Western Digital.

User Guide

OpenFlex™ Data24

FW Version 5.2.0
Regulatory Model: DCS0010
D018-000331-000
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January 2024

Table of Contents

Revision History

Date	Revision	Comment
August 2021	2.0	Initial release for version 2.0
November 2021	01	Changed document number from 1ET2228 to D018-000331-000 **Note:** The revision numbering has been updated to a new scheme and will begin with 01.
December 2021	02	Updated the Supported Operating Systems *(page 22)*. Updated the Supported SKUs *(page 22)*. Updated the List of CRUs *(page 25)*. Added the IO Module (IOM) w/ Two AICs *(page 30)* in the Components chapter. Updated API and GUI content in Management *(page 108)* chapter. Added the Drive Firmware Upgrade section to the Management *(page 108)* chapter. Updated the Device Installation Order *(page 173)* section to include the IOM w/ 2 AICs. Added the In-band Management features in the Configuration *(page 172)* chapter. Added the South Korea Warning Label Statement, Class A ITE *(page 235)*.
January 2022	03	Added the Drive Firmware Upgrade section to the Management *(page 108)* chapter.
February 2022	04	Added the Cable Management Arm (CMA) Assembly information to the List of CRUs *(page 25)*, Components *(page 27)*, and Support *(page 38)* (CRU replacements) sections. Created the Cable Management *(page 39)* section.
March 2022	05	Updated the Supported SKUs *(page 22)*
April 2022	06	Updated the Best Practices *(page 17)* Updated the Limitations & Restrictions *(page 19)*
August 2022	07	Added Enabling LDAP on a Storage Device *(page 151)* Added Third Party devices to the List of Compatible Devices *(page 11)*
September 2022	08	Rebranded document to new Western Digital design
April 2023	09	Added TCG-FIPS devices to the List of Compatible Devices *(page 11)* Updated the Supported Operating Systems *(page 22)* Added TCG-FIPS to the Supported SKUs *(page 22)*

Date	Revision	Comment
December 2023	10	Added Ultrastar SN655 devices to the List of Compatible Devices *(page 11)*
		Added Ultrastar SN655 SKUs to the Supported SKUs *(page 22)*
January 2024	11	Updated the List of Compatible Devices *(page 11)*

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Overview

In This Chapter:

1.1 OpenFlex™ Data24 Overview

The OpenFlex™ Data24 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 Data24is a Just-a-Bunch-Of-Flash (JBOF) platform that leverages this OCI approach in the form of disagreggated 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—will vastly improve compute and storage utilization, performance, and agility in the data center.

Open Composable API

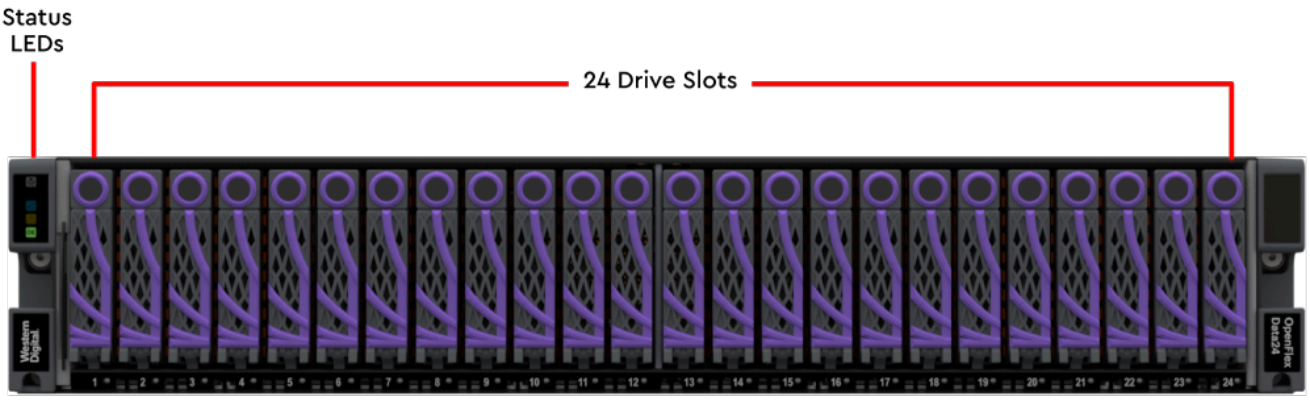
Western Digital's Open Composable API is a REST interface designed for data center composability. It builds upon existing industry standards utilizing the best features of those standards as well as practices from proprietary management protocols.[1]

Features

- 368TB Max Storage Capacity[2]
- 100Gbps NVMe-oF
- 29.7 kg / 65.5 lbs.
- 200 - 240Vac Input Voltages
- 2U Form Factor
- Dual 2000W PSUs
- Operational Temperature: 10°C to 35°C

1.2 Design Details

On the front of the OpenFlex Data24 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 6)* section.



The rear of the platform contains the Power Supply Units (PSUs) and IO Modules (IOMs). The System Fans are accessible from the top of the unit via a latch cover, which can be accessed by extending the unit out of the rack. All of these components are hot-swappable and do not require tools to replace.

Figure 3: Single AIC Configuration

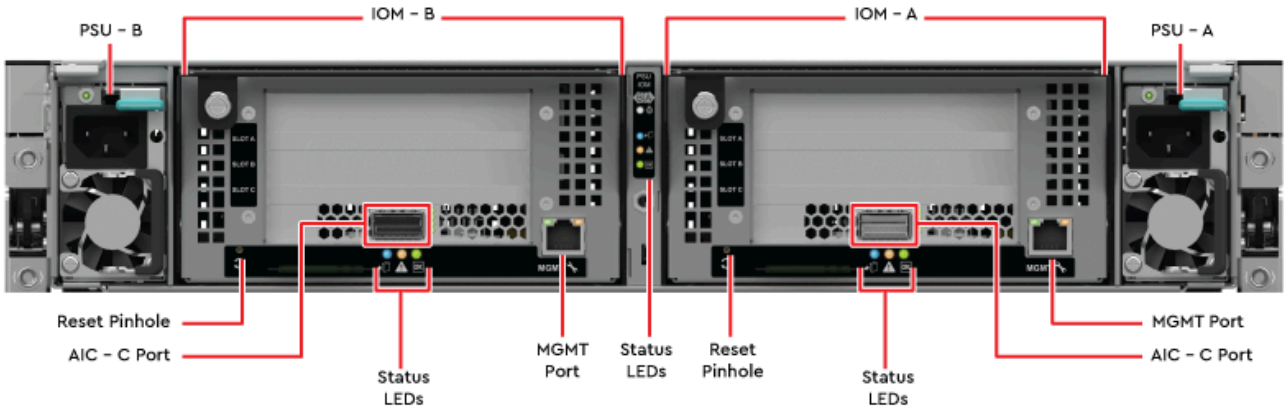


Figure 4: Two AIC Configuration

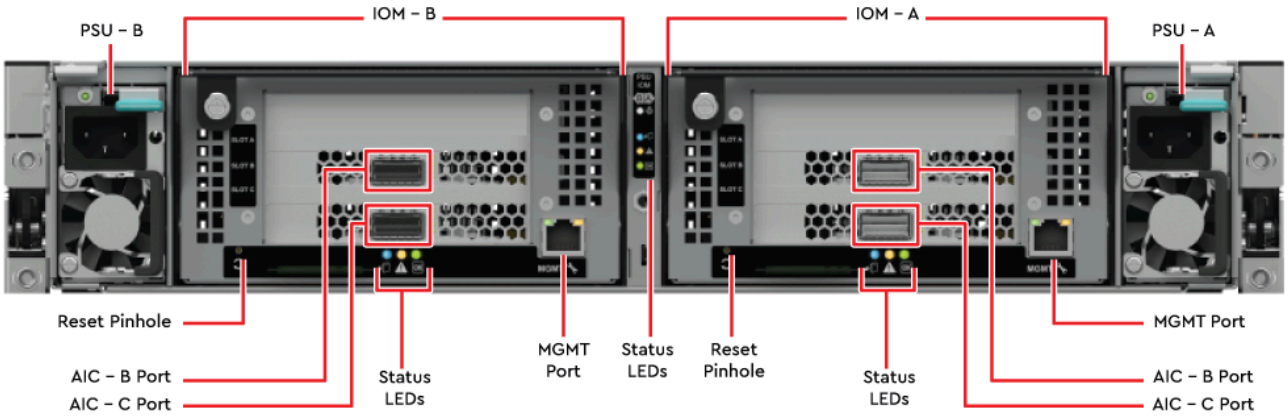
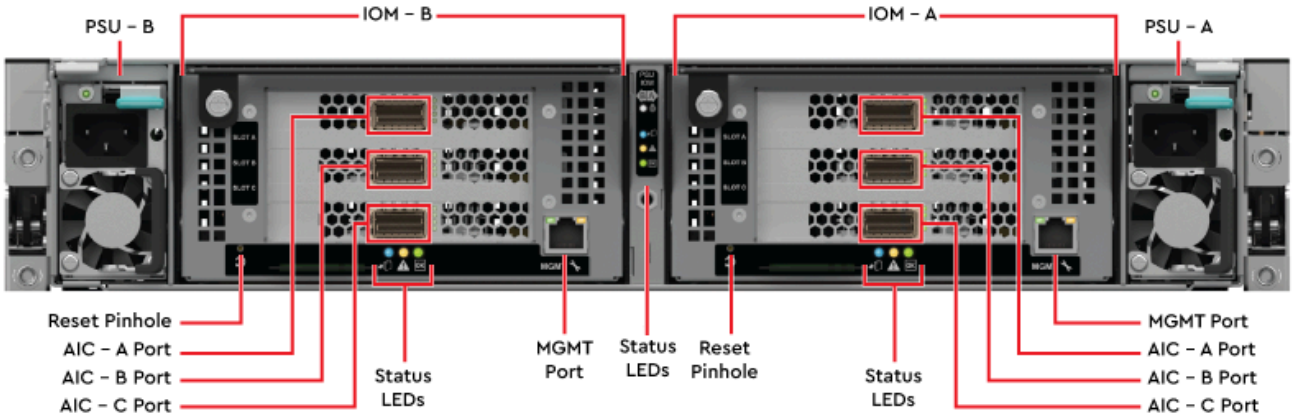
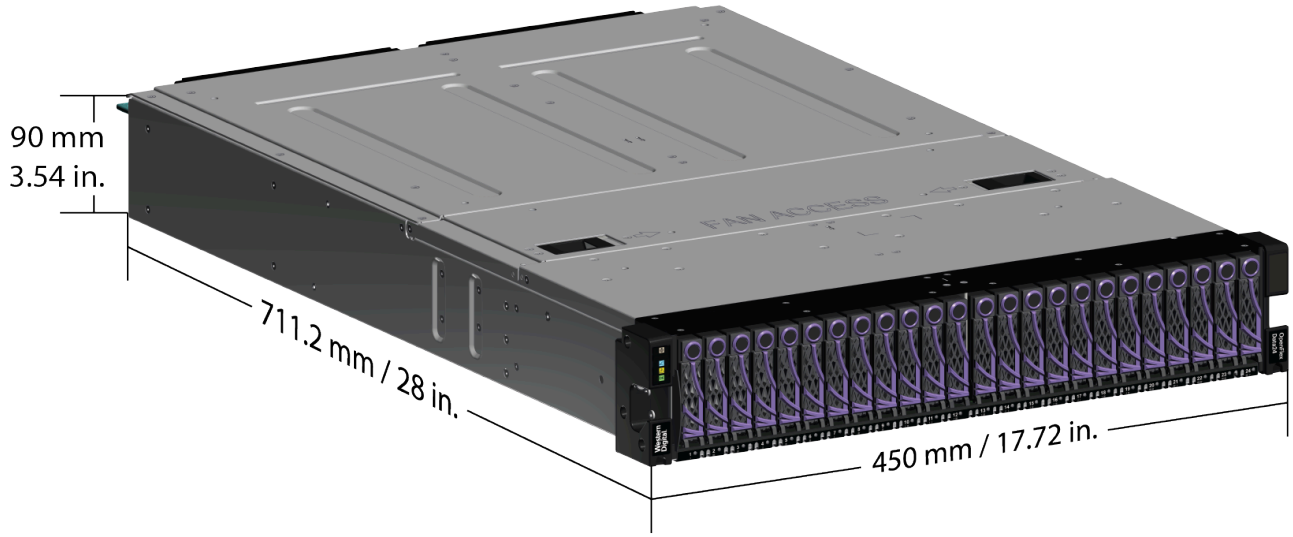


Figure 5: Three AIC Configuration



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. Both of the systems IOMs will be factory reset when initiating the reset using the Reset Pinhole on a single IOM.

The enclosure measures 450 mm/17.72 in. wide by 711.2 mm/28 in. long. The height is 90 mm/3.54 in. or 2U.



1.2.1 LEDs

The OpenFlex Data24 contains LEDs on the enclosure, PSU, system fans, 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 6: Enclosure LEDs (displaying three AIC configuration)

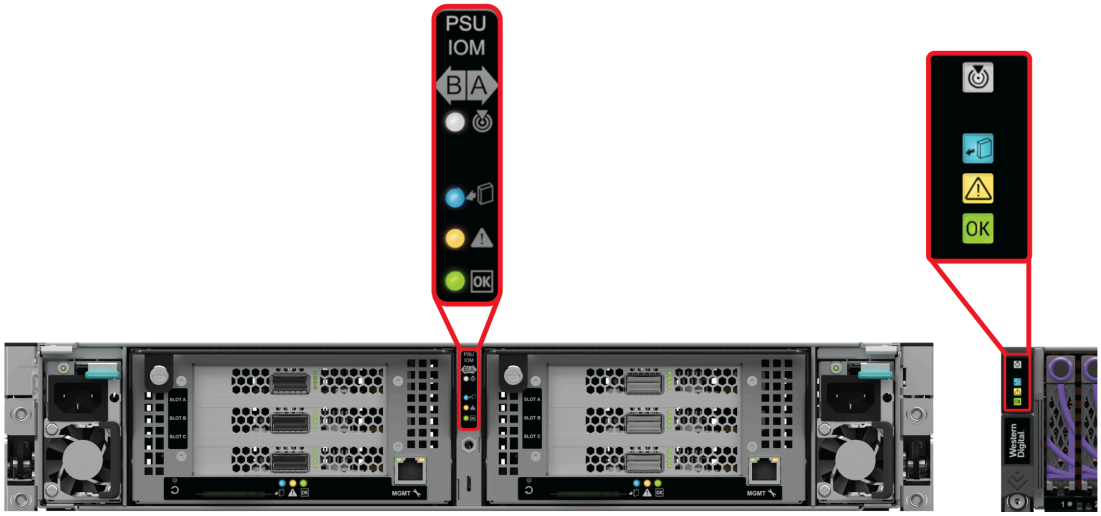


Table 2: Enclosure LED Flash Patterns

LED Name	LED Icon	Color	Behavior
Identification		White	**Blink @ 1 Hz:** Blinks only when Identification has been activated. **Off:** Enclosure not being identified/ located
Service		Blue	No LED behaviour (unused)
Fault		Amber	**Solid:** Enclosure has a fault **Off:** Enclosure has no fault
Power	OK	Green	**Blink @ 1Hz:** Enclosure is booting **3Hz Quick Flash:** Enclosure is in low-power mode. **Solid:** Enclosure is powered on **Off:** Enclosure is powered off

Power Supply Unit (PSU) LED

Figure 7: Power Supply Unit (PSU) LED

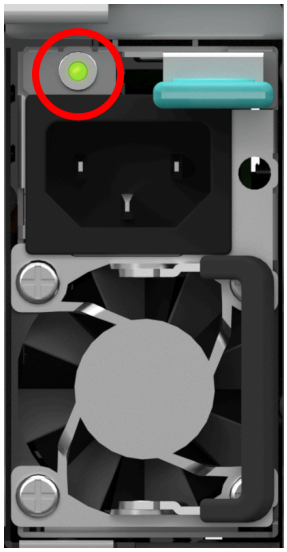


Table 3: Power Supply Unit (PSU) LED Flash Patterns

LED Name	Color	Behavior
Multi-function LED	Green	**Solid:** PSU is on and reporting no faults **Blinking @ 2Hz:** PSU in firmware update mode **Blinking @ 3Hz:** PSU is in Low Power 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

System Fan LED

Figure 8: System Fan LED

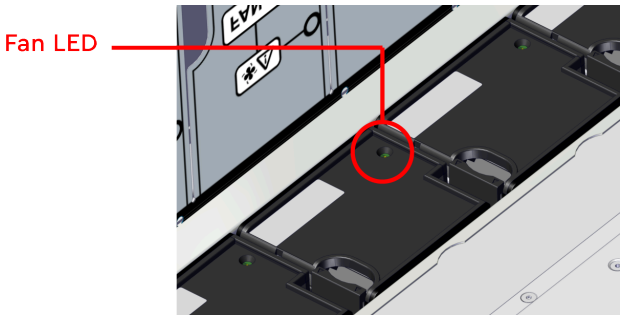


Table 4: System Fan LED Flash Patterns

LED Name	Color	Behavior
LED	Amber	**Solid:** Critical Failure **Blinking @ 2 Hz:** Fan is reporting a fault **Off:** Fan is on and reporting no faults

Drive Assembly LED

Figure 9: Drive Assembly LED

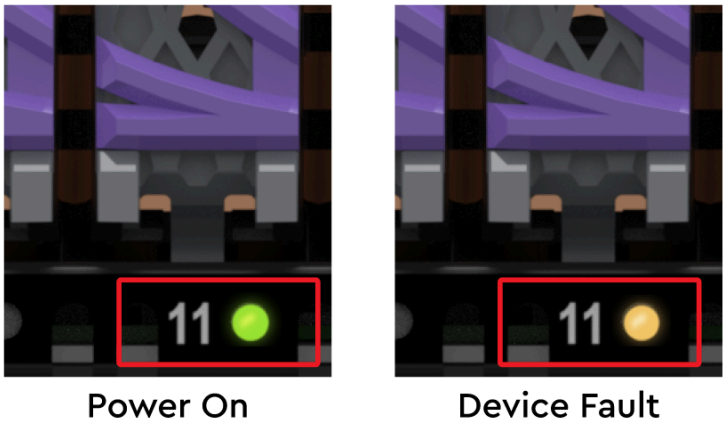


Table 5: Drive Assembly LED Flash Patterns

LED Name	Color	Behavior
Status	Green/Amber	**Green:** Device is Powered On **Flashing Green:** Activity **Amber:** Device has fault **Off:** Device is Powered Down

IO Module (IOM) LEDs

Figure 10: IO Module (IOM) LEDs

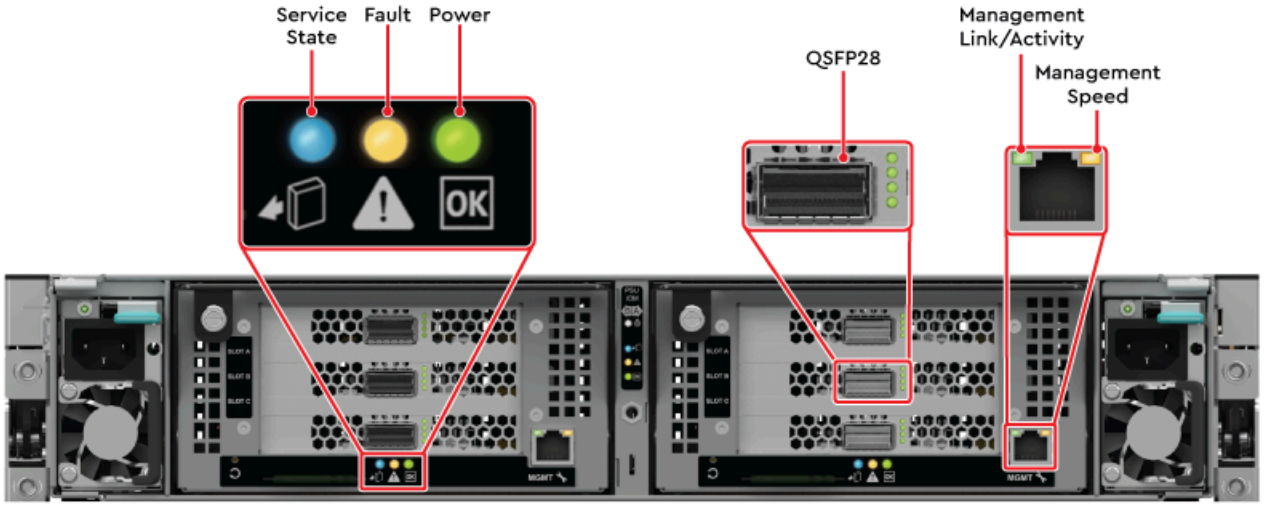
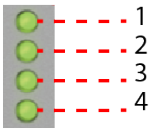


Table 6: IOM LEDs Flash Patterns

LED Name	Color/Number	Behavior
RJ45 Management Port Ethernet Link/Activity	Green	**Off:** No Connection **Solid:** Connected **Blink:** 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 	1 - QSFP28 (left port)	**Green Blinking:**Activity **Off:**No Activity
	2 - QSFP28 (right port - **unused**)	
	3 - Firmware State	**Amber:** Boot Sequence Started or Action Required **Green:** Firmware Up with No Errors
	4 - Hardware and Management State	**Green:** Operational **Off:** Off
Power	Green	**Solid:** IOM is powered on **Off:** IOM is powered off
Service State (**unused**)	Blue	**N/A**
Fault	Amber	**Solid:** Enclosure has a fault **Off:** IOM has no fault

1.2.2 Cables

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

Table 7: 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 8: 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 9: 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
Mellanox QSFP28 to QSFP28 Cable, 10m, AOC	Active	MFA1A00-C010-AO
Amphenol 100G/200G, QSFP28Gb 30AWG, 1m	Passive	NDAAFF-0001
Amphenol 100G/200G, QSFP28Gb 30AWG, 1.5m	Passive	NDAAFF-0006
Amphenol 100G/200G, QSFP28Gb 30AWG, 2m	Passive	NDAAFF-0002
Amphenol 100G/200G, QSFP28Gb 30AWG, 3m	Passive	NDAAFF-0003
Amphenol QSFP28Gb 26AWG, 5m	Passive	NDAAFJ-0004

1.2.3 Servicing Features

Toolless Servicing

All internal system components can be serviced without any additional tools.

All **System Fans** can be removed via an access panel on the top of the system. Each fan has a housing that can be used to safely remove it during servicing.

Power Supply Units (PSUs) and **IO Modules (IOMs)** can be accessed from the rear, and have toolless latching mechanisms.

All **Drive Assemblies** can be hot swapped from the cold-aisle using built-in drive carrier latches.

1.3 List of Compatible Devices

Table 10: Western Digital Device List

Device	Volume[3]	Max Bandwidth[4]	Drive Writes	Encryption	vPart Number
Western Digital Ultrastar DC SN655 SSD w/ Carrier	3.84TB	3.3GB/s	RI-1DW/D	SE	1EX3062
Western Digital Ultrastar DC SN655 SSD w/ Carrier	3.84TB	3.3GB/s	RI-1DW/D	ISE	1EX3065
Western Digital Ultrastar DC SN655 SSD w/ Carrier	3.84TB	3.3GB/s	RI-1DW/D	TCG-FIPS	1EX3068
Western Digital Ultrastar DC SN655 SSD w/ Carrier	7.68TB	3.3GB/s	RI-1DW/D	SE	1EX3063
Western Digital Ultrastar DC SN655 SSD w/ Carrier	7.68TB	3.3GB/s	RI-1DW/D	ISE	1EX3066
Western Digital Ultrastar DC SN655 SSD w/ Carrier	7.68TB	3.3GB/s	RI-1DW/D	TCG-FIPS	1EX3069
Western Digital Ultrastar DC SN655 SSD w/ Carrier	15.36TB	3.3GB/s	RI-1DW/D	SE	1EX3064
Western Digital Ultrastar DC SN655 SSD w/ Carrier	15.36TB	3.3GB/s	RI-1DW/D	ISE	1EX3067

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

4. 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[3]	Max Bandwidth[4]	Drive Writes	Encryption	vPart Number
Western Digital Ultrastar DC SN655 SSD w/ Carrier	15.36TB	3.3GB/s	RI-1DW/D	TCG-FIPS	1EX3070
Western® Digital Ultrastar DC SN840 SSD w/ Carrier	1.6 TB	3.3GB/s	RI-3DW/D	SE	1EX2708
Western Digital Ultrastar DC SN840 SSD w/ Carrier	1.92 TB	3.3GB/s	RI-1DW/D	SE	1EX2753
Western Digital Ultrastar DC SN840 SSD w/ Carrier	3.2 TB	3.3GB/s	RI-3DW/D	SE	1EX2754
Western Digital Ultrastar DC SN840 SSD w/ Carrier	3.2 TB	3.3GB/s	RI-3DW/D	ISE	1EX2924
Western Digital Ultrastar DC SN840 SSD w/ Carrier	3.2 TB	3.3GB/s	RI-3DW/D	TCG	1EX2832
Western Digital Ultrastar DC SN840 SSD w/ Carrier	3.84 TB	3.3GB/s	RI-1DW/D	SE	1EX2706
Western Digital Ultrastar DC SN840 SSD w/ Carrier	3.84 TB	3.3GB/s	RI-1DW/D	ISE	1EX2925
Western Digital Ultrastar DC SN840 SSD w/ Carrier	3.84 TB	3.3GB/s	RI-1DW/D	TCG	1EX2829
Western Digital Ultrastar DC SN840 SSD w/ Carrier	3.84 TB	3.3GB/s	RI-1DW/D	TCG-FIPS	1EX2968
Western Digital Ultrastar DC SN840 SSD w/ Carrier	6.4 TB	3.3GB/s	RI-3DW/D	SE	1EX2794
Western Digital Ultrastar DC SN840 SSD w/ Carrier	6.4 TB	3.3GB/s	RI-3DW/D	ISE	1EX2926
Western Digital Ultrastar DC SN840 SSD w/ Carrier	6.4 TB	3.3GB/s	RI-3DW/D	TCG	1EX2833

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

4. 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[3]	Max Bandwidth[4]	Drive Writes	Encryption	vPart Number
Western Digital Ultrastar DC SN840 SSD w/ Carrier	7.68 TB	3.3 GB/s	RI-1DW/D	SE	1EX2707
Western Digital Ultrastar DC SN840 SSD w/ Carrier	7.68 TB	3.3 GB/s	RI-1DW/D	ISE	1EX2927
Western Digital Ultrastar DC SN840 SSD w/ Carrier	7.68 TB	3.3 GB/s	RI-1DW/D	TCG	1EX2830
Western Digital Ultrastar DC SN840 SSD w/ Carrier	7.68 TB	3.3 GB/s	RI-1DW/D	TCG-FIPS	1EX2923
Western Digital Ultrastar DC SN840 SSD w/ Carrier	15.36 TB	3.3 GB/s	RI-1DW/D	SE	1EX2709
Western Digital Ultrastar DC SN840 SSD w/ Carrier	15.36 TB	3.3 GB/s	RI-1DW/D	ISE	1EX2928
Western Digital Ultrastar DC SN840 SSD w/ Carrier	15.36 TB	3.3 GB/s	RI-1DW/D	TCG	1EX2831
Western Digital Ultrastar DC SN840 SSD w/ Carrier	15.36 TB	3.3 GB/s	RI-1DW/D	TCG-FIPS	1EX2852

Table 11: Third-Party Device List

Device	Volume	Encryption	Drive Firmware	Manufacturer Part Number
Kioxia PCIe® Gen 4-enabled SSD	1.92 TB	SE	0106	KCM6DRUL1T92
Samsung PCIe Gen 4-enabled PM1733 SSD	1.92 TB	SE	EPK9AB5Q	MZWLJ1T9HBJR-00007

1.4 Electrical Specifications

Table 12: Electrical Specifications

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

4. 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.

