

Cisco UCS X440p PCIe Node Installation and Service Guide

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Preface

This preface contains the following topics:

- Bias-Free Documentation, on page v
- Full Cisco Trademarks with Hardware License, on page v
- Communications, Services, and Additional Information, on page vii

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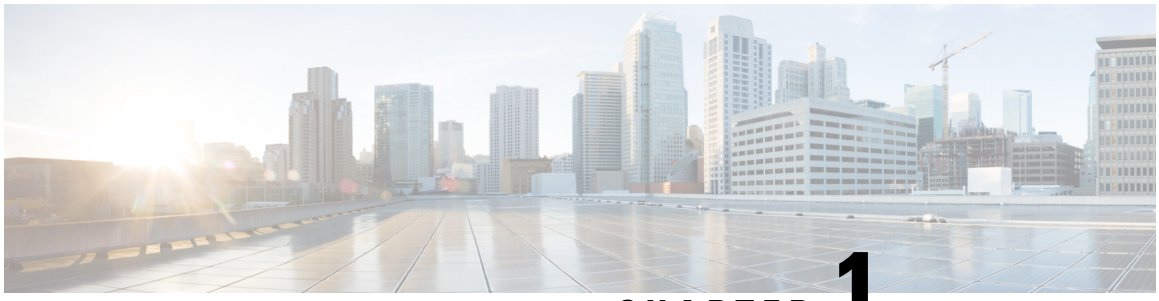
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CHAPTER 1

Overview

This chapter contains the following topics:

- Overview, on page 1

Overview

The Cisco UCS X440p PCIe node (UCSX-440P) is the first PCIe node that is part of the Cisco UCS X-Fabric system.

The PCIe node pairs with Cisco UCS X-Series compute nodes and X-Fabric modules to support workloads that require GPUs. The node is designed to work with its related hardware to simplify adding, removing, or upgrading GPUs on compute nodes. For information about the hardware, see Required Hardware, on page 2.

The PCIe node supports PCIe connectivity for a variety of GPU form factors.

- GPUs:
  - PCIe connectivity for either:
    - Two x16 FHFL (full-height, full length) or HHFL (half-height, full length) dual slot PCIe cards, one per riser cage
    - Four x8 HHHL (half-height, half length) single slot PCIe card, two per riser cage

Note Each PCIe node must be configured with the same type of GPU. Per vendor limitation, only the same GPUs are supported on a PCIe node, either two NVIDIA A16, two NVIDIA A40, two NVIDIA L40, two NVIDIA A100, two NVIDIA H100, or two Intel Flex 170 GPUs in a PCIe node (Riser Type A), or four NVIDIA L4, NVIDIA T4, or Intel Flex 140 GPUs in a PCIe node (Riser Type B).

- Host connection between the PCIe mezzanine (MEZZ) and the PCIe node is supported through a PCIe Gen 4 (2 x16) connector in the rear MEZZ slot.
- Riser options, a maximum of two risers is supported in each PCIe node. Each riser type can contain a specific type of GPU:

- Riser Type A supports 1x16 PCIe connectivity for FHFL and HHFL GPUs
- Riser Type B supports 2x8 PCIe connectivity for HHHL GPUs

Each PCIe node must have the same type of riser, either two Type A or two Type B risers. You cannot mix and match riser types in the same PCIe node.

Required Hardware

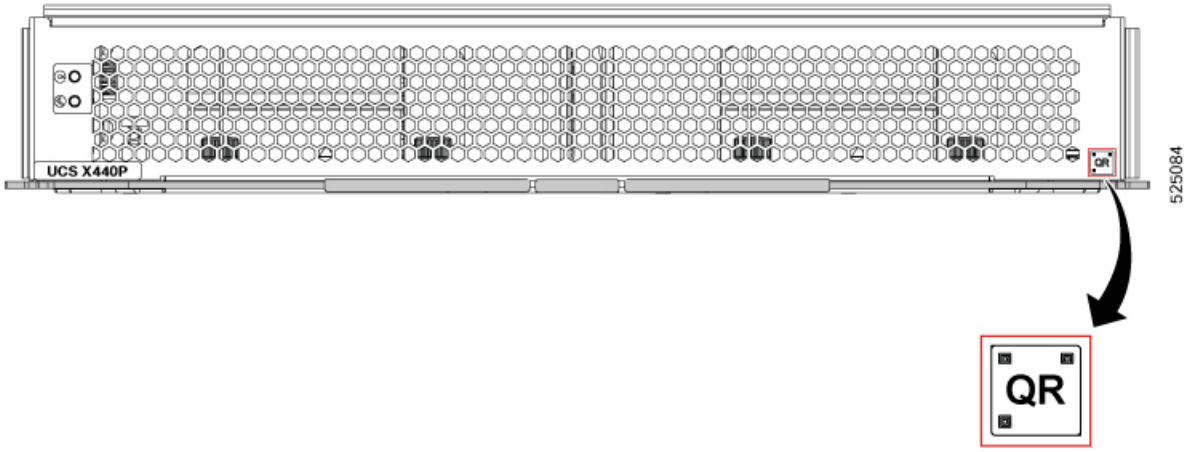
The Cisco UCS X440p PCIe Node is part of an integrated system to provide GPU acceleration for Cisco UCS compute nodes. For a complete system, the PCIe node requires the following hardware components.

- An X-Series server chassis, such as the Cisco UCS X9508 Server Chassis, that contains the paired compute and PCIe Nodes and the Cisco X-Fabric Modules. For more information, go to the Cisco UCS X9508 Server Chassis Installation Guide.
- Two X-Fabric Modules to connect Cisco UCS Compute Nodes to Cisco UCS X440p PCIe Nodes in the X-Series Server chassis. For more information, go to the Cisco UCS X9508 Server Chassis Installation Guide.
- Compute Nodes, such as the Cisco UCS X210c M6 Compute Node, to pair with the PCIe Nodes. For more information, go to the Cisco UCS X210c M6 Compute Node Installation and Service Note.
- UCS PCIe mezzanine (MEZZ) card for Fabric connectivity, which is a rear mezzanine card required on each paired UCS Compute Node. For more information, go to the Cisco UCS X210c M6 Compute Node Installation and Service Note
- Cisco UCS X440p PCIe nodes themselves to pair with the compute nodes.
- Risers, which are sized for either full height, full length (FHFL) or half-height, half length (HHHL) GPUs. Risers are part of each PCIe Node. For more information, see Riser Cage Options, on page 5.
- GPUs which provide the GPU processing offload and acceleration. For more information, see Supported GPUs, on page 7

If you require hardware to support or expand your PCIe node support, see Obtaining Hardware, on page 55.

Compute Node Identification

Each Cisco UCS X440p PCIe node (UCSX-440P) features a node identification tag at the lower right corner of the primary node.



The node identification tag is a QR code that contains information that uniquely identifies the product, such as:

- The Cisco product identifier (PID) or virtual identifier (VID)
- The product serial number

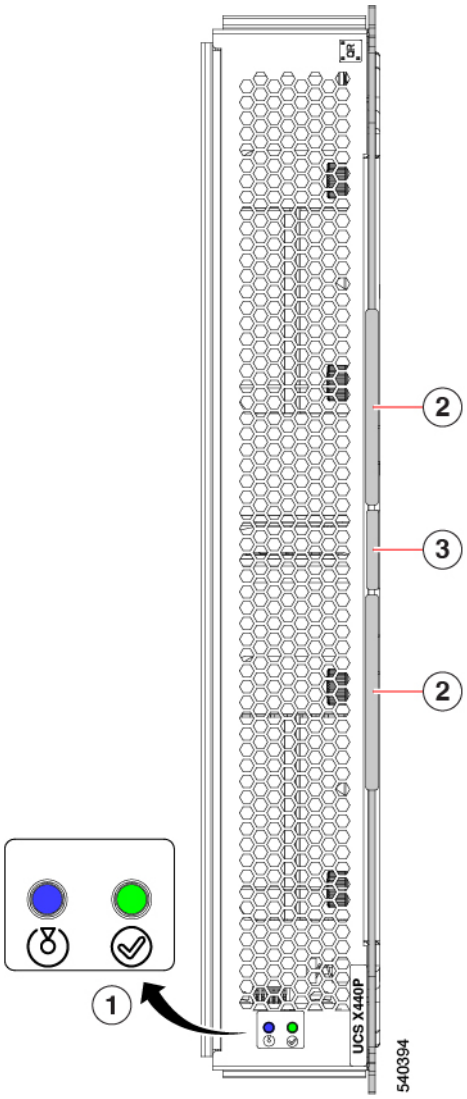
The product identification tag applies to the entire PCIe node.

You will find it helpful to scan the QR code so that the information is available if you need to contact Cisco personnel.

Front Panel

The Cisco UCS X440p PCIe node occupies an entire slot in the Cisco UCS X-Series server chassis. The node is front loading, so it is inserted into, and removed from, the front of the server chassis.

The following image shows the PCIe node front panel.



1	PCIe node LED cluster See LEDs, on page 4.	2	PCIe node Ejector handles, 2
3	PCIe node Ejector Button	-	

LEDs

The PCIe node front panel has the following status LEDs.

Table 1: PCIe node LEDs

LED	Color	Description
PCIe node Locator LED 	Off	Locator not enabled.
	Blinking Blue (1 Hz)	**Note** The PCIe node Locator LED is synced with its paired compute node (host). When the compute node locator LED is turned on, the paired slot PCIe node locator LED is also turned on. Locates a selected PCIe node—If the LED is not blinking, the PCIe node is not selected. You can activate the LED in UCS Intersight, which enables toggling the LED on and off.
PCIe node Health 	Off	PCIe node is not powered on.
	Solid Green	Host is receiving power.
	Blinking Green (1 Hz)	Host is powered off. You can safely remove the PCIe node.
	Solid Amber	Fault condition exists, such as a configuration or system or device inventory problem.
	Blinking Amber (1 Hz)	Severe fault, such as an insufficient power condition.

Riser Cage Options

GPUs are contained in risers that mount onto the PCIe node sheet metal. Power and signaling are supported by cables that connect each riser cage to the PCIe node rear mezzanine PCBA.

- Riser Type A: Supports FHFL or HHFL GPU cards through a single x16 FHFL dual-slot PCIe connector.
- Riser Type B: Supports HHHL GPU cards through two x16 PCIe connectors, which the PCIe node supports as two x8 PCIe connectors.

If your PCIe node is not fully populated, any empty riser cage must contain PCIe slot blanks. For example, if you have a PCIe node with two HHHL GPUs in one riser, but no GPUs in the second riser, the second riser must contain two Cisco PCIe blanks.

Regardless of the riser type, any empty GPU card slot in a riser must be filled with a PCIe slot blank.

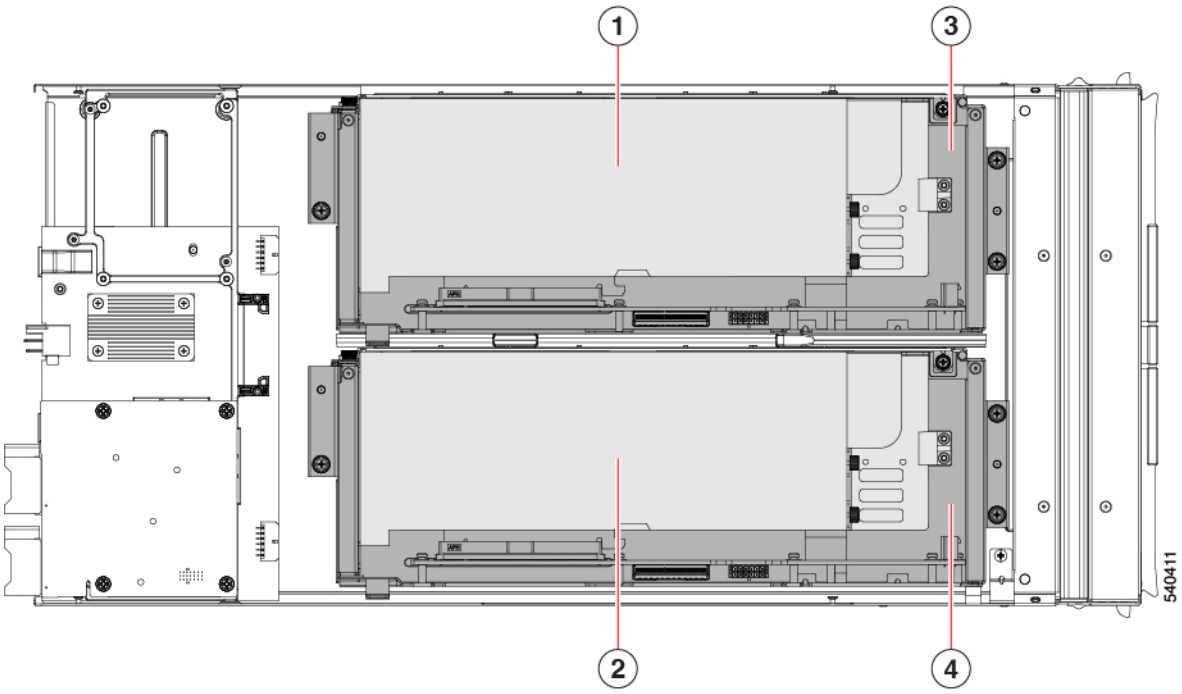
Slot Numbering

Risers and GPU slots have set numbering to identify the correct locations in the PCIe node.

- For hardware, slot numbering consists of `Riser Number Riser Type/Slot`. So, for example, `1A/1` indicates riser number 1, riser type A, slot 1.
- For Cisco management software, such as Cisco Intersight Managed Mode (IMM), the slot numbering consists of **Riser** *[number/type]*-**Slot** *[number]*. So, for example, `RISER1A-SLOT1` indicates riser number 1, riser type A, slot 1.

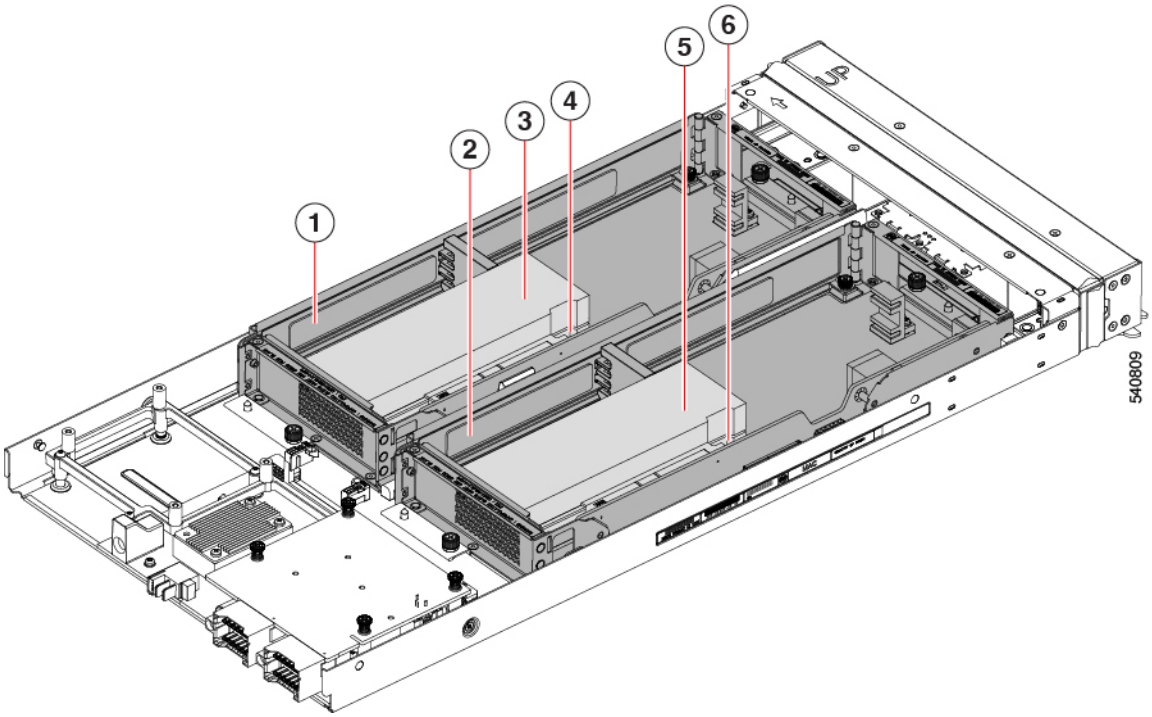
GPU slot numbering differs depending on the type of riser.

Figure 1: Riser and Slot Numbering, Riser Type A (UCSX-RISA-440P)



1	Slot 1A/1 for FHFL GPU Riser1A is controlled by CPU1 on the Cisco UCS compute node paired with the PCIe node	2	Slot 2A/2 for FHFL GPU Riser2A is controlled by CPU2 on the Cisco UCS compute node paired with the PCIe node
3	Riser 1 location	4	Riser 2 location

Figure 2: Riser and Slot Numbering, Riser Type B (UCSX-RISB-440P)



1	Riser 1 location	2	Riser 2 location
3	Slot 1B/2 for HHHL GPU Riser1B is controlled by CPU1 on the Cisco UCS compute node paired with the PCIe node	4	Slot 1B/1 for HHHL GPU (underneath Slot 1B/2) Riser1B is controlled by CPU1 on the Cisco UCS compute node paired with the PCIe node
5	Slot 2B/4 for HHHL GPU Riser2B is controlled by CPU2 on the Cisco UCS compute node paired with the PCIe node	6	Slot 2B/3 for HHHL GPU (underneath Slot 2B/4) Riser2B is controlled by CPU2 on the Cisco UCS compute node paired with the PCIe node

Supported GPUs

The following tables show the models and form factors of GPU supported by the Cisco UCS X440p PCIe node.

The Supported Risers column lists the slot and riser type that can accept the GPU. For example, `Riser1A` and `Riser 2A` indicate that the GPU can be installed in riser number 1, riser type A and riser number 2, riser type A. For more information, see Slot Numbering, on page 5.

Table 2: Full-Height, Full Length (FHFL) GPUs

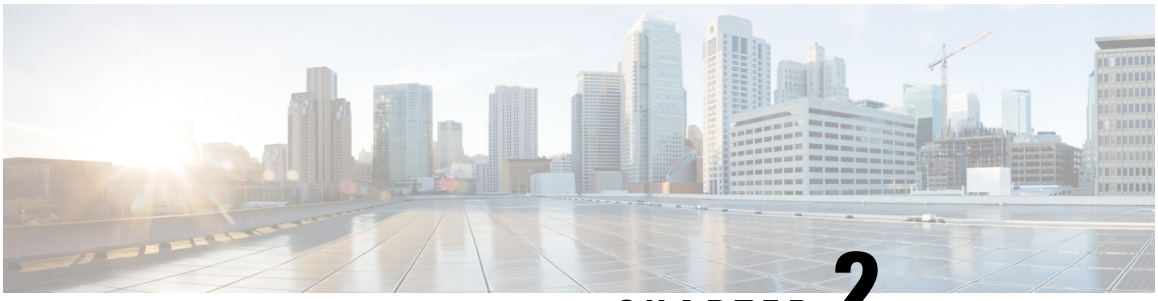
GPU	Cisco PID	Supported Risers
NVIDIA A16 PCIe 250W 4X16 GB	UCSX-GPU-A16-D	Riser Type A only. Riser 1A (Gen 4) and Riser 2A (Gen 4)
NVIDIA Tesla A40 RTX, Passive, 300W, 48 GB	UCSX-GPU-A40-D	Riser Type A only. Riser 1A (Gen 4) and Riser 2A (Gen 4)
NVIDIA L40 300W, 48GB	UCSX-GPU-L40	Riser Type A only. Riser 1A (Gen 4) and Riser 2A (Gen 4)
NVIDIA Tesla A100, Passive, 300W, 80 GB	UCSX-GPU-A100-80-D	Riser Type A only. Riser 1A (Gen 4) and Riser 2A (Gen 4)
NVIDIA Tesla H100, Passive, 350W, 80 GB	UCSX-GPU-H100-80	Riser Type A only. Riser 1A (Gen 4) and Riser 2A (Gen 4)

Table 3: Half-Height, Full-Length (HHFL) GPU

GPU	Cisco PID	Supported Risers
Intel GPU Flex 170, Gen4 x16, 150W PCIe	UCSX-GPU-FLEX170	Riser Type A only. Riser 1A (Gen 4) and Riser 2A (Gen 4)

Table 4: Half-Height, Half-Length (HHHL) GPUs

GPU	Cisco PID	Supported Risers
NVIDIA L4 Tensor Core, 70W, 24 GB	UCSX-GPU-L4	Riser Type B only. Riser 1B (Gen 4) and Riser 2B (Gen 4)
NVIDIA T4 PCIe 75W 16 GB	UCSX-GPU-T4-16	Riser Type B only. Riser 1B (Gen 4) and Riser 2B (Gen 4)
Intel GPU Flex 140, Gen4x8, 75W PCIe	UCSX-GPU-FLEX140	Riser Type B only. Riser 1B (Gen 4) and Riser 2B (Gen 4)



CHAPTER 2

Installing the Cisco UCS X440p PCIe Node

This chapter includes the following topics:

- Installation Guides and Limitations, on page 9
- PCIe Node Companion Module, on page 11
- Replacing the Cisco UCS X440p PCIe Node, on page 12
- PCIe Node Configuration, on page 16

Installation Guides and Limitations

Be aware of the following guidelines and limitations when installing the Cisco UCS X440p PCIe node.

