



Western Digital

User Guide

OpenFlex™ Data24 4000 Series

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Table of Contents

Revision History.....	v
Notices.....	vi
Points of Contact.....	vii
Chapter 1. Overview.....	1
OpenFlex™ Data24 4000 Series Overview.....	2
Design Details.....	3
LEDs.....	5
Cables.....	8
Servicing Features.....	9
Electrical Specifications.....	9
Environmental Specifications.....	9
Mechanical Specifications.....	10
System Level Block Diagram.....	11
Best Practices.....	12
Limitations & Restrictions.....	14
Rack Requirements.....	16
Space Requirements.....	16
Supported Operating Systems.....	16
Supported SKUs.....	17
List of Compatible Devices.....	18
List of CRUs.....	20
Third Party Licenses.....	21
Chapter 2. Components.....	22
Chassis.....	23
Chassis Specifications.....	23
Power Supply Unit (PSU).....	24

PSU Specifications.....	24
IO Module (IOM).....	25
IOM Specifications.....	25
Drive Assembly.....	26
Drive Assembly Specifications.....	26
Drive Blank Assembly.....	27
Drive Blank Assembly Specifications.....	27
System Fan.....	28
System Fan Specifications.....	28
Rail Assembly.....	29
Rail Assembly Specification.....	29
Chapter 3. Support.....	30
Drive Assembly Replacement.....	31
Drive Blank Assembly Replacement.....	35
Power Supply Unit (PSU) Replacement.....	39
IO Module (IOM) Replacement.....	43
Rail Assembly Replacement.....	48
System Fan Replacement.....	61
Chassis Replacement.....	86
Power Cable Replacement.....	105
QSFP28 Cable Replacement.....	107
Chapter 4. Management.....	109
Open Composable API.....	110
Accessing the API.....	110
RESTful API.....	110
Discovering and Connecting to NVMe Devices using the Open Composable API.....	111
Open Composable GUI.....	114
Compatible Browsers.....	114

Login Page.....	114
Dashboard.....	116
Storage Device Page.....	120
Basic Operational Functions.....	127
Device Sharing.....	152
Maintenance.....	155
Firmware Upgrade.....	166
Downloading Firmware from the Support Portal.....	166
Upgrading Firmware.....	168
Drive Firmware Upgrade.....	170
Enclosure Pullout Tabs.....	173
In-band Enclosure Management.....	173
NVMe-CLI.....	173
Supported NVMe-CLI Commands.....	174
Unsupported NVMe Drive Level Commands.....	174
Chapter 5. Safety.....	175
Electrostatic Discharge.....	176
Optimizing Location.....	176
Power Connections.....	176
Power Cords.....	176
Rack-Mountable Systems.....	177
Safety and Service.....	177
Safety Warnings and Cautions.....	178
Chapter 6. Regulatory.....	179
Country Certifications.....	180
Electromagnetic Compatibility (EMC) Class A Compliance.....	180
Restricted Access Location.....	180
Regulatory Statement of Compliance.....	180

Europe (CE Declaration of Conformity).....181

FCC Class A Notice.....181

ICES-003 Class A Notice—Avis NMB-003, Classe A.....182

Japanese Compliance Statement, Class A ITE.....182

South Korea Warning Label Statement, Class A ITE.....182

Taiwan Warning Label Statement, Class A ITE.....183

Revision History

Date	Revision	Comment
November 2024	01	Initial release
December 2024	02	Updated the List of CRUs (page 20)
March 2025	03	Added a section on Disabling Device Sharing (page 154)
March 2025	04	Various editorial updates
March 2025	04	Branding update

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Points of Contact

For further assistance with a Western Digital product, contact Western Digital Datacenter Platforms technical support. Please be prepared to provide the following information, as applicable: part number (P/N), serial number (S/N), product name and/or model number, software version, and a brief description of the issue.

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Overview

In This Chapter:

- OpenFlex Data24 4000 Series Overview.....	2
- Design Details.....	3
- Electrical Specifications.....	9
- Environmental Specifications.....	9
- Mechanical Specifications.....	10
- System Level Block Diagram.....	11
- Best Practices.....	12
- Limitations & Restrictions.....	14
- Rack Requirements.....	16
- Space Requirements.....	16
- Supported Operating Systems.....	16
- Supported SKUs.....	17
- List of Compatible Devices.....	18
- List of CRUs.....	20
- Third Party Licenses.....	21

1.1 OpenFlex™ Data24 4000 Series Overview

The OpenFlex™ Data24 4000 Series is a 2U rack mounted data storage enclosure built on the OpenFlex platform. OpenFlex is Western Digital's architecture that supports Open Composable Infrastructure (OCI). The OpenFlex Data24 4000 Series is a Just-a-Bunch-Of-Flash (JBOF) platform that leverages this OCI approach in the form of disaggregated data storage using NVMe-over-Fabrics (NVMe-oF™). NVMe-oF is a networked storage protocol that allows storage to be disaggregated from compute to make that storage widely available to multiple applications and hosts. By enabling applications to share a common pool of storage capacity, data can be easily shared between applications, or needed capacity can be allocated to an application regardless of location. Utilizing NVMe™ device-level performance, NVMe-oF promises to deliver the lowest end-to-end latency from application to shared storage. NVMe-oF enables composable infrastructures to deliver the data locality benefits of NVMe (low latency, high performance) while providing the agility and flexibility of sharing storage and compute.



OpenFlex

OpenFlex is Western Digital's architecture that supports Open Composable Infrastructure through storage disaggregation – both disk and flash natively attached to a scalable fabric. OpenFlex does not rule out multiple fabrics, but whenever possible, Ethernet will be used as a unifying connection for both flash and disk because of its broad applicability and availability.

Composable Infrastructure

An emerging category of datacenter infrastructure that seeks to disaggregate compute, storage, and networking fabric resources into shared resource pools that can be available for on-demand allocation (i.e., “composable”). Composability occurs at the software level, disaggregation occurs at the hardware level using NVMe-over-Fabric that will vastly improve compute and storage utilization, performance, and agility in the data center.

Open Composable API

Western Digital's Open Composable API is a REST interface designed for data center composability. It builds upon existing industry standards utilizing the best features of those standards as well as practices from proprietary management protocols.¹

Features

- 1474.56TB Max Storage Capacity²
- 100Gbps NVMe-oF
- Operational Temperature: 10°C to 35°C
- 100V - 240V Input Voltages
- 2U Form Factor
- 15.6 kg / 34.4 lbs.
- Dual 800W PSUs
- Device Sharing

1.2 Design Details

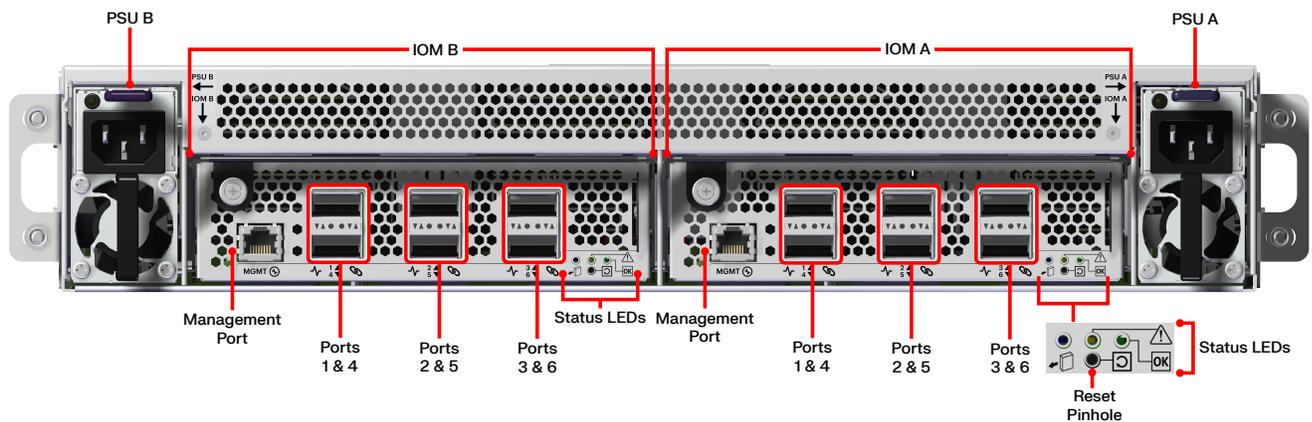
On the front of the OpenFlex Data24 4000 Series there are the 24 Small Form Factor (SFF) drive slots, and the enclosure status LEDs. Each drive is individually removable/serviceable. Below each drive slot is a status and activity LED embedded in the chassis. For more details, see the [LEDs \(page 5\)](#) section.

Figure 2: Front of the System



The rear of the platform contains the Power Supply Units (PSUs) and IO Modules (IOMs). All of these components are hot-swappable and do not require tools to replace.

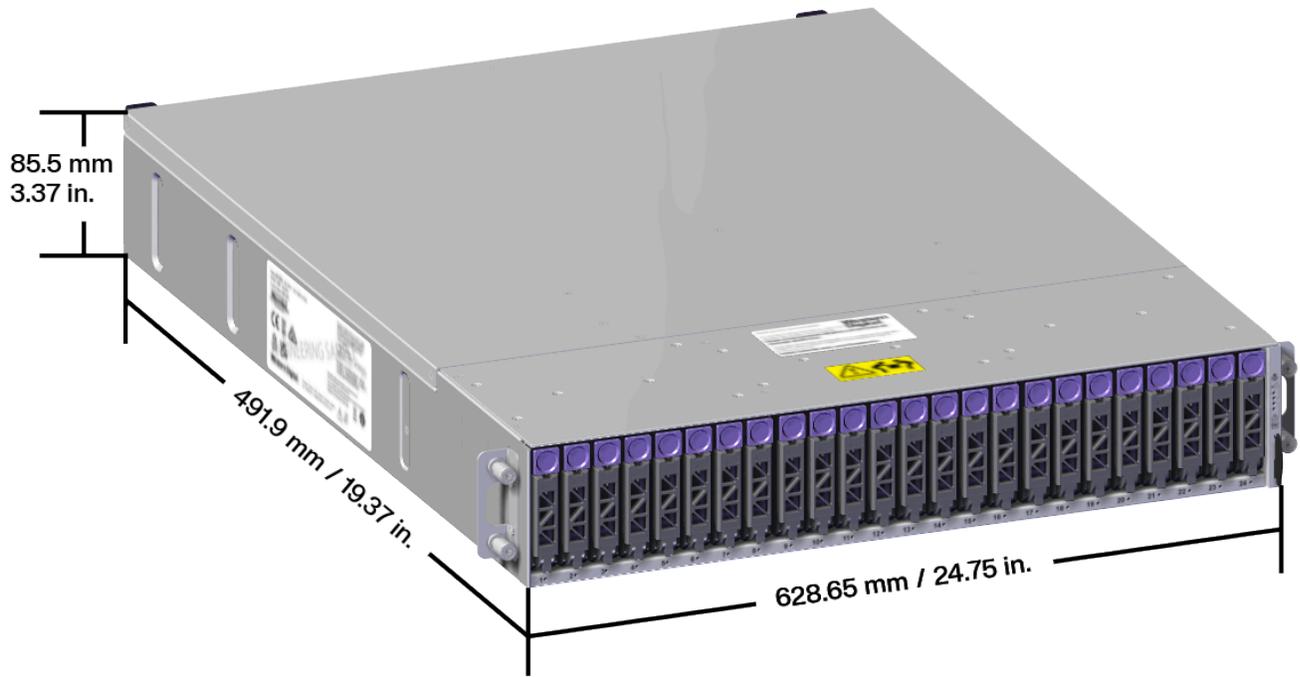
Figure 3: Rear of the System



Each IOM contains a Reset Pinhole that will factory reset the enclosure if it is pressed for more than three seconds. The enclosure automatically restarts when the reset completes. Use of the Reset Pinhole is not recommended in Low Power Mode.

The enclosure measures 491.9 mm/19.37 in. wide by 628.65 mm/24.75 in. long. The height is 85.5 mm/3.37 in. or 2U.

Figure 4: Enclosure Measurements



1.2.1 LEDs

The OpenFlex Data24 4000 Series contains LEDs on the enclosure, PSU, drive slots, and the IOMs. This section defines the LED name, corresponding color, and the behavior of each of the LEDs on the system.

Enclosure LEDs

Figure 5: Enclosure LEDs

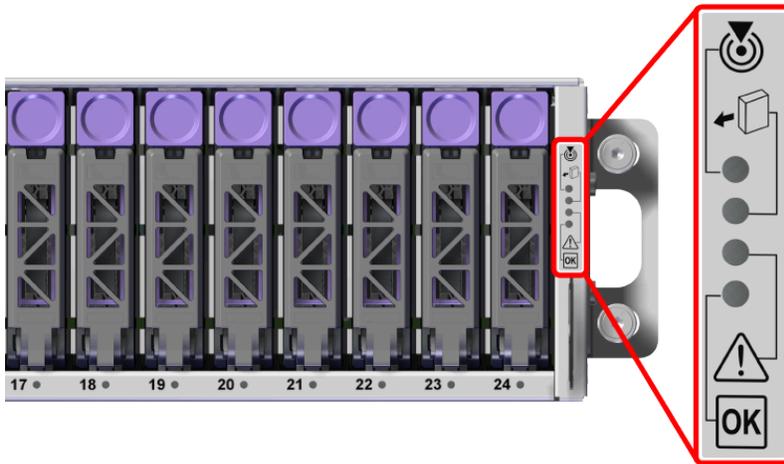


Table 2: Enclosure LED Flash Patterns

LED Name	LED Icon	Color	Behavior
Identification		White	Fast Blink: Enclosure is being identified/ located Off: Enclosure not being identified/ located
Service		Blue	No LED behavior (unused)
Fault		Amber	Solid: Enclosure has a fault Off: Enclosure has no fault
Power		Green	Off: Enclosure is powered off or in a degraded state Solid: Enclosure is powered on Standby Blink: Enclosure is in sleep mode (low-power mode) Slow Blink: Enclosure is booting

Power Supply Unit (PSU) LED

Figure 6: Power Supply Unit (PSU) LED



Table 3: Power Supply Unit (PSU) LED Flash Patterns

LED Name	Color	Behavior
Multi-function LED	Green	Solid: PSU is on and reporting no faults Blinking @ 2Hz: PSU in firmware update mode Off: PSU is disconnected from power
	Amber	Solid: PSU is disconnected from power or critical fault causing a shutdown failure Blinking @ 0.5Hz: PSU reporting warnings Off: PSU is reporting no faults

Drive Assembly LED

Figure 7: Drive Assembly LED



Device Fault

Device Ident

Table 4: Drive Assembly LED Flash Patterns

LED Name	Color	Behavior
Status	Amber	Steady On: Device has Fault Fast Blink: Device is being Identified Off: Device is Healthy

IO Module (IOM) LEDs

Figure 8: IO Module (IOM) LEDs

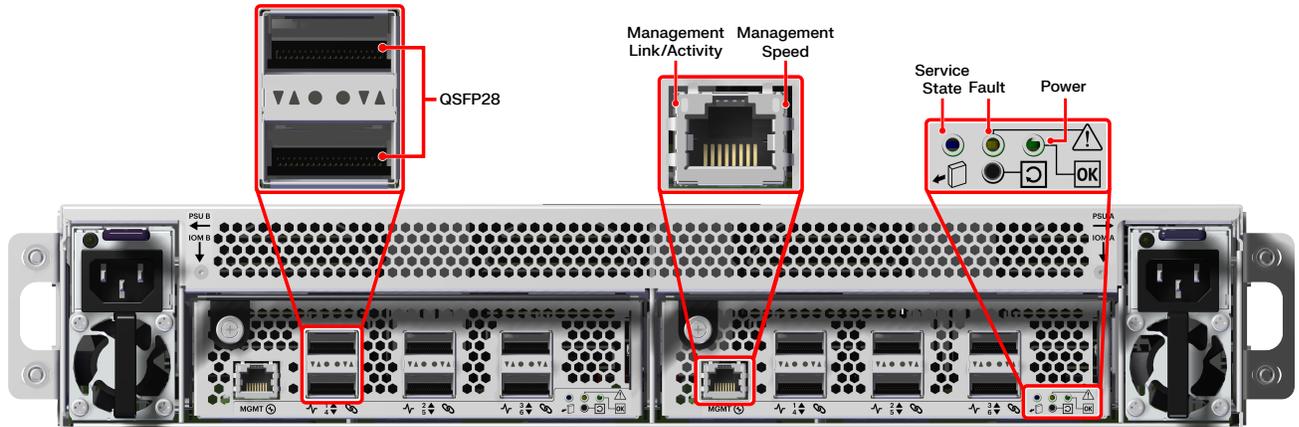


Table 5: IOM LEDs Flash Patterns

LED Name	Color/Number	Behavior
RJ45 Management Port Ethernet Link/Activity	Green	Off: No Connection Solid: Connected Feedback Flash: Activity
RJ45 Management Port Ethernet Speed	Bi-color Green/Amber	Off: Operating at 10 Mbps Solid Green: Operating at 100Mbps Solid Amber: Operating at 1000Mbps
QSFP28	QSFP28 (top port)	Green Blinking: Activity Off: No Activity
	Activity	Off: No Activity Feedback Flash: Activity
	Link	(unused)
	QSFP28 (bottom port)	Green Blinking: Activity Off: No Activity
	Activity	Off: No Activity Feedback Flash: Activity
	Link	(unused)
Service State (unused)	N/A	N/A
Fault	Amber	Solid: IOM has a fault Off: IOM has no fault
Power	Green	Solid: IOM is powered on Off: IOM is powered off IOM is in a degraded or warning state Enclosure is in low power mode

1.2.2 Cables

The following table displays the CRU power cables available from Western Digital:

Table 6: Available CRU Power Cables

Type	Part Number	Length
IEC C13 to IEC C14 Heavy Duty 15A Power Cable	1EX1530 (Provided in Accessory Kit)	3m

The following table displays the CRU Ethernet cables available from Western Digital:

Table 7: Available CRU Ethernet Cables

Vendor	Active/Passive	Vendor Model Number	Western Digital Part Number
Mellanox® Ethernet 100GbE, 100Gb/s, QSFP, PVC, 3m 28AWG	Passive	MCP1600-C003	1EX2705

The following table displays additional Ethernet cables qualified by Western Digital:

Table 8: Qualified Direct Attached Cables

Vendor	Active/Passive	Vendor Model Number
Mellanox QSFP28 to QSFP28 Cable, 1m 30AWG	Passive	MCP1600-C001E30N
Mellanox QSFP28 to QSFP28 Cable, 2m 30AWG	Passive	MCP1600-C002E30N
Mellanox QSFP28 to QSFP28 Cable, 3m 30AWG	Passive	MCP1600-C003E30L
Mellanox QSFP28 to QSFP28 Cable, 5m 26AWG	Passive	MCP1600-C005E26L
Mellanox QSFP28 to QSFP28 Cable, 5m 26AWG	Active	MFA1A00-C005
Amphenol 100G/200G, QSFP28Gb 30AWG, 1m	Passive	NDAAFF-0001
Amphenol 100G/200G, QSFP28Gb 30AWG, 2m	Passive	NDAAFF-0002
Amphenol 100G/200G, QSFP28Gb 30AWG, 3m	Passive	NDAAFF-0003
Molex zQSFP+ to zQSFP+ Cable Assembly, 30AWG, 1.5m	Active	100297-1151
Molex zQSFP+ to zQSFP+ Cable Assembly, 30AWG, 2m	Active	100297-1201
FS 100G QSFP28 Cable Assembly, 30AWG, 10m	Active	Q28-AO10
FS 100G QSFP28 Cable Assembly, 30AWG, 15m	Active	Q28-AO15
FS 100G QSFP28 Cable Assembly, 30AWG, 20m	Active	Q28-AO20

1.2.3 Servicing Features

Toolless Servicing

- External system components can be serviced without any additional tools.
- **IO Module (IOM)** and **Power Supply Unit (PSU)** can be accessed from the rear, and have toolless latching mechanisms.
- All **Drive Assemblies** and **Drive Blanks** can be hotswapped from the front of the enclosure using built-in drive carrier latches.

Standard Servicing

- Standard servicing requires the use of tools.
- **System Fans** must be accessed with the top cover removed. This requires the system to be shut down and uninstalled from the installation location.
- **Rail Assembly** must be uninstalled using additional tools with the Chassis removed.

1.3 Electrical Specifications

Table 9: Electrical Specifications

Specification	Value
Max Power Consumption	800W
Typical Power Consumption	~700W
Input Voltage	100V - 240V
PSU Connector Type	C14
Inrush Current Maximum (per PSU)	AC line inrush current shall not exceed 40A peak, for up to one-quarter of the AC cycle after which, the input current should be no more than the specified maximum input current.
PSU Efficiency	80 Plus Titanium

1.4 Environmental Specifications

Table 10: Environmental Specifications

Specification	Non-Operational	Operational
Temperature	5°C to 45°C	10°C to 35°C
Temperature Gradient	30°C/hr Maximum	5°C per 15 minutes
Temperature De-rating	1°C per 300m above 3000m	1°C per 300m above 900m
Relative Humidity	5-95% Non-Condensing	8-80% 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.
Cooling	N/A	4 System Fans (N+2 Supported)

1.5 Mechanical Specifications

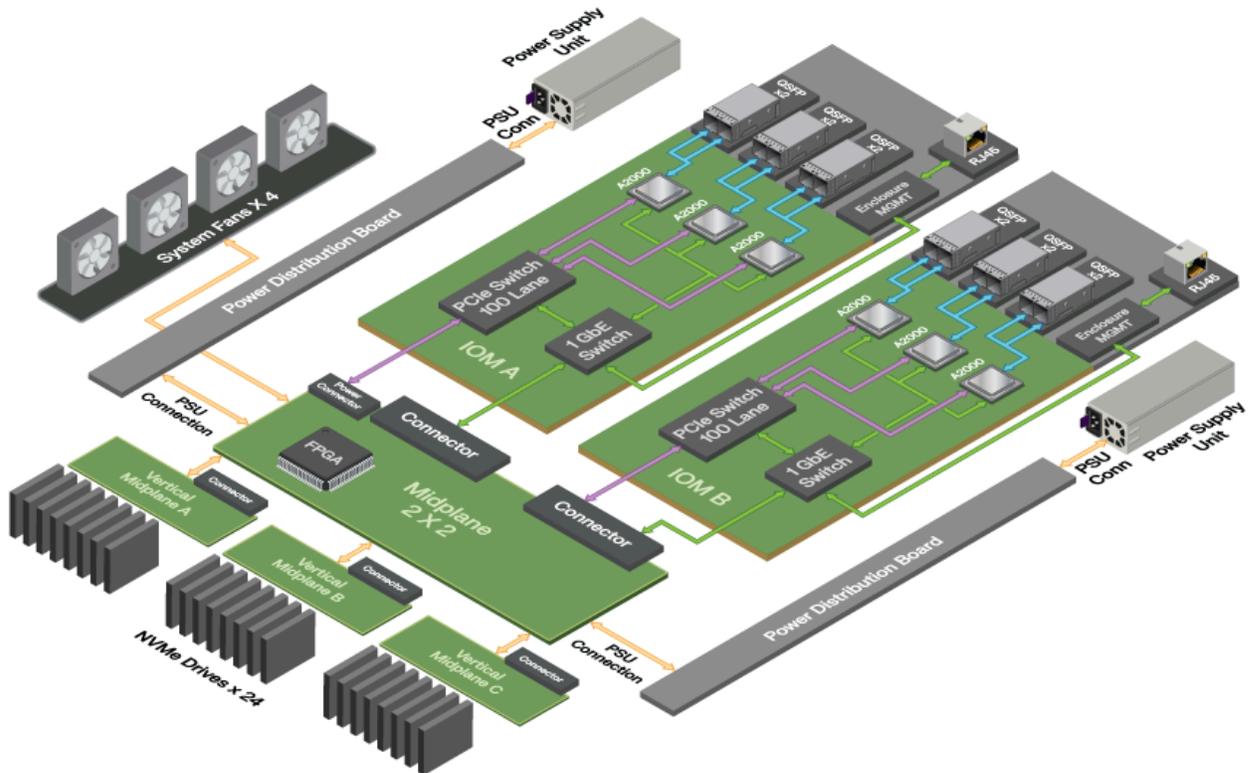
Table 11: Mechanical Specifications

Specification	Non-Operational	Operational
Shock	10G, 11ms half sine; 3 positive and 3 negative pulses in X, Y, and Z axes.	5G, 11ms half sine; positive and 3 negative pulses in X, Y, and Z axes.
Vibration	<p>Linear Random: 0.54 Grms; 5-500 Hz; 10 minutes each axis in X, Y, and Z</p> <p>Linear Random: 0.54 Grms; 1-200 Hz; 60 minutes in Z axis.</p> <p>Linear Random: 0.80 Grms; 2 - 200Hz; 15 minutes in Z axis</p> <p>Swept Sine: 0.75 Grms, 0 - peak swept sine; 5 - 500Hz; 1 complete sweep @ 1/2 octave per minute</p>	<p>Linear Random: 0.15 Grms 5-500 Hz 10 minutes each axis in X, Y and Z</p> <p>Swept Sine: 0.10 G, 0 - peak, 5-500 Hz 0.5 octaves/min, approx. 13 minutes each axis</p>
Weight	<p>24 Drive Configuration: 18.25 kg / 40.2 lbs.</p> <p>12 Drive Configuration: 15.6 kg / 34.4 lbs.</p>	
Dimensions	<p>W: 491.9 mm x L: 628.65 mm x H: 85.5 mm / W: 19.37 in. x L: 24.75 in. x H: 3.37 in.</p>	
Required Rack Depth	1000 mm (39.4 in.) of usable rack space, door to door	
Required Rack Width	450mm (17.72in.) with 465mm (18.31in.) ± with 1.5mm nominal hole spacing. See EIA-310 Rack Standard	
Rack Units (U)		2U
Vertical Rack Rail Spacing	650 mm – 850 mm / 25.6 in. – 33.46 in.	

1.6 System Level Block Diagram

The system block diagram for the OpenFlex Data24 4000 Series is a conceptual depiction of the communication and power relationships between major components within the system.

Figure 9: System Block Diagram



1.7 Best Practices

The following is a list of best practices to follow when using the OpenFlex™ Data24 4000 Series :

1. For best performance, recommend the following:
 - a. Utilize the recommended network configuration for the product. Contact Western Digital for the best practices documentation on multi-path and network configuration.
 - b. Configure native NVMe multi-pathing instead of Device Mapper multi-pathing.
 - c. For best bandwidth, balance concurrently accessed drives (e.g. a RAID set) equally across the devices.
2. For NVMe-oF stability, recommend the following:
 - a. There are a maximum of 448 I/O connections for RoCE and TCP per RFX. It is recommended to share this resource equally across all hosts that connect to the RFX. It is recommended to open 8 I/O queues per NVMe connect command.
 - b. It is recommended that the version 1.16 of the NVMe-CLI utility is used. Refer to the release notes for issues encountered with other NVMe-CLI versions. Incompatibilities may cause connect or disconnect issues.
 - c. Disable auto-negotiate on the switch ports for the RFXs.
 - d. Enable auto-negotiate on a host.
 - e. Disable auto-negotiate on data ports.
 - f. Set the Linux I/O timeout to 12 seconds RoCE and 30 seconds for TCP or greater to avoid the default I/O timeout of 1 second.
3. For optimal enclosure management, recommend the following:
 - a. Wait 5 minutes before performing management actions after updating firmware, enclosure reboots or power state changes.
 - b. Confirm that the enclosure is healthy - through the OCAPI / User Interface and enclosure LEDs - prior to making configuration changes.
 - c. Check the health of the IOM after each firmware update. Once the firmware update is complete, verify that both IOMs are on the latest version of firmware. If the firmware is not the expected version, after the update, the enclosure will report a warning enclosure "Firmware Mismatch".
 - d. Configuration changes should not be made during the enclosure firmware update process.
 - e. Configure NTP on the enclosure. It is disabled by default.
 - The configured NTP servers must be reachable at the time of configuration, otherwise, the request to enable NTP will be rejected.
 - Disable NTP if the enclosure cannot connect to a timeserver.
 - NTP requires the Out of Band management port be connected to the network.
 - f. Changing the enclosure name should only be done as an offline event. Changing the enclosure name requires an enclosure restart to go into effect. Changing the enclosure name changes the NVMe Qualified Name (NQN) for the devices, which affects access.
 - g. Changing the Device Sharing state should only be done as an offline event. All devices should be disconnected before modifying the setting. When changing Device Sharing Setting, please note the following:
 - The command to enable or disable Device Sharing must be issued to each IOM separately.

- Enabling or Disabling Device Sharing will cause the IOM to reboot. For best results, wait for the first IOM to finish rebooting before changing the setting on the other IOM.
 - The Device Sharing setting must be the same on both IOMs.
- h.** To eliminate browser caching the page for accurate data returned, clear the web browser cache or use OCAPI curl commands.

1.8 Limitations & Restrictions

The following are limitations and restrictions when using the OpenFlex Data24 4000 Series :

1. Drive related:
 - a. Maximum of 24 drives and 32 namespaces per drive is supported.
 - b. Namespaces from the same drive, should have the same block size (either 4096 or 512B).
 - c. Creating namespaces on the drive outside of the enclosure, and then inserting the drive into the unsupported enclosure.
 - d. Update only four devices per RFX at a time when doing drive firmware updates using NVMe-CLI. Drive updates may be in parallel through different RFXs and may take up to five minutes to complete.
2. NVMe/NVMe-oF related:
 - a. Maximum of 448 for RoCE and TCP I/O connections per RFX.
 - b. Maximum of 64 Admin connections per RFX.
 - c. The following NVMe Admin commands are not supported:
 - Asymmetric Namespace Access (ANA)
 - Reservations
 - Non-Transparent Bridge (NTB)
 - NVMe-MI Send/Receive
 - Directive Send/Receive
 - Virtualization Management
 - Doorbell Buffer Config
 - Fused (Compare and Write)
 - Zoned Namespaces (ZNS)
 - d. Not all NVMe-cli wdc plug-in commands are supported. The following are supported if needed for support:
 - cap-diag (may take up to 50 minutes to complete)
 - vs-internal-log (specify transfer size of 0x1000)
 - vs-smart-add-log (-CA Log Page)
 - clear-pcie-correctable-errors
 - get-drive-status
 - e. When using multiple NICs on a single host with IPs on the same subnet, two ARP settings need to be changed from the Linux default on the host:

```
net.ipv4.conf.all.arp_announce=2
net.ipv4.conf.all.arp_ignore=1
```

 **Note:** This will prevent the host from responding to the wrong MAC address when there are multiple target ports on the same subnet.
 - f. SPDK initiator running on the host is not supported on all host configurations. Please contact Western Digital for supported configurations.
 - g. Extended metadata on 4k and 512B block sectors is not supported.

3. OCAPI and GUI related:
 - a. Maximum of one GUI or OCAPI client per enclosure is supported. Launch one GUI to display one dashboard and up to one device page.
 - b. The Web Client needs to operate with the HTTP Conditional capability provided by the Web Service. If the client does not, it may see a "precondition failed" error, match HTTP Conditional capability.
 - c. Recommend that the number of threads used in an OCAPI client be limited to 6. Connections beyond that limit will result in a 429, system busy error.
 - d. Daylight Savings Time (DST) field under system clock will always be disabled.
 - e. TLS certification file size cannot exceed 4K when uploaded through in-band management.
 - f. Maximum of one openflex-api installed server in one subnet for managing up to three enclosures via in-band.
 - g. When using In-Band GUI enclosure management:
 - One MI device is presented from each IOM for in-band enclosure management
 - The first MI Device that is NVMe connected in the in-band setup process determines which controller (IOM) MI Device is used for the GUI Device Page
 - Management through the other IOM requires changing the first MI Device connected or switch to the Out-of-Band IP on the other controller IOM
 - Generally, either IOM can be used for enclosure management
 - Refer to the [Management \(page 109\)](#) for the In-Band Management setup and usage instructions
 - h. When creating accounts for In-Band Management, setup the user credentials to be the same on storage nodes (MAT-4719).
 - i. When using In-Band enclosure management, if the enclosure is put into low power sleep mode, the power must be restored back on through the out-of-band management port.
 - j. The OCAPI interface with the option stream=True may exceed all the available file handles. Explicitly close the connection if you are using stream=True. This issue does not exist when using cURL (MAT-3874).
4. Enclosure related:
 - a. IPv6 networking is not supported.
 - b. VLAN tagging is not supported.
 - c. Hot swap one CRU at a time..
 - d. Factory reset and pinhole reset are not supported when the enclosure is in sleep mode.

1.9 Rack Requirements

The OpenFlex Data24 4000 Series is designed to be installed into a rack that meets the EIA-310 standard with a minimum of 1000 mm (39.4 in.) of usable rack space, door to door. The vertical rack rails must be set between 650 mm – 850 mm / 25.6 in. – 33.46 in. to support the enclosure. It requires 2U 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 12: Required Rack Specifications

Parameter	Requirement
Rack Depth	1000 mm (39.4 in.) of usable rack space, door to door
Rack Width	450mm (17.72in.) with 465mm (18.31in.) ± with 1.5mm nominal hole spacing. See EIA-310 Rack Standard
Rack Units (U)	2U
Vertical Rack Rail Spacing	650 mm – 850 mm / 25.6 in. – 33.46 in.
Static Load Rating	Rack meets ISTA 3E or 3B test requirements and regulations when mounted to the shipping pallet
Dynamic Load Rating	Rack meets ISTA 3E or 3B test requirements and regulations when mounted to the shipping pallet

1.10 Space Requirements

The installation of the OpenFlex Data24 4000 Series requires enough space in front of the rack for two people to perform a safe installation. The recommended forward clearance is 914.4 mm / 36 in. from the front of the rack and 609.6 mm / 24 in. on both sides of the enclosure. It is also recommended to make considerations for any carts or lift equipment that might be used to perform the installation.³ The servicing of the enclosure requires one person and a minimum of 711 mm / 27.99 in. of space in front of the rack to allow enough clearance to remove an enclosure.

1.11 Supported Operating Systems

The following table lists the operating systems tested on the OpenFlex Data24 4000 Series .

Table 13: Supported Operating Systems

Operating System	Supported Network Type	Kernel
RHEL 9.2	RoCE	5.14.0-284.111.el9_2.x86_64
Ubuntu 22.04	RoCE	5.15.0-94-generic
Ubuntu 24.04	TCP	6.8.0-31-generic

3. The weight of the enclosure during installation will vary, depending on the number of devices and blanks contained in the OpenFlex Data24 4000 Series . In some situations, carts or lift equipment may be required.

1.12 Supported SKUs

The following table lists the versions of this Western Digital product that are supported by this document.

Table 14: List of Supported SKUs

Component	Capacity	SKU
OpenFlex Data24-0 4141 nTAA	0TB	1ES2364
OpenFlex Data24-0 4241 nTAA	0TB	1ES2365
OpenFlex Data24-12 4243 nTAA RI-1DW/D SE	46.08TB	1ES2415
OpenFlex Data24-12 4243 nTAA RI-1DW/D ISE	46.08TB	1ES2417
OpenFlex Data24-12 4243 nTAA RI-1DW/D TCG	46.08TB	1ES2420
OpenFlex Data24-12 4243 nTAA RI-1DW/D SE	92.16TB	1ES2416
OpenFlex Data24-24 4243 nTAA RI-1DW/D SE	92.16TB	1ES2380
OpenFlex Data24-12 4243 nTAA RI-1DW/D ISE	92.16TB	1ES2418
OpenFlex Data24-24 4243 nTAA RI-1DW/D ISE	92.16TB	1ES2387
OpenFlex Data24-12 4243 nTAA RI-1DW/D TCG	92.16TB	1ES2421
OpenFlex Data24-24 4243 nTAA RI-1DW/D TCG	92.16TB	1ES2412
OpenFlex Data24-24 4243 nTAA RI-3DW/D ISE	153.6TB	1ES2715
OpenFlex Data24-12 4243 nTAA RI-1DW/D SE	184.32TB	1ES2383
OpenFlex Data24-24 4243 nTAA RI-1DW/D SE	184.32TB	1ES2381
OpenFlex Data24-12 4243 nTAA RI-1DW/D ISE	184.32TB	1ES2419
OpenFlex Data24-24 4243 nTAA RI-1DW/D ISE	184.32TB	1ES2388
OpenFlex Data24-12 4243 nTAA RI-1DW/D TCG	184.32TB	1ES2422
OpenFlex Data24-24 4243 nTAA RI-1DW/D TCG	184.32TB	1ES2413
OpenFlex Data24-24 4243 nTAA RI-1DW/D SE	368.64TB	1ES2382
OpenFlex Data24-24 4243 nTAA RI-1DW/D ISE	368.64TB	1ES2389
OpenFlex Data24-24 4243 nTAA RI-1DW/D TCG	368.64TB	1ES2414
OpenFlex Data24-24 4243 nTAA RI-1DW/D SE	737.28TB	1ES2704
OpenFlex Data24-24 4243 nTAA RI-1DW/D ISE	737.28TB	1ES2705
OpenFlex Data24-24 4243 nTAA RI-1DW/D TCG	737.28TB	1ES2706
OpenFlex Data24-24 4243 nTAA RI-1DW/D SE	1474.56TB	1ES2707
OpenFlex Data24-24 4243 nTAA RI-1DW/D ISE	1474.56TB	1ES2708
OpenFlex Data24-24 4243 nTAA RI-1DW/D TCG	1474.56TB	1ES2709

1.13 List of Compatible Devices

Table 15: Western Digital Device List

Device	Volume ⁴	Max Bandwidth ⁵	Drive Writes	Encryption	Drive Firmware	Part Number
Western Digital Ultrastar DC SN655 SSD w/ Carrier	3.84 TB	3.3GB/s	RI-IDW/D	SE	RC610008	1EX3087
Western Digital Ultrastar DC SN655 SSD w/ Carrier	3.84 TB	3.3GB/s	RI-IDW/D	ISE	RC610008	1EX3079
Western Digital Ultrastar DC SN655 SSD w/ Carrier	3.84 TB	3.3GB/s	RI-IDW/D	TCG	RC610008	1EX3082
Western Digital Ultrastar DC SN655 SSD w/ Carrier	7.68 TB	3.3GB/s	RI-IDW/D	SE	RC610008	1EX3088
Western Digital Ultrastar DC SN655 SSD w/ Carrier	7.68 TB	3.3GB/s	RI-IDW/D	ISE	RC610008	1EX3080
Western Digital Ultrastar DC SN655 SSD w/ Carrier	7.68 TB	3.3GB/s	RI-IDW/D	TCG	RC610008	1EX3083
Western Digital Ultrastar DC SN655 SSD w/ Carrier	15.36 TB	3.3GB/s	RI-IDW/D	SE	RC610008	1EX3089
Western Digital Ultrastar DC SN655 SSD w/ Carrier	15.36 TB	3.3GB/s	RI-IDW/D	ISE	RC610008	1EX3081
Western Digital Ultrastar DC SN655 SSD w/ Carrier	15.36 TB	3.3GB/s	RI-IDW/D	TCG	RC610008	1EX3084
Western Digital Ultrastar DC SN655 SSD w/ Carrier	30.72 TB	3.3GB/s	RI-IDW/D	SE	RC910002	1EX3241
Western Digital Ultrastar DC SN655 SSD w/ Carrier	30.72 TB	3.3GB/s	RI-IDW/D	ISE	RC910002	1EX3242
Western Digital Ultrastar DC SN655 SSD w/ Carrier	30.72 TB	3.3GB/s	RI-IDW/D	TCG	RC910002	1EX3243

4. One terabyte (TB) is equal to one trillion bytes. Actual user capacity may be less due to operating environment.

5. Sequential read bandwidth, 64KiB block size. Based on internal testing. Performance will vary by capacity point, or with changes in useable capacity. All measurements are in full sustained mode and are peak values. Subject to change.

Device	Volume ⁴	Max Bandwidth ⁵	Drive Writes	Encryption	Drive Firmware	Part Number
Western Digital Ultrastar DC SN655 SSD w/ Carrier	61.44 TB	3.3GB/s	RI-1DW/D	SE	RC910002	1EX3244
Western Digital Ultrastar DC SN655 SSD w/ Carrier	61.44 TB	3.3GB/s	RI-1DW/D	ISE	RC910002	1EX3245
Western Digital Ultrastar DC SN655 SSD w/ Carrier	61.44 TB	3.3GB/s	RI-1DW/D	TCG	RC910002	1EX3246
Samsung PCIe Gen 4-enabled PM1733 SSD				SE	EPK9AB5Q	MZWLJ1T9HBJR-00007
Samsung PCIe Gen 5-enabled PM1743 SSD				SE	EPK9AB5Q	MZWLO3T8HCLS-00A07/00B07

4. One terabyte (TB) is equal to one trillion bytes. Actual user capacity may be less due to operating environment.

5. Sequential read bandwidth, 64KiB block size. Based on internal testing. Performance will vary by capacity point, or with changes in useable capacity. All measurements are in full sustained mode and are peak values. Subject to change.

1.14 List of CRUs

Table 16: List of Replaceable Components

Component	Package Dimensions	Packaged Weight	Part Number
OpenFlex Data24 4200 Chassis	W: 927.1 mm x L: 609.6 mm x H: 254 mm W: 36.5 in x L: 24 in x H: 10 in	9.34 kg / 20.6 lbs	1EX3076
Power Supply Unit (PSU) 800W Titanium	W: 177.8 mm x L: 184.1 mm x H: 133.3 mm W: 7 in x L: 7.25 in x H: 5.25 in	1.4 kg / 3.1 lbs	1EX3057
IO Module (IOM)	W: 292.1 mm x L: 469.9 mm x H: 203.2 mm W: 11.5 in x L: 18.5 in x H: 8 in	3.6 kg / 8 lbs	1EX3059
System Fan	W: 69.8 mm x L: 69.8 mm x H: 38.1 mm W: 2.75 in. x L: 2.75 in. x H: 1.5 in. Fan Cable length: 254 mm / 10 in.	0.49 kg / 1.1 lbs	1EX3060
Western Digital Ultrastar DC Drives w/ Carrier	W: 69.85 mm x L: 100.33 mm x H: 14.98 mm W: 2.75 in x L: 3.95 in x H: 0.59 in	0.49 kg / 1.1 lbs	List of Compatible Devices (page 18)
Rail Assembly	W: 990.6 mm x L: 812.8 mm x H: 50.8 mm W: 9 in x L: 32 in x H: 2 in	2.6 kg / 6.8 lbs	1EX3085
Power Cord 3m C13-C14 18AWG	W: 107.9 mm x L: 158.7 mm x H: 311.1 mm W: 4.25 in x L: 6.25 in x H: 12.25 in	0.81 kg / 1.8 lbs	1EX1530
QSFP28 to QSFP28 30AWG 3m Cable	W: 261.6 mm x L: 373.8 mm x H: 116.8 mm W: 10.3 in x L: 13.3 in x H: 4.6 in	0.95 kg / 2.1 lbs	1EX2705
Drive Blank	W: 261.6 mm x L: 373.8 mm x H: 116.8 mm W: 10.3 in x L: 13.3 in x H: 4.6 in	0.72 kg / 1.1 lbs	1EX3078

Component	Package Dimensions	Packaged Weight	Part Number
Rack Ear Kit	W: 261.6 mm x L: 373.8 mm x H: 116.8 mm W: 10.3 in x L: 13.3 in x H: 4.6 in	0.72 kg / 1.1 lbs	1EX3086

1.15 Third Party Licenses

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For open source licensing information, please download the **Third-Party Notices** from the Western Digital Business Support Center at <https://www.westerndigital.com/company/innovation/open-source/product-compliance>.

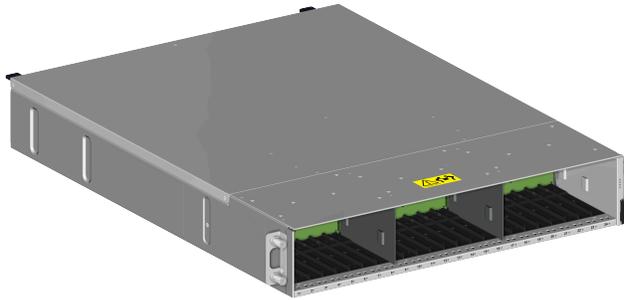


Components

In This Chapter:

- Chassis.....	23
- Power Supply Unit (PSU).....	24
- IO Module (IOM).....	25
- Drive Assembly.....	26
- Drive Blank Assembly.....	27
- System Fan.....	28
- Rail Assembly.....	29

2.1 Chassis



The chassis is the primary housing that contains and connects all of the system components. All of the drives are located at the front in the drive bay, and the rear houses the IO Modules, PSUs, and cable connections. There is a compartment cover on the top of the chassis that can be opened for access to the system fans for servicing.

