User Guide

Ultrastar Serv60+8
Regulatory Model H4060-S
Document D018-000247-000
Revision 01
September 2021

Western Digital.

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Revision History

Date	Revision	Comment
June 2018	1.0	Initial release
July 2018	1.1	Added the following sections: • DIMM Replacement *(page 87)* • CMA Replacement *(page 213)* • Heat Sink Replacement *(page 143)* • M.2 Replacement *(page 176)* • Add-In Card Replacement *(page 194)*
August 2018	1.2	Updated the following sections: • List of Customer Replaceable Units (CRUs) *(page 10)* • CPU Heat Sink Replacement *(page 114)* • Heat Sink Replacement *(page 143)* • Storage Subsystem Firmware Upgrade *(page 318)*
December 2018	1.3	Updated the following sections: • List of Customer Replaceable Units (CRUs) *(page 10)* • List of Compatible Drives *(page 22)* • LEDs *(page 13)* Added the following sections: • BIOS Firmware Update *(page 331)* • Updating the Server BMC Firmware Using Redfish OOBM *(page 374)*
February 2019	1.4	Updated the following sections: • List of Compatible Drives *(page 22)* Added the following sections: • Cabling for CMA Standard and CMA Lite *(page 312)* • Predefined Multi-HBA / RAID Zoning Configurations *(page 382)* • System MAC Address *(page 339)*
July 2019	1.5	Moved the following topics to the Ultrastar Serv60+8 Description *(page 2)* section: • Ultrastar Serv60+8 Rack Requirements *(page 17)* • Power Requirements *(page 21)* • ESD *(page 21)* • Enclosure Cooling *(page 21)* • List of Supported Server Components (topic removed)

Date	Revision	Comment
		Moved the Supported Operating Systems *(page 11)* topic to the Management *(page 316)* section.
		Corrected LED identification tables for IOMs, PSUs, and drives in the LEDs *(page 13)* section.
		Updated the following for CMA Lite:
		• Added CMA Lite Component Overview *(page 55)* section, including description, specs, and layout.
		• Updated CMA Replacement *(page 213)* section to combine CMA Standard and CMA Lite content where applicable.
		• Updated Maximum HD Mini-SAS Configuration *(page 314)* section.
		Added a note about OOBM ports configured for DHCP by default to the OOBM Management Overview *(page 327)* section.
October 2019	1.6	• Added Subenclosure Nickname *(page 385)* section • Updated Supported Operating Systems *(page 11)* • Updated identification LED behavior description in Front and Rear IO LEDs *(page 13)*
November 2019	1.7	• Removed Broadcom® MegaRAID 9361-24i RAID card without Cache from List of Customer Replaceable Units (CRUs) *(page 10)* • Updated images of captive chassis-cover screws throughout
December 2019	1.8	• Rebranded document to WD design • Corrected image labels in System Level Block Diagram *(page 3)* section
April 2020	1.9	• Moved the following topics to the Management *(page 316)* section: ○ Storage Subsystem Firmware Features Overview *(page 317)* ○ OOBM Management Overview *(page 327)* ○ Configuring OOBM Network Settings Using SES *(page 328)* ○ Upgrading Firmware with OOBM *(page 330)* ○ SES Page 02 *(page 331)* • Moved Supported Operating Systems *(page 11)* to the Overview *(page 1)* section • Added RHEL 8.0 to Supported Operating Systems *(page 11)* • Updated company references from HGST to Western Digital throughout • Added DIMM *(page 65)* section • Added note about drive LED behavior during insertion in Drive Assembly LED *(page 15)* • Removed List of Supported Server Components

Date	Revision	Comment
		• Added note about LED behavior during proper drive insertion in Drive Assembly LED *(page 15)* • Added note about minimum time between removing and reapplying power in Power Connections *(page 397)*
August 2020	1.10	• Updated Supported Operating Systems *(page 11)* • Updated List of Compatible Drives *(page 22)* • Corrected zoning configuration wording in Predefined Multi-HBA / RAID Zoning Configurations *(page 382)* • Fixed typo in Rails Layout *(page 51)* • Updated images in LEDs *(page 13)* and Components *(page 42)*
December 2020	1.11	Added UK Import Representation Contact
April 2021	1.12	• Added Ultrastar DC HC650 drives to List of Compatible Drives *(page 22)* • Updated Rails Replacement *(page 234)* to include instructions for screwplate • Added instructions for securing top cover in DIMM Replacement *(page 87)*, CPU Heat Sink Replacement *(page 114)*, Heat Sink Replacement *(page 143)*, M.2 Replacement *(page 176)*, and Add-In Card Replacement *(page 194)* • Removed Mexico from Country Certifications *(page 401)*
August 2021	1.13	• Added BIOS Firmware Update Using BMC Web GUI *(page 376)* • Added Multiple CRU Replacements *(page 67)* to Part Replacement Service Window *(page 67)*
September 2021	01	Changed document number from 1ET1110 to D018-000247-000

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1.1 Product Label Information

The following product information is required for technical support requests:

- Part Number (P/N)
- Serial Number (S/N)
- Product Name and/or Model Number (MODEL)

This information may be found on the product label, which is affixed to an exterior, non-removable surface of the chassis. The following is an example label with the applicable information fields highlighted:

Overview

This section provides a high level overview of the features of the Ultrastar Serv60+8 .

In This Chapter:

1.1 Ultrastar Serv60+8 Description

Figure 2: Ultrastar Serv60+8

The Ultrastar Serv60+8 is a 4U form factor, high density, rack-mounted storage enclosure that is capable of hosting up to 60 HDD SAS or SATA drives. The maximum data storage capacity of the Ultrastar Serv60+8 is 901TB using 14TB Ultrastar® HC530 drives   plus an additional 61.44TB using Ultrastar® SS300 SSDs in the system SSD slots. (For a full list of compatible drives and total storage capacities, see the List of Compatible Drives *(page 22)*.) The Ultrastar Serv60+8 also integrates an Intel Skylake or Cascade Lake based server front end. The server is built around an Intel Sawtooth Pass S2600ST motherboard and supports 2 LGA3647-0 (Socket P) processor sockets CPUs, 16 (8 per CPU) slots of DDR4 ECC DIMM memory, and leverages an AST2500 BMC for out-of-band management of the server subsystem. The enclosure runs on an input voltage of 200 - 240 VAC and consumes ~1800W of power under typical conditions. It requires a maximum of ~2000W at full load.

The system contains three externally facing Half-Height, Half-Length (HHHL) PCIe x16 slots, and 3 externally facing HHHL PCIe x8 slots.

It is designed to fit within a 4U rack space and requires 1200 mm (47.24in.) of usable rack space, frame to frame. A fully loaded system will add 95.25 kg / 210 lbs. of static load when fully loaded with drives.

- 4U Storage Server
- Supports up to 60 HDD Drives
- Can support 3.5" drives and 2.5" SSD drives (2.5" requires an adapter) in the 60 available drive bays. Supports an additional 8 2.5" drives in the system SSD slots located in the center channel
- Up to 12W per drive slot for the 60 HDD data storage drives (Cannot exceed 85A on the 5V rail) and 25W per slot for the 8 system SSD slots
- House and control six (6) N+1 redundant 80mm fans
- Supports High Line (220-240 VAC) Input Power
- Powered by two (2) redundant 2000W PSUs (High Line only)
- Toolless replacement of all Customer Replaceable Units (CRUs)
- Fits within a standard EIA-310 rack including all necessary cable management (see Compatible Rack Hardware Configuration *(page 19)*)
- Dual Skylake LGA3647 Socket Processors
- 16 DDR4 ECC DIMM slots

- ASPEED AST2500 BMC
- Lewisburg PCH C624 Chipset

1.2 System Architecture Overview

Storage Subsystem Overview

The Ultrastar Serv60+8 IOM uses a cascaded expander design to allow for connection to all 60 HDD drives. The minimum configuration comes with two of the six PCIe slots pre-populated with a combination of internal SAS HBAs and RAID adapters that act as an interconnect between the server subsystem and the storage subsystem by connecting to the system SSDs and the IOM. The exact configuration of the PCIe slots may vary depending the specific version of the Ultrastar Serv60+8 . The eight system SSDs are connected via one of these SAS HBAs.

The storage subsystem out-of-band management microprocessor provides an Ethernet connection using a Redfish/RESTful API to access the various enclosure services. All the SES enclosure information can be obtained through the out-of-band management port. Major use cases for this feature include obtaining storage subsystem health information, locating enclosure components using the IDENT LEDs, and updating expander and storage OOBM firmware.

The system FPGAs control and report the states of the four storage subsystem fans, drive LEDs, and T10 drive power disable signals on the 60 HDD data storage drives.

> **Note:** To use T10 power disable, the drives installed must also support this feature.

The I^2C architecture is designed to support only one single master on any given bus. The primary expander will be the master on each I^2C bus. There are eight I^2C buses used in the Ultrastar Serv60+8 enclosure. The number of devices on each bus are balanced to allow communication to peripheral devices and not overload any one bus. The devices connected on the I^2C buses include the enclosure VPDs, temp sensors, baseboard FPGAs, and SAS connectors among others.

Four of the six total fans are controlled by the storage subsystem. Status and control for these four fans is handled by the in-band SES management interface called the SEP and the Redfish OOBM.

Server Subsystem Overview

The server subsystem is situated in an individual compartment at the rear of the unit. It is comprised of a dual socket Intel Sawtooth Pass S2600ST that supports LGA3647 socket Intel Xeon processors. The Ultrastar Serv60+8 has 16 DDR4 ECC DIMM slots for memory that support a clock speed of 2933 MHz, and it leverages the Intel C624 chipset. The motherboard also hosts an ASPEED AST2500 BMC for out-of-band management of the server components. The server motherboard has a total of six PCIe slots that support PCIe 3.0, two M.2 ports that can host compatible SSDs for the system OS.

1.3 System Level Block Diagram

The following image shows the system block diagram for the Ultrastar Serv60+8 . The block diagram is split into two, one for the storage subsystem and one for the server subsystem.

Figure 3: System Block Diagram for the Server Subsystem
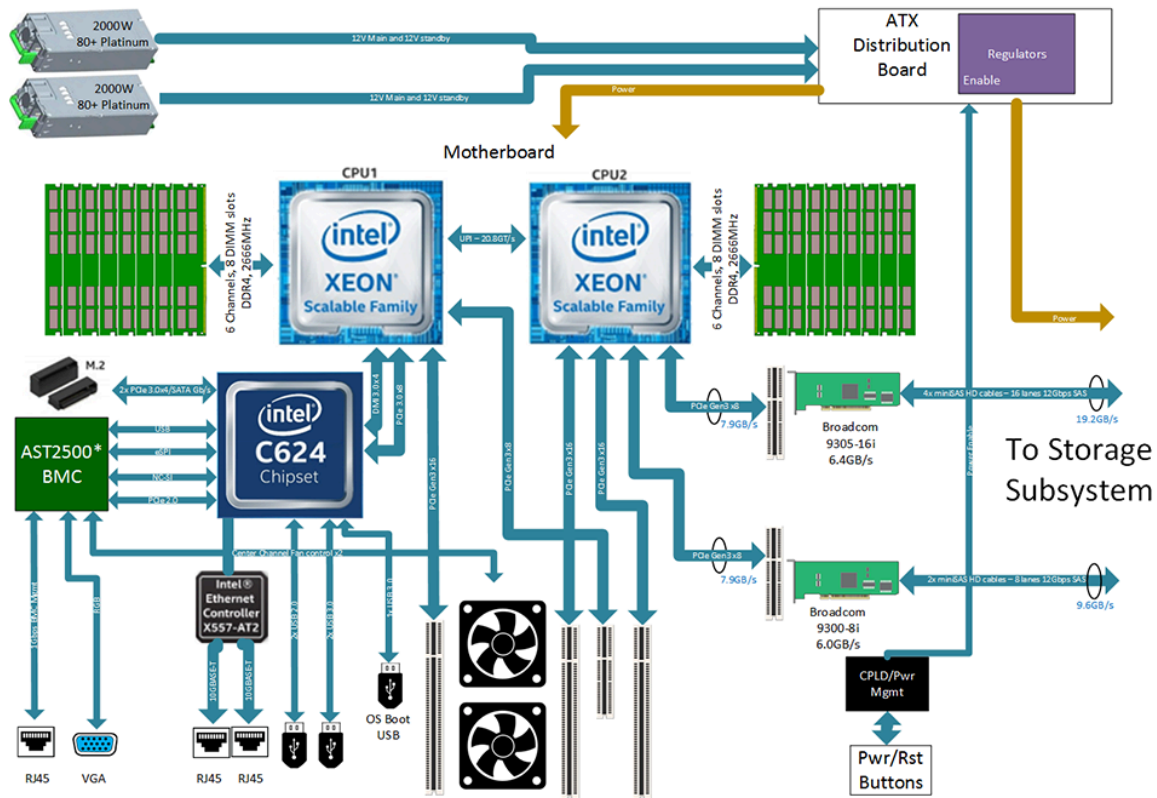
Figure 4: System Block Diagram for the Storage Subsystem
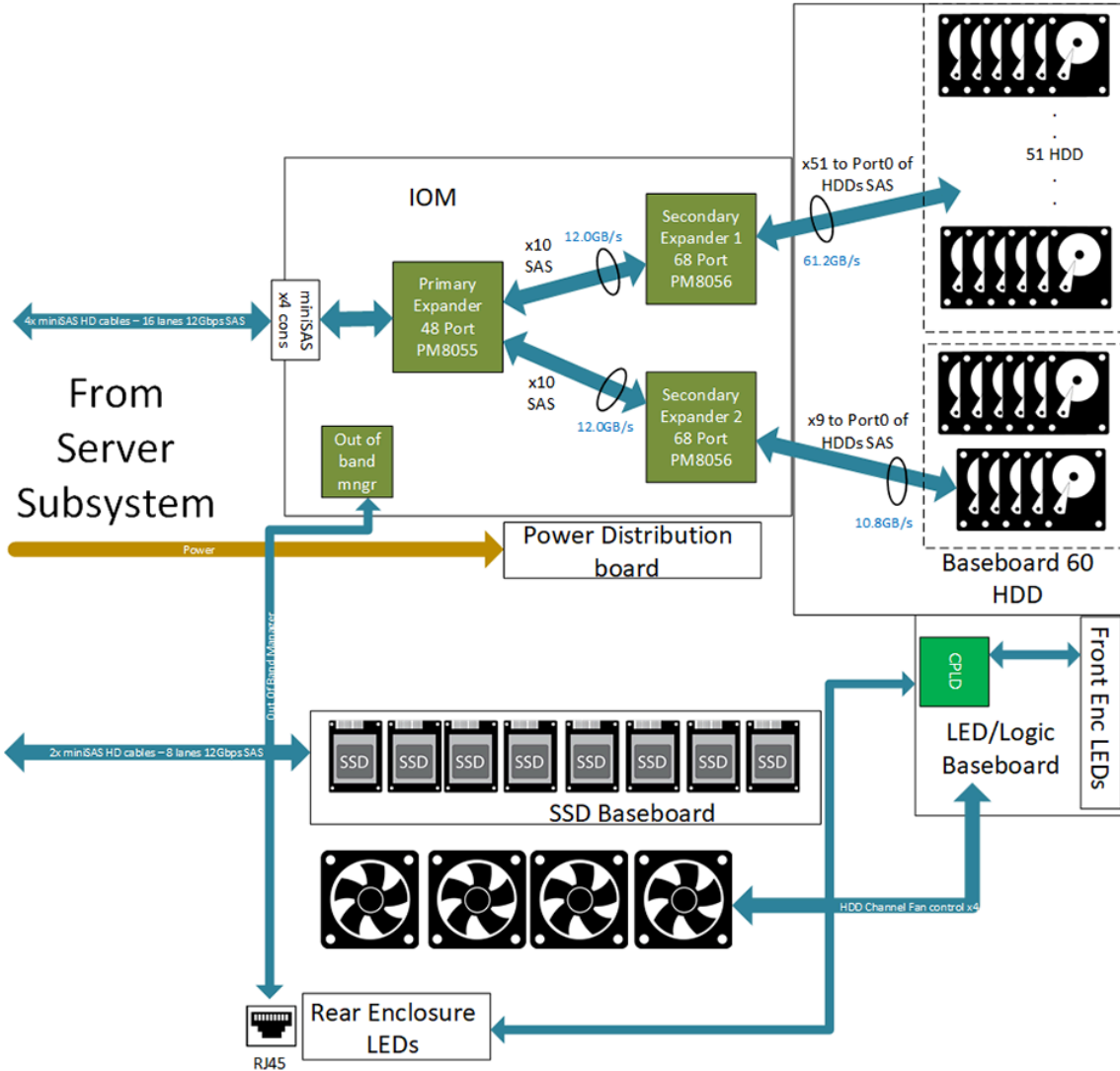
1.4 Environmental Specifications

Table 1: Environmental Specification Summary

Specification	Non-Operational	Operational
Temperature	-40°C to 70°C	5°C to 35°C
Temperature Gradient	30°C per hour maximum	20°C per hour maximum
Temperature De-rating	1°C per 300m above 3000m	1°C per 300m above 900m
Relative Humidity	8-90% Non-Condensing	8-90% Non-Condensing
Relative Humidity Gradient	30% per hour maximum	30% per hour maximum

Specification	Non-Operational	Operational
Altitude	-300m to 12,000m / -984 ft. to 39,370 ft	-300m to 3048m / -984 ft. to 10,000 ft.

1.5 Electrical Specifications

Table 2: Electrical Specifications

Specification	Value
Max Power Consumption	~2000W
Typical Power Consumption[1]	~1800W
Input Voltage	200 - 240 VAC
PSU Connector Type	C14
PSU Efficiency	80 PLUS Platinum
Inrush Current Maximum (per PSU)	AC line inrush current shall not exceed 35A peak measured per IPC-9592B(L) Appendix C-4.1.
Inrush Current Typical (per PSU)	15A

⚠️ **Caution:** The Ultrastar Serv60+8 can only be plugged into high line (200 - 240 VAC) power. If the unit is plugged into low line (110-127 VAC), the PSU will report a "Critical" state when status pages are queried using SES. In this case, the enclosure will power up, but the drives will not.

1.6 Mechanical Specifications

Table 3: Mechanical Specifications

Specification	Non-Operational	Operational
Shock	10G, 0 - peak,11ms half sine; 3 positive and 3 negative pulses in each axis shock	5G, 0 - peak, 11ms half sine; 3 positive and 3 negative pulses in each axis-minimum 6 seconds between shocks to allow for write/read recovery
Vibration	0.75G, 0 - peak swept sine; 5 -500Hz; 1 complete sweep @ 1/2 octave per minute	0.10G,0 - peak swept sine; 5 -500Hz; 1 complete sweep @ 1/2octave per minute
Weight	95.25 kg / 210 lbs.	
Enclosure Dimensions	**W:** 447mm x **L:** 1030mm x **H:** 175mm / **W:** 17.6in. x **L:** 40.6in. x **H:** 6.89in.	
Length of Enclosure w/ CMA	**CMA Standard:** 1182mm / 46.5in.	

1.   Max and typical power consumption values represent the output power to the system. Input power will vary depending on the PSU efficiency and load sharing between PSUs.

Specification	Non-Operational	Operational
Required Rack Width	CMA Lite: 1148mm / 45.2in.	
	450mm (17.72in.) minimum width with 465mm (18.31in.) ± 1.5mm nominal hole spacing and W1 is 492mm minimum. See EIA-310 Rack Standard	
Required Rack Depth	1200 mm (47.24in.) of usable rack space, frame to frame	
Rack Units (U)	4U	
Vertical Rack Rail Spacing	812.8mm - 914.4mm / 32 in. - 36 in.	

1.7 Performance Specifications

Table 4: Performance Specifications

Specification	Value
Mother Board	Intel Sawtooth Pass S2600ST
Processor Type	Intel Skylake or Cascade Lake
Socket	LGA3647-0 (Socket P) processor sockets
Number of Processors	2
Chipset	Lewisburg PCH C624 Chipset
Memory Type	DDR4 ECC DIMM
Number of Memory Slots	16 (8 per CPU)
Graphics	Integrated
Server BMC Chip	AST2500
Number of Drive Slots	60 HDD / 8 SSD
Data Transfer Rates	12Gbps SAS / 6Gbps SATA
Max Raw Data Storage Capacity	901TB using 14TB Ultrastar® HC530 drives / 61.44TB using Ultrastar® SS300 SSDs

1.8 Ultrastar Serv60+8 Layout

Figure 5: Front and Rear Product Layout
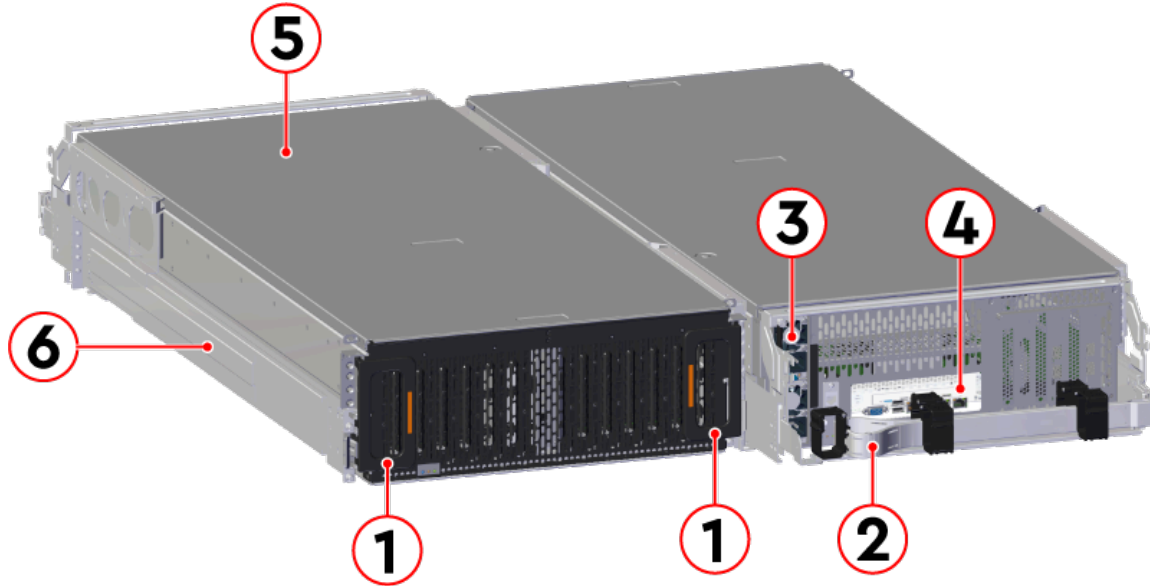
Table 5: Front and Rear Component Identification

Number	Component
1	Enclosure Handles
2	CMA
3	PSUs (Delta PSUs shown)
4	Rear IO Ports
5	Chassis Cover
6	Rails (includes rear cover alignment brackets)

The following is an image of the layout of the major system components inside the Ultrastar Serv60+8 .

Figure 6: Component Layout
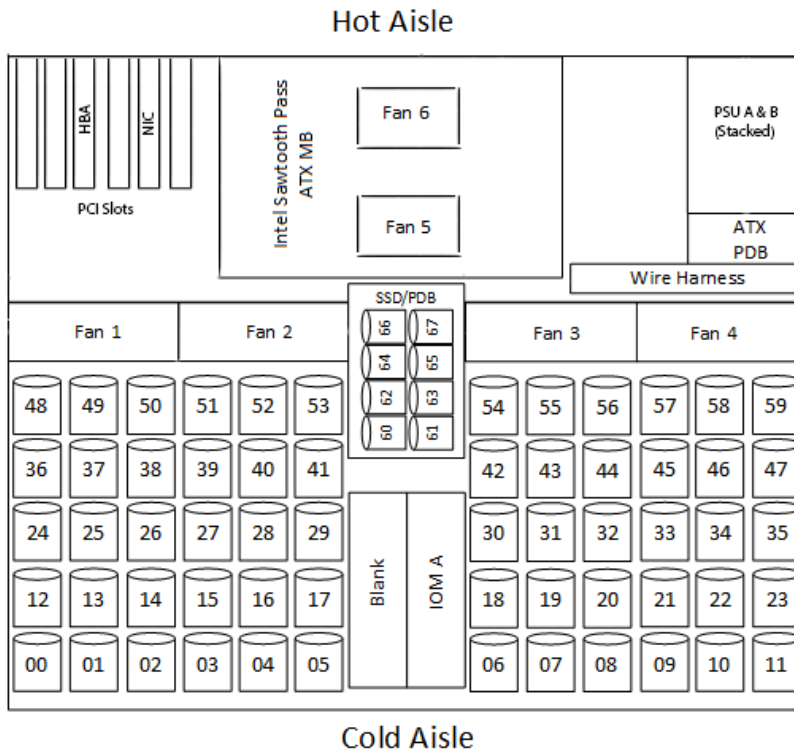
Figure 7: Rear IO Ports
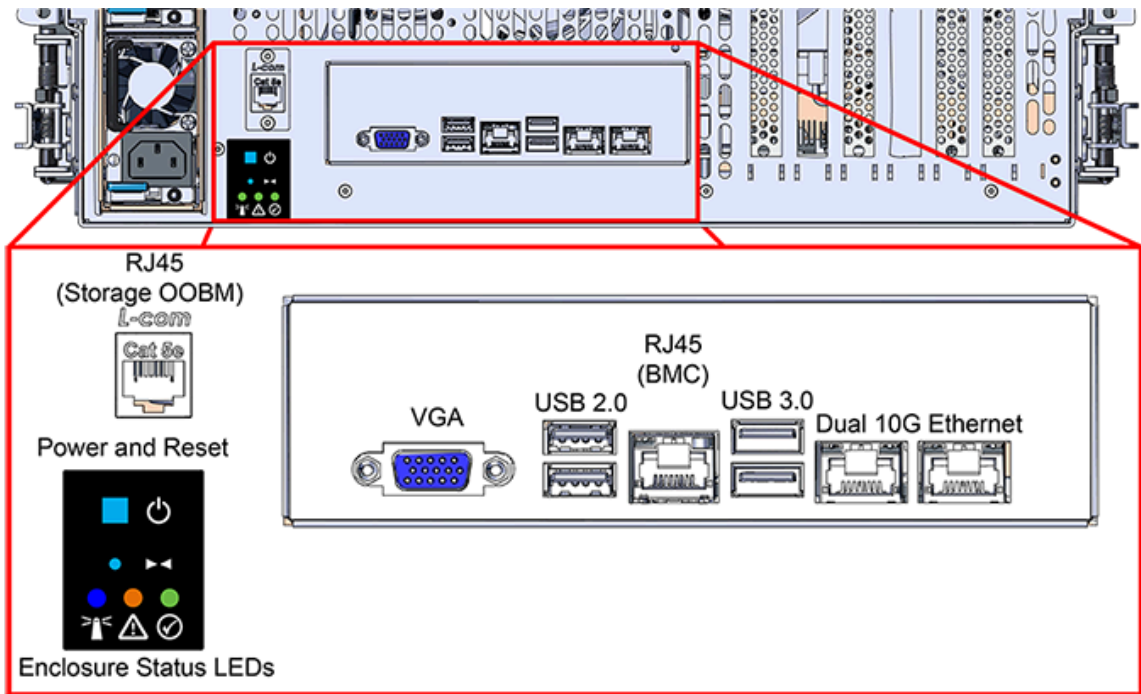
1.9 List of Customer Replaceable Units (CRUs)

The following table lists the replaceable components and their part numbers.

Table 6: List of Replaceable Components

Component	Part Number
Ultrastar Serv60+8 Chassis with Single IOM and PSUs	1EX1801
PSU 2000W	1EX1171
IOM	1EX2201
IOM Blank	1EX0431
System Fan	1EX1173
Top Cover Alignment Brackets	1EX2288
Rails Kit (CMA Standard)	1EX0435
Rails Kit (CMA Lite)	1EX1601
CMA Standard Arm (single)	1EX1174
CMA Lite Arm (2U baskets)	1EX1834
CMA Lite Arm (1U baskets)	1EX1602
CMA Lite Kit (w/ rails, spacer brackets, and 2U-basket CMA)	1EX1825
CMA Lite Kit (w/ rails, spacer brackets, and 1U-basket CMA)	1EX1527

Component	Part Number
Bracket PCIe Cache Vault Mount	1EX1800
3.5 in. Drive Carrier	1EX0438
3.5 in. Drive Blank	1EX0429
2.5 in. to 3.5 in. Conversion Drive Carrier	1EX0439
2.5 in. Drive Carrier for Center Channel	1EX1473
2.5 in. Drive Blank for Center Channel	1EX1459
Power Cable for PDU, C13-C14, 18AWG, 2m	1EX1529
Power Cable for PDU, C13-C14, 18AWG, 3m	1EX1530
Dual Port 1/10/25GbE Unified Wire Adapter	1EX1161
Packaging Kit	

1.10 Supported Operating Systems

Table 7: Compatible Operating Systems

OS Support	
Microsoft® Windows	**2012** R2 x64 Server
	2016 R1 x64 Server
	2019 R1 x64 Server
CentOS/RedHat® Enterprise Linux (RHEL)	**7.2** (x86_64) Kernel: 3.10.0-327
	7.3 (x86_64) Kernel: 3.10.0-514
	7.4 (x86_64) Kernel: 3.10.0-693
	7.6 (x86_64) Kernel: 3.10.0-957
	8.0 (x86_64) Kernel: 4.18.0-80
	8.2 (x86_64) Kernel: 4.18.0-193
Ubuntu® Server	**14.04** Kernel: 3.13
	16.04 Kernel: 4.4
	18.04 Kernel: 4.15
	20.04 Kernel: 5.4
9.8	
SUSE® Linux Enterprise Server (SLES)	**12** SP3

OS Support
15 SP1

1.11 LEDs

1.11.1 Front and Rear IO LEDs

The Ultrastar Serv60+8 has three LEDs on the front and three on the rear that mirror each other and provide general status. This allows the status of the enclosure to be determined from either side of the rack.

Figure 8: Front LEDs Location
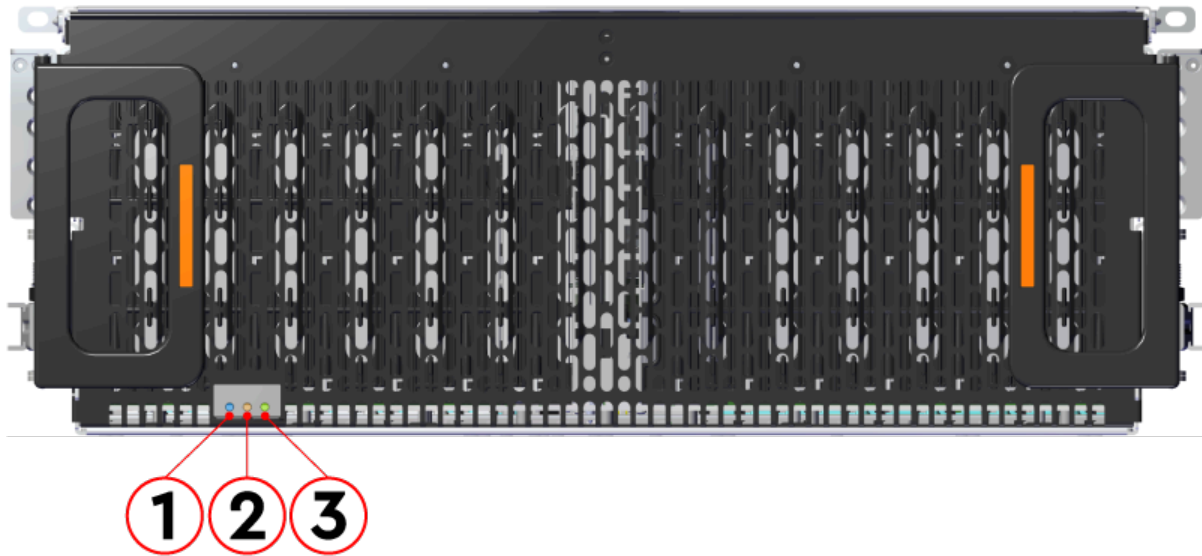
Figure 9: Rear LEDs Location
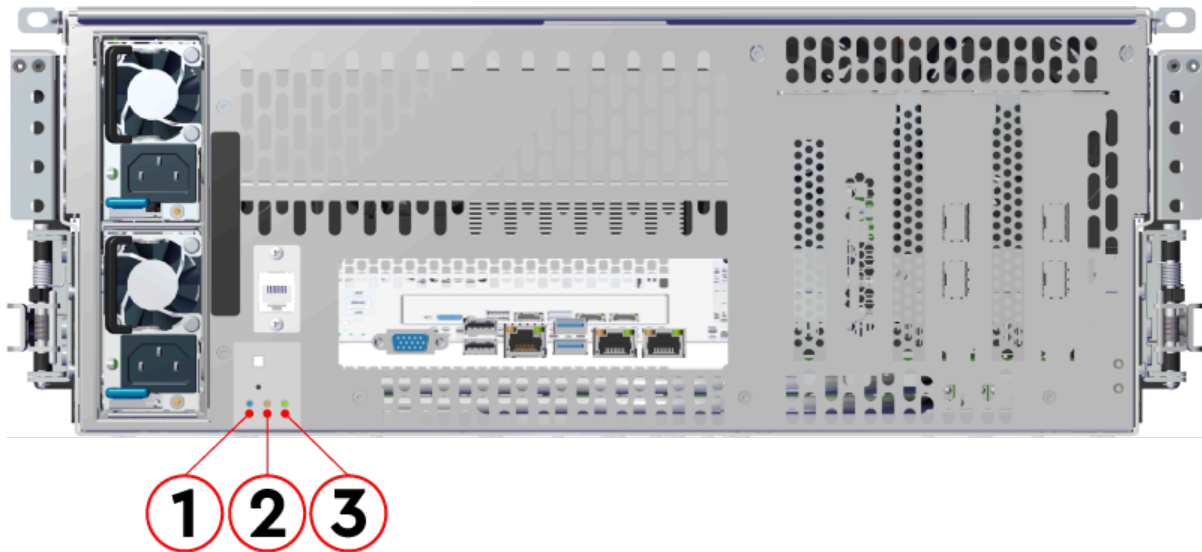
Table 8: Front and Rear LED Identification

Number	LED Name	Color	Behavior
1	Identification	Blue	**Blink** @ 1 Hz (50% duty cycle) – Blinks only when Identification has been activated. Will blink when **any** component is identified.
2	Fault	Amber	**Blink** @ 1 Hz (50% duty cycle) – Enclosure has a fault **Off** - Enclosure is functioning properly
3	Power	Green	**Solid** – Powered On

1.11.2 IOM LEDs

The IOM has three LEDs, one each for power, fault, and identification.

Figure 10: IOM LEDs Location
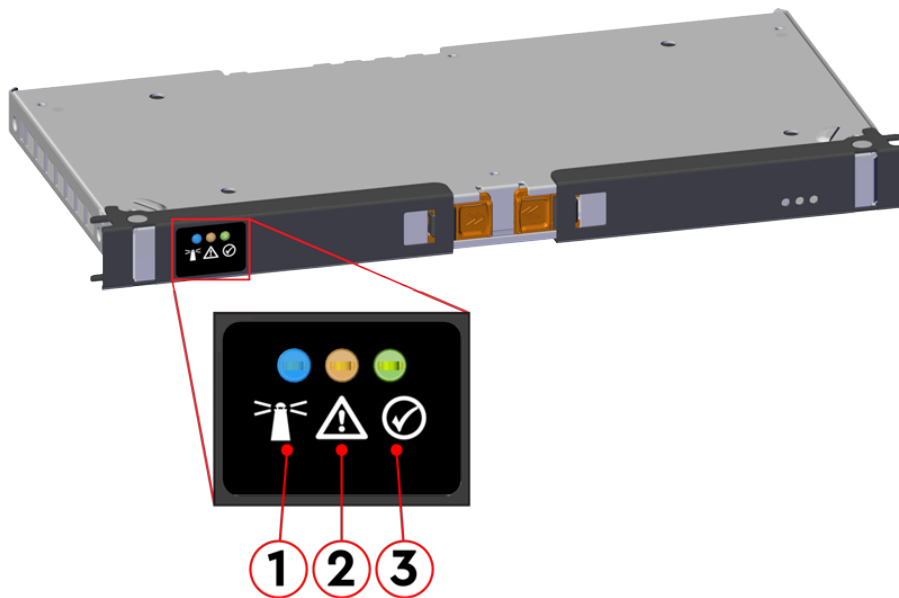
Table 9: IOM LEDs Identification

Number	LED Name	Color	Behavior
1	IOM Identification	Blue	**Blink** @ 0.5 Hz (75% duty cycle) – Blinks only when IOM Identification has been activated **Off** - Not being identified
2	IOM Fault	Amber	**Blink** @ 0.5 Hz (75% duty cycle) – IOM has Fault **Off** - IOM is functioning normally
3	IOM Power	Green	**Solid** – IOM is on **Off** – IOM is off

1.11.3 PSU LED

The PSU has a single, multi-function LED. See the table below for a detailed functional description.

Figure 11: PSU LED Location
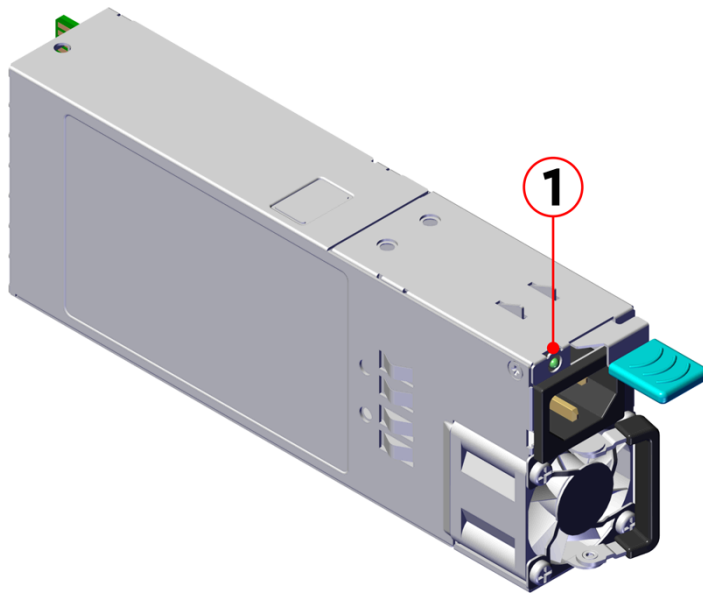
Table 10: PSU LED Identification

Number	LED Name	Color	Behavior
1	PSU Multi-Function LED	Green/Amber	**Off** – PSU disconnected from power
		Green	**Solid** – PSU on and reporting no faults **Blink** @ 0.5Hz (50% duty cycle) – AC present and 12VSB on **Blink** @ 2Hz (50% duty cycle) – PSU in firmware update mode
		Amber	**Solid** – PSU disconnected from power, or critical fault causing a shutdown failure **Blink** @ 0.5Hz (50% duty cycle) – PSU reporting warnings

1.11.4 Drive Assembly LED

The HDD drive assembly itself does not contain an LED, but it contains a light-pipe that displays the multi-function LED located on the drive slot. This amber LED has three distinct states for indicating a fault condition, identification, or normal operation.

Figure 12: HDD Assembly LED Location
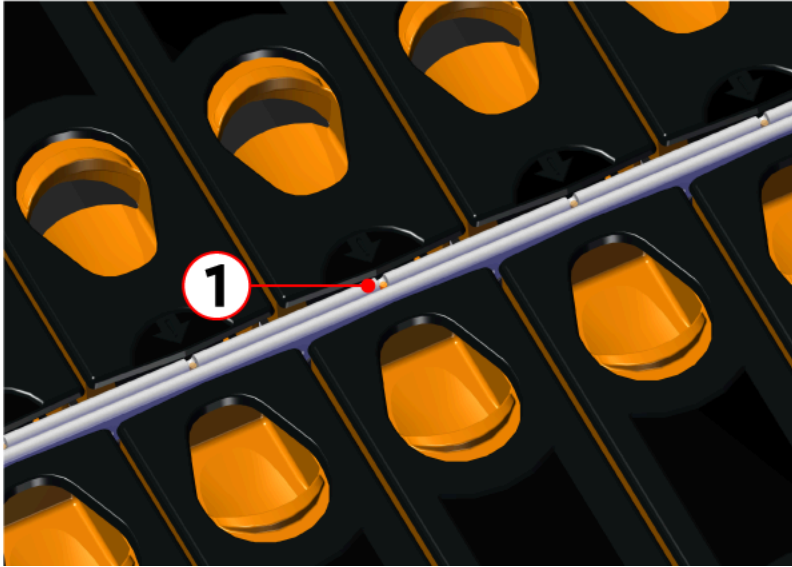
Table 11: HDD Assembly LED Identification

Number	LED Name	Color	Behavior
1	HDD Drive Multi-Function LED	Amber	**Blink** @ 2 Hz (50% duty cycle) – Drive identify **Blink** @ 1 Hz (50% duty cycle) – Drive fault **Off** – Drive has no faults

The SSD drive assembly contains a multi-function LED with three distinct states for indicating a fault condition, identification, or normal operation.

Figure 13: SSD Assembly LED Location
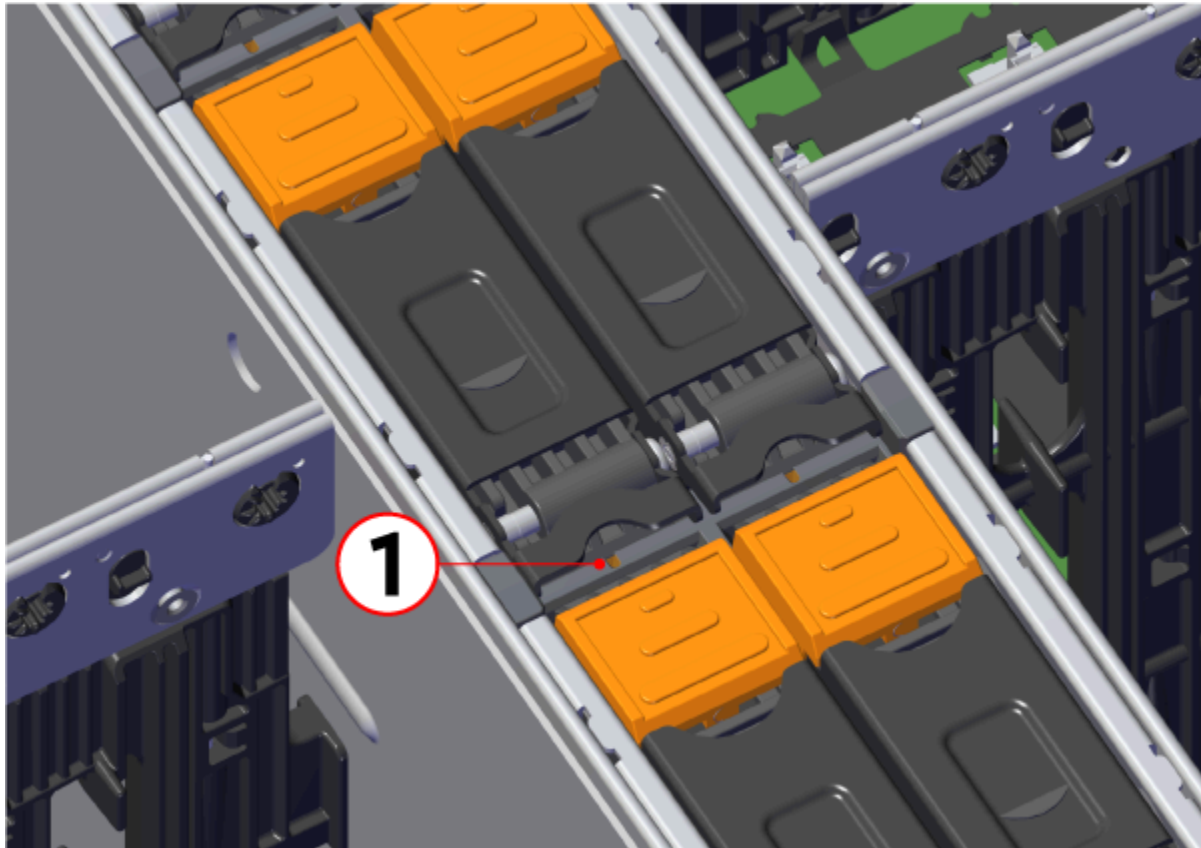
Table 12: SSD Assembly LED Identification

LED Name	Color	Behavior
SSD Drive Multi-Function LED	Amber	**Blink** @ 2 Hz (50% duty cycle) – Drive identify **Blink** @ 1 Hz (50% duty cycle) – Drive fault **Off** – Drive has no faults

Note: During service events—when a drive is hot plugged or replaced and the drive installed properly—the LED state of that drive slot will change to solid ON. This is to provide the user with visual feedback that the drive has been successfully connected and has been discovered by the expander. Once the enclosure has been slid back into the rack and the OPEN bit on the door sensor element is 0, the LED will return to the previously set state (Ident, Fault, or Off).

For example: A drive in slot 0 needs to be replaced. The fault bit on Array Slot descriptor 0 is set to indicate to the service technician which drive slot to replace. This will cause the LED to blink at 1Hz (50% duty cycle). When the service technician pulls out the enclosure, inserts a new drive, and successfully installs the drive, the slot LED state will change to solid ON to indicate that the drive was properly installed. When the service technician pushes the enclosure back into the rack and the OPEN bit of the door sensor element changes from 1 to 0, the LED state of drive slot 0 will change back to the fault indication blink rate (1 Hz 50% duty cycle).

1.12 Ultrastar Serv60+8 Rack Requirements

The Ultrastar Serv60+8 is designed to be installed into a rack that meets the EIA-310 standard at a minimum 1200 mm (47.24in.) of usable rack space, frame to frame. The vertical rack rails must be set between 812.8mm - 914.4mm / 32 in. - 36 in. to support the enclosure. It requires 4U of rack space, and it should be installed into the rack at the lowest possible U height to keep the load on the rack balanced.

Table 13: Required Rack Specifications

Parameter	Requirement
Rack Depth	1200 mm (47.24in.) of usable rack space, frame to frame
Rack Width	450mm (17.72in.) minimum width with 465mm (18.31in.) ± 1.5mm nominal hole spacing and W1 is 492mm minimum. See EIA-310 Rack Standard
Rack Units (U)	4U
Vertical Rack Rail Spacing	812.8mm - 914.4mm / 32 in. - 36 in.
Static Load Rating	1360.7 kg. / 3000 lbs.
Dynamic Load Rating	1020.5 kg. / 2250 lbs.

⚠️ **Warning:** When extended out of the rack on the rail system, the Ultrastar Serv60+8 will be ~950 mm / 37.4in. extended outward. This may be a potential tipping hazard depending on the configuration of the rack. Ensure that leveling feet, anti-tilt, and any other safety features recommended by the specific rack manufacturers have been deployed before servicing.

The following section provides specific information necessary to install, service, and remove the Ultrastar Serv60+8 . The installation of the Ultrastar Serv60+8 requires two people and a space of 1524mm / 60in. in front of the installation space. The servicing of the enclosure requires one person and a minimum of 1219.2mm / 48in. of space in front of the installation space. The removal of the enclosure requires two people, 1371mm / 54in. of space in front of the installation space, and 24in. on either side of the enclosure for two people to remove the enclosure.

⚠️ **Warning:** The handles on the front of the chassis are not intended to be used to support the weight of the Ultrastar Serv60+8 . Lifting the unit by the chassis handles or trying to support the unit on the handles can cause them to fail. This can cause serious damage to the unit or serious bodily harm to those handling the unit. Always team lift the chassis by gripping the underside of the unit, and never try to lift a chassis that is filled with drives.

Figure 14: Installation, Servicing, and Removal
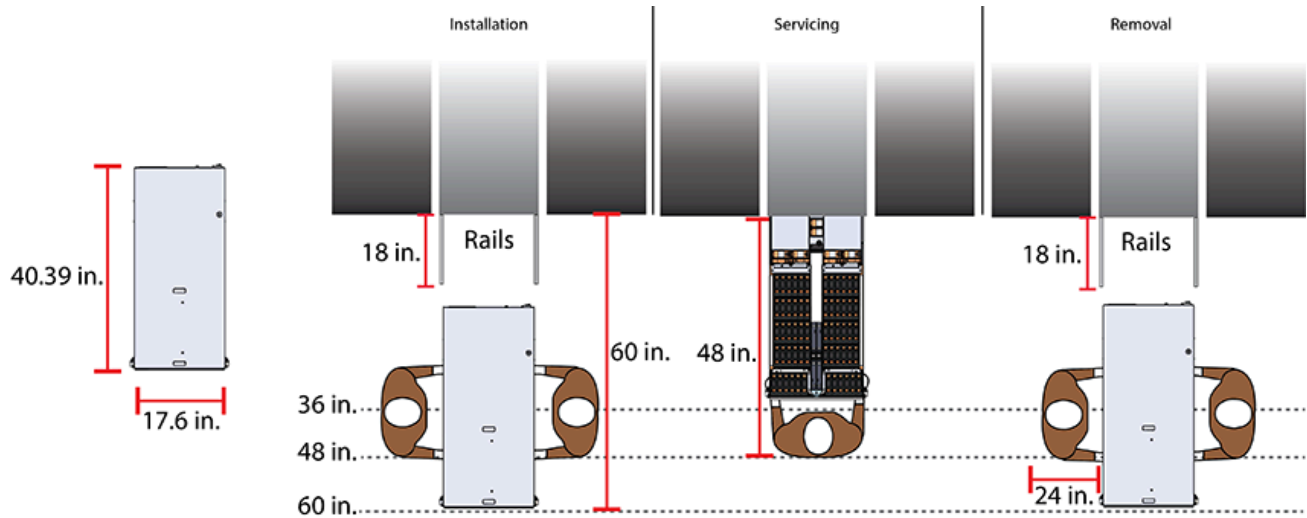
> ⓘ **Attention: Do not** install or remove the enclosure while it is populated with drives. The fully populated enclosure exceeds the amount of weight that a team of two should lift.

1.12.1 Compatible Rack Hardware Configuration

The following table(s) list the approved rack hardware configurations for the Ultrastar Serv60+8 :

Table 14: Compatible Hardware Configuration 1

Parameter	Rack	PDU (Vertical)	PDU Mounting Bracket	Additional Mounting Bracket Hardware
Vendor	CRENLO/EMCOR	Server Technology	Server Technology	Various
Part Number	AS-160099-03 (Drawing Number EMCOR 526121 Rev 5)	412-0761-11_STV-4501 412-0761-20_STV-4502 412-0761-23_STV-4503	KIT-MBVPT-1B (one kit per PDU)	4 x M6 x 16 Hex Cap Screws 8 x M6 Fender Washers 4 x M6 Hex Nut with Nylon Lock
Quantity	1	2	2	Varies

Table 15: Compatible Hardware Configuration 2

Parameter	Rack	PDU (Vertical)	PDU Mounting Bracket	Additional Mounting Bracket Hardware
Vendor	AFCO/Legrand	Server Technology	Server Technology	Various
Part Number	**Options:**	412-0761-11_STV-4501 412-0761-20_STV-4502	KIT-MB-40	None

Parameter	Rack	PDU (Vertical)	PDU Mounting Bracket	Additional Mounting Bracket Hardware
	42RU – WEDIT605	412-0761-23_STV-4503		
	45RU – WEDIT604			
	48RU – WEDIT603			
	51RU – WEDIT606			
Quantity	1 rack	2	1	N/A

Table 16: Compatible Hardware Configuration 3

Parameter	Rack	PDU (Vertical)	PDU Mounting Bracket	Additional Mounting Bracket Hardware
Vendor	TRIPP LITE	Server Technology	Server Technology	Various
Part Number	**Options:**	412-0761-11_STV-4501	KIT-MBVPT-1B	None
	SR42UBDP (Rack)	412-0761-20_STV-4502		
	SREXTENDER 25U (Rack Extension)	412-0761-23_STV-4503		
	SREXTENDER 42U (Rack Extension)			
	SREXTENDER 48U (Rack Extension)			
Quantity	1 rack	2	1	N/A

Table 17: Compatible Hardware Configuration 4

Parameter	Rack	PDU (Vertical)	PDU Mounting Bracket	Additional Mounting Bracket Hardware
Vendor	APC/Schneider	Server Technology	Server Technology	Various
Part Number	AR3300W	412-0761-11_STV-4501	KIT-MBVPT-1B (one kit per PDU)	4 x M6 x 16 Hex Cap Screws
		412-0761-20_STV-4502		8 x M6 Fender Washers
		412-0761-23_STV-4503		4 x M6 Hex Nut with Nylon Lock

Parameter	Rack	PDU (Vertical)	PDU Mounting Bracket	Additional Mounting Bracket Hardware
Quantity	1 rack	2	2	Varies

1.13 Power Requirements

The following table describes the A/C input power specification for the Ultrastar Serv60+8 .

Table 18: AC Power Specifications

Power	
Alternating Current (AC) Power Supply (2 per enclosure)	
Wattage (per power supply)[2]	**Supply Rating:** 80 PLUS Platinum rated **Max Power Consumption:** ~2000W **Typical Power Consumption:** ~1800W
Voltage (per power supply)	200 - 240 VAC, auto-ranging, 50/60 Hz
Maximum inrush current (per power supply)	AC line inrush current shall not exceed 35A peak measured per IPC-9592B(L) Appendix C-4.1.

⚠ **Caution:** The Ultrastar Serv60+8 can only be plugged into high line (220-240 VAC). If the unit is plugged into low line (110-127 VAC), the PSU will report a "Critical" state when status pages are queried using SES. In this case, the enclosure will power up, but the drives will not.

1.14 ESD

The enclosure is designed to dissipate all electrostatic discharge (ESD) to the chassis base. Ensure that there is sufficient electrical and mechanical connection from the chassis base to the rack rails, and that the rack itself is tied to earth ground. Precautions must be taken to ensure that the system is not exposed to ESD while handling components or servicing the unit.

The unit must be grounded in accordance with all local/regional and national electrical codes.

1.15 Enclosure Cooling

2.   Max and typical power consumption values represent the output power to the system. Input power will vary depending on the PSU efficiency and load sharing between PSUs.

The Ultrastar Serv60+8 storage subsystem has an advanced thermal algorithm running within the logical enclosure services process called the SEP that monitors all of the temperature sensors in the enclosure. The SEP makes adjustments to the fan speeds based upon the thermal sensors. The fan algorithm takes into account the component and the warning and critical threshold limits defaulted and managed by the SEP controller. If any temperature sensor exceeds the temperature threshold configured in the SES pages, the fan speed will increase to cool the enclosure. If the enclosure encounters low temperatures, the enclosure will reduce fan speed in an attempt to conserve power and not over-cool the enclosure. This algorithm is agnostic to effects of altitude and humidity. The algorithm works based on temperatures within the enclosure with emphasis on reducing power consumption.

The server subsystem also has a thermal algorithm that functions similarly to the storage subsystem. The BMC reads thermal sensors in each of the four memory banks, CPUs, on-board NIC, temperature sensors on the motherboard, and the IOM SXP temperture, from the BMC itself to react to changing thermal conditions and adjust the speed of the two server subsystem fan as necessary. The rack that the Ultrastar Serv60+8 is installed in must not restrict airflow to the enclosure. Racks with doors should be tested to ensure they do not constrict airflow to the enclosure.

The Ultrastar Serv60+8 system provides its own cooling using four (4) 80mm fans mounted internally behind the drive bay and two (2) 80mm fans mounted above the server motherboard in custom fan housings. These fans draw air from the cold aisle (drive bay side) to the hot isle (server side) through the enclosure. When the Ultrastar Serv60+8 is extended out of the rack, the cover of the enclosure remains inside the rack which exposes the drives. This feature allows for easier access to drives and simplifies maintenance tasks related to internal components. However, there is a limit to the amount of time the enclosure can be extended out of the rack before the enclosure will begin to overheat.

(i) **Attention:** Limit the amount of time that the enclosure is extended out of the rack to only what is necessary to exchange a component or perform regular maintenance and should be limited to a maximum of 5 minutes total. **Never extend the enclosure out for longer than 5 minutes to prevent overheating.** Only extend the enclosure out of the rack as far as necessary to service components. The enclosure is equipped with a sensor that will be tripped when the enclosure's top cover has been opened resulting in the system fans increasing to max speed. In the event that a fan has failed, it must be replaced before any other CRUs and should be removed from the enclosure within 30 seconds of removing the enclosure cover.

1.16 List of Compatible Drives

HDD with 3.5-inch Drive Carrier

Table 19: Western Digital Ultrastar DC HC310

Drive	Type	Interface	Sector Size	Encryption	Volume	Part Number
Ultrastar DC HC310 w/ 3.5 in. drive carrier	HDD	SATA 6Gb/s	512e	SE	6TB	1EX1189
Ultrastar DC HC310 w/ 3.5 in. drive carrier	HDD	SATA 6Gb/s	512e	TCG	6TB	1EX1188
Ultrastar DC HC310 w/ 3.5 in. drive carrier	HDD	SATA 6Gb/s	4Kn	SE	6TB	1EX1187
Ultrastar DC HC310	HDD	SATA 6Gb/s	4Kn	TCG	6TB	1EX1186

Drive	Type	Interface	Sector Size	Encryption	Volume	Part Number
w/ 3.5 in. drive carrier						
Ultrastar DC HC310 w/ 3.5 in. drive carrier	HDD	SAS 12Gb/s	512e	SE	6TB	1EX1185
Ultrastar DC HC310 w/ 3.5 in. drive carrier	HDD	SAS 12Gb/s	512e	TCG	6TB	1EX1184
Ultrastar DC HC310 w/ 3.5 in. drive carrier	HDD	SAS 12Gb/s	512e	TCG-FIPS	6TB	1EX1853
Ultrastar DC HC310 w/ 3.5 in. drive carrier	HDD	SAS 12Gb/s	4Kn	SE	6TB	1EX1183
Ultrastar DC HC310 w/ 3.5 in. drive carrier	HDD	SAS 12Gb/s	4Kn	TCG	6TB	1EX1182
Ultrastar DC HC310 w/ 3.5 in. drive carrier	HDD	SAS 12Gb/s	4Kn	TCG-FIPS	6TB	1EX1852

Table 20: Western Digital Ultrastar DC HC320

Drive	Type	Interface	Sector Size	Encryption	Volume	Part Number
Ultrastar DC HC320 w/ 3.5 in. drive carrier	HDD	SATA 6Gb/s	512e	SE	8TB	1EX1227
Ultrastar DC HC320 w/ 3.5 in. drive carrier	HDD	SATA 6Gb/s	512e	SED	8TB	1EX1226
Ultrastar DC HC320 w/ 3.5 in. drive carrier	HDD	SATA 6Gb/s	4Kn	SE	8TB	1EX1225
Ultrastar DC HC320 w/ 3.5 in. drive carrier	HDD	SATA 6Gb/s	4Kn	TCG	8TB	1EX1224
Ultrastar DC HC320 w/ 3.5 in. drive carrier	HDD	SAS 12Gb/s	512e	SE	8TB	1EX1223
Ultrastar DC HC320 w/ 3.5 in. drive carrier	HDD	SAS 12Gb/s	512e	TCG	8TB	1EX1222
Ultrastar DC HC320 w/ 3.5 in. drive carrier	HDD	SAS 12Gb/s	512e	TCG-FIPS	8TB	1EX1343
Ultrastar DC HC320 w/ 3.5 in. drive carrier	HDD	SAS 12Gb/s	4Kn	SE	8TB	1EX1221
Ultrastar DC HC320 w/ 3.5 in. drive carrier	HDD	SAS 12Gb/s	4Kn	TCG	8TB	1EX1220
Ultrastar DC HC320 w/ 3.5 in. drive carrier	HDD	SAS 12Gb/s	4Kn	TCG-FIPS	8TB	1EX1342

Table 21: Western Digital Ultrastar DC HC510

Drive	Type	Interface	Sector Size	Encryption	Volume	Part Number
Ultrastar DC HC510 w/ 3.5 in. drive carrier	HDD	SATA 6Gb/s	512e	SE	10TB	1EX0499
Ultrastar DC HC510 w/ 3.5 in. drive carrier	HDD	SATA 6Gb/s	512e	ISE	10TB	1EX0497
Ultrastar DC HC510 w/ 3.5 in. drive carrier	HDD	SATA 6Gb/s	512e	SED	10TB	1EX0498
Ultrastar DC HC510 w/ 3.5 in. drive carrier	HDD	SATA 6Gb/s	4Kn	SE	10TB	1EX0496
Ultrastar DC HC510 w/ 3.5 in. drive carrier	HDD	SATA 6Gb/s	4Kn	ISE	10TB	1EX0494
Ultrastar DC HC510 w/ 3.5 in. drive carrier	HDD	SATA 6Gb/s	4Kn	SED	10TB	1EX0495
Ultrastar DC HC510 w/ 3.5 in. drive carrier	HDD	SAS 12Gb/s	512e	SE	10TB	1EX0487
Ultrastar DC HC510 w/ 3.5 in. drive carrier	HDD	SAS 12Gb/s	512e	ISE	10TB	1EX0485
Ultrastar DC HC510 w/ 3.5 in. drive carrier	HDD	SAS 12Gb/s	512e	TCG	10TB	1EX0486
Ultrastar DC HC510 w/ 3.5 in. drive carrier	HDD	SAS 12Gb/s	512e	TCG-FIPS	10TB	1EX1341
Ultrastar DC HC510 w/ 3.5 in. drive carrier	HDD	SAS 12Gb/s	4Kn	SE	10TB	1EX0484
Ultrastar DC HC510 w/ 3.5 in. drive carrier	HDD	SAS 12Gb/s	4Kn	ISE	10TB	1EX0482
Ultrastar DC HC510 w/ 3.5 in. drive carrier	HDD	SAS 12Gb/s	4Kn	TCG	10TB	1EX0483
Ultrastar DC HC510 w/ 3.5 in. drive carrier	HDD	SAS 12Gb/s	4Kn	TCG-FIPS	10TB	1EX1340

Table 22: Western Digital Ultrastar DC HC520

Drive	Type	Interface	Sector Size	Encryption	Volume	Part Number
Ultrastar DC HC520 w/ 3.5 in. drive carrier	HDD	SATA 6Gb/s	512e	SE	12TB	1EX1015
Ultrastar DC HC520 w/ 3.5 in. drive carrier	HDD	SATA 6Gb/s	512e	ISE	12TB	1EX1013
Ultrastar DC HC520 w/ 3.5 in. drive carrier	HDD	SATA 6Gb/s	512e	SED	12TB	1EX1014
Ultrastar DC HC520	HDD	SATA 6Gb/s	4Kn	SE	12TB	1EX1012

Drive	Type	Interface	Sector Size	Encryption	Volume	Part Number
w/ 3.5 in. drive carrier						
Ultrastar DC HC520 w/ 3.5 in. drive carrier	HDD	SATA 6Gb/s	4Kn	ISE	12TB	1EX1010
Ultrastar DC HC520 w/ 3.5 in. drive carrier	HDD	SATA 6Gb/s	4Kn	SED	12TB	1EX1011
Ultrastar DC HC520 w/ 3.5 in. drive carrier	HDD	SAS 12Gb/s	512e	SE	12TB	1EX1009
Ultrastar DC HC520 w/ 3.5 in. drive carrier	HDD	SAS 12Gb/s	512e	ISE	12TB	1EX1007
Ultrastar DC HC520 w/ 3.5 in. drive carrier	HDD	SAS 12Gb/s	512e	TCG	12TB	1EX1008
Ultrastar DC HC520 w/ 3.5 in. drive carrier	HDD	SAS 12Gb/s	512e	TCG-FIPS	12TB	1EX1338
Ultrastar DC HC520 w/ 3.5 in. drive carrier	HDD	SAS 12Gb/s	4Kn	SE	12TB	1EX1006
Ultrastar DC HC520 w/ 3.5 in. drive carrier	HDD	SAS 12Gb/s	4Kn	ISE	12TB	1EX1004
Ultrastar DC HC520 w/ 3.5 in. drive carrier	HDD	SAS 12Gb/s	4Kn	TCG	12TB	1EX1005
Ultrastar DC HC520 w/ 3.5 in. drive carrier	HDD	SAS 12Gb/s	4Kn	TCG-FIPS	12TB	1EX1339

Table 23: Western Digital Ultrastar DC HC530

Drive	Type	Interface	Sector Size	Encryption	Volume	Part Number
Ultrastar DC HC530 w/ 3.5 in. drive carrier	HDD	SATA 6Gb/s	512e	SE	14TB	1EX1793
Ultrastar DC HC530 w/ 3.5 in. drive carrier	HDD	SATA 6Gb/s	512e	SED	14TB	1EX1794
Ultrastar DC HC530 w/ 3.5 in. drive carrier	HDD	SATA 6Gb/s	4Kn	SE	14TB	1EX1790
Ultrastar DC HC530 w/ 3.5 in. drive carrier	HDD	SAS 12Gb/s	512e	SE	14TB	1EX1791
Ultrastar DC HC530 w/ 3.5 in. drive carrier	HDD	SAS 12Gb/s	512e	ISE	14TB	1EX1583
Ultrastar DC HC530 w/ 3.5 in. drive carrier	HDD	SAS 12Gb/s	512e	TCG	14TB	1EX1792
Ultrastar DC HC530 w/ 3.5 in. drive carrier	HDD	SAS 12Gb/s	512e	TCG-FIPS	14TB	1EX1855
Ultrastar DC HC530 w/ 3.5 in. drive carrier	HDD	SAS 12Gb/s	4Kn	SE	14TB	1EX1788

Drive	Type	Interface	Sector Size	Encryption	Volume	Part Number
Ultrastar DC HC530 w/ 3.5 in. drive carrier	HDD	SAS 12Gb/s	4Kn	TCG	14TB	1EX1789
Ultrastar DC HC530 w/ 3.5 in. drive carrier	HDD	SAS 12Gb/s	4Kn	TCG-FIPS	14TB	1EX1854

Table 24: Western Digital Ultrastar DC HC550

Drive	Type	Interface	Sector Size	Encryption	Volume	Part Number
Ultrastar DC HC550 w/ 3.5 in. drive carrier	HDD	SATA 6Gb/s	512e	SE	16TB	1EX2476
Ultrastar DC HC550 w/ 3.5 in. drive carrier	HDD	SATA 6Gb/s	512e	SED	16TB	1EX2477
Ultrastar DC HC550 w/ 3.5 in. drive carrier	HDD	SAS 12Gb/s	512e	SE	16TB	1EX2473
Ultrastar DC HC550 w/ 3.5 in. drive carrier	HDD	SAS 12Gb/s	512e	TCG	16TB	1EX2474
Ultrastar DC HC550 w/ 3.5 in. drive carrier	HDD	SAS 12Gb/s	512e	TCG-FIPS	16TB	1EX2475
Ultrastar DC HC550 w/ 3.5 in. drive carrier	HDD	SATA 6Gb/s	512e	SE	18TB	1EX2481
Ultrastar DC HC550 w/ 3.5 in. drive carrier	HDD	SATA 6Gb/s	512e	SED	18TB	1EX2482
Ultrastar DC HC550 w/ 3.5 in. drive carrier	HDD	SAS 12Gb/s	512e	SE	18TB	1EX2478
Ultrastar DC HC550 w/ 3.5 in. drive carrier	HDD	SAS 12Gb/s	512e	TCG	18TB	1EX2479
Ultrastar DC HC550 w/ 3.5 in. drive carrier	HDD	SAS 12Gb/s	512e	TCG-FIPS	18TB	1EX2480

⚠ **Caution:** Ultrastar DC HC650 drives are only compatible with the OSs and HBAs listed in the following table.

Table 25: Western Digital Ultrastar DC HC650

OS	Kernel	HBA	HBA FW	HBA Driver
Ubuntu 18.04	4.15.0-76-generic	9400-8e	15.00.01.00	34.00.00.00
		9405-16e		
Ubuntu 20.04	5.4.0-47-generic	9400-8e		
		9405-16e		

Drive	Type	Interface	Sector Size	Encryption	Volume	Part Number
Ultrastar DC HC650 w/ 3.5 in. drive carrier	HDD	SATA 6Gb/s	4Kn	SE	20TB	1EX2719
Ultrastar DC HC650 w/ 3.5 in. drive carrier	HDD	SATA 6Gb/s	4Kn	SED	20TB	1EX2720
Ultrastar DC HC650 w/ 3.5 in. drive carrier	HDD	SAS 12Gb/s	4Kn	SE	20TB	1EX2716
Ultrastar DC HC650 w/ 3.5 in. drive carrier	HDD	SAS 12Gb/s	4Kn	TCG	20TB	1EX2717

SSD with 2.5-inch Drive Carrier

Table 26: Western Digital Ultrastar SS200

Drive	Type	Interface	Drive Writes	Encryption	Volume	Part Number
Ultrastar SS200 w/ 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-3DW/D	SE	400GB	No longer available
Ultrastar SS200 w/ 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-3DW/D	ISE	400GB	No longer available
Ultrastar SS200 w/ 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-3DW/D	TCG	400GB	No longer available
Ultrastar SS200 w/ 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-3DW/D	SE	800GB	No longer available
Ultrastar SS200 w/ 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-3DW/D	ISE	800GB	No longer available
Ultrastar SS200 w/ 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-3DW/D	TCG	800GB	No longer available
Ultrastar SS200 w/ 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-3DW/D	SE	1.6TB	No longer available
Ultrastar SS200 w/ 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-3DW/D	ISE	1.6TB	No longer available
Ultrastar SS200 w/ 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-3DW/D	TCG	1.6TB	No longer available
Ultrastar SS200 w/ 2.5 in. drive carrier	SSD	SAS 12Gb/s	ME-10DW/D	SE	1.6TB	No longer available
Ultrastar SS200 w/ 2.5 in. drive carrier	SSD	SAS 12Gb/s	ME-10DW/D	ISE	1.6TB	No longer available
Ultrastar SS200 w/ 2.5 in. drive carrier	SSD	SAS 12Gb/s	ME-10DW/D	TCG	1.6TB	No longer available

Table 27: Western Digital Ultrastar SS300

Drive	Type	Interface	Drive Writes	Encryption	Volume	Part Number
Ultrastar SS300 w/ 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-3DW/D	SE	400GB	No longer available
Ultrastar SS300 w/ 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-3DW/D	ISE	400GB	No longer available
Ultrastar SS300 w/ 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-3DW/D	TCG	400GB	No longer available
Ultrastar SS300 w/ 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-3DW/D	TCG-FIPS	400GB	No longer available
Ultrastar SS300 w/ 2.5 in. drive carrier	SSD	SAS 12Gb/s	ME-10DW/D	SE	400GB	No longer available
Ultrastar SS300 w/ 2.5 in. drive carrier	SSD	SAS 12Gb/s	ME-10DW/D	ISE	400GB	No longer available
Ultrastar SS300 w/ 2.5 in. drive carrier	SSD	SAS 12Gb/s	ME-10DW/D	TCG	400GB	No longer available
Ultrastar SS300 w/ 2.5 in. drive carrier	SSD	SAS 12Gb/s	ME-10DW/D	TCG-FIPS	400GB	No longer available
Ultrastar SS300 w/ 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-3DW/D	SE	800GB	No longer available
Ultrastar SS300 w/ 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-3DW/D	ISE	800GB	No longer available
Ultrastar SS300 w/ 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-3DW/D	TCG	800GB	No longer available
Ultrastar SS300 w/ 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-3DW/D	TCG-FIPS	800GB	No longer available
Ultrastar SS300 w/ 2.5 in. drive carrier	SSD	SAS 12Gb/s	ME-10DW/D	SE	800GB	No longer available
Ultrastar SS300 w/ 2.5 in. drive carrier	SSD	SAS 12Gb/s	ME-10DW/D	ISE	800GB	No longer available
Ultrastar SS300 w/ 2.5 in. drive carrier	SSD	SAS 12Gb/s	ME-10DW/D	TCG	800GB	No longer available
Ultrastar SS300 w/ 2.5 in. drive carrier	SSD	SAS 12Gb/s	ME-10DW/D	TCG-FIPS	800GB	No longer available
Ultrastar SS300 w/ 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-3DW/D	ISE	1.6TB	No longer available
Ultrastar SS300 w/ 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-3DW/D	TCG-FIPS	1.6TB	No longer available
Ultrastar SS300 w/ 2.5 in. drive carrier	SSD	SAS 12Gb/s	ME-10DW/D	TCG-FIPS	1.6TB	No longer available

Table 28: Western Digital Ultrastar SS530

Drive	Type	Interface	Drive Writes	Encryption	Volume	Part Number
Ultrastar SS530 w/ 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-3DW/D	SE	400GB	1EX2000
Ultrastar SS530 w/ 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-3DW/D	ISE	400GB	1EX2001
Ultrastar SS530 w/ 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-3DW/D	TCG	400GB	1EX2077
Ultrastar SS530 w/ 2.5 in. drive carrier	SSD	SAS 12Gb/s	ME-10DW/D	SE	400GB	1EX1994
Ultrastar SS530 w/ 2.5 in. drive carrier	SSD	SAS 12Gb/s	ME-10DW/D	ISE	400GB	1EX1995
Ultrastar SS530 w/ 2.5 in. drive carrier	SSD	SAS 12Gb/s	ME-10DW/D	TCG	400GB	1EX2074
Ultrastar SS530 w/ 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-1DW/D	SE	480GB	1EX2006
Ultrastar SS530 w/ 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-1DW/D	ISE	480GB	1EX2007
Ultrastar SS530 w/ 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-1DW/D	TCG	480GB	1EX2080
Ultrastar SS530 w/ 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-3DW/D	SE	800GB	1EX2002
Ultrastar SS530 w/ 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-3DW/D	ISE	800GB	1EX2003
Ultrastar SS530 w/ 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-3DW/D	TCG	800GB	1EX2078
Ultrastar SS530 w/ 2.5 in. drive carrier	SSD	SAS 12Gb/s	ME-10DW/D	SE	800GB	1EX1996
Ultrastar SS530 w/ 2.5 in. drive carrier	SSD	SAS 12Gb/s	ME-10DW/D	ISE	800GB	1EX1997
Ultrastar SS530 w/ 2.5 in. drive carrier	SSD	SAS 12Gb/s	ME-10DW/D	TCG	800GB	1EX2075
Ultrastar SS530 w/ 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-1DW/D	SE	960GB	1EX2008
Ultrastar SS530 w/ 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-1DW/D	ISE	960GB	1EX2009
Ultrastar SS530 w/ 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-1DW/D	TCG	960GB	1EX2081
Ultrastar SS530 w/ 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-3DW/D	SE	1.6TB	1EX2004
Ultrastar SS530	SSD	SAS 12Gb/s	RI-3DW/D	ISE	1.6TB	1EX2005

Drive	Type	Interface	Drive Writes	Encryption	Volume	Part Number
w/ 2.5 in. drive carrier						
Ultrastar SS530 w/ 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-3DW/D	TCG	1.6TB	1EX2079
Ultrastar SS530 w/ 2.5 in. drive carrier	SSD	SAS 12Gb/s	ME-10DW/D	SE	1.6TB	1EX1998
Ultrastar SS530 w/ 2.5 in. drive carrier	SSD	SAS 12Gb/s	ME-10DW/D	ISE	1.6TB	1EX1999
Ultrastar SS530 w/ 2.5 in. drive carrier	SSD	SAS 12Gb/s	ME-10DW/D	TCG	1.6TB	1EX2076
Ultrastar SS530 w/ 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-1DW/D	SE	1.92TB	1EX2010
Ultrastar SS530 w/ 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-1DW/D	ISE	1.92TB	1EX2011
Ultrastar SS530 w/ 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-1DW/D	TCG	1.92TB	1EX2082
Ultrastar SS530 w/ 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-3DW/D	SE	3.2TB	1EX1810
Ultrastar SS530 w/ 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-3DW/D	ISE	3.2TB	1EX1811
Ultrastar SS530 w/ 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-3DW/D	TCG	3.2TB	1EX1812
Ultrastar SS530 w/ 2.5 in. drive carrier	SSD	SAS 12Gb/s	ME-10DW/D	SE	3.2TB	1EX1807
Ultrastar SS530 w/ 2.5 in. drive carrier	SSD	SAS 12Gb/s	ME-10DW/D	ISE	3.2TB	1EX1808
Ultrastar SS530 w/ 2.5 in. drive carrier	SSD	SAS 12Gb/s	ME-10DW/D	TCG	3.2TB	1EX1809
Ultrastar SS530 w/ 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-1DW/D	SE	3.84TB	1EX1816
Ultrastar SS530 w/ 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-1DW/D	ISE	3.84TB	1EX1817
Ultrastar SS530 w/ 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-1DW/D	TCG	3.84TB	1EX1818
Ultrastar SS530 w/ 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-3DW/D	SE	6.4TB	1EX1813
Ultrastar SS530 w/ 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-3DW/D	ISE	6.4TB	1EX1814
Ultrastar SS530 w/ 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-3DW/D	TCG	6.4TB	1EX1815
Ultrastar SS530 w/ 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-3DW/D	SE	7.68TB	1EX1819

Drive	Type	Interface	Drive Writes	Encryption	Volume	Part Number
Ultrastar SS530 w/ 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-3DW/D	ISE	7.68TB	1EX1820
Ultrastar SS530 w/ 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-3DW/D	TCG	7.68TB	1EX1821
Ultrastar SS530 w/ 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-3DW/D	SE	15.36TB	1EX1822
Ultrastar SS530 w/ 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-3DW/D	ISE	15.36TB	1EX1823
Ultrastar SS530 w/ 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-3DW/D	TCG	15.36TB	1EX1824

Table 29: Western Digital Ultrastar SS540

Drive	Type	Interface	Drive Writes	Encryption	Volume	Part Number
Ultrastar SS540 w/ 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-3DW/D	SE	800GB	1EX2550
Ultrastar SS540 w/ 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-3DW/D	ISE	800GB	1EX2551
Ultrastar SS540 w/ 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-3DW/D	TCG	800GB	1EX2552
Ultrastar SS540 w/ 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-3DW/D	TCG-FIPS	800GB	1EX2553
Ultrastar SS540 w/ 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-1DW/D	SE	960GB	1EX2570
Ultrastar SS540 w/ 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-1DW/D	ISE	960GB	1EX2571
Ultrastar SS540 w/ 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-1DW/D	TCG	960GB	1EX2572
Ultrastar SS540 w/ 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-1DW/D	TCG-FIPS	960GB	1EX2573
Ultrastar SS540 w/ 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-3DW/D	SE	1.6TB	1EX2546
Ultrastar SS540 w/ 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-3DW/D	ISE	1.6TB	1EX2547
Ultrastar SS540 w/ 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-3DW/D	TCG	1.6TB	1EX2548
Ultrastar SS540 w/ 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-3DW/D	TCG-FIPS	1.6TB	1EX2549
Ultrastar SS540 w/ 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-1DW/D	SE	1.92TB	1EX2566
Ultrastar SS540	SSD	SAS 12Gb/s	RI-1DW/D	ISE	1.92TB	1EX2567

Drive	Type	Interface	Drive Writes	Encryption	Volume	Part Number
w/ 2.5 in. drive carrier						
Ultrastar SS540 w/ 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-1DW/D	TCG	1.92TB	1EX2568
Ultrastar SS540 w/ 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-1DW/D	TCG-FIPS	1.92TB	1EX2569
Ultrastar SS540 w/ 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-3DW/D	SE	3.2TB	1EX2542
Ultrastar SS540 w/ 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-3DW/D	ISE	3.2TB	1EX2543
Ultrastar SS540 w/ 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-3DW/D	TCG	3.2TB	1EX2544
Ultrastar SS540 w/ 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-3DW/D	TCG-FIPS	3.2TB	1EX2545
Ultrastar SS540 w/ 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-1DW/D	SE	3.84TB	1EX2562
Ultrastar SS540 w/ 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-1DW/D	ISE	3.84TB	1EX2563
Ultrastar SS540 w/ 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-1DW/D	TCG	3.84TB	1EX2564
Ultrastar SS540 w/ 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-1DW/D	TCG-FIPS	3.84TB	1EX2565
Ultrastar SS540 w/ 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-3DW/D	SE	6.4TB	1EX2538
Ultrastar SS540 w/ 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-3DW/D	ISE	6.4TB	1EX2539
Ultrastar SS540 w/ 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-3DW/D	TCG	6.4TB	1EX2540
Ultrastar SS540 w/ 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-3DW/D	TCG-FIPS	6.4TB	1EX2541
Ultrastar SS540 w/ 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-1DW/D	SE	7.68TB	1EX2558
Ultrastar SS540 w/ 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-1DW/D	ISE	7.68TB	1EX2559
Ultrastar SS540 w/ 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-1DW/D	TCG	7.68TB	1EX2560
Ultrastar SS540 w/ 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-1DW/D	TCG-FIPS	7.68TB	1EX2561
Ultrastar SS540 w/ 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-1DW/D	SE	15.36TB	1EX2554
Ultrastar SS540 w/ 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-1DW/D	ISE	15.36TB	1EX2555

Drive	Type	Interface	Drive Writes	Encryption	Volume	Part Number
Ultrastar SS540 w/ 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-1DW/D	TCG	15.36TB	1EX2556
Ultrastar SS540 w/ 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-1DW/D	TCG-FIPS	15.36TB	1EX2557

Table 30: Western Digital Ultrastar SA620

Drive	Type	Interface	Drive Writes	Encryption	Volume	Part Number
Ultrastar SA620 w/ 2.5 in. drive carrier	SSD	SATA 6Gb/s	RI-0.6DW/D	SE	480GB	No longer available
Ultrastar SA620 w/ 2.5 in. drive carrier	SSD	SATA 6Gb/s	RI-0.6DW/D	ISE	480GB	No longer available
Ultrastar SA620 w/ 2.5 in. drive carrier	SSD	SATA 6Gb/s	RI-1.8DW/D	SE	400GB	No longer available
Ultrastar SA620 w/ 2.5 in. drive carrier	SSD	SATA 6Gb/s	RI-1.8DW/D	ISE	400GB	No longer available
Ultrastar SA620 w/ 2.5 in. drive carrier	SSD	SATA 6Gb/s	RI-1.8DW/D	SE	800GB	No longer available
Ultrastar SA620 w/ 2.5 in. drive carrier	SSD	SATA 6Gb/s	RI-1.8DW/D	ISE	800GB	No longer available
Ultrastar SA620 w/ 2.5 in. drive carrier	SSD	SATA 6Gb/s	RI-0.6DW/D	SE	960GB	No longer available
Ultrastar SA620 w/ 2.5 in. drive carrier	SSD	SATA 6Gb/s	RI-0.6DW/D	ISE	960GB	No longer available
Ultrastar SA620 w/ 2.5 in. drive carrier	SSD	SATA 6Gb/s	RI-1.8DW/D	SE	1.6TB	1EX1685
Ultrastar SA620 w/ 2.5 in. drive carrier	SSD	SATA 6Gb/s	RI-1.8DW/D	ISE	1.6TB	No longer available
Ultrastar SA620 w/ 2.5 in. drive carrier	SSD	SATA 6Gb/s	RI-0.6DW/D	SE	1.92TB	No longer available
Ultrastar SA620 w/ 2.5 in. drive carrier	SSD	SATA 6Gb/s	RI-0.6DW/D	ISE	1.92TB	No longer available

SSD with 3.5-inch to 2.5-inch Drive Carrier

Table 31: Western Digital Ultrastar SS200

Drive	Type	Interface	Drive Writes	Encryption	Volume	Part Number
Ultrastar SS200 w/ 3.5 in. to 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-3DW/D	SE	400GB	No longer available

Drive	Type	Interface	Drive Writes	Encryption	Volume	Part Number
Ultrastar SS200 w/ 3.5 in. to 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-3DW/D	ISE	400GB	No longer available
Ultrastar SS200 w/ 3.5 in. to 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-3DW/D	TCG	400GB	No longer available
Ultrastar SS200 w/ 3.5 in. to 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-3DW/D	TCG-FIPS	400GB	No longer available
Ultrastar SS200 w/ 3.5 in. to 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-1DW/D	TCG	480GB	No longer available
Ultrastar SS200 w/ 3.5 in. to 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-3DW/D	SE	800GB	No longer available
Ultrastar SS200 w/ 3.5 in. to 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-3DW/D	ISE	800GB	No longer available
Ultrastar SS200 w/ 3.5 in. to 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-3DW/D	TCG	800GB	No longer available
Ultrastar SS200 w/ 3.5 in. to 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-1DW/D	TCG	960GB	No longer available
Ultrastar SS200 w/ 3.5 in. to 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-3DW/D	SE	1.6TB	No longer available
Ultrastar SS200 w/ 3.5 in. to 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-3DW/D	ISE	1.6TB	No longer available
Ultrastar SS200 w/ 3.5 in. to 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-3DW/D	TCG	1.6TB	No longer available
Ultrastar SS200 w/ 3.5 in. to 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-1DW/D	TCG	1.92TB	No longer available
Ultrastar SS200 w/ 3.5 in. to 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-3DW/D	ISE	3.2TB	No longer available
Ultrastar SS200 w/ 3.5 in. to 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-1DW/D	ISE	3.84TB	No longer available
Ultrastar SS200 w/ 3.5 in. to 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-1DW/D	SE	7.68TB	No longer available

Table 32: Western Digital Ultrastar SS300

Drive	Type	Interface	Drive Writes	Encryption	Volume	Part Number
Ultrastar SS300 w/ 3.5 in. to 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-3DW/D	SE	400GB	No longer available
Ultrastar SS300 w/ 3.5 in. to 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-3DW/D	ISE	400GB	No longer available
Ultrastar SS300 w/ 3.5 in. to 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-3DW/D	TCG	400GB	No longer available

Drive	Type	Interface	Drive Writes	Encryption	Volume	Part Number
Ultrastar SS300 w/ 3.5 in. to 2.5 in. drive carrier	SSD	SAS 12Gb/s	ME-10DW/D	SE	400GB	No longer available
Ultrastar SS300 w/ 3.5 in. to 2.5 in. drive carrier	SSD	SAS 12Gb/s	ME-10DW/D	ISE	400GB	No longer available
Ultrastar SS300 w/ 3.5 in. to 2.5 in. drive carrier	SSD	SAS 12Gb/s	ME-10DW/D	TCG	400GB	No longer available
Ultrastar SS300 w/ 3.5 in. to 2.5 in. drive carrier	SSD	SAS 12Gb/s	ME-10DW/D	TCG-FIPS	400GB	No longer available
Ultrastar SS300 w/ 3.5 in. to 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-3DW/D	SE	800GB	No longer available
Ultrastar SS300 w/ 3.5 in. to 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-3DW/D	ISE	800GB	No longer available
Ultrastar SS300 w/ 3.5 in. to 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-3DW/D	TCG	800GB	No longer available
Ultrastar SS300 w/ 3.5 in. to 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-3DW/D	TCG-FIPS	800GB	No longer available
Ultrastar SS300 w/ 3.5 in. to 2.5 in. drive carrier	SSD	SAS 12Gb/s	ME-10DW/D	SE	800GB	No longer available
Ultrastar SS300 w/ 3.5 in. to 2.5 in. drive carrier	SSD	SAS 12Gb/s	ME-10DW/D	ISE	800GB	No longer available
Ultrastar SS300 w/ 3.5 in. to 2.5 in. drive carrier	SSD	SAS 12Gb/s	ME-10DW/D	TCG	800GB	No longer available
Ultrastar SS300 w/ 3.5 in. to 2.5 in. drive carrier	SSD	SAS 12Gb/s	ME-10DW/D	TCG-FIPS	800GB	No longer available
Ultrastar SS300 w/ 3.5 in. to 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-3DW/D	SE	1.6TB	No longer available
Ultrastar SS300 w/ 3.5 in. to 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-3DW/D	ISE	1.6TB	No longer available
Ultrastar SS300 w/ 3.5 in. to 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-3DW/D	TCG	1.6TB	No longer available
Ultrastar SS300 w/ 3.5 in. to 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-3DW/D	TCG-FIPS	1.6TB	No longer available
Ultrastar SS300 w/ 3.5 in. to 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-10DW/D	SE	1.6TB	No longer available
Ultrastar SS300 w/ 3.5 in. to 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-10DW/D	ISE	1.6TB	No longer available
Ultrastar SS300 w/ 3.5 in. to 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-10DW/D	TCG	1.6TB	No longer available
Ultrastar SS300 w/ 3.5 in. to 2.5 in. drive carrier	SSD	SAS 12Gb/s	ME-10DW/D	TCG-FIPS	1.6TB	No longer available

Drive	Type	Interface	Drive Writes	Encryption	Volume	Part Number
Ultrastar SS300 w/ 3.5 in. to 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-3DW/D	SE	3.2TB	No longer available
Ultrastar SS300 w/ 3.5 in. to 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-3DW/D	ISE	3.2TB	No longer available

Table 33: Western Digital Ultrastar SS530

Drive	Type	Interface	Drive Writes	Encryption	Volume	Part Number
Ultrastar SS530 w/ 3.5 in. to 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-3DW/D	SE	400GB	1EX2020
Ultrastar SS530 w/ 3.5 in. to 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-3DW/D	ISE	400GB	1EX2021
Ultrastar SS530 w/ 3.5 in. to 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-3DW/D	TCG	400GB	1EX2087
Ultrastar SS530 w/ 3.5 in. to 2.5 in. drive carrier	SSD	SAS 12Gb/s	ME-10DW/D	SE	400GB	1EX2012
Ultrastar SS530 w/ 3.5 in. to 2.5 in. drive carrier	SSD	SAS 12Gb/s	ME-10DW/D	ISE	400GB	1EX2013
Ultrastar SS530 w/ 3.5 in. to 2.5 in. drive carrier	SSD	SAS 12Gb/s	ME-10DW/D	TCG	400GB	1EX2083
Ultrastar SS530 w/ 3.5 in. to 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-1DW/D	SE	480GB	1EX2030
Ultrastar SS530 w/ 3.5 in. to 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-1DW/D	ISE	480GB	1EX2031
Ultrastar SS530 w/ 3.5 in. to 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-1DW/D	TCG	480GB	1EX2092
Ultrastar SS530 w/ 3.5 in. to 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-3DW/D	SE	800GB	1EX2022
Ultrastar SS530 w/ 3.5 in. to 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-3DW/D	ISE	800GB	1EX2023
Ultrastar SS530 w/ 3.5 in. to 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-3DW/D	TCG	800GB	1EX2088
Ultrastar SS530 w/ 3.5 in. to 2.5 in. drive carrier	SSD	SAS 12Gb/s	ME-10DW/D	SE	800GB	1EX2014
Ultrastar SS530 w/ 3.5 in. to 2.5 in. drive carrier	SSD	SAS 12Gb/s	ME-10DW/D	ISE	800GB	1EX2015
Ultrastar SS530 w/ 3.5 in. to 2.5 in. drive carrier	SSD	SAS 12Gb/s	ME-10DW/D	TCG	800GB	1EX2084
Ultrastar SS530 w/ 3.5 in. to 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-1DW/D	SE	960GB	1EX2032
Ultrastar SS530	SSD	SAS 12Gb/s	RI-1DW/D	ISE	960GB	1EX2033

Drive	Type	Interface	Drive Writes	Encryption	Volume	Part Number
w/ 3.5 in. to 2.5 in. drive carrier						
Ultrastar SS530 w/ 3.5 in. to 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-1DW/D	TCG	960GB	1EX2093
Ultrastar SS530 w/ 3.5 in. to 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-3DW/D	SE	1.6TB	1EX2024
Ultrastar SS530 w/ 3.5 in. to 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-3DW/D	ISE	1.6TB	1EX2025
Ultrastar SS530 w/ 3.5 in. to 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-3DW/D	TCG	1.6TB	1EX2089
Ultrastar SS530 w/ 3.5 in. to 2.5 in. drive carrier	SSD	SAS 12Gb/s	ME-10DW/D	SE	1.6TB	1EX2016
Ultrastar SS530 w/ 3.5 in. to 2.5 in. drive carrier	SSD	SAS 12Gb/s	ME-10DW/D	ISE	1.6TB	1EX2017
Ultrastar SS530 w/ 3.5 in. to 2.5 in. drive carrier	SSD	SAS 12Gb/s	ME-10DW/D	TCG	1.6TB	1EX2085
Ultrastar SS530 w/ 3.5 in. to 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-1DW/D	SE	1.92TB	1EX2034
Ultrastar SS530 w/ 3.5 in. to 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-1DW/D	ISE	1.92TB	1EX2035
Ultrastar SS530 w/ 3.5 in. to 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-1DW/D	TCG	1.92TB	1EX2094
Ultrastar SS530 w/ 3.5 in. to 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-3DW/D	SE	3.2TB	1EX2026
Ultrastar SS530 w/ 3.5 in. to 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-3DW/D	ISE	3.2TB	1EX2027
Ultrastar SS530 w/ 3.5 in. to 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-3DW/D	TCG	3.2TB	1EX2090
Ultrastar SS530 w/ 3.5 in. to 2.5 in. drive carrier	SSD	SAS 12Gb/s	ME-10DW/D	SE	3.2TB	1EX2018
Ultrastar SS530 w/ 3.5 in. to 2.5 in. drive carrier	SSD	SAS 12Gb/s	ME-10DW/D	ISE	3.2TB	1EX2019
Ultrastar SS530 w/ 3.5 in. to 2.5 in. drive carrier	SSD	SAS 12Gb/s	ME-10DW/D	TCG	3.2TB	1EX2086
Ultrastar SS530 w/ 3.5 in. to 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-1DW/D	SE	3.84TB	1EX2036
Ultrastar SS530 w/ 3.5 in. to 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-1DW/D	ISE	3.84TB	1EX2037
Ultrastar SS530 w/ 3.5 in. to 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-1DW/D	TCG	3.84TB	1EX2095
Ultrastar SS530 w/ 3.5 in. to 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-3DW/D	SE	6.4TB	1EX2028

Drive	Type	Interface	Drive Writes	Encryption	Volume	Part Number
Ultrastar SS530 w/ 3.5 in. to 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-3DW/D	ISE	6.4TB	1EX2029
Ultrastar SS530 w/ 3.5 in. to 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-3DW/D	TCG	6.4TB	1EX2091
Ultrastar SS530 w/ 3.5 in. to 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-1DW/D	SE	7.68TB	1EX2038
Ultrastar SS530 w/ 3.5 in. to 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-1DW/D	ISE	7.68TB	1EX2039
Ultrastar SS530 w/ 3.5 in. to 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-1DW/D	TCG	7.68TB	1EX2096
Ultrastar SS530 w/ 3.5 in. to 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-1DW/D	SE	15.36TB	1EX2040
Ultrastar SS530 w/ 3.5 in. to 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-1DW/D	ISE	15.36TB	1EX2041
Ultrastar SS530 w/ 3.5 in. to 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-1DW/D	TCG	15.36TB	1EX2097

Table 34: Western Digital Ultrastar SS540

Drive	Type	Interface	Drive Writes	Encryption	Volume	Part Number
Ultrastar SS540 w/ 3.5 in. to 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-3DW/D	SE	800GB	1EX2672
Ultrastar SS540 w/ 3.5 in. to 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-3DW/D	ISE	800GB	1EX2673
Ultrastar SS540 w/ 3.5 in. to 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-3DW/D	TCG	800GB	1EX2674
Ultrastar SS540 w/ 3.5 in. to 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-3DW/D	TCG-FIPS	800GB	1EX2675
Ultrastar SS540 w/ 3.5 in. to 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-1DW/D	SE	960GB	1EX2692
Ultrastar SS540 w/ 3.5 in. to 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-1DW/D	ISE	960GB	1EX2693
Ultrastar SS540 w/ 3.5 in. to 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-1DW/D	TCG	960GB	1EX2694
Ultrastar SS540 w/ 3.5 in. to 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-1DW/D	TCG-FIPS	960GB	1EX2695
Ultrastar SS540 w/ 3.5 in. to 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-3DW/D	SE	1.6TB	1EX2668
Ultrastar SS540 w/ 3.5 in. to 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-3DW/D	ISE	1.6TB	1EX2669
Ultrastar SS540	SSD	SAS 12Gb/s	RI-3DW/D	TCG	1.6TB	1EX2670

Drive	Type	Interface	Drive Writes	Encryption	Volume	Part Number
w/ 3.5 in. to 2.5 in. drive carrier						
Ultrastar SS540 w/ 3.5 in. to 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-3DW/D	TCG-FIPS	1.6TB	1EX2671
Ultrastar SS540 w/ 3.5 in. to 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-1DW/D	SE	1.92TB	1EX2688
Ultrastar SS540 w/ 3.5 in. to 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-1DW/D	ISE	1.92TB	1EX2689
Ultrastar SS540 w/ 3.5 in. to 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-1DW/D	TCG	1.92TB	1EX2690
Ultrastar SS540 w/ 3.5 in. to 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-1DW/D	TCG-FIPS	1.92TB	1EX2691
Ultrastar SS540 w/ 3.5 in. to 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-3DW/D	SE	3.2TB	1EX2664
Ultrastar SS540 w/ 3.5 in. to 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-3DW/D	ISE	3.2TB	1EX2665
Ultrastar SS540 w/ 3.5 in. to 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-3DW/D	TCG	3.2TB	1EX2666
Ultrastar SS540 w/ 3.5 in. to 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-3DW/D	TCG-FIPS	3.2TB	1EX2667
Ultrastar SS540 w/ 3.5 in. to 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-1DW/D	SE	3.84TB	1EX2684
Ultrastar SS540 w/ 3.5 in. to 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-1DW/D	ISE	3.84TB	1EX2685
Ultrastar SS540 w/ 3.5 in. to 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-1DW/D	TCG	3.84TB	1EX2686
Ultrastar SS540 w/ 3.5 in. to 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-1DW/D	TCG-FIPS	3.84TB	1EX2687
Ultrastar SS540 w/ 3.5 in. to 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-3DW/D	SE	6.4TB	1EX2660
Ultrastar SS540 w/ 3.5 in. to 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-3DW/D	ISE	6.4TB	1EX2661
Ultrastar SS540 w/ 3.5 in. to 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-3DW/D	TCG	6.4TB	1EX2662
Ultrastar SS540 w/ 3.5 in. to 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-3DW/D	TCG-FIPS	6.4TB	1EX2663
Ultrastar SS540 w/ 3.5 in. to 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-1DW/D	SE	7.68TB	1EX2680
Ultrastar SS540 w/ 3.5 in. to 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-1DW/D	ISE	7.68TB	1EX2681
Ultrastar SS540 w/ 3.5 in. to 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-1DW/D	TCG	7.68TB	1EX2682

Drive	Type	Interface	Drive Writes	Encryption	Volume	Part Number
Ultrastar SS540 w/ 3.5 in. to 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-1DW/D	TCG-FIPS	7.68TB	1EX2683
Ultrastar SS540 w/ 3.5 in. to 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-1DW/D	SE	15.36TB	1EX2676
Ultrastar SS540 w/ 3.5 in. to 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-1DW/D	ISE	15.36TB	1EX2677
Ultrastar SS540 w/ 3.5 in. to 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-1DW/D	TCG	15.36TB	1EX2678
Ultrastar SS540 w/ 3.5 in. to 2.5 in. drive carrier	SSD	SAS 12Gb/s	RI-1DW/D	TCG-FIPS	15.36TB	1EX2679

Table 35: Western Digital Ultrastar SA620

Drive	Type	Interface	Drive Writes	Encryption	Volume	Part Number
Ultrastar SA620 w/ 3.5 in. to 2.5 in. drive carrier	SSD	SATA 6Gb/s	RI-1.8DW/D	SE	400GB	No longer available
Ultrastar SA620 w/ 3.5 in. to 2.5 in. drive carrier	SSD	SATA 6Gb/s	RI-1.8DW/D	ISE	400GB	No longer available
Ultrastar SA620 w/ 3.5 in. to 2.5 in. drive carrier	SSD	SATA 6Gb/s	RI-0.6DW/D	SE	480GB	No longer available
Ultrastar SA620 w/ 3.5 in. to 2.5 in. drive carrier	SSD	SATA 6Gb/s	RI-0.6DW/D	ISE	480GB	No longer available
Ultrastar SA620 w/ 3.5 in. to 2.5 in. drive carrier	SSD	SATA 6Gb/s	RI-1.8DW/D	SE	800GB	No longer available
Ultrastar SA620 w/ 3.5 in. to 2.5 in. drive carrier	SSD	SATA 6Gb/s	RI-1.8DW/D	ISE	800GB	No longer available
Ultrastar SA620 w/ 3.5 in. to 2.5 in. drive carrier	SSD	SATA 6Gb/s	RI-0.6DW/D	SE	960GB	No longer available
Ultrastar SA620 w/ 3.5 in. to 2.5 in. drive carrier	SSD	SATA 6Gb/s	RI-0.6DW/D	ISE	960GB	No longer available
Ultrastar SA620 w/ 3.5 in. to 2.5 in. drive carrier	SSD	SATA 6Gb/s	RI-1.8DW/D	SE	1.6TB	No longer available
Ultrastar SA620 w/ 3.5 in. to 2.5 in. drive carrier	SSD	SATA 6Gb/s	RI-1.8DW/D	ISE	1.6TB	No longer available
Ultrastar SA620 w/ 3.5 in. to 2.5 in. drive carrier	SSD	SATA 6Gb/s	RI-0.6DW/D	SE	1.92TB	No longer available
Ultrastar SA620 w/ 3.5 in. to 2.5 in. drive carrier	SSD	SATA 6Gb/s	RI-0.6DW/D	ISE	1.92TB	No longer available

M.2

Table 36: Western Digital Ultrastar SA210

Drive	Type	Form Factor	Interface	Encryption	Volume	Part Number
Ultrastar SA210 M.2	SSD	M.2 2280	SATA 6Gb/s	SED	120GB	1EX1143
Ultrastar SA210 M.2	SSD	M.2 2280	SATA 6Gb/s	SED	240GB	1EX1354
Ultrastar SA210 M.2	SSD	M.2 2280	SATA 6Gb/s	SED	480GB	1EX1579
Ultrastar SA210 M.2	SSD	M.2 2280	SATA 6Gb/s	SED	960GB	1EX1580
Ultrastar SA210 M.2	SSD	M.2 2280	SATA 6Gb/s	SED	1.92TB	1EX1581

Table 37: Sandisk X600

Drive	Type	Form Factor	Interface	Encryption	Volume	Part Number
Sandisk X600 M.2	SSD	M.2 2280	SATA 6Gb/s	—	128GB	1EX1569
Sandisk X600 M.2	SSD	M.2 2280	SATA 6Gb/s	SED	128GB	1EX1574
Sandisk X600 M.2	SSD	M.2 2280	SATA 6Gb/s	—	256GB	1EX1570
Sandisk X600 M.2	SSD	M.2 2280	SATA 6Gb/s	SED	256GB	1EX1575
Sandisk X600 M.2	SSD	M.2 2280	SATA 6Gb/s	—	512GB	1EX1571
Sandisk X600 M.2	SSD	M.2 2280	SATA 6Gb/s	SED	512GB	1EX1576
Sandisk X600 M.2	SSD	M.2 2280	SATA 6Gb/s	—	1TB	1EX1572
Sandisk X600 M.2	SSD	M.2 2280	SATA 6Gb/s	SED	1TB	1EX1577
Sandisk X600 M.2	SSD	M.2 2280	SATA 6Gb/s	—	2TB	1EX1573
Sandisk X600 M.2	SSD	M.2 2280	SATA 6Gb/s	SED	2TB	1EX1578

Components

This section is intended to give an overview of all of the major components contained within the Ultrastar Serv60+8 . Each section includes specifications, descriptions, and images that explain the features of each component.

In This Chapter:

2.1 Chassis

Figure 15: Ultrastar Serv60+8 Chassis

The chassis is the primary housing that contains and connects all of the system components of the Ultrastar Serv60+8 . The chassis is comprised of the drive bay that contains all of the system data storage drives and a number of other bays that contain the major system components, such as the PSUs and IOM. Other system components are attached to the exterior of the chassis, such as the rails, to provide rackmounting capability. The chassis also houses the baseboard, which is mounted inside the bottom of the chassis and is the primary data pathway that connects the HDDs to the IOM. The chassis has internal backflow preventers to prevent hot air from re-entering the drives bays.

2.1.1 Chassis Specifications

Specification	Value
Dimensions	450 mm (W) x 1026 mm (L) x 172.7 mm (H) / 17.72 in. (W) x 40.39 in. (L) x 6.8 in. (H)
Part Number	1EX0506 (L6 part number)
Hot Swappable?	No
Weight	40.82 kg / 90 lbs

2.1.2 Chassis Layout

Figure 16: Chassis Component Locations
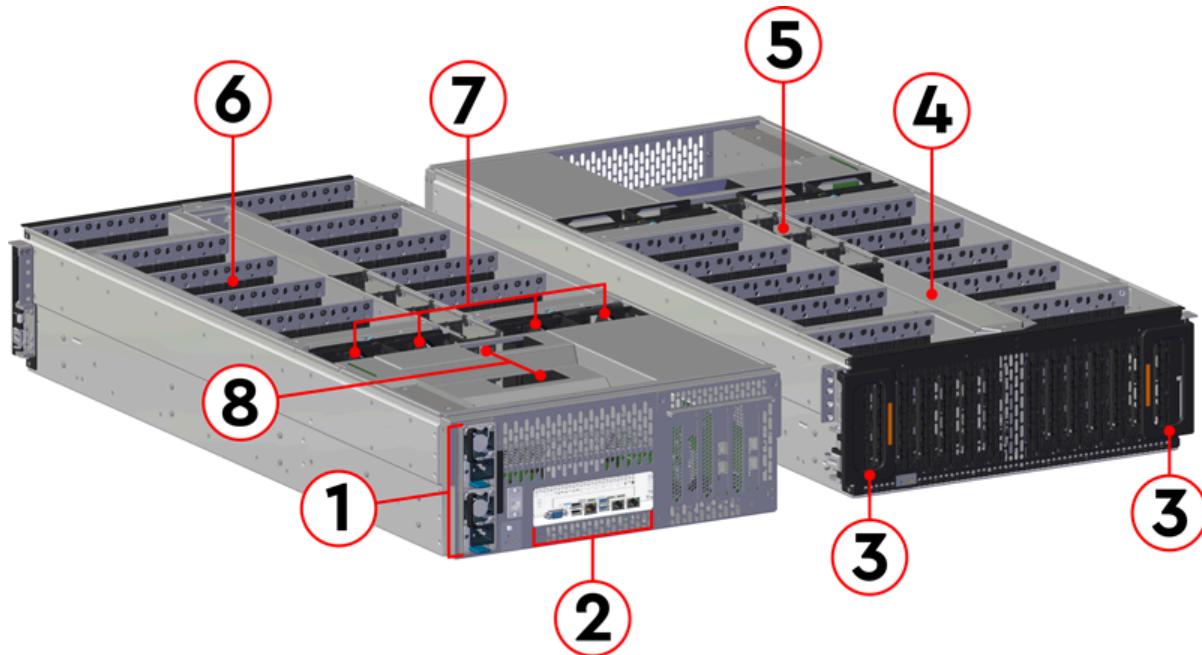
Table 38: Chassis Component Descriptions

Number	Feature
1	Top bay: PSU A Bottom bay: PSU B
2	Server IO
3	Chassis Handles
4	IOM Bay
5	SSD Drive Bays
6	HDD Drive Bays
7	System Fan Slots
8	System Fan Slots (center channel)

The chassis has a removable cover that encloses the internal system components and ensures proper airflow. The drive bays are comprised of sections that isolate the data storage drives from transmitting vibration to one another. There is a long central bay that contains the enclosure's IOM and the system SSDs. There is a large compartment at the back that houses the server motherboard, the internal cooling fans and the PSUs. The front of the chassis has a metal mesh cover and two handles that swing out from the chassis that are used to extend the enclosure out of the rack when pulled. There are two rack ears at the front of the enclosure that are used to secure the enclosure to the rack for shipping purposes.

2.2 IOM

Figure 17: Ultrastar Serv60+8 IOM
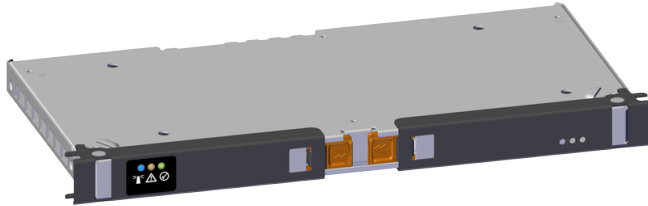
The IOM provides system data connectivity through 4 Mini-SAS HD ports, each capable of four 12Gbps SAS connections. The IOM is installed into the central bay from the top of the Chassis and connects to the drive board. The baseboard completes the connection to the Mini-SAS HD ports The IOM contains a primary and two secondary SAS expander chips, and an out-of-band management (OOBM) chip that connects to the management port on the rear of the enclosure.

2.2.1 IOM Specifications

Specification	Value
Connector Type	x4 HD Mini-SAS (connected externally at the rear of the enclosure)
Number per Enclosure	1
Part Number	1EX2201
Hot Swappable?	No
FRU or CRU?	CRU
Weight	1.27 kg / 2.8 lbs

2.2.2 IOM Layout

Figure 18: IOM Component Locations
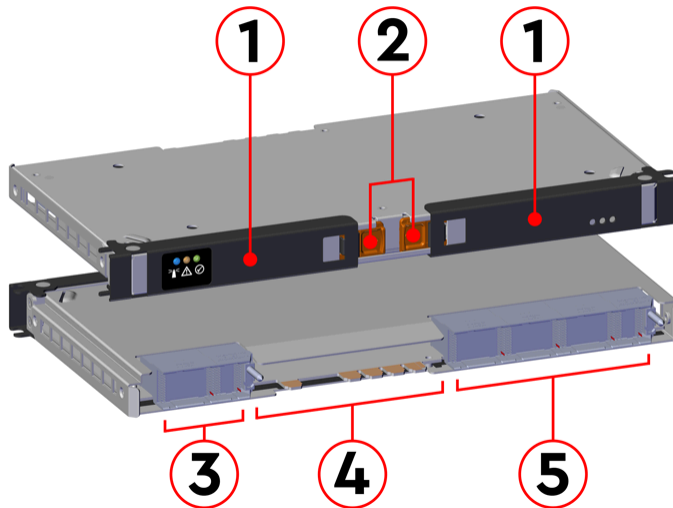
Table 39: IOM Component Descriptions

Number	Feature
1	IOM Handles
2	Latch Release
3	Internal IO Connector
4	Card Edge Power Receptacle
5	Internal IO Connector

2.2.3 IOM Blank

Figure 19: Ultrastar Serv60+8 IOM Blank
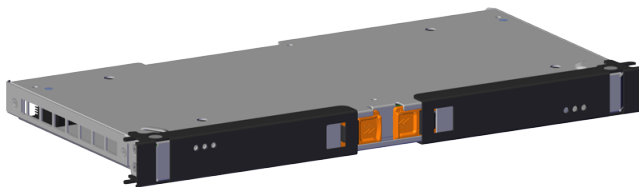
The IOM Blank is a placeholder component for filling the unused IOM slot. The IOM Blank may only be installed into IOM slot B under all circumstances. From the front of the enclosure, slot B is the left-hand slot. It is necessary to have a blank installed in this unused slot in order to ensure the airflow remains within the operational parameters designed for the enclosure; the IOM Blank has no function beyond this.

2.3 PSU

Figure 20: Ultrastar Serv60+8 PSU
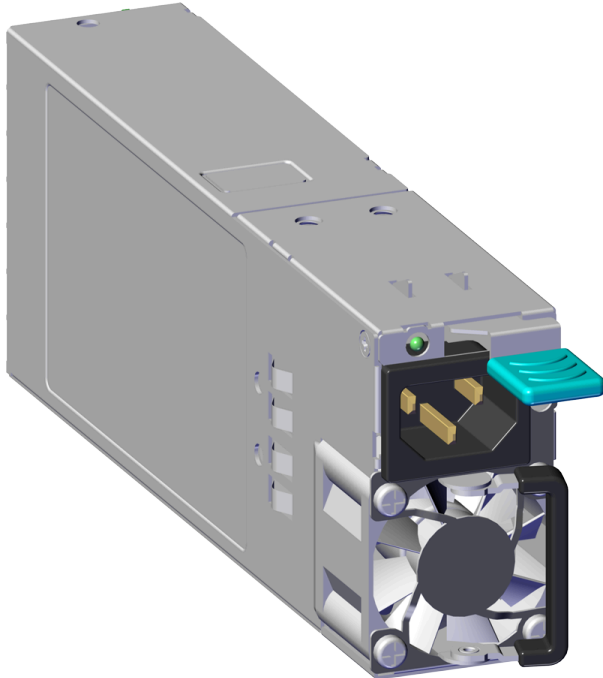
The Ultrastar Serv60+8 contains redundant 2000W Power Supply Units (PSUs). Each PSU requires an input voltage between 200 - 240 VAC. The PSUs are 80 PLUS Platinum certified and utilize C14 power cable receptacles.

2.3.1 PSU Specifications

Specification	Value
Power Output	2000W
80 PLUS Standard	Platinum
Input Voltage	200 - 240 VAC
Connector Type	C14
Number per Enclosure	2
Part Number	1EX1171
Hot Swappable?	Yes
FRU or CRU?	CRU
Weight	1 kg / 2.2 lbs.

2.3.2 PSU Layout

Figure 21: PSU Component Locations
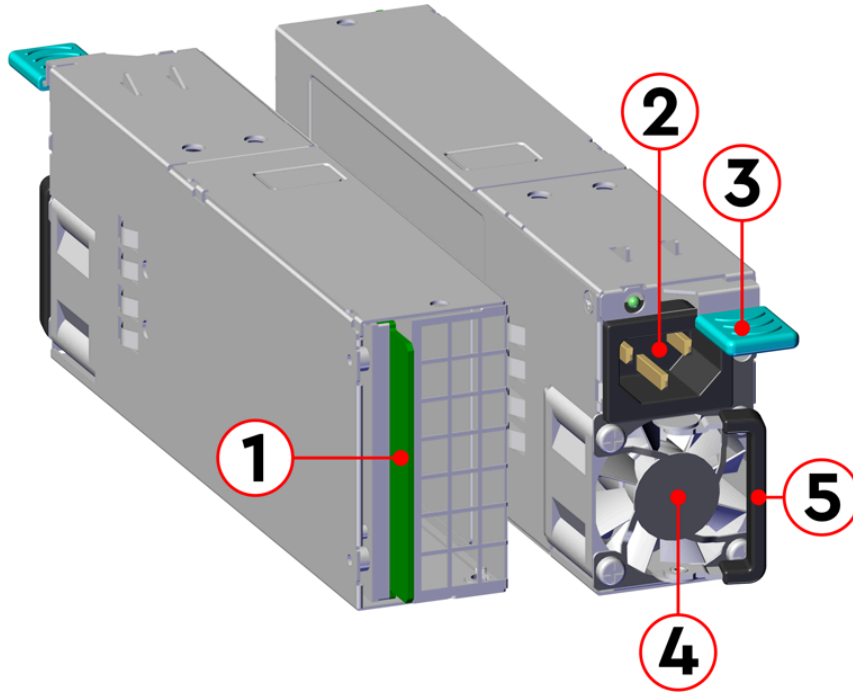
Table 40: PSU Component Descriptions

Number	Feature
1	Internal Connector
2	C14 Power Receptacle
3	Latch Release Lever
4	Fan
5	Handle

2.4 System Fan

Figure 22: Ultrastar Serv60+8 System Fan

The four System Fans are toolless fan modules that provide the primary system cooling for the Ultrastar Serv60+8 . They are located internally, behind the drive bays and above the motherboard.

2.5 Rails
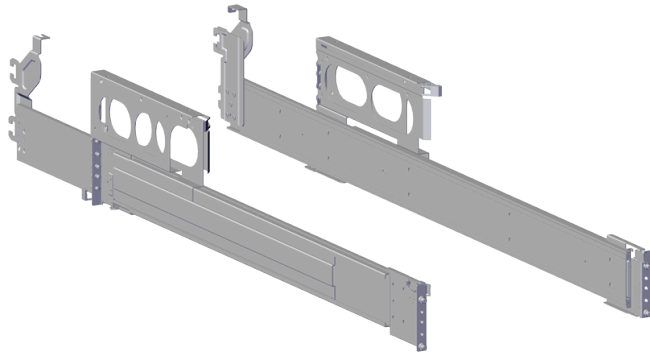
The Ultrastar Serv60+8 is installed into a rack using a toolless-attach rail system. Each rail is a two-piece assembly, with one rail that attaches directly to the chassis (*inner rail*) and another (*outer rail*) that attaches to the rack. The inner rail comes nested inside the outer rail and can be accessed by sliding it out of the outer rail. The outer rails attach to the rack and receive the chassis to support it inside the rack. The outer rails attach to vertical rack rails, which should be set between 32 in.-36 in. The toolless design allows an installer to attach the rails to a rack without any tools, which simplifies installation. Once they are attached, they can be secured with the included M5 screws and washers.

2.5.1 Rails Specifications

Specification	Value
Length	1028.7 mm / 40.5 in.
Part Number	1EX0435
Hot Swappable?	No
FRU or CRU?	CRU
Weight	7.89 kg total (3.95 kg per rail) / 17.4 lbs. total (8.7 per rail)

2.5.2 Rails Layout

Figure 24: Rails Component Locations
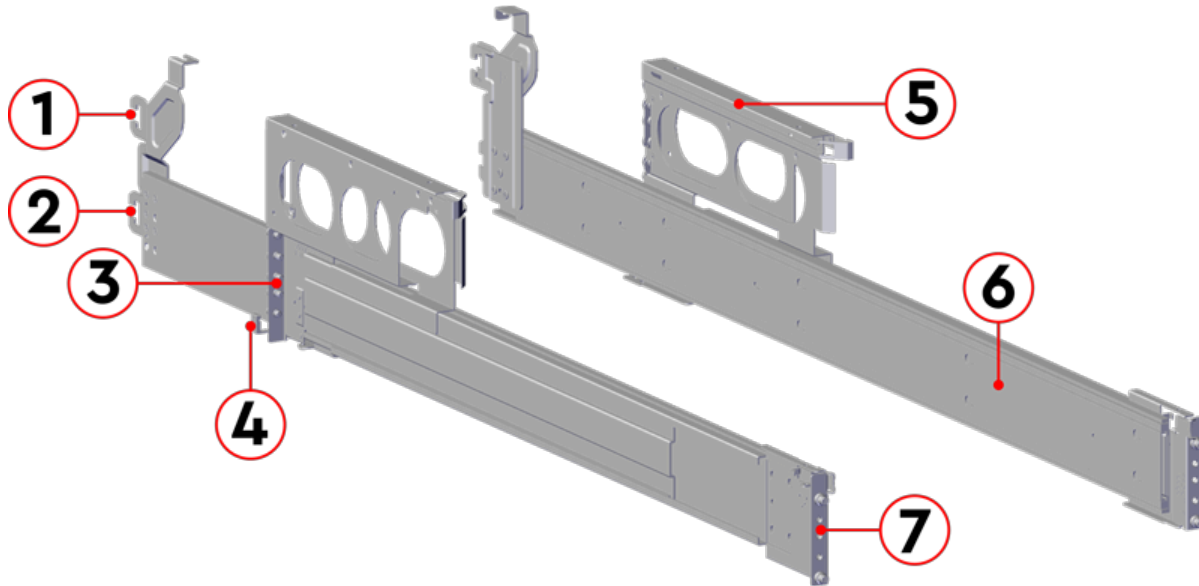
Table 41: Rails Component Descriptions

Number	Features
1	Upper CMA Connector
2	Lower CMA Connector
3	Rear Rack Mounting Bracket
4	Rear Latch Release
5	Rear Cover Alignment Bracket
6	Inner Rail
7	Front Rack Mounting Bracket and Latch Release

2.5.3 Rear Cover Alignment Bracket

Figure 25: Ultrastar Serv60+8 Rear Cover Alignment Brackets

The Rear Cover Alignment Brackets are designed to keep the top cover of the Chassis in the rack while extending the Ultrastar Serv60+8 out of the rack for servicing. The Rear Cover Alignment Brackets attach to the rear vertical rack rails and rest on top of the toolless rail system.

