Lenovo

ThinkSystem SR630 V3
Hardware Maintenance Guide

Machine Types: 7D72, 7D73, 7D74

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

Third Edition (August 2023)

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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.

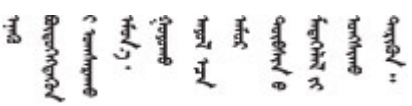
A termék telepítése előtt olvassa el a Biztonsági előírásokat!

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.

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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་སྤྱོད་མ་བྱས་གོང་། ·སྐྱོ་ཤེ·ཡིད་གཟབ·
བྱ་འདྲ་མེན་ཡོད་པའི་འོད་སྣེར་བལྟ་དགོས།

Bu ürünü kurmadan önce güvenlik bilgilerini okuyun.

.مەزكۇر مەھسۇلاتنى ئورنىتىشتىن بۇرۇن بىخەتەرلىك ئۇچۇرلىرىنى ئوقۇپ چىقىڭ

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Safety inspection checklist

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

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

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

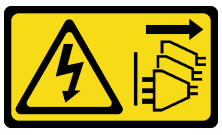
CAUTION:
This equipment must be installed or serviced by trained personnel, as defined by the NEC, IEC 62368-1 & IEC 60950-1, the standard for Safety of Electronic Equipment within the Field of Audio/Video, Information Technology and Communication Technology. Lenovo assumes that you are qualified in 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.

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Chapter 1. Hardware replacement procedures

This section provides installation and removal procedures for all serviceable system components.

Installation Guidelines

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

Before installing optional devices, read the following notices carefully:

Attention: 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 to prevent exposure to static electricity which might lead to system halt and loss of data.

- 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 enter the model name or machine type of your server in the search bar to navigate to the support page.
  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/sr630v3/7d72/downloads/driver-list/ and 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 that 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 normally before you install an optional component.
- Keep the working area clean, and place removed components on a flat and sturdy 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.

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  - Use a slow lifting force. Never move suddenly or twist when you lift a heavy object.
  - To avoid straining the muscles in your back, lift by standing or by pushing up with your leg muscles.
- Back up all important data before you make changes related to the disk drives.
- Have a small flat-blade screwdriver, a small Phillips screwdriver, and a Torx T8 and a T30 screwdriver available.
- To view the error LEDs on the system board (system board assembly) and internal components, leave the power on.
- You do not have to turn off the server to remove or install hot-swap power supply units, 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.
- Terra-cotta on a component or a terra-cotta label on or near a component indicates that the component can be hot-swapped if the server and operating system support hot-swap capability, which means that you can remove or install the component while the server is still running. (Terra-cotta can also indicate touch points on hot-swap components.) See the instructions for removing or installing a specific hot-swap component for any additional procedures that you might have to perform before you remove or install the component.
- The Red strip on the drives, adjacent to the release latch, indicates that the drive can be hot-swapped if the server and operating system support hot-swap capability. This means that you can remove or install the drive while the server is still running.

  Note: See the system specific instructions for removing or installing a hot-swap drive for any additional procedures that you might need to perform before you remove or install the drive.
- After finishing working on the server, make sure that 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**.

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

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

System reliability guidelines

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

Make sure the following requirements are met:

- When the server comes with redundant power, a power supply unit 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 unit 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: 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 to prevent exposure to static electricity which might lead to system halt and loss of data.

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

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

Memory module installation rules and order

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

Supported memory types

For information on the types of memory module supported by this server, see “Memory” section in “Technical specifications” on page 439.

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.lenovo.com/servers/options/memory

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

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

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

Memory modules and processors layout

The following illustration helps you to locate the memory module slots on the processor board. The memory-channel identification table below shows the relationship between the processors, memory controllers, memory channels, and memory module slot numbers.

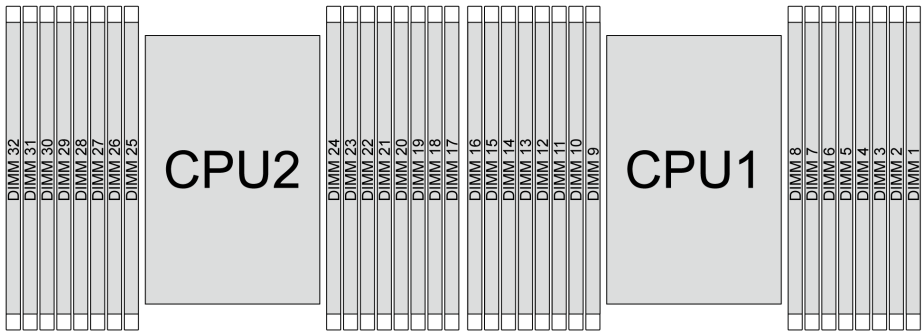


Figure 1. Memory module slots on the processor board

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 (further from the processor) and slot 1 (closer to the processor).
- DIMM No.: DIMM slot number on the processor board. Each processor has 16 DIMM slots.

Memory module installation guideline

- For the installation rules and population sequence, see “DDR5 DIMMs installation order” on page 8.
- 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.

DDR5 DIMMs installation order

This section contains information of how to install DDR5 DIMMs properly.

RDIMMs and 3DS RDIMMs installation order

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

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.

Independent mode installation rules

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

- There should be at least one DDR5 DIMM per processor.
- All DDR5 memory modules must operate at the same speed in the same system.
- Memory population must be identical between processors.
- Memory modules from different vendors are supported.
- In each memory channel, populate the slot farthest from the processor (slot 0) first.
- All DIMMs must be all DDR5 DIMMs.
- 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 mode with mixing rank” on page 10 for more information on the installation sequence when installing memory modules with different ranks.

The following table shows the sequence of populating memory modules for independent mode when only one processor (processor 1) is installed.

Table 2. Independent mode with one processor

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

Table 2. Independent mode with one processor (continued)

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

Notes:

1. DIMM configurations that support Sub NUMA Clustering (SNC), which can be enabled via UEFI. SNC is not supported if DIMM population does not follow the sequence indicated by the table above.
2. DIMM configurations that support Software Guard Extensions (SGX). See “Enable Software Guard Extensions (SGX)” in *User Guide* or *System Configuration Guide* to enable this feature.
3. 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 mode with mixing rank” on page 10 for more information on the installation sequence when installing memory modules with different ranks.

The following table shows the sequence of populating memory modules for independent mode when two processors (processor 1 and processor 2) are installed.

Table 3. Independent mode with two processors

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

Notes:

1. DIMM configurations that support Sub NUMA Clustering (SNC), which can be enabled via UEFI. SNC is not supported if DIMM population does not follow the sequence indicated by the table above.
2. DIMM configurations that support Software Guard Extensions (SGX). See “Enable Software Guard Extensions (SGX)” in *User Guide* or *System Configuration Guide* to enable this feature.
3. 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 mode with mixing rank” on page 10 for more information on the installation sequence when installing memory modules with different ranks.

Independent mode with mixing rank

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

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 4. 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 (processor 1 and processor 2) 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 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 to follow the memory population for memory mirroring.

The following table shows the memory module population sequence for mirroring mode when only one processor (processor 1) is installed.

Table 6. Mirroring mode with one processor (processor 1)

Configuration	DIMM slots															
	16	**15**	**14**	**13**	**12**	**11**	**10**	**9**	**8**	**7**	**6**	**5**	**4**	**3**	**2**	**1**
8 DIMMs	16		14		12		10			7		5		3		1
16 DIMMs	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1

Note: DIMM configurations listed in the table 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.

The following table shows the memory module population sequence for mirroring mode when two processors (processor 1 and processor 2) are installed.

Table 7. Mirroring mode with two processors (processor 1 and processor 2)

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

Note: DIMM configurations listed in the table 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.

Technical rules

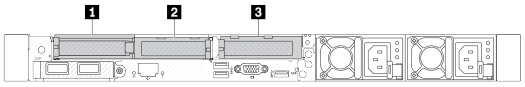
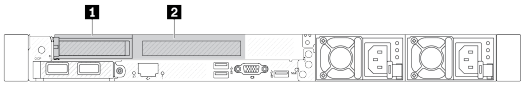
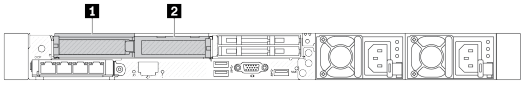
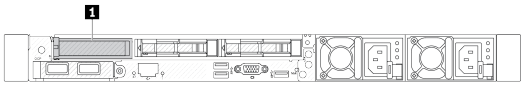
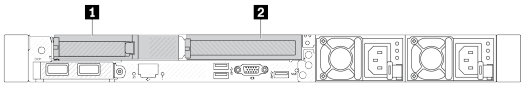
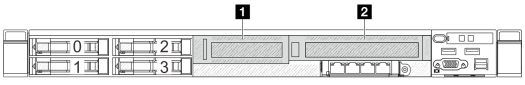
Refer to the below technical rules and limitations when you install the related server components.

PCIe slots and adapters

Understanding the technical rules for PCIe adapters helps you correctly install and configure PCIe adapters in the system.

PCIe adapters supported for different models

Table 8. PCIe adapters supported and locations

Server rear and front view	Supported types and slot location
	**Riser 1 assembly** • 1 Slot 1: PCIe x16 (x16, x8, x4, x1), low-profile • 2 Slot 2: PCIe x16 (x16, x8, x4, x1), low-profile **Riser 2 assembly** • 3 Slot 3: PCIe x16 (x16, x8, x4, x1), low-profile
	**Riser 1 assembly** • 1 Slot 1: PCIe x16 (x16, x8, x4, x1), low-profile • 2 Slot 2: PCIe x16 (x16, x8, x4, x1), full-height **Note:** One rear wall bracket must be installed next to the two PCIe slots.
	**Riser 1 assembly** • 1 Slot 1: PCIe x16 (x16, x8, x4, x1), low-profile • 2 Slot 2: PCIe x16 (x16, x8, x4, x1), low-profile
	**Riser 1 assembly** • 1 Slot 1: PCIe x16 (x16, x8, x4, x1), low-profile
	**Riser 1 assembly** • 1 Slot 1: PCIe x16 (x16, x8, x4, x1), low-profile **Riser 2 assembly** • 2 Slot 3: PCIe x16 (x16, x8, x4, x1), full-height
	**Riser 3 assembly** • 1 Slot 4: PCIe x16, low-profile, 25W[1] 1. Slot 4: PCIe x16 (x8, x4, x1)[2] 2. Slot 4: PCIe x16 (x16, x8, x4, x1)[2] **Riser 4 assembly** • 2 Slot 5: PCIe x16 (x16, x8, x4, x1), full-height

Notes:

1. The thermal design power of PCIe adapters this slot supports is limited to 25W or lower.
2. Slot 4 has different bandwidth caps. Use the table below for guidance.

Table 9. Bandwidth difference on slot 4

Bandwidth supported	Configuration	Backplane
x8, x4, x1	**4 x 2.5'' AnyBay front drives**	**4 x 2.5'' Gen 5 AnyBay backplane**
x16, x8, x4, x1	**4 x 2.5'' AnyBay front drives (Tri-mode)** **4 x 2.5'' NVMe front drives**	

To locate the PCIe slots, see “Rear view” in *User Guide* or *System Configuration Guide*.

PCIe adapter installation rules and order

When installing different types of PCIe adapters, refer to the following suggested installation priority:

Table 10. Recommended installation priority for different types of PCIe adapters

Installation priority	
1. OCP module	7. InfiniBand adapter
2. Custom form factor (CFF) internal HBA/RAID adapter	8. Fiber channel adapter
3. Standard form factor (SFF) RAID adapter	9. Network adapter
4. SFF internal HBA adapter	10. NVMe PCIe flash adapter
5. Re-timer adapter	11. External storage controller
6. GPU adapter	12. COM port bracket

When installing a specific PCIe adapter, refer to the following suggested slot installation priority:

Table 11. Recommended slot installation priority for PCIe adapters

Recommended slot installation priority	PCIe adapters
Slot 1	• SFF HBA/RAID adapter • ThinkSystem x16 Gen 4.0 Re-timer adapter (for 4 x NVMe) • ThinkSystem x16 Gen 5.0 Re-timer adapter **Note:** The RAID/HBA 4350/5350/9350-8i adapters are supported only in the server configuration with 4 x 3.5-inch SAS/SATA front bays or 8 x 2.5-inch SAS/SATA front drive bays.
Slot 2 (configured as a full-height slot)	• ThinkSystem Broadcom 57504 10/25GbE SFP28 4-Port PCIe Ethernet Adapter • ThinkSystem Intel E810-DA4 10/25GbE SFP28 4-Port PCIe Ethernet Adapter **Note:** Both Broadcom 57504 PCIe Ethernet adapter and Intel E810-DA4 PCIe Ethernet adapter can be installed to slot 2 or slot 3.
Slot 1 > Slot 3 > Slot 2	• ThinkSystem Mellanox ConnectX-6 HDR100 IB/100GbE VPI 1-port x16 PCIe 3.0 HCA • ThinkSystem Mellanox ConnectX-6 HDR100 IB/100GbE VPI 2-port x16 PCIe 3.0 HCA • ThinkSystem Mellanox ConnectX-6 Dx 100GbE QSFP56 2-port PCIe Ethernet Adapter • ThinkSystem NVIDIA ConnectX-7 NDR400 OSFP 1-port PCIe Gen5 Adapter • ThinkSystem NVIDIA ConnectX-7 NDR200/HDR QSFP112 2-port PCIe Gen5 x16 InfiniBand Adapter • ThinkSystem NVIDIA A2 16GB PCIe Gen4 Passive GPU • ThinkSystem NVIDIA A2 16GB PCIe Gen4 Passive GPU w/o CEC
Slot 2 > Slot 3	A COM port upgrade kit needs to be installed in slot 2 or 3 as a normal PCIe adapter. In this case, a riser and a bracket are needed.

Table 11. Recommended slot installation priority for PCIe adapters (continued)

Recommended slot installation priority	PCIe adapters
Slot 1 > Slot 2 > Slot 3	Other PCIe adapters not mentioned above. **Notes:** • For Mellanox ConnectX-6 HDR IB/200GbE Single Port x16 PCIe Adapter, refer to the following slot priority depending on the quantity of adapters to be installed: – Two adapters: slot 1, slot 3 or slot 2, slot 3 – Three adapters: slot 1, slot 2, slot 3 • The RAID/HBA 4350/5350/9350-8i/16i adapters and the Intel E810-DA2 OCP adapter or the Intel E810-DA2 PCIe adapter cannot be installed in the same system.
Slot 5 > Slot 4 > Slot 1 > Slot 2 > Slot 3 Maximum quantity supported: 5	• ThinkSystem 440-16e SAS/SATA 12Gb HBA • ThinkSystem 440-8e SAS/SATA PCIe Gen4 12Gb HBA • ThinkSystem RAID 940-8e 4GB Flash PCIe Gen4 12Gb Adapter • ThinkSystem QLogic 16Gb Enhanced Gen5 FC Single-port HBA • ThinkSystem Emulex 16Gb Gen6 FC Single-port HBA • ThinkSystem QLogic 16Gb Enhanced Gen5 FC Dual-port HBA • ThinkSystem Emulex 16Gb Gen6 FC Dual-port HBA • ThinkSystem Emulex LPe35000 32Gb 1-port PCIe Fibre Channel Adapter • ThinkSystem Emulex LPe35002 32Gb 2-port PCIe Fibre Channel Adapter • ThinkSystem QLogic QLE2770 32Gb 1-Port PCIe Fibre Channel Adapter • ThinkSystem QLogic QLE2772 32Gb 2-Port PCIe Fibre Channel Adapter • ThinkSystem Emulex LPe36002 64Gb 2-port PCIe Fibre Channel Adapter • ThinkSystem Broadcom NetXtreme PCIe 1Gb 4-Port RJ45 Ethernet Adapter • ThinkSystem Intel I350-T4 PCIe 1Gb 4-Port RJ45 Ethernet Adapter • ThinkSystem Intel X710-T4L 10GBase-T 4-Port PCIe Ethernet Adapter • ThinkSystem Broadcom 57414 10/25GbE SFP28 2-port PCIe Ethernet Adapter • ThinkSystem Intel X710-T2L 10GBase-T 2-Port PCIe Ethernet Adapter • ThinkSystem Broadcom 57454 10GBASE-T 4-port PCIe Ethernet Adapter • ThinkSystem Intel E810-DA2 10/25GbE SFP28 2-Port PCIe Ethernet Adapter • ThinkSystem Broadcom 57416 10GBASE-T 2-Port PCIe Ethernet Adapter

Table 11. Recommended slot installation priority for PCIe adapters (continued)

Recommended slot installation priority	PCIe adapters
Slot 5 > Slot 1 > Slot 2 > Slot 3 Maximum quantity supported: 4	• ThinkSystem Mellanox ConnectX-6 Dx 100GbE QSFP56 2-port PCIe Ethernet Adapter • ThinkSystem Broadcom 57508 100GbE QSFP56 2-port PCIe 4 Ethernet Adapter • ThinkSystem Nvidia ConnectX-7 NDR200/HDR QSFP112 2-port PCIe Gen5 x16 InfiniBand Adapter • ThinkSystem NVIDIA ConnectX-7 NDR400 OSFP 1-port PCIe Gen5 Adapter • ThinkSystem 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 w/ Tall Bracket • ThinkSystem Mellanox ConnectX-6 HDR100 IB/100GbE VPI 1-port x16 PCIe 3.0 HCA w/ Tall Bracket
Slot 5 > Slot 2 or **Slot 5 > Slot 3** Maximum quantity supported: 2	• ThinkSystem Intel E810-DA4 10/25GbE SFP28 4-Port PCIe Ethernet Adapter • ThinkSystem Broadcom 57504 10/25GbE SFP28 4-Port PCIe Ethernet Adapter

Note: 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.

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 471.

The virtual RAID on CPU (VROC) key and Tri-mode are not supported at the same time.

For ThinkSystem NVIDIA ConnectX-6 DX 200GbE QSFP56 1-Port PCIe Ethernet Adapter and ThinkSystem Mellanox HDR/200GbE 2x PCIe Aux Kit:

Adapter	Quantity supported (option 1)	Quantity supported (option 2)
ThinkSystem NVIDIA ConnectX-6 DX 200GbE QSFP56 1-Port PCIe Ethernet Adapter	**1, 2, 3, 4 (Slot 5 > Slot 1 > Slot 2 > Slot 3)**	**1 (Slot 1 or Slot 2)**
ThinkSystem Mellanox HDR/ 200GbE 2x PCIe Aux Kit	**0**	**1 (Slot 3)**

Notes:

1. PCIe adapters that can be installed to **LP-LP** riser bracket only:
   - ThinkSystem Broadcom 5719 1GbE RJ45 4-Port PCIe Ethernet Adapter
   - ThinkSystem Intel I350-T4 PCIe 1Gb 4-Port RJ45 Ethernet Adapter
   - ThinkSystem QLogic QL41134 PCIe 10Gb 4-Port Base-T Ethernet Adapter
   - ThinkSystem Intel I350-T4 ML2 1Gb 4-Port RJ45 Ethernet Adapter
   - ThinkSystem Broadcom 57454 10GBASE-T 4-port PCIe Ethernet Adapter

2. PCIe adapters that can be installed to **FH** riser bracket only:
   - ThinkSystem Broadcom 57454 10/25GbE SFP28 4-port PCIe Ethernet Adapter_Refresh
   - ThinkSystem Broadcom 57504 10/25GbE SFP28 4-port PCIe Ethernet Adapter

Technical rules for drives

Understanding the technical rules for drives helps you correctly install and configure drives in the system.

Drive installation rules

The following rules for drives provide information that you must consider when you install a drive.

General rules

1. The drive bays are numbered to indicate the installation order (starting from number “0”). Follow the installation order when you install a drive. See “Front view” in *User Guide* or *System Configuration Guide*.
2. The drives in a single RAID array must be of the same type (as in hard disk drives, solid-state drives, and so on), same size, and same capacity.
3. If your server comes with rear drives, always install the rear backplane first. The drive installation should be rear drive bay 16 → 17, and then front drive bay 0 → 1 → 2 → 3 → 4 → 5 → 6 → 7 → 8 → 9.
4. The installation order of different drive interface types: NVMe → SAS → SATA.
5. For EDSFF drives, follow the numerical order of the drive bay sequence. Do not skip bays when installing EDSFF drives.

Mixing rules

1. You can use drives from different vendors.
2. You can mix drives of different types and different capacities in one system, but not in one RAID array. And when you deploy a drive mix, install drives of lower capacity first.
3. You can install a 2.5-inch solid-state/SAS/SATA drive in a 3.5-inch hard disk drive bay.
4. When mixing NVMe/SAS/SATA drives in one system, install NVMe drives in a descending bay sequence order, 9 → 8 →7...; and SAS/SATA drives in an ascending bay sequence order, 0 → 1 → 2....
5. Mixing EDSFF, U.2 or U.3 drives in one RAID array is not supported.

Special notes

1. For the server models with a single type or mixed types of drives, take 10 x 2.5'' AnyBay drives for instance:
   - The installation order of a single type of drives (SAS/SATA/NVMe) should be: front drive bay 0 → 1 → 2 → 3 → 4 → 5 → 6 → 7 → 8 → 9.
   - The installation order of mixed types of drives should be: SAS/SATA installed from front drive bay 0 → 1 → 2..., and NVMe installed from front drive bay 9 → 8 →7 → 6 → 5→ 4 → 3 → 2 → 1 → 0.
2. For the server models with rear drives installed, take 8 x 2.5'' SAS/SATA front drives and 2 x 2.5'' SAS/SATA rear drives for instance:

   Drives can be installed to rear drive bay 16 → 17 first, and then front drive bay 0 → 1 → 2 → 3 → 4 → 5 → 6 → 7.

Thermal rules

This topic provides thermal rules for the server.

- “Server models with front drive bays only” on page 17

- “Server models with front and rear drive bays” on page 17
- “Server models with GPU(s)” on page 18
- “Server models with liquid to air module” on page 19

Server models with front drive bays only

This section provides thermal information for server models with front drive bays only.

Configuration	• 4 x 2.5'' SAS/SATA • 4 x 2.5'' NVMe • 4 x 3.5'' SAS/SATA • 4 x 3.5'' AnyBay • 6 x SAS/SATA + 2 x AnyBay + 2 x NVMe • 6 x SAS/SATA + 4 x AnyBay • 8 x 2.5'' SAS/SATA • 10 x 2.5'' SAS/SATA				• 4 x 2.5'' SAS/SATA • 4 x 2.5'' NVMe
Max. Ambient Temp. (at sea level)	45°C	35°C		30°C	
CPU TDP[1] (watts)	TDP ≤ 165	165 < TDP < 205	TDP = 205	205 < TDP ≤ 300	300 < TDP ≤ 350
Heat sink	Standard	Standard	T-shape	T-shape	T-shape
Air baffle	√	√	x	x	x
Fan type	Standard	Performance	Performance	Performance	Performance
Max. DIMM Qty.[2]	32	32	32	32	32

Configuration	• 8 x 2.5'' AnyBay drives with one processor • 8 x 2.5'' U.2 drives with one processor • 10 x 2.5'' AnyBay • 10 x 2.5'' NVMe • 16-EDSFF			
Max. Ambient Temp. (at sea level)	35°C			30°C
CPU TDP[1] (watts)	TDP ≤ 165	165 < TDP < 205	TDP = 205	205 < TDP ≤ 300
Heat sink	Standard	Standard	T-shape	T-shape
Air baffle	√	√	x	x
Fan type	Performance	Performance	Performance	Performance
Max. DIMM Qty.[2]	32	32	32	32

Notes:

1. TDP, short for Thermal Design Power. When processor 6434/6434H-195W installed, use the T-shape heat sink and performance fans.
2. When a 256 GB 3DS RDIMM is installed, the ambient temperature must be limited to 30°C or lower and performance fans are required.

Server models with front and rear drive bays

This section provides thermal information for server models with front and rear drive bays.

Configuration	• 4 x 2.5'' SAS/SATA • 4 x 2.5'' NVMe • 4 x 3.5'' SAS/SATA • 4 x 3.5'' AnyBay • 6 x SAS/SATA + 2 x AnyBay + 2 x NVMe • 6 x SAS/SATA + 4 x AnyBay • 8 x 2.5'' SAS/SATA • 8 x 2.5'' AnyBay drives with one processor • 8 x 2.5'' U.2 drives with one processor • 10 x 2.5'' SAS/SATA • 10 x 2.5'' AnyBay • 10 x 2.5'' NVMe • Rear 2 x 2.5'' SAS/SATA[1] • Rear 2 x 2.5'' U.2[1] • Rear 2 x 2.5'' U.3[1]		
Max. Ambient Temp. (at sea level)	35°C with rear SAS/SATA drives 30°C with rear U.2/U.3 drives		
CPU TDP[2] (watts)	TDP ≤ 165	165 < TDP < 205	TDP = 205
Heat sink	Standard	Standard	T-shape
Air baffle	√	√	x
Fan type	Performance	Performance	Performance
Max. DIMM Qty.[3]	32	32	32

Notes:

1. In the configuration of 10 x 2.5'' AnyBay or 10 x 2.5'' NVMe, rear U.2 or U.3 is supported, but rear SAS/SATA is not supported.
2. TDP, short for Thermal Design Power. When processor 6434/6434H-195W installed, use the T-shape heat sink and performance fans.
3. The 256 GB 3DS RDIMMs are not supported.

Server models with GPU(s)

This section provides thermal information for server models with GPUs.

GPUs supported:

- NVIDIA® A2
- NVIDIA® L4

Configuration	• 4 x 2.5'' SAS/SATA • 4 x 2.5'' NVMe • 4 x 3.5'' SAS/SATA • 4 x 3.5'' AnyBay • 6 x SAS/SATA + 2 x AnyBay + 2 x NVMe • 6 x SAS/SATA + 4 x AnyBay • 8 x 2.5'' SAS/SATA • 8 x 2.5'' AnyBay drives with one processor • 8 x 2.5'' U.2 drives with one processor • 10 x 2.5'' SAS/SATA • 10 x 2.5'' AnyBay • 10 x 2.5'' NVMe	• 4 x 2.5'' SAS/SATA • 4 x 2.5'' NVMe
Max. Ambient Temp. (at sea level)	30°C	

CPU TDP[1] (watts)	TDP ≤ 165	165 < TDP < 205	TDP = 205	205 < TDP ≤ 250	250 < TDP ≤ 300
Heat sink	Standard	Standard	T-shape	T-shape	T-shape
Air baffle	√	√	x	x	x
Fan type	Performance	Performance	Performance	Performance	Performance
Max GPU Qty	3	3	3	3	3
Max. DIMM Qty.	32	32	32	32	32

Notes:

1. TDP, short for Thermal Design Power. When processor 6434/6434H-195W installed, use the T-shape heat sink and performance fans.

Server models with liquid to air module

This section provides thermal information for server models installed with the Liquid to Air Module (L2AM).

Configuration	• 6 x SAS/SATA + 2 x AnyBay + 2 x NVMe • 6 x SAS/SATA + 4 x AnyBay • 8 x 2.5'' SAS/SATA • 8 x 2.5'' U.2 drives with one processor • 10 x 2.5'' SAS/SATA • 10 x 2.5'' NVMe
Max. Ambient Temp. (at sea level)	25°C
CPU TDP (watts)	300 ≤ TDP ≤ 350
Heat sink	Liquid to Air Module
Air baffle	x
Fan type	Performance
Max. DIMM Qty.[1]	32

Notes:

1. The 256 GB 3DS RDIMMs are not supported.

Use performance fans when your server is installed with any of the following adapters:

- ThinkSystem Broadcom 57454 10GBASE-T 4-port OCP Ethernet Adapter
- ThinkSystem Broadcom 57508 100GbE QSFP56 2-Port OCP Ethernet Adapter
- ThinkSystem Broadcom 57508 100GbE QSFP56 2-port PCIe 4 Ethernet Adapter

Use performance fans and the ambient temperature must be limited to 30°C or lower when your server is installed with any of the following adapters:

Note: The ambient temperature must be limited to 30°C or lower when 100/200 GB NIC adapters with active transceivers and fiber cables installed; and 35°C or lower when the adapters use passive copper cables.

- ThinkSystem Broadcom 57508 100GbE QSFP56 2-port PCIe 4 Ethernet Adapter V2 with Active Fiber cables
- ThinkSystem Mellanox ConnectX-6 HDR100 IB/100GbE VPI 1-port x16 PCIe 3.0 HCA
- ThinkSystem Mellanox ConnectX-6 HDR100 IB/100GbE VPI 2-port x16 PCIe 3.0 HCA

- ThinkSystem Mellanox ConnectX-6 HDR IB/200GbE Single Port x16 PCIe Adapter
- ThinkSystem Mellanox ConnectX-6 Dx 100GbE QSFP56 2-port PCIe Ethernet Adapter
- ThinkSystem Mellanox ConnectX-6 Dx 100GbE QSFP56 1-port PCIe Ethernet Adapter
- ThinkSystem NVIDIA ConnectX-7 NDR400 OSFP 1-port PCIe Gen5 Adapter
- ThinkSystem Nvidia ConnectX-7 NDR200/HDR QSFP112 2-port PCIe Gen5 x16 InfiniBand Adapter

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” in *User Guide*

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 20.

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” in *User Guide*

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 20.

Server replacement

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

- “Remove the server from the rack” on page 21
- “Install the server to the rack” on page 24

Remove the server from the 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 20.
- 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.

CAUTION:

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

Procedure

Step 1. Loosen the two 2 screws located on the 1 rack latches to disengage it from the rack.

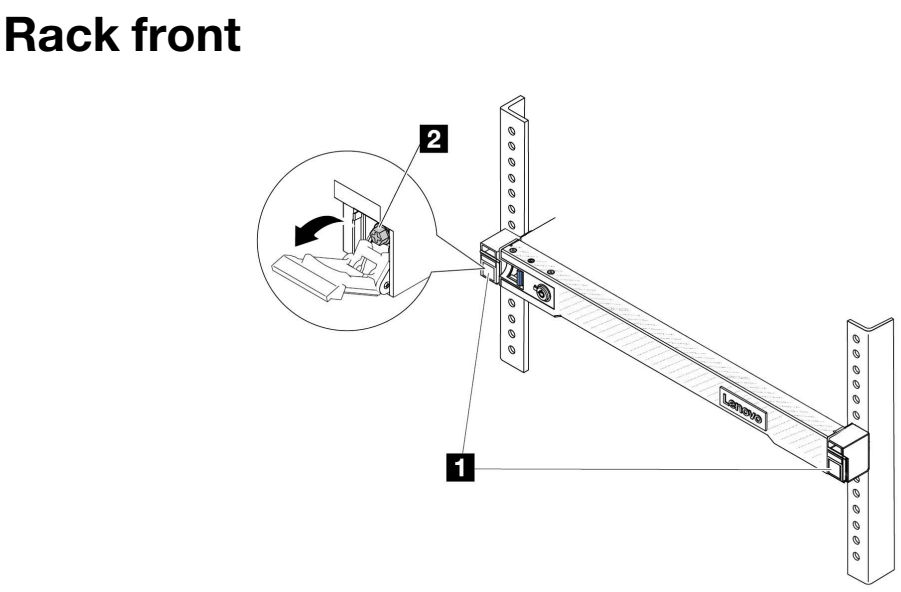


Figure 2. Disengaging server from the rack

Step 2. Hold the 1 mounting ears on the front of the server; then, slide the server all the way out until it stops.

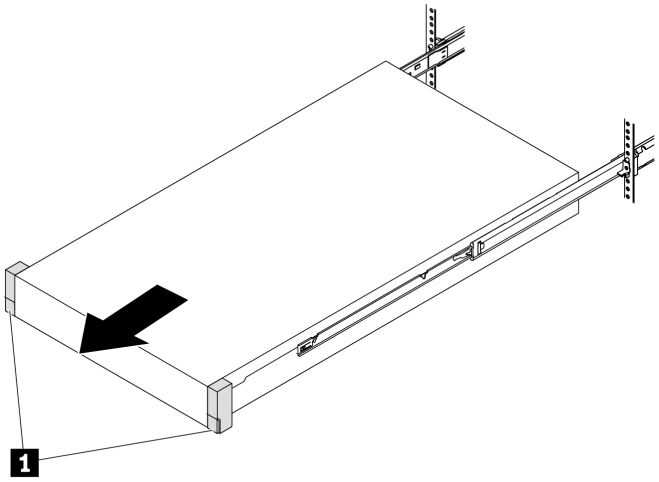


Figure 3. Pulling out the server

Step 3. Remove the server from the rack.

CAUTION:
Make sure three people are lifting the sever by holding the 1 lift points.

Rack front

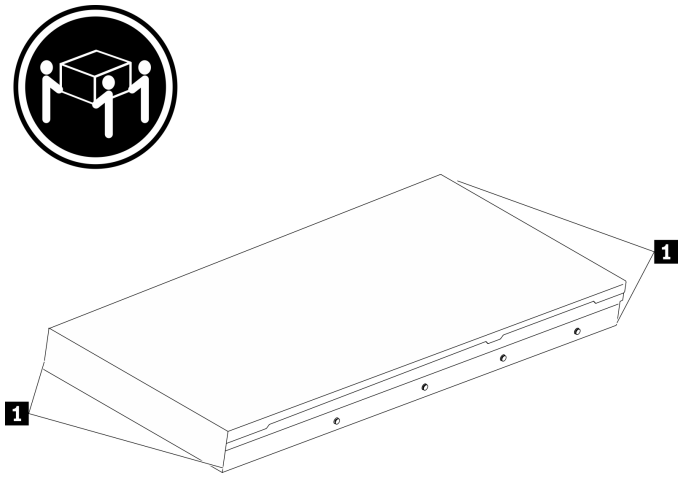


Figure 4. Lifting up the server

Rack Front

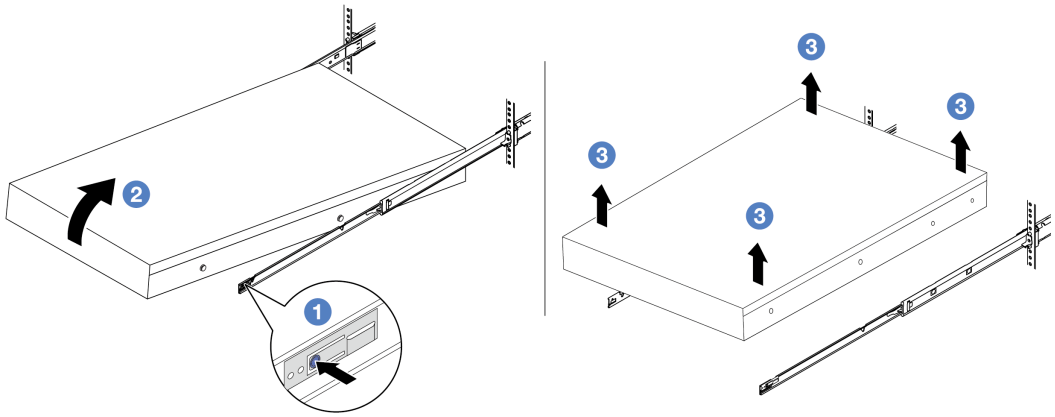


Figure 5. Removing the server from the rack.

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 With three people, lift up the serve 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 the 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 20.
- 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.

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

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

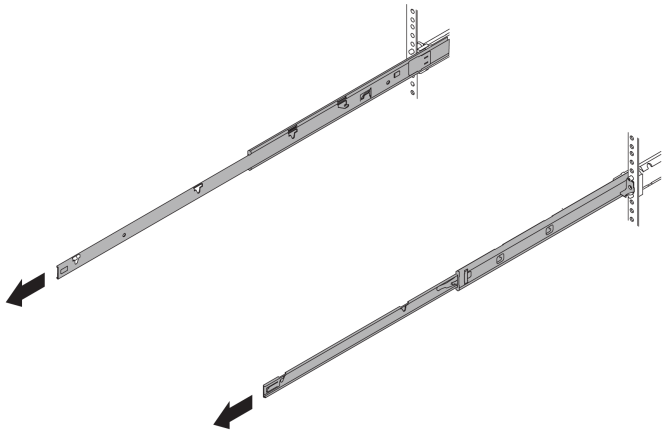


Figure 6. Pulling out the rails

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

CAUTION:
Make sure three people are lifting the sever by holding the 1 lift points.

Rack front

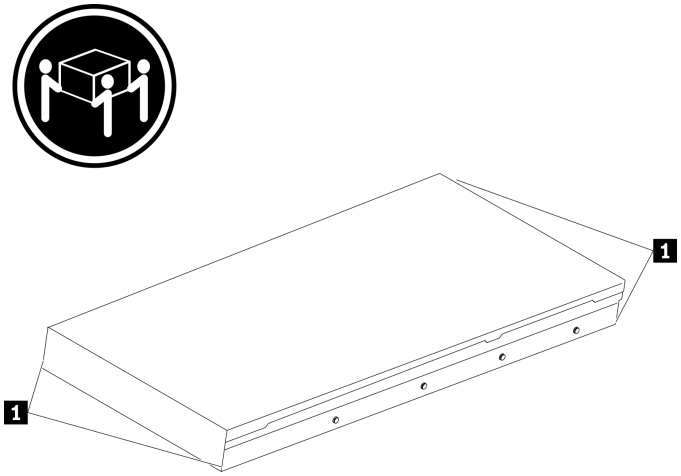
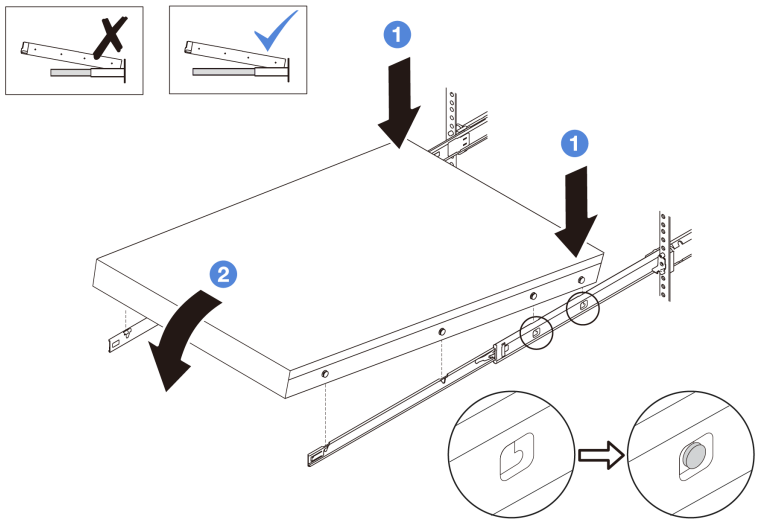


Figure 7. Lifting up the server

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.



a. 1 Tilt the server and slowly lower the 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 side slip into corresponding slots.

Step 4. Slide the server into rack.

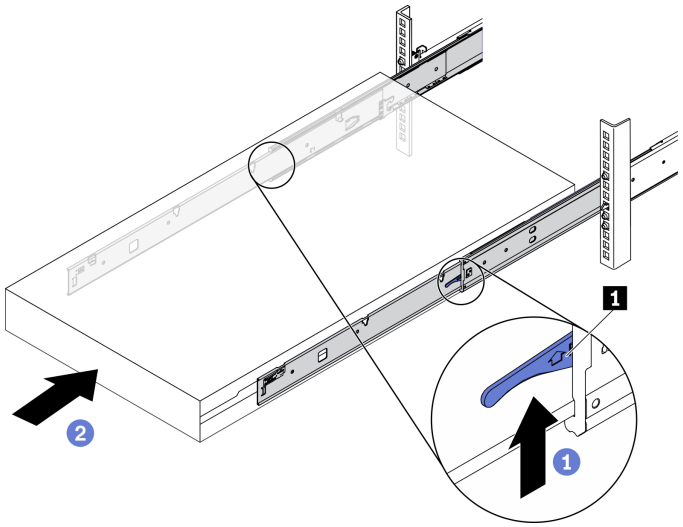


Figure 8. Installing the server into the rack

a. 1 Push up the 1 latches on the rails.

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

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

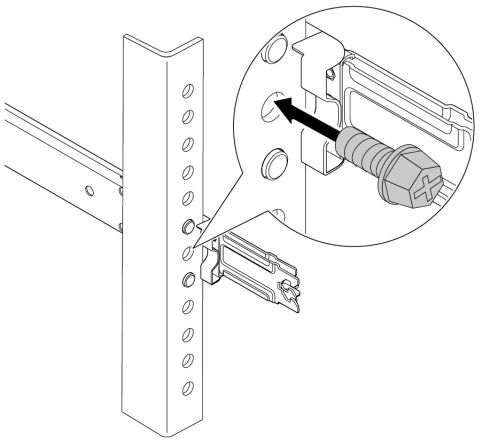


Figure 9. Securing the server to the rear of the rack

b. Secure the server to the front of the rack. Fasten the two 2 screws located on the 1 rack latches.

Rack front

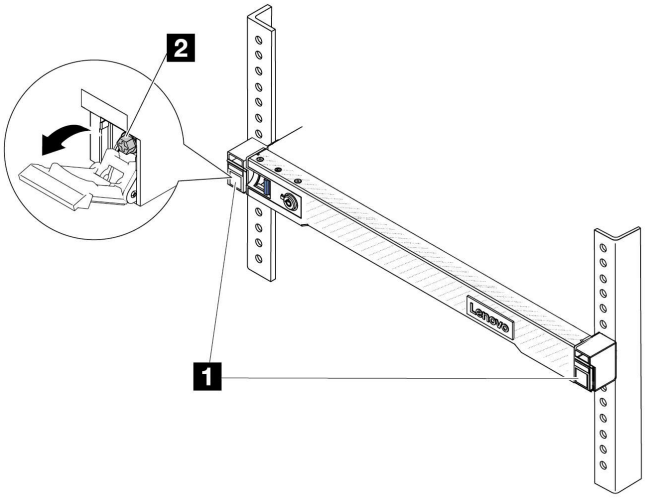


Figure 10. Securing the server to the front of the rack

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 20.
3. Update the server configuration. See “Complete the parts replacement” on page 221.

Demo video

Watch the procedure on YouTube

Air baffle replacement

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

Note: Air baffles are unavailable when the performance heat sink or the Liquid to Air Module (L2AM) is installed.

- “Remove the air baffle” on page 29
- “Install the air baffle” on page 30

Remove the air baffle

Follow instructions in this section to remove the air baffle.

About this task

Depending on the model, your server might not have an air baffle installed. The air baffle you want to remove might be different from following illustrations, but the removal method is the same.

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 20.
- 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.
- If you intend to install memory modules in the server, you must first remove the air baffle from the server.

Procedure

Step 1. Remove the top cover. See “Remove the top cover” on page 218.

Step 2. If there is a RAID flash power module installed on the back side of the air baffle, disconnect the RAID flash power module cable first.

Step 3. Grasp the air baffle and carefully lift it out of the server.

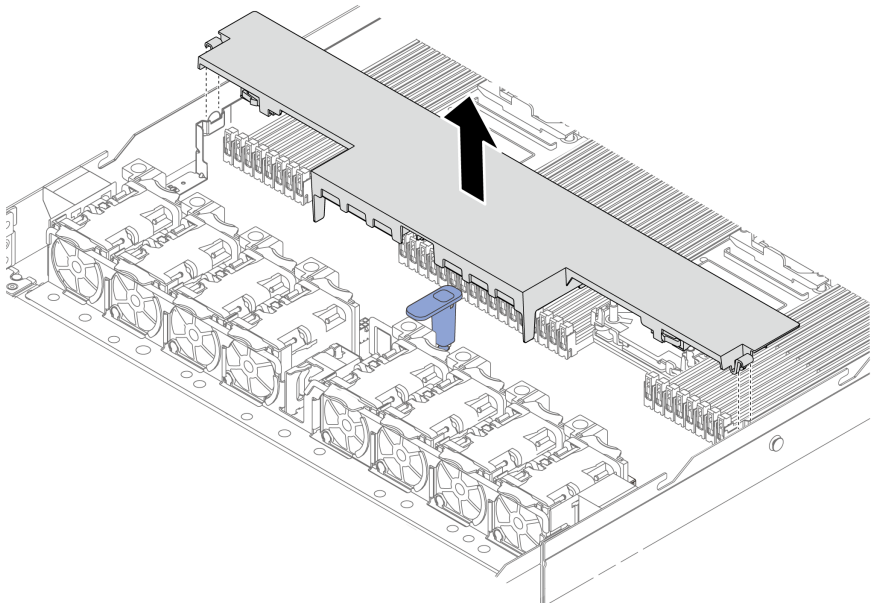


Figure 11. Air baffle removal

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

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 the air baffle

Follow instructions in this section to install the air baffle.

About this task

Depending on the model, your server might not have an air baffle installed. The air baffle you want to install might be different from following illustrations, but the installation method is the same.

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 20.
- 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.

Procedure

Step 1. If you need to install a RAID flash power module on the back side of the air baffle, install it first. See "Install the RAID flash power module on the air baffle" on page 167.

Step 2. Align the clips on the air baffle to the sockets on the cable walls.

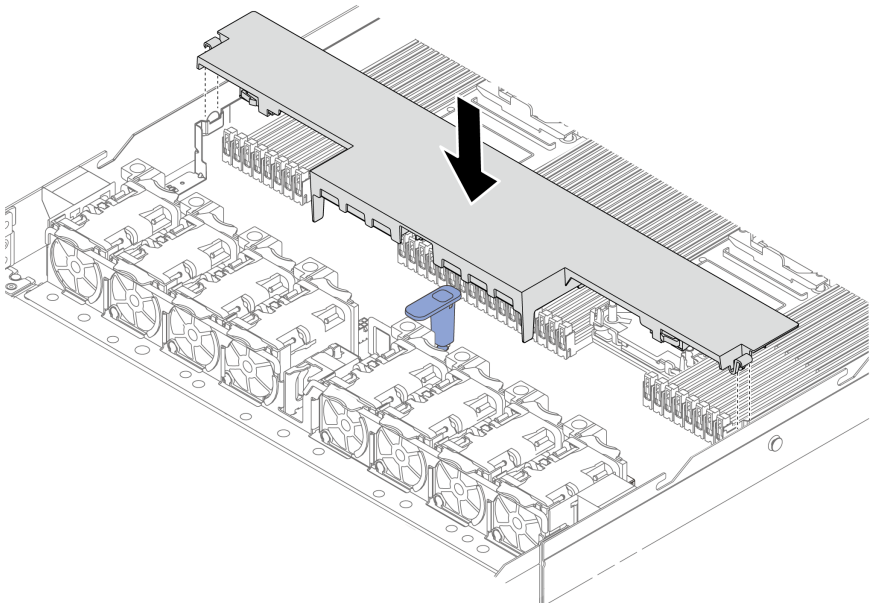


Figure 12. Air baffle installation

Step 3. Lower the air baffle into the chassis and press the air baffle down until it is securely seated.

After you finish

Complete the parts replacement. See “Complete the parts replacement” on page 221.

Backplane replacement

Use this information to remove and install a backplane.

- “Remove the front 2.5-inch drive backplane” on page 32
- “Install the front 2.5-inch drive backplane” on page 33
- “Remove the front 3.5-inch drive backplane” on page 34
- “Install the front 3.5-inch drive backplane” on page 36
- “Remove the front 16-EDSFF drive backplane” on page 37
- “Install the front 16-EDSFF drive backplane” on page 38
- “Remove the 2.5-inch rear drive backplane” on page 40
- “Install the 2.5-inch rear drive backplane” on page 42
- “Remove the 7mm drive backplanes” on page 43
- “Install the 7mm drive backplanes” on page 45

Remove the front 2.5-inch drive backplane

Use this information to remove the backplane for four, eight, or ten 2.5-inch hot-swap drives.

About this task

The following describes how to remove the backplane for ten 2.5-inch hot-swap drives. You can remove the backplane for four or eight 2.5-inch hot-swap drives in the same way.

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 20.
- 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.

Procedure

Step 1. Remove the top cover. See “Remove the top cover” on page 218.

Step 2. Remove all the installed drives and drive fillers from the drive bays. See “Remove a 2.5/3.5-inch hot-swap drive” on page 87.

Step 3. Disconnect the cables from the backplane. See Chapter 2 “Internal cable routing” on page 223. If the cable connectors come with protective dust caps, make sure to put them back on.

Step 4. Grasp the backplane and carefully lift it out of the chassis.

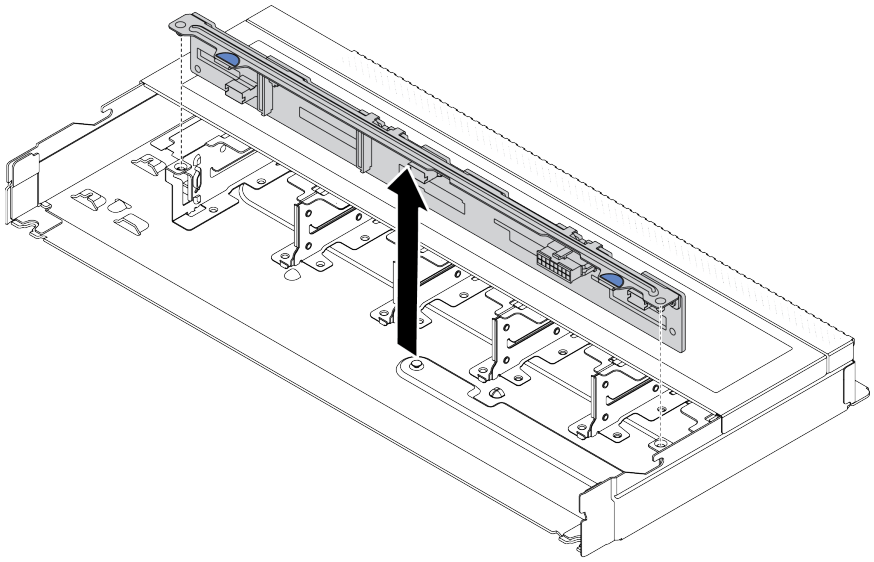


Figure 13. Removal of backplane for ten 2.5-inch hot-swap drives

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 2.5-inch drive backplane

Use this information to install the backplane for four, eight, or ten 2.5-inch hot-swap drives.

About this task

The following describes how to install the backplane for ten 2.5-inch hot-swap drives. You can install the backplane for four or eight 2.5-inch hot-swap drives in the same way.

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 20.
- 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.

Procedure

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

Step 2. Align the two pins on the backplane with the corresponding holes in the chassis.

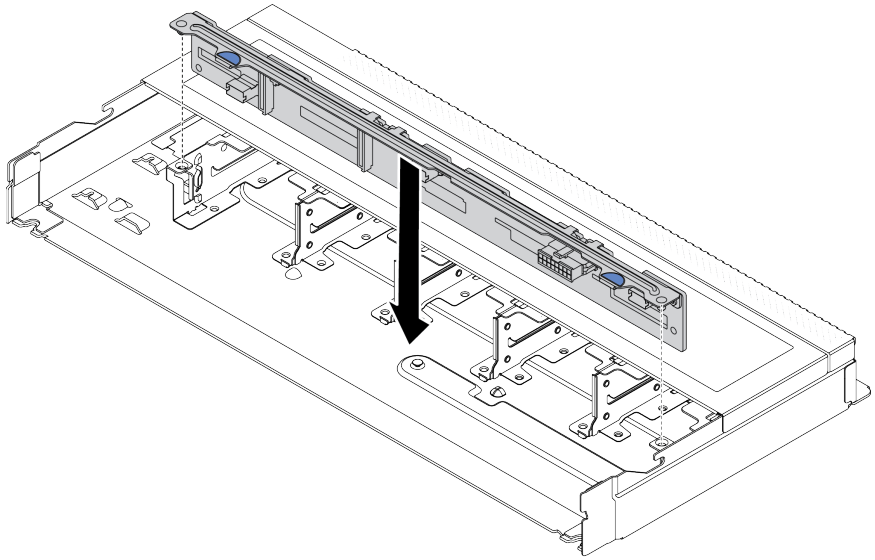


Figure 14. Installation of backplane for ten 2.5-inch hot-swap drives

Step 3. Lower the backplane into the chassis. Ensure that the pins pass through the holes and the backplane is fully seated in place.

Step 4. Connect the cables to the system board assembly and the backplane. See Chapter 2 “Internal cable routing” on page 223. If the cable connectors come with protective dust caps, make sure to remove them before plugging in.

After you finish

1. Reinstall all the drives and drive fillers into the drive bays. See “Install a 2.5/3.5-inch hot-swap drive” on page 89.
2. Complete the parts replacement. See “Complete the parts replacement” on page 221.

Demo video

Watch the procedure on YouTube

Remove the front 3.5-inch drive backplane

Use this information to remove the front 3.5-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 20.

- 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.

Watch the procedure

A video of this procedure is available on YouTube: https://www.youtube.com/playlist?list=PLYV5R7hVcs-CfNsWy-689CRZHExrZEi9I.

Procedure

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

Step 1. Prepare your server.

a. Remove the top cover. See “Remove the top cover” on page 218.

b. Remove the system fan cage for easier operation. See “Remove a system fan” on page 214.

c. Remove all installed drives and fillers (if any) from the drive bays. See “Remove a 2.5/3.5-inch hot-swap drive” on page 87.

Step 2. Record the cable connections on the backplane and then disconnect all cables from the backplane. See Chapter 2 “Internal cable routing” on page 223. If the cable connectors come with protective dust caps, make sure to put them back on.

Step 3. Remove the backplane from the chassis.

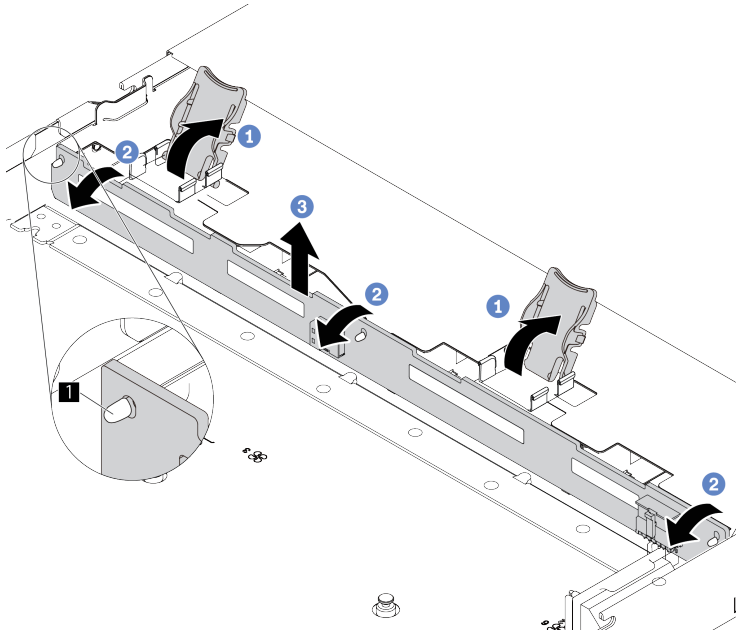


Figure 15. 3.5-inch drive backplane removal

a. 1 Open the release latches that secure the backplane.

b. 2 Pivot the backplane backward slightly to release it from the three pins 1 on the chassis.

c. 3 Carefully remove 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.

Install the front 3.5-inch drive backplane

Use this information to install the front 3.5-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 20.
- 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.

Watch the procedure

A video of this procedure is available on YouTube: https://www.youtube.com/playlist?list=PLYV5R7hVcs-CfNsWy-689CRZHExrZEi9I.

Procedure

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

Step 2. Put the backplane down into place.

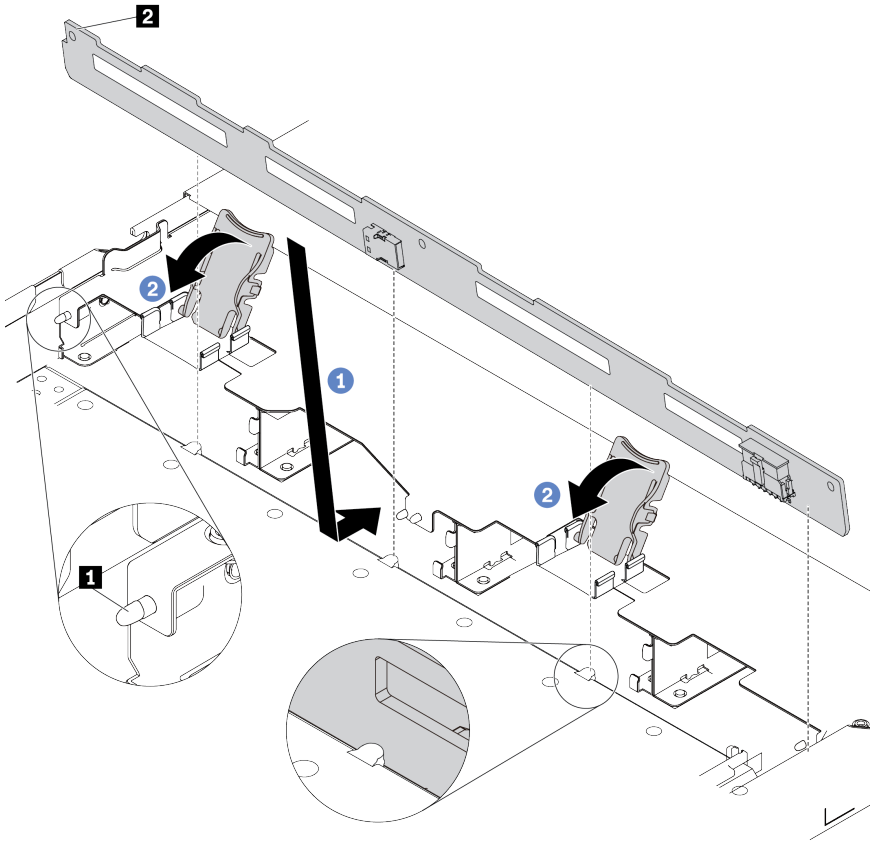


Figure 16. Installation of backplane for four 3.5-inch hot-swap drives

a. 1 Put the backplane under the front I/O assembly cables, align it with the chassis, and lower it into the chassis. Put the backplane into place with it leaning backward slightly so that the three pins 1 on the chassis pass through the three holes 2 in the backplane.

b. 2 Close the release latches to secure the backplane in place.

Step 3. Connect the cables to the system board assembly and the backplane. See Chapter 2 “Internal cable routing” on page 223. If the cable connectors come with protective dust caps, make sure to remove them before plugging in.

After you finish

1. Reinstall all the drives and drive fillers into the drive bays. See “Install a 2.5/3.5-inch hot-swap drive” on page 89.
2. Complete the parts replacement. See “Complete the parts replacement” on page 221.

Remove the front 16-EDSFF drive backplane

Use this information to remove the backplane for front 16 EDSFF drives.

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 20.
- 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.

Procedure

Step 1. Remove the top cover. See “Remove the top cover” on page 218.

Step 2. Remove all the installed drives and drive cages from the drive bays. See “Remove a hot-swap EDSFF drive” on page 90.

Step 3. Disconnect the cables from the backplane. See “16-EDSFF drive backplane” on page 434. If the cable connectors come with protective dust caps, make sure to put them back on.

Step 4. Remove the backplane from the chassis.

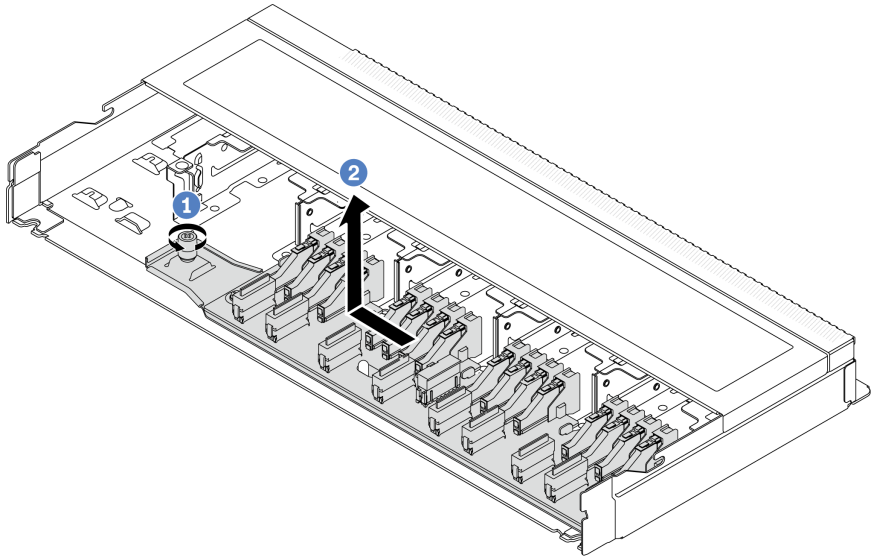


Figure 17. Removal of backplane for 16 EDSFF drives

a. 1 Loosen the screw.

b. 2 Slightly slide the backplane as shown and then lift it up.

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 16-EDSFF drive backplane

Use this information to install the backplane for front 16 EDSFF drives.

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 20.
- 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.

Procedure

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

Step 2. Connect the cables to the backplane. See Chapter 2 “Internal cable routing” on page 223.

Step 3. Put the backplane down into place.

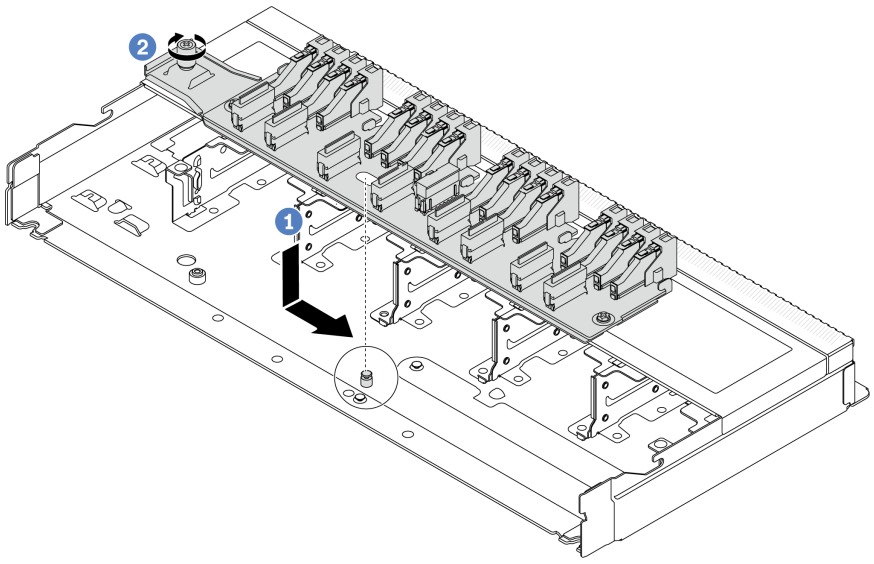


Figure 18. Installation of backplane for 16 EDSFF drives

a. 1 Align the hole on the backplane with the pin on the chassis, place it down, and slightly slide it as shown.

b. 2 Tighten the screw to secure the backplane.

Step 4. Connect the cables to the system board assembly and the backplane. See Chapter 2 “Internal cable routing” on page 223. If the cable connectors come with protective dust caps, make sure to remove them before plugging in.

After you finish

1. Reinstall all the drives and drive cages into the drive bays. See “Install a hot-swap EDSFF drive” on page 92.
2. Complete the parts replacement. See “Complete the parts replacement” on page 221.

Demo video

Watch the procedure on YouTube

Remove the 2.5-inch rear drive backplane

Use this information to remove the 2.5-inch rear 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 20.
- 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.

Procedure

Step 1. Prepare your server.

a. Remove the top cover. See “Remove the top cover” on page 218.

b. Remove all installed drives and fillers (if any) from the drive bays. See “Remove a 2.5/3.5-inch hot-swap drive” on page 87.

Step 2. Gently press and hold the tab on the rear hot-swap drive cage as shown and remove the air baffle from the rear hot-swap drive cage.

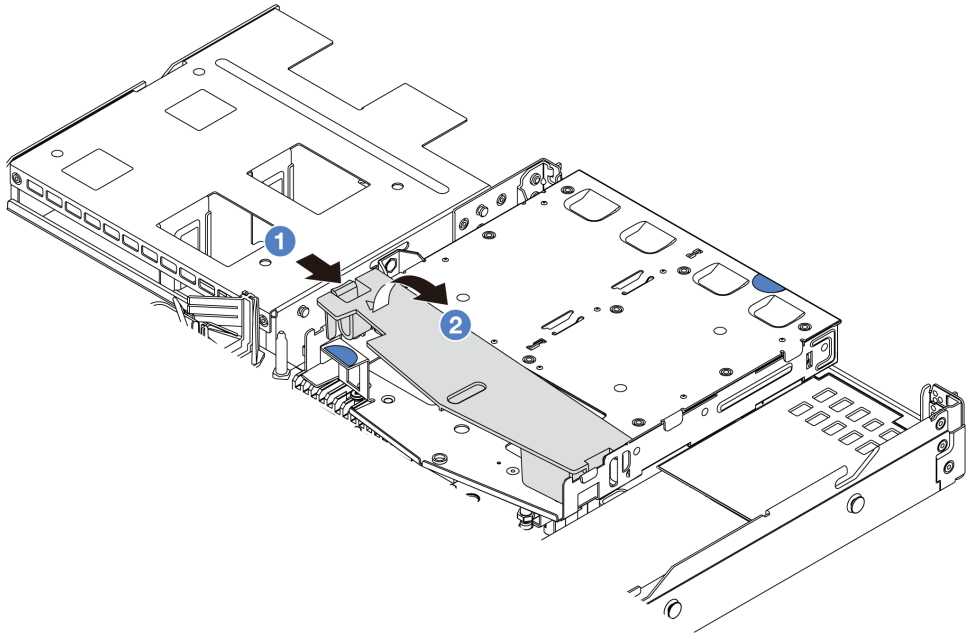


Figure 19. Air baffle removal

a. 1 Press the tab on one side to disengage the air baffle.

b. 2 Lift the air baffle to remove it from drive cage.

Step 3. Record the cable connections for 2.5–inch rear drive and then disconnect all cables from the backplanes. For information about the backplane cable routing, see Chapter 2 “Internal cable routing” on page 223.

Step 4. Carefully lift the 2.5-inch rear drive backplane out of the rear hot-swap drive cage.

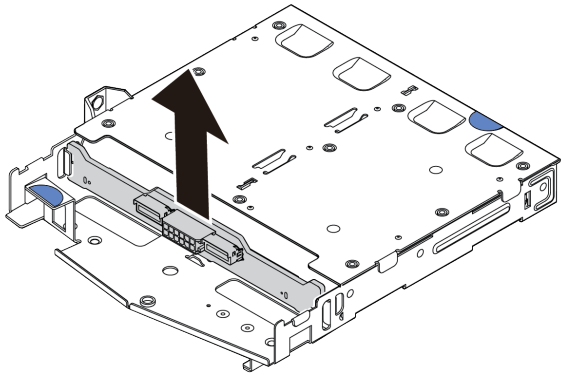


Figure 20. 2.5-inch rear drive backplane removal

After you finish

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

Demo video

Watch the procedure on YouTube

Install the 2.5-inch rear drive backplane

Use this information to install the 2.5-inch rear 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 20.
- 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.

Procedure

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

Step 2. Align the rear backplane with the rear hot-swap drive cage and lower it into the rear hot-swap drive cage.

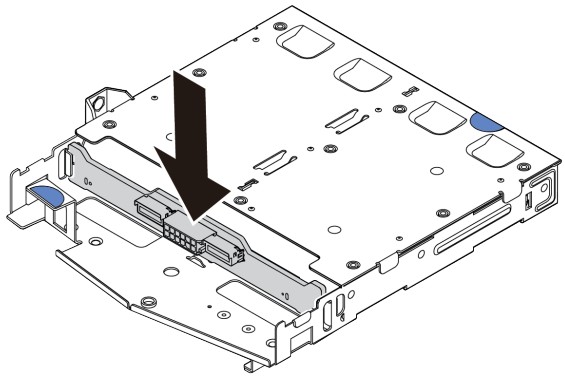


Figure 21. Rear backplane installation

Step 3. Connect the cables to the system board assembly and the backplane. See Chapter 2 “Internal cable routing” on page 223. If the cable connectors come with protective dust caps, make sure to remove them before plugging in.

Step 4. Install the air baffle into the rear hot-swap drive cage as shown.

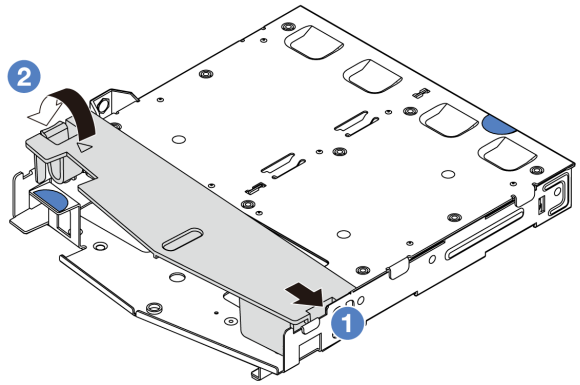


Figure 22. Air baffle installation

a. 1 Align the air baffle edge with the notch on the drive cage.

b. 2 Press the air baffle down and make sure that it is seated in place.

After you finish

1. Reinstall drives or drive fillers into the rear hot-swap drive cage. See “Install a 2.5/3.5-inch hot-swap drive” on page 89.
2. Reinstall the drive assembly to the server. See “Install the 2.5-inch rear drive assembly” on page 171.
3. Complete the parts replacement. See “Complete the parts replacement” on page 221.

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 20.
- 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.

Procedure

Note: Depending on the specific type, your backplanes might look different from the illustration in this topic.

Step 1. Prepare your server.

a. Remove the top cover. See “Remove the top cover” on page 218.

b. Record the cable connections for 7mm drives and then disconnect all cables from the backplanes. For information about the backplane cable routing, See “7mm drive backplane”

on page 247. If the cable connectors come with protective dust caps, make sure to put them back on.

Step 2. Remove the 7mm drive backplane on the top.

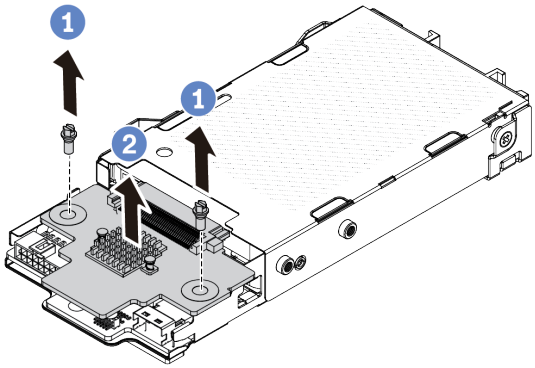


Figure 23. 7mm drive backplane removal (top)

a. 1 Remove the two screws as shown.
b. 2 Lift the top backplane up and put it aside.

Step 3. Remove the 7mm drive backplane at the bottom.

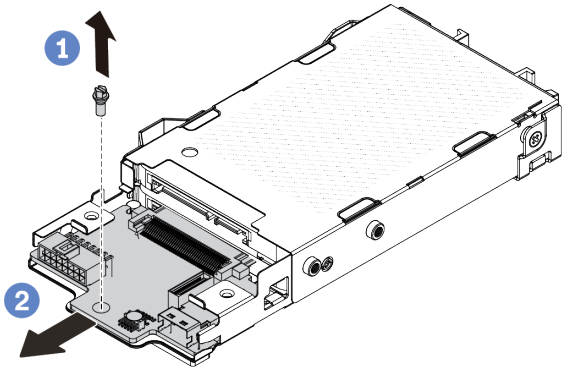


Figure 24. 7mm drive backplane removal (bottom)

a. 1 Remove the screw as shown.
b. 2 Slide the bottom backplane out from the cage as shown.

After you finish

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

Demo video

Watch the procedure on YouTube

Install the 7mm drive 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 20.
- 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.

Procedure

Step 1. Touch the static-protective package that contains new backplanes to any unpainted surface on the outside of the server. And then, take new backplanes out of the package and place them on a static-protective surface.

Step 2. Install the 7mm drive bottom backplane.

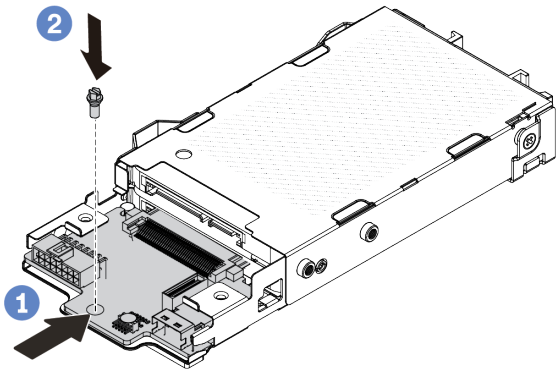


Figure 25. 7mm drive backplane installation (bottom)

a. 1 Align the pin on the cage and slightly slide the bottom backplane into the cage until it is fully seated.

b. 2 Install the screw as shown.

Step 3. Install the 7mm drive top backplane.

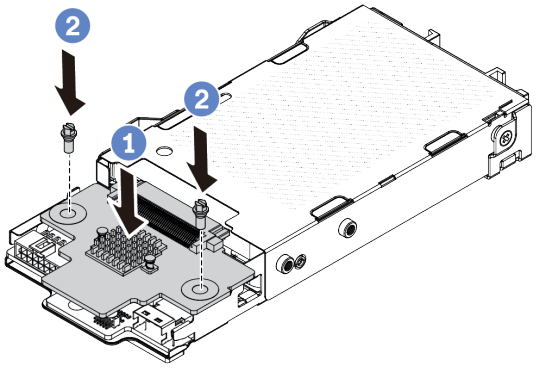


Figure 26. 7mm drive backplane installation (top)

a. 1 Put the backplane down on the cage as shown.

b. 2 Install the two screws to secure the top backplane in place.

Step 4. Connect the cables to the system board assembly and the backplane. See Chapter 2 “Internal cable routing” on page 223. If the cable connectors come with protective dust caps, make sure to remove them before plugging in.

After you finish

Complete the parts replacement. See “Complete the parts replacement” on page 221.

Demo video

Watch the procedure on YouTube

CMOS battery replacement

Use this information to remove and install the CMOS battery.

- “Remove the CMOS battery” on page 46
- “Install the CMOS battery” on page 49

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 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 20.
- 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.

Procedure

Step 1. Remove the top cover. See “Remove the top cover” on page 218.

Step 2. Remove any parts and disconnect any cables that might impede your access to the CMOS battery.

Step 3. Locate the CMOS battery. See “System-board-assembly connectors” on page 451.

Step 4. Open the battery clip as shown and carefully take the CMOS battery out of the socket.

Attention:

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

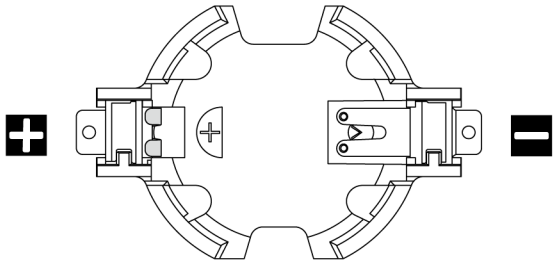


Figure 27. The positive and negative end on the CMOS battery socket

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

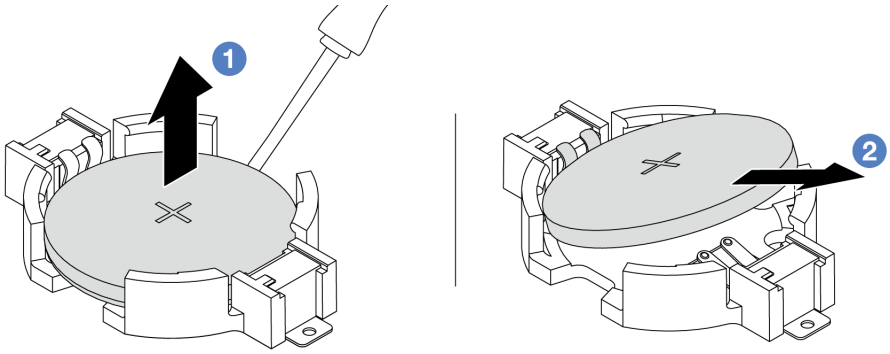


Figure 28. CMOS battery removal

1. 1 Pry the CMOS battery from the socket with a flat-blade screwdriver.
2. 2 Remove the CMOS battery.

After you finish

1. Install a new CMOS battery. See “Install the CMOS battery” on page 49.
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.
3. 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 replace the CMOS battery, you must reconfigure the server and reset the system date and time.

S004

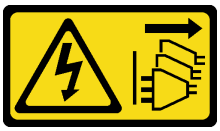
CAUTION:
When replacing the lithium battery, use only Lenovo specified part number or an equivalent type battery recommended by the manufacturer. If your system has a module containing a lithium battery, replace it only with the same module type made by the same manufacturer. The battery contains lithium 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.

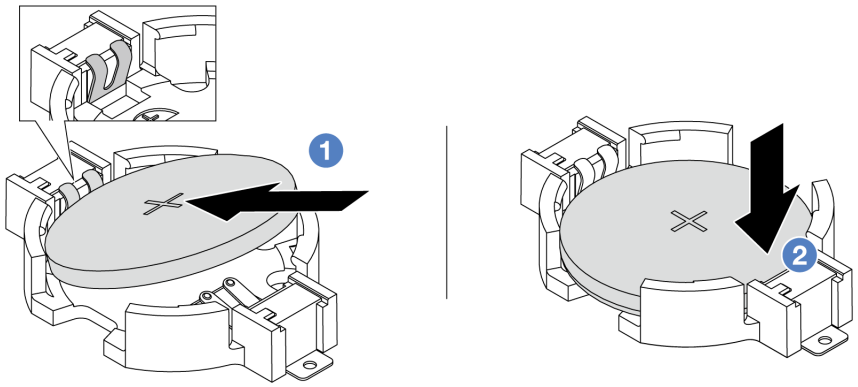
Attention:

- 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 20.
- 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.

Procedure

Step 1. Touch the static-protective package that contains the CMOS battery to any unpainted surface on the outside of the server. Then, take the CMOS battery out of the package.

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.

1. (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.
2. (2) Press the battery down until it clicks into the socket.

Figure 29. CMOS battery installation

After you finish

1. Complete the parts replacement. See "Complete the parts replacement" on page 221.
2. Use the Setup utility to set the date, time, and any passwords.

Demo video

Watch the procedure on YouTube

ConnectX-6 main and auxiliary adapters replacement

Follow the instructions in this section to remove and assemble ConnectX-6 main and auxiliary adapters.

- “Remove ConnectX-6 main and auxiliary adapters” on page 51
- “Install ConnectX-6 main and auxiliary adapters” on page 52

Note: The main adapter is ThinkSystem NVIDIA ConnectX-6 DX 200GbE QSFP56 1-Port PCIe Ethernet Adapter, and the auxiliary adapter is ThinkSystem Mellanox HDR/200GbE 2x PCIe Aux Kit.

For ThinkSystem NVIDIA ConnectX-6 DX 200GbE QSFP56 1-Port PCIe Ethernet Adapter and ThinkSystem Mellanox HDR/200GbE 2x PCIe Aux Kit:

Adapter	Quantity supported (option 1)	Quantity supported (option 2)
ThinkSystem NVIDIA ConnectX-6 DX 200GbE QSFP56 1-Port PCIe Ethernet Adapter	**1, 2, 3, 4 (Slot 5 > Slot 1 > Slot 2 > Slot 3)**	**1 (Slot 1 or Slot 2)**
ThinkSystem Mellanox HDR/ 200GbE 2x PCIe Aux Kit	**0**	**1 (Slot 3)**

Remove ConnectX-6 main and auxiliary adapters

Follow the instructions in this section to remove ConnectX-6 main and auxiliary adapters.

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 20.
- 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.

Procedure

Step 1. Remove the top cover. See “Remove the top cover” on page 218.

Step 2. Remove the riser and PCIe adapter assembly. Refer to “Remove a rear riser card” on page 183 and “Remove a PCIe adapter” on page 140.

Step 3. Remove the retention clips from both adapters. Take the removal steps of the auxiliary adapter as an example. Flip the clip up as illustrated below and disengage it from the clip holes.

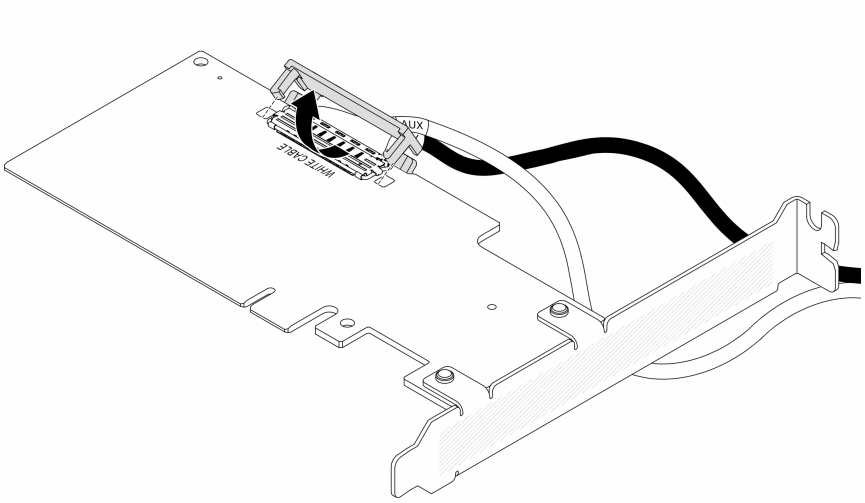


Figure 30. Removing a retention clip

Step 4. Release the cables from both adapters.

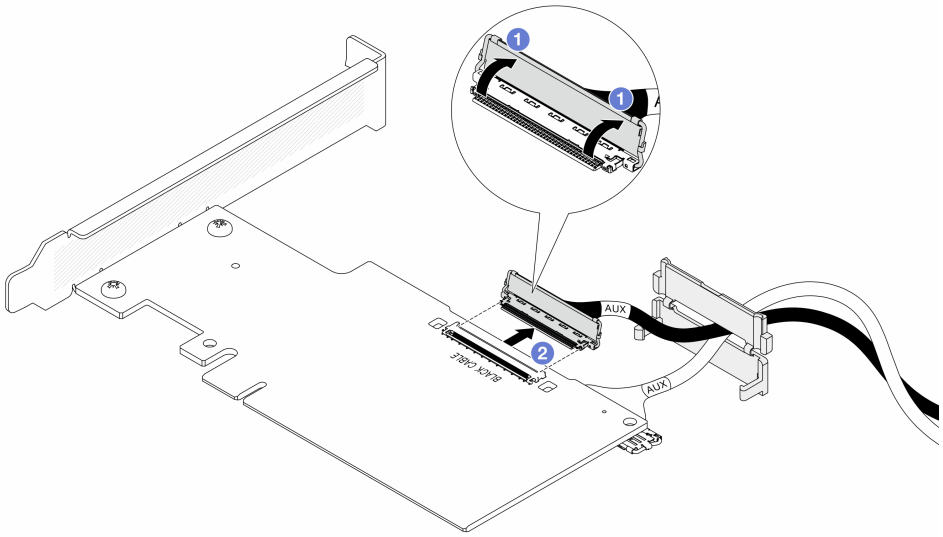


Figure 31. Releasing cables from adapters

a. 1 Flip the metal clips on both black and white cable connectors.

b. 2 Remove the cable connectors.

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 ConnectX-6 main and auxiliary adapters

Follow the instructions in this section to install and assemble ConnectX-6 main and auxiliary adapters.

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 20.
- 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.

Procedure

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

Step 2. Connect the cables to the adapter. Take the installation steps of the auxiliary adapter as an example.

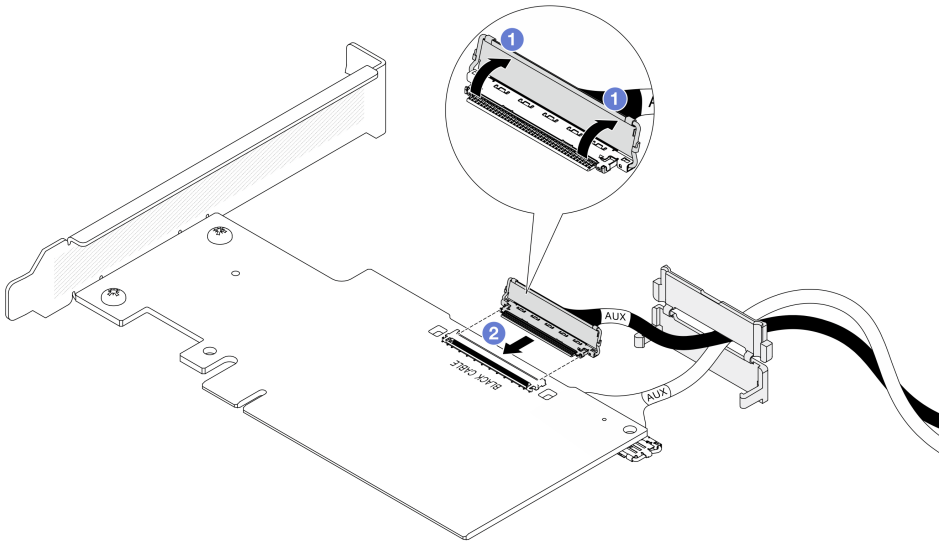


Figure 32. Connecting cables

a. 1 Open the metal clip on both cables, and make sure that the black cable finds the silkscreen “BLACK CABLE” on the adapter.

b. 2 Connect the cables and flip the clip down, and make sure that the connectors are secured in place.

Step 3. Install the retention clips to adapters after the cables are connected, and make sure that the “BOTTOM” side of the clip meets the silkscreen “WHITE CABLE” on the adapters.

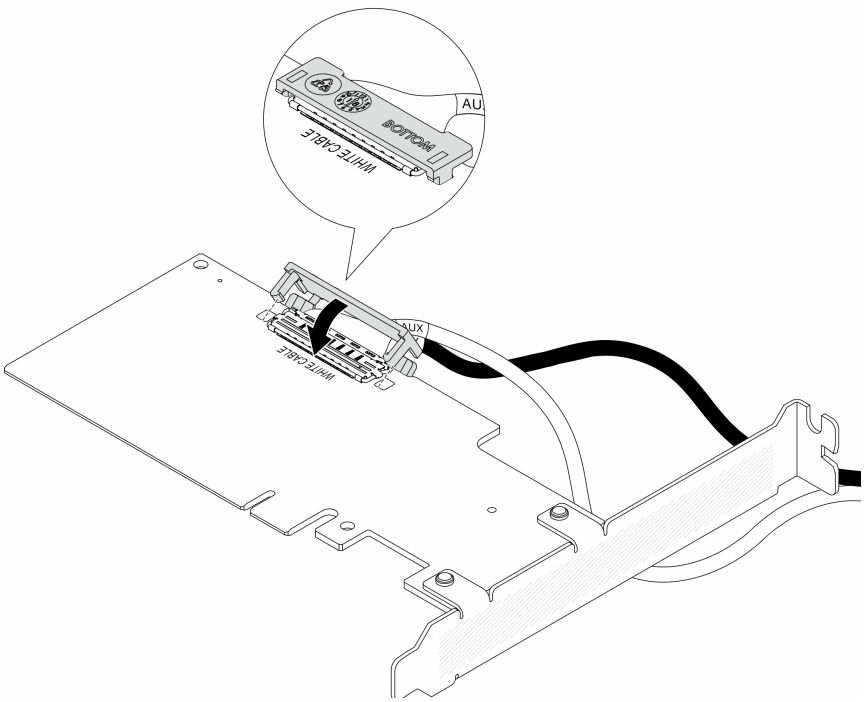


Figure 33. Installing a retention clip

Step 4. Connect the main adapter (MAIN) and auxiliary adapter (AUX) as illustrated below.

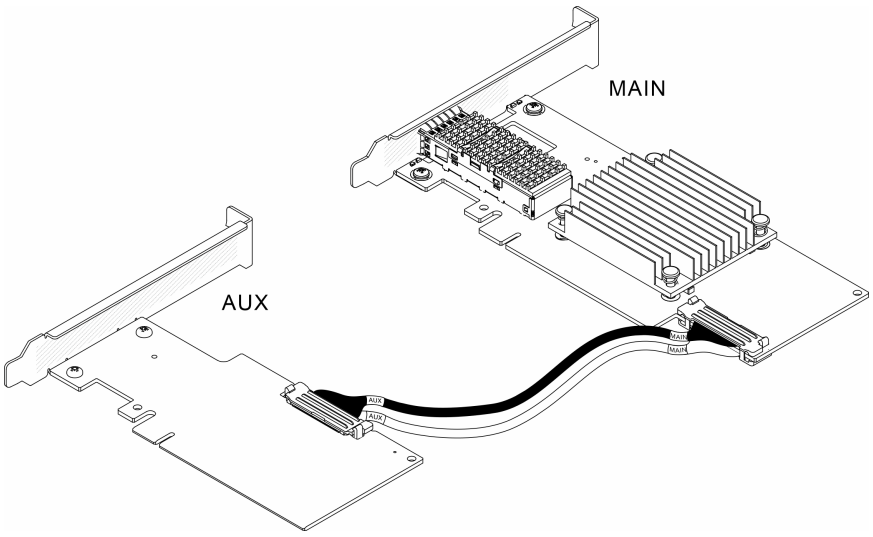


Figure 34. Connecting two adapters

Step 5. Install the riser and PCIe adapter assembly. See “Install a rear riser card” on page 186 and “Install a PCIe adapter” on page 142.

After you finish

Complete the parts replacement. See “Complete the parts replacement” on page 221.

EDSFF cage replacement

Use this information to remove and install an EDSFF cage

- “Remove an EDSFF cage” on page 55
- “Install an EDSFF cage” on page 56

Remove an EDSFF cage

Use this information to remove an EDSFF 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 20.
- 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.

Procedure

Step 1. If the security bezel is installed, remove it first. See “Remove the security bezel” on page 188.

Step 2. Locate the EDSFF cage you need to remove, and then remove all the EDSFF drives installed in it. See “Remove a hot-swap EDSFF drive” on page 90.

Step 3. Remove the EDSFF cage from the chassis.

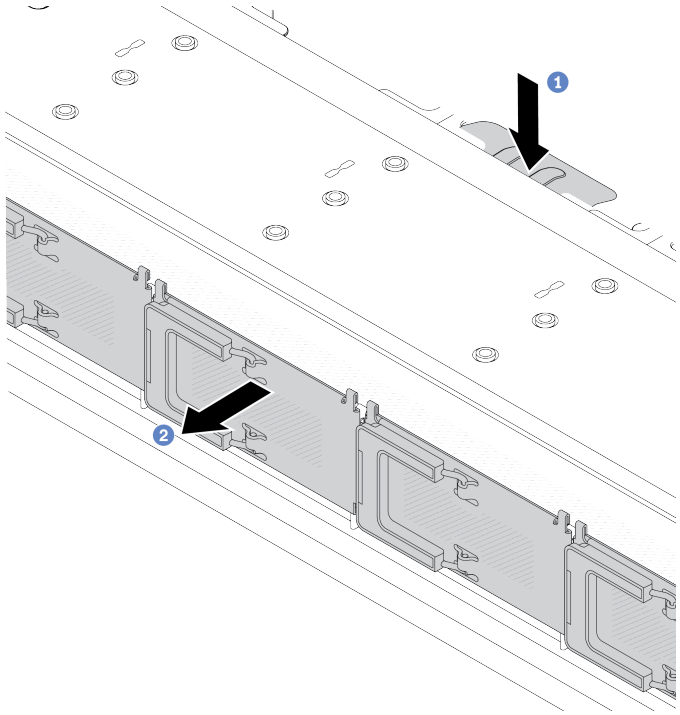


Figure 35. EDSFF cage removal

a. 1 Press down the extended tab on the other side of the front chassis.
b. 2 Slide the EDSFF cage out of the front chassis.

After you finish

1. Install a new EDSFF cage. See "Install an EDSFF cage" on page 56.
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 EDSFF cage

Use this information to install an EDSFF 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 20.

- 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.

Procedure

Step 1. Touch the static-protective package that contains the EDSFF cage to any unpainted surface on the outside of the server. And then, take the EDSFF cage out of the package and place it on a static-protective surface.

Step 2. Slide the diagnostics panel assembly into the front chassis as shown. And ensure that it is seated in place.

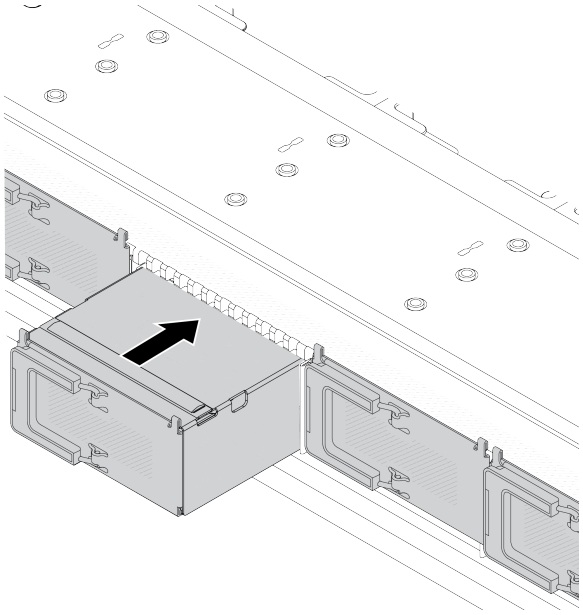


Figure 36. EDSFF cage installation

Step 3. Remove the EDSFF drive cage cover.

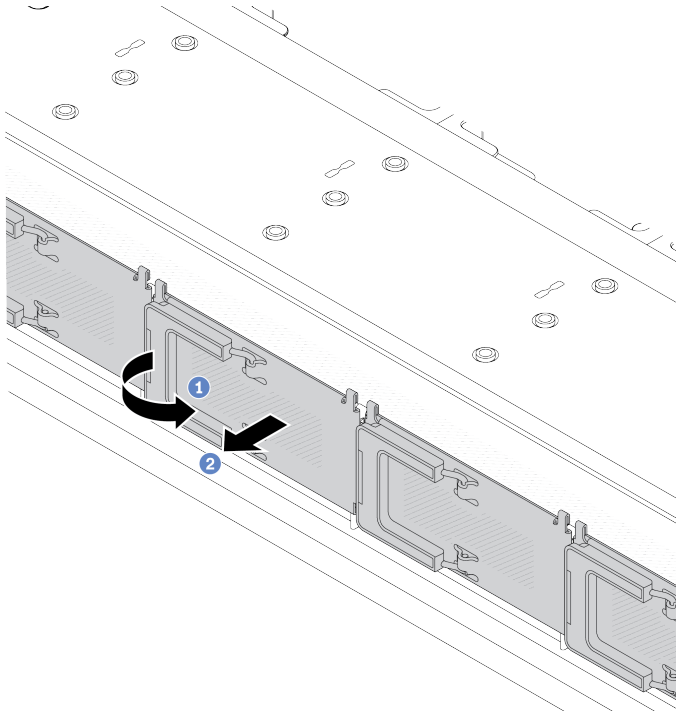


Figure 37. EDSFF drive cage cover removal

a. 1 Open the handle as shown.

b. 2 Grasp the handle and remove the drive cage cover.

Step 4. Install EDSFF drives into the EDSFF cage. See “Install a hot-swap EDSFF drive” on page 92.

After you finish

Complete the parts replacement. See “Complete the parts replacement” on page 221.

Demo video

Watch the procedure on YouTube

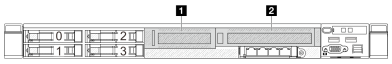
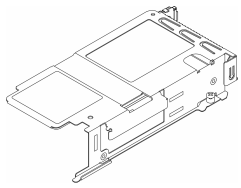
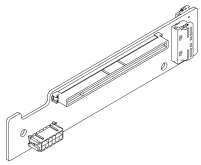
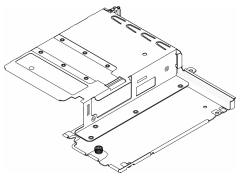
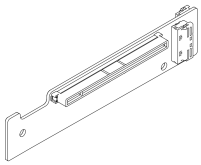
Front riser assembly replacement

A complete front riser assembly consists of two front riser cages, two front riser cards and two PCIe adapters. See this topic to understand how to remove and assemble a front riser assembly.

Server front configuration and riser assemblies

See this section to identify the correlations between the front configuration and riser assemblies.

Table 12. Server front configuration and riser assemblies

Server front configuration	Riser 3 assembly	Riser 4 assembly
 *Figure 38. Two front PCIe slots*	 *Figure 39. Riser 3 LP bracket*  *Figure 40. Riser 3 card*	 *Figure 41. Riser 4 FH bracket*  *Figure 42. Riser 4 card*

- “Front riser cage replacement” on page 59
- “Front riser card and PCIe adapter replacement” on page 61

Front riser cage replacement

Follow instructions in this section to remove and install the front riser cage.

- “Remove the front riser cage” on page 59
- “Install the front riser cage” on page 60

Remove the front riser cage

Follow the instructions in this section to remove the front riser 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 20.
- 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.

Procedure

Step 1. Remove the top cover, see “Remove the top cover” on page 218.

Step 2. Remove the cables connected to the processor board, see “Front riser assembly” on page 237.

Step 3. Remove the front riser cage.

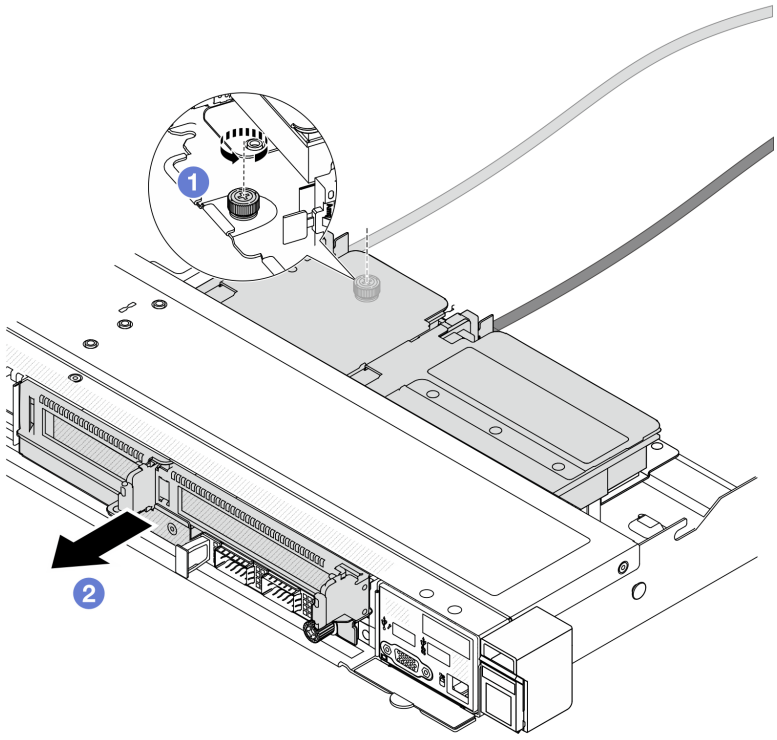


Figure 43. Removing the front riser cage

a. 1 Loosen the screw on the rear of the front riser cage.

b. 2 Pull the front riser cage out of the chassis.

Step 4. Remove the front riser assembly and PCIe adapter from the front riser cage, see "Remove the front riser card and PCIe adapter" on page 62.

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 riser cage

Follow the instructions in this section to install the front riser 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 20.

- 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.

Procedure

Step 1. Install the front riser assembly and PCIe adapter to the front riser cage, see “Install the front riser card and PCIe adapter” on page 64.

Step 2. Remove the top cover. See “Remove the top cover” on page 218.

Step 3. Install the front riser cage.

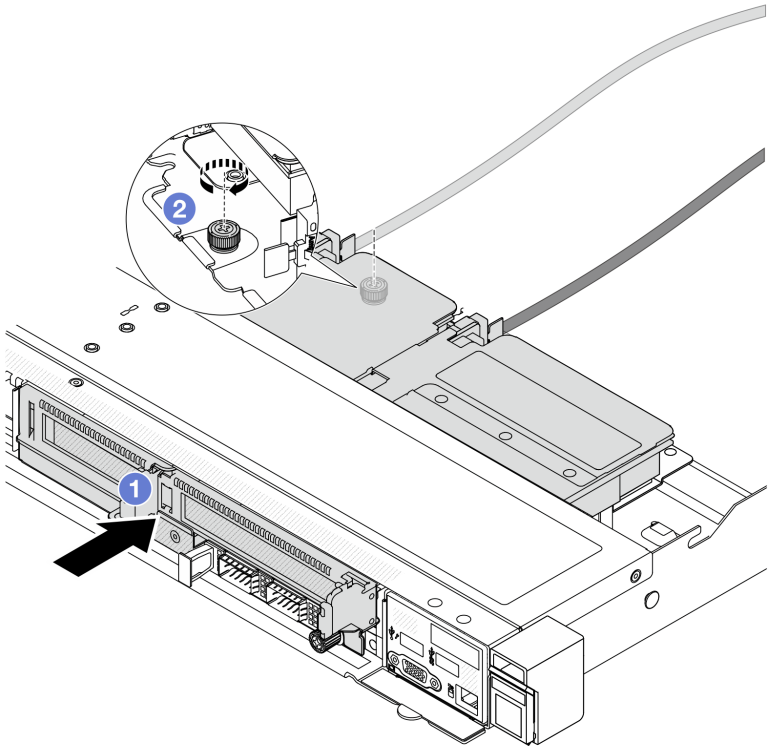


Figure 44. Installing the front riser cage

a. 1 Push the front riser cage into the chassis.

b. 2 Tighten the screw on the rear of the front riser cage to secure it to the chassis.

After you finish

Complete the parts replacement. See “Complete the parts replacement” on page 221.

Demo video

Watch the procedure on YouTube

Front riser card and PCIe adapter replacement

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

- “Remove the front riser card and PCIe adapter” on page 62
- “Install the front riser card and PCIe adapter” on page 64

Remove the front riser card and PCIe adapter

Follow the instructions in this section to remove the front riser card and PCIe 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 20.
- 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.

Procedure

Step 1. Remove the front riser cage, see “Remove the front riser cage” on page 59.

Step 2. Separate the low-profile riser cage from the full-height riser cage.

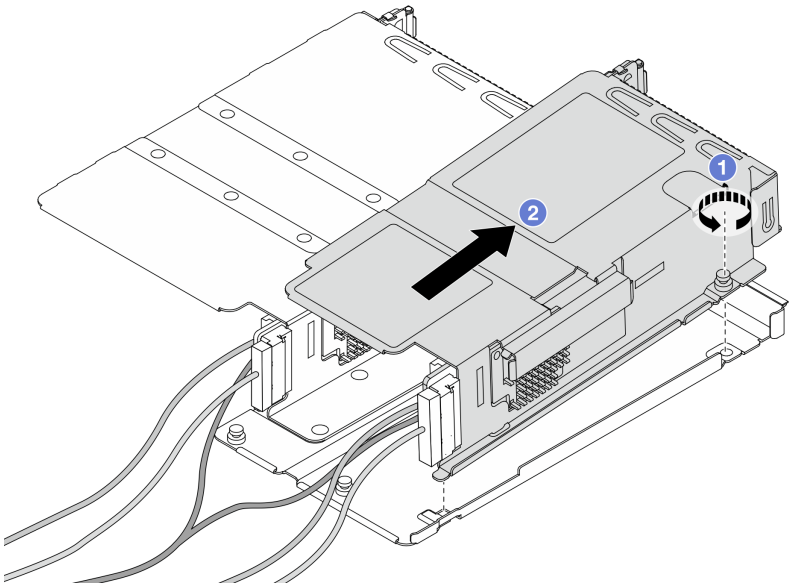


Figure 45. Separating the two cages

a. 1 Loosen the screw that secures the low-profile cage to full-height one.

b. 2 Tilt the cage and lift it out.

Step 3. Remove the PCIe adapter from the riser cage.

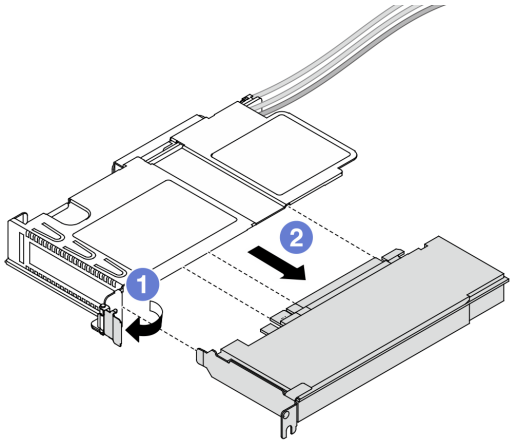


Figure 46. Removing the PCIe adapter

a. 1 Rotate the latch on the riser cage to open position.

b. 2 Disengage the PCIe adapter from the cage.

Step 4. Disconnect the cables from the riser card. For more details, see “Front riser assembly” on page 237.

Step 5. Repeat the previous two steps on the full-height cage.

Step 6. Remove the riser cards from both riser cages.

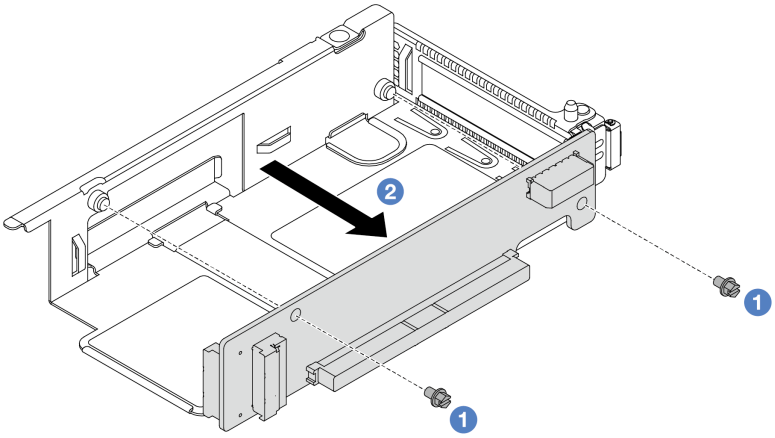


Figure 47. Removing the riser card from low-profile cage

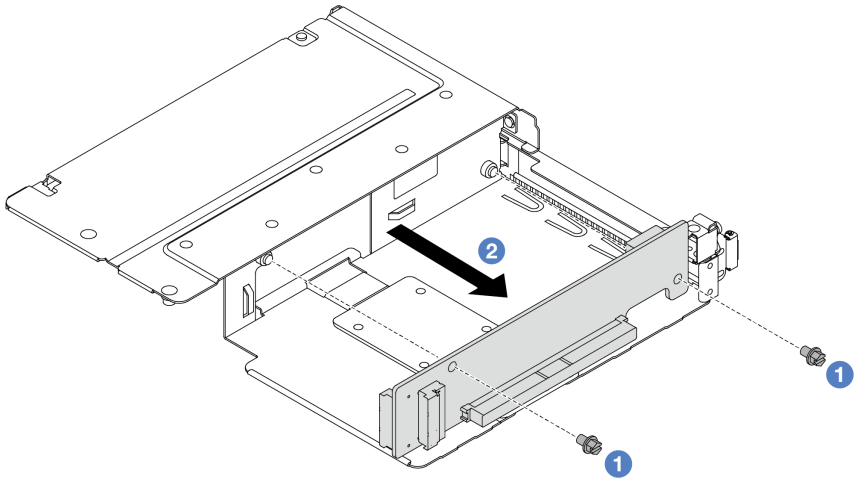


Figure 48. Removing the riser card from full-height cage

a. 1 Remove the two screws that secure the riser card to the cage.

b. 2 Remove the riser 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 front riser card and PCIe adapter

Follow the instructions in this section to install the front riser card and PCIe 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 20.
- 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.

Procedure

Step 1. Touch the static-protective package that contains the front riser card and PCIe adapter to any unpainted surface on the outside of the server. Then, take the front riser card and PCIe adapter out of the package and place it on a static-protective surface.

Step 2. Install the front riser cards to both cages.

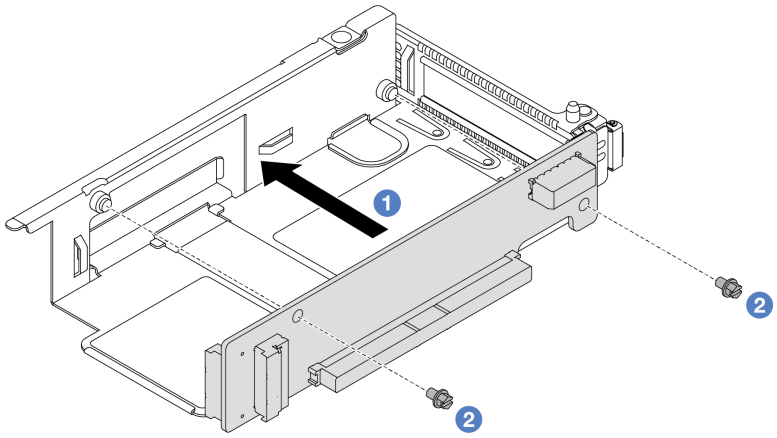


Figure 49. Installing the riser card to low-profile cage

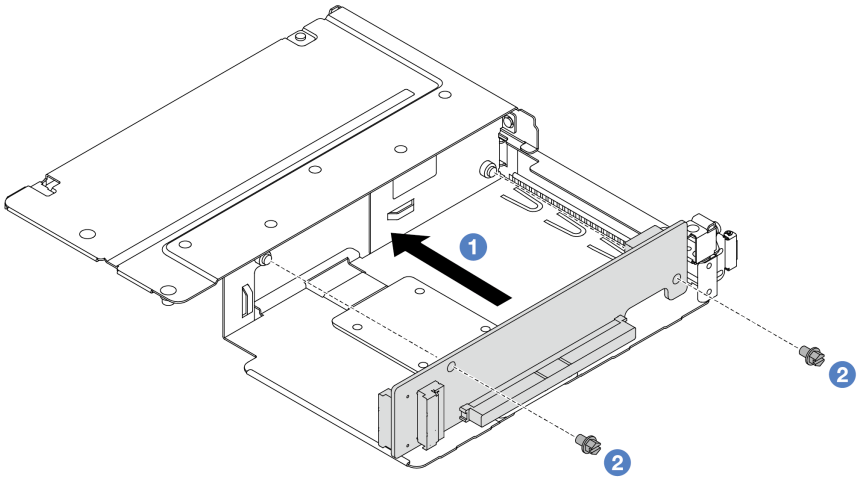


Figure 50. Installing the riser card to full-height cage

a. 1 Align the screw holes on the riser cards with the corresponding ones on the cages.

b. 2 Install the two screws to secure the riser cards to the cages.

Step 3. Connect the cables to the riser cards. For more details, see "Front riser assembly" on page 237.

Step 4. Install the PCIe adapter to the riser cage.

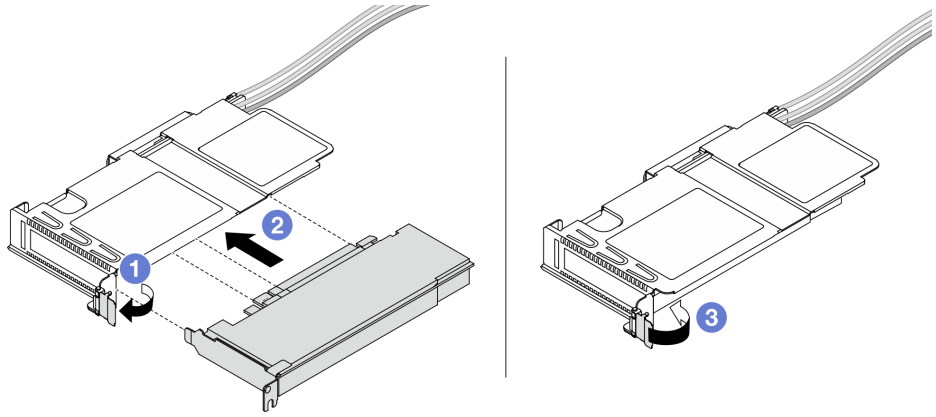


Figure 51. Installing the PCIe adapter

a. 1 Rotate the latch on the riser cage to open position.

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

c. 3 Rotate the latch on the riser cage to close position.

Step 5. Repeat the previous step on the full-height cage.

Step 6. Assemble the low-profile riser cage and the full-height riser cage.

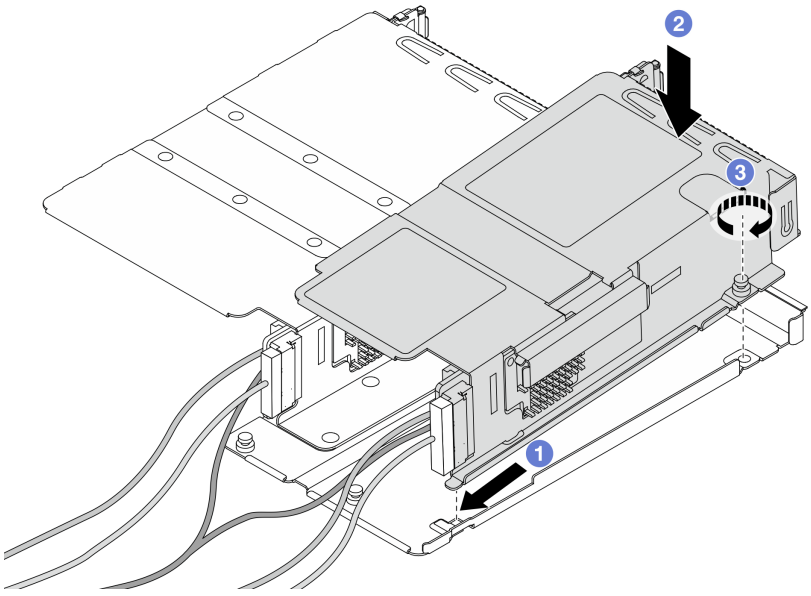


Figure 52. Assembling the two riser cages

a. 1 Tilt the low-profile cage and insert it to the latch on the full-height one.

b. 2 Place the low-profile cage down and align the screw holes.

c. 3 Tighten the screw and make sure the low-profile cage is secured.

After you finish

Complete the parts replacement. See “Complete the parts replacement” on page 221.

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 67
- “OCP interposer card replacement” on page 69

Front OCP module replacement

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

- “Remove the front OCP module” on page 67
- “Install the front OCP module” on page 68

Note: The OCP module is available only on some models.

Remove the front OCP module

Follow the steps in this section to remove a 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 20.
- 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.

Procedure

Step 1. Remove the front OCP module.

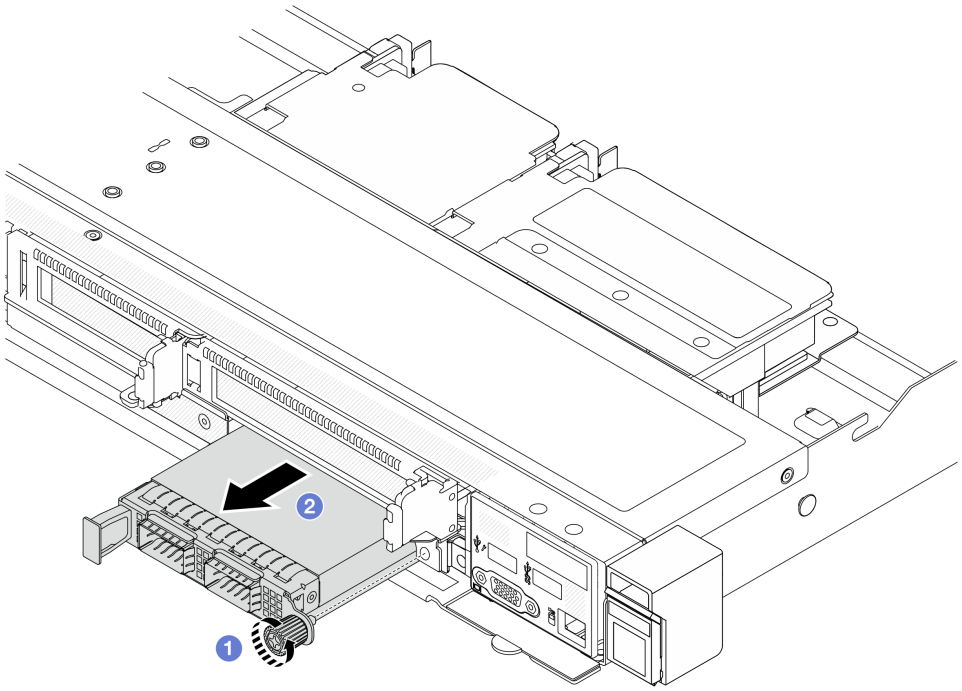


Figure 53. Removing the front OCP module

a. 1 Loosen the thumbscrew that secures the OCP module. Use a screwdriver if needed.
b. 2 Pull out the OCP module.

After you finish

1. Install a new front OCP module or a module filler. See "Install the front OCP module" on page 68.
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 the steps in this section to install a 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 20.
- 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.

Procedure

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

Step 2. Install a front OCP module.

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

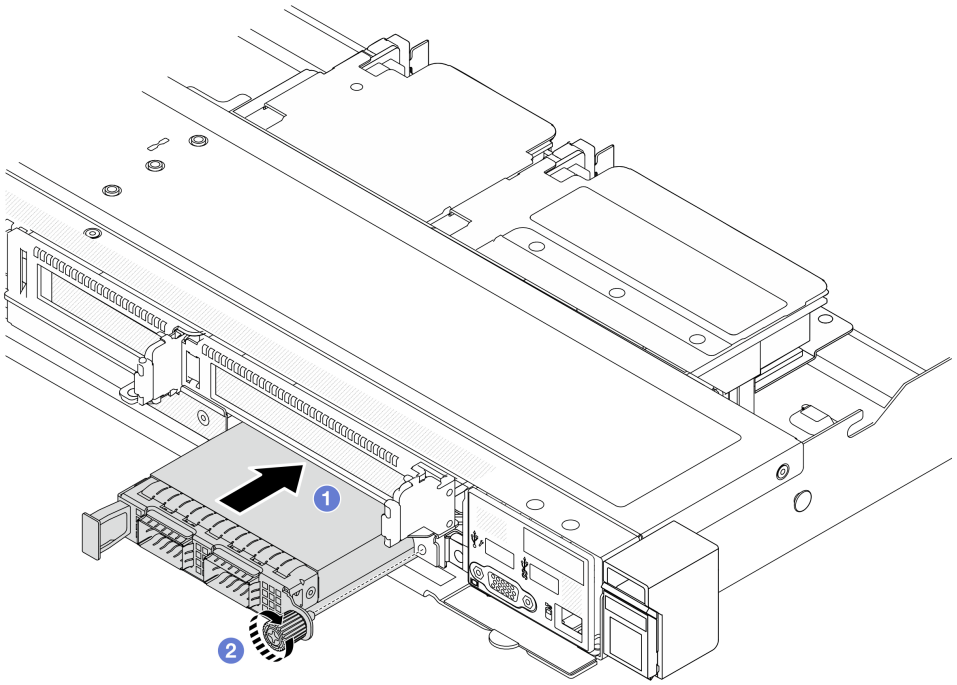


Figure 54. Installing the front OCP module

a. 1 Push the OCP module by its handle on the left until it is fully inserted into the connector on the front OCP interposer card.

b. 2 Fully tighten the thumbscrew to secure the adapter. Use a screwdriver if needed.

After you finish

Complete the parts replacement. See “Complete the parts replacement” on page 221.

Demo video

Watch the procedure on YouTube

OCP interposer card replacement

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

- “Remove the front OCP interposer card” on page 70
- “Install the front OCP interposer card” on page 71

- “Remove the rear OCP interposer card” on page 72
- “Install the rear OCP interposer card” on page 73

Remove the front OCP interposer card

Follow the steps in this section to remove a 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 20.
- 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.

Procedure

Step 1. Remove the top cover. See “Remove the top cover” on page 218.

Step 2. Remove the front riser cage. See “Remove the front riser cage” on page 59.

Step 3. Remove the front OCP module. See “Remove the front OCP module” on page 67.

Step 4. Remove the front OCP interposer card.

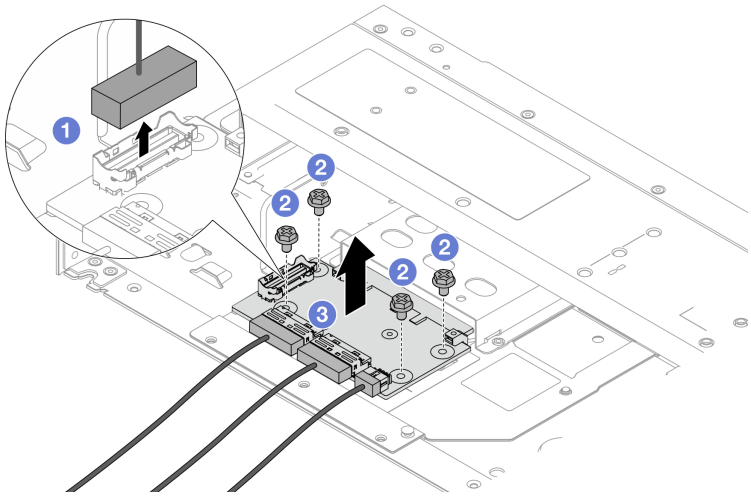


Figure 55. Removing the front OCP interposer card

a. 1 Disconnect the sideband connector to gain access to the screw underneath.

b. 2 Loosen four screws.

c. 3 Lift the front OCP interposer card out of the chassis.

Step 5. Disconnect the cables on the front OCP interposer card. For more details, see “OCP interposer card” on page 239.

After you finish

1. Install a new front OCP interposer card. See “Install the front OCP interposer card” on page 71.
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 the steps in this section to install a 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 20.
- 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.

Procedure

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

Step 2. Remove the top cover. See “Remove the top cover” on page 218.

Step 3. Connect the cables to the front OCP interposer card. For more details, see “OCP interposer card” on page 239.

Step 4. Install the front OCP interposer card to the chassis.

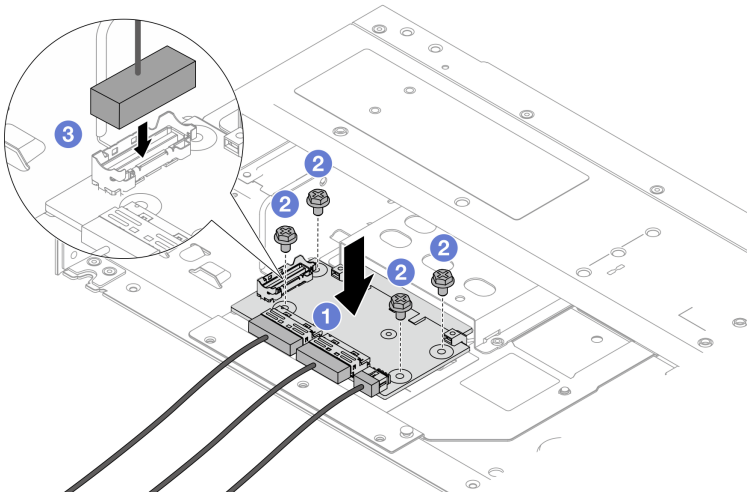


Figure 56. Installing the front OCP interposer card

a. 1 Place the front OCP interposer card on the chassis, and align the screw holes.

b. 2 Tighten four screws.

c. 3 Connect the sideband connector.

After you finish

Complete the parts replacement. See “Complete the parts replacement” on page 221.

Demo video

Watch the procedure on YouTube

Remove the rear OCP interposer card

Follow the steps in this section to remove a 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 20.
- 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.

Procedure

Step 1. Remove the top cover. See “Remove the top cover” on page 218.

Step 2. Disconnect the cables on the rear OCP interposer card. For more details, see “OCP interposer card” on page 239.

Step 3. Remove the rear OCP interposer card.

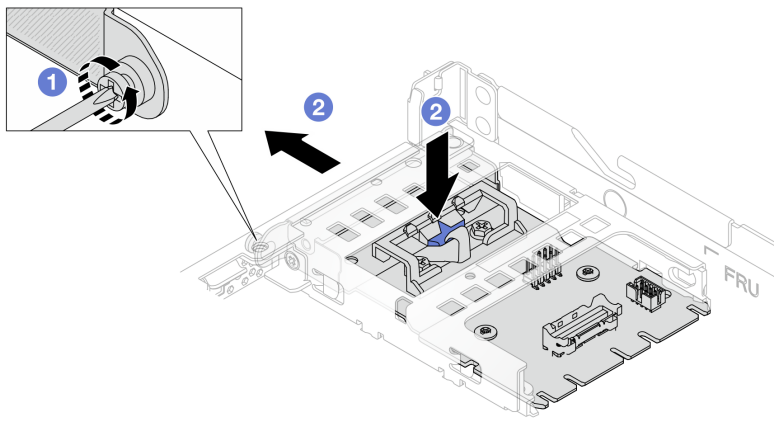


Figure 57. Removing the rear OCP interposer card

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

b. (2) Press and hold the blue latch. And pull the rear OCP interposer card by the latch out from the chassis.

After you finish

1. Install a new rear OCP interposer card. See "Install the rear OCP interposer card" on page 73.
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 the steps in this section to install a 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 20.
- 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.

Procedure

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

Step 2. Remove the top cover. See "Remove the top cover" on page 218.

Step 3. Install the rear OCP interposer card.

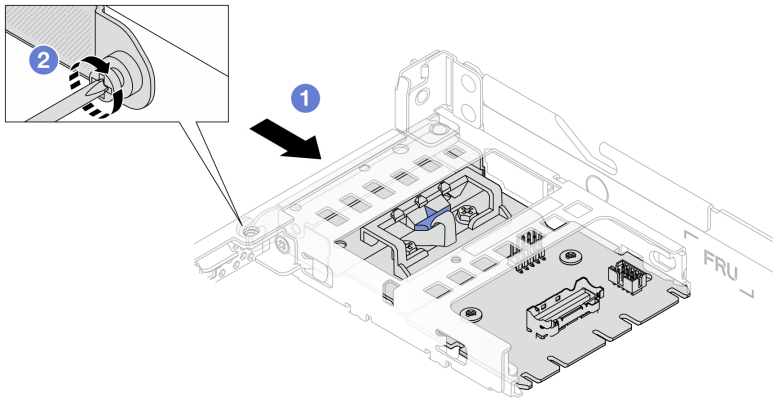


Figure 58. Installing the rear OCP interposer

a. (1) Slide the rear OCP interposer into the slot until it is fully seated.

b. (2) Tighten the screw to secure the rear OCP interposer.

Step 4. Connect the cables to the rear OCP interposer card. For more details, see “OCP interposer card” on page 239.

After you finish

Complete the parts replacement. See “Complete the parts replacement” on page 221.

Demo video

Watch the procedure on YouTube

Front I/O module replacement

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

- “Remove the front I/O module” on page 74
- “Install the front I/O module” on page 75
- “Remove the integrated diagnostics panel assembly” on page 76
- “Install the integrated diagnostics panel assembly” on page 78
- “Remove the external LCD cable (4 x 3.5'' chassis)” on page 79
- “Install the external LCD cable (4 x 3.5'' chassis)” on page 82

Remove the front I/O module

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

About this task

The following illustrates how to remove the front I/O module with a diagnostics panel. You can remove other front I/O modules in the same way.

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 20.
- 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.

Procedure

Step 1. Remove the top cover. See “Remove the top cover” on page 218.

Step 2. If the security bezel is installed, remove it. See “Remove the security bezel” on page 188.

Step 3. Disconnect the front I/O cables from the processor board.

Step 4. Remove the front I/O module.

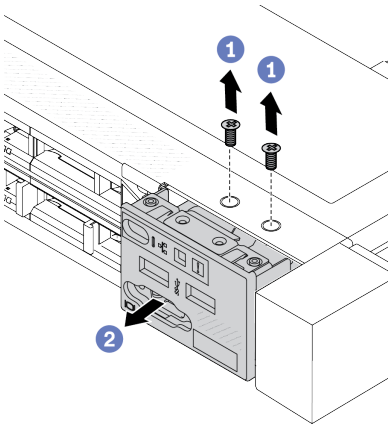


Figure 59. Remove a front I/O module on 2.5'' chassis

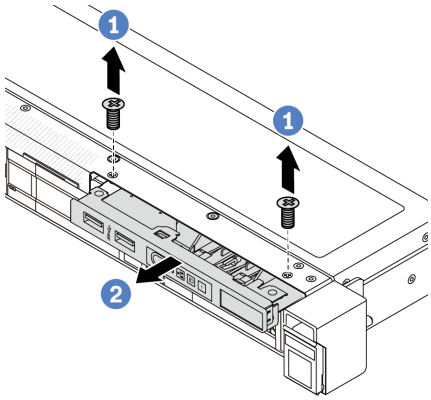


Figure 60. Remove a front I/O module on 3.5'' chassis

a. 1 Remove the screws that secure the front I/O module.

b. 2 Slide the front I/O module out of the front 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 front I/O module

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

About this task

The following illustrates how to install the front I/O module with the diagnostics panel. You can install other front I/O modules in the same way.

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 20.
- 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.

Procedure

Step 1. Touch the static-protective package that contains the front I/O module to any unpainted surface on the outside of the server. Then, take the front I/O module out of the package and place it on a static-protective surface.

Step 2. Install the front I/O module.

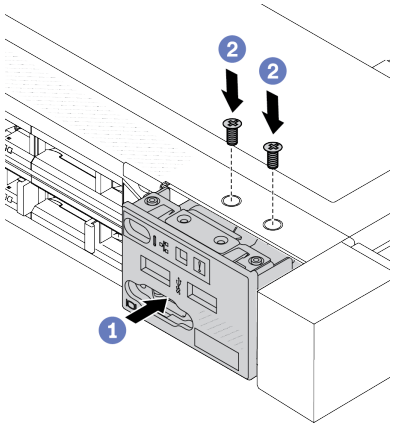


Figure 61. Install a front I/O module on 2.5'' chassis

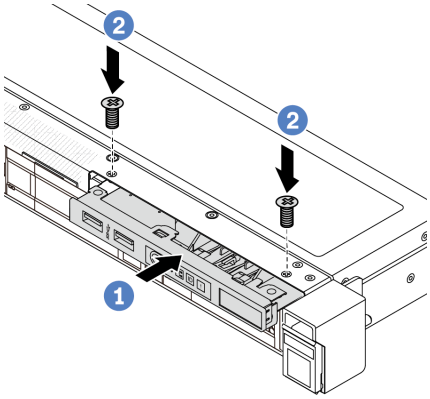


Figure 62. Install a front I/O module on 3.5'' chassis

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

b. 2 Install the screws to secure the front I/O module in place.

After you finish

1. Connect the front I/O cables to the processor board. See "Front I/O module" on page 236.
2. Complete the parts replacement. See "Complete the parts replacement" on page 221.

Demo video

Watch the procedure on YouTube

Remove the integrated diagnostics panel assembly

Use this information to remove the integrated diagnostics panel assembly.

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 20.
- 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.

Procedure

Step 1. Remove the top cover. See "Remove the top cover" on page 218.

Step 2. If the security bezel is installed, remove it. See “Remove the security bezel” on page 188.

Step 3. Remove the integrated diagnostics panel assembly from the chassis.

