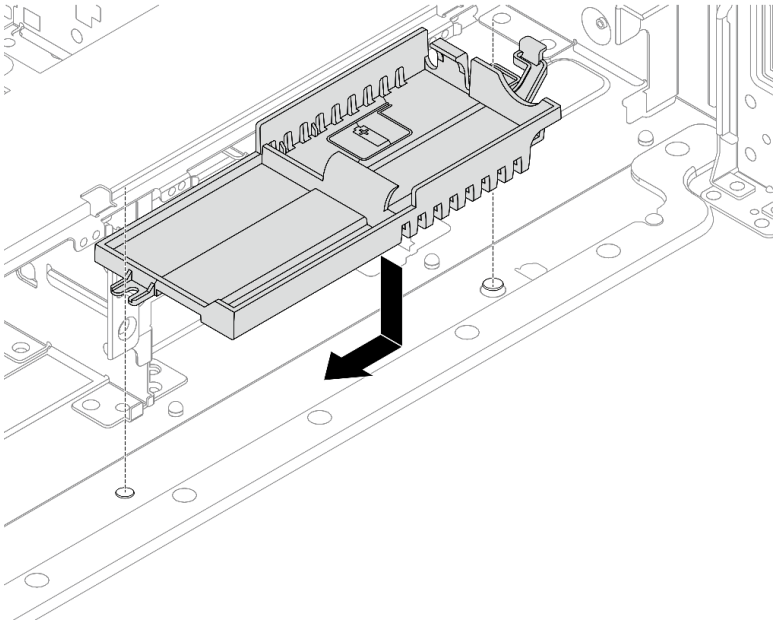


Figure 229. Supercap holder installation

a. Align the keyhole on the supercap holder with the pin on the chassis, and lower the supercap holder into the chassis.

b. Slide the supercap holder in the shown direction until it clicks into place.

Step 3. Install the RAID flash power module.

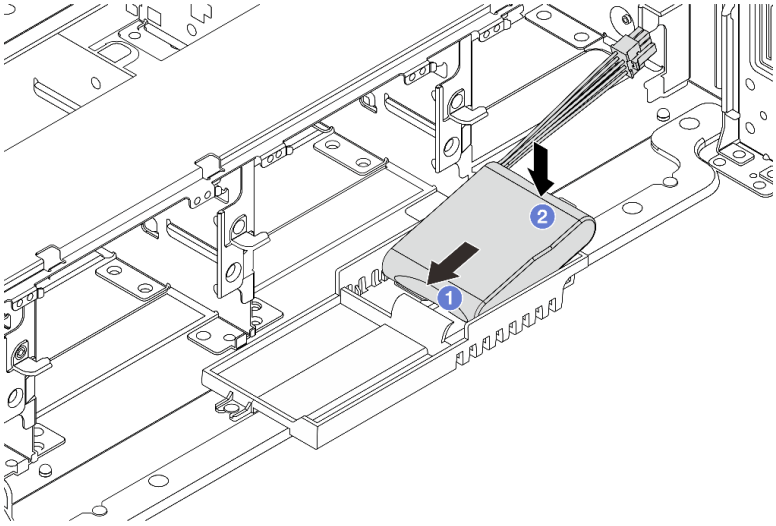


Figure 230. RAID flash power module installation

a. 1 Insert the RAID flash power module into the retaining clip at one side as shown.

b. 2 Press the RAID flash power module down on the other side until it snaps into place.

Step 4. Connect the RAID flash power module to an adapter with the extension cable that comes with the RAID flash power module. See Chapter 2 “Internal cable routing” on page 323.

After you finish

Complete the parts replacement. See “Complete the parts replacement” on page 320

Remove a RAID flash power module from the air baffle

Use this information to remove a RAID flash power module (also called supercap) from the air baffle.

About this task

Attention:

- Read “Installation Guidelines” on page 1 and “Safety inspection checklist” on page 2 to ensure that you work safely.
- Power off the server and peripheral devices and disconnect the power cords and all external cables. See “Power off the server” on page 32.
- 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.
- Before you remove any component of a RAID array (drive, RAID card, etc.), back up all RAID configuration information.

Procedure

Step 1. Make preparation for the task.

a. If the server is installed in a rack, slide the server out on its rack slide rails to gain access to the top cover, or remove the server from the rack. See “Remove the server from rack” on page 32.

b. Remove the top cover. See “Remove the top cover” on page 318.

c. Disconnect the cable of the RAID flash power module.

Step 2. Remove the RAID flash power module from the air baffle.

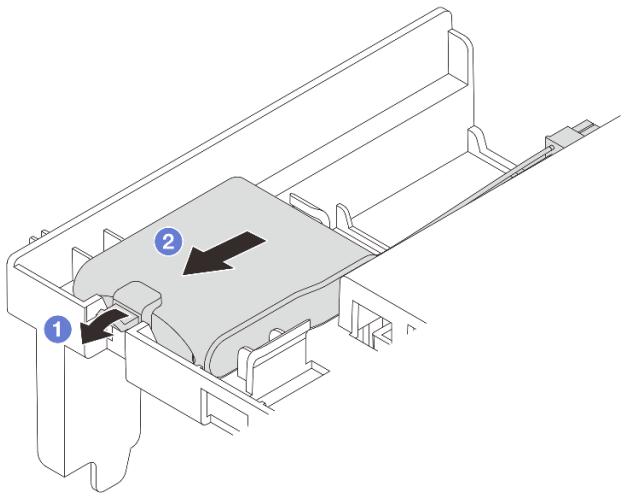


Figure 231. RAID flash power module removal

a. 1 Open the retention clip on the holder of the RAID flash power module.

b. 2 Take the RAID flash power module out of the holder.

After you finish

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

Demo video

Watch the procedure on YouTube

Install a RAID flash power module on the air baffle

Use this information to install a RAID flash power module (also called supercap) on the air baffle.

About this task

Attention:

- Read "Installation Guidelines" on page 1 and "Safety inspection checklist" on page 2 to ensure that you work safely.
- Power off the server and peripheral devices and disconnect the power cords and all external cables. See "Power off the server" on page 32.
- Prevent exposure to static electricity, which might lead to system halt and loss of data, by keeping static-sensitive components in their static-protective packages until installation, and handling these devices with an electrostatic-discharge wrist strap or other grounding system.

Procedure

Step 1. Touch the static-protective package that contains the new part to any unpainted surface on the outside of the server. Then, take the new part out of the package and place it on a static-protective surface.

Step 2. Install the RAID flash power module.

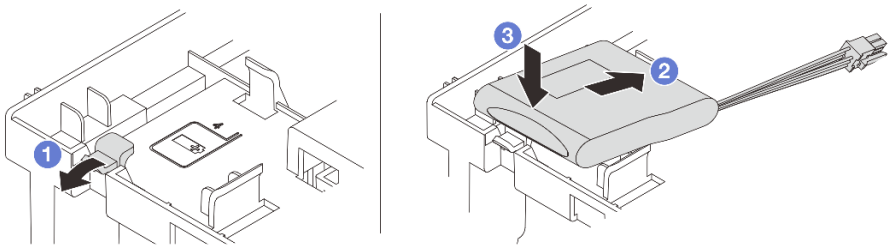


Figure 232. RAID flash power module installation (on the air baffle)

a. 1 Open the retention clip on the holder.

b. 2 Put a RAID flash power module into the holder.

c. 3 Press it down to secure it into the holder.

Step 3. Connect the RAID flash power module to an adapter with the extension cable that comes with the RAID flash power module. See Chapter 2 "Internal cable routing" on page 323.

After you finish

Complete the parts replacement. See "Complete the parts replacement" on page 320.

Demo video

Watch the procedure on YouTube

Remove a RAID flash power module from the middle 2.5-inch drive cage

Use this information to remove a RAID flash power module (also called supercap) from the middle 2.5-inch drive cage.

About this task

Attention:

- Read “Installation Guidelines” on page 1 and “Safety inspection checklist” on page 2 to ensure that you work safely.
- Power off the server and peripheral devices and disconnect the power cords and all external cables. See “Power off the server” on page 32.
- 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.
- Before you remove any component of a RAID array (drive, RAID card, etc.), back up all RAID configuration information.

Procedure

Step 1. Make preparation for the task.

a. If the server is installed in a rack, slide the server out on its rack slide rails to gain access to the top cover, or remove the server from the rack. See “Remove the server from rack” on page 32.

b. Remove the top cover. See “Remove the top cover” on page 318.

c. Disconnect the cable of the RAID flash power module.

Step 2. Open the drive cage handle.

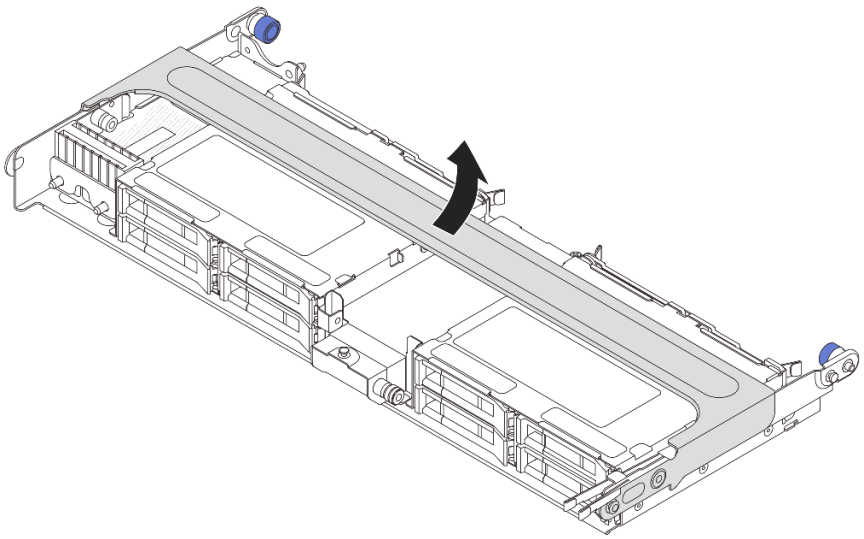


Figure 233. Opening the handle of the middle drive cage

Step 3. Remove the rubber on the cover of the supercap holder.

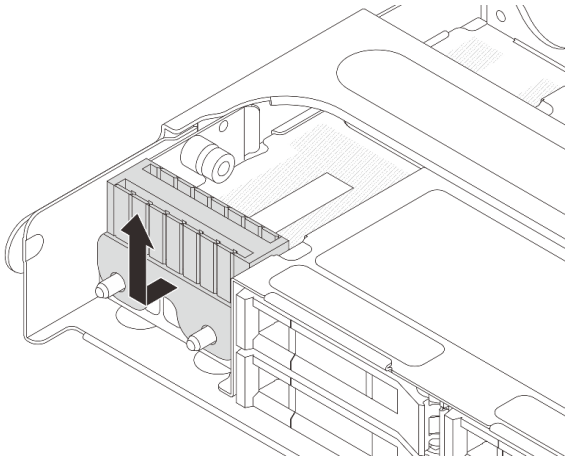


Figure 234. Rubber removal

Step 4. Remove the RAID flash power module from the supercap holder.

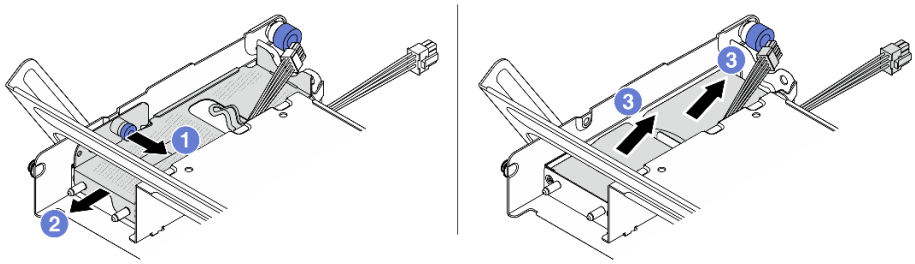


Figure 235. Removing the RAID flash power module

a. 1 Pull out the blue latch on the supercap cover.
b. 2 Slide the cover out of the holder.
c. 3 Take the RAID flash power module out of the holder.

After you finish

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

Demo video

Watch the procedure on YouTube

Install a RAID flash power module on the middle drive cage

Use this information to install a RAID flash power module (also called supercap) on the middle 2.5-inch drive cage.

About this task

Attention:

- Read “Installation Guidelines” on page 1 and “Safety inspection checklist” on page 2 to ensure that you work safely.
- Power off the server and peripheral devices and disconnect the power cords and all external cables. See “Power off the server” on page 32.
- Prevent exposure to static electricity, which might lead to system halt and loss of data, by keeping static-sensitive components in their static-protective packages until installation, and handling these devices with an electrostatic-discharge wrist strap or other grounding system.

Procedure

Step 1. Touch the static-protective package that contains the new part to any unpainted surface on the outside of the server. Then, take the new part out of the package and place it on a static-protective surface.

Step 2. Install the RAID flash power module.

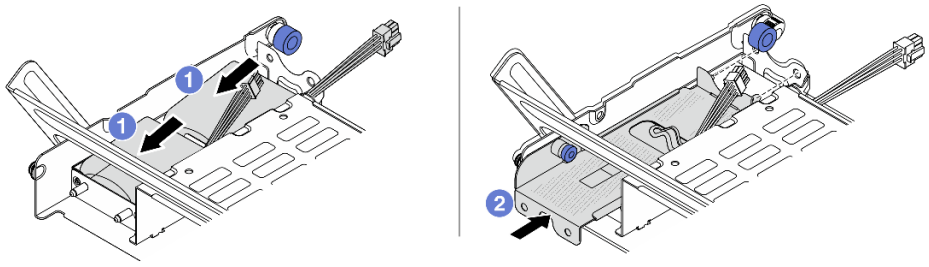


Figure 236. Installing the RAID flash power module

a. 1 Put a RAID flash power module into the holder, and press it down to secure it into the holder.

b. 2 Align the holes in the metal cover with the pins on the supercap holder, pull out the blue latch on the cover, and slide the cover into the holder until the pins pass through the holes. Then, release the blue latch to lock the cover into place.

Step 3. Install the rubber onto the cover of the supercap holder.

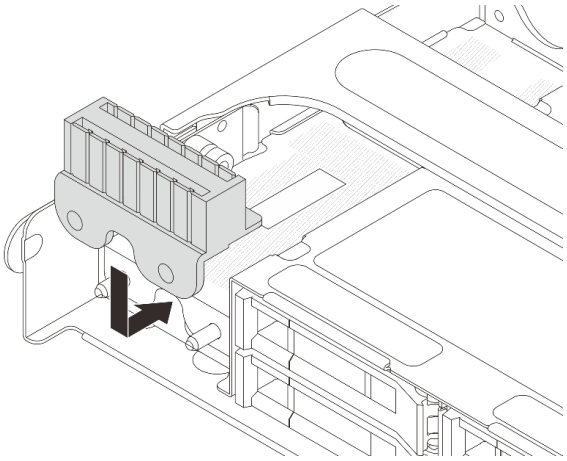


Figure 237. Rubber installation

Step 4. Connect the RAID flash power module to an adapter with the extension cable that comes with the RAID flash power module. See Chapter 2 “Internal cable routing” on page 323.

After you finish

Complete the parts replacement. See “Complete the parts replacement” on page 320.

Demo video

Watch the procedure on YouTube

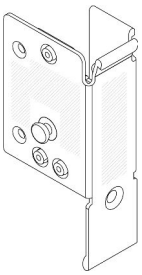
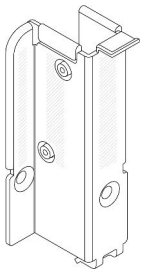
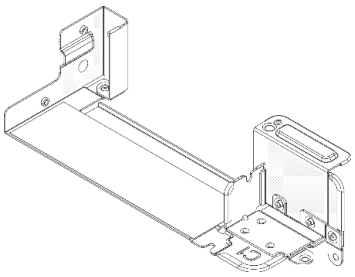
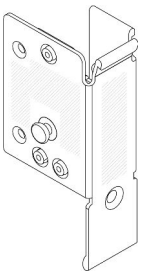
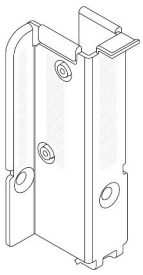
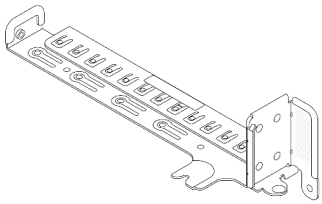
Rearwall bracket replacement

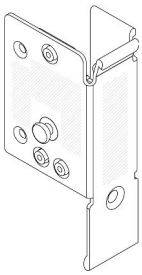
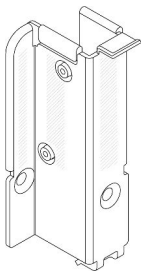
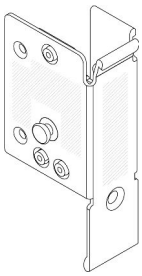
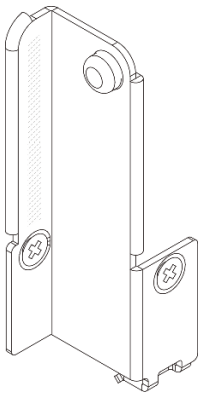
Use this information to remove and install a rearwall bracket.

The rearwall brackets vary by server rear configurations. This topic uses the A1, B1, and C1 brackets as an example for replacement illustration. The replacement procedure is the same for B2 and C2 brackets.

- “Remove a rearwall bracket” on page 238
- “Install a rearwall bracket” on page 240

Rearwall bracket matrix

Server rear config.	Required rearwall brackets		
Configuration with 8 PCIe slots	A1 rearwall bracket on the left 	B1 rearwall bracket on the middle 	C1 rearwall bracket on the right 
Configuration with 4 x 2.5-inch rear drives	A1 rearwall bracket on the left 	B1 rearwall bracket on the middle 	C2 rearwall bracket on the right 

Server rear config.	Required rearwall brackets
Configuration with 2 x 3.5-inch rear drives	A1 rearwall bracket on the left  B1 rearwall bracket on the middle 
Configuration with 8 x 2.5-inch rear drives	A1 rearwall bracket on the left  B2 rearwall bracket on the middle 
Configuration with 4 x 3.5-inch rear drives	The server requires no rearwall brackets

Remove a rearwall bracket

Use this information to remove a rearwall bracket.

About this task

Attention:

- Read “Installation Guidelines” on page 1 and “Safety inspection checklist” on page 2 to ensure that you work safely.
- Power off the server and peripheral devices and disconnect the power cords and all external cables. See “Power off the server” on page 32.
- Prevent exposure to static electricity, which might lead to system halt and loss of data, by keeping static-sensitive components in their static-protective packages until installation, and handling these devices with an electrostatic-discharge wrist strap or other grounding system.

Procedure

Step 1. Make preparation for the task.

a. If the server is installed in a rack, slide the server out on its rack slide rails to gain access to the top cover, or remove the server from the rack. See “Remove the server from rack” on page 32.

b. Remove the top cover. See “Remove the top cover” on page 318.

c. Remove the riser assembly or rear drive cage.

- “Rear PCIe adapter and riser assembly replacement” on page 269
- “Rear drive backplane and drive cage replacement” on page 250

Step 2. Remove the rearwall bracket.

a. 1 Remove the screws.

b. 2 Remove the bracket from the chassis as shown.

Note: The illustrations show removing the A1, B1, and C1 rearwall brackets. The procedure is the same for removing other rearwall brackets.

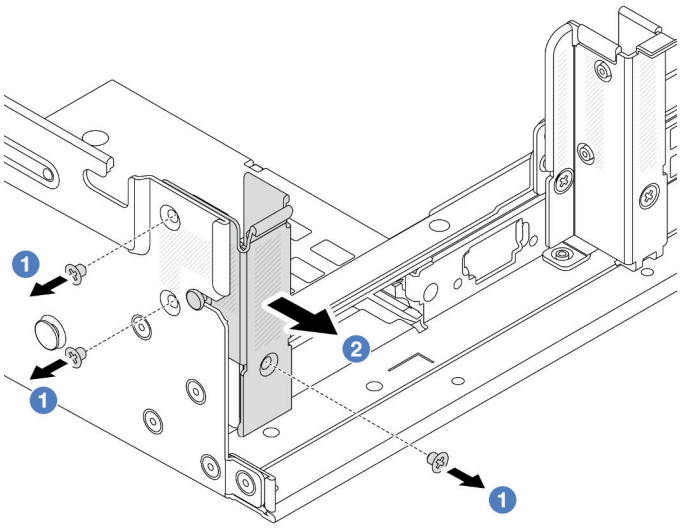


Figure 238. A1 rearwall bracket removal (left)

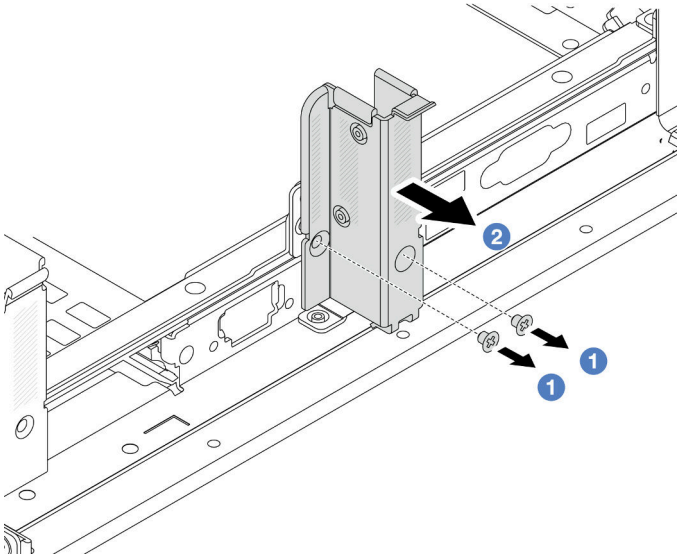


Figure 239. B1 rearwall bracket removal (middle)

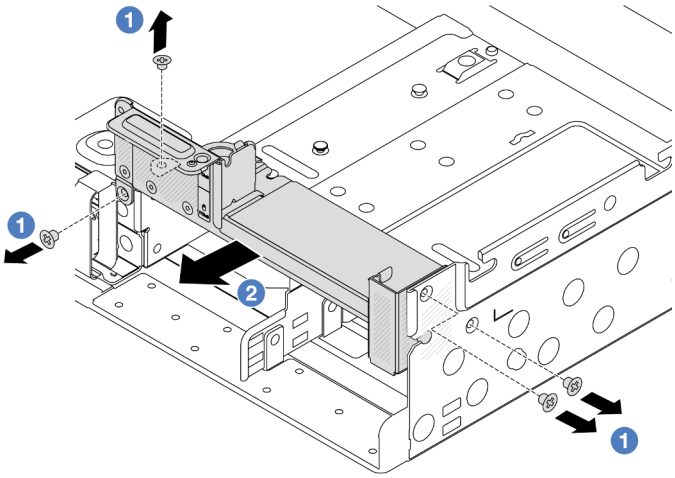


Figure 240. C1 rearwall bracket removal (right)

After you finish

1. Install required rearwall brackets back to the rear chassis.
2. If you are instructed to return the component or optional device, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Demo video

Watch the procedure on YouTube

Install a rearwall bracket

Use this information to install a rearwall bracket.

About this task

Attention:

- Read “Installation Guidelines” on page 1 and “Safety inspection checklist” on page 2 to ensure that you work safely.
- Power off the server and peripheral devices and disconnect the power cords and all external cables. See “Power off the server” on page 32.
- Prevent exposure to static electricity, which might lead to system halt and loss of data, by keeping static-sensitive components in their static-protective packages until installation, and handling these devices with an electrostatic-discharge wrist strap or other grounding system.

Procedure

Step 1. Touch the static-protective package that contains the new part to any unpainted surface on the outside of the server. Then, take the new part out of the package and place it on a static-protective surface.

Step 2. Install the rearwall brackets.

a. (1) Align the rearwall bracket with the chassis, and insert the bracket into place.

b. (2) Install the screws to secure the rearwall bracket.

Note: The illustrations show installing the A1, B1, and C1 rearwall brackets. The procedure is the same for installing other rearwall brackets.

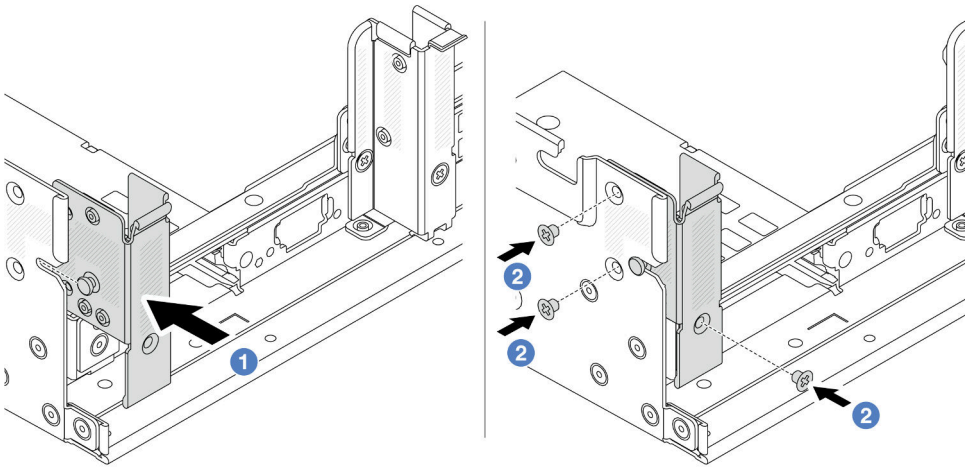


Figure 241. A1 rearwall bracket installation (left)

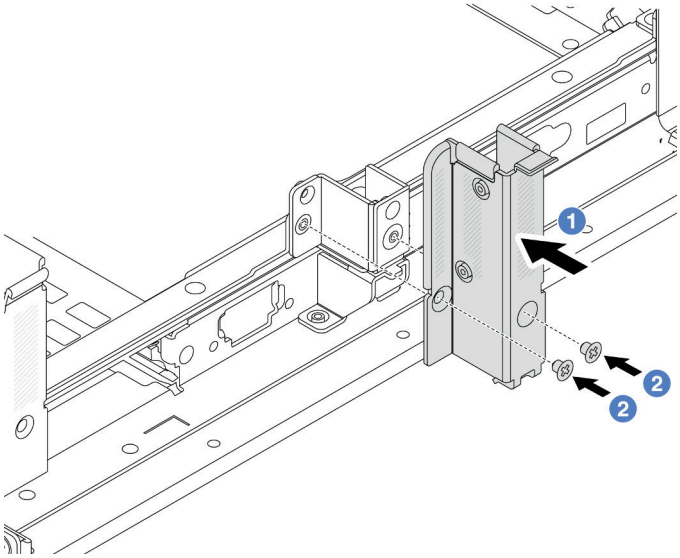


Figure 242. B1 rearwall bracket installation (middle)

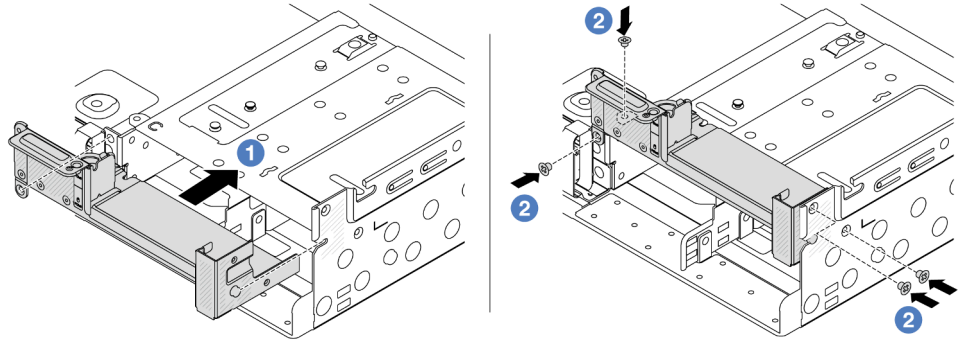


Figure 243. C1 rearwall bracket installation (right)

After you finish

1. Install a rear drive cage or riser assemblies.
   - “Rear PCIe adapter and riser assembly replacement” on page 269
   - “Rear drive backplane and drive cage replacement” on page 250
2. Complete the parts replacement. See “Complete the parts replacement” on page 320.

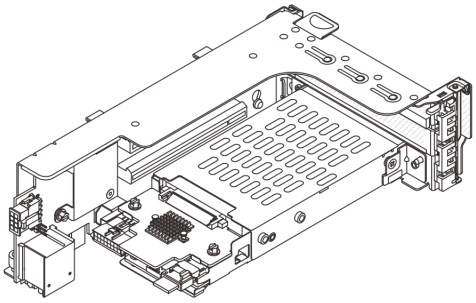
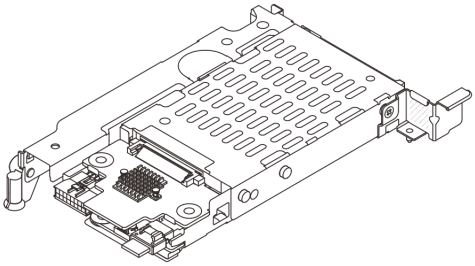
Demo video

Watch the procedure on YouTube

Rear 7mm drive backplane and drive cage replacement

Use this information to remove and install the rear 7mm drive backplanes and drive cage.

Depending on server configuration, the server supports one of the below rear 7mm drive cages. The replacement procedures for both drive cages and drive backplanes are similar. For 7mm drive cage installation rules, see “PCIe slots and PCIe adapters” on page 12.

1 2FH+7mm SSD riser cage	2 7mm SSD riser cage
	

- “Remove the 7mm drive cage” on page 242
- “Remove the 7mm drive backplanes” on page 245
- “Install the 7mm drive backplanes” on page 246
- “Install the 7mm drive cage” on page 248

Remove the 7mm drive cage

Use this information to remove the 7mm drive cage.

About this task

Attention:

- Read “Installation Guidelines” on page 1 and “Safety inspection checklist” on page 2 to ensure that you work safely.
- Power off the server and peripheral devices and disconnect the power cords and all external cables. See “Power off the server” on page 32.

- 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.
- Before you remove or make changes to drives, drive controllers (including controllers that are integrated on the system board assembly), drive backplanes or drive cables, back up all important data that is stored on drives.
- Before you remove any component of a RAID array (drive, RAID card, etc.), back up all RAID configuration information.
- If one or more NVMe solid-state drives are to be removed, it is recommended to disable them beforehand via the operating system.

Procedure

Step 1. Make preparation for the task.

a. If the server is installed in a rack, slide the server out on its rack slide rails to gain access to the top cover, or remove the server from the rack. See “Remove the server from rack” on page 32.

b. Remove the top cover. See “Remove the top cover” on page 318.

c. Remove all the installed drives and fillers (if any) from the drive bays. See “Remove a hot-swap drive” on page 41.

d. Record the cable connections for 7mm drives and then disconnect all cables from the backplanes.

Step 2. Remove the riser assembly with 7mm drive cage from the chassis.

- **2FH+7mm SSD riser cage**

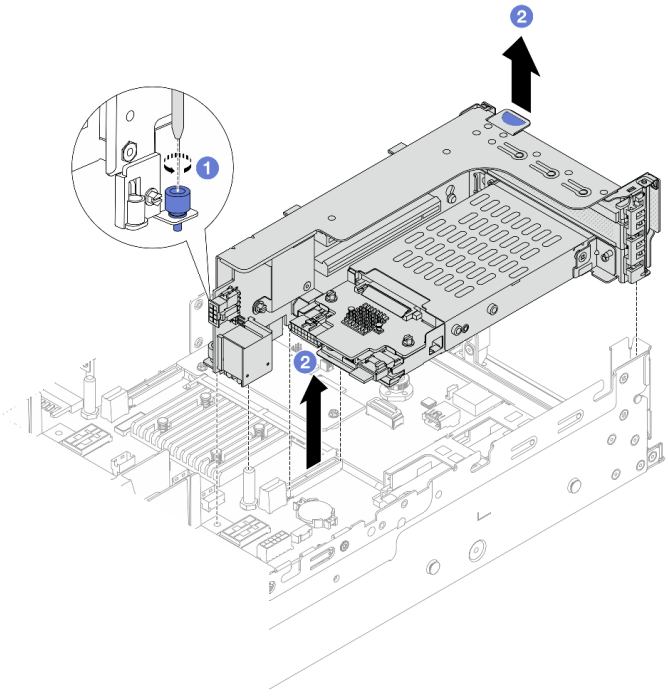


Figure 244. 2FH+7mm SSD riser cage removal

a. 1 Loosen the screw of the riser cage.

b. 2 Carefully lift the riser assembly up from the chassis.

- **7mm SSD riser cage**

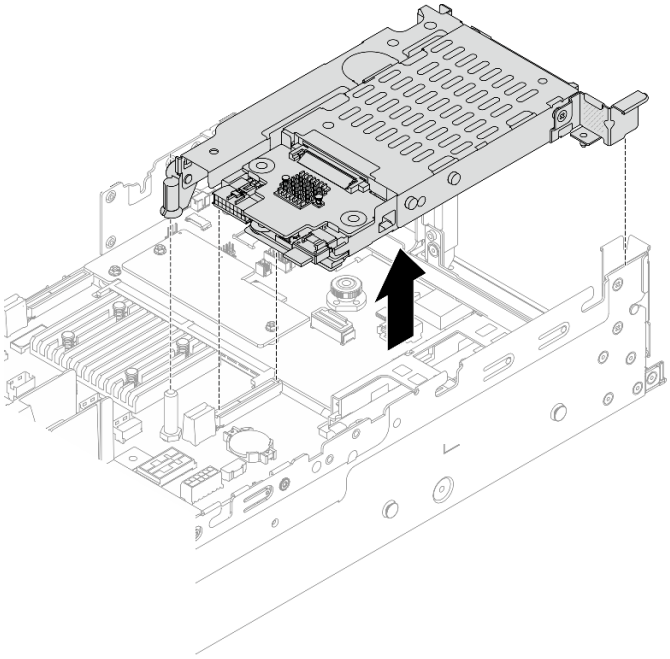


Figure 245. 7mm SSD riser cage removal

Step 3. (Only for the 2FH+7mm SSD riser cage) Remove the 7mm drive cage from the riser assembly.

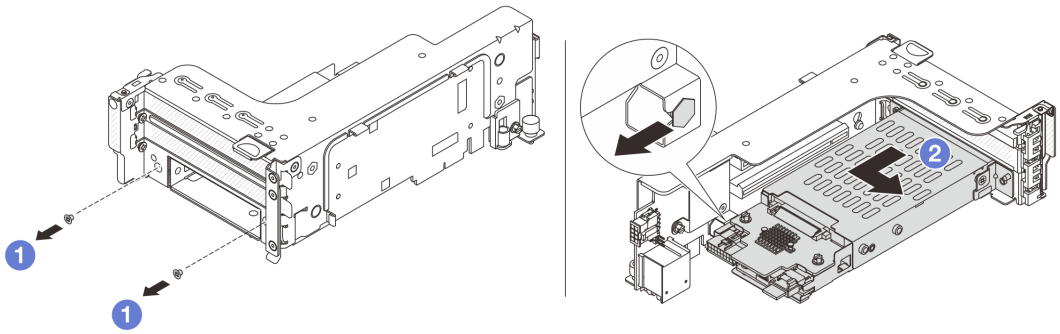


Figure 246. 7mm drive cage removal

a. 1 Remove the two screws.
b. 2 Slightly and horizontally slide the cage out of the riser cage.

After you finish

Remove the two 7mm backplanes. See “Remove the 7mm drive backplanes” on page 245.

Demo video

Watch the procedure on YouTube

Remove the 7mm drive backplanes

Use this information to remove the 7mm drive backplanes.

About this task

Attention:

- Read “Installation Guidelines” on page 1 and “Safety inspection checklist” on page 2 to ensure that you work safely.
- Power off the server and peripheral devices and disconnect the power cords and all external cables. See “Power off the server” on page 32.
- 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.
- Before you remove or make changes to drives, drive controllers (including controllers that are integrated on the system board assembly), drive backplanes or drive cables, back up all important data that is stored on drives.
- Before you remove any component of a RAID array (drive, RAID card, etc.), back up all RAID configuration information.
- If one or more NVMe solid-state drives are to be removed, it is recommended to disable them beforehand via the operating system.

Procedure

Step 1. Remove the 7mm drive backplane on the top.

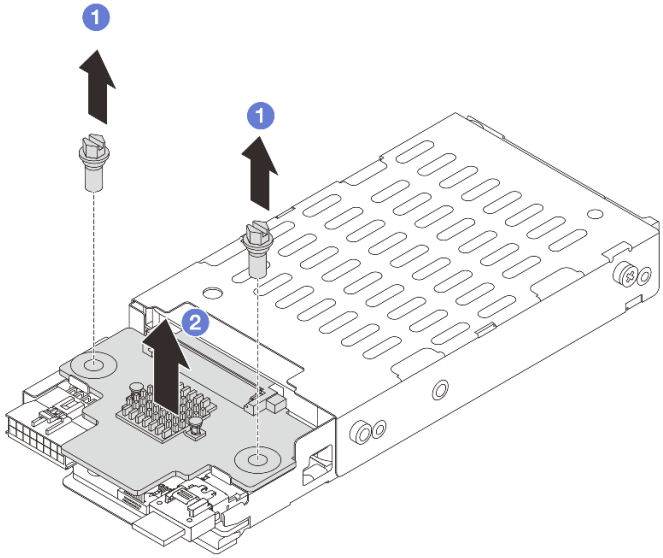


Figure 247. 7mm drive backplane removal (top)

a. 1 Remove the two screws.
b. 2 Vertically lift the backplane up and put it aside.

Step 2. Remove the 7mm drive backplane at the bottom.

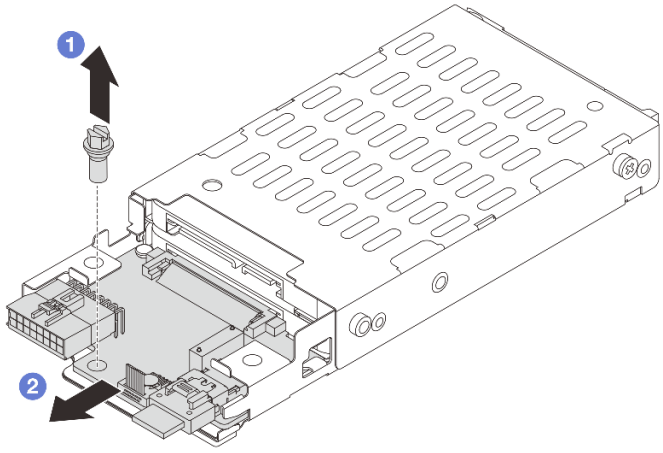


Figure 248. 7mm drive backplane removal (bottom)

a. 1 Remove the screw.
b. 2 Remove the backplane horizontally from the cage as shown.

After you finish

1. Do one of the following:
   - If you are replacing the backplanes, install new backplanes to the drive cage.
   - If you are replacing the drive cage, install the backplanes to a new drive cage.
2. If you are instructed to return the component or optional device, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Demo video

Watch the procedure on YouTube

Install the 7mm drive backplanes

Use this information to install the 7mm drive backplanes.

About this task

Attention:

- Read “Installation Guidelines” on page 1 and “Safety inspection checklist” on page 2 to ensure that you work safely.
- Power off the server and peripheral devices and disconnect the power cords and all external cables. See “Power off the server” on page 32.
- Prevent exposure to static electricity, which might lead to system halt and loss of data, by keeping static-sensitive components in their static-protective packages until installation, and handling these devices with an electrostatic-discharge wrist strap or other grounding system.

Procedure

Step 1. Touch the static-protective package that contains the new part to any unpainted surface on the outside of the server. Then, take the new part out of the package and place it on a static-protective surface.

Step 2. Connect the cables to the backplanes. See Chapter 2 “Internal cable routing” on page 323.

Step 3. Install the 7mm drive backplane at the bottom.

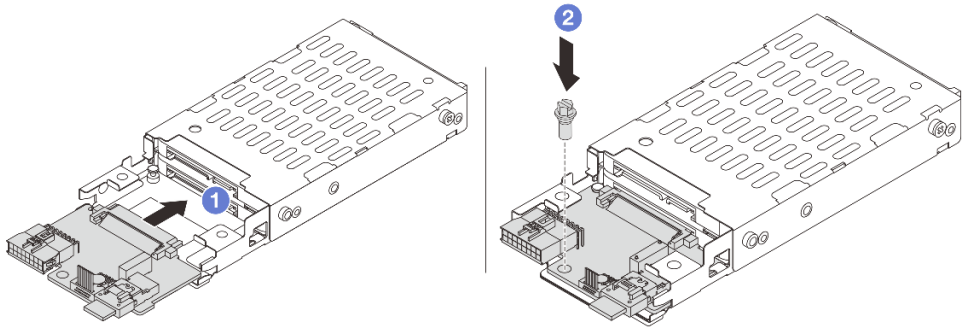


Figure 249. 7mm drive backplane installation (bottom)

a. 1 Align the notch at edge of the backplane with the pin on the cage, and slightly slide the backplane into the cage until it is fully seated.

b. 2 Install the screw to secure it.

Step 4. Install the 7mm drive backplane on the top.

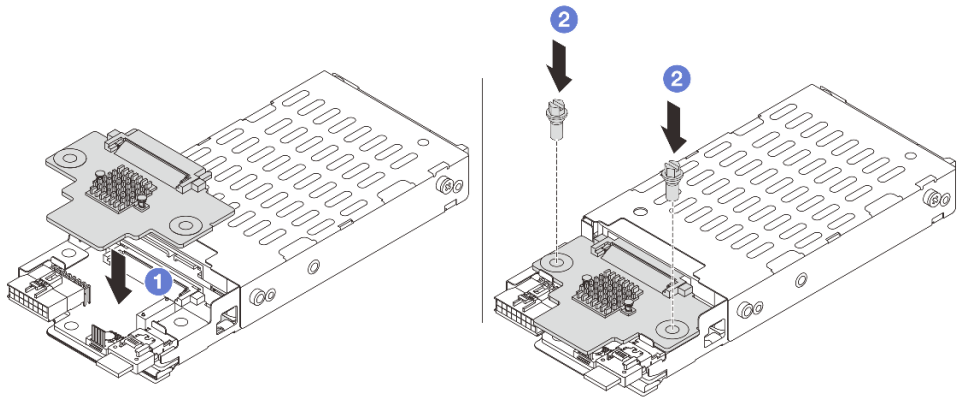


Figure 250. 7mm drive backplane installation (top)

a. 1 Align the holes in the backplane with the holes on the cage, and put the backplane down onto the cage.

b. 2 Install the two screws to secure the backplane in place.

After you finish

Install the 7mm drive cage. See “Install the 7mm drive cage” on page 248.

Demo video

Watch the procedure on YouTube

Install the 7mm drive cage

Use this information to install the 7mm drive cage.

About this task

Attention:

- Read “Installation Guidelines” on page 1 and “Safety inspection checklist” on page 2 to ensure that you work safely.
- Power off the server and peripheral devices and disconnect the power cords and all external cables. See “Power off the server” on page 32.
- Prevent exposure to static electricity, which might lead to system halt and loss of data, by keeping static-sensitive components in their static-protective packages until installation, and handling these devices with an electrostatic-discharge wrist strap or other grounding system.

Procedure

Step 1. (Only for the 2FH+7mm SSD riser cage) Hook the securing clip over the riser adapter on the riser cage.

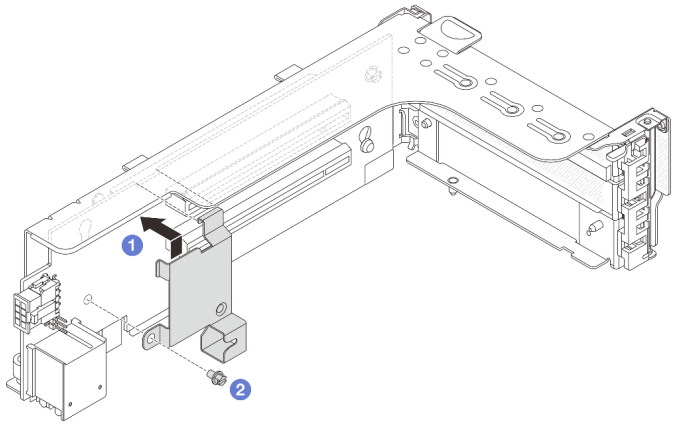


Figure 251. 7mm drive cage securing clip installation

Step 2. (Only for the 2FH+7mm SSD riser cage) Install the 7mm drive cage to the riser cage.

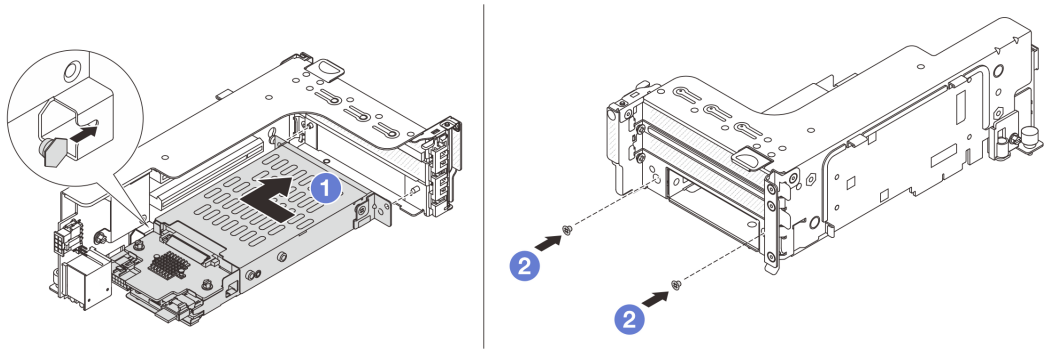


Figure 252. 7mm drive cage installation

a. 1 Align the left-side pin on the 7mm drive cage with the positioning slot on the securing clip, the two holes on the side brackets of the 7mm drive cage with the two holes on the front of the riser cage.

b. 2 Install the two screws to secure the 7mm drive cage in place.

Step 3. Install the 7mm riser assembly to the chassis.

- **2FH+7mm SSD riser cage**

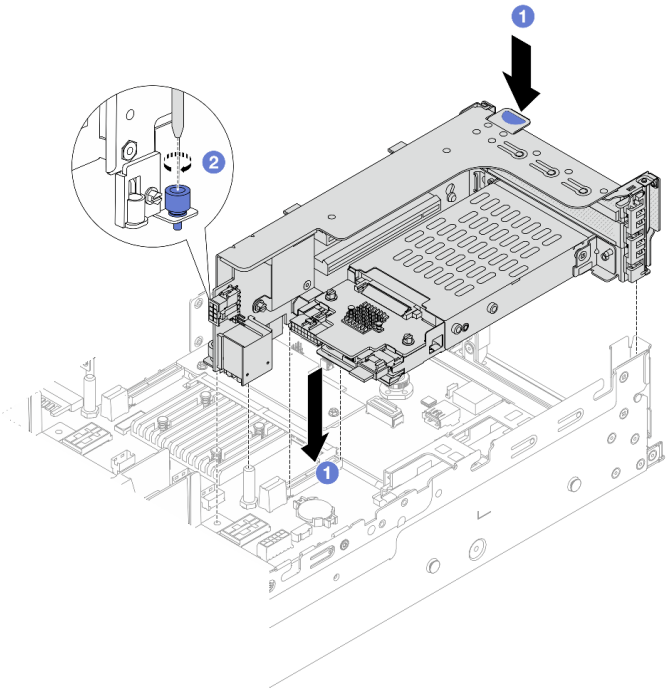


Figure 253. 2FH+7mm SSD riser cage installation

a. 1 Align the riser assembly with the slot on the system board assembly, lower and insert the riser into the riser slot.

b. 2 Tighten the screw to secure the riser assembly in place.

- **7mm SSD riser cage**

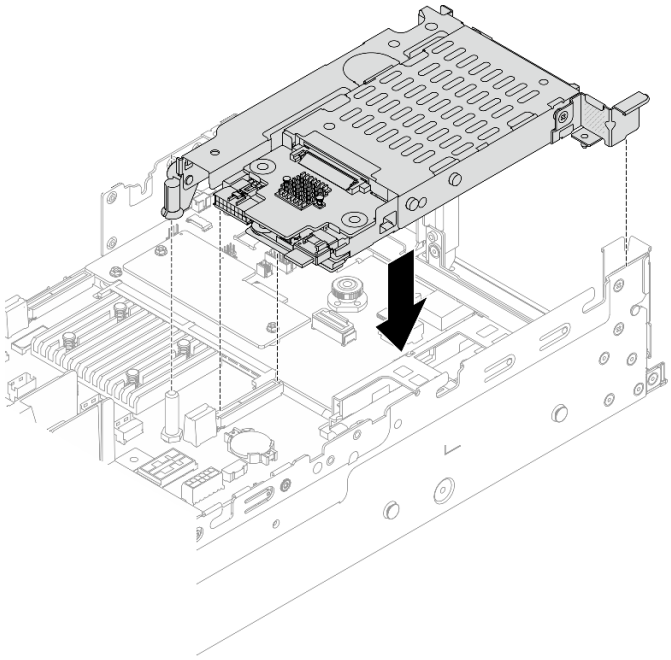


Figure 254. 7mm SSD riser cage installation

Step 4. Connect the cables from the backplanes to the system board assembly. See Chapter 2 “Internal cable routing” on page 323.

After you finish

1. Reinstall all the drives and fillers (if any) into the drive bays. See “Install a hot-swap drive” on page 42.
2. Complete the parts replacement. See “Complete the parts replacement” on page 320.

Demo video

Watch the procedure on YouTube

Rear drive backplane and drive cage replacement

Use this information to remove and install rear drive backplanes and drive cages.

Remove the 4 x 2.5" drive backplane and drive cage

Use this information to remove the rear 2.5-inch 4-bay drive backplane and drive cage.

About this task

Attention:

- Read “Installation Guidelines” on page 1 and “Safety inspection checklist” on page 2 to ensure that you work safely.
- Power off the server and peripheral devices and disconnect the power cords and all external cables. See “Power off the server” on page 32.
- 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.
- Before you remove or make changes to drives, drive controllers (including controllers that are integrated on the system board assembly), drive backplanes or drive cables, back up all important data that is stored on drives.
- Before you remove any component of a RAID array (drive, RAID card, etc.), back up all RAID configuration information.
- If one or more NVMe solid-state drives are to be removed, it is recommended to disable them beforehand via the operating system.

Procedure

Step 1. Make preparation for the task.

a. If the server is installed in a rack, slide the server out on its rack slide rails to gain access to the top cover, or remove the server from the rack. See “Remove the server from rack” on page 32.

b. Remove the top cover. See “Remove the top cover” on page 318.

c. Disconnect cables from the rear drive backplane.

d. Remove all the installed drives and fillers (if any) from the drive bays. See “Remove a hot-swap drive” on page 41.

Step 2. Remove the rear drive cage.

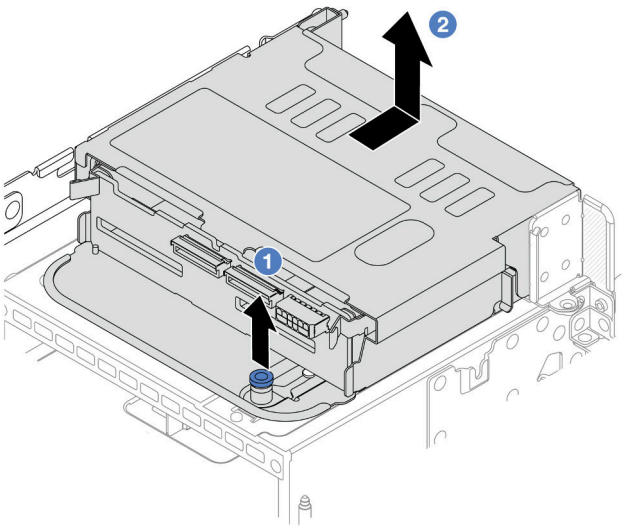


Figure 255. Removing the 4 x 2.5-inch rear drive cage

a. 1 Twist and pull out the blue plungers.

b. 2 Slide the drive cage towards the rear of the chassis to release it.

Step 3. Remove the middle drive backplane.

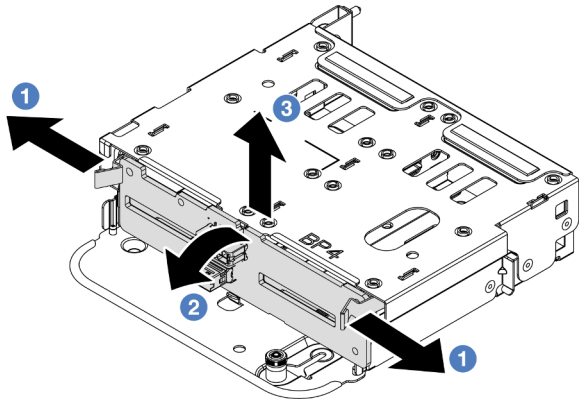


Figure 256. Removing the rear 4 x 2.5-inch drive backplane

a. 1 Open the release latches in the direction as shown.

b. 2 Rotate the backplane from the top to disengage it from the pins on the drive cage.

c. 3 Carefully lift the backplane out of the drive cage.

After you finish

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

Demo video

Watch the procedure on YouTube

Install the 4 x 2.5" drive backplane and drive cage

Use this information to install 2.5-inch 4-bay drive backplane and drive cage.

About this task

Attention:

- Read “Installation Guidelines” on page 1 and “Safety inspection checklist” on page 2 to ensure that you work safely.
- Power off the server and peripheral devices and disconnect the power cords and all external cables. See “Power off the server” on page 32.
- 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.
- The rear drive cage is supported on some server models with thermal requirements. See “Thermal rules” on page 19 to ensure that the server is under permitted ambient temperature and the correct heat sink and system fans are used. If needed, replace your heat sink or system fan first.
  - “Processor and heat sink replacement (trained technician only)” on page 205

– “System fan replacement” on page 306

Procedure

Step 1. Touch the static-protective package that contains the new part to any unpainted surface on the outside of the server. Then, take the new part out of the package and place it on a static-protective surface.

Step 2. Connect cables to the drive backplane. See Chapter 2 “Internal cable routing” on page 323.

Step 3. Install the drive backplane into the rear drive cage.

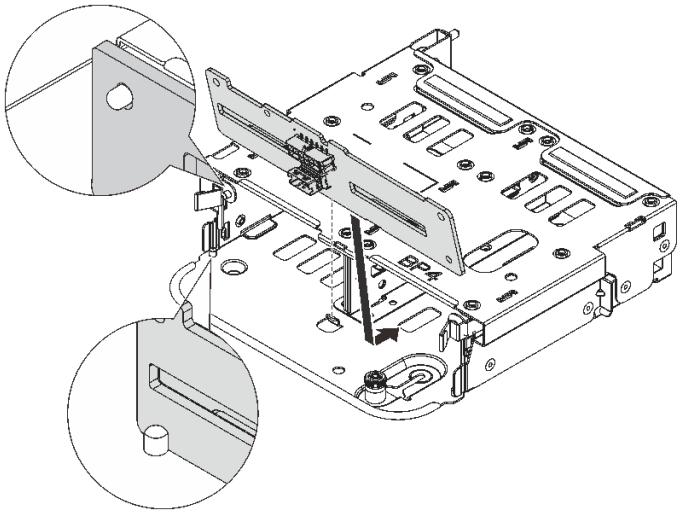


Figure 257. Installing the 4 x 2.5-inch rear drive backplane

a. Align the bottom of the backplane with the studs at the bottom of the drive cage.

b. Lower the backplane into the drive cage so that the holes in the backplane pass through the pins on the drive cage, and press the backplane into position. The release latches will secure the backplane in place.

Step 4. Install the rear drive cage.

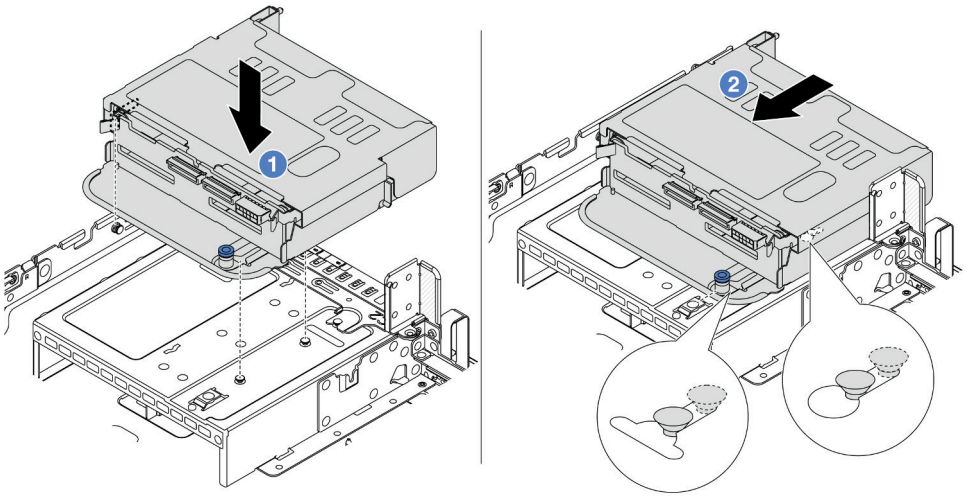


Figure 258. Installing the 4 x 2.5-inch rear drive cage

a. Align the rear drive cage with the chassis, and lower the drive cage into the chassis.

b. Move the rear drive cage forward until it clicks into position.

Step 5. Connect cables from the drive backplanes to the system board or RAID/HBA adapters. See Chapter 2 “Internal cable routing” on page 323.

After you finish

1. Reinstall the drives or drive fillers into the rear drive cage. See “Install a hot-swap drive” on page 42.
2. Complete the parts replacement. See “Complete the parts replacement” on page 320.

Demo video

Watch the procedure on YouTube

Remove the 8 x 2.5" drive backplane and drive cage

Use this information to remove the rear 2.5-inch 8-bay drive backplane and drive cage.

About this task

Attention:

- Read “Installation Guidelines” on page 1 and “Safety inspection checklist” on page 2 to ensure that you work safely.
- Power off the server and peripheral devices and disconnect the power cords and all external cables. See “Power off the server” on page 32.
- 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.
- Before you remove or make changes to drives, drive controllers (including controllers that are integrated on the system board assembly), drive backplanes or drive cables, back up all important data that is stored on drives.
- Before you remove any component of a RAID array (drive, RAID card, etc.), back up all RAID configuration information.
- If one or more NVMe solid-state drives are to be removed, it is recommended to disable them beforehand via the operating system.

Procedure

Step 1. Make preparation for the task.

a. If the server is installed in a rack, slide the server out on its rack slide rails to gain access to the top cover, or remove the server from the rack. See “Remove the server from rack” on page 32.

b. Remove the top cover. See “Remove the top cover” on page 318.

c. Disconnect cables from the rear drive backplane.

d. Remove all the installed drives and fillers (if any) from the drive bays. See “Remove a hot-swap drive” on page 41.

Step 2. Remove the rear drive cage.

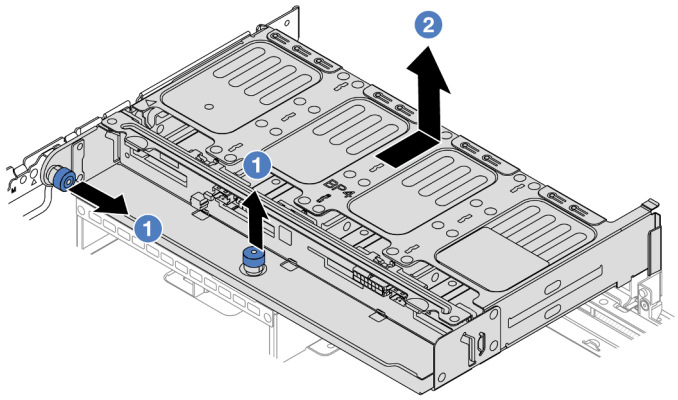


Figure 259. Removing the 8 x 2.5-inch rear drive cage

a. 1 Twist and pull out the blue plungers.

b. 2 Slide the drive cage towards the rear of the chassis to release it.

Step 3. Hold the backplane and carefully lift the backplane out of the drive cage.

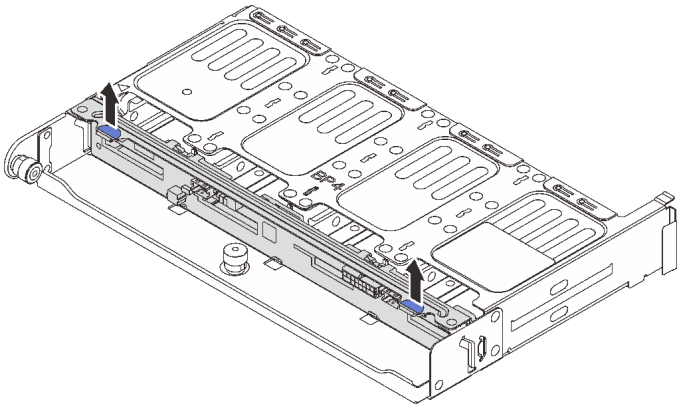


Figure 260. Removing the rear 8 x 2.5-inch drive backplane

After you finish

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

Demo video

Watch the procedure on YouTube

Install the 8 x 2.5" drive backplane and drive cage

Use this information to install 2.5-inch 8-bay drive backplane and drive cage.

About this task

Attention:

- Read “Installation Guidelines” on page 1 and “Safety inspection checklist” on page 2 to ensure that you work safely.
- Power off the server and peripheral devices and disconnect the power cords and all external cables. See “Power off the server” on page 32.
- 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.
- The rear drive cage is supported on some server models with thermal requirements. See “Thermal rules” on page 19 to ensure that the server is under permitted ambient temperature and the correct heat sink and system fans are used. If needed, replace your heat sink or system fan first.
  - “Processor and heat sink replacement (trained technician only)” on page 205
  - “System fan replacement” on page 306

Procedure

Step 1. Touch the static-protective package that contains the new part to any unpainted surface on the outside of the server. Then, take the new part out of the package and place it on a static-protective surface.

Step 2. Connect cables to the drive backplane. See Chapter 2 “Internal cable routing” on page 323.

Step 3. Install the drive backplane into the rear drive cage.

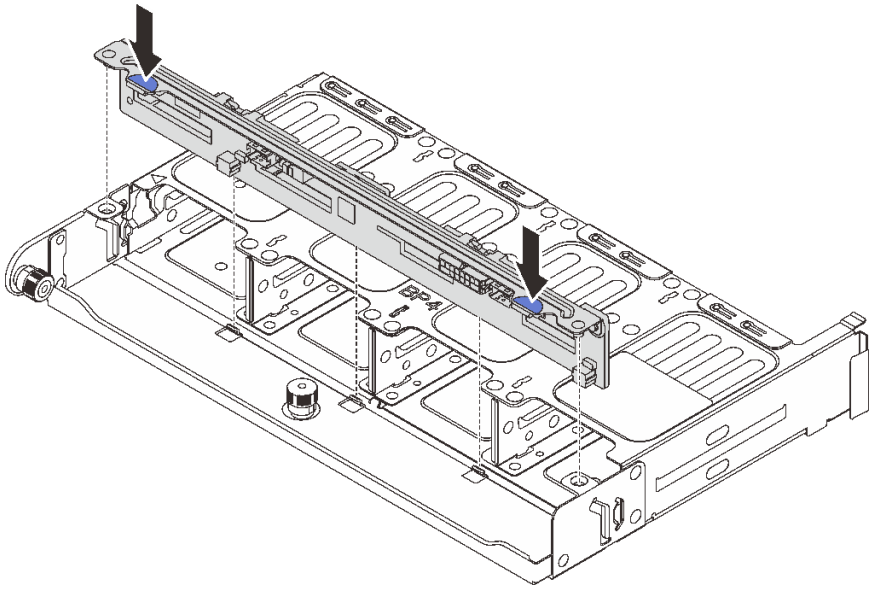


Figure 261. Installing the 8 x 2.5-inch rear drive backplane

a. Align the pins of the backplane with the holes at both sides of the drive cage.

b. Lower the backplane into the drive cage so that the pins of the backplane pass through the holes on the drive cage, and press the backplane into position.

Step 4. Install the rear drive cage.

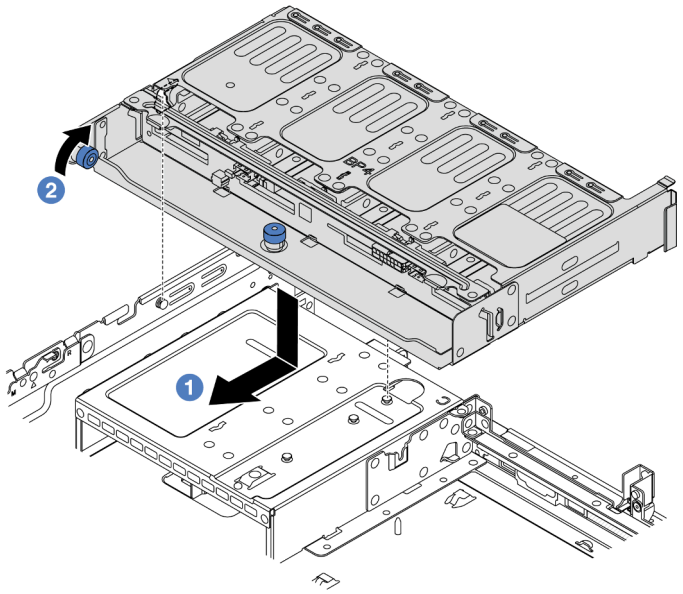


Figure 262. Installing the 8 x 2.5-inch rear drive cage

a. 1 Align the rear drive cage with the chassis, and lower the drive cage into the chassis. Move the rear drive cage forward until it clicks into position.

b. 2 Twist and release the blue plunger to secure the drive cage in place.

Step 5. Connect cables from the drive backplanes to the system board or RAID/HBA adapters. See Chapter 2 “Internal cable routing” on page 323.

After you finish

1. Reinstall the drives or drive fillers into the rear drive cage. See “Install a hot-swap drive” on page 42.
2. Complete the parts replacement. See “Complete the parts replacement” on page 320.

Demo video

Watch the procedure on YouTube

Remove the 2 x 3.5" drive backplane and drive cage

Use this information to remove the rear 3.5-inch 2-bay drive backplane and drive cage.

About this task

Attention:

- Read “Installation Guidelines” on page 1 and “Safety inspection checklist” on page 2 to ensure that you work safely.
- Power off the server and peripheral devices and disconnect the power cords and all external cables. See “Power off the server” on page 32.
- 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.

- Before you remove or make changes to drives, drive controllers (including controllers that are integrated on the system board assembly), drive backplanes or drive cables, back up all important data that is stored on drives.
- Before you remove any component of a RAID array (drive, RAID card, etc.), back up all RAID configuration information.
- If one or more NVMe solid-state drives are to be removed, it is recommended to disable them beforehand via the operating system.

Procedure

Step 1. Make preparation for the task.

a. If the server is installed in a rack, slide the server out on its rack slide rails to gain access to the top cover, or remove the server from the rack. See "Remove the server from rack" on page 32.

b. Remove the top cover. See "Remove the top cover" on page 318.

c. Disconnect cables from the rear drive backplane.

d. Remove all the installed drives and fillers (if any) from the drive bays. See "Remove a hot-swap drive" on page 41.

Step 2. Remove the rear drive cage.

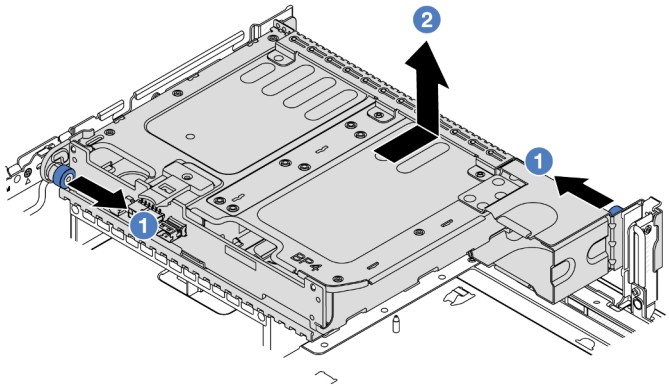


Figure 263. Removing the 2 x 3.5-inch rear drive cage

a. 1 Twist and pull out the blue plungers.

b. 2 Slide the drive cage towards the rear of the chassis to release it.

Step 3. Hold the backplane and carefully lift the backplane out of the drive cage.

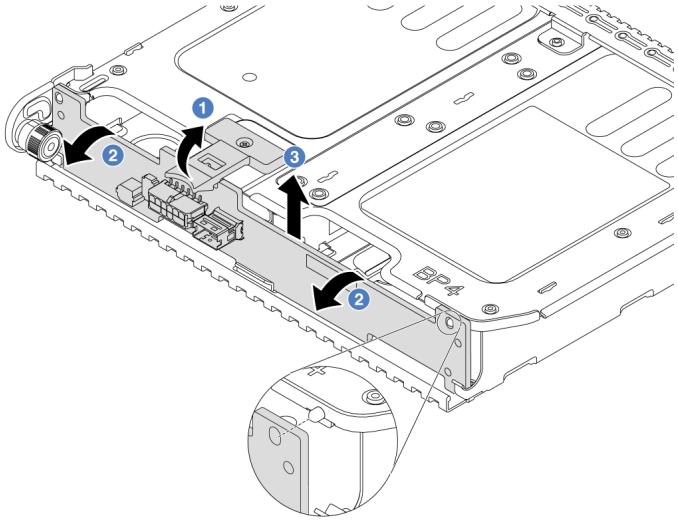


Figure 264. Removing the 2 x 3.5-inch rear drive backplane

a. 1 Open the release latches in the direction as shown.
b. 2 Rotate the backplane from the top to disengage it from the pins on the drive cage.
c. 3 Carefully lift the backplane out of the drive cage.

After you finish

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

Demo video

Watch the procedure on YouTube

Install the 2 x 3.5" drive backplane and drive cage

Use this information to install 3.5-inch 2-bay drive backplane and drive cage.

About this task

Attention:

- Read “Installation Guidelines” on page 1 and “Safety inspection checklist” on page 2 to ensure that you work safely.
- Power off the server and peripheral devices and disconnect the power cords and all external cables. See “Power off the server” on page 32.
- 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.
- The rear drive cage is supported on some server models with thermal requirements. See “Thermal rules” on page 19 to ensure that the server is under permitted ambient temperature and the correct heat sink and system fans are used. If needed, replace your heat sink or system fan first.
  - “Processor and heat sink replacement (trained technician only)” on page 205
  - “System fan replacement” on page 306

Procedure

Step 1. Touch the static-protective package that contains the new part to any unpainted surface on the outside of the server. Then, take the new part out of the package and place it on a static-protective surface.

Step 2. Connect cables to the drive backplane. See Chapter 2 “Internal cable routing” on page 323.

Step 3. Install the drive backplane into the rear drive cage.

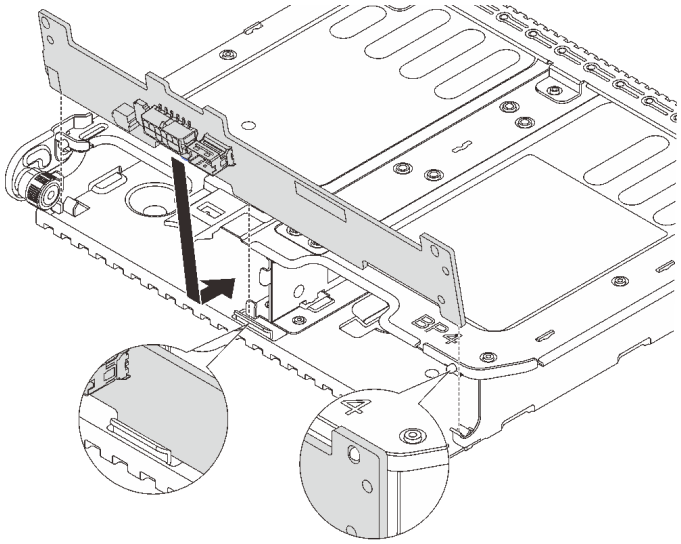


Figure 265. Installing the 2 x 3.5-inch rear drive backplane

a. Align the bottom of the backplane with the studs at the bottom of the drive cage.

b. Lower the backplane into the drive cage so that the holes in the backplane pass through the pins on the drive cage, and press the backplane into position.

Step 4. Install the rear drive cage.

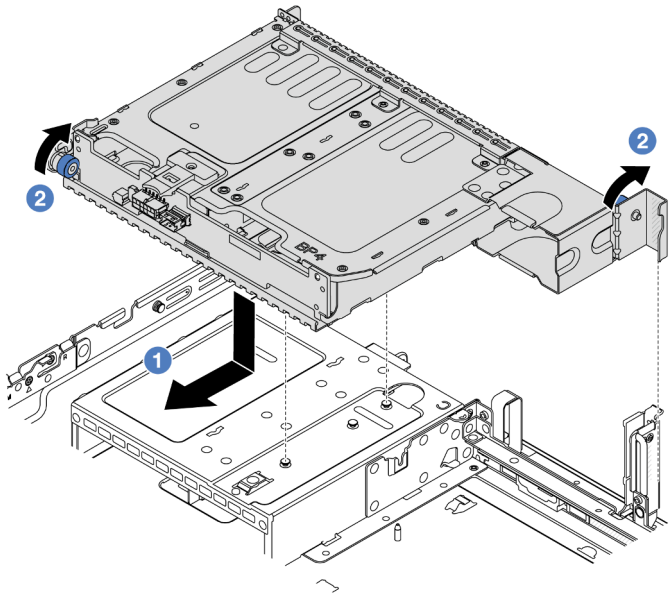


Figure 266. Installing the 2 x 3.5-inch rear drive cage

a. 1 Align the rear drive cage with the chassis, and lower the drive cage into the chassis. Move the rear drive cage forward until it clicks into position.

b. 2 Twist and release the blue plunger to secure the drive cage in place.

Step 5. Connect cables from the drive backplanes to the system board or RAID/HBA adapters. See Chapter 2 “Internal cable routing” on page 323.

After you finish

1. Reinstall the drives or drive fillers into the rear drive cage. See “Install a hot-swap drive” on page 42.
2. Complete the parts replacement. See “Complete the parts replacement” on page 320.

Demo video

Watch the procedure on YouTube

Remove the 4 x 3.5" drive backplane and drive cage

Use this information to remove the rear 3.5-inch 4-bay drive backplane and drive cage.

About this task

Attention:

- Read “Installation Guidelines” on page 1 and “Safety inspection checklist” on page 2 to ensure that you work safely.
- Power off the server and peripheral devices and disconnect the power cords and all external cables. See “Power off the server” on page 32.
- 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.

- Before you remove or make changes to drives, drive controllers (including controllers that are integrated on the system board assembly), drive backplanes or drive cables, back up all important data that is stored on drives.
- Before you remove any component of a RAID array (drive, RAID card, etc.), back up all RAID configuration information.
- If one or more NVMe solid-state drives are to be removed, it is recommended to disable them beforehand via the operating system.

Procedure

Step 1. Make preparation for the task.

a. If the server is installed in a rack, slide the server out on its rack slide rails to gain access to the top cover, or remove the server from the rack. See "Remove the server from rack" on page 32.

b. Remove the top cover. See "Remove the top cover" on page 318.

c. Disconnect cables from the rear drive backplane.

d. Remove all the installed drives and fillers (if any) from the drive bays. See "Remove a hot-swap drive" on page 41.

Step 2. Remove the rear drive cage.

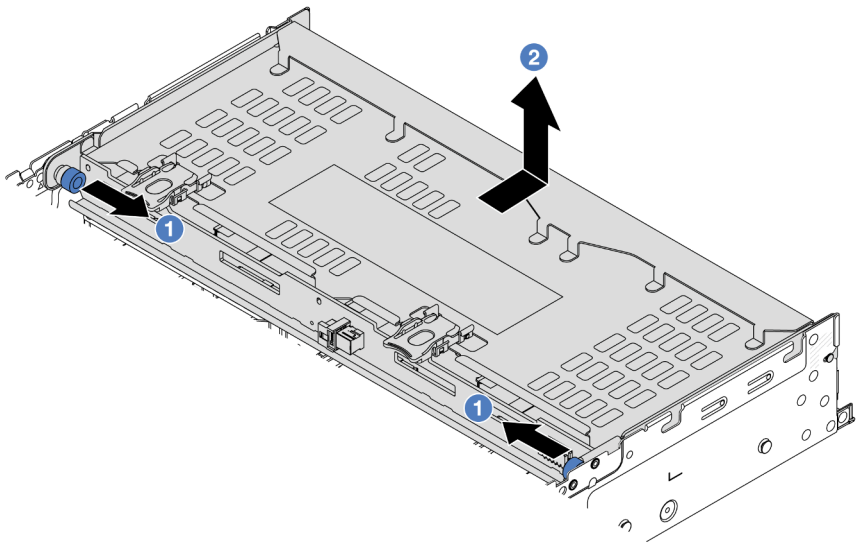


Figure 267. Removing the 4 x 3.5-inch rear drive cage

a. 1 Twist and pull out the blue plungers.

b. 2 Slide the drive cage towards the rear of the chassis to release it.

Step 3. Hold the backplane and carefully lift the backplane out of the drive cage.

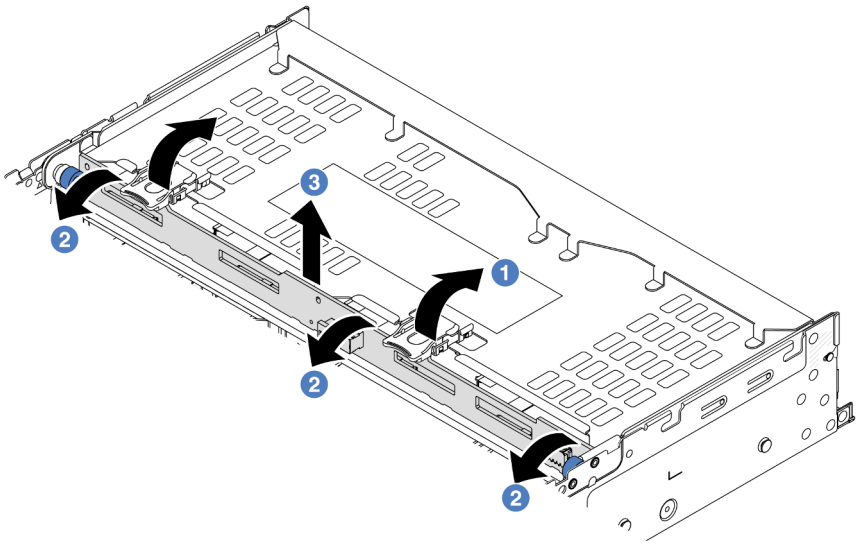


Figure 268. Removing the 2 x 3.5-inch rear drive backplane

a. 1 Open the release latches in the direction as shown.
b. 2 Rotate the backplane from the top to disengage it from the pins on the drive cage.
c. 3 Carefully lift the backplane out of the drive cage.

After you finish

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

Demo video

Watch the procedure on YouTube

Install the 4 x 3.5" drive backplane and drive cage

Use this information to install 3.5-inch 4-bay drive backplane and drive cage.

About this task

Attention:

- Read “Installation Guidelines” on page 1 and “Safety inspection checklist” on page 2 to ensure that you work safely.
- Power off the server and peripheral devices and disconnect the power cords and all external cables. See “Power off the server” on page 32.
- 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.
- The rear drive cage is supported on some server models with thermal requirements. See “Thermal rules” on page 19 to ensure that the server is under permitted ambient temperature and the correct heat sink and system fans are used. If needed, replace your heat sink or system fan first.

- “Processor and heat sink replacement (trained technician only)” on page 205
- “System fan replacement” on page 306

Procedure

Step 1. Touch the static-protective package that contains the new part to any unpainted surface on the outside of the server. Then, take the new part out of the package and place it on a static-protective surface.

Step 2. Connect cables to the drive backplane. See Chapter 2 “Internal cable routing” on page 323.

Step 3. Install the drive backplane into the rear drive cage.

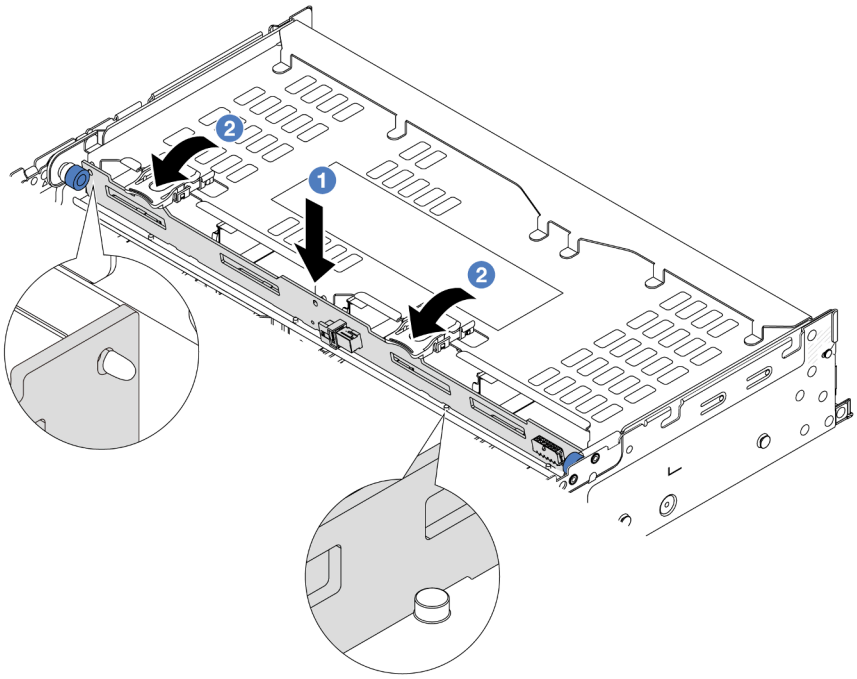


Figure 269. Installing the 4 x 3.5-inch rear drive backplane

a. 1 Align the bottom of the backplane with the studs at the bottom of the drive cage and lower the backplane into the drive cage.

b. 2 Push the top of the backplane so that the holes in the backplane pass through the pins on the drive cage, and the release latches secure the backplane in place.

Step 4. Install the rear drive cage.

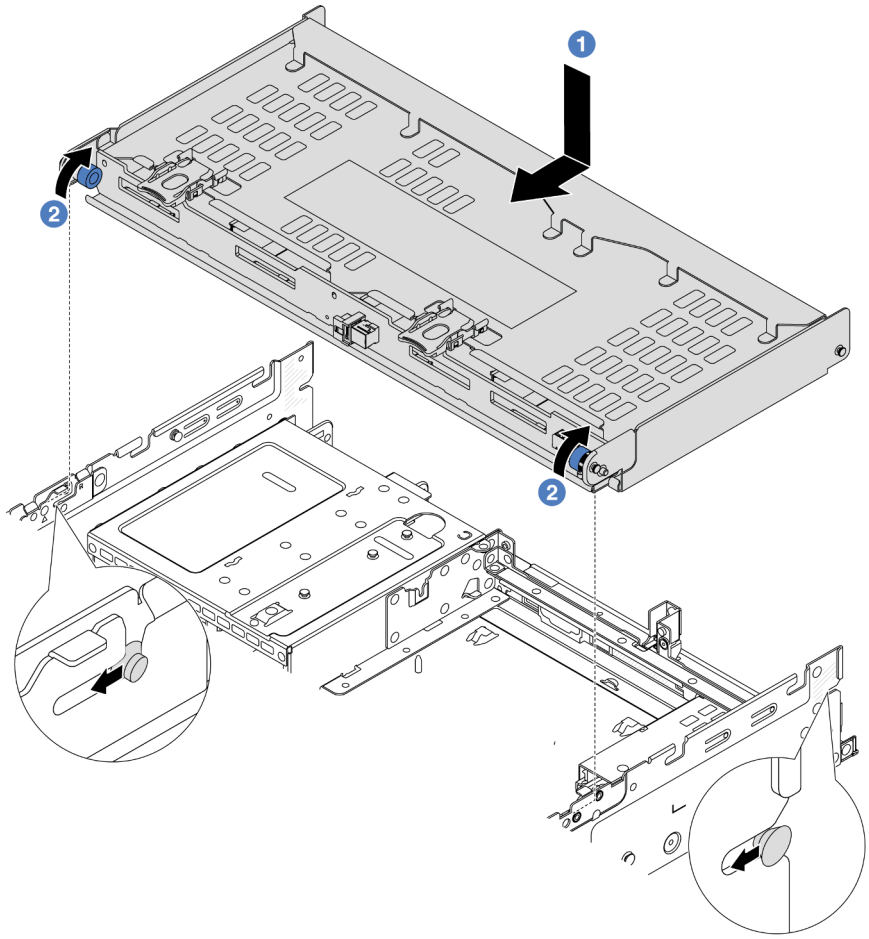


Figure 270. Installing the 4 x 3.5-inch rear drive cage

a. 1 Align the rear drive cage with the chassis, and lower the drive cage into the chassis. Move the rear drive cage forward until it clicks into position.

b. 2 Twist and release the blue plunger to secure the drive cage in place.

Step 5. Connect cables from the drive backplanes to the system board or RAID/HBA adapters. See Chapter 2 “Internal cable routing” on page 323.

Step 6. Install the top cover support bracket.

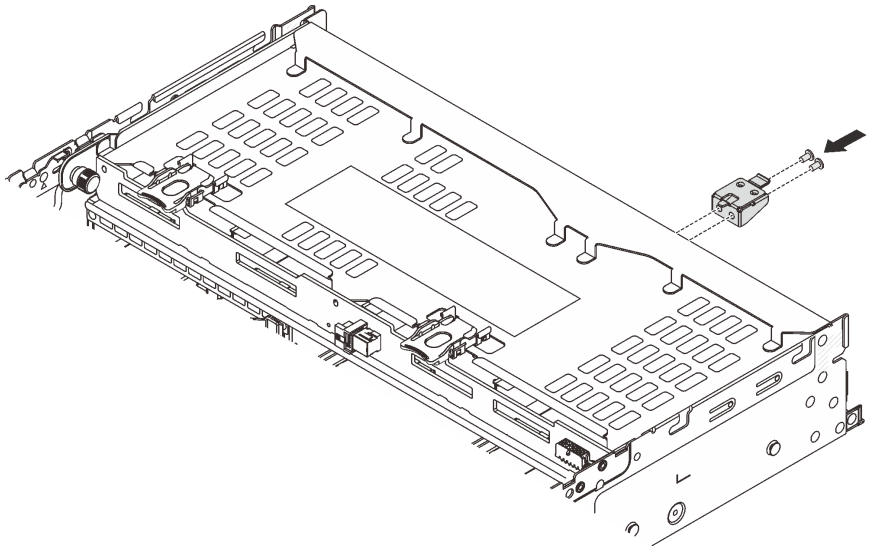


Figure 271. Installing the top cover support bracket

After you finish

1. Reinstall the drives or drive fillers into the rear drive cage. See “Install a hot-swap drive” on page 42.
2. Complete the parts replacement. See “Complete the parts replacement” on page 320.

Demo video

Watch the procedure on YouTube

Rear OCP module replacement

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

- “Remove the rear OCP module” on page 266
- “Install the rear OCP module” on page 267

Remove the rear OCP module

Follow instructions in this section to remove the rear OCP module.

Attention:

- Read “Installation Guidelines” on page 1 and “Safety inspection checklist” on page 2 to ensure that you work safely.
- Power off the server and peripheral devices and disconnect the power cords and all external cables. See “Power off the server” on page 32.
- Prevent exposure to static electricity, which might lead to system halt and loss of data, by keeping static-sensitive components in their static-protective packages until installation, and handling these devices with an electrostatic-discharge wrist strap or other grounding system.

Procedure

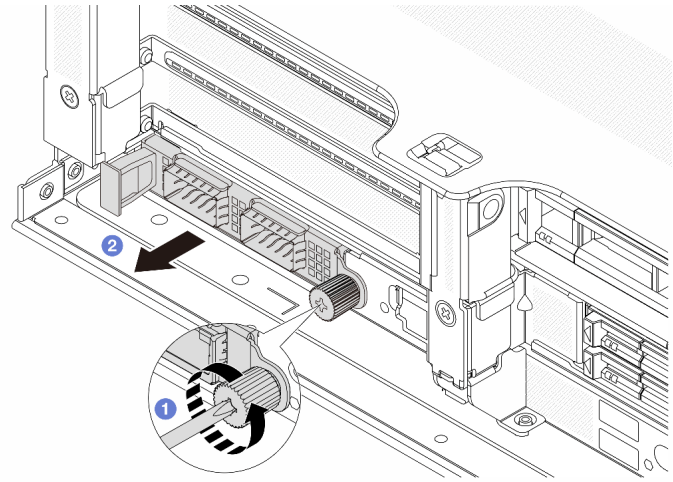


Figure 272. Removing the rear OCP module

Step 1. 1 Loosen the thumbscrew that secures the OCP module. Use a screwdriver if needed.

Step 2. 2 Pull out the OCP module.

After you finish

1. Install a new rear OCP module or an OCP module filler. See “Install the rear OCP module” on page 267.
2. If you are instructed to return the component or optional device, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Demo video

Watch the procedure on YouTube

Install the rear OCP module

Follow instructions in this section to install the rear OCP module.

About this task

Attention:

- Read “Installation Guidelines” on page 1 and “Safety inspection checklist” on page 2 to ensure that you work safely.
- Power off the server and peripheral devices and disconnect the power cords and all external cables. See “Power off the server” on page 32.
- Prevent exposure to static electricity, which might lead to system halt and loss of data, by keeping static-sensitive components in their static-protective packages until installation, and handling these devices with an electrostatic-discharge wrist strap or other grounding system.

Procedure

Step 1. Touch the static-protective package that contains the new part to any unpainted surface on the outside of the server. Then, take the new part out of the package and place it on a static-protective surface.

Step 2. Remove the OCP module filler if there is.

Step 3. Install the OCP module.

Note: Ensure that the OCP module is fully seated and the thumbscrew is securely tightened. Otherwise, the OCP module will not get full connection and may not function.

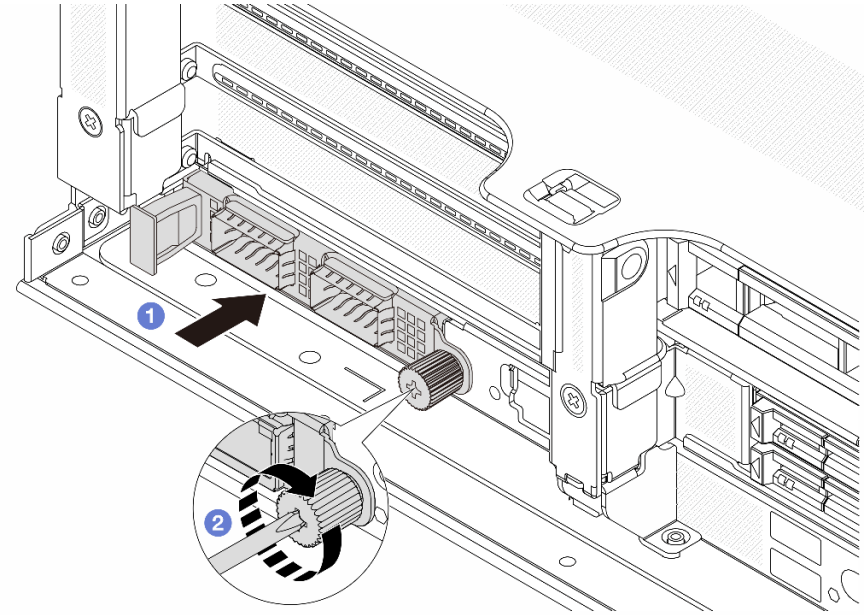


Figure 273. Installing the rear OCP module

a. 1 Push the OCP module into the slot until it is fully seated.

b. 2 Tighten the thumbscrew to secure the OCP module. Use a screwdriver if needed.

Notes:

Figure 274. OCP module (two connectors)

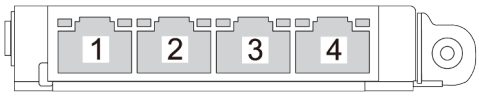


Figure 275. OCP module (four connectors)

- The OCP module provides two or four extra Ethernet connectors for network connections.
- By default, one of the Ethernet connectors on the OCP module can also function as a management connector using the shared management capacity.

After you finish

Complete the parts replacement. See “Complete the parts replacement” on page 320.

Demo video

Watch the procedure on YouTube

Rear PCIe adapter and riser assembly replacement

Use this information to remove and install a rear riser assembly and PCIe adapter. The PCIe adapter can be an Ethernet card, a host bus adapter, a RAID adapter, an add-in PCIe SSD adapter, or any other supported PCIe adapters. PCIe adapters vary by type, but the installation and removal procedures are the same.

- "Remove a rear riser assembly" on page 272
- "Remove a rear PCIe adapter" on page 276
- "Install a rear PCIe adapter" on page 280
- "Install a rear riser assembly" on page 284

Riser cages vary by server rear configurations.

Notes:

- The server supports one 7mm drive cage on the location of riser 1 cage or riser 2 cage. For 7mm drive cage installation rules, see "PCIe slots and PCIe adapters" on page 12. To replace a 7mm drive cage, see "Rear 7mm drive backplane and drive cage replacement" on page 242.
- The riser card shown in each riser cage is an example for illustration. Some riser cages support different types of riser cards. For details, see "PCIe slots and PCIe adapters" on page 12.
- The riser 5 cage is located on the front of the server. For replacement of the riser 5 cage, see "Front adapter cage replacement" on page 52.
- For replacement of 1FH and 3FH riser cages for Direct Water Cooling Module (DWCM), see "Lenovo Neptune(TM) Processor Direct Water Cooling Module replacement (trained technicians only)" on page 116.
- U.2 NVMe SSDs are not supported in configurations with front riser and rear x16/x16 riser 3.

Table 10. Riser cages for servers without DWCM

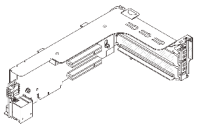
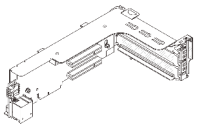
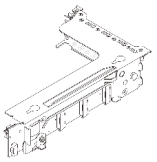
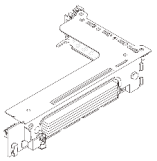
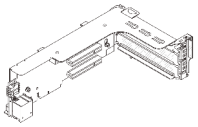
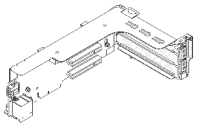
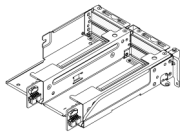
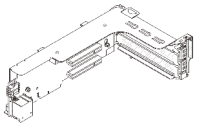
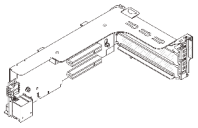
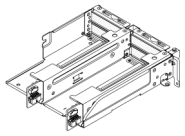
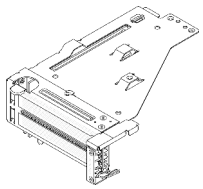
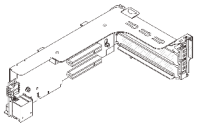
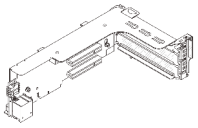
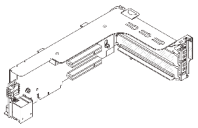
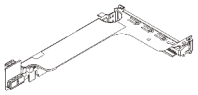
Server configuration	Riser 1 cage	Riser 2 cage	Riser 3 cage or 4LP riser 3/4 cage	Riser 5 cage
Configuration with 8 PCIe slots	• 3-slot riser cage 	• 3-slot riser cage 	Riser 3 cage • Gen 4  • Gen 5 	N/A
Configuration with 10 PCIe slots	• 3-slot riser cage 	• 3-slot riser cage 	• 4LP riser 3/4 cage  LP: low profile	N/A
Configuration with 12 PCIe slots	• 3-slot riser cage 	• 3-slot riser cage 	• 4LP riser 3/4 cage  LP: low profile	• Riser 5 cage 
Configuration with a 4 x 2.5-inch rear drive cage	• 3-slot riser cage 	• 3-slot riser cage 	N/A	N/A
Configuration with an 8 x 2.5-inch rear drive cage	• 3-slot riser cage 	• 1-slot riser cage 	N/A	N/A

Table 10. Riser cages for servers without DWCM (continued)

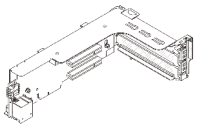
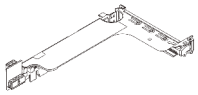
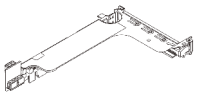
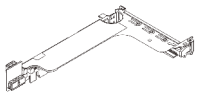
Server configuration	Riser 1 cage	Riser 2 cage	Riser 3 cage or 4LP riser 3/4 cage	Riser 5 cage
Configuration with a 2 x 3.5-inch rear drive cage	• 3-slot riser cage 	• 1-slot riser cage 	N/A	N/A
Configuration with a 4 x 3.5-inch rear drive cage	• 1-slot riser cage 	• 1-slot riser cage 	N/A	N/A

Table 11. Riser cages for servers with DWCM

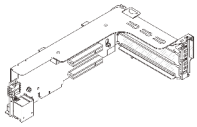
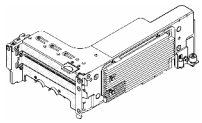
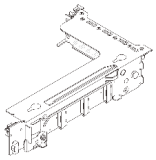
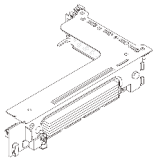
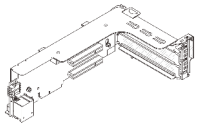
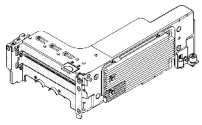
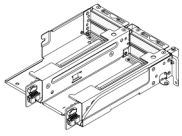
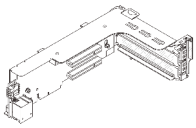
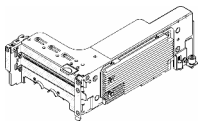
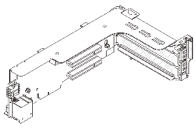
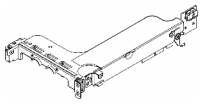
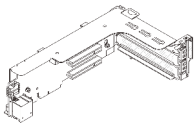
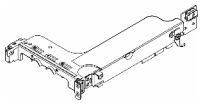
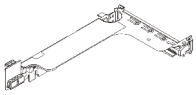
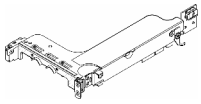
Server configuration	Riser 1 cage	Riser 2 cage	Riser 3 cage or 4LP riser 3/4 cage
Configuration with 7 PCIe slots	• 3-slot riser cage 	• 3FH riser cage for DWCM 	Riser 3 cage • Gen 4  • Gen 5 
Configuration with 9 PCIe slots	• 3-slot riser cage 	• 3FH riser cage for DWCM 	• 4LP riser 3/4 cage  LP: low profile

Table 11. Riser cages for servers with DWCM (continued)

Server configuration	Riser 1 cage	Riser 2 cage	Riser 3 cage or 4LP riser 3/4 cage
Configuration with a 4 x 2.5-inch rear drive cage	• 3-slot riser cage 	• 3FH riser cage for DWCM 	N/A
Configuration with an 8 x 2.5-inch rear drive cage	• 3-slot riser cage 	• 1FH riser cage for DWCM 	N/A
Configuration with a 2 x 3.5-inch rear drive cage	• 3-slot riser cage 	• 1FH riser cage for DWCM 	N/A
Configuration with a 4 x 3.5-inch rear drive cage	• 1-slot riser cage 	• 1FH riser cage for DWCM 	N/A

Remove a rear riser assembly

Use this information to remove a rear riser assembly.

About this task

S011

CAUTION:
Sharp edges, corners, or joints nearby.

The server supports different types of riser cages (see “Rear PCIe adapter and riser assembly replacement” on page 269).

Attention:

- Read “Installation Guidelines” on page 1 and “Safety inspection checklist” on page 2 to ensure that you work safely.
- Power off the server and peripheral devices and disconnect the power cords and all external cables. See “Power off the server” on page 32.
- 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.
- Before you remove any component of a RAID array (drive, RAID card, etc.), back up all RAID configuration information.

Watch the procedure

A video of this procedure is available at YouTube: https://www.youtube.com/playlist?list=PLYV5R7hVcs-BmyijyY0-lNvapM4fTV5Gf.

Procedure

Step 1. Make preparation for the task.

a. If the server is installed in a rack, slide the server out on its rack slide rails to gain access to the top cover, or remove the server from the rack. See “Remove the server from rack” on page 32.

b. Remove the top cover. See “Remove the top cover” on page 318.

c. If there is any PCIe adapter installed on the riser card, record the cable connections first. Then, disconnect all cables from the PCIe adapter.

Notes:

- If you need to disconnect cables from the system board assembly, disengage all latches or release tabs on cable connectors first. Failing to release the tab before removing the cables will damage the cable sockets on the system board assembly. Any damage to the cable sockets might require replacing the system board assembly.
- The connectors on your system board assembly might look different from those in the illustration, but the removal procedure is the same.
  1. Press the release tab to release the connector.
  2. Disengage the connector from the cable socket.

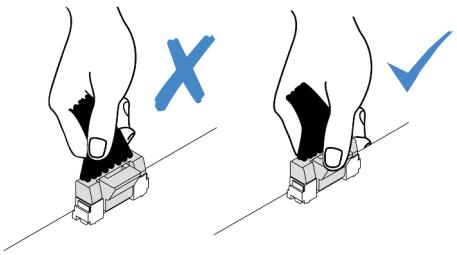


Figure 276. Disconnecting cables from the system board assembly

Step 2. Remove the riser assembly.

- **Riser 1 assembly (same for riser 2 assembly)**

  Note: The following uses the 3-slot riser cage as an example for illustration. The replacement procedure for the 1-slot riser cage is similar.

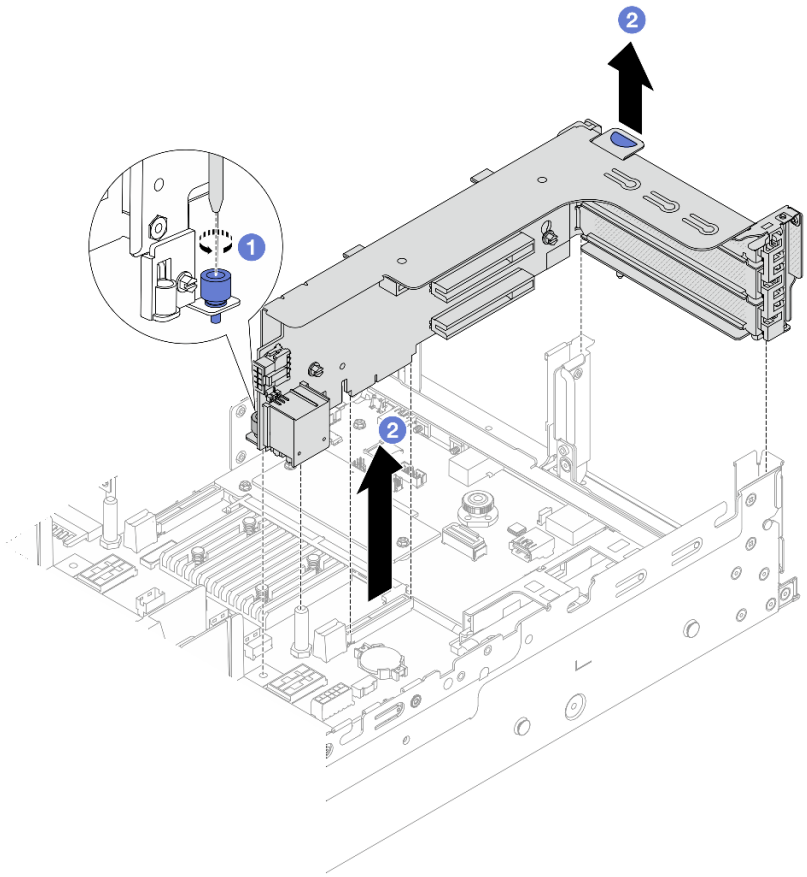


Figure 277. Riser 1 assembly removal

a. 1 Loosen the screw that secures the riser assembly.

b. 2 Grasp the riser assembly by its edges and carefully lift it straight up and off the chassis.

- **Riser 3 assembly**

  Note: The following uses the Gen 5 riser 3 cage as an example for illustration. The replacement procedure is the same for Gen 4 riser 3 cage.

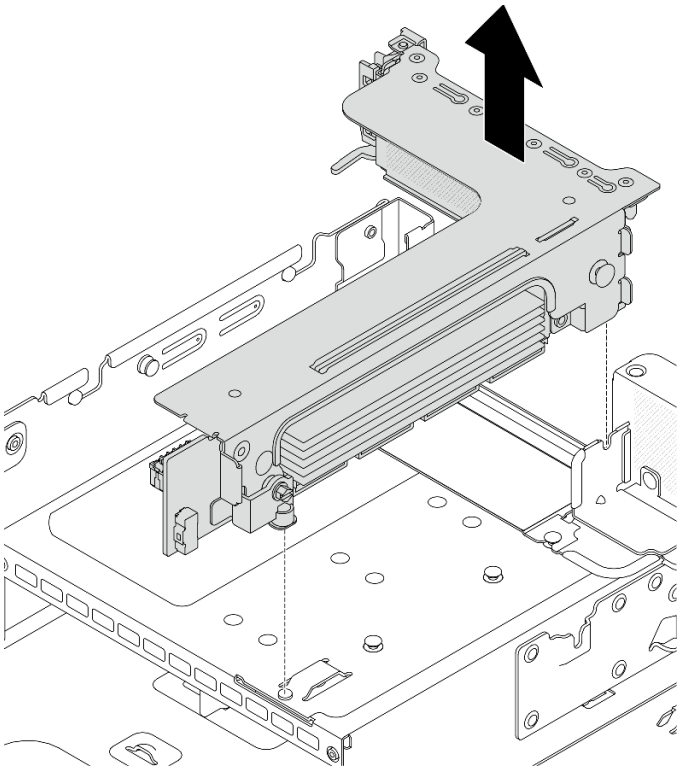


Figure 278. Riser 3 assembly removal

- **4LP riser 3/4 assembly**
  1. Remove riser 3 assembly and riser 4 assembly.

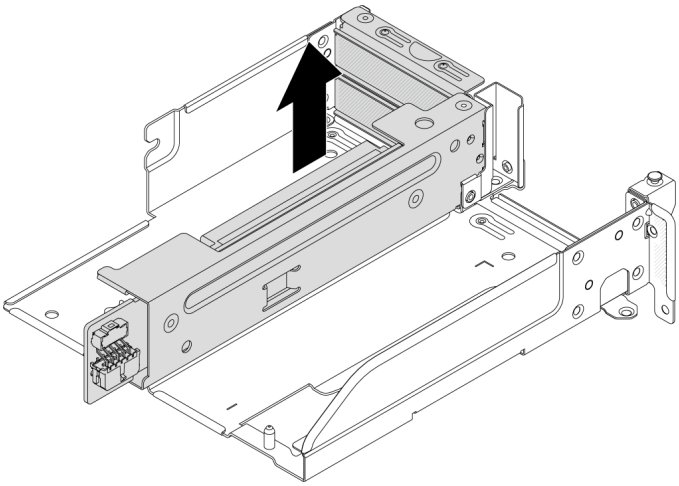


Figure 279. Riser 3/4 assembly removal

  2. Remove the riser cage tray.

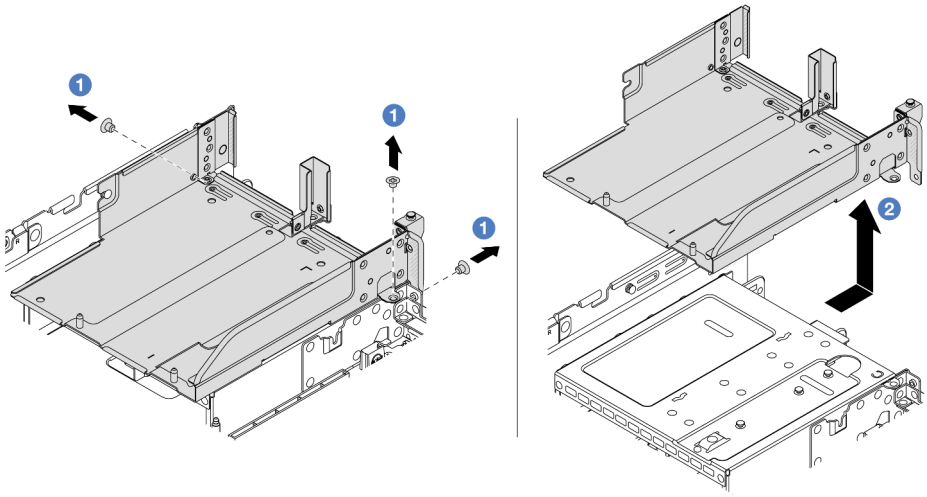


Figure 280. Riser cage tray removal

a. 1 Remove the screws that secure the riser cage tray.

b. 2 Slide the riser cage tray backwards and then lift it out the chassis.

After you finish

1. Remove the PCIe adapter from the riser assembly. See “Remove a rear PCIe adapter” on page 276.
2. If you are instructed to return the component or optional device, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Demo video

Watch the procedure on YouTube

Remove a rear PCIe adapter

Use this information to remove a rear PCIe adapter. The PCIe adapter can be an Ethernet card, a host bus adapter, a RAID adapter, an add-in PCIe SSD adapter, or any other supported PCIe adapters.

About this task

S011

CAUTION:
Sharp edges, corners, or joints nearby.

Attention:

- Read “Installation Guidelines” on page 1 and “Safety inspection checklist” on page 2 to ensure that you work safely.

- Power off the server and peripheral devices and disconnect the power cords and all external cables. See “Power off the server” on page 32.
- 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.
- Before you remove or make changes to drives, drive controllers (including controllers that are integrated on the system board assembly), drive backplanes or drive cables, back up all important data that is stored on drives.
- Before you remove any component of a RAID array (drive, RAID card, etc.), back up all RAID configuration information.

Procedure

Step 1. Make preparation for the task.

a. If the server is installed in a rack, slide the server out on its rack slide rails to gain access to the top cover, or remove the server from the rack. See “Remove the server from rack” on page 32.

b. Remove the top cover. See “Remove the top cover” on page 318.

c. Remove the riser assembly. See “Remove a rear riser assembly” on page 272.

Step 2. Remove the PCIe adapter from the riser cage.

Note: For ThinkSystem AMD X3522 10/25GbE DSFP28 2-port PCIe Ethernet Adapter, remove the screw that secures the adapter first.

- **Riser 1 cage (same for riser 2 cage)**

  Note: The following uses the 3-slot riser cage as an example for illustration. The replacement procedure for the 1-slot riser cage is similar.

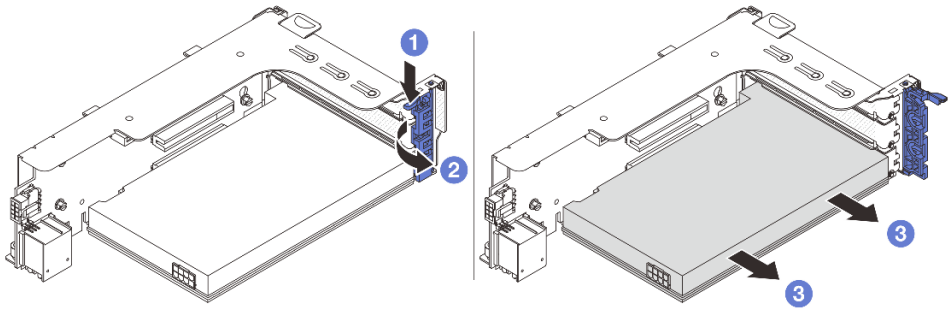


Figure 281. Removing a PCIe adapter from riser 1 cage or riser 2 cage

a. 1 Press the retainer clip downward.

b. 2 Rotate the PCIe adapter retention latch to the open position.

c. 3 Grasp the PCIe adapter by its edges and carefully pull it out of the PCIe slot.

- **Riser 3 cage**

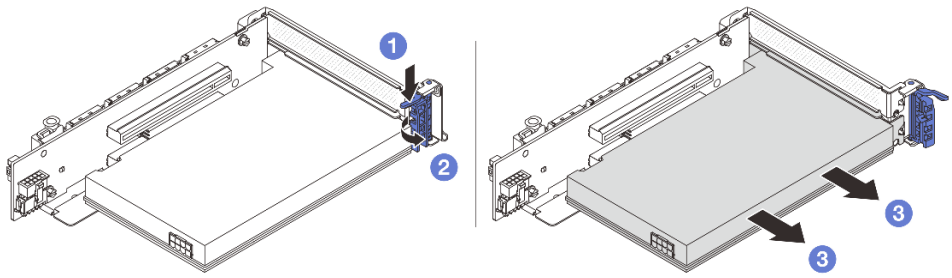


Figure 282. Removing a PCIe adapter from riser 3 cage

a. 1 Press the retainer clip downward.

b. 2 Rotate the PCIe adapter retention latch to the open position.

c. 3 Grasp the PCIe adapter by its edges and carefully pull it out of the PCIe slot.

- **4LP riser 3/4 cage**

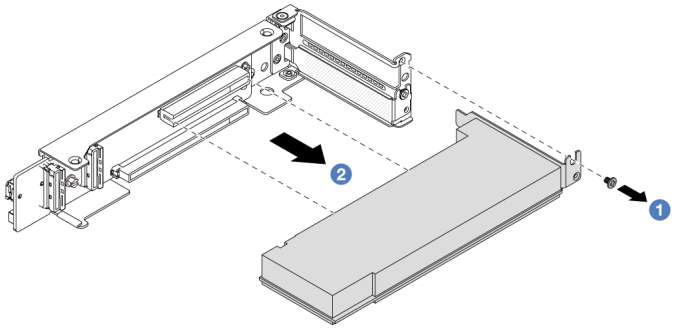


Figure 283. Removing a PCIe adapter from the 4LP riser 3/4 cage

a. 1 Remove the screw that secures the PCIe adapter.

b. 2 Grasp the PCIe adapter by its edges and carefully pull it out of the PCIe slot.

Step 3. (Optional) If you are replacing the riser card, remove the riser card from the riser cage.

- **Riser card 1 (same for riser card 2)**

  Note: The following uses the 3-slot riser cage as an example for illustration. The replacement procedure for the 1-slot riser cage is similar.

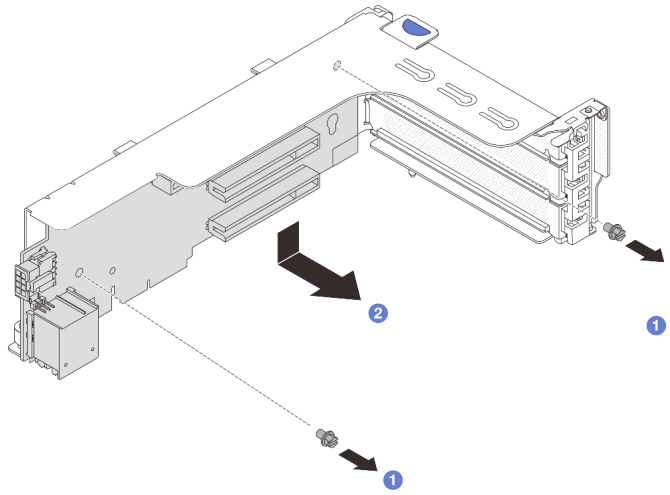


Figure 284. Removing the riser card from riser 1 cage or riser 2 cage

a. 1 Loosen the screw that secures the riser card.
b. 2 Grasp the riser card by its edges and carefully take it out of the riser bracket.

- **Riser card 3**

  Note: The following uses the Gen 5 riser 3 cage as an example for illustration. The replacement procedure is the same for Gen 4 riser 3 cage.

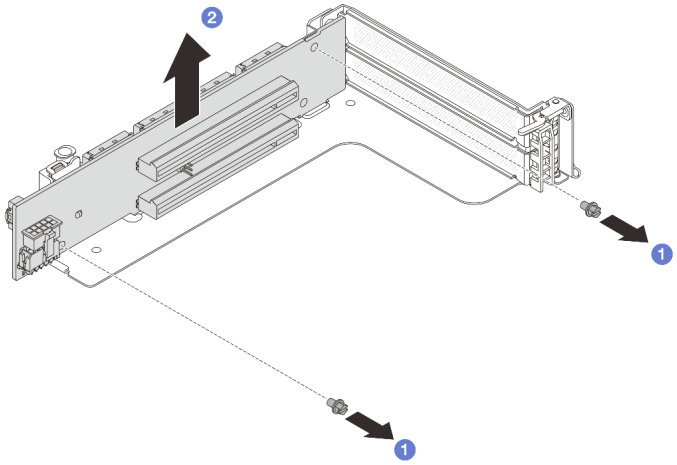


Figure 285. Removing the riser card from riser 3 cage

a. 1 Loosen the screw that secures the riser card.
b. 2 Grasp the riser card by its edges and carefully take it out of the riser bracket.

- **Riser card 3/4**

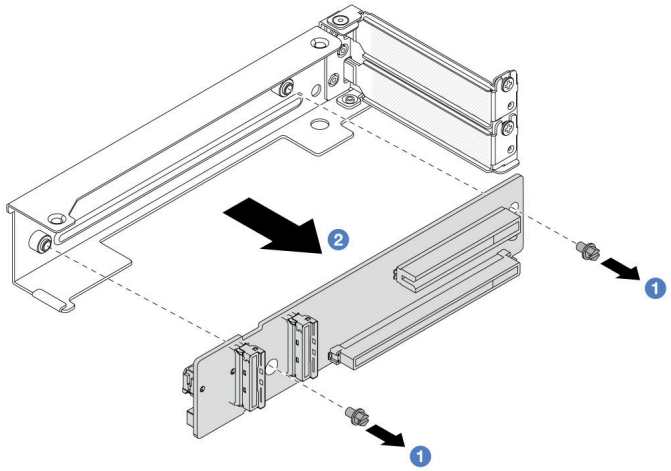


Figure 286. Removing the riser card from 4LP riser 3/4 cage

After you finish

1. Install a new PCIe adapter to the riser cage. See “Install a rear PCIe adapter” on page 280.
2. If you are instructed to return the component or optional device, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Demo video

Watch the procedure on YouTube

Install a rear PCIe adapter

Use this information to install a rear PCIe adapter. The PCIe adapter can be an Ethernet card, a host bus adapter, a RAID adapter, an add-in PCIe SSD adapter, or any other supported PCIe adapters.

About this task

S011

CAUTION:
Sharp edges, corners, or joints nearby.

Attention:

- Read “Installation Guidelines” on page 1 and “Safety inspection checklist” on page 2 to ensure that you work safely.
- Power off the server and peripheral devices and disconnect the power cords and all external cables. See “Power off the server” on page 32.
- 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.

- For PCIe adapter installation rules, see “PCIe slots and PCIe adapters” on page 12.

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

- Go to https://datacentersupport.lenovo.com/products/servers/thinksystem/sr650v3/downloads/driver-list/ to see the latest firmware and driver updates for your server.
- Go to “Update the firmware” in *User Guide* or *System Configuration Guide* for more information on firmware updating tools.

Procedure

Step 1. Touch the static-protective package that contains the new part to any unpainted surface on the outside of the server. Then, take the new part out of the package and place it on a static-protective surface.

Step 2. (Optional) If you have removed the riser card, install the riser card first.

- **Riser card 1 (same for riser card 2)**

  Note: The following uses the 3-slot riser cage as an example for illustration. The replacement procedure for the 1-slot riser cage is similar.

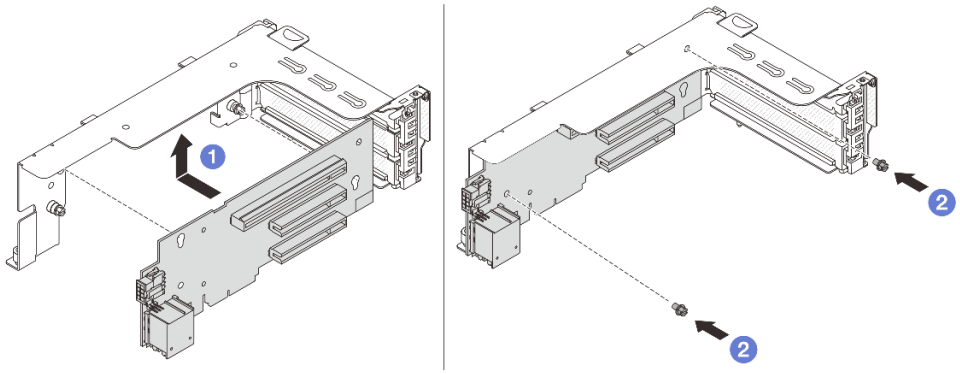


Figure 287. Installing the riser card to riser 1 cage or riser 2 cage

a. 1 Align the riser card with the riser cage and put it into the riser cage.

b. 2 Install two screws to secure riser card into place.

- **Riser card 3**

  Note: The following uses the Gen 5 riser 3 cage as an example for illustration. The replacement procedure is the same for Gen 4 riser 3 cage.

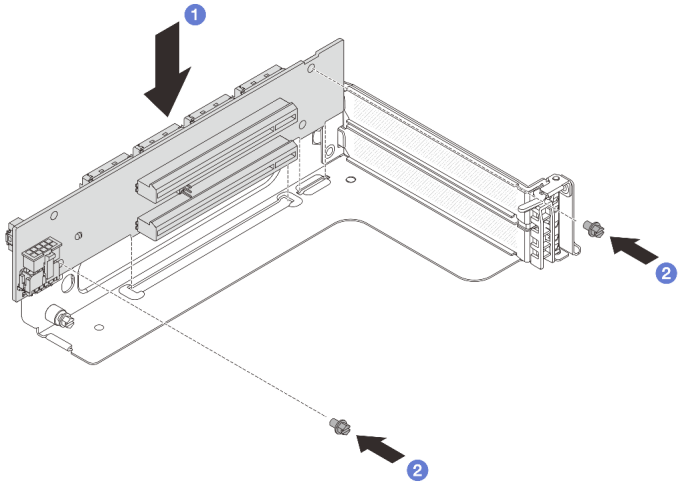


Figure 288. Installing the riser card to riser 3 cage

a. Align the riser card with the riser cage and put it into the riser cage.

b. Install two screws to secure riser card into place.

- **Riser card 3/4**

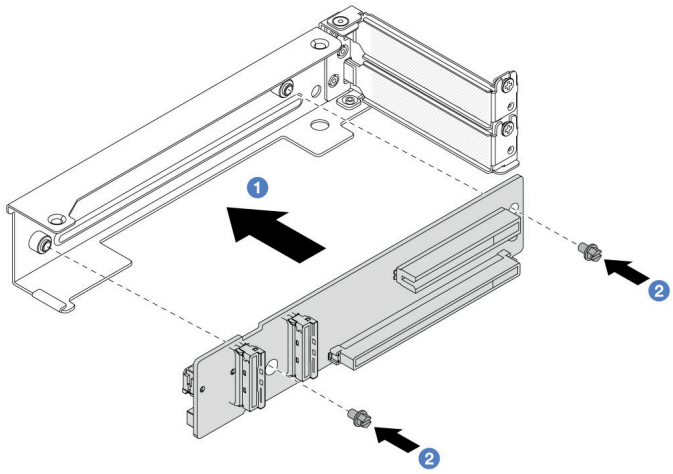


Figure 289. Installing the riser card to the 4LP riser 3/4 cage

a. Align the riser card with the riser cage and put it into the riser cage.

b. Install two screws to secure riser card into place.

Step 3. Install the new PCIe adapter to the riser cage.

- **Riser 1 cage (same for riser 2 cage)**

  Note: The following uses the 3-slot riser cage as an example for illustration. The replacement procedure for the 1-slot riser cage is similar.

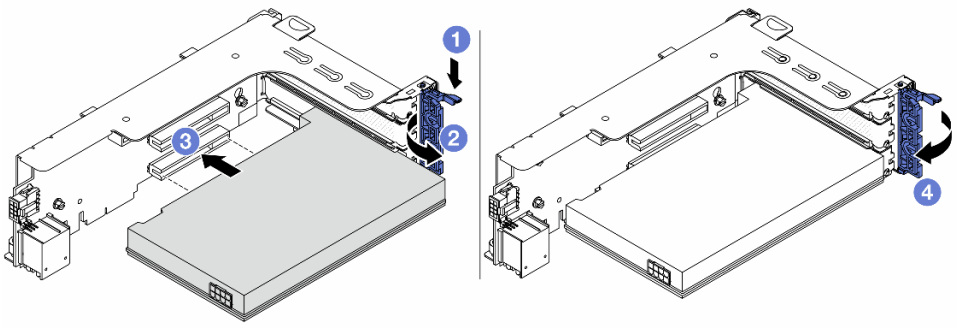


Figure 290. Installing a PCIe adapter to riser 1 cage or riser 2 cage

a. 1 Press the retainer clip downward.

b. 2 Rotate the retention latch to the open position.

c. 3 Align the PCIe adapter with the PCIe slot on the riser card. Carefully press the PCIe adapter straight into the slot until it is securely seated and its bracket also is secured.

d. 4 Close the retention latch.

Note: For ThinkSystem AMD X3522 10/25GbE DSFP28 2-port PCIe Ethernet Adapter, install the screw to secure the adapter before closing the retention latch if the server needs to be shipped.

- **Riser 3 cage**

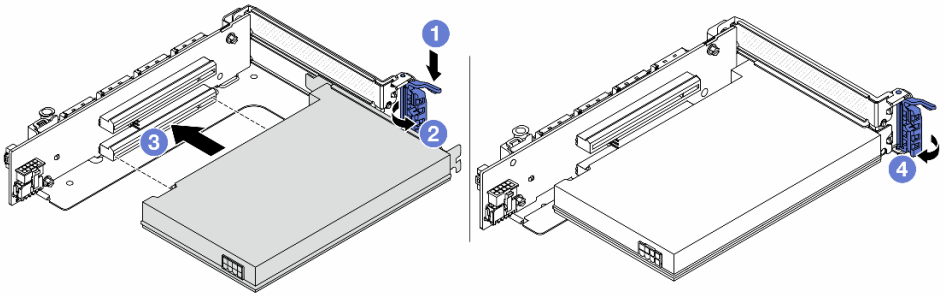


Figure 291. Installing a PCIe adapter to riser 3 cage

a. 1 Press the retainer clip downward.

b. 2 Rotate the retention latch to the open position.

c. 3 Align the PCIe adapter with the PCIe slot on the riser card. Carefully press the PCIe adapter straight into the slot until it is securely seated and its bracket also is secured.

d. 4 Close the retention latch.

Note: For ThinkSystem AMD X3522 10/25GbE DSFP28 2-port PCIe Ethernet Adapter, install the screw to secure the adapter before closing the retention latch if the server needs to be shipped.

- **4LP riser 3/4 cage**

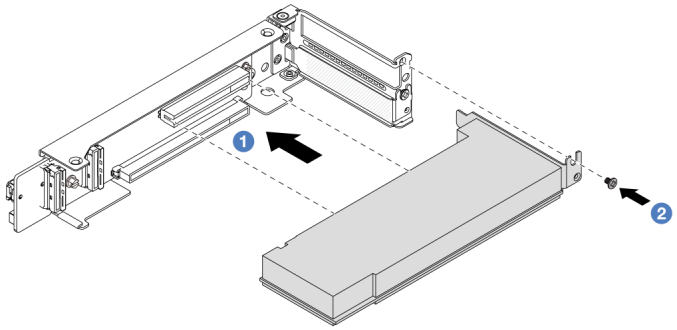


Figure 292. Installing a PCIe adapter to the 4LP riser 3/4 cage

a. 1 Align the PCIe adapter with the PCIe slot on the riser card. Carefully press the PCIe adapter straight into the slot until it is securely seated and its bracket also is secured.

b. 2 Tighten the screw to secure the PCIe adapter into place.

After you finish

1. Install the riser assembly into chassis. See "Install a rear riser assembly" on page 284.
2. If you have installed a RAID 930 or 940 adapter, install a RAID flash power module. See "RAID flash power module replacement" on page 227.

Demo video

Watch the procedure on YouTube

Install a rear riser assembly

Use this information to install a rear riser assembly.

About this task

S011

CAUTION:
Sharp edges, corners, or joints nearby.

The server supports different types of riser cages (see "Rear PCIe adapter and riser assembly replacement" on page 269).

Attention:

- Read "Installation Guidelines" on page 1 and "Safety inspection checklist" on page 2 to ensure that you work safely.
- Power off the server and peripheral devices and disconnect the power cords and all external cables. See "Power off the server" on page 32.

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

Procedure

Step 1. Install the riser assembly into chassis.

- **Riser 1 assembly (same for riser 2 assembly)**

  Note: The following uses the 3-slot riser cage as an example for illustration. The replacement procedure for the 1-slot riser cage is similar.

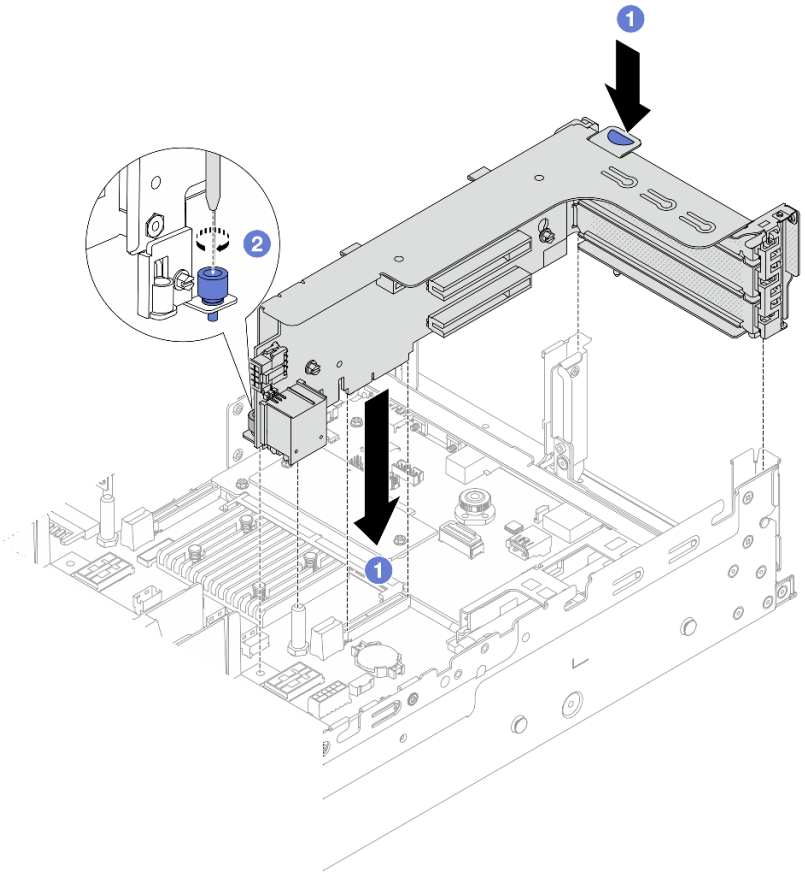


Figure 293. Riser 1 assembly installation

a. 1 Align the riser card with the riser slot on the system board assembly. Carefully press the riser card straight into the slot until it is securely seated.

b. 2 Tighten the screw to secure the riser cage.

- **Riser 3 assembly**

  Note: The following uses the Gen 5 riser 3 cage as an example for illustration. The replacement procedure is the same for Gen 4 riser 3 cage.

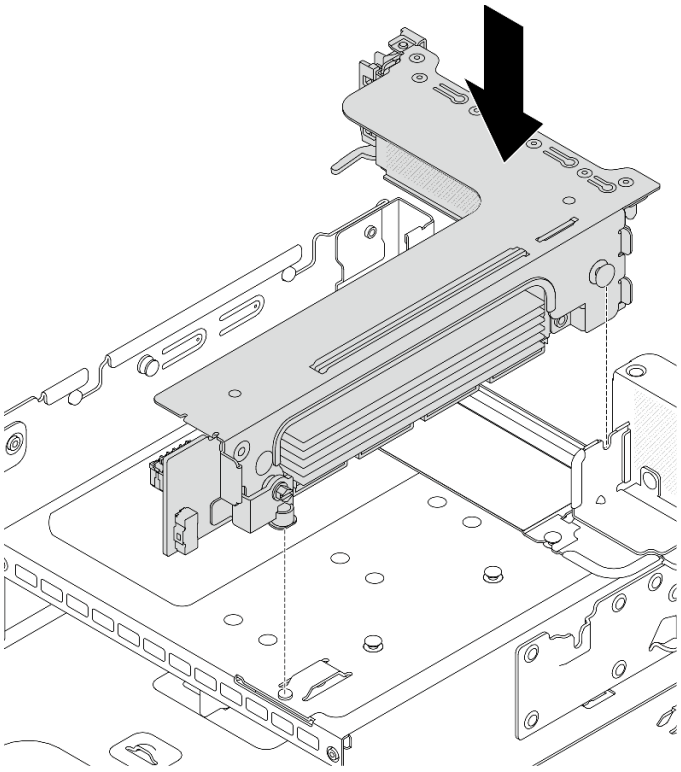


Figure 294. Riser 3 assembly installation

- **4LP Riser 3/4 assembly**
  1. Install the riser cage tray.

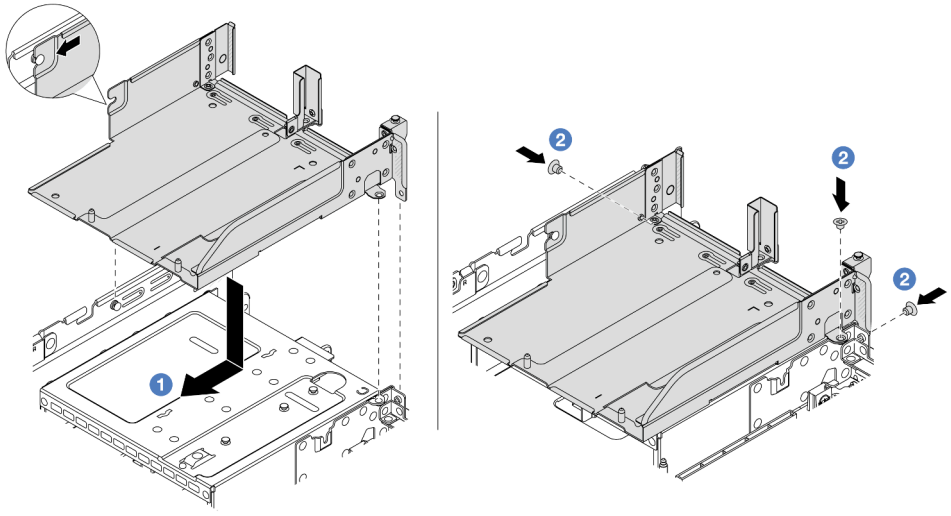


Figure 295. Riser cage tray installation

  a. (1) Align the riser cage tray with the pin and screw holes on the chassis.
  b. (2) Install the screws to fix the riser cage tray to the chassis.
  2. Install riser 3 assembly and riser 4 assembly into the riser cage.