- The Cisco UCS X440p PCIe node is supported in the Cisco UCS X9508 chassis only. Do not attempt to install the PCIe node in any other UCS server chassis.
- The companion compute node host power should be off before attempting any removal or insertion procedures. Hot removal or insertion of the PCIe node while the host is on is not supported.
- Each PCIe node must be paired with an X-Series compute node, and therefore, has specific configurations based on the type of compute node.

  For single-slot compute nodes (for example, the Cisco UCS X210c M7), either of the following configurations are supported. Be aware of these configurations, especially when removing and installing single-slot compute nodes and PCIe nodes in your deployment.

Figure 3: Supported Configuration, Single-Slot Compute Node in Initial Slot with PCIe Nodes

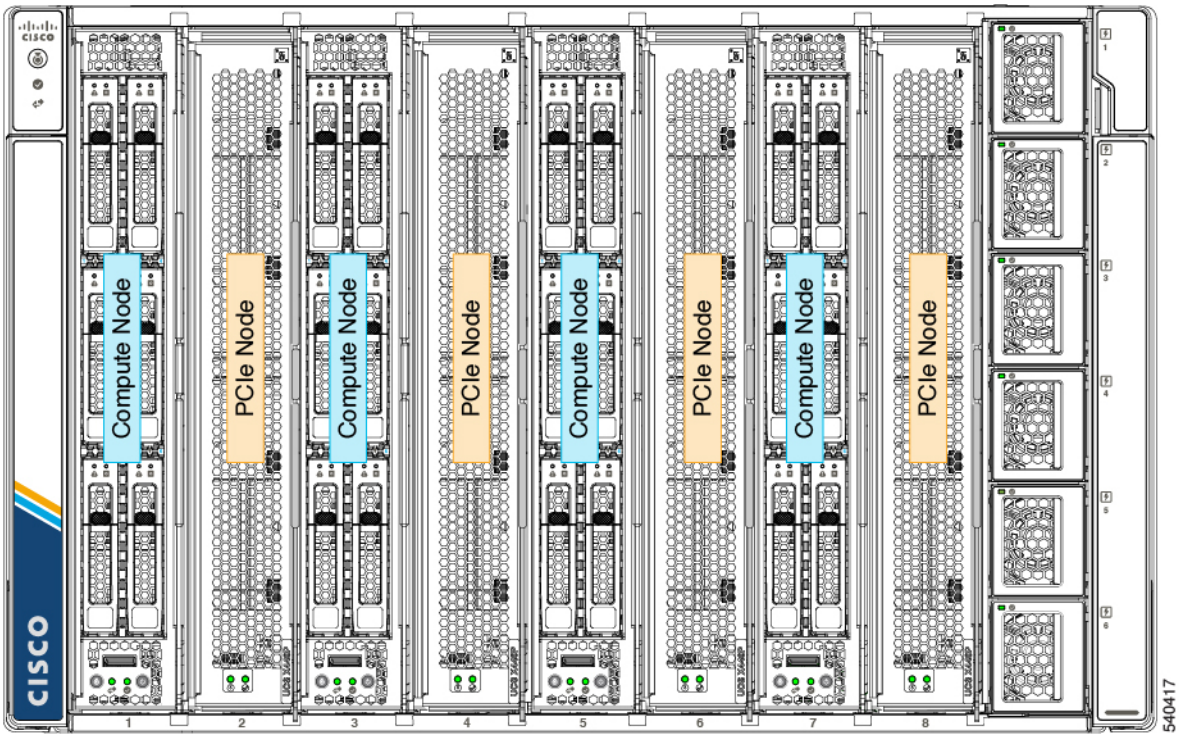
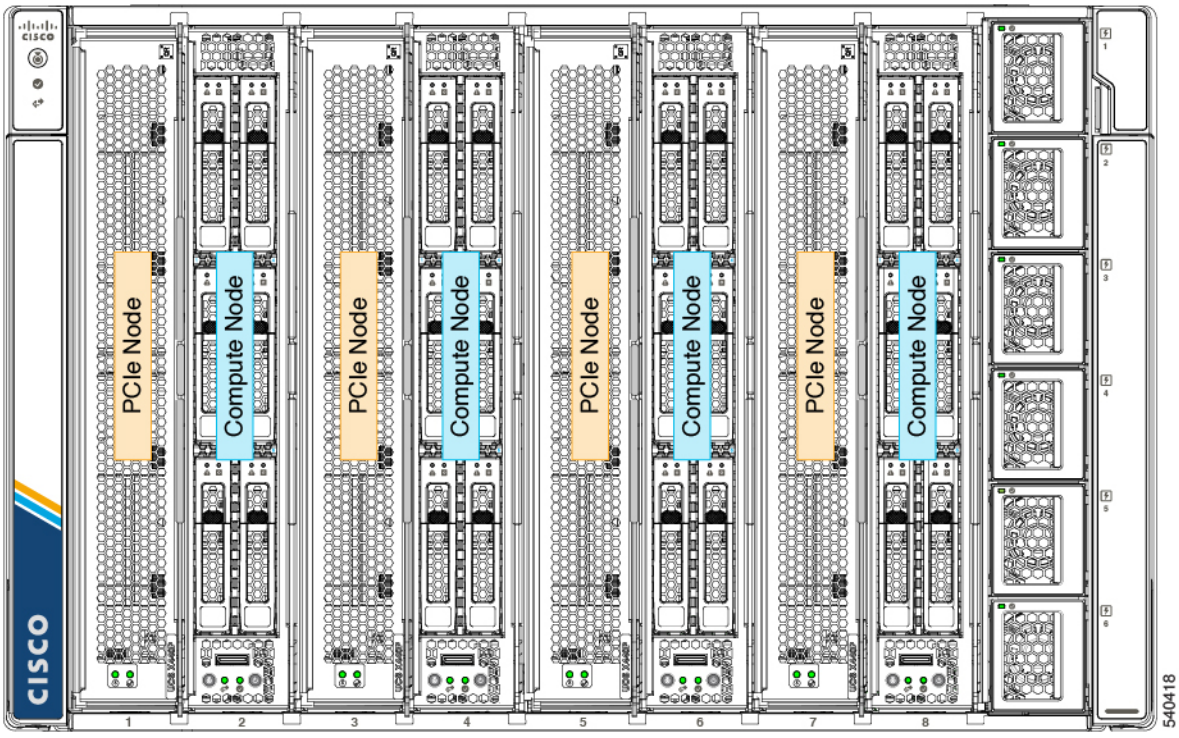
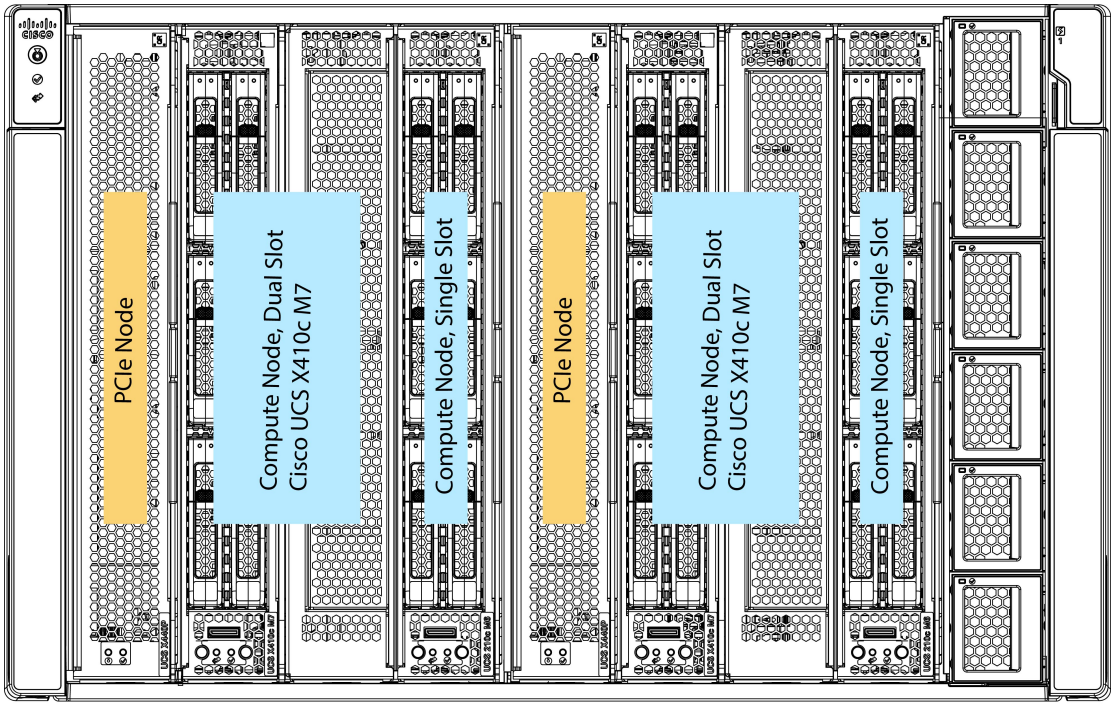


Figure 4: Supported Configuration, PCIe Node in Initial Slot with Single-Slot Compute Nodes



For a dual-slot compute node (for example, the Cisco UCS X410c M7), only one configuration is supported as shown. Be aware of this configuration, especially when removing and installing dual-slot compute nodes and PCIe nodes in your deployment.

Figure 5: Supported Configuration, PCIe Nodes with Dual-Slot Compute Nodes



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In the supported configuration for dual-slot compute nodes:

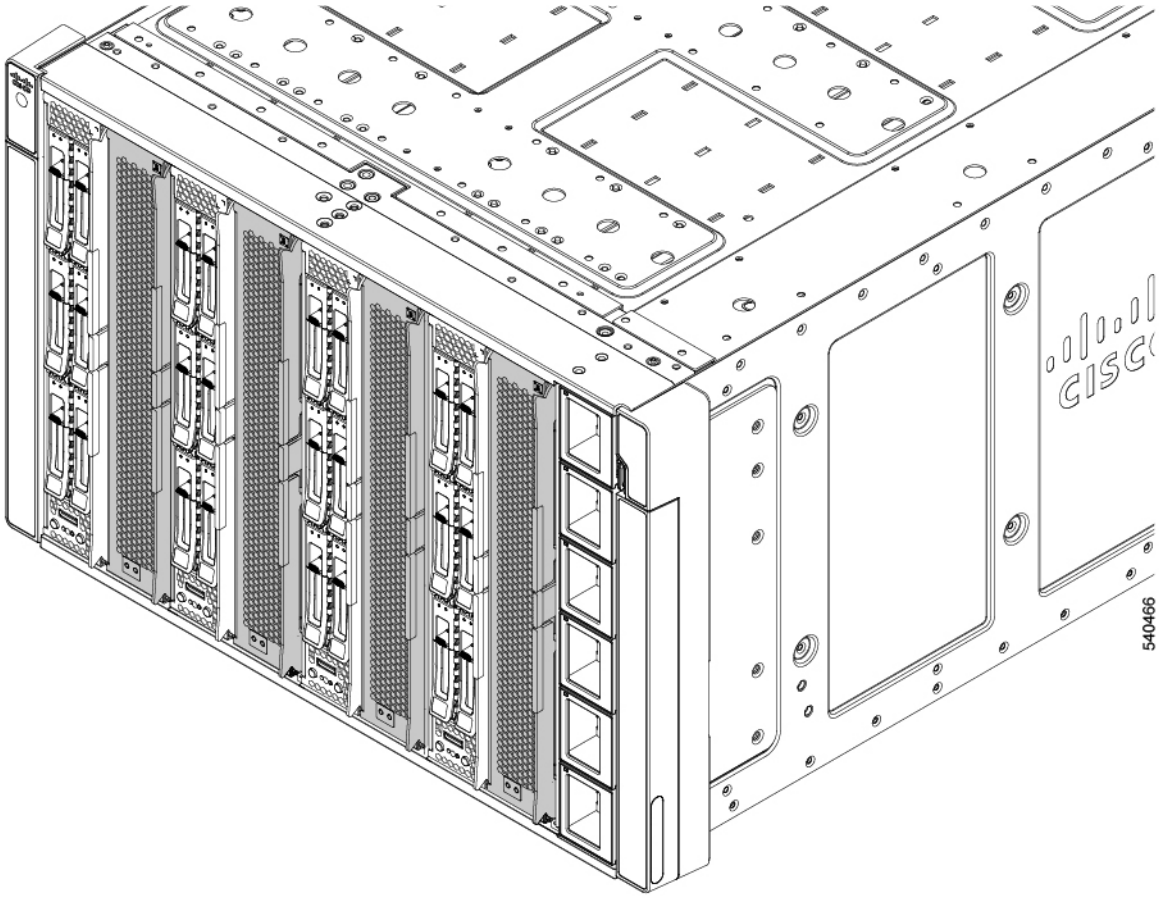
- PCIe nodes can be installed in slots 1 and 5 only
- Dual-slot compute nodes can be installed in slots 2/3 and 6/7.
- Slots 4 and 8 can contain single-slot compute nodes (as shown) or compute node blank filler panels. When slots 4 and 8 contain single-slot compute nodes, those compute nodes are not paired with the PCIe node (the dual-slot compute nodes are), so the single-slot compute nodes do not receive GPU acceleration or offload whereas the dual-slot compute nodes do.

PCIe Node Companion Module

The PCIe node must be installed in pairs with a compute node. The module and the node work together to provide compute and GPU processing acceleration.

When you install, replace, or upgrade the PCIe node, make sure that you install it next to a supported companion module, such as a Cisco UCS X210c compute node.

Note The Cisco X-Fabric solution does not limit or restrict slot usage when PCIe nodes are not required. Compute nodes can be installed in any slot without restriction where PCIe nodes are not used.



Replacing the Cisco UCS X440p PCIe Node

The Cisco UCS X440p PCIe Node is tool-less, field replaceable hardware. You can install or remove the node through node's integrated ejectors.

Caution Hot swap of the PCIe node is not supported while the host is on. The paired compute node must be powered down first before removing or inserting the PCIe node.

To replace the PCIe node, use the following tasks:

- Installation Guides and Limitations, on page 9.
- Removing the PCIe Node, on page 13
- Installing the PCIe Node, on page 14

Removing the PCIe Node

Use this task to remove the PCIe node from the chassis.

Before you begin

You can remove each PCIe node directly from the front of the chassis by using the node's ejectors. You do not need any tools to remove the node.

Note The PCIe node can be heavy. Use your other hand to support the module while you are removing it.

Caution The Cisco UCS X440p PCIe node itself is hot swappable, but the paired compute node must be powered down first before hot swapping the PCIe node.

Procedure

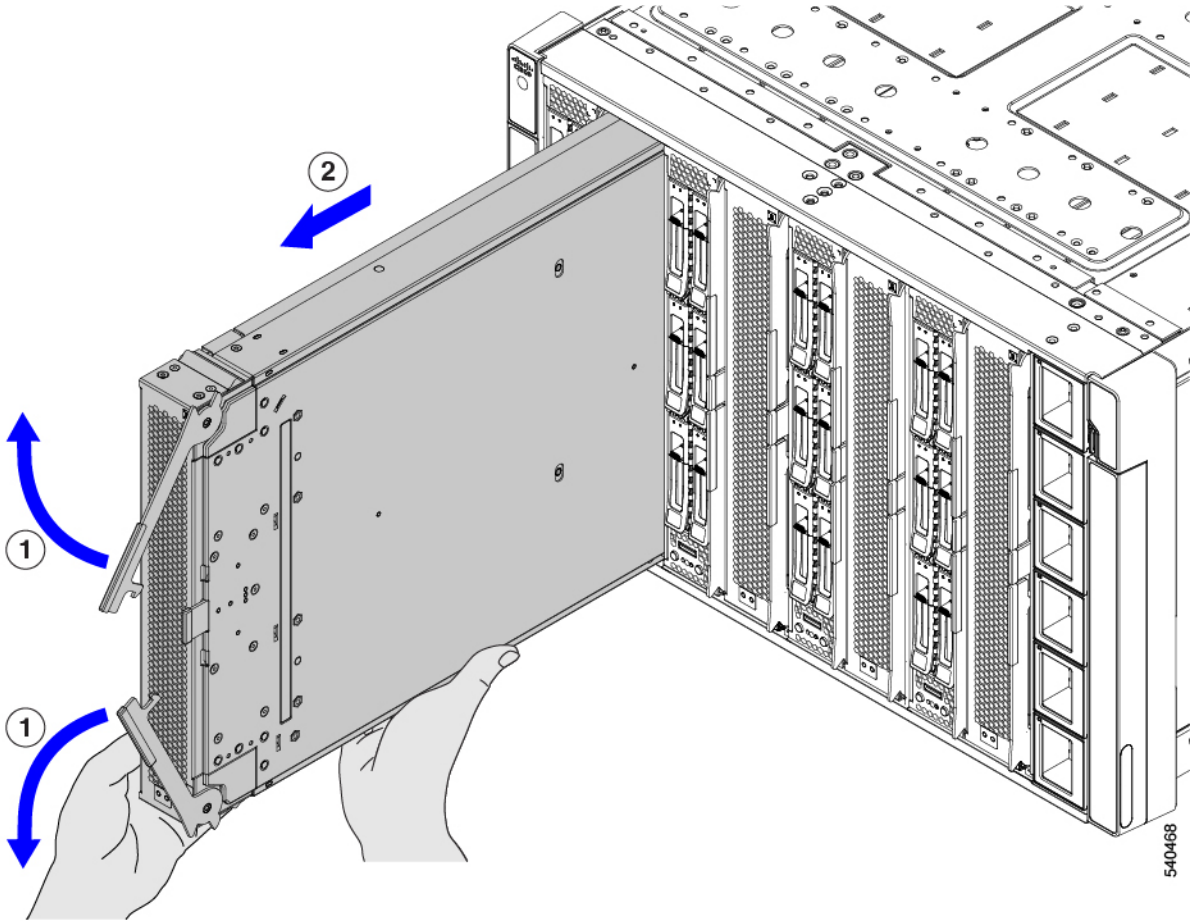
Step 1 If you have not already done so, use Cisco management software (for example, Cisco IMM) to power down the compute node paired with the PCIe node.

Step 2 After the paired compute node is completely powered off, push the PCIe node's ejector button between the two ejectors to disconnect the ejectors from the sheet metal.

When you press the ejector button, the ejector handles will pop up slightly from the face of the node.

Step 3 Gently swing each ejector vertically to disconnect the PCIe node from the server.

Step 4 Using one hand to support the PCIe node, pull the node towards you to slide it out of the server chassis.



What to do next

Reinsert the PCIe node. See Installing the PCIe Node, on page 14.

Installing the PCIe Node

Use this task to install the PCIe node.

Caution Before inserting a PCIe node, make sure that its paired compute node is powered off.

Before you begin

The PCIe node is a tools-free module that you install and secure to the chassis through ejectors.