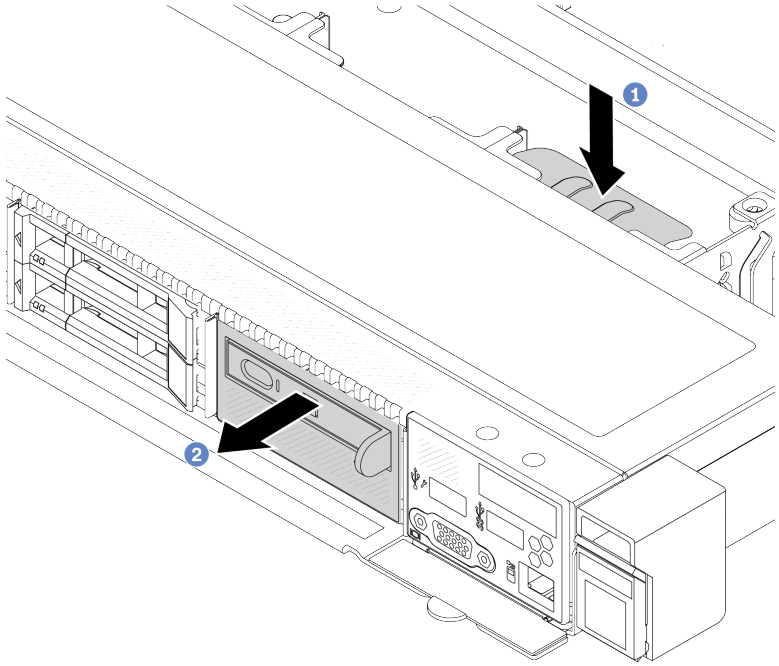


Figure 63. Integrated diagnostics panel assembly removal

a. 1 Press down the extended tab on the other side of the front chassis.

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

Step 4. Remove the integrated diagnostics panel from its assembly.

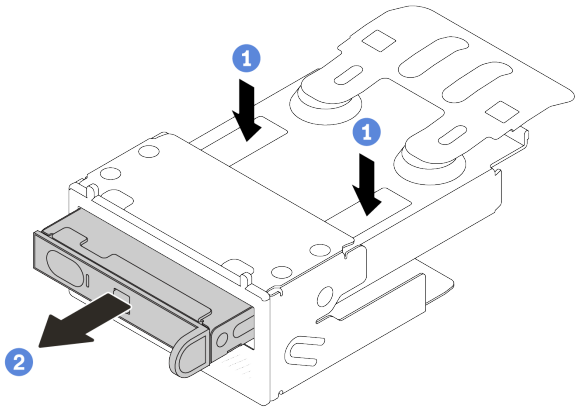


Figure 64. LCD diagnostics panel removal

a. 1 Press down the clips as shown.

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

After you finish

1. Install a new integrated diagnostics panel assembly or filler. See “Install the integrated diagnostics panel assembly” on page 78.
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 integrated diagnostics panel assembly

Use this information to install the diagnostics panel assembly.

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 20.
- 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.

Procedure

Step 1. Touch the static-protective package that contains the diagnostics panel assembly to any unpainted surface on the outside of the server. And then, take the assembly out of the package and place it on a static-protective surface.

Step 2. If there is a filler installed on the front chassis, remove it as shown.

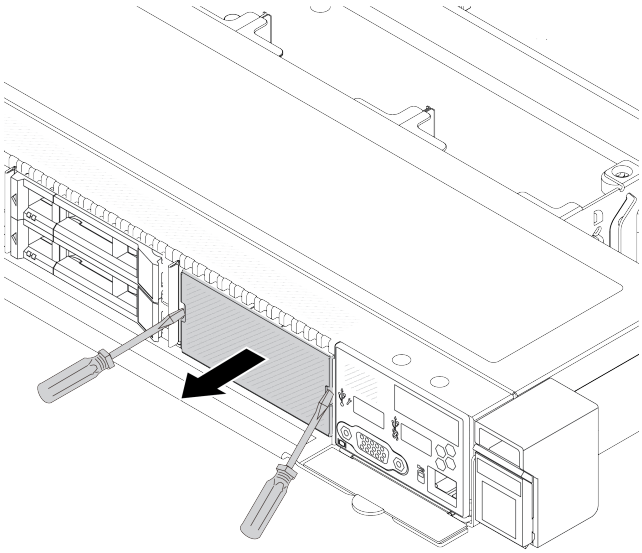


Figure 65. Filler removal

Step 3. Insert the integrated diagnostics panel into its assembly. Ensure that the panel is fully seated into its assembly.

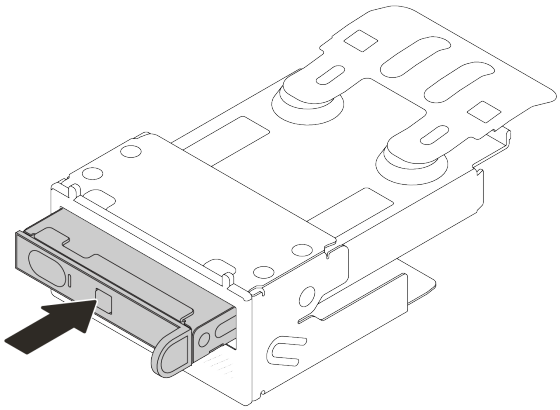


Figure 66. Integrated diagnostics panel installation into its assembly

Step 4. Slide the diagnostics panel assembly into the front chassis as shown. And ensure that it is seated in place.

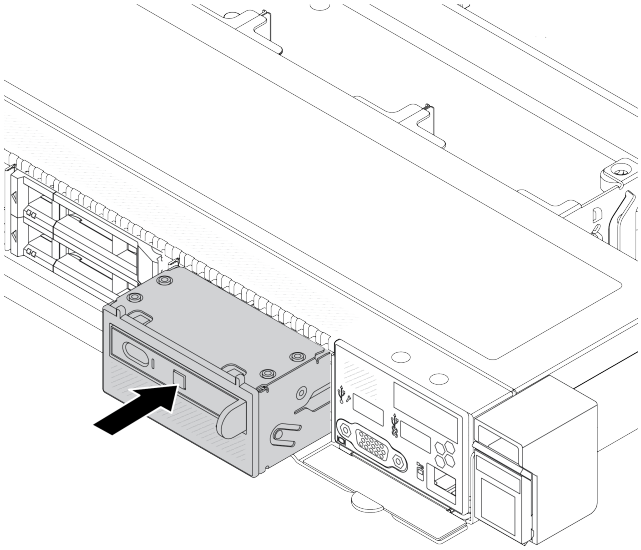


Figure 67. Diagnostics panel assembly installation

After you finish

Complete the parts replacement. See “Complete the parts replacement” on page 221.

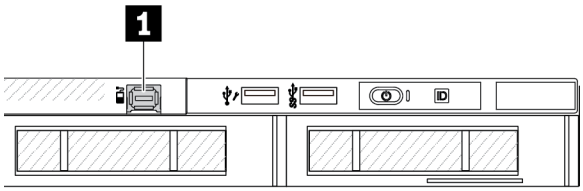
Demo video

Watch the procedure on YouTube

Remove the external LCD cable (4 x 3.5'' chassis)

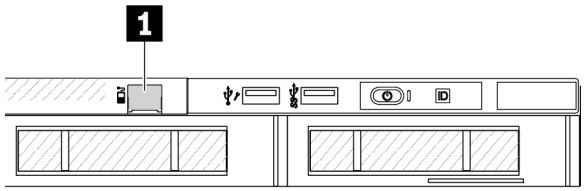
Use this information to remove the external LCD cable.

In the 4 x 3.5'' chassis configuration, the external LCD cable is an optional part. You can choose either install or remove the cable according to your actual needs. Refer to the location of external LCD cable from the front view as below:



1 The external LCD cable connector

Figure 68. A front view with the cable installed



1 A filler for external LCD cable connector

Figure 69. A front view with a filler installed

Note: Before installing the cable, remove the filler first; after removing the cable, install the filler afterwards.

About this task

The following illustrates how to remove the external LCD cable from the chassis.

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 20.
- 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.

Watch the procedure

A video of this procedure is available on YouTube: https://www.youtube.com/playlist?list=PLYV5R7hVcs-CfNsWy-689CRZHExrZEi9I.

Procedure

Step 1. Remove the top cover. See "Remove the top cover" on page 218.

Step 2. If the security bezel is installed, remove it. See "Remove the security bezel" on page 188.

Step 3. Disconnect the external LCD cable from the processor board.

Step 4. To get a better view of the cable connector latch inside the chassis, remove the front I/O module first.

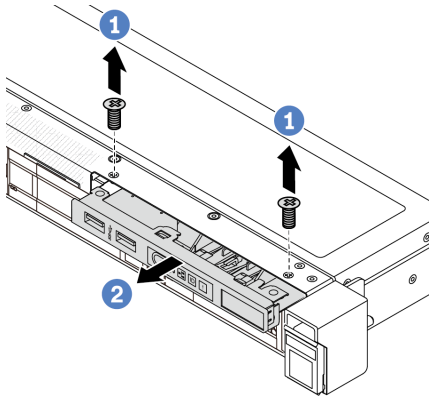


Figure 70. Front I/O module removal

a. 1 Remove the screws that secure the front I/O module.

b. 2 Slide the front I/O module out of the front chassis.

Step 5. Remove the external LCD cable.

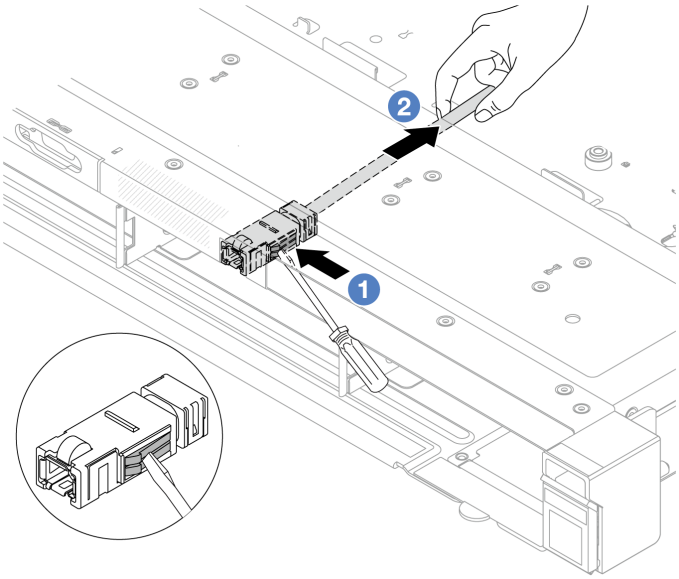


Figure 71. Removal of the external LCD cable

a. 1 Poke the connector latch with the tip of a flat-blade screwdriver (3 or 4 mm) to disengage the connector from the chassis.

b. 2 Pull out the cable from the back side.

Step 6. Install the front I/O module back to the chassis.

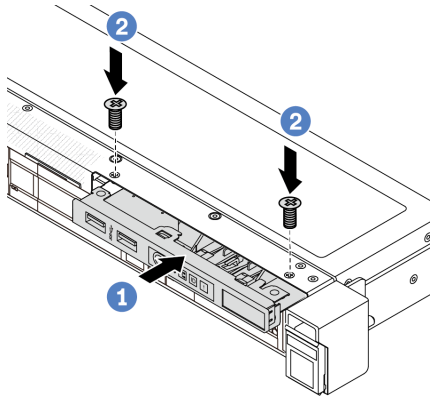


Figure 72. Front I/O module installation

a. 1 Insert the front I/O module into the front chassis.
b. 2 Install the screws to secure the front I/O module in place.

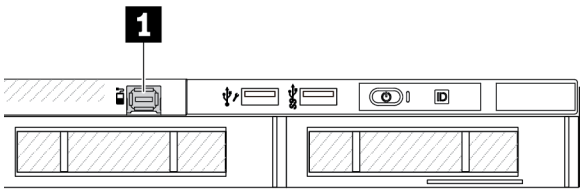
After you finish

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 the external LCD cable (4 x 3.5'' chassis)

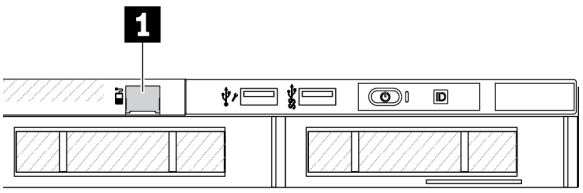
Use this information to install the external LCD cable.

In the 4 x 3.5'' chassis configuration, the external LCD cable is an optional part. You can choose either install or remove the cable according to your actual needs. Refer to the location of external LCD cable from the front view as below:



1 The external LCD cable connector

Figure 73. A front view with the cable installed



1 A filler for external LCD cable connector

Figure 74. A front view with a filler installed

Note: Before installing the cable, remove the filler first; after removing the cable, install the filler afterwards.

About this task

The following illustrates how to remove the external LCD cable from the chassis.

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 20.
- 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.

Watch the procedure

A video of this procedure is available on YouTube: https://www.youtube.com/playlist?list=PLYV5R7hVcs-CfNsWy-689CRZHExrZEi9l.

Procedure

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

Step 2. Install the external LCD cable.

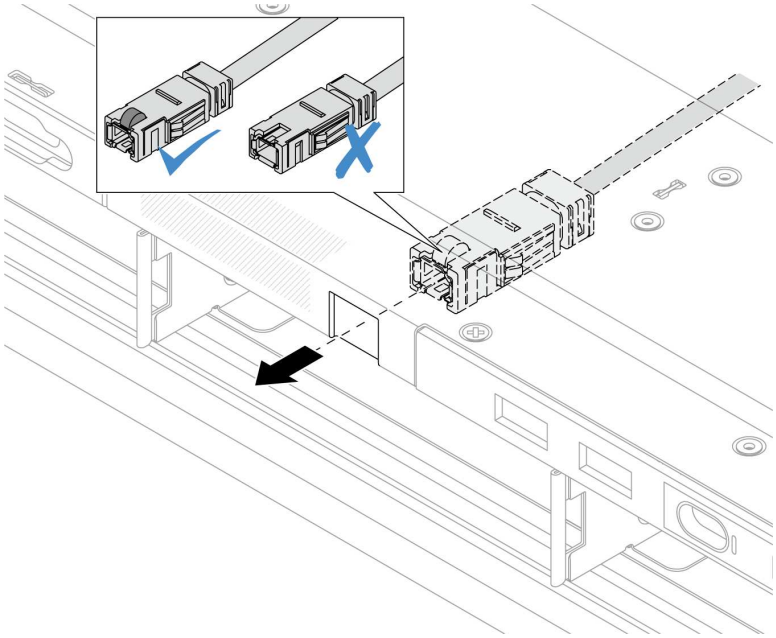


Figure 75. Installation of the external LCD cable

Note: The front and back sides of the connector to external diagnostics slot are different, and it is required to plug in with the front side.

When plugging in, face the front side upward and slide the connector into the chassis. Refer to the illustration above.

After you finish

1. Connect the external LCD cable to the processor board. See Chapter 2 “Internal cable routing” on page 223.
2. Complete the parts replacement. See “Complete the parts replacement” on page 221.

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 20.
- 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.
- 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 preparations for this task.

a. Remove the top cover. See “Remove the top cover” on page 218.

b. Remove the air baffle. See “Remove the air baffle” on page 29.

c. Remove the PHM. See “Remove a processor and heat sink” on page 147.

Step 2. Remove the Torx T30 nut.

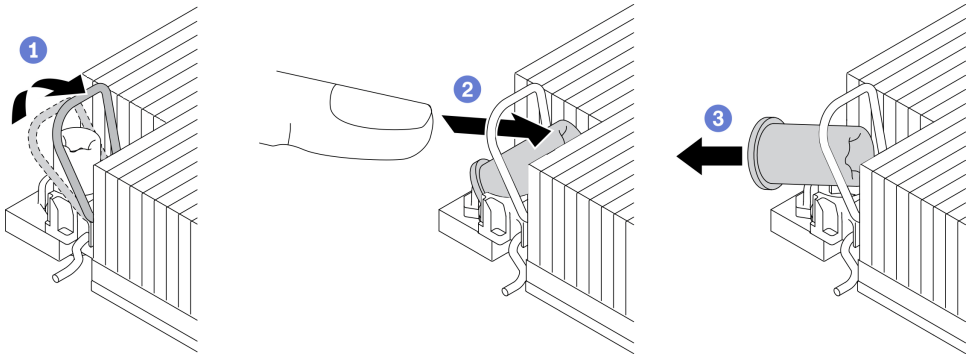


Figure 76. Removing a Torx T30 nut from the heat sink

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 85.
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 20.
- 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.
- 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/sr630v3/7d72/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.

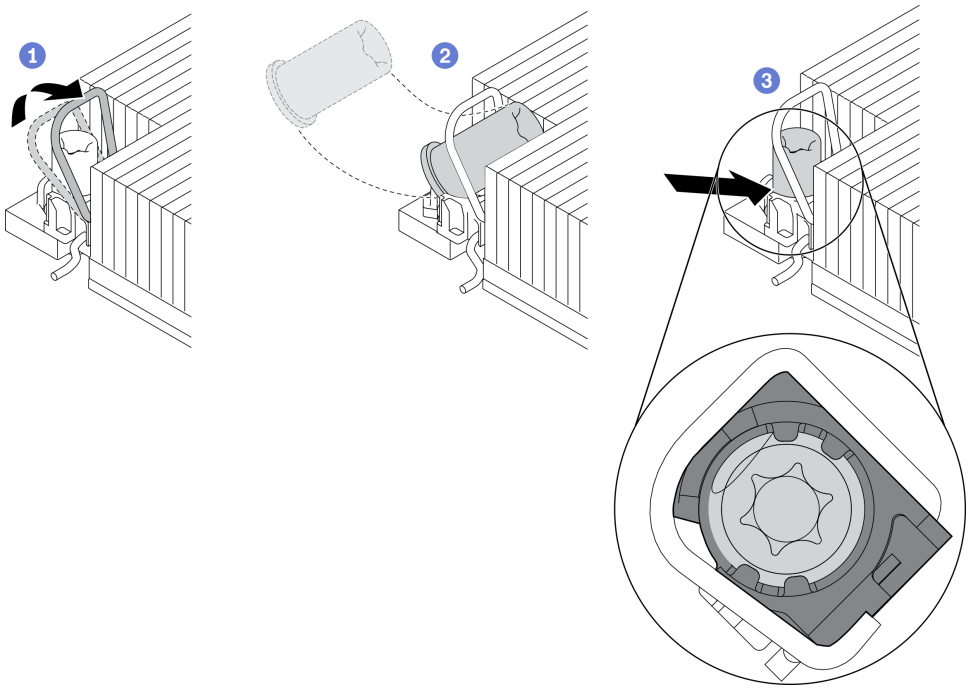


Figure 77. Installing a Torx T30 nut into the heat sink

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 153.
2. Complete the parts replacement. See “Complete the parts replacement” on page 221.

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.

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 the instructions and those in this topic.
- 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 any removed drive fillers for future use to cover vacant bays.

- 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 2.5/3.5-inch hot-swap drive

Use this information to remove a 2.5/3.5-inch hot-swap drive.

About this task

The following describes the information that you must consider for this task:

- Ensure that you have backed up data on your drive, especially if it is part of a RAID array.
  - Before you make changes to drives, RAID adapters, or drive backplanes, back up all important data that is stored on the drives.
  - Before you remove any component of a RAID array, back up all RAID configuration information.
- If one or more NVMe drives are to be removed, it is recommended to disable them first in Safely Remove Hardware and Eject Media (Windows) or filesystem (Linux). Log in to XClarity Controller and go to the **Storage** menu to identify and locate the drive type and corresponding drive bay number. If the drive bay numbers come with the term “NVMe”, it indicates that the installed drives are NVMe drives.

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 systems.
- 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. If the security bezel is installed, remove it first. See “Remove the security bezel” on page 188.

Step 2. Remove a hot-swap drive.

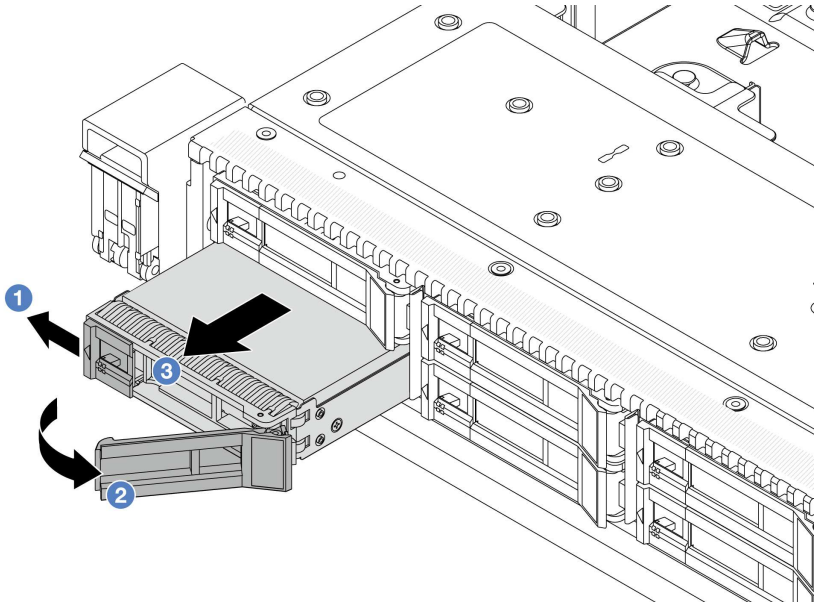


Figure 78. Remove a hot-swap drive

a. 1 Slide the release latch to the left to open the drive tray handle.

b. 2 Open the drive handle.

c. 3 Slide the drive out of the drive bay.

After you finish

1. Install a drive filler or a new drive to cover the drive bay.

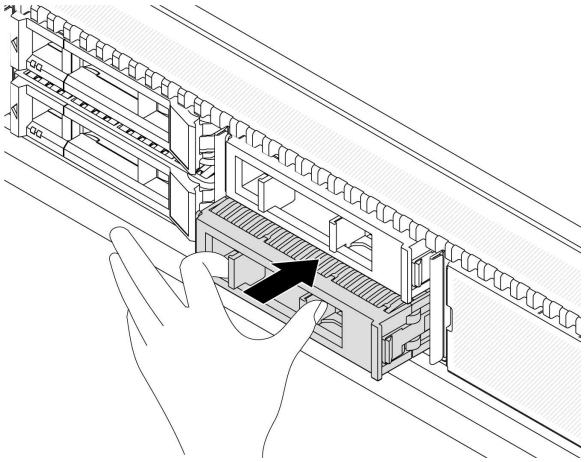


Figure 79. Install a drive filler

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 2.5/3.5-inch hot-swap drive

Use this information to install a 2.5/3.5-inch 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.
- 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.

Procedure

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

Note: Ensure that drive installation meets “Technical rules for drives” on page 16.

Step 2. Remove the drive filler from the drive bay and keep the drive filler in a safe place.

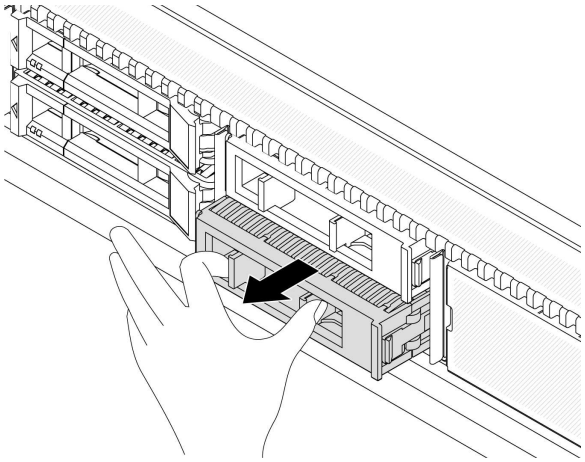


Figure 80. Remove a drive filler

Step 3. Install the drive in the drive bay.

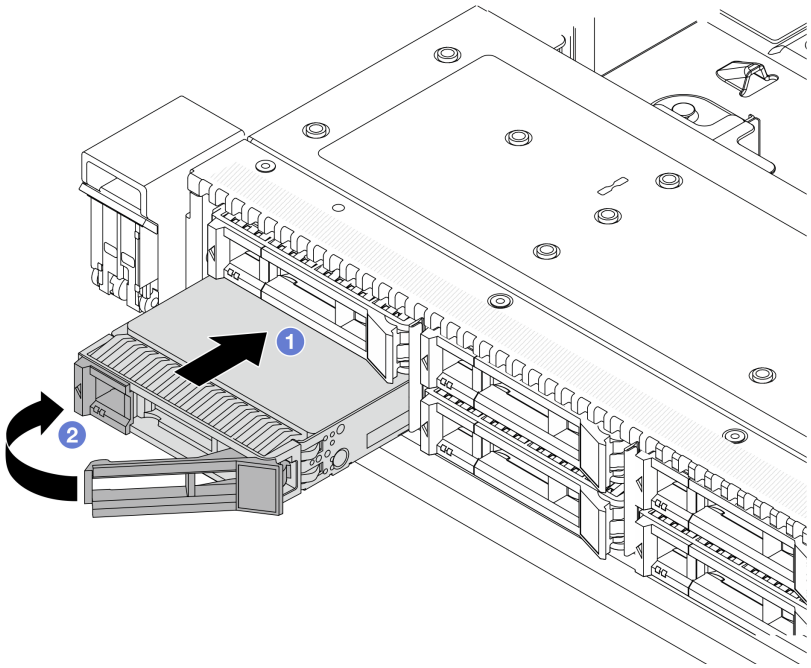


Figure 81. Hot-swap drive installation

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.

Step 4. Check the drive LEDs to verify that the drive is operating normally. For details, see “LEDs on drives” in *User Guide*.

Step 5. Continue to install additional hot-swap drives if necessary.

After you finish

1. Reinstall the security bezel if you removed it. See “Install the security bezel” on page 190.
2. Use the Lenovo XClarity Provisioning Manager to configure the RAID if necessary. For more information, see:
   https://pubs.lenovo.com/lxpm-overview/

Demo video

Watch the procedure on YouTube

Remove a hot-swap EDSFF drive

Use this information to remove an EDSFF drive.

About this task

The following describes the information that you must consider for this task:

- Ensure that you have backed up data on your drive, especially if it is part of a RAID array.

  - Before you make changes to drives, RAID adapters, or drive backplanes, back up all important data that is stored on the drives.
  - Before you remove any component of a RAID array, back up all RAID configuration information.
- If one or more NVMe drives are to be removed, it is recommended to disable them first in Safely Remove Hardware and Eject Media (Windows) or filesystem (Linux). Log in to XClarity Controller and go to the **Storage** menu to identify and locate the drive type and corresponding drive bay number. If the drive bay numbers come with the term “NVMe”, it indicates that the installed drives are NVMe drives.

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 systems.
- 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. If the security bezel is installed, remove it first. See “Remove the security bezel” on page 188.

Step 2. Remove the EDSFF drive cage cover.

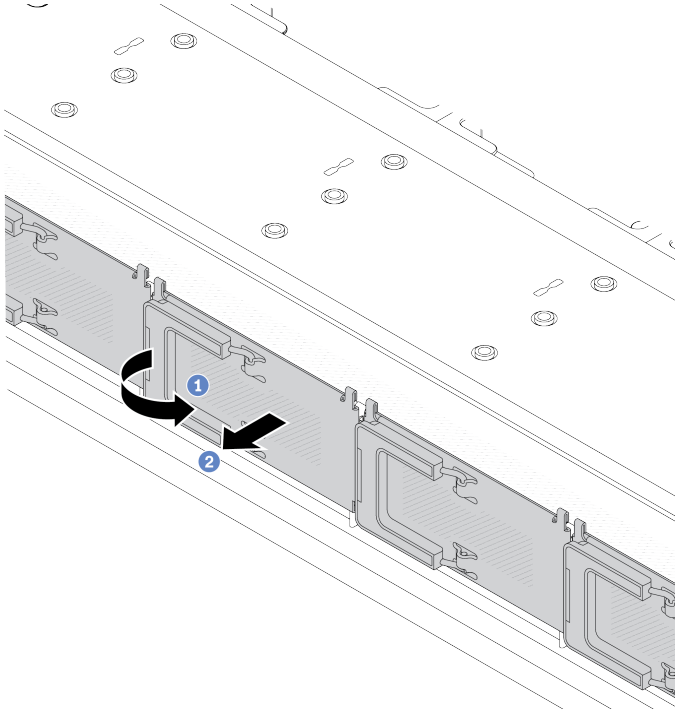


Figure 82. EDSFF drive cage cover removal

a. 1 Open the handle as shown.

b. 2 Grasp the handle and remove the drive cage cover.

Step 3. Remove the EDSFF drive.

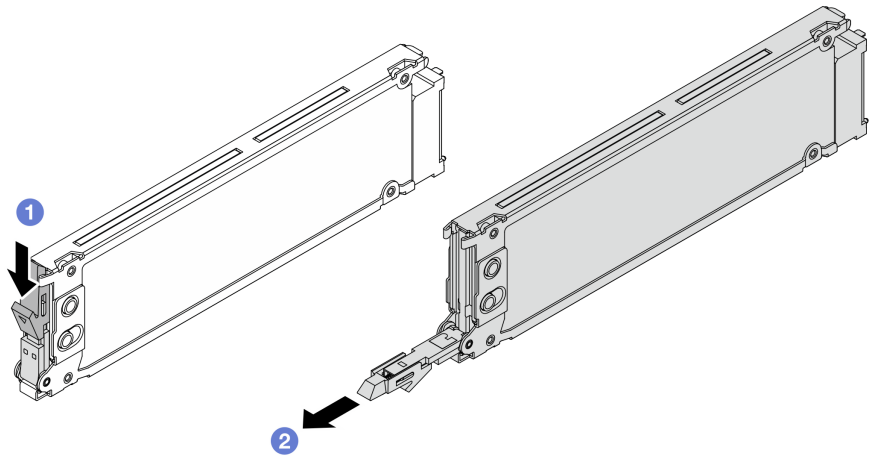


Figure 83. EDSFF drive removal

a. 1 Slide the release latch as shown to open the drive tray handle.

b. 2 Grasp the handle and slide the drive out of the drive bay.

After you finish

1. Install a new drive or a drive cage cover to cover the drive bay.

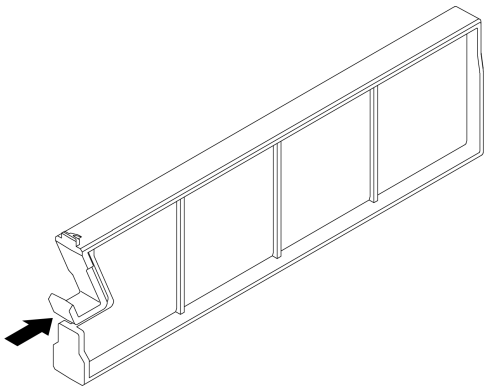


Figure 84. EDSFF drive filler installation

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 EDSFF drive

Use this information to install an EDSFF drive.

About this task

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 systems.

Procedure

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

Step 2. Remove the drive filler from the drive bay and keep the drive filler in a safe place.

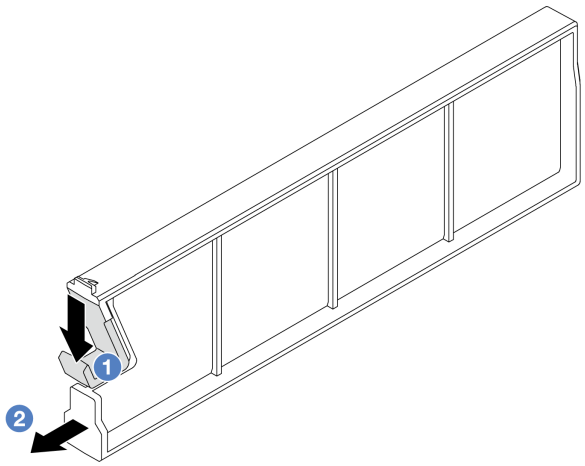


Figure 85. Remove an EDSFF drive filler

a. 1 Press the latch down to disengage the drive clip from the cage.

b. 2 Pull and slide the filler out.

Step 3. Install the EDSFF drive.

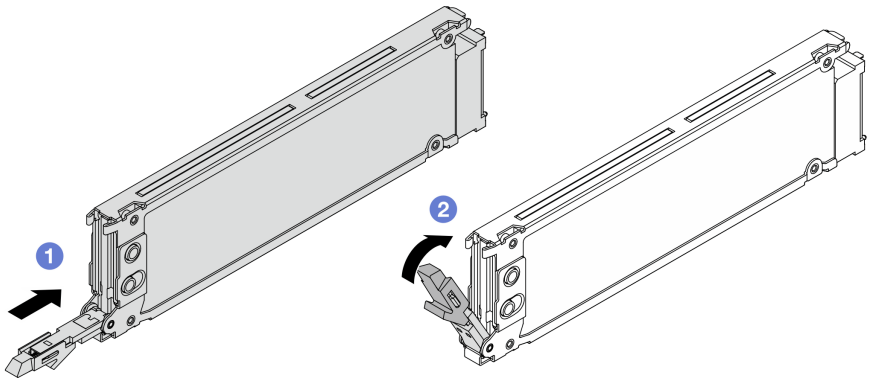


Figure 86. EDSFF drive installation

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.

Step 4. Continue to install additional EDSFF drives if necessary.

Step 5. Install the EDSFF drive cage cover.

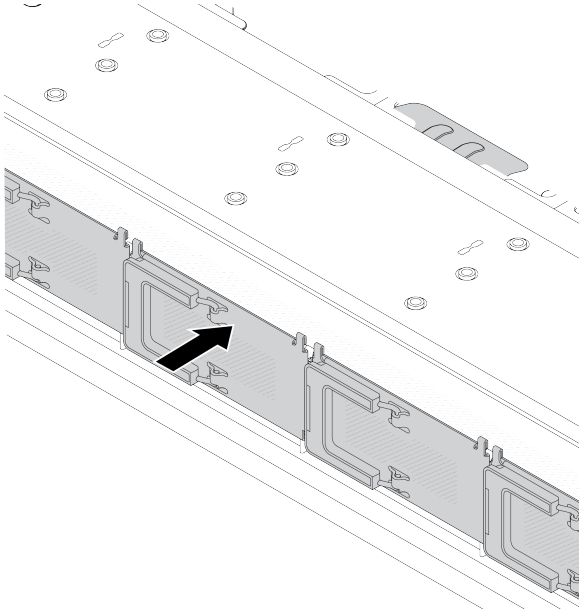


Figure 87. EDSFF drive cage cover installation

After you finish

1. Reinstall the security bezel if you have removed it. See “Install the security bezel” on page 190.
2. Use the Lenovo XClarity Provisioning Manager to configure the RAID if necessary. For more information, see:
   https://pubs.lenovo.com/lxpm-overview/

Demo video

Watch the procedure on YouTube

Hot-swap power supply unit replacement

Use this information to remove and install a hot-swap power supply unit.

Remove a hot-swap power supply unit

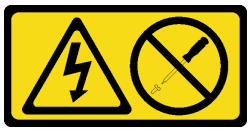
Use this information to remove a power supply unit.

About this task

If the power supply unit to be removed is the only one installed, the power supply unit is not hot-swappable. Before removing it, you must turn off the server first. To support redundancy mode or hot-swap, install an additional hot-swap power supply unit.

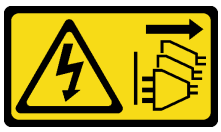
Safety information for AC power supplies

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.**

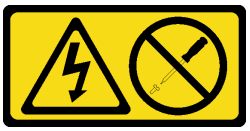
Safety information for DC power supplies

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.

在直流输入状态下，若电源供应器插座不支持热插拔功能，请务必不要对设备电源线进行热插拔，此操作可能导致设备损坏及数据丢失。因错误执行热插拔导致的设备故障或损坏，不属于保修范围。

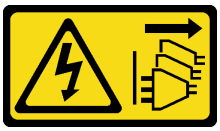
NEVER CONNECT AND DISCONNECT THE POWER SUPPLY CABLE AND EQUIPMENT WHILE YOUR EQUIPMENT IS POWERED ON WITH DC SUPPLY (hot-plugging). Otherwise you may damage the equipment and result in data loss, the damages and losses result from incorrect operation of the equipment will not be covered by the manufacturers' warranty.

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.

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 systems.

Procedure

Step 1. If the server is in a rack, adjust the cable management arm (CMA) to gain access to the power supply unit bay.

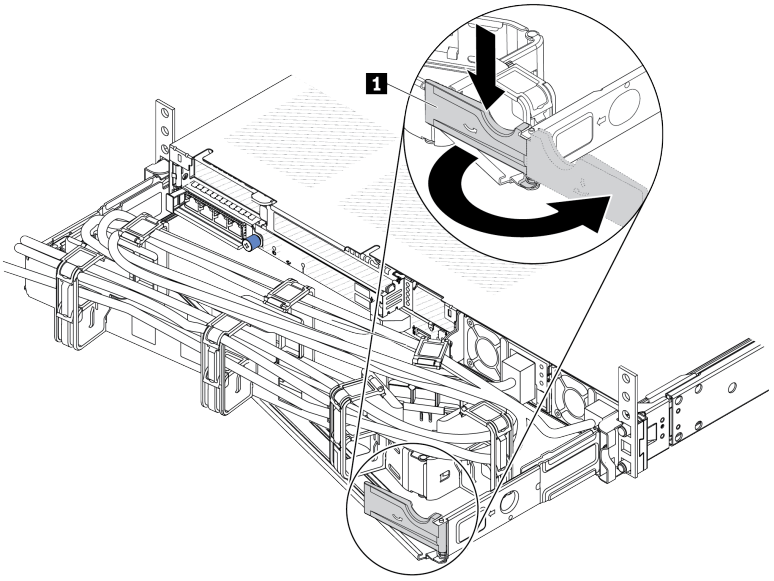


Figure 88. CMA adjustment

1. Press down the stop bracket 1 and rotate it to the open position.
2. Rotate the CMA out of the way to gain access to the power supply units.

Step 2. Disconnect the power cord from the hot-swap power supply unit.

- For 240 V DC power supply units, turn off the server, and then, disconnect both ends of the power cord and keep it in an ESD-safe place.
- For AC power supply units, disconnect both ends of the power cord and keep it in an ESD-safe place.
- For –48V DC power supply units:
  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 supply units, 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 unit until the power output LED for the firstly replaced power supply unit is lit. For the location of the power output LED, refer to “LEDs on the power supply unit” in *User Guide*.

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 unit out of the chassis.

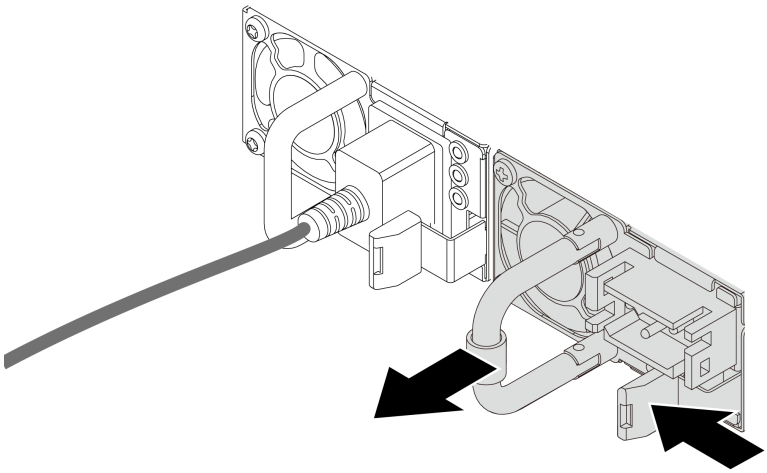


Figure 89. Hot-swap power supply removal

After you finish

1. Install a new power supply unit or install the power-supply-unit filler to cover the power supply bay. See "Install a hot-swap power supply unit" on page 99.

   Important: To ensure proper cooling during normal server operation, both power supply bays must be occupied. This means that each bay must have a power supply unit installed; or one has a power supply unit installed and the other has a power-supply-unit 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 hot-swap power supply unit

Use this information to install a hot-swap power supply unit.

About this task

The following describes the information that you must consider when installing a power supply unit:

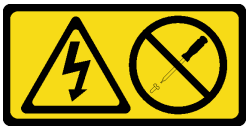
- If the power supply unit to be removed is the only one installed, the power supply unit is not hot-swappable. Before removing it, you must turn off the server first. To support redundancy mode or hot-swap, install an additional hot-swap power supply unit.
- If you are replacing the existing power supply 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 on the existing label near the power supply.

Figure 90. Example power supply unit label on the top cover

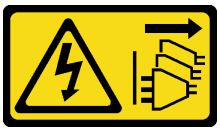
Safety information for AC power supplies

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.**

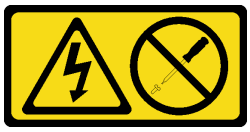
Safety information for DC power supplies

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.

在直流输入状态下，若电源供应器插座不支持热插拔功能，请务必不要对设备电源线进行热插拔，此操作可能导致设备损坏及数据丢失。因错误执行热插拔导致的设备故障或损坏，不属于保修范围。

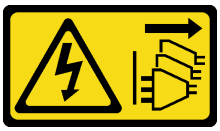
NEVER CONNECT AND DISCONNECT THE POWER SUPPLY CABLE AND EQUIPMENT WHILE YOUR EQUIPMENT IS POWERED ON WITH DC SUPPLY (hot-plugging). Otherwise you may damage the equipment and result in data loss, the damages and losses result from incorrect operation of the equipment will not be covered by the manufacturers' warranty.

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.

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 systems.

Procedure

Step 1. Touch the static-protective package that contains the hot-swap power supply unit to any unpainted surface on the outside of the server. And then, take the hot-swap power supply unit out of the package and place it on a static-protective surface.

Step 2. If there is a power-supply-unit filler installed, remove it.

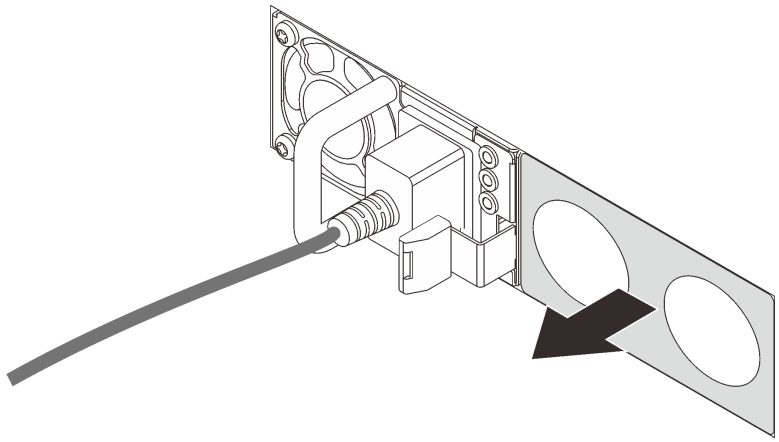


Figure 91. Hot-swap power supply filler removal

Step 3. Slide the new hot-swap power supply unit into the bay until it snaps into position.

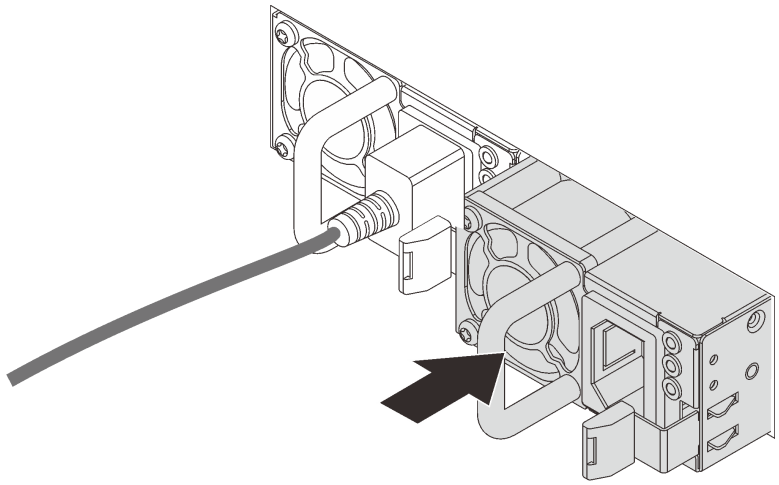


Figure 92. Hot-swap power supply installation

Step 4. Connect the power supply unit to a properly grounded electrical outlet.

- For 240 V DC power supply units:
  1. Turn off the server.
  2. Connect one end of the power cord to the power connector on the power supply unit.
  3. Connect the other end of the power cord 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, and then plug the pins into corresponding holes on the power block. Use the table above for guidance to ensure that the pins find correct slots.
  4. Tighten the captive screws on the power block. Ensure that the screws and cord pins are secured in place and no bare metal parts are shown.
  5. Connect the other end of the cables to a properly grounded electrical outlet. Ensure that the cable ends find correct outlets.

After you finish

1. If you have adjusted the CMA to gain access to the power supply bay, 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 unit are lit, indicating that the power supply unit is operating properly.

Demo video

Watch the procedure on YouTube

Internal CFF RAID adapter replacement

Use this information to remove and install the internal CFF RAID adapter.

Remove the internal CFF RAID adapter

Use this information to remove the internal CFF RAID 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 20.
- 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.

Procedure

Step 1. Remove the top cover. See “Remove the top cover” on page 218.

Step 2. Remove any components that may impede access to the internal CFF RAID adapter.

Step 3. Disconnect all cables from the internal CFF RAID adapter.

Step 4. Lift the release pin, slightly slide the internal CFF RAID adapter as shown, and carefully lift it out of the chassis.

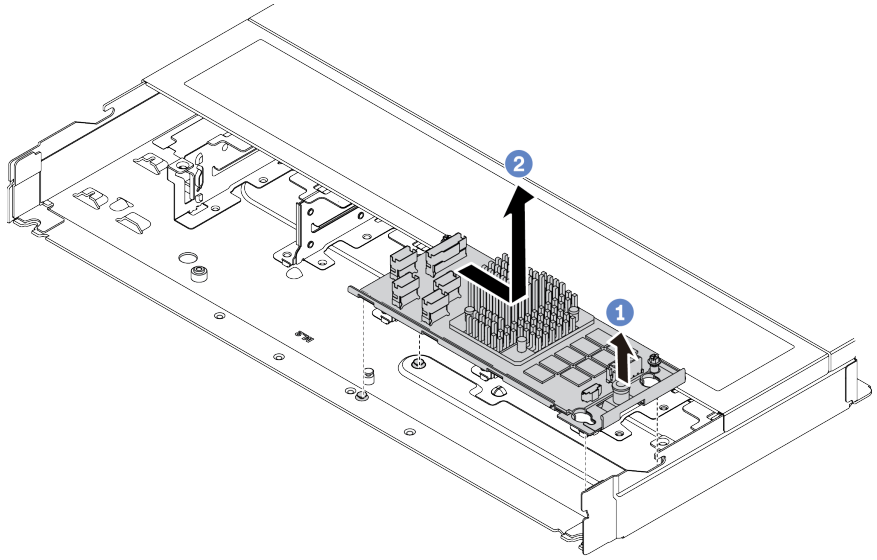


Figure 93. internal CFF RAID adapter removal

a. 1 Release the push pin on the internal CFF RAID adapter.

b. 2 Move the adapter to the right and then 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.

Demo video

Watch the procedure on YouTube

Install the internal CFF RAID adapter

Use this information to install the internal CFF RAID 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 20.

- 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.

Procedure

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

Step 2. Align the notches on the tray with the pins on the chassis, place down the internal CFF RAID adapter, and slightly slide it as shown to secure it on the chassis.

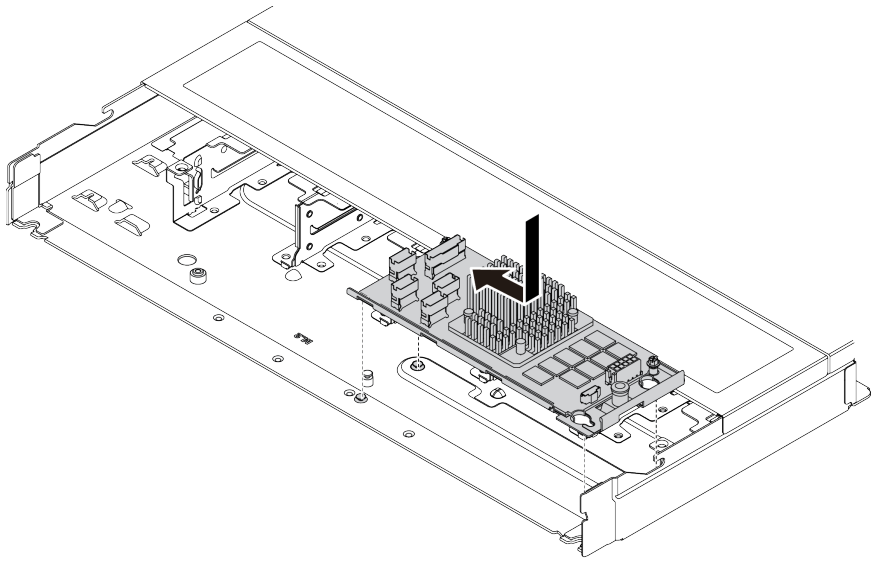


Figure 94. internal CFF RAID adapter installation

Step 3. Connect cables to the internal RAID adapter. See “CFF RAID adapter” on page 234.

After you finish

Complete the parts replacement. See “Complete the parts replacement” on page 221.

Demo video

Watch the procedure on YouTube

Intrusion switch replacement

Use this information to remove and install an 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 an intrusion switch

Use this information to remove an intrusion switch.

About this task

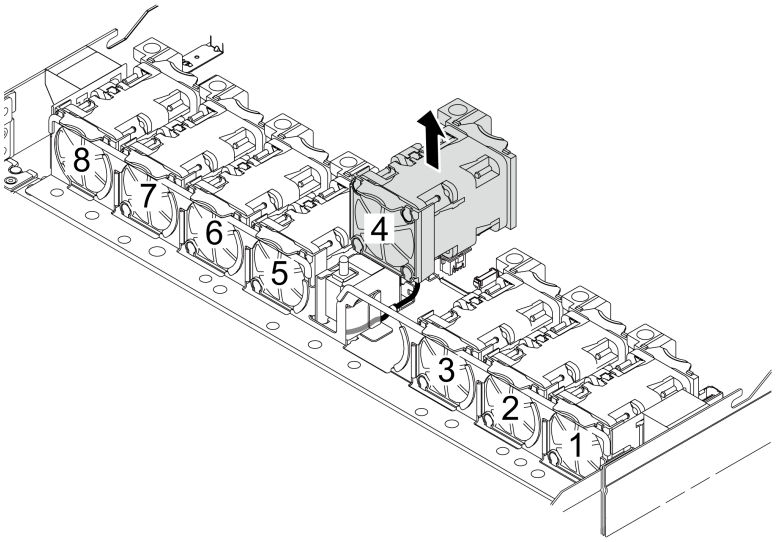
Attention:

- 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 20.
- 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.

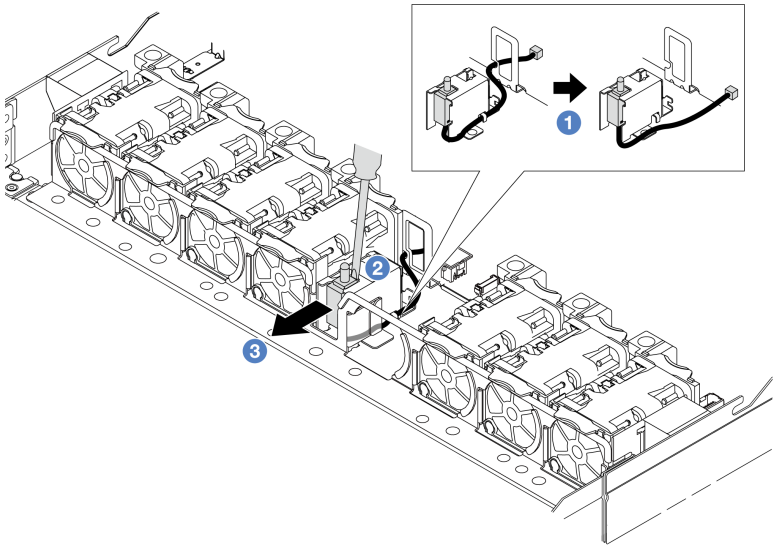
Procedure

Step 1. Remove the top cover. See “Remove the top cover” on page 218.

Step 2. Remove the system fan 4.



Step 3. Remove the intrusion switch.

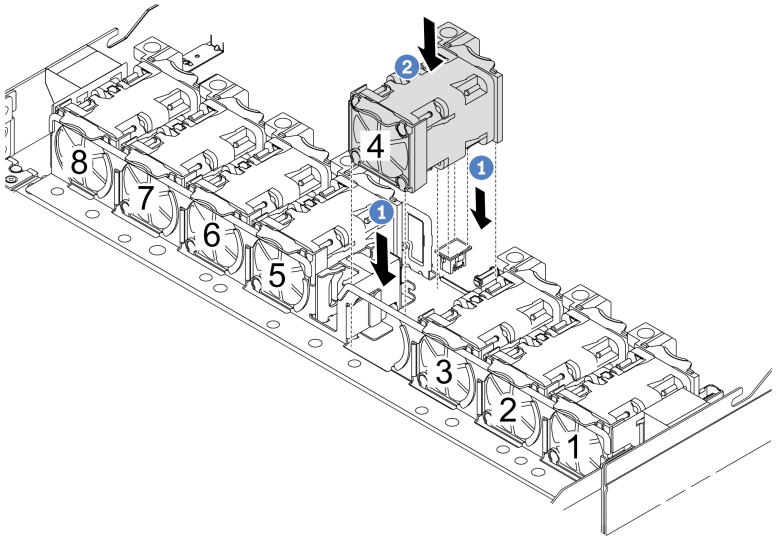


a. 1 Disconnect the cable of the intrusion switch from the processor board. For the location of the intrusion switch connector and cable routing information, refer to "System-board-assembly connectors" on page 451 and "Intrusion switch" on page 238. Route the cable out of the cable clip.

b. 2 Insert the tip of a slotted screwdriver into the gap between the cage and switch and push outwards.

c. 3 Slide the intrusion switch as shown to remove it.

Step 4. Re-install the system fan 4.



a. 1 Align the four corners of the fan to fan module socket and put it down.

b. 2 Press the fan latch down to ensure that it is plugged in the connector.

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 intrusion switch

Use this information to install an intrusion switch.

About this task

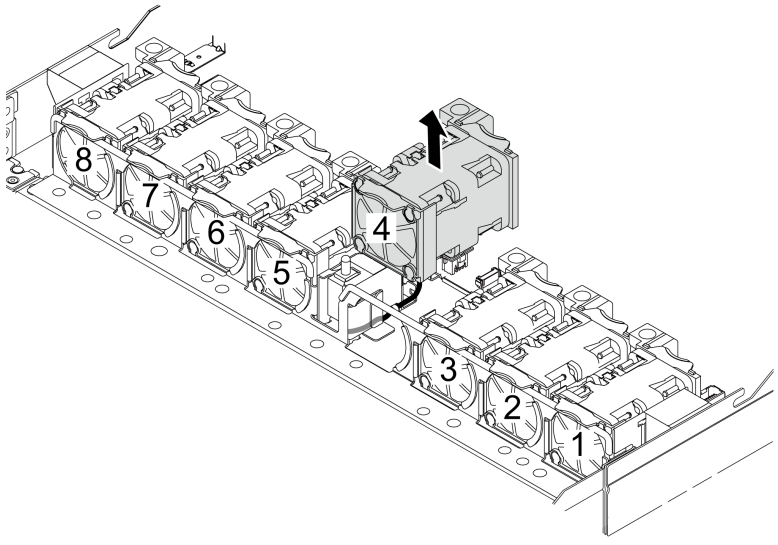
Attention:

- 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 20.
- 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.

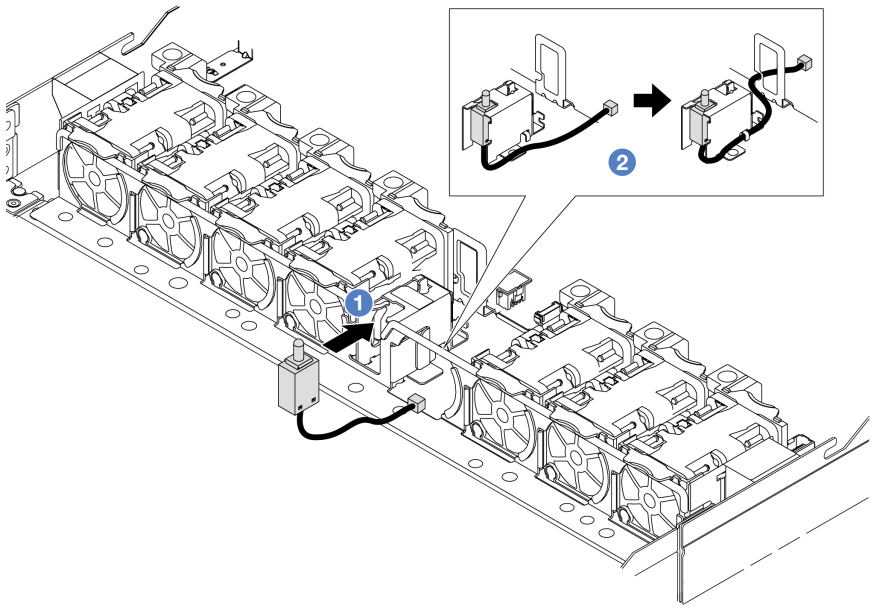
Procedure

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

Step 2. Remove the system fan 4.



Step 3. Install the intrusion switch.

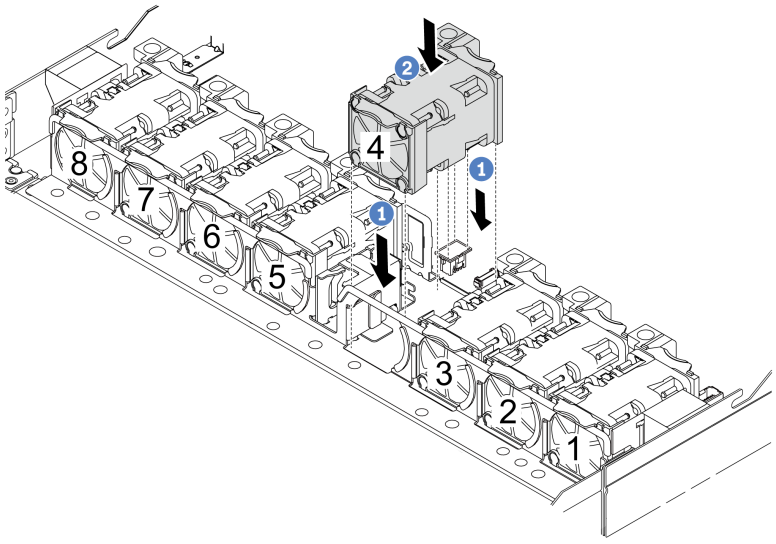


a. 1 Insert the intrusion switch into the cage.

b. 2 Route the cable into the cable clip.

Step 4. Connect the cable of the intrusion switch to the intrusion switch connector on the processor board. See “Intrusion switch” on page 238.

Step 5. Re-install the system fan 4.



a. 1 Align the four corners of the fan to fan module socket and put it down.

b. 2 Press the fan latch down to ensure that it is plugged in the connector.

After you finish

Complete the parts replacement. See “Complete the parts replacement” on page 221.

Demo video

Watch the procedure on YouTube

Lenovo Neptune(TM) Liquid to Air Module replacement (trained technicians only)

Follow the instructions in this section to remove and install the Liquid to Air Module (L2AM).

Important: This task must be operated by trained technicians that are certified by Lenovo Service. Do no attempt to remove or install it without proper training and qualification.

Remove the Lenovo Neptune(TM) Liquid to Air Module

Follow the instructions in this section to remove the Liquid to Air Module (L2AM).

Important: This task must be operated by trained technicians that are certified by Lenovo Service. Do no attempt to remove or install it without proper training and qualification.

About this task

Safety information for leakage 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 20.
- 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.

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

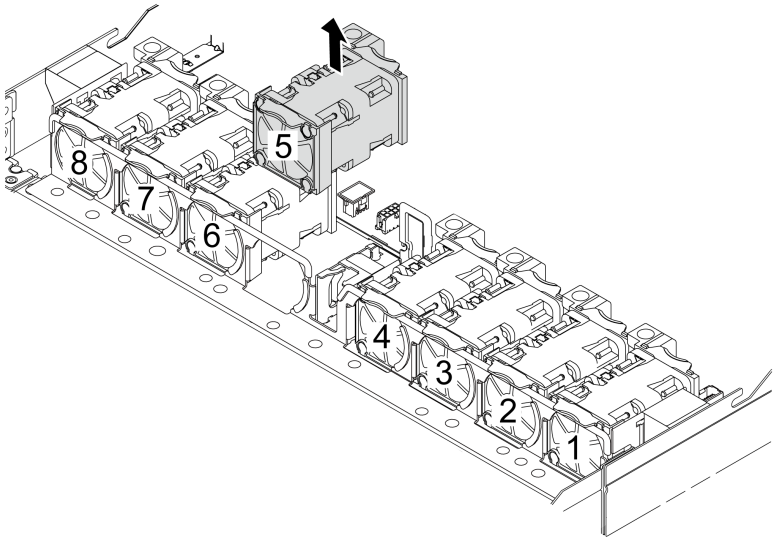
Torque screwdriver type list	Screw Type
Torx T30 head screwdriver	Torx T30 screw

Procedure

Step 1. To remove the server from the rack, see “Remove the server from the rack” on page 21.

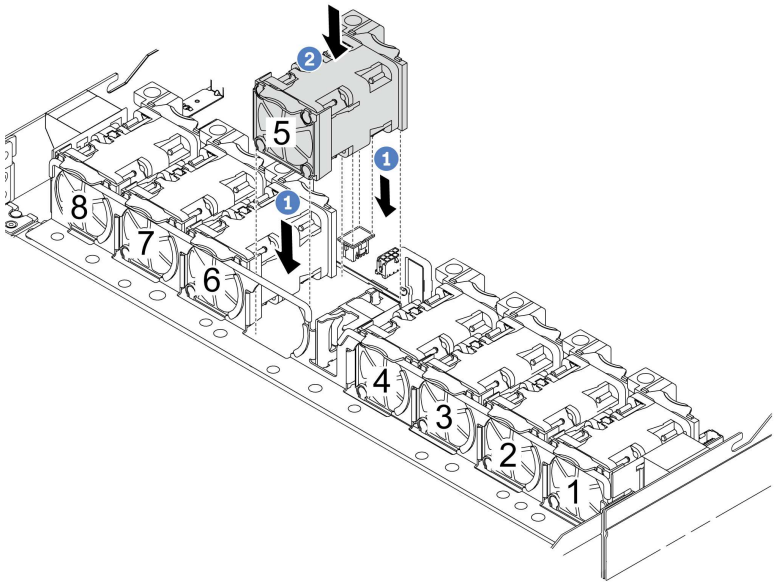
Step 2. Remove the top cover. See “Remove the top cover” on page 218.

Step 3. Remove the system fan 5 from the fan module.



Step 4. Disconnect the pump 1 cable of the L2AM from the connector on the system board assembly. See "Liquid to air module" on page 252.

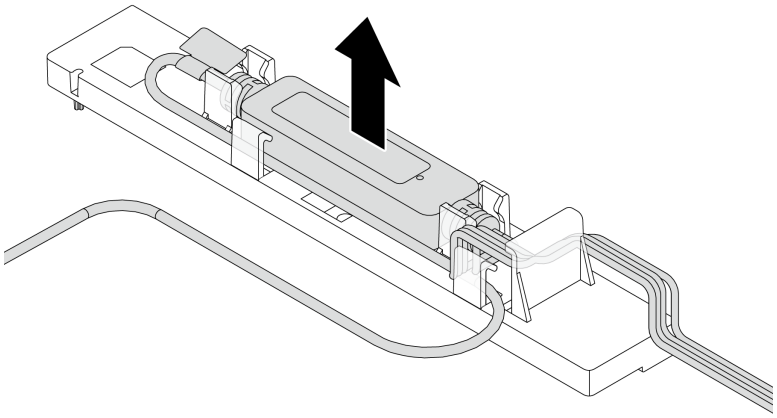
Step 5. Re-install the system fan 5 into the fan module.



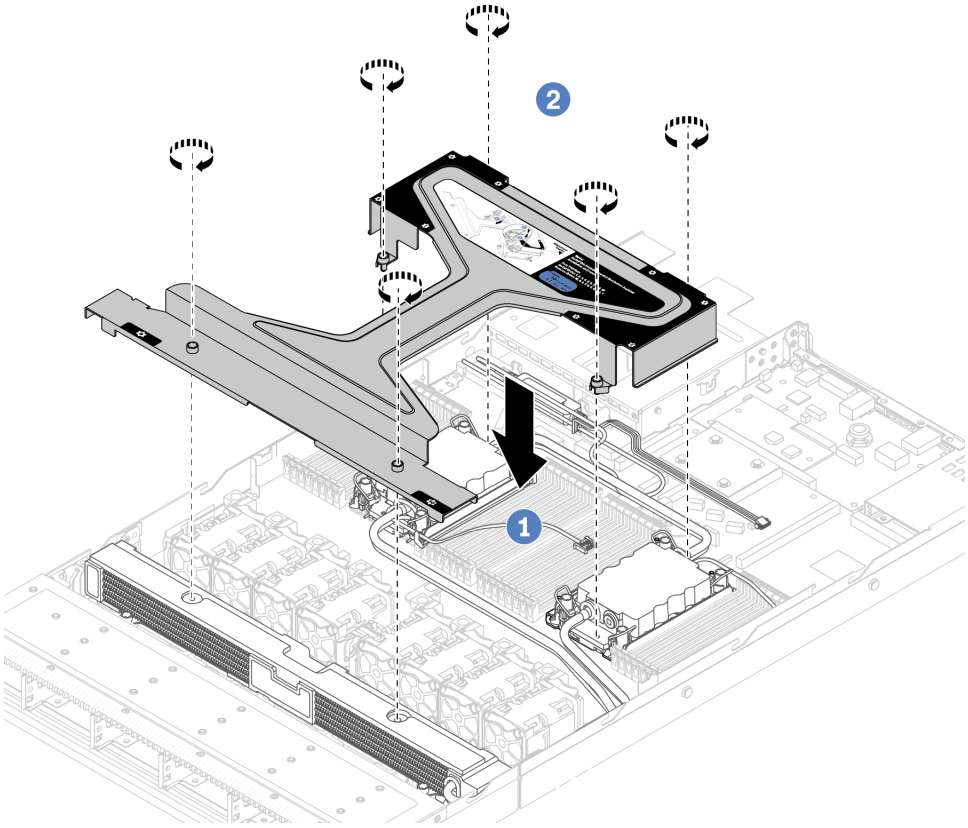
a. 1 Align the four corners of the fan to fan module socket and put it down.

b. 2 Press the fan latch down to ensure that it is plugged in the connector.

Step 6. Disconnect the leak detection cable from the processor board, and route it out of the cable clips on the leakage detection sensor module holder.



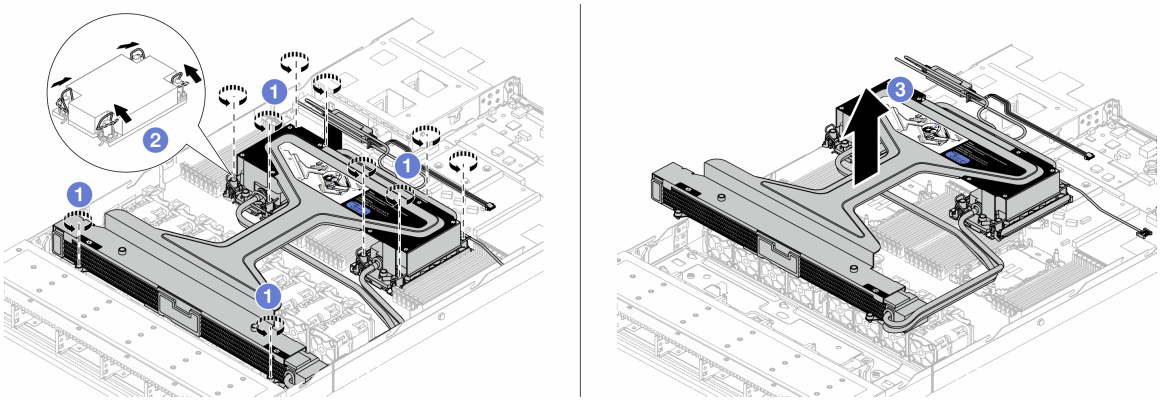
Step 7. Re-install the handle to the L2AM.



a. 1 Place the module handle (L2AM heat sink bracket) evenly on the L2AM and align screw holes.

b. 2 Tighten the screws. Ensure that the screws are secured in place.

Step 8. Disengage the L2AM from processors.



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

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

c. 3 Carefully lift the L2AM from the processor sockets by the module handle (L2AM heat sink bracket). If the L2AM cannot be fully lifted out of the socket, further loosen the Torx T30 nuts and try lifting the L2AM again.

Step 9. Place the L2AM on the shipping tray.

Step 10. 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 11. Separate the processor from the L2AM. Refer to "Separate the processor from carrier and heat sink" on page 151.

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) Liquid to Air Module

Follow the instructions in this section to install the Liquid to Air Module (L2AM).

Important: This task must be operated by trained technicians that are certified by Lenovo Service. Do no attempt to remove or install it without proper training and qualification.

About this task

Safety information for leakage 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 20.
- 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.

CAUTION:
When removing a new L2AM 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.

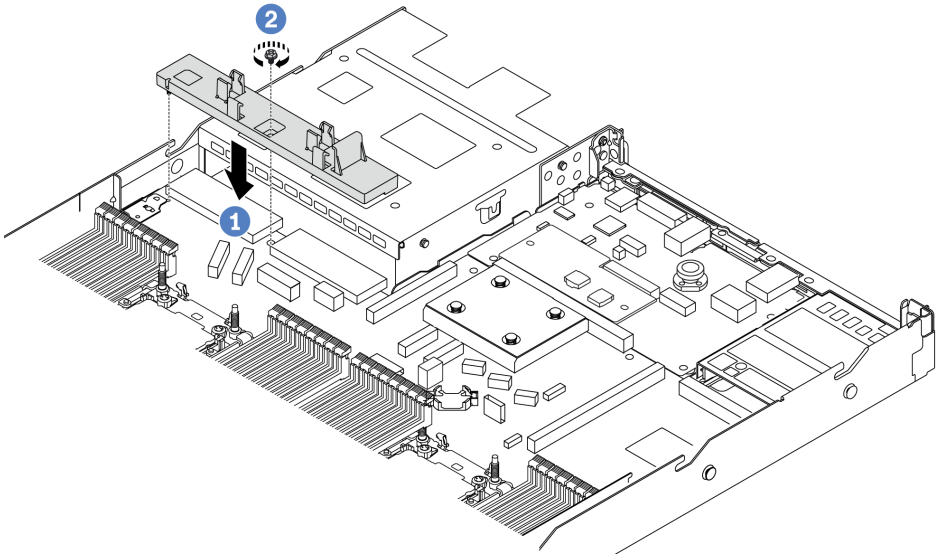
Prepare the following screwdrivers to ensure you can install and remove the corresponding screws properly.

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

Procedure

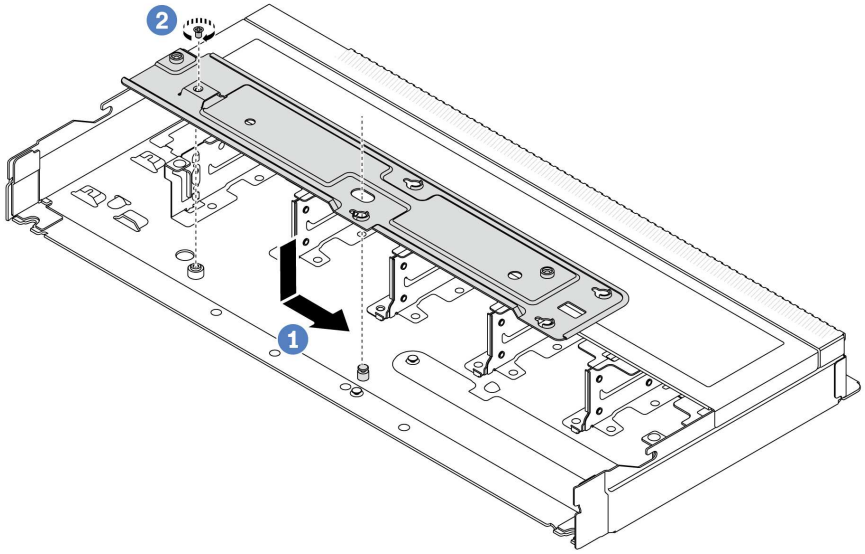
Step 1. Prepare your server.

a. Install the leakage detection sensor module holder to the chassis.



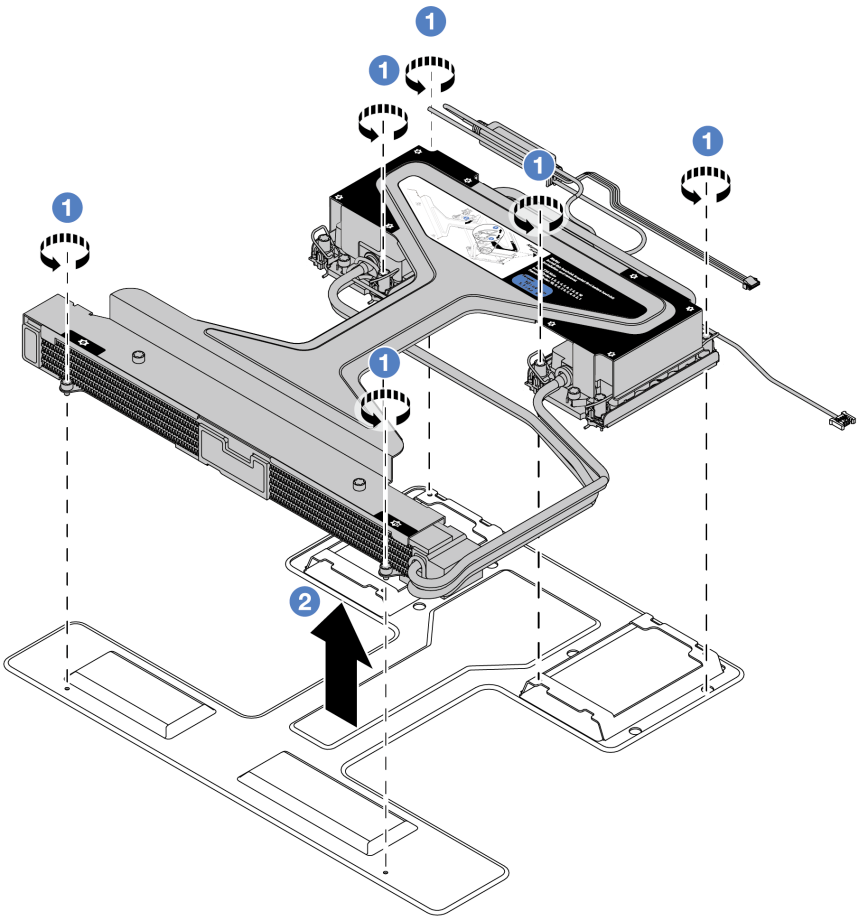
1. 1 Align the leakage detection sensor module holder to the corresponding screw hole on the chassis.
2. 2 Tighten the screw and ensure that the holder is secured in place.

b. Install the radiator tray to the chassis.



1. (1) Place the tray evenly into the chassis and then move it to the right so that the screw hole on the tray aligns with the hole on the chassis.
2. (2) Tighten the screw.

Step 2. Separate the L2AM module from the shipping tray.



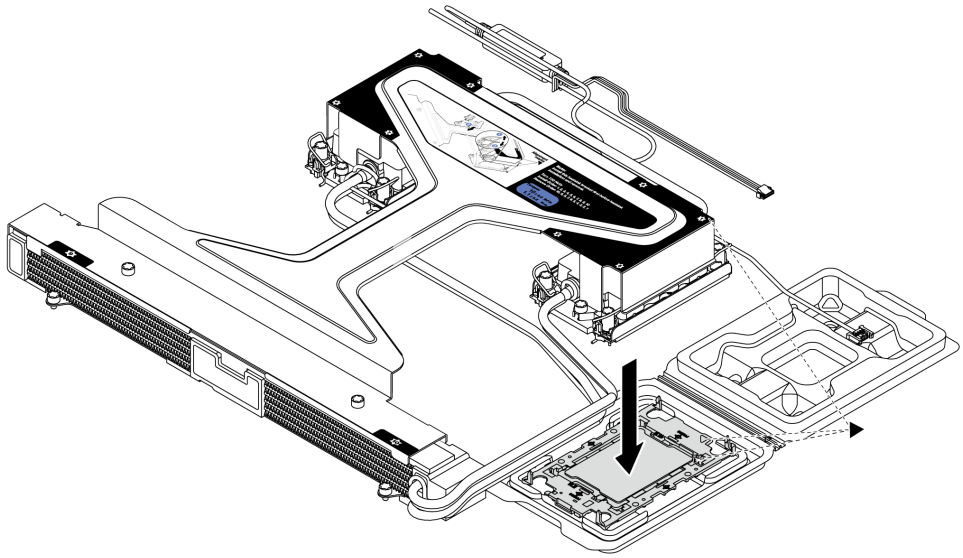
a. 1 Loosen the six screws on the L2AM module shipping tray.

b. 2 Lift the L2AM by the module handle (L2AM heat sink bracket) to separate the module from the shipping tray.

Step 3. Make sure you have an alcohol cleaning pad available.

Attention: If there is any old thermal grease on the processors, gently clean the top of the processors with an alcohol cleaning pad.

Step 4. Install the processor to the L2AM.



1. Align the triangular mark on the cold plate assembly label with the triangular mark on the processor carrier and processor.
2. Install the L2AM onto the processor-carrier.
3. Press the carrier into place until the clips at all four corners engage.

Note: If your server only has 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.

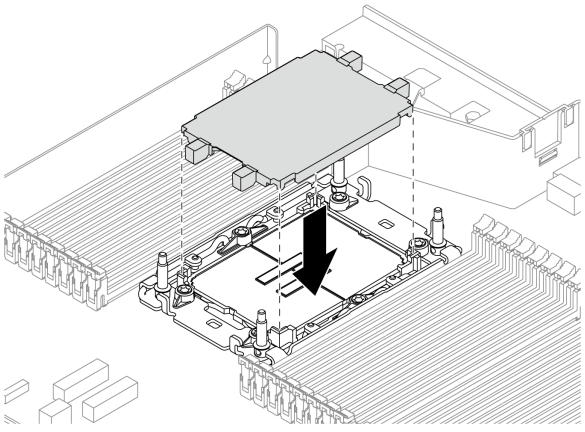
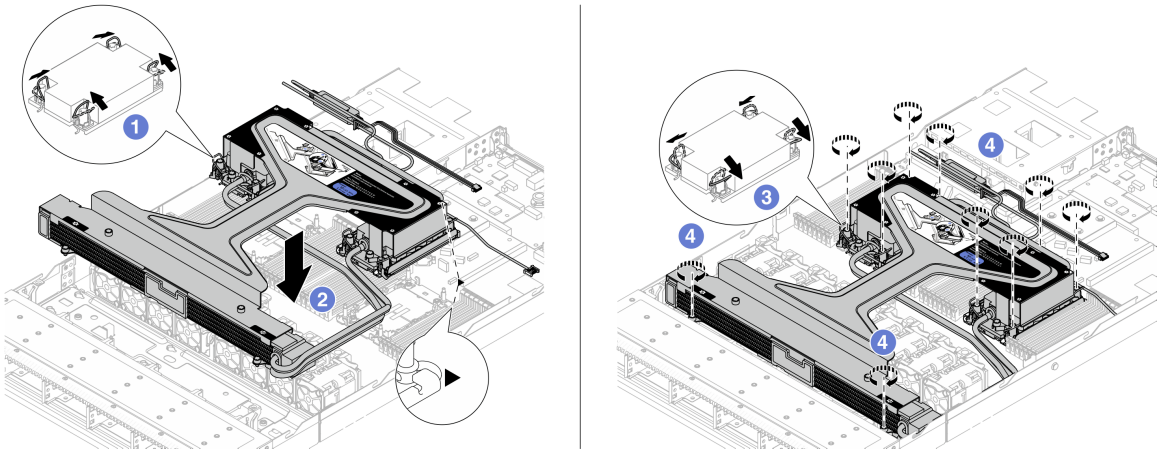


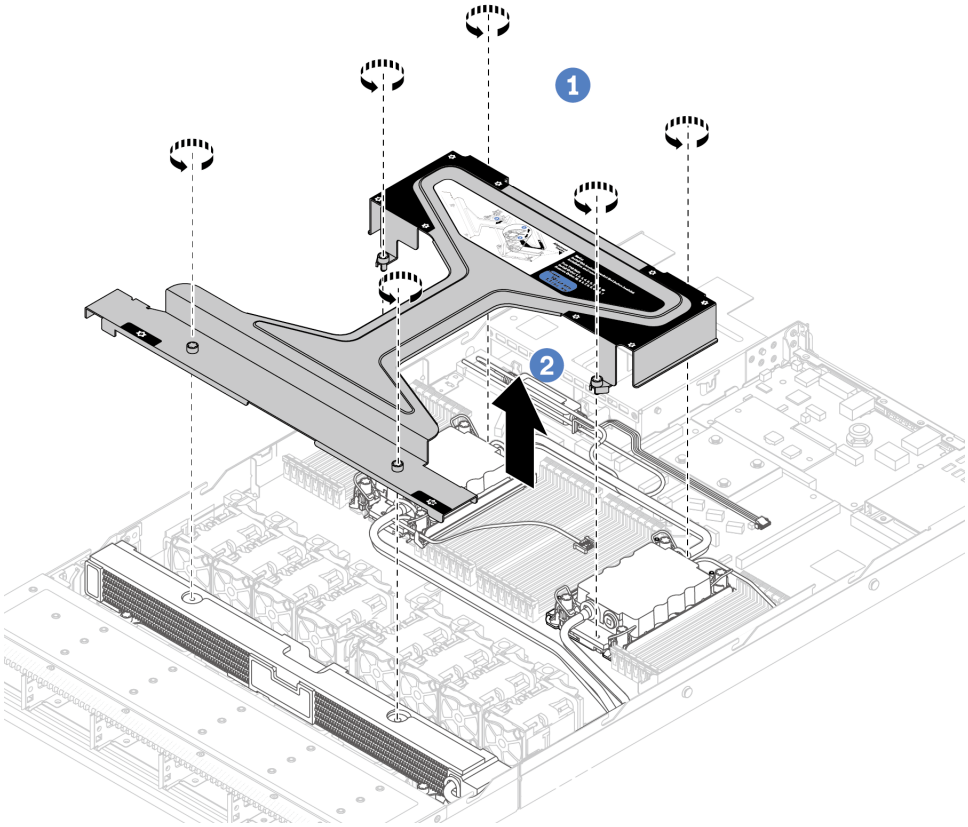
Figure 95. Install the processor socket cover

Step 5. Install the processor-L2AM to the system board assembly.



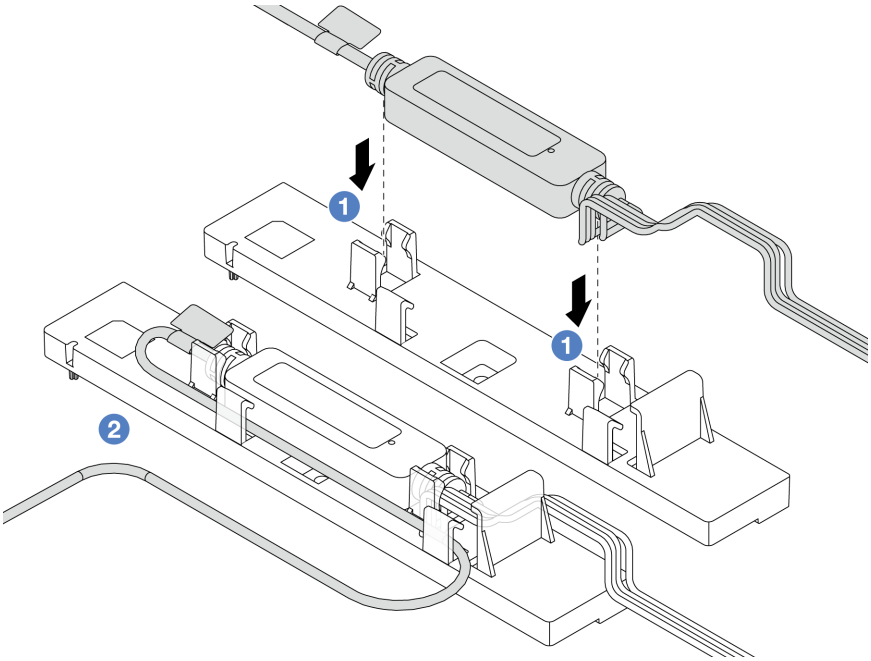
1. (1) Rotate the anti-tilt wire bails inward.
2. (2) Align the triangular mark and four Torx T30 nuts on the cold plate assembly with the triangular mark and threaded posts of the processor socket; then, insert the cold plate assembly into the processor socket.
3. (3) Rotate the anti-tilt wire bails 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 and the radiator. 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 6. Separate the module handle (L2AM heat sink bracket) from the module.



1. (1) Loosen the six screws on the module handle (L2AM heat sink bracket).
2. (2) Lift the module handle (L2AM heat sink bracket) to separate it from the module.

Step 7. Install the leak detection module to the holder.

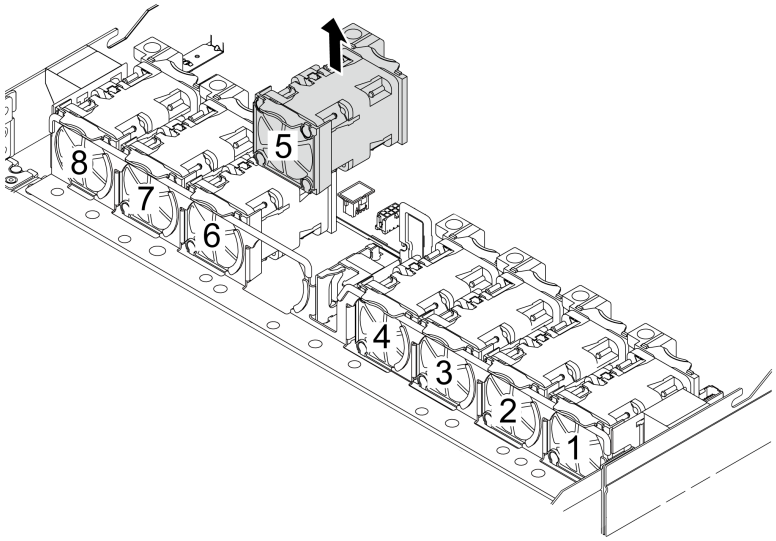


Note: For leakage detection sensor module working status, see “Liquid detection sensor module LED” in *User Guide* and *System Configuration Guide*.

a. 1 Install the leakage detection sensor module into the two clips on the holder. Ensure that the module is secured in place.

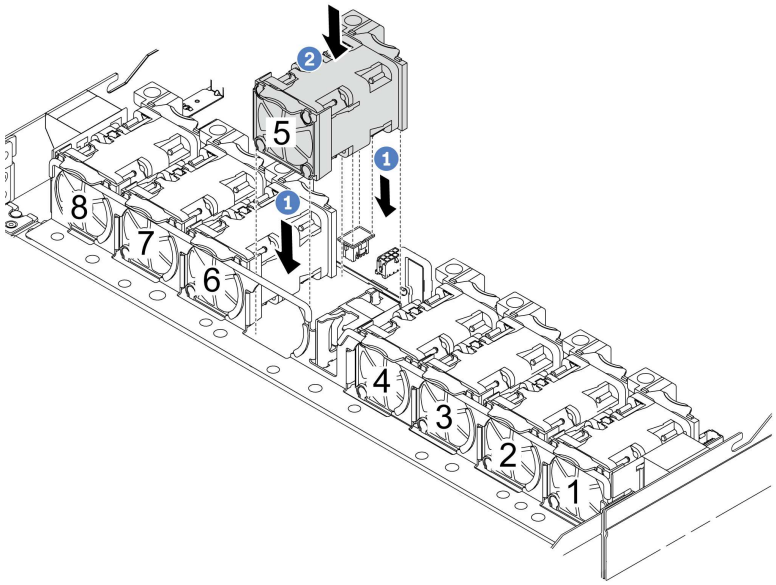
b. 2 After the module is secured, route the cable through the cable clips to keep tidy for later cable routing arrangements.

Step 8. Remove the system fan 5 from the fan module.



Step 9. Connect the pump 1 cable of the L2AM to the connector on the system board assembly. See "Liquid to air module" on page 252.

Step 10. Re-install the system fan 5 into the fan module.



a. 1 Align the four corners of the fan to fan module socket and put it down.

b. 2 Press the fan latch down to ensure that it is plugged in the connector.

Step 11. To install the server into the rack, see "Install the server to the rack" on page 24.

After you finish

Complete the parts replacement. See “Complete the parts replacement” on page 221.

Demo video

Watch the procedure on YouTube

Management NIC adapter replacement

Follow instructions in this section to install or remove 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 121
- “Install the management NIC adapter” on page 122

Remove the management NIC adapter

Follow instructions in this section to remove the ThinkSystem V3 Management NIC Adapter Kit (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 20.
- 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 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, remove the server from the rack.

c. Remove the top cover. See “Remove the top cover” on page 218.

d. If the server comes with a riser 1 assembly, remove it first. See “Remove a rear riser card” on page 183.

Step 2. Disconnect the cable on the management NIC adapter, see “Management NIC adapter” on page 243.

Step 3. Remove the management NIC adapter.

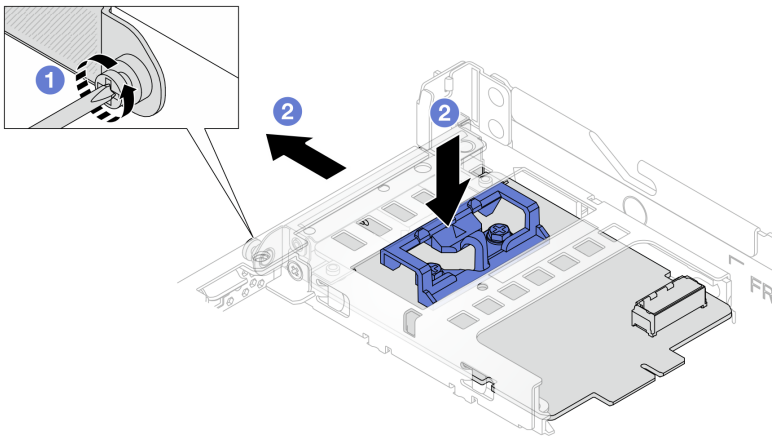


Figure 96. Removing the management NIC adapter

a. 1 Loosen the screw that secures the management NIC adapter.

b. 2 Press and hold the blue latch. And pull themanagement 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 122.
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 ThinkSystem V3 Management NIC Adapter Kit (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 20.
- 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/sr630v3/7d72/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.

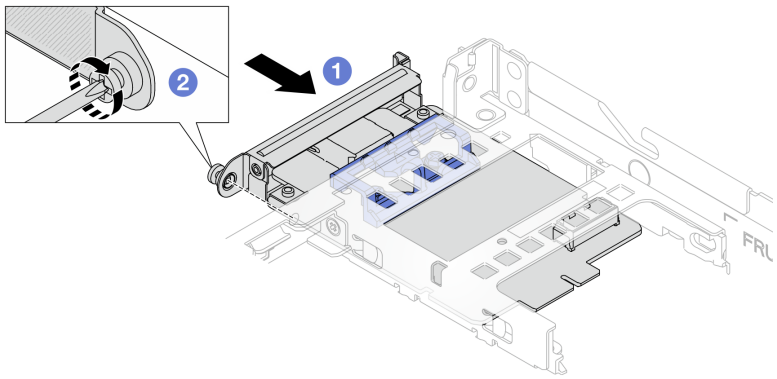


Figure 97. Installing the management NIC adapter

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 “Management NIC adapter” on page 243.

Step 4. Install the riser 1 assembly if you have removed it. See “Install a rear riser card” on page 186.

After you finish

1. Complete the parts replacement. See “Complete the parts replacement” on page 221.
2. Access the Lenovo XClarity Controller; then, select **Network** in **BMC Configuration** and enable **Ethernet Port 2**.

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.

- Power off the server and peripheral devices and disconnect the power cords and all external cables. See “Power off the server” on page 20.
- 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.
- 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.
- If you are not installing a replacement memory module to the same slot, make sure you have memory module filler available.
- Memory modules are sensitive to static discharge and require special handling. Refer to the standard guidelines for “Handling static-sensitive devices” on page 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.

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

Procedure

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

Step 1. Power off the server and disconnect all power cords.

Step 2. Remove the top cover. See “Remove the top cover” on page 218.

Step 3. If your server comes with an air baffle, remove it. See “Remove the air baffle” on page 29.

Step 4. Remove the memory module from the slot.

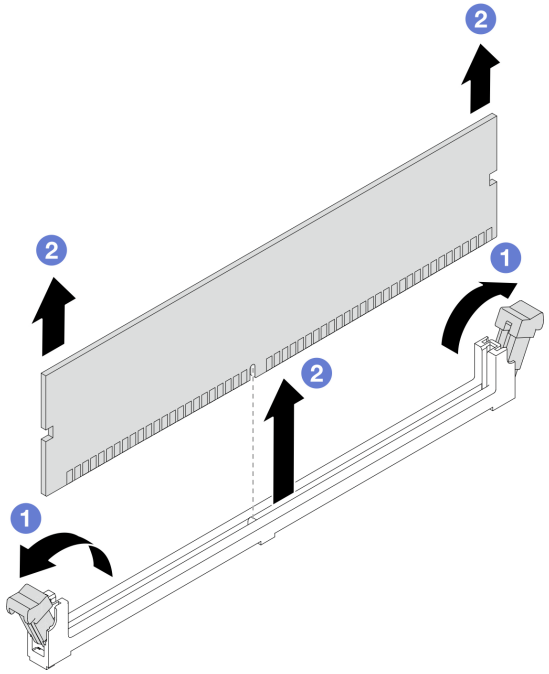


Figure 98. Memory module removal

a. 1 Open the retaining clip on each end of the memory module slot.

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

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 125.
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.
- Power off the server and peripheral devices and disconnect the power cords and all external cables. See "Power off the server" on page 20.

- 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.
- 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.
- Make sure to adopt one of the supported configurations listed in "Memory module installation rules and order" on page 6.
- 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.

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

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/sr630v3/7d72/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. Power off the server and disconnect all power cords.

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

Step 3. Locate the required memory module slot on the processor board.

Note: Ensure that you observe the installation rules and sequence in "Memory module installation rules and order" on page 6.

Step 4. Install the memory module into the slot.

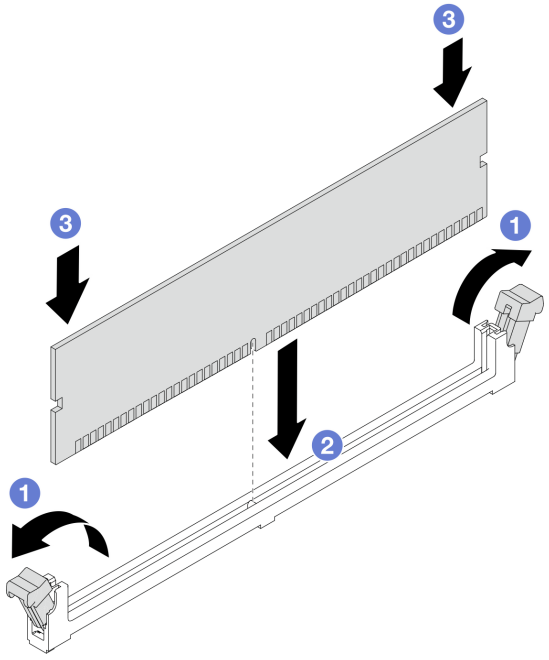


Figure 99. Memory module installation

Attention:

- Before you install a memory module into the slot, make sure that the clips are on open position, and the slot is clear of any debris.
- To avoid breaking the retaining clips or damaging the memory module slots, open and close the clips gently.

a. 1 Open the retaining clip on each end of the memory module slot.

b. 2 Identify the key on the memory module and then align the key to the slot, and gently place the memory module into the slot with both hands.

c. 3 Press both ends of the memory module straight down into the slot until the retaining clips snap into the locked position.

Note: If there is a gap between the memory module and the retaining clips, the memory module has not been correctly inserted. In this case, open the retaining clips, remove the memory module, and then reinsert it.

After you finish

Complete the parts replacement. See “Complete the parts replacement” on page 221.

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

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 20.
- 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.

Procedure

Step 1. Prepare your server.

a. Remove the top cover. See “Remove the top cover” on page 218.

b. If your server comes with riser assemblies, remove them first, see “Remove a PCIe adapter” on page 140.

c. If your server comes with a rear drive assembly, remove it first. See “Remove the 2.5-inch rear drive assembly” on page 170.

d. If your server comes with a 7mm rear drive assembly, remove it first. See “Remove the 7mm rear drive assembly” on page 174.

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.

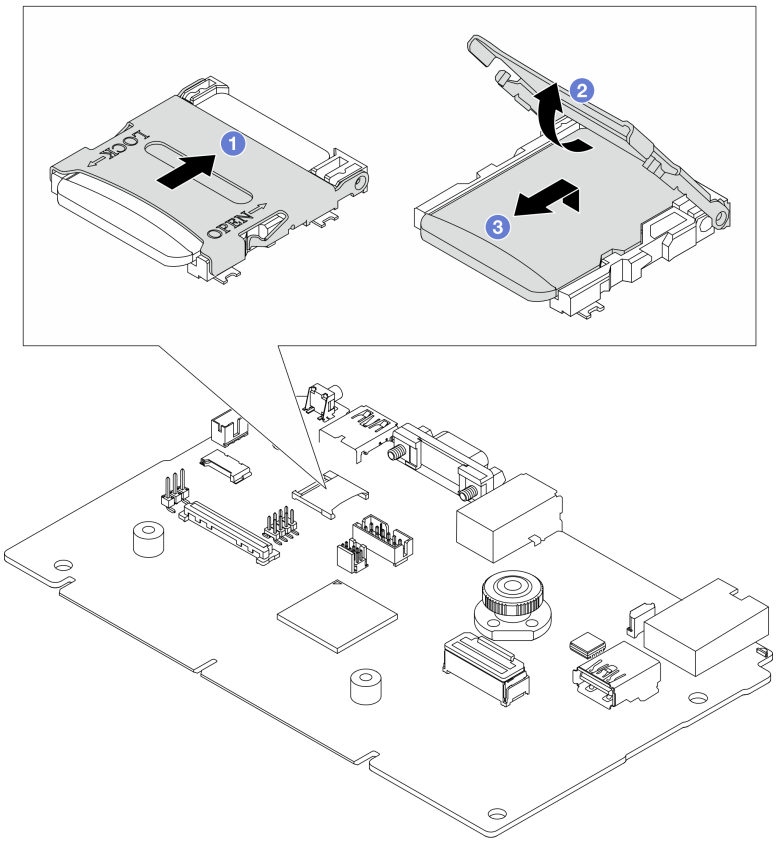


Figure 100. Removing MicroSD card

a. 1 Slide the socket lid to OPEN position.

b. 2 Lift open the socket lid.

c. 3 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 20.
- 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.

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 would 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.

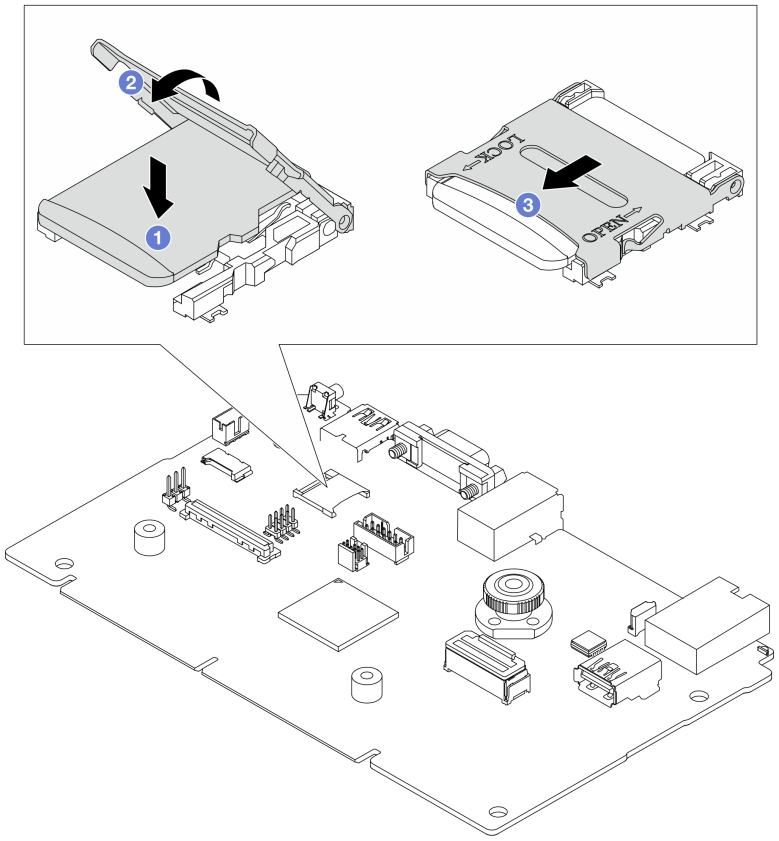


Figure 101. Installing MicroSD card

a. 1 Place the MicroSD card into the socket.
b. 2 Close the socket lid.
c. 3 Slide the socket lid to LOCK position.

After you finish

1. Install any components that you have removed:
   a. “Install a PCIe adapter” on page 142
   b. “Install the 7mm rear drive assembly” on page 175
   c. “Install the 2.5-inch rear drive assembly” on page 171
   d. “Install the top cover” on page 219
2. Complete the parts replacement. See “Complete the parts replacement” on page 221.

Demo video

Watch the procedure on YouTube

M.2 backplane and M.2 drive replacement

Use this information to remove and install the M.2 backplane and M.2 drive (an assembled M.2 backplane and M.2 drive is also known as M.2 module).

Remove the M.2 backplane and M.2 drive

Use this information to remove the M.2 backplane and 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 20.
- 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.

Procedure

Step 1. Remove the top cover. See “Remove the top cover” on page 218.

Step 2. Remove the M.2 drive from the M.2 backplane.

Note: The M.2 backplane you want to remove might be different from the following illustrations, but the removal method is the same.

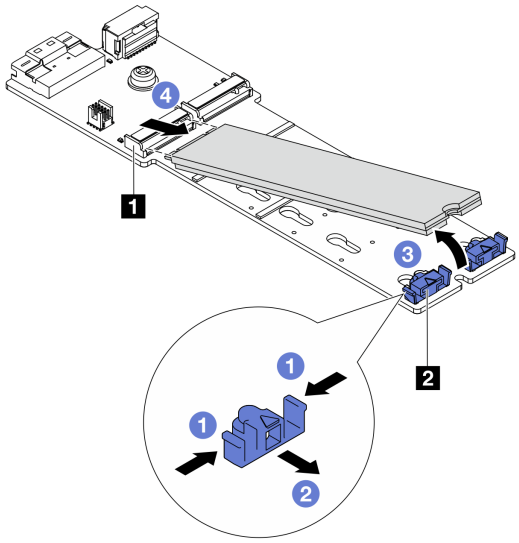


Figure 102. M.2 drive removal

a. 1 Press both sides of the 2 retainer.
b. 2 Slide the retainer backward to loosen the M.2 drive from the M.2 backplane.
c. 3 Rotate the M.2 drive away from the M.2 backplane.
d. 4 Pull the M.2 drive away from the 1 connector at an angle of approximately 30 degrees.

Step 3. Remove the M.2 module from the chassis.

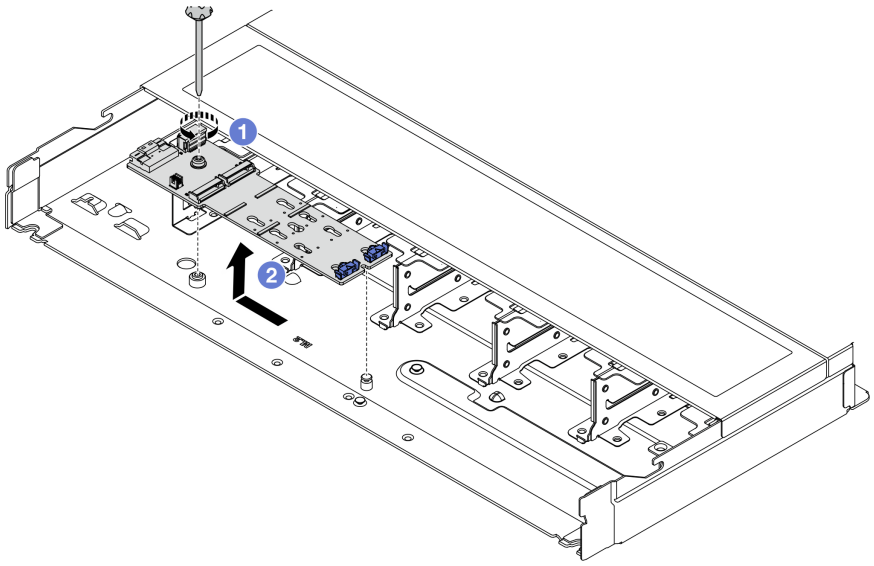


Figure 103. M.2 module removal

a. 1 Loosen the screw.

b. 2 Release the M.2 backplane from the pin and carefully lift the M.2 backplane out from the chassis.

Step 4. Disconnect all M.2 cables from the processor board.

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

Adjust the retainer on the M.2 backplane

Use this information to adjust the retainer on 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 20.
- 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.

Watch the procedure

A video of this procedure is available on YouTube: https://www.youtube.com/playlist?list=PLYV5R7hVcs-CfNsWy-689CRZHExrZEi9I.

Procedure

Note: The M.2 backplane you want to adjust might be different from the following illustrations, but the adjustment method is the same.

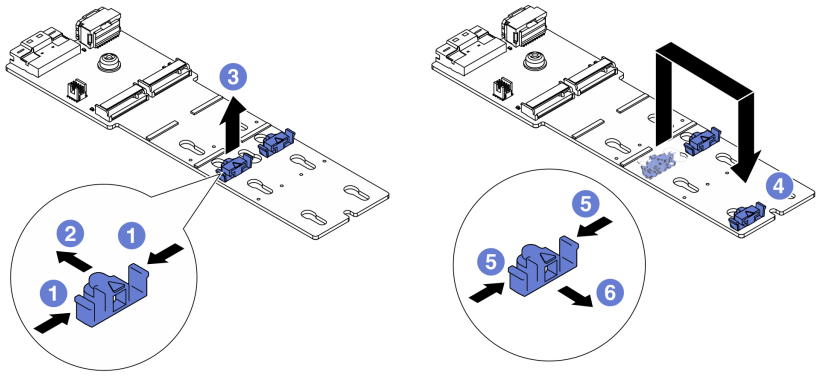


Figure 104. M.2 retainer adjustment

Step 1. 1 Press both sides of the retainers.

Step 2. 2 Move the retainer forward until it is in the large opening of the keyhole.

Step 3. 3 Take the retainer out of the keyhole.

Step 4. 4 Insert the retainer into the correct keyhole into which the retainer should be installed to accommodate the particular size of the M.2 drive you wish to install.

Step 5. 5 Press both sides of the retainer.

Step 6. 6 Slide the retainer backwards until it is seated in place.

Install the M.2 backplane and M.2 drive

Use this information to install the M.2 backplane and 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 20.
- 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.

Procedure

Step 1. Touch the static-protective package that contains the M.2 backplane and M.2 drive to any unpainted surface on the outside of the server. Then, take the M.2 backplane and M.2 drive out of the package and place them on a static-protective surface.

Note: The M.2 backplane you want to install might be different from the following illustrations, but the installation method is the same.

Step 2. Adjust the retainer on the M.2 backplane to accommodate the particular size of the M.2 drive you wish to install. See "Adjust the retainer on the M.2 backplane" on page 133.

Step 3. Locate the M.2 drive slot on the M.2 backplane.

Note: For some M.2 backplanes that support two identical M.2 drives, install the M.2 drive in slot 0 first.

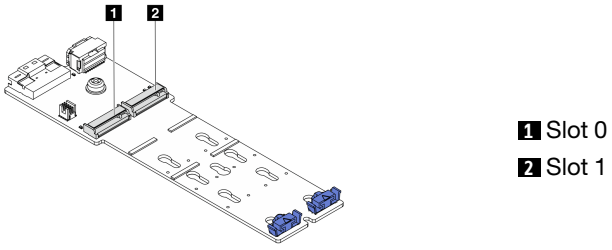


Figure 105. M.2 drive slot

Step 4. Install the M.2 backplane onto the chassis.

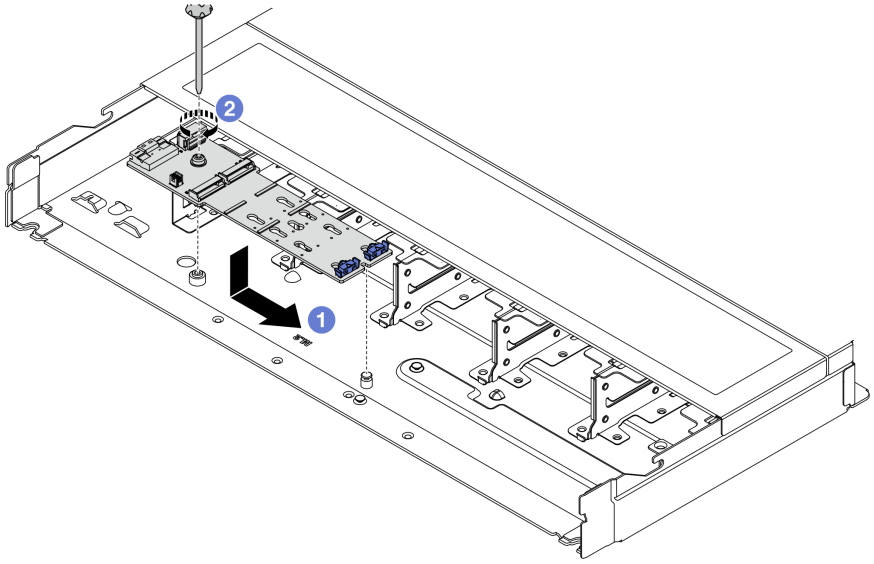


Figure 106. M.2 backplane installation

a. 1 Align the notch of the M.2 backplane with the pin on the chassis, and then place down the M.2 backplane.

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

Step 5. Install the M.2 drive on the M.2 backplane.

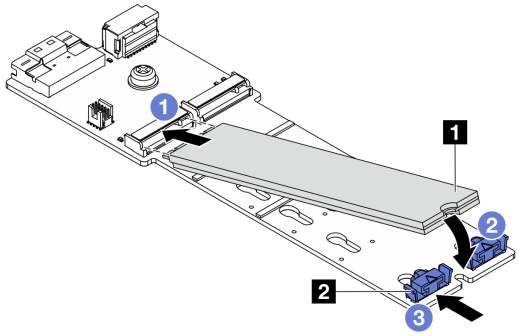


Figure 107. M.2 drive installation

a. 1 Insert the M.2 drive at an angle of approximately 30 degrees into the connector.

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 forward (toward the connector) to secure the M.2 drive into place.

Step 6. Connect the cables to the M.2 backplane and processor board. See "M.2 drive backplane" on page 244.

After you finish

1. Complete the parts replacement. See "Complete the parts replacement" on page 221.
2. Use the Lenovo XClarity Provisioning Manager to configure the RAID. For more information, see: https://pubs.lenovo.com/lxpm-overview/

Demo video

Watch the procedure on YouTube

Remove the M.2 cage and M.2 backplane (16-EDSFF chassis)

Use the information in this topic to remove the M.2 cage and M.2 backplane from the 16-EDSFF 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 20.
- 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.

Procedure

Step 1. Remove the top cover. See "Remove the top cover" on page 218.

Step 2. Disconnect the cables routed to the M.2 backplane. See “M.2 drive backplane” on page 244 for more details.

Step 3. Remove the M.2 cage from the chassis.

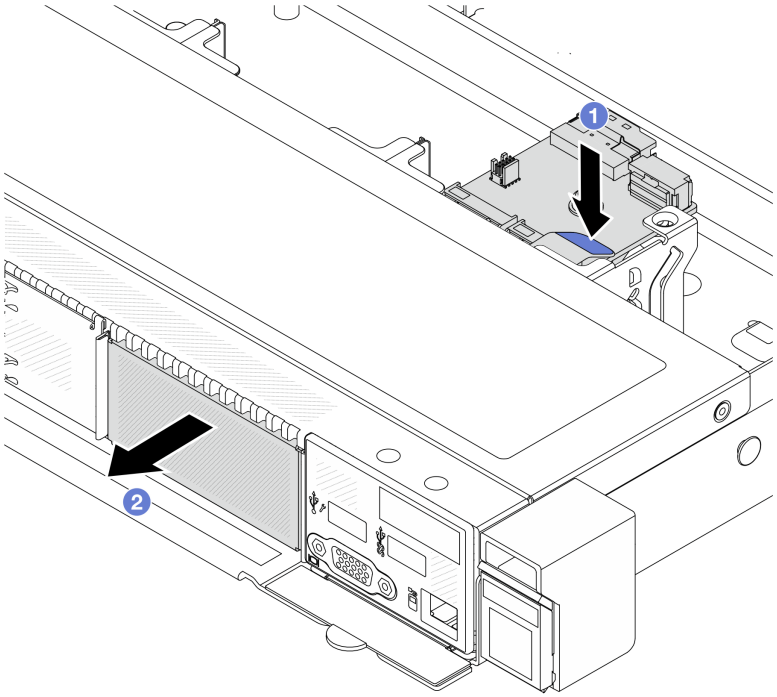


Figure 108. M.2 cage removal

a. 1 Press down the blue touch point on release latch of the M.2 cage.

b. 2 Push the cage to the direction as shown to disengage the cage from the chassis.

Step 4. Remove the M.2 backplane from the M.2 cage.

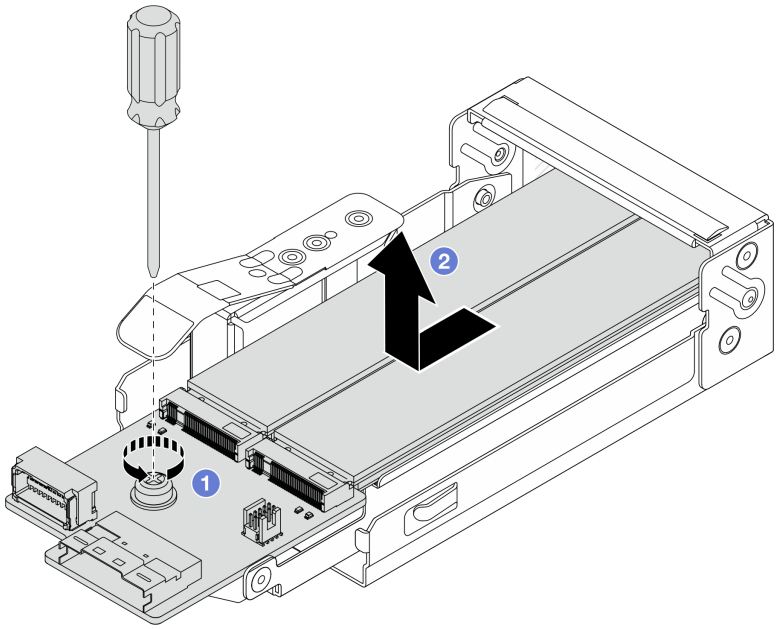


Figure 109. M.2 backplane removal

a. 1 Loosen the captive screw on the M.2 backplane.

b. 2 Slide the backplane out and take it out of the cage.

Step 5. Remove the M.2 drives if necessary, see "Remove the M.2 backplane and M.2 drive" on page 131.

After you finish

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

Demo video

Watch the procedure on YouTube

Install the M.2 cage and M.2 backplane (16-EDSFF chassis)

Use the information in this topic to install the M.2 cage and M.2 backplane to the 16-EDSFF 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 20.
- 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.

Procedure

Step 1. Touch the static-protective package that contains the M.2 backplane, M.2 drive and M.2 cage to any unpainted surface on the outside of the server. Then, take the M.2 backplane, M.2 drive and M.2 cage out of the package and place them on a static-protective surface.

Note: The M.2 backplane you want to install might be different from the following illustrations, but the installation method is the same.

Step 2. To install the M.2 drives to M.2 backplane, see "Install the M.2 backplane and M.2 drive" on page 134.

Step 3. Install the M.2 backplane to M.2 cage.

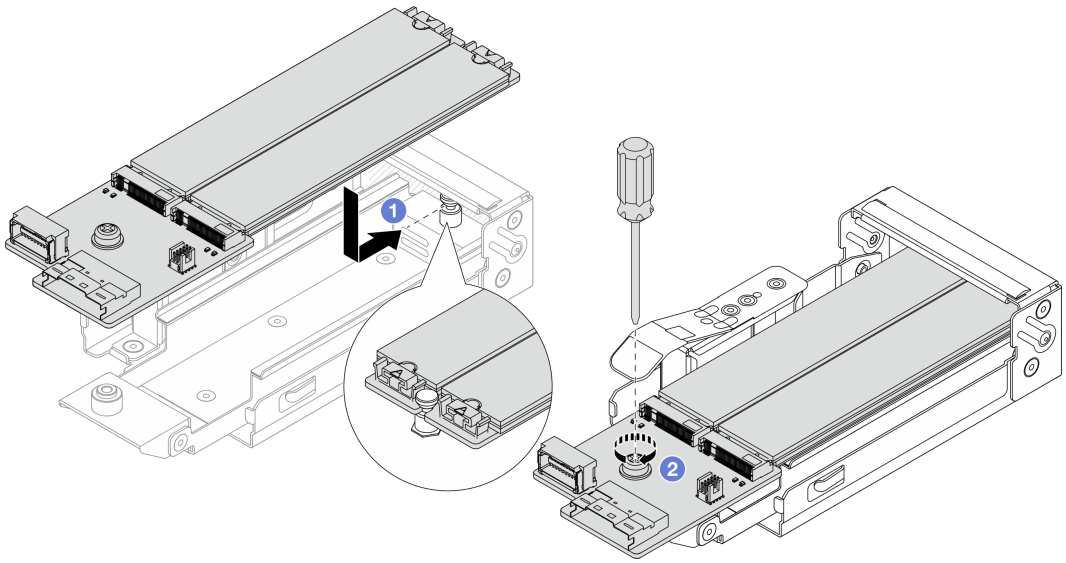


Figure 110. M.2 backplane installation

a. 1 Place the M.2 backplane evenly to the rails on the M.2 cage, and slide the backplane into the cage until the notch on the backplane mounts the groove on the standoff.

b. 2 Tighten the captive screw on the backplane, and make sure that the backplane is secured in place.

Step 4. Install the M.2 cage to the chassis.

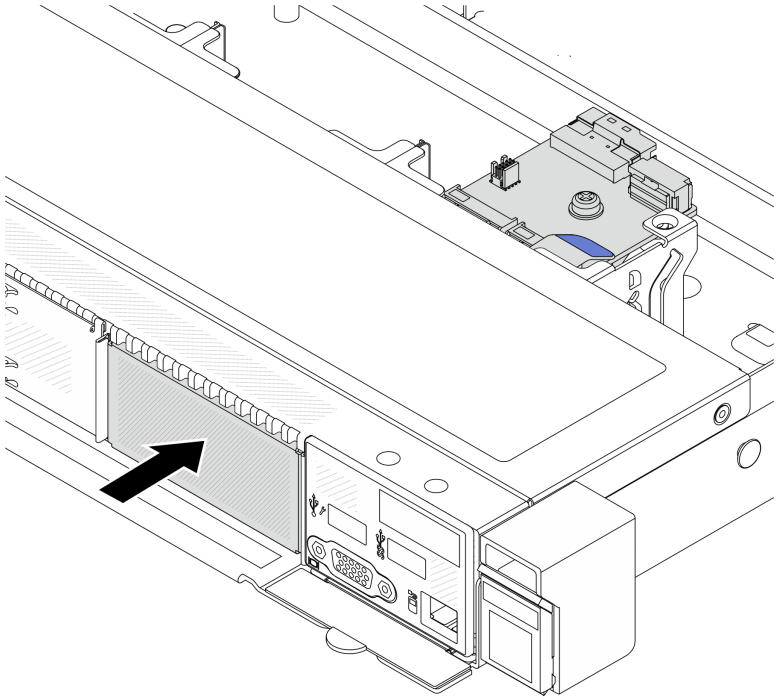


Figure 111. M.2 cage installation

Push the M.2 cage into the chassis until the release latch clicks into place.

Step 5. Reconnect the cables to the M.2 backplane. See “M.2 drive backplane” on page 244.

Step 6. Install the top cover. See “Install the top cover” on page 219.

After you finish

1. Complete the parts replacement. See “Complete the parts replacement” on page 221.
2. Use the Lenovo XClarity Provisioning Manager to configure the RAID. For more information, see: https://pubs.lenovo.com/lxpm-overview/.

Demo video

Watch the procedure on YouTube

PCIe adapter replacement

Use this information to remove and install a PCIe adapter.

The PCIe adapter can be an Ethernet adapter, a host bus adapter (HBA), a PCIe RAID adapter, a PCIe interposer adapter, a PCIe solid-state drive, a PCIe GPU, and any other supported PCIe adapter.

Notes:

- Depending on different types, the PCIe adapter might look different from the illustrations in this topic.
- Use any documentation that comes with the PCIe adapter, and follow the instructions in this topic.

Remove a PCIe adapter

Use this information to remove a PCIe 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 20.
- 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.

Procedure

Step 1. Remove the top cover. See “Remove the top cover” on page 218.

Step 2. Remove the riser assembly. See “Remove a rear riser card” on page 183.

Step 3. Remove the PCIe adapter from the riser assembly.

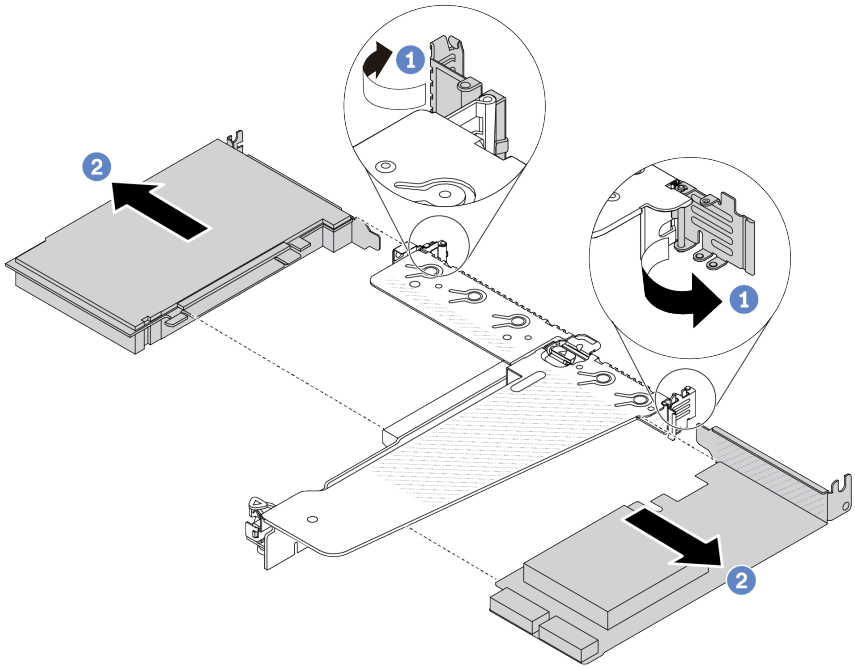


Figure 112. PCIe adapter removal from the LP-FH riser assembly

a. 1 Rotate the latch on the riser bracket to open position.

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

Note: The procedure for removing a PCIe adapter is similar for different types of riser assembly. In this topic, the LP-FH riser assembly is used as an example.

After you finish

1. Install a PCIe adapter or PCIe adapter filler. See “Install a PCIe adapter” on page 142.
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 PCIe adapter

Use this information to install a PCIe 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 20.
- 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.

Procedure

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

Step 2. Locate the correct PCIe slot for the PCIe adapter. For information about the PCIe slots and supported PCIe adapters, see “Rear view” in *User Guide* or *System Configuration Guide*.

Step 3. Install the PCIe adapter and secure it to the riser assembly.

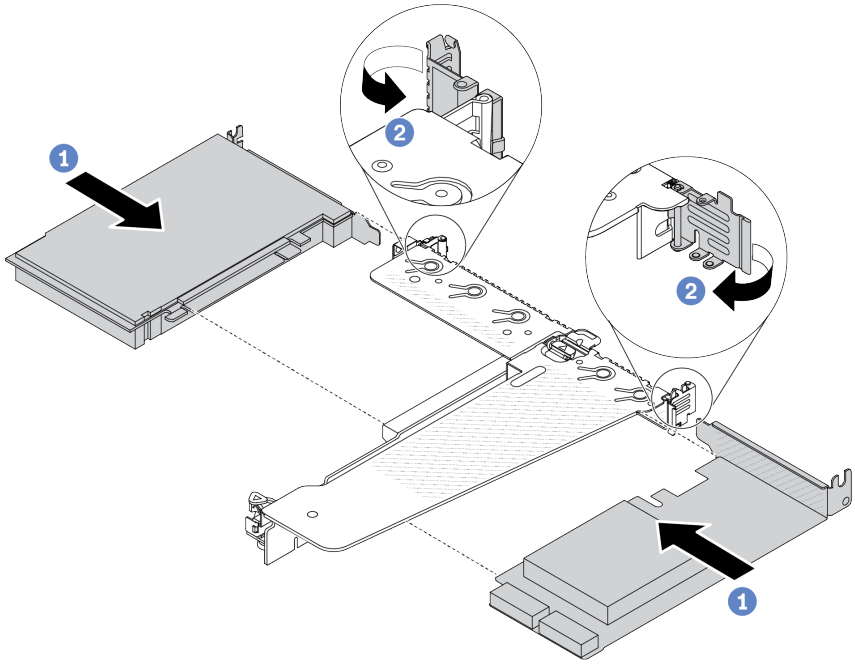


Figure 113. PCIe adapter installation into the LP-FH riser assembly

a. 1 Align the PCIe adapter with the PCIe slot on the riser card. Then, carefully press the PCIe adapter straight into the slot until it is securely seated and its bracket is secured.

b. 2 Rotate the latch on the riser bracket to closed position.

Notes:

1. Ensure that PCIe adapter installation meets the rules in "PCIe slots and adapters" on page 11.
2. The procedure for installing a PCIe adapter is similar for different types of riser assembly. In this topic, the LP-FH riser assembly is used as an example.

Step 4. Connect cables to the PCIe adapter in the riser assembly. See Chapter 2 "Internal cable routing" on page 223.

After you finish

1. Reinstall the riser assembly. See "Install a rear riser card" on page 186.
2. Complete the parts replacement. See "Complete the parts replacement" on page 221.

Demo video

Watch the procedure on YouTube

Power-supply-unit air baffle replacement

Use this information to remove and install a power-supply-unit air baffle.

Remove a power-supply-unit air baffle

Use this information to understand how to remove a power-supply-unit 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 20.

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.

Watch the procedure

A video of this procedure is available on YouTube: https://www.youtube.com/playlist?list=PLYV5R7hVcs-CfNsWy-689CRZHExrZEi9I.

Procedure

Step 1. Remove the top cover. See “Remove the top cover” on page 218.

Step 2. Disconnect the cables adjacent to the power-supply-unit air baffle. For proper operation guidelines, see Chapter 2 “Internal cable routing” on page 223.

Step 3. Remove the power-supply-unit air baffle.

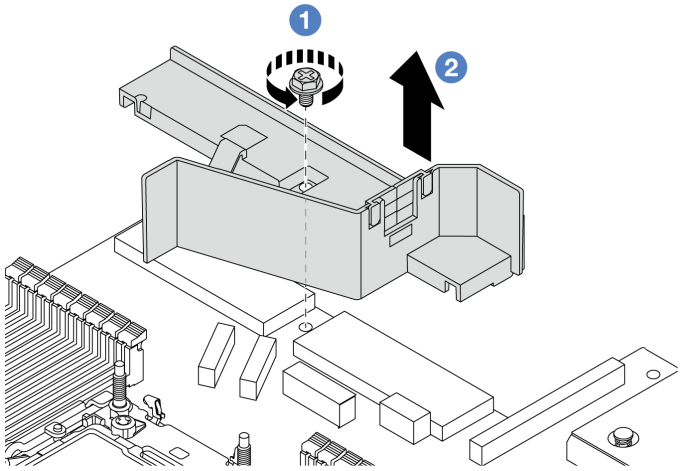


Figure 114. Power-supply-unit air baffle removal

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 power-supply-unit air baffle

Use this information to understand how to install a power-supply-unit 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 20.

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.

Watch the procedure

A video of this procedure is available on YouTube: https://www.youtube.com/playlist?list=PLYV5R7hVcs-CfNsWy-689CRZHExrZEi9I.

Procedure

Step 1. Remove the top cover. See “Remove the top cover” on page 218.

Step 2. Install the power-supply-unit air baffle.

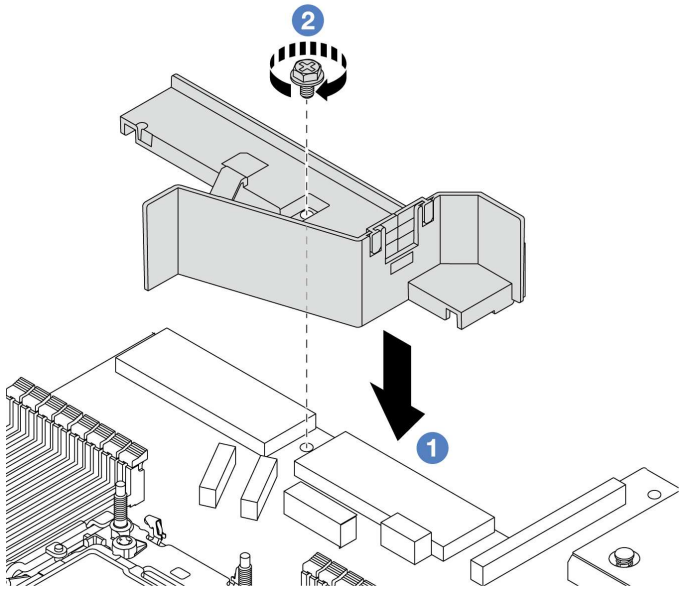


Figure 115. Power-supply-unit air baffle installation

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.

After you finish

- 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 223.
- Complete the parts replacement. See “Complete the parts replacement” on page 221.

Processor and heat sink replacement

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.

Attention: Before you begin replacing a processor, make sure that you have an alcohol cleaning pad (part number 00MP352) and thermal grease.

Important: The processor in your server can throttle in response to thermal conditions, temporarily lowering its speed to reduce heat output. In instances where a few processor cores are throttled for an extremely short time period (100 ms or less), the only indication might be an entry in the operating system event log with no corresponding entry in the system XCC event log. If this situation occurs, the event can be ignored and processor replacement is not required.

When the server has a Liquid to Air Module (L2AM) installed, you must apply for a L2AM module handle (L2AM heat sink bracket) first if you need to install or remove the system board assembly or processor. However, while replacing the old L2AM with a new one, you do not need to apply for a module handle (L2AM heat sink bracket) as the new L2AM package contains it.