2.6 CMA

Figure 26: Ultrastar Serv60+8 CMA
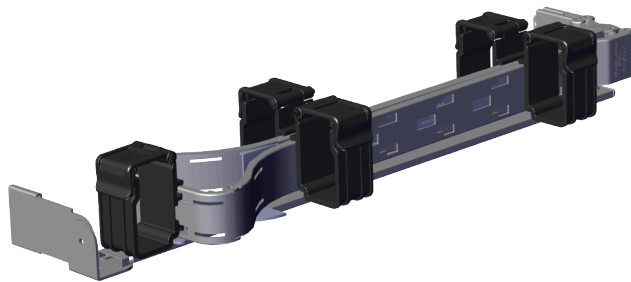
The cable management assembly (CMA) protects and manages the cables connected to the PSU ports, SAS ports, and Ethernet ports. It prevents damage to the port connectors and the cables throughout the full travel of the enclosure as it is pulled out of the rack for servicing. This motion ensures that the cables contained by the CMA arm do not snag or get pulled out of the ports as the enclosure moves.

The Ultrastar Serv60+8 CMA is a single-arm design that supports all of the cabling used in the enclosure. The cables are secured to the arm by plastic clips called baskets that can be opened at the top to adjust, add, or remove cables. The arm can also be moved into a service position by unclipping it from the elbow end of the arm and swinging away from the enclosure when the enclosure is fully inserted in a rack. This provides access to connections and components at the rear of the system without having to remove the CMA or disconnect any of the cabling.

2.6.1 CMA Specifications

Specification	Value
Extension Range	0 - 36 in.
Part Number	
Hot Swappable?	No
Maximum Number of Cables	12 SAS Cables
	2 Power Cords
	2 Ethernet Cables
FRU or CRU?	CRU
Weight	1.54 kg (0.77 per arm) / 3.4 lbs. (1.7 per arm)

2.6.2 CMA Layout

Figure 27: CMA Component Locations
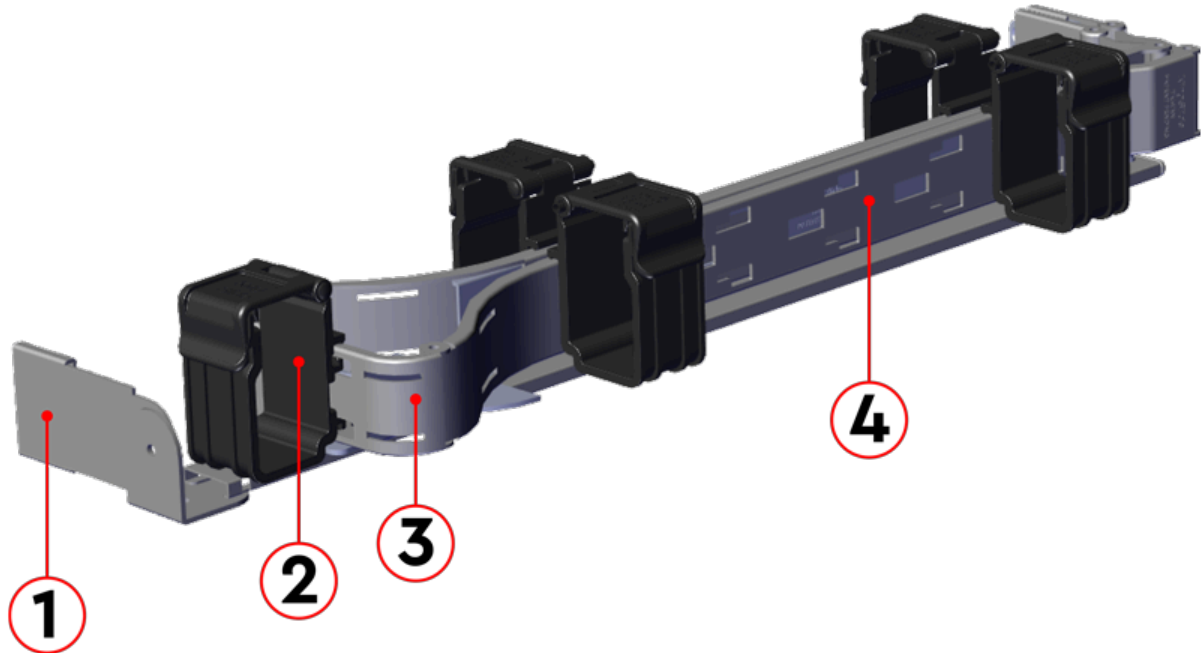
Table 42: CMA Component Descriptions

Number	Feature
1	Rail and Rack Connectors
2	Baskets (retain cables)
3	Elbow
4	Arm

2.7 CMA Lite

Figure 28: Ultrastar Serv60+8 CMA Lite
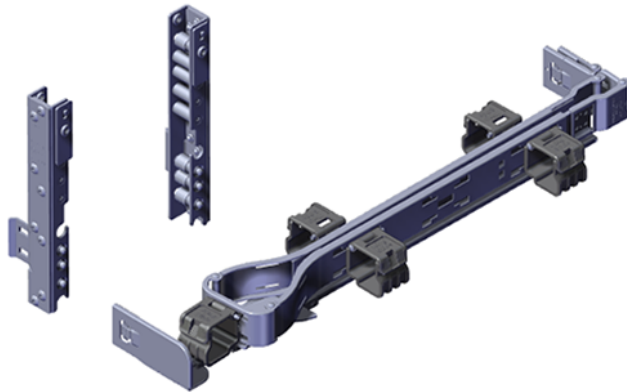
The lite version of cable management assembly (CMA Lite) provides the same cable management and protection benefits as the standard CMA for a lighter cable load (2 SAS, 2 power, 2 Ethernet). It features modified cable and enclosure positioning to allow the enclosure to fit within racks that utilize front and rear doors.

CMA Lite manages the cables connected to the PSU ports, SAS ports, and Ethernet ports by securing them to an extendable arm with basket clips that can be opened at the top to adjust, add, or remove cables. The extension of the arm prevents damage or unplugging of the port connectors and cables throughout the full travel of the enclosure as it is pulled out of the rack for servicing. The arm can also be moved into a service position by unclipping it at the elbow end and swinging it away from the enclosure when the enclosure is fully inserted in a rack. This provides access to connections and components at the rear of the system without having to remove the assembly or disconnect any of the cabling.

2.7.1 CMA Lite Specifications

Specification	Value
Extension Range	0 - 39.5 in.
Part Number	1EX1834
Maximum Number of Cables	2 SAS Cables
	2 Power Cords
	2 Ethernet Cables
Hot Swappable?	No
FRU or CRU?	CRU
Weight	0.9 kg / 1.9 lbs

2.7.2 CMA Lite Layout

Figure 29: CMA Lite Component Locations
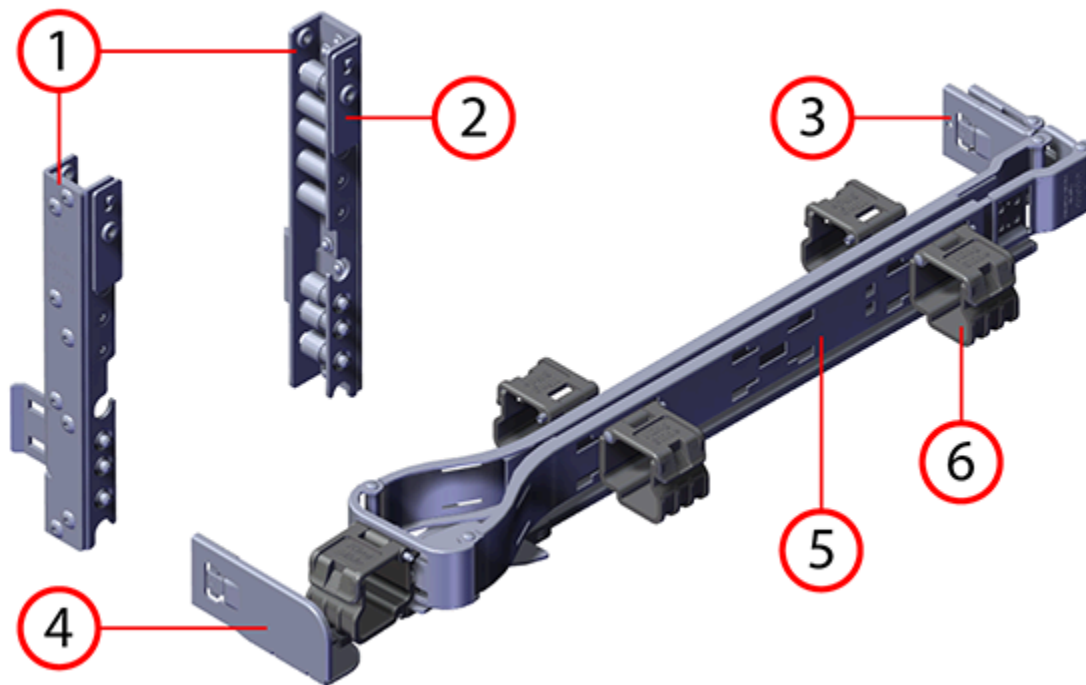
Table 43: CMA Lite Component Descriptions

Number	Feature
1	Spacer Brackets
2	Nut Plate
3	Rail and Rack Connectors
4	Elbow connector
5	Arm
6	Basket Clips (retain cables)

2.8 3.5in HDD Assembly

Figure 30: Ultrastar Serv60+8 3.5in HDD Assembly

The 3.5in HDD Assembly is comprised of two parts: the storage drive and the drive carrier. The carrier attaches to the exterior of the data storage drive and caddies the drive into the enclosure. It stabilizes the motion of the drive into the drive bay so that the drive properly mounts onto the drive board.

2.8.1 3.5in HDD Assembly Specifications

Specification	Value
Number per Enclosure	up to 60 drives
Part Number	See the List of Compatible Drives *(page 22)* to find the specific part number required.
Hot Swappable?	Yes
Weight	.68 kg / 1.5 lbs.

2.8.2 3.5in HDD Assembly Layout

Figure 31: 3.5in HDD Assembly Component Locations
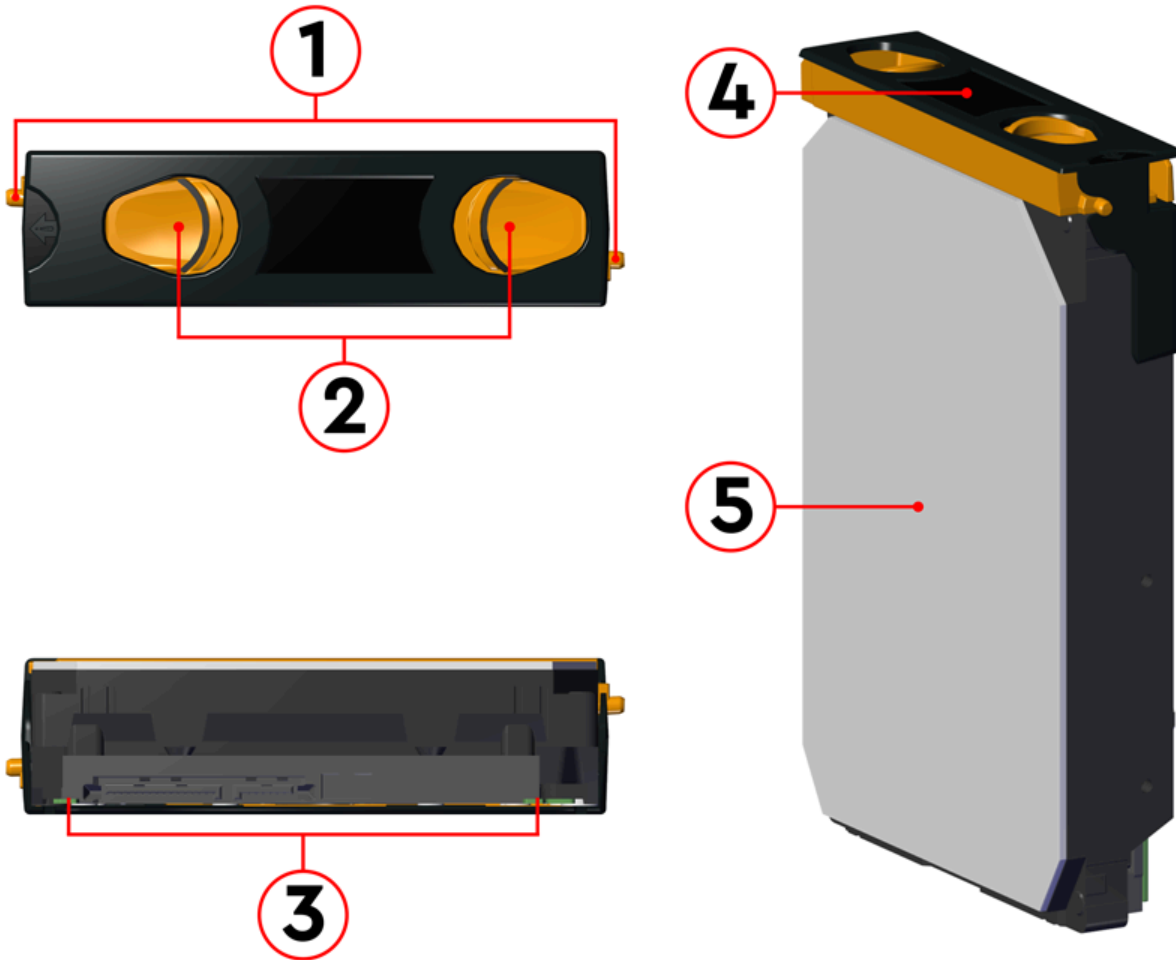
Table 44: 3.5in HDD Assembly Component Descriptions

Number	Feature
1	Latches
2	Latch Release
3	IO and Power Connectors
4	Drive Carrier
5	Disk Drive

2.8.3 3.5in Drive Blank

Figure 32: Ultrastar Serv60+8 3.5in Drive Blank
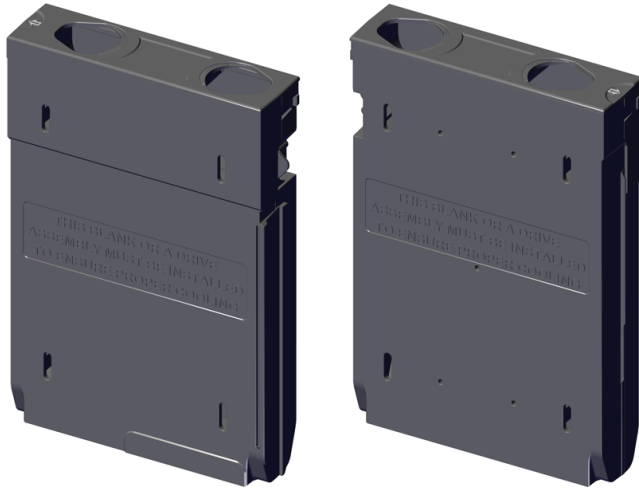
The 3.5in Drive Blank is a placeholder component used to fill empty drive slots in the chassis when an Ultrastar Serv60+8 enclosure is partially populated with drives. When the number of drives in a row is less than the total necessary to fill that row, the 3.5in Drive Blank is used to fill out the row in place of actual drives. The purpose of the 3.5in Drive Blank is to maintain proper airflow and cooling of the enclosure and the components within the enclosure. For more information on requirements for a partially populated enclosure, see Partial Population Configurations *(page 387)*.

2.9 2.5in SSD Assembly

Figure 33: 2.5in SSD Assembly Component Locations
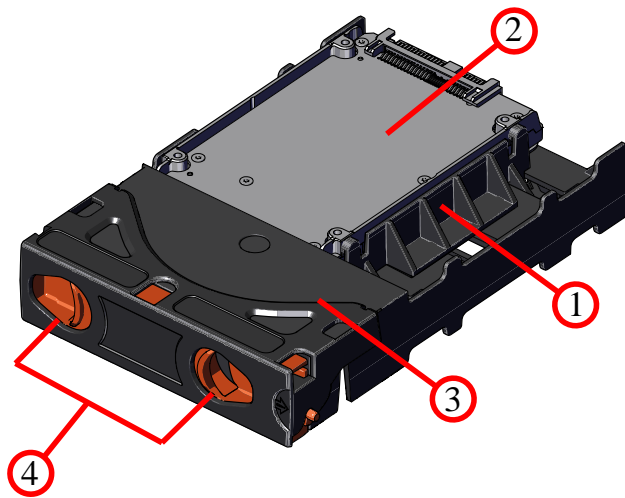
The 2.5in SSD Assembly is used to adapt a 2.5" form factor SSD to the 3.5" drive slots in the Ultrastar Serv60+8 drive bays. This allows the enclosure to accommodate high speed SSD drives as its primary data storage medium. The carrier operates by utilizing an innovative clamping mechanism. The 2.5" drive is seated in the orientation shown the overview image. Then the clamp is inserted to apply pressure to the SSD and secure it in place.

Table 45: 2.5in SSD Assembly Component Descriptions

Number	Feature
1	Drive Holder Clamp
2	SSD
3	Carrier Shell
4	Drive Latch Release

2.9.1 Operating the 2.5" Drive Carrier

Follow these steps to operate the clamping mechanism and install a 2.5" drive in the carrier.

Step 1: Locate the release clips on the rear and press them inward to release the clamp.

Figure 34: Clamp Release (clamp shown in blue for visual clarity)
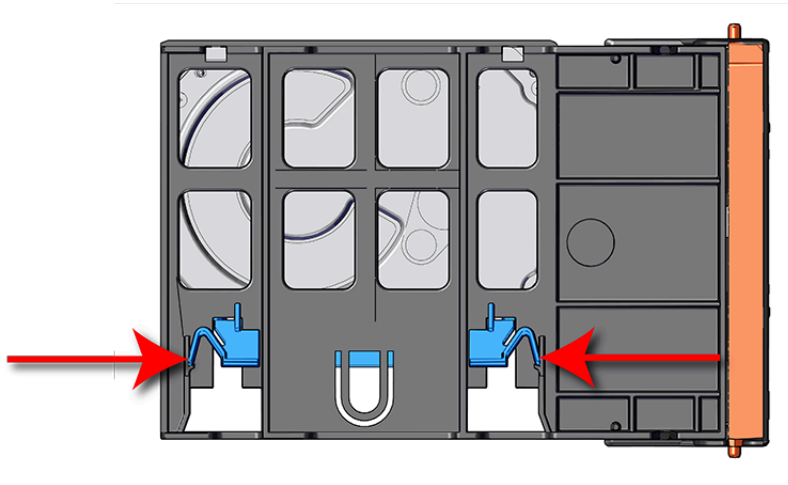
Step 2 : Slide the clamp in the direction shown in the following image to loosen it from the drive. Be sure not to slide too far as this will allow the clamp to fall from the carrier body and it will have to be reinstalled.

Figure 35: Clamp Slide (clamp shown in blue for visual clarity)
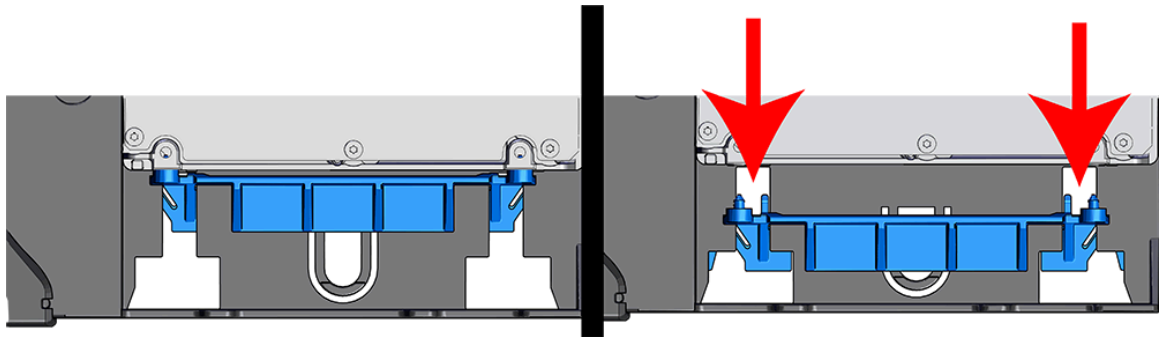
Step 3 : Insert the 2.5" drive into the drive slot so that it is snug into the corner.

Step 4 : Slide the clamp back toward the drive making sure that the two plastic pins on the side of the drive properly install into the drive screwholes. If these pins are not seated properly, unlatch the clamp and retry.

Figure 36: Clamp Pins (clamp shown in blue for visual clarity)
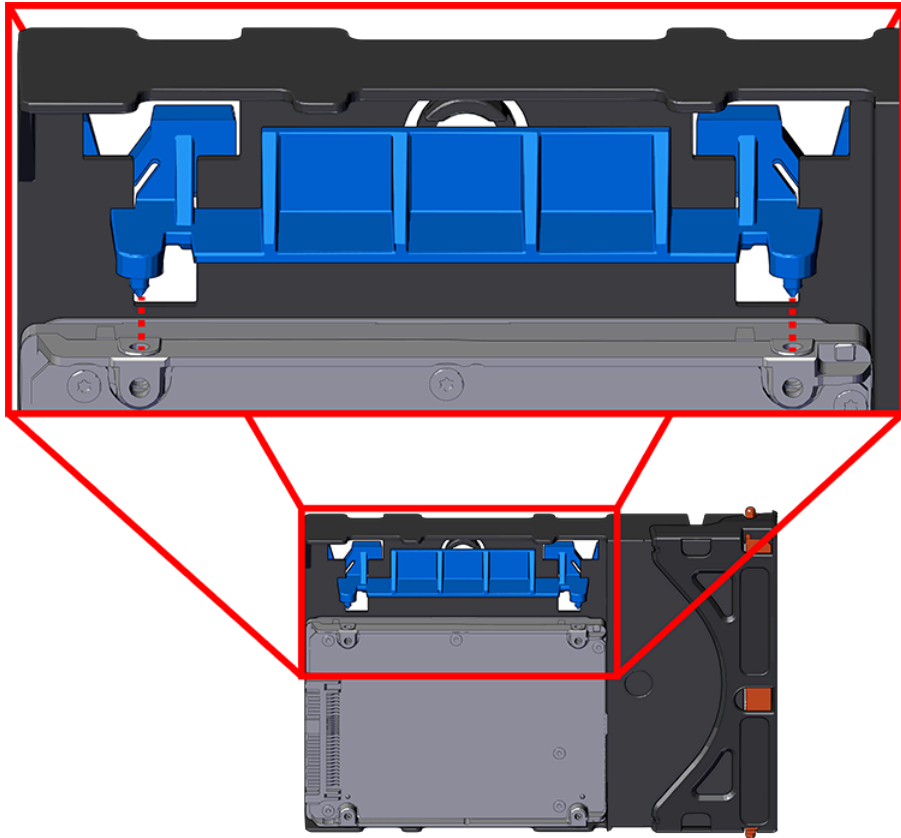
2.10 System SSD

Figure 37: Ultrastar Serv60+8 System SSD

The system SSD slots are located in the center channel inside the enclosure. These drives can be used in the same fashion as the 3.5" drives populating the major data storage bays in the Ultrastar Serv60+8 . They are accessible via the storage subsystem architecture through SES or through the Redfish OOBM.

2.10.1 System SSD Specifications

Specification	Value
Number per Enclosure	Up to 8
Part Number	See the List of Compatible Drives *(page 22)* to find the specific part number required.
Hot Swappable?	Yes
Weight	.14 kg / .31 lbs.

2.10.2 System SSD Blank

Figure 38: Ultrastar Serv60+8 System SSD Blank
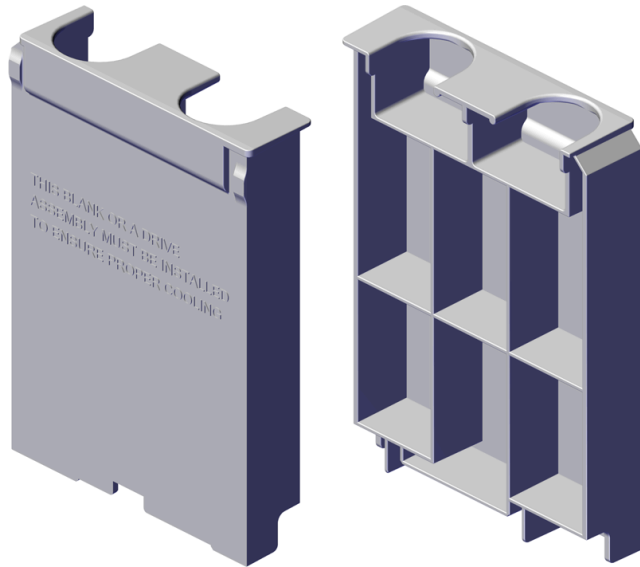
The System SSD Blank is a placeholder component used to fill empty system SSD slots in the Ultrastar Serv60+8 . When the number of System SSDs is less than the total necessary to fill all the slots in the center channel of the chassis, the System SSD Blank is used to fill out the row in place of actual drives. The purpose of the System SSD Blank is to maintain proper airflow and cooling of the enclosure and the components within the enclosure.

2.11 DIMM

Figure 39: Ultrastar Serv60+8 DIMM
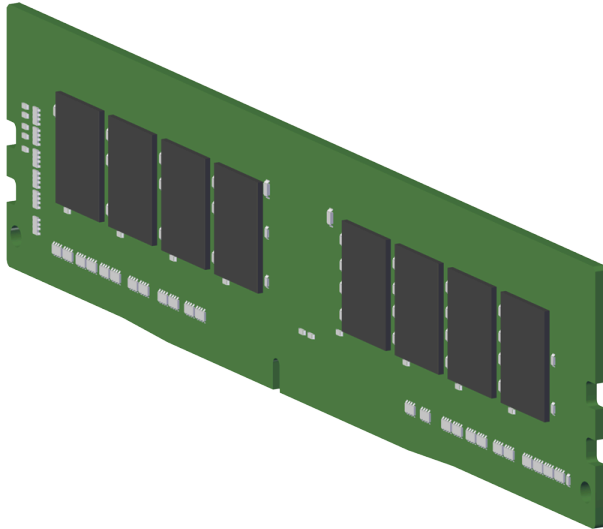
The Ultrastar Serv60+8 contains up to sixteen DDR4 ECC DIMMs (eight per CPU).

2.11.1 DIMM Specifications

Specification	Value
Part Number	See the List of Customer Replaceable Units (CRUs) *(page 10)* to find the part number required.
Number per Enclosure	up to 16 (8 per CPU)
DIMM Type	DDR4
Speed	2666 or 2933 MHz
Hot Swappable?	No
FRU or CRU?	CRU
Weight	9.07 g / 0.32 oz

Support

In This Chapter:

3.1 Part Replacement Service Window

The following table contains a time required and a replacement window for each hot-swappable replacement part within the enclosure. The *Time Required* is the expected amount of time to replace the part. The *Replacement Window* is the amount of time that the enclosure can be open for servicing. If the enclosure cover is open for a period lasting longer than the replacement window, the enclosure may reduce access to drives and other components to reduce the occurrence of thermal issues.

Table 46: Replacement Service Window

Part	Time Required	Replacement Window
IOM	1 min	5 min
PSU	1 min	5 min
System Fan	1 min	5 min
3.5in HDD Assembly	1 min	5 min
System SSD	1 min	5 min

(i) Attention: In the case of multiple CRU failures, a failed fan should **always** be replaced before any other part. Once the enclosure cover is open, the failed fan **must** be removed within a minute. The remainder of the fan replacement should be completed within the 5 minute window.

3.1.1 Multiple CRU Replacements

This procedure provides information and instructions for replacing multiple CRUs in a single servicing window.

In order to maintain proper airflow for enclosure cooling, the Ultrastar Serv60+8 can be opened for servicing of hot-swap components for a maximum of 5 minutes. If multiple CRUs must be replaced within that servicing window, it is critical to optimize servicing actions to make the best use of that time. The following procedure describes a scenario where an IOM and a Drive Assembly (3.5in HDD Assembly or 2.5in SSD Assembly) must be replaced. These instructions provide a strategy for optimizing the servicing window, the order in which CRUs should be replaced, and how to respond if the replacement time will exceed the overall enclosure servicing window.

Step 1: Remotely determine which CRUs have faulted.
Step 2: Review the appropriate CRU replacement procedures in Support *(page 66)* to familiarize yourself with the steps involved, the required parts and tools, and any safety precautions.
Step 3: Gather all the replacement CRUs and required tools.

📄 **Note:** These preparation activities should be accomplished before servicing, to minimize the number of activities that must be performed while the enclosure is open. Staying within the enclosure servicing window is critical to maintaining its thermal operating requirements.

Step 4 : If the PSUs require replacement, start with these CRUs as they are external and do not require opening the enclosure. Access the rear of the enclosure and follow the appropriate procedure for replacing these CRUs.

Step 5 : For replacement of internal CRUs, pull the enclosure out of the rack to allow access to the inside of the enclosure. The enclosure can stay in this position for a maximum of 5 minutes in an ambient temperature of 5°C to 35°C (de-rated for elevation).

Step 6 : If an IOM has faulted, remove the IOM and install the replacement in **1 minute** or less.

Step 7 : If any Drive Assemblies have faulted, replace each device in a sequential fashion. Pay close attention to proper orientation of the device within the enclosure. Replace each device in **1 minute** or less.

Step 8 : Perform a visual inspection of the enclousre to ensure that all CRUs are seated properly.

Step 9 : Before the 5-minute servicing window expires, push the enclosure back into the rack. If there are additional internal CRUs that require replacement, wait **10 minutes** before repeating this procedure, beginning with step 5 *(page 68)*.

Step 10 : After all CRUs have been replaced, verify remotely that the CRU replacements were successful and that enclosure function has returned to 100%.

3.2 IOM Replacement

Replacement Requirements	
Personnel Required	1
Avg. Replacement Time	1 min
Max Replacement Time	5 min

Tool	# Needed	Required vs. Recommended
None	N/A	N/A

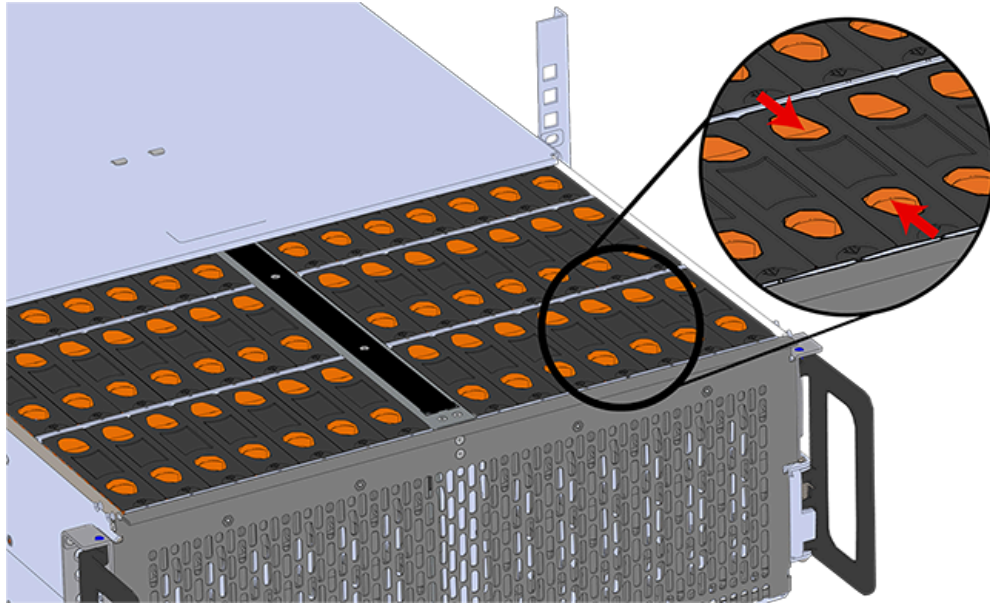**Step 1 :** Grasp both handles at the front of the enclosure and pull with even pressure to extend the chassis out of the rack until it is stopped by the safety latches. The safety latches will prevent the enclosure from coming out of the rack completely and the cover will remain in the rack attached to the rear alignment brackets.
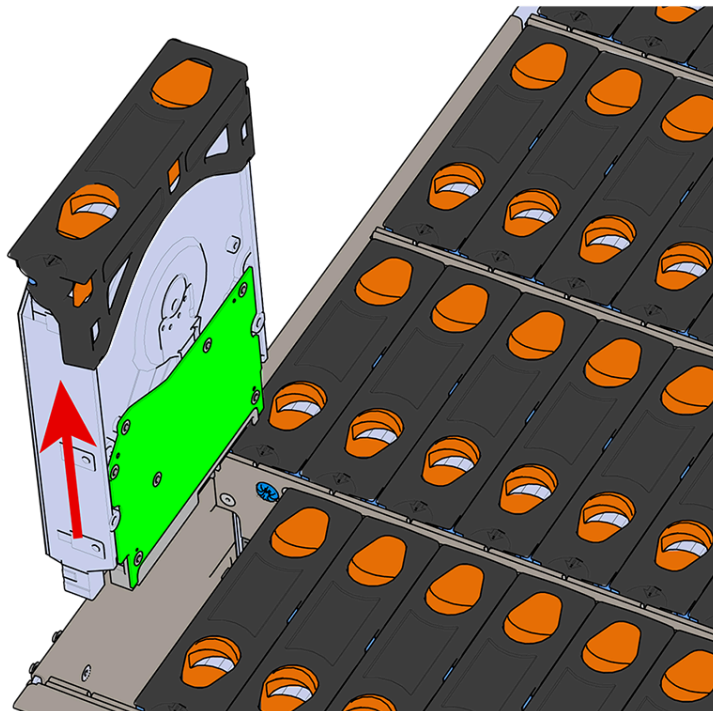
Figure 40: Chassis Handle Operation
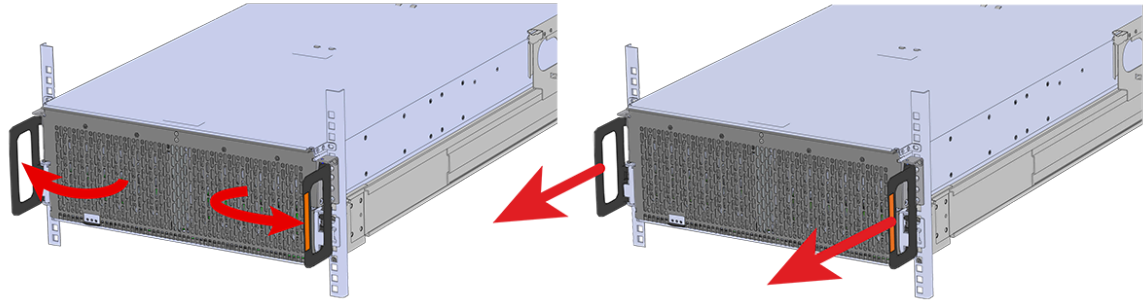
Step 2: Locate the faulty IOM by the amber LED that will be lit on top if there is a fault or by activating the identify LED on the IOM being replaced.

Step 3: Uninstall the IOM.

    a. Locate the latch release on the IOM and press it in the direction shown in the following image.

Figure 41: Unlatching the IOM
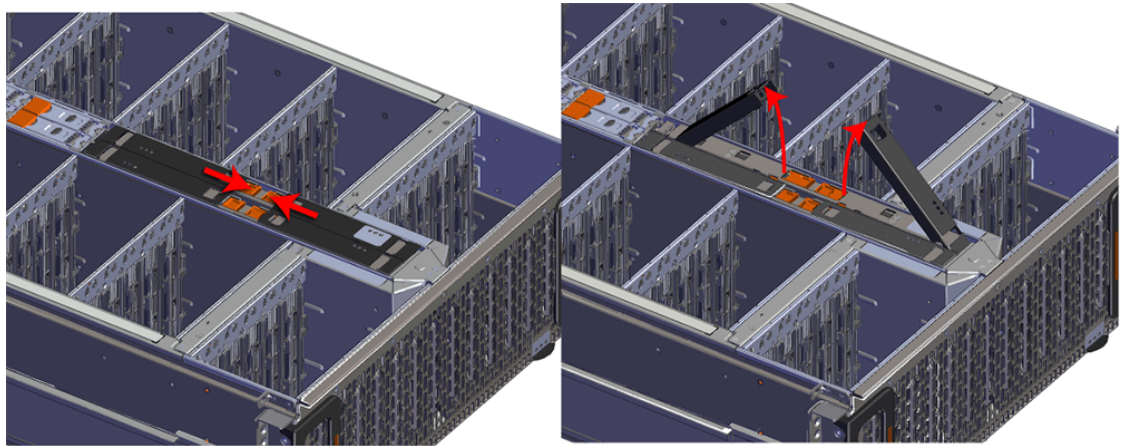
    b. Grasp both handles, one handle in each hand, and lift evenly with both hands to ensure the IOM comes out straight. This will prevent any damage to the pins on the internal connectors.

Figure 42: Removing IOM
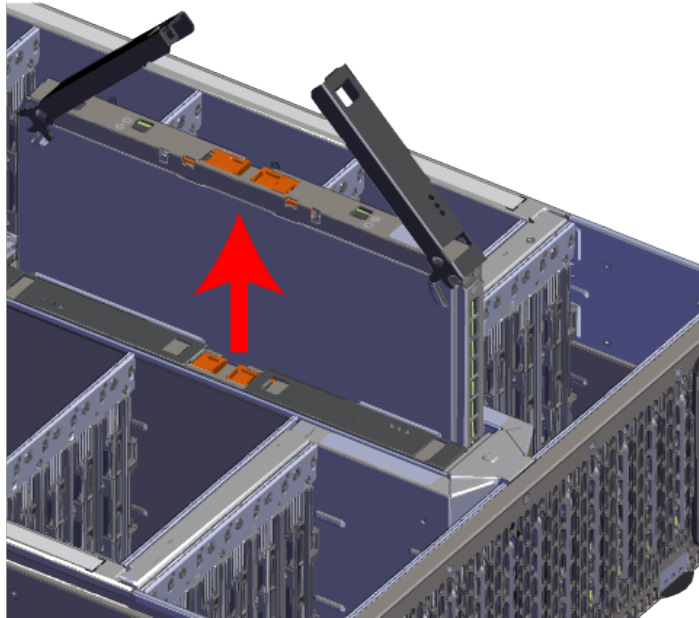
Step 4: Remove the new IOM from its packaging.

Step 5: Install the IOM.

⚠️ **Caution:** If a pin on the IOM's internal connectors is bent or damaged, the IOM will have to be replaced. For this reason it is imperative that the IOM is not forced into position, that it is inserted straight, and that the directions for installing the IOM are followed exactly.

a. Ensure that the handles on the IOM are not latched. To unlatch them, press the latch release in the direction shown in the following image.

Figure 43: Unlatching IOM Handles
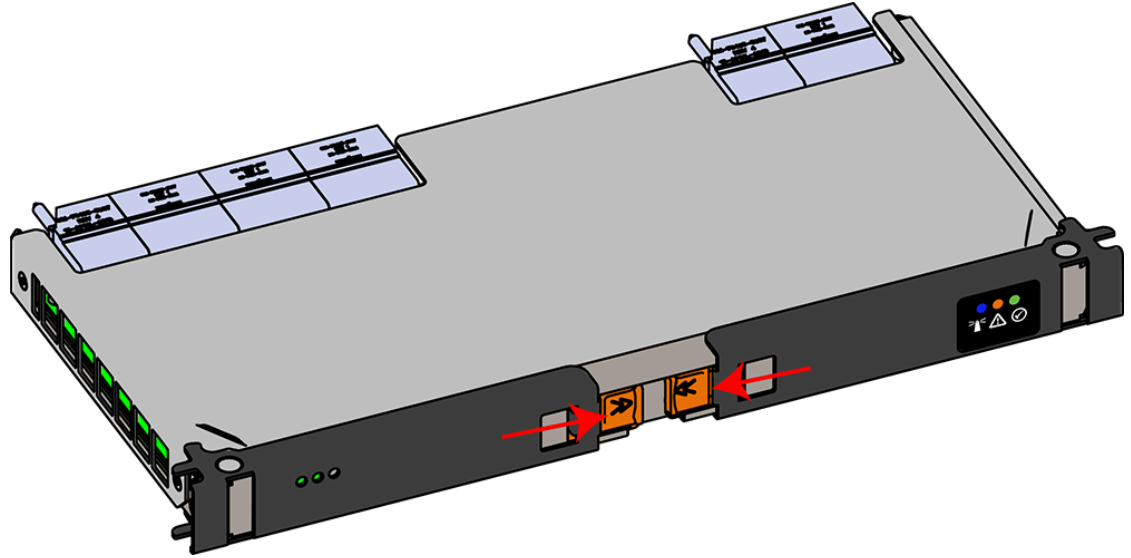
b. Align the IOM with the empty slot on the top of the chassis so that the arrow on the IOM latch release is facing toward the side shown in the following image.

c. Slowly lower the IOM into the empty slot while being careful to keep it level. Do not to force it.

Figure 44: Installing the IOM
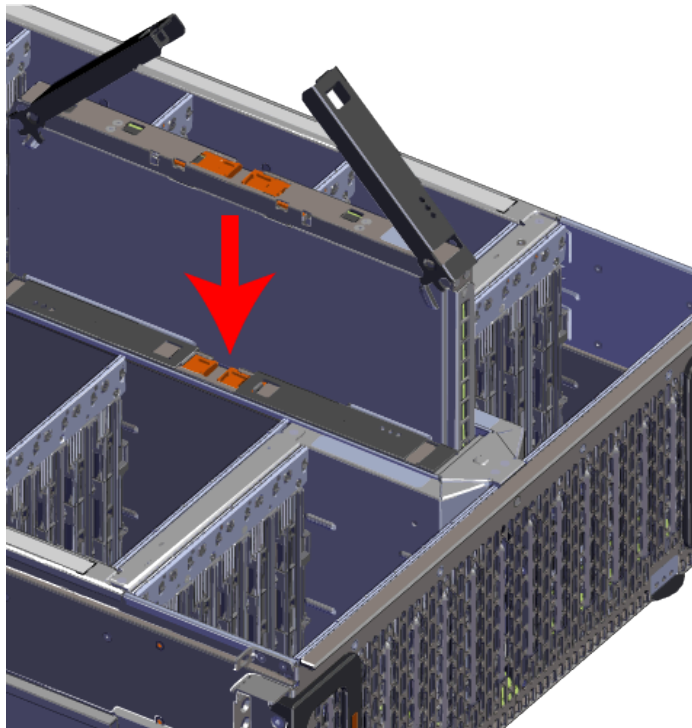
d. When the IOM is lowered fully, apply light pressure with both hands evenly on the IOM body, not the handles, to seat the IOM in the connector. If the IOM won't seat correctly, **DO NOT FORCE IT**. Instead, back the IOM out, check the pins to make sure none are damaged, and try again.

e. Once the IOM is seated properly in the slot, close the handles until they latch closed.

Step 6: Push the chassis back into the rack. Verify that the fans have slowed to their regular RPM. This ensures that the enclosure is back to its proper cooling settings.

3.3 PSU Replacement

This procedure provides instructions for replacing a PSU.

Replacement Requirements		
Personnel Required		1
Avg. Replacement Time		1 min
Max Replacement Time		5 min
Tool	**# Needed**	**Required vs. Recommended**
None	N/A	N/A

Step 1: Place the CMA into service position.

a. Unlatch the CMA at the elbow connector by pressing the blue release button to unlatch the connector from the rail.

Figure 45: Unlatching a CMA Connector
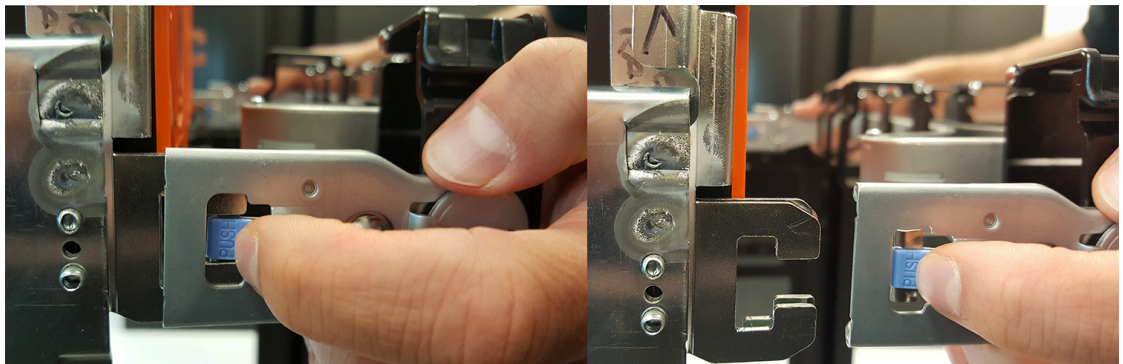
b. Swing the CMA away from the enclosure.

c. The arm should be extended away from the enclosure as shown in the following example.

Figure 46: CMAs in service position (Cables not shown)
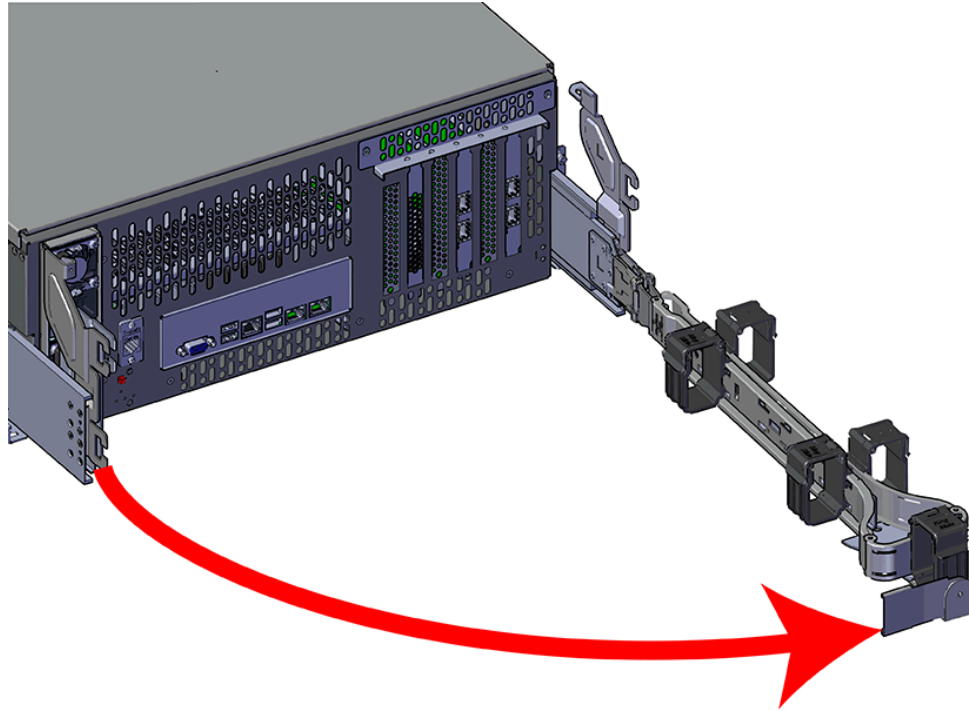
Step 2: Locate the faulty PSU by finding the amber LED lit at the rear of the enclosure.

Step 3: Detach the cable retention mechanism.

Figure 47: Cable Retention Clip
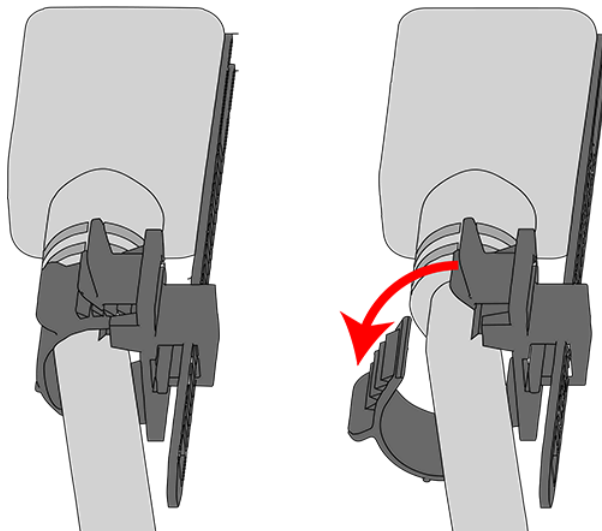
Step 4: Remove the power cable from the faulty PSU.

Step 5: Uninstall the PSU.

a. Grasp the release lever and the metal handle in a downward pinching motion to release the latching mechanism.

Figure 48: Uninstalling the PSU
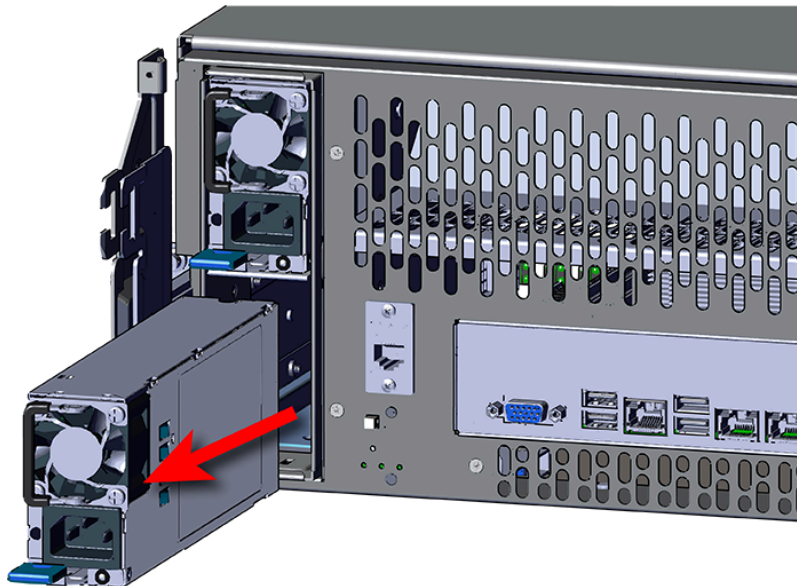
b. Pull the PSU straight out with even pressure.

Step 6: Remove the new PSU from its packaging.

Step 7: Install the PSU.

> **Note:** The Artesyn PSU requires 3000 series firmware or later.

a. Align the PSU in the orientation shown in the following image.
b. Slide the PSU into the slot until it seats fully into the chassis.

Figure 49: Installing the PSU
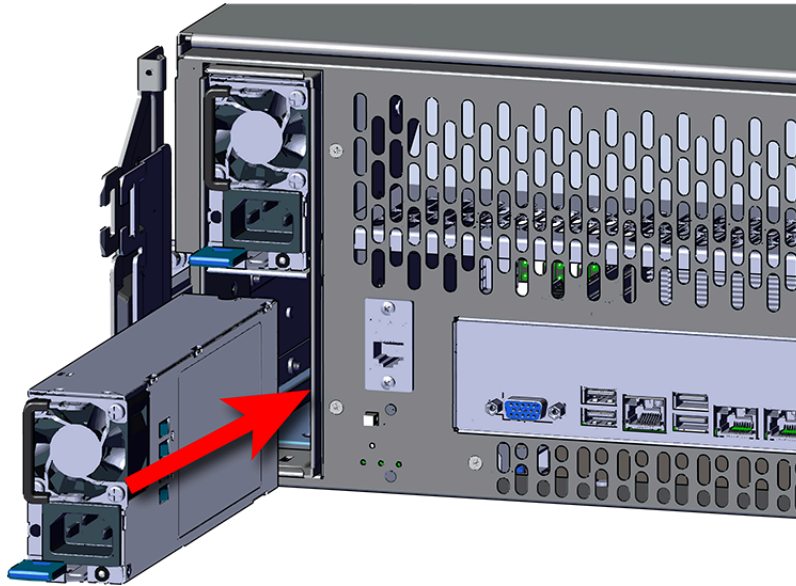
c. Plug the power cable into the receptacle at the back of the PSU.

d. Attach the cable retention mechanism.

Loop the retention clip around the power cable and pinch it until the clip catches and locks in place. Then slide the retention clip forward until it stops near the cable connector. Doing this will ensure that the retention clip functions properly in the event the cable is pulled on for some reason.

Figure 50: Cable Retention Clip
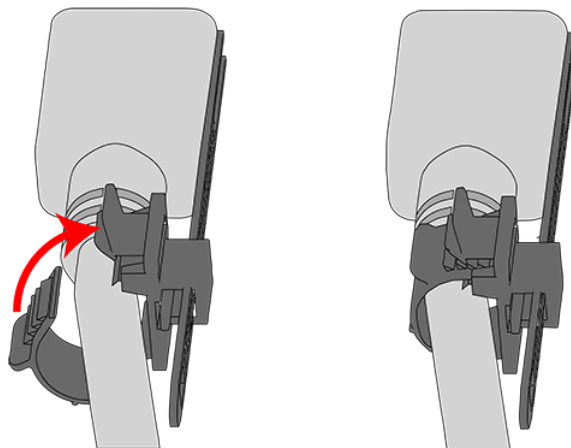
Figure 51: Cinching Cable Retention Clip
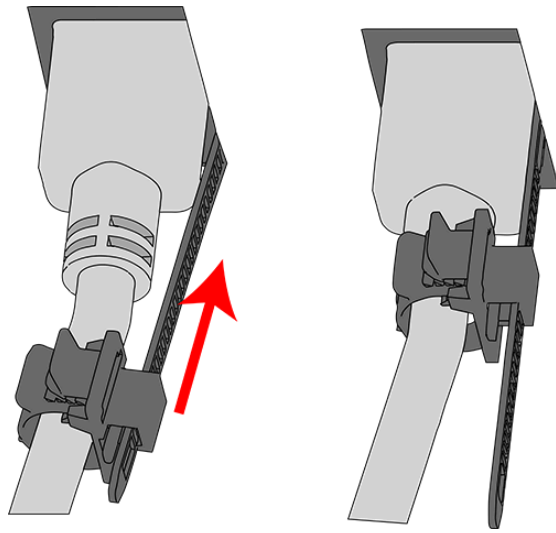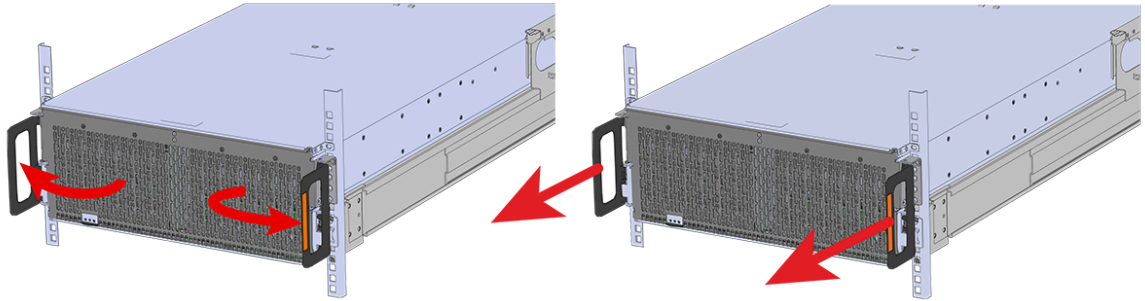
Step 8 : Make sure the CMA(s) is in operational position by folding the arm(s) in toward the enclosure and attaching the elbow end(s) to the connector(s) attached to the rail. Verify that all of the cabling is in functional order and does not bind or catch.

3.4 System Fan Replacement

Replacement Requirements		
Personnel Required		1
Avg. Replacement Time		1 min
Max Replacement Time		5 min
Tool	**# Needed**	**Required vs. Recommended**
None	N/A	N/A

Step 1: Grasp both handles at the front of the enclosure and pull with even pressure to extend the chassis out of the rack until it is stopped by the safety latches. The safety latches will prevent the enclosure from coming out of the rack completely and the cover will remain in the rack attached to the rear alignment brackets.

Figure 52: Chassis Handle Operation

Step 2 : Locate the faulty System Fan by the flashing amber LED near the rear of the drive bay and the center channel that will be lit on top if there is a fault or by activating the identify LED on the System Fan being replaced.

Step 3 : Uninstall the internal Rear Fan.

    a. Lift the Rear Fan flap and insert a finger into the service hole on the top of the Rear Fan and pull up to release the latch.

Figure 53: Lift the Rear Fan Flap
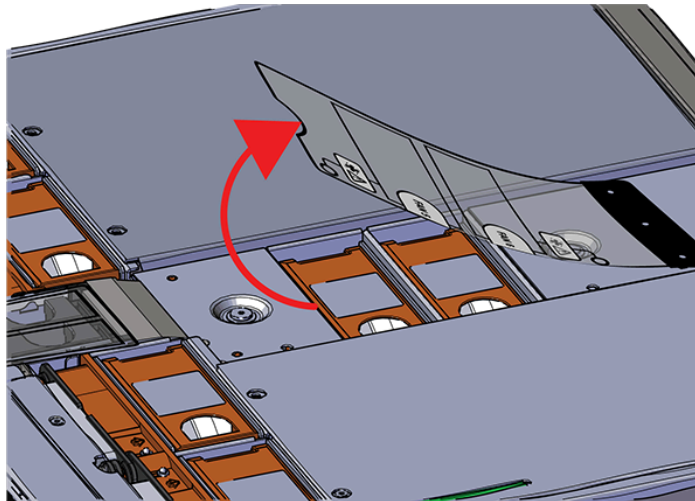
Figure 54: Unlatching Rear Fan
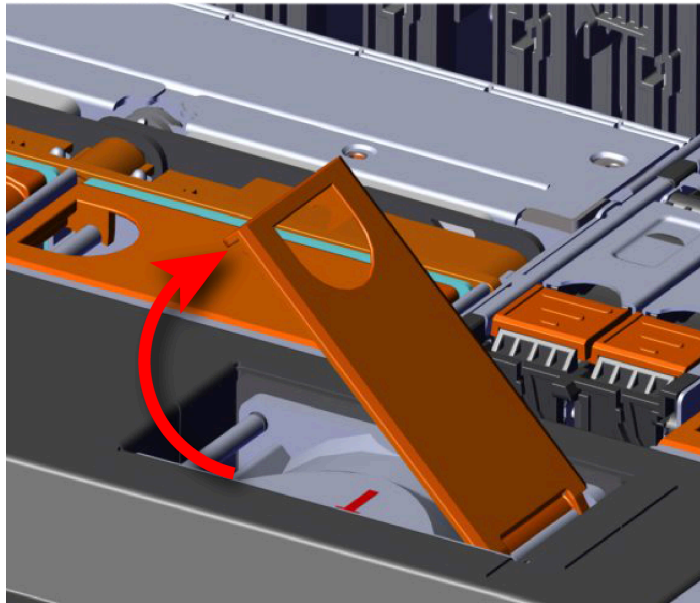
b. Use the handle to pull evenly on the component to remove it from the enclosure.

Figure 55: Removing Rear Fans
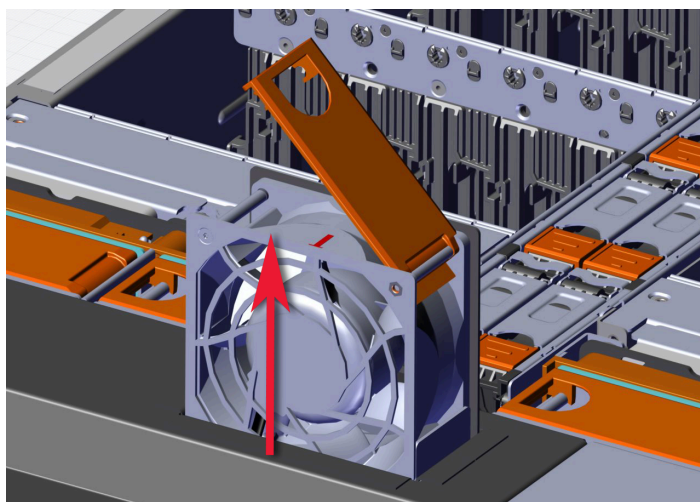
Step 4: Remove the new System Fan from its packaging.

Step 5: Install the System Fan.

a. Lift the System Fan flap and look inside the empty slot that will receive the System Fan and orient the System Fan so that the connector on the bottom of the fan is on the proper side.

Figure 56: Lift the System Fan Flap
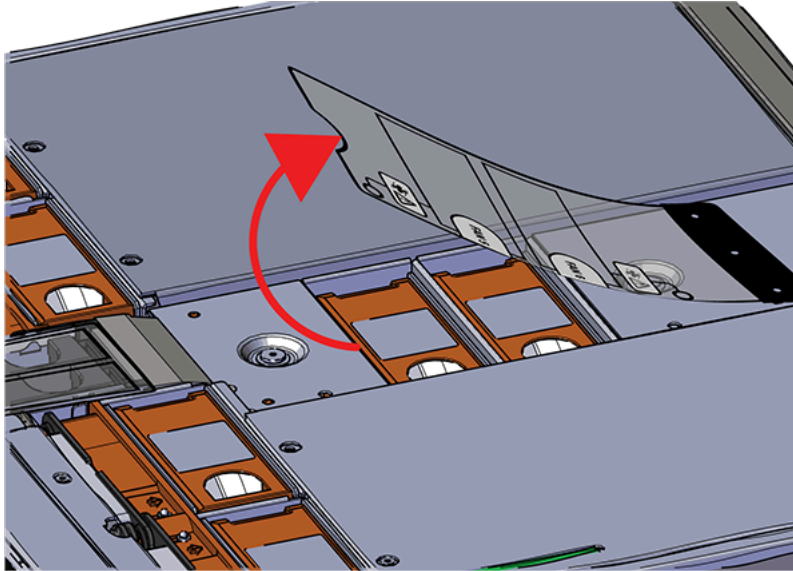
b. Lower the fan down into the empty slot. Do not force it.

Figure 57: Installing a System Fan
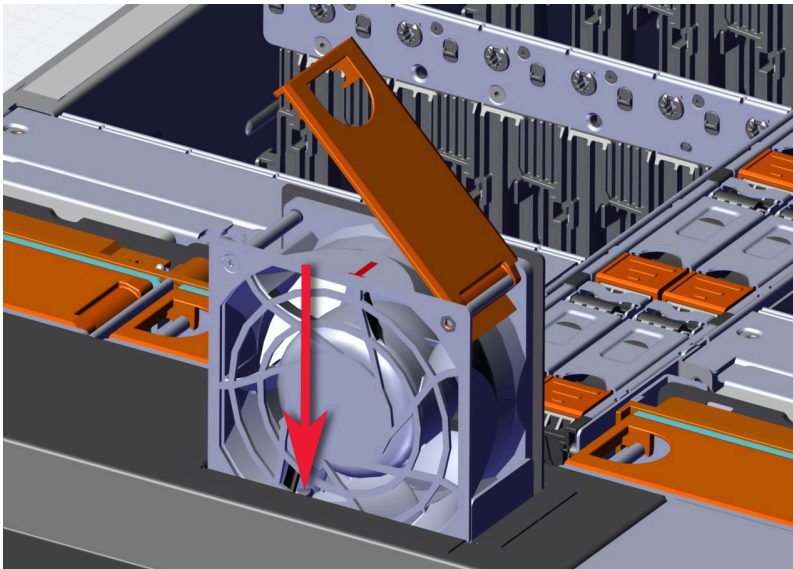
c. When the fan is fully inserted and the connectors are mated properly, close the housing cover clip as shown in the following image.

Figure 58: Latching the Fan Housing Closed
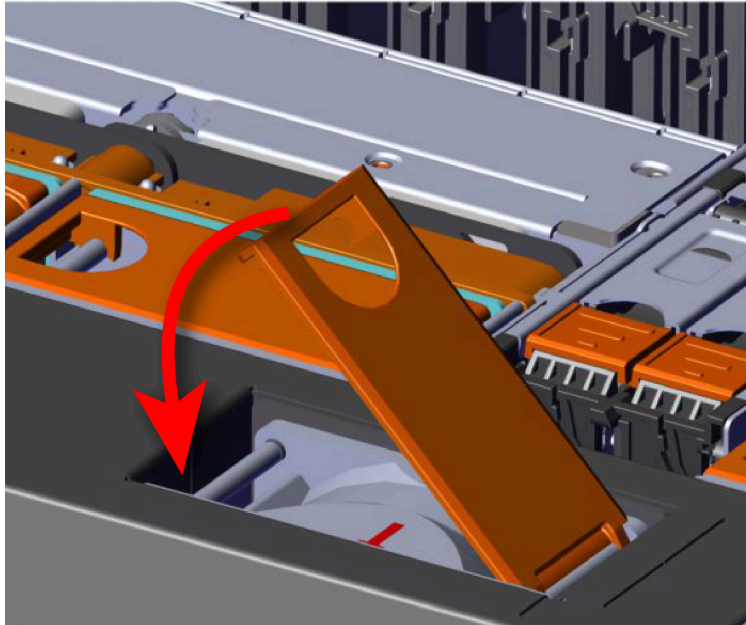
Step 6 : Push the chassis back into the rack. Verify that the fan have slowed to their regular RPM. This ensures that the enclosure is back to its proper cooling settings.

3.5 3.5in HDD Assembly Replacement

Replacement Requirements		
Personnel Required		1
Avg. Replacement Time		1 min
Max Replacement Time		5 min
Tool	**# Needed**	**Required vs. Recommended**
None	N/A	N/A

Step 1 : Grasp both handles at the front of the enclosure and pull with even pressure to extend the chassis out of the rack until it is stopped by the safety latches. The safety latches will prevent the enclosure from coming out of the rack completely and the cover will remain in the rack attached to the rear alignment brackets.

Figure 59: Chassis Handle Operation
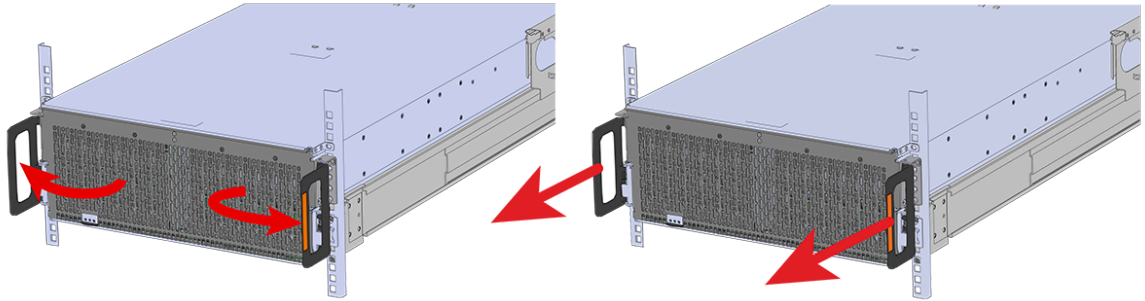
Only extend the enclosure out of the rack as far as is needed to reach the drive being replaced.

Step 2: Locate the faulty 3.5in HDD Assembly by finding the illuminated amber LED or by activating the identification LED for the drive to be replaced.

Figure 60: HDD Assembly LED
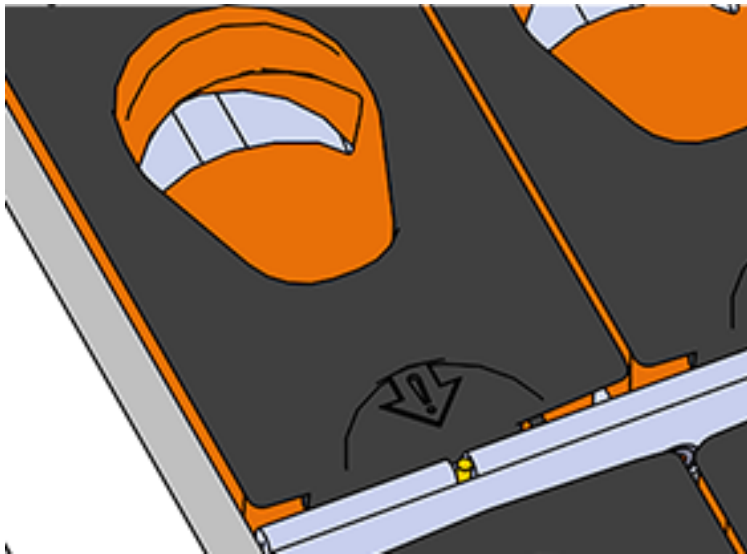
Step 3: Follow these steps to remove a 3.5in HDD Assembly.

    a. Find the latch release mechanism on the 3.5in HDD Assembly being removed.

    b. Insert a finger and a thumb into the latch release and pinch to unlatch the 3.5in HDD Assembly.

Figure 61: Unlatch Drive Carrier (IOM Not Shown)
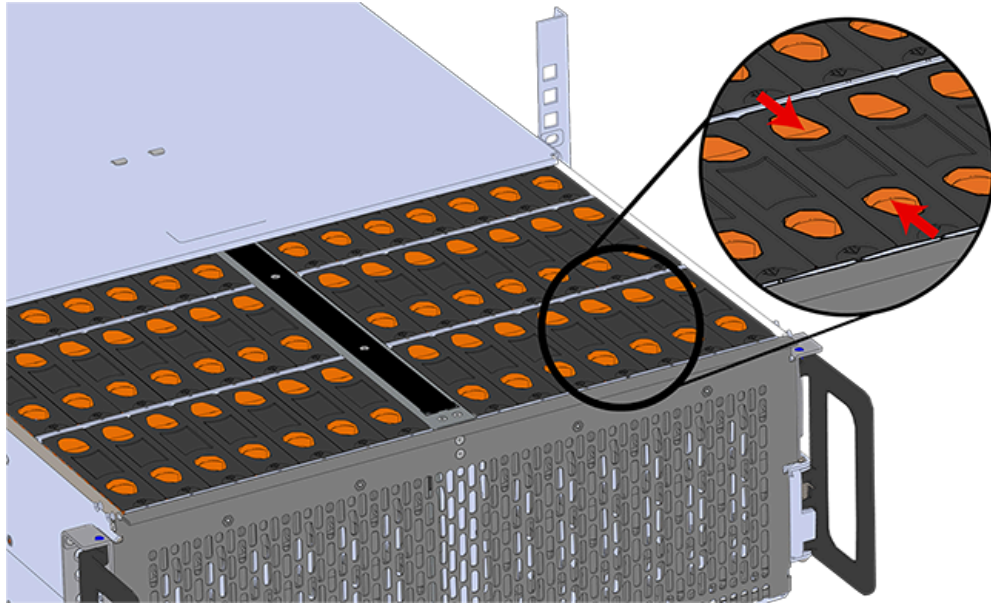
c. Lift the 3.5in HDD Assembly free from the enclosure.

Figure 62: Removing 3.5in HDD Assembly

Step 4: Remove the new 3.5in HDD Assembly from its packaging.

Step 5: Install the 3.5in HDD Assembly.

> **Note:** The 2.5in SSD Assembly is installed in the same manner as the 3.5in HDD Assembly. For instructions on assembling the 2.5in SSD Assembly, see Operating the 2.5" Drive Carrier *(page 60)*.

a. Ensure that the enclosure has been pulled out of the rack until the rail latches engage.

b. Find the LED pointer on the top of the drive carrier. This pointer should point toward the front of the unit as shown in the following image.

Figure 63: LED Pointer Orientation
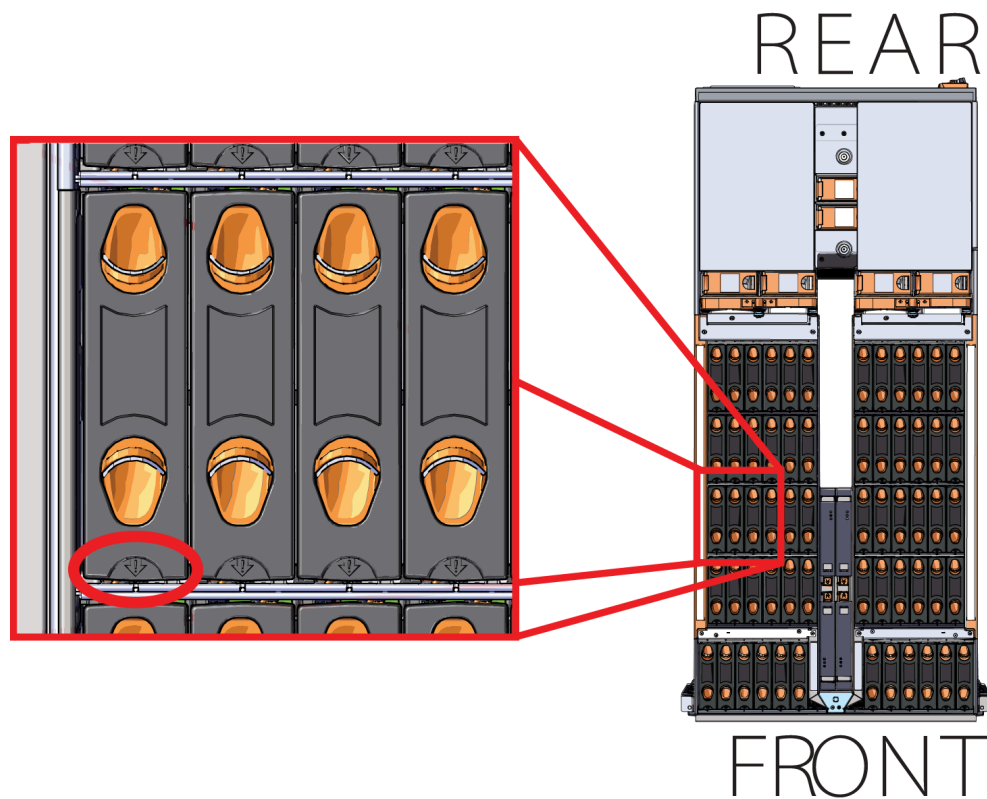
c. Align the drive with the empty slot that will receive it. Lower it into the slot, making sure it stays level and does not snag.

Figure 64: Installing a 3.5in HDD Assembly
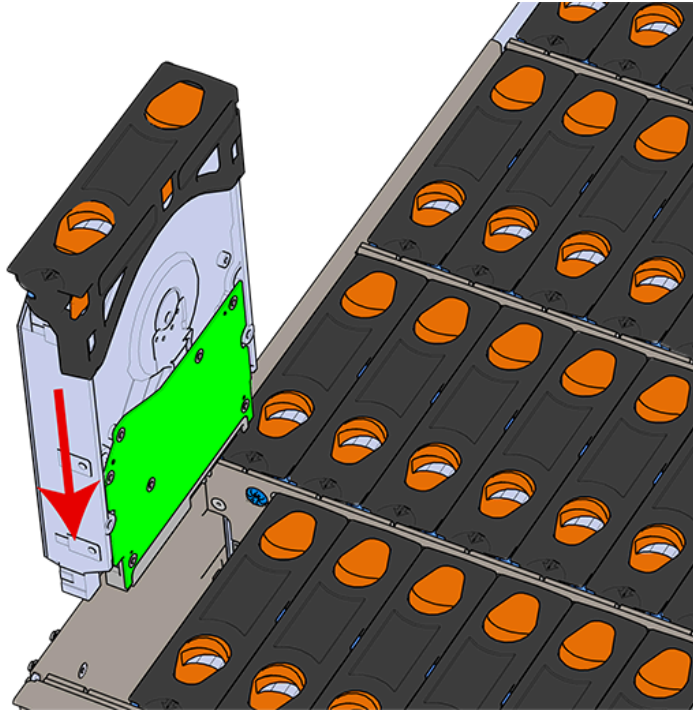
   d. Pinch the latch release and carefully press downward to seat the 3.5in HDD Assembly the rest of the way.

Step 6: Push the enclosure back into the rack to ensure proper cooling.

3.6 System SSD Replacement

Replacement Requirements		
Personnel Required		1
Avg. Replacement Time		1 min
Max Replacement Time		5 min
Tool	**# Needed**	**Required vs. Recommended**
None	N/A	N/A

Step 1: Grasp both handles at the front of the enclosure and pull with even pressure to extend the chassis out of the rack until it is stopped by the safety latches. The safety latches will prevent the enclosure from coming out of the rack completely and the cover will remain in the rack attached to the rear alignment brackets.

Figure 65: Chassis Handle Operation

Step 2: Identify the faulty System SSD by looking for the illuminated fault LED.

Step 3: Uninstall the System SSD.

    a. Lift the center channel flap and press the latch release as shown in the following image.

Figure 66: Lift the Center Channel Flap
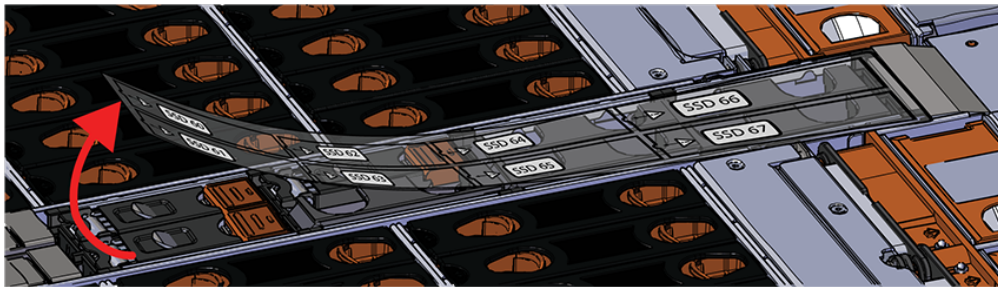
Figure 67: Latch Release
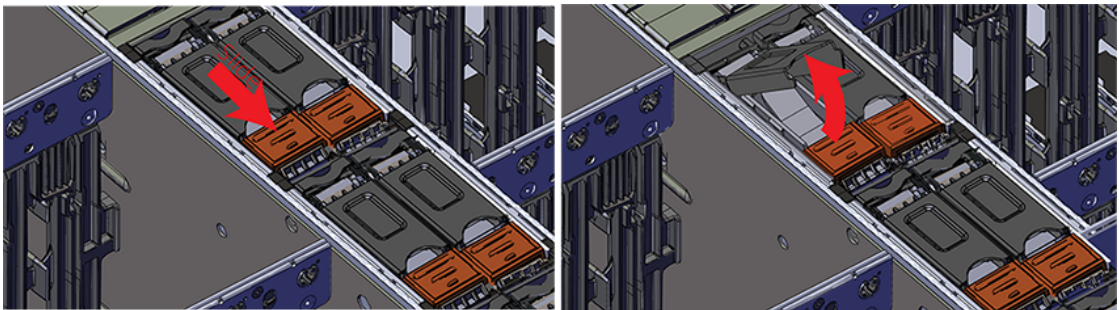
    b. Grasp the handle that pops up and pull evenly to remove the component.

Figure 68: System SSD Removal
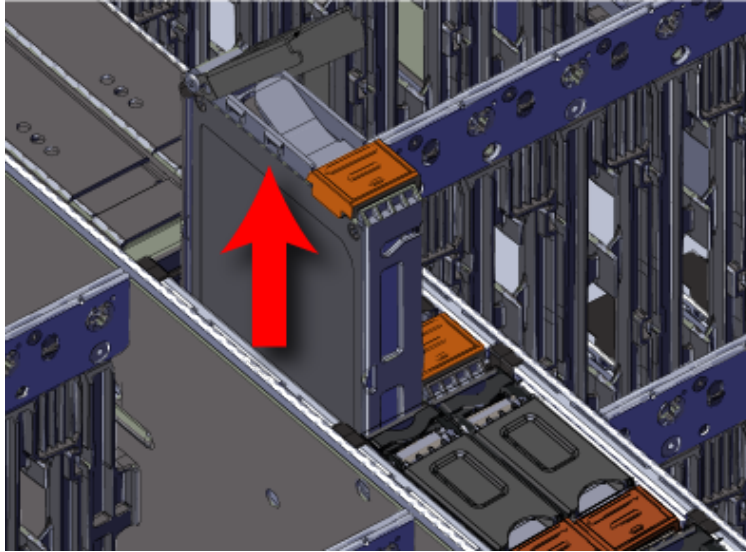
Step 4: Remove the new System SSD from its packaging.

Step 5: Install the System SSD.

    a. Lift the center channel flap and orient the assembly so that the latch release button is facing toward the rear of the system.

Figure 69: Lift the Center Channel Flap

    a. Align the System SSD with the empty drive slot and lower it slowly into the slot. Do not force it.

Figure 70: System SSD Install
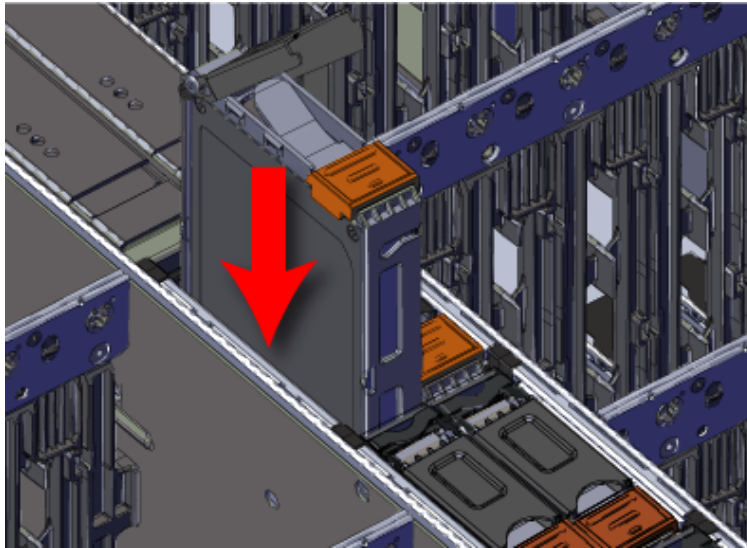
a. Once the SSD will not lower any further, press the handle down until it clicks into place.

Figure 71: System SSD Carrier Latching Closed
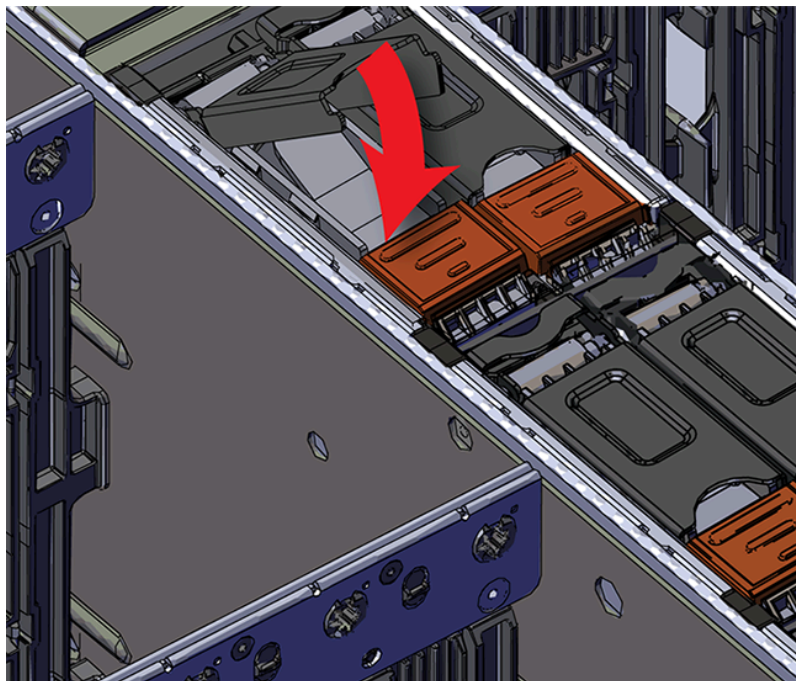
Step 6 : Push the chassis back into the rack. Verify that the fan have slowed to their regular RPM. This ensures that the enclosure is back to its proper cooling settings.

3.7 DIMM Replacement

📄 **Note:** The DIMMs are not hot swappable. The enclosure must be powered-down, disconnected from all cabling, and removed from the rack before replacing the DIMMs.

Replacement Requirements	
Personnel Required	3
Avg. Replacement Time	45 min
Max Replacement Time	N/A
Tool	**Required vs. Recommended**
T7 Torx Screwdriver	Required

Step 1: Uncable the CMA(s).

   a. Open all of the basket clips on the CMA(s).

Figure 72: Open Baskets
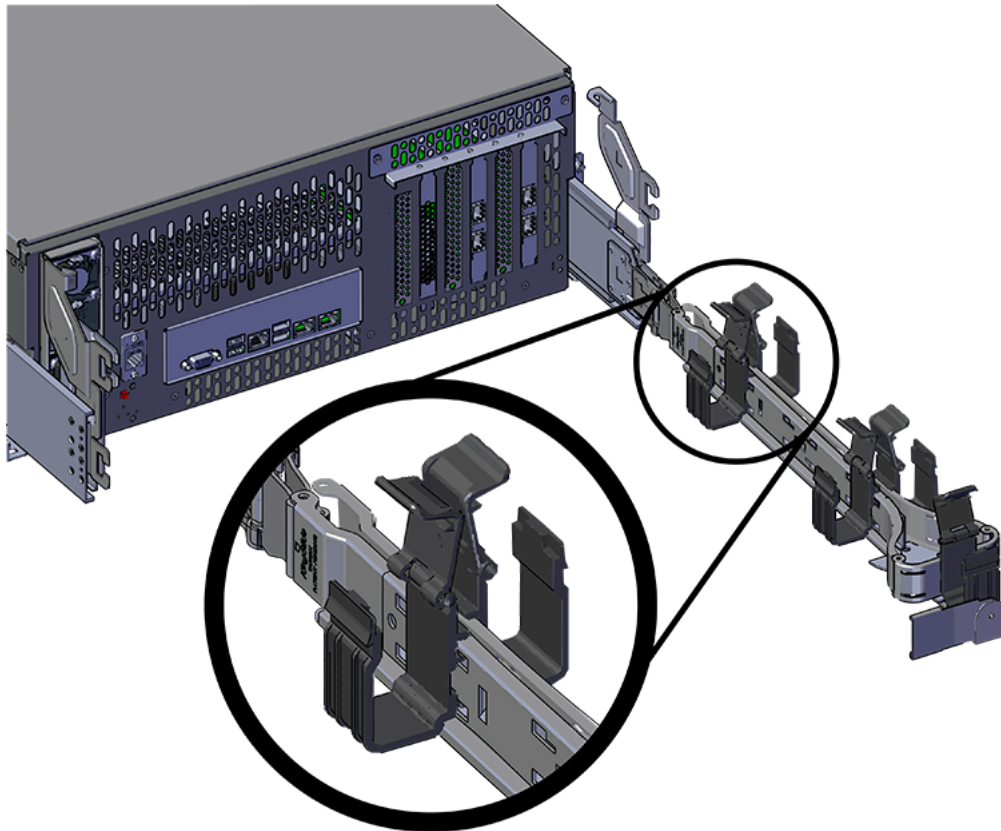
   b. Remove one cable at a time from the arm, making sure not to put too much strain on the arm.

Step 2: Remove the CMA(s).

   a. Release all of the connectors that attach the CMA(s) to the enclosure and the rail.

There are three total connections that need to be released, one at the elbow and two at the opposite end.

b. To release a connector, press the blue latch release button and pull the connector free.

Figure 73: Unlatching a CMA Connector
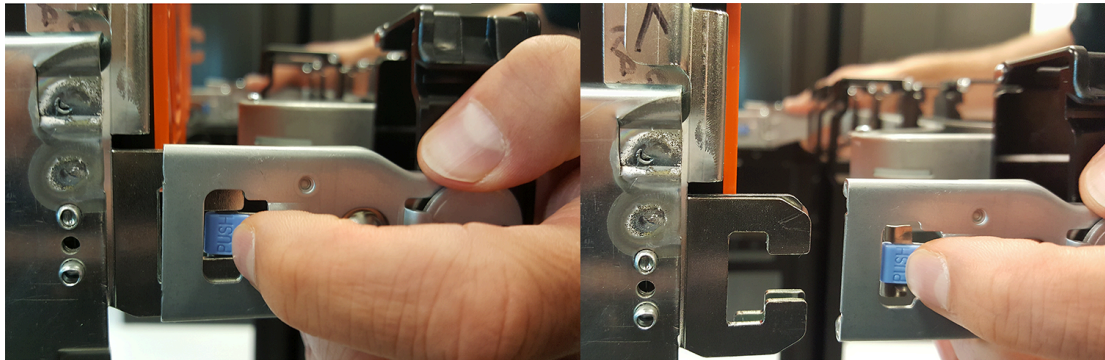
Step 3: Grasp both handles at the front of the enclosure and pull with even pressure to extend the chassis out of the rack until it is stopped by the safety latches. The safety latches will prevent the enclosure from coming out of the rack completely and the cover will remain in the rack attached to the rear alignment brackets.

Figure 74: Chassis Handle Operation
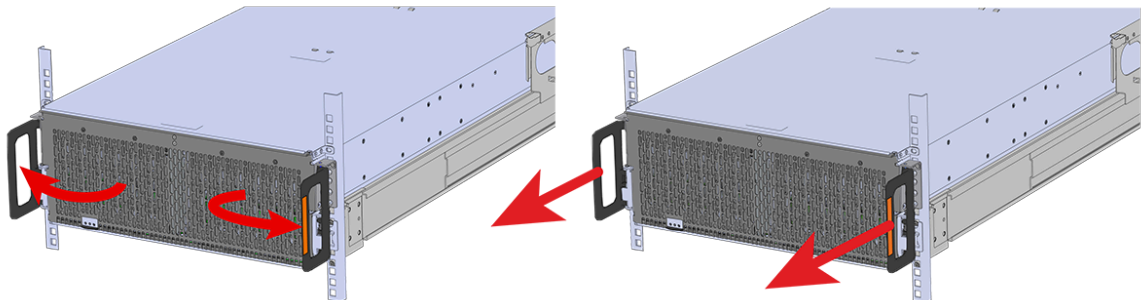
Step 4: Remove all of the drives from the chassis before uninstalling the chassis. Be prepared to label the drives as they are removed so they can be reinstalled in the same location in the new chassis.

Step 5: Follow these steps to remove a 3.5in HDD Assembly.

a. Find the latch release mechanism on the 3.5in HDD Assembly being removed.

b. Insert a finger and a thumb into the latch release and pinch to unlatch the 3.5in HDD Assembly.

Figure 75: Unlatch Drive Carrier (IOM Not Shown)

c. Lift the 3.5in HDD Assembly free from the enclosure.

Figure 76: Removing 3.5in HDD Assembly

Step 6 : Follow the previous step for each drive in the enclosure. Attach a label or mark the drives with the drive slot they were removed from in order to add them to the same slot in the future. Store the drives in an ESD safe location until the drives are ready to be installed back into an enclosure.

Step 7 : Release the safety latch on the inner rails on each side of the chassis as shown in the following image.

Figure 77: Inner Rail Safety Latch Release

Step 8 : Grasp both handles at the front of the enclosure and pull with even pressure to extend the chassis out of the rack until it is stopped by the safety latches. Make sure that the top cover comes with the chassis as it is extended out of the rack. The safety latches will prevent the enclosure from coming out of the rack completely.

Step 9 : Remove the chassis from the rack.

    a. Be prepared to support the enclosure once it is free of the rails by having a second person or a lift to support the enclosure

    b. Grasp both handles at the front of the enclosure and pull with even pressure until the enclosure will not extend further.

    c. Locate the safety catches on the inner rails attached to the enclosure.

Figure 78: Safety Latch Release

d. Depress the latch release lever for the safety latches on the rail and push the chassis very slightly forward. The chassis is now unsecured from the rack.

e. Ensure that you have the proper support mechanism to hold the chassis in position, whether that be a team lifting partner or an appropriate lift.

f. Slide the chassis forward to free it from the rails. Place the chassis in a safe location to avoid damage.

Step 10 :

(i) **Attention:** Place the enclosure on a flat ESD safe surface and ensure it is stable before continuing with the procedure.

Step 11 : Uninstall the internal Rear Fan.

a. Lift the Rear Fan flap and insert a finger into the service hole on the top of the Rear Fan and pull up to release the latch.

Figure 79: Lift the Rear Fan Flap

Figure 80: Unlatching Rear Fan

b. Use the handle to pull evenly on the component to remove it from the enclosure.

Figure 81: Removing Rear Fans
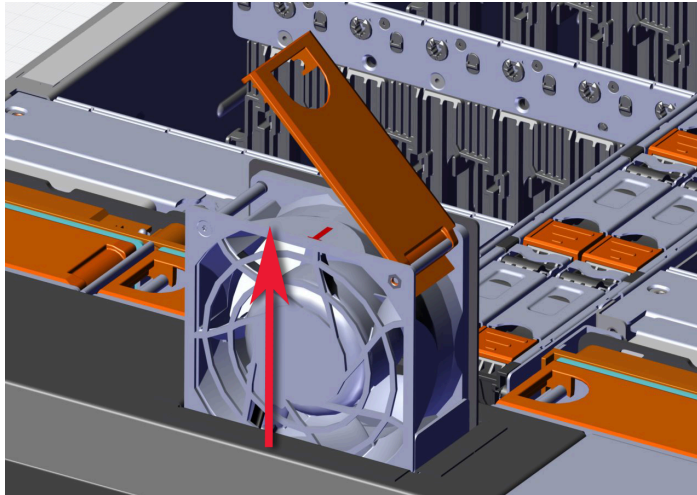
Step 12: Uninstall the rest of the system fans in the same manner as the first.

Step 13: Uninstall server cover panel on the side of the enclosure that contains the failed DIMM.
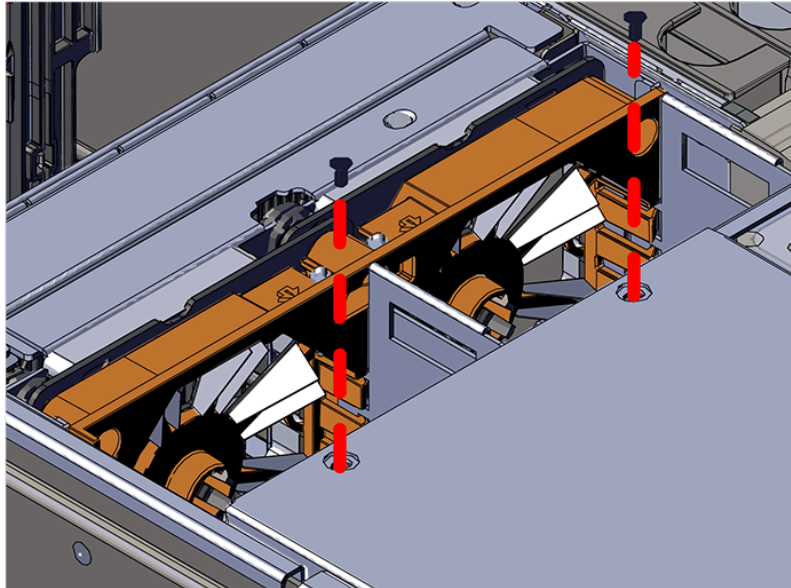
> **Note:** Uninstall the server cover panel on the side that requires the DIMM replacement. The same steps to uninstall the server cover panel apply to both sides of the enclosure with the exception of the number of screws that secure the server cover panel. From the rear of the enclosure, the left panel contains two screws. The panel on the right side of the enclosure contains one screw.
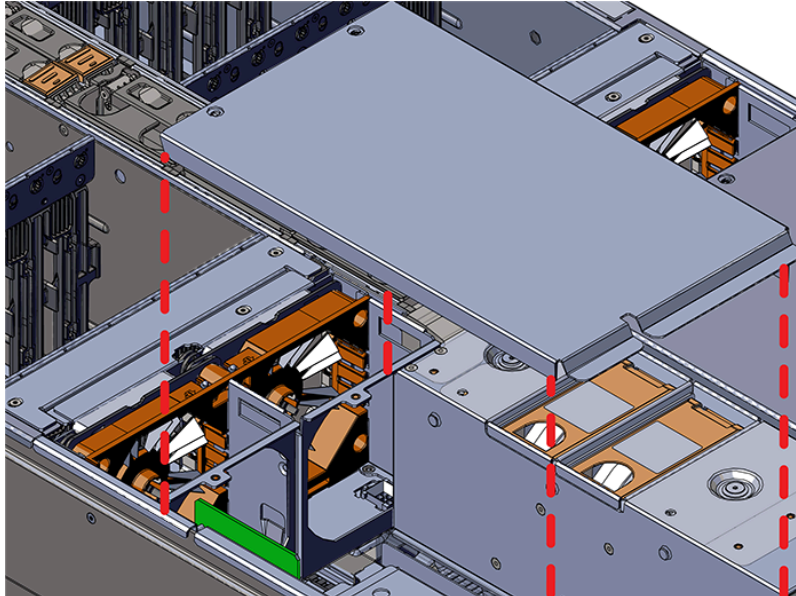
a. Remove the screws that secure the server cover panels to the chassis using a T7 Torx screwdriver.

> **Note:** When at the rear of the enclosure, the left server cover panel contains two T7 Torx screws. The left server cover panel contains only one T7 Torx screw.

Figure 82: Removing the Server Cover Panel Screws

b. Remove the server cover panel by carefully pulling on the edge where the screws were removed.

Figure 83: Removing the Server Cover Panel

Step 14: Uninstall the fan bay.

> **Note:** The Fan Bays must be uninstalled to gain access to the DIMMs located closest to the front of the enclosure. The DIMMs located closest to the rear of the enclosure may be replaced without removing the Fan Bays as indicated by the red boxes in the following image.

Figure 84: Rear DIMMs Location
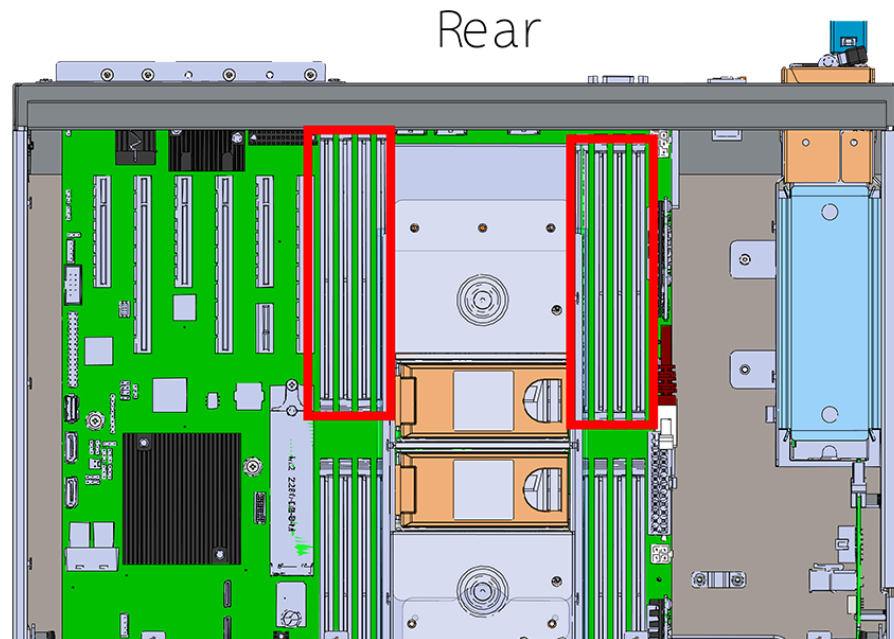
Note: Uninstall the fan bay on the side that requires the DIMM replacement.

a. Remove the screw that secures the fan bay to the chassis.

Figure 85: Removing the Fan Bay Screw
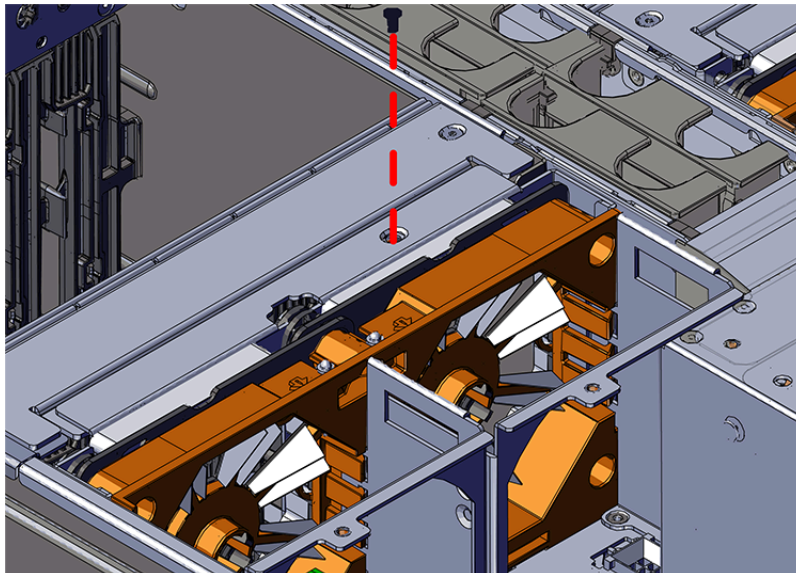
b. Locate the pin that secures the outside of the fan bay to the chassis and pull the pin out and pull up on the fan bay until the cage is clear of the chassis.

> 📄 **Note:** The fan bay is connected to the baseboard with a cable and does not need to be disconnected. When removing the fan bay to replace DIMMs, lay the assembly on the drive cage.

Figure 86: Fan Bay Pin
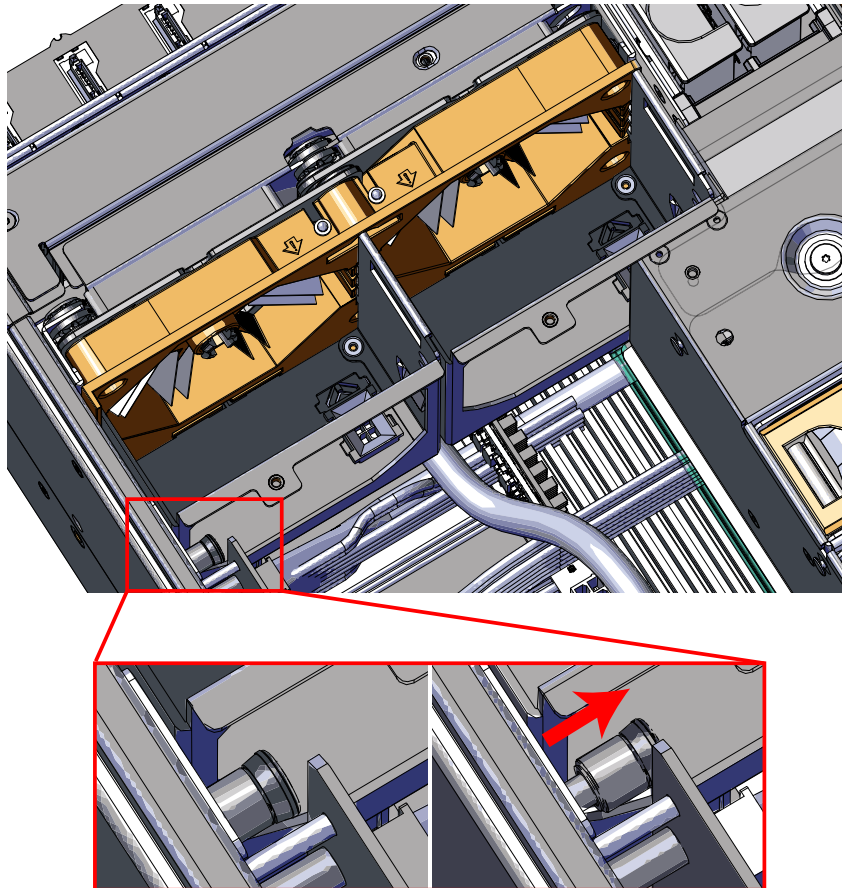
Figure 87: Removing the Fan Bay
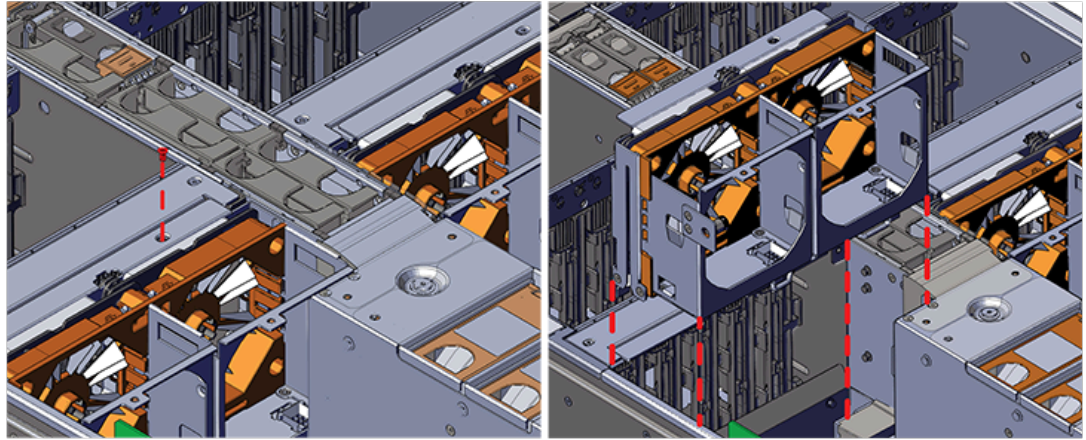
c. Remove the screws that secure the plenum in place and lift the plenum off of the chassis.

Figure 88: Removing the Plenum
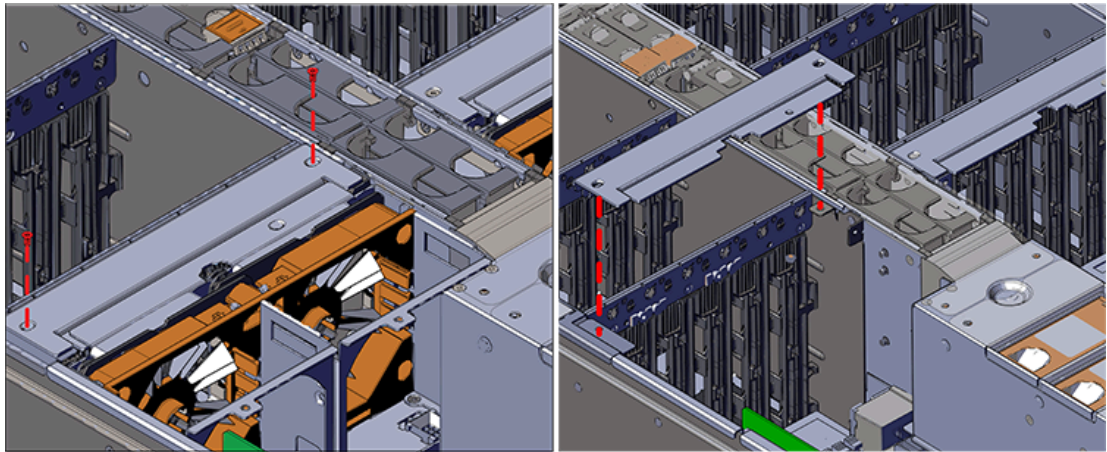
Step 15 : Uninstall the DIMMs.

    a. Locate the DIMM in need of replacement.

> 📄 **Note:** If the DIMM being removed is in the slot closest to the System Fan Bay, take special care while removing the DIMM. The DIMM in this slot can be removed and installed without removing the System Fan Bay, but the area is very constrained due to the lip on the System Fan Bay that rests directly above the DIMMs as seen in the following image.

Figure 89: DIMMs near the System Fan Bay

b. Carefully push apart on the DIMM ejector tabs located on either side of the DIMM slots.

Figure 90: DIMM Ejector Tabs
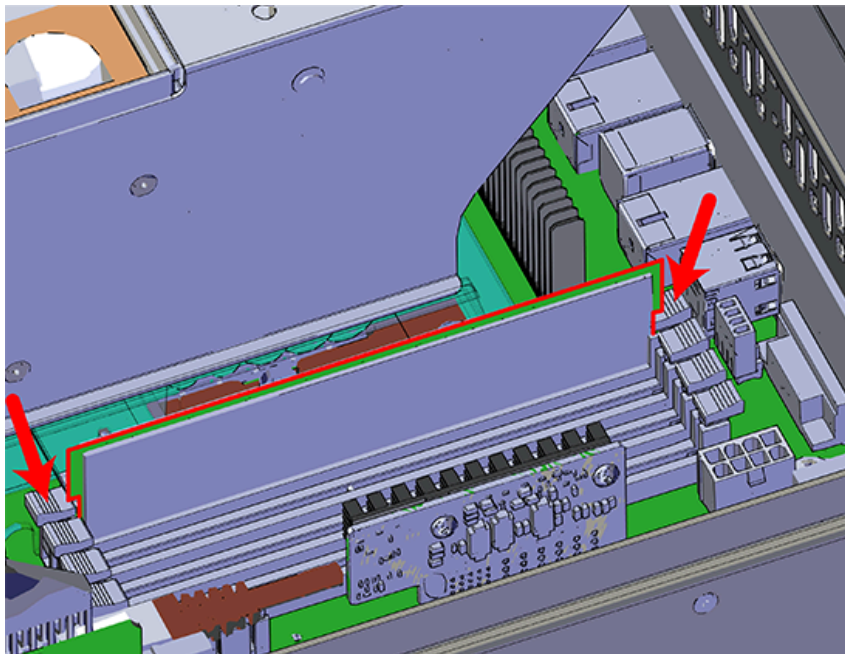
    c. Slide the DIMM out of the of DIMM slot and set it aside.

Figure 91: DIMM Removal
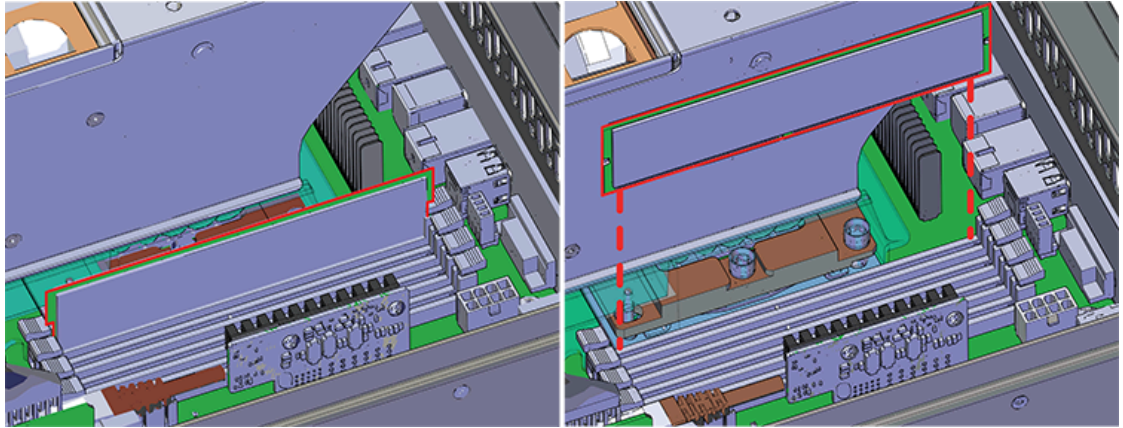
Step 16: Install the DIMMs.

    a. Remove the new DIMM from the packaging and hold it by the corners to avoid damaging the DIMM.

    b. Align the DIMM with the empty slot ensuring that it is facing in the correct direction.

Figure 92: Installing the DIMM into the DIMM Slot
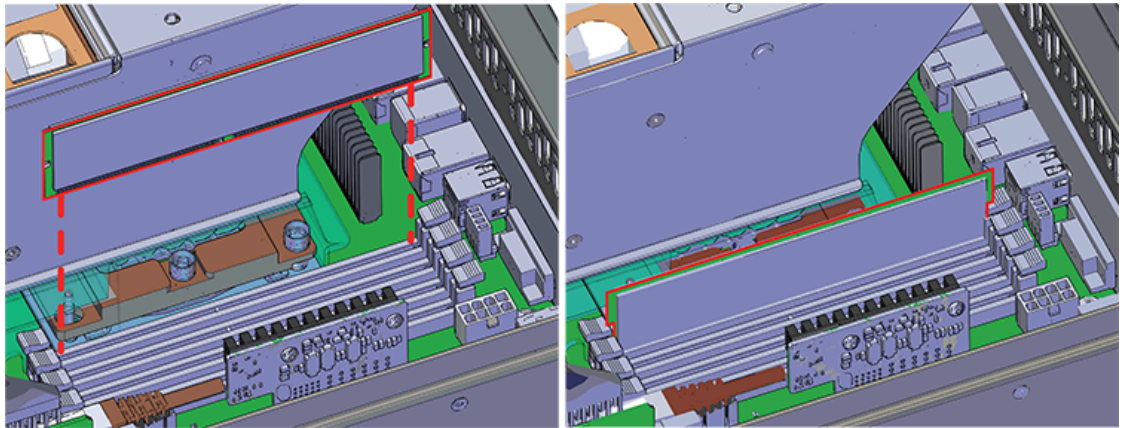
    c. Firmly press the DIMM into the slot until the ejector tabs snap into place over the notches on either side of the DIMM.

Figure 93: DIMM Notches
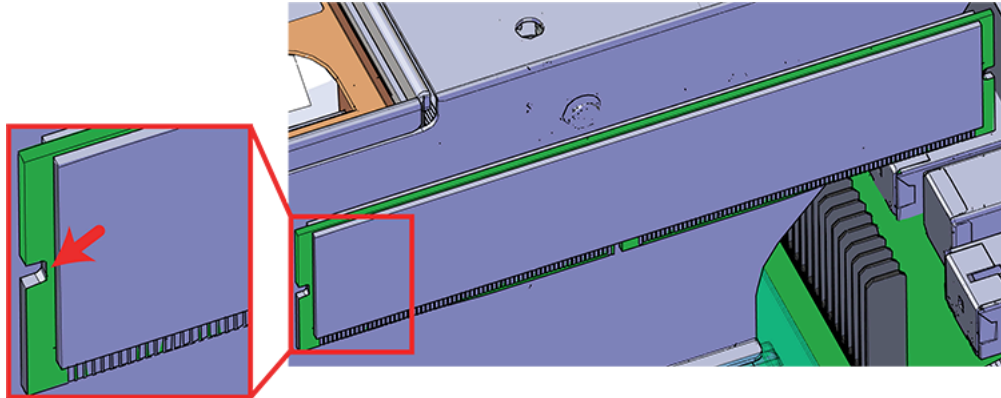
Step 17 : Install the fan bay.

    a. Place the plenum in place behind the empty fan bay slot and install the screws that secure the plenum in place.

Figure 94: Installing the Plenum
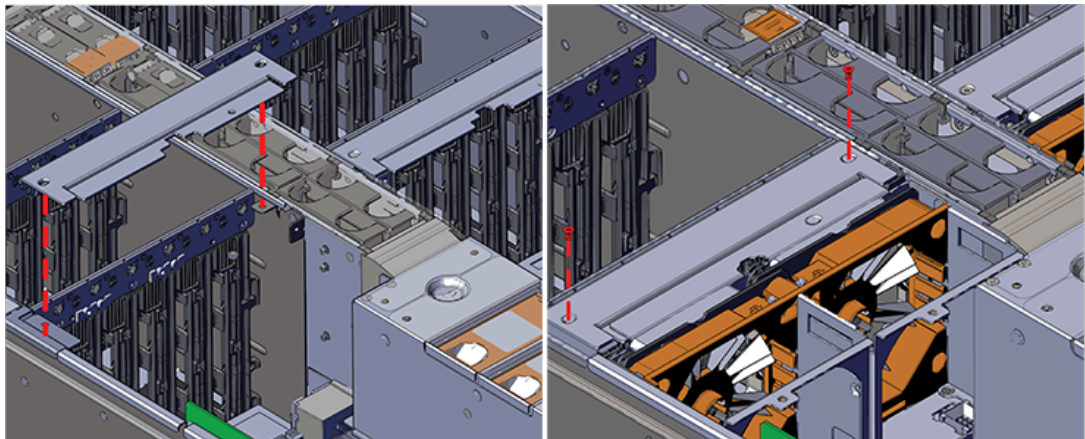
    b. Align the fan bay within the location from which it was uninstalled.

    c. Slide the fan bay into the chassis taking care not to pinch or damage any cables.

Figure 95: Installing the Fan Bay
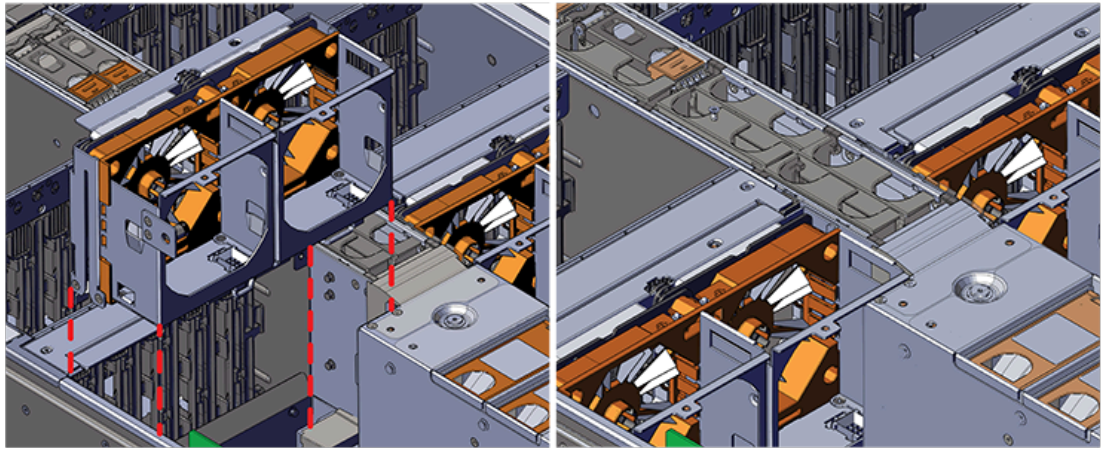
d. Ensure that the pin located on the inside of the fan bay is latched onto the chassis during the process of seating the fan bay. If the pin did not engage, use a Flathead screwdriver to disengage the pin by pulling it out and repositioning the fan bay until the pin engages with the chassis.

Figure 96: Fan Bay Pin Engaged
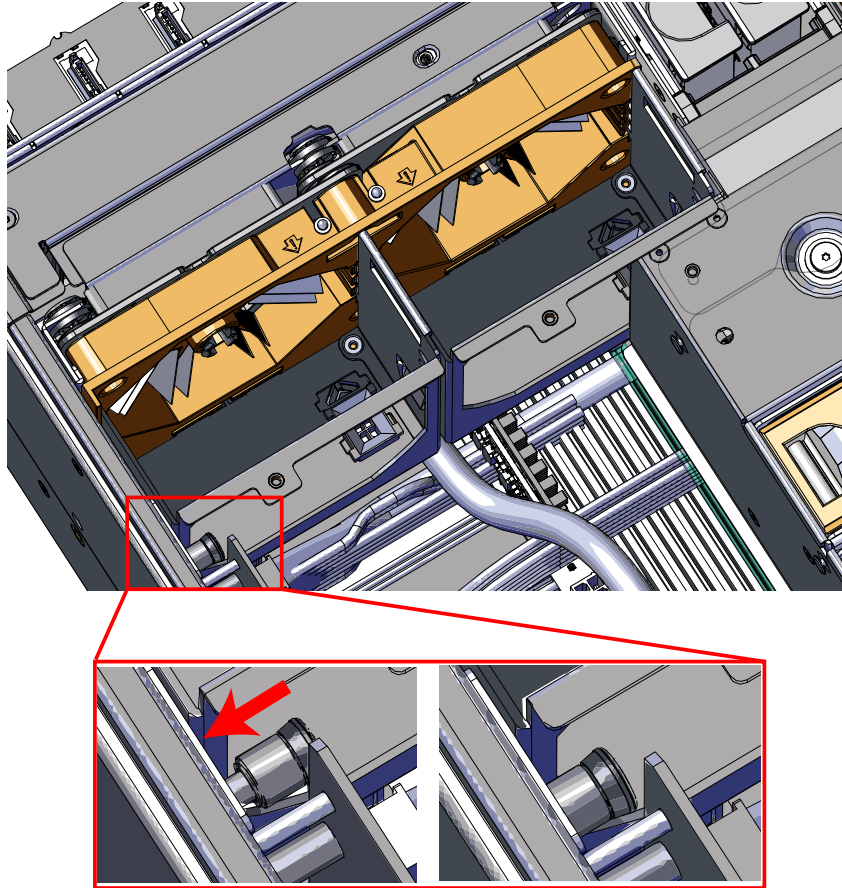
e. Install the screw that secures the fan bay to the chassis.

Figure 97: Fan Bay Screw
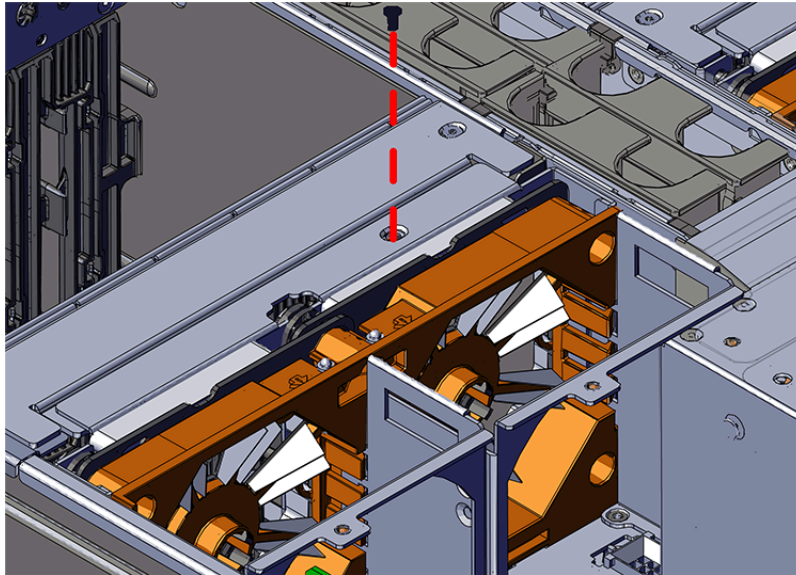
Step 18 : Install server cover panels.

    a. Align and press the server panel cover into place over the server bay.