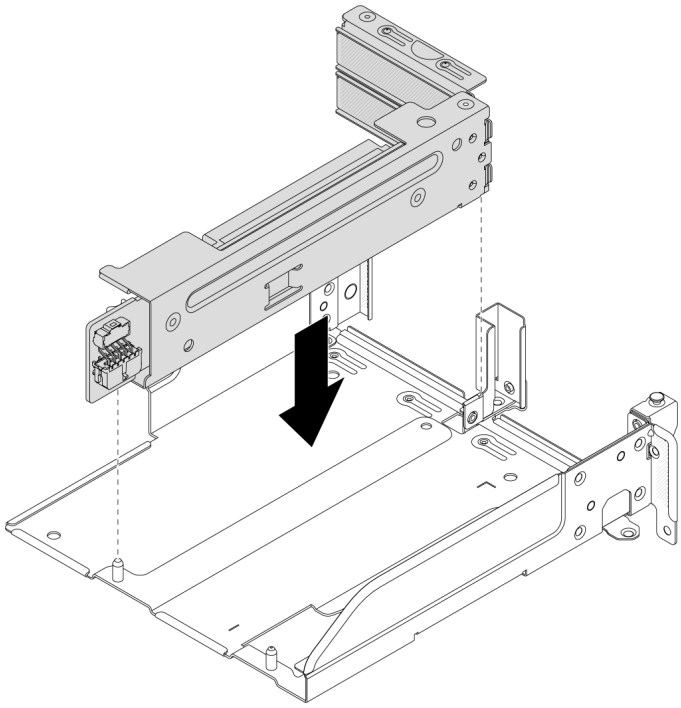


Figure 296. Riser 3/4 assembly installation

Step 2. Connect cables to the riser card and PCIe adapter. See Chapter 2 “Internal cable routing” on page 323.

After you finish

Complete the parts replacement. See “Complete the parts replacement” on page 320.

Demo video

Watch the procedure on YouTube

Replacement of OCP enablement kit for vSphere DSE

Follow instructions in this section to remove and install the ThinkSystem OCP Enablement Kit for Distributed Services Engine (OCP enablement kit for vSphere DSE).

Note: The OCP enablement kit for vSphere DSE is used in combination with ThinkSystem NVIDIA BlueField-2 25GbE SFP56 2-Port PCIe Ethernet DPU w/BMC & Crypto (DPU adapter). For replacement of the DPU adapter, see “Rear PCIe adapter and riser assembly replacement” on page 269.

- “Remove the OCP enablement kit for vSphere DSE” on page 287
- “Install the OCP enablement kit for vSphere DSE” on page 288

Remove the OCP enablement kit for vSphere DSE

Follow instructions in this section to remove the OCP enablement kit for vSphere DSE.

About this task

Attention:

- Read “Installation Guidelines” on page 1 and “Safety inspection checklist” on page 2 to ensure that you work safely.
- Power off the server and peripheral devices and disconnect the power cords and all external cables. See “Power off the server” on page 32.
- Prevent exposure to static electricity, which might lead to system halt and loss of data, by keeping static-sensitive components in their static-protective packages until installation, and handling these devices with an electrostatic-discharge wrist strap or other grounding system.

Procedure

Step 1. Make preparation for the task.

a. If the server is installed in a rack, slide the server out on its rack slide rails to gain access to the top cover, or remove the server from the rack. See “Remove the server from rack” on page 32.

b. Remove the top cover. See “Remove the top cover” on page 318.

c. If your server comes with a riser 1 assembly, remove it first. See “Remove a rear riser assembly” on page 272.

Step 2. Disconnect the cable on the OCP enablement kit for vSphere DSE.

Step 3. Remove the OCP enablement kit for vSphere DSE.

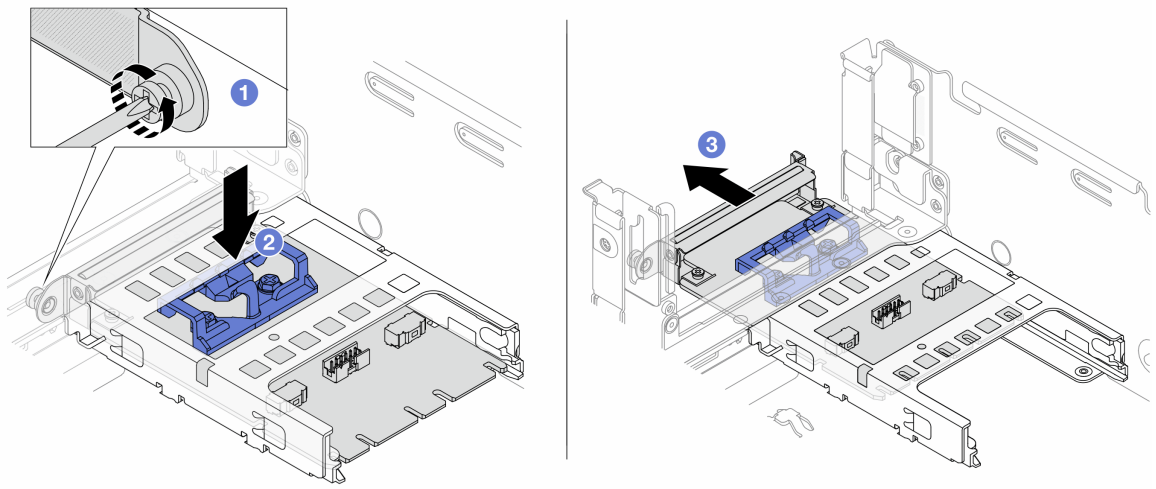


Figure 297. Removing the OCP enablement kit for vSphere DSE

a. 1 Loosen the screw that secures the OCP enablement kit for vSphere DSE.

b. 2 Press and hold the blue latch.

c. 2 Push the OCP enablement kit for vSphere DSE by the latch out from the chassis.

After you finish

1. Install a replacement unit or a filler. See “Install the OCP enablement kit for vSphere DSE” on page 288.
2. If you are instructed to return the component or optional device, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Install the OCP enablement kit for vSphere DSE

Follow instructions in this section to install the OCP enablement kit for vSphere DSE.

About this task

- Read “Installation Guidelines” on page 1 and “Safety inspection checklist” on page 2 to ensure that you work safely.
- Power off the server and peripheral devices and disconnect the power cords and all external cables. See “Power off the server” on page 32.
- 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.

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

- Go to https://datacentersupport.lenovo.com/products/servers/thinksystem/sr650v3/downloads/driver-list/ to see the latest firmware and driver updates for your server.
- Go to “Update the firmware” in *User Guide* or *System Configuration Guide* for more information on firmware updating tools.

Procedure

Step 1. If a filler is installed, remove it.

Step 2. Install the OCP enablement kit for vSphere DSE.

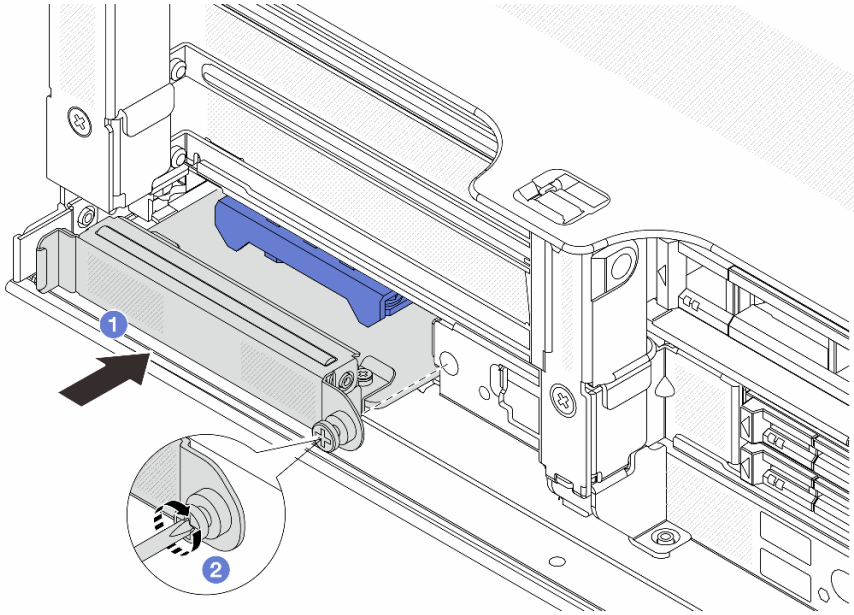


Figure 298. Installing the OCP enablement kit for vSphere DSE

a. 1 Slide the OCP enablement kit for vSphere DSE into the slot until it is fully seated.

b. 2 Tighten the screw to secure the OCP enablement kit for vSphere DSE.

Step 3. Connect the cable to the OCP enablement kit for vSphere DSE. See Chapter 2 “Internal cable routing” on page 323.

Step 4. Install the riser 1 assembly if you have removed it. See “Install a rear riser assembly” on page 284.

After you finish

Complete the parts replacement. See “Complete the parts replacement” on page 320.

Security bezel replacement

Use this information to remove and install the security bezel.

Remove the security bezel

Use this information to remove the security bezel.

About this task

Attention: Read “Installation Guidelines” on page 1 and “Safety inspection checklist” on page 2 to ensure that you work safely.

Procedure

Step 1. Use the key to unlock the security bezel.

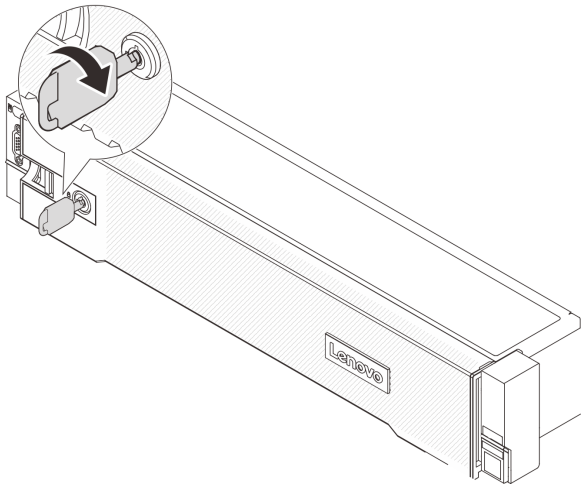


Figure 299. Unlocking the security bezel

Step 2. Press the release latch 1 and rotate the security bezel outward to remove it from the chassis.

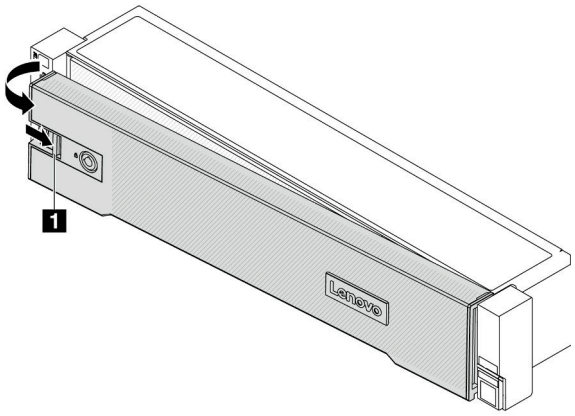


Figure 300. Security bezel removal

After you finish

Note: Before you ship the rack with the server installed, reinstall and lock the security bezel into place.

Install the security bezel

Use this information to install the security bezel.

About this task

Attention:

- Read "Installation Guidelines" on page 1 and "Safety inspection checklist" on page 2 to ensure that you work safely.
- Before you ship the rack with the server installed, reinstall and lock the security bezel into place.

Procedure

Step 1. If the key is held inside the security bezel, remove it out of the security bezel.

a. 1 Press the latch to release the key.

b. 2 Remove the key from the retaining clip in the shown direction.

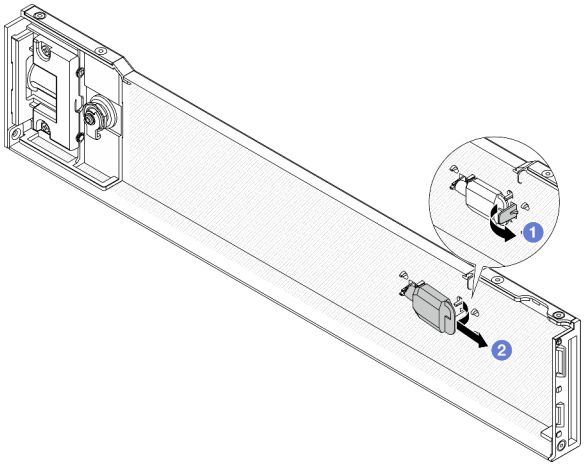


Figure 301. Removing the key

Step 2. Carefully insert the tabs on the security bezel into the slots on the right rack latch. Then, press and hold the release latch 1 and rotate the security bezel inward until the other side clicks into place.

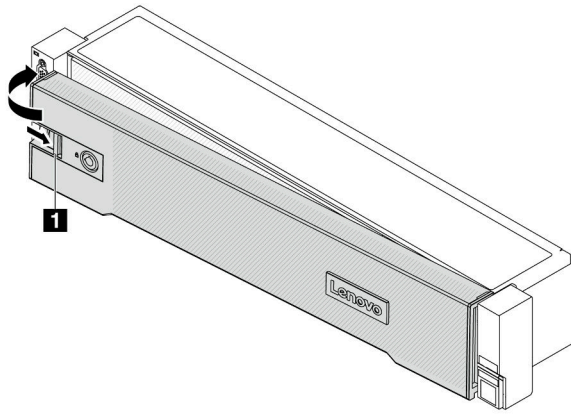


Figure 302. Security bezel installation

Step 3. Use the key to lock the security bezel to the closed position.

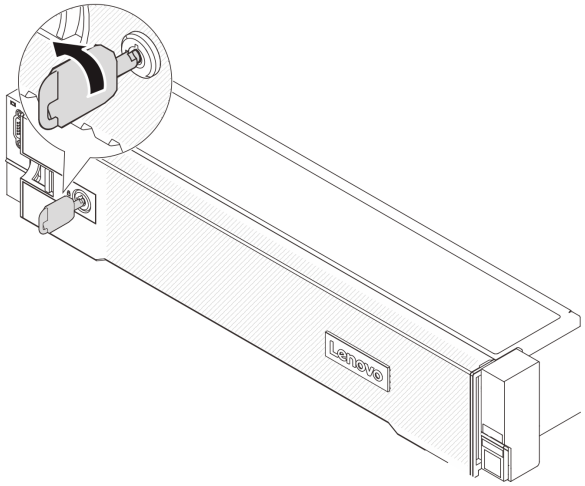


Figure 303. Locking the security bezel

After you finish

Complete the parts replacement. See “Complete the parts replacement” on page 320.

System board assembly replacement (trained technician only)

Follow instructions in this section to remove and install the system board assembly.

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

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

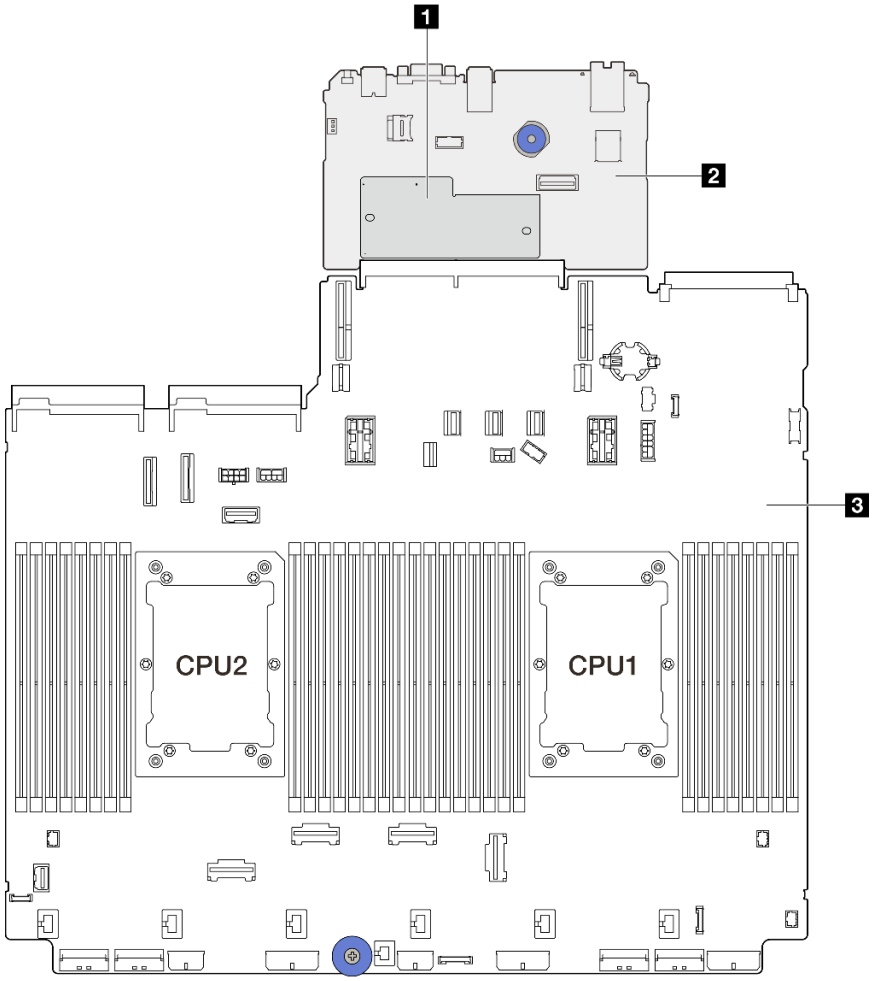


Figure 304. System-board-assembly layout

1 Firmware and RoT security module	2 System I/O board	3 Processor board

- “Remove the firmware and RoT security module” on page 293
- “Install the firmware and RoT security module” on page 295
- “Remove the system I/O board or processor board” on page 299
- “Install the system I/O board or processor board” on page 302

Remove the firmware and RoT security module

Follow instructions in this section to remove the ThinkSystem V3 Firmware and Root of Trust Security Module (firmware and RoT security module).

About this task

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

Attention:

- Read “Installation Guidelines” on page 1 and “Safety inspection checklist” on page 2 to ensure that you work safely.

- Power off the server and peripheral devices and disconnect the power cords and all external cables. See “Power off the server” on page 32.
- Prevent exposure to static electricity, which might lead to system halt and loss of data, by keeping static-sensitive components in their static-protective packages until installation, and handling these devices with an electrostatic-discharge wrist strap or other grounding system.
- After replacing the firmware and RoT security module, update the firmware to the specific version supported by the server. Make sure that you have the required firmware or a copy of the pre-existing firmware before you proceed.

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

- Go to https://datacentersupport.lenovo.com/products/servers/thinksystem/sr650v3/downloads/driver-list/ to see the latest firmware and driver updates for your server.
- Go to “Update the firmware” in *User Guide* or *System Configuration Guide* for more information on firmware updating tools.

Procedure

Step 1. Make preparation for the task.

a. Perform OneCLI commands to back up the UEFI settings. See https://pubs.lenovo.com/lxce-onecli/onecli_r_save_command.

b. Perform both OneCLI commands and XCC actions to back up the XCC settings. See https://pubs.lenovo.com/lxce-onecli/onecli_r_save_command and https://pubs.lenovo.com/xcc2/NN1ia_c_backupthexcc.html.

c. If the server is installed in a rack, slide the server out on its rack slide rails to gain access to the top cover, or remove the server from the rack. See “Remove the server from rack” on page 32.

d. Remove the top cover. See “Remove the top cover” on page 318.

e. If your server comes with riser assemblies or a rear drive cage, remove it first.

- “Remove a rear riser assembly” on page 272
- “Remove the 7mm drive cage” on page 242
- “Rear drive backplane and drive cage replacement” on page 250

Step 2. Remove the firmware and RoT security module.

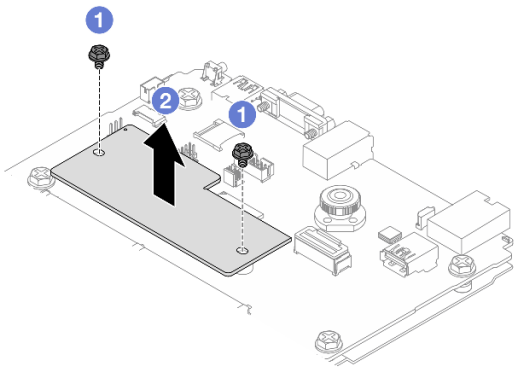


Figure 305. firmware and RoT security module *removal*

a. 1 Loosen the two screws on the firmware and RoT security module.

b. 2 Lift the firmware and RoT security module out of the chassis.

After you finish

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

Demo video

Watch the procedure on YouTube

Install the firmware and RoT security module

Follow instructions in this section to install the ThinkSystem V3 Firmware and Root of Trust Security Module (firmware and RoT security module).

About this task

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

Attention:

- Read “Installation Guidelines” on page 1 and “Safety inspection checklist” on page 2 to ensure that you work safely.
- Power off the server and peripheral devices and disconnect the power cords and all external cables. See “Power off the server” on page 32.
- 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.

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

- Go to https://datacentersupport.lenovo.com/products/servers/thinksystem/sr650v3/downloads/driver-list/ to see the latest firmware and driver updates for your server.
- Go to “Update the firmware” in *User Guide* or *System Configuration Guide* for more information on firmware updating tools.

Procedure

Step 1. Touch the static-protective package that contains the new part to any unpainted surface on the outside of the server. Then, take the new part out of the package and place it on a static-protective surface.

Step 2. Install the firmware and RoT security module to the server.

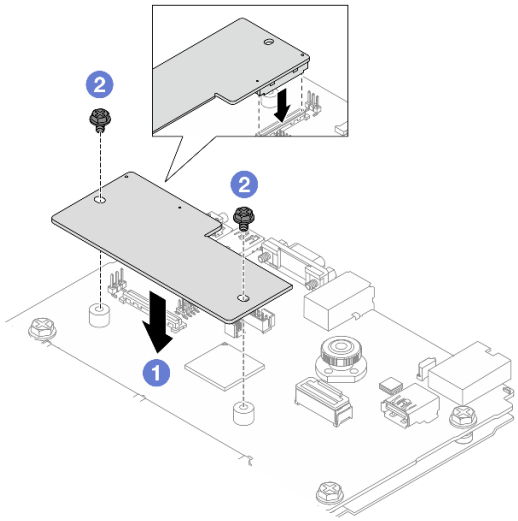


Figure 306. firmware and RoT security module *installation*

a. 1 Lower the firmware and RoT security module onto the system I/O board and ensure that the connector on the module is correctly inserted into the slot on the system I/O board.

b. 2 Tighten the two screws to secure the firmware and RoT security module in place.

After you finish

1. Install any components that you have removed:
   - “Install a rear riser assembly” on page 284
   - “Install the 7mm drive cage” on page 248
   - “Rear drive backplane and drive cage replacement” on page 250
2. Complete the parts replacement. See “Complete the parts replacement” on page 320.
3. Update the UEFI, XCC and LXPM firmware to the specific version supported by the server. See https://glosse4lenovo.lenovo.com/wiki/glosse4lenovo/view/How%20To/System%20related/How%20to%20do%20RoT%20Module%20FW%20update%20on%20ThinkSystem%20V3%20machines/ (Lenovo service technicians only).
4. Perform OneCLI commands to restore the UEFI settings. See https://pubs.lenovo.com/lxce-onecli/onecli_r_restore_command.
5. Perform both OneCLI commands and XCC actions to restore the XCC settings. See https://pubs.lenovo.com/lxce-onecli/onecli_r_restore_command and https://pubs.lenovo.com/xcc2/NN1ia_c_restorethexcc.html.
6. If there is a software (SW) key, for example, XCC FoD key, installed in the system, inject the key again to ensure that the key functions properly. See Using Lenovo Features on Demand.

   Note: If you need to replace the processor board together with the firmware and RoT security module, update the VPD before injecting the key. See Update the Vital Product Data (VPD).
7. Optionally, do the following if needed:
   - Hide/observe TPM. See “Hide/observe TPM” on page 297.
   - Update the TPM firmware. See “Update the TPM firmware” on page 298.
   - Enable UEFI Secure Boot. See “Enable UEFI Secure Boot” on page 298.

Demo video

Watch the procedure on YouTube

Hide/observe TPM

TPM is enabled by default to encrypt data transfer for system operation. Optionally, you can disable TPM using Unified Extensible Firmware Interface (UEFI) or Lenovo XClarity Essentials OneCLI.

Using UEFI

For details, see “Hide TPM from OS” in *UEFI User Guide* at https://pubs.lenovo.com/uefi-overview/.

Using Lenovo XClarity Essentials OneCLI

To disable TPM, do the following:

1. Download and install Lenovo XClarity Essentials OneCLI.

   To download Lenovo XClarity Essentials OneCLI, go to the following site:

   https://datacentersupport.lenovo.com/solutions/HT116433

2. Run the following command:
   `OneCli.exe config set TrustedComputingGroup.HideTPMfromOS "Yes" --imm <userid>:<password>@<ip_address> --override`

   where:

   - *<userid>:<password>* are the credentials used to access the BMC (Lenovo XClarity Controller interface) of your server. The default user ID is USERID, and the default password is PASSW0RD (zero, not an uppercase o)
   - *<ip_address>* is the IP address of the BMC.

   Example:

```
D:\onecli>OneCli.exe config set TrustedComputingGroup.HideTPMfromOS "Yes" --imm USERID:PASSW0RD=1@10.245.39.79 --override

Lenovo XClarity Essentials OneCLI 1xce_onecli01p-2.3.0
Licensed Materials - Property of Lenovo
(C) Copyright Lenovo Corp. 2013-2018 All Rights Reserved
If the parameters you input includes password, please Note that:
* The password must consist of a sequence of characters from `0-9a-zA-Z_-+.$%@!^&*()=` set
* Use "" to quote when password parameters include special characters
* Do not use reserved characters in path name when parameter contains path
Invoking SET command ...
Connected to BMC at IP address 10.245.39.79 by IPMI
TrustedComputingGroup.HideTPMfromOS=Yes
Success.
```

3. Reboot the system.

If you want to enable TPM again, run the following command and reboot the system:
`OneCli.exe config set TrustedComputingGroup.HideTPMfromOS "No" --imm <userid>:<password>@<ip_address> --override`

Example:

```
D:\onecli3>OneCli.exe config set TrustedComputingGroup.HideTPMfromOS "No" --imm USERID:PASSW0RD=11@10.245.39.79 --override

Lenovo XClarity Essentials OneCLI 1xce_onecli01h-3.0.1
(C) Lenovo 2013-2020 All Rights Reserved

OneCLI License Agreement and OneCLI Legal Information can be found at the following location:
    "D:\onecli3\Lic"

[1s]Certificate check finished [100%][==========================================================================================

Invoking SET command ...
Connected to BMC at IP address 10.245.39.79 by IPMI
TrustedComputingGroup.HideTPMfromOS=No
Configure successfully, please reboot system.
Succeed.
```

Update the TPM firmware

Optionally, you can update the TPM firmware using Lenovo XClarity Essentials OneCLI.

Note: TPM firmware update is irreversible. After update, the TPM firmware cannot be downgraded to earlier versions.

TPM firmware version

Follow the procedure below to see the TPM firmware version:

From Lenovo XClarity Provisioning Manager

1. Start the server and press the key specified in the on-screen instructions to display the Lenovo XClarity Provisioning Manager interface. (For more information, see the “Startup” section in the LXPM documentation compatible with your server at https://pubs.lenovo.com/lxpm-overview/.)
2. If the power-on Administrator password is required, enter the password.
3. From the UEFI Setup page, click **System Settings → Security → Trusted Platform Module → TPM 2.0 → TPM Firmware Version**.

Update the TPM firmware

To update the TPM firmware, do the following:

1. Download and install Lenovo XClarity Essentials OneCLI.

   To download Lenovo XClarity Essentials OneCLI, go to the following site:

   https://datacentersupport.lenovo.com/solutions/HT116433

2. Run the following command:
   `OneCli.exe config set TrustedComputingGroup.DeviceOperation "Update to TPM 2.0 firmware version <x.x.x.x>" --bmc <userid>:<password>@<ip_address>`

   where:

   - *<x.x.x.x>* is the target TPM version.

     e.g. TPM 2.0 (7.2.1.0) -> TPM 2.0 (7.2.2.0):

     `OneCli.exe config set TrustedComputingGroup.DeviceOperation "Update to TPM 2.0 firmware version 7.2.2.0" --bmc <userid>:<password>@<ip_address>`

   - *<userid>:<password>* are the credentials used to access the BMC (Lenovo XClarity Controller interface) of your server. The default user ID is USERID, and the default password is PASSW0RD (zero, not an uppercase o).
   - *<ip_address>* is the IP address of the BMC.

Enable UEFI Secure Boot

Optionally, you can enable UEFI Secure Boot.

There are two methods available to enable UEFI Secure Boot:

- From Lenovo XClarity Provisioning Manager

  To enable UEFI Secure Boot from Lenovo XClarity Provisioning Manager:

  1. Start the server and press the key specified in the on-screen instructions to display the Lenovo XClarity Provisioning Manager interface. (For more information, see the “Startup” section in the LXPM documentation compatible with your server at https://pubs.lenovo.com/lxpm-overview/.)
  2. If the power-on Administrator password is required, enter the password.
  3. From the UEFI Setup page, click **System Settings → Security → Secure Boot**.
  4. Enable Secure Boot and save the settings.

  Note: If disabling UEFI secure boot is needed, select Disable in step 4.

- From Lenovo XClarity Essentials OneCLI

  To enable UEFI Secure Boot from Lenovo XClarity Essentials OneCLI:

  1. Download and install Lenovo XClarity Essentials OneCLI.

     To download Lenovo XClarity Essentials OneCLI, go to the following site:

     https://datacentersupport.lenovo.com/solutions/HT116433

  2. Run the following command to enable Secure Boot:
     `OneCli.exe config set SecureBootConfiguration.SecureBootSetting Enabled --bmc <userid>:<password>@<ip_address>`

     where:

     – *<userid>:<password>* are the credentials used to access the BMC (Lenovo XClarity Controller interface) of your server. The default user ID is USERID, and the default password is PASSW0RD (zero, not an uppercase o)

     – *<ip_address>* is the IP address of the BMC.

     For more information about the Lenovo XClarity Essentials OneCLI `set` command, see:

     https://pubs.lenovo.com/lxce-onecli/onecli_r_set_command

  Note: If disabling UEFI secure boot is needed, run the following command:
  `OneCli.exe config set SecureBootConfiguration.SecureBootSetting Disabled --bmc <userid>:<password>@<ip_address>`

Remove the system I/O board or processor board

Follow instructions in this section to remove the system I/O board or processor board.

About this task

Important:

- This task must be operated by trained technicians that are certified by Lenovo Service. Do not attempt to remove or install the part without proper training and qualification.
- When removing the memory modules, label the slot number on each memory module, remove all the memory modules from the system board assembly, and set them aside on a static-protective surface for reinstallation.
- **When disconnecting cables, make a list of each cable and record the connectors the cable is connected to, and use the record as a cabling checklist after installing the new system board assembly.**

Attention:

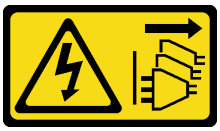
- Read “Installation Guidelines” on page 1 and “Safety inspection checklist” on page 2 to ensure that you work safely.
- Power off the server and peripheral devices and disconnect the power cords and all external cables. See “Power off the server” on page 32.
- Prevent exposure to static electricity, 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.

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

CAUTION:

The heat sinks and processors might be very hot. Turn off the server and wait several minutes to let the server cool before removing the server cover.

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.

Procedure

Step 1. Make preparation for this task.

a. Record all system configuration information, such as Lenovo XClarity Controller IP addresses, vital product data, and the machine type, model number, serial number, Universally Unique Identifier, and asset tag of the server.

b. Save the system configuration to an external device with Lenovo XClarity Essentials.

c. Save the system event log to external media.

d. Power off the server and peripheral devices and disconnect the power cords and all external cables. See “Power off the server” on page 32.

e. If the server is installed in a rack, slide the server out on its rack slide rails to gain access to the top cover, or remove the server from the rack. See “Remove the server from rack” on page 32.

f. Remove the top cover. See “Remove the top cover” on page 318.

g. If your server comes with an air baffle, a middle cage, or a rear cage, remove it first.

- “Remove the air baffle” on page 44
- “Remove the middle drive cage and drive backplanes” on page 193
- “Rear drive backplane and drive cage replacement” on page 250

h. If your server has a CFF adapter or a RAID flash power module installed on the front of the chassis, remove it first.

- “Remove an internal RAID/HBA/expander adapter” on page 109
- “Remove a RAID flash power module from the chassis” on page 228

i. Record where the cables are connected to the system board assembly; then, disconnect all the cables.

j. Remove any of the following components that are installed on the system board assembly and put them in a safe, static-protective place.

- “Remove a system fan” on page 307
- “Remove the system fan cage” on page 311
- “Remove a memory module” on page 185
- “Processor and heat sink replacement (trained technician only)” on page 205
- “Remove the CMOS battery” on page 48
- “Remove a rear riser assembly” on page 272
- “Remove the rear OCP module” on page 266

k. Pull out the power supplies slightly. Ensure that they are disconnected from the system board assembly.

Step 2. Remove the system board assembly.

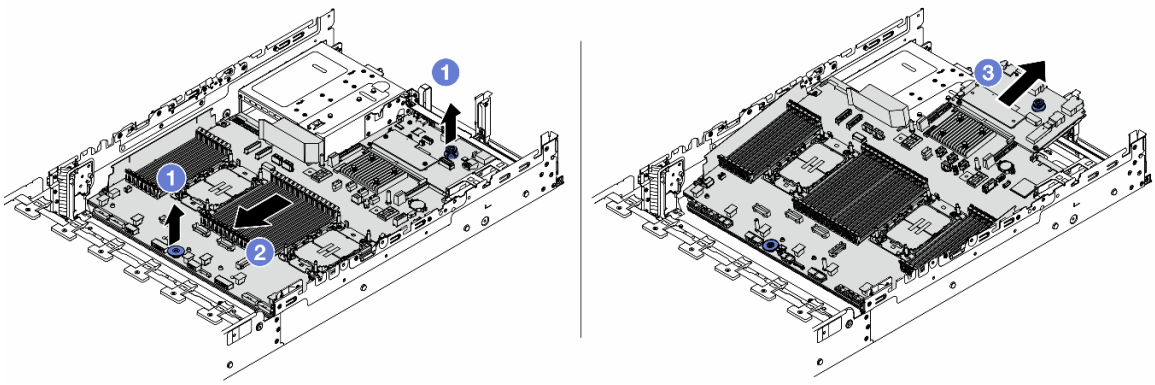


Figure 307. System board assembly removal

a. 1 Lift the two lifting handles at the same time.

b. 2 Slide the system board assembly towards the front of the chassis until it stops.

c. 3 Tilt and lift the system board assembly out of the chassis.

Step 3. Separate the system I/O board from the processor board.

Note: To prevent the contact of the system I/O board from damage, pinch and lift the plunger on the system I/O board upward a little and pull out the system I/O board outward. During the entire pulling action, ensure that the system I/O board remains as horizontal as possible.

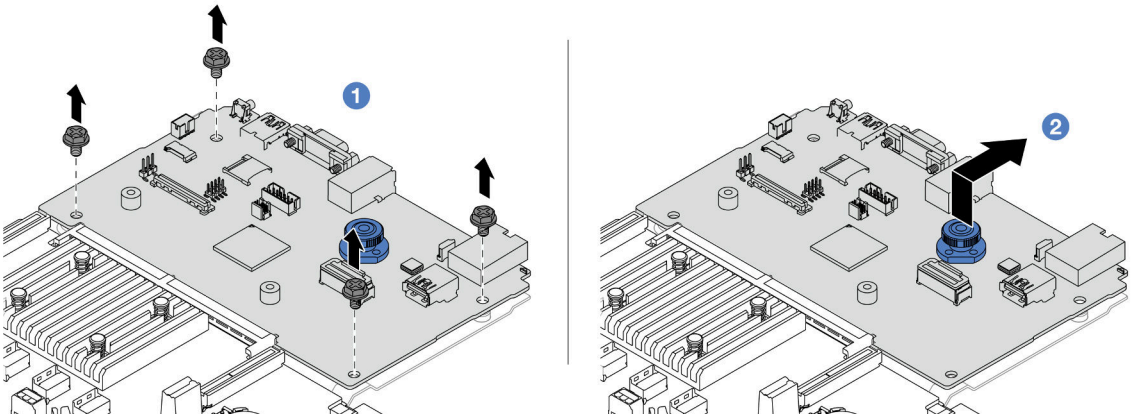


Figure 308. Separating the system I/O board from the processor board

a. 1 Remove the screws that secure the system I/O board.

b. 2 Lift and hold the rear lifting handle and slide the system I/O board towards the rear to disengage it from the processor board.

Step 4. (Optional) If you are going to replace the system I/O board, do the following:

1. Remove the firmware and RoT security module from the system I/O board. See "Remove the firmware and RoT security module" on page 293.
2. Remove the MicroSD card. See "Remove the MicroSD card" on page 189.

After you finish

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

  Important: Before you return the processor board, make sure that you install the processor socket covers from the new processor board. To replace a processor socket cover:

  1. Take a socket cover from the processor socket assembly on the new processor board and orient it correctly above the processor socket assembly on the removed processor board.
  2. Gently press down the socket cover legs to the processor socket assembly, pressing on the edges to avoid damage to the socket pins. You might hear a click on the socket cover is securely attached.
  3. **Make sure** that the socket cover is securely attached to the processor socket assembly.
- If you plan to recycle the component, see "Disassemble the system board assembly for recycle" in *User Guide*.

Demo video

Watch the procedure on YouTube

Install the system I/O board or processor board

Follow instructions in this section to install the system I/O board or processor board.

About this task

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

Attention:

- Read “Installation Guidelines” on page 1 and “Safety inspection checklist” on page 2 to ensure that you work safely.
- Power off the server and peripheral devices and disconnect the power cords and all external cables. See “Power off the server” on page 32.
- 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.

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

- Go to https://datacentersupport.lenovo.com/products/servers/thinksystem/sr650v3/downloads/driver-list/ to see the latest firmware and driver updates for your server.
- Go to “Update the firmware” in *User Guide* or *System Configuration Guide* for more information on firmware updating tools.

Procedure

Step 1. Touch the static-protective package that contains the new part to any unpainted surface on the outside of the server. Then, take the new part out of the package and place it on a static-protective surface.

Step 2. (Optional) If you are replacing the system I/O board, do the following:

1. Install the firmware and RoT security module removed from the old system I/O board onto the new system I/O board. See “Install the firmware and RoT security module” on page 295.
2. Install the MicroSD card removed from the old system I/O board onto the new system I/O board. See “Install the MicroSD card” on page 191.

Step 3. Depending on your need, do one of the following:

- If you are going to replace the system I/O board and reuse the processor board, install a new system I/O board onto the processor board.
- If you are going to replace the processor board and reuse the system I/O board, install the existing system I/O board onto a new processor board.

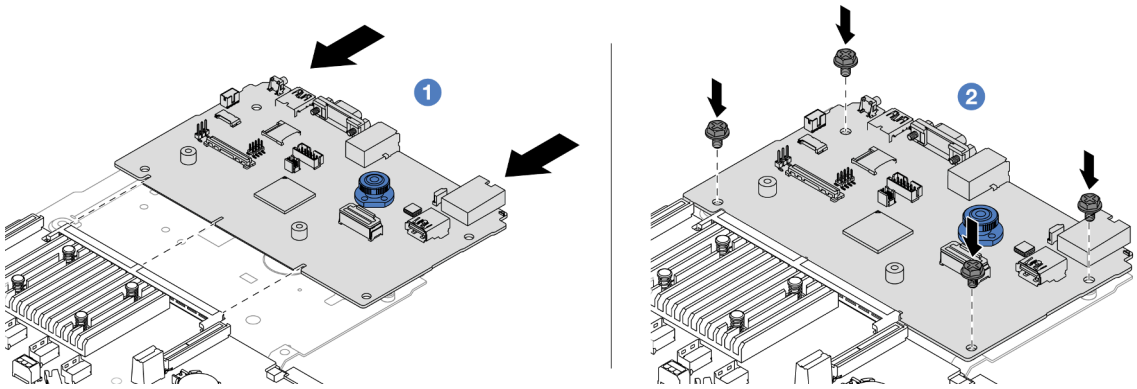
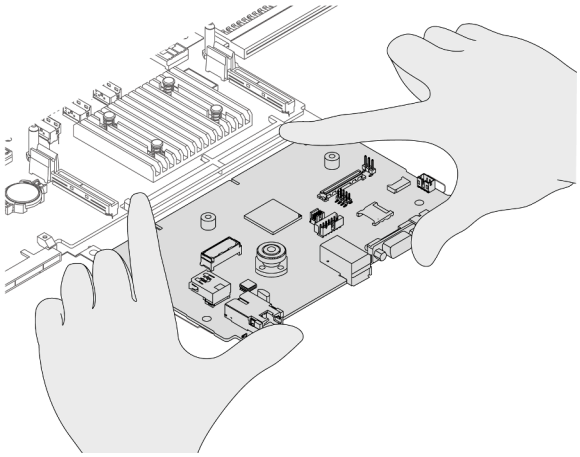


Figure 309. Installing the system I/O board onto the processor board

a. 1 Align the system I/O board with the connector on the processor board, and use both hands to push the system I/O board and slightly insert it into the connector.

Note: To prevent the contact of the system I/O board from damage, ensure that the system I/O board is aligned correctly with the connector on the processor board, and remains as horizontal as possible during the insertion.



b. 2 Install the screws to fix the system I/O board into place.

Step 4. Install the system board assembly into the server.

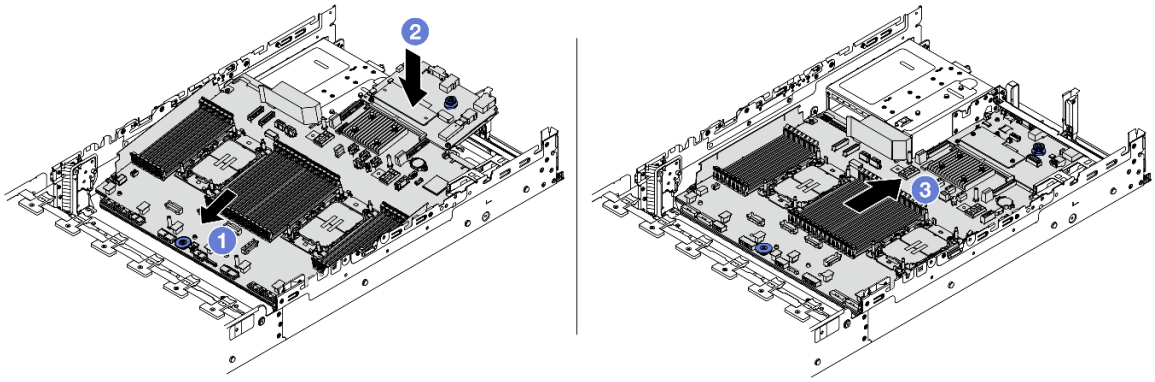


Figure 310. System board assembly installation

a. 1 Insert the front end of the system board assembly towards the front of the chassis until it stops.

b. 2 Lower the other end down into the chassis.

c. 3 Slide the system board assembly towards the rear of the chassis until it clicks into place. Ensure that rear connectors on the system I/O board are inserted into the corresponding holes in the rear panel.

After you finish

1. Install any components that you have removed:
   - “Install a processor and heat sink” on page 212
   - “Install a memory module” on page 187
   - “Install the CMOS battery” on page 50

- “Install an internal RAID/HBA/expander adapter” on page 111
- “Install a RAID flash power module on the chassis” on page 230
- “Install a system fan” on page 308
- “Install the system fan cage” on page 312
- “Install a rear riser assembly” on page 284
- “Install the middle drive backplanes and drive cage” on page 196
- “Install the rear OCP module” on page 267
- “Rear drive backplane and drive cage replacement” on page 250

2. Reconnect all the required cables to the same connectors on the system board assembly. See Chapter 2 “Internal cable routing” on page 323.
3. Ensure that all components have been reassembled correctly and that no tools or loose screws are left inside the server.
4. Reinstall the top cover. See “Install the top cover” on page 319.
5. If the sever was installed in a rack, reinstall the server into the rack. See “Install the server to rack” on page 36.
6. Reconnect the power cords and any cables that you removed.
7. Power on the server and any peripheral devices. See “Power on the server” on page 32.
8. Update the vital product data (VPD). See “Update the Vital Product Data (VPD)” on page 305.

   Machine type number and serial number can be found on the ID label, see “Identify the server and access to the Lenovo XClarity Controller” in *User Guide* or *System Configuration Guide*.
9. Optionally, enable UEFI Secure Boot. See “Enable UEFI Secure Boot” on page 298.

Demo video

Watch the procedure on YouTube

Update the Vital Product Data (VPD)

Use this topic to update the Vital Product Data (VPD).

- **(Required)** Machine type
- **(Required)** Serial number
- **(Required)** System model
- (Optional) Asset tag
- (Optional) UUID

Recommended tools:

- Lenovo XClarity Provisioning Manager
- Lenovo XClarity Essentials OneCLI commands

Using Lenovo XClarity Provisioning Manager

Steps:

1. Start the server and press the key according to the on-screen instructions. The Lenovo XClarity Provisioning Manager interface is displayed by default.
2. Click ⚙ on the top right corner of the Lenovo XClarity Provisioning Manager main interface.
3. Click **Update VPD**; then, follow on-screen instructions to update the VPD.

Using Lenovo XClarity Essentials OneCLI commands

- Updating **machine type**
  `onecli config set SYSTEM_PROD_DATA.SysInfoProdName <m/t_model> [access_method]`
- Updating **serial number**
  `onecli config set SYSTEM_PROD_DATA.SysInfoSerialNum <s/n> [access_method]`
- Updating **system model**
  `onecli config set SYSTEM_PROD_DATA.SysInfoProdIdentifier <system model> [access_method]`
  `onecli config set SYSTEM_PROD_DATA.SysInfoProdIdentifierEx <system model> --override [access_method]`
- Updating **asset tag**
  `onecli config set SYSTEM_PROD_DATA.SysEncloseAssetTag <asset_tag> [access_method]`
- Updating **UUID**
  `onecli config createuuid SYSTEM_PROD_DATA.SysInfoUUID [access_method]`

Variable	Description
<m/t_model>	The server machine type and model number. Type `xxxxyyy`, where `xxxx` is the machine type and `yyy` is the server model number.
<s/n>	The serial number on the server. Type `zzzzzzz`, where `zzzzzzz` is the serial number.
<system model>	The system model on the server. Type `system yyyyyyyy`, where *yyyyyyyy* is the product identifier.
<asset_tag>	The server asset tag number. Type `aaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaa`, where `aaaaaaaaaaaaaaaaaaaaaaaaaaaaaaaa` is the asset tag number.

[access_method]	The access method that you select to access the target server.
	• Online KCS (unauthenticated and user restricted):
	You can directly delete *[access_method]* from the command.
	• Online authenticated LAN:
	In this case, specify below LAN account information at the end of the OneCLI command:
	`--bmc-username <user_id> --bmc-password <password>`
	• Remote WAN/LAN:
	In this case, specify below XCC account information and IP address at the end of the OneCLI command:
	`--bmc <bmc_user_id>:<bmc_password>@<bmc_external_IP>`
	
	Notes:
	– *<bmc_user_id>*
	The BMC account name (1 of 12 accounts). The default value is USERID.
	– *<bmc_password>*
	The BMC account password (1 of 12 accounts).

System fan replacement

Use this information to remove and install a system fan.

- “Remove a system fan” on page 307

- “Install a system fan” on page 308

Remove a system fan

Use this information to remove a system fan.

About this task

S033

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

S017

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

Attention:

- Read “Installation Guidelines” on page 1 and “Safety inspection checklist” on page 2 to ensure that you work safely.
- 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.
- When removing a hot-swap fan without powering off the server, do not touch the system fan cage. With power on, complete the replacement within 30 seconds to ensure proper operation.

Procedure

Step 1. If the server is installed in a rack, slide the server out on its rack slide rails to gain access to the top cover, or remove the server from the rack. See “Remove the server from rack” on page 32.

Step 2. Remove the top cover. See “Remove the top cover” on page 318.

Step 3. Remove the system fan.

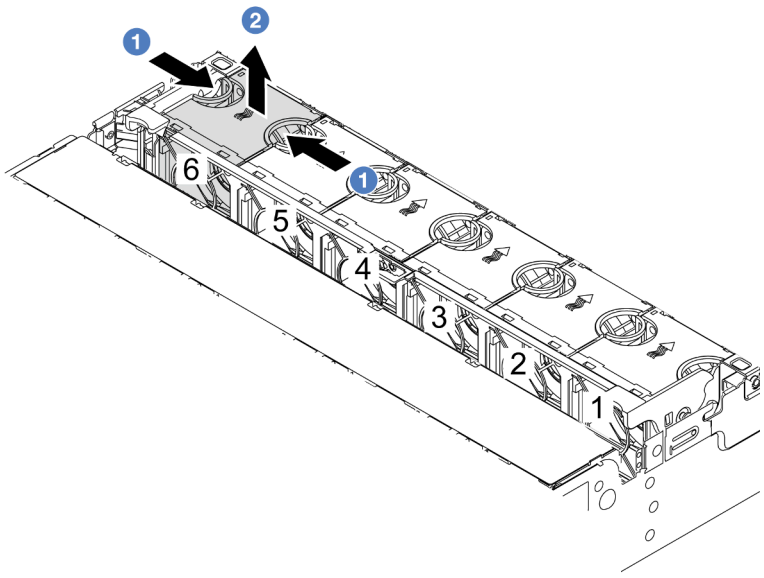


Figure 311. System fan removal

a. 1 Grasp the top of the system fan with your fingers.

b. 2 Lift the system fan out of the server.

After you finish

1. Install a new system fan or install a fan filler to cover the place. See "Install a system fan" on page 308.
2. If you are instructed to return the component or optional device, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Demo video

Watch the procedure on YouTube

Install a system fan

Use this information to install a system fan.

About this task

S033

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

S017

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

Attention:

- Read “Installation Guidelines” on page 1 and “Safety inspection checklist” on page 2 to ensure that you work safely.
- 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.
- When installing a hot-swap fan without powering off the server, do not touch the system fan cage. With power on, complete the replacement within 30 seconds to ensure proper operation.

Procedure

Step 1. Touch the static-protective package that contains the new part to any unpainted surface on the outside of the server. Then, take the new part out of the package and place it on a static-protective surface.

Step 2. Position the system fan above the system fan cage. The system fan connector on the bottom of the system fan should face the rear of the chassis. Press the system fan straight down until it is seated into place.

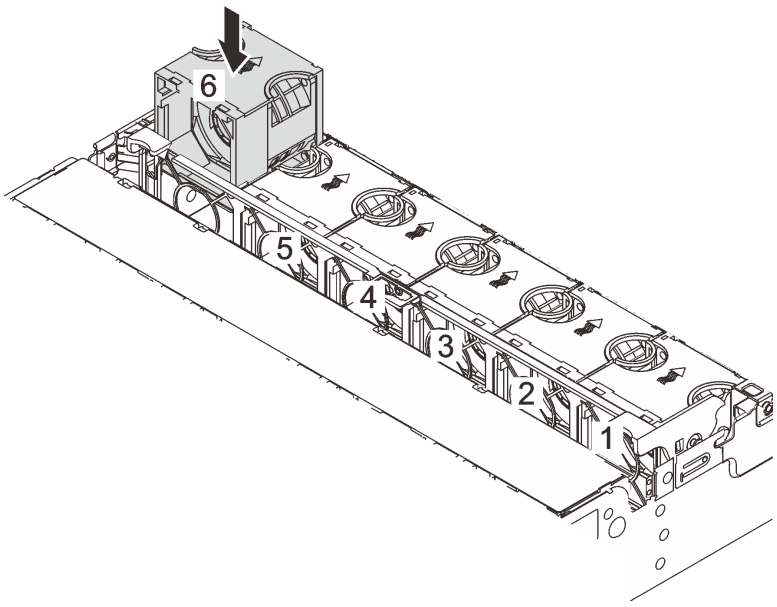


Figure 312. System fan installation

After you finish

Complete the parts replacement. See “Complete the parts replacement” on page 320.

Demo video

Watch the procedure on YouTube

System fan cage replacement

Use this information to remove and install the system fan cage.

- “Remove the system fan cage” on page 311
- “Install the system fan cage” on page 312

Remove the system fan cage

Use this information to remove the system fan cage.

About this task

Attention:

- Read “Installation Guidelines” on page 1 and “Safety inspection checklist” on page 2 to ensure that you work safely.
- Power off the server and peripheral devices and disconnect the power cords and all external cables. See “Power off the server” on page 32.
- Prevent exposure to static electricity, which might lead to system halt and loss of data, by keeping static-sensitive components in their static-protective packages until installation, and handling these devices with an electrostatic-discharge wrist strap or other grounding system.

Procedure

Step 1. If the server is installed in a rack, slide the server out on its rack slide rails to gain access to the top cover, or remove the server from the rack. See “Remove the server from rack” on page 32.

Step 2. Remove the top cover. See “Remove the top cover” on page 318.

Step 3. (Optional) If you are replacing the system fan cage, remove all system fans first. See “Remove a system fan” on page 307.If you are removing the system fan cage to access other components, you can remove it with the system fans installed.

Step 4. Remove the system fan cage.

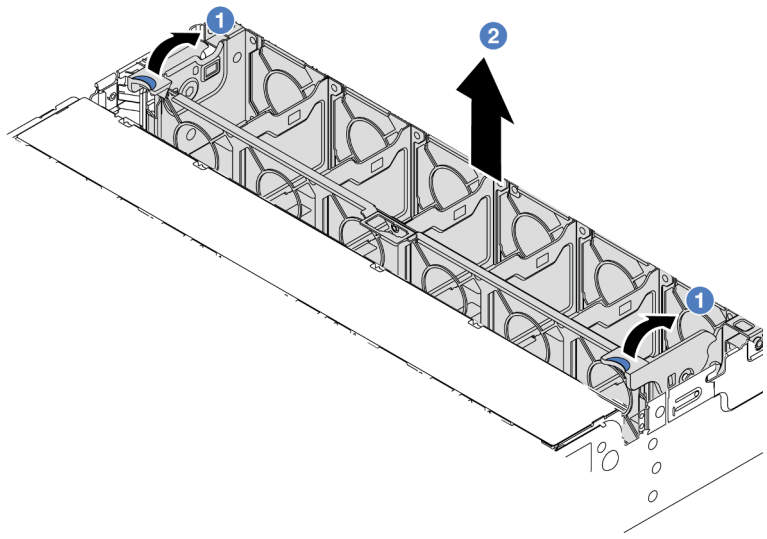


Figure 313. System fan cage removal

a. (1) Rotate the levers of the system fan cage to the rear of the server.

b. (2) Lift the system fan cage straight up and out of the chassis.

After you finish

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

Demo video

Watch the procedure on YouTube

Install the system fan cage

Use this information to install the system fan cage.

About this task

Attention:

- Read “Installation Guidelines” on page 1 and “Safety inspection checklist” on page 2 to ensure that you work safely.
- Power off the server and peripheral devices and disconnect the power cords and all external cables. See “Power off the server” on page 32.
- Prevent exposure to static electricity, which might lead to system halt and loss of data, by keeping static-sensitive components in their static-protective packages until installation, and handling these devices with an electrostatic-discharge wrist strap or other grounding system.

Procedure

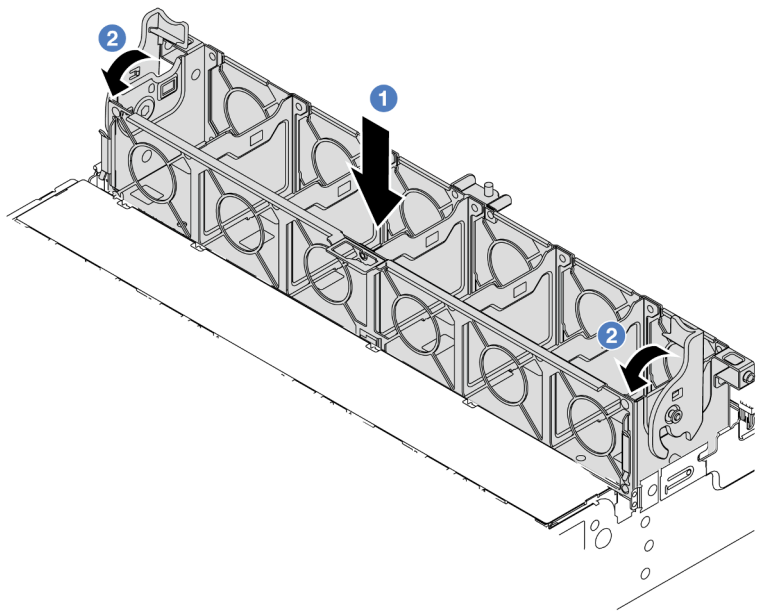


Figure 314. System fan cage installation

Step 1. Align the system fan cage with the mounting guides on both sides of chassis, and lower it into the chassis.

Step 2. Rotate the fan cage levers down until the fan cage clicks into place.

Note: If there are system fans installed in the system fan cage, ensure that the system fans are correctly connected to the system fan connectors on the system board assembly.

After you finish

1. If you have removed the system fans, reinstall them. See "Install a system fan" on page 308.
2. Complete the parts replacement. See "Complete the parts replacement" on page 320.

Demo video

Watch the procedure on YouTube

Serial port module replacement

Use this information to remove and install a serial port module.

Remove a serial port module

Use this information to remove a serial port module.

About this task

Attention:

- Read "Installation Guidelines" on page 1 and "Safety inspection checklist" on page 2 to ensure that you work safely.
- Power off the server and peripheral devices and disconnect the power cords and all external cables. See "Power off the server" on page 32.
- Prevent exposure to static electricity, which might lead to system halt and loss of data, by keeping static-sensitive components in their static-protective packages until installation, and handling these devices with an electrostatic-discharge wrist strap or other grounding system.

Procedure

Note: The riser bracket in below illustrations might look different from your riser bracket. The removal procedure is the same.

Step 1. If the server is installed in a rack, slide the server out on its rack slide rails to gain access to the top cover, or remove the server from the rack. See "Remove the server from rack" on page 32.

Step 2. Remove the top cover. See "Remove the top cover" on page 318.

Step 3. Disconnect the cable of the serial port module from the system board assembly.

Notes:

- If you need to disconnect cables from the system board assembly, disengage all latches or release tabs on cable connectors first. Failing to release the tab before removing the cables will damage the cable sockets on the system board assembly. Any damage to the cable sockets might require replacing the system board assembly.
- The connectors on your system board assembly might look different from those in the illustration, but the removal procedure is the same.

1. Press the release tab to release the connector.
2. Disengage the connector from the cable socket.

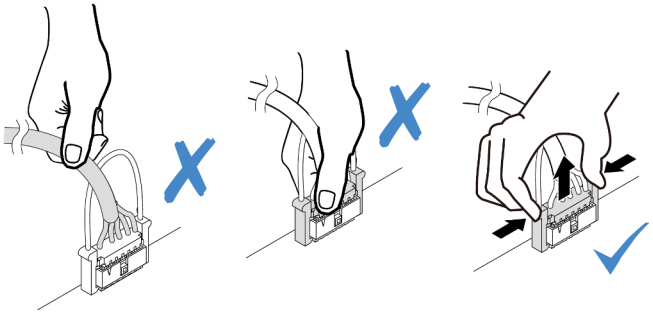


Figure 315. Disconnecting cables from the system board assembly

Step 4. Remove the riser bracket from the server.

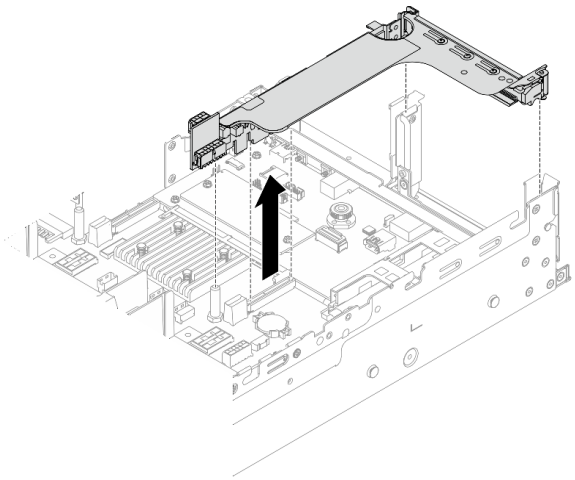


Figure 316. Removing the riser bracket

Step 5. Remove the serial port module out of the riser bracket.

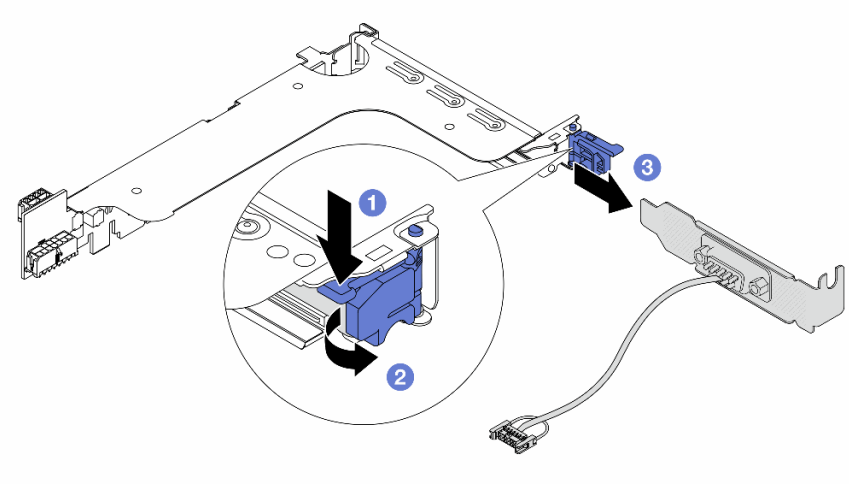


Figure 317. Removing the serial port module

a. Press down the bracket latch.
b. Open the latch.
c. Slide the serial port module out of the riser bracket.

Step 6. (Optional) If you need to replace the serial port bracket, use a 5 mm wrench to disassemble the serial port cable from the bracket.

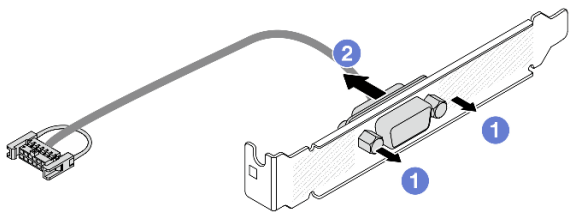


Figure 318. Disassembling the serial port module

After you finish

1. Install a new serial port module, a PCIe adapter, or a filler to cover the place. See "Install a serial port module" on page 315 and "Install a rear riser assembly" on page 284.
2. If you are instructed to return the component or optional device, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.

Demo video

Watch the procedure on YouTube

Install a serial port module

Use this information to install a serial port module.

About this task

Attention:

- Read “Installation Guidelines” on page 1 and “Safety inspection checklist” on page 2 to ensure that you work safely.
- Power off the server and peripheral devices and disconnect the power cords and all external cables. See “Power off the server” on page 32.
- Prevent exposure to static electricity, which might lead to system halt and loss of data, by keeping static-sensitive components in their static-protective packages until installation, and handling these devices with an electrostatic-discharge wrist strap or other grounding system.

Procedure

Note: The riser bracket in below illustrations might look different from your riser bracket. The installation procedure is the same.

Step 1. Touch the static-protective package that contains the new part to any unpainted surface on the outside of the server. Then, take the new part out of the package and place it on a static-protective surface.

Step 2. Use a 5 mm wrench to install the serial port cable into the bracket.

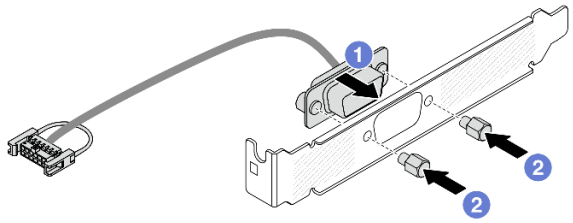


Figure 319. Assembling the serial port module

a. (1) Align the connector of the serial port cable with the holes in the bracket.

b. (2) Install the two screws to secure the cable connector into the bracket.

Step 3. Install the serial port module to the riser bracket.

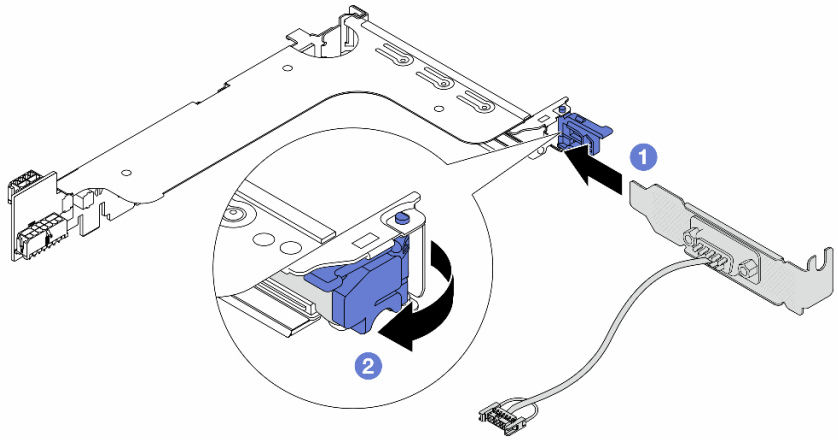


Figure 320. Installing the serial port module

a. Align the serial port module with the riser bracket and insert it into the riser bracket.

b. Close the bracket latch to secure the serial port module.

Step 4. Install the riser assembly back to the server.

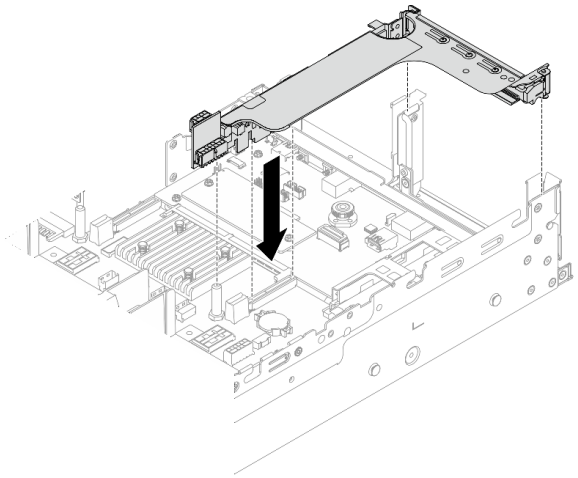


Figure 321. Installing the riser assembly

Step 5. Connect the cable of the serial port module to the serial-port-module connector on the system board assembly. For the location of the connector, refer to “System-board-assembly connector” in the *User Guide*..

After you finish

1. Complete the parts replacement. See “Complete the parts replacement” on page 320.
2. To enable the serial port module on Linux or Microsoft Windows, do one of the followings according to the installed operating system:

   Note: If the Serial over LAN (SOL) or Emergency Management Services (EMS) feature is enabled, the serial port will be hidden on Linux and Microsoft Windows. Therefore, it is required to disable SOL and EMS to use the serial port on operating systems for serial devices.

   - For Linux:

     Open the ipmitool and enter the following command to disable the Serial over LAN (SOL) feature:

     ```
     -I lanplus -H IP -U USERID -P PASSWORD sol deactivate
     ```

   - For Microsoft Windows:

     a. Open the ipmitool and enter the following command to disable the SOL feature:

     ```
     -I lanplus -H IP -U USERID -P PASSWORD sol deactivate
     ```

     b. Open Windows PowerShell and enter the following command to disable the Emergency Management Services (EMS) feature:

     ```
     Bcdedit /ems off
     ```

     c. Restart the server to ensure that the EMS setting takes effect.

Demo video

Watch the procedure on YouTube

Top cover replacement

Follow instructions in this section to remove and install the top cover.

Remove the top cover

Follow instructions in this section to remove the top cover.

S014

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

S033

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

About this task

Attention:

- Read “Installation Guidelines” on page 1 and “Safety inspection checklist” on page 2 to ensure that you work safely.
- Power off the server and peripheral devices and disconnect the power cords and all external cables. See “Power off the server” on page 32.
- Operating the server with the top cover removed might damage server components. For proper cooling and airflow, install the top cover before you turn on the server.

Procedure

Step 1. Touch the static-protective package that contains the new part to any unpainted surface on the outside of the server. Then, take the new part out of the package and place it on a static-protective surface.

Step 2. Remove the top cover.

Attention: Handle the top cover carefully. Dropping the top cover with the cover latch open might damage the cover latch.

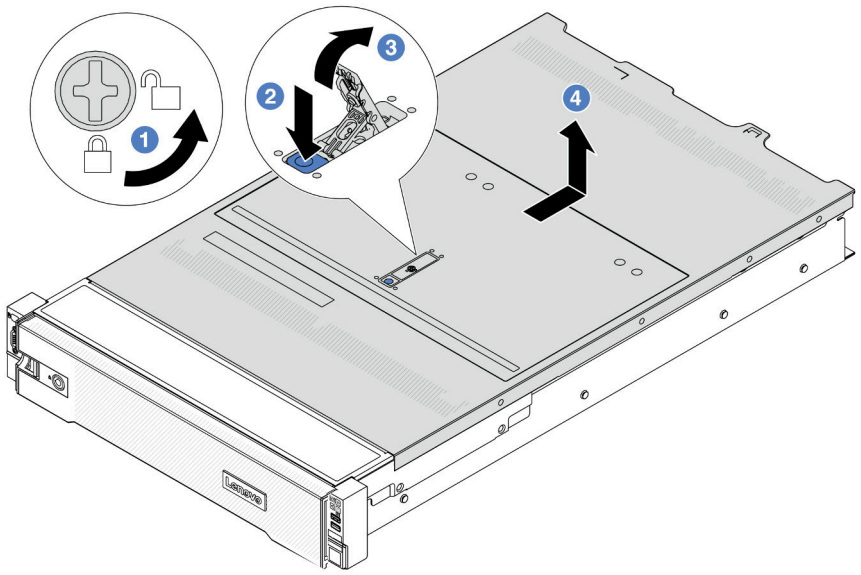


Figure 322. Top cover removal

a. 1 Use a screwdriver to turn the cover lock to the unlocked position as shown.

b. 2 Press the release button on the cover latch. The cover latch then gets released to some extent.

c. 3 Fully open the cover latch as shown.

d. 4 Slide the top cover to the rear until it is disengaged from the chassis. Then, lift the top cover off the chassis and place the top cover on a flat clean surface.

After you finish

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

Demo video

Watch the procedure on YouTube

Install the top cover

Follow instructions in this section to install the top cover.

About this task

Attention:

- Read “Installation Guidelines” on page 1 and “Safety inspection checklist” on page 2 to ensure that you work safely.
- Make sure that all cables, adapters, and other components are installed and seated correctly and that you have not left loose tools or parts inside the server.
- Make sure that all internal cables are correctly routed. See Chapter 2 “Internal cable routing” on page 323.

Procedure

Step 1. Install the top cover to your server.

Attention: Handle the top cover carefully. Dropping the top cover with the cover latch open might damage the cover latch.

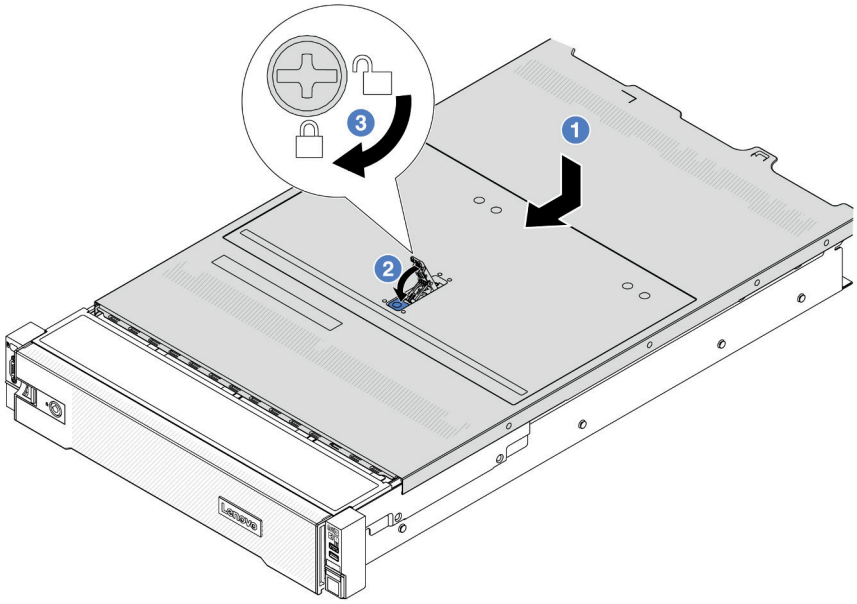


Figure 323. Top cover installation

a. 1 Ensure that the cover latch is in the open position. Lower the top cover onto the chassis until both sides of the top cover engage the guides on both sides of the chassis. Then, slide the top cover to the front of the chassis.

Note: Before you slide the top cover forward, ensure that all the tabs on the top cover engage the chassis correctly.

b. 2 Rotate the cover latch until the top cover snaps into position. Ensure that the cover latch is completely closed.

c. 3 Use a screwdriver to turn the cover lock to the locked position.

After you finish

Complete the parts replacement. See “Complete the parts replacement” on page 320.

Demo video

Watch the procedure on YouTube

Complete the parts replacement

Go through the checklist to complete parts replacement

To complete the parts replacement, do the following:

1. Ensure that all components have been reassembled correctly and that no tools or loose screws are left inside your server.

2. Properly route and secure the cables in the server. Refer to the cable connecting and routing information for each component.
3. Reinstall the air baffle. See “Install the air baffle” on page 46.

   Attention: For proper cooling and airflow, reinstall the air baffle before you turn on the server. Operating the server with the air baffle removed might damage server components.
4. Reinstall the top cover. See “Install the top cover” on page 319.
5. If the sever was installed in a rack, reinstall the server into the rack. See “Install the server to rack” on page 36.
6. Reconnect the power cords and any cables that you removed.
7. Power on the server and any peripheral devices. See “Power on the server” on page 32.
8. Update the server configuration.
   - Download and install the latest device drivers: http://datacentersupport.lenovo.com.
   - Update the system firmware. See “Update the firmware” in *User Guide* or *System Configuration Guide*.
   - Update the UEFI configuration. See https://pubs.lenovo.com/uefi-overview/.
   - Reconfigure the disk arrays if you have installed or removed a hot-swap drive or a RAID adapter. See https://pubs.lenovo.com/lxpm-overview/ for the LXPM documentation compatible with your server.

Chapter 2. Internal cable routing

See this section to do cable routing for specific components.

To connect cables, observe the following guidelines:

- Turn off the server before you connect or disconnect any internal cables.
- See the documentation that comes with any external devices for additional cabling instructions. It might be easier for you to route cables before you connect the devices to the server.
- Cable identifiers of some cables are printed on the cables that come with the server and optional devices. Use these identifiers to connect the cables to the correct connectors.
- Ensure that the cable is not pinched and does not cover any connectors or obstruct any components on the system board assembly.
- Ensure that the relevant cables pass through the cable clips.

Note: Disengage all latches, release tabs, or locks on cable connectors when you disconnect cables from the system board assembly. Failing to release them before removing the cables will damage the cable sockets on the system board assembly, which are fragile. Any damage to the cable sockets might require replacing the system board assembly.

Identifying connectors

See this section to locate and identify the connectors on the electric boards.

- “Drive backplane connectors” on page 323

For the connectors on system board assembly, see “System board assembly connector” in the *User Guide*..

Drive backplane connectors

See this section to locate the connectors on the drive backplanes.

The server supports the following backplanes depending on server configurations:

- “8 x 2.5-inch SAS/SATA front backplane” on page 324
- “8 x 2.5-inch AnyBay front backplane” on page 324
- “24 x 2.5-inch SAS/SATA front expander backplane” on page 324
- “8 x 3.5-inch SAS/SATA front backplane” on page 325
- “12 x 3.5-inch SAS/SATA front backplane” on page 325
- “12 x 3.5-inch AnyBay front backplane” on page 325
- “12 x 3.5-inch SAS/SATA front expander backplane” on page 326
- “4 x 2.5-inch SAS/SATA middle/rear backplane” on page 326
- “4 x 2.5-inch AnyBay middle/rear backplane” on page 326
- “4 x 2.5-inch NVMe middle backplane” on page 327
- “4 x 3.5-inch SAS/SATA middle/rear backplane” on page 327
- “2 x 3.5-inch SAS/SATA rear backplane” on page 327
- “8 x 2.5-inch SAS/SATA rear backplane” on page 327

8 x 2.5-inch SAS/SATA front backplane

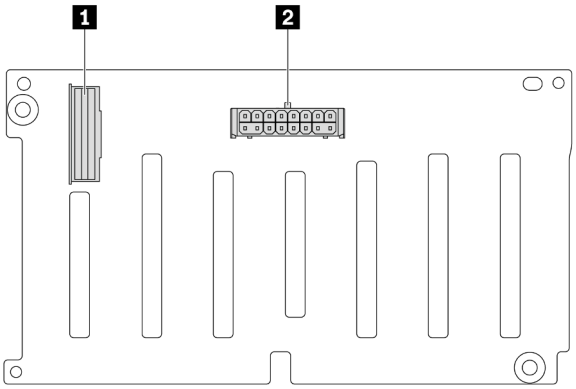


Figure 324. Connectors on the 8 x 2.5-inch SAS/SATA backplane

1 SAS connector	2 Power connector

8 x 2.5-inch AnyBay front backplane

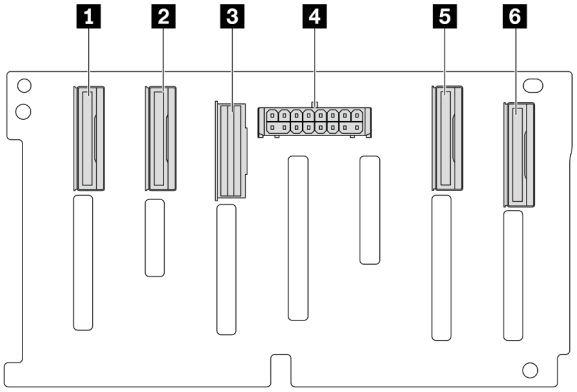


Figure 325. Connectors on the 8 x 2.5-inch AnyBay backplane

1 NVMe 6-7 connector	2 NVMe 4-5 connector
3 SAS connector	4 Power connector
5 NVMe 2-3 connector	6 NVMe 0-1 connector

24 x 2.5-inch SAS/SATA front expander backplane

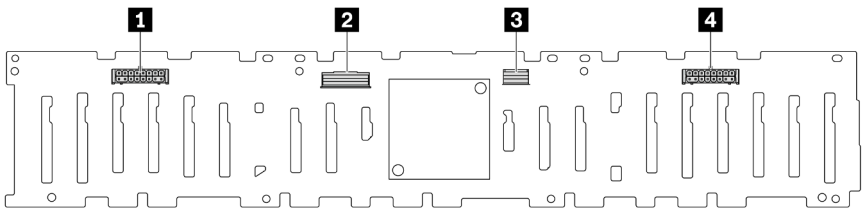


Figure 326. Connectors on the 24 x 2.5-inch SAS/SATA front expander backplane

1 Power connector 2	2 SAS 0 connector
3 SAS 1 connector	4 Power connector 1

8 x 3.5-inch SAS/SATA front backplane

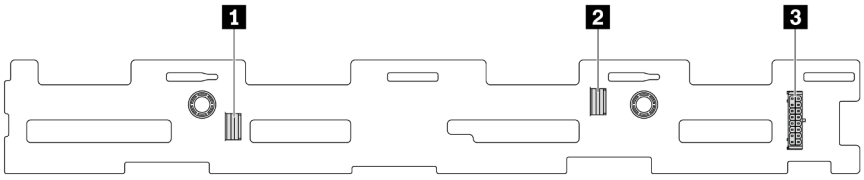


Figure 327. Connectors on the 8 x 3.5-inch SAS/SATA backplane

1 SAS 1 connector	2 SAS 0 connector
3 Power connector	

12 x 3.5-inch SAS/SATA front backplane

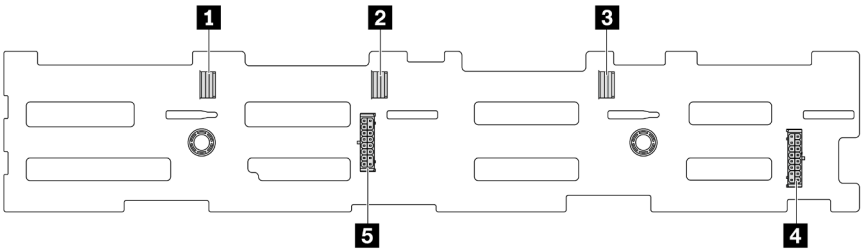


Figure 328. Connectors on the 12 x 3.5-inch SAS/SATA backplane

1 SAS 2 connector	2 SAS 1 connector
3 SAS 0 connector	4 Power connector 1
5 Power connector 2	

12 x 3.5-inch AnyBay front backplane

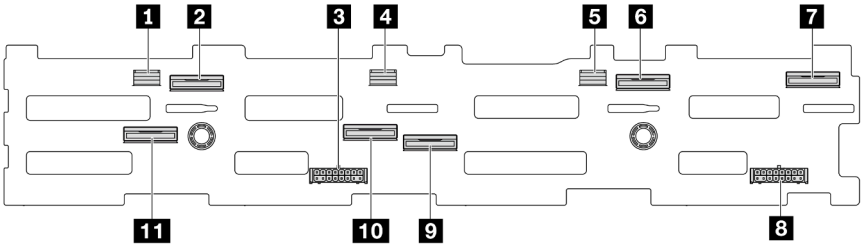


Figure 329. Connectors on the 12 x 3.5-inch AnyBay backplane

1 SAS 2 connector	2 NVMe 8-9 connector
3 Power connector 2	4 SAS 1 connector
5 SAS 0 connector	6 NVMe 2-3 connector
7 NVMe 0-1 connector	8 Power connector 1

9 NVMe 4-5 connector	10 NVMe 6-7 connector
11 NVMe 10-11 connector	

12 x 3.5-inch SAS/SATA front expander backplane

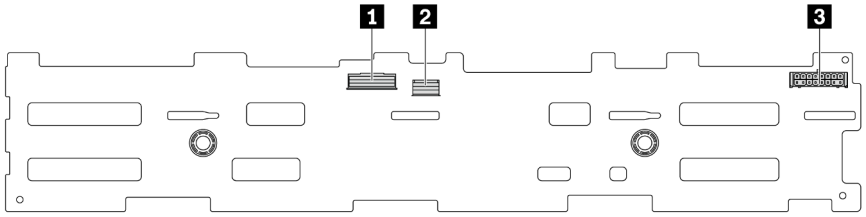


Figure 330. Connectors on the 12 x 3.5-inch SAS/SATA front expander backplane

1 SAS 0 connector	2 SAS 1 connector
3 Power connector	

4 x 2.5-inch SAS/SATA middle/rear backplane

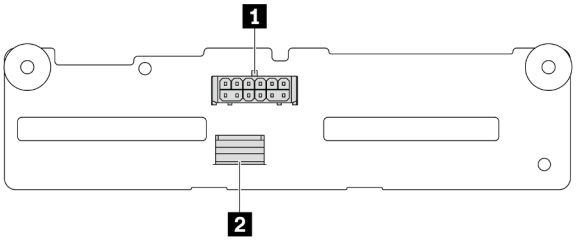


Figure 331. Connectors on the 4 x 2.5-inch SAS/SATA backplane

1 Power connector	2 SAS connector

4 x 2.5-inch AnyBay middle/rear backplane

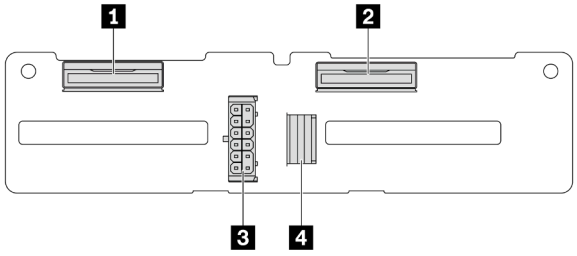


Figure 332. 4 x 2.5-inch AnyBay backplane connectors

1 NVMe 2-3 connector	3 Power connector
2 NVMe 0-1 connector	4 SAS connector

4 x 2.5-inch NVMe middle backplane

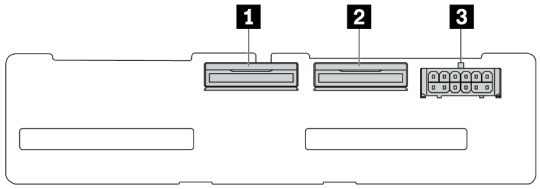


Figure 333. Connectors on the 4 x 2.5-inch NVMe backplane

1 NVMe 2-3 connector	2 NVMe 0-1 connector
3 Power connector	

4 x 3.5-inch SAS/SATA middle/rear backplane

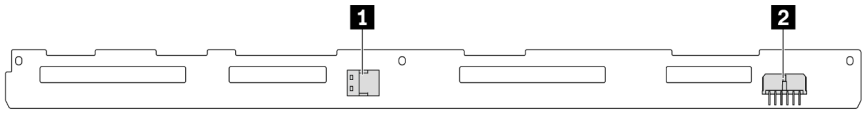


Figure 334. Connectors on the 4 x 3.5-inch SAS/SATA backplane

1 SAS connector	2 Power connector

2 x 3.5-inch SAS/SATA rear backplane

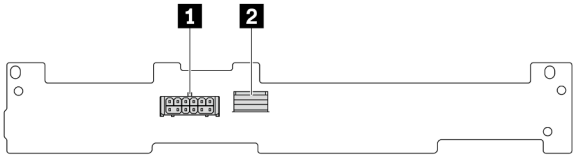


Figure 335. Connectors on the 2 x 3.5-inch SAS/SATA backplane

1 Power connector	2 SAS connector

8 x 2.5-inch SAS/SATA rear backplane

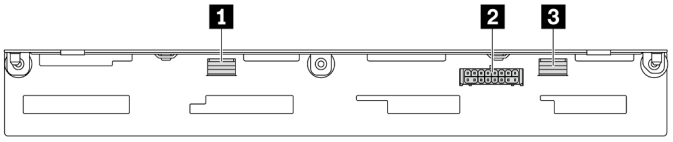


Figure 336. Connectors on the 8 x 2.5-inch SAS/SATA backplane

1 SAS 1 connector	2 Power connector
1 SAS 0 connector	

7mm drives

This section provides cable routing information for the 7mm drives.

Note: The following uses the 7mm drives installed on riser 2 as an example for illustration. The cable routing for 7mm drives installed on riser 1 is similar.

- “7mm non-RAID SATA/NVMe 2-Bay backplanes” on page 328
- “7mm RAID NVMe 2-Bay backplanes” on page 329
- “7mm RAID SATA/NVMe 2-Bay backplanes” on page 329

7mm non-RAID SATA/NVMe 2-Bay backplanes

Note: The 7mm non-RAID SATA/NVMe 2-Bay backplanes support SATA cable connection, NVMe cable connection, or RAID cable connection.

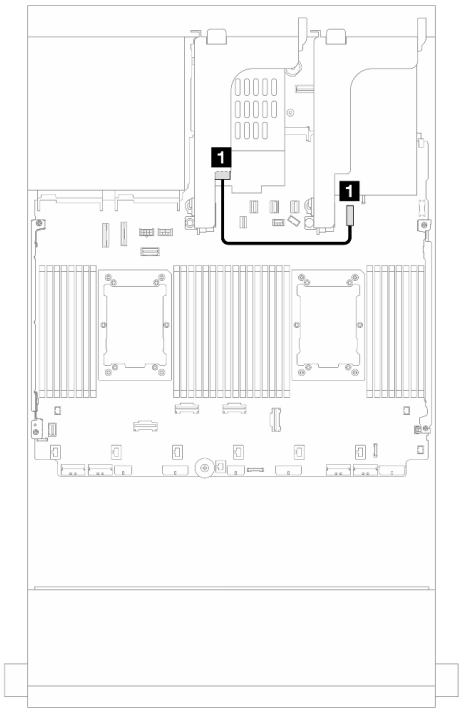


Figure 337. Power cable routing

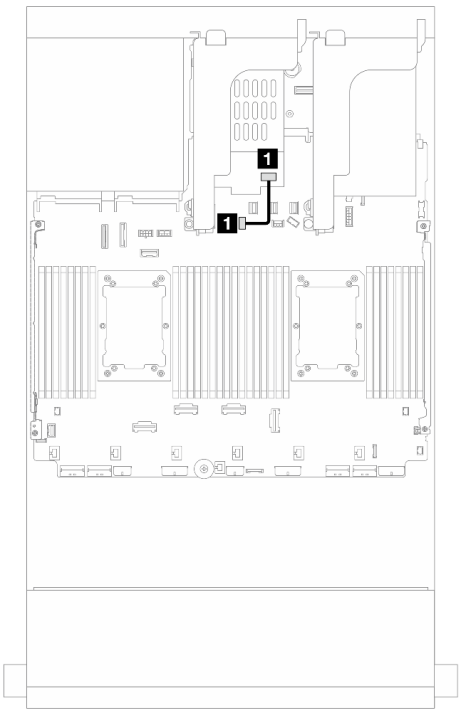


Figure 338. SATA cable routing

From	To
1 Power connector on the 7mm backplane	1 7mm power connector on the system board assembly

From	To
1 Signal connector on the 7mm drive backplane	1 M.2/7mm backplane signal connector on the system board assembly

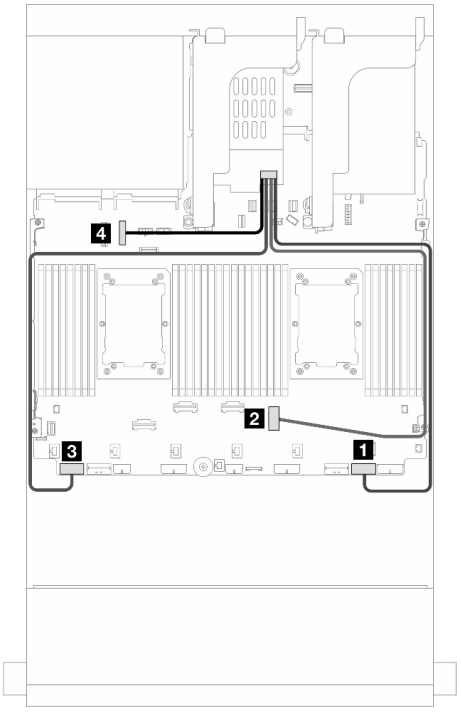


Figure 339. NVMe cable routing

Note: The illustration shows four NVMe cable connection options, but the four options are mutually exclusive. Select one of them based on your scenario.

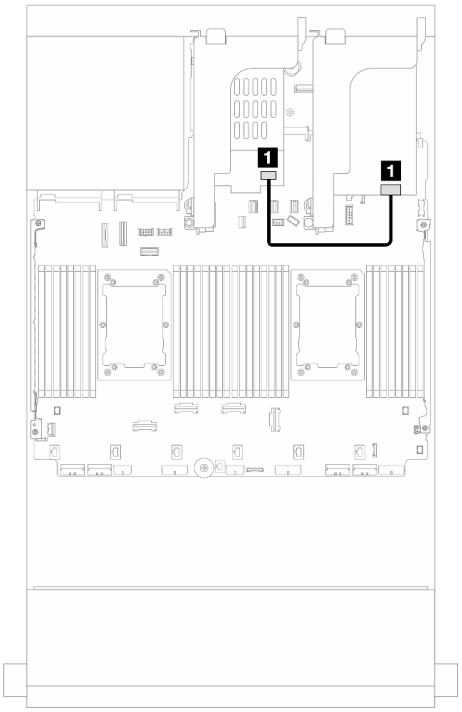


Figure 340. RAID cable routing

From	To	From	To
Signal connector on the 7mm drive backplane	1 PCIe 1	1 Signal connector on the 7mm drive backplane	1 8i adapter: C0
	2 PCIe 3 (one processor installed)		
	3 PCIe 8		
	4 PCIe 10		

7mm RAID NVMe 2-Bay backplanes

7mm RAID SATA/NVMe 2-Bay backplanes

Note: The cable routing for 7mm RAID NVMe 2-Bay backplanes is the same as that for 7mm RAID SATA/NVMe 2-Bay backplanes.

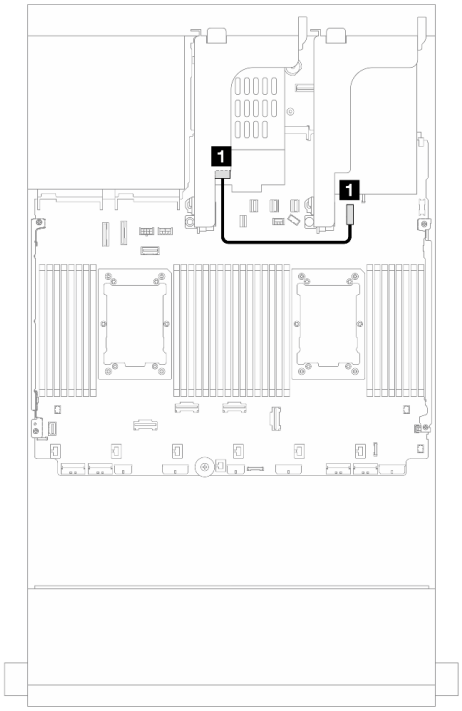


Figure 341. Power cable routing

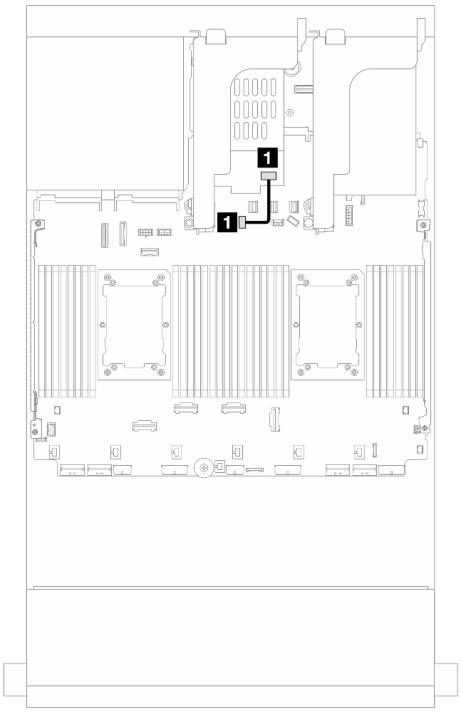


Figure 342. Signal cable routing

From	To	From	To
1 Power connector on the 7mm backplane	1 7mm power connector on the system board assembly	1 Signal connector on the 7mm drive backplane	1 M.2/7mm backplane signal connector on the system board assembly

Direct water cooling module

Use this section to understand the cable routing of the Direct Water Cooling Module (DWCM).

Note: For better cable arrangement, it is required to install the hoses and liquid detection sensor module to a designated holder, and make sure that the module is secured in holder clips. Use the illustration below or "Install the Lenovo Neptune(TM) Processor Direct Water Cooling Module" on page 120 for details.

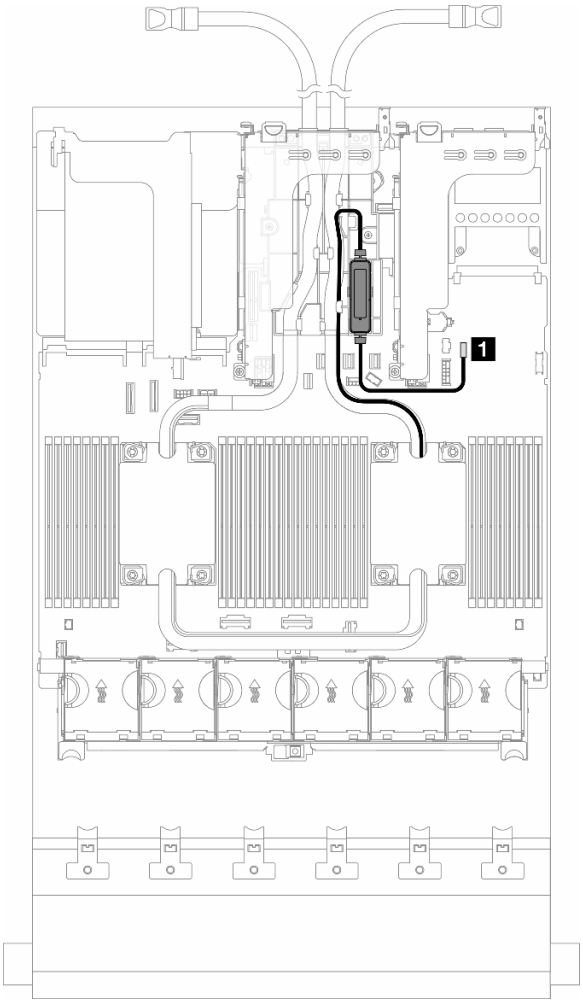


Figure 343. Direct water cooling module cable routing

From	To
Leak detection cable	Leak detection connector

Front I/O connectors

Use the section to understand the cable routing for the front I/O connectors, including VGA connector, external diagnostics connector, front operator panel connector, and front USB connectors.

- “Front I/O connectors on rack latches” on page 332
- “Front I/O connectors on the media bay” on page 332

Front I/O connectors on rack latches

Note: When routing a cable on the rack latch, ensure that it is fixed on the upper frame of the cable retainer. For details, refer to .

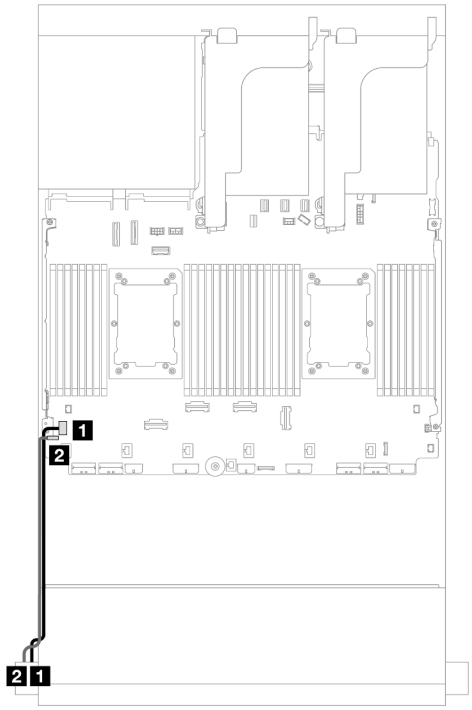


Figure 344. Front VGA connector and external diagnostics connector (left rack latch)

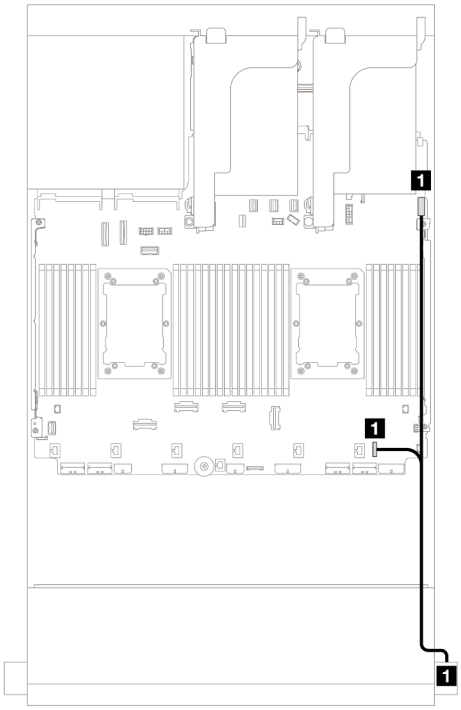


Figure 345. Front operator panel and USB connectors (right rack latch)

From	To	From	To
1 VGA cable	VGA connector on the system board assembly	1 Front operator panel and USB cable	1 FIO and USB connectors on the system board assembly
2 External diagnostics cable	External diagnostics connector on the system board assembly		

Front I/O connectors on the media bay

The illustration shows the cable routing for the front operator panel and front USB connectors on the media bay.

Depending on the server model, the server might come with a front operator panel with an LCD display (called integrated diagnostics panel) or a front operator panel without an LCD display.

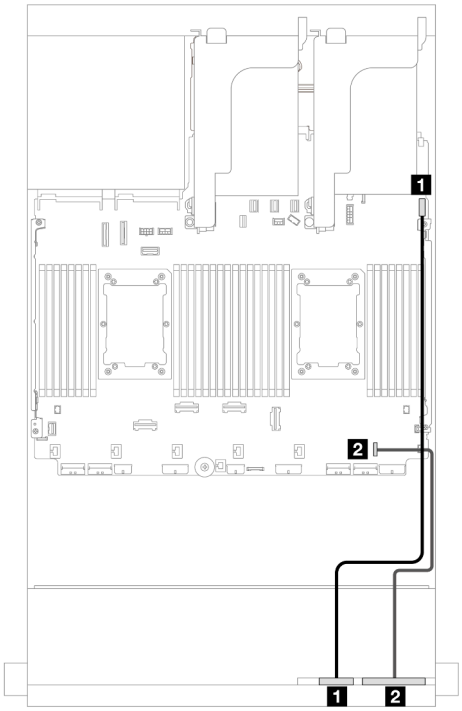


Figure 346. Front operator panel with an LCD display

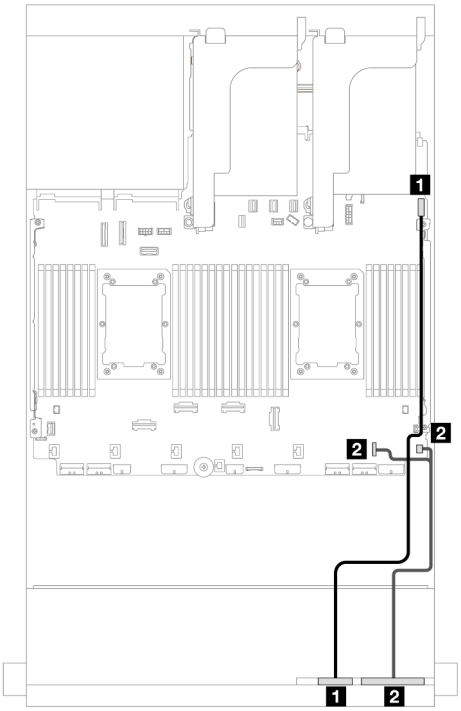


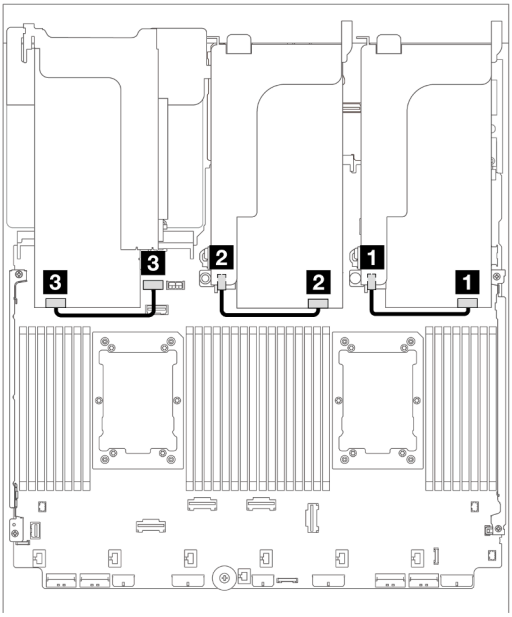
Figure 347. Front operator panel without an LCD display

From	To
1 Front USB cable	Front USB connector on the system board assembly
2 Front panel cable	Front I/O connector on the system board assembly

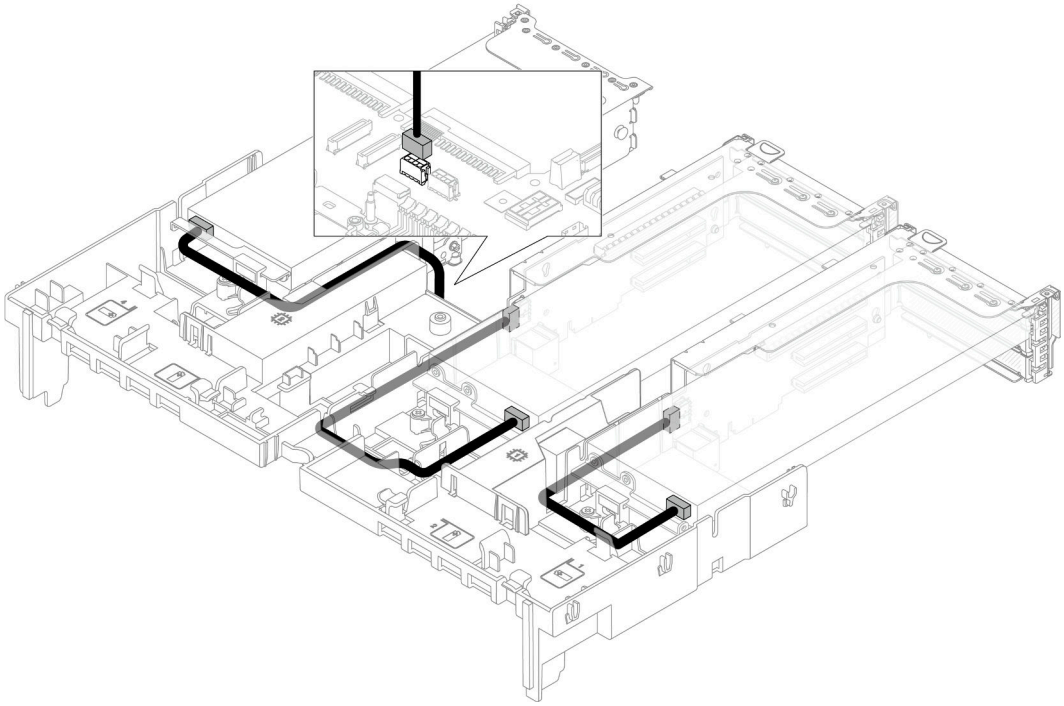
From	To
1 Front USB cable	Front USB connector on the system board assembly
2 Front panel cable	Front I/O connectors on the system board assembly

GPUs

Use this section to understand the routing for GPUs.

Cable routing	From	To
	1 GPU power cable	Power connector on the riser 1
	2 GPU power cable	Power connector on the riser 2
	3 GPU power cable	GPU power connector on the system board assembly
	Notes: • The illustration shows one GPU adapter installed on each riser card. If there are two GPU adapters installed, the GPU power cable is a Y cable. • If your GPU adapter TDP is equal to or lower than 75 watts, the adapter can be powered directly by the riser slot. Power cable connection is no needed.	

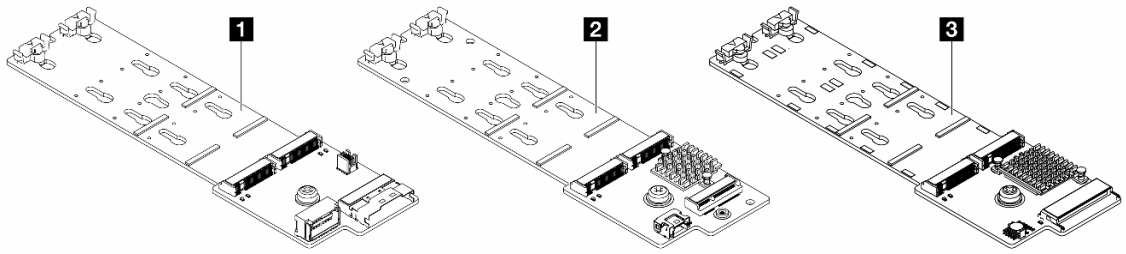
If you need to install an M.2 backplane on the GPU air baffle, refer to below illustration for cable routing on the air baffle. Route the GPU power cable from riser 2 beneath the M.2 backplane holder to the GPU power connector on the GPU adapter.



M.2 drive backplanes

Use the section to understand the cable routing for the M.2 drive backplanes.

The server supports one of the following M.2 drive backplanes:



1	M.2 x4 non-RAID SATA/NVMe 2-bay backplane
2	M.2 x1 RAID NVMe 2-bay backplane
3	M.2 RAID SATA/NVME 2-bay backplane

- “M.2 x4 non-RAID SATA/NVMe 2-bay backplane” on page 336
- “M.2 x1 RAID NVMe 2-bay backplane” on page 341
- “M.2 RAID SATA/NVME 2-bay backplane” on page 342

M.2 x4 non-RAID SATA/NVMe 2-bay backplane

Power cable routing

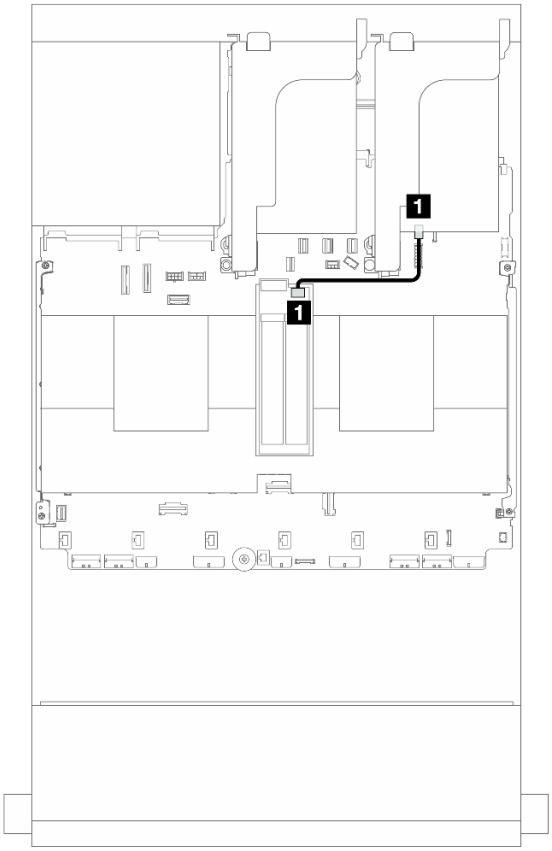


Figure 348. Power cable routing

From	To
1 Power connector on the M.2 drive backplane	1 M.2 power connector on the system board assembly

Signal cable routing

The M.2 drive backplane supports SATA, NVMe, or RAID cable connection.

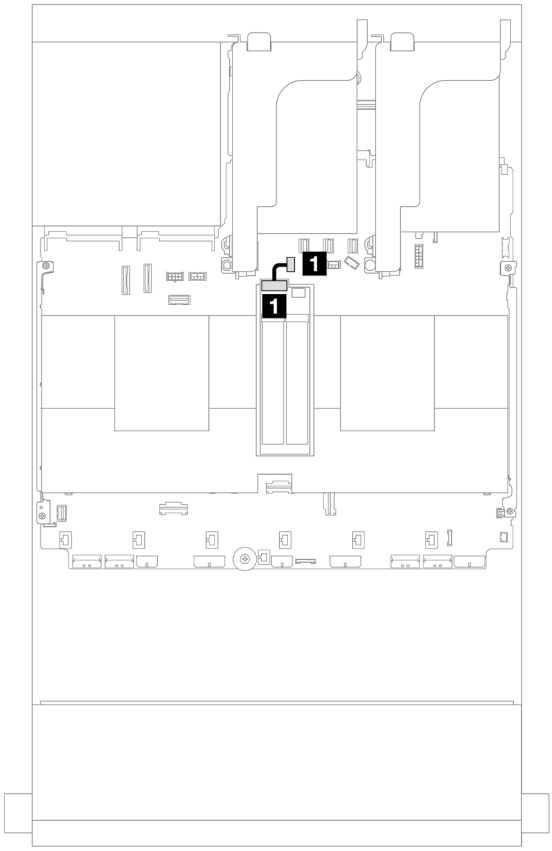


Figure 349. SATA cable routing

From	To
1 Signal connector on the M.2 drive backplane	1 M.2/7mm backplane signal connector on the system board assembly

Note: The following illustration shows four NVMe cable connection options, but the four options are mutually exclusive. Select one of them based on your scenario.

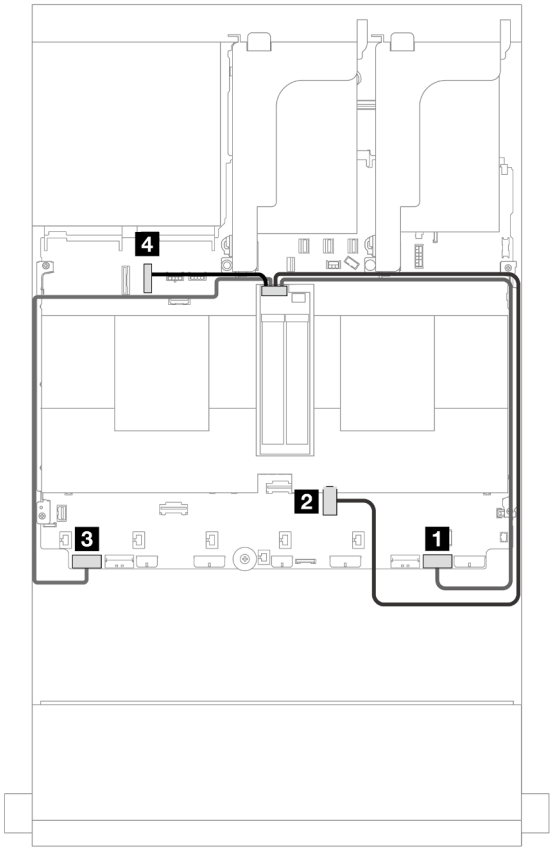


Figure 350. NVMe cable routing

From	To
Signal connector on the M.2 drive backplane	1 PCIe 1
	2 PCIe 3 (one processor installed)
	3 PCIe 8
	4 PCIe 10

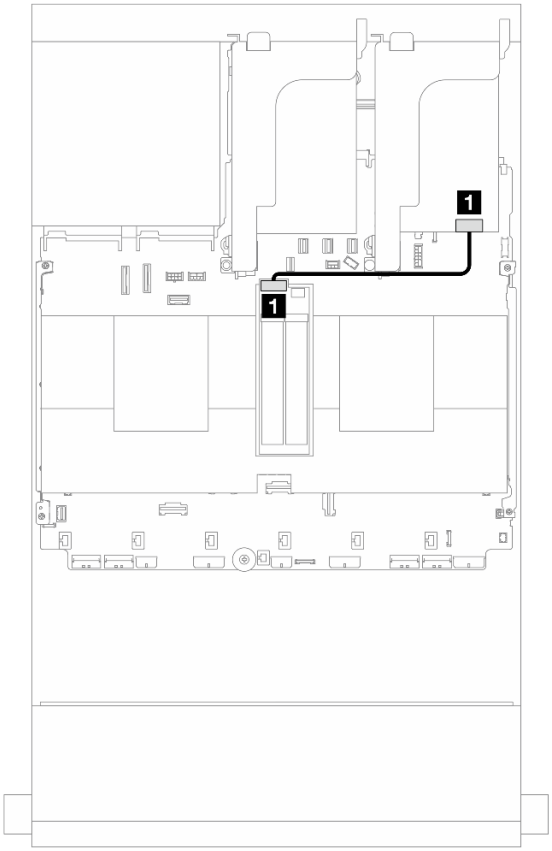


Figure 351. RAID cable routing

From	To
1 Signal connector on the M.2 drive backplane	1 8i adapter: C0

M.2 x1 RAID NVMe 2-bay backplane

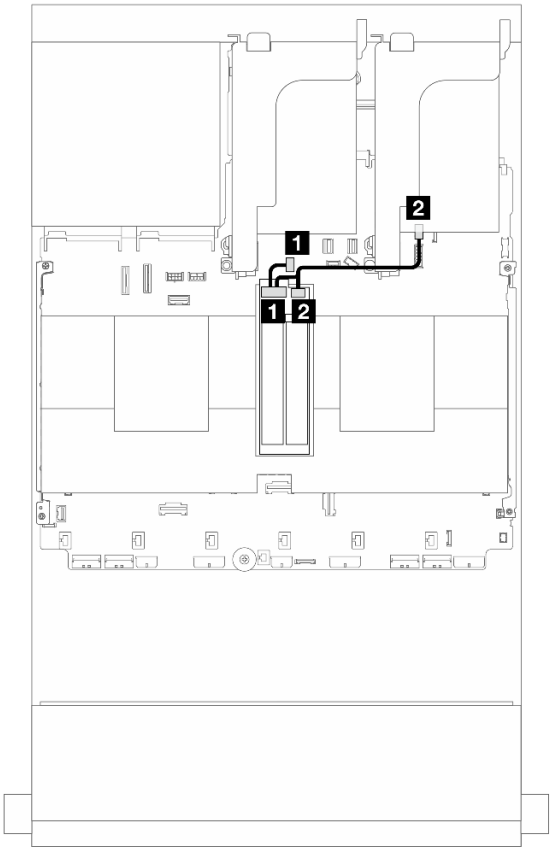


Figure 352. Cable routing for the M.2 x1 RAID NVMe 2-bay backplane

From	To
1 Signal connector on the M.2 drive backplane	1 M.2/7mm backplane signal connector on the system board assembly
2 Power connector on the M.2 drive backplane	2 M.2 power connector on the system board assembly

M.2 RAID SATA/NVME 2-bay backplane

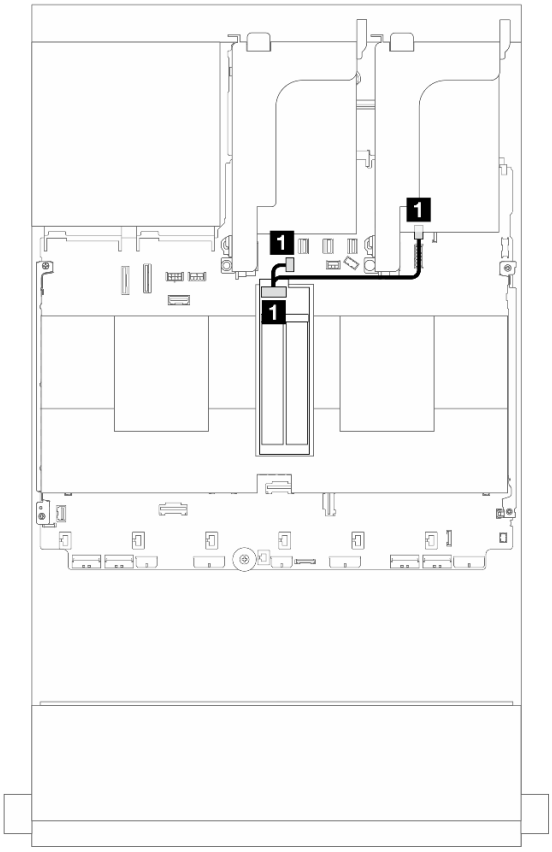


Figure 353. Cable routing for the M.2 RAID SATA/NVME 2-bay backplane

From	To
1 Connector on the M.2 drive backplane	1 • M.2 power connector on the system board assembly • M.2/7mm backplane signal connector on the system board assembly

Management NIC adapter

Use the section to understand the cable routing for the ThinkSystem V3 Management NIC Adapter Kit (management NIC adapter).

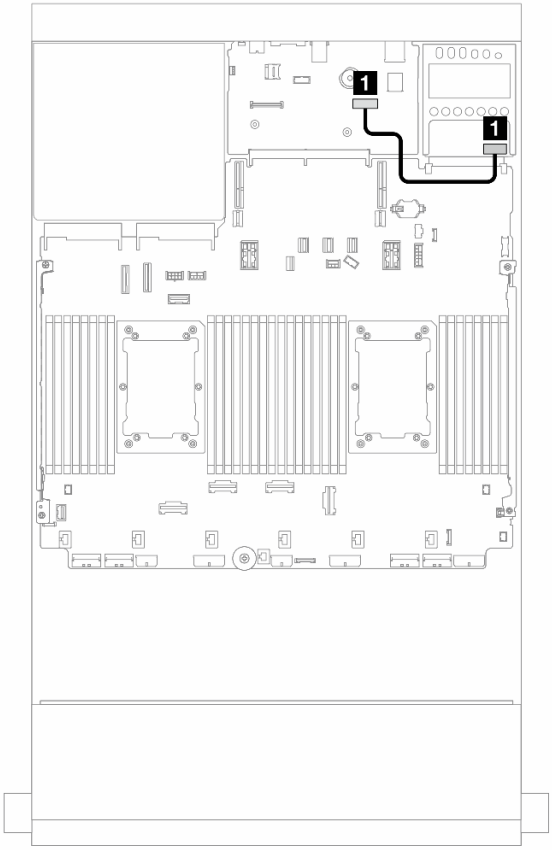


Figure 354. Cable routing for the management NIC adapter

From	To
1 Management NIC adapter	Second management Ethernet connector on the system board assembly

DPU adapter

Use the section to understand the cable routing for the ThinkSystem NVIDIA BlueField-2 25GbE SFP56 2-Port PCIe Ethernet DPU w/BMC & Crypto (DPU adapter).

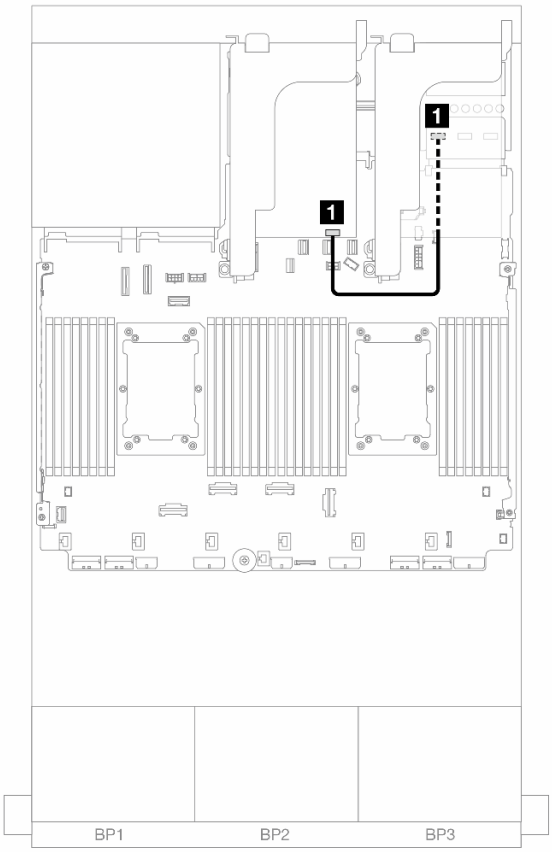


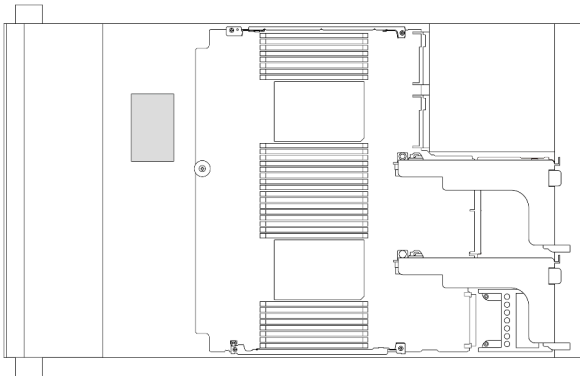
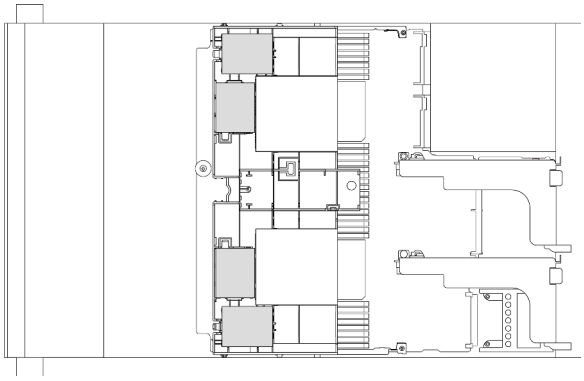
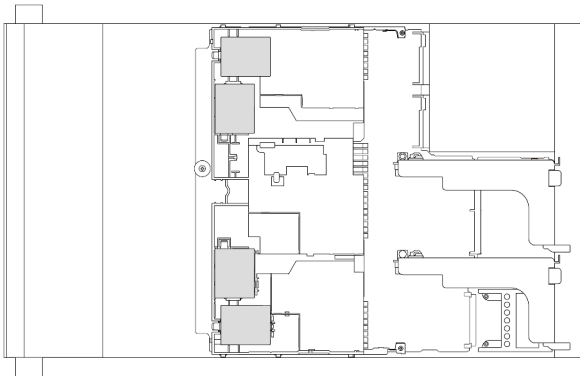
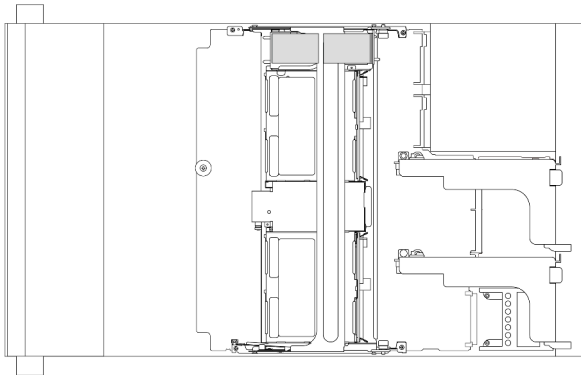
Figure 355. Cable routing for the DPU adapter

From	To
1 DPU adapter: NC-SI connector	OCP enablement kit for vSphere DSE: NC-SI 1 connector

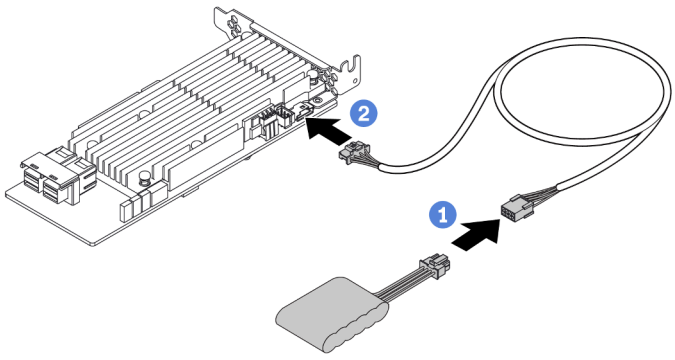
RAID flash power module

Use this section to understand the cable routing for RAID flash power modules (also called supercap).

Table 12. Location of RAID flash power modules

Figure 356. On the chassis 	*Figure 357. On standard air baffle* 
Figure 358. On GPU air baffle 	*Figure 359. On the 2.5-inch middle drive cage* 

An extension cable is provided for each RAID flash power module for cable connection. Connect the cable from the RAID flash power module to the corresponding RAID adapter as shown.

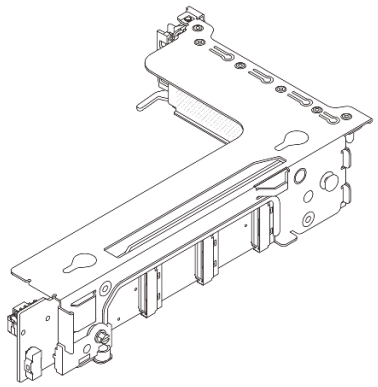
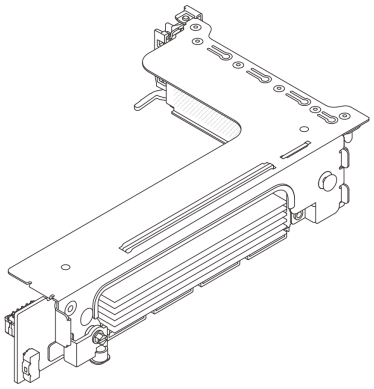


From	To
RAID flash power module	Supercap connector on the RAID adapter

Riser 3 cage

Use this section to understand the cable routing for riser 3 cage.

The following illustrations show the PCIe riser 3 cages. The riser card types vary by server model. For detailed information, see “PCIe slots and PCIe adapters” on page 12.

Gen 4 riser 3 cage	Gen 5 riser 3 cage
	

- “Riser card 3 power and sideband connection (Gen 4/Gen 5)” on page 347
- “Riser card 3 (x8/x8 Gen 4 PCIe) signal cable connection” on page 348
- “Riser card 3 (x16/x16 Gen 4 PCIe) signal cable connection” on page 349
- “Riser card 3 (x8/x8 Gen 5 PCIe) signal cable connection” on page 351
- “Riser card 3 (x16/x16 Gen 5 PCIe) signal cable connection” on page 352

Riser card 3 power and sideband connection (Gen 4/Gen 5)

The power and sideband connections for x8/x8 PCIe riser card 3 and x16/x16 PCIe riser card 3 are the same.

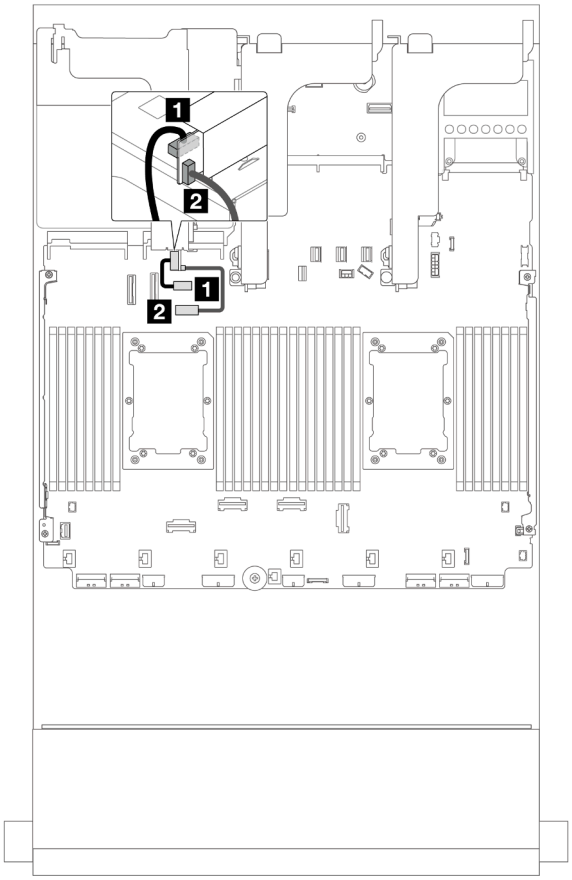


Figure 360. Riser card 3 power and sideband connection

From	To
1 Power connector on the riser card	Riser 3 power connector on the system board assembly
2 Sideband connector on the riser card	Riser 3 sideband connector on the system board assembly

Riser card 3 (x8/x8 Gen 4 PCIe) signal cable connection

The following illustration shows the signal cable connections for the x8/x8 Gen 4 PCIe riser card 3.

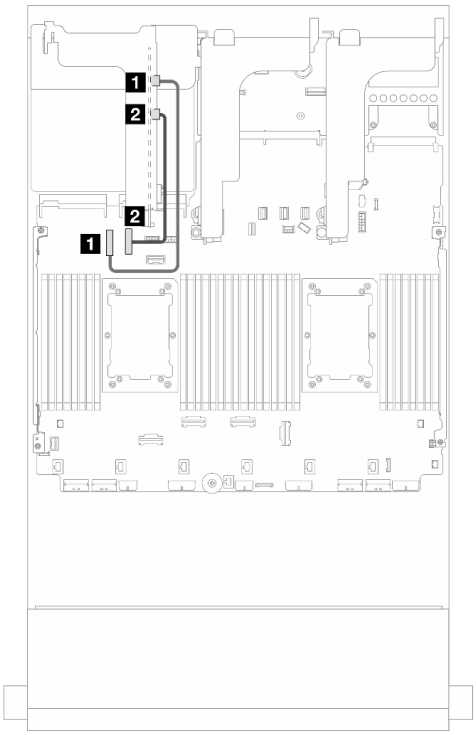


Figure 361. Cable routing when two processors installed

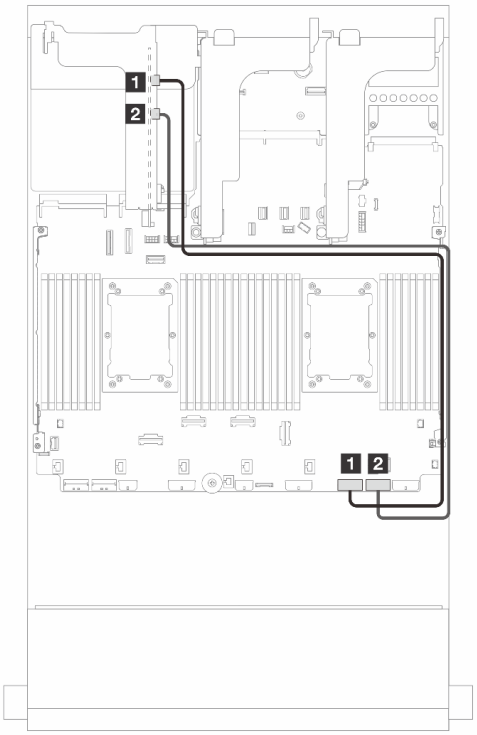


Figure 362. Cable routing when one processor installed

From	To
1 MCIO 1 on the riser card	PCIe connector 9 on the system board assembly
2 MCIO 2 on the riser card	PCIe connector 10 on the system board assembly

From	To
1 MCIO 1 on the riser card	PCIe connector 2 on the system board assembly
2 MCIO 2 on the riser card	PCIe connector 1 on the system board assembly

Riser card 3 (x16/x16 Gen 4 PCIe) signal cable connection

The following illustration shows the signal cable connections for the x16/x16 Gen 4 PCIe riser card 3.