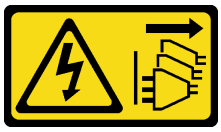
Note: This section is for processor and heat sink replacement. For the replacement of the Liquid to Air Module (L2AM), refer to "Lenovo Neptune(TM) Liquid to Air Module replacement (trained technicians only)" on page 111.

Remove a processor and heat sink

This task has instructions for removing an assembled processor and heat sink, known as a processor-heat-sink module (PHM). This task requires a Torx T30 driver. This procedure must be executed by a trained technician.

About this task

S002



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

Attention:

- Read "Installation Guidelines" on page 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 20.

- 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.
- 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 the rack” on page 21.
- 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 processor board 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.

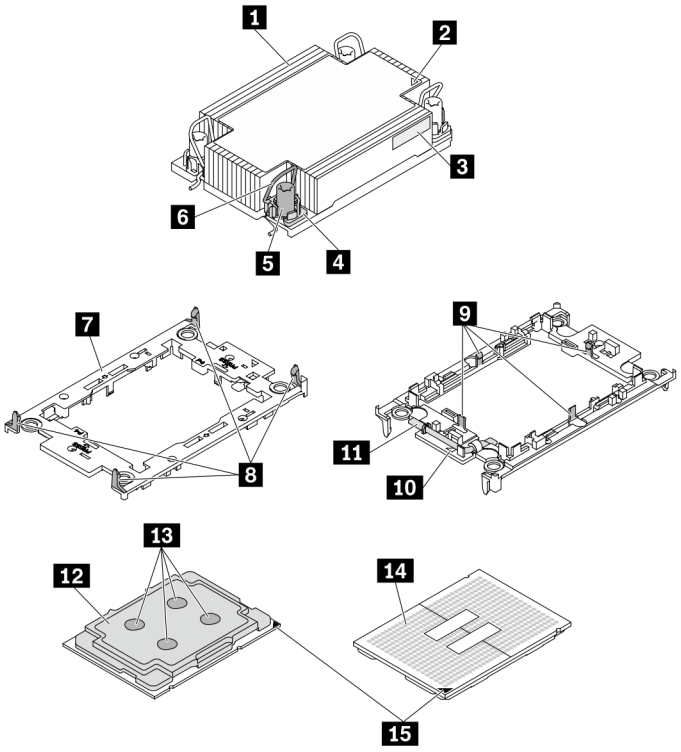


Figure 116. PHM components

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	

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

Procedure

Step 1. Make preparations for this task.

a. Remove the top cover. See "Remove the top cover" on page 218.

Step 2. If the processor comes with a T-shaped heat sink, fully loosen the two heat sink screws as shown.

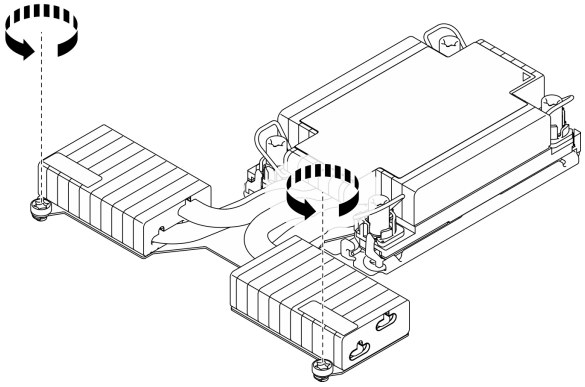


Figure 117. Loosening T-shaped heat sink screws

Step 3. Remove the PHM from the processor board.

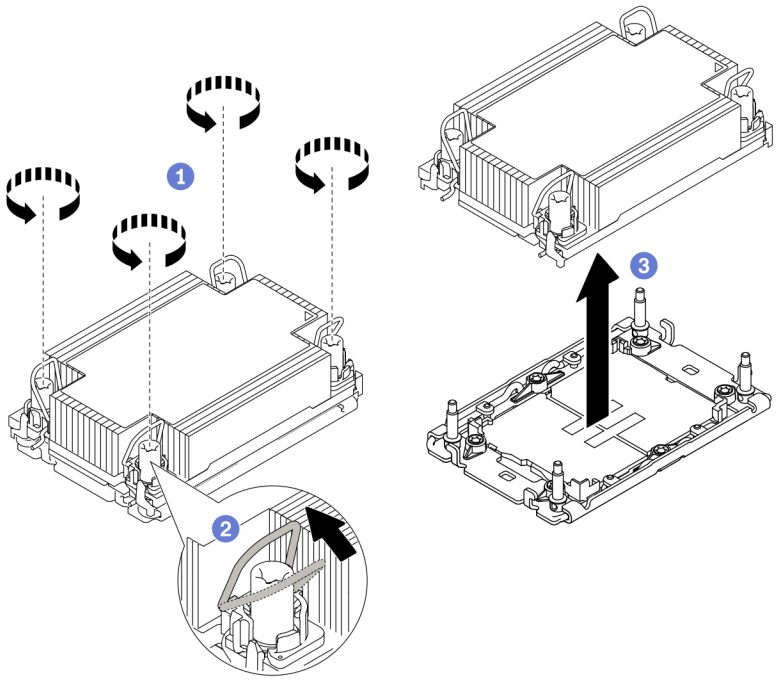


Figure 118. Removing a PHM

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.

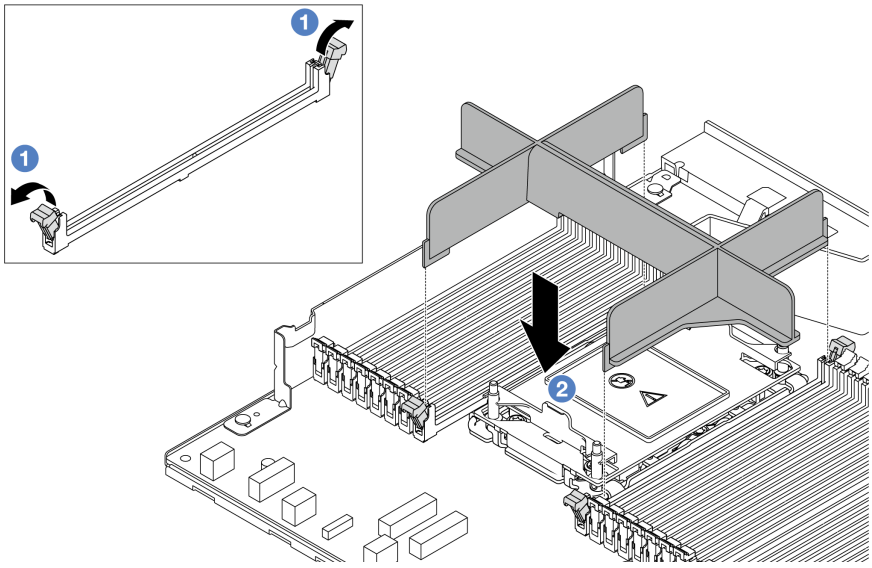
c. 3 Carefully lift the PHM from the processor socket. If the PHM cannot be fully lifted out of the socket, further loosen the Torx T30 nuts and try lifting the PHM again.

Notes:

- Do not touch the contacts on the bottom of the processor.
- Keep the processor socket clean from any object to prevent possible damages.

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.



- – 1 Open the retaining clip on each end of the memory module slots next to the left and right sides of the processor two slot.
- – 2 Align the PHM filler with the slots, and place the filler on the slots with both hands. Firmly press the 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 processor board 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 151.
- 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 20.
- 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.

- 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 than those shown in the illustrations.

Procedure

Step 1. Separate the processor from the heat sink and carrier.

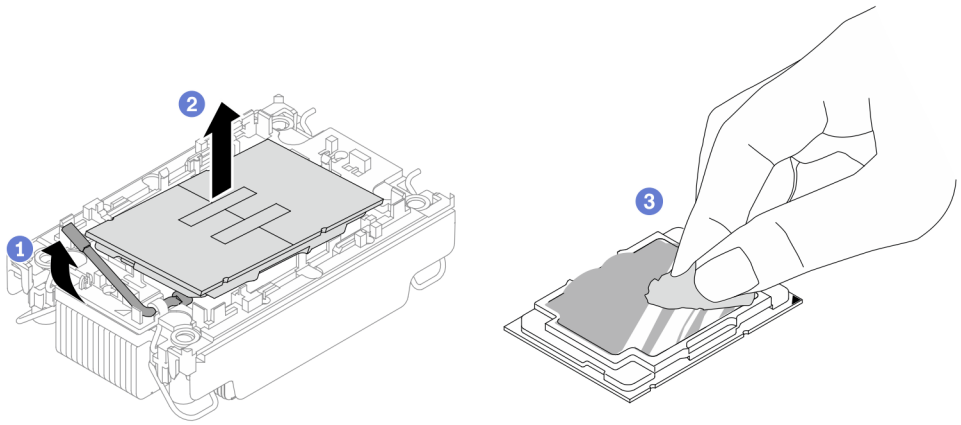


Figure 119. Separating a processor from the heat sink and carrier

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.

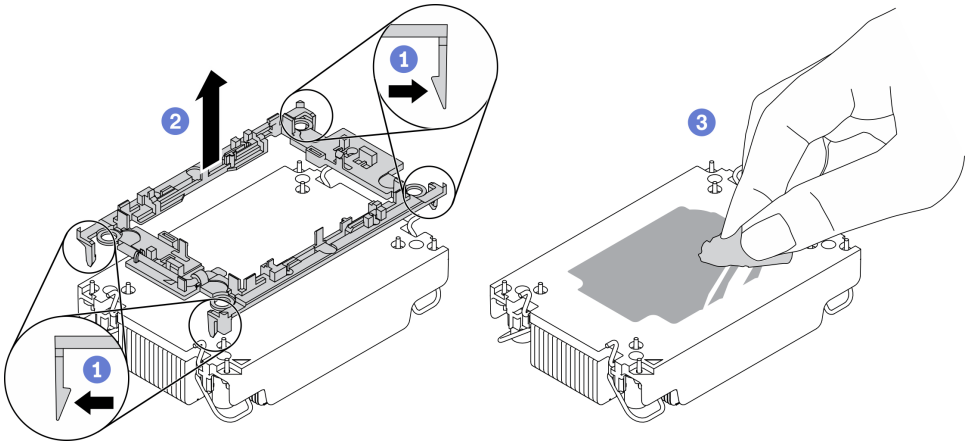


Figure 120. Separating a processor carrier the from heat sink

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 defective component, please package the part to prevent any shipping damage. Reuse the packaging the new part arrived in and follow all packaging instructions.

Install a processor and heat sink

This task has instructions for installing an assembled processor and heat sink, known as a processor-heat-sink module (PHM). This task requires a Torx T30 driver. This procedure must be executed by a trained technician.

About this task

Attention:

- Read “Installation Guidelines” on page 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 20.
- 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.
- 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 processor board supports multiple processors, install the PHMs starting with the first processor socket.
- To ensure the best performance, check the manufacturing date on the new heat sink and make sure it does not exceed 2 years. Otherwise, wipe off the existing thermal grease and apply the new grease onto it for optimal thermal performance.

Notes:

- The heat sink, processor, and processor carrier for the 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 on the processor board 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 the *ThinkSystem SR630 V3 User Guide* or *System Configuration Guide*.

The following illustration shows the components of the PHM.

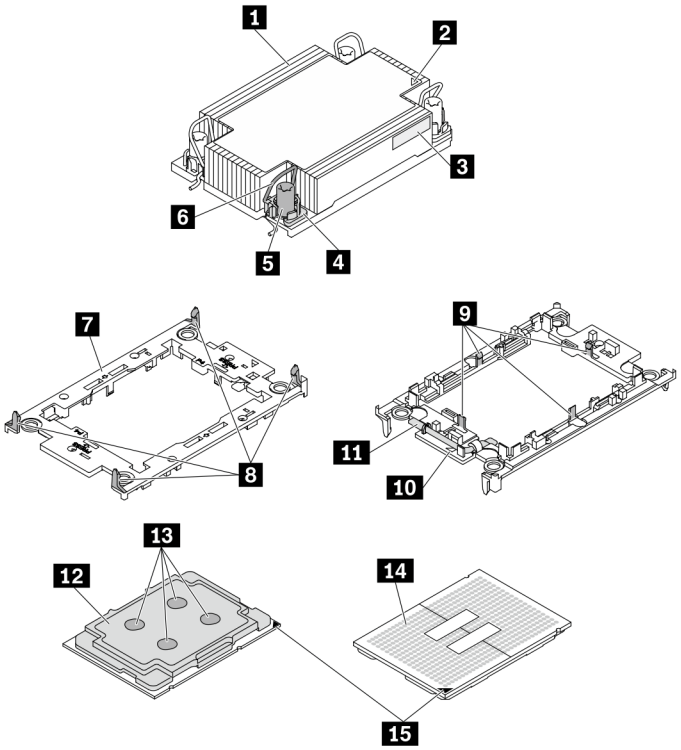


Figure 121. PHM components

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	

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

Procedure

Step 1. If you are replacing a processor and reusing the heat sink.

a. Remove the processor identification label from the heat sink and replace it with the new label that comes with the replacement processor.

b. If there is any old thermal grease on the heat sink, wipe the thermal grease from the bottom of the heat sink with an alcohol cleaning pad.

Step 2. If you are replacing a heat sink and reusing the processor.

a. Remove the processor identification label from the old heat sink and place it on the new heat sink in the same location. The label is on the side of the heat sink closest to the triangular alignment mark.

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.

b. Install processor in new carrier.

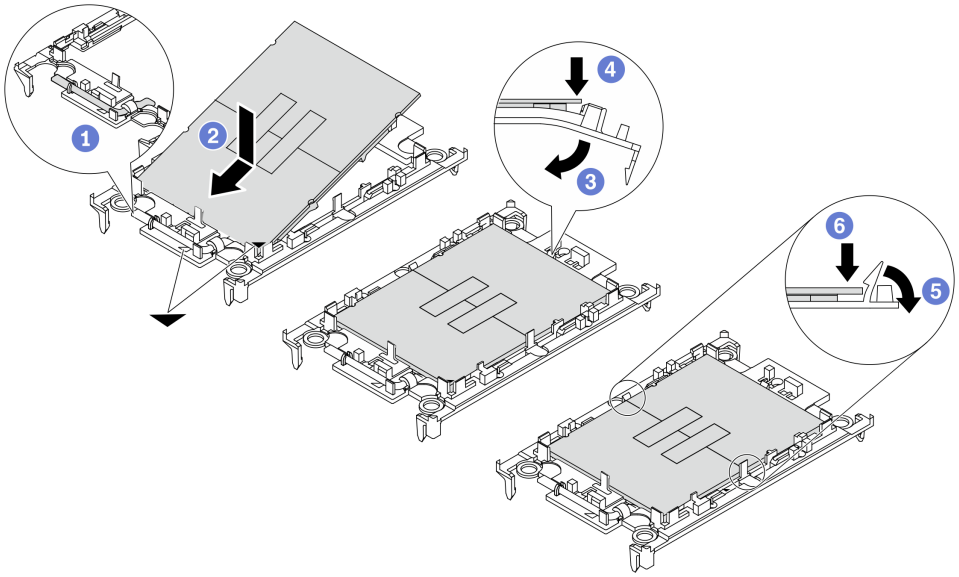


Figure 122. Installing a processor carrier

Note: Replacement heat sinks come with both gray and black processor carriers. Make sure to use the carrier with the same color as the one you discarded earlier.

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.

a. 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 aligned with the triangular mark in the shipping tray.

b. If there is any old thermal grease on the processor, gently wipe the top of the processor with an alcohol cleaning pad.

Note: Make sure the alcohol has fully evaporated before applying new thermal grease.

c. Apply the thermal grease on the top of the processor with a syringe by forming four uniformly spaced dots, while each dot consists of about 0.1 ml of thermal grease.

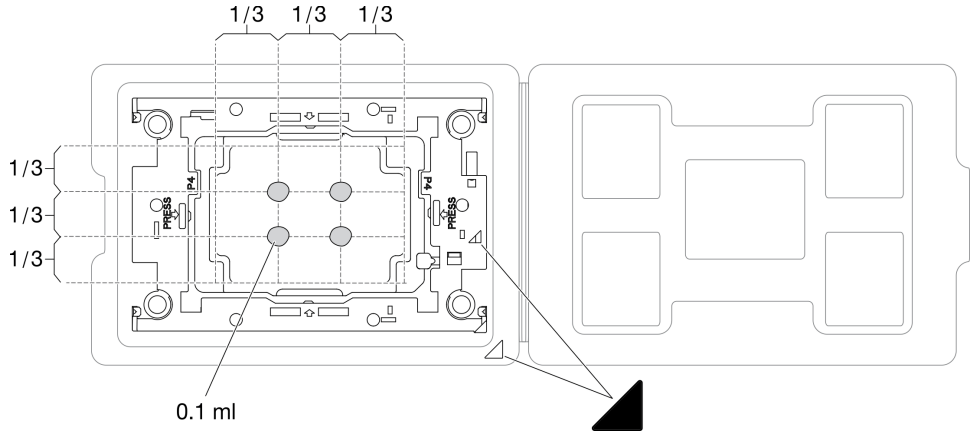


Figure 123. Thermal grease application with processor in shipping tray

Step 4. Assemble the processor and heat sink.

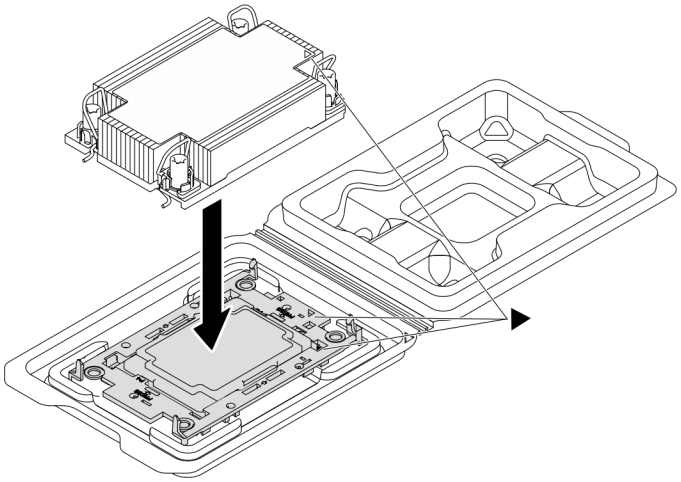


Figure 124. Assembling the PHM with processor in shipping tray

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.

Step 5. (Optional) If the server has been pre-installed with a PHM filler and a socket filler, generally on processor two, it is required to remove the fillers first before you proceed with further installation.

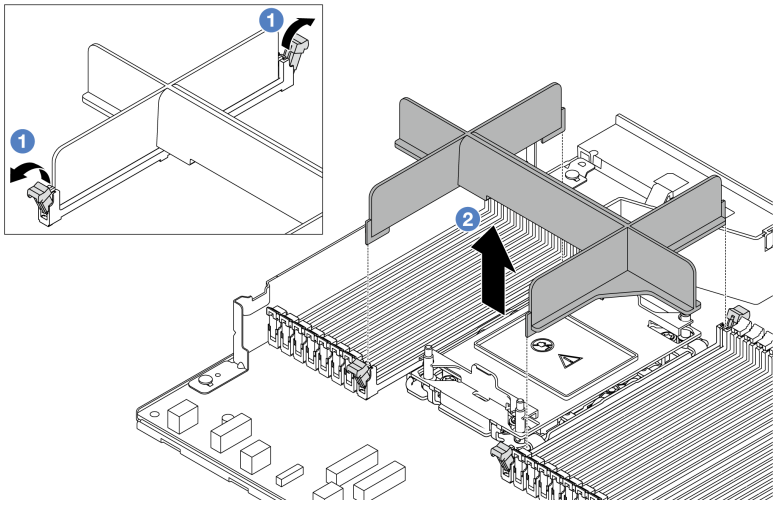


Figure 125. PHM filler removal

a. 1 Open the retaining clip on each end of the memory module slots next to the left and right sides of the processor two slot.

b. 2 Lift the PHM filler from the slots.

Step 6. Install the processor-heat-sink module to the processor board.

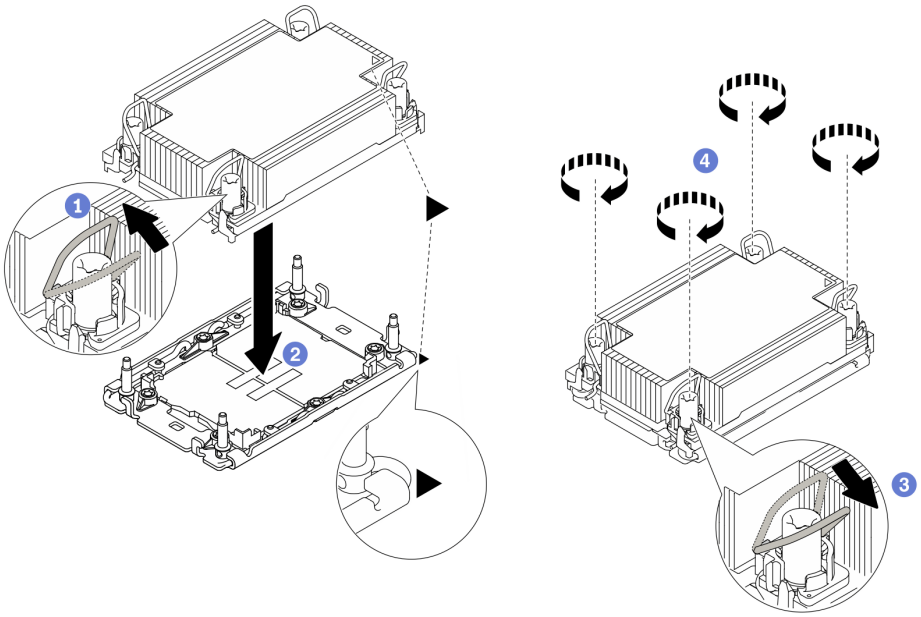


Figure 126. Installing a PHM

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.)

Step 7. If the processor comes with a T-shaped heat sink, fully tighten the two heat sink screws as shown. (For reference, the torque required for the fasteners to fully tighten is 0.9-1.3 newton-meters, 8-12 inch-pounds.)

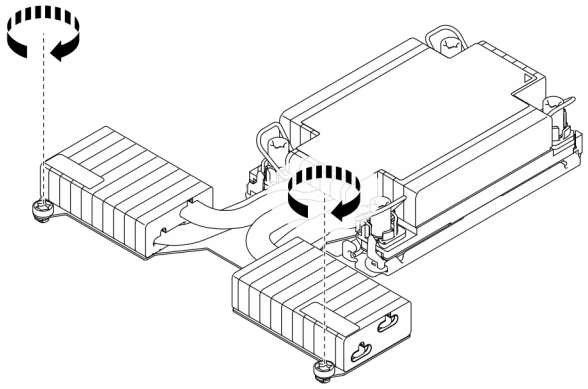


Figure 127. Tightening T-shaped heat sink screws

After you finish

1. Complete the parts replacement. See “Complete the parts replacement” on page 221.
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

Rack latches replacement

Use this information to remove and install the rack latches.

Remove the rack latches

Use this information 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.
- 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.

Procedure

Step 1. If the server is installed with the security bezel, remove it first. See “Remove the security bezel” on page 188.

Step 2. Remove the rack latch.

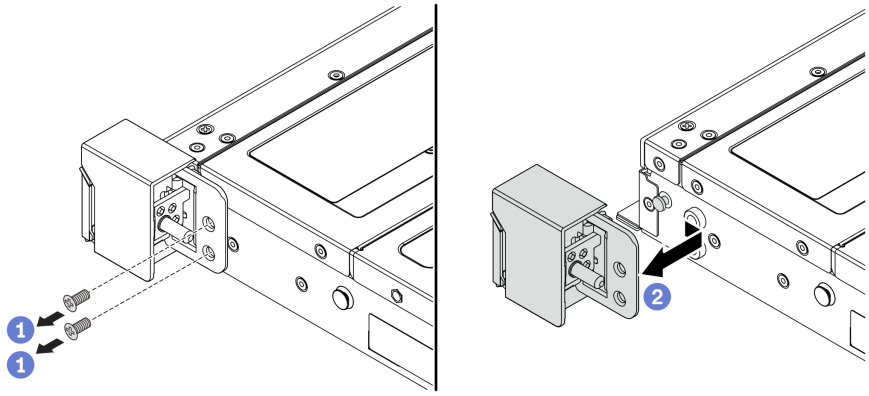


Figure 128. Rack latch removal

a. 1 On each side of the server, remove the two screws that secure the rack latch.

b. 2 On each side of the server, remove the rack latch from the chassis as shown.

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

Use this information 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.
- 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.

Procedure

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

Step 2. Install the rack latch.

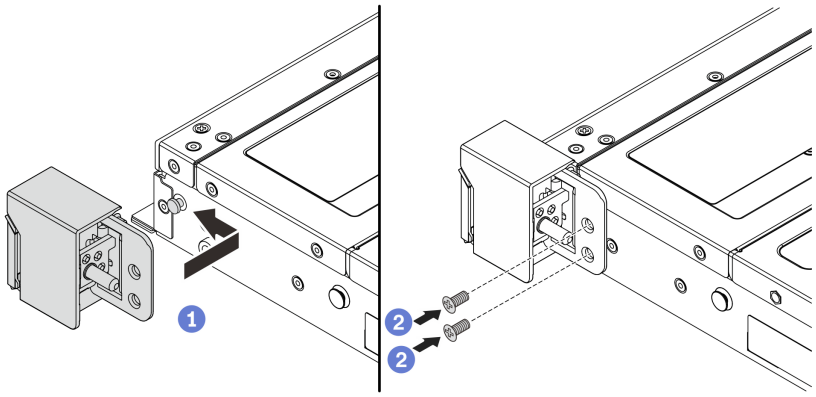


Figure 129. Rack latch installation

a. 1 On each side of the server, align the rack latch with the pin on the chassis. Then, press the rack latch onto the chassis and slightly slide it forward as shown.

b. 2 Install the two screws to secure the rack latch on each side of the server.

After you finish

Complete the parts replacement. See “Complete the parts replacement” on page 221.

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. You can purchase a RAID flash power module from Lenovo. Use this information to remove and install a RAID flash power module.

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

RAID flash power modules can be installed on the chassis, in the air baffle, or to one riser slot.

Locations of RAID flash power modules

Use the illustration and table below to locate the RAID flash power modules.

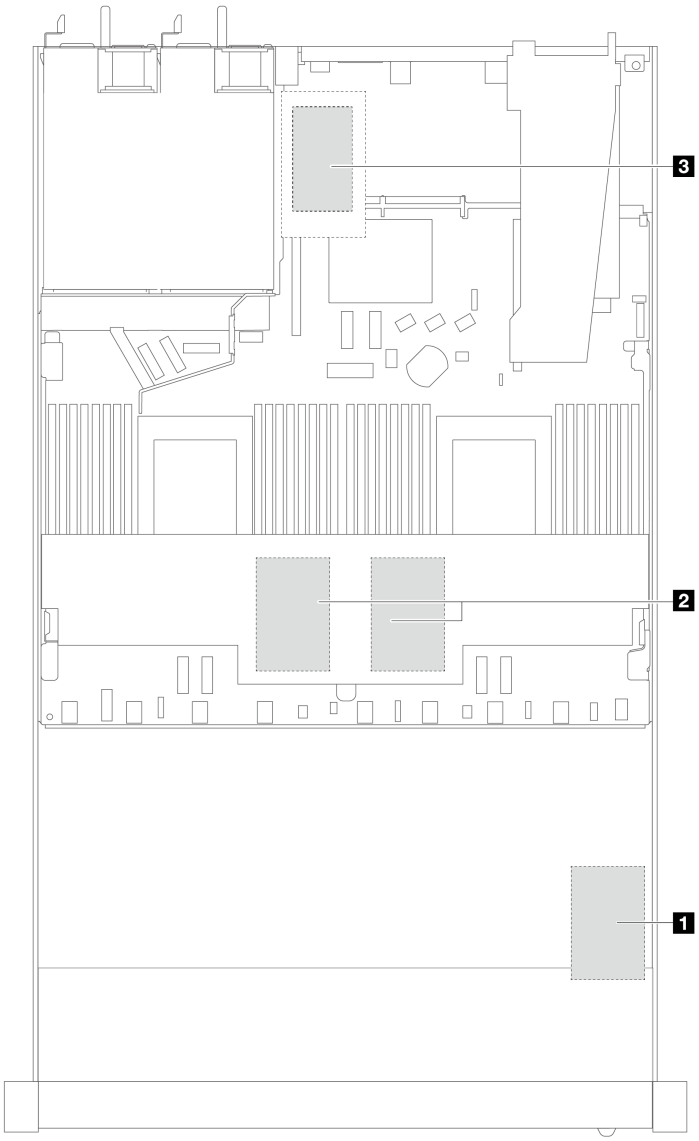


Figure 130. RAID flash power modules in the chassis

Location	Scenario
1 RAID flash power module on the chassis	2.5'' chassis installed with a standard or performance heat sink
2 RAID flash power module on the air baffle	2.5'' or 3.5'' chassis installed with a standard heat sink
3 RAID flash power module on slot 3	• 3.5'' chassis installed with a performance heat sink • 2.5'' chassis installed with Liquid to Air Module (L2AM)

An extension cable is provided for each RAID flash power module for connection. Connect the flash power module cable to the flash power module connector on the corresponding RAID adapter as shown.

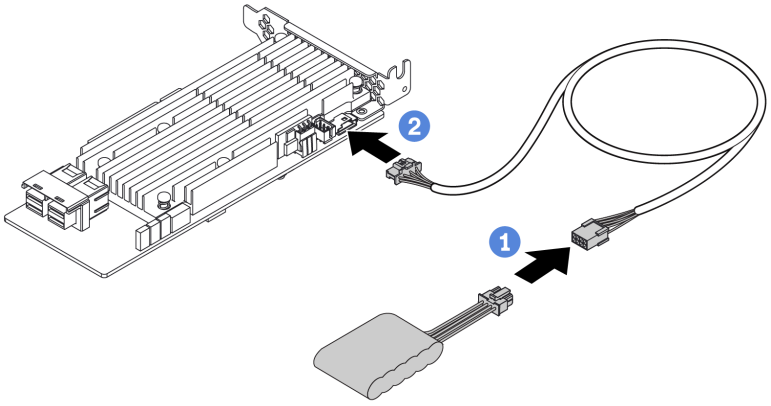


Figure 131. Power cable routing for flash power module

- 1 Connect the RAID flash power module to the extension cable.
- 2 Connect the extension cable to the SFF/CFF RAID adapter.

Remove the RAID flash power module on the chassis

Use this information to remove the RAID flash power module 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 20.
- 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.

Procedure

Step 1. Remove the top cover. See “Remove the top cover” on page 218.

Step 2. Disconnect the cable of the RAID flash power module.

Step 3. Remove the RAID flash power module on the chassis.

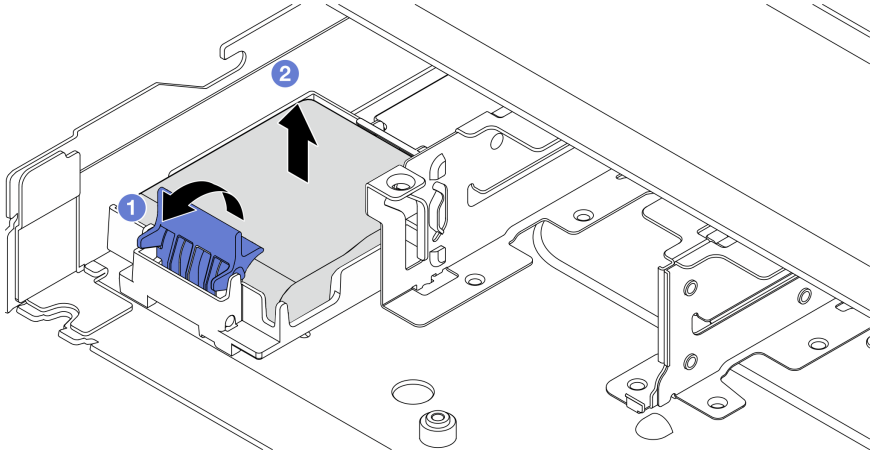


Figure 132. Removal of the RAID flash power module on the chassis

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.

Step 4. Remove the RAID flash power module holder as shown if necessary.

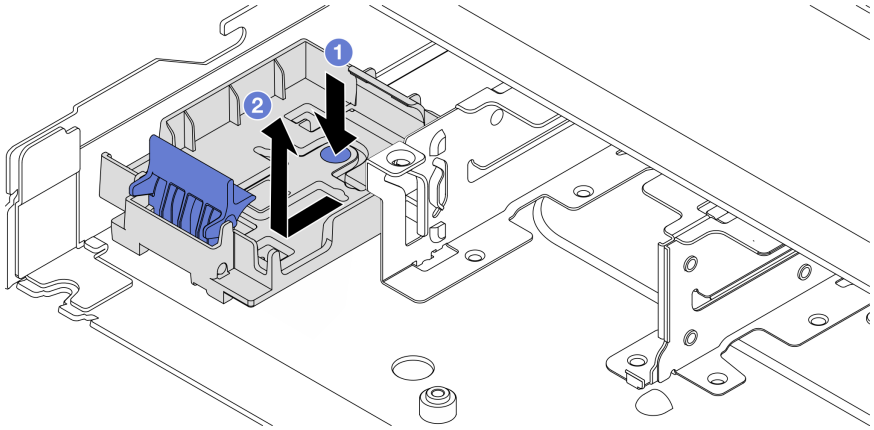


Figure 133. RAID flash power module holder removal

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 RAID flash power module on the chassis

Use this information to install the RAID flash power module 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 20.
- 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.

Procedure

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

Step 2. If the server comes with a tray that covers the place of the RAID flash power module on the chassis, remove it first.

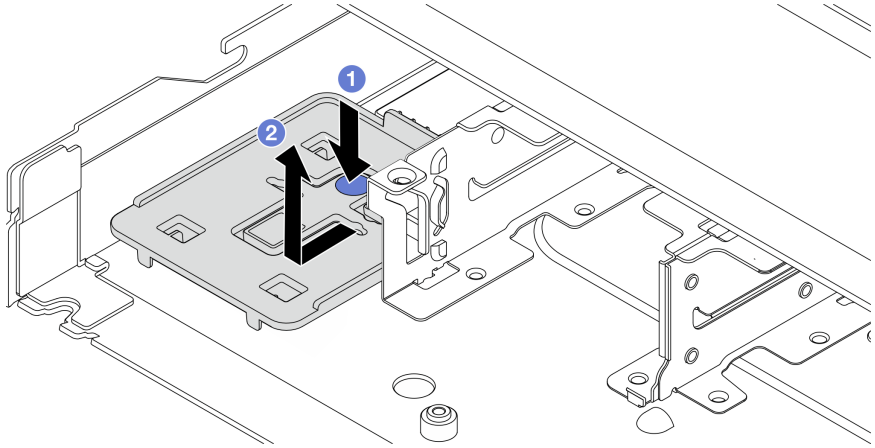


Figure 134. Tray removal

a. 1 Press the blue touch point to disengage the tray from the chassis.

b. 2 Move the tray to the direction as shown and lift it out of the chassis.

Step 3. If the server does not have a RAID flash power module holder on the chassis, install one first.

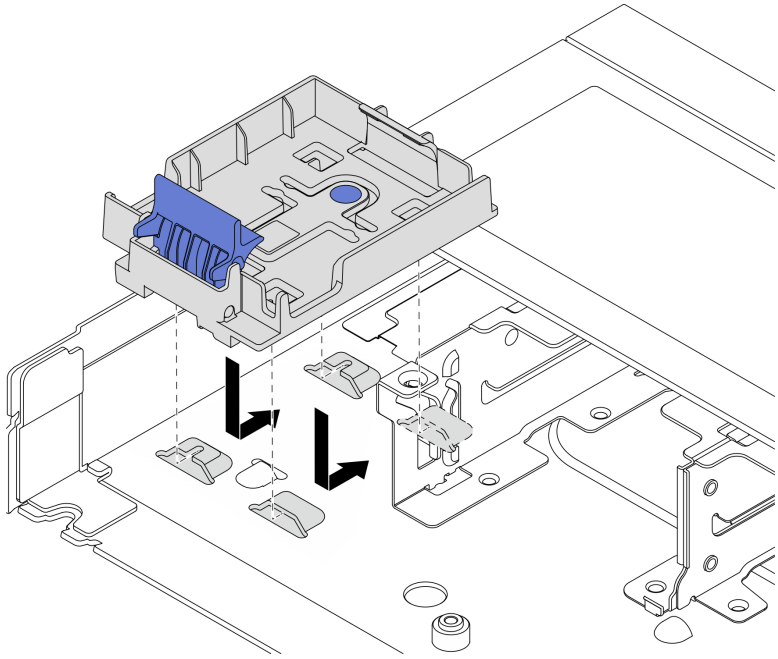


Figure 135. RAID flash power module holder installation

Put the holder down, and move it to the direction as shown to lock the holder onto the chassis.

Step 4. Install the RAID flash power module on the chassis.

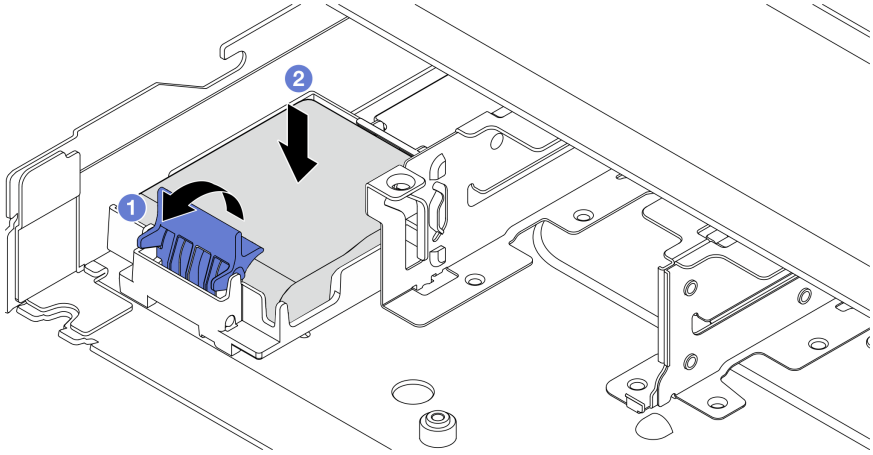


Figure 136. Installation of the RAID flash power module on the chassis

a. 1 Open the retention clip on the holder.

b. 2 Put the RAID flash power module into the holder and press it down to secure it into the holder.

After you finish

1. Connect the super capacitor module to an adapter with the extension cable that comes with the flash power module. See “RAID flash power modules” on page 240.

2. Complete the parts replacement. See “Complete the parts replacement” on page 221.

Demo video

Watch the procedure on YouTube

Remove the RAID flash power module on the air baffle

Use this information to remove the RAID flash power module 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 20.
- 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.

Watch the procedure

A video of this procedure is available on YouTube: https://www.youtube.com/playlist?list=PLYV5R7hVcs-CfNsWy-689CRZHExrZEi9I.

Procedure

Step 1. Remove the top cover. See “Remove the top cover” on page 218.

Step 2. Disconnect the cable of the RAID flash power module.

Step 3. Remove the air baffle from the chassis. See “Remove the air baffle” on page 29.

Step 4. Remove the RAID flash power module on the air baffle.

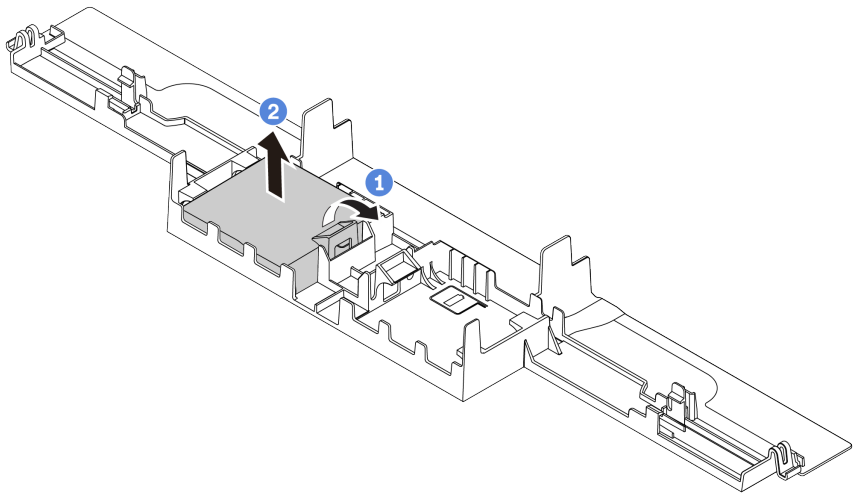


Figure 137. Removal of the RAID flash power module on the air baffle

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.

Install the RAID flash power module on the air baffle

Use this information to install the RAID flash power module 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 20.
- 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.

Watch the procedure

A video of this procedure is available on YouTube: https://www.youtube.com/playlist?list=PLYV5R7hVcs-CfNsWy-689CRZHExrZEi9I.

Procedure

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

Step 2. Install the RAID flash power module on the air baffle.

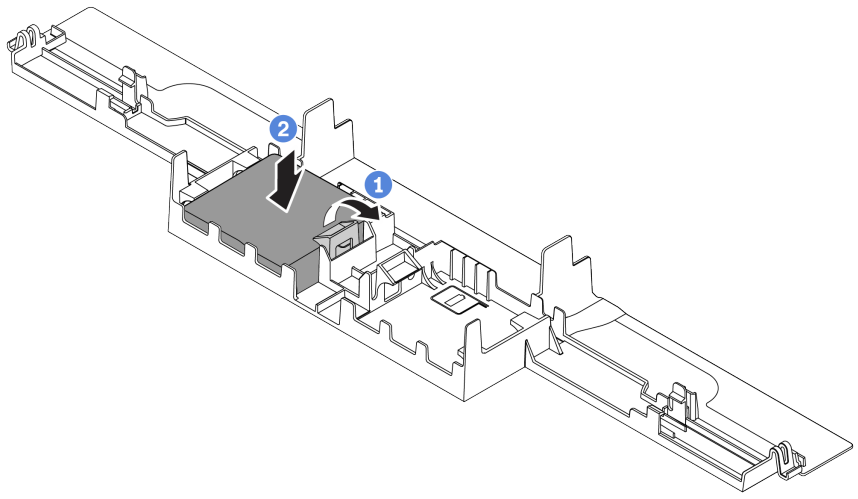


Figure 138. Installation of the RAID flash power module on the air baffle

a. 1 Open the retention clip on the holder.

b. 2 Put the RAID flash power module into the air baffle and press it down to secure it into the air baffle.

After you finish

1. Install the air baffle on the chassis. See “Install the air baffle” on page 30.
2. Connect the flash power module to an adapter with the extension cable that comes with the flash power module. See “RAID flash power modules” on page 240.
3. Complete the parts replacement. See “Complete the parts replacement” on page 221.

Remove the RAID flash power module on the riser

Use this information to remove the RAID flash power module on the riser.

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 20.
- 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.

Procedure

Step 1. Remove the top cover. See “Remove the top cover” on page 218.

Step 2. Disconnect the cable of the RAID flash power module.

Step 3. Remove the riser assembly. See “Remove a rear riser card” on page 183.

Step 4. Remove the RAID flash power module from the riser.

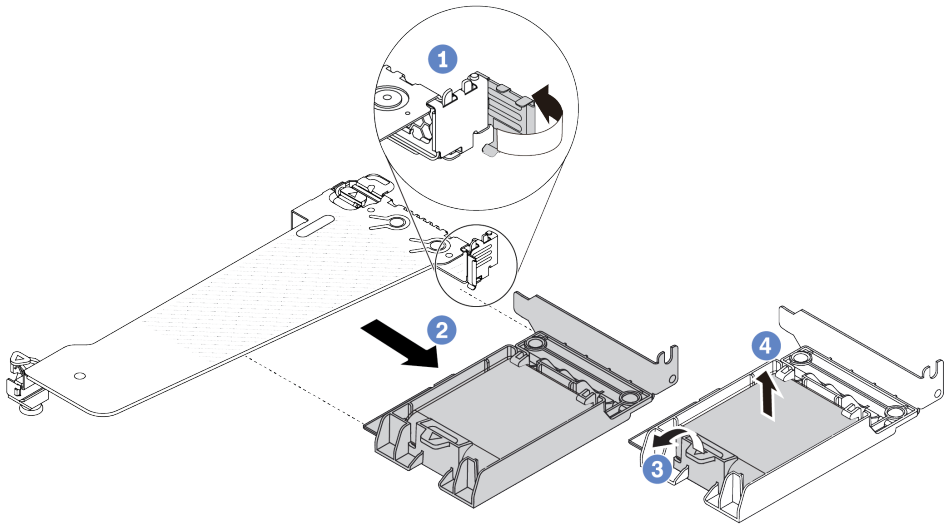


Figure 139. Removal of the RAID super capacitor assembly from the riser

a. 1 Rotate the latch on the riser bracket to the open position.
b. 2 Remove the RAID flash power assembly from the riser.
c. 3 Open the retention clip on the holder of the RAID flash power module.
d. 4 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.

Install the RAID flash power module on the riser

Use this information to install the RAID flash power module on the riser.

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 20.
- 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.

Procedure

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

Step 2. Install the RAID flash power module on the riser.

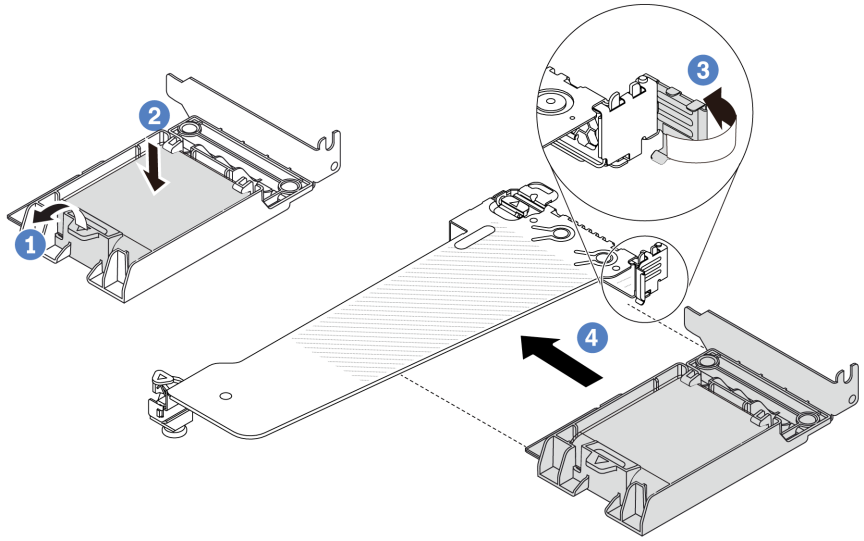


Figure 140. Installation of the RAID flash power module on the riser

a. 1 Open the retention clip on the holder.

b. 2 Put the RAID flash power module into the holder and press it down to secure it into the holder.

c. 3 Rotate the latch on the riser bracket to the open position.

d. 4 Align the RAID flash power assembly with the slot on the riser card. Then, carefully press the RAID flash power assembly straight into the slot until it is securely seated and its bracket is secured.

After you finish

1. Install the riser assembly on the chassis. See “Install a rear riser card” on page 186.
2. Connect the flash power module to an adapter with the extension cable that comes with the flash power module. See “RAID flash power modules” on page 240.
3. Complete the parts replacement. See “Complete the parts replacement” on page 221.

Rear drive assembly replacement

Use this information to remove and install the rear drive assembly.

Remove the 2.5-inch rear drive assembly

Use this information to remove the 2.5-inch rear drive assembly.

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 20.
- 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.

Procedure

Step 1. Remove the top cover. See “Remove the top cover” on page 218.

Step 2. Remove the drives or drive fillers installed in the 2.5-inch rear drive cage. See “Remove a 2.5/3.5-inch hot-swap drive” on page 87.

Step 3. Disconnect the 2.5-inch rear drive cage cables from the processor board or the PCIe adapter. See Chapter 2 “Internal cable routing” on page 223.

Step 4. Hold the two blue touch points and directly lift the 2.5-inch rear drive cage out of the chassis.

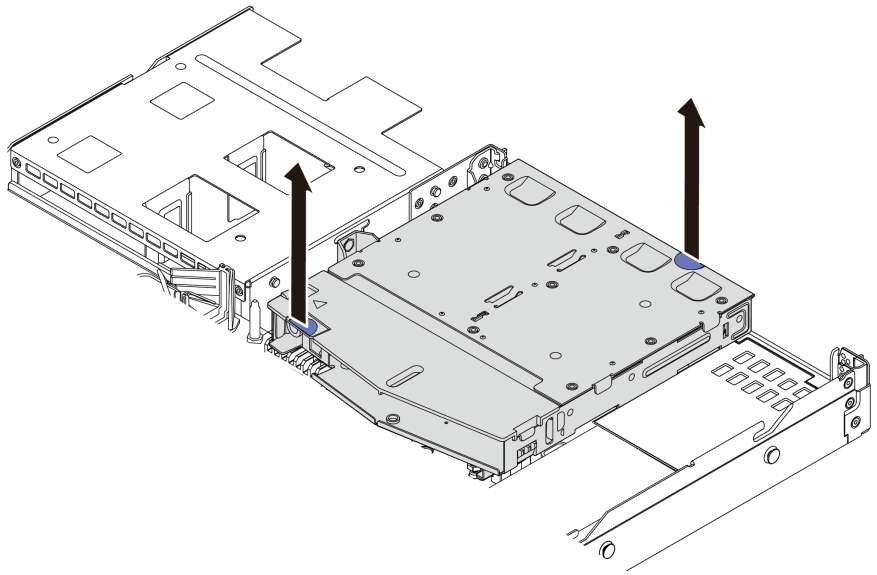


Figure 141. 2.5-inch rear drive cage removal

Step 5. If the rear backplane is reused, remove the rear backplane. See “Remove the 2.5-inch rear drive backplane” on page 40.

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 rear drive assembly

Use this information to install the 2.5-inch rear drive assembly.

About this task

The following illustrates how to install the 2.5-inch rear drive 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 20.
- 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.

Procedure

Step 1. Touch the static-protective package that contains the 2.5-inch rear drive cage to any unpainted surface on the outside of the server. And then, take the 2.5-inch rear drive cage out of the package and place it on a static-protective surface.

Step 2. Gently press and hold the tab on the 2.5-inch rear drive cage as shown and remove the air baffle from the 2.5-inch rear drive cage.

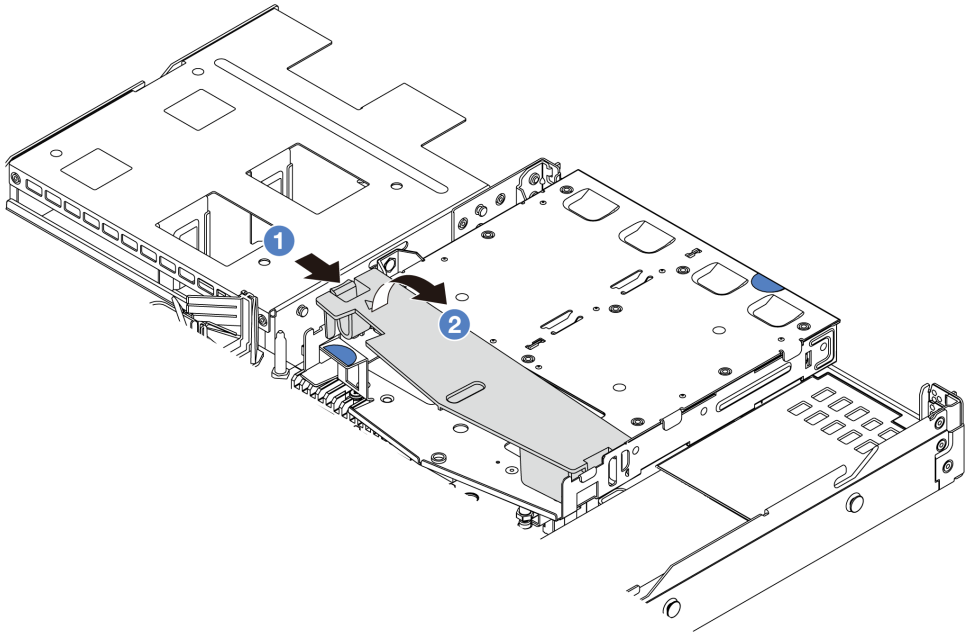


Figure 142. Air baffle removal

a. 1 Press the tab on one side to disengage the air baffle.

b. 2 Lift the air baffle to remove it from drive cage.

Step 3. Align the rear backplane with the 2.5-inch rear drive cage and lower it into the 2.5-inch rear drive cage.

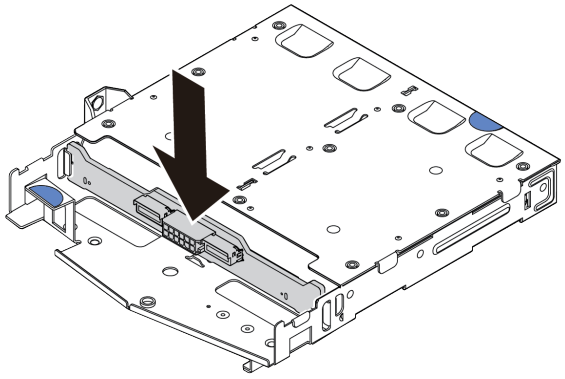


Figure 143. Rear backplane installation

Step 4. Connect the cables to the backplane.

Step 5. Install the air baffle into the 2.5-inch rear drive cage as shown.

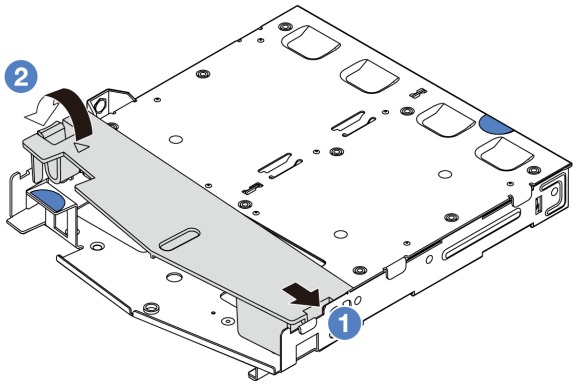


Figure 144. Air baffle installation

a. 1 Align the air baffle edge with the notch on the drive cage.

b. 2 Press the air baffle down and make sure that it is seated in place.

Step 6. Align the pins on the 2.5-inch rear drive cage with the corresponding hole and slot in the chassis. Then, lower the 2.5-inch rear drive cage into the chassis until it is fully seated.

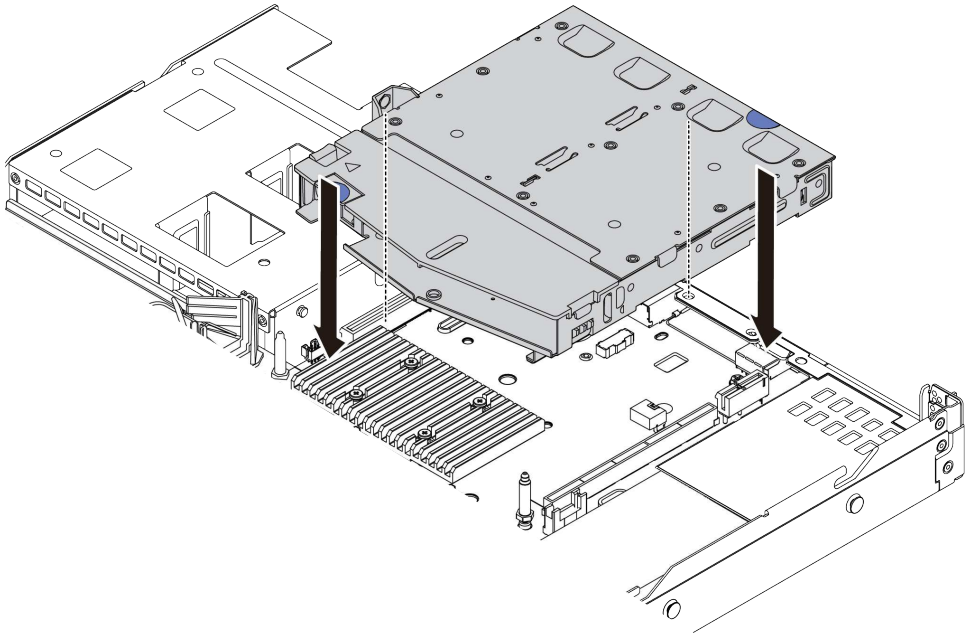


Figure 145. 2.5-inch rear drive cage installation

Step 7. Connect the cables to the processor board or expansion slots. See Chapter 2 “Internal cable routing” on page 223.

After you finish

1. Reinstall the drives or drive fillers into the 2.5-inch rear drive cage. See “Install a 2.5/3.5-inch hot-swap drive” on page 89.
2. Complete the parts replacement. See “Complete the parts replacement” on page 221.

Demo video

Watch the procedure on YouTube

Remove the 7mm rear drive assembly

Use this information to remove the 7mm rear drive assembly.

About this task

The following illustrates how to remove the 7mm rear drive 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 20.

- 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.

Procedure

Step 1. Remove the top cover. See “Remove the top cover” on page 218.

Step 2. Remove the drives or drive fillers installed in the 7mm rear drive cage. See “Remove a 2.5/3.5-inch hot-swap drive” on page 87.

Step 3. Disconnect the 7mm rear drive cage cables from the processor board or the PCIe adapter.

Step 4. Lift the 7mm rear drive cage out of the chassis.

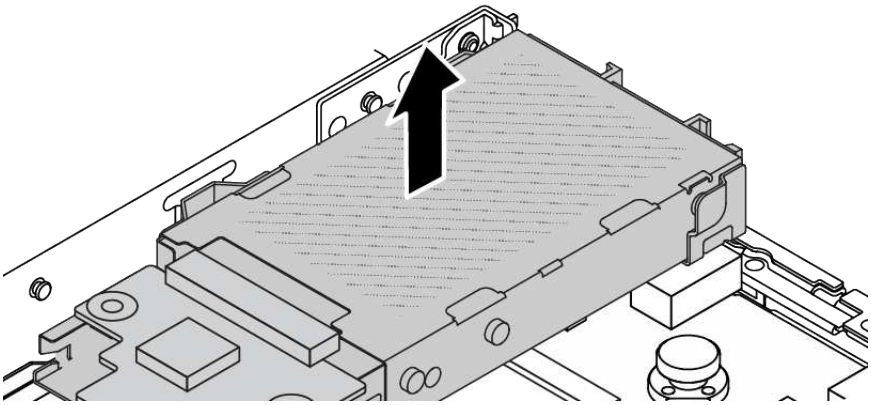


Figure 146. 7mm rear drive cage removal

Step 5. If the rear backplane is reused, remove the rear backplane. See “Remove the 7mm drive backplanes” on page 43.

After you finish

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

Demo video

Watch the procedure on YouTube

Install the 7mm rear drive assembly

Use this information to install the 7mm rear drive assembly.

About this task

The following illustrates how to install the 7mm rear drive 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 20.

- 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.

Procedure

Step 1. Touch the static-protective package that contains the 7mm rear drive cage to any unpainted surface on the outside of the server. And then, take the 7mm rear drive cage out of the package and place it on a static-protective surface.

Step 2. Install the 7mm backplane, see “Install the 7mm drive backplanes” on page 45.

Step 3. Align the pins on the 7mm rear drive cage with the corresponding pin and slot in the chassis. Then, lower the 7mm rear drive cage into the chassis until it is fully seated.

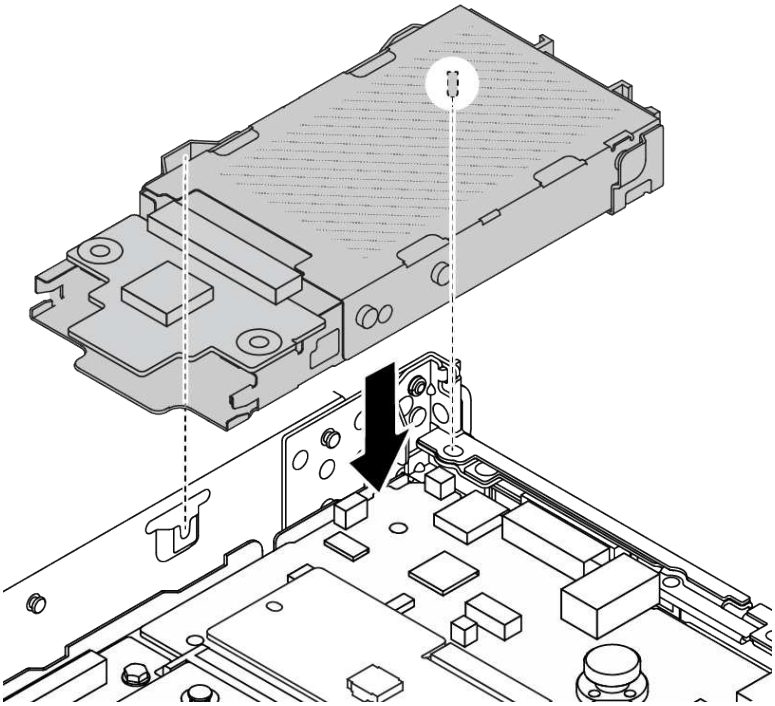


Figure 147. 7mm rear drive cage installation

Step 4. Connect the cables from the backplanes to the processor board and riser slot. See Chapter 2 “Internal cable routing” on page 223.

After you finish

1. Reinstall the drives or drive fillers into the 7mm rear drive cage. See “Install a 2.5/3.5-inch hot-swap drive” on page 89.
2. Complete the parts replacement. See “Complete the parts replacement” on page 221.

Demo video

Watch the procedure on YouTube

Rear OCP module replacement

Use this information to remove and install the rear OCP module.

Note: The OCP module is available only on some models.

- “Remove the rear OCP module” on page 177
- “Install the rear OCP module” on page 178

Remove the rear OCP module

Use this information to remove 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 20.
- 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.

Procedure

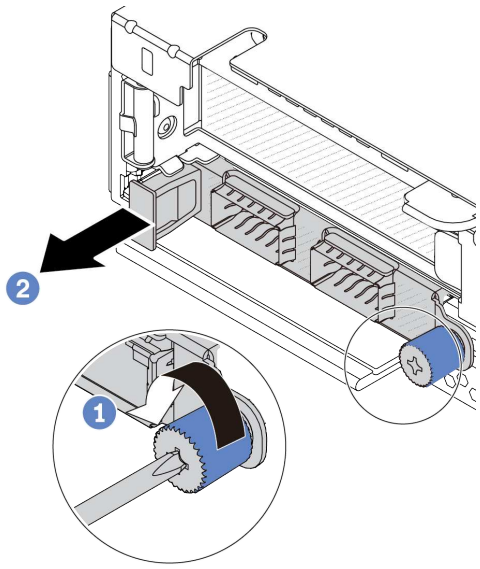


Figure 148. OCP module removal

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

Step 2. 2 Pull out the OCP module by its handle on the left as shown.

After you finish

1. Install a new OCP module or a card filler. See “Install the rear OCP module” on page 178.
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

Use this information 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 20.
- 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.

Procedure

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

Step 2. Install the OCP module.

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

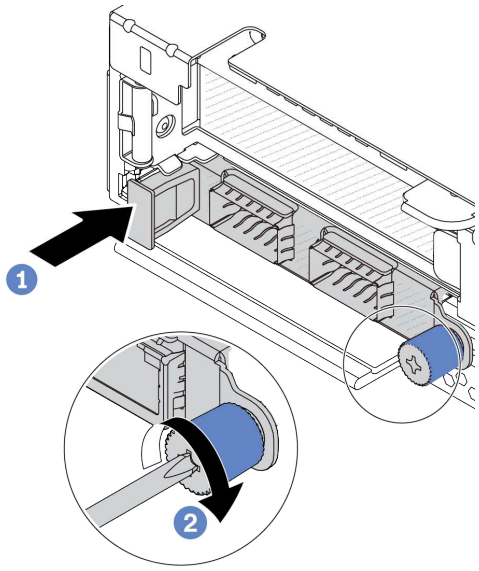


Figure 149. OCP module installation

a. 1 Push the OCP module by its handle on the left until it is fully inserted into the connector on the processor board.

b. 2 Fully tighten the thumbscrew to secure the adapter. Use a screwdriver if necessary.

Notes:

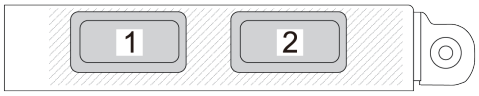


Figure 150. OCP module (two connectors)

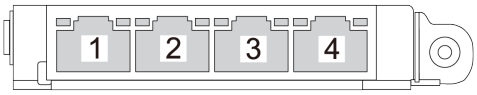


Figure 151. OCP module (four connectors)

- The OCP module provides two or four extra Ethernet connectors for network connections.
- By default, any Ethernet connector 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 221.

Demo video

Watch the procedure on YouTube

Rear riser card replacement

Use this information to remove and install a rear riser card.

- “Server rear configuration and riser assemblies” on page 179
- “The overview of rear riser brackets” on page 182
- “The overview of rear riser cards” on page 182

Server rear configuration and riser assemblies

See this section to identify the correlations between the rear configuration and riser assemblies.

Table 13. Server rear configuration and riser assemblies[1]

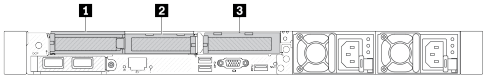
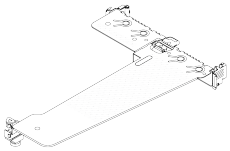
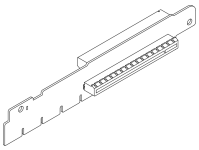
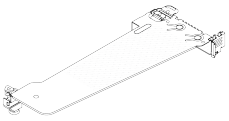
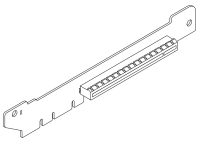
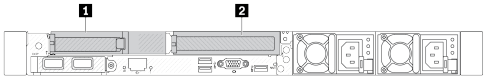
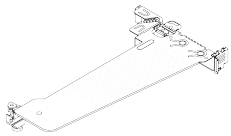
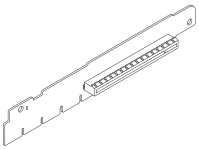
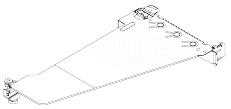
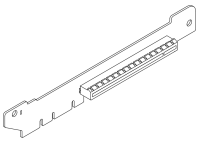
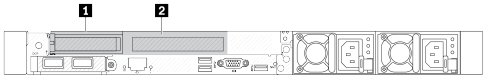
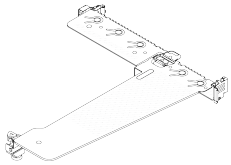
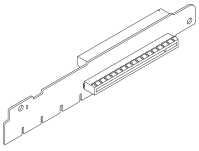
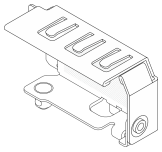
Server rear configuration	Riser 1 assembly	Riser 2 assembly
 *Figure 152. Three PCIe slots*	 *Figure 153. Riser 1 LP-LP bracket*  *Figure 154. Riser 1 BF[2] card*	 *Figure 155. Riser 2 bracket*  *Figure 156. Riser 2 card*
 *Figure 157. Two PCIe slots*	 *Figure 158. Riser 1 LP-filler bracket*  *Figure 159. Riser 1 card*	 *Figure 160. Riser 2 FH bracket*  *Figure 161. Riser 2 card*
 *Figure 162. Two PCIe slots*	 *Figure 163. Riser 1 LP-FH bracket*  *Figure 164. Riser 1 BF card*	Riser 2 assembly is not supported. A rear wall bracket is required for this configuration.  *Figure 165. A rear wall bracket*

Table 13. Server rear configuration and riser assemblies[1] (continued)

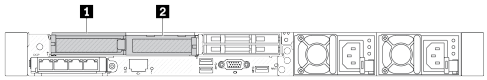
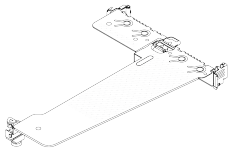
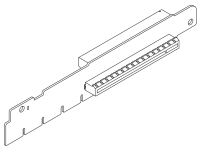
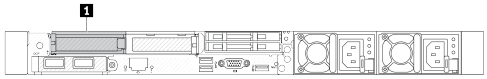
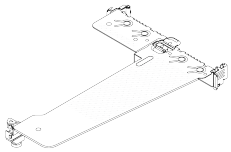
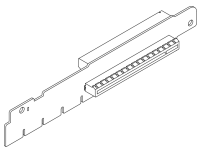
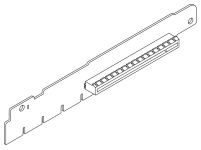
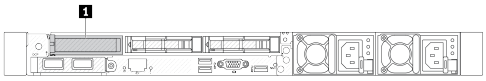
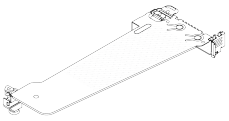
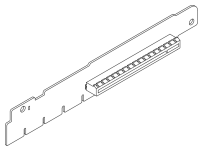
Server rear configuration	Riser 1 assembly	Riser 2 assembly
 *Figure 166. Two PCIe slots*	 *Figure 167. Riser 1 LP-LP bracket*  *Figure 168. Riser 1 BF card*	Riser 2 assembly is not supported.
 *Figure 169. One PCIe slot*	 *Figure 170. Riser 1 LP-LP bracket* Choose either one below to assemble: •  *Figure 171. Riser 1 BF card* •  *Figure 172. Riser 1 card*	Riser 2 assembly is not supported.

Table 13. Server rear configuration and riser assemblies[1] (continued)

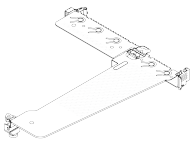
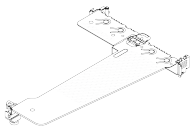
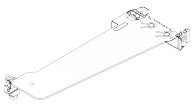
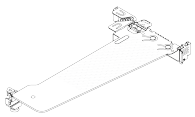
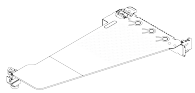
Server rear configuration	Riser 1 assembly	Riser 2 assembly
 *Figure 173. One PCIe slot*	 *Figure 174. Riser 1 LP bracket*  *Figure 175. Riser 1 card*	Riser 2 assembly is not supported.

Notes:

1. The illustrations of riser brackets and cards may look slightly different from the physical ones.
2. BF: “butterfly”, a riser card with slots on both sides.

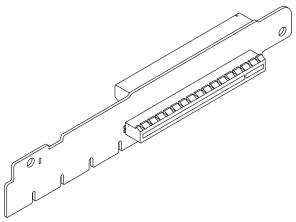
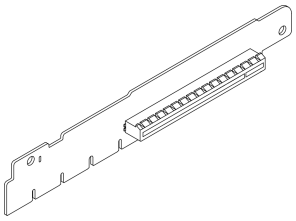
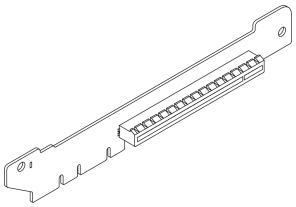
The overview of rear riser brackets

See this section to identify different riser brackets.

 *Figure 176. Riser 1 LP-FH bracket*	 *Figure 177. Riser 1 LP-LP bracket*	 *Figure 178. Riser 1/2 LP bracket*	 *Figure 179. Riser 1 LP-filler bracket*	 *Figure 180. Riser 2 FH bracket*

The overview of rear riser cards

See this section to identify different riser cards.

Riser card	Notes
 *Figure 181. A Gen 4/5 BF riser card*	• Depending on the server configuration or specific orders, the riser card can be a Gen 4 or Gen 5 card. • This section only breaks down how to match the cards with the brackets as the appearance and the installation methods are the same for the Gen 4 and Gen 5 BF cards.
 *Figure 182. A Gen 4/5 riser card*	This card can be: • A Gen 4 riser 1 card • A Gen 5 BF riser 1 card with one slot removed
 *Figure 183. A Gen 4/5 riser card*	Gen 4/5 riser 2 card

Remove a rear riser card

Use this information to remove a rear riser card.

About this task

For more riser brackets supported, see “Rear riser card replacement” on page 179.

The riser assembly you want to remove might be different from the following illustrations, but the removal method is the same. The following takes the LP-FH riser assembly as an example.

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 20.
- 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.

Procedure

Step 1. Remove the top cover. See “Remove the top cover” on page 218.

Step 2. If there is any PCIe adapter installed on the riser card, record the cable connections first. Then, disconnect all cables from the PCIe adapter.

Step 3. Press the two latches on both ends at the same time, and carefully lift it out of the chassis by the two latches.

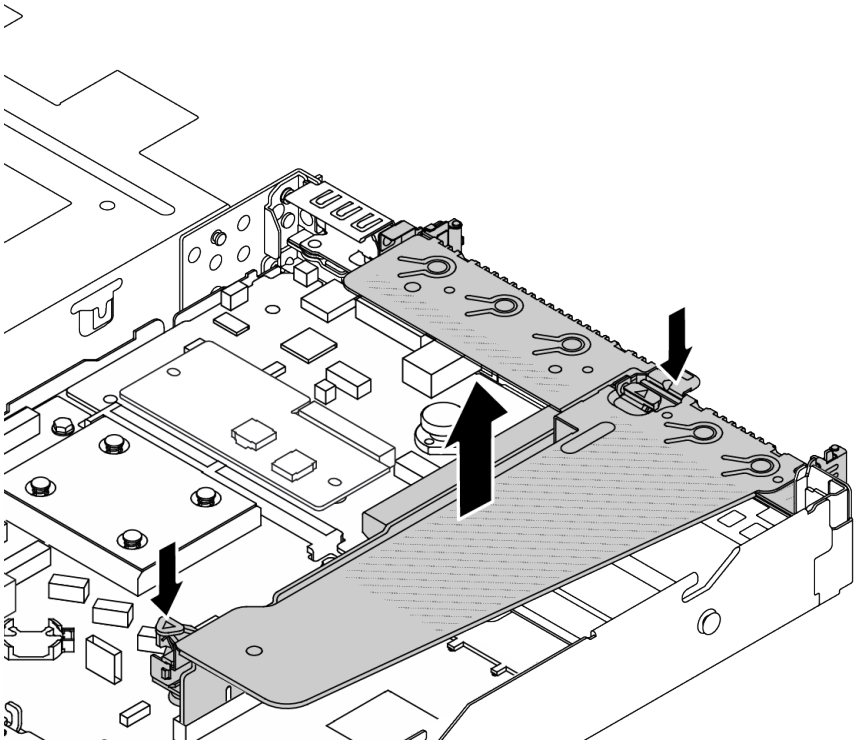


Figure 184. Riser assembly removal

Step 4. If necessary, remove the PCIe adapters that are installed on the riser card. See “Remove a PCIe adapter” on page 140.

Step 5. Remove the riser card from the bracket.

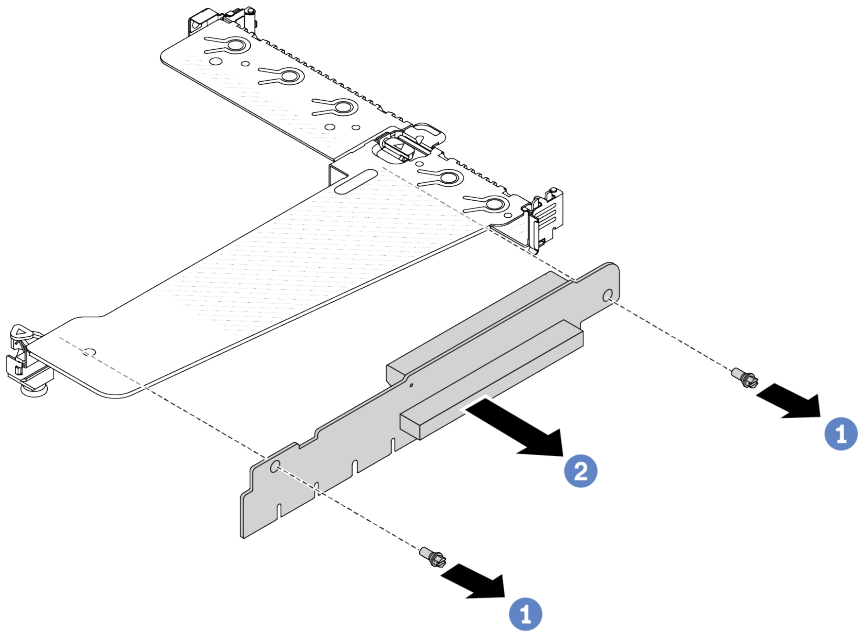


Figure 185. Riser card removal

a. 1 Remove the two screws that secure the riser card to the bracket.
b. 2 Remove the riser card.

After you finish

1. If you are instructed to return the component or optional device, follow all packaging instructions, and use any packaging materials for shipping that are supplied to you.
2. Remove the rear wall bracket if you would like to install a non-LP-FH riser assembly.

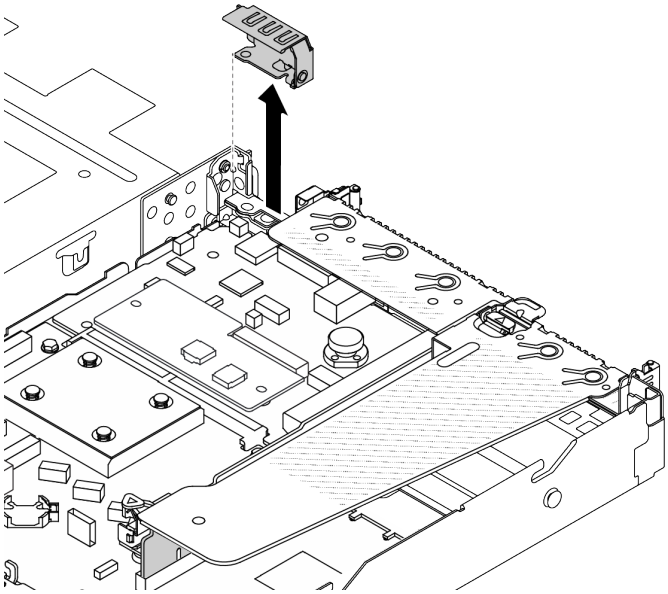


Figure 186. Rear wall bracket removal

Demo video

Watch the procedure on YouTube

Install a rear riser card

Use this information to install a rear riser card.

About this task

For more riser brackets supported, see “Rear riser card replacement” on page 179.

The riser assembly you want to install might be different from the following illustrations, but the installation method is the same. The following takes the LP-FH riser assembly as an example.

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 20.
- 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.

Procedure

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

Step 2. Install the riser card and secure it to the bracket.

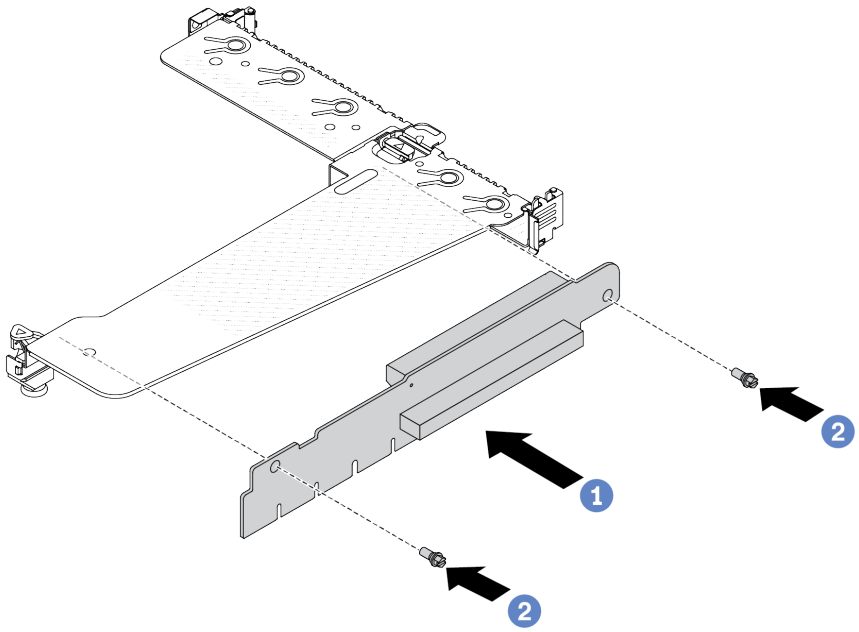


Figure 187. Riser card installation

1. 1 Align the screw holes in the riser card with the corresponding ones in the bracket.
2. 2 Install the two screws to secure the riser card to the bracket.

Step 3. If necessary, reinstall the PCIe adapters on the riser card. See “Install a PCIe adapter” on page 142. Then, refer to your note to reconnect any cables of the PCIe adapters on the riser card. Or you can refer to the Chapter 2 “Internal cable routing” on page 223 and locate the cable routing information for your configuration options.

Step 4. Position the riser assembly on the chassis. Align the plastic clip and two pins on the bracket with the guide pin and two holes on the chassis, and align the riser card with the riser slot on the system board assembly. Then, carefully press the riser assembly straight down into the slot until it is fully seated.

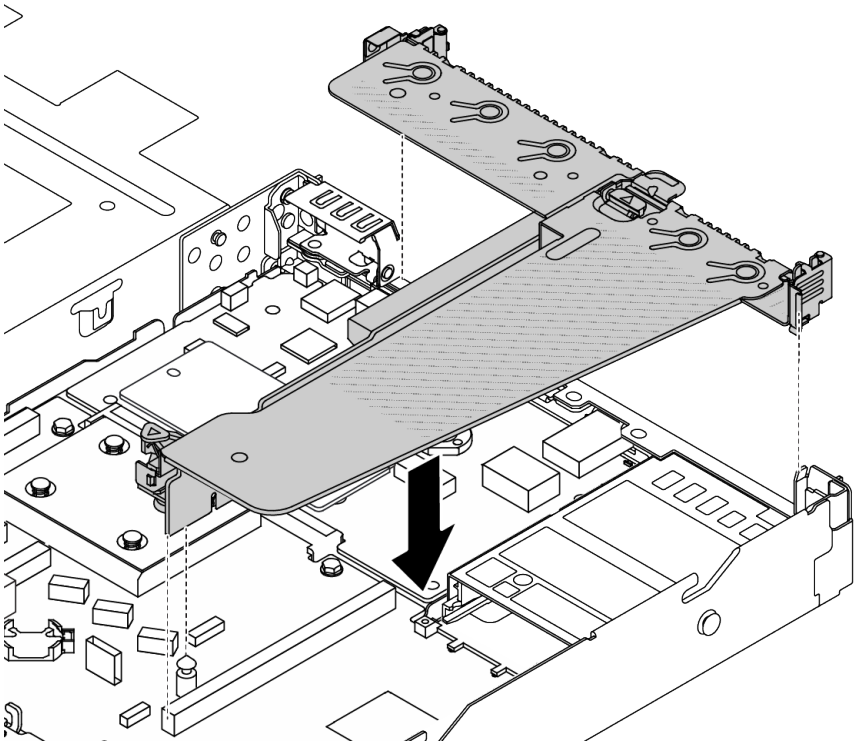


Figure 188. Riser assembly installation

After you finish

Complete the parts replacement. See “Complete the parts replacement” on page 221.

Demo video

Watch the procedure on YouTube

Security bezel replacement

Use this information to remove and install the security bezel.

Note: The security bezel is available on some models.

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.
- 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.

Watch the procedure

A video of this procedure is available on YouTube: https://www.youtube.com/playlist?list=PLYV5R7hVcs-CfNsWy-689CRZHExrZEi9l.

Procedure

Step 1. Use the key to unlock the security bezel.

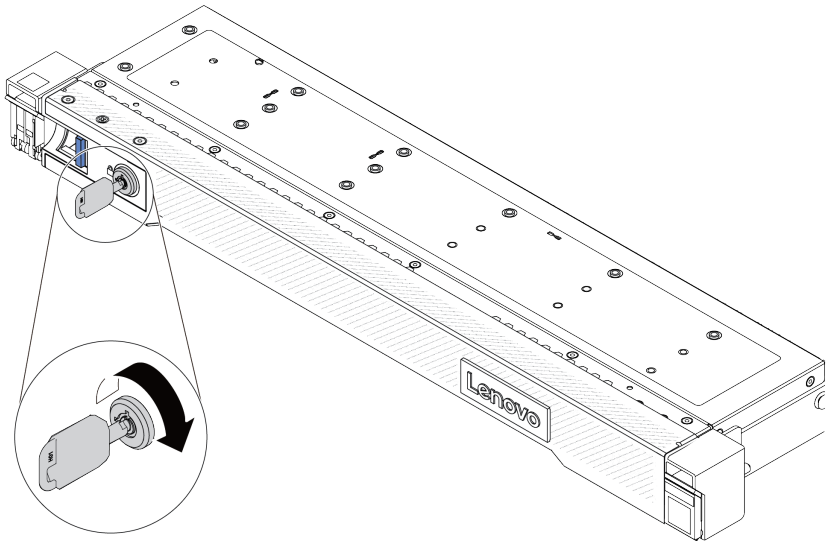


Figure 189. Unlocking the security bezel

Step 2. Remove the security bezel.

Attention: Before you ship the rack with the server installed, reinstall and lock the security bezel into place.

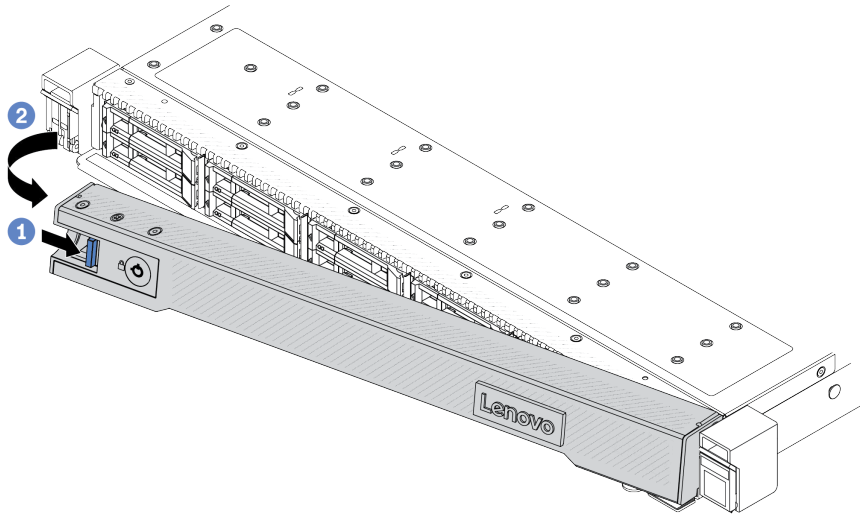


Figure 190. Security bezel removal

a. 1 Press the release latch.
b. 2 Rotate the security bezel outward to remove it from 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 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.
- 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.

Watch the procedure

A video of this procedure is available on YouTube: https://www.youtube.com/playlist?list=PLYV5R7hVcs-CfNsWy-689CRZHExrZEi9I.

Procedure

Step 1. If you have removed the rack latches, reinstall them. See "Install the rack latches" on page 159.

Step 2. If the key is held inside the security bezel, remove it out of the security bezel.

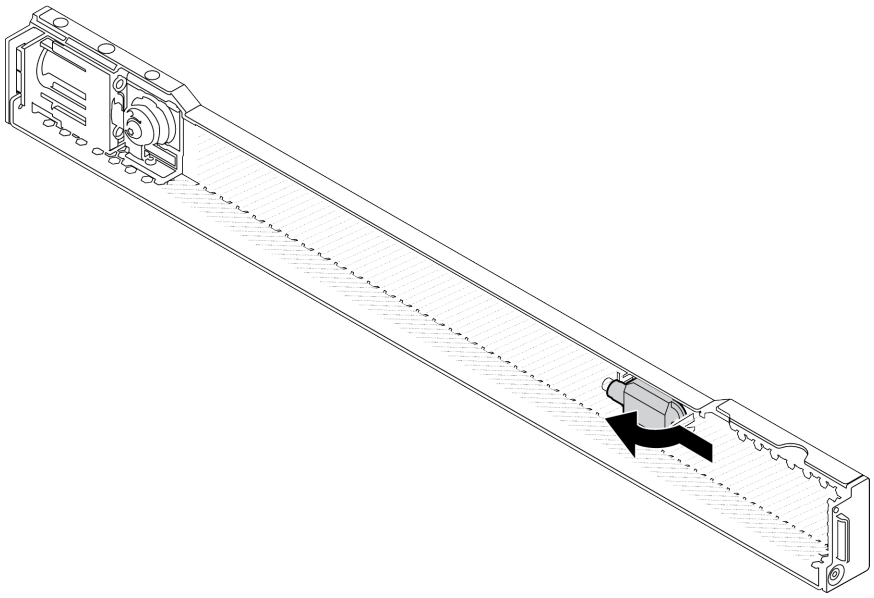


Figure 191. Key removal

Step 3. Install the security bezel to the chassis.

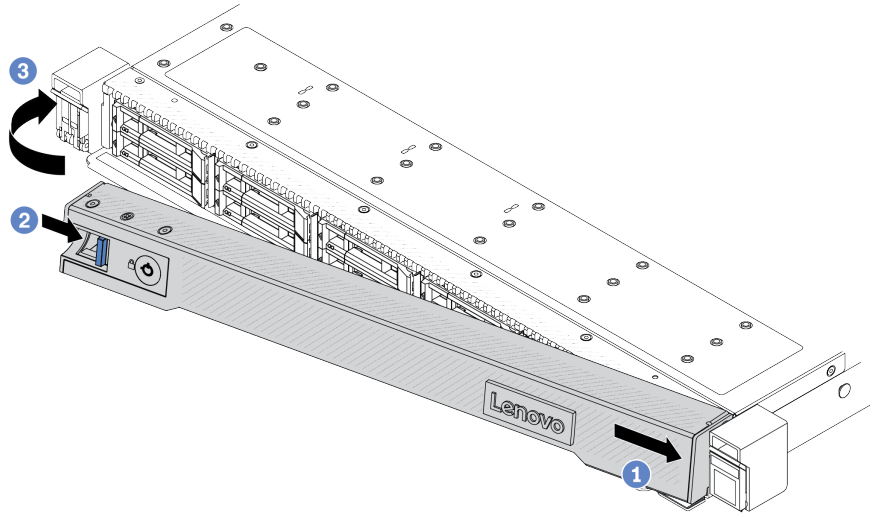


Figure 192. Security bezel installation

a. 1 Insert the tab on the security bezel into the slot on the right rack latch.
b. 2 Press and hold the blue release latch.
c. 3 Rotate the security bezel inward until the left side clicks into place.

Step 4. Use the key to lock the security bezel to the closed position.

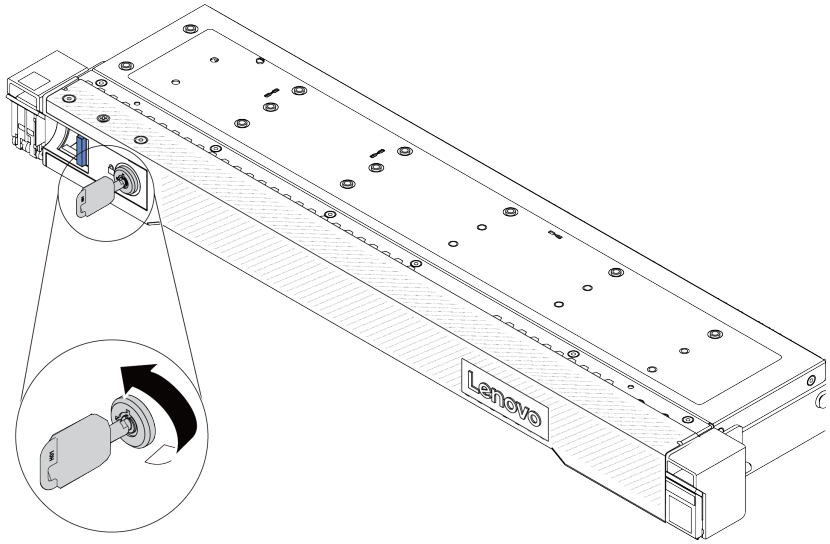


Figure 193. Locking the security bezel

After you finish

Complete the parts replacement. See "Complete the parts replacement" on page 221.

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 20.
- 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.

Procedure

Step 1. Remove the top cover. See "Remove the top cover" on page 218.

Step 2. Disconnect the cable of the serial port module from the system board assembly.

Step 3. Press the two latches on both ends at the same time, and carefully lift the riser cage out of the chassis by two latches.

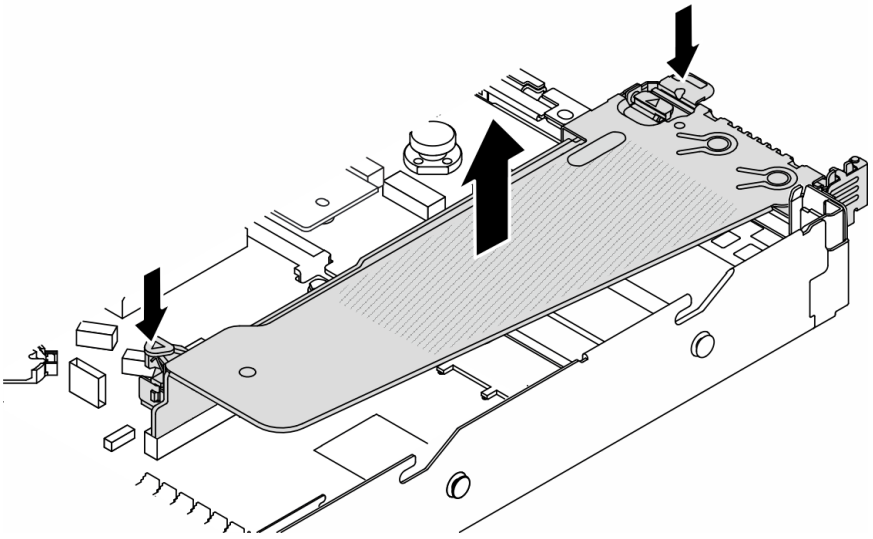


Figure 194. Removing the riser bracket

Step 4. Open the retention latch and remove the serial port module from the riser bracket.

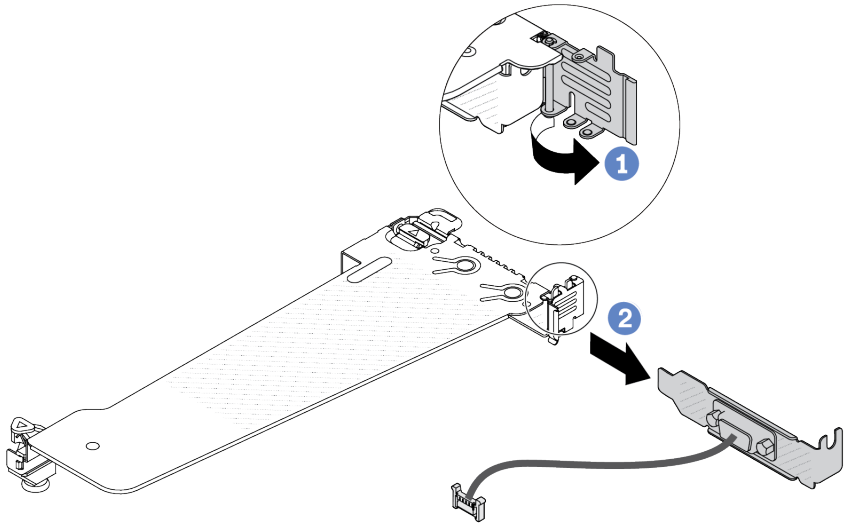


Figure 195. Removing the riser bracket

a. 1 Open the retention latch.

b. 2 Remove the serial port module from the riser bracket.

Step 5. (Optional) If you need to replace the serial port bracket, use a 5 mm wrench to disassemble the serial port cable from the bracket.

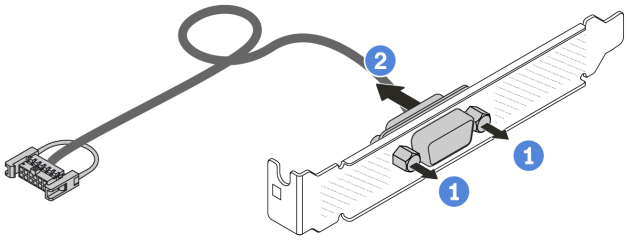


Figure 196. Disassembling the serial port module

a. 1 Loosen the two screws.
b. 2 Pull out the serial port cable from the bracket.

After you finish

1. Install a new serial port module, a PCIe adapter, or a PCIe slot bracket to cover the place. See "Install a serial port module" on page 194 and "Install a PCIe adapter" on page 142.
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 20.
- 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.
- Read the "PCIe slots and adapters" on page 11 to ensure that you install the serial port module to a correct PCIe slot.

Procedure

Step 1. Touch the static-protective package that contains the component to any unpainted surface on the outside of the server. Then, take the component 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.

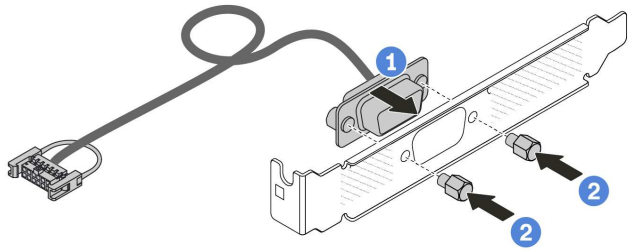


Figure 197. Assembling the serial port module

a. 1 Align the two screw holes on the cable connector to the bracket.

b. 2 Install the two screws to the bracket.

Step 3. Install the serial port module to the riser bracket.

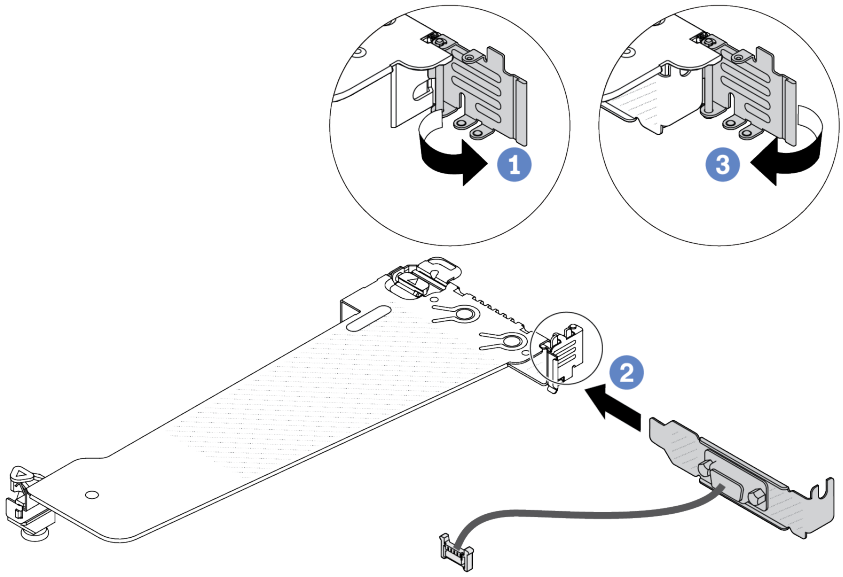


Figure 198. Installing the serial port module

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

b. 2 Install the serial port module to the riser bracket.

c. 3 Close the retention latch and ensure that the serial port module is securely installed.

Step 4. Install the riser assembly to the server.

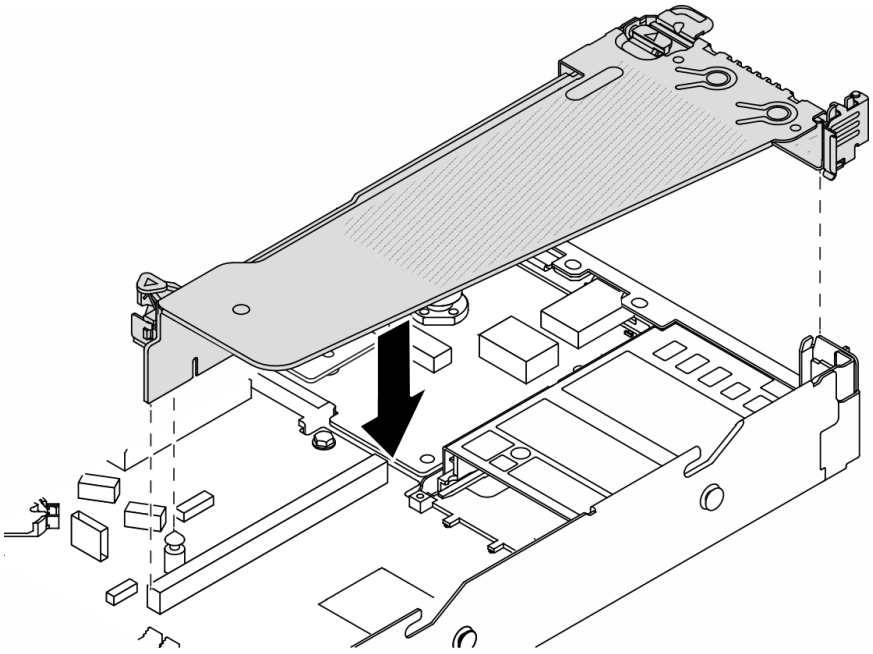


Figure 199. Installing the riser assembly

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 serial-port-module connector, refer to "System-board-assembly connectors" on page 451.

After you finish

1. Complete the parts replacement. See "Complete the parts replacement" on page 221.
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

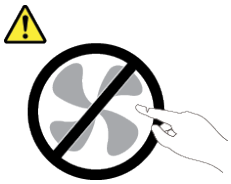
System board assembly replacement (trained technicians only)

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 no attempt to remove or install it without proper training and qualification.

When the server has a Liquid to Air Module (L2AM) installed, you must apply for a L2AM module handle (L2AM heat sink bracket) first if you need to install or remove the system board assembly or processor. However, while replacing the old L2AM with a new one, you do not need to apply for a module handle (L2AM heat sink bracket) as the new L2AM package contains it.

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



CAUTION:

The heat sinks and processors might be very hot. Turn off the server and wait several minutes to let the server cool before removing the server cover.

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

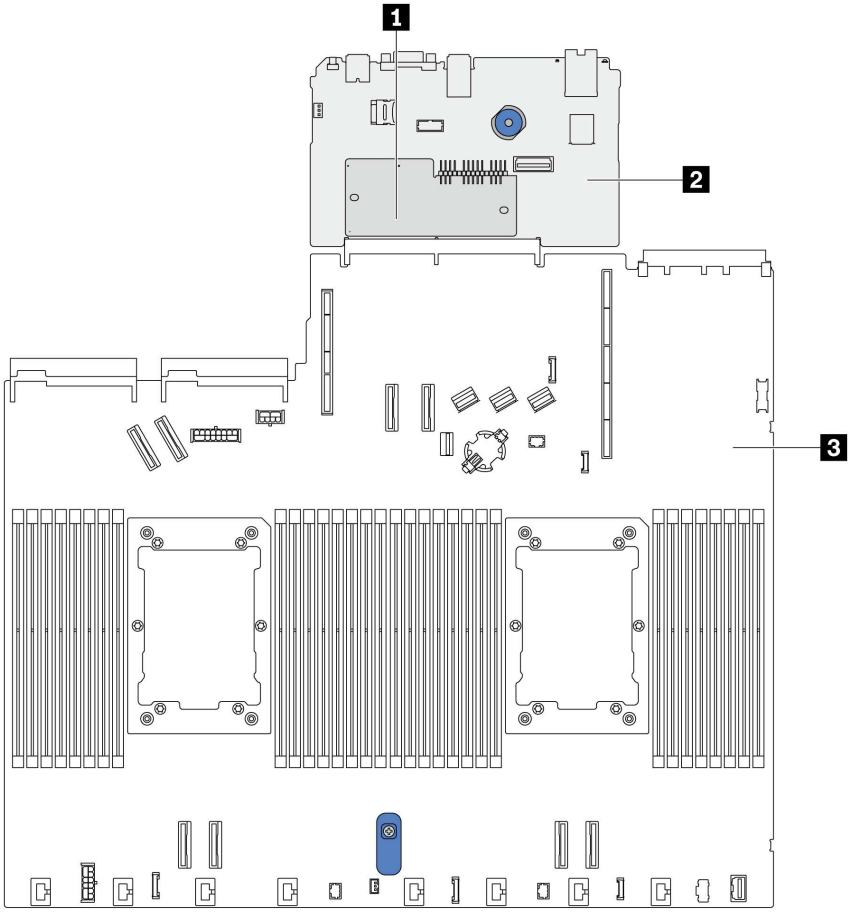


Figure 200. System-board-assembly layout

1 Firmware and RoT Security Module	2 System I/O board	3 Processor board

Firmware and RoT Security Module replacement (Lenovo trained technicians only)

Use this information to remove and install the Firmware and RoT Security Module.

Attention: Removing and installing this component requires trained technicians that are certified by Lenovo Service. Do no attempt to remove or install it without proper training and qualification.

Remove the Firmware and RoT Security Module

Use this information to remove the Firmware and RoT Security Module.

About this task

Important: This task must be operated by trained technicians that are certified by Lenovo Service. Do no attempt to remove or install it 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 20.
- 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/sr630v3/7d72/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.

Step 1. Prepare your server.

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. Remove the top cover. See “Remove the top cover” on page 218.

d. If your server comes with a rear drive assembly, remove it first. See “Remove the 2.5-inch rear drive assembly” on page 170.

e. If your server comes with a 7mm rear drive assembly, remove it first. See “Remove the 7mm rear drive assembly” on page 174.

f. If your server comes with riser assemblies, remove them first, see “Riser assemblies” on page 179.

Step 2. Remove the Firmware and RoT Security Module.

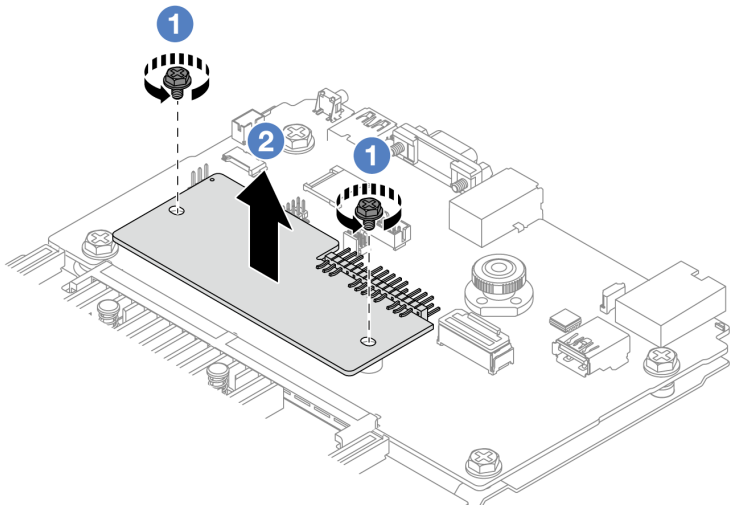


Figure 201. RoT module removal

a. 1 Loosen the two screws on the RoT module.
b. 2 Lift the RoT 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

Use this information to install the Firmware and RoT Security Module.

Important: This task must be operated by trained technicians that are certified by Lenovo Service. Do no attempt to remove or install it without proper training and qualification.

(Lenovo trained technicians only) After replacing the Firmware and RoT Security Module, update the UEFI firmware to the specific version supported by the server. For detailed information on how to update the firmware, see Tip for replacing a Firmware and RoT Security 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 20.
- 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.

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.

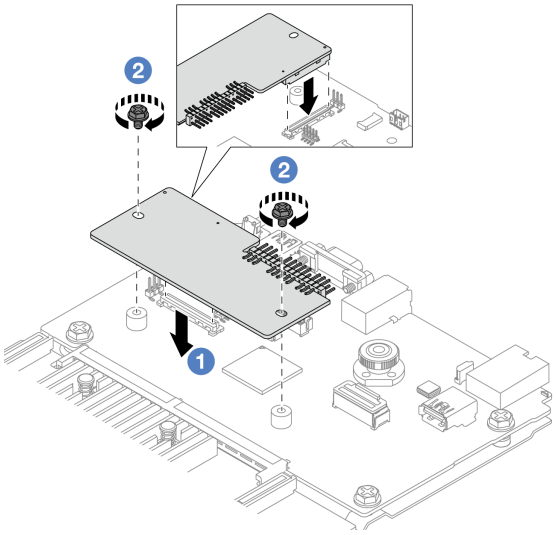


Figure 202. Firmware and RoT Security Module *installation*

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 riser card” on page 186
   - “Install the rear 7mm drive assembly” on page 175
   - “Install the rear hot-swap drive assembly” on page 171
2. Complete the parts replacement. See “Complete the parts replacement” on page 221.
3. Perform OneCLI commands to restore the UEFI settings. See https://pubs.lenovo.com/lxce-onecli/onecli_r_save_command.
4. Perform both OneCLI commands and XCC actions to restore the XCC settings. See https://pubs.lenovo.com/lxce-onecli/onecli_r_save_command and https://pubs.lenovo.com/xcc2/NN1ia_c_backupthexcc.html.
5. Update the UEFI firmware to the specific version supported by the server. See Tip for replacing a Firmware and RoT Security Module.
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)” on page 213.
7. Optionally, do the following if needed:

- Hide TPM, see “Hide TPM” on page 202.
- Update the TPM firmware, see “Update the TPM firmware” on page 203.
- Enable UEFI Secure Boot, “Enable UEFI Secure Boot” on page 203.

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 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:PASSWORD=11@10.245.39.79 --override

Lenovo XClarity Essentials OneCLI lxce_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>`

System I/O board replacement (trained technicians only)

Use this section to remove and install the system I/O board from the system board assembly.

Note: When the server has a Liquid to Air Module (L2AM) installed, you must apply for a L2AM module handle (L2AM heat sink bracket) first if you need to install or remove the system board assembly or processor. However, while replacing the old L2AM with a new one, you do not need to apply for a module handle (L2AM heat sink bracket) as the new L2AM package contains it.

Remove the system I/O board

Follow the instructions to remove the system I/O board.

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 20.
- 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.

Procedure

Step 1. Prepare your server.

a. Remove the top cover. See “Remove the top cover” on page 218.

b. If your server comes with an air baffle, remove it first. See “Remove the air baffle” on page 29.

c. If your server comes with a rear drive assembly, remove it first. See “Remove the 2.5-inch rear drive assembly” on page 170.

d. 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.

e. Remove any of the following components that are installed on the system board assembly and put them in a safe, static-protective place.

- “Processor and heat sink” on page 147
- “Memory modules” on page 123
- “System fans” on page 214
- “RAID flash power modules” on page 160
- “Riser assemblies” on page 179
- “CMOS battery” on page 46
- “OCP module” on page 176

f. Pull out the power supplies gently. Ensure that they are disconnected from the system board assembly.

Step 2. Remove the Firmware and RoT Security module, see “Remove the Firmware and RoT Security Module” on page 198.

Step 3. Remove the MicroSD card, see “Remove the MicroSD card” on page 128.

Step 4. Separate the system I/O board from the processor board.

Note: To prevent the contact of the IO board from damage, pinch and lift the plunger on the IO board upward a little and pull out the IO board outward. During the entire pulling action, ensure that the IO board remains as horizontal as possible.

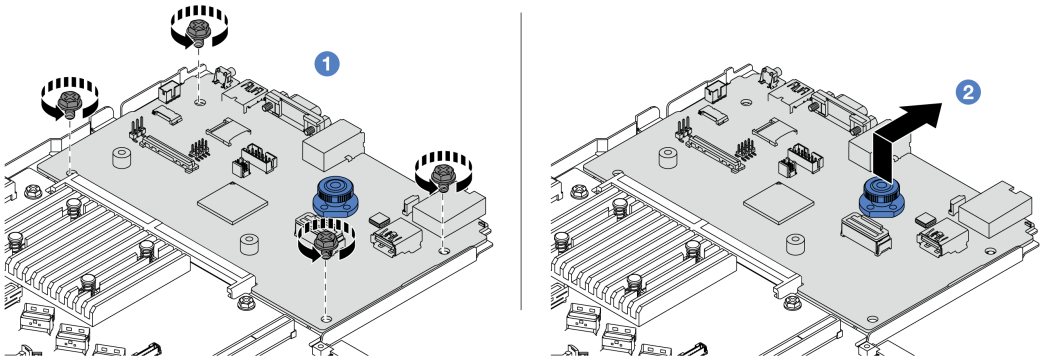


Figure 203. System I/O board removal

a. 1 Remove the screws that secure the system I/O board.

b. 2 Lift and hold the plunger and slide the system I/O board towards the rear to disengage it from the processor board.

After you finish

Important:

- Before you return the processor board, make sure that you install the processor socket covers to the new processor board.
- If replacing a new system I/O board, transfer the MicroSD card from the old system I/O board to the new one. See “Remove the MicroSD card” on page 128 and “Install the MicroSD card” on page 129.
- If you are planning to recycle the system board assembly, follow the instructions in “Hardware disassembling for recycle” in *User Guide* for compliance with local regulations.

Demo video

Watch the procedure on YouTube

Install the system I/O board

Follow the instructions in this section to install the system I/O board.

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 20.
- 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.

Watch the procedure

A video of this procedure is available on YouTube: https://www.youtube.com/playlist?list=PLYV5R7hVcs-CfNsWy-689CRZHExrZEi9I.

Procedure

Step 1. Touch the static-protective package that contains the system I/O board to any unpainted surface on the outside of the server. Then, take the system I/O board out of the package and place it on a static-protective surface.

Step 2. Install the system I/O board.

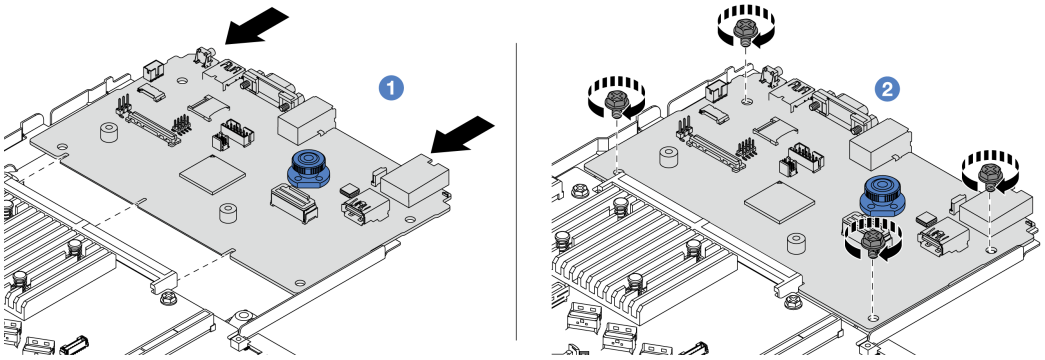


Figure 204. System I/O board installation

a. 1 Align the contacts on the system I/O board with the slots 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 contacts 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.

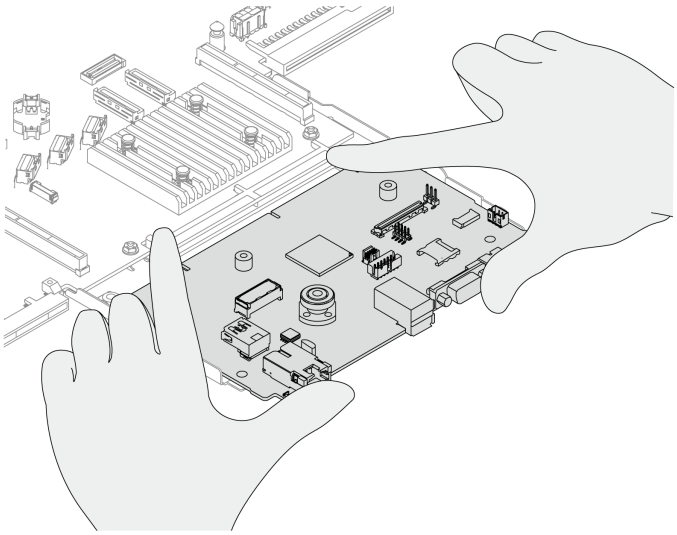


Figure 205. Install with both hands

b. 2 Install the screws to install the system I/O board to the supporting metal sheet.

Step 3. Install the Firmware and RoT Security Module, see “Install the Firmware and RoT Security Module” on page 200.

Step 4. Install the MicroSD card, see “Install the MicroSD card” on page 129.

After you finish

1. Install any components that you have removed before the removal of system I/O board.
   - “Processor and heat sink” on page 147
   - “Memory modules” on page 123
   - “System fans” on page 214
   - “RAID flash power modules” on page 160
   - “Riser assemblies” on page 179
   - “CMOS battery” on page 46
   - “OCP module” on page 176
   - “Install the Firmware and RoT Security Module” on page 200
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 223.
3. Install the rear drive cage if you have removed it. See “Install the 2.5-inch rear drive assembly” on page 171.
4. Install the air baffle if you have removed it. See “Install the air baffle” on page 30.
5. Install the top cover. See “Install the top cover” on page 219.
6. Push the power supplies into the bays until they click into place.
7. Connect power cords to the server and turn on the server.
8. Update the Vital Product Data (VPD) of the system board assembly. See “Update the Vital Product Data (VPD)” on page 213.
9. If hiding TPM or updating TPM firmware is needed, see “Hide/observe TPM” on page 202 or “Update the TPM firmware” on page 203.
10. Optionally, enable Secure Boot. See “Enable UEFI Secure Boot” on page 203.

Demo video

Watch the procedure on YouTube

Processor board replacement (trained technicians only)

Use this section to remove and install the processor board from the system board assembly.

Note: When the server has a Liquid to Air Module (L2AM) installed, you must apply for a L2AM module handle (L2AM heat sink bracket) first if you need to install or remove the system board assembly or processor. However, while replacing the old L2AM with a new one, you do not need to apply for a module handle (L2AM heat sink bracket) as the new L2AM package contains it.

Remove the processor board

Follow instructions in this section to remove the processor board.

About this task

A processor board provides different connectors or slots to connect different components or peripherals of the system for communication. The board and the supporting metal sheet constitute a base for the system board assembly. If the processor board fails, it must be replaced.

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 20.
- 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.

Procedure

Step 1. Prepare your server.

a. Remove the top cover. See “Remove the top cover” on page 218.

b. If your server comes with an air baffle, remove it first. See “Remove the air baffle” on page 29.

c. If your server comes with a rear drive assembly, remove it first. See “Remove the 2.5-inch rear drive assembly” on page 170.

d. 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.

e. Remove any of the following components that are installed on the system board assembly and put them in a safe, static-protective place.

- “Processor and heat sink” on page 147
- “Memory modules” on page 123
- “System fans” on page 214
- “RAID flash power modules” on page 160
- “Riser assemblies” on page 179
- “CMOS battery” on page 46
- “OCP module” on page 176

f. Pull out the power supplies gently. Ensure that they are disconnected from the system board assembly.

Step 2. Remove the system board assembly from the chassis.

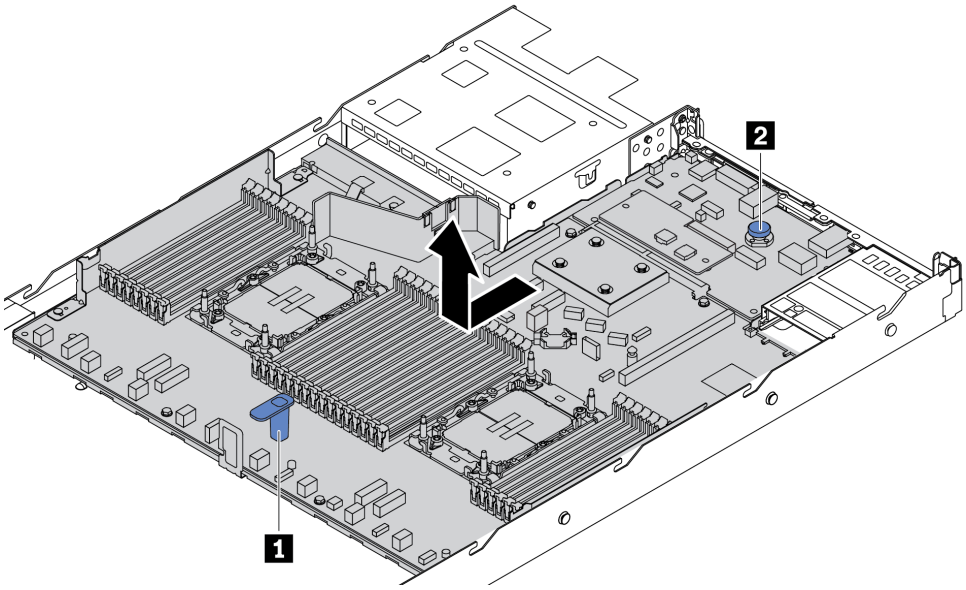


Figure 206. System board assembly removal

a. Hold the lift handle 1 and lift the release pin 2 at the same time and slide the system board assembly toward the front of the server.

b. Lift the system board assembly out of the chassis.

Step 3. Remove the Firmware and RoT Security module, see "Remove the Firmware and RoT Security Module" on page 198.

Step 4. Remove the system I/O board, see "Remove the system I/O board" on page 204.

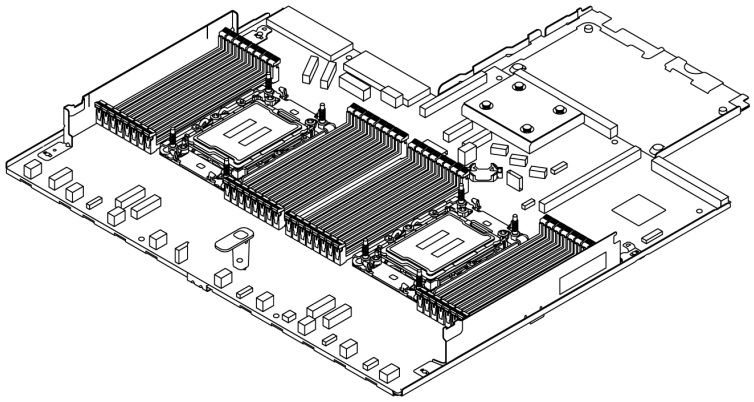


Figure 207. The processor board

Note: The processor board comes with a supporting metal sheet. No further removal is needed.

After you finish

Important: Before you return the system board assembly, make sure that the processor socket is covered. There is a processor external cap covering the processor socket on the new system board assembly. Slide

the processor external cap out from the processor socket on the new system board assembly, and install the external cap on the processor socket on the removed system board assembly.

If you are planning to recycle the system board assembly, follow the instructions in “Hardware disassembling for recycle” in *User Guide* for compliance with local regulations.

Demo video

Watch the procedure on YouTube

Install the processor board

Follow instructions in this section to install the processor board.

About this task

A processor board provides different connectors or slots to connect different components or peripherals of the system for communication. The board and the supporting metal sheet constitute a base for the system board assembly. If the processor board fails, it must be replaced.

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 20.
- 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.

Procedure

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

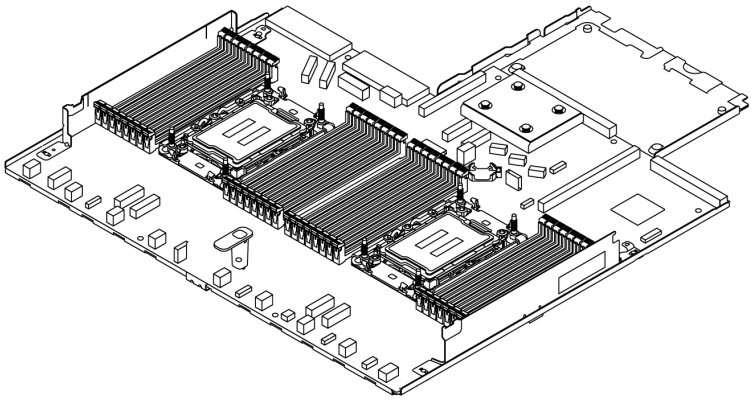


Figure 208. The processor board

Step 2. Install the system I/O board, see “Install the system I/O board” on page 206.

Step 3. Install the Firmware and RoT Security Module, see “Install the Firmware and RoT Security Module” on page 200.

Step 4. Install the system board assembly to the server.

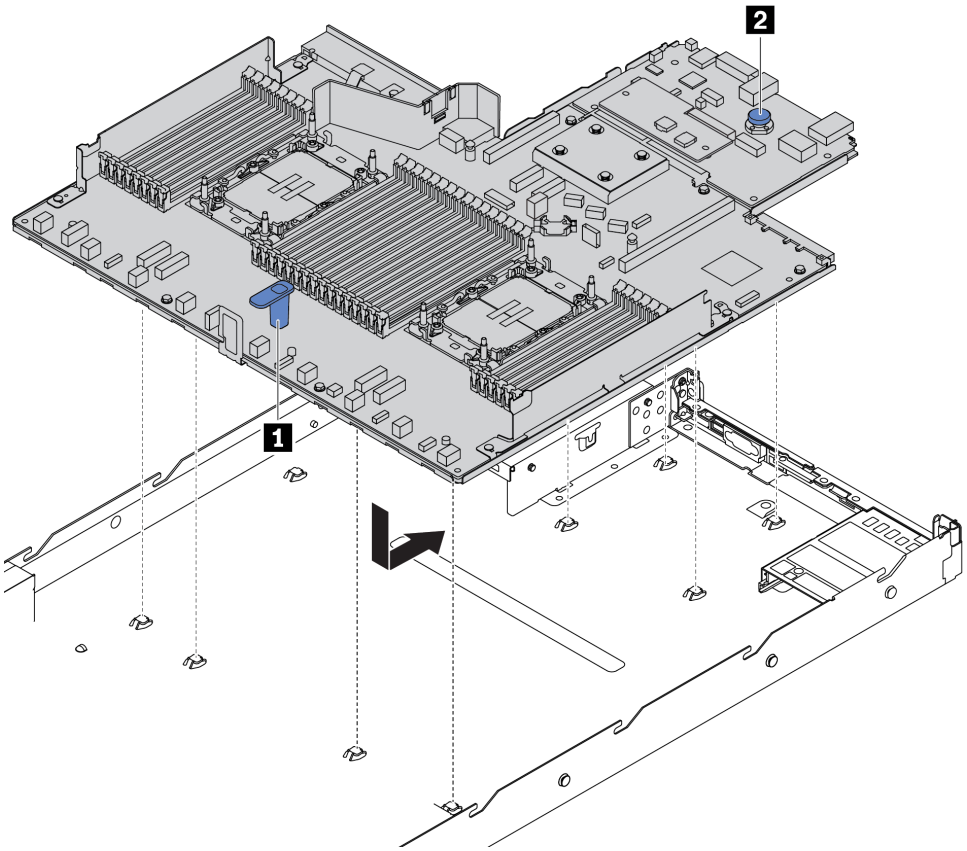


Figure 209. System board assembly installation

a. Hold the lift handle 1 and the release pin 2 at the same time to lower the system board assembly into the chassis.

b. Slide the system board assembly to the rear of the server until the system board assembly snaps into position. Ensure that:

- The rear connectors on the new system board assembly are inserted into the corresponding holes in the rear panel.
- The release pin 2 secures the system board assembly in place.

After you finish

1. Install any components that you have removed from the failing system board assembly.
   - “Processor and heat sink” on page 147
   - “Memory modules” on page 123
   - “System fans” on page 214
   - “RAID flash power modules” on page 160
   - “Riser assemblies” on page 179
   - “CMOS battery” on page 46
   - “OCP module” on page 176

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 223.
3. Install the rear drive cage if you have removed it. See “Install the 2.5-inch rear drive assembly” on page 171.
4. Install the air baffle if you have removed it. See “Install the air baffle” on page 30.
5. Install the top cover. See “Install the top cover” on page 219.
6. Push the power supplies into the bays until they click into place.
7. Connect power cords to the server and turn on the server.
8. Update the Vital Product Data (VPD) of the system board assembly. See “Update the Vital Product Data (VPD)” on page 213.
9. Optionally, enable Secure Boot. See “Enable UEFI Secure Boot” on page 203.

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
- (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. Choose **System Summary**. The “System Summary” tab page is displayed.
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

Use this information to remove a system fan. You can remove a hot-swap fan without powering off the server, which helps you avoid significant interruption to the operation of the system.

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 20.
- 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.

Procedure

Step 1. Remove the top cover. See “Remove the top cover” on page 218.

Step 2. Grasp the fan tabs on both ends of the system fan and carefully lift the system fan out of the server.

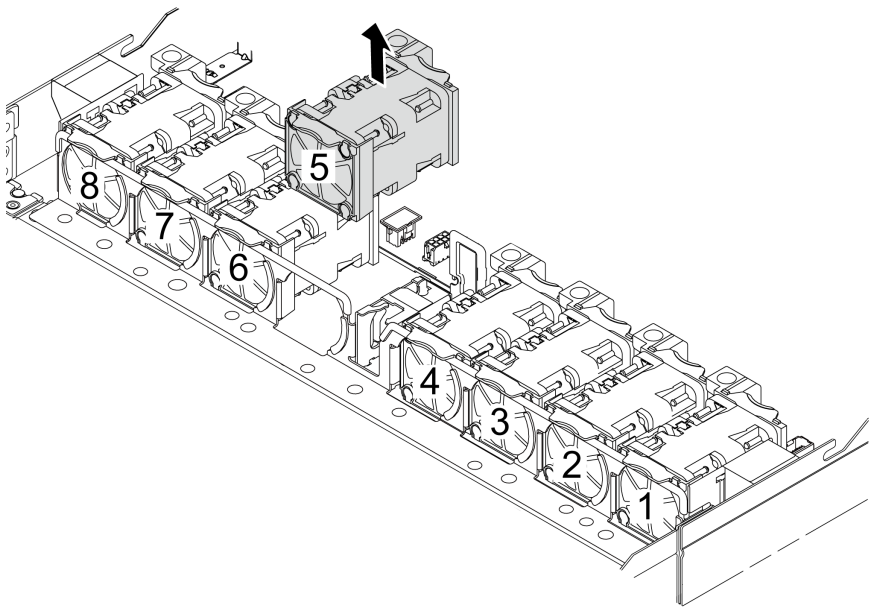


Figure 210. System fan removal

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 216.
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. You can install a hot-swap fan without powering off the server, which helps you avoid significant interruption to the operation of the system.

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 20.
- 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.

Procedure

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

Step 2. Install the system fan.

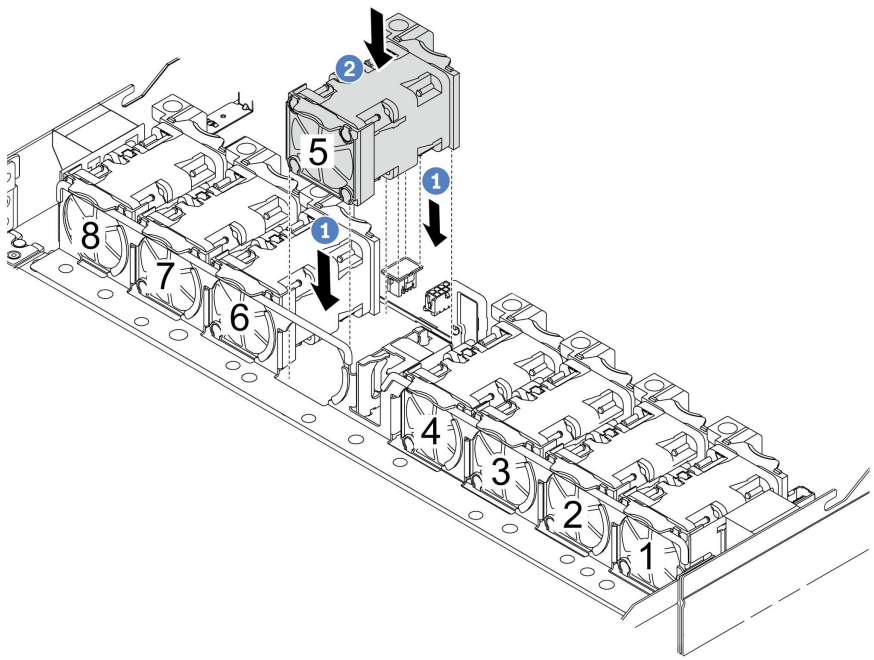


Figure 211. System fan installation

a. 1 Align the four corners of the fan to fan module socket and put it down.

b. 2 Press the fan latch down to ensure that it is plugged in the connector.