Specification	Value
Max Power Consumption	750W
Typical Power Consumption	~550W
Input Voltage	200 - 240Vac
Current	10A
Frequency	50/60Hz
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 Platinum

1.5 Environmental Specifications

Table 13: 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
Altitude	-300m to 12,000m / -984 ft. to 39,370 ft	-300m to 3048m / -984 ft. to 10,000 ft.
Cooling	N/A	5 Dual Rotor System Fans (N+1 Supported)

1.6 Mechanical Specifications

Table 14: Mechanical Specifications

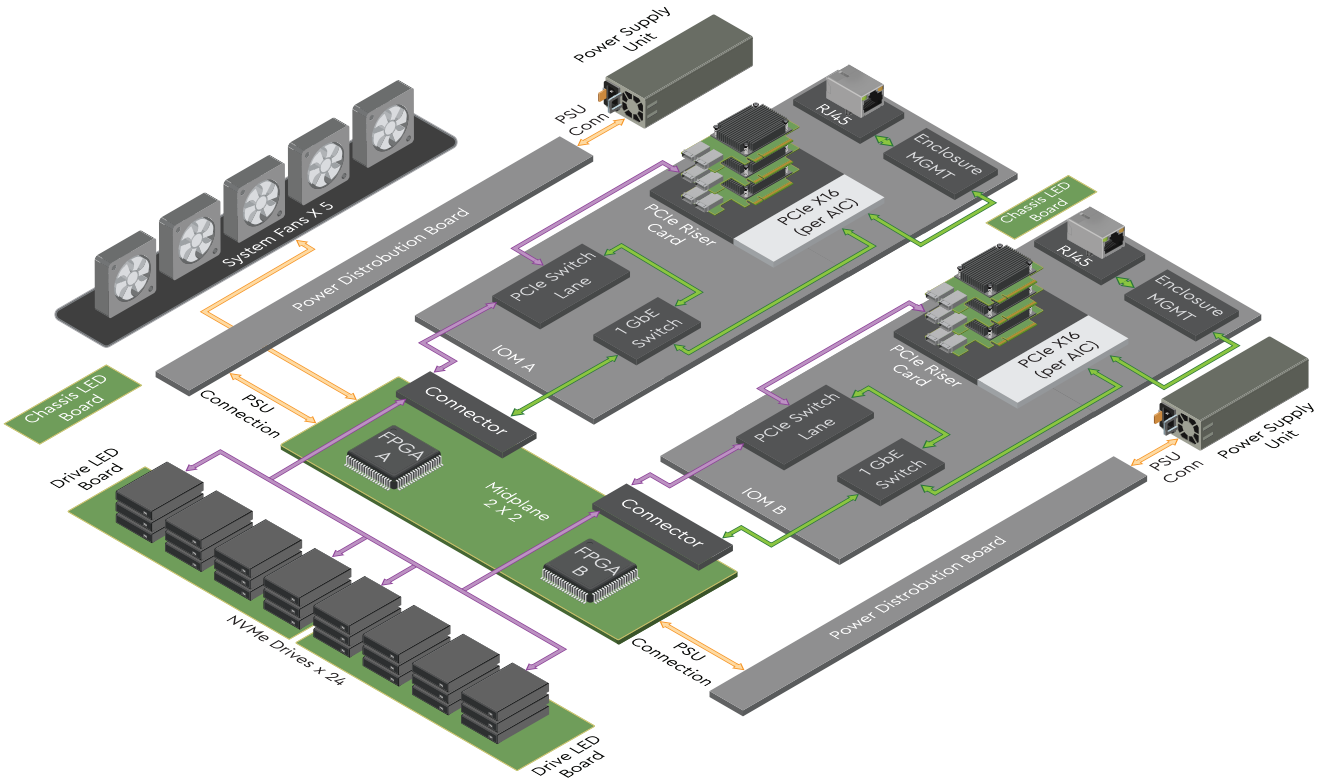
Specification	Non-Operational	Operational
Shock	10G, 11ms half sine; 3 positive and 3 negative pulses in X, Y, and Z axes.	5G, 11ms half sine; positive and 3 negative pulses in X, Y, and Z axes.

Specification	Non-Operational	Operational
Vibration	**Linear Random:** 0.54 Grms; 5-500 Hz; 10 minutes each axis in X, Y, and Z **Linear Random:** 0.54 Grms; 1-200 Hz; 60 minutes in Z axis. **Linear Random:** 0.80 Grms; 2 - 200Hz; 15 minutes in Z axis **Swept Sine:** 0.75 Grms, 0 - peak swept sine; 5 - 500Hz; 1 complete sweep @ 1/2 octave per minute	**Linear Random:** 0.15 Grms 5-500 Hz 10 minutes each axis in X, Y and Z **Swept Sine:**0.10 G, 0 - peak, 5-500 Hz 0.5 octaves/min, approx. 13 minutes each axis
Weight	29.7 kg / 65.5 lbs.	
Dimensions	**W:** 450 mm x **L:** 711.2 mm x **H:** 90 mm / **W:** 17.72 in. x **L:** 28 in. x **H:** 3.54 in.	
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.	

1.7 System Level Block Diagram

The system block diagram for the OpenFlex Data24 is a conceptual depiction of the communication and power relationships between major components within the system. The following diagram displays the configuration containing the maximum of three add-in cards per IOM.

Figure 11: System Block Diagram



1.8 Best Practices

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

1. For best performance, recommend the following:
   a. Setting Maximum Transmission Unit (MTU) to 2200(default) on the AICs and the fabric switch. If changing the MTU setting, I/O should be stopped.
   b. Configure a lossless network. OpenFlex Data24 has default settings of PFC , Priority 3, and DSCP 24. Refer to Lossless Networking guidance on Western Digital's OpenComposible web site: https://www.opencomposable.com/
   c. Configure native nvme multi-pathing instead of Device Mapper multi-pathing.
2. For NVMe-oF stability, recommend the following:
   a. An AIC reset may occur if Ethernet flow control is not enabled correctly. The AIC may detect that it is deployed in a configuration where Ethernet flow control is either not enabled (Global Pause or PFC) or if there is a mismatch in flow control setting (Ethernet Switch configured for Global Pause and AIC for PFC as an example). Following the reset, the Host will re-establish previous conditions and traffic should resume normally. (MAT-2151)
   b. Configure a lossless network. OpenFlex Data24 has default settings of PFC, Priority 3, and DSCP 24. Refer to the Lossless Networking documentation on the Western Digital Open Composible web site: https://www.opencomposable.com/.
   c. Matching MTU setting on host initiator NIC and the OpenFlex Data24 AIC. A mismatch may impact device discovery. (MAT-3409)
   d. If issuing an nvme-cli connect-all command, use the -i16 parameter to assure will not exceed maximum connections. (MAT-3082, MAT-2810)
   e. There are a maximum of 448 I/O connections per AIC. It is recommended to share this resource equally across all hosts that connect to the AIC. Additionally, it is recommended that you open the same number of connections per drive. For example, for a maximum of 3 hosts connecting to OpenFlex Data24, it is recommended to open 16 connections per nvme connect command. This allocates 128 connections per host to all 8 drives and consumes a total of 384 connections with the AIC. (MAT-3082)
   f. Avoid issuing an `nvme disconnect-all` command. This will cause a segmentation fault when running an nvme list command. Instead, disconnect individual connections. (MAT-3232, MAT-4321)
   g. Assure the nvme-cli utility is compatible with the nvme driver and kernel supported by the OpenFlex Data24. Incompatibilities may cause connect or disconnect issues.
   h. Any namespace management should be performed when there are no I/Os active to the drive. If Device Mapper (DM) multi-path is enabled, disable it when doing namespace management to assure no I/O. (MAT-3516)
   i. Creation of the namespace should be directly followed up with attach of namespace. This is necessary in a multi-path configuration as the host reacts to asynchronous completion notifications. (MAT-3516, MAT-3497, MAT-3827)
   j. Creating or formatting a namespace with wrong parameter can cause the namespace to report zero sized block device. (MAT-2372)
   k. Disable auto-negotiation to force 100G only. This will prevent an unexpected link down event when auto-negotiation occurs in the fabric. In a switched topology, disable the auto-negotiation settings in the switch on the ports connected to the system. In a direct attach topology, enable link_mode_force setting on Mellanox initiator NIC to force the NIC from auto-negotiation to 100G only. This can be done via the mlxlink utility on the host (e.g. sudo mlxlink -d 3b:00.1 -s 100G --link_mode_force).

   l. Wait 5 minutes before performing management actions after an IOM or enclosure reboots or power state changes. (MAT-4348)

3. For high availability, recommend the following:
   a. Contact Western Digital for best practices documentation on multi-path configuration.
   b. Changing the enclosure name should only be done when necessary and as an offline event. Changing the NVMe Qualified Name (NQN) affects device access. Changing the enclosure name requires an enclosure restart to go into effect.
   c. To eliminate browser caching the page for accurate data returned, use curl commands or clear the web browser cache.
   d. Confirm good health through the OCAPI and enclosure LEDs prior to making changes.
   e. Wait 5 minutes in between updating firmware on each IOM for the fabric to stabilize. Check the health of the IOM after each firmware update.
4. For better interoperability performance, recommend the following:
   a. When in a direct attach topology, the Mellanox initiator NIC auto-negotiates and intermittently takes down the link.
   b. AIC may reset during I/O if DCBX/LDDP is enabled on the host initiator NIC. Issue the following command to disable DCBX/LDDP:`DCBX mlxconfig -d` .
   c. After formatting the NVMe drive from non-metadata to metadata namespace, the host is not displaying. This issue is a result of an OFED 5.1 driver issue. nvme format must use -m 1 parameter for all fabrics as required by the NVMe-oF Specification.
5. For best bandwidth, recommend the following:
   a. Balance concurrently accessed drives (e.g. a RAID set) equally on boundaries of 24 / num_AIC / 2. For example, if a RAID set requires 8 drives on a 2 AIC OpenFlex Data24, chose drives from groups of 24/2/2 = 6 (i.e. slot 1,2,7,8,13,14,19,20)
6. For best management, recommend the following:
   a. The Enclosure Management Controller should only be used for management purposes and other commands should not be attempted (e.g. I/O read/write, namespace management, reservations, and so on).

1.9 Limitations & Restrictions

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

1. Drive related:
   a. Maximum of 24 drives and four namespaces per drive, when the OpenFlex Data24 contains one AIC per IO Module.
   b. Maximum of twelve drives per AIC and eight namespaces per drive, when the OpenFlex Data24 contains two AIC per IO Module.
   c. Maximum of eight drives per AIC and eight namespaces per drive, when the OpenFlex Data24 contains three AIC per IO Module.
   d. Creating namespaces on the drive outside of the enclosure, and then inserting it into the enclosure is not supported.
   e. For drive firmware updates, update only one drive per AIC at a time using nvme-cli. Drive updates may be in parallel through different AICs.
   f. Namespaces from the same drive, should have same the blocksize (either 4K or 512B).
2. NVMe/NVMe-oF related:
   a. Maximum of 16 I/O Queue Depth per IO Queue Pair.
   b. The following NVMe Admin commands are not supported:
      - Reservations.
      - NVMe-MI Send/Receive.
      - Directive Send/Receive.
      - Virtualization Management.
      - Doorbell Buffer Config.
      - Fused (Compare and Write).
      - Zoned Namespaces (ZNS).
   c. Not all nvme-cli wdc plug-in commands are supported. The following are supported if needed for support:
      - cap-diag (may take up to 30 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
   d. Maximum payload size for a ping command is limited to 1472 bytes (MAT-2836).
   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
      ```

      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 block sectors is not supported.

h. When fetching drive logs with the nvme cap-diag command, a failure may occur if the command is issued to more than 8 drives in parallel.

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. Only basic authentication is supported.
   c. 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 (MAT-3278).
   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 (MAT-3695, MAT-4636).
   g. When using In-Band GUI 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 information via the OpenFlex API. 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 OpenFlex Data24 User Guide for the In-Band Management setup and usage instructions (MAT-4704).
   h. When creating accounts for In-Band Management, setup the user credentials to be the same on both the compute and 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 (MAT-3198).
   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).
   k. Sensor threshold names are abstracted to the CIM model naming convention and the enclosure status more closely follows VITA-40 status reporting (MAT-4030)

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 or button reset when the enclosure is in low-power mode is not supported (MAT-4127, MAT-3821).
   e. Cap-diag may take up to 30 minutes to complete with no mention of transfer size. The expected result is specifically related to the transfer size that is to be used while using cap-diag.
   f. OCAPI consistently returns HTTP code 429 even if there are no known outstanding connections

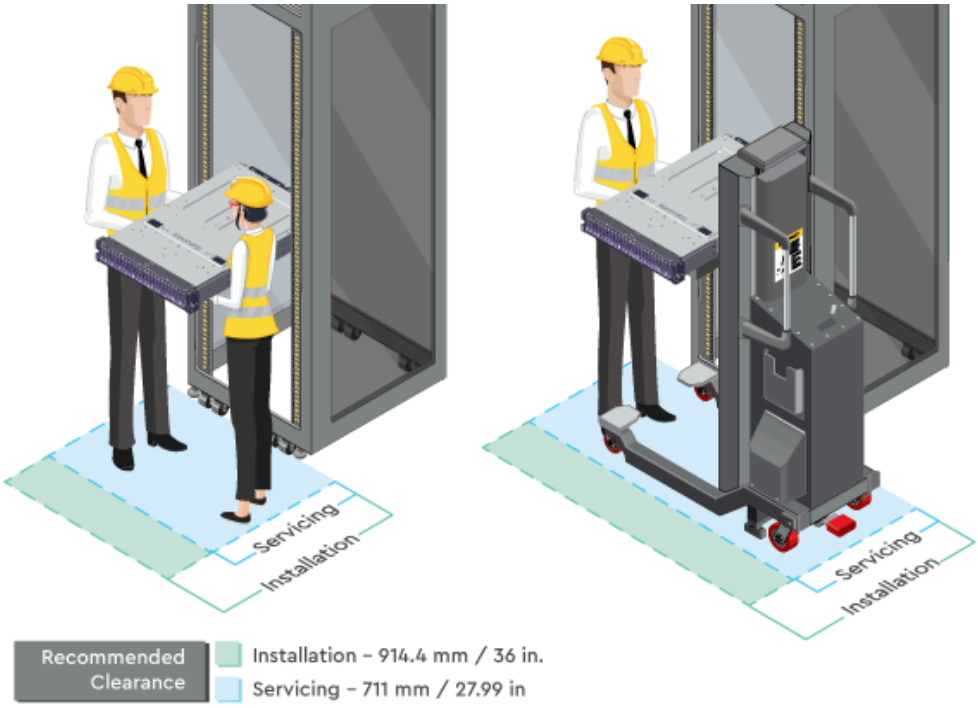
1.10 Rack Requirements

The OpenFlex Data24 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 15: 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

1.11 Space Requirements



The installation of the OpenFlex Data24requires 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.[5] 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.

1.12 Supported Operating Systems

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

Table 16: Supported Operating Systems

Operating System	Kernel
CentOS / RHEL 8.3	4.18.0-240.el8.x86_64
CentOS 8.5	4.18.0-348.7.1.el8_5.x86_64
RHEL 8.5	4.18.0-348.7.1.el8_5.x86_64
Ubuntu 20.04.1	5.15.0-52-generic
Ubuntu 22.04	5.15.0-76-generic

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

1.13 Supported SKUs

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

Table 17: List of Supported SKUs

Component	Capacity	SKU
OpenFlex Data24-0 0TB 2x100GbE TAA (Titanium PSU)	N/A	1ES2573
OpenFlex Data24-0 0TB 6x100GbE TAA (Titanium PSU)	N/A	1ES2572
OpenFlex Data24-0 SN840 2x100GbE nTAA	N/A	1ES2142
OpenFlex Data24-0 SN840 4x100GbE nTAA	N/A	1ES1918
OpenFlex Data24-0 SN840 6x100GbE nTAA	N/A	1ES1917
OpenFlex Data24-12 SN840 6x100GbE nTAA PCIe RI-1DW/D SE	23.04 TB	1ES2027
OpenFlex Data24-12 SN655 6x100GbE TAA PCIe RI-1DW/D SE	46.08TB	1ES2398
OpenFlex Data24-12 SN840 6x100GbE nTAA PCIe RI-1DW/D SE	46.08TB	1ES2025
OpenFlex Data24-24 SN655 2x100GbE TAA PCIe RI-3DW/D ISE	76.8TB	1ES2567
OpenFlex Data24-24 SN655 2x100GbE TAA PCIe RI-3DW/D ISE	76.8TB	1ES2567
OpenFlex Data24-24 SN840 2x100GbE nTAA PCIe RI-3DW/D SE	76.8TB	1ES2055
OpenFlex Data24-24 SN840 6x100GbE nTAA PCIe RI-3DW/D SE	76.8TB	1ES1986
OpenFlex Data24-24 SN840 6x100GbE nTAA PCIe RI-3DW/D ISE	76.8TB	1ES2129
OpenFlex Data24-24 SN655 2x100GbE TAA PCIe RI-1DW/D SE	92.16TB	1ES2400
OpenFlex Data24-24 SN655 2x100GbE TAA PCIe RI-1DW/D TCG	92.16TB	1ES2402
OpenFlex Data24-24 SN655 4x100GbE TAA PCIe RI-1DW/D SE	92.16TB	1ES2408
OpenFlex Data24-24 SN655 4x100GbE TAA PCIe RI-1DW/D SE	92.16TB	1ES2410
OpenFlex Data24-12 SN655 6x100GbE TAA PCIe RI-1DW/D SE	92.16TB	1ES2399
OpenFlex Data24-24 SN655 6x100GbE TAA PCIe RI-1DW/D SE	92.16TB	1ES2395
OpenFlex Data24-24 SN840 2x100GbE nTAA PCIe RI-1DW/D SE	92.16TB	1ES2052
OpenFlex Data24-24 SN840 2x100GbE nTAA PCIe RI-1DW/D TCG	92.16TB	1ES2079
OpenFlex Data24-12 SN840 6x100GbE nTAA PCIe RI-1DW/D SE	92.16TB	1ES2026
OpenFlex Data24-24 SN840 6x100GbE nTAA PCIe RI-1DW/D SE	92.16TB	1ES1913
OpenFlex Data24-24 SN840 6x100GbE nTAA PCIe RI-1DW/D ISE	92.16TB	1ES2131
OpenFlex Data24-24 SN840 6x100GbE TAA PCIe RI-1DW/D TCG	92.16TB	1ES2116
OpenFlex Data24-24 SN840 6x100GbE TAA PCIe RI-1DW/D TCG-FIPS	92.16TB	1ES2119
OpenFlex Data24-24 SN840 2x100GbE nTAA PCIe RI-3DW/D SE	153.6TB	1ES2056
OpenFlex Data24-24 SN655 2x100GbE TAA PCIe RI-3DW/D ISE	153.6TB	1ES2568
OpenFlex Data24-24 SN840 6x100GbE nTAA PCIe RI-3DW/D SE	153.6TB	1ES2040
OpenFlex Data24-24 SN840 6x100GbE nTAA PCIe RI-3DW/D ISE	153.6TB	1ES2130
OpenFlex Data24-24 SN655 2x100GbE TAA PCIe RI-1DW/D TCG	184.32TB	1ES2404

Component	Capacity	SKU
OpenFlex Data24-24 SN655 4x100GbE TAA PCIe RI-1DW/D TCG	184.32TB	1ES2406
OpenFlex Data24-24 SN655 6x100GbE TAA PCIe RI-1DW/D TCG	184.32TB	1ES2403
OpenFlex Data24-24 SN655 6x100GbE TAA PCIe RI-1DW/D SE	184.32TB	1ES2397
OpenFlex Data24-24 SN840 2x100GbE nTAA PCIe RI-1DW/D SE	184.32TB	1ES2053
OpenFlex Data24-12 SN840 6x100GbE nTAA PCIe RI-1DW/D SE	184.32TB	1ES2033
OpenFlex Data24-24 SN840 6x100GbE nTAA PCIe RI-1DW/D SE	184.32TB	1ES1915
OpenFlex Data24-24 SN840 6x100GbE nTAA PCIe RI-1DW/D ISE	184.32TB	1ES2132
OpenFlex Data24-12 SN840 6x100GbE nTAA PCIe RI-1DW/D ISE	184.32TB	1ES2134
OpenFlex Data24-24 SN840 6x100GbE TAA PCIe RI-1DW/D TCG	184.32TB	1ES2117
OpenFlex Data24-12 SN840 2x100GbE nTAA PCIe RI-1DW/D TCG-FIPS	184.32TB	1ES2162
OpenFlex Data24-24 SN655 2x100GbE TAA PCIe RI-1DW/D SE	368.64TB	1ES2401
OpenFlex Data24-24 SN655 2x100GbE TAA PCIe RI-1DW/D ISE	368.64TB	1ES2405
OpenFlex Data24-24 SN655 4x100GbE TAA PCIe RI-1DW/D SE	368.64TB	1ES2407
OpenFlex Data24-24 SN655 4x100GbE TAA PCIe RI-1DW/D SE	368.64TB	1ES2409
OpenFlex Data24-24 SN655 6x100GbE TAA PCIe RI-1DW/D SE	368.64TB	1ES2396
OpenFlex Data24-24 SN840 2x100GbE nTAA PCIe RI-1DW/D SE	368.64TB	1ES2054
OpenFlex Data24-24 SN840 6x100GbE nTAA PCIe RI-1DW/D SE	368.64TB	1ES1914
OpenFlex Data24-24 SN840 6x100GbE nTAA PCIe RI-1DW/D ISE	368.64TB	1ES2133
OpenFlex Data24-24 SN840 6x100GbE TAA PCIe RI-1DW/D TCG	368.64TB	1ES2118
OpenFlex Data24-24 SN840 2x100GbE nTAA RI-1DW/D TCG-FIPS	368.64TB	1ES2113
OpenFlex Data24-24 SN840 2x100GbE nTAA RI-1DW/D TCG-FIPS	368.64TB	1ES2163
OpenFlex Data24-24 SN840 6x100GbE nTAA RI-1DW/D TCG-FIPS	368.64TB	1ES2121

1.14 List of CRUs

Table 18: List of Replaceable Components

Component	Package Dimensions	Packaged Weight	Part Number
OpenFlex Data24 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	22.2 kg / 49 lbs	1EX2704
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
Delta Power Supply Unit (PSU) 2000W Platinum	**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	1.3 kg / 2.9 lbs	1EX2698
Gospower Power Supply Unit (PSU) 2000W Titanium	**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	1.45 kg / 3.2 lbs	1EX2982
System Fan Module	**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	0.49 kg / 1.1 lbs	1EX2699
IO Module (IOM) w/1 Add-In Card	**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	1EX2813
IO Module (IOM) w/2 Add-In Cards	**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	1EX2700
IO Module (IOM) w/3 Add-In Cards	**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	1EX2701

Component	Package Dimensions	Packaged Weight	Part Number
Rail Kit	**W:** 254 mm x **L:** 863.6 mm x **H:** 152.4 mm **W:** 10 in x **L:** 34 in x **H:** 6 in	5.4 kg / 12 lbs	1EX2702
Cable Management Arm Assembly	**W:** 140 mm x **L:** 286 mm x **H:** 54 mm **W:** 5.5 in x **L:** 11.25 in x **H:** 2.1 in	0.93 kg / 2.06 lbs	1EX2921
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	0.49 kg / 1.1 lbs	1EX2705
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	0.49 kg / 1.1 lbs	1EX2744
Drive Carrier w/o Interposer	**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	0.22 kg / 0.5 lbs	1EX2745
Drive Carrier 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	1EX2703
Western Digital Ultrastar DC SN840 Drive w/Carrier	**W:** 20.46 mm x **L:** 211.80 mm x **H:** 80.38 mm **W:**	0.49 kg / 1.1 lbs	List of Compatible Devices *(page 11)*

1.15 Third Party Licenses

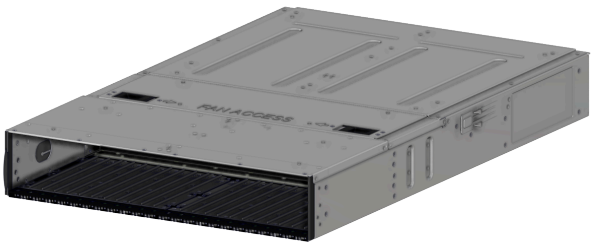
This product may include or use open source software subject to open source licenses. If required by the applicable open source license, Western Digital may provide the open source code to you on request either electronically or on a physical storage medium for a charge covering the cost of performing such distribution, which may include the cost of media, shipping, and handling.

For open source licensing information, please download **`OpenFlexData24ThirdPartyLicenses_FW5.0`** from the Western Digital Business Support Center at https://www.westerndigital.com/company/innovation/open-source/product-compliance.

Components

In This Chapter:

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 19: Chassis Specification Summary

Specification	Value
Part Number	1EX2704
Hot Swappable?	No
Dimensions	**W:** 450 mm x **L:** 845mm x **H:** 90 mm **W:** 17.72 in. x **L:** 33.27 in. x **H:** 3.54 in.
Weight	22.14 kg 48.81 lbs.

2.2 IO Module (IOM) w/ Single AIC

Each IOM provides 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 connector and 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.

2.2.1 IOM Specifications w/ Single AIC

Table 20: IO Module (IOM) w/ Single AIC Specification Summary

Specification	Value
Part Number	1EX2813
Number per Enclosure	2
Number of Add-in Cards	1
Hot Swappable?	Yes
Service window	5 minutes
Dimensions	**W:** 169.69 mm x **L:** 392.77 mm x **H:** 83.41 mm **W:** 3.28 in. x **L:** 15.46 in. x **H:** 6.68 in.
Connector Type	1 QSFP28 connector and 1 RJ45 Mgmt Port

2.3 IO Module (IOM) w/ Two AICs

Each IOM provides system data connectivity through up to two QSFP28 cables per IOM, 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 connectors and 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 w/ Two AICs

Table 21: IO Module (IOM) w/ Two AICs Specification Summary

Specification	Value
Part Number	1EX2700
Number per Enclosure	2
Number of Add-in Cards	**Two** RapidFlex C2000 Fabric Bridge Adapters
Hot Swappable?	Yes
Service window	5 minutes
Dimensions	**W:** 169.69 mm x **L:** 392.77 mm x **H:** 83.41 mm **W:** 3.28 in. x **L:** 15.46 in. x **H:** 6.68 in.
Connector Type	2 QSFP28 connectors and 1 RJ45 Mgmt Port

2.4 IO Module (IOM) w/ Three AICs

Each IOM provides system data connectivity through up to three QSFP28 cables per IOM, 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.

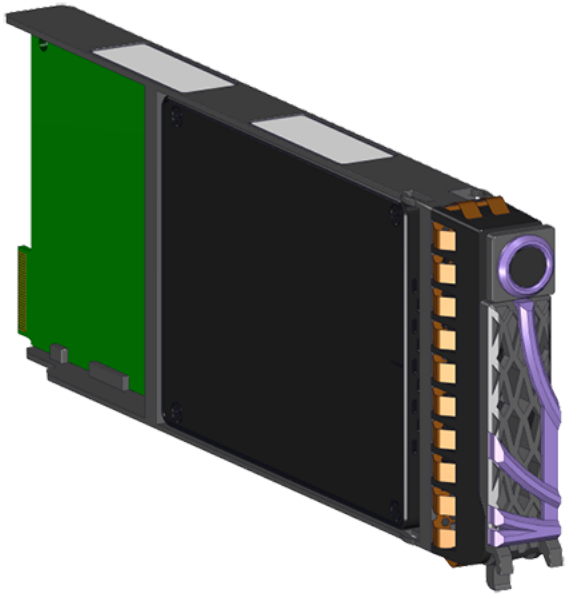
Warning: It is important to remove the QSFP28 connectors and cables before unscrewing and lowering the handle. Lowering the handle while the cables are still installed can damage the internal components and the connector itself.

2.4.1 IOM Specifications w/ Three AICs

Table 22: IO Module (IOM) w/ Three AICs Specification Summary

Specification	Value
Part Number	1EX2701
Number per Enclosure	2
Number of Add-in Cards	3
Hot Swappable?	Yes
Service window	5 minutes
Dimensions	**W:** 169.69 mm x **L:** 392.77 mm x **H:** 83.41 mm **W:** 3.28 in. x **L:** 15.46 in. x **H:** 6.68 in.
Connector Type	3 QSFP28 connectors and 1 RJ45 Mgmt Port

2.5 Drive Assembly



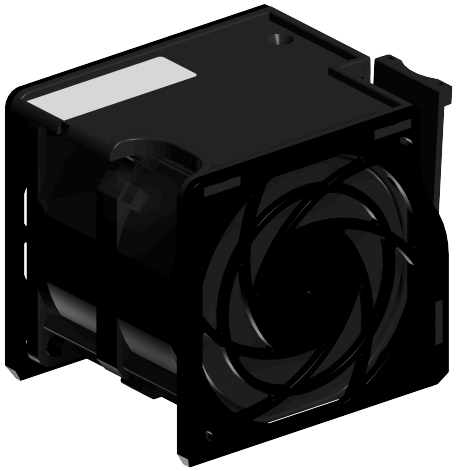
The drive assembly is comprised of 3 basic parts: the 2.5 in. SSD, the drive carrier, and the active interposer card. The drive carrier houses the 2.5 in. drive and the interposer card and enables toolless installation and replacement. The drive assembly is available in many different volumes, encryption, and block sizes.