Cable routing when two processors installed

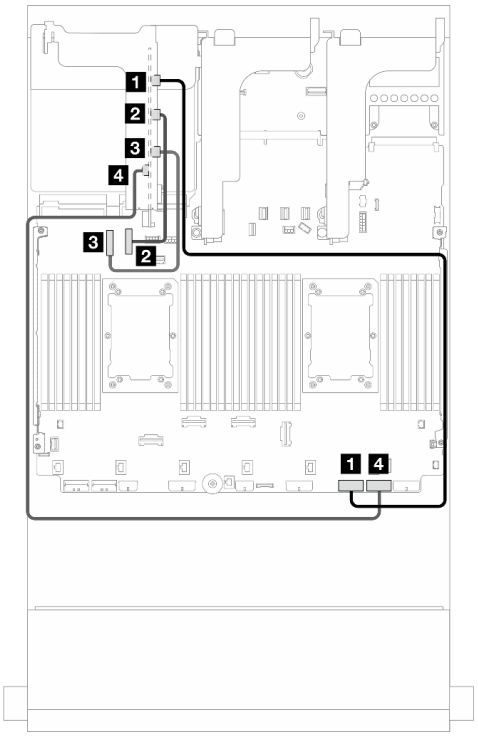


Figure 363. Cable routing in configurations without riser 5

From	To
1 MCIO 1 on the riser card	PCIe connector 2 on the system board assembly
2 MCIO 2 on the riser card	PCIe connector 10 on the system board assembly
3 MCIO 3 on the riser card	PCIe connector 9 on the system board assembly
4 MCIO 4 on the riser card	PCIe connector 1 on the system board assembly

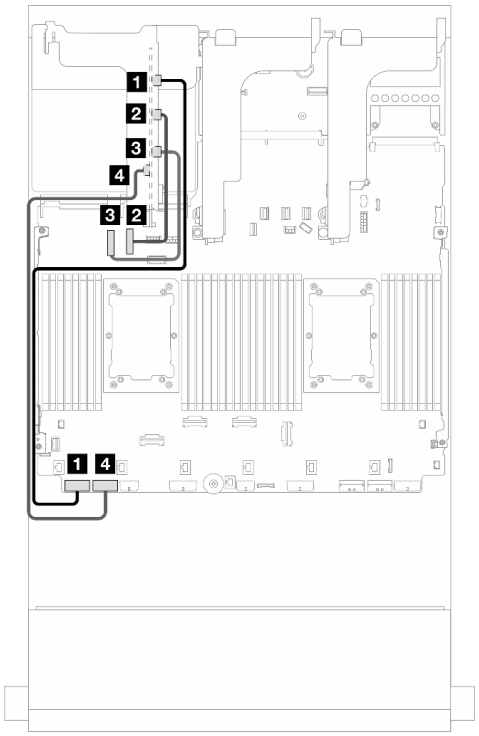


Figure 364. Cable routing in configurations with riser 5

From	To
1 MCIO 1 on the riser card	PCIe connector 8 on the system board assembly
2 MCIO 2 on the riser card	PCIe connector 10 on the system board assembly
3 MCIO 3 on the riser card	PCIe connector 9 on the system board assembly
4 MCIO 4 on the riser card	PCIe connector 7 on the system board assembly

Cable routing when one processor installed

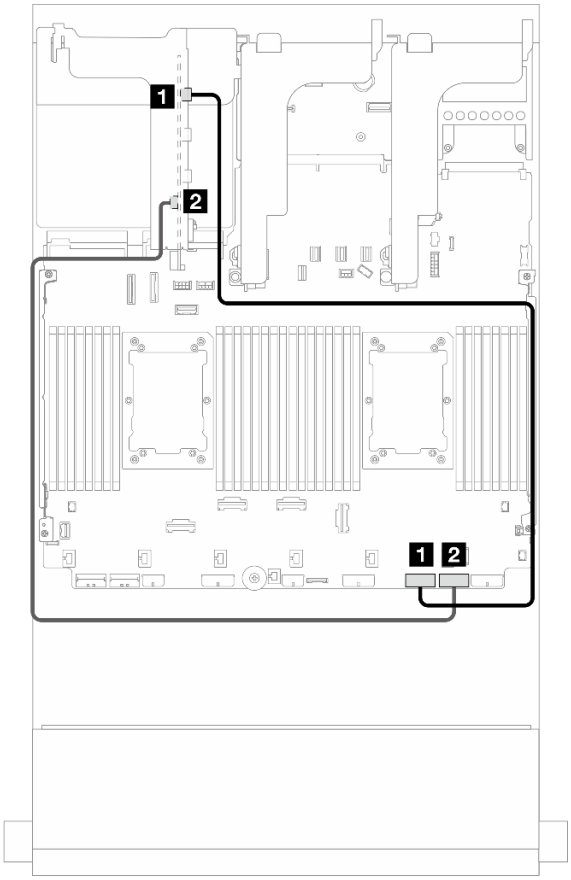


Figure 365. Cable routing when one processor installed

From	To
1 MCIO 1 on the riser card	PCIe connector 2 on the system board assembly
2 MCIO 4 on the riser card	PCIe connector 1 on the system board assembly

Riser card 3 (x8/x8 Gen 5 PCIe) signal cable connection

The following illustration shows the signal cable connections for the x8/x8 Gen 5 PCIe riser card 3.

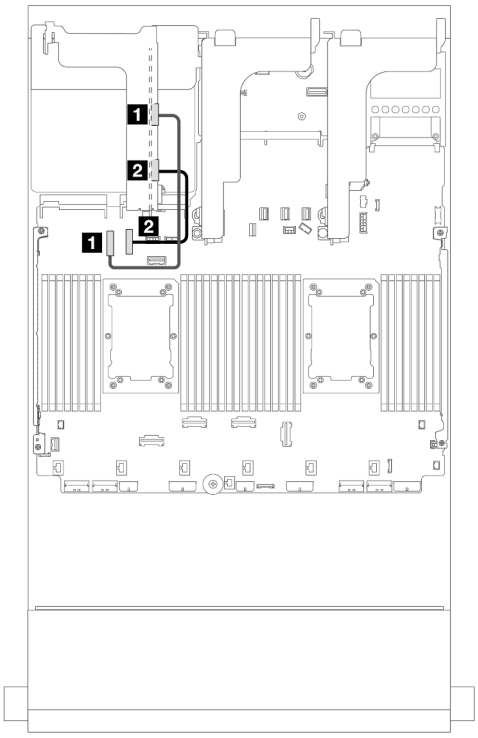


Figure 366. Cable routing when two processors installed

From	To
1 MCIO 1 on the riser card	PCIe connector 9 on the system board assembly
2 MCIO 3 on the riser card	PCIe connector 10 on the system board assembly

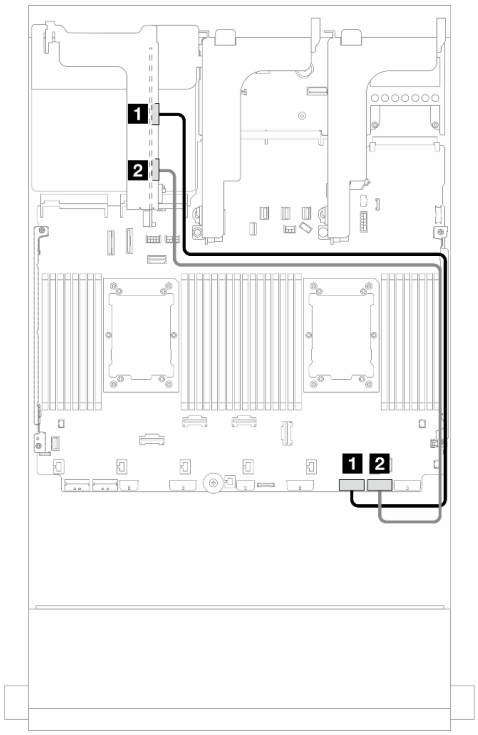


Figure 367. Cable routing when one processor installed

From	To
1 MCIO 1 on the riser card (Gen 4)	PCIe connector 2 on the system board assembly
2 MCIO 3 on the riser card (Gen 5)	PCIe connector 1 on the system board assembly

Riser card 3 (x16/x16 Gen 5 PCIe) signal cable connection

The following illustration shows the signal cable connections for the x16/x16 Gen 5 PCIe riser card 3.

Cable routing when two processors installed

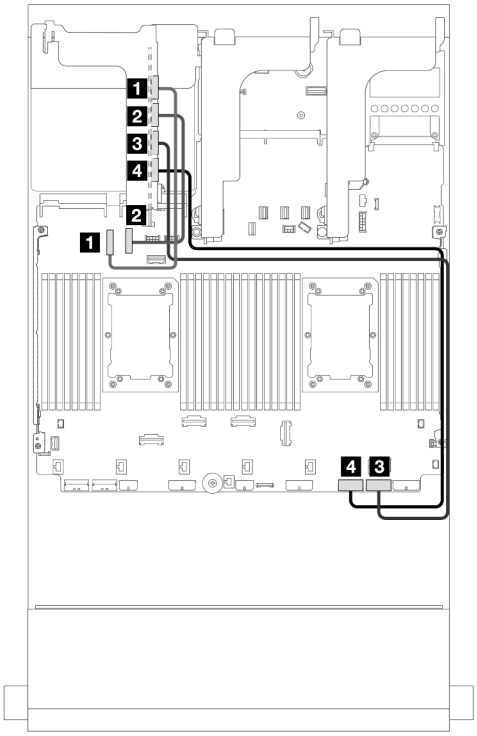


Figure 368. Cable routing in configurations without riser 5

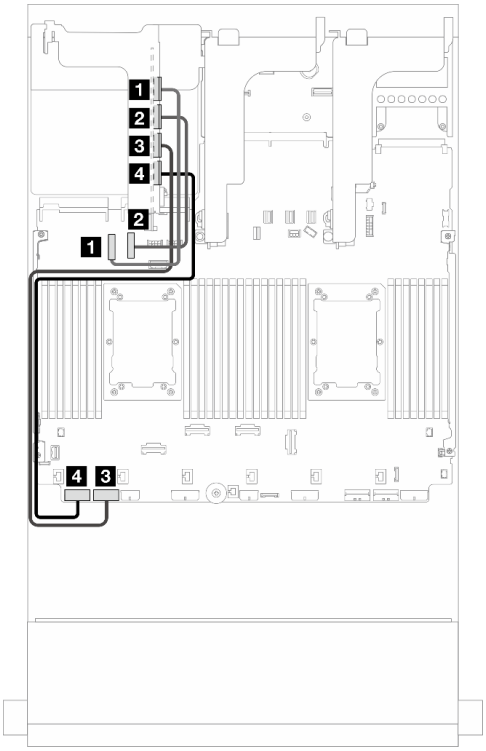


Figure 369. Cable routing in configurations with riser 5

From	To	From	To
1 MCIO 1 on the riser card	PCIe connector 9 on the system board assembly	1 MCIO 1 on the riser card	PCIe connector 9 on the system board assembly
2 MCIO 2 on the riser card	PCIe connector 10 on the system board assembly	2 MCIO 2 on the riser card	PCIe connector 10 on the system board assembly
3 MCIO 3 on the riser card	PCIe connector 1 on the system board assembly	3 MCIO 3 on the riser card	PCIe connector 7 on the system board assembly
4 MCIO 4 on the riser card	PCIe connector 2 on the system board assembly	4 MCIO 4 on the riser card	PCIe connector 8 on the system board assembly

Cable routing when one processor installed

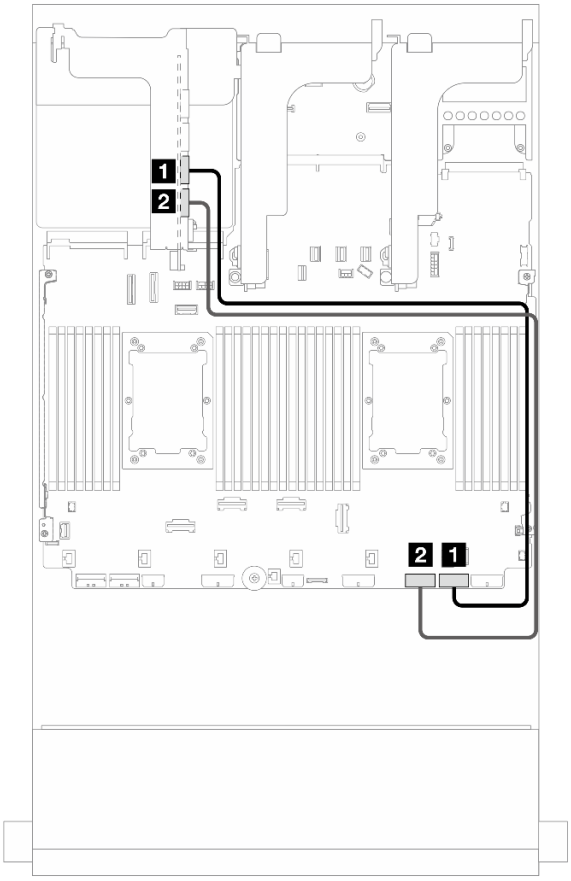


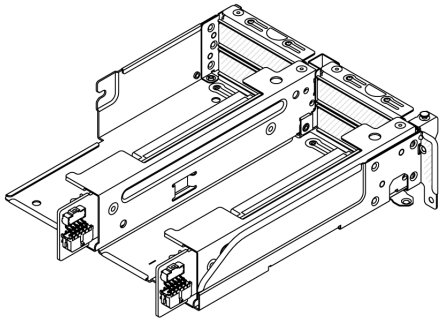
Figure 370. Cable routing when one processor installed

From	To
1 MCIO 3 on the riser card	PCIe connector 1 on the system board assembly
2 MCIO 4 on the riser card	PCIe connector 2 on the system board assembly

Riser 3/4 cage

Use this section to understand the cable routing for the riser 3/4 cage, which provide four low-profile (4LP) PCIe slots.

The following illustration shows the 4LP PCIe riser 3/4 cage. The riser card types vary by server model. For detailed information, see “PCIe slots and PCIe adapters” on page 12.



Power and sideband cable routing

The following illustration shows the power and sideband connections for x8/x8 PCIe riser 3 card and x8/x8 PCIe riser 4 card.

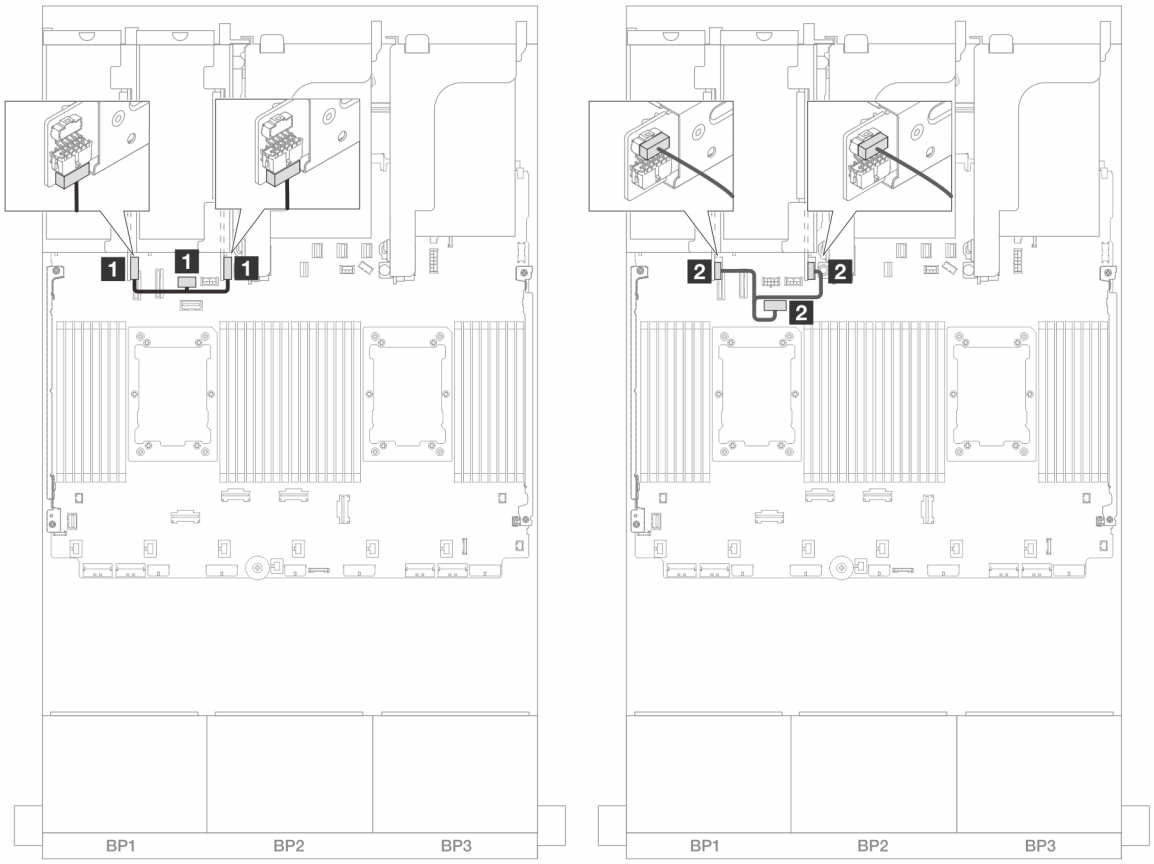


Figure 371. Riser 3/4 card power and sideband cable routing

From	To
1 Power connector on the riser cards	Riser 3 power connector on the system board assembly
2 Sideband connector on the riser cards	Riser 3 sideband connector on the system board assembly

Signal cable connection

The following illustration shows the signal connections for x8/x8 PCIe riser 3 card and x8/x8 PCIe riser 4 card.

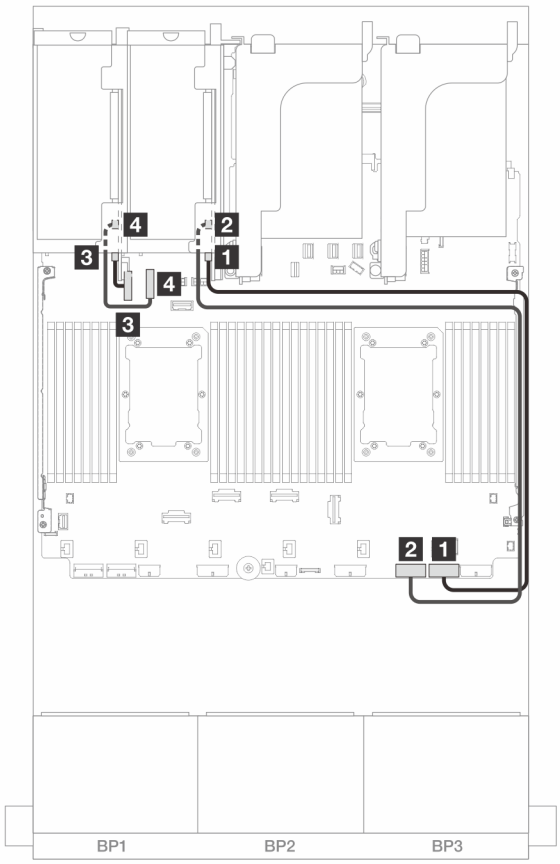


Figure 372. Cable routing in configurations without riser 5 and front OCP module

From	To
1 Swift connector 1 on riser 3 card	Onboard: PCIe 1
2 Swift connector 2 on riser 3 card	Onboard: PCIe 2
3 Swift connector 1 on riser 4 card	Onboard: PCIe 9
4 Swift connector 2 on riser 4 card	Onboard: PCIe 10

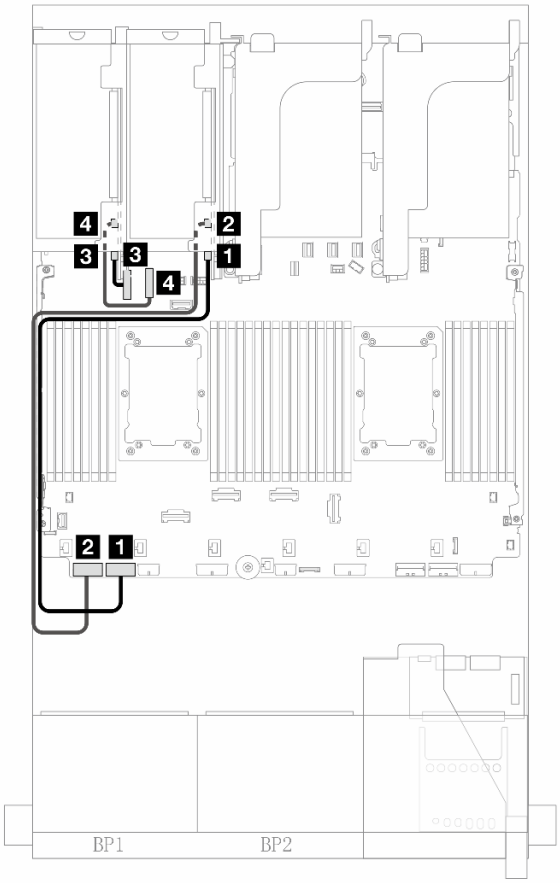


Figure 373. Cable routing in configurations with riser 5 and front OCP module when two processors are installed

From	To
1 Swift connector 1 on riser 3 card	Onboard: PCIe 7
2 Swift connector 2 on riser 3 card	Onboard: PCIe 8
3 Swift connector 1 on riser 4 card	Onboard: PCIe 9
4 Swift connector 2 on riser 4 card	Onboard: PCIe 10

Riser 5 card + OCP interposer cards

This section provides cable routing information for the riser 5 card and front and rear OCP interposer cards.

Riser 5 card cable routing

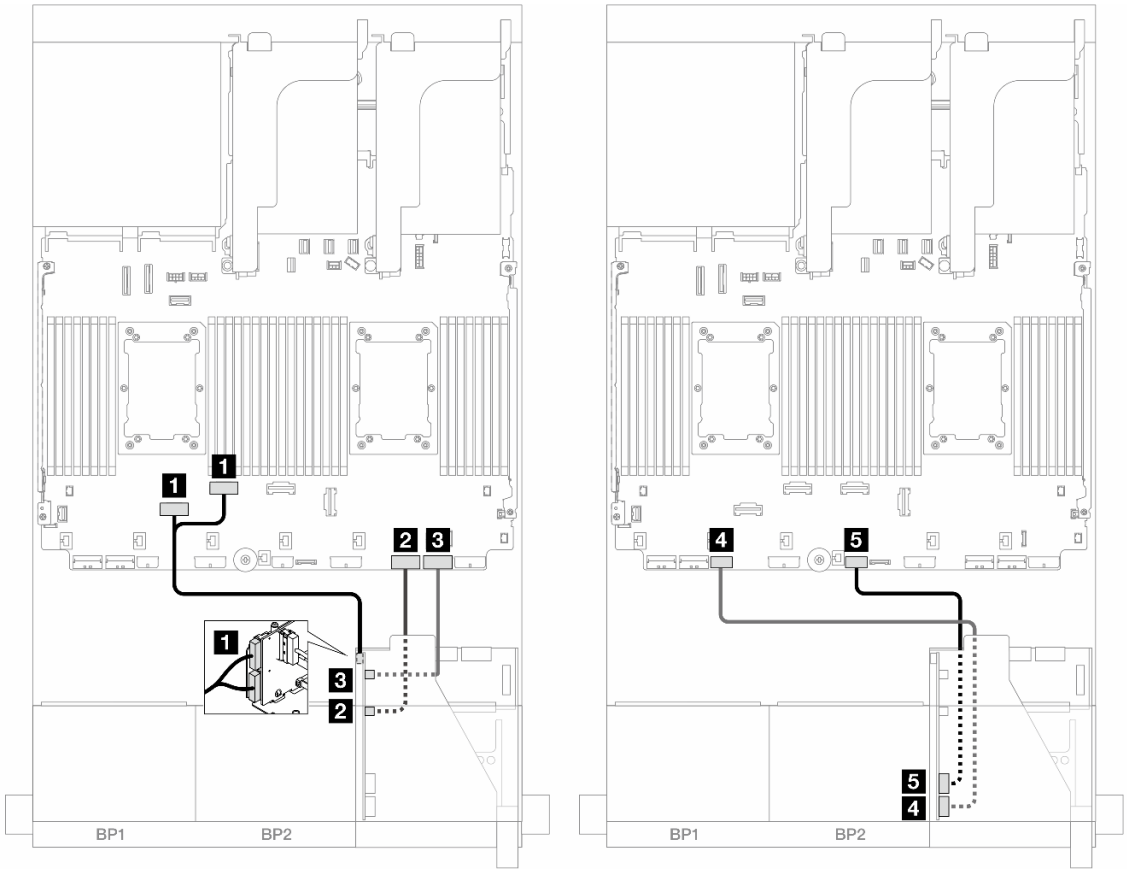


Figure 374. Riser 5 card cable routing

From	To
1 Riser 5 card: MCIO 1, MCIO 2	1 Onboard: PCIe 6, 5
2 Riser 5 card: MCIO 3	2 Onboard: PCIe 2
3 Riser 5 card: MCIO 4	3 Onboard: PCIe 1
4 Riser 5 card: RAID PWR	4 Onboard: CFF RAID/HBA PWR
5 Riser 5 card: EXP PWR	5 Onboard: CFF EXP PWR

OCP interposer card cable routing

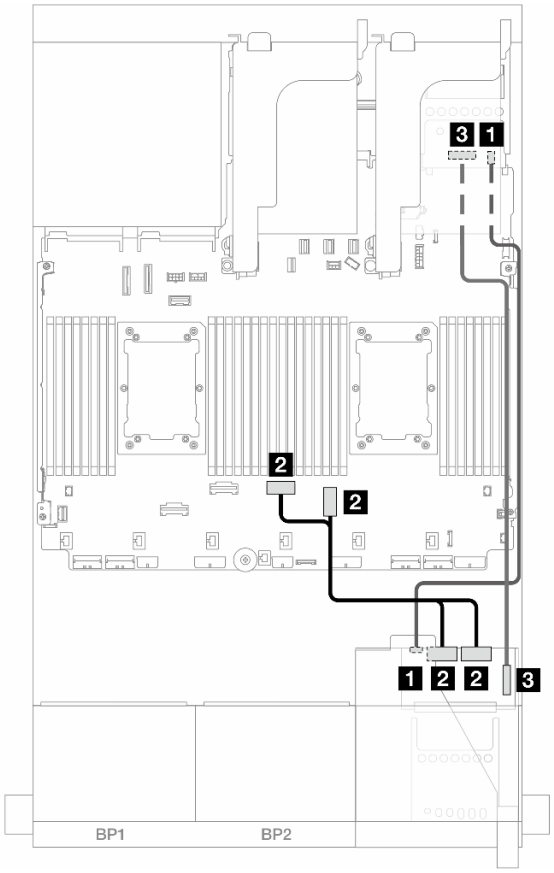


Figure 375. OCP interposer card cable routing

From	To
1 Front OCP interposer card: PWR	1 Rear OCP interposer card: PWR
2 Front OCP interposer card: MCIO 1, MCIO 2	2 Onboard: PCIe 3, 4
3 Front OCP interposer card: F-SWIFT	3 Rear OCP interposer card: R-SWIFT

Backplanes: server models with 2.5-inch front drive bays

This section provides backplane cable connection information for server models with 2.5-inch front drive bays.

Before you start

Ensure below parts are removed before starting cable routing for front backplanes.

- Top cover (see “Remove the top cover” on page 318)
- Air baffle (see “Remove the air baffle” on page 44)
- Fan cage (see “Remove the system fan cage” on page 311)

Power cable connections

The server supports the following 2.5-inch drive backplanes:

- 8 x 2.5-inch SAS/SATA backplane
- 8 x 2.5-inch AnyBay backplane (also used as an 8 x 2.5-inch NVMe backplane when only NVMe connectors on the backplane are cabled)
- 24 x 2.5-inch SAS/SATA expander backplane

For connectors on each drive backplane, see “Drive backplane connectors” on page 323.

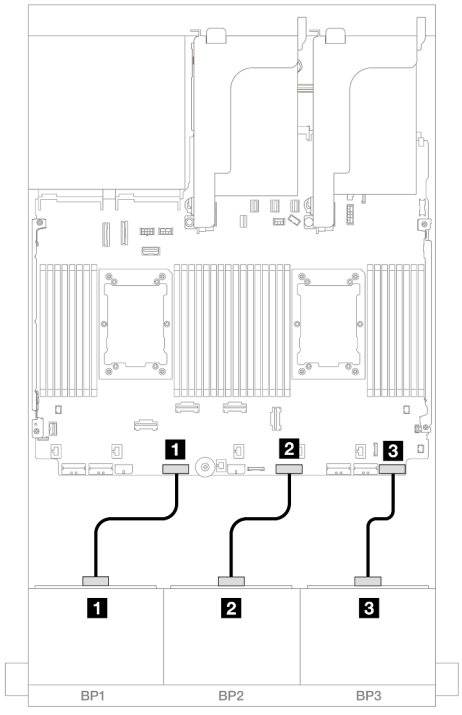


Figure 376. Power cable connections for the 8 x 2.5-inch SAS/SATA/AnyBay/NVMe backplanes

From	To
1 Power connector on backplane 1	Backplane 1 power connector

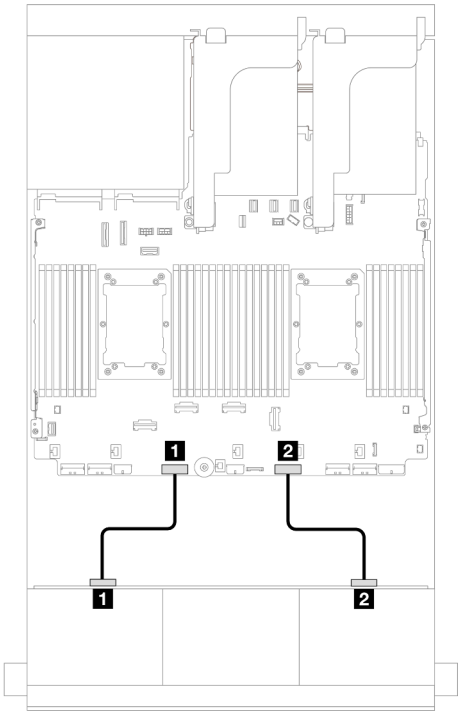


Figure 377. Power cable connections for the 24 x 2.5-inch expander backplane

From	To
1 Power connector 1 on backplane	Backplane 1 power connector

2 Power connector on backplane 2	Backplane 2 power connector	2 Power connector 2 on backplane	Backplane 2 power connector
3 Power connector on backplane 3	Backplane 3 power connector		

Signal cable connections

Refer to the specific topic for signal cable connections depending on the backplanes you have installed.

- One front backplane:
  - “One 8 x SAS/SATA backplane” on page 362
  - “One 8 x AnyBay backplane (Gen 4)” on page 364
  - “One 8 x AnyBay backplane (Gen 5)” on page 369
  - “One 8 x NVMe backplane (Gen 4)” on page 380
  - “One 8 x NVMe backplane (Gen 5)” on page 382
- Two front backplanes:
  - “Two 8 x SAS/SATA backplanes” on page 387
  - “Two 8 x AnyBay backplanes (Gen 4)” on page 392
  - “Two 8 x AnyBay backplanes (Gen 5)” on page 396
  - “Two 8 x NVMe backplanes (Gen 4)” on page 405
  - “Two 8 x NVMe backplanes (Gen 5)” on page 408
  - “One 8 x SAS/SATA and one 8 x AnyBay (Gen 4) backplanes” on page 412
  - “One 8 x SAS/SATA and one 8 x AnyBay (Gen 5) backplanes” on page 420
  - “One 8 x SAS/SATA and one 8 x NVMe (Gen 4) backplanes” on page 428
  - “One 8 x SAS/SATA and one 8 x NVMe (Gen 5) backplanes” on page 436
  - “One 8 x AnyBay and one 8 x NVMe backplanes (Gen 4)” on page 444
  - “One 8 x AnyBay and one 8 x NVMe backplanes (Gen 5)” on page 448
- Three front backplanes:
  - “Three 8 x SAS/SATA backplanes” on page 454
  - “Three 8 x AnyBay backplanes” on page 508
  - “Three 8 x NVMe backplanes (Gen 4)” on page 510
  - “Three 8 x NVMe backplanes (Gen 5)” on page 517
  - “One 8 x AnyBay and two 8 x NVMe backplanes (Gen 4)” on page 526
  - “One 8 x AnyBay and two 8 x NVMe backplanes (Gen 5)” on page 528
  - “One 8 x SAS/SATA and two 8 x NVMe (Gen 4) backplanes” on page 533
  - “One 8 x SAS/SATA and two 8 x NVMe (Gen 5) backplanes” on page 534
  - “One 8 x SAS/SATA and two 8 x AnyBay backplanes” on page 538
  - “Two 8 x SAS/SATA and one 8 x AnyBay (Gen 4) backplanes” on page 539
  - “Two 8 x SAS/SATA and one 8 x AnyBay (Gen 5) backplanes” on page 555
  - “Two 8 x SAS/SATA and one 8 x NVMe (Gen 4) backplanes” on page 580
  - “Two 8 x SAS/SATA and one 8 x NVMe (Gen 5) backplanes” on page 583
  - “24 x 2.5" SAS/SATA expander backplane” on page 588

One 8 x SAS/SATA backplane

This section provides cable routing information for the server model with one 8 x 2.5-inch SAS/SATA front drive backplane.

To connect power cables for the front backplane(s), refer to “Backplanes: server models with 2.5-inch front drive bays” on page 360.

To connect signal cables for the front backplane(s), refer to the following cable routing scenarios depending on your server configuration.

- “Onboard connectors” on page 362
- “8i/16i RAID/HBA adapter” on page 363
- “CFF 8i/16i RAID/HBA adapter” on page 364

Onboard connectors

The following shows the cable connections for the 8 x 2.5-inch SAS/SATA configuration with onboard connectors.

To connect riser 3/4 cables, see “Riser 3/4 cage” on page 354.

To connect cables to the riser 5 card and OCP interposer cards, see “Riser 5 card + OCP interposer cards” on page 358.

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

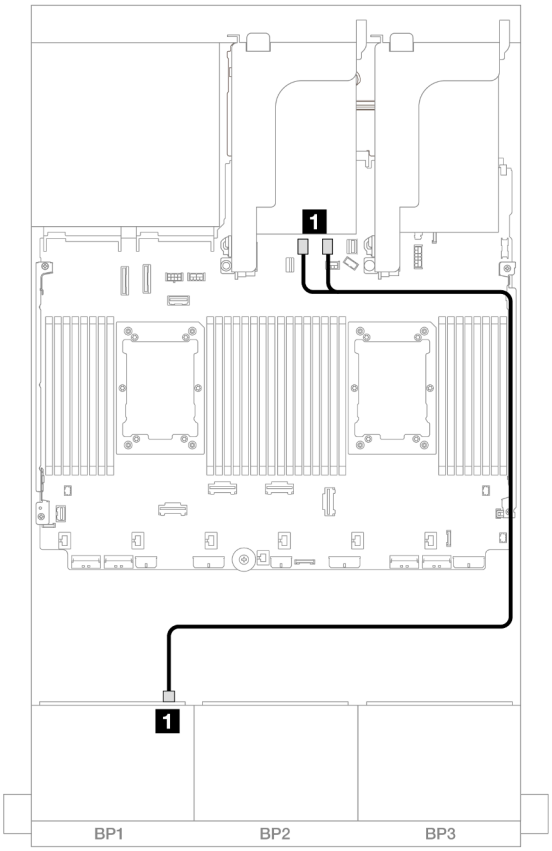


Figure 378. SAS/SATA cable routing to onboard SATA connectors

From	To
1 Backplane 1: SAS	Onboard: SATA 0, SATA 1

8i/16i RAID/HBA adapter

The following shows the cable connections for the 8 x 2.5-inch SAS/SATA configuration with one 8i/16i RAID/HBA adapter.

To connect riser 3/4 cables, see “Riser 3/4 cage” on page 354.

To connect cables to the riser 5 card and OCP interposer cards, see “Riser 5 card + OCP interposer cards” on page 358.

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

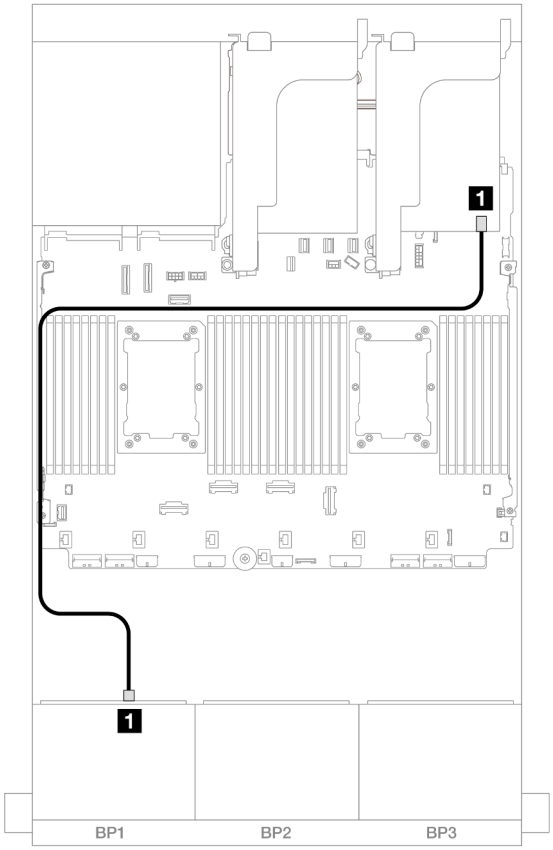


Figure 379. SAS/SATA cable routing to 8i/16i RAID/HBA adapter

From	To
1 Backplane 1: SAS	8i/16i adapter • Gen 4: C0 • Gen 3: C0C1

CFF 8i/16i RAID/HBA adapter

The following shows the cable connections for the 8 x 2.5-inch SAS/SATA configuration with one CFF 8i/16i RAID/HBA adapter.

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

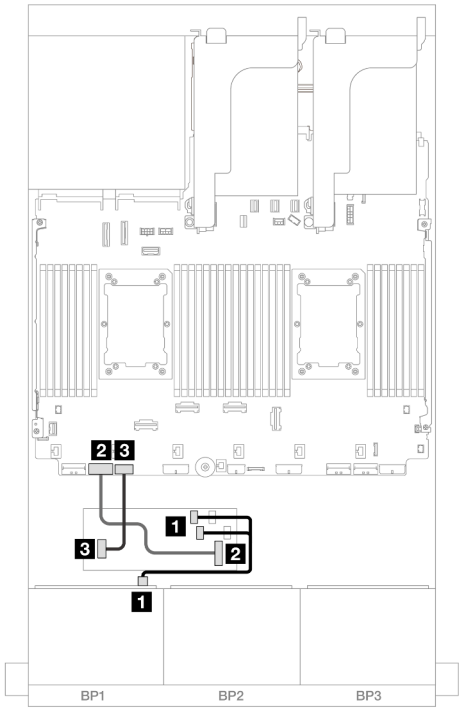


Figure 380. Cable routing when two processors installed

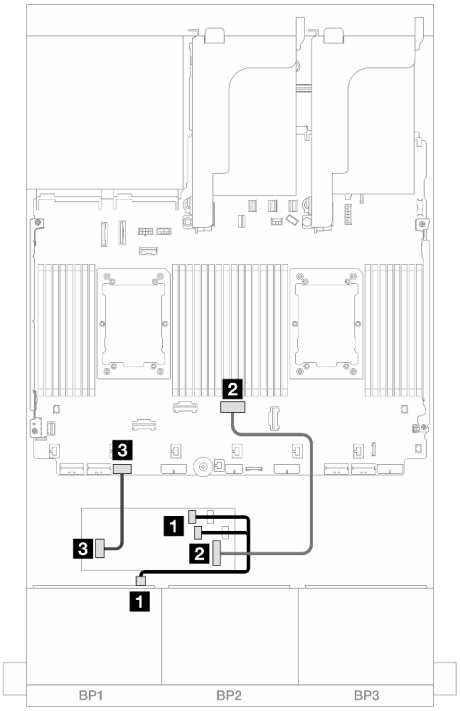


Figure 381. Cable routing when one processor installed

From	To
1 Backplane 1: SAS	CFF adapter • C0 • C1
2 CFF adapter: MB (CFF input)	Onboard: PCIe 7
3 CFF adapter: PWR	Onboard: CFF RAID/HBA PWR

From	To
1 Backplane 1: SAS	CFF adapter • C0 • C1
2 CFF adapter: MB (CFF input)	Onboard: PCIe 4
3 CFF adapter: PWR	Onboard: CFF RAID/HBA PWR

One 8 x AnyBay backplane (Gen 4)

This section provides cable routing information for the server model with one 8 x 2.5-inch AnyBay front drive backplane (Gen 4).

To connect power cables for the front backplane(s), refer to "Backplanes: server models with 2.5-inch front drive bays" on page 360.

To connect signal cables for the front backplane(s), refer to the following cable routing scenarios depending on your server configuration.

- "8i/16i RAID/HBA adapter" on page 365

- “CFF 8i/16i RAID/HBA adapter” on page 366
- “Riser 5 + OCP interposer cards + 8i/16i RAID/HBA adapter” on page 368

8i/16i RAID/HBA adapter

The following shows the cable connections for the 8 x 2.5-inch AnyBay (Gen 4) configuration with one 8i/16i RAID/HBA adapter.

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

SAS/SATA cable routing

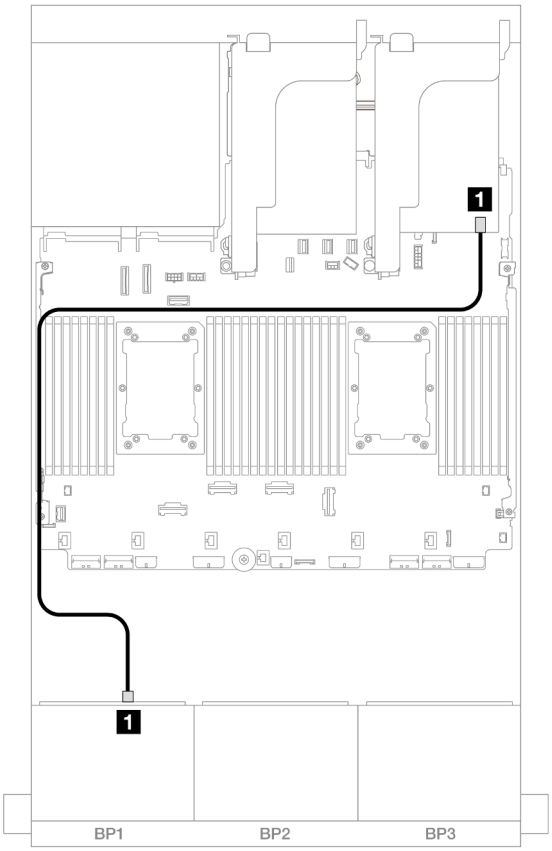


Figure 382. SAS/SATA cable routing to 8i/16i RAID/HBA adapter

From	To
1 Backplane 1: SAS	8i/16i adapter • Gen 4: C0 • Gen 3: C0C1

NVMe cable routing

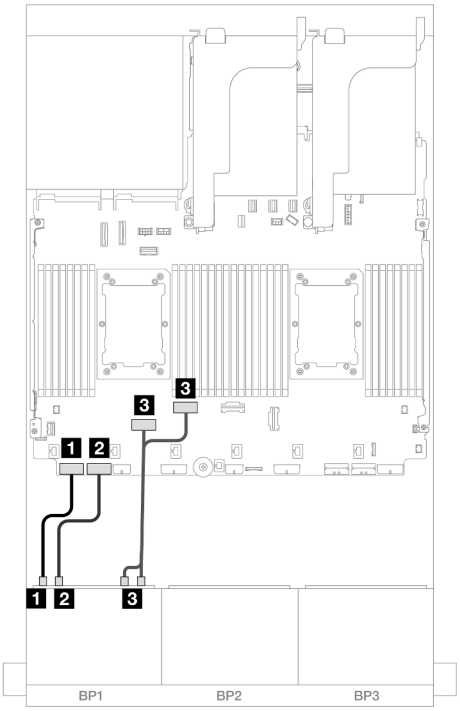


Figure 383. Cable routing when two processors installed

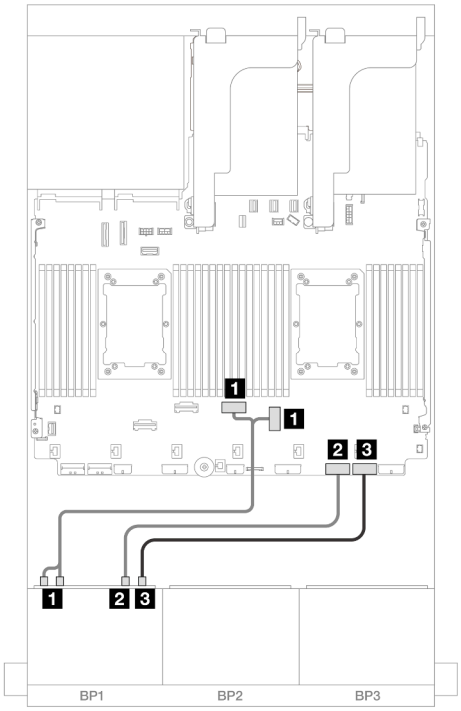


Figure 384. Cable routing when one processor installed

From	To
1 Backplane 1: NVMe 0-1	Onboard: PCIe 8
2 Backplane 1: NVMe 2-3	Onboard: PCIe 7
3 Backplane 1: NVMe 4-5, 6-7	Onboard: PCIe 6, 5

From	To
1 Backplane 1: NVMe 0-1, 2-3	Onboard: PCIe 3, 4
2 Backplane 1: NVMe 4-5	Onboard: PCIe 2
3 Backplane 1: NVMe 6-7	Onboard: PCIe 1

CFF 8i/16i RAID/HBA adapter

The following shows the cable connections for the 8 x 2.5-inch AnyBay (Gen 4) configuration with one CFF 8i/16i RAID/HBA adapter.

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

SAS/SATA cable routing

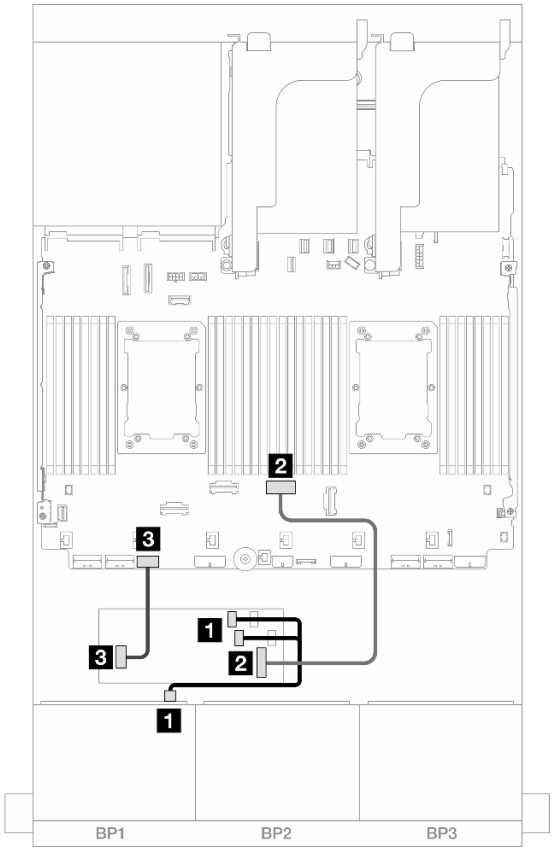


Figure 385. SAS/SATA cable routing to CFF RAID/HBA adapter

From	To
1 Backplane 1: SAS	CFF adapter • C0 • C1
2 CFF adapter: MB (CFF input)	Onboard: PCIe 4
3 CFF adapter: PWR	Onboard: CFF RAID/HBA PWR

NVMe cable routing

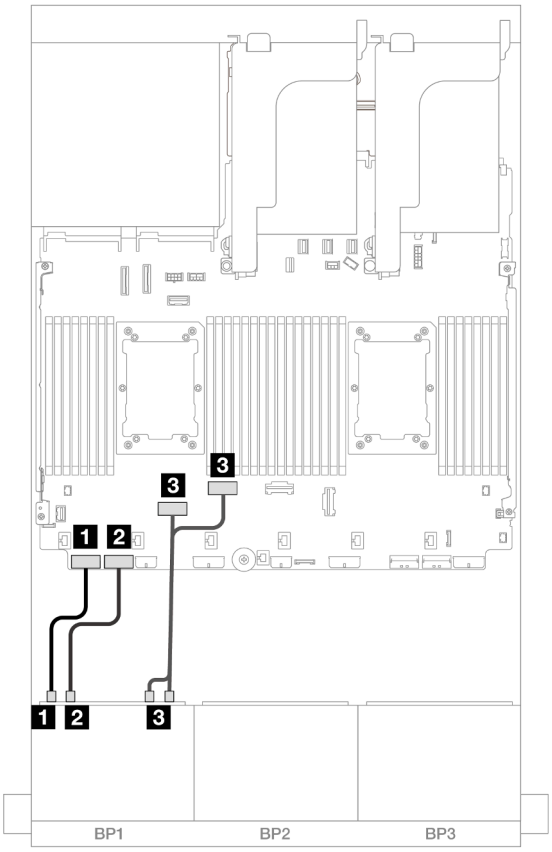


Figure 386. NVMe cable routing to onboard PCIe connectors

From	To
1 Backplane 1: NVMe 0-1	Onboard: PCIe 8
2 Backplane 1: NVMe 2-3	Onboard: PCIe 7
3 Backplane 1: NVMe 4-5, 6-7	Onboard: PCIe 6, 5

Riser 5 + OCP interposer cards + 8i/16i RAID/HBA adapter

The following shows the cable connections for the 8 x 2.5-inch AnyBay configuration with riser 5, front and rear OCP interposer cards, and one 8i/16i RAID/HBA adapter.

To connect cables to the riser 5 card and OCP interposer cards, see "Riser 5 card + OCP interposer cards" on page 358.

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

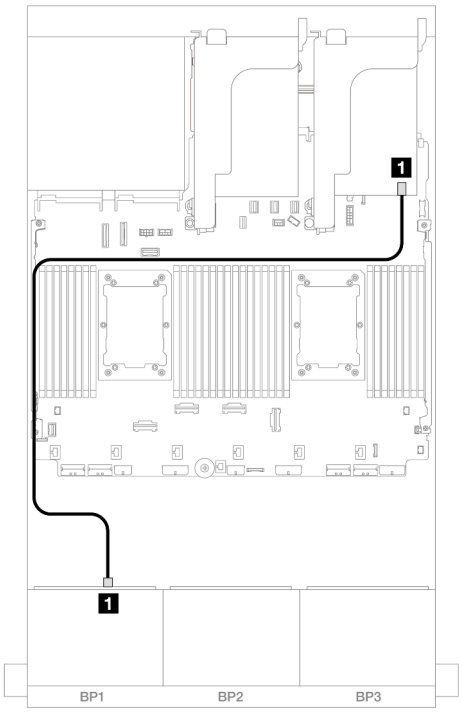


Figure 387. SAS/SATA cable routing

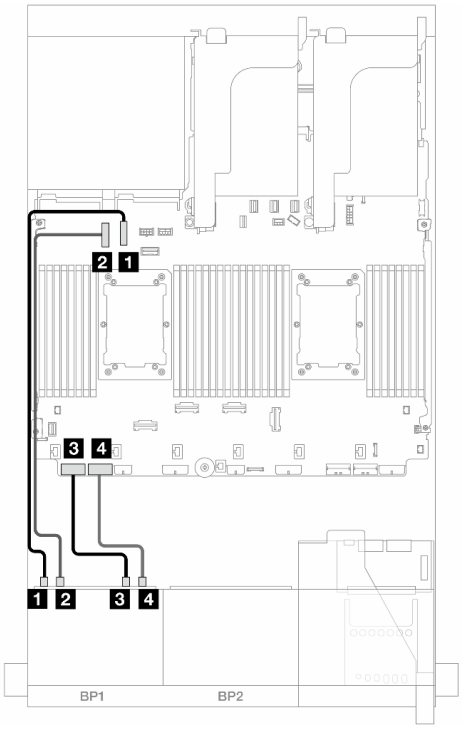


Figure 388. NVMe cable routing

From	To
1 Backplane 1: SAS	8i/16i adapter • Gen 4: C0 • Gen 3: C0C1

From	To
1 Backplane 1: NVMe 0-1	Onboard: PCIe 10
2 Backplane 1: NVMe 2-3	Onboard: PCIe 9
3 Backplane 1: NVMe 4-5	Onboard: PCIe 8
4 Backplane 1: NVMe 6-7	Onboard: PCIe 7

One 8 x AnyBay backplane (Gen 5)

This section provides cable routing information for the server model with one 8 x 2.5-inch AnyBay front drive backplane (Gen 5).

To connect power cables for the front backplane(s), refer to “Backplanes: server models with 2.5-inch front drive bays” on page 360.

To connect signal cables for the front backplane(s), refer to the following cable routing scenarios depending on your server configuration.

- “8i/16i RAID/HBA adapter” on page 370
- “CFF 8i/16i RAID/HBA adapter” on page 374
- “Trimode 8i RAID/HBA adapter” on page 378
- “Riser 5 + OCP interposer cards + 8i/16i RAID/HBA adapter” on page 368

8i/16i RAID/HBA adapter

The following shows the cable connections for the 8 x 2.5-inch AnyBay (Gen 5) configuration with one 8i/16i RAID/HBA adapter.

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

SAS/SATA cable routing

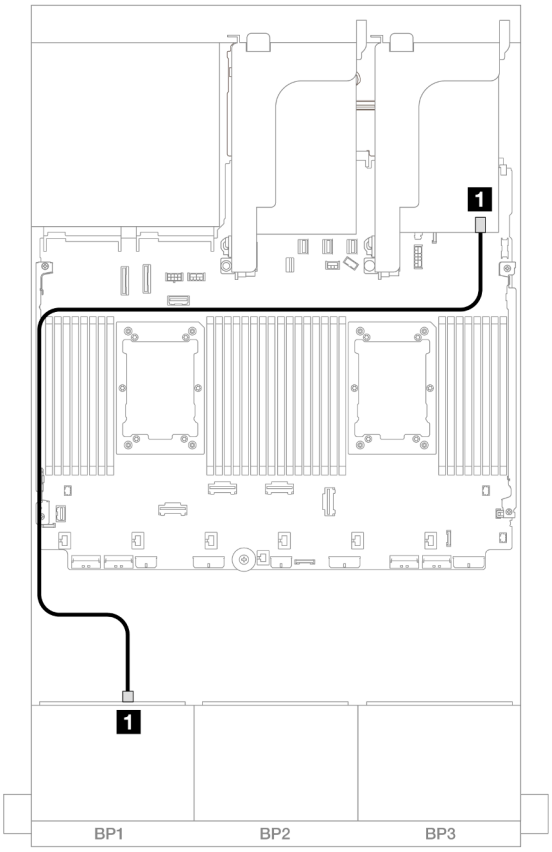


Figure 389. SAS/SATA cable routing to 8i/16i RAID/HBA adapter

From	To
1 Backplane 1: SAS	8i/16i adapter • Gen 4: C0 • Gen 3: C0C1

NVMe cable routing

Cable routing when two processors installed

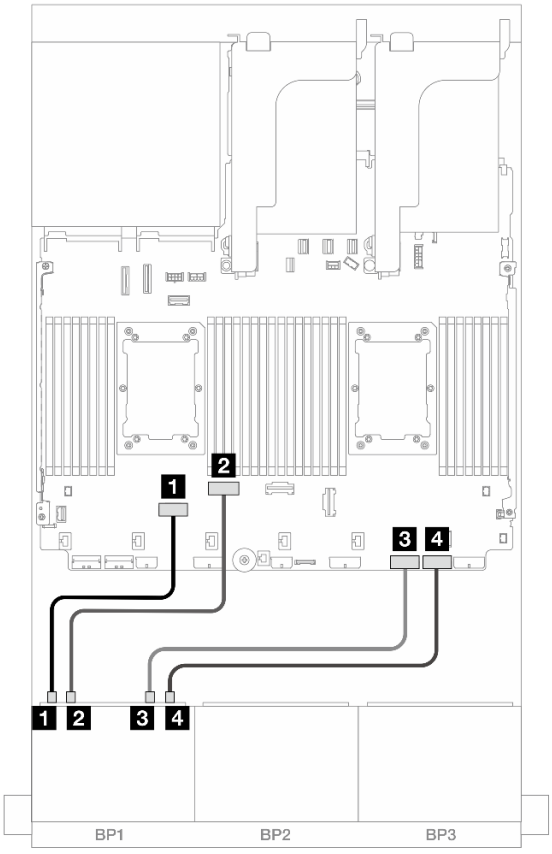


Figure 390. Cable routing when two Platinum series processors installed with no riser 3 or with x8/x8 riser card

From	To
1 Backplane 1: NVMe 0-1	Onboard: PCIe 6
2 Backplane 1: NVMe 2-3	Onboard: PCIe 5
3 Backplane 1: NVMe 4-5	Onboard: PCIe 2
4 Backplane 1: NVMe 6-7	Onboard: PCIe 1

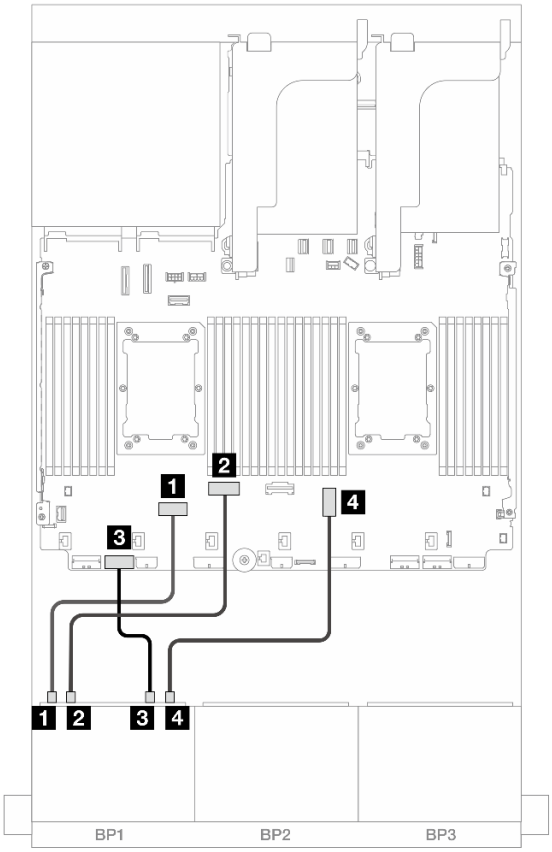


Figure 391. Cable routing when two Platinum series processors installed with x16/x16 riser card

From	To
1 Backplane 1: NVMe 0-1	Onboard: PCIe 6
2 Backplane 1: NVMe 2-3	Onboard: PCIe 5
3 Backplane 1: NVMe 4-5	Onboard: PCIe 7
4 Backplane 1: NVMe 6-7	Onboard: PCIe 3

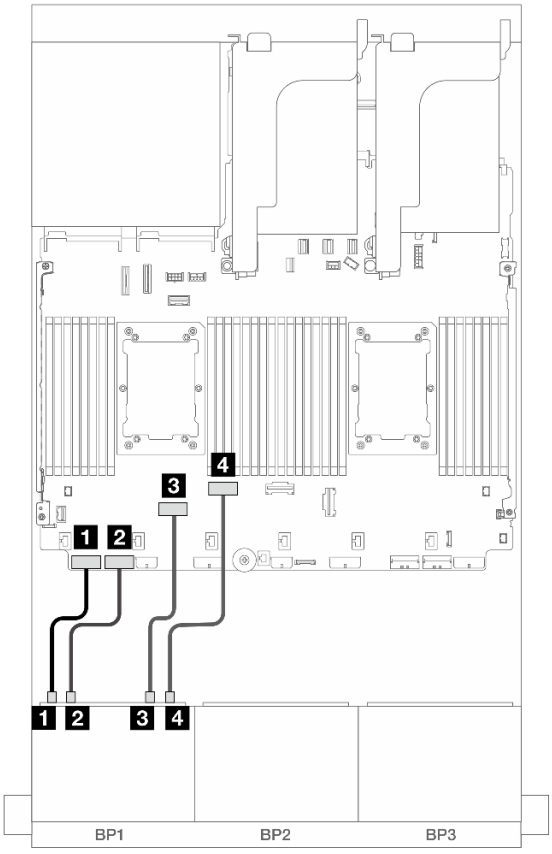


Figure 392. Cable routing in other scenarios

From	To
1 Backplane 1: NVMe 0-1	Onboard: PCIe 8
2 Backplane 1: NVMe 2-3	Onboard: PCIe 7
3 Backplane 1: NVMe 4-5	Onboard: PCIe 6
4 Backplane 1: NVMe 6-7	Onboard: PCIe 5

Cable routing when one processor installed

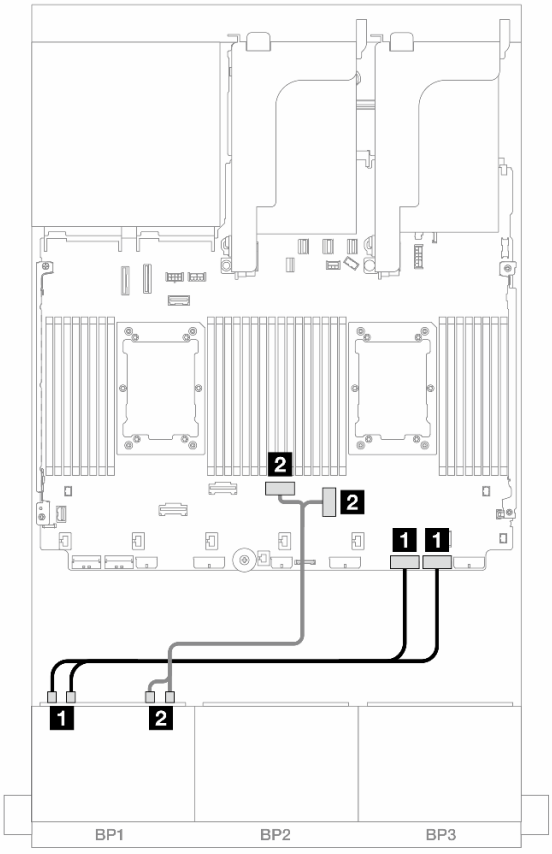


Figure 393. Cable routing when one processor installed

From	To
1 Backplane 1: NVMe 0-1, 2-3	Onboard: PCIe 2, 1
2 Backplane 1: NVMe 4-5, 6-7	Onboard: PCIe 3, 4

CFF 8i/16i RAID/HBA adapter

The following shows the cable connections for the 8 x 2.5-inch AnyBay (Gen 5) configuration with one CFF 8i/16i RAID/HBA adapter.

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

SAS/SATA cable routing

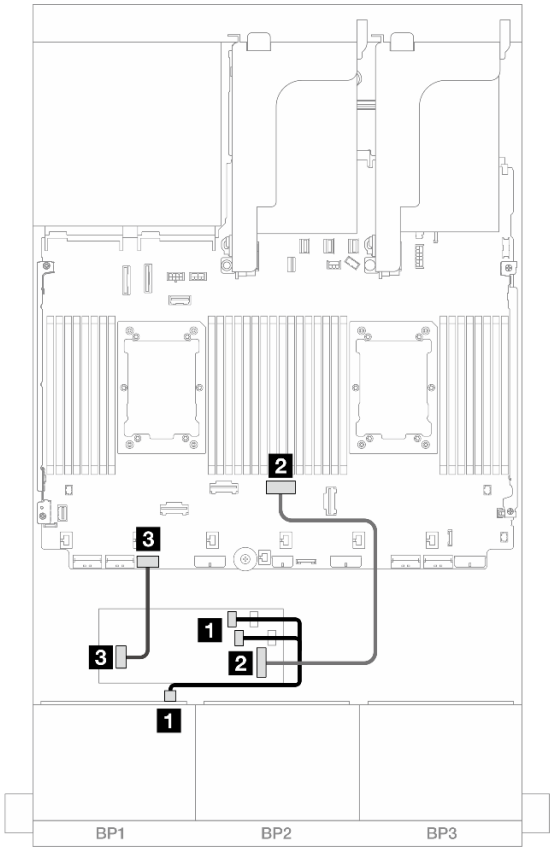


Figure 394. SAS/SATA cable routing to CFF RAID/HBA adapter

From	To
1 Backplane 1: SAS	CFF adapter • C0 • C1
2 CFF adapter: MB (CFF input)	Onboard: PCIe 4
3 CFF adapter: PWR	Onboard: CFF RAID/HBA PWR

NVMe cable routing

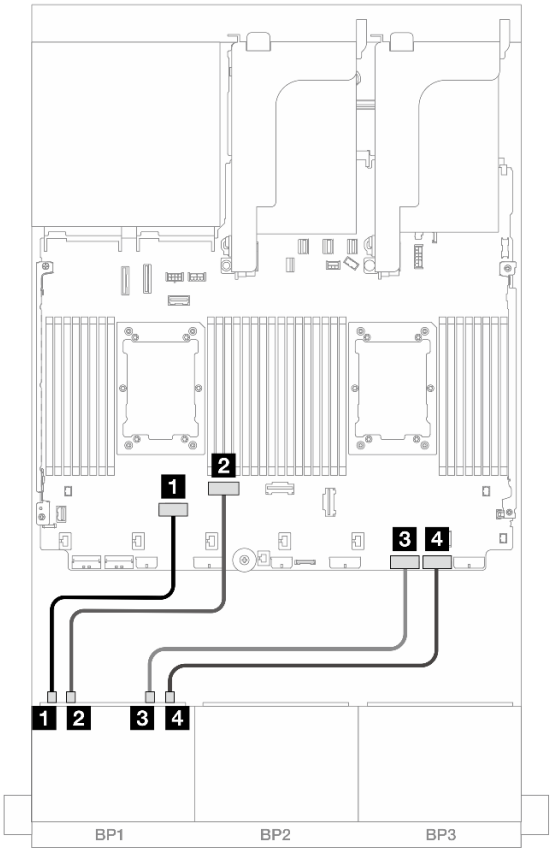


Figure 395. Cable routing when two Platinum series processors installed with no riser 3 or with x8/x8 riser card

From	To
1 Backplane 1: NVMe 0-1	Onboard: PCIe 6
2 Backplane 1: NVMe 2-3	Onboard: PCIe 5
3 Backplane 1: NVMe 4-5	Onboard: PCIe 2
4 Backplane 1: NVMe 6-7	Onboard: PCIe 1

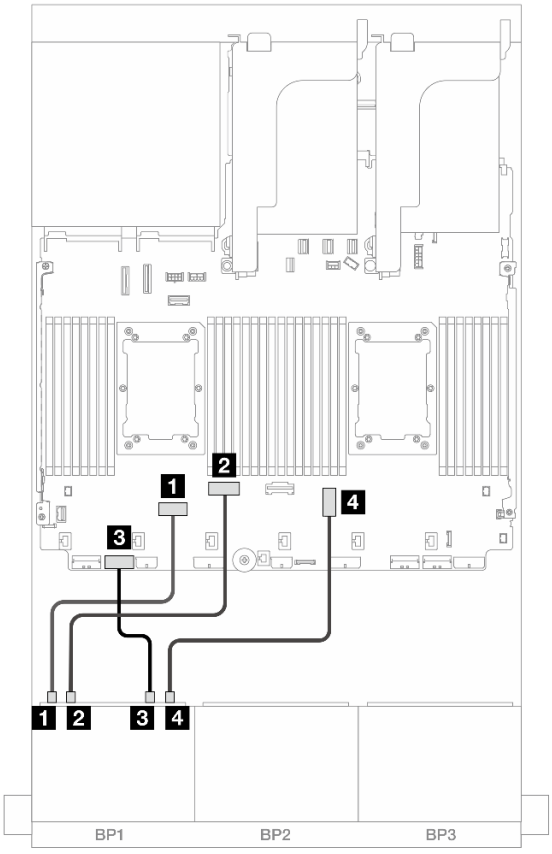


Figure 396. Cable routing when two Platinum series processors installed with x16/x16 riser card

From	To
1 Backplane 1: NVMe 0-1	Onboard: PCIe 6
2 Backplane 1: NVMe 2-3	Onboard: PCIe 5
3 Backplane 1: NVMe 4-5	Onboard: PCIe 7
4 Backplane 1: NVMe 6-7	Onboard: PCIe 3

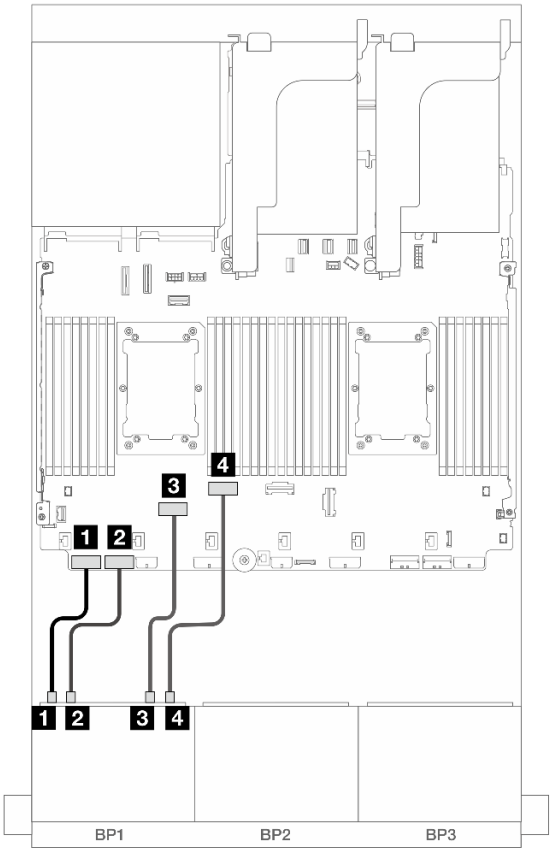


Figure 397. Cable routing in other scenarios

From	To
1 Backplane 1: NVMe 0-1	Onboard: PCIe 8
2 Backplane 1: NVMe 2-3	Onboard: PCIe 7
3 Backplane 1: NVMe 4-5	Onboard: PCIe 6
4 Backplane 1: NVMe 6-7	Onboard: PCIe 5

Trimode 8i RAID/HBA adapter

The following shows the cable connections for the 8 x 2.5-inch AnyBay (Gen 5) configuration with one Trimode 8i RAID/HBA adapter.

To connect cables to the riser 5 card and OCP interposer cards, see "Riser 5 card + OCP interposer cards" on page 358.

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

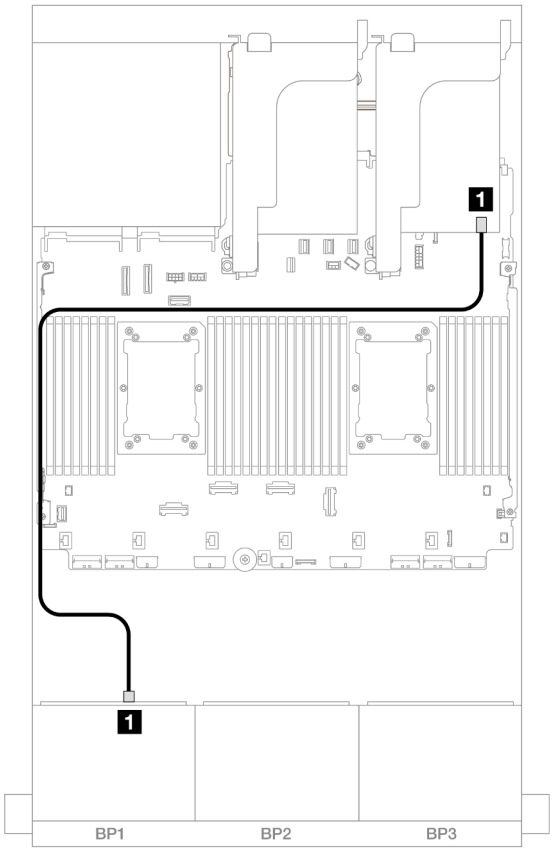


Figure 398. Backplane cable routing

From	To
1 Backplane 1: SAS	8i adapter: C0

Riser 5 + OCP interposer cards + 8i/16i RAID/HBA adapter

The following shows the cable connections for the 8 x 2.5-inch AnyBay configuration with riser 5, front and rear OCP interposer cards, and one 8i/16i RAID/HBA adapter.

To connect cables to the riser 5 card and OCP interposer cards, see "Riser 5 card + OCP interposer cards" on page 358.

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

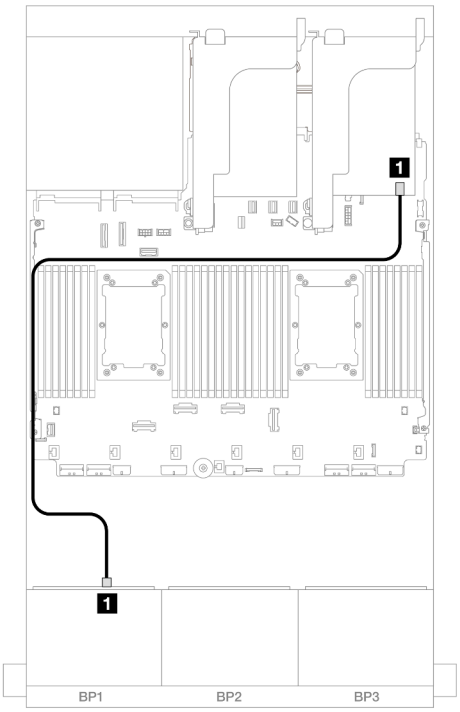


Figure 399. SAS/SATA cable routing

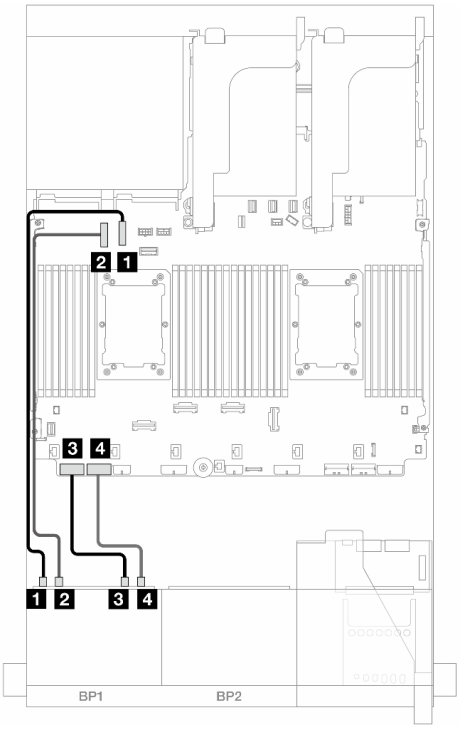


Figure 400. NVMe cable routing

From	To
1 Backplane 1: SAS	8i/16i adapter • Gen 4: C0 • Gen 3: C0C1

From	To
1 Backplane 1: NVMe 0-1	Onboard: PCIe 10
2 Backplane 1: NVMe 2-3	Onboard: PCIe 9
3 Backplane 1: NVMe 4-5	Onboard: PCIe 8
4 Backplane 1: NVMe 6-7	Onboard: PCIe 7

One 8 x NVMe backplane (Gen 4)

This section provides cable routing information for the server model with one 8 x 2.5-inch NVMe front drive backplane (Gen 4).

To connect power cables for the front backplane(s), refer to "Backplanes: server models with 2.5-inch front drive bays" on page 360.

To connect signal cables for the front backplane(s), refer to the following cable routing scenarios depending on your server configuration.

- "Onboard connectors" on page 380
- "Onboard connectors + Riser 5 + OCP interposer cards" on page 381

Onboard connectors

The following shows the cable connections for the 8 x 2.5-inch NVMe (Gen4) configuration with onboard connectors.

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

NVMe cable routing to onboard PCIe connectors

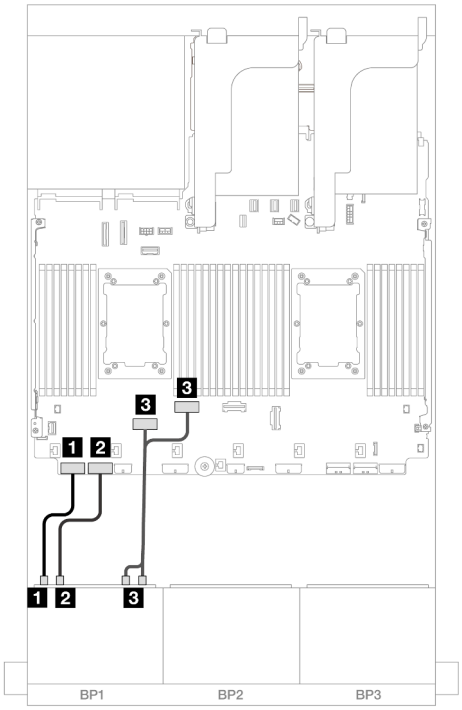


Figure 401. Cable routing when two processors installed

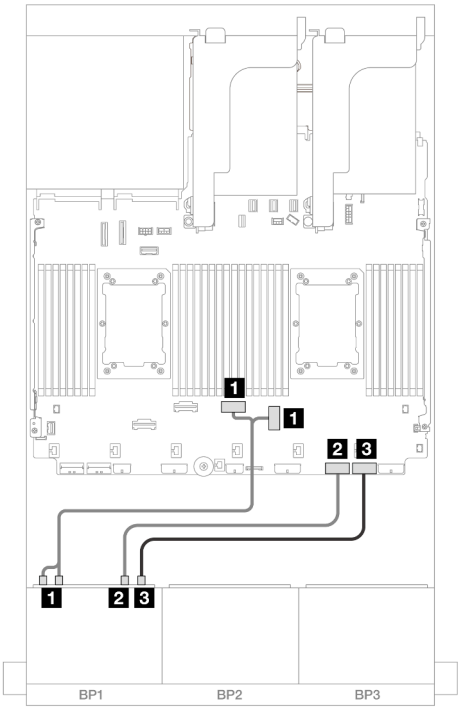


Figure 402. Cable routing when one processor installed

From	To
1 Backplane 1: NVMe 0-1	Onboard: PCIe 8
2 Backplane 1: NVMe 2-3	Onboard: PCIe 7
3 Backplane 1: NVMe 4-5, 6-7	Onboard: PCIe 6, 5

From	To
1 Backplane 1: NVMe 0-1, 2-3	Onboard: PCIe 3, 4
2 Backplane 1: NVMe 4-5	Onboard: PCIe 2
3 Backplane 1: NVMe 6-7	Onboard: PCIe 1

Onboard connectors + Riser 5 + OCP interposer cards

The following shows the cable connections for the 8 x 2.5-inch NVMe configuration with onboard connectors, riser 5, and OCP interposer cards.

To connect cables to the riser 5 card and OCP interposer cards, see “Riser 5 card + OCP interposer cards” on page 358.

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

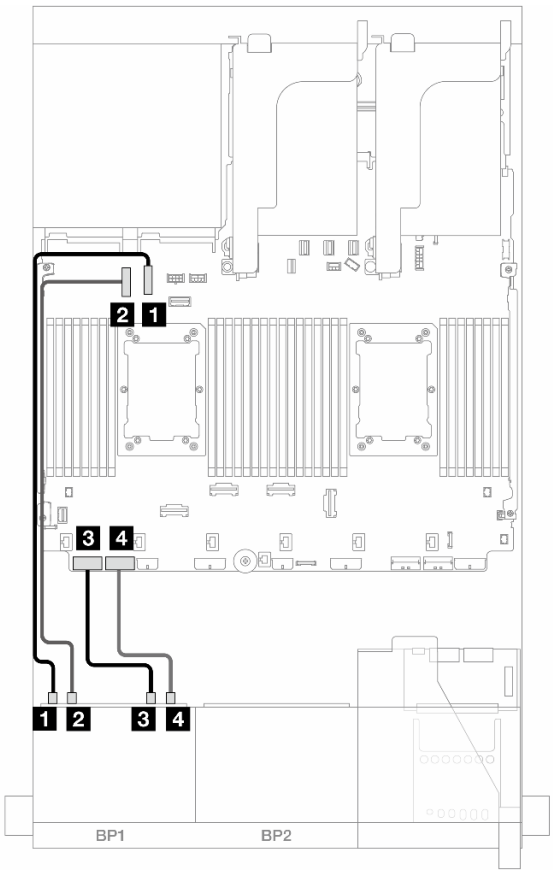


Figure 403. NVMe cable routing

From	To
1 Backplane 1: NVMe 0-1	Onboard: PCIe 10
2 Backplane 1: NVMe 2-3	Onboard: PCIe 9
3 Backplane 1: NVMe 4-5	Onboard: PCIe 8
4 Backplane 1: NVMe 6-7	Onboard: PCIe 7

One 8 x NVMe backplane (Gen 5)

This section provides cable routing information for the server model with one 8 x 2.5-inch NVMe front drive backplane (Gen 5).

To connect power cables for the front backplane(s), refer to “Backplanes: server models with 2.5-inch front drive bays” on page 360.

To connect signal cables for the front backplane(s), refer to the following cable routing scenarios depending on your server configuration.

- “Onboard connectors” on page 383
- “Onboard connectors + Riser 5 + OCP interposer cards” on page 381

Onboard connectors

The following shows the cable connections for the 8 x 2.5-inch NVMe (Gen5) configuration with onboard connectors.

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

Cable routing when two processors installed

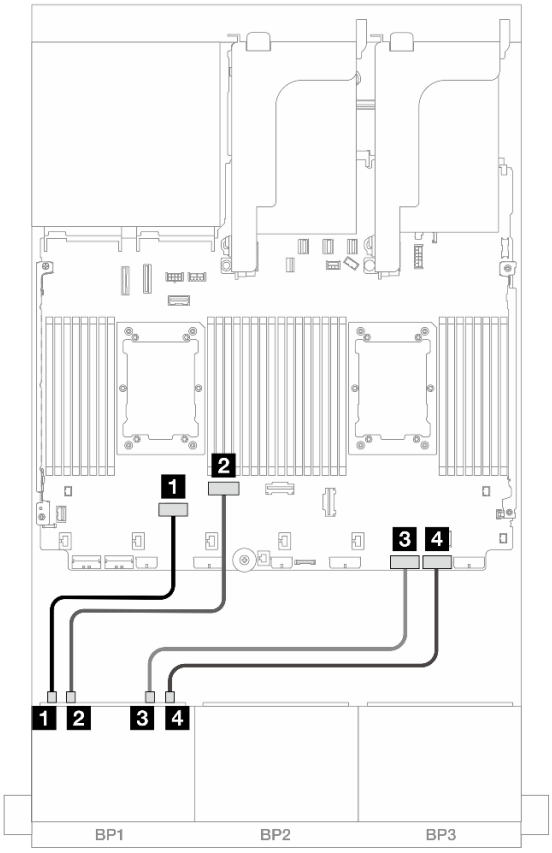


Figure 404. Cable routing when two Platinum series processors installed with no riser 3 or with x8/x8 riser card

From	To
1 Backplane 1: NVMe 0-1	Onboard: PCIe 6
2 Backplane 1: NVMe 2-3	Onboard: PCIe 5
3 Backplane 1: NVMe 4-5	Onboard: PCIe 2
4 Backplane 1: NVMe 6-7	Onboard: PCIe 1

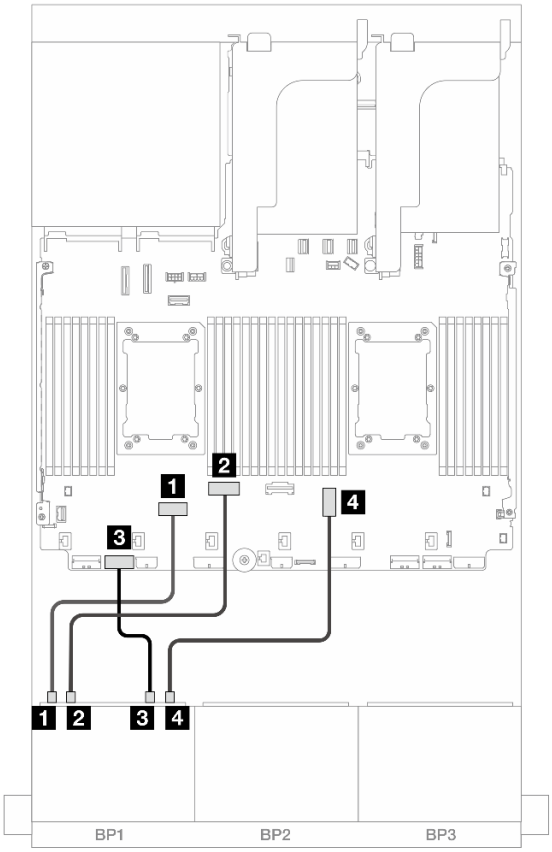


Figure 405. Cable routing when two Platinum series processors installed with x16/x16 riser card

From	To
1 Backplane 1: NVMe 0-1	Onboard: PCIe 6
2 Backplane 1: NVMe 2-3	Onboard: PCIe 5
3 Backplane 1: NVMe 4-5	Onboard: PCIe 7
4 Backplane 1: NVMe 6-7	Onboard: PCIe 3

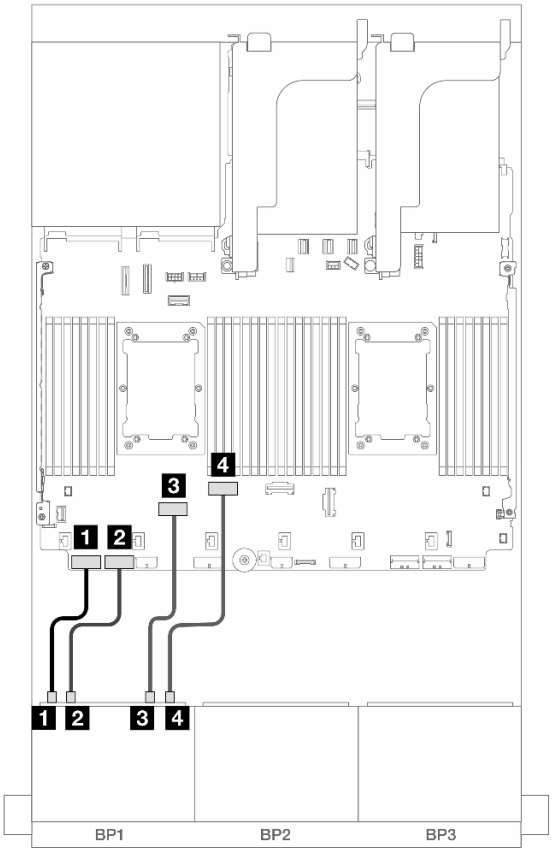


Figure 406. Cable routing in other scenarios

From	To
1 Backplane 1: NVMe 0-1	Onboard: PCIe 8
2 Backplane 1: NVMe 2-3	Onboard: PCIe 7
3 Backplane 1: NVMe 4-5	Onboard: PCIe 6
4 Backplane 1: NVMe 6-7	Onboard: PCIe 5

Cable routing when one processor installed

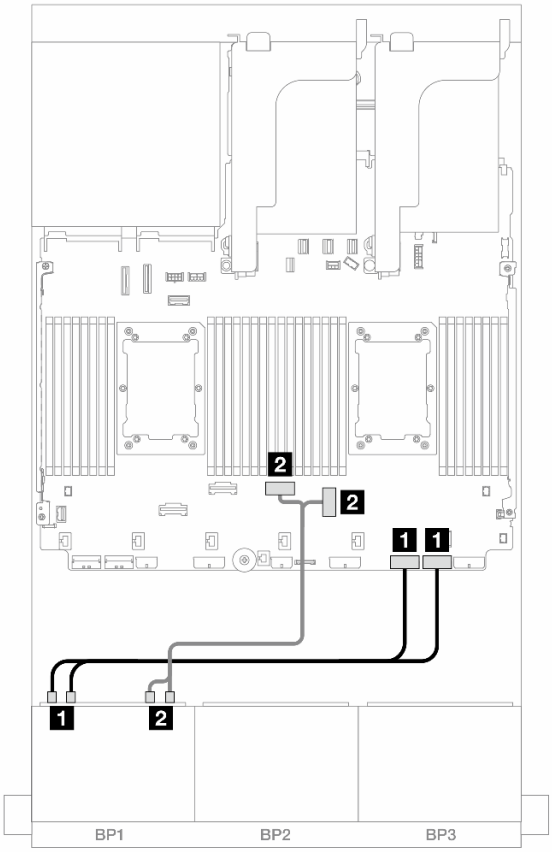


Figure 407. Cable routing when one processor installed

From	To
1 Backplane 1: NVMe 0-1, 2-3	Onboard: PCIe 2, 1
2 Backplane 1: NVMe 4-5, 6-7	Onboard: PCIe 3, 4

Onboard connectors + Riser 5 + OCP interposer cards

The following shows the cable connections for the 8 x 2.5-inch NVMe configuration with onboard connectors, riser 5, and OCP interposer cards.

To connect cables to the riser 5 card and OCP interposer cards, see "Riser 5 card + OCP interposer cards" on page 358.

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

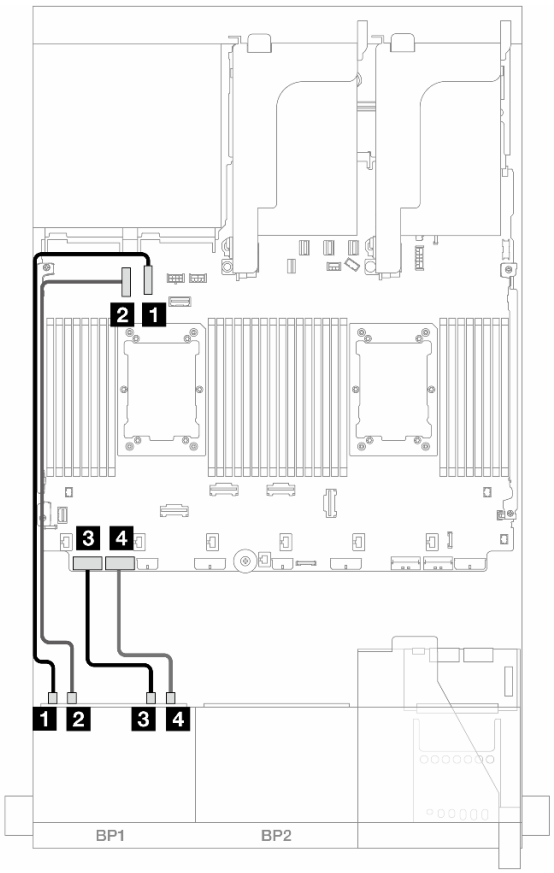


Figure 408. NVMe cable routing

From	To
1 Backplane 1: NVMe 0-1	Onboard: PCIe 10
2 Backplane 1: NVMe 2-3	Onboard: PCIe 9
3 Backplane 1: NVMe 4-5	Onboard: PCIe 8
4 Backplane 1: NVMe 6-7	Onboard: PCIe 7

Two 8 x SAS/SATA backplanes

This section provides cable routing information for the server model with two 8 x 2.5-inch SAS/SATA front drive backplanes.

To connect power cables for the front backplane(s), refer to “Backplanes: server models with 2.5-inch front drive bays” on page 360.

To connect signal cables for the front backplane(s), refer to the following cable routing scenarios depending on your server configuration.

- “16 x SAS/SATA” on page 387
- “14 x SAS/SATA” on page 391

16 x SAS/SATA

This topic provides cable routing information for the configuration with 16 SAS/SATA front drive bays.

To connect power cables for the front backplane(s), refer to “Backplanes: server models with 2.5-inch front drive bays” on page 360.

To connect signal cables for the front backplane(s), refer to the following cable routing scenarios depending on your server configuration.

- “Onboard connectors” on page 362
- “8i/16i RAID/HBA adapter” on page 363
- “CFF 8i/16i RAID/HBA adapter” on page 364
- “Riser 5 + OCP interposer cards + 8i/16i RAID/HBA adapter” on page 390

Onboard connectors + 8i RAID/HBA adapter

The following shows the cable connections for the 16 x 2.5-inch SAS/SATA configuration with onboard connectors and one 8i RAID/HBA adapter.

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

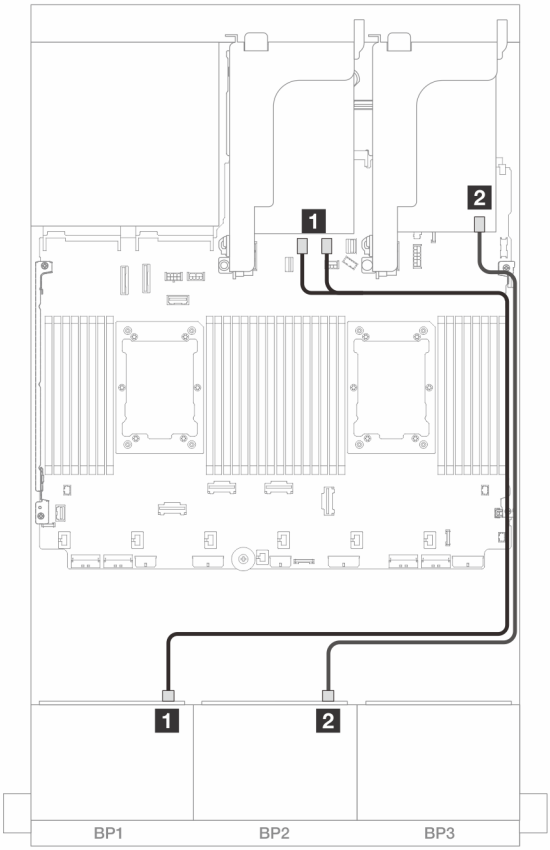


Figure 409. SAS/SATA cable routing to onboard SATA connectors and 8i adapter

From	To
1 Backplane 1: SAS	Onboard: SATA 0, SATA 1
2 Backplane 2: SAS	8i adapter • Gen 4: C0 • Gen 3: C0C1

8i/16i RAID/HBA adapter

The following shows the cable connections for the 16 x 2.5-inch SAS/SATA configuration with two 8i RAID/HBA adapters or one 16i RAID/HBA adapter.

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

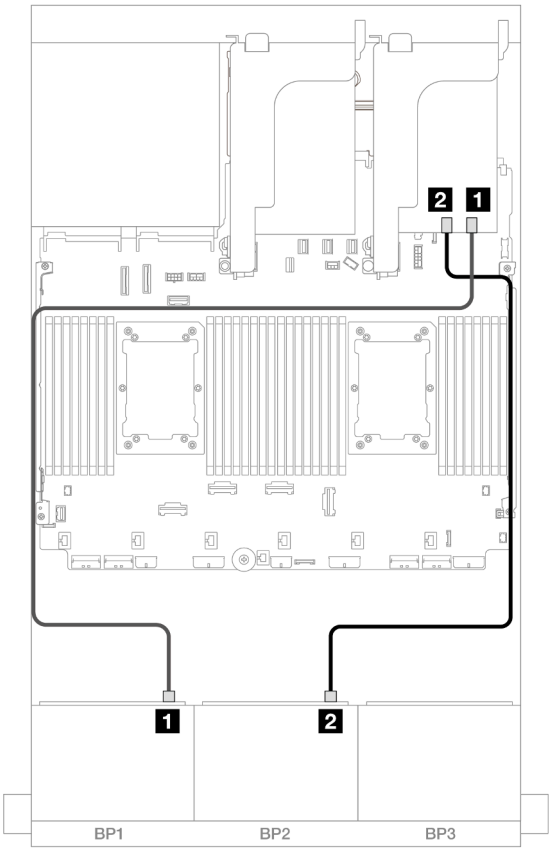


Figure 410. SAS/SATA cable routing to 8i/16i RAID/HBA adapter

From	To	
1 Backplane 1: SAS	8i adapter • Gen 4: C0 • Gen 3: C0C1	16i adapter • Gen 4: C0 • Gen 3: C0C1
2 Backplane 2: SAS	8i adapter • Gen 4: C0 • Gen 3: C0C1	• Gen 4: C1 • Gen 3: C2C3

CFF 16i RAID/HBA adapter

The following shows the cable connections for the 16 x 2.5-inch SAS/SATA configuration with one internal CFF 16i RAID/HBA adapter.

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

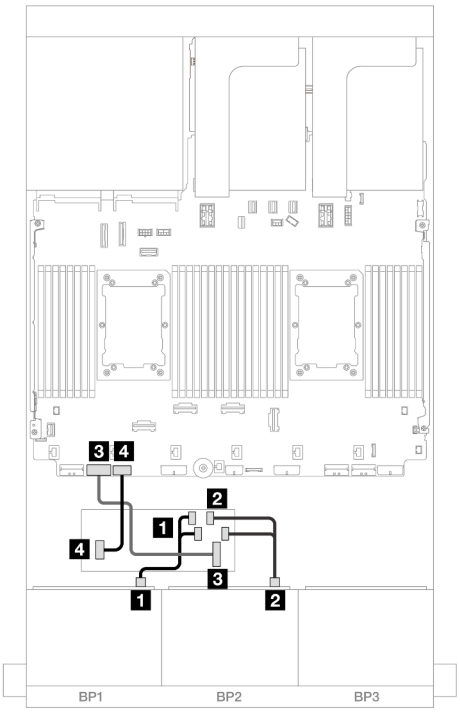


Figure 411. Cable routing when two processors installed

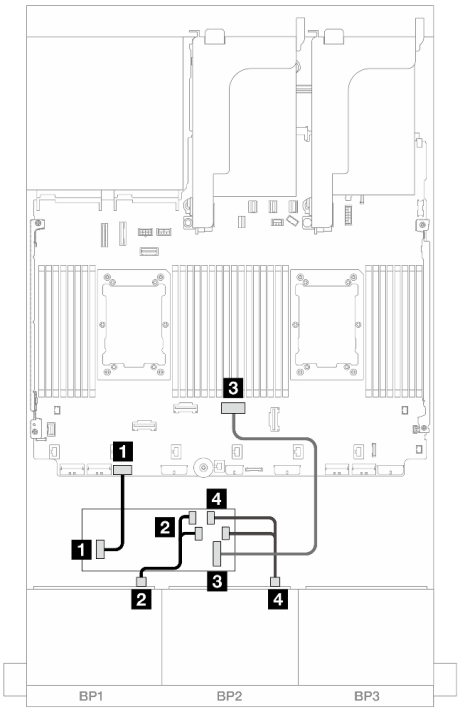


Figure 412. Cable routing when one processor installed

From	To
1 Backplane 1: SAS	CFF adapter • C0 • C1
2 Backplane 2: SAS	CFF adapter • C2 • C3
3 CFF adapter: MB (CFF input)	Onboard: PCIe 7
4 CFF adapter: PWR	Onboard: CFF RAID/HBA PWR

From	To
1 Backplane 1: SAS	CFF adapter • C0 • C1
2 Backplane 2: SAS	CFF adapter • C2 • C3
3 CFF adapter: MB (CFF input)	Onboard: PCIe 4
4 CFF adapter: PWR	Onboard: CFF RAID/HBA PWR

Riser 5 + OCP interposer cards + 8i/16i RAID/HBA adapter

The following shows the cable connections for the 16 x 2.5-inch SAS/SATA configuration with riser 5, front and rear OCP interposer cards, and two 8i RAID/HBA adapters or one 16i RAID/HBA adapter.

To connect riser 3/4 cables, see "Riser 3/4 cage" on page 354.

To connect cables to the riser 5 card and OCP interposer cards, see "Riser 5 card + OCP interposer cards" on page 358.

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

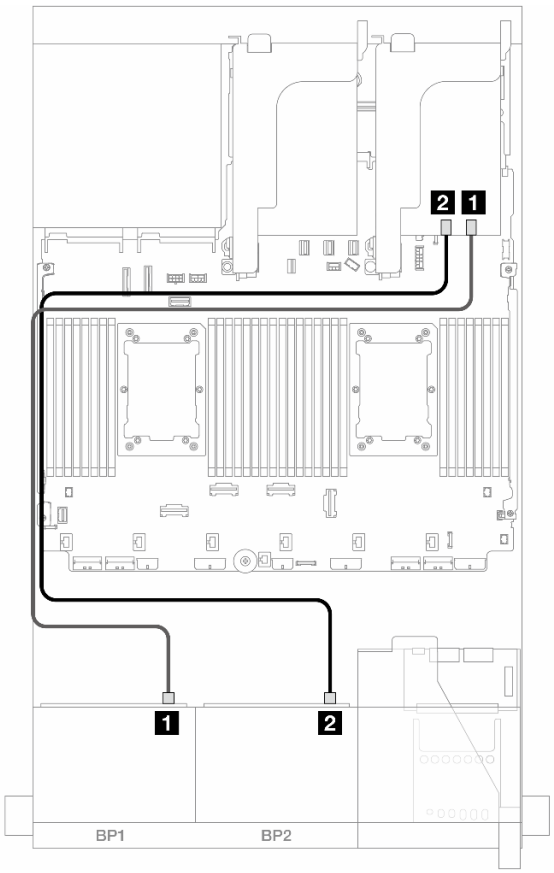


Figure 413. Backplane cable routing

From	To	
1 Backplane 1: SAS	8i adapter • Gen 4: C0 • Gen 3: C0C1	16i adapter • Gen 4: C0 • Gen 3: C0C1
2 Backplane 2: SAS	8i adapter • Gen 4: C0 • Gen 3: C0C1	• Gen 4: C1 • Gen 3: C2C3

14 x SAS/SATA

This topic provides cable routing information for the configuration with 14 x SAS/SATA front drives using two 8 x SAS/SATA front backplanes.

To connect cables to the riser 5 card and OCP interposer cards, see “Riser 5 card + OCP interposer cards” on page 358.

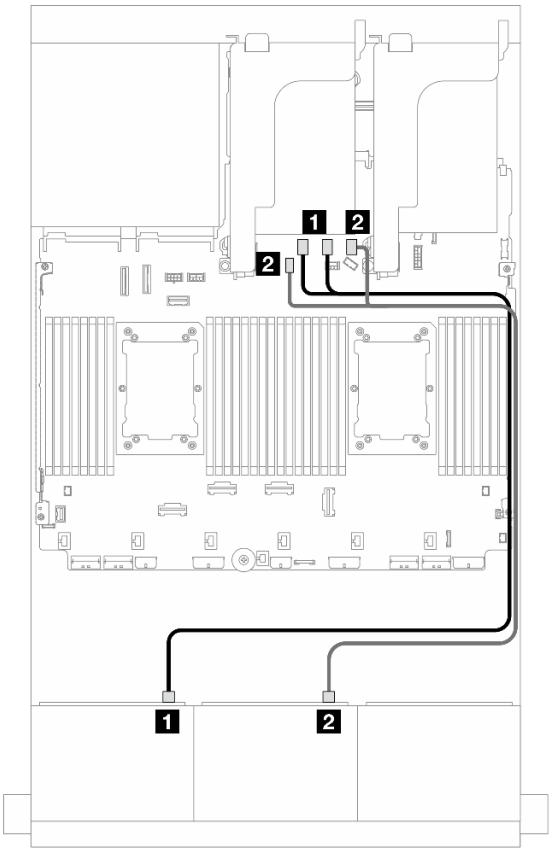


Figure 414. SAS/SATA cable routing to onboard connectors

From	To
1 Backplane 1: SAS	Onboard: SATA 0, SATA 1
2 Backplane 2: SAS	Onboard: SATA 2, M.2 signal connector

Two 8 x AnyBay backplanes (Gen 4)

This section provides cable routing information for the server model with two 8 x 2.5-inch AnyBay front drive backplanes (Gen 4).

To connect power cables for the front backplane(s), refer to "Backplanes: server models with 2.5-inch front drive bays" on page 360.

To connect signal cables for the front backplane(s), refer to the following cable routing scenarios depending on your server configuration.

- "Onboard connectors + 16i RAID/HBA adapter" on page 393
- "Trimode 8i RAID adapter" on page 394
- "Trimode 16i RAID adapter" on page 395

16 x AnyBay

This topic provides cable routing information for the 16 x AnyBay (Gen 4) configuration.

- "Onboard connectors + 16i RAID/HBA adapter" on page 393

- “Trimode 8i RAID adapter” on page 394
- “Trimode 16i RAID adapter” on page 395

Onboard connectors + 16i RAID/HBA adapter

The following shows the cable connections for the 16 x 2.5-inch AnyBay (Gen 4) configuration with one 16i RAID/HBA adapter.

SAS/SATA cable routing

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

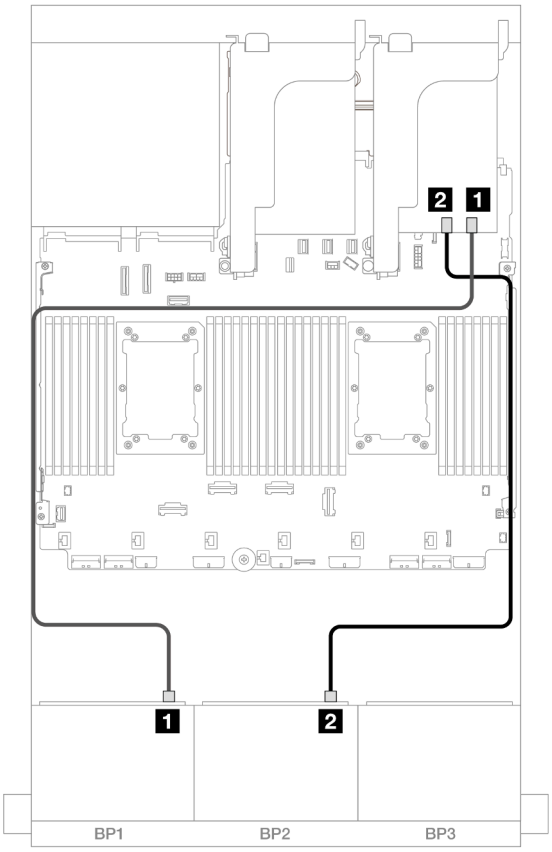


Figure 415. SAS/SATA cable routing to 16i adapter

From	To
1 Backplane 1: SAS	16i adapter • Gen 4: C0 • Gen 3: C0C1
2 Backplane 2: SAS	• Gen 4: C1 • Gen 3: C2C3

NVMe cable routing

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

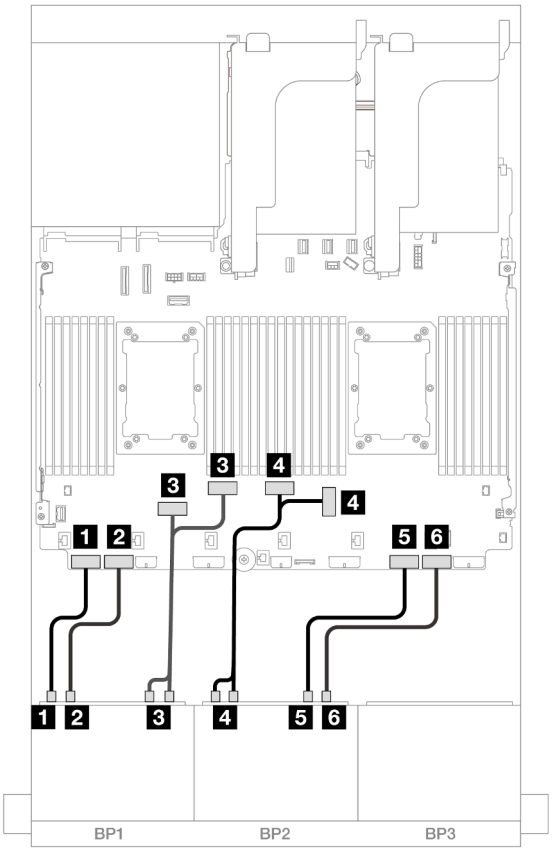


Figure 416. NVMe cable routing to onboard PCIe connectors

From	To
1 Backplane 1: NVMe 0-1	Onboard: PCIe 8
2 Backplane 1: NVMe 2-3	Onboard: PCIe 7
3 Backplane 1: NVMe 4-5, 6-7	Onboard: PCIe 6, 5
4 Backplane 2: NVMe 0-1, 2-3	Onboard: PCIe 3, 4
5 Backplane 2: NVMe 4-5	Onboard: PCIe 2
6 Backplane 2: NVMe 6-7	Onboard: PCIe 1

Trimode 8i RAID adapter

The following shows the cable connections for the 16 x 2.5-inch AnyBay (Gen 4) configuration with two Trimode 8i RAID adapters.

To connect riser 3/4 cables, see “Riser 3/4 cage” on page 354.

To connect cables to the riser 5 card and OCP interposer cards, see “Riser 5 card + OCP interposer cards” on page 358.

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

Signal cable routing

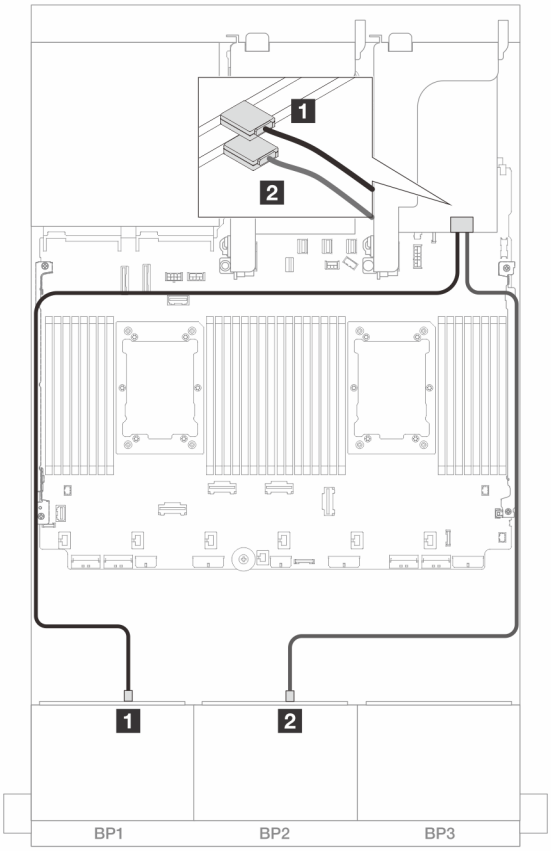


Figure 417. Signal cable routing to Trimode 8i adapters

From	To
1 Backplane 1: SAS	8i adapter • C0
2 Backplane 2: SAS	8i adapter • C0

Trimode 16i RAID adapter

The following shows the cable connections for the 16 x 2.5-inch AnyBay (Gen 4) configuration with one Trimode 16i RAID adapter.

To connect riser 3/4 cables, see “Riser 3/4 cage” on page 354.

To connect cables to the riser 5 card and OCP interposer cards, see “Riser 5 card + OCP interposer cards” on page 358.

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

Signal cable routing

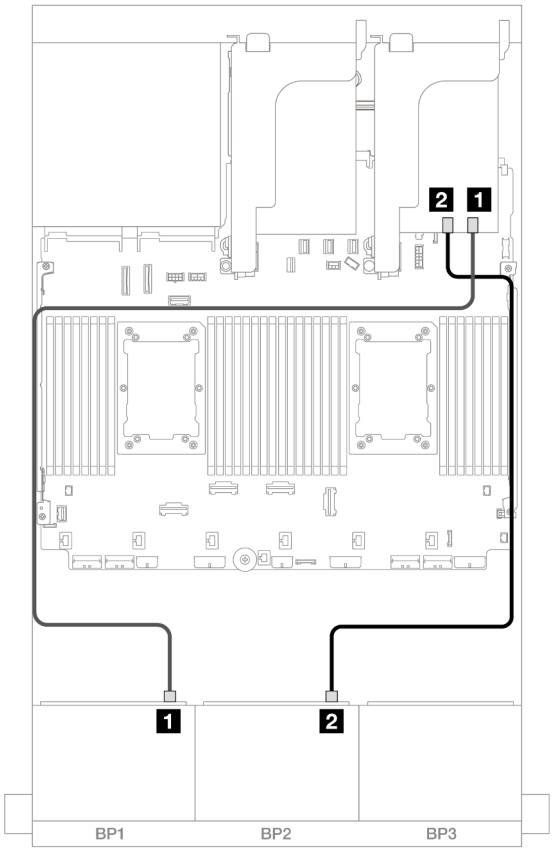


Figure 418. Signal cable routing to Trimode 16i adapter

From	To
1 Backplane 1: SAS	16i adapter • C0
2 Backplane 2: SAS	• C1

Two 8 x AnyBay backplanes (Gen 5)

This section provides cable routing information for the server model with two 8 x 2.5-inch AnyBay front drive backplanes (Gen 5).

To connect power cables for the front backplane(s), refer to “Backplanes: server models with 2.5-inch front drive bays” on page 360.

To connect signal cables for the front backplane(s), refer to the following cable routing scenarios depending on your server configuration.

- “16 x AnyBay” on page 396
- “12 x AnyBay + 4 x SAS/SATA” on page 403

16 x AnyBay

This topic provides cable routing information for the 16 x AnyBay (Gen 5) configuration.

- “Onboard connectors + 8i/16i RAID/HBA adapter” on page 397
- “Onboard connectors + 16i RAID/HBA adapter + Retimer card” on page 400
- “Trimode 8i/16i RAID/HBA adapter” on page 402

Onboard connectors + 8i/16i RAID/HBA adapter

The following shows the cable connections for the 16 x 2.5-inch AnyBay (Gen 5) configuration with one 8i/16i RAID/HBA adapter.

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

SAS/SATA cable routing

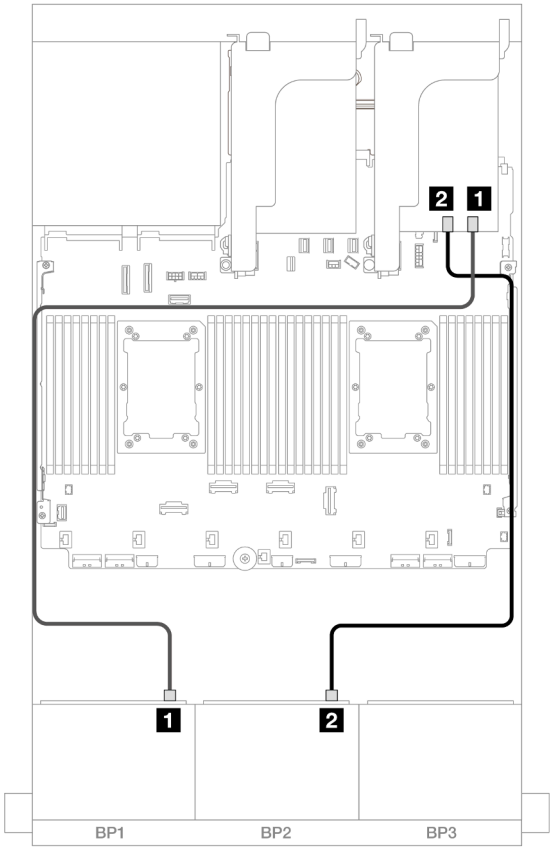


Figure 419. SAS/SATA cable routing to 8i/16i adapter

From	To
1 Backplane 1: SAS	8i/16i adapter • Gen 4: C0 • Gen 3: C0C1
2 Backplane 2: SAS	• Gen 4: C1 • Gen 3: C2C3

NVMe cable routing

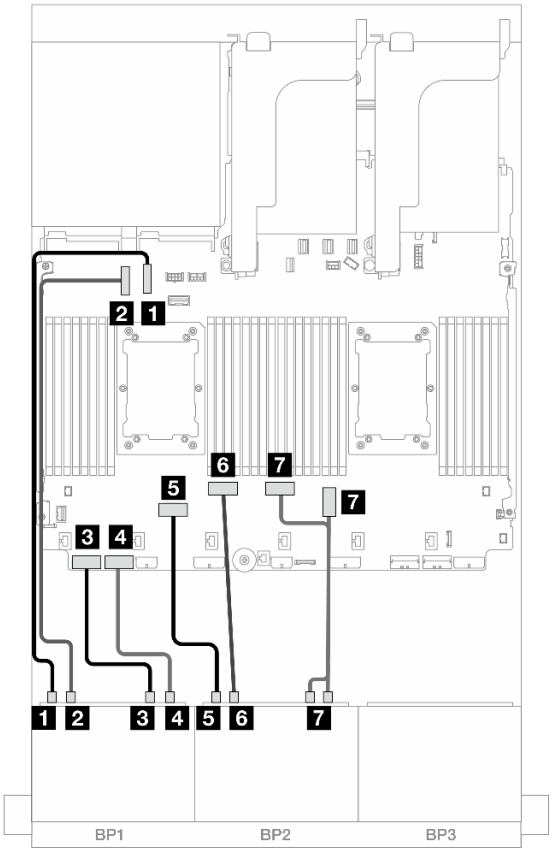


Figure 420. Cable routing when x16/x16 riser card installed

From	To
1 Backplane 1: NVMe 0-1	Onboard: PCIe 10
2 Backplane 1: NVMe 2-3	Onboard: PCIe 9
3 Backplane 1: NVMe 4-5	Onboard: PCIe 8
4 Backplane 1: NVMe 6-7	Onboard: PCIe 7
5 Backplane 2: NVMe 0-1	Onboard: PCIe 6
6 Backplane 2: NVMe 2-3	Onboard: PCIe 5
7 Backplane 2: NVMe 4-5, 6-7	Onboard: PCIe 3, 4

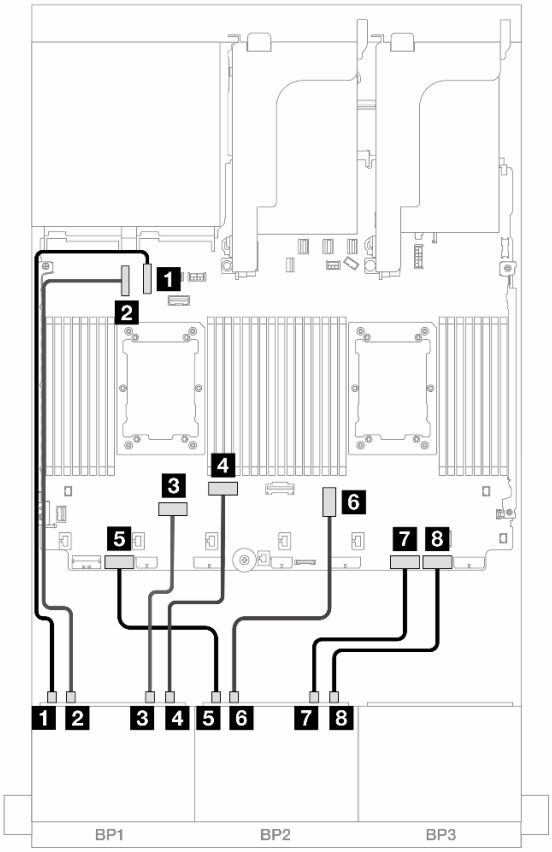


Figure 421. Cable routing when two Platinum series processors installed with no riser 3

From	To
1 Backplane 1: NVMe 0-1	Onboard: PCIe 10
2 Backplane 1: NVMe 2-3	Onboard: PCIe 9
3 Backplane 1: NVMe 4-5	Onboard: PCIe 6
4 Backplane 1: NVMe 6-7	Onboard: PCIe 5
5 Backplane 2: NVMe 0-1	Onboard: PCIe 7
6 Backplane 2: NVMe 2-3	Onboard: PCIe 3
7 Backplane 2: NVMe 4-5	Onboard: PCIe 2
8 Backplane 2: NVMe 6-7	Onboard: PCIe 1

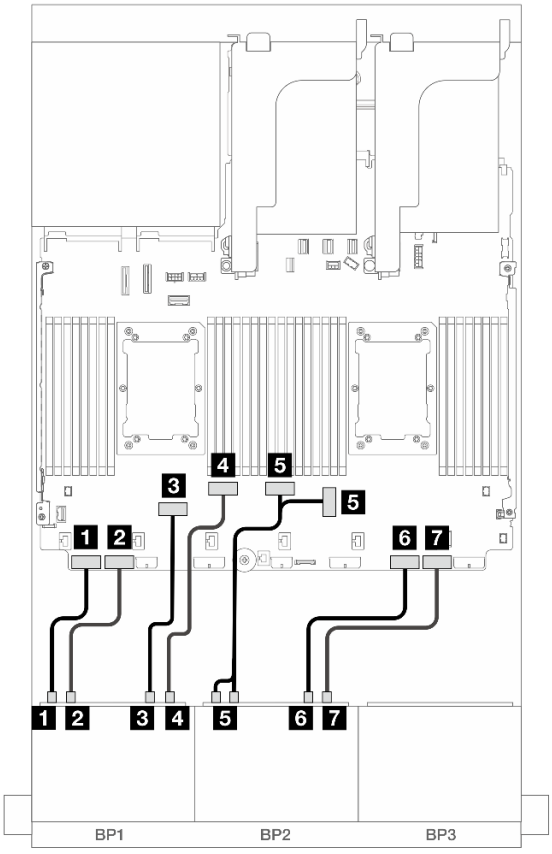


Figure 422. Cable routing in other scenarios

From	To
1 Backplane 1: NVMe 0-1	Onboard: PCIe 8
2 Backplane 1: NVMe 2-3	Onboard: PCIe 7
3 Backplane 1: NVMe 4-5	Onboard: PCIe 6
4 Backplane 1: NVMe 6-7	Onboard: PCIe 5
5 Backplane 2: NVMe 0-1, 2-3	Onboard: PCIe 3, 4
6 Backplane 2: NVMe 4-5	Onboard: PCIe 2
7 Backplane 2: NVMe 6-7	Onboard: PCIe 1

Onboard connectors + 16i RAID/HBA adapter + Retimer card

The following shows the cable connections for the 16 x 2.5-inch AnyBay (Gen 5) configuration with one 16i RAID/HBA adapter and one retimer card.

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

SAS/SATA cable routing

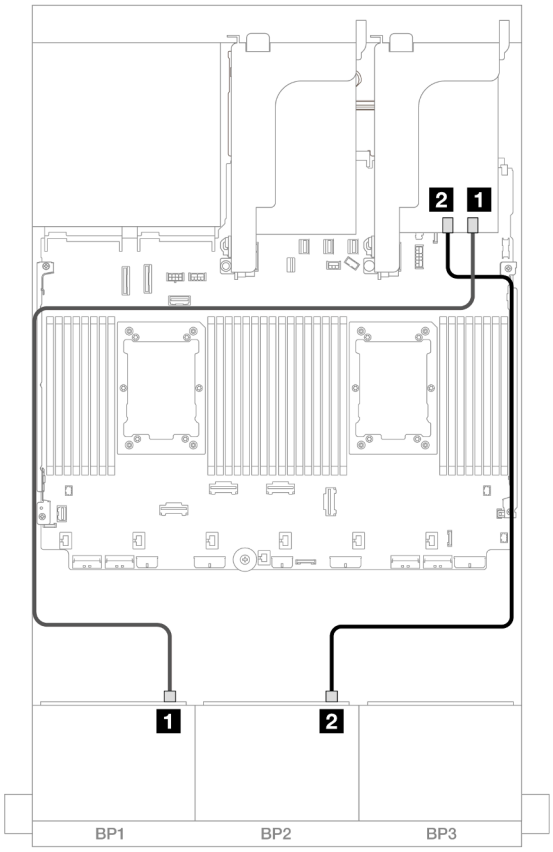


Figure 423. SAS/SATA cable routing to 16i adapter

From	To
1 Backplane 1: SAS	16i adapter • Gen 4: C0 • Gen 3: C0C1
2 Backplane 2: SAS	• Gen 4: C1 • Gen 3: C2C3

NVMe cable routing

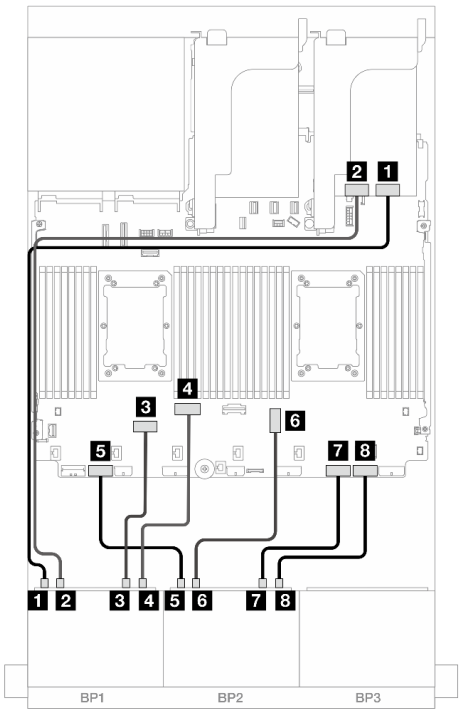


Figure 424. Cable routing when two Platinum series processors installed with no riser 3 or with x8/x8 riser card

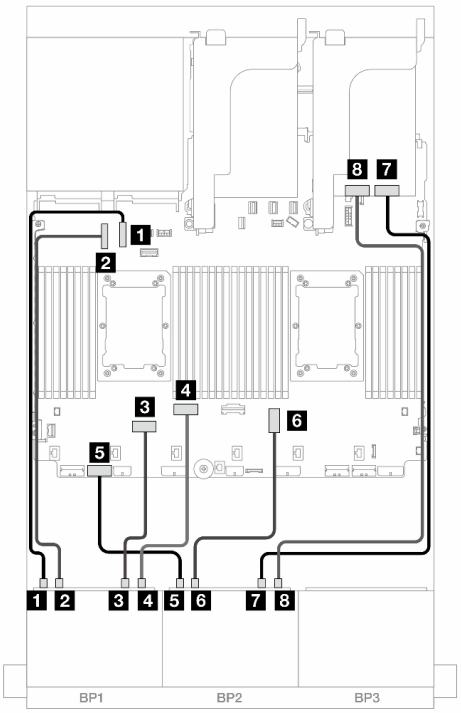


Figure 425. Cable routing when two Platinum series processors installed with x16/x16 riser card (only slot 7)

From	To	From	To
1 Backplane 1: NVMe 0-1	Retimer: C0	1 Backplane 1: NVMe 0-1	Onboard: PCIe 10
2 Backplane 1: NVMe 2-3	Retimer: C1	2 Backplane 1: NVMe 2-3	Onboard: PCIe 9
3 Backplane 1: NVMe 4-5	Onboard: PCIe 6	3 Backplane 1: NVMe 4-5	Onboard: PCIe 6
4 Backplane 1: NVMe 6-7	Onboard: PCIe 5	4 Backplane 1: NVMe 6-7	Onboard: PCIe 5
5 Backplane 2: NVMe 0-1	Onboard: PCIe 7	5 Backplane 2: NVMe 0-1	Onboard: PCIe 7
6 Backplane 2: NVMe 2-3	Onboard: PCIe 3	6 Backplane 2: NVMe 2-3	Onboard: PCIe 3
7 Backplane 2: NVMe 4-5	Onboard: PCIe 2	7 Backplane 2: NVMe 4-5	Retimer: C0
8 Backplane 2: NVMe 6-7	Onboard: PCIe 1	8 Backplane 2: NVMe 6-7	Retimer: C1

Trimode 8i/16i RAID/HBA adapter

The following shows the cable connections for the 16 x 2.5-inch AnyBay (Gen 5) configuration with one Trimode 8i/16i RAID/HBA adapter.

To connect cables to the riser 5 card and OCP interposer cards, see "Riser 5 card + OCP interposer cards" on page 358.

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

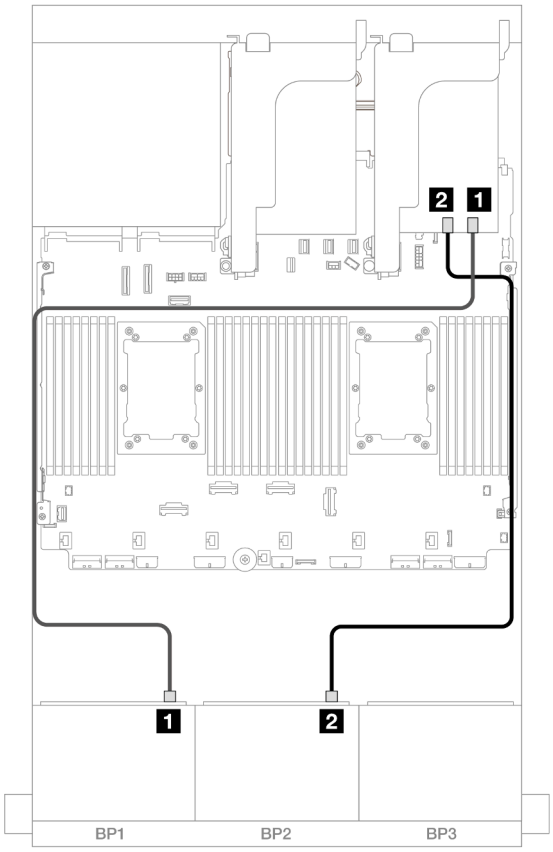


Figure 426. Backplane cable routing

From	To
1 Backplane 1: SAS	8i/16i adapter: C0
2 Backplane 2: SAS	8i/16i adapter: C1

12 x AnyBay + 4 x SAS/SATA

This topic provides cable routing information for the 12 x AnyBay + 4 x SAS/SATA configuration using two 8 x AnyBay front backplanes (Gen 5).

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

SAS/SATA cable routing

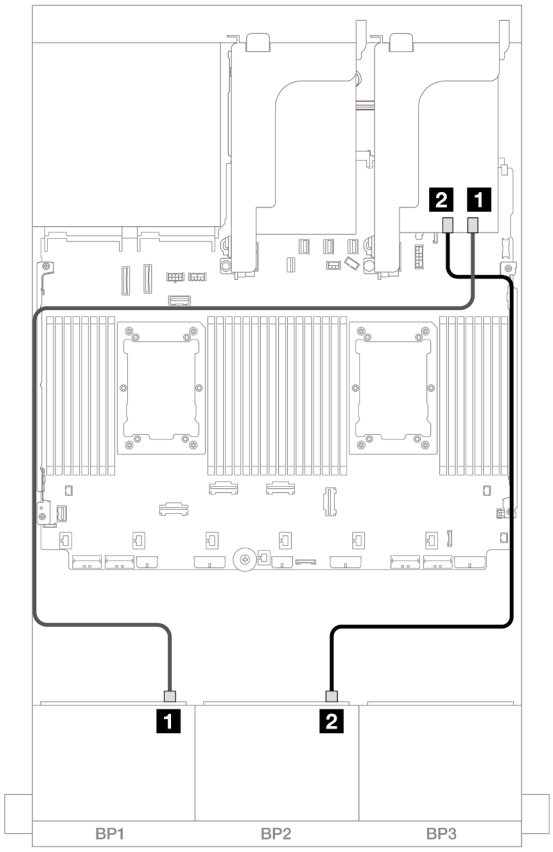


Figure 427. SAS/SATA cable routing to 16i adapter

From	To
1 Backplane 1: SAS	16i adapter • Gen 4: C0 • Gen 3: C0C1
2 Backplane 2: SAS	• Gen 4: C1 • Gen 3: C2C3

NVMe cable routing

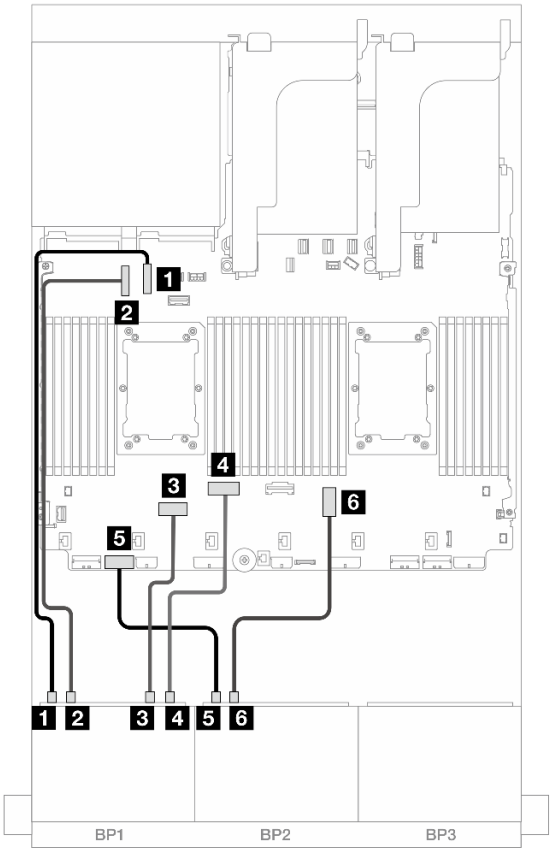


Figure 428. NVMe cable routing to onboard connectors

From	To
1 Backplane 1: NVMe 0-1	Onboard: PCIe 10
2 Backplane 1: NVMe 2-3	Onboard: PCIe 9
3 Backplane 1: NVMe 4-5	Onboard: PCIe 6
4 Backplane 1: NVMe 6-7	Onboard: PCIe 5
5 Backplane 2: NVMe 0-1	Onboard: PCIe 7
6 Backplane 2: NVMe 2-3	Onboard: PCIe 3

Two 8 x NVMe backplanes (Gen 4)

This section provides cable routing information for the server model with two 8 x 2.5-inch NVMe front drive backplanes (Gen 4).

To connect power cables for the front backplane(s), refer to “Backplanes: server models with 2.5-inch front drive bays” on page 360.

To connect signal cables for the front backplane(s), refer to the following cable routing scenarios depending on your server configuration.

- “16 x NVMe” on page 406

- “12 x NVMe” on page 408

16 x NVMe

This topic provides cable routing information for the configuration with 16 x NVMe front drives using two 8 x NVMe front backplanes (Gen 4).

- “Onboard connectors” on page 406
- “Riser 5 + OCP interposer cards + Retimer cards” on page 407

Onboard connectors

The following shows the cable connections for the 16 x 2.5-inch NVMe (Gen 4) configuration with onboard connectors.

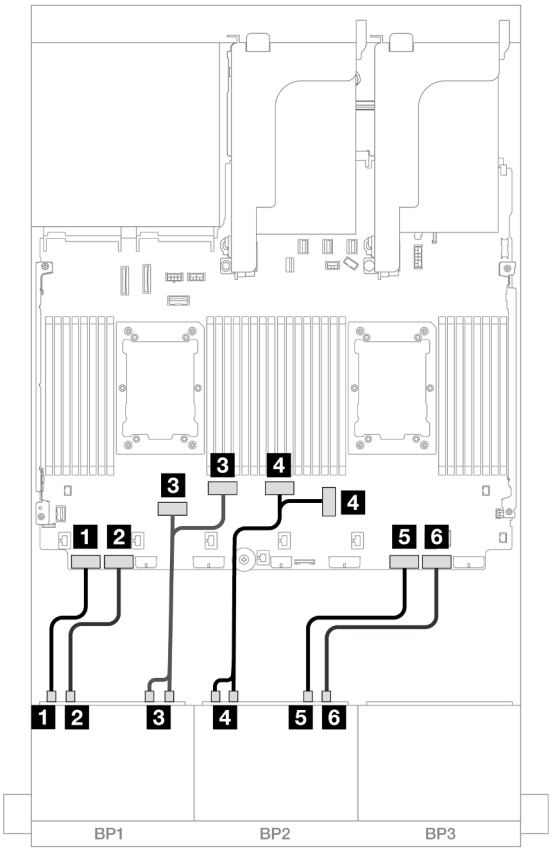


Figure 429. NVMe cable routing to onboard PCIe connectors

From	To
1 Backplane 1: NVMe 0-1	Onboard: PCIe 8
2 Backplane 1: NVMe 2-3	Onboard: PCIe 7
3 Backplane 1: NVMe 4-5, 6-7	Onboard: PCIe 6, 5
4 Backplane 2: NVMe 0-1, 2-3	Onboard: PCIe 3, 4
5 Backplane 2: NVMe 4-5	Onboard: PCIe 2
6 Backplane 2: NVMe 6-7	Onboard: PCIe 1

Riser 5 + OCP interposer cards + Retimer cards

The following shows the cable connections for the 16 x 2.5-inch NVMe (Gen 4) configuration with riser 5, front and rear OCP interposer cards, and two retimer cards.

To connect cables to the riser 5 card and OCP interposer cards, see “Riser 5 card + OCP interposer cards” on page 358.