Procedure

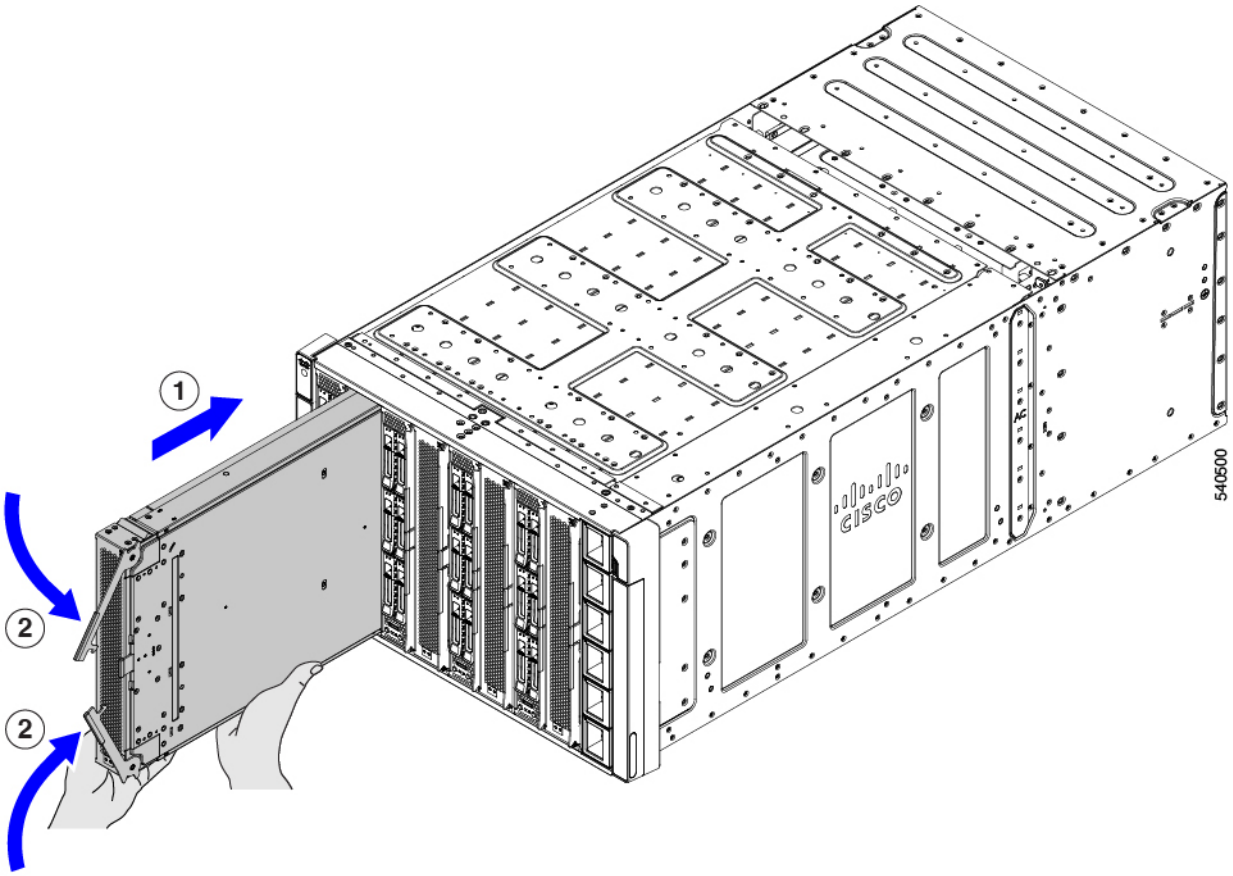
Step 1 Orient and align the PCIe node so that the ejectors are on the right vertical side of the slot.

Step 2 Using one hand to support the PCIe node, hold the node level and slide it into the chassis slot.

When the node is almost all the way in the slot, you might feel some resistance. This resistance is normal. It comes from the connector on the rear of the module meeting its socket on the inside of the chassis.

Step 3 Press on both ends of the faceplate to seat the module, then push the ejectors inward to secure the node in the slot.

The node is fully seated when the ejectors click into place and are flush with the node's faceplate.

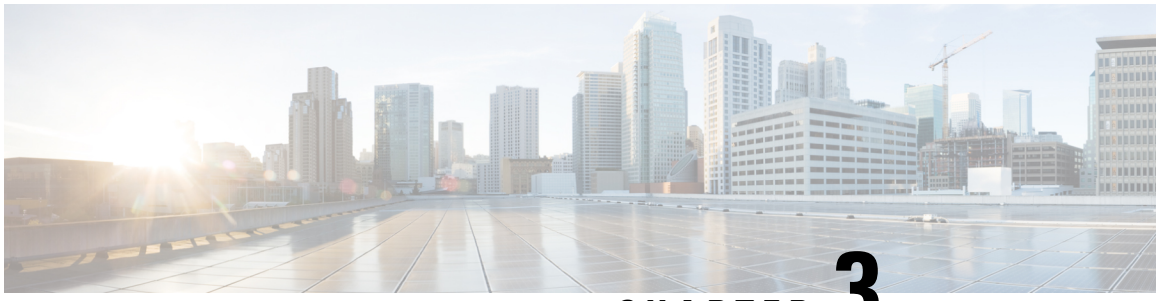


Step 4 Using Cisco management software, such as Cisco Intersight Managed Mode (IMM), power on the PCIe node's paired compute node.

Step 5 After the paired compute node is completely powered on, use Cisco's management software, such as Cisco Intersight Managed Mode (IMM), to rediscover the PCIe node.

PCIe Node Configuration

The Cisco UCS X440p PCIe Node can be configured and managed using the Cisco Intersight management platform in Intersight Managed Mode (Cisco Intersight Managed Mode). For details, see the *Cisco Intersight Managed Mode Configuration Guide*, which is available at: Cisco Intersight Managed Mode Configuration Guide.



CHAPTER 3

Servicing the Cisco UCS X440p PCIe Node

This chapter contains the following topics:

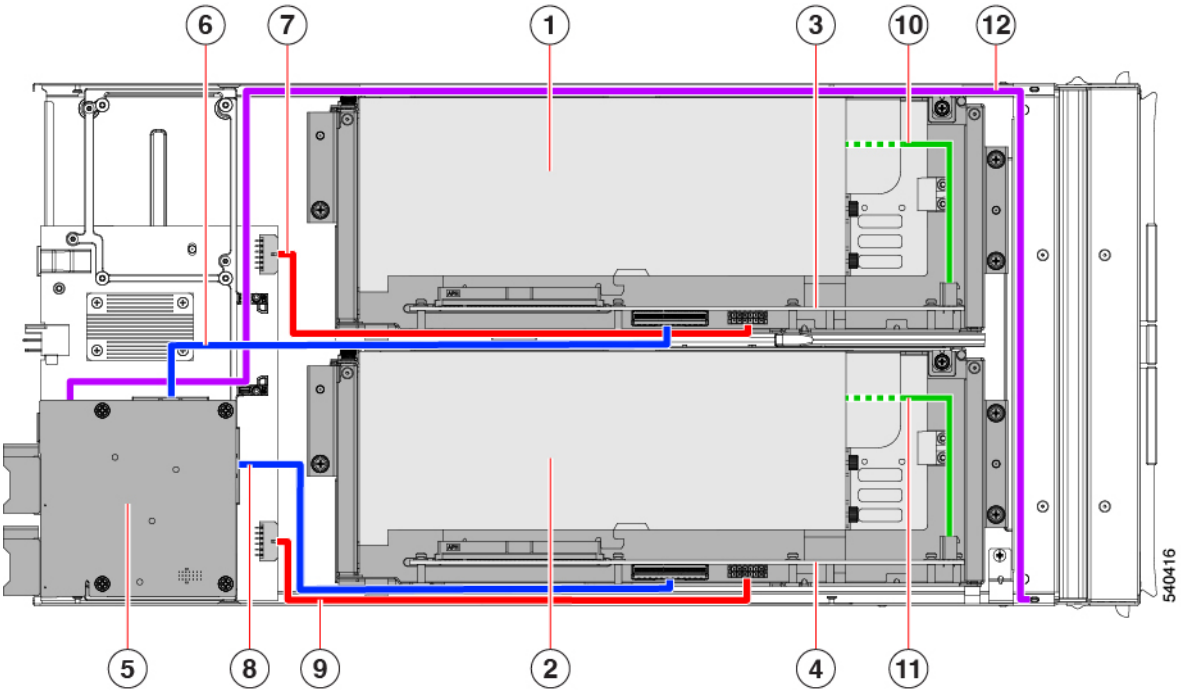
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- Cover, Components, Risers, and GPU Population Instructions, on page 19
- Removing and Installing the PCIe Node Cover, on page 21
- Replacing the PCIe Node Companion Module, on page 23
- Replacing Riser Cages, on page 23
- Replacing a GPU Card, on page 30
- Replacing the Rear Mezzanine Card, on page 43
- Recycling the PCB Assemblies, on page 46

Serviceable Component Locations

The following image shows the locations of serviceable components on the PCIe node.

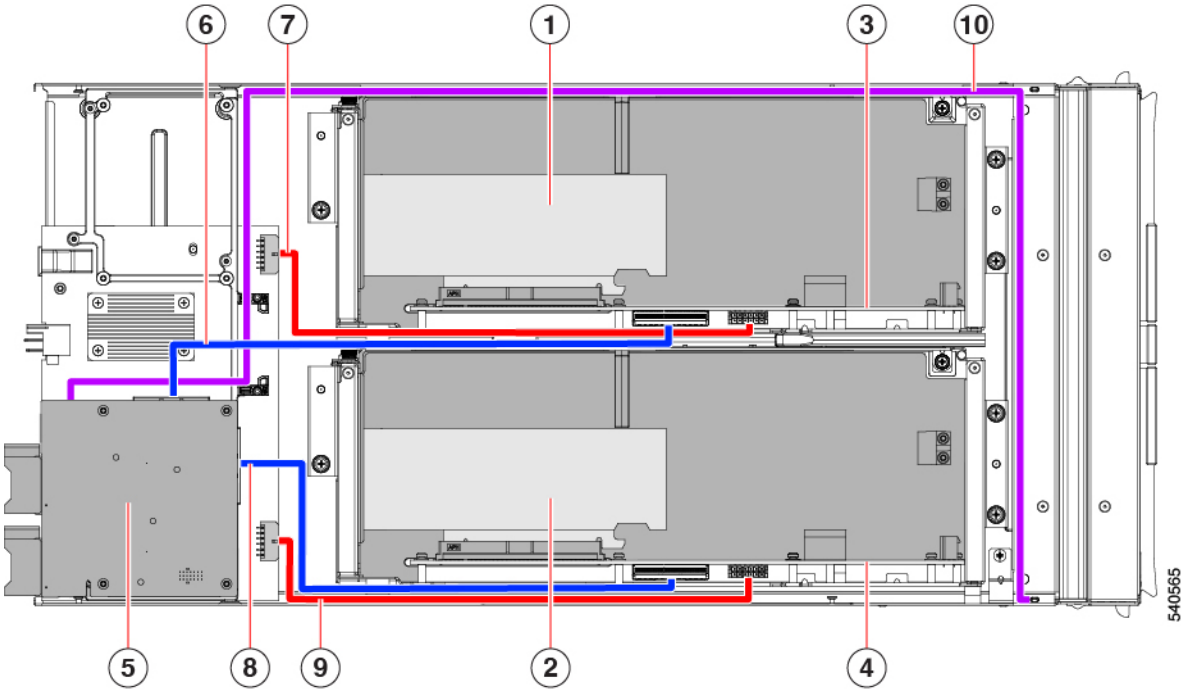
Note The PCIe node has a heatsink next to the rear mezzanine (MEZZ) slot. This heatsink is not serviceable.

Serviceable Component Locations, PCIe Node with Type A Risers



1	GPU slot 1 (1A/1) with FHFL GPU shown	2	GPU slot 2 (2A/2) with FHFL GPU shown)
3	Riser 1	4	Riser 2
5	Rear Mezzanine card	6	MCIO cable for riser 1.
7	Power cable for riser 1	8	MCIO cable for riser 2.
9	Power cable for riser 2	10	GPU power cable for GPU slot 1 This cable is supported on FHFL GPUs only.
11	GPU power cable for GPU slot 2 This cable is supported on FHFL GPUs only.	12	LED cable for Front Panel

Serviceable Component Locations, PCIe Node with Type B Risers



1	GPU slot 1B/2 with HHHL GPU shown GPU slot 1B/1 (not shown) is under 1B/2	2	GPU slot 2B/4 with HHHL GPU shown GPU slot 2B/3 (not shown) is under 2B/4
3	Riser 1	4	Riser 2
5	Rear Mezzanine card	6	MCIO cable for riser 1
7	Power cable for riser 1	8	MCIO cable for riser 2
9	Power cable for riser 2	10	LED cable for Front Panel

Cover, Components, Risers, and GPU Population Instructions

The following illustrations show the PCIe node's FRU service labels.

Figure 6: Cover Removal and Component Identification

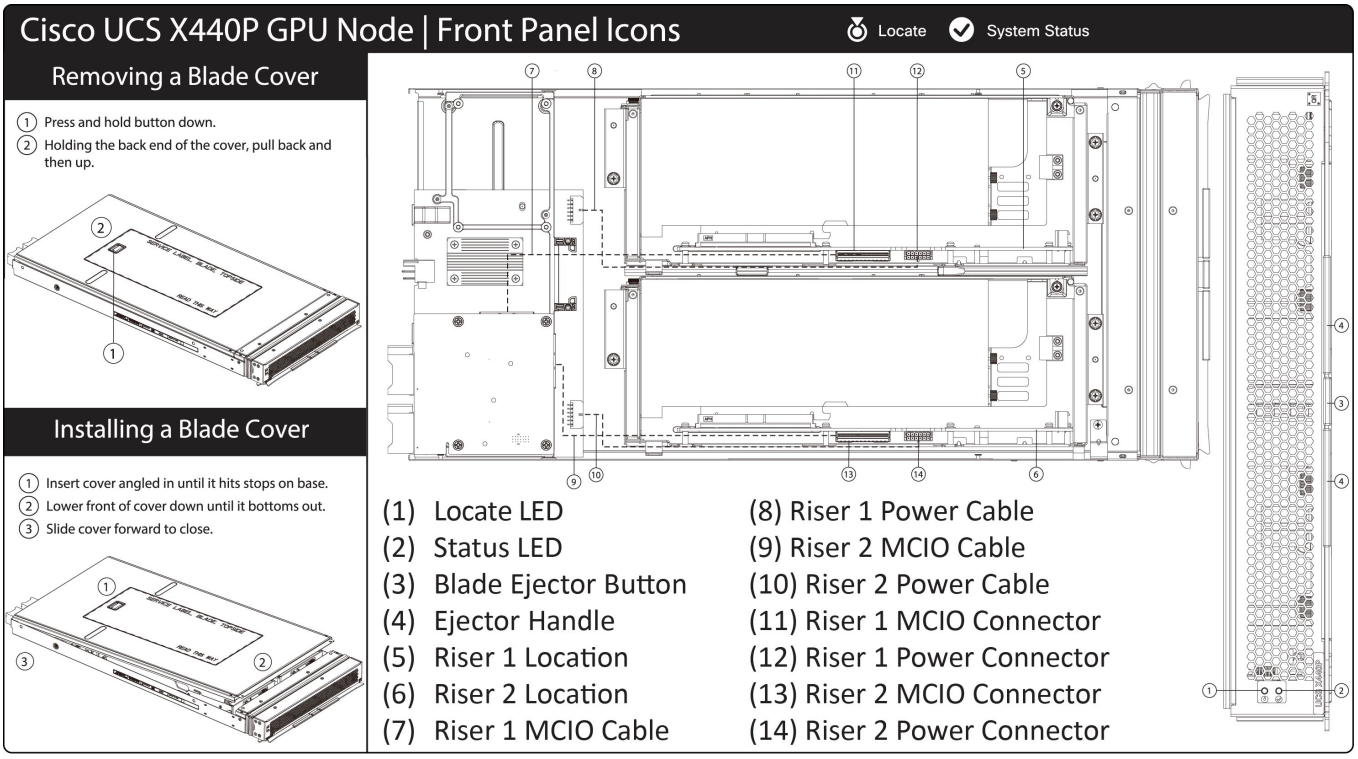
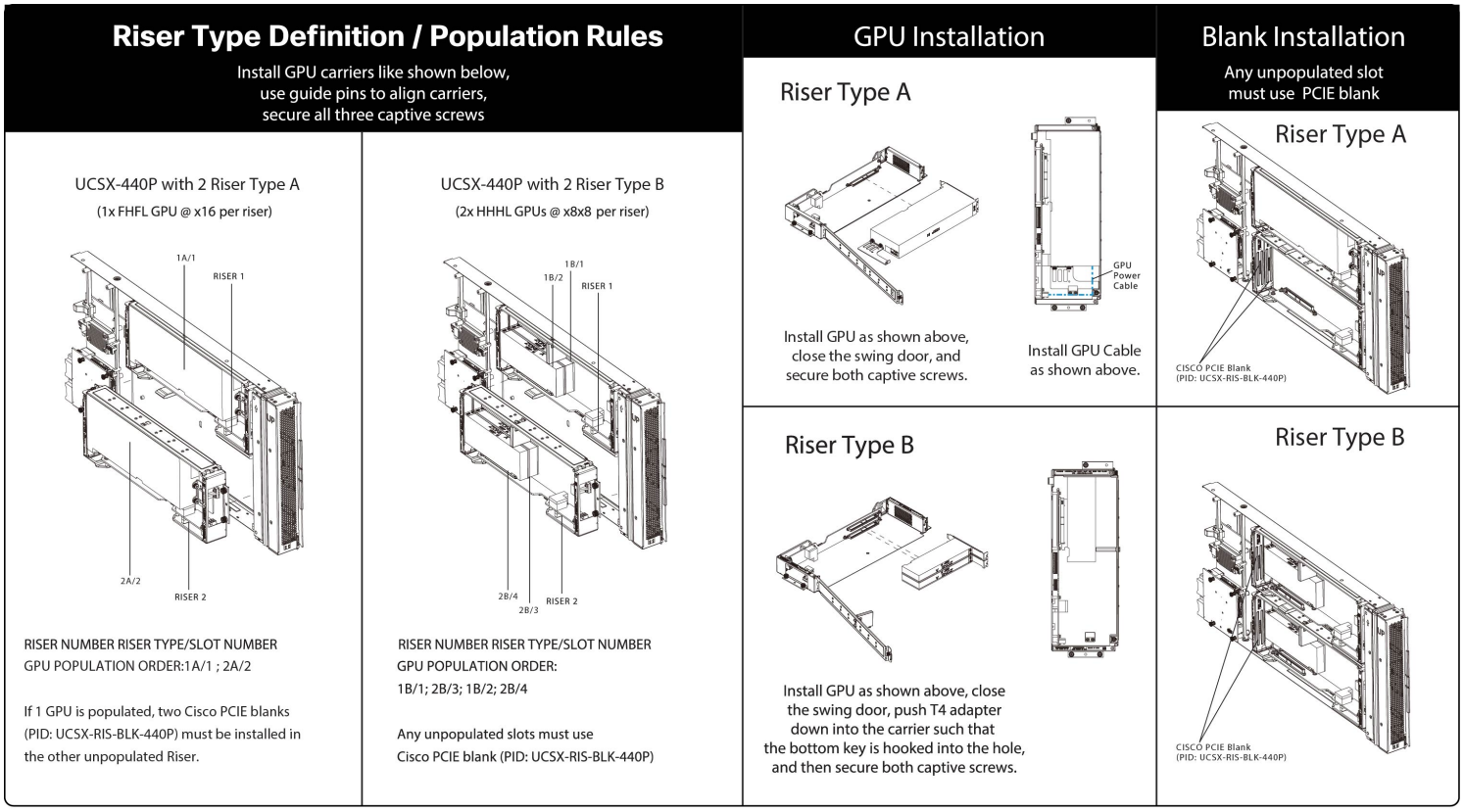


Figure 7: Riser Type Definitions and GPU Population Rules



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Removing and Installing the PCIe Node Cover

The top cover for the Cisco UCS X440p PCIe node can be removed to allow access to internal components, some of which are field-replaceable. The green button on the top cover releases the PCIe node's cover.