> 📄 **Note:** The Formex material that the panel is made from is flexible and will allow for the panel to be flexed to fit back into its original placement.

Figure 98: Installing the Server Cover Panel
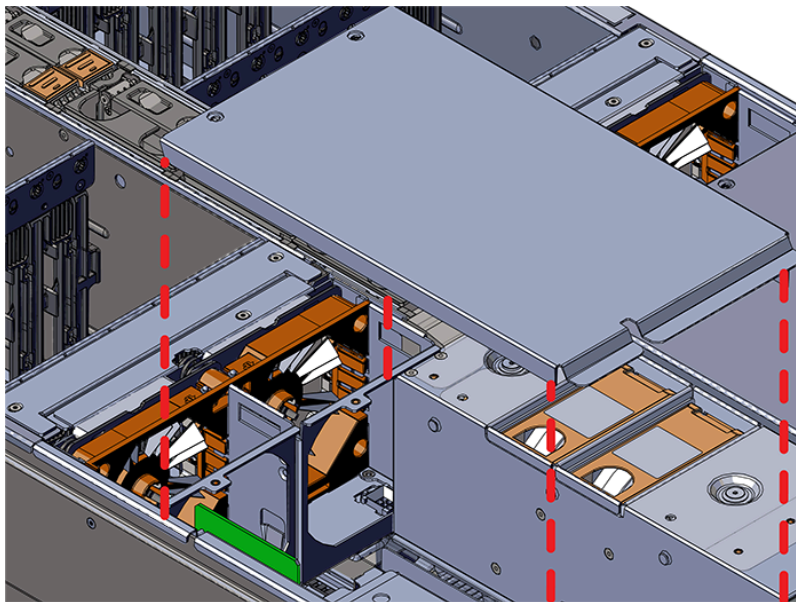
    b. Secure the server cover panel using the original screws and a T7 Torx screwdriver.

Figure 99: Server Cover Panel Screws
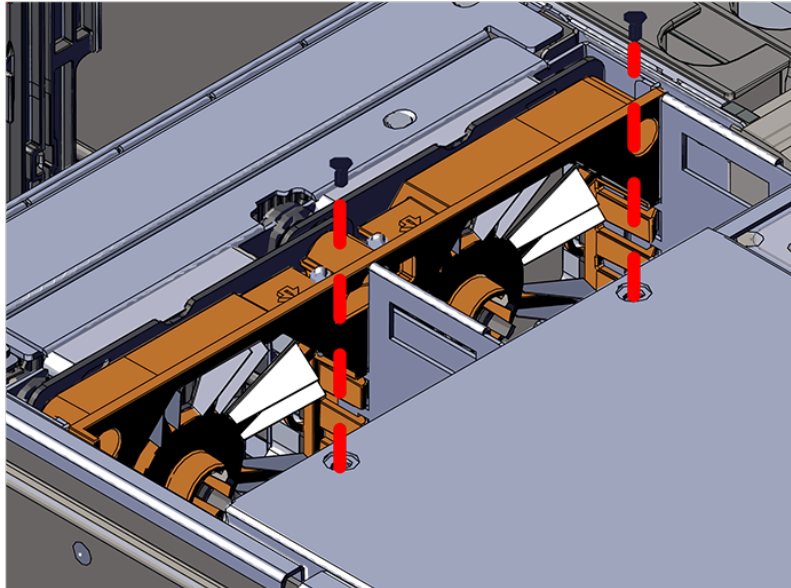
Step 19: Install the System Fan.

    a. Lift the System Fan flap and look inside the empty slot that will receive the System Fan and orient the System Fan so that the connector on the bottom of the fan is on the proper side.

Figure 100: Lift the System Fan Flap
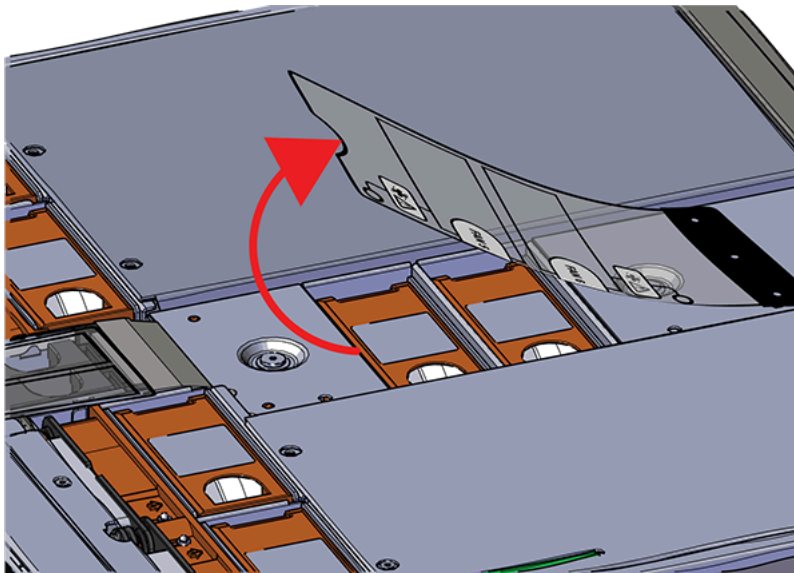
    b. Lower the fan down into the empty slot. Do not force it.
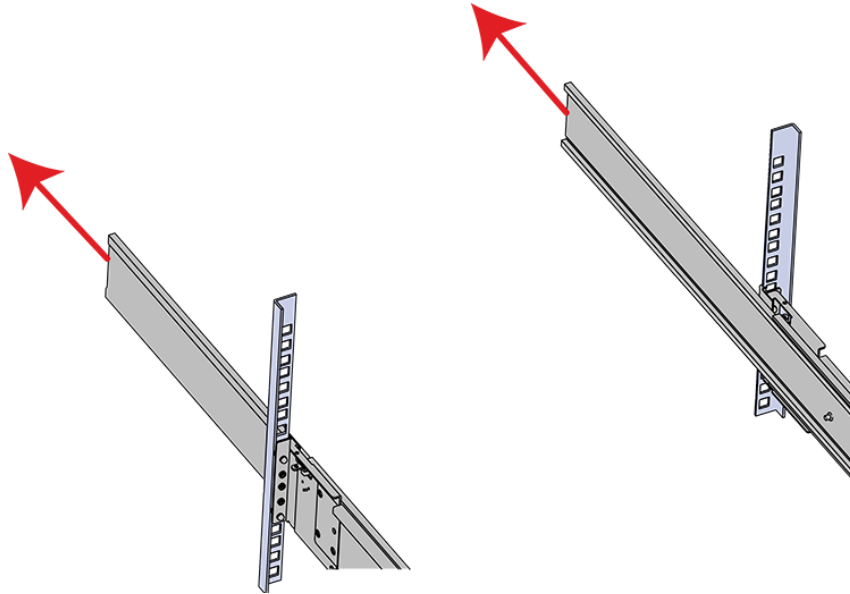
Figure 101: Installing a System Fan
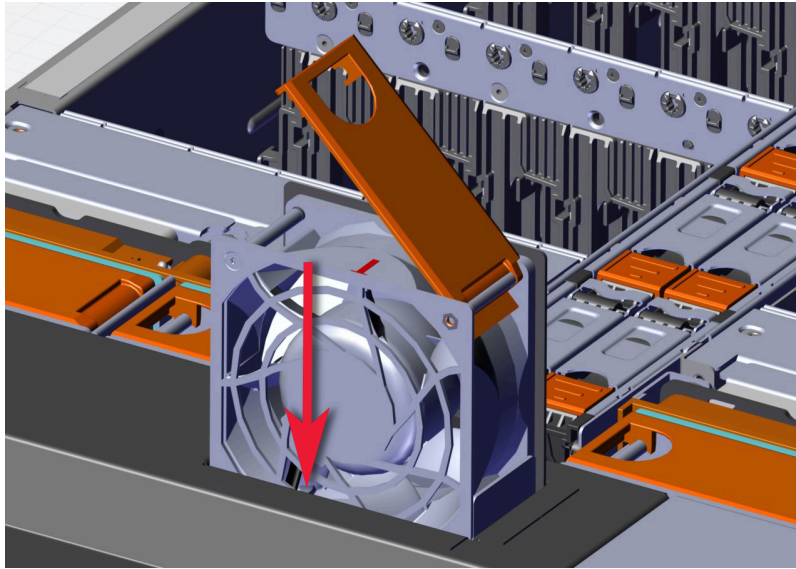
c. When the fan is fully inserted and the connectors are mated properly, close the housing cover clip as shown in the following image.

Figure 102: Latching the Fan Housing Closed
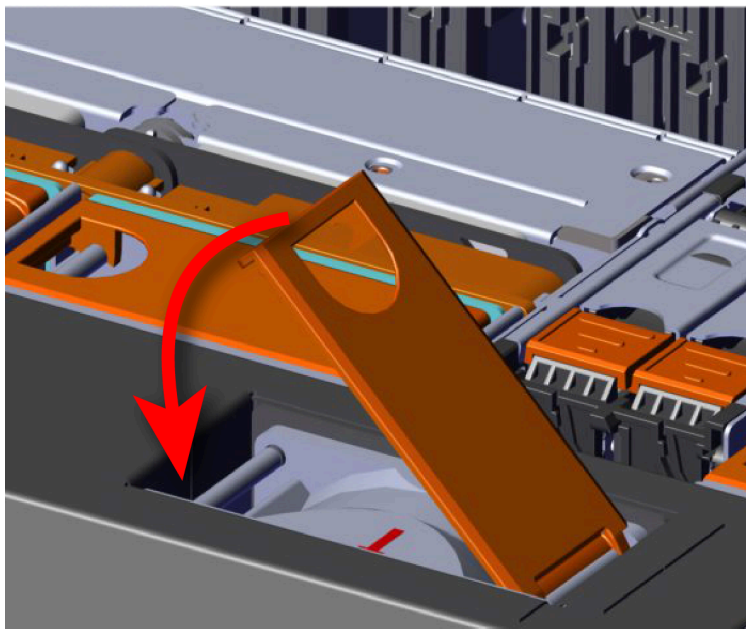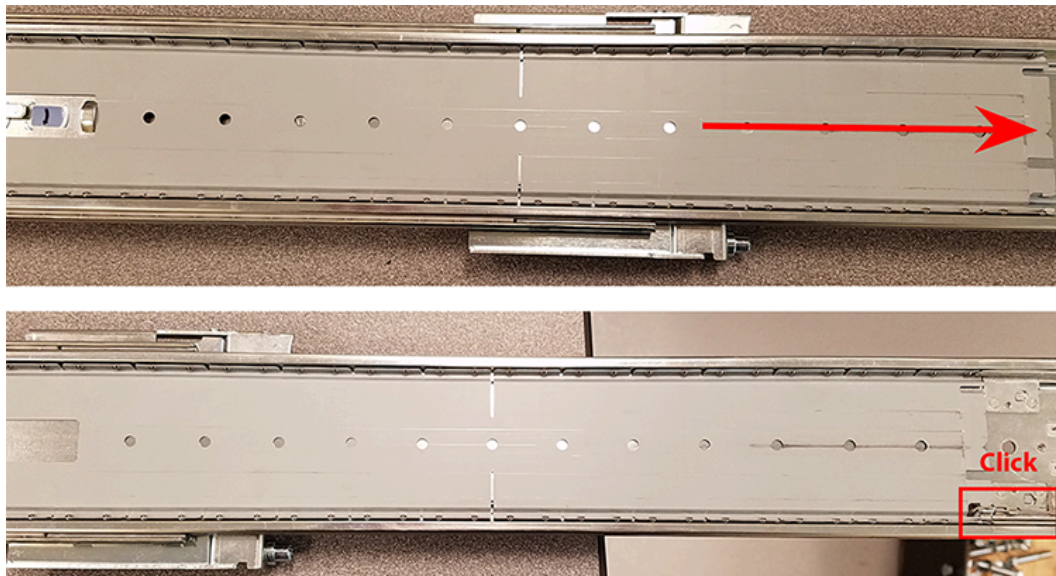
Step 20 : Install the remaining system fans in the same manner as the first.

Step 21 : Extend the mid-rails out of the rack so that they are protruding from the front of the rack and the safety latches engage.

Figure 103: Extend Mid-Rails

Step 22: Install the chassis into the rails.

    a. Extend the bearing plates on the inside of the mid-rails until they are fully forward (detent has engaged). This prevents potential damage due to improper mating of the rails.

Figure 104: Bearing Plate

b. ⚠ **Caution:** This step in the installation requires a minimum of 3 individuals to install safely, two to lift and one to guide the others who may have difficulty seeing because the enclosure is in the way. Ensure that the appropriate measures are taken to safely support the enclosure during installation. The enclosure MUST have no drives installed and requires a two person team lift to install. **Do not attempt to lift the system if it is fully populated with drives.** The only case in which the system may be installed or removed with the drives populated is if the facility has a lift that is rated to handle the maximum weight of the fully loaded system.

In preparation to perform a team lift, position one individual on each side of the enclosure (to lift) and a third individual standing at the protruding rack rails (to guide the chassis to mate with rack rails).

c. Team-lift the enclosure until the inner rails (which are attached to the chassis) align with the extended mid-rails (which are attached to the rack), and guide the inner rails on the chassis to mate with the rack rails.

Figure 105: Installing the Chassis
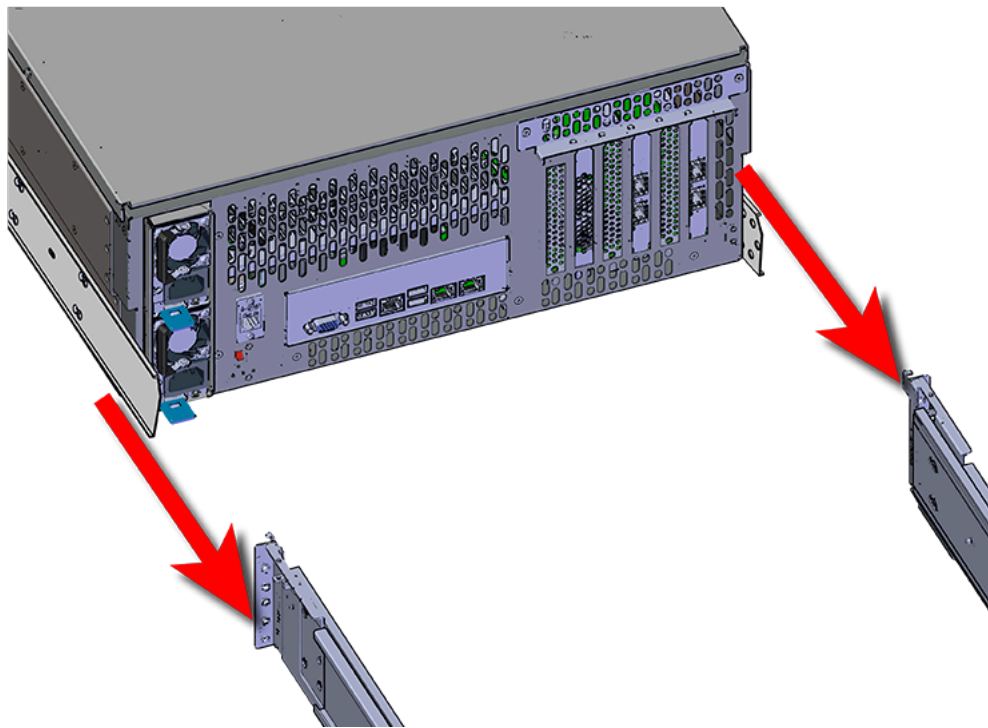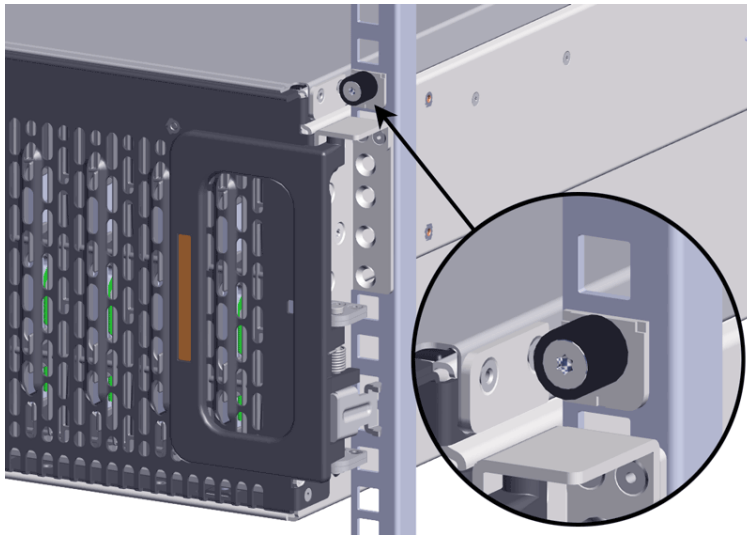
d. Once the rails are mated properly, slide the enclosure into the rack until it is stopped by the safety catch on the rails. Push the release lever on the safety latch (located on the side of each of the rails), and push the enclosure the rest of the way into the rack.

Figure 106: Safety Latch Release

e. As the chassis is slid into the rack, position one installer at the rear of the rack to ensure that the pegs on the sides of the cover will slide correctly into the rear cover alignment brackets on both sides of the rack. If the chassis does not install smoothly or snags, check that the rear cover alignment brackets are not interfering with the chassis sidewalls, and try again.

Step 23: Secure the chassis top cover to the rack using the captive M5 thumb-screws as shown in the following image. Use a T15 Torx screwdriver, and tighten the screws to 3.38-3.61 Nm / 30-32 in-lbf.

Figure 107: Cover Retention Screws

Step 24: Now that the chassis is installed, test the installation by sliding the enclosure in and out of the rack a minimum of three times. If the enclosure binds, catches, or displays any incorrect motion or behavior repeat the installation.

Note: Adjustments of the vertical rack rails may be required to fix any issues that may occur.

Step 25: Install the CMA(s).

> 📄 **Note:** CMA has one arm, to be installed at the lower position. This arm should have the elbow on the left side.

a. Orient the CMA so that the elbow is on the left hand side.

b. Attach all three of the connectors to the brackets on the rails. There should be one at the elbow side and two at the other end.

Figure 108: CMA Orientation
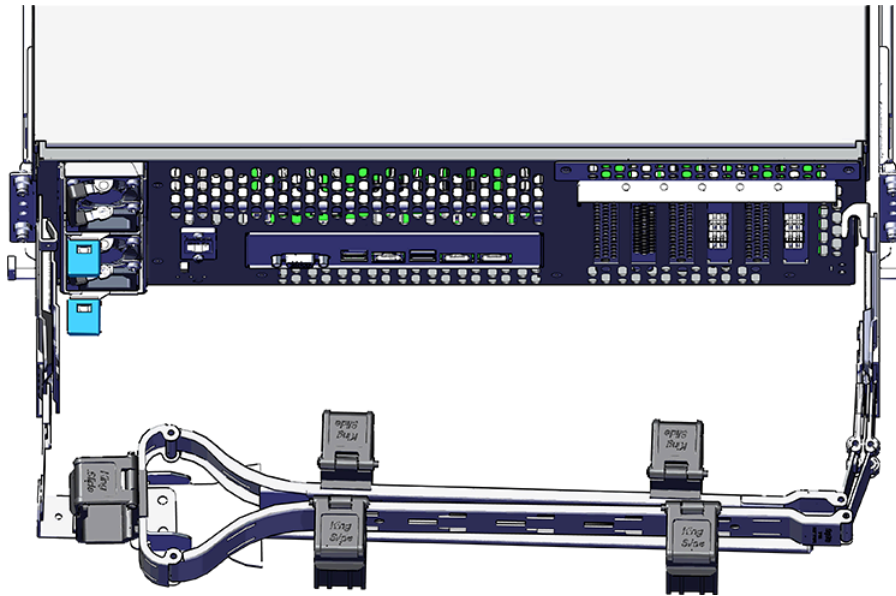
c. Slowly slide the enclosure forward to ensure the arm is operating properly, then slide it back into the rack.

Step 26: Install the 3.5in HDD Assembly.

> 📄 **Note:** The 2.5in SSD Assembly is installed in the same manner as the 3.5in HDD Assembly. For instructions on assembling the 2.5in SSD Assembly, see Operating the 2.5" Drive Carrier *(page 60)*.

a. Ensure that the enclosure has been pulled out of the rack until the rail latches engage.

b. Find the LED pointer on the top of the drive carrier. This pointer should point toward the front of the unit as shown in the following image.

Figure 109: LED Pointer Orientation
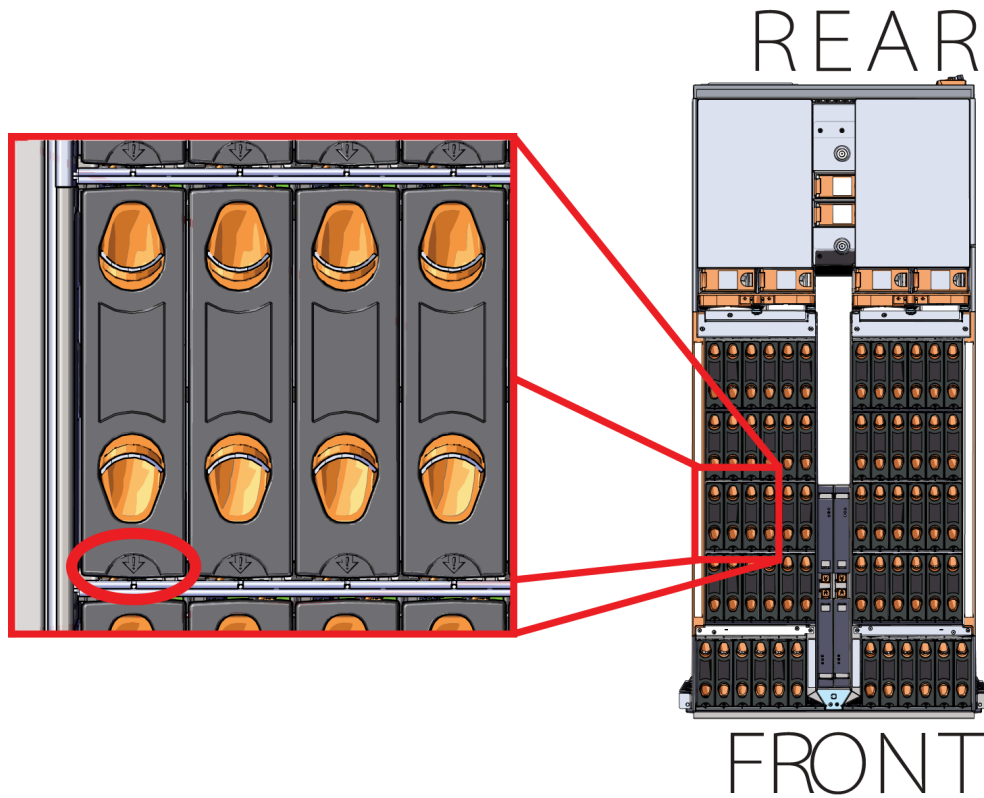
c. Align the drive with the empty slot that will receive it. Lower it into the slot, making sure it stays level and does not snag.

Figure 110: Installing a 3.5in HDD Assembly
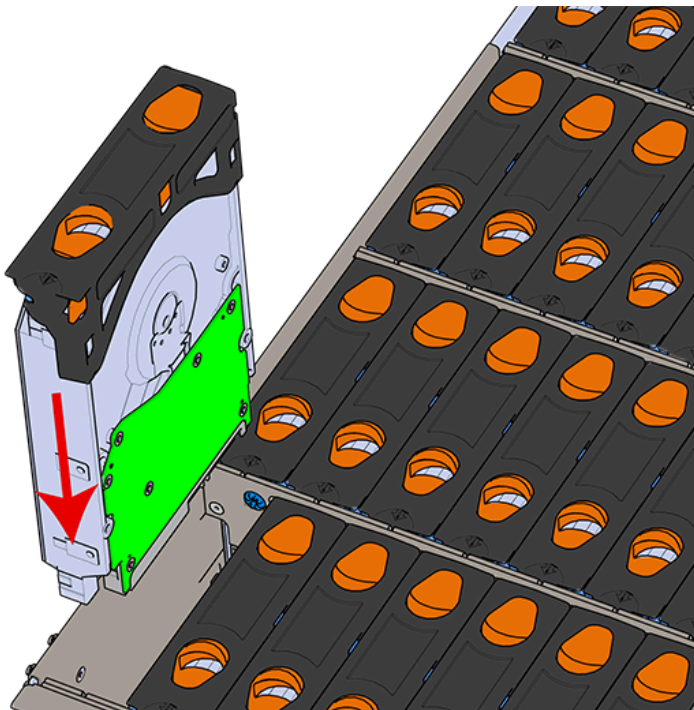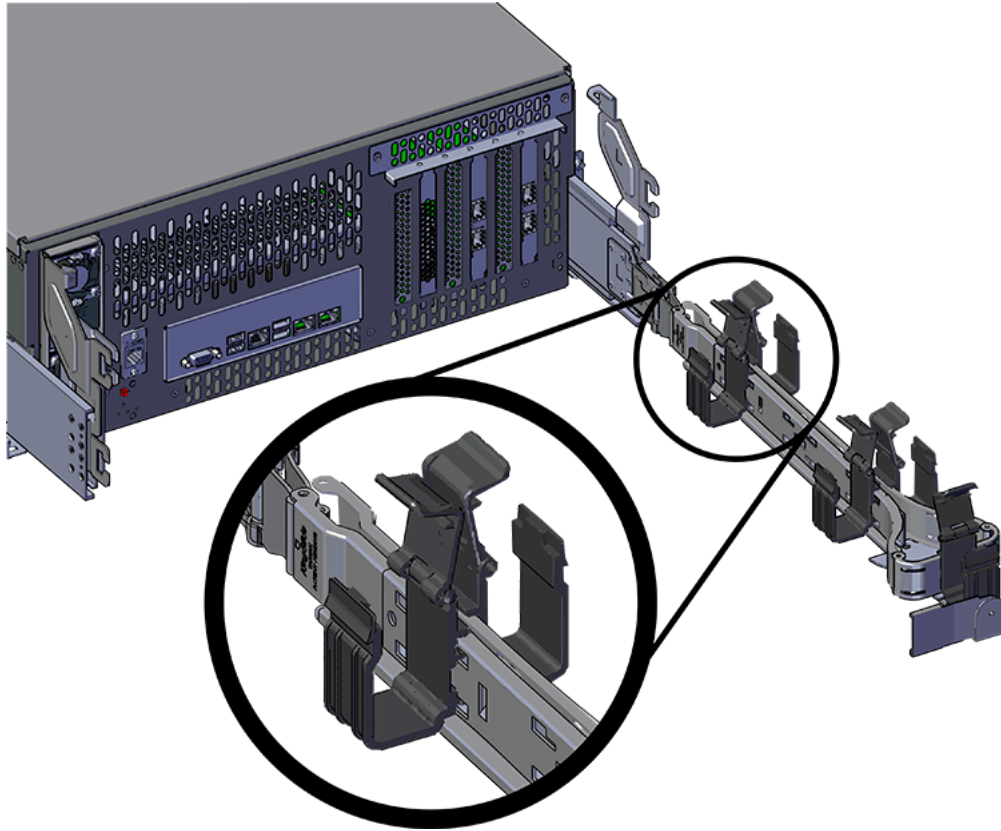
 d. Pinch the latch release and carefully press downward to seat the 3.5in HDD Assembly the rest of the way.

Step 27 : Install each drive in the place it was removed from by following the labels or marks that were added earlier.

Step 28 : Cable the CMA(s).

 CMA Standard:
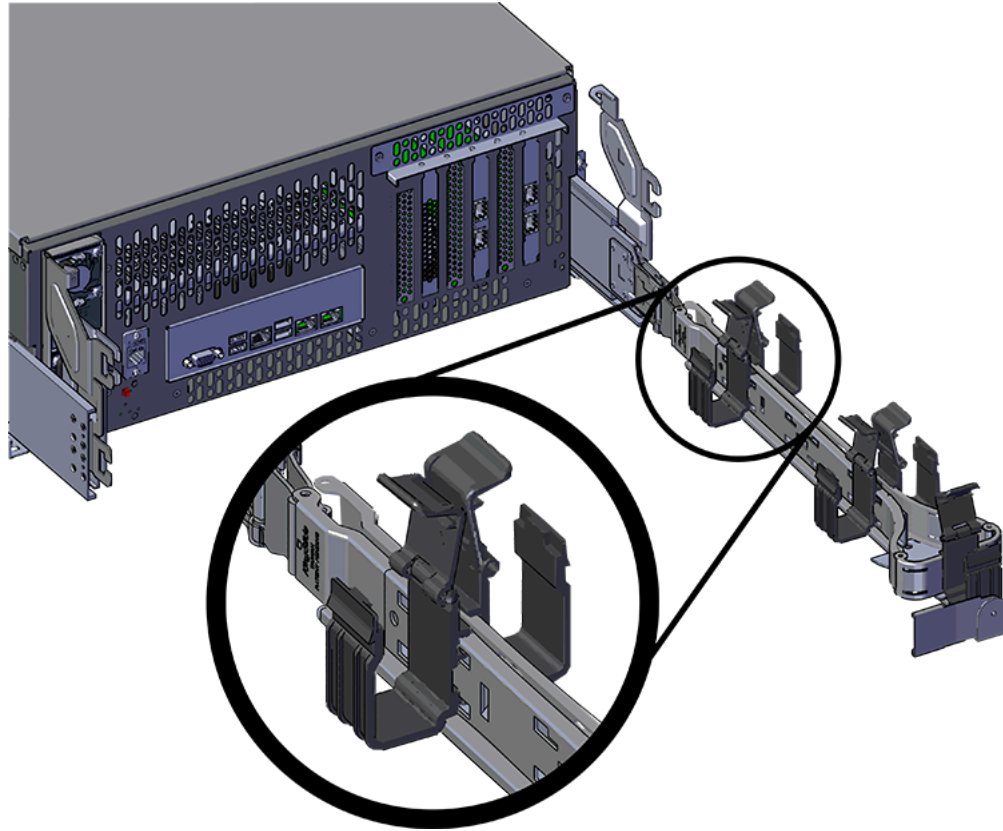
 a. Unlatch the elbow side of the arm(s) by pressing the blue button labeled "push," and then swing the arm(s) open.

 b. Open all of the baskets.

Figure 111: Open Baskets

c. Route all of the cables being connected to the enclosure through the open baskets.

d. Close all of the baskets.

e. If the Ultrastar Serv60+8 is being installed in a rack and will subsequently be transported inside that rack, it is important to use the included cable tie to wrap the CMA bundle to ensure it does not get damaged during transport. If the Ultrastar Serv60+8 is instead being installed where it will be operated, skip this step. Remember to remove the cable ties after the enclosure has reached its final operational location.

f. Reconnect the arm at the elbow to the connectors on the rail.

CMA Lite:

a. Press the blue latch button labeled "push" to unlatch the elbow side of the CMA arm, and then swing the arm open.

b. Open all of the baskets.

Figure 112: Open Baskets

c. Gather the SAS, power, and Ethernet cables for installation.

> 📄 **Note:** Route all cables to IOM A (left hand side looking at the rear).

d. Route all of the cables being connected to the enclosure through the open baskets.

e. Close all of the baskets.

f. If the Ultrastar Serv60+8 is being installed in a rack and will subsequently be transported inside that rack, it is important to use the included cable tie to wrap the CMA bundle to ensure it does not get damaged during transport. If the Ultrastar Serv60+8 is instead being installed where it will operated, skip this step. Remember to remove the cable ties after the enclosure has reached its final operational location.

g. Reconnect the arm to the rail by the connector at the elbow.

Step 29: Test for binding in the extension of the arm by gently pulling the enclosure out of the rack, ensuring the cables extend properly and that the system doesn't bind at all. If it does, examine the point at which the binding occurred and adjust the seating of cables in the baskets, check the connections to the rails, and examine the joints of the arm to ensure that they are all functioning properly.

Step 30: Make sure the CMA(s) is in operational position by folding the arm(s) in toward the enclosure and attaching the elbow end(s) to the connector(s) attached to the rail. Verify that all of the cabling is in functional order and does not bind or catch.

3.8 CPU Heat Sink Replacement

Note: The CPU and Heat Sink module are not hot swappable. The enclosure must be powered-down, disconnected from all cabling, and removed from the rack before replacing the CPU and Heat Sink module module.

Replacement Requirements	
Personnel Required	3
Avg. Replacement Time	2 hr
Max Replacement Time	N/A
Tool	**Required vs. Recommended**
T30 Torx Screwdriver	Required
T15 Torx Screwdriver	Required

Step 1: Uncable the CMA(s).

   a. Open all of the basket clips on the CMA(s).

Figure 113: Open Baskets
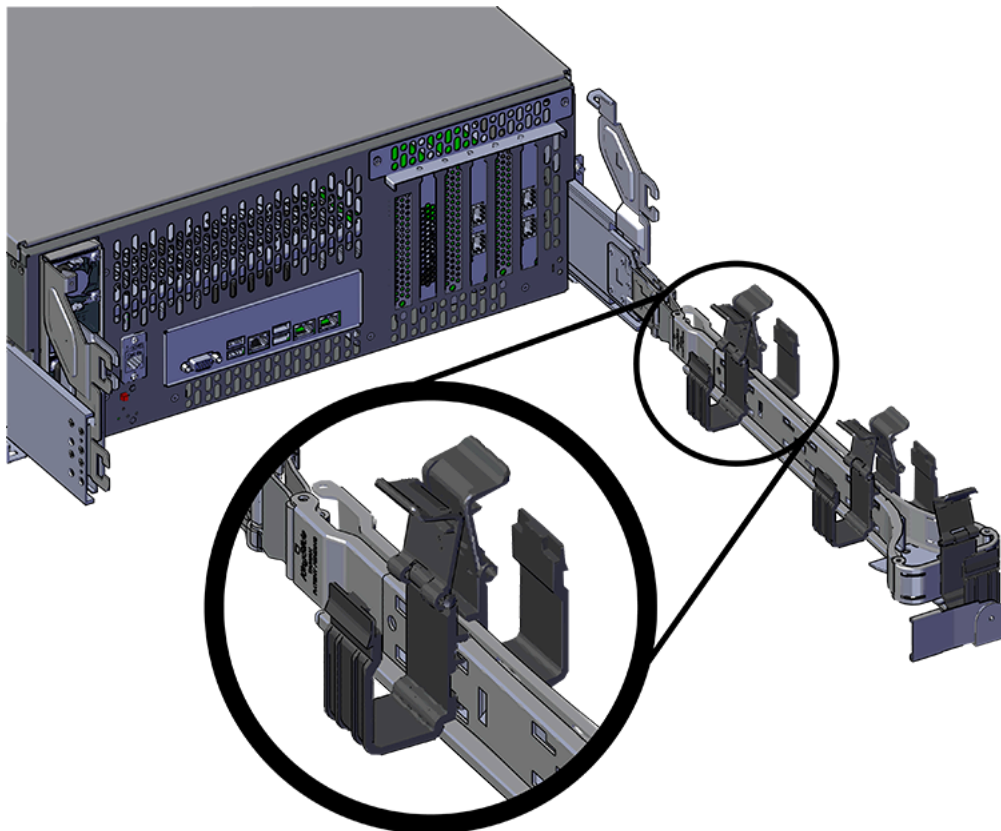
b. Remove one cable at a time from the arm, making sure not to put too much strain on the arm.

Step 2: Remove the CMA(s).

a. Release all of the connectors that attach the CMA(s) to the enclosure and the rail.

There are three total connections that need to be released, one at the elbow and two at the opposite end.

b. To release a connector, press the blue latch release button and pull the connector free.

Figure 114: Unlatching a CMA Connector
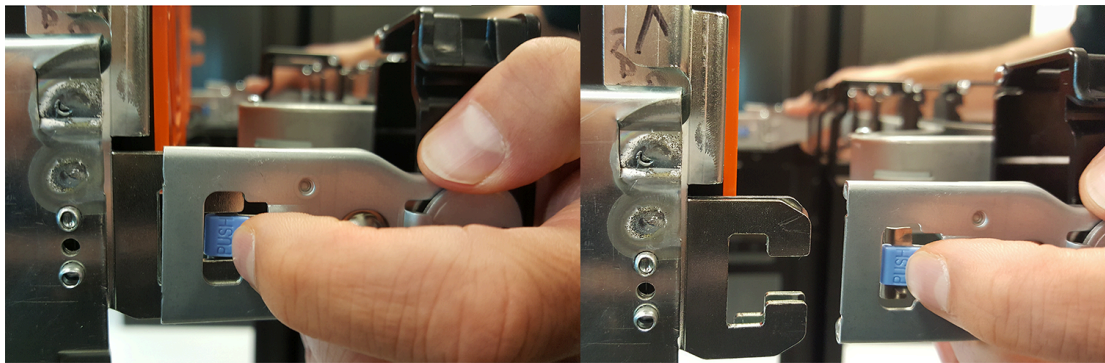
Step 3: Grasp both handles at the front of the enclosure and pull with even pressure to extend the chassis out of the rack until it is stopped by the safety latches. The safety latches will prevent the enclosure from coming out of the rack completely and the cover will remain in the rack attached to the rear alignment brackets.
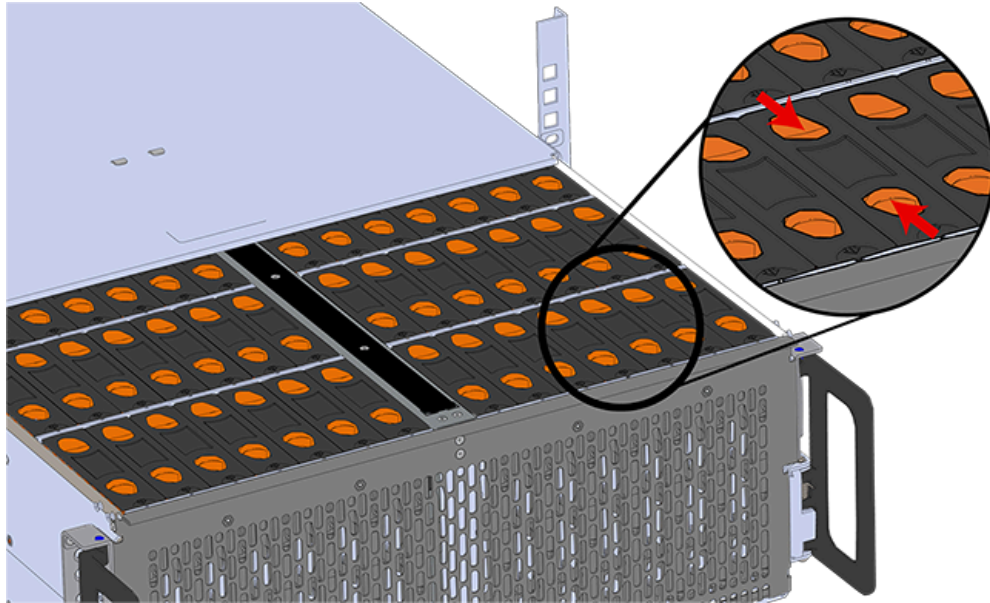
Figure 115: Chassis Handle Operation
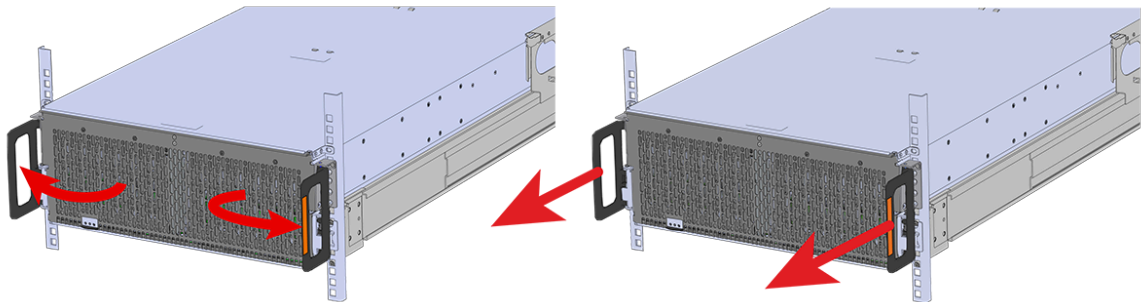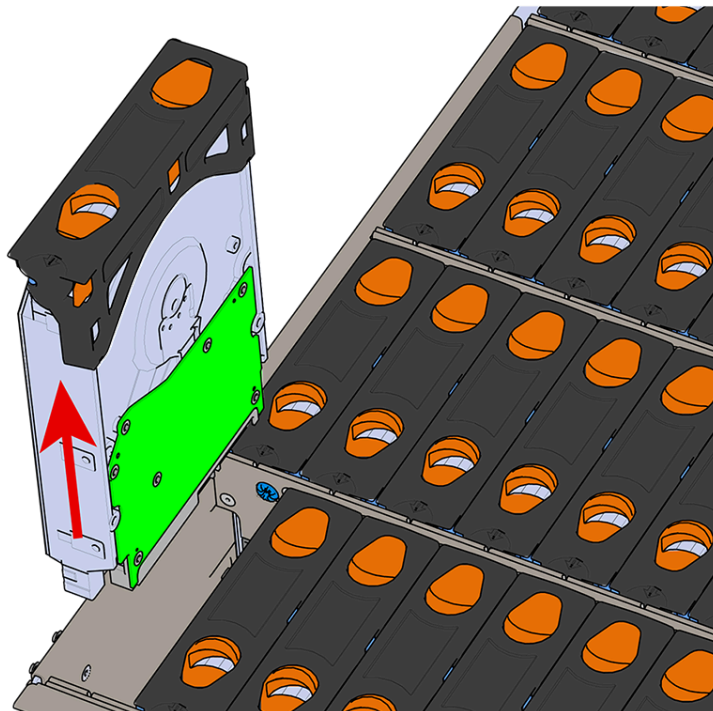
Step 4: Remove all of the drives from the chassis before uninstalling the chassis. Be prepared to label the drives as they are removed so they can be reinstalled in the same location in the new chassis.

Step 5: Follow these steps to remove a 3.5in HDD Assembly.

a. Find the latch release mechanism on the 3.5in HDD Assembly being removed.

b. Insert a finger and a thumb into the latch release and pinch to unlatch the 3.5in HDD Assembly.

Figure 116: Unlatch Drive Carrier (IOM Not Shown)

c. Lift the 3.5in HDD Assembly free from the enclosure.

Figure 117: Removing 3.5in HDD Assembly

Step 6 : Follow the previous step for each drive in the enclosure. Attach a label or mark the drives with the drive slot they were removed from in order to add them to the same slot in the future. Store the drives in an ESD safe location until the drives are ready to be installed back into an enclosure.

Step 7 : Release the safety latch on the inner rails on each side of the chassis as shown in the following image.

Figure 118: Inner Rail Safety Latch Release

Step 8 : Grasp both handles at the front of the enclosure and pull with even pressure to extend the chassis out of the rack until it is stopped by the safety latches. Make sure that the top cover comes with the chassis as it is extended out of the rack. The safety latches will prevent the enclosure from coming out of the rack completely.

Step 9 : Remove the chassis from the rack.

    a. Be prepared to support the enclosure once it is free of the rails by having a second person or a lift to support the enclosure

    b. Grasp both handles at the front of the enclosure and pull with even pressure until the enclosure will not extend further.

    c. Locate the safety catches on the inner rails attached to the enclosure.

Figure 119: Safety Latch Release

d. Depress the latch release lever for the safety latches on the rail and push the chassis very slightly forward. The chassis is now unsecured from the rack.

e. Ensure that you have the proper support mechanism to hold the chassis in position, whether that be a team lifting partner or an appropriate lift.

f. Slide the chassis forward to free it from the rails. Place the chassis in a safe location to avoid damage.

Step 10:

> ⓘ **Attention:** Place the enclosure on a flat ESD safe surface and ensure it is stable before continuing with the procedure.

Step 11: Uninstall the internal Rear Fan.

a. Lift the Rear Fan flap and insert a finger into the service hole on the top of the Rear Fan and pull up to release the latch.

Figure 120: Lift the Rear Fan Flap
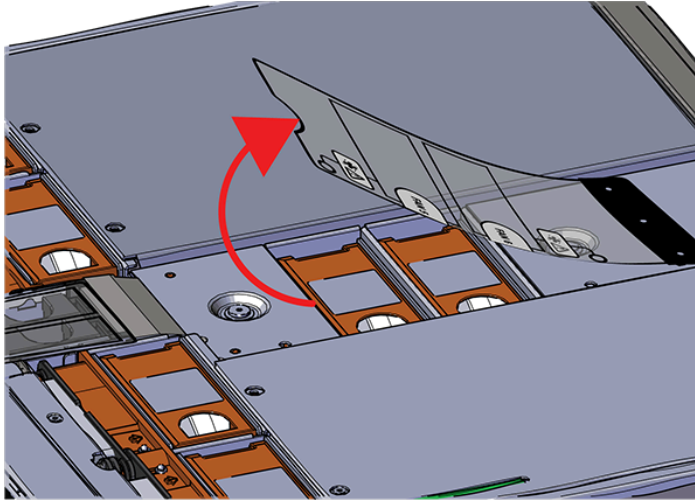
Figure 121: Unlatching Rear Fan
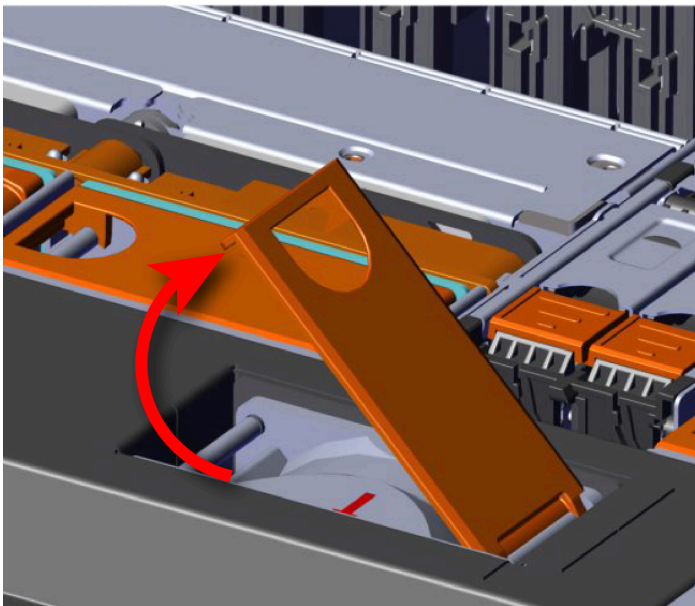
b. Use the handle to pull evenly on the component to remove it from the enclosure.

Figure 122: Removing Rear Fans
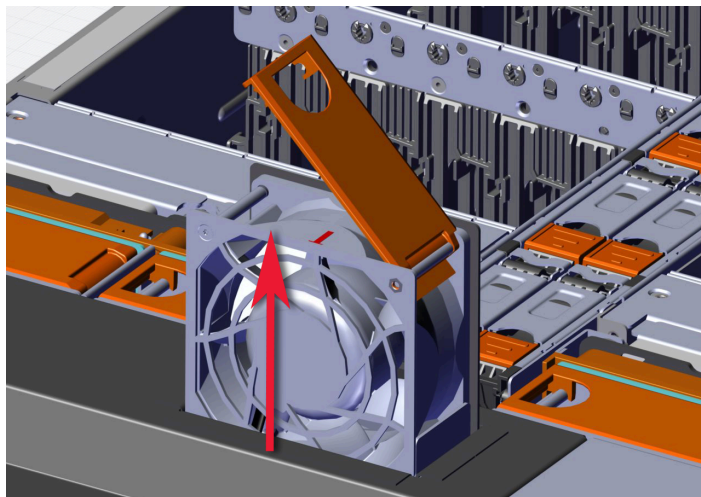
Step 12: Uninstall the rest of the system fans in the same manner as the first.

Step 13: Uninstall server cover panel on both sides of the enclosure that contains the failed CPU and Heat Sink module.

> **Note:** The same steps to uninstall the server cover panel apply to both sides of the enclosure with the exception of the number of screws that secure the server cover panel. From the rear of the enclosure, the left panel contains two screws. The panel on the right side of the enclosure contains one screw.

   a. Remove the screws that secure the server cover panels to the chassis using a T7 Torx screwdriver.

   > **Note:** When at the rear of the enclosure, the left server cover panel contains two T7 Torx screws. The left server cover panel contains only one T7 Torx screw.

Figure 123: Removing the Server Cover Panel Screws
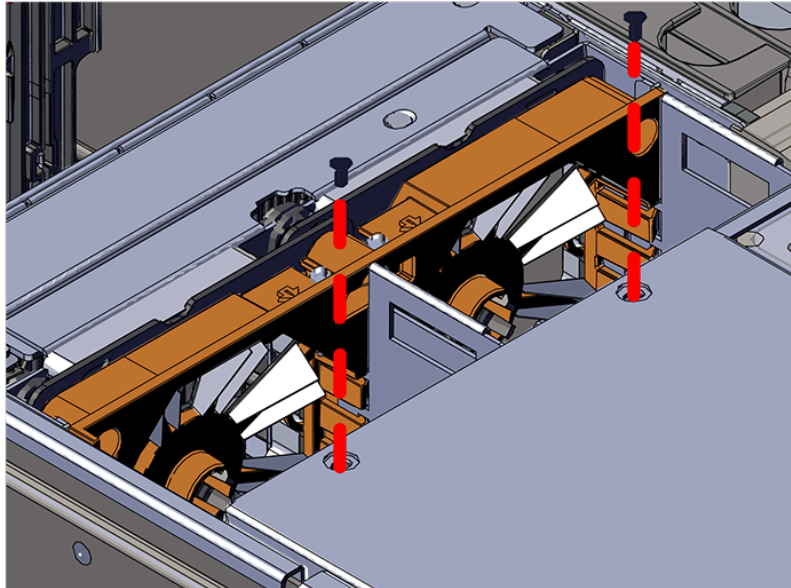
b. Remove the server cover panel by carefully pulling on the edge where the screws were removed.

Figure 124: Removing the Server Cover Panel
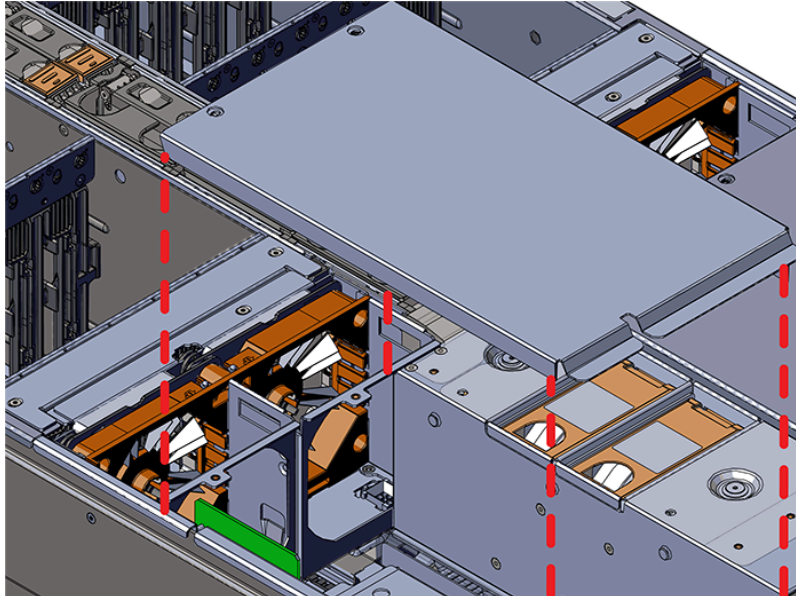
Step 14: Uninstall the fan bays.

> **Note:** Uninstall the fan bay on both sides.

a. Remove the screw that secures the fan bay to the chassis.

Figure 125: Removing the Fan Bay Screws
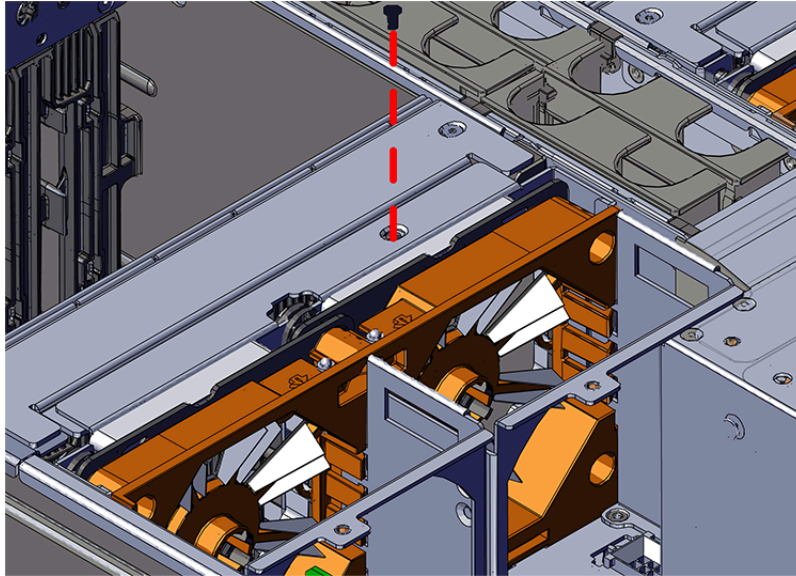
b. Locate the pin that secures the outside of the fan bay to the chassis and pull the pin out and pull up on the fan bay until the cage is clear of the chassis.

> **Note:** The fan bay is connected to the baseboard with a cable and does not need to be disconnected. When removing the fan bay, lay the assembly on the drive cage.

Figure 126: Fan Bay Pin
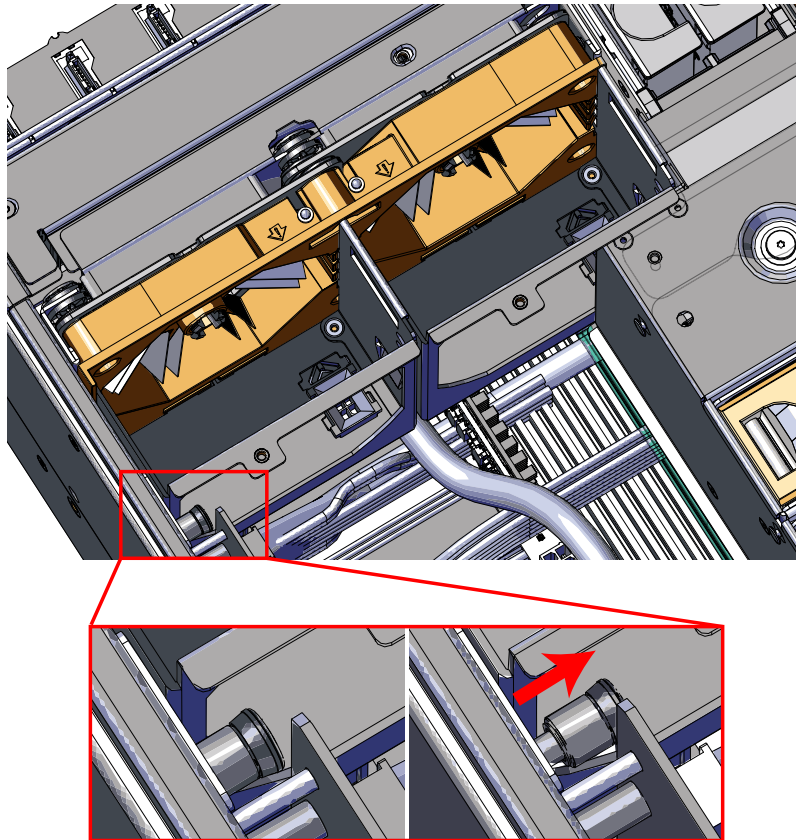
Step 15 : Uninstall the remaining fan bay in the same manner as the first.

Step 16 : Uninstall the System Fan Bay.

    a. Loosen the captive screws that secure the system fan bay to the chassis using a T15 Torx Screwdriver until the cover comes loose. The screws will be retained within the System Fan Bay while uninstalling the part.

Figure 127: Loosening the System Fan Bay Captive Screws
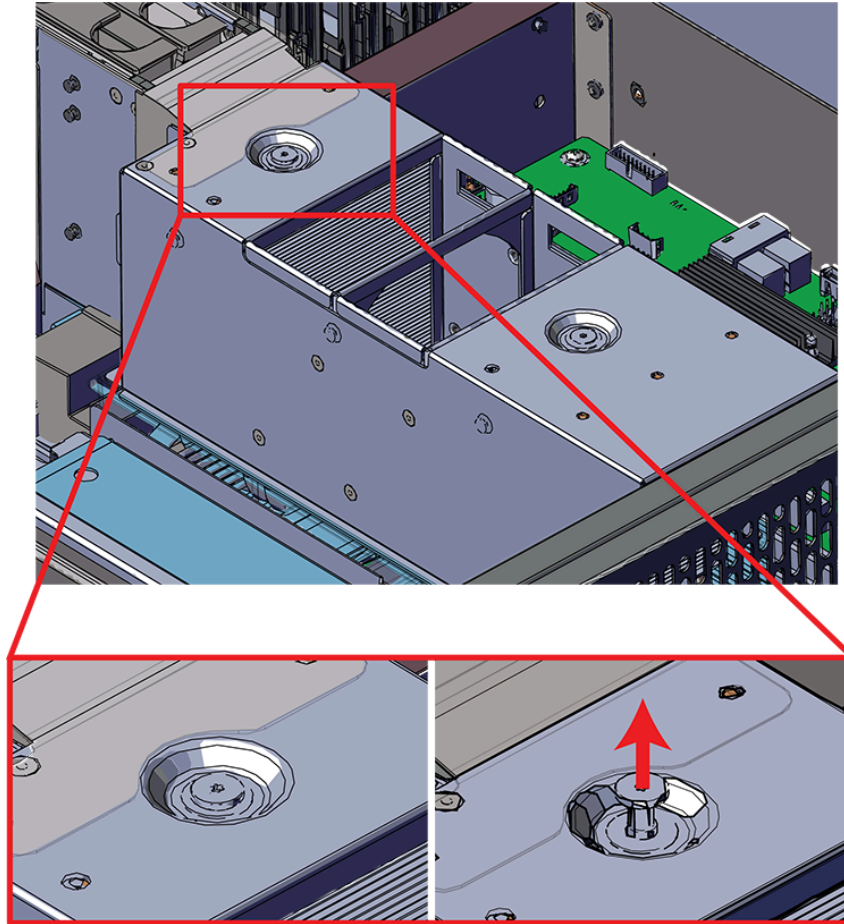
b. Slide the system fan bay out of the chassis and set it aside.

Figure 128: Removing the System Fan Bay
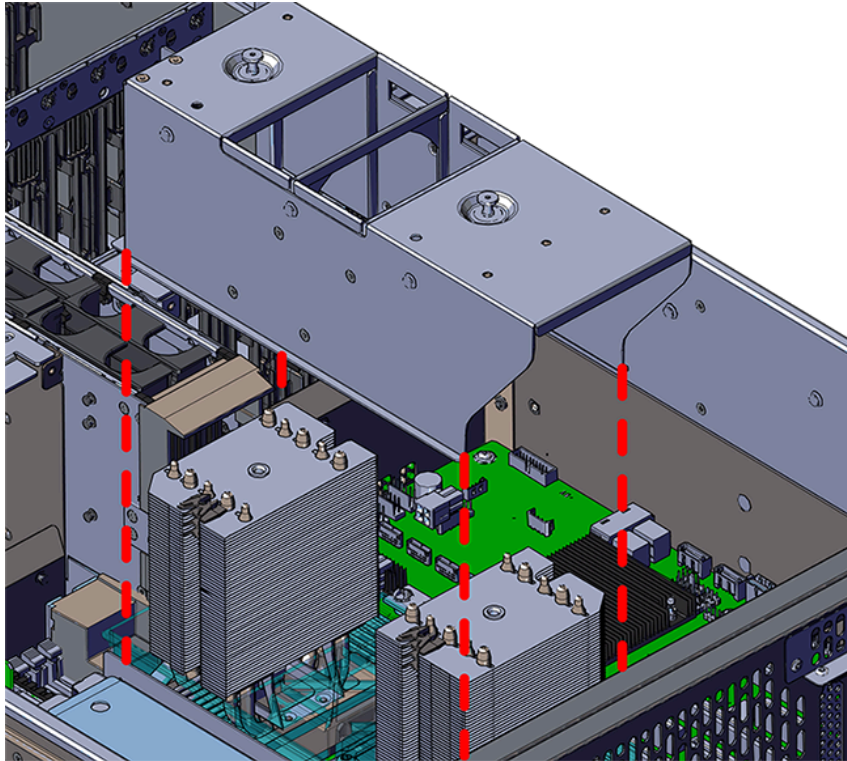
Step 17 : Uninstall the System Fan base.

a. Slide the system fan base up and over the CPUs until clear of the CPUs. Set the system fan base to the side with cables still attached. The cables are long enough to remain connected during these steps.

Figure 129: Removing the System Fan Base (highlighted in red)
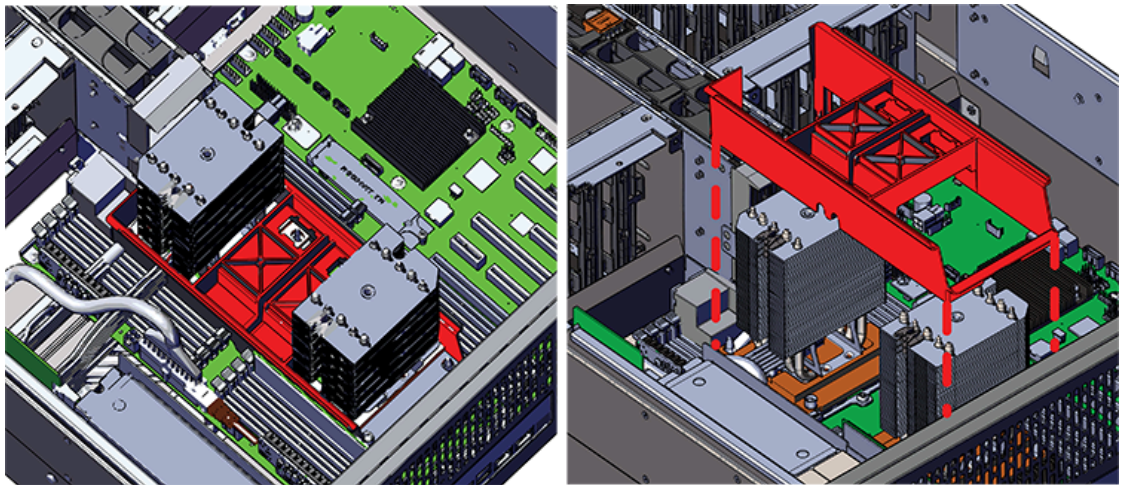
b. Locate and remove the LED brackets that are attached to the Heat Sink.

Figure 130: Uninstalling the CPU LED Brackets
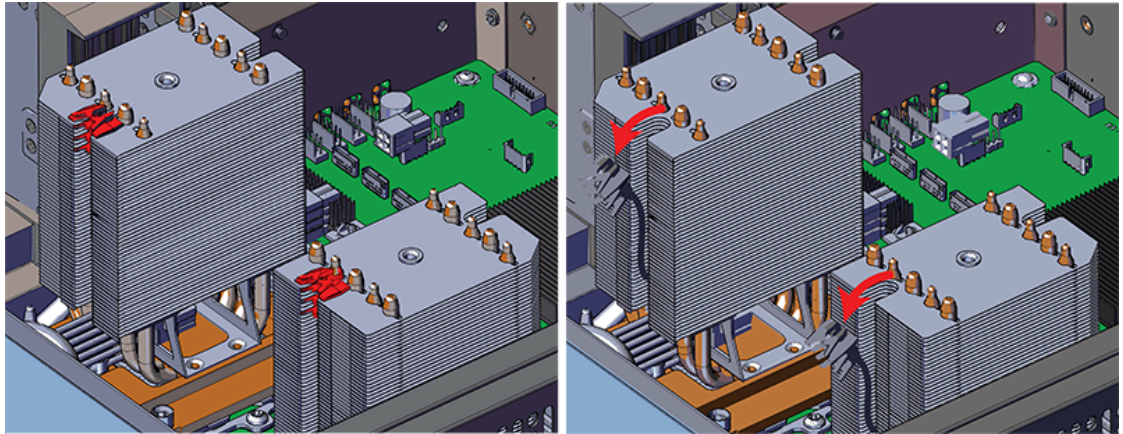
Step 18: Uninstall the CPU and Heat Sink module.

    a. Locate the failed CPU and Heat Sink module.

    b. The Heat Sink must be removed by loosening the Torx T30 screws in a specific order. Use the following diagram to determine the specific order.

Figure 131: Heat Sink Removal Order
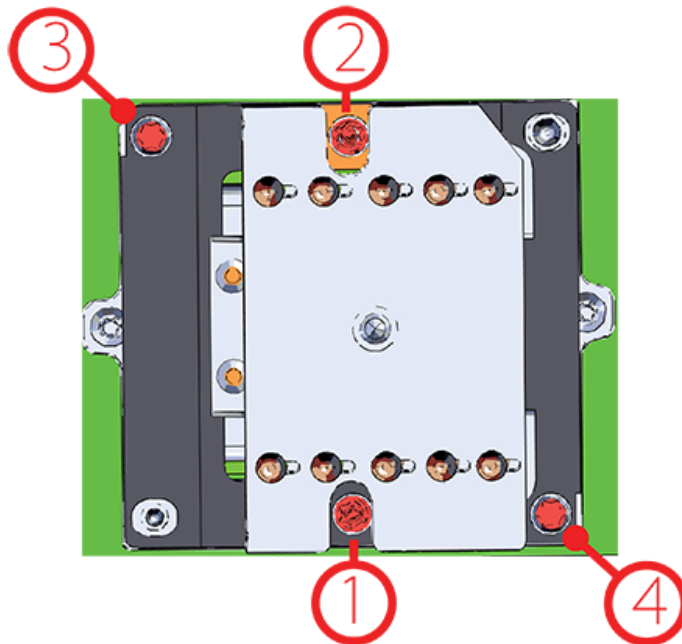
    c. Slide the Heat Sink clear of the socket alignment pins.

Step 19: Install the CPU and Heat Sink module.

    a. Locate the socket alignment pin on the baseboard and the alignment hole on the Heat Sink.

    b. Carefully place the CPU and Heat Sink module in position on the socket alignment pins.

Figure 132: Heat Sink Alignment Pins
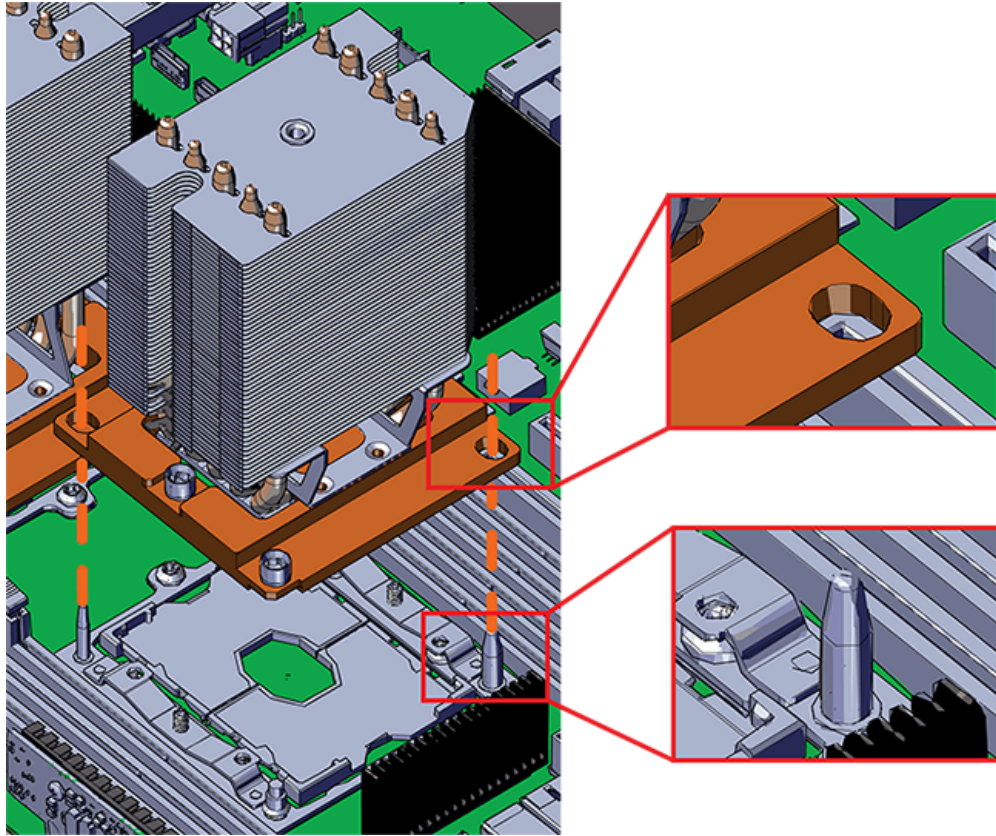
c. The Heat Sink must be installed by tightening the Torx T30 screws in a specific order. Use the following diagram to determine the specific order.

> **Note:** The Heat Sink screws must be tightened to a torque setting of 12in.-lbs. Do not over-tighten. Over-tightening may cause damage to the parts.

Figure 133: Heat Sink Installation Order
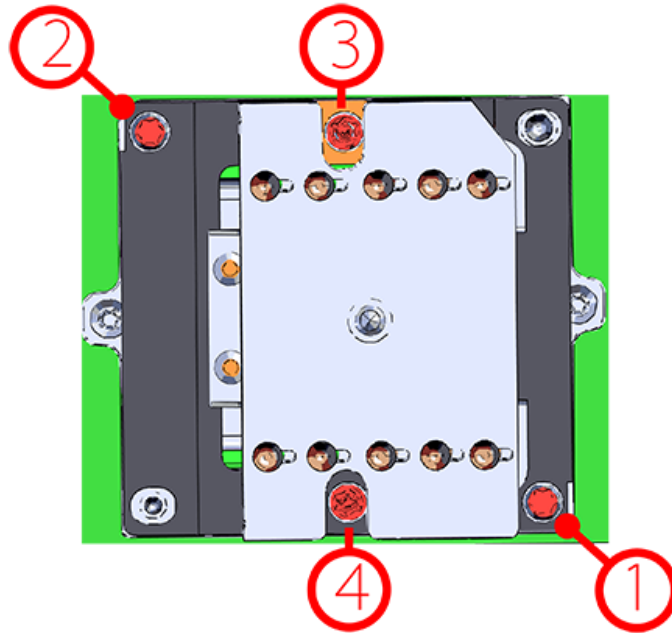
Step 20 : Install the System Fan base.

    a. Slide the system fan base down over the CPUs until the base rests on the baseboard.

    b. Slide the LED cable and LED bracket into the Heat Sink channel and snap it into place at the top of the Heat Sink.

Figure 134: Installing the CPU LED Brackets
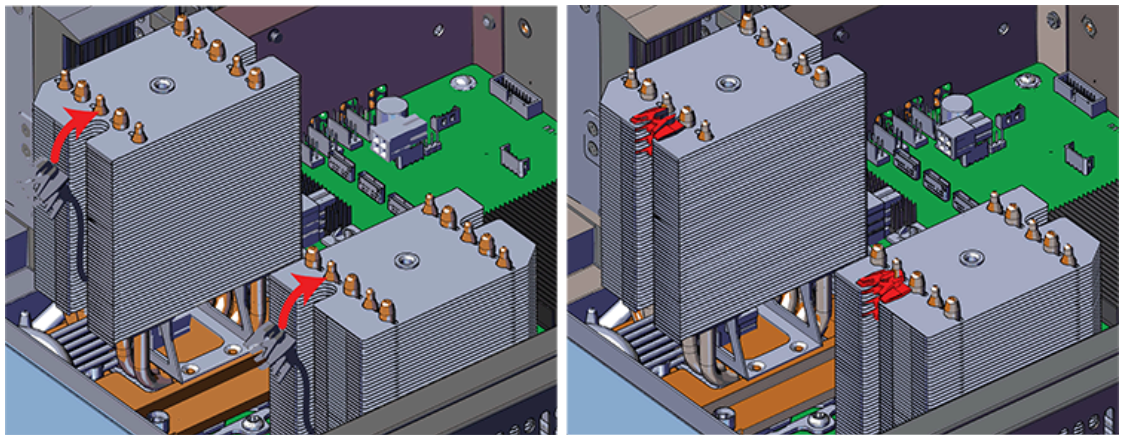
    c. Install the remaining LED bracket in the same manner as the first.

Step 21 : Install the System Fan Bay.

    a. Slide the system fan bay down over the CPUs until the captive screws line up with screw holes on the Heat Sink.

b. Lift the system fan flap and push in and tighten the captive screws until the system fan bay is secure.

Figure 135: Lift the System Fan Flap
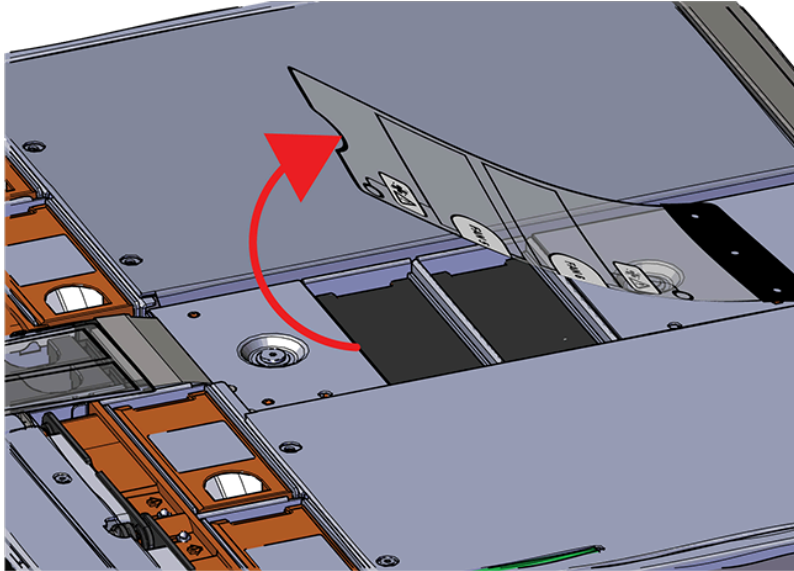
Figure 136: Installing the System Fan Bay Captive Screws
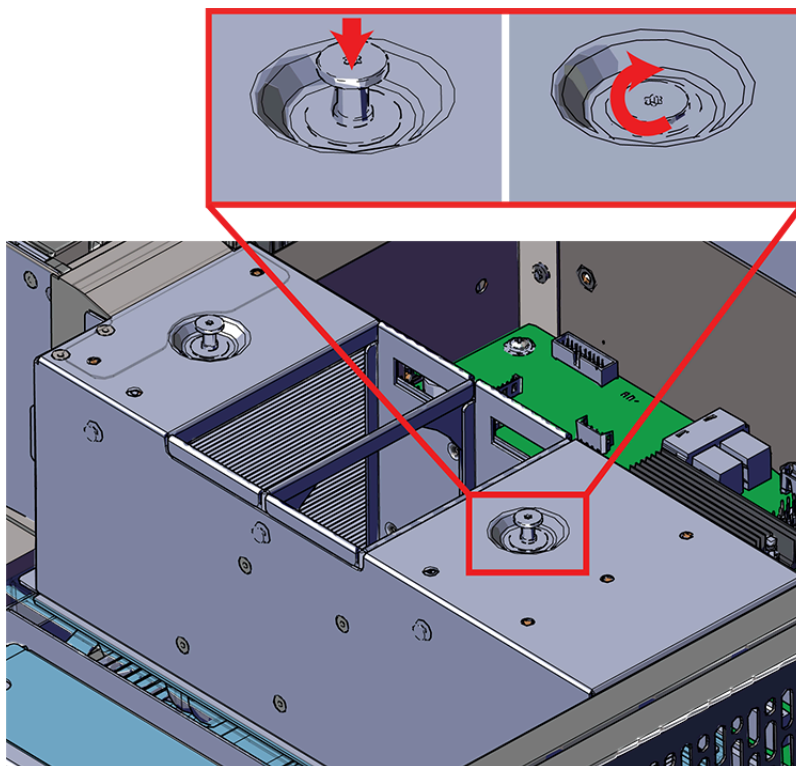
Step 22 : Install the fan bay.

a. Align the first fan bay within the location from which it was uninstalled.

b. Slide the fan bay into the chassis taking care not to pinch or damage any cables.

Figure 137: Installing the Fan Bay
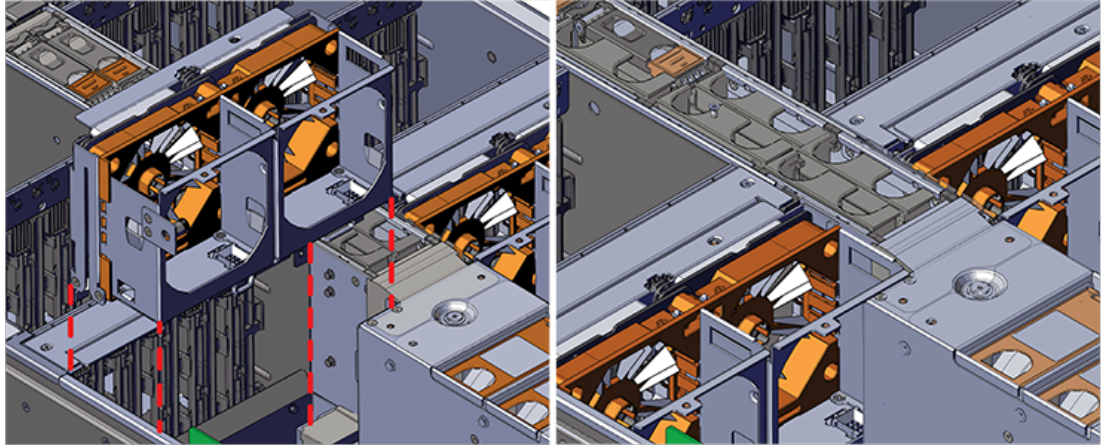
c. Ensure that the pin located on the inside of the fan bay is latched onto the chassis during the process of seating the fan bay. If the pin did not engage, use a Flathead screwdriver to disengage the pin by pulling it out and repositioning the fan bay until the pin engages with the chassis.

Figure 138: Fan Bay Pin Engaged
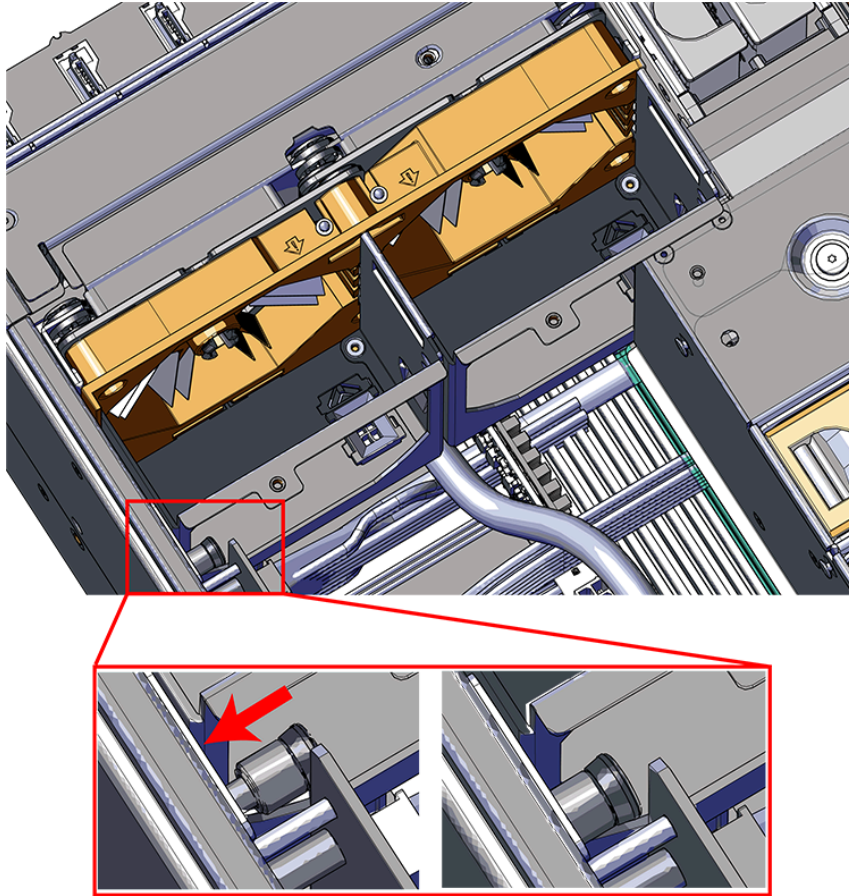
    d. Install the screw that secures the mid-bulkhead fan cage to the chassis.

Figure 139: Fan Bay Screw
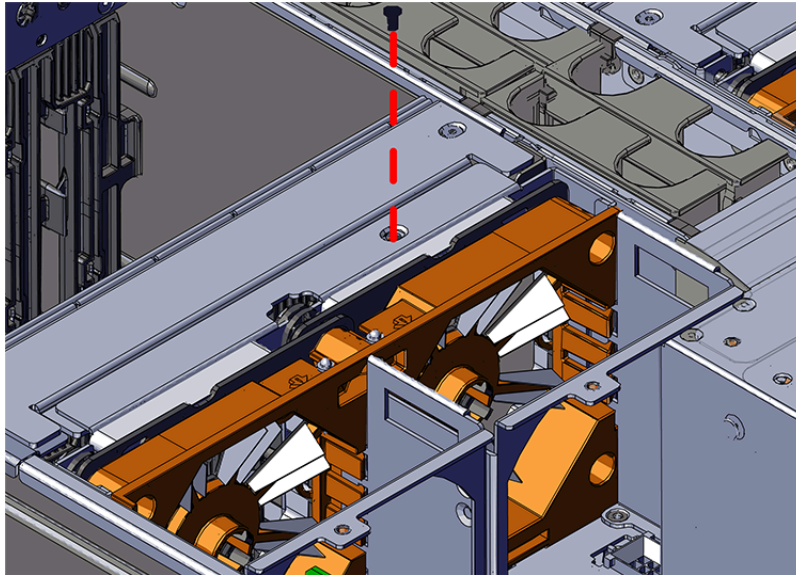
Step 23: Install the remaining fan bay in the same manner as the first.

Step 24: Install server cover panels.

    a. Align and press the server panel cover into place over the server bay.

> **Note:** The Formex material that the panel is made from is flexible and will allow for the panel to be flexed to fit back into its original placement.

Figure 140: Installing the Server Cover Panel
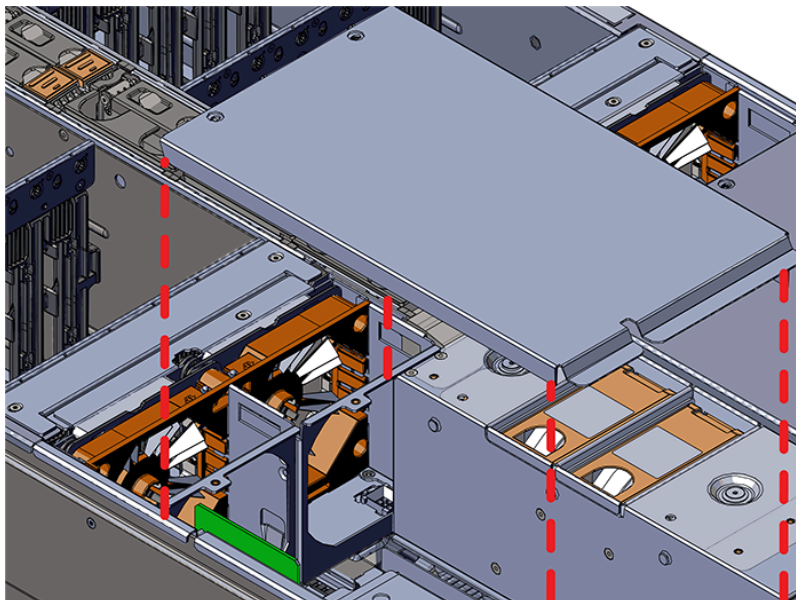
    b. Secure the server cover panel using the original screws and a T7 Torx screwdriver.

Figure 141: Server Cover Panel Screws
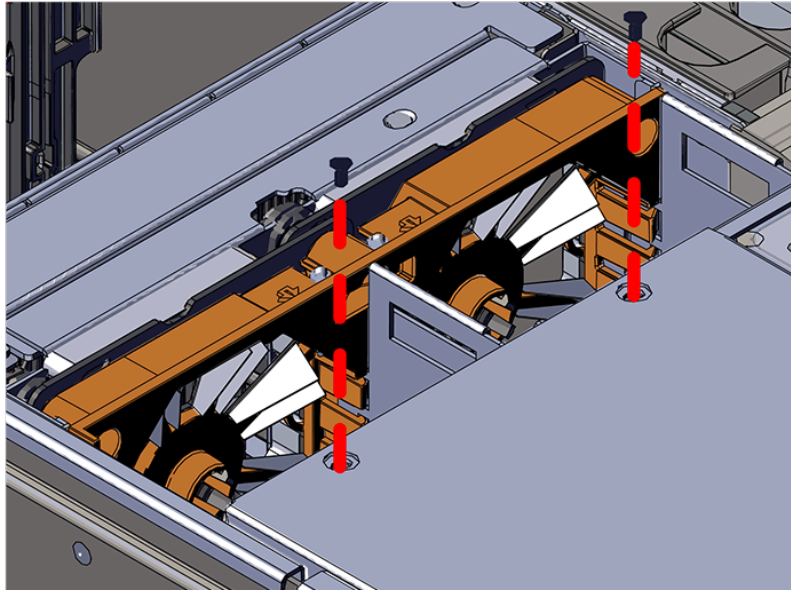
Step 25: Install the System Fan.

a. Lift the System Fan flap and look inside the empty slot that will receive the System Fan and orient the System Fan so that the connector on the bottom of the fan is on the proper side.

Figure 142: Lift the System Fan Flap
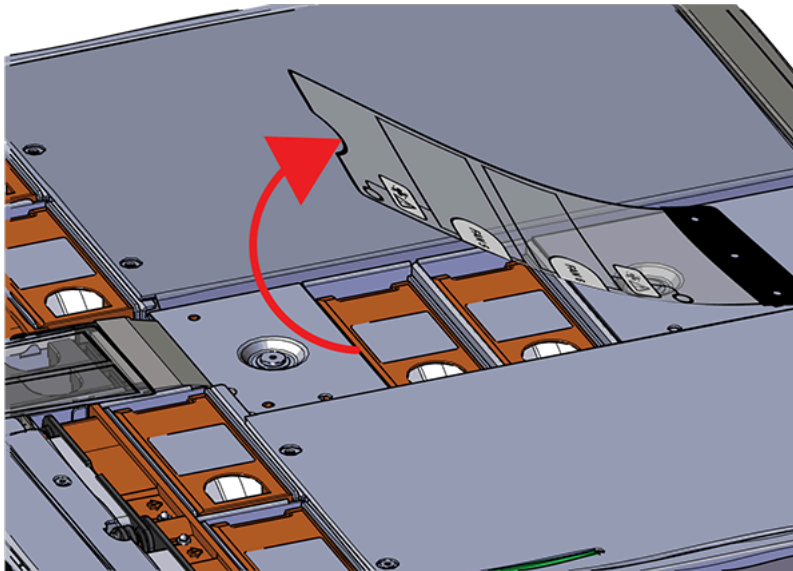
b. Lower the fan down into the empty slot. Do not force it.

Figure 143: Installing a System Fan
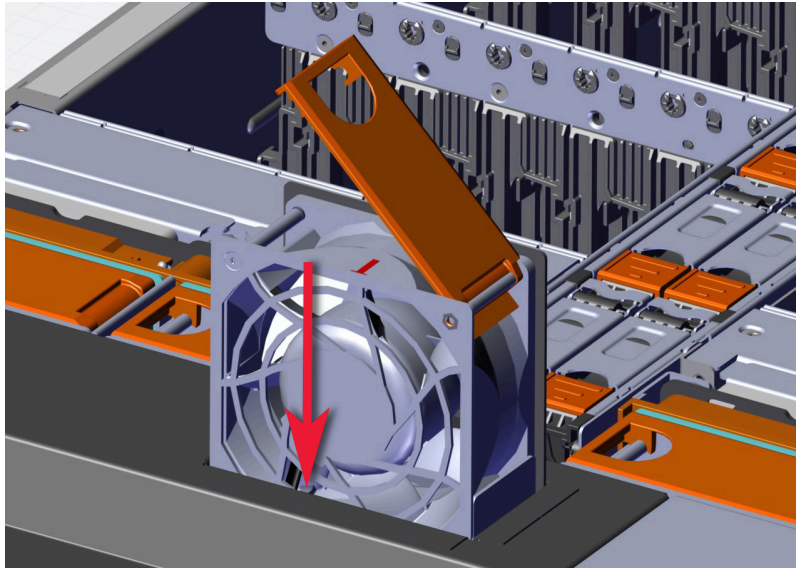
c. When the fan is fully inserted and the connectors are mated properly, close the housing cover clip as shown in the following image.

Figure 144: Latching the Fan Housing Closed
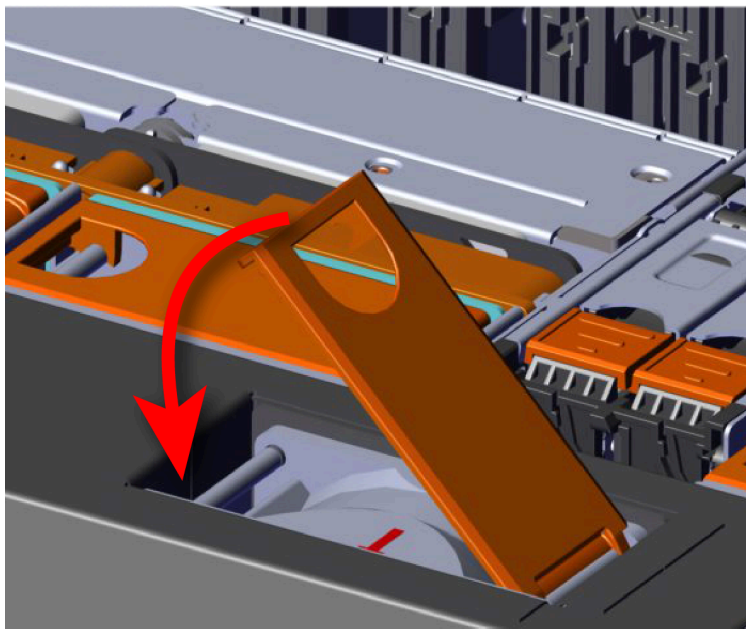
Step 26: Install the remaining system fans in the same manner as the first.

Step 27: Extend the mid-rails out of the rack so that they are protruding from the front of the rack and the safety latches engage.

Figure 145: Extend Mid-Rails
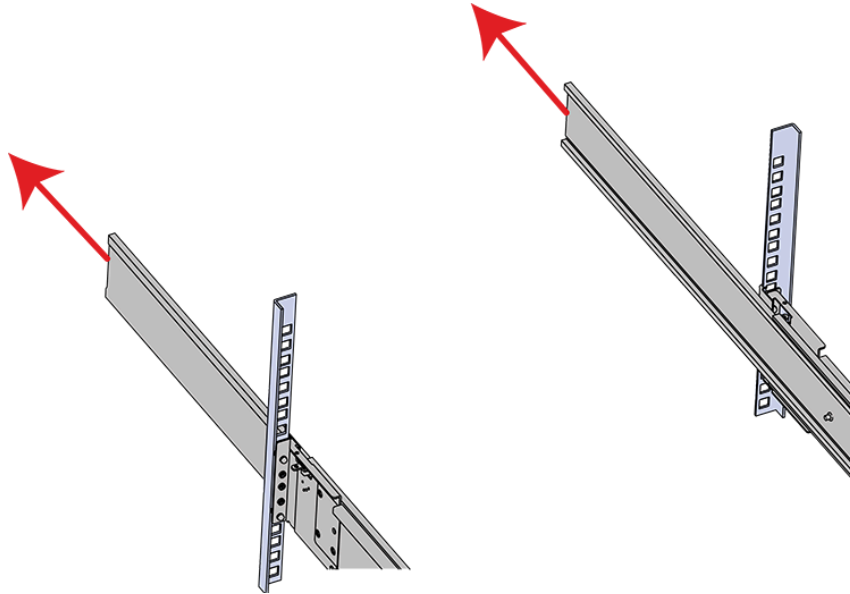
Step 28: Install the chassis into the rails.

    a. Extend the bearing plates on the inside of the mid-rails until they are fully forward (detent has engaged). This prevents potential damage due to improper mating of the rails.

Figure 146: Bearing Plate

b. ⚠️ **Caution:** This step in the installation requires a minimum of 3 individuals to install safely, two to lift and one to guide the others who may have difficulty seeing because the enclosure is in the way. Ensure that the appropriate measures are taken to safely support the enclosure during installation. The enclosure MUST have no drives installed and requires a two person team lift to install. **Do not attempt to lift the system if it is fully populated with drives.** The only case in which the system may be installed or removed with the drives populated is if the facility has a lift that is rated to handle the maximum weight of the fully loaded system.

In preparation to perform a team lift, position one individual on each side of the enclosure (to lift) and a third individual standing at the protruding rack rails (to guide the chassis to mate with rack rails).

c. Team-lift the enclosure until the inner rails (which are attached to the chassis) align with the extended mid-rails (which are attached to the rack), and guide the inner rails on the chassis to mate with the rack rails.

Figure 147: Installing the Chassis
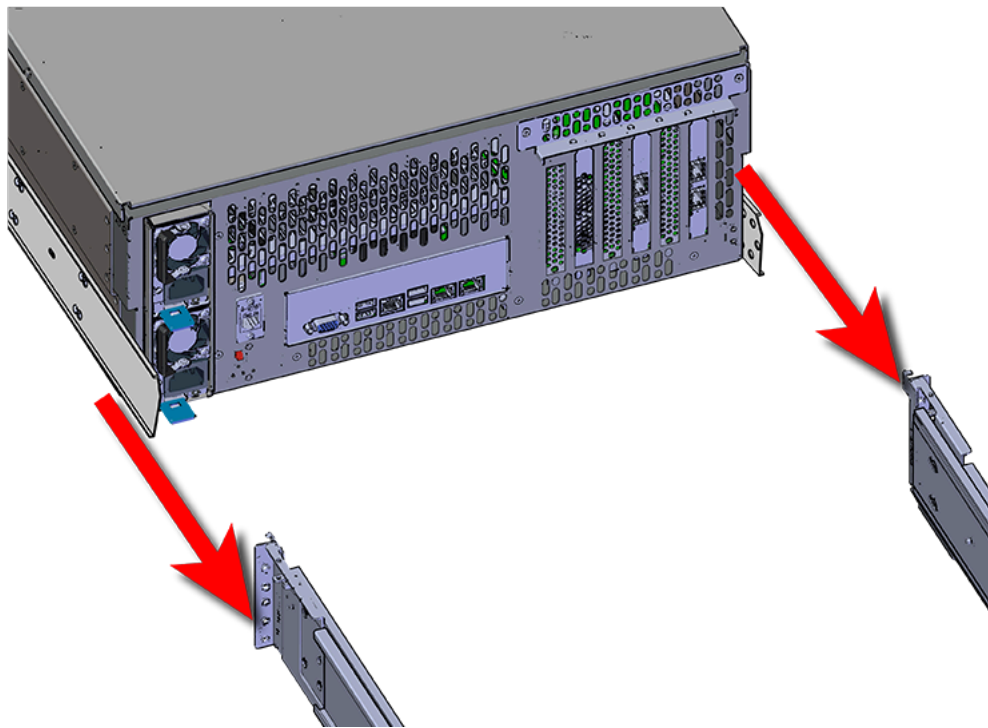
d. Once the rails are mated properly, slide the enclosure into the rack until it is stopped by the safety catch on the rails. Push the release lever on the safety latch (located on the side of each of the rails), and push the enclosure the rest of the way into the rack.

Figure 148: Safety Latch Release
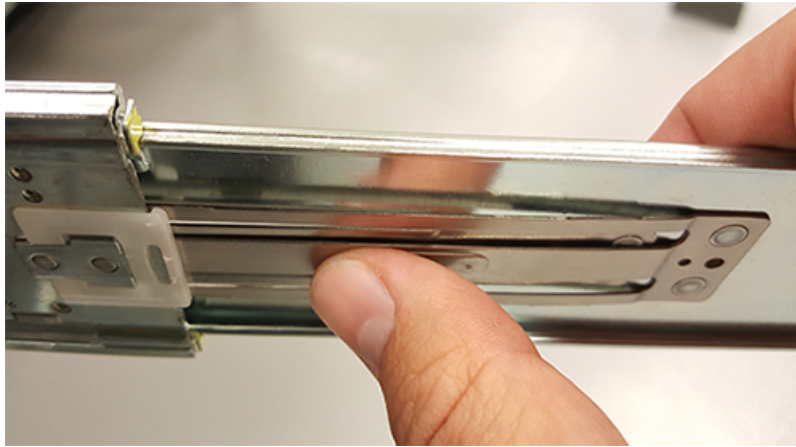
e. As the chassis is slid into the rack, position one installer at the rear of the rack to ensure that the pegs on the sides of the cover will slide correctly into the rear cover alignment brackets on both sides of the rack. If the chassis does not install smoothly or snags, check that the rear cover alignment brackets are not interfering with the chassis sidewalls, and try again.

Step 29 : Secure the chassis top cover to the rack using the captive M5 thumb-screws as shown in the following image. Use a T15 Torx screwdriver, and tighten the screws to 3.38-3.61 Nm / 30-32 in-lbf.

Figure 149: Cover Retention Screws
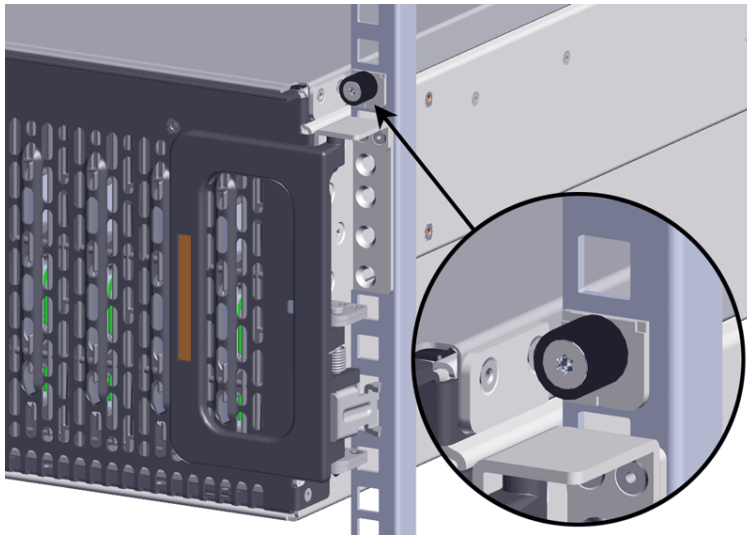
Step 30 : Now that the chassis is installed, test the installation by sliding the enclosure in and out of the rack a minimum of three times. If the enclosure binds, catches, or displays any incorrect motion or behavior repeat the installation.

Note: Adjustments of the vertical rack rails may be required to fix any issues that may occur.

Step 31: Install the CMA(s).

> 📄 **Note:** CMA has one arm, to be installed at the lower position. This arm should have the elbow on the left side.

    a. Orient the CMA so that the elbow is on the left hand side.

    b. Attach all three of the connectors to the brackets on the rails. There should be one at the elbow side and two at the other end.

Figure 150: CMA Orientation
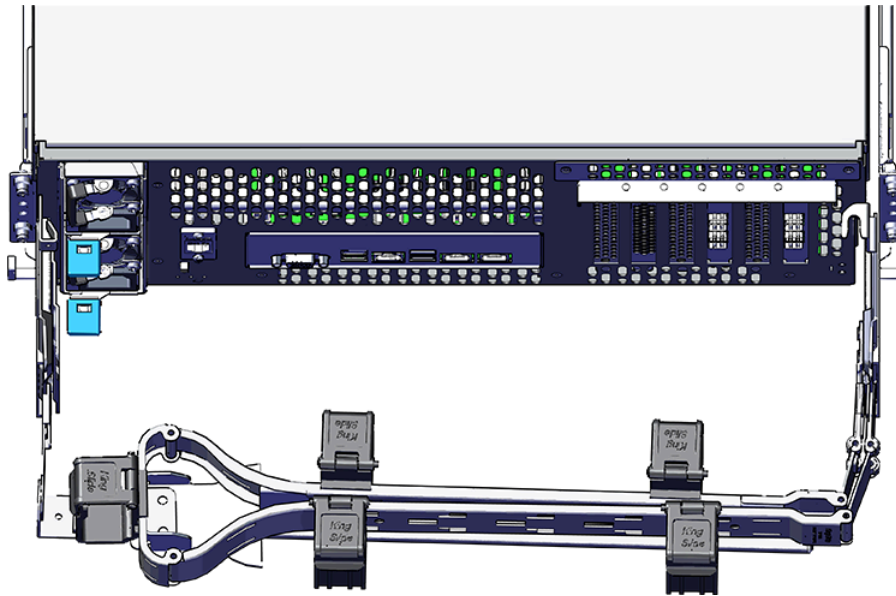
    c. Slowly slide the enclosure forward to ensure the arm is operating properly, then slide it back into the rack.

Step 32: Install the 3.5in HDD Assembly.

> 📄 **Note:** The 2.5in SSD Assembly is installed in the same manner as the 3.5in HDD Assembly. For instructions on assembling the 2.5in SSD Assembly, see Operating the 2.5" Drive Carrier *(page 60)*.

    a. Ensure that the enclosure has been pulled out of the rack until the rail latches engage.

    b. Find the LED pointer on the top of the drive carrier. This pointer should point toward the front of the unit as shown in the following image.

Figure 151: LED Pointer Orientation
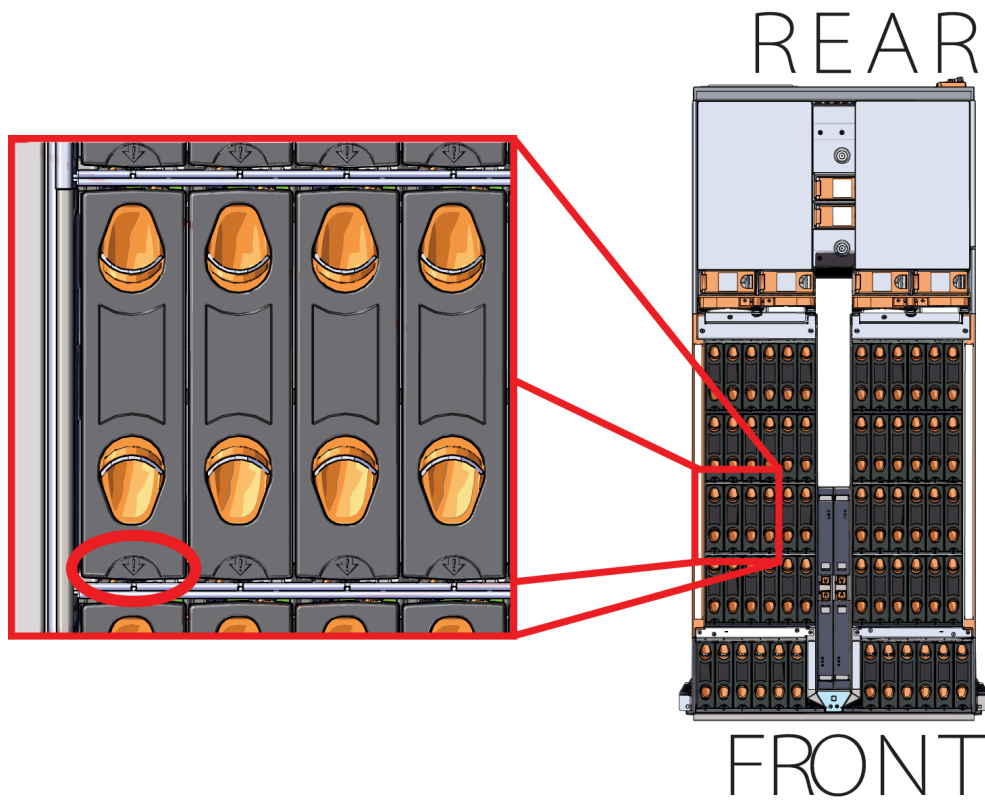
c. Align the drive with the empty slot that will receive it. Lower it into the slot, making sure it stays level and does not snag.

Figure 152: Installing a 3.5in HDD Assembly
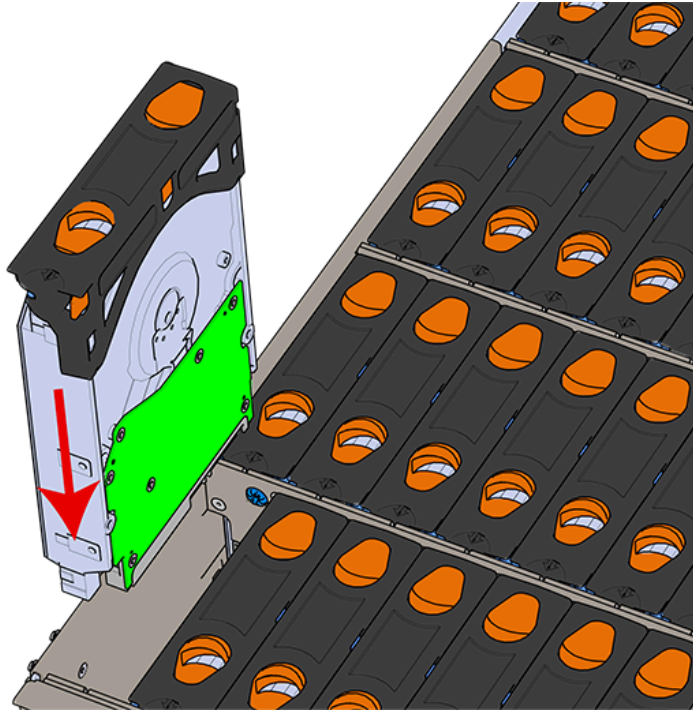
d. Pinch the latch release and carefully press downward to seat the 3.5in HDD Assembly the rest of the way.

Step 33 : Install each drive in the place it was removed from by following the labels or marks that were added earlier.

Step 34 : Cable the CMA(s).

CMA Standard:

a. Unlatch the elbow side of the arm(s) by pressing the blue button labeled "push," and then swing the arm(s) open.

b. Open all of the baskets.
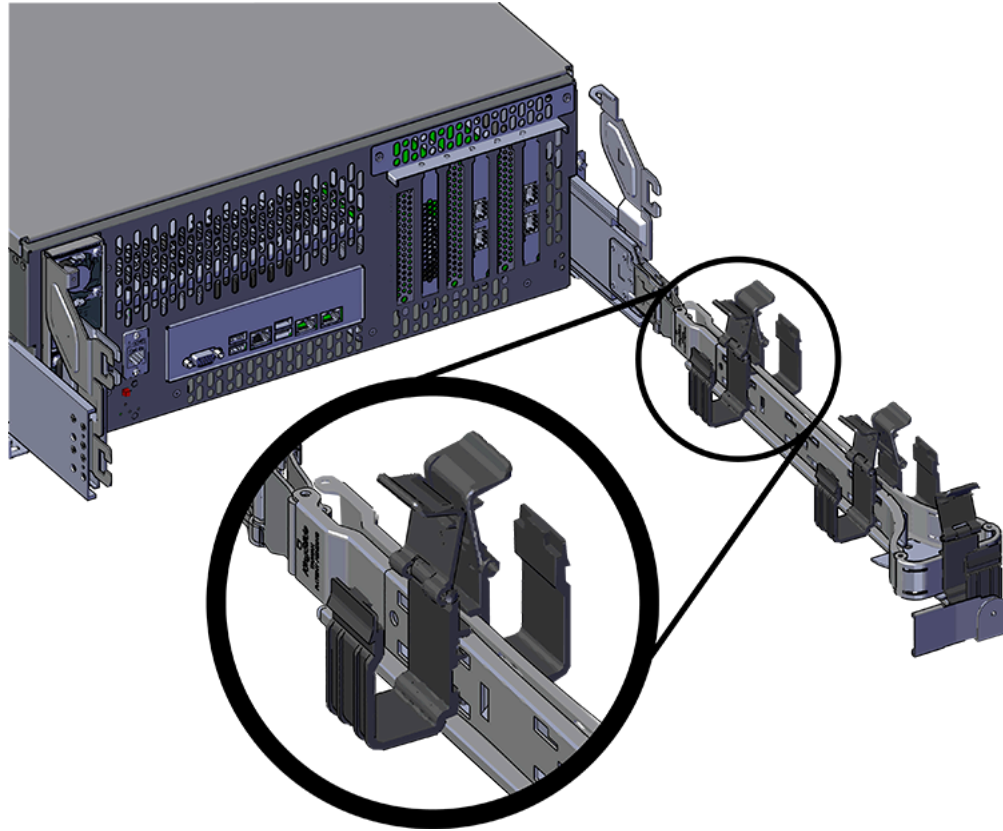
Figure 153: Open Baskets

c. Route all of the cables being connected to the enclosure through the open baskets.

d. Close all of the baskets.

e. If the Ultrastar Serv60+8 is being installed in a rack and will subsequently be transported inside that rack, it is important to use the included cable tie to wrap the CMA bundle to ensure it does not get damaged during transport. If the Ultrastar Serv60+8 is instead being installed where it will be operated, skip this step. Remember to remove the cable ties after the enclosure has reached its final operational location.

f. Reconnect the arm at the elbow to the connectors on the rail.

CMA Lite:

a. Press the blue latch button labeled "push" to unlatch the elbow side of the CMA arm, and then swing the arm open.

b. Open all of the baskets.

Figure 154: Open Baskets

c. Gather the SAS, power, and Ethernet cables for installation.

> **Note:** Route all cables to IOM A (left hand side looking at the rear).

d. Route all of the cables being connected to the enclosure through the open baskets.

e. Close all of the baskets.

f. If the Ultrastar Serv60+8 is being installed in a rack and will subsequently be transported inside that rack, it is important to use the included cable tie to wrap the CMA bundle to ensure it does not get damaged during transport. If the Ultrastar Serv60+8 is instead being installed where it will operated, skip this step. Remember to remove the cable ties after the enclosure has reached its final operational location.

g. Reconnect the arm to the rail by the connector at the elbow.

Step 35: Test for binding in the extension of the arm by gently pulling the enclosure out of the rack, ensuring the cables extend properly and that the system doesn't bind at all. If it does, examine the point at which the binding occurred and adjust the seating of cables in the baskets, check the connections to the rails, and examine the joints of the arm to ensure that they are all functioning properly.

Step 36: Make sure the CMA(s) is in operational position by folding the arm(s) in toward the enclosure and attaching the elbow end(s) to the connector(s) attached to the rail. Verify that all of the cabling is in functional order and does not bind or catch.

3.9 Heat Sink Replacement

Note: The Heat Sink is not hot swappable. The enclosure must be powered-down, disconnected from all cabling, and removed from the rack before replacing the Heat Sink.

Replacement Requirements	
Personnel Required	3
Avg. Replacement Time	~2 hr
Max Replacement Time	N/A
Tool	**Required vs. Recommended**
T30 Torx Screwdriver	Required
Plastic Spudger (not provided)	Required
Isopropyl Alcohol and lint-free wipes (not provided)	Required

Step 1: Uncable the CMA(s).

   a. Open all of the basket clips on the CMA(s).

Figure 155: Open Baskets
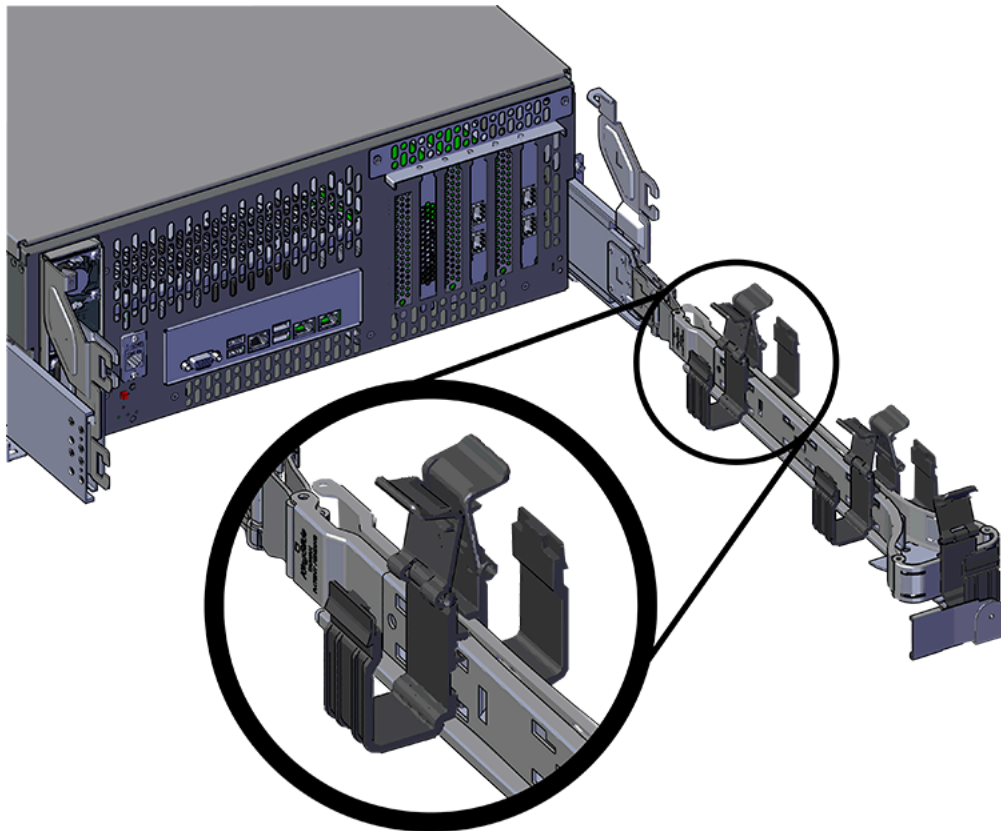
b. Remove one cable at a time from the arm, making sure not to put too much strain on the arm.

Step 2 : Remove the CMA(s).

a. Release all of the connectors that attach the CMA(s) to the enclosure and the rail.

There are three total connections that need to be released, one at the elbow and two at the opposite end.

b. To release a connector, press the blue latch release button and pull the connector free.

Figure 156: Unlatching a CMA Connector
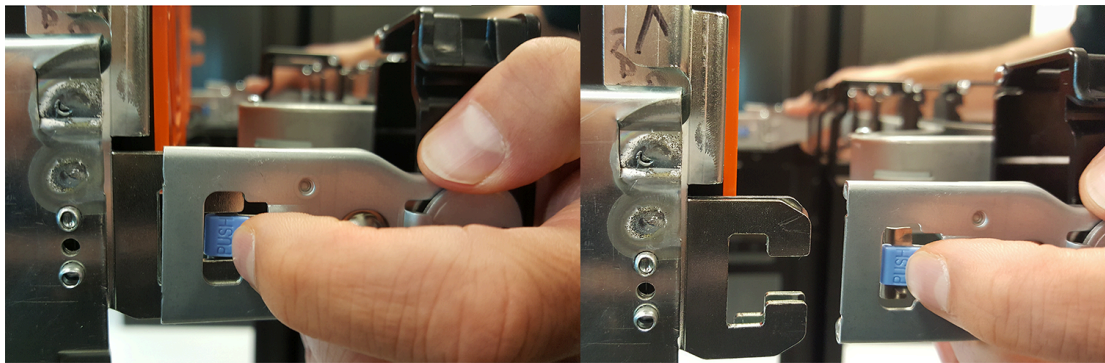
Step 3 : Grasp both handles at the front of the enclosure and pull with even pressure to extend the chassis out of the rack until it is stopped by the safety latches. The safety latches will prevent the enclosure from coming out of the rack completely and the cover will remain in the rack attached to the rear alignment brackets.

Figure 157: Chassis Handle Operation
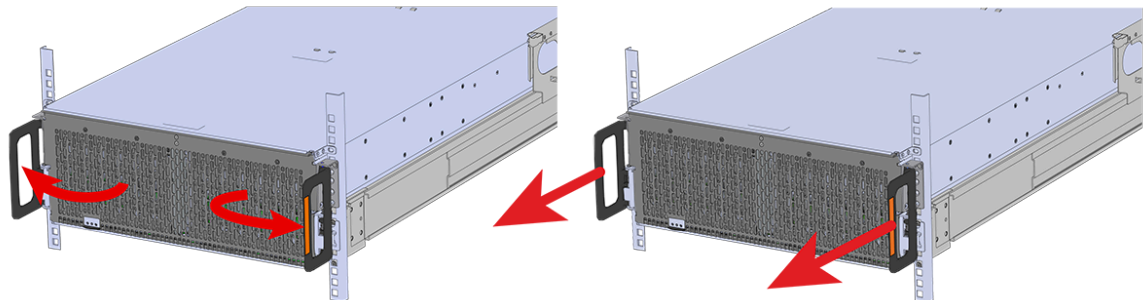
Step 4 : Remove all of the drives from the chassis before uninstalling the chassis. Be prepared to label the drives as they are removed so they can be reinstalled in the same location in the new chassis.

Step 5 : Follow these steps to remove a 3.5in HDD Assembly.

a. Find the latch release mechanism on the 3.5in HDD Assembly being removed.

b. Insert a finger and a thumb into the latch release and pinch to unlatch the 3.5in HDD Assembly.

Figure 158: Unlatch Drive Carrier (IOM Not Shown)

c. Lift the 3.5in HDD Assembly free from the enclosure.

Figure 159: Removing 3.5in HDD Assembly

Step 6: Follow the previous step for each drive in the enclosure. Attach a label or mark the drives with the drive slot they were removed from in order to add them to the same slot in the future. Store the drives in an ESD safe location until the drives are ready to be installed back into an enclosure.

Step 7: Release the safety latch on the inner rails on each side of the chassis as shown in the following image.

Figure 160: Inner Rail Safety Latch Release

Step 8: Grasp both handles at the front of the enclosure and pull with even pressure to extend the chassis out of the rack until it is stopped by the safety latches. Make sure that the top cover comes with the chassis as it is extended out of the rack. The safety latches will prevent the enclosure from coming out of the rack completely.

Step 9: Remove the chassis from the rack.

    a. Be prepared to support the enclosure once it is free of the rails by having a second person or a lift to support the enclosure

    b. Grasp both handles at the front of the enclosure and pull with even pressure until the enclosure will not extend further.

    c. Locate the safety catches on the inner rails attached to the enclosure.

Figure 161: Safety Latch Release

d. Depress the latch release lever for the safety latches on the rail and push the chassis very slightly forward. The chassis is now unsecured from the rack.

e. Ensure that you have the proper support mechanism to hold the chassis in position, whether that be a team lifting partner or an appropriate lift.

f. Slide the chassis forward to free it from the rails. Place the chassis in a safe location to avoid damage.

Step 10 :

> **(i)** **Attention:** Place the enclosure on a flat ESD safe surface and ensure it is stable before continuing with the procedure.

Step 11 : Uninstall the internal Rear Fan.

a. Lift the Rear Fan flap and insert a finger into the service hole on the top of the Rear Fan and pull up to release the latch.

Figure 162: Lift the Rear Fan Flap

Figure 163: Unlatching Rear Fan

b. Use the handle to pull evenly on the component to remove it from the enclosure.