2.5.1 Drive Assembly Specifications

Table 23: Drive Assembly Specification Summary

Specification	Value
Part Number	See List of Compatible Devices *(page 11)*
Number per Enclosure	1-24
Hot Swappable?	Yes
Service window	5 minutes
Dimensions	**W:** 20.46 mm x **L:** 211.80 mm x **H:** 80.38 mm **W:** 0.81 in. x **L:** 3.16 in. x **H:** 8.34 in.

2.6 System Fan



The system fans provide the primary system cooling for the OpenFlex Data24. There are a total of five N+1 redundant fans, and they are accessible from a latch cover on the top of the chassis. The system fans are hot swappable CRU components, and do not require any wiring. The plastic fan covers also have labels identifying each fan.

2.6.1 System Fan Specifications

Table 24: System Fan Specification Summary

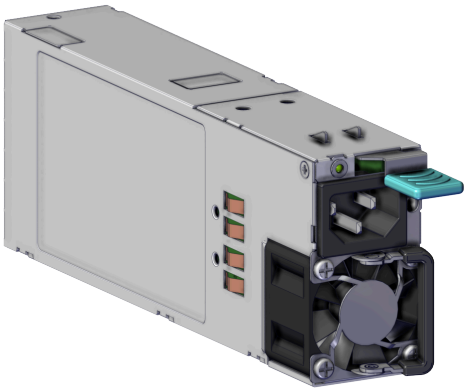
Specification	Value
Part Number	1EX2699
Number per Enclosure	5
Hot Swappable?	Yes
Service window	5 minutes
Dimensions	**W:** 76.33 mm x **L:** 63.07 mm x **H:** 67.60 mm **W:** 3.01 in. x **L:** 2.48 in. x **H:** 2.66 in.

2.7 PSU

The OpenFlex™ Data24 supports two PSU models. Please see the following sections for details on each model:

- Delta Power Supply Unit (PSU) *(page 34)*
- Gospower Power Supply Unit (PSU) *(page 35)*

2.7.1 Delta Power Supply Unit (PSU)



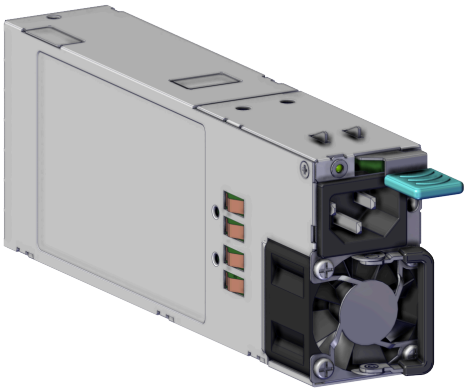
The Gospower Power Supply Unit (PSU) inside the OpenFlex Data24 are 2000W, 80 Plus Titanium efficiency rated, and operate within a 200 - 240 VAC voltage range. The PSUs are redundant and can be hot swapped one at a time. There must always be one PSU in operation for continuous usage during replacements of the PSUs.

2.7.1.1 Delta PSU Specifications

Table 25: Delta Power Supply Unit (PSU) Specification Summary

Specification	Value
Part Number	1EX2698
Number per Enclosure	2
Hot Swappable?	Yes
Service window	5 minutes
Dimensions	**W:** 41 mm x **L:** 234.80 mm x **H:** 76.50 mm **W:** 1.61 in. x **L:** 9.24 in. x **H:** 3.01 in.
Current Output	16A
Power Output	2000W Maximum
Input Voltage	200 - 240Vac
80 PLUS Standard	Platinum
Connector Type	C14

2.7.2 Gospower Power Supply Unit (PSU)



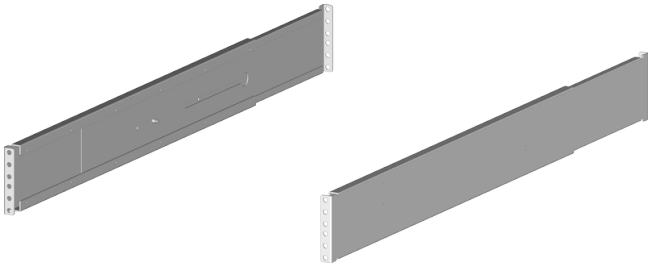
The Gospower Power Supply Unit (PSU) inside the OpenFlex Data24 are 2000W, 80 Plus Titanium efficiency rated, and operate within a 200 - 240 VAC voltage range. The PSUs are redundant and can be hot swapped one at a time. There must always be one PSU in operation for continuous usage during replacements of the PSUs.

2.7.2.1 Gospower PSU Specifications

Table 26: Gospower Power Supply Unit (PSU) Specification Summary

Specification	Value
Part Number	1EX2982
Number per Enclosure	2
Hot Swappable?	Yes
Service window	5 minutes
Dimensions	**W:** 40 mm x **L:** 185 mm x **H:** 73.5 mm **W:** 1.57 in. x **L:** 7.28 in. x **H:** 2.89 in.
Current Output	16A
Power Output	2000W Maximum
Input Voltage	200 - 240Vac
80 PLUS Standard	Titanium
Connector Type	C14

2.8 Rails



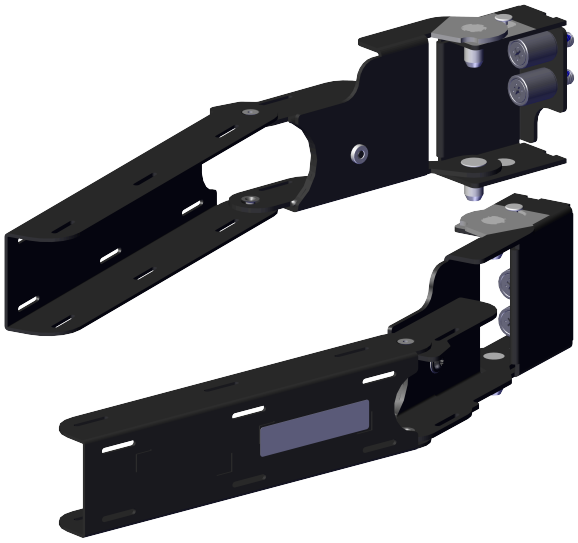
The Rails included with the OpenFlex Data24 are 2U, shelf style rails with springloaded inner arms that enable easy installation.

2.8.1 Rails Specification

Table 27: Rails Specification Summary

Specification	Value
Part Number	1EX2702
Number per Enclosure	1 Pair
Hot Swappable?	No
Service window	N/A

2.9 Cable Management Arm (CMA) Assembly



The Cable Management Arm (CMA) Assembly included as an option for the OpenFlex Data24 contains a right arm and a left arm that are mounted to the vertical rails of a rack using captive screws. Each arm can manage up to five cables, one power cord, one management cable, and three QSFP28 cables, that route through the rack, into the CMA, and connect to the IO Module (IOM). The CMA allows for ease of servicing of the system cables, IOMs, and PSUs. The CMA Assembly can be used between both the minimum (645mm) and maximum (1000mm) rack rail spacing configuration.

2.9.1 Cable Management Arm (CMA) Assembly Specifications

Table 28: Cable Management Arm (CMA) Assembly Specification Summary

Specification	Value
Part Number	1EX2921
Number per Enclosure	One assembly containing a right and a left arm
Component Dimensions	**W:** 29.9 mm x **L:** 266.7 mm x **H:** 57.1 mm **W:** 1.18 in x **L:** 10.5 in x **H:** 2.25 in
Component Weight	0.48 kg / 1.06 lbs
Packaged Dimensions	**W:** 140 mm x **L:** 286 mm x **H:** 54 mm **W:** 5.5 in x **L:** 11.25 in x **H:** 2.1 in
Packaged Weight	0.93 kg / 2.06 lbs

Support

In This Chapter:

3.1 Cable Management

The OpenFlex Data24 system is connected to power and data through a series of cables. Once the system is installed into a rack power cables are connected to the Power Supply Unit (PSU)s and data cables are connected to the IO Module (IOM)s to allow for the proper transfer of data. OpenFlex Data24 system contains two types of cable management: Standard Cable Management and Cable management with the use of a Cable Management Arm (CMA) Assembly. For more information on both options, see the following sections:

- Standard OpenFlex Data24 Cable Management *(page 39)*
- OpenFlex Data24 Cable Management Arm (CMA) Assembly Cable Management *(page 39)*

3.1.1 Standard OpenFlex Data24 Cable Management

No additional components are required for standard cable management of the system. The cables are secured in place with standard attachment points such as, a clip and synch on the PSUs and the standard data cables contain locking mechanisms to securely connect them to the IOMs. The only recommended cable management is that the cables should contain enough slack for the system to be pulled part of the way out the system for the servicing of hot-swappable components. The remaining cable management preferences are up to the end-user.

3.1.2 OpenFlex Data24 Cable Management Arm (CMA) Assembly Cable Management

This cable management option requires the addition of a Cable Management Arm (CMA) Assembly. The CMA Assembly allows for ease of servicing in a rack. Similar to the standard cable management option, the cables are secured in place with standard attachment points such as, a clip and synch on the PSUs and the standard data cables contain locking mechanisms to securely connect them to the IOMs. The cable management itself is handled by the arms that are installed onto the rear rack rails and house the cables for the right and the left side of the system. This allows each arm to manage and protect the cabling from tangling and snagging during use.

CMA Assembly Servicing

In order to gain access to components located behind the CMA Assembly, you will need to disconnect an cables connected to the component being serviced, carefully move the CMA out of the way on the side in which are working, and remove the component.

Replacing the CMA Assembly will require the physical removal of cables. The CMA Assembly may be replaced during system operation as long as one arm is serviced, cables are reconnected, and the IOM and PSU comes back up before proceeding to servicing the other arm.

CMA Assembly Cabling

Once each CMA is populated with the necessary cables, it is highly recommended that you connect the cables to the necessary components and slide the system out of the front of rack to ensure that the cables have enough slack to remain connected during the servicing of components like the System Fans.

Use the hook and loop fastener straps to secure the cables into each CMA to ensure the proper cable loops remain in tact.

For more information related to the Cable Management Arm (CMA) Assembly see the Cable Management Arm (CMA) Assembly *(page 37)* section containing a component description and specifications.

3.2 Drive Assembly Replacement

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.

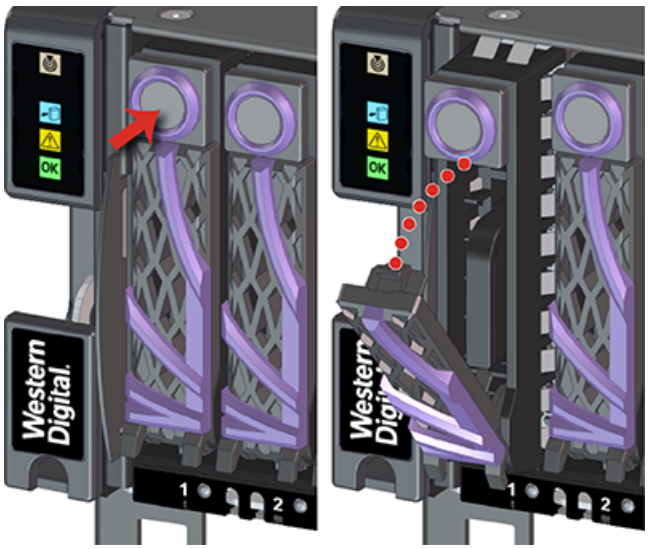
Replacement Requirements	
Personnel Required	1
Service Window	5 minutes

- ESD Sensitive

Step 1: Uninstall the Drive Assembly from the enclosure.

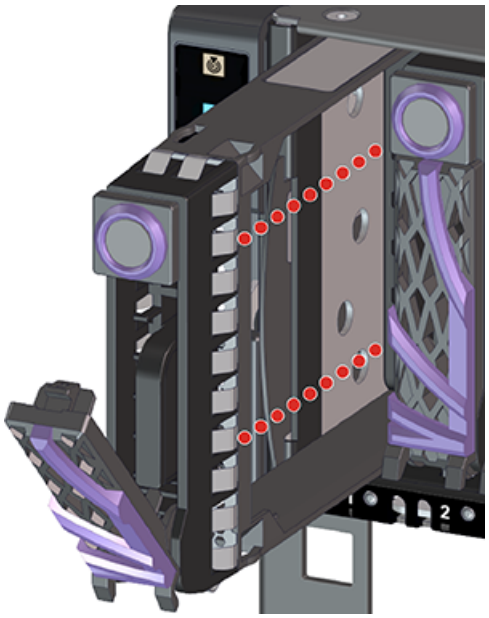
a. From the front of the rack, press the release button on the front of the Drive Assembly. The release handle will eject outward.

Figure 22: Drive Assembly Release Operation



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

Figure 23: Uninstall Drive Assembly



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

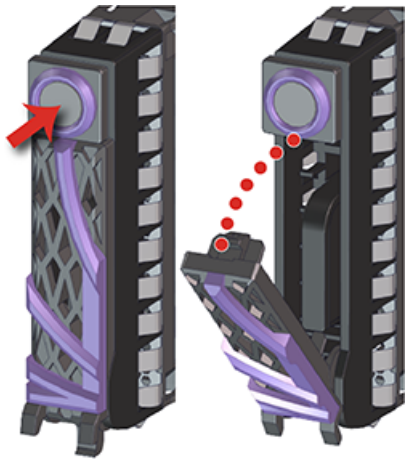
a. Inspect the packaging that the Drive Assembly replacement was shipped in and record any damage to the box. Large cuts, open boxes, and crushed corners should be reported.

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.

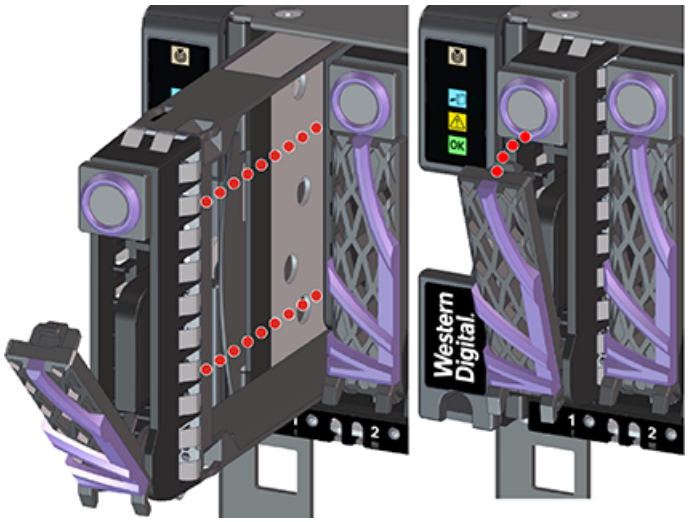
a. Prepare the Drive Assembly for installation by pressing the release button on the front of the Drive Assembly. The release handle will eject outward.

Figure 24: Drive Assembly Release Operation



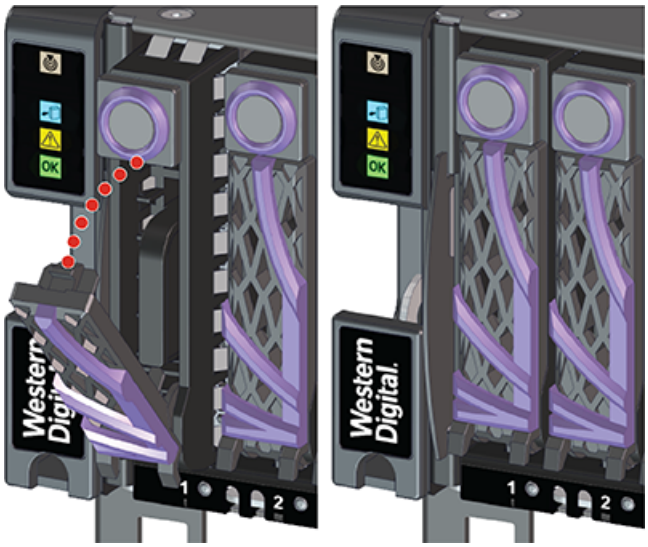
b. From the front of the rack, gently slide the Drive Assembly into the Drive Assembly slot until the release handle lifts up slightly, indicating that it is engaged with the Chassis.

Figure 25: 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 26: Drive Assembly Installation



Result: The Drive Assembly has now been replaced.

3.3 System Fan Replacement

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

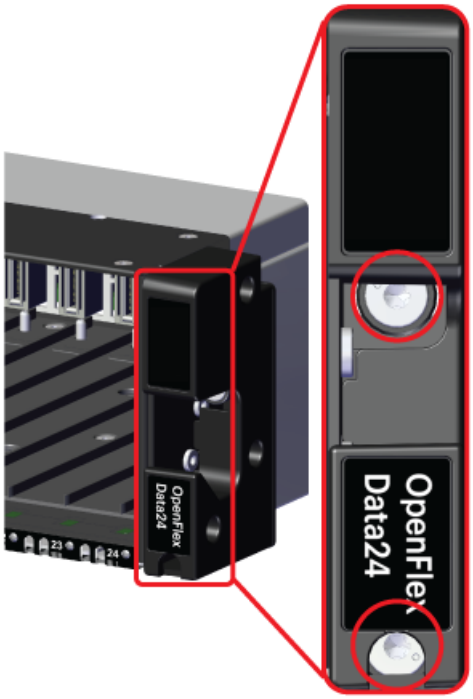
Replacement Requirements		
Personnel Required		1
Service Window		5 minutes
Tool	**# Needed**	**Required vs. Recommended**
T15 Torx Screwdriver	1	Required
ESD Mitigation Equipment (site specific)	1	Required

- ESD Sensitive
- Electric Shock
- Fan Blade Danger

Step 1: Extend the platform out of the rack to access the System Fan bay.

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 27: Rack Ear Captive Screw Location



b. Carefully slide the Chassis out of the rack until the System Fan bay is completely accessible and the locking tabs on the right side of the chassis have stopped the OpenFlex Data24 and locked it in place. The System Fan bay accessibility is shown in the following image.

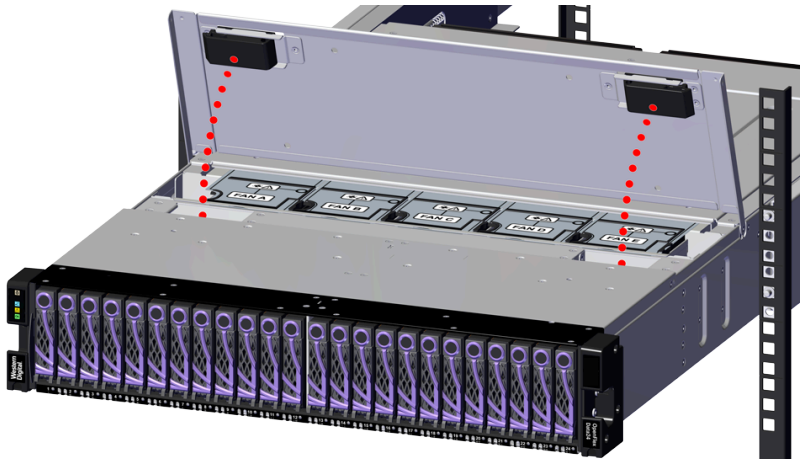
Figure 28: System Fan Bay Access

Step 2 : Uninstall the System Fan from the enclosure.

a. Unlatch the System Fan bay cover by sliding both latches in towards the center of the Chassis until the cover is released and can rotated open on its hinges. The latch operation is shown in the following image.

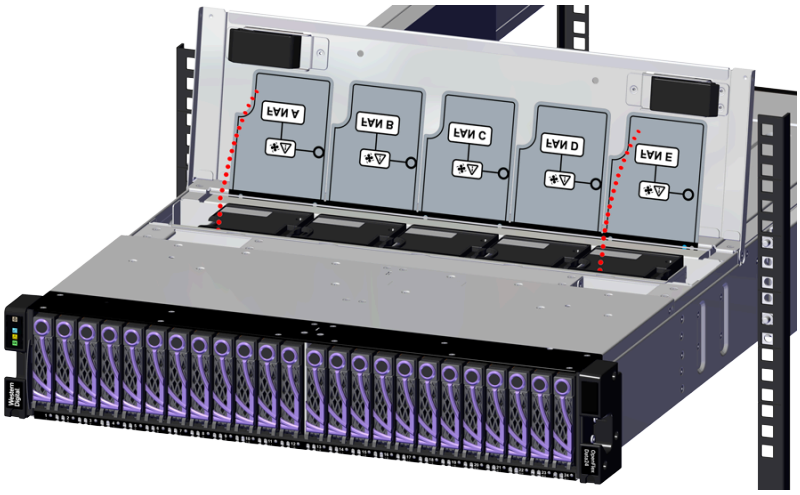
Figure 29: System Fan Bay Cover Latch Location

Figure 30: System Fan Bay Cover Operation



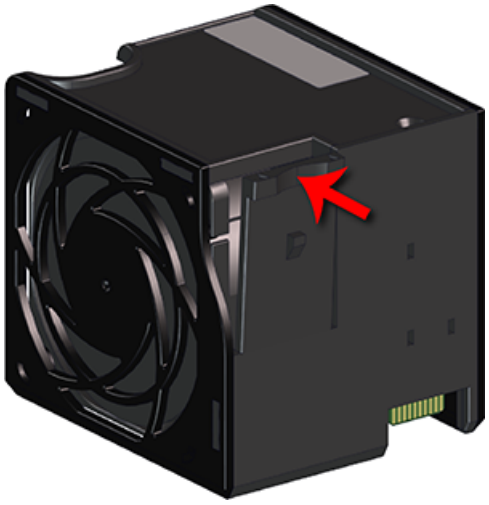
b. Gain access to the System Fan bay by lifting the flexible label.

Figure 31: Flexible Label



c. Grasp the System Fan firmly with your index finger, and use your thumb to press the latch release using a pinching motion.

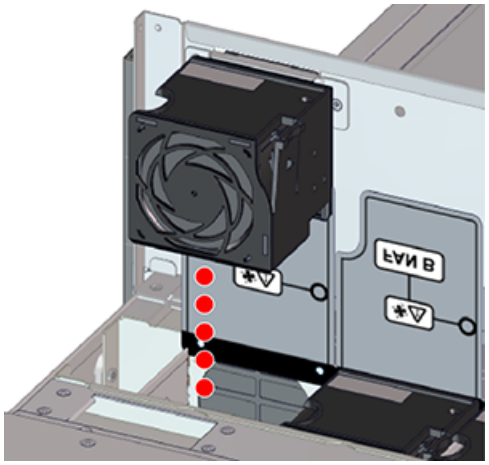
Figure 32: System Fan Latch Operation



d. **Caution:** The fan module must be replaced within 5 minutes.

Carefully pull the System Fan out of the System Fan slot.

Figure 33: Uninstall System Fan



Step 3 : Unpack and inspect the new System Fan for damage.

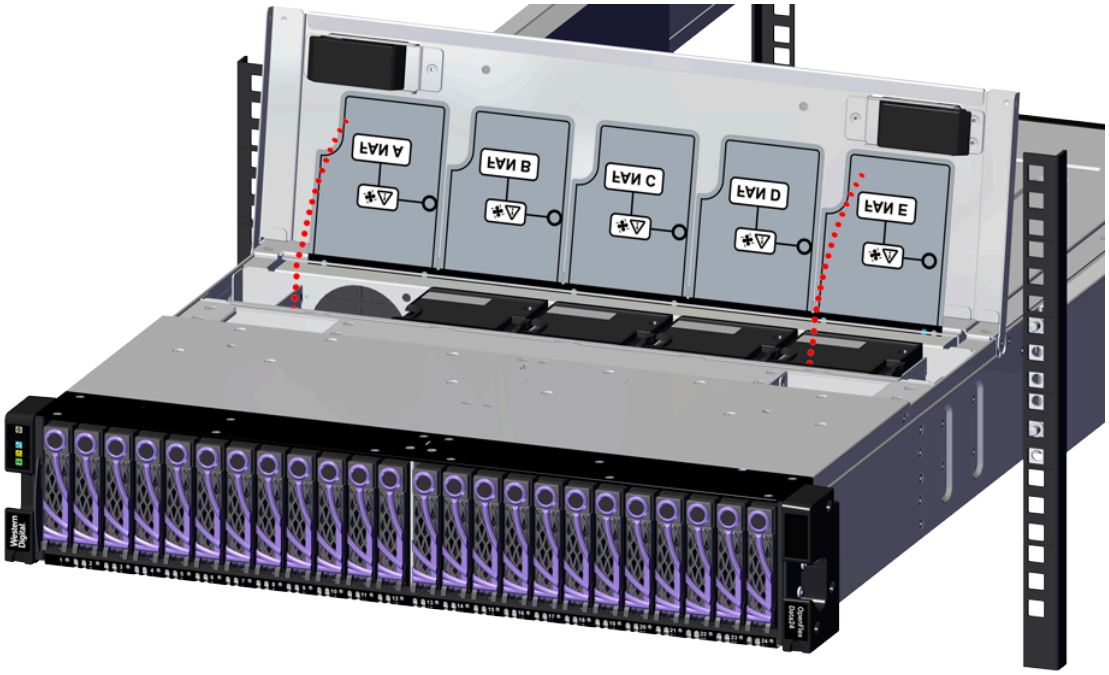
a. Inspect the packaging that the System Fan replacement was shipped in and record any damage to the box. Large cuts, open boxes, and crushed corners should be reported.

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 4 : Install the System Fan into the enclosure.

a. Gain access to the System Fan bay by lifting the flexible Formex flap.

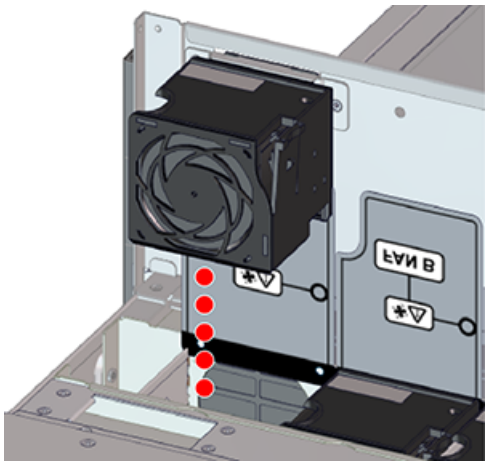
Figure 34: Flexible Label



b. Orient the System Fan with the module latch (and connector) on the right-hand side and insert it into the System Fan slot.

Figure 35: System Fan Installation

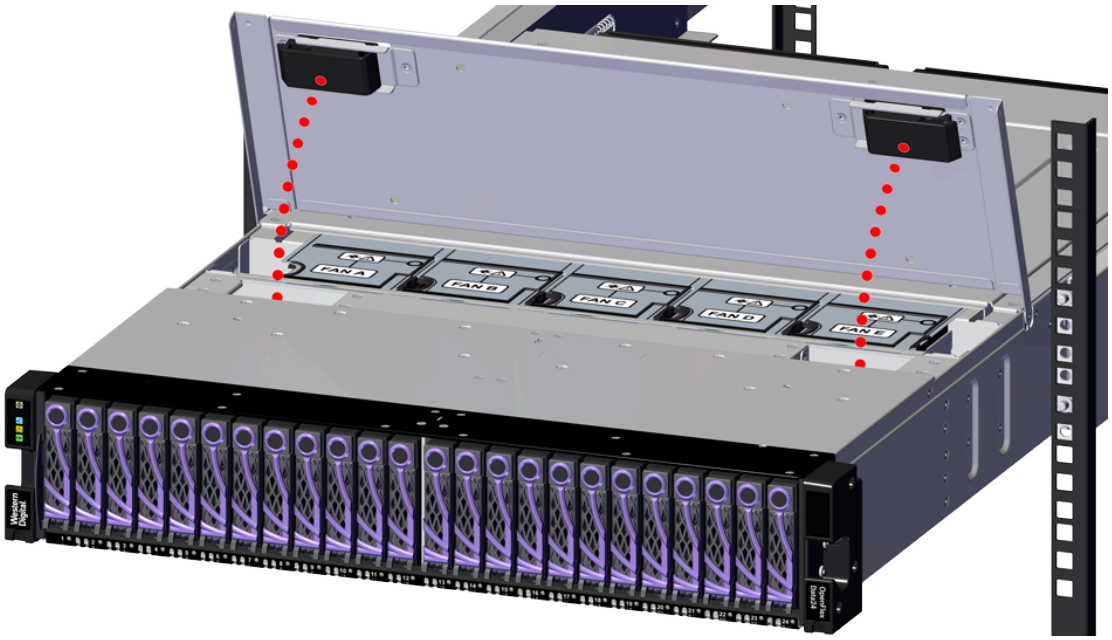
Figure 36: System Fan Installation



c. Verify that the System Fan is fully seated and latched into the System Fan slot by gently pulling on the module.

d. Latch the System Fan bay cover by rotating the cover toward the Chassis and sliding both latches in towards the center of the Chassis until the cover engages with the Chassis.