2.1.1 Chassis Specifications

Table 17: Chassis Specification Summary

Specification	Value
Part Number	1EX3076
Hot Swappable?	No
Service Window	N/A
Dimensions	W: 491.9 mm x L: 596.9mm x H: 85.5 mm W: 19.37 in. x L: 23.5 in. x H: 3.37 in.
Weight	8.89 kg / 19.6 lbs.

2.2 Power Supply Unit (PSU)



The Power Supply Unit (PSU) inside the OpenFlex™ Data24 4000 Series are 800W, 80 Plus Titanium efficiency rated, and operate within a 100V - 240V voltage range. The PSUs are redundant and can be hotswapped one at a time. There must always be one PSU in operation for continuous usage during replacements of the PSUs.

2.2.1 PSU Specifications

Table 18: Power Supply Unit (PSU) Specification Summary

Specification	Value
Part Number	1EX3057
Number per Enclosure	2
Hot Swappable?	Yes
Service window	5 minutes
Dimensions	W: 38.1 mm x L: 228.6 mm x H: 72.8 mm W: 1.5 in. x L: 9 in. x H: 2.87 in.
Weight	0.95 kg / 2.1 lbs.
Current Output	12V current output 65A maximum
Power Output	800W Maximum
Input Voltage	100V - 240V
Redundancy	N+1
PSU Type	Common Redundant Power Supply (CRPS)
80 PLUS Standard	Titanium
Connector Type	C14

2.3 IO Module (IOM)



Each IOM contains three, chip down RapidFlex A2000s that provide system data connectivity through a QSFP28 cable, and supports cable lengths up to 10m. Out-of-Band Management (OOBM) features are accessed via an RJ45 port that supports a 10/100/1000 Mbps Ethernet connection. The IOM status LEDs report Fault and Power. The IOM is hotswappable and easily removable by removing cables/connectors, loosening the single thumbscrew and pulling on the handle.



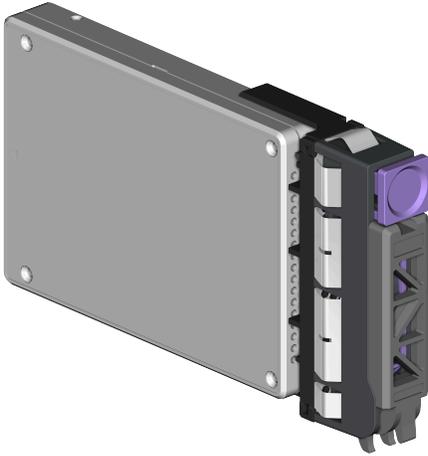
Warning: It is important to remove the QSFP28 and management cables before unscrewing and lowering the handle. Lowering the handle while the cables are still installed can damage the internal components and the connector itself.

2.3.1 IOM Specifications

Table 19: IO Module (IOM) Specification Summary

Specification	Value
Part Number	1EX3059
Number per Enclosure	2
Number of ASICs	3
Hot Swappable?	Yes
Service window	5 minutes
Dimensions	W: 165.1 mm x L: 381 mm x H: 50.8 mm W: 6.5 in. x L: 15 in. x H: 2 in.
Weight	1.45 kg / 3.1 lbs.
Connector Type	Six QSFP28 connectors and one Management Port

2.4 Drive Assembly



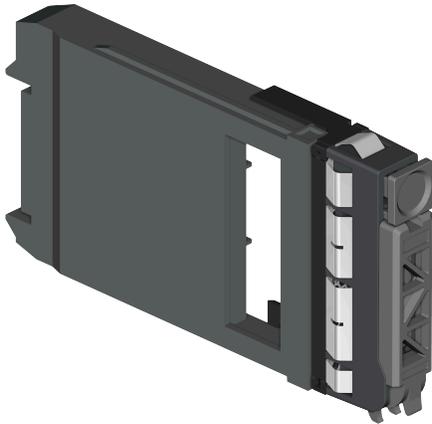
The Drive Assembly is comprised of two basic parts: the 2.5 in. SSD and the drive carrier. The drive carrier connects to the 2.5 in. drive enables toolless installation and replacement. The drive assembly is available in many different volumes, encryption, and block sizes.

2.4.1 Drive Assembly Specifications

Table 20: Drive Assembly Specification Summary

Specification	Value
Part Number	See List of Compatible Devices (page 18)
Number per Enclosure	12 or 24 drive configurations
Maximum Drive Capacity	61.44 TB
Hot Swappable?	Yes
Dimensions	W: 15.7 mm x L: 136.3 mm x H: 76.2 mm W: 0.62 in. x L: 5.37 in. x H: 3 in.
Weight	0.15 kg / 0.4 lbs.

2.5 Drive Blank Assembly



The Drive Blank Assembly is a component that is used to fill empty drive slots in the chassis when an OpenFlex Data24 4000 Series enclosure is partially populated with drives.

2.5.1 Drive Blank Assembly Specifications

Table 21: Drive Assembly Specification Summary

Specification	Value
Part Number	1EX3078
Number per Enclosure	Up to 12
Hot Swappable?	Yes
Dimensions	W: 15.7 mm x L: 136.3 mm x H: 76.2 mm W: 0.62 in. x L: 5.37 in. x H: 3 in.
Weight	0.045 kg / 0.1 lbs.

2.6 System Fan



The System Fans provide the primary system cooling for the OpenFlex Data24 4000 Series. There are a total of four N+2 redundant fans. The System Fans are coldswap capable components, and require the system to be shut down for servicing and accessed by removing the chassis cover.

2.6.1 System Fan Specifications

Table 22: System Fan Specification Summary

Specification	Value
Part Number	1EX3060
Number per Enclosure	4
Hot Swappable?	No
Service window	N/A
Dimensions	W: 69.8 mm x L: 38.1 mm x H: 69.8 mm W: 2.75 in. x L: 1.5 in. x H: 2.75 in.
Weight	0.15 kg / 0.3 lbs.
Fan Size	60 mm, single rotor
System Fan Cable Length	254 mm / 10 in.

2.7 Rail Assembly



The rails contained in the Rail Assembly included with the OpenFlex Data24 4000 Series are 2U, shelf style rails with inner arms that enable easy installation.

2.7.1 Rail Assembly Specification

Table 23: Rail Assembly Specification Summary

Specification	Value
Part Number	1EX3085
Number per Enclosure	1 Pair
Hot Swappable?	No
Service window	N/A
Dimensions	W: 40.6 mm x L: 590.5 mm x H: 88.9 mm W: 1.6 in. x L: 23.25 in. x H: 3.5 in.
Weight	2.6 kg / 5.8 lbs.
Rail Extension Length	590.5 - 825.5 mm / 23.25 - 32.5 in.
Mounting Hardware	Eight T15 Torx screws and eight washers



Support

In This Chapter:

- Drive Assembly Replacement.....	31
- Drive Blank Assembly Replacement.....	35
- Power Supply Unit (PSU) Replacement.....	39
- IO Module (IOM) Replacement.....	43
- Rail Assembly Replacement.....	48
- System Fan Replacement.....	61
- Chassis Replacement.....	86
- Power Cable Replacement.....	105
- QSFP28 Cable Replacement.....	107

3.1 Drive Assembly Replacement

This procedure supports the replacement of the Drive Assembly. The Drive Assembly is a toolless replacement meaning that it **does not** require the use of any tools.

i **Attention:** Hot swappable CRUs must be replaced one at a time. If multiple drives are being replaced, there must be a waiting period of 30 seconds in between each drive insertion to avoid the drive entering a degraded warning state. This would cause the drive to disconnect from the host.

Replacement Requirements

Personnel Required	1
Average Replacement Time	3 minutes
Service Window	N/A

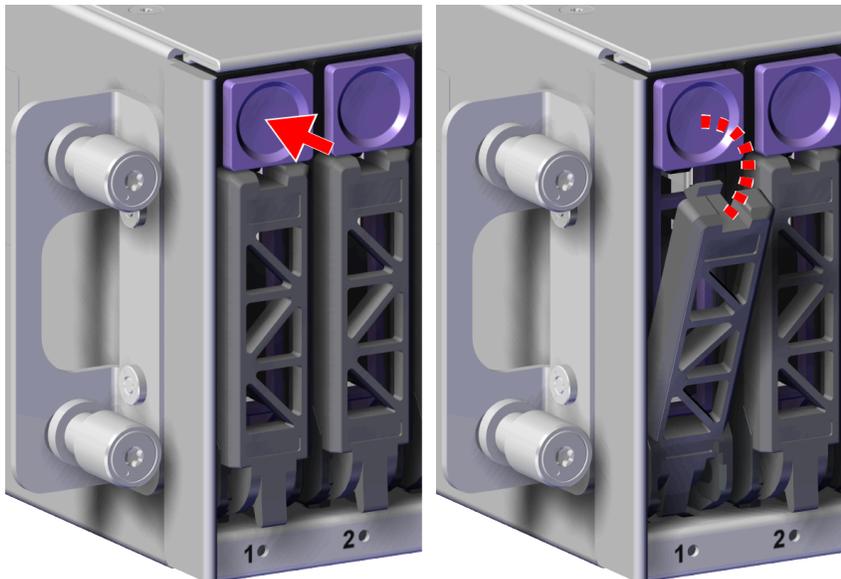
Safety List

- ESD Sensitive

Step 1: Uninstall the Drive Assembly from the enclosure.

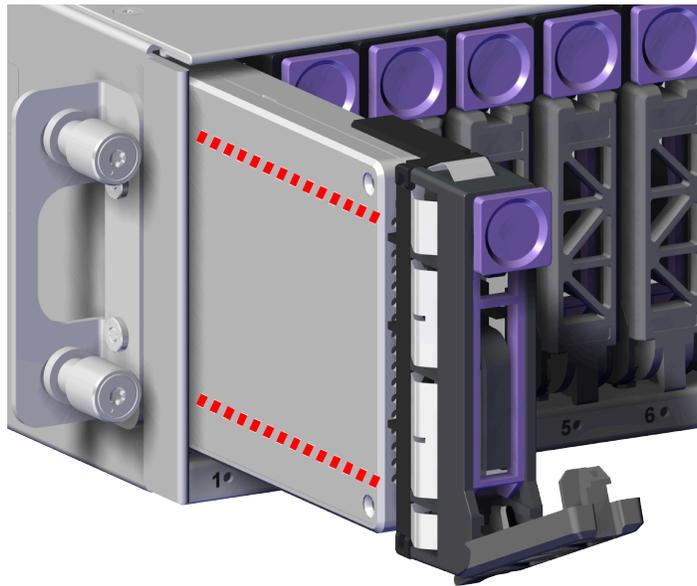
- From the front of the rack, press the release button on the front of the Drive Assembly. The release handle will eject outward.

Figure 17: Drive Assembly Release Operation



- Use the release handle to pull the Drive Assembly out of the enclosure.

Figure 18: Uninstall Drive Assembly



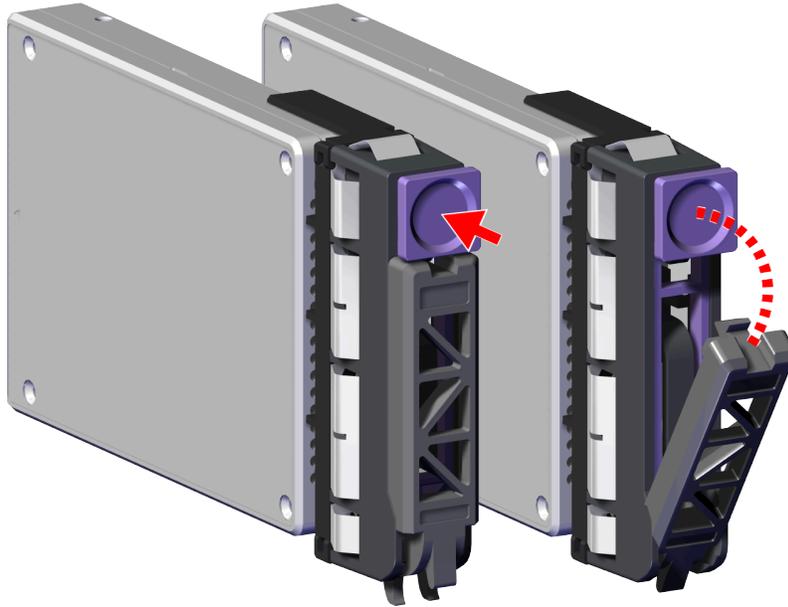
Step 2: Unpack and inspect the new Drive Assembly for damage.

- a. Inspect the packaging that the Drive Assembly replacement was shipped in and record any damage to the box. Large cuts, open boxes, and crushed corners should be reported.
- b. Remove the Drive Assembly from the packaging and verify that there is no damage to the Drive Assembly. Dents, scratches, and broken parts should be reported. If major damage has occurred to the Drive Assembly, DO NOT use the replacement part.

Step 3: Install the Drive Assembly into the enclosure.

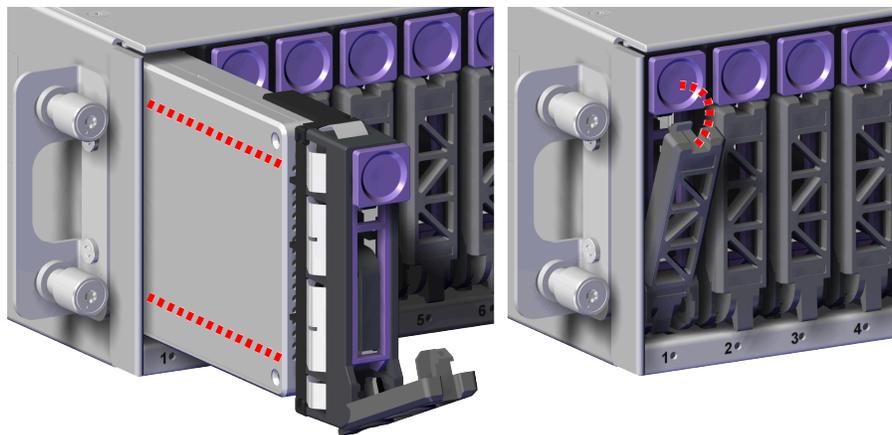
- a. Prepare the Drive Assembly for installation by pressing the release button on the front of the Drive Assembly. The release handle will eject outward.

Figure 19: Drive Assembly Release Operation



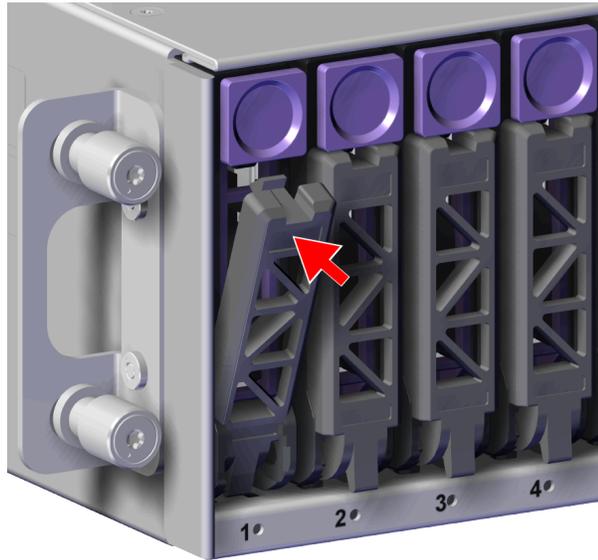
- b. From the front of the rack, gently slide the Drive Assembly into the Drive Assembly slot until the release handle lifts up slightly, indicating that it is engaged with the Chassis.

Figure 20: Drive Assembly Latch Engaged



- c. Rotate the release handle up and press it into the Drive Assembly to secure it into the slot. When it is fully installed the user will feel the handle snap and lock into place.

Figure 21: Drive Assembly Installation



Result: The Drive Assembly has now been replaced.

3.2 Drive Blank Assembly Replacement

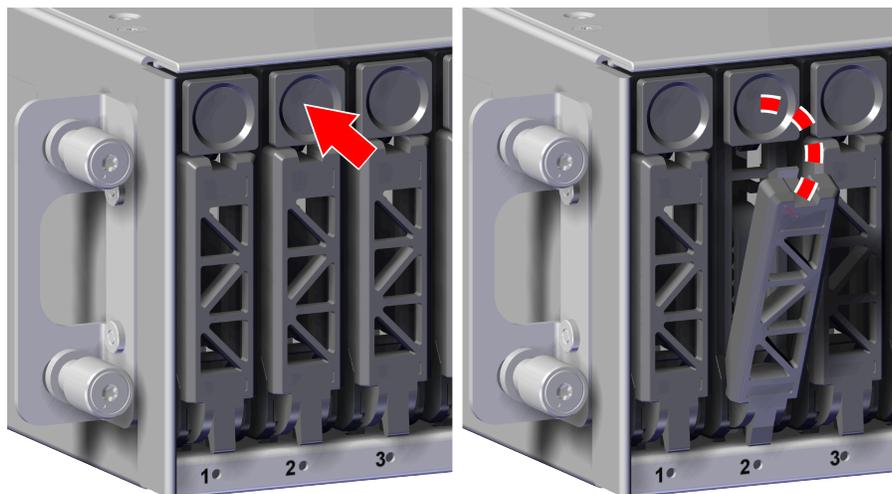
This procedure supports the replacement of the Drive Blank Assembly. The Drive Blank Assembly is a toolless replacement meaning that it **does not** require the use of any tools.

Replacement Requirements	
Personnel Required	1
Average Replacement Time	3 minutes

Step 1: Uninstall the Drive Blank Assembly from the enclosure.

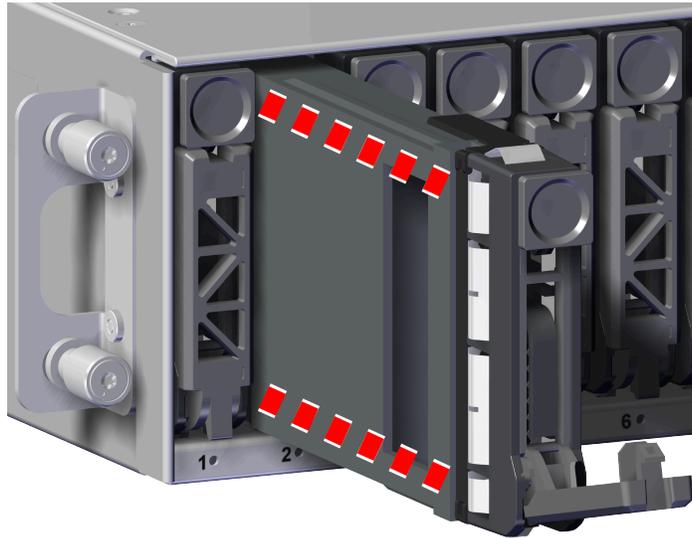
- From the front of the rack, press the release button on the front of the Drive Blank Assembly. The release handle will eject outward.

Figure 22: Drive Blank Assembly Release Operation



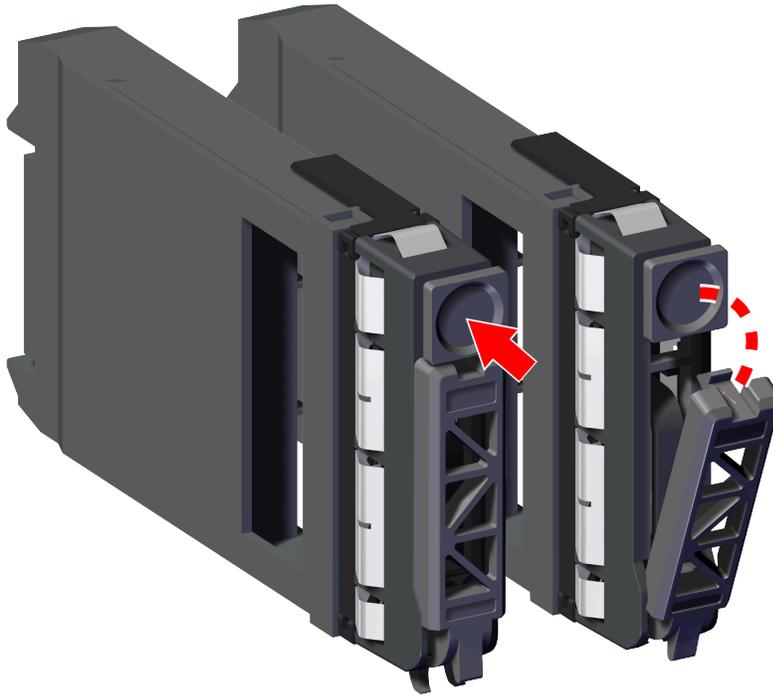
- Use the release handle to pull the Drive Blank Assembly out of the enclosure.

Figure 23: Uninstall Drive Blank Assembly



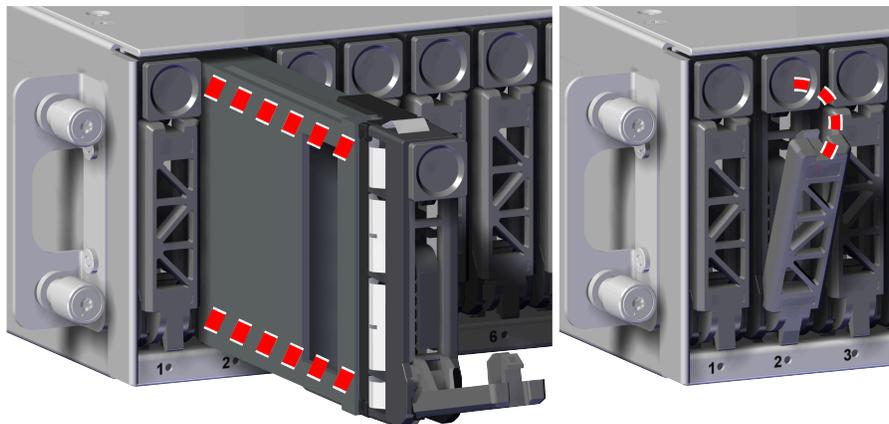
- Step 2:** Unpack and inspect the new Drive Blank Assembly for damage.
- Inspect the packaging that the Drive Blank Assembly replacement was shipped in and record any damage to the box. Large cuts, open boxes, and crushed corners should be reported.
 - Remove the Drive Blank Assembly from the packaging and verify that there is no damage to the Drive Blank Assembly. Dents, scratches, and broken parts should be reported. If major damage has occurred to the Drive Blank Assembly, DO NOT use the replacement part.
- Step 3:** Install the Drive Blank Assembly into the enclosure.
- Prepare the Drive Blank Assembly for installation by pressing the release button on the front of the Drive Blank Assembly. The release handle will eject outward.

Figure 24: Drive Blank Assembly Release Operation



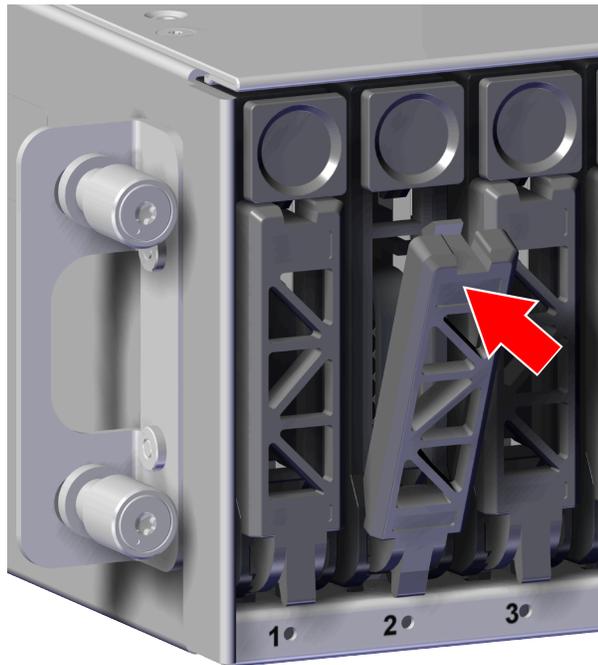
- b. From the front of the rack, gently slide the Drive Blank Assembly into the Drive Blank Assembly slot until the release handle lifts up slightly, indicating that it is engaged with the Chassis.

Figure 25: Drive Blank Assembly Latch Engaged



- c. Rotate the release handle up and press it into the Drive Blank Assembly to secure it into the slot. When it is fully installed the user will feel the handle snap and lock into place.

Figure 26: Drive Blank Assembly Installation



Result: The Drive Blank Assembly has now been replaced.

3.3 Power Supply Unit (PSU) Replacement

This procedure supports the replacement of the PSU. The PSU is a toolless replacement meaning that it **does not** require the use of any tools.



Attention: Hot swappable CRUs must be replaced one at a time.

Replacement Requirements

Personnel Required	1
Average Replacement Time	5 minutes
Service Window	5 minutes

Safety List

- ESD Sensitive
- Electric Shock
- Fan Blade Danger

Step 1: Move to the rear of the rack.

Step 2: Disconnect the power cable from the PSU.

- Remove the hook and loop strap that secures the power cable to the PSU.
- Disconnect the power cable from the PSU power port.

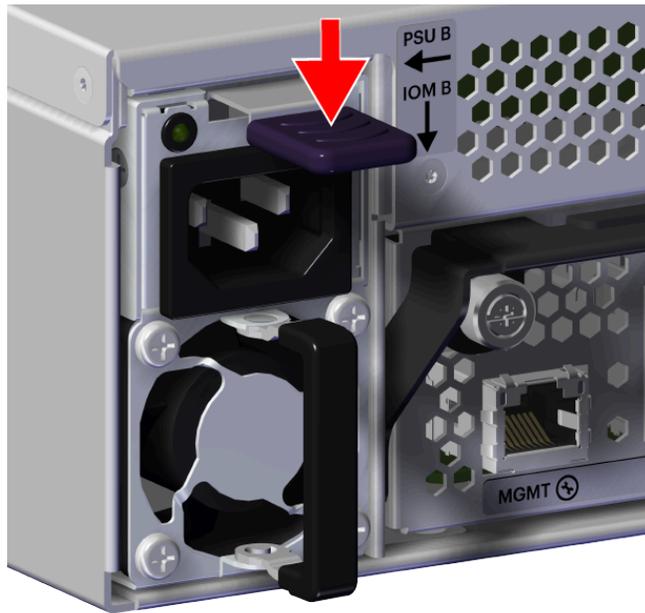
Figure 27: Disconnect Power Cable



Step 3: Uninstall the PSU from the enclosure.

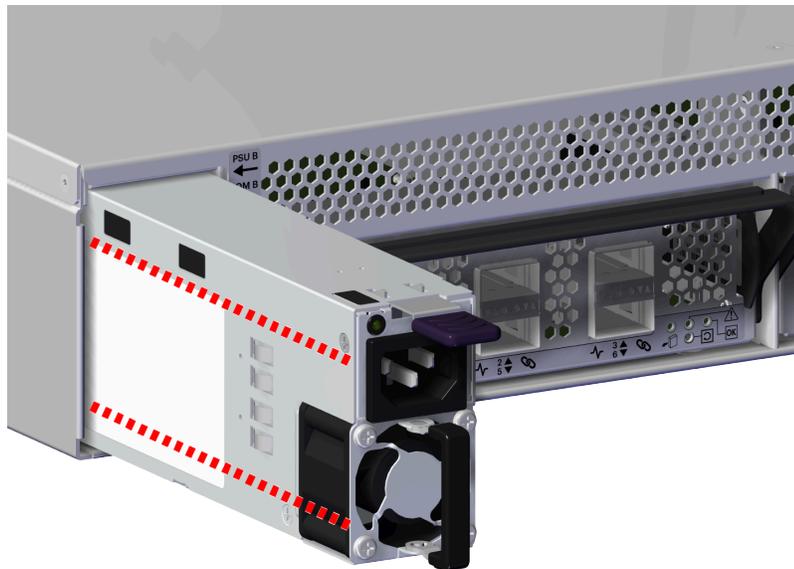
- From the rear of the rack, grasp the ring handle with your index finger and use your thumb to press the latch release using a pinching motion.

Figure 28: PSU Release Latch Operation



- b. Carefully pull the PSU out of the PSU slot.

Figure 29: Uninstall PSU



Step 4: Unpack and inspect the new PSU for damage.

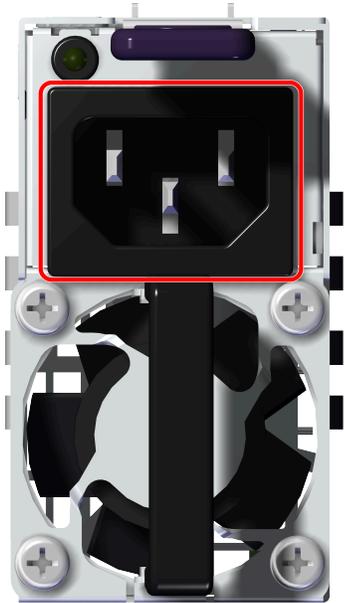
- a. Inspect the packaging that the PSU replacement was shipped in and record any damage to the box. Large cuts, open boxes, and crushed corners should be reported.

- b. Remove the PSU from the packaging and verify that there is no damage to the PSU. Dents, scratches, and broken parts should be reported. If major damage has occurred to the PSU, DO NOT use the replacement part.

Step 5: Install the PSU into the enclosure.

- a. Orient the PSU with the power port located on the top and insert it into the PSU slot. The location of the power port is shown in the following image.

Figure 30: Power Port Location



- b. Carefully push the PSU into the PSU slot.

Figure 31: PSU Installation

- c. Verify that the PSU is fully seated and latched into the PSU slot by gently pulling on the handle.

Step 6: Connect the power cable to the PSU.

- a. Plug the power cable into the PSU power port.

Figure 32: Connect Power Cable

- b. Secure the power cable to the PSU by wrapping the hook and loop strap around the power cable.

Result: The PSU has now been replaced.

3.4 IO Module (IOM) Replacement

This procedure supports the replacement of the IOM. The IOM is a toolless replacement meaning that it **does not** require the use of any tools.



Attention: Hot swappable CRUs must be replaced one at a time.

Replacement Requirements	
Personnel Required	1
Average Replacement Time	4 minutes
Service Window	5 minutes

Safety List

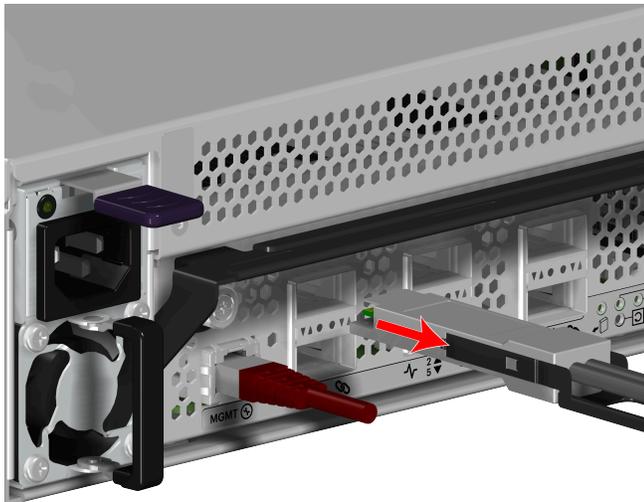
- ESD Sensitive
- Electric Shock

Step 1: Move to the rear of the rack.

Step 2: Record the QSFP28 cable connections for each port.

Step 3: Disconnect the QSFP28 cable from the IOM by pulling on the release tab and removing the cable from the port.

Figure 33: Disconnect QSFP28 Cable



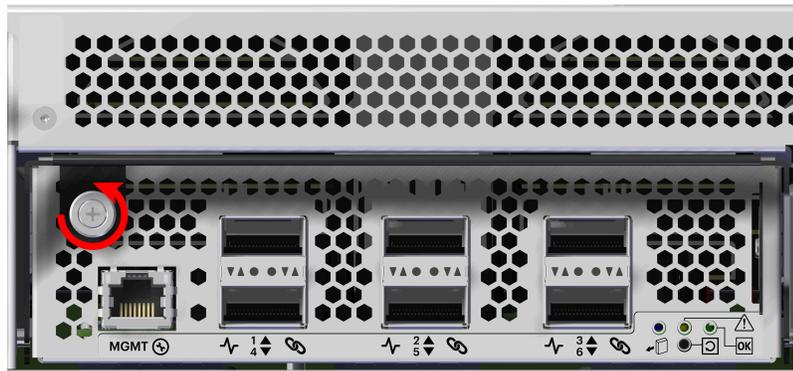
Step 4: Repeat the previous step to uninstall the remaining QSFP28 cable(s).

Step 5: Disconnect the Ethernet cable from the IOM Ethernet Management port.

Figure 34: Disconnect Ethernet Cable

Step 6: Uninstall the IOM from the enclosure.

- a. Unlock the IOM by turning the thumbscrew counterclockwise until the screw threads are no longer engaged any longer. The location of the thumbscrew is shown in the following image. A screwdriver may be used if desired.

Figure 35: IOM Thumbscrew Operation

- b. Pull the release handle down until the IOM is unseated and can be removed from the IOM slot.

Figure 36: IOM Release Handle Operation

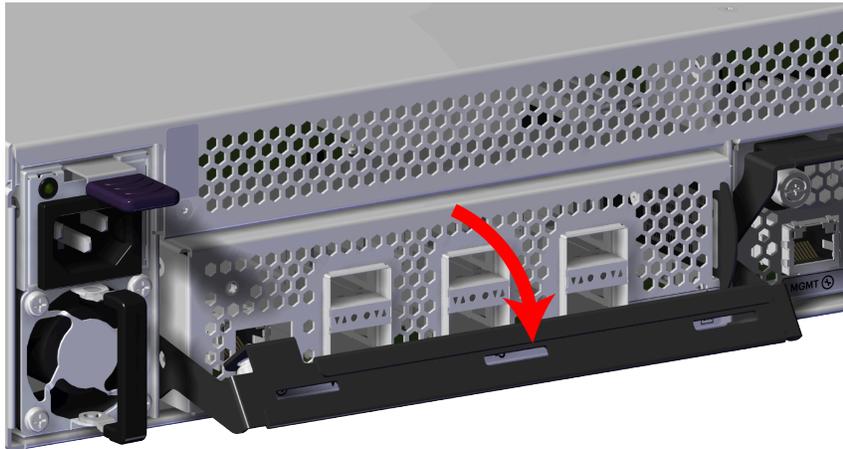
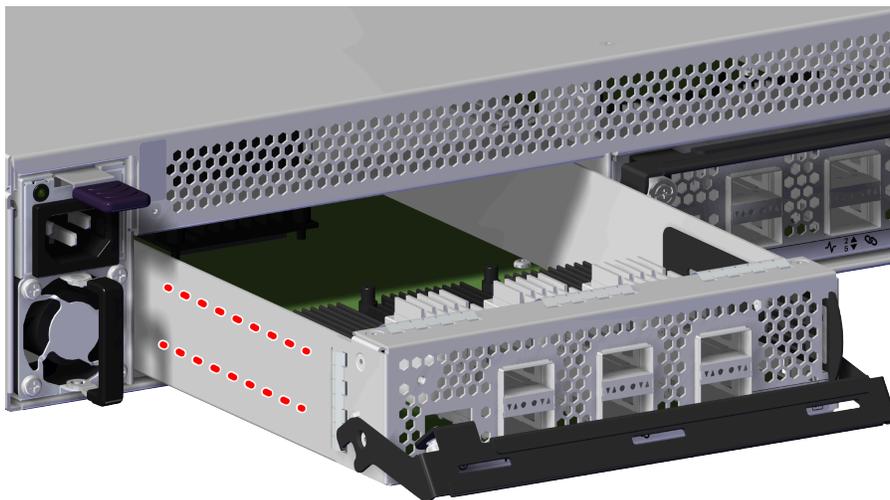


Figure 37: Uninstall IOM



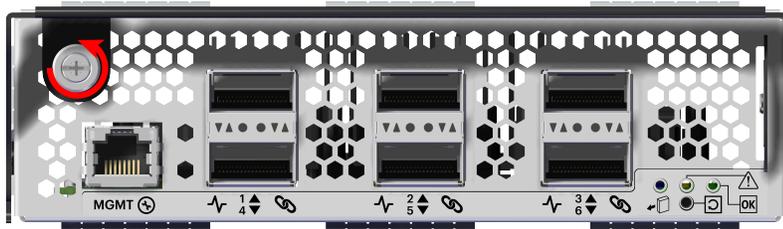
Step 7: Unpack and inspect the new IOM for damage.

- a. Inspect the packaging that the IOM replacement was shipped in and record any damage to the box. Large cuts, open boxes, and crushed corners should be reported.
- b. Remove the IOM from the packaging and verify that there is no damage to the IOM. Dents, scratches, and broken parts should be reported. If major damage has occurred to the IOM, DO NOT use the replacement part.

Step 8: Install the IOM into the enclosure.

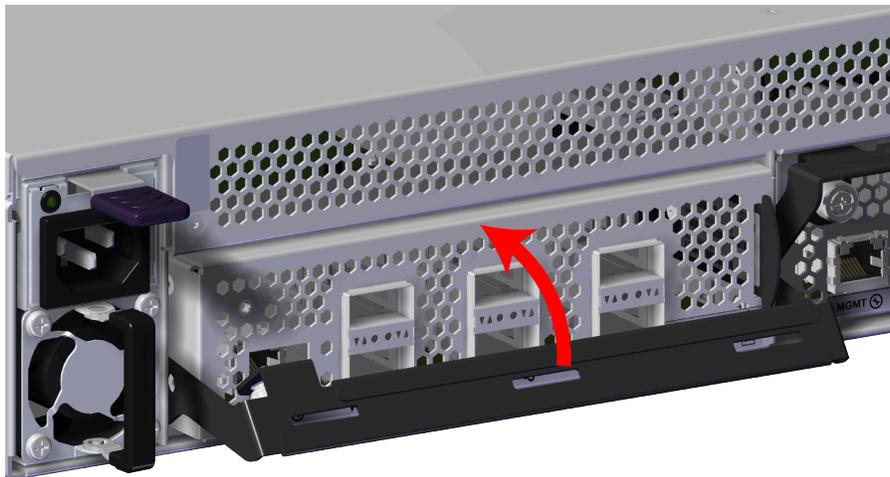
- a. Unlock the IOM by turning the thumbscrew counterclockwise until the screw threads are not engaged any longer. The location of the thumbscrew is shown in the following image.

Figure 38: Prepare IOM



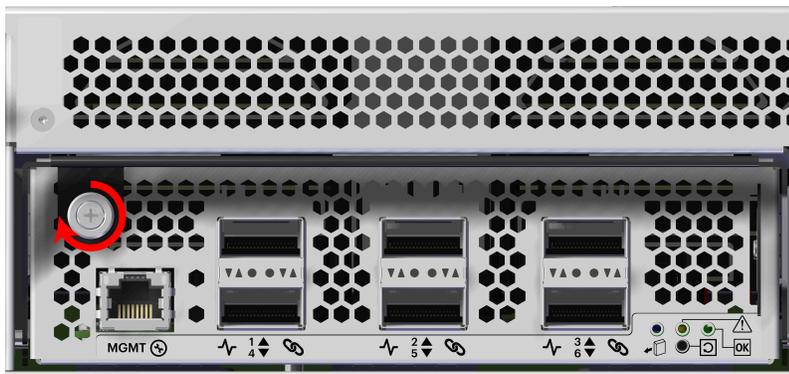
- b. Gently slide the IOM into the IOM slot until the release handle is engaged with the Chassis. When the handle lifts up slightly, it is an indicator that the release handle is engaged with the Chassis.

Figure 39: IOM Handle Engaged



- c. Press the release handle into the IOM and secure it in place by turning the thumbscrew clockwise until it is tight.

Figure 40: IOM Secure



- d. Verify that the IOM is securely latched into the Chassis by pulling on the release handle and ensuring the IOM does not move when pulled. Reinstall the IOM if it is not securely installed into the Chassis.

Step 9: Connect the Ethernet cable into the Ethernet Management port on the IOM.

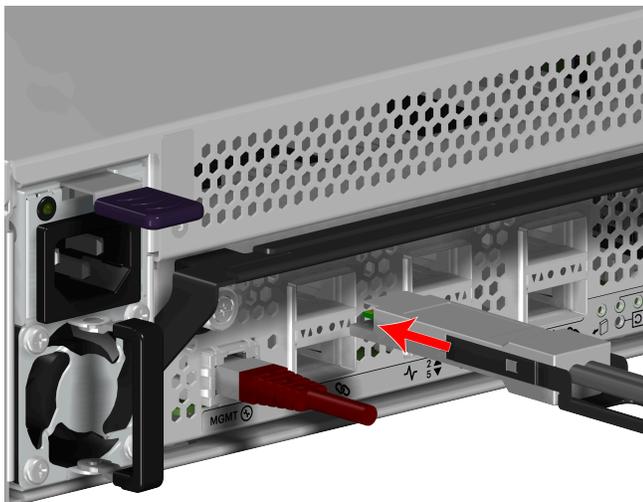
Figure 41: Connect Ethernet Cable



Step 10: Refer to the QSFP28 location connections that were recorded earlier in the replacement.

Step 11: Connect the QSFP28 cable to the IOM to the QSFP the port.

Figure 42: Connect QSFP28 Cable



Result: The IOM has now been replaced.

3.5 Rail Assembly Replacement

This procedure supports the replacement of the Rail Assembly. This procedure requires the Chassis be placed on an ESD safe surface.

Replacement Requirements			
Personnel Required			1
Average Replacement Time			15 minutes
Service Window			N/A
Tool	# Needed	Required vs. Optional	
T15 Torx screwdriver	1	Required	
ESD Mitigation Equipment (site specific)	1	Required	
Level	1	Optional	
Lift Equipment	1	Optional	

Safety List

- ESD Sensitive
- Electric Shock
- Team Lift Recommended

Step 1: Move to the rear of the rack.

Step 2: Disconnect the power cable from the PSU.

- Remove the hook and loop strap that secures the power cable to the PSU.
- Disconnect the power cable from the PSU power port.

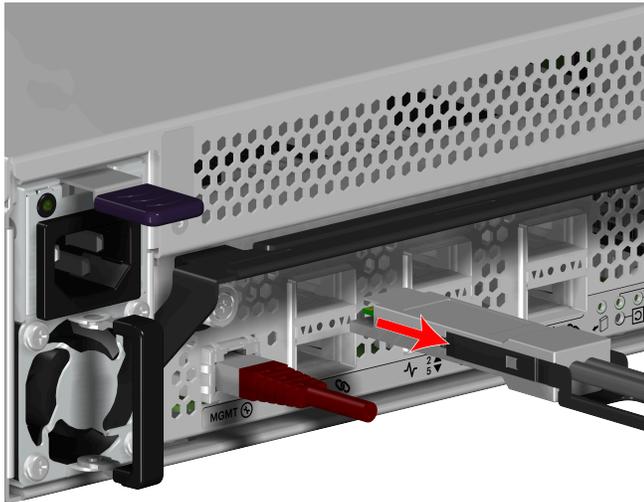
Figure 43: Disconnect Power Cable



Step 3: Repeat the previous step to uninstall the remaining power cable.

Step 4: Disconnect the QSFP28 cable from the IOM by pulling on the release tab and removing the cable from the port.

Figure 44: Disconnect QSFP28 Cable



Step 5: Repeat the previous step to uninstall the remaining QSFP28 cable(s).

Step 6: Disconnect the Ethernet cable from the IOM Ethernet Management port.

Figure 45: Disconnect Ethernet Cable



Step 7: Repeat the previous step to uninstall the remaining Ethernet cable.

Step 8: Uninstall the Chassis from the rack mounted rails.

- a. From the front of the rack, using the T15 Torx screwdriver, loosen the two Torx captive screws that secure the Chassis to the rail. Repeat this step to loosen the two Torx captive screws that secure the Chassis to the remaining rail. The location of the captive screws are shown in the following image.