Figure 164: Removing Rear Fans
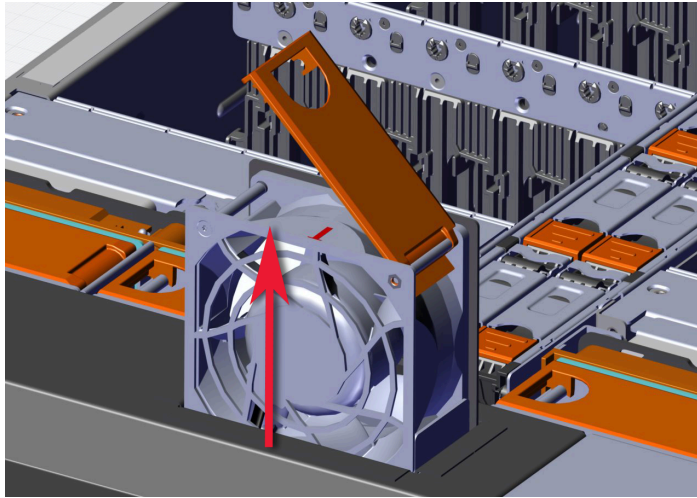
Step 12: Uninstall the rest of the system fans in the same manner as the first.

Step 13: Uninstall server cover panel on both sides of the enclosure that contains the failed Heat Sink.

> **Note:** Uninstall the server cover panel on the side that requires the CPU replacement. The same steps to uninstall the server cover panel apply to both sides of the enclosure with the exception of the number of screws that secure the server cover panel. From the rear of the enclosure, the left panel contains two screws. The panel on the right side of the enclosure contains one screw.

a. Remove the screws that secure the server cover panels to the chassis using a T7 Torx screwdriver.

> **Note:** When at the rear of the enclosure, the left server cover panel contains two T7 Torx screws. The left server cover panel contains only one T7 Torx screw.

Figure 165: Removing the Server Cover Panel Screws

b. Remove the server cover panel by carefully pulling on the edge where the screws were removed.

Figure 166: Removing the Server Cover Panel

Step 14: Uninstall the fan bays.

📄 **Note:** Uninstall the fan bay on both sides.

a. Remove the screw that secures the fan bay to the chassis.

Figure 167: Removing the Fan Bay Screws
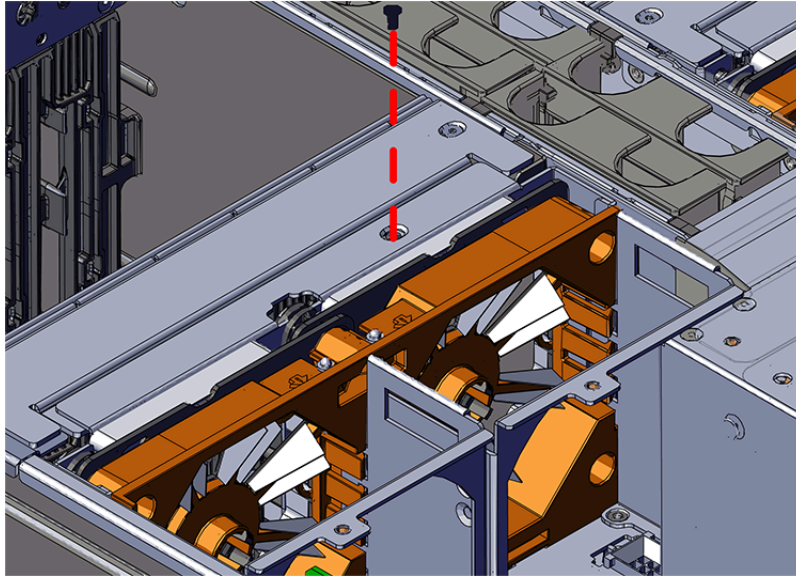
b. Locate the pin that secures the outside of the fan bay to the chassis and pull the pin out and pull up on the fan bay until the cage is clear of the chassis.

> **Note:** The fan bay is connected to the baseboard with a cable and does not need to be disconnected. When removing the fan bay, lay the assembly on the drive cage.

Figure 168: Fan Bay Pin
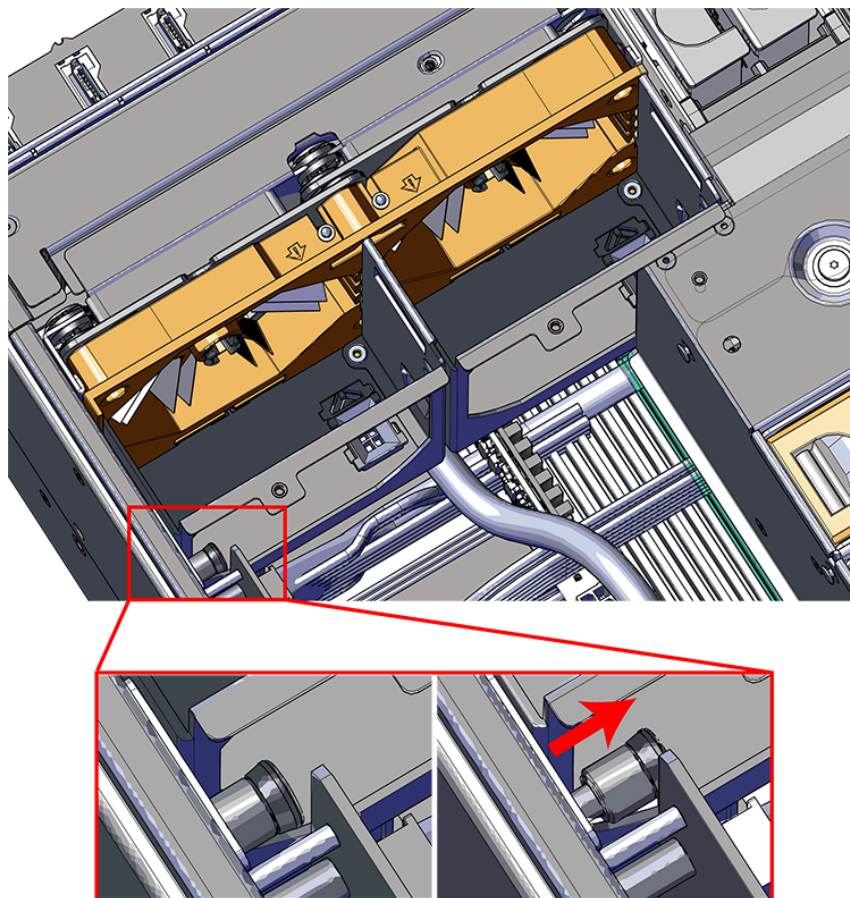
Step 15 : Uninstall the remaining fan bay in the same manner as the first.

Step 16 : Uninstall the System Fan Bay.
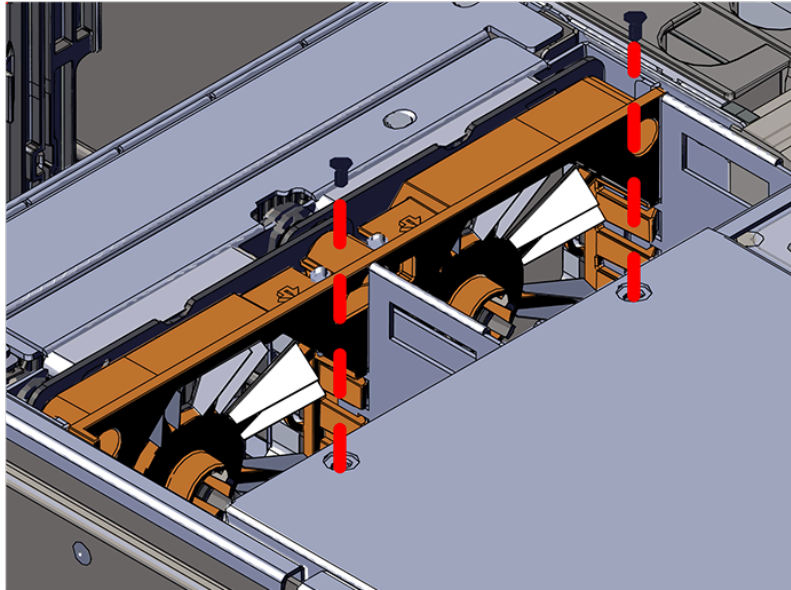
    a. Lift the system fan flap and loosen the captive screws that secure the system fan bay to the chassis until the cover comes loose. The screws will be retained within the System Fan Bay while uninstalling the part.

Figure 169: Lift the System Fan Flap
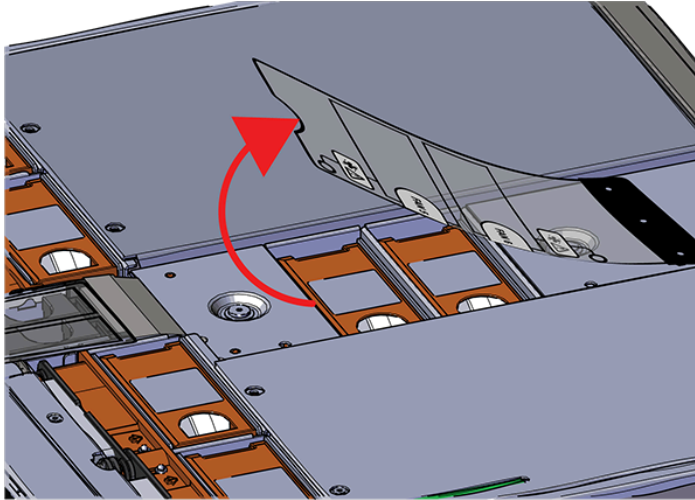
Figure 170: Loosening the System Fan Bay Captive Screws
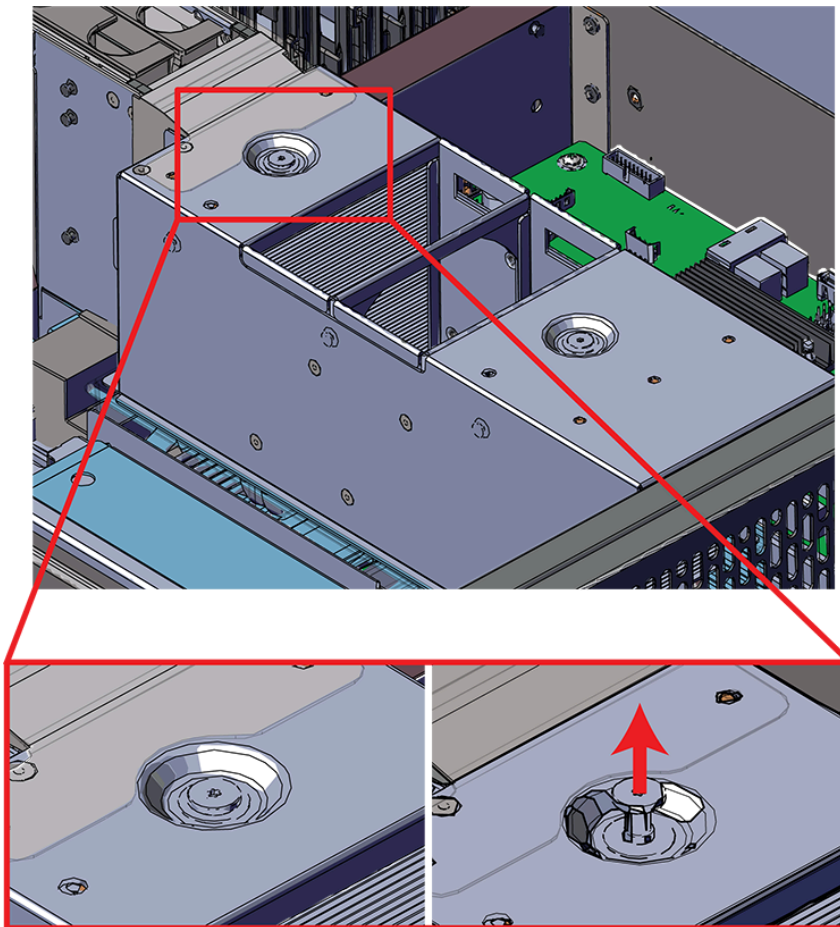
b. Slide the system fan bay out of the chassis and set it aside.

Figure 171: Removing the System Fan Bay
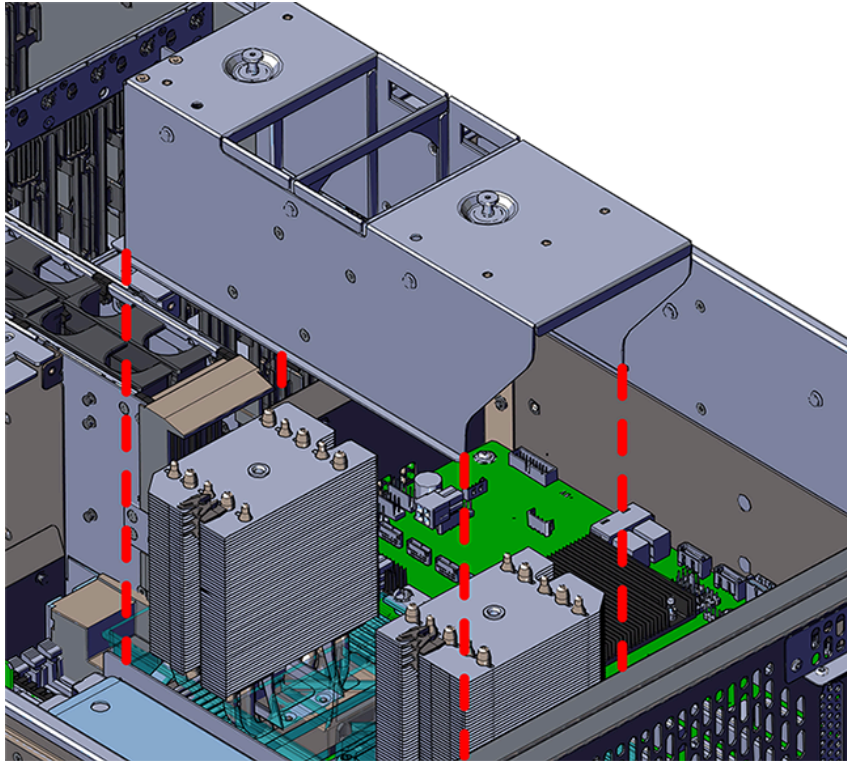
Step 17 : Uninstall the System Fan base.

a. Slide the system fan base up and over the CPUs until clear of the CPUs. Set the system fan base to the side with cables still attached. The cables are long enough to remain connected during these steps.

Figure 172: Removing the System Fan Base (highlighted in red)
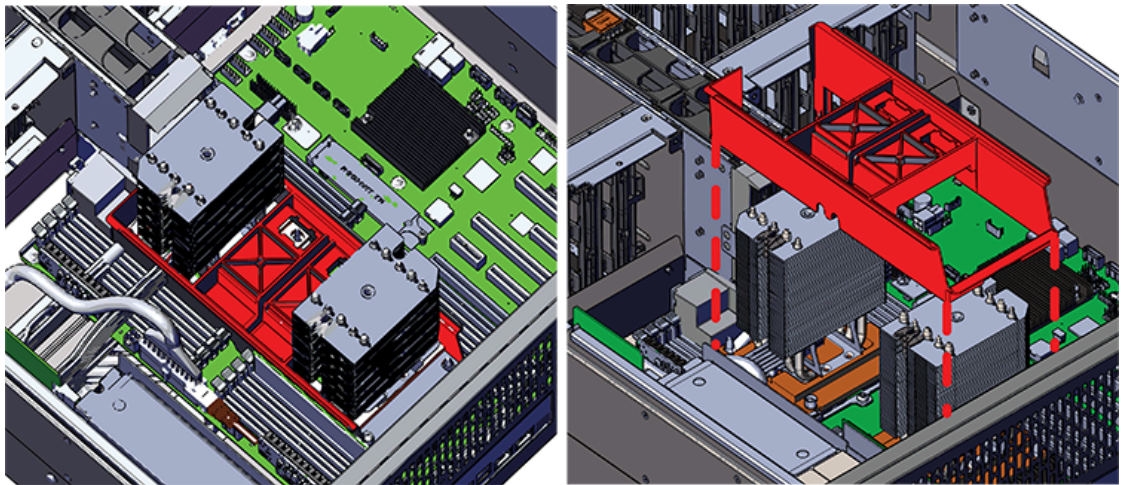
b. Locate and remove the LED brackets that are attached to the Heat Sink.

Figure 173: Uninstalling the CPU LED Brackets
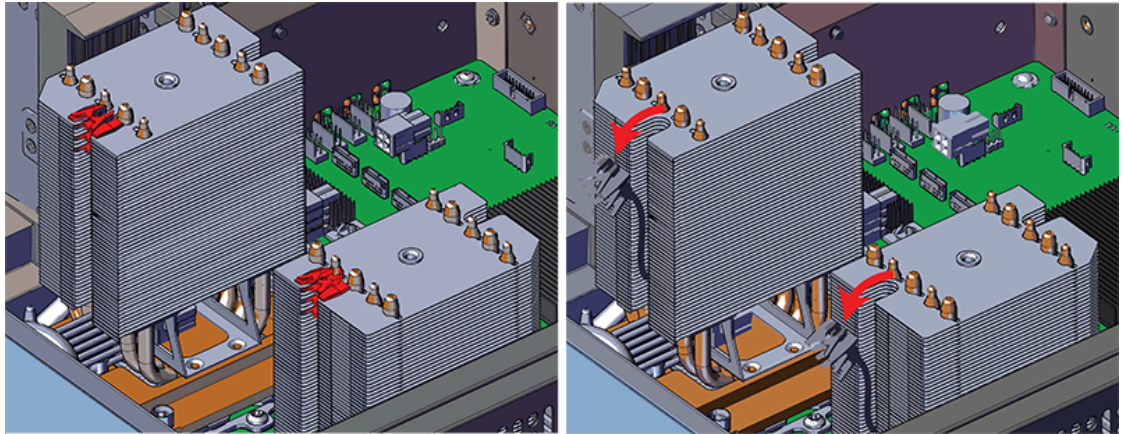
Step 18 : Uninstall the Heat Sink.

    a. Locate the failed Heat Sink.

    b. The Heat Sink must be removed by loosening the Torx T30 screws in a specific order. Use the following diagram to determine the specific order.

Figure 174: Heat Sink Removal Order
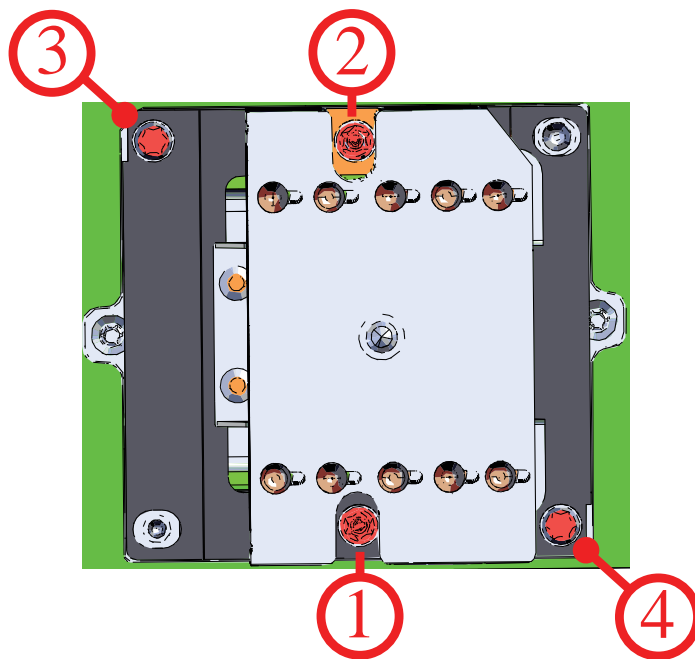
    c. Slide the Heat Sink clear of the socket alignment pins.

Step 19 : Remove the CPU from the Heat Sink.

    a. Locate the seam that connects the CPU and Heat Sink.

Figure 175: Removing the CPU from the Heat Sink with a Spudger
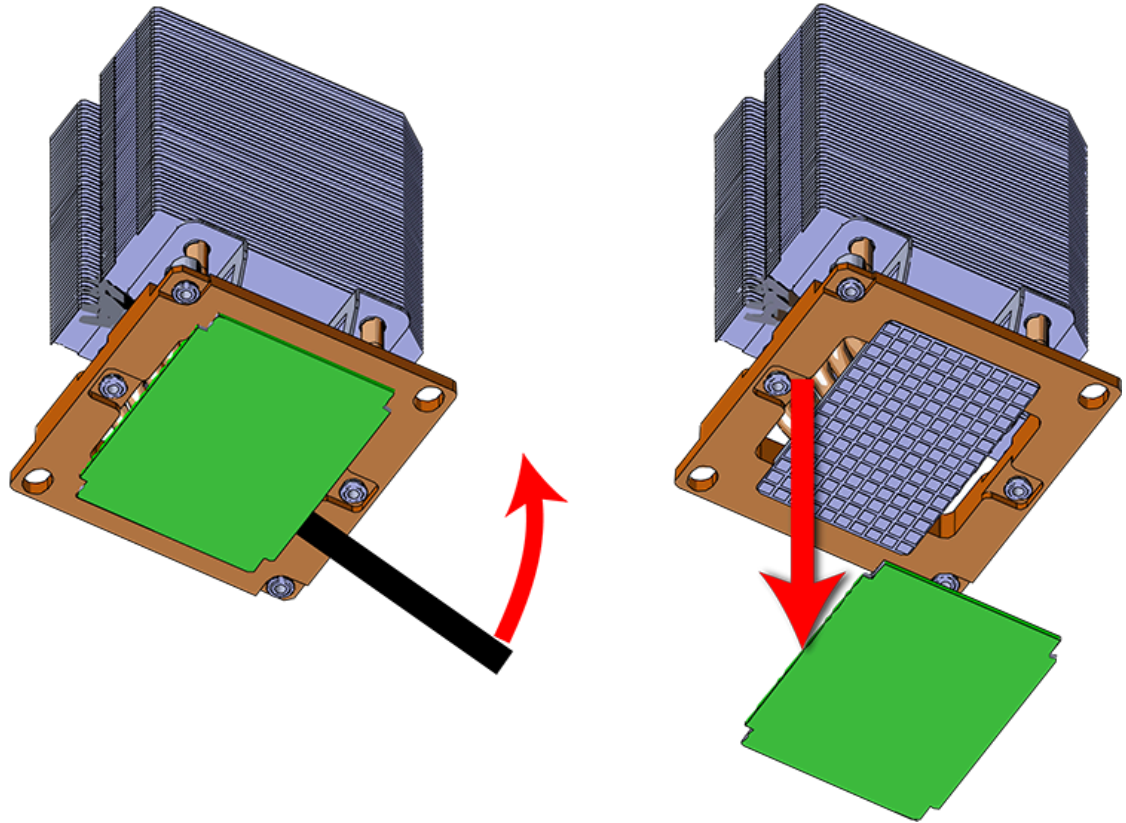
b. Insert the edge of a plastic spudger in between the CPU and Heat Sink and carefully pry the two components apart. The plastic spudger may need to be worked around the edges of the entire CPU and Heat Sink to separate the two parts.

Step 20 : Install the Heat Sink onto the CPU.

a. Clean the thermal compound from the top of the CPU using isopropyl alcohol and lint-free wipes. Ensure that the CPU is residue free and dry before installing the replacement Heat Sink.

b. Align the gold triangle on the CPU with the triangle on CPU retainer and snap the CPU into the plastic CPU retainer.

Figure 176: CPU and CPR Retainer Triangles
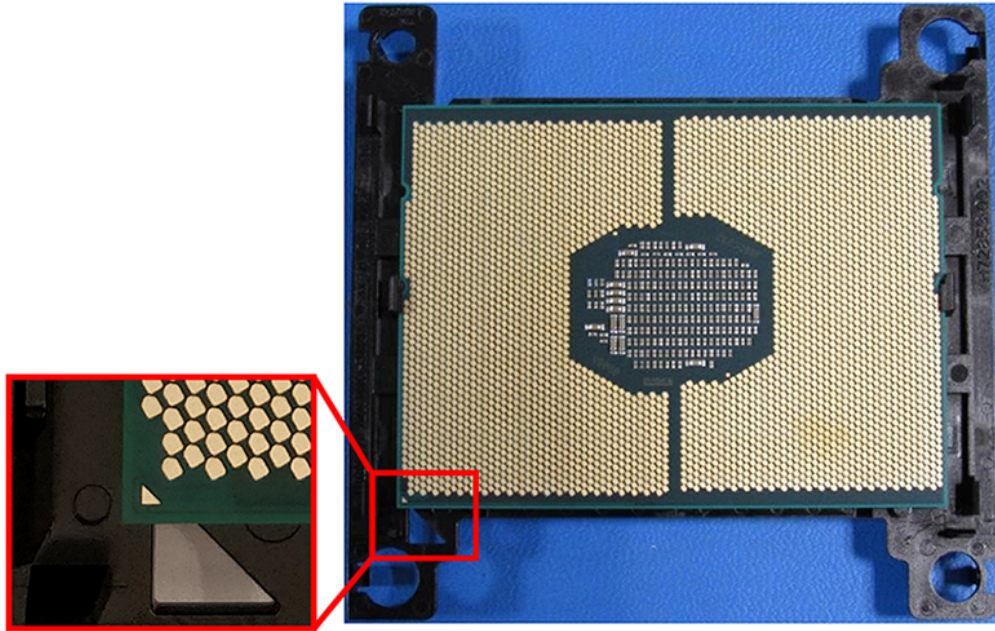
c. Unpack and remove the protective plastic tray that is attached to the bottom of the Heat Sink. The protective plastic tray protects the thermal compound until it is ready to be installed.

d. Align the triangles on the CPU and CPU retainer with the chamfer on the Heat Sink.

Figure 177: Heat Sink Chamfer
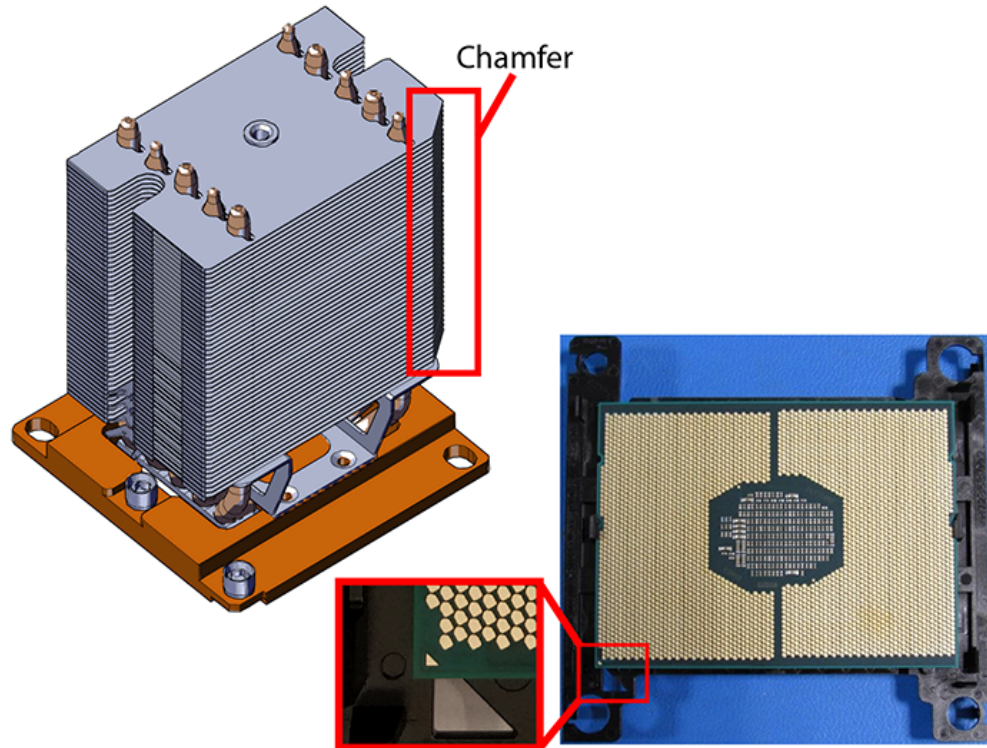
e. Press the CPU retainer firmly into the Heat Sink to ensure the thermal compound is evenly spread out across the CPU.

Figure 178: Attaching the CPU to the Heat Sink
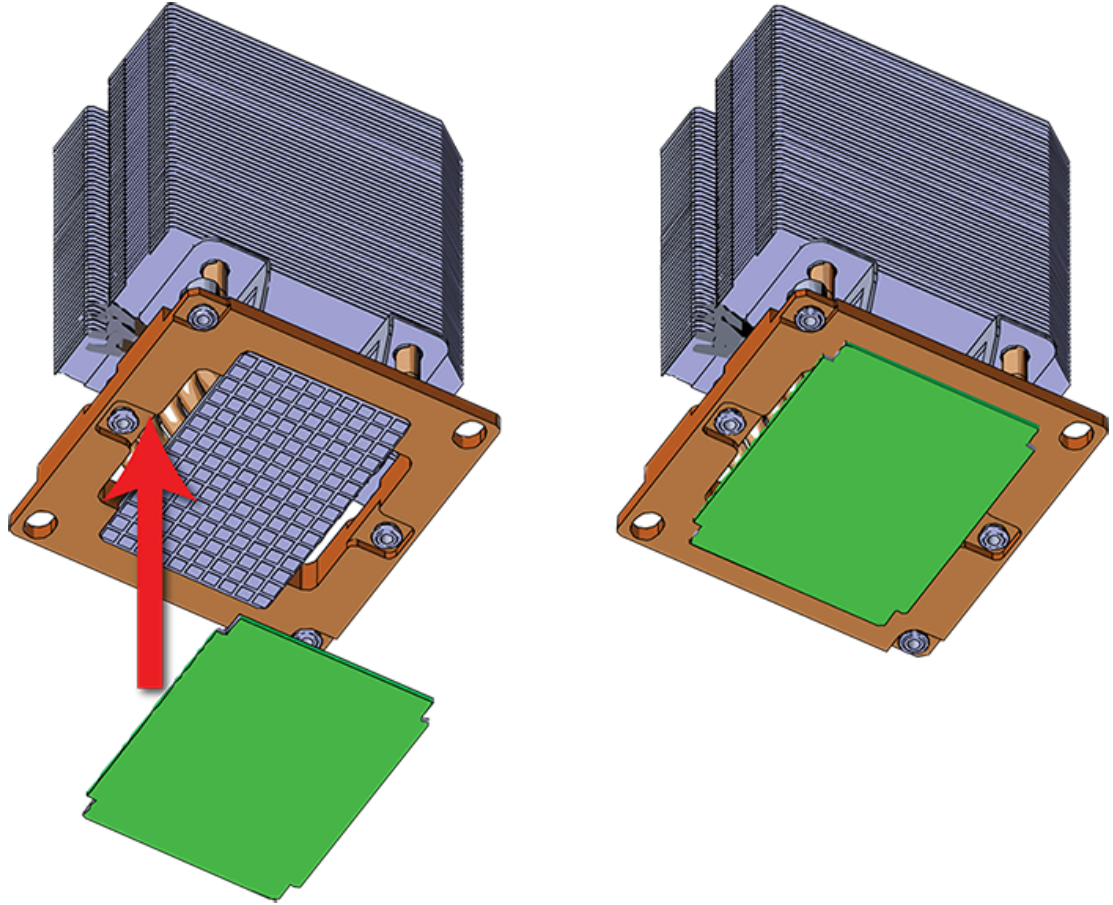
Step 21: Install the Heat Sink onto the CPU socket.

    a. Locate the socket alignment pin on the baseboard and the alignment hole on the Heat Sink.

    b. Carefully place the Heat Sink module in position on the socket alignment pins.

Figure 179: Heat Sink Alignment Pins
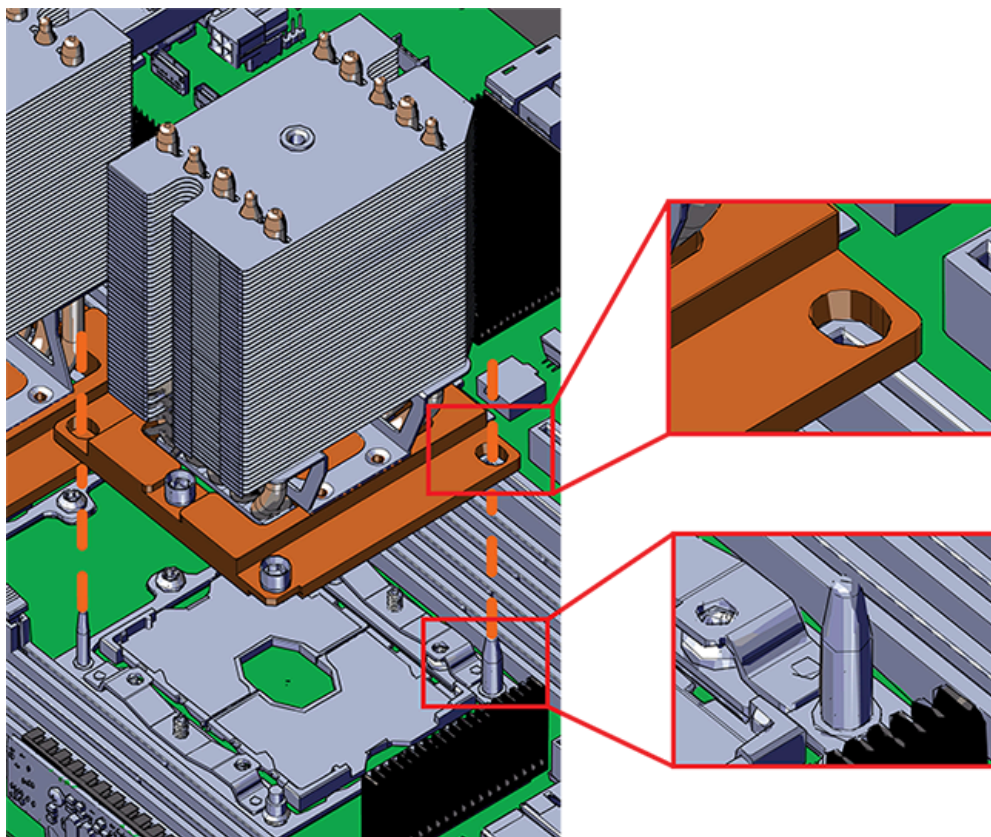
c. The Heat Sink must be installed by tightening the Torx T30 screws in a specific order. Use the following diagram to determine the specific order.

Note: The Heat Sink screws must be tightened to a torque setting of 12in.-lbs. Do not over-tighten. Over-tightening may cause damage to the parts.

Figure 180: Heat Sink Installation Order
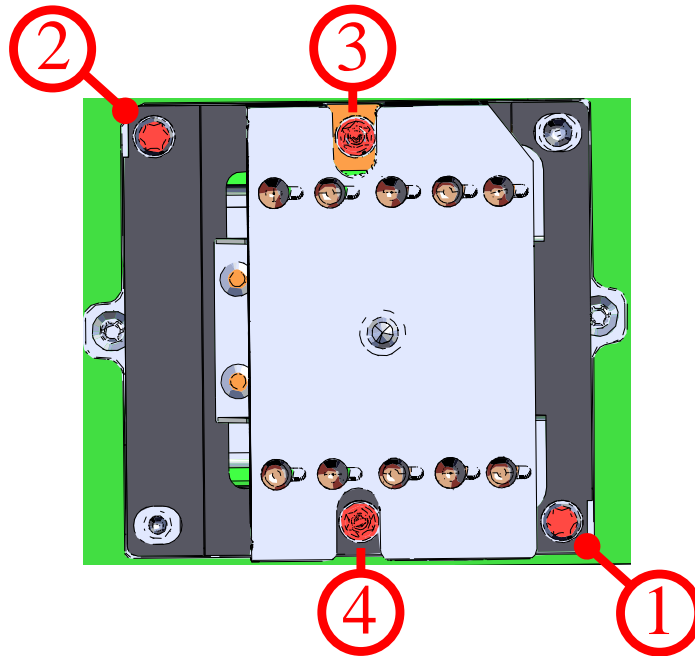
Step 22: Install the System Fan base.

    a. Slide the system fan base down over the CPUs until the base rests on the baseboard.

    b. Slide the LED cable and LED bracket into the Heat Sink channel and snap it into place at the top of the Heat Sink.

Figure 181: Installing the CPU LED Brackets
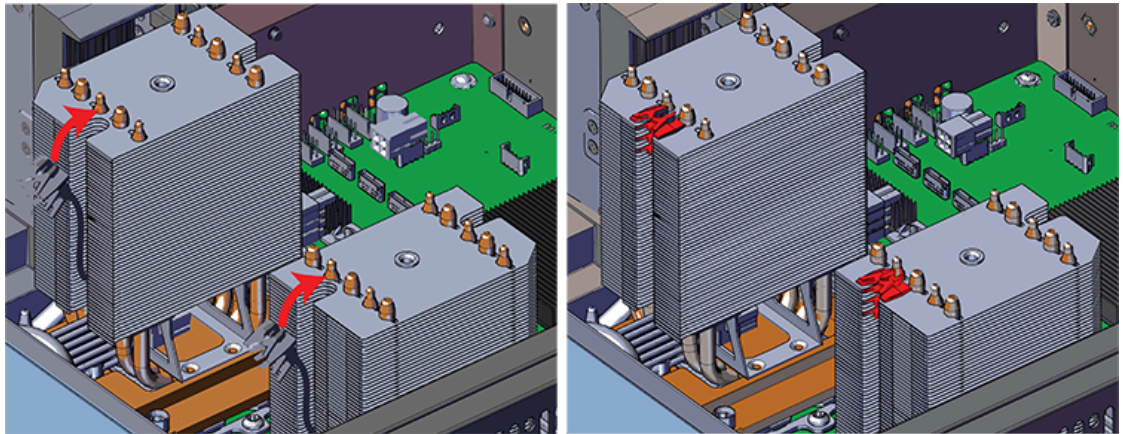
    c. Install the remaining LED bracket in the same manner as the first.

Step 23: Install the System Fan Bay.

    a. Slide the system fan bay down over the CPUs until the captive screws line up with screw holes on the Heat Sink.

b. Lift the system fan flap and push in and tighten the captive screws until the system fan bay is secure.

Figure 182: Lift the System Fan Flap
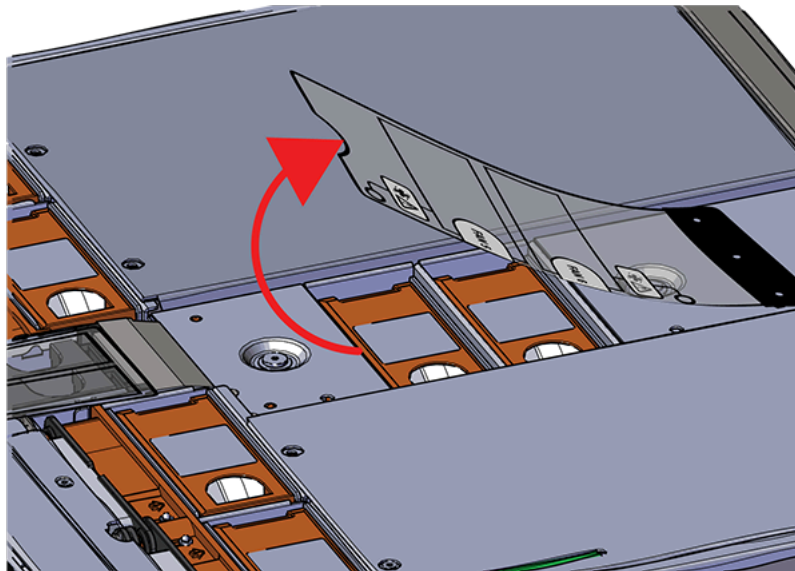
Figure 183: Installing the System Fan Bay Captive Screws (highlighted in red)
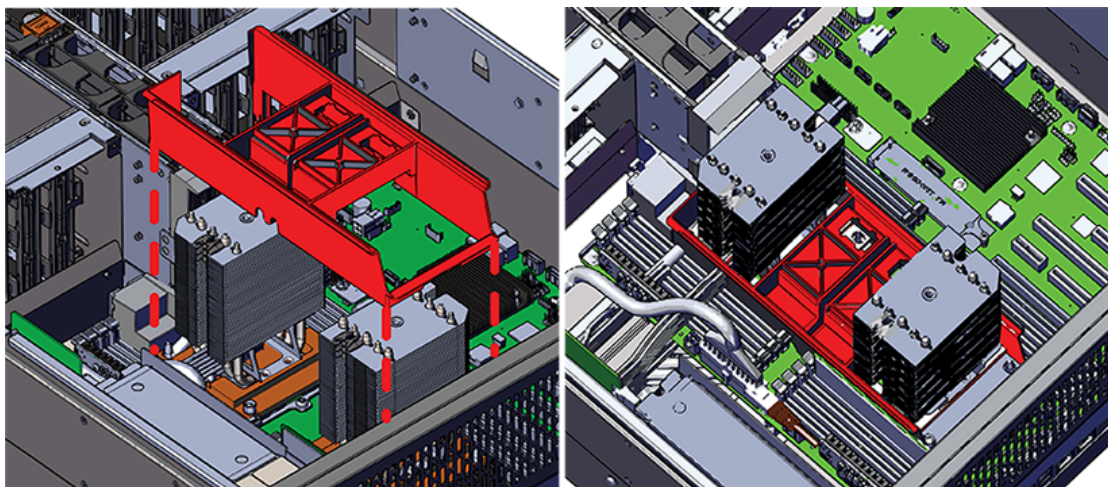
Step 24: Install the fan bay.

    a. Align the first fan bay within the location from which it was uninstalled.

    b. Slide the fan bay into the chassis taking care not to pinch or damage any cables.

Figure 184: Installing the Fan Bay
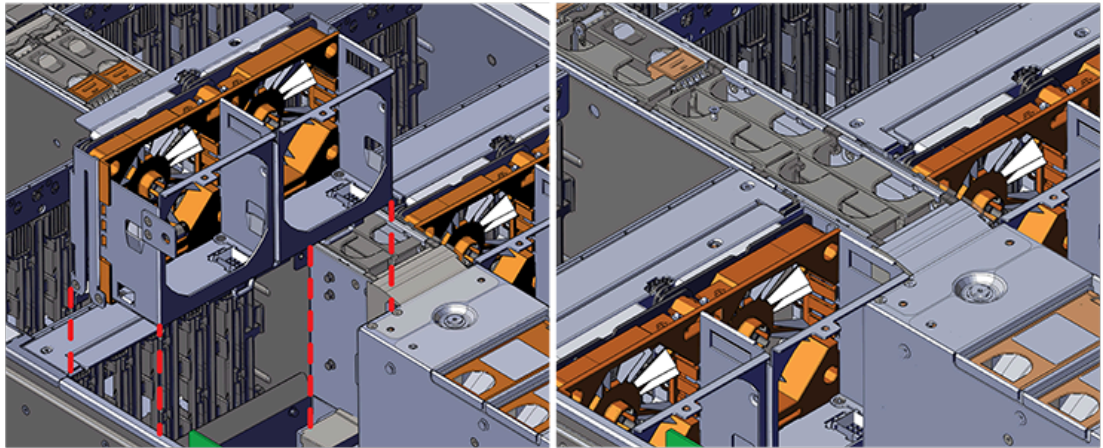
c. Ensure that the pin located on the inside of the fan bay is latched onto the chassis during the process of seating the fan bay. If the pin did not engage, use a Flathead screwdriver to disengage the pin by pulling it out and repositioning the fan bay until the pin engages with the chassis.

Figure 185: Fan Bay Pin Engaged
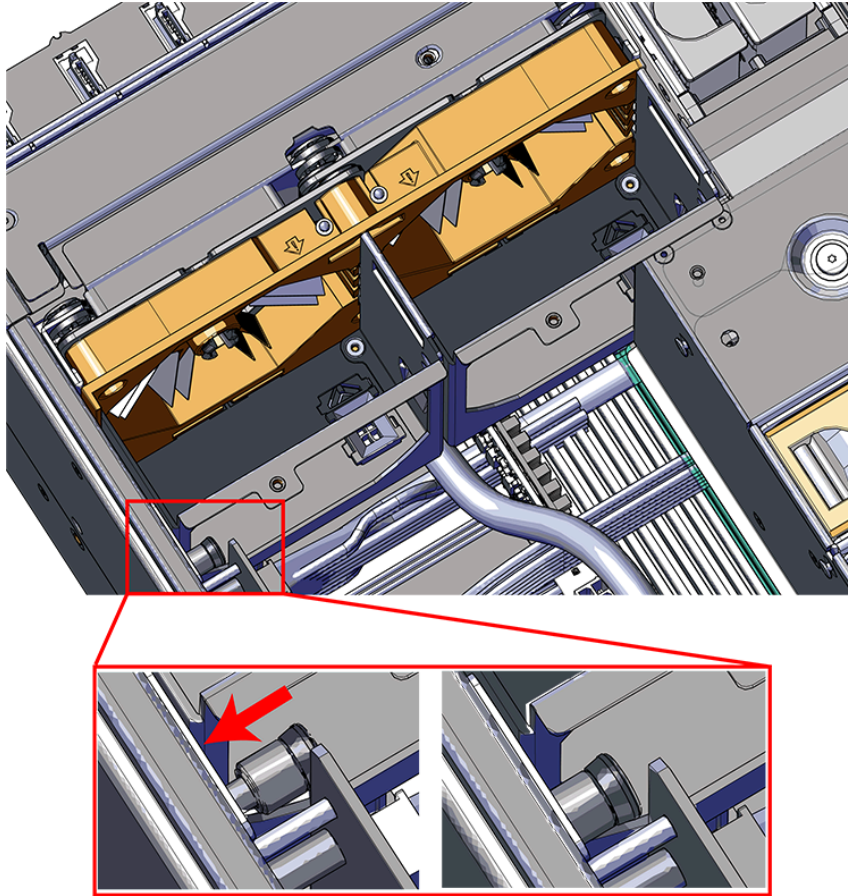
    d. Install the screw that secures the mid-bulkhead fan cage to the chassis.

Figure 186: Fan Bay Screw
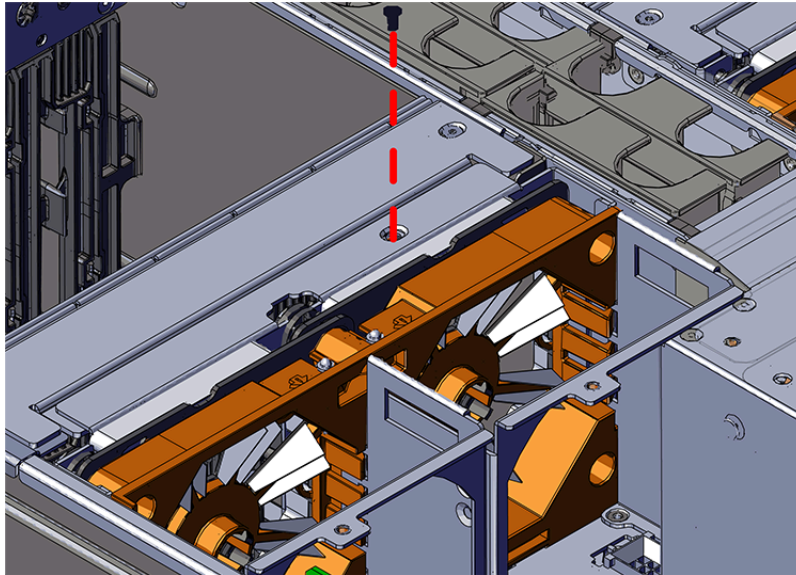
Step 25: Install the remaining fan bay in the same manner as the first.

Step 26: Install server cover panels.

    a. Align and press the server panel cover into place over the server bay.

> 📄 **Note:** The Formex material that the panel is made from is flexible and will allow for the panel to be flexed to fit back into its original placement.

Figure 187: Installing the Server Cover Panel
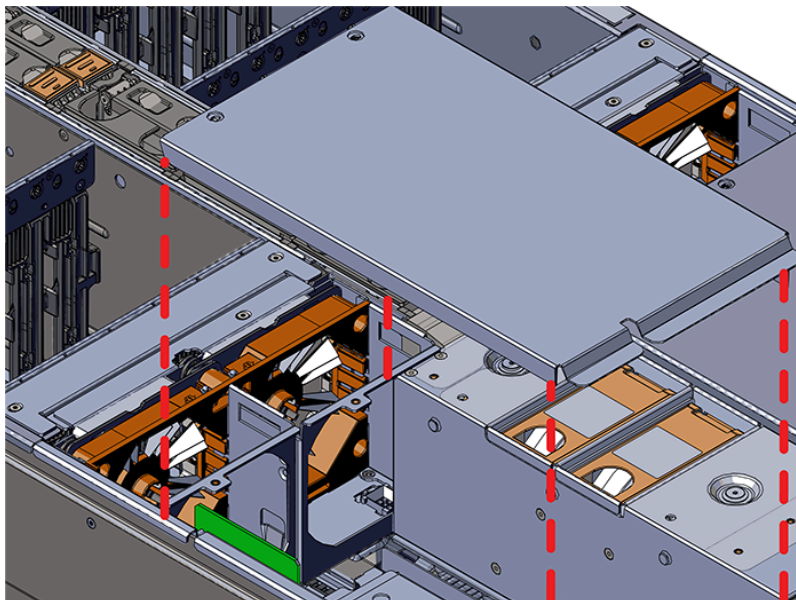
    b. Secure the server cover panel using the original screws and a T7 Torx screwdriver.

Figure 188: Server Cover Panel Screws

Step 27 : Install the System Fan.

a. Lift the System Fan flap and look inside the empty slot that will receive the System Fan and orient the System Fan so that the connector on the bottom of the fan is on the proper side.

Figure 189: Lift the System Fan Flap
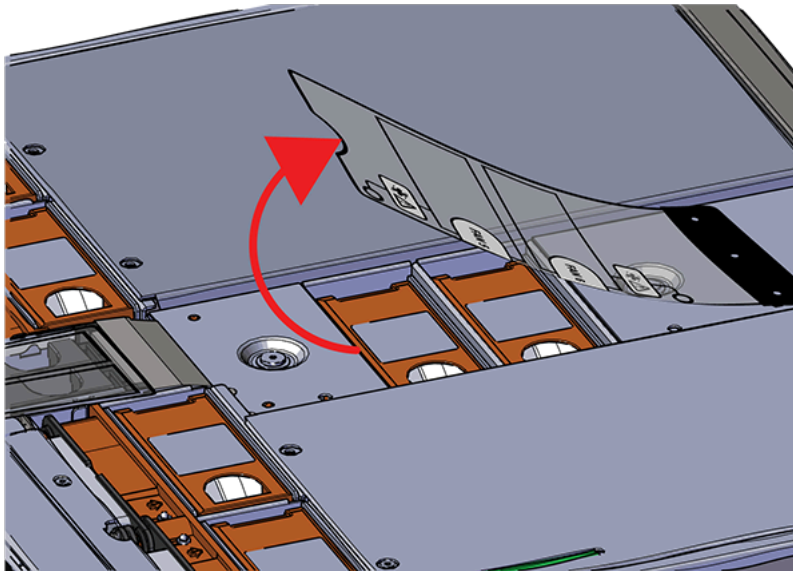
b. Lower the fan down into the empty slot. Do not force it.

Figure 190: Installing a System Fan
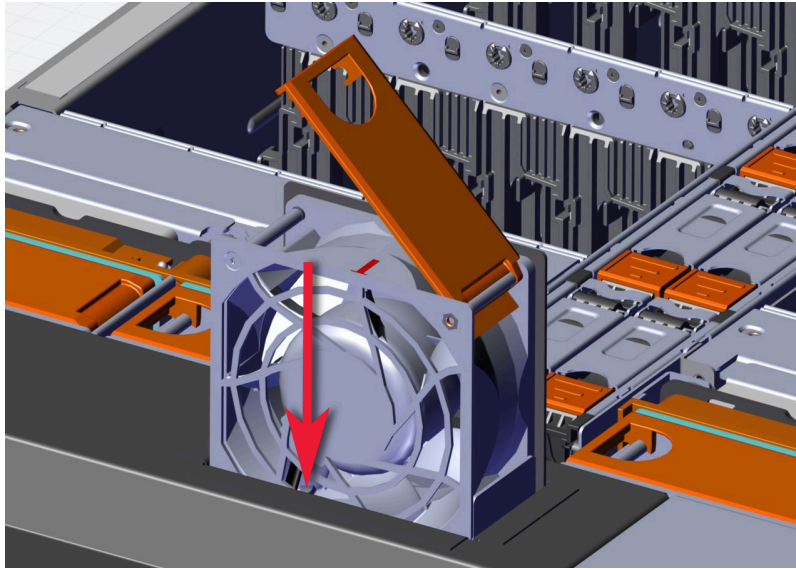
c. When the fan is fully inserted and the connectors are mated properly, close the housing cover clip as shown in the following image.

Figure 191: Latching the Fan Housing Closed
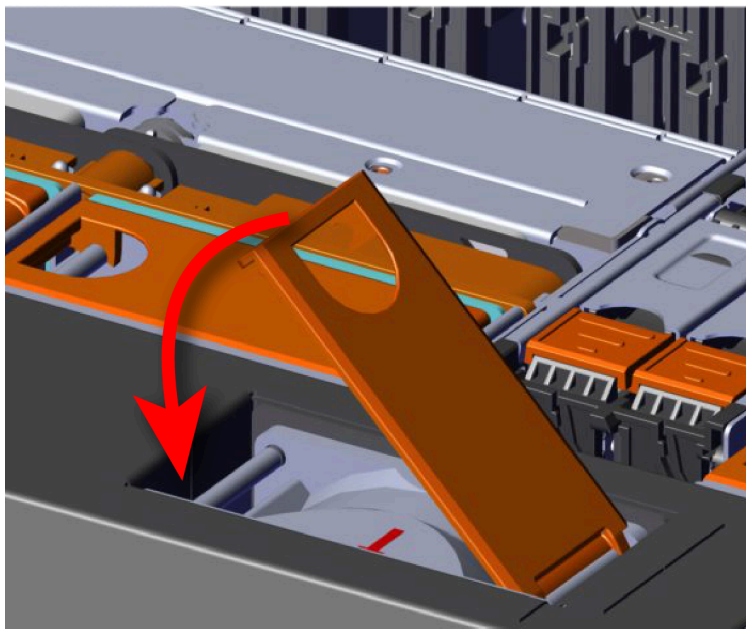
Step 28: Install the remaining system fans in the same manner as the first.

Step 29: Extend the mid-rails out of the rack so that they are protruding from the front of the rack and the safety latches engage.

Figure 192: Extend Mid-Rails
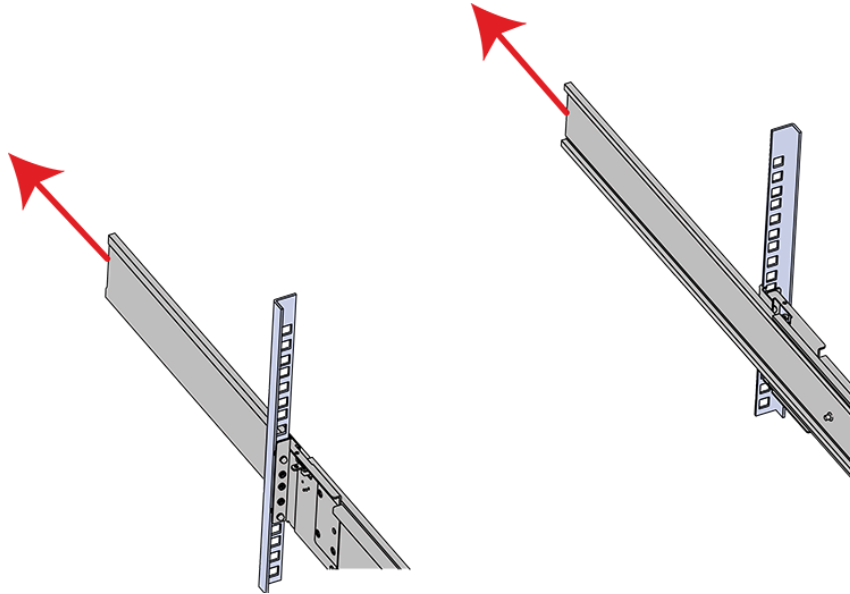
Step 30 : Install the chassis into the rails.

   a. Extend the bearing plates on the inside of the mid-rails until they are fully forward (detent has engaged). This prevents potential damage due to improper mating of the rails.

Figure 193: Bearing Plate

b. ⚠ **Caution:** This step in the installation requires a minimum of 3 individuals to install safely, two to lift and one to guide the others who may have difficulty seeing because the enclosure is in the way. Ensure that the appropriate measures are taken to safely support the enclosure during installation. The enclosure MUST have no drives installed and requires a two person team lift to install. **Do not attempt to lift the system if it is fully populated with drives.** The only case in which the system may be installed or removed with the drives populated is if the facility has a lift that is rated to handle the maximum weight of the fully loaded system.

In preparation to perform a team lift, position one individual on each side of the enclosure (to lift) and a third individual standing at the protruding rack rails (to guide the chassis to mate with rack rails).

c. Team-lift the enclosure until the inner rails (which are attached to the chassis) align with the extended mid-rails (which are attached to the rack), and guide the inner rails on the chassis to mate with the rack rails.

Figure 194: Installing the Chassis
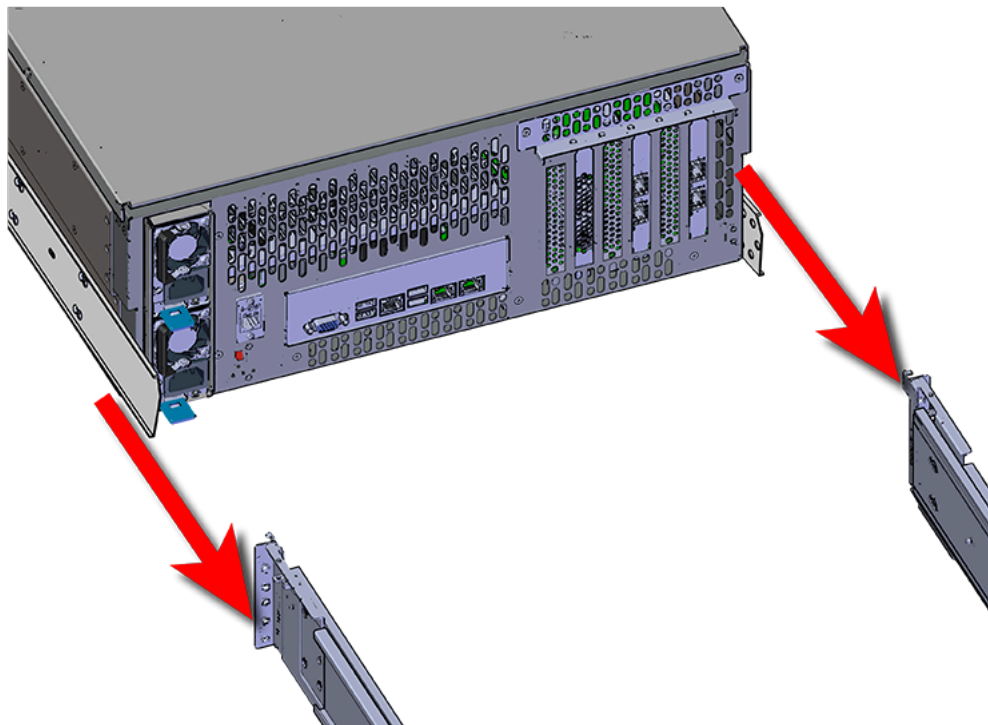
d. Once the rails are mated properly, slide the enclosure into the rack until it is stopped by the safety catch on the rails. Push the release lever on the safety latch (located on the side of each of the rails), and push the enclosure the rest of the way into the rack.

Figure 195: Safety Latch Release
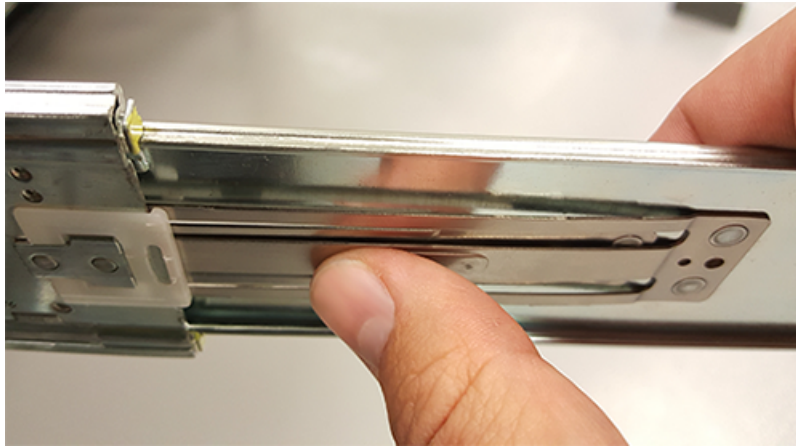
e. As the chassis is slid into the rack, position one installer at the rear of the rack to ensure that the pegs on the sides of the cover will slide correctly into the rear cover alignment brackets on both sides of the rack. If the chassis does not install smoothly or snags, check that the rear cover alignment brackets are not interfering with the chassis sidewalls, and try again.

Step 31: Secure the chassis top cover to the rack using the captive M5 thumb-screws as shown in the following image. Use a T15 Torx screwdriver, and tighten the screws to 3.38-3.61 Nm / 30-32 in-lbf.

Figure 196: Cover Retention Screws
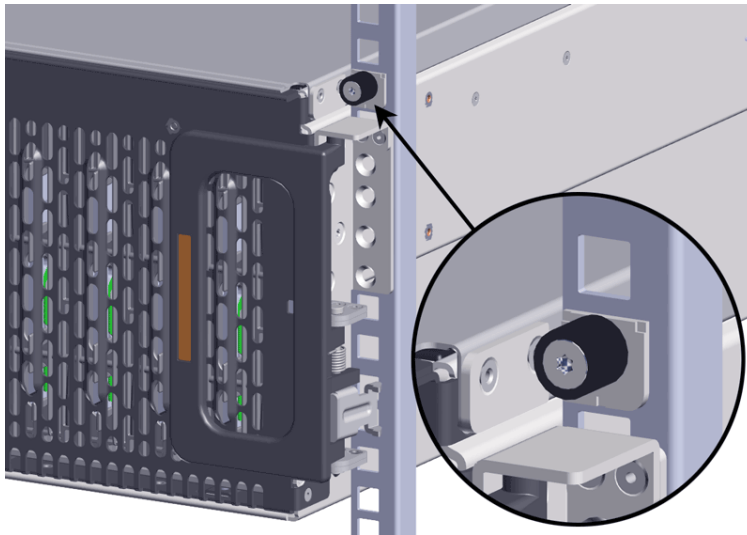
Step 32: Now that the chassis is installed, test the installation by sliding the enclosure in and out of the rack a minimum of three times. If the enclosure binds, catches, or displays any incorrect motion or behavior repeat the installation.

📄 **Note:** Adjustments of the vertical rack rails may be required to fix any issues that may occur.

Step 33: Install the CMA(s).

> 📄 **Note:** CMA has one arm, to be installed at the lower position. This arm should have the elbow on the left side.

a. Orient the CMA so that the elbow is on the left hand side.
b. Attach all three of the connectors to the brackets on the rails. There should be one at the elbow side and two at the other end.

Figure 197: CMA Orientation
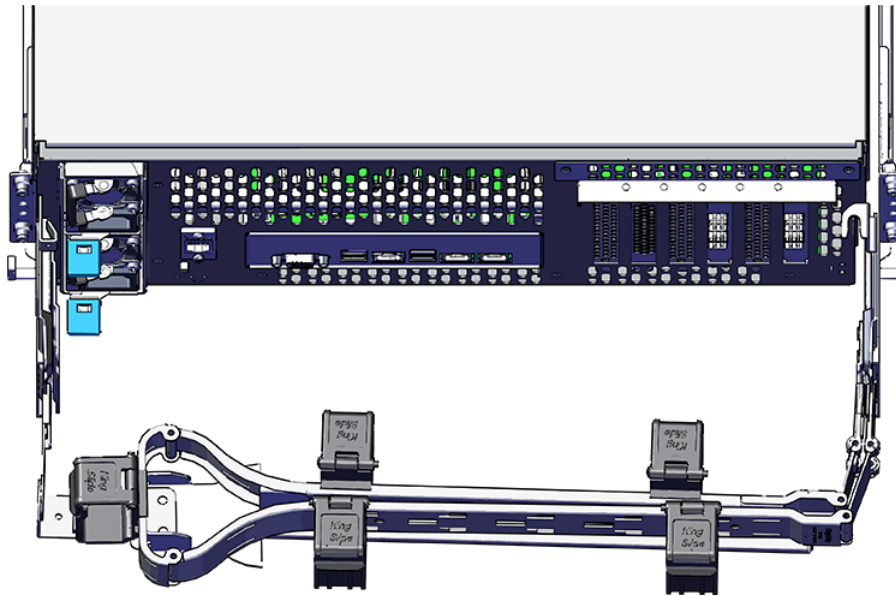
c. Slowly slide the enclosure forward to ensure the arm is operating properly, then slide it back into the rack.

Step 34: Install the 3.5in HDD Assembly.

> 📄 **Note:** The 2.5in SSD Assembly is installed in the same manner as the 3.5in HDD Assembly. For instructions on assembling the 2.5in SSD Assembly, see Operating the 2.5" Drive Carrier *(page 60)*.

a. Ensure that the enclosure has been pulled out of the rack until the rail latches engage.
b. Find the LED pointer on the top of the drive carrier. This pointer should point toward the front of the unit as shown in the following image.

Figure 198: LED Pointer Orientation
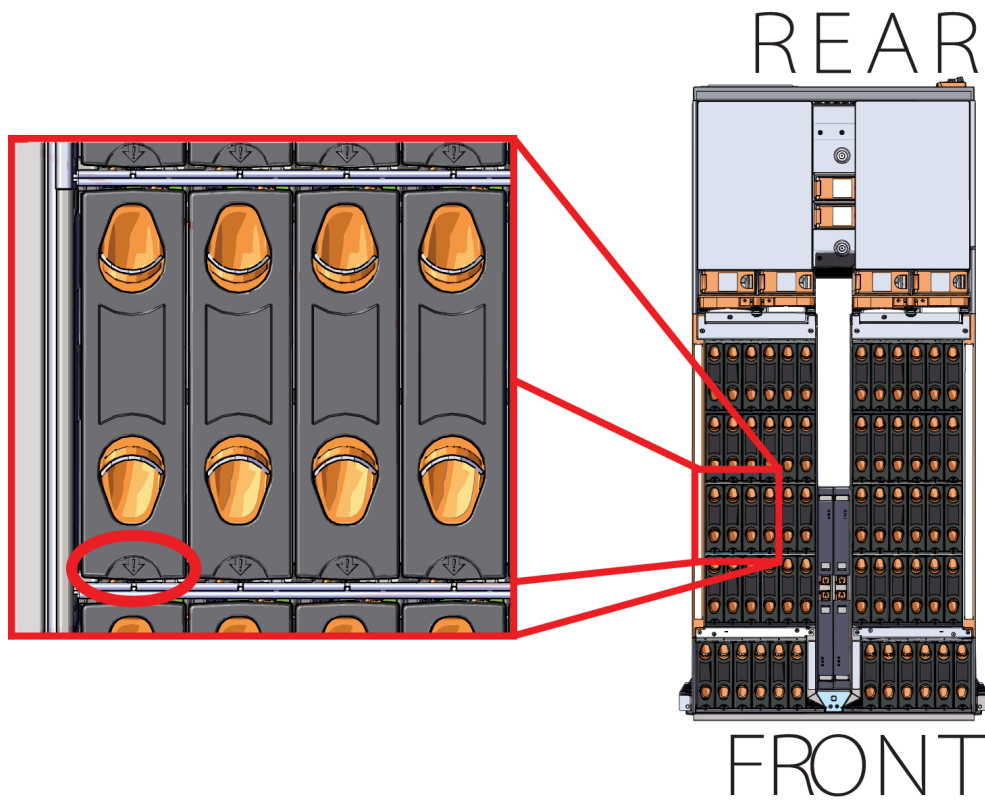
c. Align the drive with the empty slot that will receive it. Lower it into the slot, making sure it stays level and does not snag.

Figure 199: Installing a 3.5in HDD Assembly
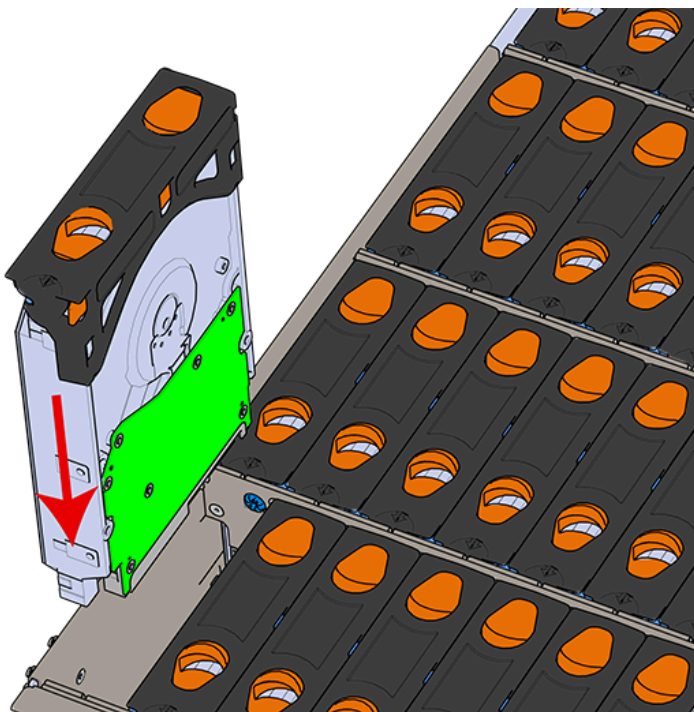
    d. Pinch the latch release and carefully press downward to seat the 3.5in HDD Assembly the rest of the way.

Step 35 : Install each drive in the place it was removed from by following the labels or marks that were added earlier.

Step 36 : Cable the CMA(s).

    CMA Standard:

    a. Unlatch the elbow side of the arm(s) by pressing the blue button labeled "push," and then swing the arm(s) open.

    b. Open all of the baskets.

Figure 200: Open Baskets

c. Route all of the cables being connected to the enclosure through the open baskets.

d. Close all of the baskets.

e. If the Ultrastar Serv60+8 is being installed in a rack and will subsequently be transported inside that rack, it is important to use the included cable tie to wrap the CMA bundle to ensure it does not get damaged during transport. If the Ultrastar Serv60+8 is instead being installed where it will be operated, skip this step. Remember to remove the cable ties after the enclosure has reached its final operational location.

f. Reconnect the arm at the elbow to the connectors on the rail.

CMA Lite:

a. Press the blue latch button labeled "push" to unlatch the elbow side of the CMA arm, and then swing the arm open.

b. Open all of the baskets.

Figure 201: Open Baskets

c. Gather the SAS, power, and Ethernet cables for installation.

> 📄 **Note:** Route all cables to IOM A (left hand side looking at the rear).

d. Route all of the cables being connected to the enclosure through the open baskets.

e. Close all of the baskets.

f. If the Ultrastar Serv60+8 is being installed in a rack and will subsequently be transported inside that rack, it is important to use the included cable tie to wrap the CMA bundle to ensure it does not get damaged during transport. If the Ultrastar Serv60+8 is instead being installed where it will operated, skip this step. Remember to remove the cable ties after the enclosure has reached its final operational location.

g. Reconnect the arm to the rail by the connector at the elbow.

Step 37: Test for binding in the extension of the arm by gently pulling the enclosure out of the rack, ensuring the cables extend properly and that the system doesn't bind at all. If it does, examine the point at which the binding occurred and adjust the seating of cables in the baskets, check the connections to the rails, and examine the joints of the arm to ensure that they are all functioning properly.

Step 38: Make sure the CMA(s) is in operational position by folding the arm(s) in toward the enclosure and attaching the elbow end(s) to the connector(s) attached to the rail. Verify that all of the cabling is in functional order and does not bind or catch.

3.10 M.2 Replacement

Replacement Requirements	
Personnel Required	3
Avg. Replacement Time	90 min
Max Replacement Time	
Tool	**Required vs. Recommended**
T7 Torx Screwdriver	Required

Step 1: Uncable the CMA(s).

    a. Open all of the basket clips on the CMA(s).

Figure 202: Open Baskets
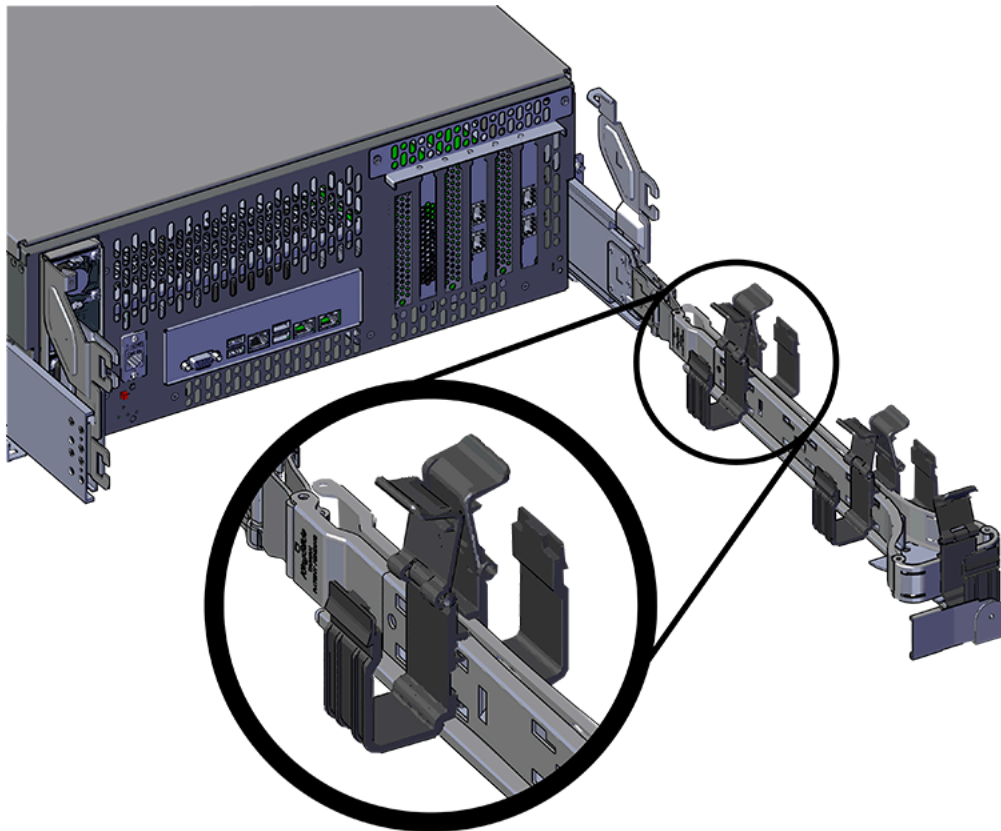
    b. Remove one cable at a time from the arm, making sure not to put too much strain on the arm.

Step 2 : Remove the CMA(s).

    a. Release all of the connectors that attach the CMA(s) to the enclosure and the rail.

There are three total connections that need to be released, one at the elbow and two at the opposite end.

b. To release a connector, press the blue latch release button and pull the connector free.

Figure 203: Unlatching a CMA Connector
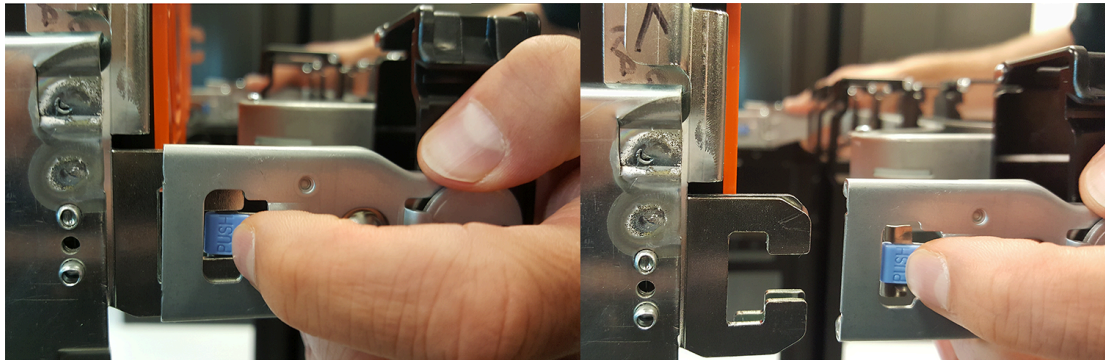
Step 3: Grasp both handles at the front of the enclosure and pull with even pressure to extend the chassis out of the rack until it is stopped by the safety latches. The safety latches will prevent the enclosure from coming out of the rack completely and the cover will remain in the rack attached to the rear alignment brackets.

Figure 204: Chassis Handle Operation
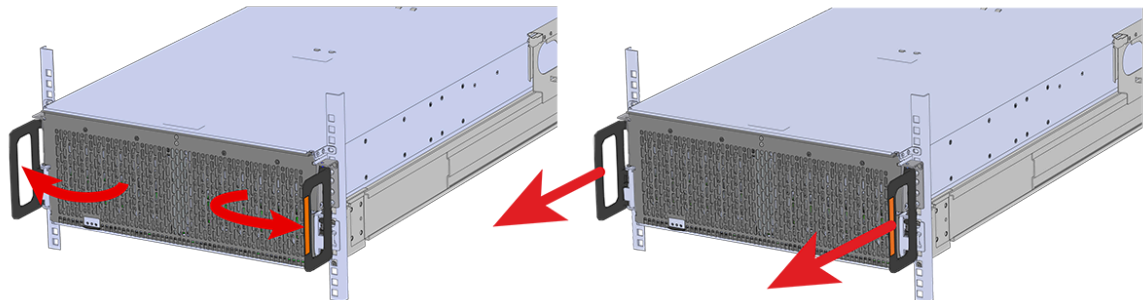
Step 4: Remove all of the drives from the chassis before uninstalling the chassis. Be prepared to label the drives as they are removed so they can be reinstalled in the same location in the new chassis.

Step 5: Follow these steps to remove a 3.5in HDD Assembly.

a. Find the latch release mechanism on the 3.5in HDD Assembly being removed.

b. Insert a finger and a thumb into the latch release and pinch to unlatch the 3.5in HDD Assembly.

Figure 205: Unlatch Drive Carrier (IOM Not Shown)
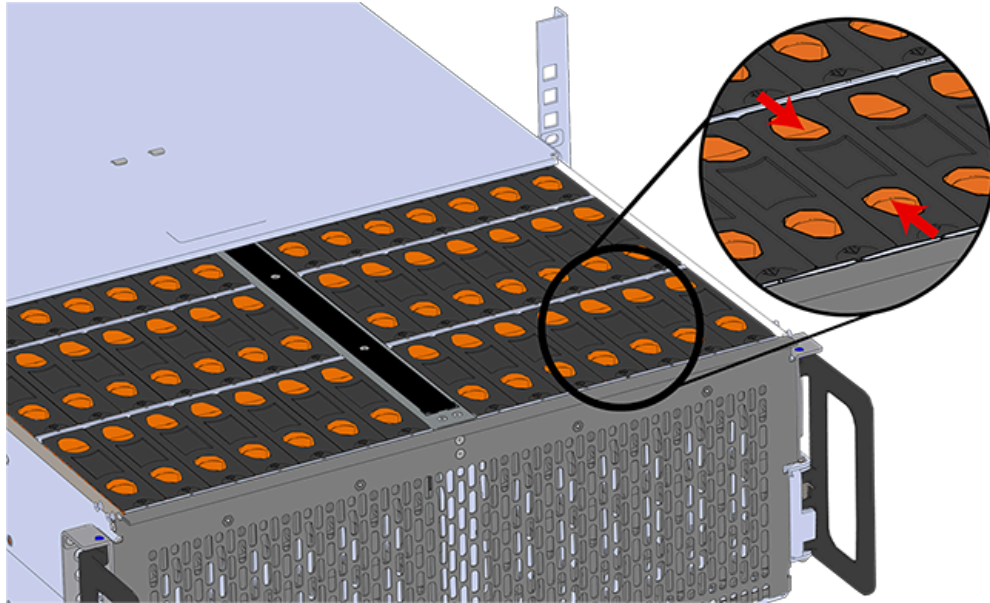
c. Lift the 3.5in HDD Assembly free from the enclosure.

Figure 206: Removing 3.5in HDD Assembly
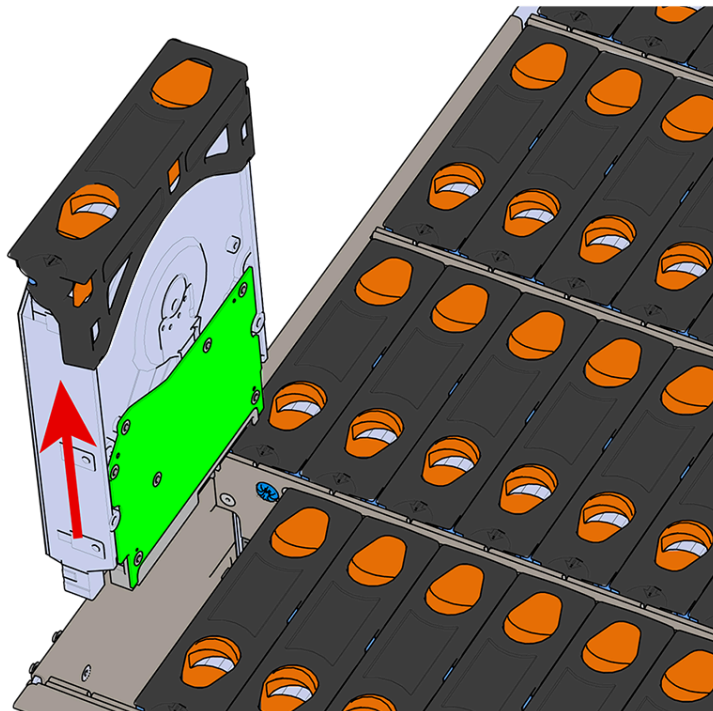
Step 6 : Follow the previous step for each drive in the enclosure. Attach a label or mark the drives with the drive slot they were removed from in order to add them to the same slot in the future. Store the drives in an ESD safe location until the drives are ready to be installed back into an enclosure.

Step 7 : Release the safety latch on the inner rails on each side of the chassis as shown in the following image.

Figure 207: Inner Rail Safety Latch Release

Step 8 : Grasp both handles at the front of the enclosure and pull with even pressure to extend the chassis out of the rack until it is stopped by the safety latches. Make sure that the top cover comes with the chassis as it is extended out of the rack. The safety latches will prevent the enclosure from coming out of the rack completely.

Step 9 : Remove the chassis from the rack.

   a. Be prepared to support the enclosure once it is free of the rails by having a second person or a lift to support the enclosure

   b. Grasp both handles at the front of the enclosure and pull with even pressure until the enclosure will not extend further.

   c. Locate the safety catches on the inner rails attached to the enclosure.

Figure 208: Safety Latch Release

d. Depress the latch release lever for the safety latches on the rail and push the chassis very slightly forward. The chassis is now unsecured from the rack.

e. Ensure that you have the proper support mechanism to hold the chassis in position, whether that be a team lifting partner or an appropriate lift.

f. Slide the chassis forward to free it from the rails. Place the chassis in a safe location to avoid damage.

Step 10 :

> (i) **Attention:** Place the enclosure on a flat ESD safe surface and ensure it is stable before continuing with the procedure.

Step 11 : Uninstall server cover panel over the Add-in cards. The server cover panel that needs to be removed is located (from the rear of the enclosure) on the right side of the enclosure.

a. Remove the screws that secure the server cover panels to the chassis using a T7 Torx screwdriver.

Figure 209: Removing the Server Cover Panel Screws
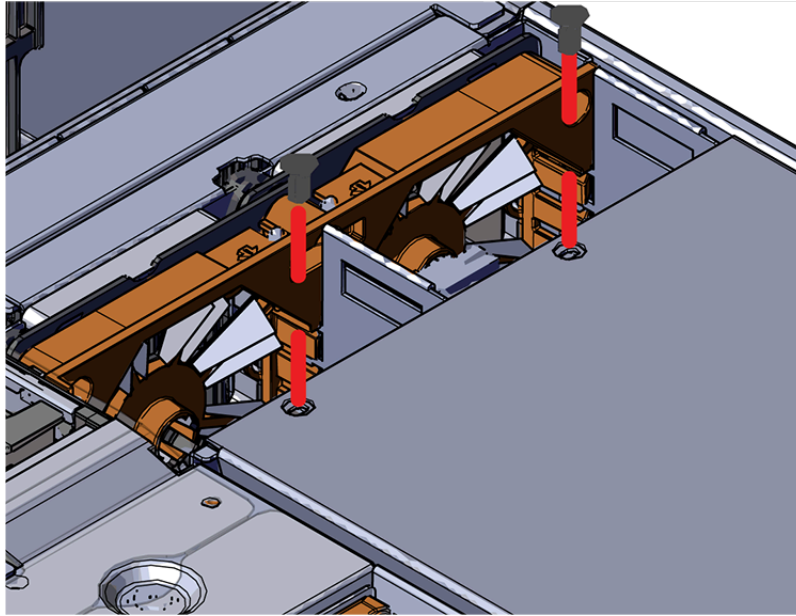
b. Remove the server cover panel by carefully pulling on the edge where the screws were removed.

Figure 210: Removing the Server Cover Panel
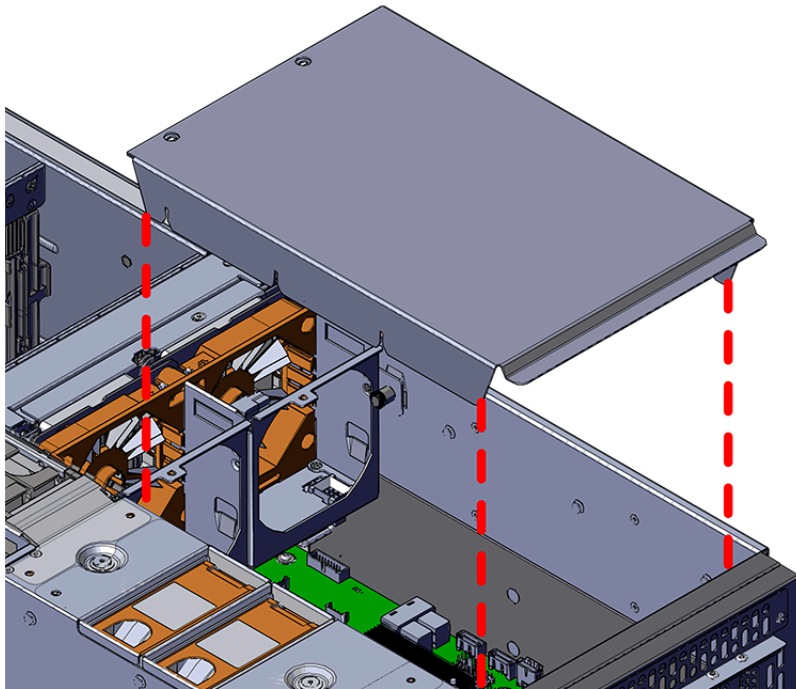
Step 12 : Uninstall the M.2.

a. Locate the M.2 installed on the baseboard.

b. Remove the Philips head screw that secures the M.2 to the baseboard.

Figure 211: M.2 Screw
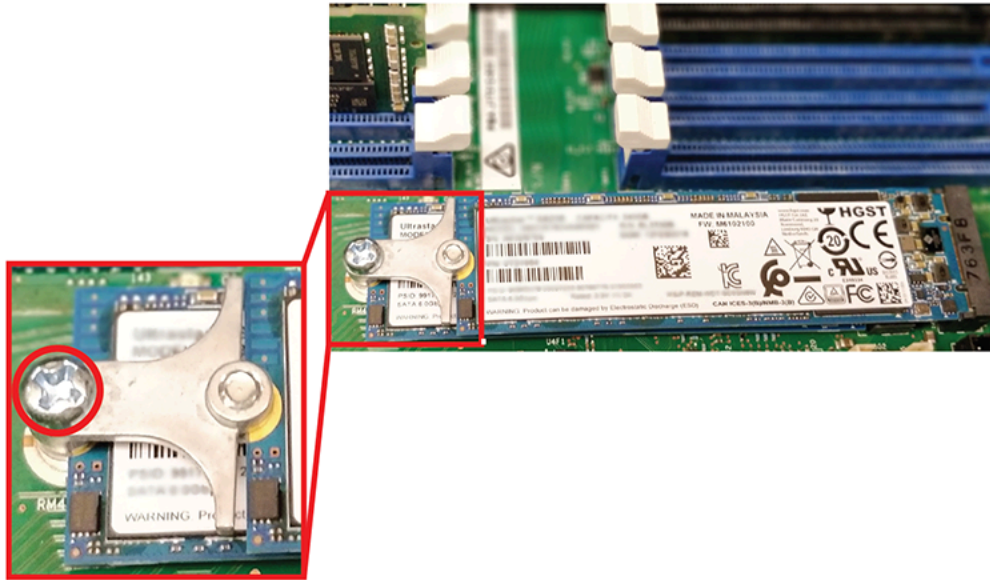
c. Pull the top M.2 out of the connector.

Figure 212: Uninstalling the M.2s

d. Repeat the previous substep to remove the bottom M.2.

Step 13: Install the M.2.

a. Locate the M.2 connectors on the baseboard.

Figure 213: M.2 Connectors
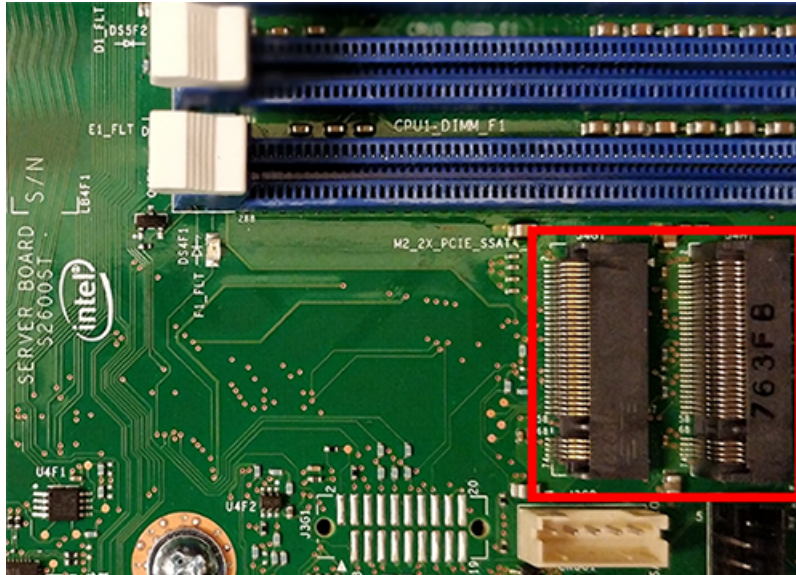
b. Slide the card edge of the bottom M.2 into the M.2 connector on the baseboard.

c. Slide the card edge of the top M.2 into the M.2 connector on the baseboard.

Figure 214: M.2 Install (Top)

d. Secure both M.2s with the Philips head screw that held the failed M.2s.

Figure 215: M.2 Screw
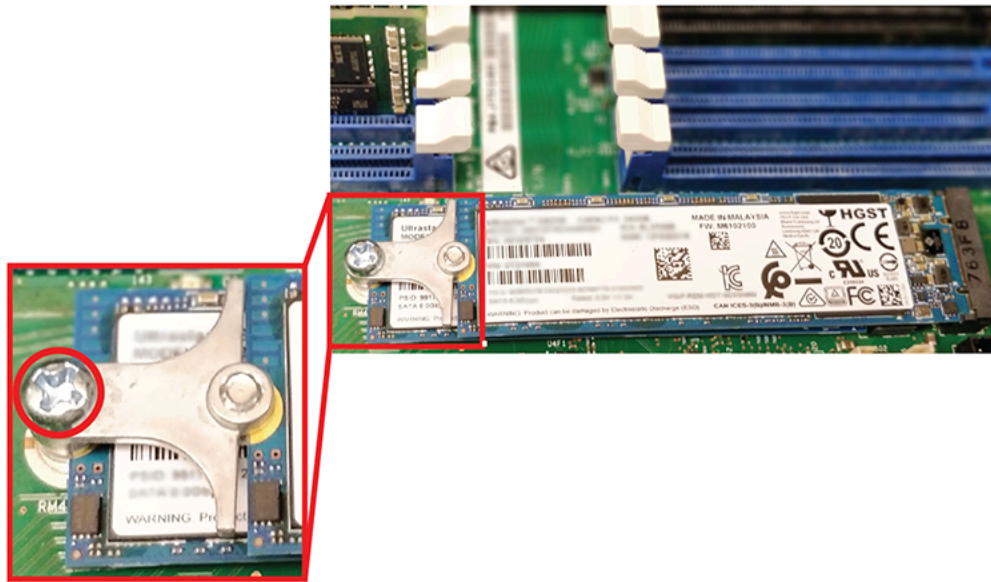
Step 14 : Install server cover panels.

   a. Align and press the server panel cover into place over the server bay.

   📄 **Note:** The Formex material that the panel is made from is flexible and will allow for the panel to be flexed to fit back into its original placement.

Figure 216: Installing the Server Cover Panel
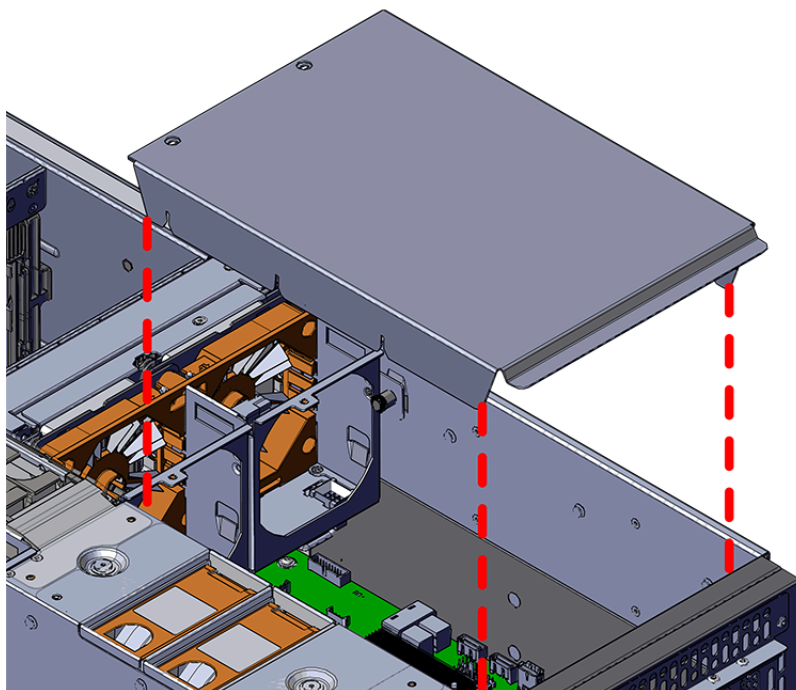
b. Secure the server cover panel using the original screws and a T7 Torx screwdriver.

Figure 217: Server Cover Panel Screws
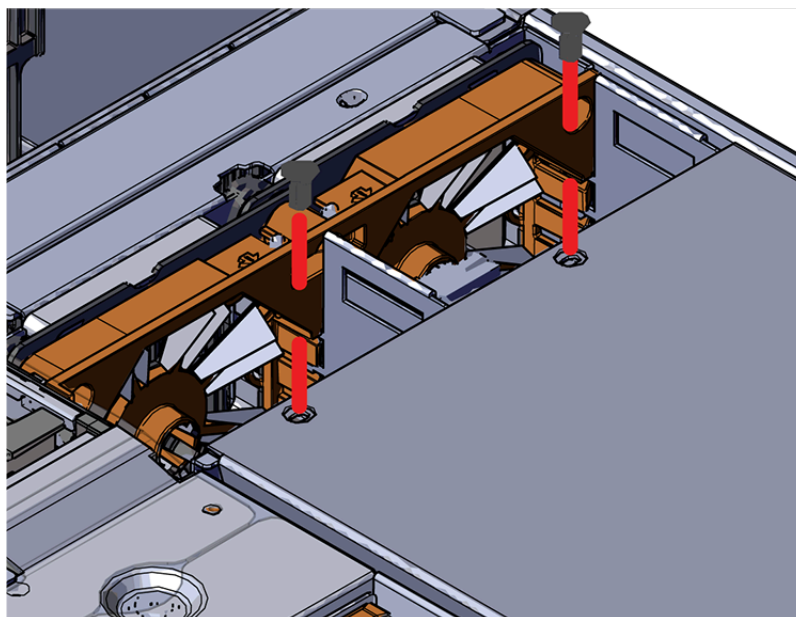
Step 15: Extend the mid-rails out of the rack so that they are protruding from the front of the rack and the safety latches engage.

Figure 218: Extend Mid-Rails

Step 16 : Install the chassis into the rails.

    a. Extend the bearing plates on the inside of the mid-rails until they are fully forward (detent has engaged). This prevents potential damage due to improper mating of the rails.

Figure 219: Bearing Plate

b. ⚠ **Caution:** This step in the installation requires a minimum of 3 individuals to install safely, two to lift and one to guide the others who may have difficulty seeing because the enclosure is in the way. Ensure that the appropriate measures are taken to safely support the enclosure during installation. The enclosure MUST have no drives installed and requires a two person team lift to install. **Do not attempt to lift the system if it is fully populated with drives.** The only case in which the system may be installed or removed with the drives populated is if the facility has a lift that is rated to handle the maximum weight of the fully loaded system.

In preparation to perform a team lift, position one individual on each side of the enclosure (to lift) and a third individual standing at the protruding rack rails (to guide the chassis to mate with rack rails).

c. Team-lift the enclosure until the inner rails (which are attached to the chassis) align with the extended mid-rails (which are attached to the rack), and guide the inner rails on the chassis to mate with the rack rails.

Figure 220: Installing the Chassis
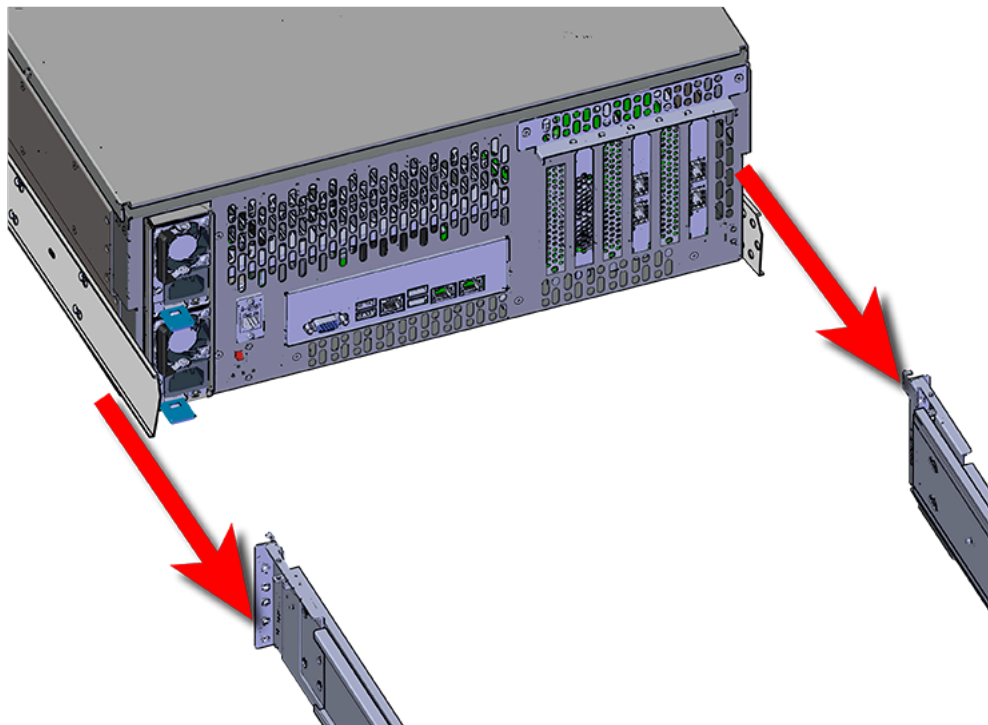
d. Once the rails are mated properly, slide the enclosure into the rack until it is stopped by the safety catch on the rails. Push the release lever on the safety latch (located on the side of each of the rails), and push the enclosure the rest of the way into the rack.

Figure 221: Safety Latch Release

e. As the chassis is slid into the rack, position one installer at the rear of the rack to ensure that the pegs on the sides of the cover will slide correctly into the rear cover alignment brackets on both sides of the rack. If the chassis does not install smoothly or snags, check that the rear cover alignment brackets are not interfering with the chassis sidewalls, and try again.

Step 17: Secure the chassis top cover to the rack using the captive M5 thumb-screws as shown in the following image. Use a T15 Torx screwdriver, and tighten the screws to 3.38-3.61 Nm / 30-32 in-lbf.

Figure 222: Cover Retention Screws

Step 18: Now that the chassis is installed, test the installation by sliding the enclosure in and out of the rack a minimum of three times. If the enclosure binds, catches, or displays any incorrect motion or behavior repeat the installation.

Note: Adjustments of the vertical rack rails may be required to fix any issues that may occur.

Step 19: Install the CMA(s).

> 📄 **Note:** CMA has one arm, to be installed at the lower position. This arm should have the elbow on the left side.

a. Orient the CMA so that the elbow is on the left hand side.
b. Attach all three of the connectors to the brackets on the rails. There should be one at the elbow side and two at the other end.

Figure 223: CMA Orientation
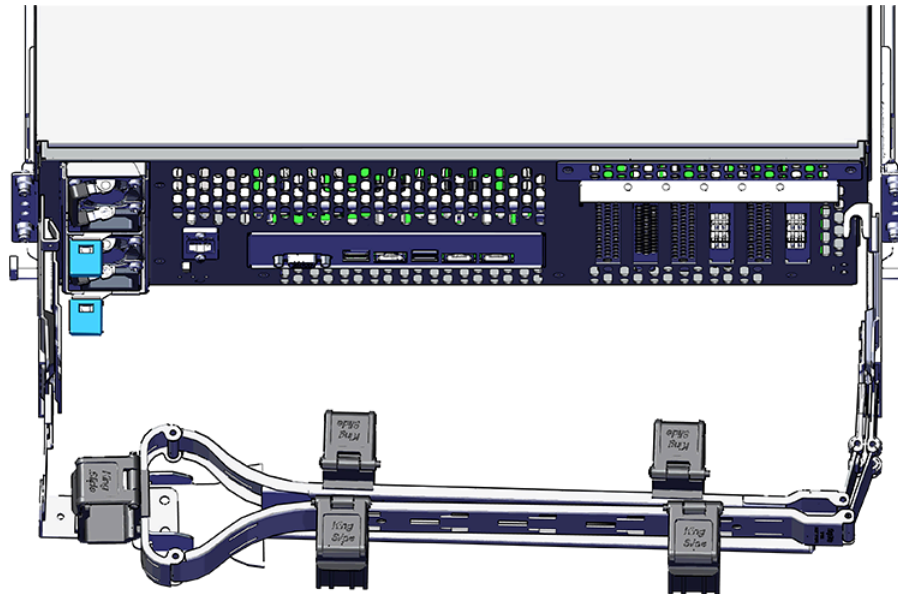
c. Slowly slide the enclosure forward to ensure the arm is operating properly, then slide it back into the rack.

Step 20: Install the 3.5in HDD Assembly.

> 📄 **Note:** The 2.5in SSD Assembly is installed in the same manner as the 3.5in HDD Assembly. For instructions on assembling the 2.5in SSD Assembly, see Operating the 2.5" Drive Carrier *(page 60)*.

a. Ensure that the enclosure has been pulled out of the rack until the rail latches engage.
b. Find the LED pointer on the top of the drive carrier. This pointer should point toward the front of the unit as shown in the following image.

Figure 224: LED Pointer Orientation
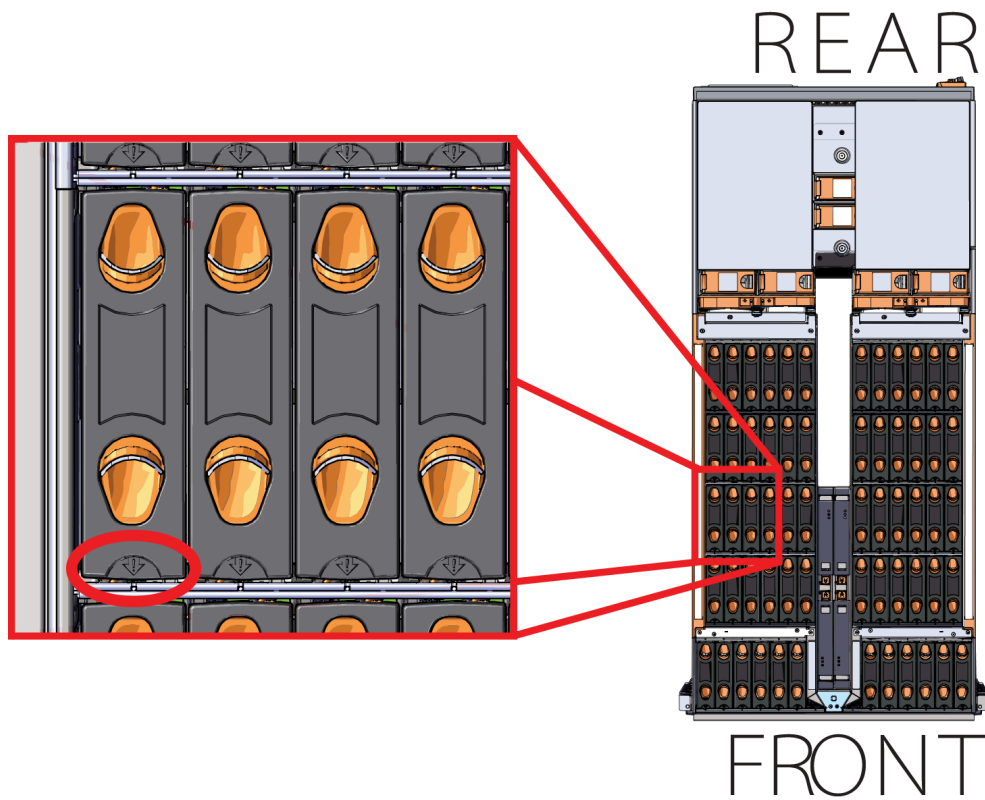
c. Align the drive with the empty slot that will receive it. Lower it into the slot, making sure it stays level and does not snag.

Figure 225: Installing a 3.5in HDD Assembly
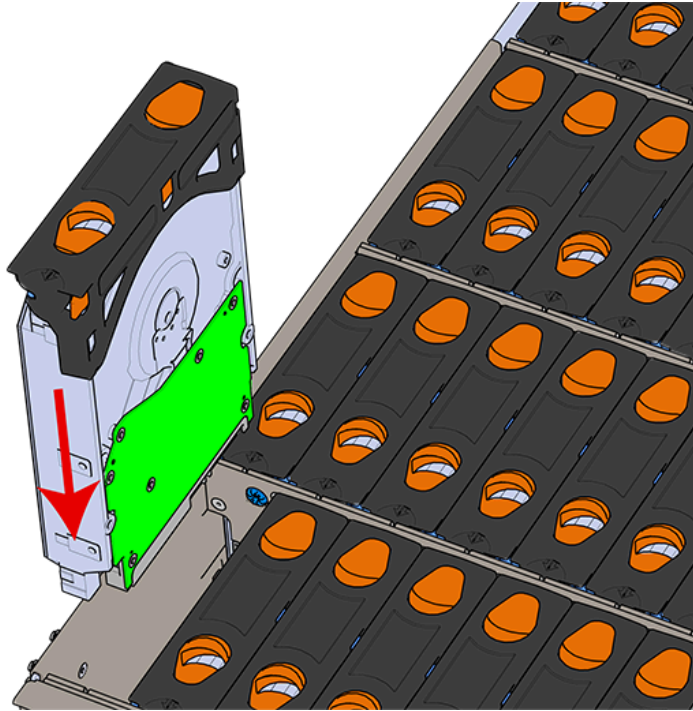
    d. Pinch the latch release and carefully press downward to seat the 3.5in HDD Assembly the rest of the way.

Step 21: Install each drive in the place it was removed from by following the labels or marks that were added earlier.

Step 22: Cable the CMA(s).

    CMA Standard:

    a. Unlatch the elbow side of the arm(s) by pressing the blue button labeled "push," and then swing the arm(s) open.

    b. Open all of the baskets.

Figure 226: Open Baskets

c. Route all of the cables being connected to the enclosure through the open baskets.

d. Close all of the baskets.

e. If the Ultrastar Serv60+8 is being installed in a rack and will subsequently be transported inside that rack, it is important to use the included cable tie to wrap the CMA bundle to ensure it does not get damaged during transport. If the Ultrastar Serv60+8 is instead being installed where it will be operated, skip this step. Remember to remove the cable ties after the enclosure has reached its final operational location.

f. Reconnect the arm at the elbow to the connectors on the rail.

CMA Lite:

a. Press the blue latch button labeled "push" to unlatch the elbow side of the CMA arm, and then swing the arm open.

b. Open all of the baskets.

Figure 227: Open Baskets

   c. Gather the SAS, power, and Ethernet cables for installation.

> 📄 **Note:** Route all cables to IOM A (left hand side looking at the rear).

   d. Route all of the cables being connected to the enclosure through the open baskets.

   e. Close all of the baskets.

   f. If the Ultrastar Serv60+8 is being installed in a rack and will subsequently be transported inside that rack, it is important to use the included cable tie to wrap the CMA bundle to ensure it does not get damaged during transport. If the Ultrastar Serv60+8 is instead being installed where it will operated, skip this step. Remember to remove the cable ties after the enclosure has reached its final operational location.

   g. Reconnect the arm to the rail by the connector at the elbow.

Step 23 : Test for binding in the extension of the arm by gently pulling the enclosure out of the rack, ensuring the cables extend properly and that the system doesn't bind at all. If it does, examine the point at which the binding occurred and adjust the seating of cables in the baskets, check the connections to the rails, and examine the joints of the arm to ensure that they are all functioning properly.

Step 24 : Make sure the CMA(s) is in operational position by folding the arm(s) in toward the enclosure and attaching the elbow end(s) to the connector(s) attached to the rail. Verify that all of the cabling is in functional order and does not bind or catch.

3.11 Add-In Card Replacement

Note: The add-in card is not hot swappable. The enclosure must be powered-down, disconnected from all cabling, and removed from the rack before replacing the add-in card.

Replacement Requirements	
Personnel Required	3
Avg. Replacement Time	90 min
Max Replacement Time	90 min
Tool	**Required vs. Recommended**
T7 Torx Screwdriver	Required

Step 1: Uncable the CMA(s).

   a. Open all of the basket clips on the CMA(s).

Figure 228: Open Baskets
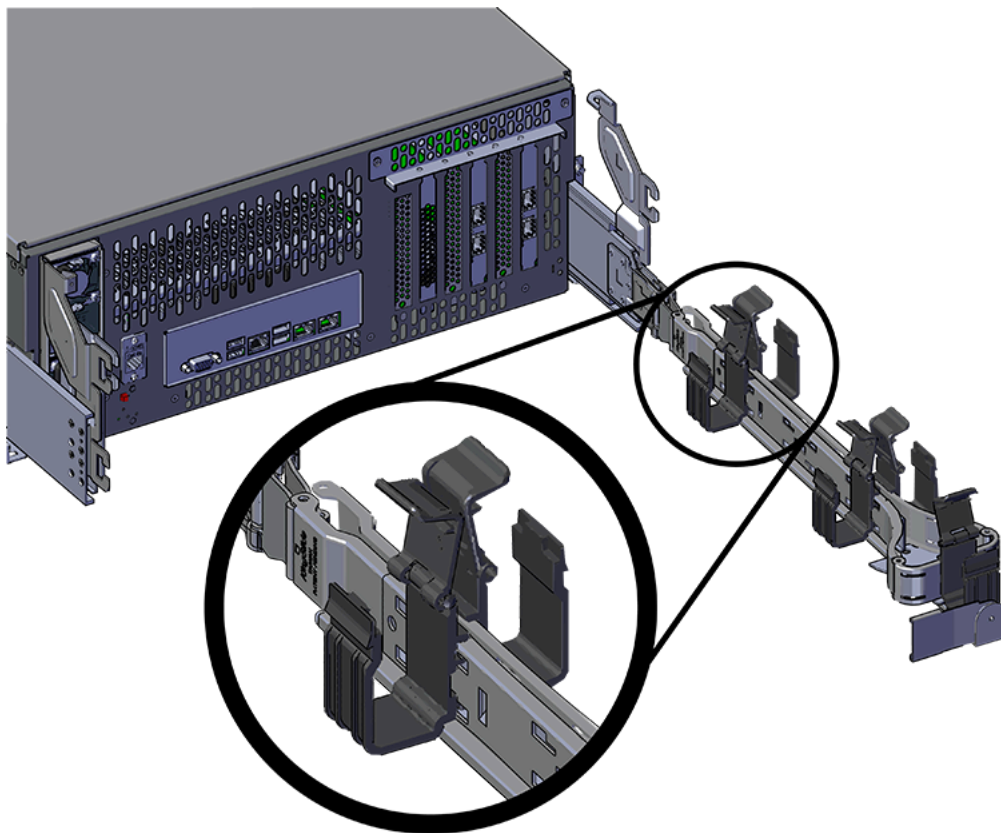
   b. Remove one cable at a time from the arm, making sure not to put too much strain on the arm.

Step 2: Remove the CMA(s).

    a. Release all of the connectors that attach the CMA(s) to the enclosure and the rail.

       There are three total connections that need to be released, one at the elbow and two at the opposite end.

    b. To release a connector, press the blue latch release button and pull the connector free.

Figure 229: Unlatching a CMA Connector
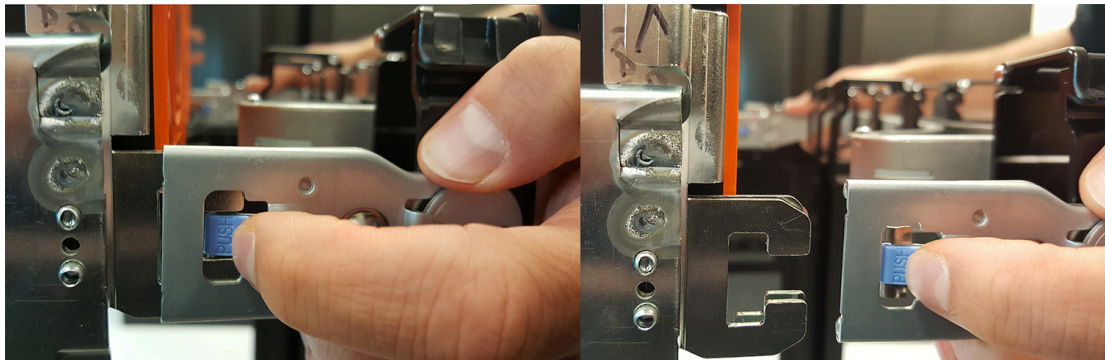
Step 3: Grasp both handles at the front of the enclosure and pull with even pressure to extend the chassis out of the rack until it is stopped by the safety latches. The safety latches will prevent the enclosure from coming out of the rack completely and the cover will remain in the rack attached to the rear alignment brackets.

Figure 230: Chassis Handle Operation
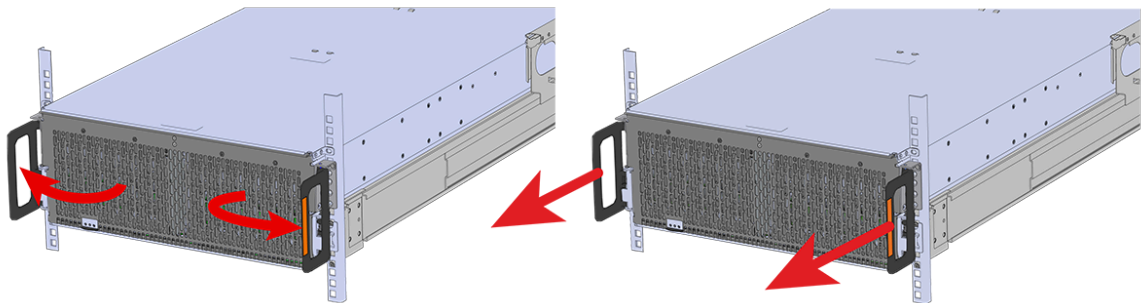
Step 4: Remove all of the drives from the chassis before uninstalling the chassis. Be prepared to label the drives as they are removed so they can be reinstalled in the same location in the new chassis.

Step 5: Follow these steps to remove a 3.5in HDD Assembly.

    a. Find the latch release mechanism on the 3.5in HDD Assembly being removed.

    b. Insert a finger and a thumb into the latch release and pinch to unlatch the 3.5in HDD Assembly.

Figure 231: Unlatch Drive Carrier (IOM Not Shown)

c. Lift the 3.5in HDD Assembly free from the enclosure.

Figure 232: Removing 3.5in HDD Assembly

Step 6 : Follow the previous step for each drive in the enclosure. Attach a label or mark the drives with the drive slot they were removed from in order to add them to the same slot in the future. Store the drives in an ESD safe location until the drives are ready to be installed back into an enclosure.

Step 7 : Release the safety latch on the inner rails on each side of the chassis as shown in the following image.

Figure 233: Inner Rail Safety Latch Release

Step 8 : Grasp both handles at the front of the enclosure and pull with even pressure to extend the chassis out of the rack until it is stopped by the safety latches. Make sure that the top cover comes with the chassis as it is extended out of the rack. The safety latches will prevent the enclosure from coming out of the rack completely.

Step 9 : Remove the chassis from the rack.

    a. Be prepared to support the enclosure once it is free of the rails by having a second person or a lift to support the enclosure

    b. Grasp both handles at the front of the enclosure and pull with even pressure until the enclosure will not extend further.

    c. Locate the safety catches on the inner rails attached to the enclosure.

Figure 234: Safety Latch Release

d. Depress the latch release lever for the safety latches on the rail and push the chassis very slightly forward. The chassis is now unsecured from the rack.

e. Ensure that you have the proper support mechanism to hold the chassis in position, whether that be a team lifting partner or an appropriate lift.

f. Slide the chassis forward to free it from the rails. Place the chassis in a safe location to avoid damage.

Step 10 : Uninstall server cover panel over the Add-in cards. The server cover panel that needs to be removed is located (from the rear of the enclosure) on the right side of the enclosure.

a. Remove the screws that secure the server cover panels to the chassis using a T7 Torx screwdriver.

Figure 235: Removing the Server Cover Panel Screws
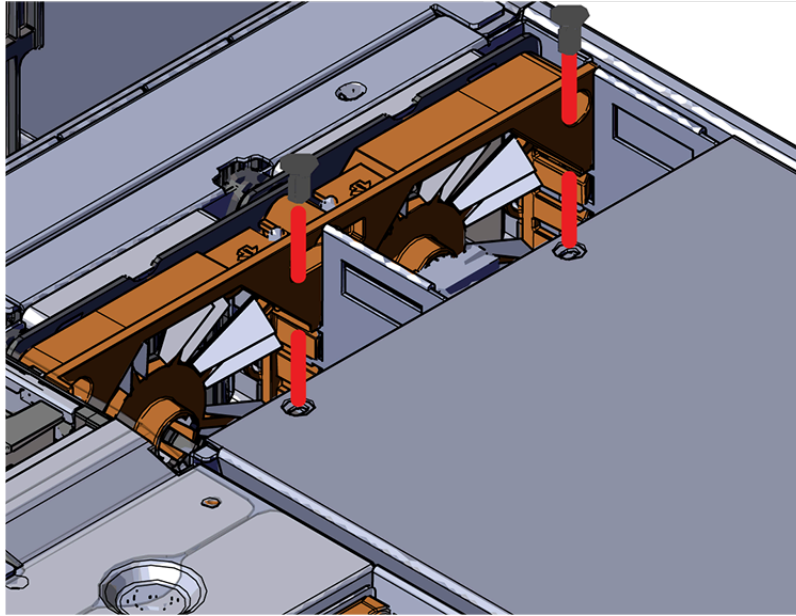
b. Remove the server cover panel by carefully pulling on the edge where the screws were removed.