To replace the PCIe node's top cover, use the following tasks:

- Removing a PCIe Node Cover, on page 21
- Installing a PCIe Node Cover , on page 22

Removing a PCIe Node Cover

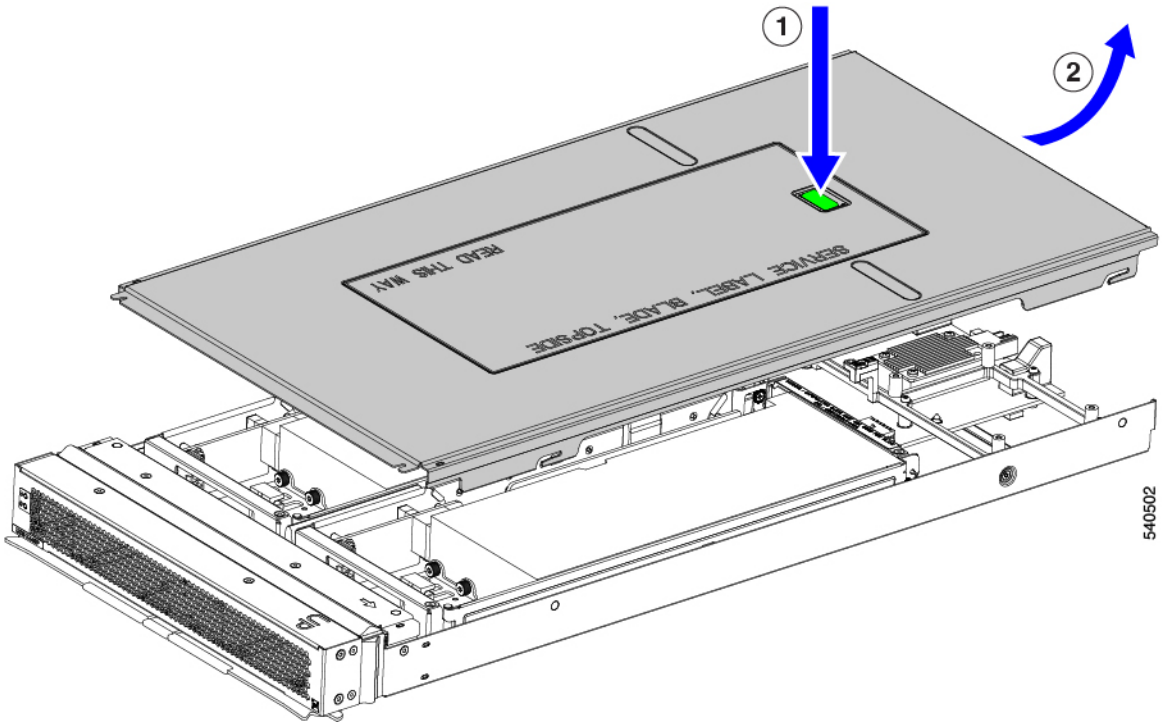
To remove the cover of the Cisco UCS X440p PCIe Node, follow these steps:

Procedure

Step 1 Press and hold the button down (1, in the figure below).

Step 2 While holding the back end of the cover, slide it back, then pull it up (2).

By sliding the cover back, you enable the front edge to clear the metal lip on the rear of the PCIe node.



Installing a PCIe Node Cover

Use this task to install a removed top cover for the PCIe node.

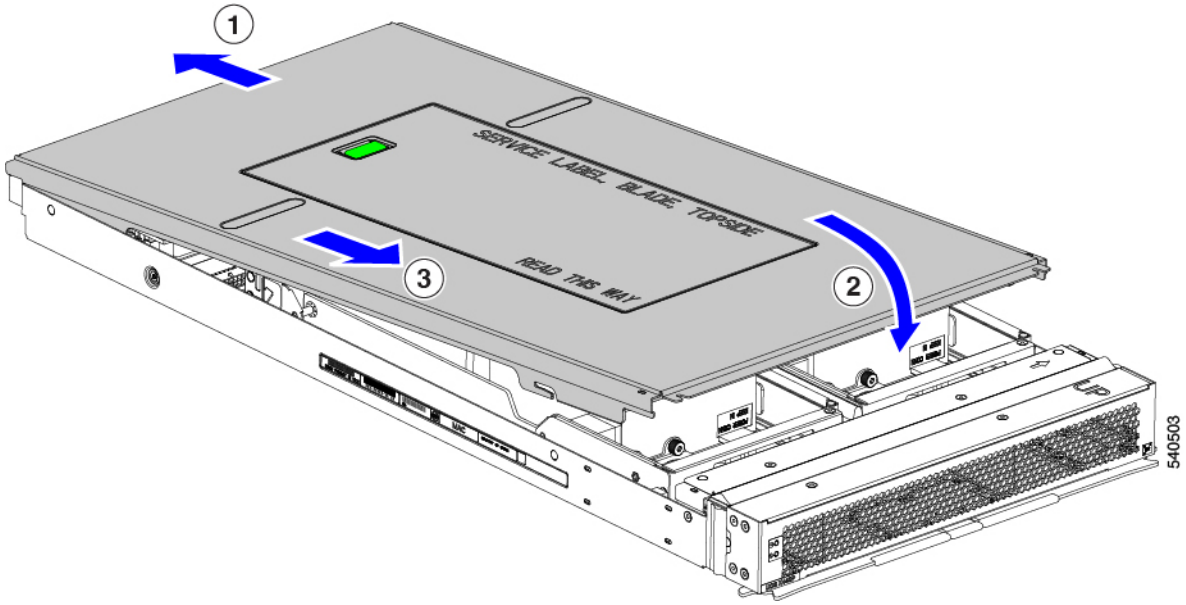
Procedure

Step 1 Insert the cover at an angle so that the cutouts on the rear of the catch the guide pins on the inside walls of the node.

Step 2 Lower the PCIe node's cover until it sits on the node.

Step 3 Keeping the PCIe node's cover flat, slide it forward until the release button clicks.

Note
Make sure that the front edge of the top cover slides under the metal edge of the node. If you feel resistance, these two edges might be making contact instead of sitting on top of each other.



Replacing the PCIe Node Companion Module

Caution You must power off the PCIe node companion module before replacing it!

The PCIe node has a companion module, such as a Cisco UCS X210c compute node. To replace the PCIe node companion module, see the hardware documentation for the specific companion module.

Replacing Riser Cages

Each PCIe node has two riser cages, which mount to the PCIe node sheet metal and contain the GPUs. Risers can be either Type A or Type B, and the type of riser is determined by the GPU that it contains. For more information, see Riser Cage Options, on page 5.

Riser cages cannot be mixed on the same PCIe node. If you are replacing a riser cage, the PCIe node must have a pair of the same type, either two Type A riser cages or two Type B riser cages.

To replace riser cages, use the following tasks:

- Required Equipment, on page 24
- Cabling Considerations, on page 24
- Removing Riser, Type A, on page 25
- Installing Riser, Type A, on page 27
- Removing Riser, Type B, on page 28

- Installing Riser, Type B, on page 29

Required Equipment

To remove Type A and Type B risers, you need a #2 Phillips screwdriver. For information about the riser types, see Riser Cage Options, on page 5.

Cabling Considerations

Riser Cage Cables

The PCIe node has two dark colored GPU cables that carry power and data.

- One cable, the power cable, connects from the PCIe riser cage to the base PCBA connector. This cable is shown in red in the following image.
- One cable, the MCIO cable, connects from the PCIe riser cage to the rear mezzanine PCBA. This cable is shown in blue in the following image.

Figure 8: PCB Cable Connectors, FHFL GPU

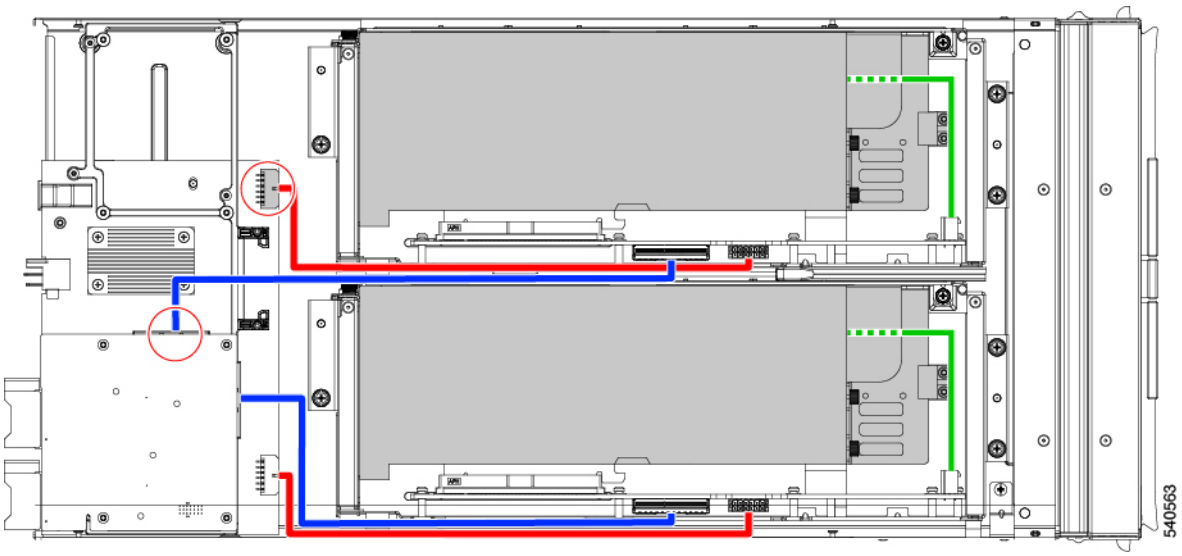
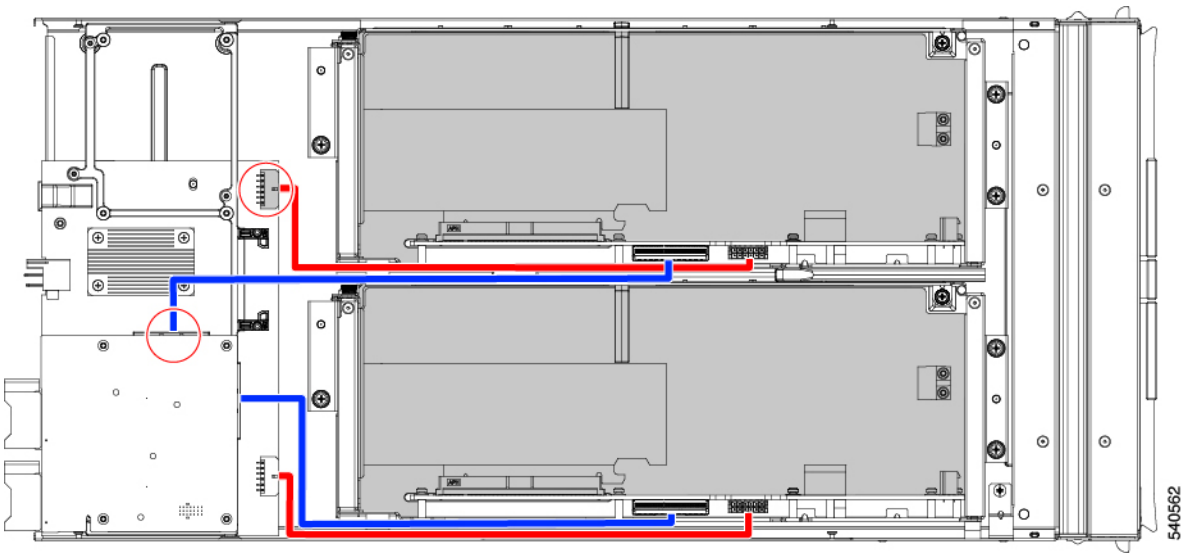


Figure 9: PCB Cable Connectors, HHHL GPU



While performing some tasks, you will need to disconnect these cables. When disconnecting cables, you must disconnect the ends opposite the riser cages.

- For the power cable, disconnect the end that connects to the base PCBA.
- For the MCIO cables, disconnect the end that connects to the rear mezzanine PCB.

GPU Cables

Each full height full length (FHFL) GPU requires a separate cable that connects the GPU directly to a socket on the riser cage. This cable is the GPU auxiliary (AUX) power cable, and it is different from the riser cables described in the preceding section.

While performing some tasks for an FHFL GPU (for example, replacing a FHFL GPU), you must disconnect this cable. It is a best practice to disconnect the GPU AUX power cable from the riser socket, not the GPU, unless otherwise documented.

Removing Riser, Type A

Each PCIe node can contain a maximum of two PCIe riser cages of the same type. Use this procedure to remove a Type A riser.

Procedure

Step 1 Remove the PCIe node from the server.

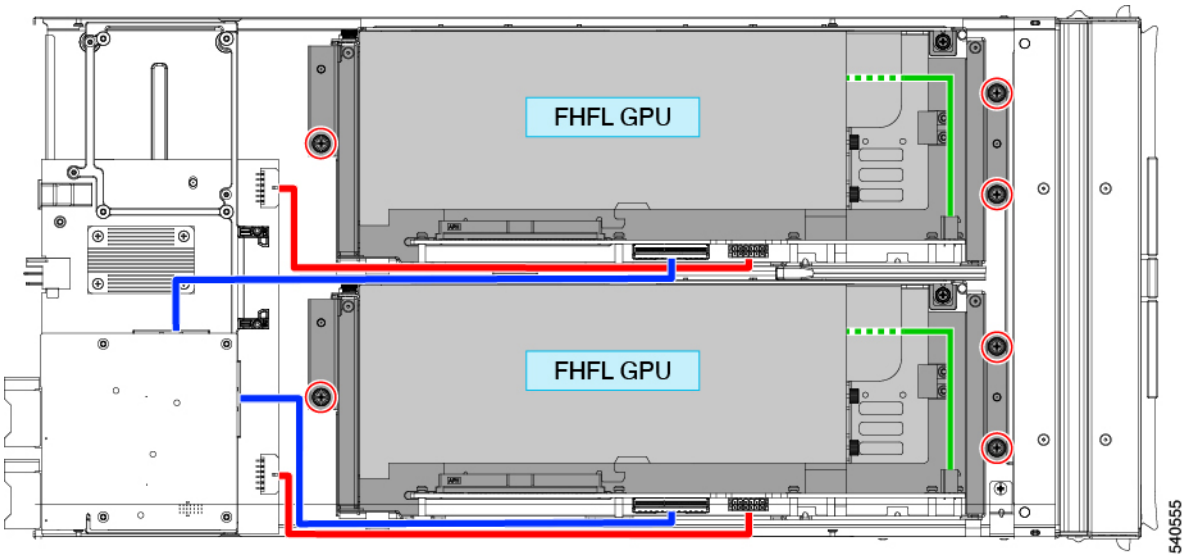
See Removing the PCIe Node, on page 13.

Step 2 Remove the top cover.

See Removing a PCIe Node Cover, on page 21.

Step 3 Detach the riser cage from the PCIe node.

a) Using a #2 Phillips screwdriver, loosen the three captive thumbscrews.

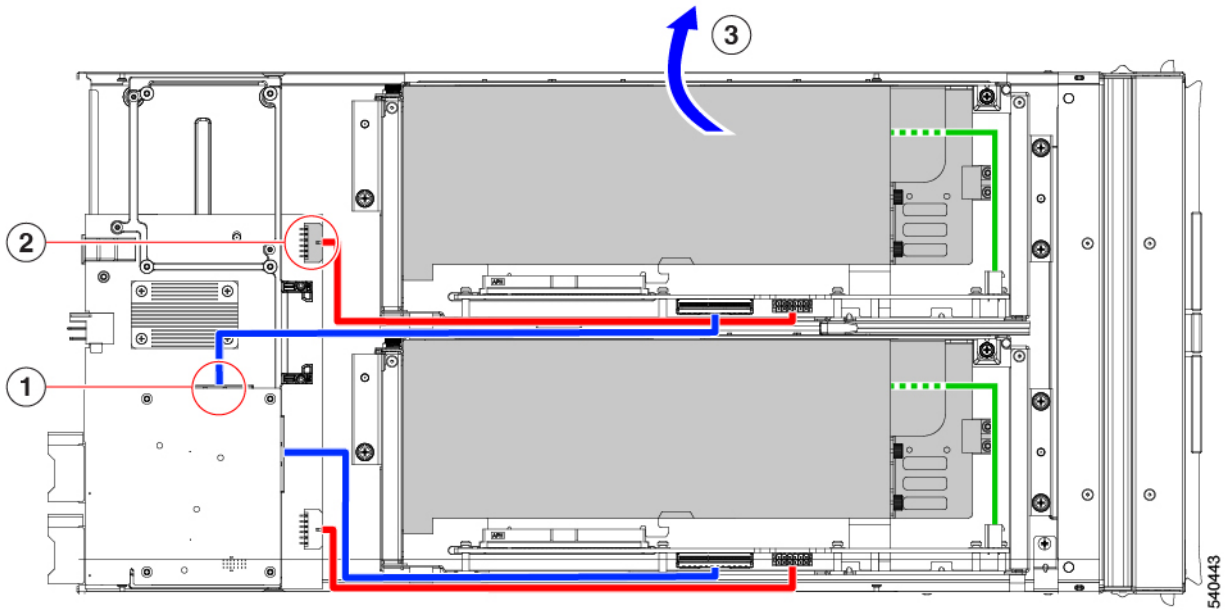


b) Disconnect the MCIO cable from the rear mezzanine (MEZZ) connector.

c) Lift and slide the tray slightly to expose the rear mezzanine connector of the power cable.

d) Disconnect the power cable from the node's rear motherboard connector.

e) When both cables are disconnected, lift the riser cage off of the PCIe node.



What to do next

Choose the appropriate option:

- Removing a FHFL GPU
- Installing a FHFL GPU, on page 33
- Installing Riser, Type A, on page 27

Installing Riser, Type A

Use this procedure to install a Type A riser onto the PCIe node.

Before you begin

You will find it helpful to get a #2 Phillips screwdriver before you begin.

Procedure

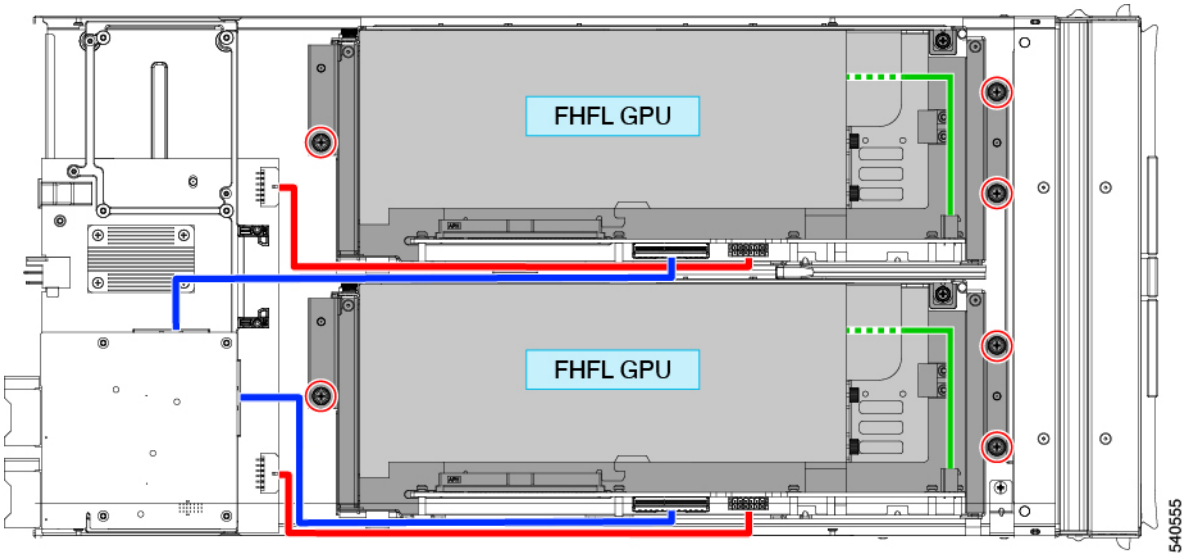
Step 1 Orient the riser cage with the PCIe node so that the single two thumbscrews are closest to the front of the node.

Step 2 Attach the riser cage to the PCIe node.

a) While lowering the riser cage onto the node, align two guide holes on the cage with their respective guide pins on the PCIe module.

Note
Make sure that the cables are not pinched by the riser cage.

b) Lower the riser cage onto the PCIe module, making sure to align the thumbscrews with the correct screw holes.
c) Connect the MCIO cable to the rear mezzanine (MEZZ) connector.
d) Connect the power cable to the node's rear motherboard connector.
e) Using a #2 Phillips screwdriver, tighten the three captive thumbscrews to secure the riser cage to the node.



What to do next

Choose the appropriate option:

- Replace another riser cage.
- Installing a PCIe Node Cover , on page 22

Removing Riser, Type B

Each PCIe node can contain a maximum of two PCIe riser cages of either type. Use this procedure to remove a Type B riser.

Before you begin

You will find it helpful to have a #2 Phillips screwdriver for this procedure.

Procedure

Step 1 Remove the PCIe node from the server.