Figure 46: Captive Screw Loosen

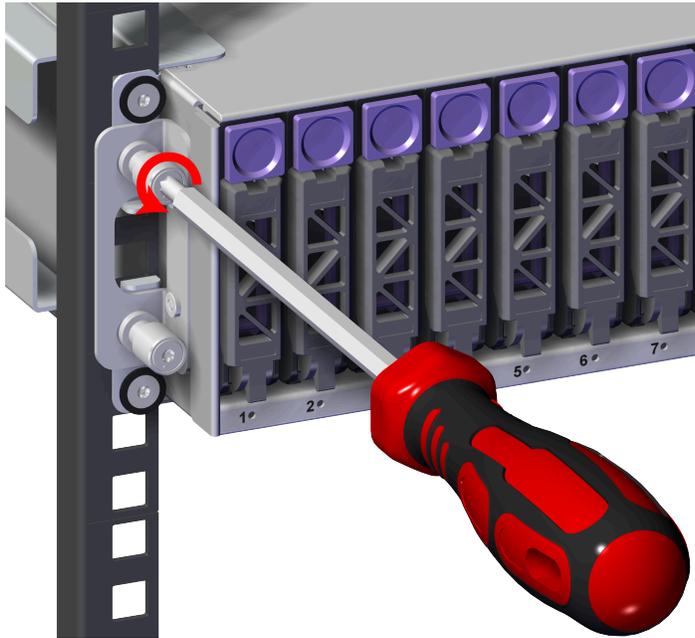
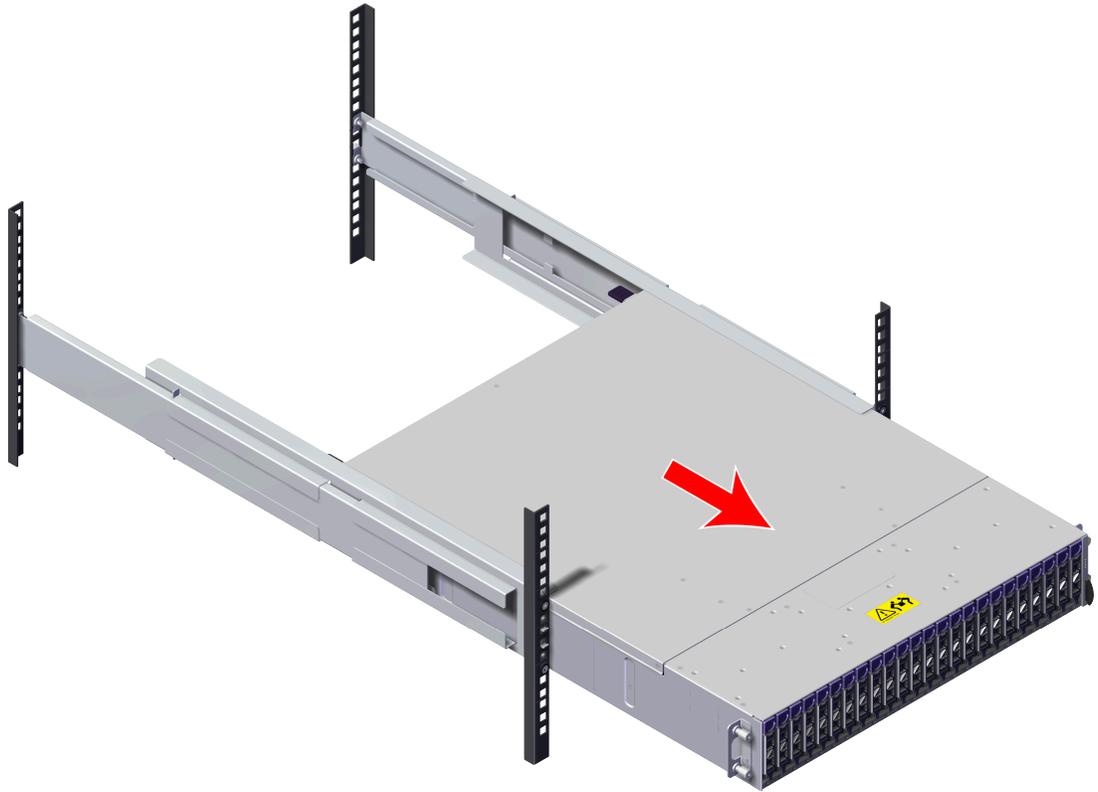


Figure 47: Captive Screw Location



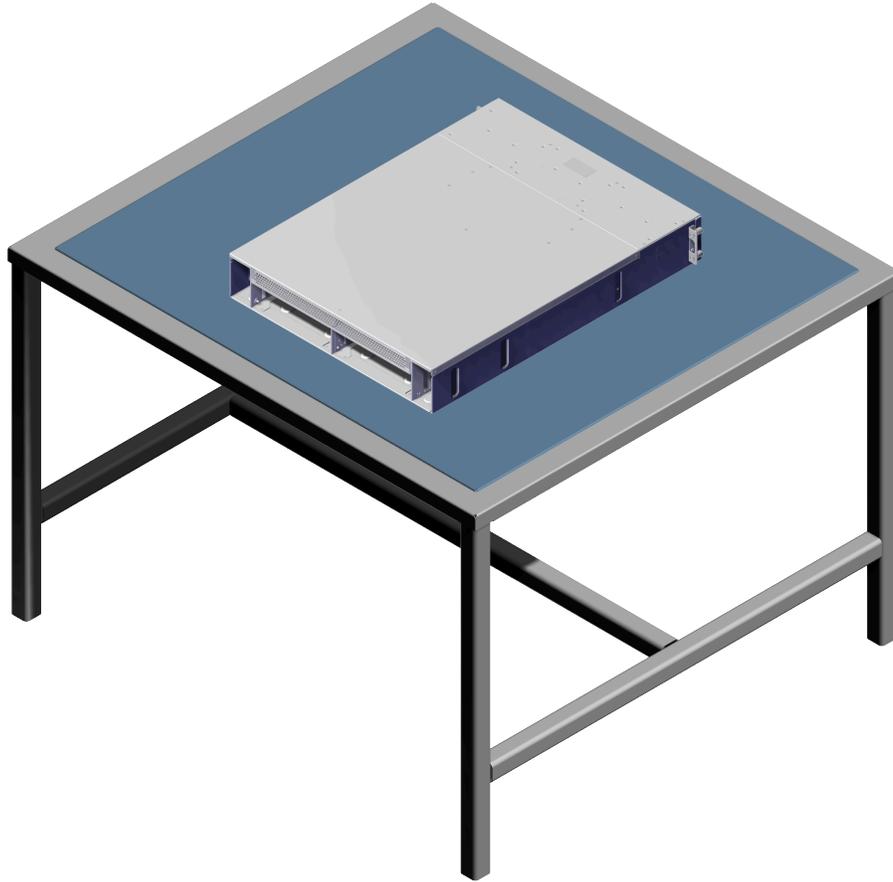
- b.** Carefully pull the Chassis out of the rack and ensure extra care is taken to support the weight of the Chassis when the Chassis is clear of the rack mount rails.

Figure 48: Uninstall Chassis



Step 9: Carefully place the enclosure on a sturdy ESD safe surface.

Figure 49: Chassis on an ESD Safe Table



Step 10: Uninstall the Rail Assembly.

- a. From the front of the rack, using the T15 Torx screwdriver, uninstall the two screws and washers that secure the front of the left rack mount Rail Assembly and bracket to the rack.

Figure 50: Uninstall Front Rack Mount

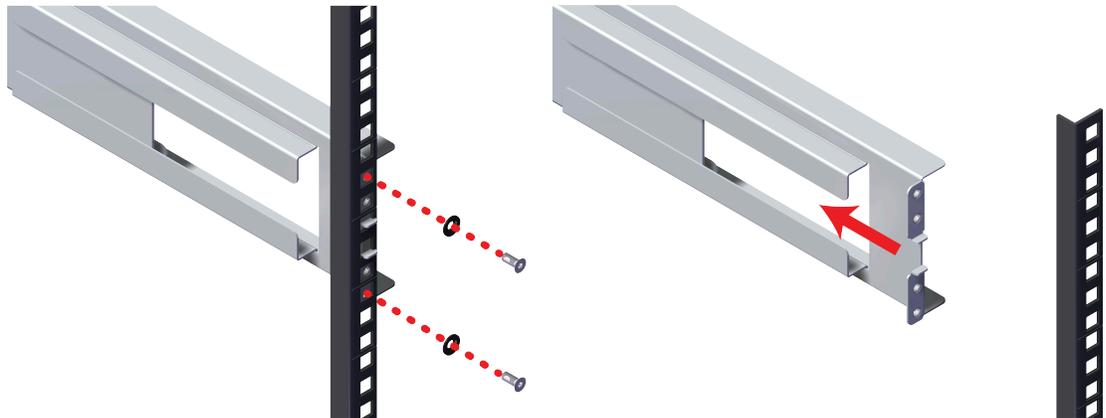
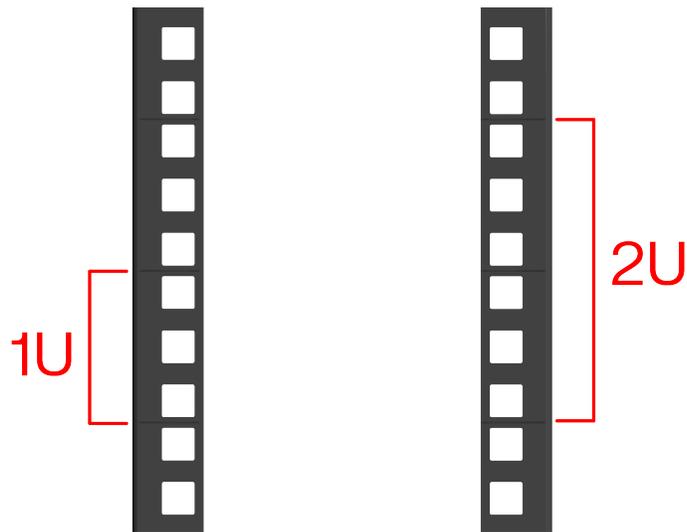
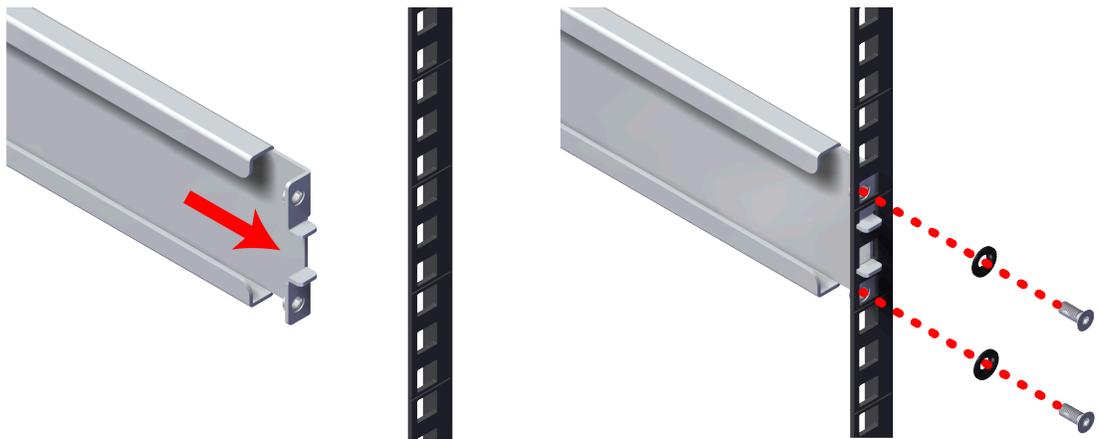


Figure 52: Rail Assembly U Location



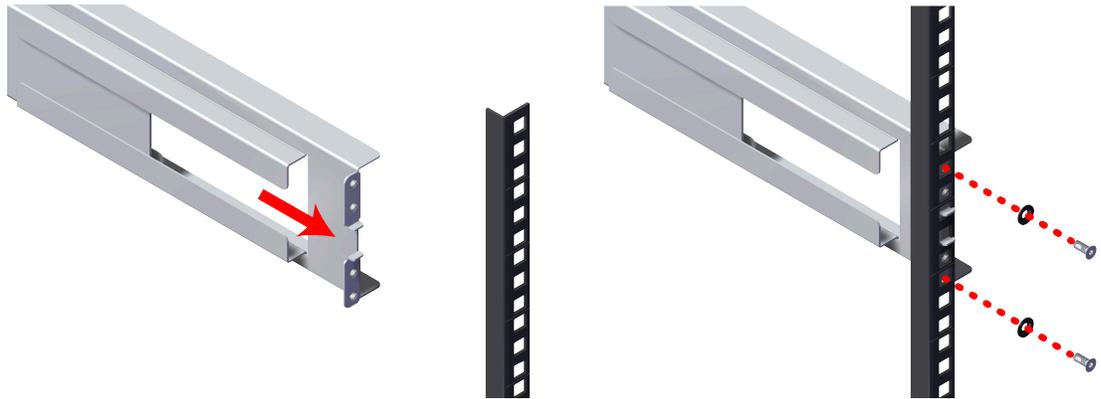
- c. Secure the rear of the rack mount Rail Assembly to the rack using the T15 Torx screwdriver and secure the rail mount using the two washers and screws.

Figure 53: Install Rear Rack Mount



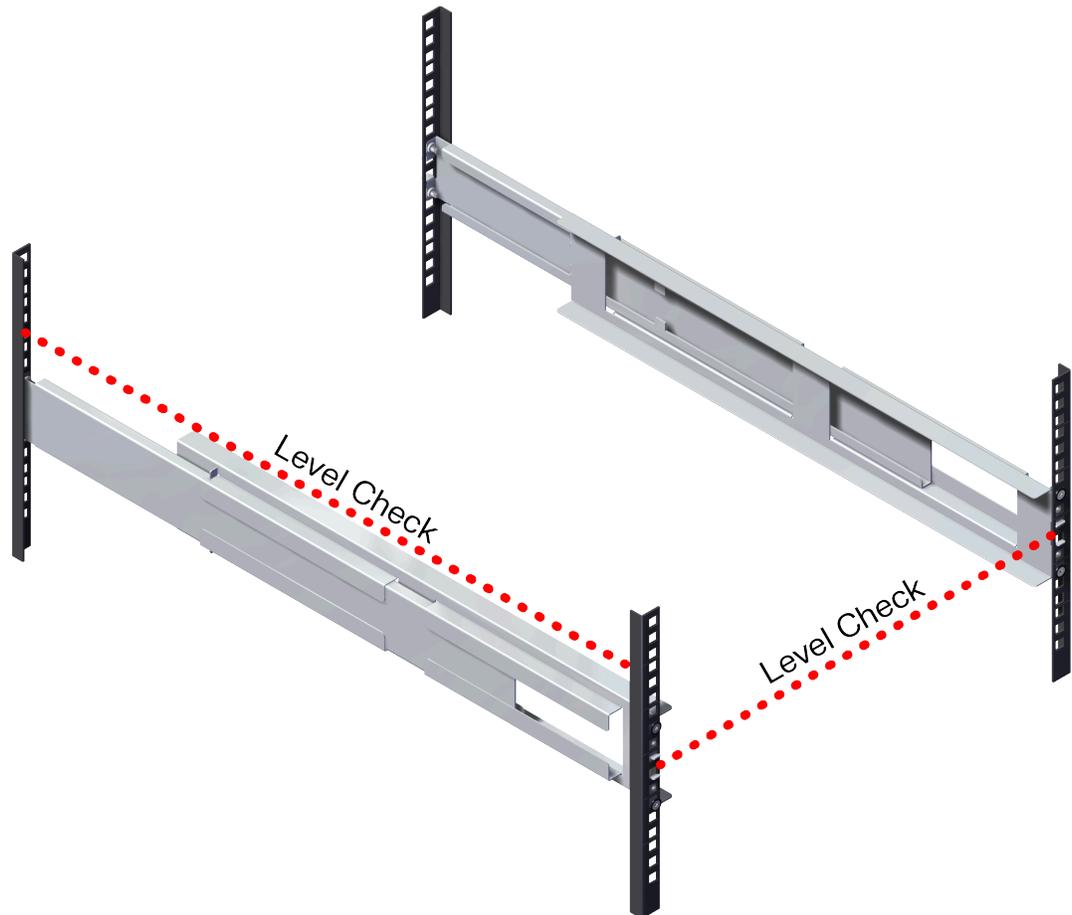
- d. From the front of the rack, using the T15 Torx screwdriver, install the two washers and screws that secure the front of the rack mount Rail Assembly.

Figure 54: Install Front Rack Mount



- e. It is recommended at this point to use a level to ensure that the rails are installed in the appropriate position in the rack. Check each rail is installed level individually, and then ensure they are installed at the appropriate rack by spanning both rails. It may be necessary to insert the level used at an angle to rest inside the rack shelf space.

Figure 55: Rail Level Check

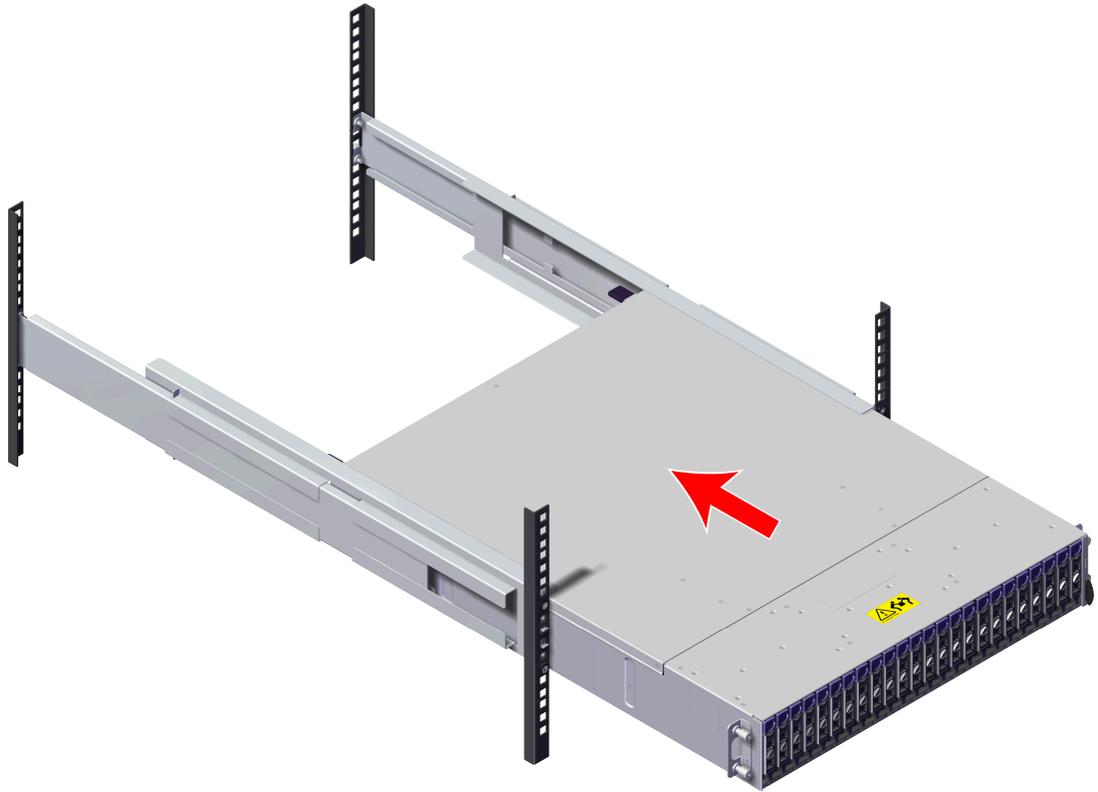


Step 14: Install the remaining Rail Assembly in the same way the first was installed.

Step 15: Install the Chassis onto the rack mounted rails.

- a. Carefully slide the Chassis onto the rails until the rack mounts are flush with the mounts on the rails.

Figure 56: Chassis Installation



- b.** Using the T15 Torx screwdriver, tighten the two Torx captive screws to secure the Chassis to the rail. Repeat this step to secure the remaining rack mount to the remaining rail.

Figure 57: Captive Screw Tighten

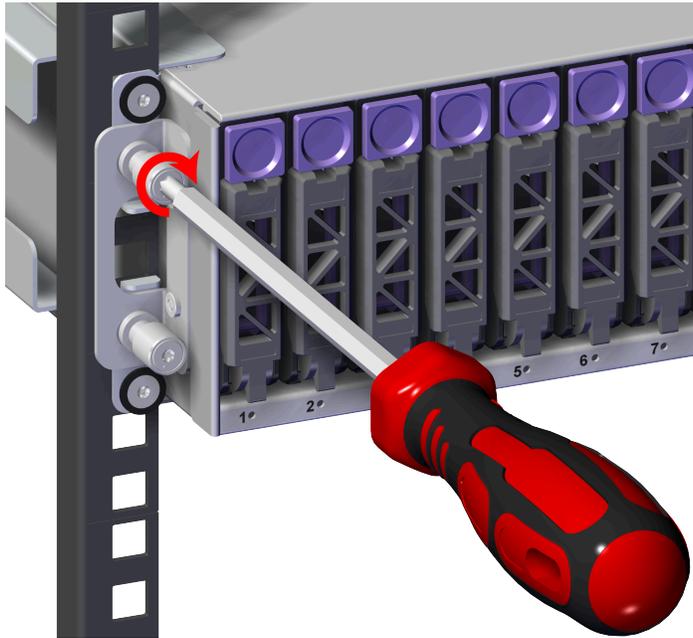


Figure 58: Captive Screw Location

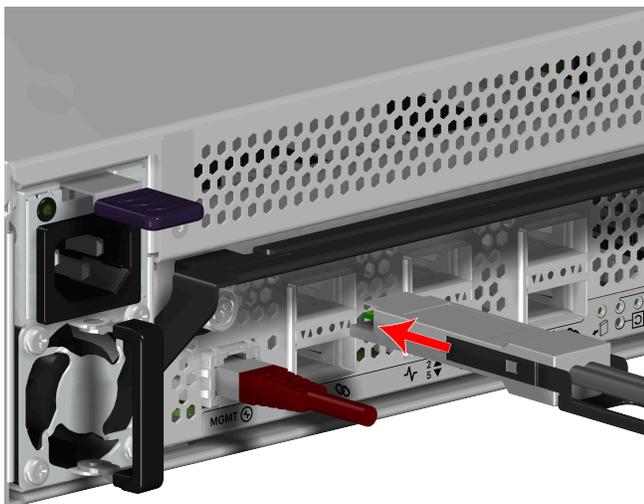


Step 16: Connect the Ethernet cable into the Ethernet Management port on the IOM.

Figure 59: Connect Ethernet Cable

Step 17: Repeat the previous step to install the remaining Ethernet cable.

Step 18: Connect the QSFP28 cable to the IOM to the QSFP the port.

Figure 60: Connect QSFP28 Cable

Step 19: Repeat the previous step to install the remaining QSFP28 cable(s).

Step 20: Connect the power cable to the PSU.

- a. Plug the power cable into the PSU power port.

Figure 61: Connect Power Cable



- b.** Secure the power cable to the PSU by wrapping the hook and loop strap around the power cable.

Step 21: Repeat the previous step to install the remaining power cable.

Result: The Rail Assembly has now been replaced.

3.6 System Fan Replacement

This procedure supports the replacement of the System Fan. The enclosure has to be taken offline and uninstalled to replace the System Fan.

Replacement Requirements		
Personnel Required		1
Average Replacement Time		40 minutes
Service Window		N/A
Tool	# Needed	Required vs. Optional
T7 Torx screwdriver	1	Required
T15 Torx screwdriver	1	Required

Safety List

- ESD Sensitive
- Electric Shock
- Team Lift Recommended

Step 1: Move to the rear of the rack.

Step 2: Disconnect the power cable from the PSU.

- Remove the hook and loop strap that secures the power cable to the PSU.
- Disconnect the power cable from the PSU power port.

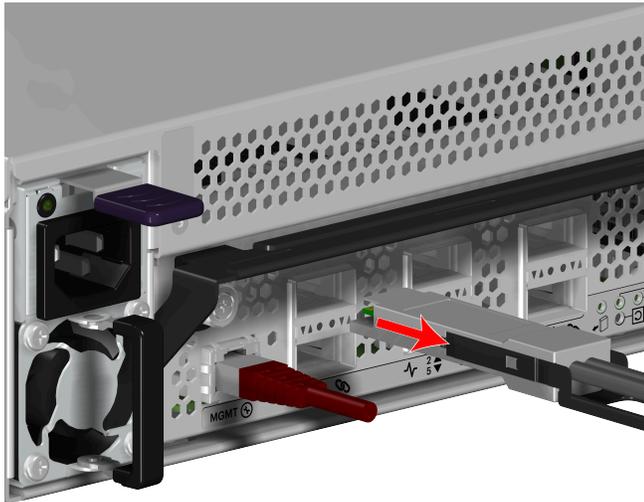
Figure 62: Disconnect Power Cable



Step 3: Repeat the previous step to uninstall the remaining power cable.

Step 4: Disconnect the QSFP28 cable from the IOM by pulling on the release tab and removing the cable from the port.

Figure 63: Disconnect QSFP28 Cable



Step 5: Repeat the previous step to uninstall the remaining QSFP28 cable(s).

Step 6: Disconnect the Ethernet cable from the IOM Ethernet Management port.

Figure 64: Disconnect Ethernet Cable

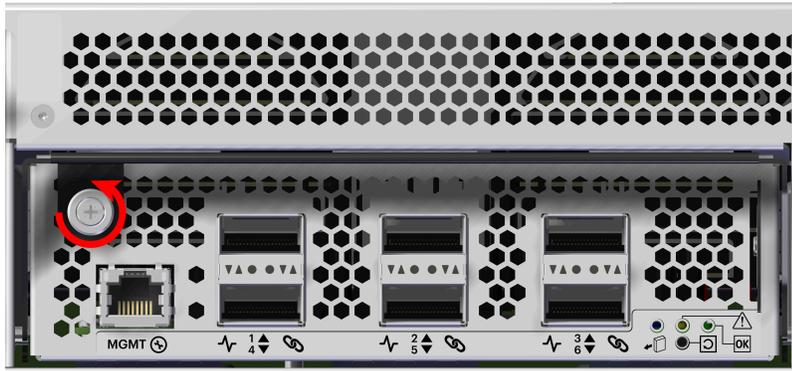


Step 7: Repeat the previous step to uninstall the remaining Ethernet cable.

Step 8: Uninstall the IOM from the enclosure.

- a. Unlock the IOM by turning the thumbscrew counterclockwise until the screw threads are no longer engaged any longer. The location of the thumbscrew is shown in the following image. A screwdriver may be used if desired.

Figure 65: IOM Thumbscrew Operation



- b. Pull the release handle down until the IOM is unseated and can be removed from the IOM slot.

Figure 66: IOM Release Handle Operation

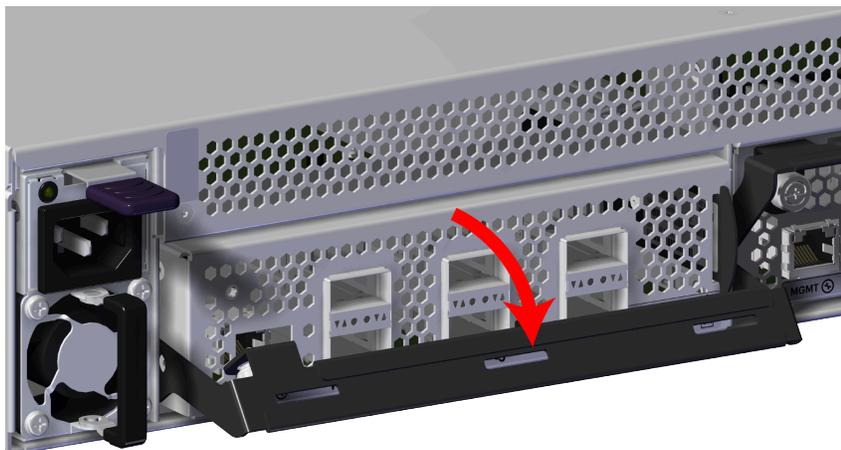
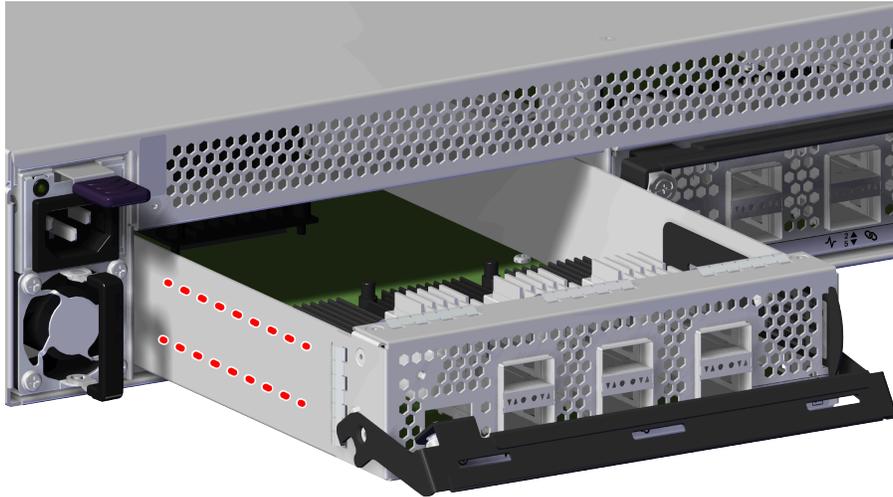


Figure 67: Uninstall IOM

Step 9: Repeat the previous step to uninstall the remaining IOM.

Step 10: Ensure that the IOMs are placed on a sturdy ESD safe surface.

Step 11: Uninstall the PSU from the enclosure.

- a. From the rear of the rack, grasp the ring handle with your index finger and use your thumb to press the latch release using a pinching motion.

Figure 68: PSU Release Latch Operation

- b. Carefully pull the PSU out of the PSU slot.

Figure 69: Uninstall PSU



Step 12: Repeat the previous step to uninstall the remaining PSU.

Step 13: Ensure that the PSUs are placed on a sturdy ESD safe surface.

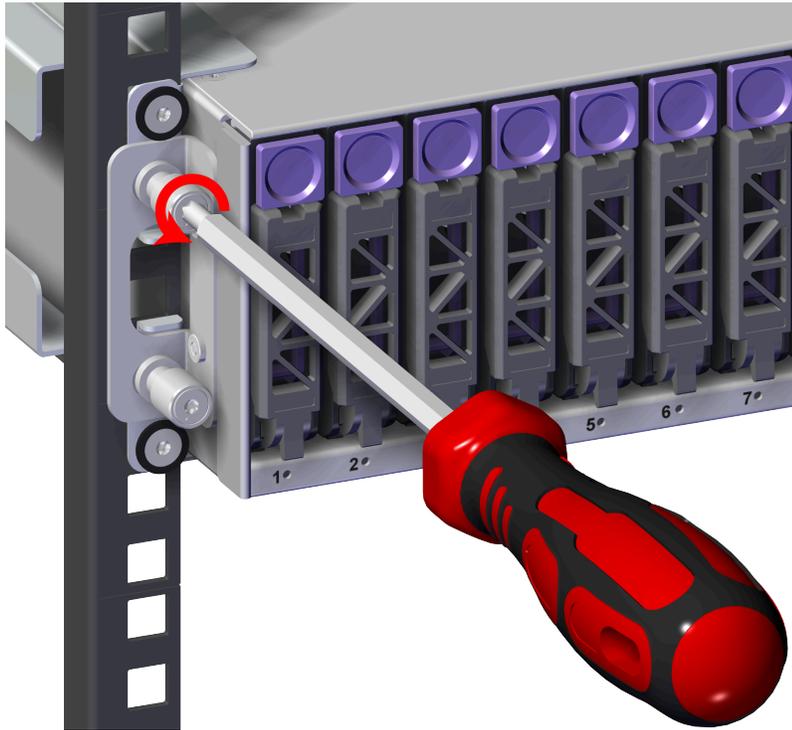
Step 14: Uninstall the Chassis from the rack mounted rails.

- a. From the front of the rack, using the T15 Torx screwdriver, loosen the two Torx captive screws that secure the Chassis to the rail. Repeat this step to loosen the two Torx captive screws that secure the Chassis to the remaining rail. The location of the captive screws are shown in the following image.

Figure 70: Captive Screw Location

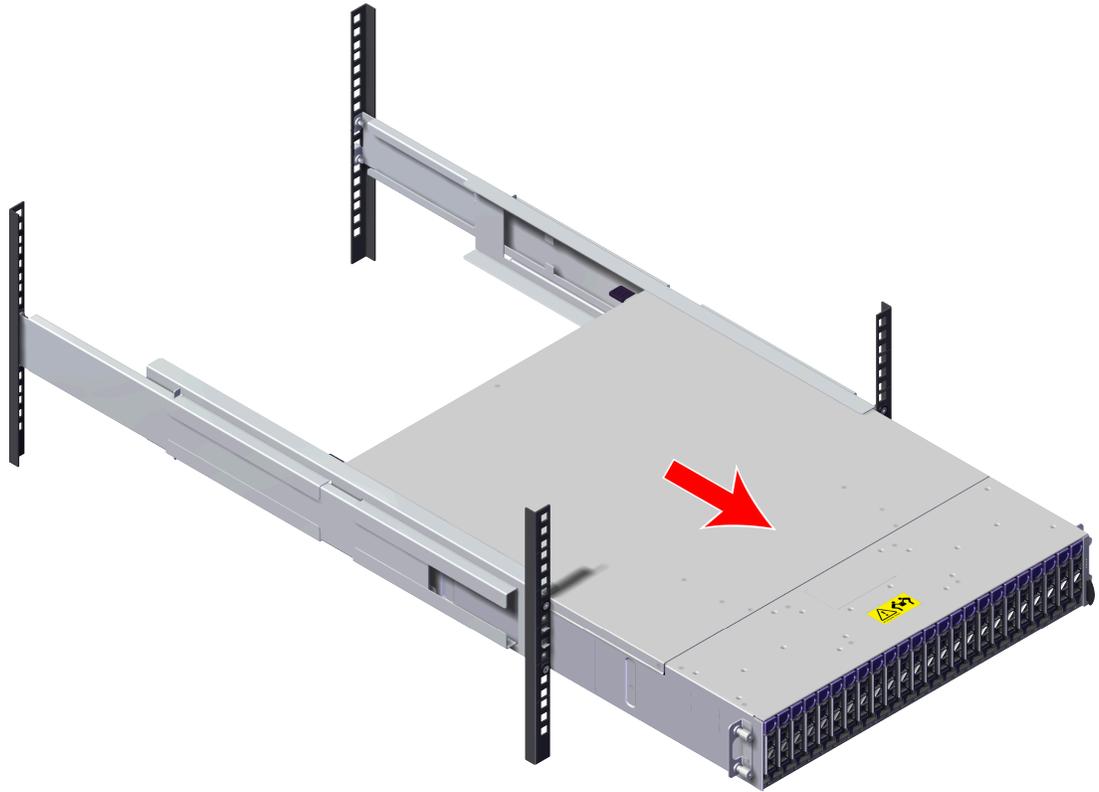


Figure 71: Captive Screw Loosen



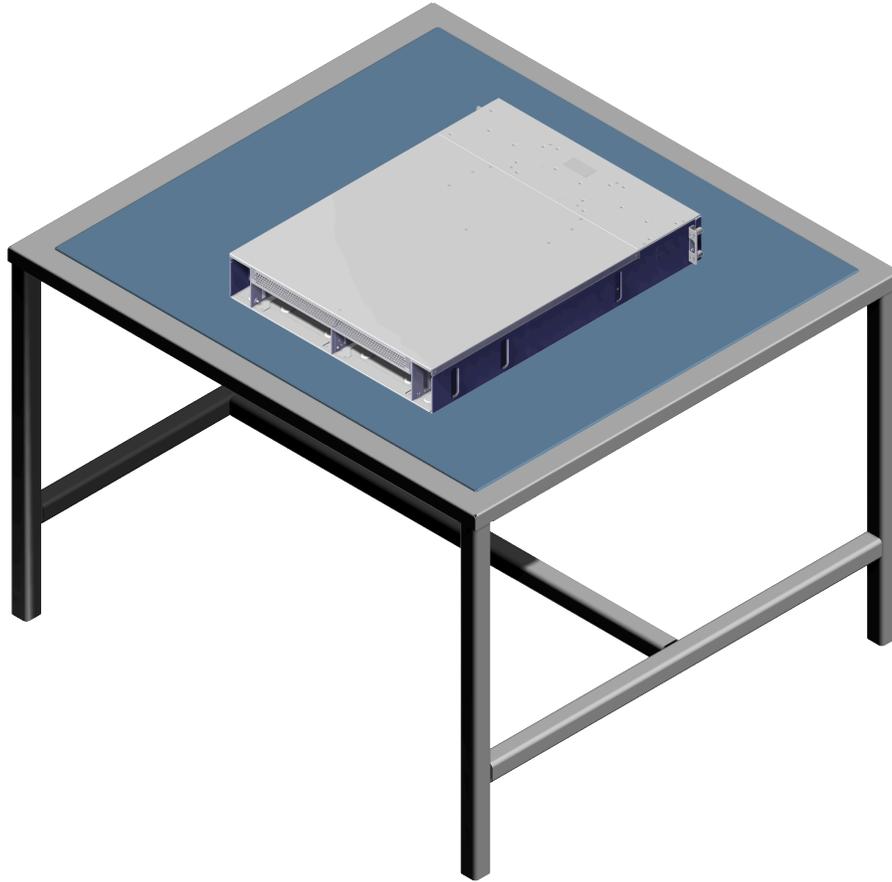
- b.** Carefully pull the Chassis out of the rack and ensure extra care is taken to support the weight of the Chassis when the Chassis is clear of the rack mount rails.

Figure 72: Uninstall Chassis



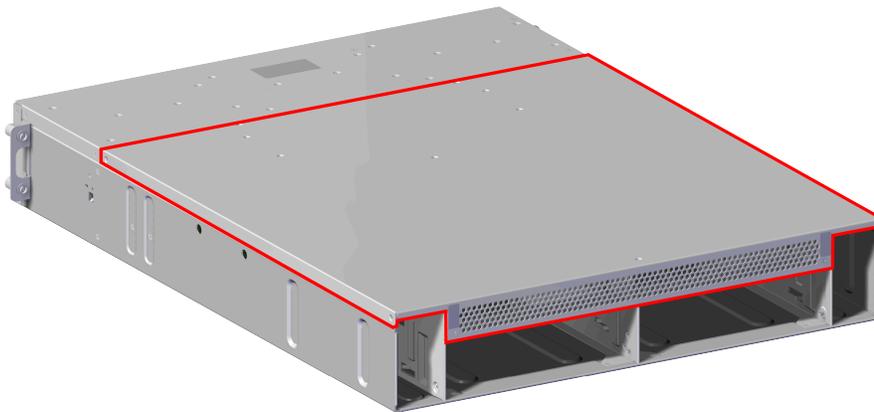
Step 15: Carefully place the enclosure on a sturdy ESD safe surface.

Figure 73: Chassis on an ESD Safe Table



Step 16: Uninstall the Chassis cover.

Figure 74: Chassis Cover Location



- a. Using a T7 Torx screwdriver, remove the eight (8) screws from the top of the Chassis cover.

Figure 75: Top Chassis Cover Screw Locations

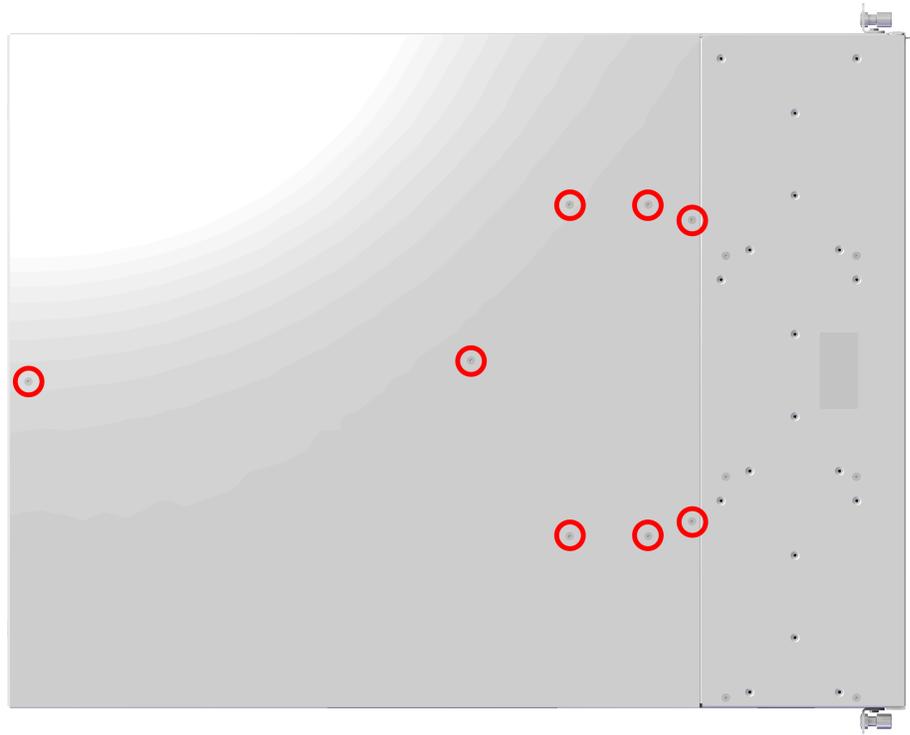
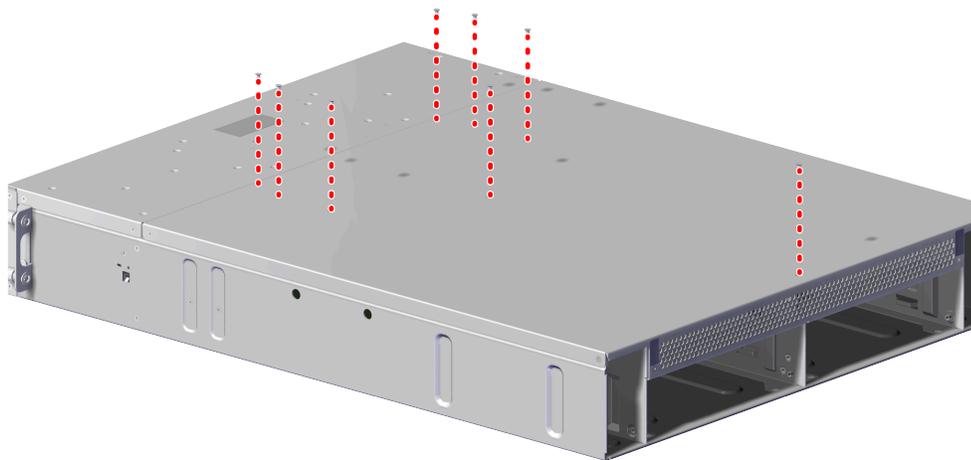
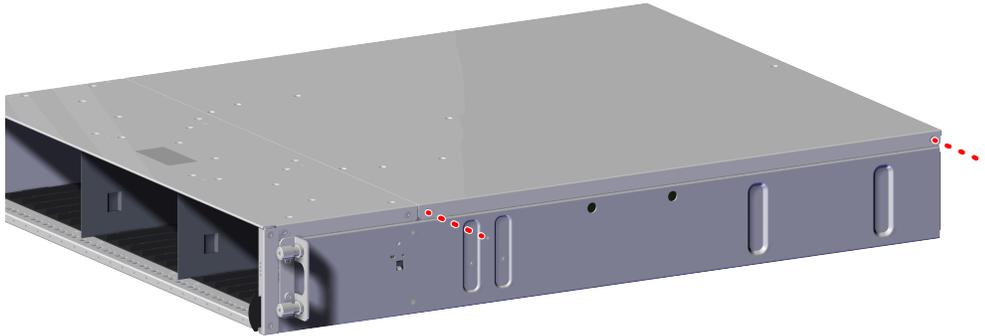


Figure 76: Remove Top Chassis Cover Screws



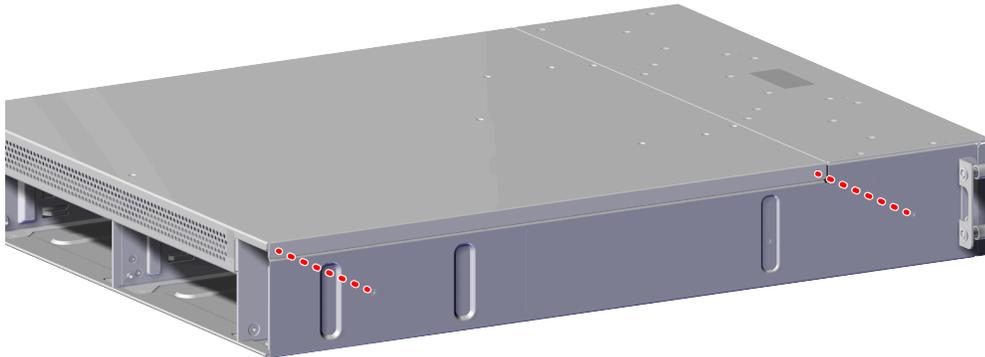
- b.** Using a T7 Torx screwdriver, remove the two (2) screws from the right side of the Chassis cover.