Figure 236: Removing the Server Cover Panel
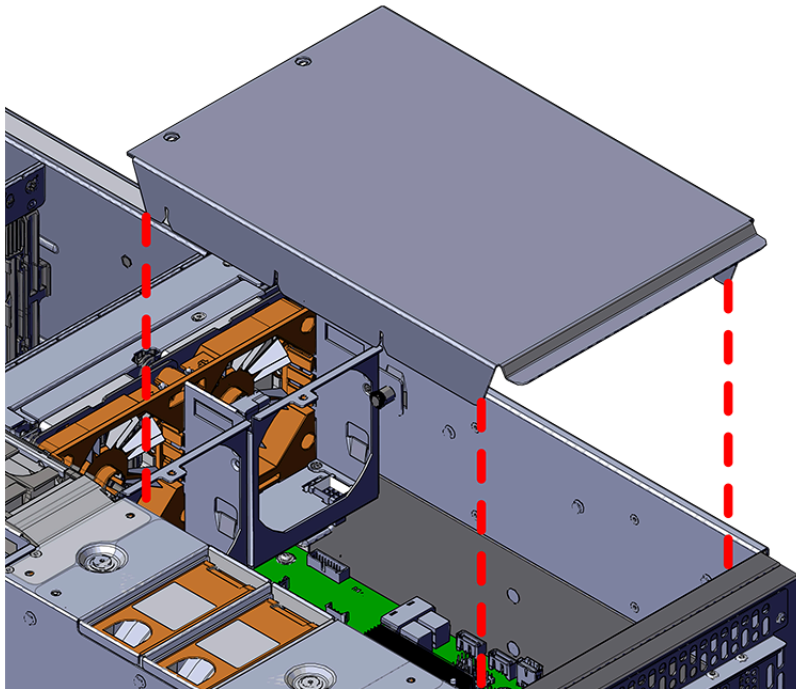
Step 11: Uninstall the add-in card bracket.

a. From the rear of the enclosure, remove the eight screws that secure the add-in cards to the enclosure using a T10 Torx Screwdriver.

Figure 237: Add-In Card Screws

b. Remove the bracket from the end of the chassis.

Figure 238: Add-In Card Bracket
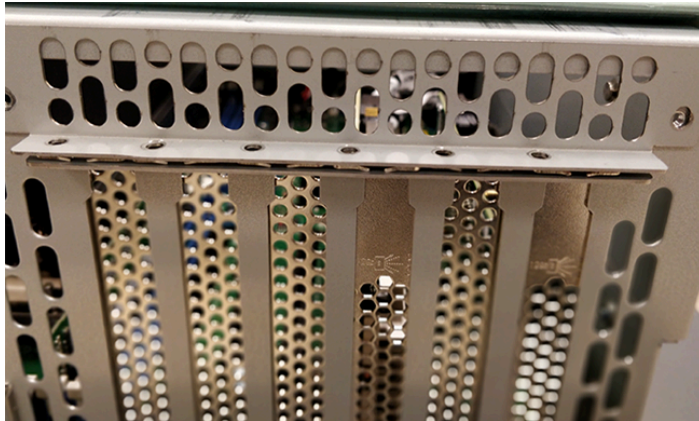
Figure 239: Add-In Card Bracket Removed
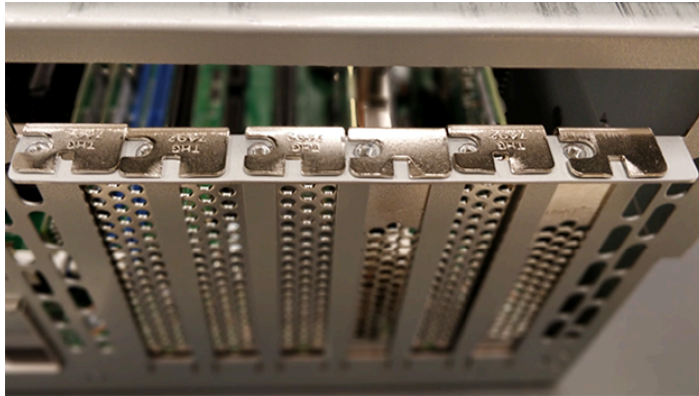
Step 12 : Uninstall the add-in cards.

    a. Locate the first add-in card.

    b. Remove all cabling from the add-in card.

Figure 240: Add-In Card Remove Cabling and Uninstall
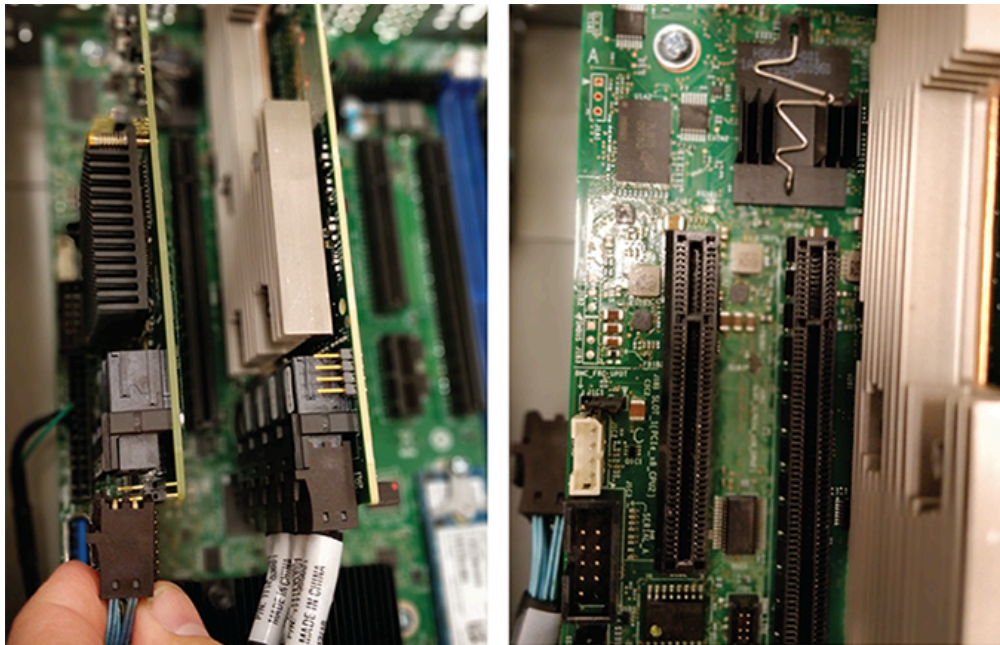
    c. Carefully pull up on the add-in card until it comes free from the connector on the baseboard.

Step 13 : Install the add-in cards.

    a. Locate the connector for the add-in card being installed.

    b. Set the card edge of the add-in card on the connector and firmly press down until the add-in card is seated.

Figure 241: Add-In Card Install and Connect Cabling
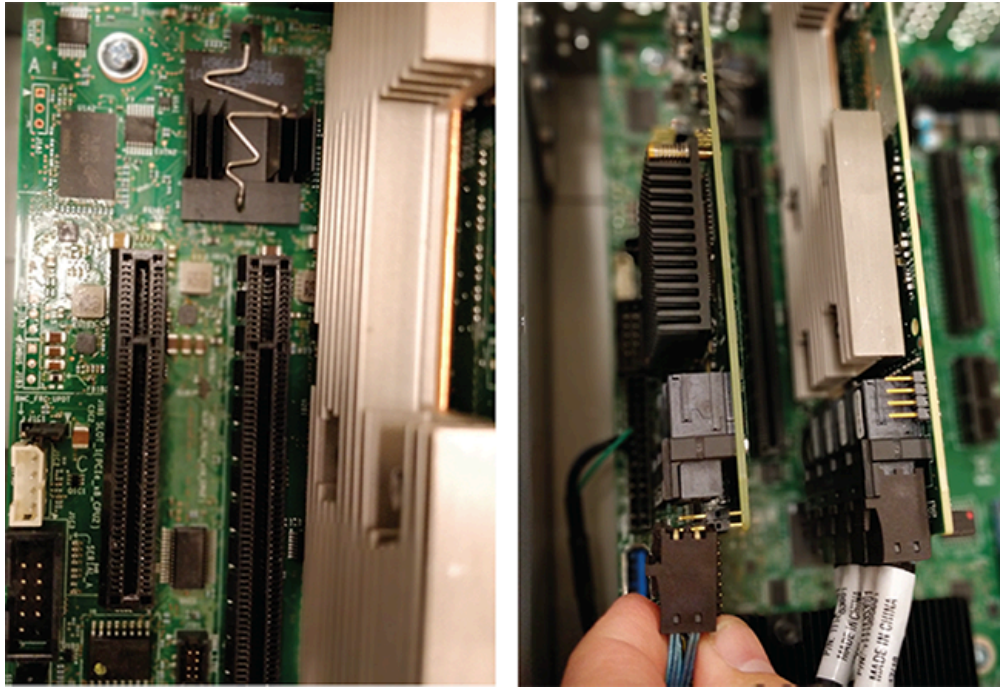
Step 14: Install the add-in card bracket.

    a. From the rear of in the enclosure, line the add-in card bracket up with the holes on the add-in cards.

Figure 242: Add-In Card Bracket Removed
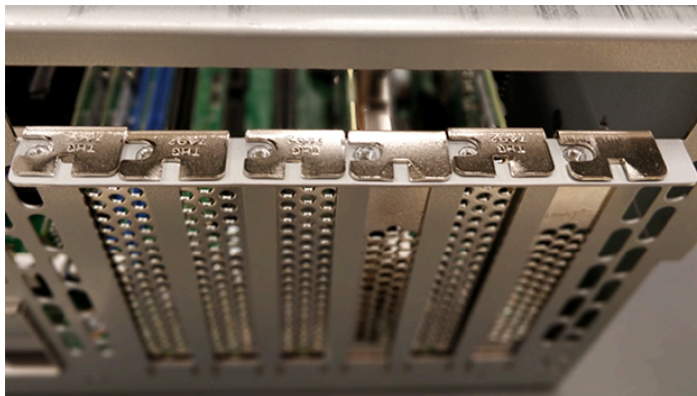
Figure 243: Add-In Card Bracket Installed
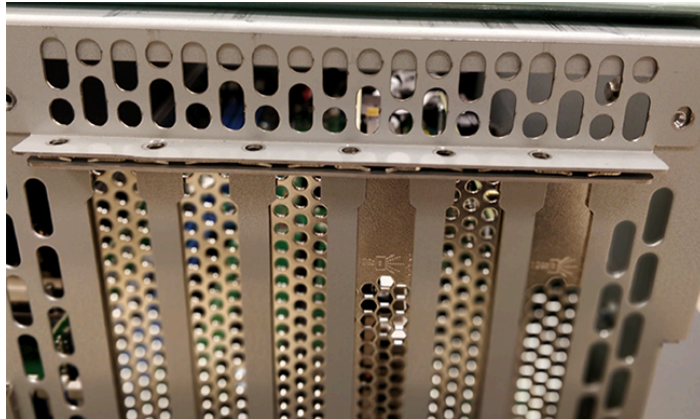
b. Secure the bracket to the chassis with the eight T10 Torx screws that held the bracket in originally.

Figure 244: Add-In Card Screws

Step 15: Install server cover panels.

a. Align and press the server panel cover into place over the server bay.

> **Note:** The Formex material that the panel is made from is flexible and will allow for the panel to be flexed to fit back into its original placement.

Figure 245: Installing the Server Cover Panel
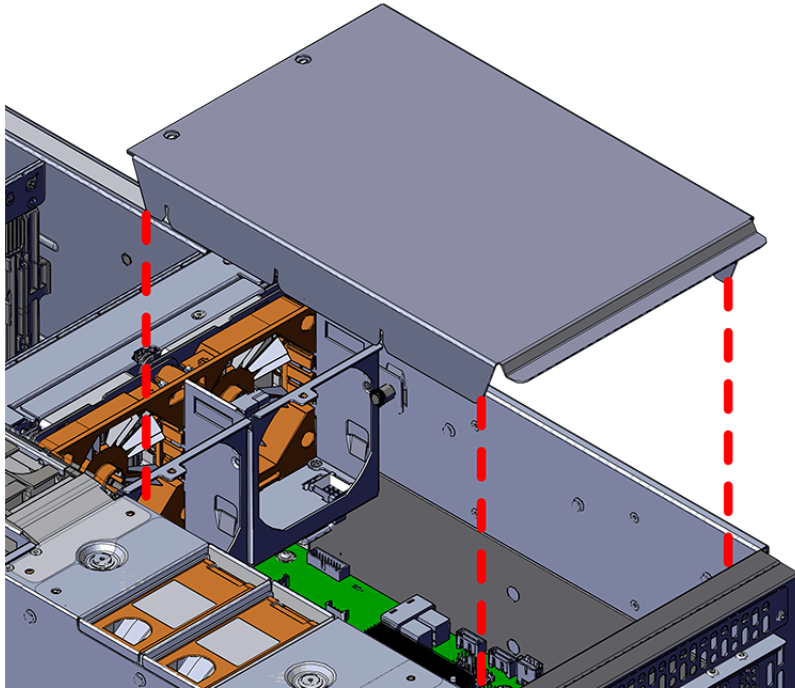
b. Secure the server cover panel using the original screws and a T7 Torx screwdriver.

Figure 246: Server Cover Panel Screws
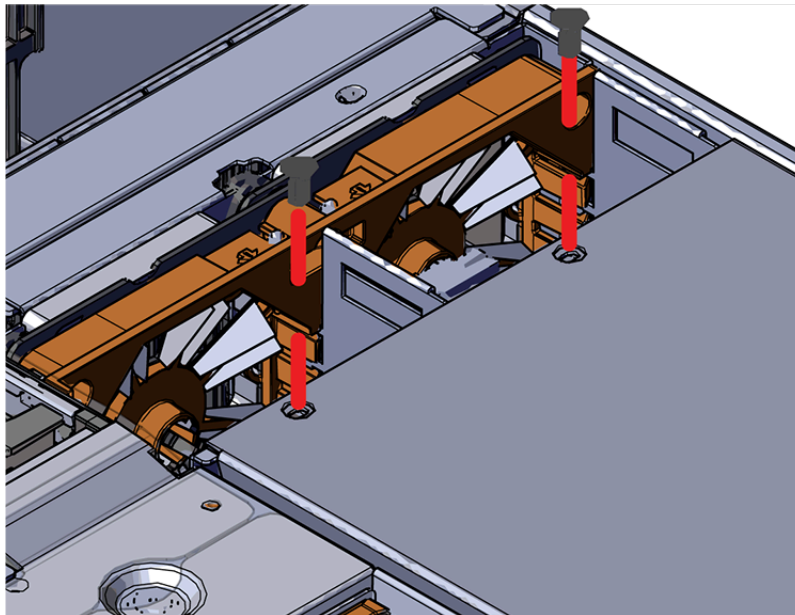
Step 16 : Extend the mid-rails out of the rack so that they are protruding from the front of the rack and the safety latches engage.

Figure 247: Extend Mid-Rails
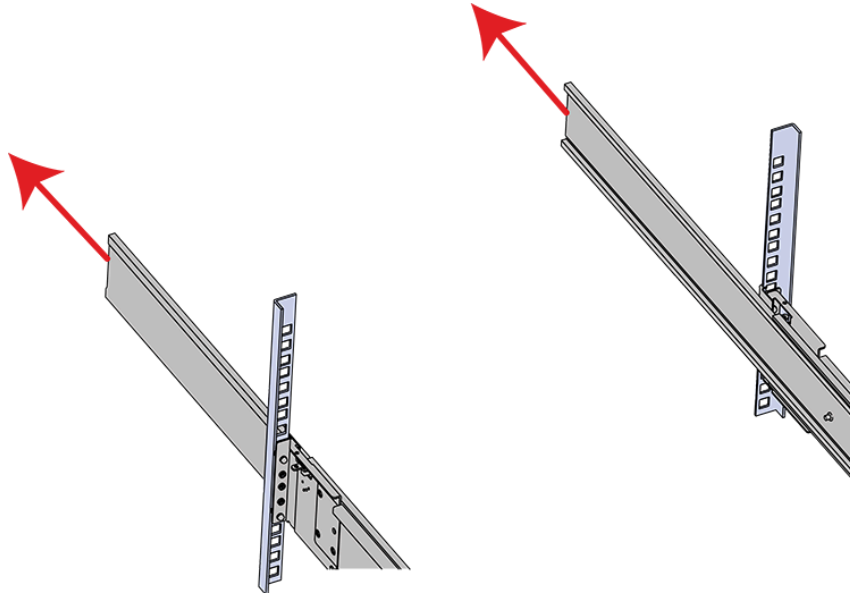
Step 17: Install the chassis into the rails.

    a. Extend the bearing plates on the inside of the mid-rails until they are fully forward (detent has engaged). This prevents potential damage due to improper mating of the rails.

Figure 248: Bearing Plate

b. ⚠️ **Caution:** This step in the installation requires a minimum of 3 individuals to install safely, two to lift and one to guide the others who may have difficulty seeing because the enclosure is in the way. Ensure that the appropriate measures are taken to safely support the enclosure during installation. The enclosure MUST have no drives installed and requires a two person team lift to install. **Do not attempt to lift the system if it is fully populated with drives.** The only case in which the system may be installed or removed with the drives populated is if the facility has a lift that is rated to handle the maximum weight of the fully loaded system.

In preparation to perform a team lift, position one individual on each side of the enclosure (to lift) and a third individual standing at the protruding rack rails (to guide the chassis to mate with rack rails).

c. Team-lift the enclosure until the inner rails (which are attached to the chassis) align with the extended mid-rails (which are attached to the rack), and guide the inner rails on the chassis to mate with the rack rails.

Figure 249: Installing the Chassis
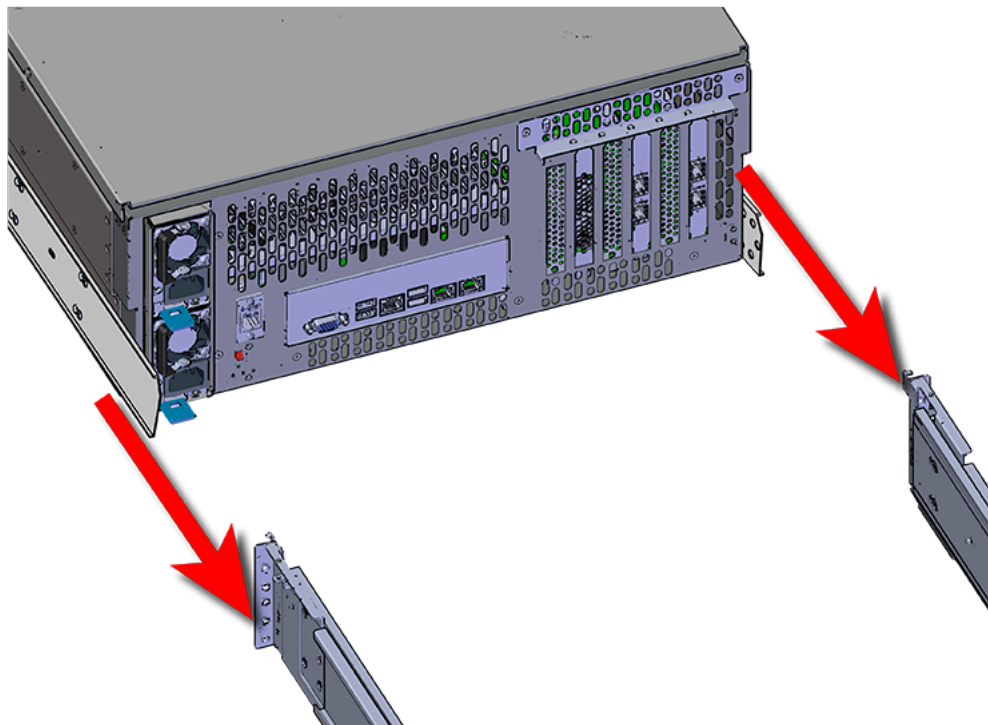
d. Once the rails are mated properly, slide the enclosure into the rack until it is stopped by the safety catch on the rails. Push the release lever on the safety latch (located on the side of each of the rails), and push the enclosure the rest of the way into the rack.

Figure 250: Safety Latch Release
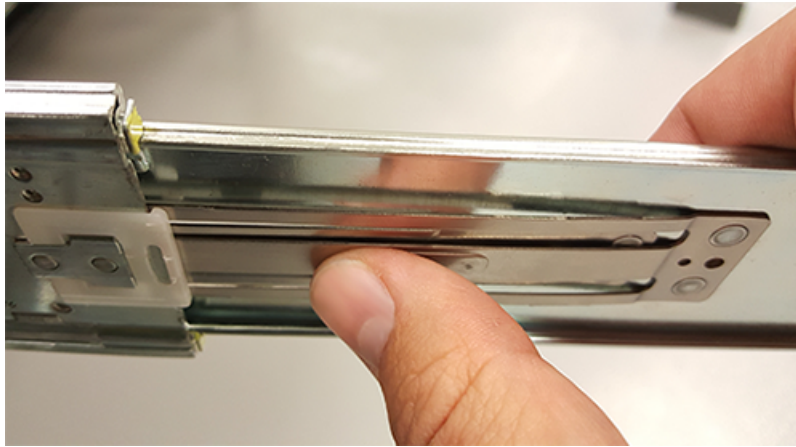
e. As the chassis is slid into the rack, position one installer at the rear of the rack to ensure that the pegs on the sides of the cover will slide correctly into the rear cover alignment brackets on both sides of the rack. If the chassis does not install smoothly or snags, check that the rear cover alignment brackets are not interfering with the chassis sidewalls, and try again.

Step 18 : Secure the chassis top cover to the rack using the captive M5 thumb-screws as shown in the following image. Use a T15 Torx screwdriver, and tighten the screws to 3.38-3.61 Nm / 30-32 in-lbf.

Figure 251: Cover Retention Screws
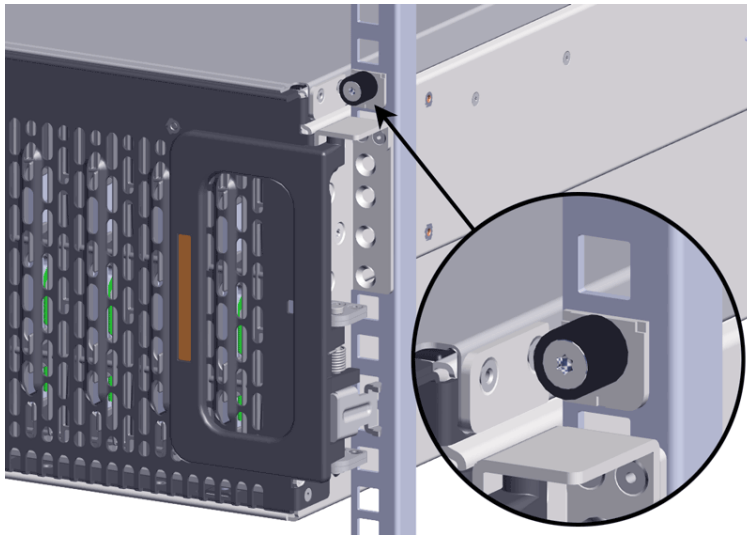
Step 19 : Now that the chassis is installed, test the installation by sliding the enclosure in and out of the rack a minimum of three times. If the enclosure binds, catches, or displays any incorrect motion or behavior repeat the installation.

📄 **Note:** Adjustments of the vertical rack rails may be required to fix any issues that may occur.

Step 20: Install the CMA(s).

> 📄 **Note:** CMA has one arm, to be installed at the lower position. This arm should have the elbow on the left side.

a. Orient the CMA so that the elbow is on the left hand side.
b. Attach all three of the connectors to the brackets on the rails. There should be one at the elbow side and two at the other end.

Figure 252: CMA Orientation
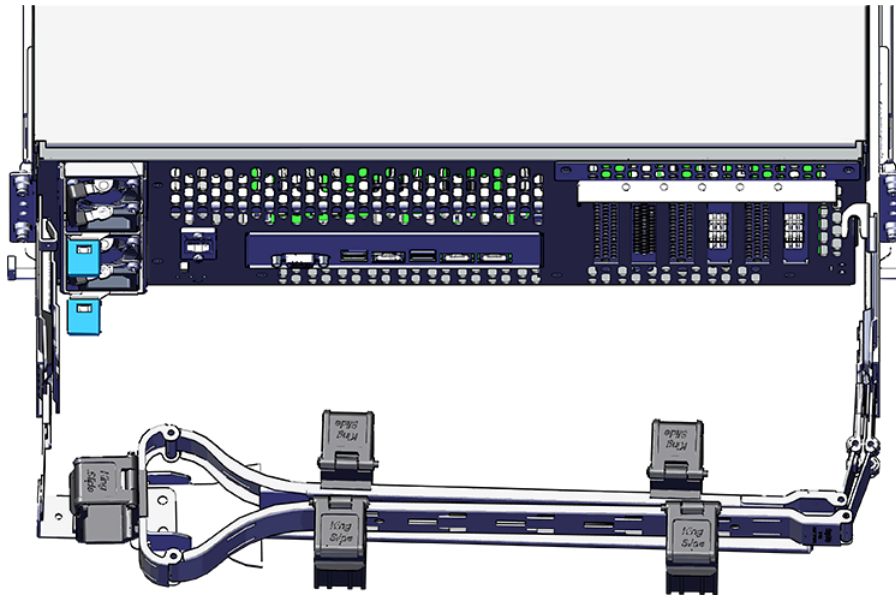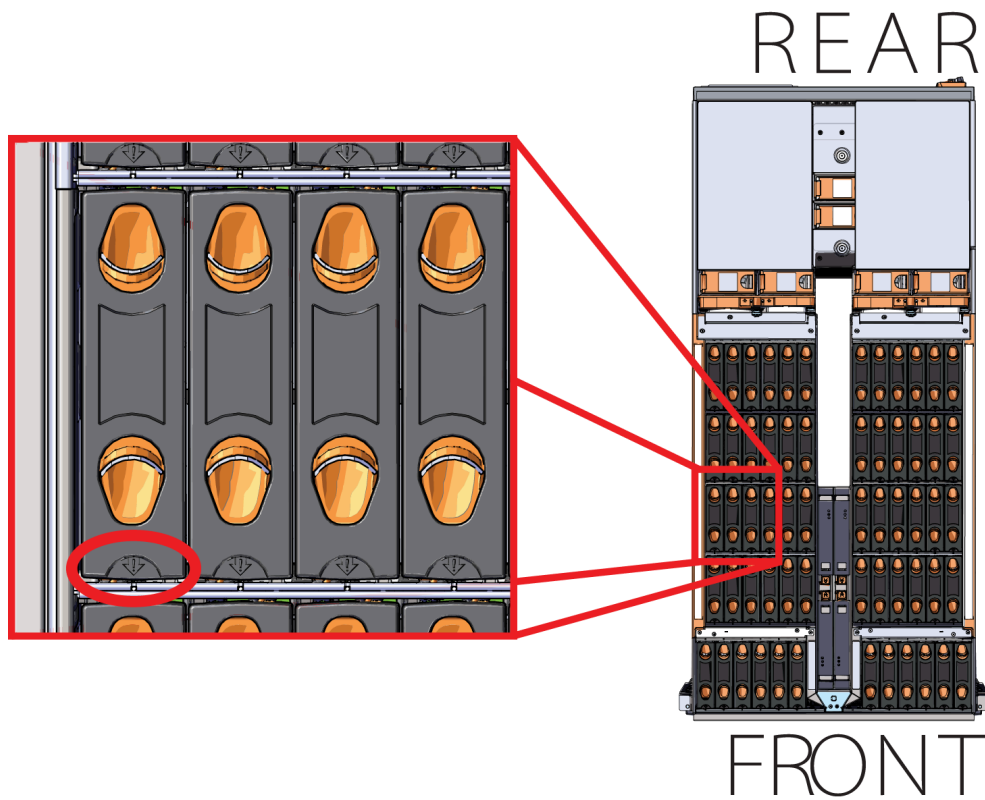
c. Slowly slide the enclosure forward to ensure the arm is operating properly, then slide it back into the rack.

Step 21: Install the 3.5in HDD Assembly.
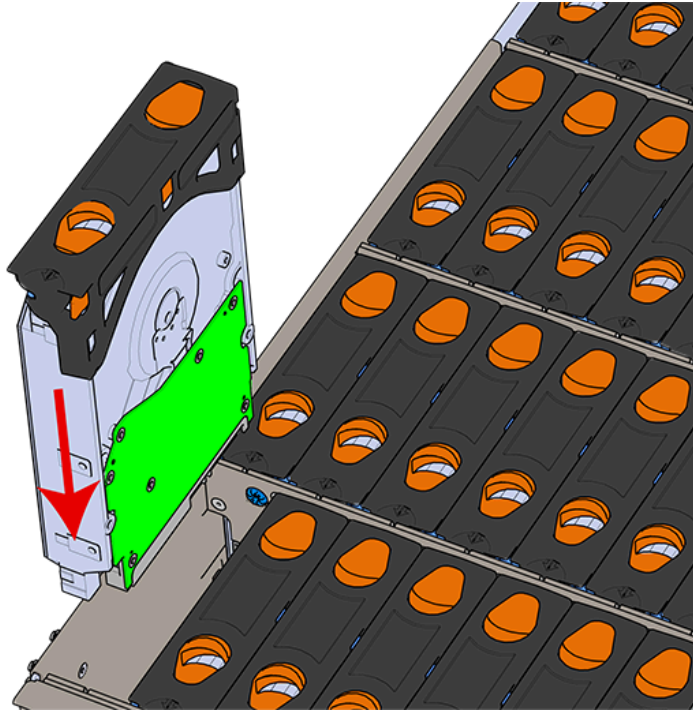
> 📄 **Note:** The 2.5in SSD Assembly is installed in the same manner as the 3.5in HDD Assembly. For instructions on assembling the 2.5in SSD Assembly, see Operating the 2.5" Drive Carrier *(page 60)*.

a. Ensure that the enclosure has been pulled out of the rack until the rail latches engage.
b. Find the LED pointer on the top of the drive carrier. This pointer should point toward the front of the unit as shown in the following image.

Figure 253: LED Pointer Orientation

c. Align the drive with the empty slot that will receive it. Lower it into the slot, making sure it stays level and does not snag.

Figure 254: Installing a 3.5in HDD Assembly

> **d.** Pinch the latch release and carefully press downward to seat the 3.5in HDD Assembly the rest of the way.

Step 22: Install each drive in the place it was removed from by following the labels or marks that were added earlier.
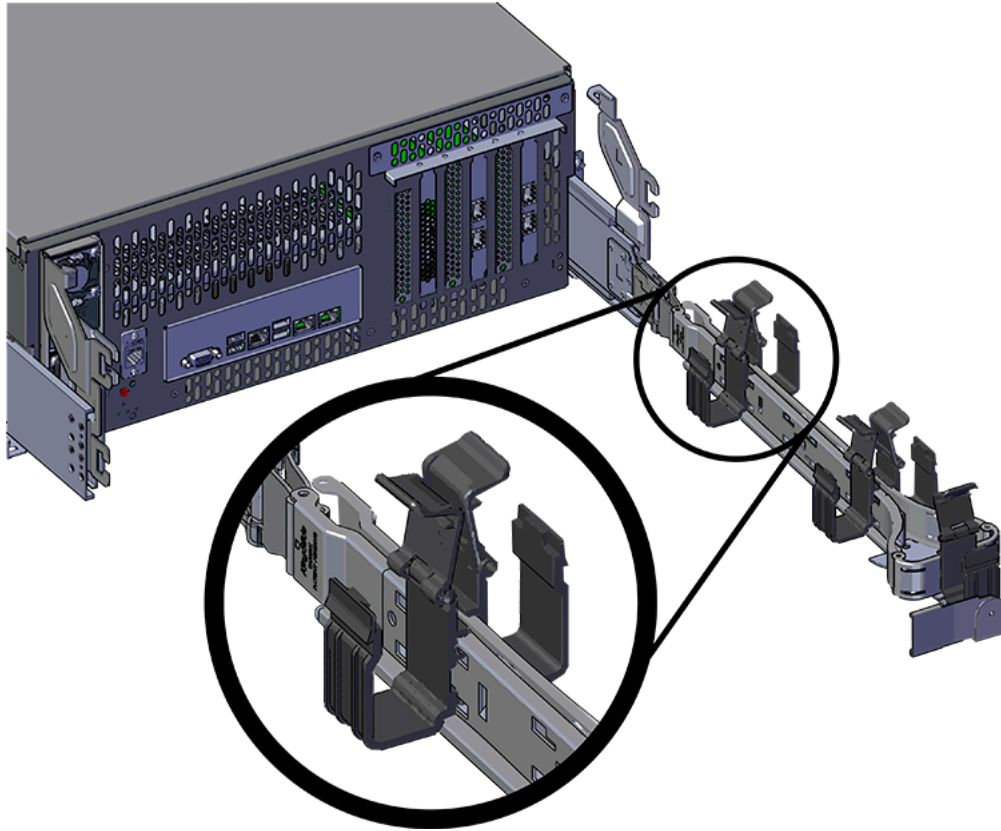
Step 23: Cable the CMA(s).

> **CMA Standard:**
>
> **a.** Unlatch the elbow side of the arm(s) by pressing the blue button labeled "push," and then swing the arm(s) open.
> **b.** Open all of the baskets.

Figure 255: Open Baskets

c. Route all of the cables being connected to the enclosure through the open baskets.

d. Close all of the baskets.

e. If the Ultrastar Serv60+8 is being installed in a rack and will subsequently be transported inside that rack, it is important to use the included cable tie to wrap the CMA bundle to ensure it does not get damaged during transport. If the Ultrastar Serv60+8 is instead being installed where it will be operated, skip this step. Remember to remove the cable ties after the enclosure has reached its final operational location.

f. Reconnect the arm at the elbow to the connectors on the rail.

CMA Lite:

a. Press the blue latch button labeled "push" to unlatch the elbow side of the CMA arm, and then swing the arm open.

b. Open all of the baskets.

Figure 256: Open Baskets

c. Gather the SAS, power, and Ethernet cables for installation.

> 📄 **Note:** Route all cables to IOM A (left hand side looking at the rear).

d. Route all of the cables being connected to the enclosure through the open baskets.

e. Close all of the baskets.

f. If the Ultrastar Serv60+8 is being installed in a rack and will subsequently be transported inside that rack, it is important to use the included cable tie to wrap the CMA bundle to ensure it does not get damaged during transport. If the Ultrastar Serv60+8 is instead being installed where it will operated, skip this step. Remember to remove the cable ties after the enclosure has reached its final operational location.

g. Reconnect the arm to the rail by the connector at the elbow.

Step 24: Test for binding in the extension of the arm by gently pulling the enclosure out of the rack, ensuring the cables extend properly and that the system doesn't bind at all. If it does, examine the point at which the binding occurred and adjust the seating of cables in the baskets, check the connections to the rails, and examine the joints of the arm to ensure that they are all functioning properly.

Step 25: Make sure the CMA(s) is in operational position by folding the arm(s) in toward the enclosure and attaching the elbow end(s) to the connector(s) attached to the rail. Verify that all of the cabling is in functional order and does not bind or catch.

3.12 CMA Replacement

ⓘ **Attention:** The CMA Lite replacement package includes a CMA arm and spacer brackets. Replacing the CMA arm can be done with the enclosure in place in the rack. To replace the spacer brackets, the enclosure must be removed from the rack. For the replacement of a CMA arm alone, anything pertaining to the spacer brackets may be skipped.

Replacement Requirements	
Personnel Required	**CMA Standard:** 1 **CMA Lite:** 2
Avg. Replacement Time	**CMA Standard:** 15m **CMA Lite:** 45m
Max Replacement Time	
Tool	**Required vs. Recommended**
# 2 Philips Screwdriver	Required
Cable Ties (for configurations with greater than 10 total cables)	Recommended
Tape Measure	Recommended
Low-Profile M4 x 3.2mm Philips screws	Recommended

Step 1: Place the CMA(s) into the service position.

    a. Unlatch the CMA(s) at the elbow connector by pressing the blue release button to unlatch the connector from the rail.

Figure 257: Unlatching a CMA Connector
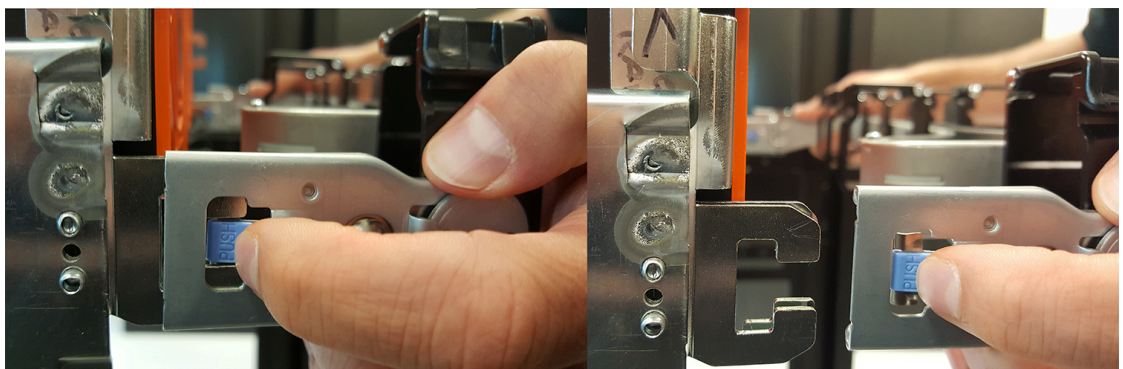
    b. Swing the CMA(s) away from the enclosure.

    c. The CMA arm(s) should be extended away from the enclosure.

Step 2: Disconnect the Enclosure from power.

    a. Locate the redundant PSUs at the rear of the enclosure.

    b. Detach the cable retention mechanism from both power cords.

Figure 258: Cable Retention Clip
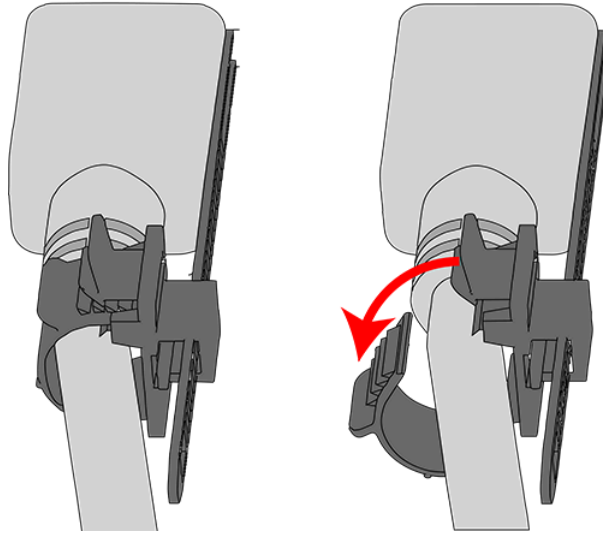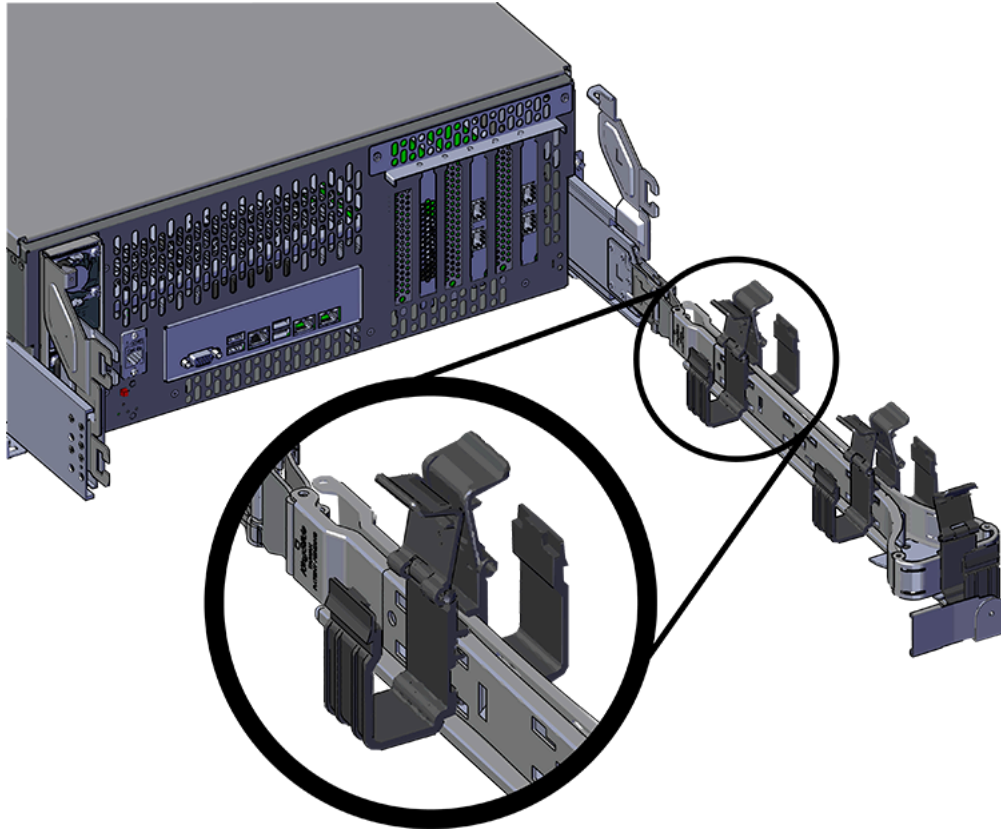
    c. Power down the enclosure by disconnecting both power cables, one from each PSU.

Step 3: Disconnect the remaining cables from the enclosure.

Step 4: Uncable the CMA(s).

    CMA Standard:

    a. Open all of the baskets on the CMA.

Figure 259: Open Baskets

b. Remove one cable from the CMA at a time making sure not to put too much strain on the arm.

CMA Lite:

a. Open all of the baskets on the CMA.

Figure 260: Open Baskets
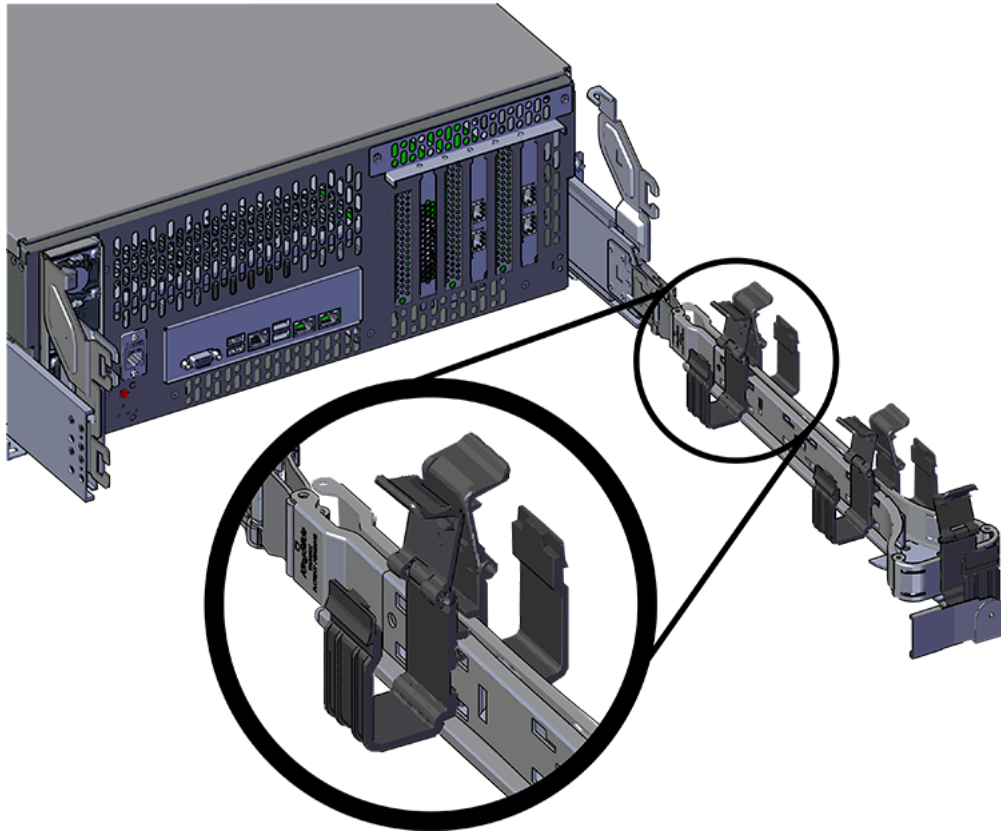
b. Remove one cable from the CMA at a time making sure not to put too much strain on the arm.

Step 5: Unlatch all of the connectors that attach the CMA(s) to the enclosure and the rail by locating the latch release button and pressing it from either side of the latch. There are three total connections that need to be removed, one at the elbow and two at the opposite end.

Figure 261: Unlatching a CMA Connector
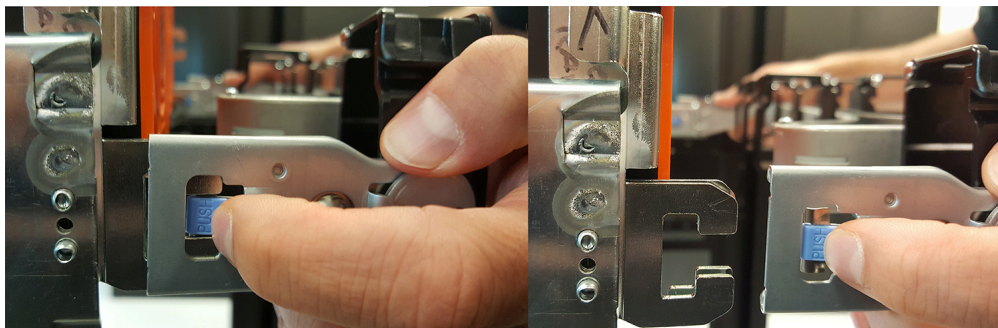
Step 6: Grasp both handles at the front of the enclosure and pull with even pressure to extend the chassis out of the rack until it is stopped by the safety latches. The safety latches will prevent the enclosure from coming out of the rack completely and the cover will remain in the rack attached to the rear alignment brackets.

Figure 262: Chassis Handle Operation
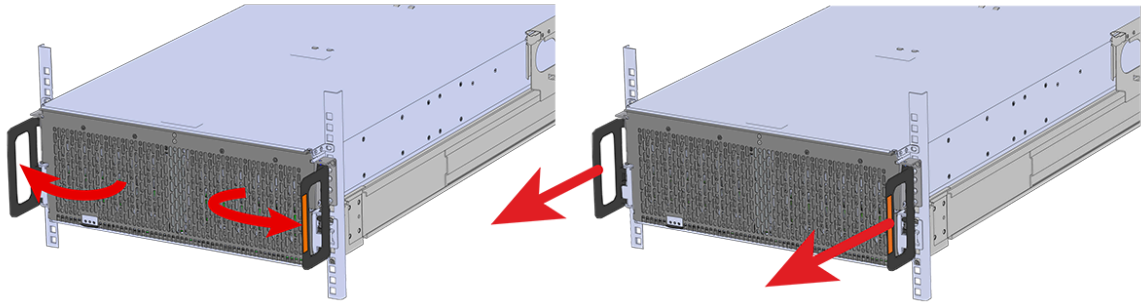
Step 7: Follow these steps to remove a 3.5in HDD Assembly.

    a. Find the latch release mechanism on the 3.5in HDD Assembly being removed.

    b. Insert a finger and a thumb into the latch release and pinch to unlatch the 3.5in HDD Assembly.

Figure 263: Unlatch Drive Carrier (IOM Not Shown)
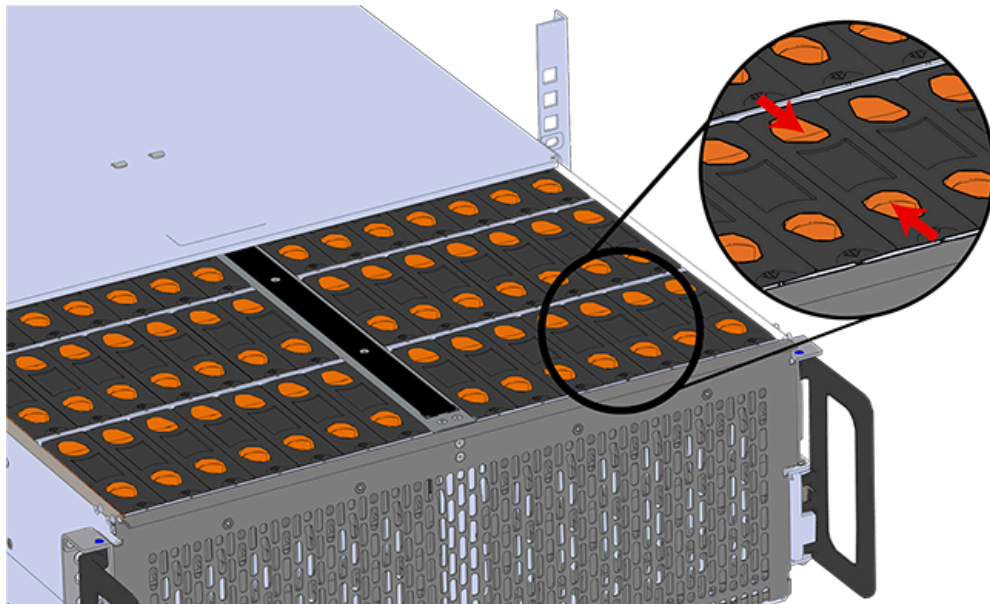
    c. Lift the 3.5in HDD Assembly free from the enclosure.

Figure 264: Removing 3.5in HDD Assembly
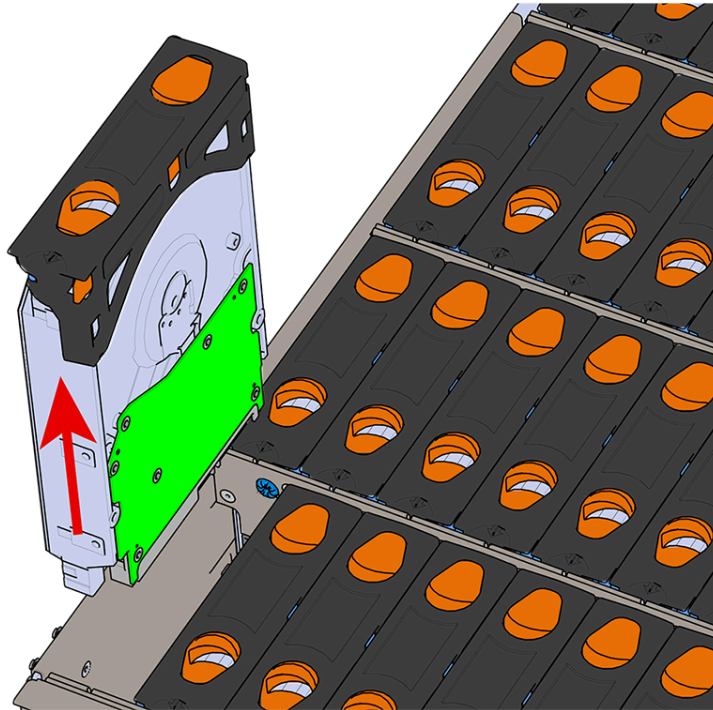
Step 8 : Follow the previous step for each drive in the enclosure. Attach a label or mark the drives with the drive slot they were removed from in order to add them to the same slot in the future. Store the drives in an ESD safe location until the drives are ready to be installed back into an enclosure.

Step 9 : Release the safety latch on the inner rails on each side of the chassis as shown in the following image.

Figure 265: Inner Rail Safety Latch Release

Step 10 : Remove the chassis from the rack.

    a. Be prepared to support the enclosure once it is free of the rails by having a second person or a lift to support the enclosure

b. Grasp both handles at the front of the enclosure and pull with even pressure until the enclosure will not extend further.

c. Locate the safety catches on the inner rails attached to the enclosure.

Figure 266: Safety Latch Release

d. Depress the latch release lever for the safety latches on the rail and push the chassis very slightly forward. The chassis is now unsecured from the rack.

e. Ensure that you have the proper support mechanism to hold the chassis in position, whether that be a team lifting partner or an appropriate lift.

f. Slide the chassis forward to free it from the rails. Place the chassis in a safe location to avoid damage.

Step 11: CMA Lite: Uninstall the spacer brackets.

a. Using a screwdriver, remove all four of the captive screws from the spacer bracket.

Figure 267: Captive Screws Removal
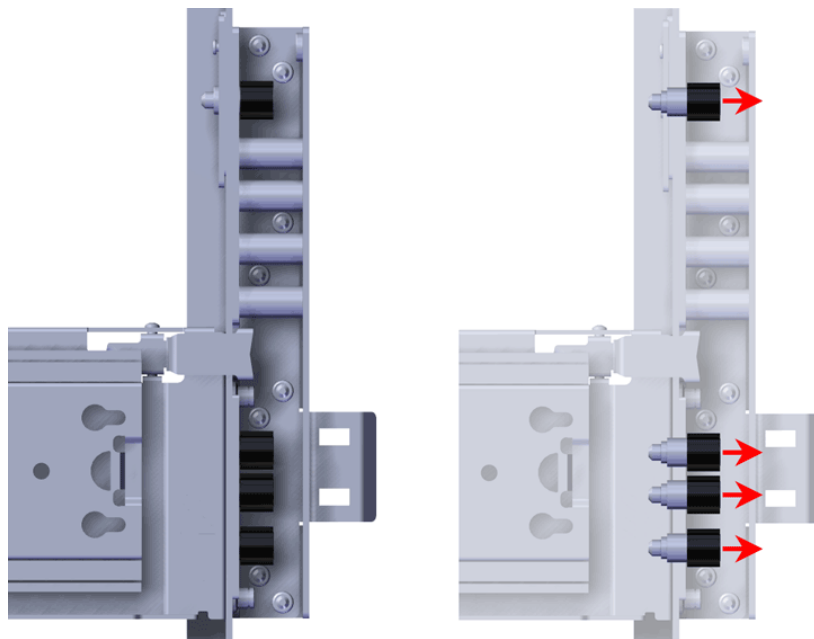
b. Remove the nut plate from the mounting pin on the back of the spacer bracket.

Figure 268: Rack Spacer Nut Plate Removal
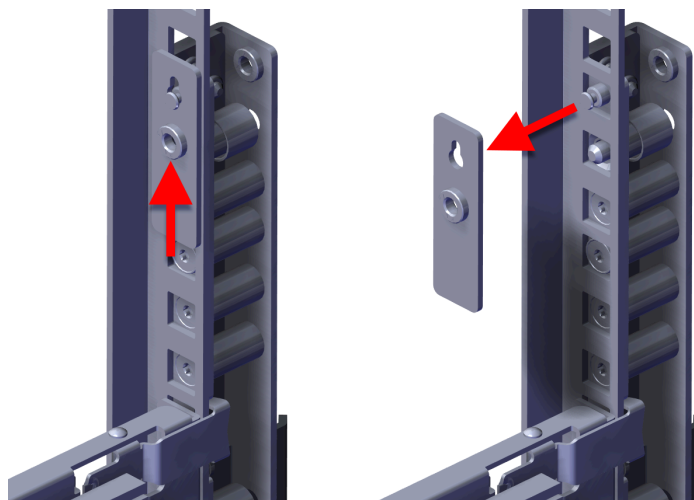

c. Remove the spacer brackets from the rack.

Figure 269: Spacer Bracket Removal
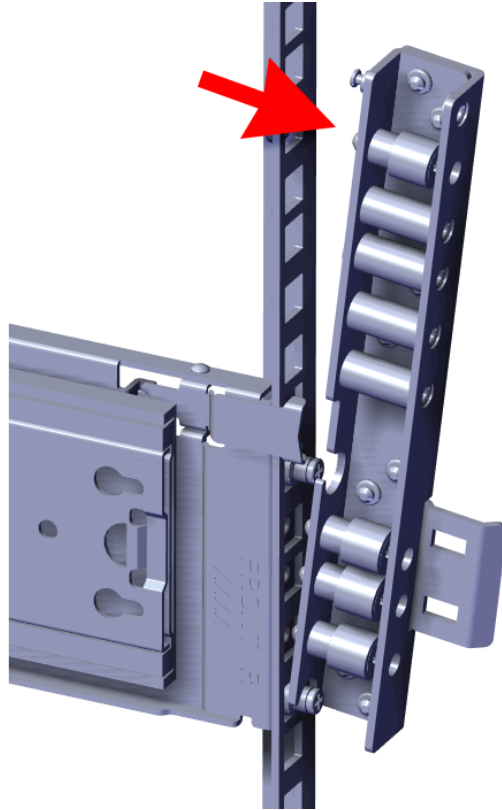

Step 12 : **CMA Lite:** Install the new spacer brackets.

a. Line the spacer bracket up with the bottom of rack unit location of the installed outer rails. The bottom of the spacer bracket will rest on top of the bottom outer rail pin.

Figure 270: Spacer Bracket Orientation
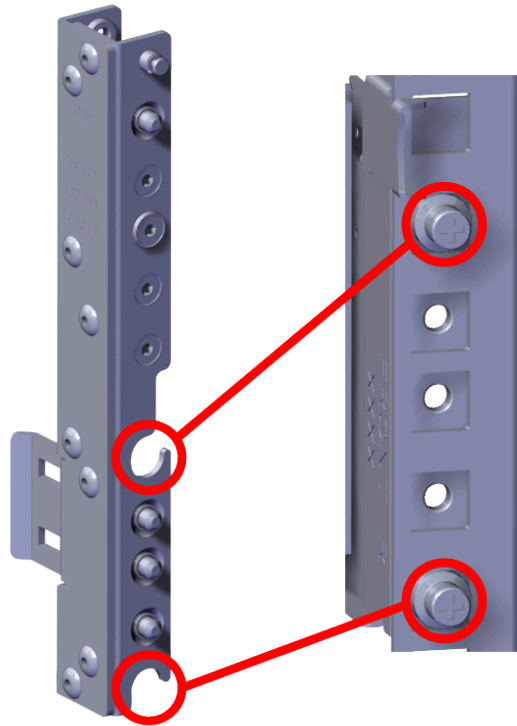
Figure 271: Spacer Bracket Placement
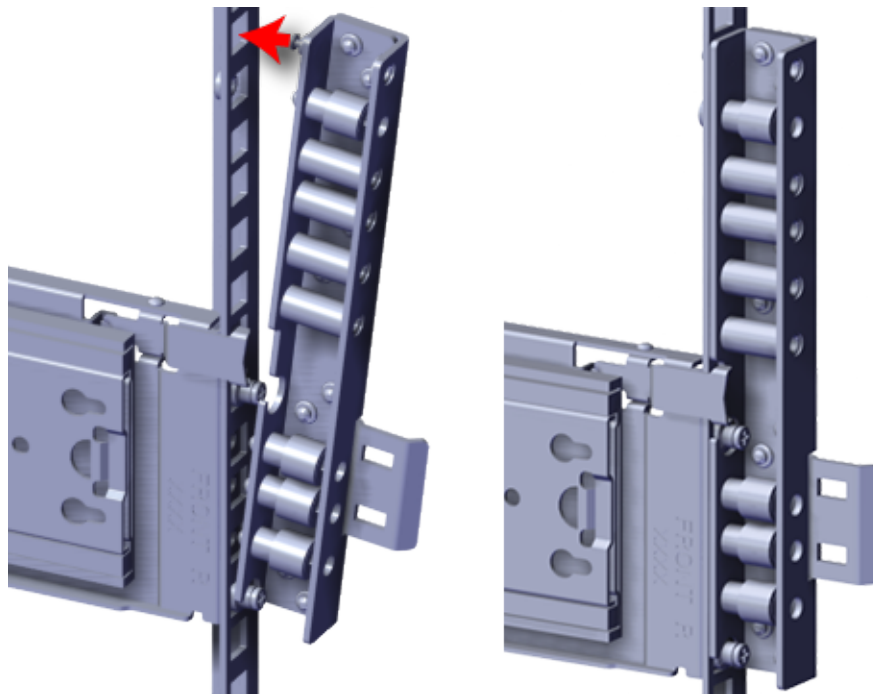
b. Slide the nut plate down over the mounting pin on the back of the spacer bracket.

Figure 272: Rack Spacer Nut Plate Installation
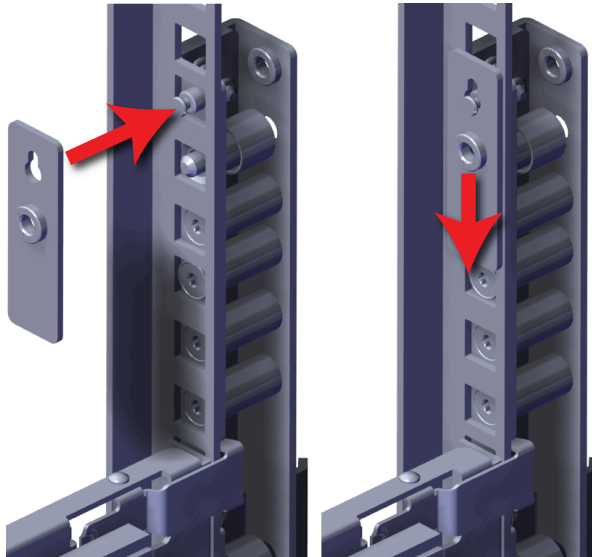
c. Using a T15 Torx screwdriver, tighten the top captive screw to secure the mounting plate in place. Tighten the remaining captive screws at the bottom of the spacer bracket, and torque all four of the captive screws to 3.38-3.61 Nm / 30-32 in-lbf.

Figure 273: Captive Screws
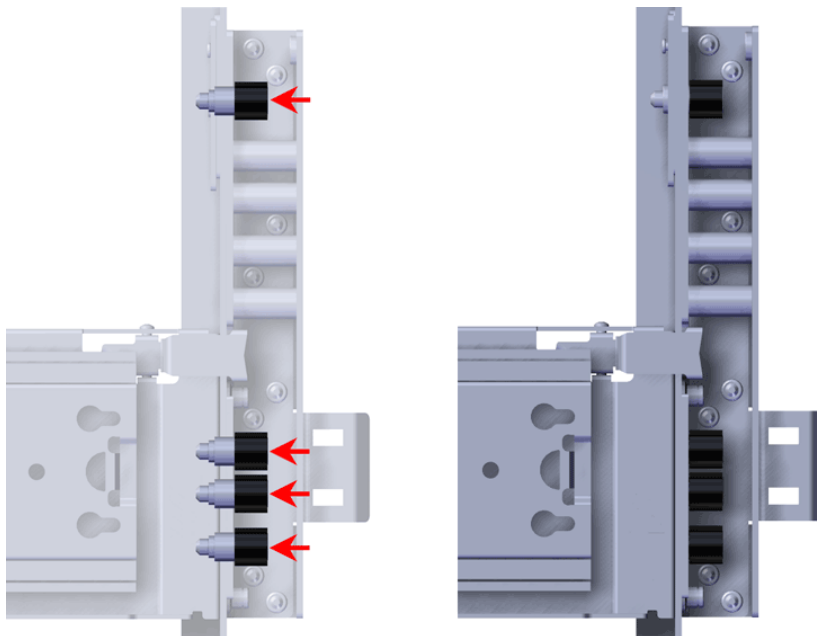
d. Repeat these steps to install the remaining rack spacer.

Step 13 : Install the chassis into the rails.

a. Extend the bearing plates on the inside of the mid-rails until they are fully forward (detent has engaged). This prevents potential damage due to improper mating of the rails.

Figure 274: Bearing Plate

b. ⚠ **Caution:** This step in the installation requires a minimum of 3 individuals to install safely, two to lift and one to guide the others who may have difficulty seeing because the enclosure is in the way. Ensure that the appropriate measures are taken to safely support the enclosure during installation. The enclosure MUST have no drives installed and requires a two person team lift to install. **Do not attempt to lift the system if it is fully populated with drives.** The only case in which the system may be installed or removed with the drives populated is if the facility has a lift that is rated to handle the maximum weight of the fully loaded system.

In preparation to perform a team lift, position one individual on each side of the enclosure (to lift) and a third individual standing at the protruding rack rails (to guide the chassis to mate with rack rails).

c. Team-lift the enclosure until the inner rails (which are attached to the chassis) align with the extended mid-rails (which are attached to the rack), and guide the inner rails on the chassis to mate with the rack rails.

Figure 275: Installing the Chassis
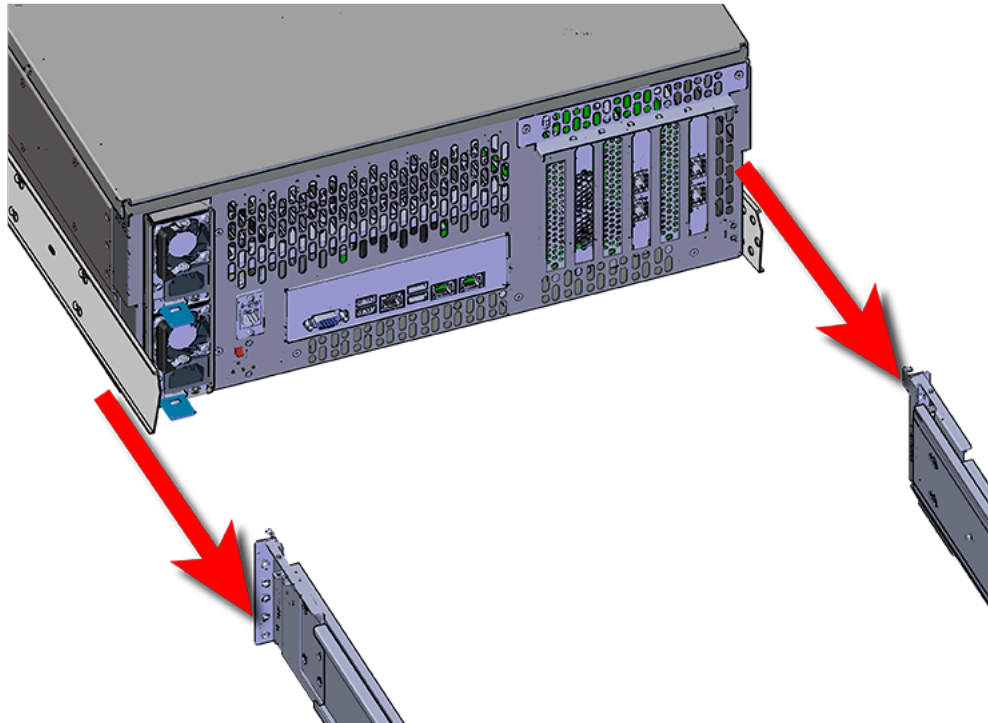
d. Once the rails are mated properly, slide the enclosure into the rack until it is stopped by the safety catch on the rails. Push the release lever on the safety latch (located on the side of each of the rails), and push the enclosure the rest of the way into the rack.

Figure 276: Safety Latch Release
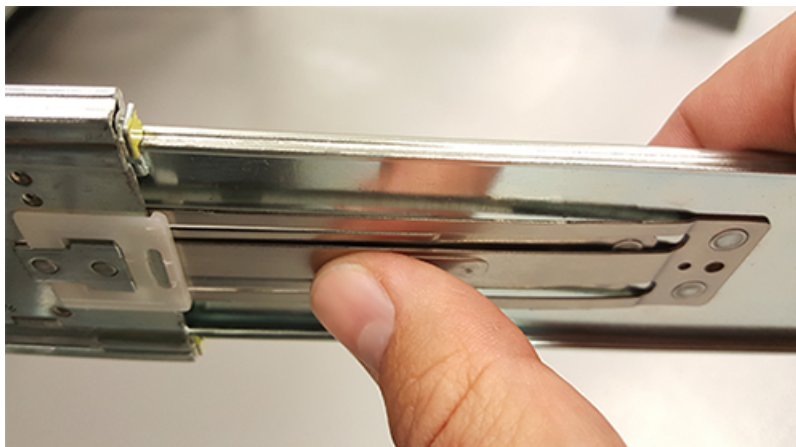
e. As the chassis is slid into the rack, position one installer at the rear of the rack to ensure that the pegs on the sides of the cover will slide correctly into the rear cover alignment brackets on both sides of the rack. If the chassis does not install smoothly or snags, check that the rear cover alignment brackets are not interfering with the chassis sidewalls, and try again.
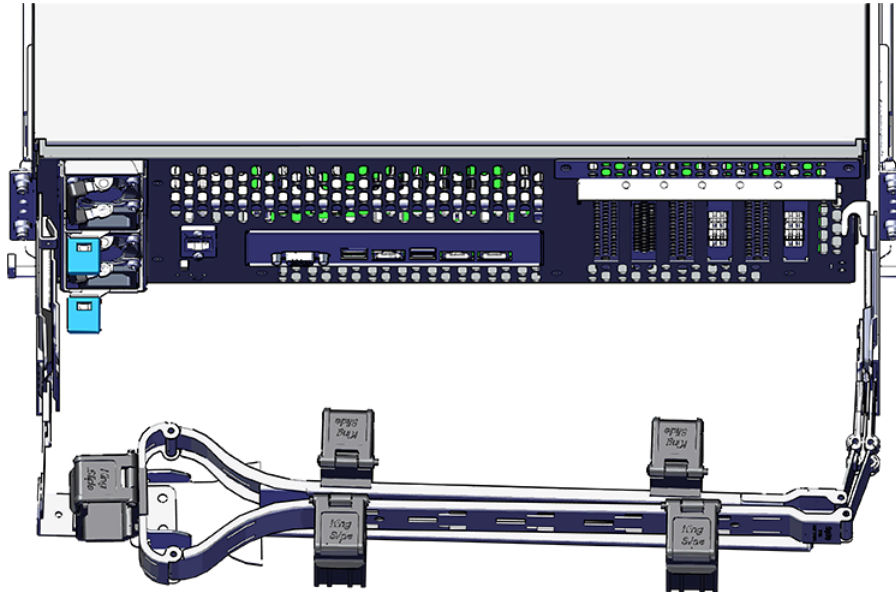
Step 14: Install the CMA(s).

📄 **Note:** CMA has one arm, to be installed at the lower position. This arm should have the elbow on the left side.

a. Orient the CMA so that the elbow is on the left hand side.

b. Attach all three of the connectors to the brackets on the rails. There should be one at the elbow side and two at the other end.
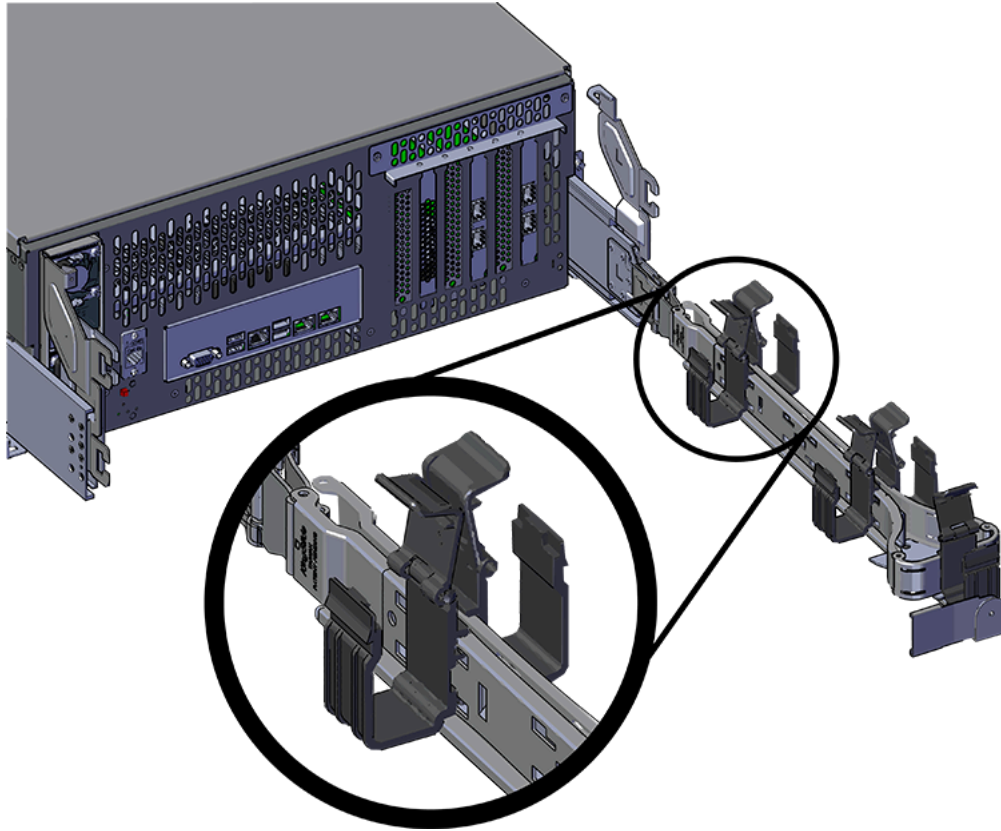
Figure 277: CMA Orientation

c. Slowly slide the enclosure forward to ensure the arm is operating properly, then slide it back into the rack.

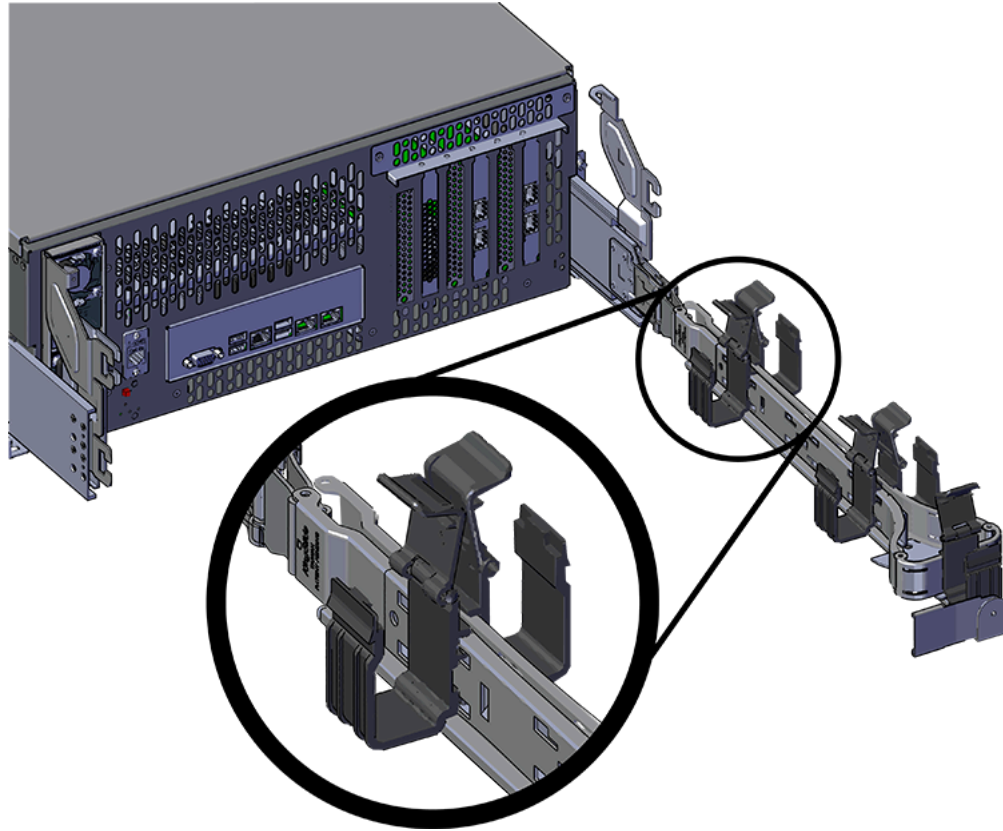**Step 15 :** Cable the CMA(s).

CMA Standard:

a. Unlatch the elbow side of the arm(s) by pressing the blue button labeled "push," and then swing the arm(s) open.

b. Open all of the baskets.

Figure 278: Open Baskets

c. Route all of the cables being connected to the enclosure through the open baskets.

d. Close all of the baskets.

e. If the Ultrastar Serv60+8 is being installed in a rack and will subsequently be transported inside that rack, it is important to use the included cable tie to wrap the CMA bundle to ensure it does not get damaged during transport. If the Ultrastar Serv60+8 is instead being installed where it will be operated, skip this step. Remember to remove the cable ties after the enclosure has reached its final operational location.

f. Reconnect the arm at the elbow to the connectors on the rail.

CMA Lite:

a. Press the blue latch button labeled "push" to unlatch the elbow side of the CMA arm, and then swing the arm open.

b. Open all of the baskets.

Figure 279: Open Baskets

**c.** Gather the SAS, power, and Ethernet cables for installation.

> **Note:** Route all cables to IOM A (left hand side looking at the rear).

d. Route all of the cables being connected to the enclosure through the open baskets.

e. Close all of the baskets.

f. If the Ultrastar Serv60+8 is being installed in a rack and will subsequently be transported inside that rack, it is important to use the included cable tie to wrap the CMA bundle to ensure it does not get damaged during transport. If the Ultrastar Serv60+8 is instead being installed where it will operated, skip this step. Remember to remove the cable ties after the enclosure has reached its final operational location.

g. Reconnect the arm to the rail by the connector at the elbow.

Step 16 : Make sure the CMA(s) is in operational position by folding the arm(s) in toward the enclosure and attaching the elbow end(s) to the connector(s) attached to the rail. Verify that all of the cabling is in functional order and does not bind or catch.

Step 17 : Test for binding in the extension of the arm by gently pulling the enclosure out of the rack, ensuring the cables extend properly and that the system doesn't bind at all. If it does, examine the point at which the binding occurred and adjust the seating of cables in the baskets, check the connections to the rails, and examine the joints of the arm to ensure that they are all functioning properly.

Step 18 : Secure the chassis top cover to the rack using the captive M5 thumb-screws as shown in the following image. Use a T15 Torx screwdriver, and tighten the screws to 3.38-3.61 Nm / 30-32 in-lbf.

Figure 280: Cover Retention Screws
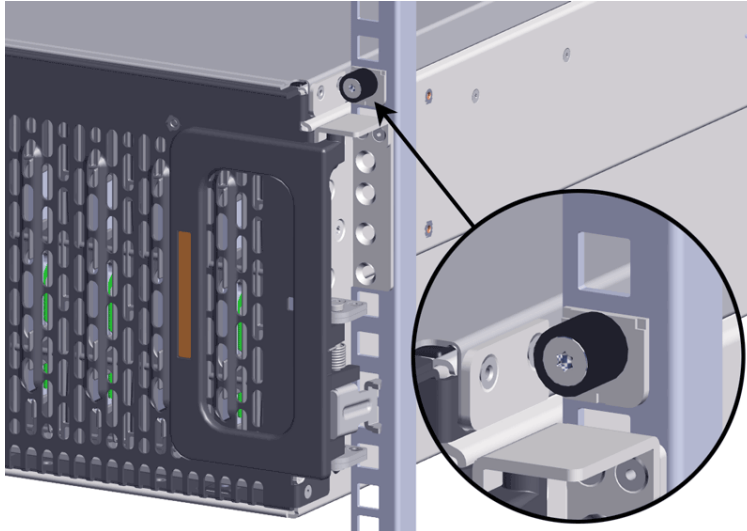
Step 19 : Now that the chassis is installed, test the installation by sliding the enclosure in and out of the rack a minimum of three times. If the enclosure binds, catches, or displays any incorrect motion or behavior repeat the installation.

> **Note:** Adjustments of the vertical rack rails may be required to fix any issues that may occur.

Step 20 : Grasp both handles at the front of the enclosure and pull with even pressure to extend the chassis out of the rack until it is stopped by the safety latches. The safety latches will prevent the enclosure from coming out of the rack completely and the cover will remain in the rack attached to the rear alignment brackets.

Figure 281: Chassis Handle Operation
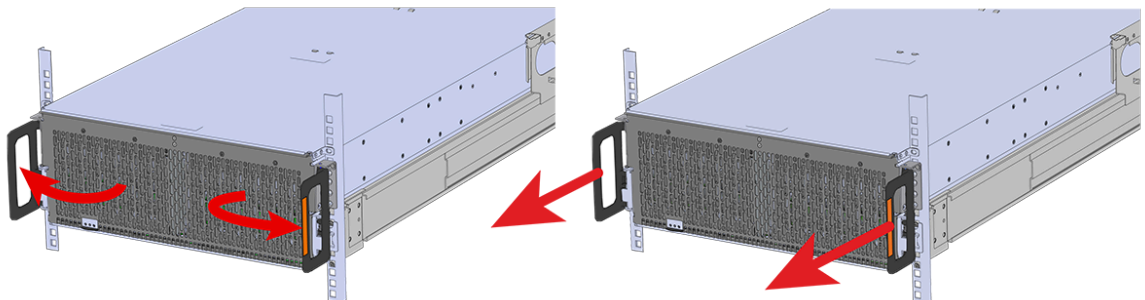
Step 21 : Perform this same action two more times without the drives loaded to make sure the rail kits are installed properly.
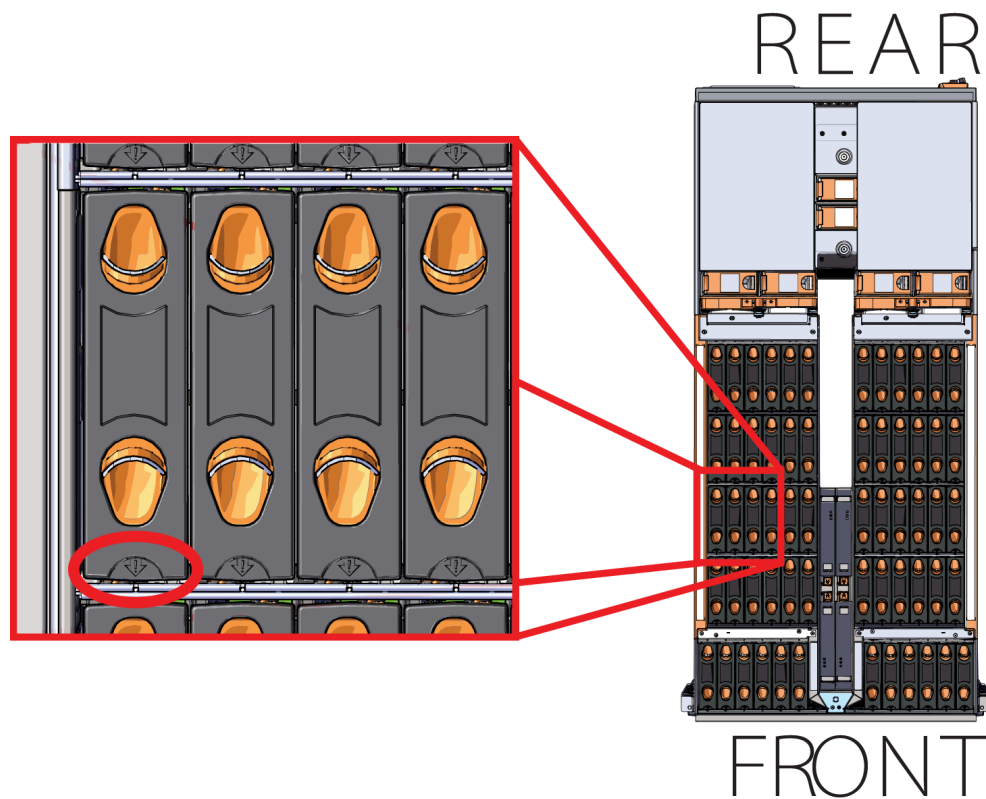
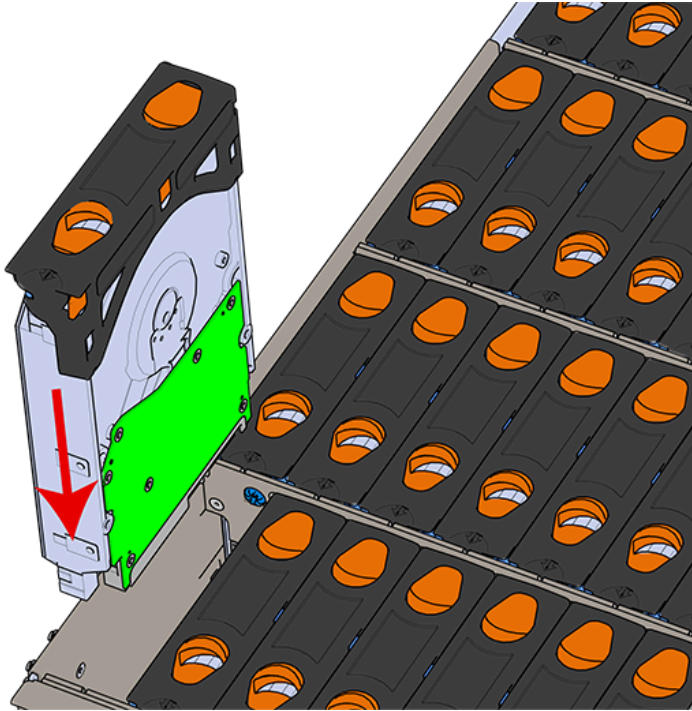**Step 22 :** Install the 3.5in HDD Assembly.

> 📄 **Note:** The 2.5in SSD Assembly is installed in the same manner as the 3.5in HDD Assembly. For instructions on assembling the 2.5in SSD Assembly, see Operating the 2.5" Drive Carrier *(page 60)*.

a. Ensure that the enclosure has been pulled out of the rack until the rail latches engage.
b. Find the LED pointer on the top of the drive carrier. This pointer should point toward the front of the unit as shown in the following image.

**Figure 282:** LED Pointer Orientation

c. Align the drive with the empty slot that will receive it. Lower it into the slot, making sure it stays level and does not snag.

**Figure 283:** Installing a 3.5in HDD Assembly

d. Pinch the latch release and carefully press downward to seat the 3.5in HDD Assembly the rest of the way.

Step 23: Install each drive in the same way the first was installed. Make sure to follow the drive layout in numerical sequence as shown in the following image.

Figure 284: Drive Layout
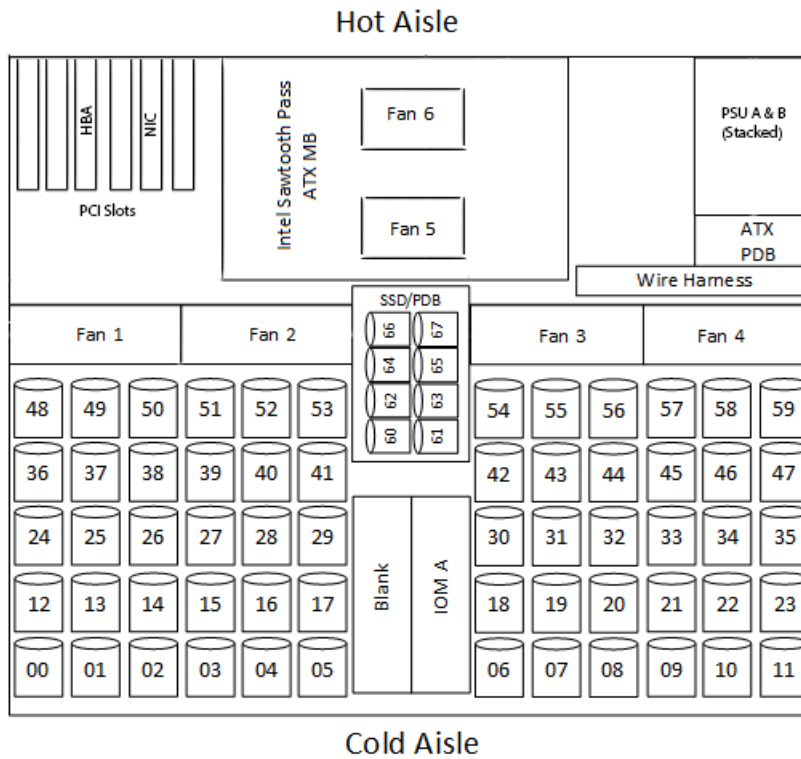
Step 24 : Now that the drives are installed into the chassis, test the installation by sliding the enclosure in and out of the rack a minimum of three times. If the enclosure binds, catches, or displays any incorrect motion or behavior retry the installation of the drives and chassis.

Step 25 : If the chassis is being installed into a rack that will be shipped fully assembled, you **must** install eight (four per side) of the included M5 x 12mm T15 Flat Head Torx screws into the two brackets at the front of the chassis in the following locations. These screws should be tightened to 3.38-3.61 Nm / 30-32 in-lbf using a Long T15 Torx Screwdriver. If this chassis will not be installed into a rack for shipping purposes, skip this step and move on to the next one.

Figure 285: Shipping Bracket Screw Locations
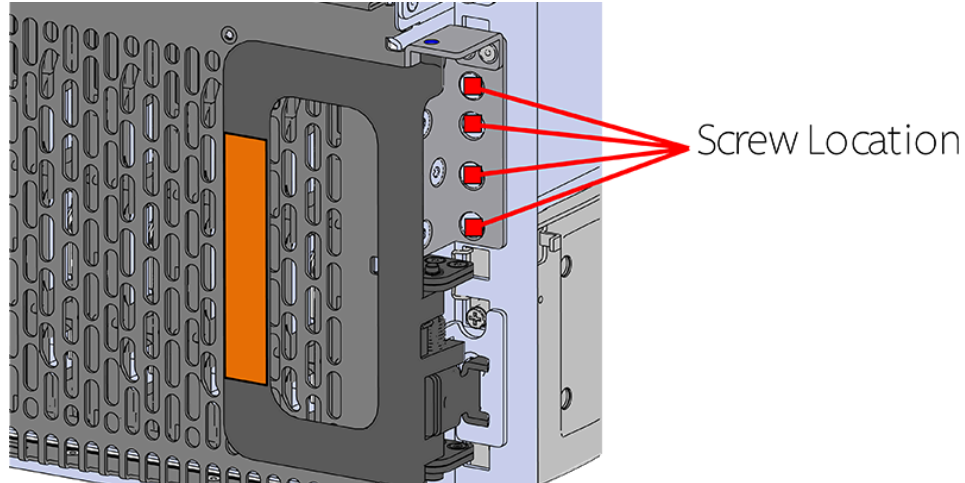
Figure 286: Shipping Bracket Screw Locations (CMA Lite)

Step 26: Plug the enclosure power cords into a PDU to power the enclosure.

Step 27: Press the power button at the back of the enclosure to power it up.

Step 28: Double check the power indicators and other LEDs to ensure that the system is booting.
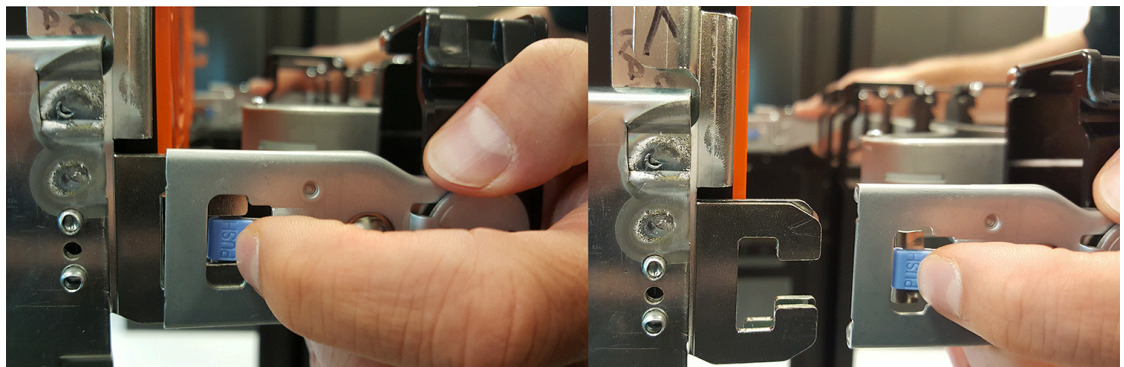
3.13 Rails Replacement

Replacement Requirements	
Personnel Required	3 Total (2 for Team Lifting Purposes and 1 to Guide and Spot)

| Replacement Requirements	
Avg. Replacement Time	~1 hr
Max Replacement Time	N/A
Tool	**Required vs. Recommended**
Long T15 Torx Screwdriver	Required
# 2 Philips Screwdriver	Required
Long T10 Torx Screwdriver	Recommended
Cable Ties (for configurations with greater than 10 total cables)	Recommended
Tape measure	Recommeded
Level	Recommeded
Option 1: M5 x 12mm T15 Flat Head Torx screws with washers **Option 2**: Toolless screwplate	Required
Low-Profile M4 x 3.2mm Philips screws (included with rail assembly)	Required

Step 1: Place the CMA into service position.

   a. Unlatch the CMA at the elbow connector by pressing the blue release button to unlatch the connector from the rail.

Figure 287: Unlatching a CMA Connector

   b. Swing the CMA away from the enclosure.

   c. The arm should be extended away from the enclosure as shown in the following example.

Figure 288: CMAs in service position (Cables not shown)
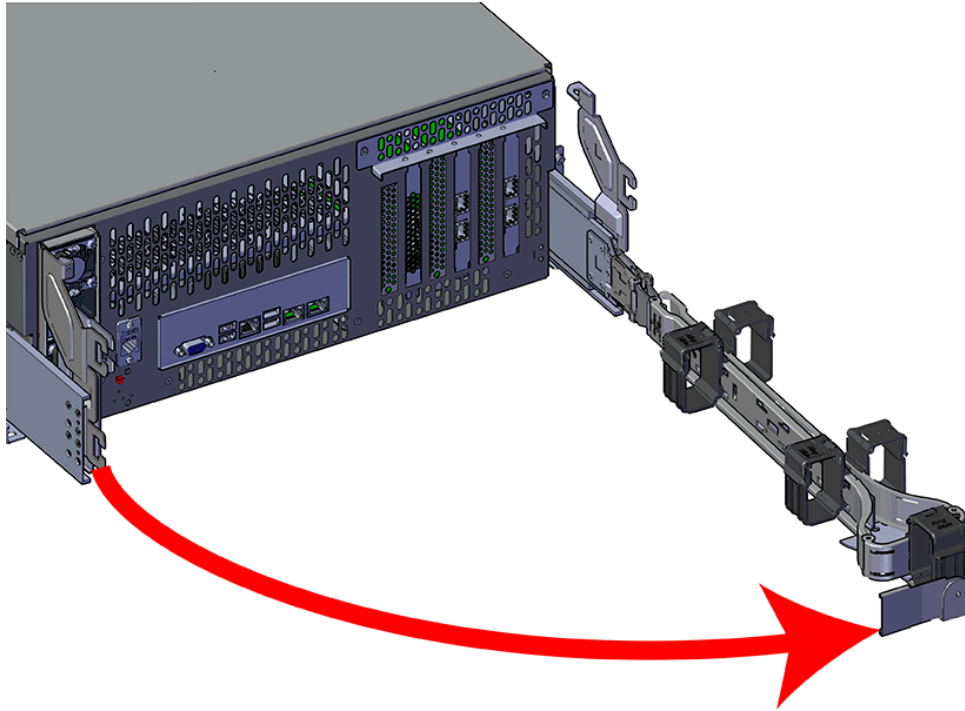
Step 2: Disconnect the Enclosure from power.

    a. Locate the redundant PSUs at the rear of the enclosure.

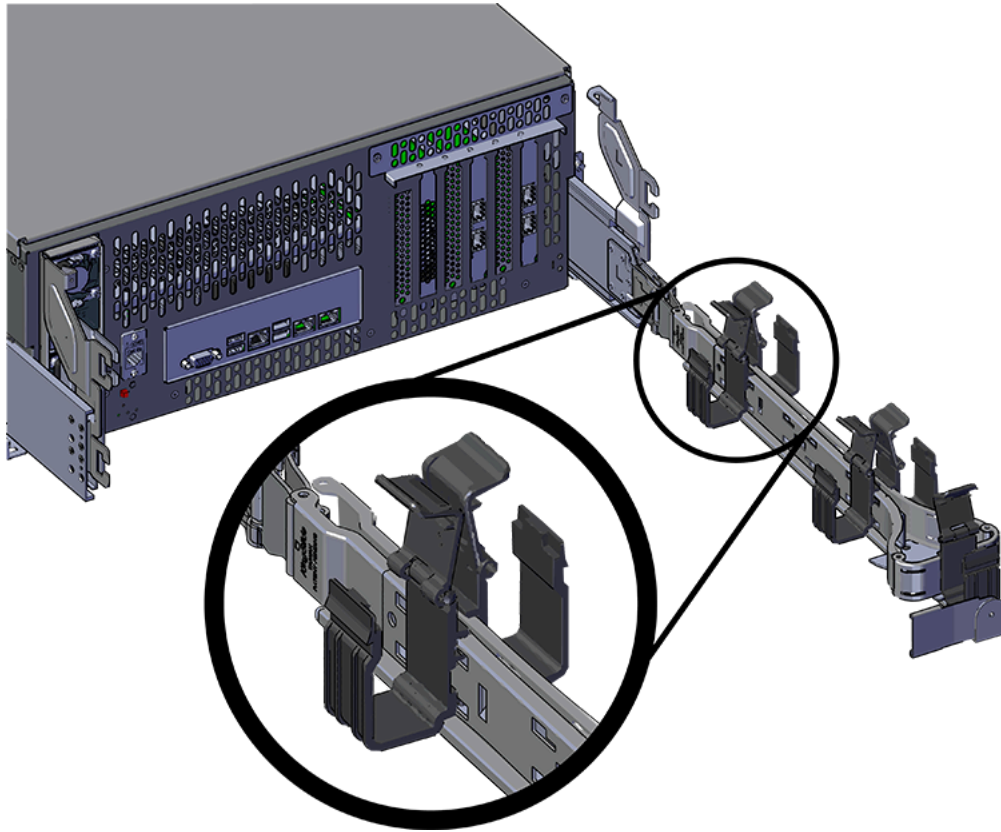   **b.** Detach the cable retention mechanism from both power cords.

Figure 289: Cable Retention Clip
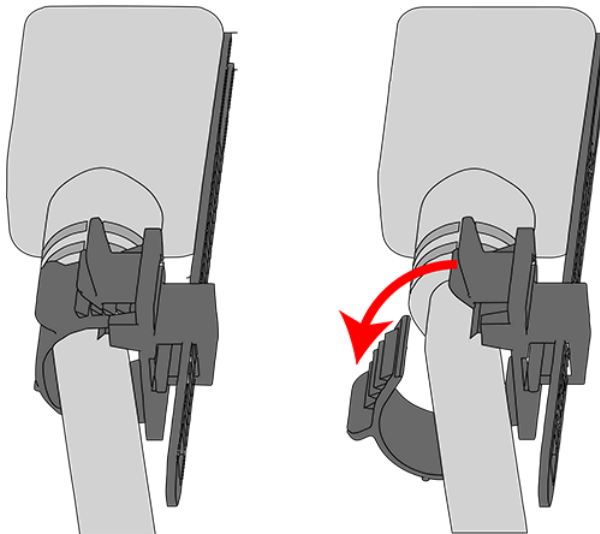
    c. Power down the enclosure by disconnecting both power cables, one from each PSU.

Step 3: Uncable the CMA(s).

    a. Open all of the basket clips on the CMA(s).

    Figure 290: Open Baskets

    b. Remove one cable at a time from the arm, making sure not to put too much strain on the arm.

**Step 4:** Remove the CMA(s).

    a. Release all of the connectors that attach the CMA(s) to the enclosure and the rail.

    There are three total connections that need to be released, one at the elbow and two at the opposite end.

    b. To release a connector, press the blue latch release button and pull the connector free.

Figure 291: Unlatching a CMA Connector
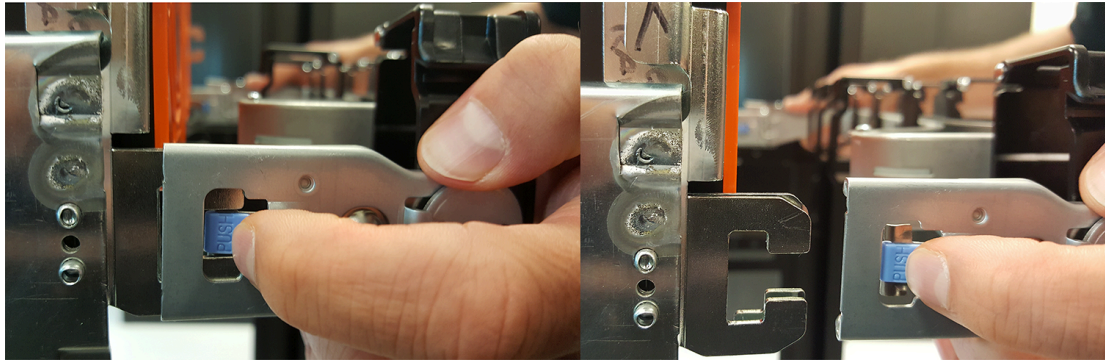
> ⚠ **Warning:** The following steps regarding uninstalling drives from the enclosure should be followed in order to reduce the weight enough to remove the chassis during the rails replacement process. However, if there is proper lift/support equipment rated to support the full weight of the enclosure, 95.25 kg / 210 lbs. , these steps can be skipped. If not, please follow these drive removal instructions to remove all of the drives and reduce the weight. **Never try to support the weight of the full system by hand.** Doing so could cause damage to the system or serious bodily harm.

Step 5: Grasp both handles at the front of the enclosure and pull with even pressure to extend the chassis out of the rack until it is stopped by the safety latches. The safety latches will prevent the enclosure from coming out of the rack completely and the cover will remain in the rack attached to the rear alignment brackets.

Figure 292: Chassis Handle Operation
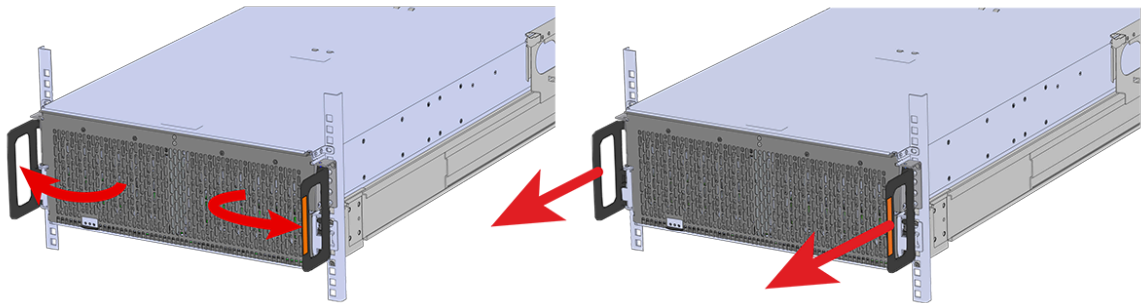
Step 6: Follow these steps to remove a 3.5in HDD Assembly.

    a. Find the latch release mechanism on the 3.5in HDD Assembly being removed.

    b. Insert a finger and a thumb into the latch release and pinch to unlatch the 3.5in HDD Assembly.

Figure 293: Unlatch Drive Carrier (IOM Not Shown)
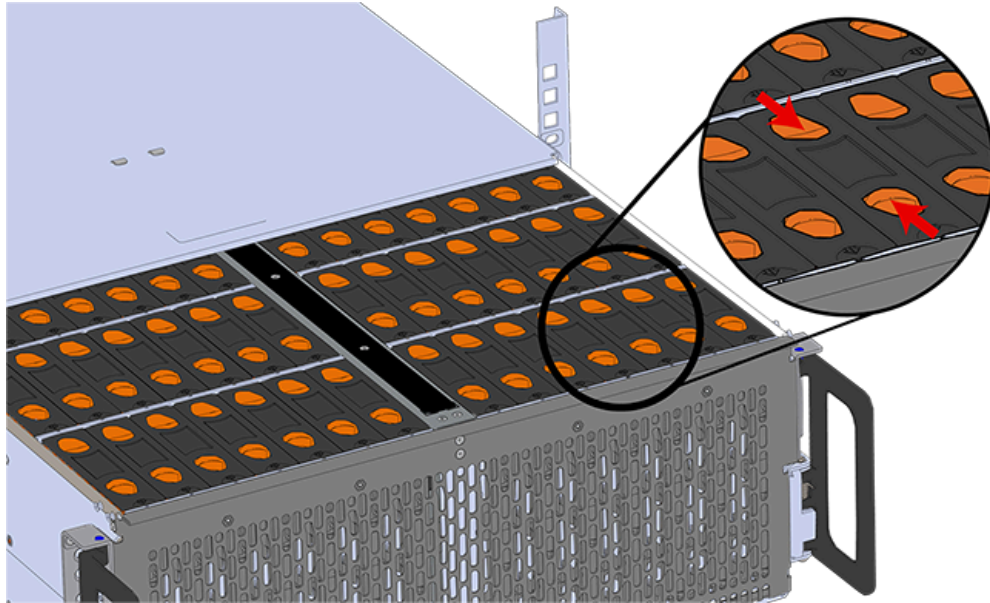
**c.** Lift the 3.5in HDD Assembly free from the enclosure.

Figure 294: Removing 3.5in HDD Assembly
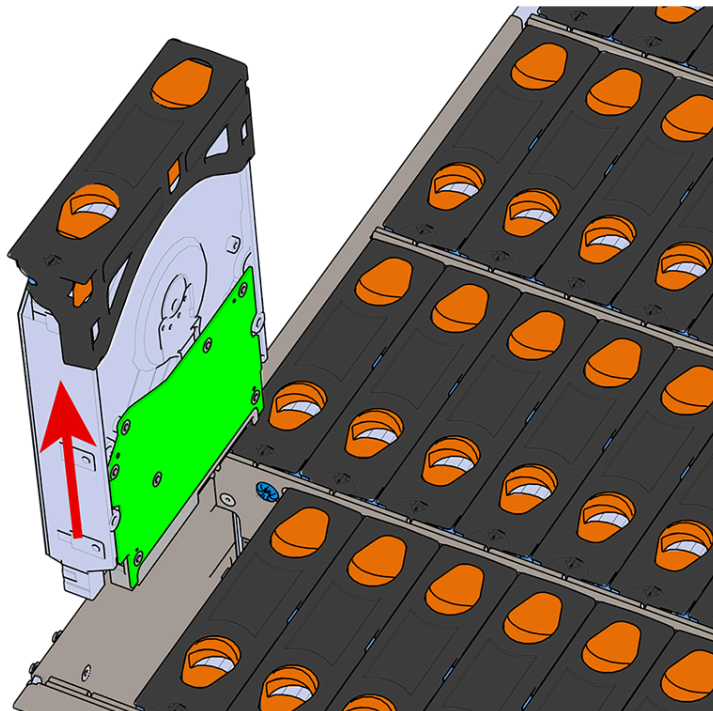
Step 7: Follow the previous step for each drive in the enclosure. Attach a label or mark the drives with the drive slot they were removed from in order to add them to the same slot in the future. Store the drives in an ESD safe location until the drives are ready to be installed back into an enclosure.

Step 8: Release the safety latch on the inner rails on each side of the chassis as shown in the following image.

Figure 295: Inner Rail Safety Latch Release

Step 9: Push the chassis back into the rack.

Step 10: Locate the M5 thumb-screws on the top cover of the enclosure that keep it in place when the drawer is extended, and unscrew them using a T15 Torx screwdriver. This will allow the top cover to move freely with the enclosure when the enclosure is removed.
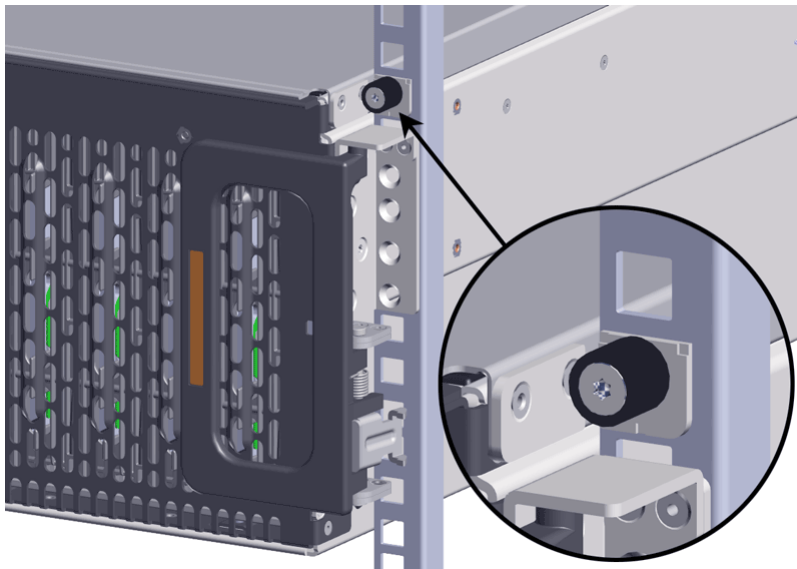
Step 11: Remove the chassis from the rack.

    a. Be prepared to support the enclosure once it is free of the rails by having a second person or a lift to support the enclosure

    b. Grasp both handles at the front of the enclosure and pull with even pressure until the enclosure will not extend further.

c. Locate the safety catches on the inner rails attached to the enclosure.

**Figure 297:** Safety Latch Release

d. Depress the latch release lever for the safety latches on the rail and push the chassis very slightly forward. The chassis is now unsecured from the rack.

e. Ensure that you have the proper support mechanism to hold the chassis in position, whether that be a team lifting partner or an appropriate lift.

f. Slide the chassis forward to free it from the rails. Place the chassis in a safe location to avoid damage.

Step 12: Uninstall the inner rails from the sides of the chassis.

a. Unscrew the three Low-Profile M4 x 3.2mm Philips screws that attach the inner rails to the chassis using a #2 Philips head screwdriver.

Figure 298: Remove Inner Rail
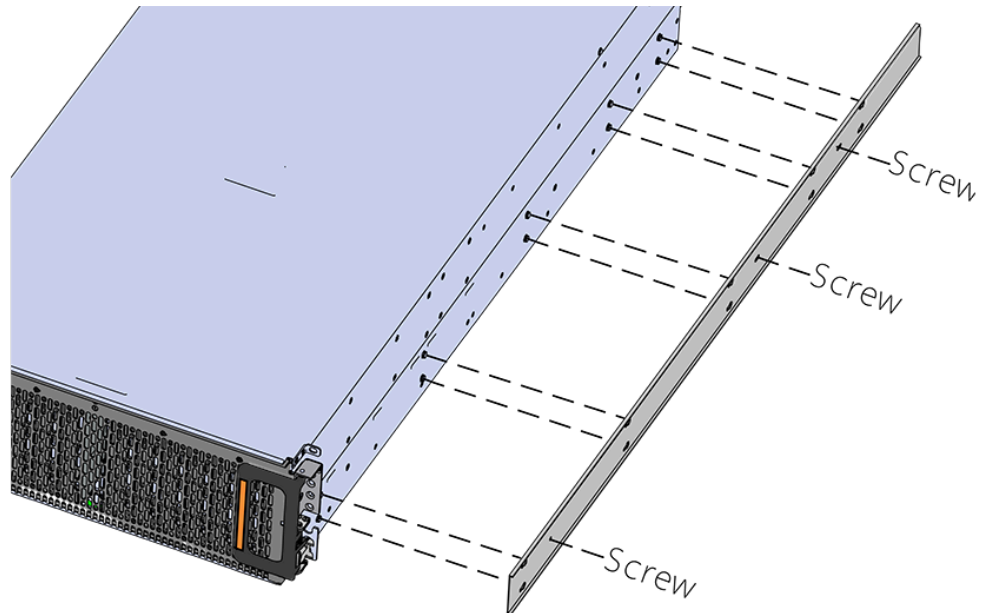
b. Locate and unlatch the springlock on the side of the inner rail.

**Figure 299:** Inner Rail Spring Latch
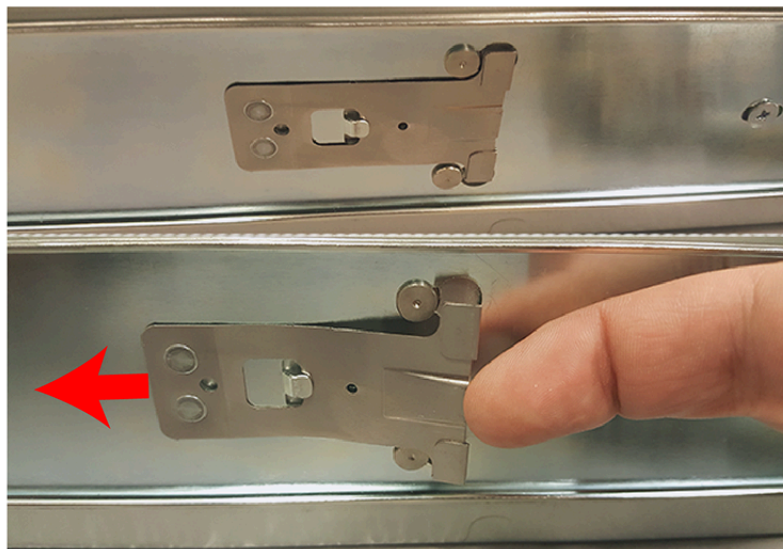
c. Slide the inner rail toward the front of the enclosure to unlock it from the pegs that secure it to the sidewall and pull it free.

Step 13 : Remove the screws that secure the alignment brackets and rails to the rack.

a. Remove the screws that secure the alignment bracket and rail to the rack. Be careful, the alignment bracket will be free once the screws are removed. Make sure you have a solid grip on it before removing the final screw. The following images show two methods by which these components could be secured to the rack: individual screws (with washers) or a toolless screwplate.

Figure 300: Rear Screws Removal
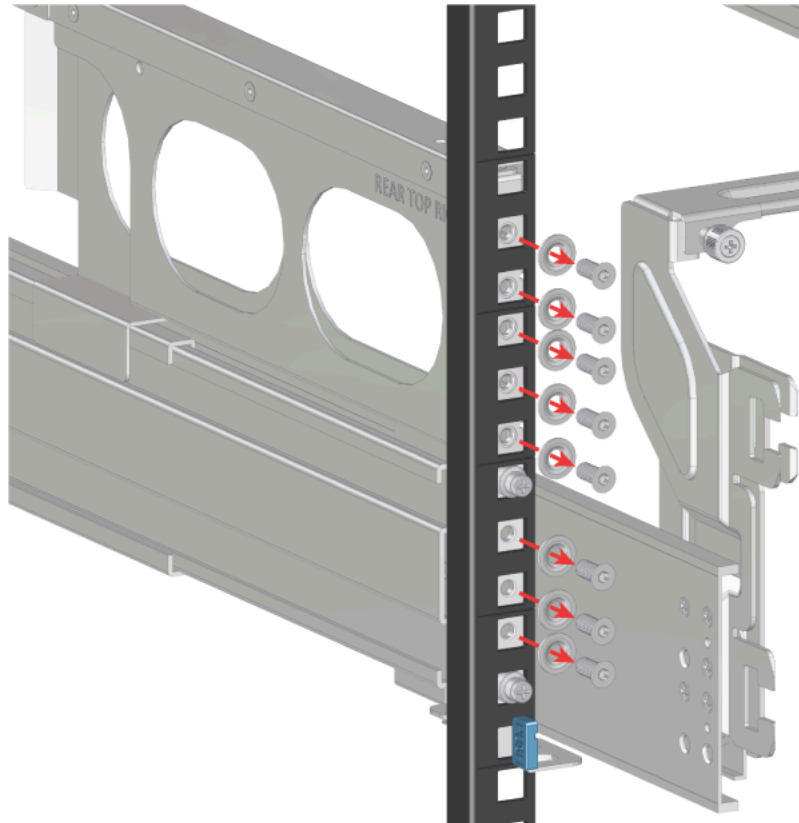
Figure 301: Rear Screwplate Removal
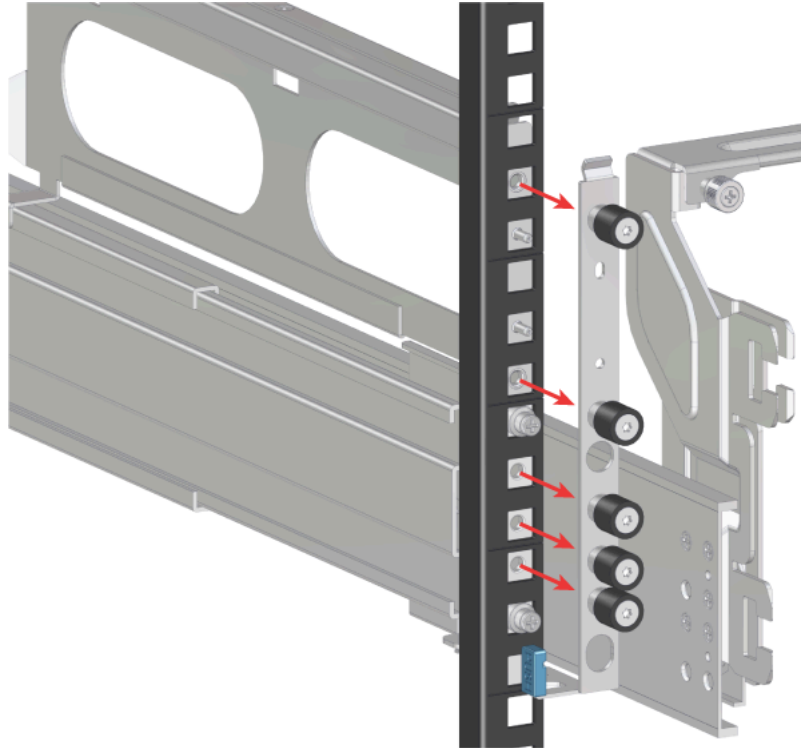
b. Move to the front of the rack and remove the three screws that hold the latch bracket to the front of the rack using a T15 Torx screwdriver. Be careful, the rack latch bracket will be free once the screws are removed. Make sure you have a solid grip on it before removing the final screw.

Figure 302: Rack Latch Bracket Installed

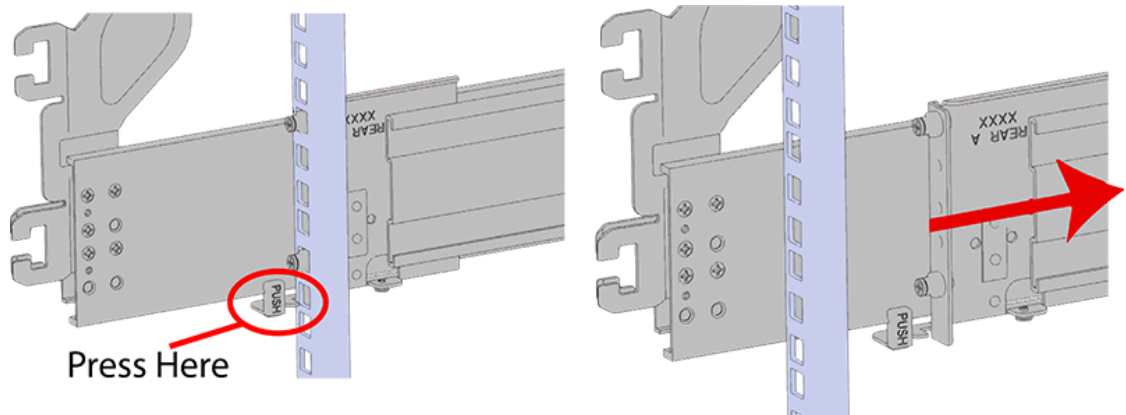**Step 14 :** Uninstall the rack rails from the rack.

    a. From the front of the rack, locate the release clip as shown in the following image.

Figure 303: Front Rail Release Clip Operation
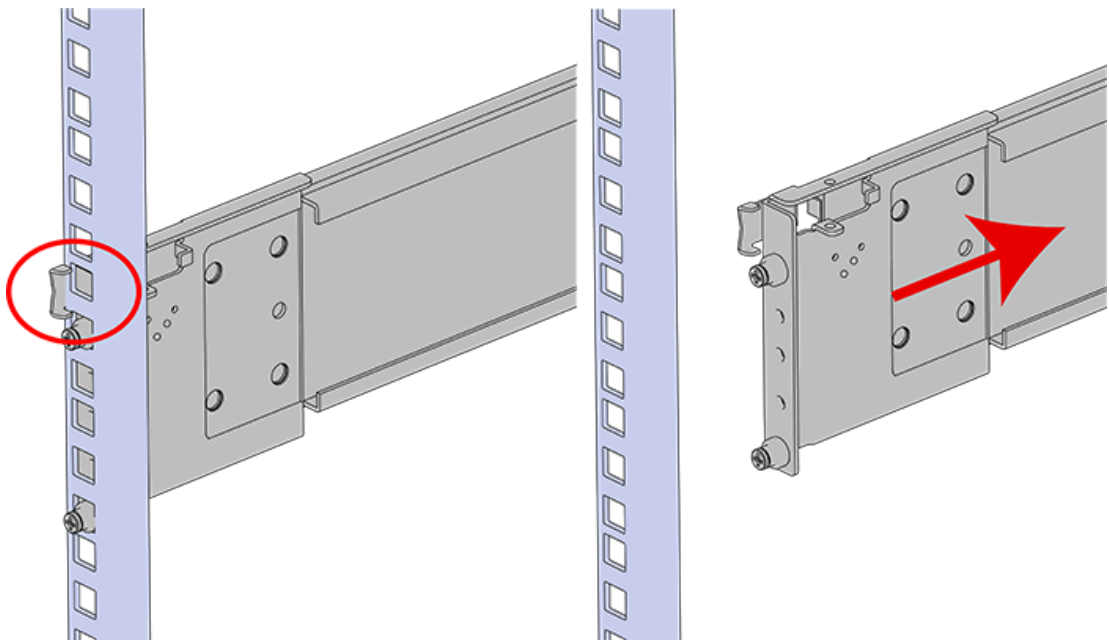
b. Press the release clip and press lightly toward the rear of the rack to compress the rail clear of the rack post.

c. Let go of the rail and move to the rear of the rack.

d. Support the rail with one hand and press the release button with the other to free the rail from the rack and remove it.