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

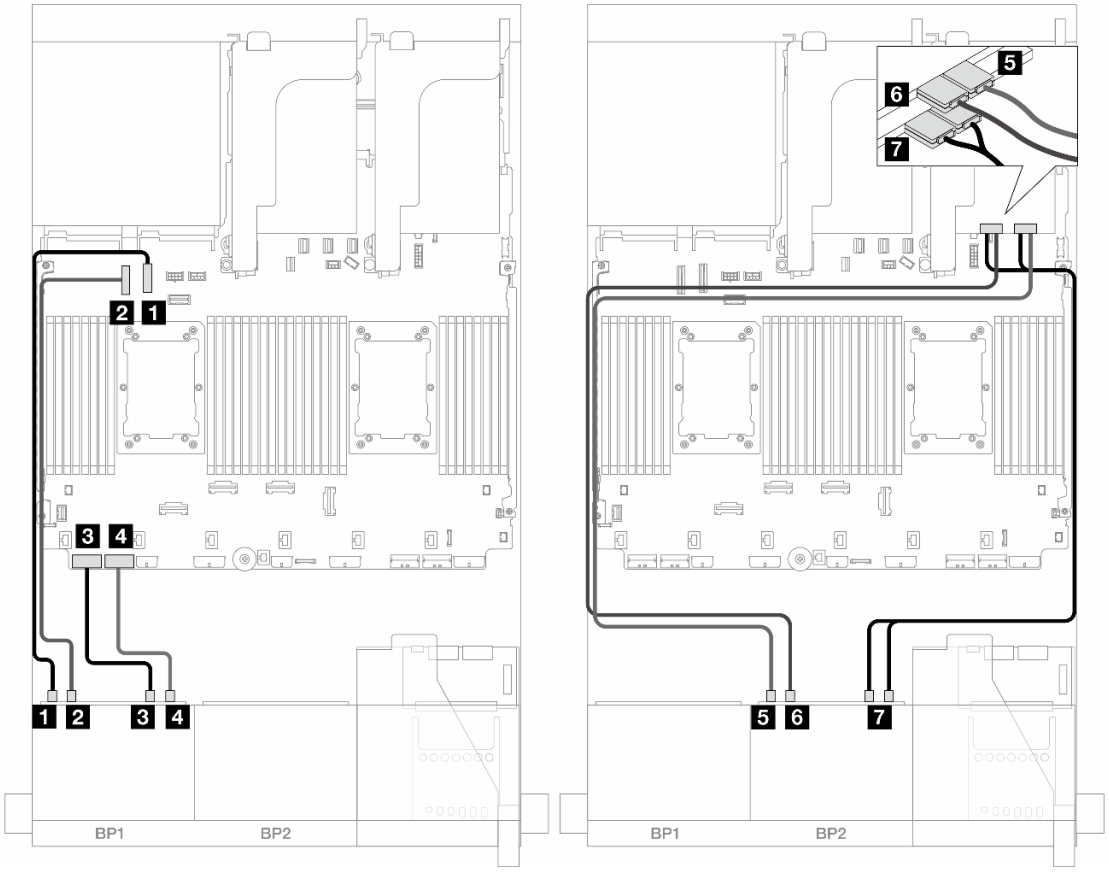


Figure 430. Backplane cable routing

From	To
1 Backplane 1: NVMe 0-1	Onboard: PCIe 10
2 Backplane 1: NVMe 2-3	Onboard: PCIe 9
3 Backplane 1: NVMe 4-5	Onboard: PCIe 8
4 Backplane 1: NVMe 6-7	Onboard: PCIe 7
5 Backplane 2: NVMe 0-1	Retimer: C0
6 Backplane 2: NVMe 2-3	Retimer: C1
7 Backplane 2: NVMe 4-5, 6-7	Retimer: C0, C1

12 x NVMe

This topic provides cable routing information for the configuration with 12 x NVMe front drives using two 8 x NVMe front backplanes (Gen 4).

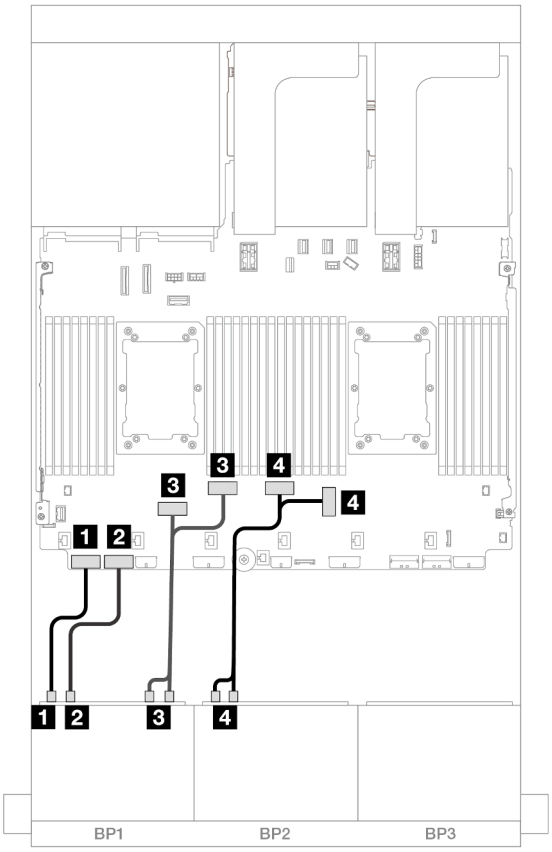


Figure 431. NVMe cable routing to onboard connectors

From	To
1 Backplane 1: NVMe 0-1	Onboard: PCIe 8
2 Backplane 1: NVMe 2-3	Onboard: PCIe 7
3 Backplane 1: NVMe 4-5, 6-7	Onboard: PCIe 6, 5
4 Backplane 2: NVMe 0-1, 2-3	Onboard: PCIe 3, 4

Two 8 x NVMe backplanes (Gen 5)

This section provides cable routing information for the server model with two 8 x 2.5-inch NVMe front drive backplanes (Gen 5).

To connect power cables for the front backplane(s), refer to “Backplanes: server models with 2.5-inch front drive bays” on page 360.

To connect signal cables for the front backplane(s), refer to the following cable routing scenarios depending on your server configuration.

- “16 x NVMe” on page 409

- “12 x NVMe” on page 412

16 x NVMe

This topic provides cable routing information for the configuration with 16 x NVMe front drives using two 8 x NVMe front backplanes (Gen 5).

- “Onboard connectors” on page 409
- “Onboard connectors + Retimer card” on page 410
- “Riser 5 + OCP interposer cards + Retimer cards” on page 411

Onboard connectors

The following shows the cable connections for the 16 x 2.5-inch NVMe (Gen 5) configuration.

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

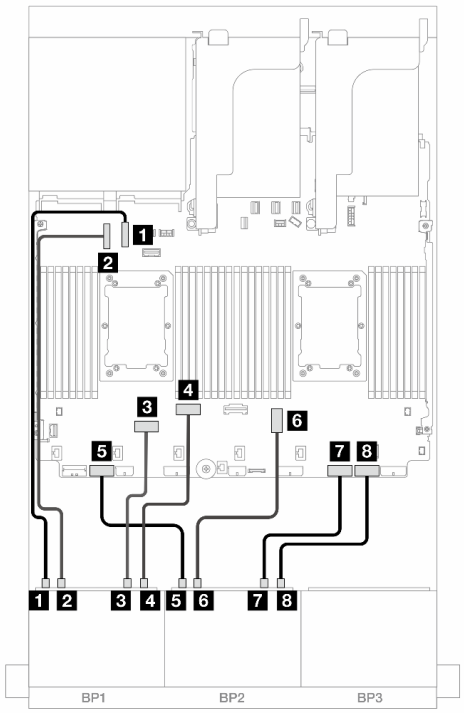


Figure 432. Cable routing when two Platinum series processors installed with no riser 3

From	To
1 Backplane 1: NVMe 0-1	Onboard: PCIe 10
2 Backplane 1: NVMe 2-3	Onboard: PCIe 9
3 Backplane 1: NVMe 4-5	Onboard: PCIe 6
4 Backplane 1: NVMe 6-7	Onboard: PCIe 5
5 Backplane 2: NVMe 0-1	Onboard: PCIe 7
6 Backplane 2: NVMe 2-3	Onboard: PCIe 3

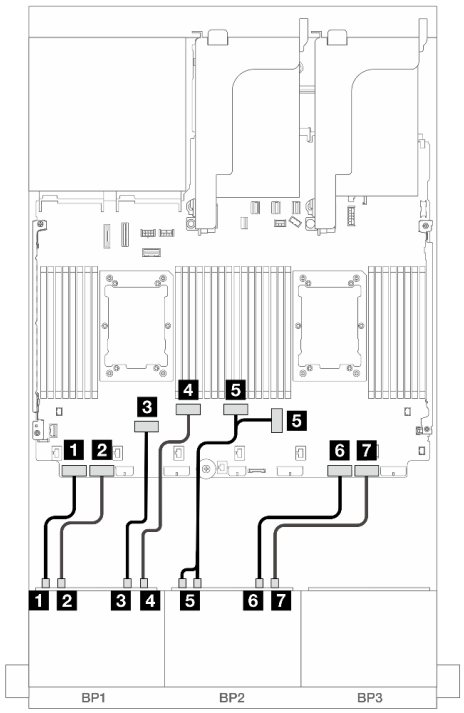


Figure 433. Cable routing in other scenarios

From	To
1 Backplane 1: NVMe 0-1	Onboard: PCIe 8
2 Backplane 1: NVMe 2-3	Onboard: PCIe 7
3 Backplane 1: NVMe 4-5	Onboard: PCIe 6
4 Backplane 1: NVMe 6-7	Onboard: PCIe 5
5 Backplane 2: NVMe 0-1, 2-3	Onboard: PCIe 3, 4
6 Backplane 2: NVMe 4-5	Onboard: PCIe 2

7 Backplane 2: NVMe 4-5	Onboard: PCIe 2	7 Backplane 2: NVMe 6-7	Onboard: PCIe 1
8 Backplane 2: NVMe 6-7	Onboard: PCIe 1		

Onboard connectors + Retimer card

The following shows the cable connections for the 16 x 2.5-inch NVMe (Gen 5) configuration with one retimer card.

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

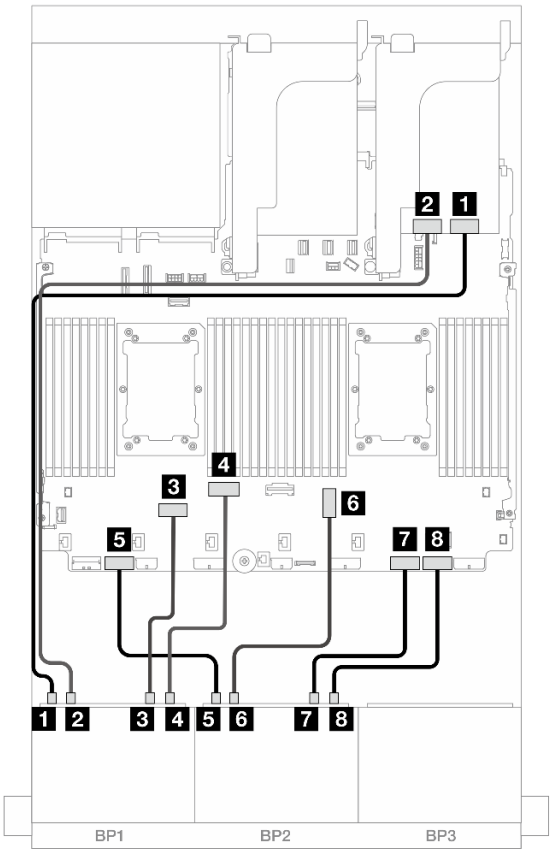


Figure 434. NVMe cable routing to onboard connectors and retimer card

From	To
1 Backplane 1: NVMe 0-1	Retimer: C0
2 Backplane 1: NVMe 2-3	Retimer: C1
3 Backplane 1: NVMe 4-5	Onboard: PCIe 6
4 Backplane 1: NVMe 6-7	Onboard: PCIe 5
5 Backplane 2: NVMe 0-1	Onboard: PCIe 7
6 Backplane 2: NVMe 2-3	Onboard: PCIe 3
7 Backplane 2: NVMe 4-5	Onboard: PCIe 2
8 Backplane 2: NVMe 6-7	Onboard: PCIe 1

Riser 5 + OCP interposer cards + Retimer cards

The following shows the cable connections for the 16 x 2.5-inch NVMe (Gen 5) configuration with riser 5, front and rear OCP interposer cards, and two retimer cards.

To connect cables to the riser 5 card and OCP interposer cards, see “Riser 5 card + OCP interposer cards” on page 358.

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

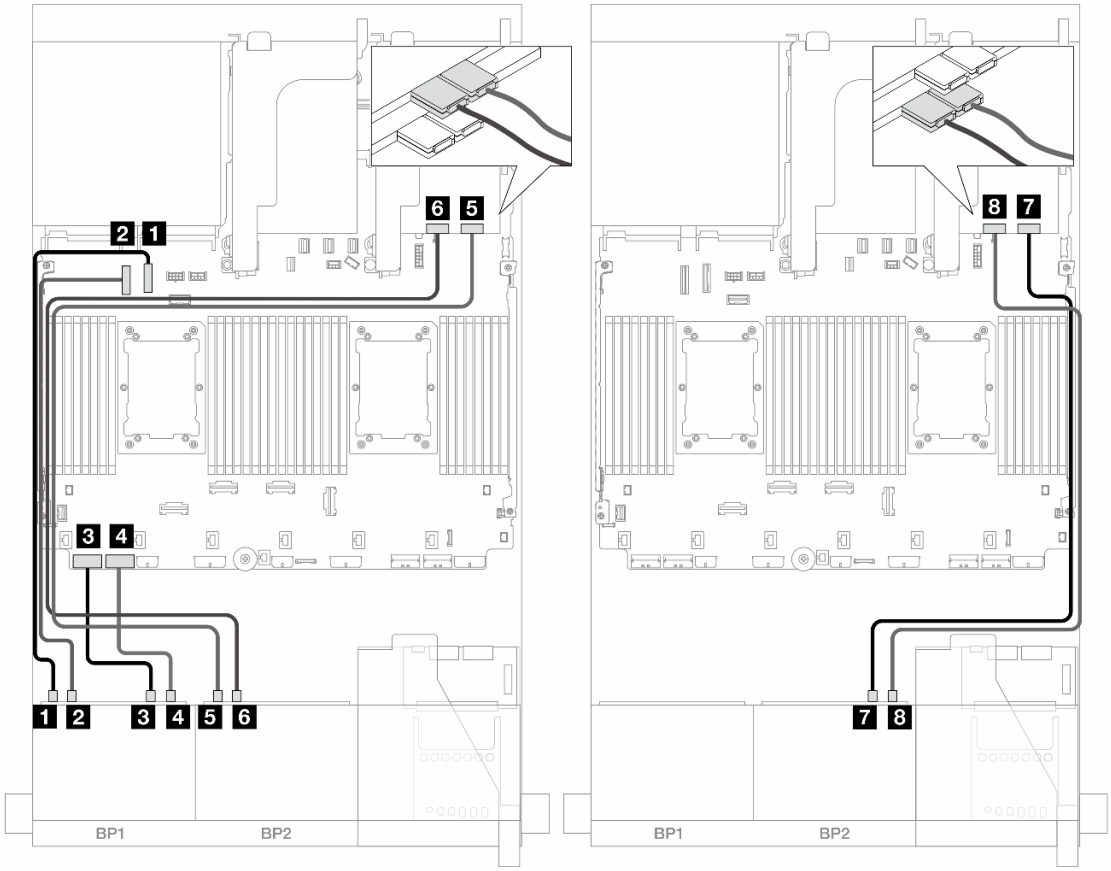


Figure 435. Backplane cable routing

From	To
1 Backplane 1: NVMe 0-1	Onboard: PCIe 10
2 Backplane 1: NVMe 2-3	Onboard: PCIe 9
3 Backplane 1: NVMe 4-5	Onboard: PCIe 8
4 Backplane 1: NVMe 6-7	Onboard: PCIe 7
5 Backplane 2: NVMe 0-1	Retimer: C0
6 Backplane 2: NVMe 2-3	Retimer: C1
7 Backplane 2: NVMe 4-5	Retimer: C0
8 Backplane 2: NVMe 6-7	Retimer: C1

12 x NVMe

This topic provides cable routing information for the configuration with 12 x NVMe front drives using two 8 x NVMe front backplanes (Gen 5).

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

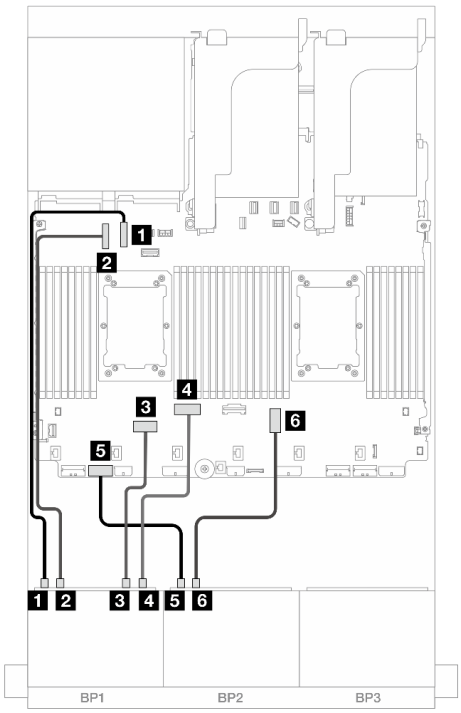


Figure 436. Cable routing when two Platinum series processors installed with x16/x16 riser card (only slot 7)

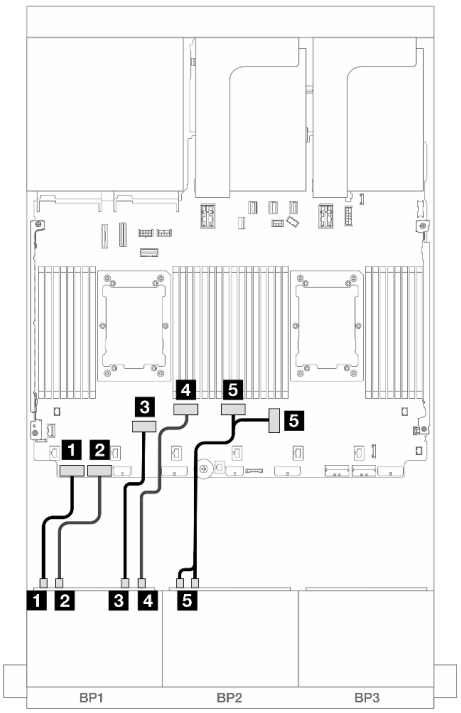


Figure 437. Cable routing in other scenarios

From	To	From	To
1 Backplane 1: NVMe 0-1	Onboard: PCIe 10	1 Backplane 1: NVMe 0-1	Onboard: PCIe 8
2 Backplane 1: NVMe 2-3	Onboard: PCIe 9	2 Backplane 1: NVMe 2-3	Onboard: PCIe 7
3 Backplane 1: NVMe 4-5	Onboard: PCIe 6	3 Backplane 1: NVMe 4-5	Onboard: PCIe 6
4 Backplane 1: NVMe 6-7	Onboard: PCIe 5	4 Backplane 1: NVMe 6-7	Onboard: PCIe 5
5 Backplane 2: NVMe 0-1	Onboard: PCIe 7	5 Backplane 2: NVMe 0-1, 2-3	Onboard: PCIe 3, 4
6 Backplane 2: NVMe 2-3	Onboard: PCIe 3		

One 8 x SAS/SATA and one 8 x AnyBay (Gen 4) backplanes

This section provides cable routing information for the server model with one 8 x 2.5-inch SAS/SATA backplane and one 8 x 2.5-inch AnyBay backplane (Gen 4).

To connect power cables for the front backplane(s), refer to "Backplanes: server models with 2.5-inch front drive bays" on page 360.

To connect signal cables for the front backplane(s), refer to the following cable routing scenarios depending on your server configuration.

- “Onboard connectors + 8i RAID/HBA adapter” on page 413
- “Onboard connectors + 16i RAID/HBA adapter” on page 414
- “Onboard connectors + CFF 16i RAID/HBA adapter” on page 416
- “Riser 5 + OCP interposer cards + 8i/16i RAID/HBA adapter” on page 418

Onboard connectors + 8i RAID/HBA adapter

The following shows the cable connections for the 8 SAS/SATA + 8 AnyBay (Gen 4) configuration with two 8i RAID/HBA adapters.

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

SAS/SATA cable routing

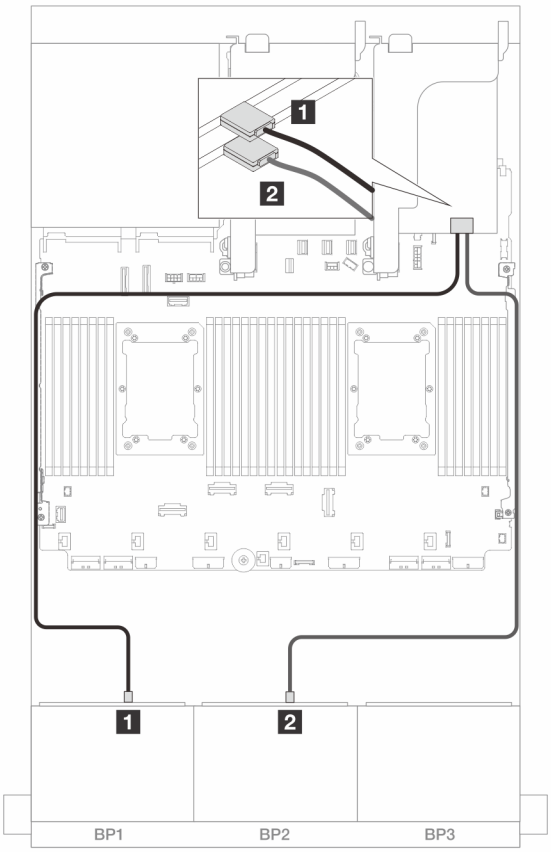


Figure 438. SAS/SATA cable routing to 8i adapters

From	To
1 Backplane 1: SAS	8i adapter • Gen 4: C0 • Gen 3: C0C1
2 Backplane 2: SAS	8i adapter • Gen 4: C0 • Gen 3: C0C1

NVMe cable routing

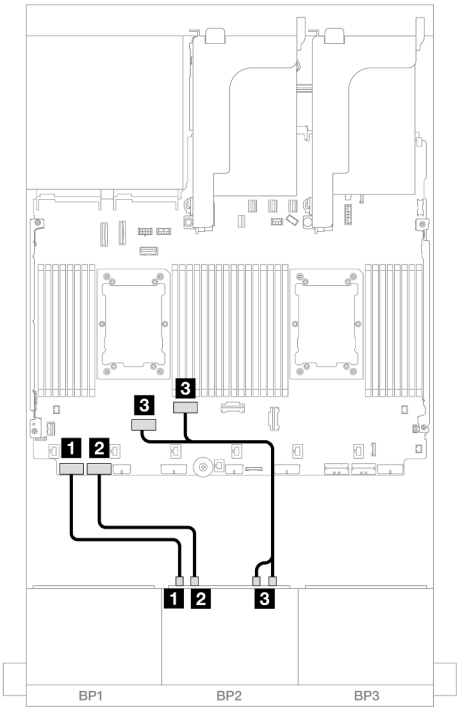


Figure 439. Cable routing when two processors installed

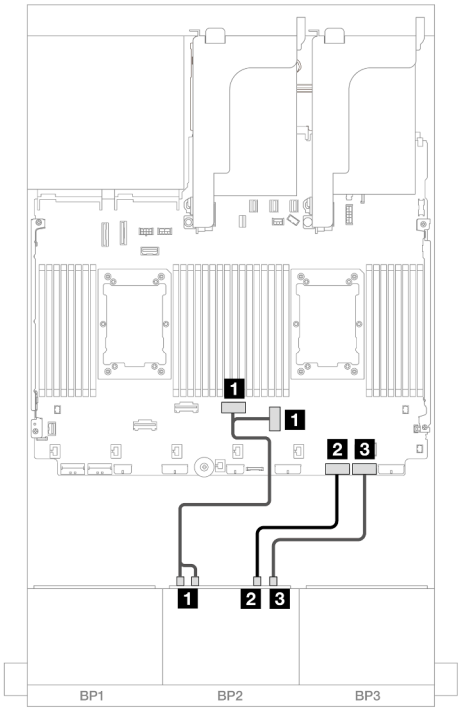


Figure 440. Cable routing when one processor installed

From	To
1 Backplane 2: NVMe 0-1	Onboard: PCIe 8
2 Backplane 2: NVMe 2-3	Onboard: PCIe 7
3 Backplane 2: NVMe 4-5, 6-7	Onboard: PCIe 6, 5

From	To
1 Backplane 2: NVMe 0-1, 2-3	Onboard: PCIe 3, 4
2 Backplane 2: NVMe 4-5	Onboard: PCIe 2
3 Backplane 2: NVMe 6-7	Onboard: PCIe 1

Onboard connectors + 16i RAID/HBA adapter

The following shows the cable connections for the 8 SAS/SATA + 8 AnyBay (Gen 4) configuration with one 16i RAID/HBA adapter.

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

SAS/SATA cable routing

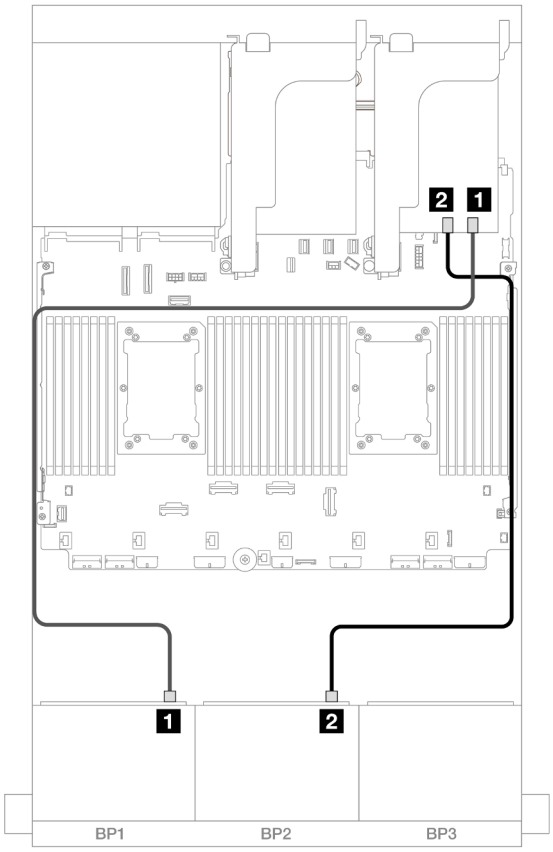


Figure 441. SAS/SATA cable routing to 16i adapter

From	To
1 Backplane 1: SAS	16i adapter • Gen 4: C0 • Gen 3: C0C1
2 Backplane 2: SAS	• Gen 4: C1 • Gen 3: C2C3

NVMe cable routing

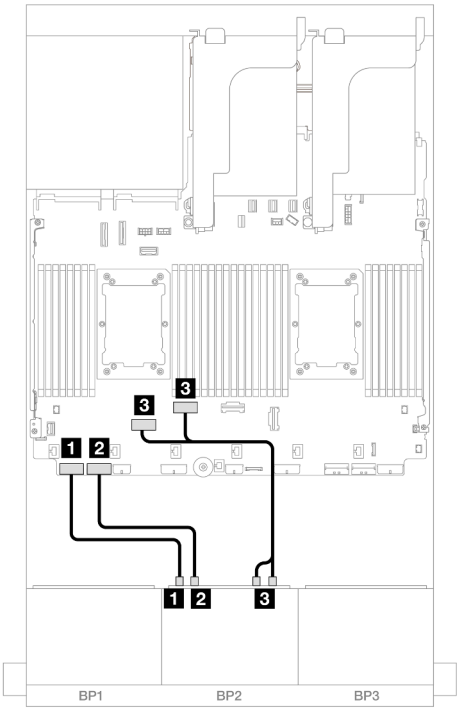


Figure 442. Cable routing when two processors installed

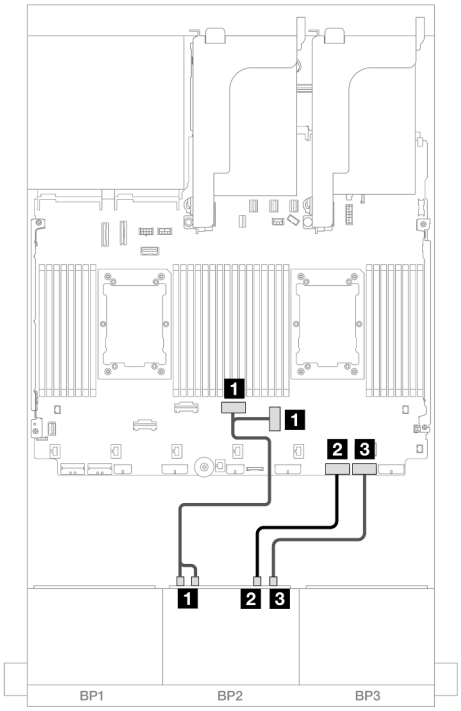


Figure 443. Cable routing when one processor installed

From	To
1 Backplane 2: NVMe 0-1	Onboard: PCIe 8
2 Backplane 2: NVMe 2-3	Onboard: PCIe 7
3 Backplane 2: NVMe 4-5, 6-7	Onboard: PCIe 6, 5

From	To
1 Backplane 2: NVMe 0-1, 2-3	Onboard: PCIe 3, 4
2 Backplane 2: NVMe 4-5	Onboard: PCIe 2
3 Backplane 2: NVMe 6-7	Onboard: PCIe 1

Onboard connectors + CFF 16i RAID/HBA adapter

The following shows the cable connections for the 8 SAS/SATA + 8 AnyBay (Gen 4) configuration with one internal CFF 16i RAID/HBA adapter.

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

SAS/SATA cable routing

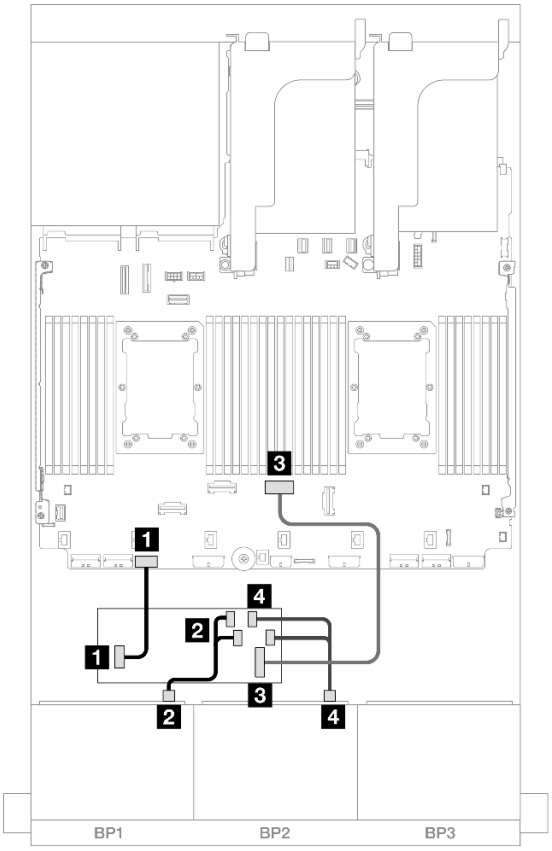


Figure 444. SAS/SATA cable routing to CFF 16i adapter

From	To
1 Backplane 1: SAS	CFF adapter • C0 • C1
2 Backplane 2: SAS	CFF adapter • C2 • C3
3 CFF adapter: MB (CFF input)	Onboard: PCIe 4
4 CFF adapter: PWR	Onboard: CFF RAID/HBA PWR

NVMe cable routing

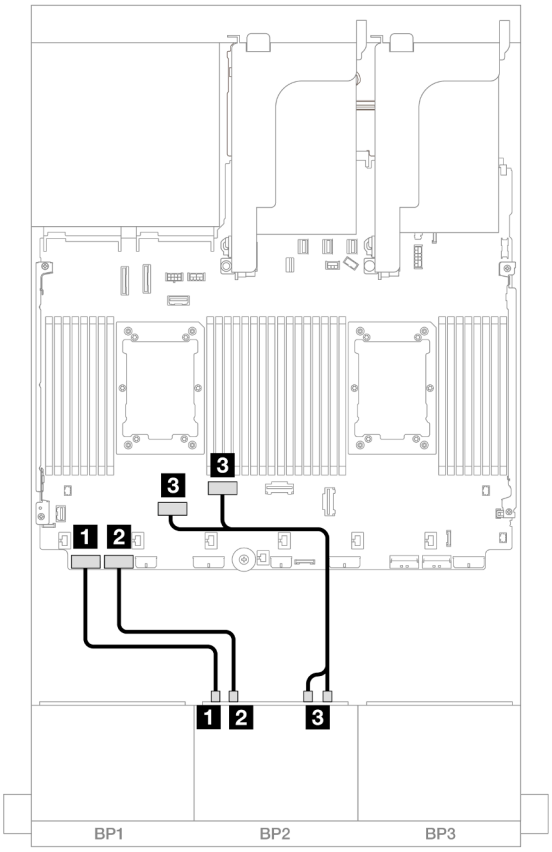


Figure 445. NVMe cable routing to onboard PCIe connectors

From	To
1 Backplane 2: NVMe 0-1	Onboard: PCIe 8
2 Backplane 2: NVMe 2-3	Onboard: PCIe 7
3 Backplane 2: NVMe 4-5, 6-7	Onboard: PCIe 6, 5

Riser 5 + OCP interposer cards + 8i/16i RAID/HBA adapter

The following shows the cable connections for the 8 SAS/SATA + 8 AnyBay (Gen 4) configuration with riser 5, front and rear OCP interposer cards, and two 8i RAID/HBA adapters or one 16i RAID/HBA adapter.

To connect cables to the riser 5 card and OCP interposer cards, see “Riser 5 card + OCP interposer cards” on page 358.

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

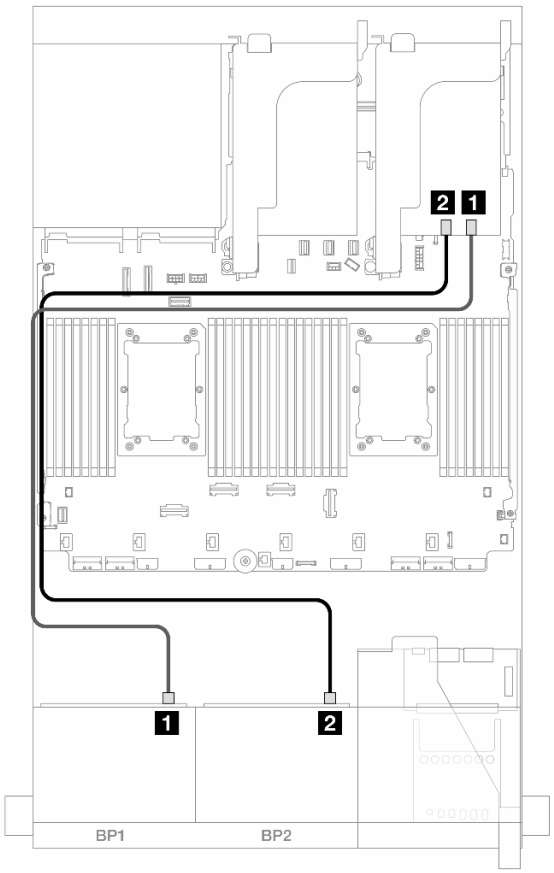


Figure 446. SAS/SATA cable routing

From	To	
1 Backplane 1: SAS	8i adapter • Gen 4: C0 • Gen 3: C0C1	16i adapter • Gen 4: C0 • Gen 3: C0C1
2 Backplane 2: SAS	8i adapter • Gen 4: C0 • Gen 3: C0C1	• Gen 4: C1 • Gen 3: C2C3

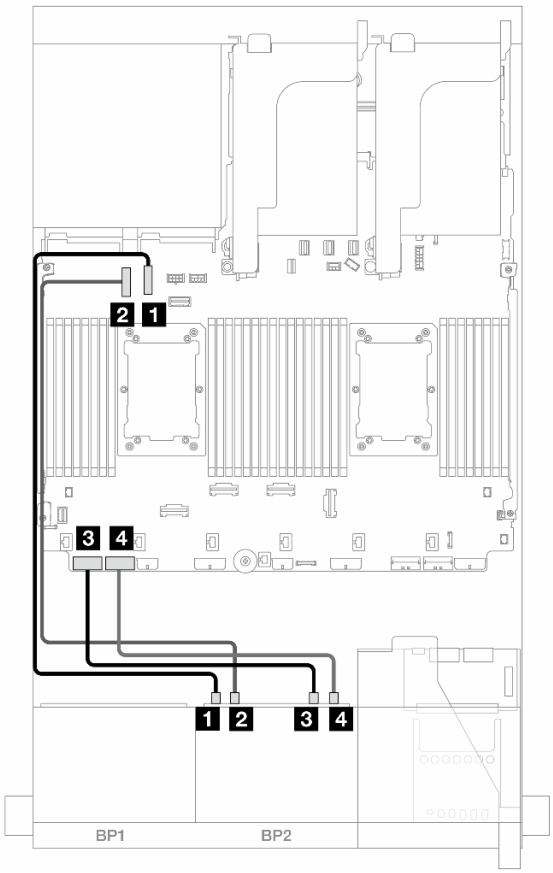


Figure 447. NVMe cable routing

From	To
1 Backplane 2: NVMe 0-1	Onboard: PCIe 10
2 Backplane 2: NVMe 2-3	Onboard: PCIe 9
3 Backplane 2: NVMe 4-5	Onboard: PCIe 8
4 Backplane 2: NVMe 6-7	Onboard: PCIe 7

One 8 x SAS/SATA and one 8 x AnyBay (Gen 5) backplanes

This section provides cable routing information for the server model with one 8 x 2.5-inch SAS/SATA backplane and one 8 x 2.5-inch AnyBay backplane (Gen 5).

To connect power cables for the front backplane(s), refer to "Backplanes: server models with 2.5-inch front drive bays" on page 360.

To connect signal cables for the front backplane(s), refer to the following cable routing scenarios depending on your server configuration.

- "Onboard connectors + 8i RAID/HBA adapter" on page 421
- "Onboard connectors + 16i RAID/HBA adapter" on page 423
- "Onboard connectors + CFF 16i RAID/HBA adapter" on page 426

Onboard connectors + 8i RAID/HBA adapter

The following shows the cable connections for the 8 SAS/SATA + 8 AnyBay (Gen 5) configuration with two 8i RAID/HBA adapters.

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

SAS/SATA cable routing

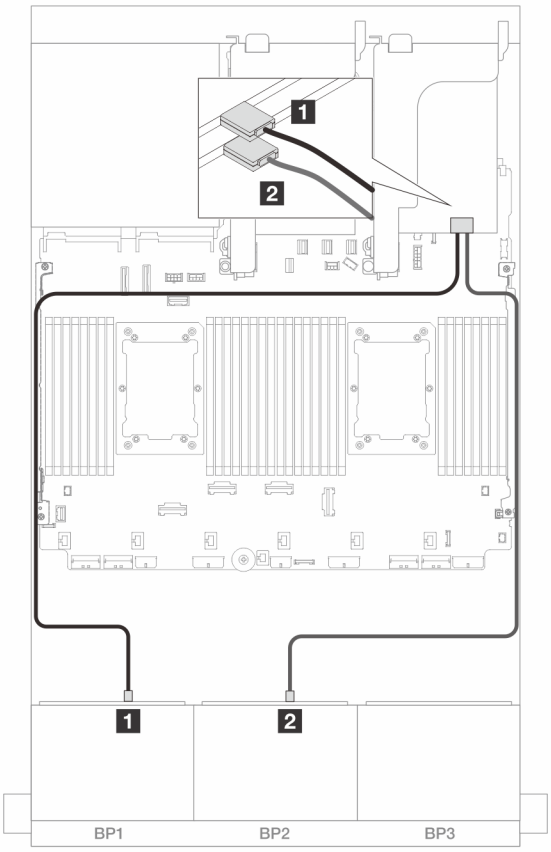


Figure 448. SAS/SATA cable routing to 8i adapters

From	To
1 Backplane 1: SAS	8i adapter • Gen 4: C0 • Gen 3: C0C1
2 Backplane 2: SAS	8i adapter • Gen 4: C0 • Gen 3: C0C1

NVMe cable routing

Cable routing when two processors installed

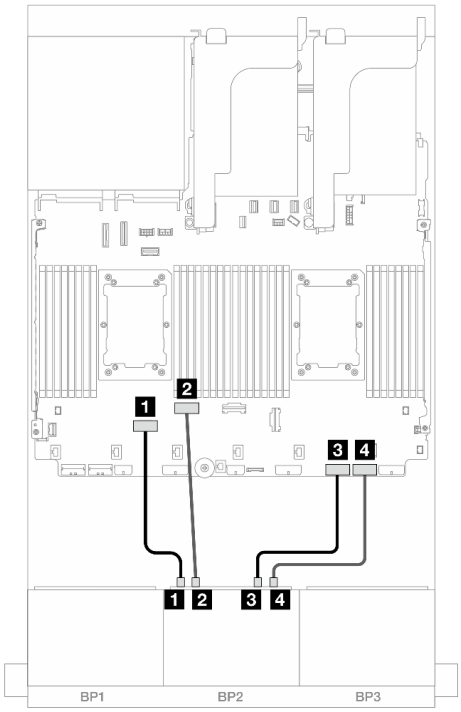


Figure 449. Cable routing when two Platinum series processors installed with no riser 3 or with x8/x8 riser card

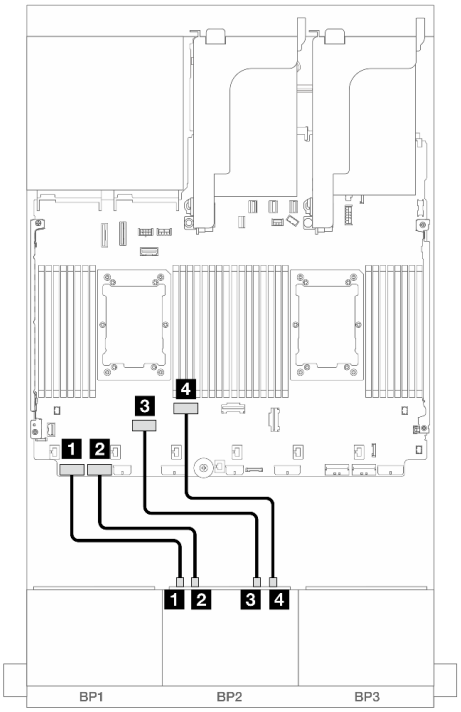


Figure 450. Cable routing in other scenarios

From	To	From	To
1 Backplane 2: NVMe 0-1	Onboard: PCIe 6	1 Backplane 2: NVMe 0-1	Onboard: PCIe 8
2 Backplane 2: NVMe 2-3	Onboard: PCIe 5	2 Backplane 2: NVMe 2-3	Onboard: PCIe 7
3 Backplane 2: NVMe 4-5	Onboard: PCIe 2	3 Backplane 2: NVMe 4-5	Onboard: PCIe 6
4 Backplane 2: NVMe 6-7	Onboard: PCIe 1	4 Backplane 2: NVMe 6-7	Onboard: PCIe 5

Cable routing when one processor installed

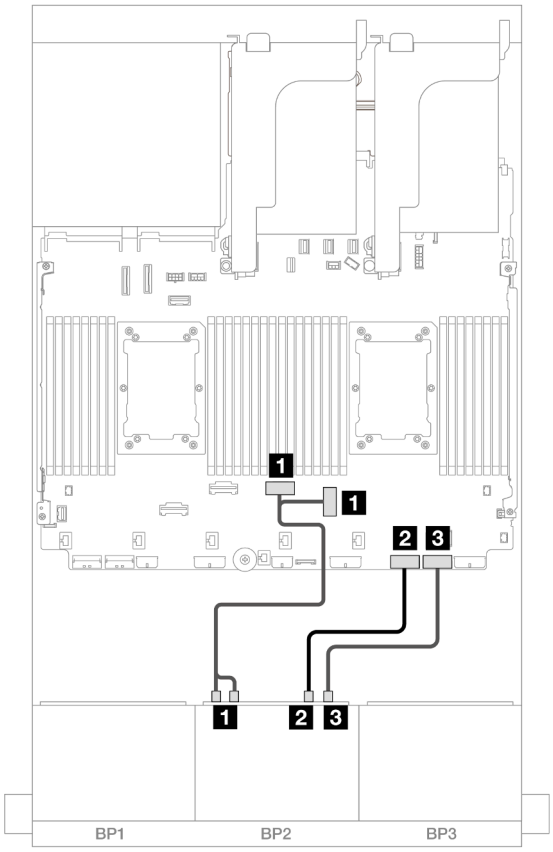


Figure 451. Cable routing when one processor installed

From	To
1 Backplane 2: NVMe 0-1, 2-3	Onboard: PCIe 3, 4
2 Backplane 2: NVMe 4-5	Onboard: PCIe 2
3 Backplane 2: NVMe 6-7	Onboard: PCIe 1

Onboard connectors + 16i RAID/HBA adapter

The following shows the cable connections for the 8 SAS/SATA + 8 AnyBay (Gen 5) configuration with one 16i RAID/HBA adapter.

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

SAS/SATA cable routing

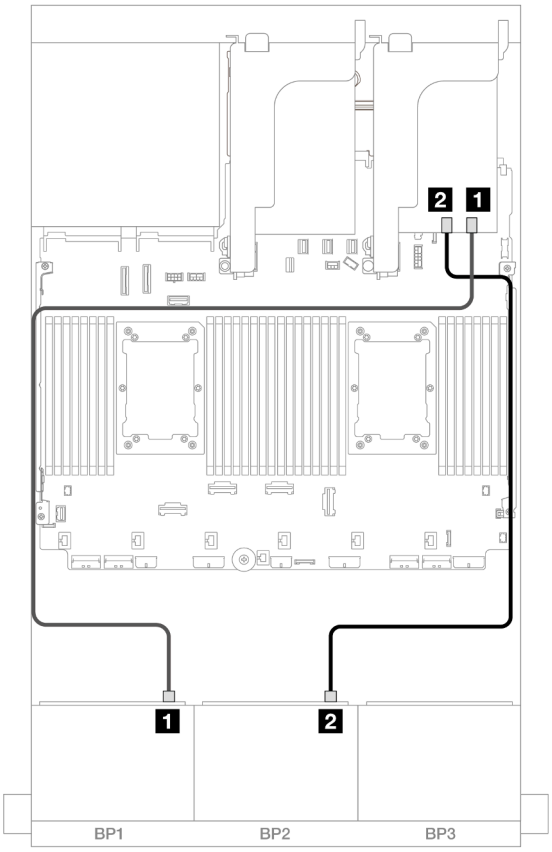


Figure 452. SAS/SATA cable routing to 16i adapter

From	To
1 Backplane 1: SAS	16i adapter • Gen 4: C0 • Gen 3: C0C1
2 Backplane 2: SAS	• Gen 4: C1 • Gen 3: C2C3

NVMe cable routing

Cable routing when two processors installed

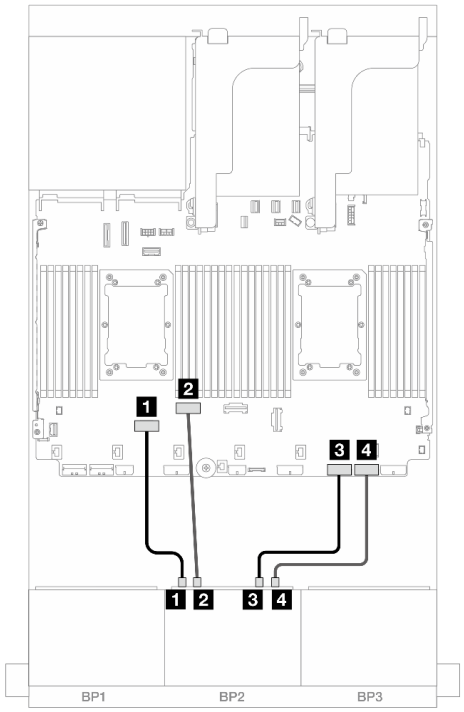


Figure 453. Cable routing when two Platinum series processors installed with no riser 3 or with x8/x8 riser card

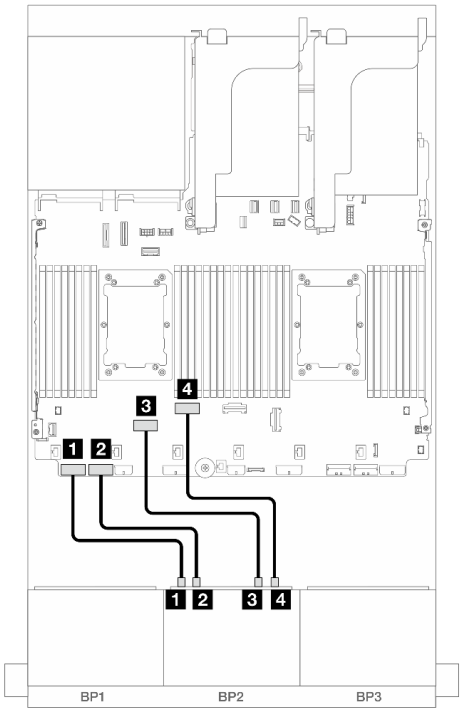


Figure 454. Cable routing in other scenarios

From	To	From	To
1 Backplane 2: NVMe 0-1	Onboard: PCIe 6	1 Backplane 2: NVMe 0-1	Onboard: PCIe 8
2 Backplane 2: NVMe 2-3	Onboard: PCIe 5	2 Backplane 2: NVMe 2-3	Onboard: PCIe 7
3 Backplane 2: NVMe 4-5	Onboard: PCIe 2	3 Backplane 2: NVMe 4-5	Onboard: PCIe 6
4 Backplane 2: NVMe 6-7	Onboard: PCIe 1	4 Backplane 2: NVMe 6-7	Onboard: PCIe 5

Cable routing when one processor installed

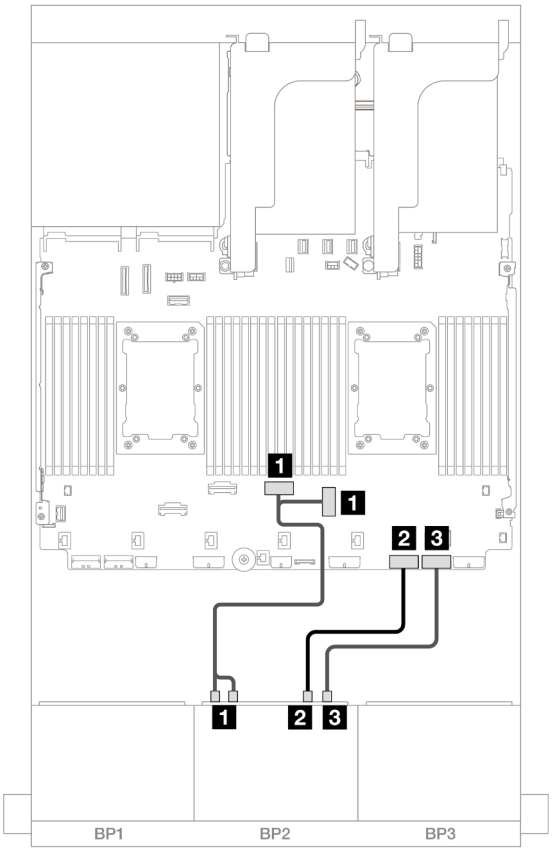


Figure 455. Cable routing when one processor installed

From	To
1 Backplane 2: NVMe 0-1, 2-3	Onboard: PCIe 3, 4
2 Backplane 2: NVMe 4-5	Onboard: PCIe 2
3 Backplane 2: NVMe 6-7	Onboard: PCIe 1

Onboard connectors + CFF 16i RAID/HBA adapter

The following shows the cable connections for the 8 SAS/SATA + 8 AnyBay (Gen 5) configuration with one internal CFF 16i RAID/HBA adapter.

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

SAS/SATA cable routing

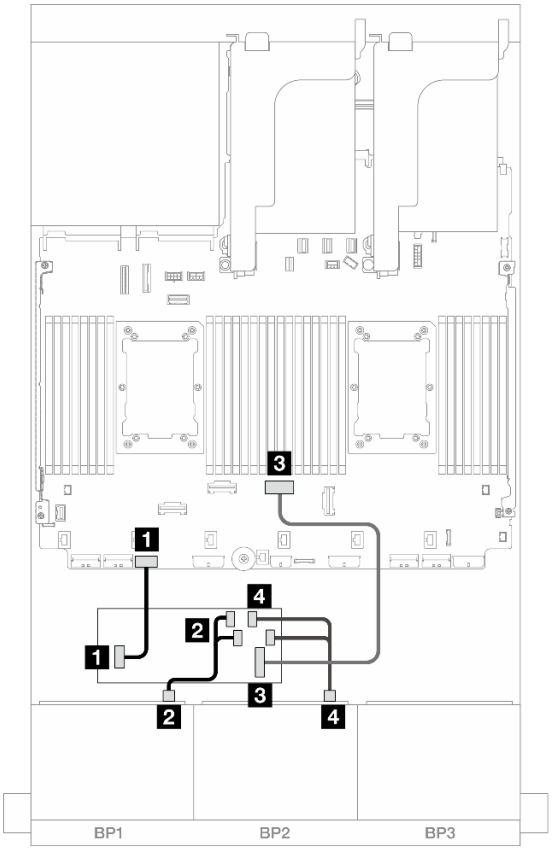


Figure 456. SAS/SATA cable routing to CFF 16i adapter

From	To
1 Backplane 1: SAS	CFF adapter • C0 • C1
2 Backplane 2: SAS	CFF adapter • C2 • C3
3 CFF adapter: MB (CFF input)	Onboard: PCIe 4
4 CFF adapter: PWR	Onboard: CFF RAID/HBA PWR

NVMe cable routing

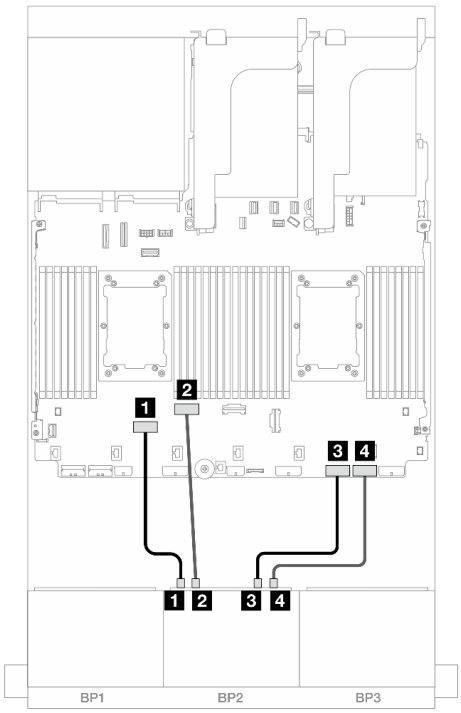


Figure 457. Cable routing when two Platinum series processors installed with no riser 3 or with x8/x8 riser card

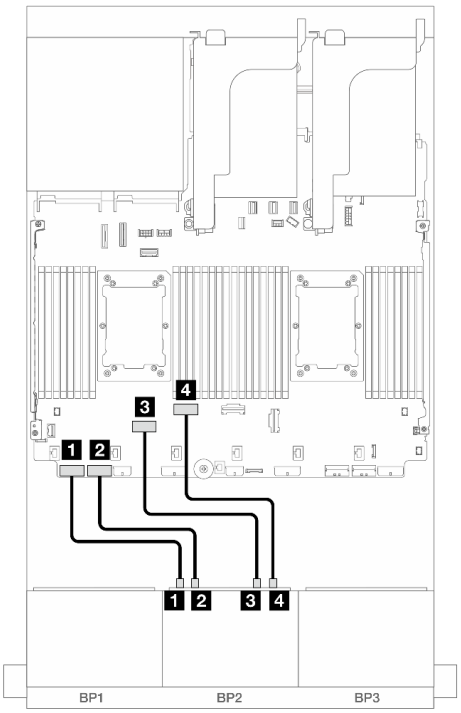


Figure 458. Cable routing in other scenarios

From	To	From	To
1 Backplane 2: NVMe 0-1	Onboard: PCIe 6	1 Backplane 2: NVMe 0-1	Onboard: PCIe 8
2 Backplane 2: NVMe 2-3	Onboard: PCIe 5	2 Backplane 2: NVMe 2-3	Onboard: PCIe 7
3 Backplane 2: NVMe 4-5	Onboard: PCIe 2	3 Backplane 2: NVMe 4-5	Onboard: PCIe 6
4 Backplane 2: NVMe 6-7	Onboard: PCIe 1	4 Backplane 2: NVMe 6-7	Onboard: PCIe 5

One 8 x SAS/SATA and one 8 x NVMe (Gen 4) backplanes

This section provides cable routing information for the server model with one 8 x 2.5-inch SAS/SATA backplane and one 8 x 2.5-inch NVMe backplane (Gen 4).

To connect power cables for the front backplane(s), refer to “Backplanes: server models with 2.5-inch front drive bays” on page 360.

To connect signal cables for the front backplane(s), refer to the following cable routing scenarios depending on your server configuration.

- “Onboard connectors” on page 429
- “Onboard connectors + 8i RAID/HBA adapter” on page 430
- “Onboard connectors + CFF 16i RAID/HBA adapter” on page 432
- “Onboard connectors + Riser 5 + OCP interposer cards” on page 434
- “Onboard connectors + Riser 5 + OCP interposer cards + 8i RAID/HBA adapter” on page 435

Onboard connectors

This topic provides cable routing information for the 8 SAS/SATA + 8 NVMe (Gen 4) configuration with onboard connectors.

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

SAS/SATA cable routing

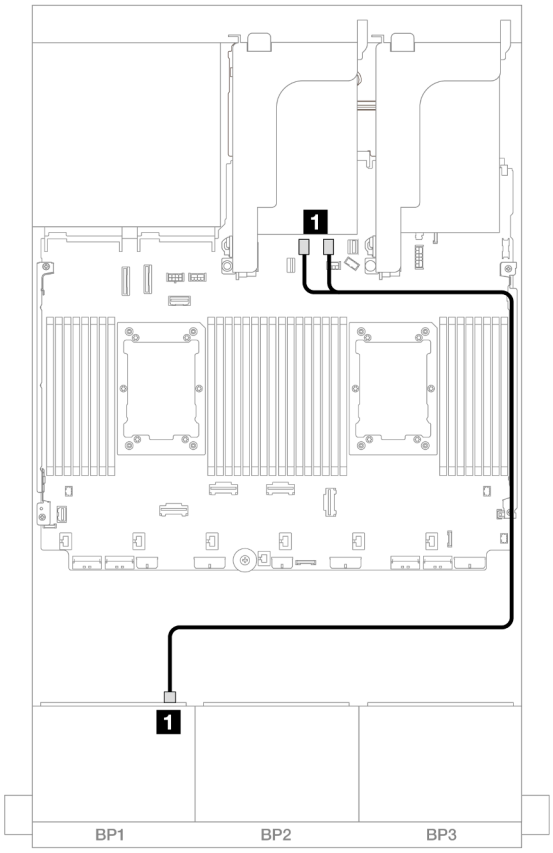


Figure 459. SAS/SATA cable routing to onboard SATA connectors

From	To
1 Backplane 1: SAS	Onboard: SATA 0, SATA 1

NVMe cable routing

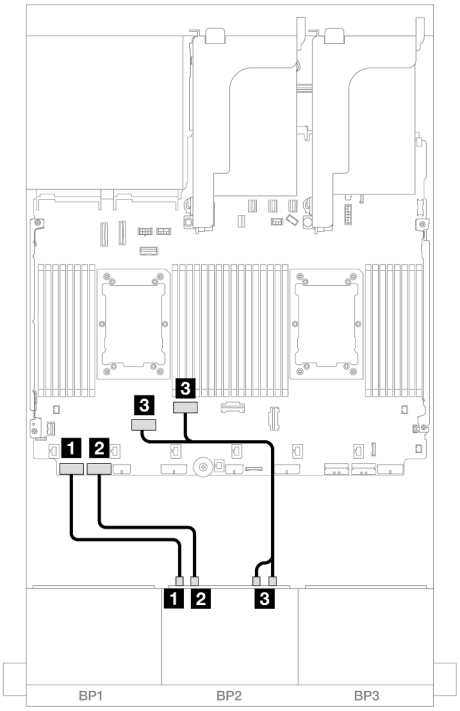


Figure 460. Cable routing when two processors installed

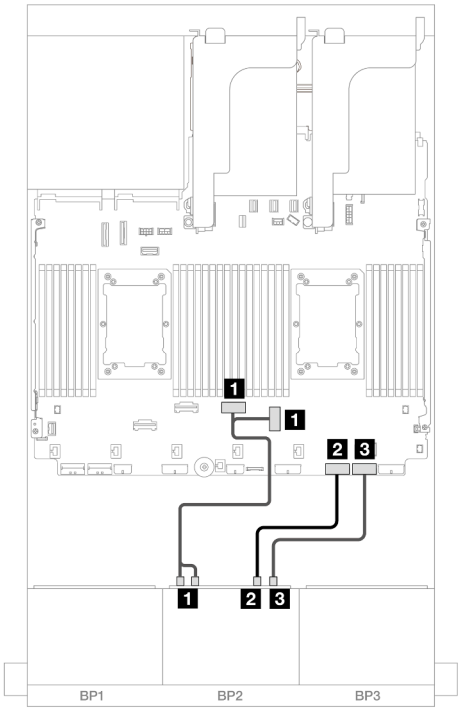


Figure 461. Cable routing when one processor installed

From	To
1 Backplane 2: NVMe 0-1	Onboard: PCIe 8
2 Backplane 2: NVMe 2-3	Onboard: PCIe 7
3 Backplane 2: NVMe 4-5, 6-7	Onboard: PCIe 6, 5

From	To
1 Backplane 2: NVMe 0-1, 2-3	Onboard: PCIe 3, 4
2 Backplane 2: NVMe 4-5	Onboard: PCIe 2
3 Backplane 2: NVMe 6-7	Onboard: PCIe 1

Onboard connectors + 8i RAID/HBA adapter

This topic provides cable routing information for the 8 SAS/SATA + 8 NVMe (Gen 4) configuration with one 8i RAID/HBA adapter.

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

SAS/SATA cable routing

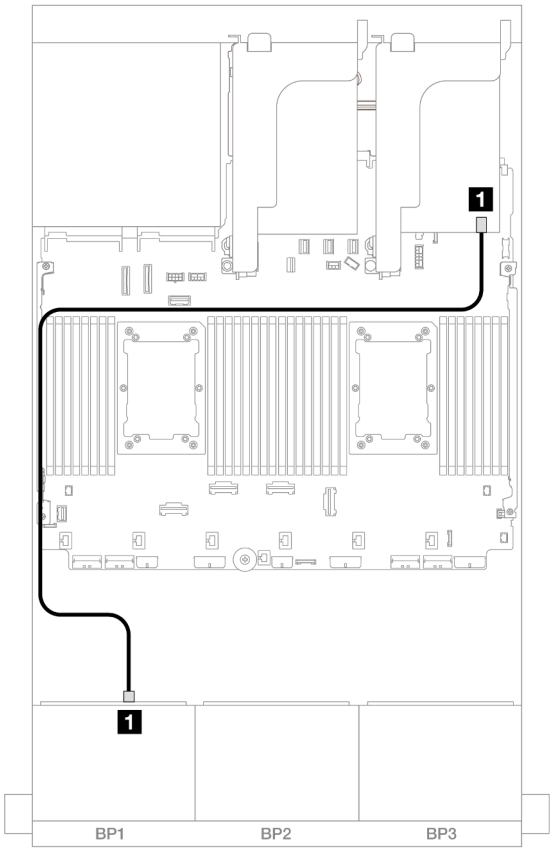


Figure 462. SAS/SATA cable routing to 8i adapter

From	To
1 Backplane 1: SAS	8i adapter • Gen 4: C0 • Gen 3: C0C1

NVMe cable routing

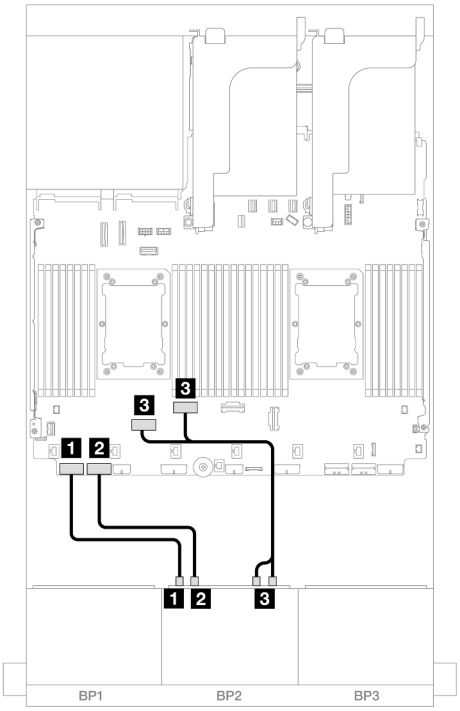


Figure 463. Cable routing when two processors installed

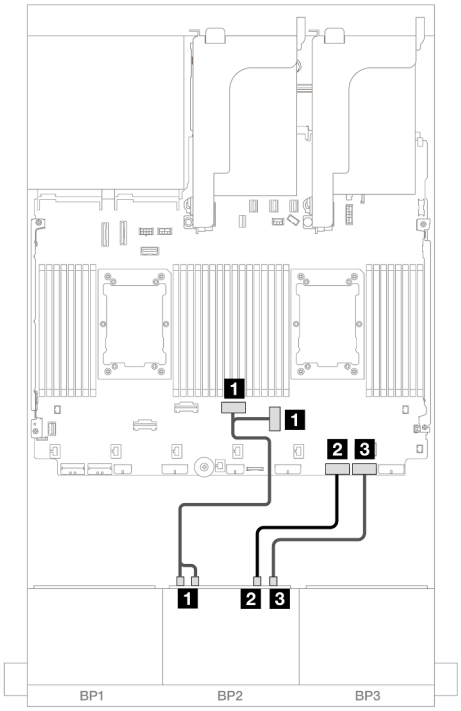


Figure 464. Cable routing when one processor installed

From	To	From	To
1 Backplane 2: NVMe 0-1	Onboard: PCIe 8	1 Backplane 2: NVMe 0-1, 2-3	Onboard: PCIe 3, 4
2 Backplane 2: NVMe 2-3	Onboard: PCIe 7	2 Backplane 2: NVMe 4-5	Onboard: PCIe 2
3 Backplane 2: NVMe 4-5, 6-7	Onboard: PCIe 6, 5	3 Backplane 2: NVMe 6-7	Onboard: PCIe 1

Onboard connectors + CFF 16i RAID/HBA adapter

This topic provides cable routing information for the 8 SAS/SATA + 8 NVMe (Gen 4) configuration with one internal CFF 16i RAID/HBA adapter.

SAS/SATA cable routing

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

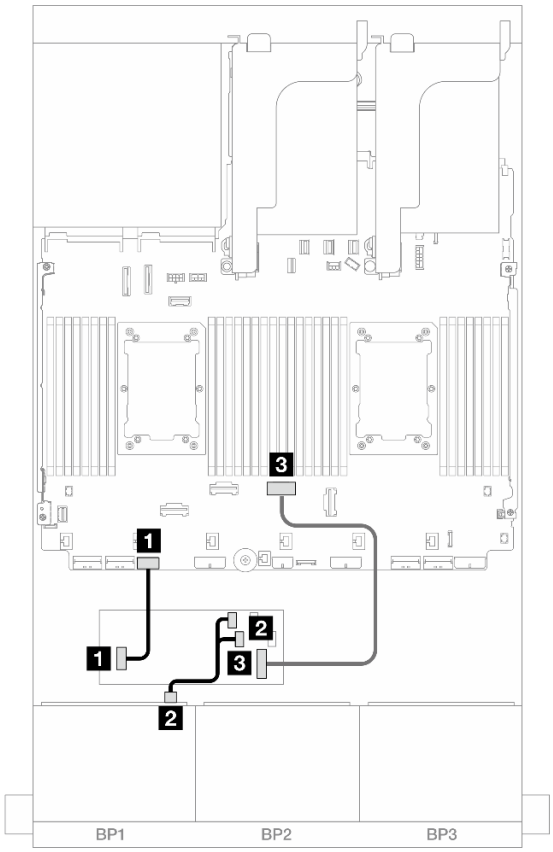


Figure 465. SAS/SATA cable routing to CFF 16i adapter

From	To
1 CFF adapter: PWR	Onboard: CFF RAID/HBA PWR
2 Backplane 1: SAS	CFF adapter • C0 • C1
3 CFF adapter: MB (CFF input)	Onboard: PCIe 4

NVMe cable routing

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

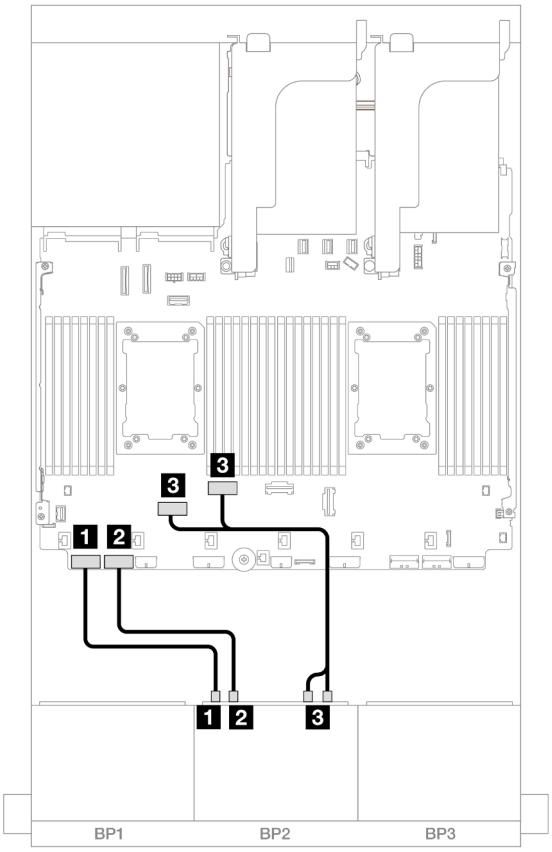


Figure 466. NVMe cable routing to onboard PCIe connectors

From	To
1 Backplane 2: NVMe 0-1	Onboard: PCIe 8
2 Backplane 2: NVMe 2-3	Onboard: PCIe 7
3 Backplane 2: NVMe 4-5, 6-7	Onboard: PCIe 6, 5

Onboard connectors + Riser 5 + OCP interposer cards

The following shows the cable connections for the 8 SAS/SATA + 8 NVMe (Gen 4) configuration with onboard connectors, riser 5, and OCP interposer cards.

To connect cables to the riser 5 card and OCP interposer cards, see "Riser 5 card + OCP interposer cards" on page 358.

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

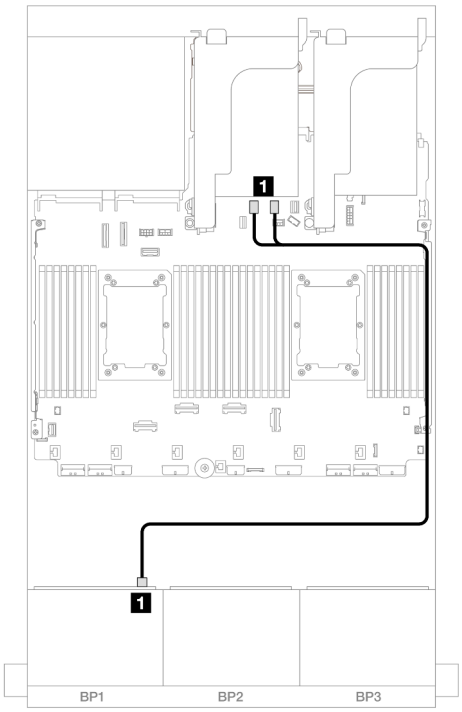


Figure 467. SAS/SATA cable routing

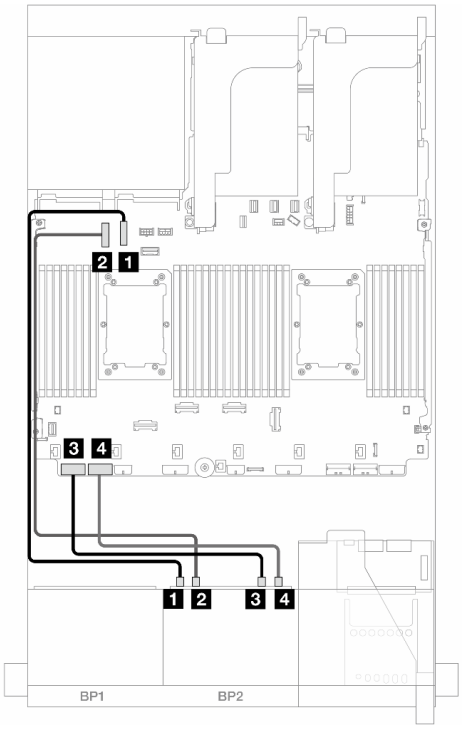


Figure 468. NVMe cable routing

From	To
1 Backplane 1: SAS	Onboard: SATA 0, SATA 1

From	To
1 Backplane 2: NVMe 0-1	Onboard: PCIe 10
2 Backplane 2: NVMe 2-3	Onboard: PCIe 9
3 Backplane 2: NVMe 4-5	Onboard: PCIe 8
4 Backplane 2: NVMe 6-7	Onboard: PCIe 7

Onboard connectors + Riser 5 + OCP interposer cards + 8i RAID/HBA adapter

This topic provides cable routing information for the 8 SAS/SATA + 8 NVMe (Gen 4) configuration with riser 5, front and rear OCP interposer cards, and one 8i RAID/HBA adapter.

To connect cables to the riser 5 card and OCP interposer cards, see "Riser 5 card + OCP interposer cards" on page 358.

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

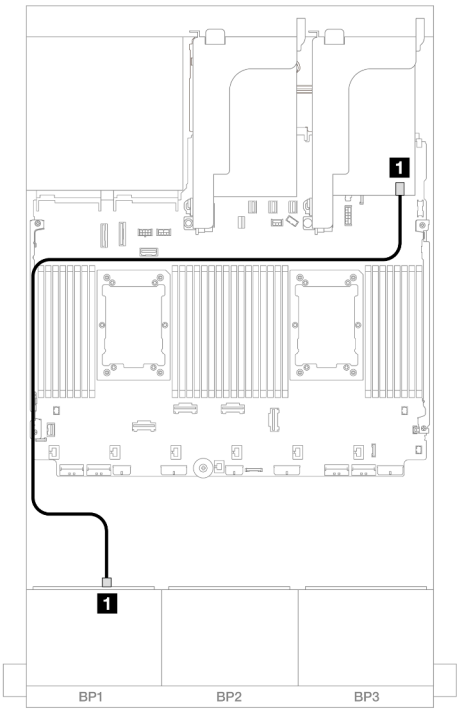


Figure 469. SAS/SATA cable routing

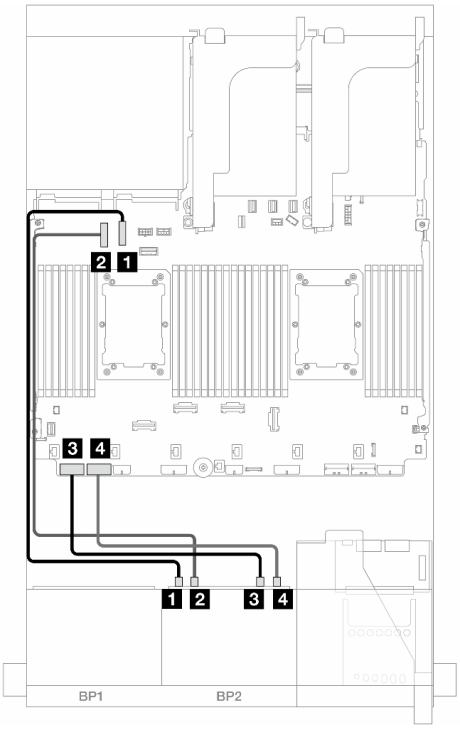


Figure 470. NVMe cable routing

From	To
1 Backplane 1: SAS	8i/16i adapter • Gen 4: C0 • Gen 3: C0C1

From	To
1 Backplane 2: NVMe 0-1	Onboard: PCIe 10
2 Backplane 2: NVMe 2-3	Onboard: PCIe 9
3 Backplane 2: NVMe 4-5	Onboard: PCIe 8
4 Backplane 2: NVMe 6-7	Onboard: PCIe 7

One 8 x SAS/SATA and one 8 x NVMe (Gen 5) backplanes

This section provides cable routing information for the server model with one 8 x 2.5-inch SAS/SATA backplane and one 8 x 2.5-inch NVMe backplane (Gen 5).

To connect power cables for the front backplane(s), refer to "Backplanes: server models with 2.5-inch front drive bays" on page 360.

To connect signal cables for the front backplane(s), refer to the following cable routing scenarios depending on your server configuration.

- "Onboard connectors" on page 436
- "Onboard connectors + 8i RAID/HBA adapter" on page 439
- "Onboard connectors + CFF 16i RAID/HBA adapter" on page 442

Onboard connectors

This topic provides cable routing information for the 8 SAS/SATA + 8 NVMe (Gen 5) configuration with onboard connectors.

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

SAS/SATA cable routing

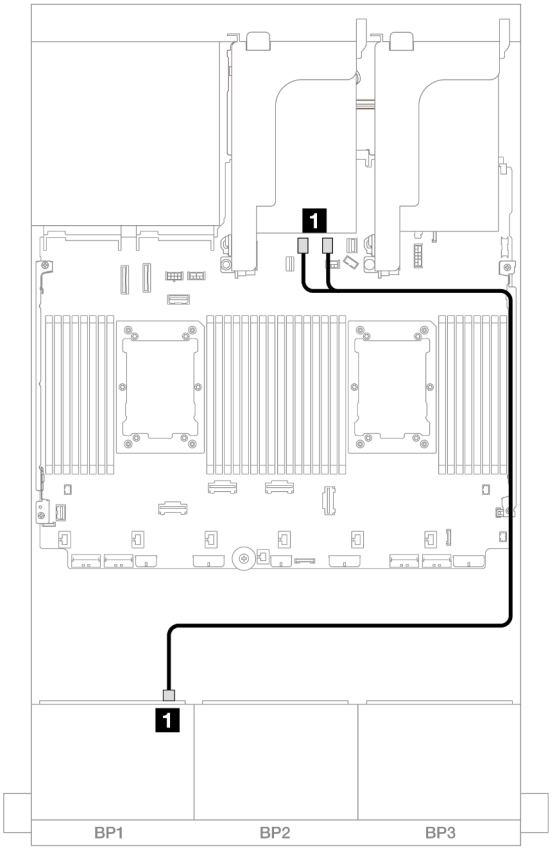


Figure 471. SAS/SATA cable routing to onboard SATA connectors

From	To
1 Backplane 1: SAS	Onboard: SATA 0, SATA 1

NVMe cable routing

Cable routing when two processors installed

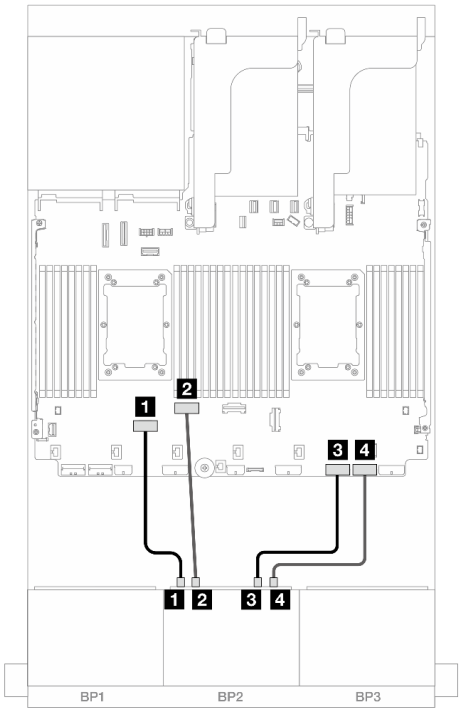


Figure 472. Cable routing when two Platinum series processors installed with no riser 3 or with x8/x8 riser card

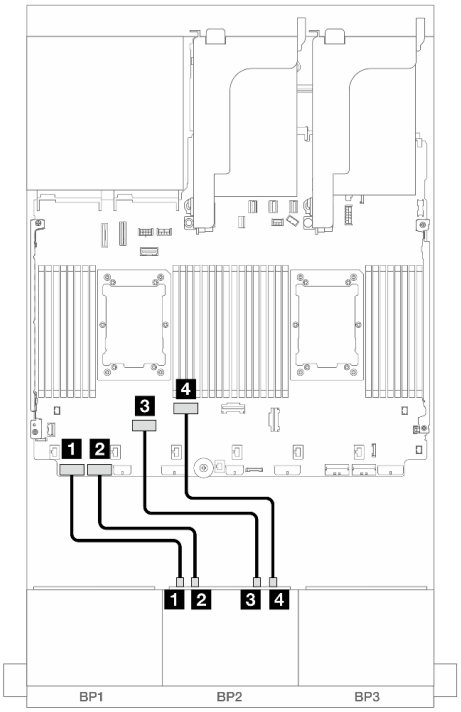


Figure 473. Cable routing in other scenarios

From	To	From	To
1 Backplane 2: NVMe 0-1	Onboard: PCIe 6	1 Backplane 2: NVMe 0-1	Onboard: PCIe 8
2 Backplane 2: NVMe 2-3	Onboard: PCIe 5	2 Backplane 2: NVMe 2-3	Onboard: PCIe 7
3 Backplane 2: NVMe 4-5	Onboard: PCIe 2	3 Backplane 2: NVMe 4-5	Onboard: PCIe 6
4 Backplane 2: NVMe 6-7	Onboard: PCIe 1	4 Backplane 2: NVMe 6-7	Onboard: PCIe 5

Cable routing when one processor installed

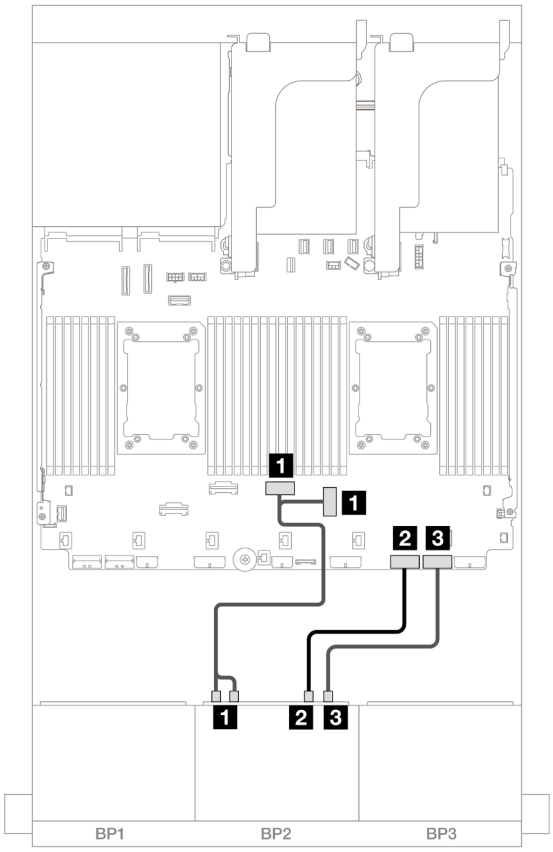


Figure 474. Cable routing when one processor installed

From	To
1 Backplane 2: NVMe 0-1, 2-3	Onboard: PCIe 3, 4
2 Backplane 2: NVMe 4-5	Onboard: PCIe 2
3 Backplane 2: NVMe 6-7	Onboard: PCIe 1

Onboard connectors + 8i RAID/HBA adapter

This topic provides cable routing information for the 8 SAS/SATA + 8 NVMe (Gen 5) configuration with one 8i RAID/HBA adapter.

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

SAS/SATA cable routing

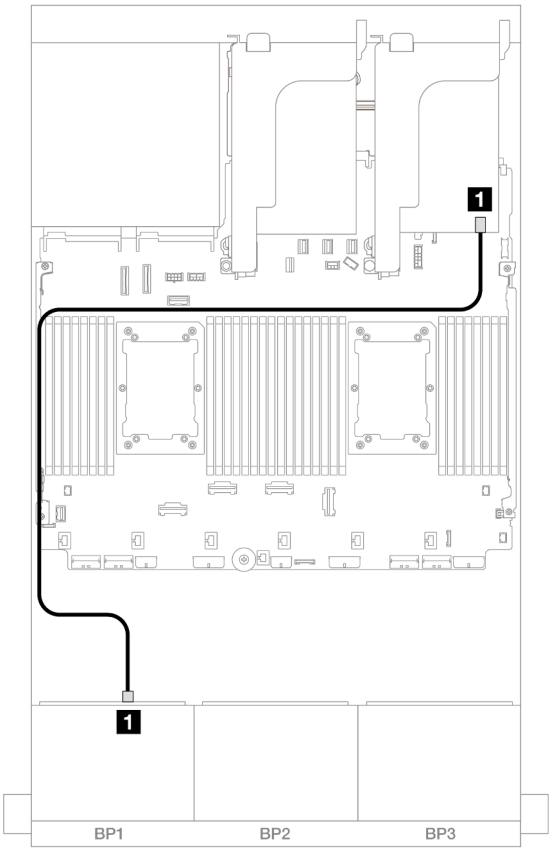


Figure 475. SAS/SATA cable routing to 8i adapter

From	To
1 Backplane 1: SAS	8i adapter • Gen 4: C0 • Gen 3: C0C1

NVMe cable routing

Cable routing when two processors installed

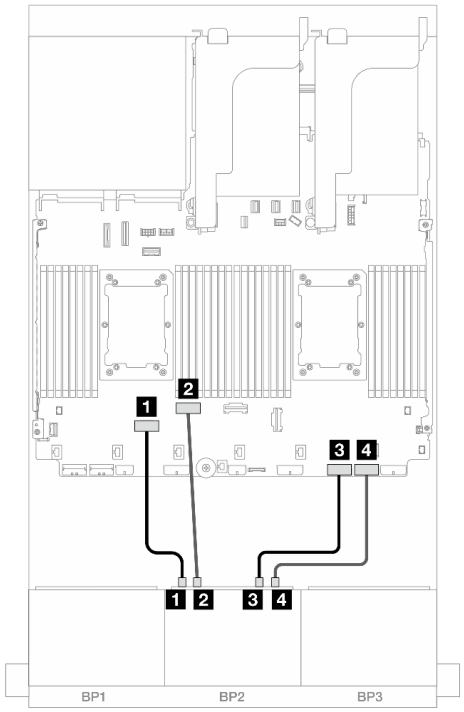


Figure 476. Cable routing when two Platinum series processors installed with no riser 3 or with x8/x8 riser card

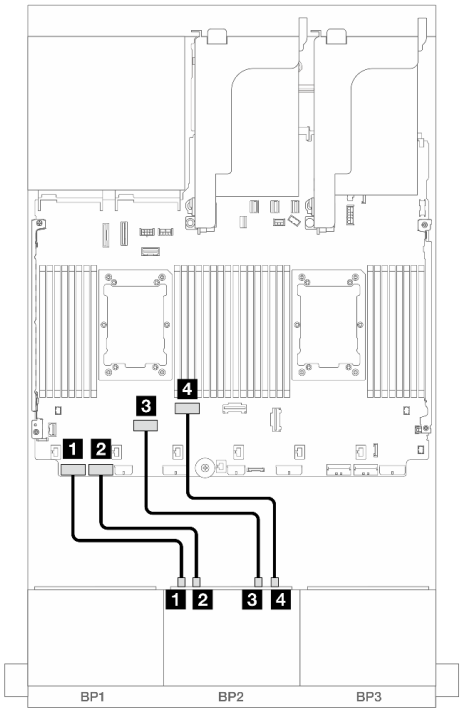


Figure 477. Cable routing in other scenarios

From	To	From	To
1 Backplane 2: NVMe 0-1	Onboard: PCIe 6	1 Backplane 2: NVMe 0-1	Onboard: PCIe 8
2 Backplane 2: NVMe 2-3	Onboard: PCIe 5	2 Backplane 2: NVMe 2-3	Onboard: PCIe 7
3 Backplane 2: NVMe 4-5	Onboard: PCIe 2	3 Backplane 2: NVMe 4-5	Onboard: PCIe 6
4 Backplane 2: NVMe 6-7	Onboard: PCIe 1	4 Backplane 2: NVMe 6-7	Onboard: PCIe 5

Cable routing when one processor installed

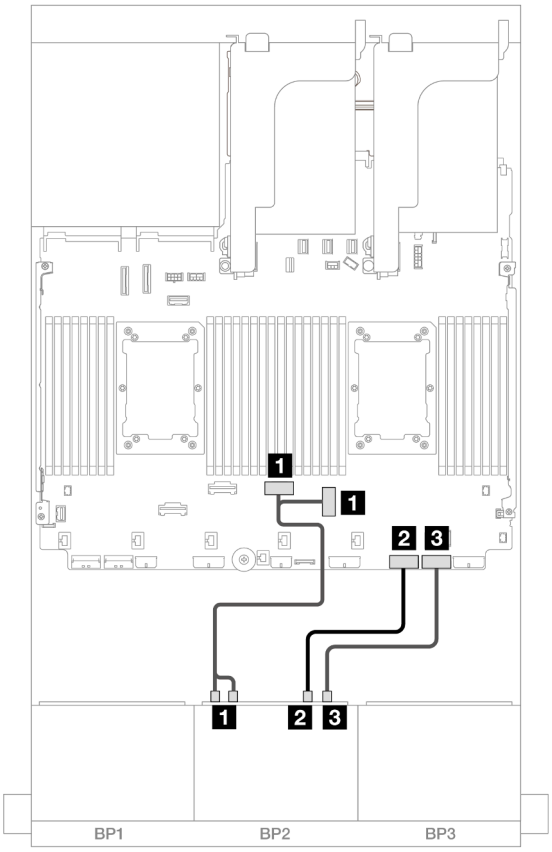


Figure 478. Cable routing when one processor installed

From	To
1 Backplane 2: NVMe 0-1, 2-3	Onboard: PCIe 3, 4
2 Backplane 2: NVMe 4-5	Onboard: PCIe 2
3 Backplane 2: NVMe 6-7	Onboard: PCIe 1

Onboard connectors + CFF 16i RAID/HBA adapter

This topic provides cable routing information for the 8 SAS/SATA + 8 NVMe (Gen 5) configuration with one internal CFF 16i RAID/HBA adapter.

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

SAS/SATA cable routing

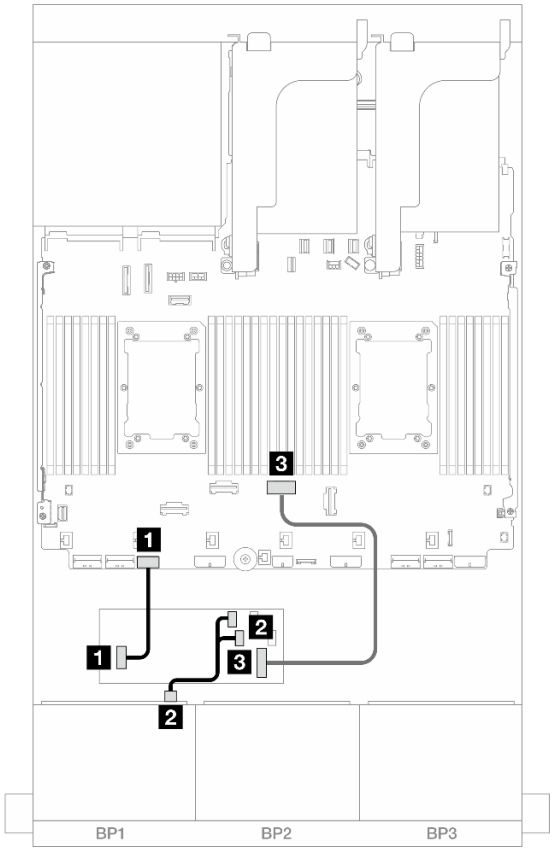


Figure 479. SAS/SATA cable routing to CFF 16i adapter

From	To
1 CFF adapter: PWR	Onboard: CFF RAID/HBA PWR
2 Backplane 1: SAS	CFF adapter • C0 • C1
3 CFF adapter: MB (CFF input)	Onboard: PCIe 4

NVMe cable routing

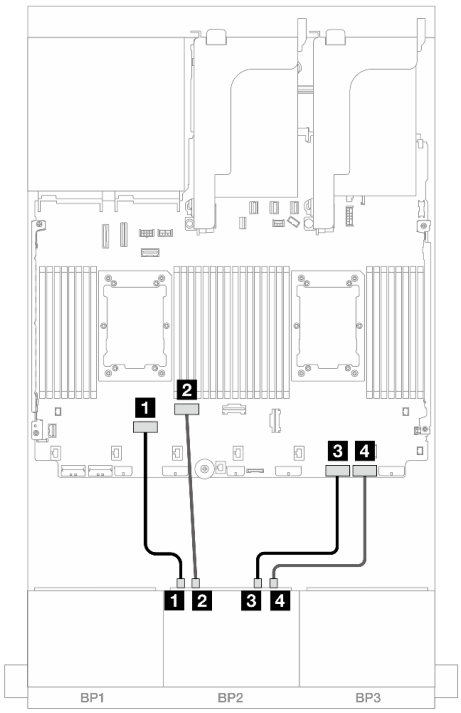


Figure 480. Cable routing when two Platinum series processors installed with no riser 3 or with x8/x8 riser card

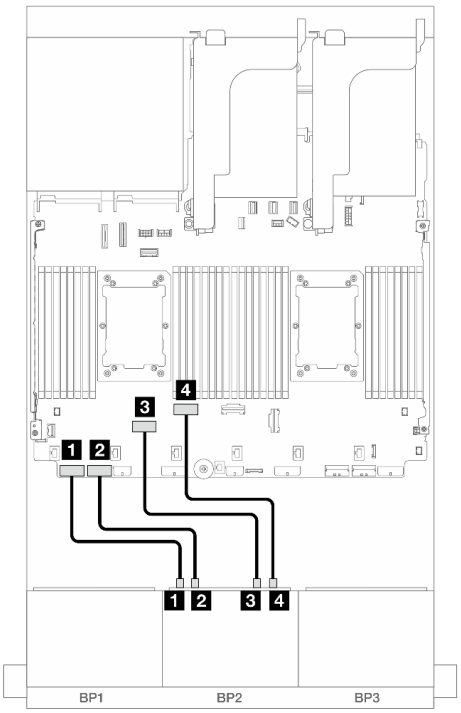


Figure 481. Cable routing in other scenarios

From	To	From	To
1 Backplane 2: NVMe 0-1	Onboard: PCIe 6	1 Backplane 2: NVMe 0-1	Onboard: PCIe 8
2 Backplane 2: NVMe 2-3	Onboard: PCIe 5	2 Backplane 2: NVMe 2-3	Onboard: PCIe 7
3 Backplane 2: NVMe 4-5	Onboard: PCIe 2	3 Backplane 2: NVMe 4-5	Onboard: PCIe 6
4 Backplane 2: NVMe 6-7	Onboard: PCIe 1	4 Backplane 2: NVMe 6-7	Onboard: PCIe 5

One 8 x AnyBay and one 8 x NVMe backplanes (Gen 4)

This section provides cable routing information for the server model with one 8 x 2.5-inch AnyBay and one 8 x 2.5-inch NVMe backplanes (Gen 4).

To connect power cables for the front backplane(s), refer to "Backplanes: server models with 2.5-inch front drive bays" on page 360.

To connect signal cables for the front backplane(s), refer to the following cable routing scenarios depending on your server configuration.

- "Onboard connectors + 8i RAID/HBA adapter" on page 444
- "Onboard connectors + CFF 16i RAID/HBA adapter" on page 446

Onboard connectors + 8i RAID/HBA adapter

The following shows the cable connections for the 8 AnyBay + 8 NVMe configuration (Gen 4) with one 8i RAID/HBA adapter.

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

SAS/SATA cable routing

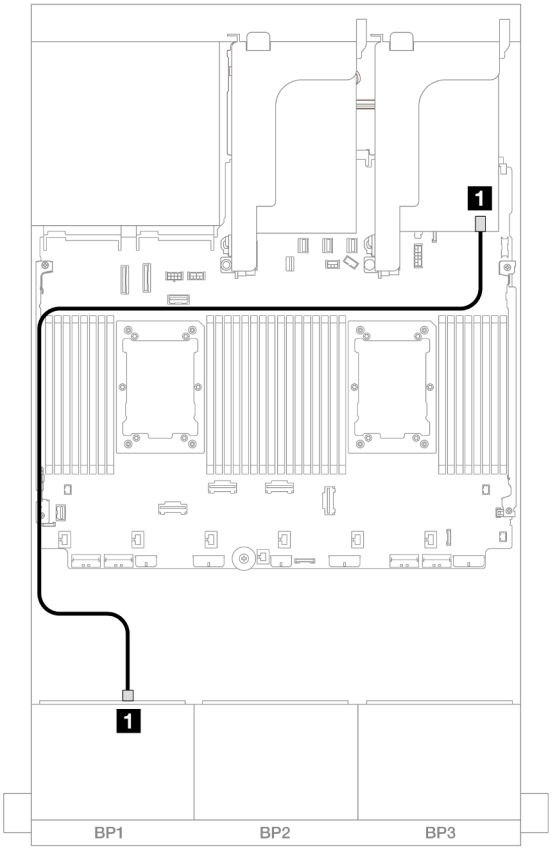


Figure 482. SAS/SATA cable routing to 8i adapter

From	To
1 Backplane 1: SAS	8i adapter • Gen 4: C0 • Gen 3: C0C1

NVMe cable routing

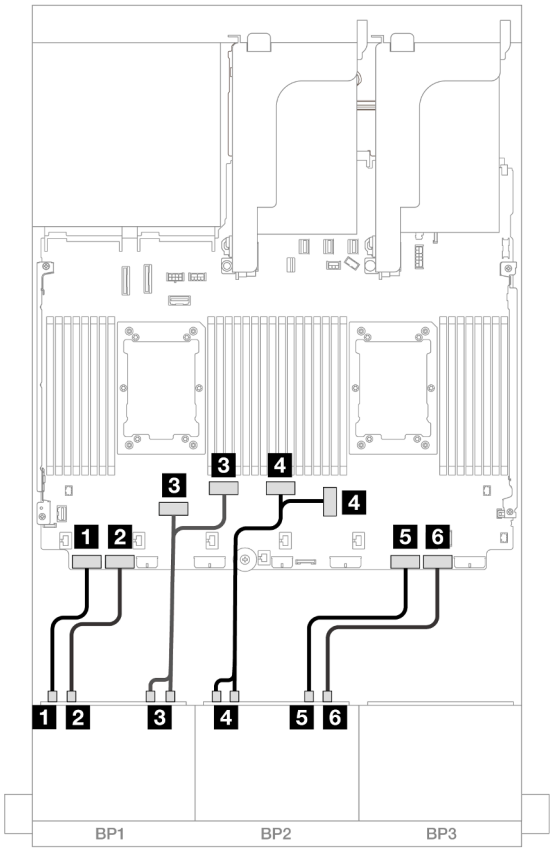


Figure 483. NVMe cable routing to onboard PCIe connectors

From	To
1 Backplane 1: NVMe 0-1	Onboard: PCIe 8
2 Backplane 1: NVMe 2-3	Onboard: PCIe 7
3 Backplane 1: NVMe 4-5, 6-7	Onboard: PCIe 6, 5
4 Backplane 2: NVMe 0-1, 2-3	Onboard: PCIe 3, 4
5 Backplane 2: NVMe 4-5	Onboard: PCIe 2
6 Backplane 2: NVMe 6-7	Onboard: PCIe 1

Onboard connectors + CFF 16i RAID/HBA adapter

The following shows the cable connections for the 8 AnyBay + 8 NVMe configuration (Gen 4) with one internal CFF 16i RAID/HBA adapter.

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

SAS/SATA cable routing

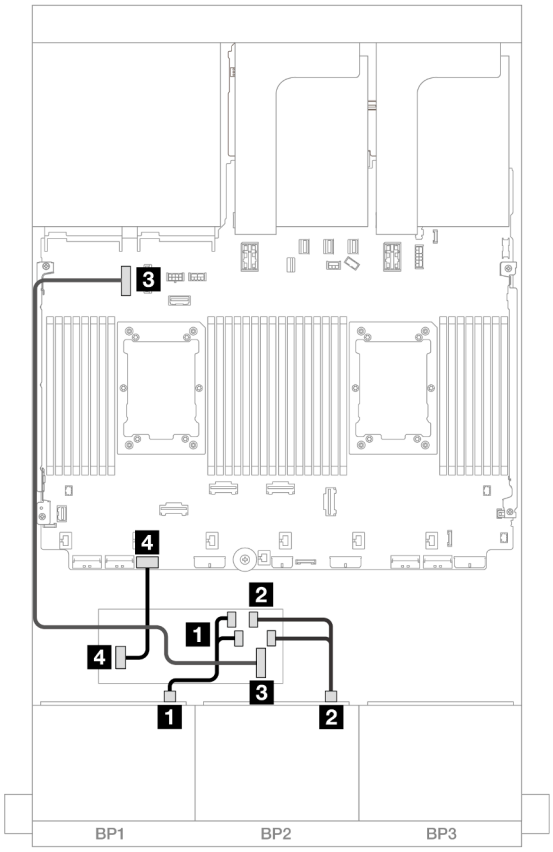


Figure 484. SAS/SATA cable routing to CFF 16i adapter

From	To
1 Backplane 1: SAS	CFF adapter • C0 • C1
2 CFF adapter: MB (CFF input)	Onboard: PCIe 9
3 CFF adapter: PWR	Onboard: CFF RAID/HBA PWR

NVMe cable routing

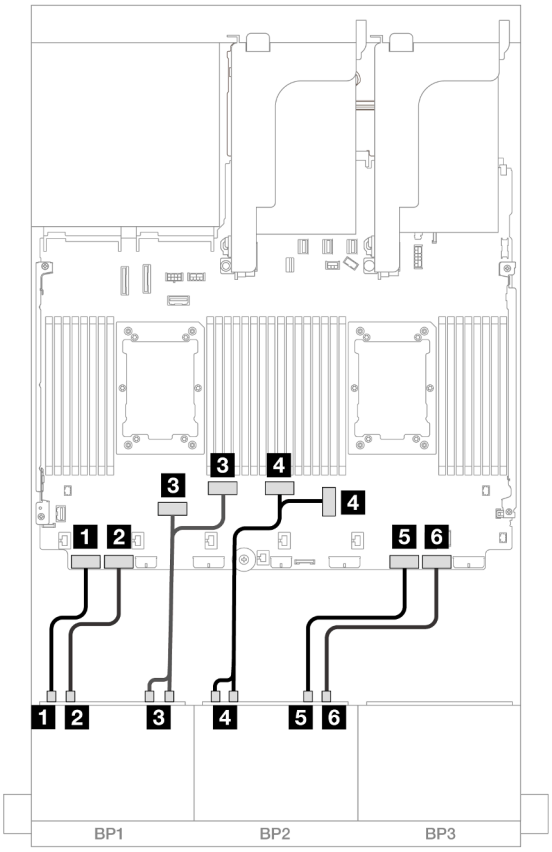


Figure 485. NVMe cable routing to onboard PCIe connectors

From	To
1 Backplane 1: NVMe 0-1	Onboard: PCIe 8
2 Backplane 1: NVMe 2-3	Onboard: PCIe 7
3 Backplane 1: NVMe 4-5, 6-7	Onboard: PCIe 6, 5
4 Backplane 2: NVMe 0-1, 2-3	Onboard: PCIe 3, 4
5 Backplane 2: NVMe 4-5	Onboard: PCIe 2
6 Backplane 2: NVMe 6-7	Onboard: PCIe 1

One 8 x AnyBay and one 8 x NVMe backplanes (Gen 5)

This section provides cable routing information for the server model with one 8 x 2.5-inch AnyBay and one 8 x 2.5-inch NVMe backplanes (Gen 5).

To connect power cables for the front backplane(s), refer to “Backplanes: server models with 2.5-inch front drive bays” on page 360.

To connect signal cables for the front backplane(s), refer to the following cable routing scenarios depending on your server configuration.

- “Onboard connectors + 8i RAID/HBA adapter” on page 449

- “Onboard connectors + CFF 8i/16i RAID/HBA adapter” on page 450
- “Onboard connectors + 8i RAID/HBA adapter + Retimer card” on page 452

Onboard connectors + 8i RAID/HBA adapter

The following shows the cable connections for the 8 AnyBay + 8 NVMe configuration (Gen 5) with one 8i RAID/HBA adapter.

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

SAS/SATA cable routing

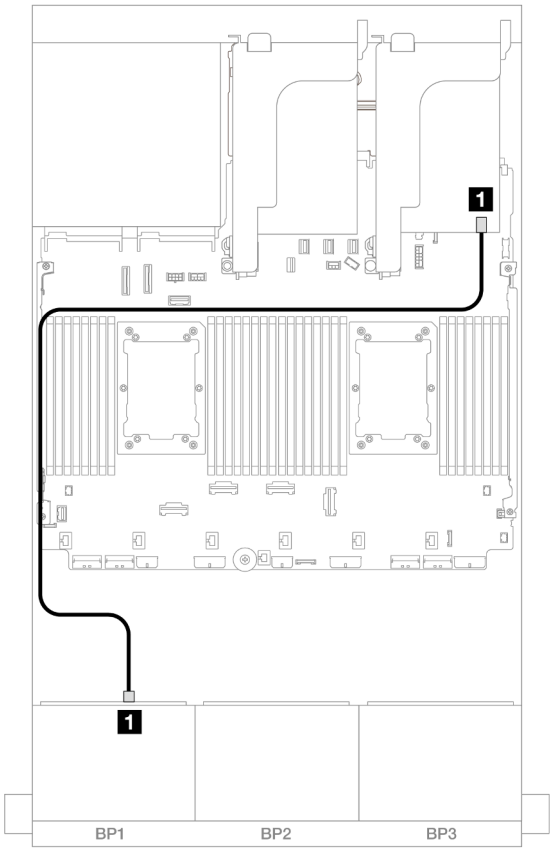


Figure 486. SAS/SATA cable routing to 8i adapter

From	To
1 Backplane 1: SAS	8i adapter • Gen 4: C0 • Gen 3: C0C1

NVMe cable routing

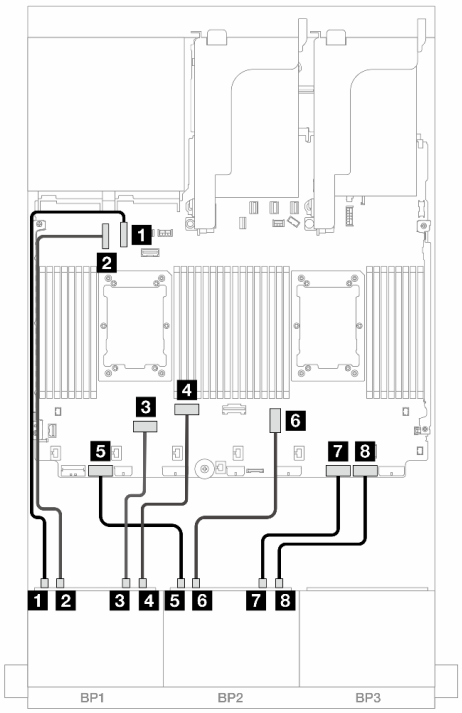


Figure 487. Cable routing when two Platinum series processors installed with no riser 3

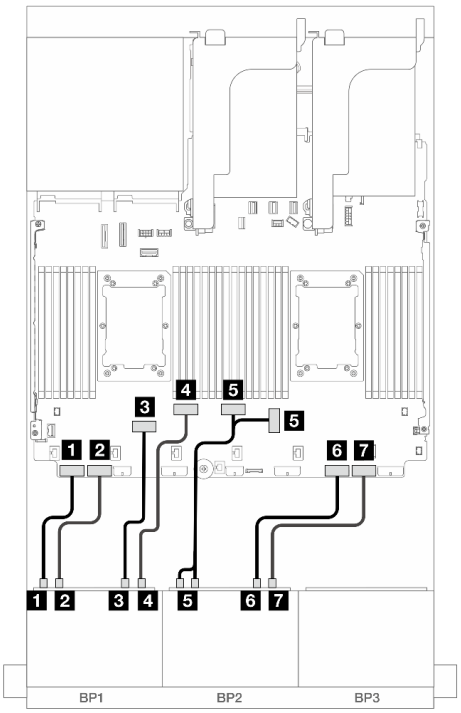


Figure 488. Cable routing in other scenarios

From	To
1 Backplane 1: NVMe 0-1	Onboard: PCIe 10
2 Backplane 1: NVMe 2-3	Onboard: PCIe 9
3 Backplane 1: NVMe 4-5	Onboard: PCIe 6
4 Backplane 1: NVMe 6-7	Onboard: PCIe 5
5 Backplane 2: NVMe 0-1	Onboard: PCIe 7
6 Backplane 2: NVMe 2-3	Onboard: PCIe 3
7 Backplane 2: NVMe 4-5	Onboard: PCIe 2
8 Backplane 2: NVMe 6-7	Onboard: PCIe 1

From	To
1 Backplane 1: NVMe 0-1	Onboard: PCIe 8
2 Backplane 1: NVMe 2-3	Onboard: PCIe 7
3 Backplane 1: NVMe 4-5	Onboard: PCIe 6
4 Backplane 1: NVMe 6-7	Onboard: PCIe 5
5 Backplane 2: NVMe 0-1, 2-3	Onboard: PCIe 3, 4
6 Backplane 2: NVMe 4-5	Onboard: PCIe 2
7 Backplane 2: NVMe 6-7	Onboard: PCIe 1

Onboard connectors + CFF 8i/16i RAID/HBA adapter

The following shows the cable connections for the 8 AnyBay + 8 NVMe (Gen 5) configuration with one internal CFF 8i/16i RAID/HBA adapter.

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

CFF adapter cable routing

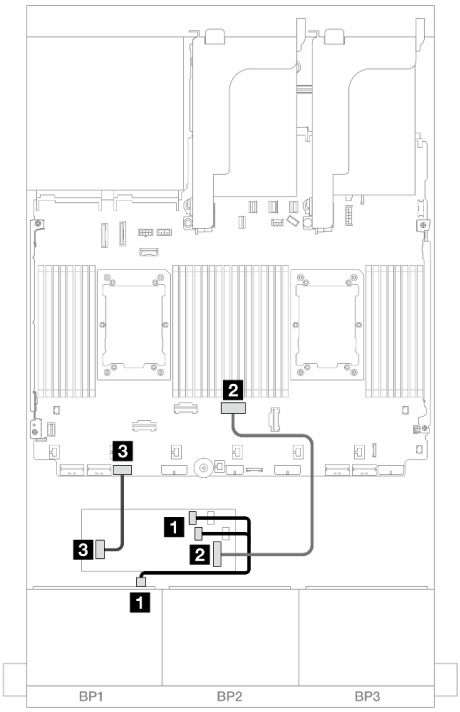


Figure 489. Cable routing when two Platinum series processors installed with no riser 3

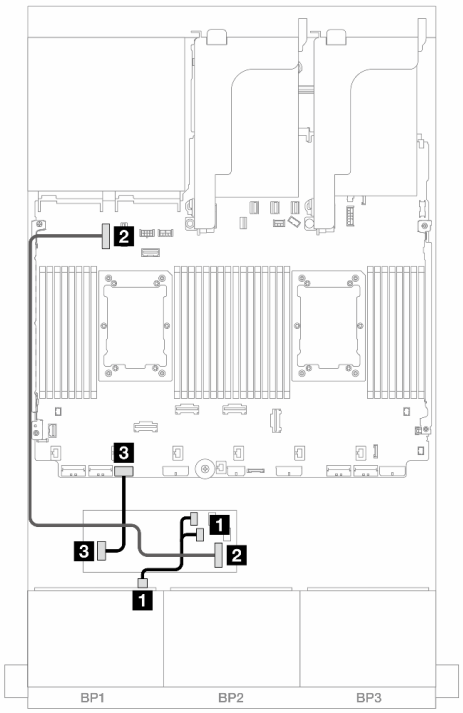


Figure 490. Cable routing in other scenarios

From	To	From	To
1 Backplane 1: SAS	CFF adapter • C0 • C1	1 Backplane 1: SAS	CFF adapter • C0 • C1
2 CFF adapter: MB (CFF input)	Onboard: PCIe 4	2 CFF adapter: MB (CFF input)	Onboard: PCIe 9
3 CFF adapter: PWR	Onboard: CFF RAID/HBA PWR	3 CFF adapter: PWR	Onboard: CFF RAID/HBA PWR

NVMe cable routing

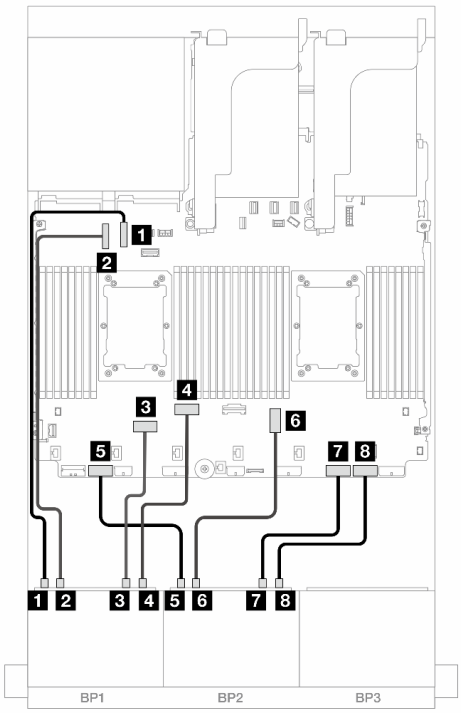


Figure 491. Cable routing when two Platinum series processors installed with no riser 3

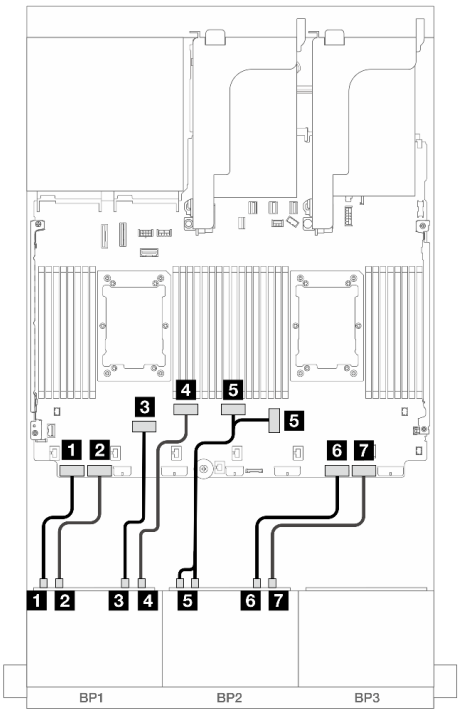


Figure 492. Cable routing in other scenarios

From	To
1 Backplane 1: NVMe 0-1	Onboard: PCIe 10
2 Backplane 1: NVMe 2-3	Onboard: PCIe 9
3 Backplane 1: NVMe 4-5	Onboard: PCIe 6
4 Backplane 1: NVMe 6-7	Onboard: PCIe 5
5 Backplane 2: NVMe 0-1	Onboard: PCIe 7
6 Backplane 2: NVMe 2-3	Onboard: PCIe 3
7 Backplane 2: NVMe 4-5	Onboard: PCIe 2
8 Backplane 2: NVMe 6-7	Onboard: PCIe 1

From	To
1 Backplane 1: NVMe 0-1	Onboard: PCIe 8
2 Backplane 1: NVMe 2-3	Onboard: PCIe 7
3 Backplane 1: NVMe 4-5	Onboard: PCIe 6
4 Backplane 1: NVMe 6-7	Onboard: PCIe 5
5 Backplane 2: NVMe 0-1, 2-3	Onboard: PCIe 3, 4
6 Backplane 2: NVMe 4-5	Onboard: PCIe 2
7 Backplane 2: NVMe 6-7	Onboard: PCIe 1

Onboard connectors + 8i RAID/HBA adapter + Retimer card

The following shows the cable connections for the 8 AnyBay + 8 NVMe configuration (Gen 5) with one 8i RAID/HBA adapter and one retimer card when two Platinum series processors are installed.

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

SAS/SATA cable routing

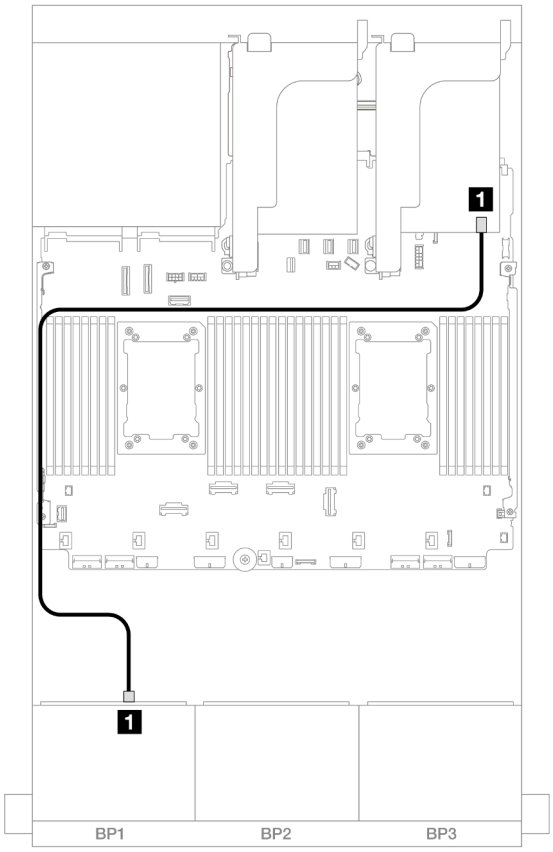


Figure 493. SAS/SATA cable routing to 8i adapter

From	To
1 Backplane 1: SAS	8i adapter • Gen 4: C0 • Gen 3: C0C1

NVMe cable routing

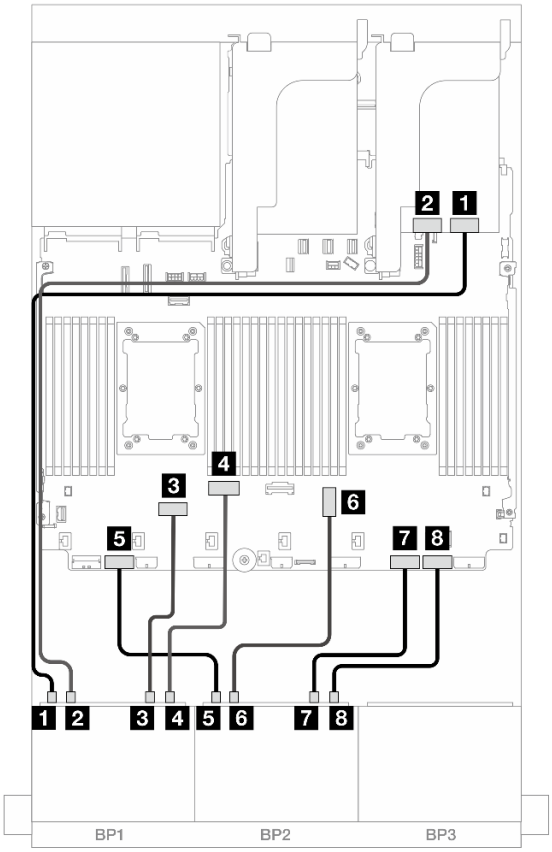


Figure 494. NVMe cable routing to onboard connectors and retimer card

From	To
1 Backplane 1: NVMe 0-1	Retimer: C0
2 Backplane 1: NVMe 2-3	Retimer: C1
3 Backplane 1: NVMe 4-5	Onboard: PCIe 6
4 Backplane 1: NVMe 6-7	Onboard: PCIe 5
5 Backplane 2: NVMe 0-1	Onboard: PCIe 7
6 Backplane 2: NVMe 2-3	Onboard: PCIe 3
7 Backplane 2: NVMe 4-5	Onboard: PCIe 2
8 Backplane 2: NVMe 6-7	Onboard: PCIe 1

Three 8 x SAS/SATA backplanes

This section provides cable routing information for the server model with three 8 x 2.5-inch SAS/SATA front drive backplanes.

- “Front backplanes: 24 x 2.5" SAS/SATA” on page 455
- “Front + rear backplanes: 24 x 2.5" SAS/SATA + 4 x 2.5"/8 x 2.5" SAS/SATA/4 x 2.5" AnyBay” on page 460
- “Front + middle backplanes: 24 x 2.5" SAS/SATA + 4 x 2.5"/8 x 2.5" SAS/SATA” on page 483

- “Front + middle + rear backplanes: 24 x 2.5" SAS/SATA + 8 x 2.5" SAS/SATA+ 4 x 2.5"/8 x 2.5" SAS/SATA” on page 491

Front backplanes: 24 x 2.5" SAS/SATA

This topic provides cable routing information for the 24 x 2.5-inch SAS/SATA configuration.

To connect power cables for the front backplane(s), refer to “Backplanes: server models with 2.5-inch front drive bays” on page 360.

To connect signal cables for the front backplane(s), refer to the following cable routing scenarios depending on your server configuration.

- “32i RAID/HBA adapter” on page 455
- “8i RAID/HBA adapters” on page 458
- “8i + 16i RAID/HBA adapters” on page 459
- “CFF expander + 8i/16i RAID/HBA adapter” on page 457
- “CFF 16i RAID/HBA adapter + CFF expander” on page 456

32i RAID/HBA adapter

The following shows the cable connections for the 24 x 2.5-inch SAS/SATA configuration with one 32i RAID/HBA adapter.

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

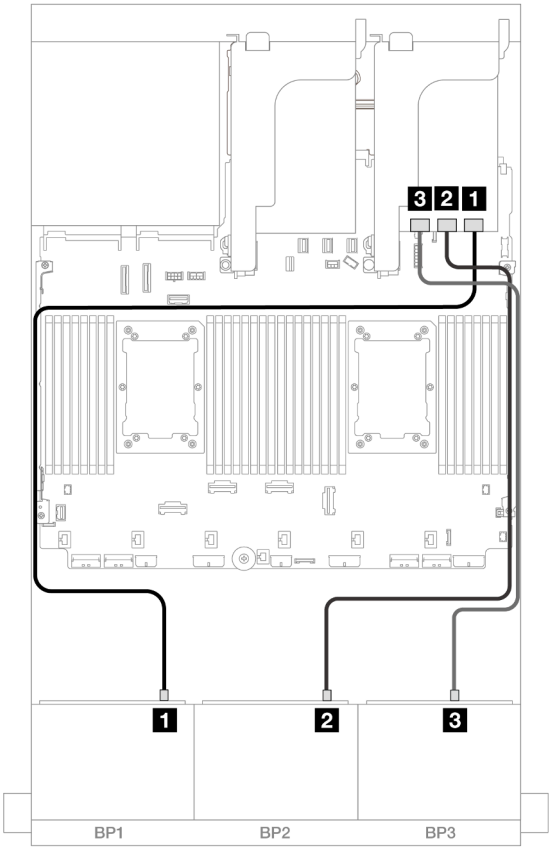


Figure 495. SAS/SATA cable routing to 32i adapter

From	To
1 Backplane 1: SAS	32i adapter • C0
2 Backplane 2: SAS	• C1
3 Backplane 3: SAS	• C2

CFF 16i RAID/HBA adapter + CFF expander

The following shows the cable connections for the 24 x 2.5-inch SAS/SATA configuration with one CFF expander and one CFF 16i RAID/HBA adapter.

Cable routing when two processors installed

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

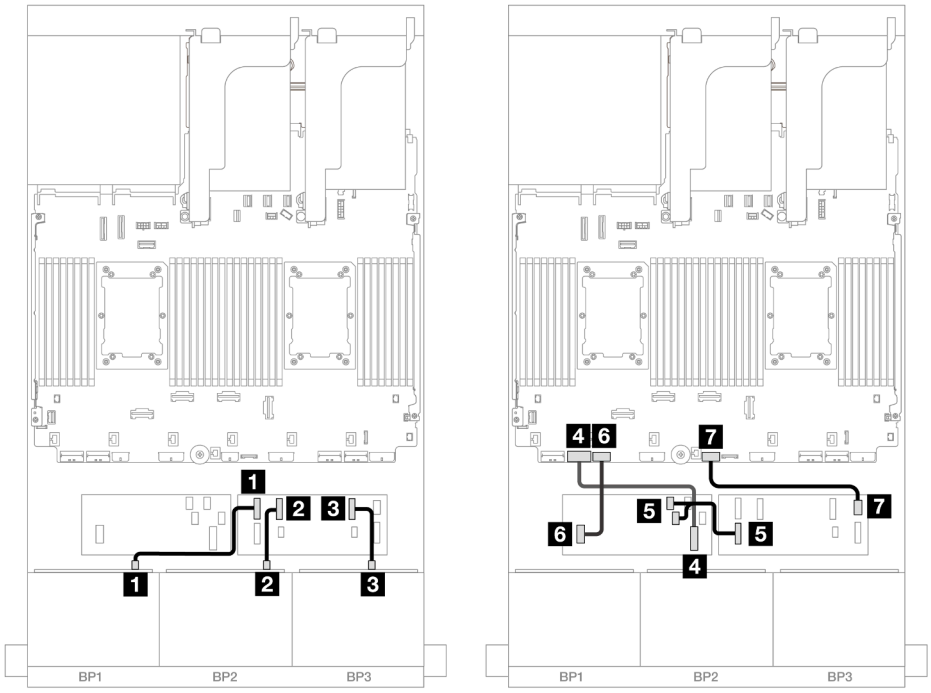


Figure 496. SAS/SATA cable routing to CFF expander and CFF 16i adapter

From	To
1 Backplane 1: SAS	CFF expander • C0
2 Backplane 2: SAS	• C1
3 Backplane 3: SAS	• C2
4 CFF adapter: MB (CFF input)	Onboard: PCIe 7
5 CFF expander: RAID/HBA	CFF adapter • C0 • C1

From	To
6 CFF adapter: PWR	Onboard: CFF RAID/HBA PWR
7 CFF expander: PWR	Onboard: CFF EXP PWR

Cable routing when one processor installed

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

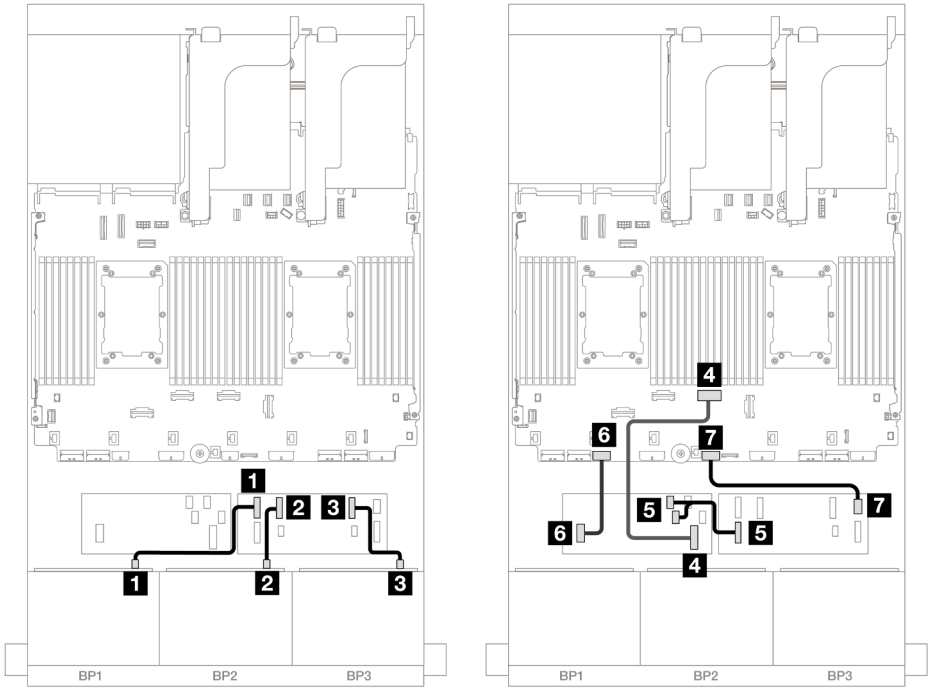


Figure 497. SAS/SATA cable routing to CFF expander and CFF 16i adapter

From	To
1 Backplane 1: SAS	CFF expander • C0
2 Backplane 2: SAS	• C1
3 Backplane 3: SAS	• C2
4 CFF adapter: MB (CFF input)	Onboard: PCIe 4
5 CFF expander: RAID/HBA	CFF adapter • C0 • C1
6 CFF adapter: PWR	Onboard: CFF RAID/HBA PWR
7 CFF expander: PWR	Onboard: CFF EXP PWR

CFF expander + 8i/16i RAID/HBA adapter

The following shows the cable connections for the 24 x 2.5-inch SAS/SATA configuration with one CFF expander and one 8i/16i RAID/HBA adapter.

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

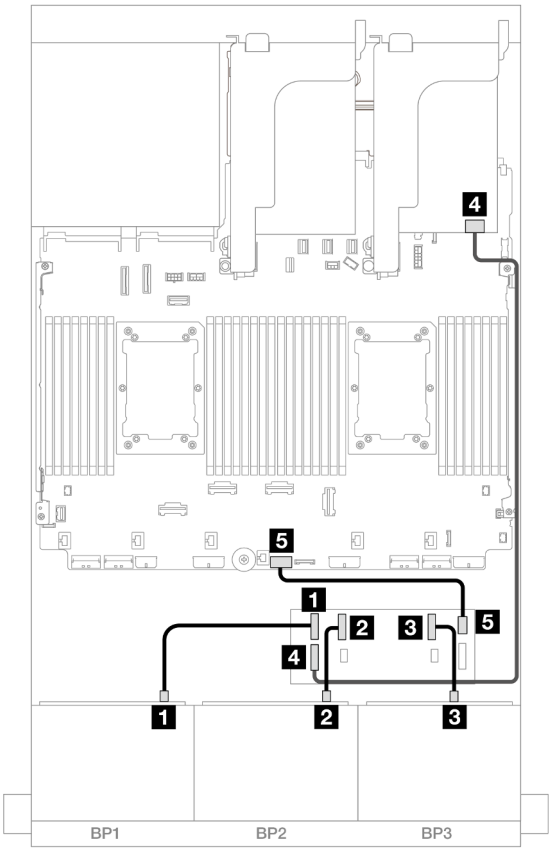


Figure 498. SAS/SATA cable routing to CFF expander and 8i/16i adapter

From	To
1 Backplane 1: SAS	CFF expander • C0
2 Backplane 2: SAS	• C1
3 Backplane 3: SAS	• C2
4 CFF expander: RAID/HBA	8i/16i adapter • Gen 4: C0 • Gen 3: C0C1
5 CFF expander: PWR	Onboard: CFF EXP PWR

8i RAID/HBA adapters

The following shows the cable connections for the 24 x 2.5-inch SAS/SATA configuration with three 8i RAID/HBA adapters.

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

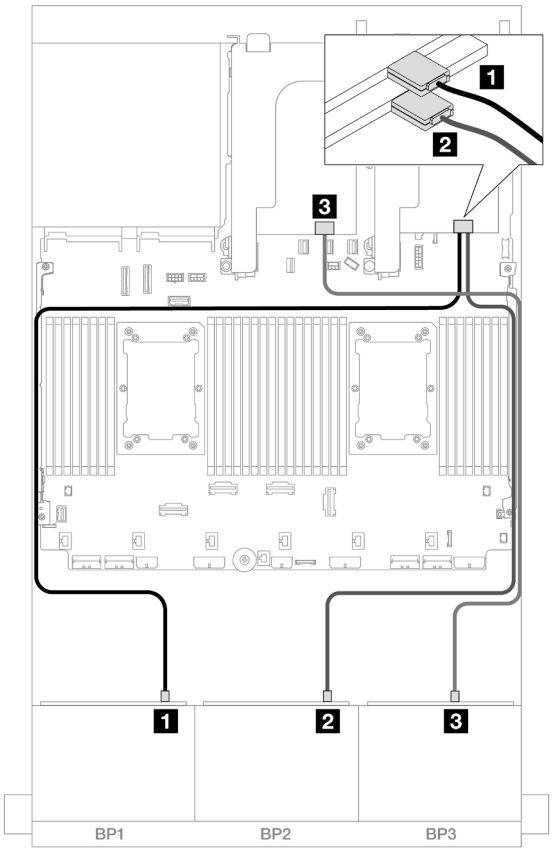


Figure 499. SAS/SATA cable routing to 8i adapters

From	To
1 Backplane 1: SAS	8i adapter • Gen 4: C0 • Gen 3: C0C1
2 Backplane 2: SAS	8i adapter • Gen 4: C0 • Gen 3: C0C1
3 Backplane 3: SAS	8i adapter • Gen 4: C0 • Gen 3: C0C1

8i + 16i RAID/HBA adapters

The following shows the cable connections for the 24 x 2.5-inch SAS/SATA configuration with one 8i RAID/HBA adapter and one 16i RAID/HBA adapter.

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

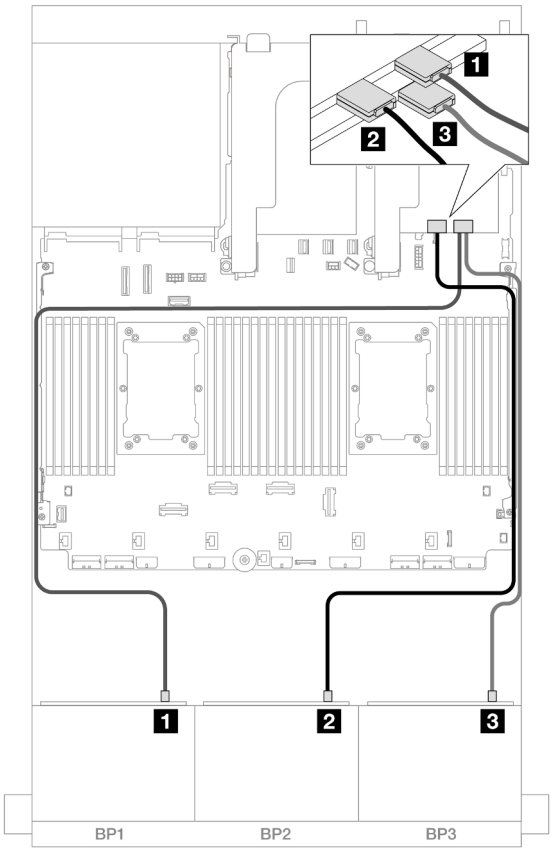


Figure 500. SAS/SATA cable routing to 8i/16i adapters

From	To
1 Backplane 1: SAS	16i adapter • Gen 4: C0 • Gen 3: C0C1
2 Backplane 2: SAS	• Gen 4: C1 • Gen 3: C2C3
3 Backplane 3: SAS	8i adapter • Gen 4: C0 • Gen 3: C0C1

Front + rear backplanes: 24 x 2.5" SAS/SATA + 4 x 2.5"/8 x 2.5" SAS/SATA/4 x 2.5" AnyBay

This topic provides cable routing information for the 12 x 3.5-inch SAS/SATA front backplane and a 4 x 2.5-inch/8 x 2.5-inch SAS/SATA/4 x 2.5-inch AnyBay rear backplane.