Figure 37: System Fan Bay Cover Operation



e. Verify that the System Fan bay cover is securely latched into the Chassis by gently pulling up on the latches ensuring the System Fan bay cover does not move when pulled. Reinstall the System Fan bay cover if it is not securely installed onto the Chassis.

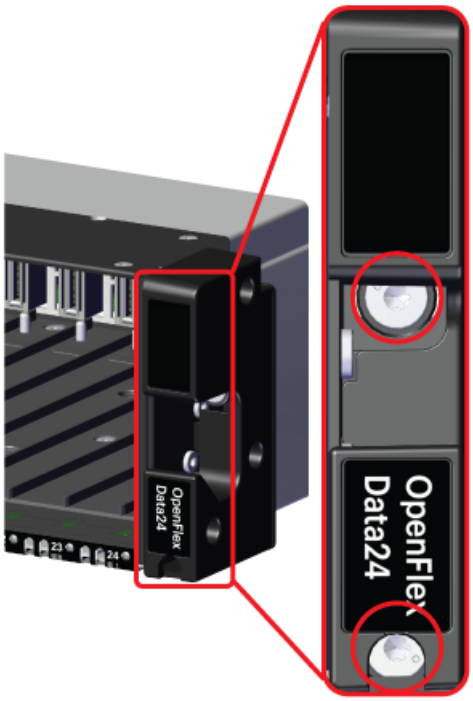
Step 5 : Secure the Chassis to the rack rails.

a. Slide the locking tab on right side to unlock the Chassis and carefully slide the Chassis into the rack until the rack ears are flush with the mounts on the rails.

Figure 38: Seating the Chassis

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 39: Chassis Captive Screws



Result: The System Fan has now been replaced.

3.4 IO Module (IOM) Replacement

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

Replacement Requirements		
Personnel Required		1
Service Window		5 minutes
Tool	**# Needed**	**Required vs. Optional**
Philips head Screwdriver	1	Optional

- ESD Sensitive
- Electric Shock

Step 1: Disconnect the data cables from the IO Module (IOM).

a. Disconnect the Ethernet Cable from the RJ45 Ethernet Management port.

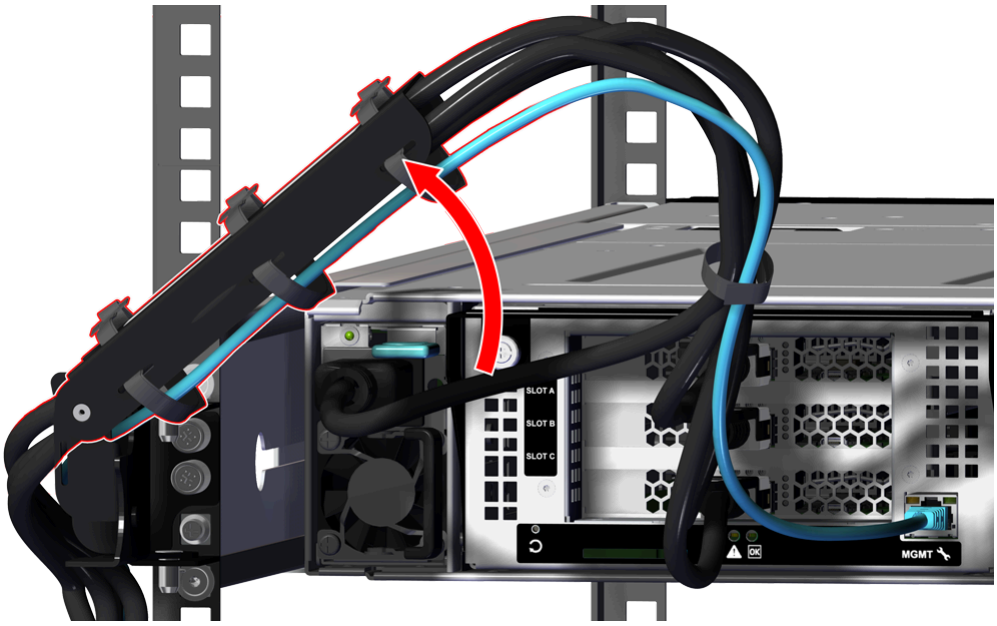
Figure 40: Disconnect RJ45 Ethernet Cables

b. Disconnect the QSFP28 cables from all of the IOM ports.

Figure 41: Disconnect QSFP28 Cables

Step 2 : **(Optional)** If your configuration contains a CMA, carefully move the arm on the side in need of servicing away from the system. This will allow for ease of access to the components on the chosen side while keeping the system cabling organized and safe. The CMA must be removed before attempting to remove the rails.

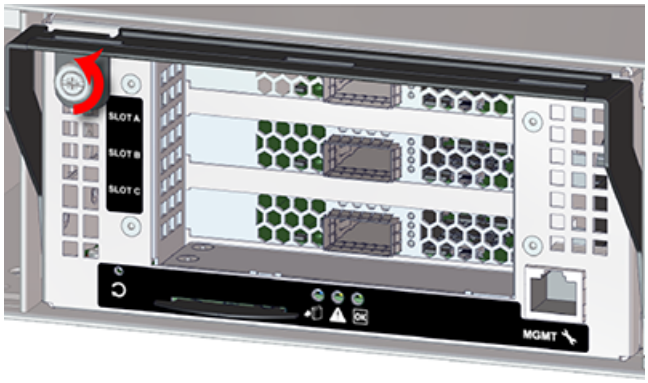
Figure 42: Move CMA Assembly into a Servicing State



Step 3 : Uninstall the IO Module (IOM) from the enclosure.

a. Unlock the IO Module (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. A screwdriver may be used if desired.

Figure 43: IO Module (IOM) Thumbscrew Operation



b. Pull the release handle out until the IO Module (IOM) is unseated and can be removed from the IO Module (IOM) slot.

Figure 44: IO Module (IOM) Release Handle Operation

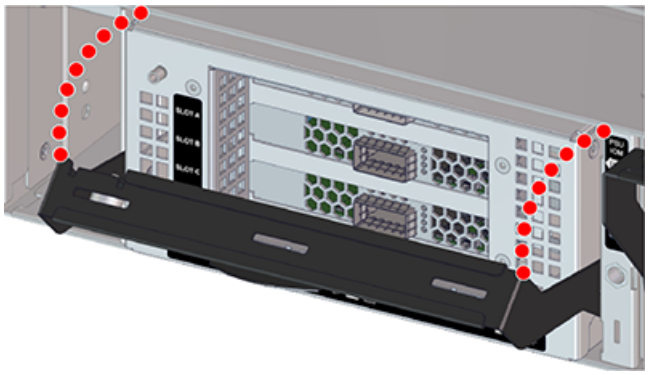


Figure 45: Uninstall IO Module (IOM)

Step 4 : Unpack and inspect the new IO Module (IOM) for damage.

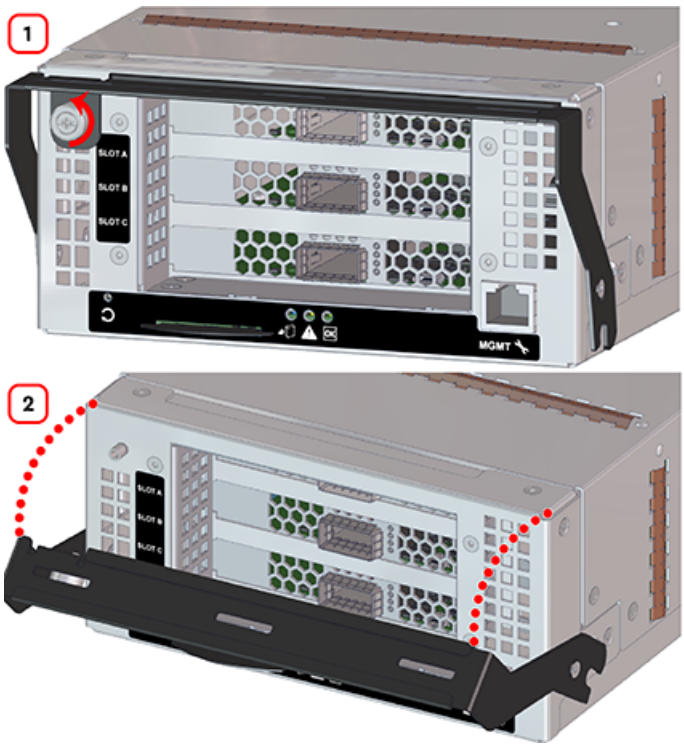
a. Inspect the packaging that the IO Module (IOM) replacement was shipped in and record any damage to the box. Large cuts, open boxes, and crushed corners should be reported.

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

Step 5 : Install the IO Module (IOM) into the enclosure.

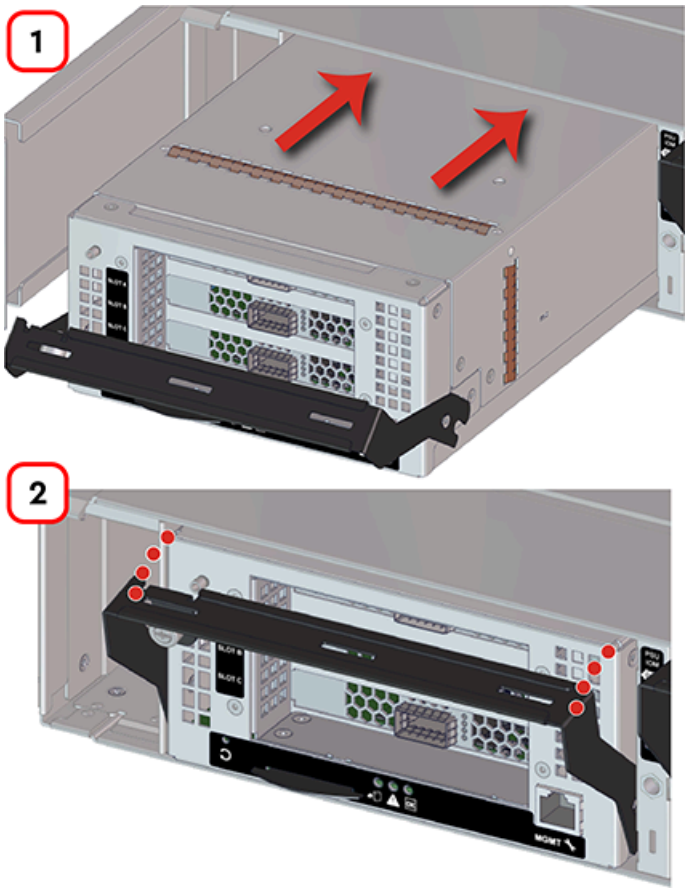
a. Unlock the IO Module (IOM) by turning the thumbscrew counterclockwise until the screw threads are not engaged any longer. The location of the thumbscrew is shown in the following image.

Figure 46: Prepare IO Module (IOM)



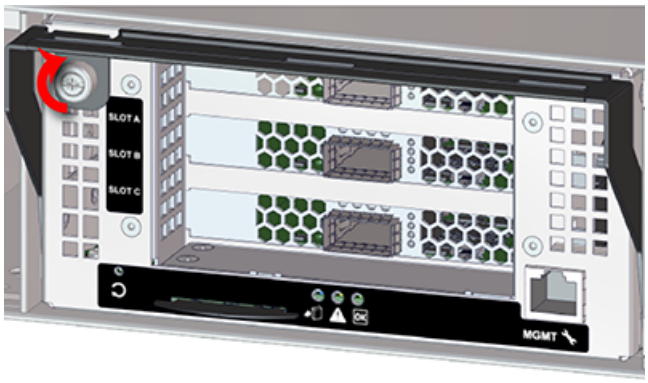
b. Gently slide the IO Module (IOM) into the IO Module (IOM) slot until the release handle is engaged with the Chassis. When the handle lifts up slightly, it is an indicator that the release handle is engaged with the Chassis.

Figure 47: IO Module (IOM) Handle Engaged



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

Figure 48: IO Module (IOM) Secure

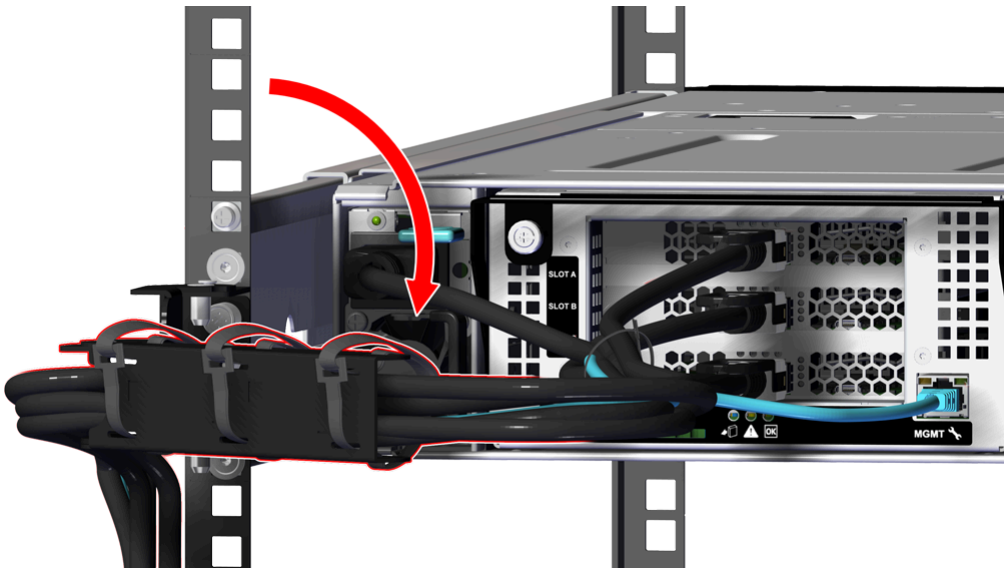


d. Verify that the IO Module (IOM) is securely latched into the Chassis by pulling on the release handle and ensuring the IO Module (IOM) does not move when pulled. Reinstall the IO Module (IOM) if it is not securely installed into the Chassis.

Attention: The IO Module (IOM) firmware procedure may have to be executed to match the other IO Module (IOM) if you are replacing the IO Module (IOM). This will depend on what firmware version is loaded on the replacement IOM.

Step 6 : **(Optional)** If your configuration contains a Cable Management Arm (CMA) Assembly, carefully push the arm on the side you serviced toward the system until the cables have enough slack to connect to their designated components.

Figure 49: Return the CMA Assembly to the Operational State



Step 7 : Connect the data cables to the IO Module (IOM).

a. Connect the Ethernet Cables into the Ethernet Management ports.

Figure 50: Connecting RJ45 Ethernet Cable to Management Port

b. Connect the QSFP28 cables into all of the IOM ports.

Figure 51: Connect QSFP28 Cables

Result: The IO Module (IOM) has now been replaced.

3.5 Power Supply Unit (PSU) Replacement

This procedure supports the replacement of both the Delta and the Gospower power supplies. For more information related to PSU requirements, see the PSU *(page 34)* section.

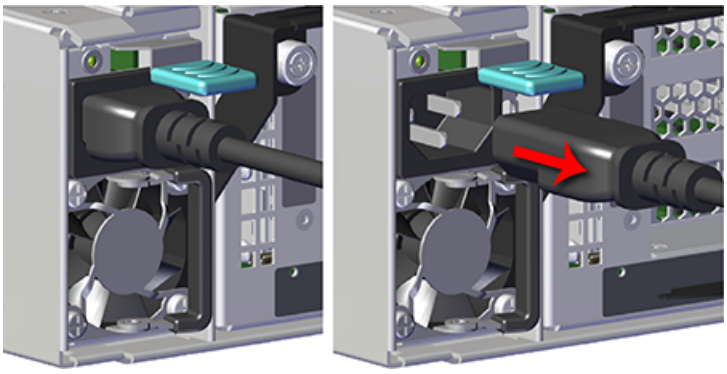
Attention: Hot swappable CRUs must be replaced one at a time.

Replacement Requirements	
Personnel Required	1
Service Window	5 minutes

- ESD Sensitive
- Electric Shock
- Fan Blade Danger

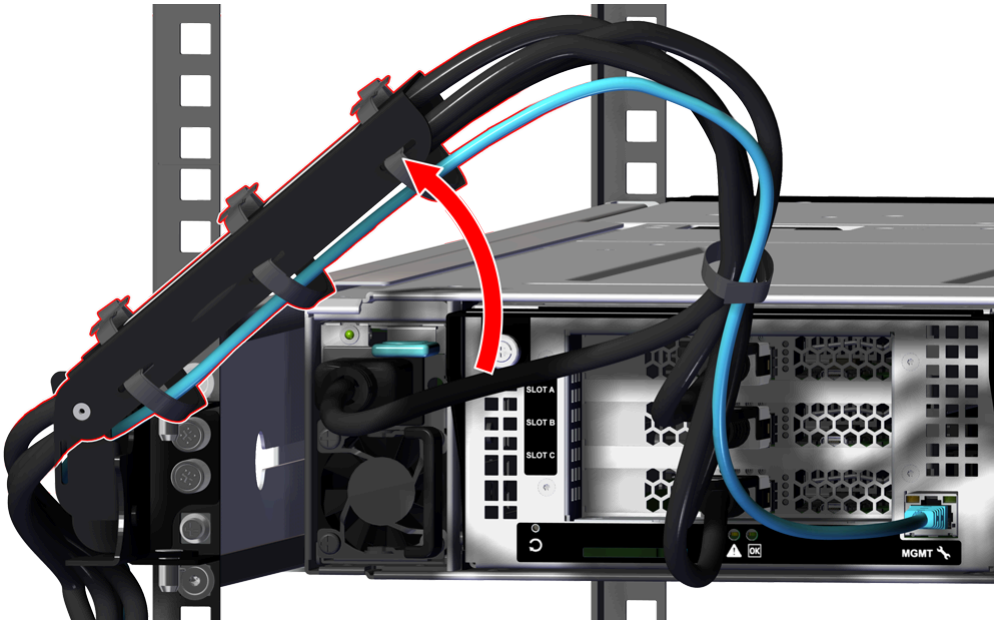
Step 1: Move to the rear of the rack and disconnect the power cable from the Power Supply Unit (PSU).

Figure 52: Disconnect Power Cable



Step 2: **(Optional)** If your configuration contains a CMA, carefully move the arm on the side in need of servicing away from the system. This will allow for ease of access to the components on the chosen side while keeping the system cabling organized and safe. The CMA must be removed before attempting to remove the rails.

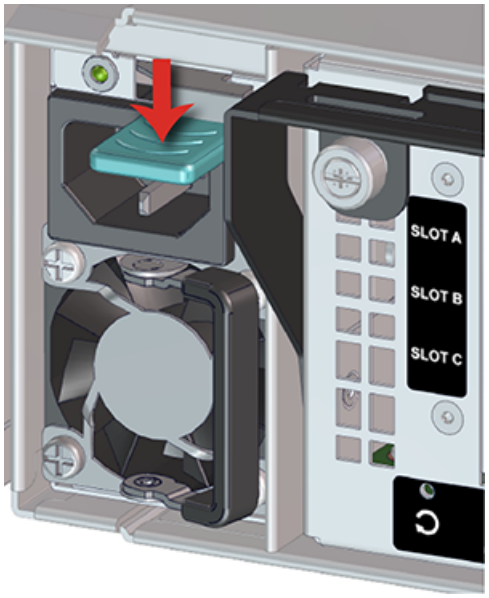
Figure 53: Move CMA Assembly into a Servicing State



Step 3 : Uninstall the Power Supply Unit (PSU) from the enclosure.

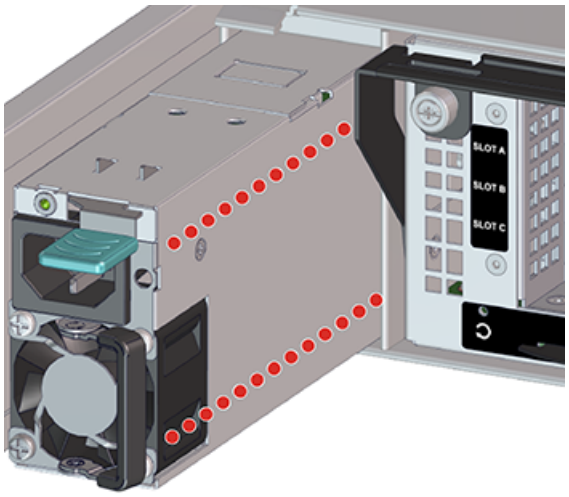
a. From the rear of the rack, grasp the ring handle with your index finger and use your thumb to press the latch release using a pinching motion.

Figure 54: Power Supply Unit (PSU) Release Latch Operation



b. Carefully pull the Power Supply Unit (PSU) out of the Power Supply Unit (PSU) slot.

Figure 55: Uninstall Power Supply Unit (PSU)



Step 4 : Unpack and inspect the new Power Supply Unit (PSU) for damage.

a. Inspect the packaging that the Power Supply Unit (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 Power Supply Unit (PSU) from the packaging and verify that there is no damage to the Power Supply Unit (PSU). Dents, scratches, and broken parts should be reported. If major damage has occurred to the Power Supply Unit (PSU), DO NOT use the replacement part.

Step 5 : Install the Power Supply Unit (PSU) into the enclosure.

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

Figure 56: Power Port Location

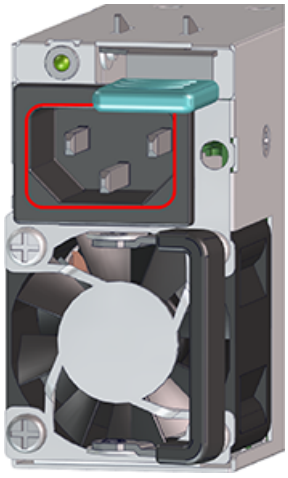
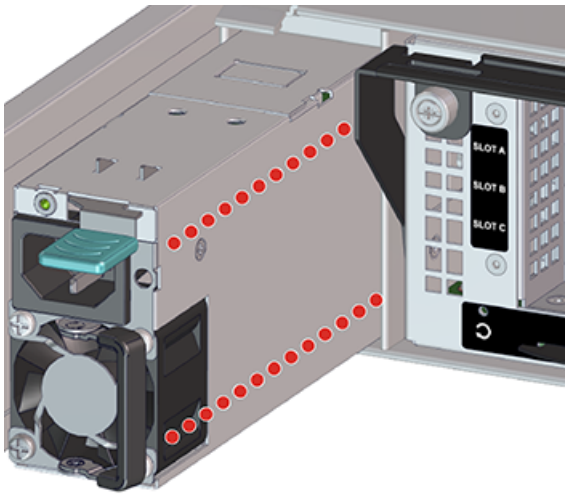


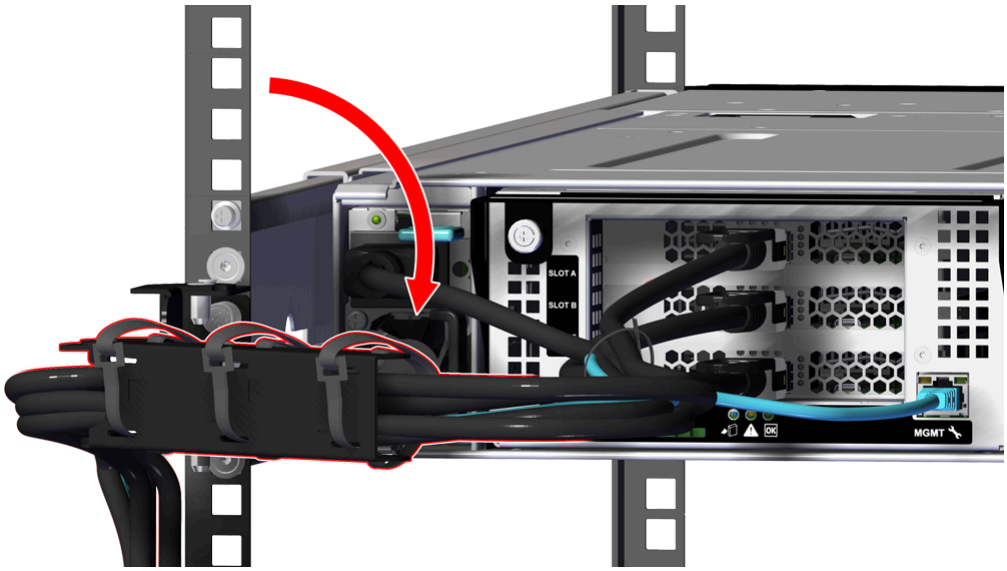
Figure 57: Power Supply Unit (PSU) Installation



b. Verify that the Power Supply Unit (PSU) is fully seated and latched into the Power Supply Unit (PSU) slot by gently pulling on the handle.

Step 6 : **(Optional)** If your configuration contains a Cable Management Arm (CMA) Assembly, carefully push the arm on the side you serviced toward the system until the cables have enough slack to connect to their designated components.

Figure 58: Return the CMA Assembly to the Operational State



Step 7 : Connect the power cable to the Power Supply Unit (PSU) and loop the PSU's retention clip around the power cable and pinch it until the clip catches and locks in place.

Figure 59: Connect Power Cable

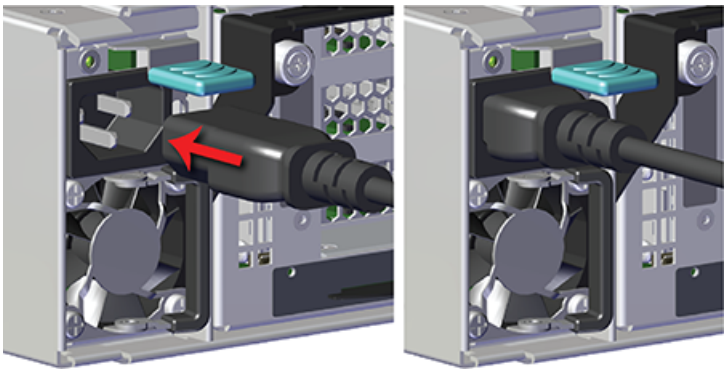
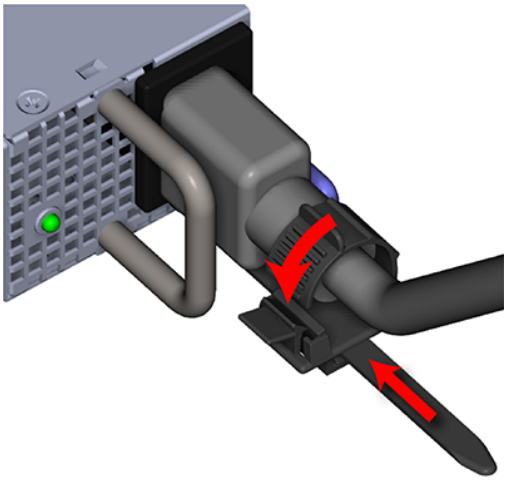


Figure 60: Locking the Retention Clip



Result: The Power Supply Unit (PSU) has now been replaced.