**Figure 304:** Rear Rail Latch Release Button

Press Here

Step 15 : Gather the replacement rails and prepare to install them.

**Step 16 :** Remove the inner rail that is nested inside the rack rails.

> **Note:** There are Right and Left rails and they must be installed as a set. Each inner rail will read "R" for the right or "L" for the left embossed on the inside. Each outer rail will read "R-Front" for the right or "L-Front" for the left. Right and Left refer to when you are facing the front of the rack.

a. Start by sliding the inner rail out of the outer/rack rail until the safety latch engages and the inner rail will not extend further. It will only slide one way.

b. Press on the safety latch release spring located on the side of the rail and slide the inner rail out the rest of the way.

Figure 305: Rail Safety Latch
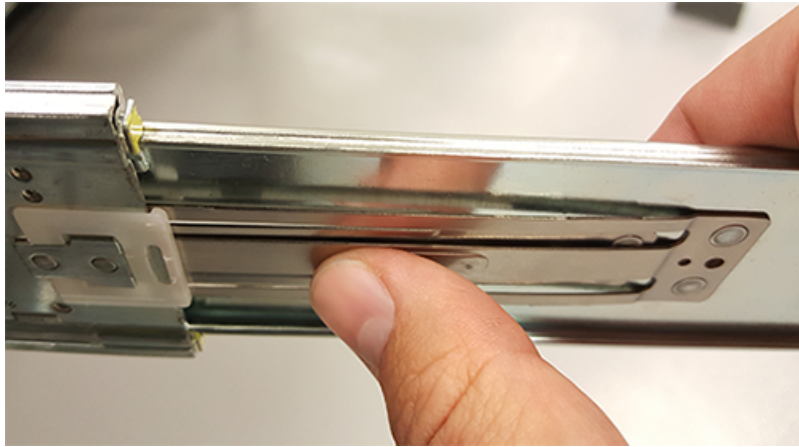
Step 17 : Install the inner rail onto the chassis making sure they are installed on the correct side. Each inner rail will read "R" for the right or "L" for the left embossed on the side that faces away from the chassis. Right and Left are with reference to looking at the front of the enclosure.

    a. Orient the inner rails so that the flat side is facing the enclosure and the side with the grooves is facing away from the enclosure.

    b. Align the keyholes on the inner rail to the mounting pegs on the side of the enclosure and press the inner rail flush against the chassis. If the keyholes don't line up with the pegs, flip the rail length-wise to see if this will align them.

Figure 306: Inner Rail Attachment
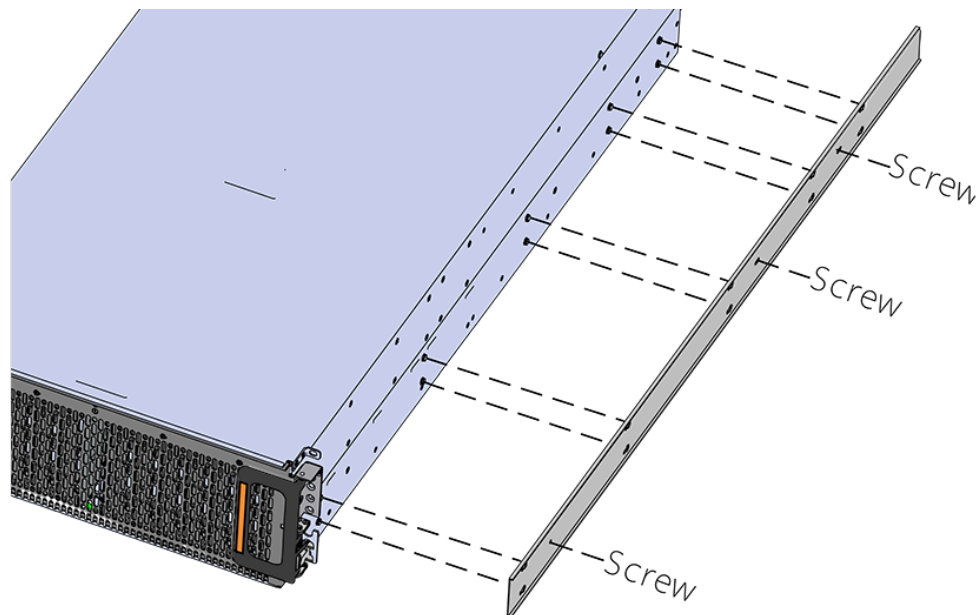
    c. Slide the inner rail toward the rear of the chassis to lock it in place. There will be an audible click and the mounting pegs will cover the front part of the keyhole.

Figure 307: Slide Inner Rail
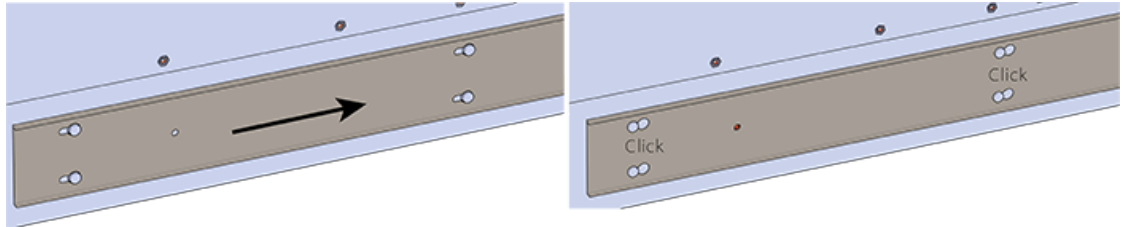
d. ⚠ **Caution:** When installing the inner rail onto the chassis, make sure to only use the special Low-Profile M4 x 3.2mm Philips screws provided in the accessory kit with the CMA. These screws should be tightened to .90-1.12 Nm / 8-10 in-lbf using a # 2 Philips Screwdriver. These screws are specially designed for this purpose. Using unapproved screws could cause damage to the slides inside the rail.

Install the three special low-profile M4 x 3.2mm Philips screws provided to secure the inner rail to the chassis.

e. Follow these steps for the second inner rail on the opposite side of the enclosure.

Step 18 : Install the outer rails into the rack. Pay special attention to which side is being installed. The embossed R is for the right side and L is for the left side. Right and Left refer to when you are facing the front of the rack.
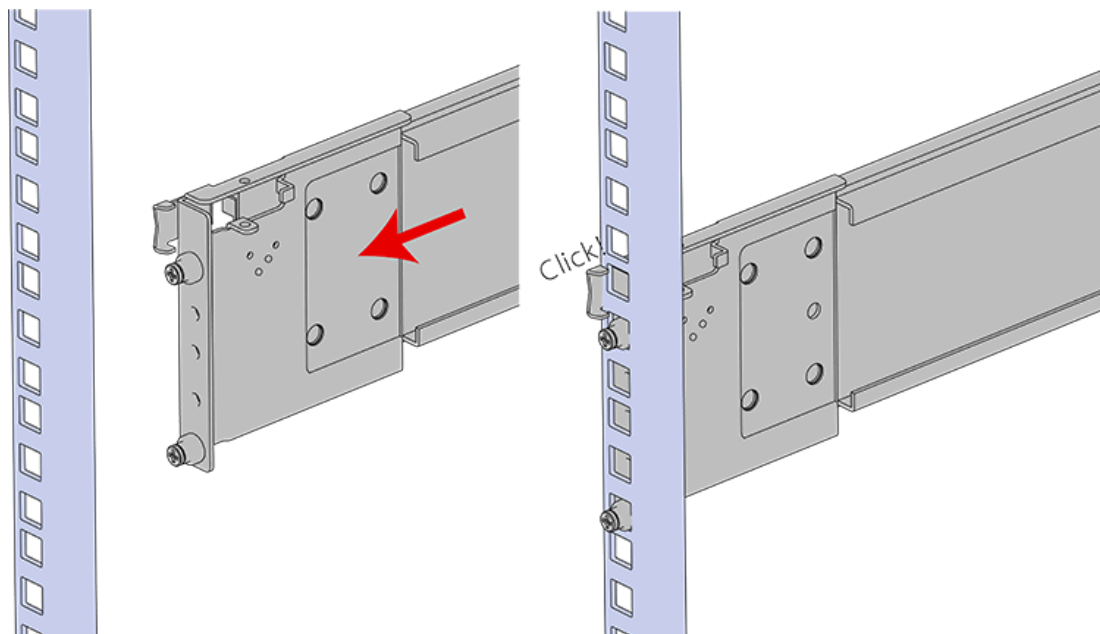
a. Move to the rear of the rack.

b. Orient the rail so that the word "REAR" that is embossed into the metal of the rail is at the rear end of the rack, and the release latch is facing the inside of the rack posts as shown in the following image.

Figure 308: Rear Rail Latch Release Latch
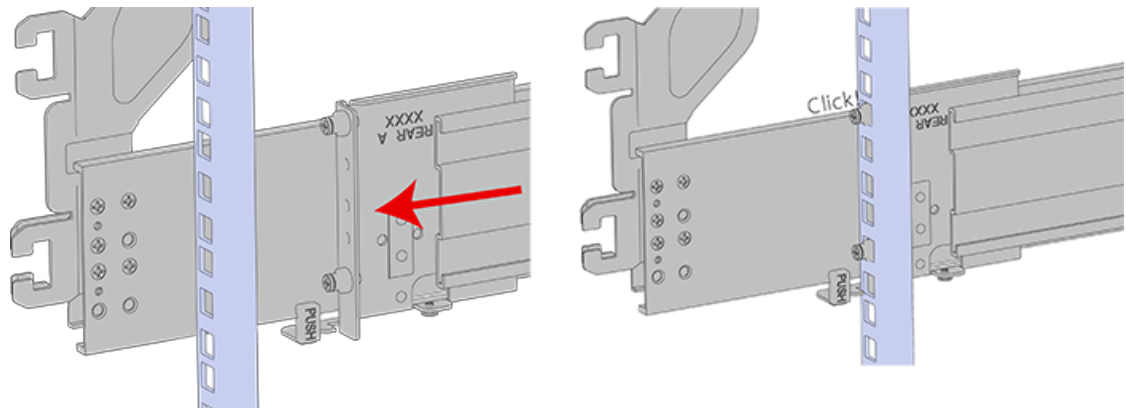
c. Align the rail on the rack posts at the U-height desired for installation. The bottom of the rail will be the lower most U of the total 4U height.

d. Pull the rail toward the rack post until the toolless latching mechanism engages the rack. The latching mechanism may need to be pulled open to get around the rack post.

e. Move to the front of the rack.

f. Align the front of the rail with the holes on the rack posts that will receive the rails and pull the rail toward the holes until the toolless latching mechanism engages the rack.

**Figure 309:** Front Rail Release Clip Operation

g. Use a level to make sure that the rails are aligned properly.

h. Follow these steps for the other outer rail.

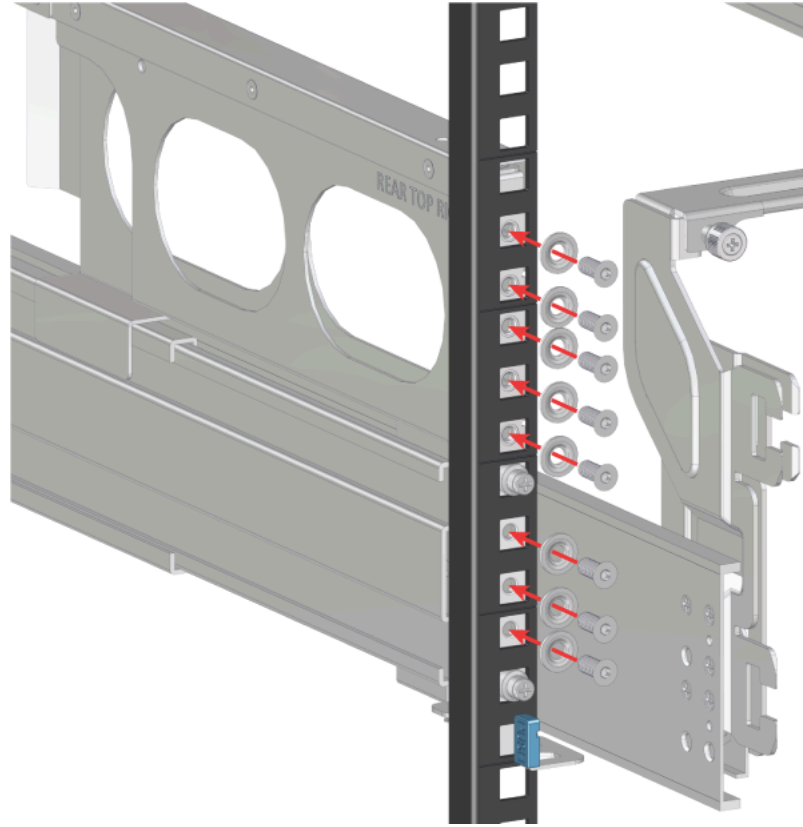**Step 19:** Install the rear cover alignment brackets and secure the rear rails.

a. From the rear of the rack, orient the alignment brackets so that the groove that will catch the cover is facing the inside of the rack.

**Figure 310:** Alignment Bracket Groove (highlighted in red)
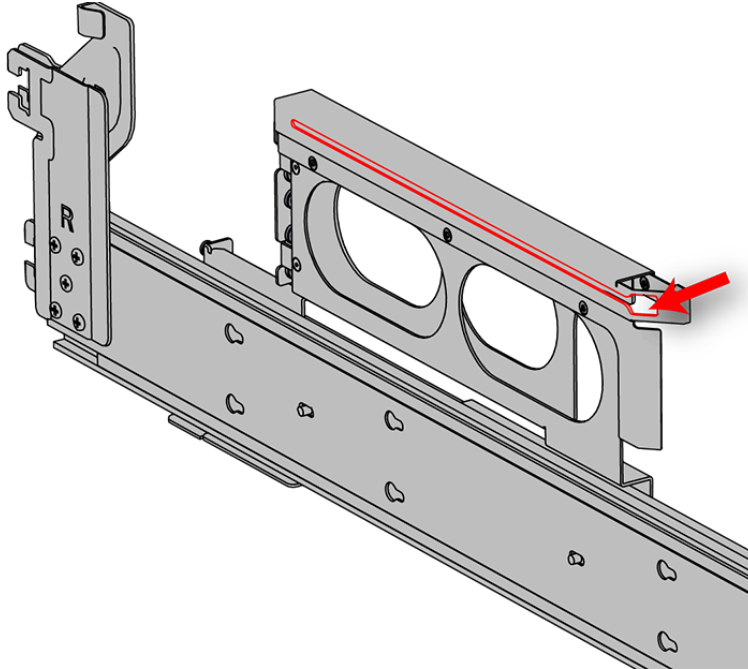
b. Attach the rear cover alignment bracket and rear rail to the vertical rack rail. The following examples show two methods for securing the bracket and rail to the rack: individual screws (with washers) or a screw plate.

Option 1: Using a Long T15 Torx Screwdriver, install M5 x 12mm T15 Flat Head Torx screws (with washers) to attach the rear cover alignment bracket. The number of required screws will vary depending on the bracket type. Install additional M5 x 12mm T15 Flat Head Torx screws (with washers) to attach the rear rail to the rack posts. Screw locations are shown in the following image. Tighten the rails screws to 3.38-3.61 Nm / 30-32 in-lbf.

Figure 311: Rear Screws Installation

⚠ **Caution:** Be careful to set the screws properly in the cover alignment bracket and rail to prevent crossthreading.

Option2: Using a Long T15 Torx Screwdriver, install the screw plate to attach the rear cover alignment bracket and the rear rail to the rack posts. The screw locations are shown in the following image. Tighten the rail screws to 3.38-3.61 Nm / 30-32 in-lbf.

Figure 312: Screw Plate Installation
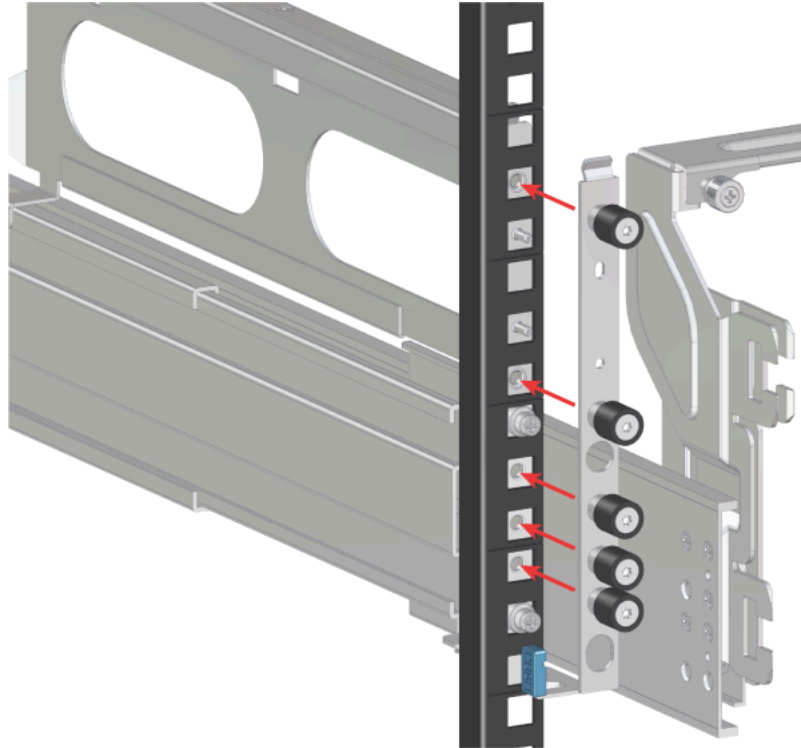
Step 20 : CMA Standard: Install the two rack latch brackets at the front of the rack.

    a. Orient the brackets so that the screw holes are between the two pins supporting the outer rails as shown in the following image. There is a left and a right. Use the image below as a guide for how to orient this bracket and mirror it for the other side. Notice the increased distance between the top two screw holes and the lower screwholes and the flange being oriented on the outside.

Figure 313: Rack Latch Bracket Installed

    b. Use 6 of the included M5 x 12mm screws and the T15 Torx screwdriver to install each bracket, 3 screws per bracket.
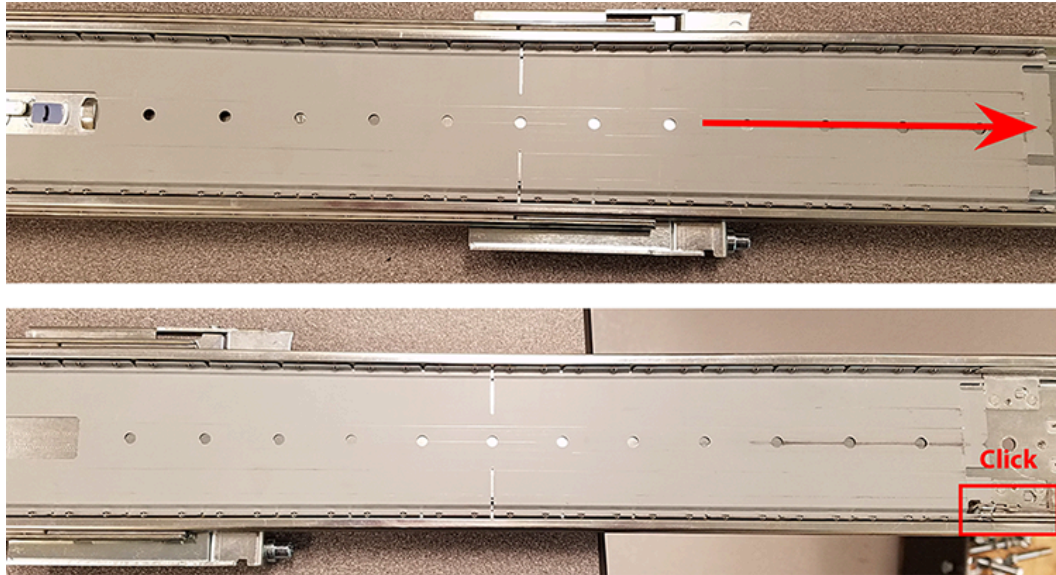
⚠️ **Caution:** Always install the top cover onto the enclosure before installing the chassis into a rack. Not having the top cover installed may damage the alignment brackets.

Step 21: Install the chassis into the rails.

    a. Extend the bearing plates on the inside of the mid-rails until they are fully forward (detent has engaged). This prevents potential damage due to improper mating of the rails.

Figure 314: Bearing Plate

b. ⚠️ **Caution:** This step in the installation requires a minimum of 3 individuals to install safely, two to lift and one to guide the others who may have difficulty seeing because the enclosure is in the way. Ensure that the appropriate measures are taken to safely support the enclosure during installation. The enclosure MUST have no drives installed and requires a two person team lift to install. **Do not attempt to lift the system if it is fully populated with drives.** The only case in which the system may be installed or removed with the drives populated is if the facility has a lift that is rated to handle the maximum weight of the fully loaded system.

In preparation to perform a team lift, position one individual on each side of the enclosure (to lift) and a third individual standing at the protruding rack rails (to guide the chassis to mate with rack rails).

c. Team-lift the enclosure until the inner rails (which are attached to the chassis) align with the extended mid-rails (which are attached to the rack), and guide the inner rails on the chassis to mate with the rack rails.

Figure 315: Installing the Chassis
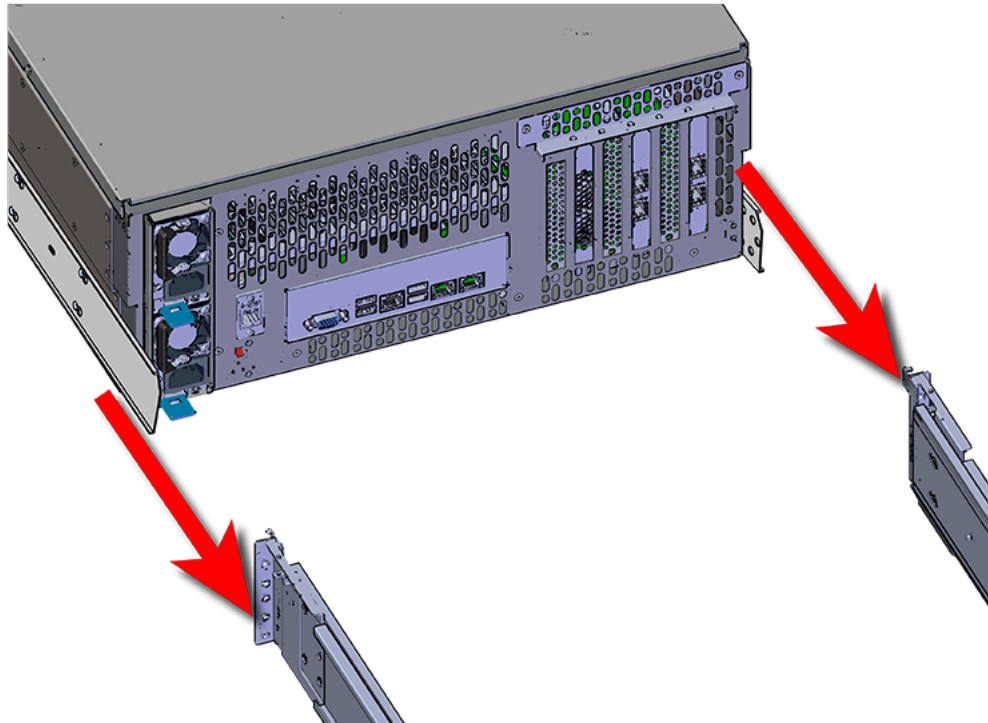
d. Once the rails are mated properly, slide the enclosure into the rack until it is stopped by the safety catch on the rails. Push the release lever on the safety latch (located on the side of each of the rails), and push the enclosure the rest of the way into the rack.

Figure 316: Safety Latch Release
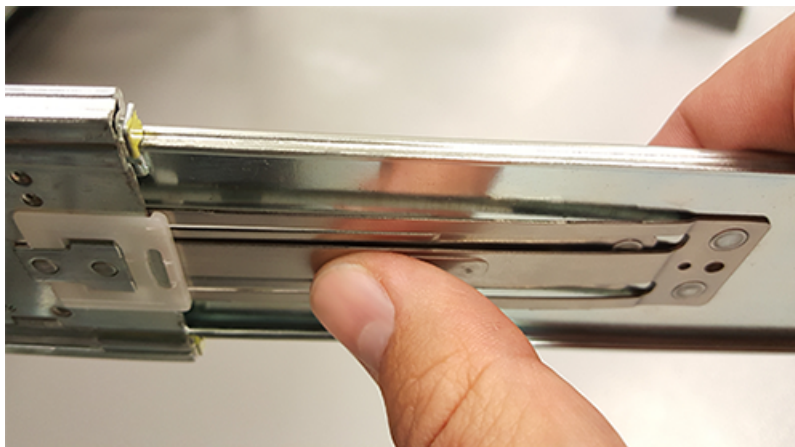
e. As the chassis is slid into the rack, position one installer at the rear of the rack to ensure that the pegs on the sides of the cover will slide correctly into the rear cover alignment brackets on both sides of the rack. If the chassis does not install smoothly or snags, check that the rear cover alignment brackets are not interfering with the chassis sidewalls, and try again.

Step 22: Secure the chassis top cover to the rack using the captive M5 thumb-screws as shown in the following image. Use a T15 Torx screwdriver, and tighten the screws to 3.38-3.61 Nm / 30-32 in-lbf.

Figure 317: Cover Retention Screws
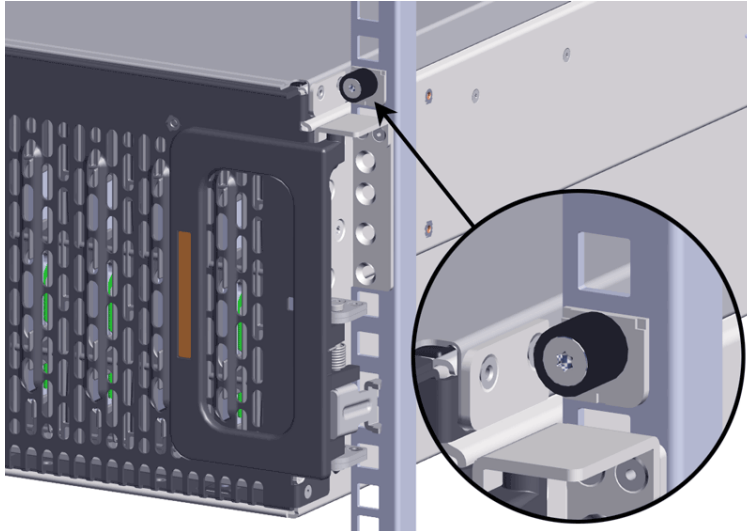
> **Note:** If any drives were removed earlier to facilitate the removal of the chassis, follow the rest of the steps to reinstall the drives by following the labeling scheme noted earlier. If not, proceed to the cabling section.

Step 23: If the chassis is being installed into a rack that will be shipped fully assembled, you **must** install eight (four per side) of the included M5 x 12mm T15 Flat Head Torx screws into the two brackets at the front of the chassis in the following locations. These screws should be tightened to 3.38-3.61 Nm / 30-32 in-lbf using a Long T15 Torx Screwdriver. If this chassis will not be installed into a rack for shipping purposes, skip this step and move on to the next one.

Figure 318: Shipping Bracket Screw Locations
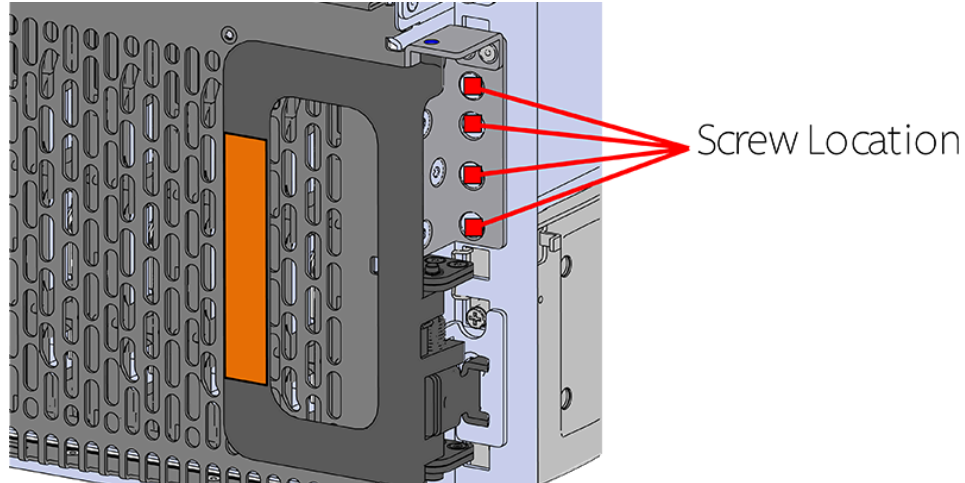
Figure 319: Shipping Bracket Screw Locations (CMA Lite)

Step 24: Install the 3.5in HDD Assembly.

> **Note:** The 2.5in SSD Assembly is installed in the same manner as the 3.5in HDD Assembly. For instructions on assembling the 2.5in SSD Assembly, see Operating the 2.5" Drive Carrier *(page 60)*.

a. Ensure that the enclosure has been pulled out of the rack until the rail latches engage.
b. Find the LED pointer on the top of the drive carrier. This pointer should point toward the front of the unit as shown in the following image.

Figure 320: LED Pointer Orientation

c. Align the drive with the empty slot that will receive it. Lower it into the slot, making sure it stays level and does not snag.

Figure 321: Installing a 3.5in HDD Assembly

    d. Pinch the latch release and carefully press downward to seat the 3.5in HDD Assembly the rest of the way.

Step 25: Install each drive in the place it was removed from by following the labels or marks that were added earlier.

Step 26: Install the CMA(s).

> 📄 **Note:** CMA has one arm, to be installed at the lower position. This arm should have the elbow on the left side.

    a. Orient the CMA so that the elbow is on the left hand side.

    b. Attach all three of the connectors to the brackets on the rails. There should be one at the elbow side and two at the other end.

Figure 322: CMA Orientation
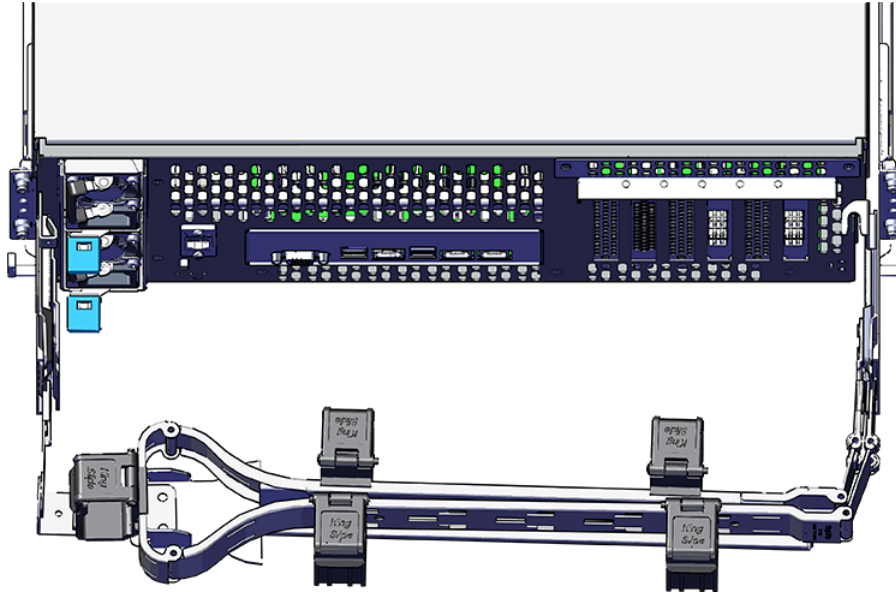
   c. Slowly slide the enclosure forward to ensure the arm is operating properly, then slide it back into the rack.

Step 27 : Cable the CMA(s).

   CMA Standard:

   a. Unlatch the elbow side of the arm(s) by pressing the blue button labeled "push," and then swing the arm(s) open.

   b. Open all of the baskets.

Figure 323: Open Baskets

c. Route all of the cables being connected to the enclosure through the open baskets.

d. Close all of the baskets.

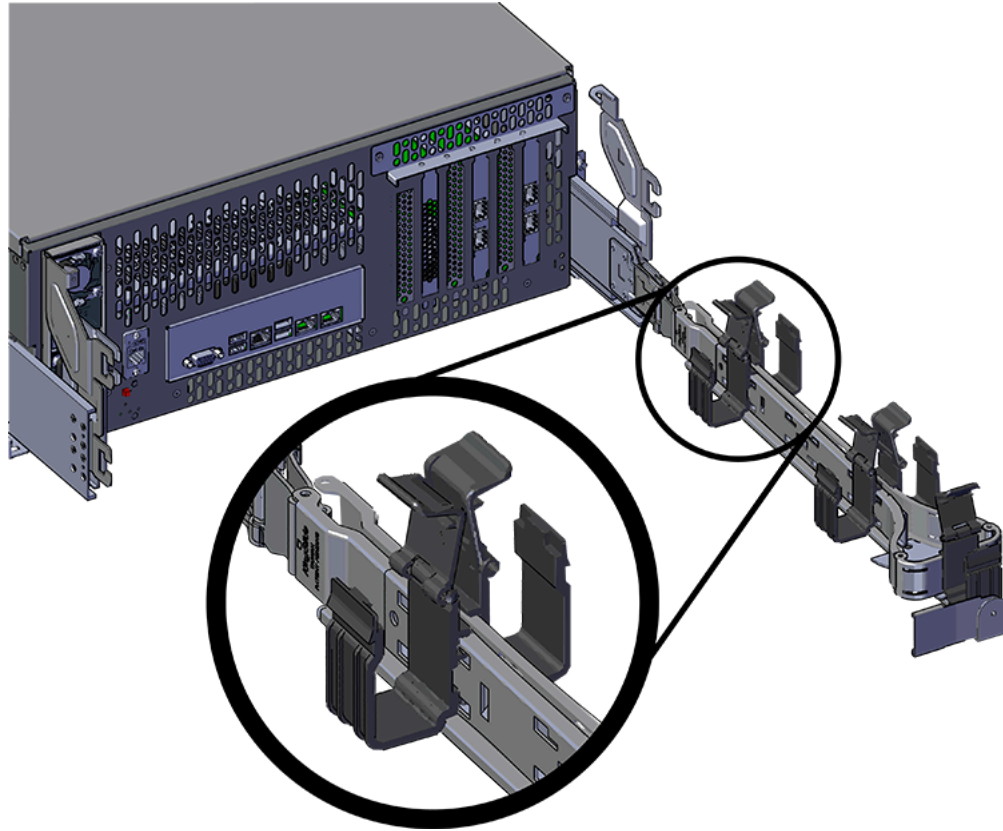**e.** If the Ultrastar Serv60+8 is being installed in a rack and will subsequently be transported inside that rack, it is important to use the included cable tie to wrap the CMA bundle to ensure it does not get damaged during transport. If the Ultrastar Serv60+8 is instead being installed where it will be operated, skip this step. Remember to remove the cable ties after the enclosure has reached its final operational location.

f. Reconnect the arm at the elbow to the connectors on the rail.

CMA Lite:

a. Press the blue latch button labeled "push" to unlatch the elbow side of the CMA arm, and then swing the arm open.

b. Open all of the baskets.

Figure 324: Open Baskets

c. Gather the SAS, power, and Ethernet cables for installation.

> **Note:** Route all cables to IOM A (left hand side looking at the rear).

d. Route all of the cables being connected to the enclosure through the open baskets.

e. Close all of the baskets.

f. If the Ultrastar Serv60+8 is being installed in a rack and will subsequently be transported inside that rack, it is important to use the included cable tie to wrap the CMA bundle to ensure it does not get damaged during transport. If the Ultrastar Serv60+8 is instead being installed where it will operated, skip this step. Remember to remove the cable ties after the enclosure has reached its final operational location.

g. Reconnect the arm to the rail by the connector at the elbow.

Step 28: Test for binding in the extension of the arm by gently pulling the enclosure out of the rack, ensuring the cables extend properly and that the system doesn't bind at all. If it does, examine the point at which the binding occurred and adjust the seating of cables in the baskets, check the connections to the rails, and examine the joints of the arm to ensure that they are all functioning properly.

Step 29: Make sure the CMA(s) is in operational position by folding the arm(s) in toward the enclosure and attaching the elbow end(s) to the connector(s) attached to the rail. Verify that all of the cabling is in functional order and does not bind or catch.

3.14 Chassis Replacement

| Replacement Requirements	
Personnel Required	3
Avg. Replacement Time	2 hr.
Max Replacement Time	2 hr.
Tool	**Required vs. Recommended**
Long T15 Torx Screwdriver	Required
# 2 Philips Screwdriver	Required
T30 Torx Screwdriver	Required
Tape Measure	Recommended
Level	Recommended
Option 1: M5 x 12mm T15 Flat Head Torx screws with washers **Option 2**: Toolless screwplate	Required
Included Washers	Required
Low-Profile M4 x 3.2mm Philips screws (included with rail assembly)	Required

Step 1: Place the CMA into service position.

    a. Unlatch the CMA at the elbow connector by pressing the blue release button to unlatch the connector from the rail.

**Figure 325:** Unlatching a CMA Connector
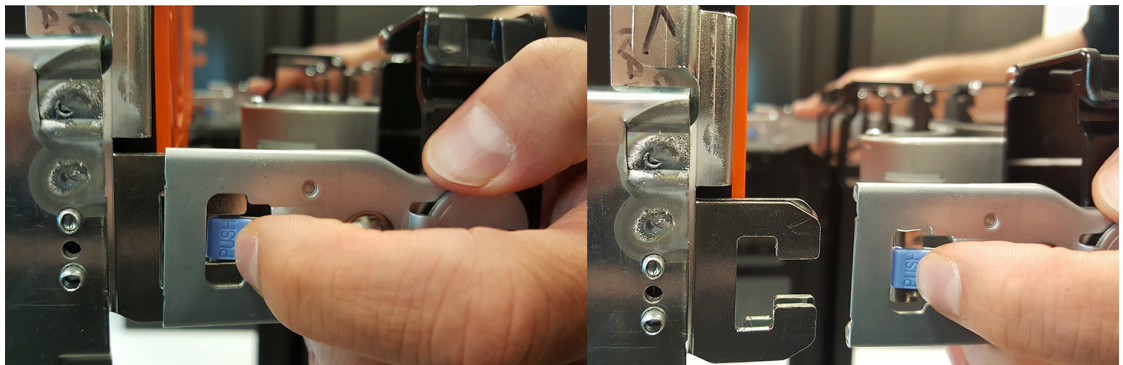
    b. Swing the CMA away from the enclosure.

    c. The arm should be extended away from the enclosure as shown in the following example.

Figure 326: CMAs in service position (Cables not shown)
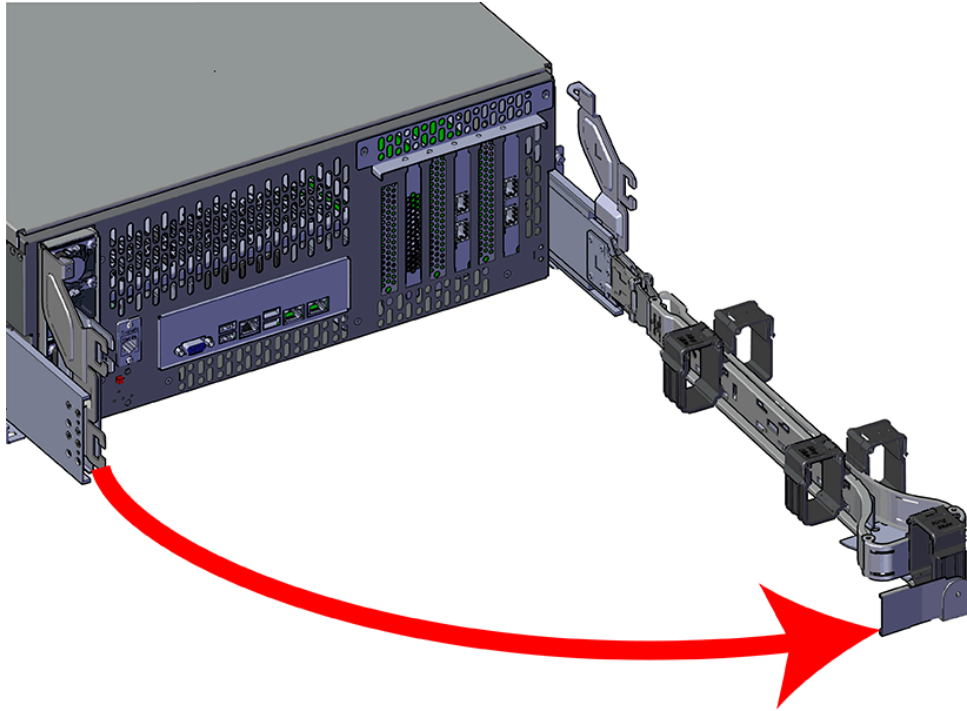
Step 2: Disconnect the Enclosure from power.

  a. Locate the redundant PSUs at the rear of the enclosure.

  b. Detach the cable retention mechanism from both power cords.
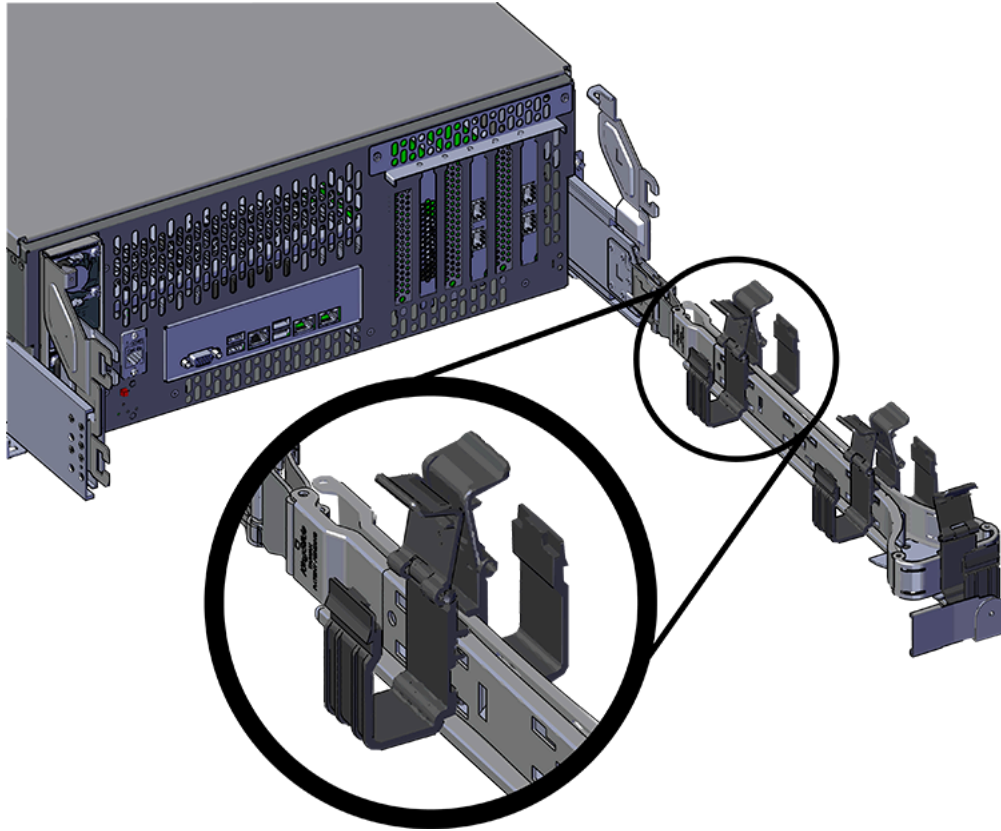
Figure 327: Cable Retention Clip
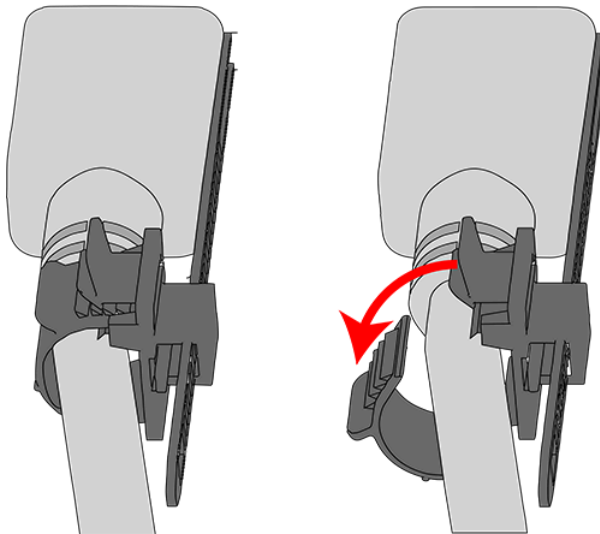
  c. Power down the enclosure by disconnecting both power cables, one from each PSU.

Step 3: Disconnect any other cabling that is connected to the rest of the rear IO ports.

Step 4 : Uncable the CMA(s).

    a. Open all of the basket clips on the CMA(s).

Figure 328: Open Baskets

    b. Remove one cable at a time from the arm, making sure not to put too much strain on the arm.

Step 5 : Remove the CMA(s).

    a. Release all of the connectors that attach the CMA(s) to the enclosure and the rail.

       There are three total connections that need to be released, one at the elbow and two at the opposite end.

    b. To release a connector, press the blue latch release button and pull the connector free.

Figure 329: Unlatching a CMA Connector
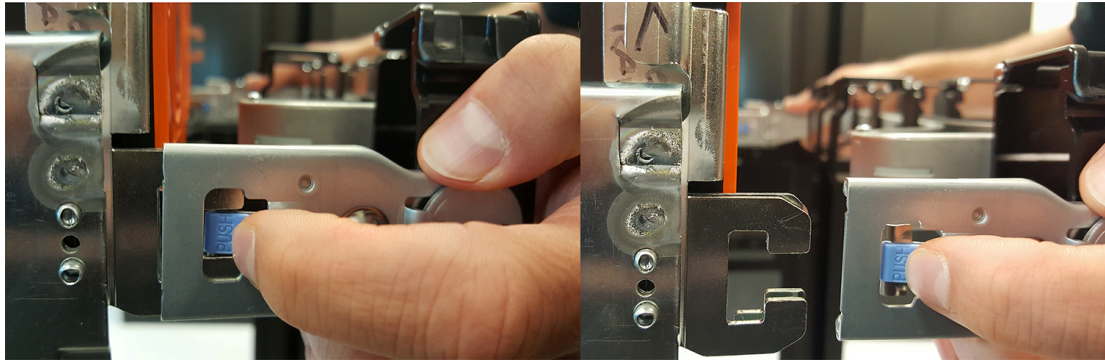
Step 6: Uninstall the PSU.

a. Grasp the release lever and the metal handle in a downward pinching motion to release the latching mechanism.

Figure 330: Uninstalling the PSU
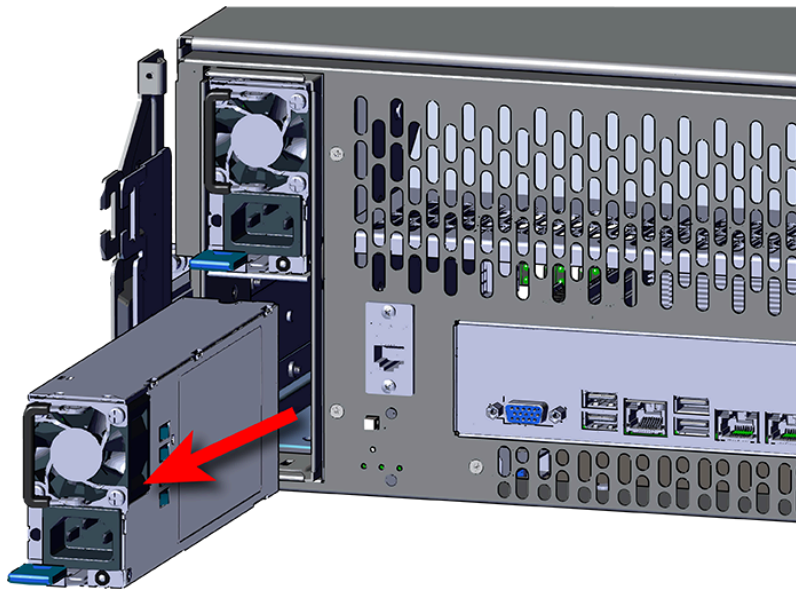

b. Pull the PSU straight out with even pressure.

Step 7: Grasp both handles at the front of the enclosure and pull with even pressure to extend the chassis out of the rack until it is stopped by the safety latches. The safety latches will prevent the enclosure from coming out of the rack completely and the cover will remain in the rack attached to the rear alignment brackets.

Figure 331: Chassis Handle Operation
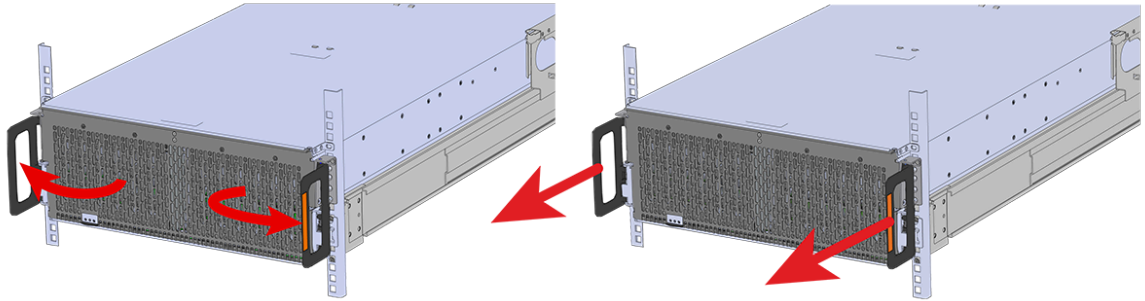
Step 8: Remove all of the drives from the chassis before uninstalling the chassis. Be prepared to label the drives as they are removed so they can be reinstalled in the same location in the new chassis.

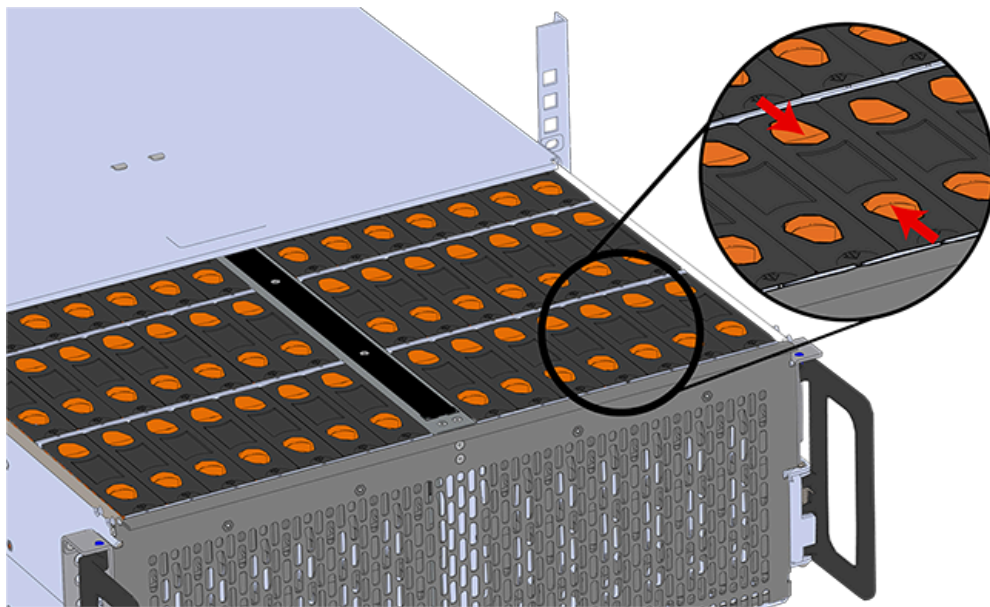**Step 9:** Follow these steps to remove a 3.5in HDD Assembly.

    a. Find the latch release mechanism on the 3.5in HDD Assembly being removed.

    b. Insert a finger and a thumb into the latch release and pinch to unlatch the 3.5in HDD Assembly.

Figure 332: Unlatch Drive Carrier (IOM Not Shown)

    c. Lift the 3.5in HDD Assembly free from the enclosure.

Figure 333: Removing 3.5in HDD Assembly
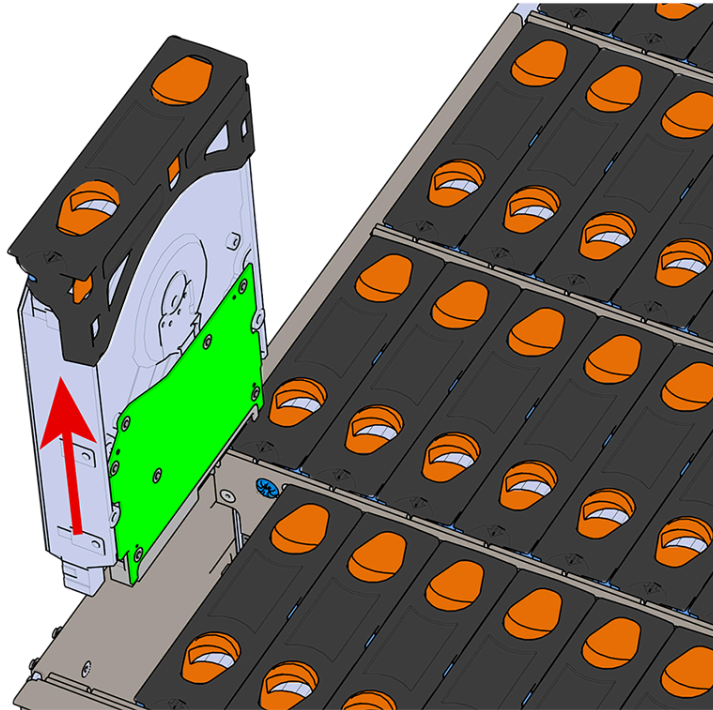
Step 10 : Follow the previous step for each drive in the enclosure. Attach a label or mark the drives with the drive slot they were removed from in order to add them to the same slot in the future. Store the drives in an ESD safe location until the drives are ready to be installed back into an enclosure.

Step 11 : Uninstall the IOM.

    a. Locate the latch release on the IOM and press it in the direction shown in the following image.

Figure 334: Unlatching the IOM
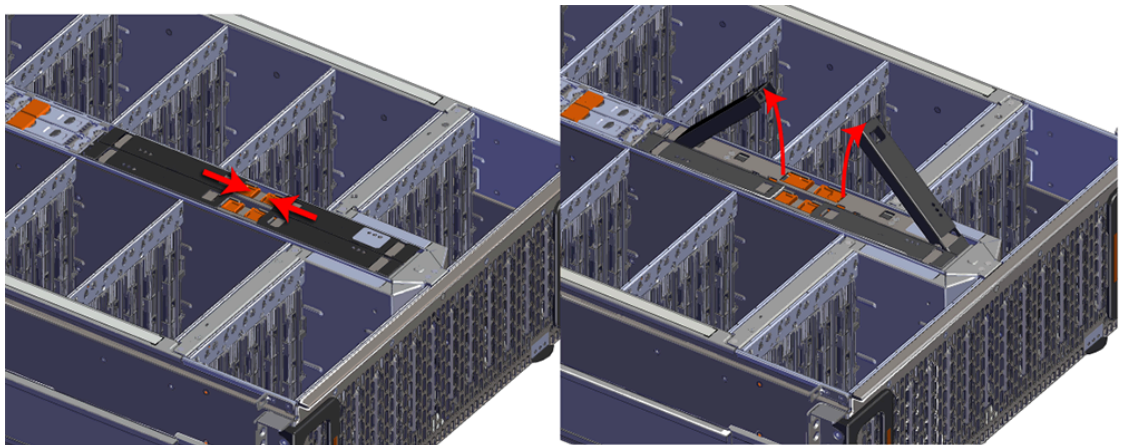
b. Grasp both handles, one handle in each hand, and lift evenly with both hands to ensure the IOM comes out straight. This will prevent any damage to the pins on the internal connectors.

Figure 335: Removing IOM
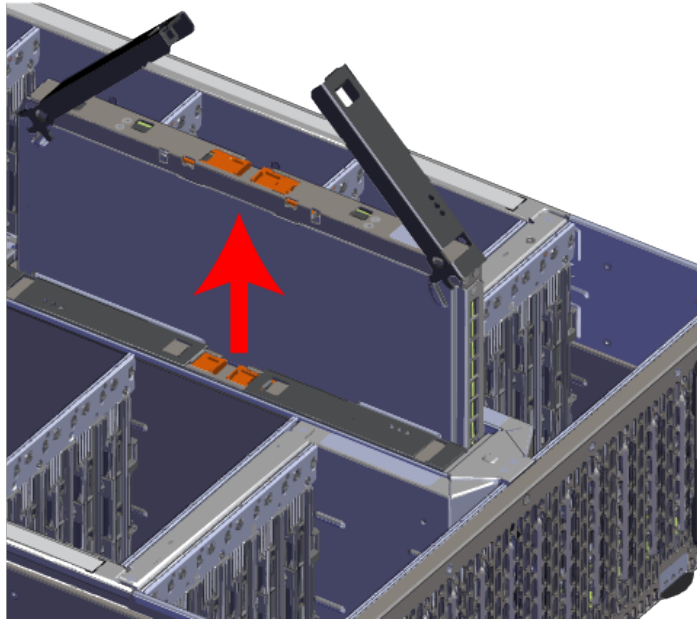
Step 12 : Remove the IOM Blank from IOM slot B.

Step 13 : Uninstall the System SSD.

a. Lift the center channel flap and press the latch release as shown in the following image.

Figure 336: Lift the Center Channel Flap

Figure 337: Latch Release
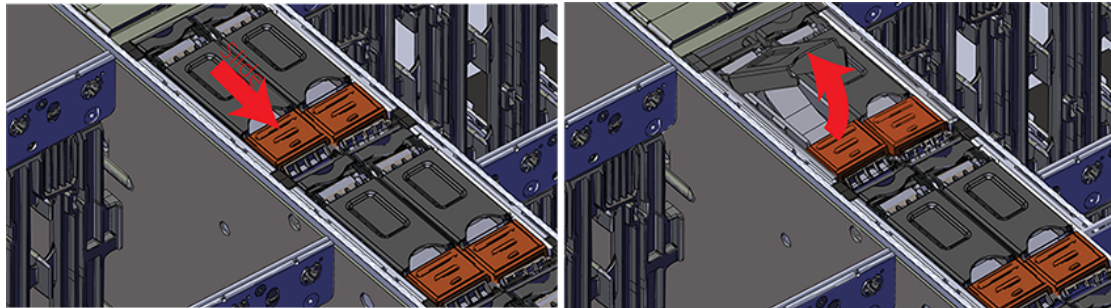
b. Grasp the handle that pops up and pull evenly to remove the component.

Figure 338: System SSD Removal
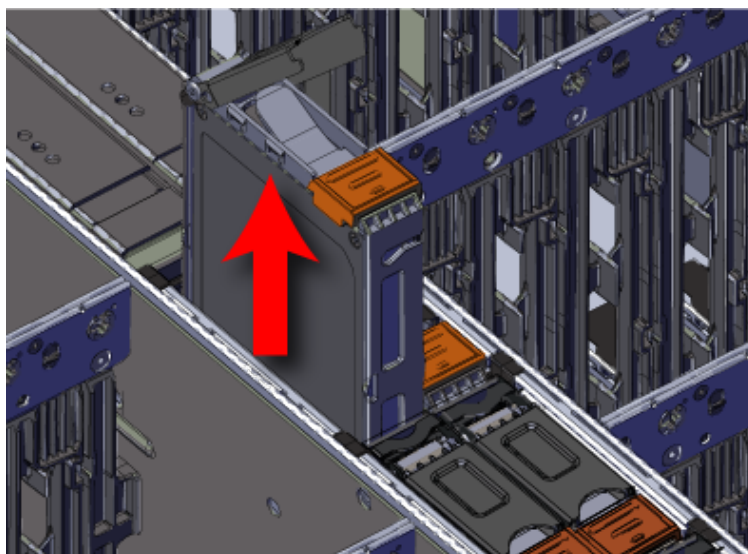
Step 14 : Uninstall the rest of the System SSD assemblies in the same way as the first.

Step 15 : Uninstall the internal Rear Fan.

a. Lift the Rear Fan flap and insert a finger into the service hole on the top of the Rear Fan and pull up to release the latch.

Figure 339: Lift the Rear Fan Flap
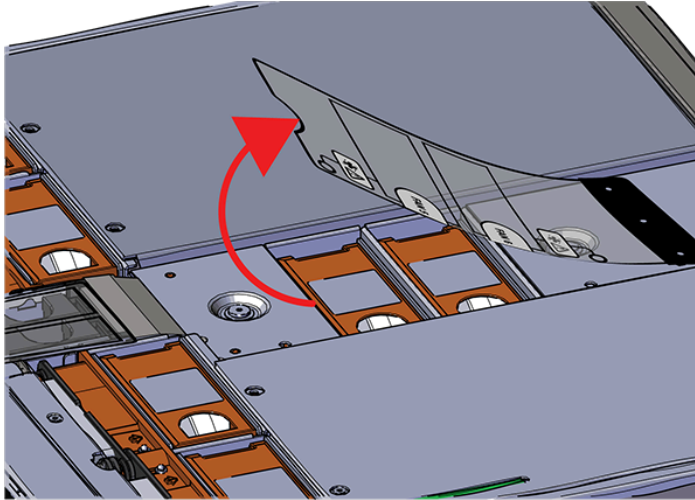
Figure 340: Unlatching Rear Fan
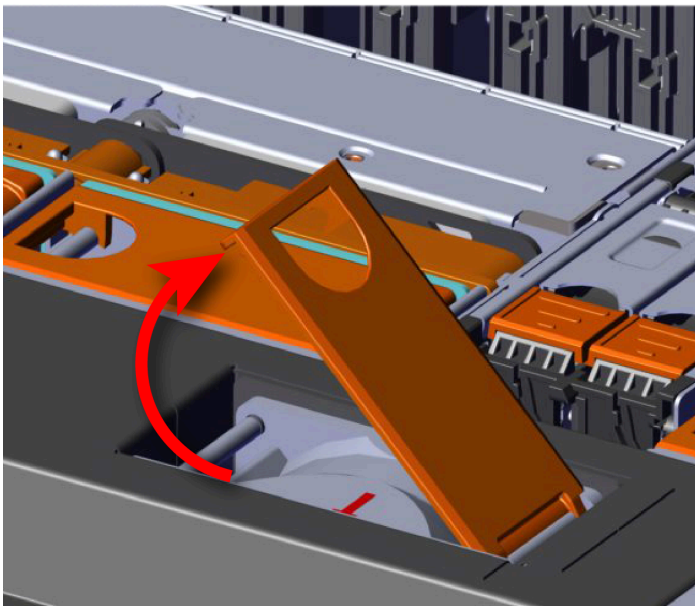
b. Use the handle to pull evenly on the component to remove it from the enclosure.

Figure 341: Removing Rear Fans
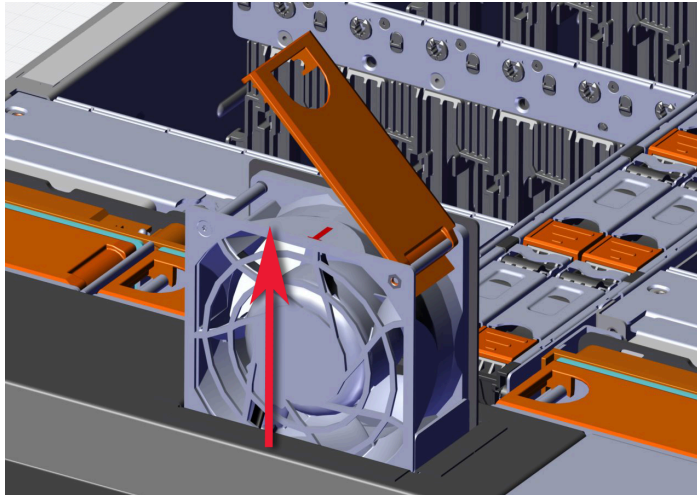
Step 16: Uninstall the rest of the system fans in the same manner as the first.

Step 17: Release the safety latch on the inner rails on each side of the chassis as shown in the following image.

Figure 342: Inner Rail Safety Latch Release

Step 18: Push the chassis back into the rack.

Step 19: Locate the M5 thumb-screws on the top cover of the enclosure that keep it in place when the drawer is extended, and unscrew them using a T15 Torx screwdriver. This will allow the top cover to move freely with the enclosure when the enclosure is removed.
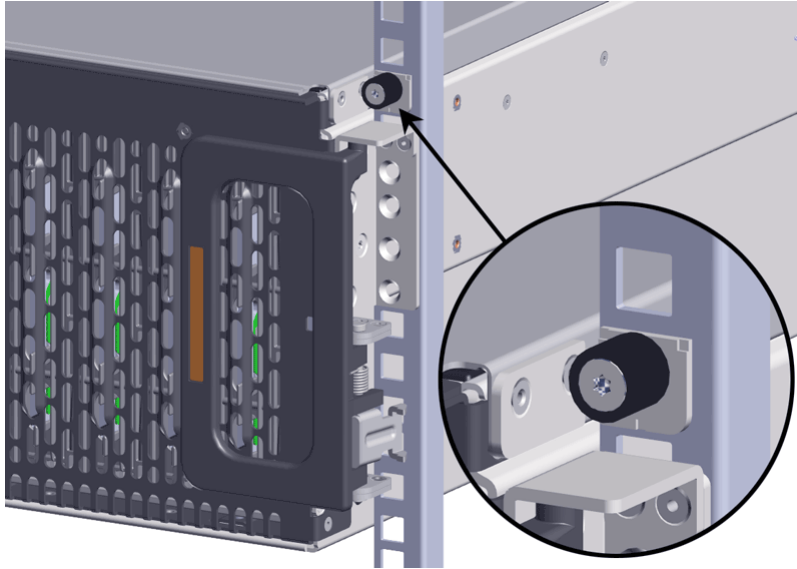
Step 20 : Grasp both handles at the front of the enclosure and pull with even pressure to extend the chassis out of the rack until it is stopped by the safety latches. Make sure that the top cover comes with the chassis as it is extended out of the rack. The safety latches will prevent the enclosure from coming out of the rack completely.

Step 21 : Remove the chassis from the rack.

    a. Be prepared to support the enclosure once it is free of the rails by having a second person or a lift to support the enclosure

    b. Grasp both handles at the front of the enclosure and pull with even pressure until the enclosure will not extend further.

    c. Locate the safety catches on the inner rails attached to the enclosure.

Figure 344: Safety Latch Release

    d. Depress the latch release lever for the safety latches on the rail and push the chassis very slightly forward. The chassis is now unsecured from the rack.

e. Ensure that you have the proper support mechanism to hold the chassis in position, whether that be a team lifting partner or an appropriate lift.

f. Slide the chassis forward to free it from the rails. Place the chassis in a safe location to avoid damage.

Step 22: Uninstall server cover panels.

> 📄 **Note:** The same steps to uninstall the server cover panel apply to both sides of the enclosure with the exception of the number of screws that secure the server cover panel. From the rear of the enclosure, the left panel contains two screws. The panel on the right side of the enclosure contains one screw.

a. Remove the screws that secure the server cover panels to the chassis using a T7 Torx screwdriver.

> 📄 **Note:** When at the rear of the enclosure, the left server cover panel contains two T7 Torx screws. The left server cover panel contains only one T7 Torx screw.

Figure 345: Removing the Server Cover Panel Screws
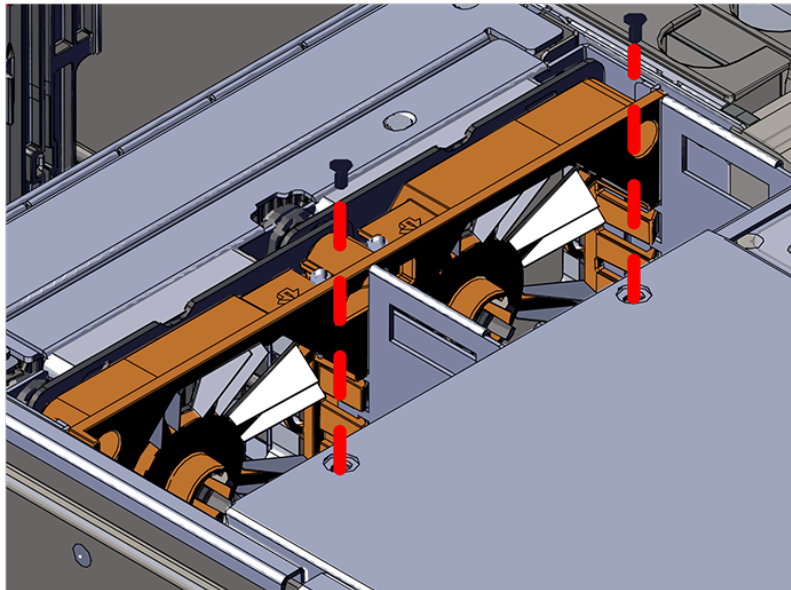
b. Remove the server cover panel by carefully pulling on the edge where the screws were removed.

Figure 346: Removing the Server Cover Panel
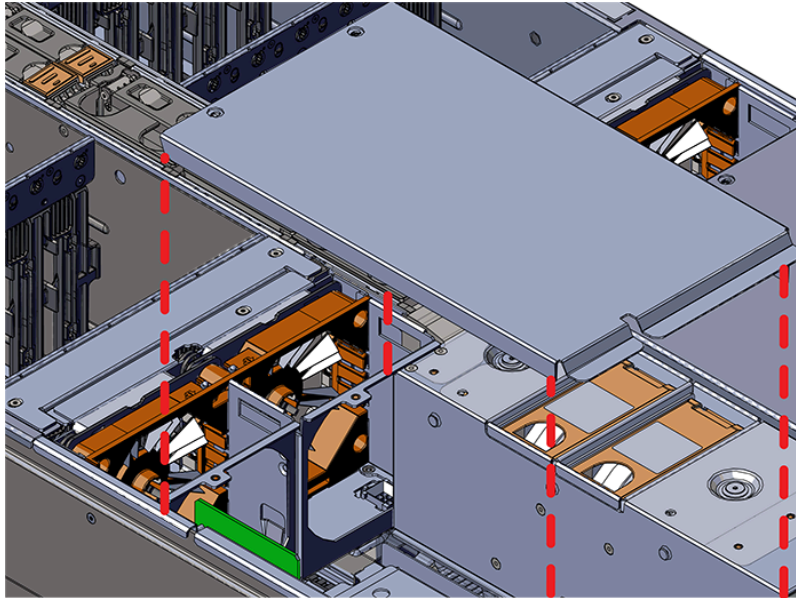
Step 23: Uninstall the server cover panel in the same manner as the first.

Step 24: Uninstall the fan bay.

    a. Remove the screw that secures the fan bay to the chassis.

Figure 347: Removing the Fan Bay Screws
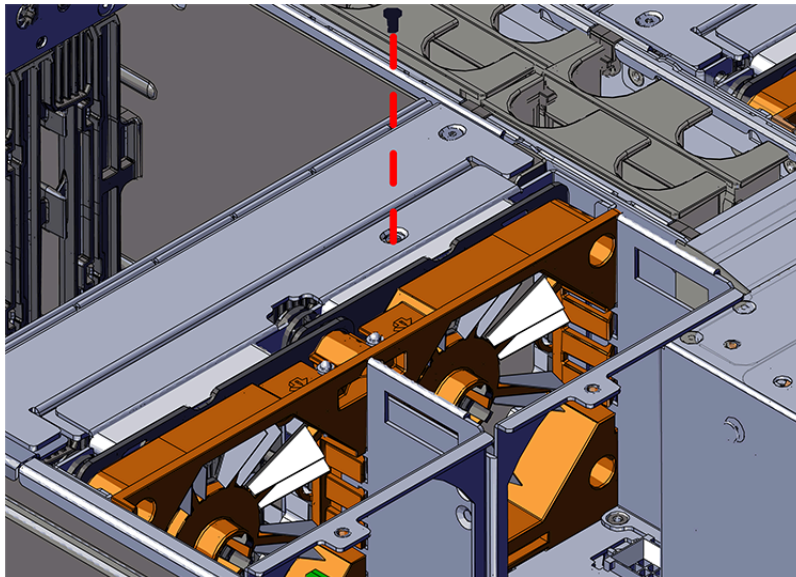
    b. Locate the pin that secures the outside of the fan bay to the chassis and pull the pin out and pull up on the fan bay until the cage is clear of the chassis.

Note: The fan bay is connected to the baseboard with a cable and does not need to be disconnected. When removing the fan bay to replace DIMMs, lay the assembly on the drive cage.

Figure 348: Fan Bay Pin
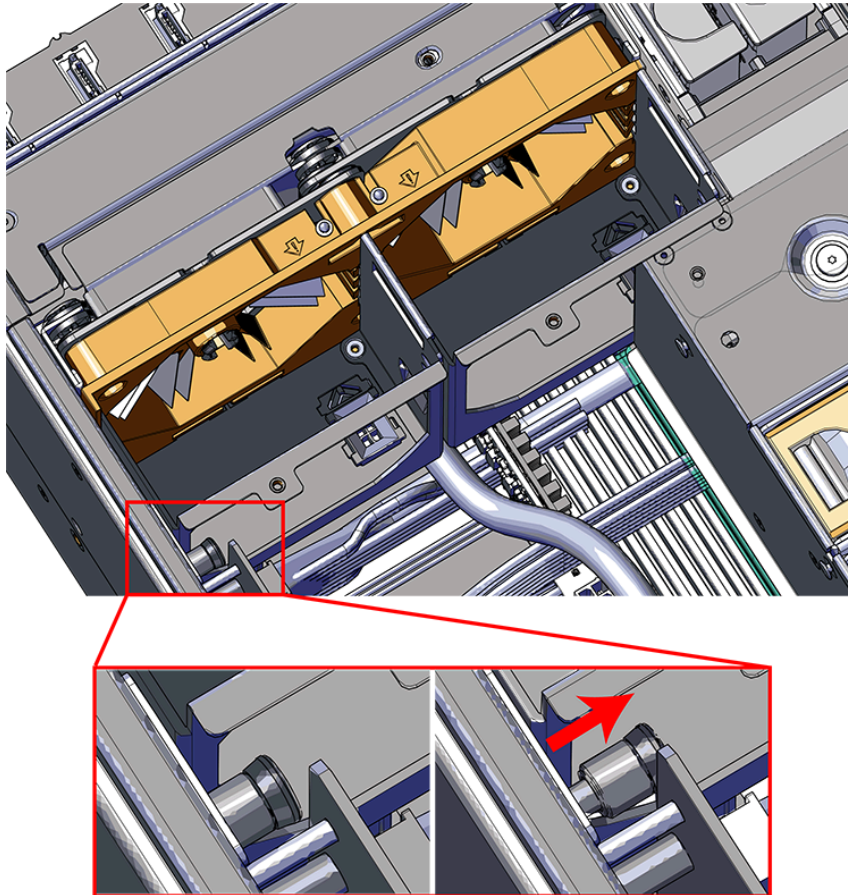
Figure 349: Removing the Fan Bay
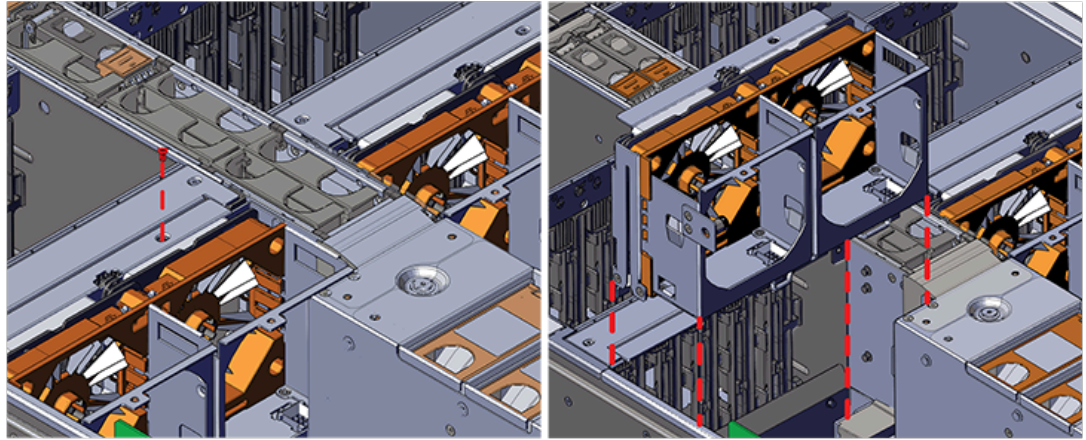
Step 25: Uninstall the remaining fan bay in the same manner as the first.

Step 26: Uninstall the DIMMs.

    a. Locate the DIMMs on both sides of the server.

    b. Carefully push apart on the DIMM ejector tabs located on either side of the DIMM slots.

Figure 350: DIMM Ejector Tabs
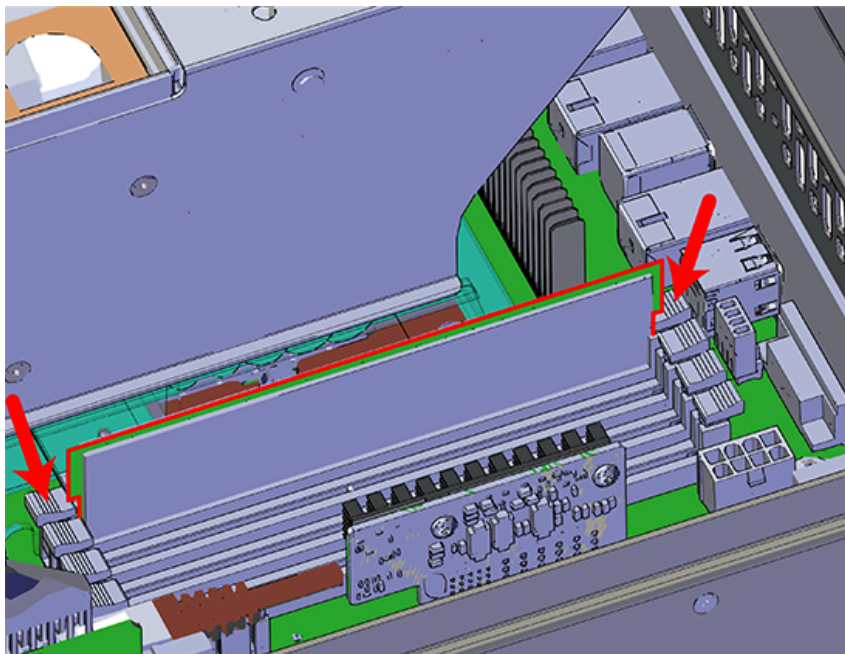
    c. Slide the DIMM out of the of DIMM slot and set it aside.

Figure 351: DIMM Removal
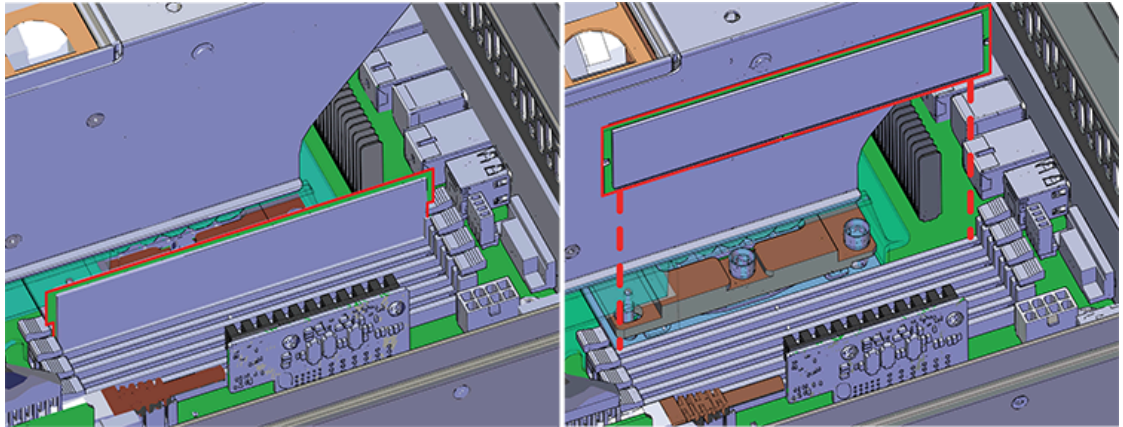
Step 27 : Uninstall the System Fan Bay.

    a. Loosen the captive screws that secure the system fan bay to the chassis using a T15 Torx Screwdriver until the cover comes loose. The screws will be retained within the System Fan Bay while uninstalling the part.

Figure 352: Loosening the System Fan Bay Captive Screws
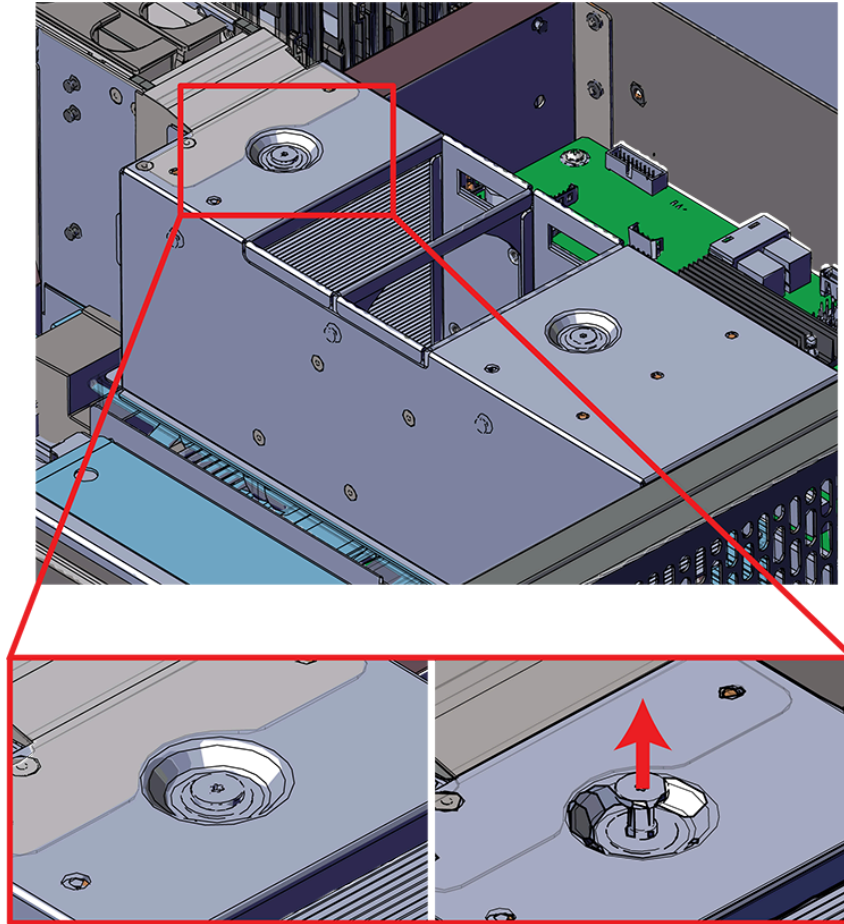
b. Slide the system fan bay out of the chassis and set it aside.

Figure 353: Removing the System Fan Bay
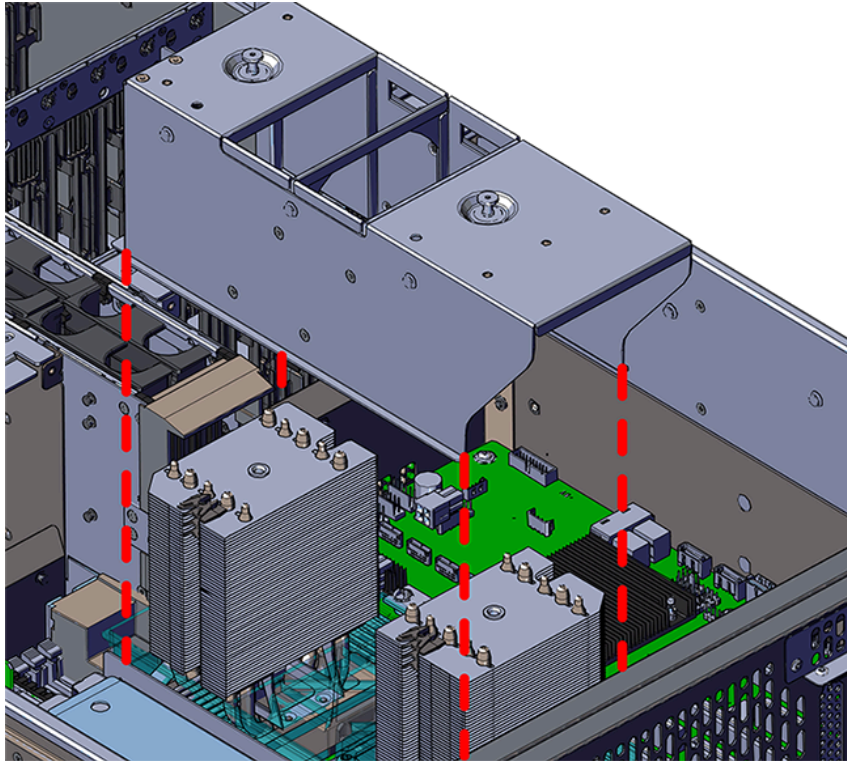
Step 28 : Uninstall the System Fan base.

   a. Slide the system fan base up and over the CPUs until clear of the CPUs. Set the system fan base to the side with cables still attached. The cables are long enough to remain connected during these steps.

Figure 354: Removing the System Fan Base (highlighted in red)
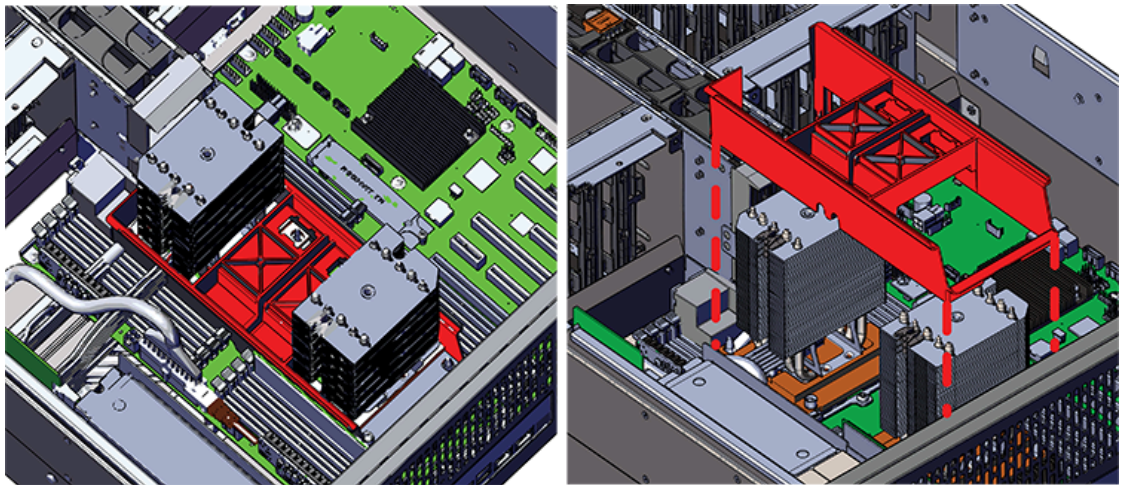
   b. Locate and remove the LED brackets that are attached to the Heat Sink.

Figure 355: Uninstalling the CPU LED Brackets
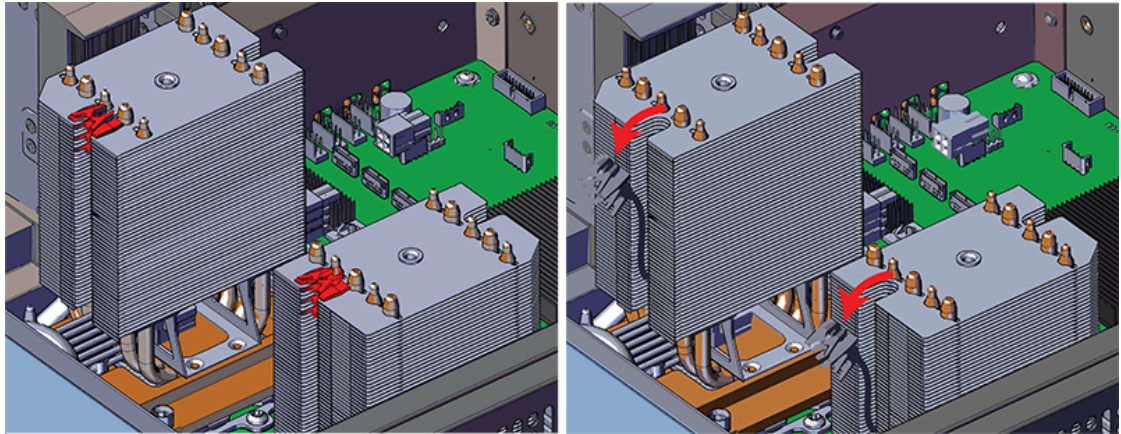
Step 29 : Uninstall the CPU and Heat Sink module.

    a. Locate the CPU and Heat Sink modules.

    b. The Heat Sink must be removed by loosening the Torx T30 screws in a specific order. Use the following diagram to determine the specific order.

Figure 356: Heat Sink Removal Order
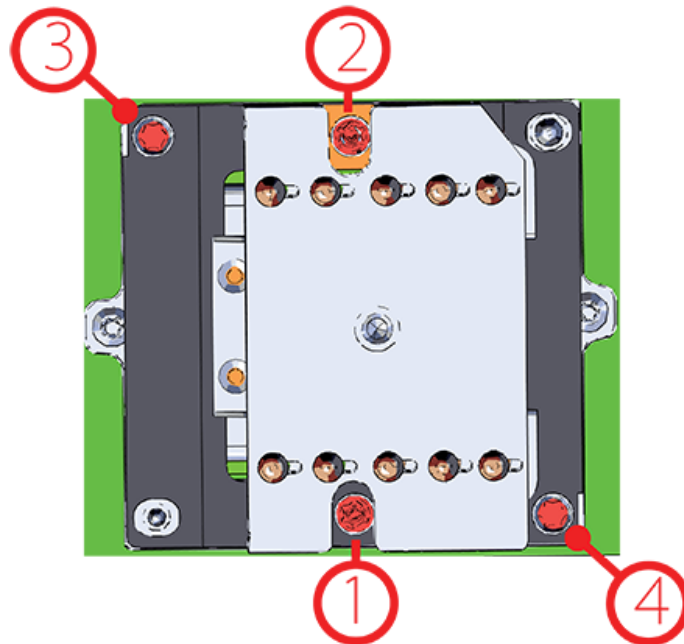
    c. Slide the Heat Sink clear of the socket alignment pins.

Step 30 : Uninstall the M.2.

    a. Locate the M.2 installed on the baseboard.

    b. Remove the Philips head screw that secures the M.2 to the baseboard.

Figure 357: M.2 Screw
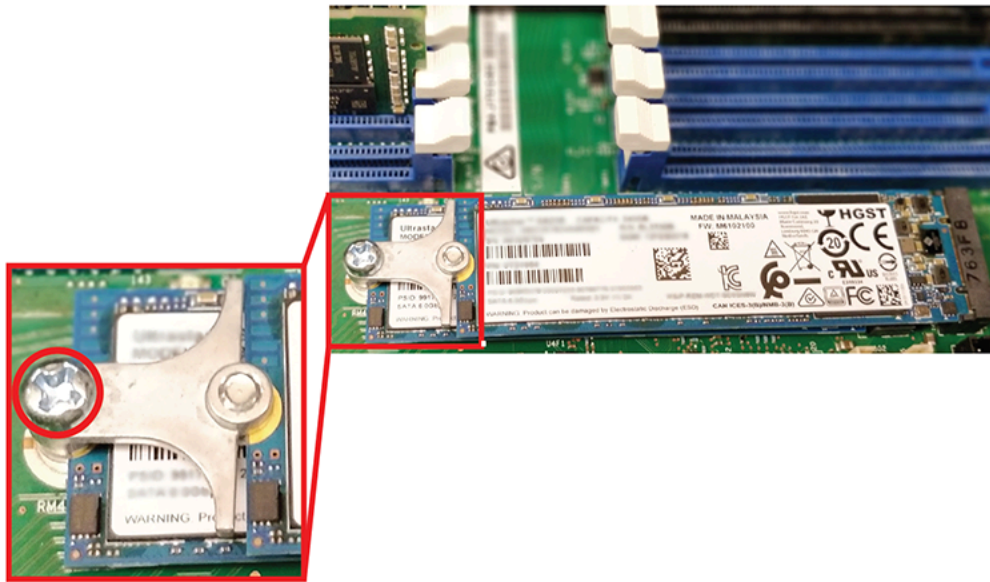
c. Pull the top M.2 out of the connector.

Figure 358: Uninstalling the M.2s

d. Repeat the previous substep to remove the bottom M.2.

Step 31: Uninstall the add-in card bracket.

a. From the rear of the enclosure, remove the eight screws that secure the add-in cards to the enclosure using a T10 Torx Screwdriver.

Figure 359: Add-In Card Screws

b. Remove the bracket from the end of the chassis.

Figure 360: Add-In Card Bracket
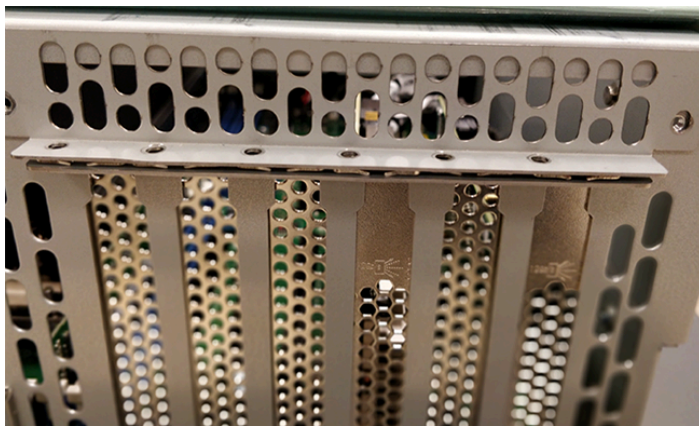
Figure 361: Add-In Card Bracket Removed
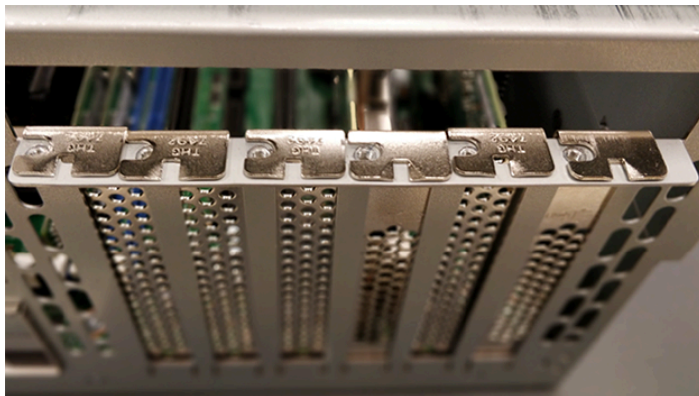
Step 32 : Uninstall the add-in cards.

    a. Locate the first add-in card.

    b. Remove all cabling from the add-in card.

Figure 362: Add-In Card Remove Cabling and Uninstall
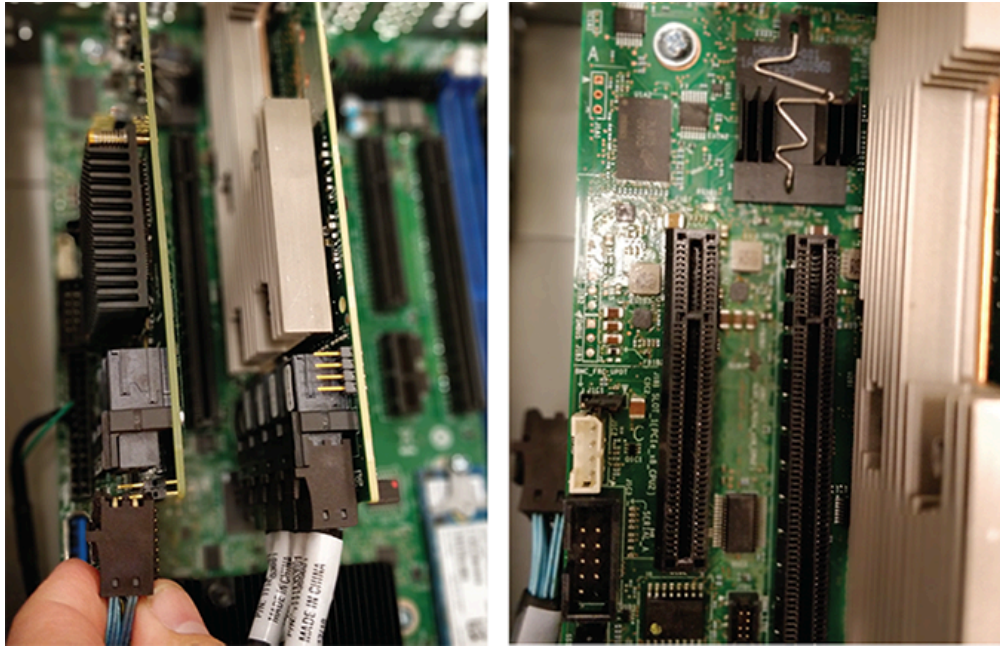
    c. Carefully pull up on the add-in card until it comes free from the connector on the baseboard.

Step 33 : Install the DIMMs.

    a. Remove the new DIMM from the packaging and hold it by the corners to avoid damaging the DIMM.

    b. Align the DIMM with the empty slot ensuring that it is facing in the correct direction.

Figure 363: Installing the DIMM into the DIMM Slot
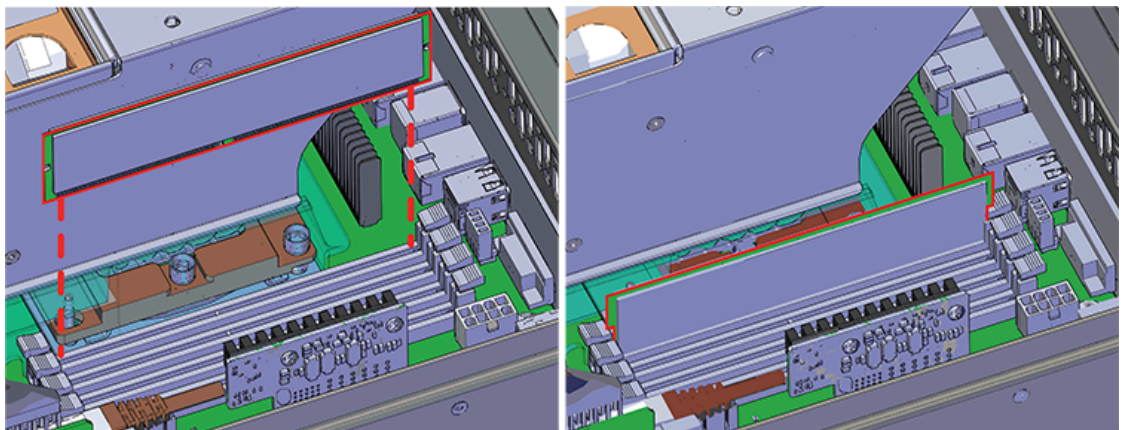
c. Firmly press the DIMM into the slot until the ejector tabs snap into place over the notches on either side of the DIMM.

Figure 364: DIMM Notches
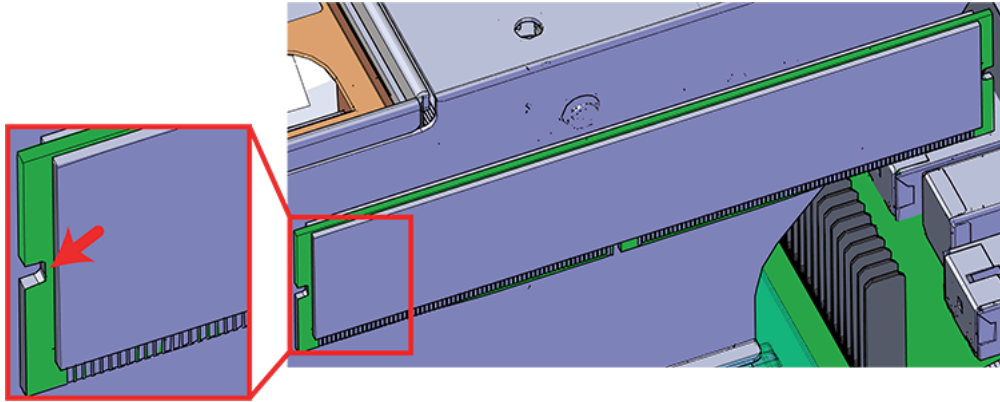
Step 34: Install the CPU and Heat Sink module.

a. Locate the socket alignment pin on the baseboard and the alignment hole on the Heat Sink.
b. Carefully place the CPU and Heat Sink module in position on the socket alignment pins.

Figure 365: Heat Sink Alignment Pins
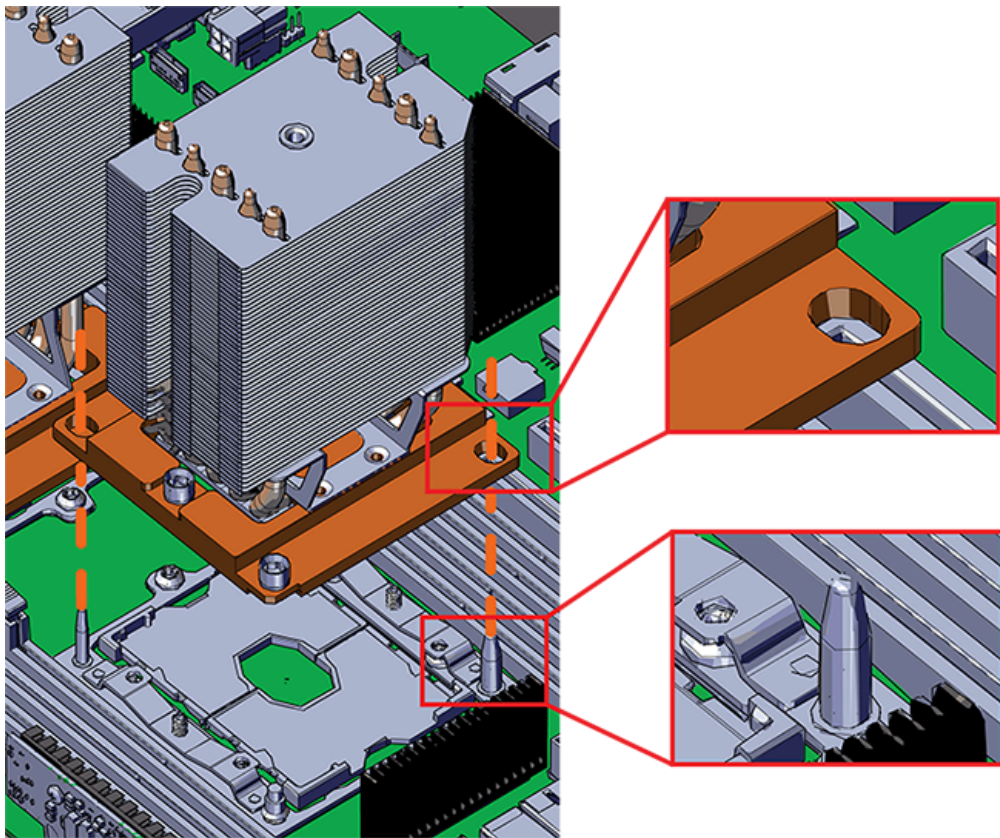
c. The Heat Sink must be installed by tightening the Torx T30 screws in a specific order. Use the following diagram to determine the specific order.

> **Note:** The Heat Sink screws must be tightened to a torque setting of 12in.-lbs. Do not over-tighten. Over-tightening may cause damage to the parts.

Figure 366: Heat Sink Installation Order
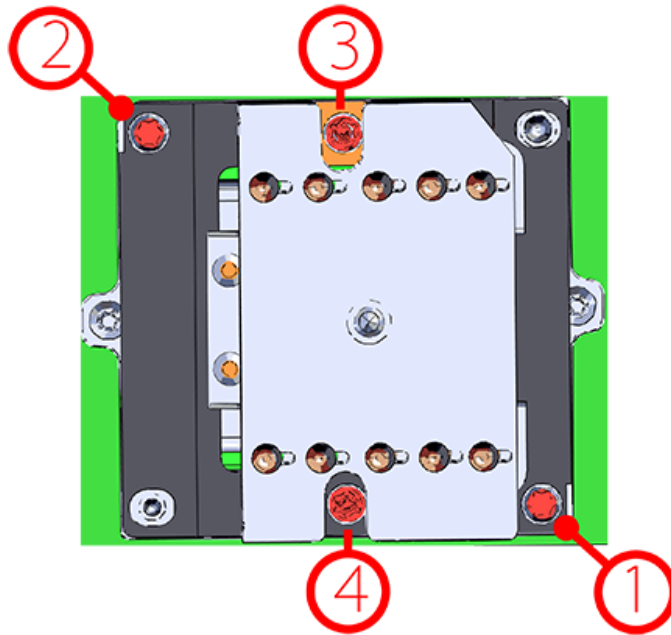
Step 35: Install the System Fan base.

a. Slide the system fan base down over the CPUs until the base rests on the baseboard.

b. Slide the LED cable and LED bracket into the Heat Sink channel and snap it into place at the top of the Heat Sink.

Figure 367: Installing the CPU LED Brackets
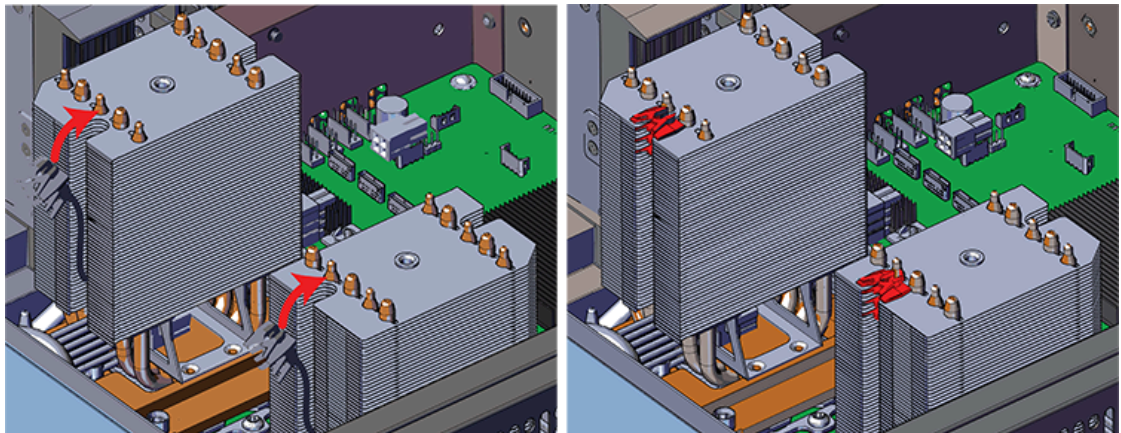
    c. Install the remaining LED bracket in the same manner as the first.

Step 36: Install the System Fan Bay.

    a. Slide the system fan bay down over the CPUs until the captive screws line up with screw holes on the Heat Sink.

    b. Lift the system fan flap and push in and tighten the captive screws until the system fan bay is secure.

Figure 368: Lift the System Fan Flap
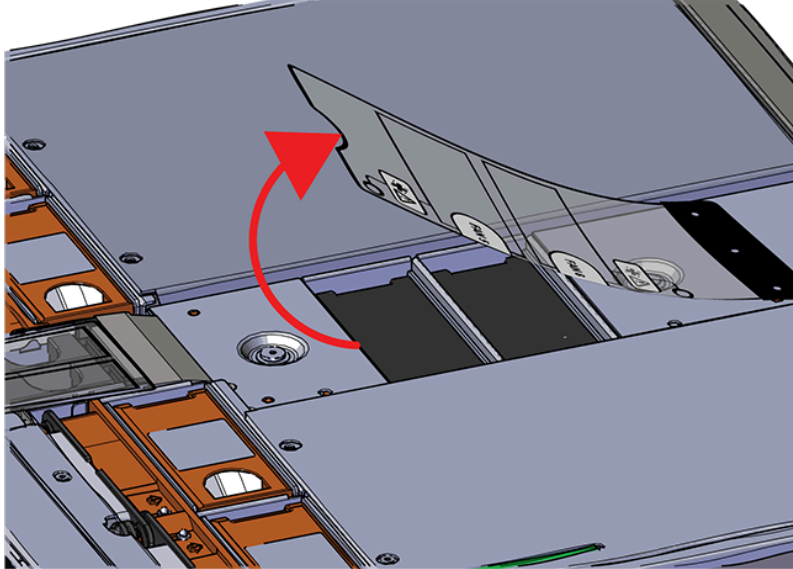
Figure 369: Installing the System Fan Bay Captive Screws
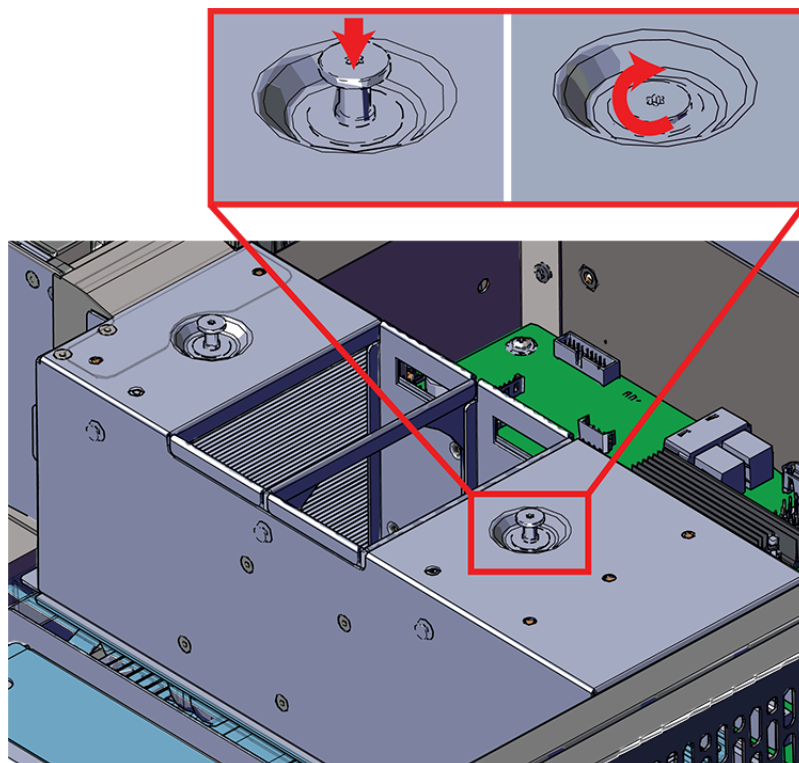
Step 37: Install the fan bay.

    a. Align the first fan bay within the location from which it was uninstalled.

    b. Slide the fan bay into the chassis taking care not to pinch or damage any cables.

Figure 370: Installing the Fan Bay
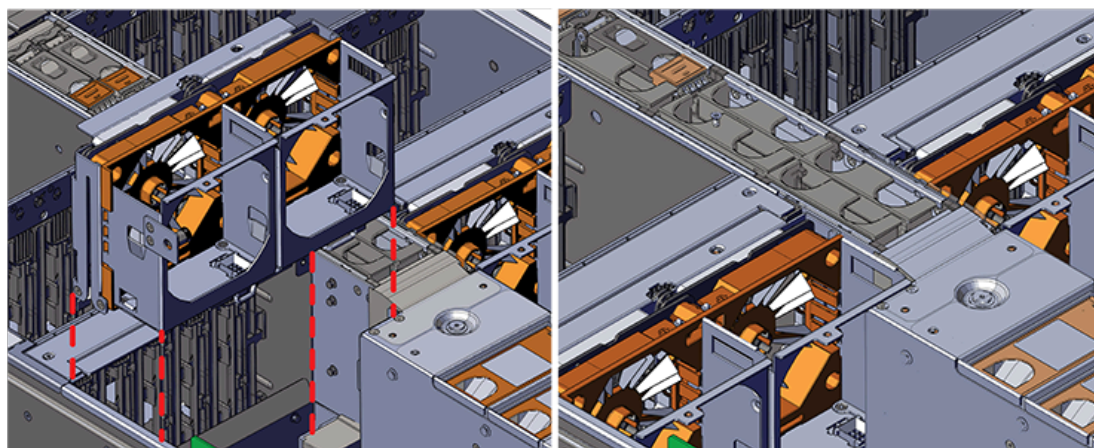
c. Ensure that the pin located on the inside of the fan bay is latched onto the chassis during the process of seating the fan bay. If the pin did not engage, use a Flathead screwdriver to disengage the pin by pulling it out and repositioning the fan bay until the pin engages with the chassis.

Figure 371: Fan Bay Pin Engaged
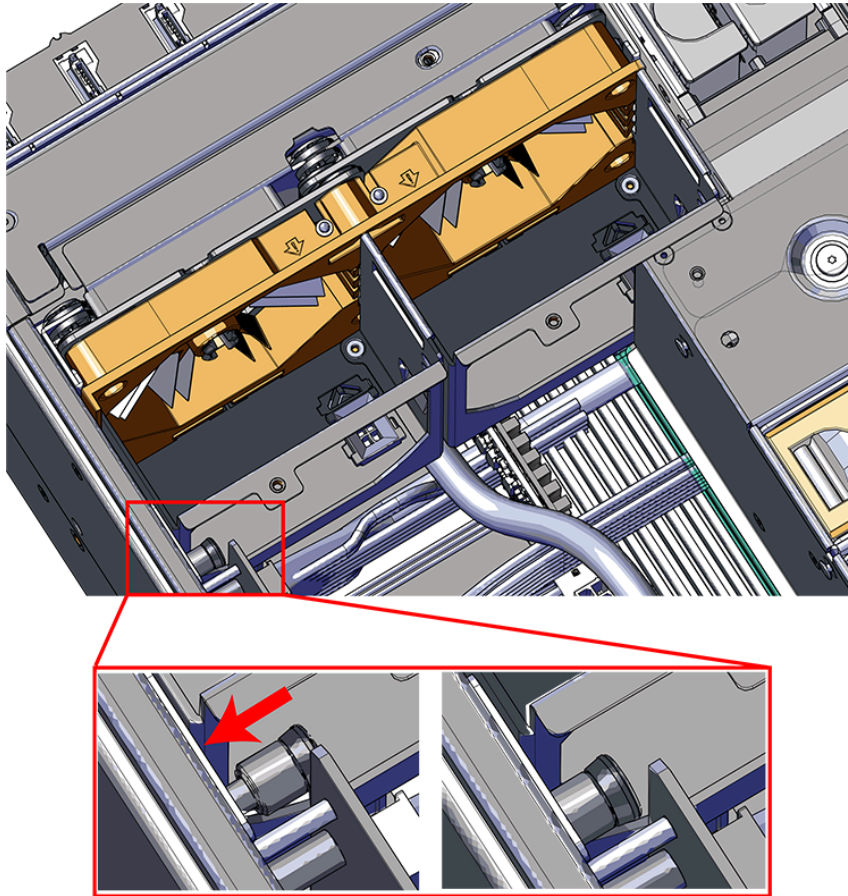
d. Install the screw that secures the mid-bulkhead fan cage to the chassis.

Figure 372: Fan Bay Screw
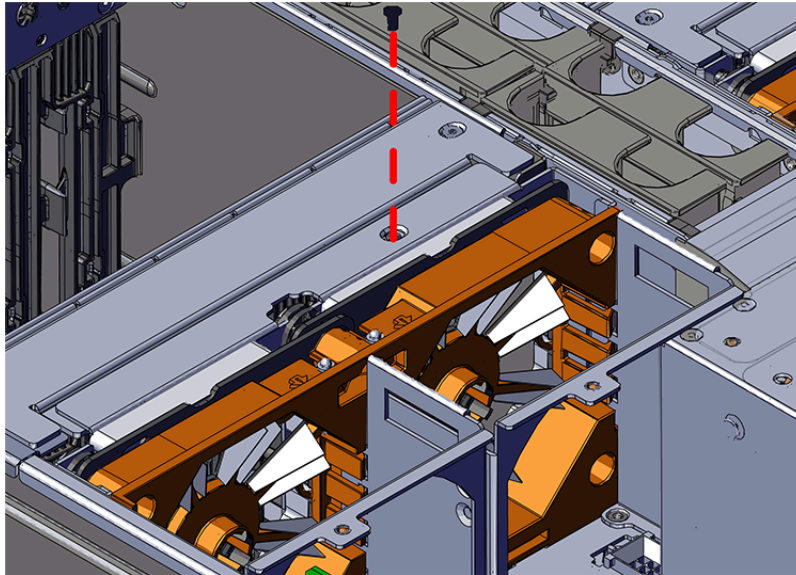
Step 38: Install the remaining fan bay in the same manner as the first.

Step 39: Install the M.2.

    a. Locate the M.2 connectors on the baseboard.

Figure 373: M.2 Connectors
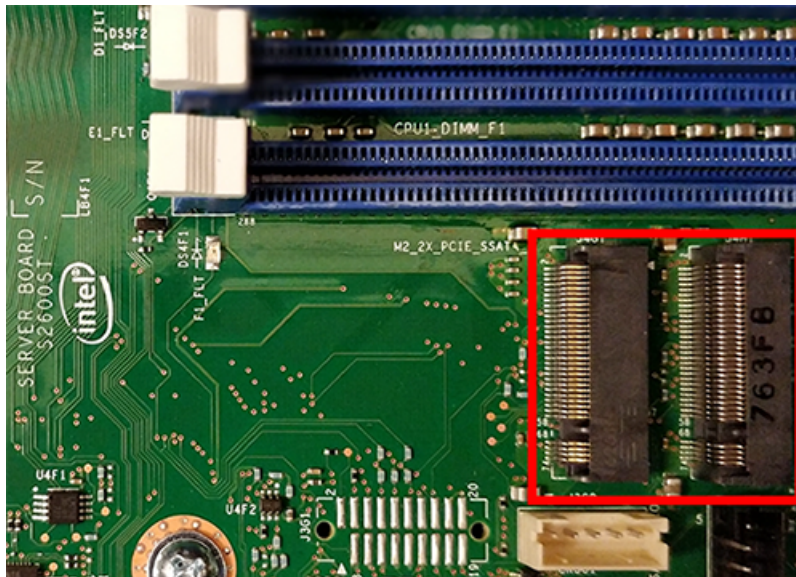
    b. Slide the card edge of the bottom M.2 into the M.2 connector on the baseboard.

    c. Slide the card edge of the top M.2 into the M.2 connector on the baseboard.