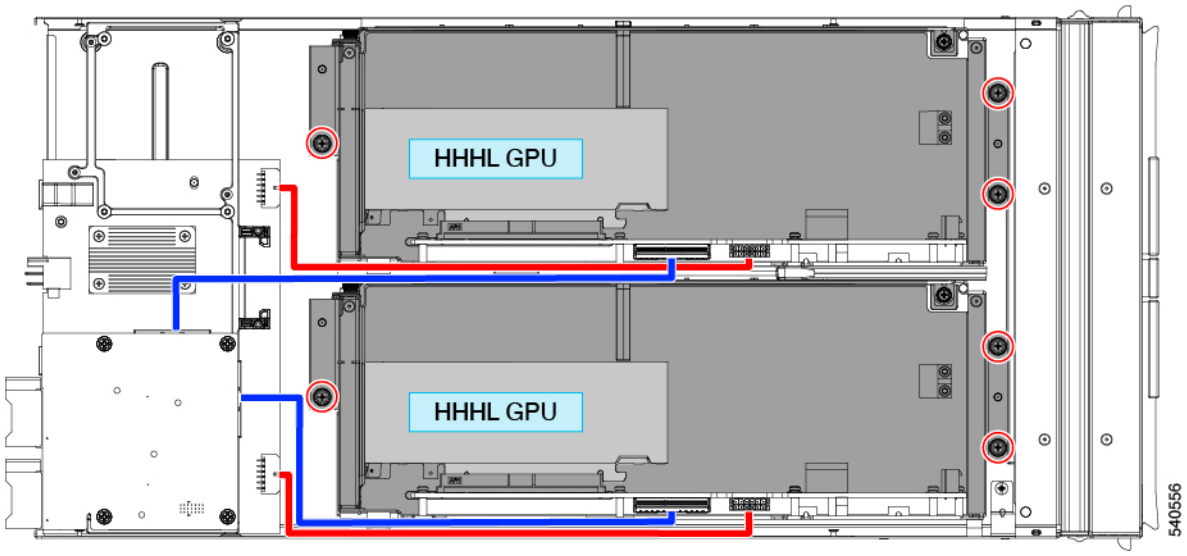
See Removing the PCIe Node, on page 13.

Step 2 Remove the top cover.

See Removing a PCIe Node Cover, on page 21.

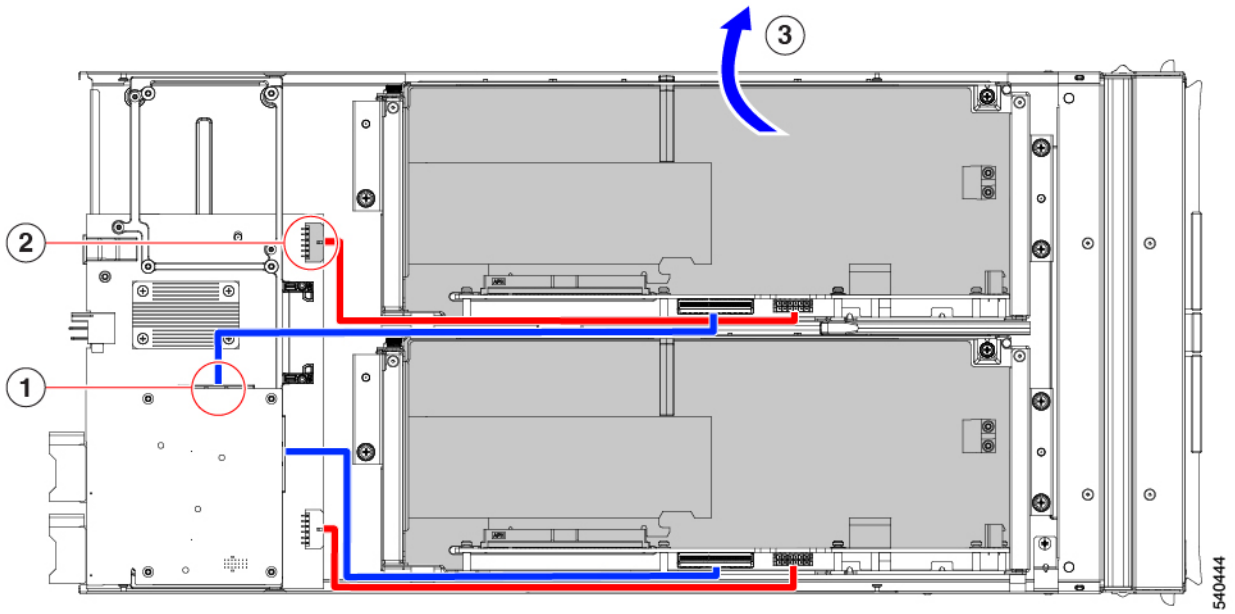
Step 3 Detach the riser cage from the PCIe node.

a) Using a #2 Phillips screwdriver, loosen the three captive thumbscrews.



b) Disconnect the MCIO cable from the rear mezzanine (MEZZ) connector.
c) Lift and slide the riser cage slightly to expose the rear mezzanine connector of the power cable.
d) Disconnect the power cable from the node's rear motherboard connector.

e) When both cables are disconnected, lift the riser cage off of the PCIe node.



What to do next

Choose the appropriate option:

- Removing a HHHL GPU, on page 36
- Installing a HHHL GPU, on page 40
- Installing Riser, Type B, on page 29

Installing Riser, Type B

Use the following procedure to install a Type B riser onto the PCIe node.

Before you begin

You will find it helpful to gather a #2 Phillips screwdriver before starting this procedure.

Procedure

Step 1 Orient the riser cage with the PCIe node so that the two thumbscrews are closest to the front of the node.

Step 2 Attach the riser cage to the PCIe node.

a) While lowering the riser cage onto the node, align the two guide holes on the cage with their respective guide pins on the PCIe module.

Note

Make sure that the cables are not pinched by the riser cage.

b) Lower the riser cage onto the PCIe module making sure to align the thumbscrews with the correct screw holes.
c) Connect the MCIO cable to the rear mezzanine (MEZZ) connector.
d) Connect the power cable to the node's rear motherboard connector.
e) Using a #2 Phillips screwdriver, tighten the three captive thumbscrews to secure the riser cage to the node.

Replacing a GPU Card

Supported GPU cards are contained in a slot in either a Type A or Type B riser cage. For more information, see Riser Cage Options, on page 5.

GPUs must be replaced with the same form factor of GPU that was removed. For example, if you remove a HHHL GPU, you must install a HHHL GPU in its place. You cannot mix and match the GPUs in the same riser cage.

To replace a GPU card, use the following tasks:

- GPU Replacement Guidelines and Limitations, on page 30
- Removing a FHFL GPU, on page 32
- Installing a FHFL GPU, on page 33
- Removing a HHHL GPU, on page 36
- Installing a HHHL GPU, on page 40

GPU Replacement Guidelines and Limitations

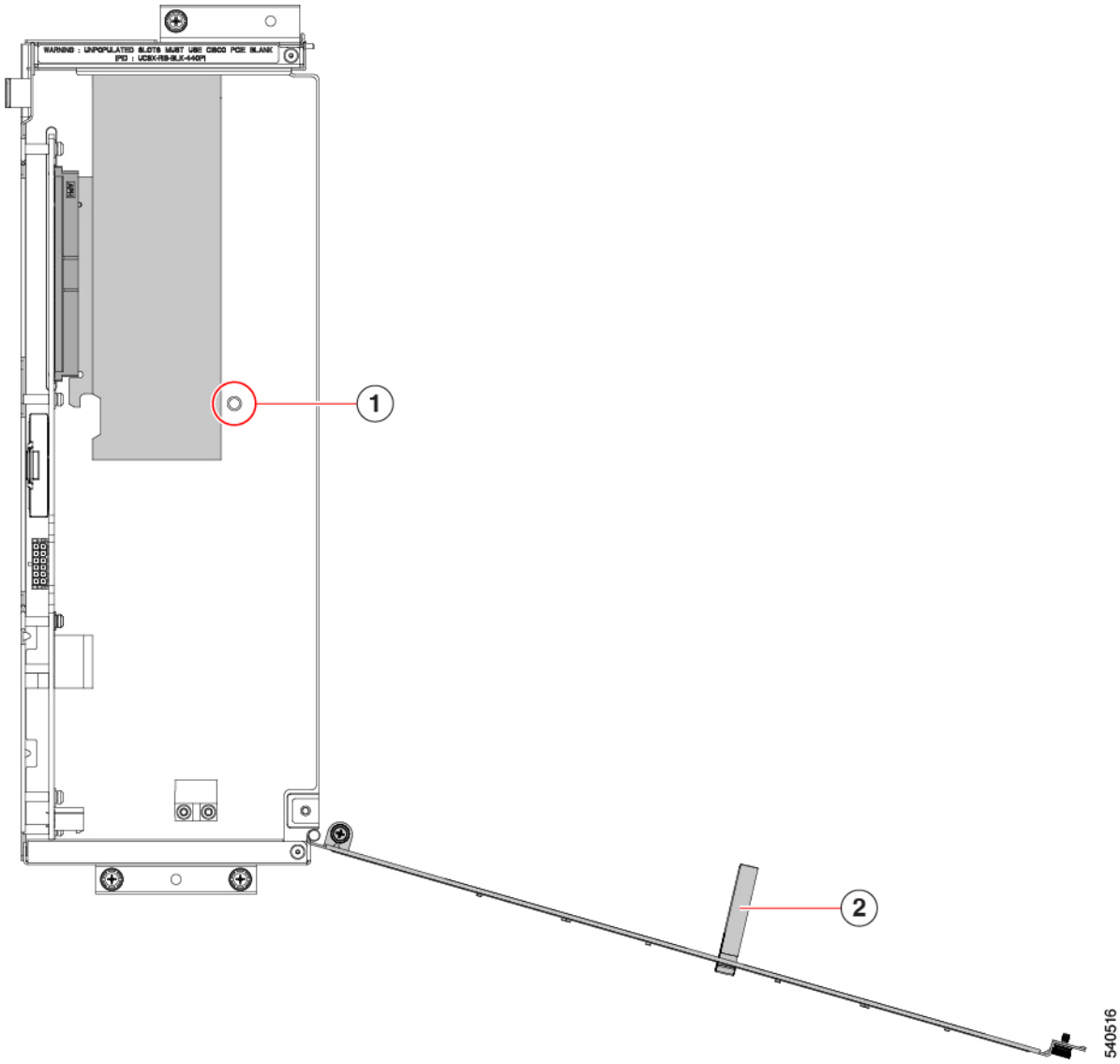
Be aware of the following guidelines and limitation for replacing FHFL and HHHL GPUs.

- For installing GPUs into a riser type, there is a defined population order as shown in the following table. It is a best practice to use this population order, which shows which slot(s) should be populated before the other(s).

  For information about how slots are numbered in each riser type, see Slot Numbering, on page 5.

Riser Type	GPU Population Order (Riser Number Riser Designator/Slot Number)
A	1A/1; 2A/2
B	1B/1: 2B/3; 1B/2; 2B/4

- For HHHL GPUs, the riser cage door has a retention block that prevents the HHHL GPU from backing out of its PCIe socket while the door is closed. The retention block has a retaining pin that seats into a hole in the bottom of the riser cage.



1	Retaining pin hole, bottom of HHHL riser cage	2	Retention block, inside riser cage door

When removing an HHHL GPU, use your finger to push up on the retaining pin to unseat it and allow the door to swing open.

When installing an HHHL GPU, make sure that the pin seats into the hole when you close the riser cage door.

- Cisco offers Cisco PCIe blanks (UCSX-RIS-BLK-440P=) that fill unused connectors in the PCIe node. If your PCIe node is not fully configured with GPUs, you must install the appropriate number of blanks. For PCIe nodes that are less than fully configured with GPUs, do not operate the PCIe node without a GPU filler blank.

- For FHFL GPUs, an additional power cable connects the GPU card to the Type A riser cage. This power cable usually has a black connector on one end and a white connector on the other end. Each end must be connected to the correct power connector.

Caution Handle the FHFL GPU power cable carefully so that it doesn't get pinched or positioned at a severe bend radius. Pinching or severely bending the GPU's power cable can damage it.

Removing a FHFL GPU

Full height, full length (FHFL) GPUs are supported in Type A risers. Each Type A riser has one PCIe socket that the GPU connects to. One FHFL GPU can be installed in riser Type A.

Use this task to remove a FHFL GPU.

Before you begin

Review the GPU Replacement Guidelines and Limitations, on page 30.

Procedure

Step 1 If you have not already done so remove the Type A riser from the PCIe node.

See Removing Riser, Type A, on page 25.

Step 2 When the Type A riser is removed from the node, open the riser door.

a) Using a #2 Phillips screwdriver, loosen the vertical securing screw on the wall of the riser.
b) Using a #2 Phillips screwdriver, loosen the hinge retention screw, which allows the door to swing open.
c) Gently pull the door outward so that it swings open in an arc.

Caution
Make sure to hold the door level when you open it! Do not push the door down or lift the door up while opening it. Pushing down or pulling up can apply force to the door's hinge.

Step 3 Disconnect the black connector of GPU auxiliary (AUX) power cable from the riser.

If you will be reinstalling the FHFL GPU, you can leave the GPU cable connected to the GPU itself.

Caution
Handle the GPU power cable carefully while removing or installing the FHFL GPU. See GPU Replacement Guidelines and Limitations, on page 30.

Step 4 Remove the FHFL GPU from the riser.

a) Slide the FHFL GPU out to unseat it from its PCIe socket.
b) Holding the FHFL GPU level, slide it along the floor of the riser cage until it clears the retaining bracket on the floor of the riser cage.

The retaining bracket is at the opposite end of the GPU's PCIe bracket.

Step 5 Lift the GPU out of the riser.

What to do next

Reinsert an FHFL GPU. See Installing a FHFL GPU, on page 33.

Installing a FHFL GPU

Type A riser cages have two alignment pins for the single PCIe connector. The pair of pins catches a pair of notches on the GPU bracket to correctly position the GPU.

Use the following procedure to install a full height full length GPU into a Type A riser.

Before you begin

Review the GPU Replacement Guidelines and Limitations, on page 30.

Procedure

Step 1 Plug the black connector of GPU auxiliary (AUX) power cable into the FHFL GPU.

Step 2 Attach the GPU to the Type A riser.

a) Orient the GPU so that the notches on the GPU bracket line up with the pins on the riser cage.

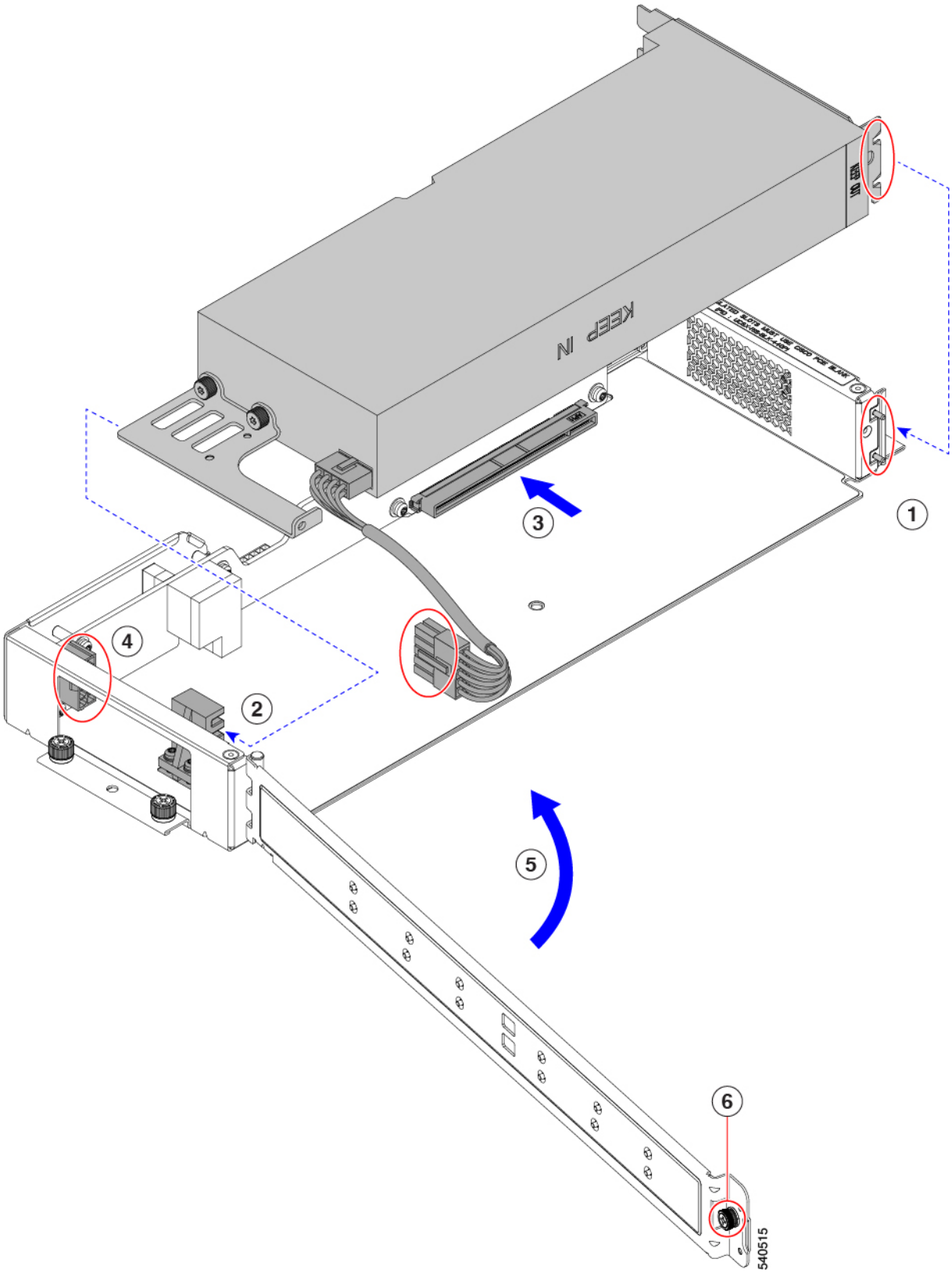
Note
You might need to open the riser door completely to have enough space to insert the FHFL GPU.

b) Lower the FHFL GPU so that the front edge will slide into the lowest retaining bracket on the riser cage floor.

c) Align the GPU connector with its socket on the riser.

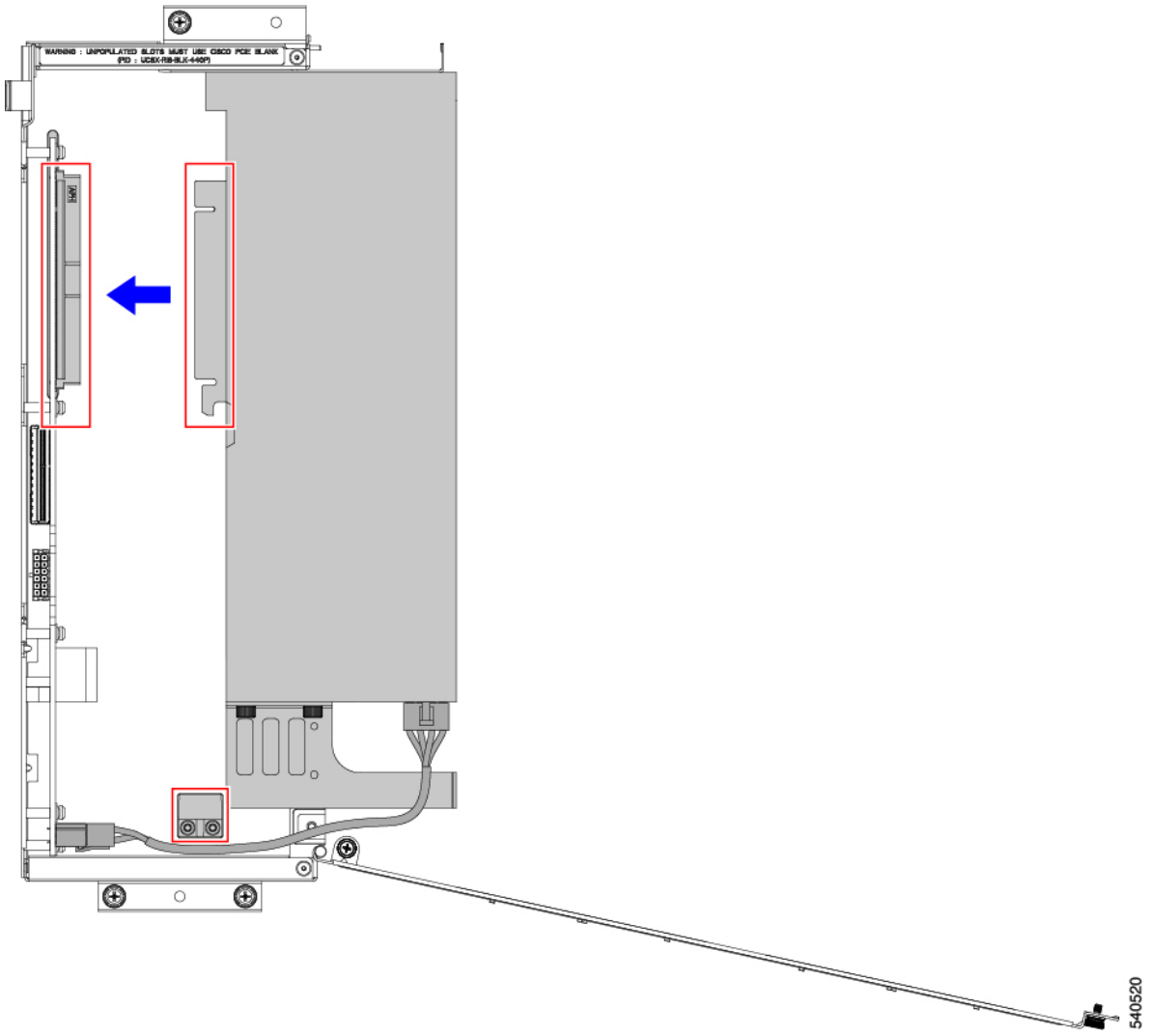
d) Gently slide the GPU along the floor of the riser, making sure that the bottom notch on the retaining bracket captures the FHFL.