3.6 Chassis Replacement

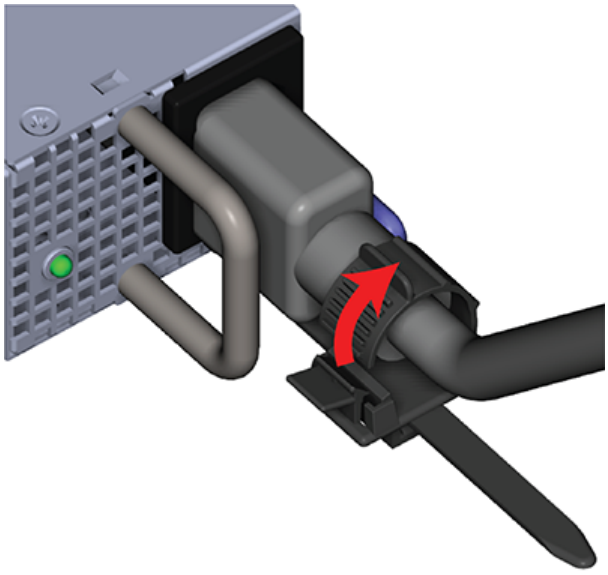
Replacement Requirements		
Personnel Required		2
Average Replacement Time		1 hour
Tool	**# Needed**	**Required vs. Optional**
T15 Torx Screwdriver	1	Required
Lift Equipment	1	Optional
ESD Mitigation Equipment (site specific)	1	Required

- ESD Sensitive
- Electric Shock
- Team Lift Required

Step 1: Disconnect the power and data cables from the enclosure.

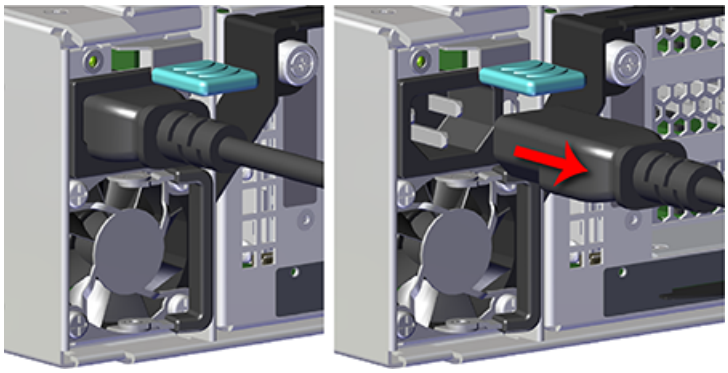
a. Move to the rear of the rack and unclip the retention strap as shown in the following image.

Figure 61: Unclipping Cable Retention Strap (Generic PSU Shown)



b. Disconnect the power cables from each of the two Power Supply Unit (PSU).

Figure 62: Disconnect Power Cables



c. Disconnect the Ethernet Cable from the RJ45 Ethernet Management port.

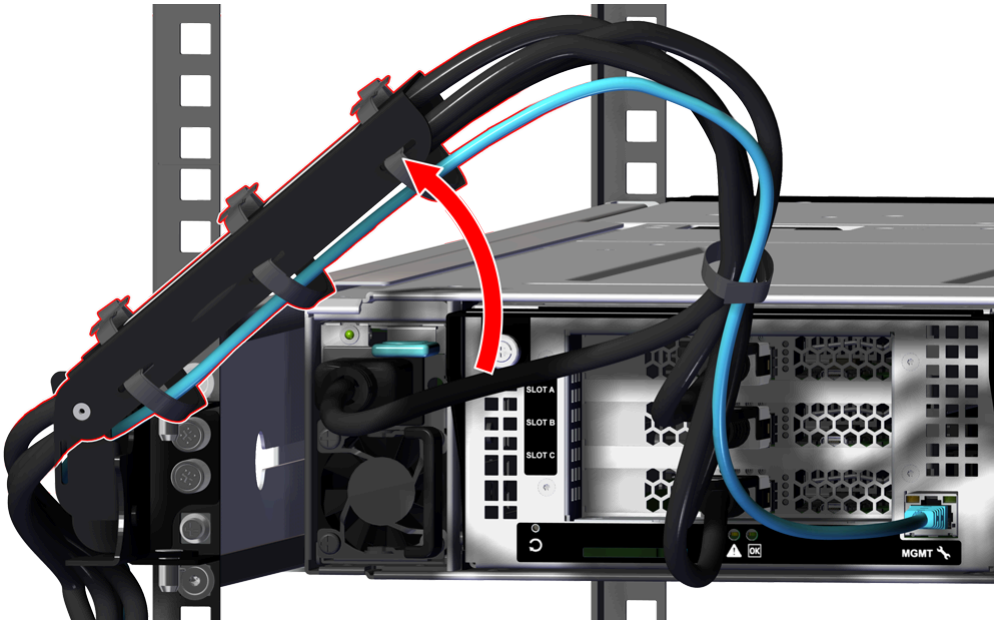
Figure 63: Disconnect RJ45 Ethernet Cables

d. Disconnect the QSFP28 cables from all of the IOM ports.

Figure 64: Disconnect QSFP28 Cables

Step 2 : **(Optional)** If your configuration contains a CMA, carefully move the arm on the side in need of servicing away from the system. This will allow for ease of access to the components on the chosen side while keeping the system cabling organized and safe. The CMA must be removed before attempting to remove the rails.

Figure 65: Move CMA Assembly into a Servicing State



Step 3 : **(Optional)** Repeat the previous step to move the remaining arm into the servicing state.

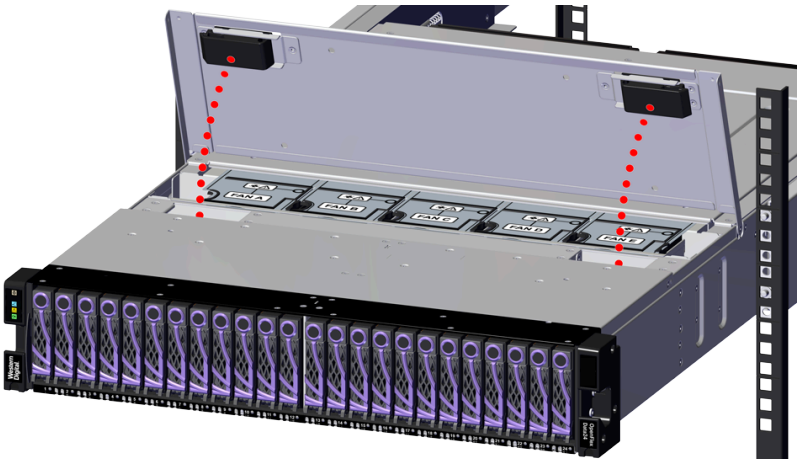
Remember: Its important to return drives to their proper slot when reinstalling. Use an appropriate tracking methodology to ensure that drive assemblies are reinstalled in the slots from which they were removed.

Step 4 : Uninstall the System Fans from the enclosure.

a. Unlatch the System Fan bay cover by sliding both latches in towards the center of the Chassis until the cover is released and can rotated open on its hinges. The latch operation is shown in the following image.

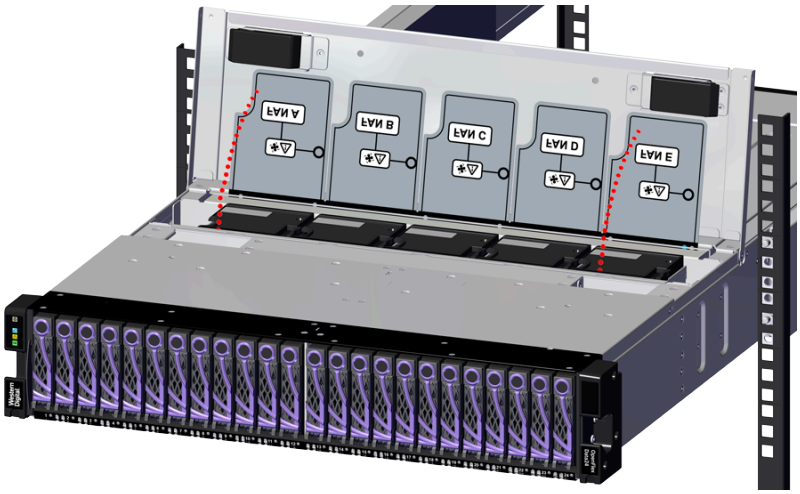
Figure 66: System Fan Bay Cover Latch Location

Figure 67: System Fan Bay Cover Operation



b. Gain access to the System Fan bay by lifting the flexible label.

Figure 68: Flexible Label

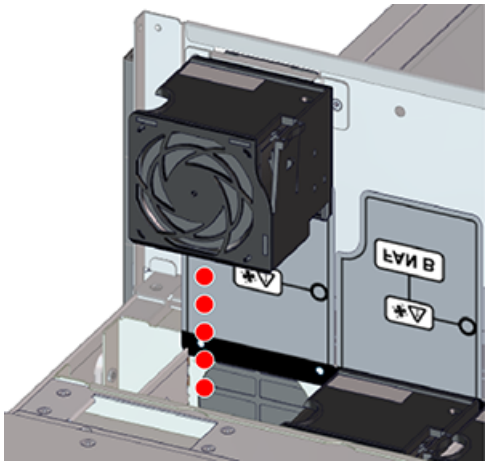


c. Grasp the System Fan firmly with your index finger, and use your thumb to press the latch release using a pinching motion.

Figure 69: System Fan Latch Operation

d. Carefully pull the System Fan out of the System Fan slot.

Figure 70: Uninstall System Fan

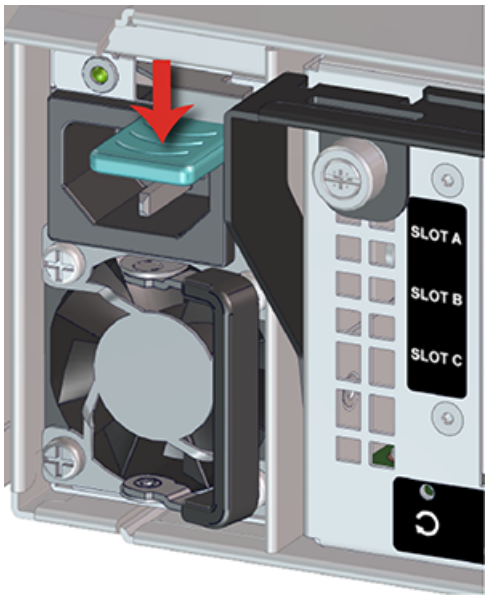


e. Repeat these steps to remove the remaining System Fans.

Step 5 : Uninstall the Power Supply Unit (PSU) from the enclosure.

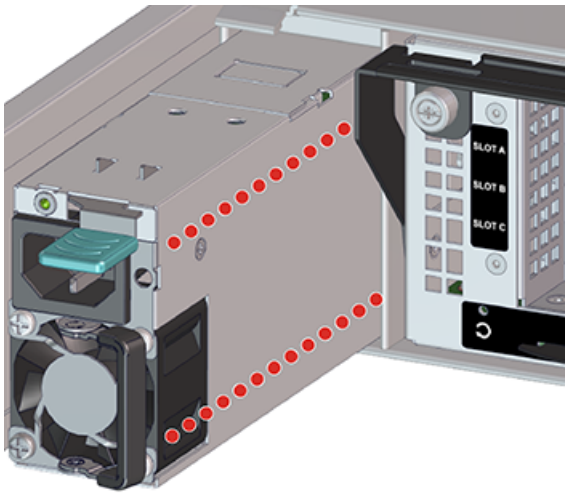
a. From the rear of the rack, grasp the ring handle with your index finger and use your thumb to press the latch release using a pinching motion.

Figure 71: Power Supply Unit (PSU) Release Latch Operation



b. Carefully pull the Power Supply Unit (PSU) out of the Power Supply Unit (PSU) slot.

Figure 72: Uninstall Power Supply Unit (PSU)

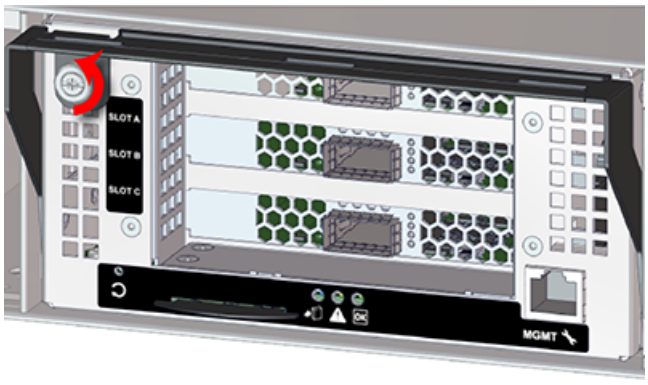


Step 6 : Uninstall the remaining Power Supply Unit (PSU) in the same way the first was uninstalled.

Step 7 : Uninstall the IO Module (IOM) from the enclosure.

a. Unlock the IO Module (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. A screwdriver may be used if desired.

Figure 73: IO Module (IOM) Thumbscrew Operation



b. Pull the release handle out until the IO Module (IOM) is unseated and can be removed from the IO Module (IOM) slot.

Figure 74: IO Module (IOM) Release Handle Operation

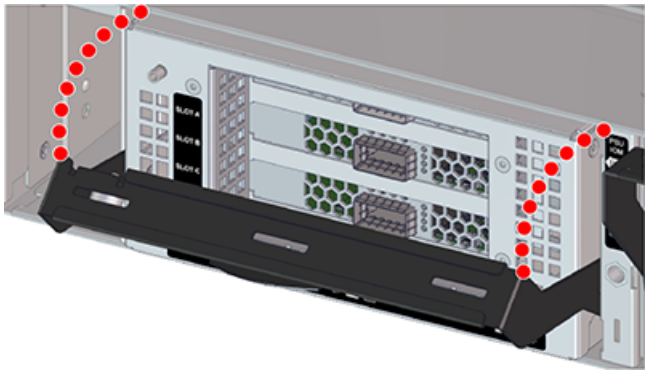


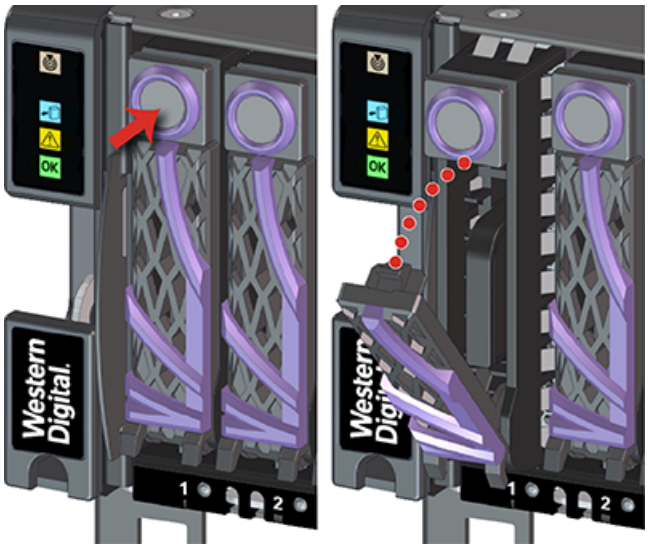
Figure 75: Uninstall IO Module (IOM)

Step 8: Uninstall the remaining IO Module (IOM) in the same way the first was uninstalled.

Step 9: Uninstall the Drive Assembly from the enclosure.

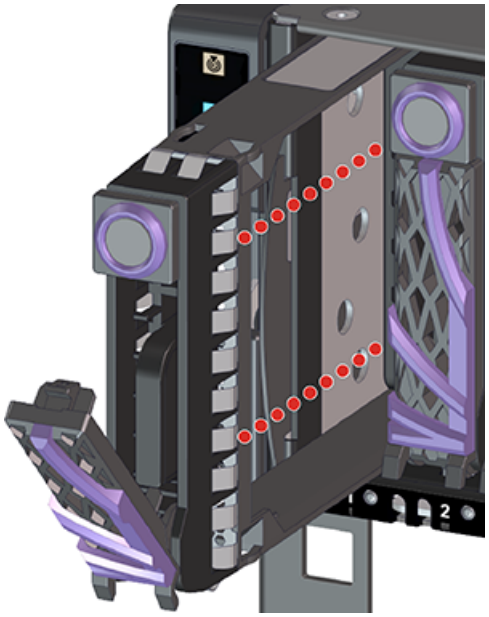
a. From the front of the rack, press the release button on the front of the Drive Assembly. The release handle will eject outward.

Figure 76: Drive Assembly Release Operation



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

Figure 77: Uninstall Drive Assembly

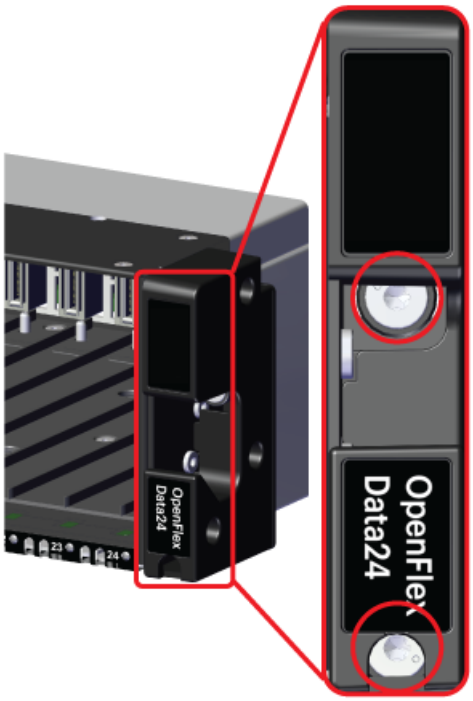


Step 10 : Uninstall each Drive Assembly in the same way the first was uninstalled.

Step 11 : 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.

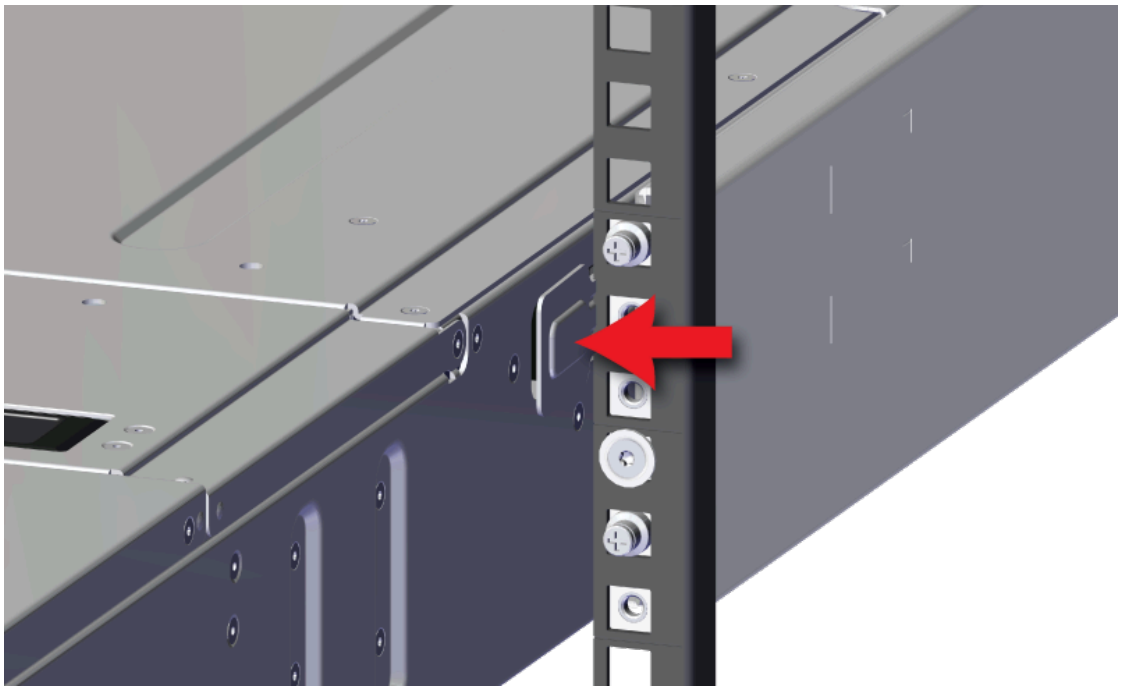
Figure 78: Rack Ear Captive Screw Location



b. Carefully pull the Chassis out of the rack. The chassis will slide out of the rails until the locking tabs on the side of the chassis engage and stop the chassis from being pulled out further.

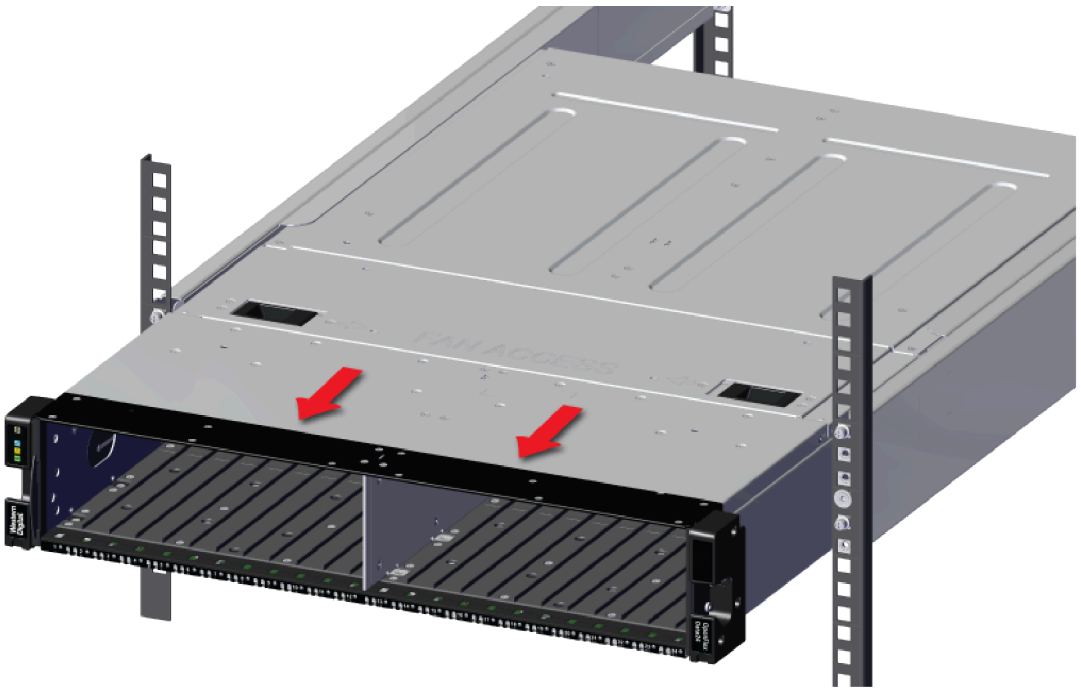
c. Depress the locking tab on the right side of the chassis to allow it to be removed from the rails.

Figure 79: Locking Tab



d. Continue sliding 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 80: Uninstall Chassis



Step 12 : Unpack and inspect the new Chassis for damage.

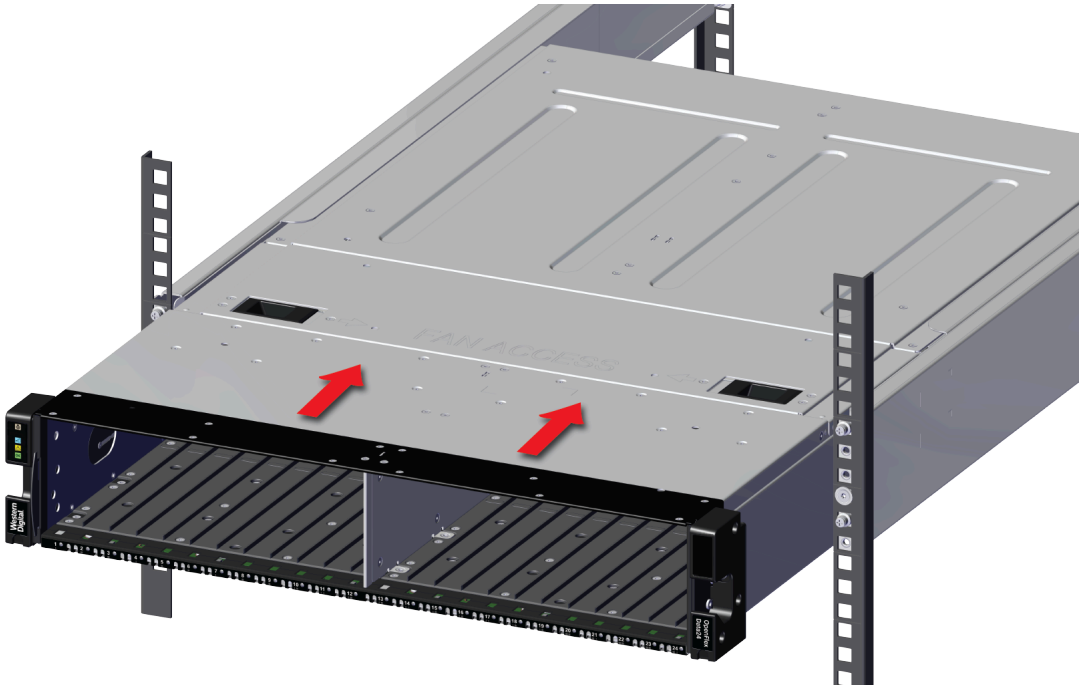
a. Inspect the packaging that the Chassis replacement was shipped in and record any damage to the box. Large cuts, open boxes, and crushed corners should be reported.

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 13 : Install the Chassis onto the rack mounted rails.

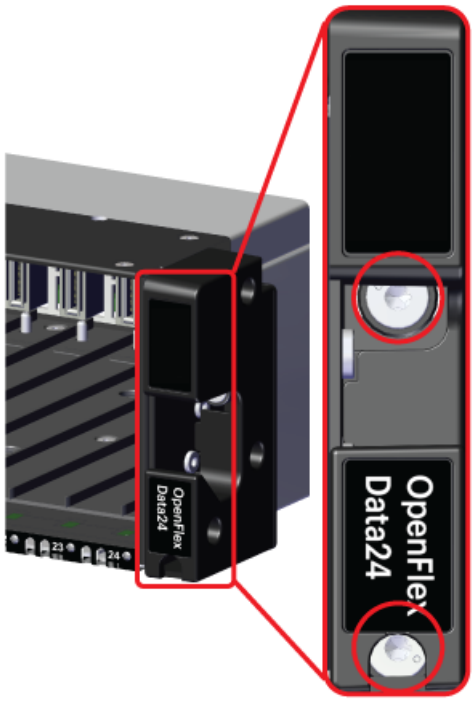
a. Carefully slide the Chassis onto the rails until the rack ears are flush with the mounts on the rails.

Figure 81: Chassis Installation



b. Using the T15 Torx screwdriver, tighten the two Torx captive screws, located under the rack ear cutouts, to secure the Chassis to the rail. Repeat this step to secure the remaining rack mount to the remaining rail.

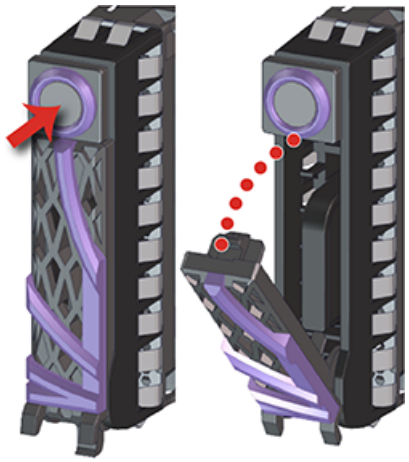
Figure 82: Captive Screws



Step 14 : Install the Drive Assembly into the enclosure.

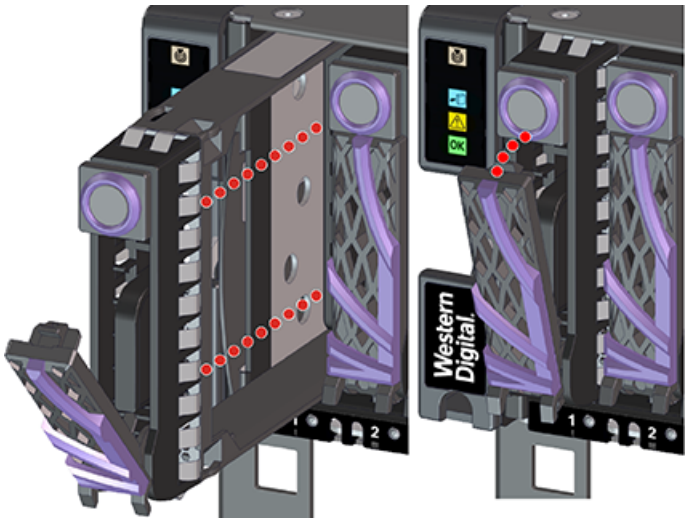
a. Prepare the Drive Assembly for installation by pressing the release button on the front of the Drive Assembly. The release handle will eject outward.