After you finish

Complete the parts replacement. See “Complete the parts replacement” on page 221.

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.

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.

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.

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 20.
- 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.

Procedure

Step 1. If the server is installed in a rack, remove the server from the rack. See the Rack Installation Guide that comes with the rail kit for your server.

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.

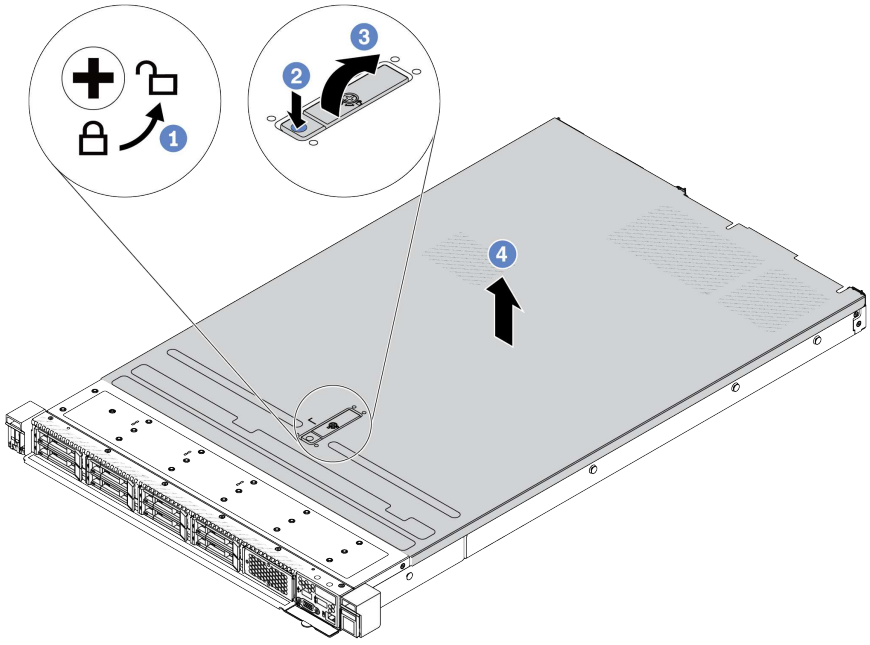


Figure 212. Top cover removal

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

1. Replace any options as required or install a new top cover. See "Install the top cover" on page 219.
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 top cover

Follow instructions in this section to install the top cover.

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.

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.

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 20.
- 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.

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.

Note: A new top cover comes without a service label attached. If you need a service label, order it together with the new top cover and attach the service label to the new top cover first.

Procedure

Step 1. Check your server and ensure 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.
- All internal cables are connected and routed correctly. See Chapter 2 "Internal cable routing" on page 223.

Step 2. 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.

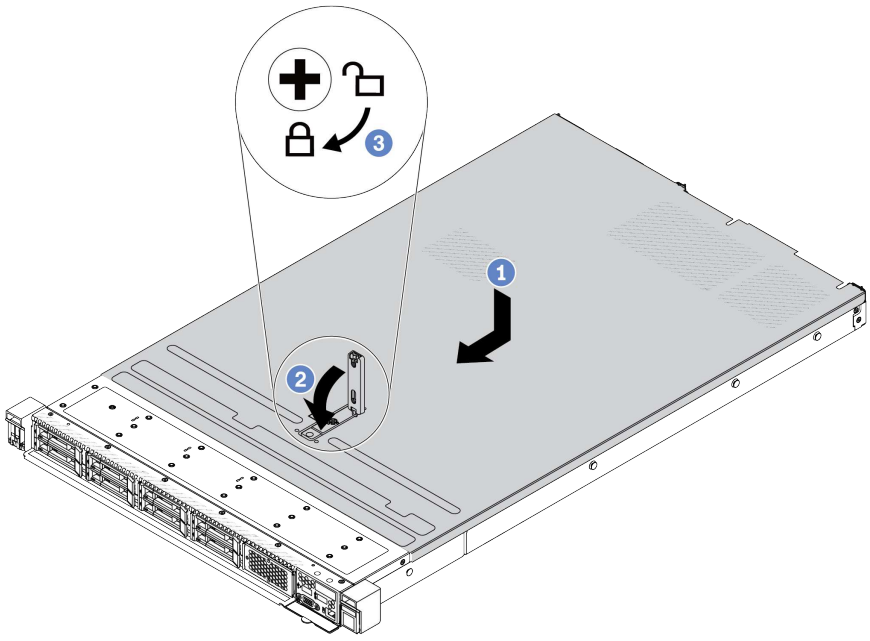


Figure 213. Top cover installation

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 Press down the cover latch and 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

After installing the top cover, complete the parts replacement. See "Complete the parts replacement" on page 221.

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 detailed cable routing information for each component in Chapter 2 “Internal cable routing” on page 223.
3. After the cables are properly routed, make sure to close the sponge cable clips.

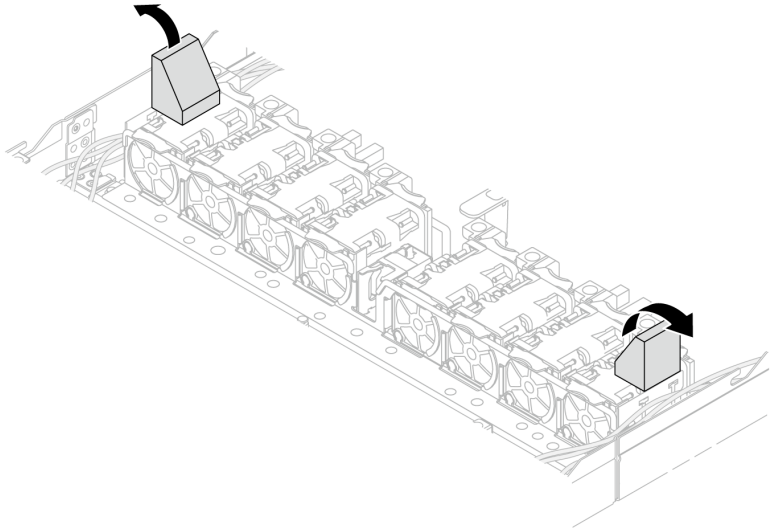


Figure 214. Close the sponge cable clips

4. If you have removed the top cover, reinstall it. See “Install the top cover” on page 219.
5. Reconnect external cables and power cords to the server.

   Attention: To avoid component damage, connect the power cords last.

Chapter 2. Internal cable routing

See this section to do cable routing for specific components.

Notes: Follow below guidelines when connecting cables:

- 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.
- If the cable to be routed goes through the cable walls, make sure that the sponge cable clips are on open position.

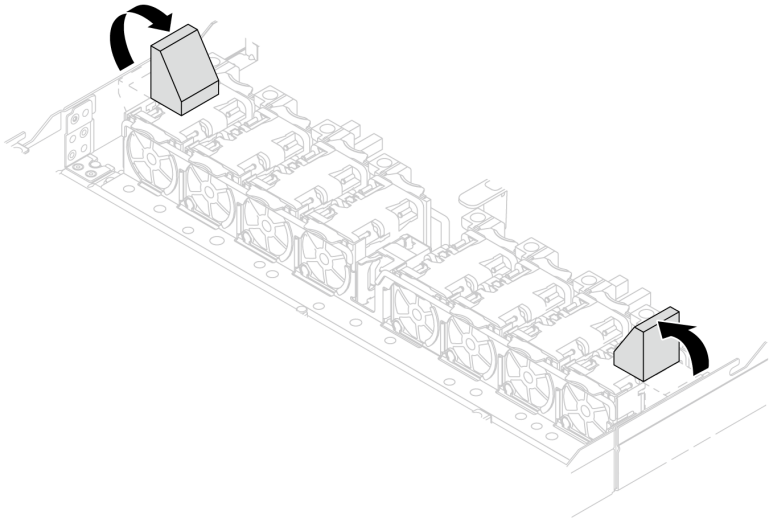
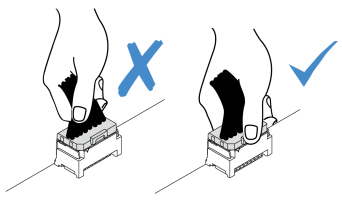
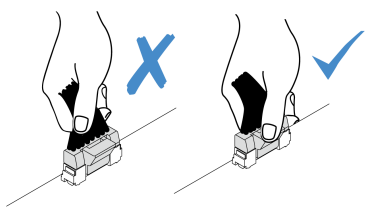
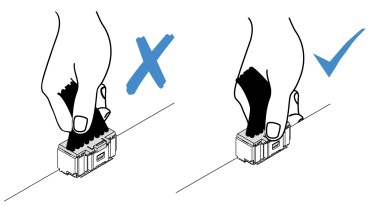


Figure 215. Open the sponge cable clips

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 ports on the system board assembly. Any damage to the cable ports might require replacing the system board assembly.

Disconnect cables by pressing the release latches		
		

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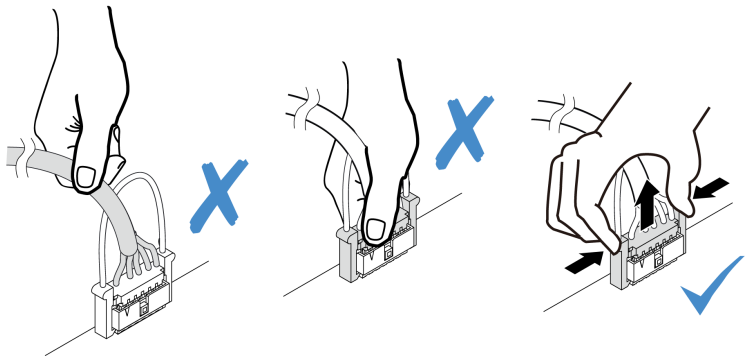
Disconnect cables by pinching the release latches


Identifying connectors

See this section to locate and identify the connectors on the electric boards.

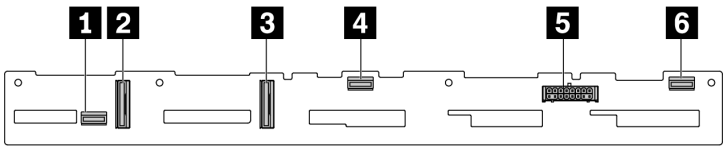
Drive backplane connectors

See this section to locate the connectors on the drive backplanes.

- “10 x 2.5-inch SAS/SATA/AnyBay backplane” on page 224
- “8 x 2.5-inch SAS/SATA backplane” on page 225
- “4 x 3.5-inch SAS/SATA/AnyBay backplane” on page 226
- “4 x 2.5-inch SAS/SATA/NVMe/AnyBay backplane” on page 226
- “16 x EDSFF backplane” on page 227
- “Rear 7mm SAS/SATA/NVMe backplane” on page 227
- “Rear 2 x 2.5-inch SAS/SATA/NVMe backplane” on page 228
- “M.2 drive backplane” on page 228

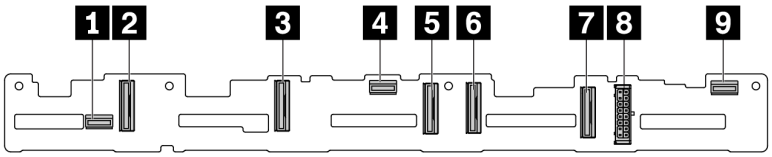
10 x 2.5-inch SAS/SATA/AnyBay backplane

See this section to locate the connectors on the 10 x 2.5-inch drive backplane.



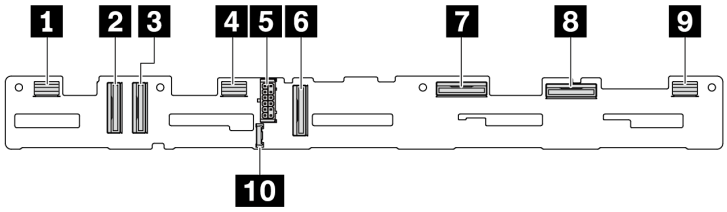
1 SAS 2
2 NVMe 2–3
3 NVMe 0–1
4 SAS 1
5 Power
6 SAS 0

Figure 216. 6 x SAS/SATA + 4 x AnyBay backplane



1 SAS 2
2 NVMe 8–9
3 NVMe 6–7
4 SAS 1
5 NVMe 4–5
6 NVMe 2–3
7 NVMe 0–1
8 Power
9 SAS 0

Figure 217. 10 x 2.5-inch AnyBay backplane

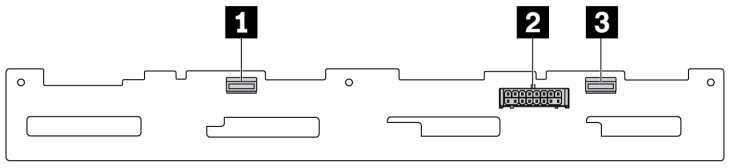


1 SAS 8–9
2 NVMe 8–9
3 NVMe 6–7
4 SAS 4–7
5 Power
6 NVMe 4–5
7 NVMe 2–3
8 NVMe 0–1
9 SAS 0–3
10 Sideband connector

Figure 218. 10 x 2.5-inch AnyBay backplane (Gen 5)

8 x 2.5-inch SAS/SATA backplane

See this section to locate the connectors on the 8 x 2.5-inch drive backplane.

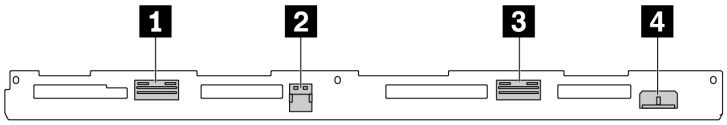


1 SAS 1
2 Power
3 SAS 0

Figure 219. 8 x 2.5-inch SAS/SATA backplane

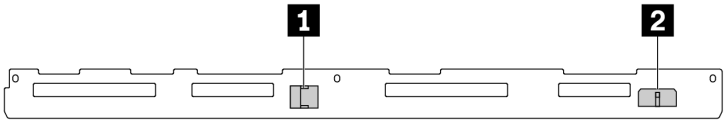
4 x 3.5-inch SAS/SATA/AnyBay backplane

See this section to locate the connectors on the 4 x 3.5-inch drive backplane.



1 NVMe 2–3
2 SAS
3 NVMe 0–1
4 Power

Figure 220. 4 x 3.5-inch AnyBay backplane

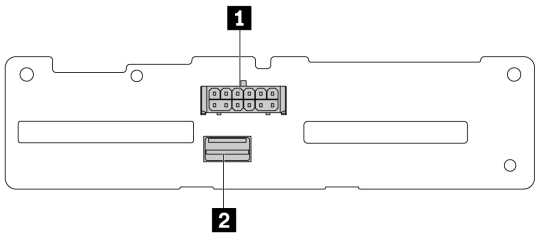


1 SAS
2 Power

Figure 221. 4 x 3.5-inch SAS/SATA backplane

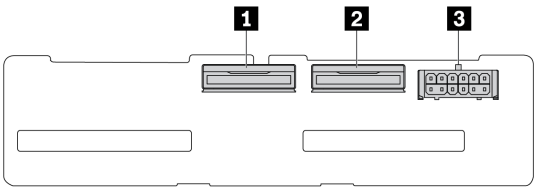
4 x 2.5-inch SAS/SATA/NVMe/AnyBay backplane

See this section to locate the connectors on the 4 x 2.5-inch drive backplane.



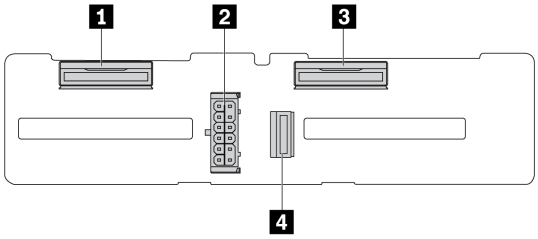
1 Power
2 SAS

Figure 222. 4 x 2.5-inch SAS/SATA backplane



1 NVMe 2–3
2 NVMe 0–1
3 Power

Figure 223. 4 x 2.5-inch NVMe backplane

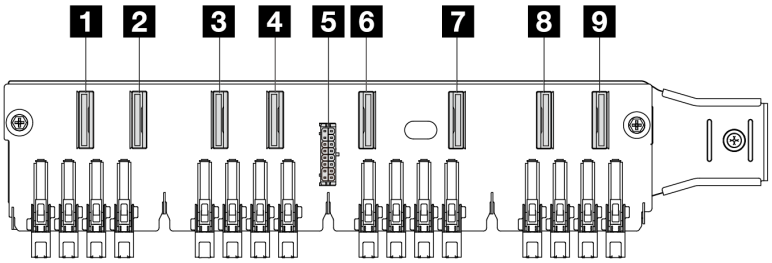


1 NVMe 2–3
2 NVMe 0–1
3 Power
4 SAS

Figure 224. 4 x 2.5-inch AnyBay backplane

16 x EDSFF backplane

See this section to locate the connectors on the 16 x EDSFF drive backplane.

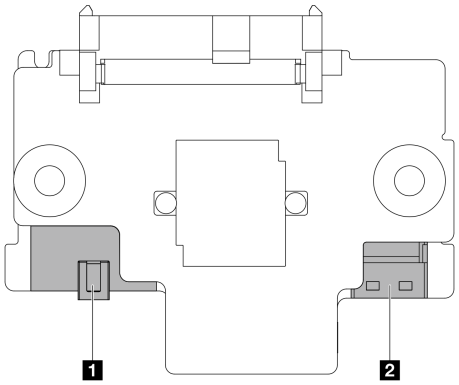


1 EDSFF 0–1
2 EDSFF 2–3
3 EDSFF 4–5
4 EDSFF 6–7
5 Power
6 EDSFF 8–9
7 EDSFF 10–11
8 EDSFF 12–13
9 EDSFF 14–15

Figure 225. 16 x EDSFF backplane

Rear 7mm SAS/SATA/NVMe backplane

See this section to locate the connectors on the rear 7mm drive backplane.

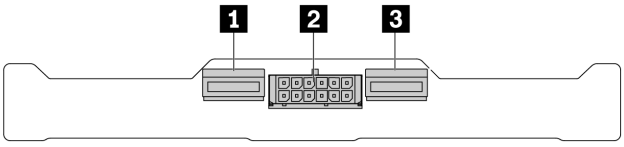


1 Power
2 Signal

Figure 226. 7mm SAS/SATA/NVMe backplane (top + bottom)

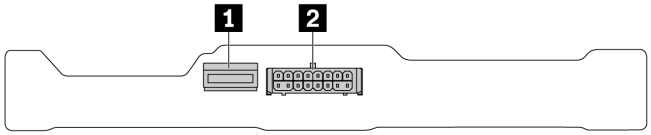
Rear 2 x 2.5-inch SAS/SATA/NVMe backplane

See this section to locate the connectors on the rear 2 x 2.5-inch drive backplane.



1 NVMe 1
2 Power
3 NVMe 0

Figure 227. Rear 2 x 2.5-inch NVMe backplane



1 SAS
2 Power

Figure 228. Rear 2 x 2.5-inch SAS/SATA backplane

M.2 drive backplane

To locate the connectors on the M.2 drive backplane, see “M.2 backplane and M.2 drive replacement” on page 131 for details.

RAID and HBA adapter connectors

See this section to locate the connectors on RAID and HBA adapters.

The following adapter illustrations are examples taken from the storage controller matrix of your server, see “Technical specifications” on page 439 for more adapters supported. The illustrations might look slightly different from physical adapters.

- “SFF RAID and HBA adapters” on page 229
  - Figure 229 “A Gen 3 8i SFF HBA adapter (two port connectors)” on page 229
  - Figure 230 “A Gen 3 16i SFF RAID adapter (four port connectors)” on page 229
  - Figure 231 “A Gen 4 8i SFF RAID adapter (one port connector)” on page 230
- “CFF RAID adapters” on page 230
  - Figure 232 “A Gen 3 16i CFF RAID adapter (four port connectors)” on page 230
  - Figure 233 “A Gen 4 16i CFF RAID adapter (four port connectors)” on page 231

SFF RAID and HBA adapters

See this section to locate the connectors on SFF RAID and HBA adapters.

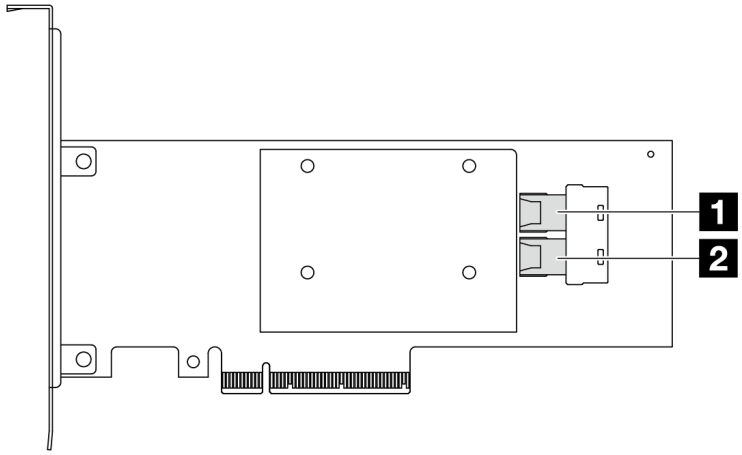


Figure 229. A Gen 3 8i SFF RAID/HBA adapter (two port connectors)

1 C0
2 C1

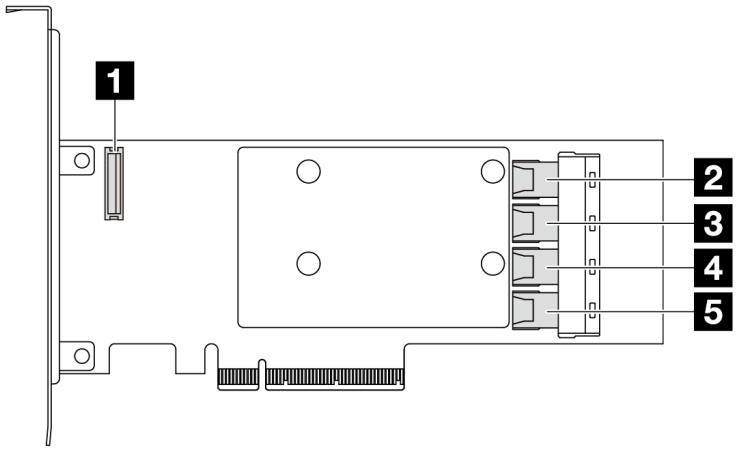


Figure 230. A Gen 3 16i SFF RAID/HBA adapter (four port connectors)

1 RAID flash power module connector
2 C0

3 C1
4 C2
5 C3

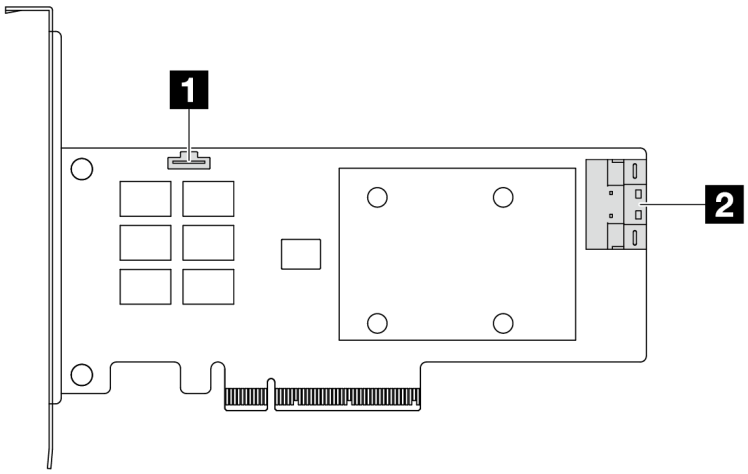


Figure 231. A Gen 4 8i SFF RAID/HBA adapter (one port connector)

1 RAID flash power module connector
2 C0

CFF RAID adapters

See this section to locate the connectors on CFF RAID adapters.

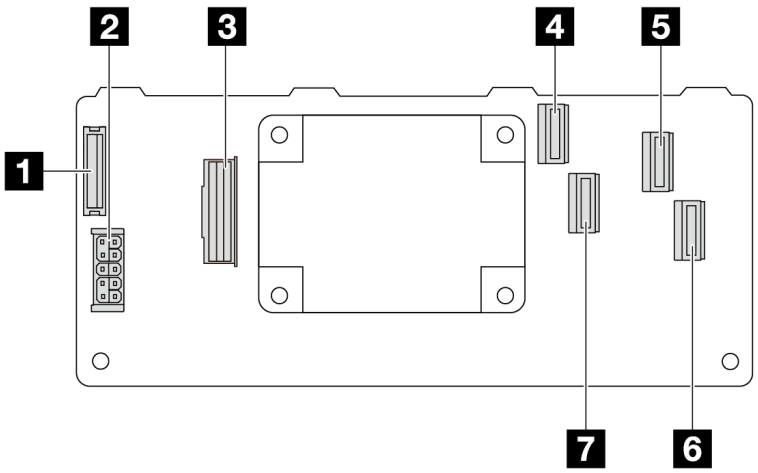


Figure 232. A Gen 3 16i CFF RAID adapter (four port connectors)

1 RAID flash power module connector
2 Power
3 MB input connector
4 C0
5 C2
6 C3
7 C1

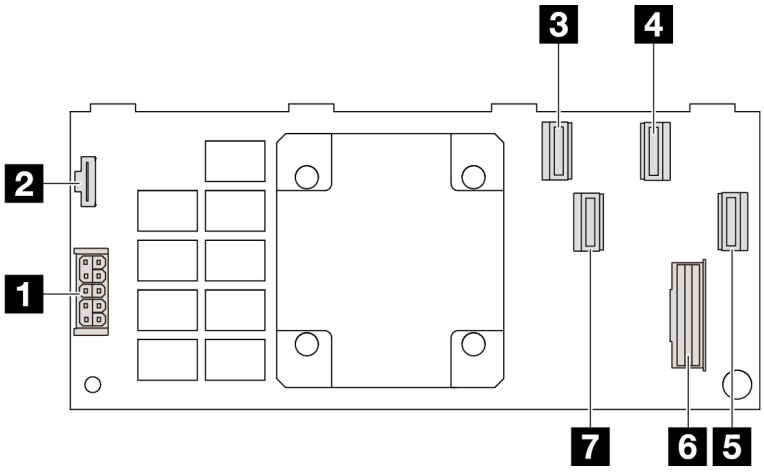


Figure 233. A Gen 4 16i CFF RAID adapter (four port connectors)

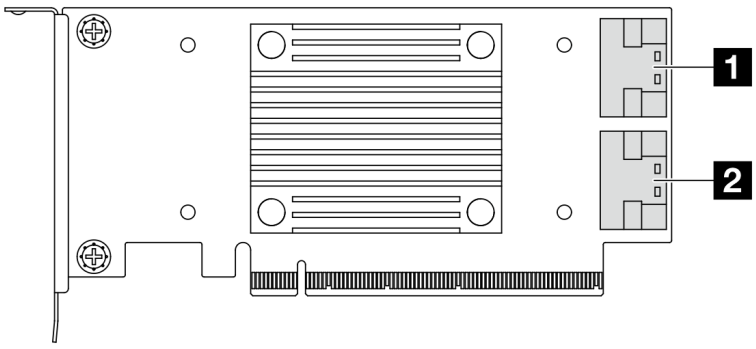
1 Power
2 RAID flash power module connector
3 C0
4 C2
5 C3
6 MB input connector
7 C1

Re-timer adapter connectors

See this section to locate the connectors on the re-timer adapters.

An SFF re-timer adapter

See this section to locate the connectors on an SFF re-timer adapter.



1 C0
2 C1

Figure 234. A Gen 4/5 SFF re-timer adapter

Processor-board connectors for cable routing

The following illustrations show the internal connectors on the processor board that are used for internal cable routing.

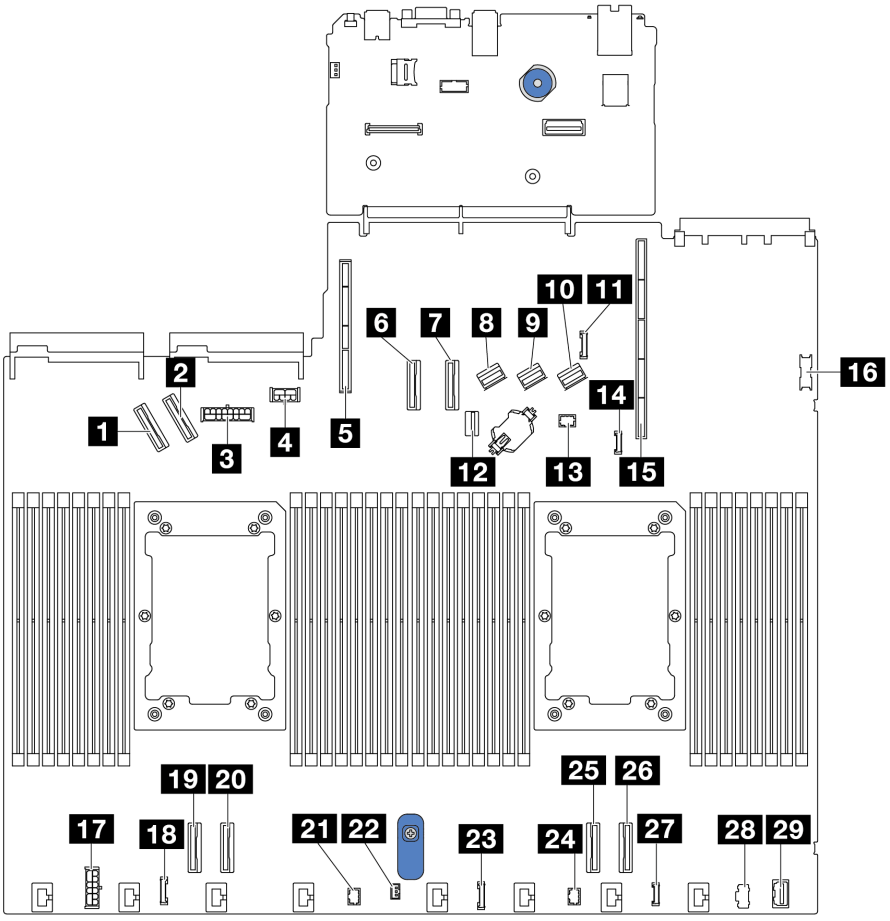


Figure 235. Processor-board connectors for cable routing

Table 14. Processor-board connectors for cable routing

Connectors	
1 PCIe connector 5	16 Front USB connector
2 PCIe connector 6	17 Internal RAID power connector
3 Front backplane power connector	18 CFF Re-timer clock connector
4 GPU and rear backplane power connector	19 PCIe connector 4
5 Riser 2 Slot	20 PCIe connector 3
6 PCIe connector 7	21 Pump 2 connector
7 PCIe connector 8	22 Intrusion switch connector
8 SAS/SATA connector 0	23 Front panel connector
9 SAS/SATA connector 1	24 Front panel LCD connector
10 SAS/SATA connector 2	25 PCIe connector 2

Table 14. Processor-board connectors for cable routing (continued)

Connectors	
11 Rear backplane sideband connector	26 PCIe connector 1
12 M.2/7mm backplane signal connector	27 External LCD connector
13 Pump 1 connector	28 M.2 power connector
14 Leak detection connector	29 Front VGA connector
15 Riser 1 slot	

CFF RAID adapter

Use the section to understand the power cable and signal input cable routing for CFF RAID adapters.

Cable routing for CFF RAID adapters

- For the locations of connectors on CFF RAID adapters and the processor board, see “RAID and HBA adapter connectors” on page 228 and “Processor-board connectors for cable routing” on page 231 for details.
- For more information about the CFF RAID adapters supported, see “RAID adapter” on page 443.
- The table below presents that how the power cables and MB input cables are connected with one and two processors installed. Find more connections in different configuration at “Cable routing for backplane signals (one processor)” on page 286 and “Cable routing for backplane signals (two processors)” on page 338.
- “Cable routing for Gen 4 CFF RAID adapters” on page 235
- “Cable routing for Gen 3 CFF RAID adapters” on page 236

Cable routing for Gen 4 CFF RAID adapters

Table 15. Cable routing for Gen 4 CFF RAID adapters

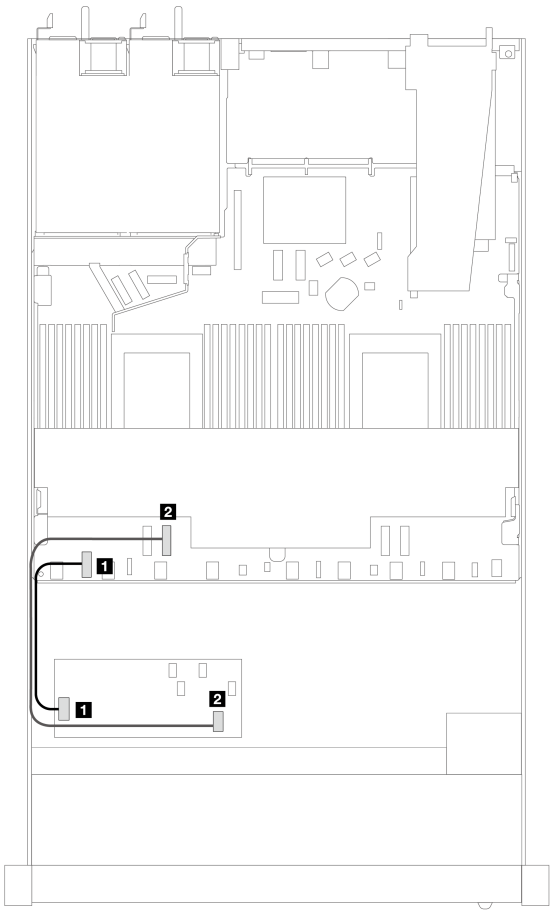


Figure 236. Gen 4 CFF RAID adapter cabling with two processors installed

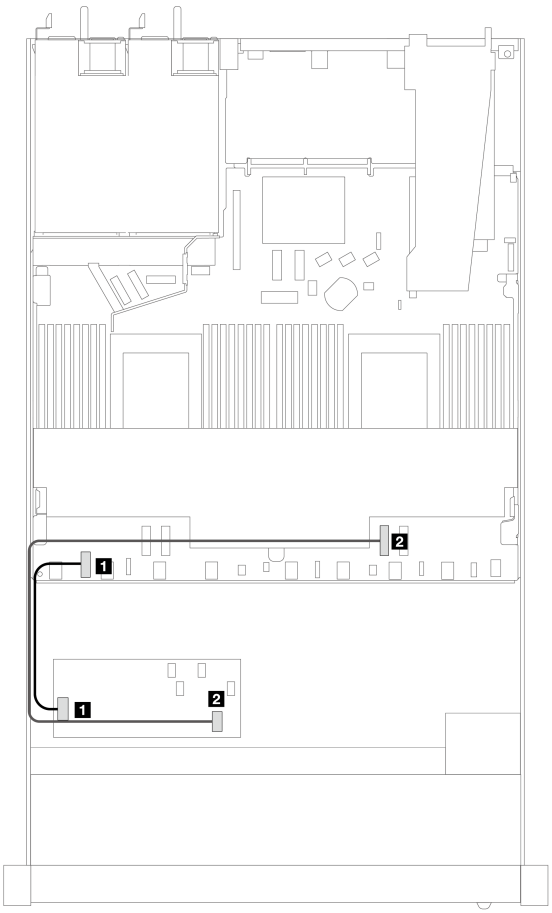


Figure 237. Gen 4 CFF RAID adapter cabling with one processor installed

From	To	From	To
1 Power	1 Internal RAID power connector	1 Power	1 Internal RAID power connector
2 MB input	2 PCIe 3	2 MB input	2 PCIe 2

Cable routing for Gen 3 CFF RAID adapters

Table 16. Cable routing for Gen 3 CFF RAID adapters

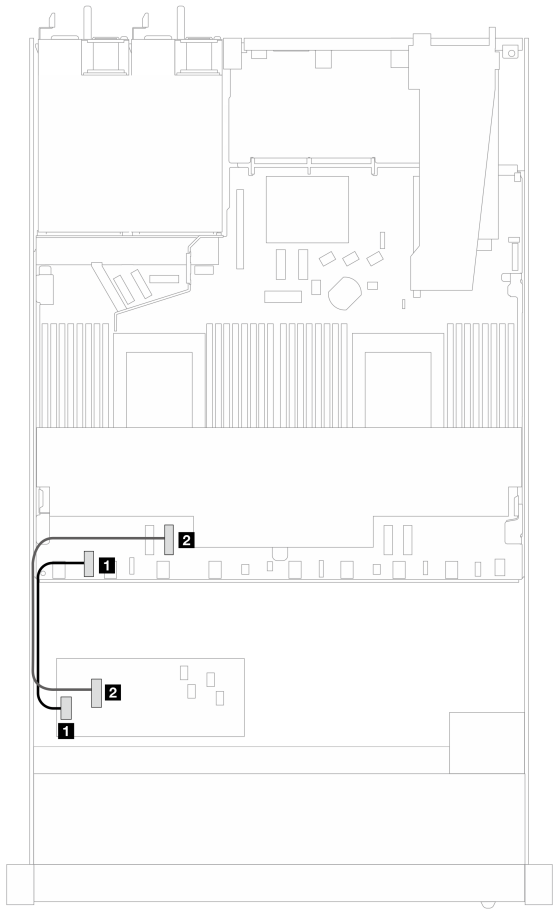


Figure 238. Gen 3 CFF RAID adapter cabling with two processors installed

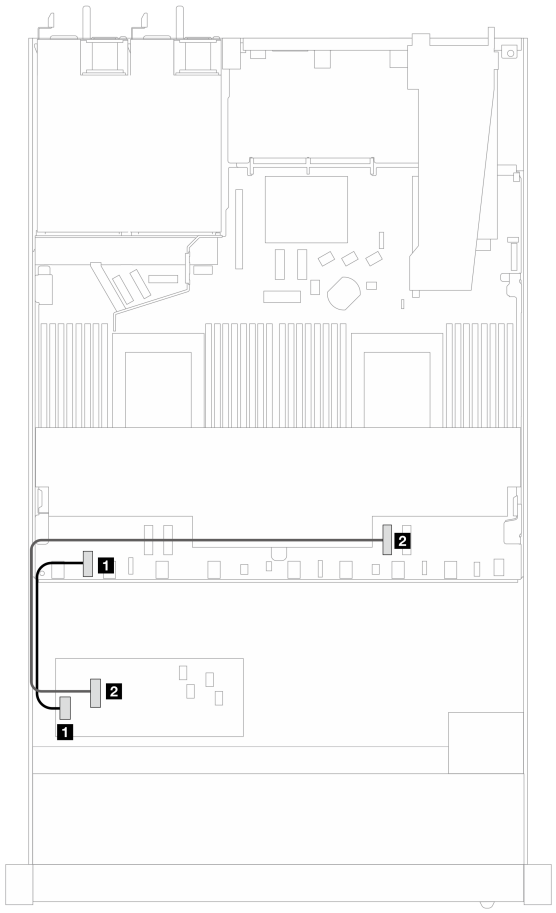


Figure 239. Gen 3 CFF RAID adapter cabling with one processor installed

From	To	From	To
1 Power	1 Internal RAID power connector	1 Power	1 Internal RAID power connector
2 MB input	2 PCIe 3	2 MB input	2 PCIe 2

Note: When the server is installed with 4 x 2.5'' NVMe drives with two processors, the “MB input” connector on the CFF RAID adapters connects to PCIe 2 on the processor board.

Front I/O module

Use the section to understand the cable routing for front I/O modules.

Cable routing for front I/O modules

- For the locations of front I/O module connectors on the processor board, see “Processor-board connectors for cable routing” on page 231 for details.

- The illustrations show the cabling scenario for server models with 2.5-inch and 3.5-inch front drive bays. Location of each connector on the front of the server varies by models. For detailed locations of front I/O components for different models, see “Front view” in *User Guide* or *System Configuration Guide* and “Front I/O module” in *User Guide* or *System Configuration Guide*.

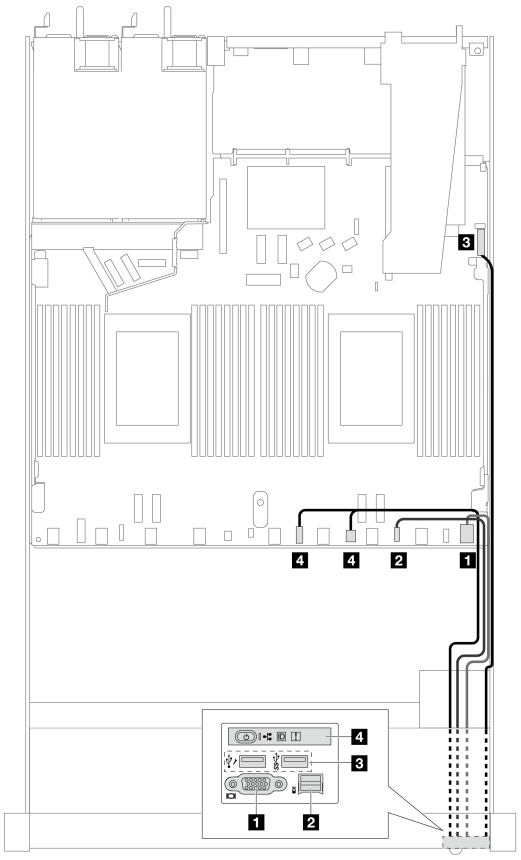


Figure 240. Cable routing for a front I/O module on 2.5'' chassis

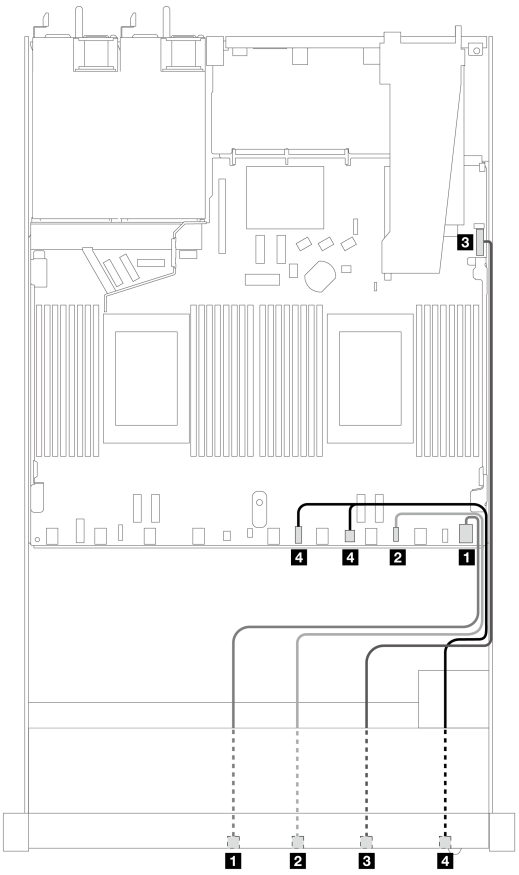


Figure 241. Cable routing for the front I/O module on 3.5'' chassis

From	To
1 VGA connector	1 VGA connector
2 External LCD diagnostics handset connector Note	2 External LCD diagnostics handset connector
3 Front USB connector	3 Front USB connector
4 Front operator panel	4 Left: front panel connector 4 Right: front panel LCD connector

Note: The external LCD connector is not available on certain front I/O modules of 10 x 2.5-inch server models.

Front riser assembly

Use the section to understand the power cable and signal cables routing for the front riser assembly.

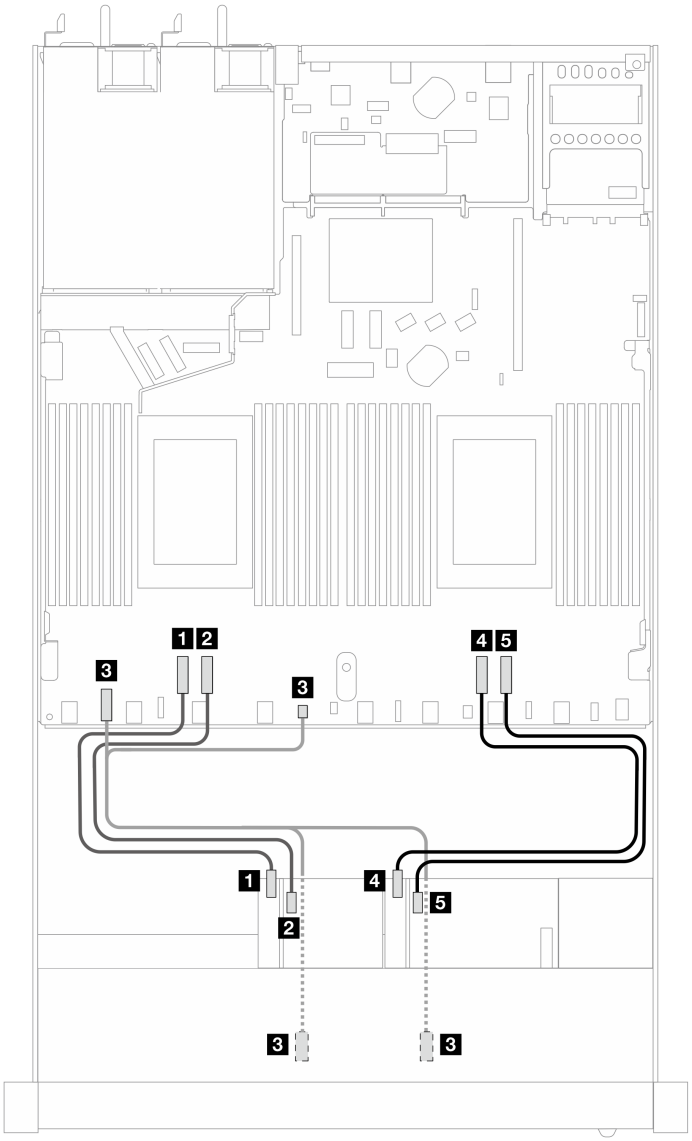


Figure 242. Cable routing for the front riser assembly

From	To
1 Riser 3 card signal (MCIO 2)	1 PCIe 4
2 Riser 3 card signal (MCIO 1)	2 PCIe 3
3 Riser power	3 Left: internal RAID power connector 3 Right: pump 2 connector
4 Riser 4 card signal (MCIO 2)	4 PCIe 2
5 Riser 4 card signal (MCIO 1)	5 PCIe 1

Intrusion switch

Use the section to understand the cable routing for the intrusion switch.

For the locations of the intrusion switch connector on the processor board, see “Processor-board connectors for cable routing” on page 231 for details.

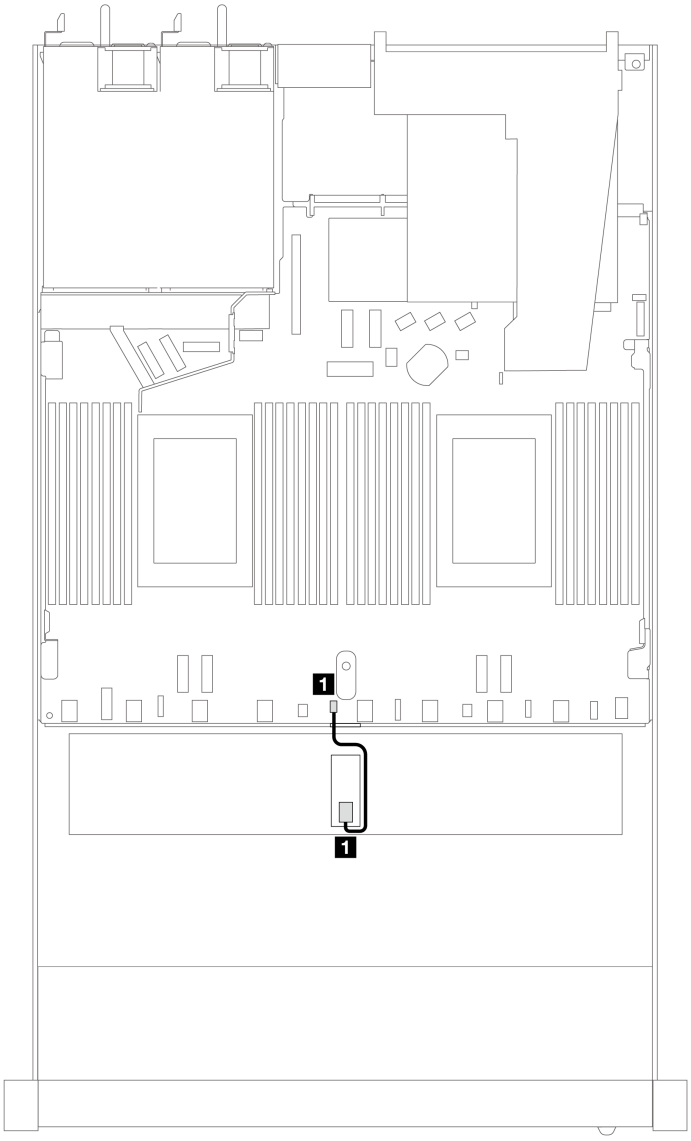


Figure 243. Intrusion switch cable routing

From	To
1 Intrusion switch cable	1 Intrusion switch connector

OCP interposer card

Use the section to understand the cable routing between two OCP interposer cards and the processor board.

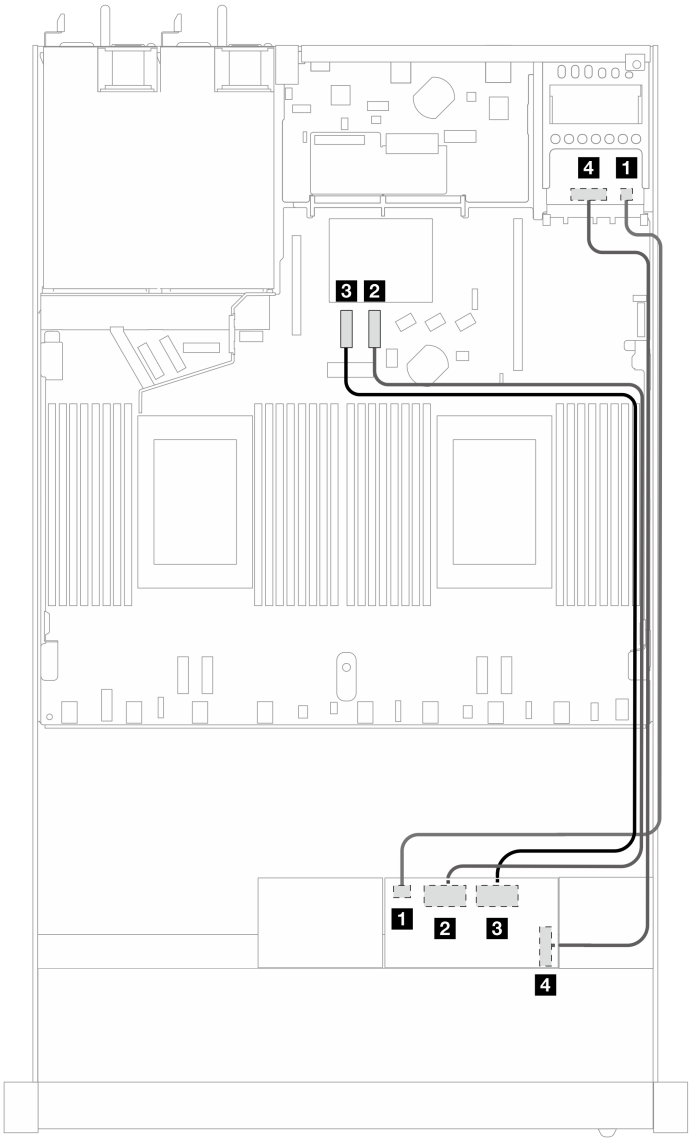


Figure 244. Cable routing for the OCP interposer cards

From	To
1 Front OCP interposer power	1 Rear OCP interposer power
2 OCP interposer signal (MCIO 2)	2 PCIe 8
3 OCP interposer signal (MCIO 1)	3 PCIe 7
4 Front OCP interposer power sideband (SWIFT)	4 Rear OCP interposer power sideband (SWIFT)

RAID flash power modules

Use the section to understand the cable routing for RAID flash power modules.

Locations of RAID flash power modules

Use the illustration and table below to locate the RAID flash power modules.

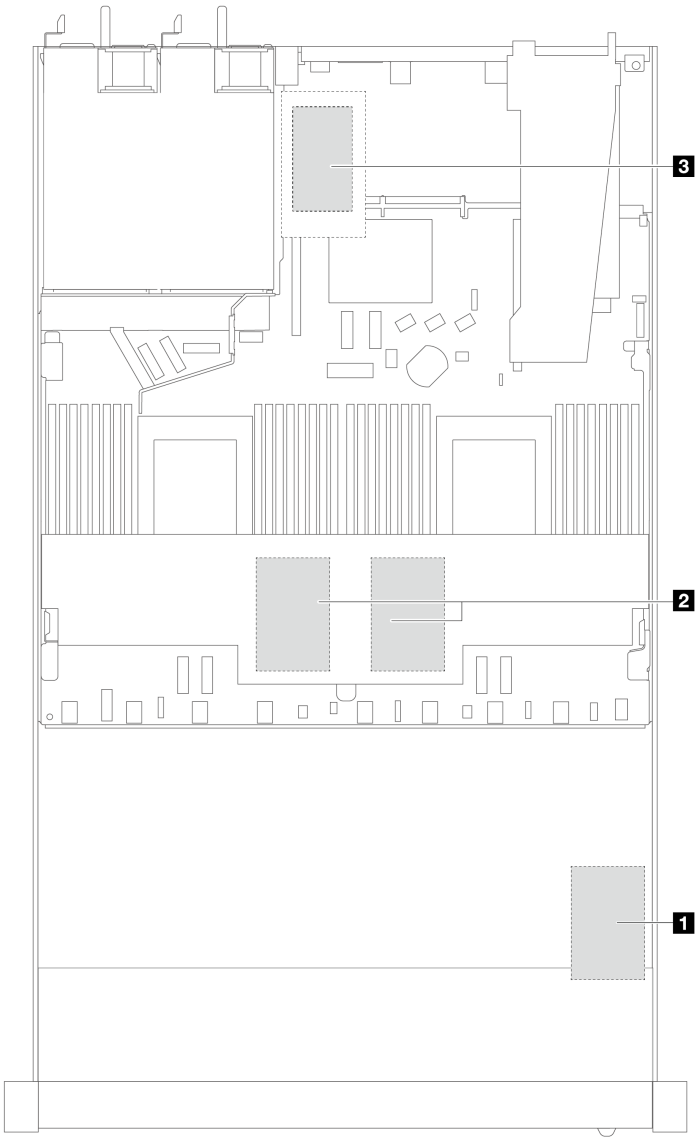


Figure 245. RAID flash power modules in the chassis

Location	Scenario
1 RAID flash power module on the chassis	2.5'' chassis installed with a standard or performance heat sink
2 RAID flash power module on the air baffle	2.5'' or 3.5'' chassis installed with a standard heat sink
3 RAID flash power module on slot 3	• 3.5'' chassis installed with a performance heat sink • 2.5'' chassis installed with Liquid to Air Module (L2AM)

Cable routing of the RAID flash power modules

The following illustrations show the cable routing of the RAID flash power modules on different locations:

1 On the chassis

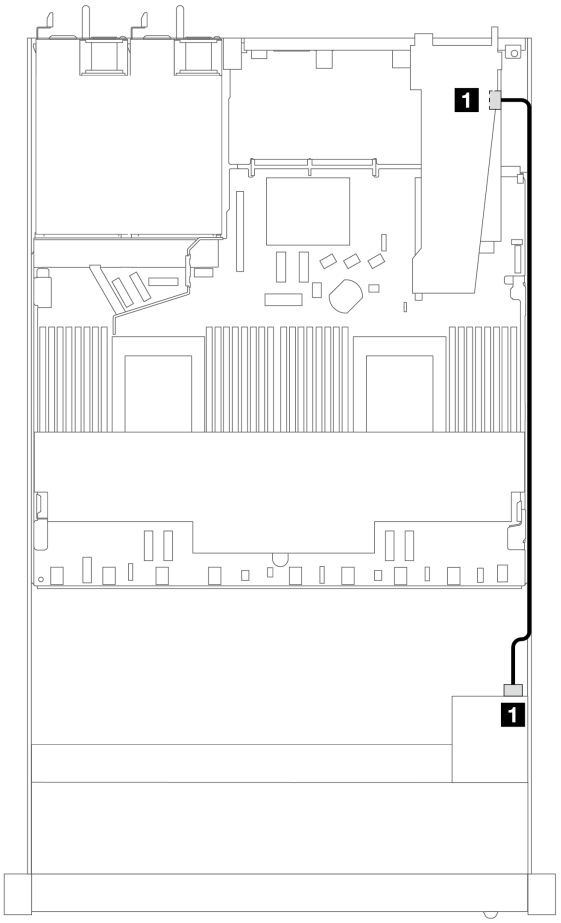


Figure 246. Flash power for SFF RAID/HBA adapters

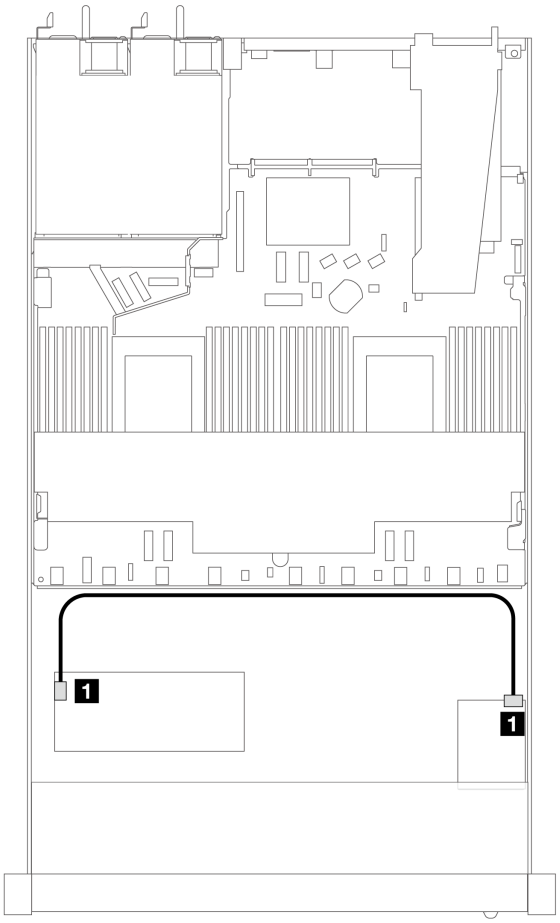


Figure 247. Flash power for CFF RAID adapters

2 On the air baffle	3 On slot 3

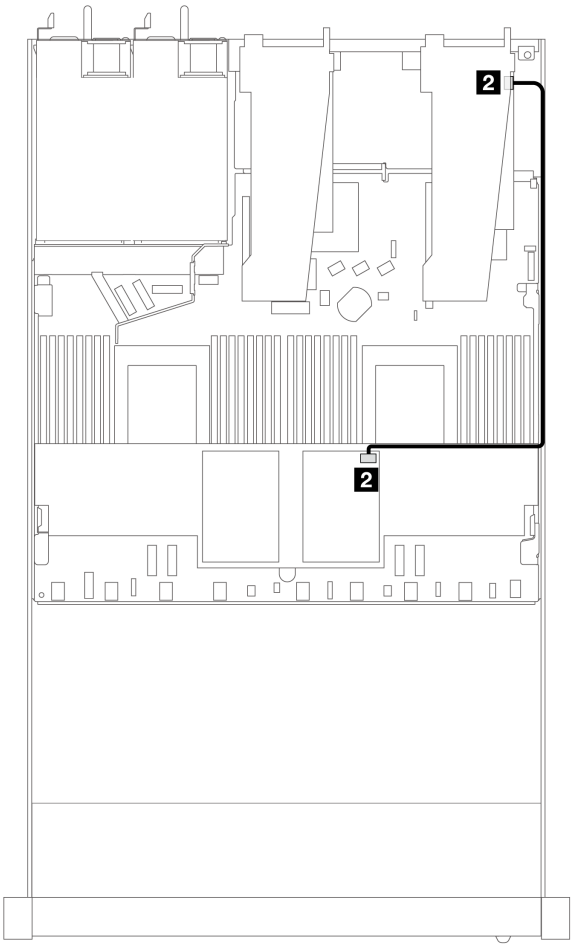
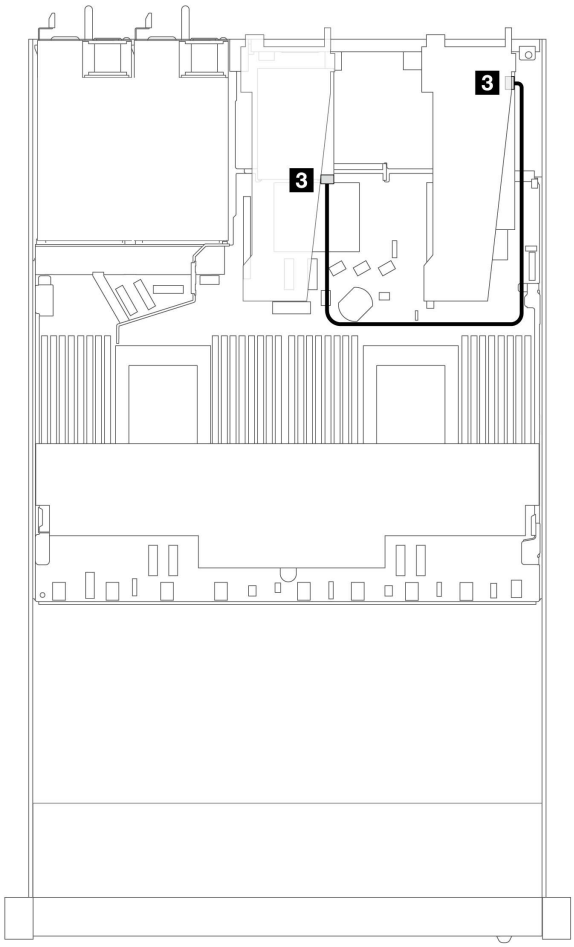

	

Figure 248. Flash power for SFF RAID/HBA adapters	*Figure 249. Flash power for SFF RAID/HBA adapters*

From	To
1 2 3 RAID flash power module	1 2 3 RAID flash power port on the RAID/HBA adapter

Management NIC adapter

Use the section to understand the cable routing for the ThinkSystem V3 Management NIC Adapter Kit (management NIC adapter).

For the locations of the intrusion switch connector on the system board assembly, see “System-board-assembly connectors” on page 451 for details.

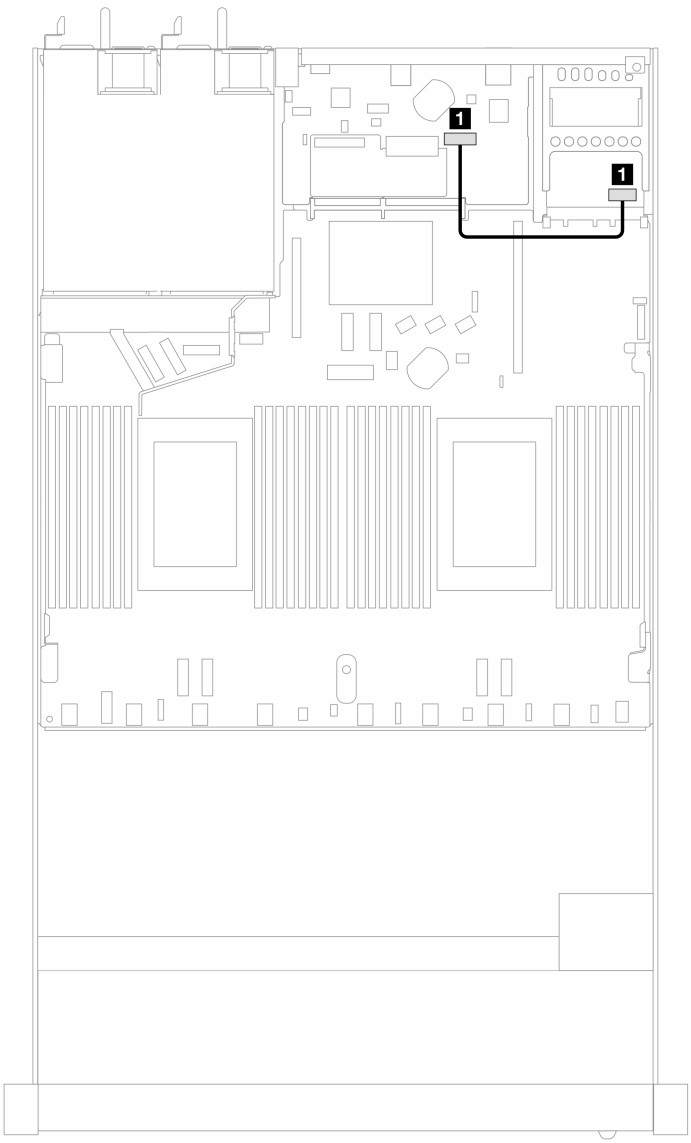


Figure 250. Management NIC adapter cable routing

From	To
1 The connector on the management NIC adapter	1 Second management Ethernet connector

M.2 drive backplane

This section provides cable routing information for the M.2 drives. Your server supports M.2 SATA/NVMe drive backplanes.

Locations of M.2 drive assemblies

The locations of M.2 drive assemblies vary in different configuration. The server has two locations for M.2 drive assemblies.

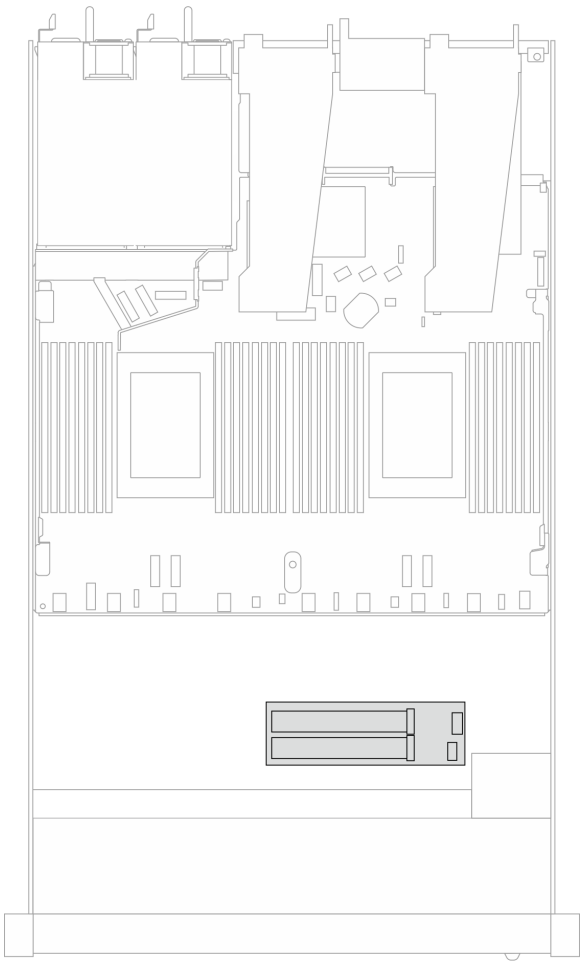


Figure 251. An M.2 drive assembly in the 2.5/3.5-inch drive chassis

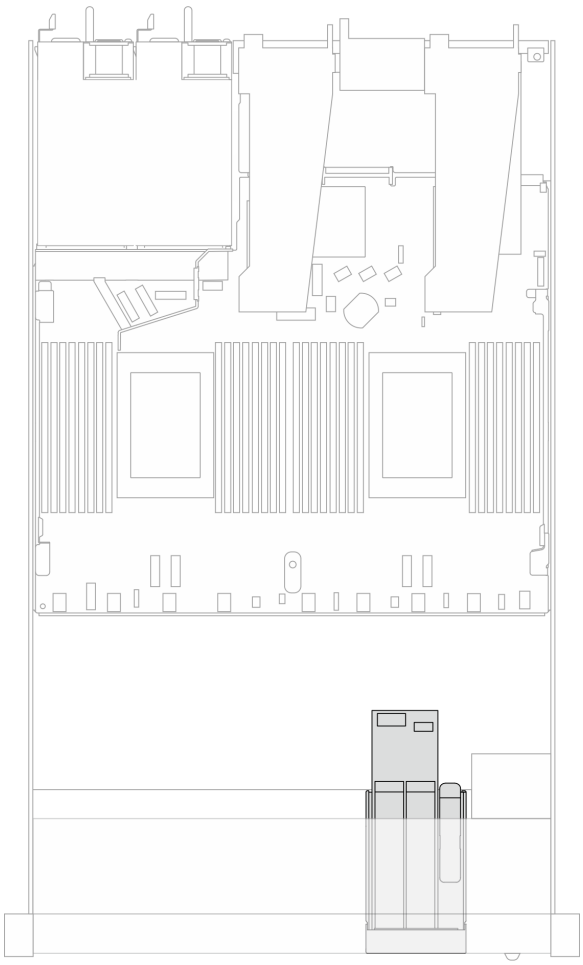
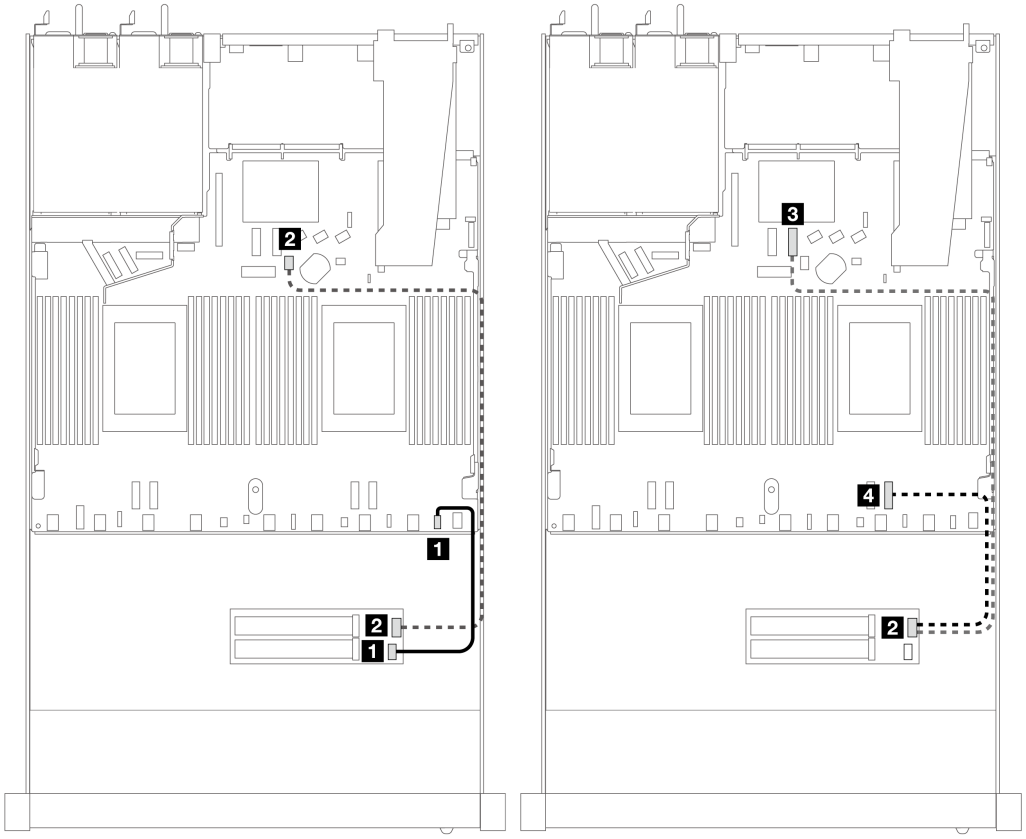


Figure 252. An M.2 drive assembly in the 16-EDSFF drive chassis

Cable routing of the M.2 drive backplane

- For the locations of M.2 connectors on the backplanes and the processor board, see "M.2 backplane and M.2 drive replacement" on page 131 and "Processor-board connectors for cable routing" on page 231 for details.
- The following illustration and table list the M.2 drive backplane supported:

Cable routing for M.2 SATA/NVMe x4 backplane



From	To
1 M.2 power	1 M.2 power connector
2 M.2 signal	2 7mm/M.2 signal port on the processor board (for SATA signal)
	3 PCIe 8 (for NVMe signal, connected when two processors are installed)
	4 PCIe 1 (for NVMe signal, connected when one processor is installed)

Note: The illustrations above take the M.2 drive assembly in the 2.5/3.5-inch drive chassis for an example. In the 16-EDSFF drive chassis, the cable routing method remains the same.

M.2 backplane to SFF RAID adapters

See this section to understand the cable routing between an M.2 drive backplane and an SFF RAID adapter.

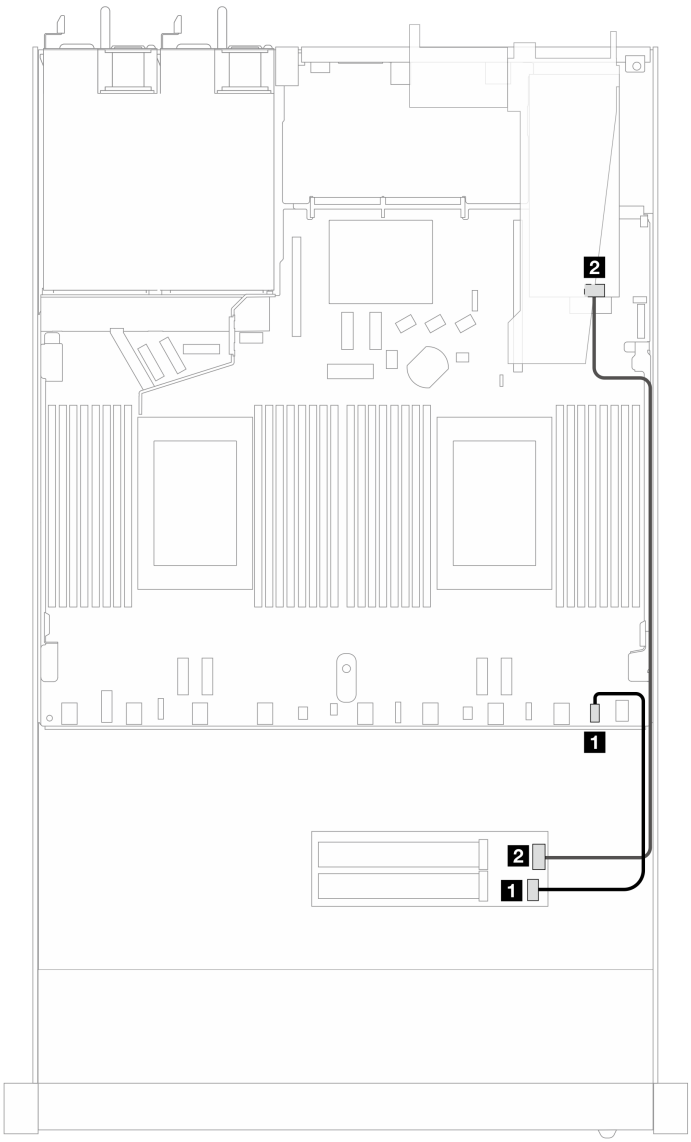


Figure 253. M.2 backplane to a Gen 3 SFF RAID adapter

From	To
1 Power	1 Power
2 M.2 PCIe	2 SFF C0

7mm drive backplane

This section provides cable routing information for the 7mm drives.

For the locations of 7mm drive connectors on the processor board, see “Processor-board connectors for cable routing” on page 231 for details.

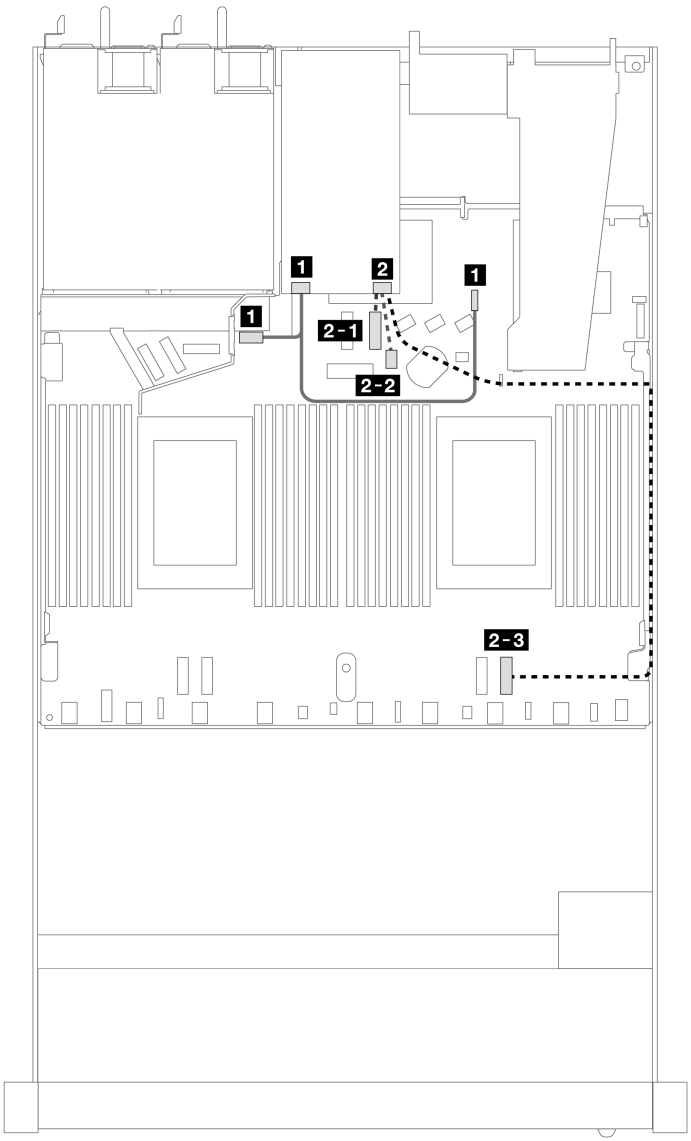


Figure 254. Cable routing for 7mm drives

From	To
1 Power port on the 7mm solid-state drive	1 Left: rear hard drive power connector 1 Right: rear hard drive sideband connector
2 Signal port on the 7mm solid-state drive	2-1 PCIe 8 (for NVMe signal, connected when two processors are installed)
	2-2 7mm/M.2 signal port on the processor board (for SATA signal)
	2-3 PCIe 1 (for NVMe signal, connected when one processor is installed)

7mm backplane to SFF RAID adapters

See this section to understand the cable routing between a 7mm drive backplane and an SFF RAID adapter.

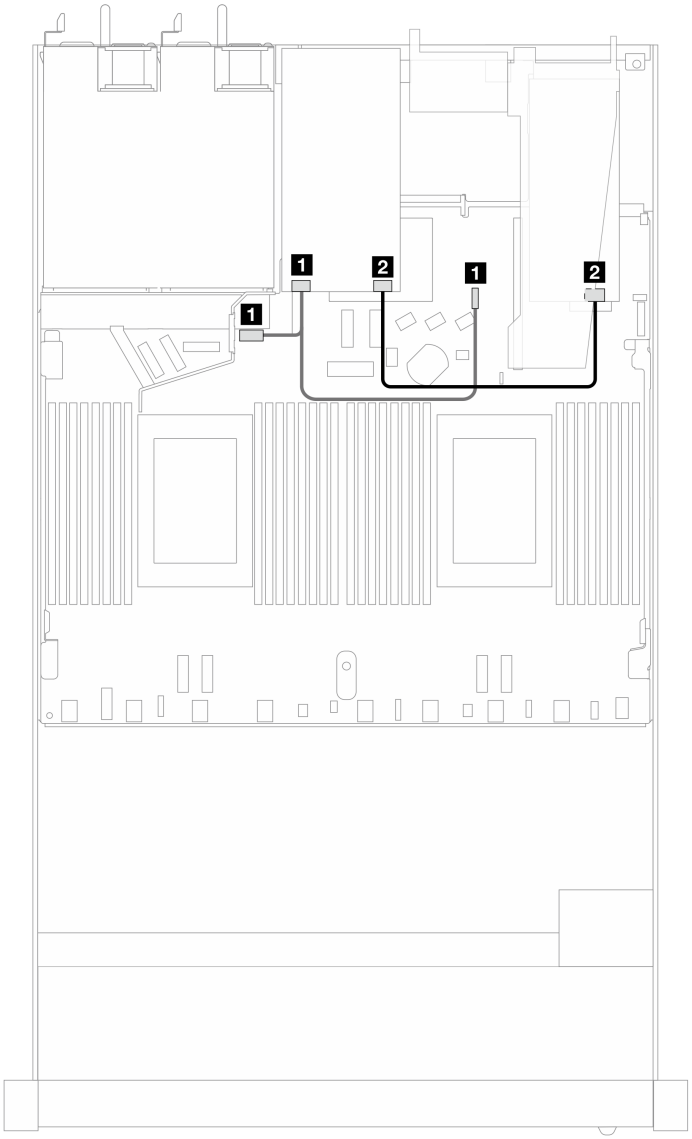


Figure 255. 7mm backplane to a Gen 3 SFF RAID adapter

From	To
1 Power	1 Power and sideband
2 7mm signal	2 SFF C0

Rear NVMe drive backplane

Use this section to understand the cable routing of rear NVMe backplanes with both one and two processors installed.

- The onboard connection of rear NVMe drive backplane are different based on whether one or two processors installed.
- For the locations of rear NVMe drive backplane connectors on the processor board, see “Processor-board connectors for cable routing” on page 231 for details.

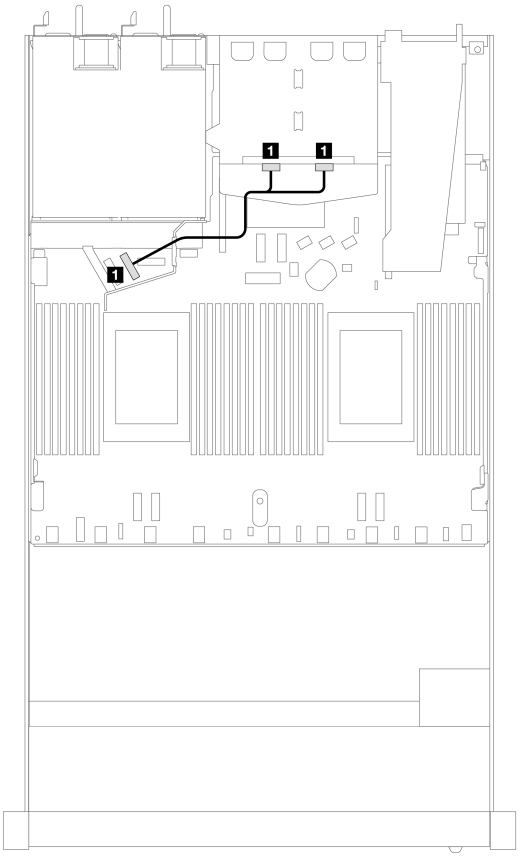


Figure 256. Rear NVMe backplane cable routing with two processors installed

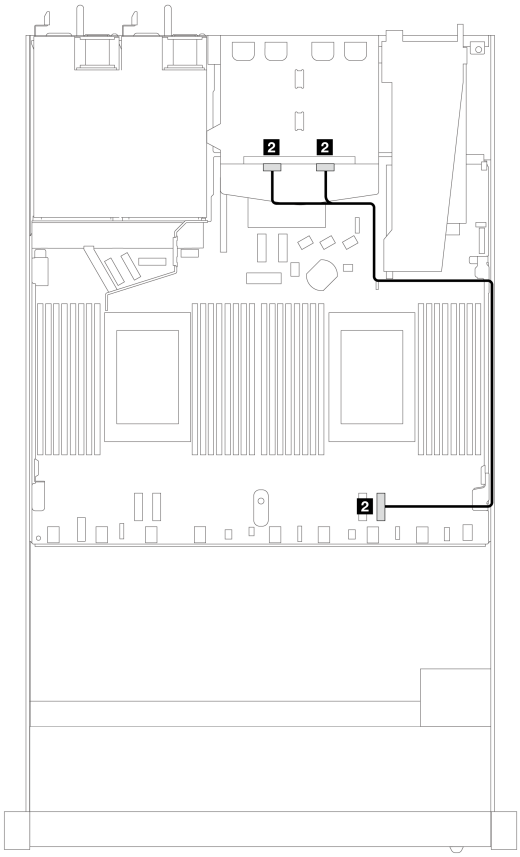


Figure 257. Rear NVMe backplane cable routing with one processor installed

1 From NVMe 0, 1 to PCIe 6	2 From NVMe 0, 1 to PCIe 1

Rear NVMe backplane cable routing with 10 x 2.5'' AnyBay backplane (Gen 5) installed

Note: With the 10 x 2.5'' AnyBay backplane (Gen 5) installed, the rear NVMe connection to the processor board is different from other customary configuration.

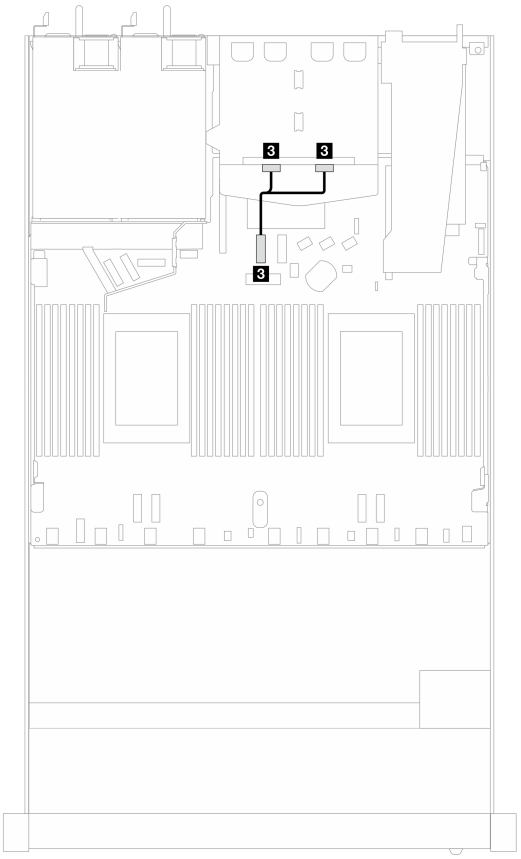


Figure 258. Mapping between the rear NVMe backplane signal cable and the processor board

3 From NVMe 0, 1 to PCIe 7

Cable routing for backplane power

Use the section to understand the power cable routing for both front and rear drive backplanes.

- The backplanes your server supports require power connection. This section singles out the power connection from signal connection for better understanding.
- For the locations of backplane power connectors on the processor board, see “Processor-board connectors for cable routing” on page 231 for details.
- For more information about backplanes supported and their connectors, see “Drive backplane connectors” on page 224.

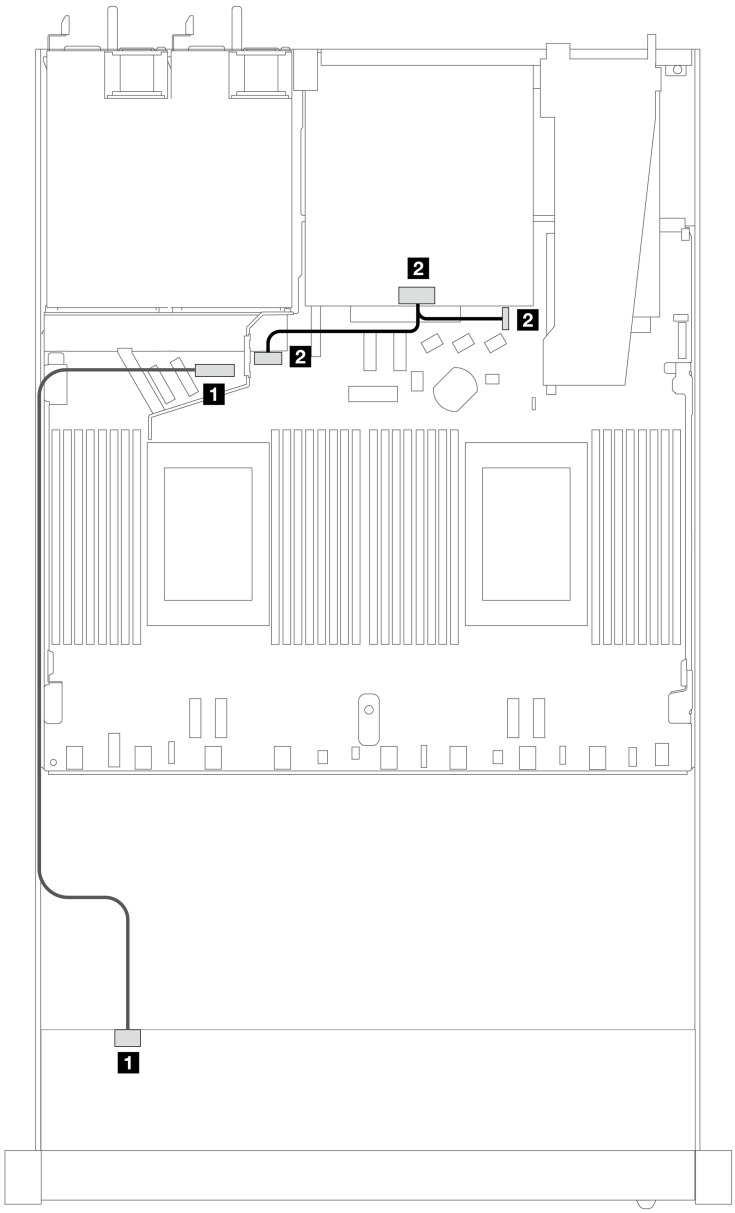


Figure 259. Backplane power cable connection

From	To
1 Power connector on the front drive backplane	1 Front backplane power connector
2 Power connector on the rear drive backplane	2 Left: rear hard drive power connector 2 Right: rear hard drive sideband connector

Liquid to air module

Use this section to understand the cable routing of the Liquid to Air Module (L2AM).

- For the locations of the L2AM connectors on the processor board, see “Processor-board connectors for cable routing” on page 231 for details.

- The two pump cables and one cable for the leakage detection sensor module are integrated to the L2AM, make sure that all three cables are connected.

Note: For better cable arrangement, it is required to install the leakage 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) Liquid to Air Module" on page 114 for details.

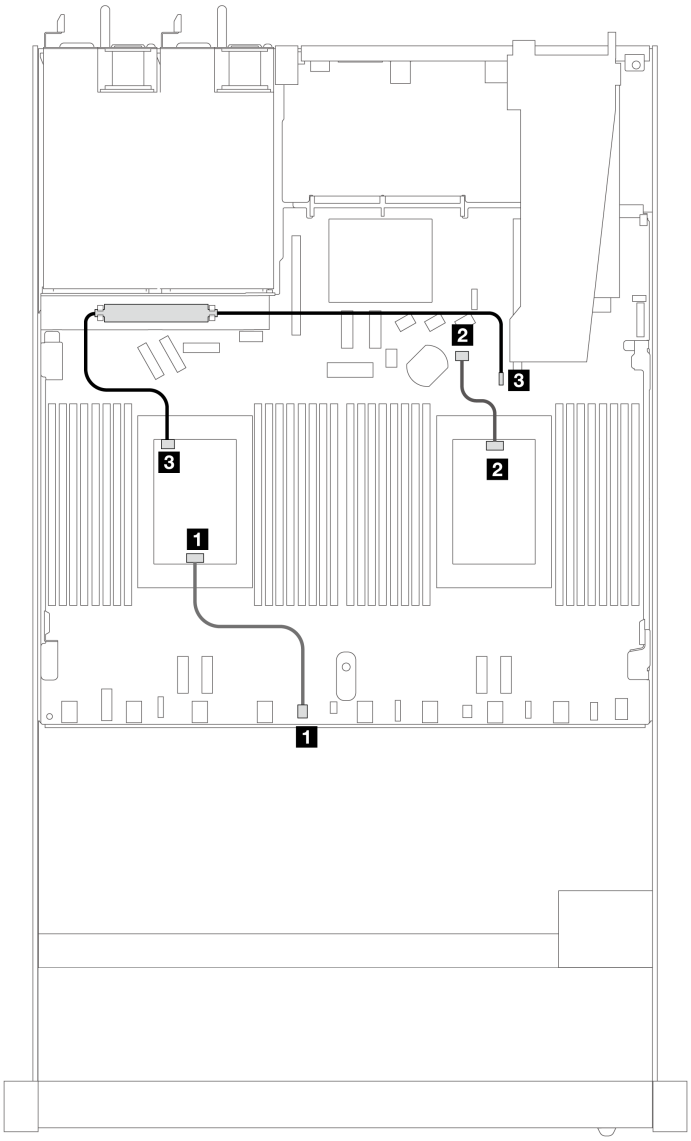


Figure 260. Liquid to air module cable routing

Cable	From	To
1 Pump 1	Pump 1 cable	Pump 1 connector
2 Pump 2	Pump 2 cable	Pump 2 connector
3 Leak detection	Leak detection cable	Leak detection connector

With the L2AM installed, your server supports below drive combinations:

- “4 x 2.5'' NVMe with 4 x 2.5'' Gen 5 AnyBay backplane (liquid cooling)” on page 254
- “6 x 2.5'' SAS/SATA + 4 x 2.5'' AnyBay (liquid cooling)” on page 255
- “6 x 2.5'' SAS/SATA + 2 x 2.5'' AnyBay + 2 x 2.5'' NVMe (liquid cooling)” on page 262
- “8 x 2.5'' SAS/SATA (liquid cooling)” on page 266
- “8 x 2.5'' U.2 drives with 10 x 2.5'' Gen 5 AnyBay backplane (liquid cooling)” on page 270
- “8 x 2.5'' U.3 drives with 10 x 2.5'' AnyBay backplane (liquid cooling)” on page 272
- “10 x 2.5'' SAS/SATA (liquid cooling)” on page 273
- “10 x 2.5'' NVMe (liquid cooling)” on page 276
- “10 x 2.5'' AnyBay (liquid cooling)” on page 279

4 x 2.5'' NVMe with 4 x 2.5'' Gen 5 AnyBay backplane (liquid cooling)

Use this section to understand the cable routing for four NVMe drives for liquid cooling configuration with 4 x 2.5'' Gen 5 AnyBay backplane and one processor installed.

To connect cables for a 7mm drive backplane, refer to “7mm drive backplane” on page 247.

To connect power cables for a backplane for standard 2.5-inch or 3.5-inch drives, refer to “Cable routing for backplane power” on page 251.

Onboard cabling of four NVMe drives for liquid cooling

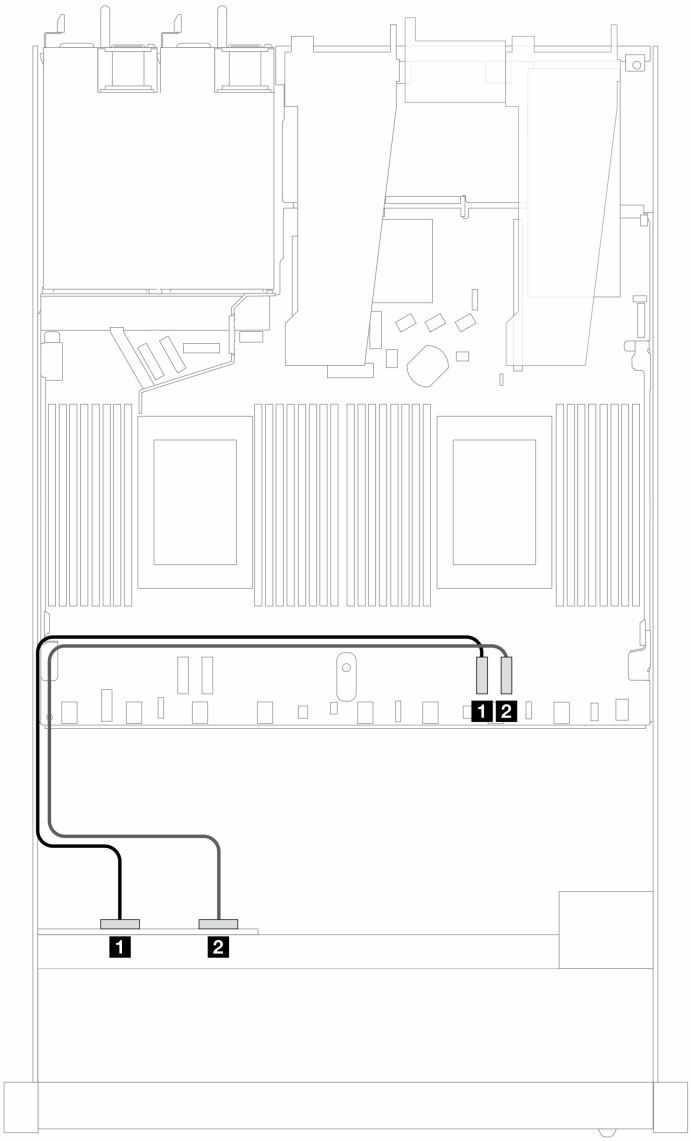


Figure 261. Onboard cabling of four NVMe drives for liquid cooling

Table 17. Mapping between one front AnyBay backplane and processor board for onboard configuration

Backplane	From	To
Front BP (NVMe)	1 NVMe 0–1	1 PCIe 2
	2 NVMe 2–3	2 PCIe 1

6 x 2.5'' SAS/SATA + 4 x 2.5'' AnyBay (liquid cooling)

Use this section to understand the cable routing of six SAS/SATA front drives and four AnyBay front drives for liquid cooling configuration with the 6 x 2.5'' SAS/SATA and 4 x 2.5'' AnyBay front backplane installed.

To connect power cables for a backplane for standard 2.5-inch or 3.5-inch drives, refer to “Cable routing for backplane power” on page 251.

To connect cables for a 7mm drive backplane, refer to “7mm drive backplane” on page 247.

To connect signal cables for a backplane for standard six SAS/SATA and four AnyBay front drives, refer to the following cable routing scenarios depending on your server configuration:

- “Cable routing for onboard configuration” on page 256
- “Cable routing with an SFF HBA/RAID adapter” on page 258

Cable routing for onboard configuration

The following illustrations and tables show the mapping relationship between backplane connectors and processor board connectors for onboard configuration.

The following figure illustrates the cable routing for the configuration of six SAS/SATA and four AnyBay front drives bays. Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n.

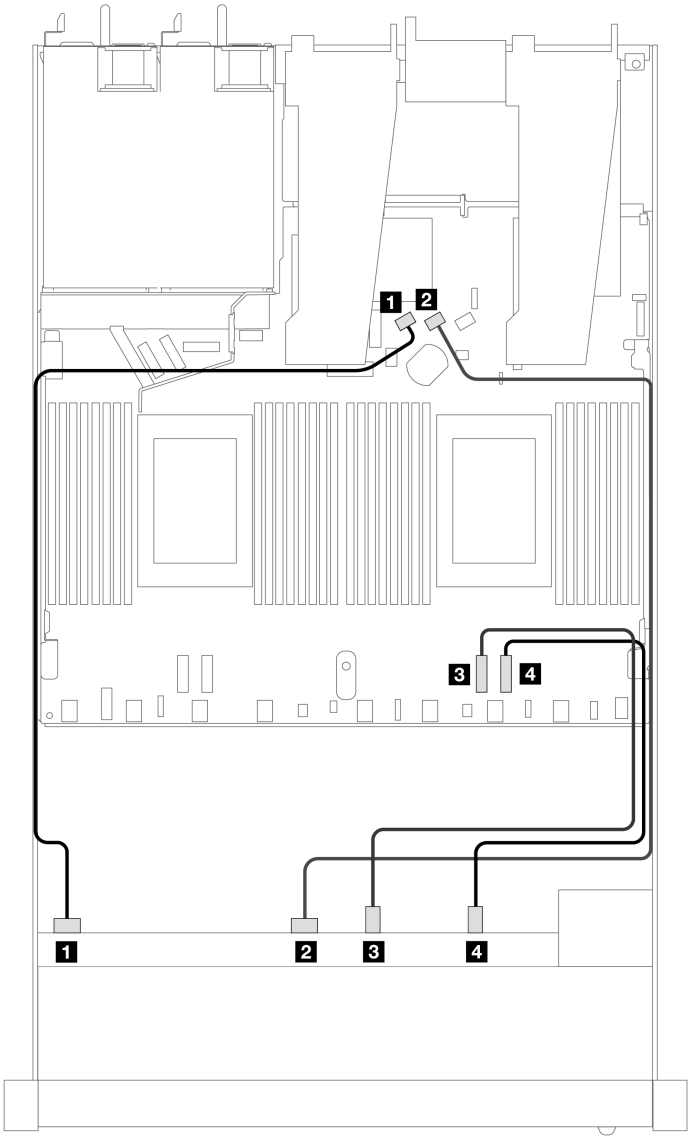


Figure 262. Cable routing for onboard configuration of six SAS/SATA and four NVMe front drives

Table 18. Mapping between one front AnyBay backplane and processor board for onboard configuration

Backplane	From	To
Front BP (SAS)	1 SAS 0	1 SATA 0
	2 SAS 1	2 SATA 1
Front BP (NVMe)	3 NVMe 0–1	3 PCIe 2
	4 NVMe 2–3	4 PCIe 1

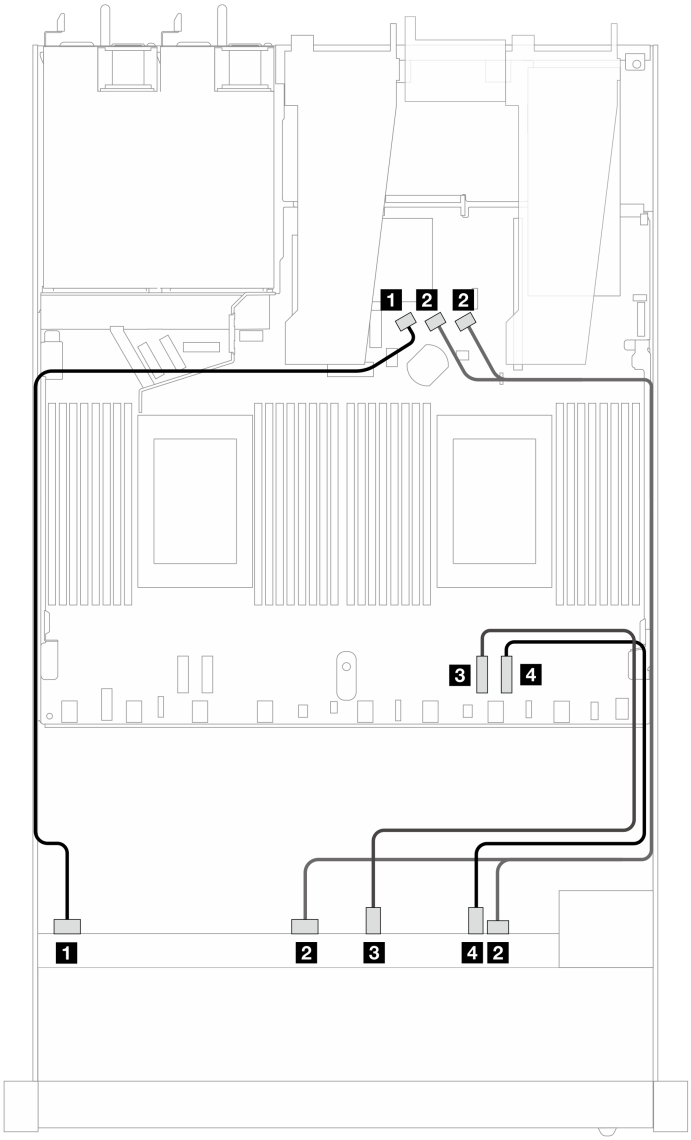


Figure 263. Cable routing for onboard configuration of six SAS/SATA and four NVMe front drives

Table 19. Mapping between one front AnyBay backplane and processor board for onboard configuration

Backplane	From	To
Front BP (SAS)	1 SAS 0	1 SATA 0
	2 SAS 1, 2	2 SATA 1, 2
Front BP (NVMe)	3 NVMe 0–1	3 PCIe 2
	4 NVMe 2–3	4 PCIe 1

Cable routing with an SFF HBA/RAID adapter

The following tables show the mapping relationship between backplane connectors and an 8i or 16i SFF HBA/RAID adapter (Gen 4).

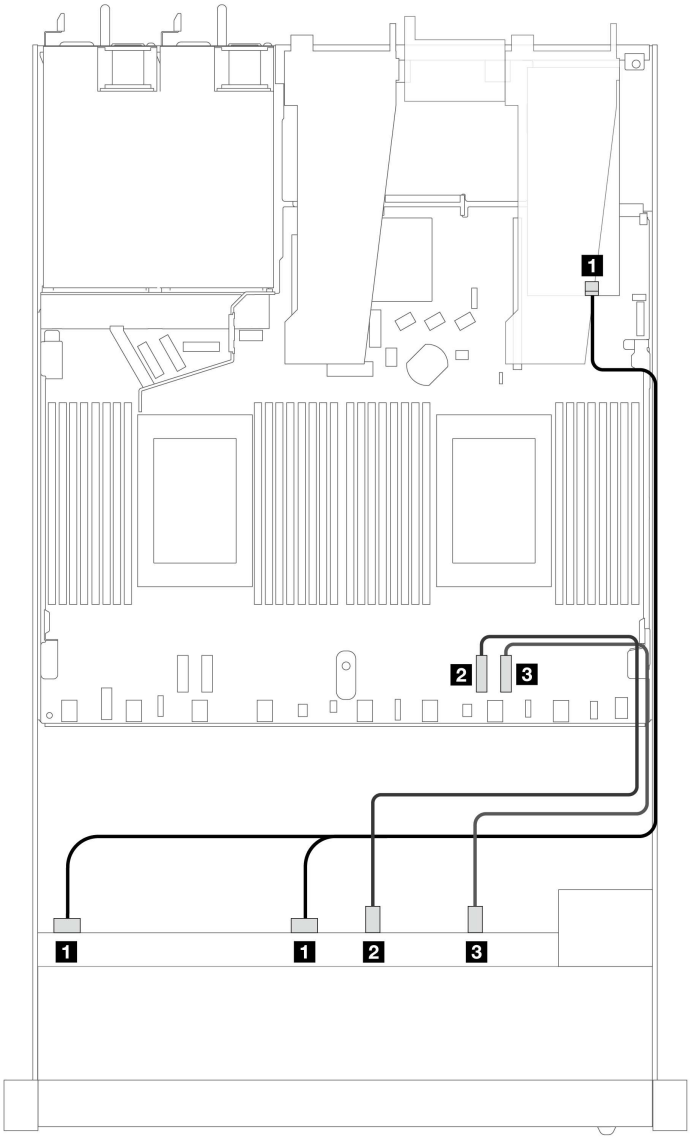


Figure 264. Cable routing for six front SAS/SATA drives and four front AnyBay drives bays with an 8i or 16i SFF RAID adapter (Gen 4)

Table 20. Mapping between one front AnyBay backplane and an SFF HBA/RAID adapter

Backplane	From	To
Front BP (SAS)	1 SAS 0, SAS 1	1 C0
Front BP (NVMe)	2 NVMe 0–1	2 PCIe 2
	3 NVMe 2–3	3 PCIe 1

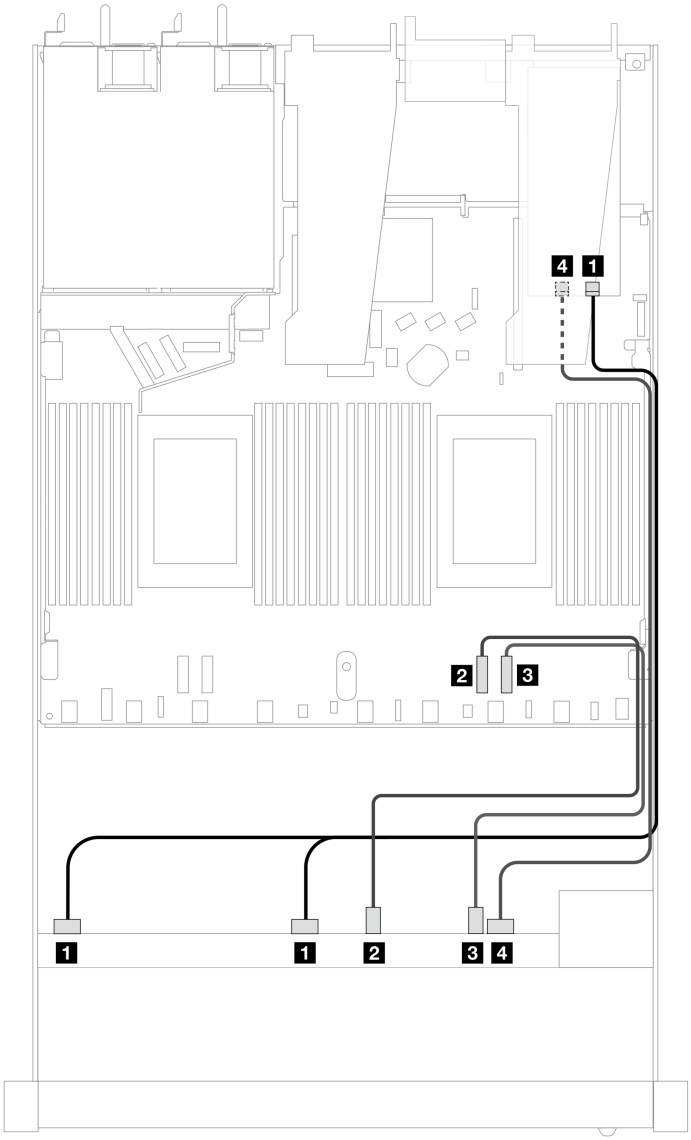


Figure 265. Cable routing for six front SAS/SATA drives and four front AnyBay drives bays with an 8i or 16i SFF RAID adapter (Gen 4)

Table 21. Mapping between one front AnyBay backplane and an SFF HBA/RAID adapter

Backplane	From	To
Front BP (SAS)	1 SAS 0, SAS 1	1 C0
Front BP (NVMe)	2 NVMe 0–1	2 PCIe 2
	3 NVMe 2–3	3 PCIe 1
Front BP (SAS)	4 SAS 2	4 C1

The following illustrations and tables show the mapping relationship between backplane connectors and an 8i or 16i SFF HBA/RAID adapter (Gen 3).

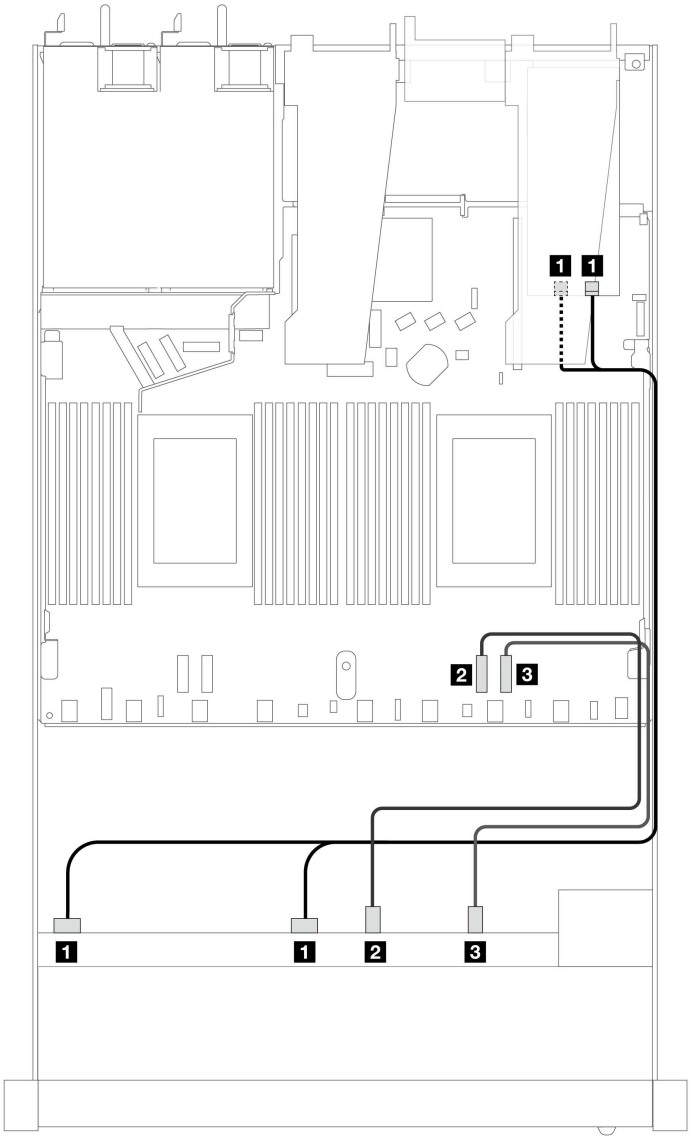


Figure 266. Cable routing for six front SAS/SATA drives and four front AnyBay drives bays with an 8i or 16i SFF RAID adapter (Gen 3)

Table 22. Mapping between one front AnyBay backplane and an SFF HBA/RAID adapter

Backplane	**From**	**To**
Front BP (SAS)	1 SAS 0, SAS 1	1 C0, C1
Front BP (NVMe)	2 NVMe 0–1	2 PCIe 2
	3 NVMe 2–3	3 PCIe 1

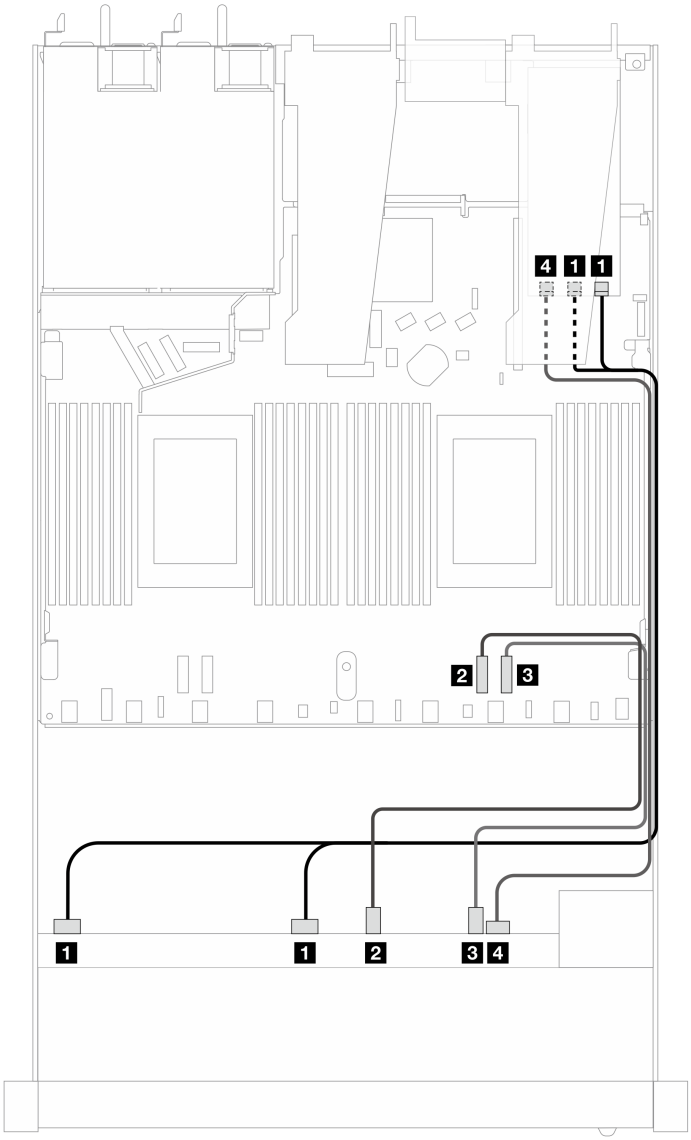


Figure 267. Cable routing for six front SAS/SATA drives and four front AnyBay drives bays with an 8i or 16i SFF RAID adapter (Gen 3)

Table 23. Mapping between one front AnyBay backplane and an SFF HBA/RAID adapter

Backplane	From	To
Front BP (SAS)	1 SAS 0, SAS 1	1 C0, C1
Front BP (NVMe)	2 NVMe 0–1	2 PCIe 2
	3 NVMe 2–3	3 PCIe 1
Front BP (SAS)	4 SAS 2	4 C2

6 x 2.5'' SAS/SATA + 2 x 2.5'' AnyBay + 2 x 2.5'' NVMe (liquid cooling)

See this section to understand the cable routing of six front SAS/SATA drives, two AnyBay drives and two front NVMe drives for the liquid cooling configuration.

To connect cables for a 7mm drive backplane, refer to “7mm drive backplane” on page 247.

To connect power cables for a backplane for standard 2.5-inch or 3.5-inch drives, refer to “Cable routing for backplane power” on page 251.

To connect signal cables for a backplane for standard six front SAS/SATA drives, two AnyBay drives and two front NVMe drives, refer to the following cable routing scenarios depending on your server configuration:

- “Cable routing for onboard configuration” on page 263
- “Cable routing with an SFF HBA/RAID adapter” on page 264

Cable routing for onboard configuration

The following tables show the mapping relationship between backplane connectors and processor board connectors for onboard configuration.

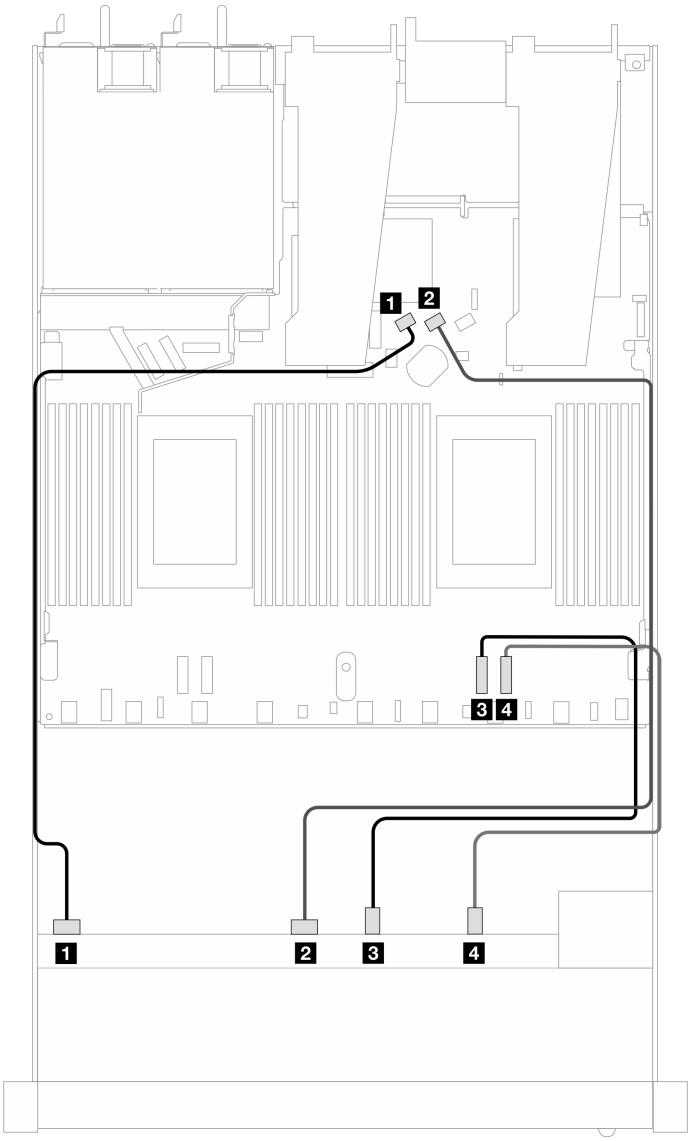


Figure 268. Cable routing for onboard configuration of six SAS/SATA drives and two AnyBay and two NVMe front drives bays

Table 24. Mapping between one front AnyBay backplane and processor board for onboard configuration

Backplane	From	To
Front BP (SAS)	1 SAS 0	1 SATA 0
	2 SAS 1	2 SATA 1
Front BP (NVMe)	3 NVMe 0–1	3 PCIe 2
	4 NVMe 2–3	4 PCIe 1

Cable routing with an SFF HBA/RAID adapter

The following tables show the mapping relationship between backplane connectors and an SFF HBA/RAID adapter.

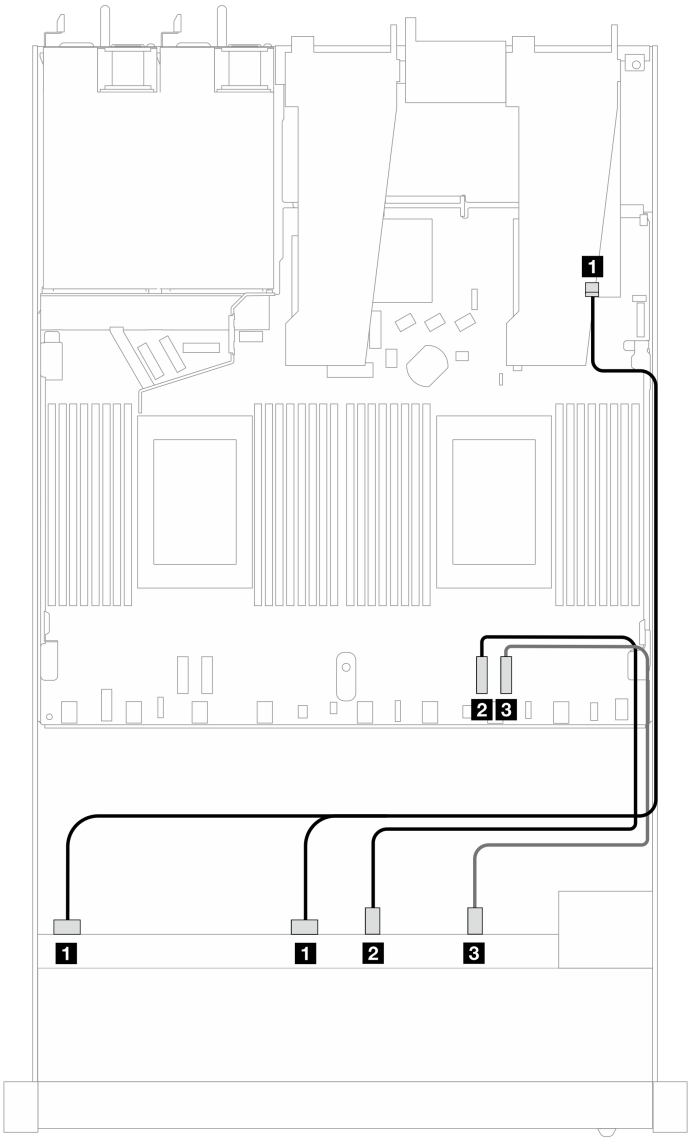


Figure 269. Cable routing for 6 SAS/SATA drives and 2 AnyBay drives and 2 NVMe front drive bays with an 8i or 16i SFF RAID adapter (Gen 4)

Table 25. Mapping between one front AnyBay backplane and an SFF HBA/RAID adapter

Backplane	**From**	**To**
Front BP (SAS)	1 SAS 0, SAS 1	1 C0
Front BP (NVMe)	2 NVMe 0–1	2 PCIe 2
	3 NVMe 2–3	3 PCIe 1

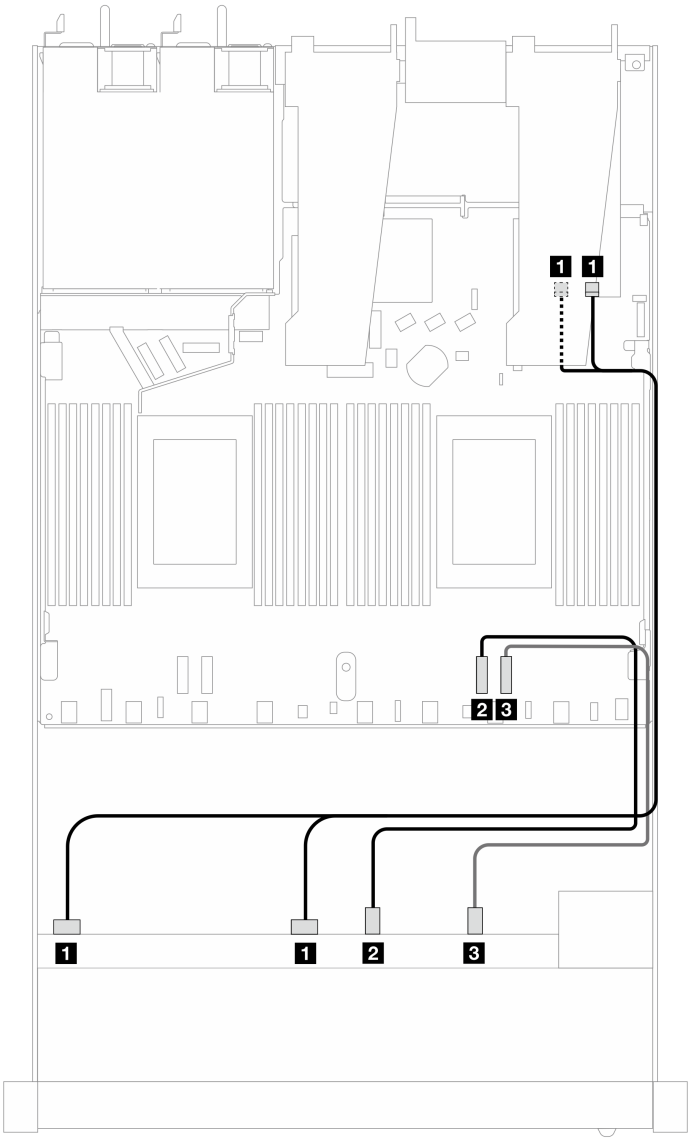


Figure 270. Cable routing for 6 SAS/SATA drives and 2 AnyBay drives and 2 NVMe front drive bays with an 8i or 16i SFF RAID adapter (Gen 3)

Table 26. Mapping between one front AnyBay backplane and an SFF HBA/RAID adapter

Backplane	From	To
Front BP (SAS)	1 SAS 0, SAS 1	1 C0, C1
Front BP (NVMe)	2 NVMe 0–1	2 PCIe 2
	3 NVMe 2–3	3 PCIe 1

8 x 2.5'' SAS/SATA (liquid cooling)

Use this section to understand the cable routing of eight SAS/SATA front drives for liquid cooling configuration with 10 x 2.5'' AnyBay front backplane installed.

To connect cables for a 7mm drive backplane, refer to “7mm drive backplane” on page 247.

To connect power cables for a backplane for standard 2.5-inch or 3.5-inch drives, refer to “Cable routing for backplane power” on page 251.

To connect signal cables for a backplane for standard 4 x 3.5-inch front drives, refer to the following cable routing scenarios depending on your server configuration:

- “Cable routing for onboard configuration” on page 267
- “Cable routing with an SFF HBA/RAID adapter” on page 268

Cable routing for onboard configuration

The following illustrations and tables show the mapping relationship between backplane connectors and processor board connectors for onboard configuration.

The following figure illustrates the cable routing for the onboard configuration of 8 x 2.5-inch front SAS/SATA drive bays. Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n.

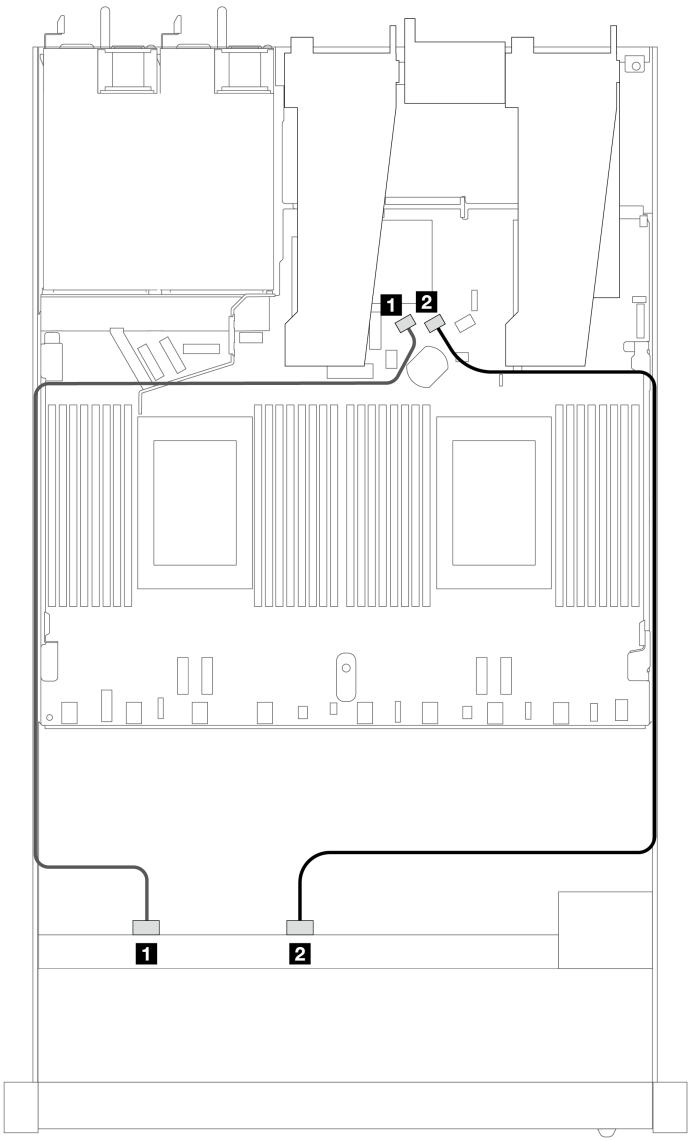


Figure 271. Cable routing for onboard configuration of 8 x 2.5 SAS/SATA front drives

Table 27. Mapping between one front SAS/SATA backplane and processor board for onboard configuration

Backplane	From	To
Front BP (SAS)	1 SAS 0	1 SATA 0
	2 SAS 1	2 SATA 1

Cable routing with an SFF HBA/RAID adapter

The following illustrations and tables show the mapping relationship between backplane connectors and an 8i or 16i SFF HBA/RAID adapter (Gen 3 or Gen 4).