- “24 x 2.5" SAS/SATA + 4 x 2.5" SAS/SATA” on page 461
- “24 x 2.5" SAS/SATA + 4 x 2.5" AnyBay” on page 467
- “24 x 2.5" SAS/SATA + 8 x 2.5" SAS/SATA” on page 472

24 x 2.5" SAS/SATA + 4 x 2.5" SAS/SATA

This topic provides cable routing information for the 24 x 2.5-inch SAS/SATA front backplane and a 4 x 2.5-inch SAS/SATA rear backplane.

To connect power cables for the front backplane(s), refer to “Backplanes: server models with 2.5-inch front drive bays” on page 360.

To connect signal cables for the front backplane(s), refer to the following cable routing scenarios depending on your server configuration.

- “32i RAID/HBA adapter” on page 461
- “CFF expander + 8i/16i RAID/HBA adapter” on page 462
- “CFF 16i RAID/HBA adapter + CFF expander” on page 464

32i RAID/HBA adapter

This topic provides cable routing information for the 24 x 2.5-inch SAS/SATA + 4 x 2.5-inch SAS/SATA configuration with one 32i RAID/HBA adapter.

Front backplane cable routing

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

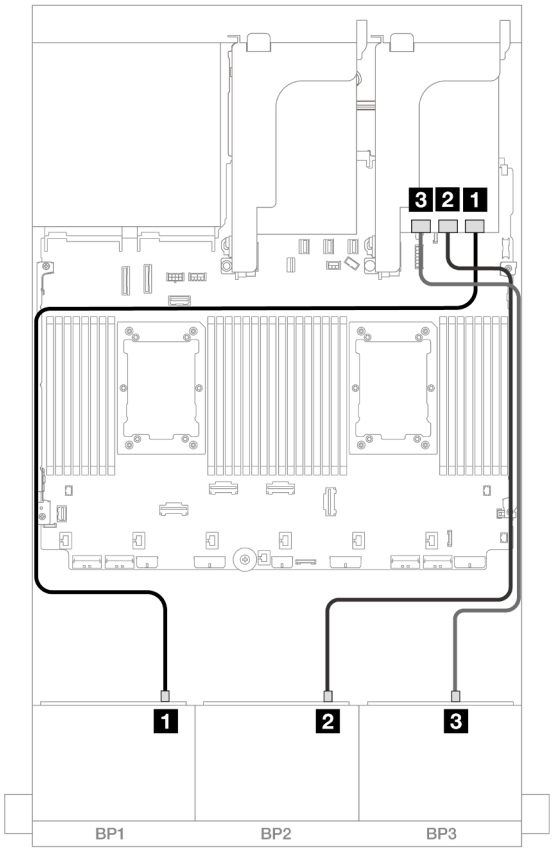


Figure 501. SAS/SATA cable routing to 32i adapter

From	To
1 Backplane 1: SAS	32i adapter • C0
2 Backplane 2: SAS	• C1
3 Backplane 3: SAS	• C2

Rear backplane cable routing

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

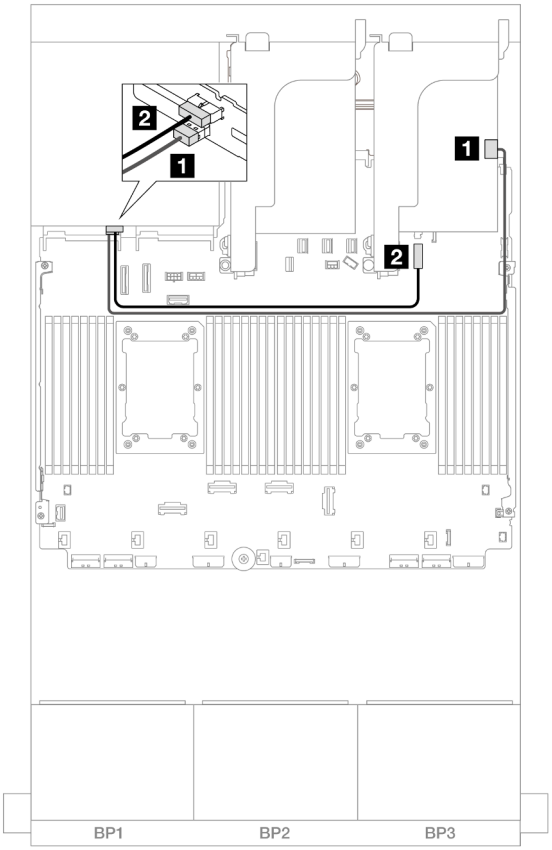


Figure 502. Rear backplane cable routing

From	To
1 Backplane 4: SAS	32i adapter • C3
2 Backplane 4: PWR	Onboard: 7mm backplane power connector

CFF expander + 8i/16i RAID/HBA adapter

This topic provides cable routing information for the 24 x 2.5-inch SAS/SATA + 4 x 2.5-inch SAS/SATA configuration with one CFF expander and one 8i/16i RAID/HBA adapter.

Front backplane cable routing

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

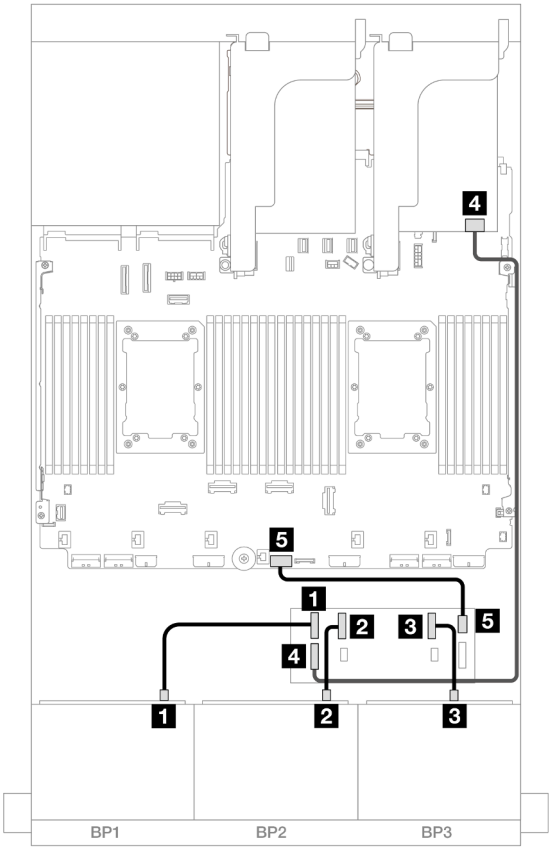


Figure 503. SAS/SATA cable routing to CFF expander and 8i/16i adapter

From	To
1 Backplane 1: SAS	CFF expander • C0
2 Backplane 2: SAS	• C1
3 Backplane 3: SAS	• C2
4 CFF expander: RAID/HBA	8i/16i adapter • Gen 4: C0 • Gen 3: C0C1
5 CFF expander: PWR	Onboard: CFF EXP PWR

Rear backplane cable routing

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

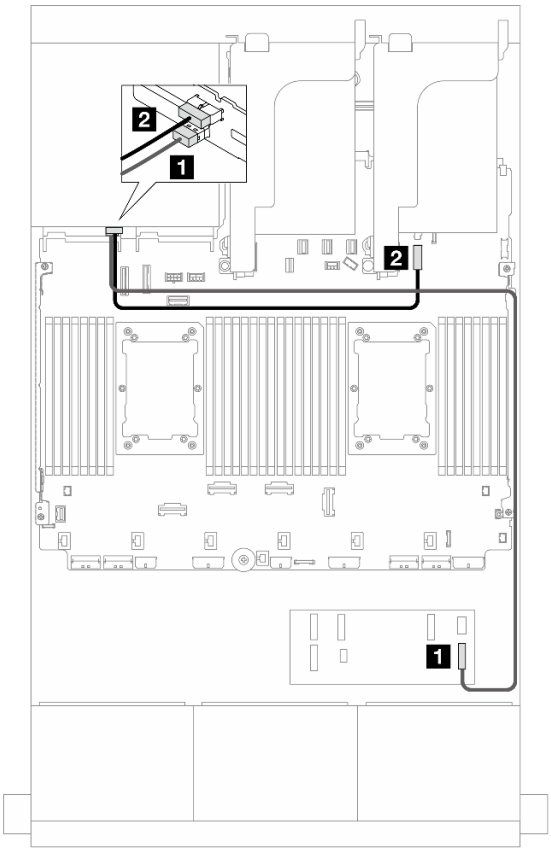


Figure 504. Rear backplane cable routing

From	To
1 Backplane 4: SAS	CFF expander • C3
2 Backplane 4: PWR	Onboard: 7mm backplane power connector

CFF 16i RAID/HBA adapter + CFF expander

This topic provides cable routing information for the 24 x 2.5-inch SAS/SATA + 4 x 2.5-inch SAS/SATA configuration with one CFF expander and one CFF 16i RAID/HBA adapter.

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

Front backplane cable routing

Cable routing when two processors installed

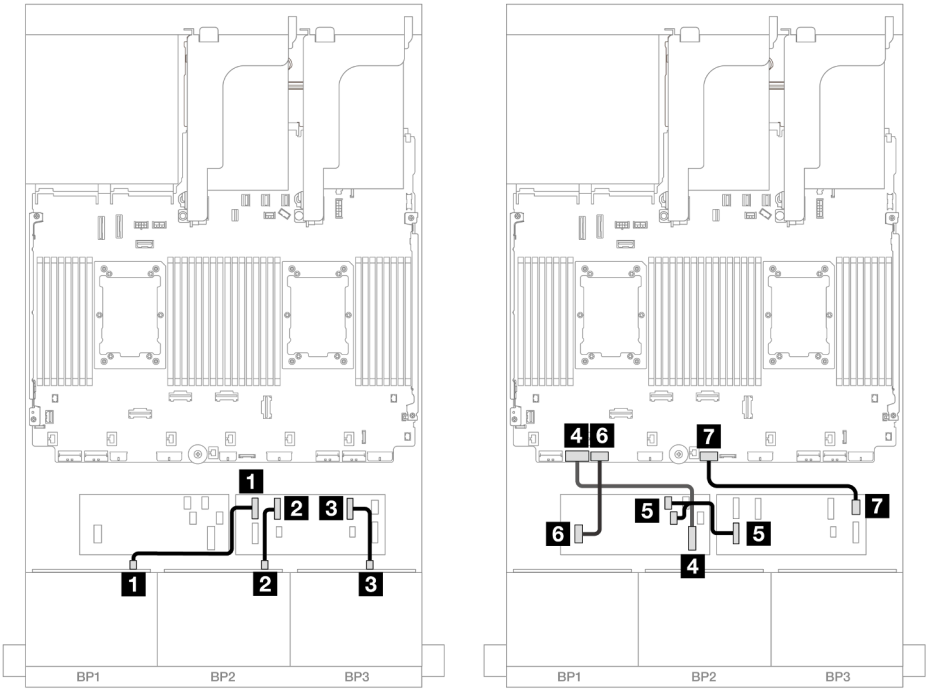


Figure 505. Cable routing to CFF expander and CFF 16i adapter

From	To
1 Backplane 1: SAS	CFF expander • C0
2 Backplane 2: SAS	• C1
3 Backplane 3: SAS	• C2
4 CFF adapter: MB (CFF input)	Onboard: PCIe 7
5 CFF expander: RAID/HBA	CFF adapter • C0 • C1
6 CFF adapter: PWR	Onboard: CFF RAID/HBA PWR
7 CFF expander: PWR	Onboard: CFF EXP PWR

Cable routing when one processor installed

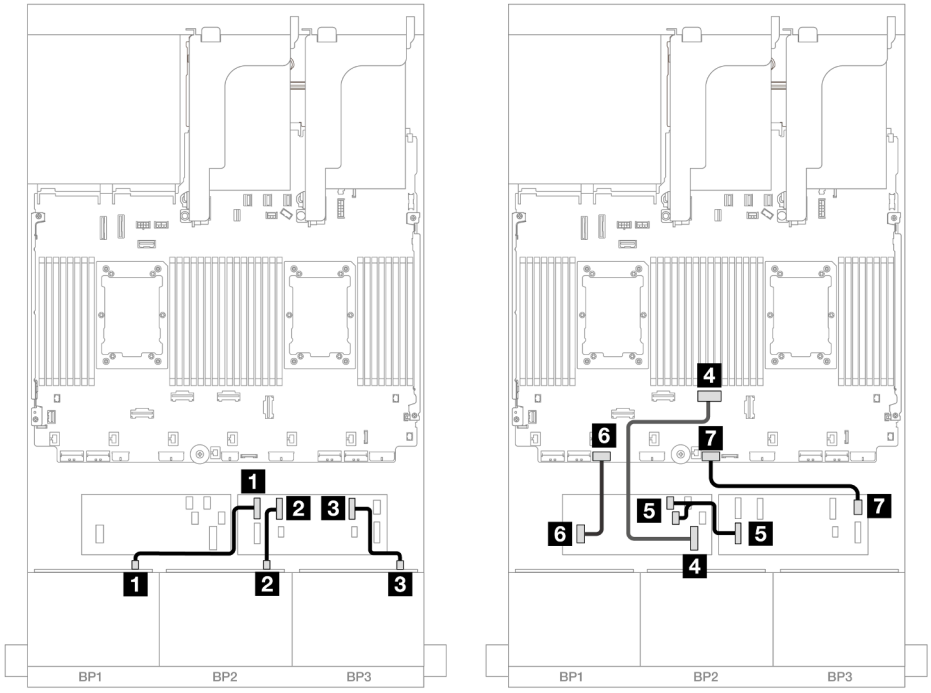


Figure 506. Cable routing to CFF expander and CFF 16i adapter

From	To
1 Backplane 1: SAS	CFF expander • C0
2 Backplane 2: SAS	• C1
3 Backplane 3: SAS	• C2
4 CFF adapter: MB (CFF input)	Onboard: PCIe 4
5 CFF expander: RAID/HBA	CFF adapter • C0 • C1
6 CFF adapter: PWR	Onboard: CFF RAID/HBA PWR
7 CFF expander: PWR	Onboard: CFF EXP PWR

Rear backplane cable routing

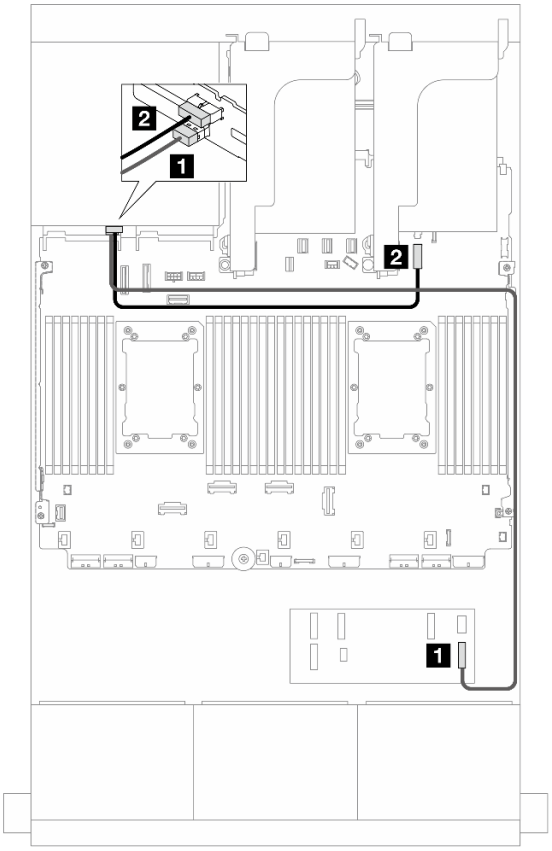


Figure 507. Rear backplane cable routing

From	To
1 Backplane 4: SAS	CFF expander • C3
2 Backplane 4: PWR	Onboard: 7mm backplane power connector

24 x 2.5" SAS/SATA + 4 x 2.5" AnyBay

This topic provides cable routing information for the server model with three 8 x 2.5-inch SAS/SATA front backplanes and one 4 x 2.5-inch AnyBay rear backplane.

- "32i RAID/HBA adapter" on page 467
- "CFF expander + 8i/16i RAID/HBA adapter" on page 468
- "CFF 16i RAID/HBA adapter + CFF expander" on page 469

32i RAID/HBA adapter

The following shows the cable connections for the front 24 x 2.5-inch SAS/SATA + rear 4 x 2.5-inch AnyBay configuration with one 32i RAID/HBA adapter.

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

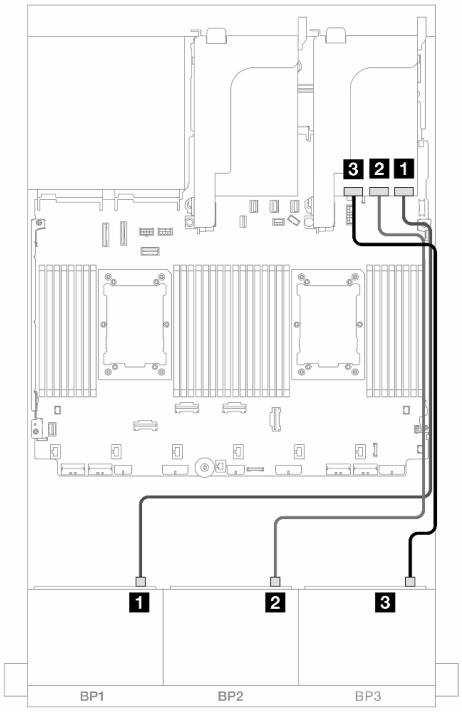


Figure 508. Front backplane cable routing

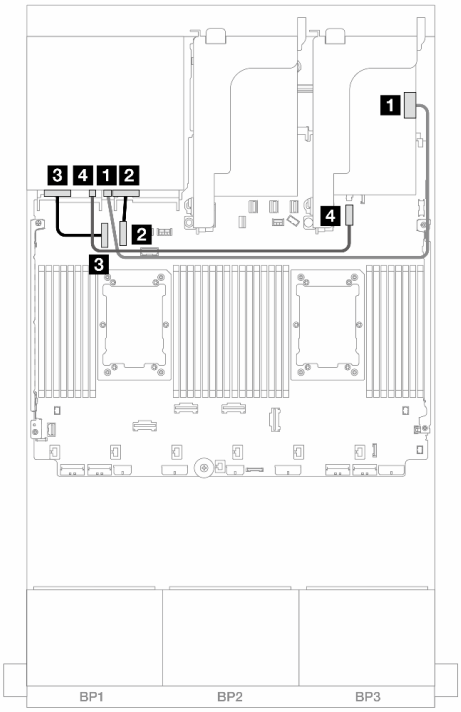


Figure 509. Rear backplane cable routing

From	To
1 Backplane 1: SAS	32i adapter • C0
2 Backplane 2: SAS	• C1
3 Backplane 3: SAS	• C2

From	To
1 Backplane 4: SAS	1 32i adapter • C3
2 Backplane 4: NVMe 0-1	2 Onboard: PCIe 10
3 Backplane 4: NVMe 2-3	3 Onboard: PCIe 9
4 Backplane 4: PWR	4 Onboard: 7mm power connector

CFF expander + 8i/16i RAID/HBA adapter

The following shows the cable connections for the front 24 x 2.5-inch SAS/SATA + rear 4 x 2.5-inch AnyBay configuration with one CFF expander and one 8i/16i RAID/HBA adapter.

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

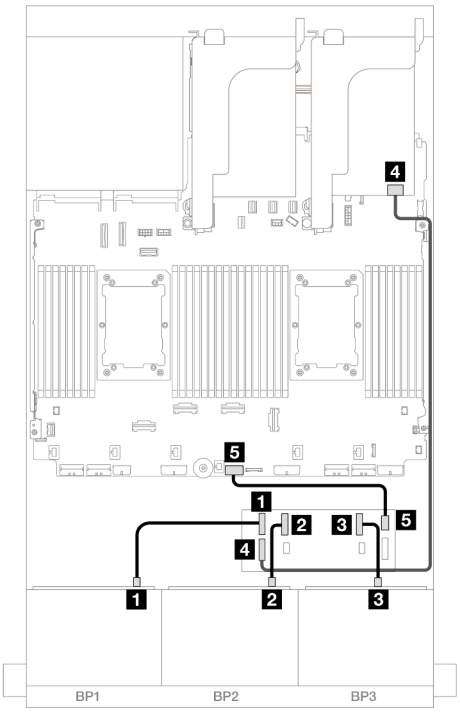


Figure 510. Cable routing to CFF expander and 8i/16i adapter

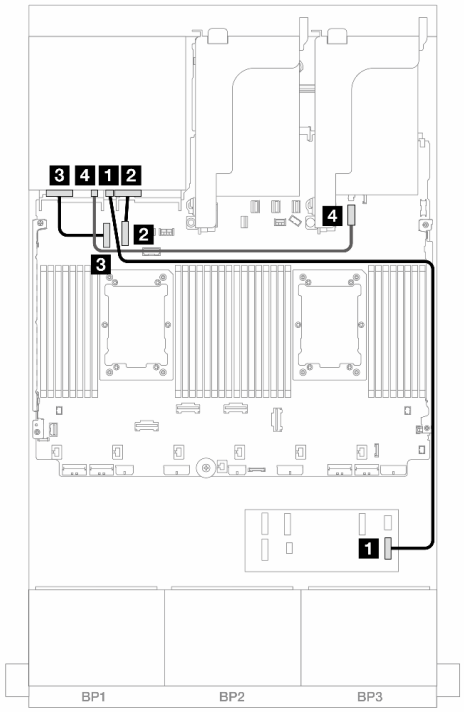


Figure 511. Rear backplane cable routing

From	To
1 Backplane 1: SAS	CFF expander • C0
2 Backplane 2: SAS	• C1
3 Backplane 3: SAS	• C2
4 CFF expander: RAID/ HBA	8i/16i adapter • Gen 4: C0 • Gen 3: C0C1
5 CFF expander: PWR	Onboard: CFF EXP PWR

From	To
1 Backplane 4: SAS	1 CFF expander • C3
2 Backplane 4: NVMe 0-1	2 Onboard: PCIe 10
3 Backplane 4: NVMe 2-3	3 Onboard: PCIe 9
4 Backplane 4: PWR	4 Onboard: 7mm power connector

CFF 16i RAID/HBA adapter + CFF expander

The following shows the cable connections for the front 24 x 2.5-inch SAS/SATA + rear 4 x 2.5-inch AnyBay configuration with one CFF expander and one CFF 16i RAID/HBA adapter.

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

Front backplane cable routing

Cable routing when two processors installed

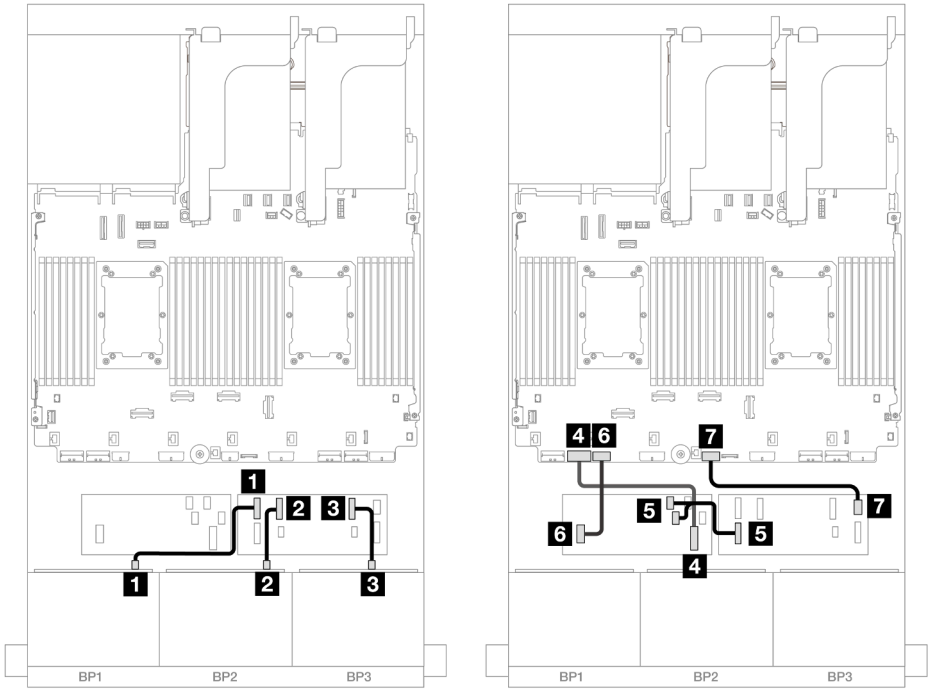


Figure 512. Cable routing to CFF expander and CFF 16i adapter

From	To
1 Backplane 1: SAS	CFF expander • C0
2 Backplane 2: SAS	• C1
3 Backplane 3: SAS	• C2
4 CFF adapter: MB (CFF input)	Onboard: PCIe 7
5 CFF expander: RAID/HBA	CFF adapter • C0 • C1
6 CFF adapter: PWR	Onboard: CFF RAID/HBA PWR
7 CFF expander: PWR	Onboard: CFF EXP PWR

Cable routing when one processor installed

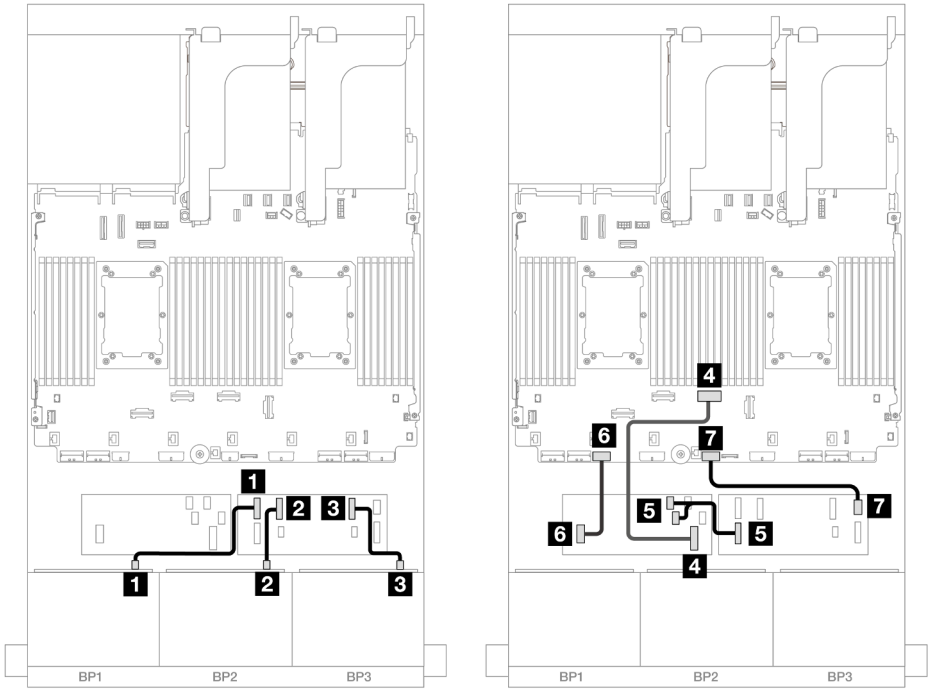


Figure 513. Cable routing to CFF expander and CFF 16i adapter

From	To
1 Backplane 1: SAS	CFF expander • C0
2 Backplane 2: SAS	• C1
3 Backplane 3: SAS	• C2
4 CFF adapter: MB (CFF input)	Onboard: PCIe 4
5 CFF expander: RAID/HBA	CFF adapter • C0 • C1
6 CFF adapter: PWR	Onboard: CFF RAID/HBA PWR
7 CFF expander: PWR	Onboard: CFF EXP PWR

Rear backplane cable routing

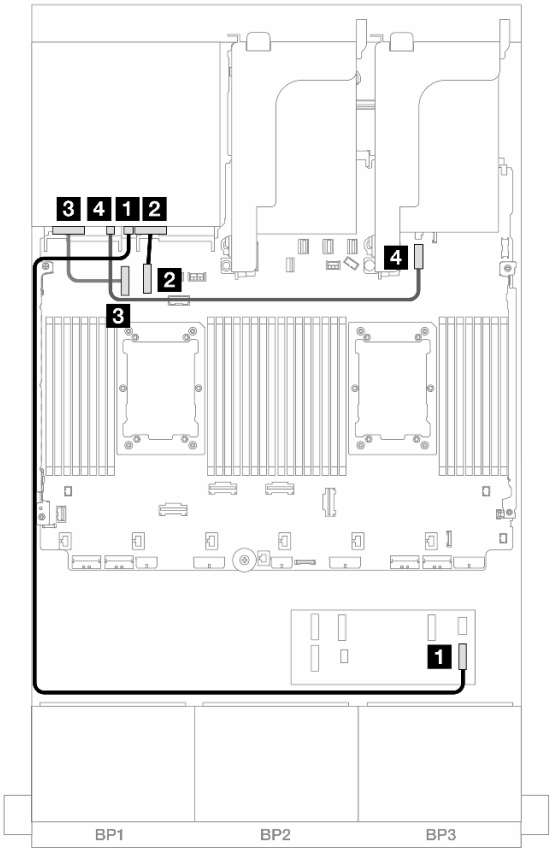


Figure 514. Rear backplane cable routing

From	To
1 Backplane 4: SAS	1 CFF expander • C3
2 Backplane 4: NVMe 0-1	2 Onboard: PCIe 10
3 Backplane 4: NVMe 2-3	3 Onboard: PCIe 9
4 Backplane 4: PWR	4 Onboard: 7mm power connector

24 x 2.5" SAS/SATA + 8 x 2.5" SAS/SATA

This topic provides cable routing information for the 24 x 2.5-inch SAS/SATA front backplane and an 8 x 2.5-inch SAS/SATA rear backplane.

To connect power cables for the front backplane(s), refer to "Backplanes: server models with 2.5-inch front drive bays" on page 360.

To connect signal cables for the front backplane(s), refer to the following cable routing scenarios depending on your server configuration.

- "32i RAID/HBA adapter" on page 473
- "16i RAID/HBA adapters" on page 474
- "CFF expander + 8i/16i RAID/HBA adapter" on page 478

- “CFF 16i RAID/HBA + SFF 16i RAID/HBA adapters” on page 476
- “CFF 16i RAID/HBA adapter + CFF expander” on page 480

32i RAID/HBA adapter

This topic provides cable routing information for the 24 x 2.5-inch SAS/SATA + 8 x 2.5-inch SAS/SATA configuration with one 32i RAID/HBA adapter.

Front backplane cable routing

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

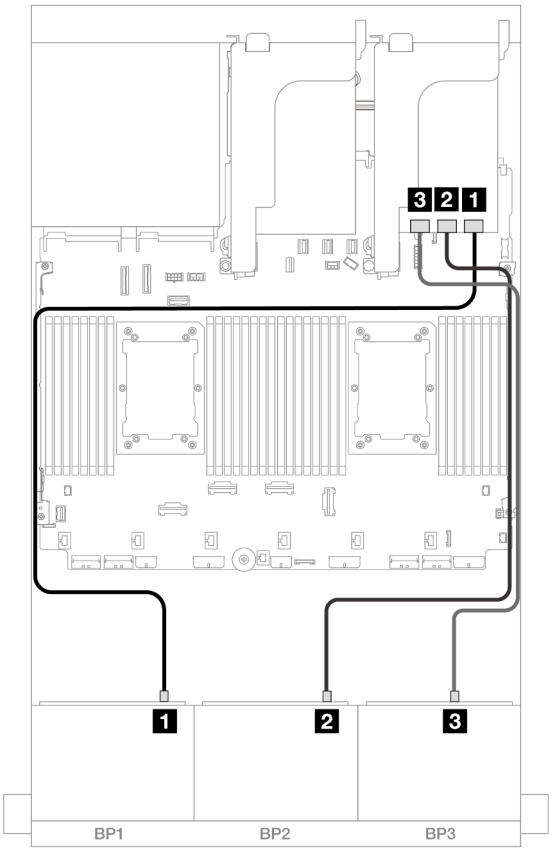


Figure 515. SAS/SATA cable routing to 32i adapter

From	To
1 Backplane 1: SAS	32i adapter • C0
2 Backplane 2: SAS	• C1
3 Backplane 3: SAS	• C2

Rear backplane cable routing

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

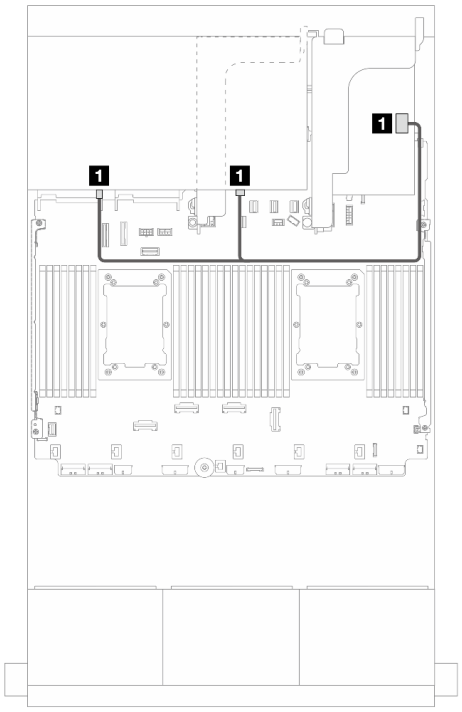


Figure 516. Signal cable routing

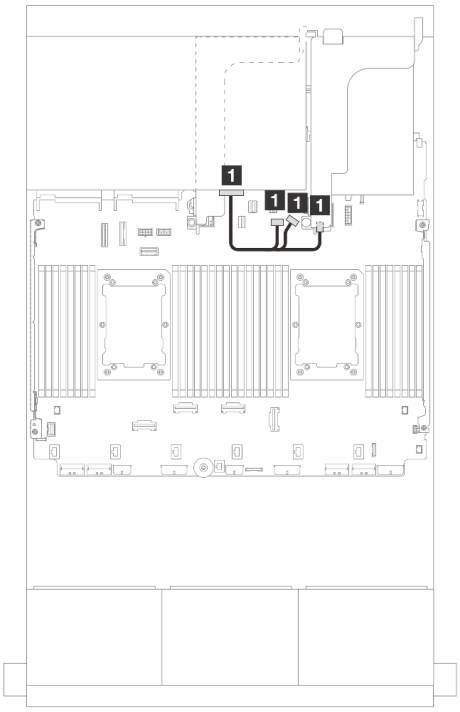


Figure 517. Power cable routing

From	To
1 Backplane 4: SAS 0, SAS 1	32i adapter • C3

From	To
1 Backplane 4: PWR	• Onboard: backplane power • Onboard: backplane sideband • Riser 1: PWR

16i RAID/HBA adapters

This topic provides cable routing information for the 24 x 2.5-inch SAS/SATA + 8 x 2.5-inch SAS/SATA configuration with two 16i RAID/HBA adapters.

Front backplane cable routing

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

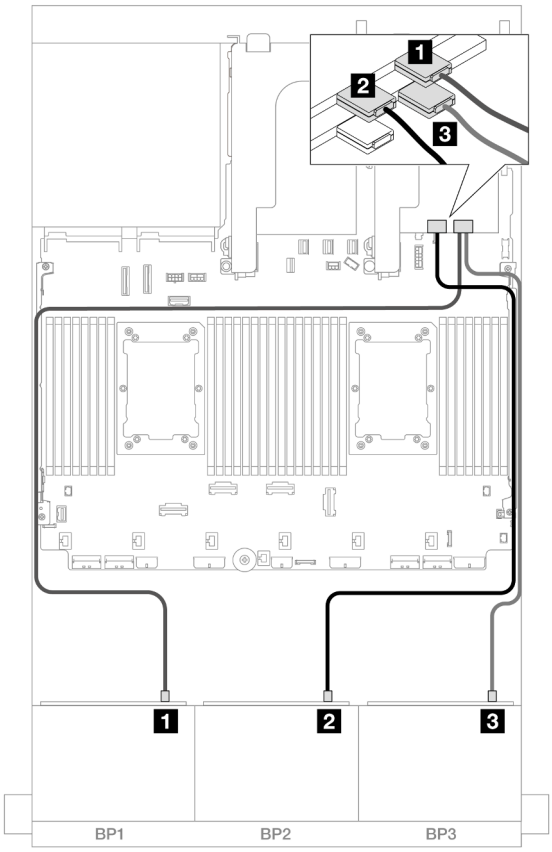


Figure 518. SAS/SATA cable routing to 16i adapters

From	To
1 Backplane 1: SAS	16i adapter • Gen 4: C0 • Gen 3: C0C1
2 Backplane 2: SAS	• Gen 4: C1 • Gen 3: C2C3
3 Backplane 3: SAS	16i adapter • Gen 4: C0 • Gen 3: C0C1

Rear backplane cable routing

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

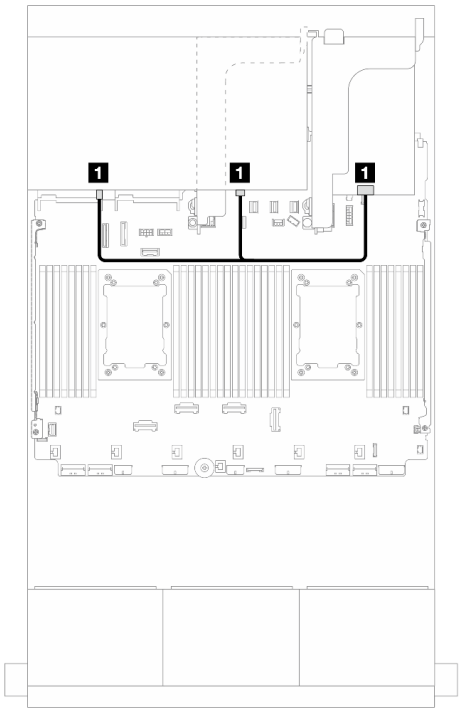


Figure 519. Signal cable routing

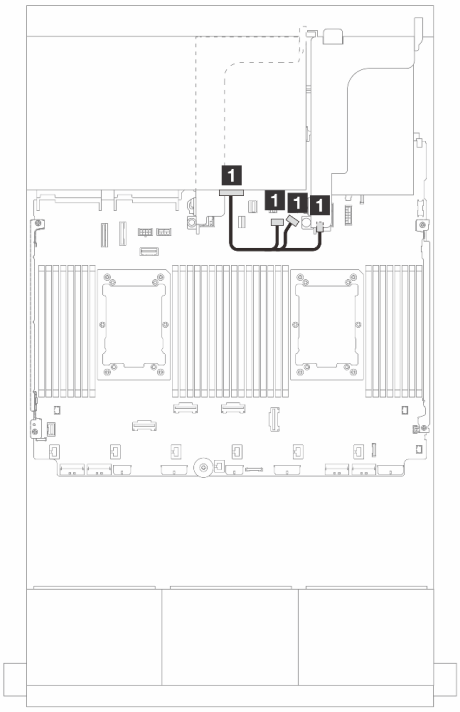


Figure 520. Power cable routing

From	To
1 Backplane 4: SAS 0, SAS 1	16i adapter • Gen 4: C1 • Gen 3: C2C3

From	To
1 Backplane 4: PWR	• Onboard: backplane power • Onboard: backplane sideband • Riser 1: PWR

CFF 16i RAID/HBA + SFF 16i RAID/HBA adapters

This topic provides cable routing information for the 24 x 2.5-inch SAS/SATA + 8 x 2.5-inch SAS/SATA configuration with one CFF 16i RAID/HBA adapter and one 16i RAID/HBA adapter.

Front backplane cable routing

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

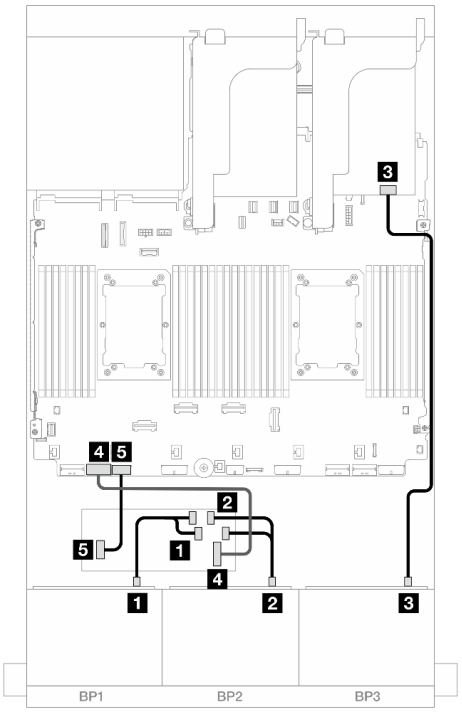


Figure 521. Cable routing when two processors installed

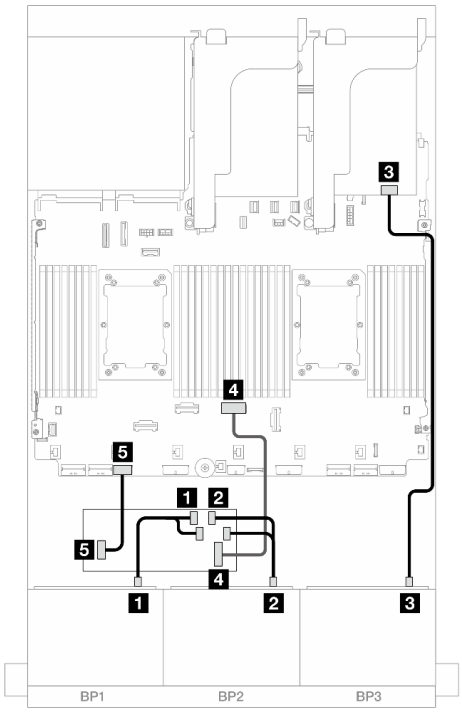


Figure 522. Cable routing when one processor installed

From	To
1 Backplane 1: SAS	CFF adapter • C0 • C1
2 Backplane 2: SAS	• C2 • C3
3 Backplane 3: SAS	16i adapter • Gen 4: C0 • Gen 3: C0C1
4 CFF adapter: MB (CFF input)	Onboard: PCIe 7
5 CFF adapter: PWR	Onboard: CFF RAID/HBA PWR

From	To
1 Backplane 1: SAS	CFF adapter • C0 • C1
2 Backplane 2: SAS	• C2 • C3
3 Backplane 3: SAS	16i adapter • Gen 4: C0 • Gen 3: C0C1
4 CFF adapter: MB (CFF input)	Onboard: PCIe 4
5 CFF adapter: PWR	Onboard: CFF RAID/HBA PWR

Rear backplane cable routing

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

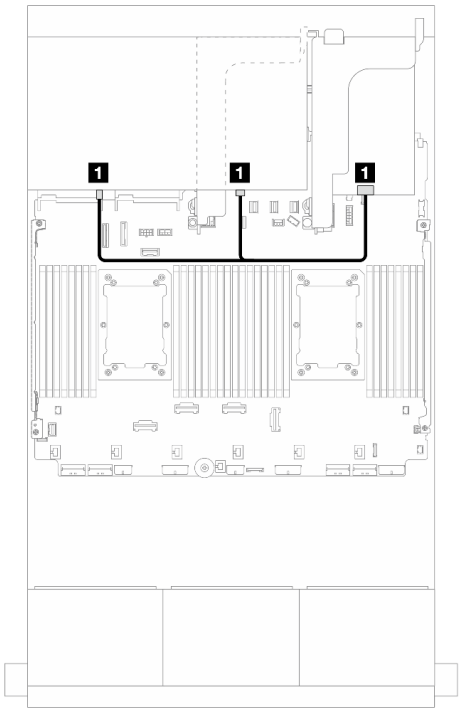


Figure 523. Signal cable routing

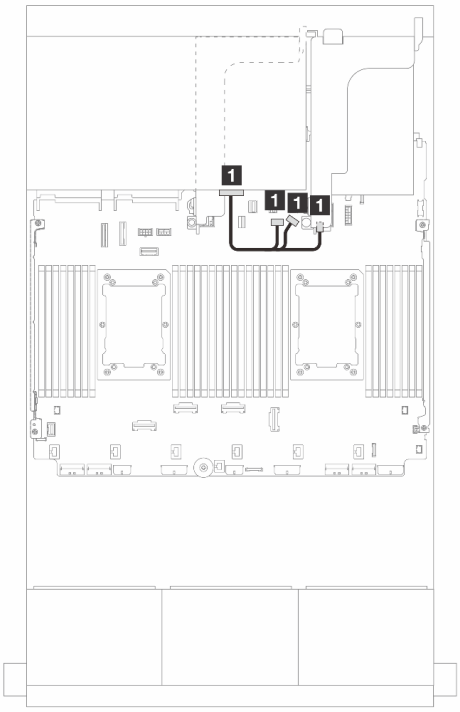


Figure 524. Power cable routing

From	To
1 Backplane 4: SAS 0, SAS 1	16i adapter • Gen 4: C1 • Gen 3: C2C3

From	To
1 Backplane 4: PWR	• Onboard: backplane power • Onboard: backplane sideband • Riser 1: PWR

CFF expander + 8i/16i RAID/HBA adapter

This topic provides cable routing information for the 24 x 2.5-inch SAS/SATA + 8 x 2.5-inch SAS/SATA configuration with one CFF expander and one 8i/16i RAID/HBA adapter.

Front backplane cable routing

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

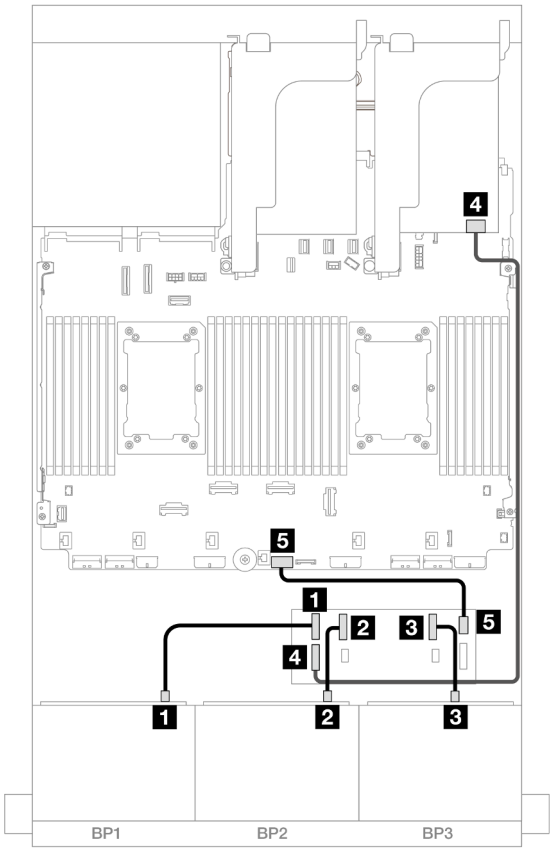


Figure 525. SAS/SATA cable routing to CFF expander and 8i/16i adapter

From	To
1 Backplane 1: SAS	CFF expander • C0
2 Backplane 2: SAS	• C1
3 Backplane 3: SAS	• C2
4 CFF expander: RAID/HBA	8i/16i adapter • Gen 4: C0 • Gen 3: C0C1
5 CFF expander: PWR	Onboard: CFF EXP PWR

Rear backplane cable routing

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

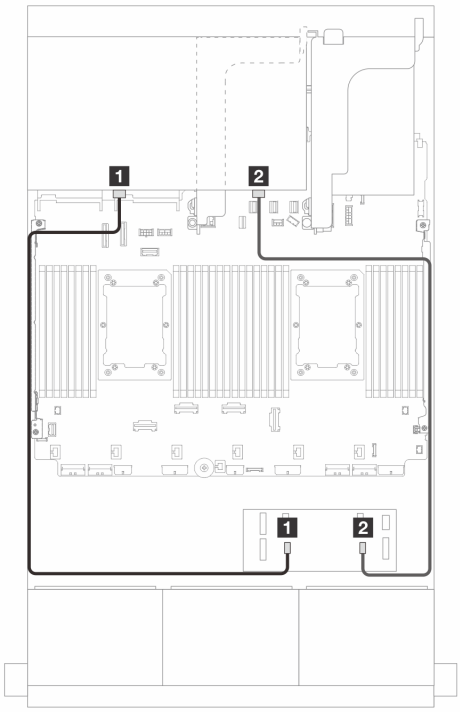


Figure 526. Signal cable routing

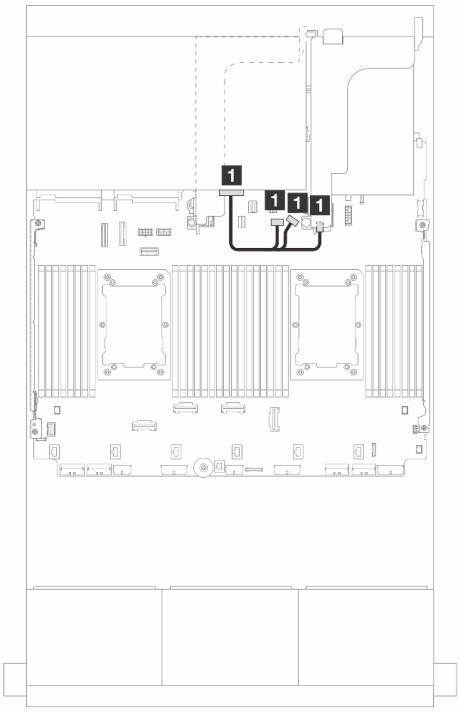


Figure 527. Power cable routing

From	To
1 Backplane 4: SAS 0	CFF expander • C4
2 Backplane 4: SAS 1	• C5

From	To
1 Backplane 4: PWR	• Onboard: backplane power • Onboard: backplane sideband • Riser 1: PWR

CFF 16i RAID/HBA adapter + CFF expander

This topic provides cable routing information for the 24 x 2.5-inch SAS/SATA + 8 x 2.5-inch SAS/SATA configuration with one CFF expander and one CFF 16i RAID/HBA adapter.

Front backplane cable routing

Cable routing when two processors installed

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

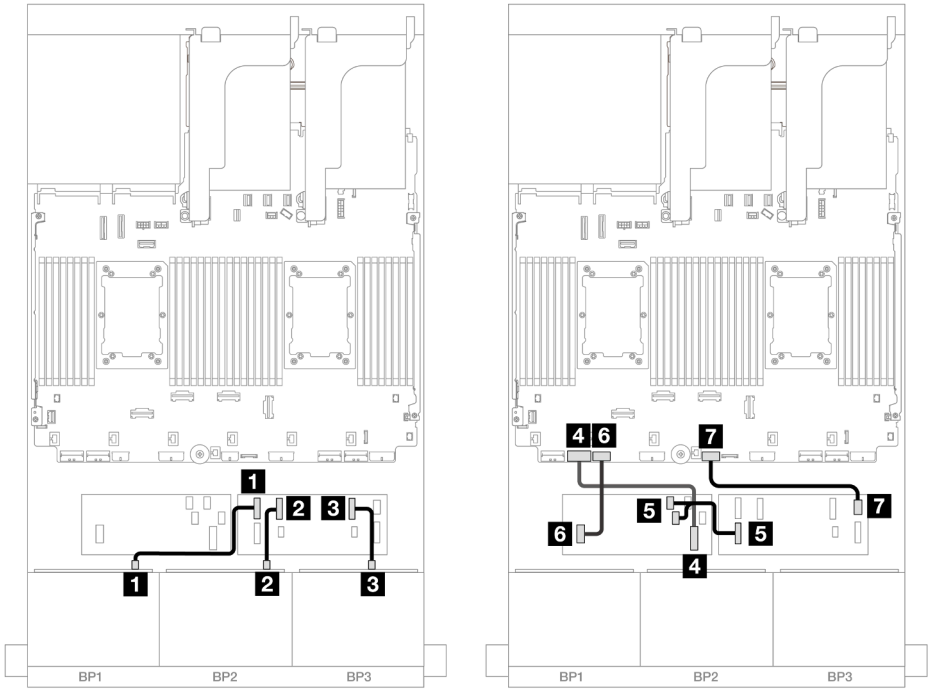


Figure 528. SAS/SATA cable routing to CFF expander and CFF 16i adapter

From	To
1 Backplane 1: SAS	CFF expander • C0
2 Backplane 2: SAS	• C1
3 Backplane 3: SAS	• C2
4 CFF adapter: MB (CFF input)	Onboard: PCIe 7
5 CFF expander: RAID/HBA	CFF adapter • C0 • C1
6 CFF adapter: PWR	Onboard: CFF RAID/HBA PWR
7 CFF expander: PWR	Onboard: CFF EXP PWR

Cable routing when one processor installed

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

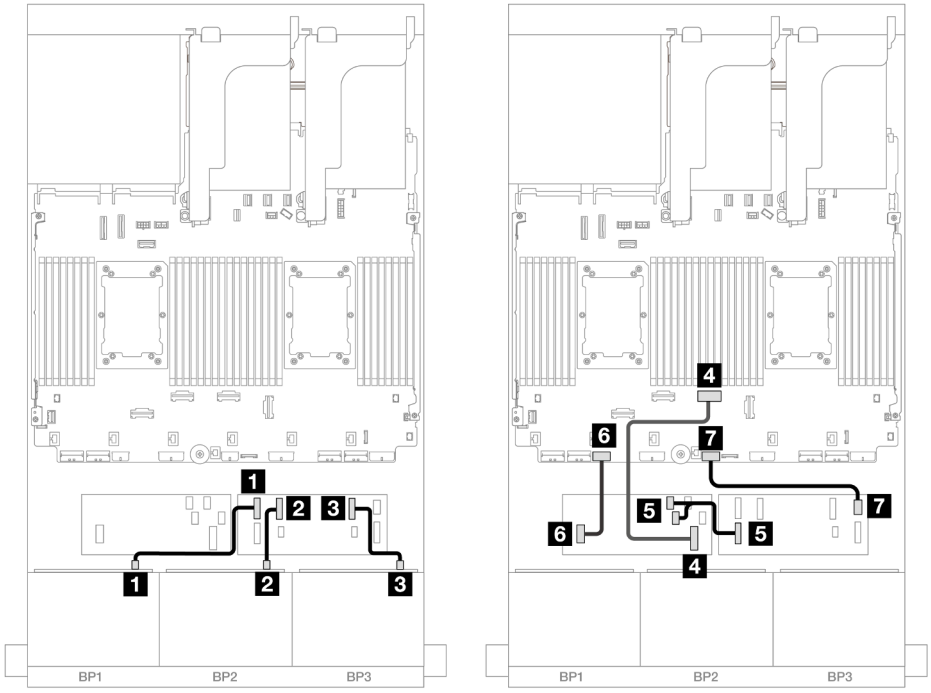


Figure 529. SAS/SATA cable routing to CFF expander and CFF 16i adapter

From	To
1 Backplane 1: SAS	CFF expander • C0
2 Backplane 2: SAS	• C1
3 Backplane 3: SAS	• C2
4 CFF adapter: MB (CFF input)	Onboard: PCIe 4
5 CFF expander: RAID/HBA	CFF adapter • C0 • C1
6 CFF adapter: PWR	Onboard: CFF RAID/HBA PWR
7 CFF expander: PWR	Onboard: CFF EXP PWR

Rear backplane cable routing

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

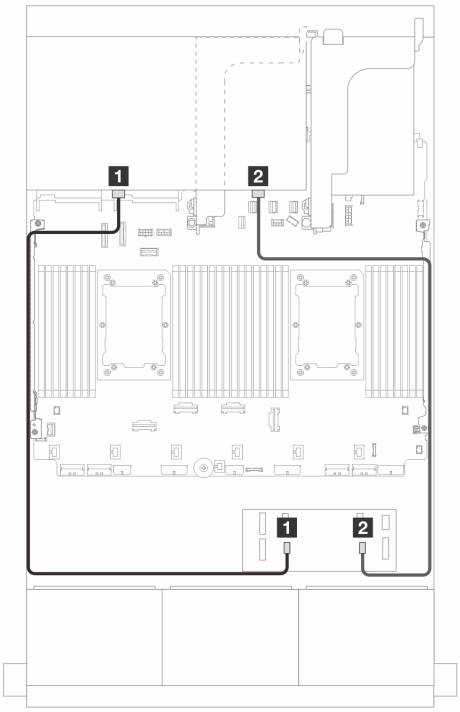


Figure 530. Signal cable routing

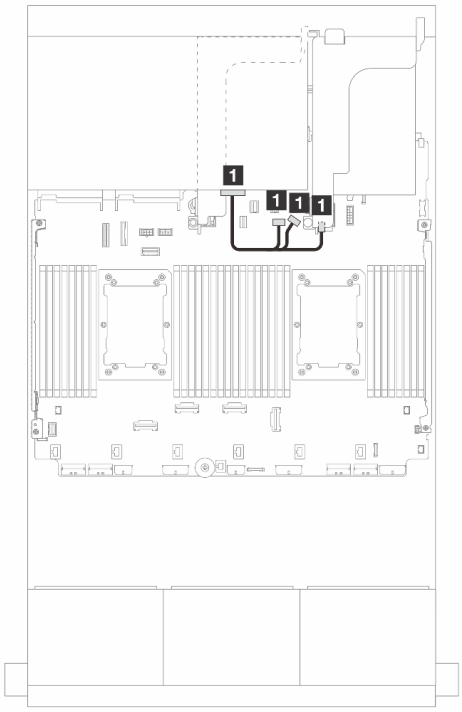


Figure 531. Power cable routing

From	To
1 Backplane 4: SAS 0	CFF expander • C4
2 Backplane 4: SAS 1	• C5

From	To
1 Backplane 4: PWR	• Onboard: backplane power • Onboard: backplane sideband • Riser 1: PWR

Front + middle backplanes: 24 x 2.5" SAS/SATA + 4 x 2.5"/8 x 2.5" SAS/SATA

This topic provides cable routing information for the 12 x 3.5-inch SAS/SATA front backplane and one or two 4 x 2.5-inch SAS/SATA rear backplanes.

- "24 x 2.5" SAS/SATA + 4 x 2.5" SAS/SATA" on page 483
- "24 x 2.5" SAS/SATA + 8 x 2.5" SAS/SATA" on page 487

24 x 2.5" SAS/SATA + 4 x 2.5" SAS/SATA

This topic provides cable routing information for the 24 x 2.5-inch SAS/SATA front backplane and one 4 x 2.5-inch SAS/SATA middle backplane.

To connect power cables for the front backplane(s), refer to "Backplanes: server models with 2.5-inch front drive bays" on page 360.

To connect signal cables for the front backplane(s), refer to the following cable routing scenarios depending on your server configuration.

- "32i RAID/HBA adapter" on page 488
- "16i RAID/HBA adapters" on page 489

32i RAID/HBA adapter

The following shows the cable connections for the 24 x 2.5-inch SAS/SATA + 4 x 2.5-inch SAS/SATA configuration with one 32i RAID/HBA adapter.

Front backplane cable routing

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

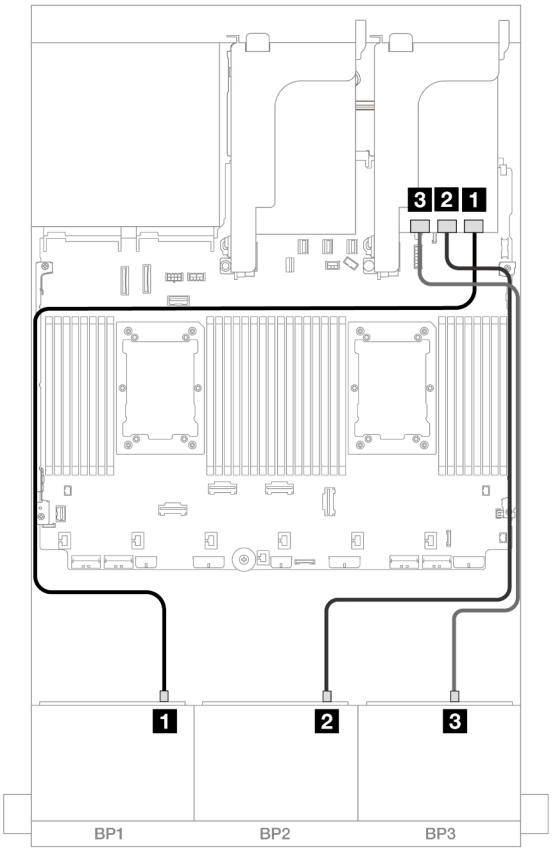


Figure 532. SAS/SATA cable routing to 32i adapter

From	To
1 Backplane 1: SAS	32i adapter • C0
2 Backplane 2: SAS	• C1
3 Backplane 3: SAS	• C2

Middle backplane cable routing

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

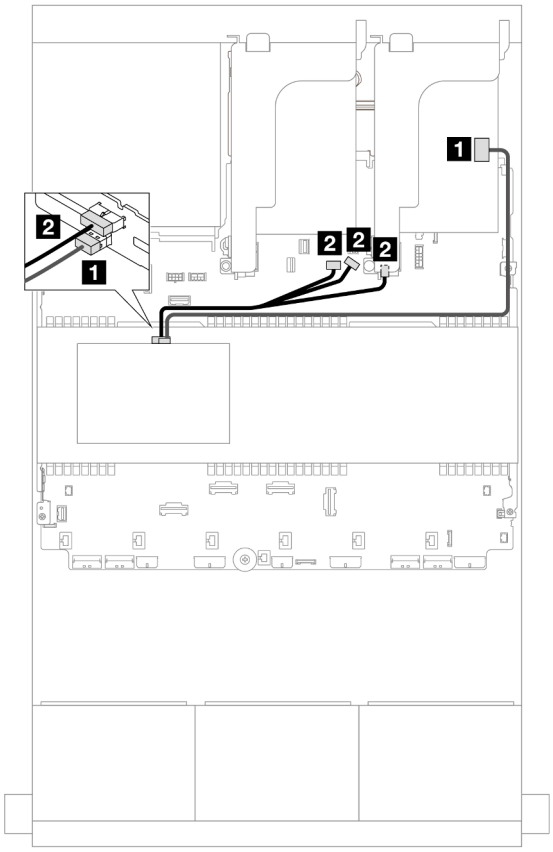


Figure 533. Middle backplane cable routing

From	To
1 Backplane 5: SAS	32i adapter • C3
2 Backplane 5: PWR	• Onboard: backplane power • Onboard: backplane sideband • Riser 1: PWR

16i RAID/HBA adapters

The following shows the cable connections for the 24 x 2.5-inch SAS/SATA + 4 x 2.5-inch SAS/SATA configuration with two 16i RAID/HBA adapters.

Front backplane cable routing

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

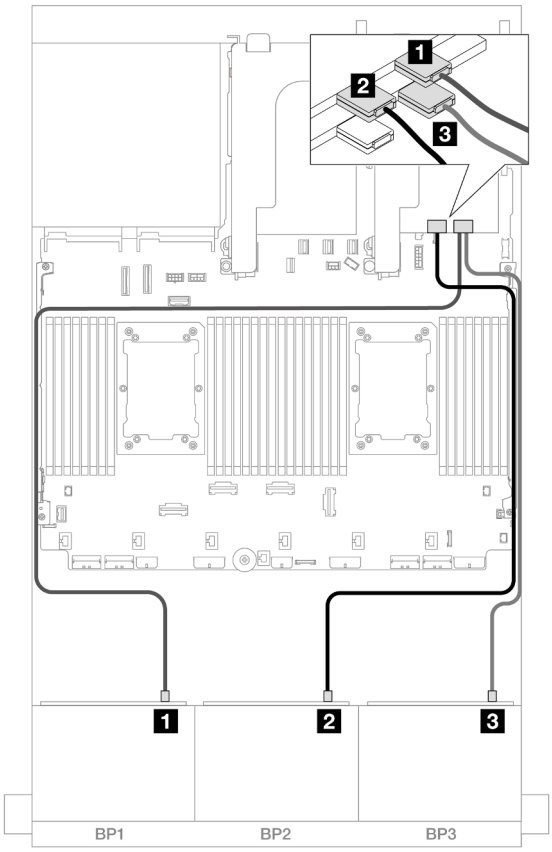


Figure 534. SAS/SATA cable routing to 16i adapters

From	To
1 Backplane 1: SAS	16i adapter • Gen 4: C0 • Gen 3: C0C1
2 Backplane 2: SAS	• Gen 4: C1 • Gen 3: C2C3
3 Backplane 3: SAS	16i adapter • Gen 4: C0 • Gen 3: C0C1

Middle backplane cable routing

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

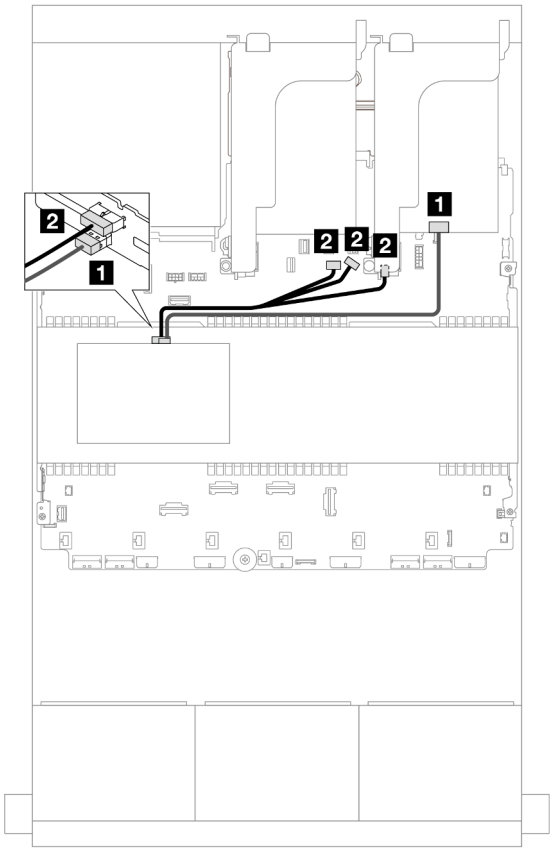


Figure 535. Middle backplane cable routing

From	To
1 Backplane 5: SAS	16i adapter • Gen 4: C1 • Gen 3: C2
2 Backplane 5: PWR	• Onboard: backplane power • Onboard: backplane sideband • Riser 1: PWR

24 x 2.5" SAS/SATA + 8 x 2.5" SAS/SATA

This topic provides cable routing information for the 24 x 2.5-inch SAS/SATA front backplane and two 4 x 2.5-inch SAS/SATA middle backplanes.

To connect power cables for the front backplane(s), refer to "Backplanes: server models with 2.5-inch front drive bays" on page 360.

To connect signal cables for the front backplane(s), refer to the following cable routing scenarios depending on your server configuration.

- "32i RAID/HBA adapter" on page 488
- "16i RAID/HBA adapters" on page 489

32i RAID/HBA adapter

The following shows the cable connections for the 24 x 2.5-inch SAS/SATA + 8 x 2.5-inch SAS/SATA configuration with one 32i RAID/HBA adapter.

Front backplane cable routing

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

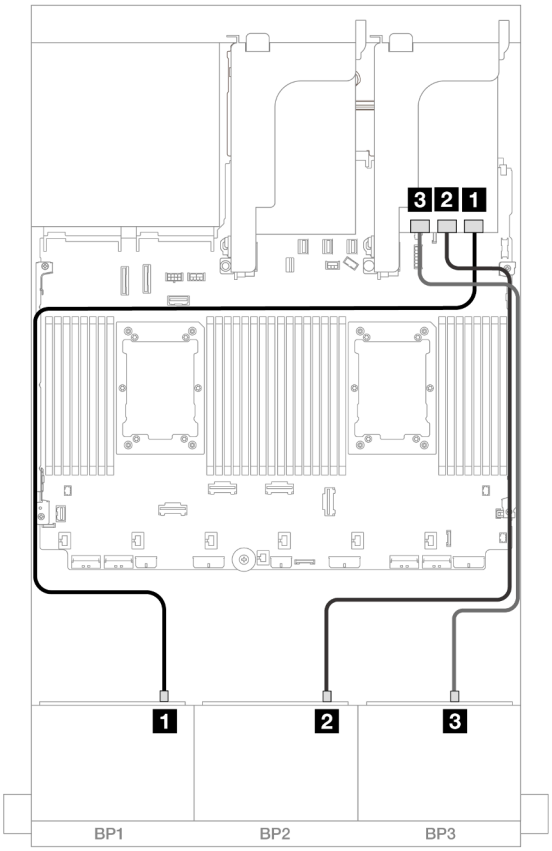


Figure 536. SAS/SATA cable routing to 32i adapter

From	To
1 Backplane 1: SAS	32i adapter • C0
2 Backplane 2: SAS	• C1
3 Backplane 3: SAS	• C2

Middle backplane cable routing

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

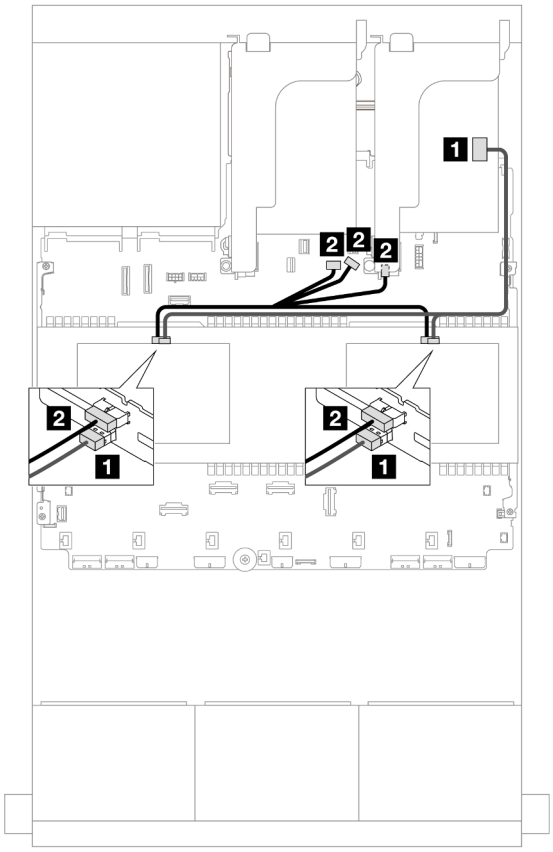


Figure 537. Middle backplane cable routing

From	To
1 • Backplane 5: SAS • Backplane 6: SAS	32i adapter • C3
2 • Backplane 5: PWR • Backplane 6: PWR	• Onboard: backplane power • Onboard: backplane sideband • Riser 1: PWR

16i RAID/HBA adapters

The following shows the cable connections for the 24 x 2.5-inch SAS/SATA + 8 x 2.5-inch SAS/SATA configuration with two 16i RAID/HBA adapters.

Front backplane cable routing

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

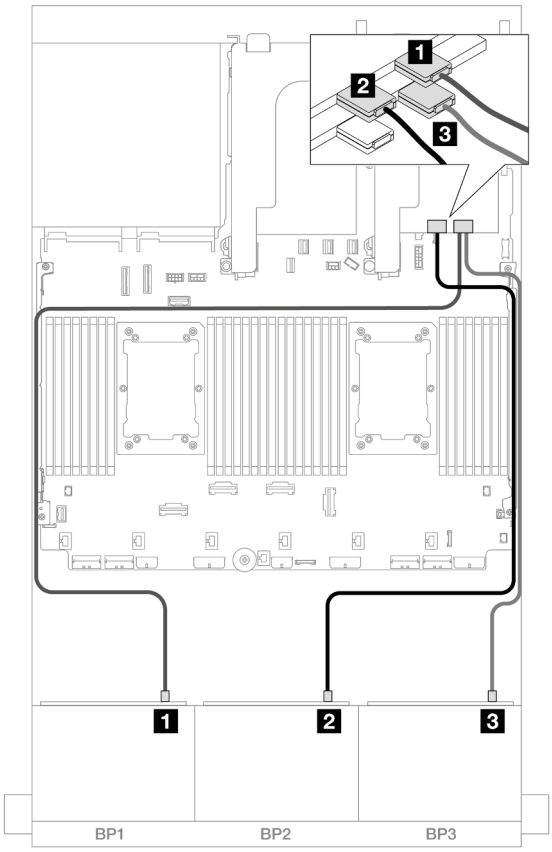


Figure 538. SAS/SATA cable routing to 16i adapters

From	To
1 Backplane 1: SAS	16i adapter • Gen 4: C0 • Gen 3: C0C1
2 Backplane 2: SAS	• Gen 4: C1 • Gen 3: C2C3
3 Backplane 3: SAS	16i adapter • Gen 4: C0 • Gen 3: C0C1

Middle backplane cable routing

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

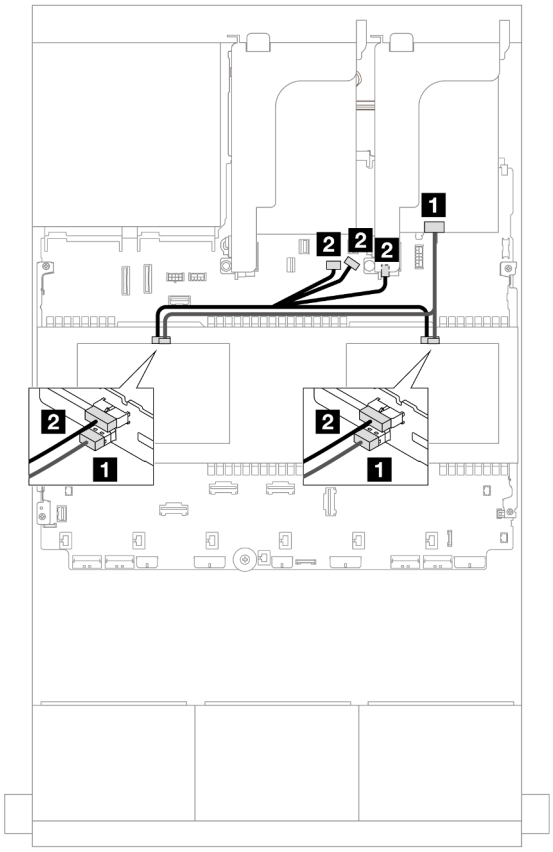


Figure 539. Middle backplane cable routing

From	To
1 • Backplane 5: SAS • Backplane 6: SAS	16i adapter • Gen 4: C1 • Gen 3: C2C3
2 • Backplane 5: PWR • Backplane 6: PWR	• Onboard: backplane power • Onboard: backplane sideband • Riser 1: PWR

Front + middle + rear backplanes: 24 x 2.5" SAS/SATA + 8 x 2.5" SAS/SATA+ 4 x 2.5"/ 8 x 2.5" SAS/SATA

This topic provides cable routing information for the 12 x 3.5-inch SAS/SATA front backplane, two 4 x 2.5-inch SAS/SATA middle backplanes, and one 4 x 2.5-inch/8 x 2.5-inch SAS/SATA rear backplane.

To connect power cables for the front backplane(s), refer to "Backplanes: server models with 2.5-inch front drive bays" on page 360.

To connect signal cables for the front backplane(s), refer to the following cable routing scenarios depending on your server configuration.

- "24 x 2.5" SAS/SATA + 8 x 2.5" SAS/SATA+ 4 x 2.5" SAS/SATA" on page 492
- "24 x 2.5" SAS/SATA + 8 x 2.5" SAS/SATA+ 8 x 2.5" SAS/SATA" on page 501

24 x 2.5" SAS/SATA + 8 x 2.5" SAS/SATA+ 4 x 2.5" SAS/SATA

This topic provides cable routing information for the 24 x 2.5-inch SAS/SATA + 8 x 2.5-inch SAS/SATA + 4 x 2.5-inch SAS/SATA configuration.

To connect power cables for the front backplane(s), refer to “Backplanes: server models with 2.5-inch front drive bays” on page 360.

To connect signal cables for the front backplane(s), refer to the following cable routing scenarios depending on your server configuration.

- “32i + 8i RAID/HBA adapter” on page 492
- “CFF expander + 8i/16i RAID/HBA adapter” on page 494
- “CFF 16i RAID/HBA adapter + CFF expander” on page 497

32i + 8i RAID/HBA adapter

This topic provides cable routing information for the 24 x 2.5-inch SAS/SATA + 8 x 2.5-inch SAS/SATA+ 4 x 2.5-inch SAS/SATA configuration with one 32i RAID adapter and one 8i RAID/HBA adapter.

Front backplane cable routing

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

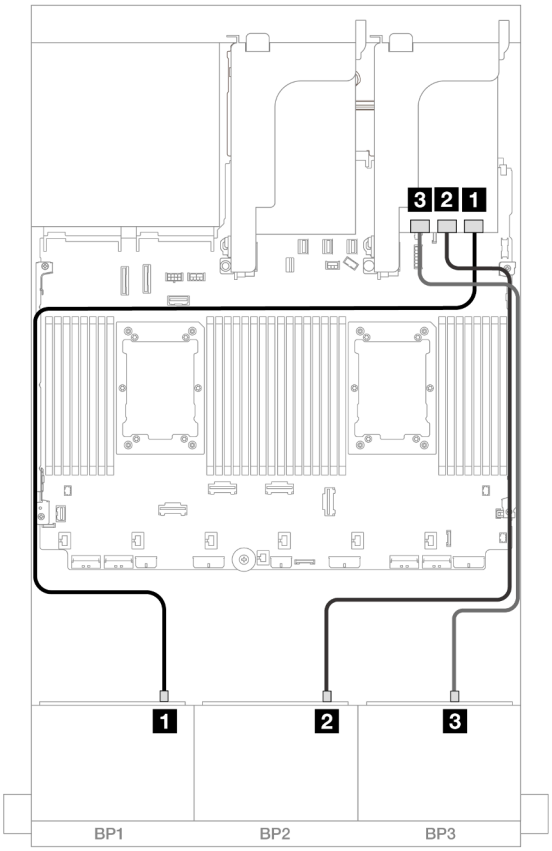


Figure 540. SAS/SATA cable routing to 32i adapter

From	To
1 Backplane 1: SAS	32i adapter • C0
2 Backplane 2: SAS	• C1
3 Backplane 3: SAS	• C2

Rear backplane cable routing

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

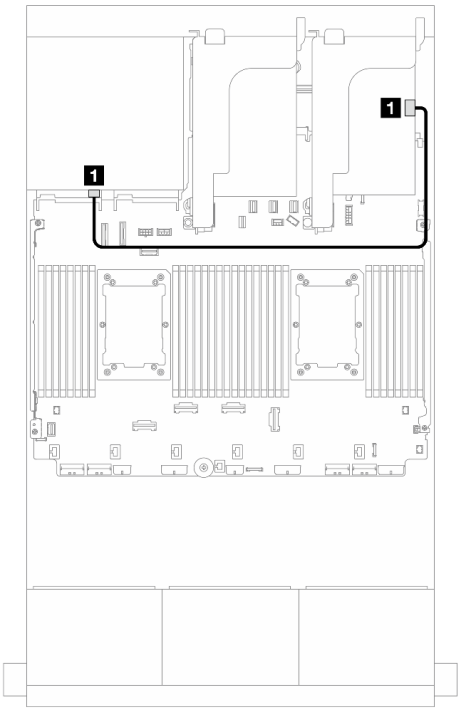


Figure 541. Signal cable routing

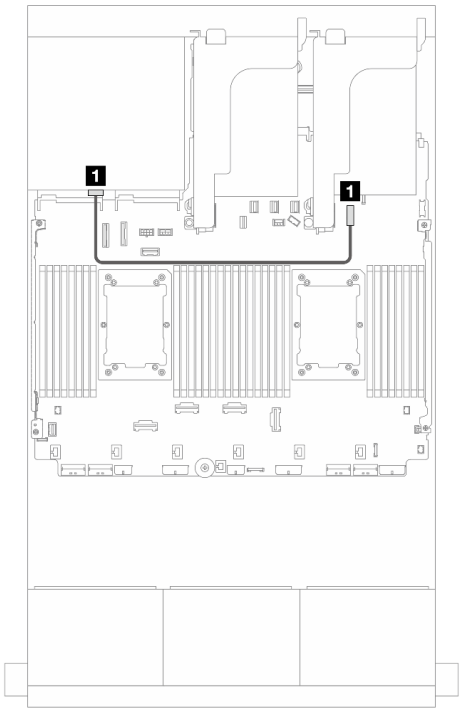


Figure 542. Power cable routing

From	To
1 Backplane 4: SAS	32i adapter • C3

From	To
1 Backplane 4: PWR	Onboard: 7mm power connector

Middle backplane cable routing

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

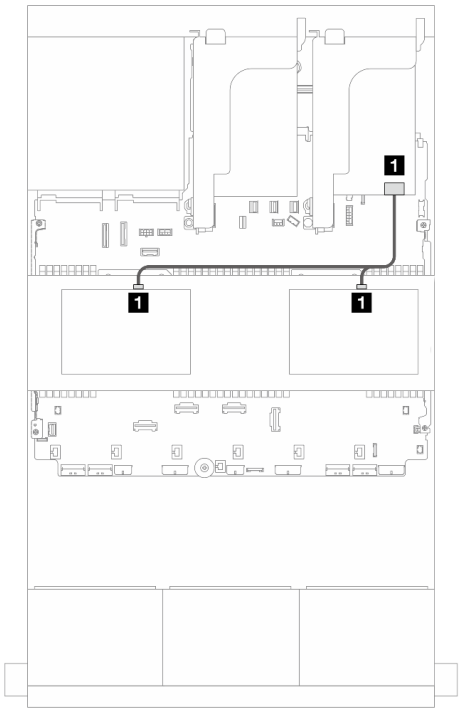


Figure 543. Signal cable routing

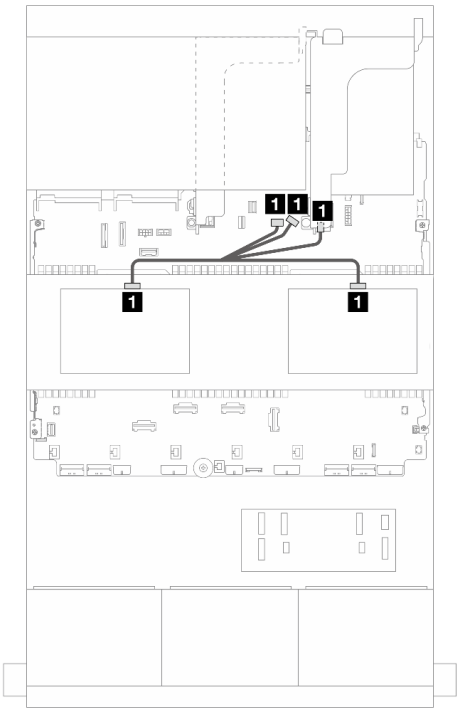


Figure 544. Power cable routing

From	To
1 • Backplane 5: SAS • Backplane 6: SAS	8i adapter • C0

From	To
1 • Backplane 5: PWR • Backplane 6: PWR	• Onboard: backplane power • Onboard: backplane sideband • Riser 1: PWR

CFF expander + 8i/16i RAID/HBA adapter

This topic provides cable routing information for the 24 x 2.5-inch SAS/SATA + 8 x 2.5-inch SAS/SATA+ 4 x 2.5-inch SAS/SATA configuration with one CFF expander and one 8i/16i RAID/HBA adapter.

Front backplane cable routing

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

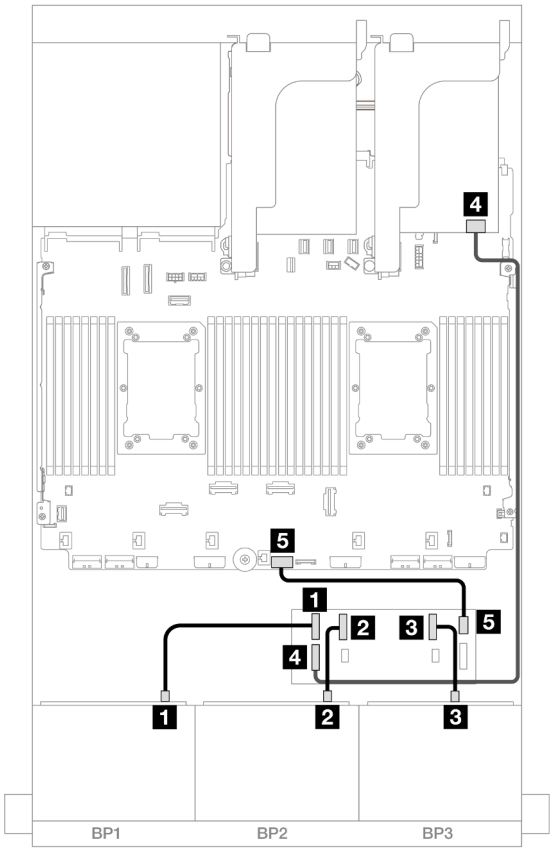


Figure 545. SAS/SATA cable routing to CFF expander and 8i/16i adapter

From	To
1 Backplane 1: SAS	CFF expander • C0
2 Backplane 2: SAS	• C1
3 Backplane 3: SAS	• C2
4 CFF expander: RAID/HBA	8i/16i adapter • Gen 4: C0 • Gen 3: C0C1
5 CFF expander: PWR	Onboard: CFF EXP PWR

Rear backplane cable routing

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

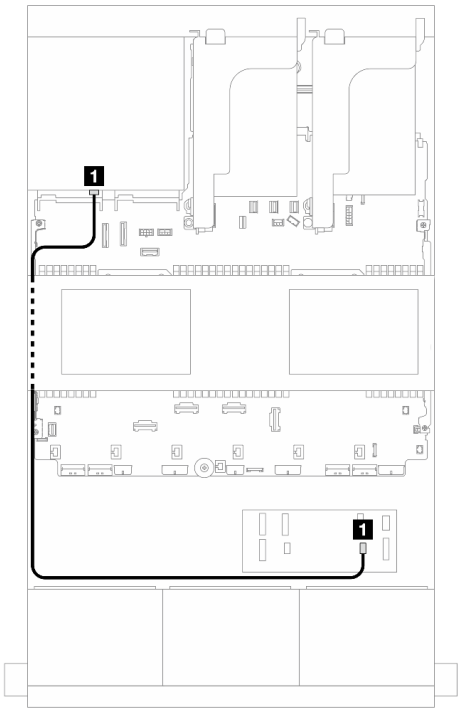


Figure 546. Signal cable routing

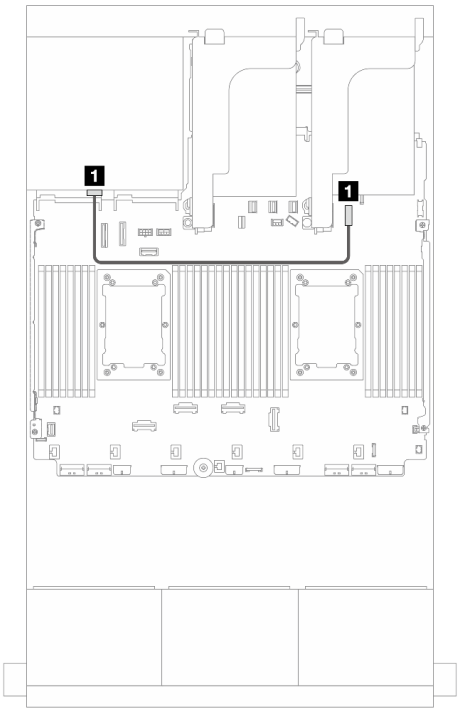


Figure 547. Power cable routing

From	To	From	To
1 Backplane 4: SAS	CFF expander • C4	1 Backplane 4: PWR	Onboard: 7mm power connector

Middle backplane cable routing

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

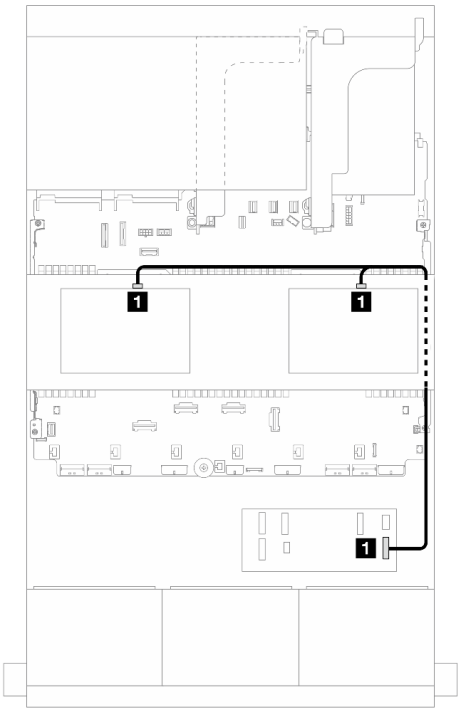


Figure 548. Signal cable routing

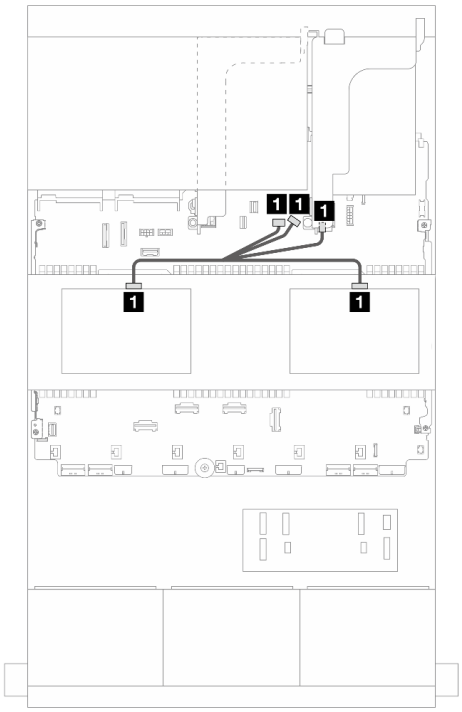


Figure 549. Power cable routing

From	To
1 • Backplane 5: SAS • Backplane 6: SAS	CFF expander • C3

From	To
1 • Backplane 5: PWR • Backplane 6: PWR	• Onboard: backplane power • Onboard: backplane sideband • Riser 1: PWR

CFF 16i RAID/HBA adapter + CFF expander

This topic provides cable routing information for the 24 x 2.5-inch SAS/SATA + 8 x 2.5-inch SAS/SATA + 4 x 2.5-inch SAS/SATA configuration with one CFF expander and one CFF 16i RAID/HBA adapter.

Front backplane cable routing

Cable routing when two processors installed

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

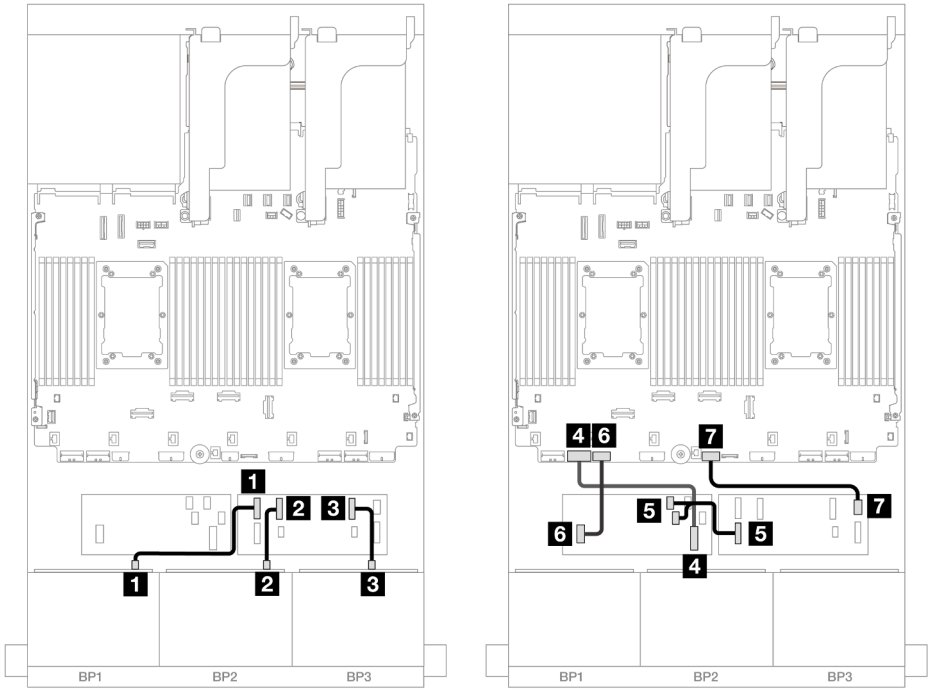


Figure 550. SAS/SATA cable routing to CFF expander and CFF 16i adapter

From	To
1 Backplane 1: SAS	CFF expander • C0
2 Backplane 2: SAS	• C1
3 Backplane 3: SAS	• C2
4 CFF adapter: MB (CFF input)	Onboard: PCIe 7
5 CFF expander: RAID/HBA	CFF adapter • C0 • C1
6 CFF adapter: PWR	Onboard: CFF RAID/HBA PWR
7 CFF expander: PWR	Onboard: CFF EXP PWR

Cable routing when one processor installed

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

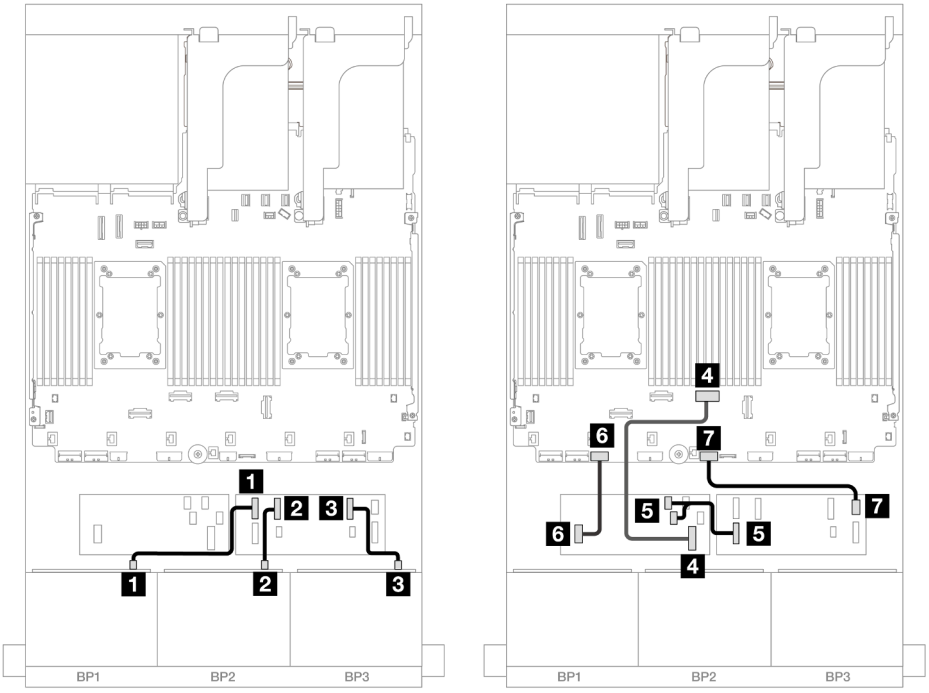


Figure 551. SAS/SATA cable routing to CFF expander and CFF 16i adapter

From	To
1 Backplane 1: SAS	CFF expander • C0
2 Backplane 2: SAS	• C1
3 Backplane 3: SAS	• C2
4 CFF adapter: MB (CFF input)	Onboard: PCIe 4
5 CFF expander: RAID/HBA	CFF adapter • C0 • C1
6 CFF adapter: PWR	Onboard: CFF RAID/HBA PWR
7 CFF expander: PWR	Onboard: CFF EXP PWR

Rear backplane cable routing

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

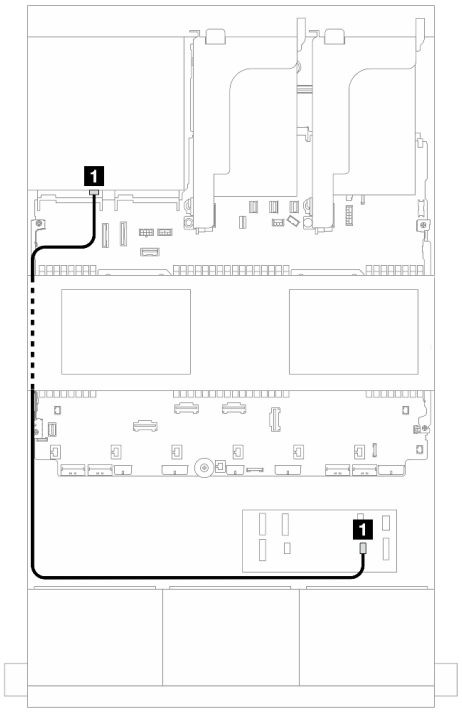


Figure 552. Signal cable routing

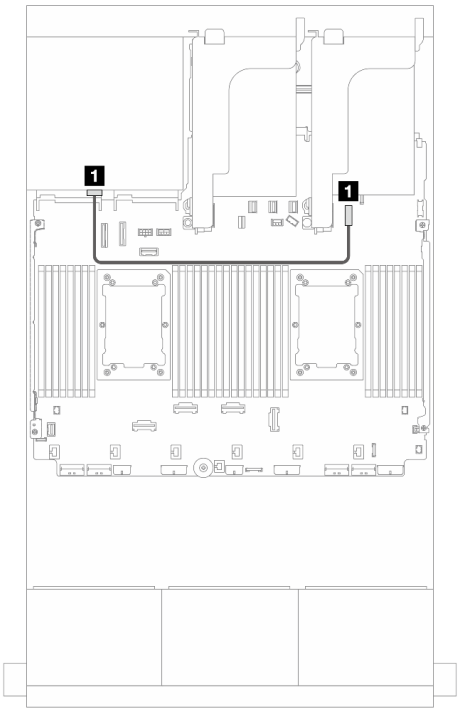


Figure 553. Power cable routing

From	To	From	To
1 Backplane 4: SAS	CFF expander • C4	1 Backplane 4: PWR	Onboard: 7mm power connector

Middle backplane cable routing

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

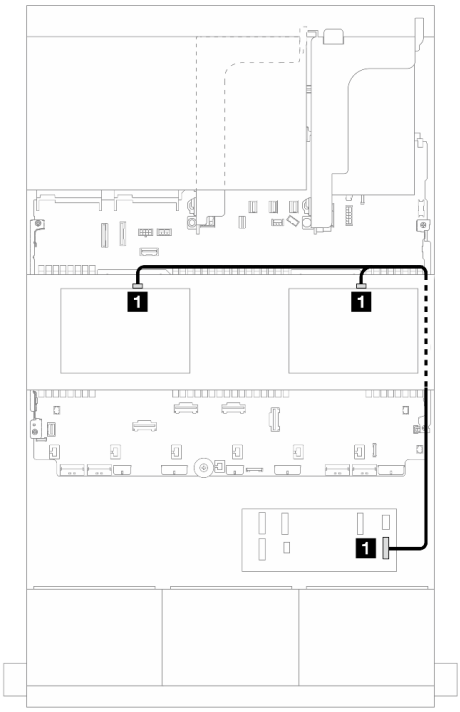


Figure 554. Signal cable routing

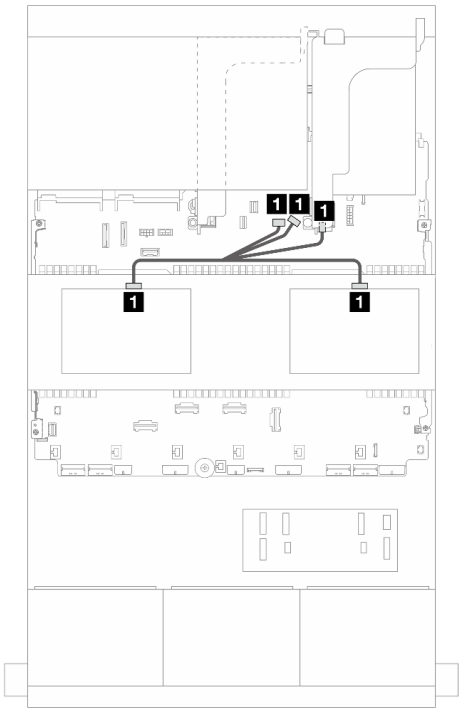


Figure 555. Power cable routing

From	To
1 • Backplane 5: SAS • Backplane 6: SAS	CFF expander • C3

From	To
1 • Backplane 5: PWR • Backplane 6: PWR	• Onboard: backplane power • Onboard: backplane sideband • Riser 1: PWR

24 x 2.5" SAS/SATA + 8 x 2.5" SAS/SATA+ 8 x 2.5" SAS/SATA

This topic provides cable routing information for the 24 x 2.5-inch SAS/SATA + 8 x 2.5-inch SAS/SATA + 8 x 2.5-inch SAS/SATA configuration.

To connect power cables for the front backplane(s), refer to “Backplanes: server models with 2.5-inch front drive bays” on page 360.

To connect signal cables for the front backplane(s), refer to the following cable routing scenarios depending on your server configuration.

- “CFF expander + 16i RAID/HBA adapter” on page 501
- “CFF 16i RAID/HBA adapter + CFF expander” on page 504

CFF expander + 16i RAID/HBA adapter

This topic provides cable routing information for the 24 x 2.5-inch SAS/SATA + 8 x 2.5-inch SAS/SATA+ 8 x 2.5-inch SAS/SATA configuration with one CFF expander and one 16i RAID/HBA adapter.

Front backplane cable routing

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

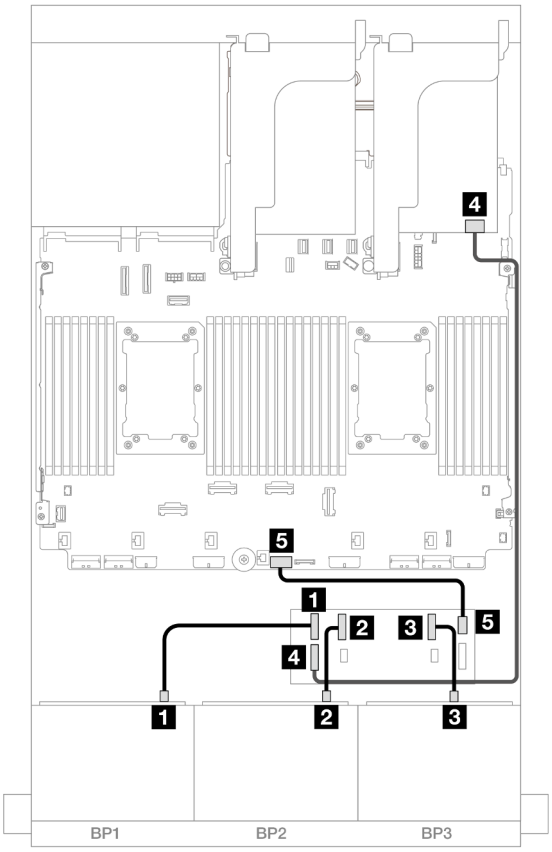


Figure 556. SAS/SATA cable routing to CFF expander and 16i adapter

From	To
1 Backplane 1: SAS	CFF expander • C0
2 Backplane 2: SAS	• C1
3 Backplane 3: SAS	• C2
4 CFF expander: RAID/HBA	16i adapter • Gen 4: C0 • Gen 3: C0C1
5 CFF expander: PWR	Onboard: CFF EXP PWR

Rear backplane cable routing

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

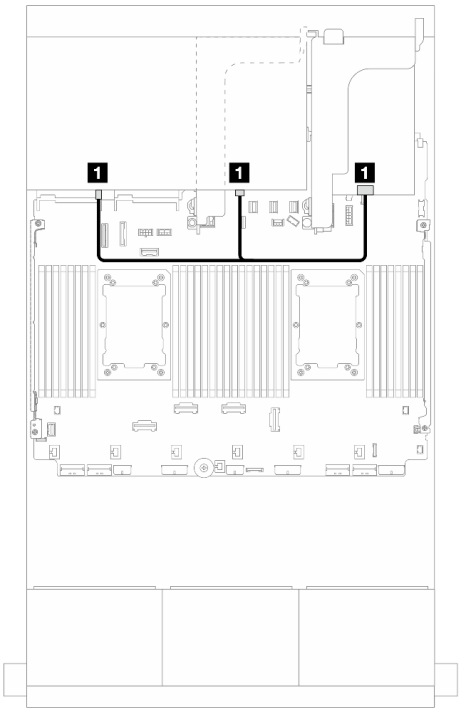


Figure 557. Signal cable routing

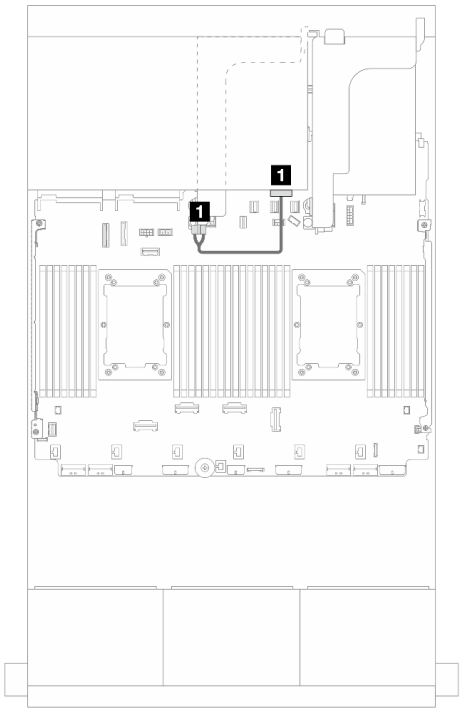


Figure 558. Power cable routing

From	To	From	To
1 Backplane 4: SAS 0, SAS 1	16i adapter • Gen 4: C1 • Gen 3: C2C3	1 Backplane 4: PWR	Riser 2: PWR1, PWR2

Middle backplane cable routing

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

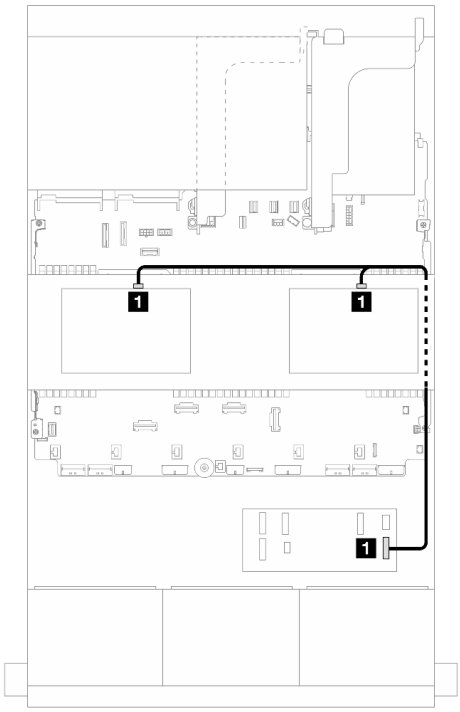


Figure 559. Signal cable routing

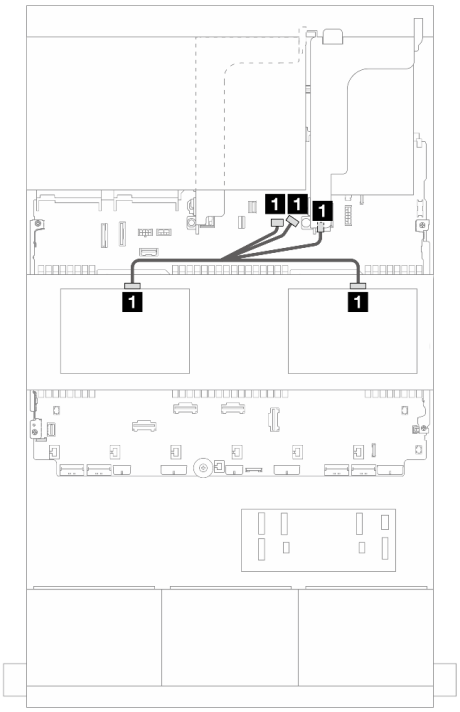


Figure 560. Power cable routing

From	To
1 • Backplane 5: SAS • Backplane 6: SAS	CFF expander • C3

From	To
1 • Backplane 5: PWR • Backplane 6: PWR	• Onboard: backplane power • Onboard: backplane sideband • Riser 1: PWR

CFF 16i RAID/HBA adapter + CFF expander

This topic provides cable routing information for the 24 x 2.5-inch SAS/SATA + 8 x 2.5-inch SAS/SATA + 8 x 2.5-inch SAS/SATA configuration with one CFF expander and one CFF 16i RAID/HBA adapter.

Front backplane cable routing

Cable routing when two processors installed

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

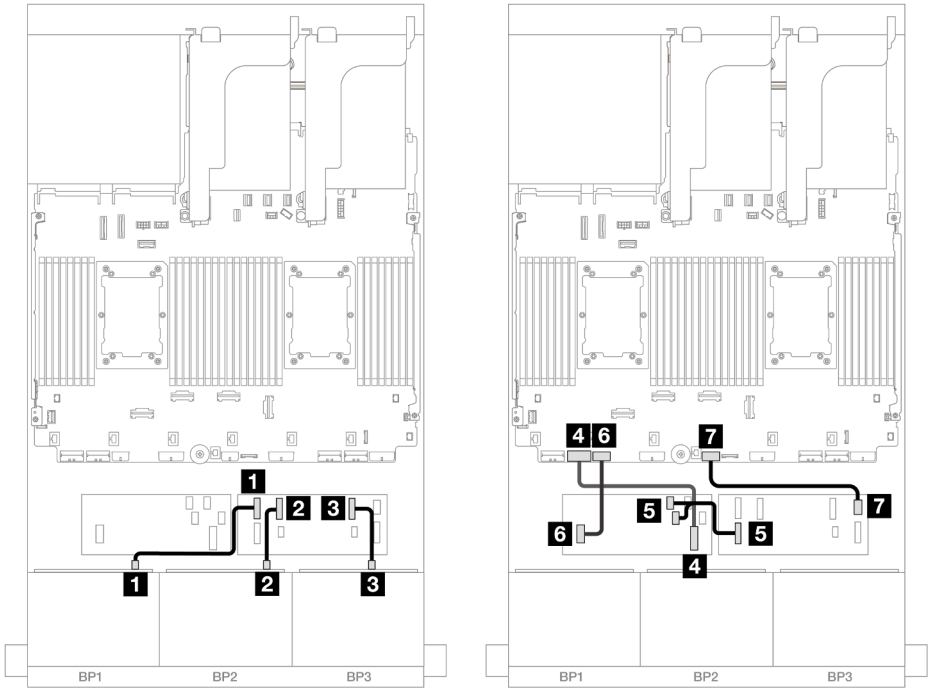


Figure 561. SAS/SATA cable routing to CFF expander and CFF 16i adapter

From	To
1 Backplane 1: SAS	CFF expander • C0
2 Backplane 2: SAS	• C1
3 Backplane 3: SAS	• C2
4 CFF adapter: MB (CFF input)	Onboard: PCIe 7
5 CFF expander: RAID/HBA	CFF adapter • C0 • C1
6 CFF adapter: PWR	Onboard: CFF RAID/HBA PWR
7 CFF expander: PWR	Onboard: CFF EXP PWR

Cable routing when one processor installed

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

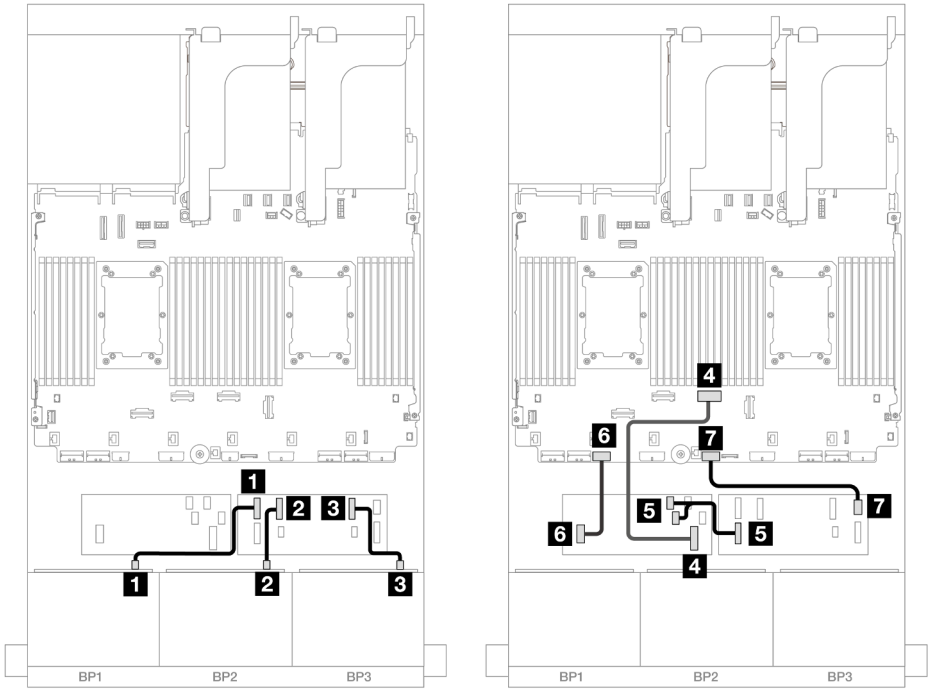


Figure 562. SAS/SATA cable routing to CFF expander and CFF 16i adapter

From	To
1 Backplane 1: SAS	CFF expander • C0
2 Backplane 2: SAS	• C1
3 Backplane 3: SAS	• C2
4 CFF adapter: MB (CFF input)	Onboard: PCIe 4
5 CFF expander: RAID/HBA	CFF adapter • C0 • C1
6 CFF adapter: PWR	Onboard: CFF RAID/HBA PWR
7 CFF expander: PWR	Onboard: CFF EXP PWR

Rear backplane cable routing

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

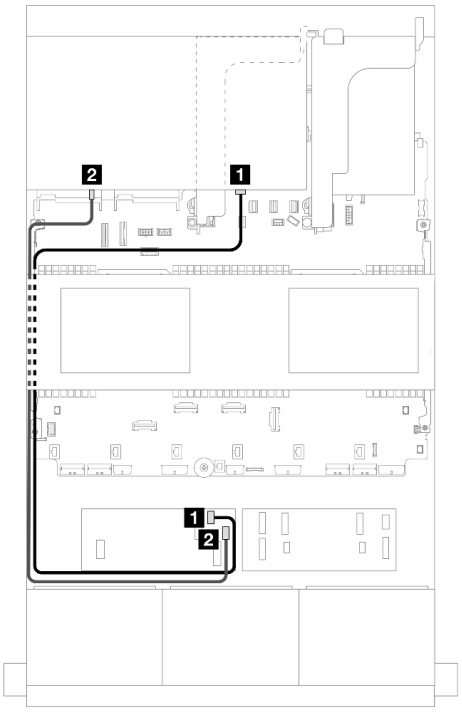


Figure 563. Signal cable routing

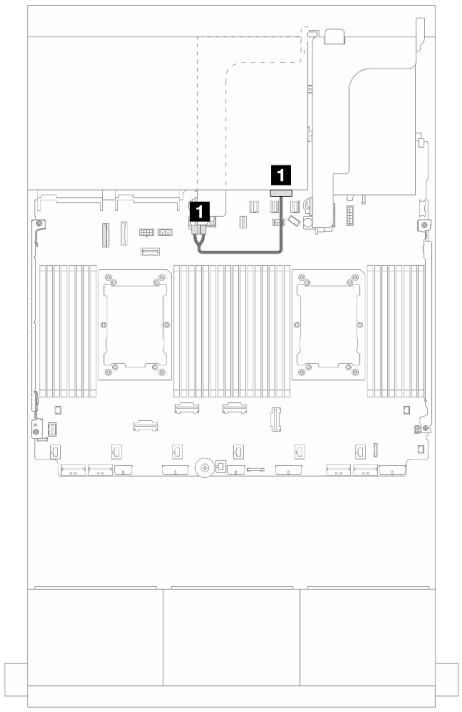


Figure 564. Power cable routing

From	To	From	To
1 Backplane 4: SAS 0	CFF adapter • C2	1 Backplane 4: PWR	Riser 2: PWR1, PWR2
2 Backplane 4: SAS 1	• C3		

Middle backplane cable routing

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

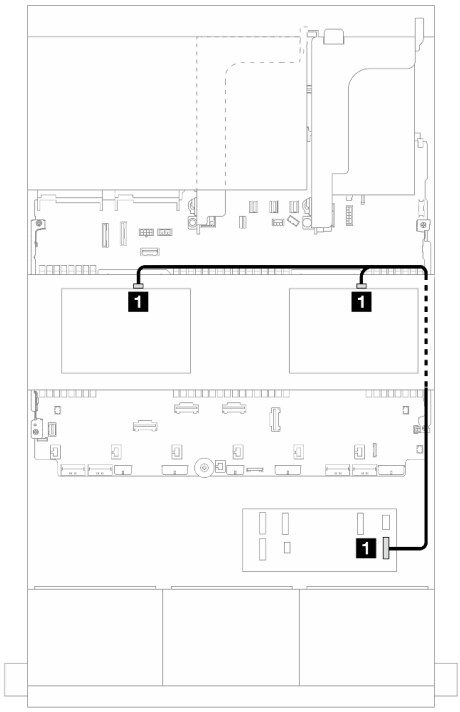


Figure 565. Signal cable routing

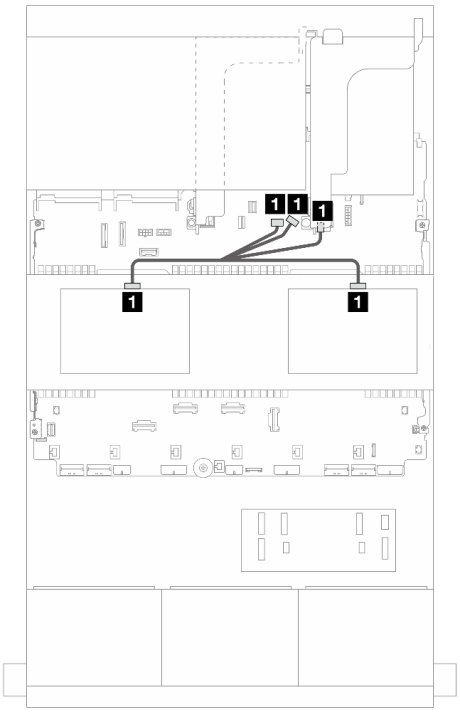


Figure 566. Power cable routing

From	To
1 • Backplane 5: SAS • Backplane 6: SAS	CFF expander • C3

From	To
1 • Backplane 5: PWR • Backplane 6: PWR	• Onboard: backplane power • Onboard: backplane sideband • Riser 1: PWR

Three 8 x AnyBay backplanes

This section provides cable routing information for the server model with three 8 x 2.5-inch AnyBay front drive backplanes.

To connect power cables for the front backplane(s), refer to “Backplanes: server models with 2.5-inch front drive bays” on page 360.

To connect signal cables for the front backplane(s), refer to the following cable routing scenarios depending on your server configuration.

- “8i RAID/HBA Trimode adapters” on page 509
- “8i + 16i RAID/HBA Trimode adapters” on page 508

8i + 16i RAID/HBA Trimode adapters

The following shows the cable connections for the 24 x 2.5-inch AnyBay configuration with one Trimode 8i RAID/HBA adapter and one Trimode 16i RAID/HBA adapter.

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

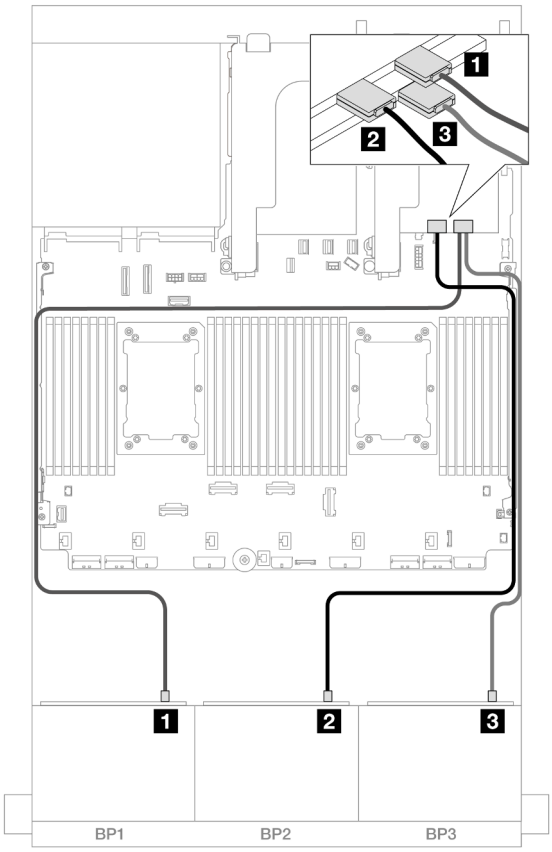


Figure 567. SAS/SATA cable routing to Trimode 8i/16i adapters

From	To
1 Backplane 1: SAS	16i adapter • C0
2 Backplane 2: SAS	• C1
3 Backplane 3: SAS	8i adapter • C0

8i RAID/HBA Trimode adapters

The following shows the cable connections for the 24 x 2.5-inch AnyBay configuration with three 8i Trimode RAID/HBA adapters.

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

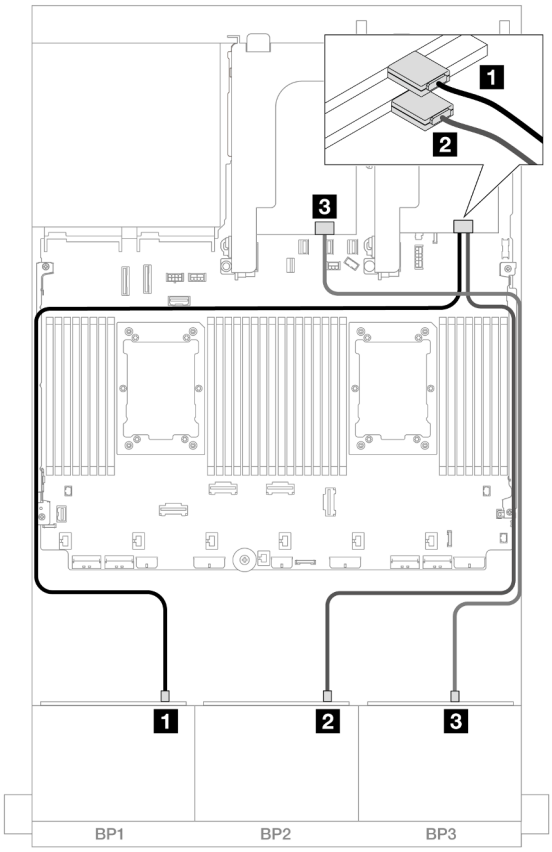


Figure 568. SAS/SATA cable routing to Trimode 8i adapters

From	To
1 Backplane 1: SAS	8i adapter • C0
2 Backplane 2: SAS	8i adapter • C0
3 Backplane 3: SAS	8i adapter • C0

Three 8 x NVMe backplanes (Gen 4)

This section provides cable routing information for the server model with three 8 x 2.5-inch NVMe front drive backplanes (Gen 4).

To connect power cables for the front backplane(s), refer to "Backplanes: server models with 2.5-inch front drive bays" on page 360.

To connect signal cables for the front backplane(s), refer to the following cable routing scenarios depending on your server configuration.

- "Front backplanes: 24 x NVMe" on page 511
- "Front + middle backplanes: 24 x NVMe + 8 x NVMe" on page 512
- "Front + rear backplanes: 24 x NVMe + 4 x NVMe" on page 513

- “Front + middle + rear backplanes: 24 x NVMe + 8 x NVMe + 4 x NVMe” on page 515

Front backplanes: 24 x NVMe

This section provides cable routing information for the server model with three 8 x 2.5-inch NVMe front drive backplanes (Gen 4).

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

Onboard PCIe connectors + Retimer

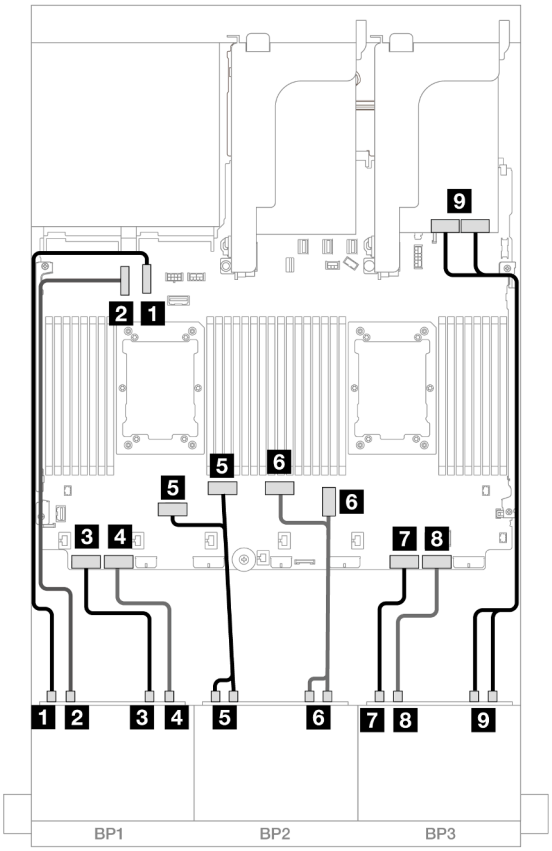


Figure 569. NVMe cable routing to onboard connectors and retimer

From	To
1 Backplane 1: NVMe 0-1	Onboard: PCIe 10
2 Backplane 1: NVMe 2-3	Onboard: PCIe 9
3 Backplane 1: NVMe 4-5	Onboard: PCIe 8
4 Backplane 1: NVMe 6-7	Onboard: PCIe 7
5 Backplane 2: NVMe 0-1, 2-3	Onboard: PCIe 6, 5
6 Backplane 2: NVMe 4-5, 6-7	Onboard: PCIe 3, 4
7 Backplane 3: NVMe 0-1	Onboard: PCIe 2

From	To
8 Backplane 3: NVMe 2-3	Onboard: PCIe 1
9 Backplane 3: NVMe 4-5, 6-7	Retimer: C0, C1

Front + middle backplanes: 24 x NVMe + 8 x NVMe

This section provides cable routing information for the 24 x NVMe (Gen 4) + 8 x NVMe configuration with three retimer cards.

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

Front backplane cable routing

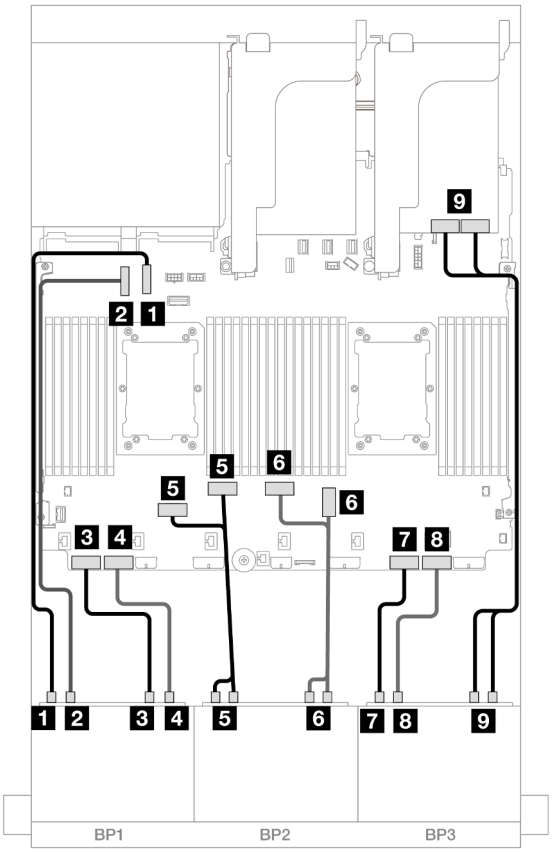


Figure 570. NVMe cable routing to onboard connectors and retimer

From	To
1 Backplane 1: NVMe 0-1	Onboard: PCIe 10
2 Backplane 1: NVMe 2-3	Onboard: PCIe 9
3 Backplane 1: NVMe 4-5	Onboard: PCIe 8
4 Backplane 1: NVMe 6-7	Onboard: PCIe 7
5 Backplane 2: NVMe 0-1, 2-3	Onboard: PCIe 6, 5
6 Backplane 2: NVMe 4-5, 6-7	Onboard: PCIe 3, 4

From	To
7 Backplane 3: NVMe 0-1	Onboard: PCIe 2
8 Backplane 3: NVMe 2-3	Onboard: PCIe 1
9 Backplane 3: NVMe 4-5, 6-7	Retimer: C0, C1

Middle backplane cable routing

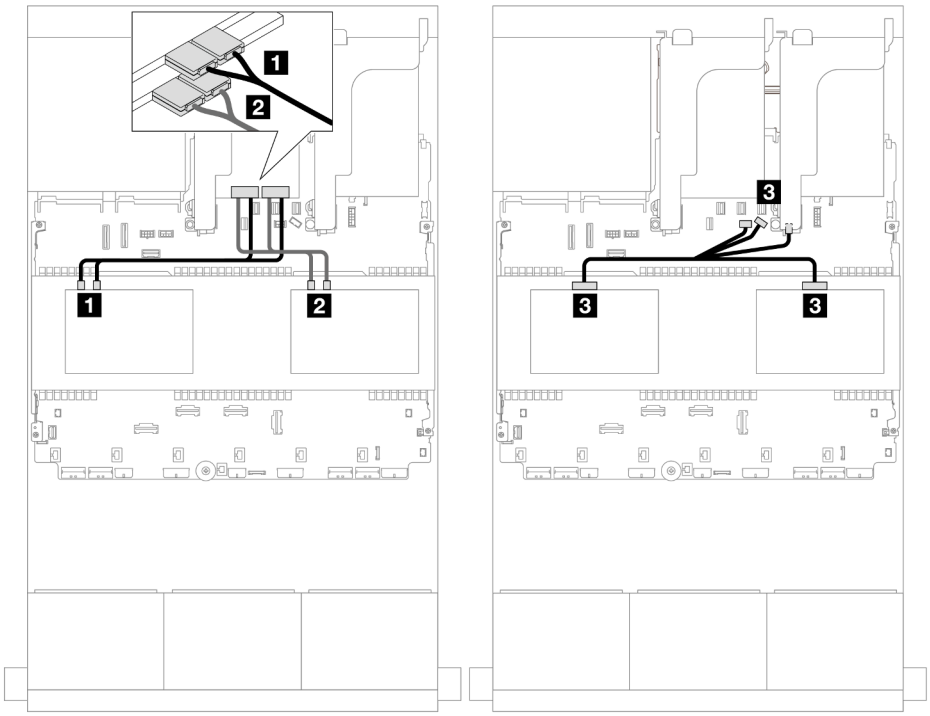


Figure 571. Middle backplane cable routing

From	To
1 Backplane 5: NVMe 0-1, 2-3	Retimer: C0, C1
2 Backplane 6: NVMe 0-1, 2-3	Retimer: C0, C1
3 • Backplane 5: PWR • Backplane 6: PWR	• Onboard: backplane power • Onboard: backplane sideband • Riser 1: PWR

Front + rear backplanes: 24 x NVMe + 4 x NVMe

This section provides cable routing information for the 24 x NVMe (Gen 4) + 4 x NVMe configuration with two retimer cards.

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

Front backplane cable routing

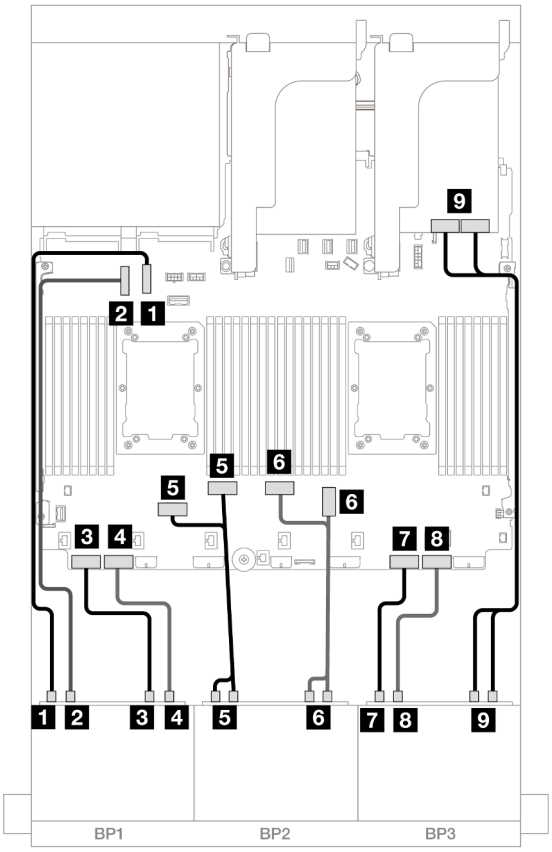


Figure 572. NVMe cable routing to onboard connectors and retimer

From	To
1 Backplane 1: NVMe 0-1	Onboard: PCIe 10
2 Backplane 1: NVMe 2-3	Onboard: PCIe 9
3 Backplane 1: NVMe 4-5	Onboard: PCIe 8
4 Backplane 1: NVMe 6-7	Onboard: PCIe 7
5 Backplane 2: NVMe 0-1, 2-3	Onboard: PCIe 6, 5
6 Backplane 2: NVMe 4-5, 6-7	Onboard: PCIe 3, 4
7 Backplane 3: NVMe 0-1	Onboard: PCIe 2
8 Backplane 3: NVMe 2-3	Onboard: PCIe 1
9 Backplane 3: NVMe 4-5, 6-7	Retimer: C0, C1

Rear backplane cable routing

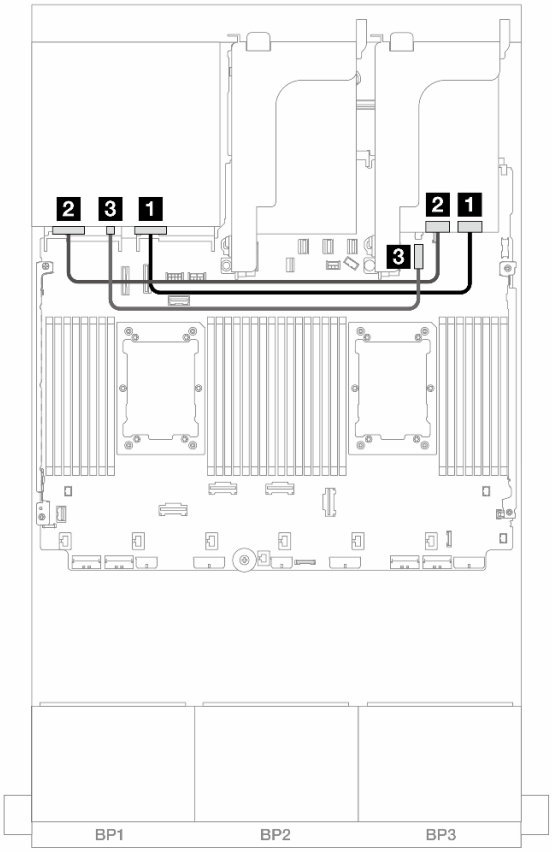


Figure 573. Rear backplane cable routing

From	To
1 Backplane 4: NVMe 0-1	Retimer: C0
2 Backplane 4: NVMe 2-3	Retimer: C1
3 Backplane 4: PWR	4 Onboard: 7mm power connector

Front + middle + rear backplanes: 24 x NVMe + 8 x NVMe + 4 x NVMe

This section provides cable routing information for the 24 x NVMe (Gen 4) + 8 x NVMe + 4 x NVMe configuration with four retimer cards.