Figure 83: Drive Assembly Release Operation



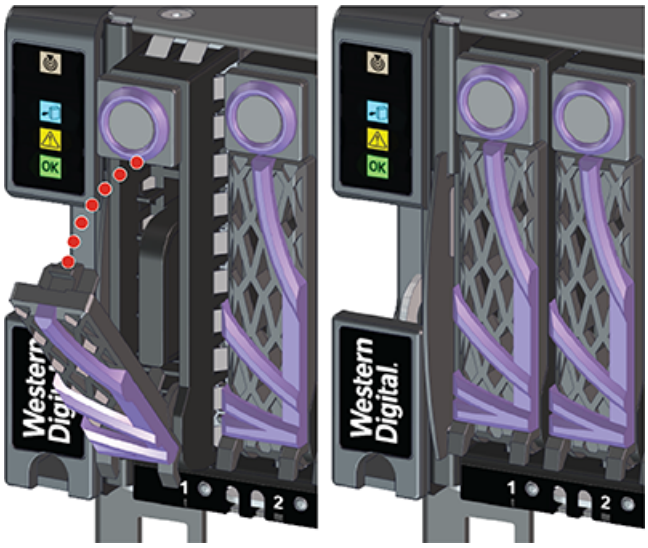
b. From the front of the rack, gently slide the Drive Assembly into the Drive Assembly slot until the release handle lifts up slightly, indicating that it is engaged with the Chassis.

Figure 84: 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 85: Drive Assembly Installation

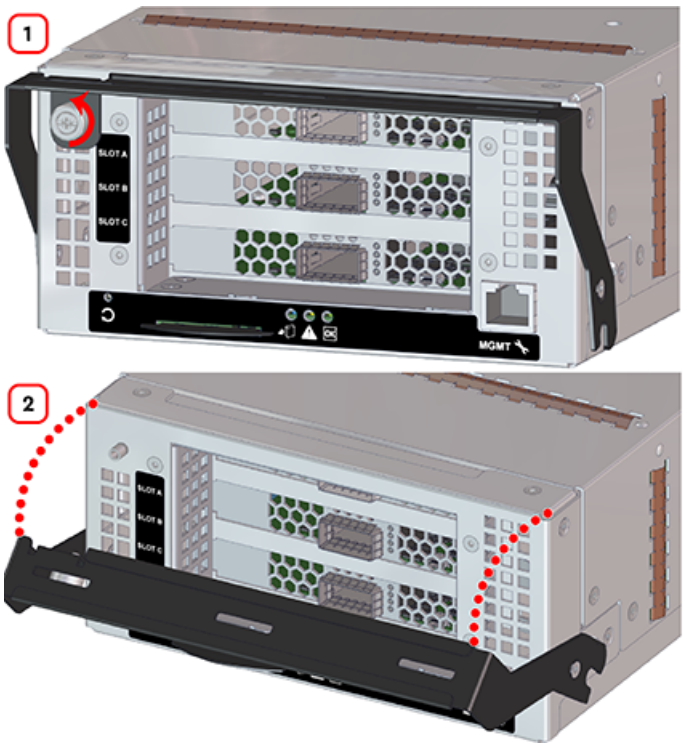


Step 15 : Install the remaining Drive Assembly in the same way the first was installed.

Step 16 : Install the IO Module (IOM) into the enclosure.

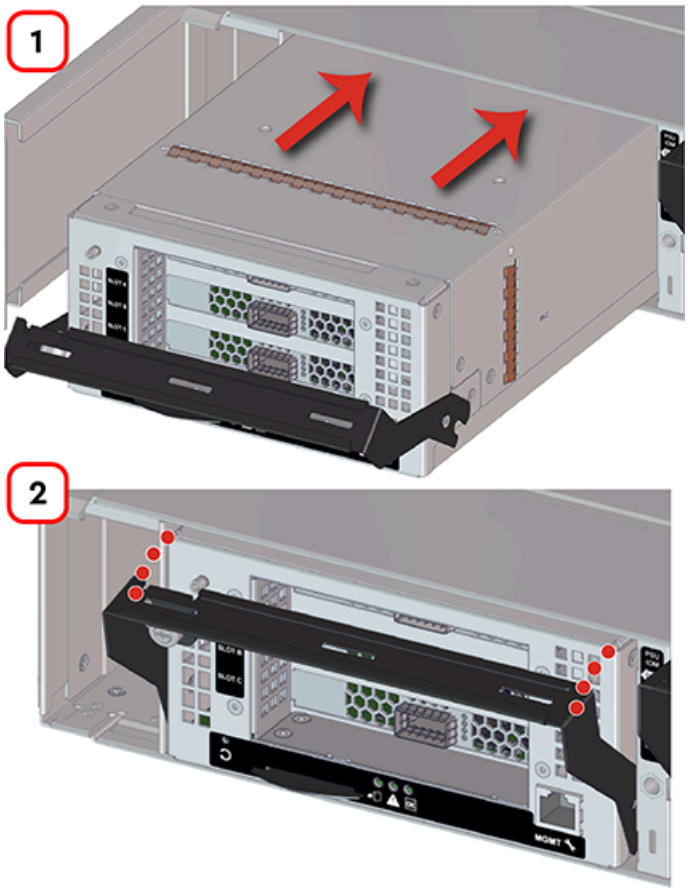
a. Unlock the IO Module (IOM) by turning the thumbscrew counterclockwise until the screw threads are not engaged any longer. The location of the thumbscrew is shown in the following image.

Figure 86: Prepare IO Module (IOM)



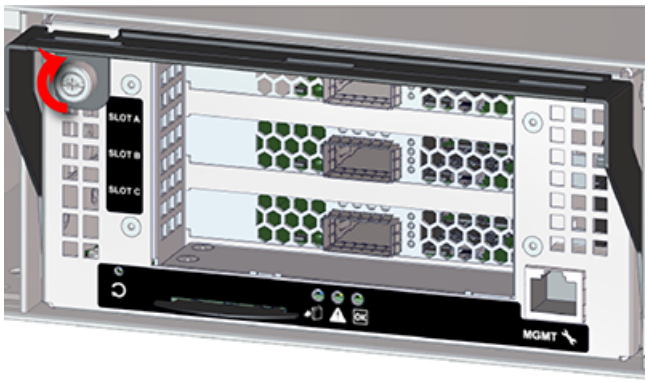
b. Gently slide the IO Module (IOM) into the IO Module (IOM) slot until the release handle is engaged with the Chassis. When the handle lifts up slightly, it is an indicator that the release handle is engaged with the Chassis.

Figure 87: IO Module (IOM) Handle Engaged



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

Figure 88: IO Module (IOM) Secure



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

Attention: The IO Module (IOM) firmware procedure may have to be executed to match the other IO Module (IOM) if you are replacing the IO Module (IOM). This will depend on what firmware version is loaded on the replacement IOM.

Step 17 : Install the remaining IO Module (IOM) in the same way the first was installed.

Step 18 : Install the Power Supply Unit (PSU) into the enclosure.

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

Figure 89: Power Port Location

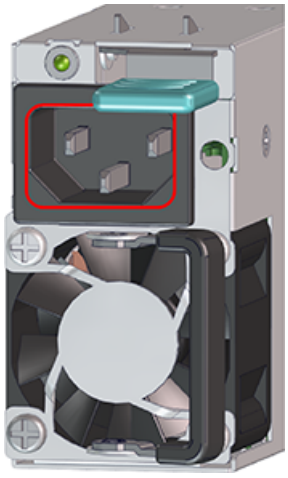
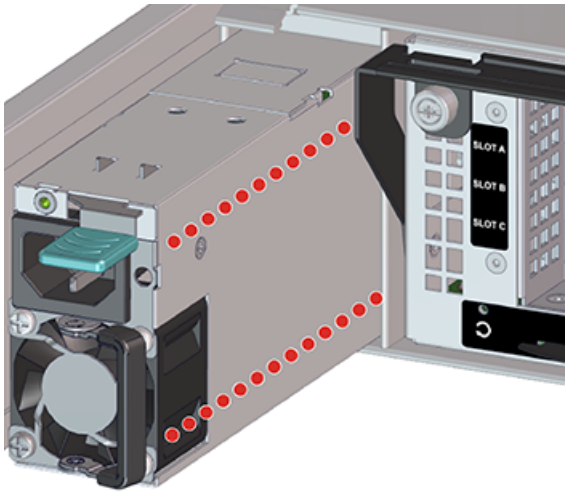


Figure 90: Power Supply Unit (PSU) Installation



b. Verify that the Power Supply Unit (PSU) is fully seated and latched into the Power Supply Unit (PSU) slot by gently pulling on the handle.

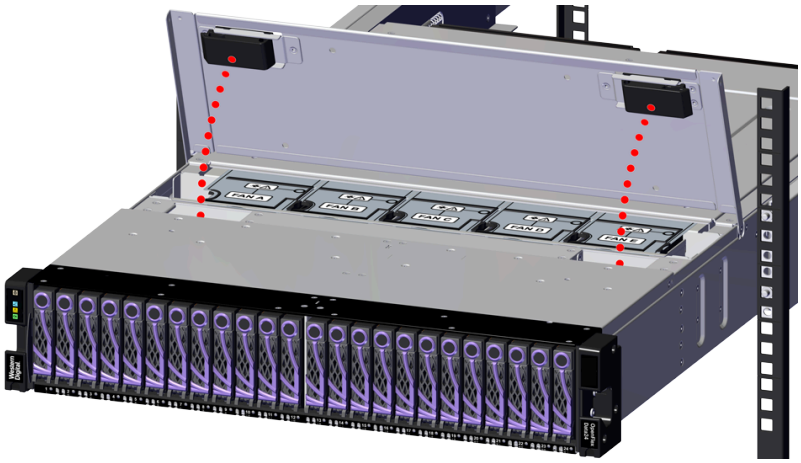
Step 19 : Install the remaining Power Supply Unit (PSU) in the same way the first was installed.

Step 20 : Install the System Fans into the enclosure.

a. Unlatch the System Fan bay cover by sliding both latches in towards the center of the Chassis until the cover is released and can rotated open on its hinges. The latch operation is shown in the following image.

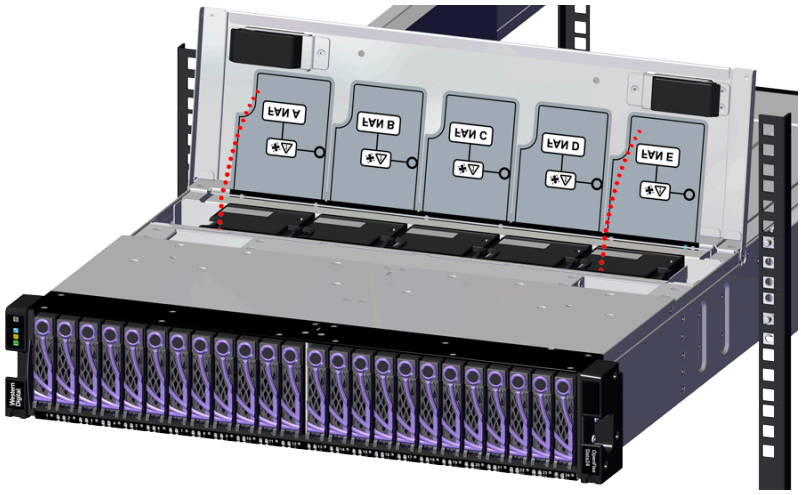
Figure 91: System Fan Bay Cover Latch Location

Figure 92: System Fan Bay Cover Operation



b. Gain access to the System Fan bay by lifting the flexible label.

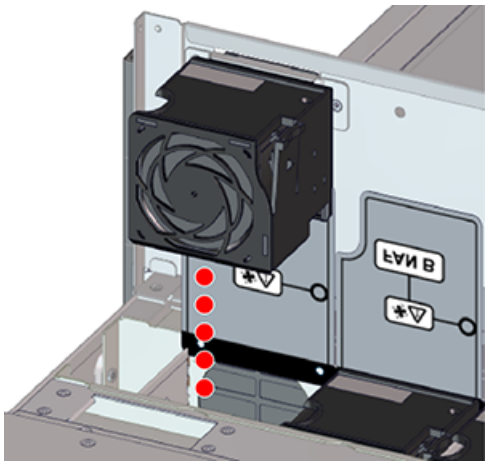
Figure 93: Flexible Label



c. Orient the System Fan with the module latch (and connector) on the right-hand side and insert it into the System Fan slot.

Figure 94: System Fan Installation

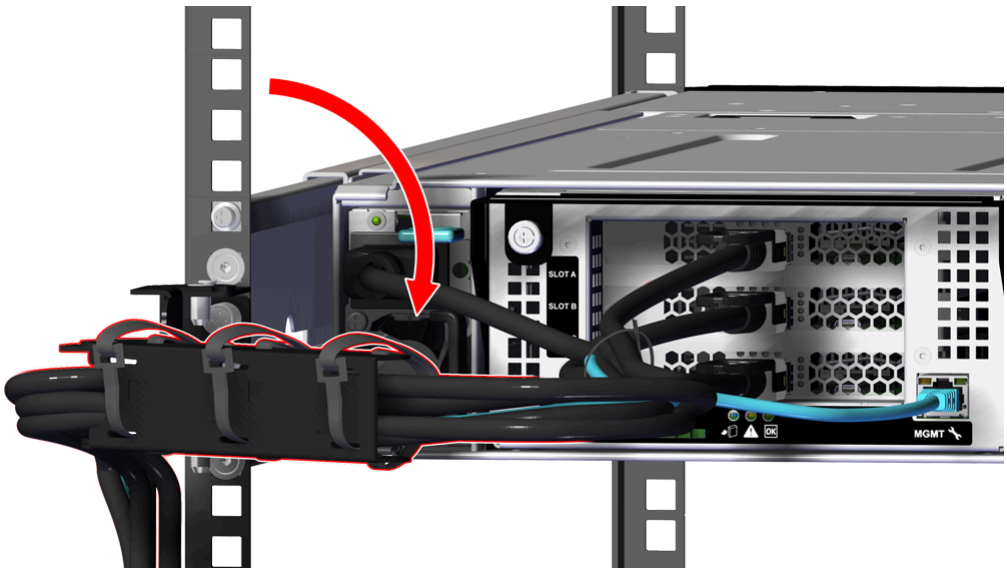
Figure 95: System Fan Installation



d. Repeat these steps to install the remaining System Fans.

Step 21: **(Optional)** If your configuration contains a Cable Management Arm (CMA) Assembly, carefully push the arm on the side you serviced toward the system until the cables have enough slack to connect to their designated components.

Figure 96: Return the CMA Assembly to the Operational State



Step 22 : **(Optional)** Repeat the previous step to return the remaining arm to the operational state.

Step 23 : Connect the data and power cables to the enclosure.

Attention: The system requires a power source that can support a voltage range of 200 - 240Vac.

a. Move to the rear of the rack and connect the Ethernet Cables into the Ethernet Management ports.

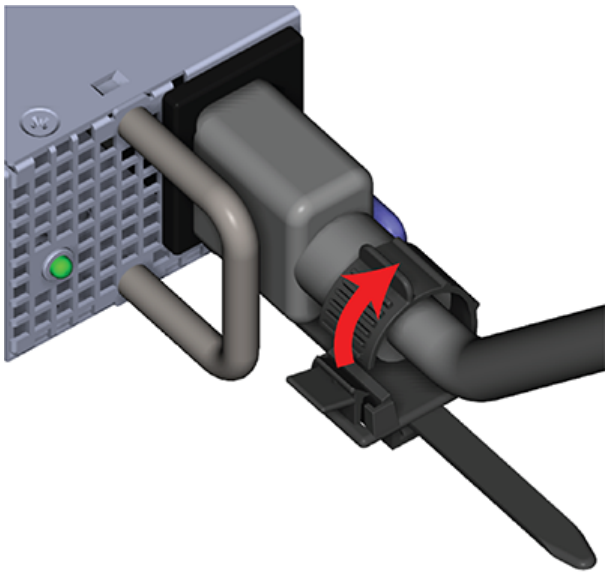
Figure 97: Connecting RJ45 Ethernet Cable to Management Port

b. Connect the QSFP28 cables into all of the IOM ports.

Figure 98: Connect QSFP28 Cables

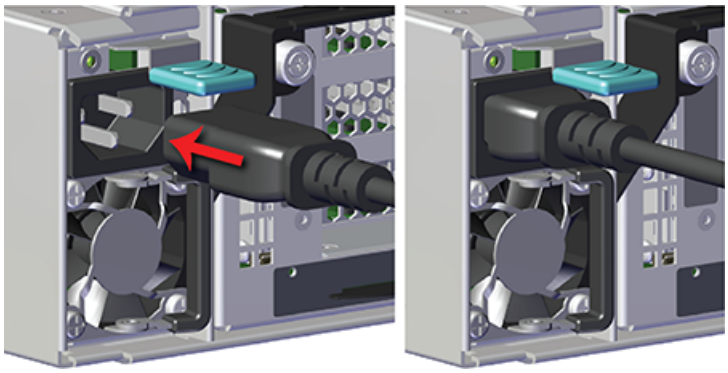
c. Unclip the retention strap on the PSU as shown in the following image.

Figure 99: Unclipping Cable Retention Strap (Generic PSU Shown)



d. Connect the power cables into the two Power Supply Unit (PSU) power connectors.

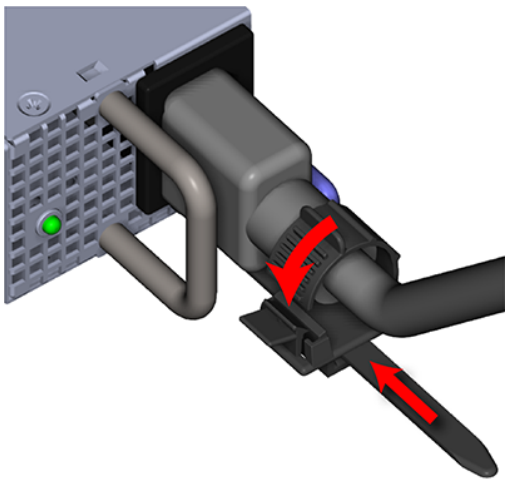
Figure 100: Connect Power Cables



Note: Once the first power cord has been connected to the enclosure the system will begin to power-on.

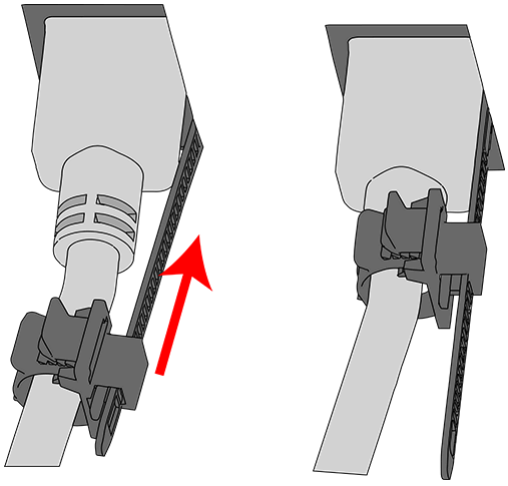
e. Loop the PSU's retention clip around each power cable and pinch it until the clip catches and locks in place.

Figure 101: Locking the Retention Clip



f. Slide the retention clip forward until it stops near the cable connector. Doing this will ensure that the retention clip functions properly in the event the cable is accidentally pulled.

Figure 102: Sliding the Retention Clip Forward



Result: The Chassis has now been replaced.

3.7 Rails Replacement

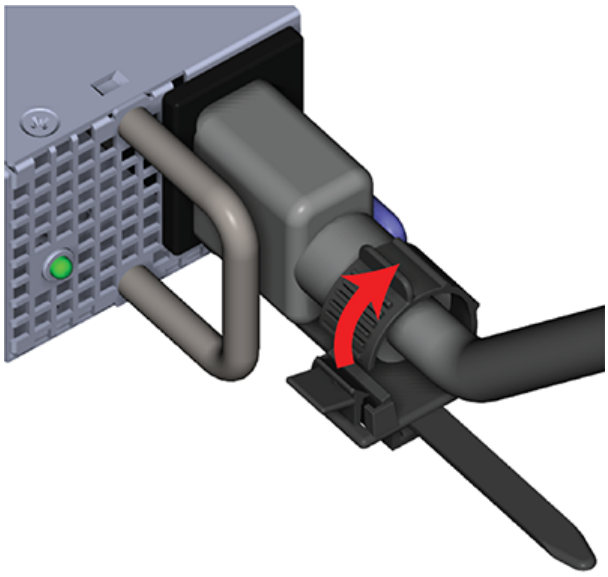
Replacement Requirements		
Personnel Required		1
Service Window		N/A
Tool	**# Needed**	**Required vs. Optional**
T15 Torx Screwdriver	1	Required
Level	1	Optional
Lift Equipment	1	Optional
ESD Mitigation Equipment (site specific)	1	Required

- ESD Sensitive
- Electric Shock
- Fan Blade Danger
- Safe Lift: Over 50 lbs.

Step 1: Disconnect the power and data cables from the enclosure.

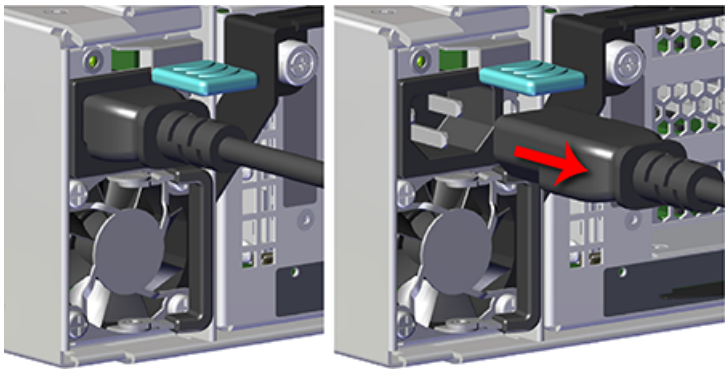
a. Move to the rear of the rack and unclip the retention strap as shown in the following image.

Figure 103: Unclipping Cable Retention Strap (Generic PSU Shown)



b. Disconnect the power cables from each of the two Power Supply Unit (PSU).

Figure 104: Disconnect Power Cables



c. Disconnect the Ethernet Cable from the RJ45 Ethernet Management port.

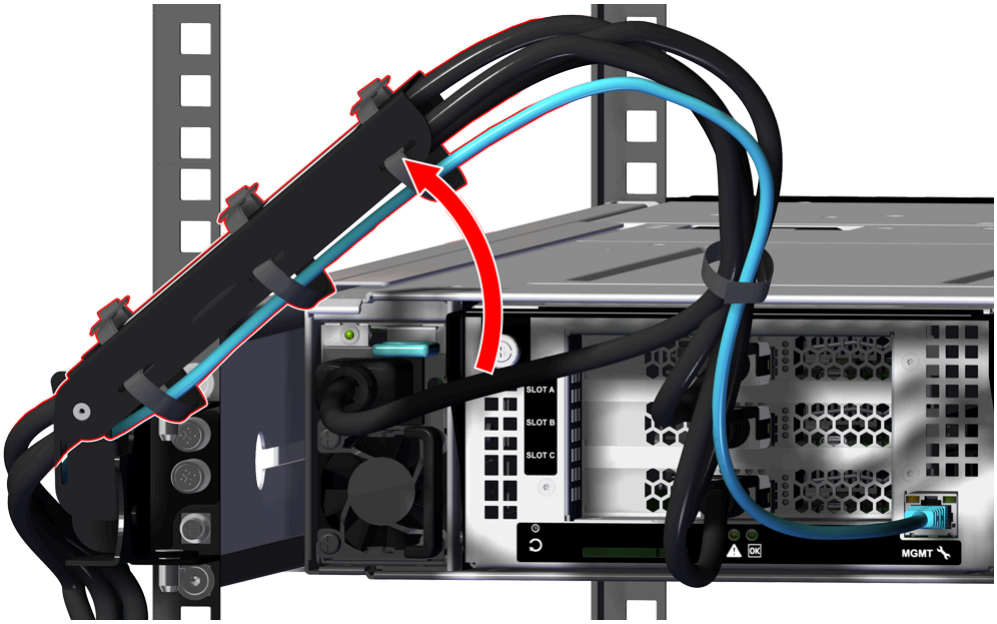
Figure 105: Disconnect RJ45 Ethernet Cables

d. Disconnect the QSFP28 cables from all of the IOM ports.

Figure 106: Disconnect QSFP28 Cables

Step 2 : **(Optional)** If your configuration contains a CMA, carefully move the arm on the side in need of servicing away from the system. This will allow for ease of access to the components on the chosen side while keeping the system cabling organized and safe. The CMA must be removed before attempting to remove the rails.

Figure 107: Move CMA Assembly into a Servicing State

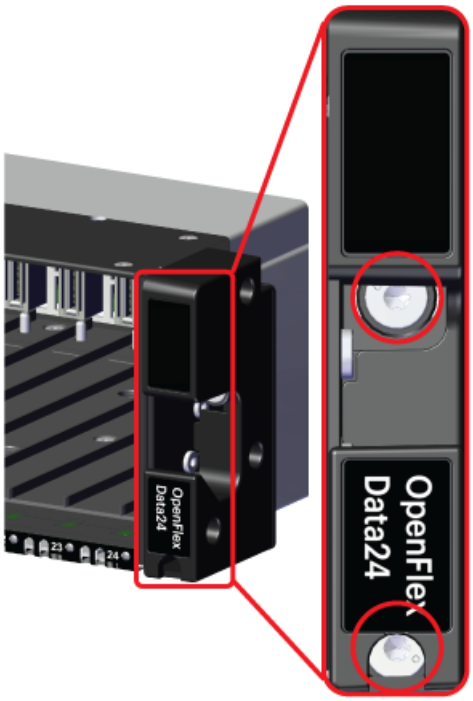


Step 3 : **(Optional)** Repeat the previous step to move the remaining arm into the servicing state.

Step 4 : 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.

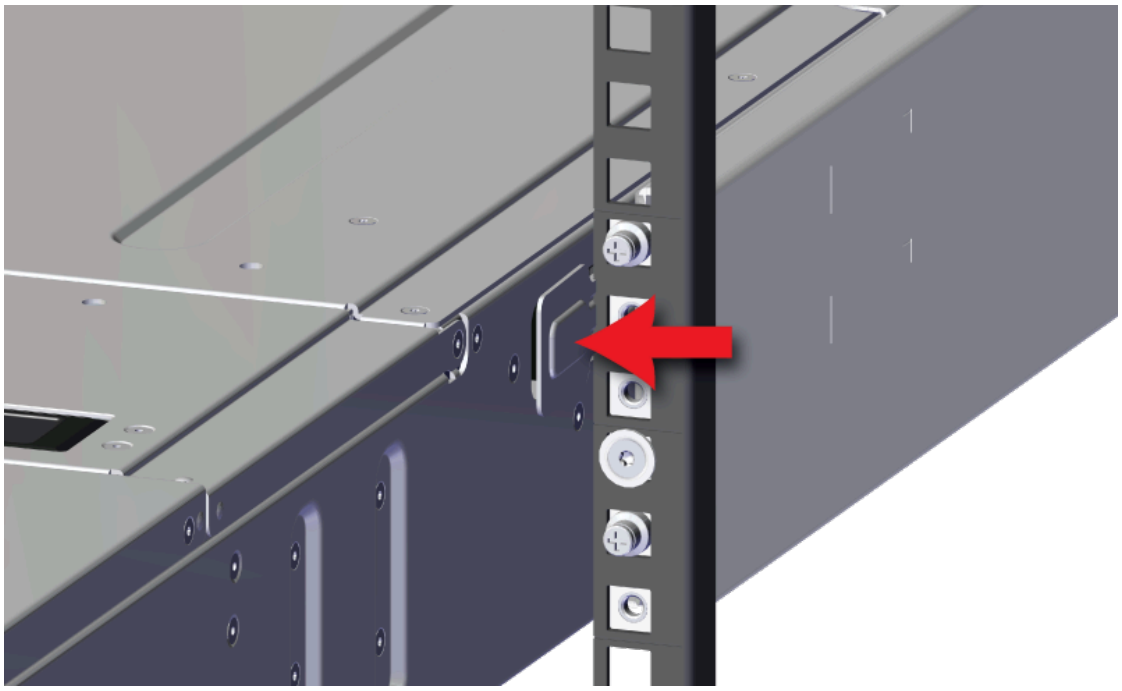
Figure 108: Rack Ear Captive Screw Location



b. Carefully pull the Chassis out of the rack. The chassis will slide out of the rails until the locking tabs on the side of the chassis engage and stop the chassis from being pulled out further.

c. Depress the locking tab on the right side of the chassis to allow it to be removed from the rails.