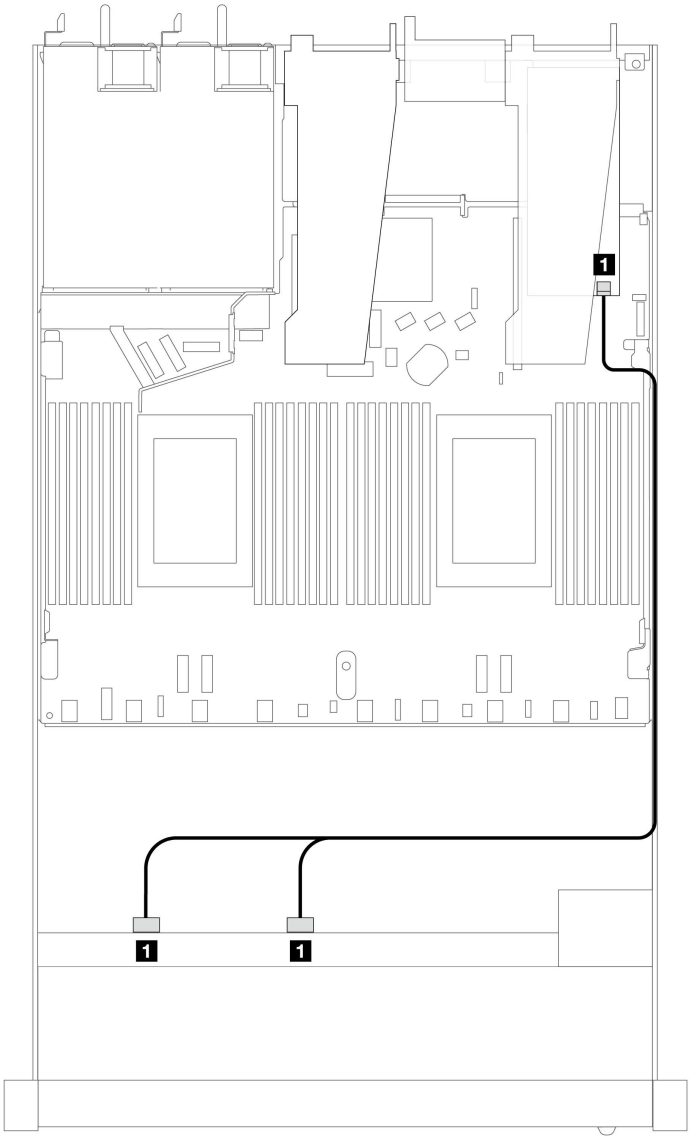


Figure 272. Cable routing for 8 x 2.5-inch front SAS/SATA drive bays with an 8i SFF RAID adapter (Gen 4)

Table 28. Mapping between one front SAS/SATA backplane and an SFF HBA/RAID adapter

Backplane	From	To
Front BP (SAS)	1 SAS 0, SAS 1	1 C0

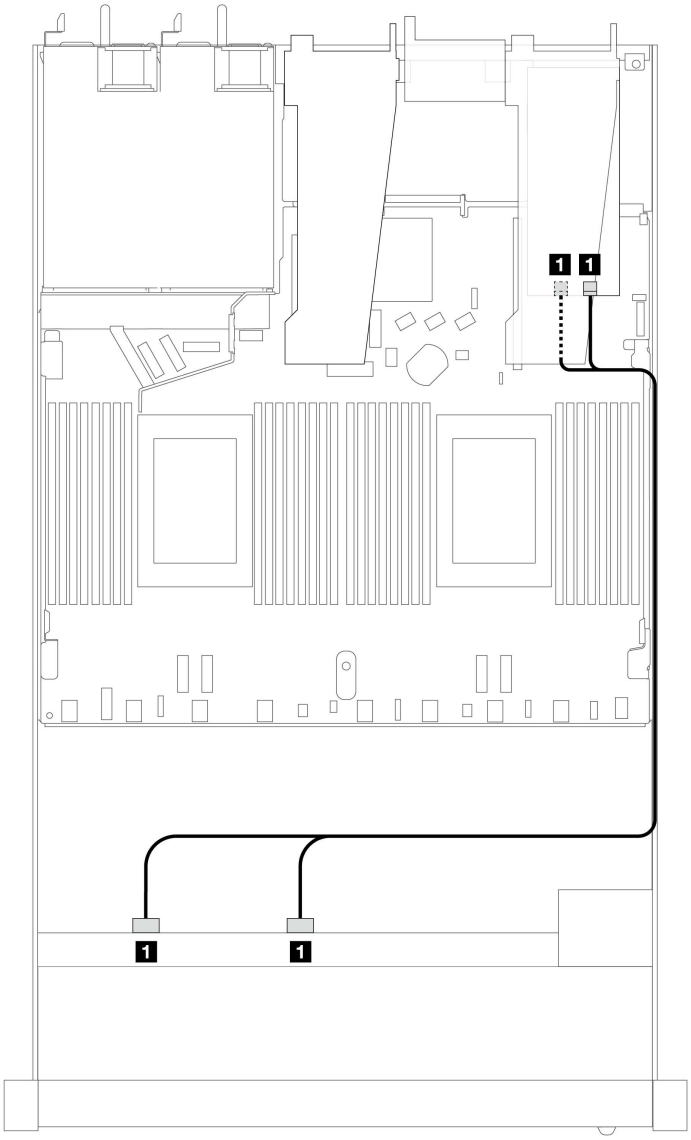


Figure 273. Cable routing for 8 x 2.5-inch front SAS/SATA drive bays with an 8i or 16i SFF RAID adapter (Gen 3)

Table 29. Mapping between one front SAS/SATA backplane and an SFF HBA/RAID adapter

Backplane	From	To
Front BP (SAS)	1 SAS 0, SAS 1	1 C0, C1

8 x 2.5'' U.2 drives with 10 x 2.5'' Gen 5 AnyBay backplane (liquid cooling)

Use this section to understand the cable routing for eight U.2 drives for liquid cooling configuration with 10 x 2.5 Gen 5 AnyBay backplane and one processor installed.

To connect cables for a 7mm drive backplane, refer to “7mm drive backplane” on page 247.

To connect power cables for a backplane for standard 2.5-inch or 3.5-inch drives, refer to “Cable routing for backplane power” on page 251.

The following illustration and table show the cabling among the front backplane, the processor board and a Gen 5 SFF re-timer adapter.

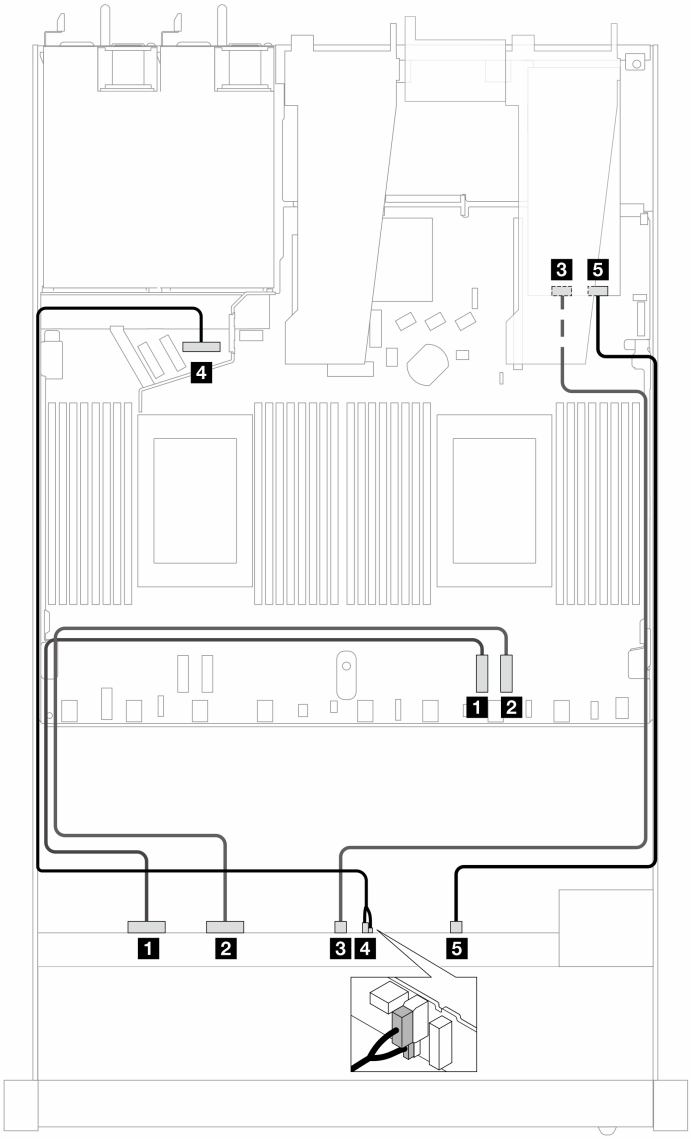


Figure 274. Cable routing of eight U.2 front drives for both connections onboard and to a Gen 5 SFF re-timer adapter

Table 30. Mapping between one front AnyBay backplane, the processor board and a re-timer adapter

Backplane	From	To
Front BP (NVMe)	1 NVMe 0–1	1 PCIe 2
	2 NVMe 2–3	2 PCIe 1
	3 NVMe 4–5	3 C1
Front BP (power)	4 Power and sideband	4 Power port for front BP
Front BP (NVMe)	5 NVMe 6–7	5 C0

8 x 2.5'' U.3 drives with 10 x 2.5'' AnyBay backplane (liquid cooling)

Use this section to understand the cable routing for eight U.3 drives for liquid cooling configuration with 10 x 2.5'' Anybay backplane and one processor installed.

To connect cables for a 7mm drive backplane, refer to “7mm drive backplane” on page 247.

To connect power cables for a backplane for standard 2.5-inch or 3.5-inch drives, refer to “Cable routing for backplane power” on page 251.

Cable routing with an SFF HBA/RAID adapter

The following illustrations and tables show the mapping relationship between backplane connectors and an 8i SFF RAID adapter (Gen 4).

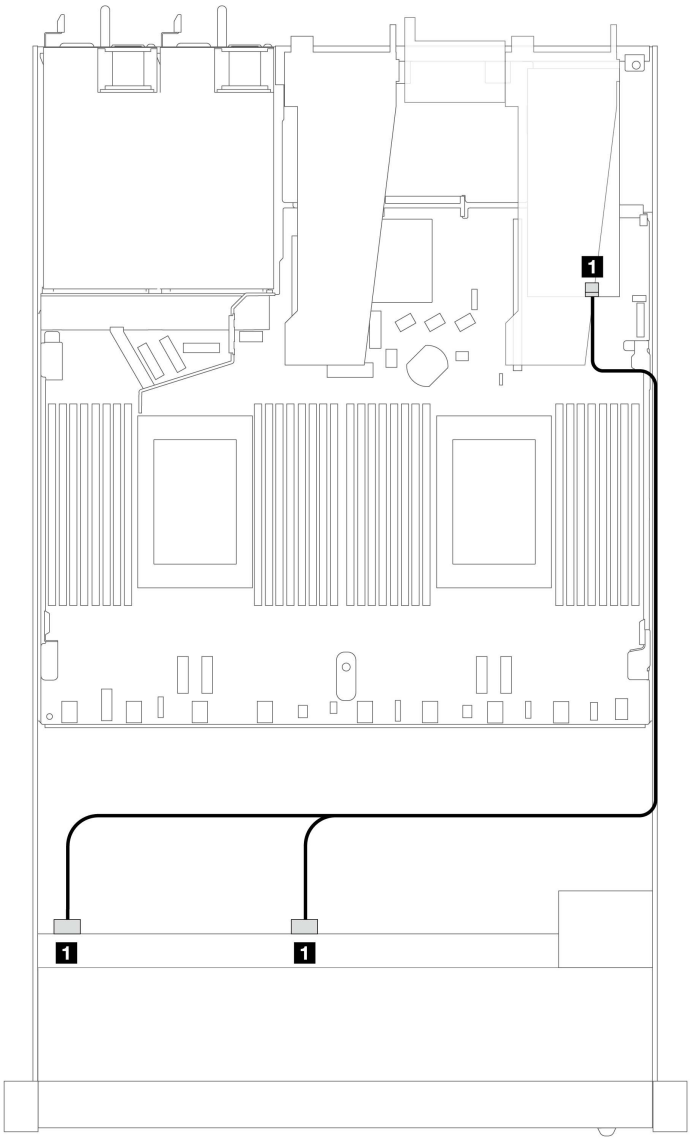


Figure 275. Cable routing for 8 x 2.5-inch front U.3 drives with an 8i SFF RAID adapter (Gen 4)

Table 31. Mapping between one front AnyBay backplane and an SFF HBA/RAID adapter

Backplane	From	To
Front BP (SAS)	SAS 0, SAS 1	C0

10 x 2.5'' SAS/SATA (liquid cooling)

Use this section to understand the cable routing of 10 SAS/SATA front drives for liquid cooling configuration with 10 x 2.5'' AnyBay front backplane installed.

To connect cables for a 7mm drive backplane, refer to “7mm drive backplane” on page 247.

To connect power cables for a backplane for standard 2.5-inch or 3.5-inch drives, refer to “Cable routing for backplane power” on page 251.

To connect signal cables for a backplane for standard 4 x 3.5-inch front drives, refer to the following cable routing scenarios depending on your server configuration:

- “Cable routing for onboard configuration” on page 273
- “Cable routing with an SFF HBA/RAID adapter” on page 274

Cable routing for onboard configuration

The following illustrations and tables show the mapping relationship between backplane connectors and processor board connectors for onboard configuration.

The following figure illustrates the cable routing for the configuration of 10 front SAS/SATA drives bays. Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n.

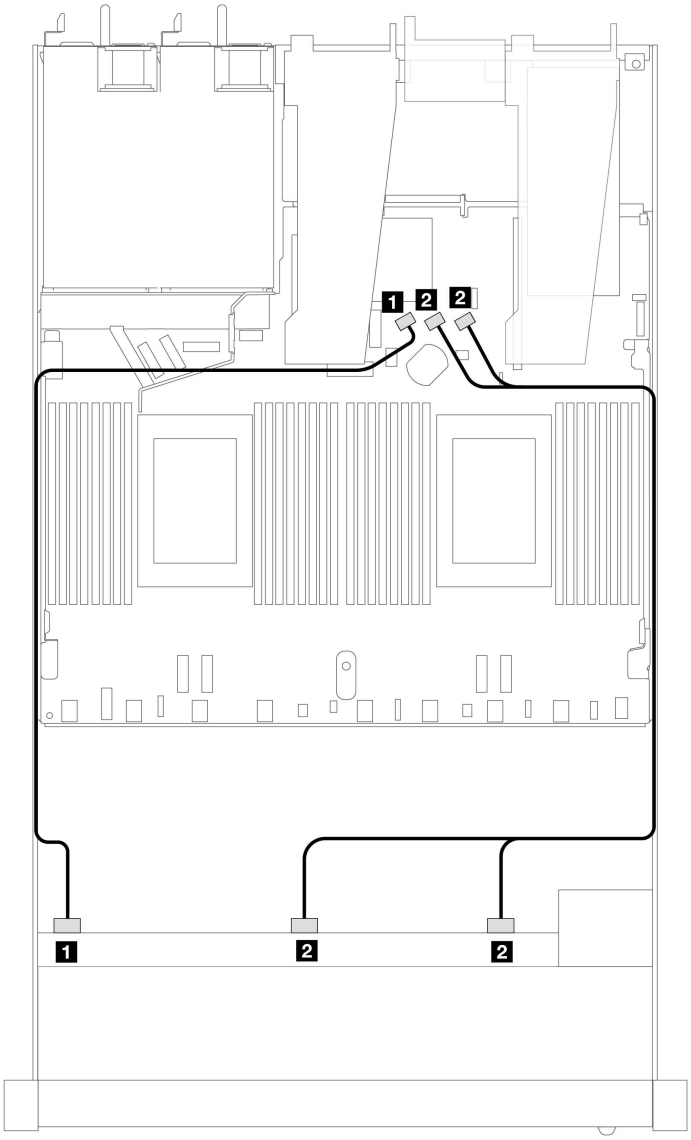


Figure 276. Cable routing for onboard configuration of 10 x 2.5 SAS/SATA front drives

Table 32. Mapping between one front AnyBay backplane and processor board for onboard configuration

Backplane	From	To
Front BP (SAS)	1 SAS 0	1 SATA 0
	2 SAS 1, SAS 2	2 SATA 1, SATA 2

Cable routing with an SFF HBA/RAID adapter

The following tables show the mapping relationship between backplane connectors and a 16i SFF HBA/RAID adapter (Gen 3 or Gen 4).

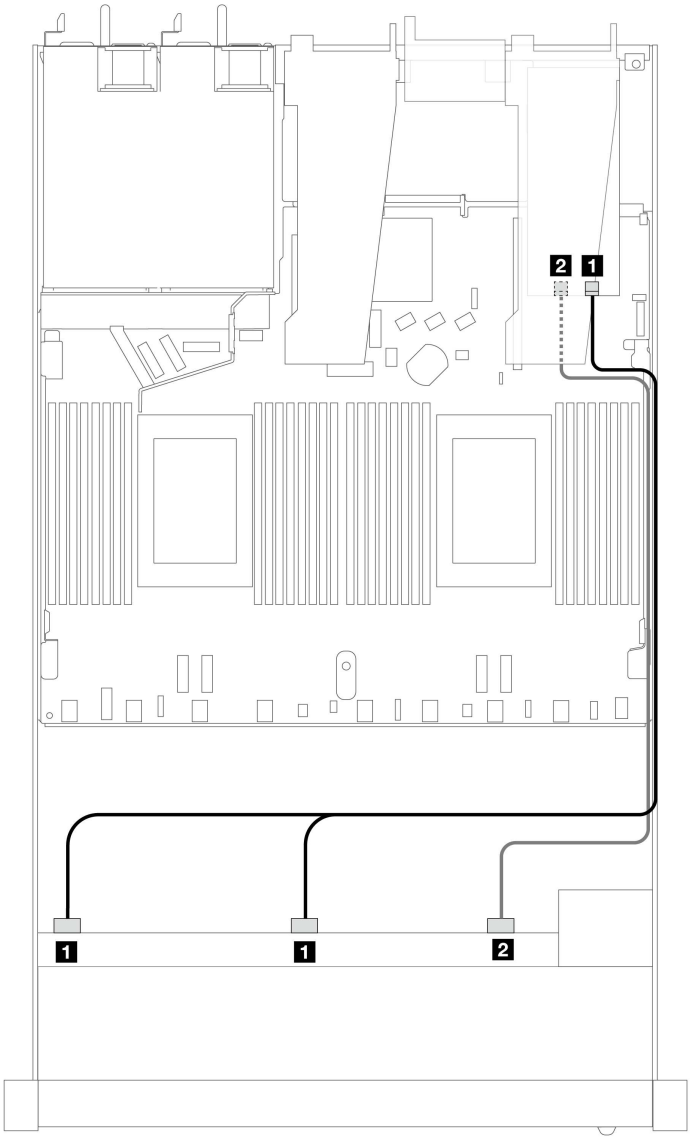


Figure 277. Cable routing for 10 front SAS/SATA drives bays with a 16i SFF RAID adapter (Gen 4)

Table 33. Mapping between one front AnyBay backplane and an SFF HBA/RAID adapter

Backplane	From	To
Front BP (SAS)	1 SAS 0, SAS 1	1 C0
	2 SAS 2	2 C1

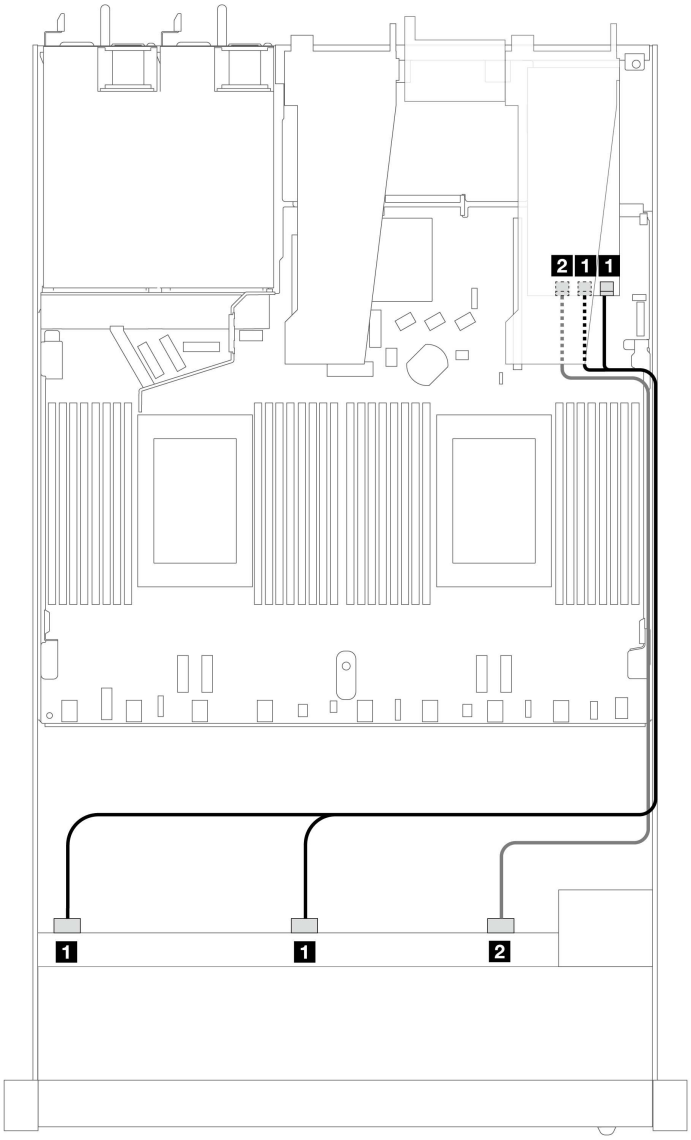


Figure 278. Cable routing for 10 front SAS/SATA drives bays with a 16i SFF RAID adapter (Gen 3)

Table 34. Mapping between one front AnyBay backplane and an SFF HBA/RAID adapter

Backplane	From	To
Front BP (SAS)	1 SAS 0, SAS 1	1 C0, C1
	2 SAS 2	2 C2

10 x 2.5'' NVMe (liquid cooling)

Use this section to understand the cable routing of ten NVMe front drives for liquid cooling configuration with 10 x 2.5'' AnyBay front backplane (Gen 4 or Gen 5) installed.

To connect cables for a 7mm drive backplane, refer to “7mm drive backplane” on page 247.

To connect power cables for a backplane for standard 2.5-inch or 3.5-inch drives, refer to “Cable routing for backplane power” on page 251.

The following illustration and table show the cabling between the backplane and processor board for onboard configuration.

- “Onboard cabling of 10 NVMe drives for liquid cooling (Gen 4 backplane)” on page 277
- “Onboard cabling of 10 NVMe drives for liquid cooling (Gen 5 backplane)” on page 278

Onboard cabling of 10 NVMe drives for liquid cooling (Gen 4 backplane)

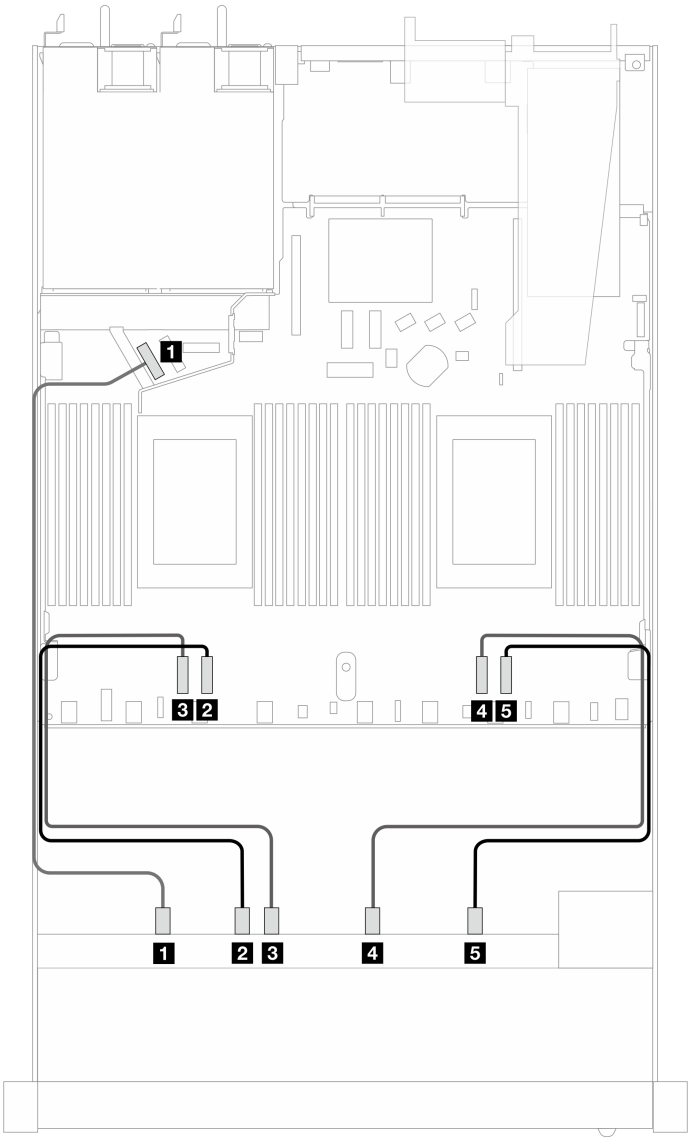


Figure 279. Onboard cabling of 10 NVMe drives for liquid cooling (Gen 4 backplane)

Table 35. Mapping between one front AnyBay backplane (Gen 4) and processor board for onboard configuration

Backplane	From	To
Front BP (NVMe)	1 NVMe 0–1	1 PCIe 5
	2 NVMe 2–3	2 PCIe 3
	3 NVMe 4–5	3 PCIe 4
	4 NVMe 6–7	4 PCIe 2
	5 NVMe 8–9	5 PCIe 1

Onboard cabling of 10 NVMe drives for liquid cooling (Gen 5 backplane)

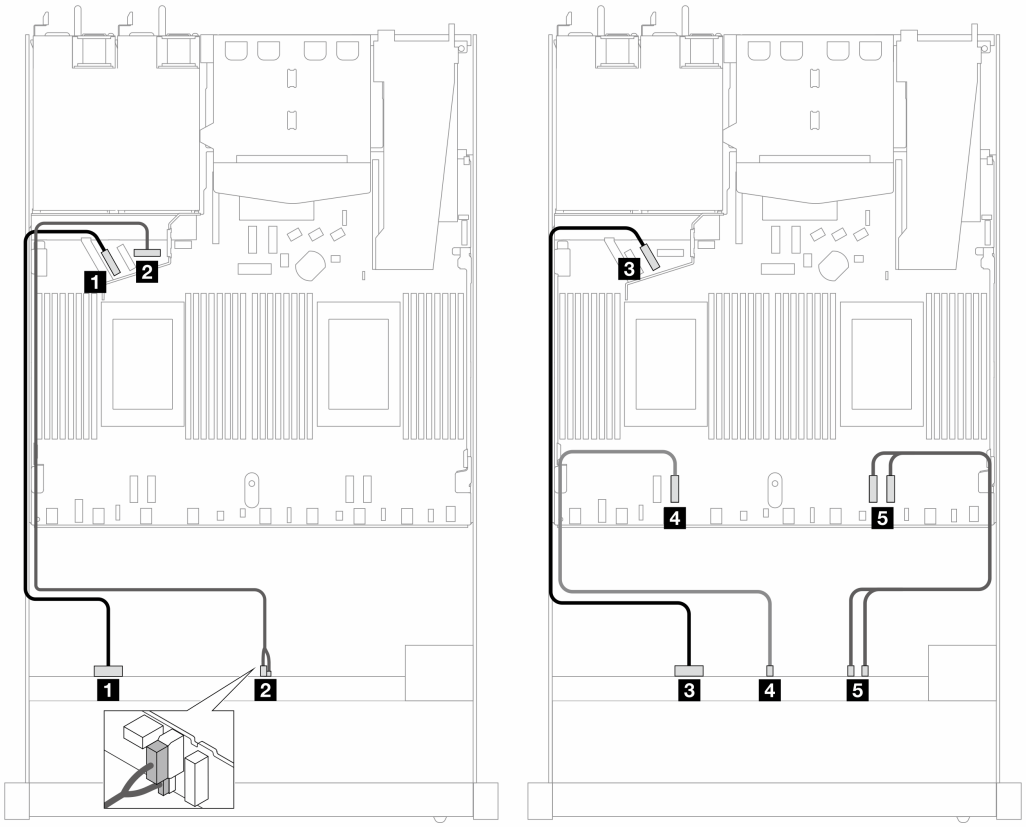


Figure 280. Onboard cabling of 10 NVMe drives for liquid cooling (Gen 5 backplane)

Table 36. Mapping between one front AnyBay backplane (Gen 5) and processor board for onboard configuration

Backplane	From	To
Front BP (NVMe)	1 NVMe 0–1	1 PCIe 5
Power	2 Power and sideband	2 Power port for front BP
Front BP (NVMe)	3 NVMe 2–3	3 PCIe 6
	4 NVMe 4–5	4 PCIe 3
	5 NVMe 6–7, 8–9	5 PCIe 2, 1

10 x 2.5'' AnyBay (liquid cooling)

Use this section to understand the cable routing of ten AnyBay front drives for liquid cooling configuration with 10 x 2.5'' AnyBay front backplane (Gen 4 or Gen 5) installed.

To connect cables for a 7mm drive backplane, refer to “7mm drive backplane” on page 247.

To connect power cables for a backplane for standard 2.5-inch or 3.5-inch drives, refer to “Cable routing for backplane power” on page 251.

To connect signal cables for a backplane for standard 10 AnyBay front drives, refer to the following cable routing scenarios depending on your server configuration:

- “Cable routing for 10 x 2.5'' AnyBay drives with 10 x 2.5'' AnyBay front backplane (Gen 5)” on page 279
  - “Cable routing for onboard configuration (Gen 5 backplane)” on page 279
  - “Cable routing with an SFF HBA/RAID adapter (Gen 5 backplane)” on page 280
- “Cable routing for 10 x 2.5'' AnyBay drives with 10 x 2.5'' AnyBay front backplane (Gen 4)” on page 282
  - “Cable routing for onboard configuration (Gen 4 backplane)” on page 282
  - “Cable routing with an SFF HBA/RAID adapter (Gen 4 backplane)” on page 284

Cable routing for 10 x 2.5'' AnyBay drives with 10 x 2.5'' AnyBay front backplane (Gen 5)

This section offers cable routing information for 10 x 2.5'' AnyBay drives with the 10 x 2.5'' AnyBay Gen 5 front backplane installed.

Cable routing for onboard configuration (Gen 5 backplane)

The following illustrations and tables show the mapping relationship between backplane connectors and processor board connectors for onboard configuration.

The following figure illustrates the cable routing for the configuration of 10 AnyBay front drives bays. Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n.

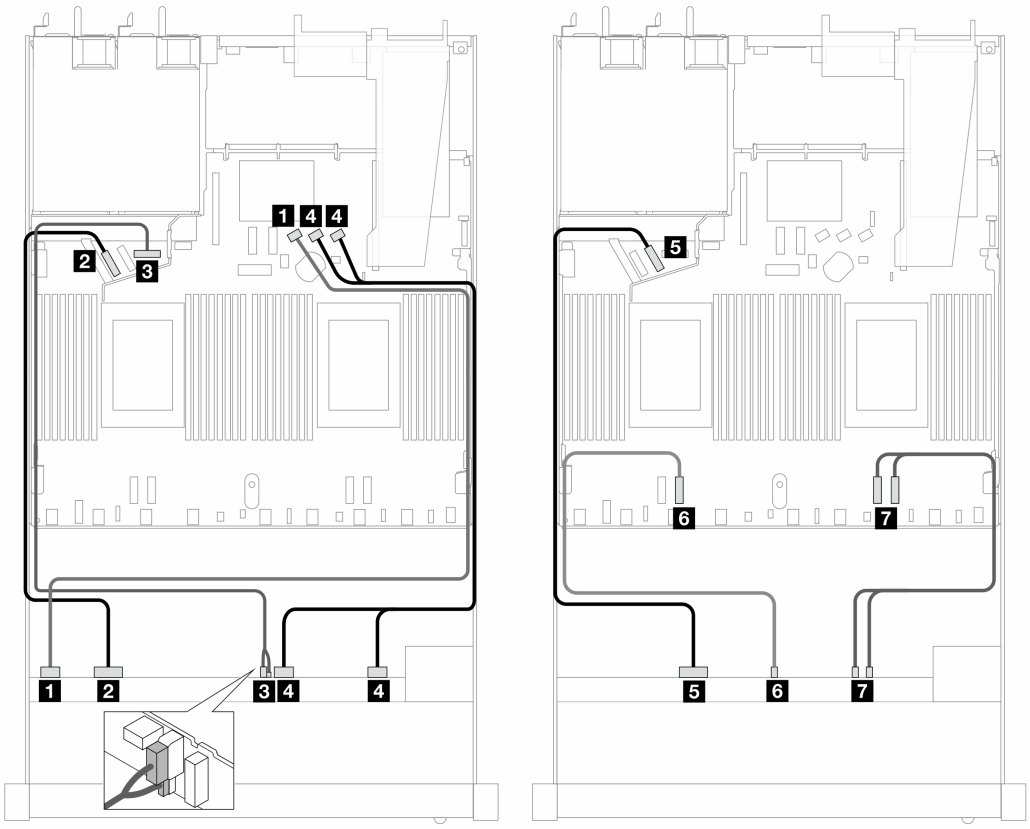


Figure 281. Cable routing for onboard configuration of 10 AnyBay front drives (Gen 5 backplane)

Table 37. Mapping between one front AnyBay backplane and processor board for onboard configuration

Backplane	From	To
Front BP (SAS)	1 SAS 0–3	1 SATA 0
Front BP (NVMe)	2 NVMe 0–1	2 PCIe 5
Front BP (power)	3 Power and sideband	3 Power port for front BP
Front BP (SAS)	4 SAS 4–7, 8–9	4 SATA 1, 2
Front BP (NVMe)	5 NVMe 2–3	5 PCIe 6
	6 NVMe 4–5	6 PCIe 3
	7 NVMe 6–7, 8–9	7 PCIe 2, 1

Cable routing with an SFF HBA/RAID adapter (Gen 5 backplane)

The following tables show the mapping relationship between backplane connectors and an SFF HBA/RAID adapter (Gen 3 or Gen 4).

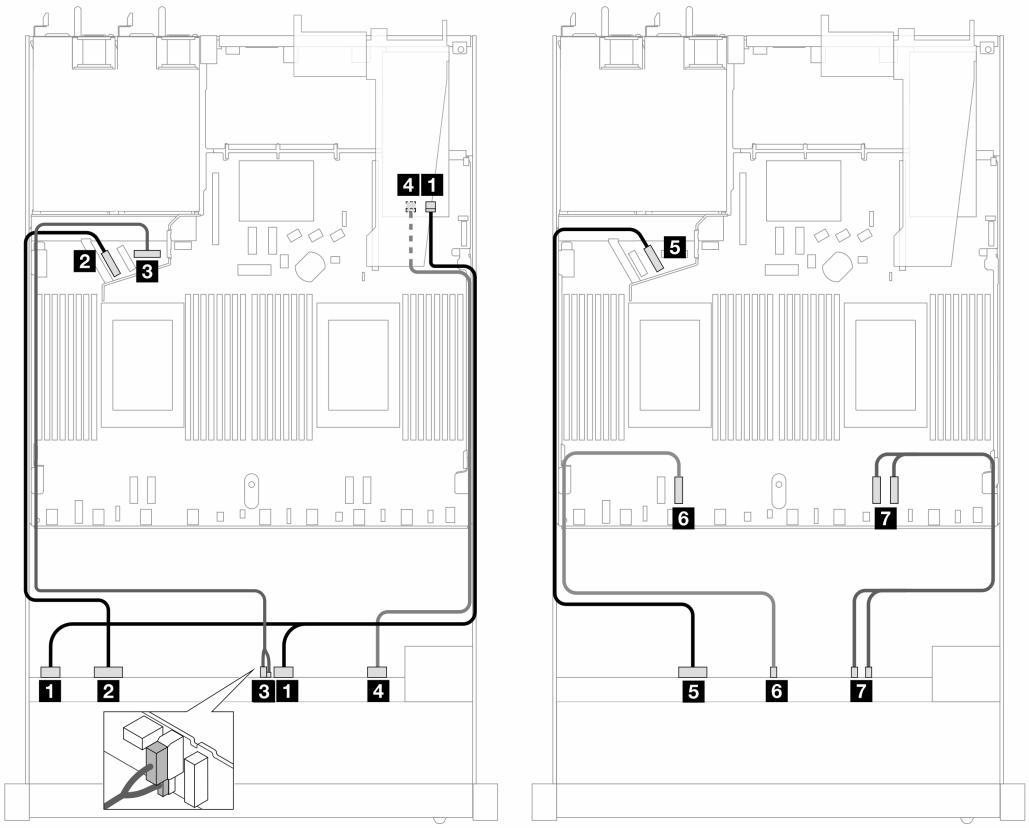


Figure 282. Cable routing for 10 front AnyBay drives with a 16i SFF RAID adapter (Gen 4)

Table 38. Mapping between one front AnyBay backplane and a Gen 4 SFF HBA/RAID adapter

Backplane	**From**	**To**
Front BP (SAS)	1 SAS 0–3, 4–7	1 C0
Front BP (NVMe)	2 NVMe 0–1	2 PCIe 5
Front BP (power)	3 Power and sideband	3 Power port for front BP
Front BP (SAS)	4 SAS 8–9	4 C1
Front BP (NVMe)	5 NVMe 2–3	5 PCIe 6
	6 NVMe 4–5	6 PCIe 3
	7 NVMe 6–7, 8–9	7 PCIe 2, 1

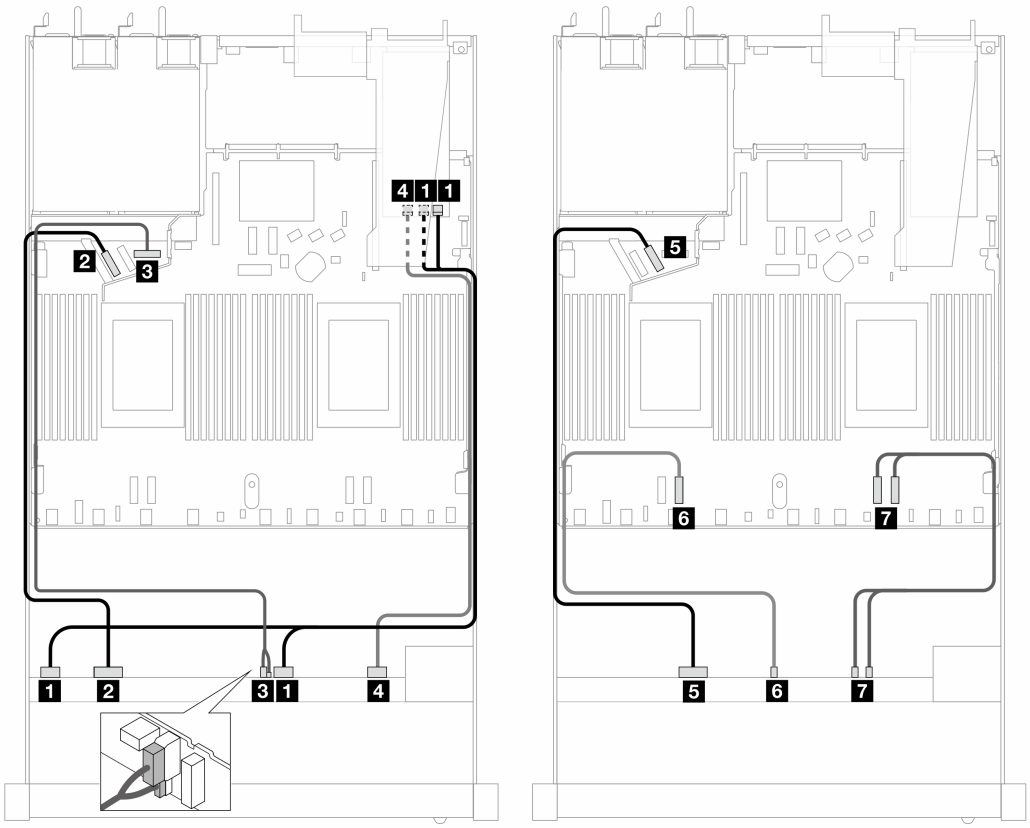


Figure 283. Cable routing for 10 AnyBay drives with a 16i SFF RAID adapter (Gen 3)

Table 39. Mapping between one front AnyBay backplane and an SFF HBA/RAID adapter

Backplane	From	To
Front BP (SAS)	1 SAS 0–3, 4–7	1 C0, C1
Front BP (NVMe)	2 NVMe 0–1	2 PCIe 5
Front BP (power)	3 Power and sideband	3 Power port for front BP
Front BP (SAS)	4 SAS 8–9	4 C2
Front BP (NVMe)	5 NVMe 2–3	5 PCIe 6
	6 NVMe 4–5	6 PCIe 3
	7 NVMe 6–7, 8–9	7 PCIe 2, 1

Cable routing for 10 x 2.5'' AnyBay drives with 10 x 2.5'' AnyBay front backplane (Gen 4)

This section offers cable routing information for 10 x 2.5'' AnyBay drives with the 10 x 2.5'' AnyBay Gen 4 front backplane installed.

Cable routing for onboard configuration (Gen 4 backplane)

The following figure illustrates the cable routing for the configuration of 10 AnyBay front drives bays. Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n.

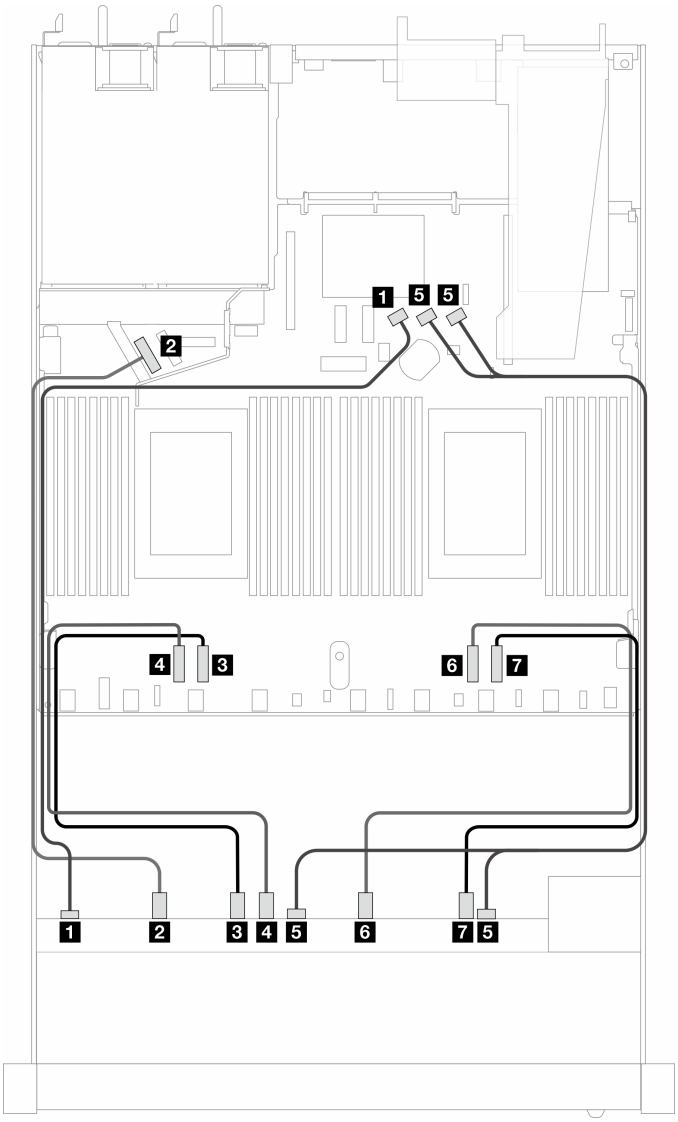


Figure 284. Cable routing for onboard configuration of 10 AnyBay front drives (Gen 4 backplane)

Table 40. Mapping between one front AnyBay backplane and processor board for onboard configuration

Backplane	**From**	**To**
Front BP (SAS)	1 SAS 0	1 SATA 0
Front BP (NVMe)	2 NVMe 0–1	2 PCIe 5
	3 NVMe 2–3	3 PCIe 3
	4 NVMe 4–5	4 PCIe 4
Front BP (SAS)	5 SAS 1, 2	5 SATA 1, 2
Front BP (NVMe)	6 NVMe 6–7	6 PCIe 2
	7 NVMe 8–9	7 PCIe 1

Cable routing with an SFF HBA/RAID adapter (Gen 4 backplane)

The following tables show the mapping relationship between backplane connectors and an SFF HBA/RAID adapter (Gen 3 or Gen 4).

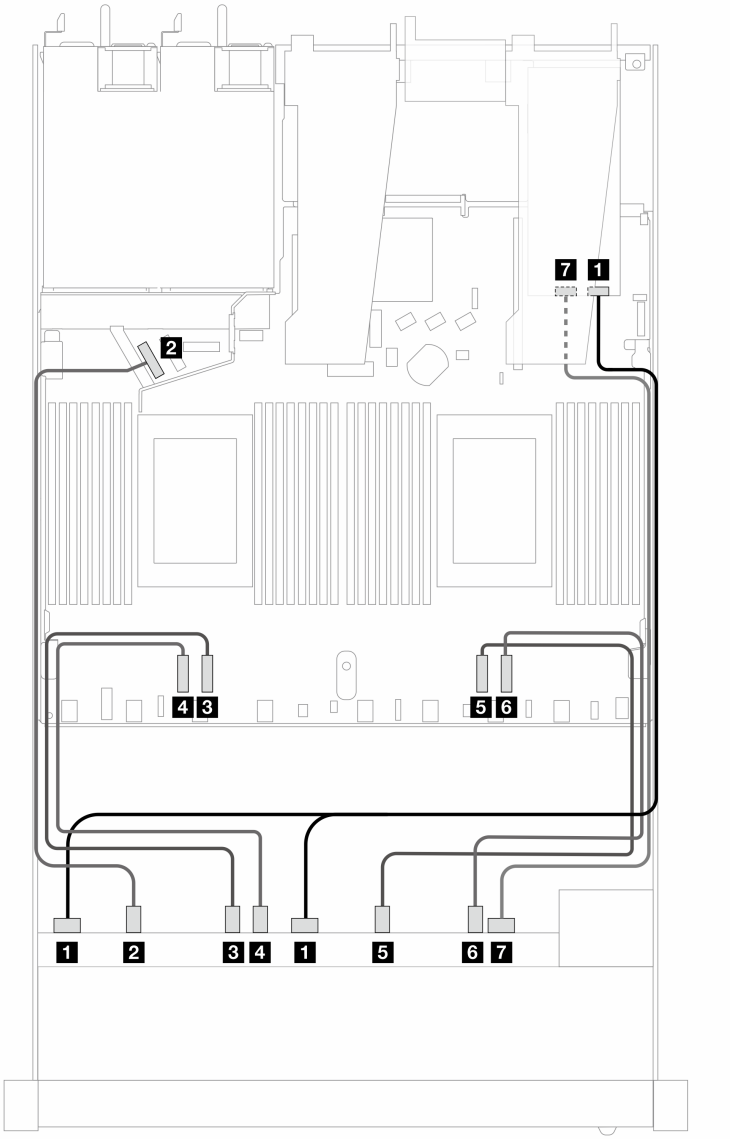


Figure 285. Cable routing for 10 front AnyBay drives with a 16i SFF RAID adapter (Gen 4)

Table 41. Mapping between one front AnyBay backplane and a Gen 4 SFF HBA/RAID adapter

Backplane	From	To
Front BP (SAS)	1 SAS 0, 1	1 C0
Front BP (NVMe)	2 NVMe 0–1	2 PCIe 5
	3 NVMe 2–3	3 PCIe 3
	4 NVMe 4–5	4 PCIe 4
	5 NVMe 6–7	5 PCIe 2

Table 41. Mapping between one front AnyBay backplane and a Gen 4 SFF HBA/RAID adapter (continued)

Backplane	From	To
	6 NVMe 8–9	6 PCIe 1
Front BP (SAS)	7 SAS 2	7 C1

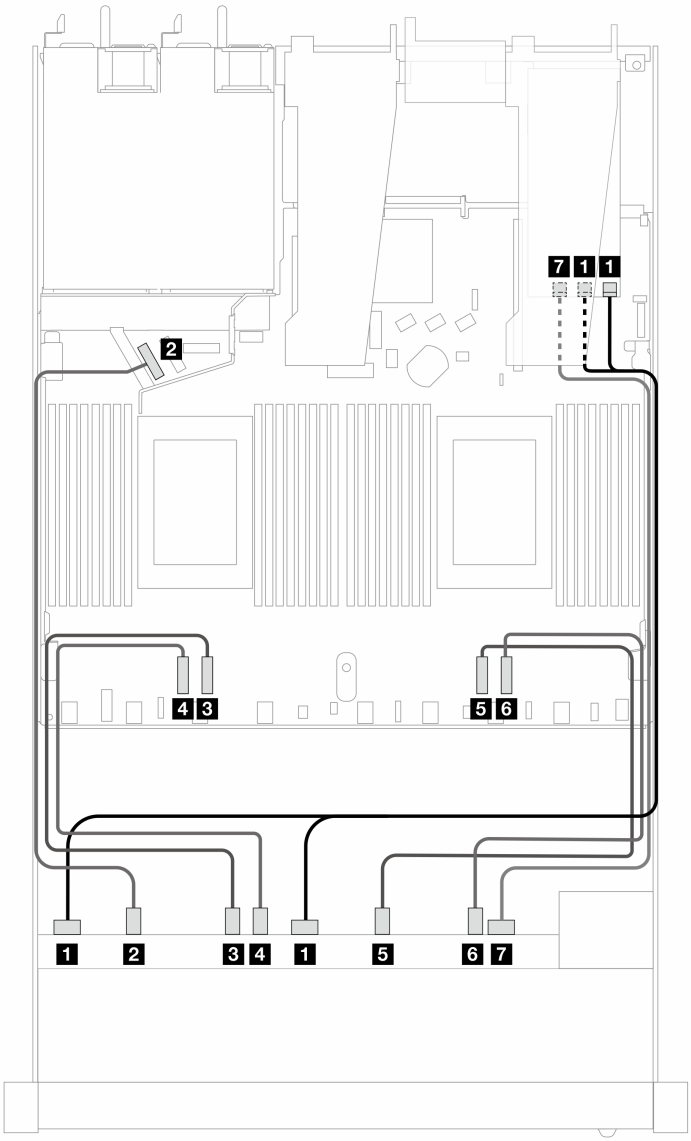


Figure 286. Cable routing for 10 AnyBay drives with a 16i SFF RAID adapter (Gen 3)

Table 42. Mapping between one front AnyBay backplane and an SFF HBA/RAID adapter

Backplane	From	To
Front BP (SAS)	1 SAS 0, 1	1 C0, C1
Front BP (NVMe)	2 NVMe 0–1	2 PCIe 5
	3 NVMe 2–3	3 PCIe 3

Table 42. Mapping between one front AnyBay backplane and an SFF HBA/RAID adapter (continued)

Backplane	From	To
	4 NVMe 4–5	4 PCIe 4
	5 NVMe 6–7	5 PCIe 2
	6 NVMe 8–9	6 PCIe 1
Front BP (SAS)	7 SAS 2	7 C2

Cable routing for backplane signals (one processor)

In this section, you can find cable routing of backplane signals when only one processor installed.

- Each backplane your server supports offers multiple signal connections. This section singles out the signal connection from power connection for better understanding. For backplane power connection, see “Cable routing for backplane power” on page 251.
- For the locations of backplane signal connectors on the processor board and adapters, see “Processor-board connectors for cable routing” on page 231 and “RAID and HBA adapter connectors” on page 228 for details.
- For more information about backplanes supported and their connectors, see “Drive backplane connectors” on page 224.

4 x 3.5'' front drives (one processor)

Use the section to understand the cable routing for signal cable connections for 4 x 3.5'' front drive backplanes when one processor installed.

4 x 3.5'' SAS/SATA backplane (one processor)

Use this section to understand the SAS/SATA backplane cable routing for server model with four 3.5-inch front drives.

To connect cables for a 7mm drive backplane, refer to “7mm drive backplane” on page 247.

To connect power cables for a backplane for standard 2.5-inch or 3.5-inch drives, refer to “Cable routing for backplane power” on page 251.

To connect cables for M.2 drives, refer to “M.2 drive backplane” on page 244.

To connect signal cables for a SAS/SATA backplane for standard 4 x 3.5-inch front drives, refer to the following cable routing scenarios depending on your server configuration:

- “Cable routing for onboard configuration” on page 287
- “Cable routing with an SFF HBA/RAID adapter” on page 289

Cable routing for onboard configuration

The following table shows the mapping relationship between backplane connectors and processor board connectors for onboard configuration.

The following figure illustrates the cable routing for the onboard configuration of 4 x 3.5-inch front SAS/SATA drive bays. Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n.

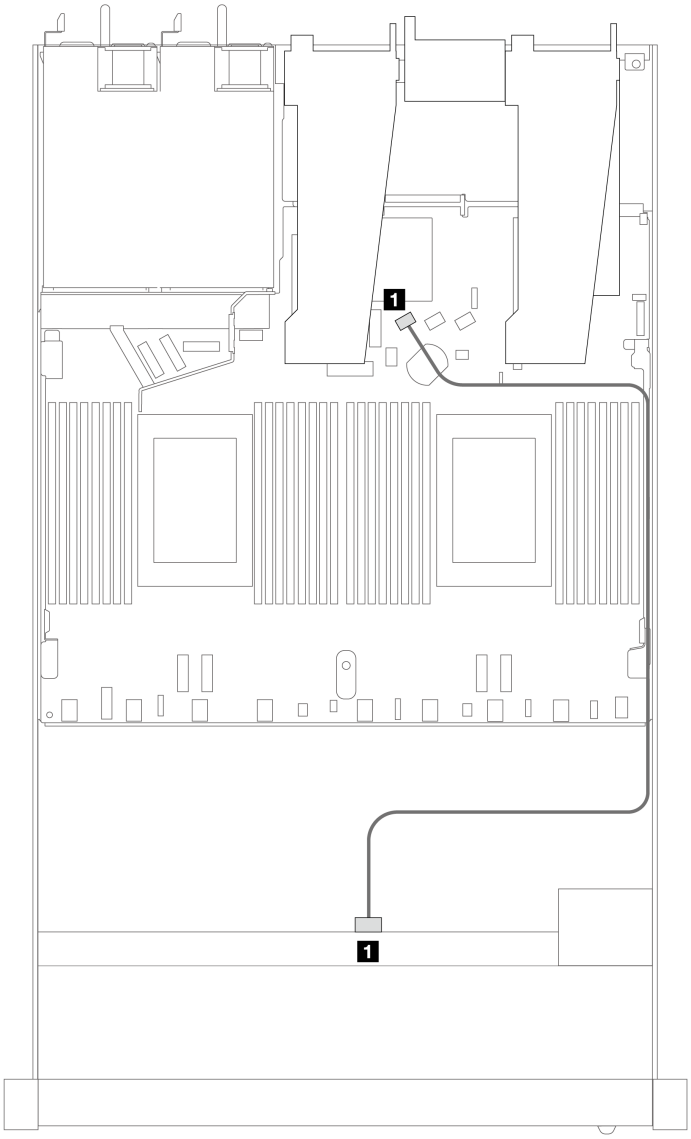


Figure 287. Cable routing for onboard configuration of 4 x 3.5-inch front SAS/SATA drive bays

Table 43. Mapping between one front SAS/SATA backplane and processor board for onboard configuration

Backplane	From	To
1 Front BP (SAS)	SAS	SATA 0

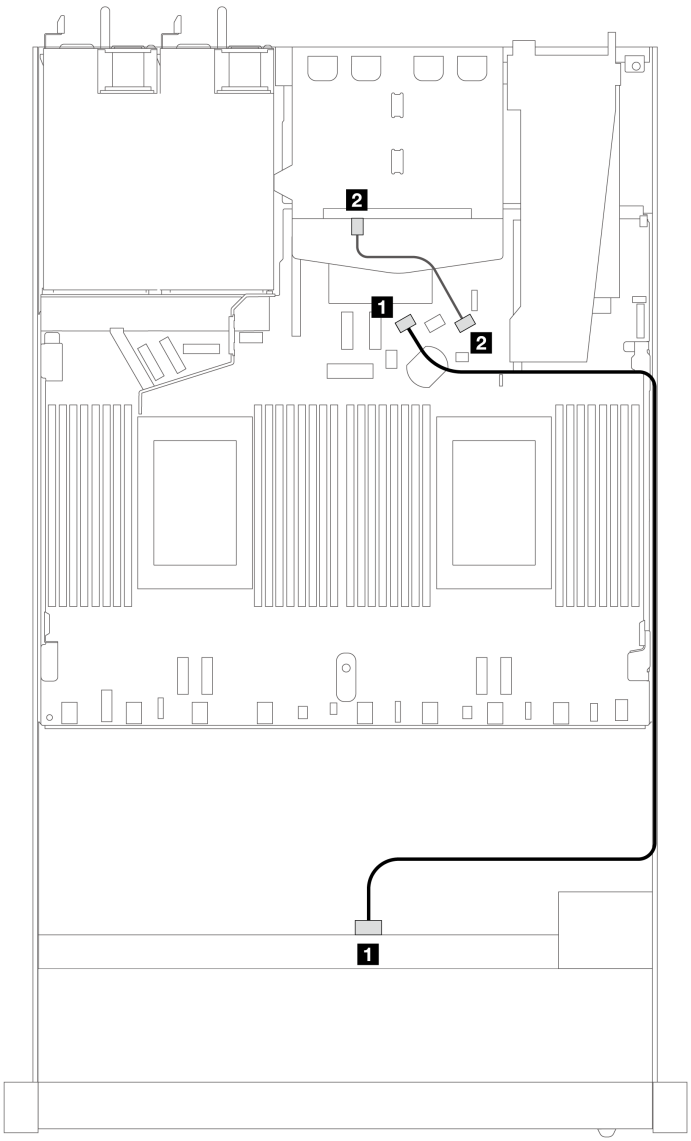


Figure 288. Cable routing for onboard configuration of 4 x 3.5-inch front SAS/SATA drive bays with 2 x 2.5 rear SAS/SATA drives

Table 44. Mapping between one front SAS/SATA backplane with one rear SAS/SATA backplane and processor board for onboard configuration

Backplane	From	To
1 Front BP (SAS)	SAS (front)	SATA 0
2 Rear BP (SAS)	SAS (rear)	SATA 2

Cable routing with an SFF HBA/RAID adapter

The following table shows the mapping relationship between backplane connectors and processor board/adapter connectors when an 8i SFF HBA/RAID adapter (Gen 3 or Gen 4) is installed.

The following figure illustrates the cable routing for the configuration of 4 x 3.5-inch front SAS/SATA drive bays with an 8i SFF RAID adapter. Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n.

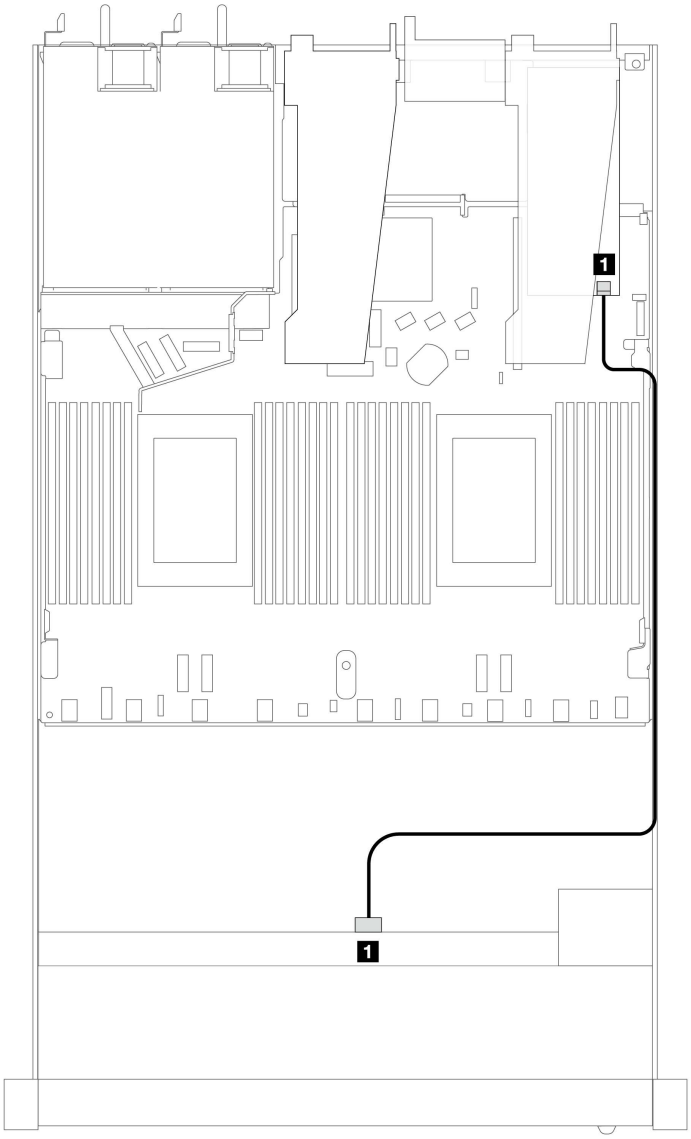


Figure 289. Cable routing for 4 x 3.5-inch front SAS/SATA drive bays with an 8i SFF RAID adapter

Table 45. Mapping between backplane connectors and processor board/adapter connectors when an SFF HBA/RAID adapter is installed

Backplane	From	To
1 Front BP (SAS)	SAS	C0

Notes:

- Gen 3 and Gen 4 SFF HBA/RAID adapters are slightly different in their connectors, but the cable routing method is similar.
- To connect cables for RAID flash power module, refer to “RAID flash power modules” on page 240.

The following table shows the mapping relationship between backplane connectors and processor board/adapter connectors when an 8i SFF HBA/RAID adapter (Gen 3) is installed.

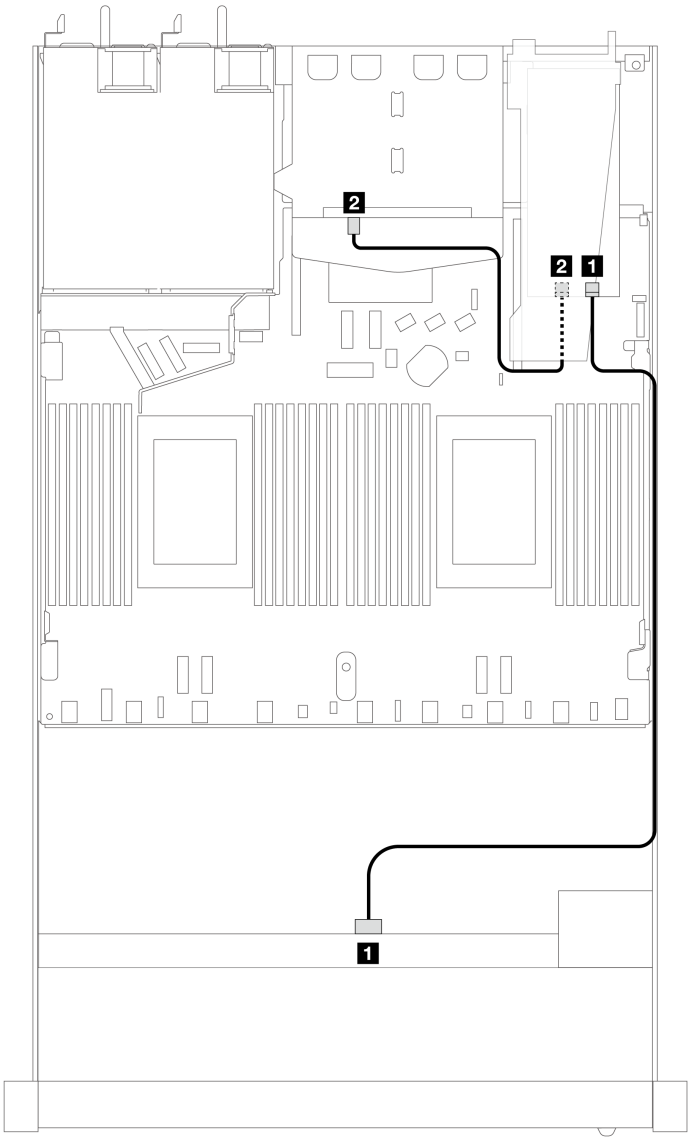


Figure 290. Cable routing for 4 x 3.5-inch front SAS/SATA drive bays with an 8i SFF RAID adapter (Gen 3) and rear 2 x 2.5–inch SAS/SATA drives

Table 46. Mapping between backplane connectors and processor board/adapter connectors when an SFF HBA/RAID adapter is installed

Backplane	From	To
1 Front BP (SAS)	SAS	C0
2 Rear BP (SAS)	SAS (rear)	C1

The following table shows the mapping relationship between backplane connectors and processor board/adapter connectors when an 8i SFF HBA/RAID adapter (Gen 4) is installed.

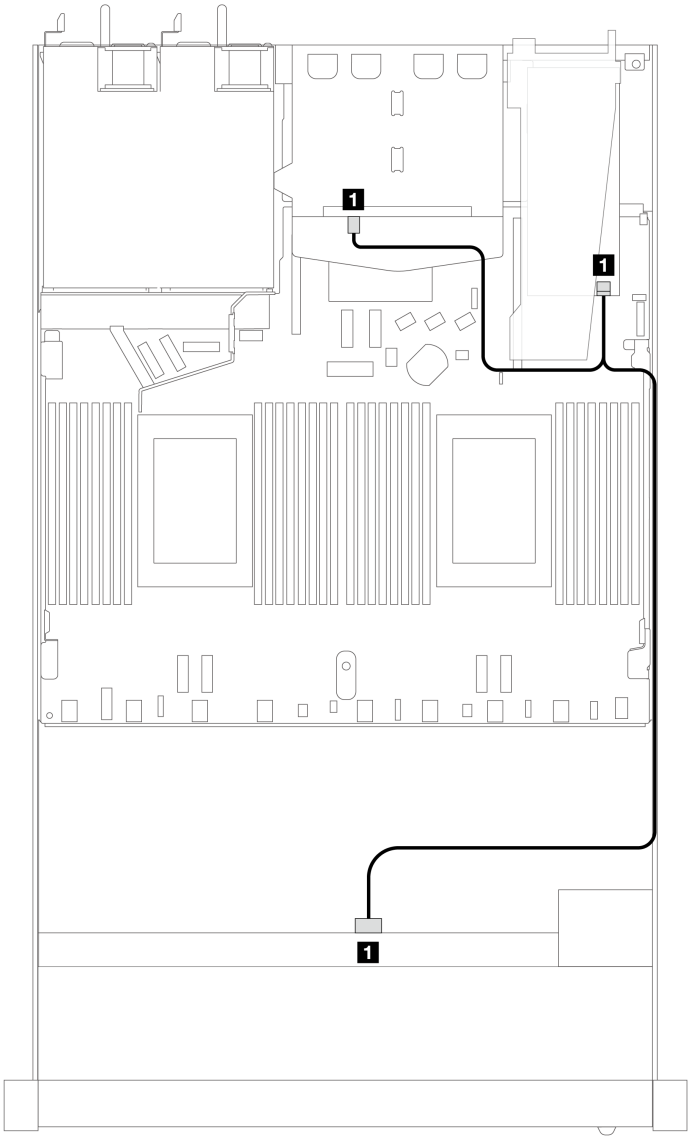


Figure 291. Cable routing for 4 x 3.5-inch front SAS/SATA drive bays with an 8i SFF RAID adapter (Gen 4) and rear 2 x 2.5–inch SAS/SATA drives

Table 47. Mapping between backplane connectors and processor board/adapter connectors when an SFF HBA/RAID adapter is installed

Backplane	From	To
1 Front and Rear BP (SAS)	SAS	C0

4 x 3.5'' AnyBay backplane (one processor)

Use this section to understand the AnyBay backplane cable routing for server model with four 3.5-inch front drives.

To connect cables for a 7mm drive backplane, refer to “7mm drive backplane” on page 247.

To connect power cables for a backplane for standard 2.5-inch or 3.5-inch drives, refer to “Cable routing for backplane power” on page 251.

To connect cables for M.2 drives, refer to “M.2 drive backplane” on page 244.

To connect signal cables for a backplane for standard 4 x 3.5-inch front drives, refer to the following cable routing scenarios depending on your server configuration:

- “Cable routing for onboard configuration” on page 294
- “Cable routing with an SFF HBA/RAID adapter” on page 295

Cable routing for onboard configuration

The following table shows the mapping relationship between backplane connectors and processor board connectors for onboard configuration.

Table 48. Mapping between one front AnyBay backplane and processor board for onboard configuration

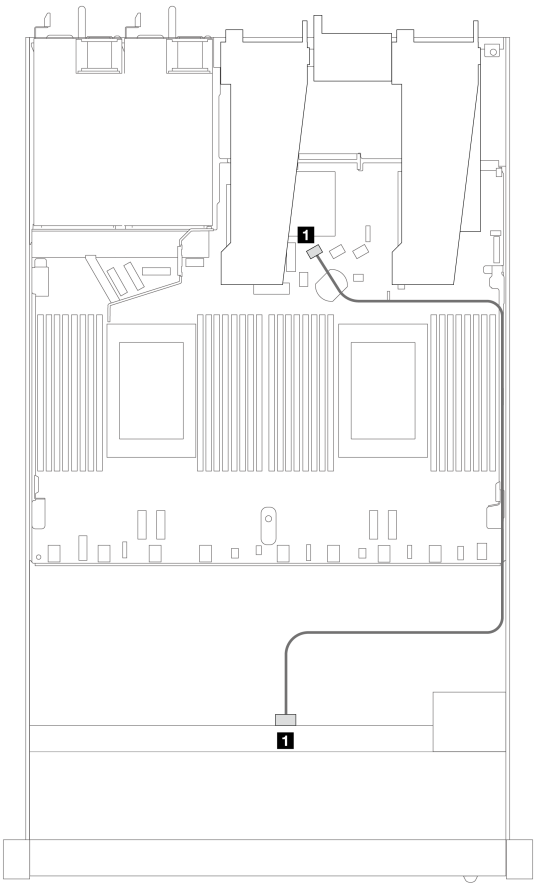
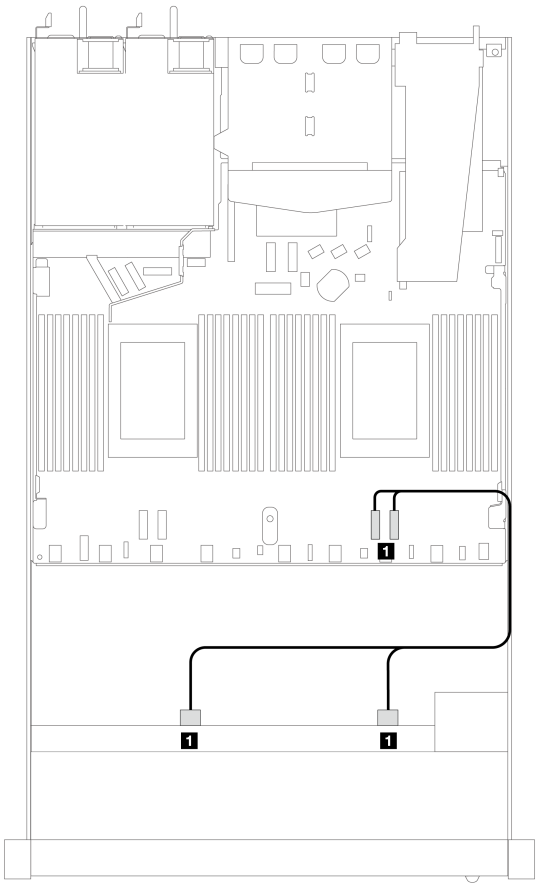
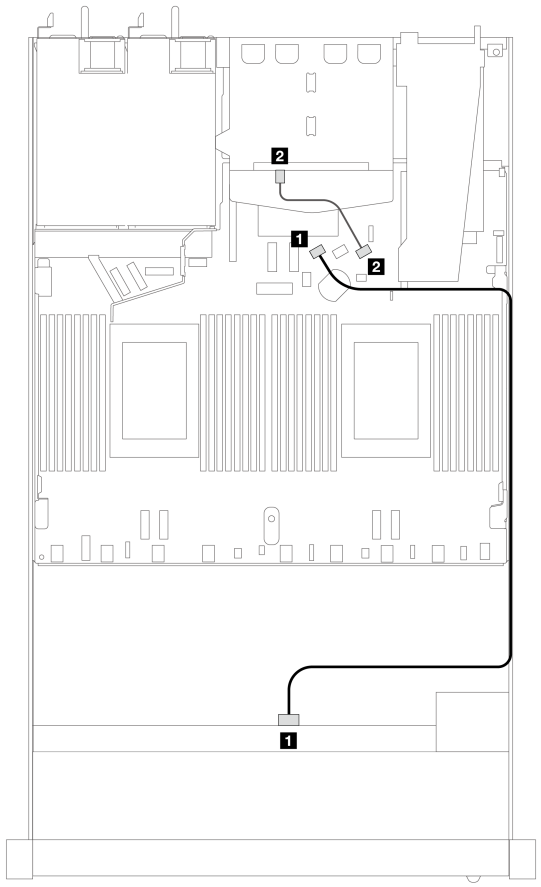
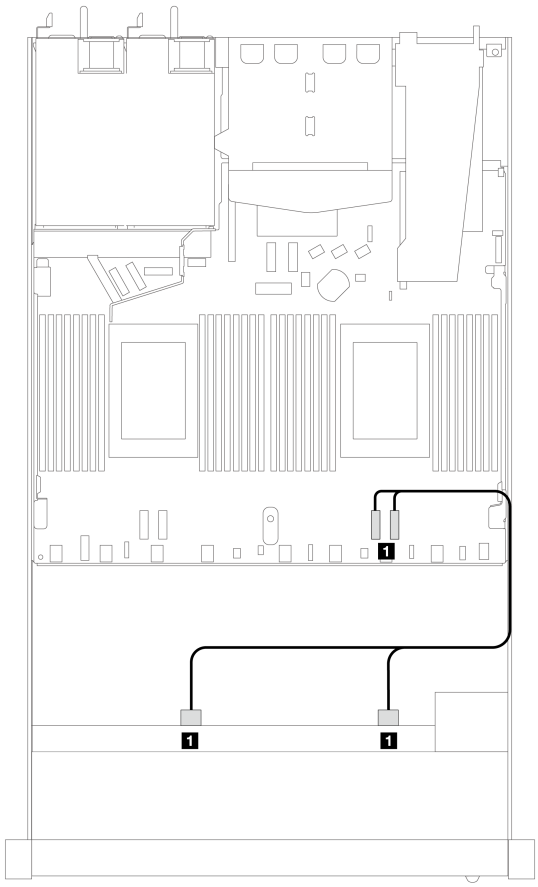
<table>
<tr><td>  </td><td>  </td></tr>
<tr><td colspan="3">SAS/SATA cable routing</td><td colspan="3">NVMe cable routing</td></tr>
<tr><td>SAS/SATA connector</td><td>From</td><td>To</td><td>NVMe connector</td><td>From</td><td>To</td></tr>
<tr><td>1 SAS</td><td>Front BP</td><td>SATA 0</td><td>1 2-3, 0–1</td><td>Front BP</td><td>PCIe 1, PCIe 2</td></tr>
</table>

Table 49. Cable routing for onboard configuration of 4 x 3.5-inch front AnyBay drive bays with 2 x 2.5 rear SAS/SATA drives



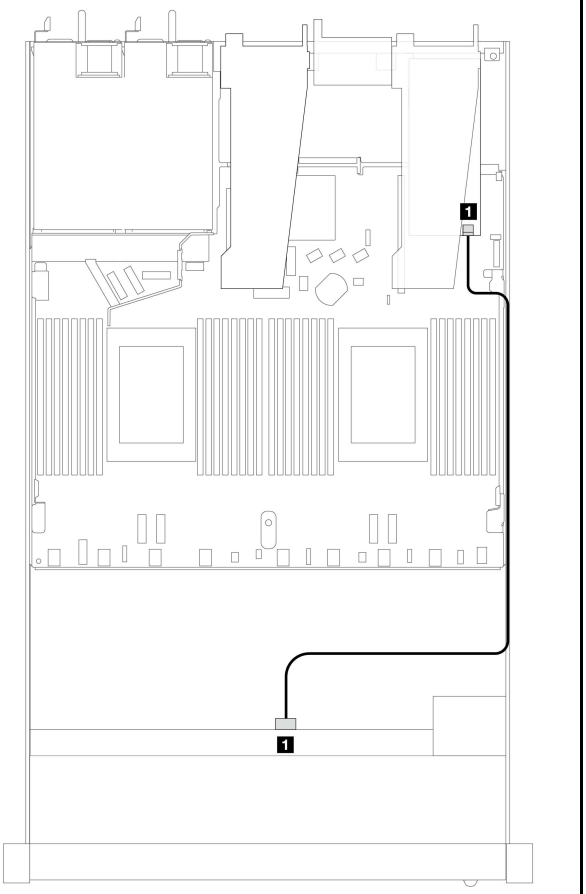


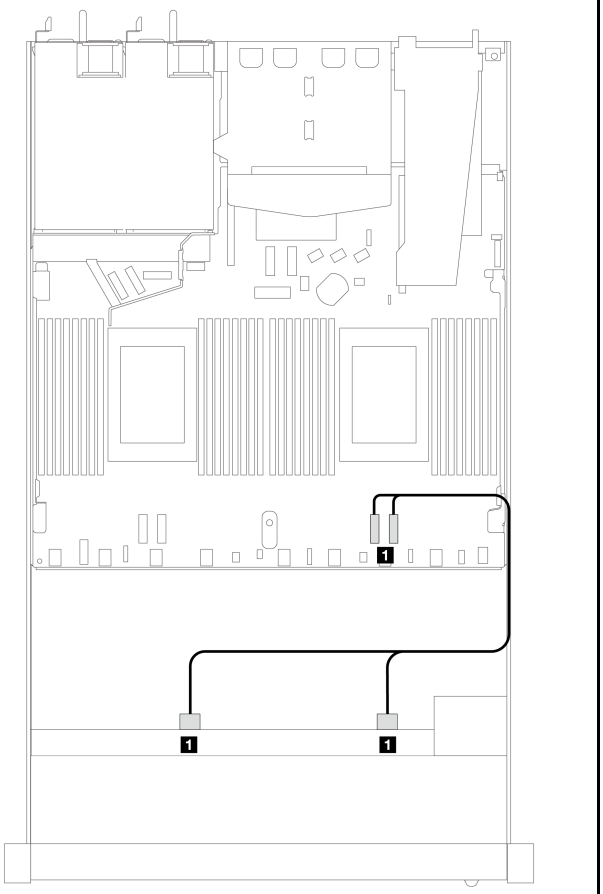
SAS/SATA cable routing			NVMe cable routing		
1 SAS	Front BP	SATA 0	NVMe connector	From	To
2 SAS	Rear BP	SATA 2	1 2-3, 0–1	Front BP	PCIe 1, PCIe 2

Cable routing with an SFF HBA/RAID adapter

The following table shows the mapping relationship between backplane connectors and processor board/adapter connectors when an 8i SFF HBA/RAID adapter (Gen 3 or Gen 4) is installed.

Table 50. Mapping between backplane connectors and processor board/adapter connectors when an SFF HBA/RAID adapter is installed

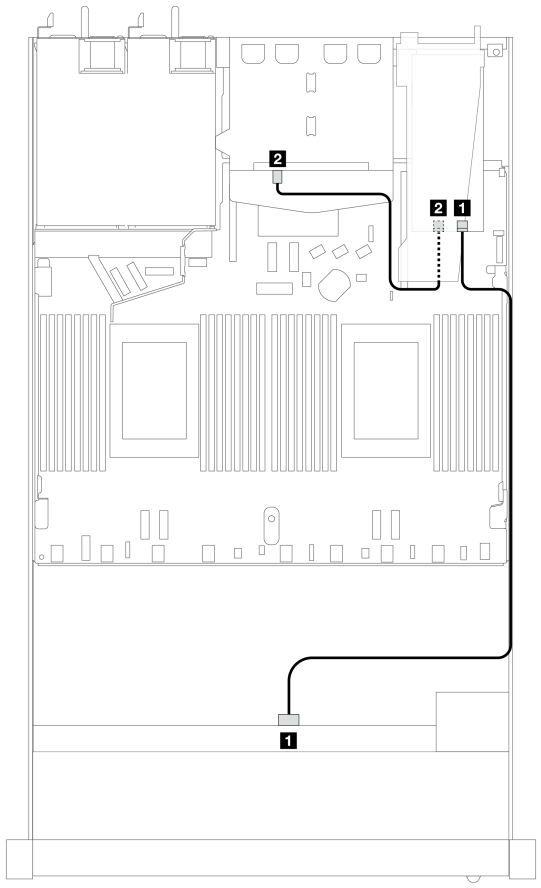


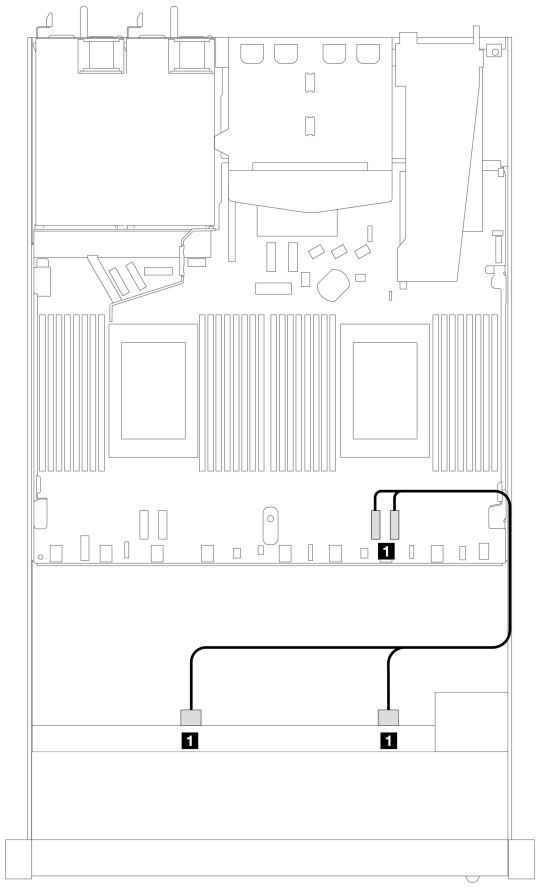


SAS/SATA cable routing			NVMe cable routing		
SAS/SATA connector	From	To	NVMe connector	From	To
1 SAS	Front BP	C0	1 2-3, 0–1	Front BP	PCIe 1, PCIe 2

Note: Gen 3 and Gen 4 SFF HBA/RAID adapters are slightly different in their connectors, but the cable routing method is similar.

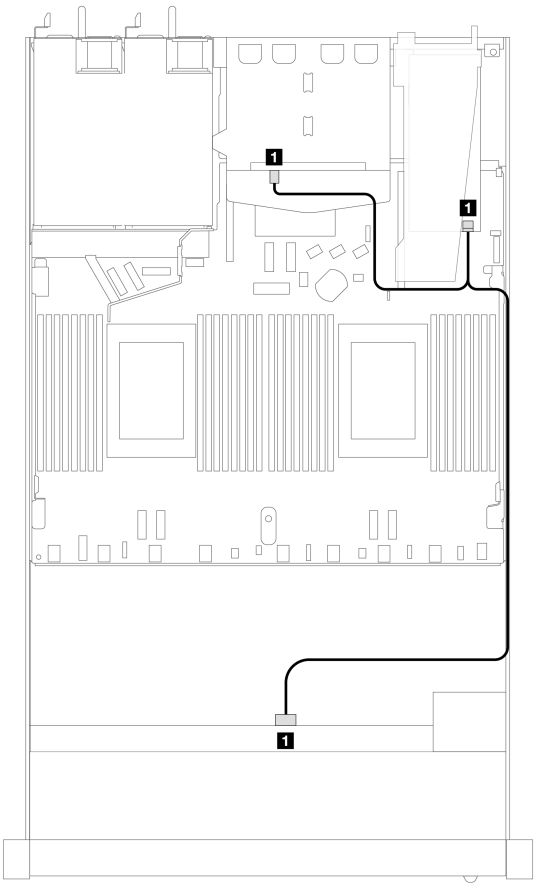
Table 51. Mapping between backplane connectors and processor board/adapter connectors when an 8i SFF RAID adapter (Gen 3) and rear 2 x 2.5–inch SAS/SATA drives are installed

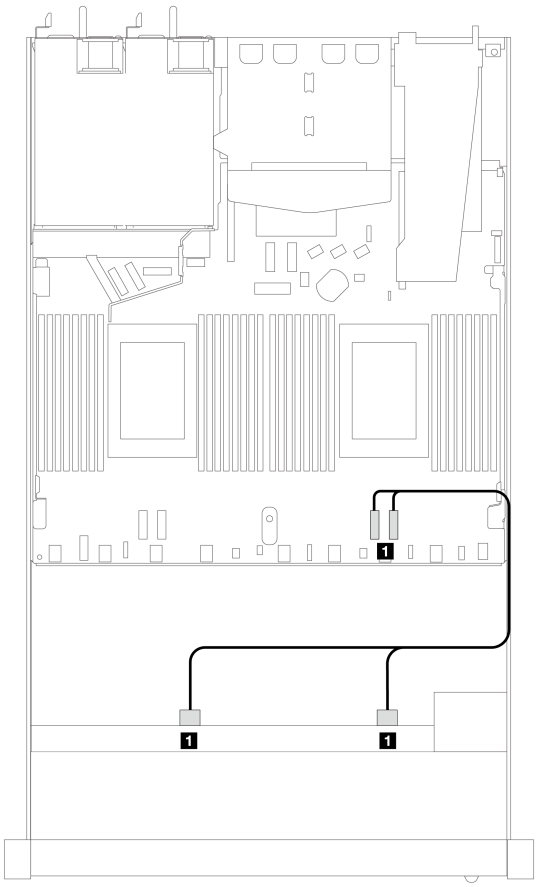




Connector	From	To	NVMe cable routing		
1 SAS	Front BP	C0	NVMe connector	From	To
2 SAS	Rear BP	C1	1 2-3, 0–1	Front BP	PCIe 1, PCIe 2

Table 52. Mapping between backplane connectors and processor board/adapter connectors when an 8i SFF RAID adapter (Gen 4) and rear 2 x 2.5–inch SAS/SATA drives are installed





SAS/SATA cable routing			NVMe cable routing		
SAS/SATA connector	From	To	NVMe connector	From	To
1 SAS	Front and rear BP	C0	1 2-3, 0–1	Front BP	PCIe 1, PCIe 2

4 x 2.5'' front drives (one processor)

Use the section to understand the cable routing for signal cable connections for 4 x 2.5'' front drive backplanes when one processor installed.

4 x 2.5'' SAS/SATA backplane (one processor)

Use this section to understand the SAS/SATA backplane cable routing for server model with four 2.5-inch front drives.

To connect cables for a 7mm drive backplane, refer to “7mm drive backplane” on page 247.

To connect power cables for a backplane for standard 2.5-inch or 3.5-inch drives, refer to “Cable routing for backplane power” on page 251.

To connect signal cables for a backplane for standard 4 x 2.5-inch front drives, refer to the following cable routing scenarios depending on your server configuration:

- “Cable routing for onboard configuration” on page 300
- “Cable routing with an SFF HBA/RAID adapter” on page 301
- “Cable routing for 4 x 2.5-inch front SAS/SATA drive bays with an 8i CFF RAID adapter (Gen 3) installed” on page 302

Cable routing for onboard configuration

The following table shows the mapping relationship between backplane connectors and processor board connectors for onboard configuration.

The following figure illustrates the cable routing for the onboard configuration of 4 x 2.5-inch front AnyBay drive bays. Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

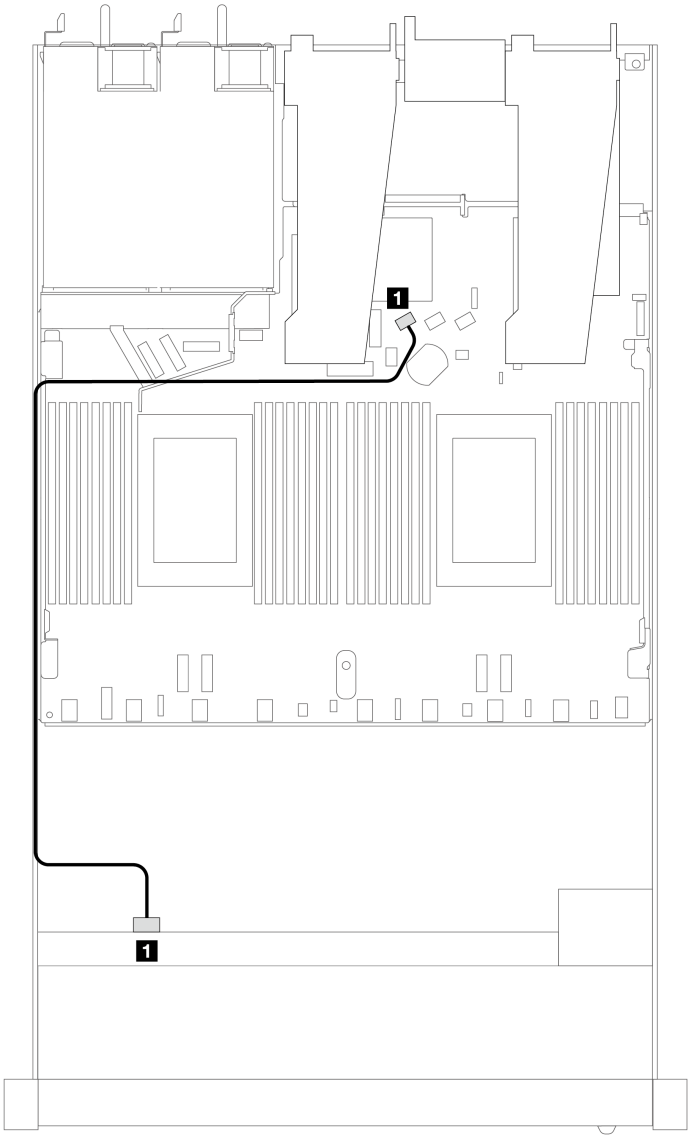


Figure 292. Cable routing for onboard configuration of 4 x 2.5-inch front AnyBay drive bays

Table 53. Mapping between backplane connectors and processor board connectors for onboard configuration

Backplanes	From	To
Front BP (SAS)	SAS	SATA 0

Cable routing with an SFF HBA/RAID adapter

The following table shows the mapping relationship between backplane connectors and processor board/adapter connectors when an 8i SFF HBA/RAID adapter (Gen 3 or Gen 4) is installed.

The following figure illustrates the cable routing for the configuration of 4 x 2.5-inch front AnyBay drive bays with an 8i SFF RAID adapter. Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

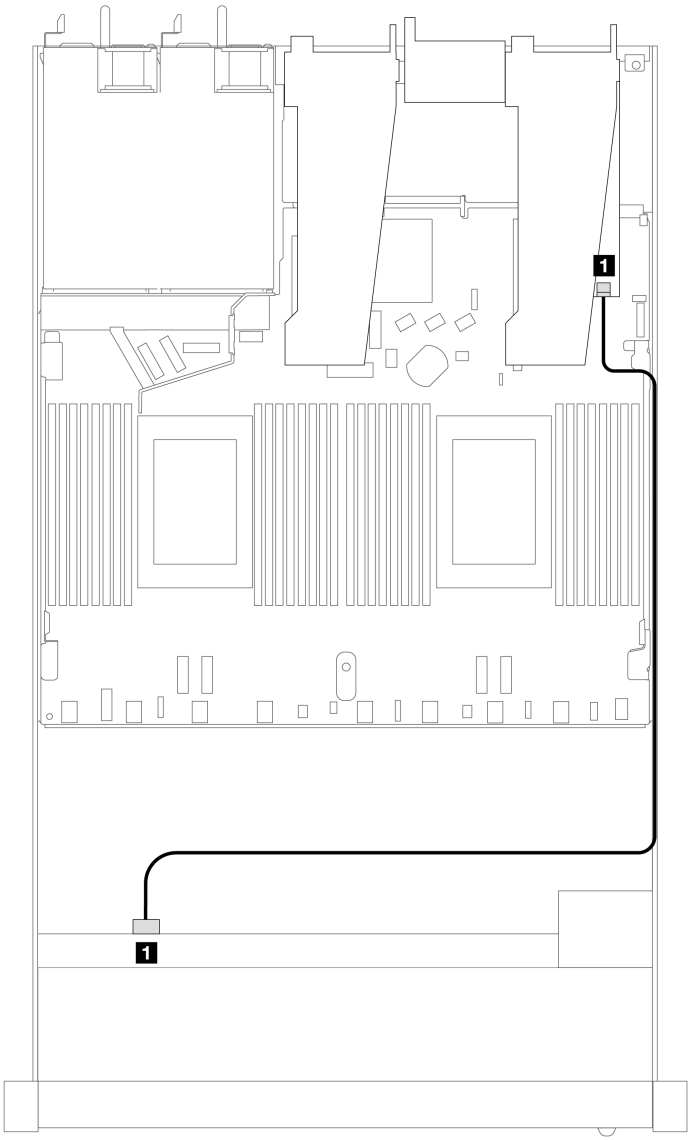


Figure 293. Cable routing for 4 x 2.5-inch front AnyBay drive bays with an 8i SFF RAID adapter

Table 54. Mapping between backplane connectors and processor board/adapter connectors when an SFF HBA/RAID adapter is installed

Backplanes	From	To
Front BP (SAS)	SAS	C0

Notes:

- Gen 3 and Gen 4 SFF HBA/RAID adapters are slightly different in their connectors, but the cable routing method is similar.
- To connect cables for RAID flash power module, refer to “RAID flash power modules” on page 240.

Cable routing for 4 x 2.5-inch front SAS/SATA drive bays with an 8i CFF RAID adapter (Gen 3) installed

The following table shows the mapping relationship between backplane connectors and processor board/ adapter connectors when an 8i CFF RAID adapter (Gen 3) is installed.

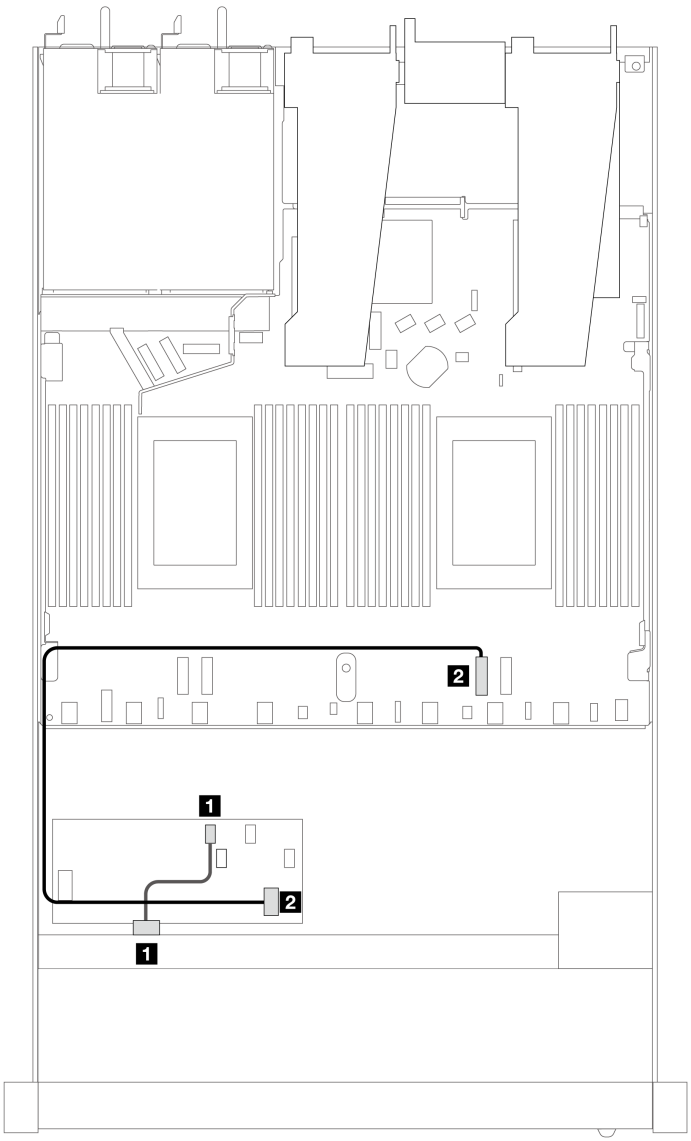


Figure 294. Cable routing for 4 x 2.5-inch front SAS/SATA drive bays with an 8i CFF RAID adapter installed

Table 55. Mapping between backplane connectors and processor board/adapter connectors when a CFF RAID adapter is installed

Backplanes	From	To
Front BP (SAS)	SAS	C0
CFF RAID adapter	MB input	PCIe 2

4 x 2.5'' NVMe backplane (one processor)

Use this section to understand the NVMe backplane cable routing for server model with four 2.5-inch front drives.

To connect cables for a 7mm drive backplane, refer to “7mm drive backplane” on page 247.

To connect power cables for a backplane for standard 2.5-inch or 3.5-inch drives, refer to “Cable routing for backplane power” on page 251.

Cable routing for onboard configuration with one processor

The following table shows the mapping relationship between backplane connectors and processor board connectors for onboard configuration.

The following figure illustrates the cable routing for the onboard configuration of 4 x 2.5-inch front NVMe drive bays. Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

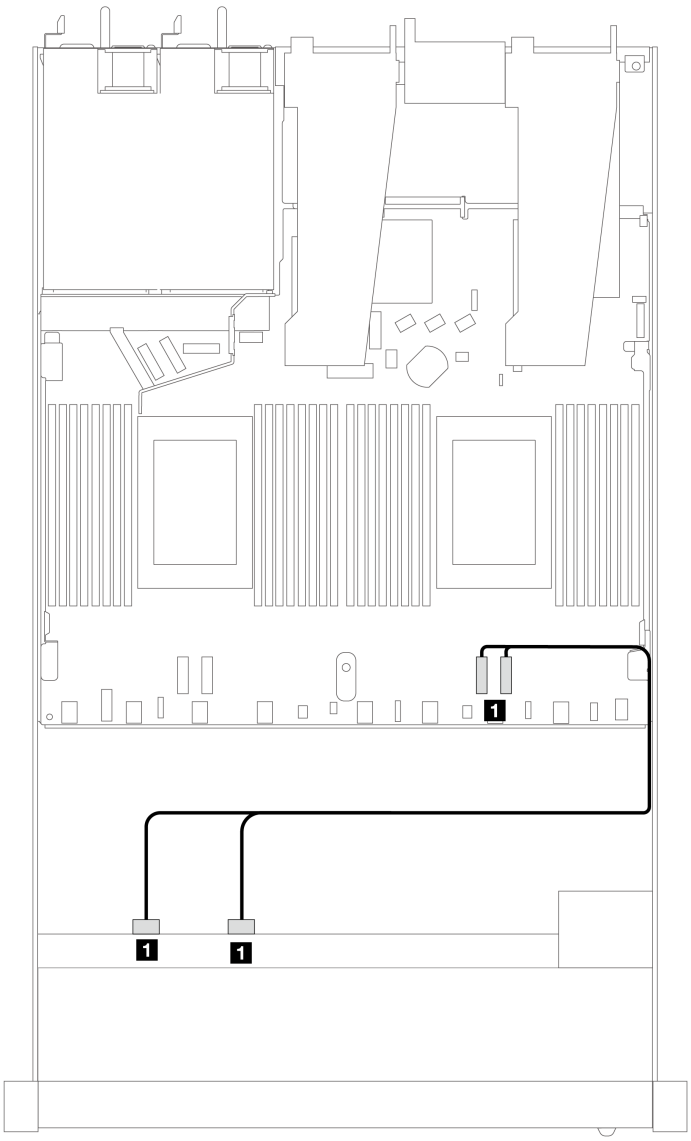


Figure 295. Cable routing for onboard configuration of 4 x 2.5-inch front NVMe drive bays with one processor

Table 56. Mapping between backplane connectors and processor board connectors for onboard configuration

Backplanes	From	To
Front BP (NVMe)	NVMe 2–3, NVMe 0–1	PCIe 1, PCIe 2

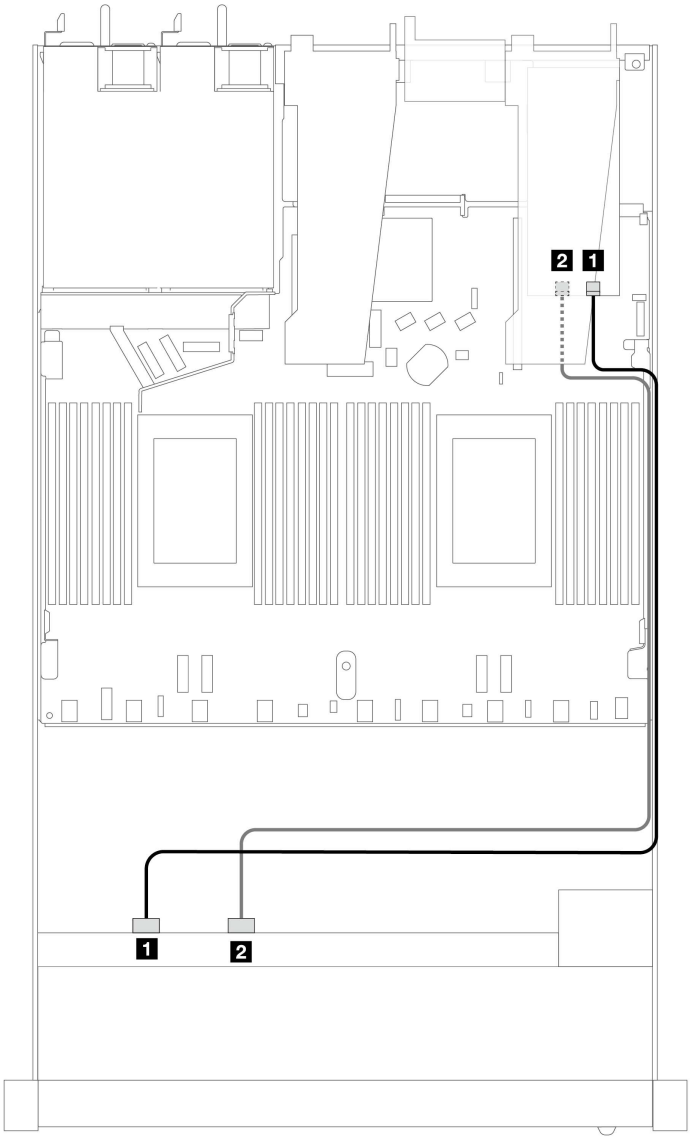


Figure 296. Cable routing of 4 x 2.5-inch front NVMe drive bays and a re-timer adapter (Gen 4) with one processor

Table 57. Mapping between a front backplane and a re-timer adapter connectors

Backplanes	From	To
Front BP (NVMe)	NVMe 0–1, NVMe 2–3	C0, C1

4 x 2.5'' U.3 front drives with 4 x 3.5'' AnyBay backplane (one processor)

Cable routing with an SFF HBA/RAID adapter

The following illustrations and tables show the mapping relationship between backplane connectors and an 8i SFF RAID adapter (Gen 4).

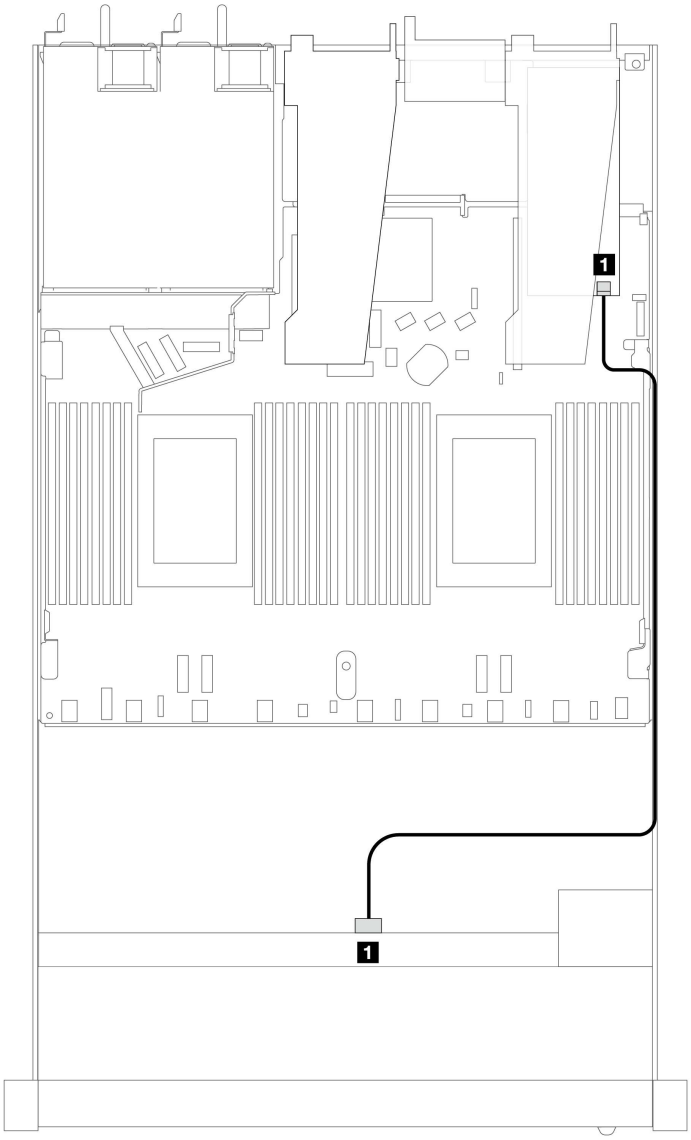


Figure 297. Cable routing for 4 x 2.5-inch front U.3 drives with an 8i SFF RAID adapter (Gen 4)

Table 58. Mapping between one front AnyBay backplane and an SFF HBA/RAID adapter

Backplane	From	To
Front BP (SAS)	SAS	C0

8 x 2.5'' front drives (one processor)

Use the section to understand the cable routing for signal cable connections for 8 x 2.5'' front drive backplanes when one processor installed.

8 x 2.5'' SAS/SATA backplane (one processor)

Use this section to understand the SAS/SATA backplane cable routing for server model with eight 2.5-inch front drives.

To connect cables for a 7mm drive backplane, refer to “7mm drive backplane” on page 247.

To connect power cables for a backplane for standard 2.5-inch or 3.5-inch drives, refer to “Cable routing for backplane power” on page 251.

To connect cables for M.2 drives, refer to “M.2 drive backplane” on page 244.

To connect signal cables for a backplane for standard 4 x 3.5-inch front drives, refer to the following cable routing scenarios depending on your server configuration:

- “Cable routing for onboard configuration” on page 307
- “Cable routing with an SFF HBA/RAID adapter” on page 309
- “Cable routing with a CFF RAID adapter” on page 313

Cable routing for onboard configuration

The following illustrations and tables show the mapping relationship between backplane connectors and processor board connectors for onboard configuration.

The following figure illustrates the cable routing for the onboard configuration of 8 x 2.5-inch front SAS/SATA drive bays. Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n.

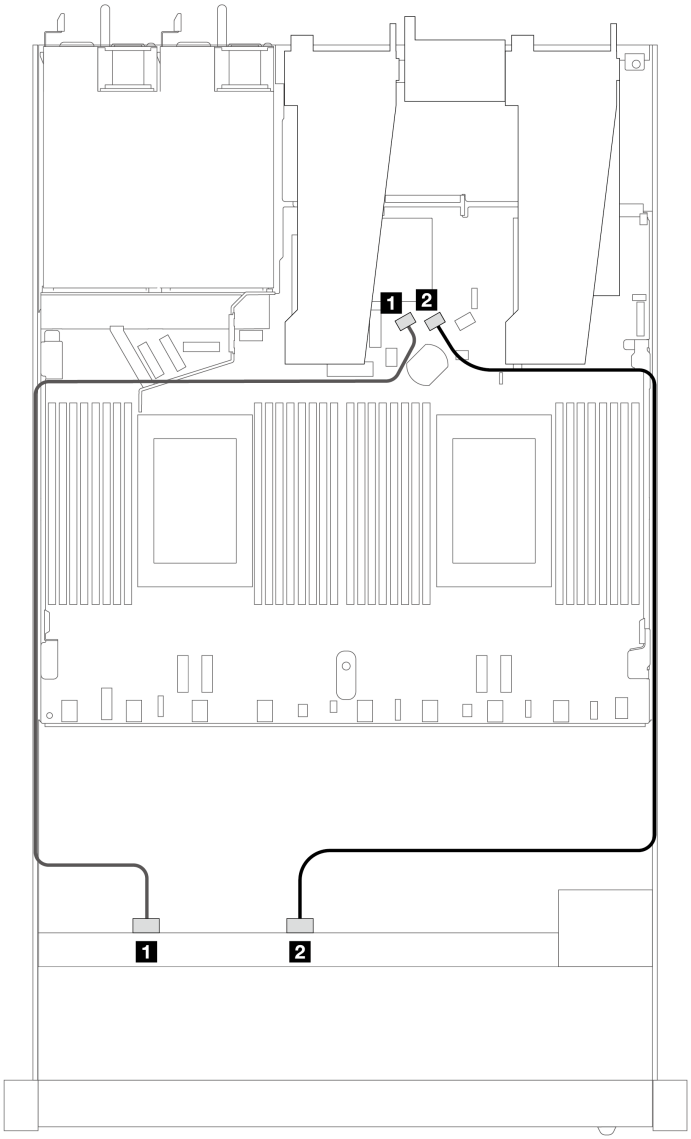


Figure 298. Cable routing for onboard configuration of 8 x 2.5 SAS/SATA front drives

Table 59. Mapping between one front SAS/SATA backplane and processor board for onboard configuration

Backplane	From	To
Front BP (SAS)	1 SAS 0	1 SATA 0
	2 SAS 1	2 SATA 1

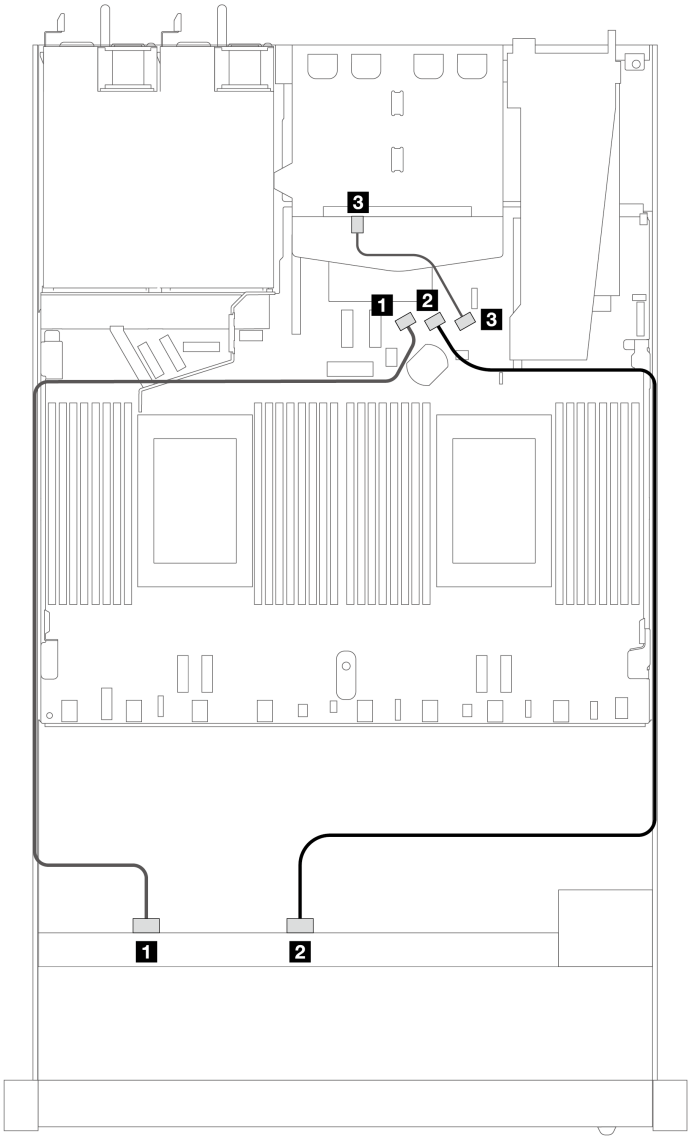


Figure 299. Cable routing for onboard configuration of 8 x 2.5 SAS/SATA front drives with 2 x 2.5 rear SAS/SATA drives installed

Table 60. Mapping between one front and one rear SAS/SATA backplanes and processor board for onboard configuration

Backplane	From	To
Front BP (SAS)	1 SAS 0	1 SATA 0
	2 SAS 1	2 SATA 1
Rear BP (SAS)	3 SAS	3 SATA 2

Cable routing with an SFF HBA/RAID adapter

The following illustrations and tables show the mapping relationship between backplane connectors and an 8i or 16i SFF HBA/RAID adapter (Gen 3 or Gen 4).

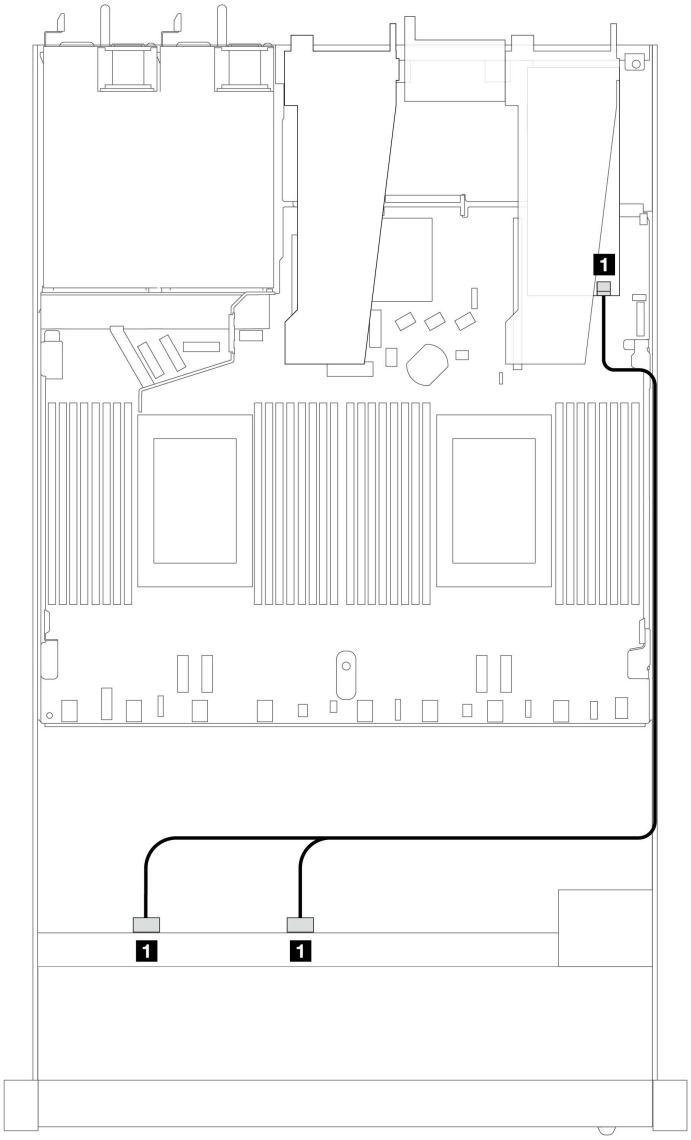


Figure 300. Cable routing for 8 x 2.5-inch front SAS/SATA drive bays with an 8i or 16i SFF RAID adapter (Gen 4)

Table 61. Mapping between one front SAS/SATA backplane and an SFF HBA/RAID adapter

Backplane	From	To
Front BP (SAS)	1 SAS 0, SAS 1	1 C0

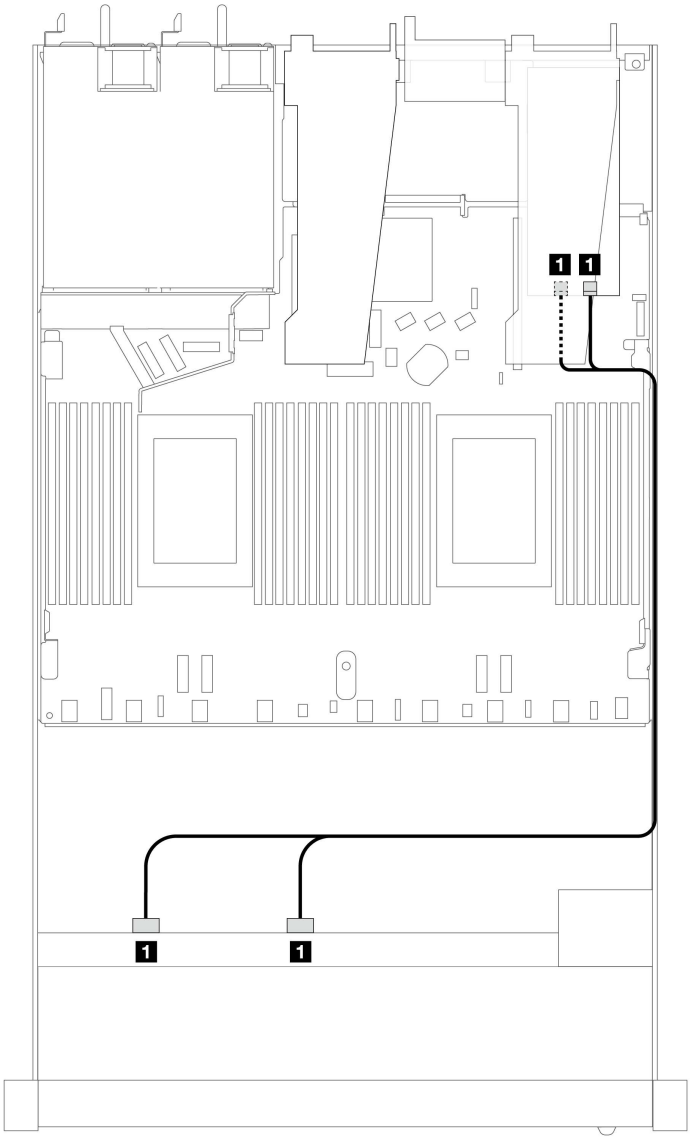


Figure 301. Cable routing for 8 x 2.5-inch front SAS/SATA drive bays with an 8i or 16i SFF RAID adapter (Gen 3)

Table 62. Mapping between one front SAS/SATA backplane and an SFF HBA/RAID adapter

Backplane	From	To
Front BP (SAS)	1 SAS 0, SAS 1	1 C0, C1

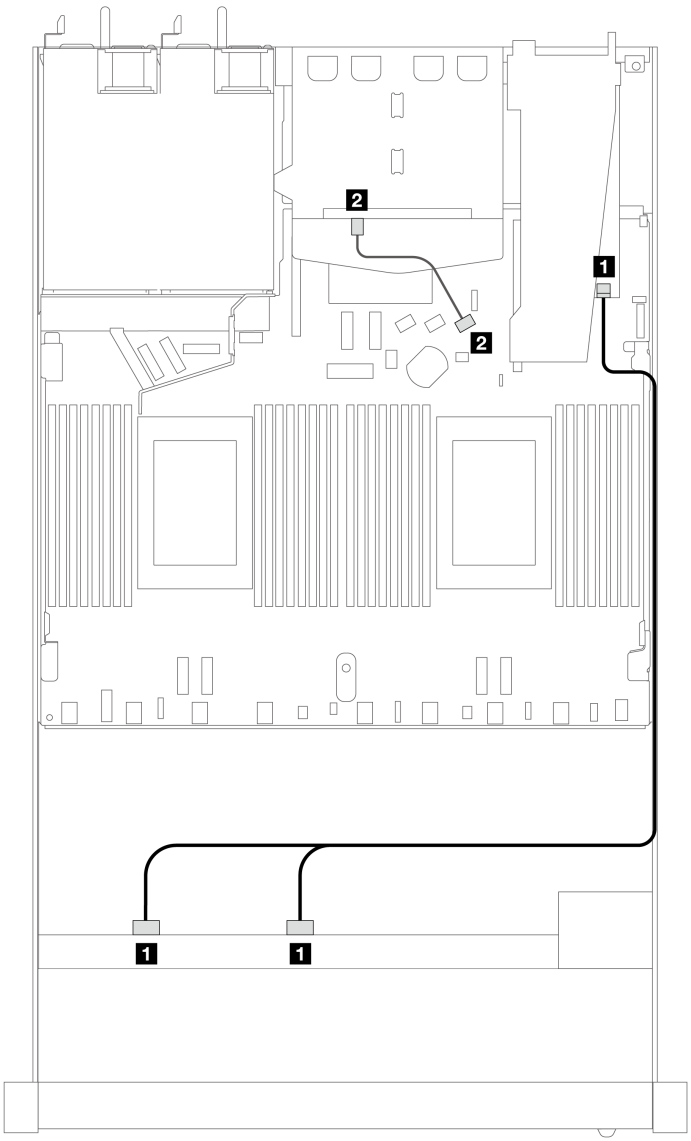


Figure 302. Cable routing for 8 x 2.5-inch front SAS/SATA drive bays with an 8i SFF RAID adapter (Gen 4) with 2 x 2.5 SAS/SATA rear drives installed

Table 63. Mapping between one front and one rear SAS/SATA backplanes and an SFF HBA/RAID adapter

Backplane	**From**	**To**
Front BP (SAS)	1 SAS 0, SAS 1	1 C0
Rear BP (SAS)	2 SAS	2 SATA 2

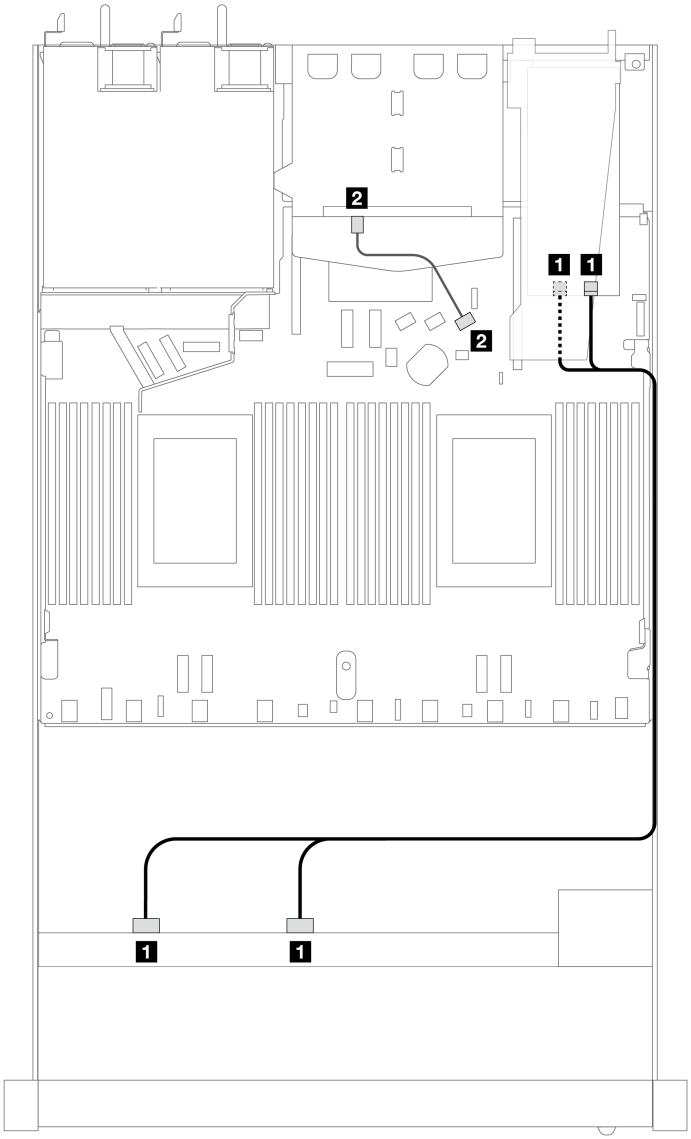


Figure 303. Cable routing for 8 x 2.5-inch front SAS/SATA drive bays with an 8i SFF RAID adapter (Gen 3) with 2 x 2.5 SAS/SATA rear drives installed

Table 64. Mapping between one front SAS/SATA backplane and an SFF HBA/RAID adapter

Backplane	From	To
Front BP (SAS)	1 SAS 0, SAS 1	1 C0, C1
Rear BP (SAS)	2 SAS	2 SATA 2

Cable routing with a CFF RAID adapter

The following illustration and table show the mapping relationship between backplane connectors and an 8i or 16i CFF RAID adapter (Gen 3).

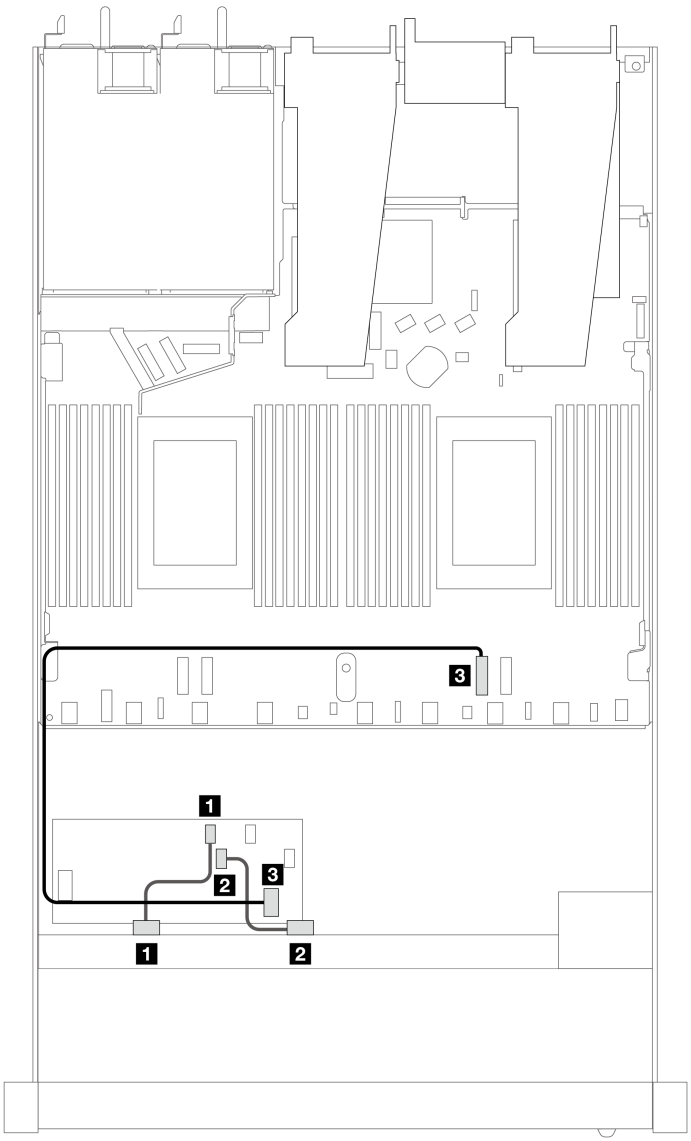


Figure 304. Cable routing for 8 x 2.5-inch front SAS/SATA drive bays with an 8i or 16i CFF RAID adapter (Gen 3)

Table 65. Mapping between one front SAS/SATA backplane and a CFF RAID adapter

Backplane/adapter	**From**	**To**
Front BP (SAS)	1 SAS 0	1 C0
	2 SAS 1	2 C1
CFF RAID adapter	3 MB input	3 PCIe 2

The following illustration and table show the mapping relationship between backplane connectors and an 8i CFF RAID adapter (Gen 3).

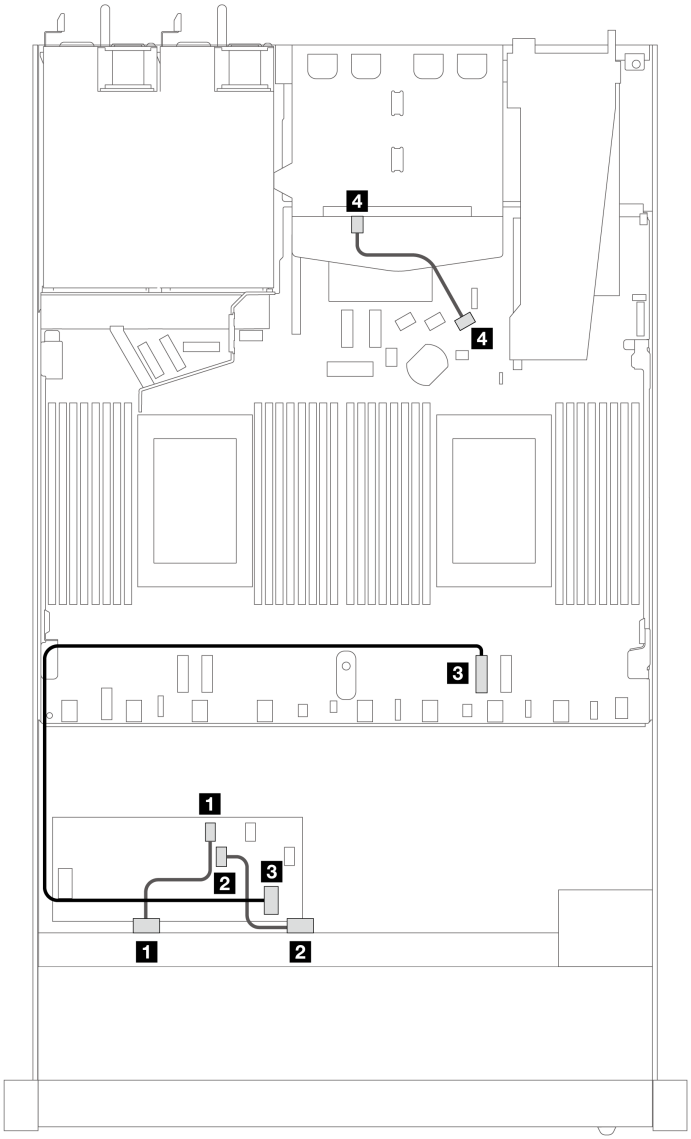


Figure 305. Cable routing for 8 x 2.5-inch front SAS/SATA drive bays with an 8i CFF RAID adapter (Gen 3) with 2 x 2.5 SAS/SATA drives installed

Table 66. Mapping between one front and one rear SAS/SATA backplane and a CFF RAID adapter

Backplane/adapter	**From**	**To**
Front BP (SAS)	1 SAS 0	1 C0
	2 SAS 1	2 C1
CFF RAID adapter	3 MB input	3 PCIe 2
Rear BP (SAS)	4 SAS (rear)	4 SATA 2

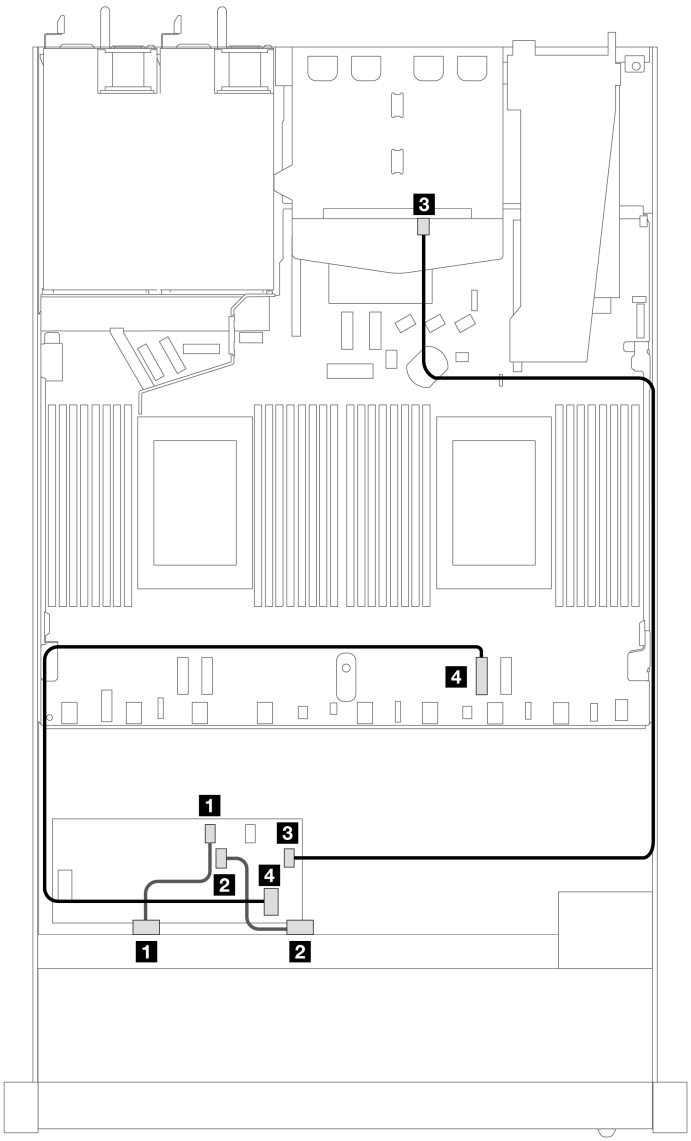


Figure 306. Cable routing for 8 x 2.5-inch front SAS/SATA drive bays with a 16i CFF RAID adapter (Gen 3 or Gen 4) with 2 x 2.5 SAS/SATA drives installed

Table 67. Mapping between one front and one rear SAS/SATA backplane and a CFF RAID adapter

Backplane/adapter	From	To
Front BP (SAS)	1 SAS 0	1 C0
	2 SAS 1	2 C1
CFF RAID adapter	3 C3	3 SAS (rear)
	4 MB input	4 PCIe 2

8 x 2.5'' U.3 drives with 10 x 2.5'' AnyBay backplane (one processor)

Use this section to understand the cable routing for eight U.3 drives with 10 x 2.5 Anybay backplane and one processor installed.