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

Front backplane cable routing

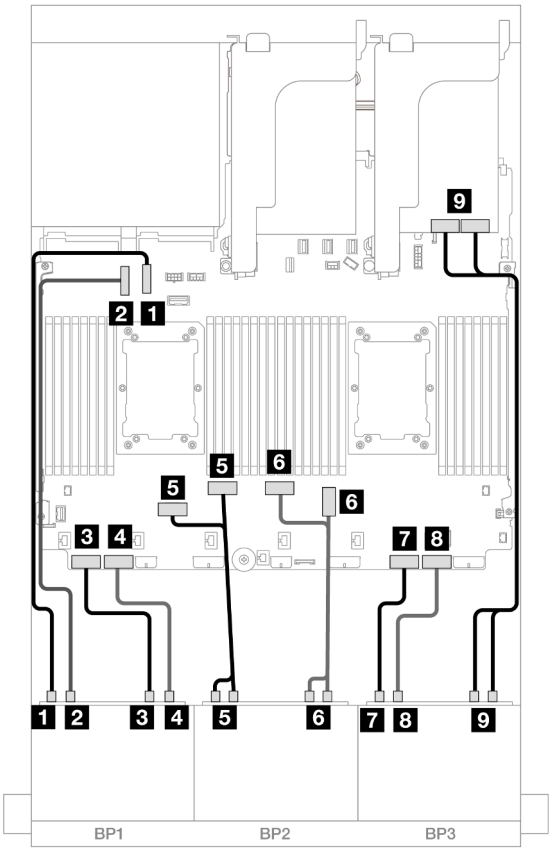


Figure 574. NVMe cable routing to onboard connectors and retimer

From	To
1 Backplane 1: NVMe 0-1	Onboard: PCIe 10
2 Backplane 1: NVMe 2-3	Onboard: PCIe 9
3 Backplane 1: NVMe 4-5	Onboard: PCIe 8
4 Backplane 1: NVMe 6-7	Onboard: PCIe 7
5 Backplane 2: NVMe 0-1, 2-3	Onboard: PCIe 6, 5
6 Backplane 2: NVMe 4-5, 6-7	Onboard: PCIe 3, 4
7 Backplane 3: NVMe 0-1	Onboard: PCIe 2
8 Backplane 3: NVMe 2-3	Onboard: PCIe 1
9 Backplane 3: NVMe 4-5, 6-7	Retimer: C0, C1

Middle/Rear backplane cable routing

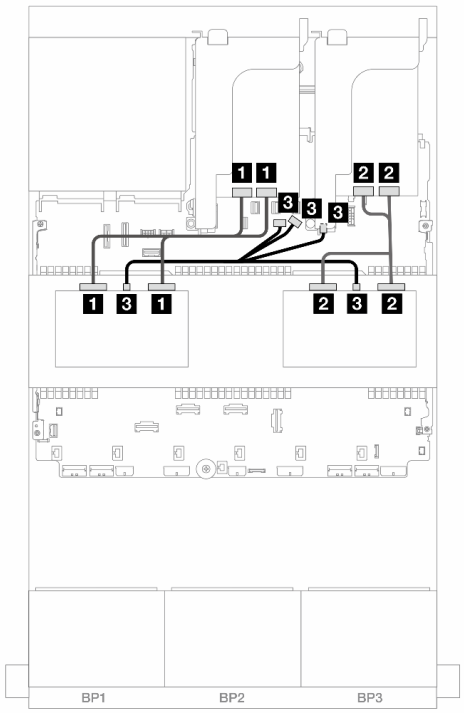


Figure 575. Middle backplane cable routing

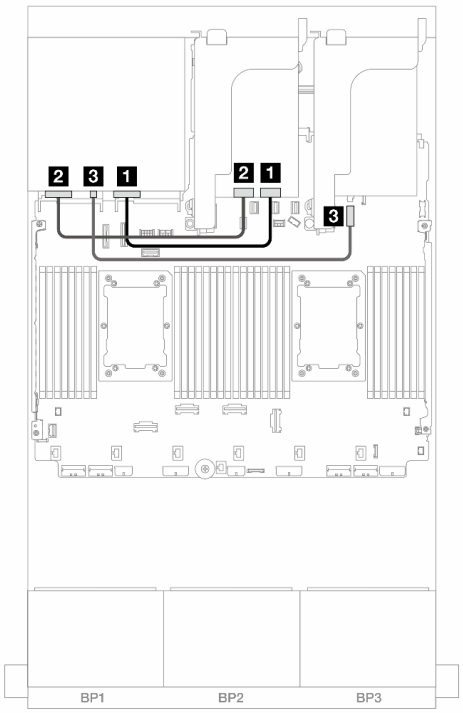


Figure 576. Rear backplane cable routing

From	To
1 Backplane 5: NVMe 0-1, 2-3	Retimer: C0, C1
2 Backplane 6: NVMe 0-1, 2-3	Retimer: C0, C1
3 • Backplane 5: PWR • Backplane 6: PWR	• Onboard: backplane power • Onboard: backplane sideband • Riser 1: PWR

From	To
1 Backplane 4: NVMe 0-1	Retimer: C0
2 Backplane 4: NVMe 2-3	Retimer: C1
3 Backplane 4: PWR	4 Onboard: 7mm power connector

Three 8 x NVMe backplanes (Gen 5)

This section provides cable routing information for the server model with three 8 x 2.5-inch NVMe front drive backplanes (Gen 5).

To connect power cables for the front backplane(s), refer to “Backplanes: server models with 2.5-inch front drive bays” on page 360.

To connect signal cables for the front backplane(s), refer to the following cable routing scenarios depending on your server configuration.

- “Front backplanes: 24 x NVMe” on page 518
- “Front + rear backplanes: 24 x NVMe + 4 x NVMe” on page 520
- “Front + middle backplanes: 24 x NVMe + 8 x NVMe (two 4 x AnyBay)” on page 521

- “Front + middle + rear backplanes: 24 x NVMe + 8 x NVMe (two 4 x AnyBay) + 4 x NVMe” on page 523

Front backplanes: 24 x NVMe

This topic provides cable routing information for the 24 x 2.5" NVMe (Gen 5) configuration with one or two retimer cards.

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

Onboard connectors + One retimer card

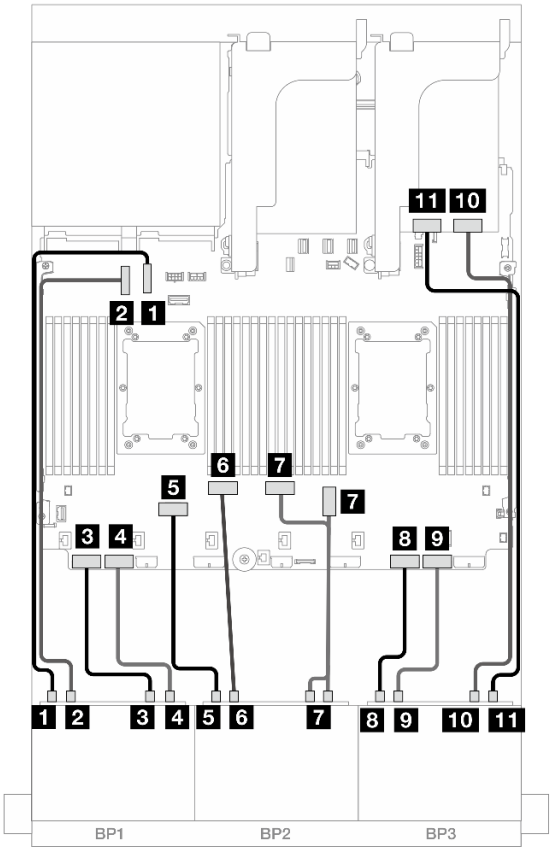


Figure 577. NVMe cable routing to onboard connectors and retimer card

From	To
1 Backplane 1: NVMe 0-1	Onboard: PCIe 10
2 Backplane 1: NVMe 2-3	Onboard: PCIe 9
3 Backplane 1: NVMe 4-5	Onboard: PCIe 8
4 Backplane 1: NVMe 6-7	Onboard: PCIe 7
5 Backplane 2: NVMe 0-1	Onboard: PCIe 6
6 Backplane 2: NVMe 2-3	Onboard: PCIe 5
7 Backplane 2: NVMe 4-5, 6-7	Onboard: PCIe 3, 4
8 Backplane 3: NVMe 0-1	Onboard: PCIe 2
9 Backplane 3: NVMe 2-3	Onboard: PCIe 1

From	To
10 Backplane 3: NVMe 4-5	Retimer: C0
11 Backplane 3: NVMe 6-7	Retimer: C1

Onboard connectors + Two retimer cards

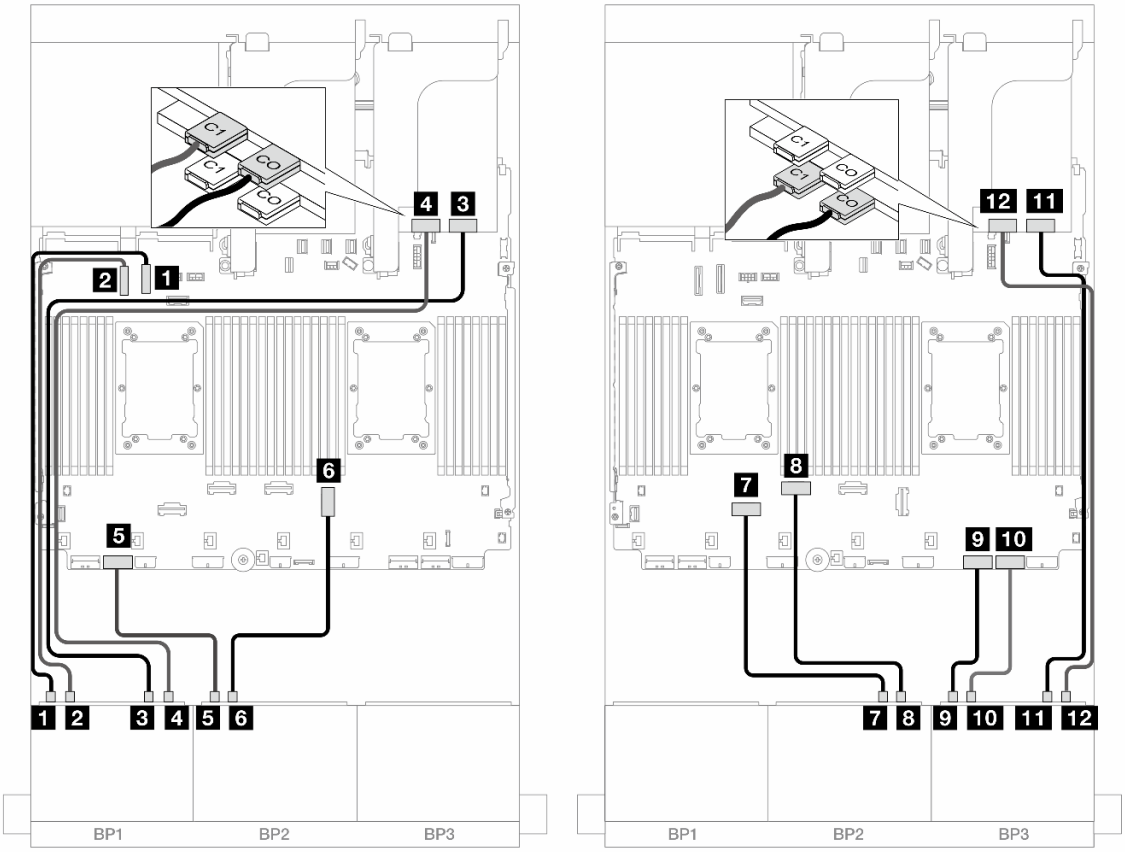


Figure 578. NVMe cable routing to onboard connectors and two retimer cards

From	To
1 Backplane 1: NVMe 0-1	Onboard: PCIe 10
2 Backplane 1: NVMe 2-3	Onboard: PCIe 9
3 Backplane 1: NVMe 4-5	Retimer: C0
4 Backplane 1: NVMe 6-7	Retimer: C1
5 Backplane 2: NVMe 0-1	Onboard: PCIe 7
6 Backplane 2: NVMe 2-3	Onboard: PCIe 3
7 Backplane 2: NVMe 4-5	Onboard: PCIe 6
8 Backplane 2: NVMe 6-7	Onboard: PCIe 5
9 Backplane 3: NVMe 0-1	Onboard: PCIe 2
10 Backplane 3: NVMe 2-3	Onboard: PCIe 1

From	To
11 Backplane 3: NVMe 4-5	Retimer: C0
12 Backplane 3: NVMe 6-7	Retimer: C1

Front + rear backplanes: 24 x NVMe + 4 x NVMe

This section provides cable routing information for the 24 x 2.5" NVMe (Gen 5) + 4 x 2.5" NVMe configuration with three retimer cards.

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

Front backplane cable routing

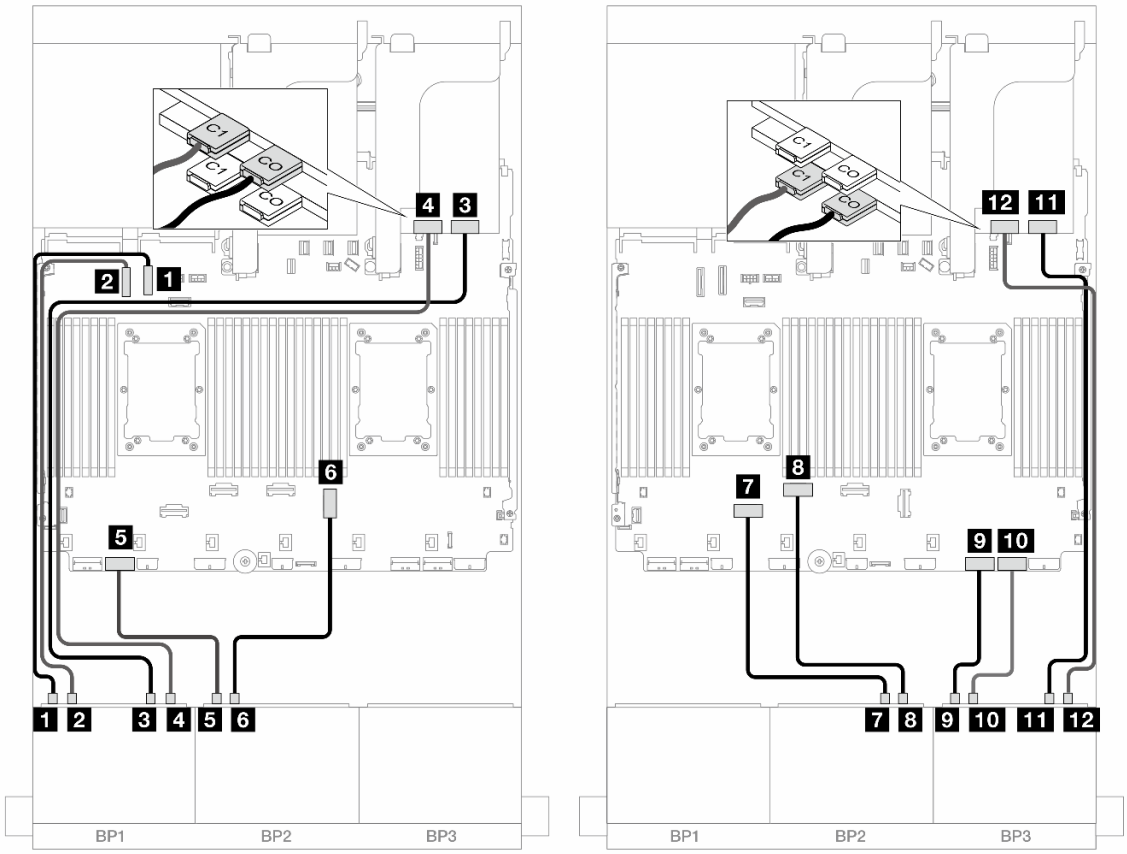


Figure 579. NVMe cable routing to onboard connectors and two retimer cards

From	To
1 Backplane 1: NVMe 0-1	Onboard: PCIe 10
2 Backplane 1: NVMe 2-3	Onboard: PCIe 9
3 Backplane 1: NVMe 4-5	Retimer: C0
4 Backplane 1: NVMe 6-7	Retimer: C1
5 Backplane 2: NVMe 0-1	Onboard: PCIe 7
6 Backplane 2: NVMe 2-3	Onboard: PCIe 3

From	To
7 Backplane 2: NVMe 4-5	Onboard: PCIe 6
8 Backplane 2: NVMe 6-7	Onboard: PCIe 5
9 Backplane 3: NVMe 0-1	Onboard: PCIe 2
10 Backplane 3: NVMe 2-3	Onboard: PCIe 1
11 Backplane 3: NVMe 4-5	Retimer: C0
12 Backplane 3: NVMe 6-7	Retimer: C1

Rear backplane cable routing

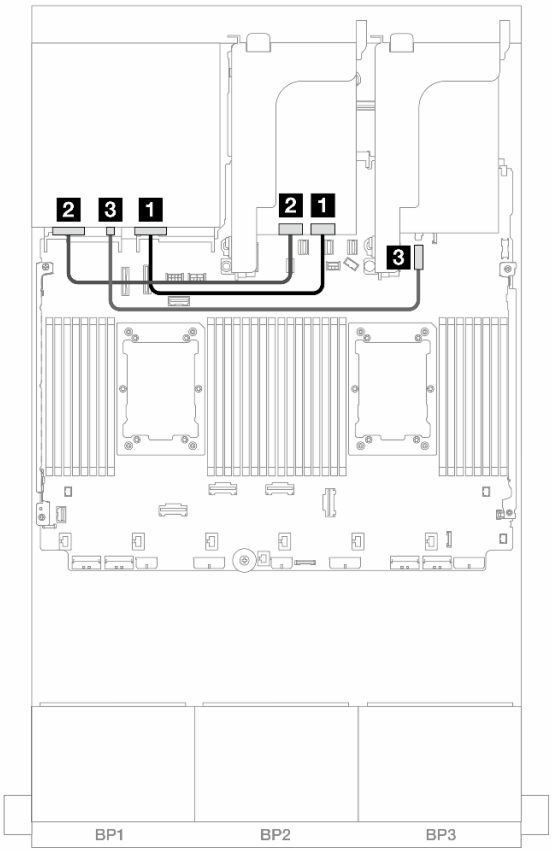


Figure 580. Rear backplane cable routing

From	To
1 Backplane 4: NVMe 0-1	Retimer: C0
2 Backplane 4: NVMe 2-3	Retimer: C1
3 Backplane 4: PWR	4 Onboard: 7mm power connector

Front + middle backplanes: 24 x NVMe + 8 x NVMe (two 4 x AnyBay)

This topic provides cable routing information for the 24 x 2.5" NVMe (Gen 5) + 8 x 2.5" NVMe (using two 4 x 2.5" AnyBay backplanes) configuration with three retimer cards.

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

Front backplane cable routing

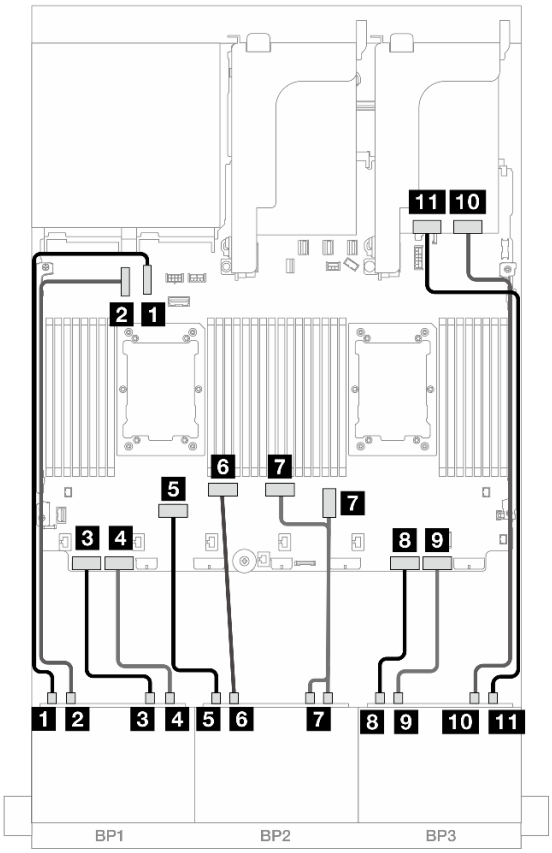


Figure 581. NVMe cable routing to onboard connectors and retimer card

From	To
1 Backplane 1: NVMe 0-1	Onboard: PCIe 10
2 Backplane 1: NVMe 2-3	Onboard: PCIe 9
3 Backplane 1: NVMe 4-5	Onboard: PCIe 8
4 Backplane 1: NVMe 6-7	Onboard: PCIe 7
5 Backplane 2: NVMe 0-1	Onboard: PCIe 6
6 Backplane 2: NVMe 2-3	Onboard: PCIe 5
7 Backplane 2: NVMe 4-5, 6-7	Onboard: PCIe 3, 4
8 Backplane 3: NVMe 0-1	Onboard: PCIe 2
9 Backplane 3: NVMe 2-3	Onboard: PCIe 1
10 Backplane 3: NVMe 4-5	Retimer: C0
11 Backplane 3: NVMe 6-7	Retimer: C1

Middle backplane cable routing

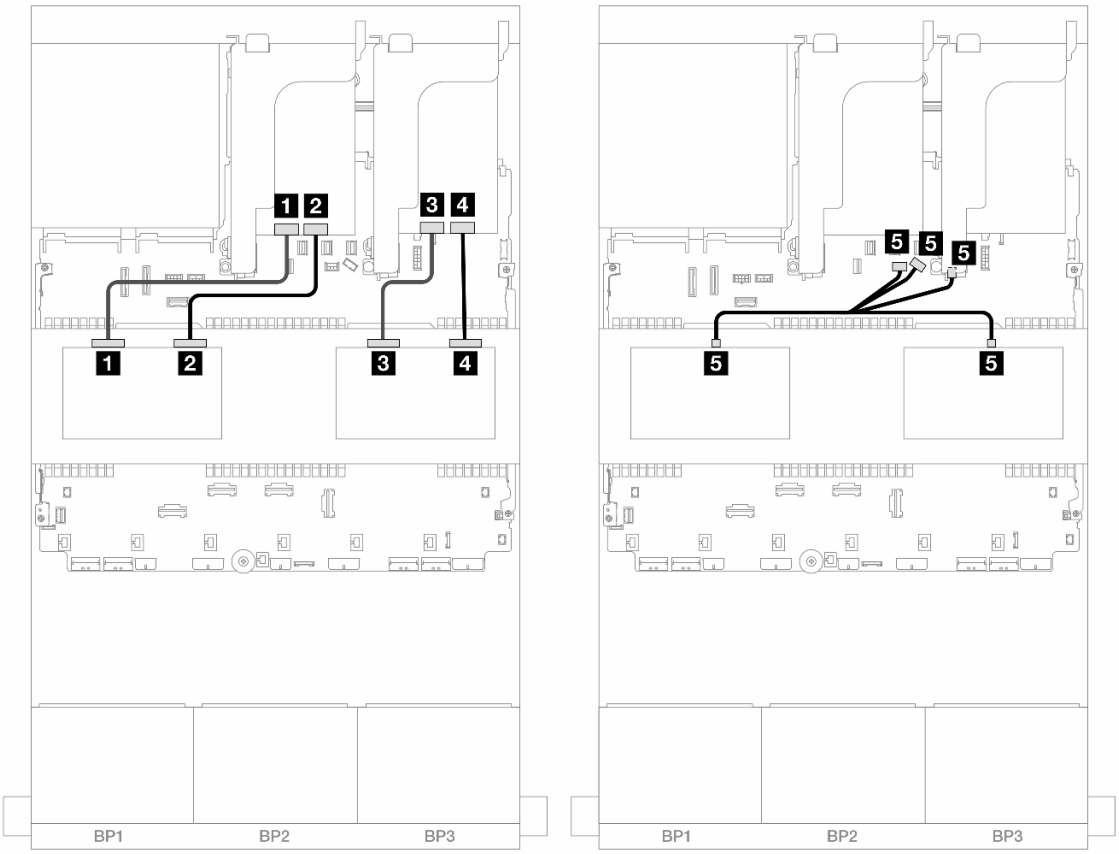


Figure 582. Middle backplane cable routing

From	To
1 Backplane 5: NVMe 0-1	Retimer: C1
2 Backplane 5: NVMe 2-3	Retimer: C0
3 Backplane 6: NVMe 0-1	Retimer: C1
4 Backplane 6: NVMe 2-3	Retimer: C0
5 • Backplane 5: PWR • Backplane 6: PWR	• Onboard: backplane power • Onboard: backplane sideband • Riser 1: PWR

Front + middle + rear backplanes: 24 x NVMe + 8 x NVMe (two 4 x AnyBay) + 4 x NVMe

This section provides cable routing information for the 24 x 2.5" NVMe + 8 x 2.5" NVMe (using two 4 x 2.5" AnyBay backplanes) + 4 x 2.5" NVMe configuration with four retimer cards.

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

Front backplane cable routing

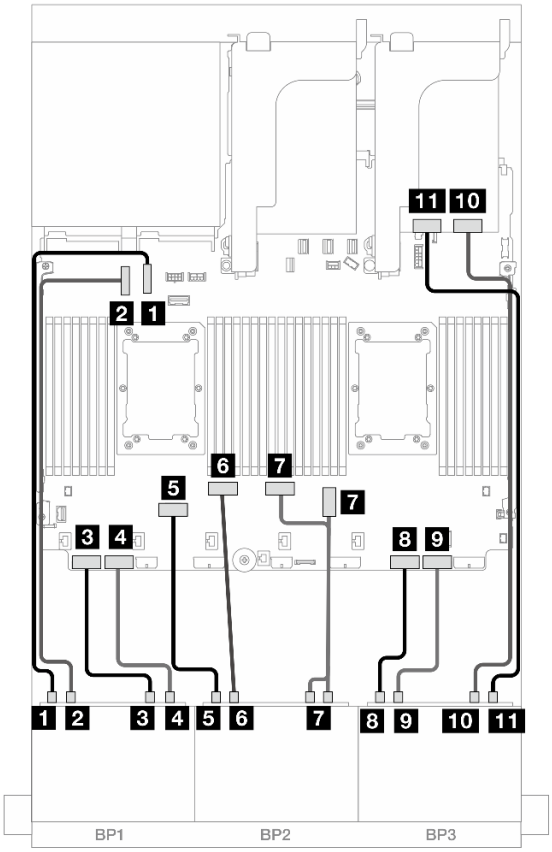


Figure 583. NVMe cable routing to onboard connectors and retimer card

From	To
1 Backplane 1: NVMe 0-1	Onboard: PCIe 10
2 Backplane 1: NVMe 2-3	Onboard: PCIe 9
3 Backplane 1: NVMe 4-5	Onboard: PCIe 8
4 Backplane 1: NVMe 6-7	Onboard: PCIe 7
5 Backplane 2: NVMe 0-1	Onboard: PCIe 6
6 Backplane 2: NVMe 2-3	Onboard: PCIe 5
7 Backplane 2: NVMe 4-5, 6-7	Onboard: PCIe 3, 4
8 Backplane 3: NVMe 0-1	Onboard: PCIe 2
9 Backplane 3: NVMe 2-3	Onboard: PCIe 1
10 Backplane 3: NVMe 4-5	Retimer: C0
11 Backplane 3: NVMe 6-7	Retimer: C1

Middle backplane cable routing

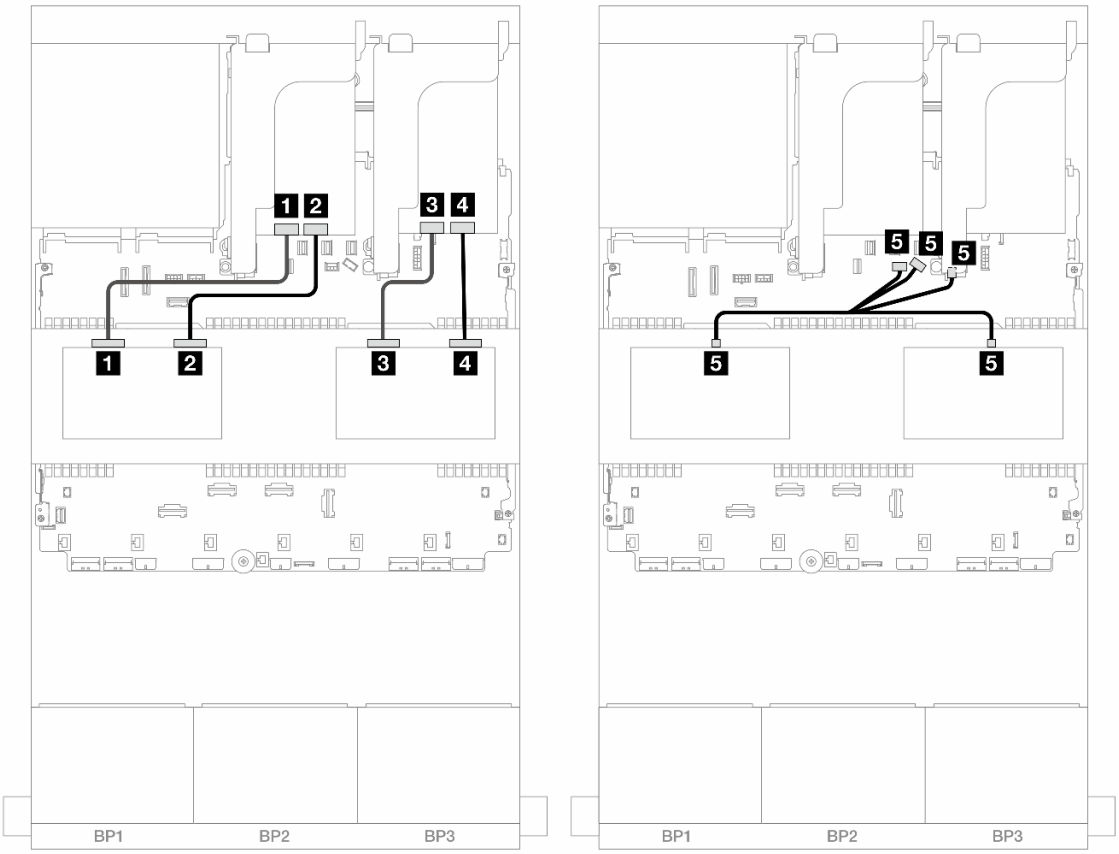


Figure 584. Middle backplane cable routing

From	To
1 Backplane 5: NVMe 0-1	Retimer: C1
2 Backplane 5: NVMe 2-3	Retimer: C0
3 Backplane 6: NVMe 0-1	Retimer: C1
4 Backplane 6: NVMe 2-3	Retimer: C0
5 • Backplane 5: PWR • Backplane 6: PWR	• Onboard: backplane power • Onboard: backplane sideband • Riser 1: PWR

Rear backplane cable routing

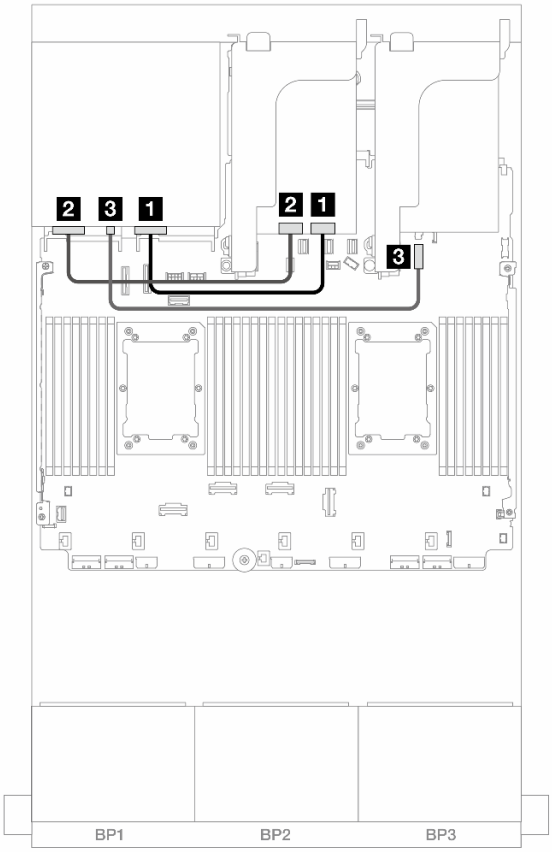


Figure 585. Rear backplane cable routing

From	To
1 Backplane 4: NVMe 0-1	Retimer: C0
2 Backplane 4: NVMe 2-3	Retimer: C1
3 Backplane 4: PWR	4 Onboard: 7mm power connector

One 8 x AnyBay and two 8 x NVMe backplanes (Gen 4)

This section provides cable routing information for the server model with one 8 x 2.5-inch AnyBay and two 8 x 2.5-inch NVMe front drive backplanes (Gen 4).

To connect power cables for the front backplane(s), refer to “Backplanes: server models with 2.5-inch front drive bays” on page 360.

SAS/SATA cable routing

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

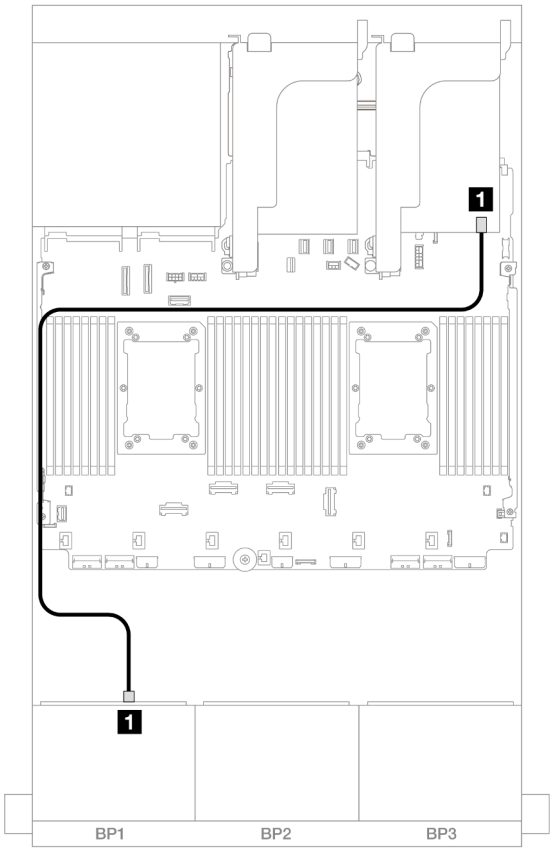


Figure 586. SAS/SATA cable routing to 8i adapter

From	To
1 Backplane 1: SAS	8i adapter • Gen 4: C0 • Gen 3: C0C1

NVMe cable routing

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

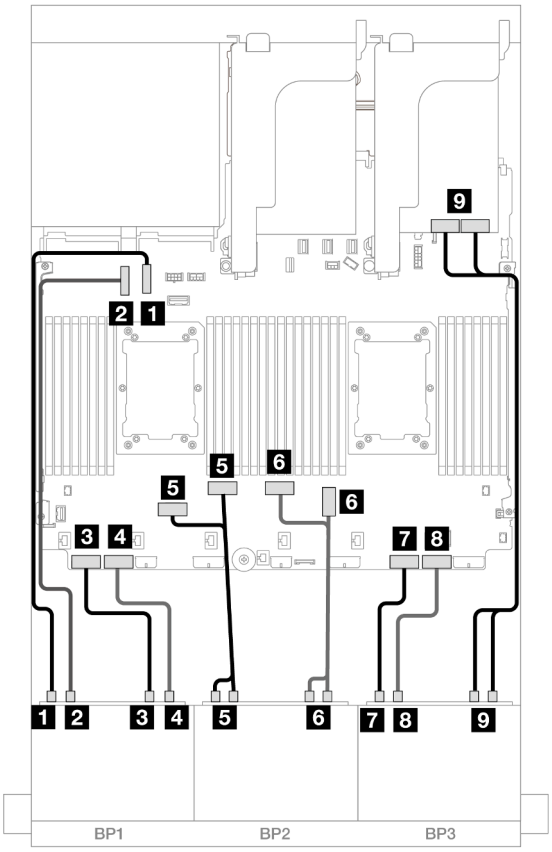


Figure 587. NVMe cable routing to onboard connectors and Retimer card

From	To
1 Backplane 1: NVMe 0-1	Onboard: PCIe 10
2 Backplane 1: NVMe 2-3	Onboard: PCIe 9
3 Backplane 1: NVMe 4-5	Onboard: PCIe 8
4 Backplane 1: NVMe 6-7	Onboard: PCIe 7
5 Backplane 2: NVMe 0-1, 2-3	Onboard: PCIe 6, 5
6 Backplane 2: NVMe 4-5, 6-7	Onboard: PCIe 3, 4
7 Backplane 3: NVMe 0-1	Onboard: PCIe 2
8 Backplane 3: NVMe 2-3	Onboard: PCIe 1
9 Backplane 3: NVMe 4-5, 6-7	Retimer: C0, C1

One 8 x AnyBay and two 8 x NVMe backplanes (Gen 5)

This section provides cable routing information for the server model with one 8 x 2.5-inch AnyBay and two 8 x 2.5-inch NVMe front drive backplanes (Gen 5).

To connect power cables for the front backplane(s), refer to "Backplanes: server models with 2.5-inch front drive bays" on page 360.

To connect signal cables for the front backplane(s), refer to the following cable routing scenarios depending on your server configuration.

- “8i RAID/HBA adapter + One retimer card” on page 529
- “8i RAID/HBA adapter + Two retimer cards” on page 530

8i RAID/HBA adapter + One retimer card

This topic provides cable routing information for the 8 x 2.5-inch AnyBay + 16 x 2.5-inch NVMe configuration (Gen 5) with one 8i RAID/HBA adapter and one retimer card.

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

SAS/SATA cable routing

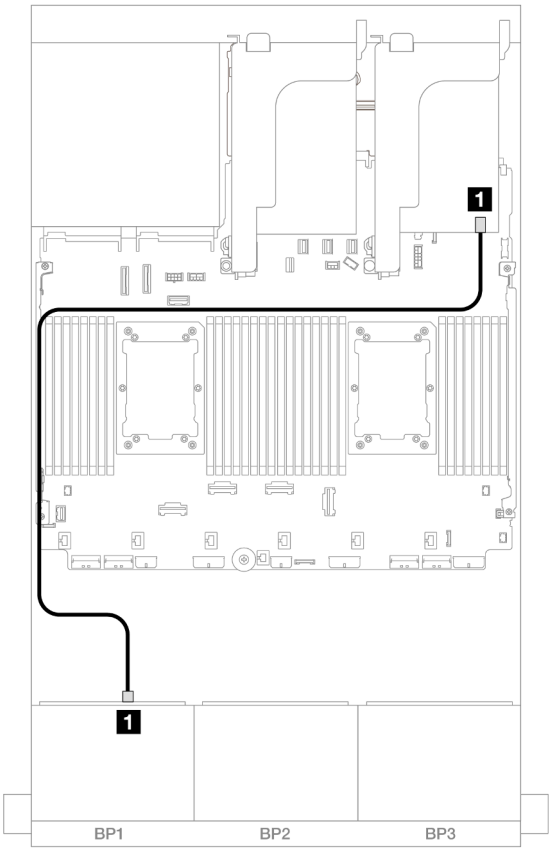


Figure 588. SAS/SATA cable routing to 8i adapter

From	To
1 Backplane 1: SAS	8i adapter • Gen 4: C0 • Gen 3: C0C1

NVMe cable routing

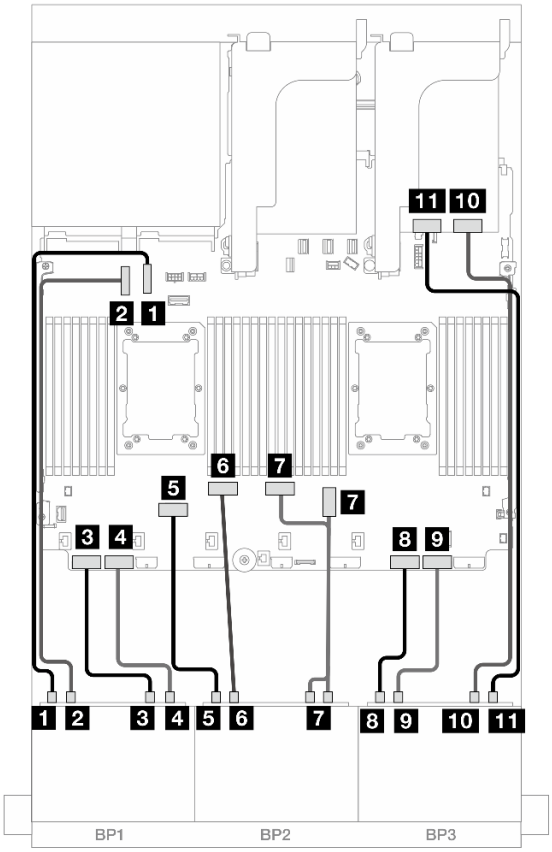


Figure 589. NVMe cable routing to onboard connectors and retimer card

From	To
1 Backplane 1: NVMe 0-1	Onboard: PCIe 10
2 Backplane 1: NVMe 2-3	Onboard: PCIe 9
3 Backplane 1: NVMe 4-5	Onboard: PCIe 8
4 Backplane 1: NVMe 6-7	Onboard: PCIe 7
5 Backplane 2: NVMe 0-1	Onboard: PCIe 6
6 Backplane 2: NVMe 2-3	Onboard: PCIe 5
7 Backplane 2: NVMe 4-5, 6-7	Onboard: PCIe 3, 4
8 Backplane 3: NVMe 0-1	Onboard: PCIe 2
9 Backplane 3: NVMe 2-3	Onboard: PCIe 1
10 Backplane 3: NVMe 4-5	Retimer: C0
11 Backplane 3: NVMe 6-7	Retimer: C1

8i RAID/HBA adapter + Two retimer cards

This topic provides cable routing information for the 8 x 2.5-inch AnyBay + 16 x 2.5-inch NVMe configuration (Gen 5) with one 8i RAID/HBA adapter and two retimer cards when two Platinum series processors are installed.

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

SAS/SATA cable routing

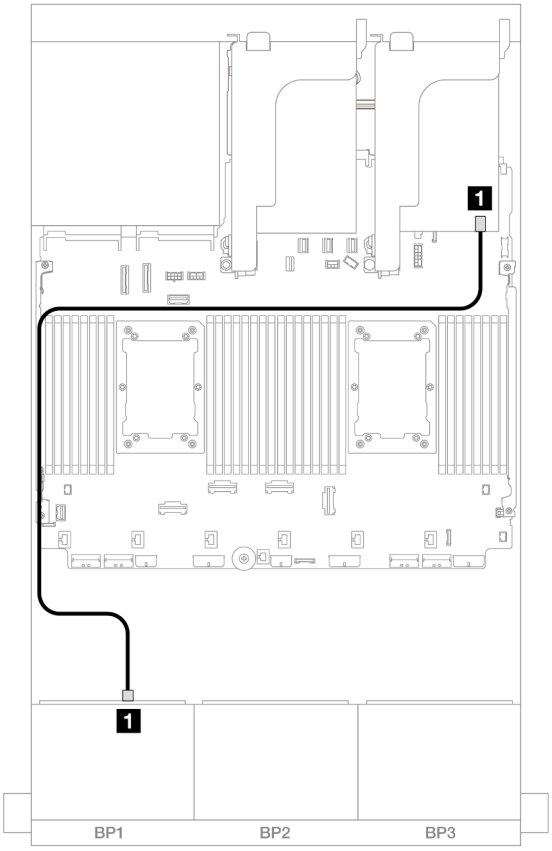


Figure 590. SAS/SATA cable routing to 8i adapter

From	To
1 Backplane 1: SAS	8i adapter • Gen 4: C0 • Gen 3: C0C1

NVMe cable routing

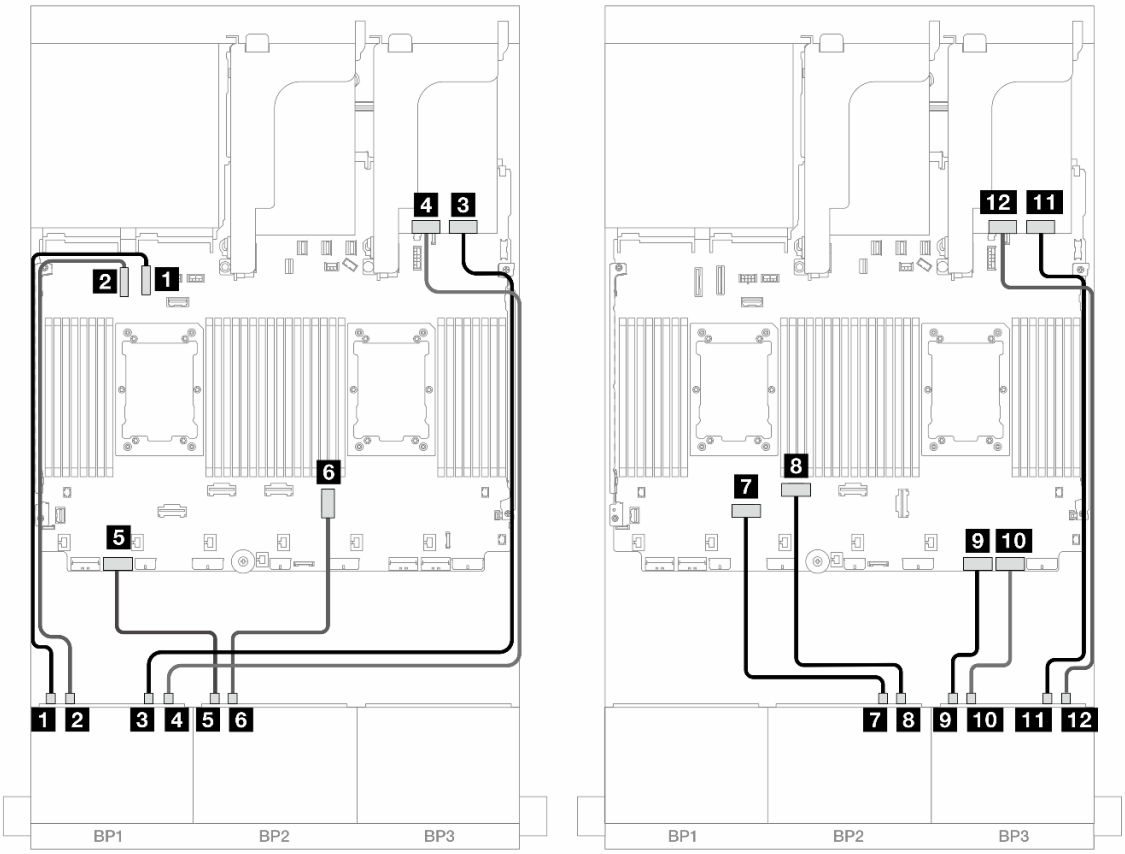


Figure 591. NVMe cable routing to onboard connectors and two retimer cards

From	To
1 Backplane 1: NVMe 0-1	Onboard: PCIe 10
2 Backplane 1: NVMe 2-3	Onboard: PCIe 9
3 Backplane 1: NVMe 4-5	Retimer: C0
4 Backplane 1: NVMe 6-7	Retimer: C1
5 Backplane 2: NVMe 0-1	Onboard: PCIe 7
6 Backplane 2: NVMe 2-3	Onboard: PCIe 3
7 Backplane 2: NVMe 4-5	Onboard: PCIe 6
8 Backplane 2: NVMe 6-7	Onboard: PCIe 5
9 Backplane 3: NVMe 0-1	Onboard: PCIe 2
10 Backplane 3: NVMe 2-3	Onboard: PCIe 1
11 Backplane 3: NVMe 4-5	Retimer: C0
12 Backplane 3: NVMe 6-7	Retimer: C1

One 8 x SAS/SATA and two 8 x NVMe (Gen 4) backplanes

This section provides cable routing information for the server model with one 8 x 2.5" SAS/SATA front drive backplane and two 8 x 2.5" NVMe front drive backplanes (Gen 4).

To connect power cables for the front backplane(s), refer to “Backplanes: server models with 2.5-inch front drive bays” on page 360.

SAS/SATA cable routing

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

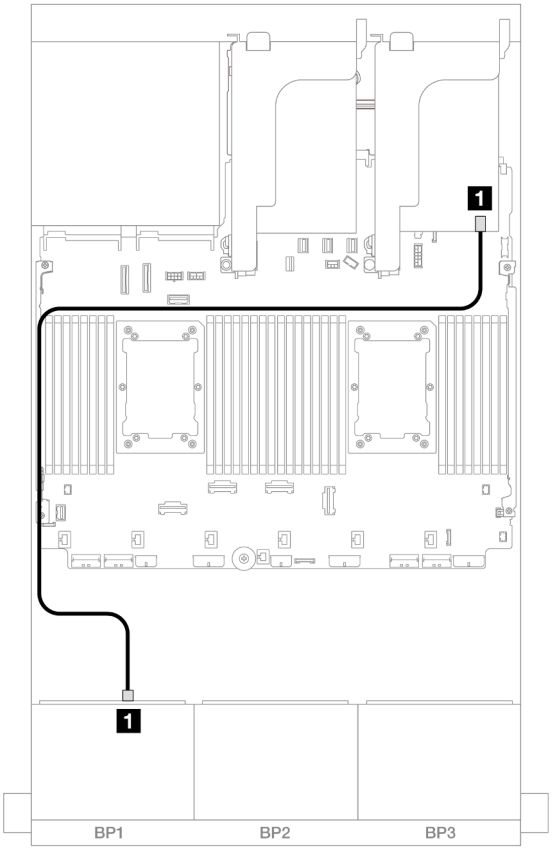


Figure 592. SAS/SATA cable routing to 8i adapter

From	To
1 Backplane 1: SAS	8i adapter • Gen 4: C0 • Gen 3: C0C1

NVMe cable routing

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

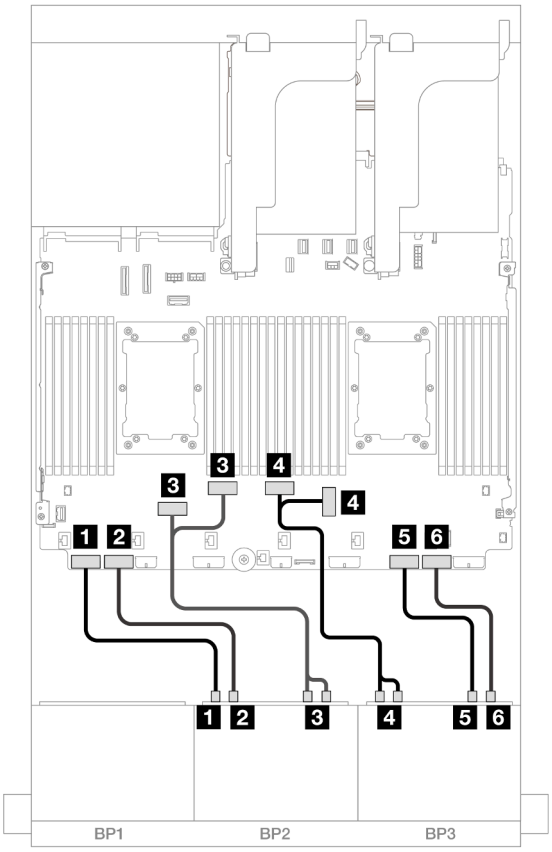


Figure 593. NVMe cable routing

From	To
1 Backplane 2: NVMe 0-1	Onboard: PCIe 8
2 Backplane 2: NVMe 2-3	Onboard: PCIe 7
3 Backplane 2: NVMe 4-5, 6-7	Onboard: PCIe 6, 5
4 Backplane 3: NVMe 0-1, 2-3	Onboard: PCIe 3, 4
5 Backplane 3: NVMe 4-5	Onboard: PCIe 2
6 Backplane 3: NVMe 6-7	Onboard: PCIe 1

One 8 x SAS/SATA and two 8 x NVMe (Gen 5) backplanes

This section provides cable routing information for the server model with one 8 x 2.5" SAS/SATA front drive backplane and two 8 x 2.5" NVMe front drive backplanes (Gen 5).

To connect power cables for the front backplane(s), refer to "Backplanes: server models with 2.5-inch front drive bays" on page 360.

To connect signal cables for the front backplane(s), refer to the following cable routing scenarios depending on your server configuration.

- "Onboard connectors + 8i RAID/HBA adapter" on page 535
- "Onboard connectors + 8i RAID/HBA adapter + Retimer card" on page 536

Onboard connectors + 8i RAID/HBA adapter

This topic provides cable routing information for the 8 x 2.5" SAS/SATA + 16 x 2.5" NVMe (Gen 5) configuration with one 8i RAID/HBA adapter.

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

SAS/SATA cable routing

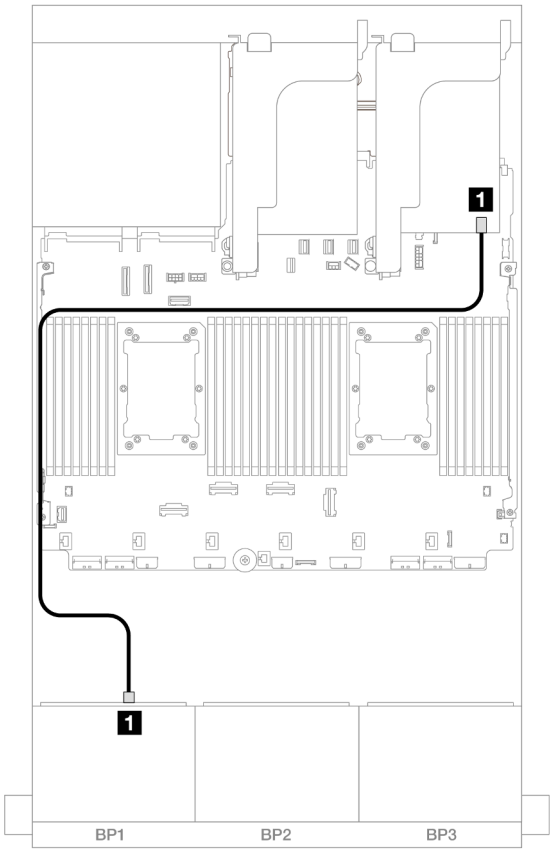


Figure 594. SAS/SATA cable routing to 8i adapter

From	To
1 Backplane 1: SAS	8i adapter • Gen 4: C0 • Gen 3: C0C1

NVMe cable routing

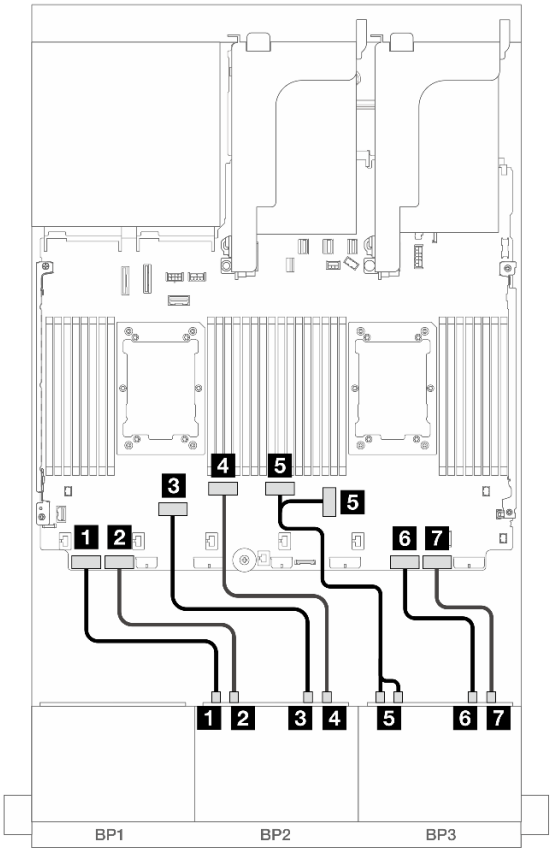


Figure 595. NVMe cable routing to onboard connectors

From	To
1 Backplane 2: NVMe 0-1	Onboard: PCIe 8
2 Backplane 2: NVMe 2-3	Onboard: PCIe 7
3 Backplane 2: NVMe 4-5	Onboard: PCIe 6
4 Backplane 2: NVMe 6-7	Onboard: PCIe 5
5 Backplane 3: NVMe 0-1, 2-3	Onboard: PCIe 4, 3
6 Backplane 3: NVMe 4-5	Onboard: PCIe 2
7 Backplane 3: NVMe 6-7	Onboard: PCIe 1

Onboard connectors + 8i RAID/HBA adapter + Retimer card

This topic provides cable routing information for the 8 x 2.5" SAS/SATA + 16 x 2.5" NVMe (Gen 5) configuration with one 8i RAID/HBA adapter and one retimer card when two Platinum series processors are installed.

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

SAS/SATA cable routing

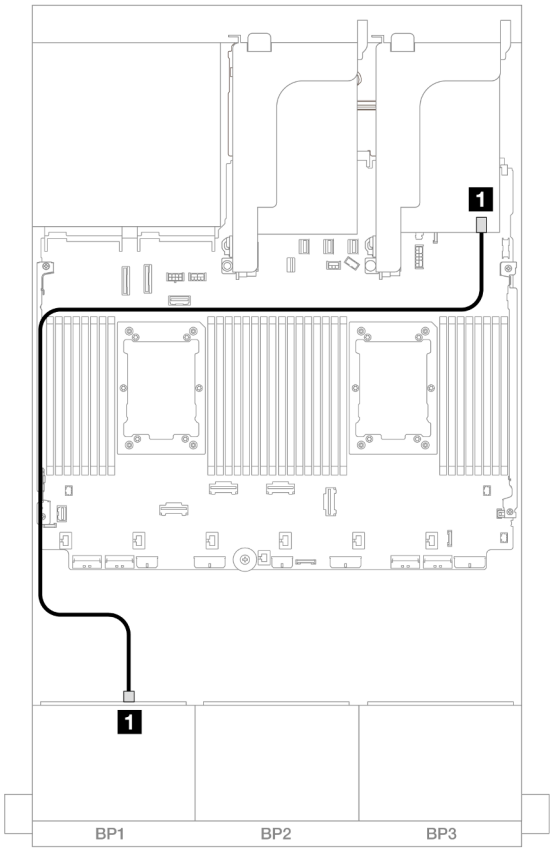


Figure 596. SAS/SATA cable routing to 8i adapter

From	To
1 Backplane 1: SAS	8i adapter • Gen 4: C0 • Gen 3: C0C1

NVMe cable routing

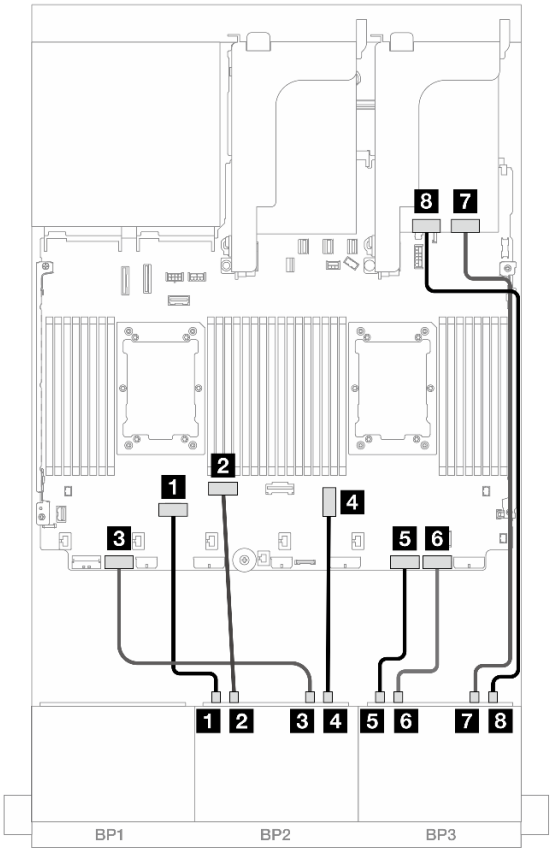


Figure 597. NVMe cable routing to onboard connectors and retimer card

From	To
1 Backplane 2: NVMe 0-1	Onboard: PCIe 6
1 Backplane 2: NVMe 2-3	Onboard: PCIe 5
2 Backplane 2: NVMe 4-5	Onboard: PCIe 7
3 Backplane 2: NVMe 6-7	Onboard: PCIe 3
4 Backplane 3: NVMe 0-1	Onboard: PCIe 2
5 Backplane 3: NVMe 2-3	Onboard: PCIe 1
6 Backplane 3: NVMe 4-5	Retimer: C0
7 Backplane 3: NVMe 6-7	Retimer: C1

One 8 x SAS/SATA and two 8 x AnyBay backplanes

This section provides cable routing information for the server model with one 8 x 2.5-inch SAS/SATA and two 8 x 2.5-inch AnyBay front drive backplanes.

To connect power cables for the front backplane(s), refer to “Backplanes: server models with 2.5-inch front drive bays” on page 360.

8i RAID/HBA adapter + 16i Trimode RAID adapter

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

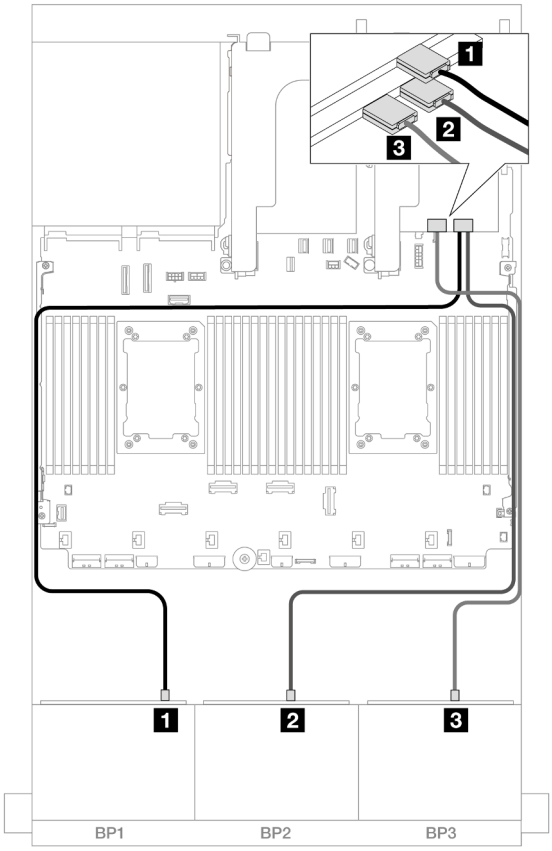


Figure 598. Cable routing to one 8i adapter and one Trimode 16i adapter

From	To
1 Backplane 1: SAS	8i adapter • C0
2 Backplane 2: SAS	16i adapter • C0
3 Backplane 3: SAS	• C1

Two 8 x SAS/SATA and one 8 x AnyBay (Gen 4) backplanes

This section provides cable routing information for the server model with two 8 x 2.5-inch SAS/SATA and one 8 x 2.5-inch AnyBay (Gen 4) front drive backplanes.

- “Front backplanes: 16 x 2.5" SAS/SATA + 8 x 2.5" AnyBay” on page 539
- “Front + rear backplanes: (16 x 2.5" SAS/SATA + 8 x 2.5" AnyBay) + 4 x 2.5" SAS/SATA” on page 544

Front backplanes: 16 x 2.5" SAS/SATA + 8 x 2.5" AnyBay

This topic provides cable routing information for the 16 x 2.5" SAS/SATA + 8 x 2.5" AnyBay (Gen 4) configuration.

To connect power cables for the front backplane(s), refer to “Backplanes: server models with 2.5-inch front drive bays” on page 360.

To connect signal cables for the front backplane(s), refer to the following cable routing scenarios depending on your server configuration.

- “32i RAID/HBA adapter” on page 540
- “8i RAID/HBA adapters” on page 541
- “CFF expander + 8i RAID/HBA adapter” on page 542

32i RAID/HBA adapter

This topic provides cable routing information for the 16 x 2.5" SAS/SATA + 8 x 2.5" AnyBay (Gen 4) configuration with one 32i RAID/HBA adapter.

SAS/SATA cable routing

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

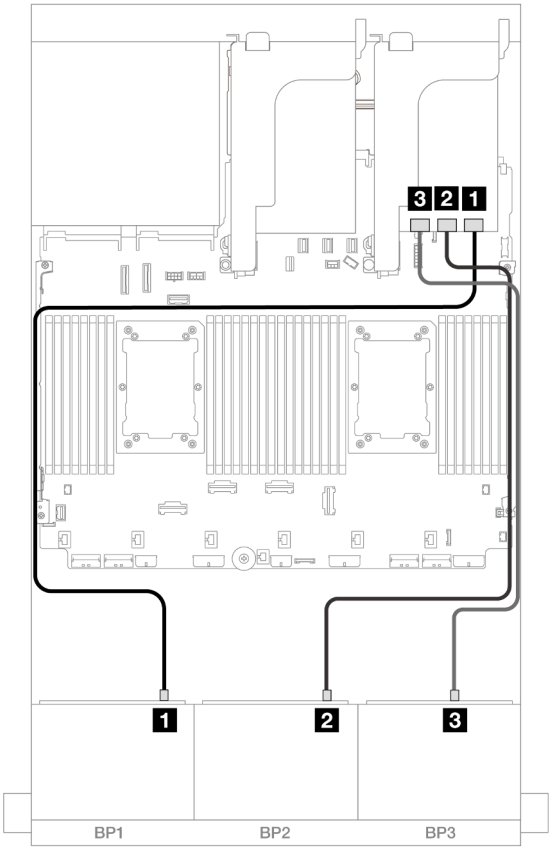


Figure 599. SAS/SATA cable routing

From	To
1 Backplane 1: SAS	32i adapter • C0
2 Backplane 2: SAS	• C1
3 Backplane 3: SAS	• C2

NVMe cable routing

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

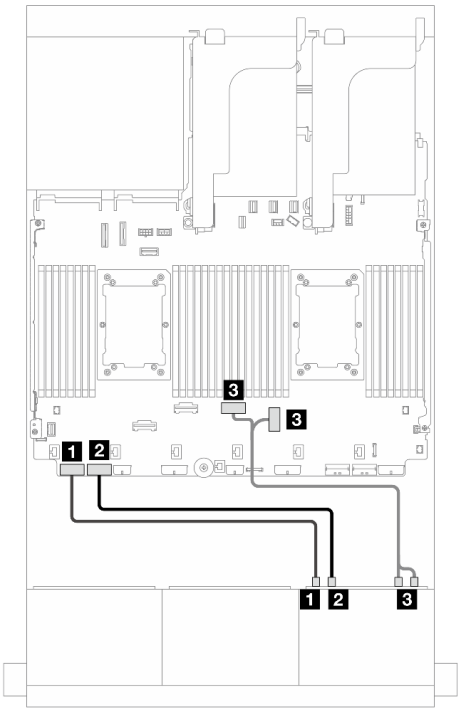


Figure 600. Cable routing when two processors installed

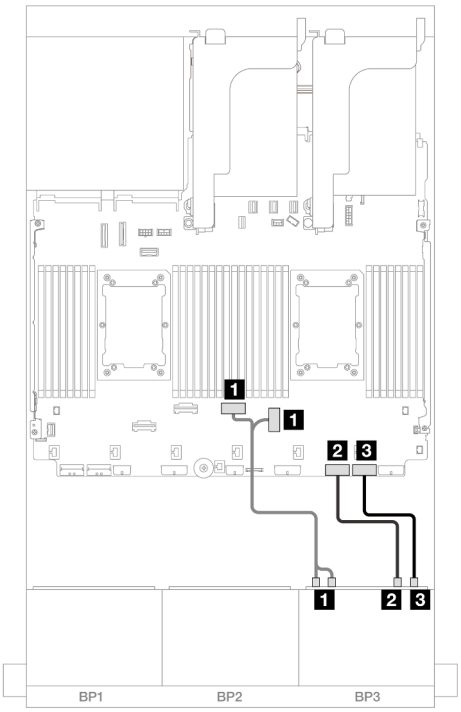


Figure 601. Cable routing when one processor installed

From	To	From	To
1 Backplane 3: NVMe 0-1	Onboard: PCIe 8	1 Backplane 3: NVMe 0-1, 2-3	Onboard: PCIe 3, 4
2 Backplane 3: NVMe 2-3	Onboard: PCIe 7	2 Backplane 3: NVMe 4-5	Onboard: PCIe 2
3 Backplane 3: NVMe 4-5, 6-7	Onboard: PCIe 4, 3	3 Backplane 3: NVMe 6-7	Onboard: PCIe 1

8i RAID/HBA adapters

This topic provides cable routing information for the 16 x 2.5" SAS/SATA + 8 x 2.5" AnyBay (Gen 4) configuration with three 8i RAID/HBA adapters.

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

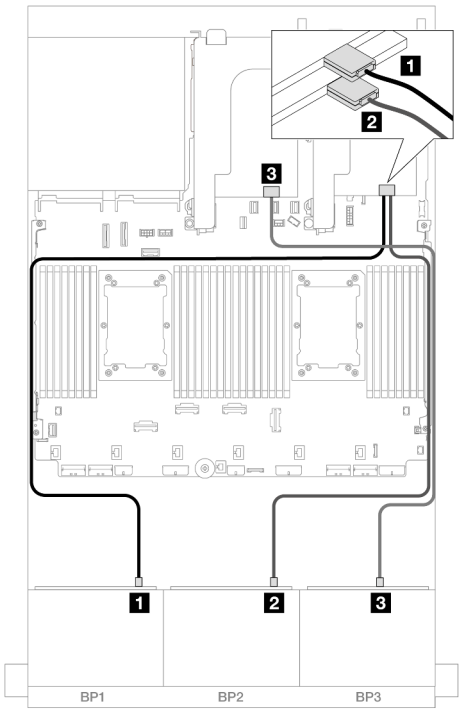


Figure 602. SAS/SATA cable routing

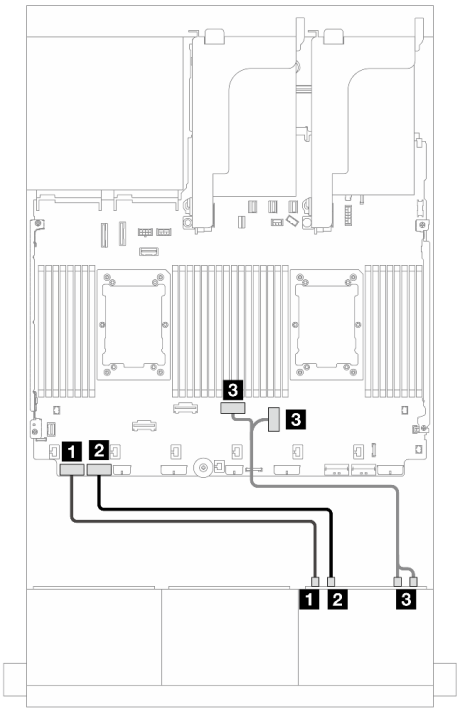


Figure 603. NVMe cable routing

From	To
1 Backplane 1: SAS	8i adapter • C0
2 Backplane 2: SAS	8i adapter • C0
3 Backplane 3: SAS	8i adapter • C0

From	To
1 Backplane 3: NVMe 0-1	Onboard: PCIe 8
2 Backplane 3: NVMe 2-3	Onboard: PCIe 7
3 Backplane 3: NVMe 4-5, 6-7	Onboard: PCIe 4, 3

CFF expander + 8i RAID/HBA adapter

This topic provides cable routing information for the 16 x 2.5" SAS/SATA + 8 x 2.5" AnyBay (Gen 4) configuration with one CFF expander and one 8i RAID/HBA adapter.

SAS/SATA cable routing

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

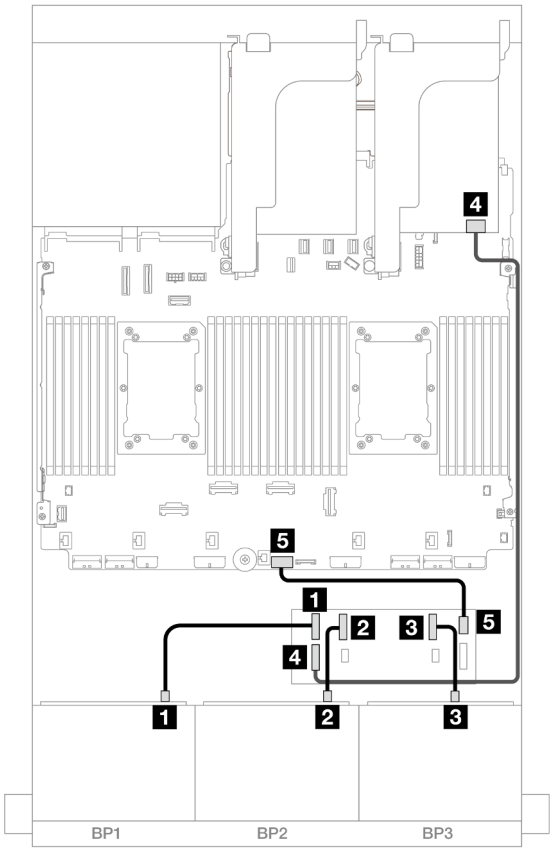


Figure 604. SAS/SATA cable routing

From	To
1 Backplane 1: SAS	CFF expander • C0
2 Backplane 2: SAS	• C1
3 Backplane 3: SAS	• C2
4 CFF expander: RAID/HBA	8i adapter • Gen 4: C0 • Gen 3: C0C1
5 CFF expander: PWR	Onboard: CFF EXP PWR

NVMe cable routing

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

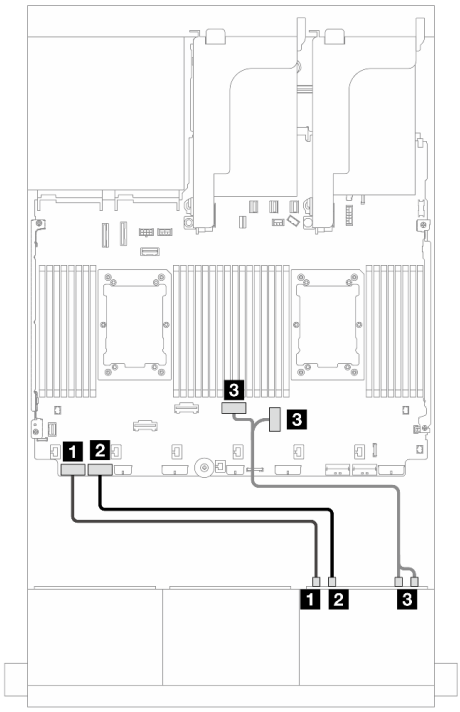


Figure 605. Cable routing when two processors installed

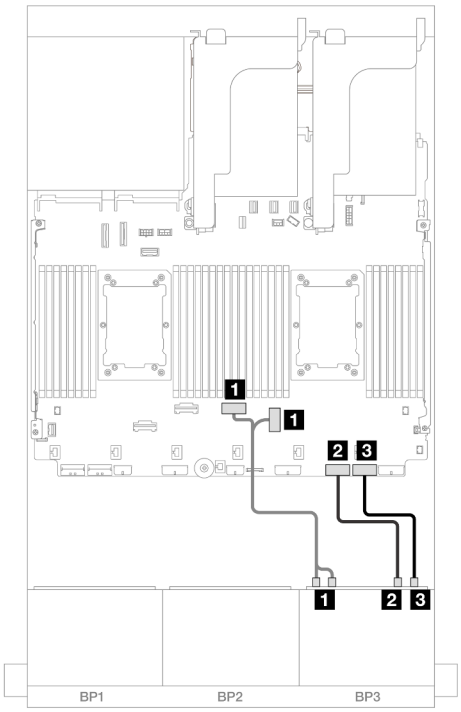


Figure 606. Cable routing when one processor installed

From	To
1 Backplane 3: NVMe 0-1	Onboard: PCIe 8
2 Backplane 3: NVMe 2-3	Onboard: PCIe 7
3 Backplane 3: NVMe 4-5, 6-7	Onboard: PCIe 4, 3

From	To
1 Backplane 3: NVMe 0-1, 2-3	Onboard: PCIe 3, 4
2 Backplane 3: NVMe 4-5	Onboard: PCIe 2
3 Backplane 3: NVMe 6-7	Onboard: PCIe 1

Front + rear backplanes: (16 x 2.5" SAS/SATA + 8 x 2.5" AnyBay) + 4 x 2.5" SAS/SATA

This topic provides cable routing information for the 16 x 2.5" SAS/SATA + 8 x 2.5" AnyBay (Gen 4) + 4 x 2.5" SAS/SATA configuration.

To connect power cables for the front backplane(s), refer to “Backplanes: server models with 2.5-inch front drive bays” on page 360.

To connect signal cables for the front backplane(s), refer to the following cable routing scenarios depending on your server configuration.

- “32i RAID/HBA adapter” on page 544
- “8i RAID/HBA adapters” on page 553
- “CFF expander + 8i RAID/HBA adapter” on page 547
- “CFF expander + CFF 16i RAID/HBA adapter” on page 550

32i RAID/HBA adapter

This topic provides cable routing information for the 16 x 2.5" SAS/SATA + 8 x 2.5" AnyBay (Gen 4) + 4 x 2.5" SAS/SATA configuration with one 32i RAID/HBA adapter.

Front backplane cable routing

SAS/SATA cable routing

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

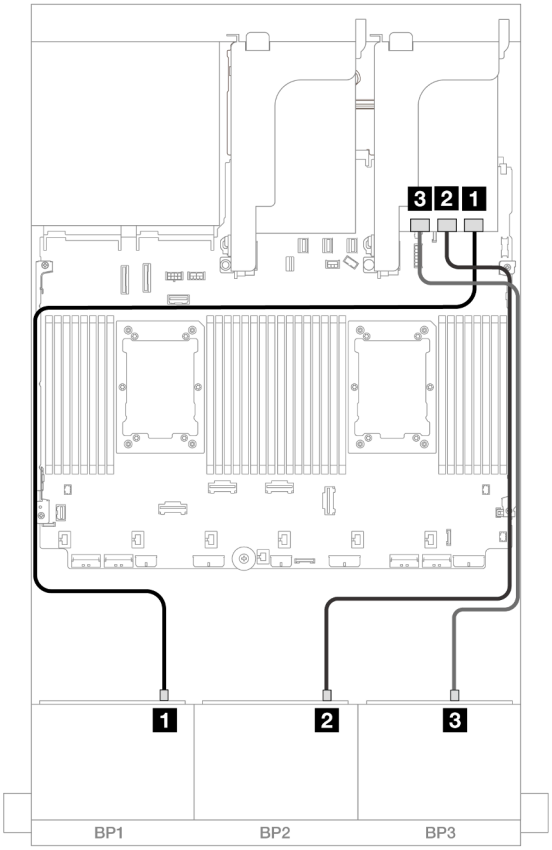


Figure 607. SAS/SATA cable routing

From	To
1 Backplane 1: SAS	32i adapter • C0
2 Backplane 2: SAS	• C1
3 Backplane 3: SAS	• C2

NVMe cable routing

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

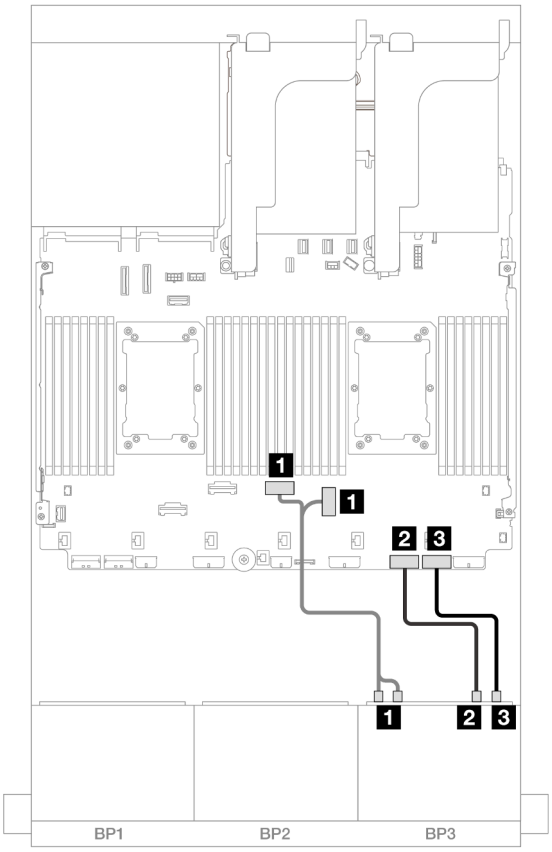


Figure 608. NVMe cable routing

From	To
1 Backplane 3: NVMe 0-1, 2-3	Onboard: PCIe 3, 4
2 Backplane 3: NVMe 4-5	Onboard: PCIe 2
3 Backplane 3: NVMe 6-7	Onboard: PCIe 1

Rear backplane cable routing

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

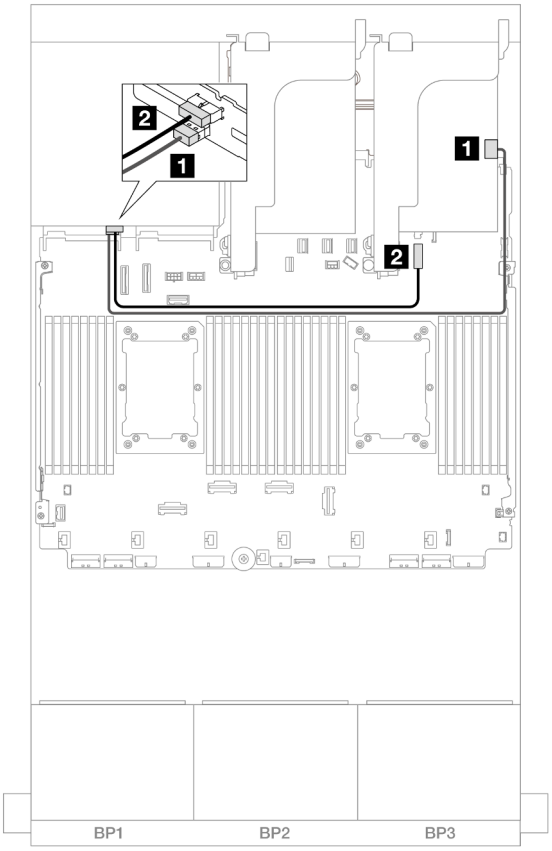


Figure 609. Rear backplane cable routing

From	To
1 Backplane 4: SAS	32i adapter • C3
2 Backplane 4: PWR	Onboard: 7mm backplane power connector

CFF expander + 8i RAID/HBA adapter

The topic provides cable routing information for the 16 x 2.5" SAS/SATA + 8 x 2.5" AnyBay (Gen 4) + rear 4 x 2.5" SAS/SATA configuration with one CFF expander and one 8i RAID/HBA adapter.

Front backplane cable routing

SAS/SATA cable routing

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

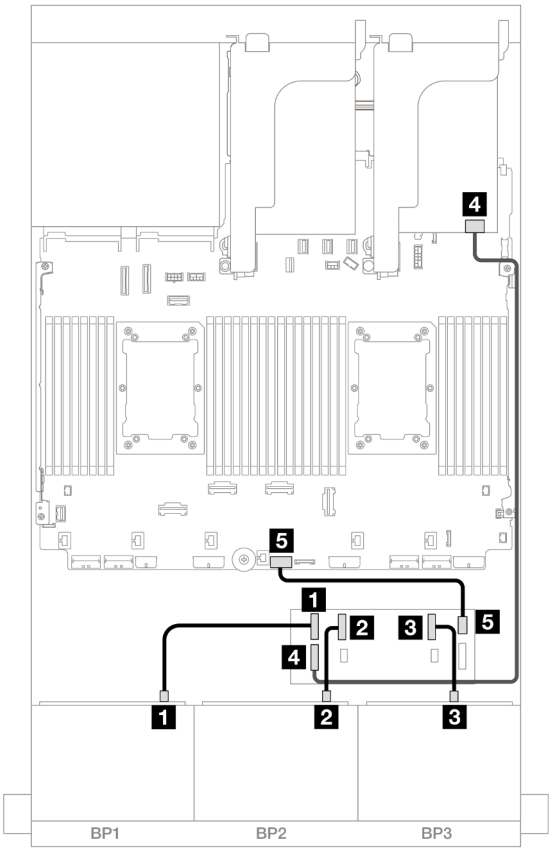


Figure 610. SAS/SATA cable routing

From	To
1 Backplane 1: SAS	CFF expander • C0
2 Backplane 2: SAS	• C1
3 Backplane 3: SAS	• C2
4 CFF expander: RAID/HBA	8i adapter • Gen 4: C0 • Gen 3: C0C1
5 CFF expander: PWR	Onboard: CFF EXP PWR

NVMe cable routing

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

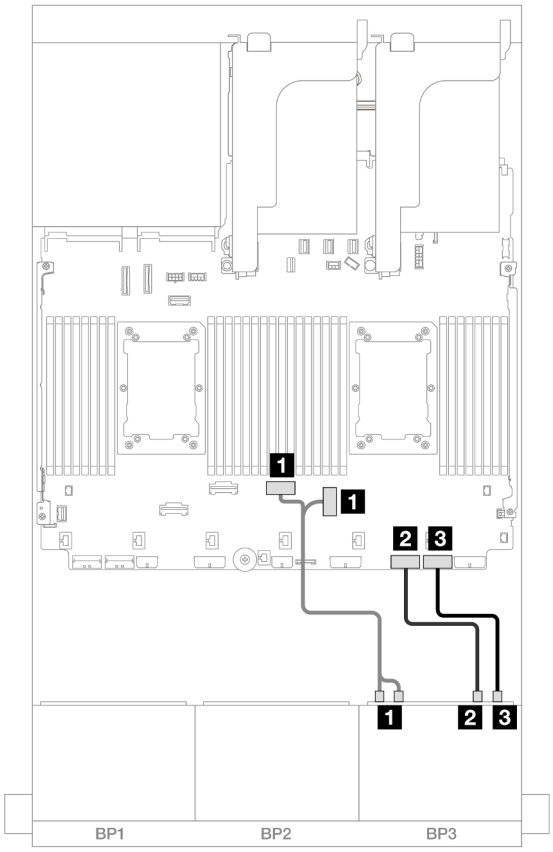


Figure 611. NVMe cable routing

From	To
1 Backplane 3: NVMe 0-1, 2-3	Onboard: PCIe 3, 4
2 Backplane 3: NVMe 4-5	Onboard: PCIe 2
3 Backplane 3: NVMe 6-7	Onboard: PCIe 1

Rear backplane cable routing

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

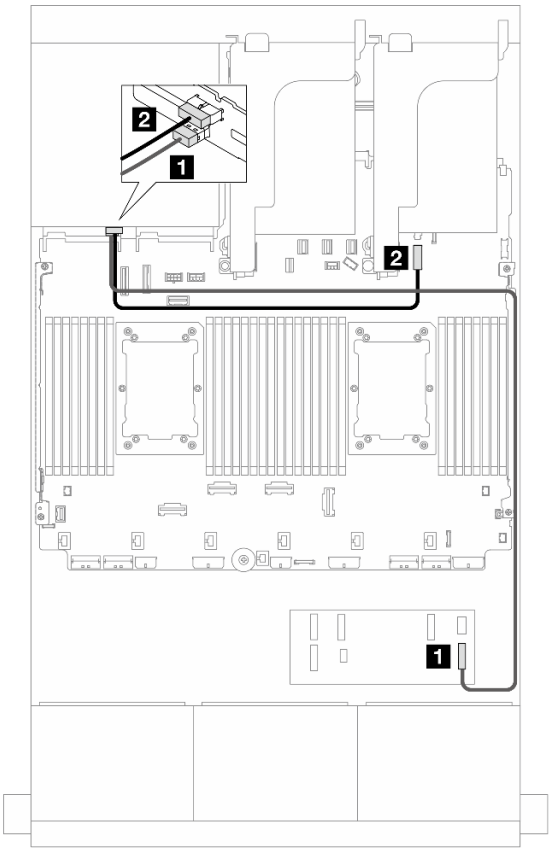


Figure 612. Rear backplane cable routing

From	To
1 Backplane 4: SAS	CFF expander • C3
2 Backplane 4: PWR	Onboard: 7mm backplane power connector

CFF expander + CFF 16i RAID/HBA adapter

This topic provides cable routing information for the 16 x 2.5" SAS/SATA + 8 x 2.5" AnyBay (Gen 4) + 4 x 2.5" SAS/SATA configuration with one CFF expander and one CFF 16i RAID/HBA adapter.

Front backplane cable routing

SAS/SATA cable routing

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

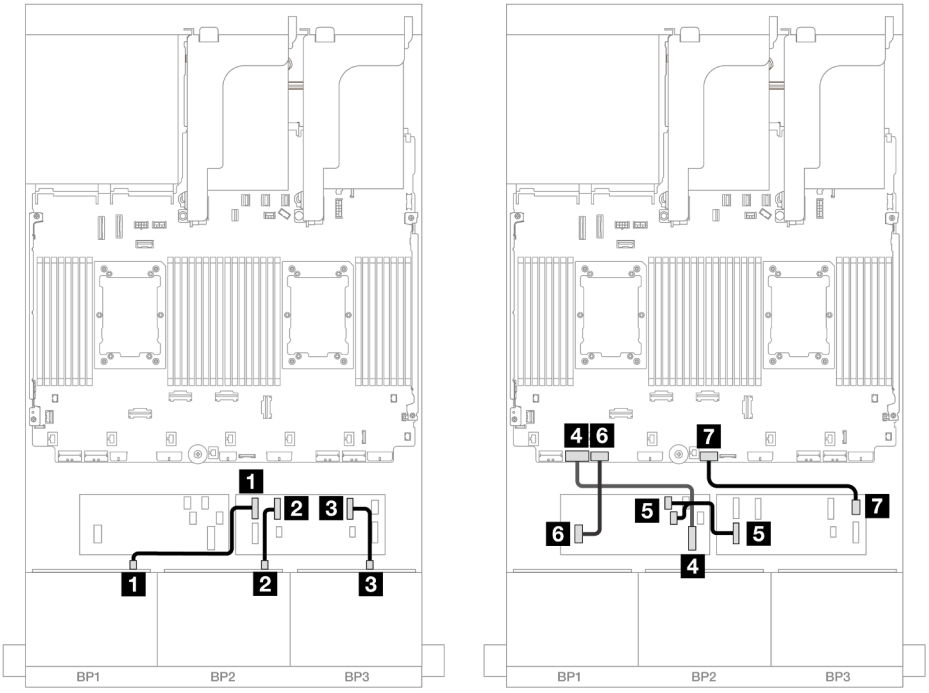


Figure 613. SAS/SATA cable routing to CFF expander and CFF 16i adapter

From	To
1 Backplane 1: SAS	CFF expander • C0
2 Backplane 2: SAS	• C1
3 Backplane 3: SAS	• C2
4 CFF adapter: MB (CFF input)	Onboard: PCIe 7
5 CFF expander: RAID/HBA	CFF adapter • C0 • C1
6 CFF adapter: PWR	Onboard: CFF RAID/HBA PWR
7 CFF expander: PWR	Onboard: CFF EXP PWR

NVMe cable routing

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

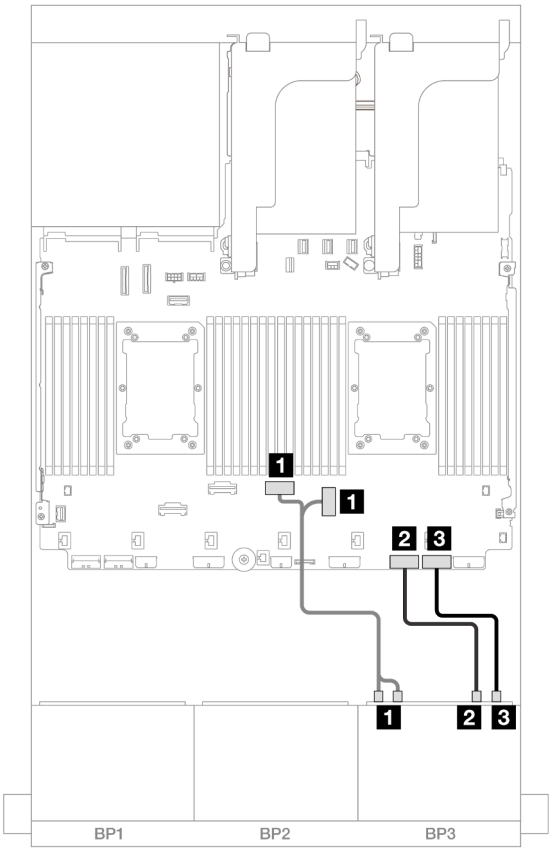


Figure 614. NVMe cable routing to onboard PCIe connectors

From	To
1 Backplane 3: NVMe 0-1, 2-3	Onboard: PCIe 3, 4
2 Backplane 3: NVMe 4-5	Onboard: PCIe 2
3 Backplane 3: NVMe 6-7	Onboard: PCIe 1

Rear backplane cable routing

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

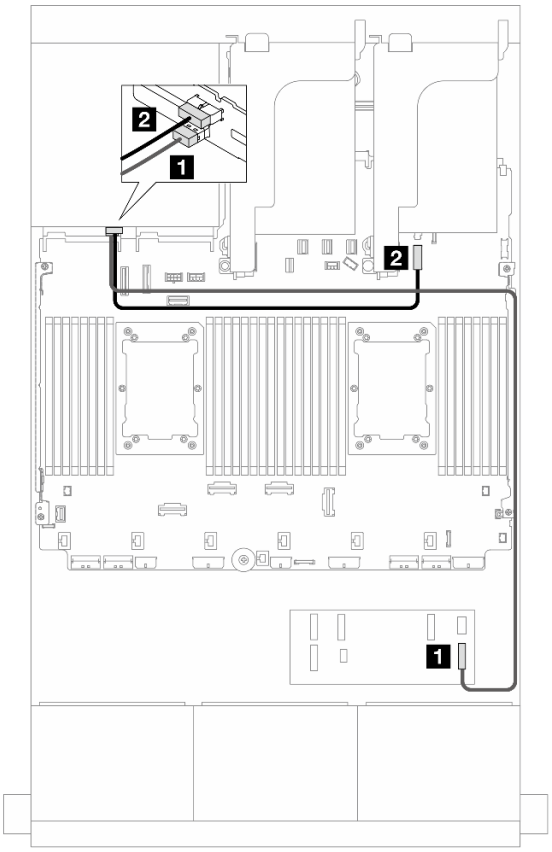


Figure 615. Rear backplane cable routing

From	To
1 Backplane 4: SAS	CFF expander • C3
2 Backplane 4: PWR	Onboard: 7mm backplane power connector

8i RAID/HBA adapters

The following shows the cable connections for the 16 x 2.5" SAS/SATA + 8 x 2.5" AnyBay (Gen 4) + 4 x 2.5" SAS/SATA configuration with four 8i RAID/HBA adapter.

Front backplane cable routing

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

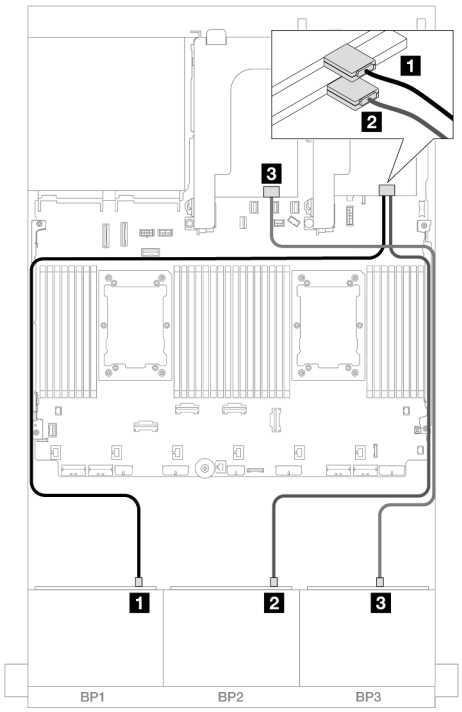


Figure 616. SAS/SATA cable routing

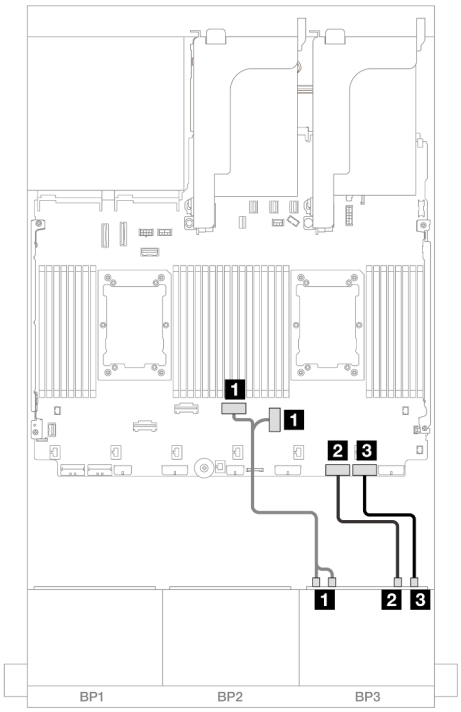


Figure 617. NVMe cable routing

From	To
1 Backplane 1: SAS	8i adapter • Gen 4: C0 • Gen 3: C0C1
2 Backplane 2: SAS	8i adapter • Gen 4: C0 • Gen 3: C0C1
3 Backplane 3: SAS	8i adapter • Gen 4: C0 • Gen 3: C0C1

From	To
1 Backplane 3: NVMe 0-1, 2-3	Onboard: PCIe 3, 4
2 Backplane 2: NVMe 4-5	Onboard: PCIe 2
3 Backplane 3: NVMe 6-7	Onboard: PCIe 1

Rear backplane cable routing

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

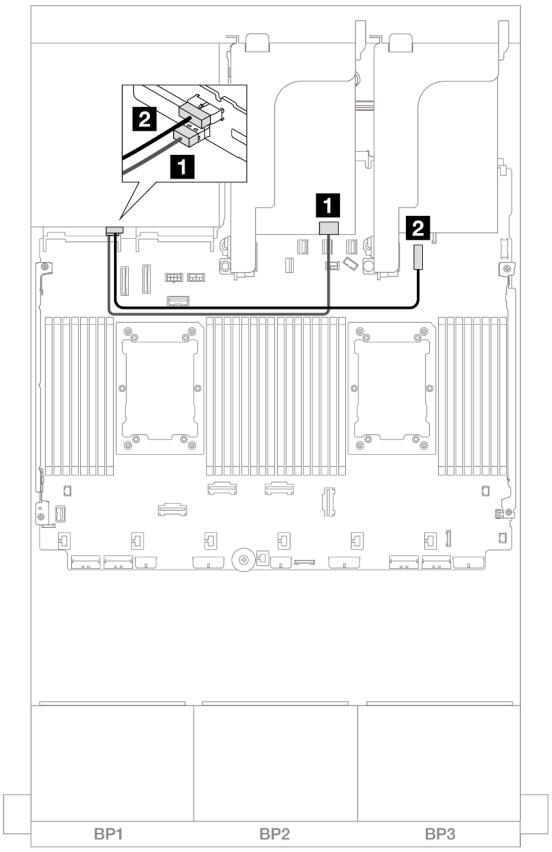


Figure 618. Rear backplane cable routing

From	To
1 Backplane 4: SAS	8i adapter • Gen 4: C0 • Gen 3: C0C1
2 Backplane 4: PWR	Onboard: 7mm backplane power connector

Two 8 x SAS/SATA and one 8 x AnyBay (Gen 5) backplanes

This section provides cable routing information for the server model with two 8 x 2.5-inch SAS/SATA and one 8 x 2.5-inch AnyBay (Gen 5) front drive backplanes.

- “Front backplanes: 16 x 2.5" SAS/SATA + 8 x 2.5" AnyBay” on page 555
- “Front + rear backplanes: (16 x 2.5" SAS/SATA + 8 x 2.5" AnyBay) + 4 x 2.5" SAS/SATA” on page 567

Front backplanes: 16 x 2.5" SAS/SATA + 8 x 2.5" AnyBay

This topic provides cable routing information for the 16 x 2.5" SAS/SATA + 8 x 2.5" AnyBay (Gen 5) configuration.

To connect power cables for the front backplane(s), refer to “Backplanes: server models with 2.5-inch front drive bays” on page 360.

To connect signal cables for the front backplane(s), refer to the following cable routing scenarios depending on your server configuration.

- “32i RAID/HBA adapter” on page 556
- “8i RAID/HBA adapters” on page 558
- “CFF expander + 8i RAID/HBA adapter” on page 561
- “CFF expander + CFF 16i RAID/HBA adapter” on page 564

32i RAID/HBA adapter

The following shows the cable connections for the 16 x 2.5" SAS/SATA + 8 x 2.5" AnyBay (Gen 5) configuration with one 32i RAID/HBA adapter.

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

SAS/SATA cable routing

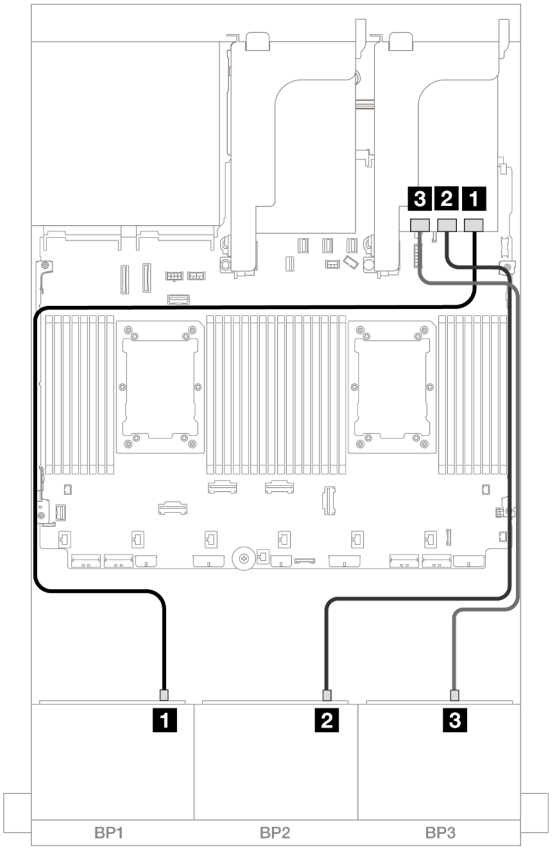


Figure 619. SAS/SATA cable routing

From	To
1 Backplane 1: SAS	32i adapter • C0
2 Backplane 2: SAS	• C1
3 Backplane 3: SAS	• C2

NVMe cable routing

Cable routing when two processors installed

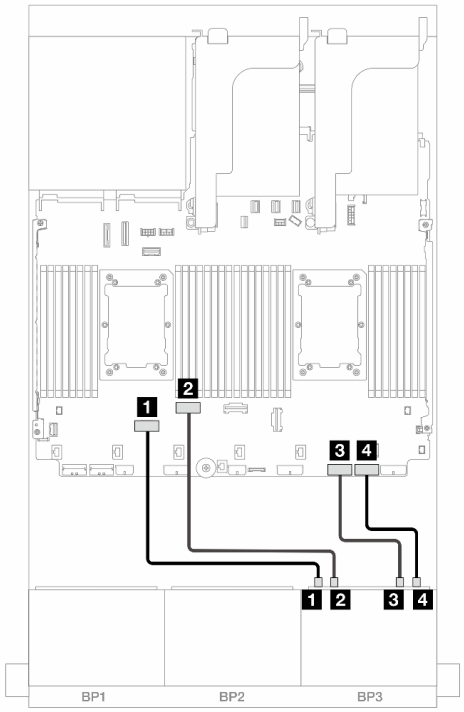


Figure 620. Cable routing when two Platinum series processors installed with no riser 3 or with x8/x8 riser card

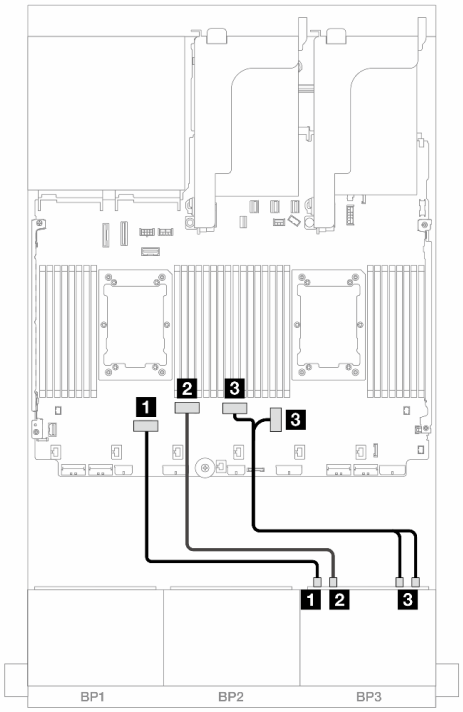


Figure 621. Cable routing in other scenarios

From	To	From	To
1 Backplane 3: NVMe 0-1	Onboard: PCIe 6	1 Backplane 3: NVMe 0-1	Onboard: PCIe 6
2 Backplane 3: NVMe 2-3	Onboard: PCIe 5	2 Backplane 3: NVMe 2-3	Onboard: PCIe 5
3 Backplane 3: NVMe 4-5	Onboard: PCIe 2	3 Backplane 3: NVMe 4-5, 6-7	Onboard: PCIe 4, 3
4 Backplane 3: NVMe 6-7	Onboard: PCIe 1		

Cable routing when one processor installed

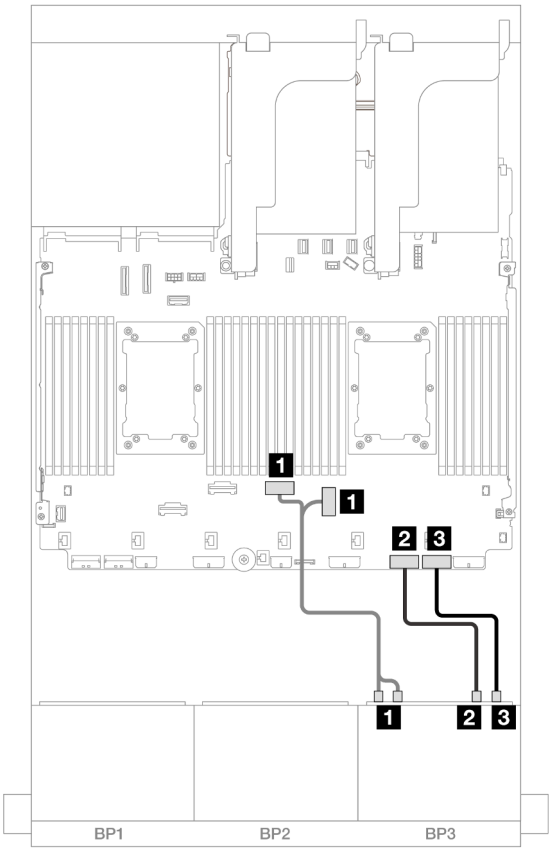


Figure 622. Cable routing when one processor installed

From	To
1 Backplane 3: NVMe 0-1, 2-3	Onboard: PCIe 4, 3
2 Backplane 3: NVMe 4-5	Onboard: PCIe 2
3 Backplane 3: NVMe 6-7	Onboard: PCIe 1

8i RAID/HBA adapters

The following shows the cable connections for the 16 x 2.5" SAS/SATA + 8 x 2.5" AnyBay (Gen 5) configuration with three 8i RAID/HBA adapters.

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

SAS/SATA cable routing

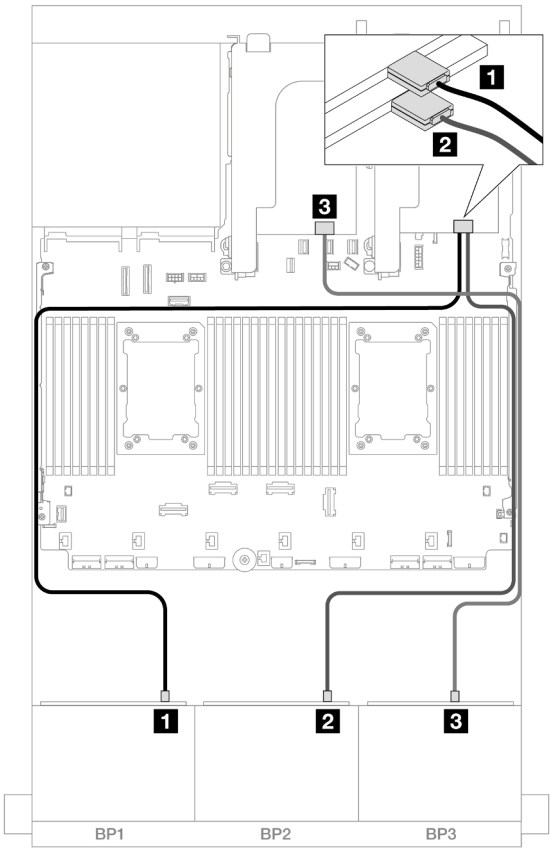


Figure 623. SAS/SATA cable routing

From	To
1 Backplane 1: SAS	8i adapter • C0
2 Backplane 2: SAS	8i adapter • C0
3 Backplane 3: SAS	8i adapter • C0

NVMe cable routing

Cable routing when two processors installed

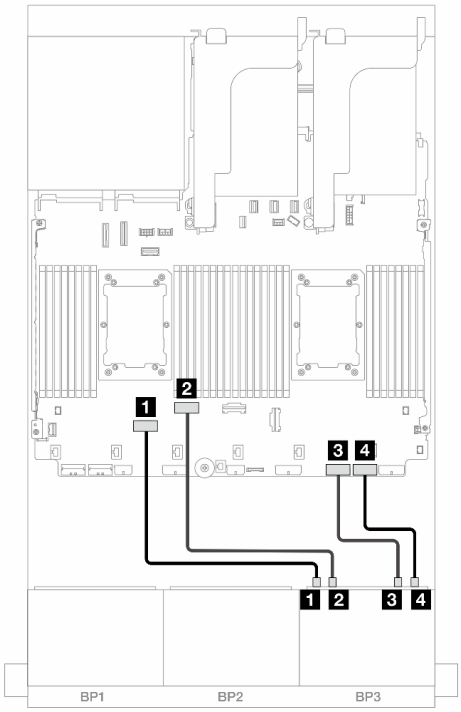


Figure 624. Cable routing when two Platinum series processors installed with no riser 3 or with x8/x8 riser card

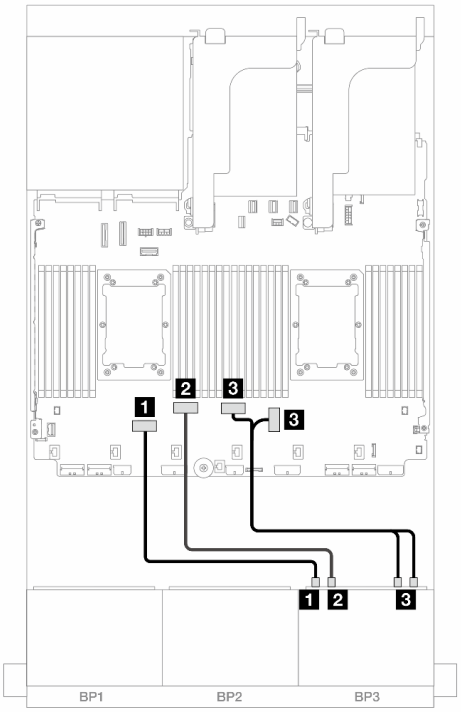


Figure 625. Cable routing in other scenarios

From	To	From	To
1 Backplane 3: NVMe 0-1	Onboard: PCIe 6	1 Backplane 3: NVMe 0-1	Onboard: PCIe 6
2 Backplane 3: NVMe 2-3	Onboard: PCIe 5	2 Backplane 3: NVMe 2-3	Onboard: PCIe 5
3 Backplane 3: NVMe 4-5	Onboard: PCIe 2	3 Backplane 3: NVMe 4-5, 6-7	Onboard: PCIe 4, 3
4 Backplane 3: NVMe 6-7	Onboard: PCIe 1		

Cable routing when one processor installed

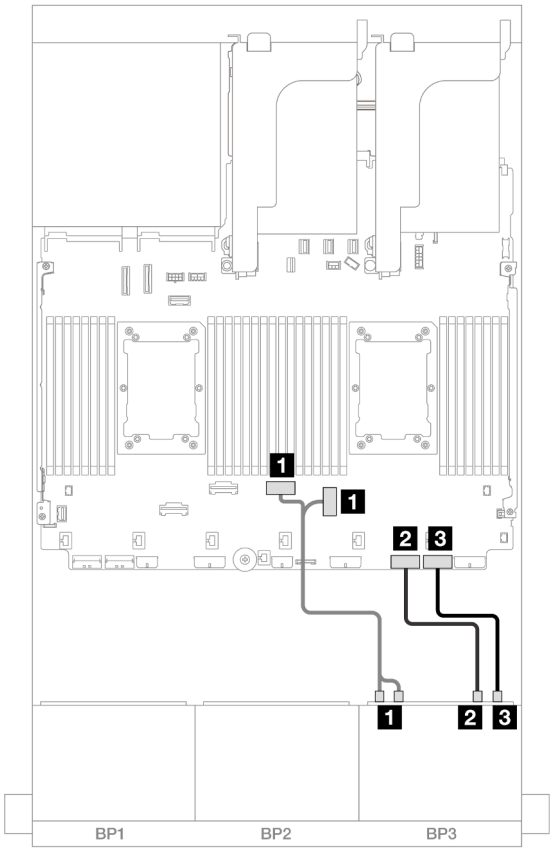


Figure 626. Cable routing when one processor installed

From	To
1 Backplane 3: NVMe 0-1, 2-3	Onboard: PCIe 4, 3
2 Backplane 3: NVMe 4-5	Onboard: PCIe 2
3 Backplane 3: NVMe 6-7	Onboard: PCIe 1

CFF expander + 8i RAID/HBA adapter

The following shows the cable connections for the 16 x 2.5" SAS/SATA + 8 x 2.5" AnyBay (Gen 5) configuration with one CFF expander and one 8i RAID/HBA adapter.

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

SAS/SATA cable routing

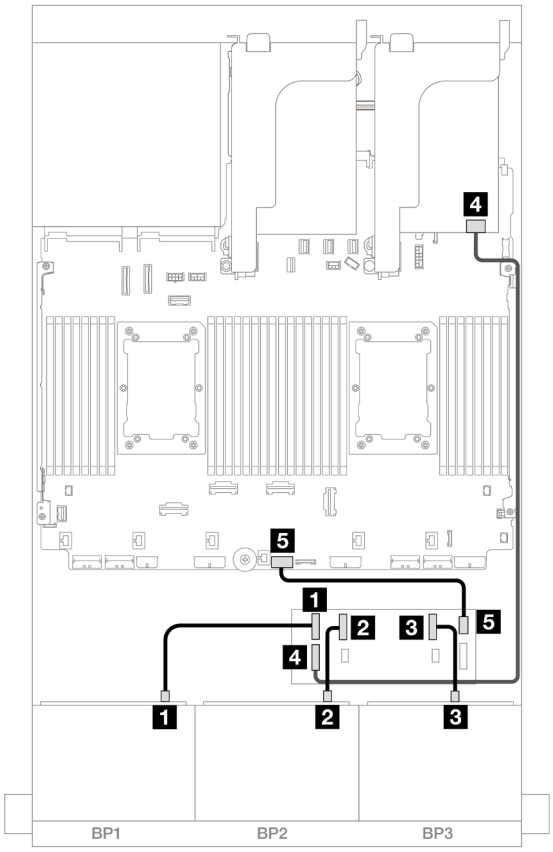


Figure 627. SAS/SATA cable routing

From	To
1 Backplane 1: SAS	CFF expander • C0
2 Backplane 2: SAS	• C1
3 Backplane 3: SAS	• C2
4 CFF expander: RAID/HBA	8i adapter • Gen 4: C0 • Gen 3: C0C1
5 CFF expander: PWR	Onboard: CFF EXP PWR

NVMe cable routing

Cable routing when two processors installed

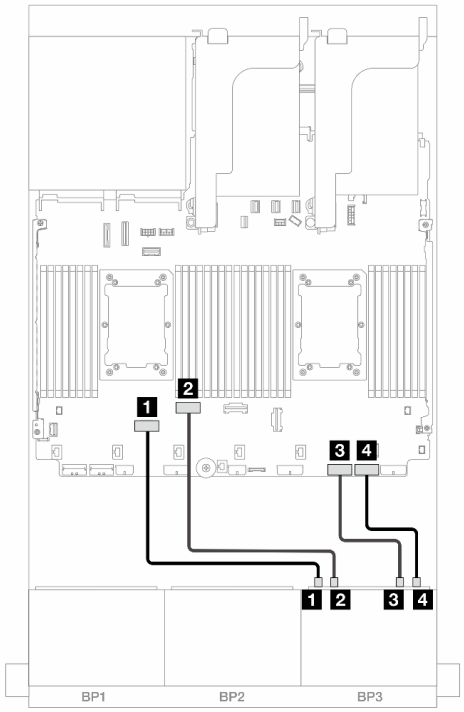


Figure 628. Cable routing when two Platinum series processors installed with no riser 3 or with x8/x8 riser card

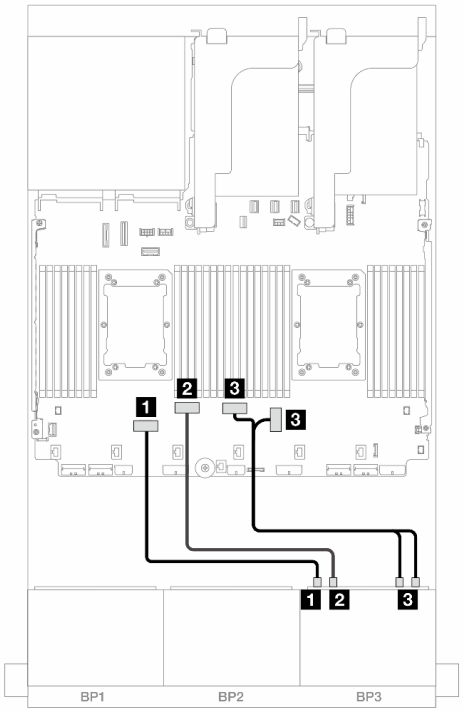


Figure 629. Cable routing in other scenarios

From	To	From	To
1 Backplane 3: NVMe 0-1	Onboard: PCIe 6	1 Backplane 3: NVMe 0-1	Onboard: PCIe 6
2 Backplane 3: NVMe 2-3	Onboard: PCIe 5	2 Backplane 3: NVMe 2-3	Onboard: PCIe 5
3 Backplane 3: NVMe 4-5	Onboard: PCIe 2	3 Backplane 3: NVMe 4-5, 6-7	Onboard: PCIe 4, 3
4 Backplane 3: NVMe 6-7	Onboard: PCIe 1		

Cable routing when one processor installed

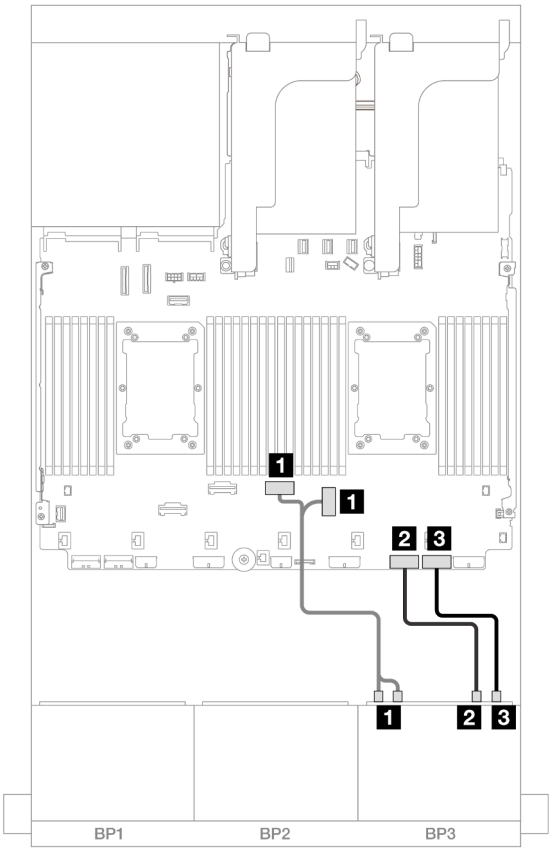


Figure 630. Cable routing when one processor installed

From	To
1 Backplane 3: NVMe 0-1, 2-3	Onboard: PCIe 4, 3
2 Backplane 3: NVMe 4-5	Onboard: PCIe 2
3 Backplane 3: NVMe 6-7	Onboard: PCIe 1

CFF expander + CFF 16i RAID/HBA adapter

The following shows the cable connections for the 16 x 2.5" SAS/SATA + 8 x 2.5" AnyBay (Gen 5) configuration with one CFF expander and one CFF 16i RAID/HBA adapter.

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

SAS/SATA cable routing

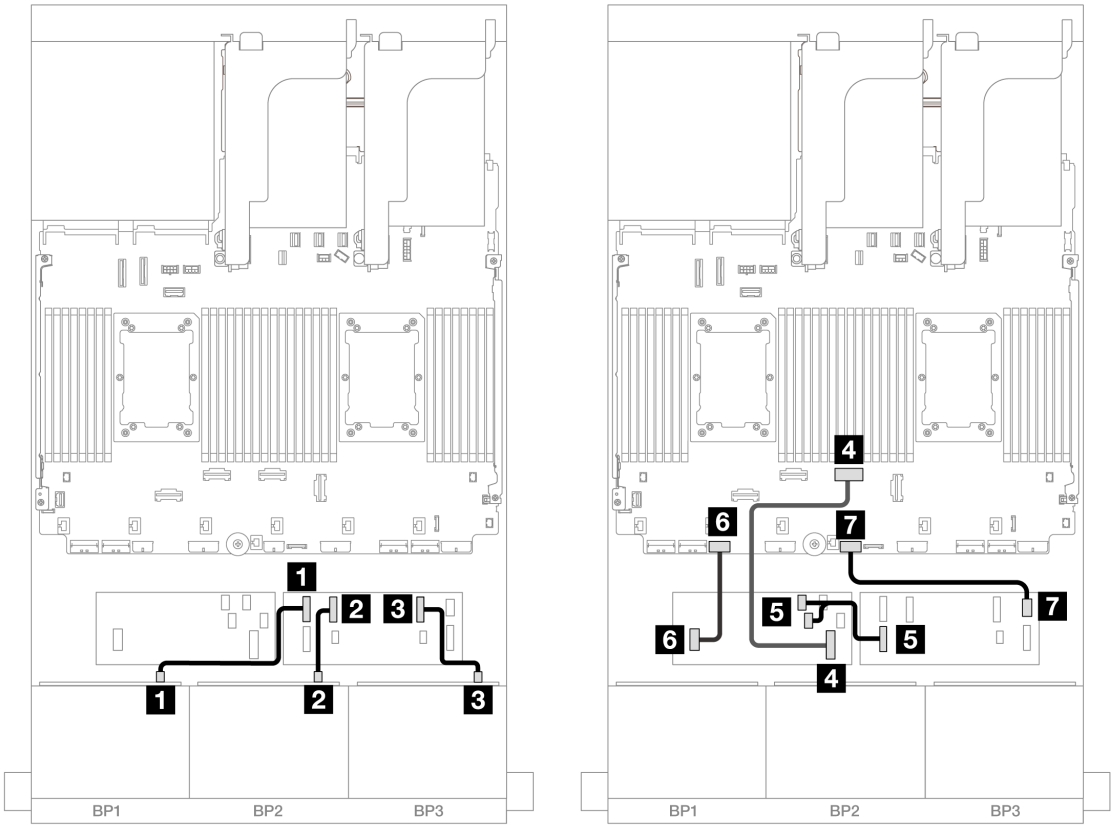


Figure 631. Cable routing when two Platinum series processors installed with no riser 3 or with x8/x8 riser card

From	To
1 Backplane 1: SAS	CFF expander • C0
2 Backplane 2: SAS	• C1
3 Backplane 3: SAS	• C2
4 CFF adapter: MB (CFF input)	Onboard: PCIe 4
5 CFF expander: RAID/HBA	CFF adapter • C0 • C1
6 CFF adapter: PWR	Onboard: CFF RAID/HBA PWR
7 CFF expander: PWR	Onboard: CFF EXP PWR

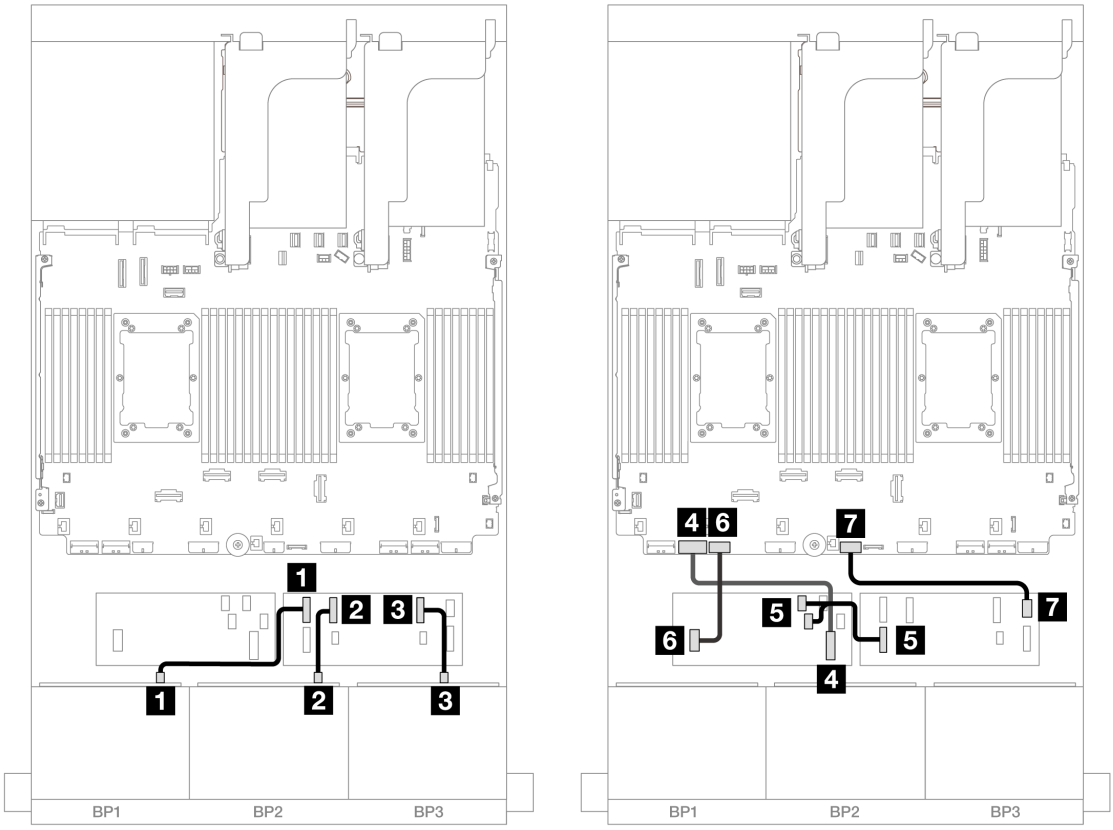


Figure 632. Cable routing in other scenarios

From	To
1 Backplane 1: SAS	CFF expander • C0
2 Backplane 2: SAS	• C1
3 Backplane 3: SAS	• C2
4 CFF adapter: MB (CFF input)	Onboard: PCIe 7
5 CFF expander: RAID/HBA	CFF adapter • C0 • C1
6 CFF adapter: PWR	Onboard: CFF RAID/HBA PWR
7 CFF expander: PWR	Onboard: CFF EXP PWR

NVMe cable routing

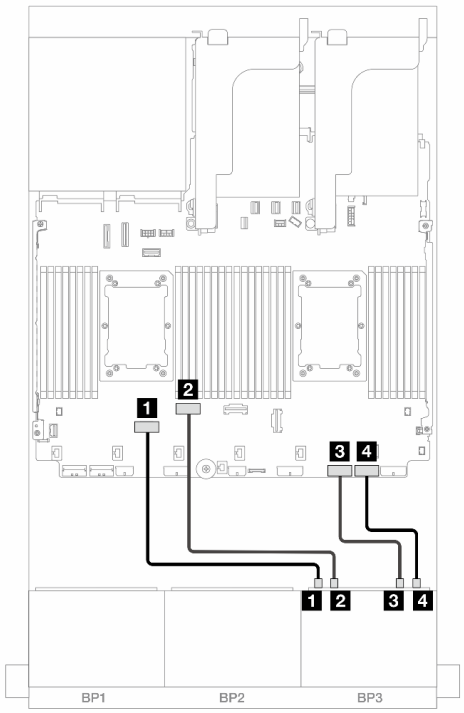


Figure 633. Cable routing when two Platinum series processors installed with no riser 3 or with x8/x8 riser card

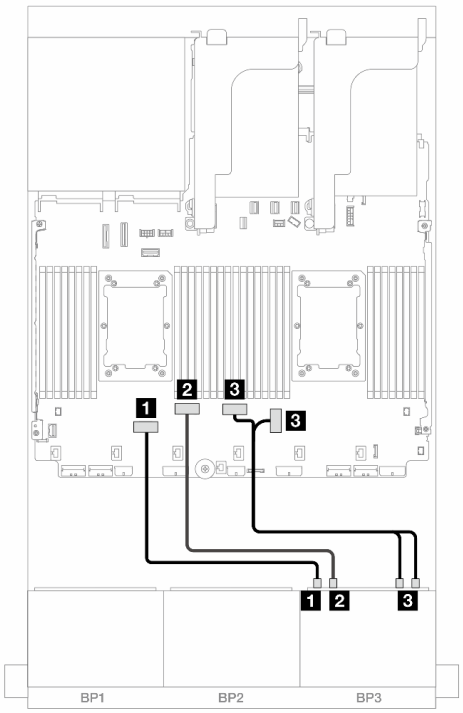


Figure 634. Cable routing in other scenarios

From	To	From	To
1 Backplane 3: NVMe 0-1	Onboard: PCIe 6	1 Backplane 3: NVMe 0-1	Onboard: PCIe 6
2 Backplane 3: NVMe 2-3	Onboard: PCIe 5	2 Backplane 3: NVMe 2-3	Onboard: PCIe 5
3 Backplane 3: NVMe 4-5	Onboard: PCIe 2	3 Backplane 3: NVMe 4-5, 6-7	Onboard: PCIe 4, 3
4 Backplane 3: NVMe 6-7	Onboard: PCIe 1		

Front + rear backplanes: (16 x 2.5" SAS/SATA + 8 x 2.5" AnyBay) + 4 x 2.5" SAS/SATA

This topic provides cable routing information for the 16 x 2.5" SAS/SATA + 8 x 2.5" AnyBay (Gen 5) + 4 x 2.5" SAS/SATA configuration.

To connect power cables for the front backplane(s), refer to "Backplanes: server models with 2.5-inch front drive bays" on page 360.

To connect signal cables for the front backplane(s), refer to the following cable routing scenarios depending on your server configuration.

- "32i RAID/HBA adapter" on page 568
- "8i RAID/HBA adapters" on page 577
- "CFF expander + 8i RAID/HBA adapter" on page 570
- "CFF expander + CFF 16i RAID/HBA adapter" on page 573

32i RAID/HBA adapter

The following shows the cable connections for the 16 x 2.5" SAS/SATA + 8 x 2.5" AnyBay (Gen 5) + 4 x 2.5" SAS/SATA configuration with one 32i RAID/HBA adapter.