Figure 77: Right Chassis Cover Screw Locations



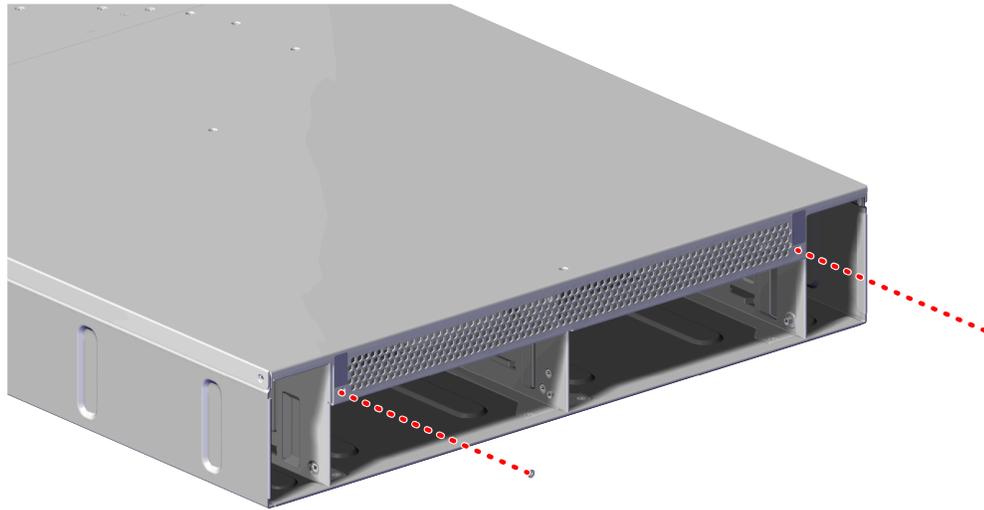
- c. Using a T7 Torx screwdriver, remove the two (2) screws from the left side of the Chassis cover.

Figure 78: Left Chassis Cover Screw Locations



- d. From the rear of the Chassis, using a T7 Torx screwdriver, remove the two (2) screws positioned just over the outer edge of each IOM bays.

Figure 79: Rear Chassis Cover Screw Locations



- e. Carefully lift the end of the cover closest to the drive bay to about 15 degrees and slide the Chassis cover toward the rear of the Chassis until it is free of the Chassis.

Figure 80: Slide Off the Rear Chassis Cover

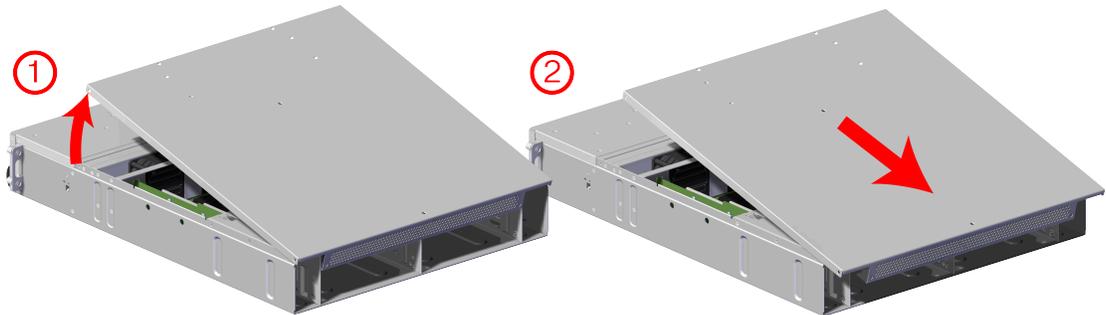
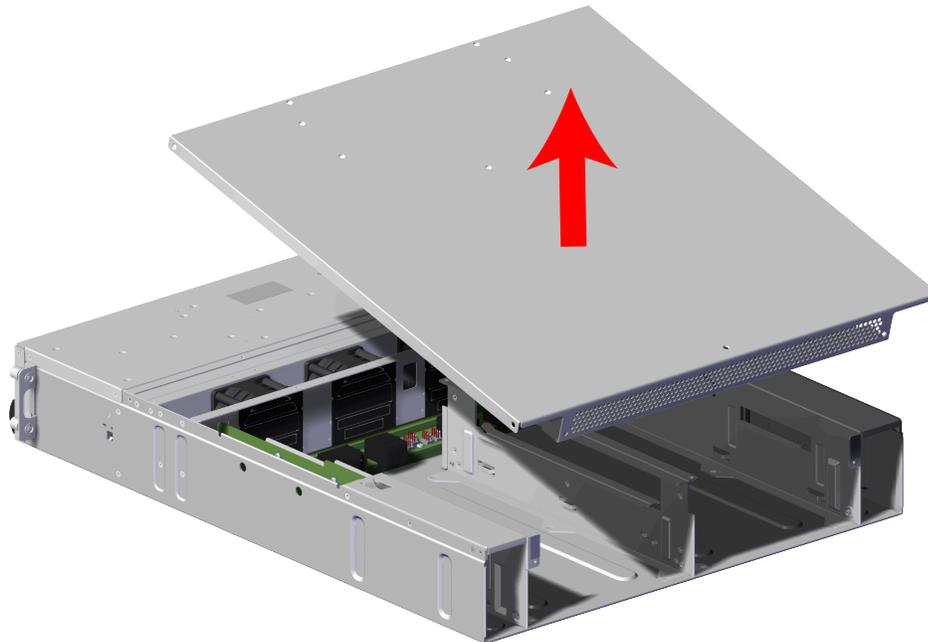


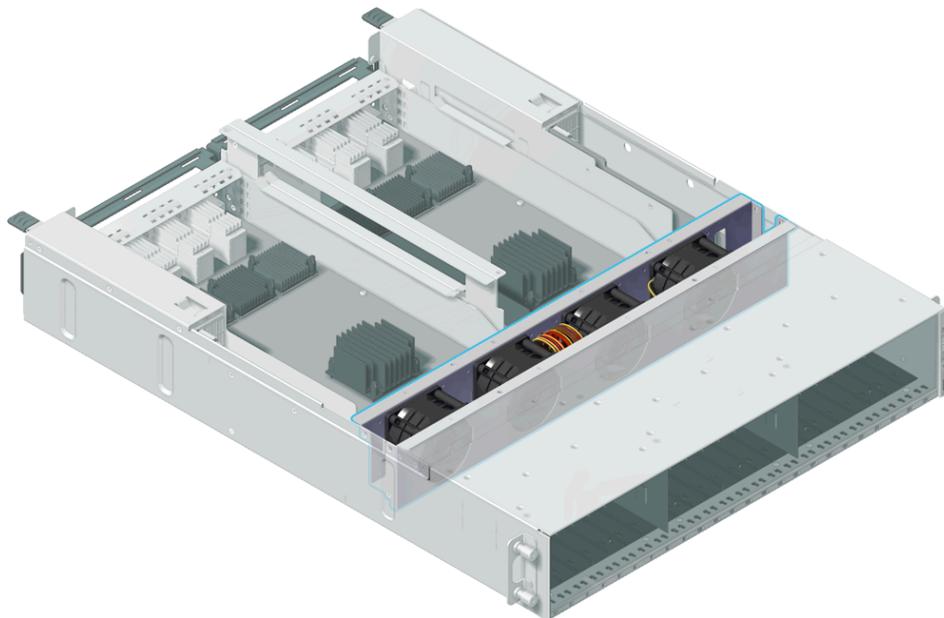
Figure 81: Removing the Rear Chassis Cover



Step 17: Locate the System Fan in need of replacement.

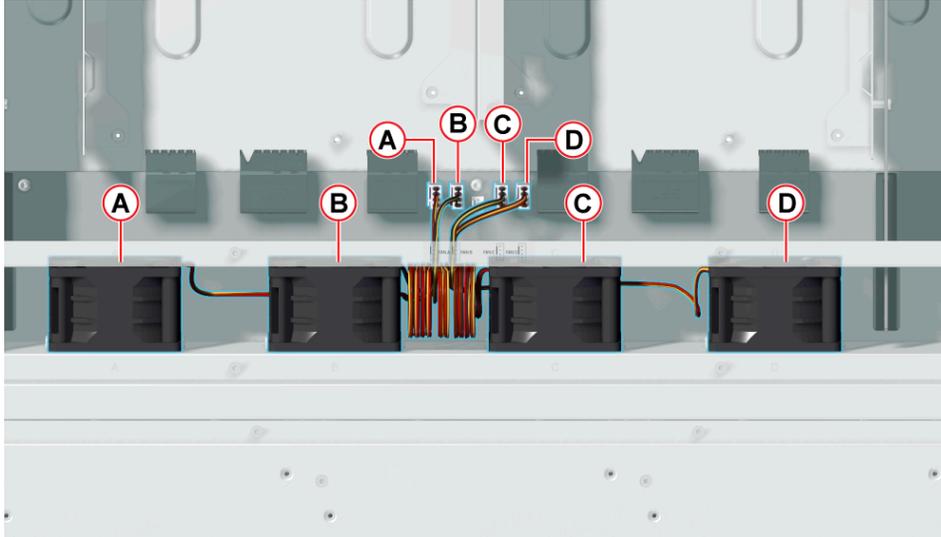
- a. Find the System Fan location by discovering the letter indicated in the system management. The fan bay is labeled A through D.

Figure 82: Locating the System Fan



- b. Once the System Fan is located, find the System Fan connector. This can be done by locating the same position order as the fan module being replaced. For example, fan module A is located on the far left and the coinciding connector is on the far left and so on.

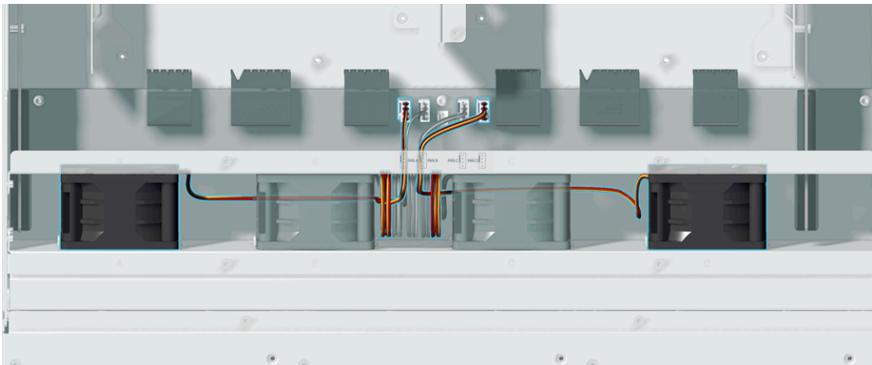
Figure 83: Locating the System Fan Connector



Step 18: Uninstall the System Fan.

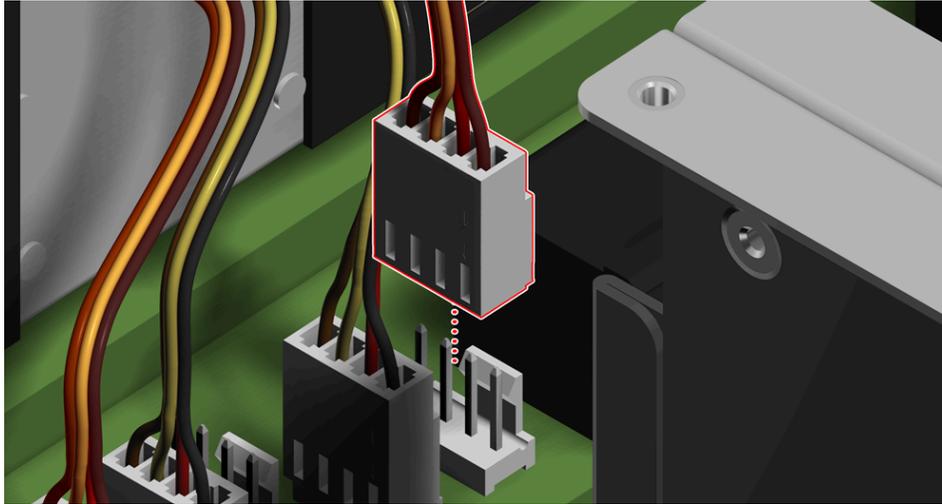
-  **Attention:** Before uninstalling the System Fan from the fan bay, take note of how the cables are run through the fan bay. The fan module cable may run under the fan module depending on the position.

Figure 84: Fan Bay Layout



- a. Disconnect the System Fan connector from the horizontal midplane by carefully pulling on the System Fan connector until it is disconnected from the horizontal midplane.

Figure 85: Disconnect the System Fan Connector



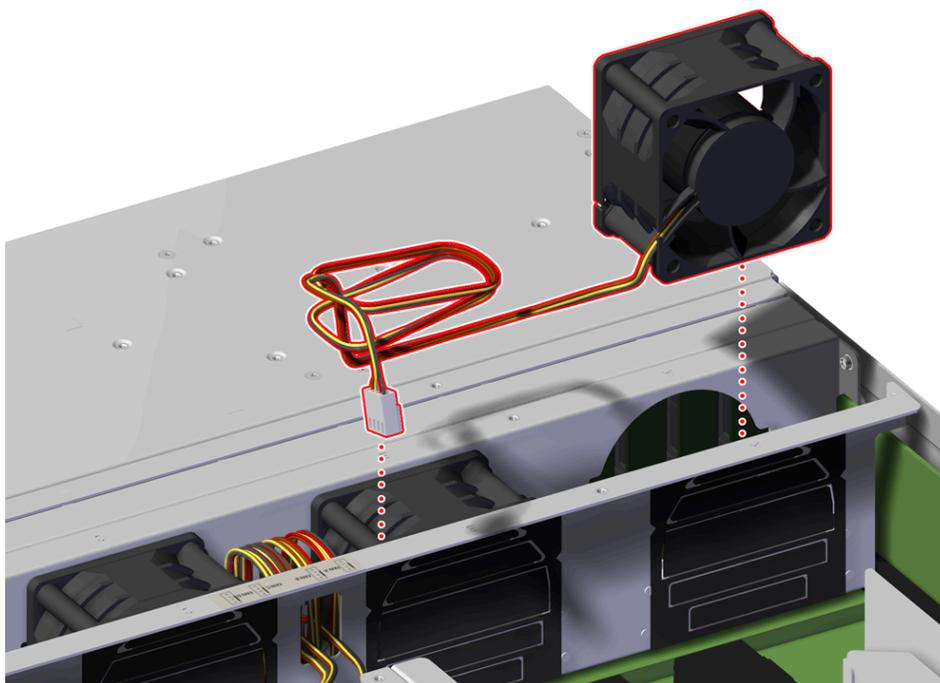
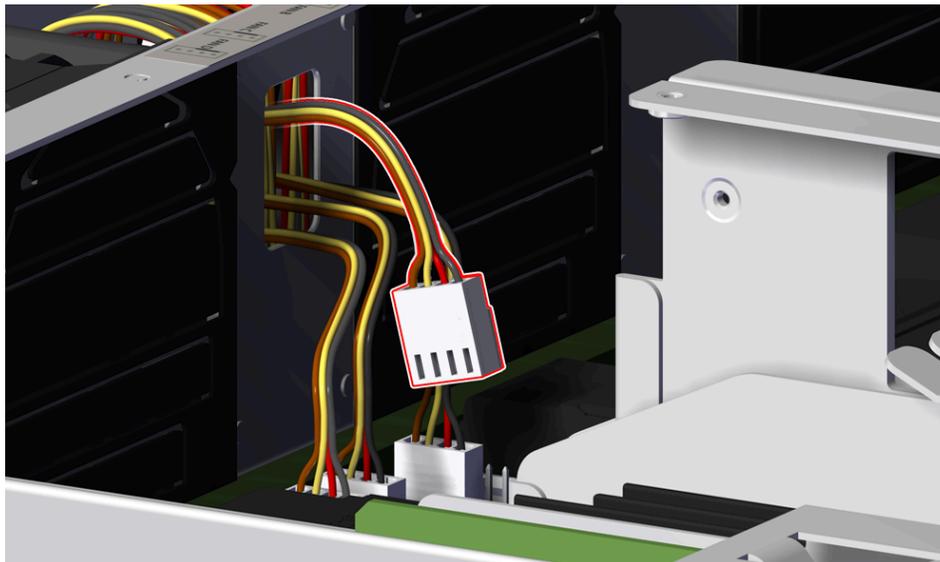
Note: The System Fan cable may run under another System Fan. If this occurs, you may pull the System Fan that is in the way partially out of the fan bay so that it may have proper clearance for the cable and connector.

Figure 86: System Fan Cable Clearance



- b.** Grip the edges of the System Fan and pull it from the fan bay while feeding the cable through the cutout on the fan bay.

Figure 87: Remove the System Fan from the Fan Bay



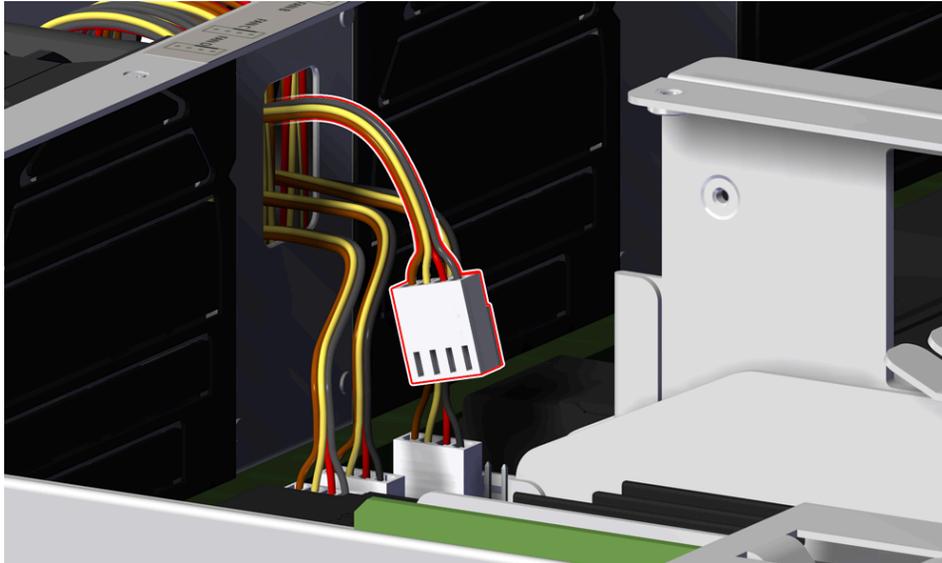
Step 19: Unpack and inspect the new System Fan for damage.

- a.** Inspect the packaging that the System Fan replacement was shipped in and record any damage to the box. Large cuts, open boxes, and crushed corners should be reported.
- b.** Remove the System Fan from the packaging and verify that there is no damage to the System Fan. Dents, scratches, and broken parts should be reported. If major damage has occurred to the System Fan, DO NOT use the replacement part.

Step 20: Install the System Fan.

- a. Feed the connector end of the System Fan cable through the cutout on the fan bay.

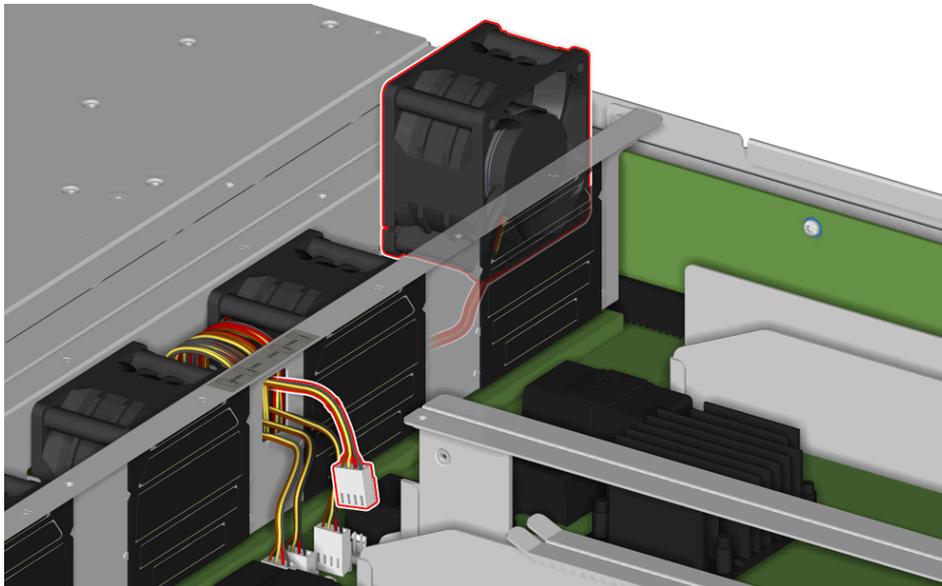
Figure 88: System Fan Connector Feed (Start)



Note: The System Fan cable may run under another System Fan. If this occurs, you may pull the System Fan that is in the way partially out of the fan bay so that it may have proper clearance to feed the cable and connector through the fan bay.

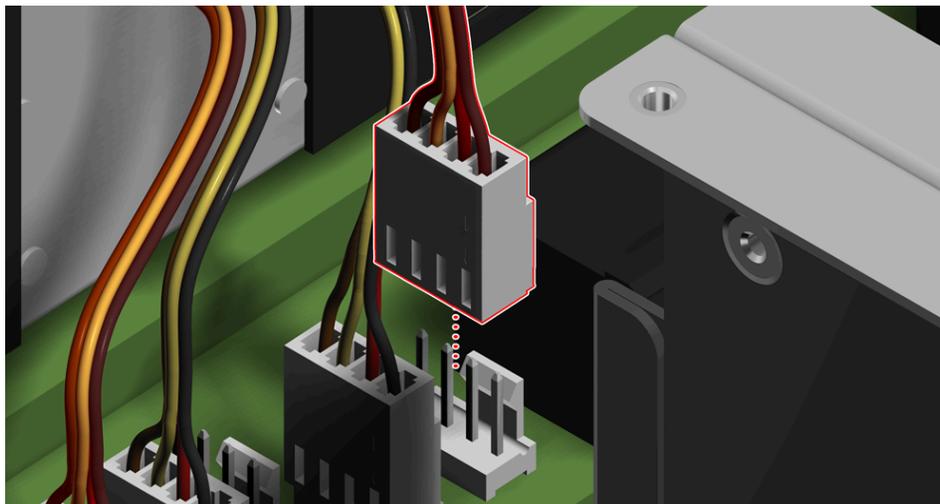
- b. Begin to seat the System Fan into the fan bay while continuing to feed the cable through the fan bay cutout.

Figure 89: System Fan Connector Feed (Continue)



- c. Set the System Fan taking care to not allow the cable to get bunched up under the System Fan.
- d. Seat the System Fan connector to the board by carefully pushing down on the System Fan connector until it is secured to the horizontal midplane.

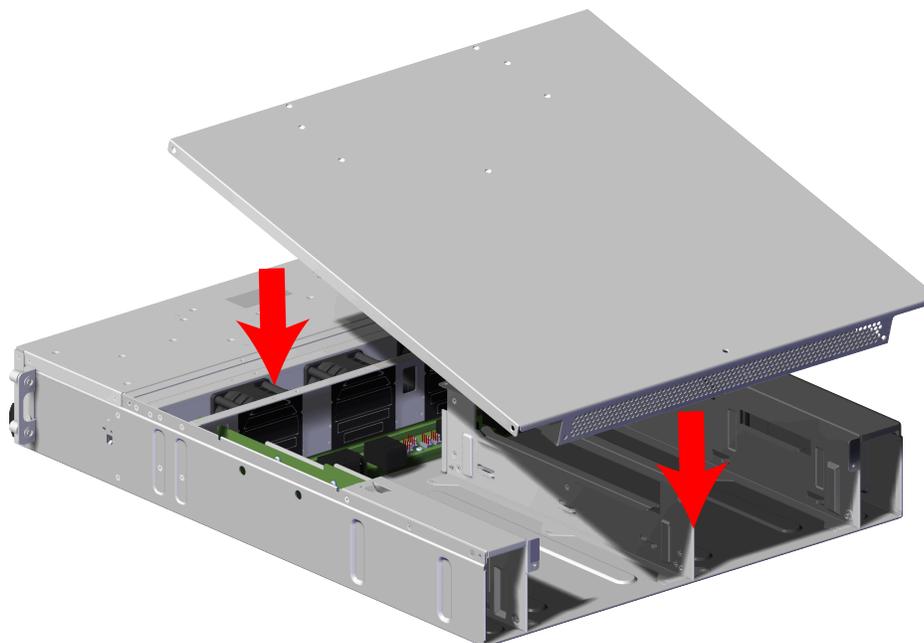
Figure 90: Seat the System Fan Connector on the Horizontal Midplane



Step 21: Install the Chassis cover.

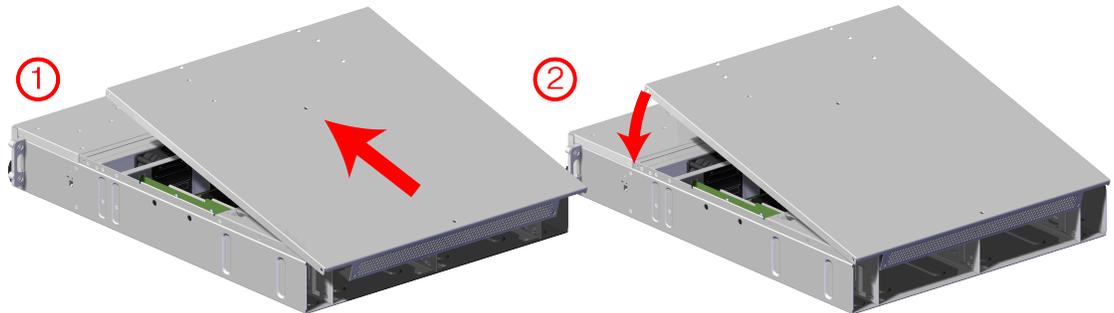
- a. Carefully slide the end of the cover under the tabs located above the IOM bays on the Chassis toward the front of the enclosure at about a 15 degree angle.

Figure 91: Aligning the Chassis Cover



- b. Once the cover has cleared the tabs above the IOM bays, rotate the front part of the cover down to seat it into place over the Chassis.

Figure 92: Seating the Chassis Cover



- c. Using a T7 Torx screwdriver, install the eight (8) screws on the top the Chassis cover.

Figure 93: Top Chassis Cover Screw Locations

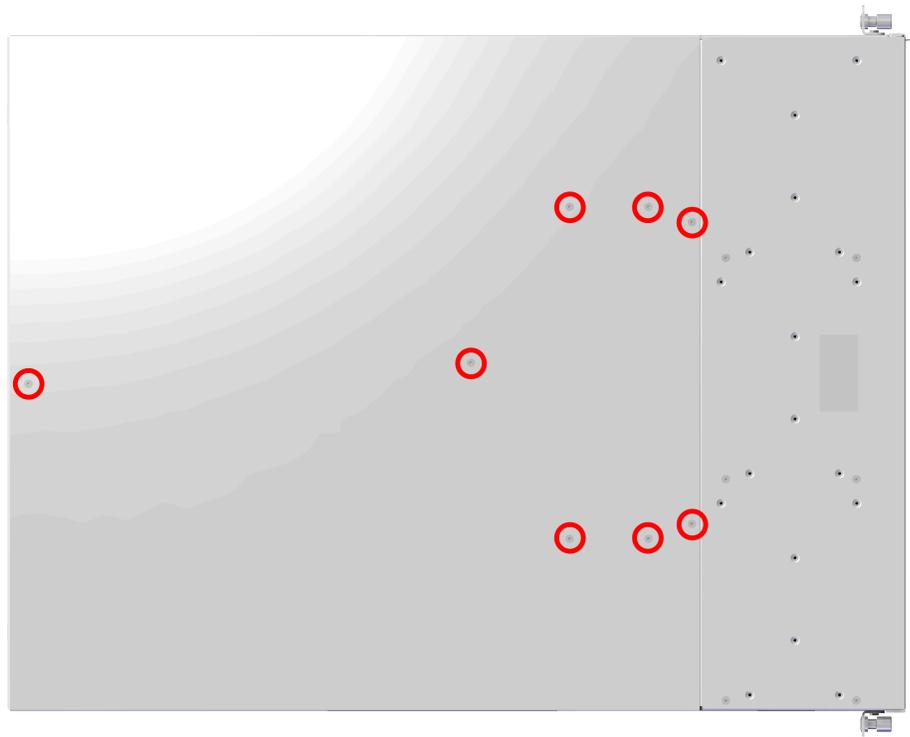
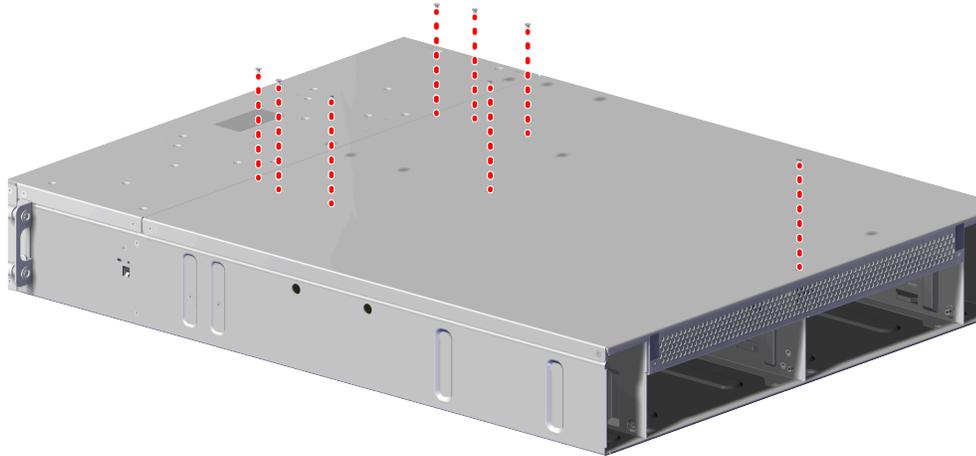
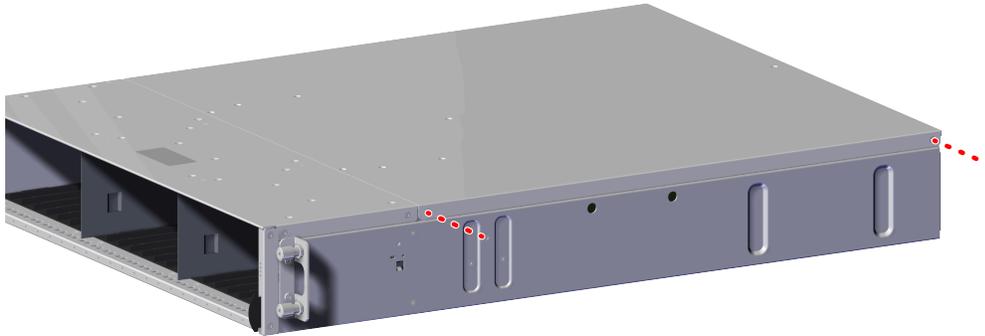


Figure 94: Install Top Chassis Cover Screws



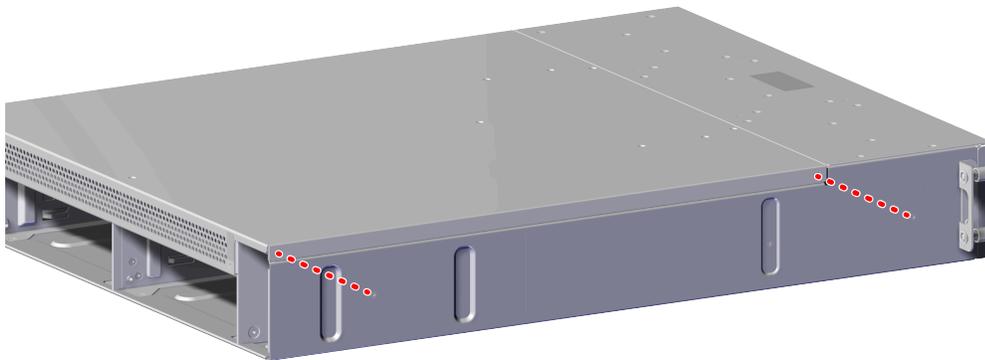
- d. Using a T7 Torx screwdriver, install the two (2) screws on the right side of the Chassis cover.

Figure 95: Right Chassis Cover Screw Locations



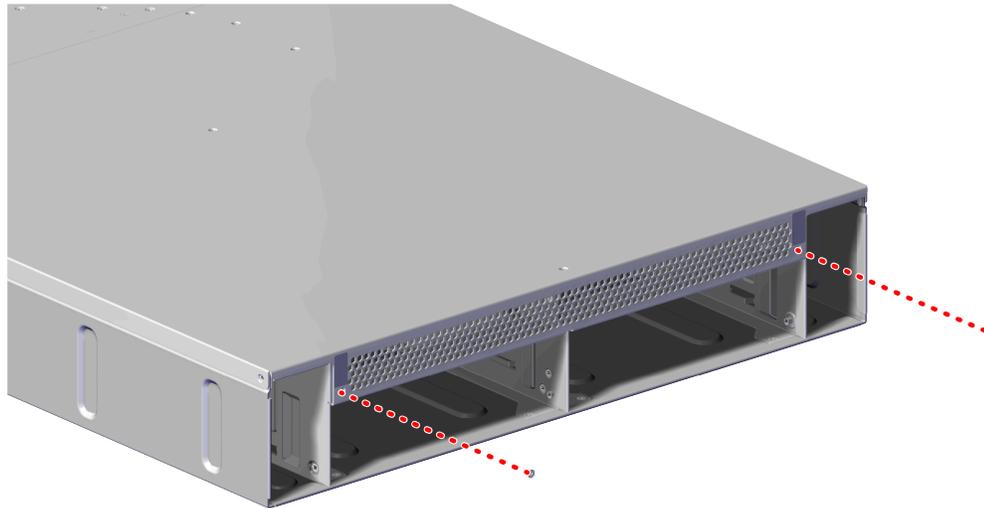
- e. Using a T7 Torx screwdriver, install the two (2) screws on the left side of the Chassis cover.

Figure 96: Left Chassis Cover Screw Locations



- f. From the rear of the Chassis, using a T7 Torx screwdriver, install the two (2) screws positioned just over the outer edge of each IOM bays.

Figure 97: Rear Chassis Cover Screw Locations



Step 22: Install the Chassis onto the rack mounted rails.

- a. Carefully slide the Chassis onto the rails until the rack mounts are flush with the mounts on the rails.

Figure 98: Chassis Installation

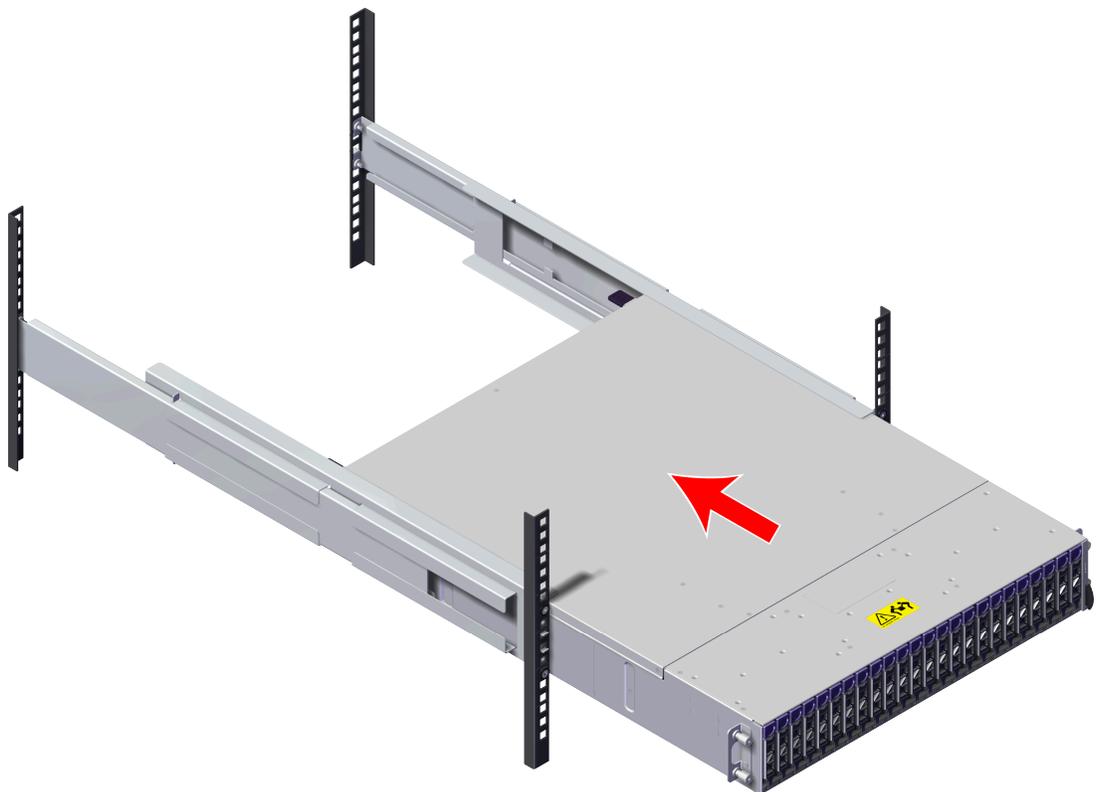
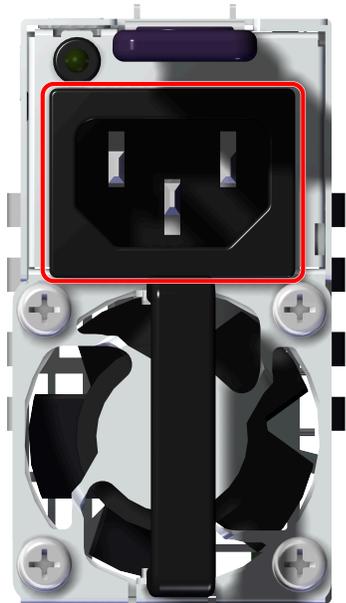
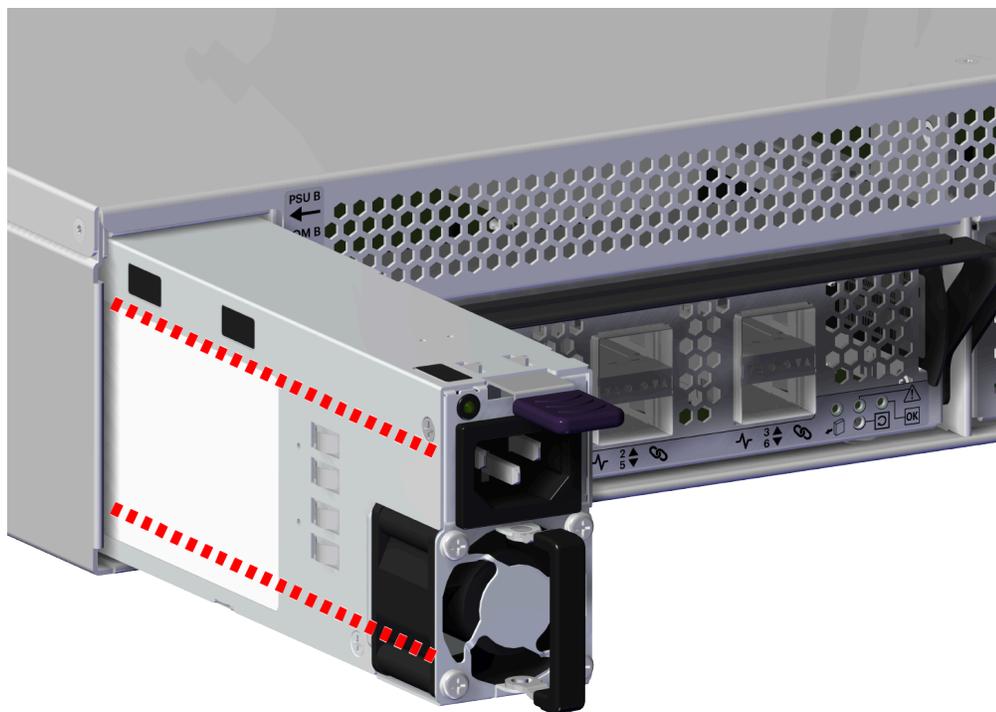


Figure 101: Power Port Location



- b. Carefully push the PSU into the PSU slot.

Figure 102: PSU Installation



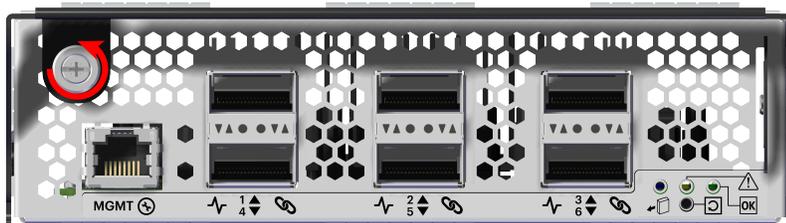
- c. Verify that the PSU is fully seated and latched into the PSU slot by gently pulling on the handle.

Step 24: Repeat the previous step to install the remaining PSU.

Step 25: Install the IOM into the enclosure.

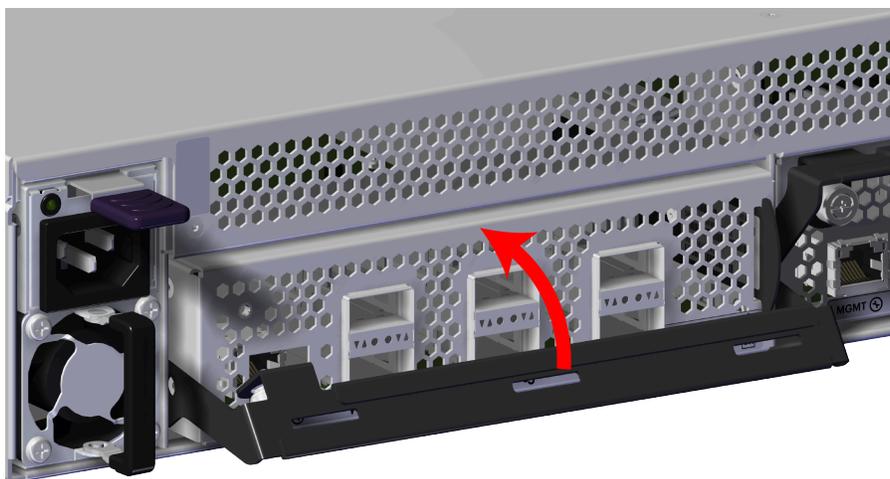
- a. Unlock the IOM by turning the thumbscrew counterclockwise until the screw threads are not engaged any longer. The location of the thumbscrew is shown in the following image.

Figure 103: Prepare IOM



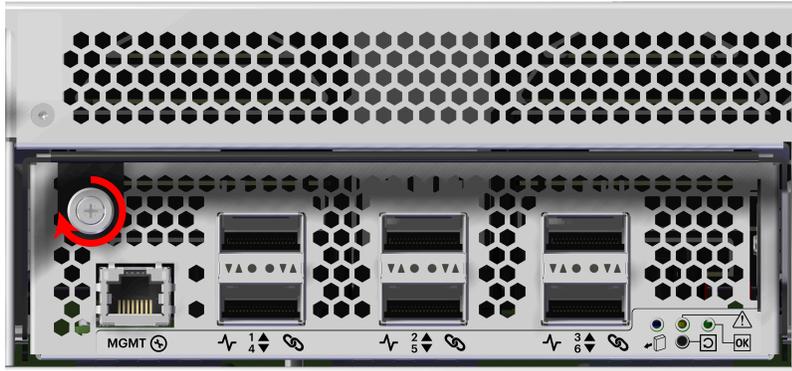
- b. Gently slide the IOM into the IOM slot until the release handle is engaged with the Chassis. When the handle lifts up slightly, it is an indicator that the release handle is engaged with the Chassis.