Cable routing with an SFF HBA/RAID adapter

The following illustrations and tables show the mapping relationship between backplane connectors and an 8i SFF RAID adapter (Gen 4).

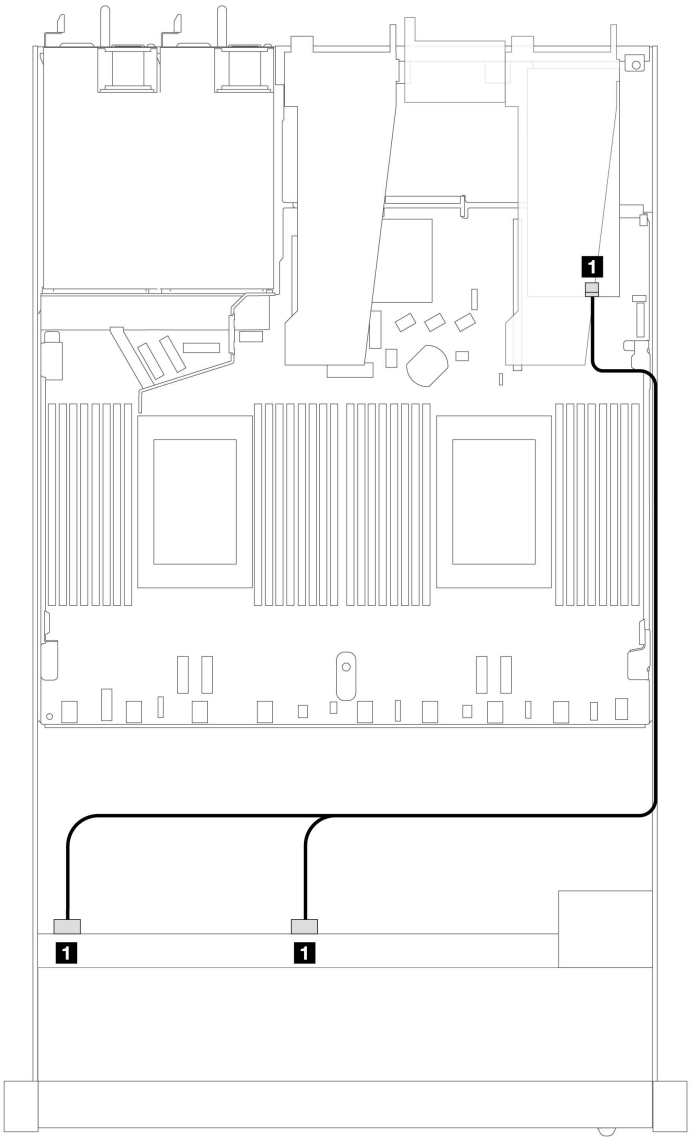


Figure 307. Cable routing for 8 x 2.5-inch front U.3 drives with an 8i SFF RAID adapter (Gen 4)

Table 68. Mapping between one front AnyBay backplane and an SFF HBA/RAID adapter

Backplane	From	To
Front BP (SAS)	SAS 0, SAS 1	C0

8 x 2.5'' AnyBay drives with 10 x 2.5'' AnyBay backplane (one processor)

Use this section to understand the cable routing for eight AnyBay drives with 10 x 2.5 Anybay backplane and one processor installed.

To connect cables for a 7mm drive backplane, refer to “7mm drive backplane” on page 247.

To connect power cables for a backplane for standard 2.5-inch or 3.5-inch drives, refer to “Cable routing for backplane power” on page 251.

The following illustration and table show the cabling among the front backplane, the processor board and a Gen 4 SFF re-timer adapter.

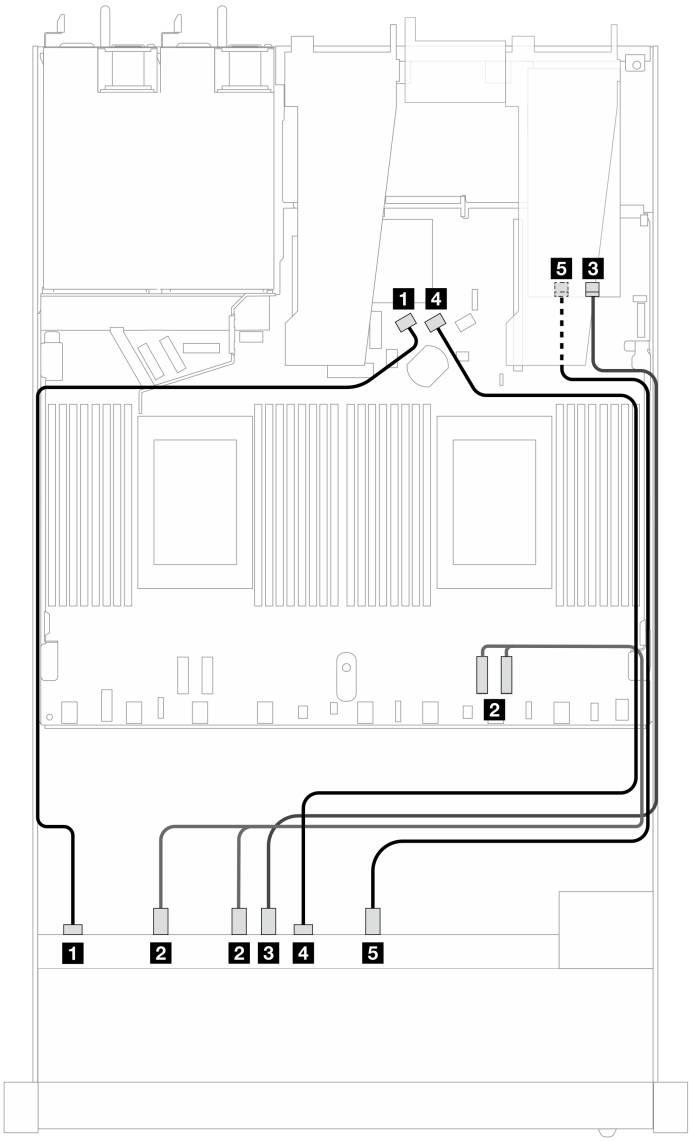


Figure 308. Cable routing of eight AnyBay front drives for both connections onboard and to a Gen 4 SFF re-timer adapter

Table 69. Mapping between one front AnyBay backplane, the processor board and a re-timer adapter

Backplane	From	To
Front BP (SAS)	1 SAS 0	1 SATA 0
Front BP (NVMe)	2 NVMe 0–1, 2–3	2 PCIe 2, PCIe 1

Table 69. Mapping between one front AnyBay backplane, the processor board and a re-timer adapter (continued)

Backplane	From	To
	3 NVMe 4–5	3 C0
Front BP (SAS)	4 SAS 1	4 SATA 1
Front BP (NVMe)	5 NVMe 6–7	5 C1

10 x 2.5'' front drives (one processor)

Use the section to understand the cable routing for signal cable connections for 10 x 2.5'' front drive backplanes when one processor installed.

6 x 2.5'' SAS/SATA + 4 x 2.5'' AnyBay (one processor)

See this section to understand the cable routing of 6 front SAS/SATA drives and 4 front AnyBay drives with 6 x 2.5'' SAS/SATA + 4 x 2.5'' AnyBay backplane installed.

To connect cables for a 7mm drive backplane, refer to “7mm drive backplane” on page 247.

To connect power cables for a backplane for standard 2.5-inch or 3.5-inch drives, refer to “Cable routing for backplane power” on page 251.

To connect cables for M.2 drives, refer to “M.2 drive backplane” on page 244.

To connect signal cables for a backplane for standard 6 front SAS/SATA drives and 4 front AnyBay drives, refer to the following cable routing scenarios depending on your server configuration:

- “Cable routing for onboard configuration” on page 319
- “Cable routing with an SFF HBA/RAID adapter” on page 321

Cable routing for onboard configuration

The following tables show the mapping relationship between backplane connectors and processor board connectors for onboard configuration.

The following figure illustrates the cable routing for the configuration of 6 front SAS/SATA drives and 4 front AnyBay drives bays. Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n.

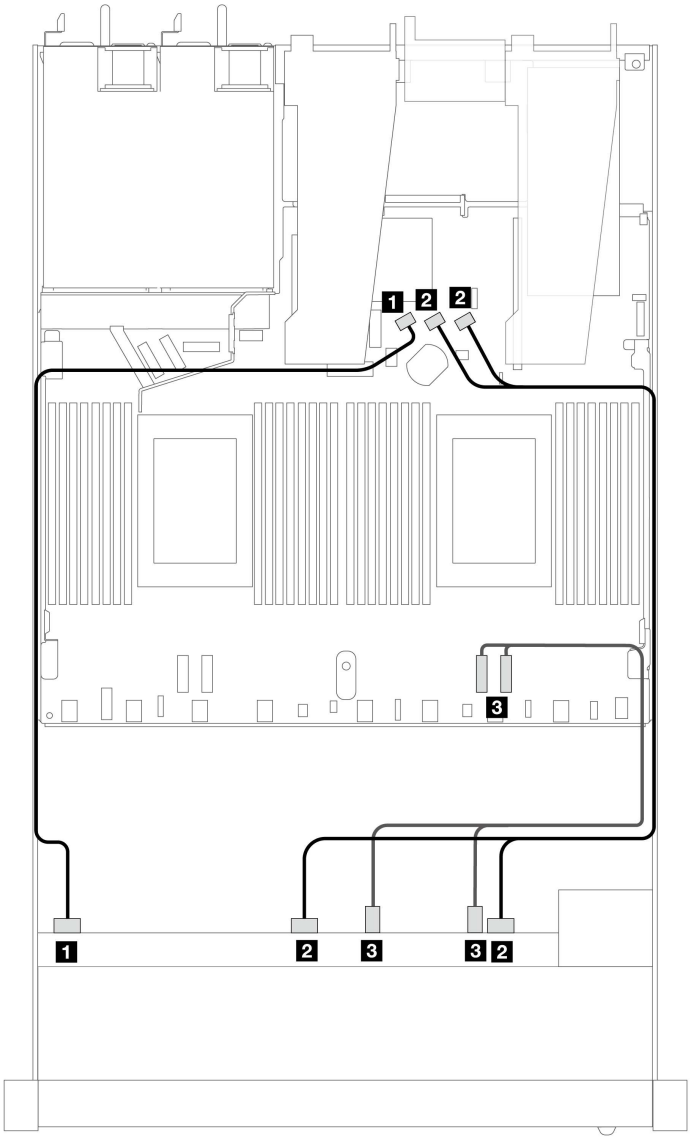


Figure 309. Cable routing for onboard configuration of 6 front SAS/SATA drives and 4 front AnyBay drives bays

Table 70. Mapping between one front AnyBay backplane and processor board for onboard configuration

Backplane	From	To
Front BP (SAS)	1 SAS 0	1 SATA 0
	2 SAS 1, SAS 2	2 SATA 1, SATA 2
Front BP (NVMe)	3 NVMe 2–3, 0–1	3 PCIe 1, 2

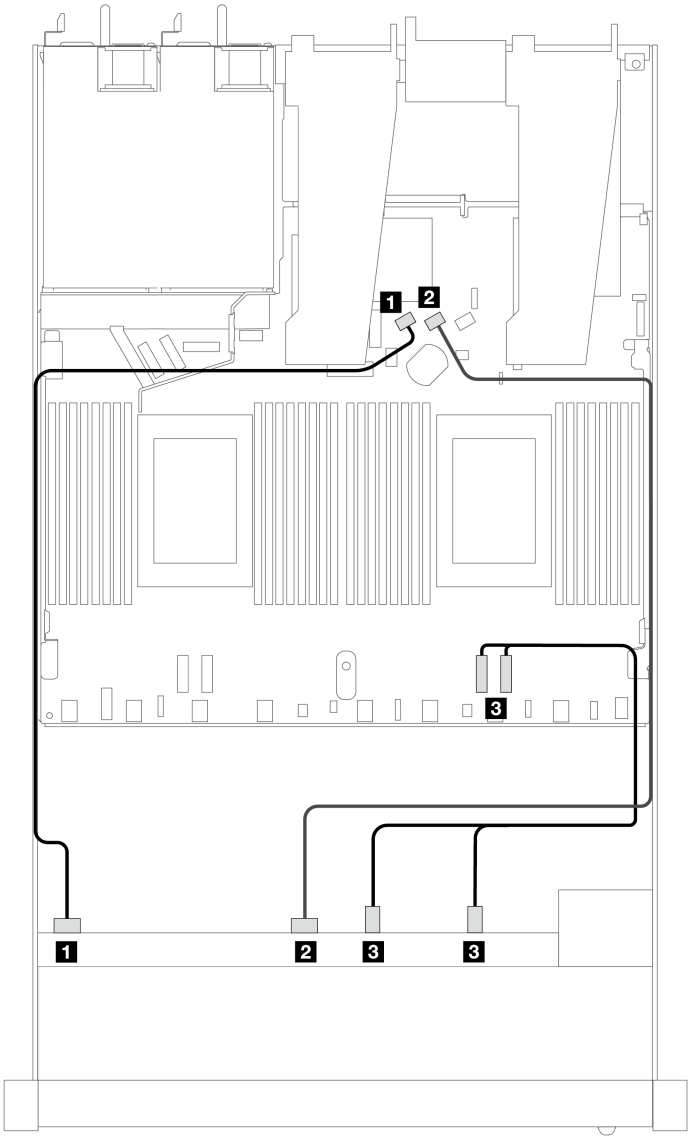


Figure 310. Cable routing for onboard configuration of 6 front SAS/SATA drives and 4 front NVMe drives bays

Table 71. Mapping between one front AnyBay backplane and processor board for onboard configuration

Backplane	From	To
Front BP (SAS)	1 SAS 0	1 SATA 0
	2 SAS 1	2 SATA 1
Front BP (NVMe)	3 NVMe 2–3, 0–1	3 PCIe 1, PCIe 2

Cable routing with an SFF HBA/RAID adapter

The following tables show the mapping relationship between backplane connectors and a 16i SFF HBA/RAID adapter (Gen 3 or Gen 4).

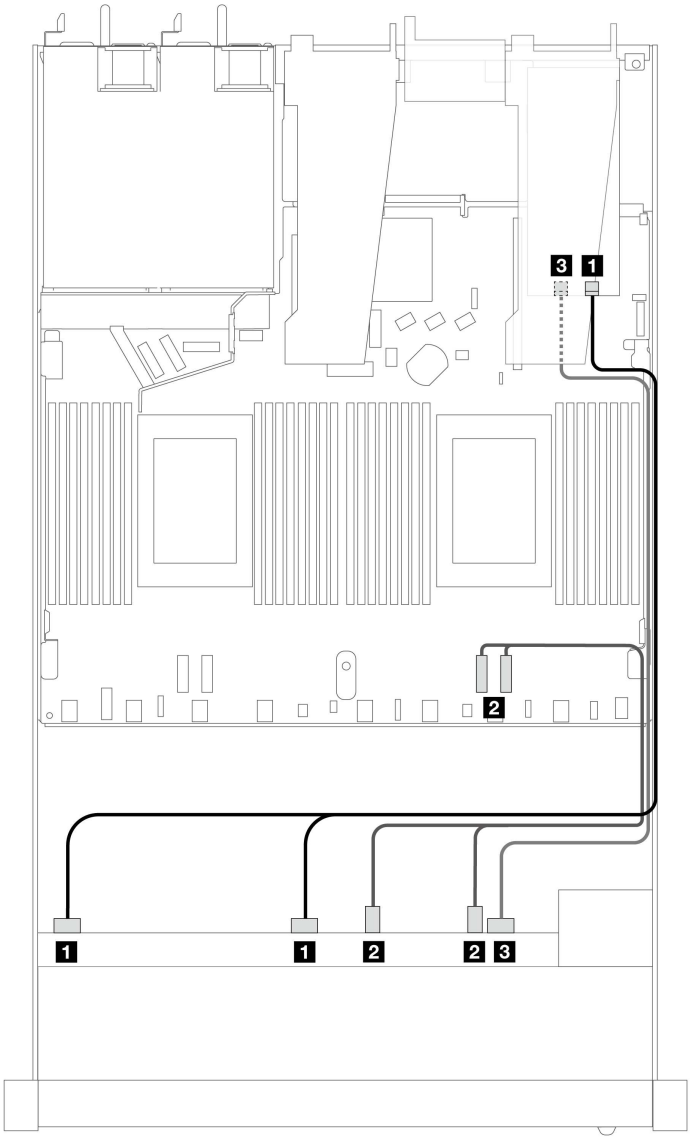


Figure 311. Cable routing for 6 front SAS/SATA drives and 4 front AnyBay drives bays with a 16i SFF RAID adapter (Gen 4)

Table 72. Mapping between one front AnyBay backplane and an SFF HBA/RAID adapter

Backplane	From	To
Front BP (SAS)	1 SAS 0, SAS 1	1 C0
Front BP (NVMe)	2 NVMe 2–3, 0–1	2 PCIe 1, 2
Front BP (SAS)	3 SAS 2	3 C1

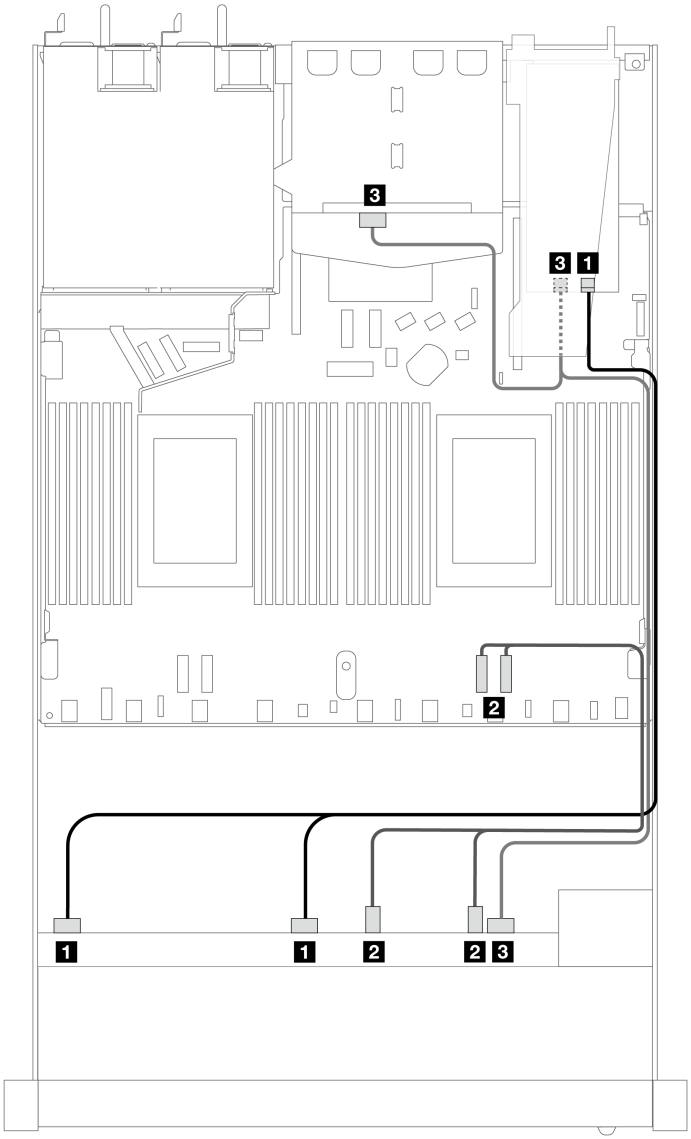


Figure 312. Cable routing for 6 front SAS/SATA drives and 4 front AnyBay drives bays and a 16i SFF RAID adapter (Gen 4) with 2 x 2.5 rear SAS/SATA drives installed

Table 73. Mapping between one front AnyBay and one rear SAS/SATA backplanes and an SFF HBA/RAID adapter

Backplane	**From**	**To**
Front BP (SAS)	1 SAS 0, SAS 1	1 C0
Front BP (NVMe)	2 NVMe 2–3, 0–1	2 PCIe 1, 2
Front and Rear BP (SAS)	3 SAS 2 (front), SAS (rear)	3 C1

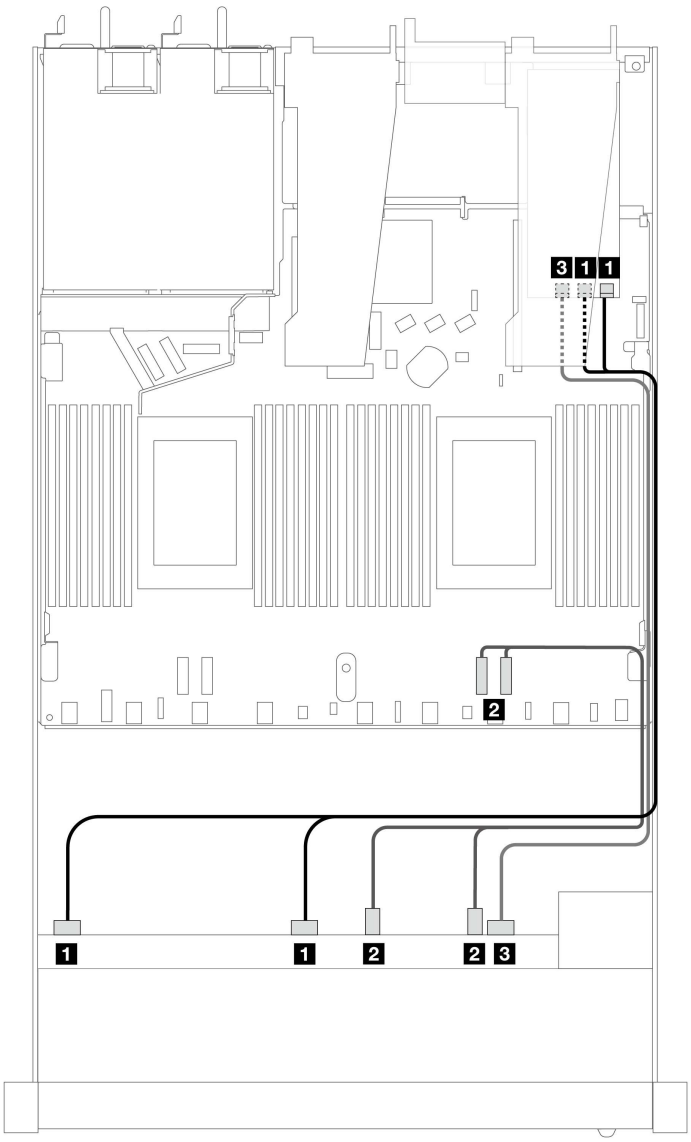


Figure 313. Cable routing for 6 front SAS/SATA drives and 4 front AnyBay drives bays with a 16i SFF RAID adapter (Gen 3)

Table 74. Mapping between one front AnyBay backplane and an SFF HBA/RAID adapter

Backplane	From	To
Front BP (SAS)	1 SAS 0, SAS 1	1 C0, C1
Front BP (NVMe)	2 NVMe 2–3, 0–1	2 PCIe 1, 2
Front BP (SAS)	3 SAS 2	3 C2

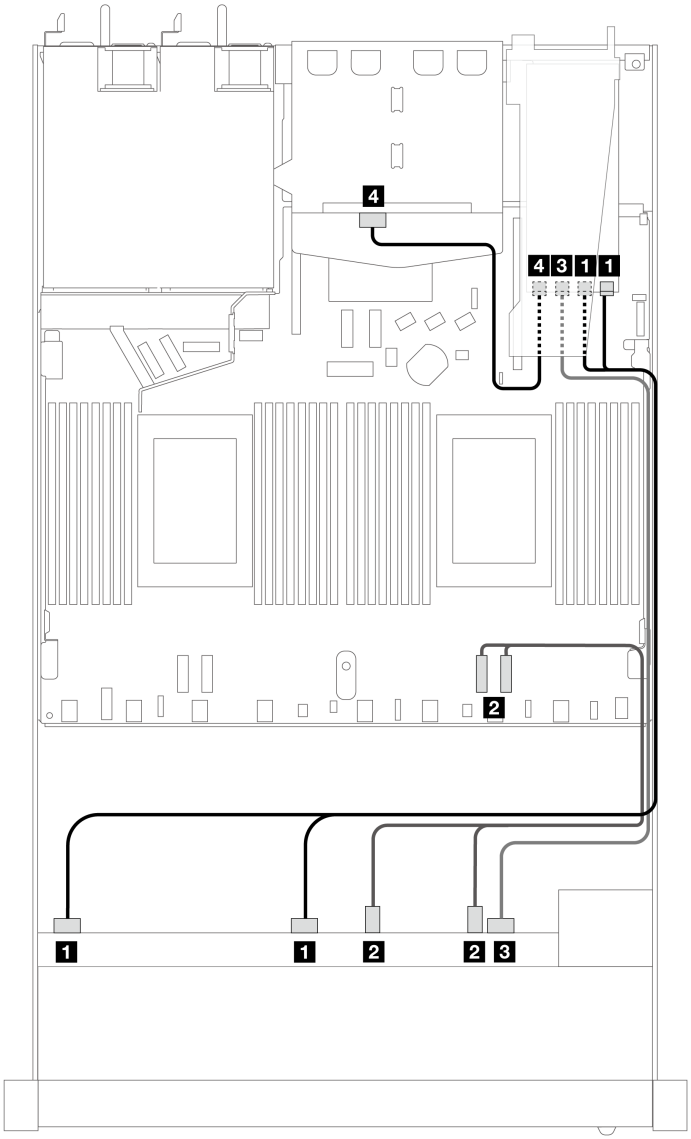


Figure 314. Cable routing for 6 front SAS/SATA drives and 4 front AnyBay drives bays and a 16i SFF RAID adapter (Gen 3) with 2 x 2.5 rear SAS/SATA drives installed

Table 75. Mapping between one front AnyBay and one rear SAS/SATA backplanes and an SFF HBA/RAID adapter

Backplane	From	To
Front BP (SAS)	1 SAS 0, SAS 1	1 C0, C1
Front BP (NVMe)	2 NVMe 2–3, 0–1	2 PCIe 1, 2
Front and Rear BP (SAS)	3 SAS 2	3 C2
	4 SAS (rear)	4 C3

6 x 2.5'' SAS/SATA + 2 x 2.5'' AnyBay + 2 x 2.5'' NVMe (one processor)

See this section to understand the cable routing of 6 front SAS/SATA drives, 2 AnyBay drives and 2 front NVMe drives.

To connect cables for a 7mm drive backplane, refer to “7mm drive backplane” on page 247.

To connect power cables for a backplane for standard 2.5-inch or 3.5-inch drives, refer to “Cable routing for backplane power” on page 251.

To connect cables for M.2 drives, refer to “M.2 drive backplane” on page 244.

To connect signal cables for a backplane for standard 6 front SAS/SATA drives, 2 AnyBay drives and 2 front NVMe drives, refer to the following cable routing scenarios depending on your server configuration:

- “Cable routing for onboard configuration” on page 326
- “Cable routing with an SFF HBA/RAID adapter” on page 327

Cable routing for onboard configuration

The following tables show the mapping relationship between backplane connectors and processor board connectors for onboard configuration.

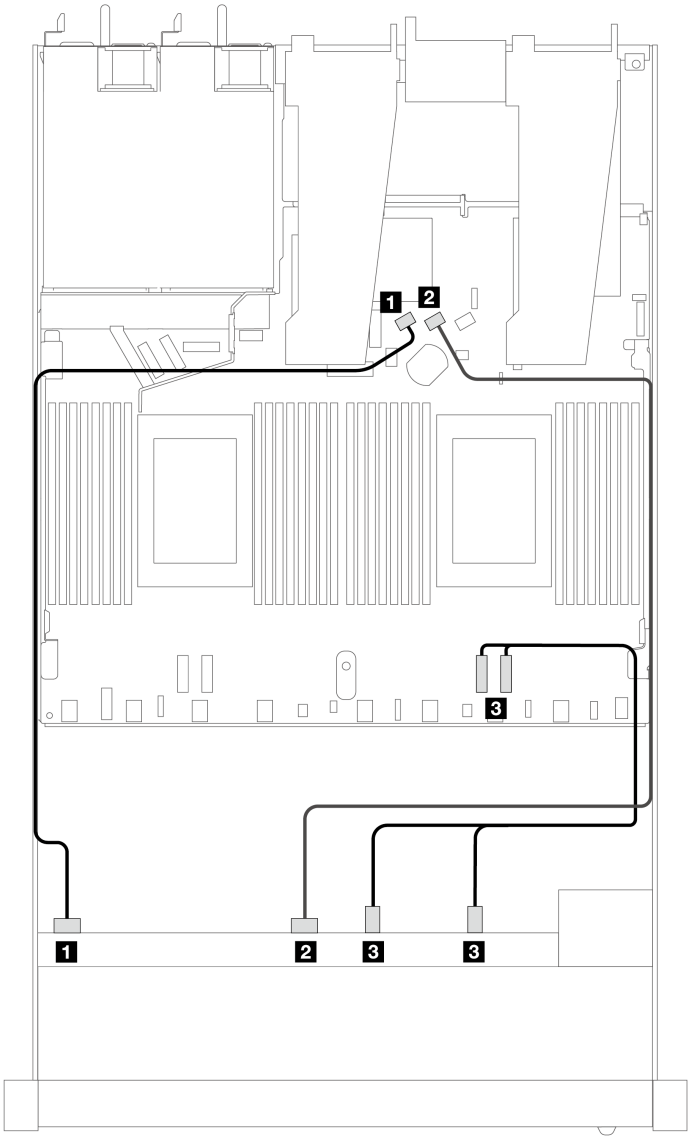


Figure 315. Cable routing for onboard configuration of 6 SAS/SATA drives and 2 AnyBay and 2 NVMe front drives bays

Table 76. Mapping between one front AnyBay backplane and processor board for onboard configuration

Backplane	From	To
Front BP (SAS)	1 SAS 0	1 SATA 0
	2 SAS 1	2 SATA 1
Front BP (NVMe)	3 NVMe 2–3, 0–1	3 PCIe 1, 2

Cable routing with an SFF HBA/RAID adapter

The following tables show the mapping relationship between backplane connectors and an SFF HBA/RAID adapter.

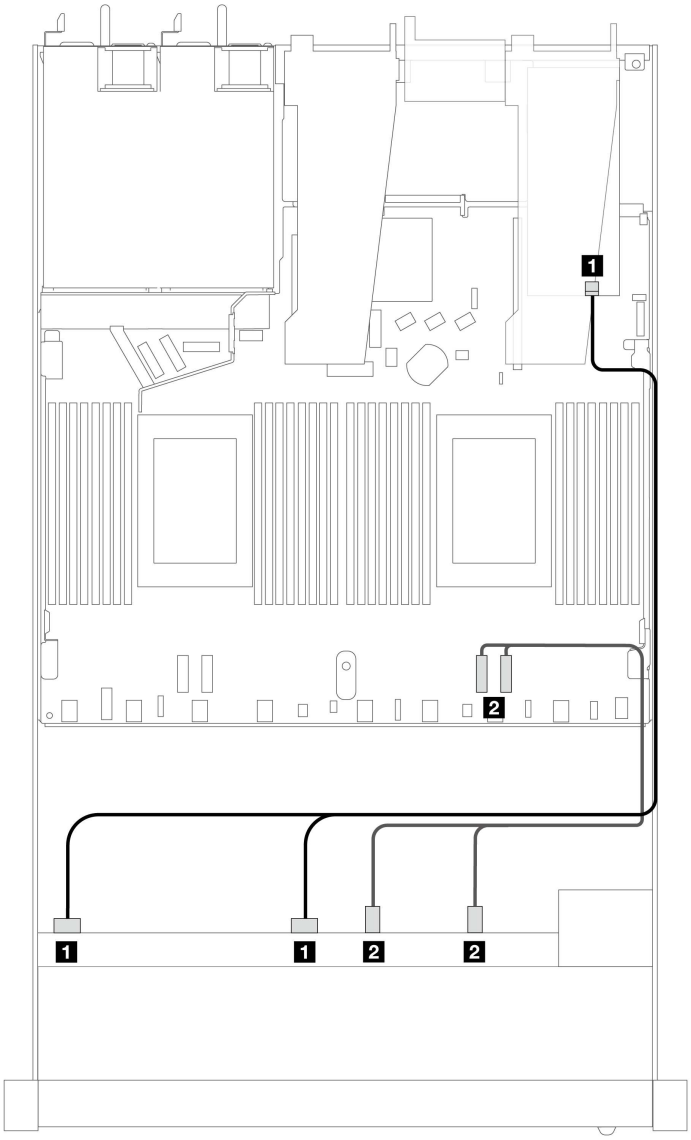


Figure 316. Cable routing for 6 SAS/SATA drives and 2 AnyBay drives and 2 NVMe front drive bays with an 8i or 16i SFF RAID adapter (Gen 4)

Table 77. Mapping between one front AnyBay backplane and an SFF HBA/RAID adapter

Backplane	From	To
Front BP (SAS)	1 SAS 0, SAS 1	1 C0
Front BP (NVMe)	2 NVMe 2–3, 0–1	2 PCIe 1, 2

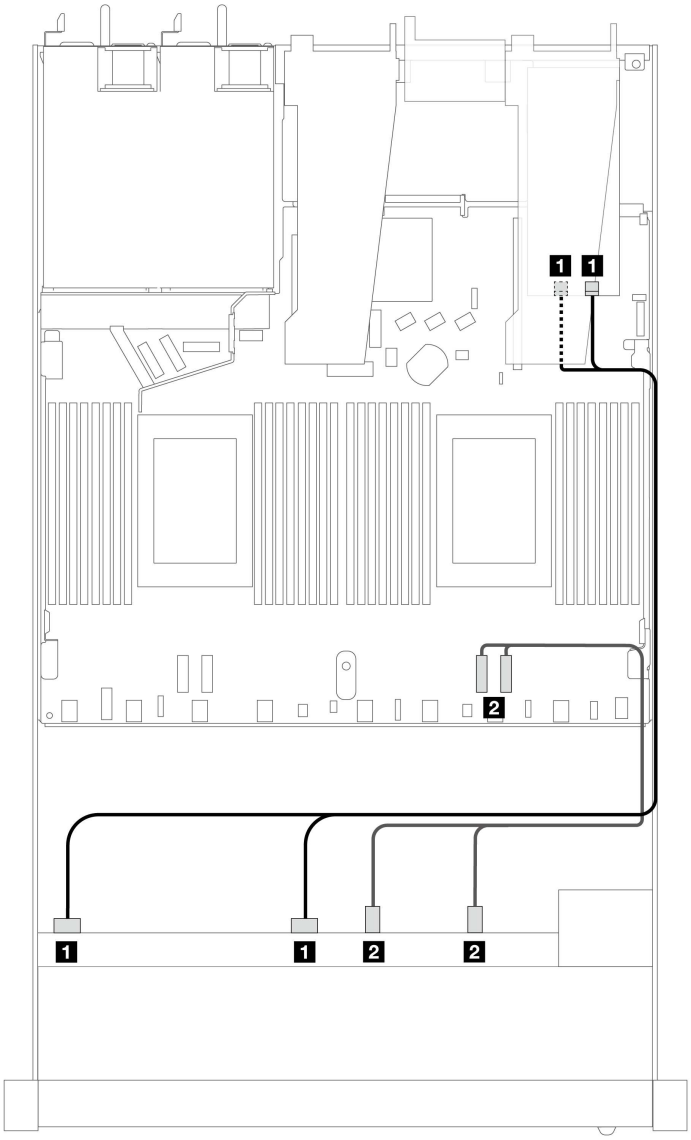


Figure 317. Cable routing for 6 SAS/SATA drives and 2 AnyBay drives and 2 NVMe front drive bays with an 8i or 16i SFF RAID adapter (Gen 3)

Table 78. Mapping between one front AnyBay backplane and an SFF HBA/RAID adapter

Backplane	From	To
Front BP (SAS)	1 SAS 0, SAS 1	1 C0, C1
Front BP (NVMe)	2 NVMe 2–3, 0–1	2 PCIe 1, 2

10 x 2.5'' SAS/SATA (one processor)

See this section to understand the cable routing of 10 front SAS/SATA drives with the 10 x 2.5 AnyBay backplane (Gen 4) installed.

To connect cables for a 7mm drive backplane, refer to “7mm drive backplane” on page 247.

To connect power cables for a backplane for standard 2.5-inch or 3.5-inch drives, refer to “Cable routing for backplane power” on page 251.

To connect cables for M.2 drives, refer to “M.2 drive backplane” on page 244.

To connect signal cables for a backplane for standard 6 front SAS/SATA drives and 4 front AnyBay drives, refer to the following cable routing scenarios depending on your server configuration:

- “Cable routing for onboard configuration” on page 330
- “Cable routing with an SFF HBA/RAID adapter” on page 331
- “Cable routing with a CFF RAID adapter” on page 335

Cable routing for onboard configuration

The following illustrations and tables show the mapping relationship between backplane connectors and processor board connectors for onboard configuration.

The following figure illustrates the cable routing for the configuration of 10 front SAS/SATA drives bays. Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n.

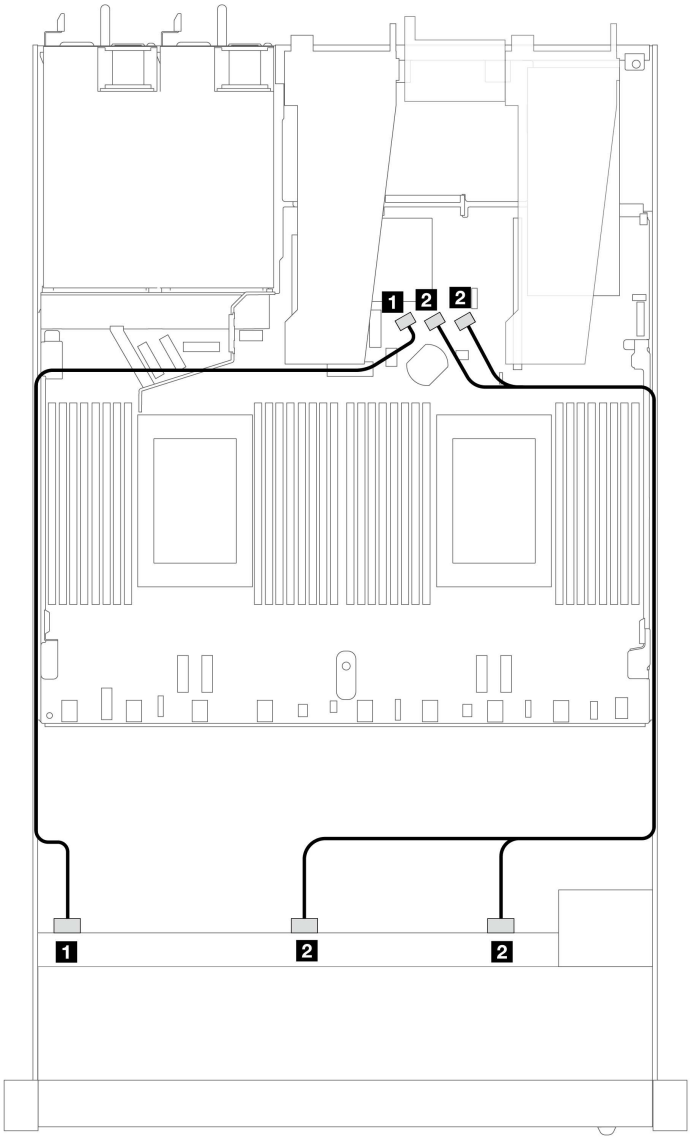


Figure 318. Cable routing for onboard configuration of 10 x 2.5 SAS/SATA front drives

Table 79. Mapping between one front AnyBay backplane and processor board for onboard configuration

Backplane	From	To
Front BP (SAS)	1 SAS 0	1 SATA 0
	2 SAS 1, SAS 2	2 SATA 1, SATA 2

Cable routing with an SFF HBA/RAID adapter

The following tables show the mapping relationship between backplane connectors and a 16i SFF HBA/RAID adapter (Gen 3 or Gen 4).

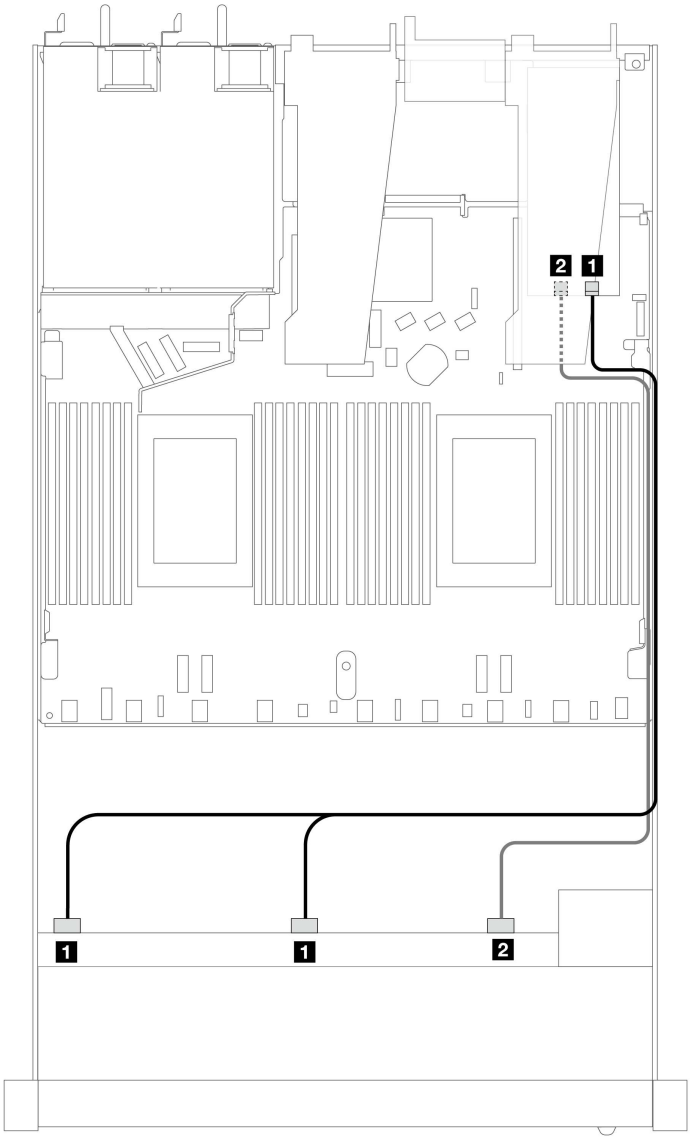


Figure 319. Cable routing for 10 front SAS/SATA drives bays with a 16i SFF RAID adapter (Gen 4)

Table 80. Mapping between one front AnyBay backplane and an SFF HBA/RAID adapter

Backplane	From	To
Front BP (SAS)	1 SAS 0, SAS 1	1 C0
	2 SAS 2	2 C1

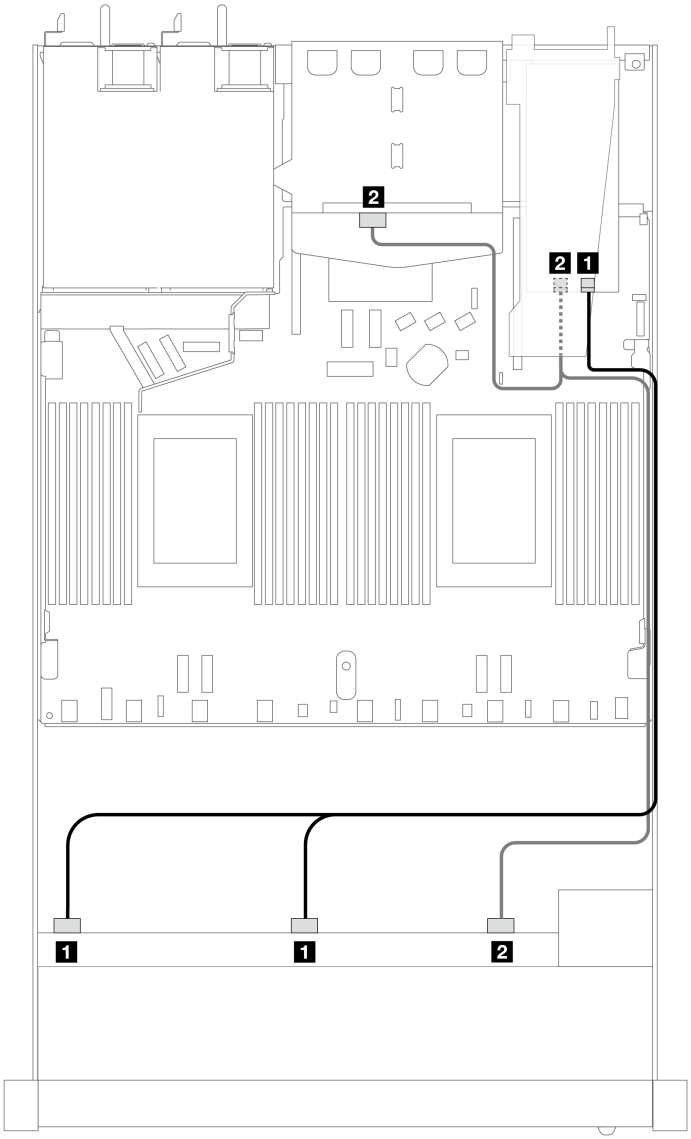


Figure 320. Cable routing for 10 front SAS/SATA drives bays and a 16i SFF RAID adapter (Gen 4) with 2 x 2.5 rear SAS/SATA drives installed

Table 81. Mapping between one front AnyBay and one rear SAS/SATA backplanes and an SFF HBA/RAID adapter

Backplane	From	To
Front BP (SAS)	1 SAS 0, SAS 1	1 C0
Rear BP (SAS)	2 SAS 2 (front), SAS (rear)	2 C1

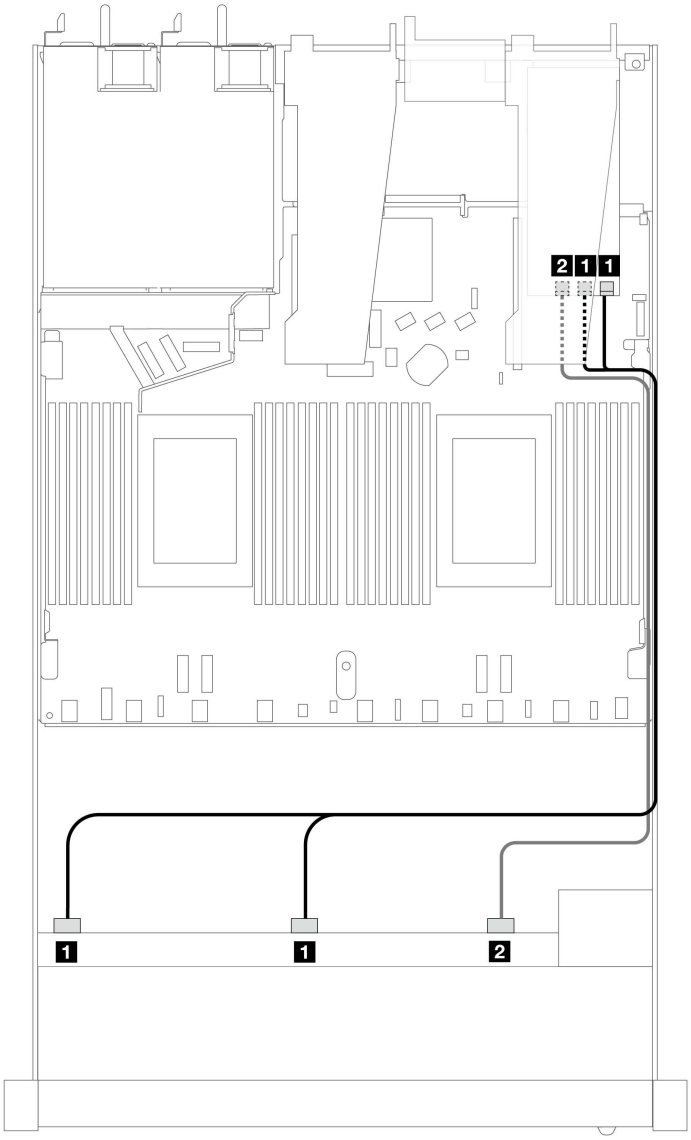


Figure 321. Cable routing for 10 front SAS/SATA drives bays with a 16i SFF RAID adapter (Gen 3)

Table 82. Mapping between one front AnyBay backplane and an SFF HBA/RAID adapter

Backplane	From	To
Front BP (SAS)	1 SAS 0, SAS 1	1 C0, C1
	2 SAS 2	2 C2

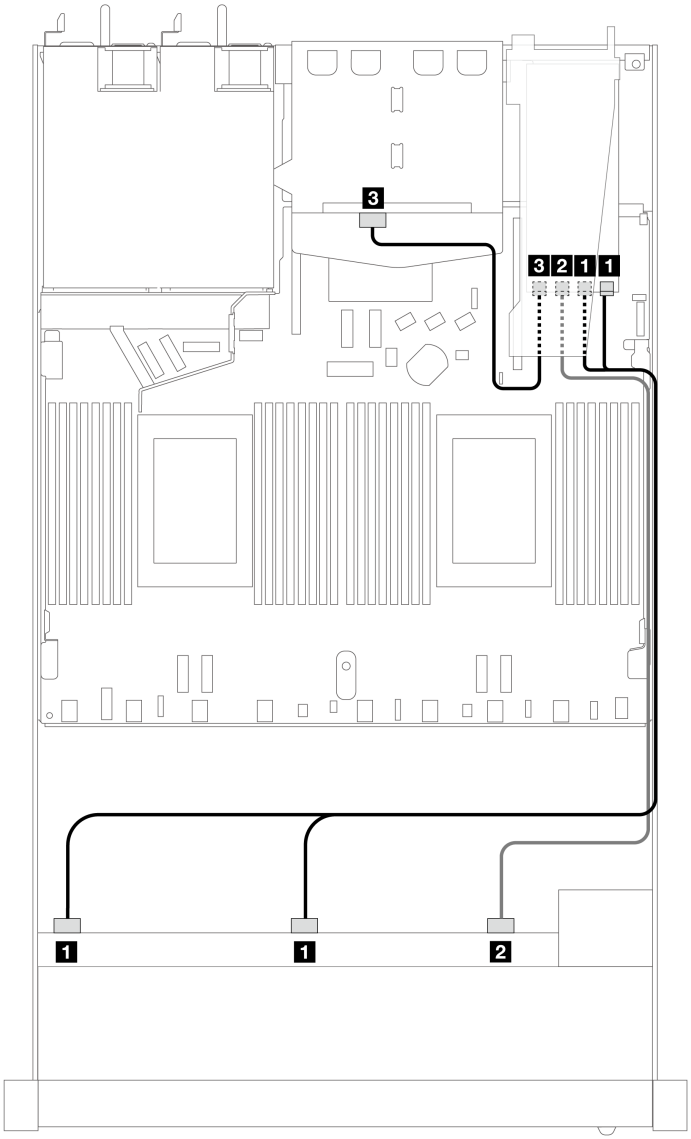


Figure 322. Cable routing for 10 front SAS/SATA drives bays and a 16i SFF RAID adapter (Gen 3) with 2 x 2.5 rear SAS/SATA drives installed

Table 83. Mapping between one front AnyBay and one rear SAS/SATA backplanes and an SFF HBA/RAID adapter

Backplane	From	To
Front BP (SAS)	1 SAS 0, SAS 1	1 C0, C1
	2 SAS 2	2 C2
Rear BP (SAS)	3 SAS	3 C3

Cable routing with a CFF RAID adapter

The following tables show the mapping relationship between backplane connectors and a 16i CFF RAID adapter (Gen 3 or Gen 4).

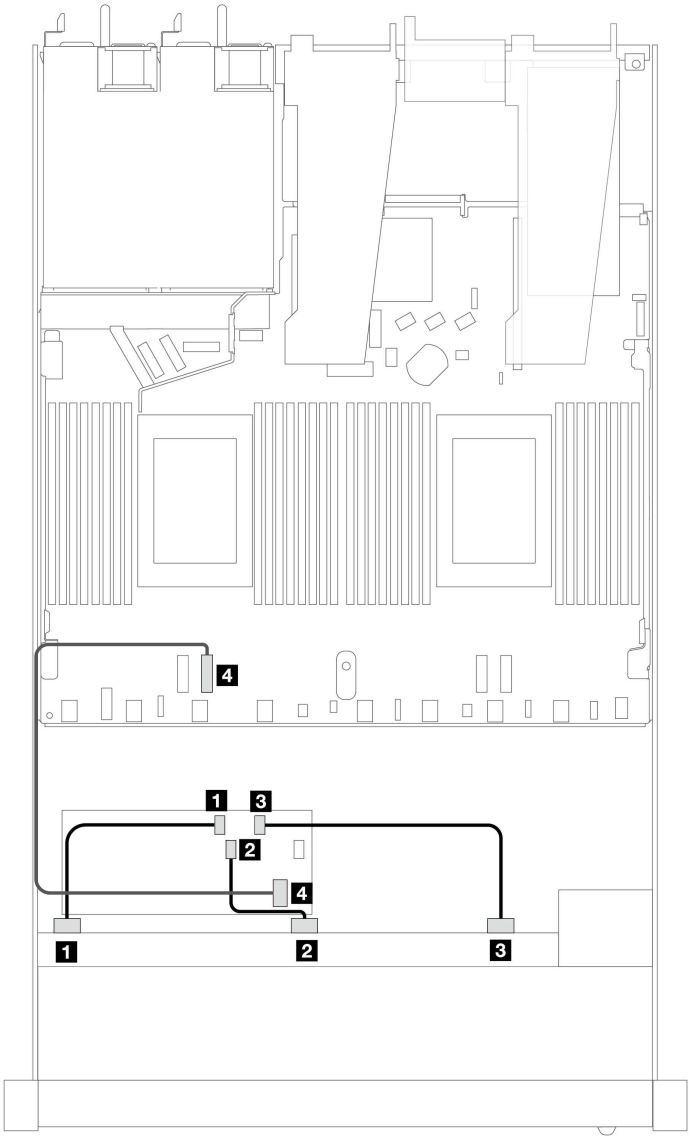


Figure 323. Cable routing for 10 front SAS/SATA drives bays with a 16i CFF RAID adapter (Gen 3 or Gen 4)

Table 84. Mapping between one front SAS/SATA backplane and a CFF RAID adapter

Backplane/adapter	From	To
Front backplane	1 SAS 0	1 C0
	2 SAS 1	2 C1
	3 SAS 2	3 C2
CFF RAID adapter	4 MB input	4 PCIe 2

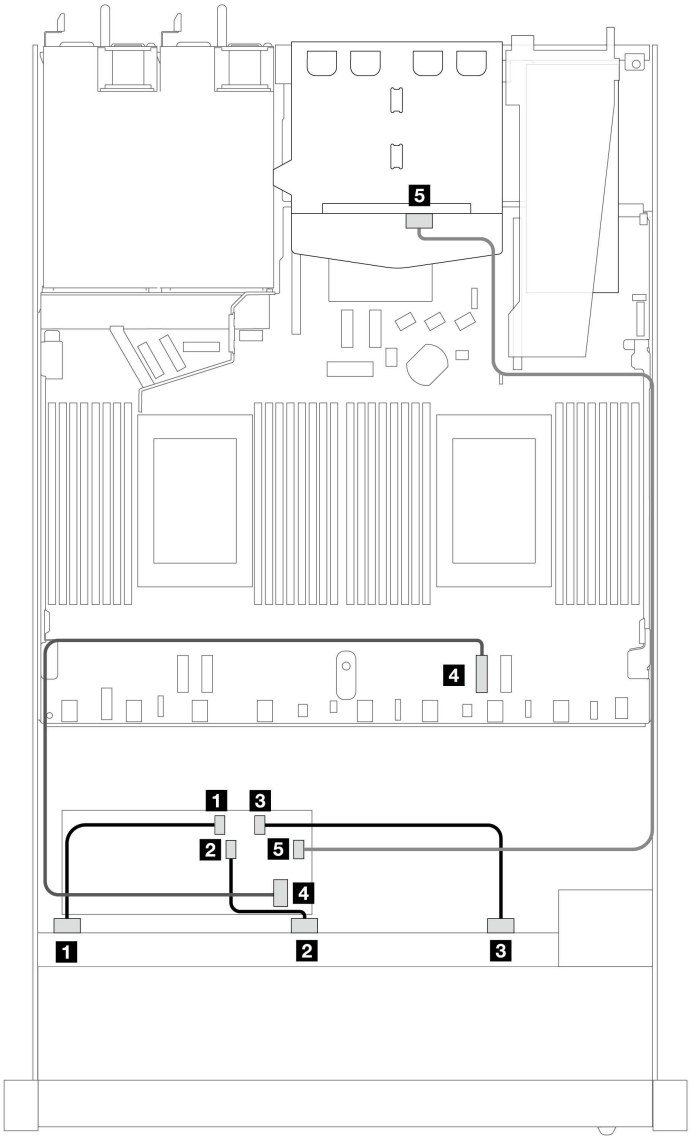


Figure 324. Cable routing for 10 front SAS/SATA drives bays and a 16i CFF RAID adapter (Gen 3 or Gen 4) with 2 x 2.5 rear SAS/SATA drives installed

Table 85. Mapping between one front AnyBay and one rear SAS/SATA backplane and a CFF RAID adapter

Backplane/adapter	**From**	**To**
Front backplane	1 SAS 0	1 C0
	2 SAS 1	2 C1
	3 SAS 2	3 C2
CFF RAID adapter	4 MB input	4 PCIe 2
	5 C3	5 SAS (rear)

Cable routing for backplane signals (two processors)

In this section, you can find cable routings of backplane signals when two processors installed.

- Each backplane your server supports offers multiple signal connections. This section singles out the signal connection from power connection for better understanding. For backplane power connection, see “Cable routing for backplane power” on page 251.
- For the locations of backplane signal connectors on the processor board and adapters, see “Processor-board connectors for cable routing” on page 231 and “RAID and HBA adapter connectors” on page 228 for details.
- For more information about backplanes supported and their connectors, see “Drive backplane connectors” on page 224.

4 x 3.5'' front drives

Use the section to understand the cable routing for signal cable connections for 4 x 3.5-inch drive backplanes.

In the configuration of 4 x 3.5-inch front drives, your server supports the following front backplanes:

4 x 3.5'' SAS/SATA backplane

Use this section to understand the SAS/SATA backplane cable routing for server model with four 3.5-inch front drives.

To connect cables for a 7mm drive backplane, refer to “7mm drive backplane” on page 247.

To connect power cables for a backplane for standard 2.5-inch or 3.5-inch drives, refer to “Cable routing for backplane power” on page 251.

To connect cables for M.2 drives, refer to “M.2 drive backplane” on page 244.

To connect signal cables for a SAS/SATA backplane for standard 4 x 3.5-inch front drives, refer to the following cable routing scenarios depending on your server configuration:

- “Cable routing for onboard configuration” on page 339
- “Cable routing with an SFF HBA/RAID adapter” on page 342

Cable routing for onboard configuration

The following table shows the mapping relationship between backplane connectors and processor board connectors for onboard configuration.

The following figure illustrates the cable routing for the onboard configuration of 4 x 3.5-inch front SAS/SATA drive bays. Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n.

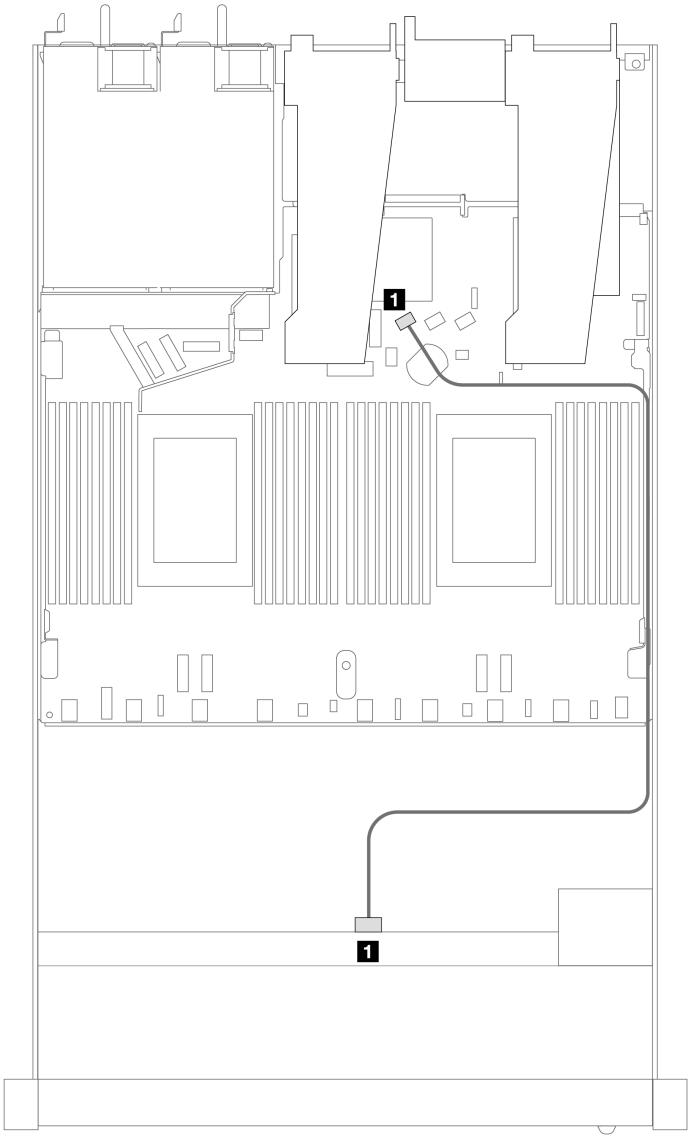


Figure 325. Cable routing for onboard configuration of 4 x 3.5-inch front SAS/SATA drive bays

Table 86. Mapping between one front SAS/SATA backplane and processor board for onboard configuration

Backplane	From	To
1 Front BP (SAS)	SAS	SATA 0

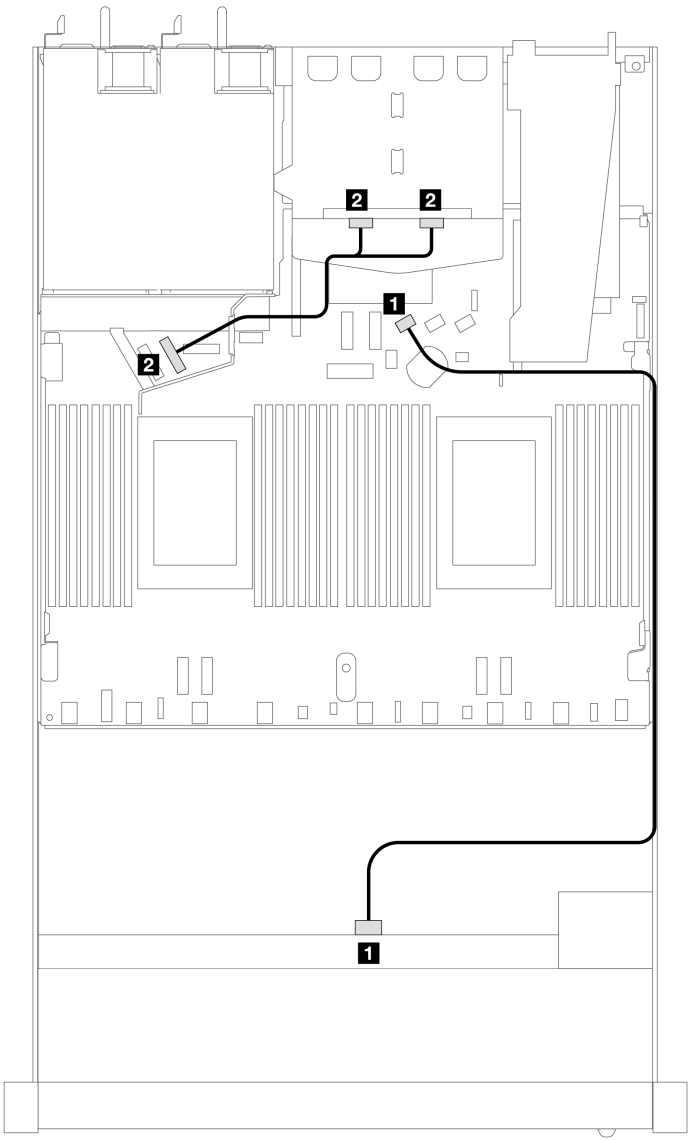


Figure 326. Cable routing for onboard configuration of 4 x 3.5-inch front SAS/SATA drive with 2 x 2.5 rear NVMe drives

Table 87. Mapping between one front SAS/SATA backplane with one rear NVMe backplane and processor board for onboard configuration

Backplane	From	To
1 Front BP (SAS)	SAS	SATA 0
2 Rear BP (NVMe)	NVMe 0, NVMe 1	PCIe 6

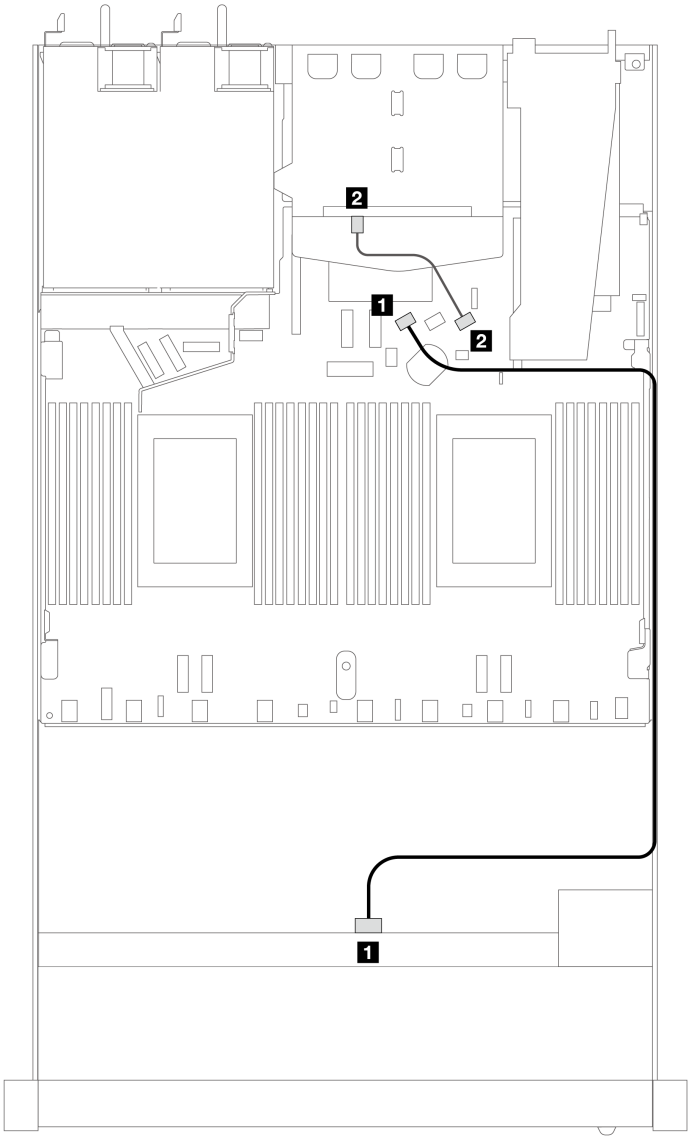


Figure 327. Cable routing for onboard configuration of 4 x 3.5-inch front SAS/SATA drive bays with 2 x 2.5 rear SAS/SATA drives

Table 88. Mapping between one front SAS/SATA backplane with one rear SAS/SATA backplane and processor board for onboard configuration

Backplane	**From**	**To**
1 Front BP (SAS)	SAS (front)	SATA 0
2 Rear BP (SAS)	SAS (rear)	SATA 2

Cable routing with an SFF HBA/RAID adapter

The following table shows the mapping relationship between backplane connectors and processor board/adapter connectors when an 8i SFF HBA/RAID adapter (Gen 3 or Gen 4) is installed.

The following figure illustrates the cable routing for the configuration of 4 x 3.5-inch front SAS/SATA drive bays with an 8i SFF RAID adapter. Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n.

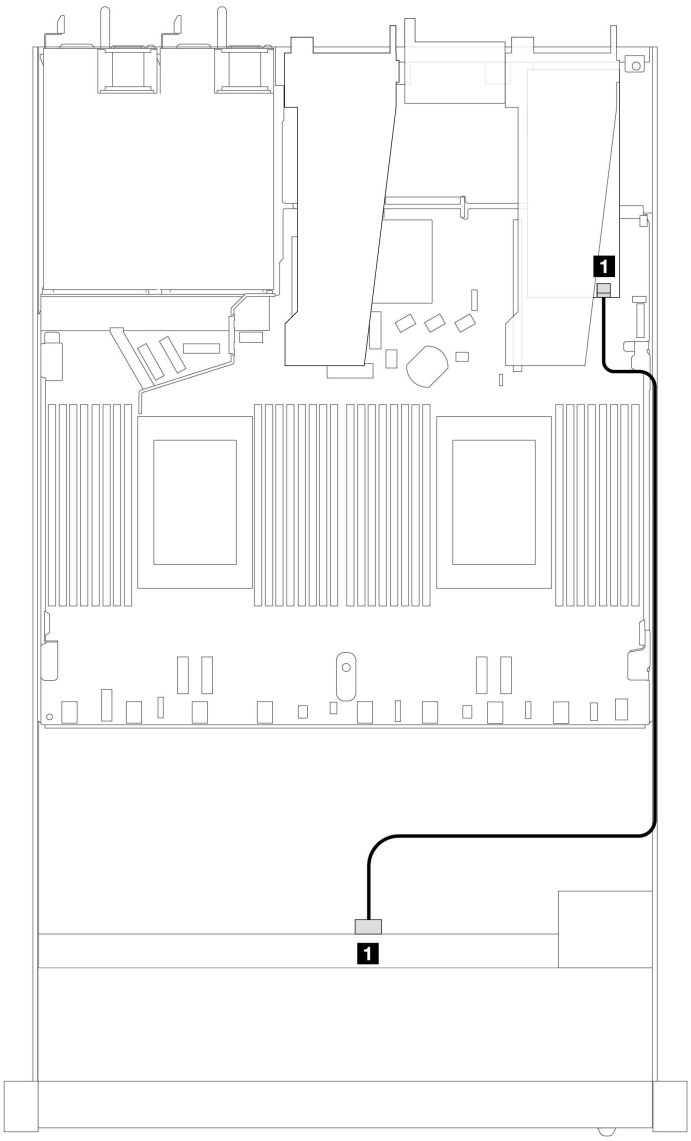


Figure 328. Cable routing for 4 x 3.5-inch front SAS/SATA drive bays with an 8i SFF RAID adapter

Table 89. Mapping between backplane connectors and processor board/adapter connectors when an SFF HBA/RAID adapter is installed

Backplane	From	To
1 Front BP (SAS)	SAS	C0

Notes:

- Gen 3 and Gen 4 SFF HBA/RAID adapters are slightly different in their connectors, but the cable routing method is similar.
- To connect cables for RAID flash power module, refer to "RAID flash power modules" on page 240.

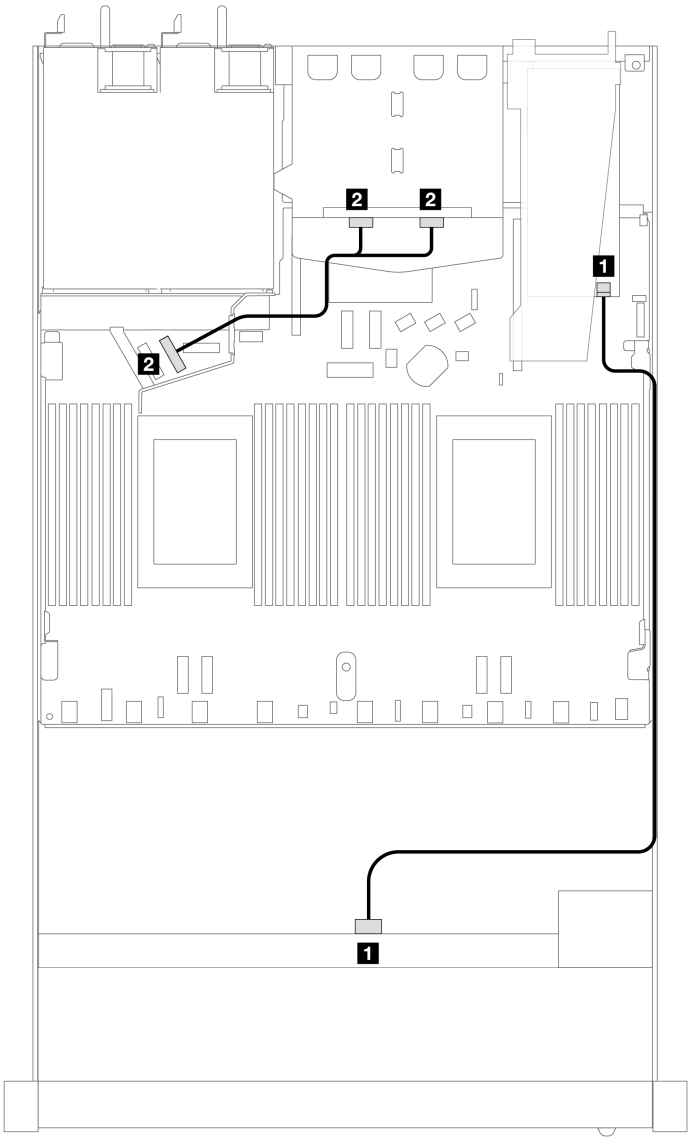


Figure 329. Cable routing for 4 x 3.5-inch front SAS/SATA drive bays with an 8i SFF RAID adapter and rear 2 x 2.5–inch NVMe drives

Table 90. Mapping between backplane connectors and processor board/adapter connectors when an SFF HBA/RAID adapter is installed

Backplane	From	To
1 Front BP (SAS)	SAS	C0
2 Rear BP (NVMe)	NVMe 0, NVMe 1	PCIe 6

The following table shows the mapping relationship between backplane connectors and processor board/adapter connectors when an 8i SFF HBA/RAID adapter (Gen 3) is installed.

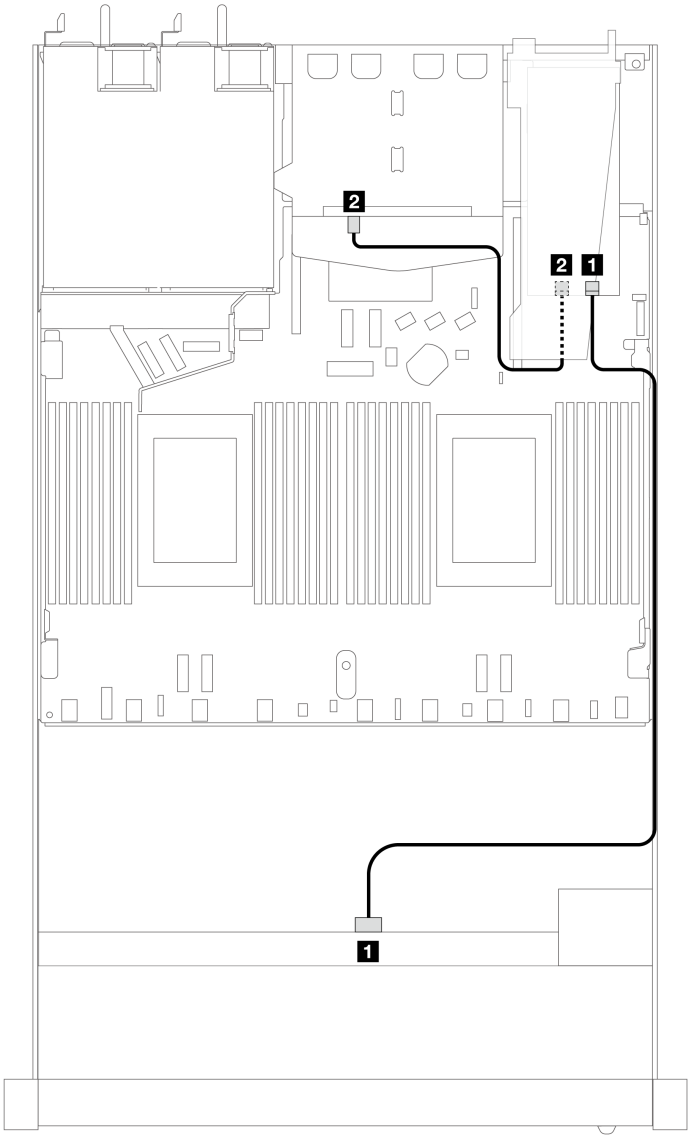


Figure 330. Cable routing for 4 x 3.5-inch front SAS/SATA drive bays with an 8i SFF RAID adapter (Gen 3) and rear 2 x 2.5–inch SAS/SATA drives

Table 91. Mapping between backplane connectors and processor board/adapter connectors when an SFF HBA/RAID adapter is installed

Backplane	From	To
1 Front BP (SAS)	SAS	C0
2 Rear BP (SAS)	SAS (rear)	C1

The following table shows the mapping relationship between backplane connectors and processor board/adapter connectors when an 8i SFF HBA/RAID adapter (Gen 4) is installed.

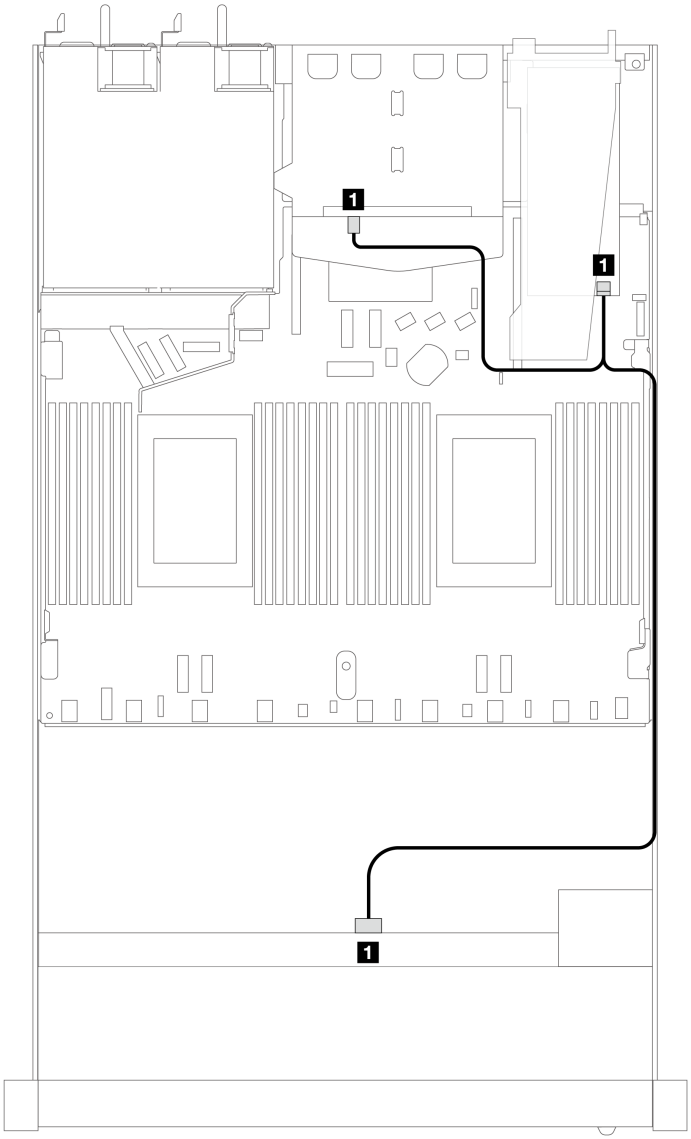


Figure 331. Cable routing for 4 x 3.5-inch front SAS/SATA drive bays with an 8i SFF RAID adapter (Gen 4) and rear 2 x 2.5–inch SAS/SATA drives

Table 92. Mapping between backplane connectors and processor board/adapter connectors when an SFF HBA/RAID adapter is installed

Backplane	From	To
1 Front and Rear BP (SAS)	SAS	C0

4 x 3.5'' AnyBay backplane

Use this section to understand the AnyBay backplane cable routing for server model with four 3.5-inch front drives.

To connect cables for a 7mm drive backplane, refer to “7mm drive backplane” on page 247.

To connect power cables for a backplane for standard 2.5-inch or 3.5-inch drives, refer to “Cable routing for backplane power” on page 251.

To connect cables for M.2 drives, refer to “M.2 drive backplane” on page 244.

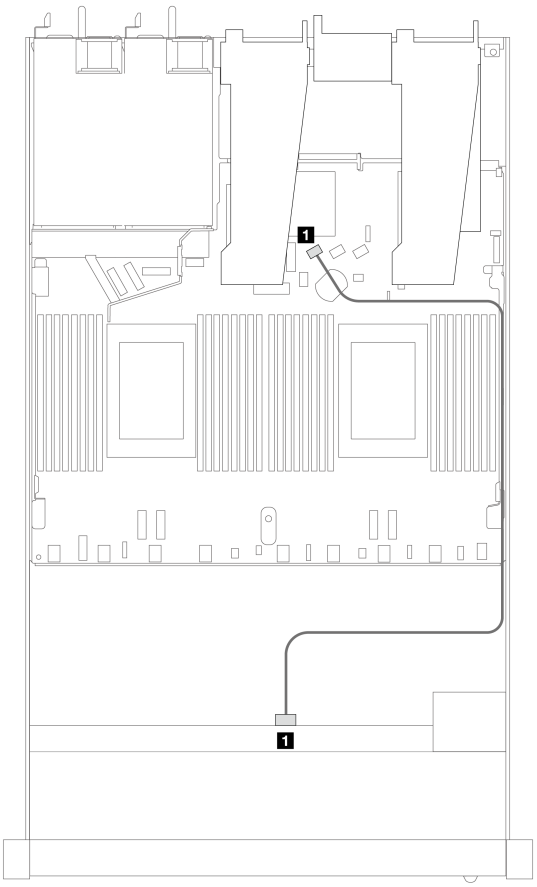
To connect signal cables for a backplane for standard 4 x 3.5-inch front drives, refer to the following cable routing scenarios depending on your server configuration:

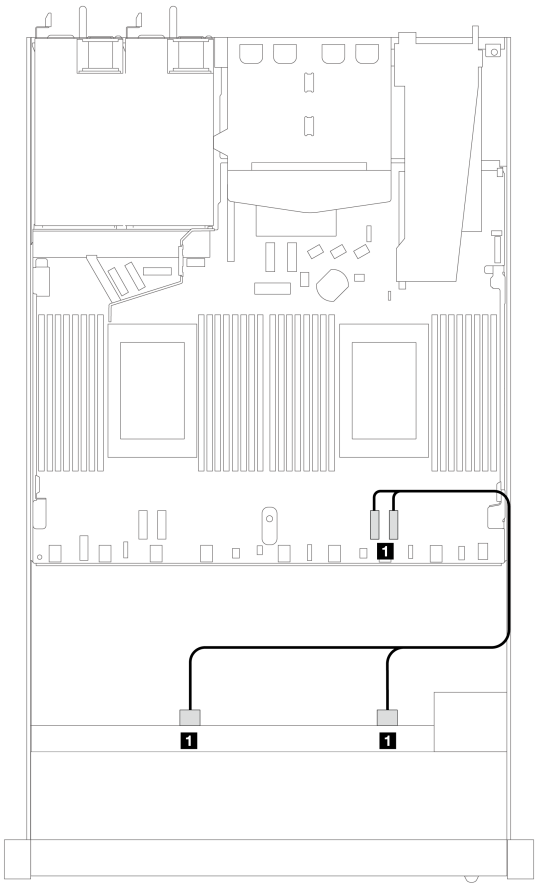
- “Cable routing for onboard configuration” on page 347
- “Cable routing with an SFF HBA/RAID adapter” on page 349

Cable routing for onboard configuration

The following table shows the mapping relationship between backplane connectors and processor board connectors for onboard configuration.

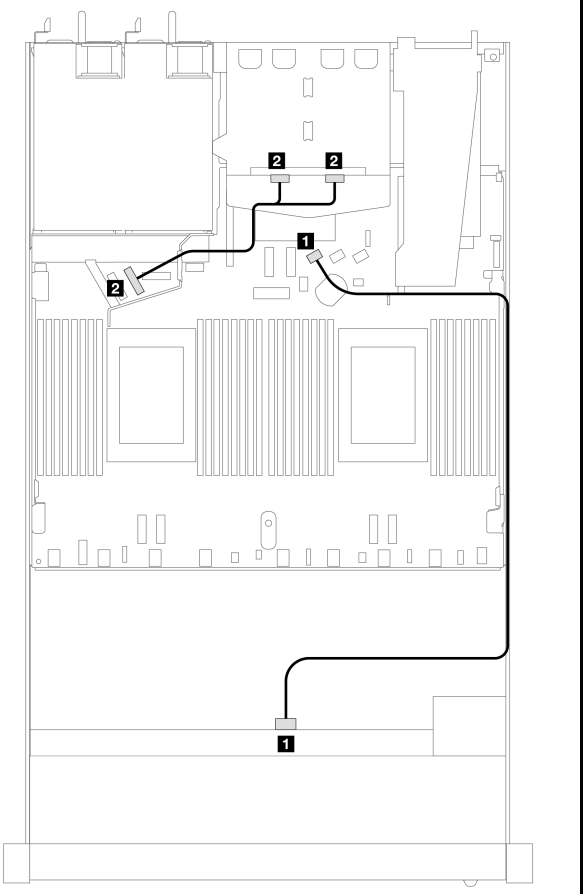
Table 93. Mapping between one front AnyBay backplane and processor board for onboard configuration

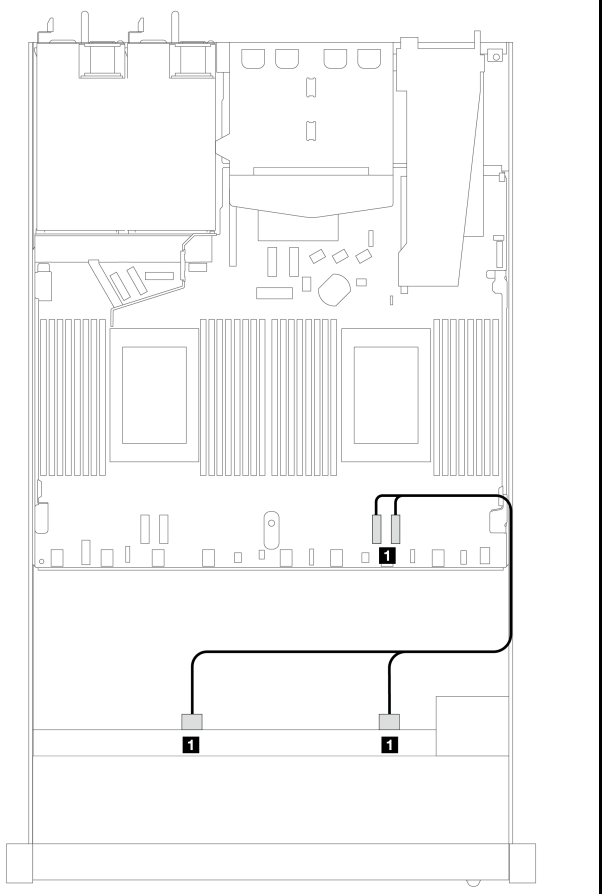




SAS/SATA cable routing			NVMe cable routing		
SAS/SATA connector	From	To	NVMe connector	From	To
1 SAS	Front BP	SATA 0	1 2–3, 0–1	Front BP	PCIe 1, PCIe 2

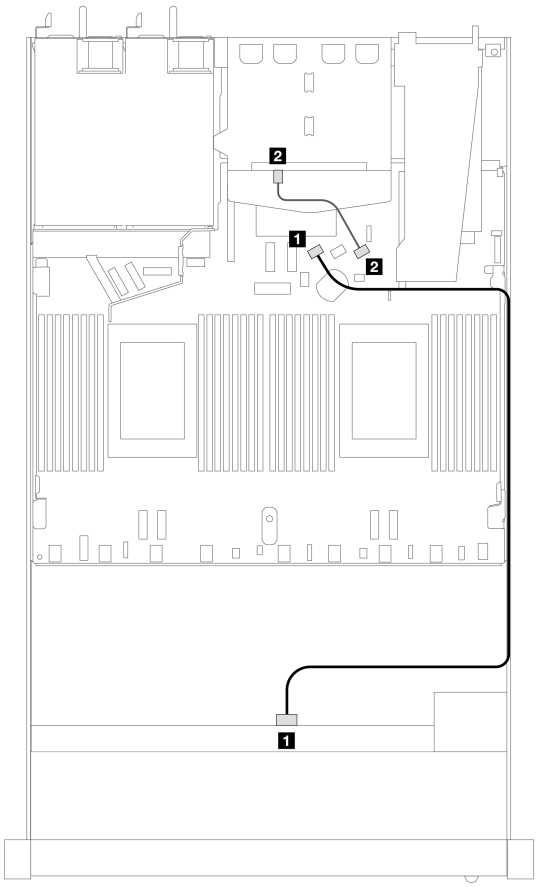
Table 94. Mapping between one front AnyBay backplane with one rear NVMe backplane and processor board for onboard configuration

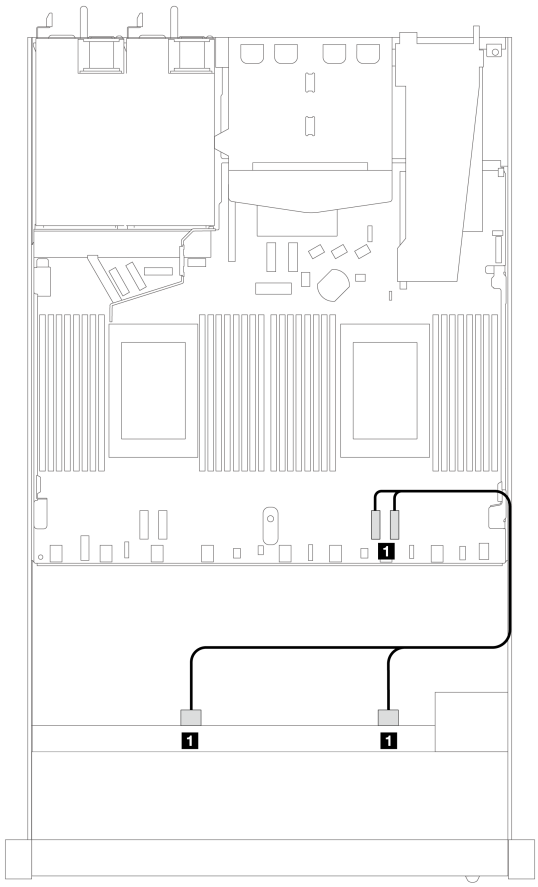




Connector	From	To	NVMe cable routing		
1 SAS	Front BP	SATA 0	NVMe connector	From	To
2 NVMe	Rear BP	PCIe 6	1 2–3, 0–1	Front BP	PCIe 1, PCIe 2

Table 95. Cable routing for onboard configuration of 4 x 3.5-inch front AnyBay drive bays with 2 x 2.5 rear SAS/SATA drives



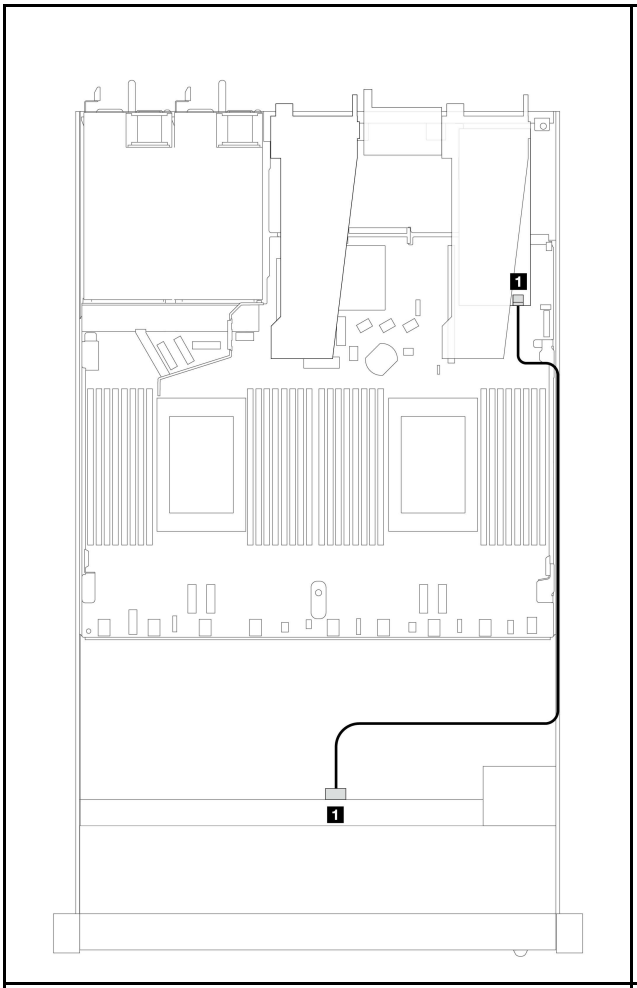


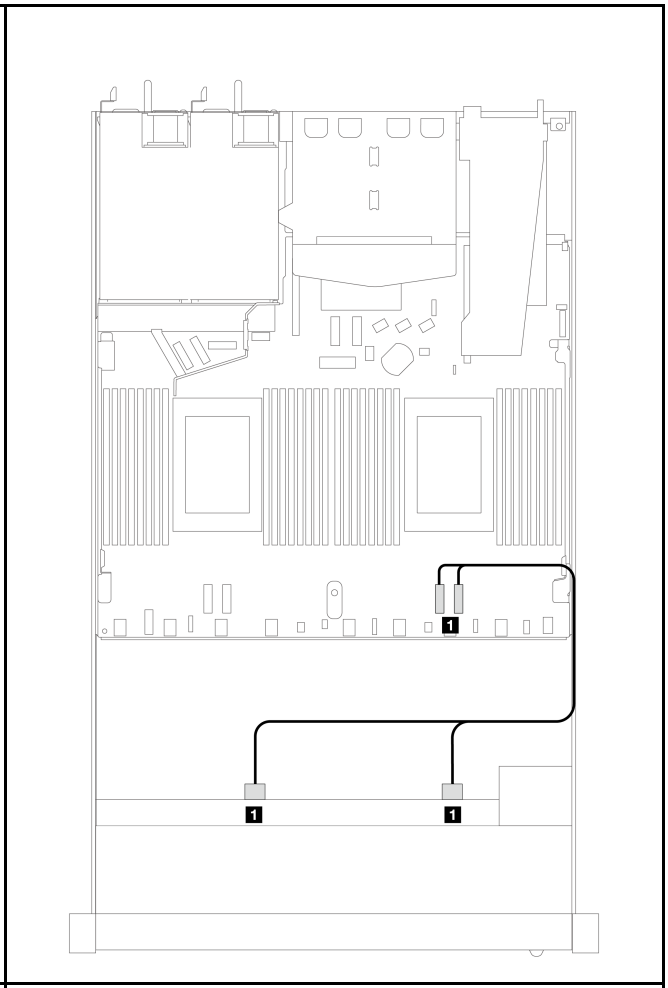
SAS/SATA cable routing			NVMe cable routing		
1 SAS	Front BP	SATA 0	NVMe connector	From	To
2 SAS	Rear BP	SATA 2	1 2–3, 0–1	Front BP	PCIe 1, PCIe 2

Cable routing with an SFF HBA/RAID adapter

The following table shows the mapping relationship between backplane connectors and processor board/adapter connectors when an 8i SFF HBA/RAID adapter (Gen 3 or Gen 4) is installed.

Table 96. Mapping between backplane and processor board/adapter when an SFF HBA/RAID adapter is installed

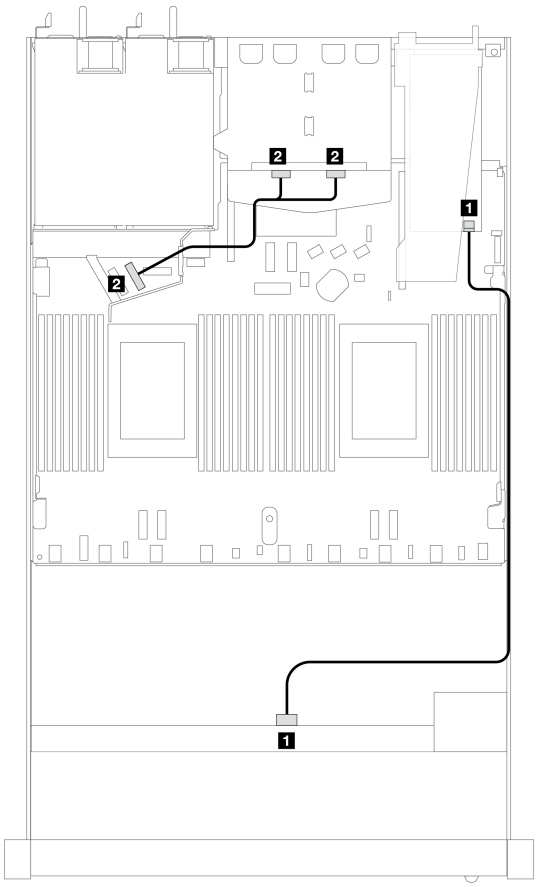


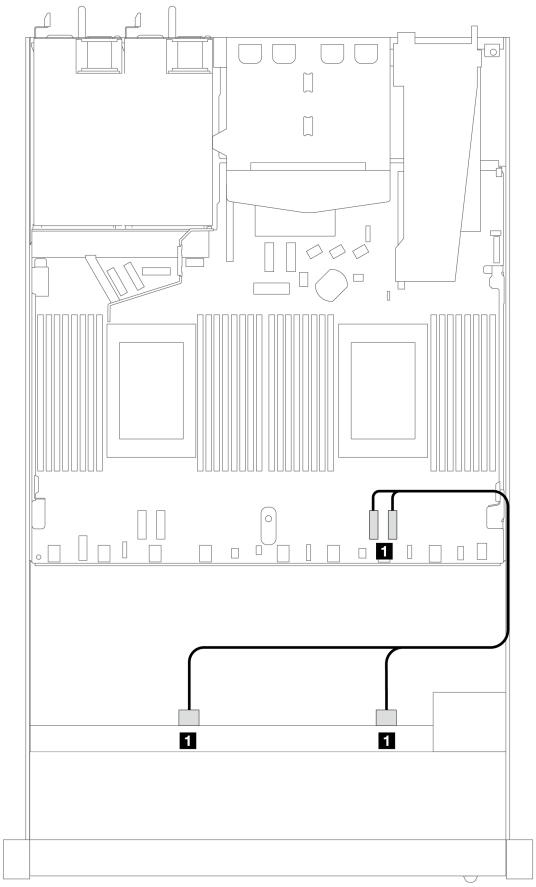


SAS/SATA cable routing			NVMe cable routing		
SAS/SATA connector	From	To	NVMe connector	From	To
1 SAS	Front BP	C0	1 2–3, 0–1	Front BP	PCIe 1, PCIe 2

Note: Gen 3 and Gen 4 SFF HBA/RAID adapters are slightly different in their connectors, but the cable routing method is similar.

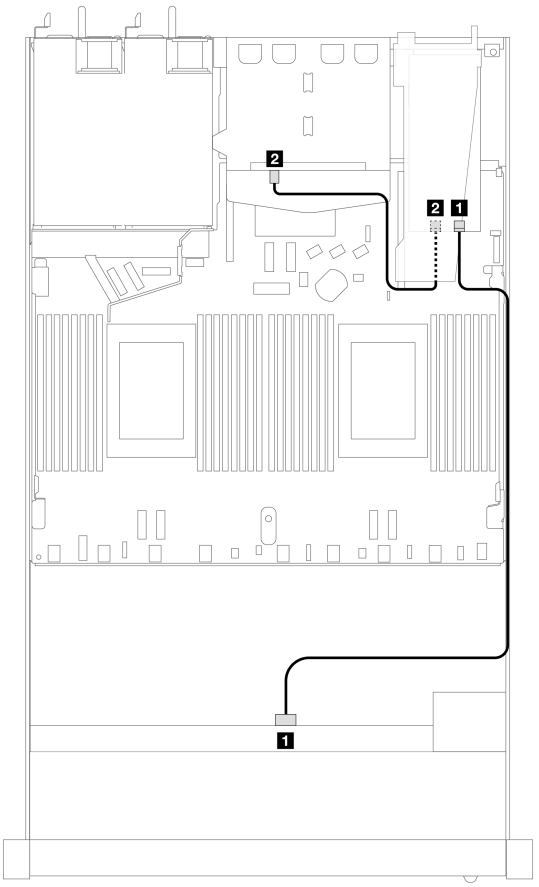
Table 97. Mapping between backplane and processor board/adapter when an SFF HBA/RAID adapter and rear 2 x 2.5–inch NVMe drives are installed

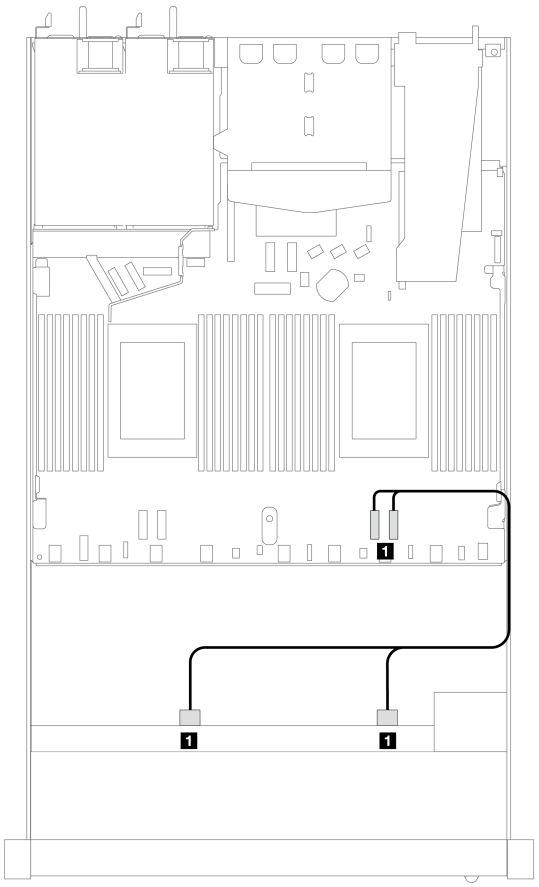




Connector	From	To	NVMe cable routing		
1 SAS	Front BP	C0	NVMe connector	From	To
2 NVMe	Rear BP	PCIe 6	1 2–3, 0–1	Front BP	PCIe 1, PCIe 2

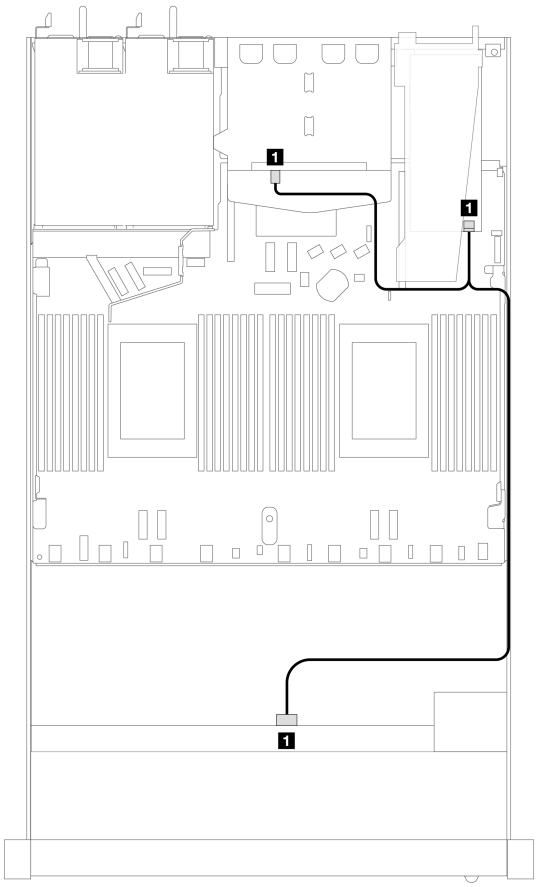
Table 98. Mapping between backplane and processor board/adapter when an 8i SFF RAID adapter (Gen 3) and rear 2 x 2.5–inch SAS/SATA drives are installed

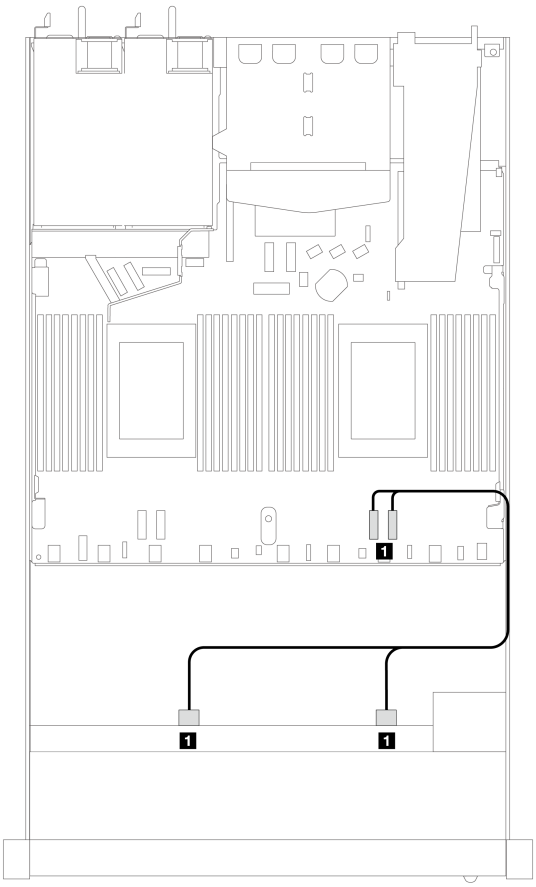




Connector	From	To	NVMe cable routing		
1 SAS	Front BP	C0	NVMe connector	From	To
2 SAS	Rear BP	C1	1 2–3, 0–1	Front BP	PCIe 1, PCIe 2

Table 99. Mapping between backplane and processor board/adapter when an 8i SFF RAID adapter (Gen 4) and rear 2 x 2.5–inch SAS/SATA drives are installed





SAS/SATA cable routing			NVMe cable routing		
SAS/SATA connector	From	To	NVMe connector	From	To
1 SAS	Front and rear BP	C0	1 2–3, 0–1	Front BP	PCIe 1, PCIe 2

4 x 2.5'' front drives

Use the section to understand the cable routing for signal cable connections for 4 x 2.5-inch drive backplanes.

Under the configuration of 4 x 2.5-inch front drives, your server supports the following front backplanes:

4 x 2.5'' SAS/SATA backplane

Use this section to understand the SAS/SATA backplane cable routing for server model with four 2.5-inch front drives.

To connect cables for a 7mm drive backplane, refer to “7mm drive backplane” on page 247.

To connect power cables for a backplane for standard 2.5-inch or 3.5-inch drives, refer to “Cable routing for backplane power” on page 251.

To connect signal cables for a backplane for standard 4 x 2.5-inch front drives, refer to the following cable routing scenarios depending on your server configuration:

- “Cable routing for onboard configuration” on page 355
- “Cable routing with an SFF HBA/RAID adapter” on page 356
- “Cable routing for 4 x 2.5-inch front SAS/SATA drive bays with an 8i CFF RAID adapter (Gen 3) installed” on page 357

Cable routing for onboard configuration

The following table shows the mapping relationship between backplane connectors and processor board connectors for onboard configuration.

The following figure illustrates the cable routing for the onboard configuration of 4 x 2.5-inch front AnyBay drive bays. Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

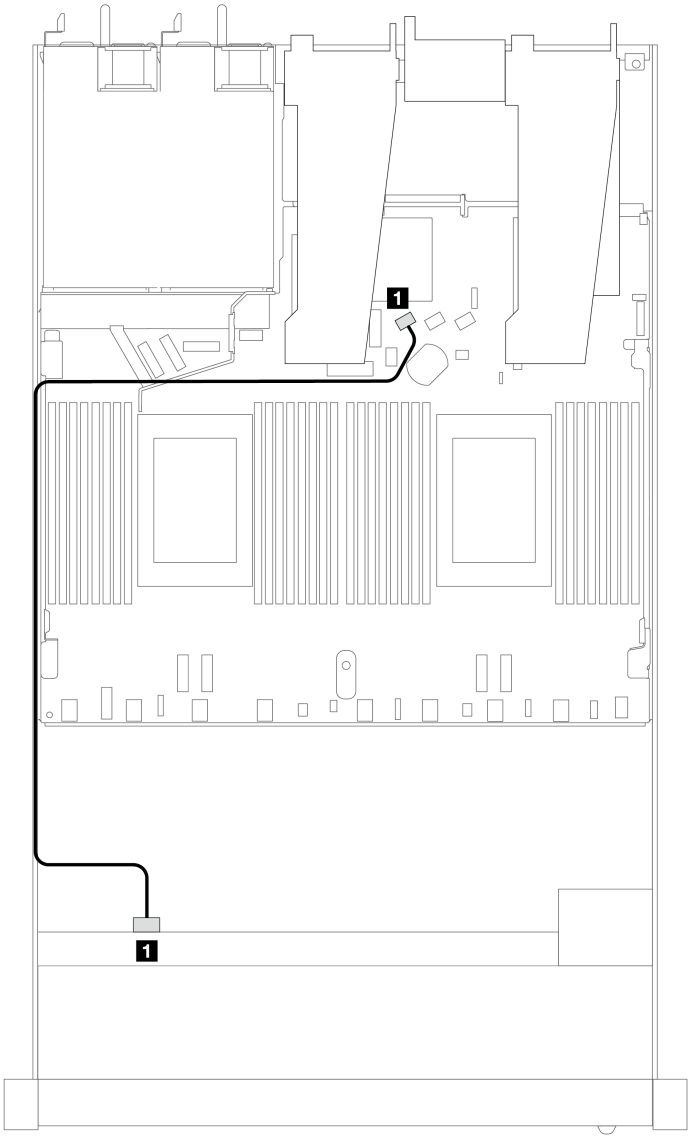


Figure 332. Cable routing for onboard configuration of 4 x 2.5-inch front AnyBay drive bays

Table 100. Mapping between backplane and processor board for onboard configuration

Backplanes	From	To
Front BP (SAS)	SAS	SATA 0

Cable routing with an SFF HBA/RAID adapter

The following table shows the mapping relationship between backplane connectors and processor board/adapter connectors when an 8i SFF HBA/RAID adapter (Gen 3 or Gen 4) is installed.

The following figure illustrates the cable routing for the configuration of 4 x 2.5-inch front AnyBay drive bays with an 8i SFF RAID adapter. Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

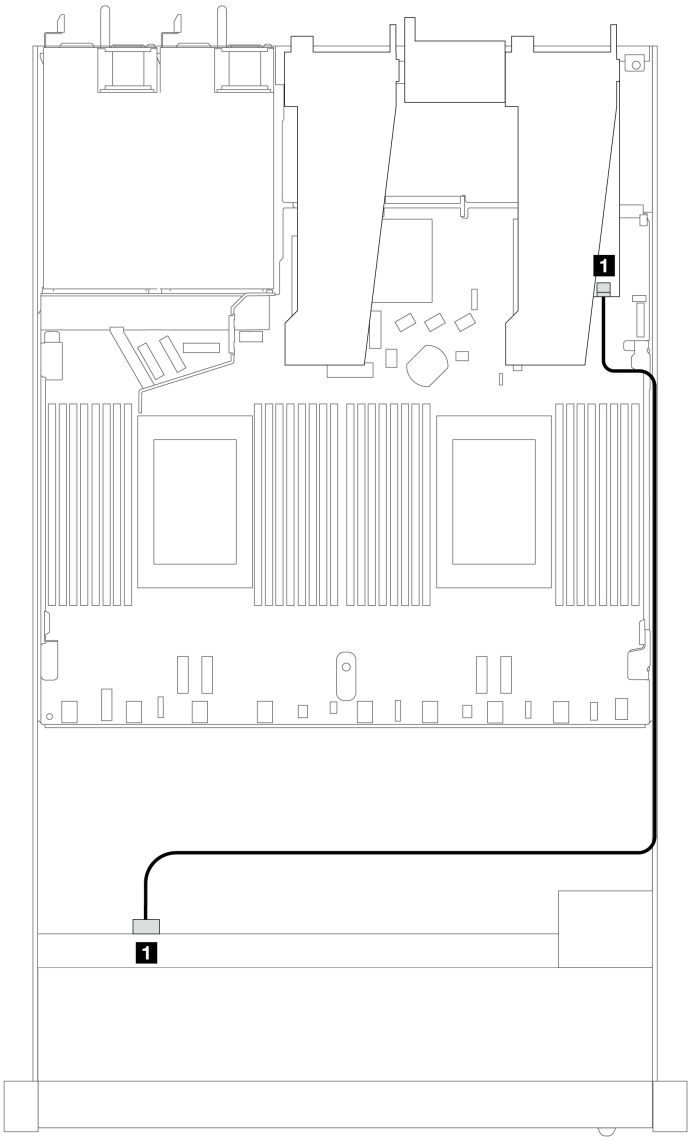


Figure 333. Cable routing for 4 x 2.5-inch front AnyBay drive bays with an 8i SFF RAID adapter

Table 101. Mapping between backplane and processor board/adapter when an SFF HBA/RAID adapter is installed

Backplanes	From	To
Front BP (SAS)	SAS	C0

Notes:

- Gen 3 and Gen 4 SFF HBA/RAID adapters are slightly different in their connectors, but the cable routing method is similar.
- To connect cables for RAID flash power module, refer to “RAID flash power modules” on page 240.

Cable routing for 4 x 2.5-inch front SAS/SATA drive bays with an 8i CFF RAID adapter (Gen 3) installed

The following table shows the mapping relationship between backplane connectors and processor board/adapter connectors when an 8i CFF RAID adapter (Gen 3) is installed.

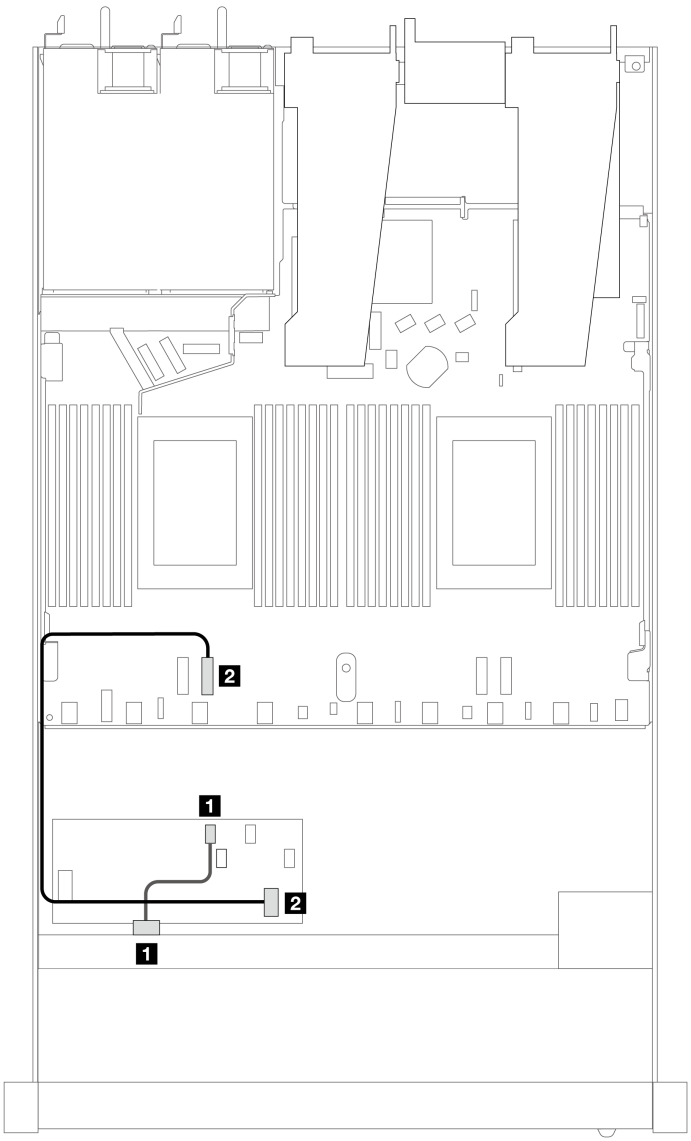


Figure 334. Cable routing for 4 x 2.5-inch front SAS/SATA drive bays with an 8i CFF RAID adapter installed

Table 102. Mapping between backplane and processor board/adapter when a CFF RAID adapter is installed

Backplanes	From	To
Front BP (SAS)	SAS	C0
CFF RAID adapter	MB input	PCIe 3

4 x 2.5'' NVMe backplane

Use this section to understand the NVMe backplane cable routing for server model with four 2.5-inch front drives.

To connect cables for a 7mm drive backplane, refer to “7mm drive backplane” on page 247.

To connect power cables for a backplane for standard 2.5-inch or 3.5-inch drives, refer to “Cable routing for backplane power” on page 251.

To connect signal cables for a backplane for standard 4 x 2.5-inch front drives, refer to the following cable routing scenarios depending on your server configuration:

- “Cable routing for onboard configuration with two processors” on page 358

Cable routing for onboard configuration with two processors

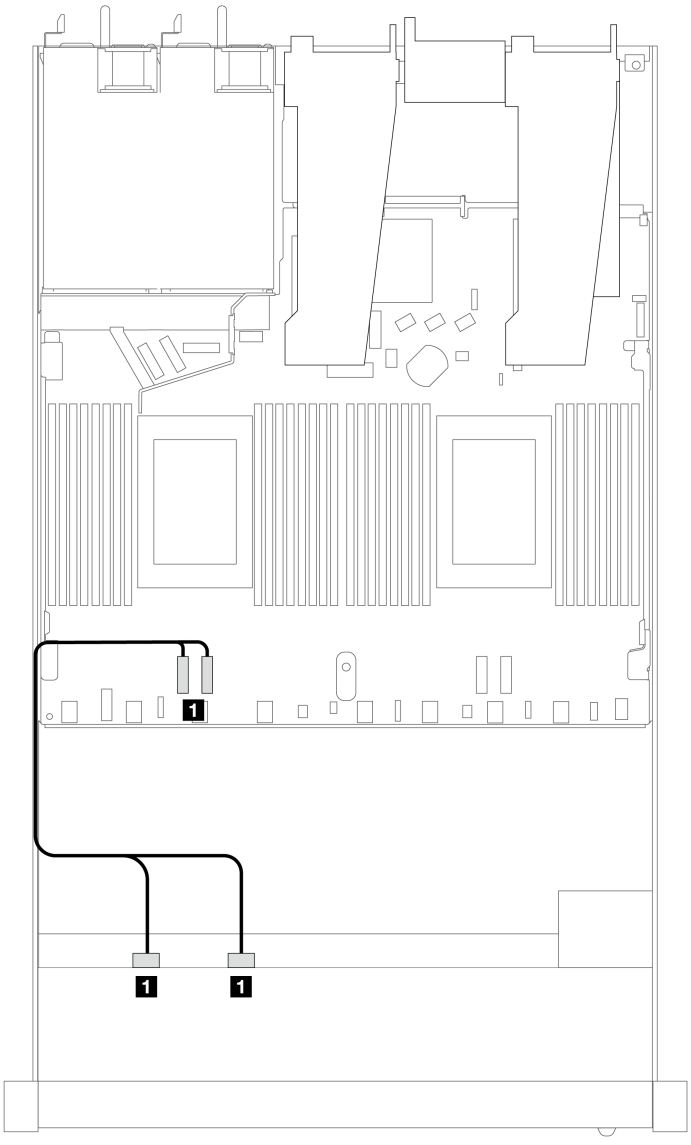


Figure 335. Cable routing for onboard configuration of 4 x 2.5-inch front NVMe drive bays with two processors

Table 103. Mapping between backplane and processor board for onboard configuration

Backplanes	From	To
Front BP (NVMe)	NVMe 0–1, NVMe 2–3	PCIe 3, PCIe 4

4 x 2.5'' U.3 front drives with 4 x 3.5'' AnyBay backplane

Use this section to understand the cable routing for four U.3 drives with 4 x 3.5'' Anybay backplane and two processors installed.

Cable routing with an SFF HBA/RAID adapter

The following illustrations and tables show the mapping relationship between backplane connectors and an 8i SFF RAID adapter (Gen 4).

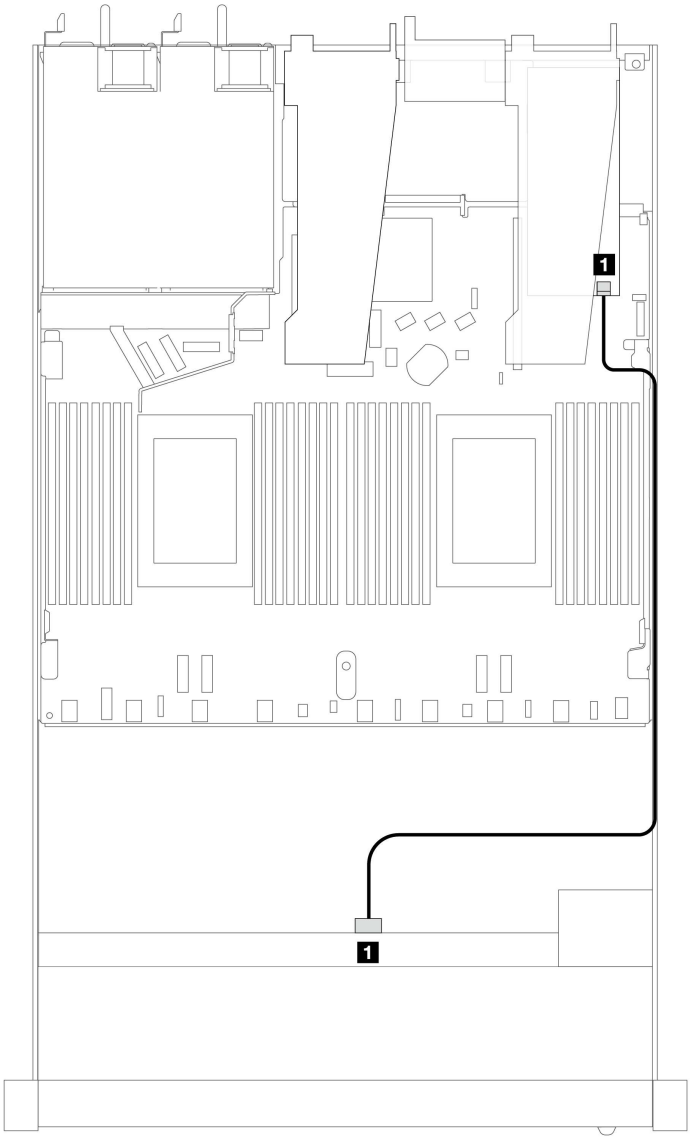


Figure 336. Cable routing for 4 x 2.5-inch front U.3 drives with an 8i SFF RAID adapter (Gen 4)

Table 104. Mapping between one front AnyBay backplane and an SFF HBA/RAID adapter

Backplane	From	To
Front BP (SAS)	SAS	C0

4 x 2.5'' front drives with front riser assembly

Use the section to understand the cable routing for signal cable connections for 4 x 2.5'' front drives with the front riser assembly.

4 x 2.5'' front drives with front riser assembly (Gen 4 backplane)

Use the section to understand the cable routing for signal cable connections for 4 x 2.5'' front drives with the front riser assembly and Gen 4 front backplanes installed.

4 x 2.5'' SAS/SATA backplane (Gen 4 backplane)

Use this section to understand the SAS/SATA backplane cable routing for server model with four 2.5-inch front drives and the front riser assembly installed.

To connect cables for a 7mm drive backplane, refer to “7mm drive backplane” on page 247.

To connect power cables for a backplane for standard 2.5-inch or 3.5-inch drives, refer to “Cable routing for backplane power” on page 251.

To connect cables for the rear NVMe drives, refer to “Rear NVMe drive backplane” on page 249.

To connect signal cables for a backplane for standard 4 x 2.5-inch front drives, refer to the following cable routing scenarios depending on your server configuration:

- “Cable routing for onboard configuration” on page 361
- “Cable routing with an SFF HBA/RAID adapter” on page 362

Cable routing for onboard configuration

The following table shows the mapping relationship between backplane connectors and processor board connectors for onboard configuration.

The following figure illustrates the cable routing for the onboard configuration of 4 x 2.5-inch front AnyBay drive bays. Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

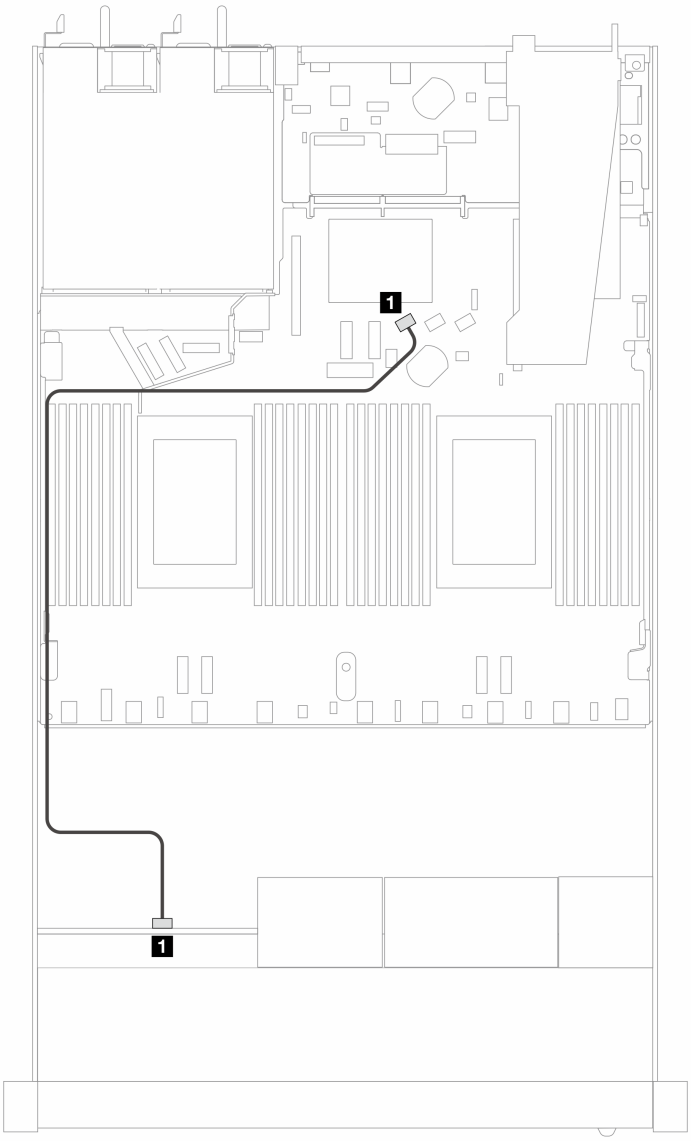


Figure 337. Cable routing for onboard configuration of 4 x 2.5-inch front SAS/SATA drives

Table 105. Mapping between backplane and processor board for onboard configuration

Backplanes	From	To
Front BP (SAS)	1 SAS	1 SATA 0

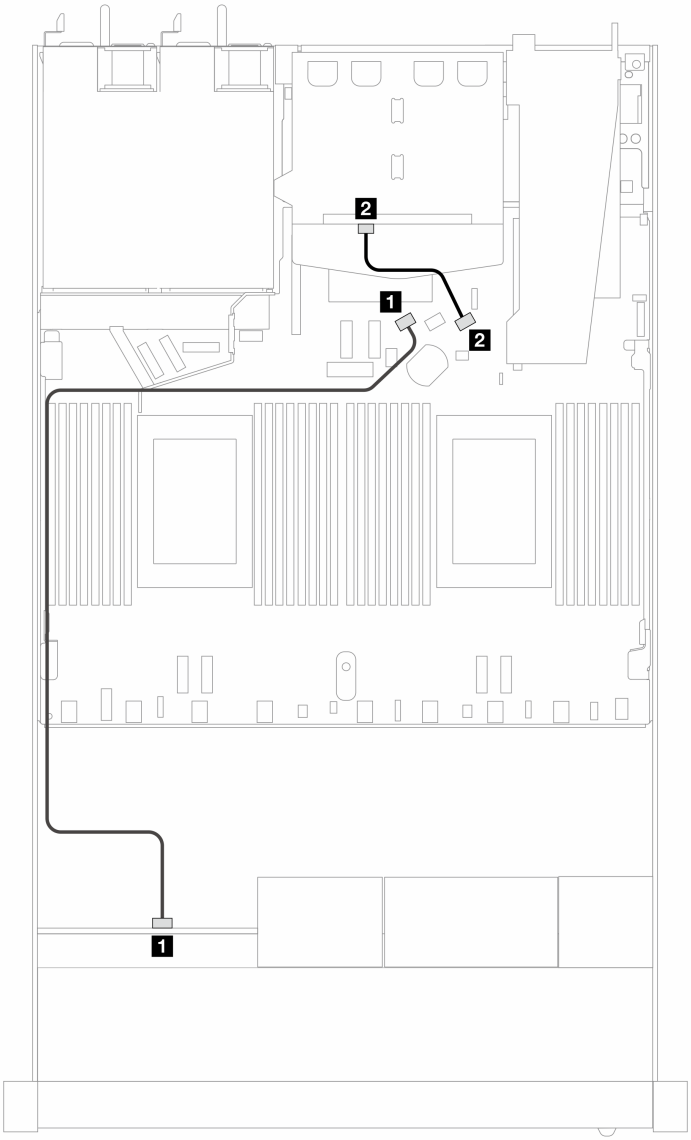


Figure 338. Cable routing for onboard configuration of 4 x 2.5-inch front SAS/SATA drives and 2 x 2.5-inch rear SAS/SATA drives

Table 106. Mapping between backplane and processor board for onboard configuration

Backplanes	From	To
Front BP (SAS)	1 SAS	1 SATA 0
Rear BP (SAS)	2 SAS	2 SATA 2

Cable routing with an SFF HBA/RAID adapter

The following table shows the mapping relationship between backplane connectors and processor board/adapter connectors when an 8i SFF HBA/RAID adapter (Gen 3 or Gen 4) is installed.