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

Front backplane cable routing

SAS/SATA cable routing

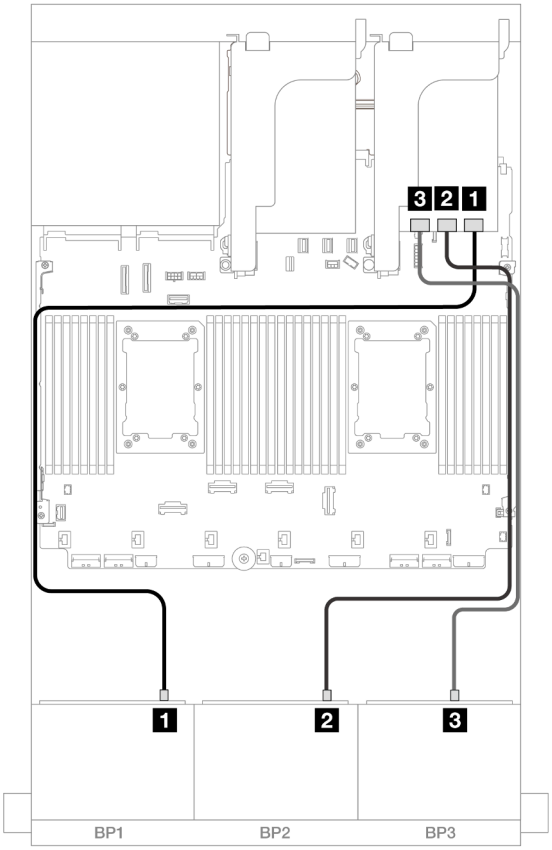


Figure 635. SAS/SATA cable routing

From	To
1 Backplane 1: SAS	32i adapter • C0
2 Backplane 2: SAS	• C1
3 Backplane 3: SAS	• C2

NVMe cable routing

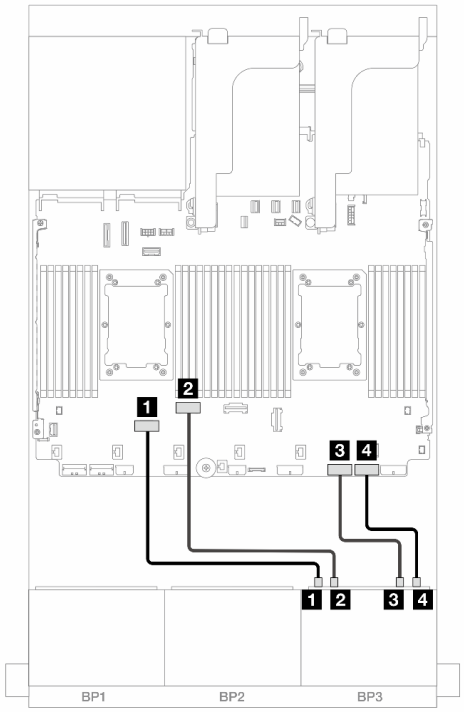


Figure 636. Cable routing when two Platinum series processors installed with no riser 3

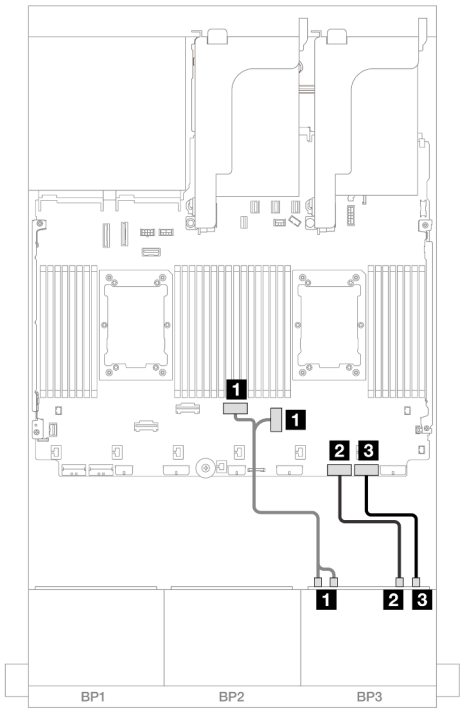


Figure 637. Cable routing in other scenarios

From	To	From	To
1 Backplane 3: NVMe 0-1	Onboard: PCIe 6	1 Backplane 3: NVMe 0-1, 2-3	Onboard: PCIe 4, 3
1 Backplane 3: NVMe 2-3	Onboard: PCIe 5	2 Backplane 3: NVMe 4-5	Onboard: PCIe 2
2 Backplane 3: NVMe 4-5	Onboard: PCIe 2	3 Backplane 3: NVMe 6-7	Onboard: PCIe 1
3 Backplane 3: NVMe 6-7	Onboard: PCIe 1		

Rear backplane cable routing

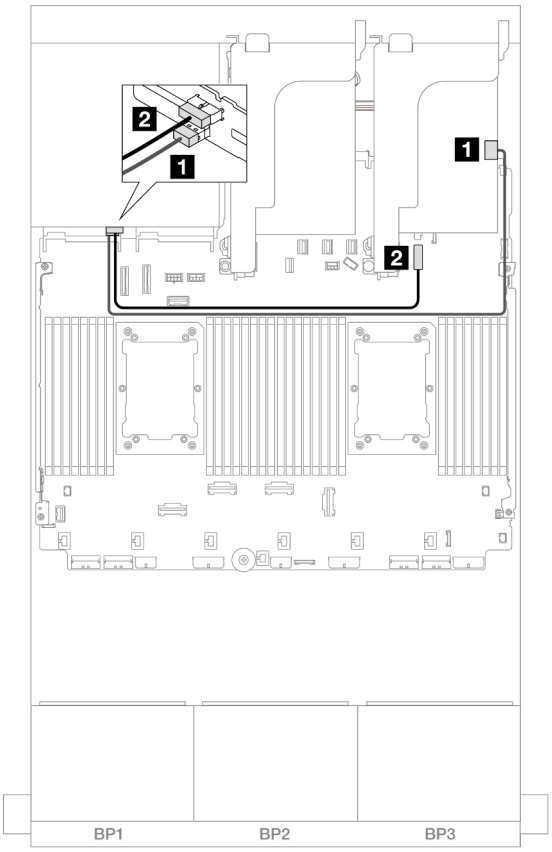


Figure 638. Rear backplane cable routing

From	To
1 Backplane 4: SAS	32i adapter • C3
2 Backplane 4: PWR	Onboard: 7mm backplane power connector

CFF expander + 8i RAID/HBA adapter

The following shows the cable connections for the 16 x 2.5" SAS/SATA + 8 x 2.5" AnyBay (Gen 5) + 4 x 2.5" SAS/SATA configuration with one CFF expander and one 8i RAID/HBA adapter.

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

Front backplane cable routing

SAS/SATA cable routing

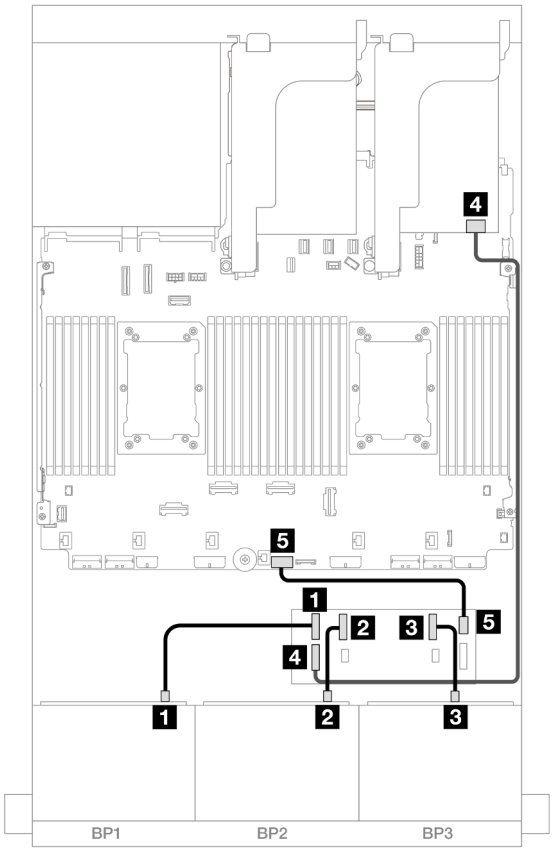


Figure 639. SAS/SATA cable routing

From	To
1 Backplane 1: SAS	CFF expander • C0
2 Backplane 2: SAS	• C1
3 Backplane 3: SAS	• C2
4 CFF expander: RAID/HBA	8i adapter • Gen 4: C0 • Gen 3: C0C1
5 CFF expander: PWR	Onboard: CFF EXP PWR

NVMe cable routing

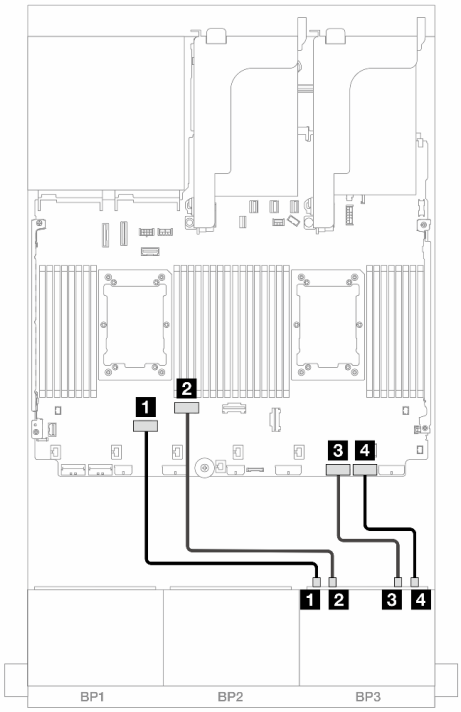


Figure 640. Cable routing when two Platinum series processors installed with no riser 3

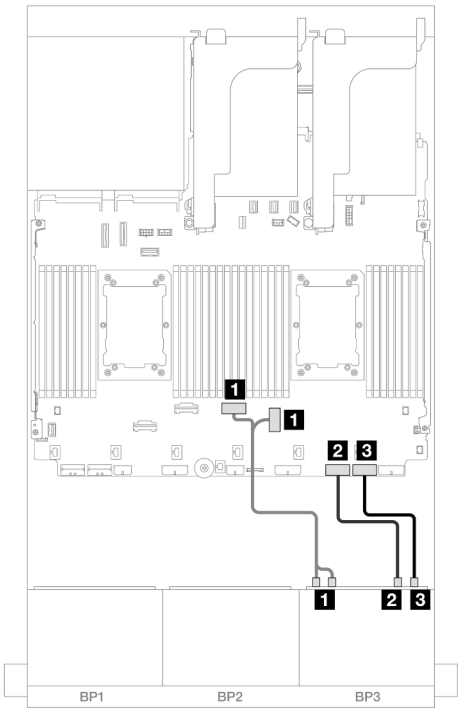


Figure 641. Cable routing in other scenarios

From	To	From	To
1 Backplane 3: NVMe 0-1	Onboard: PCIe 6	1 Backplane 3: NVMe 0-1, 2-3	Onboard: PCIe 4, 3
1 Backplane 3: NVMe 2-3	Onboard: PCIe 5	2 Backplane 3: NVMe 4-5	Onboard: PCIe 2
2 Backplane 3: NVMe 4-5	Onboard: PCIe 2	3 Backplane 3: NVMe 6-7	Onboard: PCIe 1
3 Backplane 3: NVMe 6-7	Onboard: PCIe 1		

Rear backplane cable routing

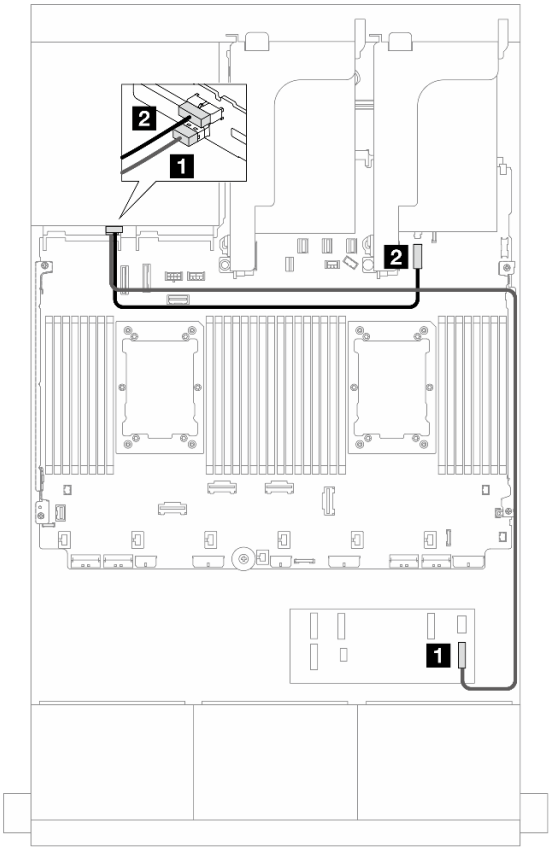


Figure 642. Rear backplane cable routing

From	To
1 Backplane 4: SAS	CFF expander • C3
2 Backplane 4: PWR	Onboard: 7mm backplane power connector

CFF expander + CFF 16i RAID/HBA adapter

The following shows the cable connections for the 16 x 2.5" SAS/SATA + 8 x 2.5" AnyBay (Gen 5) + 4 x 2.5" SAS/SATA configuration with one CFF expander and one CFF 16i RAID/HBA adapter.

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

Front backplane cable routing

SAS/SATA cable routing

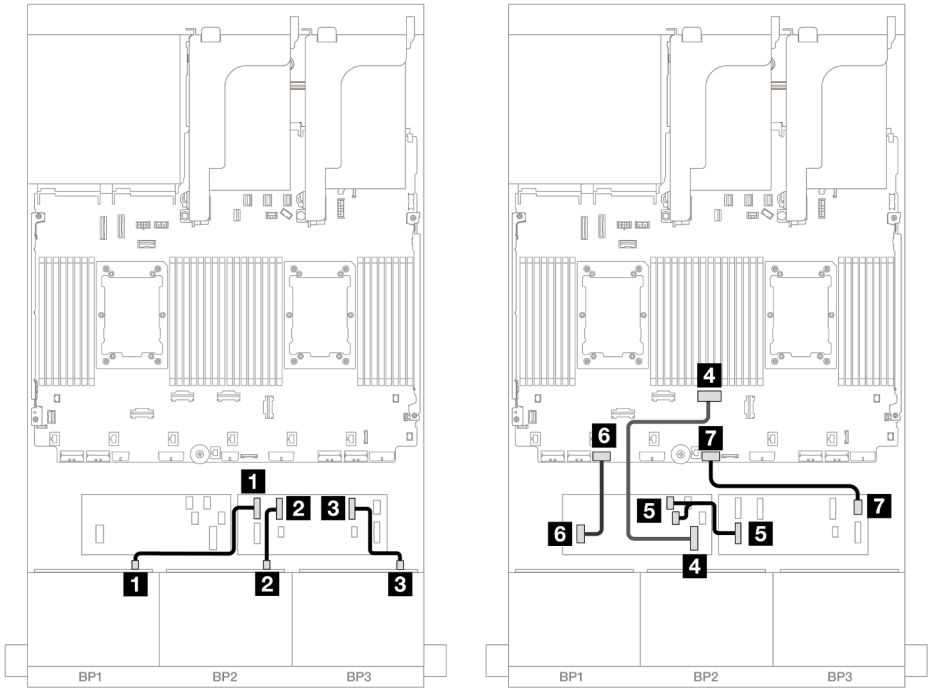


Figure 643. Cable routing when two Platinum series processors installed with no riser 3

From	To
1 Backplane 1: SAS	CFF expander • C0
2 Backplane 2: SAS	• C1
3 Backplane 3: SAS	• C2
4 CFF adapter: MB (CFF input)	Onboard: PCIe 4
5 CFF expander: RAID/HBA	CFF adapter • C0 • C1
6 CFF adapter: PWR	Onboard: CFF RAID/HBA PWR
7 CFF expander: PWR	Onboard: CFF EXP PWR

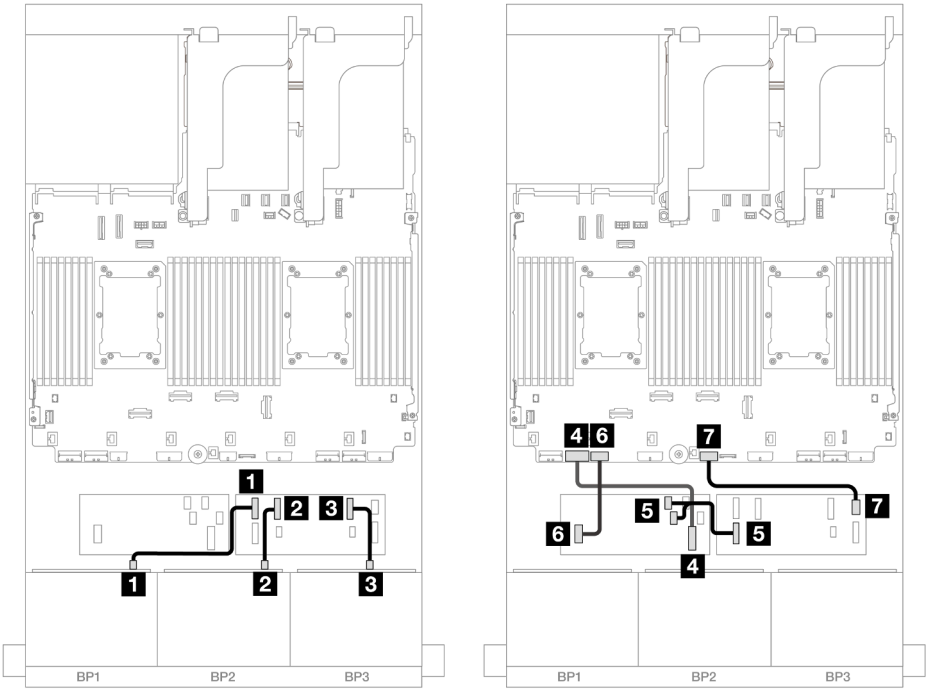


Figure 644. Cable routing in other scenarios

From	To
1 Backplane 1: SAS	CFF expander • C0
2 Backplane 2: SAS	• C1
3 Backplane 3: SAS	• C2
4 CFF adapter: MB (CFF input)	Onboard: PCIe 7
5 CFF expander: RAID/HBA	CFF adapter • C0 • C1
6 CFF adapter: PWR	Onboard: CFF RAID/HBA PWR
7 CFF expander: PWR	Onboard: CFF EXP PWR

NVMe cable routing

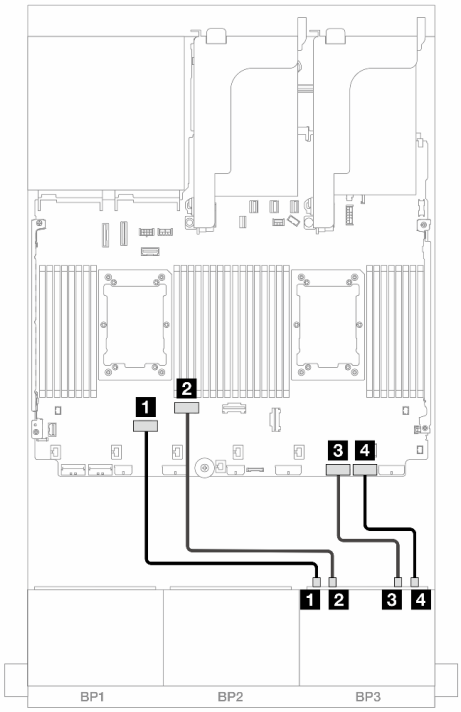


Figure 645. Cable routing when two Platinum series processors installed with no riser 3

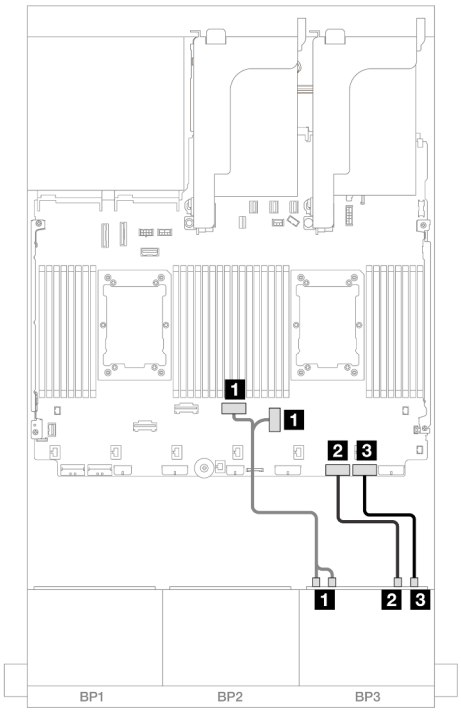


Figure 646. Cable routing in other scenarios

From	To	From	To
1 Backplane 3: NVMe 0-1	Onboard: PCIe 6	1 Backplane 3: NVMe 0-1, 2-3	Onboard: PCIe 4, 3
1 Backplane 3: NVMe 2-3	Onboard: PCIe 5	2 Backplane 3: NVMe 4-5	Onboard: PCIe 2
2 Backplane 3: NVMe 4-5	Onboard: PCIe 2	3 Backplane 3: NVMe 6-7	Onboard: PCIe 1
3 Backplane 3: NVMe 6-7	Onboard: PCIe 1		

Rear backplane cable routing

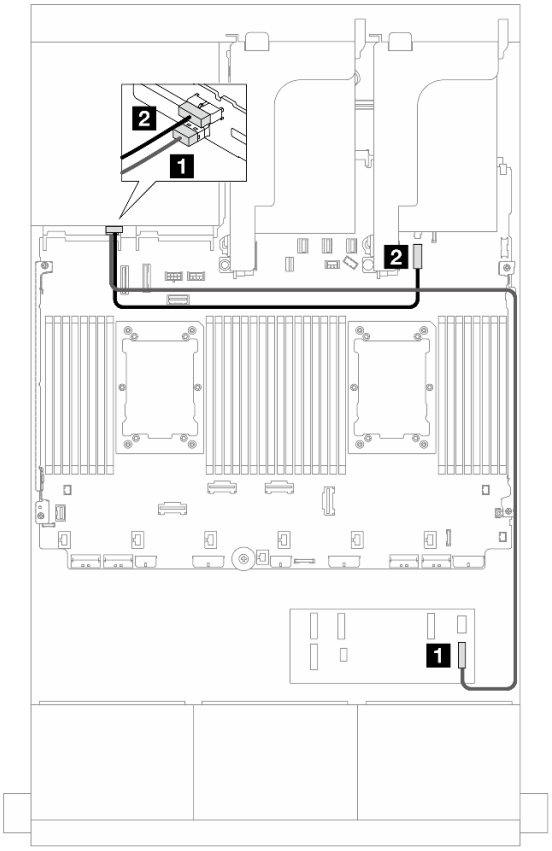


Figure 647. Rear backplane cable routing

From	To
1 Backplane 4: SAS	CFF expander • C3
2 Backplane 4: PWR	Onboard: 7mm backplane power connector

8i RAID/HBA adapters

The following shows the cable connections for the front 16 x 2.5" SAS/SATA + 8 x 2.5" AnyBay (Gen 5) + 4 x 2.5" SAS/SATA configuration with four 8i RAID/HBA adapter.

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

Front backplane cable routing

SAS/SATA cable routing

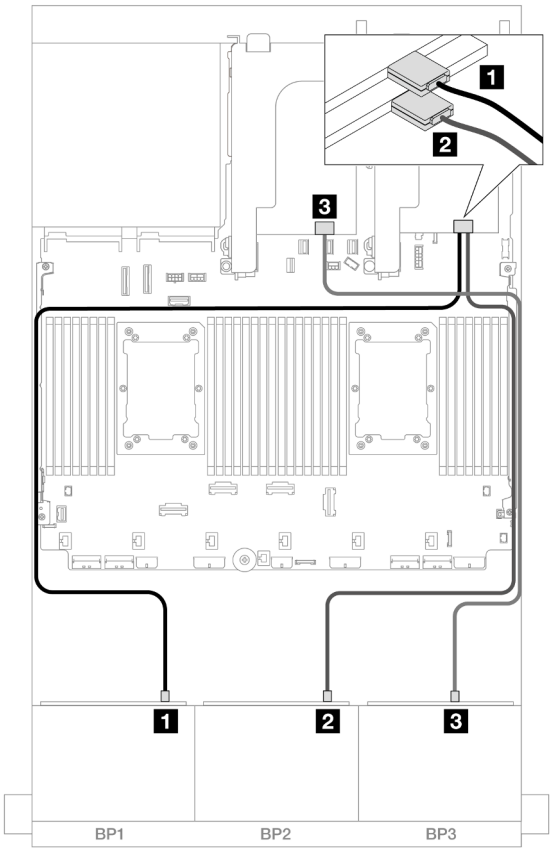


Figure 648. SAS/SATA cable routing

From	To
1 Backplane 1: SAS	8i adapter • Gen 4: C0 • Gen 3: C0C1
2 Backplane 2: SAS	8i adapter • Gen 4: C0 • Gen 3: C0C1
3 Backplane 3: SAS	8i adapter • Gen 4: C0 • Gen 3: C0C1

NVMe cable routing

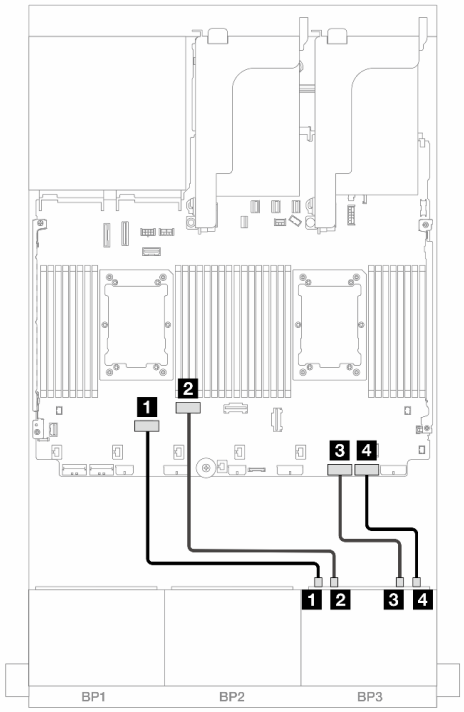


Figure 649. Cable routing when two Platinum series processors installed with no riser 3

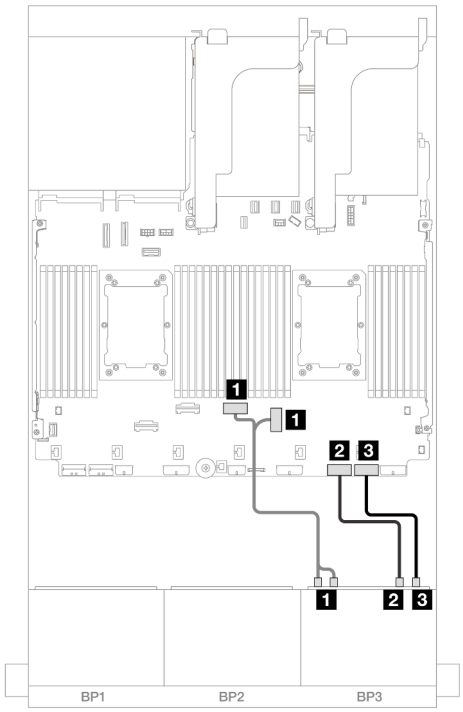


Figure 650. Cable routing in other scenarios

From	To	From	To
1 Backplane 3: NVMe 0-1	Onboard: PCIe 6	1 Backplane 3: NVMe 0-1, 2-3	Onboard: PCIe 4, 3
1 Backplane 3: NVMe 2-3	Onboard: PCIe 5	2 Backplane 3: NVMe 4-5	Onboard: PCIe 2
2 Backplane 3: NVMe 4-5	Onboard: PCIe 2	3 Backplane 3: NVMe 6-7	Onboard: PCIe 1
3 Backplane 3: NVMe 6-7	Onboard: PCIe 1		

Rear backplane cable routing

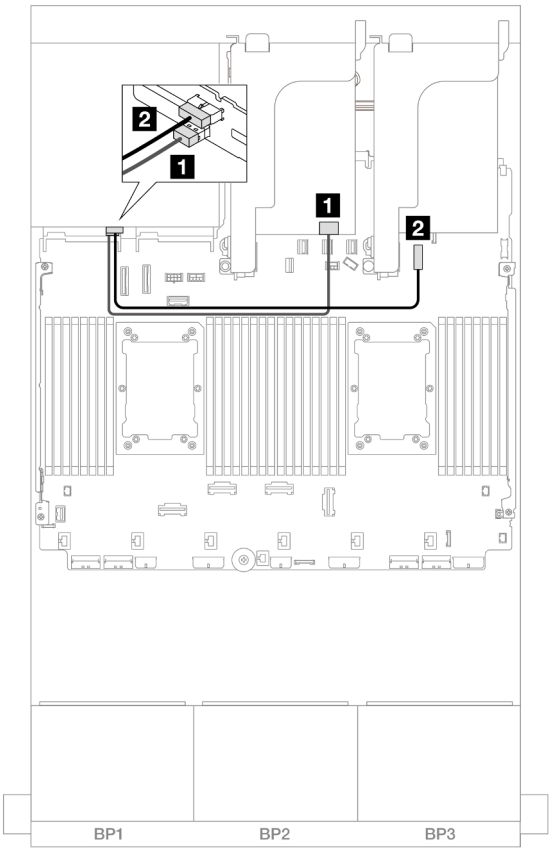


Figure 651. Rear backplane cable routing

From	To
1 Backplane 4: SAS	8i adapter • Gen 4: C0 • Gen 3: C0C1
2 Backplane 4: PWR	Onboard: 7mm backplane power connector

Two 8 x SAS/SATA and one 8 x NVMe (Gen 4) backplanes

This section provides cable routing information for the server model with two 8 x 2.5" SAS/SATA front drive backplanes and one 8 x 2.5" NVMe front drive backplane (Gen 4).

To connect power cables for the front backplane(s), refer to “Backplanes: server models with 2.5-inch front drive bays” on page 360.

To connect signal cables for the front backplane(s), refer to the following cable routing scenarios depending on your server configuration.

- “16i RAID/HBA adapter” on page 581
- “CFF expander + 8i RAID/HBA adapter” on page 581

16i RAID/HBA adapter

The topic provides cable routing information for the 16 x 2.5" SAS/SATA + 8 x 2.5" NVMe (Gen 4) configuration with one 16i RAID/HBA adapter.

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

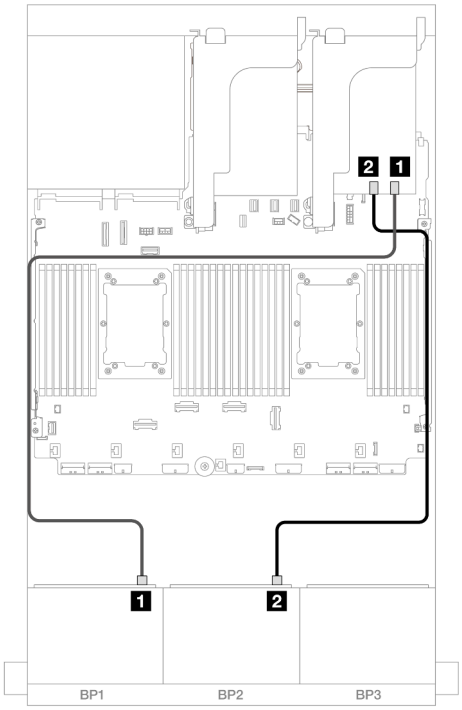


Figure 652. SAS/SATA cable routing

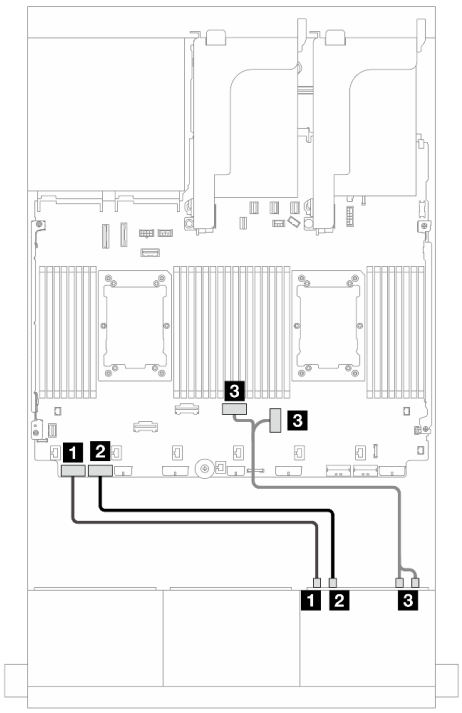


Figure 653. NVMe cable routing

From	To	From	To
1 Backplane 1: SAS	16i adapter • Gen 4: C0 • Gen 3: C0C1	1 Backplane 3: NVMe 0-1	Onboard: PCIe 8
2 Backplane 2: SAS	• Gen 4: C1 • Gen 3: C2C3	2 Backplane 3: NVMe 2-3	Onboard: PCIe 7
		3 Backplane 3: NVMe 4-5, 6-7	Onboard: PCIe 4, 3

CFF expander + 8i RAID/HBA adapter

The topic provides cable routing information for the 16 x 2.5" SAS/SATA + 8 x 2.5" NVMe (Gen 4) configuration with one CFF expander and one 8i RAID/HBA adapter.

SAS/SATA cable routing

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

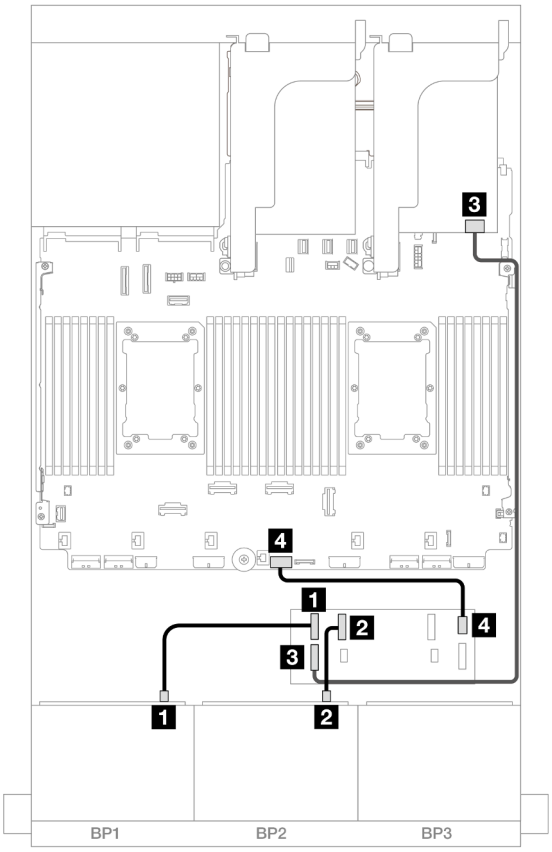


Figure 654. Cable routing to one CFF expander and one 8i adapter

From	To
1 Backplane 1: SAS	CFF expander • C0
2 Backplane 2: SAS	• C1
3 CFF expander: RAID/HBA	8i adapter • Gen 4: C0 • Gen 3: C0C1
4 CFF expander: PWR	Onboard: CFF EXP PWR

NVMe cable routing

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

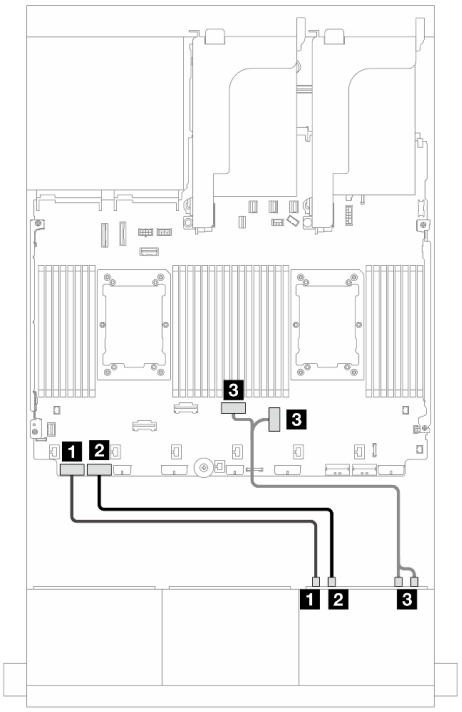


Figure 655. Cable routing when two processors installed

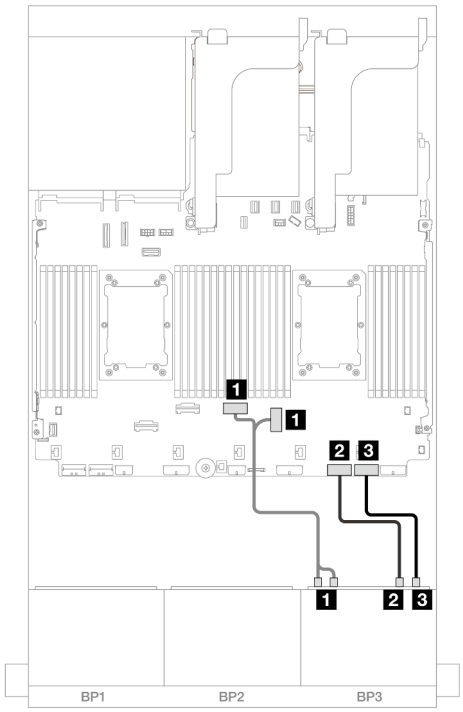


Figure 656. Cable routing when one processor installed

From	To
1 Backplane 3: NVMe 0-1	Onboard: PCIe 8
2 Backplane 3: NVMe 2-3	Onboard: PCIe 7
3 Backplane 3: NVMe 4-5, 6-7	Onboard: PCIe 4, 3

From	To
1 Backplane 3: NVMe 0-1, 2-3	Onboard: PCIe 3, 4
2 Backplane 3: NVMe 4-5	Onboard: PCIe 2
3 Backplane 3: NVMe 6-7	Onboard: PCIe 1

Two 8 x SAS/SATA and one 8 x NVMe (Gen 5) backplanes

This section provides cable routing information for the server model with two 8 x 2.5-inch SAS/SATA front drive backplanes and one 8 x 2.5-inch NVMe front drive backplane (Gen 5).

To connect power cables for the front backplane(s), refer to "Backplanes: server models with 2.5-inch front drive bays" on page 360.

To connect signal cables for the front backplane(s), refer to the following cable routing scenarios depending on your server configuration.

- "16i RAID/HBA adapter" on page 583
- "CFF expander + 8i RAID/HBA adapter" on page 585

16i RAID/HBA adapter

The topic provides cable routing information for the 16 x 2.5" SAS/SATA + 8 x 2.5" NVMe (Gen 5) configuration with one 16i RAID/HBA adapter.

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

SAS/SATA cable routing

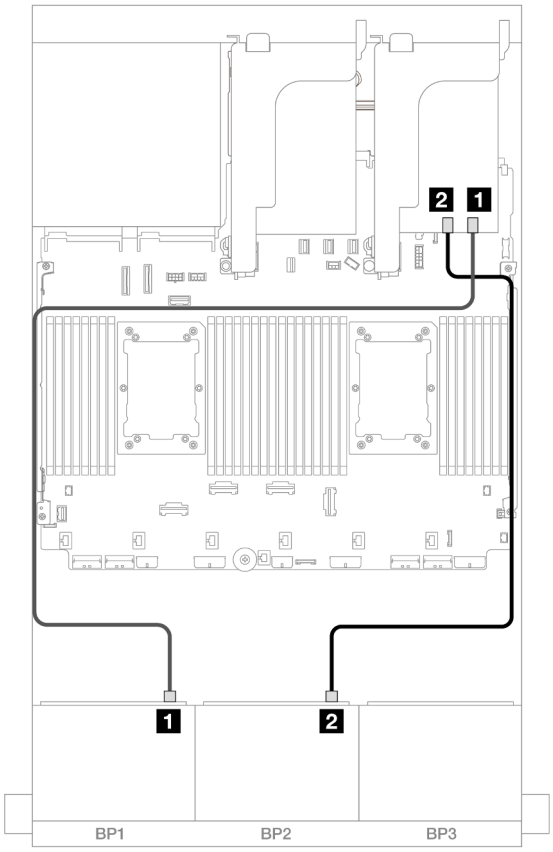


Figure 657. SAS/SATA cable routing

From	To
1 Backplane 1: SAS	16i adapter • Gen 4: C0 • Gen 3: C0C1
2 Backplane 2: SAS	• Gen 4: C1 • Gen 3: C2C3

NVMe cable routing

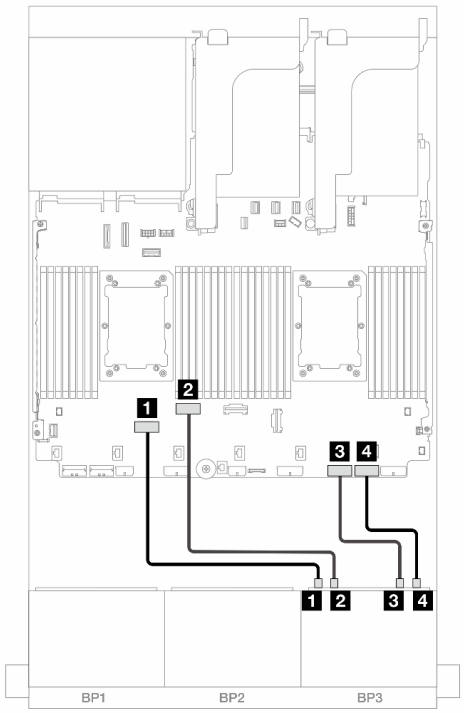


Figure 658. Cable routing when two Platinum series processors installed with no riser 3 or with x8/x8 riser card

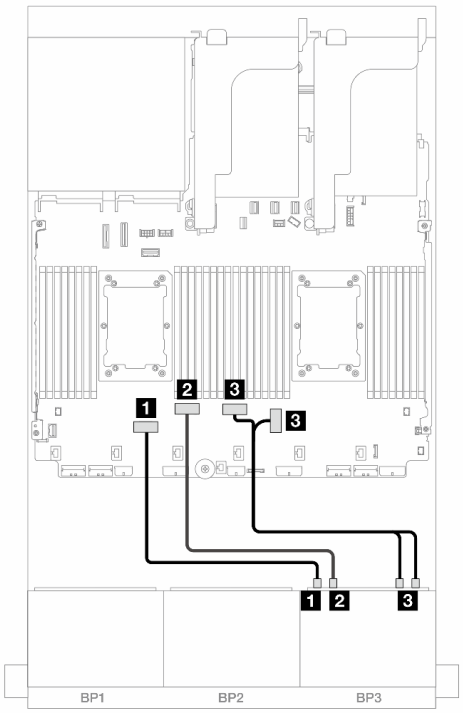


Figure 659. Cable routing in other scenarios

From	To	From	To
1 Backplane 3: NVMe 0-1	Onboard: PCIe 6	1 Backplane 3: NVMe 0-1	Onboard: PCIe 6
2 Backplane 3: NVMe 2-3	Onboard: PCIe 5	2 Backplane 3: NVMe 2-3	Onboard: PCIe 5
3 Backplane 3: NVMe 4-5	Onboard: PCIe 2	3 Backplane 3: NVMe 4-5, 6-7	Onboard: PCIe 4, 3
4 Backplane 3: NVMe 6-7	Onboard: PCIe 1		

CFF expander + 8i RAID/HBA adapter

The topic provides cable routing information for the 16 x 2.5" SAS/SATA + 8 x 2.5" NVMe (Gen 5) configuration with one CFF expander and one 8i RAID/HBA adapter.

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

SAS/SATA cable routing

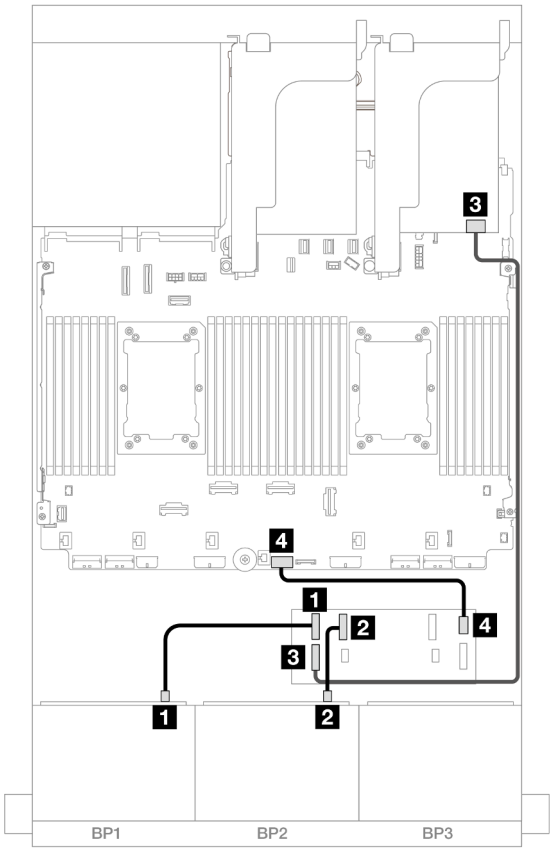


Figure 660. Cable routing to one CFF expander and one 8i adapter

From	To
1 Backplane 1: SAS	CFF expander • C0
2 Backplane 2: SAS	• C1
3 CFF expander: RAID/HBA	8i adapter • Gen 4: C0 • Gen 3: C0C1
4 CFF expander: PWR	Onboard: CFF EXP PWR

NVMe cable routing

Cable routing when two processors installed

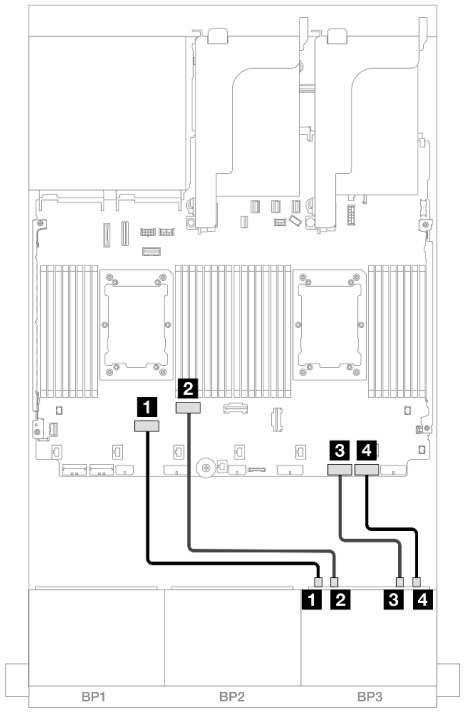


Figure 661. Cable routing when two Platinum series processors installed with no riser 3 or with x8/x8 riser card

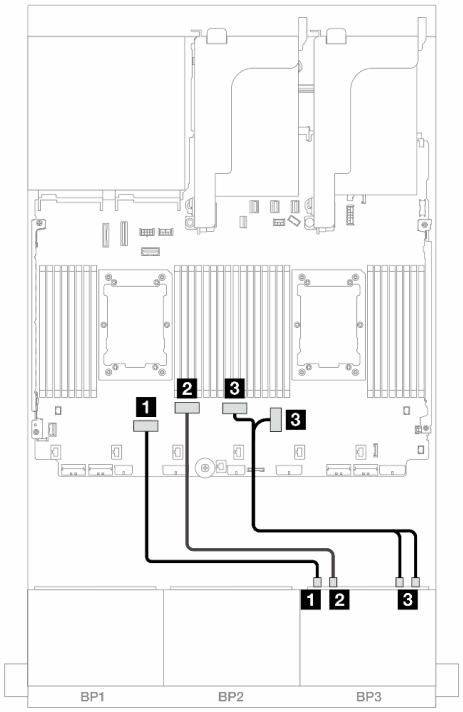


Figure 662. Cable routing in other scenarios

From	To
1 Backplane 3: NVMe 0-1	Onboard: PCIe 6
2 Backplane 3: NVMe 2-3	Onboard: PCIe 5
3 Backplane 3: NVMe 4-5	Onboard: PCIe 2
4 Backplane 3: NVMe 6-7	Onboard: PCIe 1

From	To
1 Backplane 3: NVMe 0-1	Onboard: PCIe 6
2 Backplane 3: NVMe 2-3	Onboard: PCIe 5
3 Backplane 3: NVMe 4-5, 6-7	Onboard: PCIe 4, 3

Cable routing when one processor installed

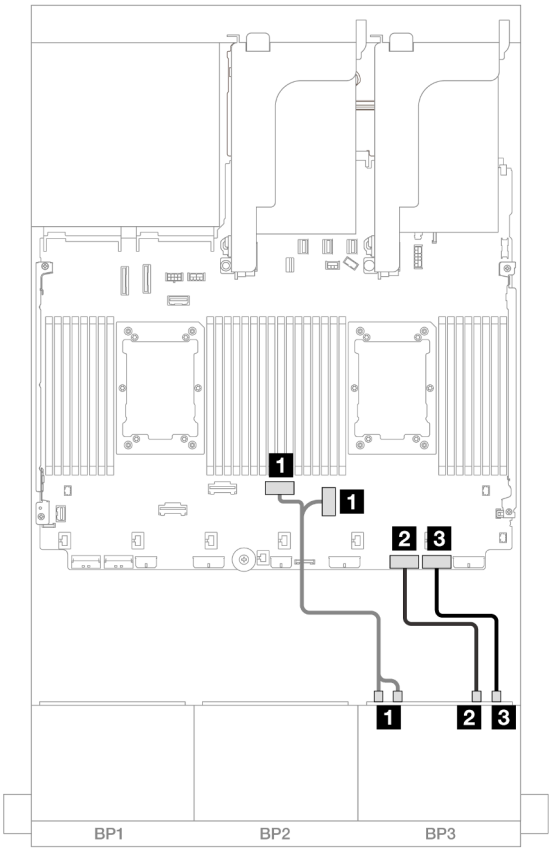


Figure 663. Cable routing when one processor installed

From	To
1 Backplane 3: NVMe 0-1, 2-3	Onboard: PCIe 4, 3
2 Backplane 3: NVMe 4-5	Onboard: PCIe 2
3 Backplane 3: NVMe 6-7	Onboard: PCIe 1

24 x 2.5" SAS/SATA expander backplane

This section provides cable routing information for the server model with the 24 x 2.5" SAS/SATA expander backplane.

- “Front backplane: 24 x 2.5" SAS/SATA” on page 588
- “Front + rear backplanes: 24 x 2.5" SAS/SATA + 4 x 2.5" AnyBay” on page 589
- “Front + rear backplanes: 24 x 2.5" SAS/SATA + 8 x 2.5" SAS/SATA” on page 590

Front backplane: 24 x 2.5" SAS/SATA

This topic provides cable routing information for the front 24 x 2.5-inch SAS/SATA expander backplane.

8i adapter

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

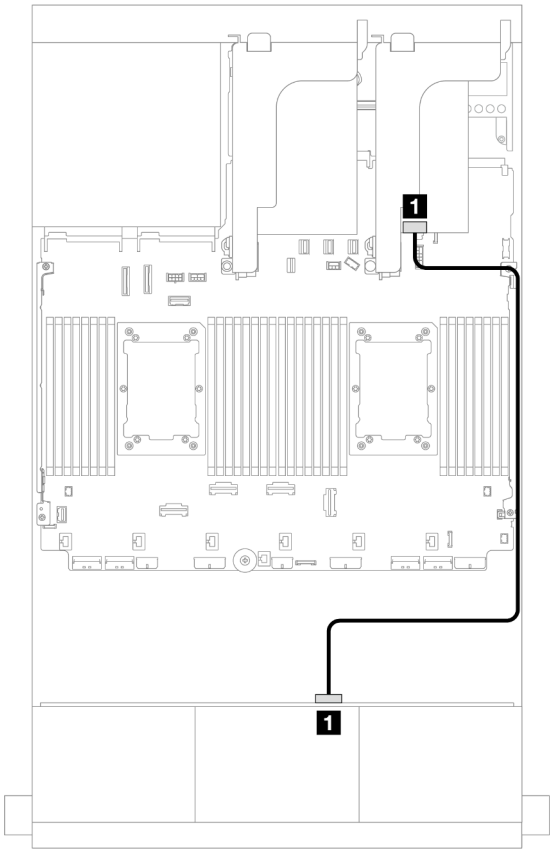


Figure 664. Cable routing to one 8i adapter

From	To
1 Backplane 1: SAS 0	8i adapter • Gen 4: C0 • Gen 3: C0C1

Front + rear backplanes: 24 x 2.5" SAS/SATA + 4 x 2.5" AnyBay

This topic provides cable routing information for the front 24 x 2.5-inch SAS/SATA expander backplane with a 4 x 2.5-inch AnyBay rear drive backplane.

8i adapter

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

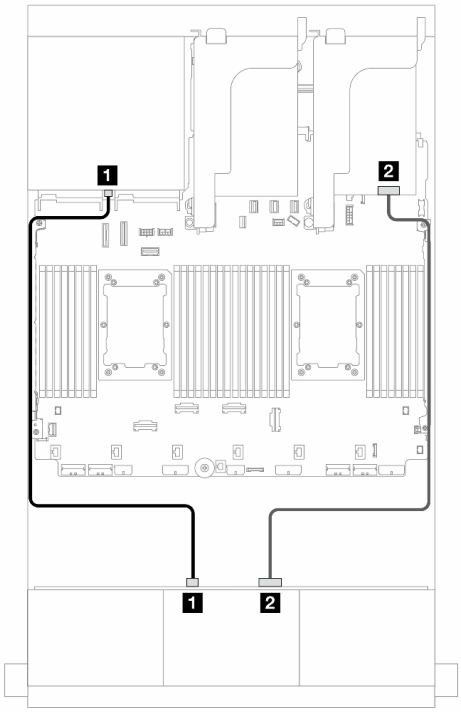


Figure 665. Front backplane cable routing

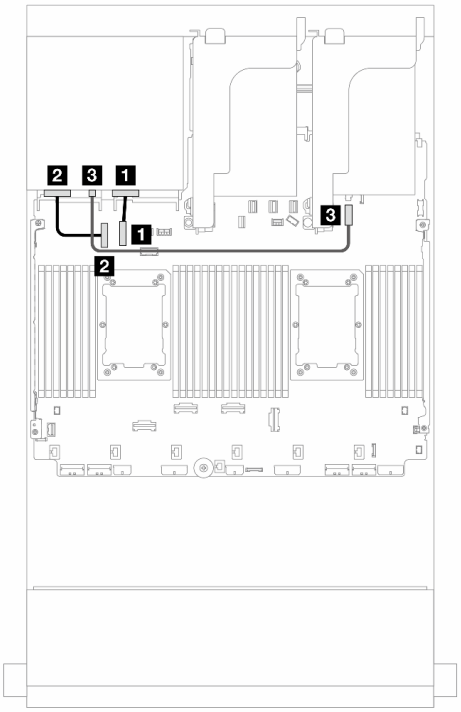


Figure 666. Rear backplane cable routing

From	To	From	To
1 Backplane 1: SAS 1	Backplane 4: SAS	1 Backplane 4: NVMe 0-1	Onboard: PCIe 10
2 Backplane 1: SAS 0	8i adapter • Gen 4: C0 • Gen 3: C0C1	2 Backplane 4: NVMe 2-3	Onboard: PCIe 9
		3 Backplane 4: PWR	4 Onboard: 7mm power connector

Front + rear backplanes: 24 x 2.5" SAS/SATA + 8 x 2.5" SAS/SATA

This topic provides cable routing information for the front 24 x 2.5-inch SAS/SATA expander backplane with an 8 x 2.5-inch SAS/SATA rear drive backplane.

- "16i RAID/HBA adapter" on page 590
- "CFF 16i RAID/HBA adapter" on page 591

16i RAID/HBA adapter

This topic provides cable routing information for the 24 x 2.5-inch SAS/SATA + 8 x 2.5-inch SAS/SATA configuration with one 16i RAID/HBA adapter.

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

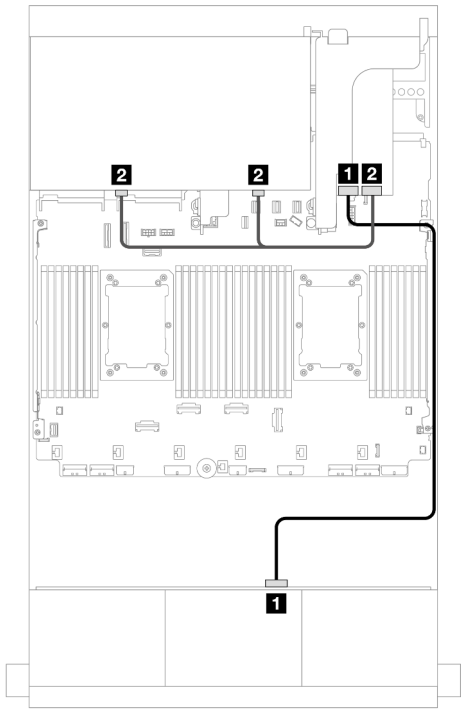


Figure 667. Front/Rear backplane signal cable routing

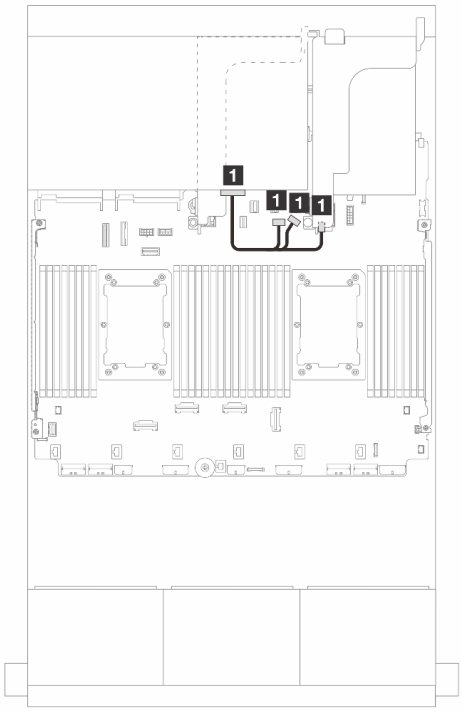


Figure 668. Rear backplane power cable routing

From	To	From	To
1 Backplane 1: SAS 0	16i adapter • Gen 4: C0 • Gen 3: C0C1	1 Backplane 4: PWR	• Onboard: backplane power • Onboard: backplane sideband • Riser 1: PWR
2 Backplane 4: SAS	• Gen 4: C1 • Gen 3: C2C3		

CFF 16i RAID/HBA adapter

This topic provides cable routing information for the 24 x 2.5-inch SAS/SATA + 8 x 2.5-inch SAS/SATA configuration with one CFF 16i RAID/HBA adapter.

Signal cable routing

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

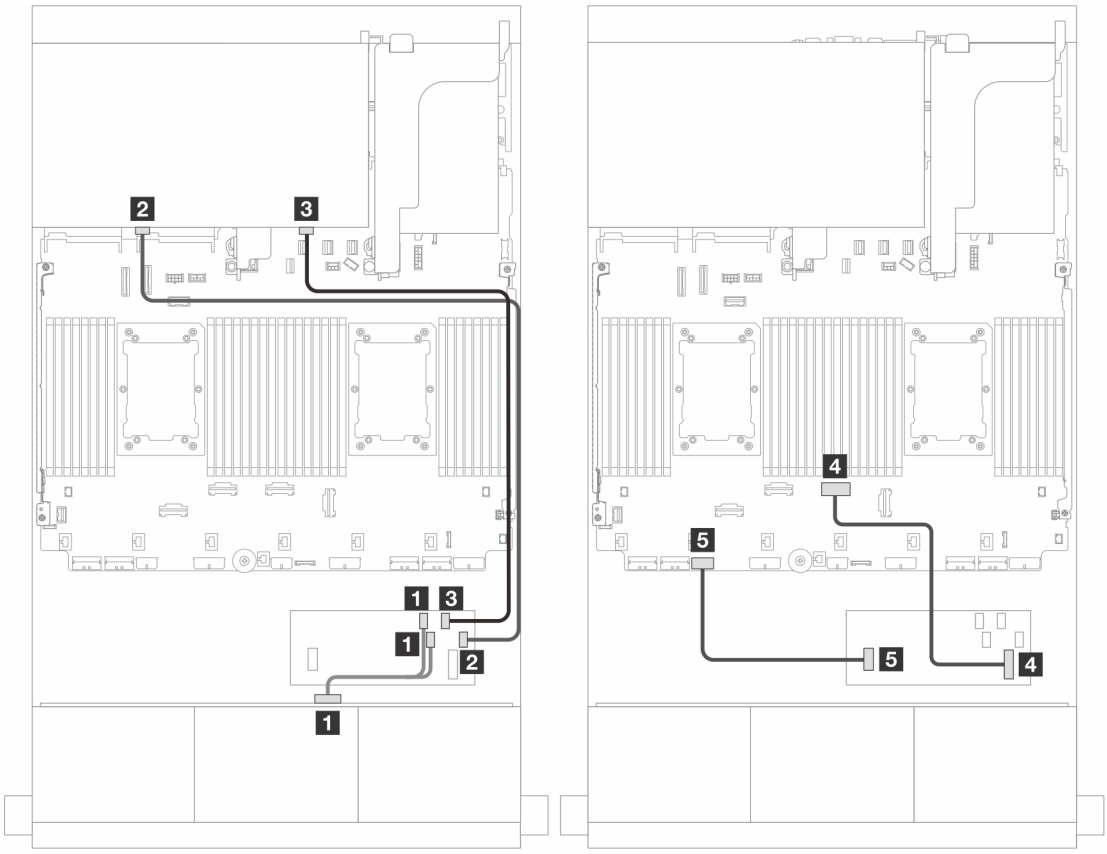


Figure 669. Cable routing to one CFF 16i RAID/HBA adapter

From	To
1 Backplane 1: SAS 0	CFF adapter • C0 • C1
2 Backplane 4: SAS 0	• C2
3 Backplane 4: SAS 1	• C3
4 CFF adapter: MB (CFF input)	Onboard: PCIe 4
5 CFF adapter: PWR	Onboard: CFF RAID/HBA PWR

Power cable routing

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

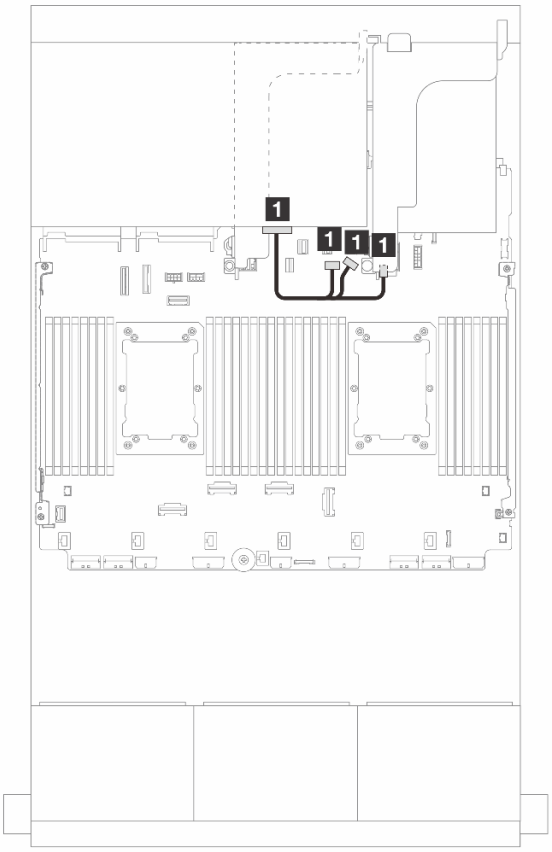


Figure 670. Rear backplane power cable routing

From	To
1 Backplane 4: PWR	• Onboard: backplane power • Onboard: backplane sideband • Riser 1: PWR

Backplanes: server models with 3.5-inch front drive bays

This section provides backplane cable connection information for server models with 3.5-inch front drive bays.

Before you start

Ensure below parts are removed before starting cable routing for front backplanes.

- Top cover (see “Remove the top cover” on page 318)
- Air baffle (see “Remove the air baffle” on page 44)
- Fan cage (see “Remove the system fan cage” on page 311)

Power cable connections

The server supports the following 3.5-inch drive backplanes:

- 8 x 3.5-inch SAS/SATA backplane
- 12 x 3.5-inch SAS/SATA backplane
- 12 x 3.5-inch AnyBay backplane
- 12 x 3.5-inch SAS/SATA expander backplane

For connectors on each drive backplane, see “Drive backplane connectors” on page 323.

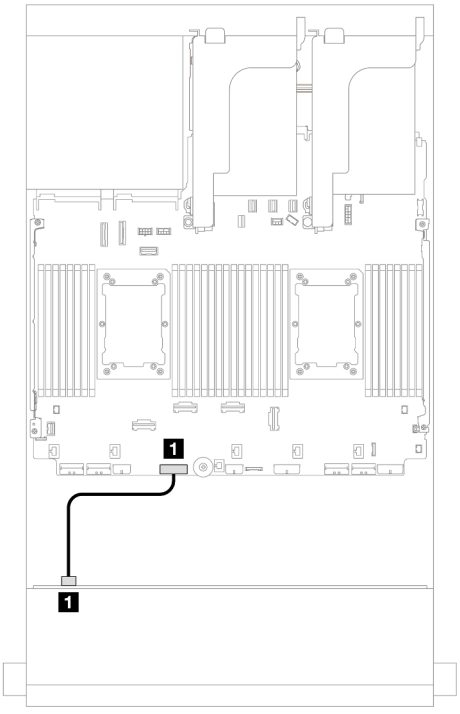


Figure 671. Power cable connections for the 8 x 3.5-inch SAS/SATA backplane and 12 x 3.5-inch SAS/SATA expander backplane

From	To

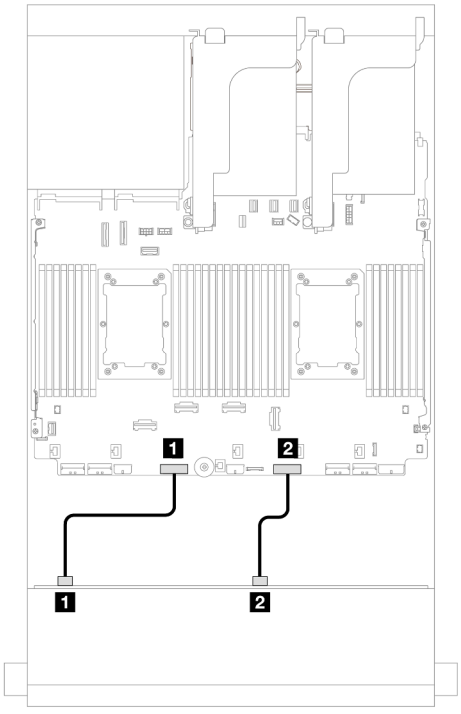


Figure 672. Power cable connections for the 12 x 3.5-inch SAS/SATA/AnyBay backplanes

From	To

1 Power connector on backplane 1	Backplane 1 power connector	1 Power connector 1 on backplane	Backplane 1 power connector
		2 Power connector 2 on backplane	Backplane 2 power connector

Notes: If there is a supercap holder installed between the front backplane and the system board assembly, connect the power cables as below:

- Connect power connector 1 on the backplane to the backplane 2 power connector on the system board assembly
- (For the backplane with two power connectors) Connect power connector 2 on the backplane to the backplane 3 power connector on the system board assembly.

Signal cable connections

Refer to the specific topic for signal cable connections depending on the backplanes you have installed.

- “8 x 3.5-inch SAS/SATA backplane” on page 595
- “12 x 3.5-inch SAS/SATA backplane” on page 597
- “12 x 3.5-inch AnyBay backplane” on page 616
- “12 x 3.5-inch SAS/SATA expander backplane” on page 622

8 x 3.5-inch SAS/SATA backplane

This section provides cable routing information for the server model with the 8 x 3.5-inch SAS/SATA front drive backplane.

- “Onboard connectors” on page 595
- “8i RAID/HBA adapter” on page 596

Onboard connectors

The following shows the cable connections for the 8 x 3.5-inch SAS/SATA configuration with onboard connectors.

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

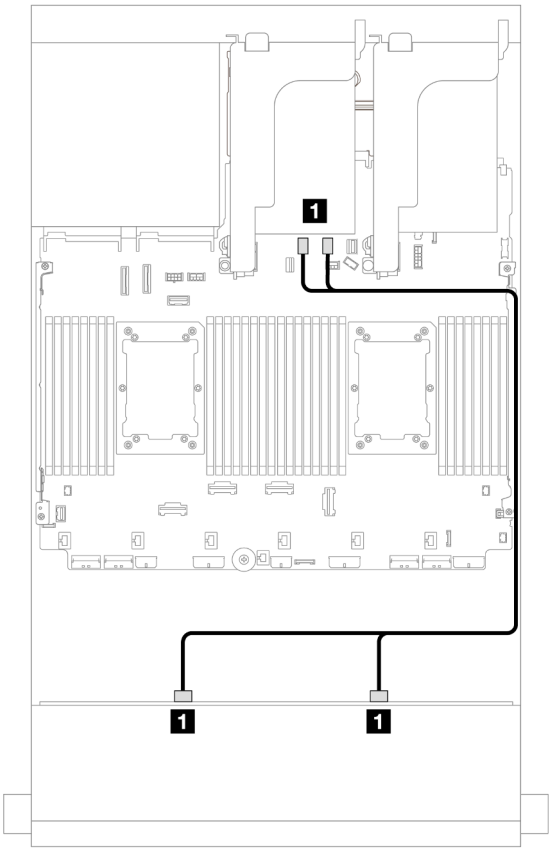


Figure 673. Cable routing to onboard SATA connectors

From	To
1 Backplane 1: SAS 0, SAS 1	Onboard: SATA 0, SATA 1

8i RAID/HBA adapter

The following shows the cable connections for the 8 x 3.5-inch SAS/SATA configuration with one 8i RAID/HBA adapter.

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

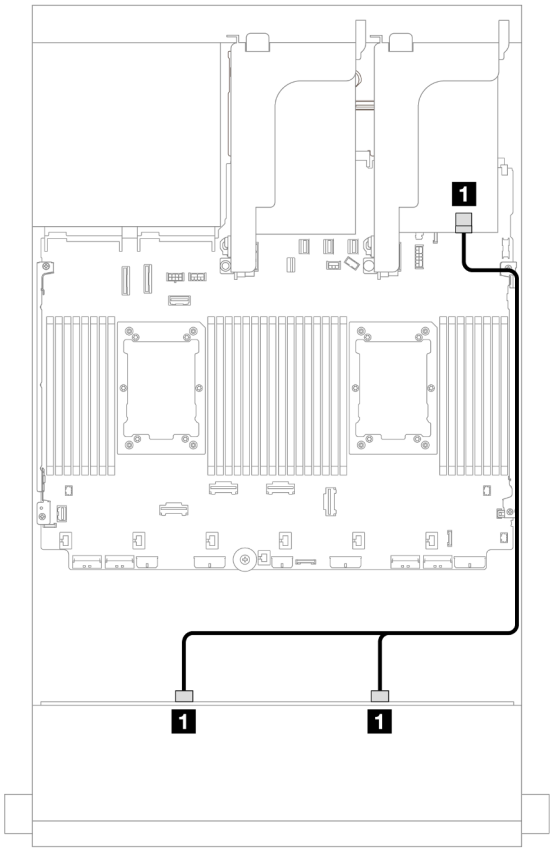


Figure 674. Cable routing to one 8i RAID/HBA adapter

From	To
1 Backplane 1: SAS 0, SAS 1	8i adapter • Gen 4: C0 • Gen 3: C0C1

12 x 3.5-inch SAS/SATA backplane

This section provides cable routing information for the server model with the 12 x 3.5-inch SAS/SATA front drive backplane.

- “Front backplane: 12 x 3.5" SAS/SATA” on page 597
- “Front + rear backplanes: 12 x 3.5" SAS/SATA + 4 x 2.5"/2 x 3.5"/4 x 3.5" SAS/SATA/4 x 2.5" AnyBay/4 x 2.5" NVMe” on page 599
- “Front + middle backplanes: 12 x 3.5" SAS/SATA + 4 x 3.5"/4 x 2.5" SAS/SATA/8 x 2.5" NVMe” on page 605
- “Front + middle + rear backplanes: 12 x 3.5" SAS/SATA + 4 x 3.5" SAS/SATA + 4 x 3.5"SAS/SATA” on page 615

Front backplane: 12 x 3.5" SAS/SATA

This topic provides cable routing information for the server model with the 12 x 3.5-inch SAS/SATA front drive backplane.

- “Onboard connectors” on page 598

- “16i RAID/HBA adapter” on page 598

Onboard connectors

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

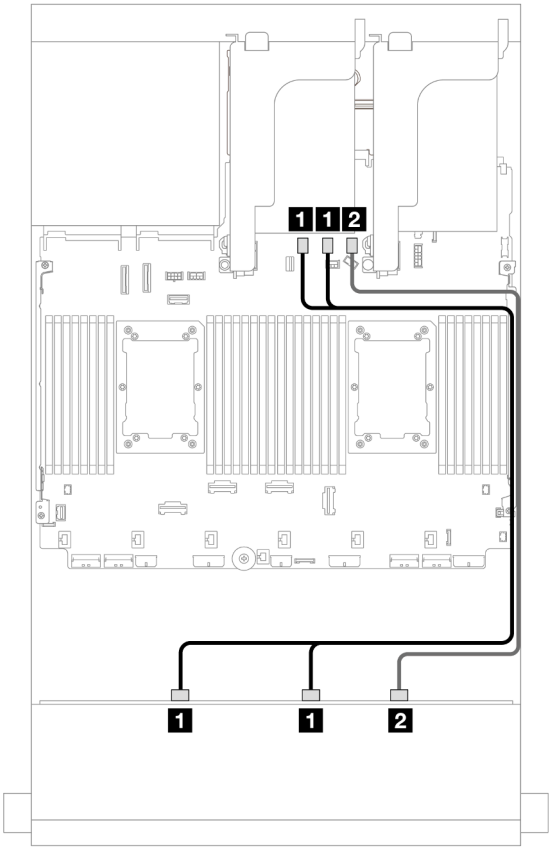


Figure 675. Cable routing to onboard SATA connectors

From	To
1 Backplane 1: SAS 0, SAS 1	Onboard: SATA 0, SATA 1
2 Backplane 1: SAS 2	Onboard: SATA 2

16i RAID/HBA adapter

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

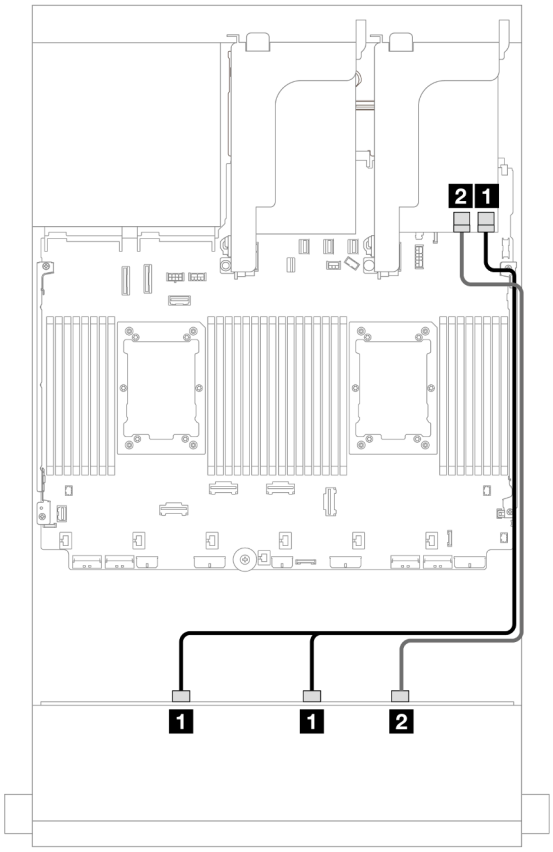


Figure 676. Cable routing to one 16i RAID/HBA adapter

From	To
1 Backplane 1: SAS 0, SAS 1	16i adapter • Gen 4: C0 • Gen 3: C0C1
2 Backplane 1: SAS 2	• Gen 4: C1 • Gen 3: C2

Front + rear backplanes: 12 x 3.5" SAS/SATA + 4 x 2.5"/2 x 3.5"/4 x 3.5" SAS/SATA/4 x 2.5" AnyBay/4 x 2.5" NVMe

This topic provides cable routing information for the 12 x 3.5-inch SAS/SATA front backplane and a 2 x 3.5-inch/4 x 3.5-inch/4 x 2.5-inch SAS/SATA rear backplane or a 4 x 2.5-inch AnyBay rear backplane.

Depending on the rear backplane you use, refer to the specific configuration for cable routing information.

- “12 x 3.5" SAS/SATA + 2 x 3.5" SAS/SATA” on page 600
- “12 x 3.5" SAS/SATA + 4 x 3.5" SAS/SATA” on page 601
- “12 x 3.5" SAS/SATA + 4 x 2.5" SAS/SATA” on page 602
- “12 x 3.5" SAS/SATA + 4 x 2.5" AnyBay” on page 603
- “12 x 3.5" SAS/SATA + 4 x 2.5" NVMe” on page 604

12 x 3.5" SAS/SATA + 2 x 3.5" SAS/SATA

This topic provides cable routing information for the 12 x 3.5-inch SAS/SATA front backplane and a 2 x 3.5-inch SAS/SATA rear backplane.

- “Onboard connectors + onboard connectors” on page 600
- “16i RAID/HBA adapter” on page 600

Onboard connectors + onboard connectors

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

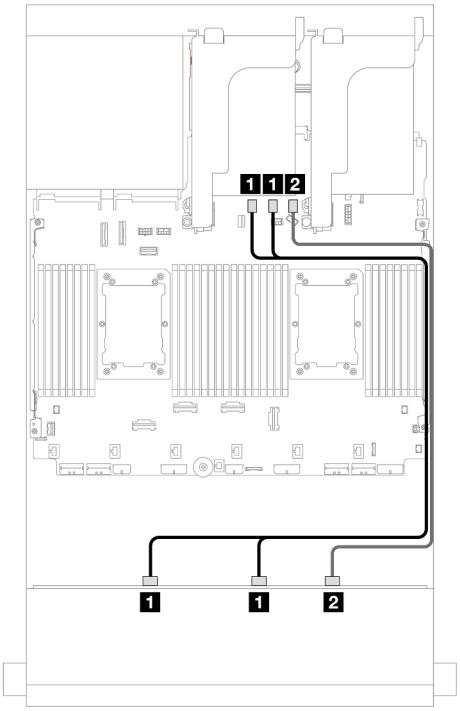


Figure 677. Front backplane cable routing

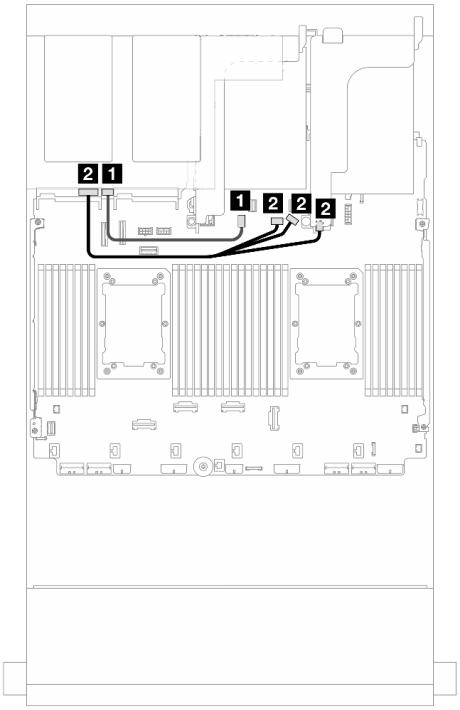


Figure 678. Rear backplane cable routing

From	To
1 Backplane 1: SAS 0, SAS 1	Onboard: SATA 0, SATA 1
2 Backplane 1: SAS 2	Onboard: SATA 2

From	To
1 Backplane 4: SAS	Onboard: M.2/7mm signal connector
2 Backplane 4: PWR	• Onboard: backplane power • Onboard: backplane sideband • Riser 1: PWR

16i RAID/HBA adapter

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

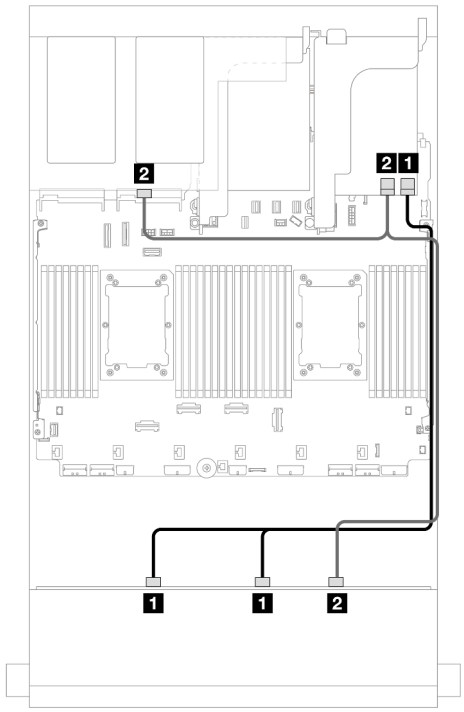


Figure 679. Front/Rear backplane signal cable routing

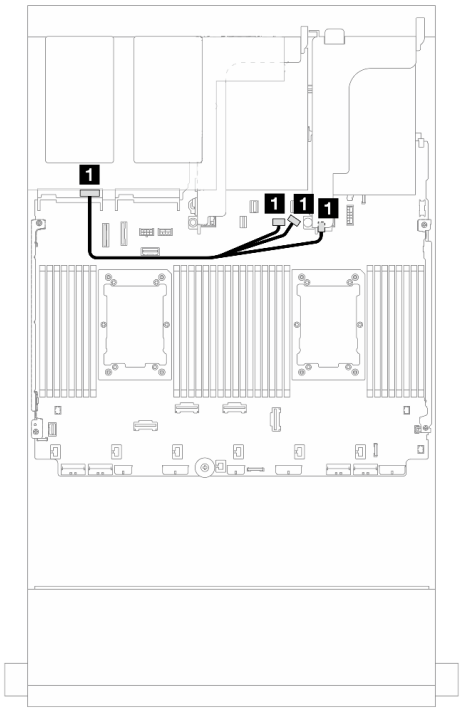


Figure 680. Rear backplane power cable routing

From	To
1 Backplane 1: SAS 0, SAS 1	16i adapter • Gen 4: C0 • Gen 3: C0C1
2 • Backplane 1: SAS 2 • Backplane 4: SAS	• Gen 4: C1 • Gen 3: C2C3

From	To
1 Backplane 4: PWR	• Onboard: backplane power • Onboard: backplane sideband • Riser 1: PWR

12 x 3.5" SAS/SATA + 4 x 3.5" SAS/SATA

This topic provides cable routing information for the 12 x 3.5-inch SAS/SATA front backplane and a 4 x 3.5-inch SAS/SATA rear backplane.

16i RAID/HBA adapter

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

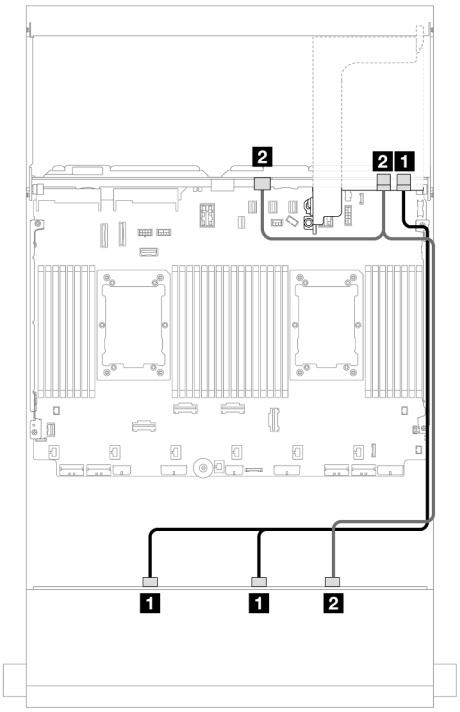


Figure 681. Front/Rear backplane signal cable routing

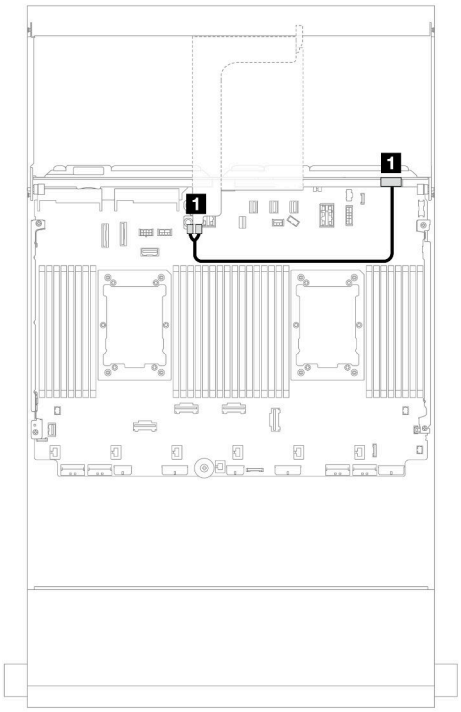


Figure 682. Rear backplane power cable routing

From	To
1 Backplane 1: SAS 0, SAS 1	16i adapter • Gen 4: C0 • Gen 3: C0C1
2 • Backplane 1: SAS 2 • Backplane 4: SAS	• Gen 4: C1 • Gen 3: C2C3

From	To
1 Backplane 4: PWR	Riser 2: PWR1, PWR2

12 x 3.5" SAS/SATA + 4 x 2.5" SAS/SATA

This topic provides cable routing information for the 12 x 3.5-inch SAS/SATA front backplane and a 4 x 2.5-inch SAS/SATA rear backplane.

16i RAID/HBA adapter

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

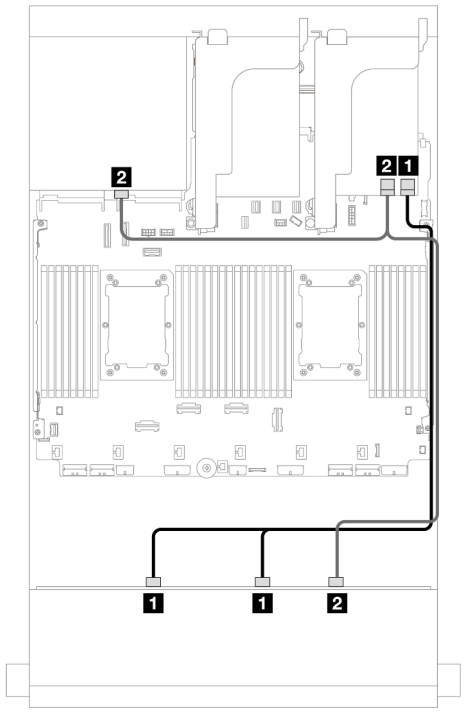


Figure 683. Front/Rear backplane signal cable routing

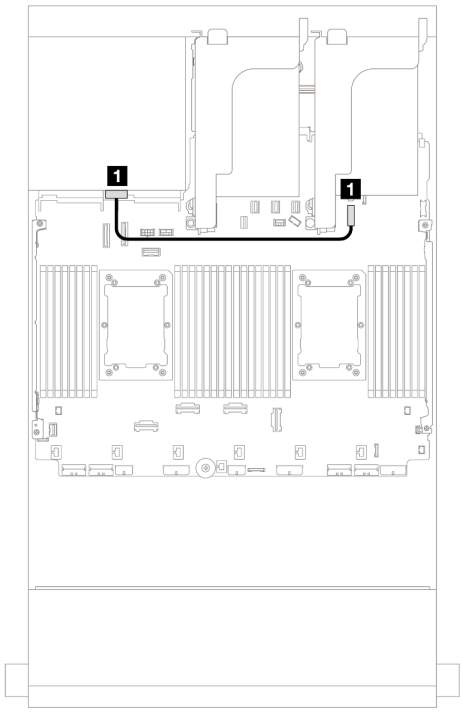


Figure 684. Rear backplane power cable routing

From	To
1 Backplane 1: SAS 0, SAS 1	16i adapter • Gen 4: C0 • Gen 3: C0C1
2 • Backplane 1: SAS 2 • Backplane 4: SAS	• Gen 4: C1 • Gen 3: C2C3

From	To
1 Backplane 4: PWR	Onboard: 7mm power connector

12 x 3.5" SAS/SATA + 4 x 2.5" AnyBay

This topic provides cable routing information for the 12 x 3.5-inch SAS/SATA front backplane and a 4 x 2.5-inch AnyBay rear backplane.

16i RAID/HBA adapter

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

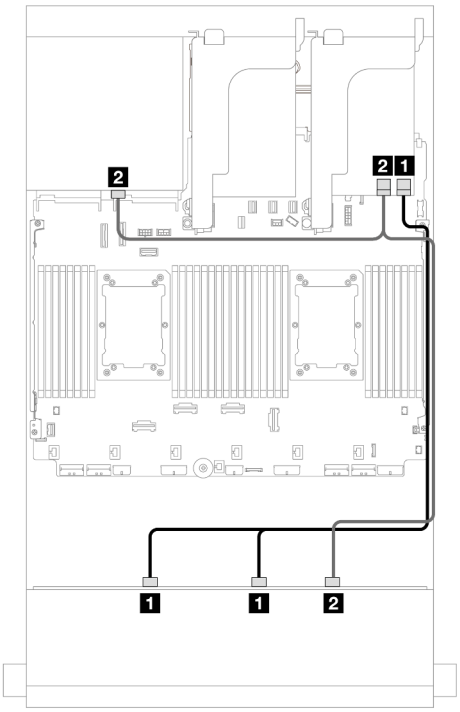


Figure 685. Front backplane cable routing

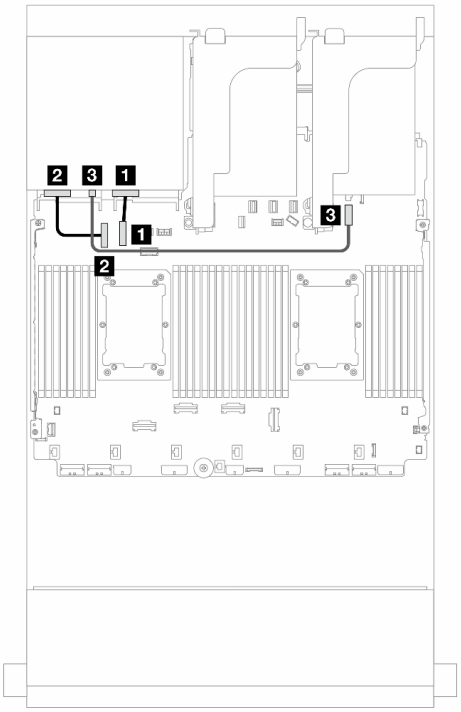


Figure 686. Rear backplane cable routing

From	To
1 Backplane 1: SAS 0, SAS 1	16i adapter • Gen 4: C0 • Gen 3: C0C1
2 • Backplane 1: SAS 2 • Backplane 4: SAS	• Gen 4: C1 • Gen 3: C2C3

From	To
1 Backplane 4: NVMe 0-1	Onboard: PCIe 10
2 Backplane 4: NVMe 2-3	Onboard: PCIe 9
3 Backplane 4: PWR	Onboard: 7mm power connector

12 x 3.5" SAS/SATA + 4 x 2.5" NVMe

This topic provides cable routing information for the front 12 x 3.5-inch SAS/SATA + rear 4 x 2.5-inch NVMe configuration with one 16i RAID/HBA adapter.

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

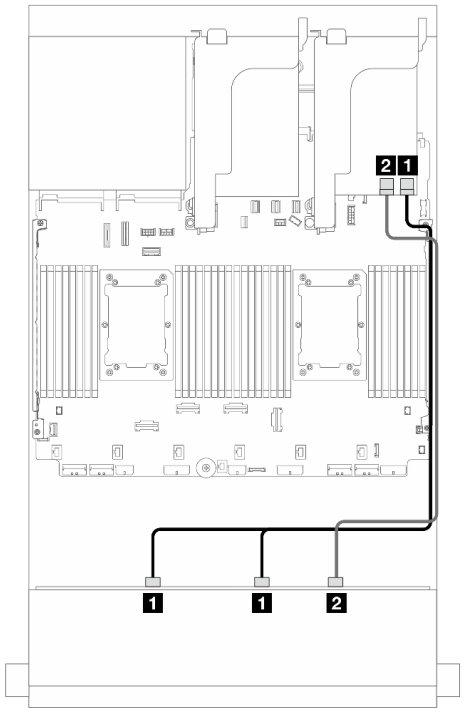


Figure 687. Front backplane cable routing

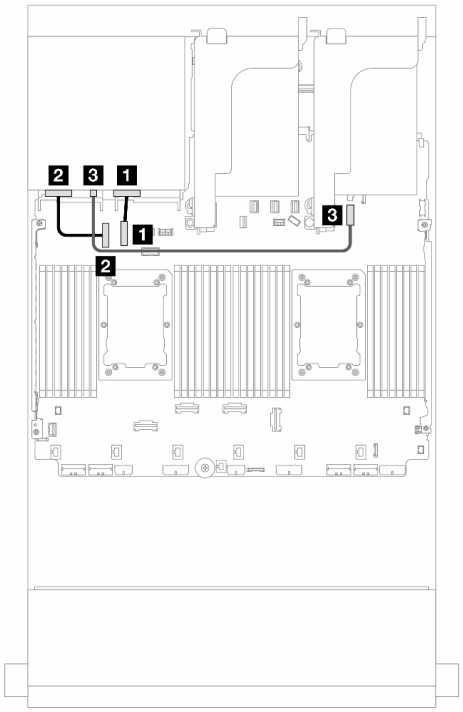


Figure 688. Rear backplane cable routing

From	To	From	To
1 Backplane 1: SAS 0, SAS 1	16i adapter • Gen 4: C0 • Gen 3: C0C1	1 Backplane 4: NVMe 0-1	Onboard: PCIe 10
2 Backplane 1: SAS 2	• Gen 4: C1 • Gen 3: C2	2 Backplane 4: NVMe 2-3	Onboard: PCIe 9
		3 Backplane 4: PWR	Onboard: 7mm power connector

Front + middle backplanes: 12 x 3.5" SAS/SATA + 4 x 3.5"/4 x 2.5" SAS/SATA/8 x 2.5" NVMe

This topic provides cable routing information for the 12 x 3.5-inch SAS/SATA front backplane and 4 x 3.5-inch/4 x 2.5-inch SAS/SATA or 4 x 2.5-inch NVMe/AnyBay middle backplanes.

Depending on the rear backplane you use, refer to the specific configuration for cable routing information.

- “12 x 3.5" SAS/SATA + 4 x 3.5" SAS/SATA” on page 605
- “12 x 3.5" SAS/SATA + 4 x 2.5" SAS/SATA” on page 606
- “12 x 3.5" SAS/SATA + 8 x 2.5" NVMe (two 4 x 2.5" NVMe)” on page 607
- “12 x 3.5" SAS/SATA + 8 x 2.5" NVMe (two 4 x 2.5" AnyBay)” on page 611

12 x 3.5" SAS/SATA + 4 x 3.5" SAS/SATA

This topic provides cable routing information for the 12 x 3.5-inch SAS/SATA front backplane and a 4 x 3.5-inch SAS/SATA middle backplane.

16i RAID/HBA adapter

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

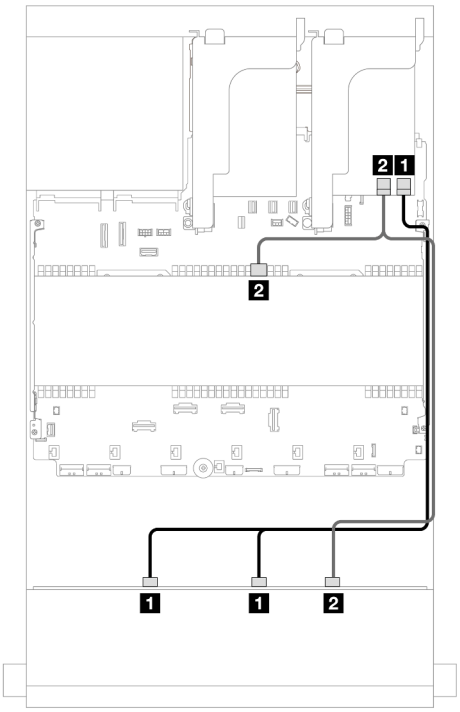


Figure 689. Front/Middle backplane signal cable routing

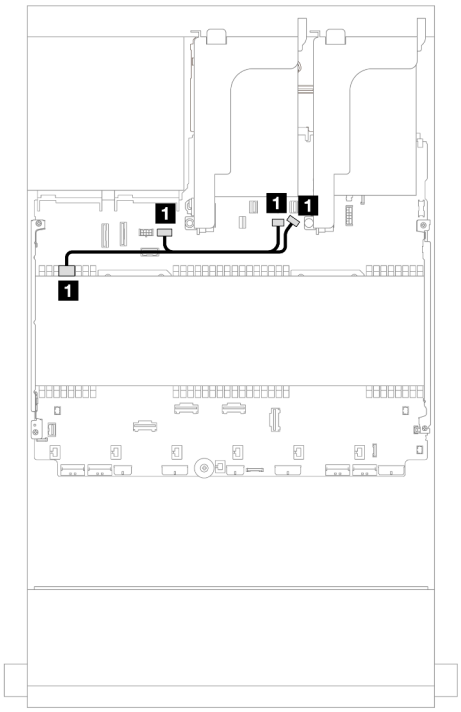


Figure 690. Middle backplane power cable routing

From	To	From	To
1 Backplane 1: SAS 0, SAS 1	16i adapter • Gen 4: C0 • Gen 3: C0C1	1 Backplane 5: PWR	• Onboard: GPU power • Onboard: backplane power • Onboard: backplane sideband
2 • Backplane 1: SAS 2 • Backplane 5: SAS	• Gen 4: C1 • Gen 3: C2C3		

12 x 3.5" SAS/SATA + 4 x 2.5" SAS/SATA

This topic provides cable routing information for the 12 x 3.5-inch SAS/SATA front backplane and a 4 x 2.5-inch SAS/SATA middle backplane.

16i RAID/HBA adapter

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

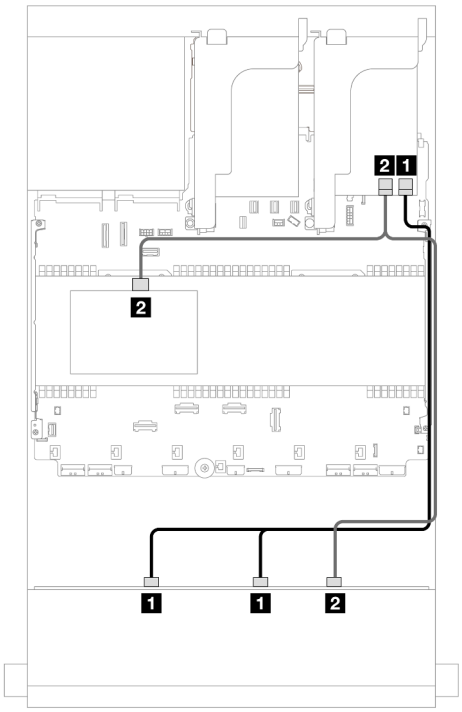


Figure 691. Front/Middle backplane signal cable routing

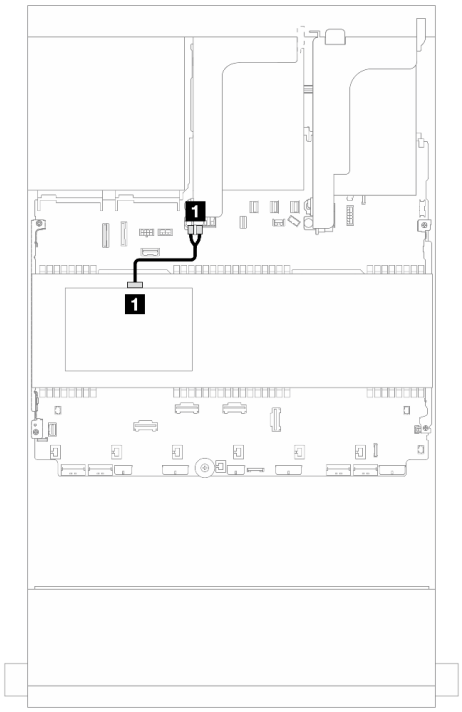


Figure 692. Middle backplane power cable routing

From	To
1 Backplane 1: SAS 0, SAS 1	16i adapter • Gen 4: C0 • Gen 3: C0C1
2 • Backplane 1: SAS 2 • Backplane 5: SAS	• Gen 4: C1 • Gen 3: C2C3

From	To
1 Backplane 5: PWR	Riser 2: PWR1, PWR2

12 x 3.5" SAS/SATA + 8 x 2.5" NVMe (two 4 x 2.5" NVMe)

This topic provides cable routing information for the 12 x 3.5-inch SAS/SATA front backplane and two 4 x 2.5-inch NVMe middle backplanes.

- "Onboard connectors" on page 607
- "16i RAID/HBA adapter" on page 609

Onboard connectors

This topic provides cable routing information for the front 12 x 3.5" SAS/SATA + middle 8 x 2.5" NVMe (using two 4 x 2.5" NVMe backplanes) configuration with onboard connectors.

Front backplane cable routing

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

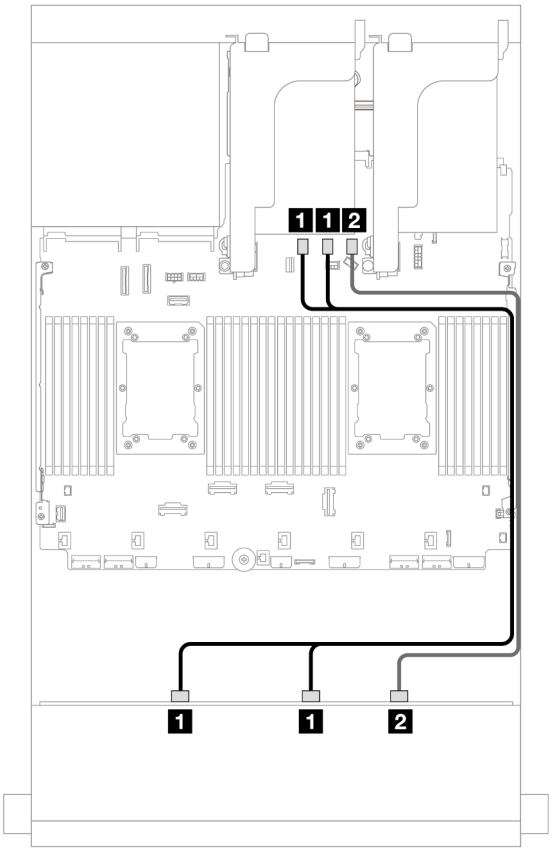


Figure 693. Cable routing to onboard SATA connectors

From	To
1 Backplane 1: SAS 0, SAS 1	Onboard: SATA 0, SATA 1
2 Backplane 1: SAS 2	Onboard: SATA 2

Middle backplane cable routing

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

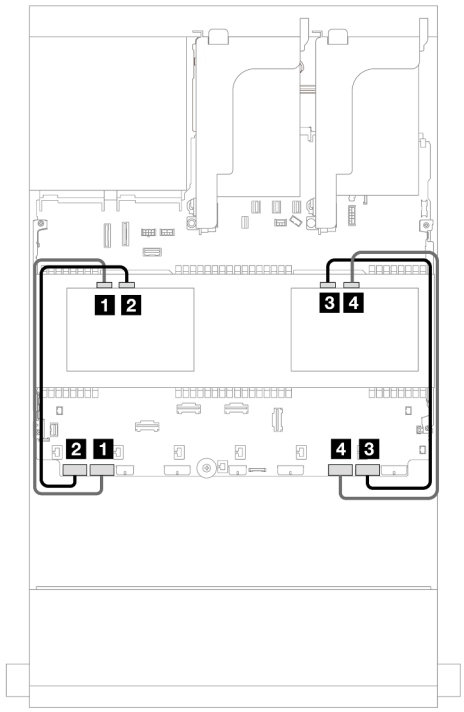


Figure 694. Middle backplane signal cable routing

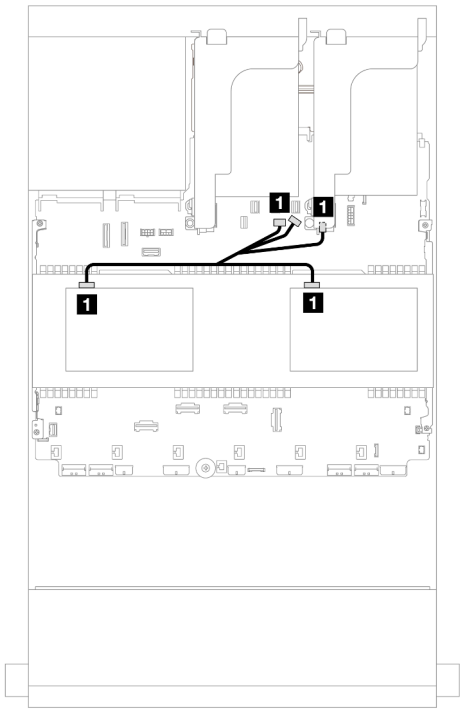


Figure 695. Middle backplane power cable routing

From	To	From	To
1 Backplane 5: NVMe 0-1	Onboard: PCIe 7	1 • Backplane 5: PWR • Backplane 6: PWR	• Onboard: backplane power • Onboard: backplane sideband • Riser 1: PWR
2 Backplane 5: NVMe 2-3	Onboard: PCIe 8		
3 Backplane 6: NVMe 0-1	Onboard: PCIe 1		
4 Backplane 6: NVMe 2-3	Onboard: PCIe 2		

16i RAID/HBA adapter

This topic provides cable routing information for the front 12 x 3.5" SAS/SATA + middle 8 x 2.5" NVMe (using two 4 x 2.5" NVMe backplanes) configuration with one 16i RAID/HBA adapter.

Front backplane cable routing

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

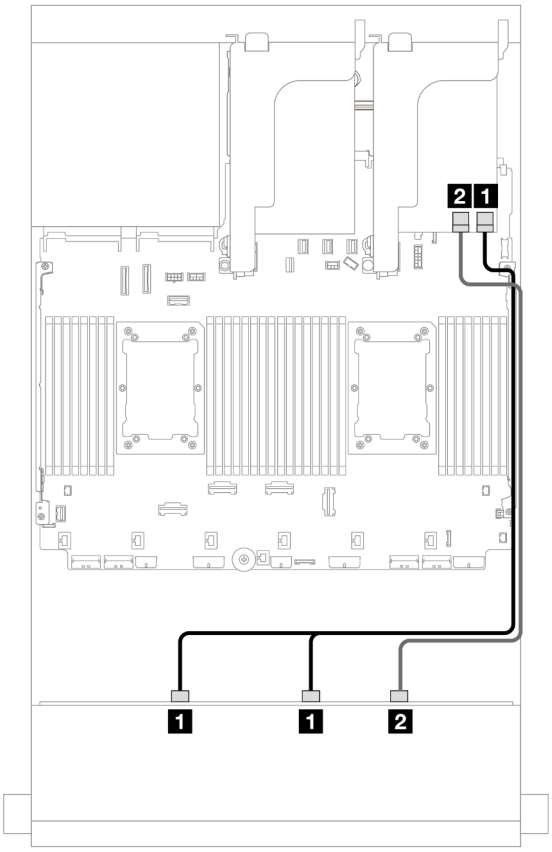


Figure 696. Cable routing to one 16i RAID/HBA adapter

From	To
1 Backplane 1: SAS 0, SAS 1	16i adapter • Gen 4: C0 • Gen 3: C0C1
2 Backplane 1: SAS 2	• Gen 4: C1 • Gen 3: C2C3

Middle backplane cable routing

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

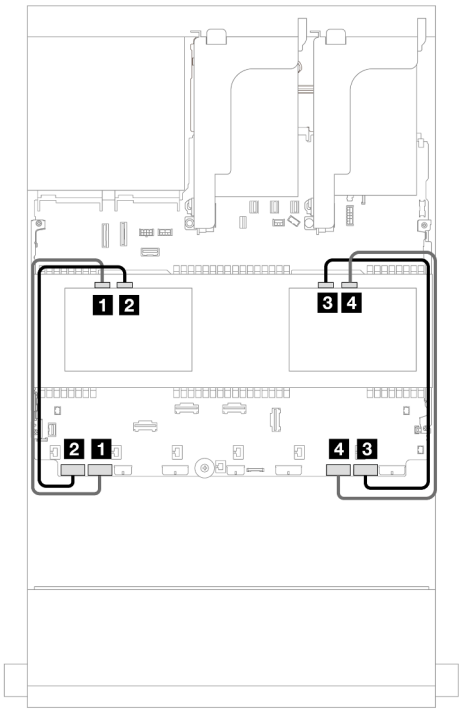


Figure 697. Middle backplane signal cable routing

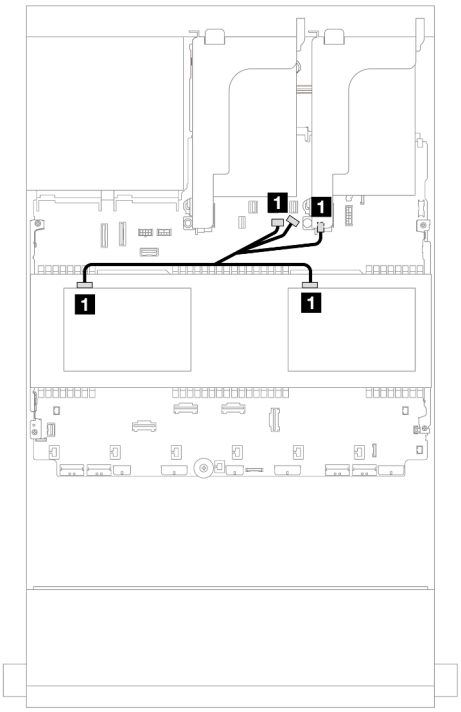


Figure 698. Middle backplane power cable routing

From	To	From	To
1 Backplane 5: NVMe 0-1	Onboard: PCIe 7	1 • Backplane 5: PWR • Backplane 6: PWR	• Onboard: backplane power • Onboard: backplane sideband • Riser 1: PWR
2 Backplane 5: NVMe 2-3	Onboard: PCIe 8		
3 Backplane 6: NVMe 0-1	Onboard: PCIe 1		
4 Backplane 6: NVMe 2-3	Onboard: PCIe 2		

12 x 3.5" SAS/SATA + 8 x 2.5" NVMe (two 4 x 2.5" AnyBay)

This topic provides cable routing information for the 12 x 3.5-inch SAS/SATA front backplane and two 4 x 2.5-inch AnyBay middle backplanes.

- "Onboard connectors" on page 607
- "16i RAID/HBA adapter" on page 609

Onboard connectors

This topic provides cable routing information for the front 12 x 3.5" SAS/SATA + middle 8 x 2.5" NVMe (using two 4 x 2.5" AnyBay backplanes) configuration with onboard connectors.

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

Front backplane cable routing

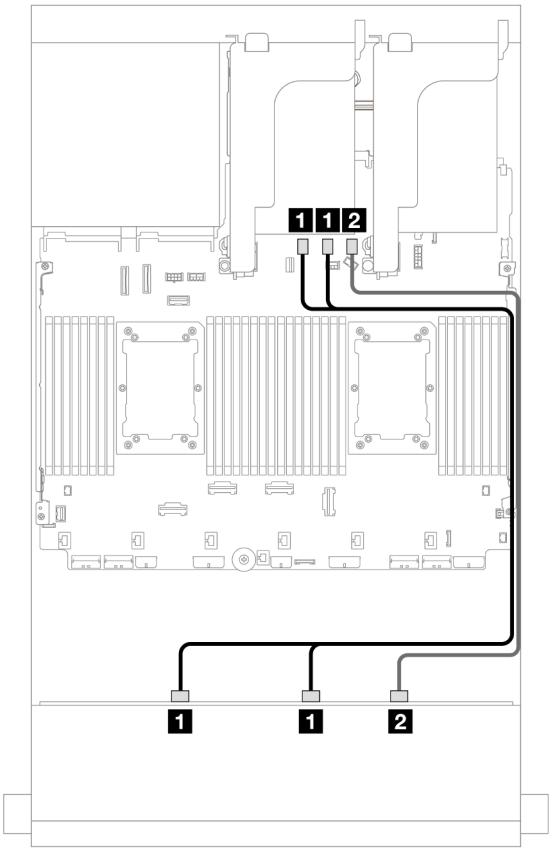


Figure 699. Cable routing to onboard SATA connectors

From	To
1 Backplane 1: SAS 0, SAS 1	Onboard: SATA 0, SATA 1
2 Backplane 1: SAS 2	Onboard: SATA 2

Middle backplane cable routing

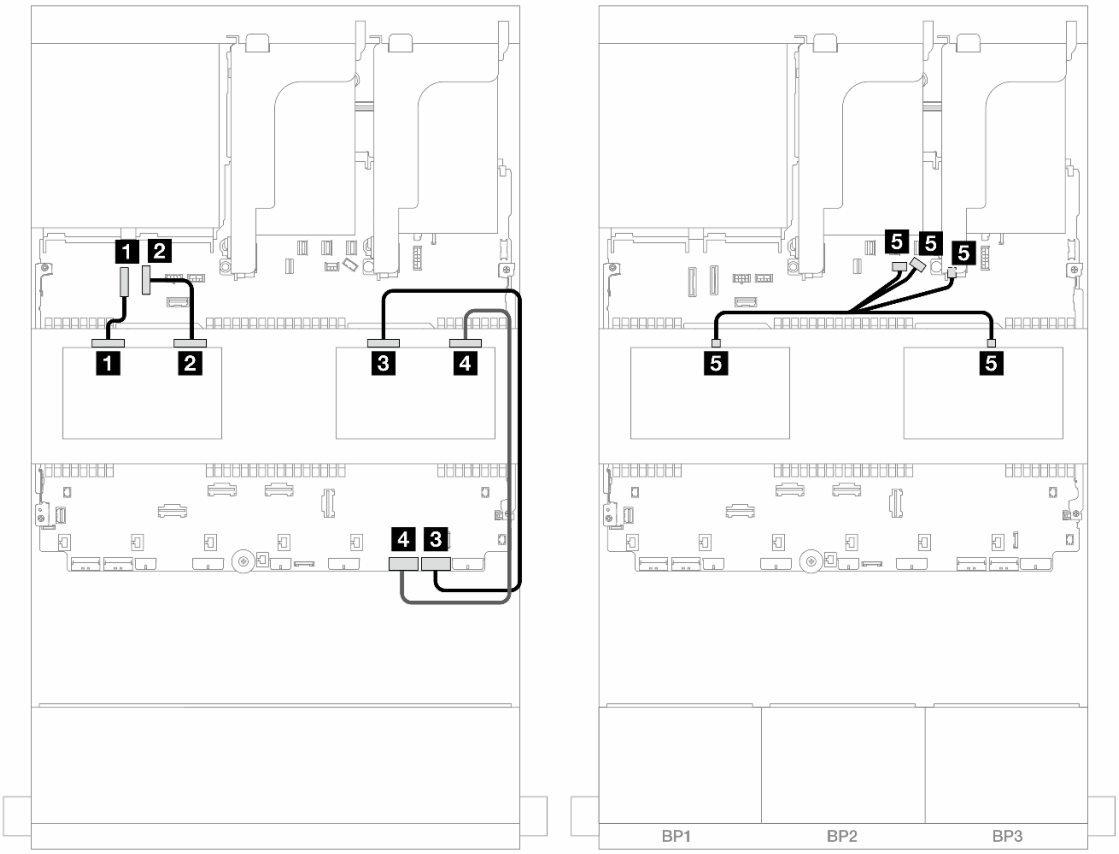


Figure 700. Middle backplane cable routing

From	To
1 Backplane 5: NVMe 0-1	Onboard: PCIe 9
2 Backplane 5: NVMe 2-3	Onboard: PCIe 10
3 Backplane 6: NVMe 0-1	Onboard: PCIe 1
4 Backplane 6: NVMe 2-3	Onboard: PCIe 2
5 • Backplane 5: PWR • Backplane 6: PWR	• Onboard: backplane power • Onboard: backplane sideband • Riser 1: PWR

16i RAID/HBA adapter

This topic provides cable routing information for the front 12 x 3.5" SAS/SATA + middle 8 x 2.5" NVMe (using two 4 x 2.5" AnyBay backplanes) configuration with one 16i RAID/HBA adapter.

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

Front backplane cable routing

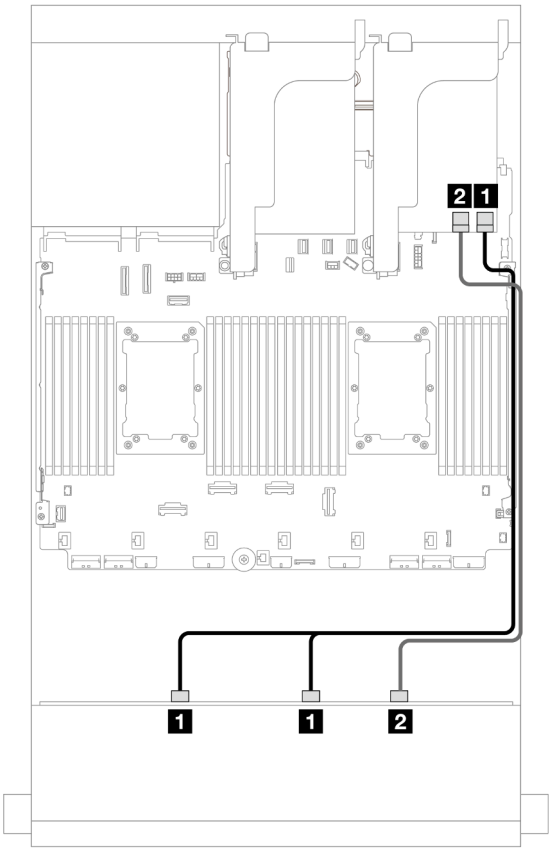


Figure 701. Cable routing to one 16i RAID/HBA adapter

From	To
1 Backplane 1: SAS 0, SAS 1	16i adapter • Gen 4: C0 • Gen 3: C0C1
2 Backplane 1: SAS 2	• Gen 4: C1 • Gen 3: C2C3

Middle backplane cable routing

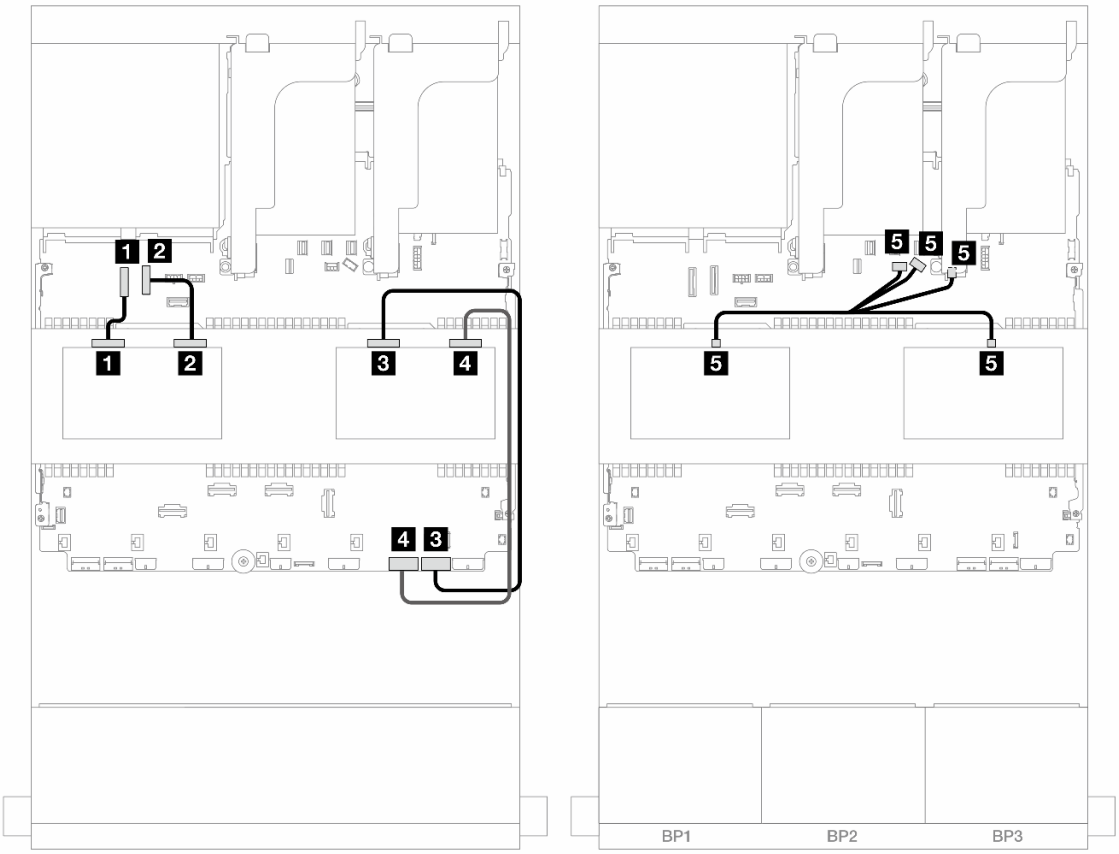


Figure 702. Middle backplane cable routing

From	To
1 Backplane 5: NVMe 0-1	Onboard: PCIe 9
2 Backplane 5: NVMe 2-3	Onboard: PCIe 10
3 Backplane 6: NVMe 0-1	Onboard: PCIe 1
4 Backplane 6: NVMe 2-3	Onboard: PCIe 2
5 • Backplane 5: PWR • Backplane 6: PWR	• Onboard: backplane power • Onboard: backplane sideband • Riser 1: PWR

Front + middle + rear backplanes: 12 x 3.5" SAS/SATA + 4 x 3.5" SAS/SATA + 4 x 3.5"SAS/SATA

This topic provides cable routing information for the 12 x 3.5-inch SAS/SATA front backplane with a 4 x 3.5-inch SAS/SATA middle backplane and a 4 x 3.5-inch SAS/SATA rear backplane.

32i RAID/HBA adapter

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

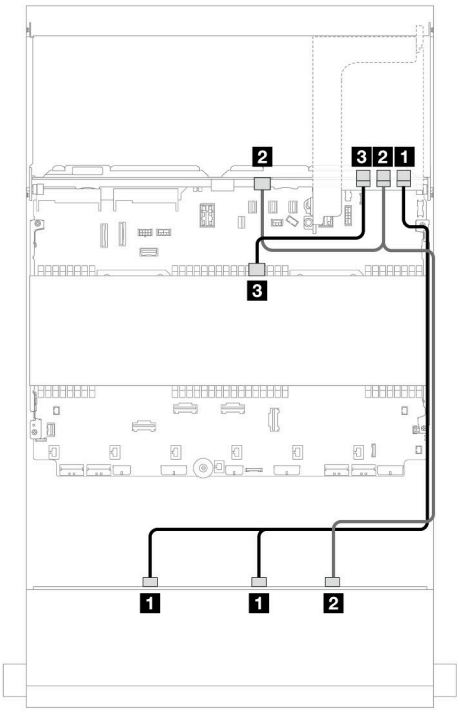


Figure 703. Backplane signal cable routing

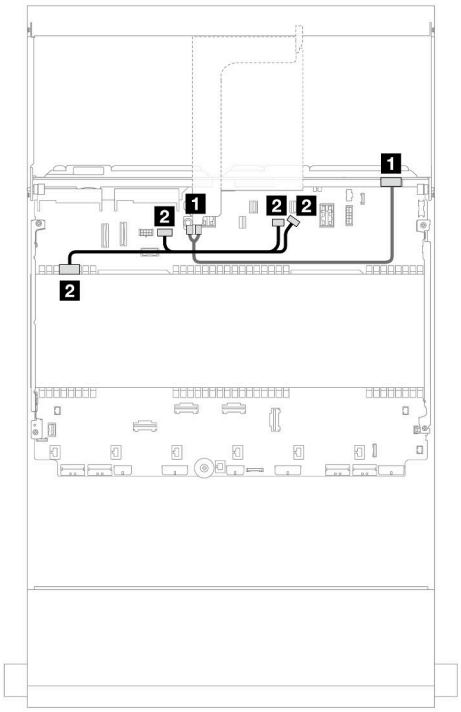


Figure 704. Middle/Rear backplane power cable routing

From	To	From	To
1 Backplane 1: SAS 0, SAS 1	32i adapter • C0	1 Backplane 4: PWR	Riser 2: PWR1, PWR2
2 • Backplane 1: SAS 2 • Backplane 4: SAS	• C1	2 Backplane 5: PWR	• Onboard: GPU power • Onboard: backplane power • Onboard: backplane sideband
3 Backplane 5: SAS	• C2		

12 x 3.5-inch AnyBay backplane

This section provides cable routing information for the server model with the 12 x 3.5-inch AnyBay front drive backplane.

- “Front backplane: 8 SAS/SATA + 4 AnyBay” on page 616
- “Front + rear backplanes: (8 SAS/SATA + 4 AnyBay) + 4 SAS/SATA” on page 618
- “Front backplane: 8 SAS/SATA + 4 NVMe” on page 619
- “Front + rear backplanes: (8 SAS/SATA + 4 NVMe) + 4 SAS/SATA” on page 621

Front backplane: 8 SAS/SATA + 4 AnyBay

This topic provides cable routing information for the configuration with 8 SAS/SATA + 4 AnyBay front drive bays using the 12 x 3.5-inch AnyBay front backplane.

- “Onboard connectors” on page 617

- “16i RAID/HBA adapter” on page 617

Onboard connectors

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

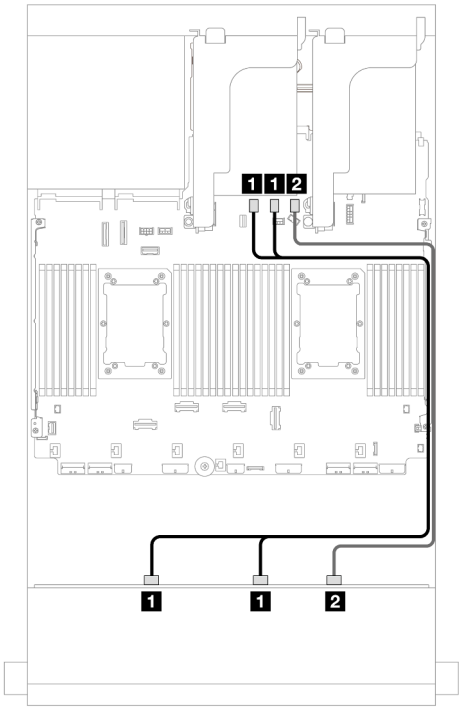


Figure 705. SAS/SATA cable routing

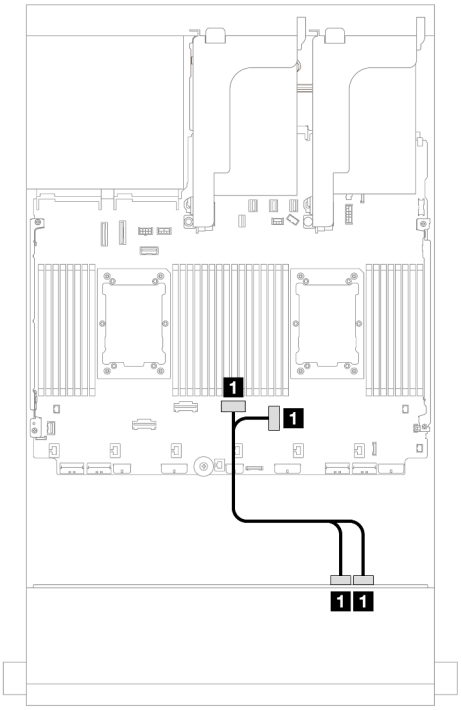


Figure 706. NVMe cable routing

From	To	From	To
1 Backplane 1: SAS 0, SAS 1	Onboard: SATA 0, SATA 1	1 Backplane 1: NVMe 8-9, 10-11	Onboard: PCIe 3, 4
2 Backplane 1: SAS 2	Onboard: SATA 2		

16i RAID/HBA adapter

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

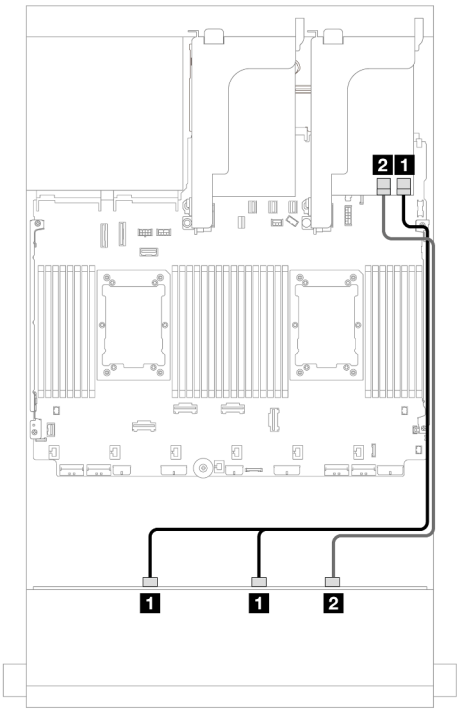


Figure 707. SAS/SATA cable routing

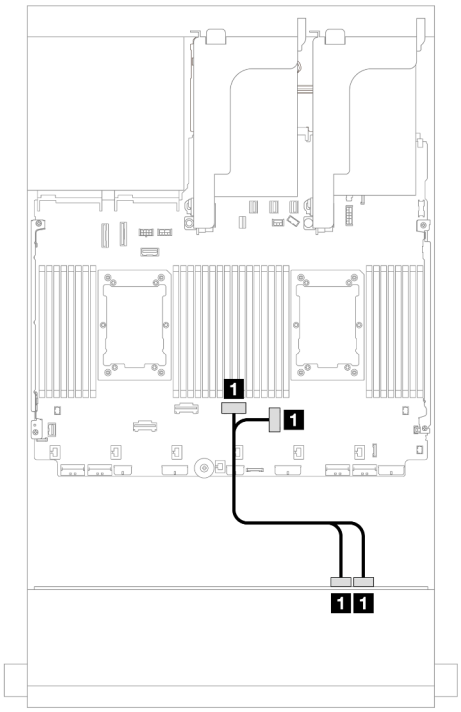


Figure 708. NVMe cable routing

From	To
1 Backplane 1: SAS 0, SAS 1	16i adapter • Gen 4: C0 • Gen 3: C0C1
2 Backplane 1: SAS 2	• Gen 4: C1 • Gen 3: C2

From	To
1 Backplane 1: NVMe 8-9, 10-11	Onboard: PCIe 3, 4

Front + rear backplanes: (8 SAS/SATA + 4 AnyBay) + 4 SAS/SATA

This topic provides cable routing information for the (8 SAS/SATA + 4 AnyBay) + 4 SAS/SATA configuration using the 12 x 3.5-inch AnyBay front backplane and 4 x 3.5-inch SAS/SATA rear backplane.

16i RAID/HBA adapter

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

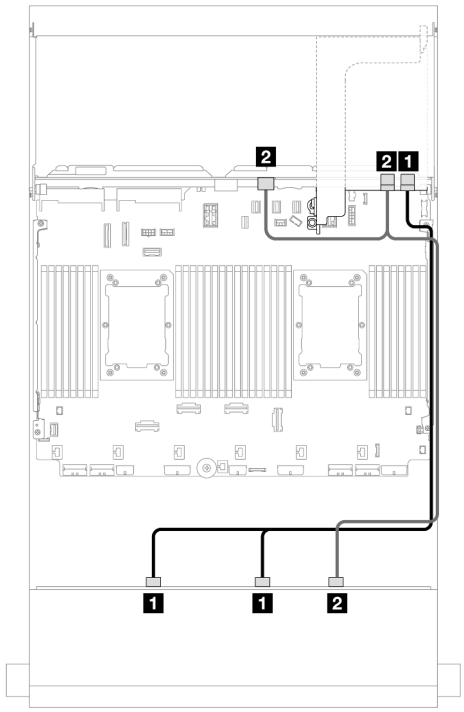


Figure 709. SAS/SATA cable routing

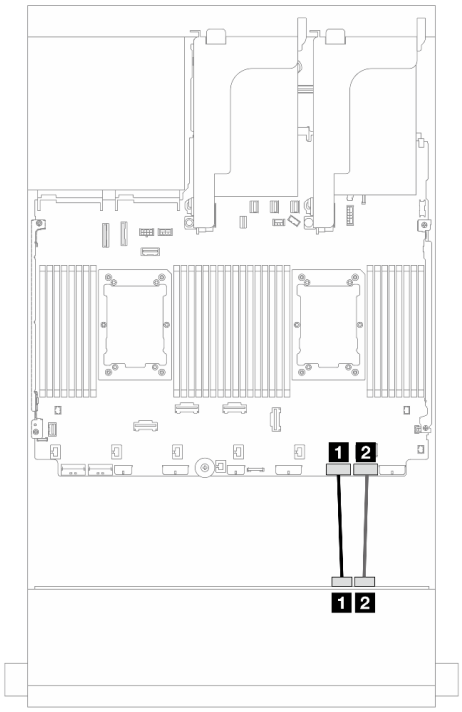


Figure 710. NVMe cable routing

From	To
1 Backplane 1: SAS 0, SAS 1	16i adapter • Gen 4: C0 • Gen 3: C0C1
2 • Backplane 1: SAS 2 • Backplane 4: SAS	• Gen 4: C1 • Gen 3: C2C3

From	To
1 Backplane 1: NVMe 8-9	Onboard: PCIe 2
2 Backplane 1: NVMe 10-11	Onboard: PCIe 1

Front backplane: 8 SAS/SATA + 4 NVMe

This topic provides cable routing information for the configuration with 8 SAS/SATA + 4 NVMe front drive bays using the 12 x 3.5-inch AnyBay front backplane.

- "Onboard connectors" on page 619
- "8i RAID/HBA adapter" on page 620

Onboard connectors

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

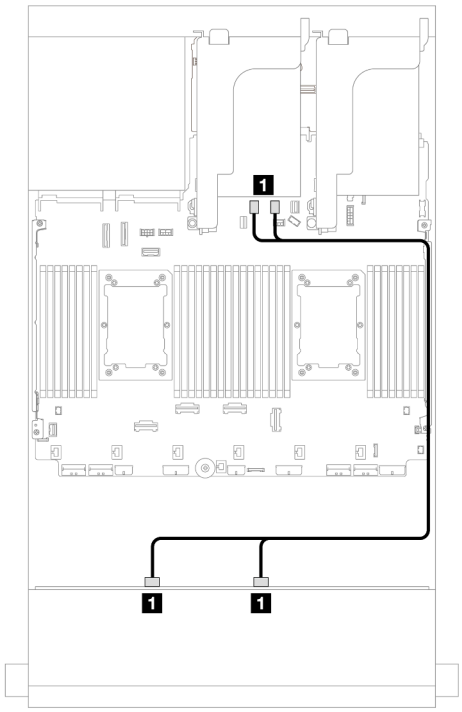


Figure 711. SAS/SATA cable routing

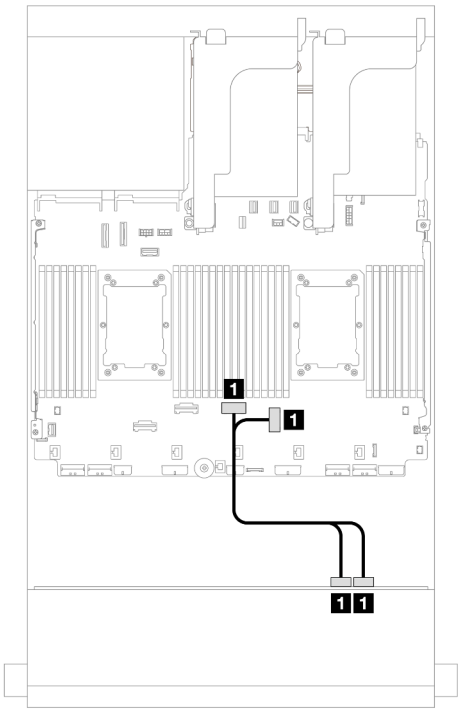


Figure 712. NVMe cable routing

From	To
1 Backplane 1: SAS 0, SAS 1	Onboard: SATA 0, SATA 1

From	To
1 Backplane 1: NVMe 8-9, 10-11	Onboard: PCIe 3, 4

8i RAID/HBA adapter

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

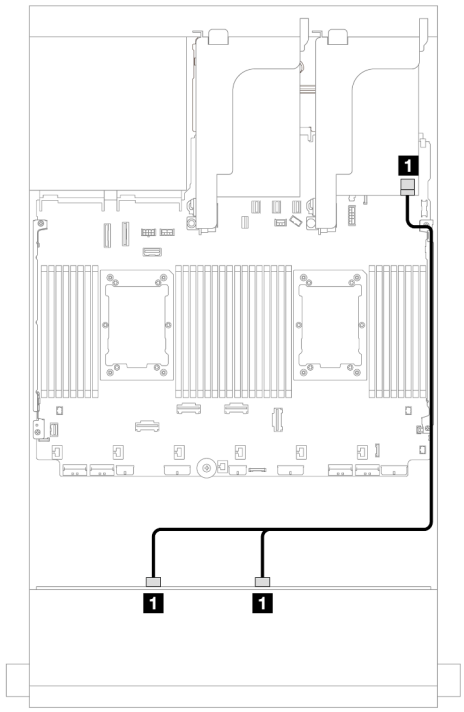


Figure 713. SAS/SATA cable routing

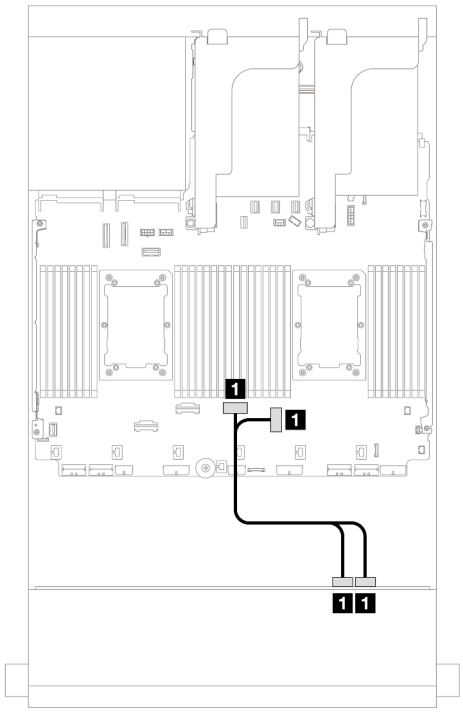


Figure 714. NVMe cable routing

From	To
1 Backplane 1: SAS 0, SAS 1	8i adapter • Gen 4: C0 • Gen 3: C0C1

From	To
1 Backplane 1: NVMe 8-9, 10-11	Onboard: PCIe 3, 4

Front + rear backplanes: (8 SAS/SATA + 4 NVMe) + 4 SAS/SATA

This topic provides cable routing information for the (8 SAS/SATA + 4 NVMe) + 4 SAS/SATA configuration using the 12 x 3.5-inch AnyBay front backplane and 4 x 3.5-inch SAS/SATA rear backplane.