Figure 104: IOM Handle Engaged



- c. Press the release handle into the IOM and secure it in place by turning the thumbscrew clockwise until it is tight.

Figure 105: IOM Secure



- d. Verify that the IOM is securely latched into the Chassis by pulling on the release handle and ensuring the IOM does not move when pulled. Reinstall the IOM if it is not securely installed into the Chassis.

Step 26: Repeat the previous step to install the remaining IOM.

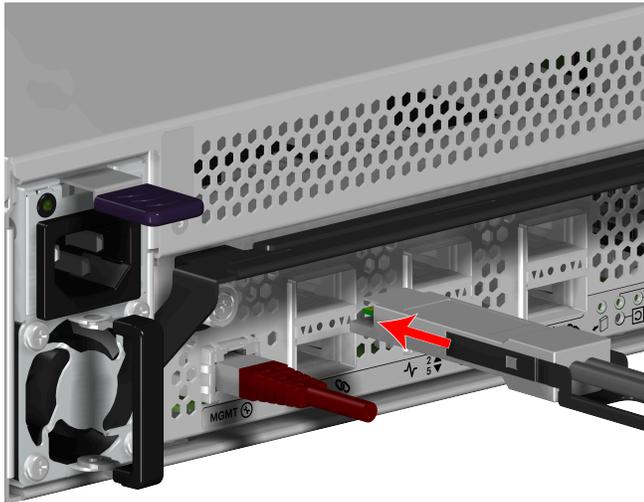
Step 27: Connect the Ethernet cable into the Ethernet Management port on the IOM.

Figure 106: Connect Ethernet Cable



Step 28: Repeat the previous step to install the remaining Ethernet cable.

Step 29: Connect the QSFP28 cable to the IOM to the QSFP the port.

Figure 107: Connect QSFP28 Cable

Step 30: Repeat the previous step to install the remaining QSFP28 cable(s).

Step 31: Connect the power cable to the PSU.

- a. Plug the power cable into the PSU power port.

Figure 108: Connect Power Cable

- b. Secure the power cable to the PSU by wrapping the hook and loop strap around the power cable.

Step 32: Repeat the previous step to install the remaining power cable.

Result: The System Fan has now been replaced.

3.7 Chassis Replacement

This procedure supports the replacement of the Chassis.

Replacement Requirements		
Personnel Required		1
Average Replacement Time		60 minutes
Tool	# Needed	Required vs. Optional
T15 Torx screwdriver	1	Required

Safety List

- ESD Sensitive
- Electric Shock
- Team Lift Recommended

Step 1: Move to the rear of the rack.

Step 2: Disconnect the power cable from the PSU.

- Remove the hook and loop strap that secures the power cable to the PSU.
- Disconnect the power cable from the PSU power port.

Figure 109: Disconnect Power Cable

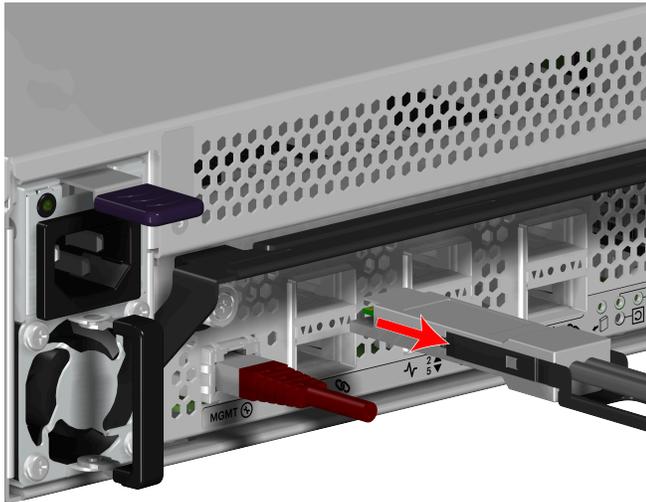


Step 3: Repeat the previous step to uninstall the remaining power cable.

Step 4: Record the QSFP28 cable connections for each port.

Step 5: Disconnect the QSFP28 cable from the IOM by pulling on the release tab and removing the cable from the port.

Figure 110: Disconnect QSFP28 Cable



Step 6: Repeat the previous step to uninstall the remaining QSFP28 cable(s).

Step 7: Disconnect the Ethernet cable from the IOM Ethernet Management port.

Figure 111: Disconnect Ethernet Cable



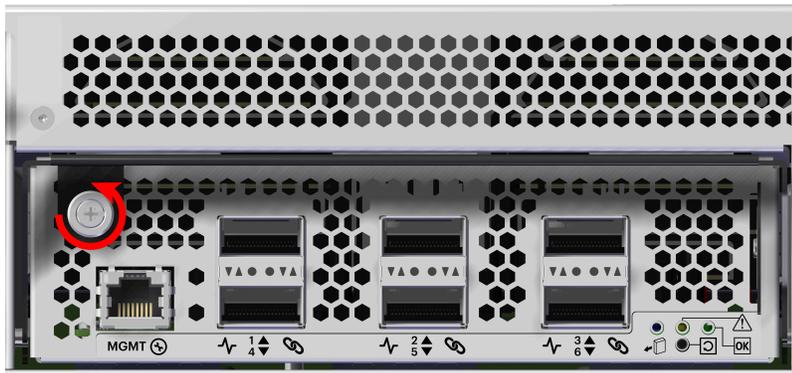
Step 8: Repeat the previous step to uninstall the remaining Ethernet cable.

Step 9: Record the IOM location to ensure they are installed into the same IOM bay.

Step 10: Uninstall the IOM from the enclosure.

- a. Unlock the IOM by turning the thumbscrew counterclockwise until the screw threads are no longer engaged any longer. The location of the thumbscrew is shown in the following image. A screwdriver may be used if desired.

Figure 112: IOM Thumbscrew Operation



- b. Pull the release handle down until the IOM is unseated and can be removed from the IOM slot.

Figure 113: IOM Release Handle Operation

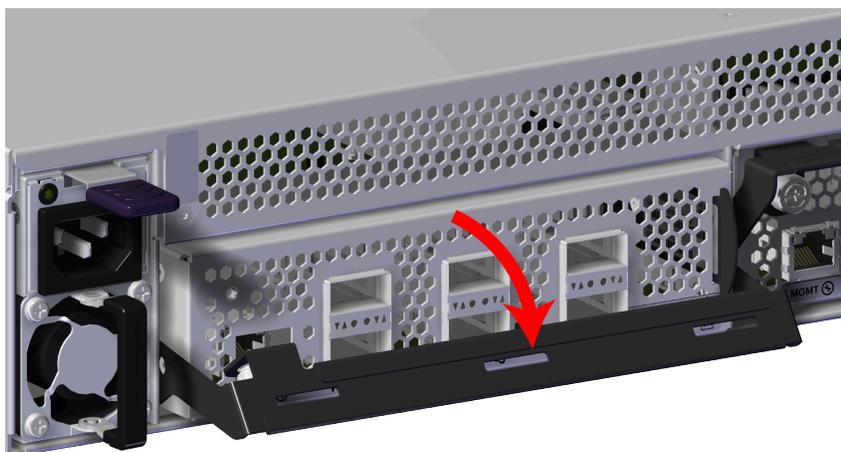
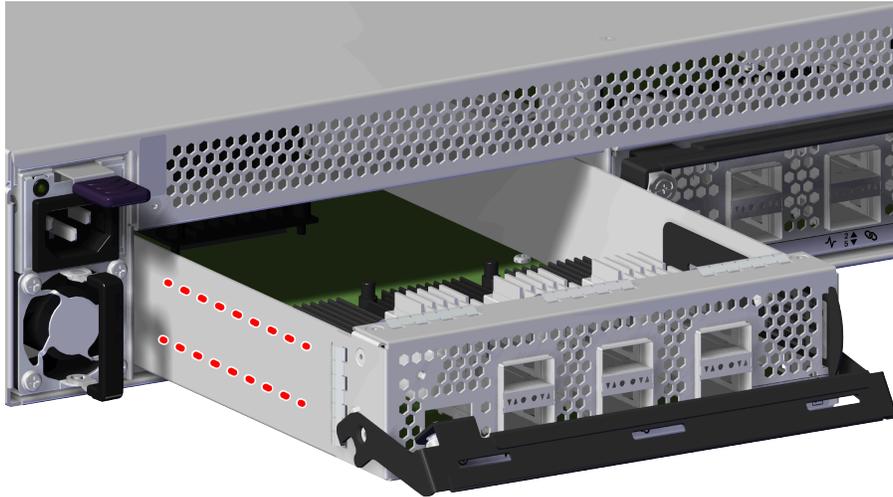


Figure 114: Uninstall IOM

Step 11: Repeat the previous step to uninstall the remaining IOM.

Step 12: Ensure that the IOMs are placed on a sturdy ESD safe surface.

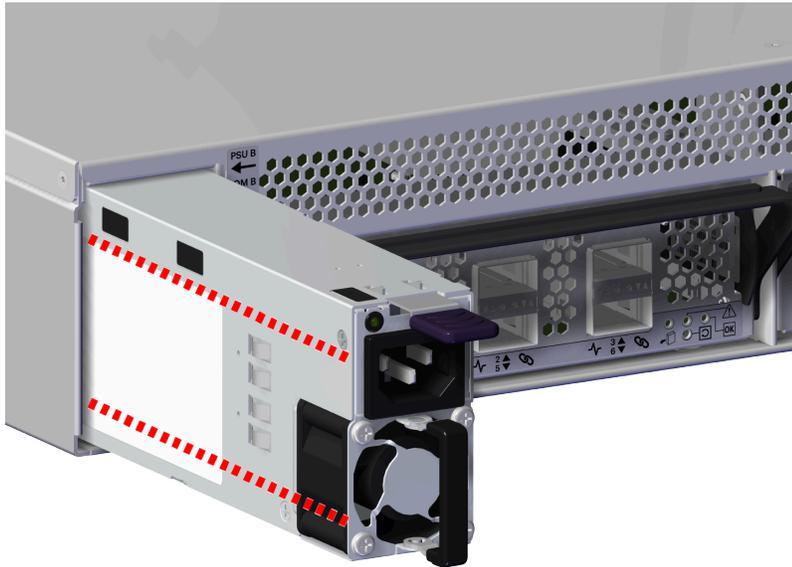
Step 13: Uninstall the PSU from the enclosure.

- a. From the rear of the rack, grasp the ring handle with your index finger and use your thumb to press the latch release using a pinching motion.

Figure 115: PSU Release Latch Operation

- b. Carefully pull the PSU out of the PSU slot.

Figure 116: Uninstall PSU



Step 14: Repeat the previous step to uninstall the remaining PSU.

Step 15: Ensure that the PSUs are placed on a sturdy ESD safe surface.

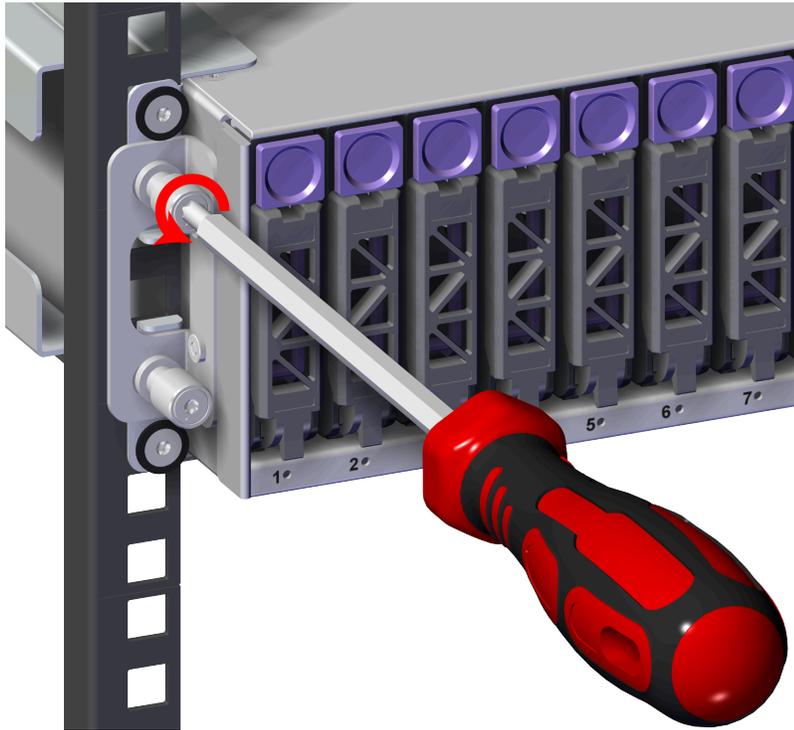
Step 16: Uninstall the Chassis from the rack mounted rails.

- a. From the front of the rack, using the T15 Torx screwdriver, loosen the two Torx captive screws that secure the Chassis to the rail. Repeat this step to loosen the two Torx captive screws that secure the Chassis to the remaining rail. The location of the captive screws are shown in the following image.

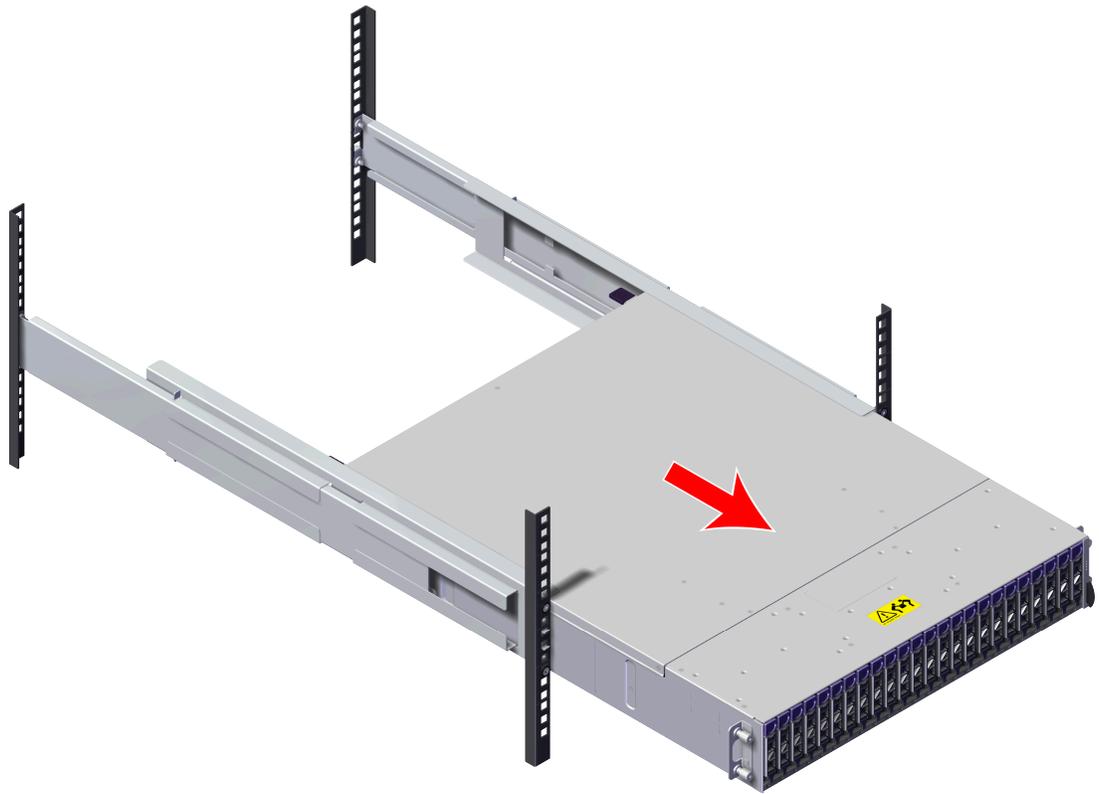
Figure 117: Captive Screw Location



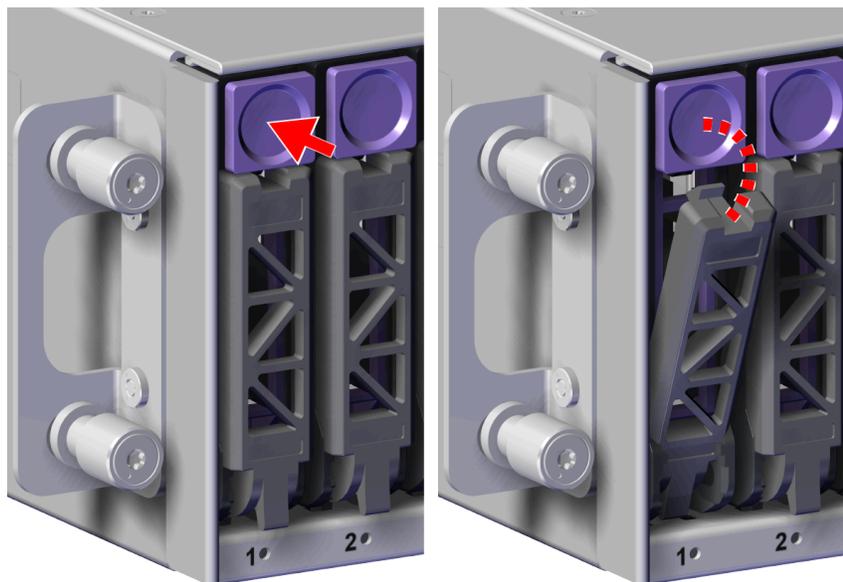
Figure 118: Captive Screw Loosen



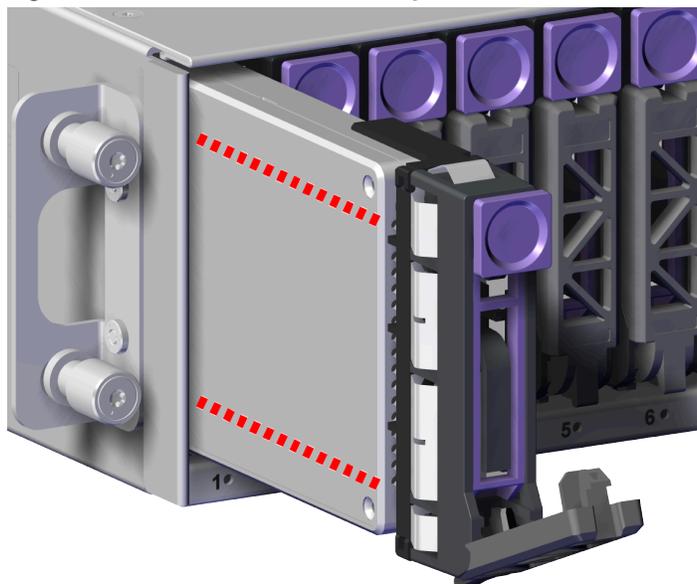
- b.** Carefully pull the Chassis out of the rack and ensure extra care is taken to support the weight of the Chassis when the Chassis is clear of the rack mount rails.

Figure 119: Uninstall Chassis

- Step 17:** Record the order of each Drive Assembly in order to ensure the drives are reinstalled in the same order.
- Step 18:** Uninstall the Drive Assembly from the enclosure.
- From the front of the rack, press the release button on the front of the Drive Assembly. The release handle will eject outward.

Figure 120: Drive Assembly Release Operation

- b. Use the release handle to pull the Drive Assembly out of the enclosure.

Figure 121: Uninstall Drive Assembly

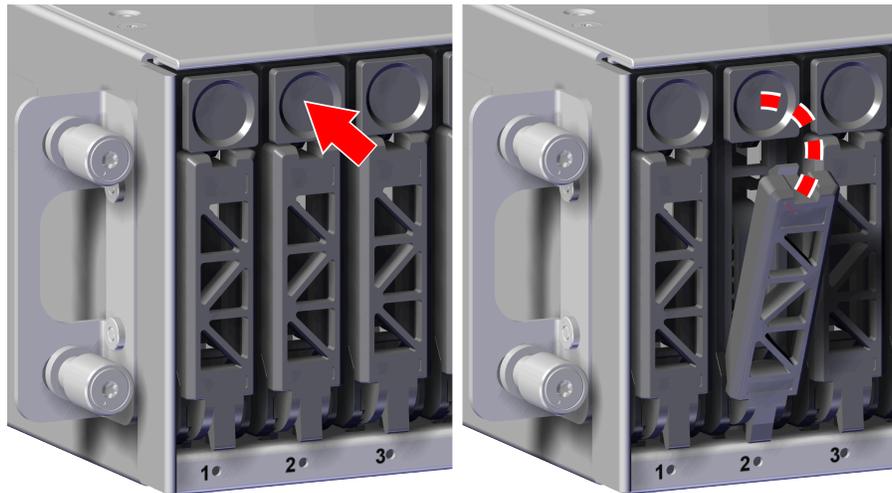
Step 19: Repeat the previous step to uninstall the remaining Drive Assemblies.

Step 20: Ensure that the Drive Assemblies are placed on a sturdy ESD safe surface.

Step 21: Optional: Uninstall the Drive Blank Assembly from the enclosure.

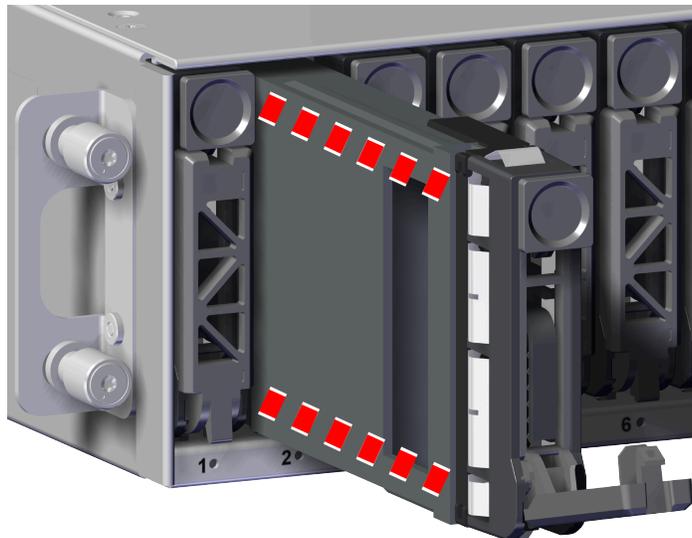
- a. From the front of the rack, press the release button on the front of the Drive Blank Assembly. The release handle will eject outward.

Figure 122: Drive Blank Assembly Release Operation



- b. Use the release handle to pull the Drive Blank Assembly out of the enclosure.

Figure 123: Uninstall Drive Blank Assembly



Step 22: Repeat the previous step to uninstall the remaining Drive Blank Assemblies.

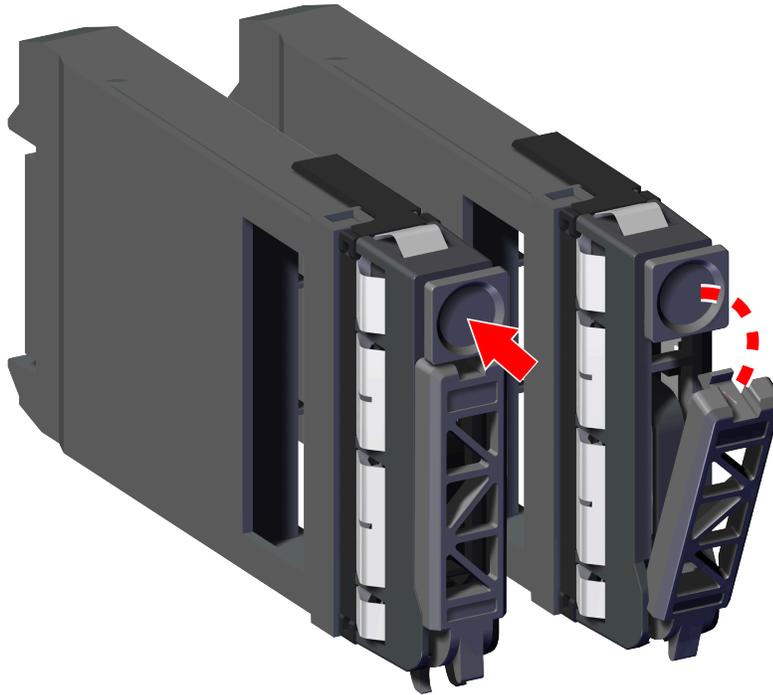
Step 23: Unpack and inspect the new Chassis for damage.

- a. Inspect the packaging that the Chassis replacement was shipped in and record any damage to the box. Large cuts, open boxes, and crushed corners should be reported.
- b. Remove the Chassis from the packaging and verify that there is no damage to the Chassis. Dents, scratches, and broken parts should be reported. If major damage has occurred to the Chassis, DO NOT use the replacement part.

Step 24: Optional: Install the Drive Blank Assembly into the enclosure.

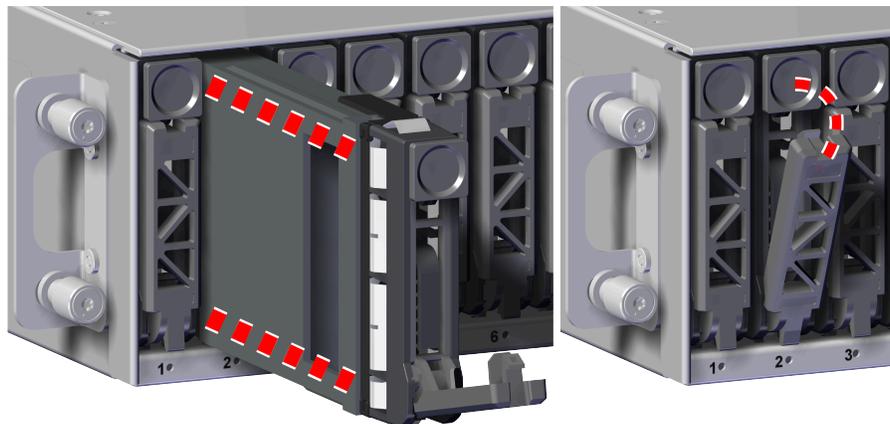
- a. Prepare the Drive Blank Assembly for installation by pressing the release button on the front of the Drive Blank Assembly. The release handle will eject outward.

Figure 124: Drive Blank Assembly Release Operation



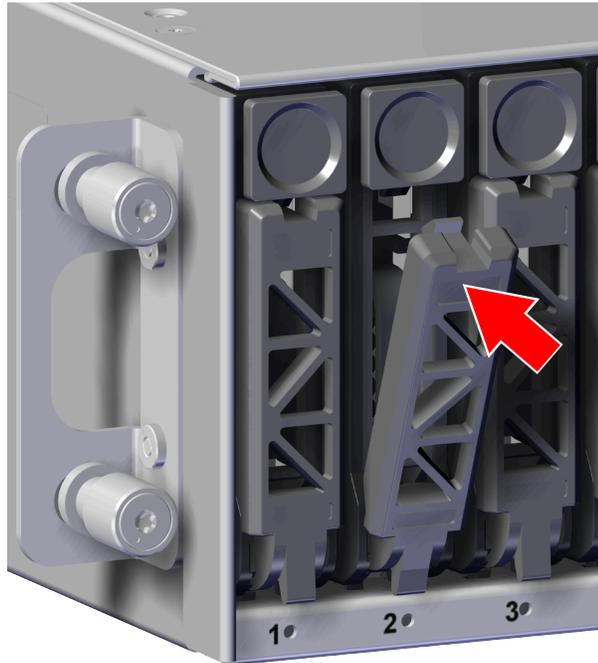
- b. From the front of the rack, gently slide the Drive Blank Assembly into the Drive Blank Assembly slot until the release handle lifts up slightly, indicating that it is engaged with the Chassis.

Figure 125: Drive Blank Assembly Latch Engaged



- c. Rotate the release handle up and press it into the Drive Blank Assembly to secure it into the slot. When it is fully installed the user will feel the handle snap and lock into place.

Figure 126: Drive Blank Assembly Installation



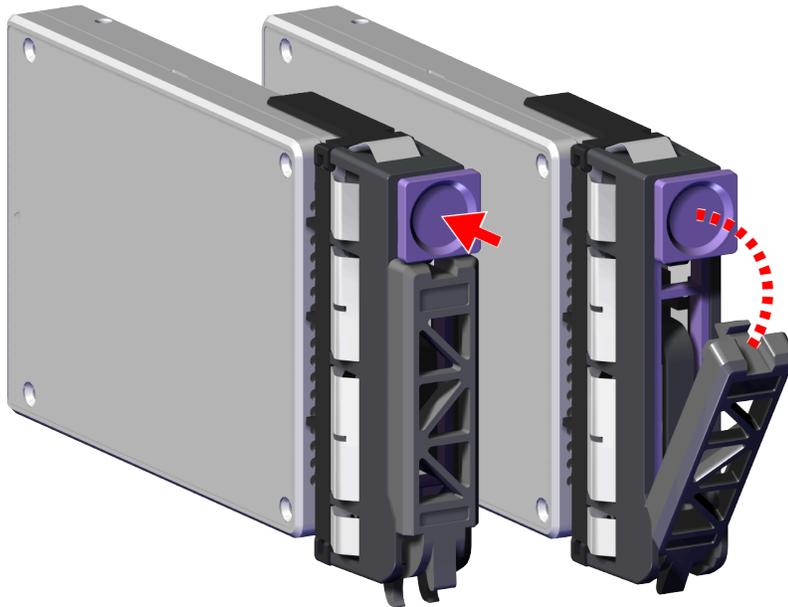
Step 25: Repeat the previous step to install the remaining Drive Blank Assemblies.

Step 26: Refer to the Drive Assembly list that was recorded earlier to ensure the drives are reinstalled in the same order.

Step 27: Install the Drive Assembly into the enclosure.

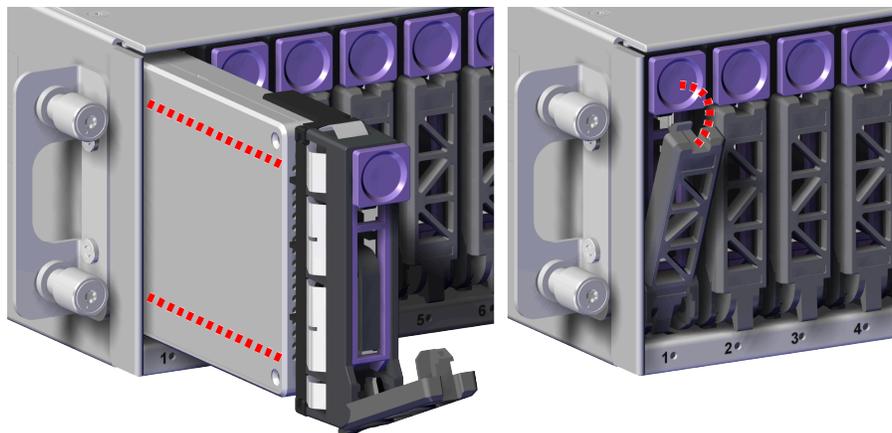
- a. Prepare the Drive Assembly for installation by pressing the release button on the front of the Drive Assembly. The release handle will eject outward.

Figure 127: Drive Assembly Release Operation



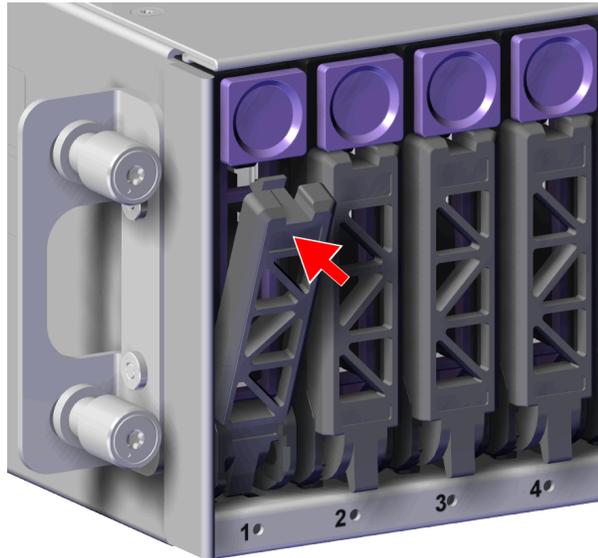
- b. From the front of the rack, gently slide the Drive Assembly into the Drive Assembly slot until the release handle lifts up slightly, indicating that it is engaged with the Chassis.

Figure 128: Drive Assembly Latch Engaged



- c. Rotate the release handle up and press it into the Drive Assembly to secure it into the slot. When it is fully installed the user will feel the handle snap and lock into place.

Figure 129: Drive Assembly Installation

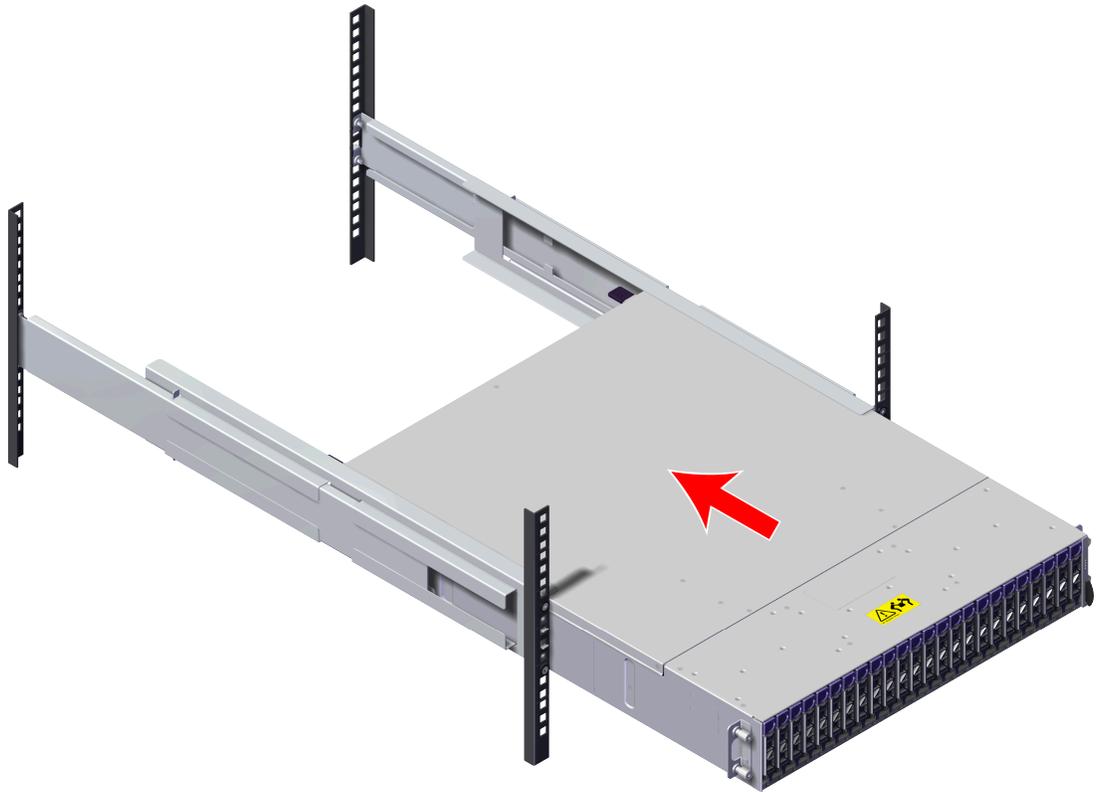


Step 28: Repeat the previous step to install the remaining Drive Assemblies.

Step 29: Install the Chassis onto the rack mounted rails.

- a. Carefully slide the Chassis onto the rails until the rack mounts are flush with the mounts on the rails.

Figure 130: Chassis Installation



- b.** Using the T15 Torx screwdriver, tighten the two Torx captive screws to secure the Chassis to the rail. Repeat this step to secure the remaining rack mount to the remaining rail.

Figure 131: Captive Screws Tighten

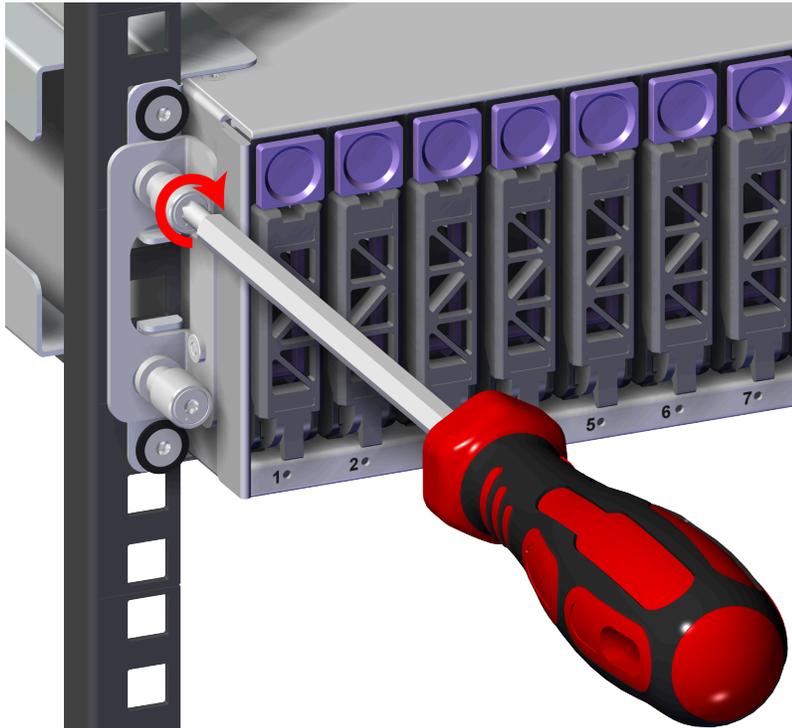
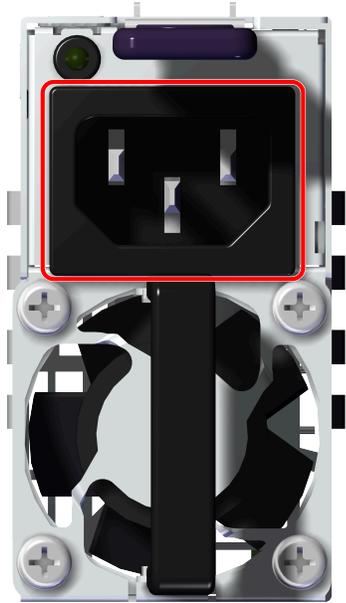


Figure 132: Captive Screw Location

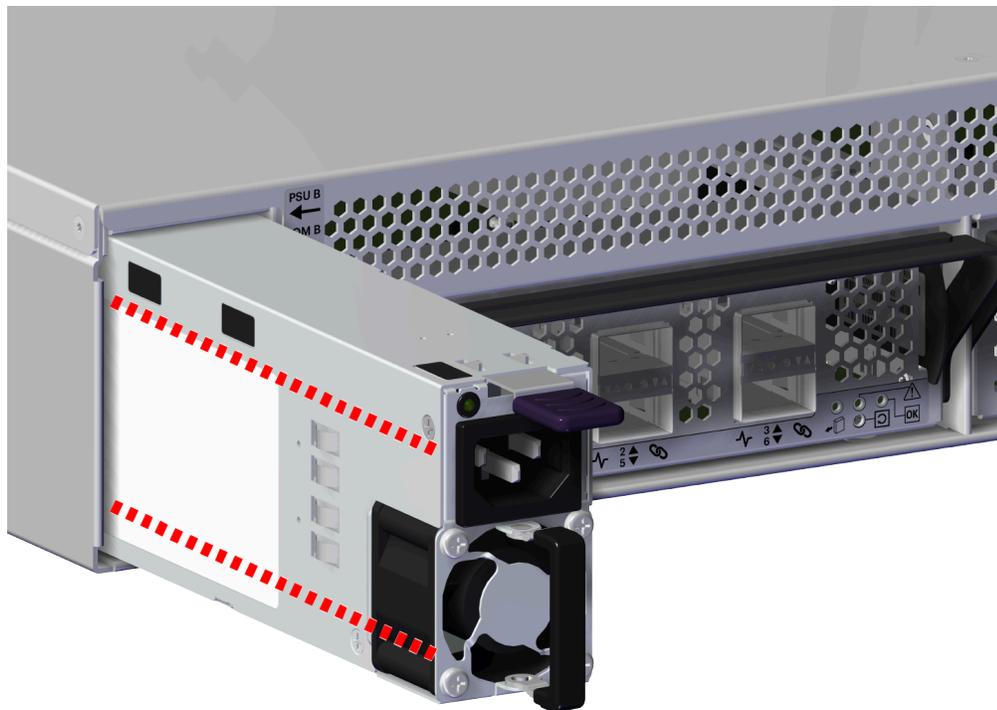


Step 30: Install the PSU into the enclosure.

- a. Orient the PSU with the power port located on the top and insert it into the PSU slot. The location of the power port is shown in the following image.

Figure 133: Power Port Location

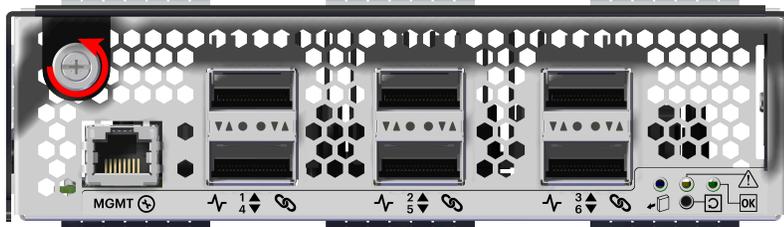
- b. Carefully push the PSU into the PSU slot.

Figure 134: PSU Installation

- c. Verify that the PSU is fully seated and latched into the PSU slot by gently pulling on the handle.

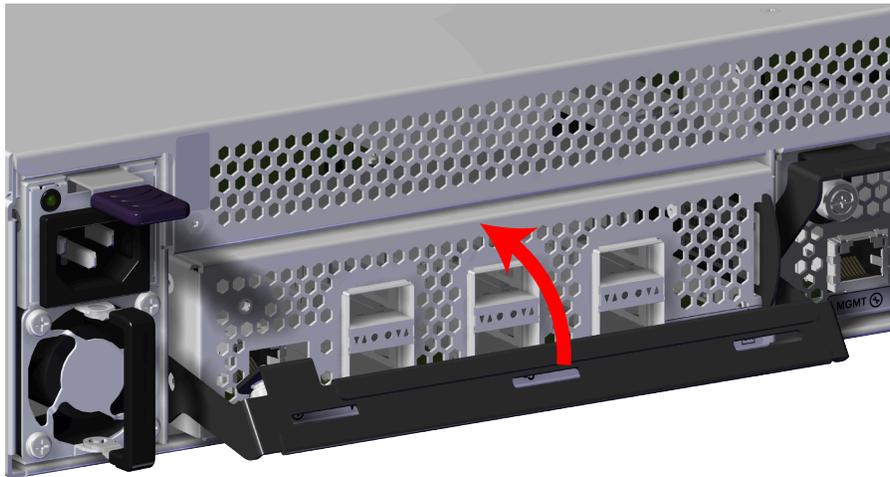
- Step 31:** Repeat the previous step to install the remaining PSU.
- Step 32:** Refer to the IOM list that was recorded earlier to ensure the IOMs are reinstalled in the same order as the previous configuration.
- Step 33:** Install the IOM into the enclosure.
- Unlock the IOM by turning the thumbscrew counterclockwise until the screw threads are not engaged any longer. The location of the thumbscrew is shown in the following image.

Figure 135: Prepare IOM



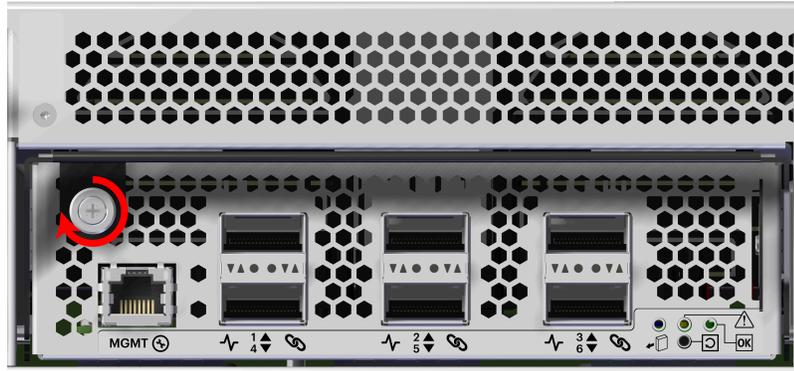
- Gently slide the IOM into the IOM slot until the release handle is engaged with the Chassis. When the handle lifts up slightly, it is an indicator that the release handle is engaged with the Chassis.