Figure 109: Locking Tab



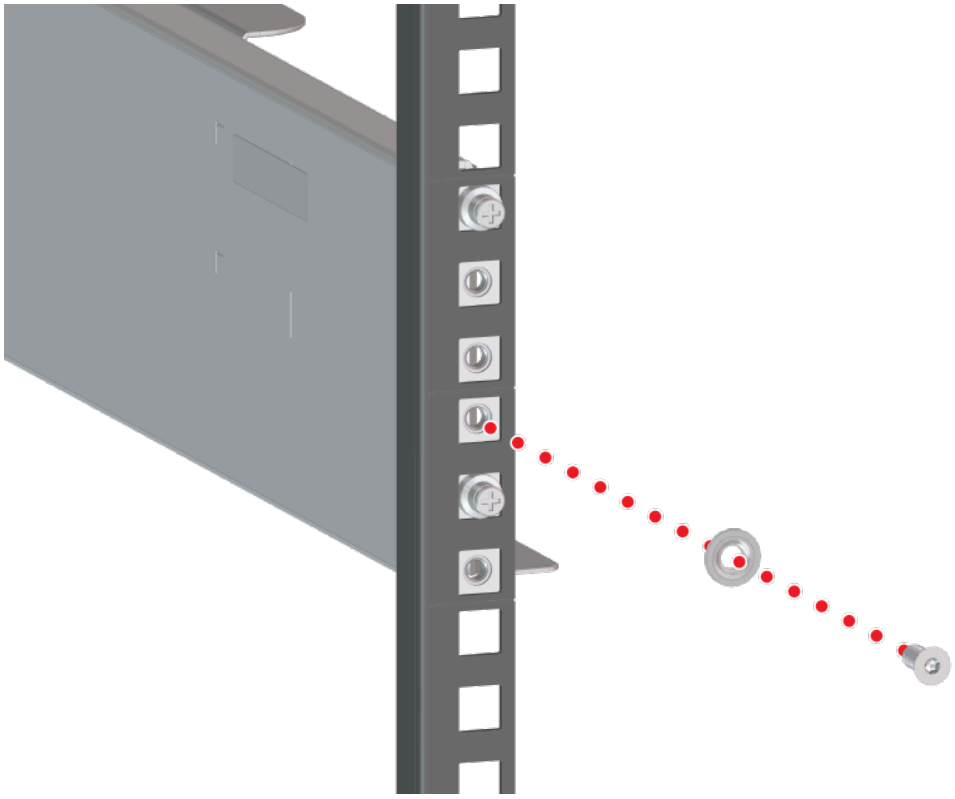
d. Continue sliding the chassis out of the rack and ensure extra care is taken to support the weight of the Chassis when the Chassis is clear of the rack mount rails.

Figure 110: Uninstall Chassis

Step 5 : Uninstall the rack mount Rails.

a. From the front of the rack, using the T15 Torx screwdriver, uninstall the M5 Torx screw and washer that secure the front of the rack mount Rails and bracket to the rack.

Figure 111: Uninstall Front Rack Mount



b. From the rear of the rack, using the T15 Torx screwdriver, uninstall the two M5 Torx screws and washers that secure the rear of the rack mount Rails to the rack. Remove the Rail from the rack by rotating the front mount out and pulling the rear mount out of the rack.

Figure 112: Uninstall Rear Rack Mount

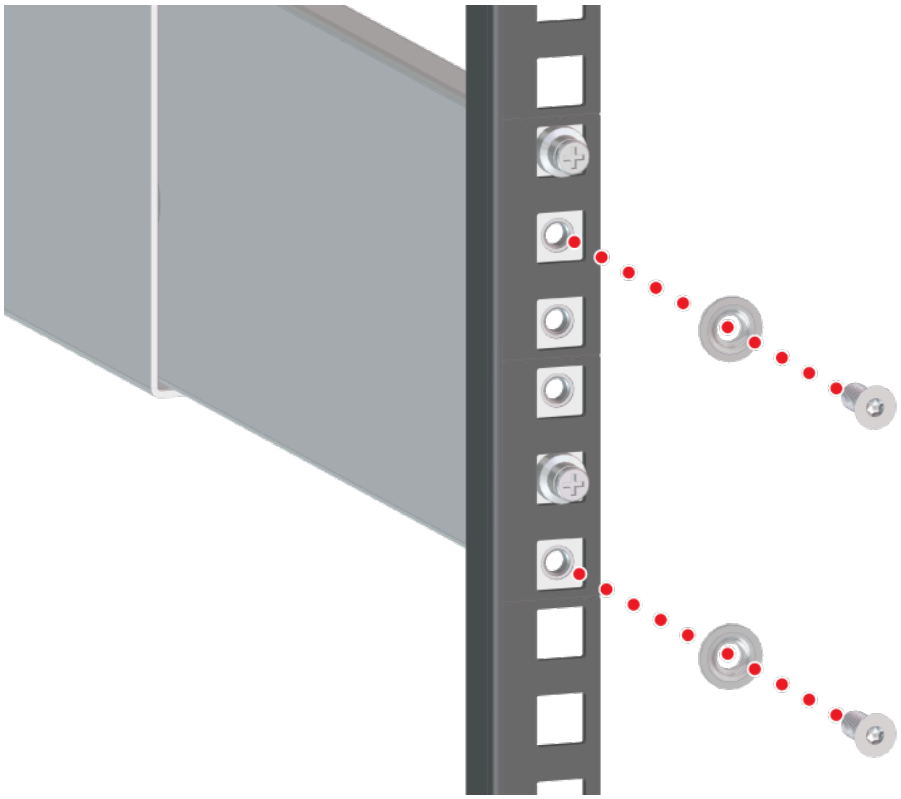
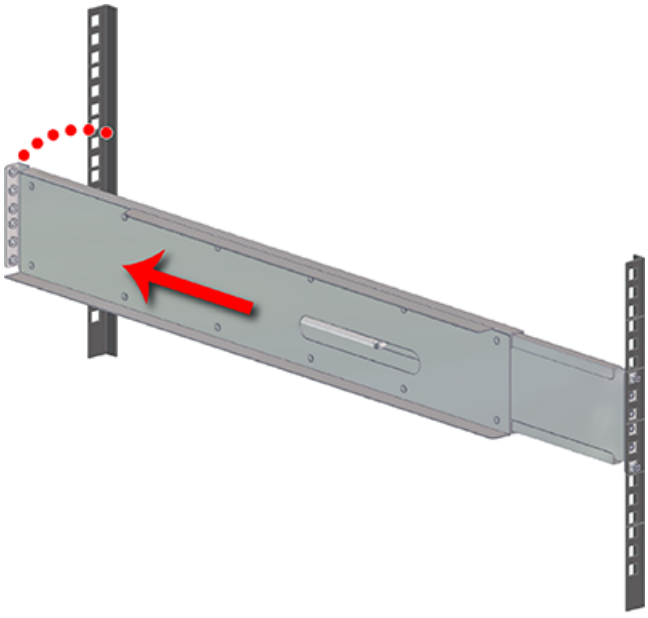


Figure 113: Remove Rail



Step 6 : Uninstall the remaining Rails in the same way the first was uninstalled.

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

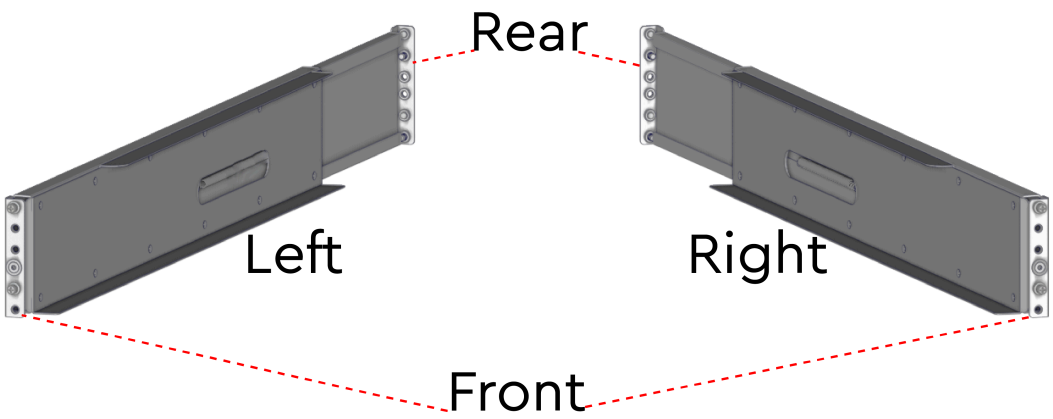
a. Inspect the packaging that the Rails replacement was shipped in and record any damage to the box. Large cuts, open boxes, and crushed corners should be reported.

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

Step 8 : Install the rack mount Rails.

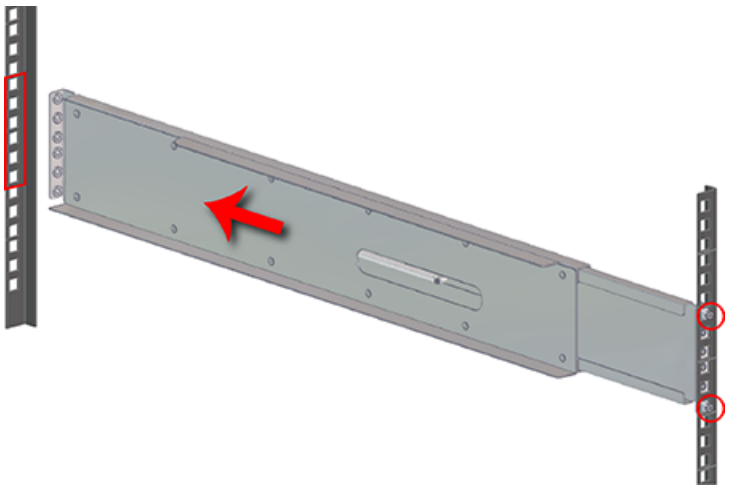
a. Determine which of the rails is the right and which is the left as shown in the following image.

Figure 114: Rails Identification



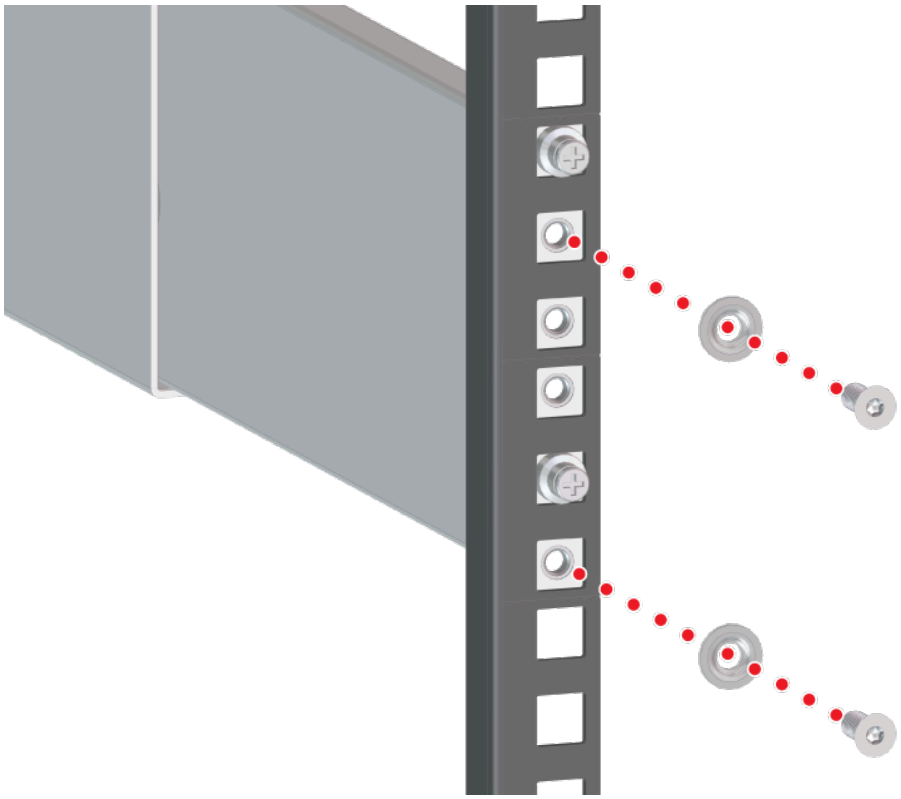
b. From the rear of the rack, set the rear of the Rails in the same location as the damaged Rails and extend it so that the pins fit into the same U holes.

Figure 115: Rails Location



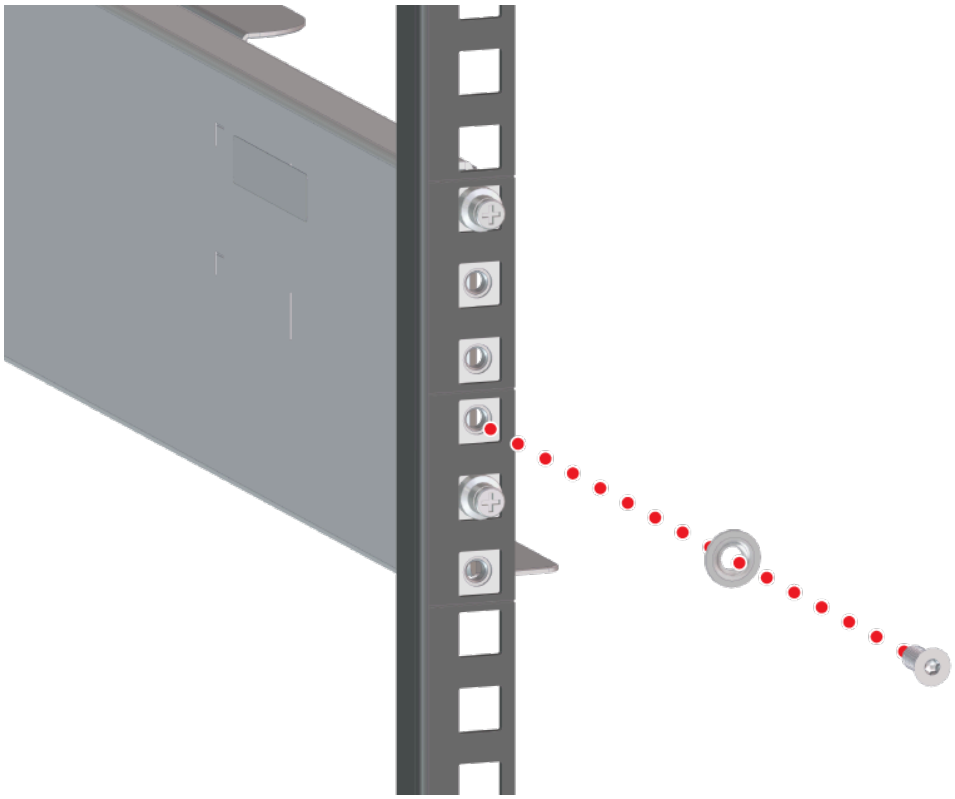
c. Secure the rear of the rack mount Rails to the rack using the T15 Torx screwdriver by tightening the preinstalled washers and M5 Torx screws to the rack mount Rails.

Figure 116: Install Rear Rack Mount



d. From the front of the rack, using the T15 Torx screwdriver, install the washers and M5 Torx screws that secure the front of the rack mount Rails and bracket to the rack.

Figure 117: Install Front Rack Mount



Step 9 : Install the remaining Rails in the same way the first was installed.

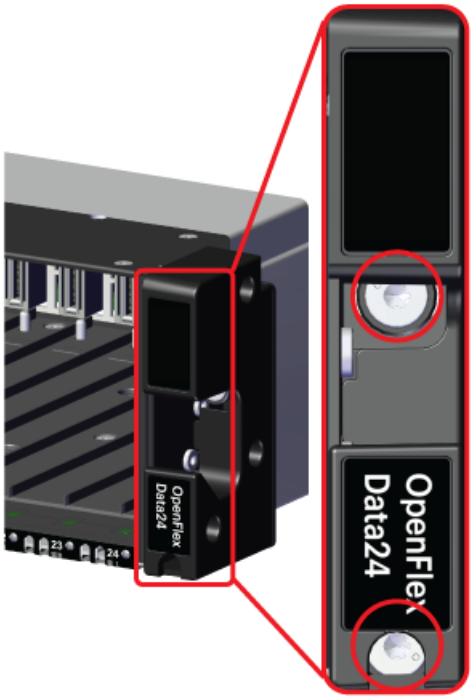
Step 10 : Install the Chassis onto the rack mounted rails.

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

Figure 118: Chassis Installation

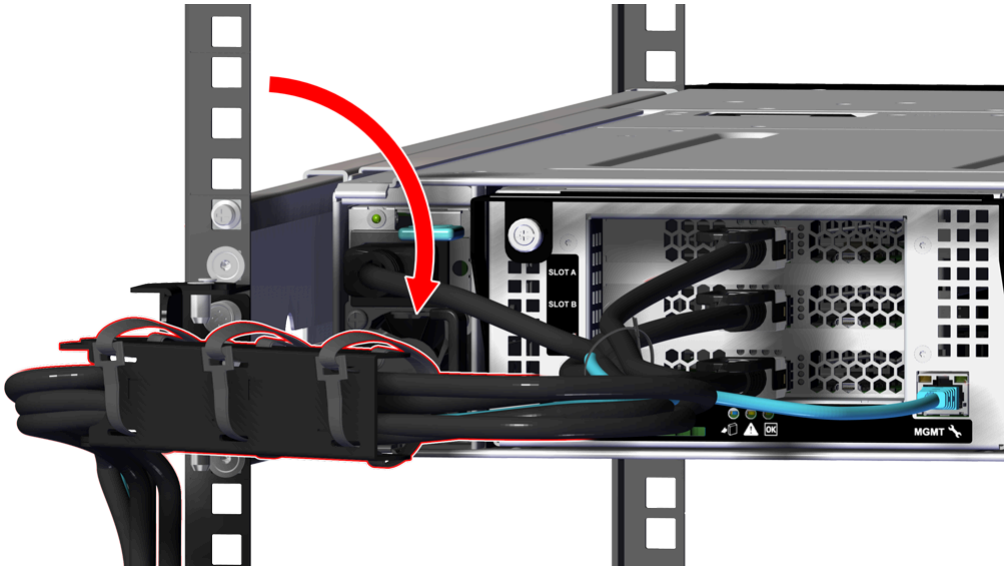
b. Using the T15 Torx screwdriver, tighten the two Torx captive screws, located under the rack ear cutouts, to secure the Chassis to the rail. Repeat this step to secure the remaining rack mount to the remaining rail.

Figure 119: Captive Screws



Step 11 : **(Optional)** If your configuration contains a Cable Management Arm (CMA) Assembly, carefully push the arm on the side you serviced toward the system until the cables have enough slack to connect to their designated components.

Figure 120: Return the CMA Assembly to the Operational State



Step 12 : **(Optional)** Repeat the previous step to return the remaining arm to the operational state.

Step 13 : Connect the data and power cables to the enclosure.

Attention: The system requires a power source that can support a voltage range of 200 - 240Vac.

a. Move to the rear of the rack and connect the Ethernet Cables into the Ethernet Management ports.

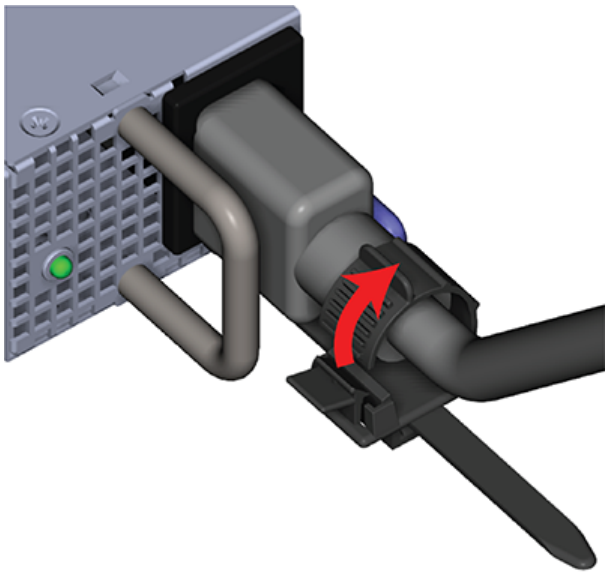
Figure 121: Connecting RJ45 Ethernet Cable to Management Port

b. Connect the QSFP28 cables into all of the IOM ports.

Figure 122: Connect QSFP28 Cables

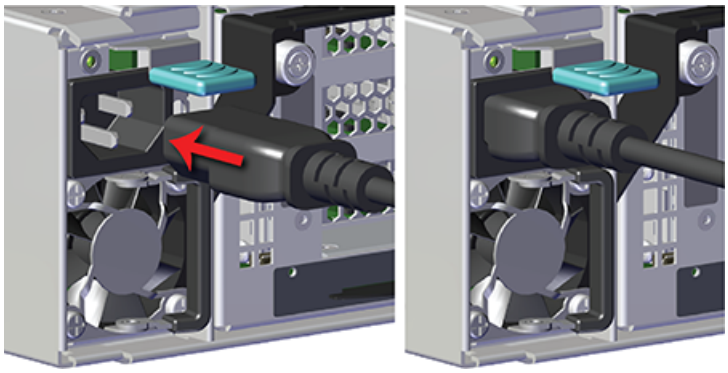
c. Unclip the retention strap on the PSU as shown in the following image.

Figure 123: Unclipping Cable Retention Strap (Generic PSU Shown)



d. Connect the power cables into the two Power Supply Unit (PSU) power connectors.

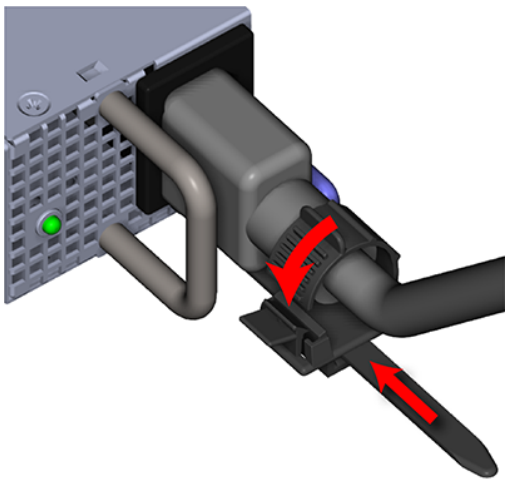
Figure 124: Connect Power Cables



Note: Once the first power cord has been connected to the enclosure the system will begin to power-on.

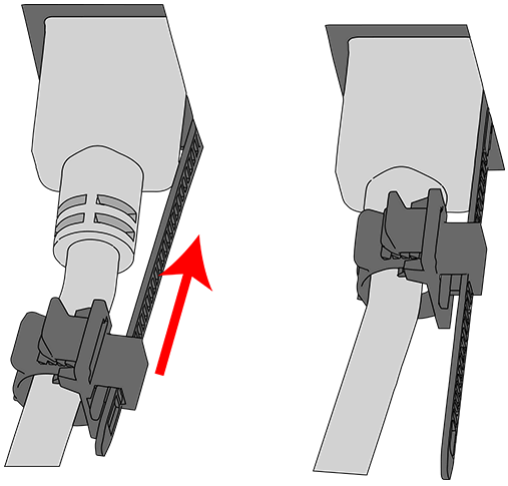
e. Loop the PSU's retention clip around each power cable and pinch it until the clip catches and locks in place.

Figure 125: Locking the Retention Clip



f. Slide the retention clip forward until it stops near the cable connector. Doing this will ensure that the retention clip functions properly in the event the cable is accidentally pulled.

Figure 126: Sliding the Retention Clip Forward



Result: The Rails have now been replaced.

3.8 Cable Management Arm (CMA) Assembly Replacement

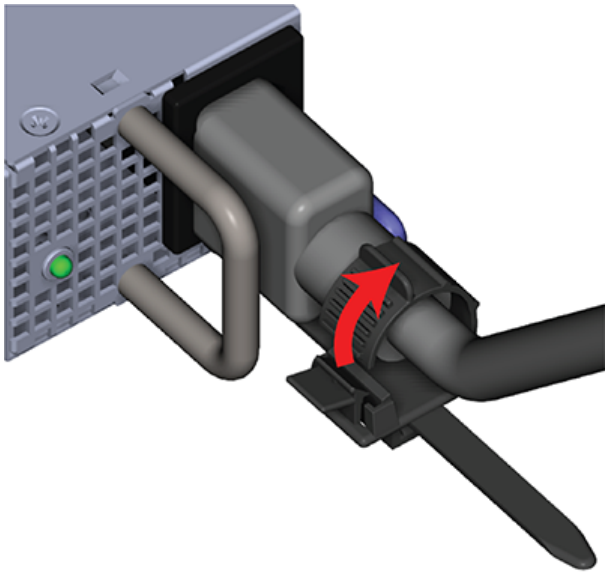
Replacement Requirements	
Personnel Required	1
Service Window	N/A

- Electric Shock
- Fan Blade Danger

Step 1: Disconnect the power and data cables from the enclosure.

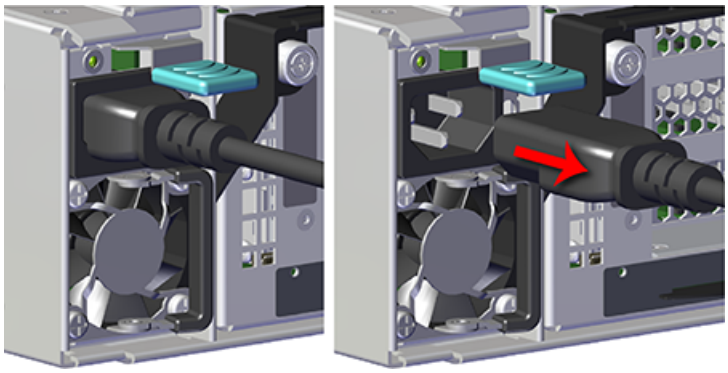
a. Move to the rear of the rack and unclip the retention strap as shown in the following image.

Figure 127: Unclipping Cable Retention Strap (Generic PSU Shown)



b. Disconnect the power cables from each of the two Power Supply Unit (PSU).

Figure 128: Disconnect Power Cables



c. Disconnect the Ethernet Cable from the RJ45 Ethernet Management port.

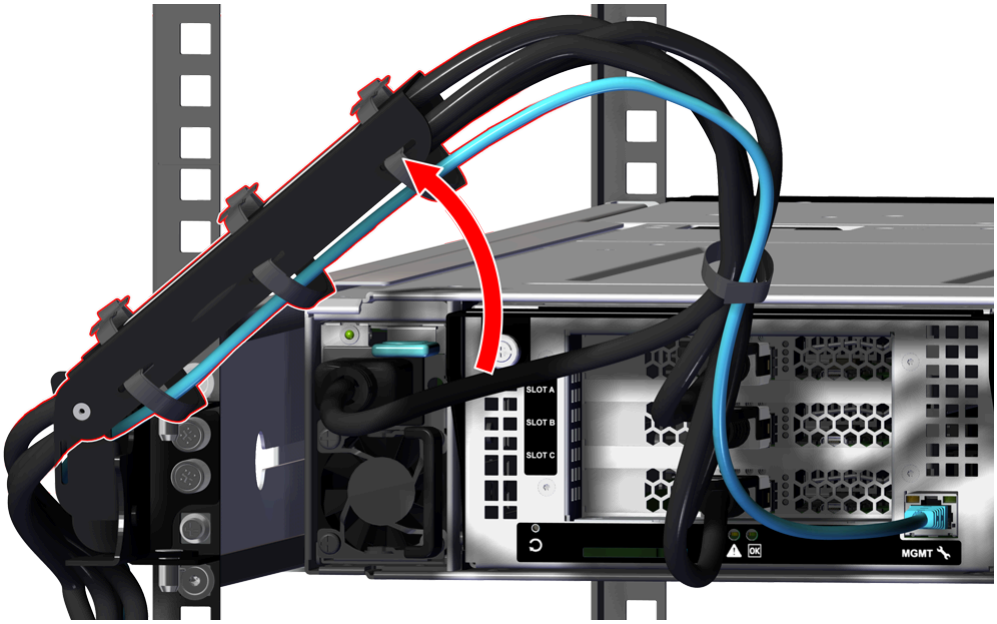
Figure 129: Disconnect RJ45 Ethernet Cables

d. Disconnect the QSFP28 cables from all of the IOM ports.