16i RAID/HBA adapter

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

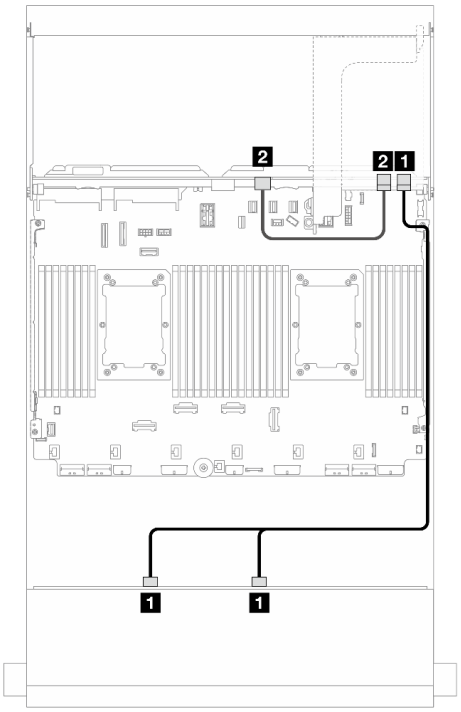


Figure 715. SAS/SATA cable routing

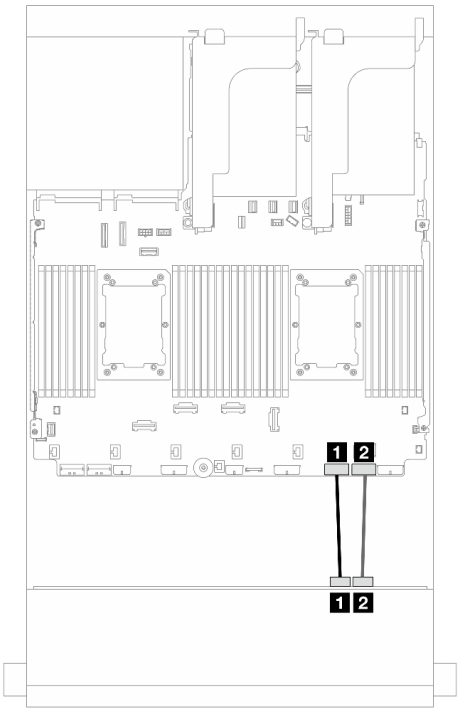


Figure 716. NVMe cable routing

From	To
1 Backplane 1: SAS 0, SAS 1	16i adapter • Gen 4: C0 • Gen 3: C0C1
2 Backplane 4: SAS	• Gen 4: C1 • Gen 3: C2

From	To
1 Backplane 1: NVMe 8-9	Onboard: PCIe 2
2 Backplane 1: NVMe 10-11	Onboard: PCIe 1

12 x 3.5-inch SAS/SATA expander backplane

This section provides cable routing information for the server model with the 12 x 3.5-inch SAS/SATA expander backplane.

- “Front backplane: 12 x 3.5" SAS/SATA” on page 622
- “Front + rear backplanes: 12 x 3.5" SAS/SATA + 2 x 3.5"/4 x 3.5" SAS/SATA/4 x 2.5" AnyBay” on page 623
- “Front + middle + rear backplanes: 12 x 3.5" SAS/SATA + 4 x 3.5" SAS/SATA+ 4 x 3.5" SAS/SATA” on page 626

Front backplane: 12 x 3.5" SAS/SATA

This topic provides cable routing information for the front 12 x 3.5-inch SAS/SATA expander backplane.

8i adapter

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

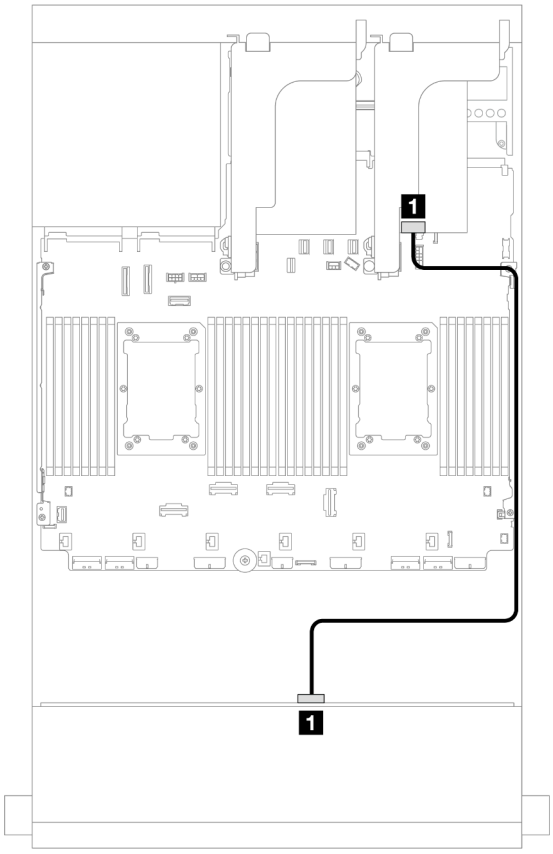


Figure 717. Cable routing to one 8i adapter

From	To
1 Backplane 1: SAS 0	8i adapter • Gen 4: C0 • Gen 3: C0C1

Front + rear backplanes: 12 x 3.5" SAS/SATA + 2 x 3.5"/4 x 3.5" SAS/SATA/4 x 2.5" AnyBay

This topic provides cable routing information for the front 12 x 3.5-inch SAS/SATA expander backplane with a 2 x 3.5-inch/4 x 3.5-inch SAS/SATA or 4 x 2.5-inch AnyBay rear drive backplane.

- "12 x 3.5" SAS/SATA + 2 x 3.5" SAS/SATA" on page 623
- "12 x 3.5" SAS/SATA + 4 x 3.5" SAS/SATA" on page 624
- "12 x 3.5" SAS/SATA + 4 x 2.5" AnyBay" on page 625

12 x 3.5" SAS/SATA + 2 x 3.5" SAS/SATA

This topic provides cable routing information for the front 12 x 3.5-inch SAS/SATA expander backplane with a 2 x 3.5-inch SAS/SATA rear drive backplane.

8i adapter

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

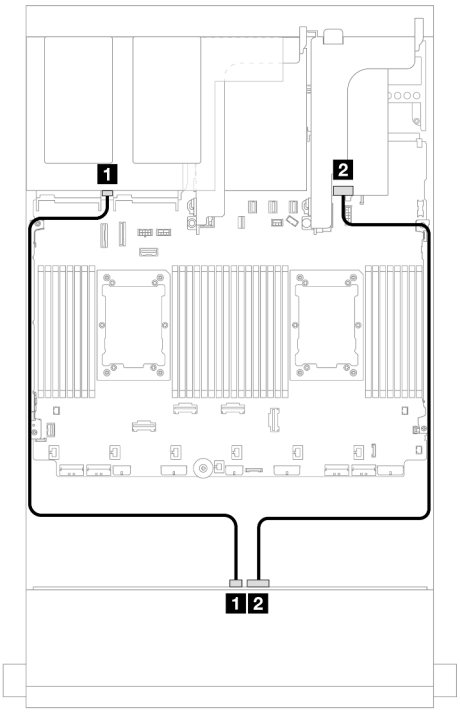


Figure 718. Front/Rear backplane signal cable routing

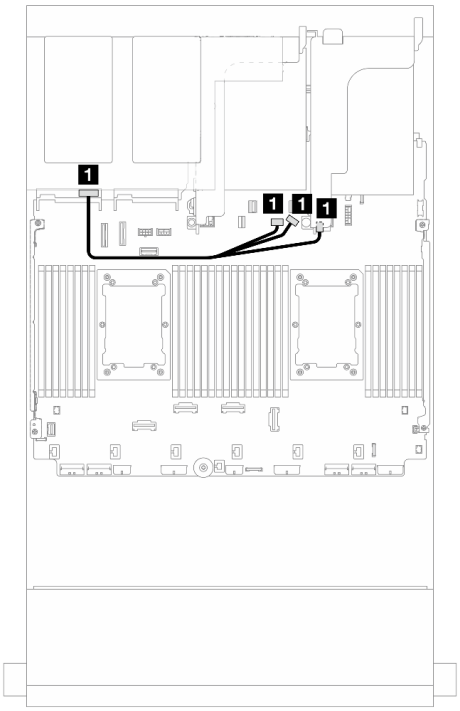


Figure 719. Rear backplane power cable routing

From	To
1 Backplane 4: SAS	Backplane 1: SAS 1
2 Backplane 1: SAS 0	8i adapter • Gen 4: C0 • Gen 3: C0C1

From	To
1 Backplane 4: PWR	• Onboard: backplane power • Onboard: backplane sideband • Riser 1: PWR

12 x 3.5" SAS/SATA + 4 x 3.5" SAS/SATA

This topic provides cable routing information for the front 12 x 3.5-inch SAS/SATA expander backplane with a 4 x 3.5-inch SAS/SATA rear drive backplane.

8i adapter

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

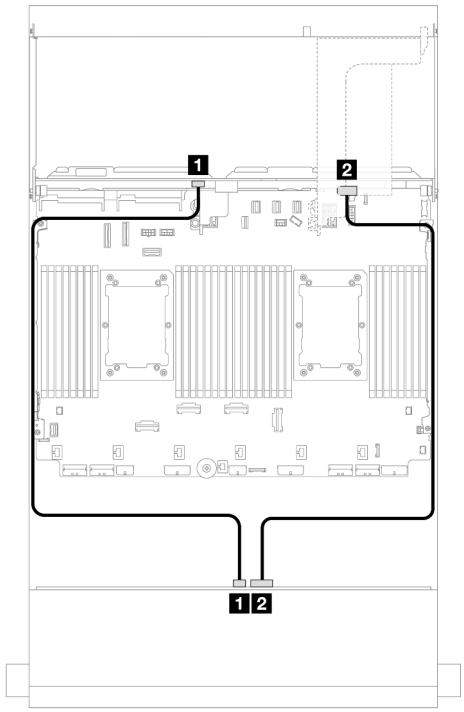


Figure 720. Front/Rear backplane signal cable routing

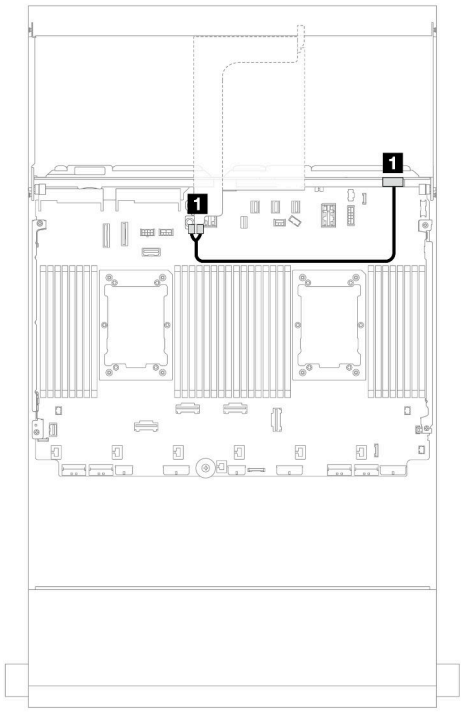


Figure 721. Rear backplane power cable routing

From	To	From	To
1 Backplane 4: SAS	Backplane 1: SAS 1	1 Backplane 4: PWR	Riser 2: PWR1, PWR2
2 Backplane 1: SAS 0	8i adapter • Gen 4: C0 • Gen 3: C0C1		

12 x 3.5" SAS/SATA + 4 x 2.5" AnyBay

This topic provides cable routing information for the front 12 x 3.5-inch SAS/SATA expander backplane with a 4 x 2.5-inch AnyBay rear drive backplane.

8i adapter

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

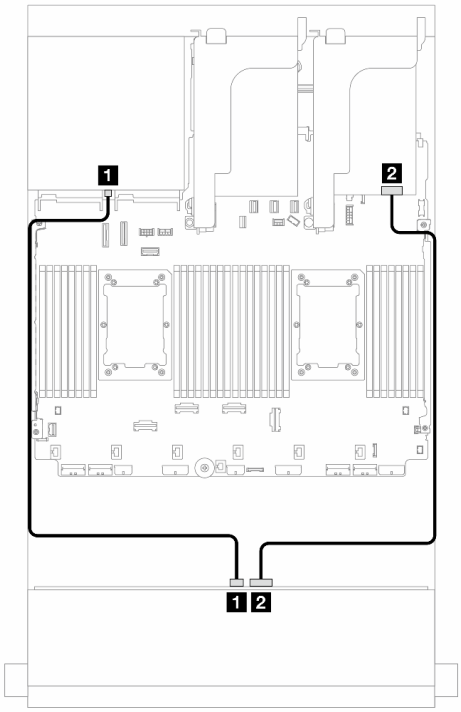


Figure 722. Front backplane cable routing

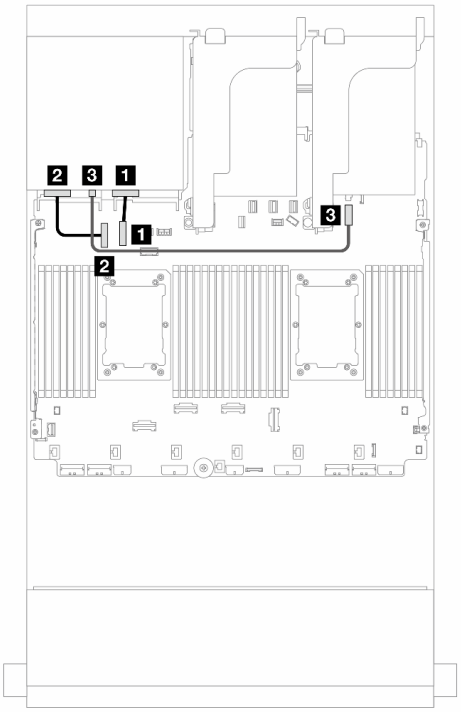


Figure 723. Rear backplane cable routing

From	To
1 Backplane 1: SAS 1	Backplane 4: SAS
2 Backplane 1: SAS 0	8i adapter • Gen 4: C0 • Gen 3: C0C1

From	To
1 Backplane 4: NVMe 0-1	Onboard: PCIe 10
2 Backplane 4: NVMe 2-3	Onboard: PCIe 9
3 Backplane 4: PWR	Onboard: 7mm power connector

Front + middle + rear backplanes: 12 x 3.5" SAS/SATA + 4 x 3.5" SAS/SATA+ 4 x 3.5" SAS/SATA

This topic provides cable routing information for the front 12 x 3.5-inch SAS/SATA expander backplane with a 4 x 3.5-inch SAS/SATA middle drive backplane and a 4 x 3.5-inch SAS/SATA rear drive backplane.

16i adapter

Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

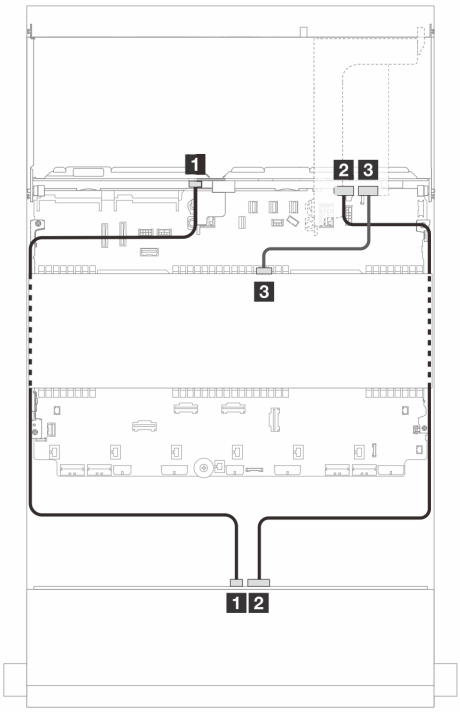


Figure 724. Backplane signal cable routing

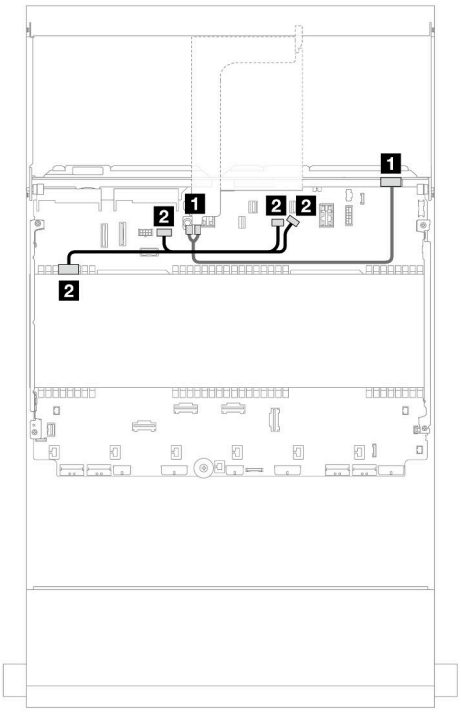


Figure 725. Middle/Rear backplane power cable routing

From	To	From	To
1 Backplane 4: SAS	Backplane 1: SAS 1	1 Backplane 4: PWR	Riser 2: PWR1, PWR2
2 Backplane 1: SAS 0	16i adapter • Gen 4: C0 • Gen 3: C0C1	2 Backplane 5: PWR	• Onboard: GPU power • Onboard: backplane power • Onboard: backplane sideband
2 Backplane 5: SAS	• Gen 4: C1 • Gen 3: C2		

Chapter 3. Problem determination

Use the information in this section to isolate and resolve issues that you might encounter while using your server.

Lenovo servers can be configured to automatically notify Lenovo Support if certain events are generated. You can configure automatic notification, also known as Call Home, from management applications, such as the Lenovo XClarity Administrator. If you configure automatic problem notification, Lenovo Support is automatically alerted whenever a server encounters a potentially significant event.

To isolate a problem, you should typically begin with the event log of the application that is managing the server:

- If you are managing the server from the Lenovo XClarity Administrator, begin with the Lenovo XClarity Administrator event log.
- If you are using some other management application, begin with the Lenovo XClarity Controller event log.

Web resources

- **Tech tips**

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

  To find the Tech Tips available for your server:

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

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

- **Lenovo Data Center Forum**
  - Check https://forums.lenovo.com/t5/Datacenter-Systems/ct-p/sv_eg to see if someone else has encountered a similar problem.

Event logs

An *alert* is a message or other indication that signals an event or an impending event. Alerts are generated by the Lenovo XClarity Controller or by UEFI in the servers. These alerts are stored in the Lenovo XClarity Controller Event Log. If the server is managed by the Lenovo XClarity Controller or by the Lenovo XClarity Administrator, alerts are automatically forwarded to those management applications.

Note: For a listing of events, including user actions that might need to be performed to recover from an event, see the *Messages and Codes Reference*, which is available at https://pubs.lenovo.com/sr650-v3/pdf_files.

Lenovo XClarity Administrator event log

If you are using Lenovo XClarity Administrator to manage server, network, and storage hardware, you can view the events from all managed devices through the XClarity Administrator.

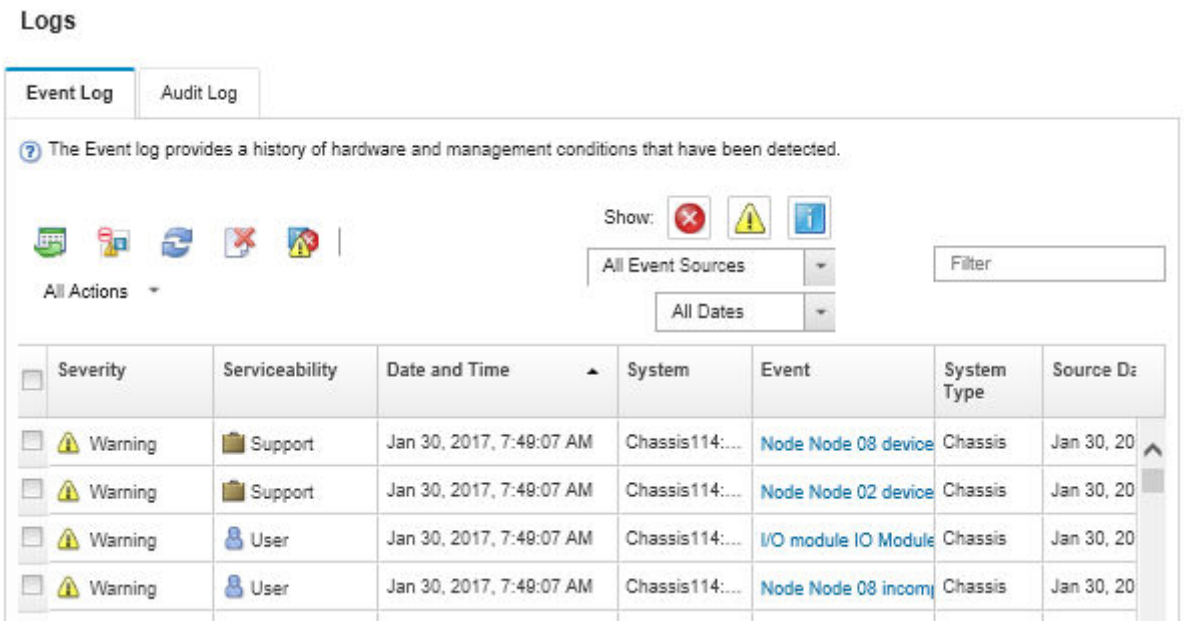


Figure 726. Lenovo XClarity Administrator event log

For more information about working with events from XClarity Administrator, see:

https://pubs.lenovo.com/lxca/events_vieweventlog

Lenovo XClarity Controller event log

The Lenovo XClarity Controller monitors the physical state of the server and its components using sensors that measure internal physical variables such as temperature, power-supply voltages, fan speeds, and component status. The Lenovo XClarity Controller provides various interfaces to systems management software and to system administrators and users to enable remote management and control of a server.

The Lenovo XClarity Controller monitors all components of the server and posts events in the Lenovo XClarity Controller event log.

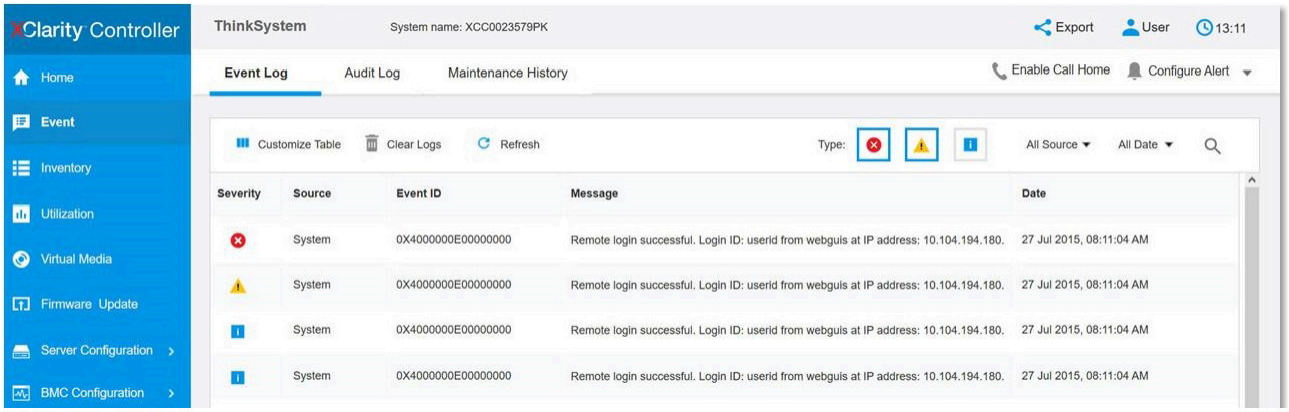


Figure 727. Lenovo XClarity Controller event log

For more information about accessing the Lenovo XClarity Controller event log, see:

“Viewing Event Logs” section in the XCC documentation compatible with your server at https://pubs.lenovo.com/lxcc-overview/

Specifications

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

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

Specification category	“Technical specifications” on page 631	“Mechanical specifications” on page 637	“Environmental specifications” on page 638
Content	• Processor • Memory • Internal drives • Expansion slots • RAID adapter • Host bus adapter (HBA)/ Expander • Graphics processing units (GPU) • Integrated functions and I/O connectors • Network • System fan • Power supplies • Operating systems • Minimal configuration for debugging	• Dimension • Weight	• Acoustical noise emissions • Environment • Water requirements • Particulate contamination

Technical specifications

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

Processor
Supports multi-core Intel Xeon processors, with integrated memory controller and Intel Mesh UPI (Ultra Path Interconnect) topology. • Up to two 4th Gen (Sapphire Rapids, SPR) or 5th Gen (Emerald Rapids, EMR) Intel Xeon scalable processors with the new LGA 4677 socket • Up to 60 cores per socket for SPR and 64 cores per socket for EMR • Up to 4 UPI links at up to 16 GT/s for SPR and 20 GT/s for EMR • Thermal Design Power (TDP): up to 350 watts for SPR and 385 watts for EMR For a list of supported processors, see https://serverproven.lenovo.com.

Memory

- Slots: 32 dual inline memory module (DIMM) connectors that support up to 32 TruDDR5 DIMMs
- Memory module types for SPR:
  - TruDDR5 4800 MHz RDIMM: 16 GB (1Rx8), 32 GB (2Rx8), 48 GB (2Rx8)
  - TruDDR5 4800 MHz 10x4 RDIMM: 32 GB (1Rx4), 64 GB (2Rx4), 96 GB (2Rx4)
  - TruDDR5 4800 MHz 9x4 RDIMM: 32 GB (1Rx4), 64 GB (2Rx4)
  - TruDDR5 4800 MHz 3DS RDIMM: 128 GB (4Rx4), 256 GB (8Rx4)
- Memory module types for EMR:
  - TruDDR5 5600 MHz RDIMM: 16 GB (1Rx8), 24 GB (1Rx8), 32 GB (2Rx8), 48 GB (2Rx8)
  - TruDDR5 5600 MHz 10x4 RDIMM: 32 GB (1Rx4), 48 GB (1Rx4), 64 GB (2Rx4), 96 GB (2Rx4)
  - TruDDR5 5600 MHz 3DS RDIMM: 128 GB (4Rx4)
  - TruDDR5 5600 MHz Performance + RDIMM: 32 GB (2Rx8), 64 GB (2Rx4 10x4)
- Speed: Operating speed depends on processor model and UEFI settings.
  - 4800 MHz RDIMMs:
    - 1 DPC: 4800 MT/s
    - 2 DPC: 4400 MT/s
  - 5600 MHz RDIMMs:
    - 1 DPC: 5600 MT/s
    - 2 DPC:
      - 4800 MT/s for Performance + RDIMMs
      - 4400 MT/s
- Minimum memory: 16 GB
- Maximum memory: 8 TB: 32 x 256 GB 3DS RDIMMs

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

Internal drives

- Front drive bays:
  - Up to 24 x 2.5-inch hot-swap SAS/SATA/NVMe drives
  - Up to 12 x 3.5-inch hot-swap SAS/SATA drives
  - Up to 4 x 3.5-inch hot-swap NVMe drives
- Middle drive bays:
  - Up to 8 x 2.5-inch hot-swap SAS/SATA/NVMe drives
  - Up to 4 x 3.5-inch hot-swap SAS/SATA drives
- Rear drive bays:
  - Up to 8 x 2.5-inch hot-swap SAS/SATA drives
  - Up to 4 x 3.5-inch hot-swap SAS/SATA drives
  - Up to 4 x 2.5-inch hot-swap NVMe drives
  - Up to two 7mm drives
- Up to two internal M.2 drives

Expansion slots

- Up to ten PCIe slots in the rear and two PCIe slots in the front
- One OCP module slot

PCIe slot availability is based on riser selection and rear drive bay selection. See “Rear view” in *User Guide* or *System Configuration Guide* and “PCIe slots and PCIe adapters” on page 12.

RAID adapter

- Onboard SATA ports with software RAID support (Intel VROC SATA RAID, supporting RAID levels 0, 1, 5, and 10)
- Onboard NVMe ports with software RAID support (Intel VROC NVMe RAID)
  - Intel VROC standard: requires an activation key and supports RAID levels 0, 1, and 10
  - Intel VROC Premium: requires an activation key and supports RAID levels 0, 1, 5, and 10
  - Intel VROC Boot (for 5th Gen processors except 4510T, 4510, 4509Y, and 3508U): requires an activation key and supports RAID level 1 only
- Hardware RAID levels 0, 1, 10:
  - ThinkSystem RAID 540-8i PCIe Gen4 12Gb Adapter
  - ThinkSystem RAID 540-16i PCIe Gen4 12Gb Adapter
- Hardware RAID levels 0, 1, 5, 10:
  - ThinkSystem RAID 5350-8i PCIe 12Gb Adapter
  - ThinkSystem RAID 5350-8i PCIe 12Gb Internal Adapter*
- Hardware RAID levels 0, 1, 5, 6, 10, 50, 60:
  - ThinkSystem RAID 9350-8i 2GB Flash PCIe 12Gb Adapter
  - ThinkSystem RAID 9350-8i 2GB Flash PCIe 12Gb Internal Adapter*
  - ThinkSystem RAID 9350-16i 4GB Flash PCIe 12Gb Adapter
  - ThinkSystem RAID 9350-16i 4GB Flash PCIe 12Gb Internal Adapter*
  - ThinkSystem RAID 940-8i 4GB Flash PCIe Gen4 12Gb Adapter
  - ThinkSystem RAID 940-16i 4GB Flash PCIe Gen4 12Gb Adapter
  - ThinkSystem RAID 940-16i 8GB Flash PCIe Gen4 12Gb Adapter
  - ThinkSystem RAID 940-16i 8GB Flash PCIe Gen4 12Gb Internal Adapter*
  - ThinkSystem RAID 940-32i 8GB Flash PCIe Gen4 12Gb Adapter
  - ThinkSystem RAID 940-8e 4GB Flash PCIe Gen4 12Gb Adapter

Notes:

- *Custom form factor (CFF) adapters that are supported only for server models with 2.5-inch front drive bays.
- Processors 4510T, 4510, 4509Y, and 3508U support Intel VROC standard and Intel VROC Premium.
- For more information about the RAID/HBA adapters, see Lenovo ThinkSystem RAID Adapter and HBA Reference.

Host bus adapter (HBA)/Expander

- ThinkSystem 4350-8i SAS/SATA 12Gb HBA
- ThinkSystem 4350-16i SAS/SATA 12Gb HBA
- ThinkSystem 440-8i SAS/SATA PCIe Gen4 12Gb HBA
- ThinkSystem 440-16i SAS/SATA PCIe Gen4 12Gb HBA
- ThinkSystem 440-16i SAS/SATA PCIe Gen4 12Gb Internal HBA*
- ThinkSystem 440-8e SAS/SATA PCIe Gen4 12Gb HBA
- ThinkSystem 440-16e SAS/SATA PCIe Gen4 12Gb HBA
- ThinkSystem 48 port 12Gb Internal Expander*

Notes:

- *Custom form factor (CFF) adapters that are supported only for server models with 2.5-inch front drive bays.
- For more information about the RAID/HBA adapters, see Lenovo ThinkSystem RAID Adapter and HBA Reference.

Graphics processing unit (GPU)

Your server supports the following GPUs:

- Double-wide: NVIDIA® A16, A30, A40, A100, A800, H100, H800, L40, L40S, RTX A2000, RTX A4500, RTX A6000, RTX 6000 Ada, H100 NVL; AMD® Instinct MI210
- Single-wide: NVIDIA A2, T1000, T400, L4

Notes:

- For GPU supporting rules, see .
- To prevent potential thermal issues, change the **Misc** setting in the BIOS from **Option3** (default value) to **Option1** if the following two conditions are met:
  - The server is equipped with a GPU adapter.
  - The UEFI firmware version is ESE122T or later.

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

Integrated functions and I/O connectors

- Lenovo XClarity Controller (XCC), which provides service processor control and monitoring functions, video controller, and remote keyboard, video, mouse, and remote drive capabilities.
  - The server supports Lenovo XClarity Controller 2 (XCC2). For additional information about Lenovo XClarity Controller 2 (XCC2), refer to https://pubs.lenovo.com/lxcc-overview/.
- Front connectors:
  - One VGA connector (optional)
  - One USB 3.2 Gen1 (5 Gbps) connector
  - One USB 2.0 connector with XCC system management function
  - One external diagnostics connector
  - One integrated diagnostics panel (optional)
- Rear connectors:
  - One VGA connector
  - Three USB 3.2 Gen1 (5 Gbps) connectors
  - One XCC system management port
  - Two or four Ethernet connectors on the OCP module (optional)
  - One serial port (optional)

Network

- OCP module in the front or rear of the server, which provides two or four Ethernet connectors for network support

  Note: If the ThinkSystem V3 Management NIC Adapter Kit (management NIC adapter) is installed on the server, it will not be displayed on the PCIe card list of system management software, such as XCC, LXPM, and so on.

System fan

- Supported fan types:
  - Standard fan (60 x 60 x 36 mm, single-rotor, 17000 RPM)
  - Performance fan (60 x 60 x 56 mm, dual-rotor, 21000 RPM)
- Fan redundancy: N+1 redundancy, one redundant fan rotor
  - One processor: five hot-swap system fans (one redundant fan rotor)
  - One processor with middle/rear bay or Riser 3, or two processors: six hot-swap system fans (one redundant fan rotor)

Notes:

- Single-rotor hot-swap fans cannot be mixed with dual-rotor hot-swap fans.
- The redundant cooling by the fans in the server enables continued operation if one rotor of a fan fails.
- When the system is powered off but still plugged in to AC power, fans 1 and 2 may continue to spin at a much lower speed. This is the system design to provide proper cooling.

Power supplies

The server supports up to two hot-swap power supplies for redundancy.

Power supply	100–127 V ac	200–240 V ac	240 V dc	-48 V dc
750W Platinum	√	√	√	
750W Titanium		√	√	
1100W Platinum	√	√	√	
1100W Titanium		√	√	
1800W Platinum		√	√	
1800W Titanium		√	√	
2400W Platinum		√	√	
2600W Titanium		√	√	
1100W -48V DC				√

CAUTION:

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

Operating systems
Supported and certified operating systems: • Microsoft Windows Server • Microsoft Windows • Red Hat Enterprise Linux • SUSE Linux Enterprise Server • VMware ESXi • Canonical Ubuntu References: • Complete list of available operating systems: https://lenovopress.com/osig. • OS deployment instructions: see “Deploy the operating system” in *User Guide* or *System Configuration Guide*. **Notes:** VMware ESXi does not support the following SSDs: • ThinkSystem 2.5 U.3 6500 ION 30.72TB Read Intensive NVMe PCIe 4.0 x4 HS SSD • ThinkSystem 2.5" U.2 P5336 7.68TB Read Intensive NVMe PCIe 4.0 x4 HS SSD • ThinkSystem 2.5" U.2 P5336 15.36TB Read Intensive NVMe PCIe 4.0 x4 HS SSD • ThinkSystem 2.5" U.2 P5336 30.72TB Read Intensive NVMe PCIe 4.0 x4 HS SSD • ThinkSystem 2.5" U.2 P5336 61.44TB Read Intensive NVMe PCIe 4.0 x4 HS SSD

Minimal configuration for debugging
• One processor in socket 1 • One DIMM in slot 7 • One power supply • One HDD/SSD drive, one M.2 drive, or one 7mm drive (if OS is needed for debugging) • Five system fans

Mechanical specifications

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

Dimension

• Form factor: 2U
• Height: 86.5 mm (3.4 inches)
• Width:
  – With rack latches: 482.0 mm (19.0 inches)
  – Without rack latches: 444.6 mm (17.5 inches)
• Depth: 763.7 mm (30.1 inches)
Note: The depth is measured with rack latches installed, but without the security bezel installed.

Weight
Up to 39 kg (86 lb), depending on the server configuration

Environmental specifications

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

Acoustical noise emissions

Acoustical noise emissions

The server has the following acoustic noise emissions declaration.

Configuration	Typical	Storage	GPU
Sound power levels (L_{WAd})	• Idling: 5.6 Bel • Operating: 5.6 Bel	• Idling: 7.3 Bel • Operating: 7.3 Bel	• Idling: 7.3 Bel • Operating: 8.9 Bel
Sound pressure level (L_{pAm})	• Idling: 41.5 dBA • Operating: 41.5 dBA	• Idling: 60.2 dBA • Operating: 60.2 dBA	• Idling: 60.2 dBA • Operating: 74.1 dBA

The declared sound levels are based on the following configurations, which may change depending on configurations or conditions.

Component	Typical configuration	Storage configuration	GPU configuration
Chassis (2U)	8 x 2.5-inch front drive bays	12 x 3.5-inch front drive bays	16 x 2.5-inch front drive bays
Fan	6 x standard fans	6 x high performance fans	6 x high performance fans
Processor	2 x 205 W CPUs	2 x 205 W CPUs	2 x 205 W CPUs
Memory	8 x 64 GB RDIMMs	16 x 64 GB RDIMMs	32 x 64 GB RDIMMs
Drive	8 x 2.4 TB SAS HDDs	20 x 14 TB SAS HDDs	16 x 2.4 TB SAS HDDs
RAID adapter	1 x RAID 940-8i	1 x RAID 940-32i	1 x RAID 940-16i
OCP adapter	1 x Intel X710-T2L 10GBASE-T 2-port OCP		
Power supply	2 x 750 W PSUs	2 x 1100 W PSUs	2 x 1800 W PSUs
GPU adapter	None	None	3 x A100

Notes:

- These sound levels were measured in controlled acoustical environments according to procedures specified by ISO7779 and are reported in accordance with ISO 9296.
- Government regulations (such as those prescribed by OSHA or European Community Directives) may govern noise level exposure in the workplace and may apply to you and your server installation. The actual sound pressure levels in your installation depend upon a variety of factors, including the number of racks in the installation; the size, materials, and configuration of the room; the noise levels from other equipment; the room ambient temperature, and employee's location in relation to the equipment. Further, compliance with such government regulations depends on a variety of additional factors, including the duration of employees' exposure and whether employees wear hearing protection. Lenovo recommends that you consult with qualified experts in this field to determine whether you are in compliance with the applicable regulations.

Environment

Environment
ThinkSystem SR650 V3 complies with ASHRAE Class A2 specifications with most configurations, and depending on the hardware configuration, also complies with ASHRAE Class A3 and Class A4 specifications. System performance may be impacted when the operating temperature is outside ASHRAE A2 specification. Depending on the hardware configuration, SR650 V3 server also complies with ASHRAE Class H1 specification. System performance may be impacted when the operating temperature is outside ASHRAE H1 specification. The restrictions to ASHRAE support are as follows (cooling by air): • The ambient temperature must be limited to 35°C or lower if the server has any of the following components: – Broadcom 57416 10GBASE-T 2-port OCP – Broadcom 57454 10GBASE-T 4-port OCP – PCIe network interface card (NIC) at a rate greater than or equal to 100 GB – Part with AOC and at the rate of 40 GB • The ambient temperature must be limited to 30°C or lower if the server has any of the following components: – 24 x 2.5" or 12 x 3.5" front bay with middle bay or rear bay – GPU adapters – 256 GB 3DS RDIMM – 350 W processor – part with AOC and at a rate greater than 40 GB – 5600 MHz RDIMMs with capacity greater than or equal to 96 GB – ThinkSystem 96GB TruDDR5 4800MHz (2Rx4) RDIMM – ThinkSystem 128GB TruDDR5 4800MHz (4Rx4) 3DS RDIMM v1 – 4800 MHz 256 GB RDIMMs (except ThinkSystem 256GB TruDDR5 4800MHz (8Rx4) 3DS RDIMM v1) • The ambient temperature must be limited to 25°C or lower if the server has any of the following components or configurations: – 350 W processor installed in the chassis with 24 x 2.5" or 12 x 3.5" front drives – 350 W processor installed in the 16 x 2.5" + FIO non-GPU configuration – processor (270 W <=TDP <= 300 W) installed in the chassis with middle or rear drives – GPU adapter installed in the chassis with 24 x 2.5" front drives – GPU adapter and processor with TDP rating greater than 300 W installed in the chassis with 16 x 2.5" or 8 x 3.5" front drives – drives larger than 3.84 TB installed in Gen 5 rear or middle NVMe drive bays – 36 NVMe configuration – 16 x 2.5" + FIO GPU configuration – ThinkSystem 256GB TruDDR5 4800MHz (8Rx4) 3DS RDIMM v1 – ThinkSystem 96GB TruDDR5 4800MHz (2Rx4) RDIMM installed in the following configurations: – 12 x 3.5" configurations including processors with TDP less than or equal to 300 W – 12 x 3.5" + middle/rear drive bay configurations including processors with TDP less than or equal to 270 W – the following NVMe SSDs installed in the front 12 x 3.5" SAS/SATA + middle 8 x 2.5" NVMe or front 12 x 3.5" SAS/SATA + rear 4 x 2.5" NVMe configuration: – ThinkSystem 2.5" U.2 P5336 61.44TB Read Intensive NVMe PCIe 4.0 x4 HS SSD – ThinkSystem 2.5" U.2 P5336 30.72TB Read Intensive NVMe PCIe 4.0 x4 HS SSD – ThinkSystem 2.5" U.2 P5336 15.36TB Read Intensive NVMe PCIe 4.0 x4 HS SSD – H100 NVL GPU adapter The restrictions to ASHRAE support are as follows (cooling by Direct Water Cooling Module (DWCM)): • The ambient temperature must be limited to 35°C or lower if the server has any of the following components or configurations: – Broadcom 57416 10GBASE-T 2-port OCP – Broadcom 57454 10GBASE-T 4-port OCP – PCIe network interface card (NIC) at a rate greater than or equal to 100 GB – Part with AOC and at the rate of 40 GB – GPU adapters (< 300 W) installed in 8 x 3.5" or 16 x 2.5" configurations – 64 GB < DIMM < 256 GB – 8 x 2.5" GPU configuration – storage configuration without middle or rear NVMe backplane

Environment

- The ambient temperature must be limited to 30°C or lower if the server has any of the following components:
  - 256 GB 3DS RDIMM
  - part with AOC and at a rate greater than 40 GB
  - GPU adapters (>= 300 W) installed in 8 x 3.5" or 16 x 2.5" configurations
  - three A40 GPU adapters installed in 24 x 2.5" configurations
  - storage configuration with middle or rear NVMe backplane
  - 5600 MHz RDIMMs with capacity greater than or equal to 96 GB
  - ThinkSystem 96GB TruDDR5 4800MHz (2Rx4) RDIMM
  - ThinkSystem 128GB TruDDR5 4800MHz (4Rx4) 3DS RDIMM v1
  - 4800 MHz 256 GB RDIMMs (except ThinkSystem 256GB TruDDR5 4800MHz (8Rx4) 3DS RDIMM v1)
  - H100 NVL GPU adapter
- The ambient temperature must be limited to 25°C or lower if the server has any of the following components:
  - three H800/H100 GPU adapters installed in 24 x 2.5" configurations
  - three H800/H100 GPU adapters installed in 16 x 2.5" + FIO configurations
  - ThinkSystem 256GB TruDDR5 4800MHz (8Rx4) 3DS RDIMM v1
  - the following NVMe SSDs installed in the front 12 x 3.5" SAS/SATA + middle 8 x 2.5" NVMe or front 12 x 3.5" SAS/SATA + rear 4 x 2.5" NVMe configuration:
    - ThinkSystem 2.5" U.2 P5336 61.44TB Read Intensive NVMe PCIe 4.0 x4 HS SSD
    - ThinkSystem 2.5" U.2 P5336 30.72TB Read Intensive NVMe PCIe 4.0 x4 HS SSD
    - ThinkSystem 2.5" U.2 P5336 15.36TB Read Intensive NVMe PCIe 4.0 x4 HS SSD

For detailed thermal information, see “Thermal rules” on page 19.

Note: When the ambient temperature is greater than the supported max temperature (ASHARE A4 45°C), the server will shut down. The server will not power on again until the ambient temperature falls within the supported temperature range.

- **Air temperature**:
  - Operating:
    - ASHRAE class H1: 5°C to 25°C (41°F to 77°F)

      The maximum ambient temperature decreases by 1°C for every 500 m (1640 ft) increase in altitude above 900 m (2,953 ft)
    - ASHRAE class A2: 10°C to 35°C (50°F to 95°F)

      The maximum ambient temperature decreases by 1°C for every 300 m (984 ft) increase in altitude above 900 m (2,953 ft)
    - ASHRAE class A3: 5°C to 40°C (41°F to 104°F)

      The maximum ambient temperature decreases by 1°C for every 175 m (574 ft) increase in altitude above 900 m (2,953 ft)
    - ASHRAE class A4: 5°C to 45°C (41°F to 113°F)

      The maximum ambient temperature decreases by 1°C for every 125 m (410 ft) increase in altitude above 900 m (2,953 ft)
  - Server off: -10°C to 60°C (14°F to 140°F)
  - Shipment/storage: -40°C to 70°C (-40°F to 158°F)
- **Maximum altitude**: 3,050 m (10,000 ft)
- **Relative Humidity** (non-condensing):
  - Operating
    - ASHRAE class H1: 8%–80%; maximum dew point: 17°C (62.6°F)
    - ASHRAE class A2: 20%–80%; maximum dew point: 21°C (70°F)
    - ASHRAE class A3: 8%–85%; maximum dew point: 24°C (75°F)
    - ASHRAE class A4: 8%–90%; maximum dew point: 24°C (75°F)
  - Shipment/storage: 8% to 90%

Water requirements

Water requirements
ThinkSystem SR650 V3 is supported in the following environment: • Maximum pressure: 3 bars • Water inlet temperature and flow rates:

Water inlet temperature	Water flow rate
50°C (122°F)	**1.5** liters per minute (lpm) per server
45°C (113°F)	**1** liter per minute (lpm) per server
40°C (104°F) or lower	**0.5** liters per minute (lpm) per server

Note: The water required to initially fill the system side cooling loop must be reasonably clean, bacteria-free water (<100 CFU/ml) such as de-mineralized water, reverse osmosis water, de-ionized water, or distilled water. The water must be filtered with an in-line 50 micron filter (approximately 288 mesh). The water must be treated with anti-biological and anti-corrosion measures.

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 13. Limits for particulates and gases

Contaminant	Limits
Reactive gases	Severity level G1 as per ANSI/ISA 71.04-1985[1]: • The copper reactivity level shall be less than 200 Angstroms per month (Å/month ≈ 0.0035 µg/cm^2-hour weight gain).[2] • The silver reactivity level shall be less than 200 Angstroms per month (Å/month ≈ 0.0035 µg/cm^2-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	Data centers must meet the cleanliness level of ISO 14644-1 class 8. For data centers without airside economizer, the ISO 14644-1 class 8 cleanliness might be met by choosing one of the following filtration methods: • 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. 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. • The deliquescent relative humidity of the particulate contamination should be more than 60% RH.[4] • Data centers must be free of zinc whiskers.[5]

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

[2] The derivation of the equivalence between the rate of copper corrosion growth in the thickness of the corrosion product in Å/month and the rate of weight gain assumes that Cu_2S and Cu_2O grow in equal proportions.

[3] The derivation of the equivalence between the rate of silver corrosion growth in the thickness of the corrosion product in Å/month and the rate of weight gain assumes that Ag_2S is the only corrosion product.

[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.

[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.

Troubleshooting by system LEDs and diagnostics display

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

- “Drive LEDs” on page 643
- “Front operator panel LEDs” on page 643
- “Integrated diagnostics panel” on page 645
- “External diagnostics handset” on page 650
- “Rear system LEDs” on page 656
- “XCC system management port LEDs” on page 657
- “Power supply LEDs” on page 657
- “System-board-assembly LEDs” on page 658
- “LEDs on the firmware and RoT security module” on page 661

Drive LEDs

This topic provides information on drive LEDs.

Each hot-swap drive comes with an activity LED and status LED and the signals are controlled by the backplanes. Different colors and speeds indicate different activities or status of the drive. The following illustration shows the LEDs on a hard disk drive or solid-state drive.

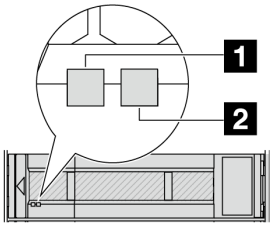


Figure 728. Drive LEDs

Drive LED	Status	Description
1 Drive activity LED (left)	Solid green	The drive is powered but not active.
	Blinking green	The drive is active.
2 Drive status LED (right)	Solid yellow	The drive has an error.
	Blinking yellow (blinking slowly, about one flash per second)	The drive is being rebuilt.
	Blinking yellow (blinking rapidly, about four flashes per second)	The drive is being identified.

Front operator panel LEDs

This topic provides information on the front operator panel LEDs.

Depending on the server model, the server comes with the front operator panel without LCD display or front operator with LCD display (integrated diagnostics panel). For information about the integrated diagnostics panel with LCD display, see “Integrated diagnostics panel” on page 645.

The following illustration shows the front operator panel on the media bay. For some server models, the front operator panel is integrated on the rack latch. See “Front I/O module” in *User Guide* or *System Configuration Guide*.

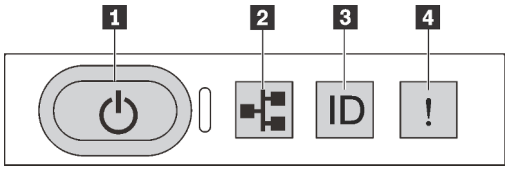


Figure 729. Front operator panel LEDs

1 Power button with power status LED (green)	2 Network activity LED (green)
3 System ID button with system ID LED (blue)	4 System Error LED (yellow)

1 Power button with power status LED (green)

You can press the power button to power on the server when you finish setting up the server. You also can hold the power button for several seconds to power off the server if you cannot shut down the server from the operating system. The states of the power LED are as follows:

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

2 Network activity LED (green)

Compatibility of the NIC adapter and the network activity LED:

NIC adapter	Network activity LED
OCP module	Support
PCIe NIC adapter	Not support

When an OCP module is installed, the network activity LED on the front I/O module helps you identify the network connectivity and activity. If no OCP module is installed, this LED is off.

Status	Color	Description
On	Green	The server is connected to a network.
Blinking	Green	The network is connected and active.
Off	None	The server is disconnected from the network. **Note:** If the network activity LED is off when an OCP module is installed, check the network ports in the rear of your server to determine which port is disconnected.

3 System ID button with system ID LED (blue)

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

If the XClarity Controller USB connector is set to have both the USB 2.0 function and XClarity Controller management function, you can press the system ID button for three seconds to switch between the two functions.

4 System Error LED (yellow)

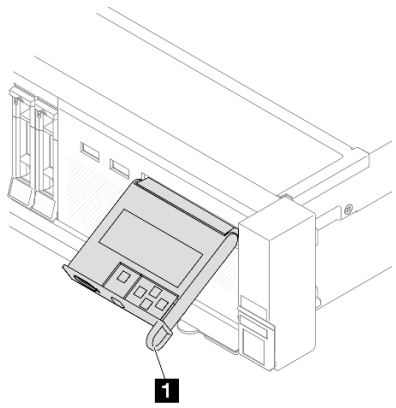
The system error LED helps you to determine if there are any system errors.

Status	Color	Description	Action
On	Yellow	An error has been detected on the server. Causes might include but are not limited to the following errors: • A fan failure • A memory error • A storage failure • A PCIe device failure • A power supply failure • A processor error • A system I/O board or processor board error	• Check the Lenovo XClarity Controller event log and the system event log to determine the exact cause of the error. • Check if additional LEDs elsewhere in the server are also lit that will direct you to the source of the error. See "Troubleshooting by system LEDs and diagnostics display" on page 642. • Save the log if necessary.
Off	None	The server is off, or the server is on and is working correctly.	None.

Integrated diagnostics panel

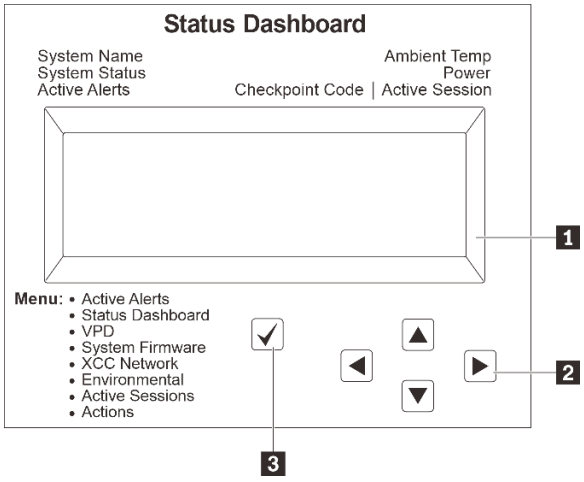
The Integrated diagnostics panel is attached to the front of the server, while it allows quick access to system information such as errors, system status, firmware, network, and health information.

Diagnostics panel location

	1 The handle with which the panel can be pulled out and inserted into the server. **Notes:** • The panel can be inserted or pulled out regardless of the system status. • When pulling out the panel, carefully hold it by the handle and avoid any hard pulling.

Diagnostics panel overview

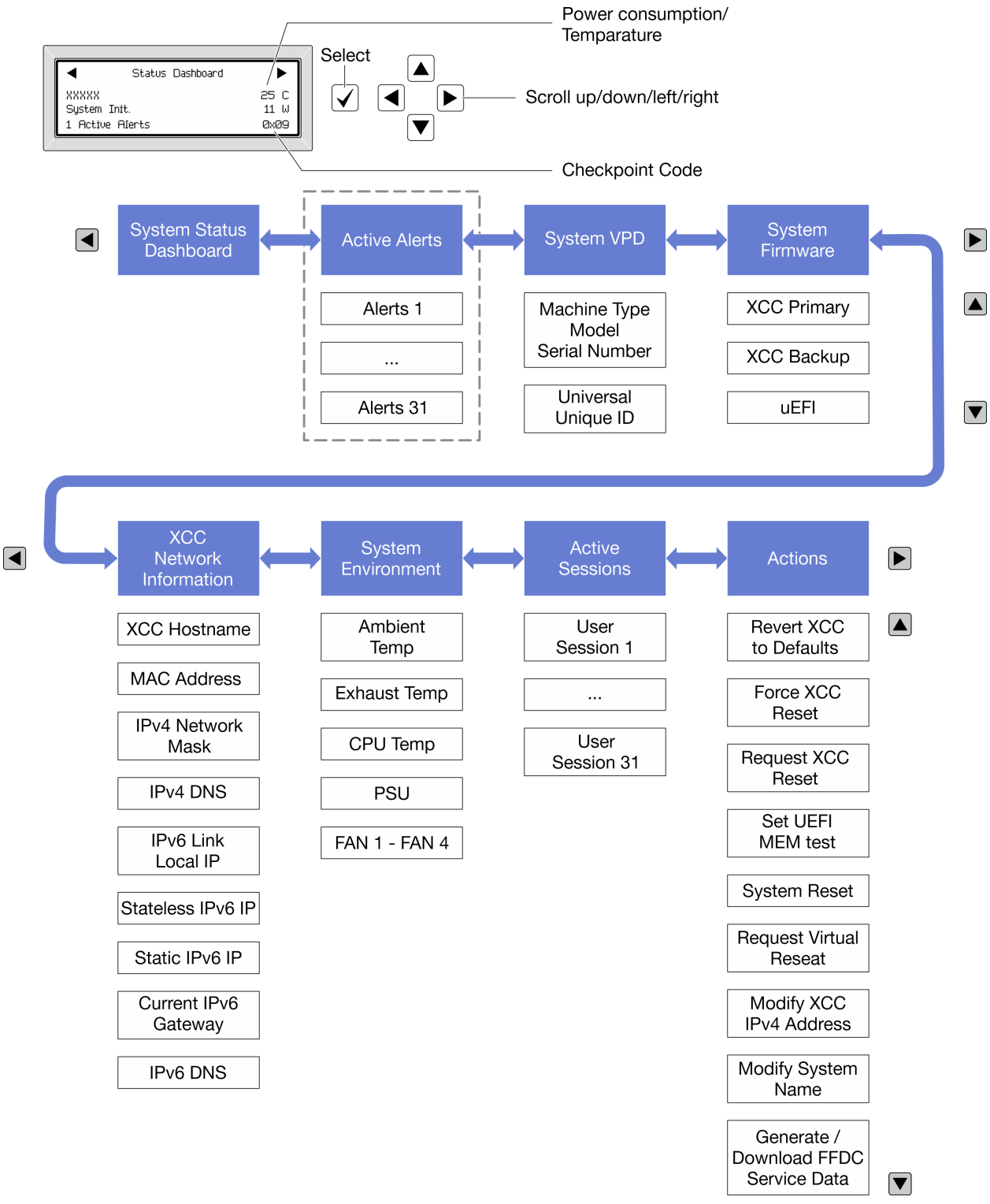
The diagnostics device consists of an LCD display and 5 navigation buttons.

<table>
<tr>
<td rowspan="3"> 
</td>
<td>1 LCD display</td>
</tr>
<tr>
<td>2 Scroll buttons (up/down/left/right)
Press the scroll buttons to locate and select system information.</td>
</tr>
<tr>
<td>3 Select button
Press the select button to select from the options in the menu.</td>
</tr>
</table>

Options flow diagram

The LCD panel shows various system information. Navigate through the options with the scroll keys.

Depending on the model, the options and entries on the LCD display might be different.



Full menu list

Following is the list of options available on the diagnostics panel or handset. 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
1 System name 2 System status 3 Active alert quantity 4 Temperature 5 Power consumption 6 Checkpoint code	

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
Details screen: • 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
• Machine type and serial number • Universal Unique ID (UUID)	Machine Type: xxxx Serial Num: xxxxxx Universal Unique ID: xxxxxxxxxxxxxxxxxxxxxxxxxxxx

System Firmware

Sub Menu	Example
XCC Primary • Firmware level (status) • Build ID • Version number • Release date	XCC Primary (Active) Build: DVI399T Version: 4.07 Date: 2020-04-07
XCC Backup • Firmware level (status) • Build ID • Version number • Release date	XCC Backup (Active) Build: D8BT05I Version: 1.00 Date: 2019-12-30
UEFI • Firmware level (status) • Build ID • Version number • Release date	UEFI (Inactive) Build: D0E101P Version: 1.00 Date: 2019-12-26

XCC Network Information

Sub Menu	Example
• XCC hostname • MAC address • IPv4 Network Mask • IPv4 DNS • IPv6 Link Local IP • Stateless IPv6 IP • Static IPv6 IP • Current IPv6 Gateway • IPv6 DNS **Note:** Only the MAC address that is currently in use is displayed (extension or shared).	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
• Ambient temperature • Exhaust temperature • CPU temperature • PSU status • Spinning speed of fans by RPM	Ambient Temp: 24 C Exhaust Temp: 30 C CPU1 Temp: 50 C PSU1: Vin= 213 w Inlet= 26 C FAN1 Front: 21000 RPM FAN2 Front: 21000 RPM FAN3 Front: 21000 RPM FAN4 Front: 21000 RPM

Active Sessions

Sub Menu	Example
Quantity of active sessions	Active User Sessions: 1

Actions

Sub Menu	Example
Several quick actions supported for users • Revert XCC to Defaults • Force XCC Reset • Request XCC Reset • Set UEFI Memory Test • 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

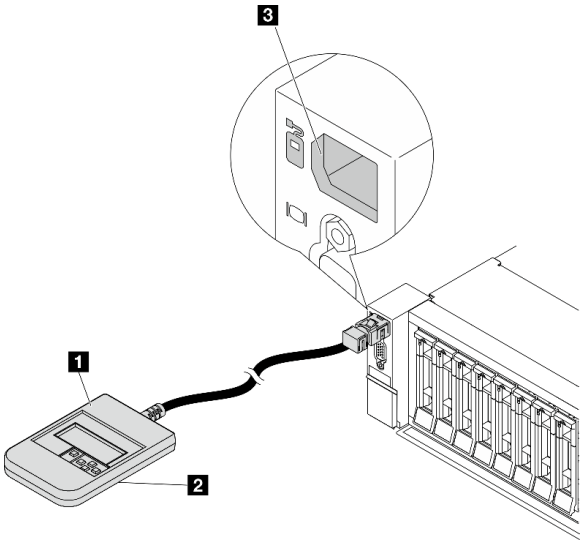
External diagnostics handset

The external diagnostics handset is an external device that can be 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.

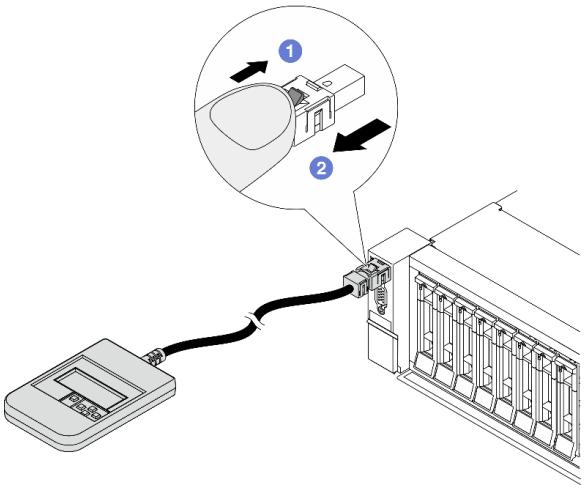
Note: The External Diagnostics Handset is an optional part that needs to be purchased separately.

- "Location of the External Diagnostics Handset" on page 651
- "Diagnostics panel overview" on page 651
- "Options flow diagram" on page 653
- "Full menu list" on page 654

Location of the External Diagnostics Handset

Location	Description
The External Diagnostics Handset is connected to the server with an external cable.  	1 External Diagnostics Handset
	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.
	3 External diagnostics connector This connector is located on the front of the server and is used to connect an external LCD diagnostics handset.

Note: Pay attention to the following steps when unplugging the external handset:

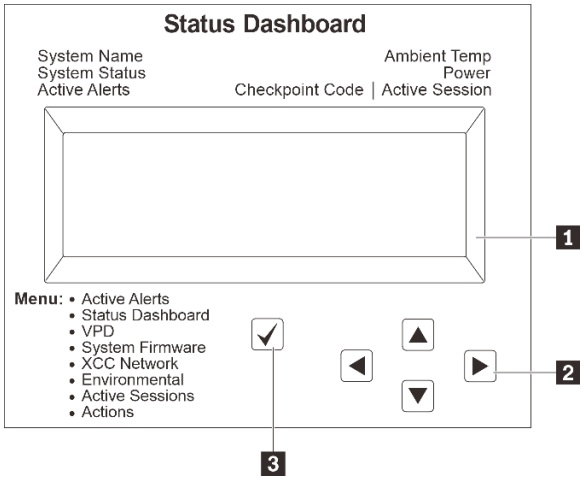


Step 1. Press the plastic clip on the plug in the shown direction.

Step 2. Gently pull out the cable from the connector while keeping the clip pressed down.

Diagnostics panel overview

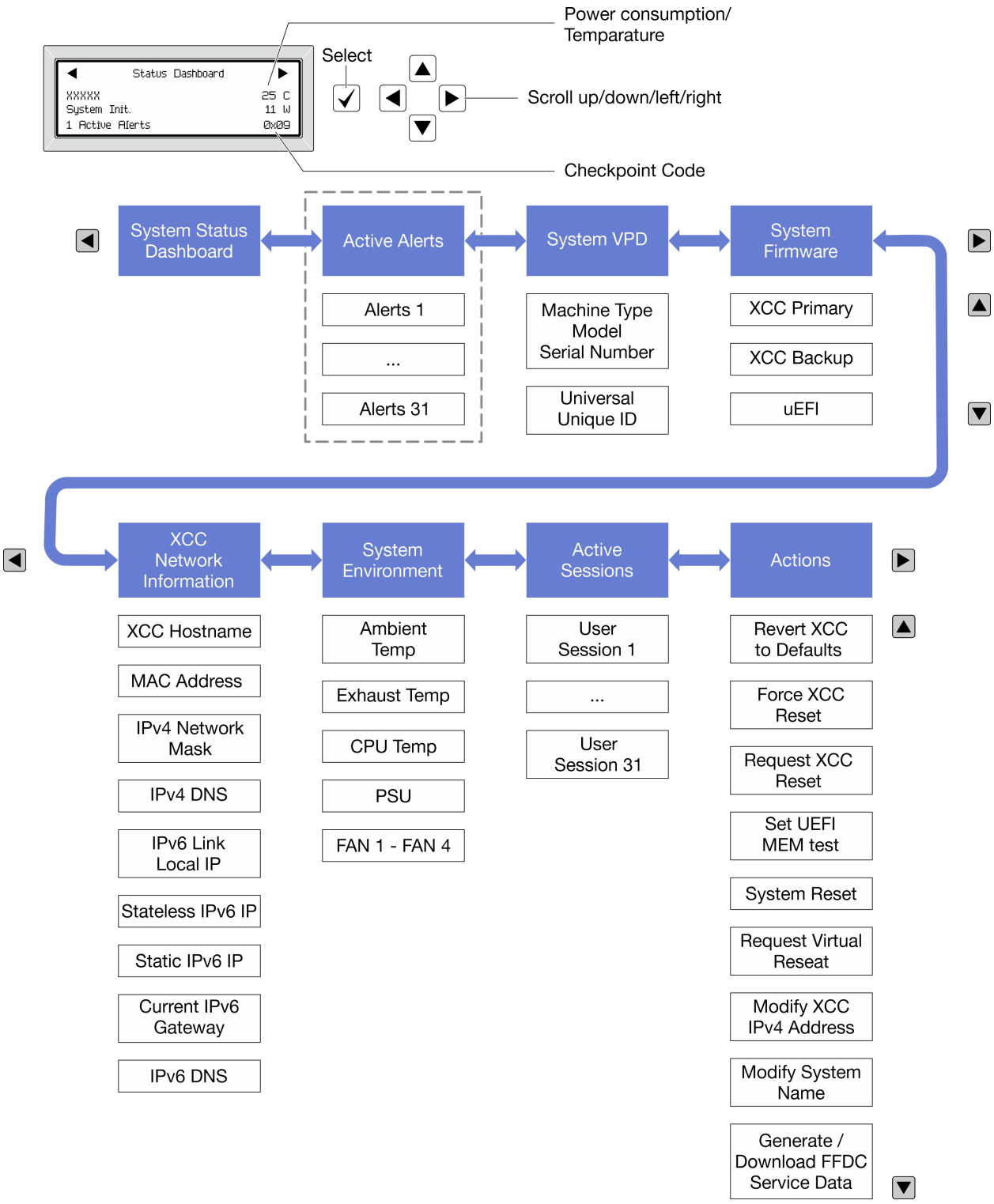
The diagnostics device consists of an LCD display and 5 navigation buttons.

<table>
<tr>
<td rowspan="3"> 
</td>
<td>1 LCD display</td>
</tr>
<tr>
<td>2 Scroll buttons (up/down/left/right)
Press the scroll buttons to locate and select system information.</td>
</tr>
<tr>
<td>3 Select button
Press the select button to select from the options in the menu.</td>
</tr>
</table>

Options flow diagram

The LCD panel shows various system information. Navigate through the options with the scroll keys.

Depending on the model, the options and entries on the LCD display might be different.



Full menu list

Following is the list of options available on the diagnostics panel or handset. 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
1 System name 2 System status 3 Active alert quantity 4 Temperature 5 Power consumption 6 Checkpoint code	

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
Details screen: • 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
• Machine type and serial number • Universal Unique ID (UUID)	Machine Type: xxxx Serial Num: xxxxxx Universal Unique ID: xxxxxxxxxxxxxxxxxxxxxxxxxxxx

System Firmware

Sub Menu	Example
XCC Primary • Firmware level (status) • Build ID • Version number • Release date	XCC Primary (Active) Build: DVI399T Version: 4.07 Date: 2020-04-07
XCC Backup • Firmware level (status) • Build ID • Version number • Release date	XCC Backup (Active) Build: D8BT05I Version: 1.00 Date: 2019-12-30
UEFI • Firmware level (status) • Build ID • Version number • Release date	UEFI (Inactive) Build: D0E101P Version: 1.00 Date: 2019-12-26

XCC Network Information

Sub Menu	Example
• XCC hostname • MAC address • IPv4 Network Mask • IPv4 DNS • IPv6 Link Local IP • Stateless IPv6 IP • Static IPv6 IP • Current IPv6 Gateway • IPv6 DNS **Note:** Only the MAC address that is currently in use is displayed (extension or shared).	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
• Ambient temperature • Exhaust temperature • CPU temperature • PSU status • Spinning speed of fans by RPM	Ambient Temp: 24 C Exhaust Temp: 30 C CPU1 Temp: 50 C PSU1: Vin= 213 w Inlet= 26 C FAN1 Front: 21000 RPM FAN2 Front: 21000 RPM FAN3 Front: 21000 RPM FAN4 Front: 21000 RPM

Active Sessions

Sub Menu	Example
Quantity of active sessions	Active User Sessions: 1

Actions

Sub Menu	Example
Several quick actions supported for users • Revert XCC to Defaults • Force XCC Reset • Request XCC Reset • Set UEFI Memory Test • 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

Rear system LEDs

This topic provides information on the system ID LED and the system error LED on the rear of the server.

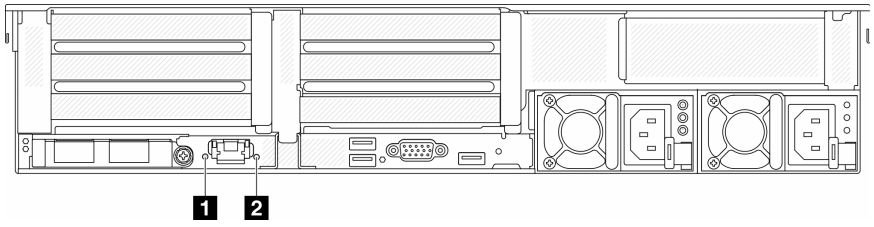


Figure 730. Rear system LEDs

LED	Description	Action
1 System ID LED (blue)	This LED helps you to visually locate the server.	A system ID button with LED is also located on the front of the server. You can press the system ID button to turn on/off or blink the front and rear ID LEDs.
2 System error LED (yellow)	LED on: an error has occurred.	Check system logs or internal error LEDs to identify the failed part. For more information, see “System error LED” in *User Guide* or *System Configuration Guide*.

XCC system management port LEDs

This topic provides information on LEDs of XCC system management port.

The following table describes the problems that are indicated by LEDs on XCC system management port.

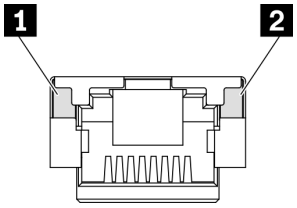


Figure 731. XCC system management port LEDs

LED	Description
1 Ethernet port link LED	Use this green LED to distinguish the network connectivity status: • Off: The network link is disconnected. • Green: The network link is established.
2 Ethernet port activity LED	Use this green LED to distinguish the network activity status: • Off: The server is disconnected from a LAN. • Green: The network is connected and active.

Power supply LEDs

This topic provides information about various power supply LED status and corresponding action suggestions.

The following minimal configuration is required for the server to start:

- One processor in socket 1
- One DIMM in slot 7
- One power supply
- One HDD/SSD drive, one M.2 drive, or one 7mm drive (if OS is needed for debugging)
- Five system fans

The following table describes the problems that are indicated by various combinations of the power-supply LEDs and the power-on LED and suggested actions to correct the detected problems.

Note: Depending on the power supply type, your power supply might look slightly different from the following illustration.

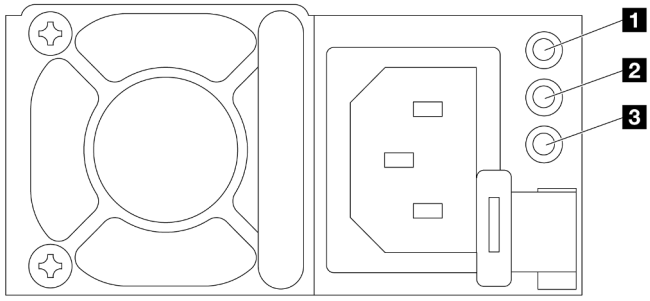
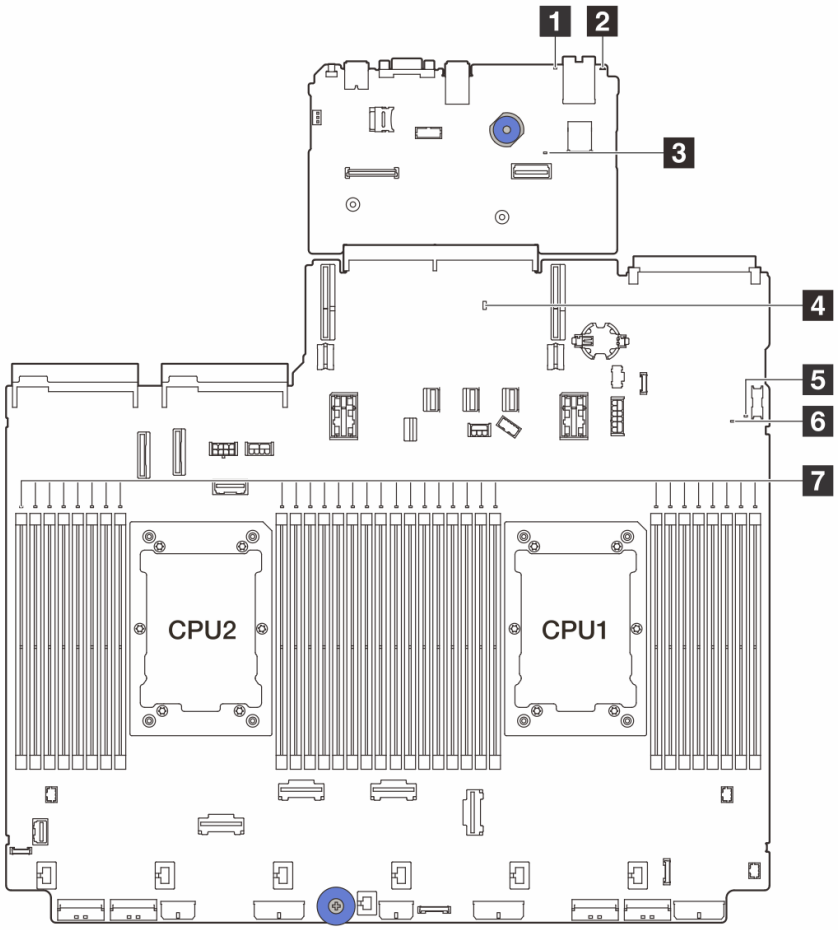


Figure 732. Power supply LEDs

LED	Description
1 Input status	The input status LED can be in one of the following states: • Green: The power supply is connected to the input power source. • Off: The power supply is disconnected from the input power source.
2 Output status	The output status LED can be in one of the following states: • 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. • 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. Zero-output mode can be disabled via Setup Utility or Lenovo XClarity Controller web interface. If you disable zero-output mode, both power supplies will be in the active state. • Start the Setup Utility, go to **System Settings → Power → Zero Output** and select **Disable**. • Log in to the Lenovo XClarity Controller web interface, choose **Server Configuration → Power Policy**, disable **Zero Output Mode**, and then click **Apply**.
3 Power supply error LED	• Off: The power supply is working normally • Yellow: Dump the FFDC log from affected systems and escalate to next level for PSU data log reviewing.

System-board-assembly LEDs

The following illustrations show the light-emitting diodes (LEDs) on the system-board-assembly which contains the system I/O board and processor board.



- 1 System error LED (yellow)
- 2 System ID LED (blue)
- 3 XCC heartbeat LED (green)
- 4 PCH heartbeat LED (green)
- 5 FPGA heartbeat LED (green)
- 6 System status LED (green)
- 7 DIMM error LEDs (Amber)

Figure 733. System-board-assembly LEDs

Table 14. System-board-assembly LEDs

LED	Description	Action
1 System error LED (yellow)	LED on: an error has occurred.	Check system logs or internal error LEDs to identify the failed part. For more information, see “System error LED” in *User Guide* or *System Configuration Guide*.
2 System ID LED (blue)	This LED helps you to visually locate the server.	A system ID button with LED is also located on the front of the server. You can press the system ID button to turn on/off or blink the front and rear ID LEDs.

Table 14. System-board-assembly LEDs (continued)

LED	Description	Action
3 XCC heartbeat LED (green)	The XCC heartbeat LED helps you identify the XCC status. • Blinking (about one flash per second) : XCC is working normally. • Blinking at other speeds or always on: XCC is at the initial phase or is working abnormally. • Off: XCC is not working.	• If the XCC heartbeat LED is always off or always on, do the following: – If XCC cannot be access: 1. Re-plug the power cord. 2. Check and ensure that the system I/O board and the firmware and RoT security module are installed correctly. (Trained technician only) Reinstall them if needed. 3. (Trained technician only) Replace the firmware and RoT security module. 4. (Trained technician only) Replace the system I/O board. – If XCC can be access, replace the system I/O board. • If the XCC heartbeat LED is always blinking fast over 5 minutes, do the following: 1. Re-plug the power cord. 2. Check and ensure that the system I/O board and the firmware and RoT security module are installed correctly. (Trained technician only) Reinstall them if needed. 3. (Trained technician only) Replace the firmware and RoT security module. 4. (Trained technician only) Replace the system I/O board. • If the XCC heartbeat LED is always blinking slow over 5 minutes, do the following: 1. Re-plug the power cord. 2. Check and ensure that the system I/O board and the firmware and RoT security module are installed correctly. (Trained technician only) Reinstall them if needed. 3. If the problem remains, contact Lenovo Support.
4 PCH heartbeat LED (green)	The PCH heartbeat LED helps you identify the PCH status. • Blinking (about one flash per second): system ME is working normally. • Off: system ME is not working.	If the PCH heartbeat LED is always off or always on, do the following: 1. Check and ensure that the system I/O board and the firmware and RoT security module are installed correctly. (Trained technician only) Reinstall them if needed. 2. Make sure the UEFI firmware has been flashed to the corresponding platform version. 3. Update UEFI and XCC firmware to latest version. 4. Check if there is ME error event triggered in system event log. If yes, and the above actions are done, replace the firmware and RoT security module. 5. (Trained technician only) If it is still not working, replace the processor board.

Table 14. System-board-assembly LEDs (continued)

LED	Description	Action
5 FPGA heartbeat LED (green)	The FPGA heartbeat LED helps you identify the FPGA status. • Blinking (about one flash per second): FPGA is working normally. • On or off: FPGA is not working.	If FPGA heartbeat LED is always off or always on, do the following: 1. Replace the processor board. 2. If the problem remains, contact Lenovo Support.
6 System status LED (green)	The system status LED indicates the working status of the system. • Fast blinking (about four flashes per second): Power fault or is waiting for XCC power permission ready. • Slow blinking (about one flash per second): Power off and is ready to be powered on (standby state). • ON: Power on	• If the system status LED is blinking fast over 5 minutes and cannot power on, check the XCC heartbeat LED and follow the actions for the XCC heartbeat LED. • If the system status LED remains off or is blinking fast (about four flashes per second) and the system error LED on the front panel is on (yellow), the system is in a power fault status. Do the following: 1. Re-plug the power cord. 2. Remove installed adapters/devices, one at a time, until you reach the minimal configuration for debugging. 3. (Trained technician only) If the problem remains, capture FFDC log, and replace the processor board. 4. If the problem still remains, contact Lenovo Support.
7 DIMM error LEDs (Amber)	LED on: an error has occurred to the DIMM the LED represents.	For more information, see "Memory problems" on page 670.

LEDs on the firmware and RoT security module

The following illustrations show the light-emitting diodes (LEDs) on the ThinkSystem V3 Firmware and Root of Trust Security Module (firmware and RoT security module).

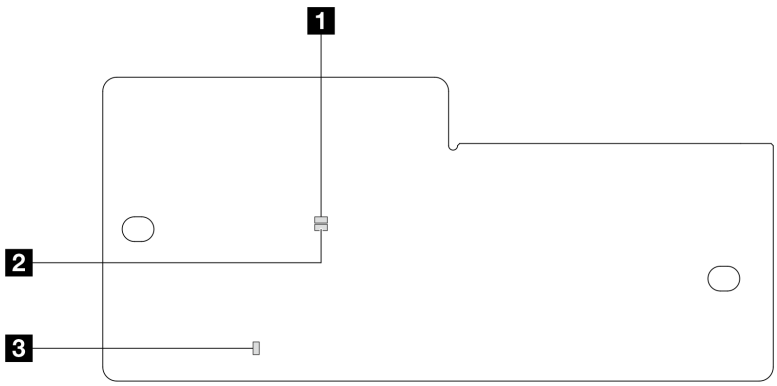


Figure 734. LEDs on the firmware and RoT security module

1 AP0 LED (Green)	2 AP1 LED (Green)	3 Fatal Error LED (Amber)

Table 15. LEDs description

Scenario	AP0 LED	AP1 LED	Fatal Error LED	FPGA heart-beat LED	XCC heart-beat LED	Actions
RoT security module fatal firmware failure	Off	Off	On	N/A	N/A	Replace the firmware and RoT security module.
	Blink	N/A	On	N/A	N/A	Replace the firmware and RoT security module.
	Blink	N/A	On	On	N/A	Replace the firmware and RoT security module.
No system power (FPGA heartbeat LED off)	Off	Off	Off	Off	Off	If the AC power is on, but the system board assembly does not have power, then: 1. Check the power supply unit (PSU) or power interposer board (PIB) if any. If the PSU or PIB has any error, replace it. 2. If the PSU or PIB is good, do the following: a. Replace the system I/O board. b. Replace the processor board.
XCC firmware recoverable error	Blink	N/A	Off	N/A	N/A	Information only. No action is required.
XCC firmware is recovered from error	Blink	N/A	Off	N/A	N/A	Information only. No action is required.
UEFI firmware authentication failure	N/A	Blink	Off	N/A	N/A	Information only. No action is required.
UEFI firmware is recovered from authentication failure	N/A	On	Off	N/A	N/A	Information only. No action is required.
System is OK (FPGA heartbeat LED is On)	On	On	Off	On	On	Information only. No action is required.

Note: For locations of the FPGA LED and XCC heartbeat LED, see "System-board-assembly LEDs" on page 658.

LED on the liquid detection sensor module

This topic provides information about the LED on the liquid detection sensor module.

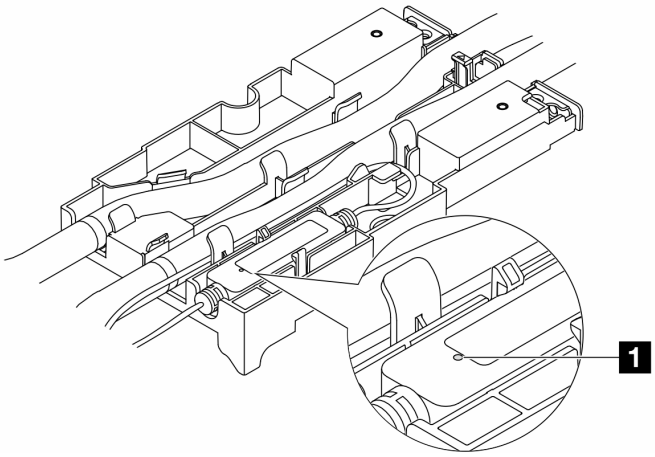


Figure 735. LED on the liquid detection sensor module

1 LED on the liquid detection sensor module	
Description	• Solid green: No coolant leakage detected. • Blinking green: Abnormal status detected.
Action	See .

General problem determination procedures

Use the information in this section to resolve problems if the event log does not contain specific errors or the server is inoperative.

If you are not sure about the cause of a problem and the power supplies are working correctly, complete the following steps to attempt to resolve the problem:

1. Power off the server.
2. Make sure that the server is cabled correctly.
3. Remove or disconnect the following devices if applicable, one at a time, until you find the failure. Power on and configure the server each time you remove or disconnect a device.
   - Any external devices.
   - Surge-suppressor device (on the server).
   - Printer, mouse, and non-Lenovo devices.
   - Each adapter.
   - Hard disk drives.
   - Memory modules until you reach the minimal configuration for debugging that is supported for the server.

     To determine the minimal configuration for your server, see “Minimal configuration for debugging” in “Technical specifications” on page 631.
4. Power on the server.

If the problem is solved when you remove an adapter from the server, but the problem recurs when you install the same adapter again, suspect the adapter. If the problem recurs when you replace the adapter with a different one, try a different PCIe slot.

If the problem appears to be a networking problem and the server passes all system tests, suspect a network cabling problem that is external to the server.

Resolving suspected power problems

Power problems can be difficult to solve. For example, a short circuit can exist anywhere on any of the power distribution buses. Usually, a short circuit will cause the power subsystem to shut down because of an overcurrent condition.

Complete the following steps to diagnose and resolve a suspected power problem.

Step 1. Check the event log and resolve any errors related to the power.

Note: Start with the event log of the application that is managing the server. For more information about event logs, see “Event logs” on page 629.

Step 2. Check for short circuits, for example, if a loose screw is causing a short circuit on a circuit board.

Step 3. Remove the adapters and disconnect the cables and power cords to all internal and external devices until the server is at the minimal configuration for debugging that is required for the server to start. To determine the minimal configuration for your server, see “Minimal configuration for debugging” in “Technical specifications” on page 631.

Step 4. Reconnect all AC power cords and turn on the server. If the server starts successfully, reseat the adapters and devices one at a time until the problem is isolated.

If the server does not start from the minimal configuration, replace the components in the minimal configuration one at a time until the problem is isolated.

Resolving suspected Ethernet controller problems

The method that you use to test the Ethernet controller depends on which operating system you are using. See the operating-system documentation for information about Ethernet controllers, and see the Ethernet controller device-driver readme file.

Complete the following steps to attempt to resolve suspected problems with the Ethernet controller.

Step 1. Make sure that the correct device drivers, which come with the server are installed and that they are at the latest level.

Step 2. Make sure that the Ethernet cable is installed correctly.

- The cable must be securely attached at all connections. If the cable is attached but the problem remains, try a different cable.
- If you set the Ethernet controller to operate at 100 Mbps or 1000 Mbps, you must use Category 5 cabling.

Step 3. Determine whether the hub supports auto-negotiation. If it does not, try configuring the integrated Ethernet controller manually to match the speed and duplex mode of the hub.

Step 4. Check the Ethernet controller LEDs on the server. These LEDs indicate whether there is a problem with the connector, cable, or hub.

Ethernet controller LED locations are specified in “Troubleshooting by system LEDs and diagnostics display” on page 642.

- The Ethernet link status LED is lit when the Ethernet controller receives a link pulse from the hub. If the LED is off, there might be a defective connector or cable or a problem with the hub.
- The Ethernet transmit/receive activity LED is lit when the Ethernet controller sends or receives data over the Ethernet network. If the Ethernet transmit/receive activity is off, make sure that the hub and network are operating and that the correct device drivers are installed.

Step 5. Check the Network activity LED on the server. The Network activity LED is lit when data is active on the Ethernet network. If the Network activity LED is off, make sure that the hub and network are operating and that the correct device drivers are installed.

Network activity LED location is specified in “Troubleshooting by system LEDs and diagnostics display” on page 642.

Step 6. Check for operating-system-specific causes of the problem, and also make sure that the operating system drivers are installed correctly.

Step 7. Make sure that the device drivers on the client and server are using the same protocol.

If the Ethernet controller still cannot connect to the network but the hardware appears to be working, the network administrator must investigate other possible causes of the error.

Troubleshooting by symptom

Use this information to find solutions to problems that have identifiable symptoms.

To use the symptom-based troubleshooting information in this section, complete the following steps:

1. Check the event log of the application that is managing the server and follow the suggested actions to resolve any event codes.
   - If you are managing the server from the Lenovo XClarity Administrator, begin with the Lenovo XClarity Administrator event log.
   - If you are using some other management application, begin with the Lenovo XClarity Controller event log.

   For more information about event logs (see “Event logs” on page 629).
2. Review this section to find the symptoms that you are experiencing and follow the suggested actions to resolve the issue.
3. If the problem persists, contact support (see “Contacting Support” on page 687).

Coolant leak problems (Direct Water Cooling Module)

Use this information to resolve coolant leak problems with the Direct Water Cooling Module (DWCM).

See this section to resolve issues related to the DWCM.

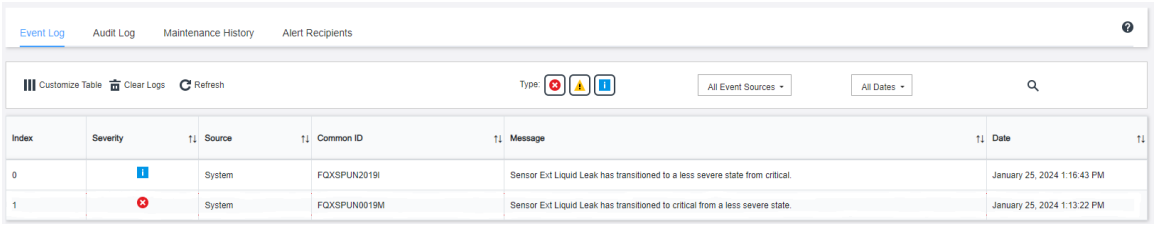
- “Options to identify coolant leaks” on page 665
- “Steps to resolve coolant leaks” on page 666

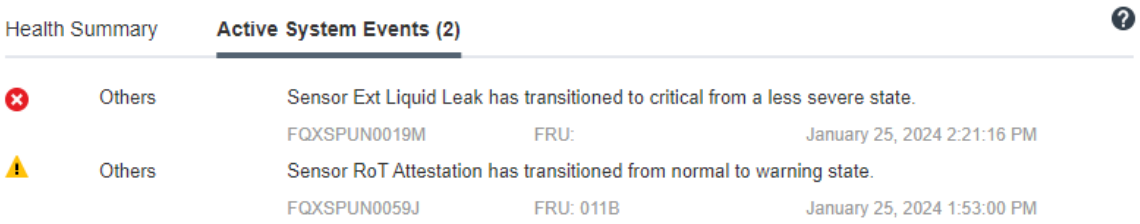
Options to identify coolant leaks

Coolant leaks can be identified through the following practices:

- If the server is on remote maintenance,
  - A Lenovo XClarity Controller event shows:

    FQXSPUN0019M: Sensor Ext Liquid Leak has transitioned to critical from a less severe state.





- Lenovo XClarity Controller has defined lots of system conditions as IPMI sensors. Users can use IPMI commands to check system running status. Here are examples of executing ipmitool, an open-source common tool which follows Intel's IPMI standard. Check for coolant leakage status with command lines as shown.

  ```
  zuody2@zuody2-07:~$ ipmitool -H 10.245.50.35 -U USERID -P Aa12345678 -I lanplus -C 17 sel elist
     1 | 01/25/2024 | 13:40:30 | Event Logging Disabled SEL Fullness | Log area reset/cleared | Asserted
     2 | 01/25/2024 | 13:41:58 | Cooling Device Ext Liquid Leak | Transition to Critical from less severe | Asserted
     3 | 01/25/2024 | 13:42:01 | Cooling Device Ext Liquid Leak | Transition to Critical from less severe | Deasserted
  ```

  The event logs shown with the parameter `sel elist`.

  ```
  zuody2@zuody2-07:~$ ipmitool -H 10.245.50.35 -U USERID -P Aa12345678 -I lanplus -C 17 sdr elist | grep "Ext Liquid Leak"
  Ext Liquid Leak  | FDh | ok  | 30.1 | Transition to Critical from less severe
  ```

  `Ext Liquid Leak | FDh | ok | 30.1 | Transition to Critical from less severe`

  The status of all sensors can be fetched with the parameter `sdr elist`. If coolant leakage happens, the log above will show up.

- If the server is within reach, and the amber LED is lit on the front operator panel, potential coolant leaks may have occurred. It is required to open the top cover to check the LED status of the liquid detection sensor module. See "Front operator panel LEDs" and "LED on the liquid detection sensor module" in *User Guide* for more details.

Steps to resolve coolant leaks

If the LED on the liquid detection sensor module is blinking green, follow the procedures to get help.

1. Save and back up data and operations.
2. Power off the server and remove the quick connect plugs from the manifolds.
3. Slide the server out or remove the server from the rack. See "Remove the server from rack" on page 32.
4. Remove the top cover. See "Remove the top cover" on page 318.
5. Check for coolant leaks around the outlet and inlet hoses, system board assembly, and under the cold plate covers:

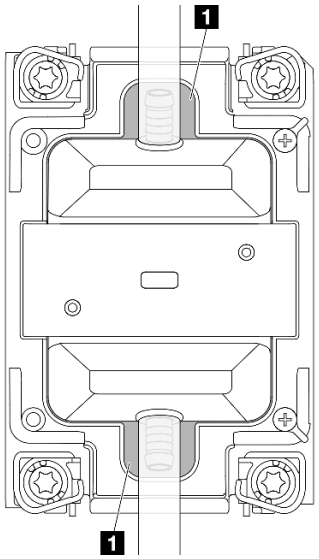


Figure 736. Leak-prone areas

Note: If leak happens, the coolant tends to collect around 1 leak-prone areas.

a. If coolant found around the hoses and system board assembly, clean up the coolant.

b. If coolant found under the cold plate covers:

1) As illustrated below, remove at least four DIMMs from both sides to get access to the clips on the cold plate covers. To remove memory modules, see "Remove a memory module" on page 185.

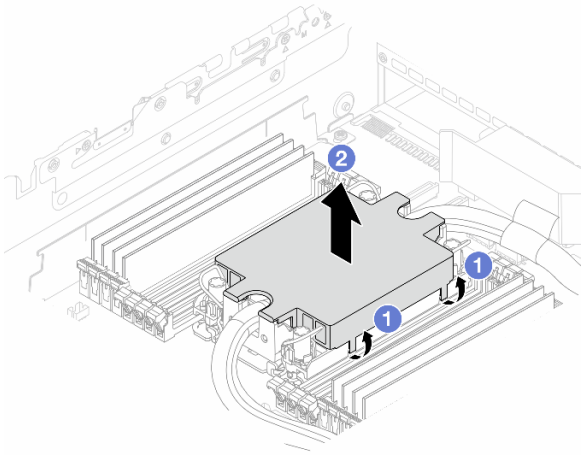


Figure 737. Removing the cold plate cover

a) 1 Open the clips.

b) 2 Remove the cold plate cover.

2) Clean up the coolant on the cold plates.

6. Check for the top cover of the server below to see if dripping happens. If yes, repeat previous steps to servers below.
7. Contact Lenovo Support.

Intermittent problems

Use this information to solve intermittent problems.

Intermittent external device problems

Complete the following steps until the problem is solved.

1. Update the UEFI and XCC firmware to the latest versions.
2. Make sure that the correct device drivers are installed. See the manufacturer's website for documentation.
3. For a USB device:
   a. Make sure that the device is configured correctly.

      Restart the server and press the key according to the on-screen instructions to display the LXPM system setup interface. (For more information, see the “Startup” section in the LXPM documentation compatible with your server at https://pubs.lenovo.com/lxpm-overview/.) Then, click **System Settings → Devices and I/O Ports → USB Configuration**.
   b. Connect the device to another port. If using a USB hub, remove the hub and connect the device directly to the server. Make sure that the device is configured correctly for the port.

Intermittent KVM problems

Complete the following steps until the problem is solved.

Video problems:

1. Make sure that all cables and the console breakout cable are properly connected and secure.
2. Make sure that the monitor is working properly by testing it on another server.
3. Test the console breakout cable on a working server to ensure that it is operating properly. Replace the console breakout cable if it is defective.

Keyboard problems:

Make sure that all cables and the console breakout cable are properly connected and secure.

Mouse problems:

Make sure that all cables and the console breakout cable are properly connected and secure.

Intermittent unexpected reboots

Note: Some correctable errors require that the server reboot so that it can disable a device, such as a memory DIMM or a processor to allow the machine to boot up properly.

1. If the reset occurs during POST and the POST watchdog timer is enabled, make sure that sufficient time is allowed in the watchdog timeout value (POST Watchdog Timer).

   To check the POST watchdog time, restart the server and press the key according to the on-screen instructions to display the LXPM system setup interface. (For more information, see the “Startup” section in the LXPM documentation compatible with your server at https://pubs.lenovo.com/lxpm-overview/.) Then, click **BMC Settings → POST Watchdog Timer**.

2. If the reset occurs after the operating system starts, enter the operating system when the system operates normally and set up operating system kernel dump process (Windows and Linux base operating systems will be using different method). Enter the UEFI setup menus and disable the feature, or disable it with the following OneCli command.
   `OneCli.exe config set SystemRecovery.RebootSystemOnNMI Disable --bmc XCC_USER:XCC_PASSWORD@XCC_IPAddress`
3. See the management controller event log to check for an event code that indicates a reboot. See "Event logs" on page 629 for information about viewing the event log. If you are using Linux base operating system, then capture all logs back to Lenovo support for further investigation.

Keyboard, mouse, KVM switch or USB-device problems

Use this information to solve problems related to a keyboard, mouse, KVM switch or USB-device problems.

All or some keys on the keyboard do not work

1. Make sure that:
   - The keyboard cable is securely connected.
   - The server and the monitor are turned on.
2. If you are using a USB keyboard, run the Setup Utility and enable keyboardless operation.
3. If you are using a USB keyboard and it is connected to a USB hub, disconnect the keyboard from the hub and connect it directly to the server.
4. Replace the keyboard.

Mouse does not work

1. Make sure that:
   - The mouse cable is securely connected to the server.
   - The mouse device drivers are installed correctly.
   - The server and the monitor are turned on.
   - The mouse option is enabled in the Setup Utility.
2. If you are using a USB mouse and it is connected to a USB hub, disconnect the mouse from the hub and connect it directly to the server.
3. Replace the mouse.

KVM switch problems

1. Make sure that the KVM switch is supported by your server.
2. Make sure that the KVM switch is powered on correctly.
3. If the keyboard, mouse or monitor can be operated normally with direct connection to the server, then replace the KVM switch.

USB-device does not work

1. Make sure that:
   - The server is turned on and there is power supplied to the server.
   - The correct USB device driver is installed.
   - The operating system supports the USB device.

2. Make sure that the USB configuration options are set correctly in system setup.

   Restart the server and press the key according to the on-screen instructions to display the LXPM system setup interface. (For more information, see the “Startup” section in the LXPM documentation compatible with your server at https://pubs.lenovo.com/lxpm-overview/.) Then, click **System Settings → Devices and I/O Ports → USB Configuration**.
3. If you are using a USB hub, disconnect the USB device from the hub and connect it directly to the server.
4. If the USB device is still not working, try to use a different USB device, or try to connect the USB device that is being tested to another working USB connector.
5. If the USB device works well on another USB connector, the original USB connector may have a problem.
   - If the USB connector is on the front of the server:
     a. Remove and reconnect the USB cable. Ensure that the USB cable is correctly connected to the system board assembly. See Chapter 2 “Internal cable routing” on page 323
     b. Replace the front panel or front I/O module.
   - If the USB connector is at the rear of the server:
     a. (Trained technician only) Replace the system I/O board.

Memory problems

See this section to resolve issues related to memory.

Multiple memory modules in a channel identified as failing

Note: Each time you install or remove a memory module, you must disconnect the server from the power source; then, wait 10 seconds before restarting the server.

Complete the following procedure to solve the problem.

1. Reseat the memory modules; then, restart the server.
2. Remove the highest-numbered memory module of those that are identified and replace it with an identical known good memory module; then, restart the server. Repeat as necessary. If the failures continue after all identified memory modules are replaced, go to step 4.
3. Return the removed memory modules, one at a time, to their original connectors, restarting the server after each memory module, until a memory module fails. Replace each failing memory module with an identical known good memory module, restarting the server after each memory module replacement. Repeat step 3 until you have tested all removed memory modules.
4. Replace the highest-numbered memory module of those identified; then, restart the server. Repeat as necessary.
5. Reverse the memory modules between the channels (of the same processor), and then restart the server. If the problem is related to a memory module, replace the failing memory module.
6. (Trained technician only) Install the failing memory module into a memory module connector for processor 2 (if installed) to verify that the problem is not the processor or the memory module connector.
7. (Trained technician only) Replace the processor board.

Displayed system memory is less than installed physical memory

Complete the following procedure to solve the problem.

Note: Each time you install or remove a memory module, you must disconnect the server from the power source; then, wait 10 seconds before restarting the server.

1. Make sure that:
   - No error LEDs are lit. See “Troubleshooting by system LEDs and diagnostics display” on page 642.
   - No memory module error LEDs are lit on the processor 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 “Memory module installation rules and order” on page 5 for requirements).
   - After changing or replacing a memory module, memory configuration is updated accordingly in the Setup Utility.
   - All banks of memory are enabled. The server might have automatically disabled a memory bank when it detected a problem, or a memory bank might have been manually disabled.
   - There is no memory mismatch when the server is at the minimum memory configuration.
2. Reseat the memory modules, and then restart the server.
3. Check the POST error log:
   - If a memory module was disabled by a systems-management interrupt (SMI), replace the memory module.
   - If a memory module was disabled by the user or by POST, reseat the memory module; then, run the Setup Utility and enable the memory module.
4. Run memory diagnostics. When you start a server and press the key according to the on-screen instructions, the LXPM interface is displayed by default. (For more information, see the “Startup” section in the LXPM documentation compatible with your server at https://pubs.lenovo.com/lxpm-overview/.) You can perform memory diagnostics with this interface. From the Diagnostic page, go to **Run Diagnostic → Memory Test → Advanced Memory Test**.
5. Reverse the modules between the channels (of the same processor), and then restart the server. If the problem is related to a memory module, replace the failing memory module.
6. Re-enable all memory modules using the Setup Utility, and then restart the server.
7. (Trained technician only) Install the failing memory module into a memory module connector for processor 2 (if installed) to verify that the problem is not the processor or the memory module connector.
8. (Trained technician only) Replace the processor board.

Invalid memory population detected

If this warning message appears, complete the following steps:

```
Invalid memory population (unsupported DIMM population) detected. Please verify memory configuration is valid.
```

1. See “Memory module installation rules and order” on page 5 to make sure the present memory module population sequence is supported.
2. If the present sequence is indeed supported, see if any of the modules is displayed as “disabled” in Setup Utility.
3. Reseat the module that is displayed as “disabled,” and reboot the system.
4. If the problem persists, replace the memory module.

Monitor and video problems

Use this information to solve problems related to a monitor or video.

Incorrect characters are displayed

Complete the following steps:

1. Verify that the language and locality settings are correct for the keyboard and operating system.
2. If the wrong language is displayed, update the server firmware to the latest level. See “Update the firmware” in *User Guide* or *System Configuration Guide*.

Screen is blank

Note: Make sure that the expected boot mode has not been changed from the UEFI to Legacy or vice versa.

1. If the server is attached to a KVM switch, bypass the KVM switch to eliminate it as a possible cause of the problem: connect the monitor cable directly to the correct connector on the rear of the server.
2. The management controller remote presence function is disabled if you install an optional video adapter. To use the management controller remote presence function, remove the optional video adapter.
3. If the server is installed with the graphical adapters while turning on the server, the Lenovo logo is displayed on the screen after approximately 3 minutes. This is normal operation while the system loads.
4. Make sure that:
   - The server is turned on and there is power supplied to the server.
   - The monitor cables are connected correctly.
   - The monitor is turned on and the brightness and contrast controls are adjusted correctly.
5. Make sure that the correct server is controlling the monitor, if applicable.
6. Make sure that the video output is not affected by corrupted server firmware; See “Update the firmware” in *User Guide* or *System Configuration Guide*.
7. If the problem remains, contact Lenovo Support.

Screen goes blank when you start some application programs

1. Make sure that:
   - The application program is not setting a display mode that is higher than the capability of the monitor.
   - You installed the necessary device drivers for the application.

The monitor has screen jitter, or the screen image is wavy, unreadable, rolling, or distorted

1. If the monitor self-tests show that the monitor is working correctly, consider the location of the monitor. Magnetic fields around other devices (such as transformers, appliances, fluorescents, and other monitors) can cause screen jitter or wavy, unreadable, rolling, or distorted screen images. If this happens, turn off the monitor.

   Attention: Moving a color monitor while it is turned on might cause screen discoloration.

   Move the device and the monitor at least 305 mm (12 in.) apart, and turn on the monitor.

Notes:

a. To prevent diskette drive read/write errors, make sure that the distance between the monitor and any external diskette drive is at least 76 mm (3 in.).

b. Non-Lenovo monitor cables might cause unpredictable problems.

2. Reseat the monitor cable.
3. Replace the components listed in step 2 one at a time, in the order shown, restarting the server each time:
   a. Monitor cable
   b. Video adapter (if one is installed)
   c. Monitor
4. If the problem remains, contact Lenovo Support.

The wrong characters appear on the screen

Complete the following steps until the problem is solved:

1. Verify that the language and locality settings are correct for the keyboard and operating system.
2. If the wrong language is displayed, update the server firmware to the latest level. See “Update the firmware” in *User Guide* or *System Configuration Guide*.

Monitor display fails when connected to the VGA connector of the server

Complete the following steps until the problem is solved:

1. Check and ensure that the server is turned on.
2. If there is a KVM connected between the monitor and server, remove the KVM.
3. Reconnect the monitor cables and ensure that the cables are connected correctly.
4. Try to use a monitor that has been verified without a problem.
5. If the monitor display still fails, do the following:
   - If the VGA connector is on the front of the server:
     a. Remove and reconnect the internal VGA cable. Ensure that the VGA cable is correctly connected to the system board assembly. See Chapter 2 “Internal cable routing” on page 323
     b. Replace the left rack latch with VGA. See “Rack latches replacement” on page 222.
     c. (Trained technician only) Replace the system I/O board.
   - If the VGA connector is on the rear of the server:
     a. (Trained technician only) Replace the system I/O board.

Observable problems

Use this information to solve observable problems.

- “Cannot enter legacy mode after installing a new adapter” on page 676
- “Cracked parts or cracked chassis” on page 676

Server hangs during the UEFI boot process

If the system hangs during the UEFI boot process with the message `UEFI: DXE INIT` on the display, make sure that Option ROMs were not configured with a setting of **Legacy**. You can remotely view the current settings for Option ROMs by running the following command using the Lenovo XClarity Essentials OneCLI:

```
onecli config show EnableDisableAdapterOptionROMSupport --bmc xcc_userid:xcc_password@xcc_ipaddress
```

To recover a system that hangs during the boot process with Legacy Option ROM settings, see the following Tech Tip:

https://datacentersupport.lenovo.com/solutions/ht506118

If legacy Option ROMs must be used, do not set slot Option ROMs to **Legacy** on the Devices and I/O Ports menu. Instead, set slot Option ROMs to **Auto** (the default setting), and set the System Boot Mode to **Legacy Mode**. Legacy option ROMs will be invoked shortly before the system boots.

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

Complete the following steps until the problem is solved.

1. Correct any errors that are indicated by the system LEDs and diagnostics display.
2. Make sure that the server supports all the processors and that the processors match in speed and cache size.

   You can view processor details from system setup.

   To determine if the processor is supported for the server, see https://serverproven.lenovo.com.
3. (Trained technician only) Make sure that processor 1 is seated correctly.
4. (Trained technician only) Remove processor 2 and restart the server.
5. Replace the following components one at a time, in the order shown, restarting the server each time:
   a. (Trained technician only) Processor
   b. (Trained technician only) Processor board

Server is unresponsive (POST is complete and operating system is running)

Complete the following steps until the problem is solved.

- If you are in the same location as the server , complete the following steps:
  1. If you are using a KVM connection, make sure that the connection is operating correctly. Otherwise, make sure that the keyboard and mouse are operating correctly.
  2. If possible, log in to the server and verify that all applications are running (no applications are hung).
  3. Restart the server.
  4. If the problem remains, make sure that any new software has been installed and configured correctly.
  5. Contact your place of purchase of the software or your software provider.
- If you are accessing the server from a remote location, complete the following steps:
  1. Make sure that all applications are running (no applications are hung).
  2. Attempt to log out of the system and log back in.
  3. Validate the network access by pinging or running a trace route to the server from a command line.

a. If you are unable to get a response during a ping test, attempt to ping another server in the enclosure to determine whether it is a connection problem or server problem.
b. Run a trace route to determine where the connection breaks down. Attempt to resolve a connection issue with either the VPN or the point at which the connection breaks down.

4. Restart the server remotely through the management interface.
5. If the problem remains, verify that any new software has been installed and configured correctly.
6. Contact your place of purchase of the software or your software provider.

Server is unresponsive (POST failed and cannot start System Setup)

Configuration changes, such as added devices or adapter firmware updates, and firmware or application code problems can cause the server to fail POST (the power-on self-test).

If this occurs, the server responds in either of the following ways:

- The server restarts automatically and attempts POST again.
- The server hangs, and you must manually restart the server for the server to attempt POST again.

After a specified number of consecutive attempts (automatic or manual), the server reverts to the default UEFI configuration and starts System Setup so that you can make the necessary corrections to the configuration and restart the server. If the server is unable to successfully complete POST with the default configuration, there might be a problem with the processor board or system I/O board. Do the following:

1. Remove any newly added devices and revert the system to the default hardware configuration.
2. Try to restart the system and check if it can boot to the System Setup successfully.
   - If no, do the following:
     a. Replace the processor board.
     b. Replace the system I/O board.
   - If yes, try to move the suspected device to another system under test (SUT).
     – If the SUT system works normally, the issue maybe is caused by the processor board or system I/O board.
     – If the SUT system works abnormally, there might be a problem with the suspected device.
3. If all the suspected parts are isolated and the issue still remains unchanged, please run the affected system to be minimum configuration for further detail issue isolation and add them back step by step.

Voltage planar fault is displayed in the event log

Complete the following steps until the problem is solved.

1. Revert the system to the minimum configuration. See “Specifications” on page 631 for the minimally required number of processors and DIMMs.
2. Restart the system.
   - If the system restarts, add each of the removed items one at a time and restart the system each time until the error occurs. Replace the item for which the error occurs.
   - If the system does not restart, suspect the processor board.

Unusual smell

Complete the following steps until the problem is solved.

1. An unusual smell might be coming from newly installed equipment.
2. If the problem remains, contact Lenovo Support.

Server seems to be running hot

Complete the following steps until the problem is solved.

Multiple servers or chassis:

1. Make sure that the room temperature is within the specified range (see “Specifications” on page 631).
2. Make sure that the fans are installed correctly.
3. Update the UEFI and XCC to the latest versions.
4. Make sure that the fillers in the server are installed correctly (see Chapter 1 “Hardware replacement procedures” on page 1 for detailed installation procedures).
5. Use the IPMI command to ramp up the fan speed to the full fan speed to see whether the issue can be resolved.

   Note: The IPMI raw command should only be used by trained technician and each system has its own specific IPMI raw command.
6. Check the management processor event log for rising temperature events. If there are no events, the server is running within normal operating temperatures. Note that you can expect some variation in temperature.

Cannot enter legacy mode after installing a new adapter

Complete the following procedure to solve the problem.

1. Go to **UEFI Setup → Devices and I/O Ports → Set Option ROM Execution Order**.
2. Move the RAID adapter with operation system installed to the top of the list.
3. Select **Save**.
4. Reboot the system and auto boot to operation system.

Cracked parts or cracked chassis

Contact Lenovo Support.

Optional-device problems

Use this information to solve problems related to optional devices.

External USB device is not recognized

Complete the following steps until the problem is resolved:

1. Update the UEFI firmware to the latest version.
2. Make sure that the proper drivers are installed on the compute node. See the product documentation for the USB device for information about device drivers.
3. Use the Setup Utility to make sure that the device is configured correctly.
4. If the USB device is plugged into a hub or the console breakout cable, unplug the device and plug it directly into the USB port on the front of the server.

PCIe adapter is not recognized or is not functioning

Complete the following steps until the problem is resolved:

1. Update the UEFI firmware to the latest version.
2. Check the event log and resolve any issues related to the device.
3. Validate that the device is supported for the server (see https://serverproven.lenovo.com). Make sure that the firmware level on the device is at the latest supported level and update the firmware if applicable.
4. Make sure that the adapter is installed in a correct slot.
5. Make sure that the proper device drivers are installed for the device.
6. Resolve any resource conflicts if running legacy mode (UEFI). Check legacy ROM boot orders and modify the UEFI setting for MM config base.

   Note: Ensure that you modify the ROM boot order associated with the PCIe adapter to the first execution order.
7. Check http://datacentersupport.lenovo.com for any tech tips (also known as retain tips or service bulletins) that might be related to the adapter.
8. Ensure any adapter external connections are correct and that the connectors are not physically damaged.
9. Make sure that the PCIe adapter is installed with the supported operating system.

Insufficient PCIe resources are detected.

If you see an error message stating “Insufficient PCI Resources Detected,” complete the following steps until the problem is resolved:

1. Press Enter to access System Setup Utility.
2. Select **System Settings → Devices and I/O Ports → MM Config Base**; then, modify the setting to increase the device resources. For example, modify 3 GB to 2 GB or modify 2 GB to 1 GB.
3. Save the settings and restart the system.
4. If the error recurs with the highest device resource setting (1GB), shutdown the system and remove some PCIe devices; then, power on the system.
5. If the reboot failed, repeat step 1 to step 4.
6. If the error recurs, press Enter to access System Setup Utility.
7. Select **System Settings → Devices and I/O Ports → PCI 64–Bit Resource Allocation**, then; modify the setting from **Auto** to **Enable**.
8. If the Boot Device does not support MMIO above 4GB for Legacy Boot, use UEFI Boot Mode or remove/disable some PCIe devices.
9. DC cycle the system and ensure the system is enter UEFI boot menu or the operating system; then, capture the FFDC log.
10. Contact Lenovo technical support.

A Lenovo optional device that was just installed does not work.

1. Make sure that:
   - The device is supported for the server (see https://serverproven.lenovo.com).
   - You followed the installation instructions that came with the device and the device is installed correctly.
   - You have not loosened any other installed devices or cables.
   - You updated the configuration information in system setup. When you start a server and press the key according to the on-screen instructions to display the Setup Utility. (For more information, see the “Startup” section in the LXPM documentation compatible with your server at https://pubs.lenovo.com/

lxpm-overview/.) Whenever memory or any other device is changed, you must update the configuration.

2. Reseat the device that you have just installed.
3. Replace the device that you have just installed.
4. Reseat the cable connection and check there is no physical damage to the cable.
5. If there is any cable damage, then replace the cable.

A Lenovo optional device that worked previously does not work now

1. Make sure that all of the cable connections for the device are secure.
2. If the device comes with test instructions, use those instructions to test the device.
3. Reseat the cable connection and check if any physical parts have been damaged.
4. Replace the cable.
5. Reseat the failing device.
6. Replace the failing device.

Performance problems

Use this information to solve performance problems.

- "Network performance" on page 678
- "Operating system performance" on page 678

Network performance

Complete the following steps until the problem is solved:

1. Isolate which network is operating slowly (such as storage, data, and management). You might find it helpful to use ping tools or operating-system tools such as task manager or resource manager.
2. Check for traffic congestion on the network.
3. Update the NIC device driver, or the storage device controller device driver.
4. Use the traffic-diagnostic tools that are provided by the IO-module manufacturer.

Operating system performance

Complete the following steps until the problem is solved:

1. If you have recently made changes to the server (for example updated device drivers or installed software applications) remove the changes.
2. Check for any networking issues.
3. Check the operating system logs for performance related errors.
4. Check for events related to high temperatures and power issues as the server might be throttled to help with cooling. If it is throttled, reduce the workload on the server to help improve performance.
5. Check for events related to disabled DIMMs. If you do not have enough memory for the application workload, your operating system will have poor performance.
6. Ensure that the workload is not too high for the configuration.

Power on and power off problems

Use this information to resolve issues when powering on or powering off the server.

- "The power button does not work (server does not start)" on page 679

- “Server does not power on” on page 679
- “Server does not power off” on page 680

The power button does not work (server does not start)

Note: The power button will not function until approximately 1 to 3 minutes after the server has been connected to ac power to allow time for BMC to initialize.

Complete the following steps until the problem is resolved:

1. Make sure that the power button on the server is working correctly:
   a. Disconnect the server power cords.
   b. Reconnect the server power cords.
   c. Reseat the front operator panel cable, and then repeat steps 1a and 1b.
      - If the server starts, reseat the front operator panel.
      - If the problem remains, replace the front operator panel.
2. Make sure that:
   - The power cords are correctly connected to the server and to a working electrical outlet.
   - The LEDs on the power supply do not indicate a problem.
   - The Power button LED lights up and flash slowly.
   - The push force is enough and with button force response.
3. If the power button LED is not lighting up or is not flashing correctly, reseat all the power supplies and make sure the AC LEDs on the PSU rear side light up.
4. If you have just installed an optional device, remove it, and restart the server.
5. If the issue is still observed or without power button LED lighting up, implement the minimum configuration to check whether any specific components lock the power permission. Replace each power supply and check the power button function after installing each one.
6. If everything is still done and the issue cannot be resolved, collect the failure information with system logs captured to Lenovo support.

Server does not power on

Complete the following steps until the problem is resolved:

1. Check the event log for any events related to the server not powering on.
2. Check for any LEDs that are flashing amber.
3. Check the LEDs on the system board assembly. See “System-board-assembly LEDs” on page 658.
4. Check if AC power LED lights up or the amber LED lights up at the PSU rear side.
5. AC cycle the system.
6. Remove the CMOS battery for at least ten seconds, then, reinstall the CMOS battery.
7. Try to power on the system by IPMI command through XCC or by the power button.
8. Implement the minimum configuration (one processor, one DIMM and one PSU without any adapter and any drive installed).
9. Reseat all power supplies and make sure that the AC LEDs on the PSU rear side light up.
10. Replace each power supply and check the power button function after installing each one.
11. If the issue cannot be resolved by above actions, call service to review the issue symptom and see whether the system I/O board or processor board replacement is necessary.

Server does not power off

Complete the following steps until the problem is resolved:

1. Determine whether you are using an Advanced Configuration and Power Interface (ACPI) or a non-ACPI operating system. If you are using a non-ACPI operating system, complete the following steps:
   a. Press Ctrl+Alt+Delete.
   b. Turn off the server by pressing the power-control button and holding it down for 5 seconds.
   c. Restart the server.
   d. If the server fails POST and the power-control button does not work, disconnect the power cord for 20 seconds; then, reconnect the power cord and restart the server.
2. If the problem remains or if you are using an ACPI-aware operating system, suspect the system board (system board assembly).

Power problems

Use this information to resolve issues related to power.

System error LED is on and event log "Power supply has lost input" is displayed

To resolve the problem, ensure that:

1. The power supply is properly connected to a power cord.
2. The power cord is connected to a properly grounded electrical outlet for the server.
3. Make sure that the power supply AC source is stable within the supported range.
4. Swap the power supply to see if the issue follows the power supply, if it follows the power supply, then replace the failing one.
5. Review the event log and see how the problem it is, and follow the event log actions to resolve the problems.

Serial-device problems

Use this information to solve problems with serial ports or devices.

- “Number of displayed serial ports is less than the number of installed serial ports” on page 680
- “Serial device does not work” on page 680

Number of displayed serial ports is less than the number of installed serial ports

Complete the following steps until the problem is solved.

1. Make sure that:
   - Each port is assigned a unique address in the Setup Utility and none of the serial ports is disabled.
   - The serial-port adapter (if one is present) is seated correctly.
2. Reseat the serial port adapter.
3. Replace the serial port adapter.

Serial device does not work

1. Make sure that:
   - The device is compatible with the server.
   - The serial port is enabled and is assigned a unique address.

- The device is connected to the correct connector (see “System board assembly connector” in the *User Guide*.).

2. Reseat the following components:
   a. Failing serial device.
   b. Serial cable.
3. Replace the following components:
   a. Failing serial device.
   b. Serial cable.
4. If the problem remains, contact Lenovo Support.

Software problems

Use this information to solve software problems.

1. To determine whether the problem is caused by the software, make sure that:
   - The server has the minimum memory that is needed to use the software. For memory requirements, see the information that comes with the software.

     Note: If you have just installed an adapter or memory, the server might have a memory-address conflict.
   - The software is designed to operate on the server.
   - Other software works on the server.
   - The software works on another server.
2. If you receive any error messages while you use the software, see the information that comes with the software for a description of the messages and suggested solutions to the problem.
3. Contact your place of purchase of the software.

Storage drive problems

Use this information to resolve issues related to the storage drives.

- “Server cannot recognize a drive” on page 681
- “Multiple drives fail” on page 682
- “Multiple drives are offline” on page 682
- “A replacement drive does not rebuild” on page 683
- “Green drive activity LED does not represent actual state of associated drive” on page 683
- “Yellow drive status LED does not represent actual state of associated drive” on page 683
- “U.3 NVMe drive can be detected in NVMe connection, but cannot be detected in Tri-mode” on page 683

Server cannot recognize a drive

Complete the following steps until the problem is solved.

1. Observe the associated yellow drive status LED. If the LED is lit, it indicates a drive fault.
2. If the status LED is lit, remove the drive from the bay, wait 45 seconds, and reinsert the drive, making sure that the drive assembly connects to the drive backplane.
3. Observe the associated green drive activity LED and the yellow status LED and perform corresponding operations in different situations:
   - If the green activity LED is flashing and the yellow status LED is not lit, the drive is recognized by the controller and is working correctly. Run the diagnostics tests for the drives. When you start a server

and press the key according to the on-screen instructions, the LXPM interface is displayed by default. (For more information, see the “Startup” section in the LXPM documentation compatible with your server at https://pubs.lenovo.com/lxpm-overview/.) You can perform drive diagnostics from this interface. From the Diagnostic page, click **Run Diagnostic → HDD test**.

- If the green activity LED is flashing and the yellow status LED is flashing slowly, the drive is recognized by the controller and is rebuilding.
- If neither LED is lit or flashing, check whether the drive backplane is correctly seated. For details, go to step 4.
- If the green activity LED is flashing and the yellow status LED is lit, replace the drive.

4. Make sure that the drive backplane is correctly seated. When it is correctly seated, the drive assemblies correctly connect to the backplane without bowing or causing movement of the backplane.
5. Reseat the backplane power cable and repeat steps 1 through 3.
6. Reseat the backplane signal cable and repeat steps 1 through 3.
7. Suspect the backplane signal cable or the backplane:
   - Replace the affected backplane signal cable.
   - Replace the affected backplane.
8. Run the diagnostics tests for the drives. When you start a server and press the key according to the on-screen instructions, the LXPM interface is displayed by default. (For more information, see the “Startup” section in the LXPM documentation compatible with your server at https://pubs.lenovo.com/lxpm-overview/.) You can perform drive diagnostics from this interface. From the Diagnostic page, click **Run Diagnostic → Disk Drive Test**.

   Based on those tests:

   - If the backplane passes the test but the drives are not recognized, replace the backplane signal cable and run the tests again.
   - Replace the backplane.
   - If the adapter fails the test, disconnect the backplane signal cable from the adapter and run the tests again.
   - If the adapter fails the test, replace the adapter.

Multiple drives fail

Complete the following steps until the problem is solved:

- View the Lenovo XClarity Controller event log for events related to power supplies or vibration issues and resolve those events.
- Make sure that the device drivers and firmware for the drive and server are at the latest level.

Important: Some cluster solutions require specific code levels or coordinated code updates. If the device is part of a cluster solution, verify that the latest level of code is supported for the cluster solution before you update the code.

Multiple drives are offline

Complete the following steps until the problem is solved:

- View the Lenovo XClarity Controller event log for events related to power supplies or vibration issues and resolve those events.
- View the storage subsystem log for events related to the storage subsystem and resolve those events.

A replacement drive does not rebuild

Complete the following steps until the problem is solved:

1. Make sure that the drive is recognized by the adapter (the green drive activity LED is flashing).
2. Review the SAS/SATA RAID adapter documentation to determine the correct configuration parameters and settings.

Green drive activity LED does not represent actual state of associated drive

Complete the following steps until the problem is solved:

1. If the green drive activity LED does not flash when the drive is in use, run the diagnostics tests for the drives. When you start a server and press the key according to the on-screen instructions, the LXPM interface is displayed by default. (For more information, see the “Startup” section in the LXPM documentation compatible with your server at https://pubs.lenovo.com/lxpm-overview/.) You can perform drive diagnostics from this interface. From the Diagnostic page, click **Run Diagnostic → HDD test**
2. If the drive passes the test, replace the backplane.
3. If the drive fails the test, replace the drive.

Yellow drive status LED does not represent actual state of associated drive

Complete the following steps until the problem is solved:

1. Turn off the server.
2. Reseat the SAS/SATA adapter.
3. Reseat the backplane signal cable and backplane power cable.
4. Reseat the drive.
5. Power on the server and observe the activity of the drive LEDs.

U.3 NVMe drive can be detected in NVMe connection, but cannot be detected in Tri-mode

In Tri-mode, NVMe drives are connected via a PCIe x1 link to the controller. To support Tri-mode with U.3 NVMe drives, **U.3 x1 mode** must be enabled for the selected drive slots on the backplane through the XCC Web GUI. By default, the backplane setting is **U.2 x4 mode**.

Complete the following steps to enable **U.3 x1 mode**:

1. Log into the XCC Web GUI, and choose **Storage → Detail** from the navigation tree on the left.
2. In the window that is displayed, click the icon ⚙ next to **Backplane**.
3. In the dialog box that is displayed, select the target drive slots and click **Apply**.
4. Do a DC power cycle to make the setting take effect.

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

You can find the product documentation for your ThinkSystem products at the following location:

https://pubs.lenovo.com/

You can take these steps to try to solve the problem yourself:

- Check all cables to make sure that they are connected.
- Check the power switches to make sure that the system and any optional devices are turned on.
- Check for updated software, firmware, and operating-system device drivers for your Lenovo product. (See the following links) The Lenovo Warranty terms and conditions state that you, the owner of the Lenovo product, are responsible for maintaining and updating all software and firmware for the product (unless it is covered by an additional maintenance contract). Your service technician will request that you upgrade your software and firmware if the problem has a documented solution within a software upgrade.
  - Drivers and software downloads
    - https://datacentersupport.lenovo.com/products/servers/thinksystem/sr650v3/downloads/driver-list/
  - Operating system support center
    - https://datacentersupport.lenovo.com/solutions/server-os
  - Operating system installing instructions
    - https://pubs.lenovo.com/thinksystem#os-installation
- If you have installed new hardware or software in your environment, check https://serverproven.lenovo.com to make sure that the hardware and software are supported by your product.
- Refer to Chapter 3 “Problem determination” on page 629 for instructions on isolating and solving issues.
- Go to http://datacentersupport.lenovo.com and check for information to help you solve the problem.

To find the Tech Tips available for your server:

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

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

- Check Lenovo Data Center Forum at https://forums.lenovo.com/t5/Datacenter-Systems/ct-p/sv_eg to see if someone else has encountered a similar problem.

Gathering information needed to call Support

If you require warranty service for your Lenovo product, the service technicians will be able to assist you more efficiently if you prepare the appropriate information before you call. You can also go to http://datacentersupport.lenovo.com/warrantylookup for more information about your product warranty.

Gather the following information to provide to the service technician. This data will help the service technician quickly provide a solution to your problem and ensure that you receive the level of service for which you might have contracted.

- Hardware and Software Maintenance agreement contract numbers, if applicable
- Machine type number (Lenovo 4-digit machine identifier). Machine type number can be found on the ID label, see "Identifying the server and access the Lenovo XClarity Controller" in *User Guide* or *System Configuration Guide*.
- 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 "Backing up the BMC configuration" section in the XCC documentation compatible with your server at https://pubs.lenovo.com/lxcc-overview/.

  - For more information about using the CLI to collect service data, see the "XCC `ffdc` command" section in the XCC documentation compatible with your server at https://pubs.lenovo.com/lxcc-overview/.

- **Lenovo XClarity Administrator**

  Lenovo XClarity Administrator can be set up to collect and send diagnostic files automatically to Lenovo Support when certain serviceable events occur in Lenovo XClarity Administrator and the managed endpoints. You can choose to send diagnostic files to Lenovo Support using Call Home or to another service provider using SFTP. You can also manually collect diagnostic files, open a problem record, and send diagnostic files to the Lenovo Support.

  You can find more information about setting up automatic problem notification within the Lenovo XClarity Administrator at https://pubs.lenovo.com/lxca/admin_setupcallhome.

- **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/supportphonelist for your region support details.

Appendix B. Documents and supports

This section provides handy documents, driver and firmware downloads, and support resources.

Documents download

This section provides introduction and download link for handy documents.

Documents

Download the following product documentations at:

https://pubs.lenovo.com/sr650-v3/pdf_files

- ***Rail Installation Guides***
  - Rail installation in a rack
- ***User Guide***
  - Complete overview, system configuration, hardware components replacing, and troubleshooting.

    Selected chapters from *User Guide*:
    - ***System Configuration Guide* :** Server overview, components identification, system LEDs and diagnostics display, product unboxing, setting up and configuring the server.
    - ***Hardware Maintenance Guide* :** Installing hardware components, cable routing, and troubleshooting.
- ***Messages and Codes Reference***
  - XClarity Controller, LXPM, and UEFI events
- ***UEFI Manual***
  - UEFI setting introduction

Note: SR650 V3 configured with Direct Water Cooling Module (DWCM) can be installed in the ThinkSystem Heavy Duty Full Depth Rack Cabinets. For ThinkSystem Heavy Duty Full Depth Rack Cabinets User Guide, see ThinkSystem Heavy Duty Full Depth Rack Cabinets User Guide.

Support websites

This section provides driver and firmware downloads and support resources.

Support and downloads

- Drivers and Software download website for ThinkSystem SR650 V3
  - https://datacentersupport.lenovo.com/products/servers/thinksystem/sr650v3/downloads/driver-list/
- Lenovo Data Center Forum
  - https://forums.lenovo.com/t5/Datacenter-Systems/ct-p/sv_eg
- Lenovo Data Center Support for ThinkSystem SR650 V3
  - https://datacentersupport.lenovo.com/products/servers/thinksystem/sr650v3
- Lenovo License Information Documents
  - https://datacentersupport.lenovo.com/documents/lnvo-eula

- Lenovo Press website (Product Guides/Datasheets/White papers)
  - http://lenovopress.com/
- Lenovo Privacy Statement
  - https://www.lenovo.com/privacy
- Lenovo Product Security Advisories
  - https://datacentersupport.lenovo.com/product_security/home
- Lenovo Product Warranty Plans
  - http://datacentersupport.lenovo.com/warrantylookup
- Lenovo Server Operating Systems Support Center website
  - https://datacentersupport.lenovo.com/solutions/server-os
- Lenovo ServerProven website (Options compatibility lookup)
  - https://serverproven.lenovo.com
- Operating System Installation Instructions
  - https://pubs.lenovo.com/thinksystem#os-installation
- Submit an eTicket (service request)
  - https://support.lenovo.com/servicerequest
- Subscribe to Lenovo Data Center Group product notifications (Stay up to date on firmware updates)
  - https://datacentersupport.lenovo.com/solutions/ht509500

Appendix C. Notices

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Morrisville, NC 27560
U.S.A.
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Any performance data contained herein was determined in a controlled environment. Therefore, the result obtained in other operating environments may vary significantly. Some measurements may have been made on development-level systems and there is no guarantee that these measurements will be the same on generally available systems. Furthermore, some measurements may have been estimated through extrapolation. Actual results may vary. Users of this document should verify the applicable data for their specific environment.

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Important notes

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

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

When referring to processor storage, real and virtual storage, or channel volume, KB stands for 1 024 bytes, MB stands for 1 048 576 bytes, and GB stands for 1 073 741 824 bytes.

When referring to hard disk drive capacity or communications volume, MB stands for 1 000 000 bytes, and GB stands for 1 000 000 000 bytes. Total user-accessible capacity can vary depending on operating environments.

Maximum internal hard disk drive capacities assume the replacement of any standard hard disk drives and population of all hard-disk-drive bays with the largest currently supported drives that are available from Lenovo.

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

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

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

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

Electronic emission notices

When you attach a monitor to the equipment, you must use the designated monitor cable and any interference suppression devices that are supplied with the monitor.

Additional electronic emissions notices are available at:

https://pubs.lenovo.com/important_notices/

Taiwan Region BSMI RoHS declaration

單元 Unit	限用物質及其化學符號 Restricted substances and its chemical symbols					
	鉛Lead (PB)	汞Mercury (Hg)	鎘Cadmium (Cd)	六價鉻 Hexavalent chromium (Cr^{+6})	多溴聯苯 Polybrominated biphenyls (PBB)	多溴二苯醚 Polybrominated diphenyl ethers (PBDE)
機架	○	○	○	○	○	○
外部蓋板	○	○	○	○	○	○
機械組合件	–	○	○	○	○	○
空氣傳動設備	–	○	○	○	○	○
冷卻組合件	–	○	○	○	○	○
內存模組	–	○	○	○	○	○
處理器模組	–	○	○	○	○	○
電纜組合件	–	○	○	○	○	○
電源供應器	–	○	○	○	○	○
儲備設備	–	○	○	○	○	○
印刷電路板	–	○	○	○	○	○

備考1. 〝超出0.1 wt %〞及〝超出0.01 wt %〞係指限用物質之百分比含量超出百分比含量基準值。

Note1 : "exceeding 0.1wt%" and "exceeding 0.01 wt%" indicate that the percentage content of the restricted substance exceeds the reference percentage value of presence condition.

備考2. 〝○〞係指該項限用物質之百分比含量未超出百分比含量基準值。

Note2 : "○"indicates that the percentage content of the restricted substance does not exceed the percentage of reference value of presence.

備考3. 〝-〞係指該項限用物質為排除項目。

Note3 : The "-" indicates that the restricted substance corresponds to the exemption.

Taiwan Region import and export contact information

Contacts are available for Taiwan Region import and export information.

委製商/進口商名稱: 台灣聯想環球科技股份有限公司
進口商地址: 台北市南港區三重路 66 號 8 樓
進口商電話: 0800-000-702