Figure 136: IOM Handle Engaged



- Press the release handle into the IOM and secure it in place by turning the thumbscrew clockwise until it is tight.

Figure 137: IOM Secure



- d. Verify that the IOM is securely latched into the Chassis by pulling on the release handle and ensuring the IOM does not move when pulled. Reinstall the IOM if it is not securely installed into the Chassis.

Step 34: Repeat the previous step to install the remaining IOM.

Step 35: Connect the Ethernet cable into the Ethernet Management port on the IOM.

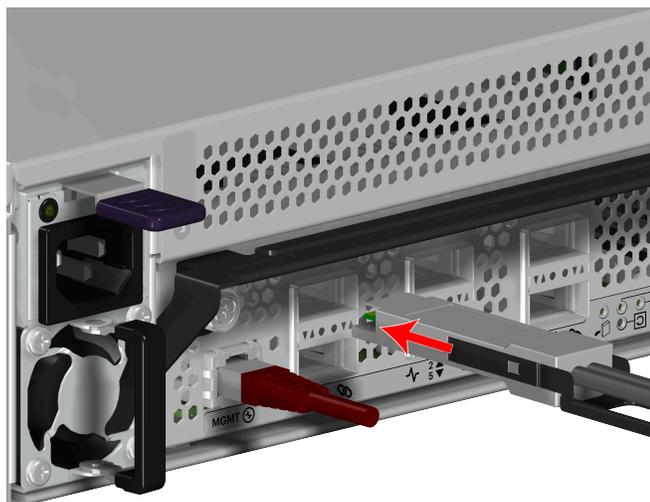
Figure 138: Connect Ethernet Cable



Step 36: Repeat the previous step to install the remaining Ethernet cable.

Step 37: Refer to the QSFP28 location connections that were recorded earlier in the replacement.

Step 38: Connect the QSFP28 cable to the IOM to the QSFP the port.

Figure 139: Connect QSFP28 Cable

Step 39: Repeat the previous step to install the remaining QSFP28 cable(s).

Step 40: Connect the power cable to the PSU.

- a. Plug the power cable into the PSU power port.

Figure 140: Connect Power Cable

- b. Secure the power cable to the PSU by wrapping the hook and loop strap around the power cable.

Step 41: Repeat the previous step to install the remaining power cable.

Result: The Chassis has now been replaced.

3.8 Power Cable Replacement

This procedure supports the replacement of the power cable. The power cable is a toolless replacement meaning that it **does not** require the use of any tools.



Attention: Power cables must be replaced one at a time.

Replacement Requirements

Personnel Required	1
Average Replacement Time	5 minutes
Service Window	5 minutes

Safety List

- Electric Shock

Step 1: Move to the rear of the rack.

Step 2: Disconnect the power cable from the PSU.

- Remove the hook and loop strap that secures the power cable to the PSU.
- Disconnect the power cable from the PSU power port.

Figure 141: Disconnect Power Cable



Step 3: Unpack and inspect the new power cable for damage.

- Inspect the packaging that the power cable replacement was shipped in and record any damage to the box. Large cuts, open boxes, and crushed corners should be reported.
- Remove the power cable from the packaging and verify that there is no damage to the power cable. Broken parts should be reported. If major damage has occurred to the power cable, DO NOT use the replacement part.

Step 4: Connect the power cable to the PSU.

- Plug the power cable into the PSU power port.

Figure 142: Connect Power Cable



- b.** Secure the power cable to the PSU by wrapping the hook and loop strap around the power cable.

Result: The power cable has now been replaced.

3.9 QSFP28 Cable Replacement

This procedure supports the replacement of the QSFP28 cable. The QSFP28 cable is a toolless replacement meaning that it **does not** require the use of any tools.



Attention: QSFP28 cables must be replaced one at a time.

Replacement Requirements

Personnel Required	1
Average Replacement Time	5 minutes
Service Window	5 minutes

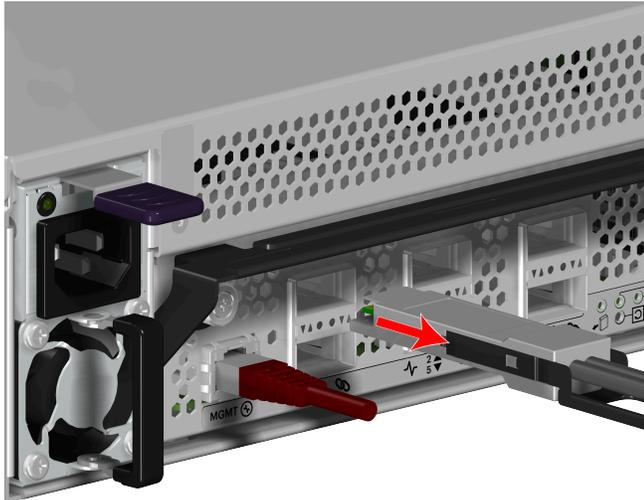
Safety List

- Electric Shock

Step 1: Move to the rear of the rack.

Step 2: Disconnect the QSFP28 cable from the IOM by pulling on the release tab and removing the cable from the port.

Figure 143: Disconnect QSFP28 Cable

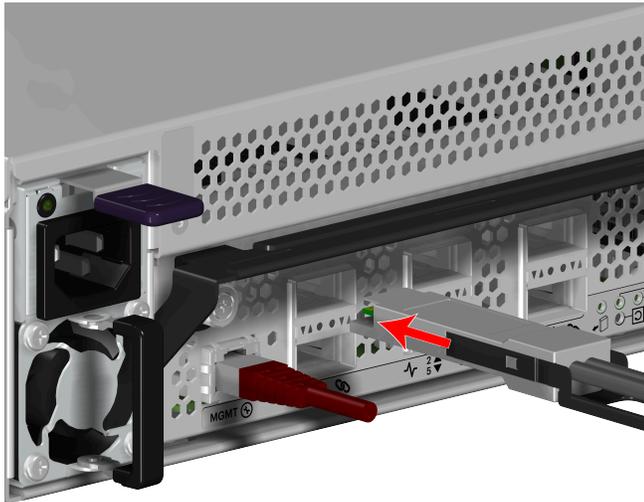


Step 3: Unpack and inspect the new QSFP28 cable for damage.

- Inspect the packaging that the QSFP28 cable replacement was shipped in and record any damage to the box. Large cuts, open boxes, and crushed corners should be reported.
- Remove the QSFP28 cable from the packaging and verify that there is no damage to the QSFP28 cable. Broken parts should be reported. If major damage has occurred to the QSFP28 cable, DO NOT use the replacement part.

Step 4: Connect the QSFP28 cable to the IOM to the QSFP the port.

Figure 144: Connect QSFP28 Cable



Result: The QSFP28 cable has now been replaced.



Management

In This Chapter:

- Open Composable API.....	110
- Open Composable GUI.....	114
- Firmware Upgrade.....	166
- Enclosure Pullout Tabs.....	173
- In-band Enclosure Management.....	173
- NVMe-CLI.....	173

4.1 Open Composable API

The Open Composable API is a RESTful interface for OpenFlex that enables a Unified Fabric Control Plane for Storage Fabric Devices. This allows for composing disaggregated storage resources—with compute, networking, and memory—into virtual systems in the future. These virtual systems will be dynamically provided to the right application at the right time, ensuring SLAs can be met automatically.

- Monitor hardware sensors (temperatures, voltages, hardware state)
- Configure hardware (update firmware, reboot individual components or systems, locate LEDs)
- Capture inventory data (serial number, part number, etc.)
- Capture log information
- Configure policies (user access lists, authentication, HTTPS/TLS encryption/security with certificate/key settings)
- Self-discovery of other locally-available resources configurable using the Open Composable API for OpenFlex

4.1.1 Accessing the API

The API is accessible on every fabric device connected to the fabric network and management port.. The simplest way to access the API is to find the IP address of the management port on the rear of the Device that contains all of the other devices. This is set to DHCP by default. The DHCP IP Address may be obtained from the DHCP Server and cross referenced with the MAC address on front pull out tab of the system. The DHCP may also be obtained by navigating to that IP address from a browser with `/Query/` added to the end of the IP address will return top level status information. There are a few APIs that follow a case sensitive behavior.

The IP addresses/API targets listed in this response body will help in navigating the resources available on this device, as well as provide links and contextual information related to other devices connected on the fabric. The entire system is accessible from either IOM management or fabric ports using the API.

4.1.2 RESTful API

This API is based on the true REST architectural style meaning that all actions/verbs will be handled exclusively by the existing HTTP Methods (GET, POST, PUT, DELETE, HEAD, OPTIONS) along with all URI patterns containing only fully qualified collections of resources and resource instantiations (nouns only, no action verbs permitted in the URI). HTTP response data is compressed when requested by the browser for reduced network traffic. Open Composable GUI (OCGUI) and in-band management always compress the response data transparent to the user.

4.1.3 Discovering and Connecting to NVMe Devices using the Open Composable API

Before you begin: The user needs to use the GUI or the REST API to set/get the IP address of the 100Gb high-speed links.



Note: This procedure may be used in cases where the network may not detect the IP addresses of the adapters that will be connected.



Attention: The following procedure uses JSON indicated by "jq". This may require you to download JSON if you would like to use the "jq" option to parse the commands. In Ubuntu, the JSON processor may be installed by issuing `sudo apt install jq` in the CLI.

Step 1: To determine the Storage Device ID, issue a GET to `/query/` to review a list of devices installed in the target enclosure. This is the Management port on the IOM.

```
curl -u http://ip.of.target.iom/Query/ | jq
```



Note: In addition, you may use the following:

```
curl -u https://ip.of.target.iom/Query/ | jq
```

Step 2: Review the data returned to find the device ID of the target device. See the highlighted example below.

```
{
  "Self": "http://10.20.30.40:80/Query/",
  "SystemQuery": "http://10.20.30.40:80/System/Query/",
  "InformationStructure": {
    "Self": "http://10.20.30.40:80/Query/InformationStructure/",
    "AuthenticationType": {
      "ID": 0,
      "Name": "Basic"
    },
  },
  "HTTPPort": 80,
  "HTTPSPort": 443,
  "LogLevel": "debug",
  "MaximumThreads": 5,
  "Name": "OpenFlex API",
  "OwningOrganization": "WDC",
  "Status": "Released",
  "StructureDescription": "REST-based API for Device Management. Use
HTTP OPTIONS with header
                                {\"Documentation\": \"Schema\"} to get
resource schema information based on URI.
                                Use HTTP OPTIONS with header {\"Documentation
\": \"Info\"} to get general information
                                based on URI. ",
  "URI": "/Query/",
  "TimeoutMultiplier": 1,
```

```

    "Version": "1.2.0-301"
  },
  "Devices": {
    "Self": "http://10.20.30.40:80/Devices/",
    "Members": [
      {
        "Self": "http://10.20.30.40:80/Storage/Devices/ofdata24-4XXX-
<EncSerialNum>/",
        "SystemType": {
          "ID": 2,
          "Name": "Storage"
        },
        "Name": "ofdata24-4XXX-<EncSerialNum>",
        "ID": "ofdata24-4XXX-<EncSerialNum>",
        "OperatingSystem": {
          "Self": "http://10.20.30.40:80/Storage/Devices/
ofdata24-4XXX-<EncSerialNum>/OperatingSystem/",
          "Name": "Vendor Firmware",
          "OSType": {
            "ID": 59,

```

Truncated Example

Step 3: Determine the Adapters URL by sending a GET to the device ID gathered in the previous step.

```
curl -u http://ip.of.target.iom/Storage/Devices/ofdata24-4XXX-<EncSerialNum>/
Adapters/ | jq
```



Note: The URL is bolded in the following example output.

```

"Adapters": {
  "Self": "http://ofdata24-4XXX-<EncSerialNum>-ioma-mgmt:80/Storage/
Devices/ofdata24-4213-<EncSerialNum>/Adapters/"
}

```

Step 4: Review the output to locate the IP of the appropriate port. The port location in the following output is identified by **"Name": "IOMA-PORT4"**.

```

{
  "Self": "http://10.20.30.40:80/Storage/Devices/ofdata24-4XXX-
<EncSerialNum>/Adapters/",
  "Members": [
    {
      "Self": "http://10.20.30.40:80/Storage/Devices/ofdata24-4XXX-
<EncSerialNum>/Adapters/1/",
      "ID": "1",
      "Name": "IOMA-PORT4",
      "Status": {
        "State": {
          "ID": 16,
          "Name": "In service"
        },
        "Health": [
          {
            "ID": 5,
            "Name": "OK"
          }
        ]
      }
    }
  ]
}

```

```

    },
    "HostName": "ofdata24-4XXX-<EncSerialNum>-ioma-port4",
    "Ports": "http://10.20.30.40:80/Storage/Devices/ofdata24-4XXX-
<EncSerialNum>/Ports/?adapterid=1"
  },

```

Truncated Example

- Step 5:** Determine the IP address of the adapter that is attached to your host using the ports link. This will be the IP that is used to perform an `nvme discover` to find drives connected on the fabric. Send a GET to the Ports object associated with the adapter.

```
curl -u username:password http://10.20.30.40:80/Storage/Devices/
ofdata24-4XXX-<EncSerialNum>/Ports/?adapterid=1 | jq
```

- Step 6:** Review the returned data to find the IP of the proper port.

```

{
  "Self": "http://10.20.30.40:80/Storage/Devices/ofdata24-4XXX-
<EncSerialNum>/Ports/",
  "Members": [
    {
      "Self": "http://10.20.30.40:80/Storage/Devices/ofdata24-4XXX-
<EncSerialNum>/Ports/70_b3_d5_76_8a_be_192_168_10_51_24/",
      "ID": "70_b3_d5_76_8a_be_192_168_10_51_24",
      "Status": {
        "State": {
          "ID": 16,
          "Name": "In service"
        },
        "Health": [
          {
            "ID": 5,
            "Name": "OK"
          }
        ]
      }
    }
  ],
  "AddressOrigin": {
    "ID": 65536,
    "Name": "DHCPv4"
  },
  "IPv4Address": "192.168.10.51/24",
  "IPv4Gateway": "192.168.10.1",
  "MACAddress": "70:b3:d5:76:8a:be",
  "NetworkType": {
    "ID": 8,
    "Name": "IPv4 Network"
  },
  "MTUBytes": 5000,
  "Adapters": "http://10.20.30.40:80/Storage/Devices/ofdata24-4XXX-
<EncSerialNum>/Adapters/?portid=70_b3_d5_76_8a_be_192_168_10_51_24"
}

```

4.2 Open Composable GUI

The Open Composable Graphical User Interface (OCGUI) is the graphical representation of all of the data shared up to the fabric by the OCAPI. This GUI is presented to the user by browsing to the IP address of any device on the fabric and the management port for each IOM. The GUI has a "command-center" design layout that presents all vital health, utilization, and performance statistics related to devices on the network at a glance.

4.2.1 Compatible Browsers

The OCGUI is compatible with the following web browsers. Some browsers require a JSON plugin in order to view OCAPI data. The JSON plugin is not required for accessing OCGUI.

Table 33: OCGUI Browser Compatibility

Browser	Version
Google Chrome™	71.0.3578.98 and higher
Mozilla Firefox	40.15063.674.0 and higher
Microsoft Edge	60.5.0 and higher

4.2.2 Login Page

Login - OFDATA24-4213- USCOS04023SB000B

Sign In to your account

	<input type="text" value="Username"/>
	<input type="password" value="Password"/>

Remember Settings

 Login - OFDATA24-4213-USCOS04023SB000B

Login ?

You will need to login first to access the system.

 OFDATA24-4213-USCOS04023SB000B

Type - Storage
ID - ofdata24-4213-usc0s04023sb000b
Device OS Version - 2.0.0
Manufacturer - WDC
Model - OpenFlex Data24 4213
Status - OK

Jul 12th 24, 2:21:47 pm
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The login page displays two panels. The left panel provides **username** and **password** fields for logging into the device. This panel also displays two options:

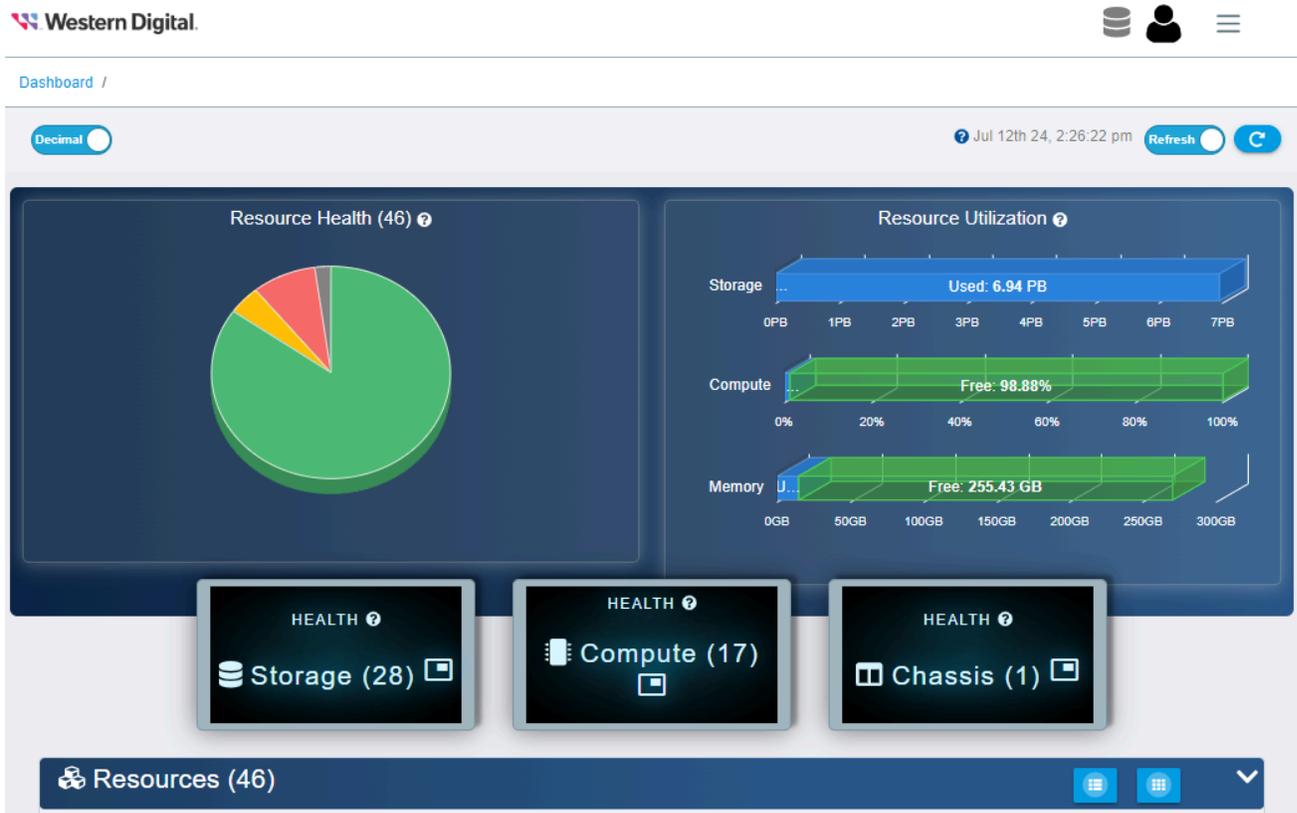
- **Dashboard NOC:** Selected by default. Will timeout after 30 minutes if NOC is not selected. The NOC option enables the dashboard to display in the Network Operations Center (NOC) mode without timing out the session.
- **Remember Settings:** Will remember the settings of the last user that signed in.

The right panel lists basic information about the device itself, including its type, status, and OS version.



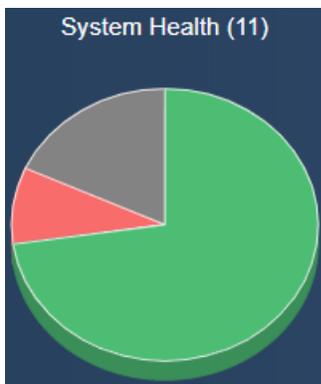
Note: For instructions on navigating to the login page, see [Navigating to a Device \(page 127\)](#).

4.2.3 Dashboard



The **Dashboard** is the first page that will load when one logs into any of the fabric-attached devices or management ports. It provides vital statistics on the health and performance of all devices on the subnet configured on the Enclosure Manager. In addition, it provides a clickable list that allows users to navigate to the device page for any device on the subnet.

4.2.3.1 System Health



The **System Health** section provides an overview of the health of the fabric network showing all **OpenFlex** devices visible on the network. . The interfaces of all devices on the same subnet as the Storage devices are queried when the page loads, and the pie chart is updated with their responses. If fabric devices respond with errors or faults, the system health chart will update accordingly.

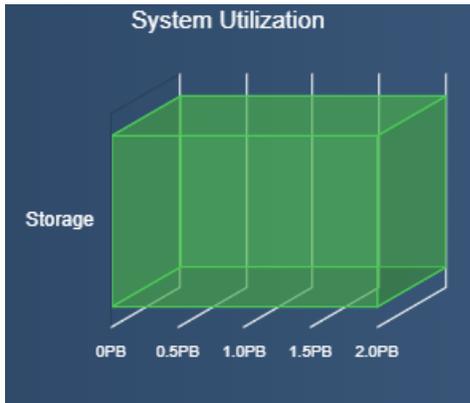
4.2.3.2 System Health States

The **System Health** pie chart contains segments for grouping devices by their health states. Clicking on a segment will bring up a modal window that provides a summary of the devices in that state. The following is a sampling of modal windows:

The image displays four modal windows, each representing a different health status category. Each window has a colored header and a list of device identifiers with status icons.

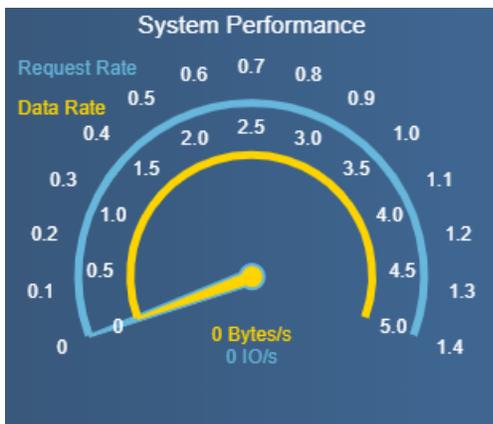
- Health Status: OK (22)** (Green header):
 - 5000ccab04105300 ^ 🟢
 - 5000ccab0410a180 ^ 🟢 ~ 🟢
 - 5000ccab0410e180 ^ 🟢
 - 5000ccab04110a00-A ~ 🟢
 - 5000ccab04110a00-B ~ 🟢
- Health Status: Critical failure (4)** (Red header):
 - 5000ccab054cd580 ^ 🟡
 - ofdata24-4213-usc0s01923sb0006 🟡 🟡
 - ofdata24-4240-usc0s02823sb000a 🟡
 - openflex-data24-3200- 🟡
- Health Status: Not available (1)** (Grey header):
 - bcm958804a8041c 🟡
- Health Status: Degraded/Warning (2)** (Yellow header):
 - eup2-2 🟡
 - openflex-data24-usalp00822qa0155 🟡

4.2.3.3 System Utilization



The **System Utilization** section displays the total, free, and used storage on the fabric. For the OpenFlex Data24 4000 Series, all storage capacity is presented as Used.

4.2.3.4 System Performance



The **System Performance** section provides general system performance information for devices on the fabric. The GUI contains a System Performance gauge, but it will not provide performance for Data24. Other Systems may display performance using this gauge. Data24 can display performance using Linux specific monitoring like **iostat**.

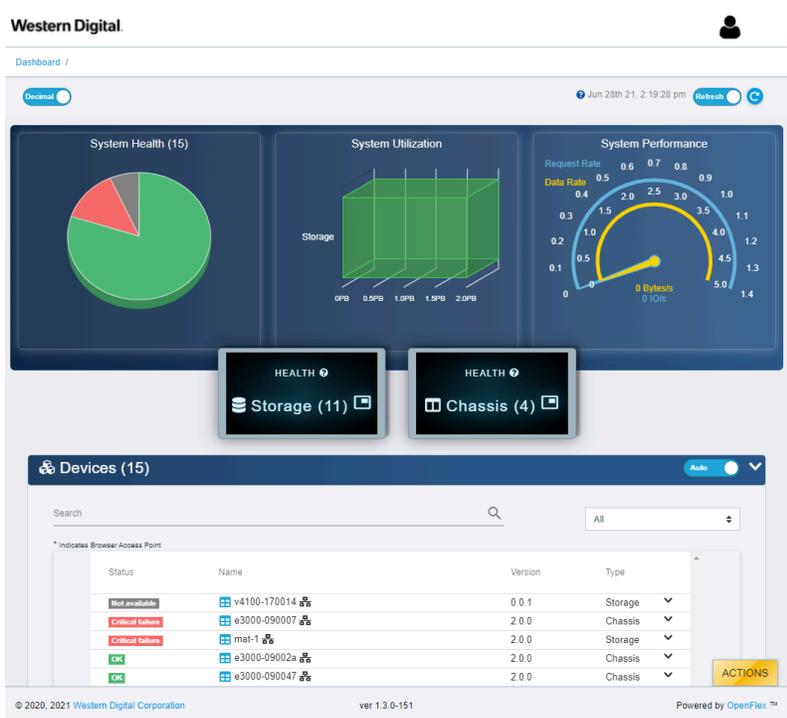
4.2.3.5 Storage Health





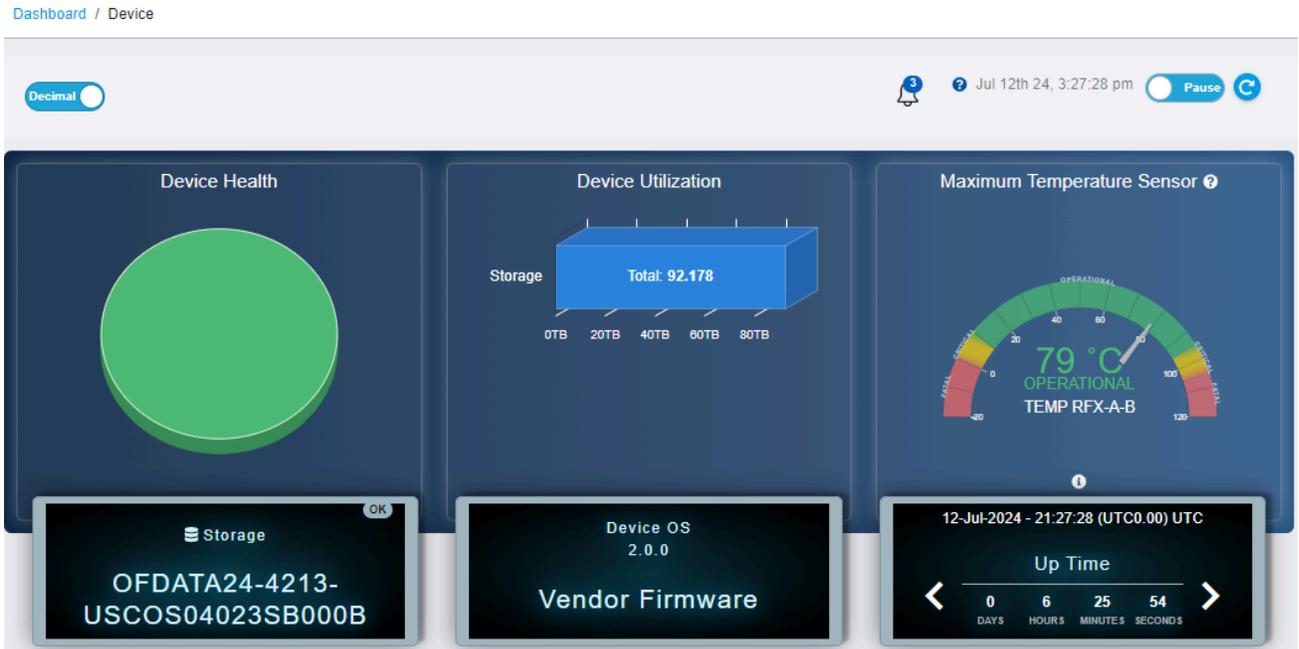
The **Storage Health** modal provides an overview of the health of all storage devices visible on the fabric (those in the subnets of what is configured on the enclosure). The modal provides separate tables for fabric devices that are presenting different health states up to the OCGUI.

4.2.3.6 Devices



The **Devices** list provides summary details about all devices visible on the fabric. Vital information is provided, such as the device ID, serial number, model, manufacturer, and the type of device that was discovered. This list will be updated with each refresh of the page, as a `/Query/` command is sent across the fabric network to discover OpenFlex devices. The search field—located at the top of the devices list—allows for users to access specific devices without having to review the list for specific devices or device configurations.

4.2.4 Storage Device Page



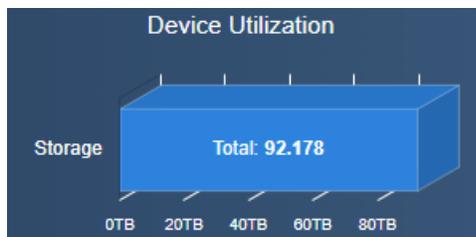
The storage device page presents all of the vital information related to a specific storage resource.

4.2.4.1 Storage Device Health



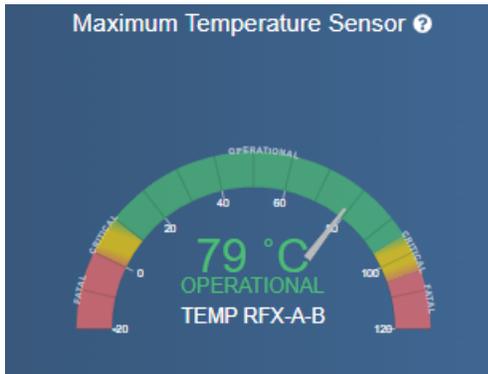
The storage **Device Health** section provides a visual summary of the health of the enclosure, including drives on the device.

4.2.4.2 Storage Device Utilization



The storage **Device Utilization** section provides a visual summary of the available and used storage on the device.

4.2.4.3 Storage Device Temperature



The storage **Maximum Temperature Sensor** section provides a visual summary of the current Maximum Temperature of the device. When the Maximum Temperature Sensor is selected it will display the device with the highest temperature.

4.2.4.4 Storage Device Information

Device Information

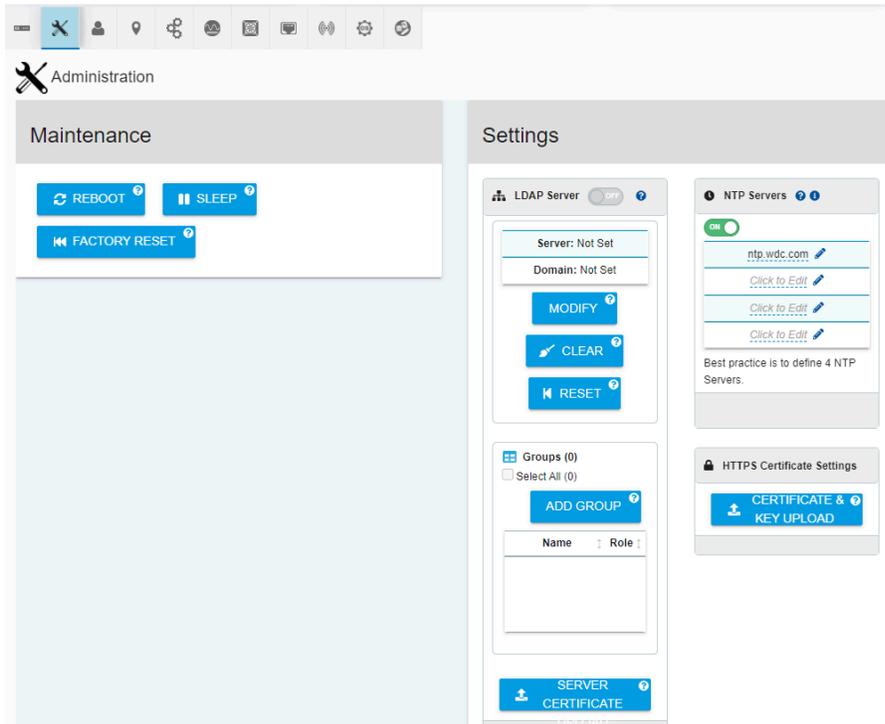
ofdata24-4213-usc0s04023sb000b   

DEVICE LOGS 

Attribute	Value
ID	ofdata24-4213-usc0s04023sb000b
SerialNumber	USCOS04023SB000B
Model	OpenFlex Data24 4213
Manufacturer	WDC
Controller	IO MODULE B (Browser Current Viewpoint)
TotalCapacity	92.18 TB (92178143576064 Bytes)

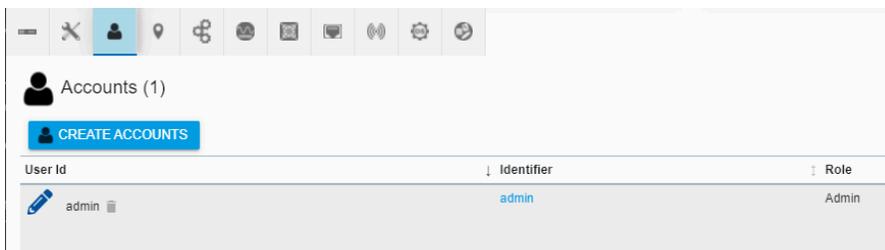
The storage **Device Information** section provides information about the device itself, such as the ID, Serial Number, and Model.

4.2.4.5 Storage Administration



The storage device's **Administration** section allows system administrators to perform important management functions to the device.

4.2.4.6 Storage Accounts



The storage device's **Accounts** section provides a list of all accounts that can access the device, as well as options for creating, modifying, and deleting accounts.

4.2.4.7 Storage Location

Attribute	Value
Address1	Click to Edit
Address2	Click to Edit
Address3	Click to Edit
Building	Click to Edit
City	Click to Edit
Country	Click to Edit
Device	Click to Edit
GPSCoords	Click to Edit
Item	Click to Edit
OtherLocationInfo	Click to Edit
Pod	Click to Edit
PostalCode	Click to Edit
Rack	Click to Edit
Room	Click to Edit
Row	Click to Edit
Shelf	Click to Edit
SiteName	Click to Edit
State	Click to Edit
Territory	Click to Edit

The storage device's **Location** section provides information about the physical location of the device and controls for setting or clearing location attributes.

4.2.4.8 Controllers

Device Actions	Name	Identifier	Part Number	Serial Number	Device Sharing	Host Name	DNS Server Addresses	DNS Search Domains	Health	Details
Browse to this Controller Viewpoint	IOMA	1	A214-000057-000	USCOS02623SD0003	<input type="checkbox"/> OFF	10.88.1.1 10.88.2.1	10.88.1.1 10.88.2.1	10.88.com	OK	None
Browser Current Viewpoint	IOMB	2	A214-000057-000	USCOS02623SD0044	<input type="checkbox"/> OFF	10.88.1.1 10.88.2.1	10.88.1.1 10.88.2.1	10.88.com	OK	None

The storage device's **Controllers** section provides access to the IOMs that are connected to the device, and provides options for rebooting and configuring the DNS settings of the controllers.

4.2.4.9 Power Supplies

 Power Supplies (2)

Name	Identifier	Part Number	Serial Number	Health	Details
POWER SUPPLY A	1	G1358-0800WNEE	1358801NEE221200018	OK	None
POWER SUPPLY B	2	G1358-0800WNEE	1358801NEE220600007	OK	None

The storage device's **Power Supplies** section provides access to the Power Supplies health statistics.

4.2.4.10 Cooling Devices

 Cooling Devices (4)

Name	Identifier	Health	Details
COOLING FRU A	1	OK	None
COOLING FRU B	2	OK	None
COOLING FRU C	3	OK	None
COOLING FRU D	4	OK	None

The storage device's **Cooling Devices** section provides access to the Fans health statistics.

4.2.4.11 Ports

 Ports (8)

Controller Ports: 2

Port	Identifier	Controller	Host Name	Health / Cable / Link / Speed	Details	MTU Bytes	Network Type	IP Address	IP Gateway	MAC Address	Address Origin
eth1	00_0c_ca_11_00_6f_inet	IO MODULE A	...	OK / Connected / Up / 1 Gbps	None	1500	IPv4 Network	...	...	...	DHCPv4
eth1	00_0c_ca_11_00_1d_inet	IO MODULE B	...	OK / Connected / Up / 1 Gbps	None	1500	IPv4 Network	...	...	...	DHCPv4

Adapter Ports: 6

Port	Identifier	Adapter	Host Name	Health / Cable / Link / Speed	Details	Protocol	MTU Bytes	Network Type	IP Address	IP Gateway	MAC Address	Address Origin
IOM-A-AIC-A-P1	00_0c_ca_12_21_2d_inet	IOM-A-AIC-A	...	OK / Connected / Up / 100 Gbps	None	TCP	5000	IPv4 Network	...	...	...	DHCPv4
IOM-A-AIC-B-P1	00_0c_ca_12_24_90_inet	IOM-A-AIC-B	...	OK / Connected / Up / 100 Gbps	None	TCP	5000	IPv4 Network	...	...	...	DHCPv4
IOM-A-AIC-C-P1	00_0c_ca_12_24_ab_inet	IOM-A-AIC-C	...	OK / Connected / Up / 100 Gbps	None	TCP	5000	IPv4 Network	...	...	...	DHCPv4
IOM-B-AIC-A-P1	00_0c_ca_12_21_27_inet	IOM-B-AIC-A	...	OK / Connected / Up / 100 Gbps	None	TCP	5000	IPv4 Network	...	...	...	DHCPv4

The storage device's **Ports** section provides access to the networking settings for the ports that exist on the device. It also displays the cable connection status, link status, and speed information.

4.2.4.12 Storage Sensors

 Sensors (48)

Name	Identifier	Type	Current Reading	Health	Details
TEMP DRIVE 01	TEMP_DRIVE_01_2_1	Temperature	  37 Degrees C 	None	
TEMP DRIVE 02	TEMP_DRIVE_02_2_2	Temperature	  37 Degrees C 	None	
TEMP DRIVE 03	TEMP_DRIVE_03_2_3	Temperature	  37 Degrees C 	None	
TEMP DRIVE 04	TEMP_DRIVE_04_2_4	Temperature	  37 Degrees C 	None	
TEMP DRIVE 05	TEMP_DRIVE_05_2_5	Temperature	  37 Degrees C 	None	
TEMP DRIVE 06	TEMP_DRIVE_06_2_6	Temperature	  38 Degrees C 	None	
TEMP DRIVE 07	TEMP_DRIVE_07_2_7	Temperature	  38 Degrees C 	None	
TEMP DRIVE 08	TEMP_DRIVE_08_2_8	Temperature	  39 Degrees C 	None	
TEMP DRIVE 09	TEMP_DRIVE_09_2_9	Temperature	  40 Degrees C 	None	
TEMP DRIVE 10	TEMP_DRIVE_10_2_10	Temperature	  39 Degrees C 	None	

The storage device's **Sensors** section lists all the sensors present on the device hardware and reports the readings from those sensors.

4.2.4.13 Storage Device OS

 Device OS



Attribute	Value	Attribute	Value
Name	Vendor Firmware	Version	2.0.0

The storage **Device OS** section displays the device's firmware version and can be used to upgrade firmware.

4.2.4.14 Media

 Media (24)

Total Capacity: 92.18 TB

Name	Identifier	Manufacturer	Model	Capacity	Protocol	Version	Serial Number	Durable Name	Indicator LED	Power State	Health	Details
DEVICE 1	1	WesternDigital	WUS4BA138DSP3X1	3.84 TB	NVMe	R2210801	A05D3BB7	nqn.1992-05.com.wdc.ofdata24-4213-uscos04023sb000b:nvme.1				None
DEVICE 2	2	WesternDigital	WUS4BA138DSP3X1	3.84 TB	NVMe	R2210801	A05D3B89	nqn.1992-05.com.wdc.ofdata24-4213-uscos04023sb000b:nvme.2				None
DEVICE 3	3	WesternDigital	WUS4BA138DSP3X1	3.84 TB	NVMe	R2210801	A05D3BFB	nqn.1992-05.com.wdc.ofdata24-4213-uscos04023sb000b:nvme.3				None
DEVICE 4	4	WesternDigital	WUS4BA138DSP3X1	3.84 TB	NVMe	R2210801	A05D3CC6	nqn.1992-05.com.wdc.ofdata24-4213-uscos04023sb000b:nvme.4				None
DEVICE 5	5	WesternDigital	WUS4BA138DSP3X1	3.84 TB	NVMe	R2210801	A05D3C25	nqn.1992-05.com.wdc.ofdata24-4213-uscos04023sb000b:nvme.5				None
DEVICE 6	6	WesternDigital	WUS4BA138DSP3X1	3.84 TB	NVMe	R2210801	A082DC42	nqn.1992-05.com.wdc.ofdata24-4213-uscos04023sb000b:nvme.6				None
DEVICE 7	7	WesternDigital	WUS4BA138DSP3X1	3.84 TB	NVMe	R2210801	A082DD2E	nqn.1992-05.com.wdc.ofdata24-4213-uscos04023sb000b:nvme.7				None
DEVICE 8	8	WesternDigital	WUS4BA138DSP3X1	3.84 TB	NVMe	R2210801	A05D3CFE	nqn.1992-05.com.wdc.ofdata24-4213-uscos04023sb000b:nvme.8				None
DEVICE 9	9	WesternDigital	WUS4BA138DSP3X1	3.84 TB	NVMe	R2210801	A082DC66	nqn.1992-05.com.wdc.ofdata24-4213-uscos04023sb000b:nvme.9				None
DEVICE 10	10	WesternDigital	WUS4BA138DSP3X1	3.84 TB	NVMe	R2210801	A082E269	nqn.1992-05.com.wdc.ofdata24-4213-uscos04023sb000b:nvme.10				None

The storage device's **Media** section lists all of the information related to media specifications, health, and power state, and provides the option to change the power state of the media.

4.2.5 Basic Operational Functions

This section provides instructions for basic operational functions that the user is likely to perform during the initial operation of the OpenFlex Data24 4000 Series, such as checking the system health, creating a user account, and so on.

4.2.5.1 Navigating to a Device

This task provides instructions for using the OCGUI to navigate to a device's dashboard through any other fabric-connected device.

- Step 1:** Open a browser and enter the IP address or hostname for any fabric-connected device into the **address bar**.

The login page for the device appears:

Login - OFDATA24-4213-USCOS04023SB000B

Sign In to your account

Username

Password

Remember Settings

Login - OFDATA24-4213-USCOS04023SB000B

Login ?

You will need to login first to access the system.