The following figure illustrates the cable routing for the configuration of 4 x 2.5-inch front AnyBay drive bays with an 8i SFF RAID adapter. Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

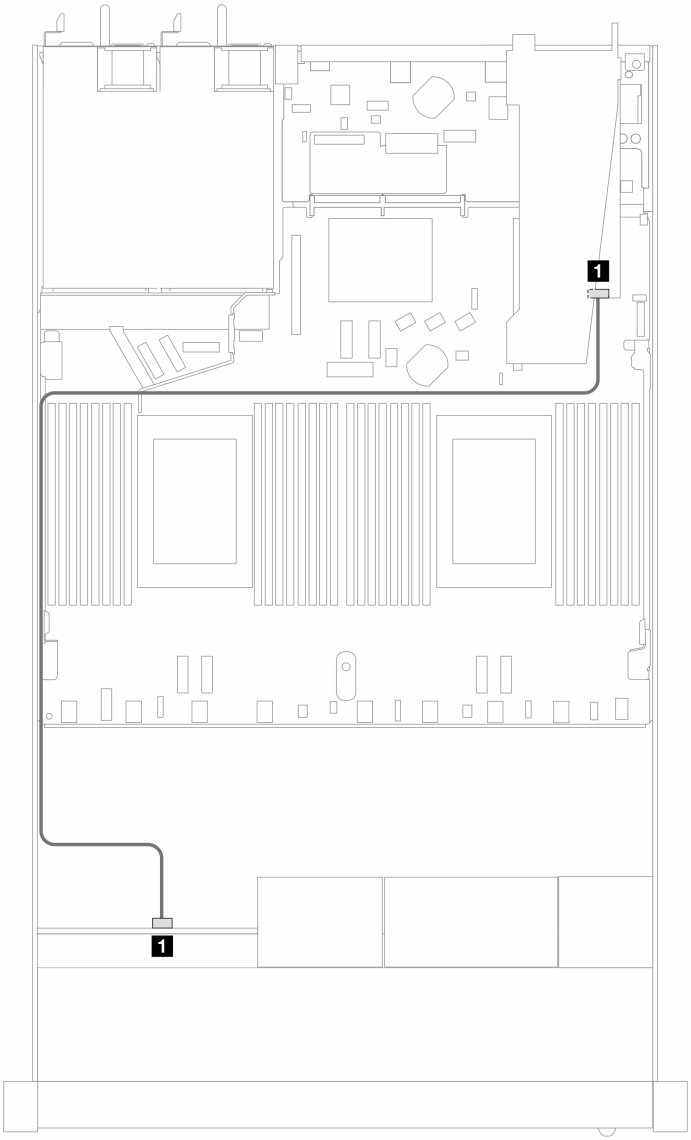


Figure 339. Cable routing for 4 x 2.5-inch front SAS/SATA drive bays with an 8i SFF RAID adapter (Gen 3/4)

Table 107. Mapping between backplane and processor board/adapter when an SFF HBA/RAID adapter is installed

Backplanes	From	To
Front BP (SAS)	1 SAS	1 C0

Notes:

- Gen 3 and Gen 4 SFF HBA/RAID adapters are slightly different in their connectors, but the cable routing method is similar.
- To connect cables for RAID flash power module, refer to "RAID flash power modules" on page 240.

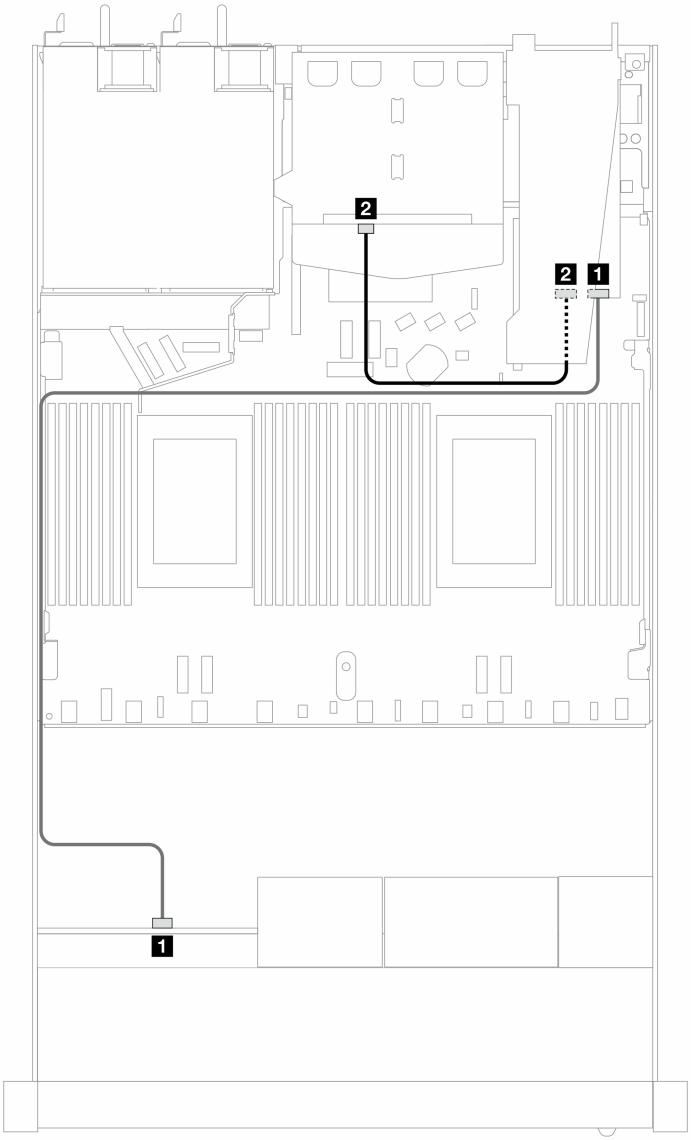


Figure 340. Cable routing for 4 x 2.5-inch front AnyBay drive bays with an 8i SFF RAID adapter (Gen 3) and 2 x 2.5-inch rear SAS/SATA drives

Table 108. Mapping between backplane and processor board/adapter when an SFF HBA/RAID adapter is installed

Backplanes	**From**	**To**
Front BP (SAS)	1 SAS (front)	1 C0
Rear BP (SAS)	2 SAS (rear)	2 C1

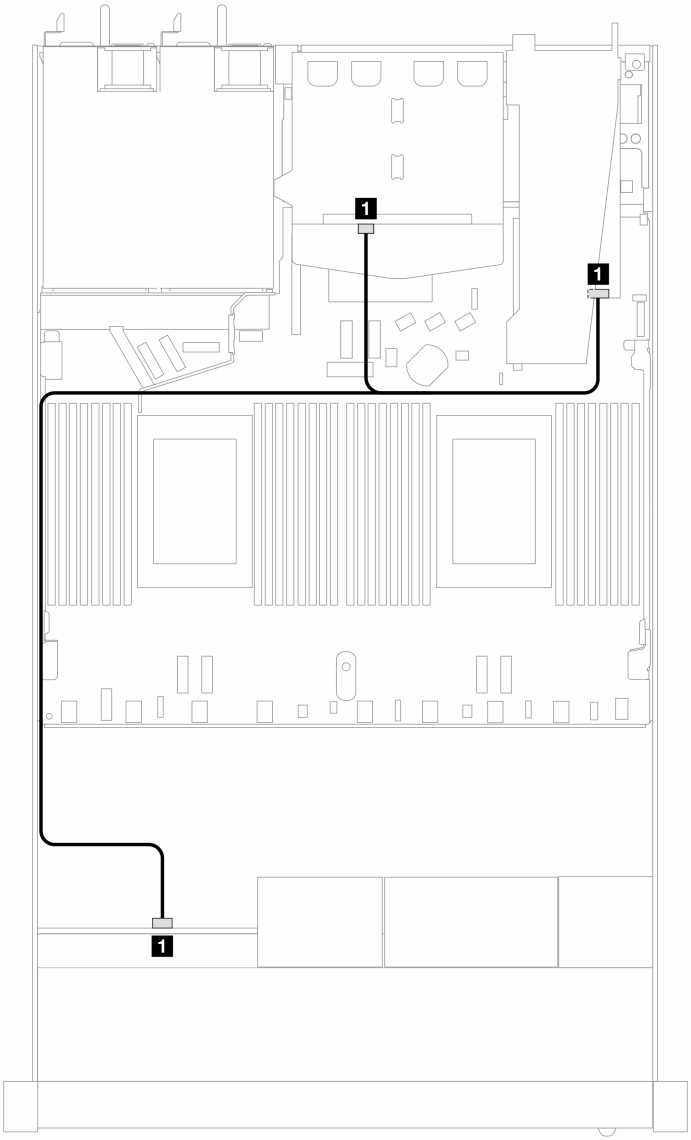


Figure 341. Cable routing for 4 x 2.5-inch front AnyBay drive bays with an 8i SFF RAID adapter (Gen 4) and 2 x 2.5-inch rear SAS/SATA drives

Table 109. Mapping between backplane and processor board/adapter when an SFF HBA/RAID adapter is installed

Backplanes	From	To
Front and rear BP (SAS)	1 SAS (front and rear)	1 C0

4 x 2.5'' NVMe backplane (Gen 4 backplane)

Use this section to understand the NVMe backplane cable routing for server model with four 2.5-inch front drives.

To connect cables for a 7mm drive backplane, refer to “7mm drive backplane” on page 247.

To connect power cables for a backplane for standard 2.5-inch or 3.5-inch drives, refer to “Cable routing for backplane power” on page 251.

To connect cables for the front riser assembly, refer to “Front riser assembly” on page 237.

To connect cables for the rear NVMe drives, refer to “Rear NVMe drive backplane” on page 249.

Cable routing for onboard configuration

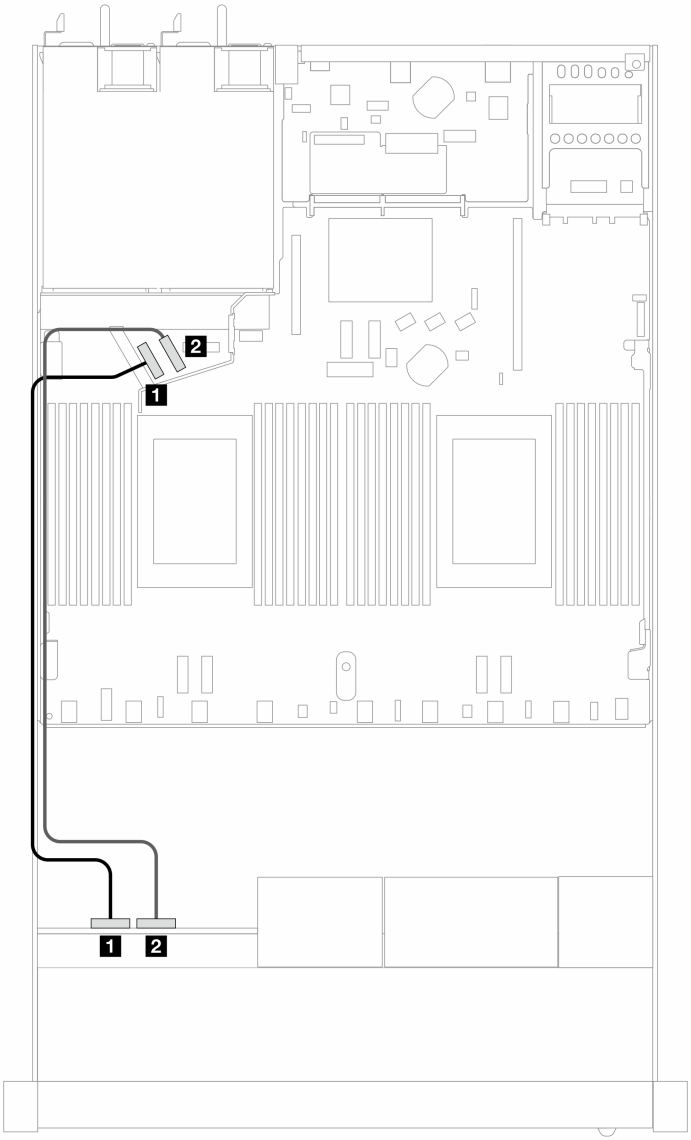


Figure 342. Cable routing for onboard configuration of 4 x 2.5-inch front NVMe drives

Table 110. Mapping between backplane and processor board for onboard configuration

Backplanes	From	To
Front BP (NVMe)	1 NVMe 0–1	1 PCIe 5
	2 NVMe 2–3	2 PCIe 6

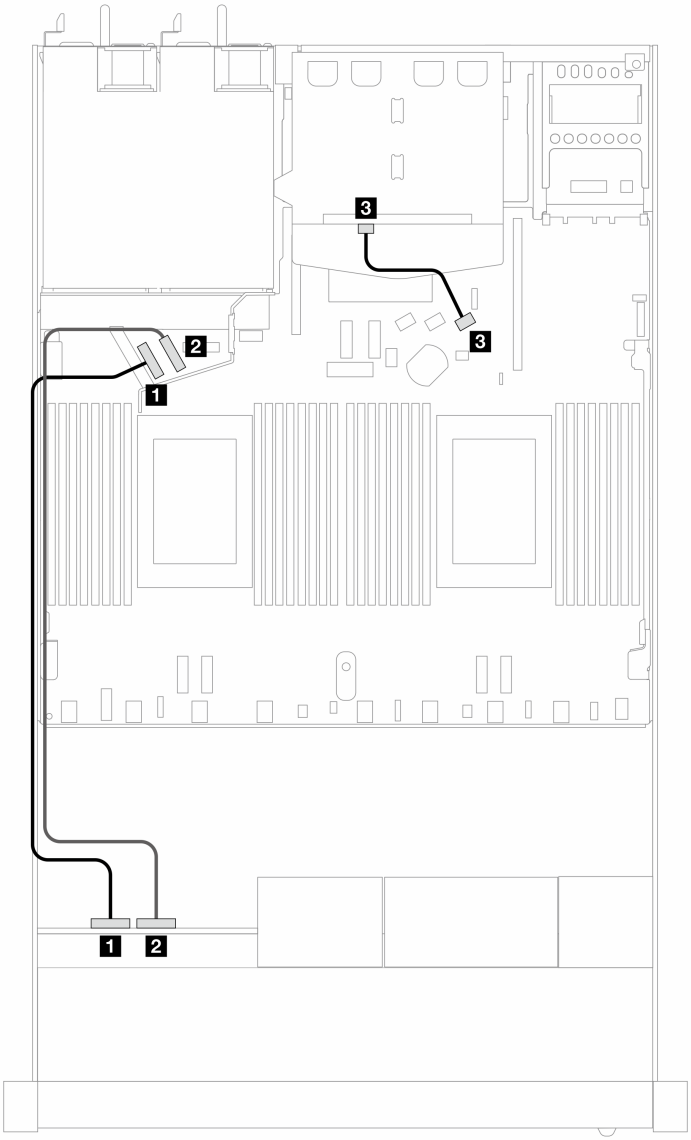


Figure 343. Cable routing for onboard configuration of 4 x 2.5-inch front NVMe drives and 2 x 2.5-inch rear SAS/SATA drives

Table 111. Mapping between backplane and processor board for onboard configuration

Backplanes	From	To
Front BP (NVMe)	1 NVMe 0–1	1 PCIe 5
	2 NVMe 2–3	2 PCIe 6
Rear BP (SAS)	3 SAS	3 SATA 2

4 x 2.5'' front drives with front riser assembly (Gen 5 backplane)

Use the section to understand the cable routing for signal cable connections for 4 x 2.5'' front drives with the front riser assembly and 4 x 2.5'' Gen 5 AnyBay backplane installed.

To connect cables for a 7mm drive backplane, refer to “7mm drive backplane” on page 247.

To connect power cables for a backplane for standard 2.5-inch or 3.5-inch drives, refer to “Cable routing for backplane power” on page 251.

To connect cables for the front riser assembly, refer to “Front riser assembly” on page 237.

To connect cables for the rear NVMe drives, refer to “Rear NVMe drive backplane” on page 249.

- “Cable routing for onboard configuration” on page 368
- “Cable routing with an SFF HBA/RAID adapter” on page 372

Cable routing for onboard configuration

The following table shows the mapping relationship between backplane connectors and processor board connectors for onboard configuration.

The following figure illustrates the cable routing for the onboard configuration of 4 x 2.5-inch front AnyBay drive bays. Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

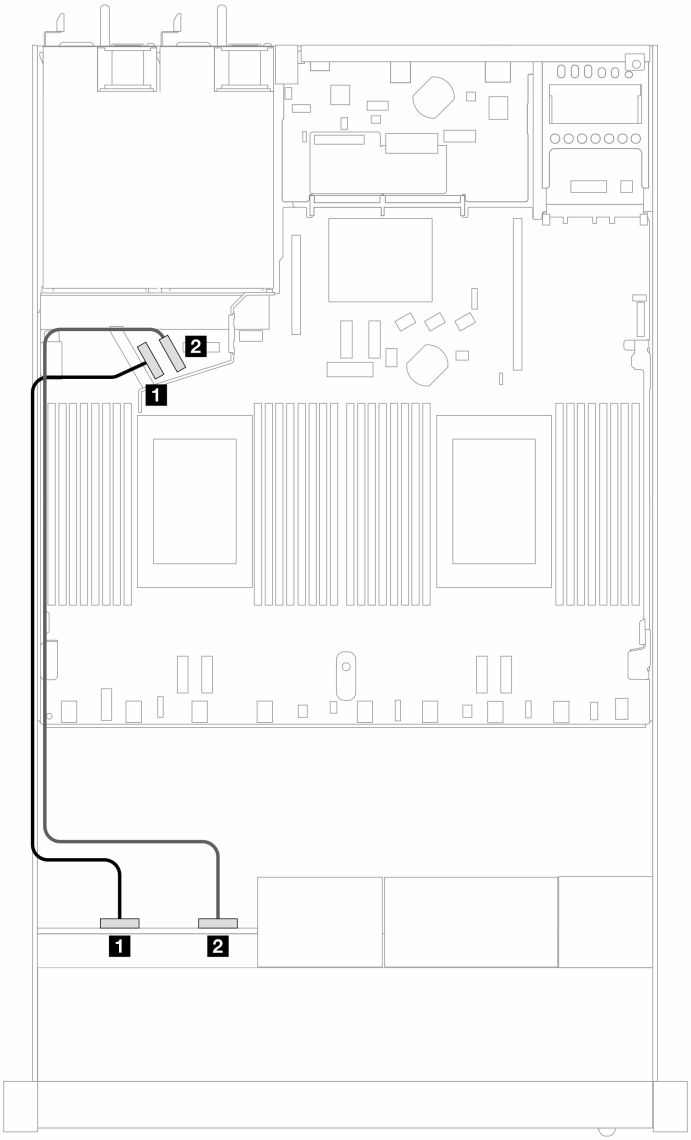


Figure 344. Cable routing for onboard configuration of 4 x 2.5-inch front NVMe drives

Table 112. Mapping between backplane and processor board for onboard configuration

Backplanes	**From**	**To**
Front BP (NVMe)	1 NVMe 0–1	1 PCIe 5
	2 NVMe 2–3	2 PCIe 6

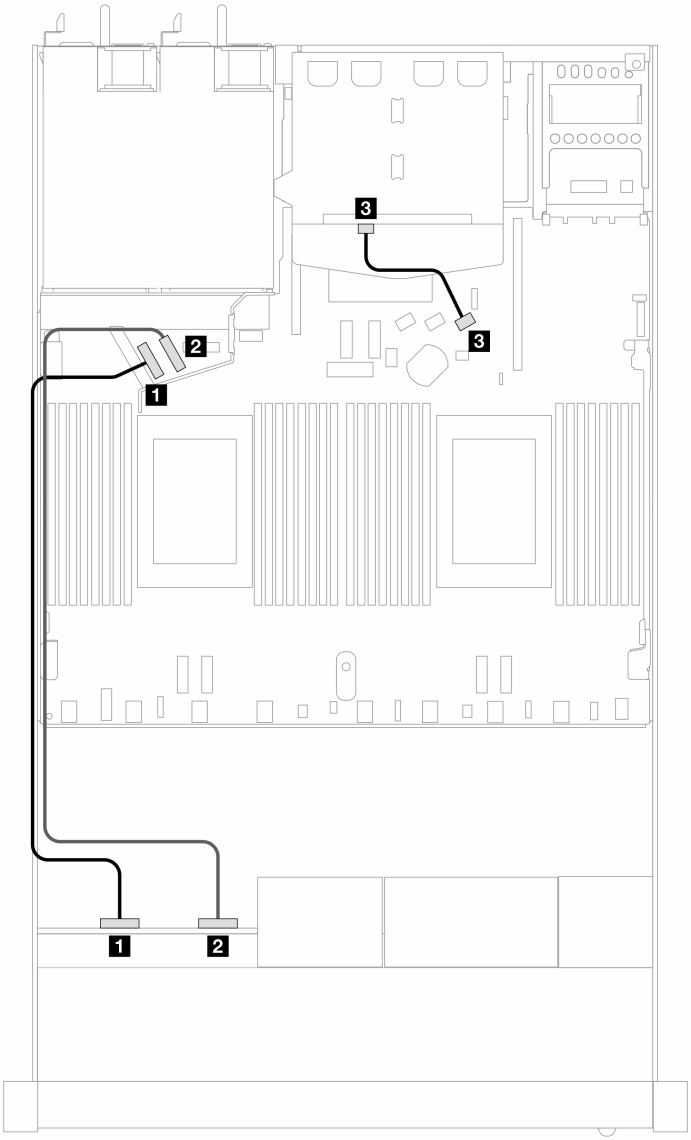


Figure 345. Cable routing for onboard configuration of 4 x 2.5-inch front NVMe drives and 2 x 2.5-inch rear SAS/SATA drives

Table 113. Mapping between backplane and processor board for onboard configuration

Backplanes	**From**	**To**
Front BP (NVMe)	1 NVMe 0–1	1 PCIe 5
	2 NVMe 2–3	2 PCIe 6
Rear BP (SAS)	3 SAS (rear)	3 SATA 2

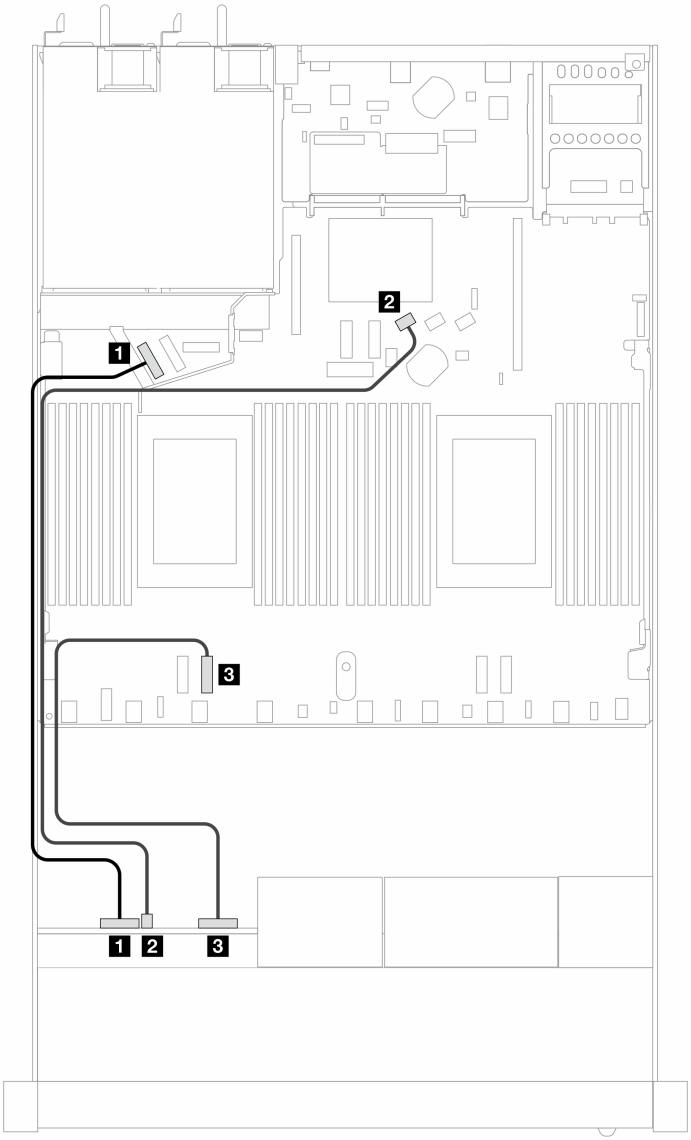


Figure 346. Cable routing for onboard configuration of 4 x 2.5-inch front AnyBay drives

Table 114. Mapping between backplane and processor board for onboard configuration

Backplanes	**From**	**To**
Front BP (NVMe)	1 NVMe 0–1	1 PCIe 5
Front BP (SAS)	2 SAS (front)	2 SATA 0
Front BP (NVMe)	3 NVMe 2–3	3 PCIe 3

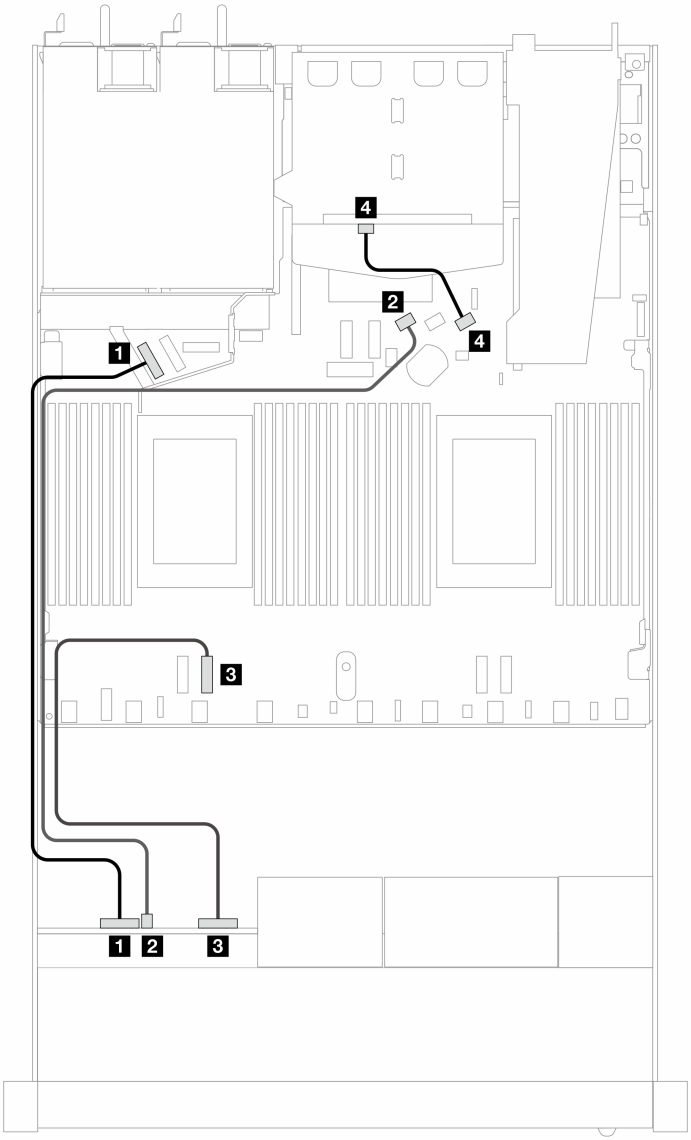


Figure 347. Cable routing for onboard configuration of 4 x 2.5-inch front AnyBay drives and 2 x 2.5-inch rear SAS/SATA drives

Table 115. Mapping between backplane and processor board for onboard configuration

Backplanes	From	To
Front BP (NVMe)	1 NVMe 0–1	1 PCIe 5
Front BP (SAS)	2 SAS (front)	2 SATA 0
Front BP (NVMe)	3 NVMe 2–3	3 PCIe 3
Rear BP (SAS)	4 SAS (rear)	4 SATA 2

Cable routing with an SFF HBA/RAID adapter

The following table shows the mapping relationship between backplane connectors and processor board/ adapter connectors when an 8i SFF HBA/RAID adapter (Gen 3 or Gen 4) is installed.

The following figure illustrates the cable routing for the configuration of 4 x 2.5-inch front AnyBay drive bays with an 8i SFF RAID adapter. Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n

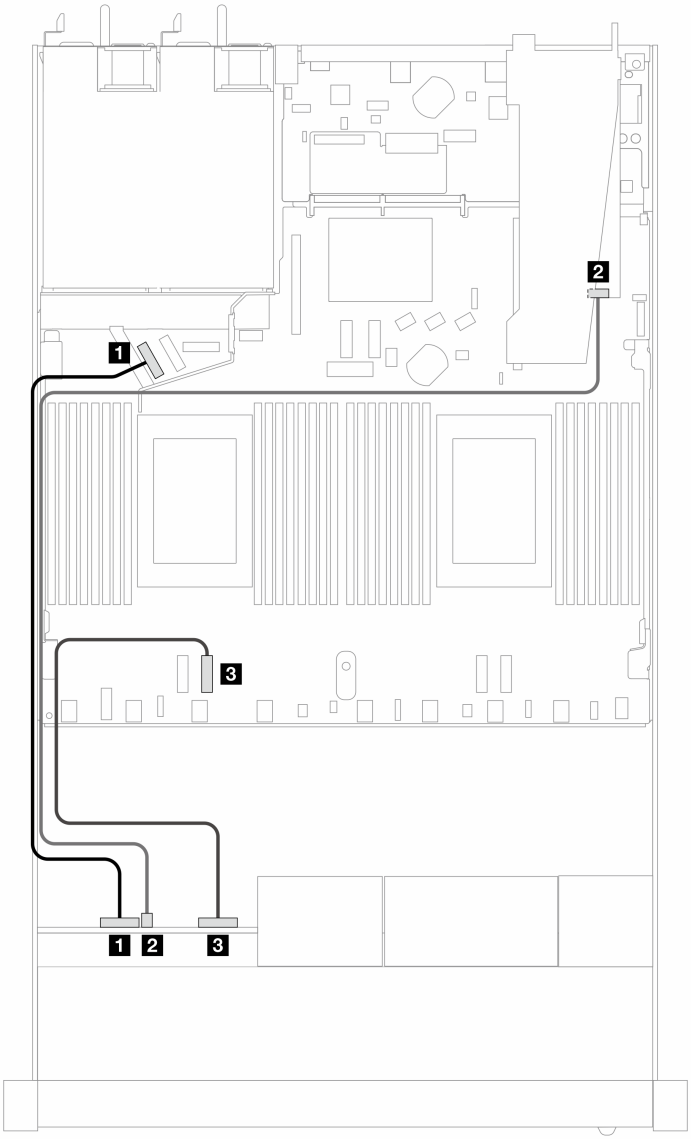


Figure 348. Cable routing for 4 x 2.5-inch front AnyBay drive bays with an 8i SFF RAID adapter (Gen 3/4)

Table 116. Mapping between backplane and processor board for onboard configuration

Backplanes	**From**	**To**
Front BP (NVMe)	1 NVMe 0–1	1 PCIe 5
Front BP (SAS)	2 SAS (front)	2 C0
Front BP (NVMe)	3 NVMe 2–3	3 PCIe 3

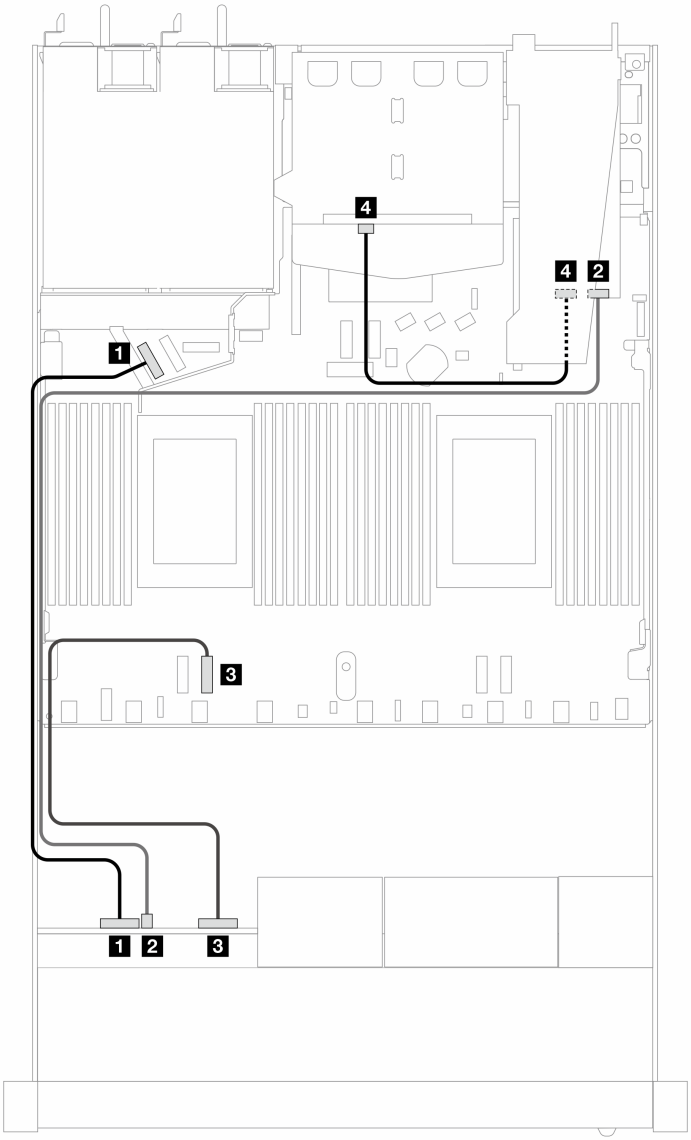


Figure 349. Cable routing for 4 x 2.5-inch front AnyBay drive bays with an 8i SFF RAID adapter (Gen 3) and 2 x 2.5-inch rear SAS/SATA drives

Table 117. Mapping between backplane and processor board/adapter when an SFF HBA/RAID adapter is installed

Backplanes	**From**	**To**
Front BP (NVMe)	1 NVMe 0–1	1 PCIe 5
Front BP (SAS)	2 SAS (front)	2 C0
Front BP (NVMe)	3 NVMe 2–3	3 PCIe 3
Rear BP (SAS)	4 SAS (rear)	4 C1

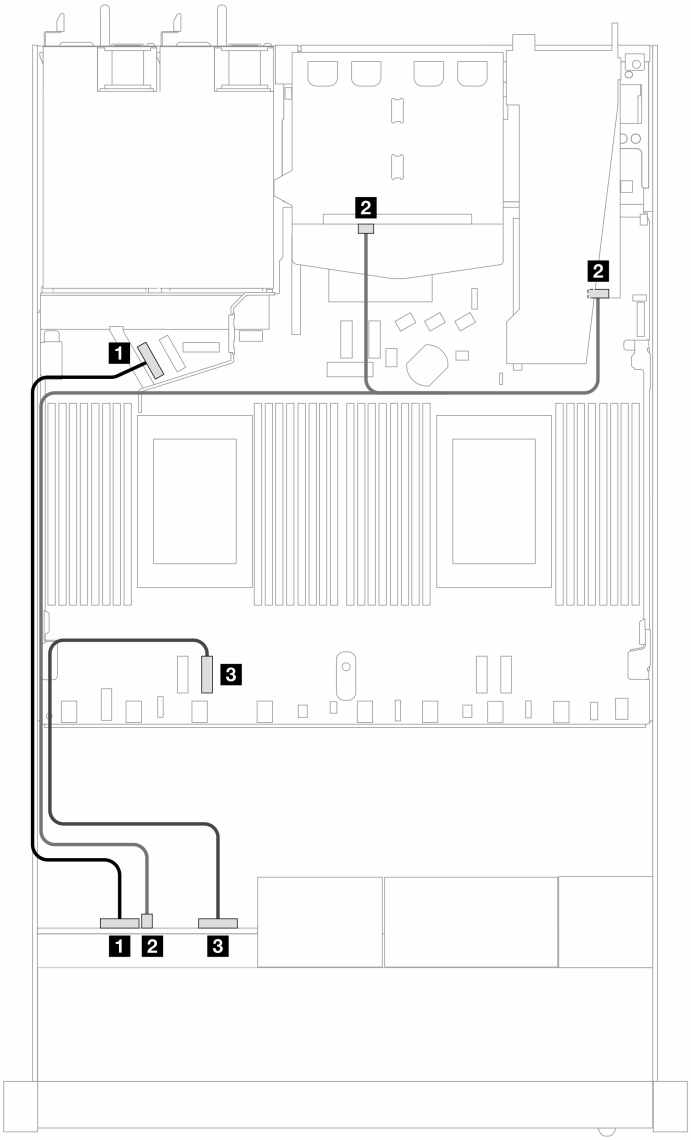


Figure 350. Cable routing for 4 x 2.5-inch front AnyBay drive bays with an 8i SFF RAID adapter (Gen 4) and 2 x 2.5-inch rear SAS/SATA drives

Table 118. Mapping between backplane and processor board/adapter when an SFF HBA/RAID adapter is installed

Backplanes	**From**	**To**
Front BP (NVMe)	1 NVMe 0–1	1 PCIe 5
Front and rear BP (SAS)	2 SAS (front and rear)	2 C0
Front BP (NVMe)	3 NVMe 2–3	3 PCIe 3

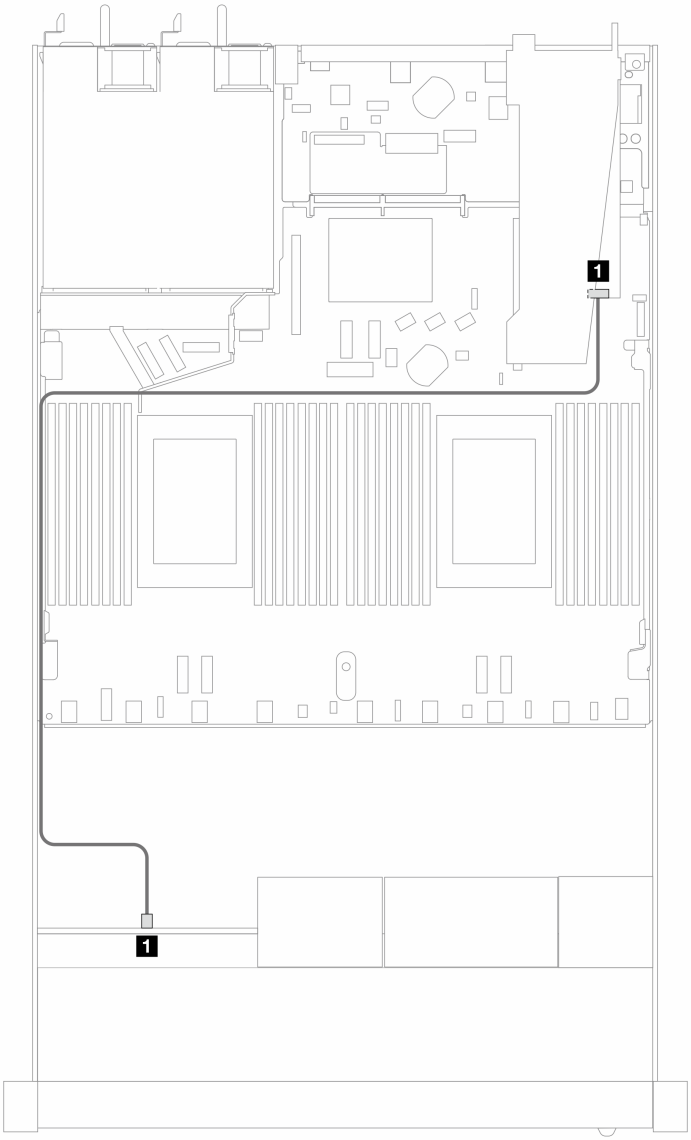


Figure 351. Cable routing for 4 x 2.5-inch front AnyBay drive bays with an 8i SFF RAID adapter (Gen 4 Tri-mode)

Table 119. Mapping between backplane and processor board/adapter when an SFF HBA/RAID adapter is installed

Backplanes	From	To
Front BP (SAS)	2 SAS (front)	2 C0

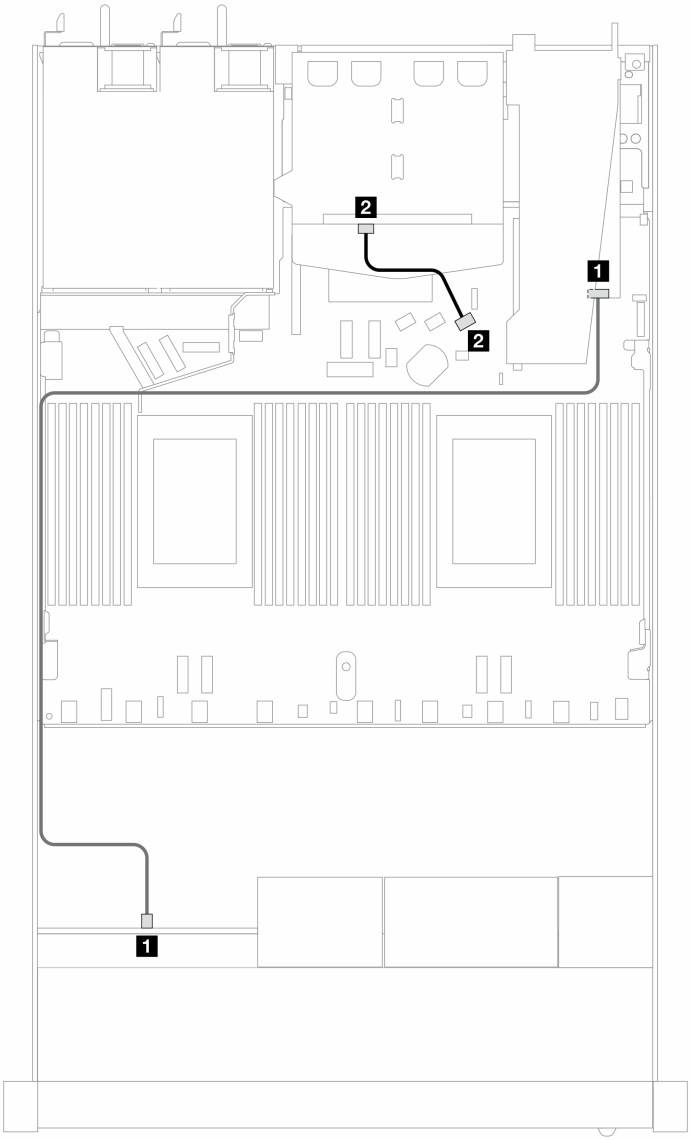


Figure 352. Cable routing for 4 x 2.5-inch front AnyBay drive bays with an 8i SFF RAID adapter (Gen 4 Tri-mode) and 2 x 2.5-inch rear SAS/SATA drives

Table 120. Mapping between backplane and processor board/adapter when an SFF HBA/RAID adapter is installed

Backplanes	**From**	**To**
Front BP (SAS)	1 SAS (front)	1 C0
Rear BP (SAS)	2 SAS (rear)	2 C1

8 x 2.5'' front drives

Use the section to understand the cable routing for signal cable connections for 8 x 2.5-inch drive backplanes.

Under the configuration of 8 x 2.5-inch front drives, your server supports the following front backplane:

8 x 2.5'' SAS/SATA backplane

Use this section to understand the SAS/SATA backplane cable routing for server model with eight 2.5-inch front drives.

To connect cables for a 7mm drive backplane, refer to “7mm drive backplane” on page 247.

To connect power cables for a backplane for standard 2.5-inch or 3.5-inch drives, refer to “Cable routing for backplane power” on page 251.

To connect cables for M.2 drives, refer to “M.2 drive backplane” on page 244.

To connect signal cables for a backplane for standard 4 x 3.5-inch front drives, refer to the following cable routing scenarios depending on your server configuration:

- “Cable routing for onboard configuration” on page 378
- “Cable routing with an SFF HBA/RAID adapter” on page 380
- “Cable routing with a CFF RAID adapter” on page 384

Cable routing for onboard configuration

The following illustrations and tables show the mapping relationship between backplane connectors and processor board connectors for onboard configuration.

The following figure illustrates the cable routing for the onboard configuration of 8 x 2.5-inch front SAS/SATA drive bays. Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n.

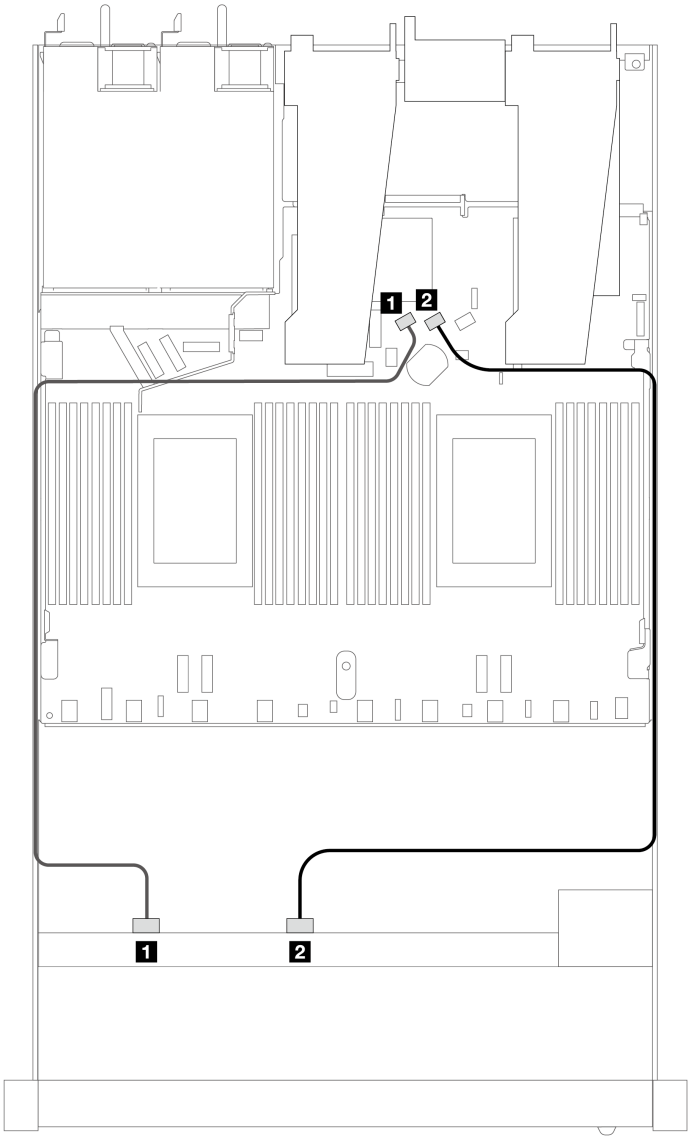


Figure 353. Cable routing for onboard configuration of 8 x 2.5 SAS/SATA front drives

Table 121. Mapping between one front SAS/SATA backplane and processor board for onboard configuration

Backplane	From	To
Front BP (SAS)	1 SAS 0	1 SATA 0
	2 SAS 1	2 SATA 1

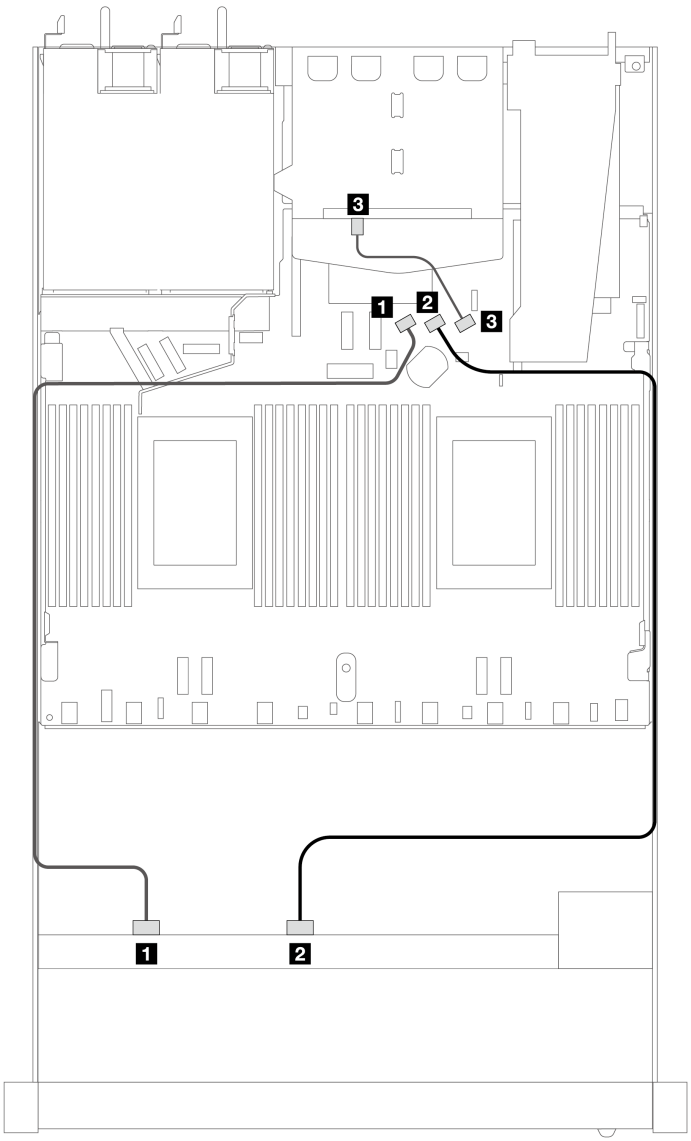


Figure 354. Cable routing for onboard configuration of 8 x 2.5 SAS/SATA front drives with 2 x 2.5 rear SAS/SATA drives installed

Table 122. Mapping between one front and one rear SAS/SATA backplanes and processor board for onboard configuration

Backplane	From	To
Front BP (SAS)	1 SAS 0	1 SATA 0
	2 SAS 1	2 SATA 1
Rear BP (SAS)	3 SAS	3 SATA 2

Cable routing with an SFF HBA/RAID adapter

The following illustrations and tables show the mapping relationship between backplane connectors and an 8i or 16i SFF HBA/RAID adapter (Gen 3 or Gen 4).

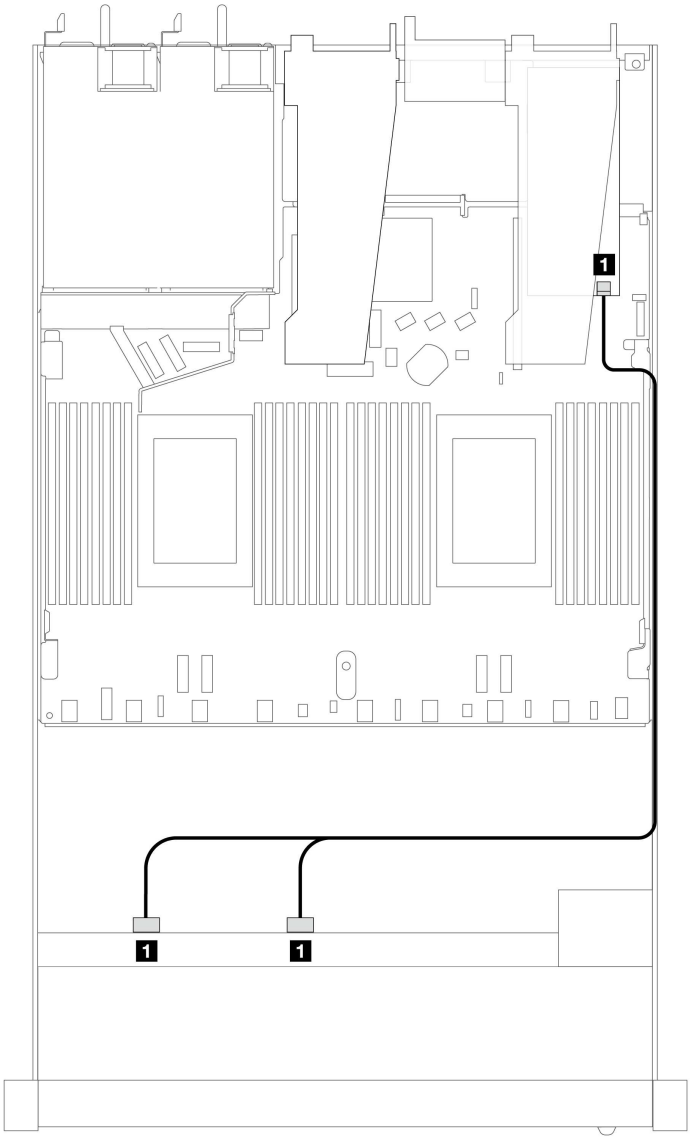


Figure 355. Cable routing for 8 x 2.5-inch front SAS/SATA drive bays with an 8i SFF RAID adapter (Gen 4)

Table 123. Mapping between one front SAS/SATA backplane and an SFF HBA/RAID adapter

Backplane	From	To
Front BP (SAS)	1 SAS 0, SAS 1	1 C0

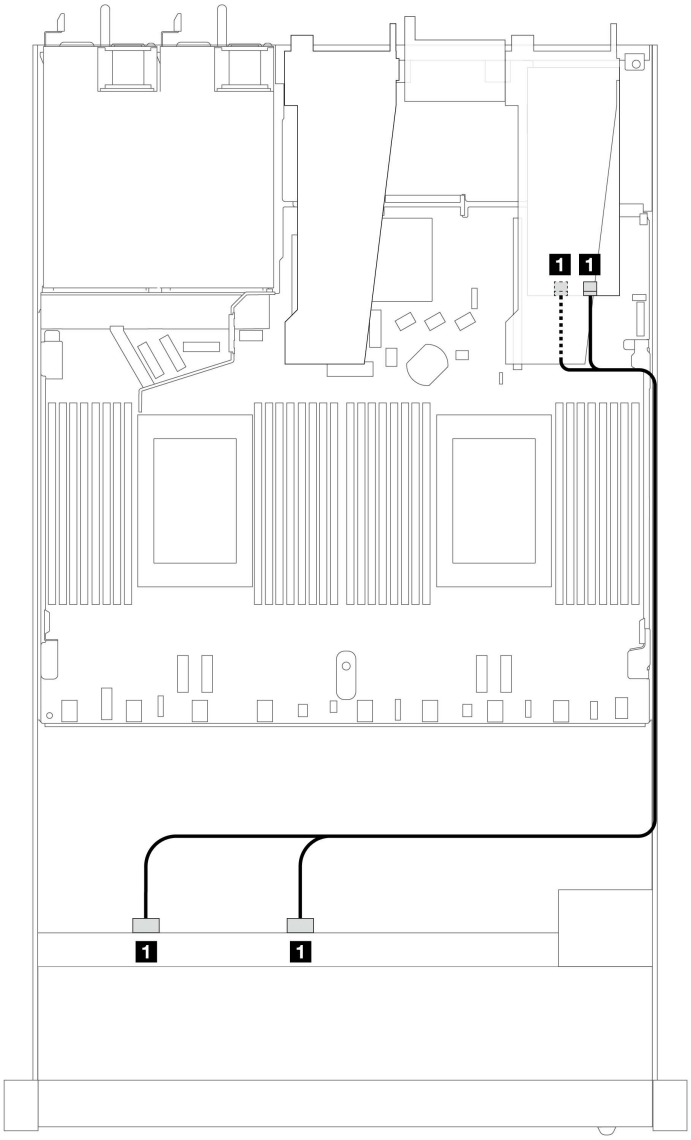


Figure 356. Cable routing for 8 x 2.5-inch front SAS/SATA drive bays with an 8i or 16i SFF RAID adapter (Gen 3)

Table 124. Mapping between one front SAS/SATA backplane and an SFF HBA/RAID adapter

Backplane	From	To
Front BP (SAS)	1 SAS 0, SAS 1	1 C0, C1

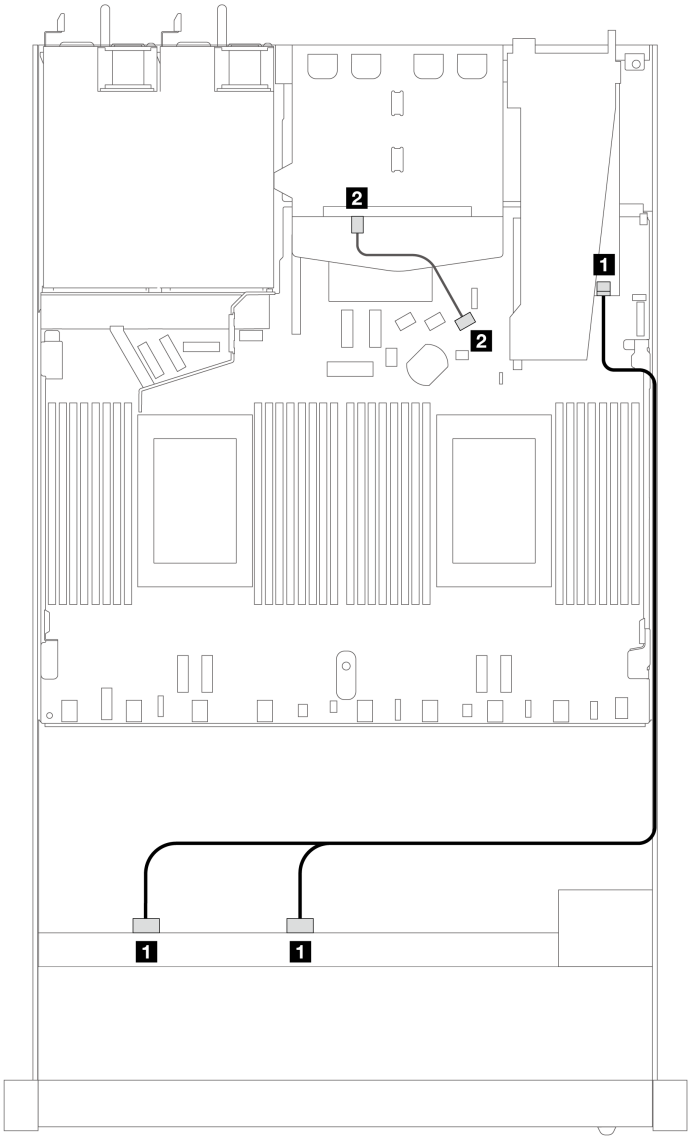


Figure 357. Cable routing for 8 x 2.5-inch front SAS/SATA drive bays with an 8i or 16i SFF RAID adapter (Gen 4) with 2 x 2.5 SAS/SATA rear drives installed

Table 125. Mapping between one front and one rear SAS/SATA backplanes and an SFF HBA/RAID adapter

Backplane	**From**	**To**
Front BP (SAS)	1 SAS 0, SAS 1	1 C0
Rear BP (SAS)	2 SAS	2 SATA 2

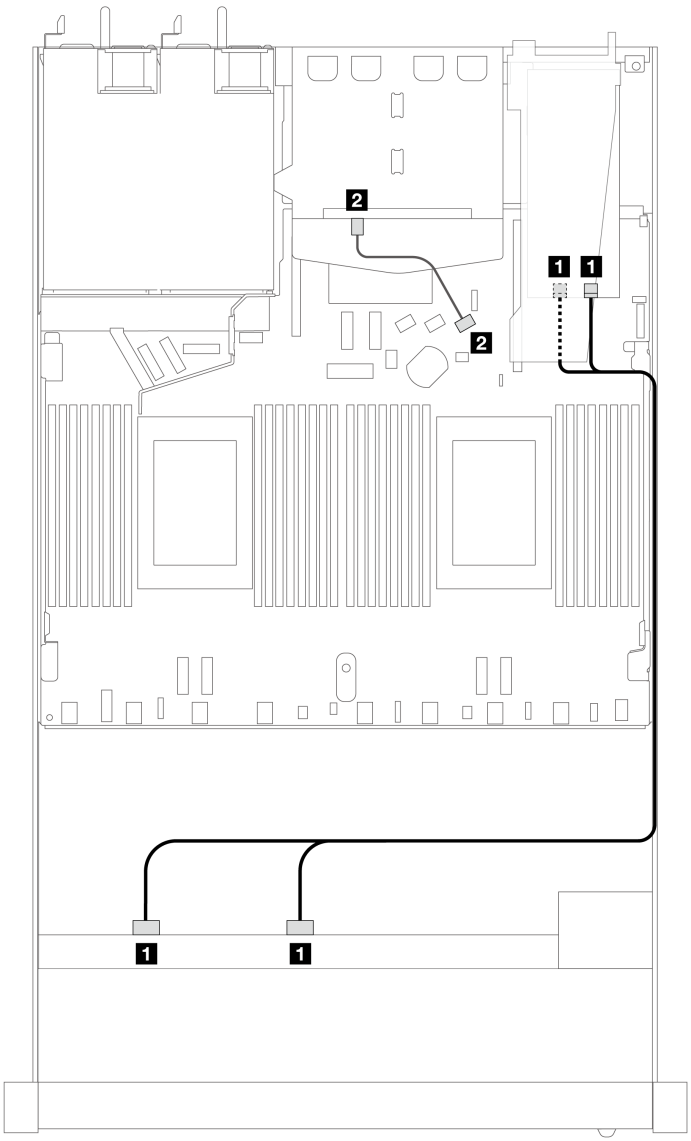


Figure 358. Cable routing for 8 x 2.5-inch front SAS/SATA drive bays with an 8i or 16i SFF RAID adapter (Gen 3) with 2 x 2.5 SAS/SATA rear drives installed

Table 126. Mapping between one front and one rear SAS/SATA backplanes and an SFF HBA/RAID adapter

Backplane	From	To
Front BP (SAS)	1 SAS 0, SAS 1	1 C0, C1
Rear BP (SAS)	2 SAS	2 SATA 2

Cable routing with a CFF RAID adapter

The following illustrations and tables show the mapping relationship between backplane connectors and an 8i or 16i CFF RAID adapter (Gen 3 or Gen 4).

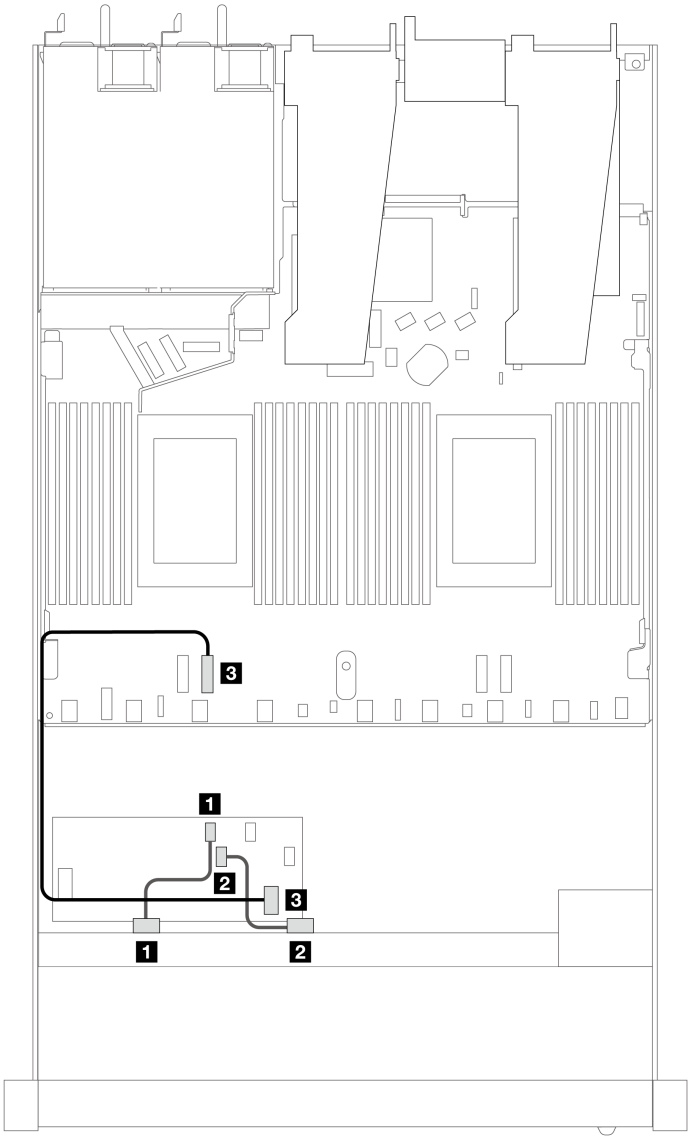


Figure 359. Cable routing for 8 x 2.5-inch front SAS/SATA drive bays with an 8i or 16i CFF RAID adapter (Gen 3 or Gen 4)

Table 127. Mapping between one front SAS/SATA backplane and a CFF RAID adapter

Backplane/adapter	**From**	**To**
Front BP (SAS)	1 SAS 0	1 C0
	2 SAS 1	2 C1
CFF RAID adapter	3 MB input	3 PCIe 3

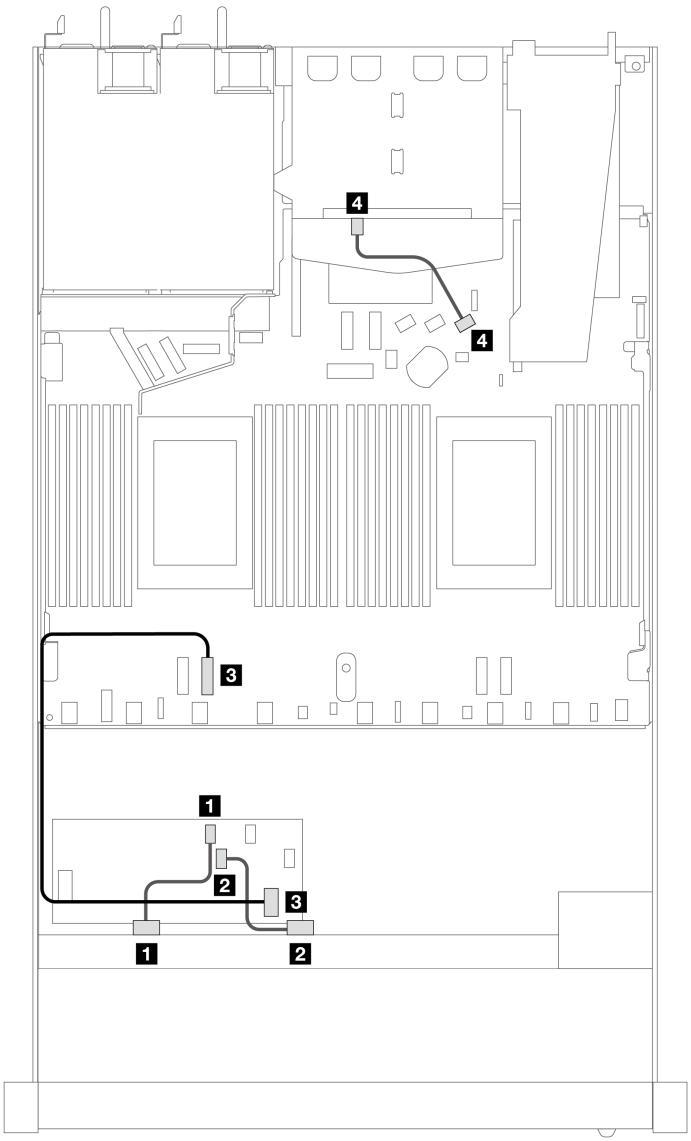


Figure 360. Cable routing for 8 x 2.5-inch front SAS/SATA drive bays with an 8i CFF RAID adapter (Gen 3) with 2 x 2.5 SAS/SATA drives installed

Table 128. Mapping between one front and one rear SAS/SATA backplane and a CFF RAID adapter

Backplane/adapter	**From**	**To**
Front BP (SAS)	1 SAS 0	1 C0
	2 SAS 1	2 C1
CFF RAID adapter	3 MB input	3 PCIe 3
Rear BP (SAS)	4 SAS (rear)	4 SATA 2

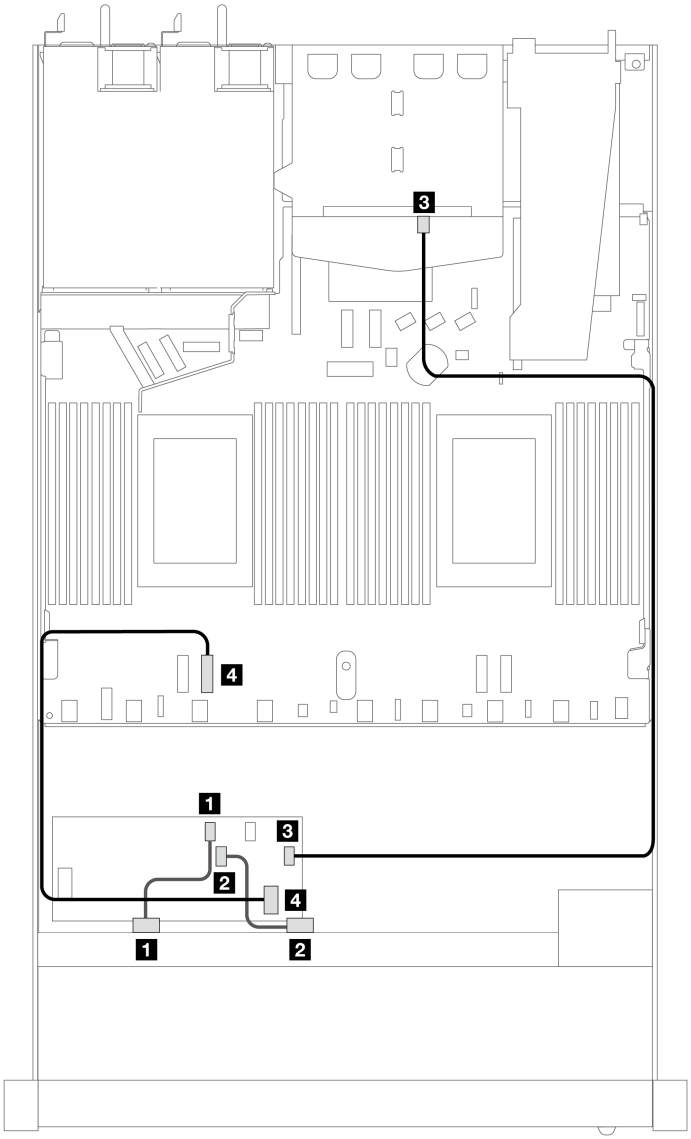


Figure 361. Cable routing for 8 x 2.5-inch front SAS/SATA drive bays with a 16i CFF RAID adapter (Gen 3 or Gen 4) with 2 x 2.5 SAS/SATA drives installed

Table 129. Mapping between one front and one rear SAS/SATA backplane and a CFF RAID adapter

Backplane/adapter	From	To
Front BP (SAS)	1 SAS 0	1 C0
	2 SAS 1	2 C1
CFF RAID adapter	3 C3	3 SAS (rear)
	4 MB input	4 PCIe 3

8 x 2.5'' U.3 drives with 10 x 2.5 AnyBay backplane

Use this section to understand the cable routing for eight U.3 drives with 10 x 2.5 Anybay backplane and two processors installed.

Cable routing with an SFF HBA/RAID adapter

The following illustrations and tables show the mapping relationship between backplane connectors and an 8i SFF RAID adapter (Gen 4).

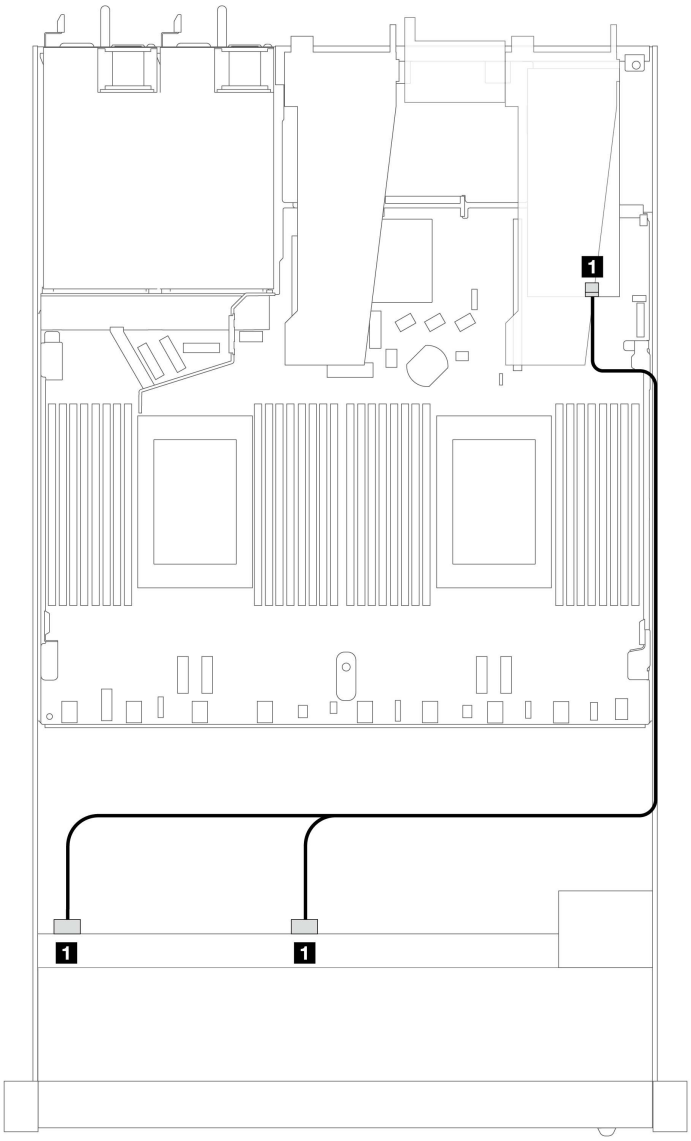


Figure 362. Cable routing for 8 x 2.5-inch front U.3 drives with an 8i SFF RAID adapter (Gen 4)

Table 130. Mapping between one front AnyBay backplane and an SFF HBA/RAID adapter

Backplane	From	To
Front BP (SAS)	SAS 0, SAS 1	C0

10 x 2.5'' front drives

Use the section to understand the cable routing for signal cable connections for 10 x 2.5-inch drive backplanes.

Under the configuration of 10 x 2.5-inch front drives, your server supports the following front backplanes:

6 x 2.5'' SAS/SATA + 4 x 2.5'' AnyBay backplane

Use this section to understand the alternatives that a 6 x SAS/SATA + 4 x AnyBay backplane offers.

With a 6 x SAS/SATA + 4 x AnyBay backplane, following front drive combinations are supported:

6 x 2.5'' SAS/SATA + 4 x 2.5'' AnyBay

See this section to understand the cable routing of 6 front SAS/SATA drives and 4 front AnyBay drives with the 6 x 2.5'' SAS/SATA + 4 x 2.5'' AnyBay backplane installed.

To connect cables for a 7mm drive backplane, refer to “7mm drive backplane” on page 247.

To connect power cables for a backplane for standard 2.5-inch or 3.5-inch drives, refer to “Cable routing for backplane power” on page 251.

To connect cables for M.2 drives, refer to “M.2 drive backplane” on page 244.

To connect signal cables for a backplane for standard 6 front SAS/SATA drives and 4 front AnyBay drives, refer to the following cable routing scenarios depending on your server configuration:

- “Cable routing for onboard configuration” on page 389
- “Cable routing with an SFF HBA/RAID adapter” on page 391
- “Cable routing with a CFF RAID adapter” on page 395

Cable routing for onboard configuration

The following tables show the mapping relationship between backplane connectors and processor board connectors for onboard configuration.

The following figure illustrates the cable routing for the configuration of 6 front SAS/SATA drives and 4 front AnyBay drives bays. Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n.

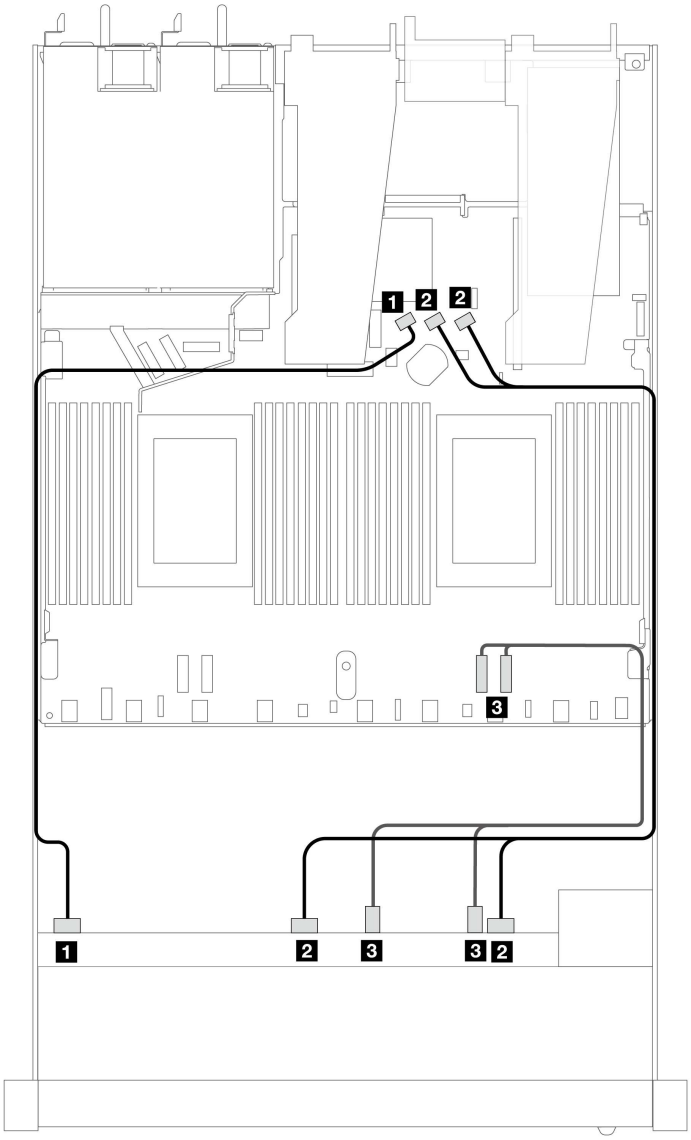


Figure 363. Cable routing for onboard configuration of 6 front SAS/SATA drives and 4 front AnyBay drives bays

Table 131. Mapping between one front AnyBay backplane and processor board for onboard configuration

Backplane	From	To
Front BP (SAS)	1 SAS 0	1 SATA 0
	2 SAS 1, SAS 2	2 SATA 1, SATA 2
Front BP (NVMe)	3 NVMe 2–3, 0–1	3 PCIe 1, 2

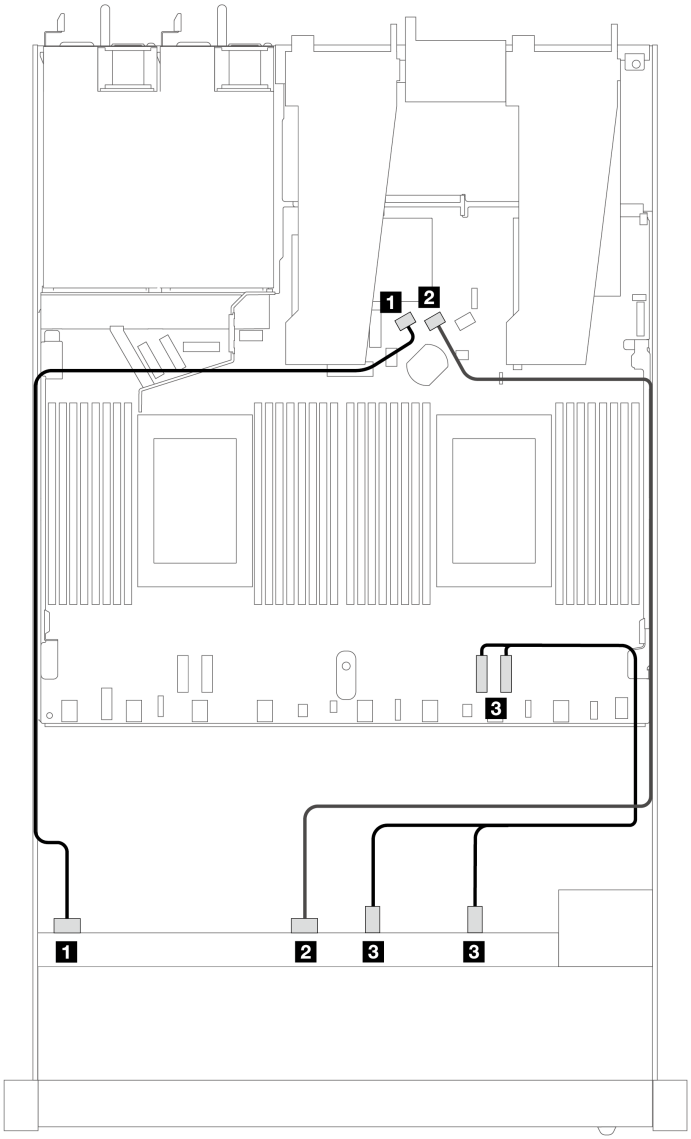


Figure 364. Cable routing for onboard configuration of 6 front SAS/SATA drives and 4 front NVMe drives bays

Table 132. Mapping between one front AnyBay backplane and processor board for onboard configuration

Backplane	From	To
Front BP (SAS)	1 SAS 0	1 SATA 0
	2 SAS 1	2 SATA 1
Front BP (NVMe)	3 NVMe 2–3, 0–1	3 PCIe 1, PCIe 2

Cable routing with an SFF HBA/RAID adapter

The following tables show the mapping relationship between backplane connectors and a 16i SFF HBA/RAID adapter (Gen 3 or Gen 4).

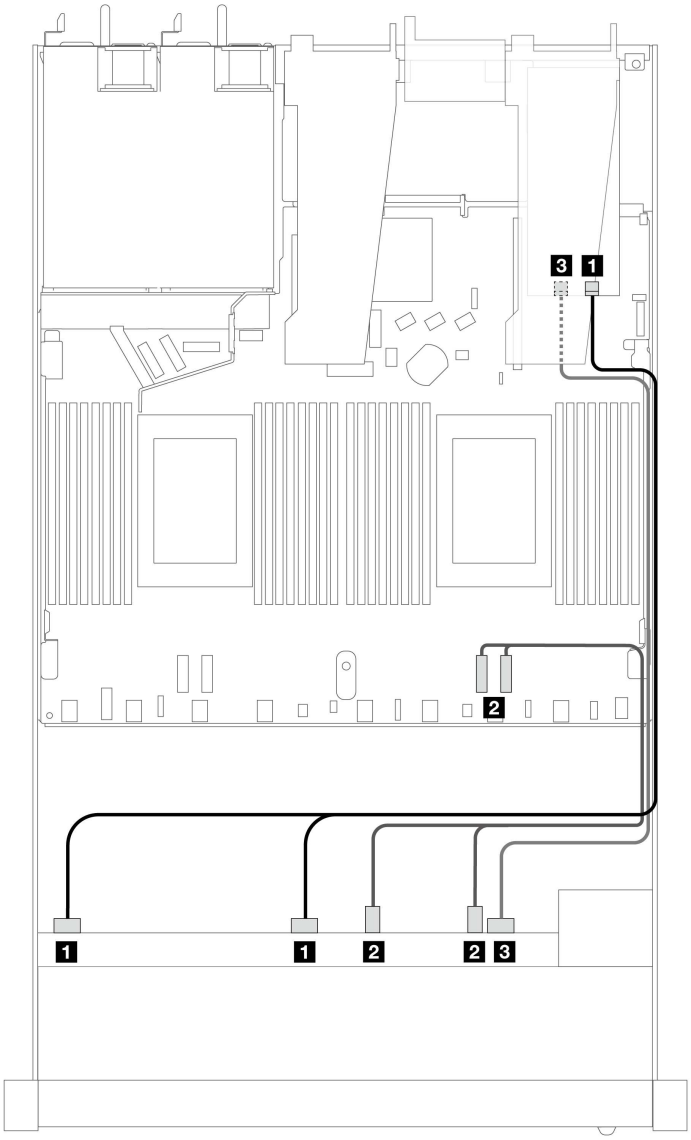


Figure 365. Cable routing for 6 front SAS/SATA drives and 4 front AnyBay drives bays with a 16i SFF RAID adapter (Gen 4)

Table 133. Mapping between one front AnyBay backplane and an SFF HBA/RAID adapter

Backplane	From	To
Front BP (SAS)	1 SAS 0, SAS 1	1 C0
Front BP (NVMe)	2 NVMe 2–3, 0–1	2 PCIe 1, 2
Front BP (SAS)	3 SAS 2	3 C1

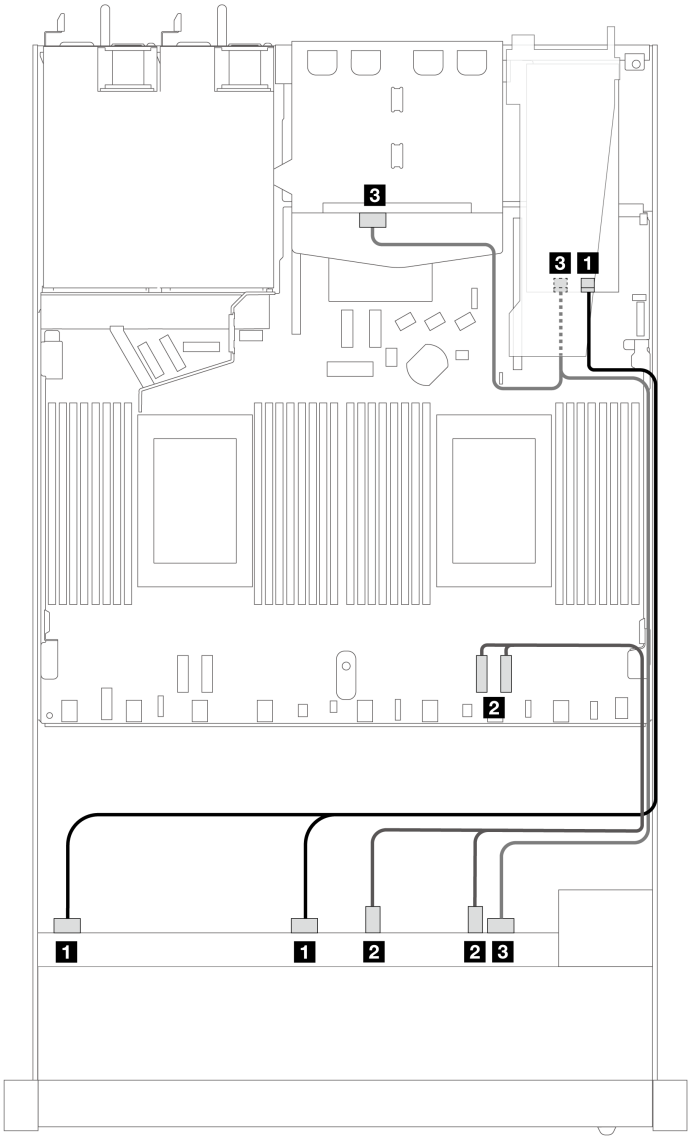


Figure 366. Cable routing for 6 front SAS/SATA drives and 4 front AnyBay drives bays and a 16i SFF RAID adapter (Gen 4) with 2 x 2.5 rear SAS/SATA drives installed

Table 134. Mapping between one front AnyBay and one rear SAS/SATA backplanes and an SFF HBA/RAID adapter

Backplane	**From**	**To**
Front BP (SAS)	1 SAS 0, SAS 1	1 C0
Front BP (NVMe)	2 NVMe 2–3, 0–1	2 PCIe 1, 2
Front and Rear BP (SAS)	3 SAS 2 (front), SAS (rear)	3 C1

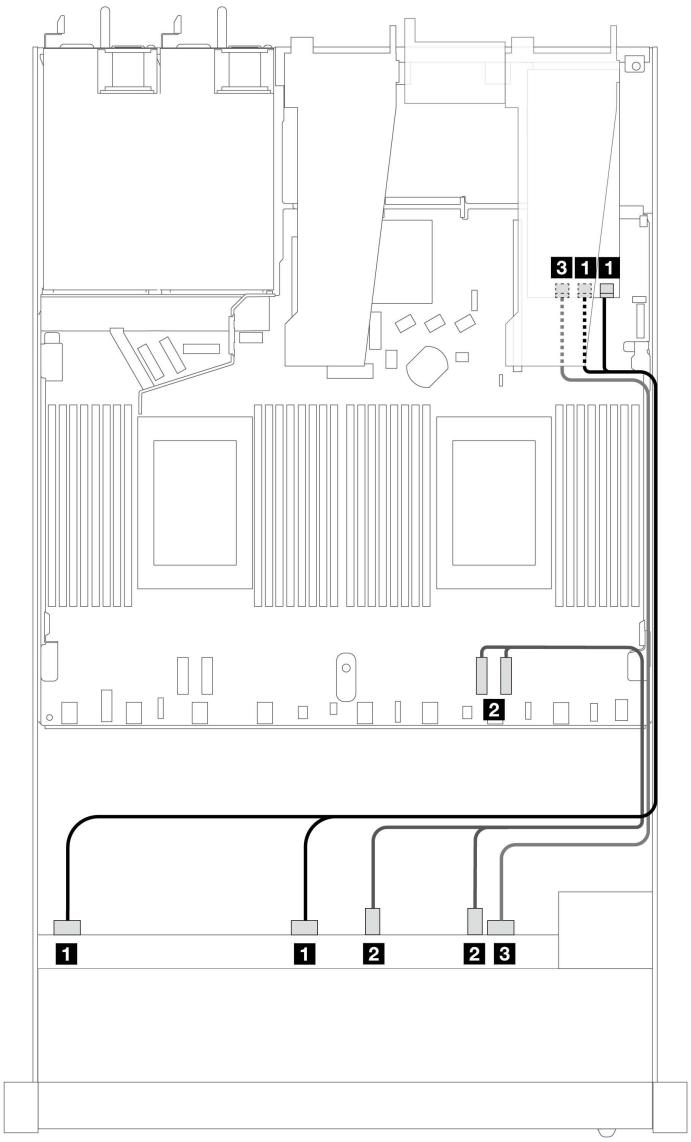


Figure 367. Cable routing for 6 front SAS/SATA drives and 4 front AnyBay drives bays with a 16i SFF RAID adapter (Gen 3)

Table 135. Mapping between one front AnyBay backplane and an SFF HBA/RAID adapter

Backplane	From	To
Front BP (SAS)	1 SAS 0, SAS 1	1 C0, C1
Front BP (NVMe)	2 NVMe 2–3, 0–1	2 PCIe 1, 2
Front BP (SAS)	3 SAS 2	3 C2

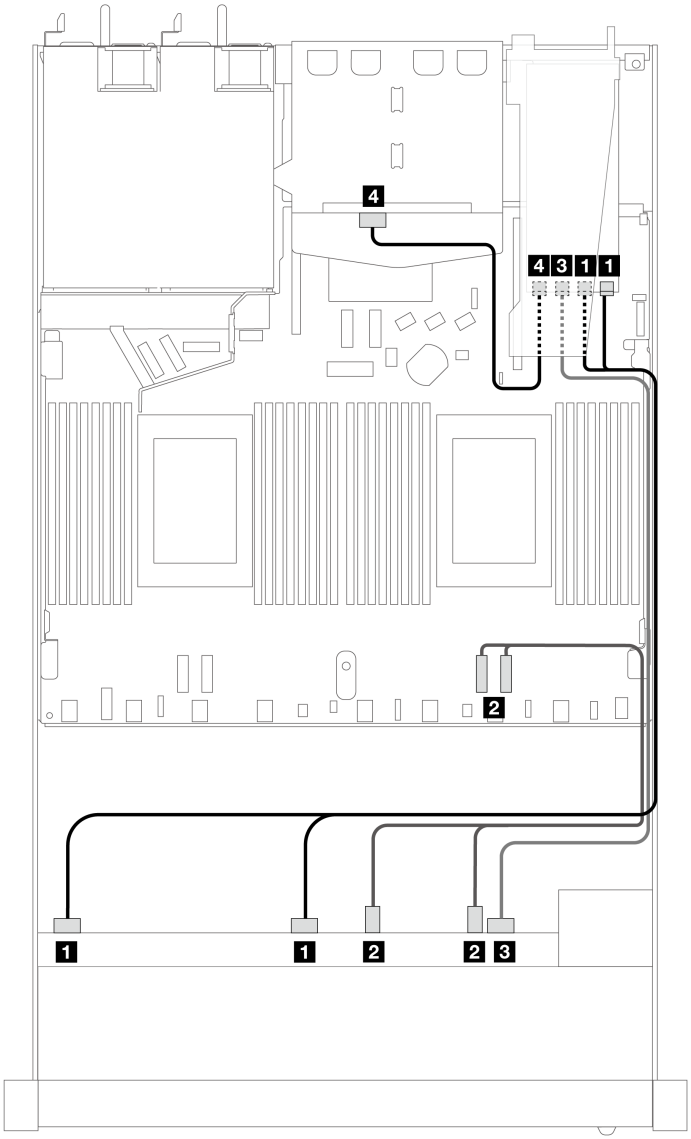


Figure 368. Cable routing for 6 front SAS/SATA drives and 4 front AnyBay drives bays and a 16i SFF RAID adapter (Gen 3) with 2 x 2.5 rear SAS/SATA drives installed

Table 136. Mapping between one front AnyBay and one rear SAS/SATA backplanes and an SFF HBA/RAID adapter

Backplane	From	To
Front BP (SAS)	1 SAS 0, SAS 1	1 C0, C1
Front BP (NVMe)	2 NVMe 2–3, 0–1	2 PCIe 1, 2
Front BP (SAS)	3 SAS 2	3 C2
Front and Rear BP (SAS)	4 SAS (rear)	4 C3

Cable routing with a CFF RAID adapter

The following tables show the mapping relationship between backplane connectors and a 16i CFF RAID adapter (Gen 3 or Gen 4).

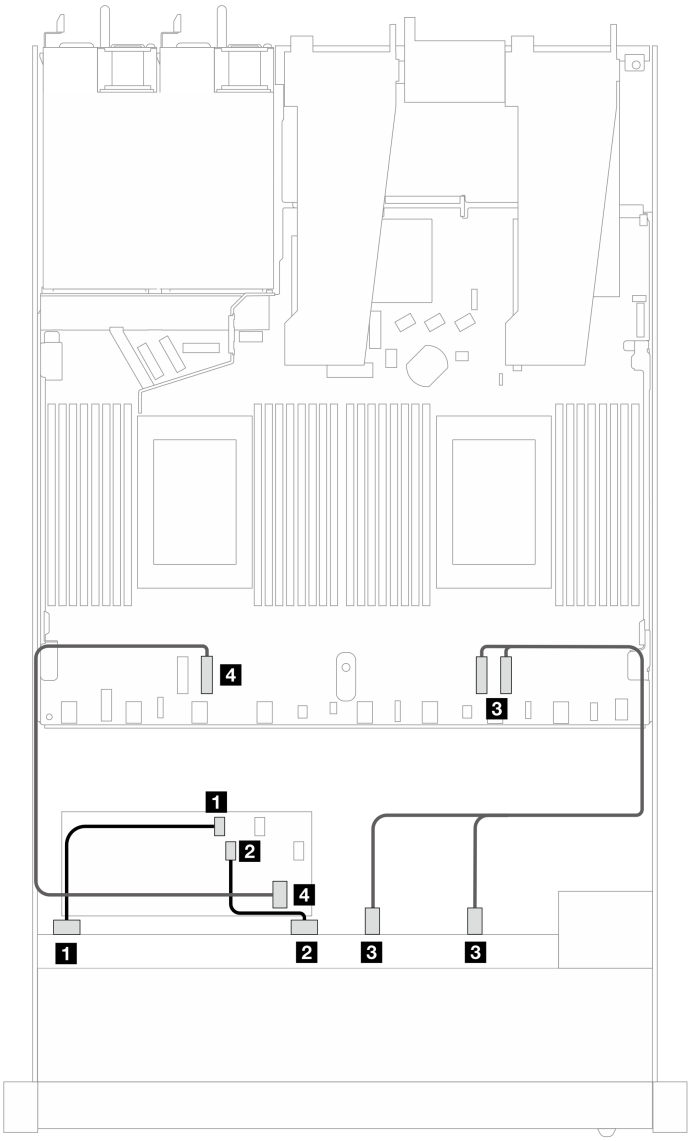


Figure 369. Cable routing for 6 front SAS/SATA drives and 4 front AnyBay drives bays with a 16i CFF RAID adapter (Gen 3 or Gen 4)

Table 137. Mapping between one front SAS/SATA backplane and a CFF RAID adapter

Backplane/adapter	**From**	**To**
Front BP (SAS)	1 SAS 0	1 C0
	2 SAS 1	2 C1
Front BP (NVMe)	3 NVMe 2–3, 0–1	3 PCIe 1, 2
Front BP (SAS)	4 SAS 2	4 C2
CFF RAID adapter	5 MB input	5 PCIe 3

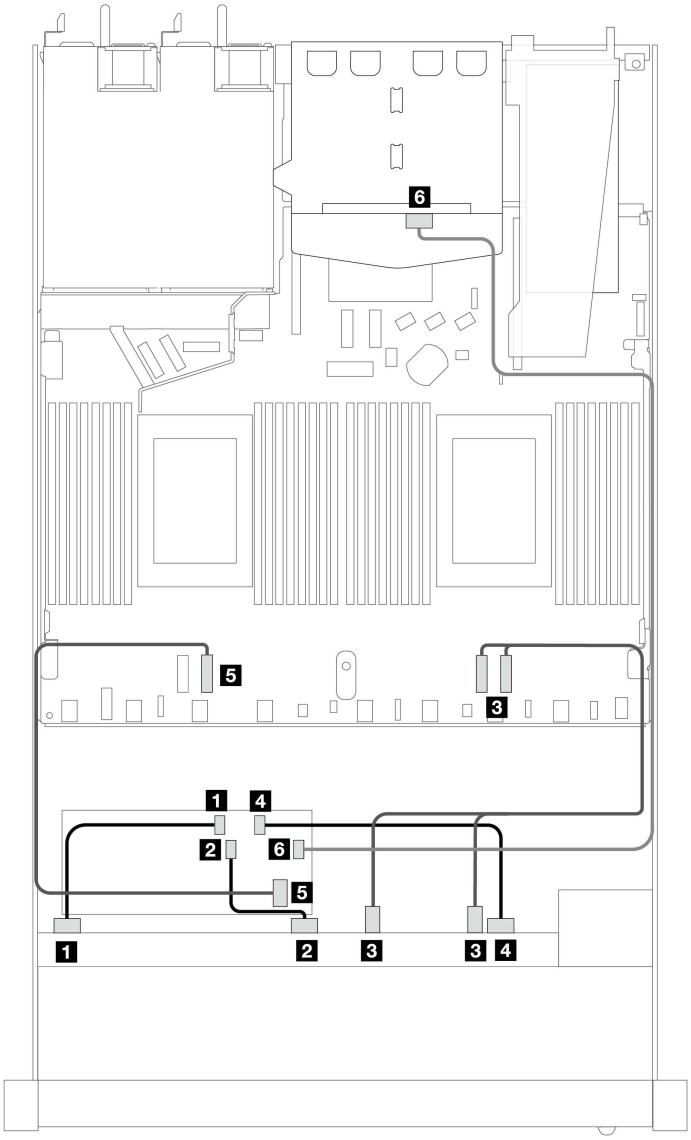


Figure 370. Cable routing for 6 front SAS/SATA drives and 4 front AnyBay drives bays with a 16i CFF RAID adapter (Gen 3 or Gen 4) with 2 x 2.5 rear SAS/SATA drives installed

Table 138. Mapping between one front AnyBay and one rear SAS/SATA backplane and a CFF RAID adapter

Backplane/adapter	From	To
Front BP (SAS)	1 SAS 0	1 C0
	2 SAS 1	2 C1
Front BP (NVMe)	3 NVMe 2–3, 0–1	3 PCIe 1, 2
Front BP (SAS)	4 SAS 2	4 C2
CFF RAID adapter	5 MB input	5 PCIe 3
	6 C3	6 SAS (rear)

6 x 2.5'' SAS/SATA + 2 x 2.5'' AnyBay + 2 x 2.5'' NVMe

See this section to understand the cable routing of 6 front SAS/SATA drives, 2 front AnyBay drives and 2 front NVMe drives.

To connect cables for a 7mm drive backplane, refer to “7mm drive backplane” on page 247.

To connect power cables for a backplane for standard 2.5-inch or 3.5-inch drives, refer to “Cable routing for backplane power” on page 251.

To connect cables for M.2 drives, refer to “M.2 drive backplane” on page 244.

To connect signal cables for a backplane for standard 6 front SAS/SATA drives, 2 AnyBay drives and 2 front NVMe drives, refer to the following cable routing scenarios depending on your server configuration:

- “Cable routing for onboard configuration” on page 398
- “Cable routing with an SFF HBA/RAID adapter” on page 399
- “Cable routing with a CFF RAID adapter” on page 401

Cable routing for onboard configuration

The following tables show the mapping relationship between backplane connectors and processor board connectors for onboard configuration.

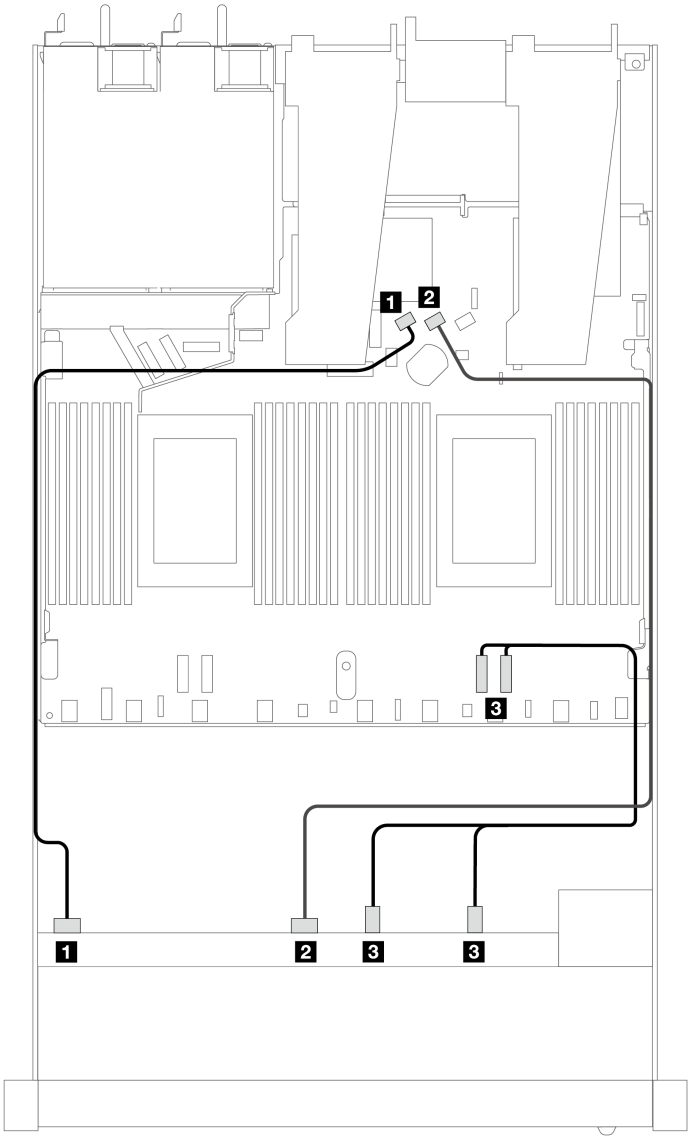


Figure 371. Cable routing for onboard configuration of 6 SAS/SATA drives and 2 AnyBay and 2 NVMe front drives bays

Table 139. Mapping between one front AnyBay backplane and processor board for onboard configuration

Backplane	From	To
Front BP (SAS)	1 SAS 0	1 SATA 0
	2 SAS 1	2 SATA 1
	3 NVMe 2–3, 0–1	3 PCIe 1, 2

Cable routing with an SFF HBA/RAID adapter

The following tables show the mapping relationship between backplane connectors and an SFF HBA/RAID adapter.

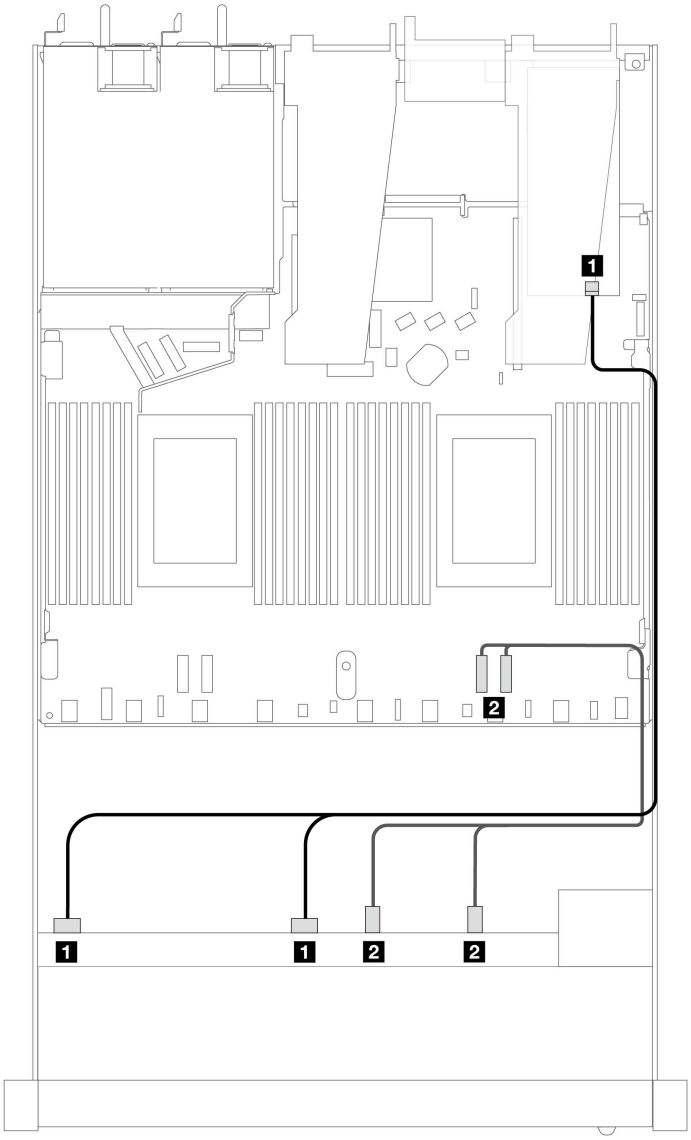


Figure 372. Cable routing for 6 SAS/SATA drives and 2 AnyBay drives and 2 NVMe front drive bays with an 8i or 16i SFF RAID adapter (Gen 4)

Table 140. Mapping between one front AnyBay backplane and an SFF HBA/RAID adapter

Backplane	From	To
Front BP (SAS)	1 SAS 0, SAS 1	1 C0
	2 NVMe 2–3, 0–1	2 PCIe 1, 2

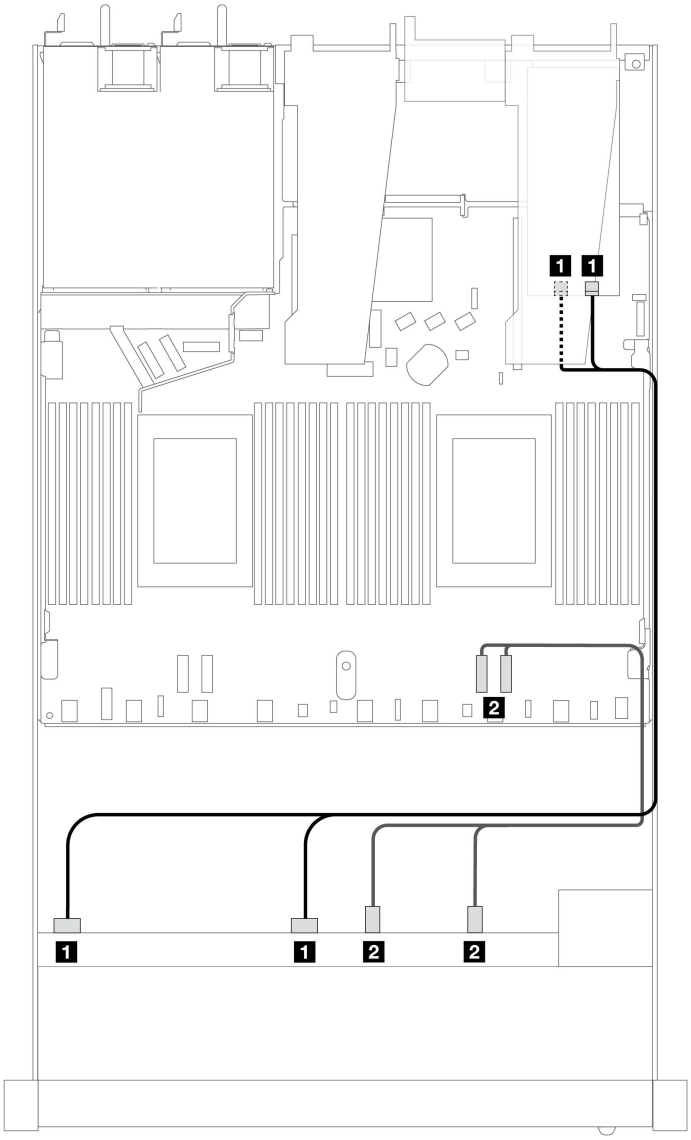


Figure 373. Cable routing for 6 SAS/SATA drives and 2 AnyBay drives and 2 NVMe front drive bays with an 8i or 16i SFF RAID adapter (Gen 3)

Table 141. Mapping between one front AnyBay backplane and an SFF HBA/RAID adapter

Backplane	From	To
Front BP (SAS)	1 SAS 0, SAS 1	1 C0, C1
	2 NVMe 2–3, 0–1	2 PCIe 1, 2

Cable routing with a CFF RAID adapter

The following tables show the mapping relationship between backplane connectors and an 8i or 16i CFF RAID adapter (Gen 3 or Gen 4).

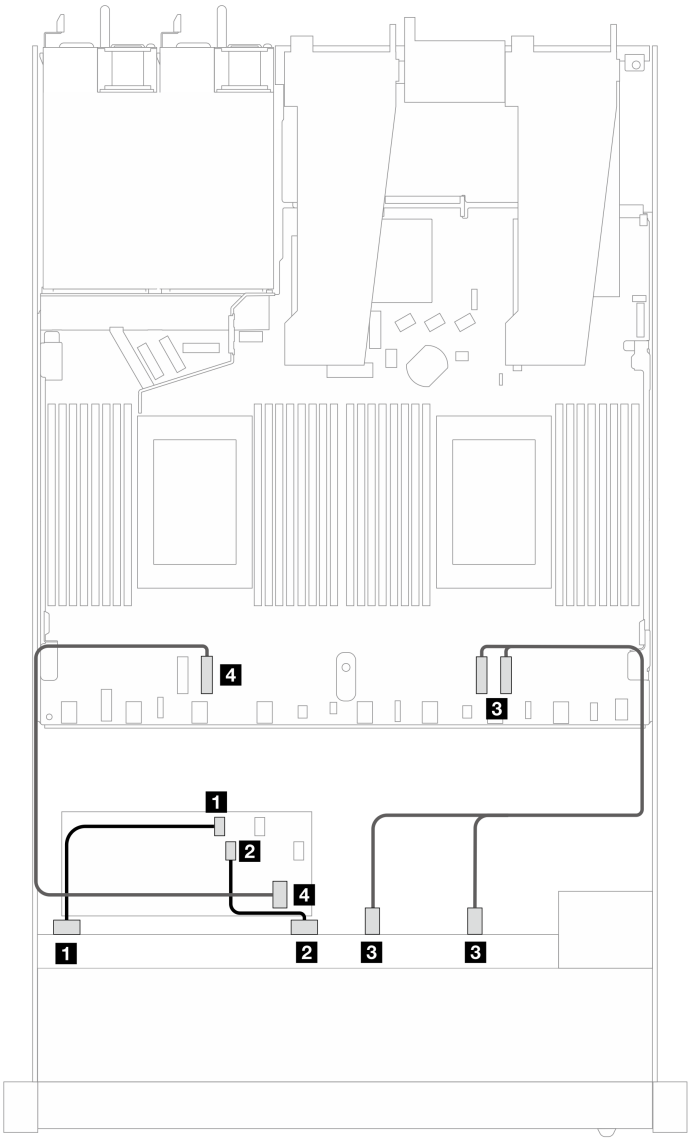


Figure 374. Cable routing for 6 SAS/SATA drives and 2 AnyBay drives and 2 NVMe front drive bays with an 8i or 16i CFF RAID adapter (Gen 3 or Gen 4)

Table 142. Mapping between one front SAS/SATA backplane and a CFF RAID adapter

Backplane/adapter	From	To
Front BP (SAS)	1 SAS 0	1 C0
	2 SAS 1	2 C1
Front BP (NVMe)	3 NVMe 2–3, 0–1	3 PCIe 1, 2
CFF RAID adapter	4 MB input	4 PCIe 3

10 x 2.5'' SAS/SATA

See this section to understand the cable routing of 10 front SAS/SATA drives with the 6 x 2.5'' SAS/SATA + 4 x 2.5'' AnyBay backplane installed.

To connect cables for a 7mm drive backplane, refer to “7mm drive backplane” on page 247.

To connect power cables for a backplane for standard 2.5-inch or 3.5-inch drives, refer to “Cable routing for backplane power” on page 251.

To connect cables for M.2 drives, refer to “M.2 drive backplane” on page 244.

To connect signal cables for a backplane for standard 10 front SAS/SATA drives, refer to the following cable routing scenarios depending on your server configuration:

- “Cable routing for onboard configuration” on page 403
- “Cable routing with an SFF HBA/RAID adapter” on page 404
- “Cable routing with a CFF RAID adapter” on page 408

Cable routing for onboard configuration

The following illustrations and tables show the mapping relationship between backplane connectors and processor board connectors for onboard configuration.

The following figure illustrates the cable routing for the configuration of 10 front SAS/SATA drives bays. Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n.

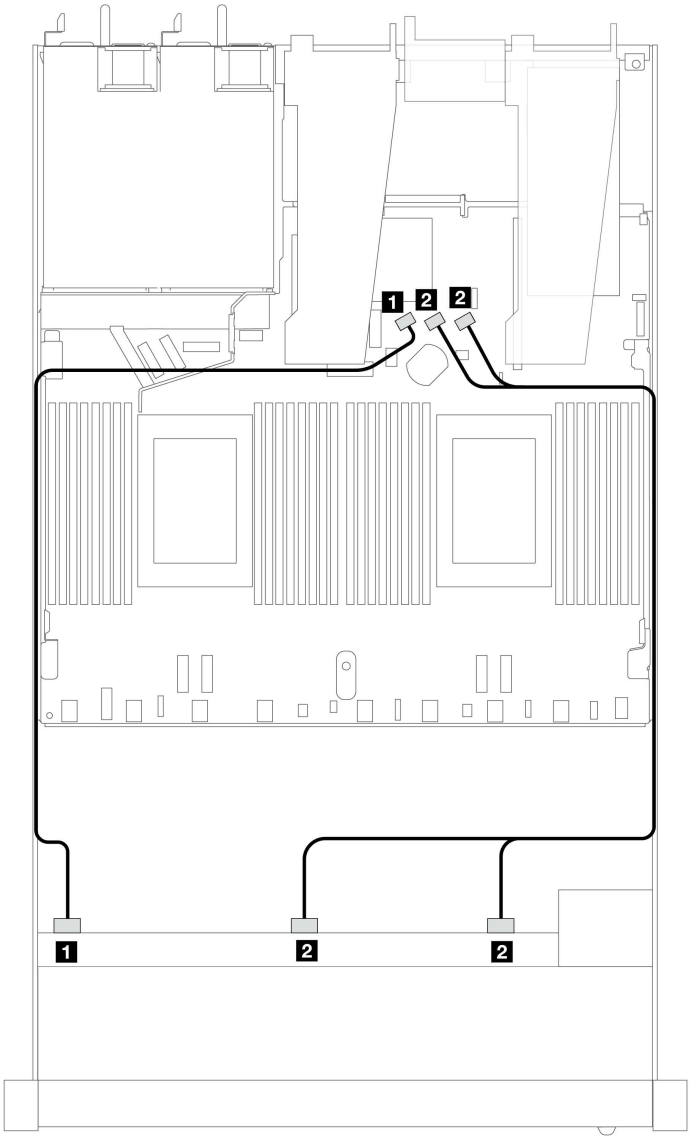


Figure 375. Cable routing for onboard configuration of 10 x 2.5 SAS/SATA front drives

Table 143. Mapping between one front AnyBay backplane and processor board for onboard configuration

Backplane	From	To
Front BP (SAS)	1 SAS 0	1 SATA 0
	2 SAS 1, SAS 2	2 SATA 1, SATA 2

Cable routing with an SFF HBA/RAID adapter

The following tables show the mapping relationship between backplane connectors and a 16i SFF HBA/RAID adapter (Gen 3 or Gen 4).

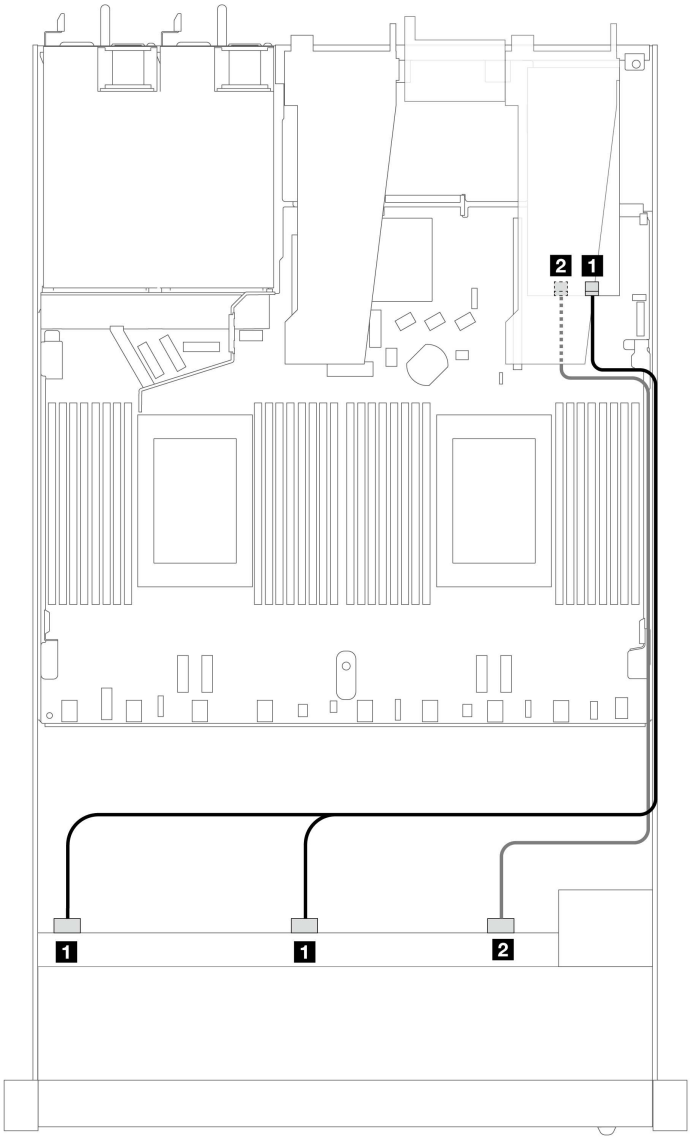


Figure 376. Cable routing for 10 front SAS/SATA drives bays with a 16i SFF RAID adapter (Gen 4)

Table 144. Mapping between one front AnyBay backplane and an SFF HBA/RAID adapter

Backplane	From	To
Front BP (SAS)	1 SAS 0, SAS 1	1 C0
	2 SAS 2	2 C1

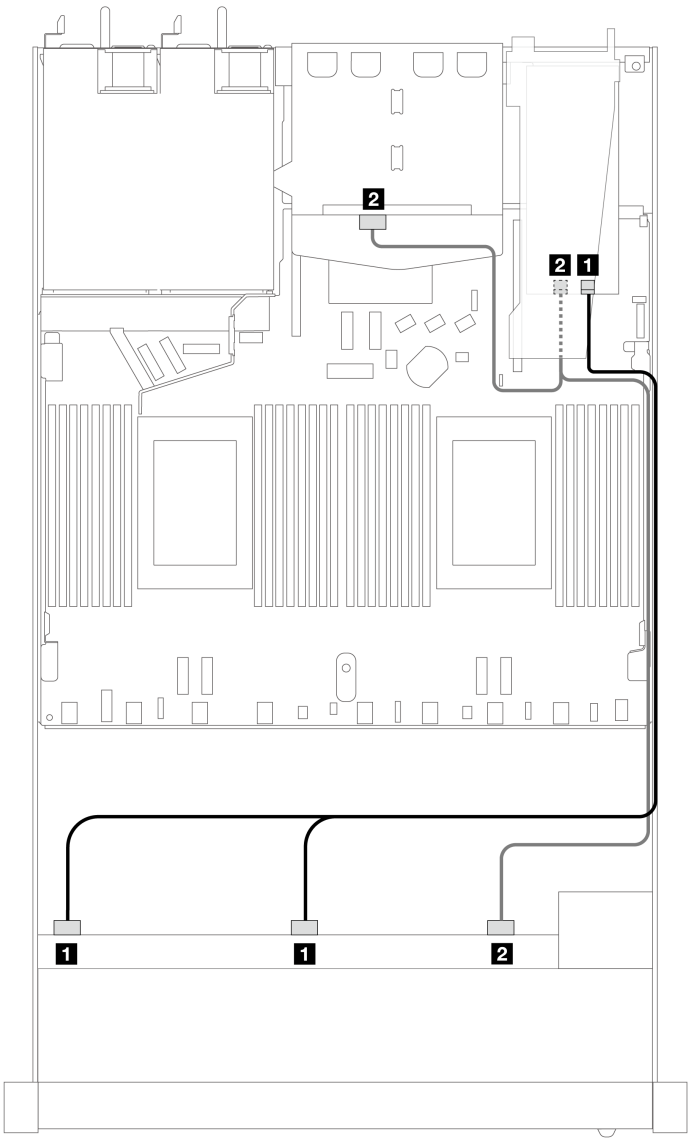


Figure 377. Cable routing for 10 front SAS/SATA drives bays and a 16i SFF RAID adapter (Gen 4) with 2 x 2.5 rear SAS/SATA drives installed

Table 145. Mapping between one front AnyBay and one rear SAS/SATA backplanes and an SFF HBA/RAID adapter

Backplane	From	To
Front BP (SAS)	1 SAS 0, SAS 1	1 C0
Rear BP (SAS)	2 SAS 2 (front), SAS (rear)	2 C1

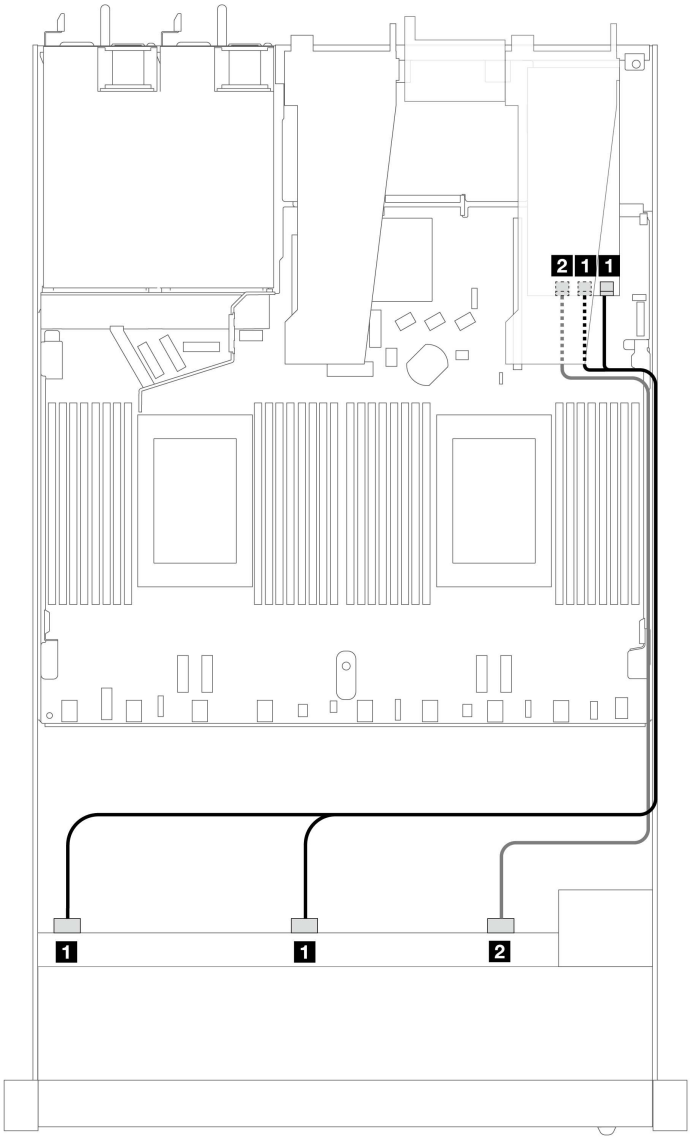


Figure 378. Cable routing for 10 front SAS/SATA drives bays with a 16i SFF RAID adapter (Gen 3)

Table 146. Mapping between one front AnyBay backplane and an SFF HBA/RAID adapter

Backplane	From	To
Front BP (SAS)	1 SAS 0, SAS 1	1 C0, C1
	2 SAS 2	2 C2

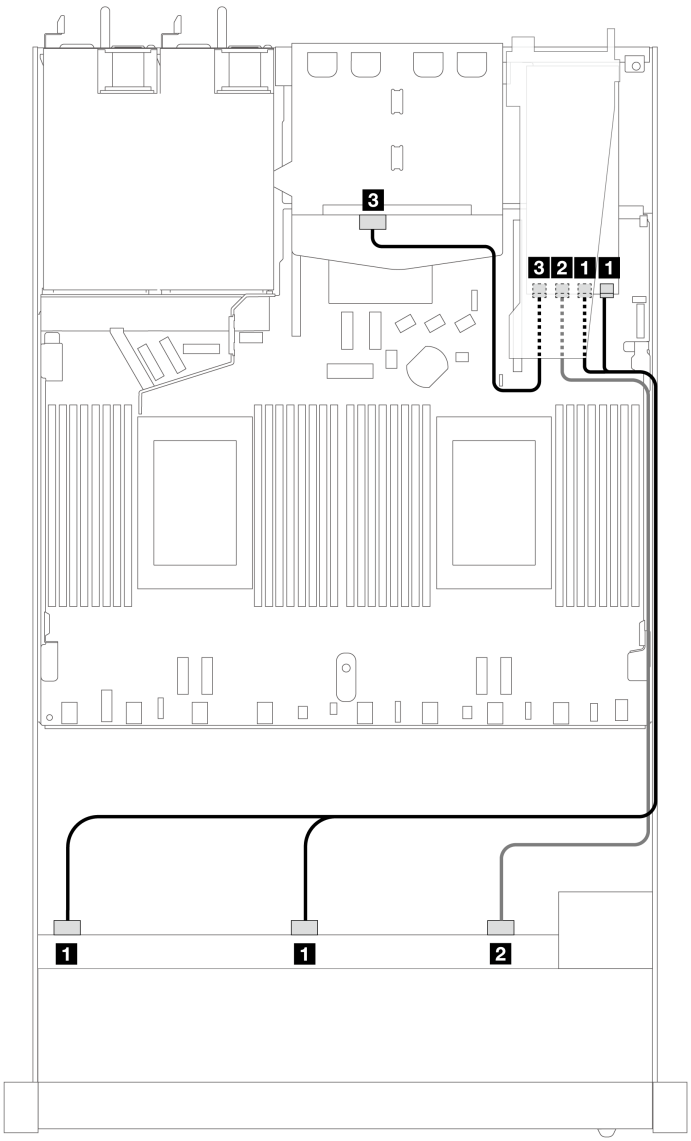


Figure 379. Cable routing for 10 front SAS/SATA drives bays and a 16i SFF RAID adapter (Gen 3) with 2 x 2.5 rear SAS/SATA drives installed

Table 147. Mapping between one front AnyBay and one rear SAS/SATA backplanes and an SFF HBA/RAID adapter

Backplane	From	To
Front BP (SAS)	1 SAS 0, SAS 1	1 C0, C1
	2 SAS 2	2 C2
Rear BP (SAS)	3 SAS	3 C3

Cable routing with a CFF RAID adapter

The following tables show the mapping relationship between backplane connectors and a 16i CFF RAID adapter (Gen 3 or Gen 4).

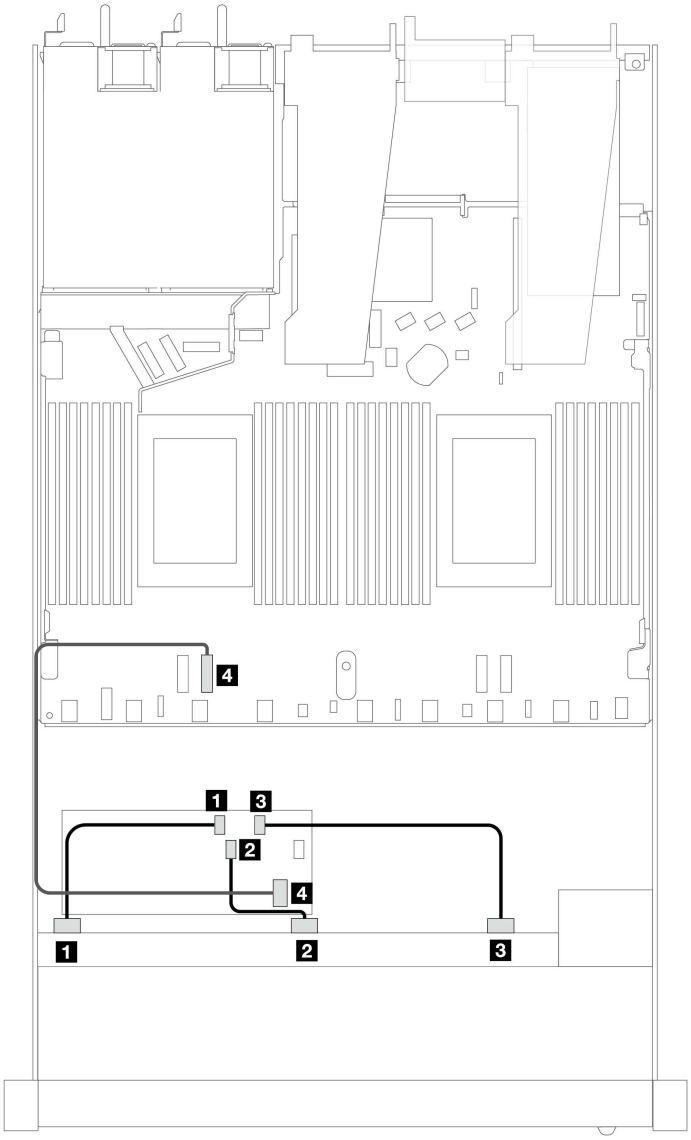


Figure 380. Cable routing for 10 front SAS/SATA drives bays with a 16i CFF RAID adapter (Gen 3 or Gen 4)

Table 148. Mapping between one front SAS/SATA backplane and a CFF RAID adapter

Backplane/adapter	**From**	**To**
Front backplane	1 SAS 0	1 C0
	2 SAS 1	2 C1
	3 SAS 2	3 C2
CFF RAID adapter	4 MB input	4 PCIe 3

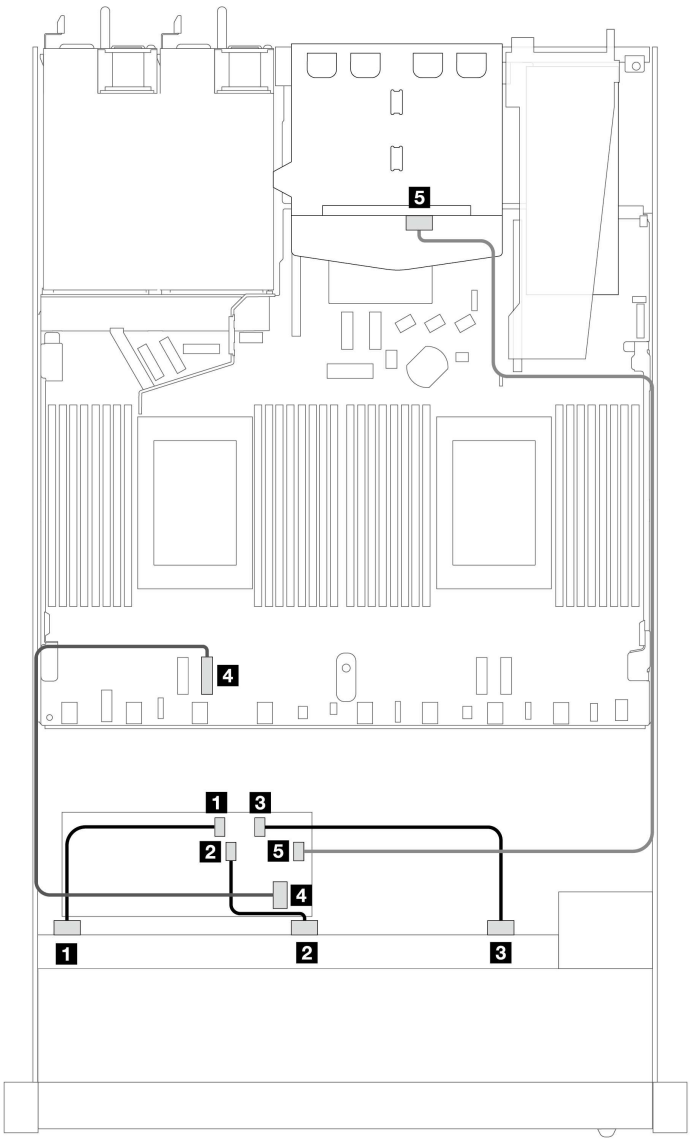


Figure 381. Cable routing for 10 front SAS/SATA drives bays and a 16i CFF RAID adapter (Gen 3 or Gen 4) with 2 x 2.5 rear SAS/SATA drives installed

Table 149. Mapping between one front AnyBay and one rear SAS/SATA backplane and a CFF RAID adapter

Backplane/adapter	From	To
Front backplane	1 SAS 0	1 C0
	2 SAS 1	2 C1
	3 SAS 2	3 C2
CFF RAID adapter	4 MB input	4 PCIe 3
	5 C3	5 SAS (rear)

10 x 2.5'' Anybay backplane (Gen 4)

Use this section to understand the alternatives that a 10 x 2.5'' AnyBay backplane (Gen 4) offers.