Figure 374: M.2 Install (Top)
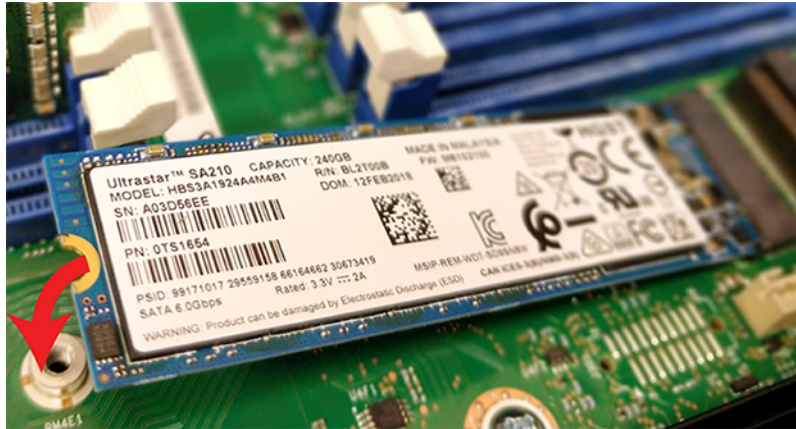
d. Secure both M.2s with the Philips head screw that held the failed M.2s.

Figure 375: M.2 Screw
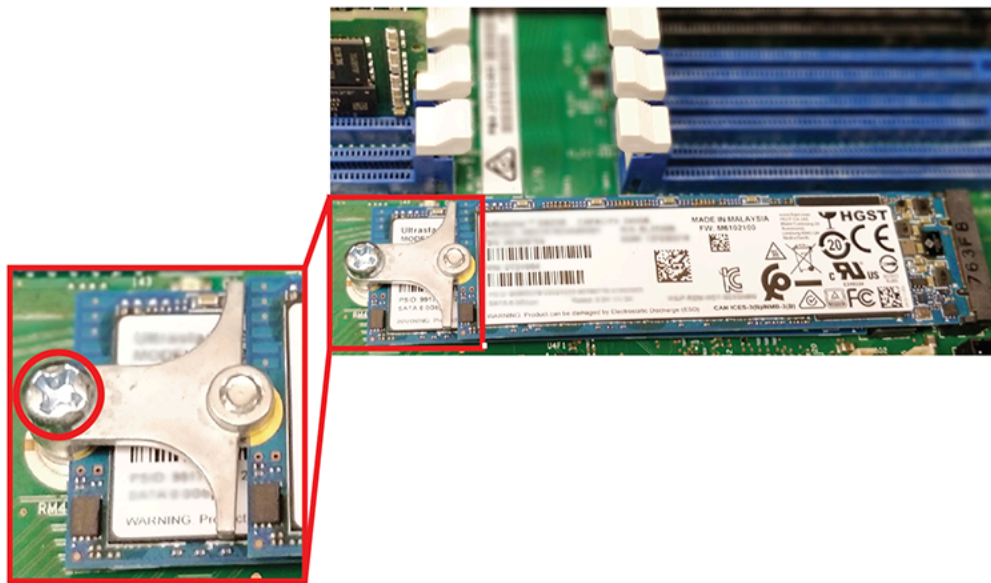
Step 40 : Install the add-in cards.

    a. Locate the connector for the add-in card being installed.

    b. Set the card edge of the add-in card on the connector and firmly press down until the add-in card is seated.

Figure 376: Add-In Card Install and Connect Cabling
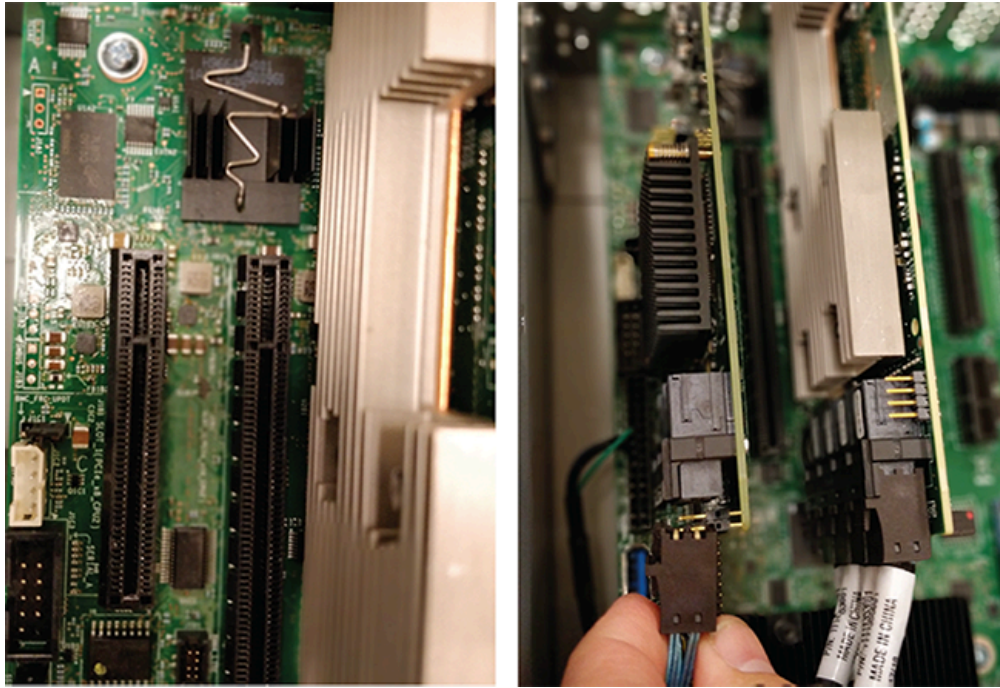
Step 41: Install the add-in card bracket.

    a. From the rear of in the enclosure, line the add-in card bracket up with the holes on the add-in cards.

Figure 377: Add-In Card Bracket Removed
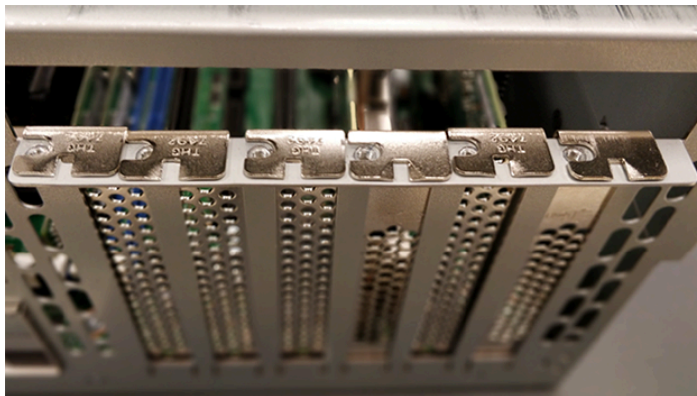
Figure 378: Add-In Card Bracket Installed
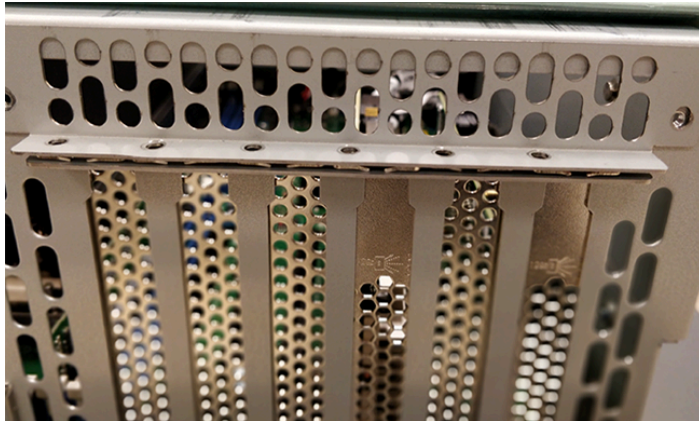
b. Secure the bracket to the chassis with the eight T10 Torx screws that held the bracket in originally.

Figure 379: Add-In Card Screws

Step 42: Install server cover panels.

    a. Align and press the server panel cover into place over the server bay.

> **Note:** The Formex material that the panel is made from is flexible and will allow for the panel to be flexed to fit back into its original placement.

Figure 380: Removing the Server Cover Panel
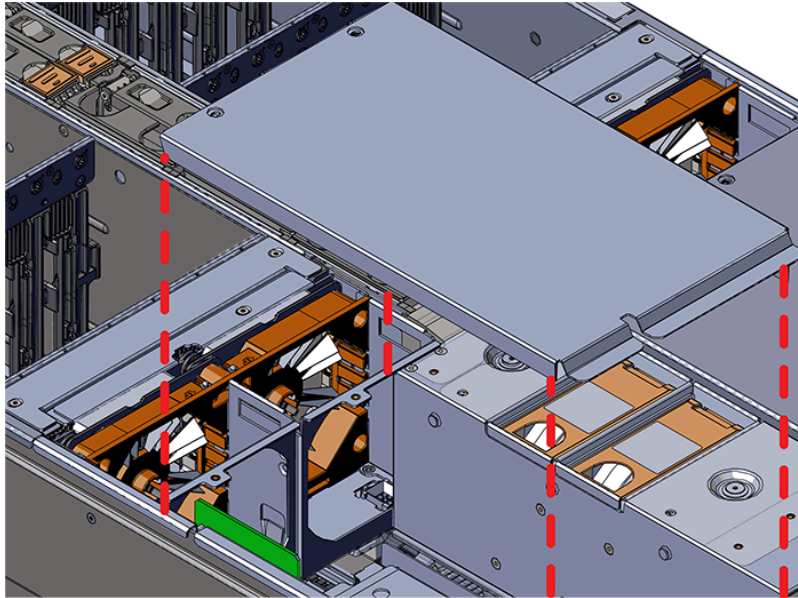
b. Secure the server cover panel using the original screws and a T7 Torx screwdriver.

Figure 381: Server Cover Panel Screws
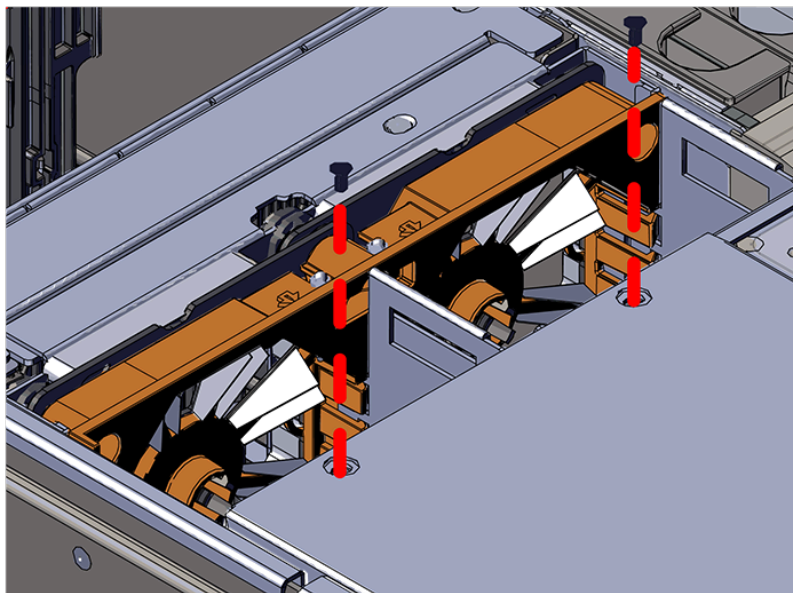
Step 43: Install the remaining server cover panel in the same manner as the first.

Step 44: Uninstall the inner rails from the sides of the chassis.

a. Unscrew the three Low-Profile M4 x 3.2mm Philips screws that attach the inner rails to the chassis using a #2 Philips head screwdriver.

Figure 382: Remove Inner Rail
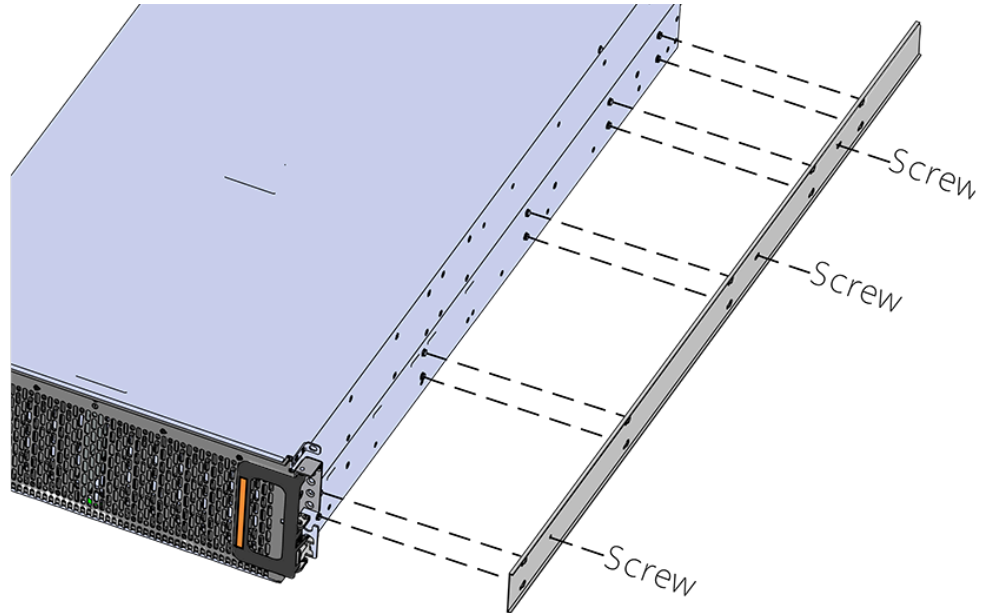
b. Locate and unlatch the springlock on the side of the inner rail.

Figure 383: Inner Rail Spring Latch
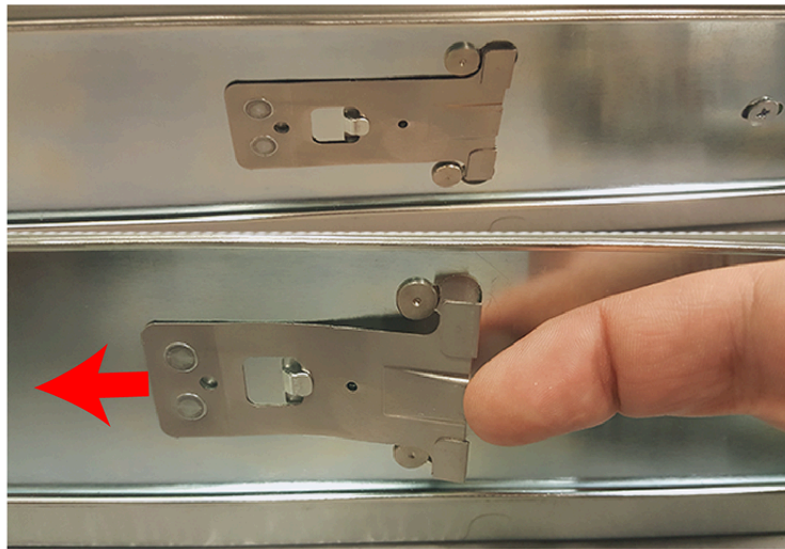
c. Slide the inner rail toward the front of the enclosure to unlock it from the pegs that secure it to the sidewall and pull it free.

⚠️ **Caution:** Always install the top cover onto the enclosure before installing the chassis into a rack. Not having the top cover installed may damage the alignment brackets.

Step 45 : Ensure the top cover is installed.

    a. From the rear of the enclosure, align the top cover with the grooves on the top of the chassis.

    b. Ensure that there is a good catch of the top cover by the chassis and slide it in all the way.

Step 46 : Install the inner rail onto the chassis making sure they are installed on the correct side. Each inner rail will read "R" for the right or "L" for the left embossed on the side that faces away from the chassis. Right and Left are with reference to looking at the front of the enclosure.

    a. Orient the inner rails so that the flat side is facing the enclosure and the side with the grooves is facing away from the enclosure.

    b. Align the keyholes on the inner rail to the mounting pegs on the side of the enclosure and press the inner rail flush against the chassis. If the keyholes don't line up with the pegs, flip the rail length-wise to see if this will align them.

Figure 384: Inner Rail Attachment
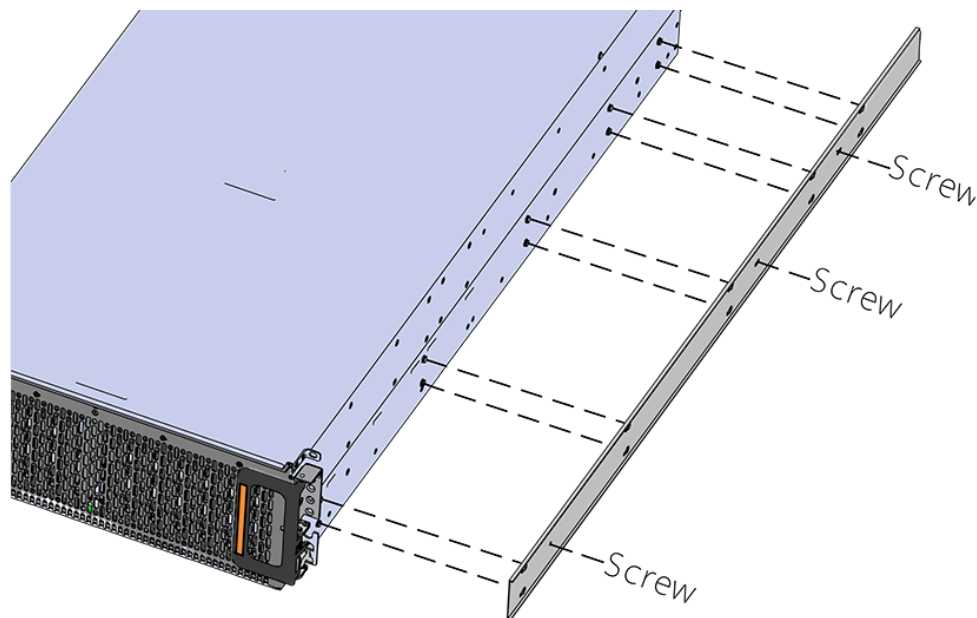
    c. Slide the inner rail toward the rear of the chassis to lock it in place. There will be an audible click and the mounting pegs will cover the front part of the keyhole.

Figure 385: Slide Inner Rail
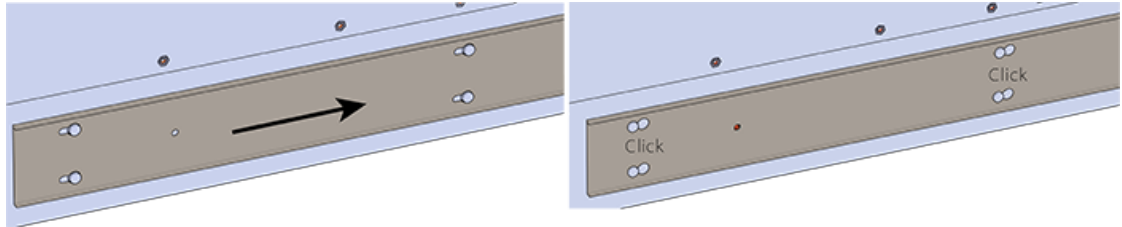
d. ⚠️ **Caution:** When installing the inner rail onto the chassis, make sure to only use the special Low-Profile M4 x 3.2mm Philips screws provided in the accessory kit with the CMA. These screws should be tightened to .90-1.12 Nm / 8-10 in-lbf using a # 2 Philips Screwdriver. These screws are specially designed for this purpose. Using unapproved screws could cause damage to the slides inside the rail.

Install the three special low-profile M4 x 3.2mm Philips screws provided to secure the inner rail to the chassis.

e. Follow these steps for the second inner rail on the opposite side of the enclosure.

Step 47: Extend the mid-rails out of the rack so that they are protruding from the front of the rack and the safety latches engage.

Figure 386: Extend Mid-Rails
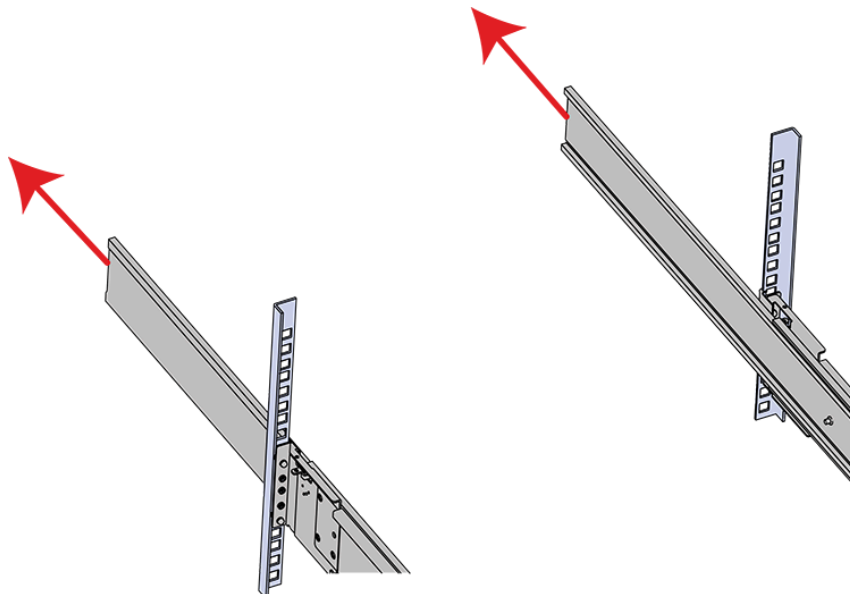
Step 48: Install the chassis into the rails.

a. Extend the bearing plates on the inside of the mid-rails until they are fully forward (detent has engaged). This prevents potential damage due to improper mating of the rails.

Figure 387: Bearing Plate

b. ⚠️ **Caution:** This step in the installation requires a minimum of 3 individuals to install safely, two to lift and one to guide the others who may have difficulty seeing because the enclosure is in the way. Ensure that the appropriate measures are taken to safely support the enclosure during installation. The enclosure MUST have no drives installed and requires a two person team lift to install. **Do not attempt to lift the system if it is fully populated with drives.** The only case in which the system may be installed or removed with the drives populated is if the facility has a lift that is rated to handle the maximum weight of the fully loaded system.

In preparation to perform a team lift, position one individual on each side of the enclosure (to lift) and a third individual standing at the protruding rack rails (to guide the chassis to mate with rack rails).

c. Team-lift the enclosure until the inner rails (which are attached to the chassis) align with the extended mid-rails (which are attached to the rack), and guide the inner rails on the chassis to mate with the rack rails.

Figure 388: Installing the Chassis
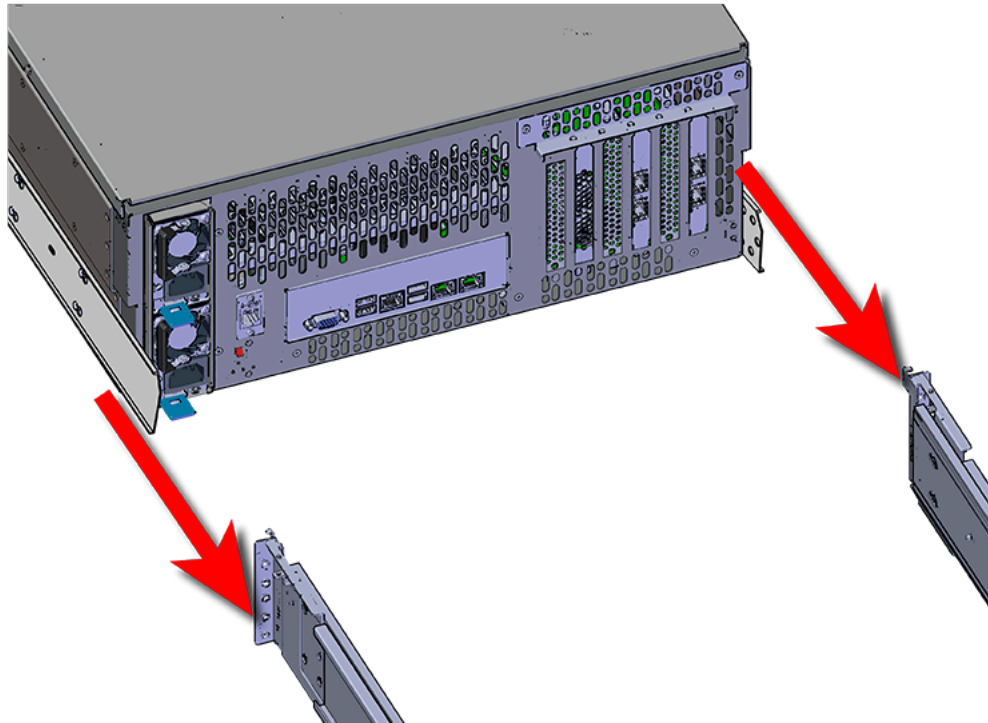
d. Once the rails are mated properly, slide the enclosure into the rack until it is stopped by the safety catch on the rails. Push the release lever on the safety latch (located on the side of each of the rails), and push the enclosure the rest of the way into the rack.

Figure 389: Safety Latch Release
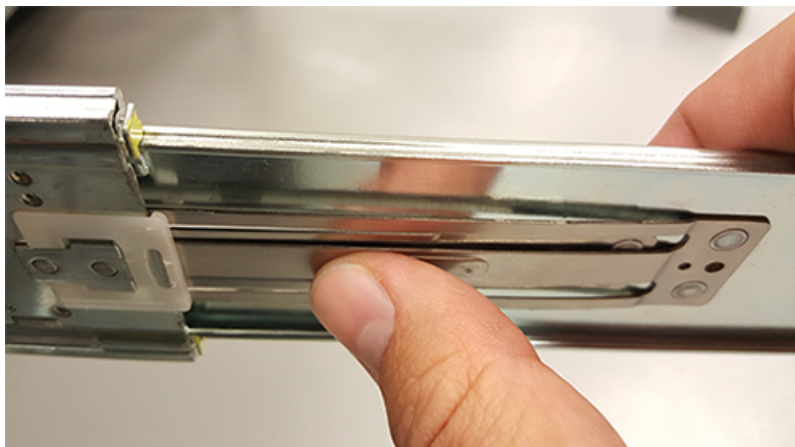
e. As the chassis is slid into the rack, position one installer at the rear of the rack to ensure that the pegs on the sides of the cover will slide correctly into the rear cover alignment brackets on both sides of the rack. If the chassis does not install smoothly or snags, check that the rear cover alignment brackets are not interfering with the chassis sidewalls, and try again.

Step 49 : Secure the chassis top cover to the rack using the captive M5 thumb-screws as shown in the following image. Use a T15 Torx screwdriver, and tighten the screws to 3.38-3.61 Nm / 30-32 in-lbf.

Figure 390: Cover Retention Screws
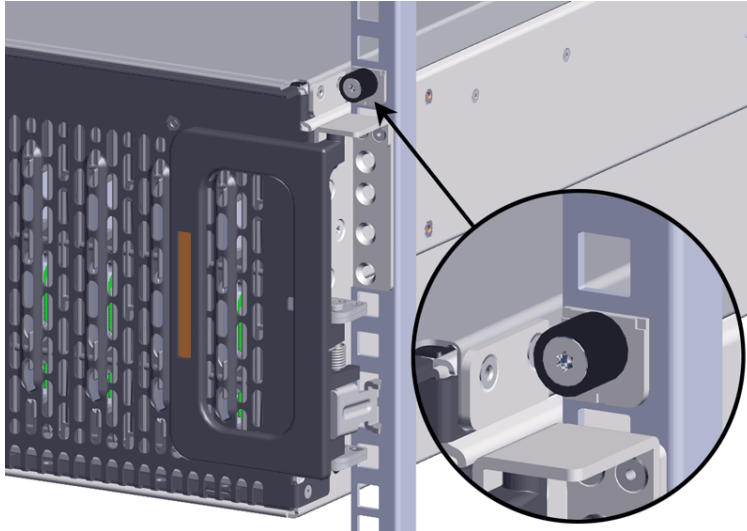
Step 50 : Now that the chassis is installed, test the installation by sliding the enclosure in and out of the rack a minimum of three times. If the enclosure binds, catches, or displays any incorrect motion or behavior repeat the installation.

> **Note:** Adjustments of the vertical rack rails may be required to fix any issues that may occur.

Step 51 : Install the CMA(s).

> **Note:** CMA has one arm, to be installed at the lower position. This arm should have the elbow on the left side.

a. Orient the CMA so that the elbow is on the left hand side.
b. Attach all three of the connectors to the brackets on the rails. There should be one at the elbow side and two at the other end.

Figure 391: CMA Orientation
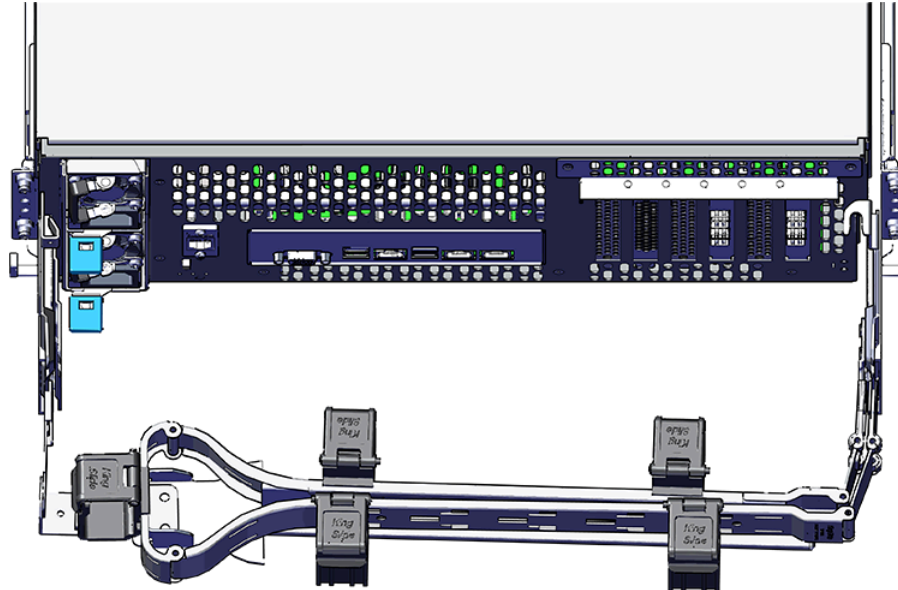
c. Slowly slide the enclosure forward to ensure the arm is operating properly, then slide it back into the rack.

Step 52 : Grasp both handles at the front of the enclosure and pull with even pressure to extend the chassis out of the rack until it is stopped by the safety latches. The safety latches will prevent the enclosure from coming out of the rack completely and the cover will remain in the rack attached to the rear alignment brackets.

Figure 392: Chassis Handle Operation
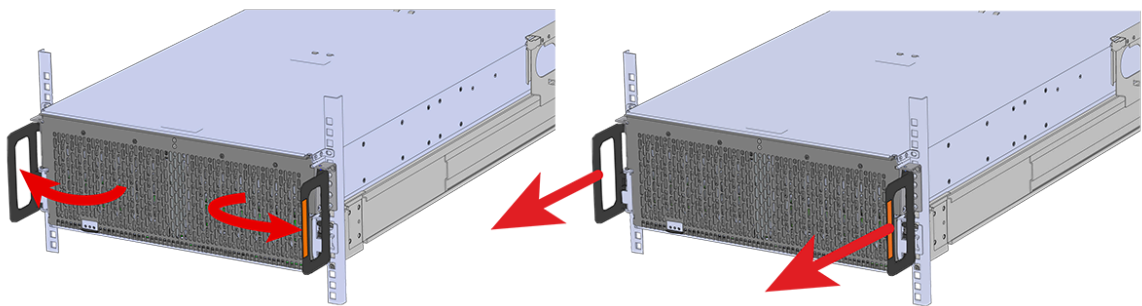
Step 53 : Install the IOM.

⚠️ **Caution:** If a pin on the IOM's internal connectors is bent or damaged, the IOM will have to be replaced. For this reason it is imperative that the IOM is not forced into position, that it is inserted straight, and that the directions for installing the IOM are followed exactly.

a. Ensure that the handles on the IOM are not latched. To unlatch them, press the latch release in the direction shown in the following image.

Figure 393: Unlatching IOM Handles
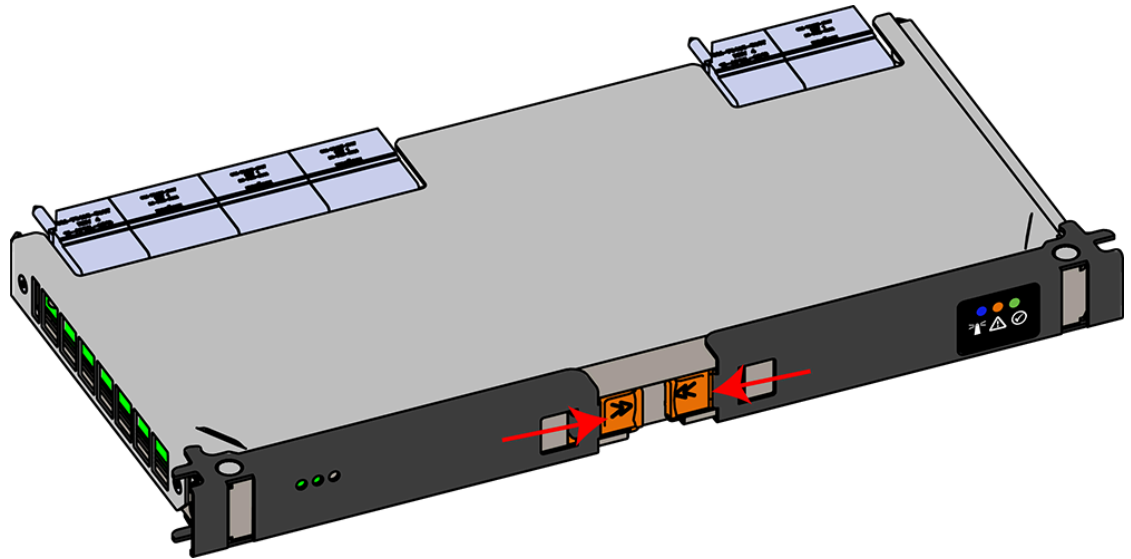
b. Align the IOM with the empty slot on the top of the chassis so that the arrow on the IOM latch release is facing toward the side shown in the following image.

c. Slowly lower the IOM into the empty slot while being careful to keep it level. Do not to force it.

Figure 394: Installing the IOM
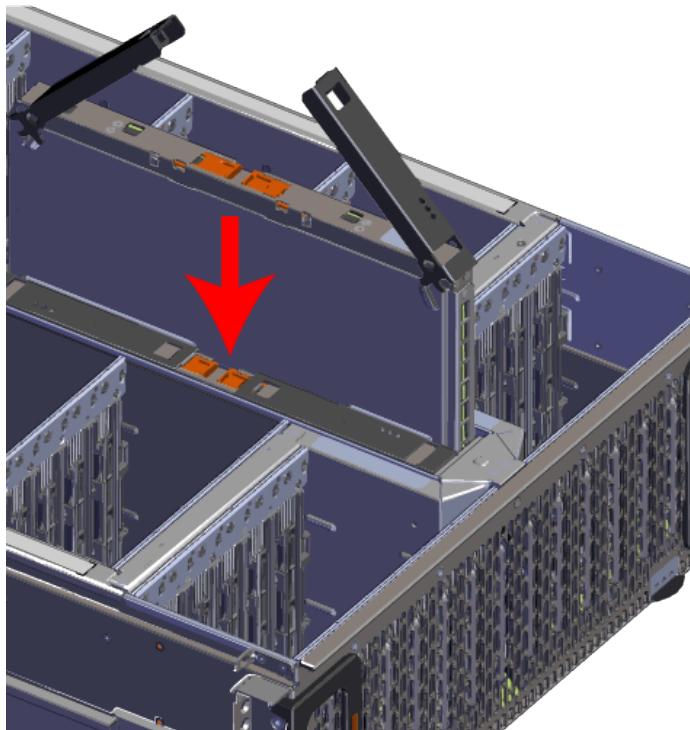
    d. When the IOM is lowered fully, apply light pressure with both hands evenly on the IOM body, not the handles, to seat the IOM in the connector. If the IOM won't seat correctly, **DO NOT FORCE IT**. Instead, back the IOM out, check the pins to make sure none are damaged, and try again.

    e. Once the IOM is seated properly in the slot, close the handles until they latch closed.

Step 54: Install the drive blank in slot B using the same method as installing the IOM.

Step 55: Install the System SSD.

    a. Lift the center channel flap and orient the assembly so that the latch release button is facing toward the rear of the system.

Figure 395: Lift the Center Channel Flap
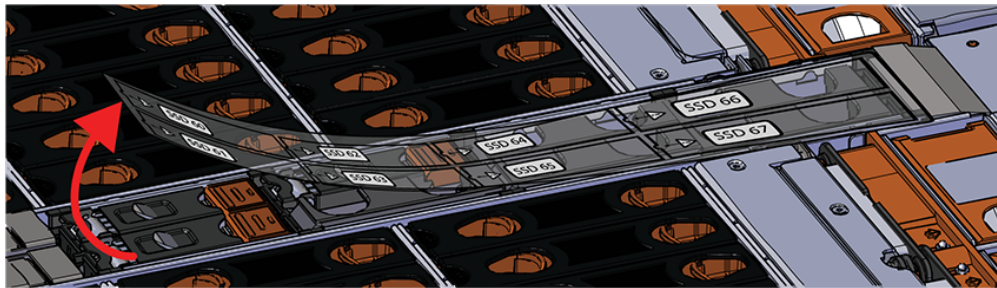
    a. Align the System SSD with the empty drive slot and lower it slowly into the slot. Do not force it.

Figure 396: System SSD Install
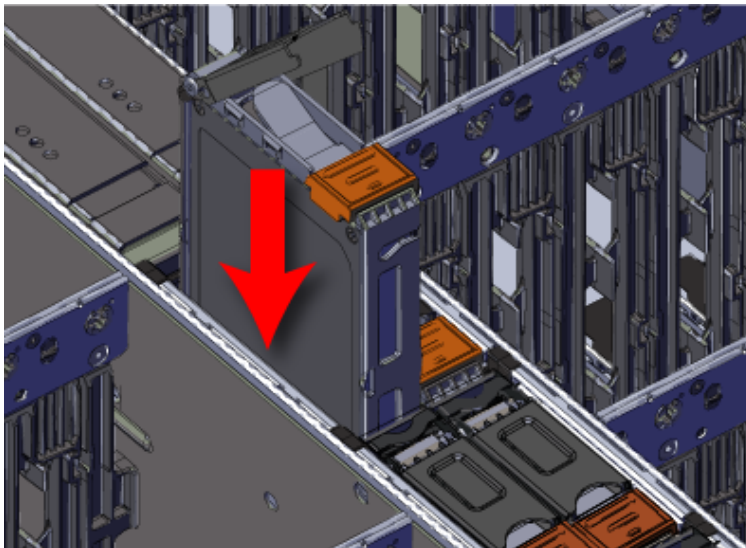
    a. Once the SSD will not lower any further, press the handle down until it clicks into place.

Figure 397: System SSD Carrier Latching Closed
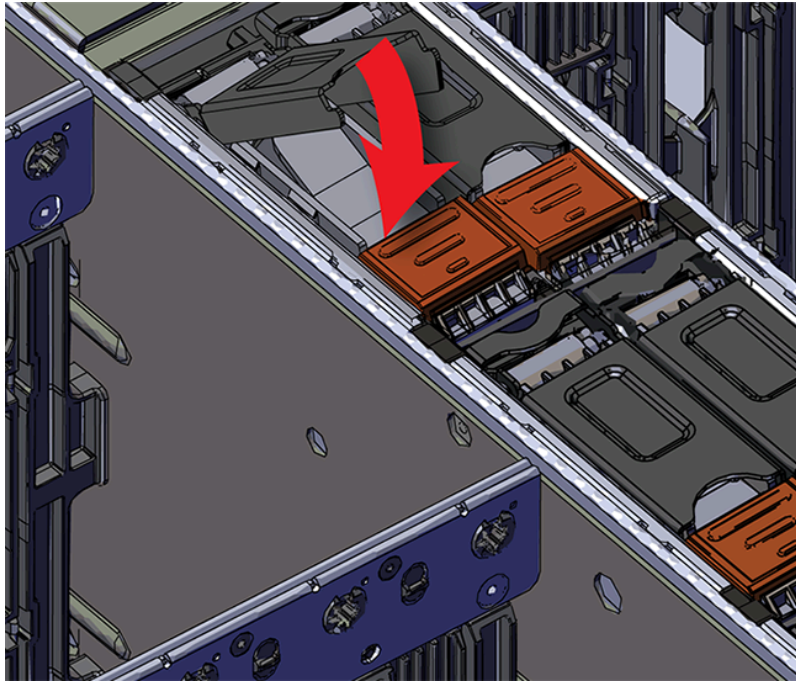
Step 56 : Install the rest of the System SSDs in the same manner as the first.

Step 57 : Install the System Fan.

    a. Lift the System Fan flap and look inside the empty slot that will receive the System Fan and orient the System Fan so that the connector on the bottom of the fan is on the proper side.

Figure 398: Lift the System Fan Flap
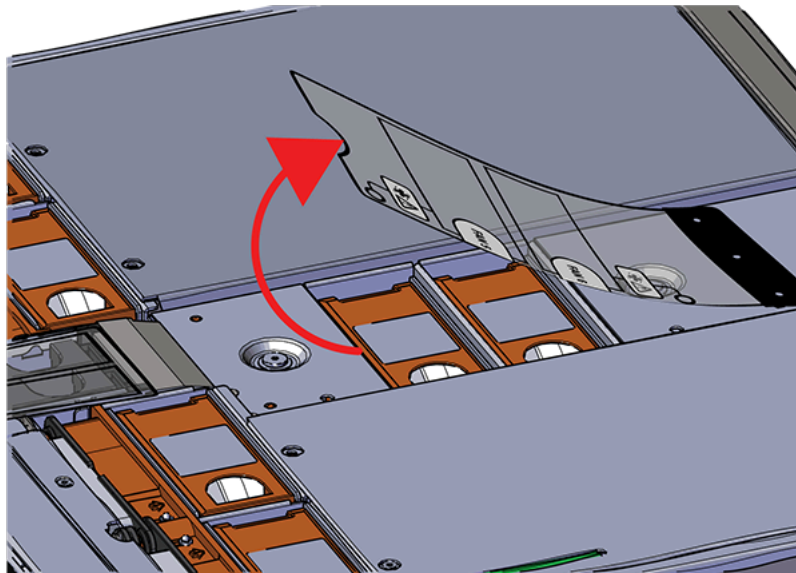
    b. Lower the fan down into the empty slot. Do not force it.

Figure 399: Installing a System Fan
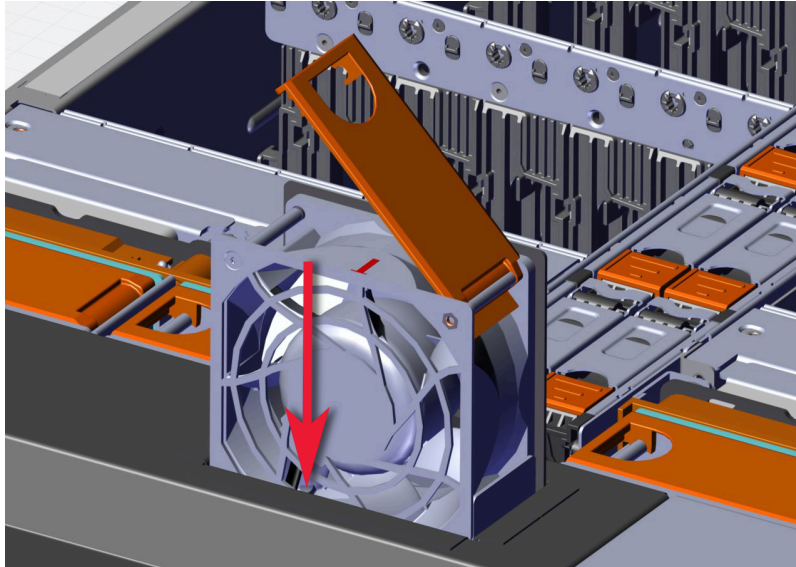
c. When the fan is fully inserted and the connectors are mated properly, close the housing cover clip as shown in the following image.

Figure 400: Latching the Fan Housing Closed
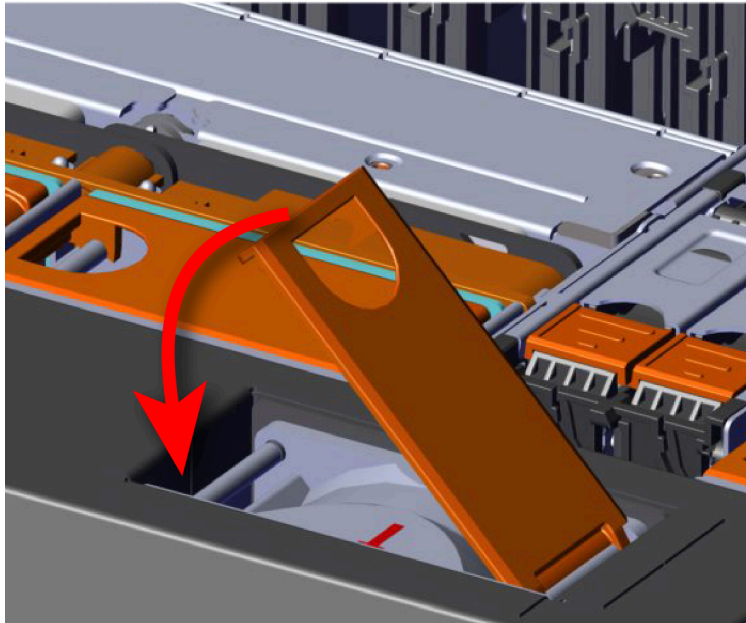
Step 58: Install the remaining system fans in the same manner as the first.

Step 59: Install the 3.5in HDD Assembly.

> **Note:** The 2.5in SSD Assembly is installed in the same manner as the 3.5in HDD Assembly. For instructions on assembling the 2.5in SSD Assembly, see Operating the 2.5" Drive Carrier *(page 60)*.

a. Ensure that the enclosure has been pulled out of the rack until the rail latches engage.
b. Find the LED pointer on the top of the drive carrier. This pointer should point toward the front of the unit as shown in the following image.

Figure 401: LED Pointer Orientation
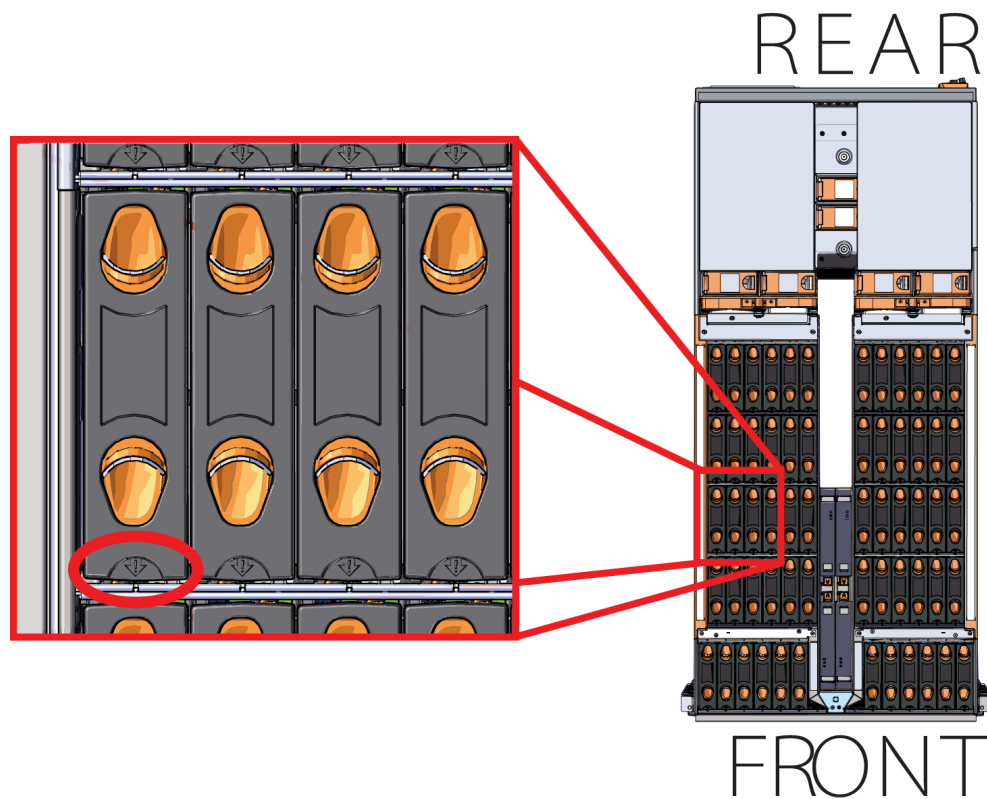
c. Align the drive with the empty slot that will receive it. Lower it into the slot, making sure it stays level and does not snag.

Figure 402: Installing a 3.5in HDD Assembly
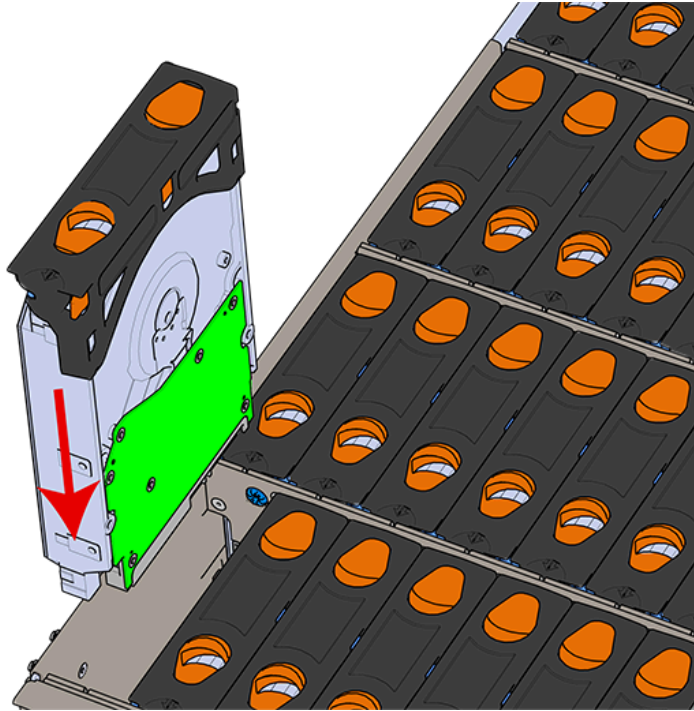
d. Pinch the latch release and carefully press downward to seat the 3.5in HDD Assembly the rest of the way.

Step 60: Install each drive in the place it was removed from by following the labels or marks that were added earlier.

Step 61: If the chassis is being installed into a rack that will be shipped fully assembled, you **must** install eight (four per side) of the included M5 x 12mm T15 Flat Head Torx screws into the two brackets at the front of the chassis in the following locations. These screws should be tightened to 3.38-3.61 Nm / 30-32 in-lbf using a Long T15 Torx Screwdriver. If this chassis will not be installed into a rack for shipping purposes, skip this step and move on to the next one.

Figure 403: Shipping Bracket Screw Locations
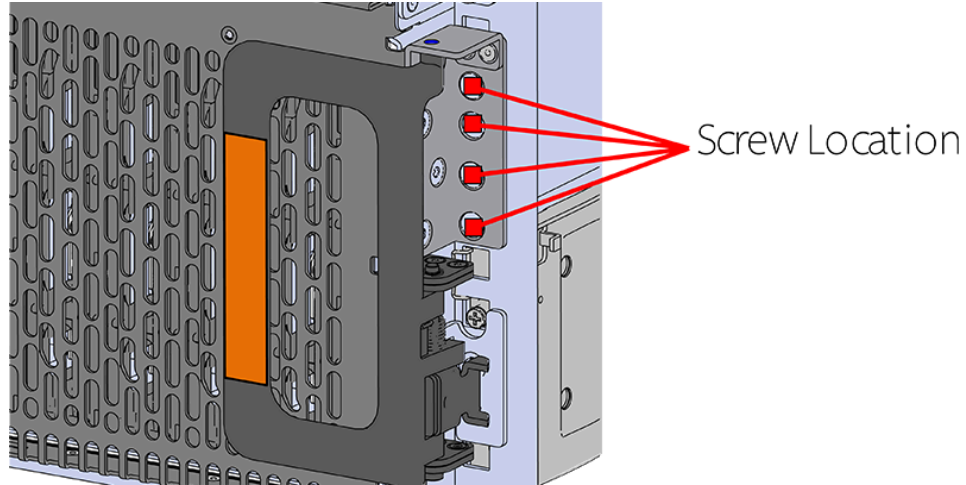
Figure 404: Shipping Bracket Screw Locations (CMA Lite)

Step 62: Install the PSU.

> **Note:** The Artesyn PSU requires 3000 series firmware or later.

a. Align the PSU in the orientation shown in the following image.
b. Slide the PSU into the slot until it seats fully into the chassis.

Figure 405: Installing the PSU
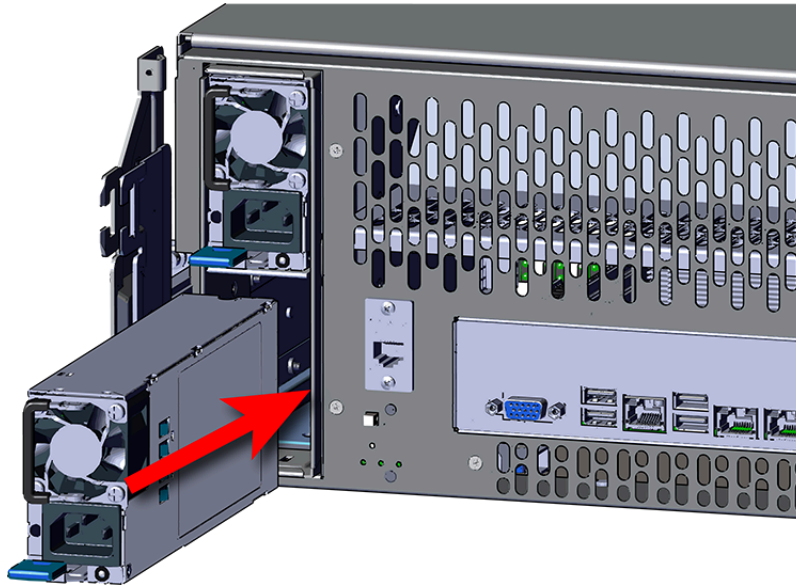
c. Plug the power cable into the receptacle at the back of the PSU.

d. Attach the cable retention mechanism.

Loop the retention clip around the power cable and pinch it until the clip catches and locks in place. Then slide the retention clip forward until it stops near the cable connector. Doing this will ensure that the retention clip functions properly in the event the cable is pulled on for some reason.

Figure 406: Cable Retention Clip
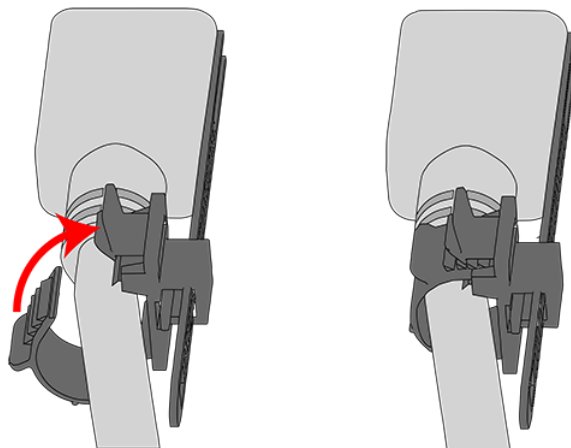
Figure 407: Cinching Cable Retention Clip
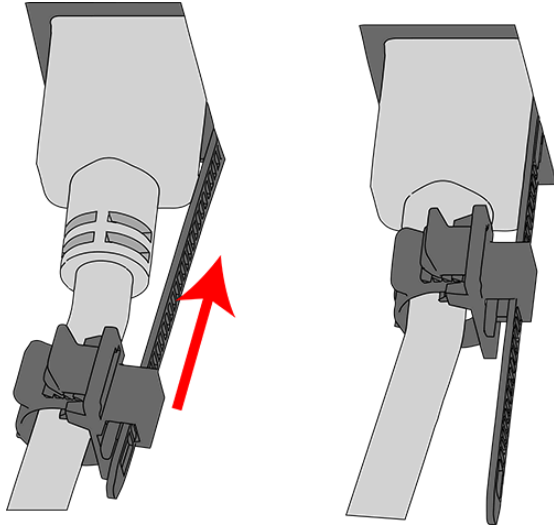
Step 63: Install the second PSU.

Step 64: Install the crossbar onto the CMA mounting bracket.

a. Align the crossbar with the mounting peg facing down and pointing toward the CMA mounting bracket.

b. Insert the peg on the underside of the crossbar into the slot on the CMA mounting bracket.

c. Swing the crossbar so that the thumbscrew lines up with the mounting hole on the opposite side of the enclosure.

d. Press the crossbar against the CMA mounting bracket and secure the crossbar in place by pressing and turning the thumbscrew clockwise until snug.

a. Check that the crossbar is fully secured to the CMA mounting bracket by pulling on the bar to ensure it does not move.

Step 65: Cable the CMA(s).

CMA Standard:

a. Unlatch the elbow side of the arm(s) by pressing the blue button labeled "push," and then swing the arm(s) open.

b. Open all of the baskets.

Figure 408: Open Baskets

- **c.** Route all of the cables being connected to the enclosure through the open baskets.
- **d.** Close all of the baskets.
- **e.** If the Ultrastar Serv60+8 is being installed in a rack and will subsequently be transported inside that rack, it is important to use the included cable tie to wrap the CMA bundle to ensure it does not get damaged during transport. If the Ultrastar Serv60+8 is instead being installed where it will be operated, skip this step. Remember to remove the cable ties after the enclosure has reached its final operational location.
- **f.** Reconnect the arm at the elbow to the connectors on the rail.

CMA Lite:

- **a.** Press the blue latch button labeled "push" to unlatch the elbow side of the CMA arm, and then swing the arm open.
- **b.** Open all of the baskets.

Figure 409: Open Baskets

c. Gather the SAS, power, and Ethernet cables for installation.

> **Note:** Route all cables to IOM A (left hand side looking at the rear).

d. Route all of the cables being connected to the enclosure through the open baskets.

e. Close all of the baskets.

f. If the Ultrastar Serv60+8 is being installed in a rack and will subsequently be transported inside that rack, it is important to use the included cable tie to wrap the CMA bundle to ensure it does not get damaged during transport. If the Ultrastar Serv60+8 is instead being installed where it will operated, skip this step. Remember to remove the cable ties after the enclosure has reached its final operational location.

g. Reconnect the arm to the rail by the connector at the elbow.

Step 66: Test for binding in the extension of the arm by gently pulling the enclosure out of the rack, ensuring the cables extend properly and that the system doesn't bind at all. If it does, examine the point at which the binding occurred and adjust the seating of cables in the baskets, check the connections to the rails, and examine the joints of the arm to ensure that they are all functioning properly.

Step 67: Make sure the CMA(s) is in operational position by folding the arm(s) in toward the enclosure and attaching the elbow end(s) to the connector(s) attached to the rail. Verify that all of the cabling is in functional order and does not bind or catch.

3.15 Cabling for CMA Standard and CMA Lite

3.15.1 Before You Begin

The cable configurations detailed in this section are intended to provide the optimal setup for your specific configuration. During the cabling of the CMA, the HD Mini-SAS and SFP+ cables should be installed into the CMA first, followed by Ethernet cables, and finally the power cables on top.

How to Use the Service Loop Dimension Figure and Table

This section uses the concept of service loops to inform the user on how to prepare HD mini-SAS cables for installation into either the CMA Standard or CMA Lite. The power and Ethernet cables do not need to be added to the Service Loop bundle. This concept utilizes measurements that begin at the connector end of the cable and along the cable itself. The Service Loop Dimensions figure and the Service Loop Dimensions table are paired together to communicate the length in which connectors, velcro, and the CMA cage must be set at to avoid binding or snagging.

> **Note:** The measurement provided in this section are only suggested values based on product testing. Your specific situation may vary. Adjust the measurement as necessary to avoid cable binding or sagging below the rear of the enclosure.

1. Identify the configuration that is needed for the particular setup and locate the Service Loop Dimension table related to that configuration.
2. Take the first measurement (letter A) and measure that length from the connector on the cable to the edge of where the first verco strip will go. Apply the velco strip.
3. Repeat this action for the B and C values until the table has been completed.

Here is an example of the Service Loop Dimension Figure and Table:

Figure 410: Service Loop Dimension Figure
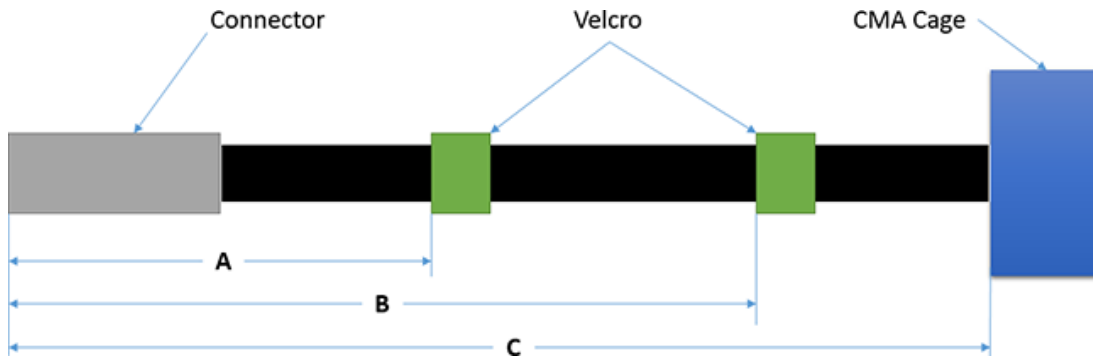
Table 47: Example Service Loop Dimension Table

A	B	C
6in.	N/A	12in.

In this case, the first measurement from the tip of the cable to the first velco strip is 6in. Followed by a 12in. measurement to the CMA cage. There is no need for a B value due how short this configuration is.

3.15.2 Cabling CMA Standard

3.15.2.1 SFP+ and HD Mini-SAS Cable Configuration

This configuration includes the use of up to **four** SFP+ and **two** HD Mini-SAS cables installed into a CMA arm.

Figure 411: Service Loop Dimension Figure
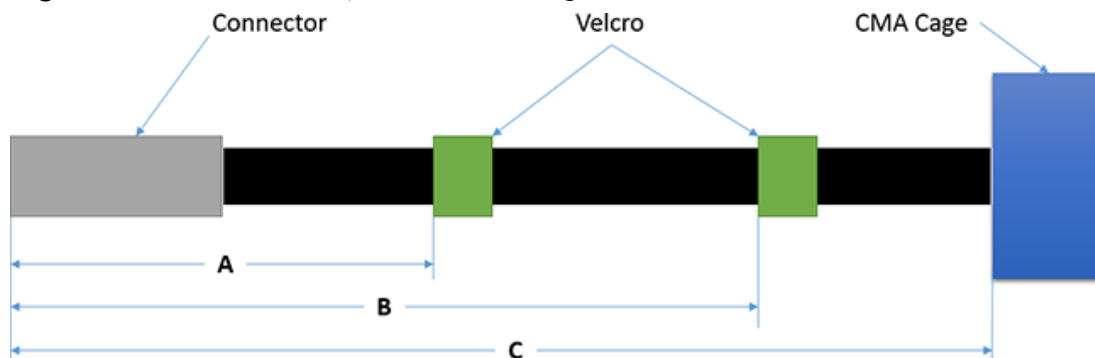
Table 48: Service Loop Dimension Table

A	B	C
6in.	12in.	16in.

3.15.3 Cable Configuration for CMA Lite

3.15.3.1 Maximum HD Mini-SAS Configuration

This configuration includes the use of up to **two** HD Mini-SAS cables, **two** Ethernet cables, and **two** power cables installed into a CMA Lite arm.

Figure 412: Service Loop Diagram
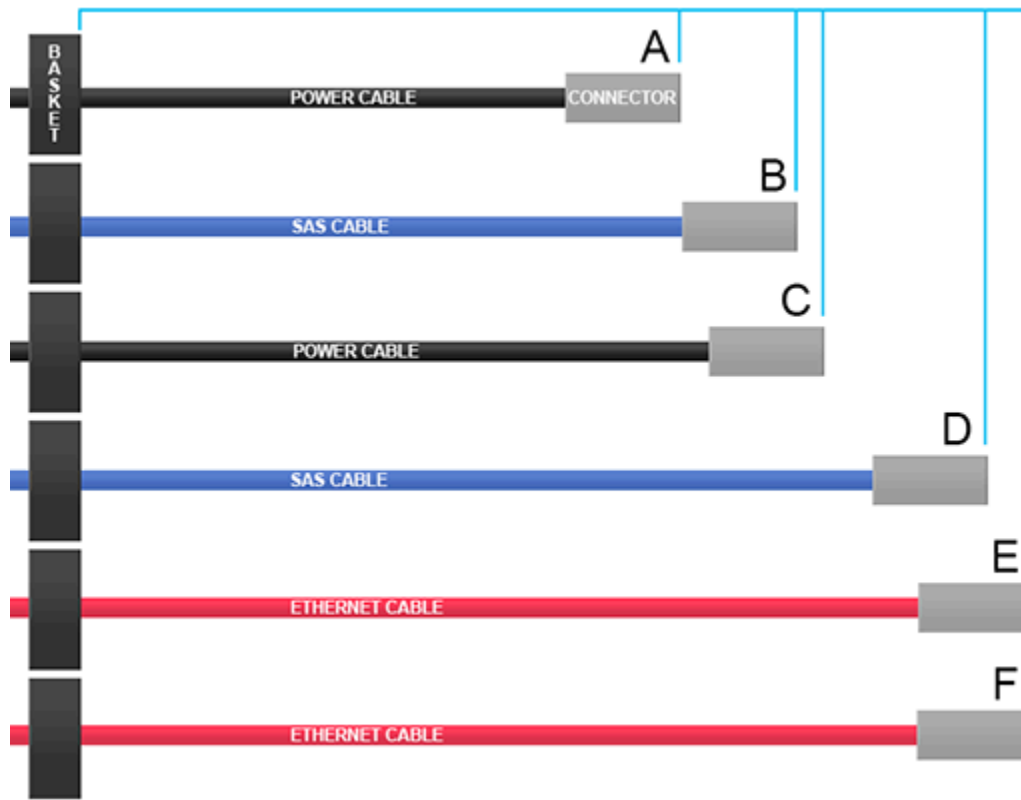
Table 49: Service Loop Lengths

Cable Identifier	Length to First Basket Clip
A	16 in / 406 mm
B	18 in / 457 mm
C	19 in / 483 mm
D	22 in / 559 mm
E	23 in / 584 mm
F	23 in / 584 mm

Management

In This Chapter:

4.1 Management Overview

This section provides an overview of the system management features available in the Ultrastar Serv60+8 through the in-band SAS connections using SG3_utils software, and out-of-band using a REST interface over HTTPS to access Western Digital's implementation of the DMTF Redfish API.

There are also two out-of-band interfaces that can be accessed through BMC that are integrated into the platform via the RJ45 port on the Ultrastar Serv60+8 . The interface is a GUI that is accessible via the BMC management port on the rear of the enclosure. The BMC is also accessible using IPMI and using the Redfish RESTful interface. For more information, visit the Insyde website for BMC documentation, or the Intel website for server BIOS documentation.

4.2 Storage Subsystem Firmware Features Overview

The enclosure services functionality is compatible with the SES-3 (SES3r14) standard. The enclosure implements the Standalone Enclosure Services Process model described in the SES standard. The logical enclosure services process is called the SEP.

The primary expander in the IOM is the only expander that presents a SCSI target, and it is the main device for gathering information from the system for presentation to hosts. The SEP services SES control page operations. All control operations follow a synchronous completion model, i.e. the SEP will send SCSI status only when the requested operation has completed, or to notify the host that the requested operation cannot be performed. Typical SES control operations include:

- Requesting LED flash patterns
- Recording predicted or known component failures
- Requesting power cycle of one or more drives
- Perform a code download. All firmware in programmable components in the storage subsystem may be updated via SES.

SES Status

The SEP services SES status pages. All status operations follow a non-blocking completion model, i.e. the SEP returns the last known status, rather than blocking the completion of the SCSI operation while doing an immediate polling operation. The SES status is updated every 0.5s. Typical SES status operations include:

- FRU and drive presence, health information, and entity names
- SAS topology maps
- Report sensor readings: temperatures, fan speeds, voltages, currents, etc.

Autonomous Behavior

The SEP autonomously manages enclosure power and thermal characteristics. This is done dynamically as needed to stay within the allowed operational envelope of power consumption, thermal heating, and ambient temperature in the data center. This management can include the use of one or more mitigating actions:

- Raise and lower the cooling fans.
- Enable or disable activity safeguards which limit enclosure activity to reduce power consumption or heat generation.
- Enter a self-healing thermal offline state in which some or all enclosure components are powered off.

The enclosure operates visual indicators. These indicators can be set or cleared via host request, or autonomously by the enclosure if it detects fault conditions. The enclosure provides non-volatile memory that records enclosure serialization and branding information. The SEP records event log entries to non-volatile memory.

4.3 Storage Subsystem Firmware Upgrade

This section provides information on actions that should be taken before starting a firmware upgrade on the Ultrastar Serv60+8 .

SAS and SATA Configurations: The Ultrastar Serv60+8 will need to be taken offline for the firmware upgrade. Ensure that all user activity has been paused during the upgrade procedure. Failing to do so could result in loss of data.

Devices (<dev>)

In order to initiate a firmware upgrade on the enclosure, a target must be identified. Linux targets are referred to as sg (SCSI Generic) devices and appear as <dev> in the Linux Firmware Upgrade procedure. Windows targets are referred to as SCSI devices and appear as <dev> in the Windows Firmware Upgrade.

Users should install all of the required downloads before beginning the firmware upgrade process.

Required Downloads:

• **SG3 Utils**: download version 1.42 from the SG3 Utils website at: http://sg.danny.cz/sg/sg3_utils.html

4.3.1 Downloading Firmware from the Support Portal

Note: The product must be registered in order to download firmware updates.

Step 1: Log in to the **Western Digital Enterprise Support Center** using a valid email address and password:

Several support options will appear on the page.

Step 2: Click the **Downloads** option in the top banner:

Downloads

The Western Digital downloads page will appear.

Step 3: From the **Identify Product** section, select the **Product**, **OS / Type**, and **Release Version**:

The **Select Files for Download** section updates with the applicable options:

Step 4: From the **Select Files for Download** section, expand the **Firmware** option and select the checkbox for the appropriate firmware file(s):

> **Note:** Filenames will vary, depending on the options chosen in the **Identify Product** section.

Step 5: In the **Review & Download Files** section, review the selected files to ensure that all intended files are included in the list.

Step 6: If needed, remove an unwanted file by clicking its red *X*.

Step 7: Select the appropriate archive file format by clicking either **Zip** or **Tar**.

Step 8: Click the **Download Files** button to download the selected files.

> (i) **Important:** Do not unzip/extract the tar.gz file. Doing so will result in errors during the firmware upgrade process.

4.3.2 Linux Upgrade Preparation

To prepare the firmware package for download, do the following:

Step 1: Login to the on board server host. This can be done using a connection to the server IP over BMC Web GUI or by connecting to the server subsystem management port at the rear of the enclosure.

Step 2: Type the **sg_scan -i** command to verify that the enclosure has been found by the server.

Step 3: **The following upgrade preparation steps apply only if the user is upgrading via OOBM.** If this does not apply, please proceed to the upgrade procedure.

    a. **IMPORTANT:** There is a firmware upgrade requirement which requires the Ethernet interface to be connected to obtain the IP address via DHCP prior to starting the upgrade process. The Ethernet port is shown in the following image:

Figure 419: Ethernet Port (RJ45 BMC)
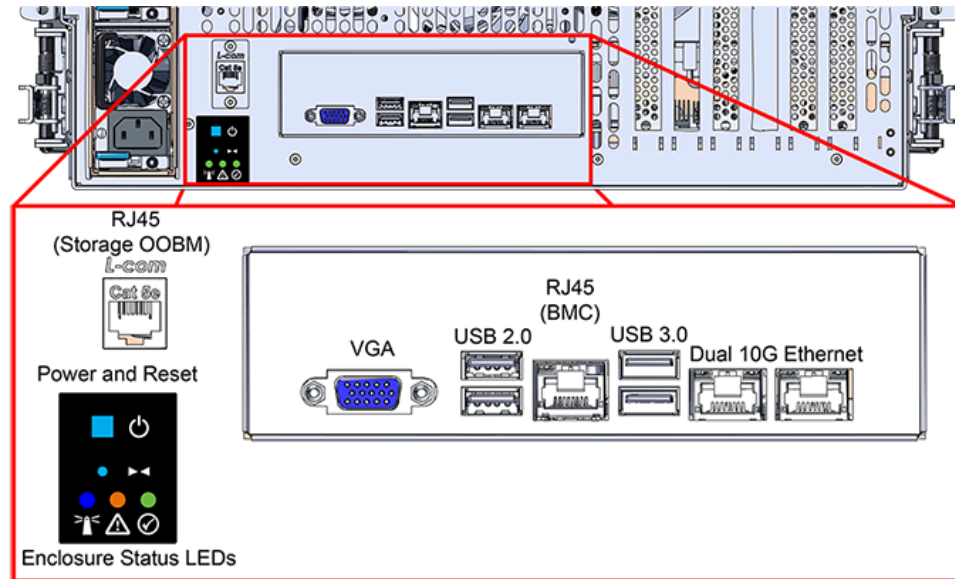
b. After connecting the Ethernet interface and obtaining the IP address via DHCP, locate the `<dev>` device name from the `sg_scan -i` output from step 2 *(page 320)*.

c. Verify that the OOBM has an IP address by issuing the command `sg_ses <dev> -p0x7`.

d. Locate the IP address in the Enclosure Services Controller Electronics (ESCE) elements, indicated by the `xxx.xxx.xxx.xxx` in the results, as shown in the following example:

```
Element type: Enclosure services controller electronics, subenclosure id:
 0 [ti=5]
Overall descriptor: <empty>
Element 0 descriptor: ESCE IOMA,IOM PART NUM ,IOM SERIAL
 NUM,5000CCAB0500003C,XXX.XXX.XXX.XXX
```

4.3.3 Linux Upgrade to New Firmware

To download the new firmware package, do the following:

Step 1: Locate the <dev> device name from the sg_scan -i.

Step 2: In the terminal, type:

```
sg_ses_microcode <dev> -m 0xe -N -b 4096 -I <filename> -vv
```

> (i) **Important:** Do not unzip/extract the tar.gz file. Doing so will result in errors during the firmware upgrade process.

Step 3: Press **Enter**.

The firmware begins loading onto the IOM. The upgrade can take up to 20 minutes to complete.

(i) Important:

Due to the firmware image being a .tar.gz file, the enclosure has to unpack and load the firmware onto the respective ICs which may take up to 15 minutes. Once the sg_ses_microcode command is issued wait 20 minutes to ensure the enclosure has time to perform this process. To check the status of this process, use the Redfish out-of-band management to make a GET request to the following target:

```
curl -G  -k -u admin:admin -H "Content-type: application/
json" https://<ip address>/redfish/v1/UpdateService/Actions/
UpdateService.SimpleUpdate/Status
```

Note:

Execute the command until you see the following result:

```
{"ErrorCode":0,"StatusCode":2,"Description":"FW update completed.
 Waiting for activation.","EstimatedRemainingMinutes":0}
```

(i) Attention: If the OOBM is not being used, query Page Eh by executing the following command `sg_ses <dev> -p 0xe`. The first time this command is issued, the output may be inaccurate, please ignore and issue the command again. The string to observe for download microcode status is "Complete, no error, start after hard reset or power cycle [0x11]" before proceeding to the activate step.
Example output:

```
sg_ses <dev> -p 0xe

  HGST  H4060-S  2040
Download microcode status diagnostic page:
  number of secondary subenclosures: 0
  generation code: 0x0
   subenclosure identifier: 0 [primary]
     download microcode status: Complete, no error, start after
 hard reset or power cycle [0x11]
     download microcode additional status: 0x0
     download microcode maximum size: 1703914 bytes
     download microcode expected buffer id: 0x0
     download microcode expected buffer id offset: 0
```

Step 4: Once the download is complete, type:

```
sg_ses_microcode <dev> -m 0xf
```

Step 5: Press **Enter**.

The IOM will reset. This process can take up to 5 minutes to activate.

(i) **Attention:** The system will lose communication with the drives during this part of the upgrade. To avoid data loss, ensure that no data is being transferred during this process.

Step 6: Verify the installation is correct by repeating the **sg_scan -i** again.

4.3.4 Non-Automatic Firmware Activation in Linux

Step 1: Locate the <dev> device name from the sg_scan -i.

Step 2: Execute the following command to upgrade the enclosure firmware using sg_ses_microcode.

    a. Issue the following command:

```
sg_ses_microcode <dev> -m 0xe -N -b 4096 -I <filename> -vv
```

(i) **Important:** Do not unzip/extract the tar.gz file. Doing so will result in errors during the firmware upgrade process.

Step 3: Press **Enter**.

The firmware begins loading onto the IOM. The upgrade can take up to 20 minutes to complete.

(i) **Important:** Due to the firmware image being a .tar.gz file, the enclosure has to unpack and load the firmware onto the respective ICs which may take up to 15 minutes. Once the sg_ses_microcode command is issued wait 20 minutes to ensure the enclosure has time to perform this process. To check the status of this process, use the Redfish out-of-band management to make a GET request to the following target:

```
curl -G  -k -u admin:admin -H "Content-type: application/
json" https://<ip address>/redfish/v1/UpdateService/Actions/
UpdateService.SimpleUpdate/Status
```

📄 **Note:** Execute the command until you see the following result:

```
{"ErrorCode":0,"StatusCode":2,"Description":"FW update completed.
 Waiting for activation.","EstimatedRemainingMinutes":0}
```

(i) **Attention:** If the OOBM is not being used, query Page Eh by executing the following command **sg_ses <dev> -p 0xe**. The first time this command is issued, the output may be inaccurate, please ignore and issue the command again. The string to observe for download microcode status is "Complete, no error, start after hard reset or power cycle [0x11]" before proceeding to the activate step. **Example output**:

```
sg_ses <dev> -p 0xe
```

ⓘ
```
   HGST  H4060-S  <FW Version>
Download microcode status diagnostic page:
  number of secondary subenclosures: 0
  generation code: 0x0
   subenclosure identifier: 0 [primary]
     download microcode status: Complete, no error, start after
 hard reset or power cycle [0x11]
     download microcode additional status: 0x0
     download microcode maximum size: 1703914 bytes
     download microcode expected buffer id: 0x0
     download microcode expected buffer id offset: 0
```

Step 4: Issue the following command to activate IOM A:

```
sg_ses <dev> -p4 -c -d 02,00,01,00
```

4.3.5 Windows Firmware Upgrade Preparation

To upgrade firmware using a windows server, do the following:

Step 1: Make sure that **sg3_utils** is installed on the system.

Step 2: Log on to the Windows server and launch a command prompt.

Step 3: Input the **sg_scan -s** command to find the IOM devices to ensure that they can be accessed.

📄 **Note:** If the Ultrastar Serv60+8 is connected to an HBA that does not present the Enclosure Services Processor to the host for management purposes, Western Digital recommends attaching the Ultrastar Serv60+8 to a host that does expose the Enclosure Services Processor so that the upgrade may be performed.

ⓘ **Attention:** Beginning with firmware version 2000-073, the user may upgrade in-band via sg_ses_microcode without the requirement of having Ethernet interfaces actively configured with DHCP. Please proceed to the upgrade procedure.

Step 4: **The following upgrade preparation steps apply only if the user is upgrading via OOBM.** If this does not apply, please proceed to the upgrade procedure.

    a. IMPORTANT: There is a firmware upgrade requirement which requires the Ethernet interface to be connected to obtain the IP address via DHCP prior to starting the upgrade process. The Ethernet port is shown in the following image:

Figure 420: Ethernet Port (RJ45 BMC)
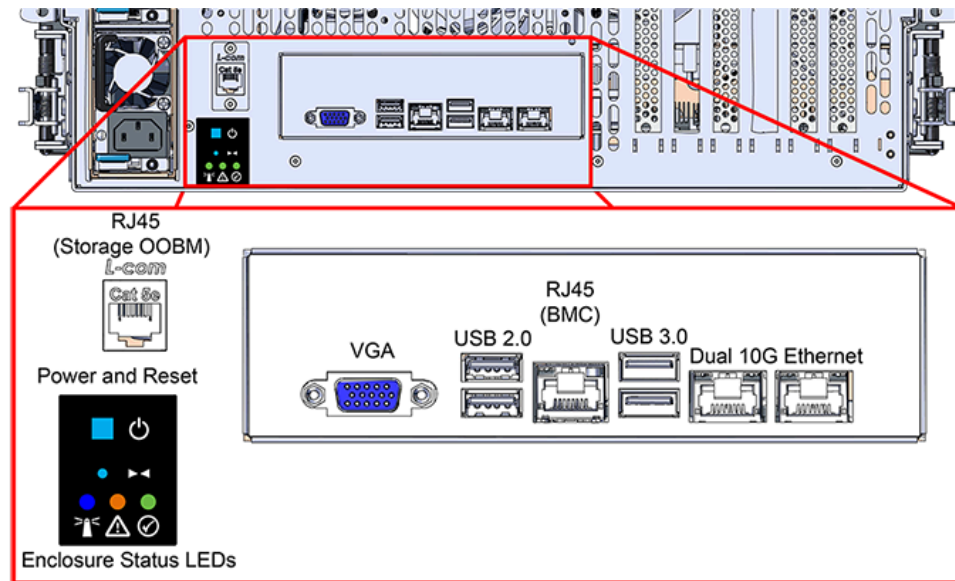
b. After connecting the Ethernet interface and obtaining the IP address via DHCP, locate the `<dev>` device name from the `sg_scan -s` output from step 3 *(page 324)*.

c. Verify that the OOBM has an IP address by issuing the command `sg_ses <dev> -p0x7`.

d. Locate the IP address in the Enclosure Services Controller Electronics (ESCE) elements, indicated by the `XXX.XXX.XXX.XXX` in the results, as shown in the following example:

```
Element type: Enclosure services controller electronics, subenclosure id:
 0 [ti=5]
Overall descriptor: <empty>
Element 0 descriptor: ESCE IOMA,IOM PART NUM ,IOM SERIAL
 NUM,5000CCAB0500003C,XXX.XXX.XXX.XXX
```

4.3.6 Windows Upgrade to New Firmware

To download the new firmware package, do the following:

Step 1: Input the **sg_scan -s** command to find the IOM devices to ensure that they can be accessed.

> **Note:** If the Ultrastar Serv60+8 is connected to an HBA that does not present the Enclosure Services Processor to the host for management purposes, Western Digital recommends attaching the Ultrastar Serv60+8 to a host that does expose the Enclosure Services Processor so that the upgrade may be performed.

Step 2: In the terminal, type:

```
sg_ses_microcode <dev> -m 0xe -N -b 4096 -I <filename> -vv
```

(i) **Important:** Do not unzip/extract the tar.gz file. Doing so will result in errors during the firmware upgrade process.

Step 3: Press **Enter**.

The firmware begins loading onto the IOM. The upgrade can take up to **20 minutes** to complete.

(i) **Important:** Due to the firmware image being a .tar.gz file, the enclosure has to unpack and load the firmware onto the respective ICs which may take up to 15 minutes. Once the sg_ses_microcode command is issued wait 20 minutes to ensure the enclosure has time to perform this process. To check the status of this process, use the Redfish out-of-band management to make a GET request to the following target:

```
curl -G  -k -u admin:admin -H "Content-type: application/
json" https://<ip address>/redfish/v1/UpdateService/Actions/
UpdateService.SimpleUpdate/Status
```

(i) **Attention:** If the OOBM is not being used, query Page Eh by executing the following command sg_ses <dev> -p 0xe. The first time this command is issued, the output may be inaccurate, please ignore and issue the command again. The string to observe for download microcode status is "Complete, no error, start after hard reset or power cycle [0x11]" before proceeding to the activate step.
Example output:

```
sg_ses 0 -p 0xe

  HGST  H4060-S  2040
Download microcode status diagnostic page:
  number of secondary subenclosures: 0
  generation code: 0x0
   subenclosure identifier: 0 [primary]
     download microcode status: Complete, no error, start after
 hard reset or power cycle [0x11]
     download microcode additional status: 0x0
     download microcode maximum size: 1703914 bytes
     download microcode expected buffer id: 0x0
     download microcode expected buffer id offset: 0
```

Step 4: Once the download is complete, type:

```
sg_ses_microcode <dev> -m 0xf
```

Step 5: Press **Enter**.

The IOM will reset. This process can take up to 5 minutes to activate.

4.3.7 Non-Automatic Firmware Activation in Windows

Step 1: Upgrade the enclosure firmware using sg_ses_microcode by executing the following command:

```
sg_ses_microcode <dev> -m 0xe -N -b 4096 -I <filename> -vv
```

> (i) **Important:** Do not unzip/extract the tar.gz file. Doing so will result in errors during the firmware upgrade process.

> (i) **Attention:** If the OOBM is not being used, query Page Eh by executing the following command `sg_ses <device> -p0xe`.

Step 2: Press **Enter**.

The firmware begins loading onto the IOM. The upgrade can take up to **20 minutes** to complete.

> (i) **Important:** Due to the firmware image being a .tar.gz file, the enclosure has to unpack and load the firmware onto the respective ICs which may take up to 15 minutes. Once the sg_ses_microcode command is issued wait 20 minutes to ensure the enclosure has time to perform this process. To check the status of this process, use the Redfish out-of-band management to make a GET request to the following target:
>
> ```
> curl -G  -k -u admin:admin -H "Content-type: application/
> json" https://<ip address>/redfish/v1/UpdateService/Actions/
> UpdateService.SimpleUpdate/Status
> ```

> (i) **Attention:** If the OOBM is not being used, query Page Eh by executing the following command `sg_ses <dev> -p 0xe`. The first time this command is issued, the output may be inaccurate, please ignore and issue the command again. The string to observe for download microcode status is "Complete, no error, start after hard reset or power cycle [0x11]" before proceeding to the activate step.
> **Example output**:
>
> ```
> sg_ses <dev> -p 0xe
>
>   HGST  H4060-S  <FW Version>
> Download microcode status diagnostic page:
>   number of secondary subenclosures: 0
>   generation code: 0x0
>    subenclosure identifier: 0 [primary]
>      download microcode status: Complete, no error, start after
>  hard reset or power cycle [0x11]
>      download microcode additional status: 0x0
>      download microcode maximum size: 1703914 bytes
>      download microcode expected buffer id: 0x0
>      download microcode expected buffer id offset: 0
> ```

Step 3: Issue the following command to activate IOM A:

```
sg_ses <dev> -p4 -c -d 02,00,01,00
```

4.4 OOBM Management Overview

The Ultrastar Serv60+8 uses an implementation of DMTF Redfish for out-of-band system management. All the SES enclosure information can be obtained through the out-of-band management port using RESTful API calls to the management port over HTTPS. The OOBM ports are configured for DHCP by default.

4.4.1 Configuring OOBM Network Settings Using SES

Changing the OOBM Network Configuration

Step 1: To change the OOBM network configuration, enter the following:

```
sg_wr_mode <dev> --dbd --page=0x23,0x01 --
contents=e3,01,00,1A,<IOM>,00,00,00,<setting>,00,00,00,<IPaddr>,
<netmask>,<gateway>,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00
```

Where:

- <dev> = the device SEP sg handle
- <IOM> = 01 (IOMA) or 02 (IOMB)
- <setting> = 00 (static) or 01 (DHCP)
- <IPaddr> = The IP address in four pairs of two-digit hex codes
- <netmask> = The netmask, in four pairs of two-digit hex codes
- <gateway> = The gateway, in four pairs of two-digit hex codes

For example, to change the OOBM network configuration on IOM A to **static**:

```
sg_wr_mode /dev/sg3 --dbd --page=0x23,0x01 --
contents=e3,01,00,1A,01,00,00,00,00,00,00,00,C0,A8,00,0A,
FF,FF,FF,00,C0,A8,00,01,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00
```

- Device = /dev/sg3
- IOM = 01 (IOM A)
- Setting = 00 (static)
- IP Address = 192.168.0.10
- Netmask = 255.255.255.0
- Gateway = 192.168.0.1

To change the OOBM network configuration on IOM B to **static**:

```
sg_wr_mode /dev/sg3 --dbd --page=0x23,0x01 --
contents=e3,01,00,1A,02,00,00,00,00,00,00,00,C0,A8,00,0B,
FF,FF,FF,00,C0,A8,00,01,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00
```

- Device = /dev/sg3
- IOM = 02 (IOM B)
- Setting = static
- IP Address = 192.168.0.11
- Netmask = 255.255.255.0
- Gateway = 192.168.0.1

To change the OOBM network configuration on IOM A to **DHCP**:

```
sg_wr_mode /dev/sg3 --dbd --page=0x23,0x01 --
contents=e3,01,00,1A,01,00,00,00,01,00,00,00,00,00,00,00,
00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00
```

- Device = /dev/sg3
- IOM = 01 (IOM A)
- Setting = 01 (DHCP)
- IP Address = 0.0.0.0
- Netmask = 0.0.0.0
- Gateway = 0.0.0.0

To change the OOBM network configuration on IOM B to **DHCP**:

```
sg_wr_mode /dev/sg3 --dbd --page=0x23,0x01 --
contents=e3,01,00,1A,02,00,00,00,01,00,00,00,00,00,00,00,
00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00
```

- Device = /dev/sg3
- IOM = 02 (IOM B)
- Setting = 01 (DHCP)
- IP Address = 0.0.0.0
- Netmask = 0.0.0.0
- Gateway = 0.0.0.0

Viewing the OOBM Network Configuration

Step 2: To view the OOBM network configuration, enter the following:

```
sg_wr_mode <dev> --dbd --page=0x23,0x01
```

This returns:

```
e3,01,00,30,03,00,00,00,<IOM A Setting>,00,00,00,<IOM A IPaddr>,<IOM
 A Netmask>,<IOM A Gateway>,00,00,00,<IOM B Setting>,00,00,00,<IOM B
 IPaddr>,<IOM B Netmask>,<IOM B Gateway>
```

- <IOM> = 03 (IOMA & IOMB)
- <IOM A Setting> = 00 (static) or 01 (DHCP)
- <IOM A IPaddr> = The IP address in four pairs of two-digit hex codes
- <IOM A Netmask> = The netmask, in four pairs of two-digit hex codes
- <IOM A Gateway> = The gateway, in four pairs of two-digit hex codes
- <IOM B Setting> = 00 (static) or 01 (DHCP)
- <IOM B IPaddr> = The IP address in four pairs of two-digit hex codes
- <IOM B Netmask> = The netmask, in four pairs of two-digit hex codes
- <IOM B Gateway> = The gateway, in four pairs of two-digit hex codes

The result, after setting the two static addresses in Changing the OOBM Network Configuration :

```
e3,01,00,30,03,00,00,00,00,00,00,00,C0,A8,00,0A,FF,FF,FF,00,C0,A8,00,01,
```

```
00,00,00,00,C0,A8,00,0A,FF,FF,FF,00,C0,A8,00,01 <dev>
```

The result, when IOM B is not booting (no IP):

```
e3,01,00,30,03,00,00,00,00,00,00,00,C0,A8,00,0A,FF,FF,FF,00,C0,A8,00,01,
00,00,00,00,00,00,00,00,00,00,00,00,00,00,00,00 <dev>
```

> **Note:** Setting an invalid gateway will result in that field being zeroed-out.

4.4.2 Upgrading Firmware with OOBM

The following procedure should be followed to upgrade the firmware of the Ultrastar Serv60+8 using the OOBM API.

Step 1: Open a web browser, go to: https://portal.wdc.com/Support/s/, and download the firmware package for the Ultrastar Serv60+8 .

Step 2: Extract the downloaded zip file and place file in a location that is accessible to the Ultrastar Serv60+8 .

Step 3: Make a POST call to the UpdateService object using the `SimpleUpdate` action.

```
POST /redfish/v1/UpdateService/Actions/UpdateService.SimpleUpdate HTTP/1.1
Content-Type: application/json;charset=utf-8
Content-Length: <computed length>
OData-Version: 4.0
Authorization: Basic userid:password
```

a. In the body of the POST, list the `ImageURI` as the data parameter, and set the value of this parameter to the file location of the bin file.

> **Note:** TFTP and HTTPS are supported.

Linux Example:

```
{"ImageURI": "tftp://<tftp IP address>/HGST_Ultrastar-DATA60-DATA102-
Server60-8_SEP_bundle_3010-007_3.1.11.tar.gz"}
```

Windows Example:

```
{\"ImageURI\":\"https://<https IP address>/HGST_Ultrastar-DATA60-DATA102-
Server60-8_SEP_bundle_3010-007_3.1.11.tar.gz\"}
```

Step 4: To check the status of this process, make a GET request to the following target:

> **Note:** This command may need to be issued multiple times until it reports a completed status. This should be done before completing the remainder of the procedure.

```
curl -G -k -u admin:admin -H "Content-type: application/json" https://<IP
 address>/redfish/v1/UpdateService/Actions/UpdateService.SimpleUpdate/Status
```

a. Execute the command until you see the following result:

```
{
```

```
        "ErrorCode":0,
        "StatusCode":2,
        "Description":"FW update completed. Waiting for activation.",
        "EstimatedRemainingMinutes":0
}
```

Step 5: To activate the firmware, send a POST request:

- For an **automatic** activation, send the POST request to the `UpdateService` object using the `UpdateService.FWActivate` command:

```
curl -X POST -k -u admin:admin -H "Content-type: application/
json" https://<IP address>/redfish/v1/UpdateService/Actions/
UpdateService.FWActivate
```

> **Note:** This command will perform a rolling reset of the IOMs.

- For a **non-automatic** activation, reset the IOMs manually by sending sequential POST requests to the `Chassis` object using the `Chassis.Reset` command:

```
curl -X POST -k -u admin:admin -H "Content-type: application/json"
 https://<OOBM IOMA-IP Address>/redfish/v1/Chassis/IOModuleAFRU/Actions/
Chassis.Reset
```

```
curl -X POST -k -u admin:admin -H "Content-type: application/json"
 https://<OOBM IOMB-IP Address>/redfish/v1/Chassis/IOModuleBFRU/Actions/
Chassis.Reset
```

4.5 SES Page 02

The SCSI `Send Diagnostic` and `Receive Diagnostic Results` commands can be addressed to a specific SES element in the enclosure. There are many different element codes, such as Page 02, defined to cover a wide range of devices. Page 02 refers to the control and status of the enclosure's PSUs, HDDs, ESMs, and sensors.

> **Note:** Refer to the SES Firmware Management Interface Specification for more information on SES Page 02.

4.6 BIOS Firmware Update

Requirements

This section outlines the requirements and procedures needed to update to the latest version of BIOS firmware. There are three ways to upgrade the BIOS firmware; using EFI boot mode, using legacy boot mode (requires a USB drive containing the BIOS update files), or using the BMC Web GUI. For details on the BMC Web GUI method, see BIOS Firmware Update Using BMC Web GUI *(page 376)*. The following is a list containing requirements for the first two BIOS update options.

Updating BIOS Firmware using EFI Boot Mode

- Linux operating system
- 1GB (or greater) FAT32 partition on the host operating system

- Latest version of the BIOS firmware

Updating BIOS Firmware using the Legacy Boot Mode

- Windows operating system
- USB Drive w/ a 1GB (or greater) FAT32 partition
- Latest version of the BIOS firmware

Reading the BIOS ID

Before executing the BIOS update, you will need to determine what the current version of the BIOS. This version verification is required to ensure the current version of the BIOS is not incrementally larger than the BIOS update. The version of the BIOS appears in the BIOS ID string and will require some deciphering. To find the current version of the BIOS, you must locate the **MajorVer**, **MinorVer**, and **RelNum** as seen in the following key:

> **BIOS ID Version Key:**
> BoardFamilyID.OEMID.**MajorVer**.**MinorVer**.**RelNum**.BuildDateTime

This example uses the BIOS Version Key to determine the BIOS version number by locating the **MajorVer**, **MinorVer**, and **RelNum**:

> **BIOS ID Version Example:**
> SE5C620.86B.**00**.**01**.**0009**.101920170742
> The version of the BIOS is **00.01.0009** in this example.

4.6.1 Updating BIOS Firmware using EFI Boot Mode

Step 1: Check the current BIOS version using Dmidecode.

    a. SSH into the enclosure.

    b. Check the current BIOS version by issuing the command:

```
sudo dmidecode -t 0 | grep Version
```

A BIOS ID number will be displayed with the BIOS version number contained in it. To learn how to read the BIOS ID see: BIOS Firmware Update *(page 331)*.

Current BIOS Version Example

```
Version: SE5C620.86B.00.01.0009.101920170742
```

    c. Verify that the version of the BIOS is incrementally earlier version than the BIOS update that you are going load.

> **Note:** If a downgrade of the BIOS is necessary, please contact support: Points of Contact *(page x)*.

Step 2: Copy the BIOS update ZIP file to the root of the FAT32 partition. The process of copying the ZIP file to the partition will vary depending on the version of the operating system.

> 📄 **Note:** The **Startup.nsh** file must be located at the root of the EFI partition. Do not move the **Startup.nsh** into the other folder that is part of the BIOS update.

Step 3: Setup a one-time boot using the EFI Shell.

> ⚠ **Warning:** Failure to set a one-time boot may result in the system being caught in boot loop.

a. Using the Terminal, locate the EFI Shell in the boot menu by issuing the command:

```
efibootmgr
```

The efibootmgr will display a list of boot manager options.

efibootmgr Options

```
root@root: /home/hgst/Downloads/BIOS Update# efibootmgr
BootCurrent: 0014
Timeout: 1 seconds
BootOrder: 0014, 0005, 0007, 0009, 000B, 000D, 000F, 0011, 0013, 0004,
 0006, 0008,
000A, 000C, 0000, 0001, 0002, 000E, 0010, 0012, 0003
Boot0000* Enter Setup
Boot0001 Boot Device List
Boot0002 Network Boot
Boot0003* Launch EFI Shell
 ...
```

b. Locate the line that is labeled `Launch EFI Shell` and identify the boot number next to it. In this example, the boot number is `0003` and it will be used to issue the one-time boot command.

c. Setup the one-time boot option by issuing the command:

```
efibootmgr -n 0003
```

The command will return the following information related to the next boot of the enclosure.

One-time boot Option

```
root@root: /home/hgst/Downloads/BIOS Update# efibootmgr -n 0003
BootNext: 0003
BootCurrent: 0014
Timeout: 1 seconds
BootOrder: 0014, 0005, 0007, 0009, 000B, 000D, 000F, 0011, 0013, 0004,
 0006, 0008,
000A, 000C, 0000, 0001, 0002, 000E, 0010, 0012, 0003
Boot0000* Enter Setup
Boot0001 Boot Device List
Boot0002 Network Boot
Boot0003* Launch EFI Shell
 ...
```

d. Verify that BootNext has changed to `0003`. The BootNext value indicates what option will be booted next when the enclosure is restarted.

e. Restart the enclosure.

The EFI shell will automatically launch the **Startup.nsh** file and start the BIOS update. The BIOS will begin to flash on the system and the enclosure will restart. Once the system restarts, it will run through the different components to verify that there were no errors that occurred during the update. After the second restart, the system will take 3-5 minutes longer than normal to boot up as the new BIOS image is flashed to the backup BIOS flash.

Step 4: Once the enclosure boots through the normal boot screen, navigate to the root of the EFI partition and delete the **Startup.nsh** and the folder from the update files. Failure to delete these files can lead to the enclosure being set on a continuous boot loop.

Step 5: Verify that the BIOS has been updated using Dmidecode.

a. Check the current BIOS version by issuing the command:

```
sudo dmidecode -t 0 | grep Version
```

A BIOS ID number will be displayed with the BIOS version number contained in it. To learn how to read the BIOS ID see: BIOS Firmware Update *(page 331)*.

Current BIOS Version Example

```
Version: SE5C620.86B.00.01.0013.030920180427
```

b. Verify that the version of the BIOS is the latest version.

4.6.2 Updating BIOS Firmware using the Legacy Boot Mode

Step 1: Create a FAT32 boot partition on a USB drive that has 1GB (or greater) worth of space and load the BIOS update files onto the partition.

> 📄 **Note:** The **Startup.nsh** file must be located at the root of the EFI partition. Do not move the **Startup.nsh** into the other folder that is part of the BIOS update.

Name	Type
📁 files	File folder
📄 Startup.nsh	NSH File

Step 2: Plug the USB drive into a USB port on the rear of the enclosure.

Step 3: From a laptop, check the current BIOS version using the BMC Web GUI.

a. Navigate to the IP Address of the enclosure and log into the BMC Web GUI.

b. From the Menu Bar, select **System > System Information**.

Figure 421: System Menu — System Information
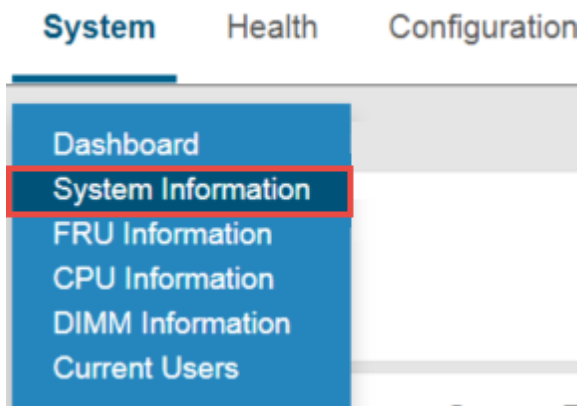
c. In the System Firmware Version section, locate the BIOS ID.

d. Verify that the version of the BIOS is an earlier version than the BIOS update that you are going load.

Figure 422: Example of Current BIOS Firmware Version

BIOS ID : SE5C620.86B.00.01.0009.101920170742

Current firmware version

> **Note:** To learn how to read the BIOS ID see: BIOS Firmware Update *(page 331)*.

Step 4: Restart the server and launch the EFI Shell from the BIOS boot menu to update the BIOS.

a. Launch the KVM by selecting **Remote Control > iKVM over HTML5** from the Menu Bar and click **Launch iKVM over HTML5**.

b. Reboot the system.

c. While the BIOS is running through its boot sequence, press F6 and select EFI shell from the boot device menu.

Figure 423: Launch EFI Shell

The EFI shell will automatically launch the **Startup.nsh** file and start the BIOS update. The BIOS will begin to flash on the system and the enclosure will restart. Once the system restarts, it will run through the different components to verify that there were no errors that occurred during the update. The enclosure will restart a second time to finish applying the BIOS updates.

Step 5: Once the server boots through the normal boot screen, navigate to the BIOS folder and delete the **Startup.nsh** file. Failure to delete the **Startup.nsh** can lead to boot loop issues on the enclosure.

Step 6: Check the latest BIOS version using the BMC Web GUI.

a. From the Menu Bar, select **System > System Information**.

Figure 424: System Menu — System Information
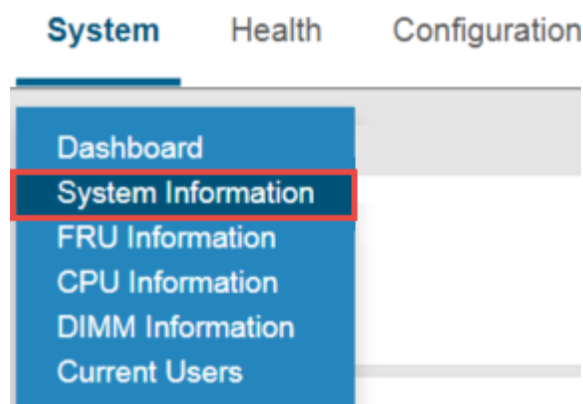
b. In the System Firmware Version section, locate the BIOS ID.

c. Verify that the version of the BIOS is the latest version.

Figure 425: Example of Updated BIOS Firmware Version

BIOS ID : SE5C620.86B.00.01.0009.101920170742

Current firmware version

> **Note:** To learn how to read the BIOS ID see: BIOS Firmware Update *(page 331)*.

4.7 BMC Web GUI

This section provides information on the BMC Web GUI and how to use the different features to interact with the enclosure.

4.7.1 BMC Web GUI Overview

The BMC Web GUI is a web-based management interface that allows users to interact with the enclosure. The user can configure network settings, manage profiles, check the health of the enclosure and components within the enclosure, configure remote settings, generate diagnostic logs, and so on.

This overview will provide information about the basic parts of the BMC GUI. The BMC Web GUI is made up of the Actions Menu, Menu Bar, Sidebar Menu, and Dashboard. The following image and list highlights the location of each of the main parts of the BMC Web GUI.

Figure 426: BMC Web GUI Overview
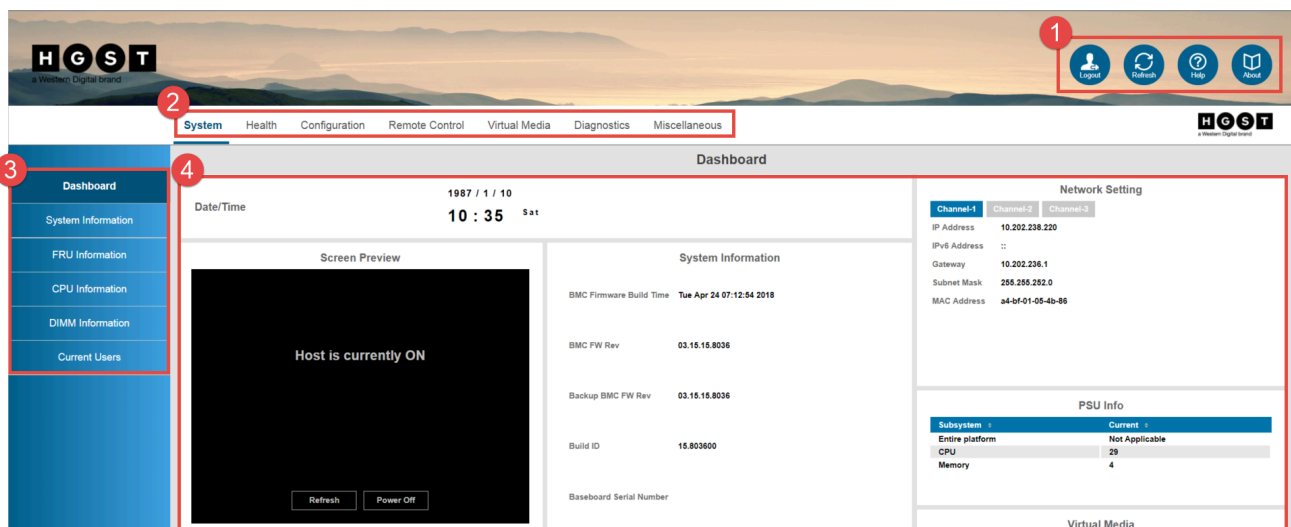
1. Action Menu
2. Menu Bar
3. Sidebar Menu

4. Dashboard

The following section provides a list of the supported browsers that can be used to access the BMC Web GUI:

Web Browser	Version
Google Chrome	66.0.3359.139 (Official Build) (64-bit) or newer
Mozilla Firefox	59.0.2 (64-bit) or newer
Microsoft Edge	• Microsoft Edge: 41.16299.402.0 or newer • Microsoft EdgeHTML: 16.16299 or newer
Internet Explorer	11.0.9600.16428 or newer **Note:** Internet Explorer 11 cannot mount ISO images with the HTML 5 media feature.
Safari	11.0.3 (11604.5.6.1.1) or newer

4.7.1.1 Dashboard

The dashboard is located in the center of the webpage and acts as the main view when the BMC Web GUI loads. The dashboard contains several different views that allow the user to get a top level view of alerts, settings, general system information, and logs. The dashboard configuration will display different information based on user privilege settings. A lower set of user privileges will result in the display of less critical information. Administrators will have access to all of the features and information related to the BMC Web GUI.

Figure 427: BMC Web GUI Dashboard

For contextual information on how specific features in the dashboard function, click the Help button located in the Actions Menu in the top right-hand corner of the BMC Web GUI. The BMC Web GUI Help guides the user on specific user tasks within the section that user is located in. The BMC Web GUI Help can remain on while the BMC Web GUI is being used or it can be hidden by clicking the Help button.

4.7.2 System MAC Address

The MAC address from the BMC and host NICs that are built into the motherboard can be calculated based on the chassis MAC address label that is affixed to the rear of the enclosure.

Figure 428: MAC Address Label Location
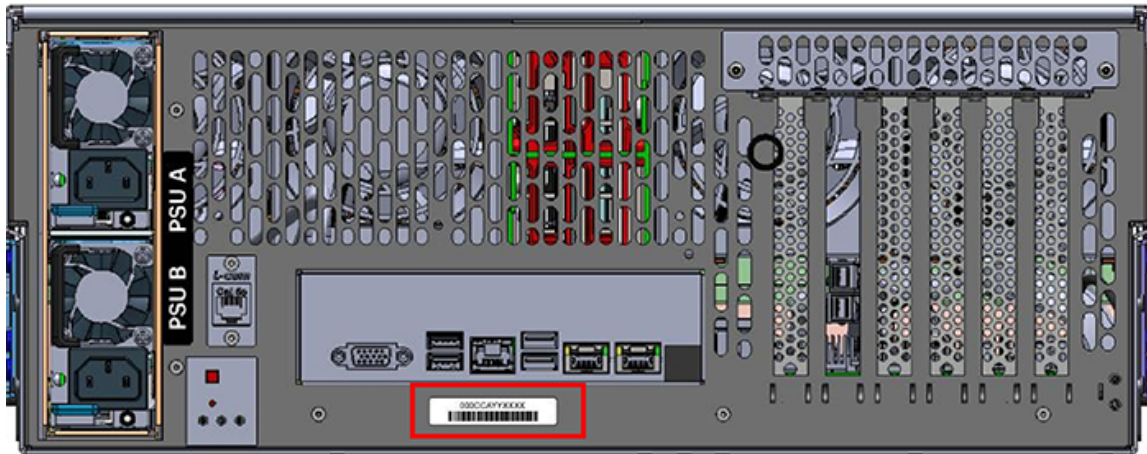
Table 50: Example MAC Address Offsets

Offset	NIC
-6	Host 1
-5	Host 2
-4	Not Used
-3	Not Used
-2	BMC Channel 1
-1	BMC Channel 2
-0	BMC Channel 3 (dedicated BMC)

The following section physically identifies the locations of the built-in NIC ports and examples of related MAC addresses.

Figure 429: Physical Ports
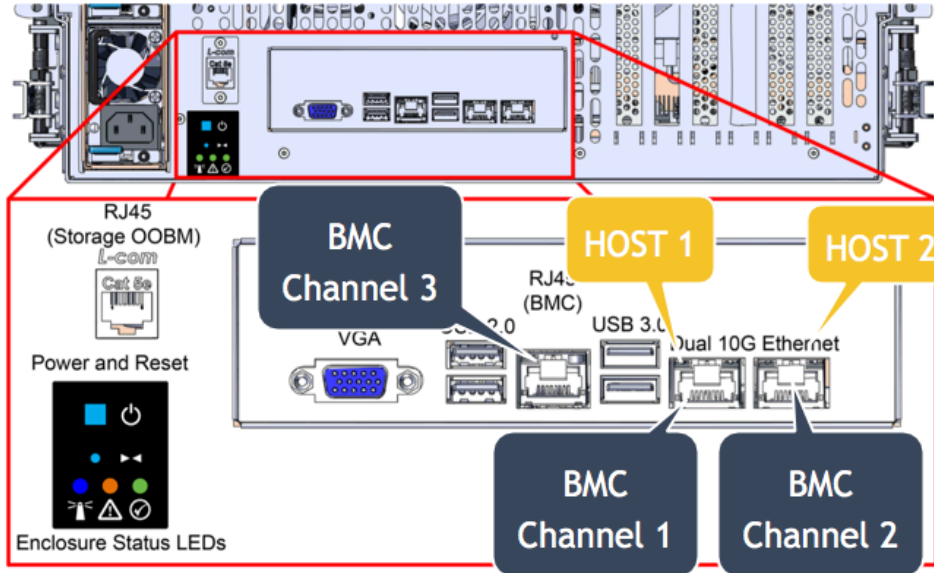
Figure 430: Example of MAC Address Related to Ports
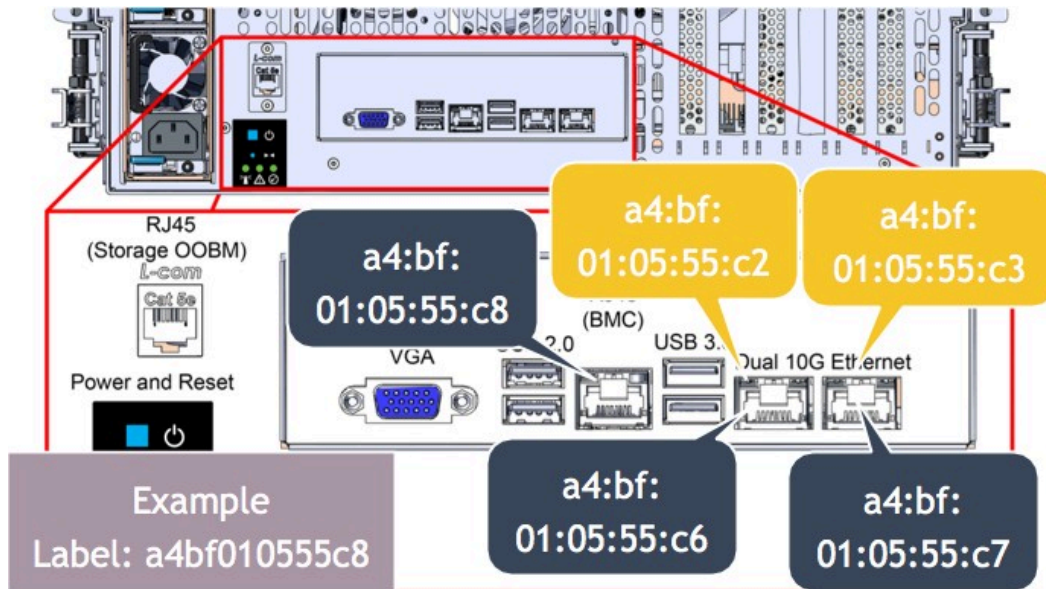
4.7.3 User Management

This section provides information related to configuring user credentials, creating a user, deleting an existing user, modifying an existing user, and ending user sessions.

The user management within the BMC Web GUI is controlled mostly from the User List that appears in the main window of the Users section. This section is comprised of a table that contains the list of users and three buttons used to add, modify, or delete a user.

Figure 431: User List

1. **User List Table**: The User List table contains a list of the current users that have access to the enclosure through the BMC Web GUI. The user ID, user name, user status, and network privilege can be viewed in the User List table. Additional settings can be viewed individually while managing each user from the Modify User window.
2. **User List Buttons**: The User List buttons allow the user to add, modify, or delete a selected user.

4.7.3.1 User Privileges

While managing users, it is important to understand user privileges. The BMC Web GUI contains five categories of user privileges: Administrator, Operator, User, Callback, and No Access. The following image displays the new user window with the possible options for selecting user privileges.

Figure 432: User Privileges

Each user role has a specific set of features that can be accessed when logged into the BMC Web GUI. This means that the BMC Web GUI will display differently depending on the privileges that are assigned to each user role. The most notable BMC Web GUI changes based on user roles will occur in the Menu Bar, Sidebar Menu, and the Dashboard. The following section provides information for each of the user roles contained in the BMC Web GUI.

> **Note:** For specific details related to each of the user privileges, from the Action Menu in the top right-hand corner, click **Help** and select the **Click here to get detailed network privilege of each level** link in the GUI. This has to be done while the user is in the Add or Modify User window.

- **Administrator**: This user role allows the user to have full access of the BMC Web GUI. The administrator role allows for full access to BMC Web GUI configurations, features, and views. The BMC Web GUI Administrator privileges contains the following available options:

Menu Bar:

- ◦ System
- ◦ Health
- ◦ Configuration
- ◦ Remote Control
- ◦ Virtual Media
- ◦ Diagnostics
- ◦ Miscellaneous

Dashboard:

- ◦ Date/Time
- ◦ Network Settings
- ◦ Screen Preview
- ◦ System Information
- ◦ Temperature, Voltage, and Fan status
- ◦ Virtual Media
- ◦ SEL Logs
- ◦ Current Users

- **Operator**: This user role allows the selected user to have a great deal of access to the BMC Web GUI. The operator is the only other type of user role that can change a subset of BMC Web GUI configurations. The operator can configure the Event Log, Server Power Control, System Diagnostics, the SOL Log, and Power Telemetry. The operator can also view basic system information, server health, system configurations, server diagnostics, and power profiles. The BMC Web GUI will reduce selections in the Menu Bar that appears across the top of the dashboard. As a result, the selections under each category will also be reduced based on the privilege level. The BMC Web GUI Operator privileges contains the following available options:

Menu Bar:

- ◦ System
- ◦ Health
- ◦ Configuration
- ◦ Remote Control
- ◦ Diagnostics

Dashboard:

- ◦ Summary
- ◦ Web Session Timeout
- ◦ System Firmware Version

- **User**: This user role allows the selected user to have access to view basic information related to the BMC Web GUI, such as: logs and diagnostics. Other privileges include power control on the enclosure and some basic configurations on the BMC. The BMC Web GUI User privileges contains the following available options:

Menu Bar:

- ◦ System
- ◦ Health
- ◦ Configuration
- ◦ Remote Control

   ◦ Diagnostics

Dashboard:

   ◦ Summary

   ◦ Web Session Timeout

   ◦ System Firmware Version

- **Callback**: This user role is the lowest privilege level with IPMI read-only access and no access to the BMC Web GUI.
- **No Access**: This user role disconnects all network privileges for the user. This allows the Administrator to turn off access to the BMC Web GUI without deleting the user.

4.7.3.2 Changing the Default Administrator Credentials

Note: Administrator privileges are required to change the default Administrator credentials.

Step 1: Log in to the BMC Web GUI.

Figure 433: BMC Web GUI Login

  a. Open a browser window and navigate to the BMC Web GUI IP address.

    Note: The IP Address can be found in the BIOS.

  b. Type **root** for the username and **root** for the password

  c. Click **Login**.

    The management dashboard will appear.

Figure 434: Management Dashboard
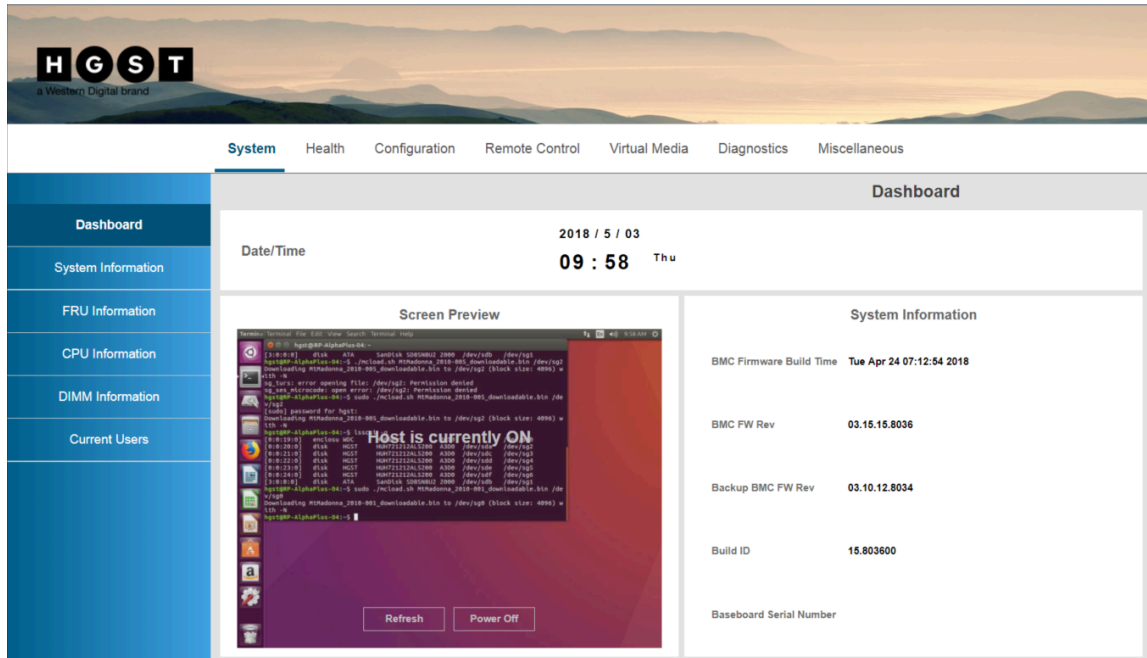
Step 2: From the Menu Bar, select **Configuration > Users**.