OFDATA24-4213-USCOS04023SB000B

Type - Storage
ID - ofdata24-4213-usc0s04023sb000b
Device OS Version - 2.0.0
Manufacturer - WDC
Model - OpenFlex Data24 4213
Status - OK

Jul 12th 24, 2:21:47 pm
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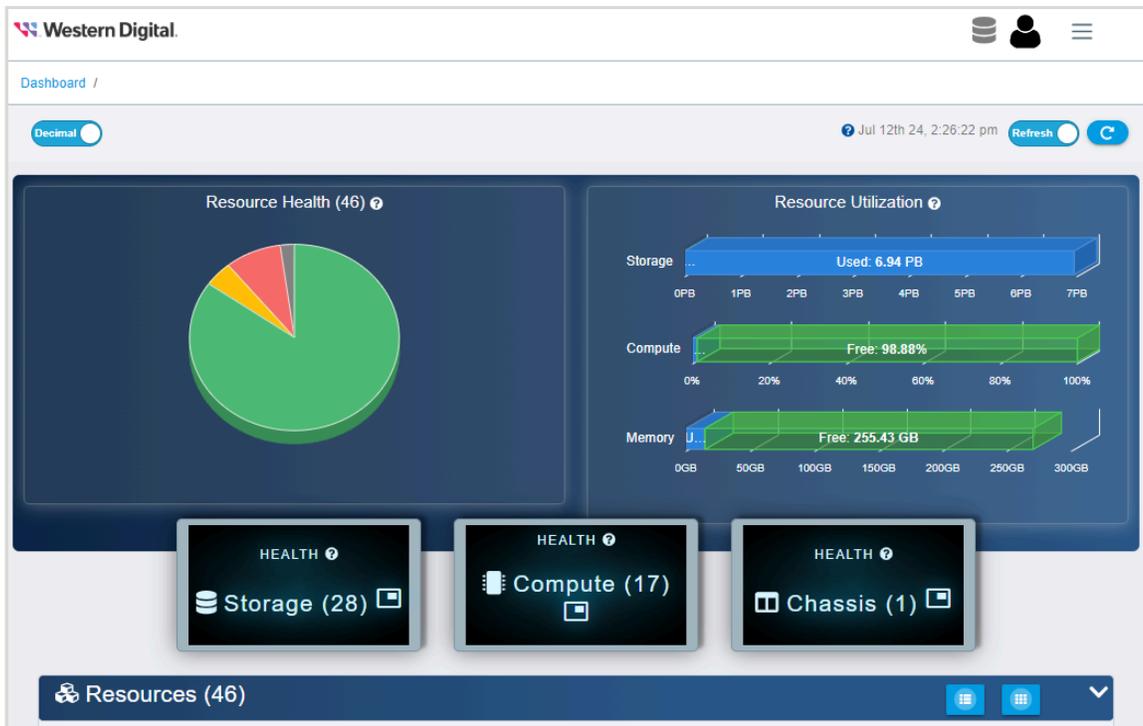
Note: mDNS has the ability to connect to the system using `http://openflex-data24-4x00-<product_SN>-ioma|b.<domain>` when the corporate DHCP Server IP list may not be available.

Step 2: Enter a valid username and password, and click the **Login** button:



Note: The default username/password is admin/admin.

The system dashboard appears. In addition, the **Devices** section provides access to all other fabric-connected devices:



Step 3: If needed, click the **Devices** banner to expand the list of all connected devices:



Step 4: From the list, identify the device to which you want to navigate.

Step 5: Click the **Device Actions** icon:



The **Device Actions** window appears:



- Step 6:** Click the **Open in a new tab/window** option to open the device page in a new window. The device's dashboard appears in a new tab/window.

4.2.5.2 Checking System Health

This task provides instructions for checking the health of the using the OCGUI, including:

- Device Information
- Administration
- Accounts
- Location
- Controllers
- Power Supplies
- Cooling Devices
- Ports
- Sensors
- Device OS
- Media

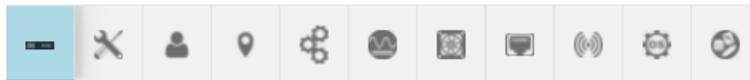


Attention: Always confirm that the enclosure status is "Healthy" after changing settings to ensure that the system is operating properly.

Checking the Device Information

Step 1: Navigate to the device. Refer to [Navigating to a Device \(page 127\)](#).

Step 2: Click the storage **Device Information** icon:



The **Device Information** appears:

Device Information

ofdata24-4213-usc0s04023sb000b  

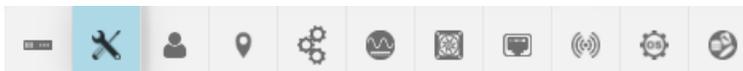
DEVICE LOGS 

Attribute	Value
ID	ofdata24-4213-usc0s04023sb000b
SerialNumber	USCOS04023SB000B
Model	OpenFlex Data24 4213
Manufacturer	WDC
Controller	IO MODULE B (Browser Current Viewpoint)
TotalCapacity	92.18 TB (92178143576064 Bytes)

Step 3: Review the device information and ensure that its health status reports **OK** in the header.

Checking the Administration Information

Step 4: Click the storage device's **Administration** icon:



The **Administration** information appears:

Administration

Maintenance

 **REBOOT** 

 **SLEEP** 

 **FACTORY RESET** 

Settings

LDAP Server 

Server: Not Set

Domain: Not Set

MODIFY 

CLEAR 

RESET 

Groups (0)

Select All (0)

ADD GROUP 

Name	Role

SERVER CERTIFICATE 

NTP Servers 



ntp.wdc.com 

[Click to Edit](#) 

[Click to Edit](#) 

[Click to Edit](#) 

Best practice is to define 4 NTP Servers.

HTTPS Certificate Settings

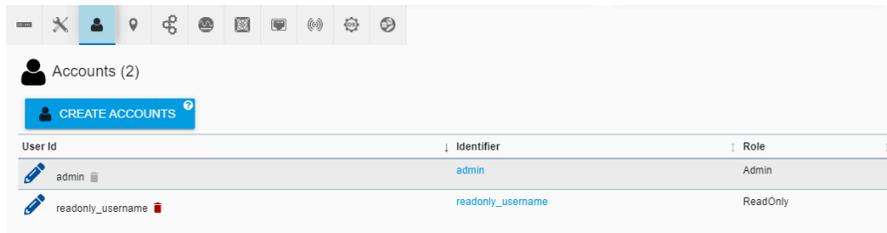
CERTIFICATE & KEY UPLOAD 

Checking Accounts

Step 5: Click the storage device's **Accounts** icon:

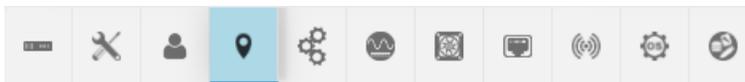


The **Accounts** information appears:

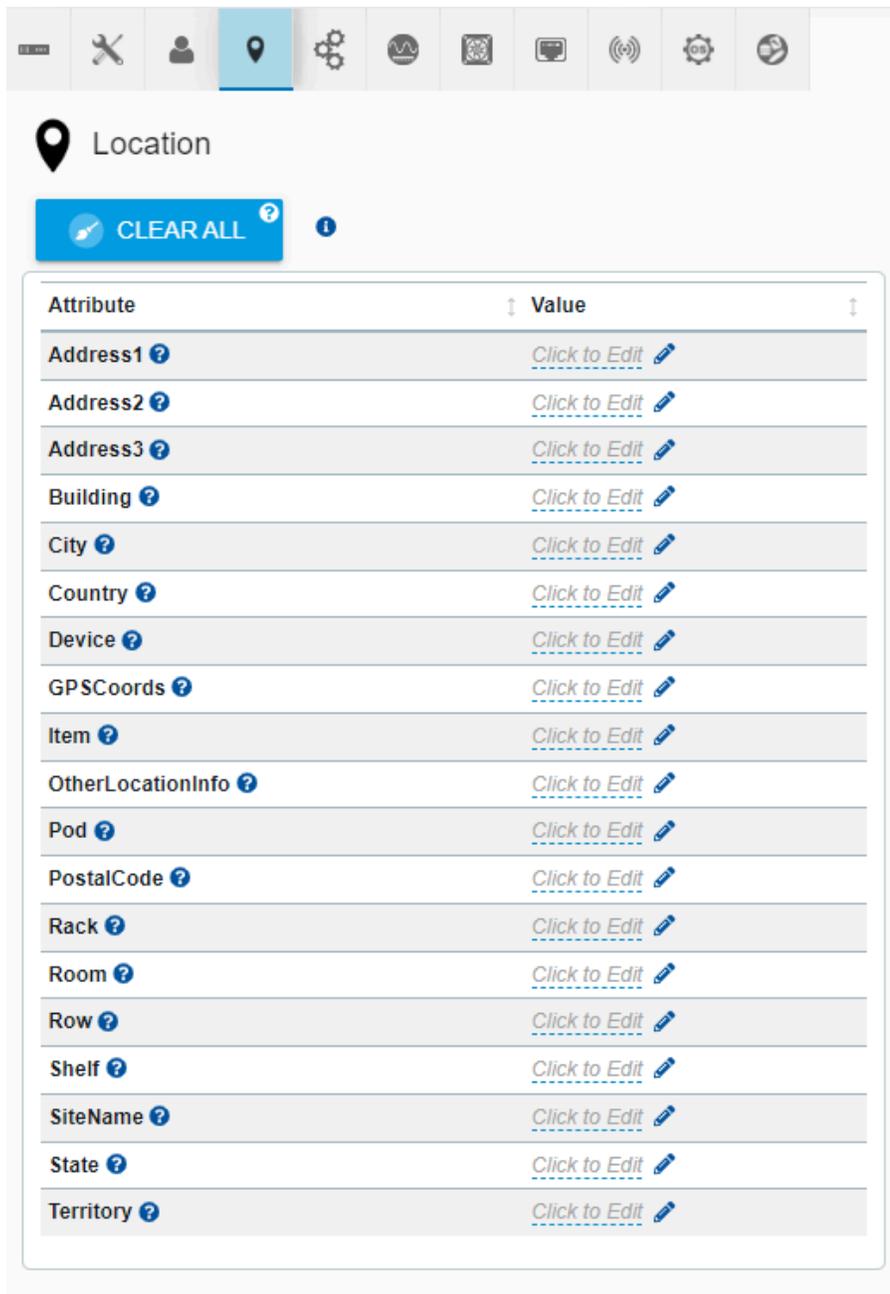


Checking the Location

Step 6: Click the storage device's **Location** icon:



The **Location** information appears:



Checking Controllers

Step 7: Click the device's **Controllers** icon:



The **Controllers** information appears:

Device Actions	Name	Identifier	Part Number	Serial Number	Device Sharing	Host Name	DNS Server Addresses	DNS Search Domains	Health	Details
Browser Current Viewpoint	MODULE A	1	1EA2302-001-01	USALP0302QG000F	OFF	10.20.10.10	10.20.1.1 10.20.2.1	10.20.1.1 10.20.2.1	OK	None
Controller Viewpoint	MODULE B	2	1EA2302-001-01	USCOS02622QG0003	OFF	10.20.10.10	10.20.1.1 10.20.2.1	10.20.1.1 10.20.2.1	OK	None

Checking the Power Supplies

Step 8: Click the chassis's **Power Supplies** icon:



The **Power Supplies** information appears:

Name	Identifier	Part Number	Serial Number	Health	Details
POWER SUPPLY A	1	DPS-2000AB-2 D	JEUD2033000217	OK	None
POWER SUPPLY B	2	DPS-2000AB-2 D	JEUD2033000214	OK	None

Step 9: Review the power supply information and ensure that both PSUs report **OK** in the **Health** column.

Checking the Fans

Step 10: Click the **Cooling Devices** icon:



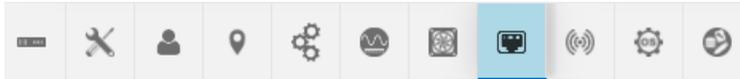
The **Cooling Devices** information appears:

Name	Identifier	Health	Details
COOLING FRU A	1	OK	None
COOLING FRU B	2	OK	None
COOLING FRU C	3	OK	None
COOLING FRU D	4	OK	None

Step 11: Review the cooling devices information and ensure that each fan reports **OK** in the **Health** column.

Checking the Ports

Step 12: Click the chassis's **Ports** icon:



The **Ports** information appears:

Ports (8)

Controller Ports: 2

Port	Identifier	Controller	Host Name	Health / Cable / Link / Speed	Details	MTU Bytes	Network Type	IP Address	IP Gateway	MAC Address	Address Origin
eth1	00_0c_ca_11_00_0c_0e	IO MODULE A		OK / Connected / 1 Gbps		1500	IPv4 Network	192.168.1.100	192.168.1.1	98:96:11:11:00:00	DHCPv4
eth1	00_0c_ca_11_00_0c_0e	IO MODULE B		OK / Connected / 1 Gbps		1500	IPv4 Network	192.168.1.100	192.168.1.1	98:96:11:11:00:00	DHCPv4

Adapter Ports: 6

Port	Identifier	Adapter	Host Name	Health / Cable / Link / Speed	Details	Protocol	MTU Bytes	Network Type	IP Address	IP Gateway	MAC Address	Address Origin
IOM-A-AIC-A-P1	00_0c_ca_12_24_24_0e	IOM-A-AIC-A		OK / Connected / 100 Gbps		TCP	5000	IPv4 Network	192.168.1.100	192.168.1.1	98:96:12:24:24:0e	DHCPv4
IOM-A-AIC-B-P1	00_0c_ca_12_24_24_0e	IOM-A-AIC-B		OK / Connected / 100 Gbps		TCP	5000	IPv4 Network	192.168.1.100	192.168.1.1	98:96:12:24:24:0e	DHCPv4
IOM-A-AIC-C-P1	00_0c_ca_12_24_24_0e	IOM-A-AIC-C		OK / Connected / 100 Gbps		TCP	5000	IPv4 Network	192.168.1.100	192.168.1.1	98:96:12:24:24:0e	DHCPv4
IOM-B-AIC-A-P1	00_0c_ca_12_21_27_0e	IOM-B-AIC-A		OK / Connected / 100 Gbps		TCP	5000	IPv4 Network	192.168.1.100	192.168.1.1	98:96:12:21:27:0e	DHCPv4

Step 13: Review the port information and ensure that each port is reporting **OK** in the **Health** column.

Checking the Sensors

Step 14: Click the device's **Sensors** icon:



The **Sensors** information appears:

Sensors (54)

Name	Identifier	Type	Current Reading	Health	Details
TEMP DRIVE 01	TEMP_DRIVE_01_2_1	Temperature	35 Degrees C	OK	None
TEMP DRIVE 02	TEMP_DRIVE_02_2_2	Temperature	35 Degrees C	OK	None
TEMP DRIVE 03	TEMP_DRIVE_03_2_3	Temperature	34 Degrees C	OK	None
TEMP DRIVE 04	TEMP_DRIVE_04_2_4	Temperature	37 Degrees C	OK	None
TEMP DRIVE 05	TEMP_DRIVE_05_2_5	Temperature	38 Degrees C	OK	None
TEMP DRIVE 06	TEMP_DRIVE_06_2_6	Temperature	37 Degrees C	OK	None
TEMP DRIVE 07	TEMP_DRIVE_07_2_7	Temperature	0 Degrees C	Unknown	None
TEMP DRIVE 08	TEMP_DRIVE_08_2_8	Temperature	0 Degrees C	Unknown	None
TEMP DRIVE 09	TEMP_DRIVE_09_2_9	Temperature	34 Degrees C	OK	None
TEMP DRIVE 10	TEMP_DRIVE_10_2_10	Temperature	35 Degrees C	OK	None
TEMP DRIVE 11	TEMP_DRIVE_11_2_11	Temperature	34 Degrees C	OK	None
TEMP DRIVE 12	TEMP_DRIVE_12_2_12	Temperature	38 Degrees C	OK	None
TEMP DRIVE 13	TEMP_DRIVE_13_2_13	Temperature	38 Degrees C	OK	None
TEMP DRIVE 14	TEMP_DRIVE_14_2_14	Temperature	37 Degrees C	OK	None
TEMP DRIVE 15	TEMP_DRIVE_15_2_15	Temperature	0 Degrees C	Unknown	None
TEMP DRIVE 16	TEMP_DRIVE_16_2_16	Temperature	0 Degrees C	Unknown	None
TEMP DRIVE 17	TEMP_DRIVE_17_2_17	Temperature	38 Degrees C	OK	None

Step 15: The sensor section provides an **Identifier** or name for each sensor, its **Type**, and **Current Reading**. The chassis's sensor information also includes a **Health** status. Hovering over the information icon in the temperature column will provide specific information related to that component's temperature thresholds, if applicable.

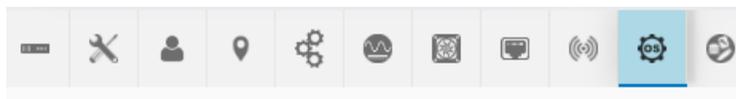
Figure 182: Threshold Information Example



Checking the Operating System (OS)

Step 16: Click the device's **OS** icon:

Figure 183: Storage Device OS Icon



The **Device OS** information appears:

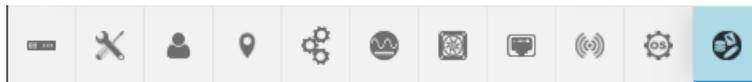
Figure 184: Storage Device OS Information



Checking the Media

Step 17: Click the device's **Media** icon:

Figure 185: Storage Media Icon



The **Media** information appears:

Figure 186: Storage Media Information



Step 18: Review the operating system information for the device. If the OS requires updating, refer to [Upgrading Firmware \(page 168\)](#).

4.2.5.3 Creating a Secure HTTPS Connection

This task provides instructions for creating a secure HTTPS connection for the OpenFlex Data24 4000 Series using the OCGUI.

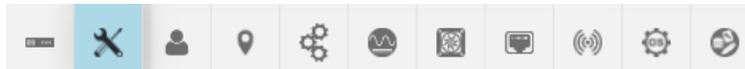
The OCGUI provides a feature for uploading a customer-generated SSL/TLS certificate and key, based on the IP address and/or DNS name, to create a fully-secure HTTPS connection to a device.

Attention: Always confirm that the enclosure status is "Healthy" after changing settings to ensure that the system is operating properly.

Step 1: Navigate to the storage device. Refer to [Navigating to a Device \(page 127\)](#).

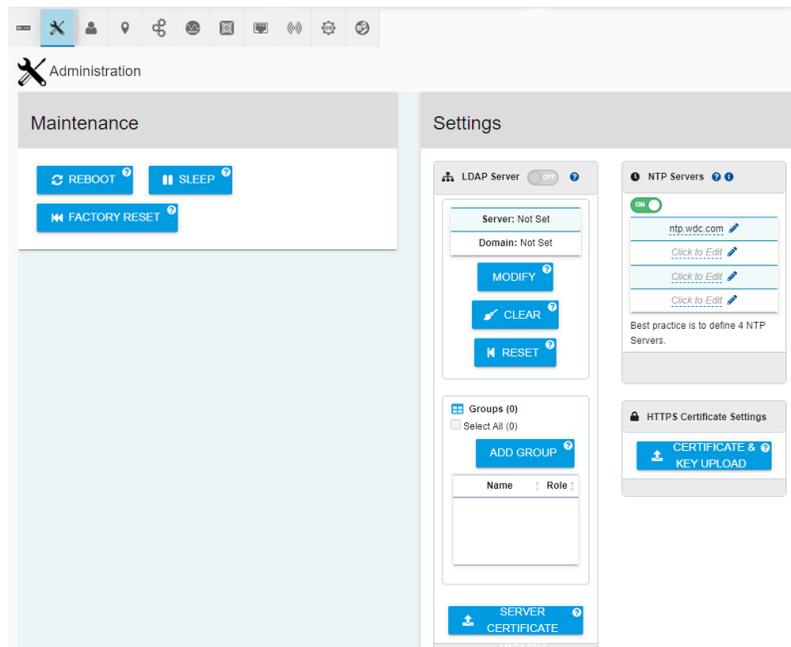
Step 2: Click the device's **Administration** icon:

Figure 187: Storage Device Administration Icon



The **Administration** information appears:

Figure 188: Storage Device Administration Information



Step 3: Click the **Certificate & Key Upload** button:

CERTIFICATE & KEY UPLOAD

The **TLS Certificate & Key Pair** window appears, showing the **Browse & Select Certificate & Key Pair** step:

TLS Certificate & Key Pair

1 Browse & Select Certificate & Key Pair ————— 2 Upload TLS Certificate & Key Pair

SELECT FILE Certificate File

SELECT FILE Key File

NEXT

CLOSE

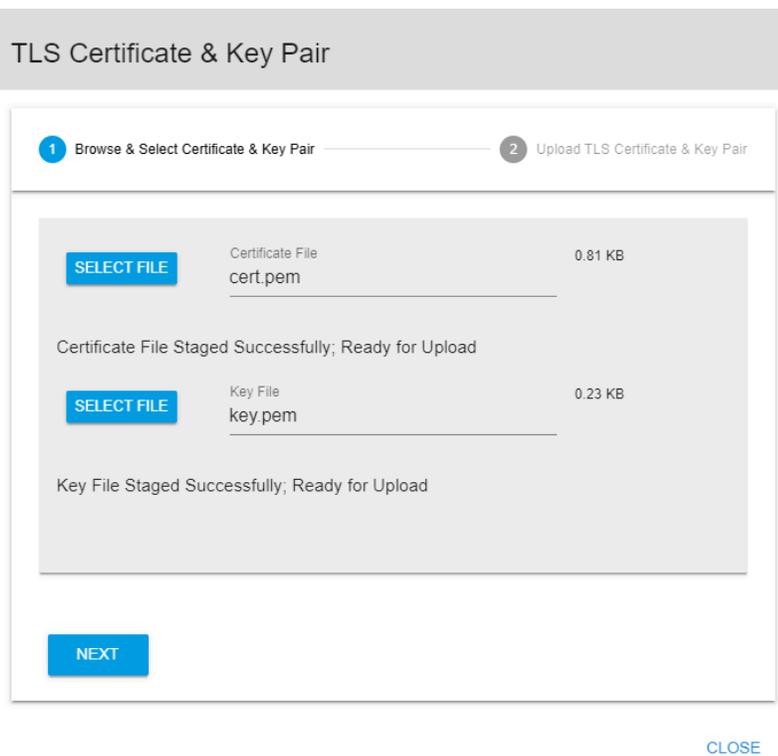
Step 4: Click the **Select File** button:

SELECT FILE

Step 5: Navigate to the location of the appropriate PEM files for the **Certificate File** and **Key File** fields:



Note: The files are not validated. It is the user's responsibility to ensure that the correct file is chosen for the appropriate field. If the chosen files are not valid, the OCGUI will reuse the defaults already on the system.



Step 6: Click the **Next** button:



The **TLS Certificate & Key Pair** confirmation window updates, showing the **Upload TLS Certificate & Key Pair** step:

TLS Certificate & Key Pair

1 Browse & Select Certificate & Key Pair — 2 Upload TLS Certificate & Key Pair

Certificate: cert.pem
Key: key.pem

Please Confirm

UPLOAD CERTIFICATE & KEY

BACK START OVER

CLOSE

Step 7: Confirm that the correct files are listed for **Certificate** and **Key**. If so, select the **Please Confirm** checkbox and click the **Upload Certificate & Key** button:

TLS Certificate & Key Pair

1 — 2

Certificate: cert.pem
Key: key.pem

Please Confirm

UPLOAD CERTIFICATE & KEY

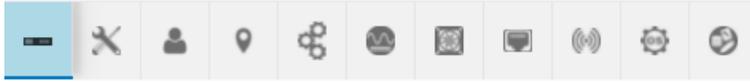
BACK START OVER

CLOSE

The **TLS Certificate & Key Pair** confirmation window closes, and the device's dashboard appears.

Step 8: Click the **Device Information** icon:

Figure 193: Storage Device Information Icon



The **Device Information** appears:

Figure 194: Storage Device Information

Device Information

ofdata24-4213-usc0s04023sb000b 

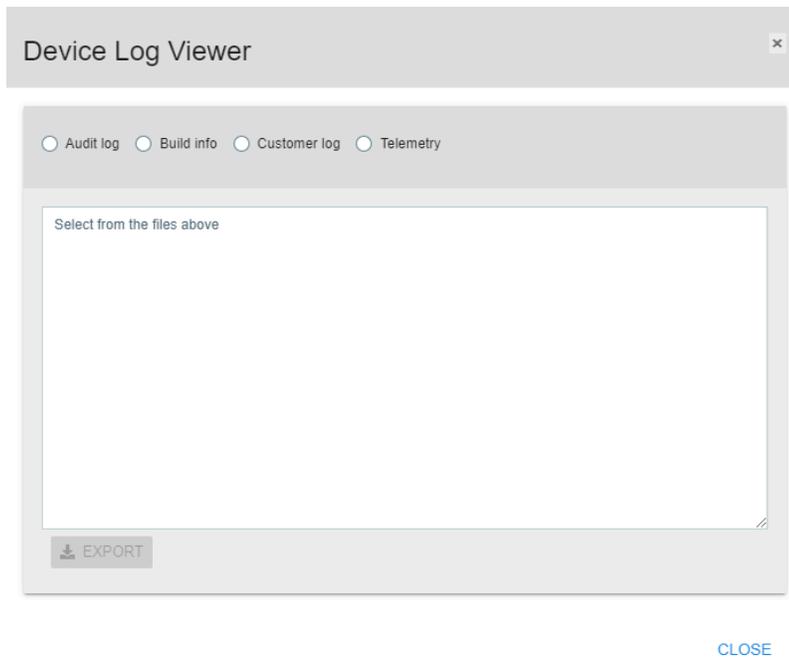
DEVICE LOGS 

Attribute	Value
ID	ofdata24-4213-usc0s04023sb000b
SerialNumber	USCOS04023SB000B
Model	OpenFlex Data24 4213
Manufacturer	WDC
Controller	IO MODULE B (Browser Current Viewpoint)
TotalCapacity	92.18 TB (92178143576064 Bytes)

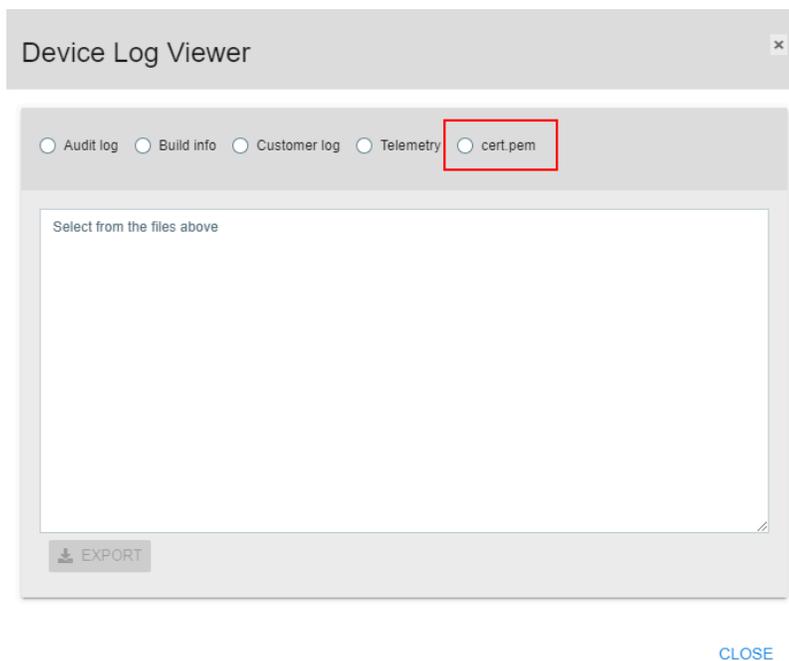
Step 9: Click the **Device Logs** button:



The **Device Log Viewer** appears:



Step 10: Confirm that the chosen certificate file is one of the selectable options. If so, a secure HTTPS connection has been established:



Step 11: Repeat this process for each IOM to ensure cert.pem file availability from both IOMs.

4.2.5.4 Creating Accounts

This task provides instructions for creating a user account on the OpenFlex Data24 4000 Series using the OCGUI.



Note: Accounts must be created on both IOMs.

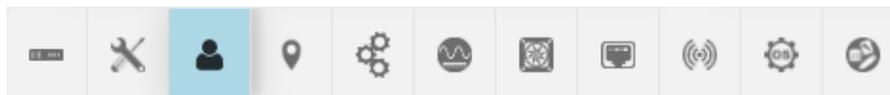


Attention: Always confirm that the enclosure status is "Healthy" after changing settings to ensure that the system is operating properly.

Step 1: Navigate to the storage device. Refer to [Navigating to a Device \(page 127\)](#).

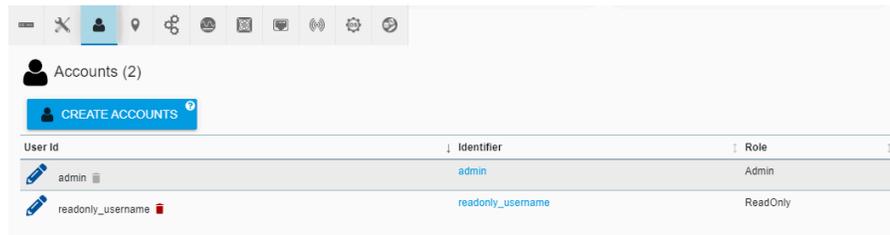
Step 2: Click the device's **Accounts** icon:

Figure 197: Storage Device Accounts Icon



The **Accounts** information appears:

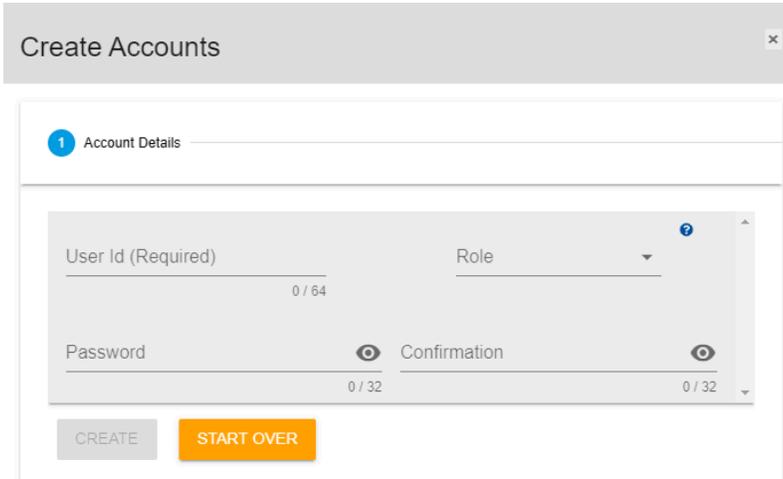
Figure 198: Storage Device Accounts Information



Step 3: Click the **Create Accounts** button:



The **Create Accounts** window appears, showing the **Account Details** step:



1 Account Details

User Id (Required) 0 / 64

Role

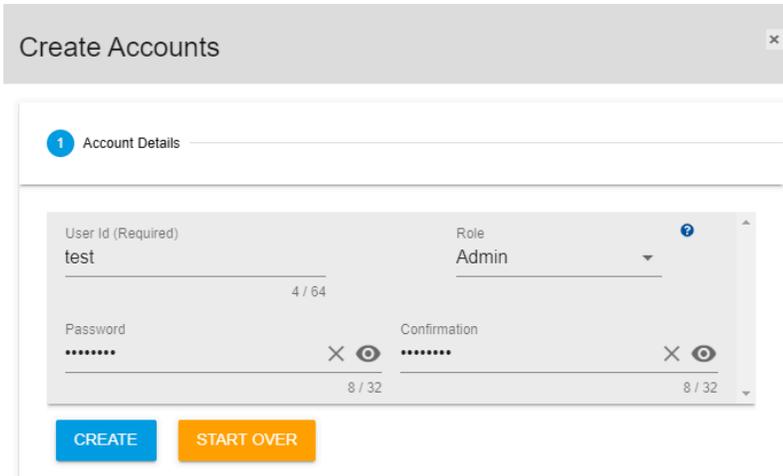
Password 0 / 32

Confirmation 0 / 32

CREATE START OVER

[CLOSE](#)

Step 4: Type a **User Id**, choose a **Role**, and type a **Password**:



1 Account Details

User Id (Required) test 4 / 64

Role Admin

Password 8 / 32

Confirmation 8 / 32

CREATE START OVER

[CLOSE](#)

The **Roles** selection allows you to create an account for a user and set their permissions to ReadOnly or Admin.

- **Admin:** This option allows for full access to all account options when logged into the GUI.
- **ReadOnly:** This option allows for read only access when logged into the GUI.

Step 5: Click the **Create** button to create the account:

CREATE

Step 6: Click **Close** to close the **Create Accounts** window:

CLOSE

The **Accounts** information appears, showing the newly created account:

Figure 203: Storage Device New Account



4.2.5.5 Configuring a Location

This task includes instructions for configuring location information for the OpenFlex Data24 4000 Series using the OCGUI.

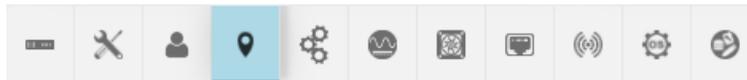


Attention: Always confirm that the enclosure status is "Healthy" after changing settings to ensure that the system is operating properly.

Step 1: Navigate to the storage device. Refer to [Navigating to a Device \(page 127\)](#).

Step 2: Click the device's **Location** icon:

Figure 204: Storage Device Location Icon



The **Location** information appears:

Attribute	Value
Address1	Click to Edit
Address2	Click to Edit
Address3	Click to Edit
Building	Click to Edit
City	Click to Edit
Country	Click to Edit
Device	Click to Edit
GPSCoords	Click to Edit
Item	Click to Edit
OtherLocationInfo	Click to Edit
Pod	Click to Edit
PostalCode	Click to Edit
Rack	Click to Edit
Room	Click to Edit
Row	Click to Edit
Shelf	Click to Edit
SiteName	Click to Edit
State	Click to Edit
Territory	Click to Edit

Step 3: Each location attribute can be assigned a value by clicking its pencil icon in the **Value** column. Add the appropriate text to the field, and click the check mark to save the value. Enter all of the values that apply.

4.2.5.6 Changing the Default Administrator Password

This procedure will provide information on changing the default administrator password using OCGUI.



Note: It is highly recommended that this be accomplished as part of the initialization process.

i **Attention:** Always confirm that the enclosure status is "Healthy" after changing settings to ensure that the system is operating properly.

Step 1: Login to the device using the default admin credentials.

Step 2: Navigate to the storage device. Refer to [Navigating to a Device \(page 127\)](#).

Step 3: Click the storage device's **Accounts** icon:



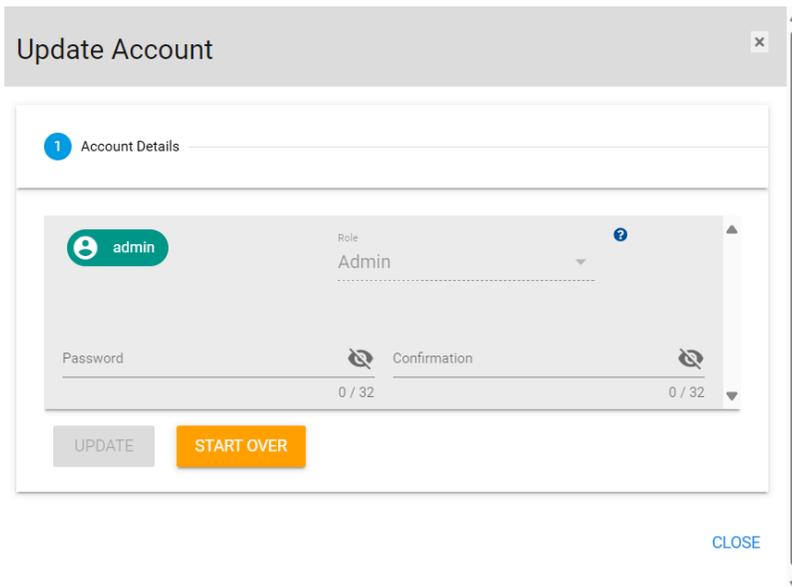
The **Accounts** information appears:



Step 4: Click the pencil icon next to the **User Id**.



The **Update Account** information appears in a new window:



Step 5: Type the new Administrator password into the **Password** and **Confirmation** fields.



Note: The passwords need to match in order to continue.

Step 6: Click the **Update** button.



The administrator password updates.

4.2.5.7 Configuring an NTP Server

This procedure will provide information on configuring an NTP server using OCGUI.



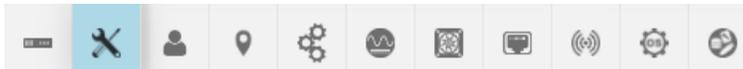
Note: It is highly recommended that this accomplished as part of the initialization process.



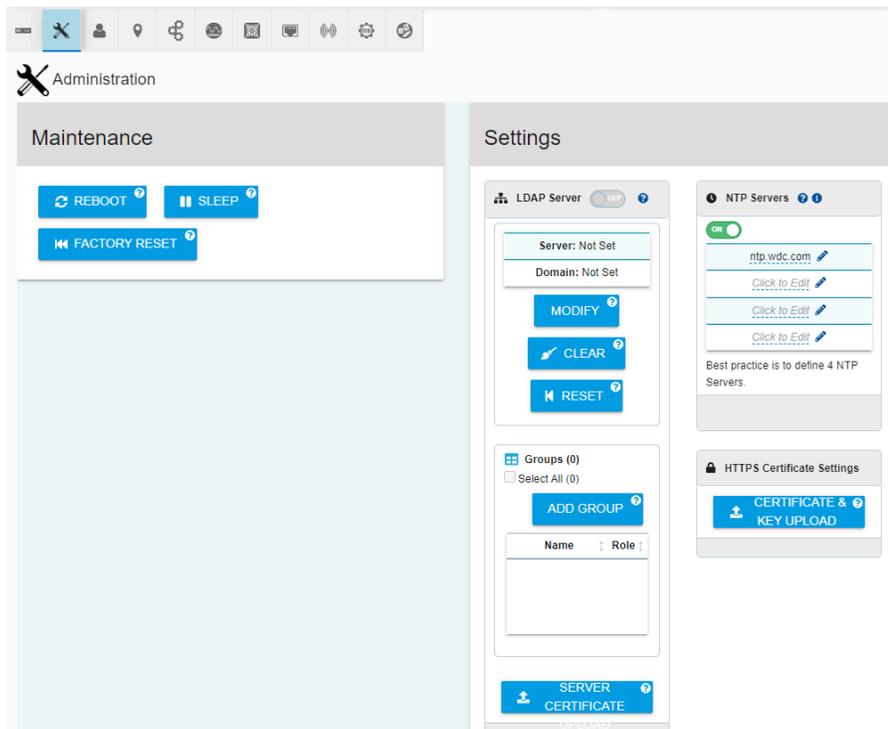
Attention: Always confirm that the enclosure status is "Healthy" after changing settings to ensure that the system is operating properly.

Step 1: Navigate to the storage device. Refer to [Navigating to a Device \(page 127\)](#).

Step 2: Click the storage device's **Administration** icon:



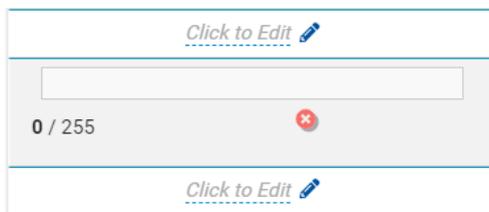
The **Administration** information appears:



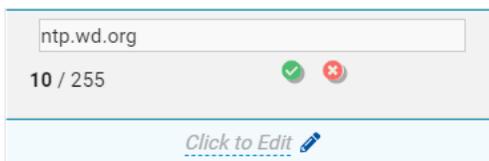
Step 3: From the right-hand side of the GUI, in the **NTP Servers** section, click the pencil icon next to a server.



A field will appear below the selected server:



Step 4: Edit or add the name of the NTP server and click the green checkmark.



The NTP Server will update with the new information. The update will apply to both IOMs.



Attention: If the source cannot be resolved, an error message will appear. Visit <https://www.ntppool.org/en/> to find the matching server for the local time zone and redo the configuration.

4.2.5.8 Editing Port Information

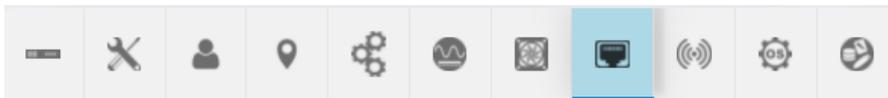
This task provides instructions for editing the port information for the OpenFlex Data24 4000 Series using the OCGUI.

Attention: Always confirm that the enclosure status is "Healthy" after changing settings to ensure that the system is operating properly.

Step 1: Navigate to the storage device. Refer to [Navigating to a Device \(page 127\)](#).

Step 2: Click the device's **Ports** icon:

Figure 215: Storage Device Ports Icon



The **Ports** information appears:

Figure 216: Storage Device Ports Information

Ports (8)												
Controller Ports: 2												
Port	Identifier	Controller	Host Name	Health / Cable / Link / Speed	Details	MTU Bytes	Network Type	IP Address	Gateway	MAC Address	Address Origin	
eth1	00_0c_ca_11_00_0f_0e01	IO MODULE A		OK / Connected / 1 Gbps		None 1500	IPv4 Network	192.168.1.100	192.168.1.1	08:00:0c:00:00:00	DHCPv4	
eth1	00_0c_ca_11_00_0f_0e02	IO MODULE B		OK / Connected / 1 Gbps		None 1500	IPv4 Network	192.168.1.101	192.168.1.1	08:00:0c:00:00:00	DHCPv4	
Adapter Ports: 6												
Port	Identifier	Adapter	Host Name	Health / Cable / Link / Speed	Details	Protocol	MTU Bytes	Network Type	IP Address	Gateway	MAC Address	Address Origin
IOM-A-AIC-A-P1	00_0c_ca_12_21_2d_0e01	IOM-A-AIC-A		OK / Connected / 10 Gbps		TCP	5000	IPv4 Network	192.168.1.102	192.168.1.1	08:00:0c:00:00:00	DHCPv4
IOM-A-AIC-B-P1	00_0c_ca_12_24_9d_0e01	IOM-A-AIC-B		OK / Connected / 10 Gbps		TCP	5000	IPv4 Network	192.168.1.103	192.168.1.1	08:00:0c:00:00:00	DHCPv4
IOM-A-AIC-C-P1	00_0c_ca_12_24_8b_0e01	IOM-A-AIC-C		OK / Connected / 10 Gbps		TCP	5000	IPv4 Network	192.168.1.104	192.168.1.1	08:00:0c:00:00:00	DHCPv4
IOM-B-AIC-A-P1	00_0c_ca_12_21_27_0e01	IOM-B-AIC-A		OK / Connected / 10 Gbps		TCP	5000	IPv4 Network	192.168.1.105	192.168.1.1	08:00:0c:00:00:00	DHCPv4

Step 3: To edit the port information for an IOM, click the pencil icon next to that port's **Adapter** name.

Note: The port will be updated and reset, resulting in dropping any active connections.

Attention: The MTU Bytes for the IOM defaults to a value of 1500 for the management port and 5000 for the data ports.

The **Update Port** window appears, showing the **Address Type, IP, MTUBytes** step:

Figure 217: IOM Device Update Port Window

CANCEL

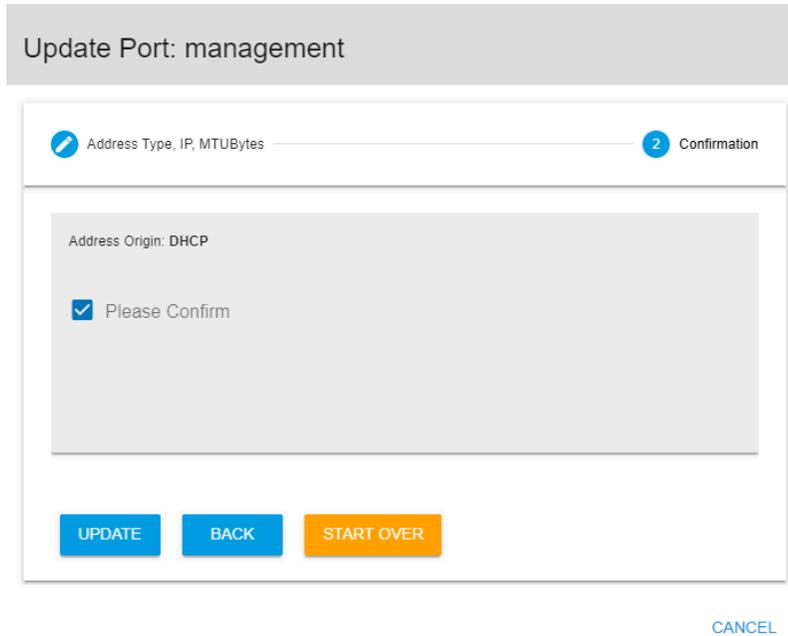
Step 4: Edit the port information for the device and click the **Next** button:



The **Confirmation** step appears:

CANCEL

Step 5: Select the **Please Confirm** checkbox to confirm the edits:



Step 6: Click the **Update** button to save the updates:



4.2.5.9 Obtaining the Drive NQN Value

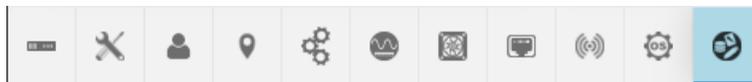


Attention: Always confirm that the enclosure status is "Healthy" after changing settings to ensure that the system is operating properly.