With a 10 x 2.5'' AnyBay backplane (Gen 4), following front drive combinations are supported:

10 x 2.5'' AnyBay

See this section to understand the cable routing of 10 front AnyBay drives with the 10 x 2.5'' AnyBay backplane (Gen 4) installed.

To connect cables for a 7mm drive backplane, refer to “7mm drive backplane” on page 247.

To connect power cables for a backplane for standard 2.5-inch or 3.5-inch drives, refer to “Cable routing for backplane power” on page 251.

To connect cables for M.2 drives, refer to “M.2 drive backplane” on page 244.

Cable routing with an SFF HBA/RAID adapter

The following tables show the mapping relationship between backplane connectors and an SFF HBA/RAID adapter (Gen 3 or Gen 4).

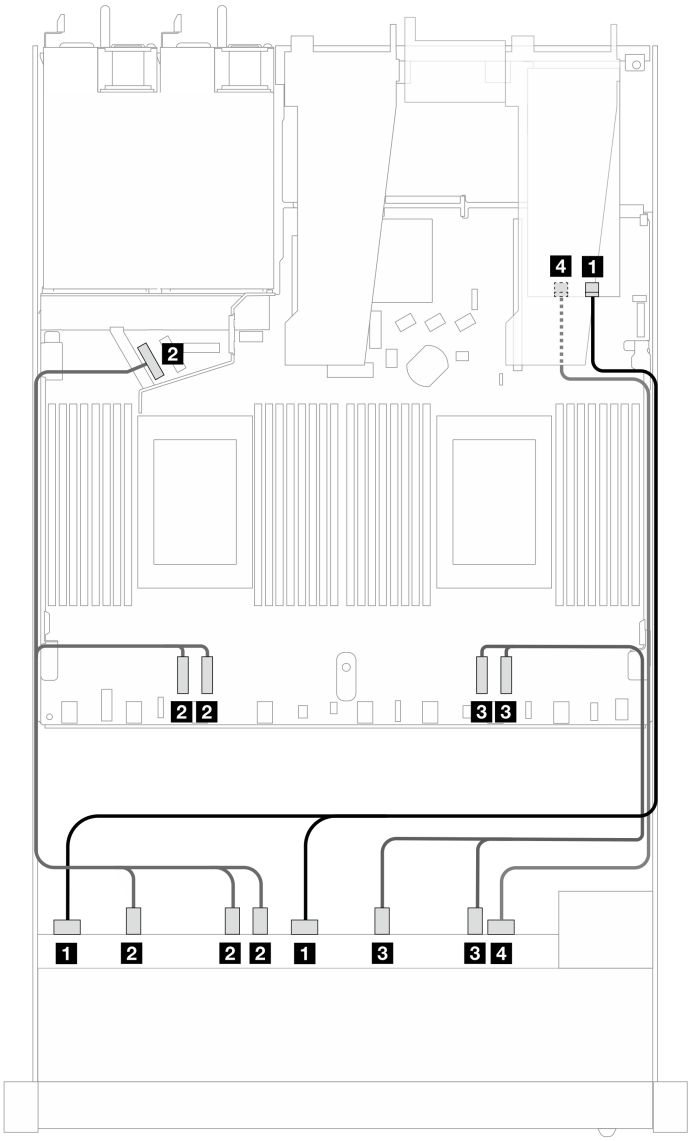


Figure 382. Cable routing for 10 AnyBay drives with a 16i SFF RAID adapter (Gen 4)

Table 150. Mapping between one front AnyBay backplane and an SFF HBA/RAID adapter

Backplane	From	To
Front BP (SAS)	1 SAS 0, SAS 1	1 C0
Front BP (NVMe)	2 NVMe 2–3, 0–1, 4–5	2 PCIe 3, 4, 5
	3 NVMe 8–9, 6–7	3 PCIe 1, 2
Front BP (SAS)	4 SAS 2	4 C1

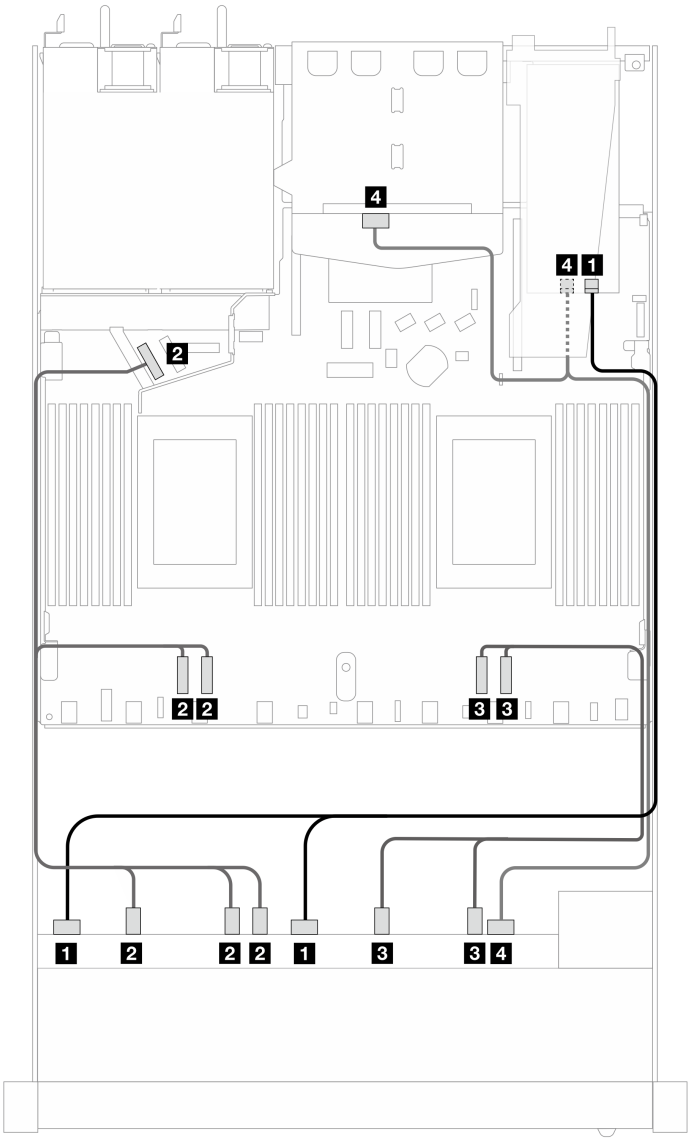


Figure 383. Cable routing for 10 front AnyBay drives and 2 rear SAS/SATA drives with a 16i SFF RAID adapter (Gen 4)

Table 151. Mapping between one front AnyBay and one rear SAS/SATA backplanes and an SFF HBA/RAID adapter

Backplane	**From**	**To**
Front BP (SAS)	1 SAS 0, SAS 1	1 C0
Front BP (NVMe)	2 NVMe 2–3, 0–1, 4–5	2 PCIe 3, 4, 5
	3 NVMe 8–9, 6–7	3 PCIe 1, 2
Front and rear BP (SAS)	4 SAS 2 (front), SAS (rear)	4 C1

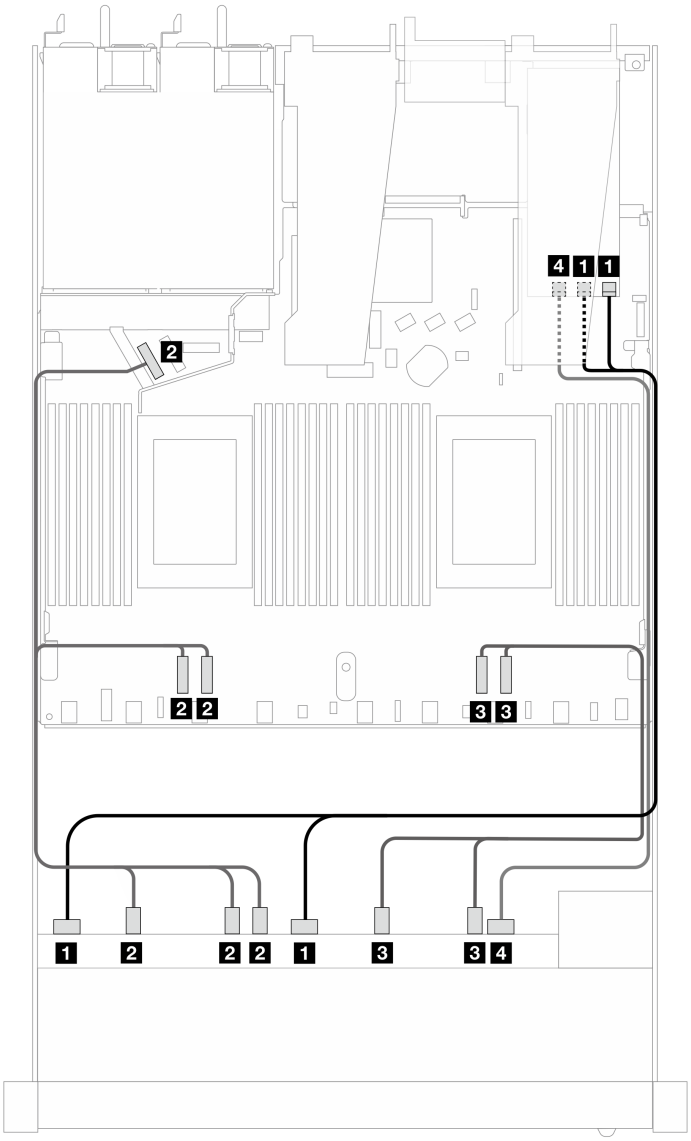


Figure 384. Cable routing for 10 AnyBay drives with a 16i SFF RAID adapter (Gen 3)

Table 152. Mapping between one front AnyBay backplane and an SFF HBA/RAID adapter

Backplane	From	To
Front BP (SAS)	1 SAS 0, SAS 1	1 C0, C1
Front BP (NVMe)	2 NVMe 2–3, 0–1, 4–5	2 PCIe 3, 4, 5
	3 NVMe 8–9, 6–7	3 PCIe 1, 2
Front BP (SAS)	4 SAS 2	4 C2

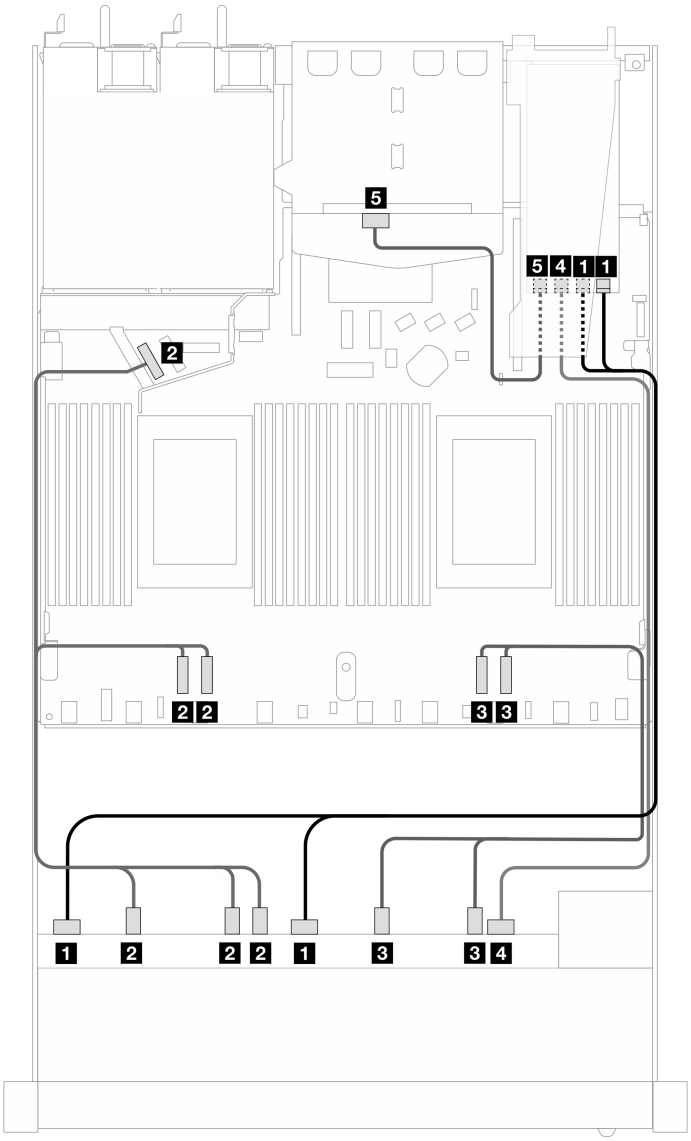


Figure 385. Cable routing for 10 front AnyBay drives and 2 rear SAS/SATA drives with a 16i SFF RAID adapter (Gen 3)

Table 153. Mapping between one front AnyBay and one rear SAS/SATA backplanes and an SFF HBA/RAID adapter

Backplane	From	To
Front BP (SAS)	1 SAS 0, SAS 1	1 C0, C1
Front BP (NVMe)	2 NVMe 2–3, 0–1, 4–5	2 PCIe 3, 4, 5
	3 NVMe 8–9, 6–7	3 PCIe 1, 2
Front and rear BP (SAS)	4 SAS 2 (front)	4 C2
Rear BP (SAS)	5 SAS (rear)	5 C3

10 x 2.5'' NVMe

Use this section to understand the cable routing of 10 NVMe front drives.

To connect power cables for a backplane for standard 2.5-inch or 3.5-inch drives, refer to “Cable routing for backplane power” on page 251.

To connect cables for M.2 drives, refer to “M.2 drive backplane” on page 244.

Cable routing for onboard configuration

The following illustrations and tables show the mapping relationship between backplane connectors and processor board connectors for onboard configuration.

The following figure illustrates the cable routing for the configuration of 10 front SAS/SATA drives bays. Connections between connectors: 1 ↔ 1, 2 ↔ 2, 3 ↔ 3, ... n ↔ n.

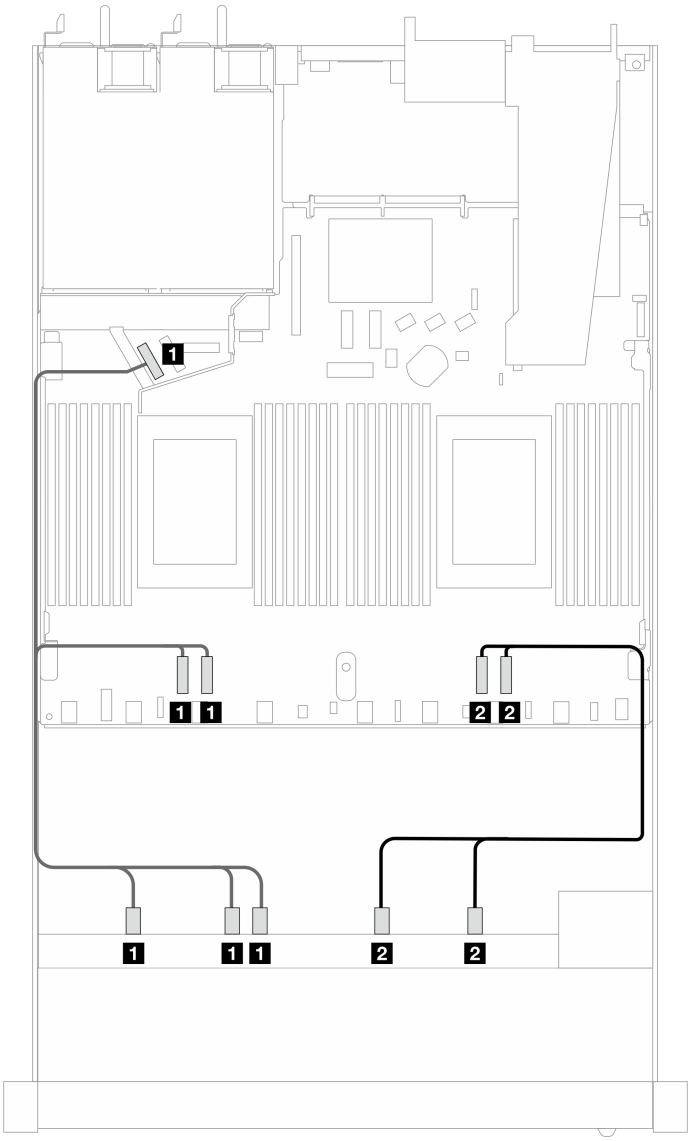


Figure 386. Cable routing for onboard configuration of 10 x 2.5 NVMe front drives

Table 154. Mapping between one front AnyBay backplane and processor board for onboard configuration

Backplane	From	To
Front BP (NVMe)	1 NVMe 2–3, NVMe 0–1, NVMe 4–5	1 PCIe 3, PCIe 4, PCIe 5
	2 NVMe 8–9, NVMe 6–7	2 PCIe 1, PCIe 2

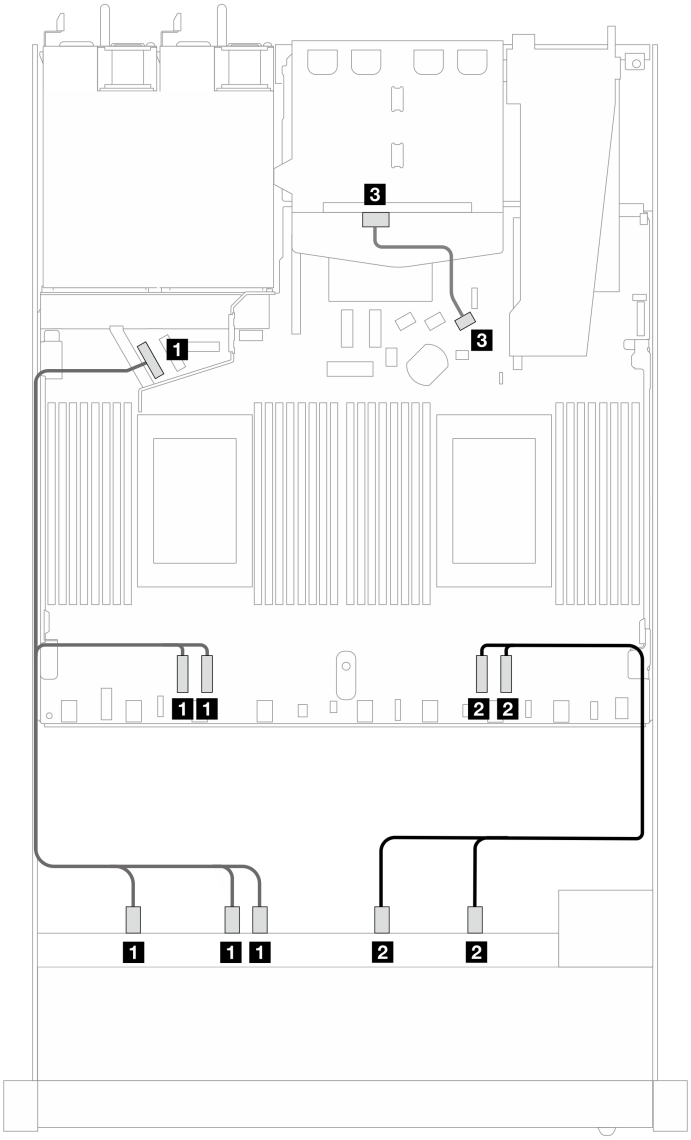


Figure 387. Cable routing for onboard configuration of 10 x 2.5 NVMe front drives with 2 x 2.5 rear SAS/SATA drives installed

Table 155. Mapping between one front AnyBay and one rear SAS/SATA backplanes and processor board for onboard configuration

Backplane	From	To
Front BP (NVMe)	1 NVMe 2–3, NVMe 0–1, NVMe 4–5	1 PCIe 3, PCIe 4, PCIe 5
	2 NVMe 8–9, NVMe 6–7	2 PCIe 1, PCIe 2
Rear BP (SAS)	3 SAS (rear)	3 SATA 2

10 x 2.5'' Anybay backplane (Gen 5)

Use this section to understand the alternatives that a 10 x 2.5'' AnyBay backplane (Gen 5) offers.

With a 10 x 2.5'' AnyBay backplane (Gen 5), following front drive combinations are supported:

6 x 2.5'' SAS/SATA + 4 x 2.5'' AnyBay (Gen 5)

See this section to understand the cable routing of six front SAS/SATA drives and four front AnyBay drives with 10 x 2.5'' backplane (Gen 5) installed.

To connect cables for a 7mm drive backplane, refer to “7mm drive backplane” on page 247.

To connect cables for M.2 drives, refer to “M.2 drive backplane” on page 244.

To connect cables for rear NVMe drives, refer to “Rear NVMe backplane cable routing with 10 x 2.5'' AnyBay backplane (Gen 5) installed” on page 250.

To connect signal cables for a backplane for standard six front SAS/SATA drives and four front AnyBay drives, refer to the following cable routing scenarios depending on your server configuration:

- “Cable routing for onboard configuration” on page 418
- “Cable routing with an SFF HBA/RAID adapter” on page 419
- “Cable routing with a CFF HBA/RAID adapter” on page 423

Cable routing for onboard configuration

The following illustration and table show the mapping relationship between backplane connectors and processor board connectors for onboard configuration.

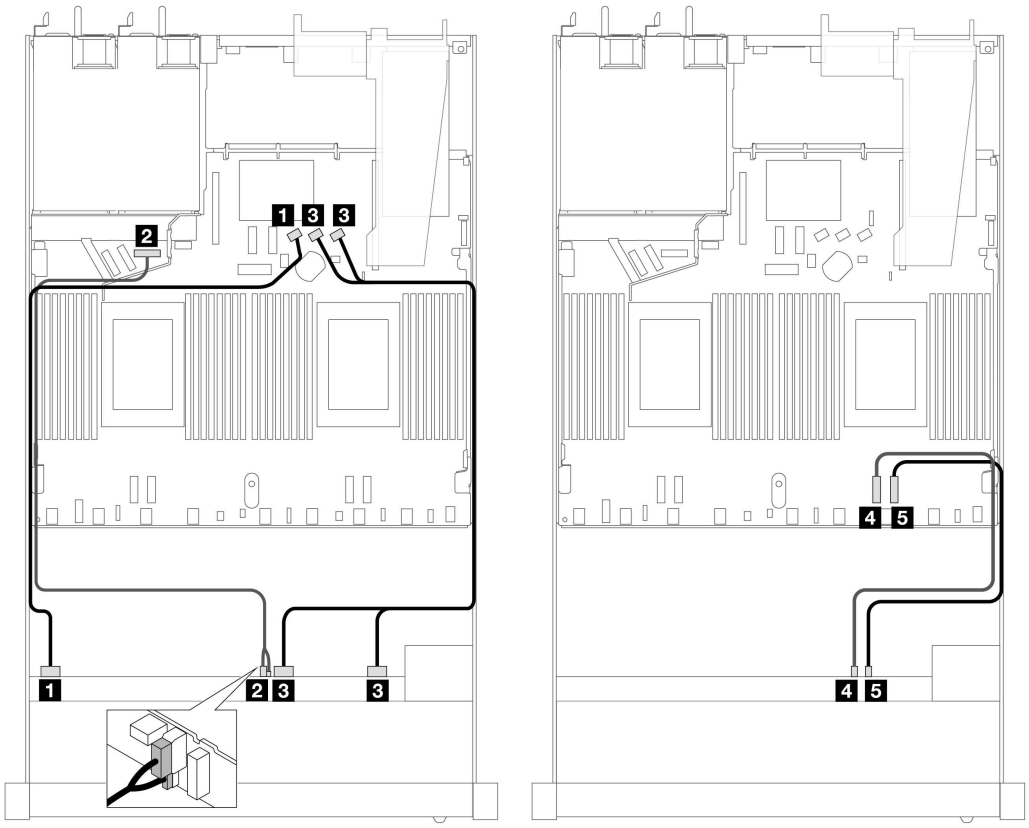


Figure 388. Cable routing for onboard configuration of 6 x 2.5'' SAS/SATA front drives and 4 x 2.5'' AnyBay front drives

Table 156. Mapping between one front AnyBay backplane and processor board for onboard configuration

Backplane	From	To
Front BP (SAS)	1 SAS 0–3	1 SATA 0
Front BP (power)	2 Power and sideband Note	2 Power port for front BP
Front BP (SAS)	3 SAS 4–7, 8–9	3 SATA 1, 2
Front BP (NVMe)	4 NVMe 6–7	4 PCIe 2
	5 NVMe 8–9	5 PCIe 1

Note: Different from the 10 x 2.5'' Anybay backplane (Gen 4), the new Gen 5 backplane has two connectors, power and sideband, for power connection. The two connectors are placed closely, make sure that the two are connected. Use the illustration above for guidance.

Cable routing with an SFF HBA/RAID adapter

The following tables show the mapping relationship between backplane connectors and a 16i SFF RAID adapter (Gen 3 or Gen 4).

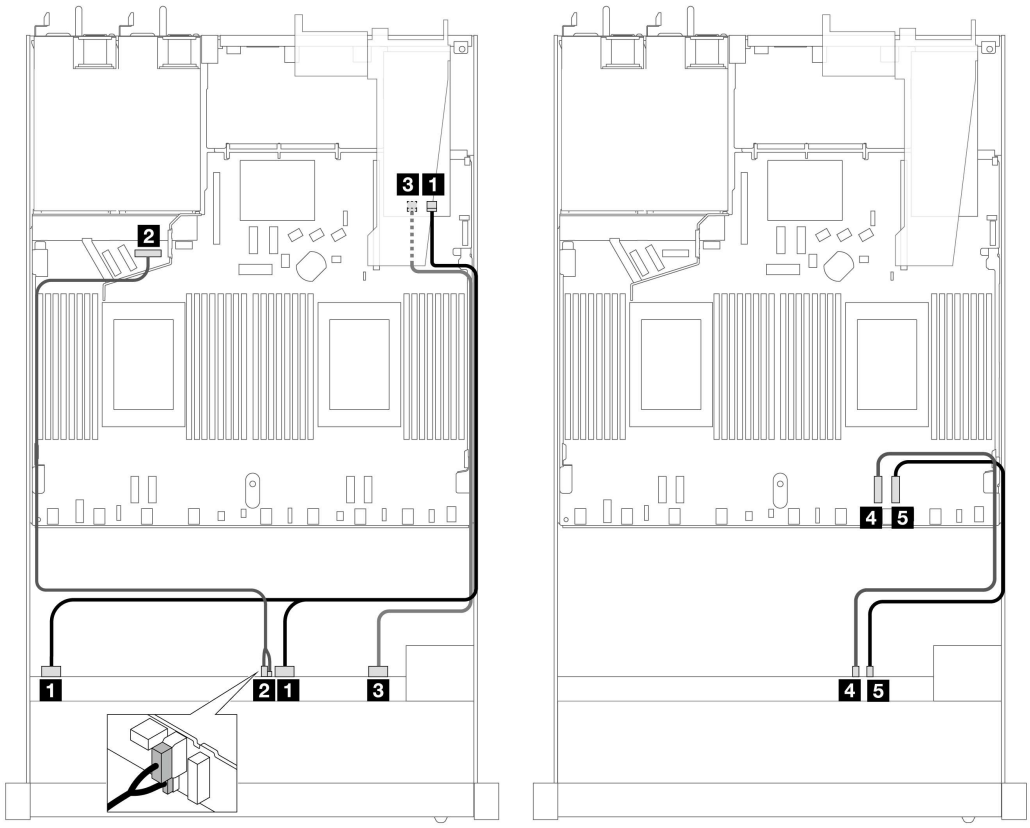


Figure 389. Cable routing for six front SAS/SATA drives and four front AnyBay drives bays with a 16i SFF RAID adapter (Gen 4)

Table 157. Mapping between one front AnyBay backplane and an SFF RAID adapter

Backplane	From	To
Front BP (SAS)	1 SAS 0–3, 4–7	1 C0
Front BP (power)	2 Power and sideband	2 Power port for front BP
Front BP (SAS)	3 SAS 8–9	3 C1
Front BP (NVMe)	4 NVMe 6–7	4 PCIe 2
	5 NVMe 8–9	5 PCIe 1

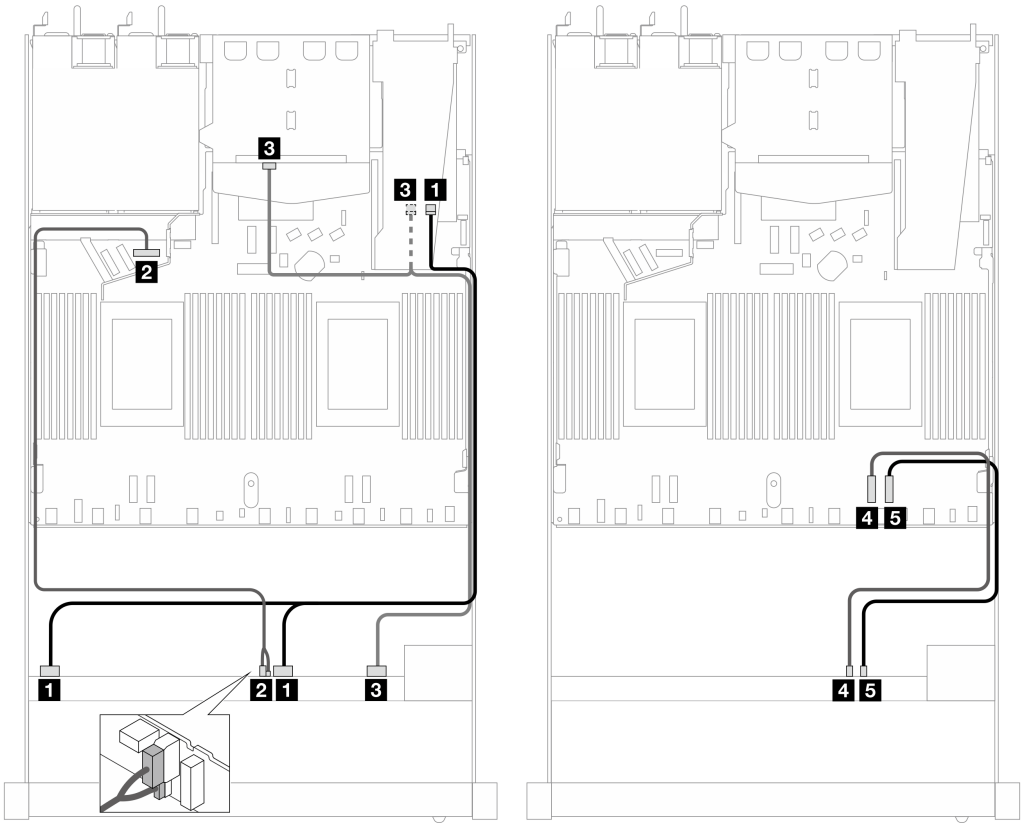


Figure 390. Cable routing for six front SAS/SATA drives and four front AnyBay drives bays and a 16i SFF RAID adapter (Gen 4) with two rear SAS/SATA drives installed

Table 158. Mapping between one front AnyBay and one rear SAS/SATA backplanes and an SFF RAID adapter

Backplane	**From**	**To**
Front BP (SAS)	1 SAS 0–3, 4–7	1 C0
Front BP (power)	2 Power and sideband	2 Power port for front BP
Front and rear BP (SAS)	3 SAS 8–9, SAS (rear)	3 C1
Front BP (NVMe)	4 NVMe 6–7	4 PCIe 2
	5 NVMe 8–9	5 PCIe 1

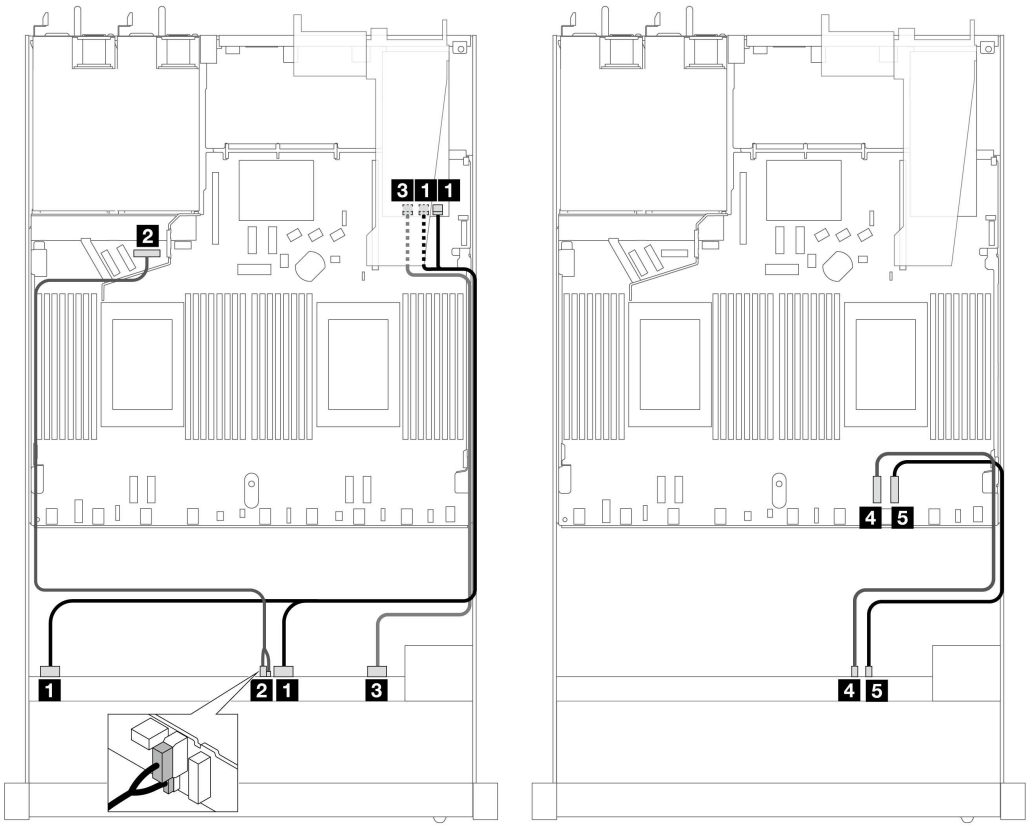


Figure 391. Cable routing for six front SAS/SATA drives and four front AnyBay drives bays with a 16i SFF RAID adapter (Gen 3)

Table 159. Mapping between one front AnyBay backplane and an SFF RAID adapter

Backplane	From	To
Front BP (SAS)	1 SAS 0–3, 4–7	1 C0, C1
Front BP (power)	2 Power and sideband	2 Power port for front BP
Front BP (SAS)	3 SAS 8–9	3 C2
Front BP (NVMe)	4 NVMe 6–7	4 PCIe 2
	5 NVMe 8–9	5 PCIe 1

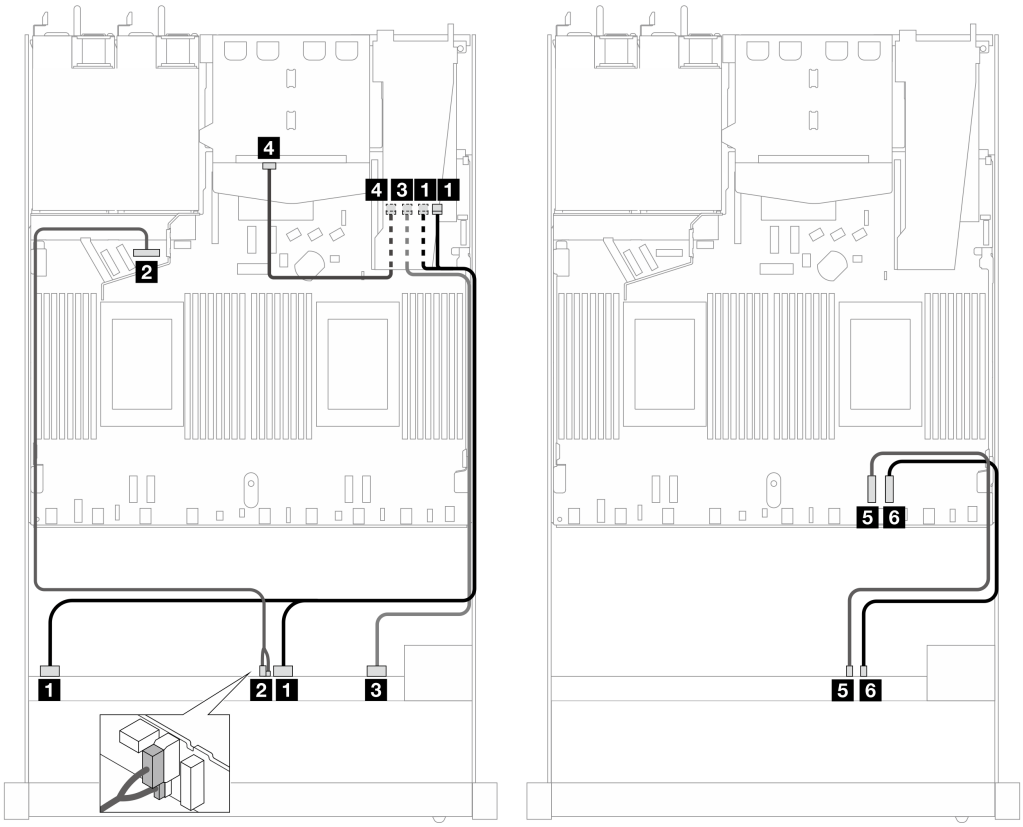


Figure 392. Cable routing for six front SAS/SATA drives and four front AnyBay drives bays and a 16i SFF RAID adapter (Gen 3) with two rear SAS/SATA drives installed

Table 160. Mapping between one front AnyBay and one rear SAS/SATA backplanes and an SFF RAID adapter

Backplane	From	To
Front BP (SAS)	1 SAS 0–3, 4–7	1 C0
Front BP (power)	2 Power and sideband	2 Power port for front BP
Front BP (SAS)	3 SAS 8–9	3 C1
Rear BP (SAS)	4 SAS (rear)	4 C2
Front BP (NVMe)	5 NVMe 6–7	5 PCIe 2
	6 NVMe 8–9	6 PCIe 1

Cable routing with a CFF HBA/RAID adapter

The following tables show the mapping relationship between backplane connectors and a CFF HBA/RAID adapter.

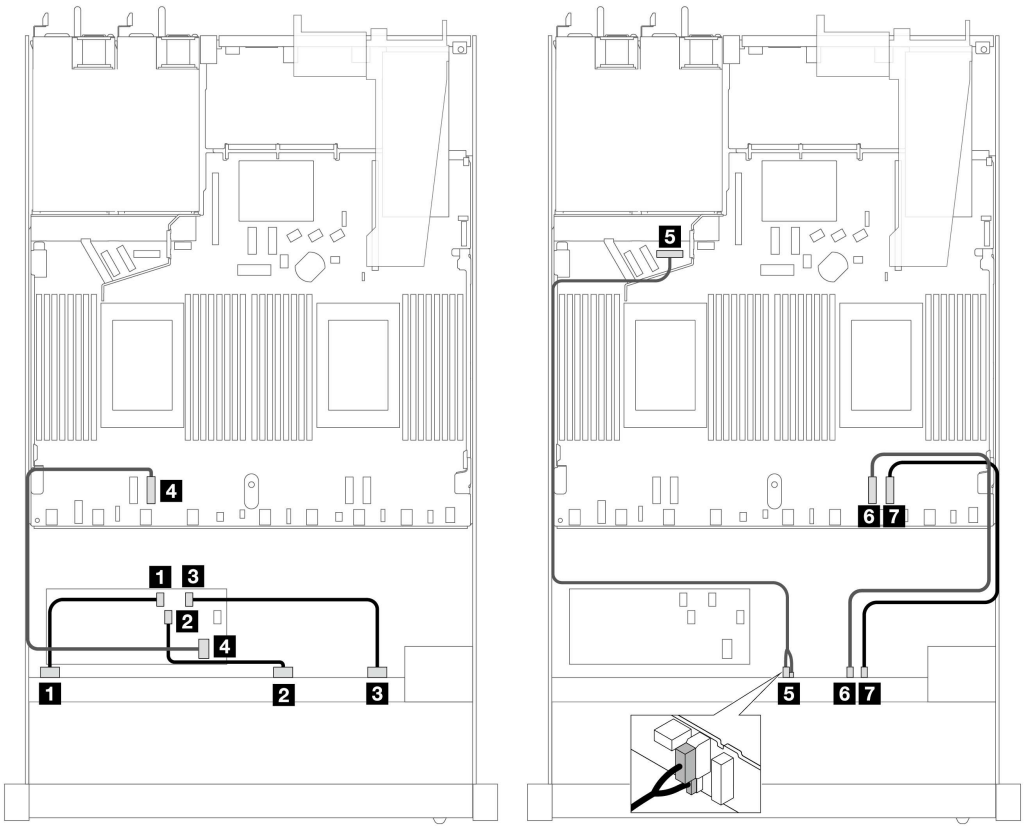


Figure 393. Cable routing for six front SAS/SATA and four front AnyBay drives with a 16i CFF HBA/RAID adapter (Gen 4)

Table 161. Mapping between one front AnyBay backplane and a CFF HBA/RAID adapter

Backplane/adapter	**From**	**To**
Front BP (SAS)	1 SAS 0–3	1 C0
	2 SAS 4–7	2 C1
	3 SAS 8–9	3 C2
CFF RAID adapter	4 MB input	4 PCIe 3
Front BP (power)	5 Power and sideband	5 Power port for front BP
Front BP (NVMe)	6 NVMe 6–7	6 PCIe 2
	7 NVMe 8–9	7 PCIe 1

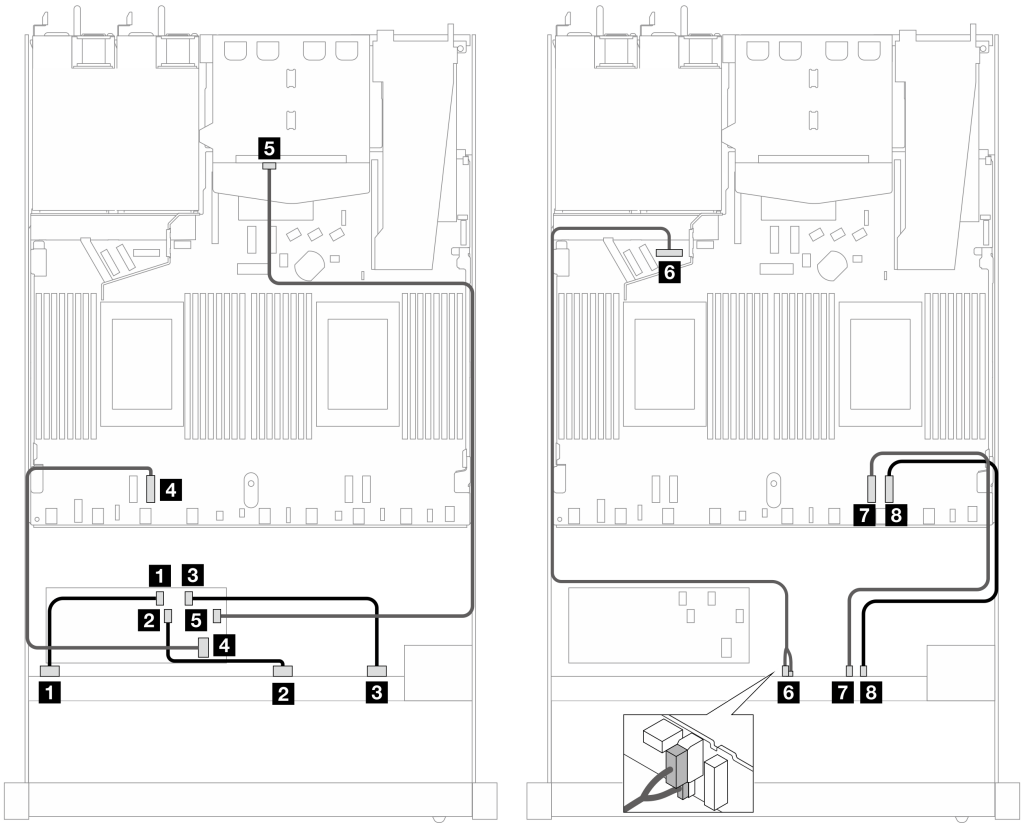


Figure 394. Cable routing for six front SAS/SATA and four front AnyBay drives with a 16i CFF HBA/RAID adapter (Gen 4) and two rear SAS/SATA drives installed

Table 162. Mapping between one front AnyBay and one rear SAS/SATA backplane and a CFF HBA/RAID adapter

Backplane/adapter	From	To
Front BP (SAS)	1 SAS 0–3	1 C0
	2 SAS 4–7	2 C1
	3 SAS 8–9	3 C2
CFF RAID adapter	4 MB input	4 PCIe 3
	5 C3	5 SAS (rear)
Front BP (power)	6 Power and sideband	6 Power port for front BP
Front BP (NVMe)	7 NVMe 6–7	7 PCIe 2
	8 NVMe 8–9	8 PCIe 1

6 x 2.5'' SAS/SATA + 2 x 2.5'' AnyBay + 2 x 2.5'' NVMe (Gen 5)

See this section to understand the cable routing of six front SAS/SATA drives, two front AnyBay drives and two front NVMe drives with the 10 x 2.5'' AnyBay backplane (Gen 5) installed.

To connect cables for a 7mm drive backplane, refer to “7mm drive backplane” on page 247.

To connect cables for M.2 drives, refer to “M.2 drive backplane” on page 244.

To connect cables for rear NVMe drives, refer to “Rear NVMe backplane cable routing with 10 x 2.5'' AnyBay backplane (Gen 5) installed” on page 250.

To connect signal cables for a backplane for standard six front SAS/SATA drives, two AnyBay drives and two front NVMe drives, refer to the following cable routing scenarios depending on your server configuration:

- “Cable routing for onboard configuration” on page 426
- “Cable routing with an SFF HBA/RAID adapter” on page 427
- “Cable routing with a CFF HBA/RAID adapter” on page 428

Cable routing for onboard configuration

The following tables show the mapping relationship between backplane connectors and processor board connectors for onboard configuration.

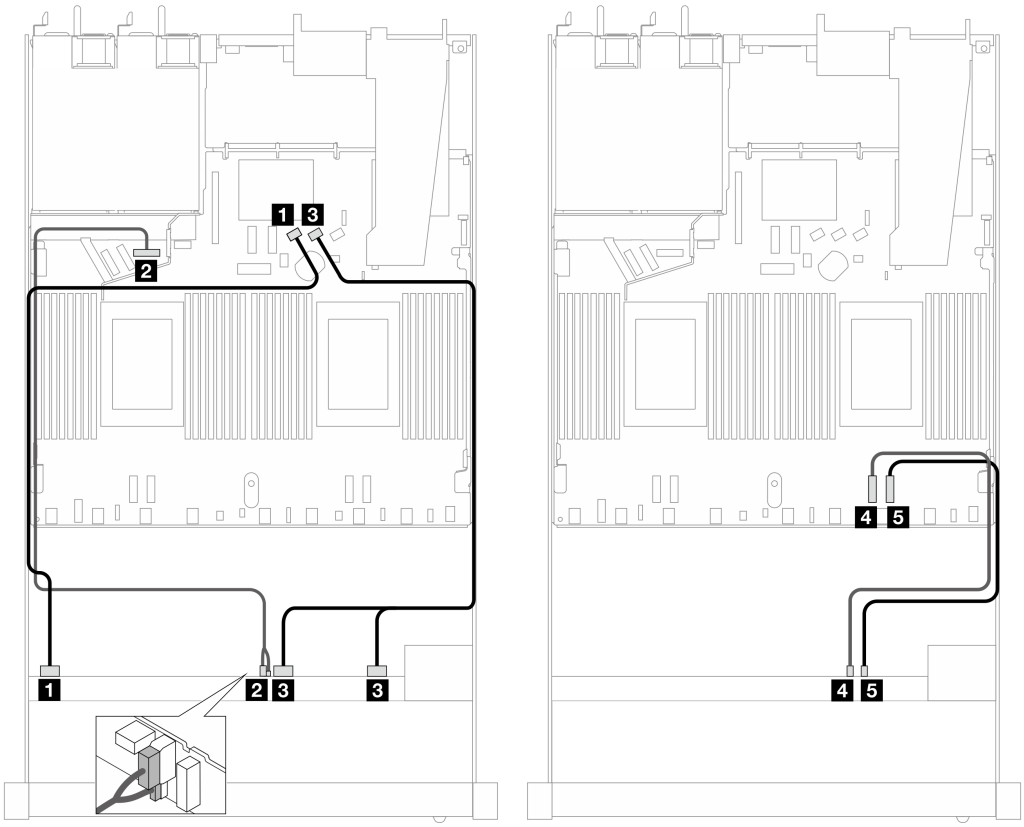


Figure 395. Cable routing for onboard configuration of six SAS/SATA drives and two AnyBay and two NVMe front drives bays

Table 163. Mapping between one front AnyBay backplane and processor board for onboard configuration

Backplane	From	To
Front BP (SAS)	1 SAS 0–3	1 SATA 0
Front BP (power)	2 Power and sideband	2 Power port for front BP
Front BP (SAS)	3 SAS 4–7, 8–9	3 SATA 1
Front BP (NVMe)	4 NVMe 6–7	4 PCIe 2

Table 163. Mapping between one front AnyBay backplane and processor board for onboard configuration (continued)

Backplane	From	To
	5 NVMe 8–9	5 PCIe 1

Cable routing with an SFF HBA/RAID adapter

The following tables show the mapping relationship between backplane connectors and an SFF HBA/RAID adapter.

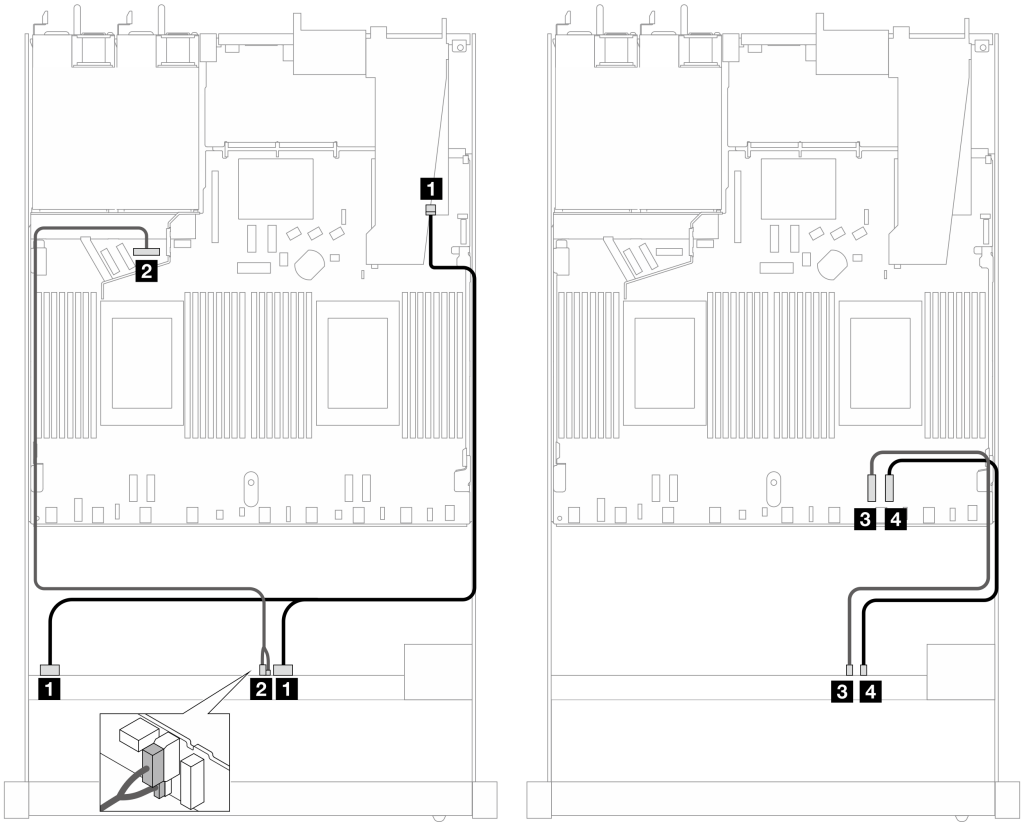


Figure 396. Cable routing for six SAS/SATA drives and two AnyBay drives and two NVMe front drive bays with a 16i SFF RAID adapter (Gen 4)

Table 164. Mapping between one front AnyBay backplane and an SFF HBA/RAID adapter

Backplane	From	To
Front BP (SAS)	1 SAS 0–3, 4–7	1 C0
Front BP (power)	2 Power and sideband	2 Power port for front BP
Front BP (NVMe)	3 NVMe 6–7	3 PCIe 2
	4 NVMe 8–9	4 PCIe 1

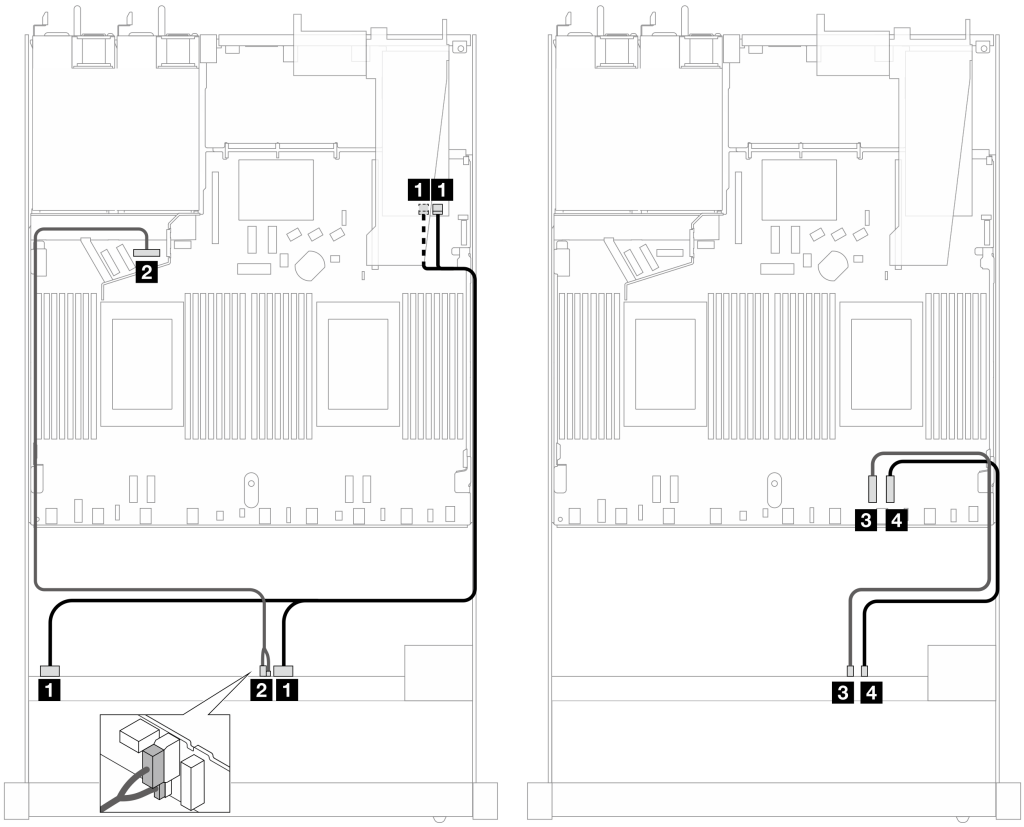


Figure 397. Cable routing for six SAS/SATA drives and two AnyBay drives and two NVMe front drive bays with a 16i SFF RAID adapter (Gen 3)

Table 165. Mapping between one front AnyBay backplane and an SFF HBA/RAID adapter

Backplane	From	To
Front BP (SAS)	1 SAS 0–3, 4–7	1 C0, C1
Front BP (power)	2 Power and sideband	2 Power port for front BP
Front BP (NVMe)	3 NVMe 6–7	3 PCIe 2
	4 NVMe 8–9	4 PCIe 1

Cable routing with a CFF HBA/RAID adapter

The following tables show the mapping relationship between backplane connectors and a 16i CFF HBA/RAID adapter (Gen 3 or Gen 4).

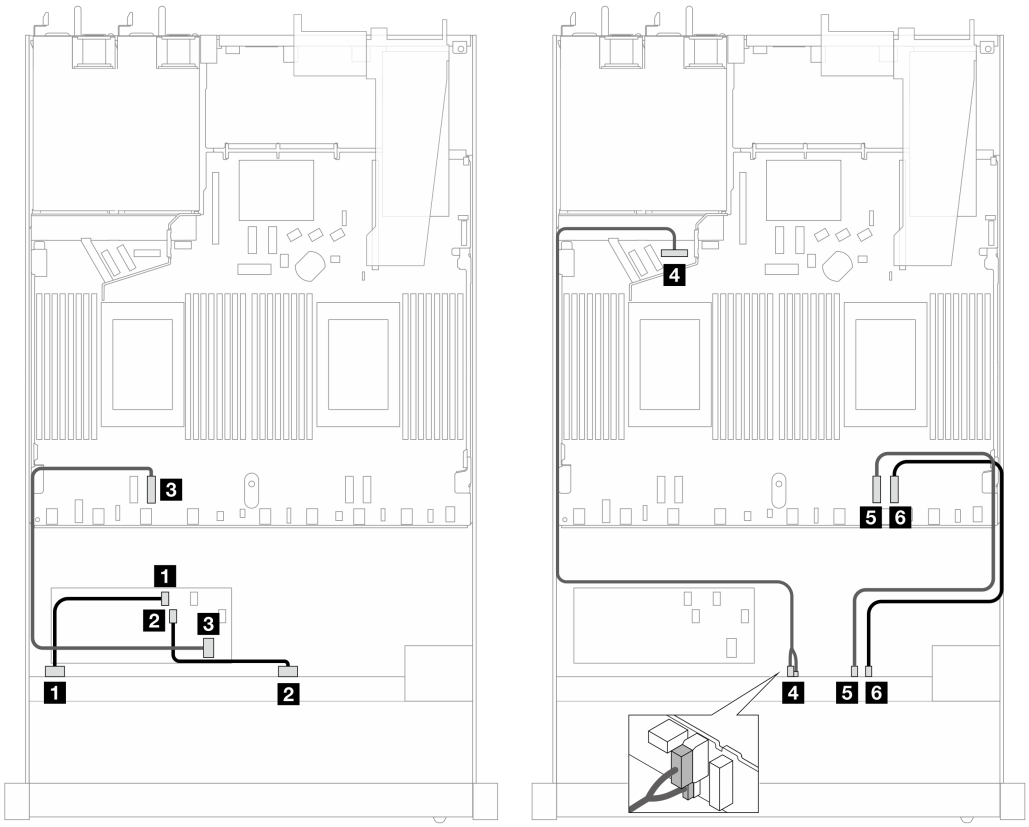


Figure 398. Cable routing for six SAS/SATA drives and two AnyBay drives and two NVMe front drive bays with a 16i CFF HBA/RAID adapter (Gen 3 or Gen 4)

Table 166. Mapping between one front SAS/SATA backplane and a CFF RAID adapter

Backplane/adapter	From	To
Front BP (SAS)	1 SAS 0–3	1 C0
	2 SAS 4–7	2 C1
CFF RAID adapter	3 MB input	3 PCIe 3
Front BP (power)	4 Power and sideband	4 Power port for front BP
Front BP (NVMe)	5 NVMe 6–7	5 PCIe 2
	6 NVMe 8–9	6 PCIe 1

10 x 2.5'' AnyBay (Gen 5)

See this section to understand the cable routing of 10 front AnyBay drives with 10 x 2.5'' backplane (Gen 5) installed.

To connect cables for a 7mm drive backplane, refer to “7mm drive backplane” on page 247.

To connect cables for M.2 drives, refer to “M.2 drive backplane” on page 244.

To connect cables for rear NVMe drives, refer to “Rear NVMe backplane cable routing with 10 x 2.5'' AnyBay backplane (Gen 5) installed” on page 250.

To connect signal cables for a backplane for standard 10 front front AnyBay drives, refer to the following cable routing scenarios depending on your server configuration:

- “Cable routing for onboard configuration” on page 430
- “Cable routing with an SFF HBA/RAID adapter” on page 431

Cable routing for onboard configuration

The following tables show the mapping relationship between backplane and processor board connectors for onboard configuration.

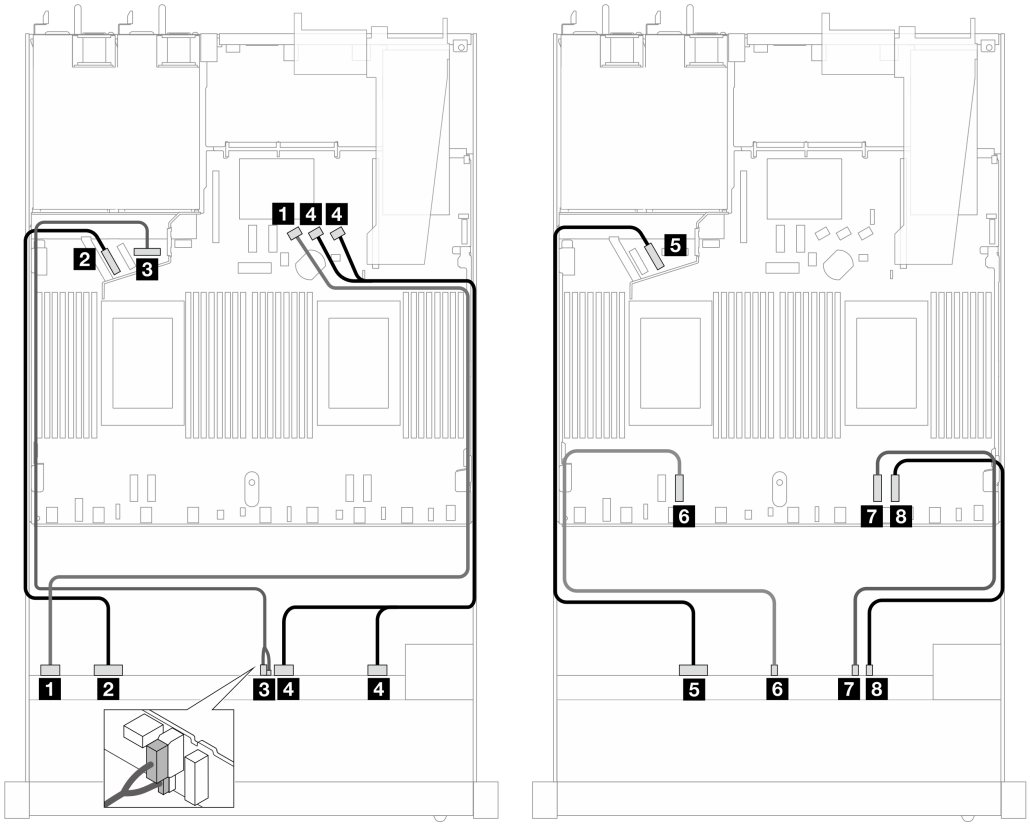


Figure 399. Cable routing for onboard configuration of 10 x 2.5'' AnyBay front drives

Table 167. Mapping between one front AnyBay backplane and processor board for onboard configuration

Backplane	From	To
Front BP (SAS)	1 SAS 0–3	1 SATA 0
Front BP (NVMe)	2 NVMe 0–1	2 PCIe 5
Front BP (power)	3 Power and sideband	3 Power port for front BP
Front BP (SAS)	4 SAS 4–7, 8–9	4 SATA 1, 2
Front BP (NVMe)	5 NVMe 2–3	5 PCIe 6
	6 NVMe 4–5	6 PCIe 3
	7 NVMe 6–7	7 PCIe 2
	8 NVMe 8–9	8 PCIe 1

Cable routing with an SFF HBA/RAID adapter

The following tables show the mapping relationship between backplane connectors and an SFF HBA/RAID adapter (Gen 3 or Gen 4).

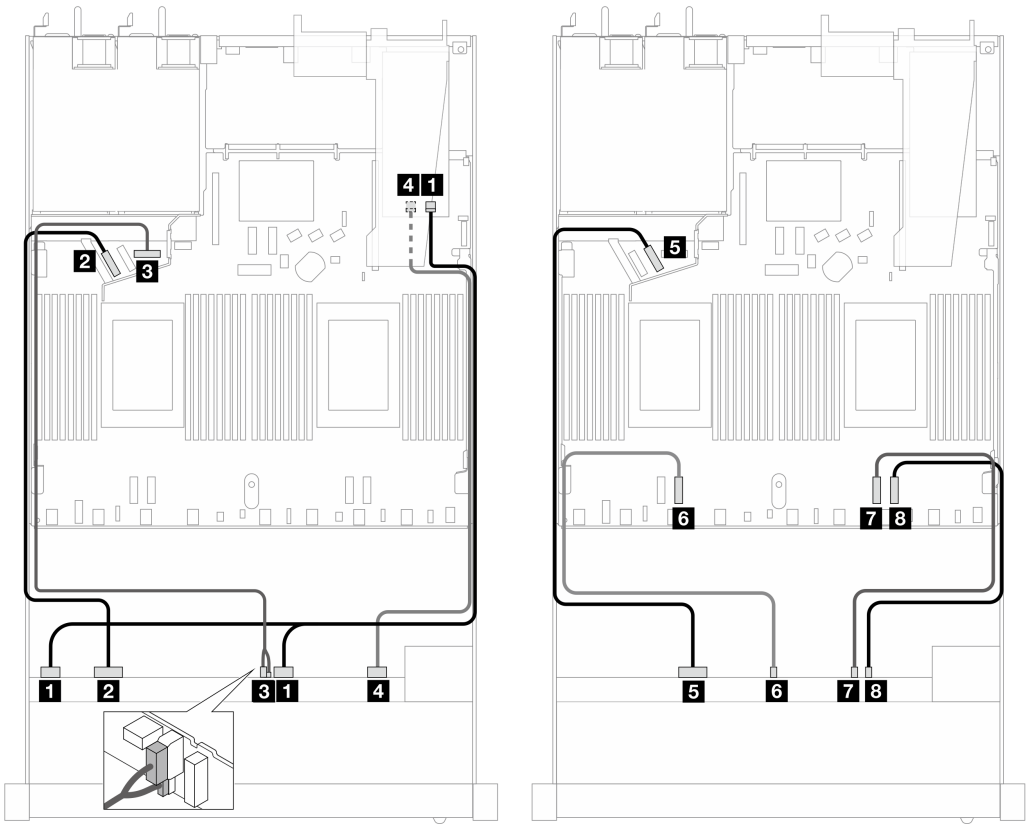


Figure 400. Cable routing for 10 front AnyBay drives with a 16i SFF RAID adapter (Gen 4)

Table 168. Mapping between one front AnyBay backplane and a Gen 4 SFF HBA/RAID adapter

Backplane	From	To
Front BP (SAS)	1 SAS 0–3, 4–7	1 C0
Front BP (NVMe)	2 NVMe 0–1	2 PCIe 5
Front BP (power)	3 Power and sideband	3 Power port for front BP
Front BP (SAS)	4 SAS 8–9	4 C1
Front BP (NVMe)	5 NVMe 2–3	5 PCIe 6
	6 NVMe 4–5	6 PCIe 3
	7 NVMe 6–7	7 PCIe 2
	8 NVMe 8–9	8 PCIe 1

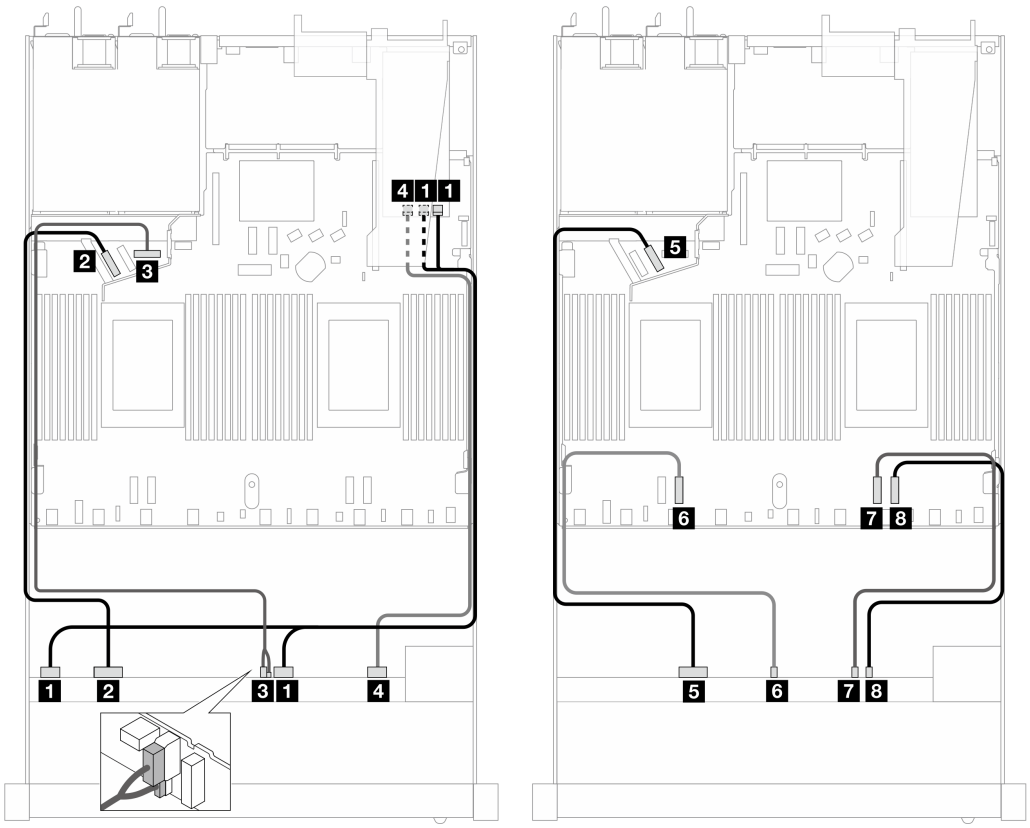


Figure 401. Cable routing for 10 AnyBay drives with a 16i SFF RAID adapter (Gen 3)

Table 169. Mapping between one front AnyBay backplane and an SFF HBA/RAID adapter

Backplane	From	To
Front BP (SAS)	1 SAS 0–3, 4–7	1 C0, C1
Front BP (NVMe)	2 NVMe 0–1	2 PCIe 5
Front BP (power)	3 Power and sideband	3 Power port for front BP
Front BP (SAS)	4 SAS 8–9	4 C2
Front BP (NVMe)	5 NVMe 2–3	5 PCIe 6
	6 NVMe 4–5	6 PCIe 3
	7 NVMe 6–7	7 PCIe 2
	8 NVMe 8–9	8 PCIe 1

10 x 2.5'' NVMe (Gen 5)

See this section to understand the cable routing of 10 front NVMe drives with 10 x 2.5'' backplane (Gen 5) installed.

To connect cables for a 7mm drive backplane, refer to “7mm drive backplane” on page 247.

To connect cables for M.2 drives, refer to “M.2 drive backplane” on page 244.

Cable routing for onboard configuration

The following table shows the mapping relationship between backplane connectors and system board connectors for onboard configuration.

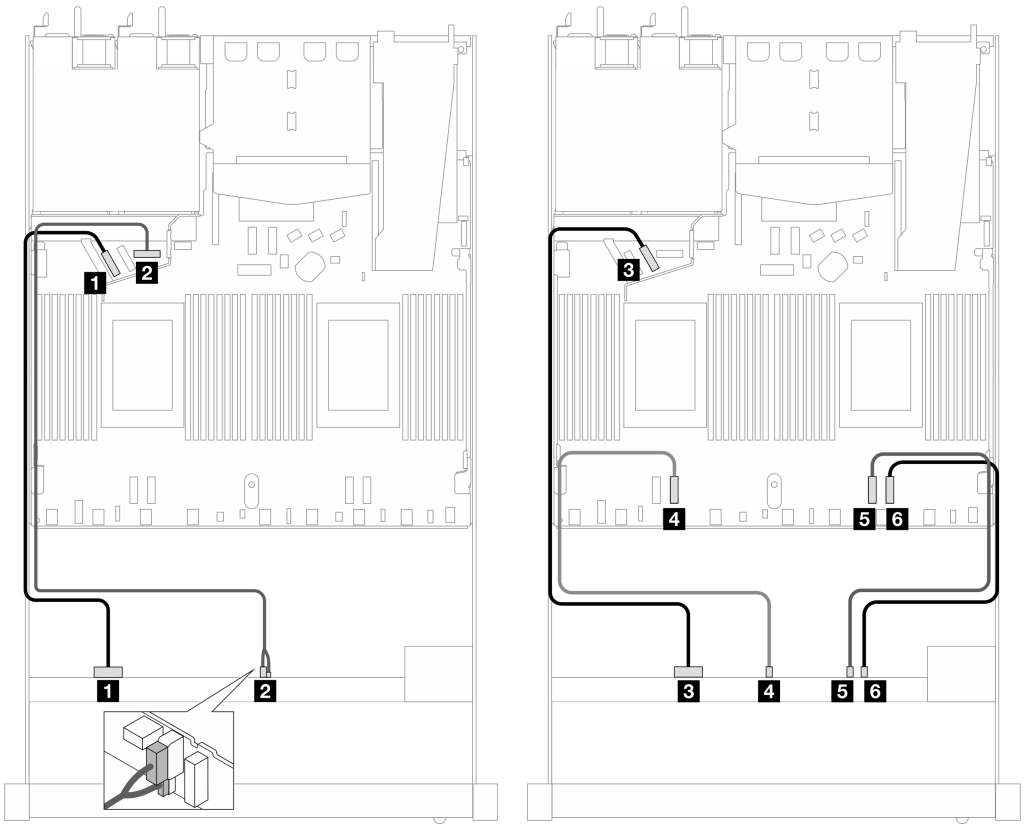


Figure 402. Cable routing for onboard configuration of 10 x 2.5'' NVMe front drives

Table 170. Mapping between one front AnyBay backplane and processor board for onboard configuration

Backplane	From	To
Front BP (NVMe)	1 NVMe 0–1	1 PCIe 5
Front BP (power)	2 Power and sideband	2 Power port for front BP
Front BP (NVMe)	3 NVMe 2–3	3 PCIe 6
	4 NVMe 4–5	4 PCIe 3
	5 NVMe 6–7	5 PCIe 2
	6 NVMe 8–9	6 PCIe 1

12 x 2.5'' NVMe (Gen 5)

See this section to understand the cable routing of 12 front NVMe drives with 10 x 2.5'' backplane (Gen 5) installed.

To connect cables for a 7mm drive backplane, refer to “7mm drive backplane” on page 247.

To connect cables for M.2 drives, refer to “M.2 drive backplane” on page 244.

Cable routing for onboard configuration

The following table shows the mapping relationship between backplane connectors and system board connectors for onboard configuration.

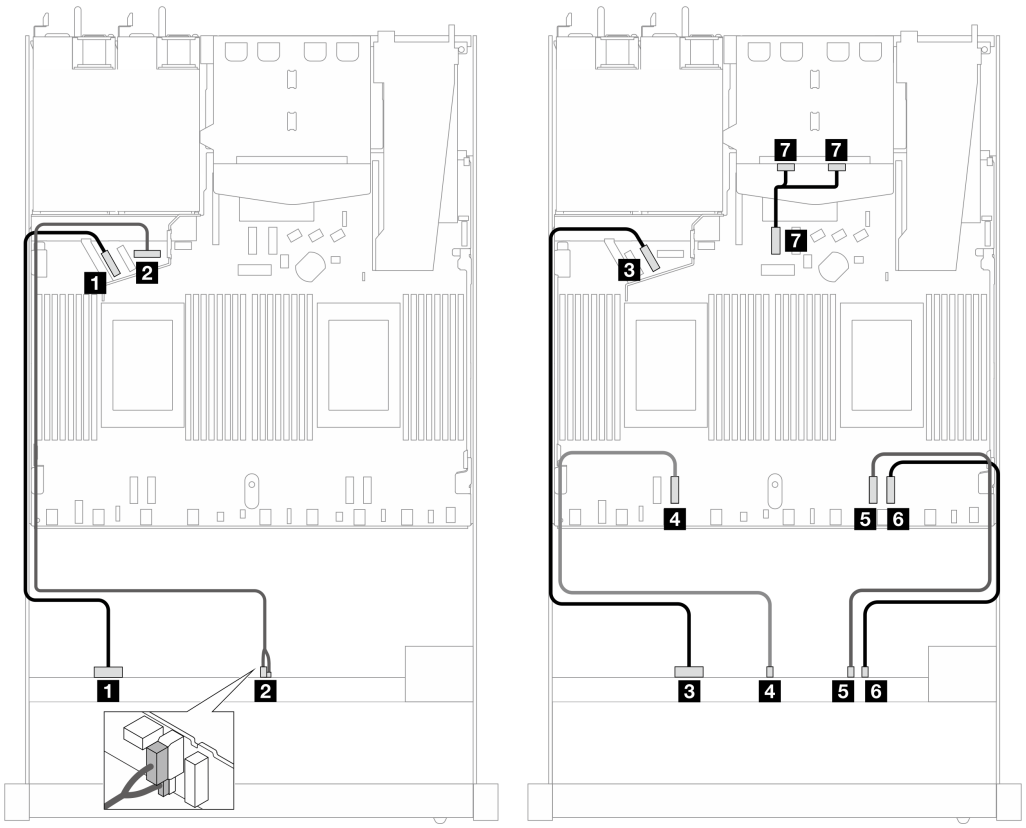


Figure 403. Cable routing for onboard configuration of 12 x 2.5'' NVMe front drives

Table 171. Mapping between one front AnyBay backplane and processor board for onboard configuration

Backplane	From	To
Front BP (NVMe)	1 NVMe 0–1	1 PCIe 5
Front BP (power)	2 Power and sideband	2 Power port for front BP
Front BP (NVMe)	3 NVMe 2–3	3 PCIe 6
	4 NVMe 4–5	4 PCIe 3
	5 NVMe 6–7	5 PCIe 2
	6 NVMe 8–9	6 PCIe 1
Rear BP (NVMe)	7 NVMe 0, 1(rear)	7 PCIe 7

16-EDSFF drive backplane

Use this section to understand the backplane cable routing for server model with 16 E1.S EDSFF front drives.

The following table shows the mapping relationship between backplane, re-timer adapter and processor board connectors.

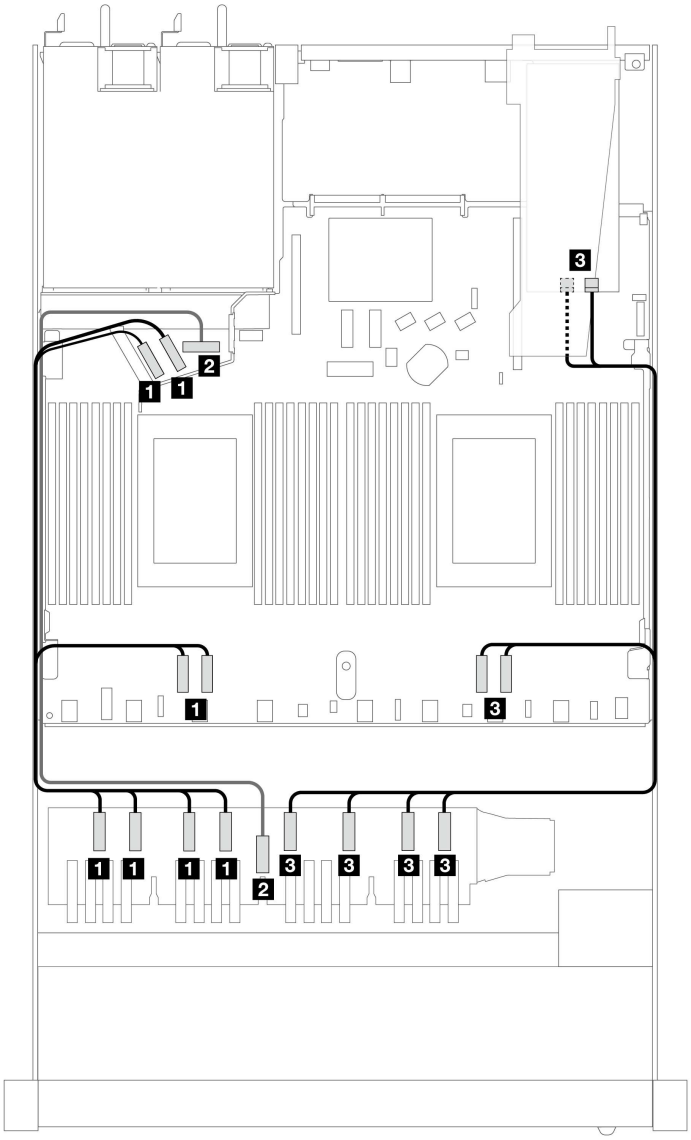


Table 172. Mapping between one front AnyBay backplane and a re-timer adapter with onboard connectors

From	To
1 EDSFF 0–1	1 PCIe 6
1 EDSFF 2–3	1 PCIe 5
1 EDSFF 4–5	1 PCIe 4
1 EDSFF 6–7	1 PCIe 3
2 Power	2 Front backplane power port on the processor board
3 EDSFF 8–9	3 C1
3 EDSFF 10–11	3 C0
3 EDSFF 12–13	3 PCIe 2
3 EDSFF 14–15	3 PCIe 1

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 input the model name or machine type of your server in the search bar to navigate to the support page.
  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 Chassis Management Module 2 or by the Lenovo XClarity Administrator, alerts are automatically forwarded to those management applications.

Note: For a listing of events, including user actions that might need to be performed to recover from an event, see the *Messages and Codes Reference*, which is available at https://thinksystem.lenovofiles.com/help/topic/SR630V3/pdf_files.html.

Lenovo XClarity Administrator event log

If you are using Lenovo XClarity Administrator to manage server, network, and storage hardware, you can view the events from all managed devices through the XClarity Administrator.

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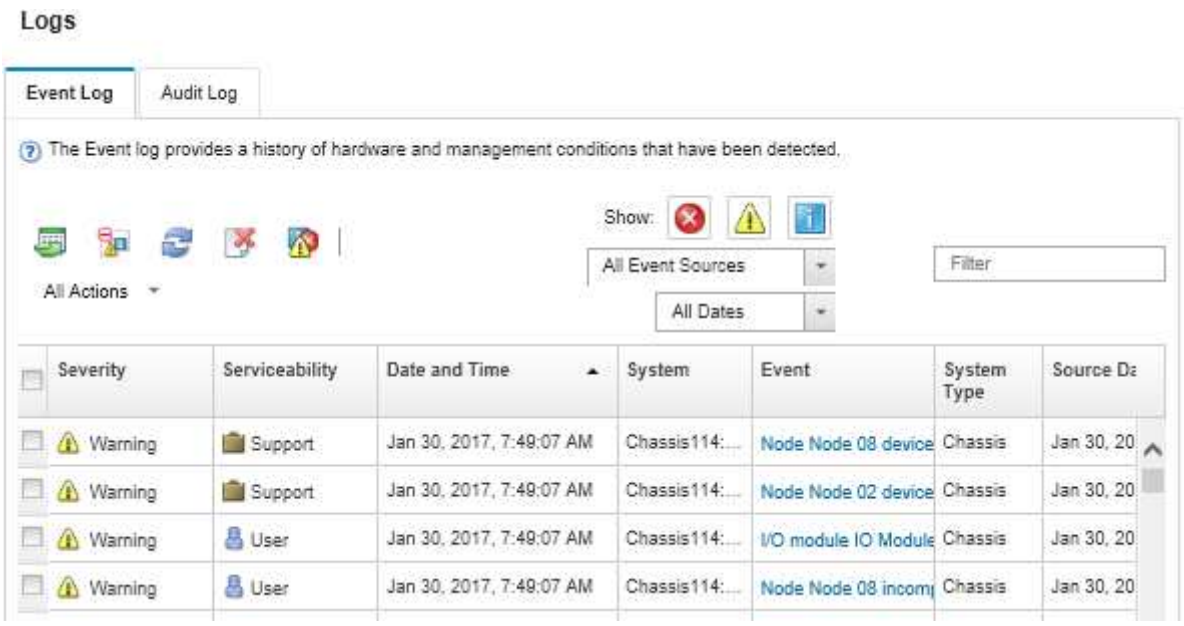


Figure 404. Lenovo XClarity Administrator event log

For more information about working with events from XClarity Administrator, see:

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

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.

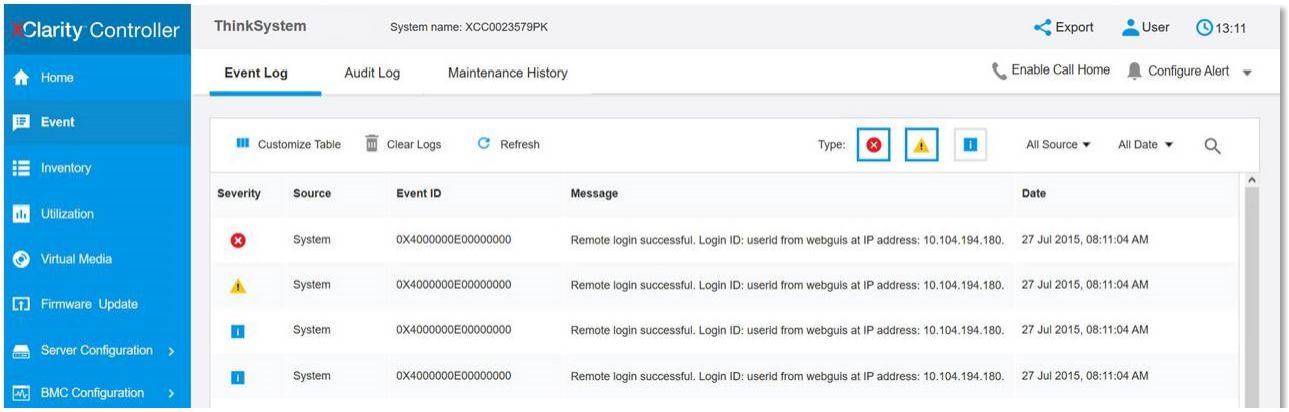


Figure 405. Lenovo XClarity Controller event log

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	Mechanical specifications	Environmental specifications
Content	• Processor • Memory • Internal drives • Expansion slots • Graphics processing units (GPU) • Integrated functions and I/O connectors • Network • Rear button • RAID adapter • Host bus adapter • System fan • Electrical input • Minimal configuration for debugging • Operating systems	• Dimension • Weight	• Acoustical noise emissions • Ambient temperature management • Environmental

Technical specifications

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

- “Processor” on page 440
- “Memory” on page 440
- “Internal drives” on page 441
- “Expansion slots” on page 441
- “Graphics processing unit (GPU)” on page 441
- “Integrated functions and I/O connectors” on page 442
- “Network” on page 442
- “Rear button” on page 442
- “RAID adapter” on page 443
- “Host bus adapter” on page 443
- “System fan” on page 444
- “Electrical input” on page 444

- “Minimal configuration for debugging” on page 445
- “Operating systems” on page 445

Processor

Processor
Supports multi-core Intel Xeon processors, with integrated memory controller and Intel Mesh UPI (Ultra Path Interconnect) topology. • Up to two 4th Gen Intel Xeon scalable processors with the new LGA 4677-X socket • Up to 60 cores per socket • Up to 4 UPI links at up to 16 GT/s • Thermal Design Power (TDP): up to 350 watts For a list of supported processors, see: https://serverproven.lenovo.com.

Memory

Memory

See “Memory module installation rules and order” on page 6 for detailed information about memory configuration and setup.
 	
• Slots: 32 dual inline memory module (DIMM) connectors that support up to:
  – 32 DDR5 DIMMs
• Memory module type:
  – TruDDR5 4800MHz RDIMM: 16 GB (1Rx8), 32 GB (2Rx8)
  – TruDDR5 4800MHz 10x4 RDIMM: 32 GB (1Rx4), 64 GB (2Rx4)
  – TruDDR5 4800MHz 9x4 RDIMM: 32 GB (1Rx4), 64 GB (2Rx4)
  – TruDDR5 4800MHz 3DS RDIMM: 128 GB (4Rx4), 256 GB (8Rx4)
• Speed: Operating speed depends on processor model and UEFI settings.
  – 4800 MT/s for 1 DIMM per channel
  – 4400 MT/s for 2 DIMMs per channel
• Minimum memory: 16 GB
• Maximum memory: 8 TB: 32 x 256 GB 3DS RDIMMs
 	
For a list of supported memory options, see https://serverproven.lenovo.com.
 	
For technical rules for memory modules, see “Memory module installation rules and order” on page 6.

Internal drives

Internal drives
Front: • Up to four 3.5-inch hot-swap SAS/SATA drives • Up to four 3.5-inch hot-swap AnyBay (SAS/SATA/NVMe) drives • Up to four 2.5-inch hot-swap SAS/SATA drives • Up to four 2.5-inch hot-swap NVMe drives • Up to eight 2.5-inch hot-swap SAS/SATA drives • Up to six 2.5-inch hot-swap SAS/SATA and four 2.5-inch hot-swap AnyBay (SAS/SATA/NVMe) drives • Up to six 2.5-inch hot-swap SAS/SATA and two 2.5-inch hot-swap AnyBay (SAS/SATA/NVMe) and two 2.5-inch hot-swap NVMe drives • Up to ten 2.5-inch hot-swap SAS/SATA drives • Up to eight 2.5-inch hot-swap NVMe drives • Up to ten 2.5-inch hot-swap NVMe drives • Up to ten 2.5-inch hot-swap AnyBay (SAS/SATA/NVMe) drives • Up to 16 hot-swap EDSFF drives Inside: • Up to two internal SATA or NVMe M.2 drives Rear: • Up to two 2.5-inch hot-swap SAS/SATA or NVMe drives • Up to two 7mm hot-swap SATA or NVMe drives **Notes:** • M.2 and 7mm drives are not supported at the same time. • If 256 GB DIMM is used, rear 2.5-inch drives are not supported.

Expansion slots

Expansion slots
Depending on the model, your server supports up to three PCIe slots in the rear and up to two PCIe slots in the front. • PCIe x16, low-profile • PCIe x16/x16, low-profile + low-profile • PCIe x16/x16, low profile + full-height • PCIe x16, full-height

Graphics processing unit (GPU)

Graphics processing unit (GPU)

Your server supports the following GPUs:
• Half-length, single-wide:
  – NVIDIA® A2
  – NVIDIA® L4
 	
Note: For GPU supporting rules, see “Thermal rules” on page 16.

Integrated functions and I/O connectors

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/.
• One XCC system management port on the rear to connect to a systems-management network. This RJ-45 connector is dedicated to the Lenovo XClarity Controller functions and runs at 1 GB speed.
• A group of two or four Ethernet connectors on OCP module
• Up to four USB 3.2 Gen1 (5 Gbps) ports:
  – Three on the rear of the server
  – (Optional) One on the front of the server[1]
• One internal USB 3.2 Gen1 (5 Gbps) port
• (Optional) One USB 2.0 port on the front of the server[1]
• (Optional) External LCD diagnostics handset connector on the front of the server[1]
• Up to two VGA connectors
  – One on the rear of the server
  – (Optional) One on the front of the server[1]
• (Optional) One serial port connector on the rear of the server[2]
Notes:
1. Available when the front I/O module is installed in the server.
2. Available when the serial port cable is installed in the server.

Network

Network
• OCP module **Note:** The OCP module is an optional part. It is default to be installed in the rear and optional in the front of the server.

Rear button

Rear button
• NMI button

RAID adapter

RAID adapter
Support the following RAID adapters: • ThinkSystem RAID 5350-8i PCIe 12Gb Adapter • ThinkSystem RAID 540-8i PCIe 12Gb Adapter • ThinkSystem RAID 540-16i PCIe 12Gb Adapter • ThinkSystem RAID 9350-8i 2GB Flash PCIe 12Gb Adapter • ThinkSystem RAID 9350-16i 4GB Flash PCIe 12Gb Adapter • ThinkSystem RAID 940-8i 4GB Flash PCIe Gen4 12Gb Adapter • ThinkSystem RAID 940-8i 4GB Flash PCIe Gen4 12Gb Adapter (Tri-mode) • ThinkSystem RAID 940-16i 4GB Flash PCIe Gen4 12Gb Adapter • ThinkSystem RAID 940-16i 4GB Flash PCIe Gen4 12Gb Adapter (Tri-mode) • ThinkSystem RAID 940-8e 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 Adapter (Tri-mode) • ThinkSystem RAID 5350-8i PCIe 12Gb Internal Adapter • ThinkSystem RAID 940-16i 8GB Flash PCIe Gen4 12Gb Internal Adapter • ThinkSystem RAID 9350-8i 2GB Flash PCIe Gen 4 12Gb Internal Adapter • ThinkSystem RAID 9350-16i 4GB Flash PCIe Gen 4 12Gb Internal Adapter

Host bus adapter

Host bus adapter
Support the following HBAs: • ThinkSystem 4350-8i SAS/SATA 12Gb HBA • ThinkSystem 4350-16i SAS/SATA 12Gb HBA • ThinkSystem 440-8i SAS/SATA 12Gb HBA • ThinkSystem 440-8e SAS/SATA 12Gb HBA • ThinkSystem 440-16i SAS/SATA 12Gb HBA • ThinkSystem 440-16e SAS/SATA 12Gb HBA • ThinkSystem 440-16i SAS/SATA PCIe Gen4 12Gb Internal HBA • ThinkSystem QLogic 16Gb Enhanced Gen5 FC Single-port HBA • ThinkSystem QLogic 16Gb Enhanced Gen5 FC Dual-port HBA • ThinkSystem Emulex 16Gb Gen6 FC Single-port HBA • ThinkSystem Emulex 16Gb Gen6 FC Dual-port HBA

System fan

System fan

- Supported fan types:
  - Standard fan 4056 (21000 RPM)
  - Performance fan 4056 (28000 RPM)
- Fan redundancy: N+1 redundancy, one redundant fan rotor
  - One processor: six hot-swap dual-rotor system fans (one redundant fan rotor)
  - Two processors: eight hot-swap dual-rotor system fans (one redundant fan rotor)

Note:
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.

Electrical input

Electrical input

One or two hot-swap power supply units for redundancy support:

Table 173. Electrical input for power supply units

Power supply	100–127 V ac	200–240 V ac	240 V dc	-48 V dc
750-watt 80 PLUS Platinum	√	√	√	
1100-watt 80 PLUS Platinum	√	√	√	
1800-watt 80 PLUS Platinum		√	√	
750-watt 80 PLUS Titanium		√	√	
1100-watt 80 PLUS Titanium		√	√	
1800-watt 80 PLUS Titanium		√	√	
1100-watt -48 V DC				√

CAUTION:

- **240 V dc input 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.**

Minimal configuration for debugging

Minimal configuration for debugging
• One processor in processor socket 1 • One memory module in slot 7 • One power supply unit • One HDD/SSD drive, one M.2 drive, or one 7mm drive (if OS is needed for debugging) • Six system fans (with one processor)

Operating systems

Operating systems
Supported and certified operating systems: • Microsoft Windows Server • VMware ESXi • Red Hat Enterprise Linux • SUSE Linux Enterprise Server • Canonical Ubuntu References: • Complete list of available operating systems: https://lenovopress.lenovo.com/osig. • OS deployment instructions: Follow the adopted combination to install DDR5 DIMMs (see “Install the operating system” in *User Guide*).

Mechanical specifications

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

Dimension

1U server
• Height: 43.0 mm (1.69 inches)
• Width:
  – With rack latches: 482 mm (18.98 inches)
  – Without rack latches: 434.4 mm (17.10 inches)
• Depth: 787.6 mm (31.01 inches)
Note: The depth is measured with rack latches and the handle of the power supply unit included.

Weight
• Net weight: up to 20.80 kg (45.86 lb) • Gross weight: up to 28.41 kg (62.66 lb) **Note:** The gross weight includes the weights of the server, power cable, packaging, rail kit and cable management arm.

Environmental specifications

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

- “Acoustical noise emissions” on page 447
- “Ambient temperature management” on page 448
- “Environment” on page 449

Acoustical noise emissions

Acoustical noise emissions

The server has the following acoustic noise emissions declaration:

Table 174. Acoustic noise emissions declaration

Scenario	Used configuration	Sound power level (L_{WAd})		Sound pressure level (L_{pAm}):	
		Idling	Operating	Idling	Operating
Minimal	Two 150 W processors Thirty two 64 GB RDIMMs Eight SAS hard disk drives RAID 440-16i CFF adapter Intel X710-T2L 10GBASE-T 2-port OCP adapter Two 750-watt power supply units	5.8 Bel	6.4 Bel	45 dBA	50 dBA
Typical	Two 205 W processors Thirty two 64 GB RDIMMs Ten SAS hard disk drives RAID 940-16i SFF adapter Intel X710-T2L 10GBASE-T 2-port OCP adapter Two 1100-watt power supply units	6.7 Bel	7.7 Bel	54 dBA	61 dBA
Storage rich	Two 165 W processors Thirty two 64 GB RDIMMs 12 SAS hard disk drives RAID 940-16i SFF adapter Intel X710-T2L 10GBASE-T 2-port OCP adapter Two 750-watt power supply units	7.5 Bel	7.6 Bel	60 dBA	61 dBA
GPU rich	Two 205 W processors Thirty two 64 GB RDIMMs Ten SAS hard disk drives RAID 940-16i SFF adapter Intel X710-T2L 10GBASE-T 2-port OCP adapter Two 1100-watt power supply units	6.7 Bel	8.3 Bel	53 dBA	68 dBA

Notes:

Acoustical noise emissions

- These sound power levels are measured in controlled acoustical environments according to procedures specified by ISO 7779 and are reported in accordance with ISO 9296.
- The declared sound levels may change depending on configuration/conditions, for example, with high-power NICs, high-power processors and GPUs, such as ThinkSystem Mellanox ConnectX-6 HDR/200GbE QSFP56 1-port/2-port PCIe Adapter, ThinkSystem Broadcom 57454 10GBASE-T 4-port OCP Ethernet Adapter.
- Government regulations (such as those prescribed by OSHA or European Community Directives) may govern noise level exposure in the workplace and may apply to you and your server installation. The actual sound pressure levels in your installation depend upon a variety of factors, including the number of racks in the installation; the size, materials, and configuration of the room; the noise levels from other equipment; the room ambient temperature, and employee's location in relation to the equipment. Further, compliance with such government regulations depends on a variety of additional factors, including the duration of employees' exposure and whether employees wear hearing protection. Lenovo recommends that you consult with qualified experts in this field to determine whether you are in compliance with the applicable regulations.

Ambient temperature management

Ambient temperature management

The server is supported in the following environment:

- Air temperature:
  - Operating:
    - ASHRAE class H1: 5–25°C (41–77°F); when the altitude exceeds 900 m (2953 ft), the maximum ambient temperature value decreases by 1°C (1.8°F) with every 500 m (1640 ft) of altitude increase.
    - ASHRAE class A2: 10–35°C (50–95°F); when the altitude exceeds 900 m (2953 ft), the maximum ambient temperature value decreases by 1°C (1.8°F) with every 300 m (984 ft) of altitude increase.
    - ASHRAE class A3: 5–40°C (41–104°F); when the altitude exceeds 900 m (2953 ft), the maximum ambient temperature value decreases by 1°C (1.8°F) with every 175 m (574 ft) of altitude increase.
    - ASHRAE class A4: 5–45°C (41–113°F); when the altitude exceeds 900 m (2953 ft), the maximum ambient temperature value decreases by 1°C (1.8°F) with every 125 m (410 ft) of altitude increase.
  - Server off: 5–45°C (41–113°F)
  - Shipping or storage: -40–60°C (-40–140°F)
- Maximum altitude: 3050 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: 8%–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 or storage: 8%–90%
- Particulate contamination

  Attention: Airborne particulates and reactive gases acting alone or in combination with other environmental factors such as humidity or temperature might pose a risk to the server. For information about the limits for particulates and gases, see “Particulate contamination” on page 450.

Environment

Environment
ThinkSystem SR630 V3 complies with ASHRAE Class A2 specifications. System performance may be affected when operating temperature is outside of AHSARE A2 specification. • Air temperature: – Operating – ASHARE Class A2: 10°C to 35°C (50°F to 95°F); the maximum ambient temperature decreases by 1°C for every 300 m (984 ft) increase in altitude above 900 m (2,953 ft). – Server off: 5°C to 45°C (41°F to 113°F) – Shipment/storage: -40°C to 60°C (-40°F to 140°F) • Maximum altitude: 3,050 m (10,000 ft) • Relative Humidity (non-condensing): – Operating – ASHRAE Class A2: 8% to 80%; maximum dew point: 21°C (70°F) – Shipment/storage: 8% to 90% • Particulate contamination **Attention:** Airborne particulates and reactive gases acting alone or in combination with other environmental factors such as humidity or temperature might pose a risk to the server. For information about the limits for particulates and gases, see “Particulate contamination” on page 450. **Note:** The server is designed for standard data center environment and recommended to be placed in industrial data centers. 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. Depending on hardware configurations, the server complies with ASHRAE Class H1, A2, A3, or A4 specifications with certain thermal restrictions. System performance may be impacted when operating temperature is out of permitted conditions. The restrictions to ASHRAE support are as follows: • The ambient temperature must be no more than 25°C if your server meets the following conditions: – 300 W ≤ TDP ≤ 350 W – Installed with the Liquid to Air Module (L2AM) • The ambient temperature must be no more than 30°C if your server meets any of the following conditions: – 205 W < TDP ≤ 350 W – Installed with any rear 2.5-inch NVMe drive – Installed with any 256 GB DIMM – Installed with any passive GPU – Installed with any ConnectX-6/ConnectX-7 adapters with the AOC transceiver – Installed with parts with AOC transceivers and the rate is greater than 25 GB • The ambient temperature must be no more than 35°C if your server meets any of the following conditions: – 165 W < TDP ≤ 205 W – Installed with any 128 GB DIMM – Installed with any front NVMe drive or rear NVMe AIC SSD – Installed with any 7mm boot drive – Installed with any M.2 NVMe drive – Installed with any rear 2.5-inch SAS/SATA drive – Installed with Broadcom 57454 10GBASE-T 4-port OCP/ Broadcom 57416 10GBASE-T 2-port OCP – Installed with PCIe network interface cards (NICs) and OCP modules at a rate greater than or equal to 100 GB – Installed with parts with AOC transceivers and at the rate of 25 GB

Environment
• The ambient temperature must be no more than 45°C if the processor TDP is equal to or smaller than 185 W.

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 factors, such as temperature or moisture in the air, can influence the effect 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 175. 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.

System-board-assembly connectors

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

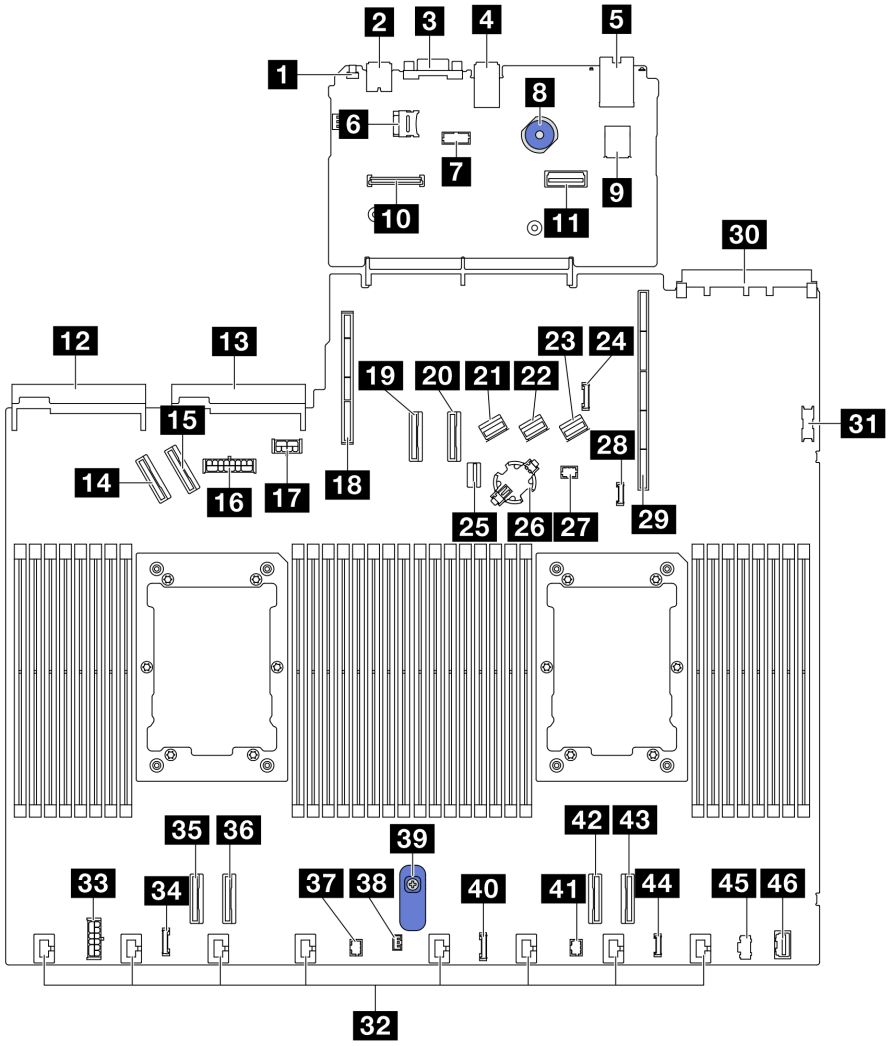


Figure 406. System-board-assembly connectors

Table 176. System-board-assembly connectors

1 NMI button	24 Rear backplane sideband connector
2 Rear USB connector 1	25 M.2/7mm backplane signal connector
3 VGA connector	26 CMOS battery socket
4 Rear USB connector 2	27 Pump 1 connector
5 Management NIC connector	28 Leak detection connector
6 MicroSD card socket	29 Riser 1 slot
7 Serial port connector	30 OCP 3.0 slot
8 Plunger	31 Front USB connector
9 Internal USB connector	32 Fan 1-8 connectors
10 Firmware and RoT Security Module connector	33 Internal RAID power connector
11 Second management Ethernet connector	34 CFF re-timer clock connector

Table 176. System-board-assembly connectors (continued)

12 Power supply unit 1 connector	35 PCIe connector 4
13 Power supply unit 2 connector	36 PCIe connector 3
14 PCIe connector 5	37 Pump 2 connector
15 PCIe connector 6	38 Intrusion switch connector
16 Front backplane power connector	39 System-board-assembly handle
17 GPU and rear backplane power connector	40 Front panel connector
18 Riser 2 slot	41 Front panel LCD connector
19 PCIe connector 7	42 PCIe connector 2
20 PCIe connector 8	43 PCIe connector 1
21 SAS/SATA connector 0	44 External LCD connector
22 SAS/SATA connector 1	45 M.2 power connector
23 SAS/SATA connector 2	46 Front VGA connector

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 439.
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 437.

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 439.

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 “System LEDs and diagnostics display” in *User Guide* or *System Configuration Guide*.

- 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 “System LEDs and diagnostics display” in *User Guide* or *System Configuration Guide*.

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 437).
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 475).

Coolant leak problems (Liquid to Air Module)

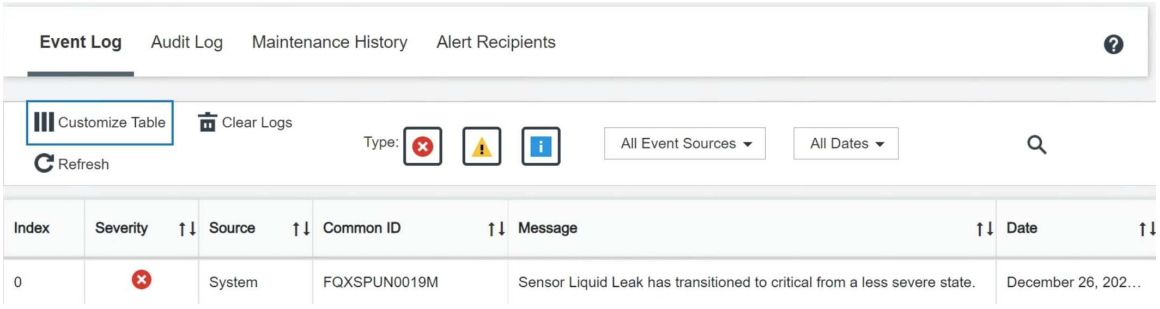
Use this information to resolve coolant leak problems with the Liquid to Air Module (L2AM).

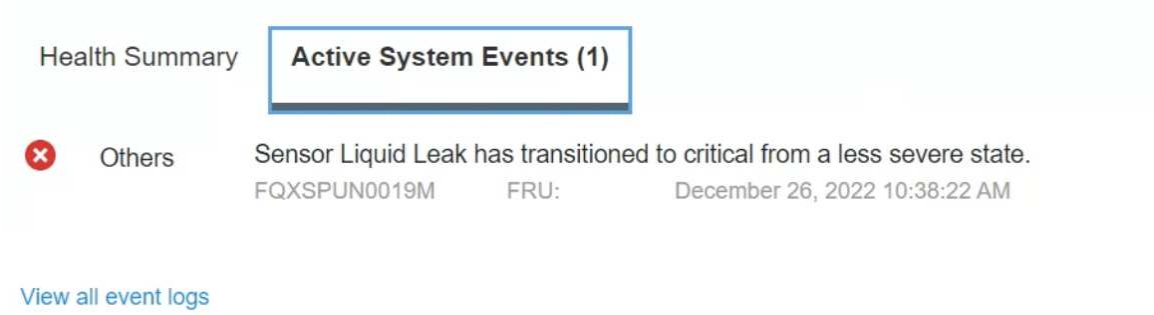
Options to identify coolant leaks

Coolant leaks can be identified through the following practices:

- If the server is on remote maintenance,
  - A Lenovo XClarity Controller event shows:

    `FQXSPUN0019M: Sensor 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.
  -
```
sysadmin@Dev-Server:~$ ipmitool -C 17 -I lanplus -H 10.132.225.164 -U USERID -P  ********  sel elist
   1 | 12/26/2022 | 10:38:17 | Event Logging Disabled SEL Fullness | Log area reset/cleared | Asserted
   2 | 12/26/2022 | 10:38:22 | Cooling Device Liquid Leak | Transition to Critical from less severe | Asserted
```
    The event logs shown with the parameter `sel elist`.
  -
```
sysadmin@Dev-Server:~$ ipmitool -C 17 -I lanplus -H 10.132.225.164 -U USERID -P  ********  sdr elist |grep "Liquid Leak"
Liquid Leak      | EAh | ok  | 30.1 | Transition to Critical from less severe
```
    `Liquid Leak | EAh | 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 leakage detection sensor module. See "LEDs and buttons on the front operator panel" and "The LED on the liquid detection sensor module" in *User Guide* for more details.

Steps to resolve coolant leaks

If the LED on the leakage detection sensor module is blinking green, follow the procedures to get help.

1. Check for green coolant leakage around the radiator, coolant pipes and pumps.
2. If green coolant found, power off the server and remove the L2AM.
3. Clean up the coolant from any components in the chassis. Inspect the server for any signs of moisture in sockets or gaps.
4. Contact Lenovo Support.

Intermittent problems

Use this information to solve intermittent problems.

- "Intermittent external device problems" on page 456
- "Intermittent KVM problems" on page 457
- "Intermittent unexpected reboots" on page 457

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 F1 to display the LXPM system setup interface. For more information, see the “Startup” section in the LXPM documentation compatible with your server at https://pubs.lenovo.com/lxpm-overview/. Then, click **System Settings → Devices and I/O Ports → USB Configuration**.
   b. Connect the device to another port. If using a USB hub, remove the hub and connect the device directly to the server. Make sure that the device is configured correctly for the port.

Intermittent KVM problems

Complete the following steps until the problem is solved.

Video problems:

1. Make sure that all cables and the console breakout cable are properly connected and secure.
2. Make sure that the monitor is working properly by testing it on another server.
3. Test the console breakout cable on a working server to ensure that it is operating properly. Replace the console breakout cable if it is defective.

Keyboard problems:

Make sure that all cables and the console breakout cable are properly connected and secure.

Mouse problems:

Make sure that all cables and the console breakout cable are properly connected and secure.

Intermittent unexpected reboots

Note: Some uncorrectable errors require that the server reboot so that it can disable a device, such as a memory DIMM or a processor to allow the machine to boot up properly.

1. If the reset occurs during POST and the POST watchdog timer is enabled, make sure that sufficient time is allowed in the watchdog timeout value (POST Watchdog Timer).

   To check the POST watchdog time, restart the server and press F1 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 437 for information about viewing the event log. If you are using Linux base operating system, then capture all logs back to Lenovo support for further investigation.

Keyboard, mouse, KVM switch or USB-device problems

Use this information to solve problems related to a keyboard, mouse, KVM switch or USB-device problems.

- “All or some keys on the keyboard do not work” on page 458
- “Mouse does not work” on page 458
- “KVM switch problems” on page 458
- “USB-device does not work” on page 458

All or some keys on the keyboard do not work

1. Make sure that:
   - The keyboard cable is securely connected.
   - The server and the monitor are turned on.
2. If you are using a USB keyboard, run the Setup utility and enable keyboardless operation.
3. If you are using a USB keyboard and it is connected to a USB hub, disconnect the keyboard from the hub and connect it directly to the server.
4. Replace the keyboard.

Mouse does not work

1. Make sure that:
   - The mouse cable is securely connected to the server.
   - The mouse device drivers are installed correctly.
   - The server and the monitor are turned on.
   - The mouse option is enabled in the Setup utility.
2. If you are using a USB mouse and it is connected to a USB hub, disconnect the mouse from the hub and connect it directly to the server.
3. Replace the mouse.

KVM switch problems

1. Make sure that the KVM switch is supported by your server.
2. Make sure that the KVM switch is powered on correctly.
3. If the keyboard, mouse or monitor can be operated normally with direct connection to the server, then replace the KVM switch.

USB-device does not work

1. Make sure that:
   - The correct USB device driver is installed.
   - The operating system supports USB devices.
2. Make sure that the USB configuration options are set correctly in system setup.

   Restart the server and press the key according to the on-screen instructions to display the LXPM system setup interface. For more information, see the “Startup” section in the LXPM documentation compatible with your server at https://pubs.lenovo.com/lxpm-overview/. Then, click **System Settings → Devices and I/O Ports → USB Configuration**.
3. If you are using a USB hub, disconnect the USB device from the hub and connect it directly to the server.

Memory problems

See this section to resolve issues related to memory.

- “Multiple memory modules in a channel identified as failing” on page 459

- “Displayed system memory is less than installed physical memory” on page 459
- “Invalid memory population detected” on page 460

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 technicians 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 technicians only) Replace the system 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 “System LEDs and diagnostics display” in *User Guide* or *System Configuration Guide*.
   - No memory module error LEDs are lit on the system board.
   - Memory mirrored channel does not account for the discrepancy.
   - The memory modules are seated correctly.
   - You have installed the correct type of memory module (see “Memory module installation rules and order” on page 6 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 technicians 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 technicians only) Replace the system 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 6 to make sure the present memory module population sequence is supported.
2. If the present sequence is indeed supported, see if any of the modules is displayed as “disabled” in Setup Utility.
3. Reseat the module that is displayed as “disabled,” and reboot the system.
4. If the problem persists, replace the memory module.

Monitor and video problems

Use this information to solve problems related to a monitor or video.

- “Incorrect characters are displayed” on page 460
- “Screen is blank” on page 460
- “Screen goes blank when you start some application programs” on page 461
- “The monitor has screen jitter, or the screen image is wavy, unreadable, rolling, or distorted” on page 461
- “The wrong characters appear on the screen” on page 461

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
   d. (Trained technicians only) System board.

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*.

Observable problems

Use this information to solve observable problems.

- “Server hangs during the UEFI boot process” on page 462

- “The server immediately displays the POST Event Viewer when it is turned on” on page 462
- “Server is unresponsive (POST is complete and operating system is running)” on page 462
- “Server is unresponsive (POST failed and cannot start System Setup)” on page 463
- “Voltage planar fault is displayed in the event log” on page 463
- “Unusual smell” on page 463
- “Server seems to be running hot” on page 464
- “Cannot enter legacy mode after installing a new adapter” on page 464
- “Cracked parts or cracked chassis” on page 464

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 technicians only) Make sure that processor 1 is seated correctly.
4. (Trained technicians 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 technicians only) Processor
   b. (Trained technicians only) System 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 compute node, complete the following steps:
  1. If you are using a KVM connection, make sure that the connection is operating correctly. Otherwise, make sure that the keyboard and mouse are operating correctly.
  2. If possible, log in to the compute node and verify that all applications are running (no applications are hung).
  3. Restart the compute node.

4. If the problem remains, make sure that any new software has been installed and configured correctly.
5. Contact your place of purchase of the software or your software provider.

- If you are accessing the compute node from a remote location, complete the following steps:
  1. Make sure that all applications are running (no applications are hung).
  2. Attempt to log out of the system and log back in.
  3. Validate the network access by pinging or running a trace route to the compute node from a command line.
     a. If you are unable to get a response during a ping test, attempt to ping another compute node in the enclosure to determine whether it is a connection problem or compute node problem.
     b. Run a trace route to determine where the connection breaks down. Attempt to resolve a connection issue with either the VPN or the point at which the connection breaks down.
  4. Restart the compute node remotely through the management interface.
  5. If the problem remains, verify that any new software has been installed and configured correctly.
  6. Contact your place of purchase of the software or your software provider.

Server is unresponsive (POST failed and cannot start System Setup)

Configuration changes, such as added devices or adapter firmware updates, and firmware or application code problems can cause the server to fail POST (the power-on self-test).

If this occurs, the server responds in either of the following ways:

- The server restarts automatically and attempts POST again.
- The server hangs, and you must manually restart the server for the server to attempt POST again.

After a specified number of consecutive attempts (automatic or manual), the server reverts to the default UEFI configuration and starts System Setup so that you can make the necessary corrections to the configuration and restart the server. If the server is unable to successfully complete POST with the default configuration, there might be a problem with the system board.

You can specify the number of consecutive restart attempts in System Setup. Restart the server and press the key according to the on-screen instructions to display the LXPM system setup interface. For more information, see the “Startup” section in the LXPM documentation compatible with your server at https://pubs.lenovo.com/lxpm-overview/. Then, click **System Settings → Recovery and RAS → POST Attempts → POST Attempts Limit**. Available options are 3, 6, 9, and disable.

Voltage planar fault is displayed in the event log

Complete the following steps until the problem is solved.

1. Revert the system to the minimum configuration. See “Specifications” on page 439 for the minimally required number of processors and DIMMs.
2. Restart the system.
   - If the system restarts, add each of the removed items one at a time and restart the system each time until the error occurs. Replace the item for which the error occurs.
   - If the system does not restart, suspect the system board.

Unusual smell

Complete the following steps until the problem is solved.

1. An unusual smell might be coming from newly installed equipment.
2. If the problem remains, contact Lenovo Support.

Server seems to be running hot

Complete the following steps until the problem is solved.

Multiple compute nodes or chassis:

1. Make sure that the room temperature is within the specified range (see “Specifications” on page 439).
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 technicians and the 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 compute node is running within normal operating temperatures. Note that you can expect some variation in temperature.

Cannot enter legacy mode after installing a new adapter

Complete the following procedure to solve the problem.

1. Go to **UEFI Setup → Devices and I/O Ports → Set Option ROM Execution Order**.
2. Move the RAID adapter with operation system installed to the top of the list.
3. Select **Save**.
4. Reboot the system and auto boot to operation system.

Cracked parts or cracked chassis

Contact Lenovo Support.

Optional-device problems

Use this information to solve problems related to optional devices.

- “External USB device is not recognized” on page 464
- “PCIe adapter is not recognized or is not functioning” on page 465
- “Insufficient PCIe resources are detected.” on page 465
- “A Lenovo optional device that was just installed does not work.” on page 465
- “A Lenovo optional device that worked previously does not work now” on page 466

External USB device is not recognized

Complete the following steps until the problem is resolved:

1. Update the UEFI firmware to the latest version.
2. Make sure that the proper drivers are installed on the compute node. See the product documentation for the USB device for information about device drivers.
3. Use the Setup utility to make sure that the device is configured correctly.
4. If the USB device is plugged into a hub or the console breakout cable, unplug the device and plug it directly into the USB port on the front of the compute node.

PCIe adapter is not recognized or is not functioning

Complete the following steps until the problem is resolved:

1. Update the UEFI firmware to the latest version.
2. Check the event log and resolve any issues related to the device.
3. Validate that the device is supported for the server (see https://serverproven.lenovo.com). Make sure that the firmware level on the device is at the latest supported level and update the firmware if applicable.
4. Make sure that the adapter is installed in a correct slot.
5. Make sure that the proper device drivers are installed for the device.
6. Resolve any resource conflicts if running legacy mode (UEFI). Check legacy ROM boot orders and modify the UEFI setting for MM config base.

   Note: Ensure that you modify the ROM boot order associated with the PCIe adapter to the first execution order.
7. Check http://datacentersupport.lenovo.com for any tech tips (also known as retain tips or service bulletins) that might be related to the adapter.
8. Ensure any adapter external connections are correct and that the connectors are not physically damaged.
9. Make sure that the PCIe adapter is installed with the supported operating system.

Insufficient PCIe resources are detected.

If you see an error message stating “Insufficient PCI Resources Detected,” complete the following steps until the problem is resolved:

1. Press Enter to access System Setup Utility.
2. Select **System Settings → Devices and I/O Ports → MM Config Base**; then, modify the setting to increase the device resources. For example, modify 3 GB to 2 GB or modify 2 GB to 1 GB.
3. Save the settings and restart the system.
4. If the error recurs with the highest device resource setting (1GB), shutdown the system and remove some PCIe devices; then, power on the system.
5. If the reboot failed, repeat step 1 to step 4.
6. If the error recurs, press Enter to access System Setup Utility.
7. Select **System Settings → Devices and I/O Ports → PCI 64–Bit Resource Allocation**, then; modify the setting from **Auto** to **Enable**.
8. If the Boot Device does not support MMIO above 4GB for Legacy Boot, use UEFI Boot Mode or remove/disable some PCIe devices.
9. DC cycle the system and ensure the system is enter UEFI boot menu or the operating system; then, capture the FFDC log.
10. Contact Lenovo technical support.

A Lenovo optional device that was just installed does not work.

1. Make sure that:
   - The device is supported for the server (see https://serverproven.lenovo.com).
   - You followed the installation instructions that came with the device and the device is installed correctly.
   - You have not loosened any other installed devices or cables.
   - You updated the configuration information in system setup. When you start a server and press the key according to the on-screen instructions to display the Setup Utility. For more information, see the “Startup” section in the LXPM documentation compatible with your server at https://pubs.lenovo.com/

lxpm-overview/. Whenever memory or any other device is changed, you must update the configuration.

2. Reseat the device that you have just installed.
3. Replace the device that you have just installed.
4. Reseat the cable connection and check there is no physical damage to the cable.
5. If there is any cable damages, then replace the cable.

A Lenovo optional device that worked previously does not work now

1. Make sure that all of the cable connections for the device are secure.
2. If the device comes with test instructions, use those instructions to test the device.
3. Reseat the cable connection and check if any physical parts have been damaged.
4. Replace the cable.
5. Reseat the failing device.
6. Replace the failing device.

Performance problems

Use this information to solve performance problems.

- "Network performance" on page 466
- "Operating system performance" on page 466

Network performance

Complete the following steps until the problem is solved:

1. Isolate which network is operating slowly (such as storage, data, and management). You might find it helpful to use ping tools or operating-system tools such as task manager or resource manager.
2. Check for traffic congestion on the network.
3. Update the NIC device driver, or the storage device controller device driver.
4. Use the traffic-diagnostic tools that are provided by the IO-module manufacturer.

Operating system performance

Complete the following steps until the problem is solved:

1. If you have recently made changes to the compute node (for example updated device drivers or installed software applications) remove the changes.
2. Check for any networking issues.
3. Check the operating system logs for performance related errors.
4. Check for events related to high temperatures and power issues as the compute node might be throttled to help with cooling. If it is throttled, reduce the workload on the compute node to help improve performance.
5. Check for events related to disabled DIMMs. If you do not have enough memory for the application workload, your operating system will have poor performance.
6. Ensure that the workload is not too high for the configuration.

Power on and power off problems

Use this information to resolve issues when powering on or powering off the server.

- “The power button does not work (server does not start)” on page 467
- “Server does not power on” on page 467
- “Server does not power off” on page 468

The power button does not work (server does not start)

Note: After the server is connected to AC power, it will take one to three minutes for XCC to initialize. The power button does not work during the initialization.

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. Reconnect 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 units work normally.
   - The power button LED is lit on and flash slowly.
   - The button-push force is sufficient and the button shows release response after pushed.
3. If the power button LED does not light on or flash correctly, reseat all the power supply units and make sure that the power input status LED is lit on.
4. If you have just installed an optional device, remove it, and restart the server.
5. If the issue is still observed or without power button LED lit on, implement the minimum configuration to check whether any specific components have locked the power permission. Replace power supply units and check the power button function after installing each unit.
6. If all procedures are tried and the issue cannot be resolved, collect the failure information with system logs captured and contact Lenovo Support.

Server does not power on

Complete the following steps until the problem is resolved:

1. Check the event logs for any events related to the server not powering on.
2. Check for any LEDs that are blinking amber or yellow.
3. Check the system status LED on the system board (system board assembly). See “LEDs on the system board assembly” in *User Guide*.
4. Check if the power input status LED is off or the yellow LED is lit on the power supply unit.
5. Do the AC cycle to the system, that is, power off the power supply units and re-power them on.
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 or any drive installed).
9. Reseat all power supply units and make sure that the power input status LED on the power supply unit is lit.
10. Replace power supply units and check the power button function after installing each unit.

11. If the issue cannot be resolved by all attempts above, call service to review the issue symptoms and see whether the system board (system board assembly) 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 button on the front operator panel 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 unit 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 AC source of the power supply unit is stable within the supported range.
4. Swap power supply units to see that the issue follows which power supply unit, if the issue follows one power supply unit, then place the failing one.
5. Review the event logs and identify problem category, follow the event log actions and fix the problem.

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 468
- “Serial device does not work” on page 468

Number of displayed serial ports is less than the number of installed serial ports

Complete the following steps until the problem is solved.

1. Make sure that:
   - Each port is assigned a unique address in the Setup utility and none of the serial ports is disabled.
   - The serial-port adapter (if one is present) is seated correctly.
2. Reseat the serial port adapter.
3. Replace the serial port adapter.

Serial device does not work

1. Make sure that:
   - The device is compatible with the server.

- The serial port is enabled and is assigned a unique address.
- The device is connected to the correct connector (see “System-board-assembly connectors” on page 451).

2. Reseat the following components:
   a. Failing serial device.
   b. Serial cable.
3. Replace the following components:
   a. Failing serial device.
   b. Serial cable.
4. (Trained technician only) Replace the system board.

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 identify a drive” on page 469
- “Multiple drives fail” on page 470
- “Multiple drives are offline” on page 470
- “A replacement drive does not rebuild” on page 471
- “Green drive activity LED does not represent actual state of associated drive” on page 471
- “Yellow drive status LED does not represent actual state of associated drive” on page 471
- “U.3 NVMe drive can be detected in NVMe connection, but cannot be detected in Tri-mode” on page 471

Server cannot identify a drive

Complete the following steps until the problem is solved.

1. Observe the target 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 for 45 seconds, and reinsert the drive. Make sure that the drive assembly connects to the drive backplane.
3. Observe the target 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 identified 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/.) From the Diagnostic page, click **Run Diagnostic → Disk Drive Test**.
- If the green activity LED is flashing and the yellow status LED is flashing slowly, the drive is identified 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 curving 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 F1, 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 F1, 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**
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/sr630v3/7d72/downloads/driver-list/
  - Operating system support center
    - https://datacentersupport.lenovo.com/solutions/server-os
  - Operating system installing instructions
    - https://pubs.lenovo.com/#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 437 for instructions on isolating and solving issues.

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- 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 input the model name or machine type of your server in the search bar to navigate to the support page.
  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 Condiguration 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 http://sysmgt.lenovofiles.com/help/topic/com.lenovo.lxca.doc/admin_setupcallhome.html.
- **Lenovo XClarity Essentials OneCLI**

  Lenovo XClarity Essentials OneCLI has inventory application to collect service data. It can run both in-band and out-of-band. When running in-band within the host operating system on the server, OneCLI can collect information about the operating system, such as the operating system event log, in addition to the hardware service data.

  To obtain service data, you can run the `getinfor` command. For more information about running the `getinfor`, see https://pubs.lenovo.com/lxce-onecli/onecli_r_getinfor_command.

Contacting Support

You can contact Support to obtain help for your issue.

You can receive hardware service through a Lenovo Authorized Service Provider. To locate a service provider authorized by Lenovo to provide warranty service, go to https://datacentersupport.lenovo.com/serviceprovider and use filter searching for different countries. For Lenovo support telephone numbers, see https://datacentersupport.lenovo.com/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

- ***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

Support websites

This section provides driver and firmware downloads and support resources.

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Appendix C. Notices

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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.

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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