The User List window will appear.

Figure 435: Configuration Menu — Users
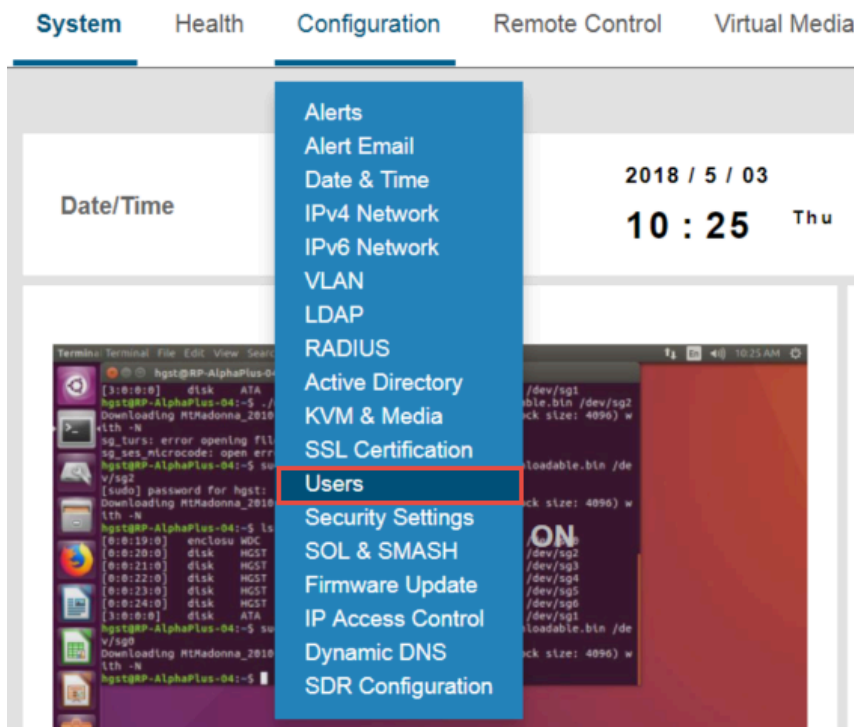
Figure 436: User List

User ID ⇕	User Name ⇕	User Status ⇕	Network Privilege ⇕
1	anonymous	Disable	No Access
2	root	Enable	Administrator
3	test1	Enable	Administrator
4	admin	Enable	Administrator
5	~	~	~
6	~	~	~

Step 3: Modify the default Administrator credentials.

    a. Select **root** from the User List and click **Modify User**.

       The Modify User window will appear.

Figure 437: Select Root

User ID	User Name	User Status	Network Privilege
1	anonymous	Disable	No Access
2	root	Enable	Administrator
3	test1	Enable	Administrator
4	admin	Enable	Administrator
5	~	~	~
6	~	~	~

Figure 438: Modify User — Root

User Name: root
Change Password ☐
Password:
Confirm Password:
Network Privileges: Administrator ▼
User Enable: Unchanged ▼

Modify **Cancel**

b. Complete the following required fields:

Figure 439: Add New User

User Name: root
Change Password ☑
Password: ••••••••••••••••••
Confirm Password: ••••••••••••••••••
Network Privileges: Administrator ▼
User Enable: Unchanged ▼

Modify **Cancel**

- **Password**: Create a new password
- **Confirm Password**: Confirm the newly created password
- **Network Privileges**: Select the network privileges for the user
- **User Enabled**: Leave the value as Unchanged.

c. Click **Modify**.

A message notifying that user has been modified will appear.

Figure 440: User was Modified successfully
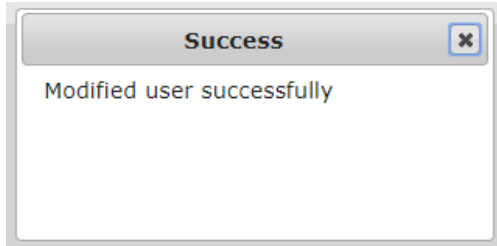
> **Note:** If it is preferred to create a completely new administrator, disable root as the Administrator. Select disable from the User Enable drop-down list and save the new configuration. Create a new administrator by following the instructions in Creating a New User *(page 350)* and set the User Enable drop-down list value to **Administrator**.

Step 4: Verify the user modifications appear in the User List. The User Status and Network Privilege changes can be viewed from the user list.

Figure 441: User added to the User List

User ID	User Name	User Status	Network Privilege
1	anonymous	Disable	No Access
2	root	Enable	Administrator
3	test1	Enable	Administrator
4	admin	Enable	Administrator
5	~	~	~
6	~	~	~

Step 5: Verify that the new Administrator credentials work as expected.

a. Log out of the BMC Web GUI by clicking **Logout** from Actions Menu in the top right-hand corner and confirming the logout selection.

b. Log in to the BMC Web GUI.

Figure 442: BMC Login
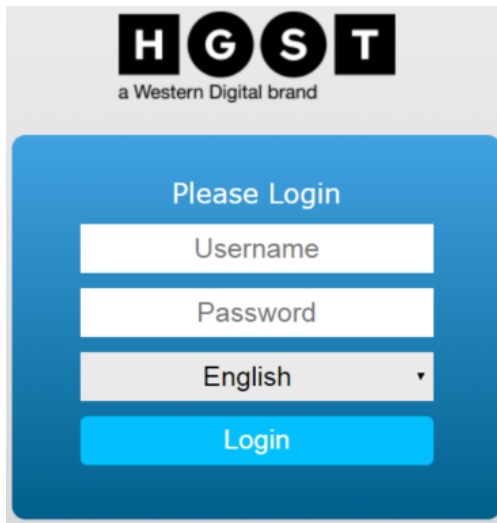
- Open a browser window and navigate to the BMC Web GUI IP address.
- Type a username and password.
- Choose a language from the drop-down list.
- Click **Login**.

The BMC Web GUI Dashboard will appear.

Figure 443: BMC Web GUI Dashboard

4.7.3.3 Logging into the BMC Web GUI

Step 1:   Log in to the BMC Web GUI.

Figure 444: BMC Login
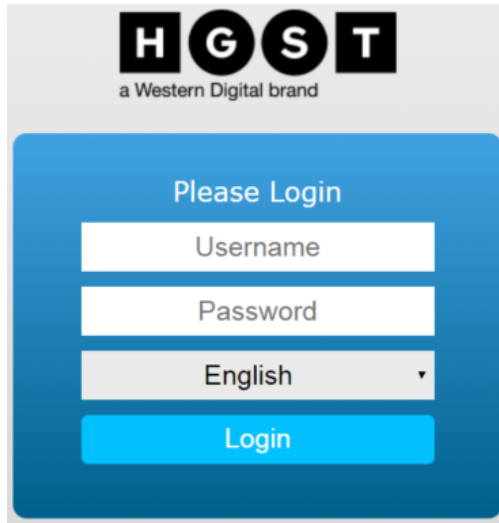
a. Open a browser window and navigate to the BMC Web GUI IP address.
b. Type a username and password
c. Click **Login**.

   The Management Dashboard will appear.

Figure 445: Management Dashboard
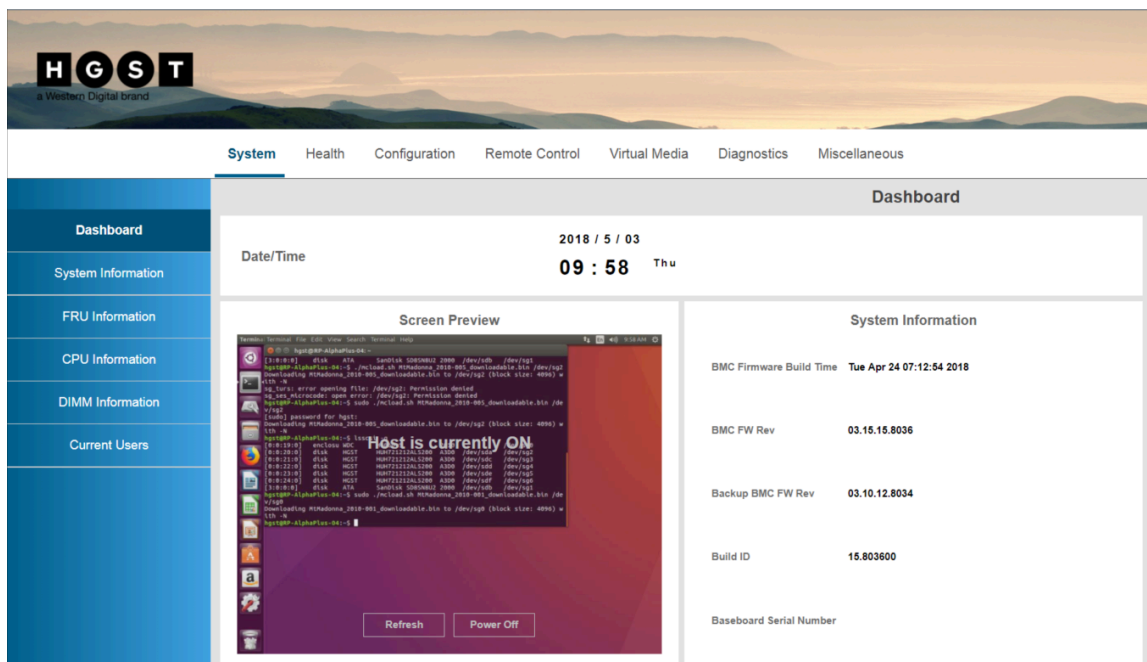
4.7.3.4 Creating a New User

Note: The user is required to log in with a user that has administrator privileges to create a new user. For more information on how to log into the BMC Web GUI, see: Logging into the BMC Web GUI *(page 349)*.
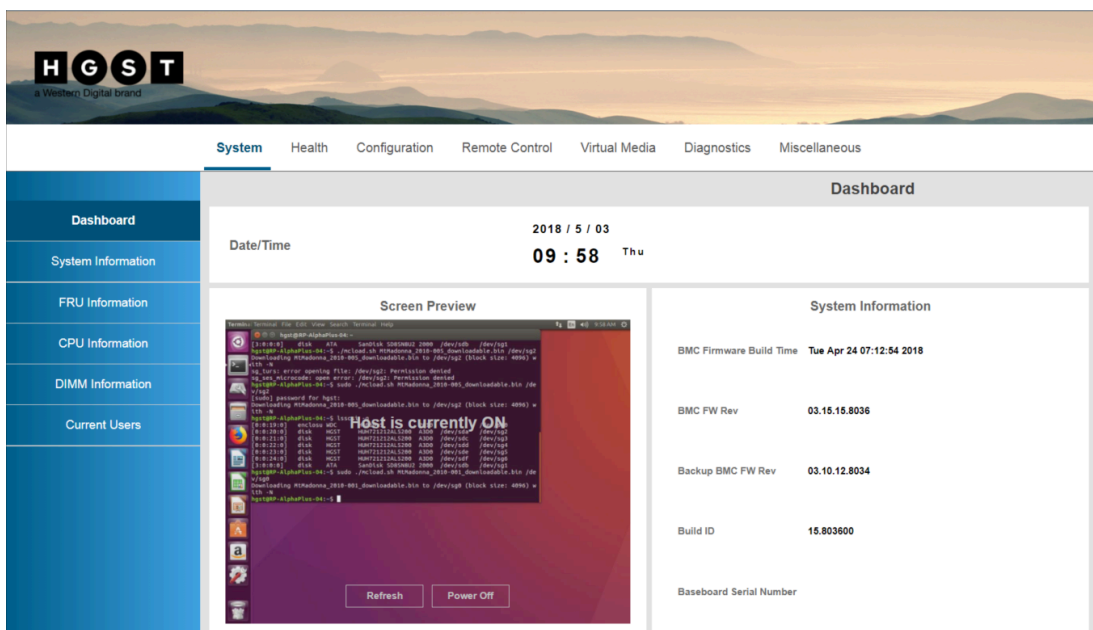
Step 1: From the Menu Bar, select **Configuration > Users**.

The User List window will appear.

Figure 446: Configuration Menu — Users
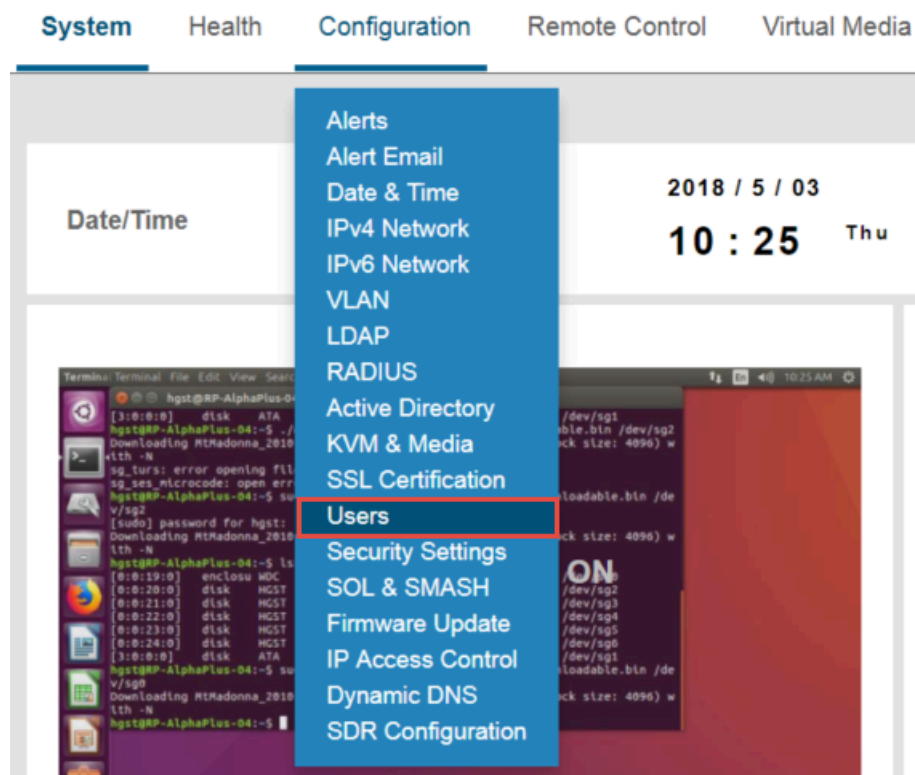
Figure 447: User List

User ID ⬍	User Name ⬍	User Status ⬍	Network Privilege ⬍
1	anonymous	Disable	No Access
2	root	Enable	Administrator
3	test1	Enable	Administrator
4	admin	Enable	Administrator
5	~	~	~
6	~	~	~

Step 2: Create a new user.

    a. Select an empty user slot from the User List and click **Add User**.

The Add New User window will appear.

Figure 448: Empty User Slot

User ID ⇕	User Name ⇕	User Status ⇕	Network Privilege ⇕
1	anonymous	Disable	No Access
2	root	Enable	Administrator
3	test1	Enable	Administrator
4	admin	Enable	Administrator
5	~	~	~
6	~	~	~
7	~	~	~
8	~	~	~

Figure 449: Add New User Fields

User Name:
Password:
Confirm Password:
Network Privileges: Administrator ▾

Add   Cancel

b. Complete the following required fields:

Figure 450: Add New User

User Name: FirstLast
Password: ••••••••
Confirm Password: ••••••••
Network Privileges: User ▾

Add   Cancel

- **User Name**: Create a user name with no spaces
- **Password**: Create a password
- **Confirm Password**: Confirm the created password
- **Network Privileges**: Select the network privileges for the user

c. Click **Add**.

A message notifying that user has been added will appear.

Figure 451: User was added successfully
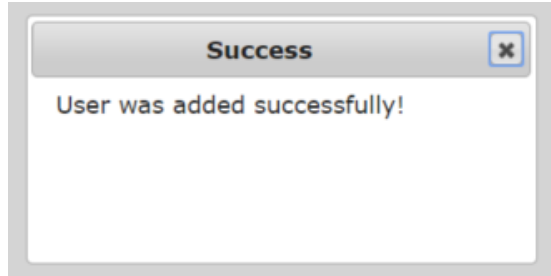
d. Verify the user has been added to the User List.

Figure 452: User added to the User List

User ID ⇕	User Name ⇕	User Status ⇕	Network Privilege ⇕
1	anonymous	Disable	No Access
2	root	Enable	Administrator
3	test1	Enable	Administrator
4	admin	Enable	Administrator
5	FirstLast	Enable	User
6	~	~	~

4.7.3.5 Modifying a User

Note: The user is required to log in with a user that has administrator privileges to modify a user. For more information on how to log into the BMC Web GUI, see: Logging into the BMC Web GUI *(page 349)*.

Step 1: From the Menu Bar, select **Configuration > Users**.

The User List window will appear.

Figure 453: Configuration Menu — Users
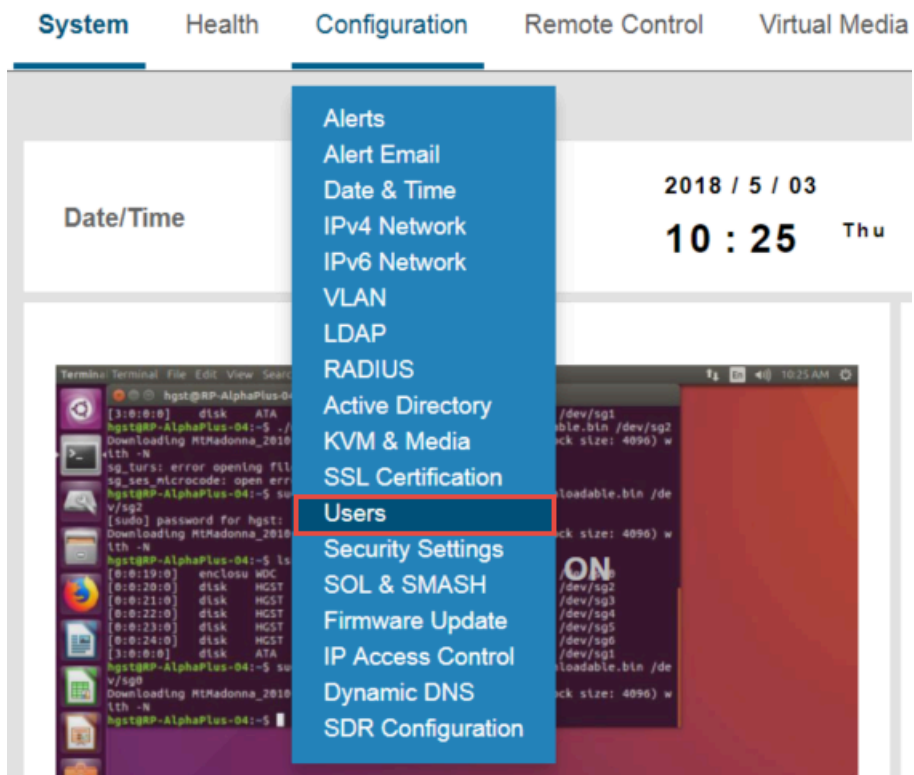
Figure 454: User List

User ID ⬍	User Name ⬍	User Status ⬍	Network Privilege ⬍
1	anonymous	Disable	No Access
2	root	Enable	Administrator
3	test1	Enable	Administrator
4	admin	Enable	Administrator
5	FirstLast	Enable	User
6	~	~	~

Step 2: Modify a user.

    a. Select an existing user from the User List and click **Modify User**.

       The Modify User window will appear.

Figure 455: Select a User

User ID ⇕	User Name ⇕	User Status ⇕	Network Privilege ⇕
1	anonymous	Disable	No Access
2	root	Enable	Administrator
3	test1	Enable	Administrator
4	admin	Enable	Administrator
5	FirstLast	Enable	User
6	~	~	~

Figure 456: Modify User

User Name: FirstLast
Change Password ☐
Password:
Confirm Password:
Network Privileges: User ▾
User Enable: Unchanged ▾

Modify **Cancel**

b. Complete the following required fields:

Figure 457: Add New User

User Name: FirstLast
Change Password ☑
Password: ●●●●●●●●●●●●●●
Confirm Password: ●●●●●●●●●●●●●●
Network Privileges: Operator ▾
User Enable: Unchanged ▾

Modify **Cancel**

- **User Name**: This field cannot be edited
- **Change Password**: Select the checkbox (this will allow the user to change the existing password)
- **Password**: Create a new password
- **Confirm Password**: Confirm the newly created password
- **Network Privileges**: Change the network privileges for the user by selecting a value from the drop-down list

c. Click **Modify**.

A message notifying that user has been modified will appear.

Figure 458: User was Modified successfully
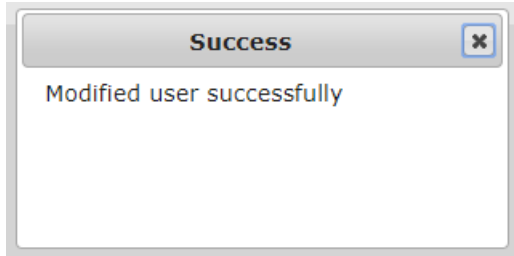
d. Verify the user modifications appear in the User List. The User Status and Network Privilege changes can be viewed from the user list.

Figure 459: User Modified in the User List

User ID	User Name	User Status	Network Privilege
1	anonymous	Disable	No Access
2	root	Enable	Administrator
3	test1	Enable	Administrator
4	admin	Enable	Administrator
5	~	~	~
6	~	~	~

4.7.3.6 Deleting a User

Note: The user is required to log in with a user that has administrator privileges to deleting a user. For more information on how to log into the BMC Web GUI, see: Logging into the BMC Web GUI *(page 349)*.

Step 1: From the Menu Bar, select **Configuration > Users**.

The User List window will appear.

Figure 460: Configuration Menu — Users
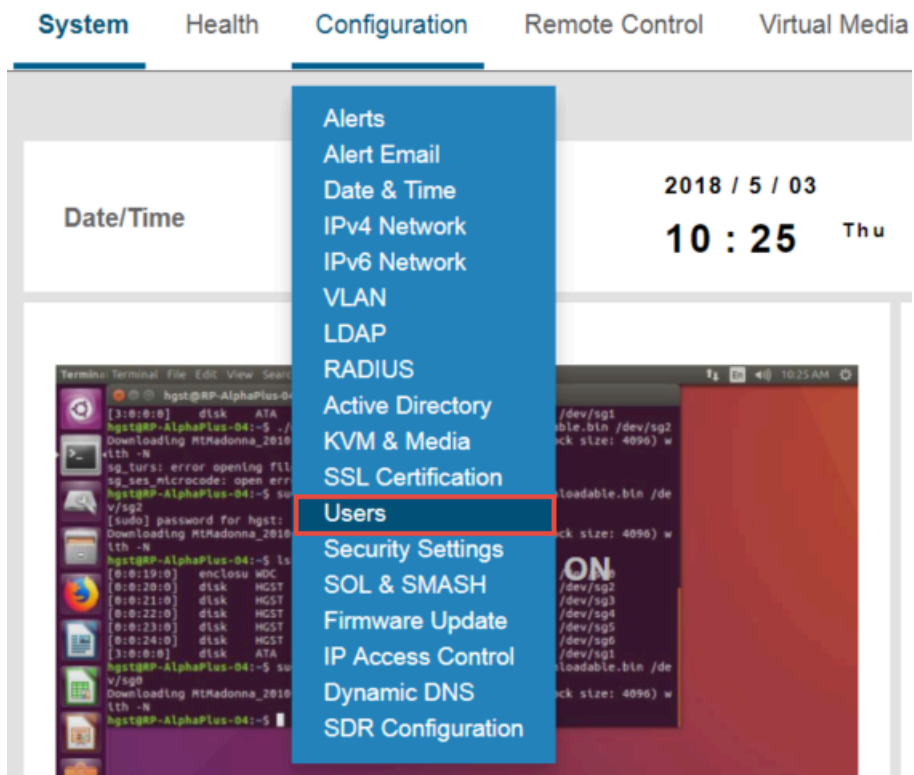
Figure 461: User List

User ID	User Name	User Status	Network Privilege
1	anonymous	Disable	No Access
2	root	Enable	Administrator
3	test1	Enable	Administrator
4	admin	Enable	Administrator
5	FirstLast	Enable	User
6	~	~	~

Step 2: Delete a user.

a. Select an existing user from the User List and click **Delete User**.

A delete user confirm message will appear.

Figure 462: Select a User

Figure 463: Delete User?

b. Click **OK**.

A user has been deleted message will appear.

4.7.3.7 Ending a User Session

Note: The user is required to log in with a user that has administrator privileges to end a user session. For more information on how to log into the BMC Web GUI, see: Logging into the BMC Web GUI *(page 349)*.

Step 1: From the Menu Bar, select **System > Current Users**.

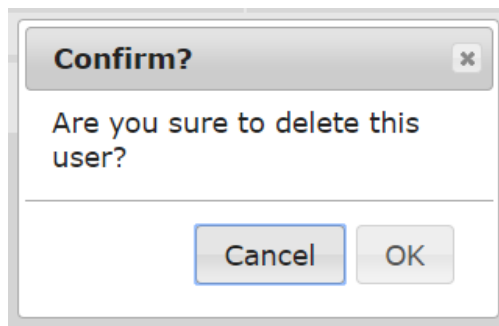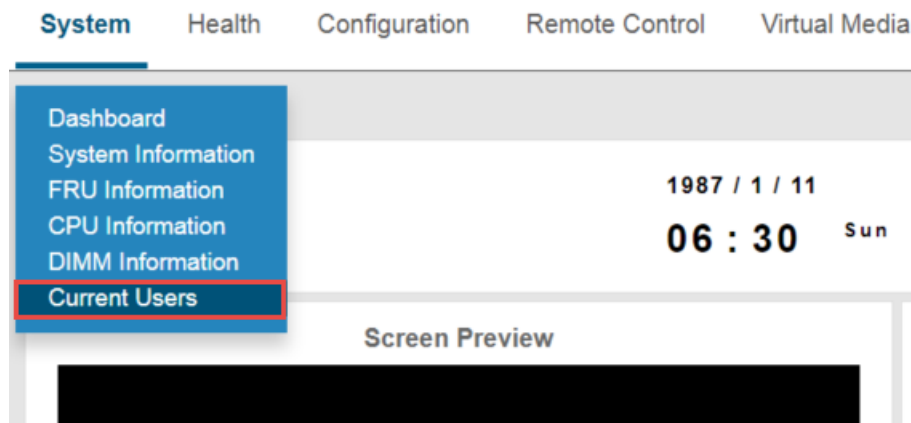The Current User window will appear.

Figure 464: System Menu — Current Users

Figure 465: Current User

Step 2: Click **Kill me** next to the user session that needs to be ended.

A delete session confirm message will appear.

Figure 466: Ending a User Session

Step 3: Click **OK** and verify that the user session has been ended. If you are ending the session of the current user, that user will automatically be logged out.

4.7.4 Security Features

This section provides information related to the security features for the BMC Web GUI. The Security Settings window contains the IP Blocking, Port Settings, and Optional Network Services sections. Each of the sections default to specific settings, but the settings may be altered, enabled, or disabled to better fit specific needs.

4.7.4.1 Enabling Security Settings

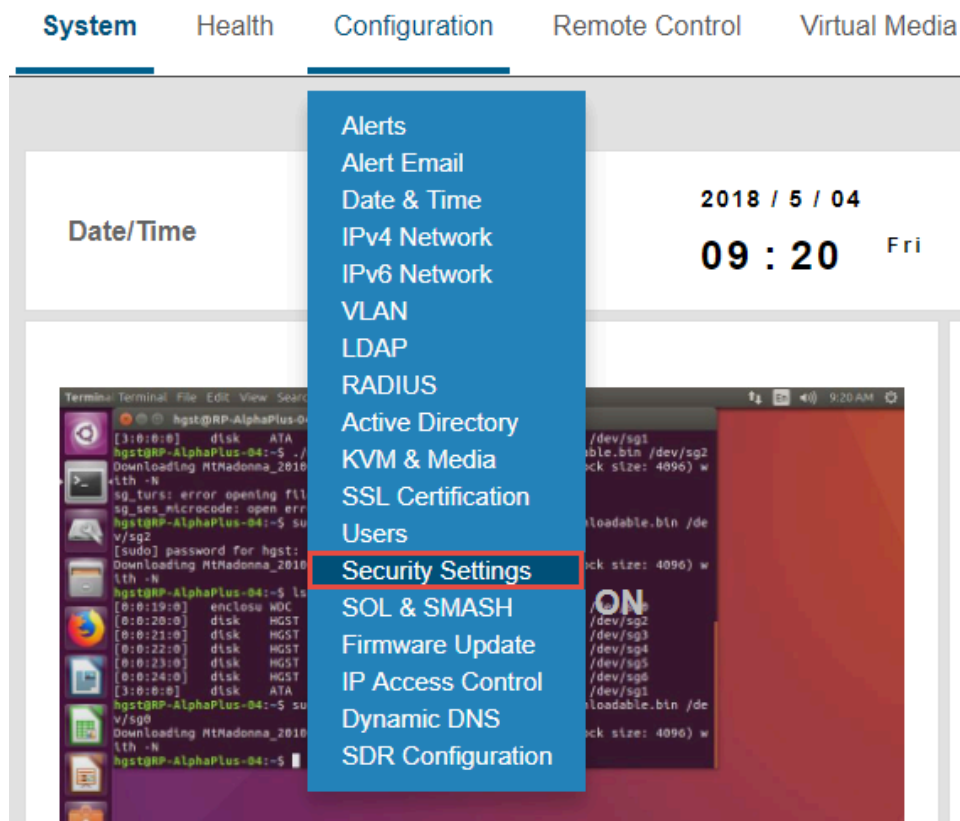**Note:** The user is required to log in with a user that has administrator privileges to enable security settings. For more information on how to log into the BMC Web GUI, see: Logging into the BMC Web GUI *(page 349)*.

Step 1: From the Menu Bar, select **Configuration > Security Settings**.

The Security Settings window will appear.

Figure 467: Configuration Menu — Security Settings

Figure 468: Security Settings

Step 2: The Security settings default to a standard set of settings. If the standard settings are sufficient, exit the Security Settings section. If a new or updated settings are preferred, complete the information as shown in section below:

a. Default IP Blocking Settings:

Figure 469: IP Blocking Settings

- **IP Blocking**: The checkbox is selected by default. Uncheck **Enable** to disable the IP Block Settings.
- **Failed Login Attempts**: The value of **3** failed login attempts set by default. The user has to have three failed attempts before being locked out. On the fourth failed attempt the user will be locked out. Input a different number to change the amount of failed attempts that are aloud before the user is locked out.

- **Failed Login Interval Time (sec)**: The value of **20** seconds between failed login attempts is set by default. Input a different number of seconds to change the amount of time between being locked out due to failed login attempts. The number of failed login attempts is defined by the **Failed Login Attempts** field.
- **Remote Client Lockout Time (sec)**: The value of **120** seconds of remote client lockout time is set by default. If the user exceeds the number of failed login attempts, it will lock remote access to the BMC Web GUI for the defined amount of time. Input a different number of seconds to change the amount of time between being locked out due to failed login attempts.

b. Default Port Settings:

Figure 470: Port Settings

- **HTTPS (Secure) Port** The port settings are set to a default of **443**. Input a different number to change the specific port that is being connected.

c. Default Optional Network Services:

Figure 471: Optional Network Services

- **SMASH SSH**: The checkbox is selected by default. Uncheck **Enable** to disable SMASH SSH.
- **SOL SSH**: The checkbox is not selected by default. Check **Enable** to enable SOL SSH.
- **HTTPS**: The checkbox is selected by default. Uncheck **Enable** to disable secure web browsing.
- **IPMI over LAN**: The checkbox is selected by default. Uncheck **Enable** to disable IPMI access over LAN.

Step 3: Save the new settings.

A message notifying that the parameters of the security section have been set will appear.

Figure 472: Security Settings Set
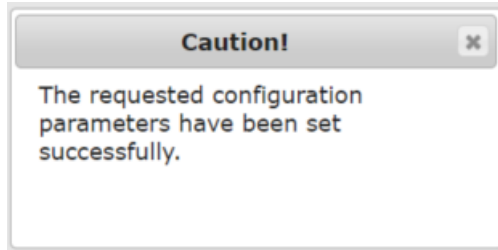
4.7.5 Network Settings

This section provides information related to the network settings for the BMC Web GUI. The Administrator may enable, disable, or configuring the network settings for the IPv4 Network, IPv6 Network, and VLAN. When changing any settings related to networking, it is important to notify any users of upcoming changes to avoid conflicts. Also, ensure that all hosts that are physically connected to the enclosure are available after the network settings have been changed.

4.7.5.1 Configuring the IPv4 Network Settings

Note: The user is required to log in with a user that has Operator privileges or higher to configure IPv4 Network Settings. For more information on how to log into the BMC Web GUI, see: Logging into the BMC Web GUI *(page 349)*.

Step 1: From the Menu Bar, select **Configuration > IPv4 Network**.

The IPv4 Network Settings window will appear.

Figure 473: Configuration Menu — IPv4 Network

Figure 474: IPv4 Network Settings

Step 2: Enable and configure the IPv4 Network Settings by completing the following steps:

> 📄 **Note:** No changes are needed to this section if DHCP is the preferred method. The BMC Web GUI is set to DHCP by default.

Figure 475: IPv4 Network Settings — Enabled

a. **Hostname**: The hostname is autogenerated by default. To change the defaulted hostname, type a new hostname into the field.
b. **Enable LAN Failover**: The Enable LAN Failover is defaulted to disbaled. Select the checkbox to enable this feature.
c. **LAN Channel**: The LAN Channel option defaults to Channel-3. Choose another option from the drop-down list to change the value.
d. **MAC Address**: The MAC Address is autogenerated.
e. **NIC Description**: Defaulted to Dedicated to BMC Web GUI with no option to change the value.
f. **Link Status**: The Link Status defaults to **Obtain an IP address automatically (use DHCP)**. This configures the IPv4 network settings to use DHCP for the IP Address, Subnet Mask, Gateway, Primary DNS Sever, and Secondary DNS Server. The other options allow for the user to choose a specific IP Address or to disable the IPv4 Network altogether.
g. **IP Address**: The IP Address is obtained by DHCP by default. Select the option **Use the following IP address** to enter a specific IP Address into the field next to IP address.
h. **Subnet Mask**: The Subnet Mask is obtained by DHCP by default. The **Use the following IP address** option must be selected to input a specific subnet mask.
i. **Gateway**: The Gateway is obtained by DHCP by default. The **Use the following IP address** option must be selected to input a specific gateway.
j. **Primary DNS Server**: The Primary DNS Server is obtained by DHCP by default. The **Use the following IP address** option must be selected to input the primary DNS server.

  k. **Secondary DNS Server**: The Secondary DNS Server is obtained by DHCP by default. The **Use the following IP address** option must be selected to input the secondary DNS server.

Step 3: Save the new settings.

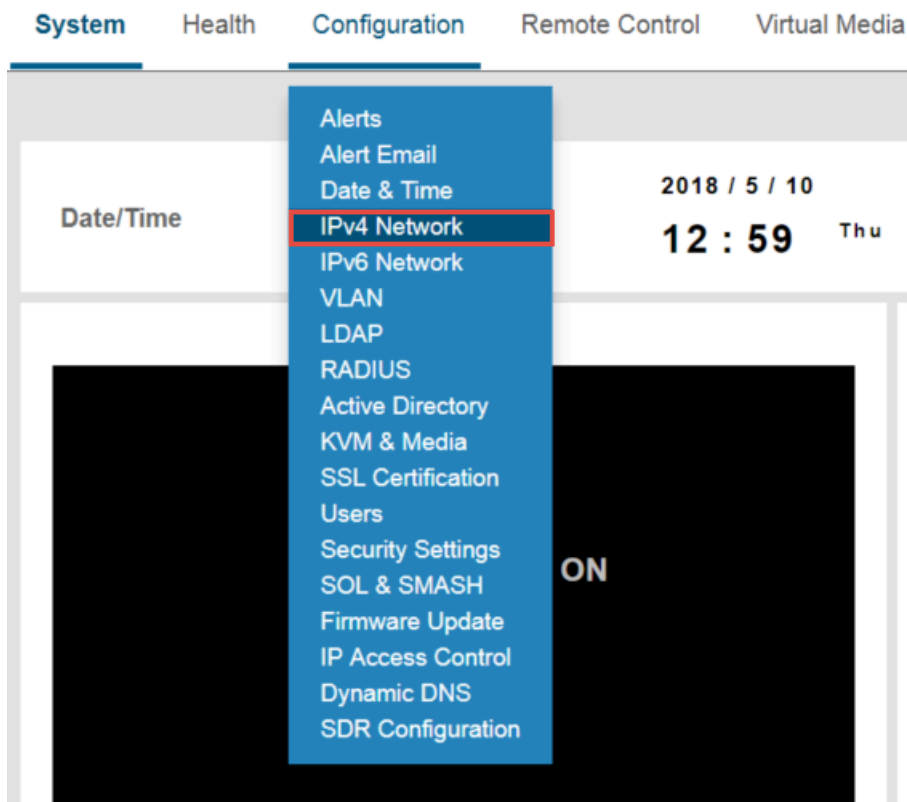A message notifying that the parameters of the IPv4 Network Settings section have been set will appear.

4.7.5.2 Configuring the IPv6 Network Settings

Note: The user is required to log in with a user that has Operator privileges or higher to configure IPv6 Network Settings. For more information on how to log into the BMC Web GUI, see: Logging into the BMC Web GUI *(page 349)*.

Step 1: From the Menu Bar, select **Configuration > IPv6 Network**.

The IPv6 Network Settings window will appear.

Figure 476: Configuration Menu — IPv6 Network

Figure 477: IPv6 Network Settings

Step 2: Enable and configure the IPv6 Network Settings by completing the following steps:

Figure 478: IPv6 Network Settings — Enabled

a. **Enable LAN Failover**: The Enable LAN Failover is defaulted to disbaled. Select the checkbox to enable this feature.

b. **LAN Channel**: The LAN Channel option defaults to Channel-3. Choose another option from the drop-down list to change the value.

c. **MAC Address**: The MAC Address is autogenerated.

d. **NIC Description**: Defaulted to Dedicated to BMC Web GUI with no option to change the value.

e. **Link Status**: The Link Status defaults to **Disable**. This configures the IPv6 network settings to disabled. Select another option to enable the link status. The user may select the option to enable DHCP or to use a specific IP Address.

f. **IP Address**: The IP Address is uneditable by default. Select the option **Use the following IP address** to enter a specific IP Address into the field next to IP address.

g. **Prefix Length**: The IPv6 Prefix Length is uneditable by default. Select the option **Use the following IP address** to enter a specific Prefix Length into the field.

> **Note:** The Prefix Length is used to identify how many bits of a Gobal Unicast IPv6 Address are available in the network.

h. **Gateway**: The Gateway is uneditable by default. The **Use the following IP address** option must be selected to input a specific gateway.

i. **Primary DNS Server**: The Primary DNS Server is uneditable by default. The **Use the following IP address** option must be selected to input the primary DNS server.

j. **Secondary DNS Server**: The Secondary DNS Server is uneditable by default. The **Use the following IP address** option must be selected to input the secondary DNS server.

Step 3: Save the new settings.

A message notifying that the parameters of the IPv6 Network Settings section have been set will appear.

4.7.5.3 Configuring VLAN Settings

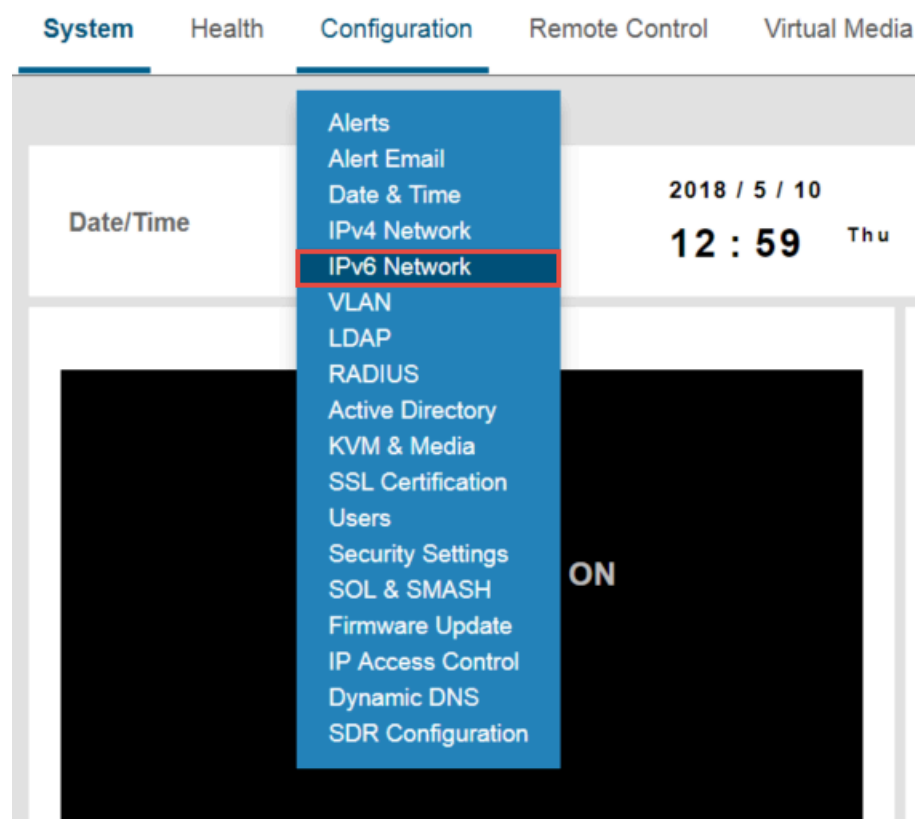> **Note:** The user is required to log in with a user that has Operator privileges or higher to configure VLAN Settings. For more information on how to log into the BMC Web GUI, see: Logging into the BMC Web GUI *(page 349)*.

Step 1: From the Menu Bar, select **Configuration > VLAN**.

The VLAN Settings window will appear.

Figure 479: Configuration Menu — VLAN
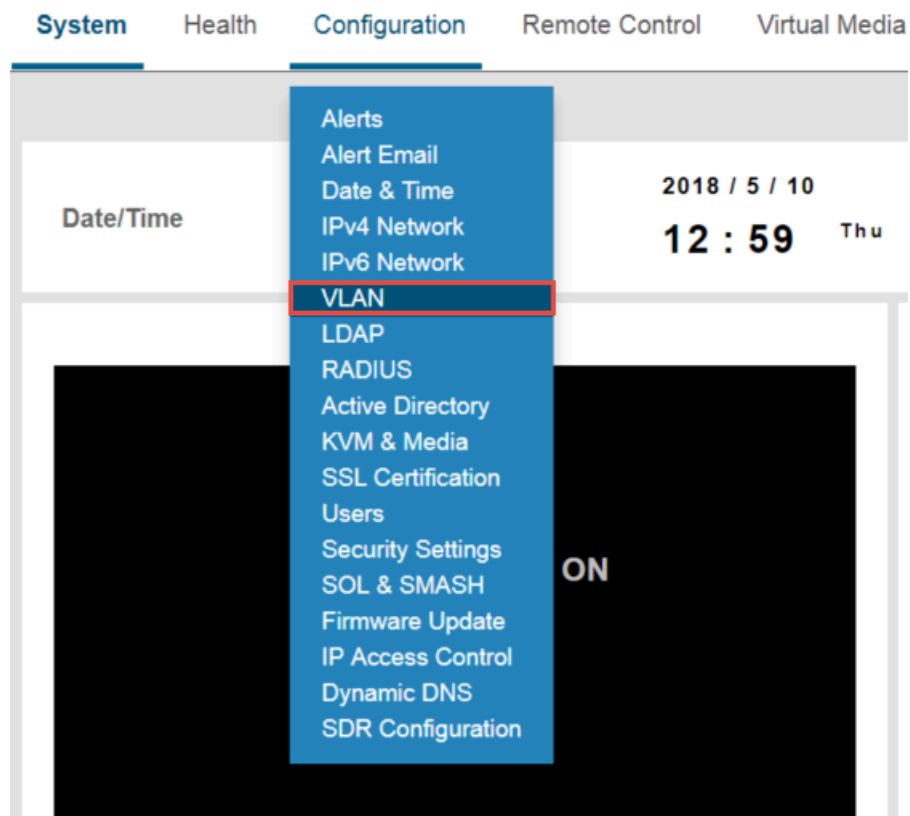
Figure 480: VLAN Settings

Step 2: Enable and configure the VLAN settings by completing the following steps:

Figure 481: VLAN Settings — Enabled

    a. **LAN Channel**: The LAN Channel option defaults to Channel-3. Choose another option from the drop-down list to change the value.

    b. **Enable VLAN**: The VLAN option defaults to disabled. The checkbox must be selected to enable VLAN.

    c. **VLAN ID**: The VLAN ID defaults to a value of 0. When the VLAN is enabled an ID of 1 to 4094 must be chosen.

    d. **VLAN Priority**: The VLAN Priority defaults to a value of 0 (zero). When the VLAN is enabled a priority of 1 (lowest priority) to 7 (highest priority) must be chosen.

Step 3: Save the new settings.

A message notifying that the parameters of the VLAN Settings section have been set will appear.

4.7.6 BMC Web GUI Firmware

This section provides information related to updating BMC Web GUI firmware. The firmware update can be acquired from Western Digital support. For more information on how to get the latest version of firmware, see: Downloading Firmware from the Support Portal *(page 318)*. When updating firmware, it is important to notify any users of upcoming changes to avoid conflicts. Also, ensure that all hosts that are physically connected to the enclosure are available after the firmware update has been completed.

4.7.6.1 Updating BMC Web GUI Firmware

Note: The user is required to log in with a user that has administrator privileges to configure IPv4 Network Settings. For more information on how to log into the BMC Web GUI, see: Logging into the BMC Web GUI *(page 349)*.

Step 1: The latest version of firmware must be downloaded from the Support site to update the BMC Web GUI firmware. For instructions on how to download the latest version of firmware, see: Downloading Firmware from the Support Portal *(page 318)*.

Step 2: From the Menu Bar, select **Configuration > Firmware Update**.

The Firmware Update screen will appear.

Figure 482: Firmware Upgrade Menu
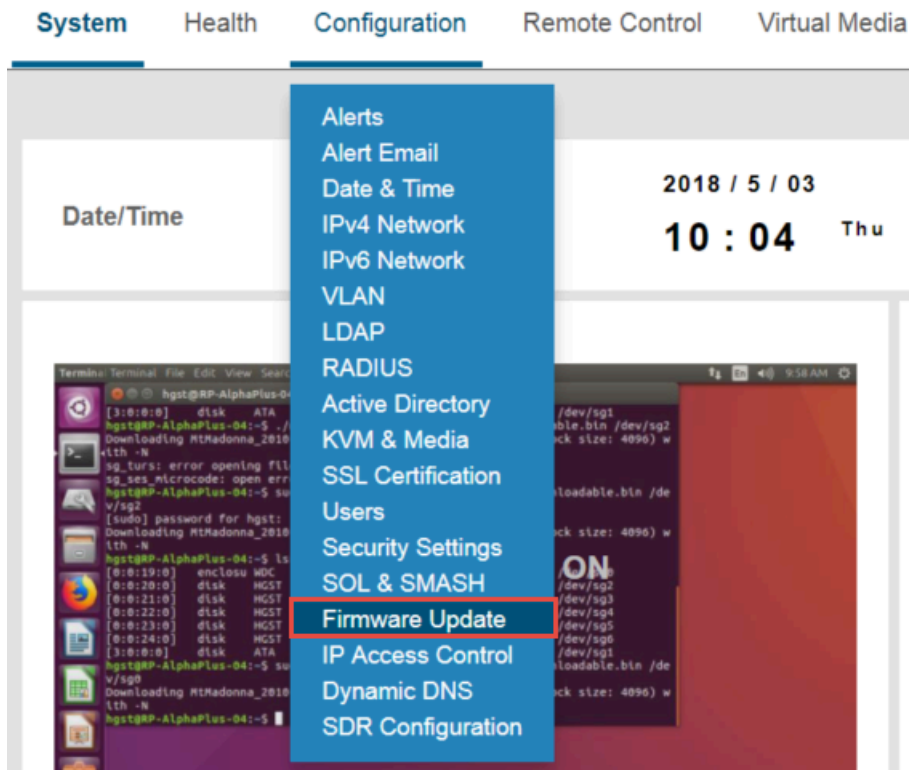
Figure 483: Firmware Update Screen
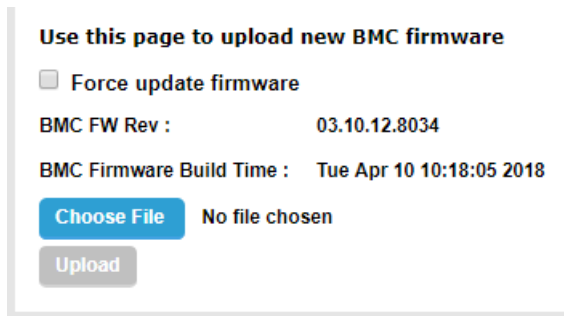
Step 3: Click **Choose File** in the BMC Firmware Update section.

Figure 484: Choose File

Use this page to upload new BMC firmware

☐ Force update firmware

BMC FW Rev :   03.10.12.8034

BMC Firmware Build Time :   Tue Apr 10 10:18:05 2018

[Choose File]   No file chosen

[Upload]

Step 4: Navigate to the latest version of firmware that was downloaded from the Support site.

Step 5: Select the BMC .bin file that lists the update with the 2Fan - 2CPU option.

Step 6: Click **Upload** in the BMC Firmware Update section.

The firmware update begins to upload to the BMC.

Figure 485: Upload

Use this page to upload new BMC firmware

☐ Force update firmware

BMC FW Rev :   03.10.12.8034

BMC Firmware Build Time :   Tue Apr 10 10:18:05 2018

[Choose File]   RubyPeak-2Fan-2Cpu-si-BMC_FW-Update.bin

[Upload]

Figure 486: Upload Progress

Use this page to upload new BMC firmware

☐ Force update firmware

BMC FW Rev :   03.10.12.8034

BMC Firmware Build Time :   Tue Apr 10 10:18:05 2018

Upload firmware :   Done.

Authenticate firmware : Done.

Program firmware :   91%

Reboot BMC :   Pending...

📄   **Note:** This could take a few minutes to complete.

Step 7: The BMC will lose connection and the session will expire during the reboot. The BMC must reboot to complete the update.

Step 8: Log back into the BMC Web GUI.

Step 9: From the Menu Bar, select **Configuration > Firmware Update**.

The Firmware Update screen will appear.

Figure 487: Firmware Upgrade Menu
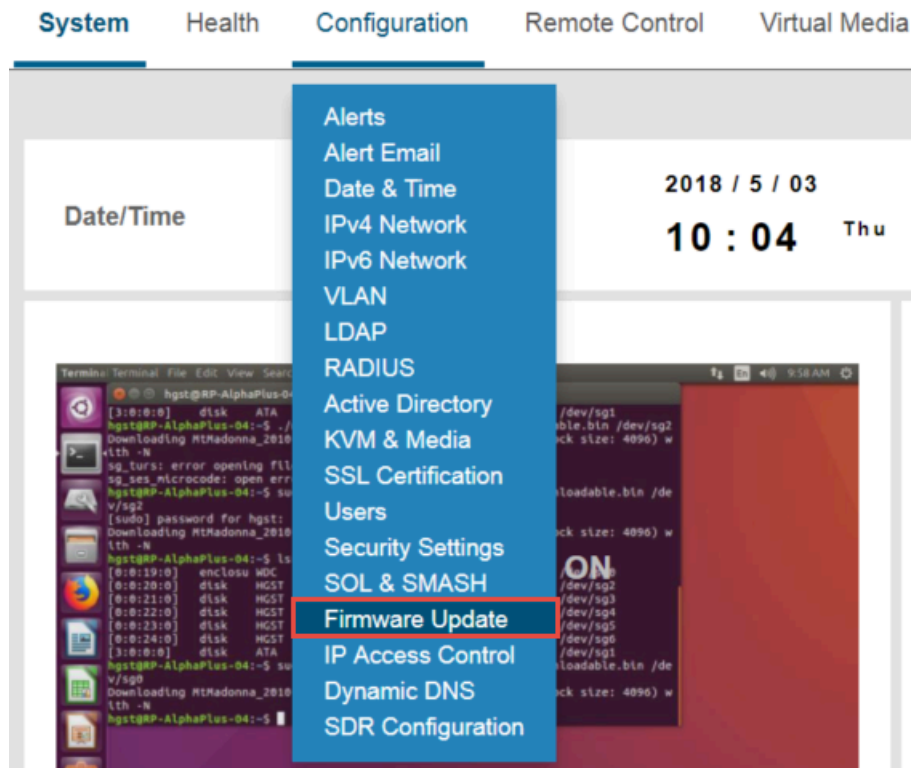
Figure 488: Firmware Update Screen
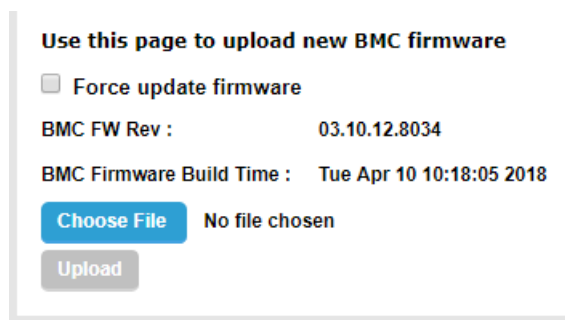
Step 10: Verify the firmware version has changed to the version that was downloaded from the Support site.

Figure 489: Firmware Update Screen—Updated

Use this page to upload new BMC firmware

☐ Force update firmware

☐ Restore to default

BMC FW Rev :   03.15.15.8036

BMC Firmware Build Time :   Tue Apr 24 07:12:54 2018

Choose File   No file chosen

Upload

4.7.6.2 Updating the Server BMC Firmware Using Redfish OOBM

Step 1:   Download the firmware package from the support portal. Follow the instructions outlined in Downloading Firmware from the Support Portal *(page 318)*.

Step 2 :   Determine which .bin file is required based on the system configuration being upgraded. There are two .bin files in the firmware package that can be used to upgrade the BMC firmware. One is for systems with a single CPU, and one is for systems with two CPUs. The following examples show what to look for in the file names. Look for the number of CPUs listed in the file name (bolded).

```
RubyPeak-2Fan-1Cpu-si-BMC_FW-Update.bin
```

```
RubyPeak-2Fan-2Cpu-si-BMC_FW-Update.bin
```

Step 3 :   Once the update file is chosen, place the update file on a server or fileshare that is accessible to the Ultrastar Serv60+8 . The Ultrastar Serv60+8 can access servers or fileshares that use the following communications protocls:

- HTTP
- HTTPS
- FTP
- TFTP

Step 4 :   Make a POST command to the BMC to start the upgrade process.

   a.   The following is a list of information needed to construct a proper POST to the BMC for upgrade:

   - The URI of the location of the BMC update .bin file.
   - The IP address of the BMC being upgraded.
   - A software client program capable of making RESTful commands to the BMC, e.g. Postman or CURL

   b.   The following example command uses CURL to make send the update command, and that is followed by a breakdown of the command's structure:

```
curl -k -u USERNAME:PASSWORD -X POST -i -H Content-Type:application/
json
-d "{\"ImageURI\" : \"http://FILESERVER/RubyPeak-2Fan-2Cpu-si-
BMC_FW-Update.bin\", \"Targets\" : [\"/redfish/v1/UpdateService/
SoftwareInventory/BMC\"]}"
https://BMC IP Adress/redfish/v1/UpdateService/Actions/
UpdateService.SimpleUpdate
```

The structure of the POST command can be broken down into three components: the base command with required headers, the data object containing the address to the firmware update image, and the Redfish API target that will execute the command.

The base command and headers can be broken down as follows:

- The **-k** modifier allows a connection to an unsecured server and can be omitted if the user prefers to store the BMC firmware package on an SSL enabled server.
- The **-u** modifer enables the Basic Auth requirement and is followed by the USERNAME:PASSWORD of the account activating the upgrade.

> **Note:** The upgrade must come from an account the appropriate roles and permissions to modify firmware code.

- **-X POST** specifies the type of REST command being entered. POST is required for firmware upgrades.
- **-i** specifies that the HTTP response headers should be included in the response output.
- **-H** specifies a header to be sent with the response body. In this example the Content-Type header is set to `application/json` to let the BMC know to expect a JSON formatted request body.

The data object contains a JSON formatted request body that sets the address of the .bin image on the host that stores it, and a "Target" that specifies which item in the Software Inventory object to update. In this case that is set to the BMC.

The final component is the base target that initiates the SimpleUpdate action in the update service.

Step 5: The BMC will commit the update and the response should looking something like the following:

```
HTTP/1.1 303 See Other
Location: /redfish/v1/TaskMonit/deb1fde1-db8c-44c2-bba6-95d83f2c9e79
Content-Type: application/json
OData-Version: 4.0
Cache-Control: no-cache
Access-Control-Allow-Origin: *
Strict-Transport-Security: max-age=31536000; includeSubdomains; preload
X-UA-Compatible: IE=11
X-Frame-Options: SAMEORIGIN
X-XSS-Protection: 1; mode=block
Content-Length: 154
Date: Fri, 30 Nov 2018 17:16:24 GMT
Server: lighttpd/1.4.48

{"@odata.type":"#Message.v1_0_5.Message","MessageId":"Base.1.1.0.Success","Message":"Succe
 Completed Request","Severity":"OK","Resolution":"None"}
```

Notice that the response body returns all of the HTTP headers because the **-i** modifier was set. This is followed by a JSON formatted response body listing the status of the update and whether it was successful.

4.7.6.3 BIOS Firmware Update Using BMC Web GUI

This procedure provides instructions for updating the server subsystem's BIOS firmware stack using the BMC Web GUI.

📄 **Note:** The ability to update the BIOS using the BMC requires BMC firmware version 3.43.X or later.

Step 1: Download the latest BIOS and firmware update package for UEFI from the server board manufacturer: https://downloadcenter.intel.com/download/30186/Intel-Server-Board-S2600ST-Family-BIOS-and-Firmware-Update-Package-for-UEFI

Step 2: Ensure that the currently installed firmware versions of the system BIOS, ME , BMC, and FRUSDR meet the manufacturer's listed requirements. If they don't, download a previously-posted System Update Package (SUP) and update the system to those revisions before updating the system to the firmware stack included in the latest package.

Step 3: Unzip the BIOS and firmware package on your local machine.

Step 4: Follow the instructions in Logging into the BMC Web GUI *(page 349)* to log into the BMC.

Step 5: Navigate to **Configuration** > **BIOS/ME Firmware Update.**
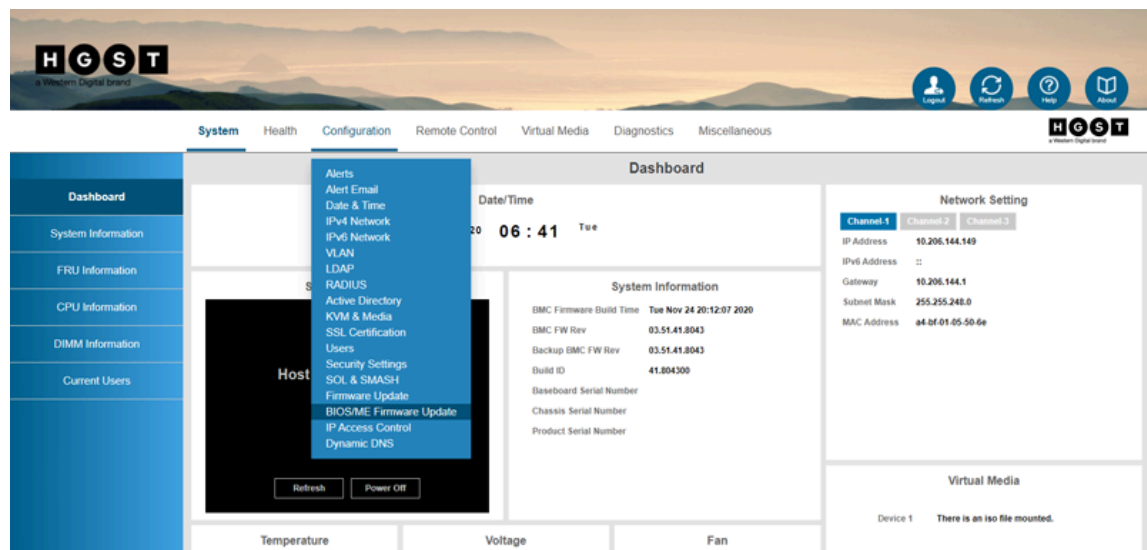
Step 6: Make note of the current **BIOS FW Version** listed on the **BIOS/ME Firmware Update** page (outlined in red in the following image). This will be used later to confirm a successful update.
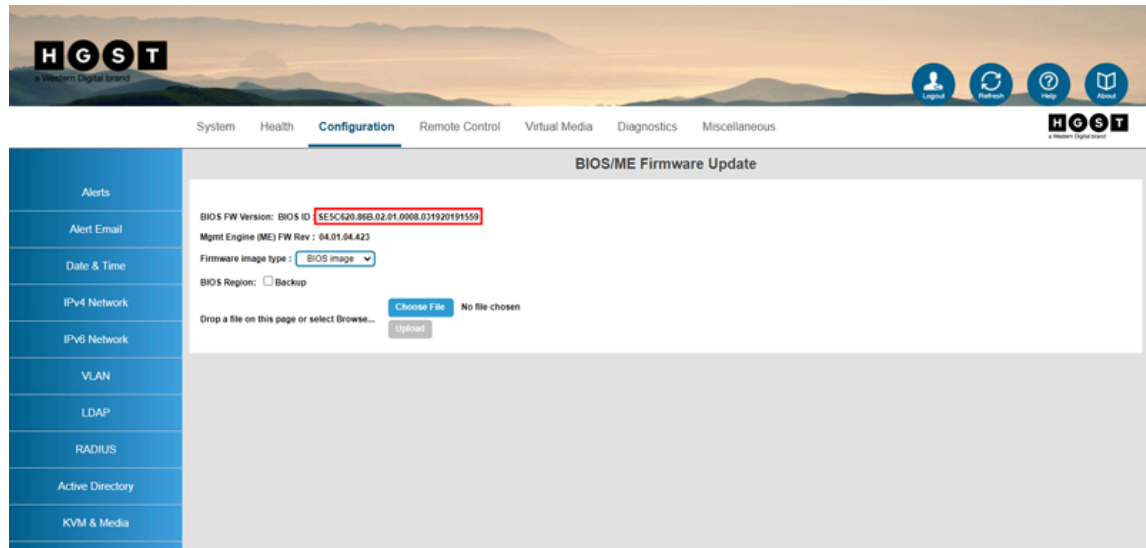
Step 7: Click the **Firmware image type** drop-down list, and select **BIOS Image**.

Step 8: Click the **Choose File** button, navigate to the new BIOS image (`UpdBIOS.nsh`) from step 3 *(page 376)* and select it.

> **Note:** Select and update the BIOS image first. Do not update the ME or FD images yet.

Step 9: Click the **Upload** button.

Step 10: After the BIOS image is uploaded, reboot the server.

Step 11: Log into the BMC again and navigate back to the **BIOS/ME Firmware Update** page. Compare the **BIOS FW Version** to the version previously listed, and verfiy that the update was successful.

Step 12: Navigate to **Health** > **Event Log**.
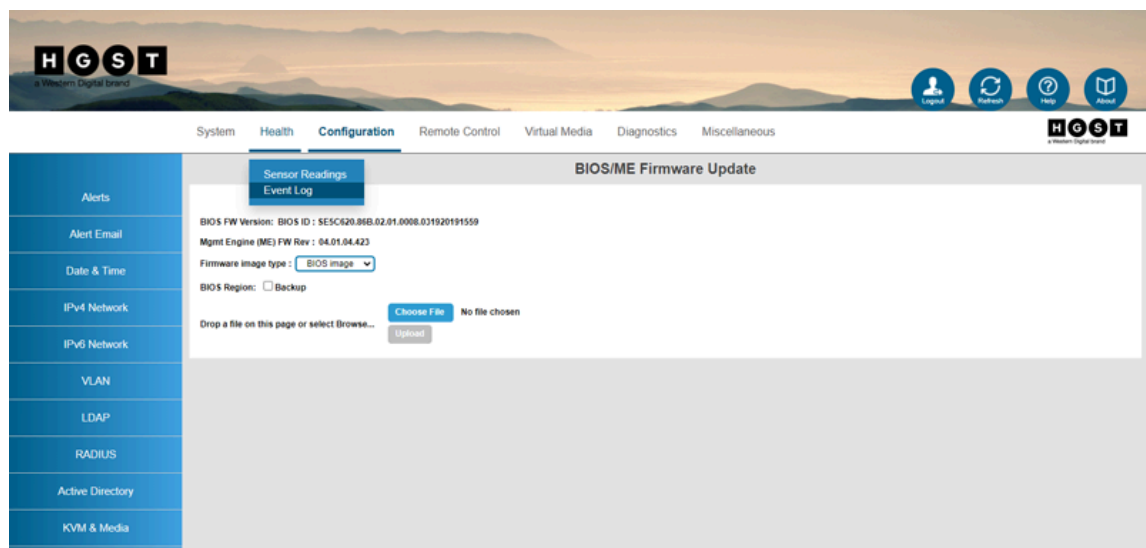
Step 13: On the **Event Log** page, look for an entry that lists *BMC* under the **Controller** column and *BIOS version update* under the **Description** column.
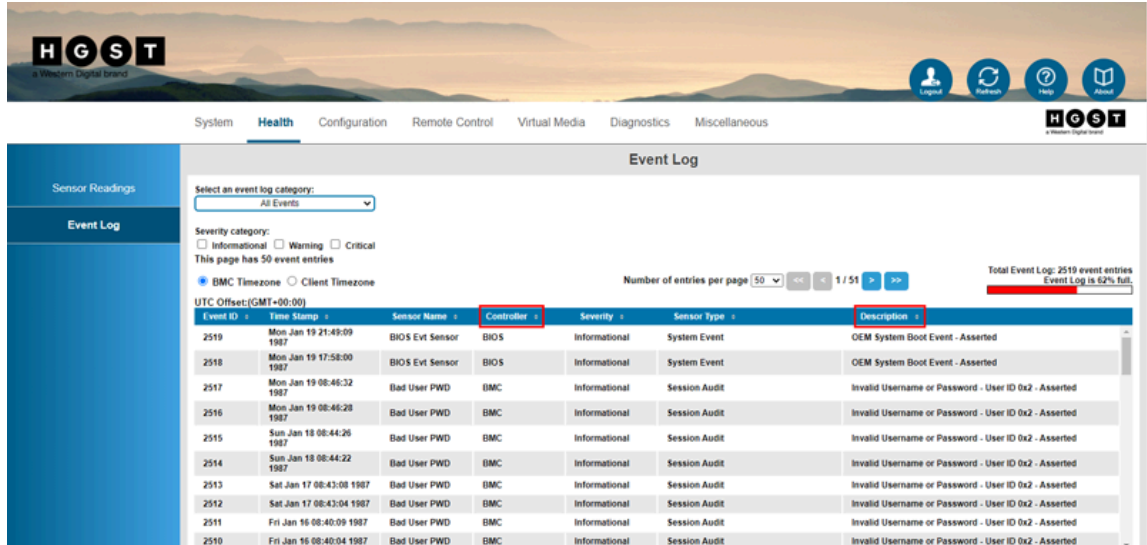
Result: The server subsystem's BIOS firmware stack has now been updated.

4.7.7 Event Logs

This section provides information related to the BMC Web GUI Event Logs. The Event Log displays all of system event logs that are captured by the BMC.

The Event Log window uses event log category and severity category filters to limit the number of results to easily locate specific logs. The event log results will be displayed in the Event Log table based on the selections from these fields.

Figure 494: Event Log
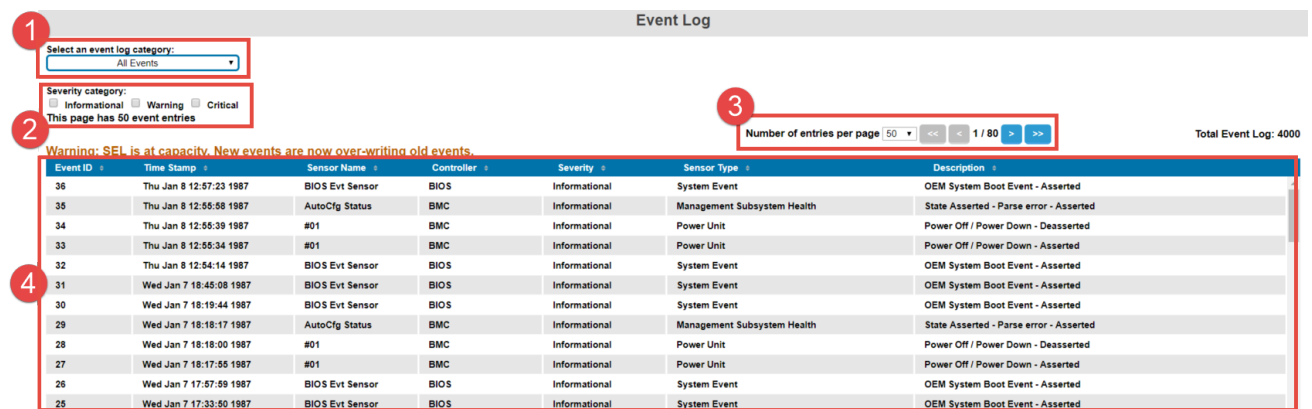
1. **Event Log Category**: The Event Log Category drop-down list contains the option to filter by Sensor-specific events, BIOS Generated Events, System Management Software Events or the All Events options can be selected to display all event logs.
2. **Severity Category**: The Severity Category options allow the user to filter based on the severity of the warning. The severity can be filtered based on the event log being informational, an enclosure warning or a critical issue. One or more options may be selected. If no options are selected the severity category will not be applied and the table will display all severity categories.
3. **Entries Selector**: The Entries Selector drop-down list allows the user to select the amount of Event Logs that are displayed in the table.
4. **Event Log Table**: The Event Log table is populated with the Event Logs that are available at the time of loading. The window must be refreshed to get any event logs that may have occured since the page was loaded.

> **Note:** Live warnings will sometimes be displayed just above the Event Log table.

Figure 495: Event Log Buttons

1. **Clear Event Log**: When clicked, the Clear Event Log button clears the results that currently appear in the Event Log.
2. **Save Event Log**: When clicked, the Save Event Log button saves the event log as a zip file containing one in hex and one in plain text Event Log report.
3. **Refresh Event Log**: When clicked, the Refresh Event Log button refreshed the events that appear in the table. This action searches for latest logs that may not have been added to the table yet and adds them.

4.7.7.1 Viewing Event Logs

Step 1: From the Menu Bar, select **Health > Event Log**.

The Event Log screen will appear.

Figure 496: Event Log Menu
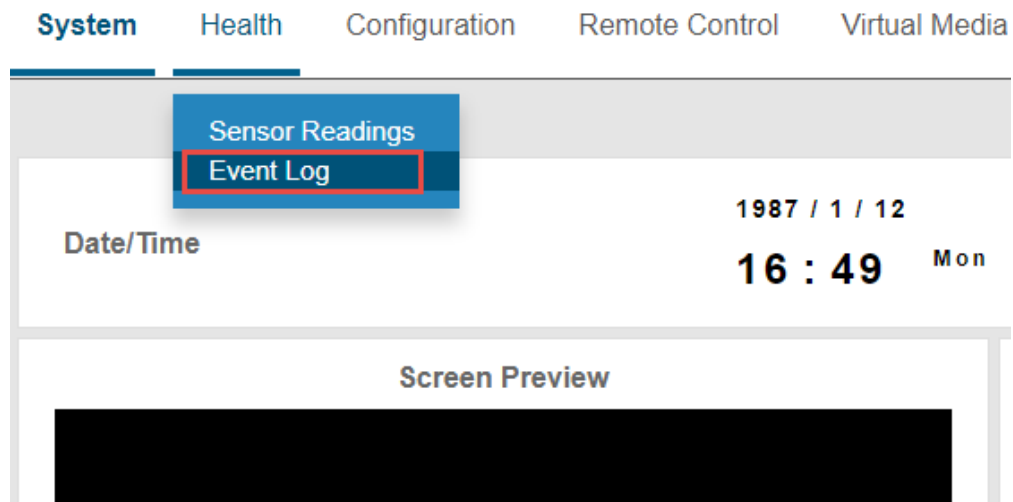
Figure 497: Event Log Window

Step 2: Complete the following actions to view event logs:

Figure 498: Event Log Filters

a. Select an event log category: choose an event

b. Severity category: Select the severity of the event type

The events will populate in the table based on the selected category values.

Figure 499: Event Log Results

Step 3: Do the following to change how the events are displayed within the table:

Figure 500: Event Log Entries Selector

a. Change the Number of entries per page by selecting a value from the drop-down list.
b. Navigate through even pages by clicking the forward button. The fast forward button skips to the last page of results.

The events will populate in the table based on the selected category values and based on the selected number of entries.

Figure 501: Event Log Results — Entries

Step 4: Refresh the event log by clicking the Refresh Event Log button.

The Event Log table will refresh and cycle through the results. This action may be used at any time that different values are applied to the event logs.

Step 5: Save the Event Log.

a. Save the even log by clicking the **Save Event Log** button.

The Event Log will be saved as a .zip file.

b. Open the .zip file by double-clicking the file and selecting how to open the file.
c. Extract the file to the desktop.

📄 **Note:** The event logs will be saved in a hex file and a text file. The text file provides detailed results related to the events that have occurred on the enclosure within the constraints of the search.

Step 6: Clear the Event Log.

📄 **Note:** This will clear all of the events that are reported in the current table. If this is not the preferred result, skip this step.

a. The Event Logs can be cleared by clicking the **Clear Event Log** button once the Event Log files have been generated.
b. Click **OK** when the clear events log confirmation appears.

The event logs will be cleared from the table.

4.8 Zoning

⚠️ **Caution:** Zone configuration should only be performed during a maintenance window, when the system is offline (not in production).

4.8.1 Predefined Multi-HBA / RAID Zoning Configurations

There are three predefined Multi-HBA and Multi-RAID zoning configurations for the Ultrastar Serv60+8 that are enabled at the manufacturer. The Multi-HBA portion of the configuration assists in providing better performance by allowing more than one HBA to connect and manage the system. The Multi-RAID portion of the configuration simply allows the main drive bay to connect to multiple HBAs. Each Multi-HBA/RAID configuration is predefined to allow the system to perform to a specific set of zones.

Each configuration allows the user connect a different number of HBAs that have access to a set number of drives. Each of these drives are part of a grouping called a zone group. This section displays the necessary information related to each of the predefined Multi-HBA/RAID zoning configurations.

Dual HBA/RAID Zoning Configuration:

The Dual HBA/RAID Zoning Configuration allows up to two HBAs to view a specific zone group of drives. Each host will be able to view up to 30 drives that are mapped to both HBAs. Each zone group will display all of the devices that are contained within that zone. If a drive slot is not populated, it will still be part of that zone group, but it will not display any results in enclosure management until the drive slot has been populated. In this Configuration, the enclosure is divided into two zone groups as shown in the image below represented by two different colors.

Figure 502: Dual HBA/RAID Zoning Configuration
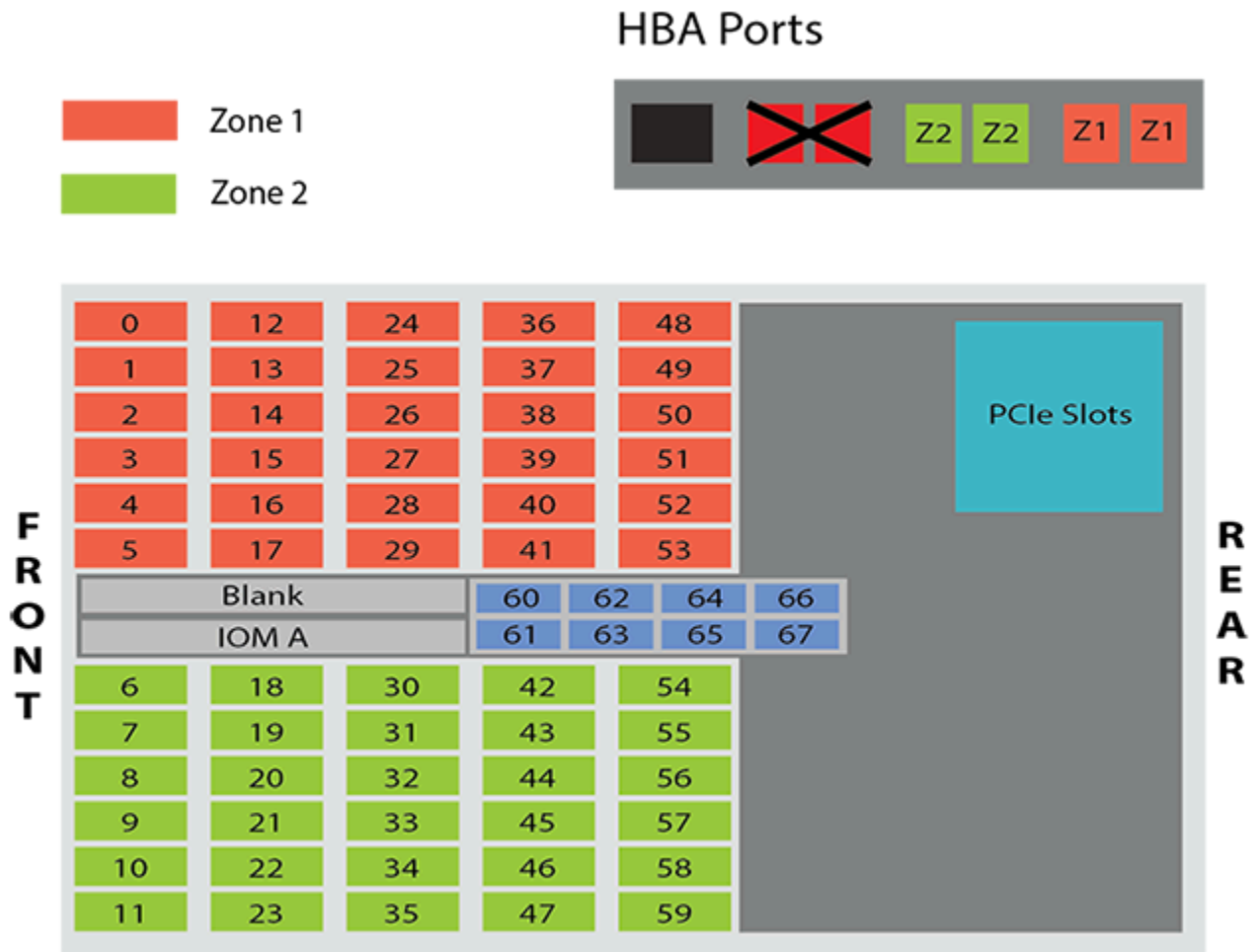
Tri HBA/RAID Zoning Configuration:

The Tri HBA/RAID Zoning Configuration allows up to three HBAs to view a specific zone group of drives. Each host will be able to view up to 20 drives that are mapped to three HBAs. Each zone group will display all of the devices that are contained within that zone. If a drive slot is not populated, it will still be part of that zone group, but it will not display any results in enclosure management until the drive slot has been populated. In this Configuration, the enclosure is divided into three zone groups as shown in the image below represented by three different colors.

Figure 503: Tri HBA/RAID Zoning Configuration
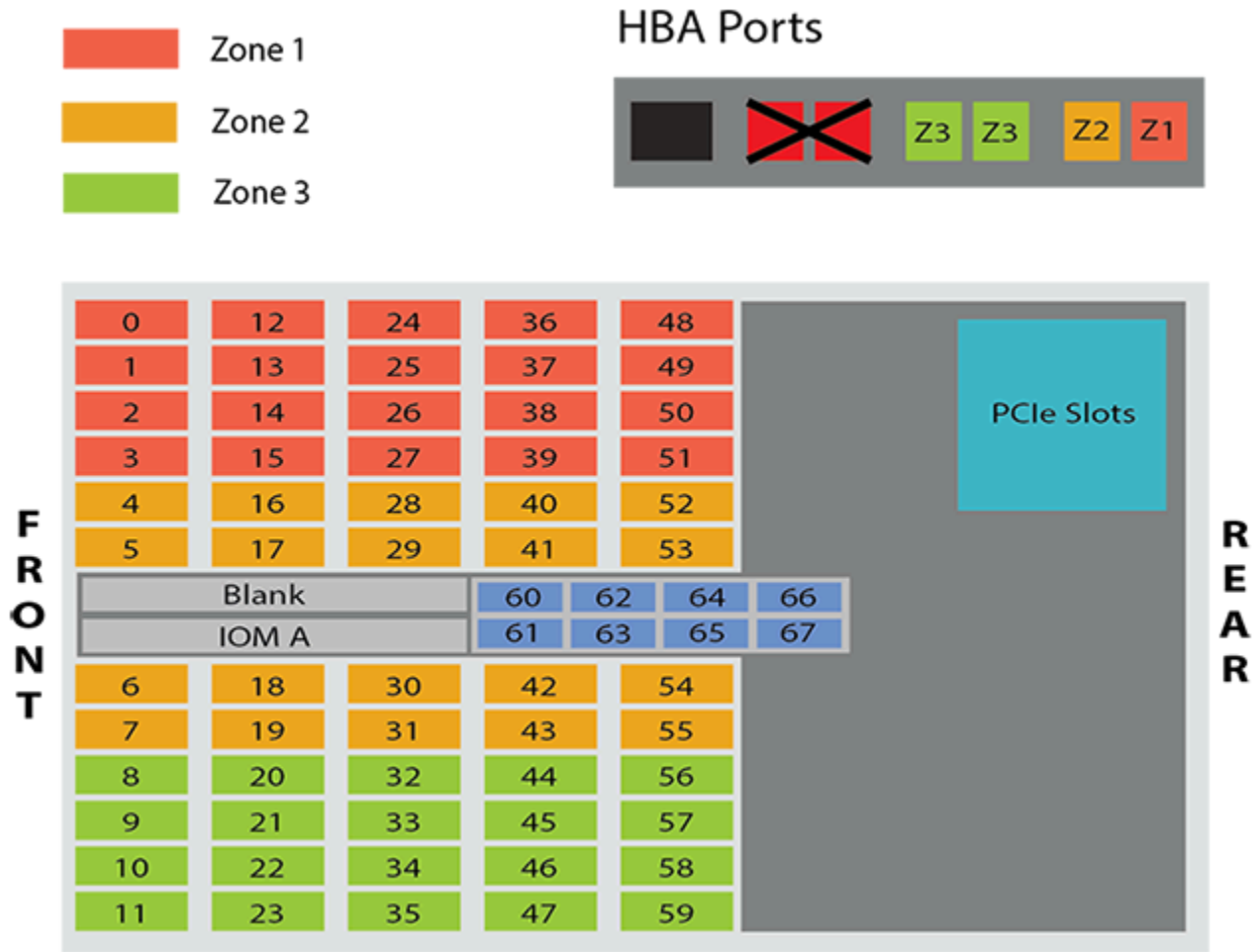
Quad HBA/RAID Zoning Configuration:

The Quad HBA/RAID Zoning Configuration allows up to four HBAs to view a specific zone group of drives. Each host will be able to view up to 15 drives that are mapped to four HBAs. Each zone group will display all of the devices that are contained within that zone. If a drive slot is not populated, it will still be part of that zone group, but it will not display any results in enclosure management until the drive slot has been populated. In this Configuration, the enclosure is divided into four zone groups as shown in the image below represented by four different colors.

Figure 504: Quad HBA/RAID Zoning Configuration
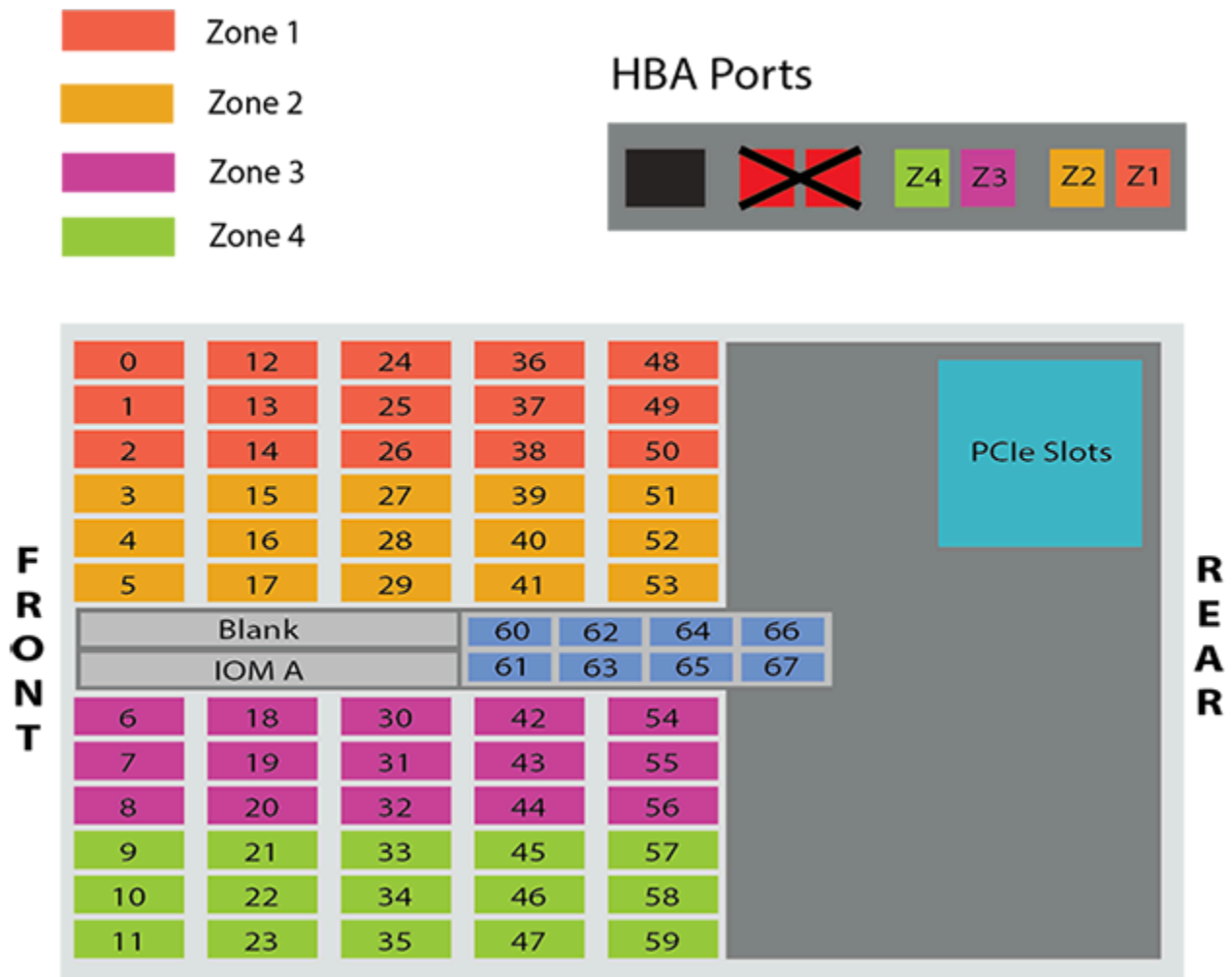
4.9 Subenclosure Nickname

4.9.1 Setting the Subenclosure Nickname

This task describes instructions for viewing and setting a subenclosure's nickname using `sg_ses` commands.

Before you begin: In the following `sg_ses` examples, angle brackets surrounding a term (i.e. `<device>`) either indicate a generic reference to an expected output or a command phrase that should be replaced with the user's specific instance of that phrase (i.e. `/dev/sg2`).

Verify Support for the Nickname Feature

Step 1: Verify the subenclosure's support for the nickname feature by using the `sg_ses <device> -p0x0` command to view the subenclosure's **Supported Diagnostic Pages**:

```
# sg_ses <device> -p0x0
  <manufacturer>  <regulatorymodel>  <firmwareversion>
Supported diagnostic pages:
  Supported Diagnostic Pages [sdp] [0x0]
  Configuration (SES) [cf] [0x1]
  Enclosure Status/Control (SES) [ec,es] [0x2]
  Help Text (SES) [ht] [0x3]
  String In/Out (SES) [str] [0x4]
  Threshold In/Out (SES) [th] [0x5]
  Element Descriptor (SES) [ed] [0x7]
  Additional Element Status (SES-2) [aes] [0xa]
  Download Microcode (SES-2) [dm] [0xe]
  Subenclosure Nickname (SES-2) [snic] [0xf]
  <unknown> [0x10]
  <unknown> [0x17]
```

If supported, the **Subenclosure Nickname** page will be included as one of the **Supported Diagnostic Pages**.

View the Nickname

Step 2: Use the `sg_ses <device> -p0xf` command to view the **Subenclosure Nickname** page:

```
# sg_ses <device> -p0xf
  <manufacturer>  <regulatorymodel>  <firmwareversion>
Subenclosure nickname status diagnostic page:
  number of secondary subenclosures: 0
  generation code: 0x0
   subenclosure identifier: 0
   nickname status: 0x0
   nickname additional status: 0x0
   nickname language code:
   nickname:
```

> **Note:** In the example above, the subenclosure's nickname is set to an empty string ("").

Set the Nickname

Step 3: Use the `sg_ses <device> -p0xf -c --nickname=<nickname>` command to set the subenclosure's nickname:

```
# sg_ses <device> -p0xf -c --nickname=<nickname>
  <manufacturer>  <regulatorymodel>  <firmwareversion>
    No errors
```

> **Note:** If the nickname contains one or more spaces, enclose the name in either single quotes (i.e. 'device nickname') or double quotes (i.e. "device nickname").

If the command was successful, `No errors` will be returned.

Step 4: Repeat the `sg_ses <device> -p0xf` command to view the **Subenclosure Nickname** page and verify that the nickname was set as intended:

```
# sg_ses <device> -p0xf
```

```
   <manufacturer>  <regulatorymodel>  <firmwareversion>
Subenclosure nickname status diagnostic page:
  number of secondary subenclosures: 0
  generation code: 0x0
   subenclosure identifier: 0
   nickname status: 0x0
   nickname additional status: 0x0
   nickname language code:
   nickname: <nickname>
```

Clear the Nickname

Step 5: If needed, use the `sg_ses <device> -p0xf -c --nickname=` command to clear the subenclosure's nickname (set it to an empty string):

```
# sg_ses <device> -p0xf -c --nickname=
  <manufacturer>  <regulatorymodel>  <firmwareversion>
    No errors
```

If the command was successful, `No errors` will be returned.

Step 6: Repeat the `sg_ses <device> -p0xf` command to view the **Subenclosure Nickname** page and verify that the nickname was cleared:

```
# sg_ses <device> -p0xf
  <manufacturer>  <regulatorymodel>  <firmwareversion>
Subenclosure nickname status diagnostic page:
  number of secondary subenclosures: 0
  generation code: 0x0
   subenclosure identifier: 0
   nickname status: 0x0
   nickname additional status: 0x0
   nickname language code:
   nickname:
```

4.10 Partially Populated Enclosures

4.10.1 Partial Population Configurations

The Ultrastar Serv60+8 supports partially-populated configurations that allow a user to increase the size of storage based on their needs. There are specific requirements that must be followed to ensure that the enclosure functions properly during operation. Partial population configurations that do not comply with the requirements listed in this section may result in enclosure performance issues. The following section details the requirements for HDD and HDD/SSD based configurations.

Minimum HDD Partial Population

The enclosure supports a minimum of 24 SAS or SATA HDDs for a partially-populated enclosure. The center SSD channel supports a minimum configuration of no SSDs with a maximum of eight SSDs. The SSDs must be populated from the drive slots closest to the rear of the enclosure first, starting with drive slot 67 and work backward. The remaining unpopulated center channel drive slots must be populated with drive blanks until the center channel is full.The enclosure does not support a mix of SAS and SATA drives. The enclosure must be populated starting with the drives closest to the rear of the enclosure and work towards the front of the enclosure. If more drives are installed into the enclosure, any unfinished rows must be completed with drive blanks. The image below details the minimum required configuration for an HDD only drive bay and minimum SSD center channel configuration.

Figure 505: Minimum HDD Partial Population
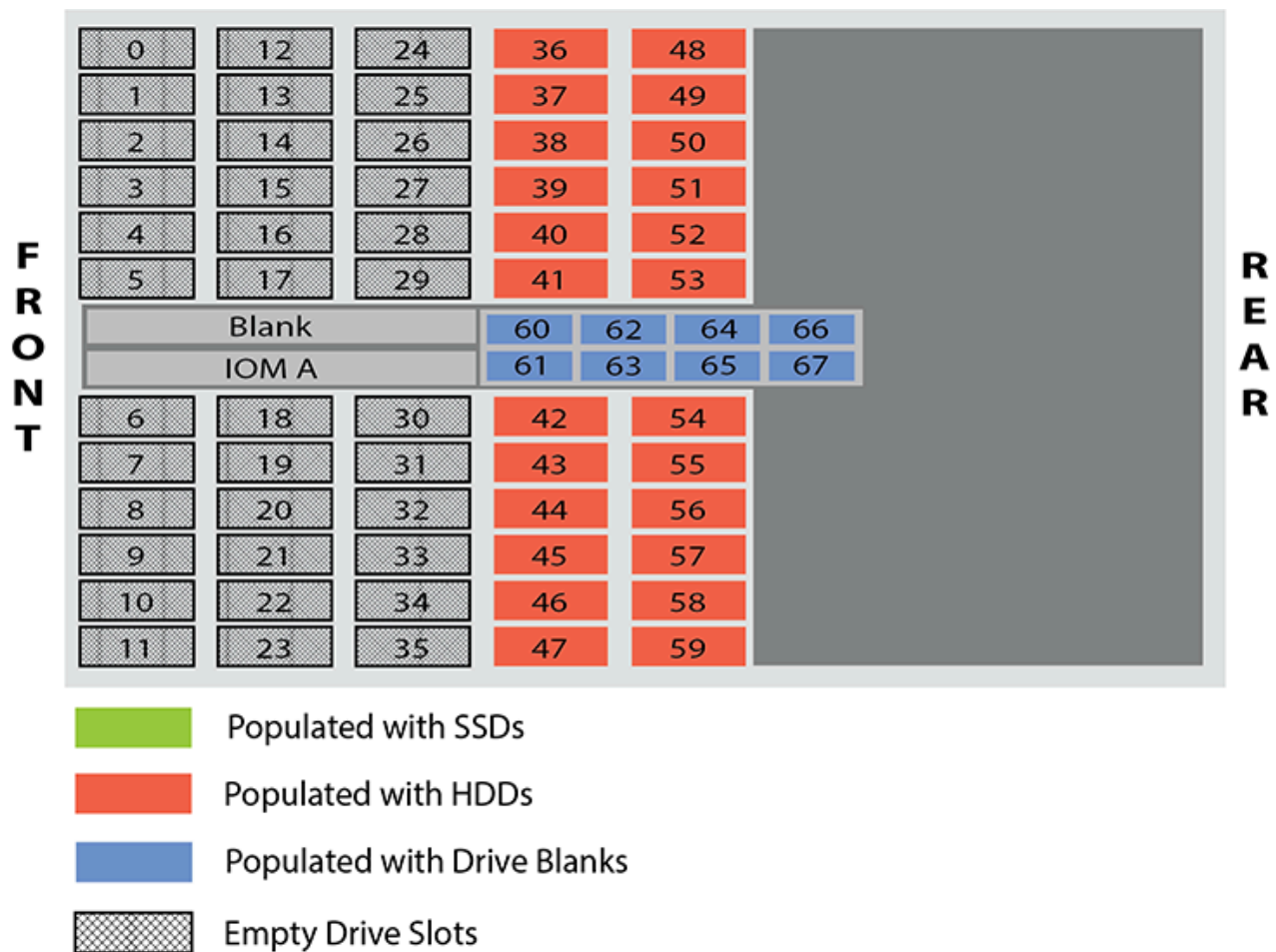
Populated with SSDs

Populated with HDDs

Populated with Drive Blanks

Empty Drive Slots

Minimum HDD and Minimum SSD Partial Population:

The enclosure supports a minimum of 24 HDDs and one SSD in the drive bay and a configuration of no SSDs in the center channel for a partially populated enclosure. The enclosure can support a minimum of one SSD with the remaining drive slots within that row being completed with drive blanks. The center SSD channel supports a minimum of no SSDs with a maximum of eight SSDs. The SSDs must be populated from the drive slots closest to the rear IO first, starting with drive slot 67 and work backward. The remaining unpopulated center channel drive slots must be populated with drive blanks until the center channel is full. The enclosure does not support a mix of SAS and SATA drives. The image below details the minimum required configuration for an HDD and SSD with the minimum SSD center channel configuration.

📄 **Note:** When installing SSDs for this configuration, the preinstalled HDDs will have to be moved one entire row to the next vacant row near the front of the enclosure.

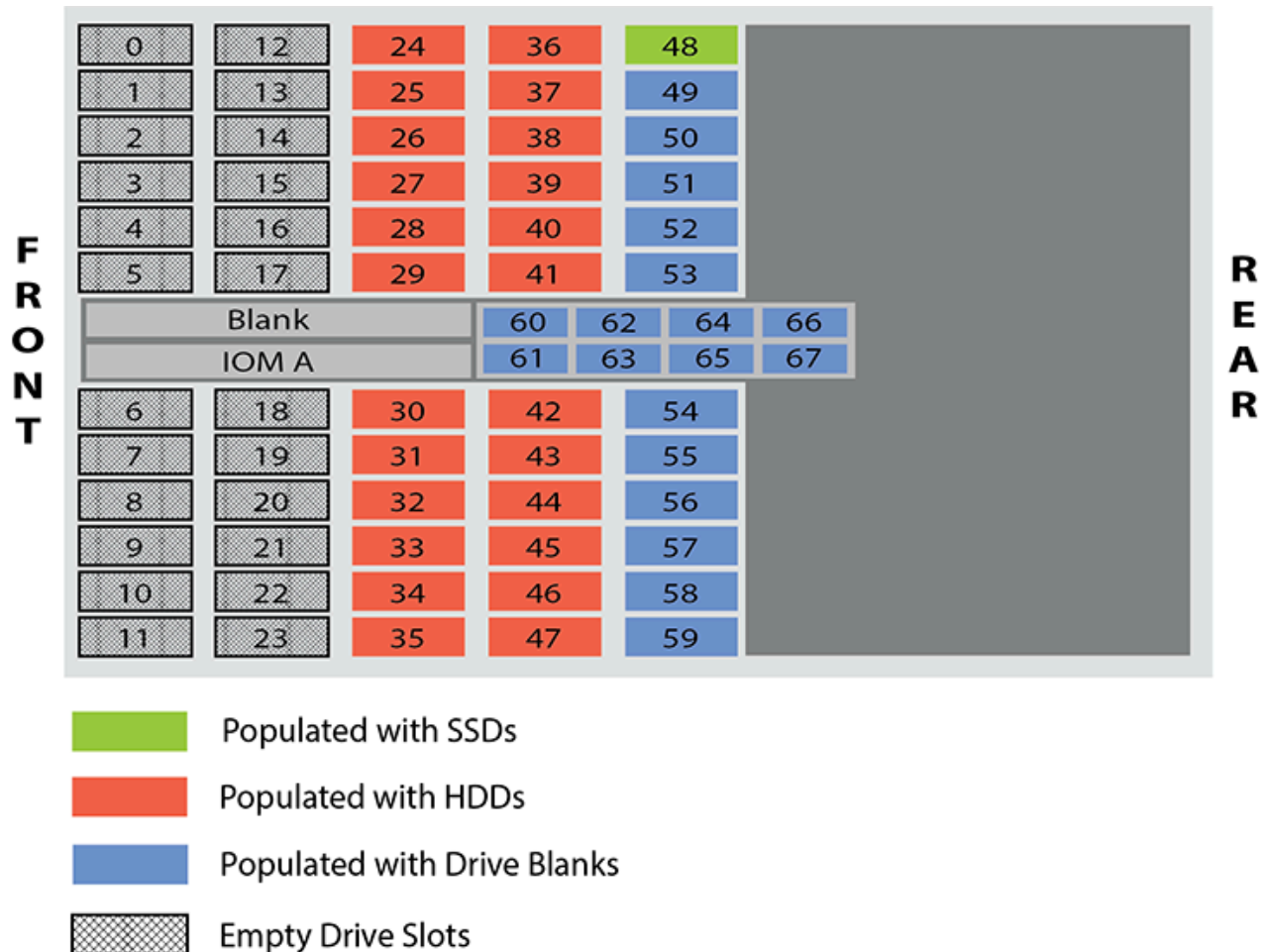**Figure 506:** Minimum HDD and Minimum SSD Partial Population

Minimum HDD and Maximum SSD Partial Population:

The enclosure supports a minimum of 24 HDDs and one SSD in the drive bay and a configuration of no SSDs in the center channel for a partially populated enclosure. The enclosure can support a maximum of up to 24 total SSDs in this configuration. The center SSD channel supports a minimum configuration of no SSDs with a maximum of eight SSDs. The center channel SSDs must be populated from the drive slots closest to the rear IO first, starting with drive slot 67 and work backward. The remaining unpopulated center channel drive slots must be populated with drive blanks until the center channel is full. The enclosure does not support a mix of SAS and SATA drives. The image below details the required configuration for minimum HDD and maximum SSD with the minimum SSD center channel configuration.

📄 **Note:** When installing SSDs for this configuration, the preinstalled HDDs will have to be moved two entire rows to the next vacant pair of rows near the front of the enclosure.

Figure 507: Minimum HDD and Maximum SSD Partial Population

4.10.2 Installing Drives

This section provides steps on how to install drives into the enclosure. The enclosure is shipped with a minimum of 24 HDDs and may require HDDs to be moved to other drives slots if SSDs are being installed. Before beginning the process of adding drives, refer to the Partial Population Configurations *(page 387)* section to determine what configuration will be used and what is required of that configuration.

Step 1: Grasp both handles at the front of the enclosure and pull with even pressure to extend the chassis out of the rack until it is stopped by the safety latches. The safety latches will prevent the enclosure from coming out of the rack completely and the cover will remain in the rack attached to the rear alignment brackets.

Figure 508: Chassis Handle Operation
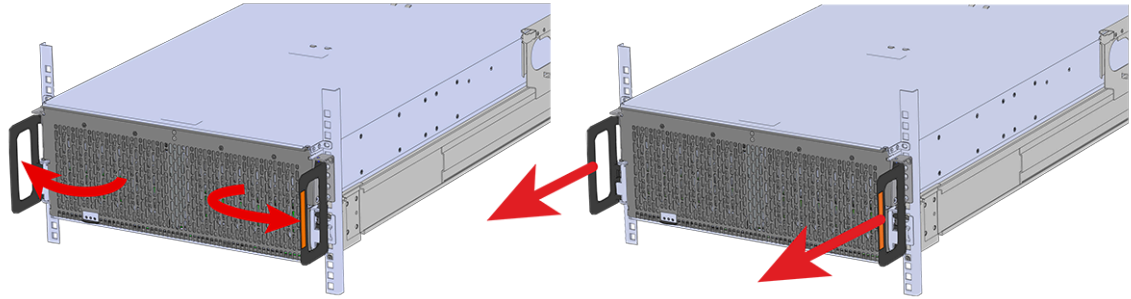
Step 2: Locate the area that the new drives will be installed into. When adding SSDs, the drives slots may already contain a drive. The drive will have to be removed and relocated before installing the HDD.

Step 3: Follow the requirements for partial populations listed in Partial Population Configurations *(page 387)*.

Step 4: Install the 3.5in HDD Assembly.

> 📄 **Note:** The 2.5in SSD Assembly is installed in the same manner as the 3.5in HDD Assembly. For instructions on assembling the 2.5in SSD Assembly, see Operating the 2.5" Drive Carrier *(page 60)*.

   a. Ensure that the enclosure has been pulled out of the rack until the rail latches engage.

   b. Find the LED pointer on the top of the drive carrier. This pointer should point toward the front of the unit as shown in the following image.

Figure 509: LED Pointer Orientation
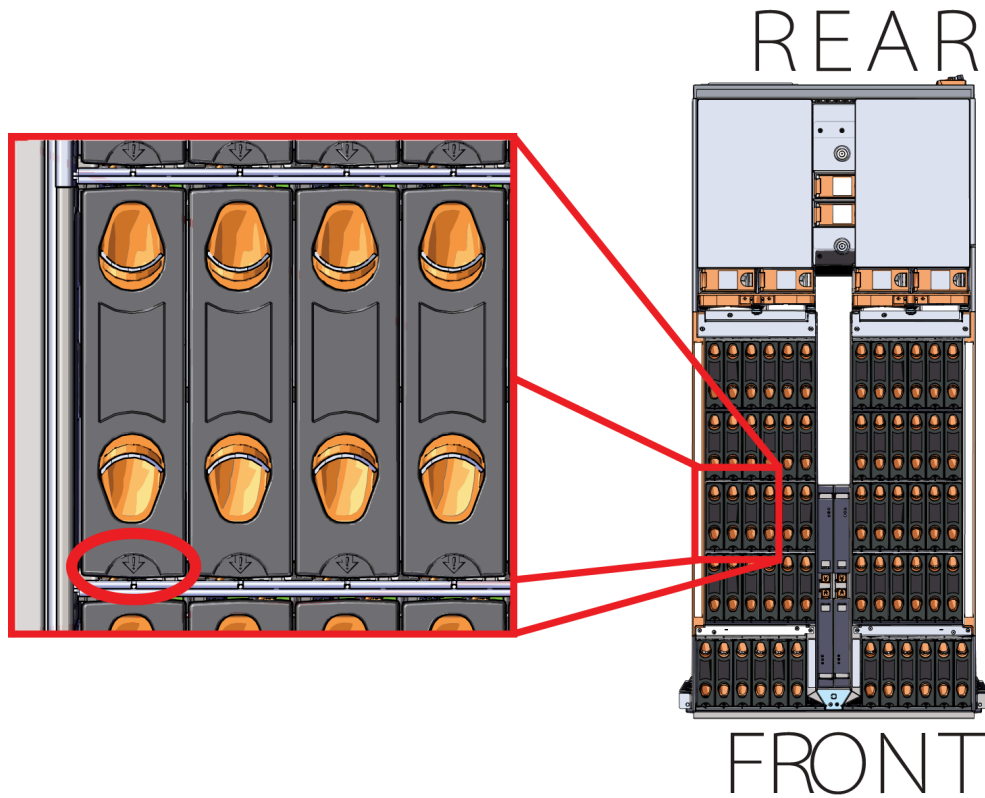
c. Align the drive with the empty slot that will receive it. Lower it into the slot, making sure it stays level and does not snag.

Figure 510: Installing a 3.5in HDD Assembly
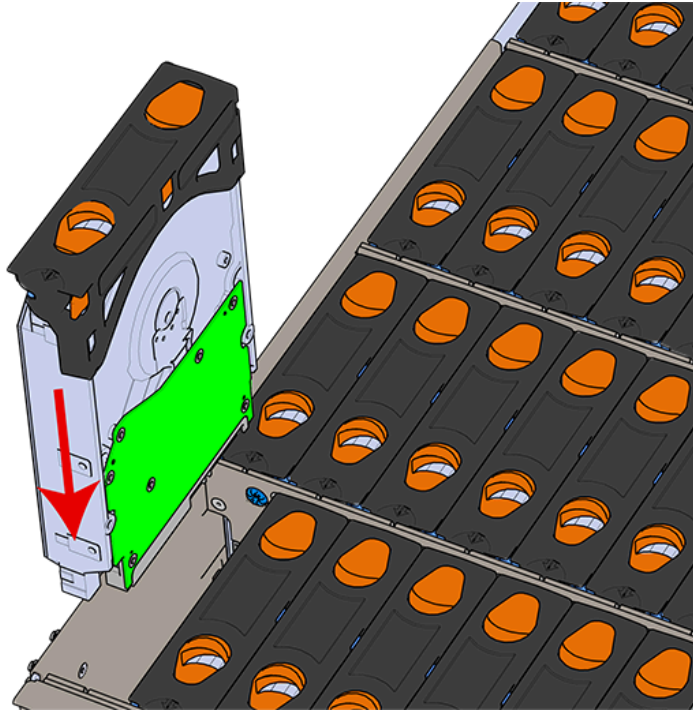
d. Pinch the latch release and carefully press downward to seat the 3.5in HDD Assembly the rest of the way.

Step 5 : Install each drive in the same way the first was installed. Make sure to follow the drive layout shown in the following image.

Figure 511: Drive Layout
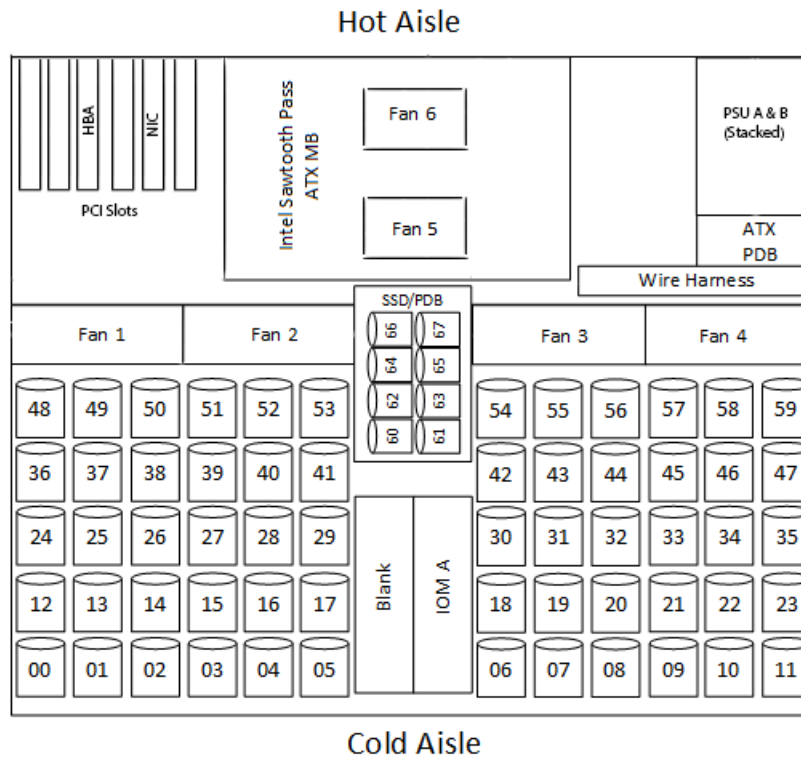
Step 6 : Push the enclosure back into the rack to ensure proper cooling.

Safety

The following chapter provides safety and regulatory information for the Ultrastar Serv60+8 .

In This Chapter:

5.1 Safety Warnings and Cautions

To avoid personal injury or property damage, before you begin installing the product, read, observe, and adhere to all of the following safety instructions and information. The following safety symbols may be used throughout the documentation and may be marked on the product and/or the product packaging.

CAUTION Indicates the presence of a hazard that may cause minor personal injury or property damage if the CAUTION is ignored.

WARNING Indicates the presence of a hazard that may result in serious personal injury if the WARNING is ignored.

Indicates potential hazard if indicated information is ignored.

Indicates shock hazards that result in serious injury or death if safety instructions are not followed.

Indicates do not touch fan blades, may result in injury.

Indicates disconnect all power sources before servicing.

5.2 Electrostatic Discharge

CAUTION

Electrostatic discharge can harm delicate components inside Western Digital products.

Electrostatic discharge (ESD) is a discharge of stored static electricity that can damage equipment and impair electrical circuitry. It occurs when electronic components are improperly handled and can result in complete or intermittent failures.

Wear an ESD wrist strap for installation, service and maintenance to prevent damage to components in the product. Ensure the antistatic wrist strap is attached to a chassis ground (any unpainted metal surface). If possible, keep one hand on the frame when you install or remove an ESD-sensitive part.

Before moving ESD-sensitive parts place them in ESD static-protective bags until you are ready to install the part.

5.3 Optimizing Location

Failure to recognize the importance of optimally locating your product and failure to protect against electrostatic discharge (ESD) when handling your product can result in lowered system performance or system failure.

Do not position the unit in an environment that has extreme high temperatures or extreme low temperatures. Be aware of the proximity of the unit to heaters, radiators, and air conditioners.

Position the unit so that there is adequate space around it for proper cooling and ventilation. Consult the product documentation for spacing information.

Keep the unit away from direct strong magnetic fields, excessive dust, and electronic/electrical equipment that generate electrical noise.

5.4 Power Connections

Be aware of the ampere limit on any power supply or extension cables being used. The total ampere rating being pulled on a circuit by all devices combined should not exceed 80% of the maximum limit for the circuit.

CAUTION The power outlet must be easily accessible close to the unit.

Always use properly grounded, unmodified electrical outlets and cables. Ensure all outlets and cables are rated to supply the proper voltage and current.

This unit has more than one power supply connection; both power cords must be removed from the power supplies to completely remove power from the unit. There is no switch or other disconnect device.

When power cycling the unit, wait 10 seconds before re-applying power. Failure to do so may cause the enclosure to boot up in an inaccessible state. If this is encountered, remove power, wait 10 seconds, and then reapply power.

5.5 Power Cords

Use only tested and approved power cords to connect to properly grounded power outlets or insulated sockets of the rack's internal power supply.

If an AC power cord was not provided with your product, purchase one that is approved for use in your country or region.

CAUTION To avoid electrical shock or fire, check the power cord(s) that will be used with the product as follows:

- The power cord must have an electrical rating that is greater than that of the electrical current rating marked on the product.
- Do not attempt to modify or use the AC power cord(s) if they are not the exact type required to fit into the grounded electrical outlets.
- The power supply cord(s) must be plugged into socket-outlet(s) that is / are provided with a suitable earth ground.
- The power supply cord(s) is / are the main disconnect device to AC power. The socket outlet(s) must be near the equipment and readily accessible for disconnection.

5.6 Rackmountable Systems

CAUTION

Always install rack rails and storage enclosure according to Ultrastar Serv60+8 product documentation. Follow all cautions, warnings, labels, and instructions provided within the rackmount instructions.

Reliable grounding of rack-mounted equipment should be maintained.

If installed in a closed or multi-unit rack assembly, the operating ambient temperature of the rack environment may be greater than room ambient. Therefore, consideration should be given to installing the equipment in an environment compatible with the maximum ambient temperature (Tma) specified by the manufacturer.

Observe the maximum rated ambient temperature, which is specified in the product documentation.

For safe operation of the equipment, installation of the equipment in a rack should be such that the amount of air flow is not impeded so that the safe operation of the equipment is not compromised.

5.7 Safety and Service

All maintenance and service actions appropriate to the end-users are described in the product documentation. All other servicing should be referred to a Western Digital-authorized service technician.

To avoid shock hazard, turn off power to the unit by unplugging both power cords before servicing the unit. Use extreme caution around the chassis because potentially harmful voltages are present.

When replacing a hot-plug power supply, unplug the power cord to the power supply being replaced before removing it from the Ultrastar Serv60+8 .

The power supply in this product contains no user-serviceable parts. Do not open the power supply. Hazardous voltage, current and energy levels are present inside the power supply. Return to manufacturer for servicing.

Use caution when accessing part of the product that are labeled as potential shock hazards, hazardous access to moving parts such as fan blades.

Disclaimers

Learn about the Regulatory, Safety, and Electromagnetic standards for which this product is compliant.

The following chapter describes the Regulatory Statement of Compliance, Safety Compliance, and Electromagnetic Compatibility Agency Requirements for the Ultrastar Serv60+8 .

In This Chapter:

6.1 Restricted Access Location

The Ultrastar Serv60+8 is intended for installation in a server room or computer room where at least one of the following conditions apply:

- access can only be gained by **service persons** or by **users** who have been instructed about the restrictions applied to the location and about any precautions that shall be taken and/or
- access is through the use of a **tool** or lock and key, or other means of security, and is controlled by the authority responsible for the location.

6.2 Safety Compliance

Product Name: **Ultrastar Serv60+8**
Regulatory Model: **H4060-S**
Electromagnetic Compatibility Emissions: **Class A**

This product has been tested and evaluated as Information Technology Equipment (ITE) at accredited third-party laboratories for all safety, emissions and immunity testing required for the countries and regions where the product is marketed and sold. The product has been verified as compliant with the latest applicable standards, regulations and directives for those regions/countries. The suitability of this product for other product categories other than ITE may require further evaluation.

The product is labeled with a unique regulatory model that is printed on the label and affixed to every unit. The label will provide traceability to the regulatory approvals listed in this document. The document applies to any product that bears the regulatory model and type names including marketing names other than those listed in this document.

6.3 Electromagnetic Compatibility (EMC) Class A Compliance

The **H4060-S** complies with and conforms to the latest international standards as applicable:

Emissions

- FCC CFR 47 Part 15, Subpart B
- ICES-003
- EN 55032
- CISPR 32
- CE – EMC Directive 2014/30/EU
- VCCI V-3
- BSMI CNS14338
- KN32
- AS/NZS CISPR 32
- TR CU 020/2011

Immunity

- EN 61000-3-2 Harmonic Current Emissions
- EN 61000-3-3 Voltage Fluctuations and Flicker
- EN 55024
- KN35
- EN 61000-4-2 ESD

- EN 61000-4-3 Radiated Immunity
- EN 61000-4-4 EFT
- EN 61000-4-5 Surge
- EN 61000-4-6 RF Common Mode
- EN 61000-4-8 Power Frequency Magnetic Field
- EN 61000-4-11 Voltage Dips and Interruptions

6.4 Country Certifications

Table 51: Country Certifications

Country/Region	Authority or Mark
North America (Canada, USA)	Nemko
European Union	CE
Japan	VCCI
Korea	MSIP
Taiwan	BSMI
Australia/New Zealand	RCM
Russia, Kazakhstan, Belarus, Armenia	CU EAC
Ukraine	Ukrsepro
Israel	SII
South Africa	SABS
India	BIS

Regulatory Statements

The following chapter provides regulatory statements for the Ultrastar Serv60+8 , **H4060-S** .

Western Digital storage enclosures are marked to indicate compliance to various country and regional standards.

> **Note:** *Potential equipment damage:* Operation of this equipment with cables that are not properly shielded and not correctly grounded may cause interference to other electronic equipment and result in violation of Class A legal requirements. Changes or modifications to this equipment that are not expressly approved in advance by Western Digital will void the warranty. In addition, changes or modifications to this equipment might cause it to create harmful interference.

In This Chapter:

7.1 Europe (CE Declaration of Conformity)

Marking by the symbol indicates compliance of this system to the applicable Council Directives of the European Union, including the Electromagnetic Compatibility Directive (2014/30/EU) and the Low Voltage Directive (2014/30/EU). A "Declaration of Conformity" in accordance with the applicable directives has been made and is on file at Western Digital Europe.

UK Import Representation Contact

Western Digital UK Limited Hamilton House, Regent Park, Kingston Road Leatherhead, Surrey KT22 7PL, GB, United Kingdom

Telephone: +44 1372 366000

7.2 FCC Class A Notice

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

1. This device may not cause harmful interference.
2. This device must accept any interference received, including interference that may cause undesired operation.

> **Note:** This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy, and if it is not installed and used in accordance with the instruction manual, it may cause harmful interference to radio communications. Any modifications made to this device that are not approved by Western Digital may void the authority granted to the user by the FCC to operate equipment.

7.3 ICES-003 Class A Notice—Avis NMB-003, Classe A

This Class A digital apparatus complies with Canadian ICES-003.

Cet appareil numerique de la classe A est conforme à la norme NMB-003 du Canada.

7.4 Japanese Compliance Statement, Class A ITE

The following Japanese compliance statement pertains to VCCI EMI regulations:

> この装置は、クラスＡ機器です。この装置を住宅環境で使用すると電波妨害を引き起こすことがあります。この場合には使用者が適切な対策を講ずるよう要求されることがあります。　　　　　　　　VCCI － A

English translation:

This is a Class A product based on the Technical Requirement of the Voluntary Control Council for Interference by Information Technology (VCCI). In a domestic environment, this product may cause radio interference, in which case the user may be required to take corrective actions.

7.5 Taiwan Warning Label Statement, Class A ITE

警告使用者:

此為甲類資訊技術設備，於居住環境中使用時，

可能會造成射頻擾動，在此種情況下，使用者會

被要求採取某些適當的對策。

English translation:

This is a Class A product. In a domestic environment, this product may cause radio interference, in which case, the user may be required to take adequate measures.