Caution
Make sure that the GPU power cable does not obstruct the GPU. Do not allow the cable to get pinched or exceed a reasonable bend radius.


KEEP IN
1
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e) Fully seat the FHFL GPU into the socket.

You should feel the GPU snap into place when it is fully seated.



Step 3 Routing the GPU AUX power cable between the retaining bracket and the riser wall as shown in the preceding illustration, plug the white end of the GPU AUX power cable into the riser cage's socket.

Make sure that the power cable lies on the floor of the riser cage.

Caution
Handle the GPU power cable carefully while removing or installing the FHFL GPU. See GPU Replacement Guidelines and Limitations, on page 30.

Step 4 When the GPU is seated, close the riser door.

a) Gently push the door inward so that it swings closed in an arc.

Caution
Make sure to hold the door level when you close it! Do not push the door down or lift the door up while closing it. Pushing down or pulling up can apply force to the door's hinge.

b) Using a #2 Phillips screwdriver, tighten the vertical securing screw on the wall of the riser.
c) Using a #2 Phillips screwdriver, tighten the hinge retention screw.

Removing a HHHL GPU

Use the following task to remove a HHHL GPU card from a Type B riser.

Before you begin

Review the GPU Replacement Guidelines and Limitations, on page 30.

Procedure

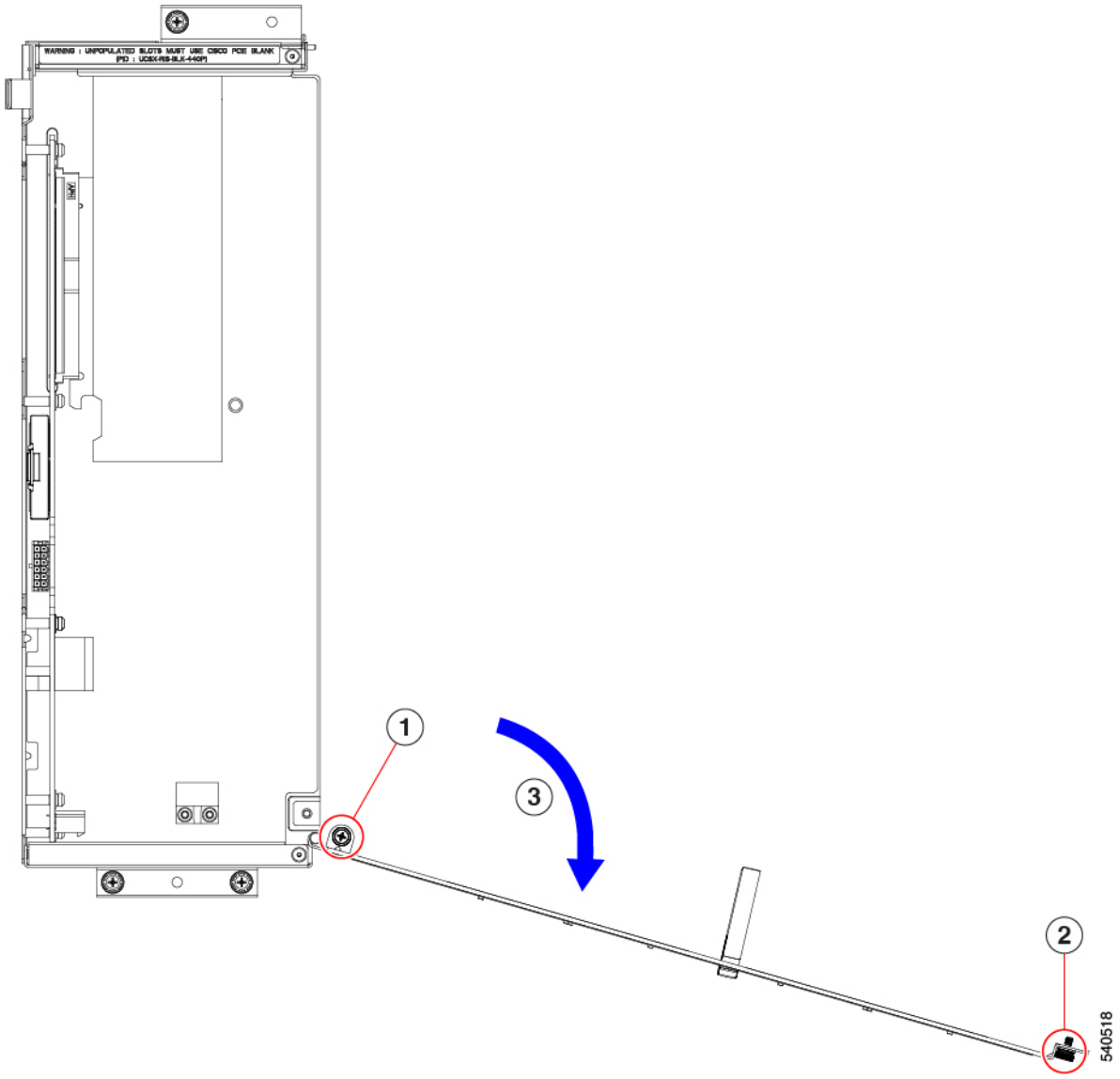
Step 1 If you have not already done so remove the Type B riser from the PCIe node..

See Removing Riser, Type B, on page 28.

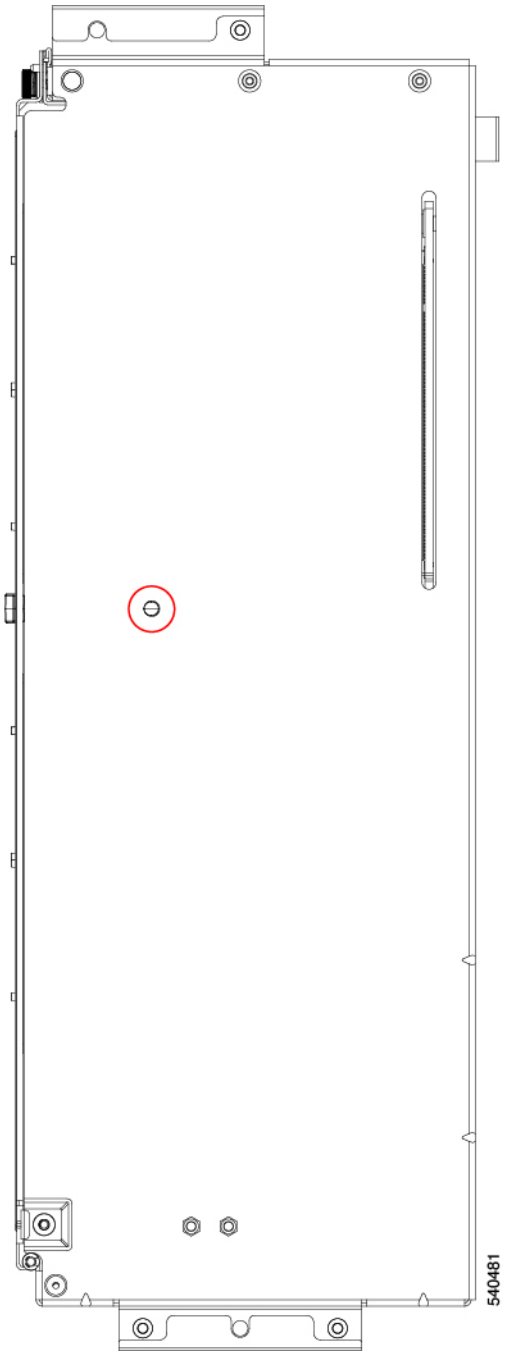
Step 2 When the Type B riser is removed from the node, open the riser door.

a) Using a #2 Phillips screwdriver, loosen the hinge retention screw.
b) Using a #2 Phillips screwdriver, loosen the vertical securing screw on the wall of the riser.
c) Gently pull the door outward do that it swings open in an arc.

Caution
Make sure to hold the door level when you open it! Do not push the door down or lift the door up while opening it. Pushing down or pulling up can apply force to the door's hinge.

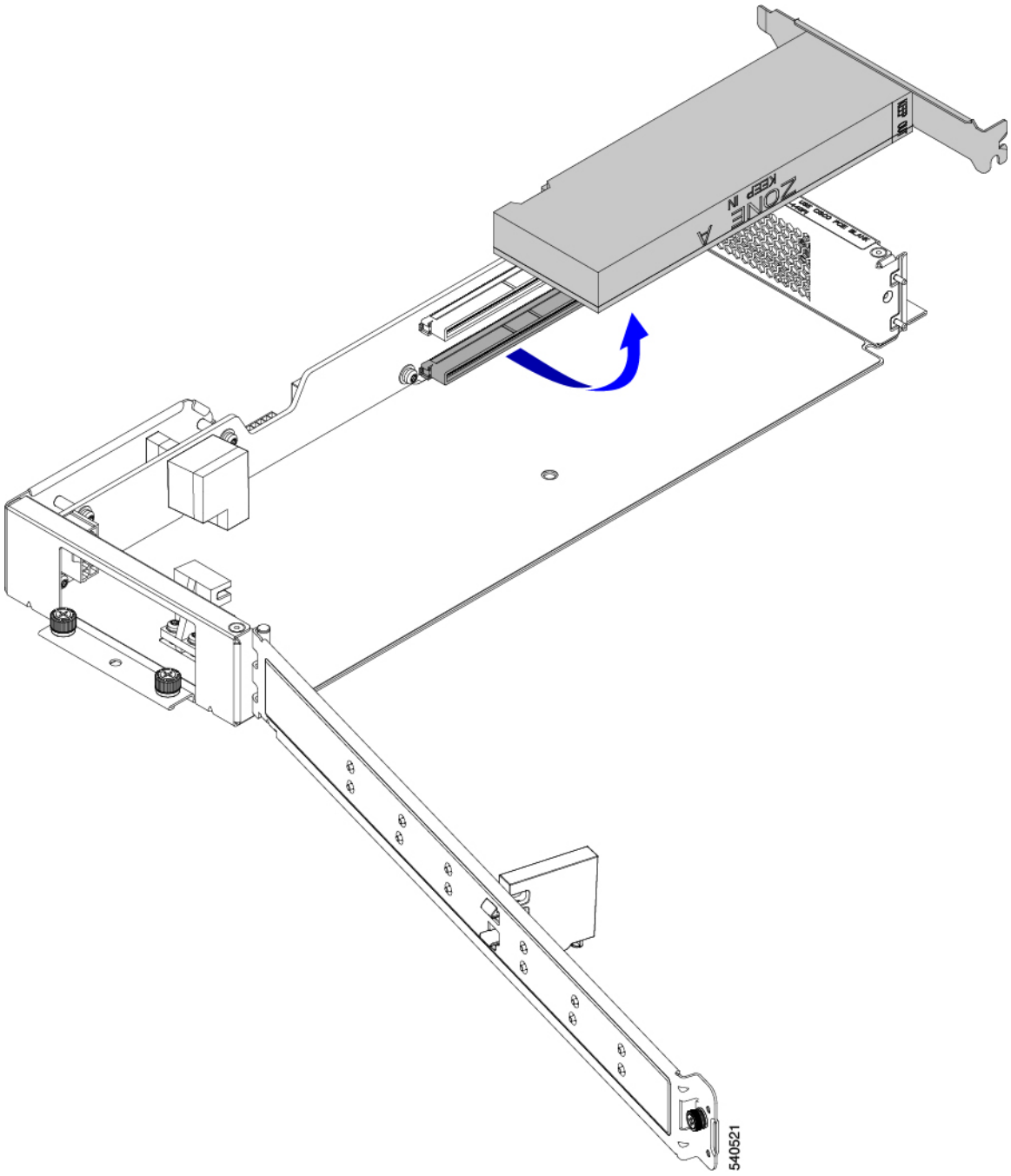


d) If you feel resistance while swinging the door open, turn the riser over and check the retaining pin.
e) Press the retaining pin to release it, then continue opening the door.



Step 3 Holding the HHHL GPU at one end and the PCIe bracket at the other end, pull the GPU card horizontally to detach it from the PCIe connector, then lift it out of the riser cage.

Caution
Make sure to hold the GPU level while removing it! Pulling up or pushing down can apply force to the GPU connector or the PCIe socket.



What to do next

Choose the correct option:

- Installing a HHHL GPU, on page 40
- Installing Riser, Type B, on page 29

Installing a HHHL GPU

Type B riser cages have one alignment pin for each PCIe connector. One pin is for the top connector, and the other pin is for the bottom connector. Each pin catches a notch on the GPU bracket to correctly position the GPU.

Use this task to install an HHHL GPU into a Type B riser.

Before you begin

Review the GPU Replacement Guidelines and Limitations, on page 30.

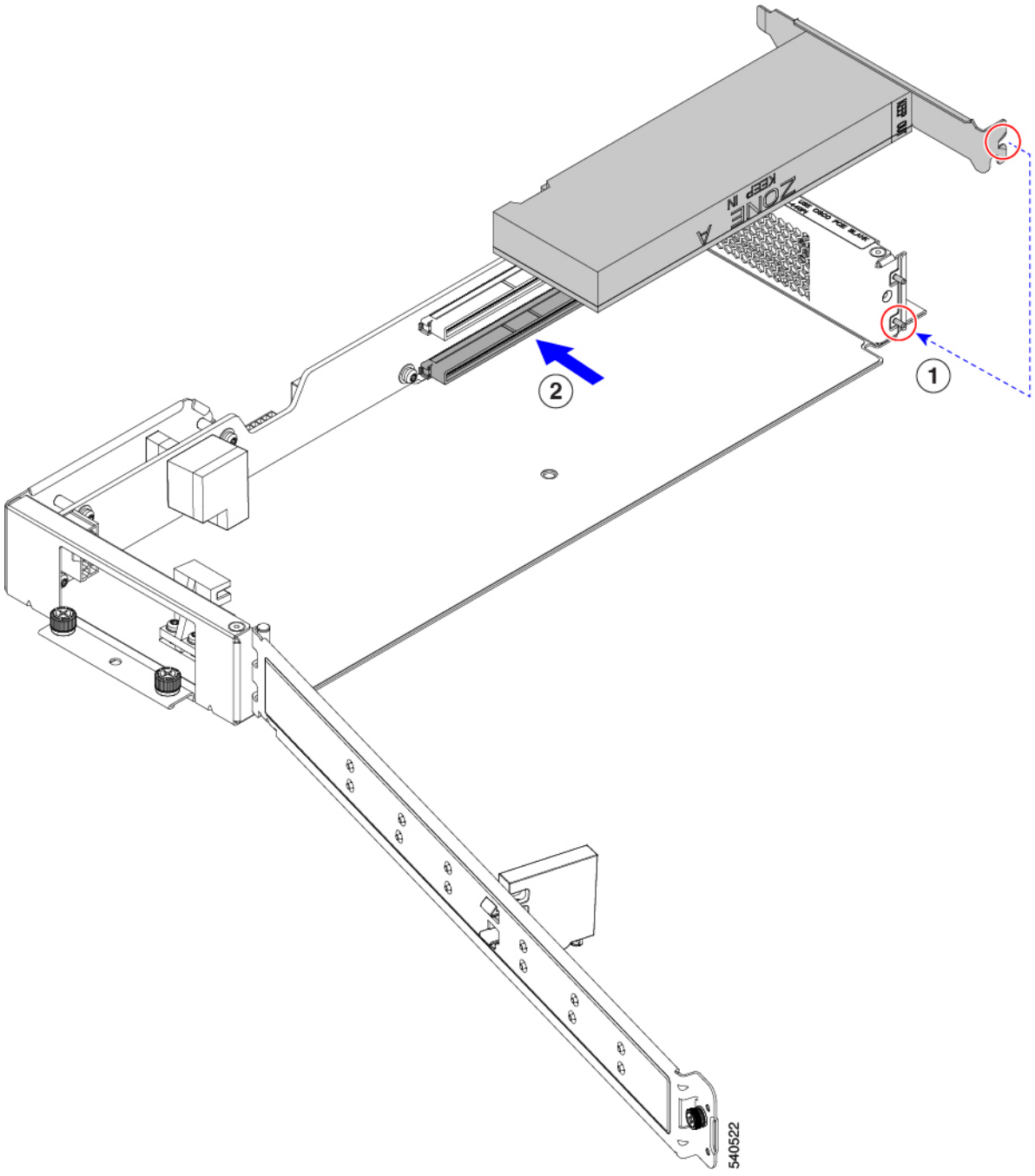
Procedure

Step 1 Holding the HHHL GPU level, align it horizontally with the PCIe connector, making sure that the notch in GPU's PCIe bracket aligns with the correct pin on the riser cage.

In the following illustration, the GPU is aligning with the bottom connector, so the bottom pin is used.

Step 2 Seat the GPU card into the PCIe socket securely.

You should feel the GPU snap into place when the connector seats into the PCIe socket.



Step 3 When the GPU is seated, close the riser door.

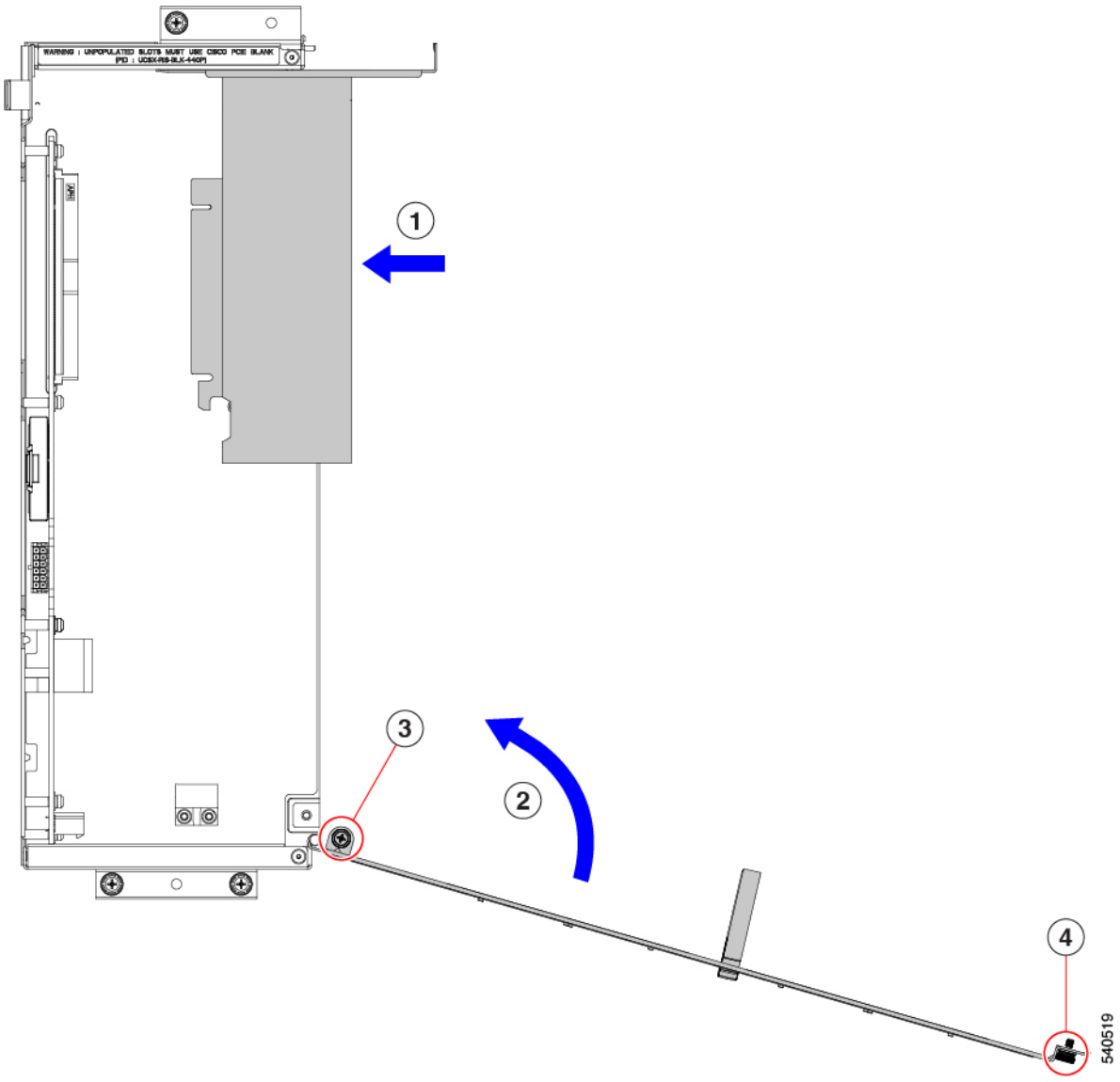
a) Gently push the door inward so that it swings closed in an arc.