Step 1: Navigate to the storage device. Refer to [Navigating to a Device \(page 127\)](#).

Step 2: Click the device's **Media** icon:

Figure 219: Storage Media Icon



The **Media** information appears:

Figure 220: Storage Media Information

Media (24)												
Total Capacity: 165.14 TB												
Name	Identifier	Manufacturer	Model	Capacity	Protocol	Version	Serial Number	Durable Name	Indicator LED	Power State	Health	Details
DEVICE 1	1	WesternDigital	WUS4BA1760SP9X5	7.68 TB	NVMe	R2210400	A0784EB3	nqn.1992-05.com.wdc.ofdata24-4213-usccos02823sb0007/nvme.1				None
DEVICE 2	2	WesternDigital	WUS4BA1380SP9X4	3.84 TB	NVMe	R2210801	A068F68F	nqn.1992-05.com.wdc.ofdata24-4213-usccos02823sb0007/nvme.2				None
DEVICE 3	3	WesternDigital	WUS5EA176ESP7E4	7.68 TB	NVMe	RC610007	23134C900035	nqn.1992-05.com.wdc.ofdata24-4213-usccos02823sb0007/nvme.3				None
DEVICE 4	4	WesternDigital	WUS5EA138ESP7E3	3.84 TB	NVMe	RC610007	23470B800081	nqn.1992-05.com.wdc.ofdata24-4213-usccos02823sb0007/nvme.4				None
DEVICE 5	5	WesternDigital	WUS4BA1380SP9X1	3.84 TB	NVMe	R2210801	A0746F6D	nqn.1992-05.com.wdc.ofdata24-4213-usccos02823sb0007/nvme.5				None
DEVICE 6	6	WesternDigital	WUS4BA1A1D5P9X1	15.36 TB	NVMe	R2210801	A05C2F1A	nqn.1992-05.com.wdc.ofdata24-4213-usccos02823sb0007/nvme.6				None

Step 3: Review the **Durable Name** value next to the devices to view the NQN value.

4.2.6 Device Sharing

Device sharing allows a single NVMe device to be shared across multiple RapidFlex A2000 Fabric Bridges. When the A2000's are configured for device sharing they have the ability to export or present those devices to connected hosts and servers.

One or more A2000's are connected through PCIe to a device switch as a management processor. The management processor implements a PCIe root complex that enumerates all of the downstream NVMe devices connected to the device switch. The management processor firmware performs NVMe initialization on each NVMe device, including the creation of an NVMe admin queue for each device. When device sharing is enabled, the device switch will be configured to present a unique PCIe endpoint to each connected A2000. This unique endpoint provides the PCIe non-transparent bridging between A2000 and backend NVMe devices.



Warning: Device sharing must be enabled or disabled on all IOMs in a system. Different settings within a system cause operational degradation.

Non-Transparent Bridging

The A2000 root complex performs PCIe enumeration and discovers an endpoint device that is exposed by the device switch. As a result, the endpoint class indicates a Non-Transparent Bridging (NTP) Device Sharing system also known as NTEP, to the A2000.

The NTEP is configured in the device switch to deliver all access to the PCIe memory space to the Management Processor firmware for servicing. The device switch is programmed to deliver all access to this PCIe memory space directly to the corresponding NVMe device. The Management Processor firmware is not involved for this access, instead, the device switch hardware routing and translation tables are programmed to deliver access directly, at speed.

NVMe

The Management Processor controls the backend NVMe devices that PCIe enumerates, performs NVMe initialization, and creates the NVMe Admin Queues.

The Management Processor is the only entity that can directly issue NVMe Admin commands to the backend NVMe device. Using Virtual NVMe Admin Queues, A2000 can be connected to the device switch and any host to which A2000 connects. This is utilized to issue NVMe Admin commands to a backend NVMe device. Virtual Admin Queues are created by each A2000 to provide a path for the A2000 to send admin commands to each backend NVMe device.

4.2.6.1 Enabling Device Sharing



Attention: Use the NVMe CLI to disconnect NVMe disks prior to starting this operation. Refer to [NVMe-CLI \(page 173\)](#).



Attention: Always confirm that the enclosure status is "Healthy" after changing settings to ensure that the system is operating properly.

Step 1: Navigate to the storage device. Refer to [Navigating to a Device \(page 127\)](#).

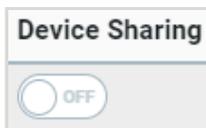
Step 2: Click the device's **Controllers** icon:



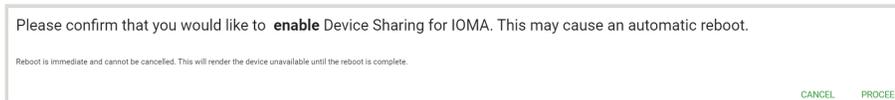
The **Controllers** information appears:

Controllers (2)										
Device Actions	Name	Identifier	Part Number	Serial Number	Device Sharing	Host Name	DNS Server Addresses	DNS Search Domains	Health	Details
Browser Current Viewpoint	IO MODULE A	1	1EA2302-001-01	USALP0302QG000F	<input type="checkbox"/>	uscp01-001-01	10.88.1.1 10.88.2.1	ipg.com	OK	None
Browse to this Controller Viewpoint	IO MODULE B	2	1EA2302-001-01	USCOS02622QG0003	<input type="checkbox"/>	uscp01-001-01	10.88.1.1 10.88.2.1	ipg.com	OK	None

Step 3: Click the **Device Sharing** toggle next to the preferred device:



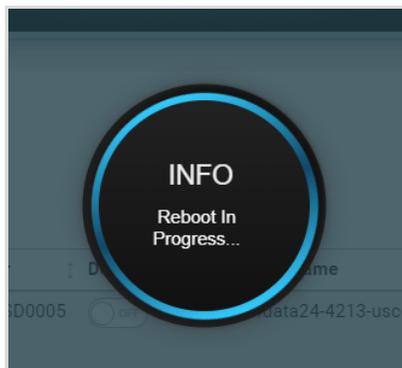
A message requesting confirmation appears.



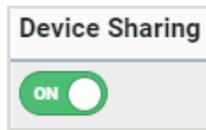
Step 4: Click **Proceed** to enable sharing for the chosen device:



A "Reboot in Progress..." message appears and the device reboots.



Step 5: Verify that the **Device Sharing** toggle next to the enabled device appears as **On**.



Step 6: Repeat the previous steps to enable sharing for other devices.

4.2.6.2 Disabling Device Sharing

i Attention: Use the NVMe CLI to disconnect NVMe disks prior to starting this operation. Refer to [NVMe-CLI \(page 173\)](#).

i Attention: Always confirm that the enclosure status is "Healthy" after changing settings to ensure that the system is operating properly.

Step 1: Navigate to the storage device. Refer to [Navigating to a Device \(page 127\)](#).

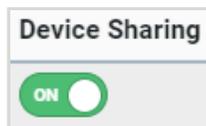
Step 2: Click the device's **Controllers** icon:



The **Controllers** information appears:

Device Actions	Name	Identifier	Part Number	Serial Number	Device Sharing	Host Name	DNS Server Addresses	DNS Search Domains	Health	Details
Browse to this Controller Viewpoint	IOMA	1	A214-000057-000	USCOS02823SD0000	<input checked="" type="checkbox"/>		10.0.0.1 10.0.0.1	10.0.0.1	OK	None
Browser Current Viewpoint	IOMB	2	A214-000057-000	USCOS02823SD0010	<input checked="" type="checkbox"/>		10.0.0.1 10.0.0.1	10.0.0.1	OK	None

Step 3: Click the **Device Sharing** toggle next to the preferred device:



A message requesting confirmation appears.

Please confirm that you would like to **disable** Device Sharing for IOMA. This may cause an automatic reboot.

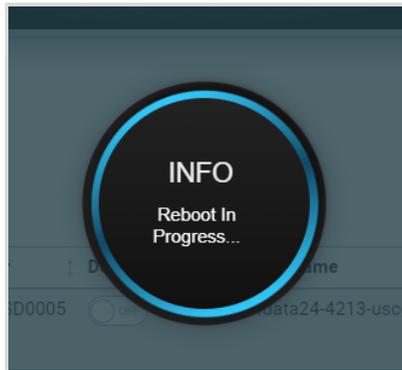
Reboot is immediate and cannot be cancelled. This will render the device unavailable until the reboot is complete.

CANCEL PROCEED

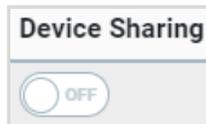
Step 4: Click **Proceed** to disable sharing for the chosen device:



A "Reboot in Progress..." message appears, and the device reboots.



Step 5: Verify that the **Device Sharing** toggle next to the disabled device appears as **Off**.



Step 6: Repeat the previous steps to disable sharing for additional devices.

4.2.7 Maintenance

For the OpenFlex Data24 4000 Series, maintenance includes the options to reboot, put a device to sleep, and factory reset the enclosure.

4.2.7.1 Rebooting a Storage Device

This task provides instructions for rebooting an OpenFlex™ Data24 4000 Series storage device using the OCGUI.

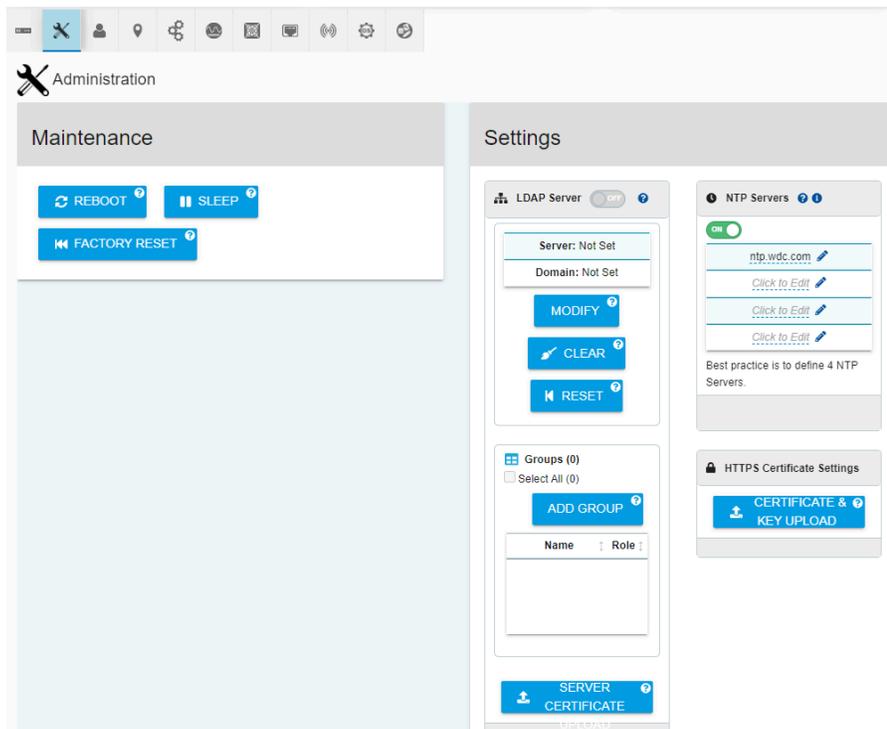
i Attention: Always confirm that the enclosure status is "Healthy" after changing settings to ensure that the system is operating properly.

Step 1: Navigate to the storage device. Refer to [Navigating to a Device \(page 127\)](#).

Step 2: Click the storage device's **Administration** icon:



The **Administration** information appears:



Step 3: Click the **Reboot** button:



A window appears, prompting the user to confirm the reboot:

Are you sure you want to **Reboot** this device?

Reboot is immediate and cannot be cancelled. This will render the device unavailable until the reboot is complete.

CANCEL REBOOT

Step 4: Click **Reboot**:

REBOOT

Step 5: The storage device will reboot, rendering it unavailable until the reboot is complete.

4.2.7.2 Putting the Storage Device to Sleep

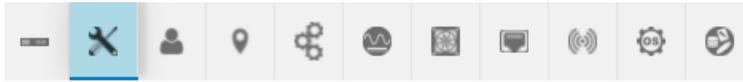
This task provides instructions for putting the storage device to sleep using the OCGUI.



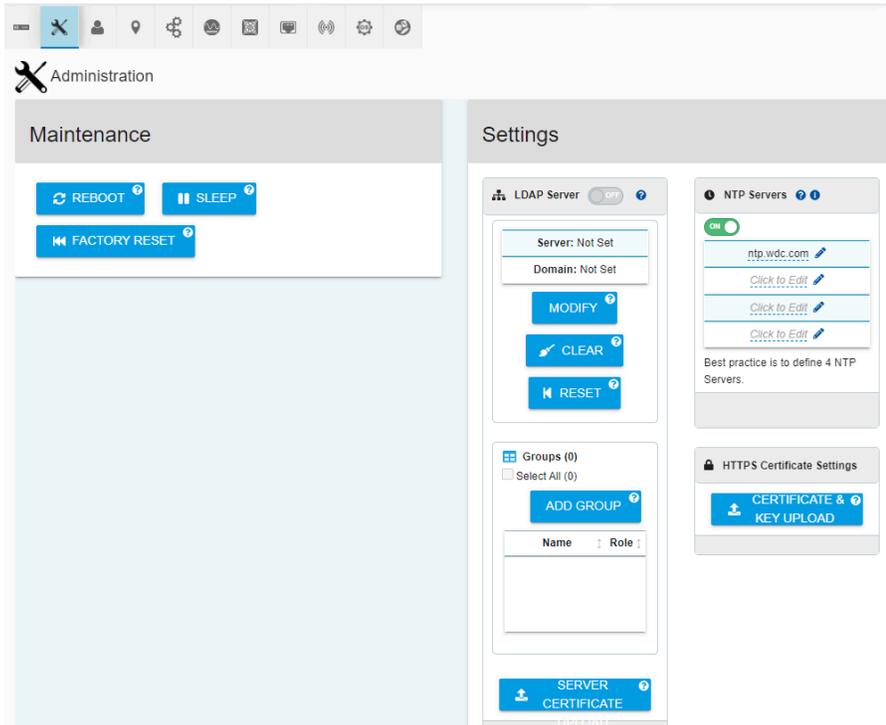
Attention: Always confirm that the enclosure status is "Healthy" after changing settings to ensure that the system is operating properly.

Step 1: Navigate to the storage device. Refer to [Navigating to a Device \(page 127\)](#).

Step 2: Click the storage device's **Administration** icon:



The **Administration** information appears:



Step 3: Click the **Sleep** button:



A window appears, prompting the user to confirm the reboot:

Are you sure you want to put this device into **Low Power Mode (Sleep)** ?

This will render the some DEVICE COMPONENTS OFFLINE until Powered On.

▲* The Fabric Adapter Cards will be powered off and will lose any network fabric connectivity including DATA IO and MANAGEMENT COMMAND capability from the Host Initiator network path.**

Use the Enclosure Management network connection to Power On.

CANCEL SLEEP

Step 4: Click **Sleep**:

SLEEP

Step 5: The storage device will go to sleep, rendering it unavailable.

4.2.7.3 Factory Resetting a Storage Device

This task provides instructions for factory resetting on an OpenFlex Data24 4000 Series storage device using the OCGUI.

Before you begin: The Factory Reset feature does the following:

- Sets the network setting back to default (100G and 1G ports on both IOMs)
- Set NTP time settings back to the default (Management port)
- All devices will be powered on (default)
- Re-enables disabled drives (power on drives upon factory reset)
- Set enclosure name back to default
- Reset user accounts and authentication (drop/recreate read/write partition, deleting all user created data and authentication accounts)



Attention: A Factory Reset should not be done while there are active connections. Factory resets cannot be performed if the system is in Sleep Mode.

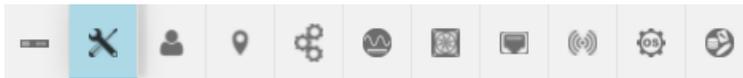


Attention: Always confirm that the enclosure status is "Healthy" after changing settings to ensure that the system is operating properly.

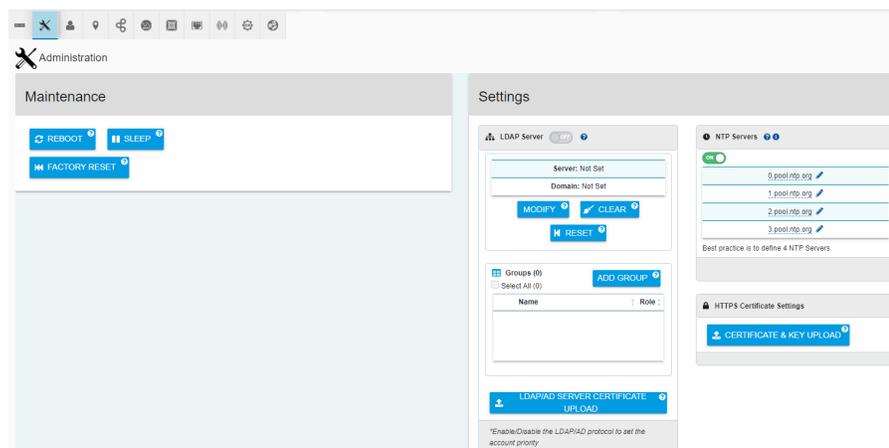
Step 1: Navigate to the storage device. Refer to [Navigating to a Device \(page 127\)](#).

Performing the Factory Reset

Step 2: Click the storage device's **Administration** icon:



The **Administration** information appears.:



Step 3: Click the **Factory Reset** button:



A window appears, prompting the user to confirm the Factory Reset.

Are you sure you want to **Factory Reset** this device?

This will return the Device to Factory fresh settings (resets system configuration). Loss of connectivity may occur when default credentials are restored. This cannot be undone and will render the device unavailable until complete.

CANCEL FACTORY RESET

Step 4: Click **Factory Reset**:

FACTORY RESET

The GUI session will end and the enclosure will reboot.

Result: The enclosure will shut down and automatically restart once the factory reset procedure is complete.

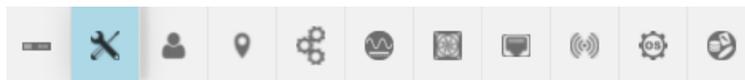
4.2.7.4 Enabling LDAP on a Storage Device

This task provides instructions to enable LDAP on a OpenFlex Data24 4000 Series storage device using the OCGUI.

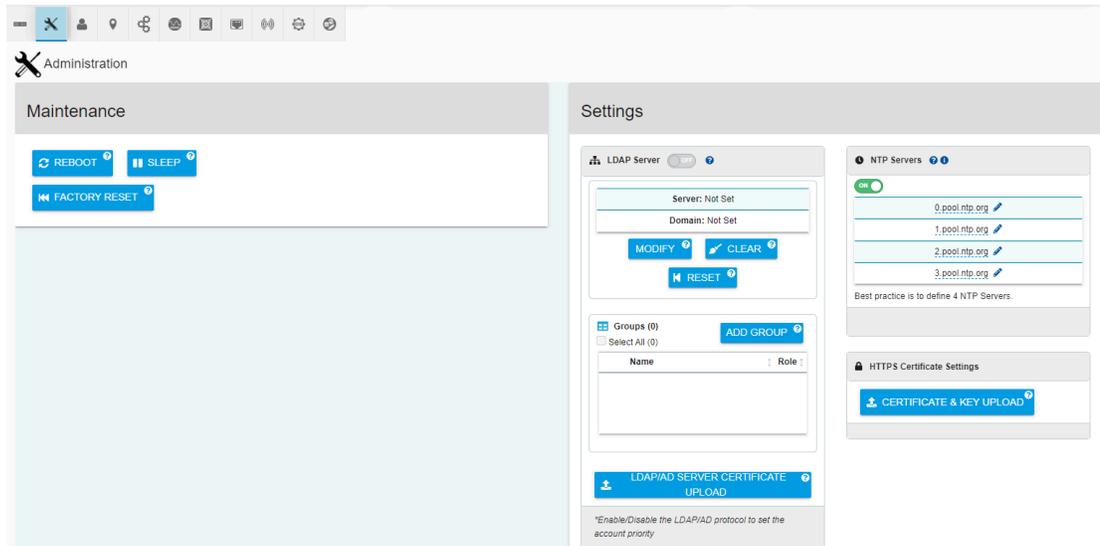
i Attention: Always confirm that the enclosure status is "Healthy" after changing settings to ensure that the system is operating properly.

Step 1: Navigate to the storage device. Refer to [Navigating to a Device \(page 127\)](#).

Step 2: Click the storage device's **Administration** icon:



The **Administration** information appears.:



Step 3: From the LDAP Server section, click **MODIFY** .



The LDAP / AD window will appear.



CANCEL

Step 4: Type a Hostname or IP Address and LDAP Domain in the fields of the LDAP / AD window.

LDAP / AD

(Lightweight Directory Access Protocol) / (Active Directory)

LDAP Server	10.20.30.40	LDAP Domain	wdc.com
Hostname or IP Address	11 / 256	companyname.com (net, org, edu, etc.)	7 / 256

- Disabled

UPDATE

CANCEL

Step 5: Click **UPDATE**.

UPDATE

The LDAP / AD window will close and the IP Address and the Hostname will update in the LDAP Server section.

LDAP Server

OFF ?

Server: 10.20.30.40

Domain: wdc.com

MODIFY ? **CLEAR** ?

RESET ?

Groups (0) **ADD GROUP** ?

Select All (0)

Name	Role
------	------

LDAP/AD SERVER CERTIFICATE UPLOAD ?

**Enable/Disable the LDAP/AD protocol to set the account priority*

Step 6: Click **ADD GROUP**.

ADD GROUP ?

The Add Group window will appear.

LDAP / AD

Add Group

Group Name 0 / 64

Select A Role

Admin ReadOnly

ADD GROUP

Status:

CLOSE

Step 7: Type a Group Name and select a role from the options.

LDAP / AD

Add Group

Group Name 10 / 64

Select A Role

Admin ReadOnly

ADD GROUP

Status:

CLOSE

Step 8: Click **ADD GROUP**.

ADD GROUP ?

The Group and Role are added to the LDAP Server section.

LDAP Server OFF ?

Server: 10.20.30.40

Domain: wdc.com

MODIFY ? CLEAR ?

RESET ?

Groups (1) ADD GROUP ?

Select All (0)

Name	Role
<input type="checkbox"/> John Smith	Admin

LDAP/AD SERVER CERTIFICATE UPLOAD ?

**Enable/Disable the LDAP/AD protocol to set the account priority*

Step 9: From the Add Group window, click **Close**.

CLOSE

Step 10: From the LDAP Server, click **MODIFY**.

MODIFY ?

The LDAP / AD window appears.

LDAP / AD

(Lightweight Directory Access Protocol) / (Active Directory)

LDAP Server	10.20.30.40	LDAP Domain	wdc.com
Hostname or IP Address	11 / 256	companyname.com (net, org, edu, etc.)	7 / 256

- Disabled

UPDATE

CANCEL

Step 11: From the LDAP / AD window, click the **Disabled** option slider to enable the LDAP Server. The slider option will now display as Enabled.

LDAP / AD

(Lightweight Directory Access Protocol) / (Active Directory)

LDAP Server	10.20.30.40	LDAP Domain	wdc.com
Hostname or IP Address	11 / 256	companyname.com (net, org, edu, etc.)	7 / 256

- Enabled

UPDATE

CANCEL

Step 12: Click **UPDATE**.

UPDATE

The LDAP Server section updates and the LDAP Server displays as ON.

LDAP Server ON ?

Server: 10.20.30.40

Domain: wdc.com

MODIFY ? **CLEAR** ?

RESET ?

Groups (1) **ADD GROUP** ?

Select All (0)

Name	Role
<input type="checkbox"/>  John Smith	Admin

LDAP/AD SERVER CERTIFICATE UPLOAD ?

**Enable/Disable the LDAP/AD protocol to set the account priority*

4.3 Firmware Upgrade

The following section provides the necessary information and procedures to execute firmware upgrades on the OpenFlex Data24 4000 Series and sub-assemblies contained within the system.

4.3.1 Downloading Firmware from the Support Portal



Note: The product must be registered in order to download firmware updates.

Step 1: Open a web browser and go to: <https://portal.wdc.com/Support/s/>.

The **Western Digital Enterprise Support Center** will appear.

Step 2: Log in to the **Western Digital Enterprise Support Center** using a valid email address and password:



Note: If you do not have registered Western Digital account, you may request one by clicking **Request access now** and selecting **Enterprise Support** from the access options before proceeding with the request.

Sign Into **Western Digital.**
BUSINESS SUPPORT CENTER

User Name / Email Address

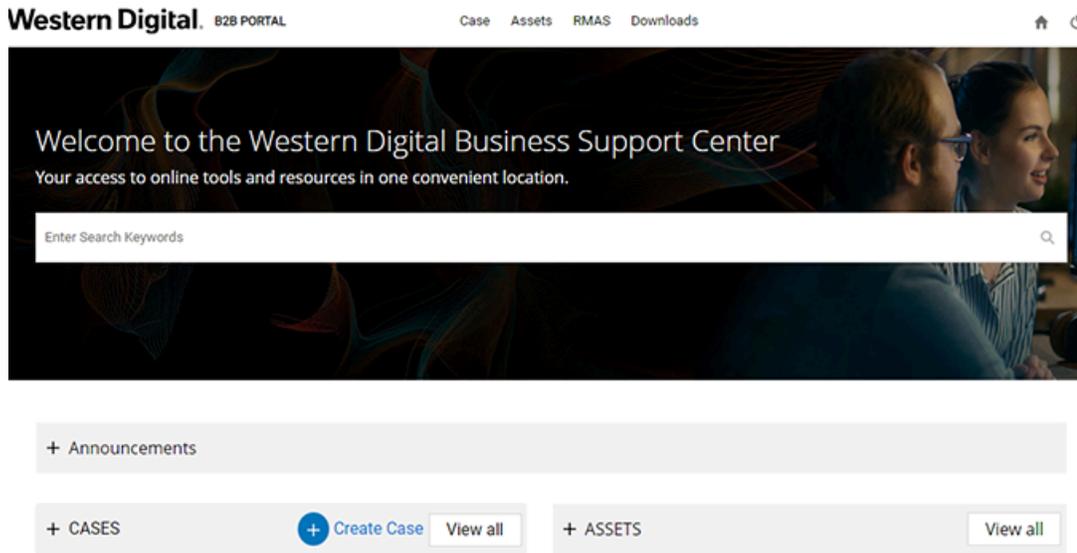
Password

[Login](#)

[Forgot Password?](#)

[Need an account?
Request access now.](#)

The support portal will appear.

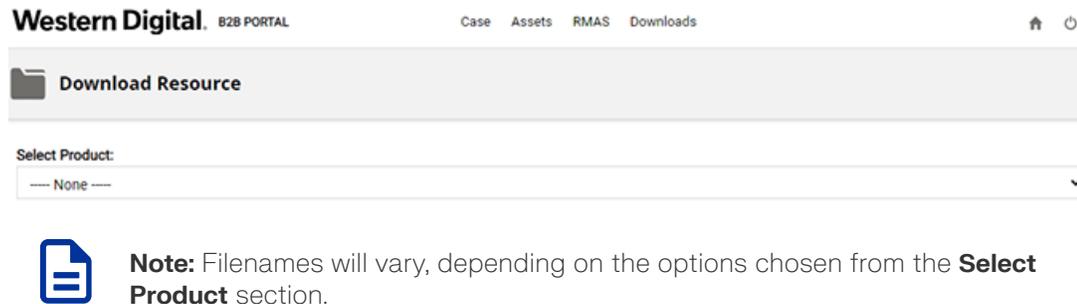


Step 3: Click the **Downloads** option from the top banner.

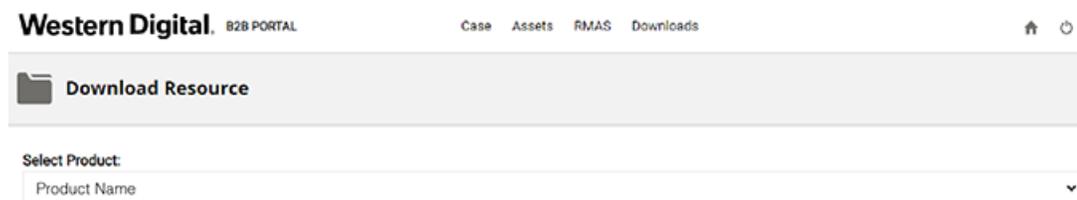
Downloads

The Western Digital downloads page will appear.

Step 4: Choose a product from the **Select Product** dropdown list.



The product specific downloads will appear in the Download Resources section.



Step 5: Expand a download option by clicking the caret next to the chosen category until files are displayed.

Please select the caret to expand each menu.

Select an option:

- > [Change-Notices](#)
- > [Datasheets](#)
- > [Documentation](#)
- > [Enclosure-Tools](#)

Step 6: Download a file by clicking the chosen file.

Please select the caret to expand each menu.

Select an option:

- > -Change-Notices
- ▼ -Chassis-Firmware
 - ▼ -Current-2000-004
 - Documentation
 - Firmware**
 - > Archive-0100-001
 - > Archive-0101-003
 - > Archive-0103-003
 - > Archive-1040-001
 - > -Documentation

Click on the filename to download

File Name	Size	Release Date
Firmware_File	9.76 MB	Jul 20, 2022

The file will automatically download.

4.3.2 Upgrading Firmware

This task provides instructions for upgrading firmware on the OpenFlex Data24 4000 Series using the OCGUI.

Before you begin:



Attention: Ensure that there are no control/configuration operations occurring during the firmware upgrade.

Step 1: The latest version of firmware must be downloaded before continuing this upgrade procedure. If the firmware has not been downloaded, follow the instructions in [Downloading Firmware from the Support Portal \(page 166\)](#).

Step 2: Click the device's **OS** icon:

Figure 265: Storage Device OS Icon

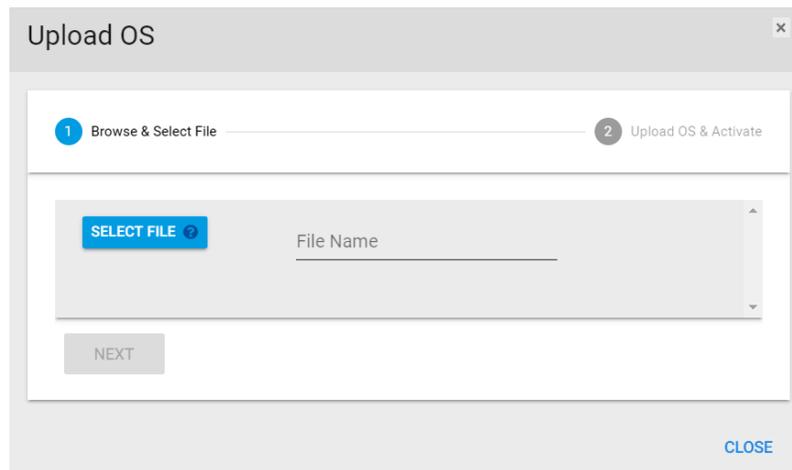
The **Device OS** information appears:

Figure 266: Storage Device OS Information

Step 3: Click the **Update OS** button:



The **Update OS** window appears, showing the **Browse & Select File** step:



Step 4: Click **Select File**, navigate to the location of the new firmware download, select the file, and click **Open**.



The **Upload OS** window updates to display the selected file:

Step 5: Click the **Next** button:



Note: This upload may take up to a few minutes.



The **Upload OS** window updates to show the **Upload OS & Activate** step:

Step 6: Click the checkbox beside **Please Confirm**. Then click the **Upload** button:



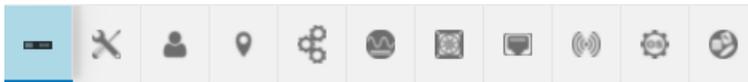
The **Upload OS** window updates, showing an upload status:

Step 7: After the device has rebooted, click the storage device's **OS** icon:

The **Device OS** information appears:

Step 8: Review the **Device OS** information to verify the firmware version by selecting the device and going to the Device Logs.

Step 9: Click the storage **Device Information** icon:



The **Device Information** appears:

Device Information

ofdata24-4213-usc0s04023sb000b 

DEVICE LOGS 

Attribute	Value
ID	ofdata24-4213-usc0s04023sb000b
SerialNumber	USCOS04023SB000B
Model	OpenFlex Data24 4213
Manufacturer	WDC
Controller	IO MODULE B (Browser Current Viewpoint)
TotalCapacity	92.18 TB (92178143576064 Bytes)

Step 10: Click the **Device Logs** button:



The **Device Log Viewer** appears:

Step 11: Select the **Build Info** log type by clicking its radio button.

The **Device Log Viewer** updates to show the Build Info log information, which can then be exported by clicking the **Export** button at the bottom of the viewer:

4.3.3 Drive Firmware Upgrade

This section provides instructions for updating drives firmware on the OpenFlex Data24 4000 Series using NVMe-CLI.

Before you begin:



Attention: Ensure that all drive I/O has been halted before initiating any drive firmware updates.

Prerequisites

- NVMe-CLI
- Supported OS
- Device identifier(s) for drives that will be updated.
- This procedure assumes that the targeted NVMe device has already been connected. For an example of how to connect a device see [Discovering and Connecting to NVMe Devices using the Open Composable API \(page 111\)](#).



Note: Only one drive may be updated using a single data port. Multiple drives may be updated at a time using multiple data ports.

Step 1: Follow the instructions in [Downloading Firmware from the Support Portal \(page 166\)](#) to download the firmware file to an appropriate location on the host.

Step 2: Use `fw-log` to verify the current firmware on the target NVMe device.

```
nvme fw-log /dev/nvme3
```

The NVMe device firmware information is displayed.

```
Firmware Log for device:nvme3
afi : 0x22
frs1 : 0x3330303930313252 (R2109003) - FW Slot 1 r.o.
frs2 : 0x3330303930313252 (R2109003) - FW Slot 2 r/w
frs3 : 0x3030323930323252 (R2209200) - FW Slot 3 r/w
frs4 : 0x3330303930313252 (R2109003) - FW Slot 4 r/w
```

- **frs<number>**: represents one of four firmware slots on each drive
- **R<number>**: represents firmware file residing in that slot
- **frs1**: is a read-only slot and all other slots are read/write
- The first afi number, occurring after the **0x**, represents the currently active firmware slot (e.g. **0x22**)
- The second afi number **0x**, occurring after the, represents the firmware slot that will be active after next drive reset/restart (e.g. **0x33**). 'afi: 0x33' indicates that the firmware in Slot 3 is currently active and will remain active after next drive reboot/reset.

Step 3: Use `fw-download` to load the new drive firmware onto the target NVMe device.

```
nvme fw-download /dev/nvme3 -f /<path-to-fw-file>/<drive_fw>.vpkg
```

The firmware is downloaded.

Step 4: Use `fw-activate` to activate firmware and commit to install the loaded firmware version.

```
nvme fw-activate /dev/nvme3 -s 3 -a 3
```



Note: When updating drive firmware use `nvme fw-activate` action 3.

The firmware is successfully committed and the SSDs will reset.

Step 5: Confirm the firmware version that is now loaded on the drive use `fw-log` and review the output.

```
nvme fw-log /dev/nvme3
```

The NVMe device firmware information is displayed.

```
Firmware Log for device:nvme3
afi : 0x33
frs1 : 0x3330303930313252 (R2109003)
frs2 : 0x3330303930313252 (R2109003)
frs3 : 0x3030323930323252 (R2209200)
frs4 : 0x3330303930313252 (R2109003)
```

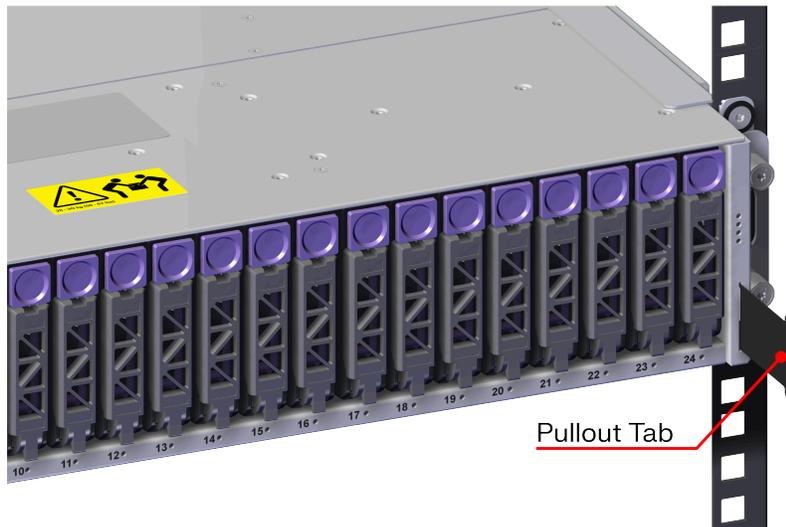
Step 6: Verify that the expected firmware slot is active under 'afi' by confirming both the first and second afi values are the same. This ensures that the firmware stays persistent after drive reboot/reset. The API Firmware data does not update until the drive or the enclosure is rebooted.

Step 7: Repeat this procedure in order to upgrade the remaining drives.

4.4 Enclosure Pullout Tabs

There is a small plastic tab located on the front of the Chassis that can be pulled out to show the vital system details such as the part number, serial number, and chassis revision number.

Figure 279: Chassis Pullout Tab Location



4.5 In-band Enclosure Management

The OpenFlex Data24 4000 Series provides In-Band Enclosure Management functionality through the OCAPI and OCGUI. To leverage the In-Band Management features, users must install a standalone version of the openflex-api software onto an initiator or host and connect a management device that is presented up to the fabric via the IOM and discoverable using `nvme discover`.

4.6 NVMe-CLI

NVMe-CLI is an open-source management tool for NVMe storage devices in Linux. The tool allows users to manage device firmware, erase data securely, output error logs, and other similar management functions. It is a command-line utility and can be used to script management functions for large storage arrays.



Note: OpenFlex Data24 4000 Series supports a minimum version of NVMe-CLI 1.16.

To install NVMe-CLI on Ubuntu 24.04:

```
sudo apt-get install -y nvme-cli
```

To Install NVMe-CLI on RHEL 9.2:

```
sudo yum install nvme-cli
```

For further details on NVMe-CLI see the following resources:

- [NVMe-CLI Debian Manpages](#)

- [General NVMe-CLI Information from nvmexpress.org](http://nvmexpress.org)

4.6.1 Supported NVMe-CLI Commands

Table 34: NVMe-CLI Fabric Commands

Command	Support Details
connect	Supported
connect-all	Supported
disconnect	Supported
disconnect-all	Supported
discover	Supported
fw-download (drives only)	Supported
fw-activate (drive only)	Supported
fw-log	Supported
nvme-device-self-test	Supported
reset (drives only)	Supported
format	Supported

4.6.2 Unsupported NVMe Drive Level Commands

The following is a list of unsupported NVMe drive level commands for OpenFlex Data24 4000 Series .

Table 35: Unsupported NVMe

Drive Command
NVMe-MI Send/Receive
Directive Send/Receive
Virtualization Management
Doorbell Buffer Config
Reservations
ZNS



Safety

In This Chapter:

- Electrostatic Discharge.....	176
- Optimizing Location.....	176
- Power Connections.....	176
- Power Cords.....	176
- Rack-Mountable Systems.....	177
- Safety and Service.....	177
- Safety Warnings and Cautions.....	178

5.1 Electrostatic Discharge



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.

5.2 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 with 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.
- Keep the unit away from direct strong magnetic fields, excessive dust, and electronic/electrical equipment that generate electrical noise.

5.3 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 and 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.

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.

5.4 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.

5.5 Rack-Mountable Systems

CAUTION: Always install rack rails and storage enclosure according to OpenFlex™ Data24 4000 Series 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 (T_{ma}) 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.

5.6 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 OpenFlex™ Data24 4000 Series .



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.

5.7 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.



Regulatory

In This Chapter:

- Country Certifications.....	180
- Electromagnetic Compatibility (EMC) Class A Compliance.....	180
- Restricted Access Location.....	180
- Regulatory Statement of Compliance.....	180
- Europe (CE Declaration of Conformity).....	181
- FCC Class A Notice.....	181
- ICES-003 Class A Notice—Avis NMB-003, Classe A.....	182
- Japanese Compliance Statement, Class A ITE.....	182
- South Korea Warning Label Statement, Class A ITE.....	182
- Taiwan Warning Label Statement, Class A ITE.....	183

6.1 Country Certifications

Table 36: Country Certifications

Country/Region	Authority or Mark
Australia/New Zealand	RCM
European Union	CE
Great Britain	UKCA
Israel	SII
Japan	VCCI
Korea	MSIP
North America (Canada, USA)	Nemko
Taiwan	BSMI

6.2 Electromagnetic Compatibility (EMC) Class A Compliance

The DCS0011 complies with and conforms to the latest international standards as applicable:

Emissions

- AS/NZS CISPR 32
- CISPR 32 Edition 6
- CNS 13438
- FCC CFR 47 Part 15, Subpart B
- ICES-003, Issue 7
- IEC 55032
- KN32
- VCCI V-3

Immunity

- IEC 55035
- KN35

6.3 Restricted Access Location

The OpenFlex™ Data24 4000 Series 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

6.4 Regulatory Statement of Compliance

Product Name: **OpenFlex™ Data24 4000 Series**

Regulatory Model: DCS0011

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.

- BS EN 62368-1
- CAN/CSA-C22.2 No. 62368-1-14 (R2019)
- CNS 14336-1
- IEC 62368-1, Second Edition Am1, Am2
- UL 62368-1, Second Edition Am1, Am2

6.5 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.

- Ecodesign Directive (2019/424/EU)
- RoHS Directive 2011/65/EU

UK Import Representation Contact

PO Box 471
Leatherhead KT22 2LU
UK

Telephone: +44 1372 366000

EU Import Representation Contact

BP 80006
92135 Issy les Moulineaux, France

6.6 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.

- 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.

6.7 ICES-003 Class A Notice—Avis NMB-003, Classe A

This Class A digital apparatus complies with Canadian ICES-003.

Cet appareil numérique de la classe A est conforme à la norme NMB-003 du Canada.

6.8 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情報技術装置です。この装置を家庭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.

6.9 South Korea Warning Label Statement, Class A ITE

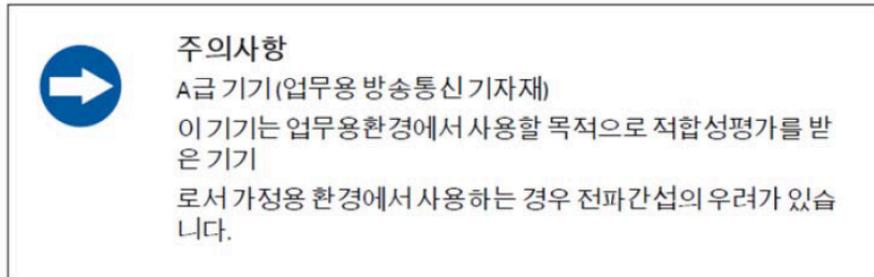


NOTICE

Class A equipment (equipment for business use).

This equipment has been evaluated for its suitability for use in a business environment.

When used in a residential environment, there is a concern of radio interference.



6.10 Taiwan Warning Label Statement, Class A ITE

警告:

為避免電磁干擾，本產品不應安裝或使用於住宅環境

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.

Safety warnings:

請仔細閱讀以下說明

1. 本設備勿置于潮濕處。
2. 連接至電源前，請先檢查電壓。
3. 當設備不用時，請將電源綫拔除避免電壓不穩而造成傷害。
4. 勿將任何液體濺入設備中，避免綫路短路。
5. 基于安全理由，只有受到專業訓練的從業人員，才可以打開本設備。
6. 請勿自行調整或修理已通電的設備，以確保您的安全。
7. 如不小心受傷，請立刻找急救人員給予您適當的救護，千萬別因傷勢輕微而忽略自己的傷勢。

English translation:

Please read the following instructions carefully

1. Do not place the device in a humid place.
2. Check the voltage before connecting to the power source.
3. When the device is not in use, please unplug the power cord to avoid injury due to unstable voltage.
4. Do not spill any liquid into the equipment to avoid short circuits.
5. For safety reasons, only practitioners who have received professional training can open the device.
6. Please do not adjust or repair the powered equipment by yourself to ensure your safety.
7. If you are accidentally injured, please find emergency personnel to give you proper first aid immediately. Don't ignore your injury because of the minor injury.