Caution
Make sure to hold the door level when you open it! Do not push the door down or lift the door up while closing it. Pushing down or pulling up can apply force to the door's hinge.

b) Verify that the retaining block is keeping the HHHL GPU(s) in place.

The door has a retaining block that prevents the HHHL GPU from backing out of its PCIe socket. The retaining block has a pin that seats into a hole on the bottom of the riser.

c) Turn the riser over and verify that the retaining pin is securely seated in the hole.
d) Using a #2 Phillips screwdriver, tighten the hinge retention screw (3 in the following illustration).
e) Using a #2 Phillips screwdriver, tighten the vertical securing screw on the wall of the riser (4).



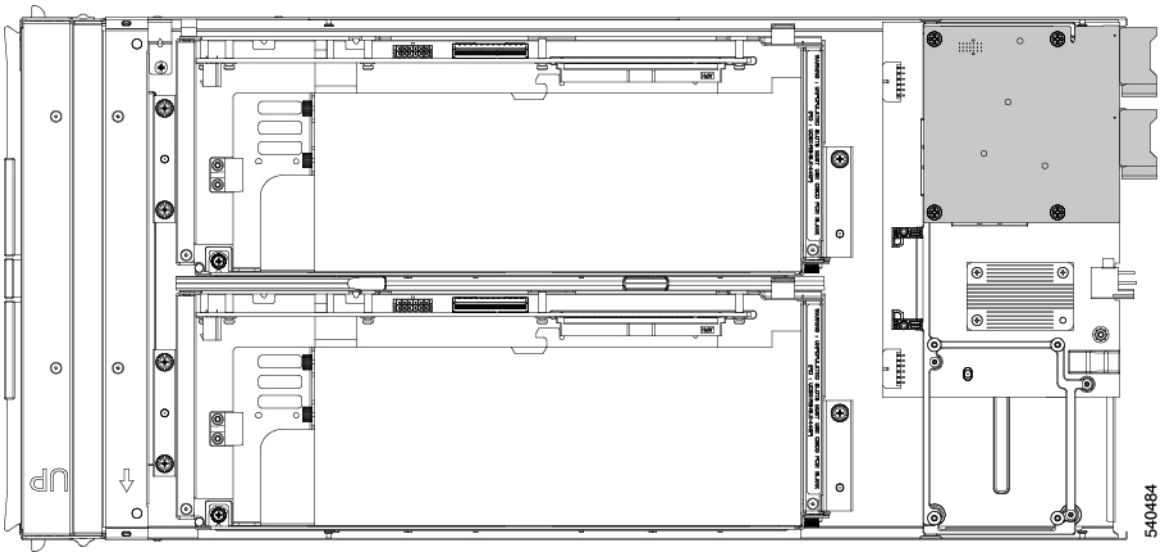
What to do next

See Installing Riser, Type B, on page 29.

Replacing the Rear Mezzanine Card

The UCS X440p PCIe node supports a rear mezzanine (MEZZ) card to provide data and power connectivity to the PCIe node. The rear MEZZ socket is at the rear corner of the PCIe node.

Note To remove or install the rear mezzanine card, you will need to disconnect the front panel LED cable. For the location of this cable, see Serviceable Component Locations, on page 17.



To service the rear MEZZ card, use the following procedures:

- Removing a Rear Mezzanine Card, on page 43
- Installing a Rear Mezzanine Card, on page 45

Removing a Rear Mezzanine Card

Use the following task to remove the rear mezzanine card from the PCIe node.

Procedure

Step 1 Shut down and remove power from the PCIe node.

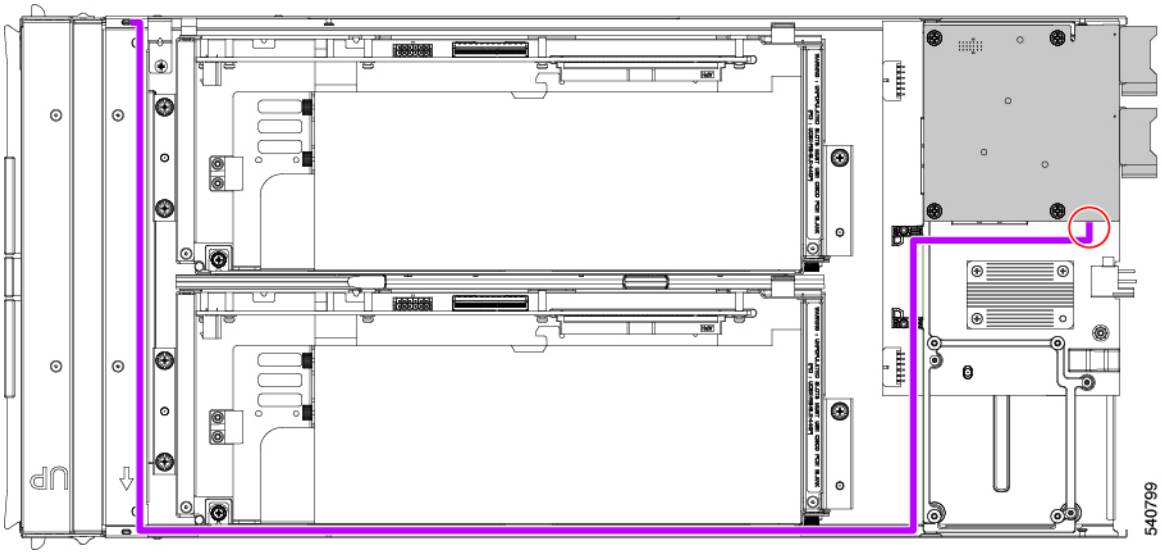
Step 2 Remove the PCIe node from the chassis.

Step 3 Remove the top cover from the PCIe node.

See Removing a PCIe Node Cover, on page 21.

Step 4 Disconnect the front panel LED cable from the rear mezzanine connector.

You can leave the cable connected to the front panel connector, but make sure to move the cable out of the way so that does not obstruct removing the rear mezzanine card.

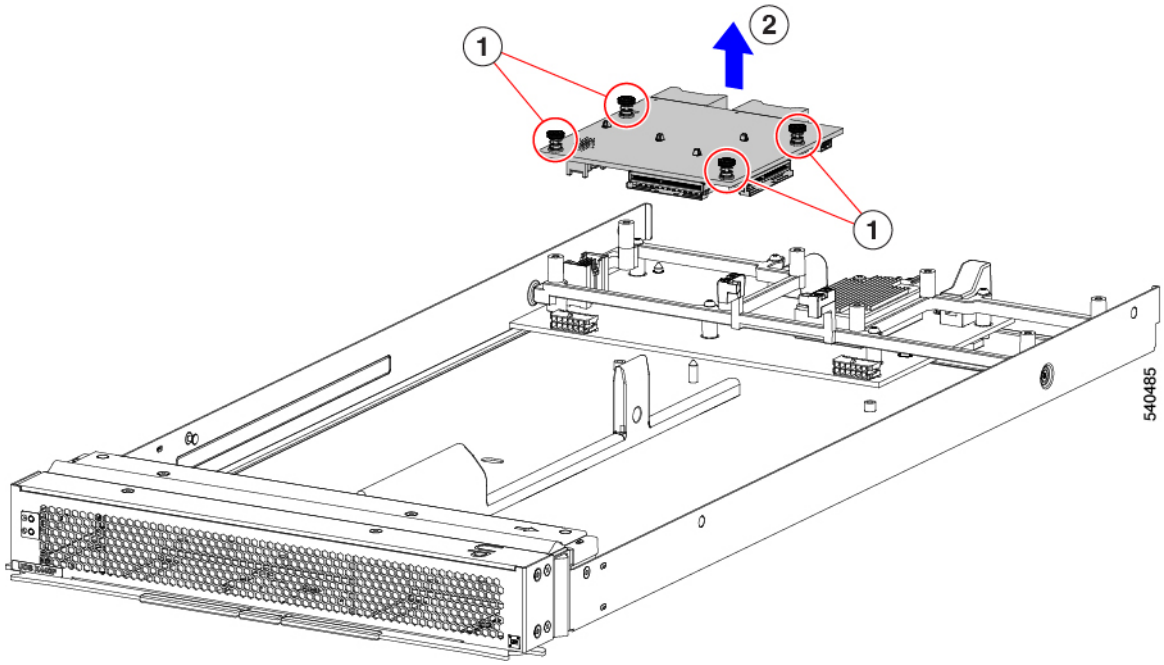


Step 5 Remove an existing rear mezzanine card.

a) Using a #2 Phillips screwdriver, loosen the captive thumbscrews that secure the card to its threaded standoffs.

b) Lift the card off of the PCIe node.

You might need to gently rock the card while lifting it to disengage it from the socket.



Installing a Rear Mezzanine Card

Use this task to install a rear mezzanine card onto the PCIe node.

Before you begin

If the PCIe node is not already removed from the chassis, power it down and remove it now.

Procedure

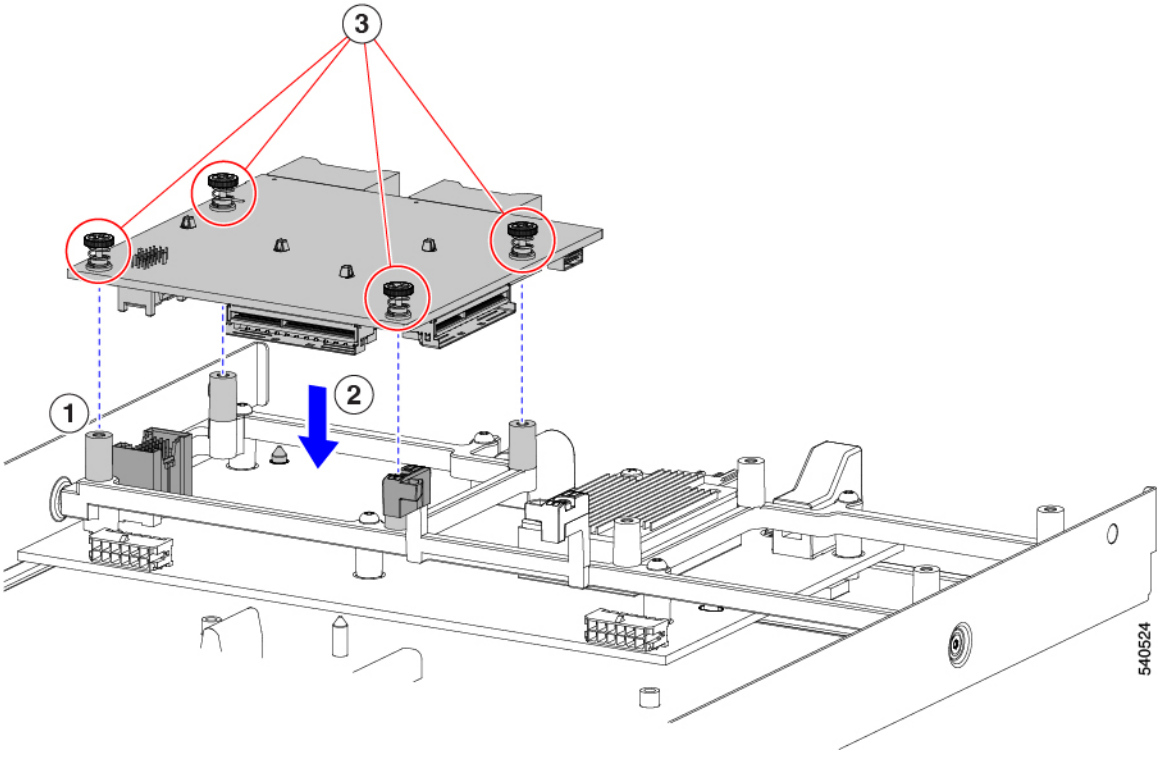
Step 1 Remove the top cover.

See Removing a PCIe Node Cover, on page 21.

Step 2 Orient the card so that the socket is facing down.

Step 3 Align the card with the motherboard socket and threaded standoffs.

Step 4 Keeping the card level, lower it and press firmly to seat the card into the socket.



Step 5 Using a #2 Phillips screwdriver, tighten the captive thumbscrews to secure the card.

Step 6 Reconnect the front panel LED cable at the rear mezzanine connector.

Step 7 Replace the top cover of the PCIe node.

Step 8 Reinsert the PCIe node into the chassis and return the node to service.

Recycling the PCB Assemblies

The Cisco UCS X440p PCIe Node has multiple different PCB assemblies (PCBAs), which consist of the PCB motherboard plus any components mounted on it.

For compliance with local e-waste and recycling laws, use the following procedures to disassemble the PCBAs.

- Recycling the Motherboard PCBA, on page 46
- Recycling the Riser A PCBA, on page 51
- Recycling the Riser B PCBA, on page 52

Recycling the Motherboard PCBA

Each Cisco UCS X440p PCIe Node has a PCBA (motherboard) that is connected to sheet metal. You must disconnect the PCBA from the chassis sheet metal to recycle the PCBA. You will need to disassemble and remove additional parts to gain access to the PCBA.

You will need to recycle the PCBA for each UCS X9508 chassis.

Use the following procedure to recycle the Cisco UCS X440p PCIe Node's motherboard.

Before you begin

Note **For Recyclers Only!** This procedure is not a standard field-service option. This procedure is for recyclers who will be reclaiming the electronics and sheet metal for proper disposal to comply with local eco design and e-waste regulations.

To remove the printed circuit board assembly (PCBA) which is the PCB (motherboard) plus components mounted on it, the following requirements must be met:

- The PCIe node must be disconnected from facility power.
- The chassis must be removed from the equipment rack.

You will find it helpful to gather the following equipment for this procedure:

- Screwdrivers: T10 Torx, T8 Torx, and a #1 Phillips
- Hexagonal screwdriver: H2.0
- A pliers
- A scissors or shop knife

Procedure

Step 1 Remove the server's top cover.

See Removing a PCIe Node Cover, on page 21.

Step 2 Remove the appropriate GPU riser cage.

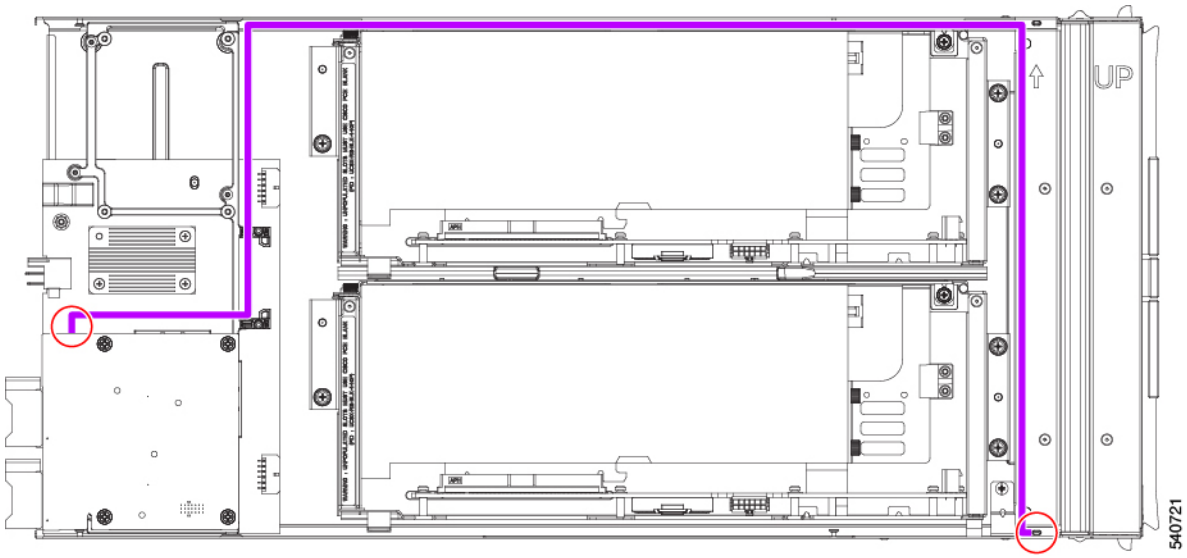
See the appropriate topic:

- Removing Riser, Type A, on page 25
- Removing Riser, Type B, on page 28

Step 3 After removing the GPU riser cages from the PCIe node, disconnect the LED cable.

a) Use a scissors or shop knife to cut the cable ties around the LED cable.

b) Detach the LED cable by disconnecting the connectors at each end.

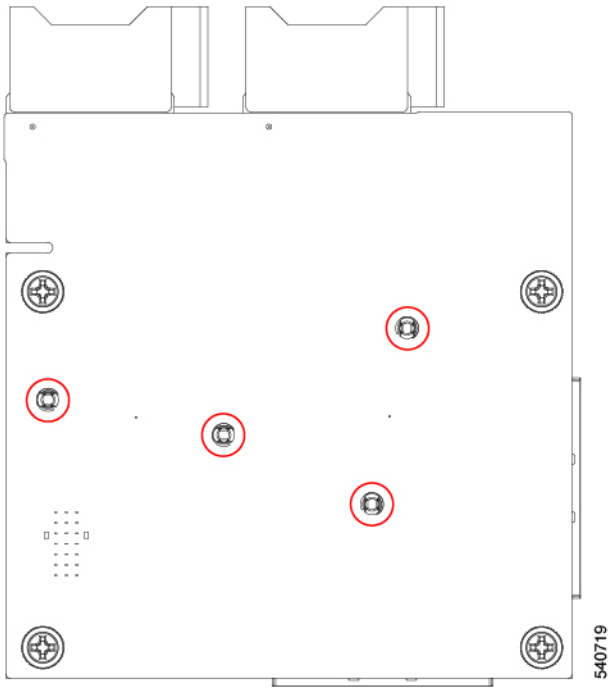


Step 4 Disassemble the rear mezzanine card.

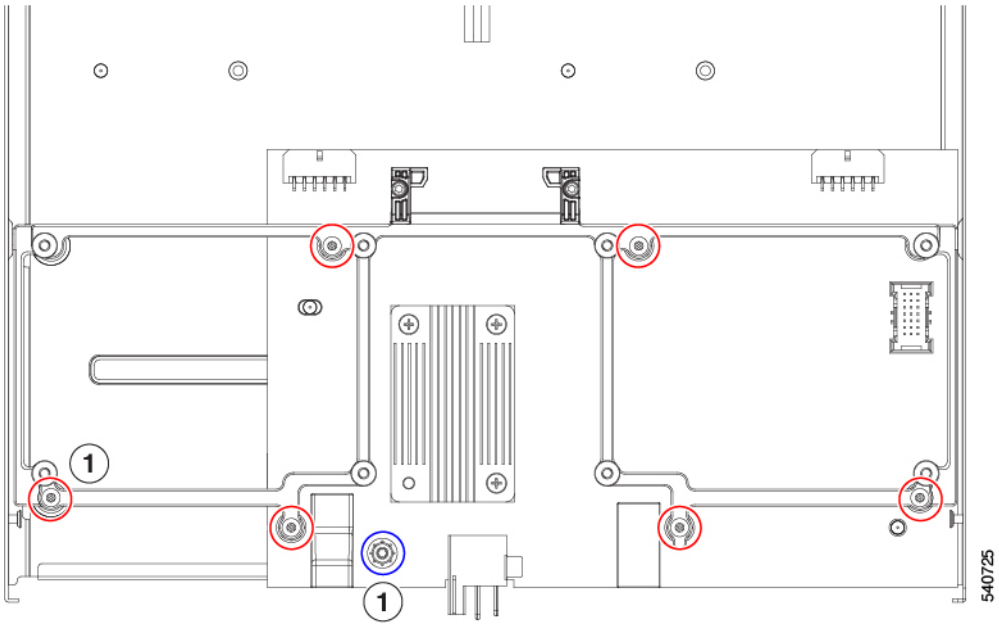
a) Remove the rear mezzanine card from the PCIe node.

See Removing a Rear Mezzanine Card, on page 43.

b) Using a pliers, pinch the heads of each of the heatsink pushpins together, then push them through the holes on the PCBA to release the heatsink from the rear mezzanine card.

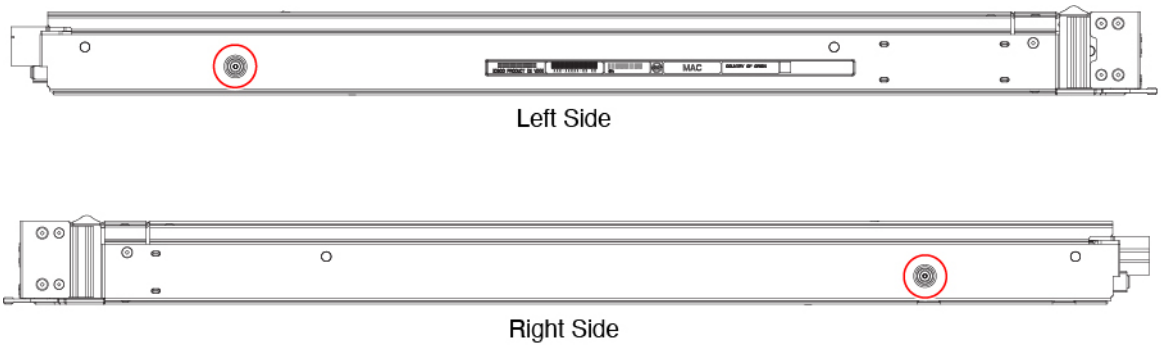


Step 5 Using a T10 Torx driver, remove the seven pan-head screws that secure the PCBA to the PCIe node's frame.



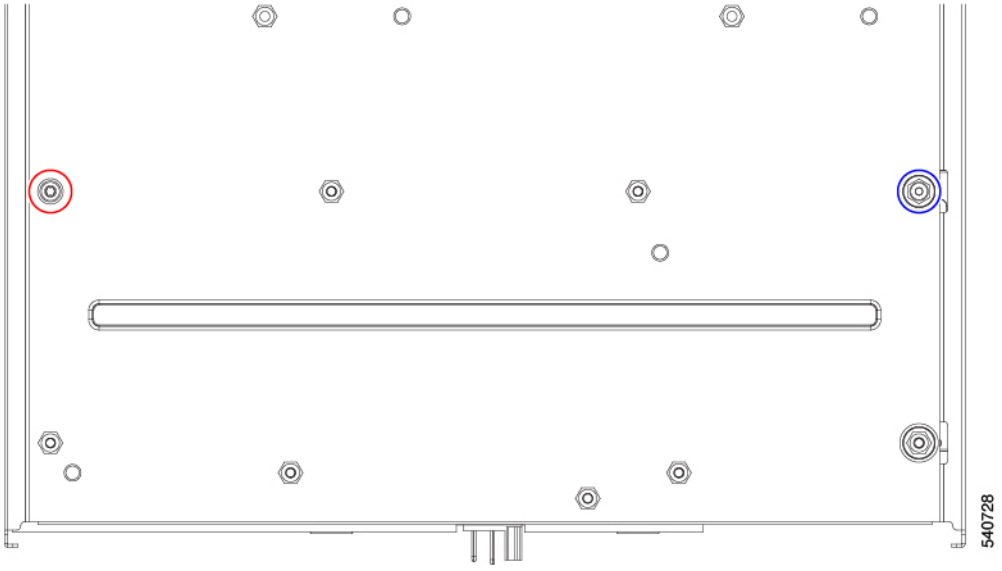
Blue circle (◯)	One pan-head M3x0.50x7mm Torx screw
Red Circles (◯)	Six pan-head M3x0.50x20mm Torx screw

Step 6 Using a T8 Torx screwdriver, remove the two M3 flat-head screws (one per side) from the PCIe node side walls.



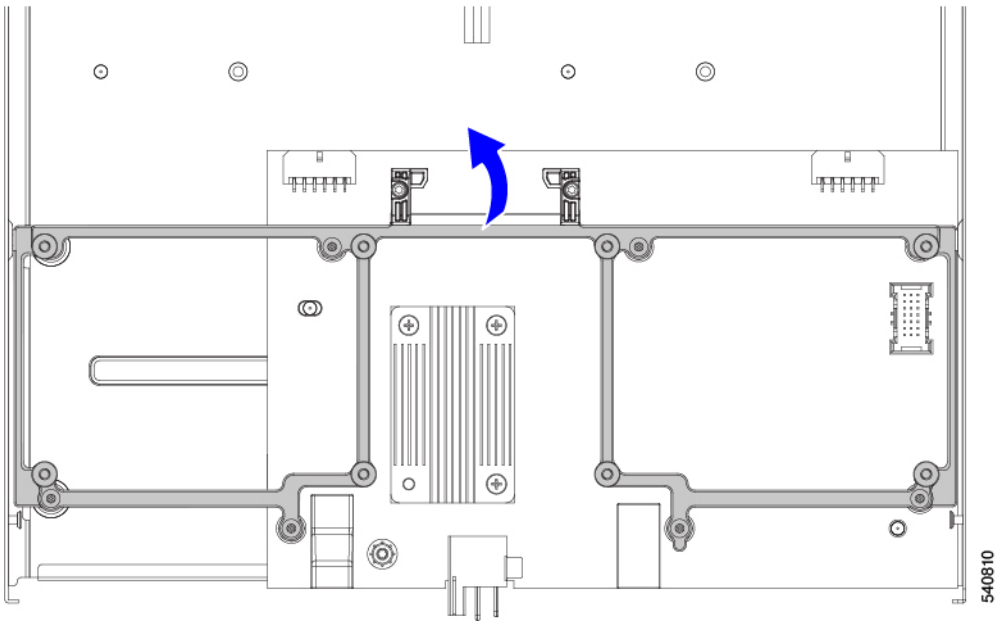
Step 7 Remove the bottom screws.

a) Turn the PCIe node over so that the bottom sheetmetal is facing up.
b) Using an H2.0 hex-head screwdriver, remove the low-profile socket-head screw.
c) Using a T10 Torx driver, remove the pan-head screw.



Blue circle ( )	One pan-head M3x0.50x7mm Torx screw
Red Circle ( )	One low-profile M3X0.50x10 mm socket-head screw

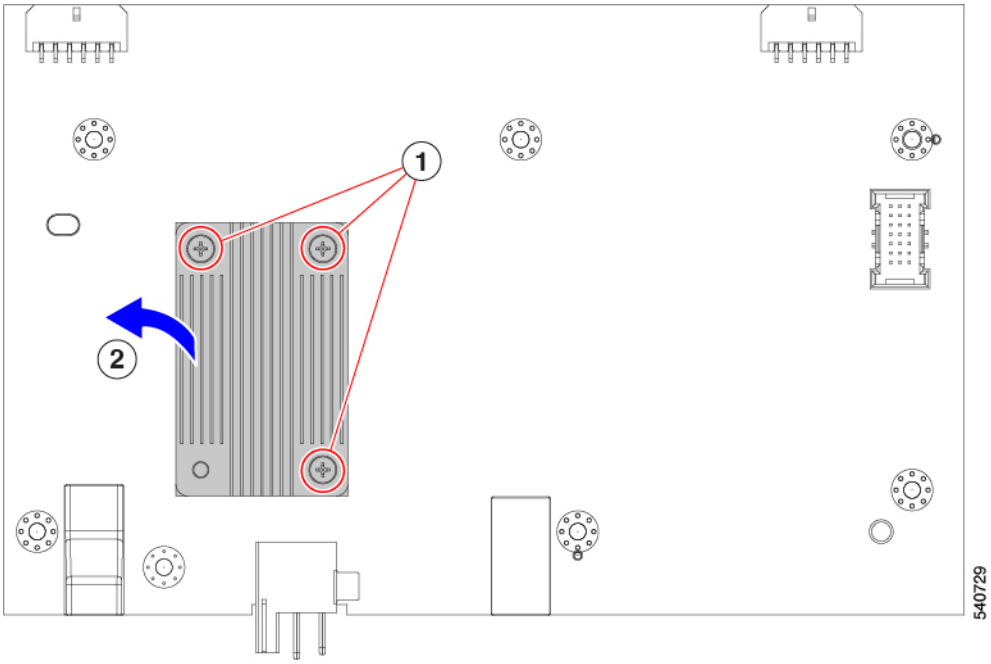
Step 8 Detach the frame and the PCB from the PCIe node.



Step 9 Remove the heatsink.

a) Using a #1 Phillips screwdriver, remove the three pan-head screws.

b) Detach the heatsink from the PCB.



Step 10 Detach the PCB from the sheetmetal and dispose of the PCB, components, and sheetmetal in compliance with relevant e-waste and recycling laws.

What to do next

If you have not already done so, recycle the riser cage PCBAs. See:

- Recycling the Riser A PCBA, on page 51
- Recycling the Riser B PCBA, on page 52

Recycling the Riser A PCBA

Use the following task to disassemble the PCB for Riser Type A.

Before you begin

Note **For Recyclers Only!** This procedure is not a standard field-service option. This procedure is for recyclers who will be reclaiming the electronics and sheet metal for proper disposal to comply with local eco design and e-waste regulations.

To remove Riser A's PCBA, the following requirements must be met:

- The PCIe node must be disconnected from facility power.
- The chassis must be removed from the equipment rack.

You will find it helpful to gather a #1 Phillips screwdriver before beginning this procedure.

Procedure

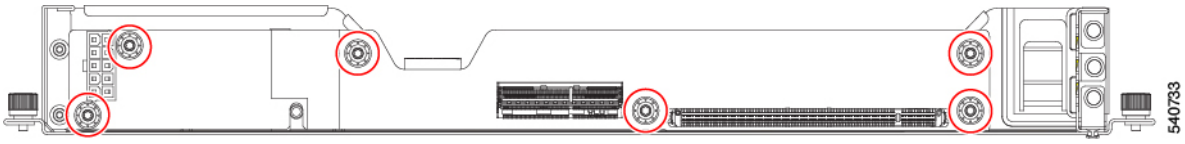
Step 1 If you have not already removed the riser cage from the PCIe node, do so now.

See Removing Riser, Type A, on page 25

Step 2 Remove the GPU (if present) from the riser.

See Removing a FHFL GPU, on page 32

Step 3 Using a #1 Phillips screwdriver, remove the six pan-head screws from the riser cage interior side wall (the side opposite the door).



Step 4 Detach the PCB from the sheetmetal and dispose of the PCB, any components, and sheetmetal in compliance with relevant e-waste and recycling laws.

Recycling the Riser B PCBA

Use the following task to disassemble the PCB for Riser Type B.

Before you begin

Note **For Recyclers Only!** This procedure is not a standard field-service option. This procedure is for recyclers who will be reclaiming the electronics and sheet metal for proper disposal to comply with local eco design and e-waste regulations.

To recyle Riser B's PCBA, the following requirements must be met:

- The PCIe node must be disconnected from facility power.
- The chassis must be removed from the equipment rack.

You will find it helpful to gather a #1 Phillips screwdriver before beginning this procedure.

Procedure

Step 1 If you have not already removed the riser cage from the PCIe node, do so now.

See Removing Riser, Type B, on page 28.

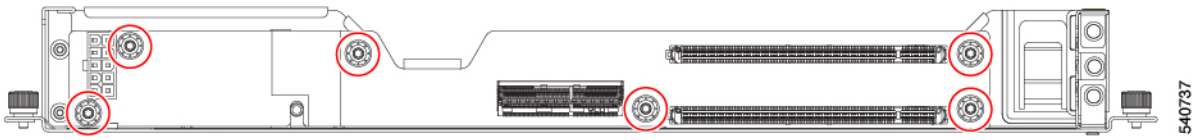
Step 2 Release the retaining button.

a) Turn the riser cage over so that the sheetmetal bottom is facing up.
b) Press the retaining button to unlock the GPU door.

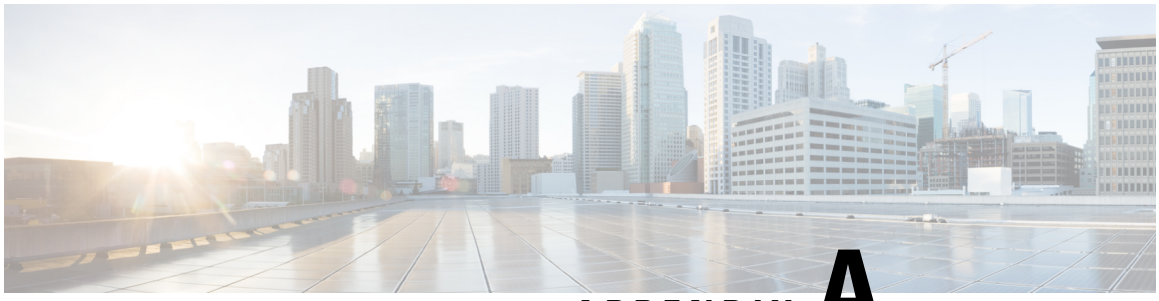
Step 3 Remove the GPU (if present) from the riser.

See Removing a HHHL GPU, on page 36.

Step 4 Using a #1 Phillips screwdriver, remove the six pan-head screws from the riser cage interior side wall (the side opposite the door).



Step 5 Detach the PCB from the sheetmetal and dispose of the PCB, any components, and sheetmetal in compliance with relevant e-waste and recycling laws.



APPENDIX A

PCIe Node Specifications

This appendix contains the following topics:

- Physical Specifications, on page 53
- Environmental Specifications, on page 54
- Power Specifications, on page 54

Physical Specifications

The following table shosw the physical specifications for the Cisco UCS X440p PCIe Node.

Parameter	Value
Height	1.80 in. (45.7 mm)
Width	11.28 in. (286.5 mm)
Depth	24 in. (602 mm)
Weight	• Minimally configured node weight = 12.8 lbs (5.8 kg) • Fully loaded PCIe Node with NVIDIA L4, NVIDIA T4, or Intel Flex140 GPU = 14.9 lbs (6.8 kg); minimum config with one of these GPUs = 12.9 lbs (5.9 kg) • Fully loaded PCIe Node with NVIDIA A16 = 17.1 lbs (7.8 kg); minimum config with one A16 GPU = 14.6 lbs (6.6 kg) • Fully loaded PCIe Node with NVIDIA A40, NVIDIA L40, Intel Flex 170 GPU = 16.6 lbs (7.5 kg); minimum config with one of these GPUs = 14.4 lbs (6.5 kg) • Fully loaded PCIe Node with NVIDIA A100 or NVIDIA H100 GPU = 17.9 lbs (8.1 kg); minimum config with one of these GPUs = 15 lbs (6.8 kg)

Environmental Specifications

The following table shosw the environmental specifications for the Cisco UCS X440p PCIe Node.

Parameter	Value
Operating Temperature	50° to 95°F (10° to 35°C)
Non-Operating Temperature	-40° to 149°F (–40° to 65°C)
Operating Humidity	5% to 90% noncondensing
Non-Operating Humidity	5% to 93% noncondensing
Operating Altitude	0 to 10,000 ft (0 to 3000m); maximum ambient temperature decreases by 1°C per 300m
Non-Operating Altitude	40,000 ft (12,000m)

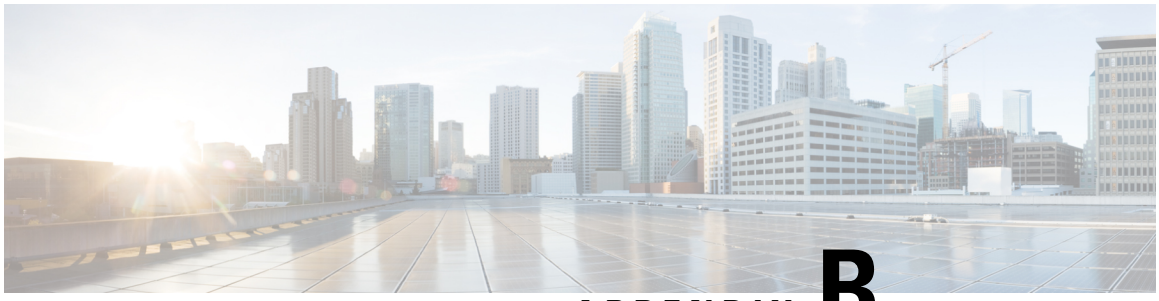
Power Specifications



Caution The Cisco UCSX-440P PCIe Node has a power cap of 1300 Watts for all combinations of components. Also, the ambient temperature must be less than 35 degrees C (95 degrees F).

For configuration-specific power specifications, use the Cisco power calculator. Go to:

Cisco UCS Power Calculator



APPENDIX B

Obtaining Hardware

This appendix contains the following topic.

- Obtaining Hardware, on page 55

Obtaining Hardware

Each Cisco UCS X440p PCIe Node interoperates with other required hardware to provide GPU processing offload and acceleration for the Cisco UCS X-Series compute node that is paired with it.

The following table shows the required hardware to support a fully functioning PCIe node. Use the following table when you want to order spares or additional PCIe nodes to scale out your Cisco UCS X-Fabric deployment.

Note Power cables are required and ship with the riser cages.

Hardware Component	Description	Cisco PID
Chassis	UCS X-Series Server Chassis, for example the Cisco UCS X9508 Server Chassis	UCSX-9508
Compute Nodes	UCS X-Series Compute Nodes, for example, the Cisco UCS X210c M6 Compute Node	UCSX-210C-M6 UCSX-210C-M7 UCSX-410C-M7
PCIe Nodes	UCS X-Series Gen4 PCIe node, for example the Cisco UCS X440p Front Mezzanine PCIe Node	UCSX-440P
PCIe Node Riser Cage, FHFL GPU	Riser A for one dual slot GPU per riser,	UCSX-RIS-A-440P
PCIe Node Riser Cage, HHHL GPU	Riser B for two single slot GPUs per riser	UCSX-RIS-B-440P

Hardware Component	Description	Cisco PID
PCIe Node Riser Blank (filler panel)	PCIe blank for UCS X-series 440P PCIe node	UCSX-RIS-BLK-440P
PCIe Node GPUs, HHHL	NVIDIA L4 Tensor Core, 70W, 24 GB	UCSX-GPU-L4
	NVIDIA T4 PCIE 75W 16GB	UCSX-GPU-T4-16
	Intel GPU Flex 140, Gen4x8, 75W PCIe	UCSX-GPU-FLEX140
PCIe Node GPU, HHFL	Intel GPU Flex 170, Gen4 x16, 150W PCIe	UCSX-GPU-FLEX170
PCIe Node GPUs, FHFL	NVIDIA A16 PCIe 250W 4X16GB	UCSX-GPU-A16
	TESLA A40 RTX, Passive, 300W, 48GB	UCSX-GPU-A40
	NVIDIA L40 300W, 48GB	UCSX-GPU-L40 This PID comes with a power cable included.
	TESLA A100, Passive, 300W, 80GB	UCSX-GPU-A100-80
	NVIDIA Tesla H100, Passive, 350W, 80 GB	UCSX-GPU-H100-80
Cisco UCS X-Fabric Modules (XFMs)	UCS 9416 X-Fabric module for 9508 chassis Must be deployed as a pair, so two are required per Cisco X-Series Server chassis	UCSX-F-9416
Rear Mezzanine Card	UCS PCI Mezz card for X-Fabric Connectivity Required for Cisco UCS X-Series compute nodes (for example, the Cisco UCS X210c M6 Compute Node)	UCSX-V4-PCIME



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