Figure 130: Disconnect QSFP28 Cables

Step 2 : If your configuration contains a CMA, carefully move the arm on the side in need of servicing away from the system. This will allow for ease of access to the components on the chosen side while keeping the system cabling organized and safe. The CMA must be removed before attempting to remove the rails.

Figure 131: Move CMA Assembly into a Servicing State



Step 3 : **(Optional)** Repeat the previous step to move the remaining arm into the servicing state.

Step 4 : Uninstall the CMA assembly by carefully loosening the captive screws using your fingers, until the CMA is no longer attached to the rear.

Figure 132: Uninstall CMA Assembly

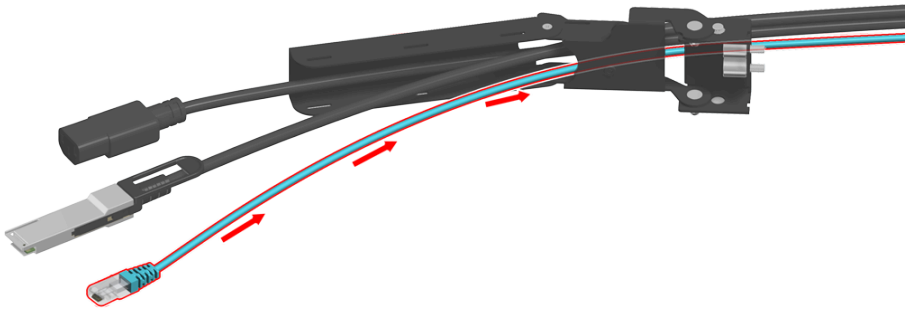
Note: If needed, a #2 Philips screwdriver may be used to loosen the captive screws.

Step 5 : Repeat the previous step to remove the remaining CMA from the rack rails.

Step 6 : Uninstall the cables from the CMA.

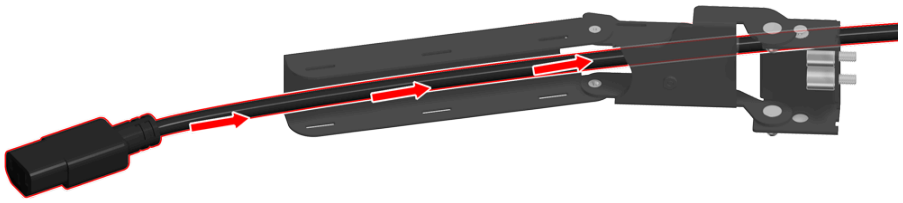
a. Carefully remove the Management cable by pulling it from the rack mounting side of the CMA.

Figure 133: CMA Cable Remove - Management



b. Repeat this step to remove the remaining cables leaving the power cable for last. It is highly recommended that each cable is removed one at a time to for ease of uninstalling and to avoid damage to the cables.

Figure 134: CMA Cable Remove - Power



Step 7 : Repeat the previous step to remove the cables from the remaining CMA.

Step 8 : Unpack and inspect the new Cable Management Arm (CMA) Assembly for damage.

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

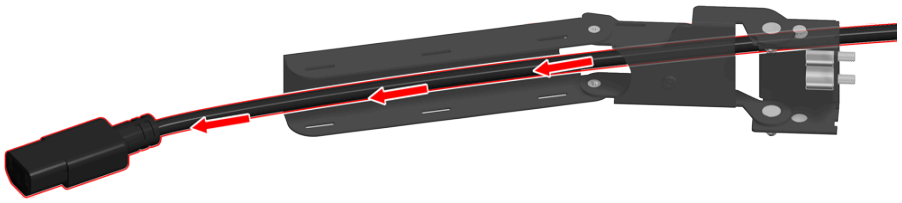
b. Remove the Cable Management Arm (CMA) Assembly from the packaging and verify that there is no damage to the Cable Management Arm (CMA) Assembly. Dents, scratches, and broken parts should be reported. If major damage has occurred to the Cable Management Arm (CMA) Assembly, DO NOT use the replacement part.

Step 9 : Install the cables into the CMA.

Note: The cables will be routed through the CMA channels before installation of the CMA.

a. From the rack mount side of CMA, route the power cable through the channel in the CMA until about 18 in on the cable is sticking out of the other end. The amount of cable slack can be adjusted once the CMA is installed.

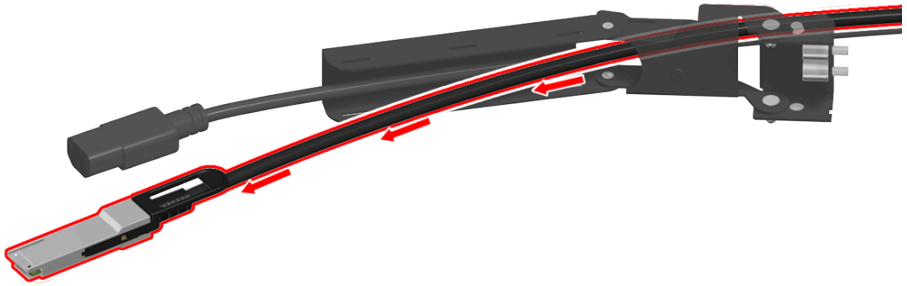
Figure 135: CMA Cable Routing - Power



b. Route the QSFP cable through the channel in the CMA until about 18 in on the cable is sticking out of the other end. The amount of cable slack can be adjusted once the CMA is installed. Repeat this step as needed.

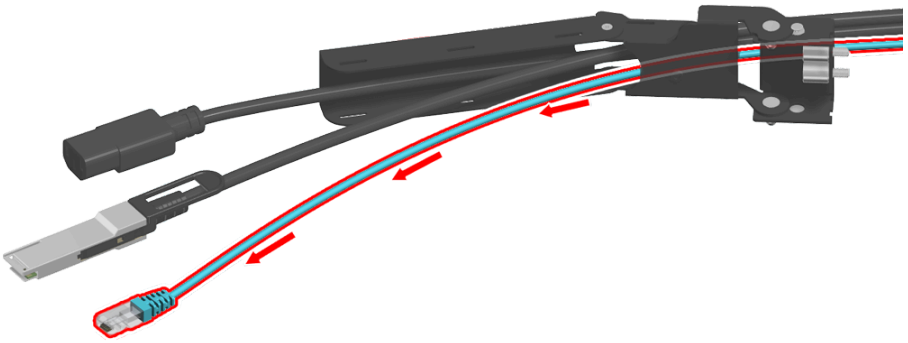
Attention: Depending on the IOM configuration, there can be **up to three** QSFP28 cables installed.

Figure 136: CMA Cable Routing - QSFP



c. Route the Management cable through the channel in the CMA until about 18 in on the cable is sticking out of the other end. The amount of cable slack can be adjusted once the CMA is installed.

Figure 137: CMA Cable Routing - Management



Step 10 : Repeat the previous step to install the cables into remaining CMA.

Step 11 : Install the CMA.

a. Identify the mounting location of the CMA. The CMA is mounted into the two middle holes on the system's rack mounted rails as shown in the following image.

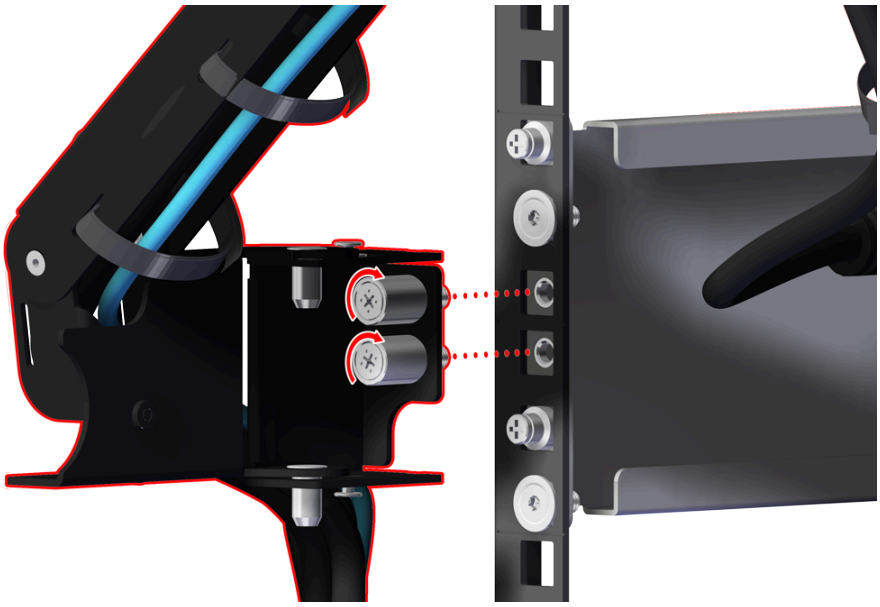
Figure 138: CMA Mounting Location

b. Place the CMA mounting assembly over the mounting location and begin turning the first captive screw clockwise until it engages with the mounting hole on the rack mounted rail.

c. Begin turning the second captive screw clockwise until it engages with the mounting hole on the rack mounted rail.

d. Tighten both captive screws until the CMA is full secure.

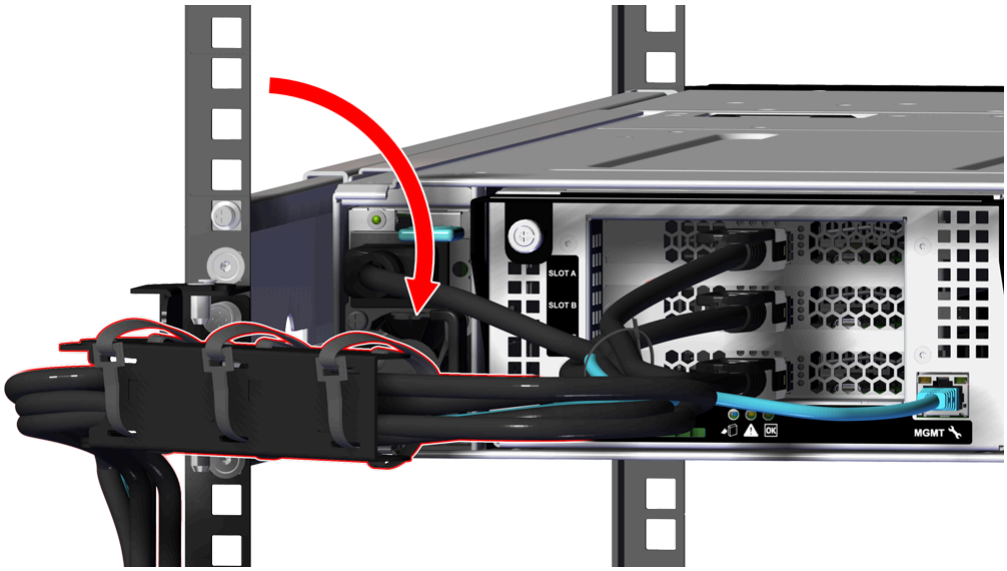
Figure 139: Secure the CMA



Step 12 : Repeat the previous step to install the remaining CMA onto the rack rails.

Step 13 : If your configuration contains a Cable Management Arm (CMA) Assembly, carefully push the arm on the side you serviced toward the system until the cables have enough slack to connect to their designated components.

Figure 140: Return the CMA Assembly to the Operational State



Step 14 : **(Optional)** Repeat the previous step to return the remaining arm to the operational state.

Step 15 : Connect the data and power cables to the enclosure.

Attention: The system requires a power source that can support a voltage range of 200 - 240Vac.

a. Move to the rear of the rack and connect the Ethernet Cables into the Ethernet Management ports.

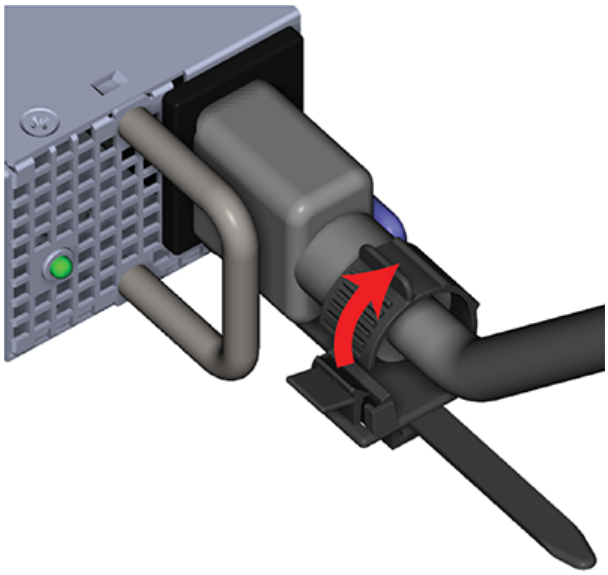
Figure 141: Connecting RJ45 Ethernet Cable to Management Port

b. Connect the QSFP28 cables into all of the IOM ports.

Figure 142: Connect QSFP28 Cables

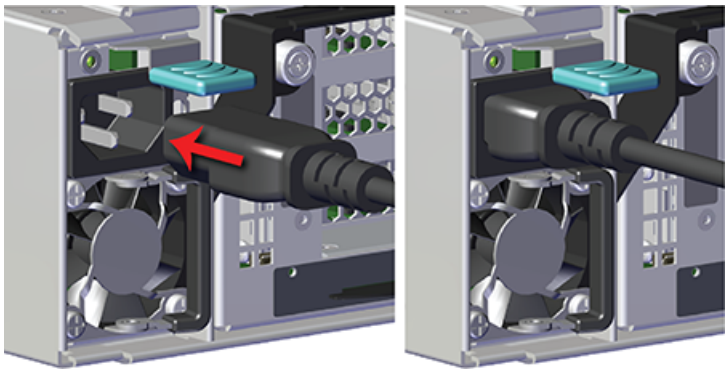
c. Unclip the retention strap on the PSU as shown in the following image.

Figure 143: Unclipping Cable Retention Strap (Generic PSU Shown)



d. Connect the power cables into the two Power Supply Unit (PSU) power connectors.

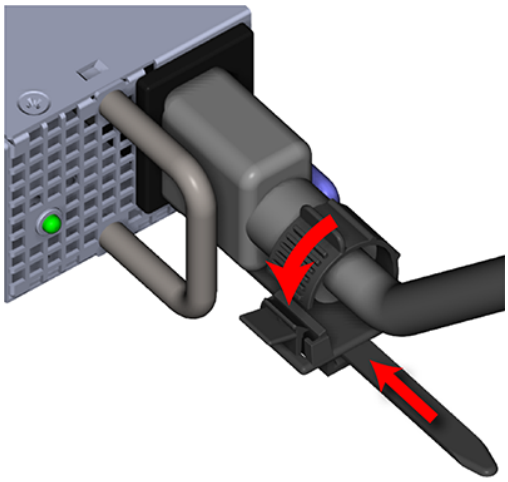
Figure 144: Connect Power Cables



Note: Once the first power cord has been connected to the enclosure the system will begin to power-on.

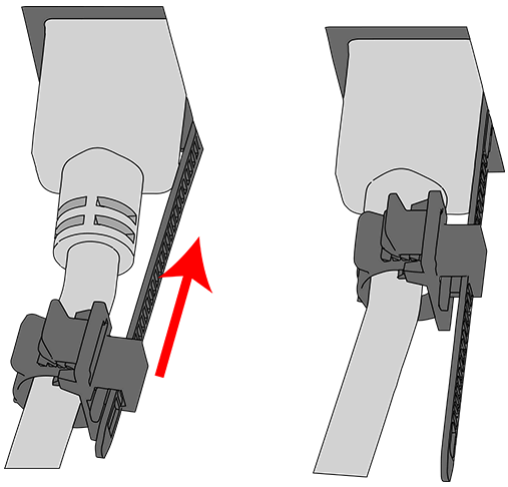
e. Loop the PSU's retention clip around each power cable and pinch it until the clip catches and locks in place.

Figure 145: Locking the Retention Clip



f. Slide the retention clip forward until it stops near the cable connector. Doing this will ensure that the retention clip functions properly in the event the cable is accidentally pulled.

Figure 146: Sliding the Retention Clip Forward



Result: The Cable Management Arm (CMA) Assembly has now been replaced.

Management

In This Chapter:

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. 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. Navigating to that IP address from a browser with `/Query/` added to the end of the IP address will return top level status information.

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.

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. 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 username:password http://ip.of.target.iom:80/Query/ | jq
```

Note: In addition, you may use the following:

```
curl -u username:password https://ip.of.target.iom:443/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/openflex-
data24-usalp00000aa000a/",
                "SystemType": {
                    "ID": 2,
                    "Name": "Storage"
                },
```

```
                "Name": "openflex-data24-usalp00000aa000a",
                "ID": "openflex-data24-usalp00000aa000a",
                "OperatingSystem": {
                    "Self": "http://10.20.30.40:80/Storage/Devices/openflex-
data24-usalp00000aa000a/OperatingSystem/",
                    "Name": "Vendor Firmware",
                    "OSType": {
                        "ID": 59,
                                                    Truncated Example
```

Step 3: Determine the Adapters in the system using the Storage Device. Send a GET to the device ID gathered in the previous step.

```
curl -u username:password http://ip.of.target.iom:80/Storage/
Devices/openflex-data24-usalp00000aa000a/Adapters/ | jq
```

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

```
{
    "Self": "http://10.20.30.40:80/Storage/Devices/openflex-data24-
usalp00000aa000a/Adapters/",
    "Members": [
        {
            "Self": "http://10.20.30.40:80/Storage/Devices/openflex-data24-
usalp00000aa000a/Adapters/1/",
            "ID": "1",
            "Name": "IOM-A-AIC-A",
            "Status": {
                "State": {
                    "ID": 16,
                    "Name": "In service"
                },
                "Health": [
                    {
                        "ID": 5,
                        "Name": "OK"
                    }
                ]
            },
            "HostName": "openflex-data24-usalp00000aa000a-iom-a-aic-a",
            "Ports": "http://10.20.30.40:80/Storage/Devices/openflex-data24-
usalp00000aa000a/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/openflex-
data24-usalp00000aa000a/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/openflex-data24-
usalp00000aa000a/Ports/",
    "Members": [
        {
            "Self": "http://10.20.30.40:80/Storage/Devices/openflex-data24-
usalp00000aa000a/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/openflex-
data24-usalp00000aa000a/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. 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.

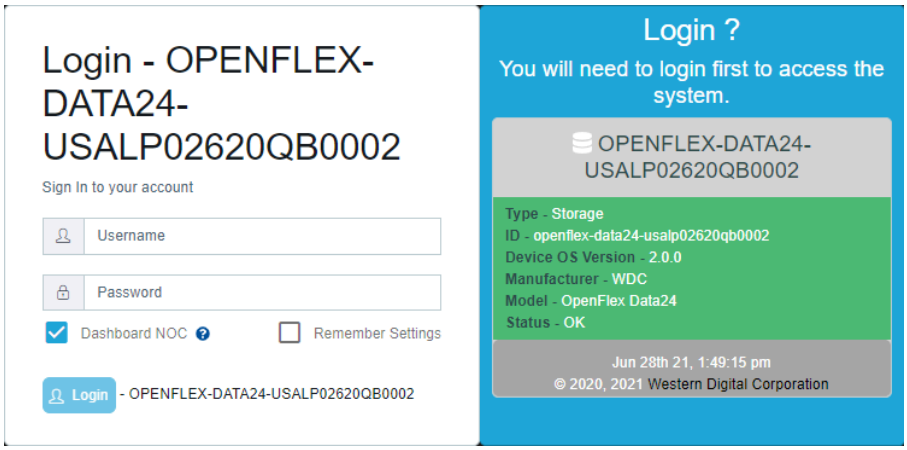
Table 36: OCGUI Browser Compatibility

Browser	Version
Google Chrome™	71.0.3578.98 and higher
Mozilla Firefox	40.15063.674.0 and higher

Browser	Version
Microsoft Edge	60.5.0 and higher

Note: The OCGUI is not compatible with Internet Explorer.

4.2.2 Login Page



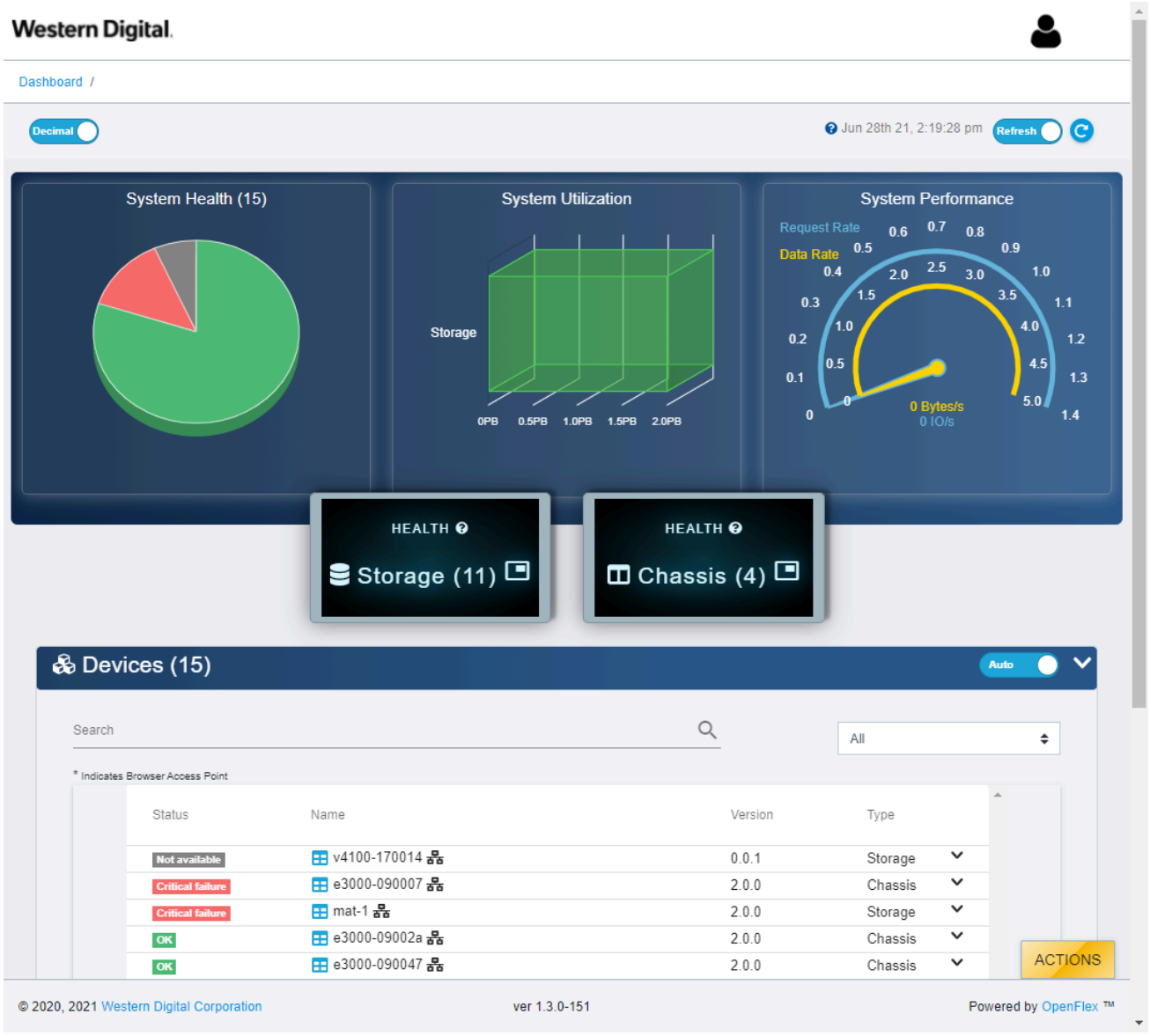
The login page displays two panels. The left panel provides **username** and **password** fields for logging into the device. This panel also displays two options:

- **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.

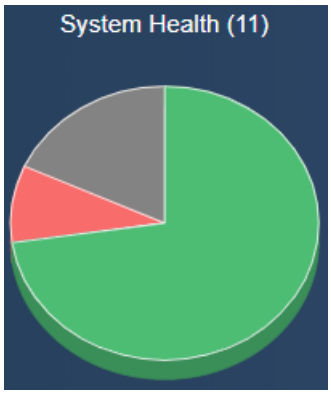
Note: For instructions on navigating to the login page, see Navigating to a Device *(page 128)*.

4.2.3 Dashboard



The **Dashboard** is the first page that will load when one logs into **any** of the fabric-attached devices. 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.

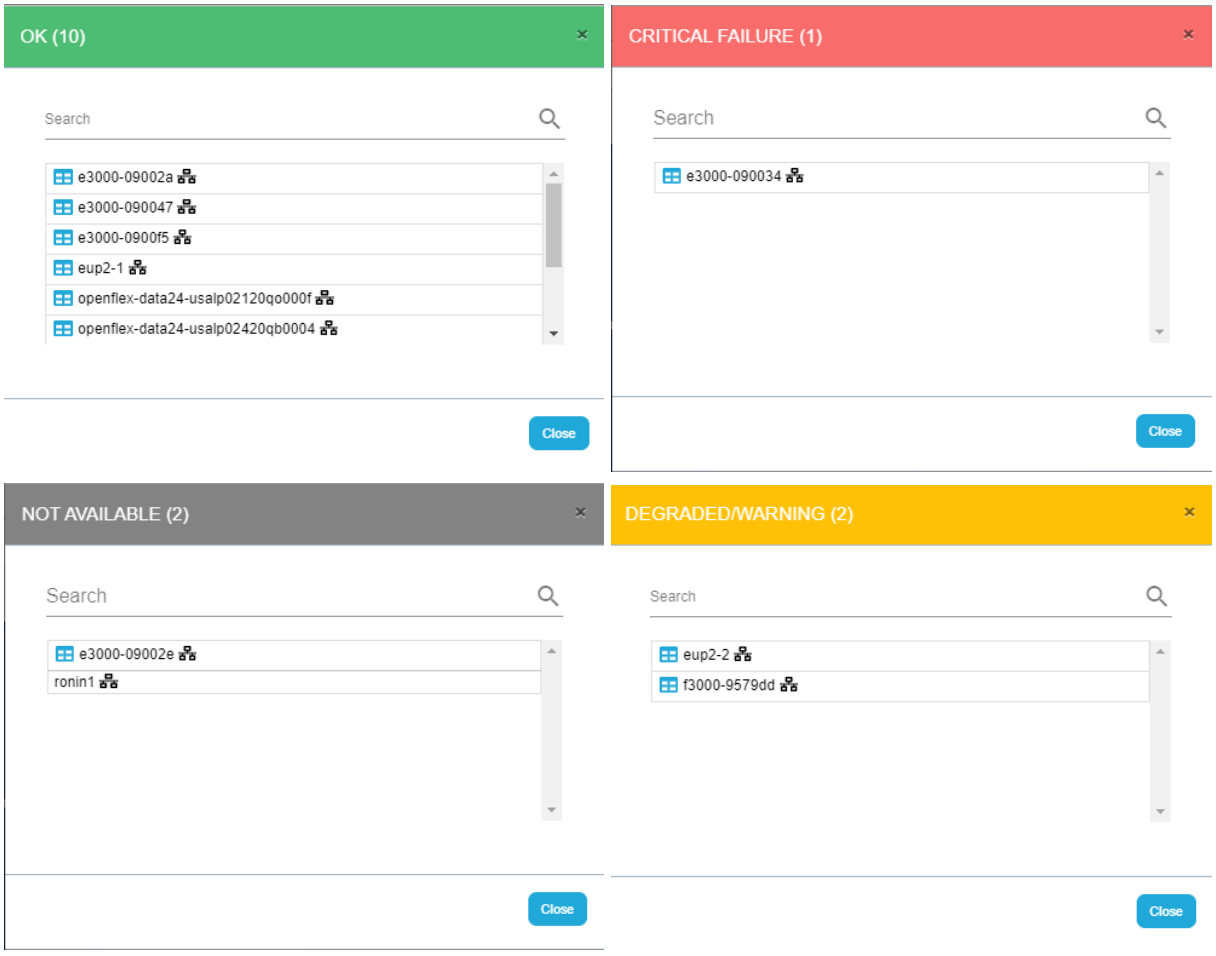
4.2.3.1 System Health



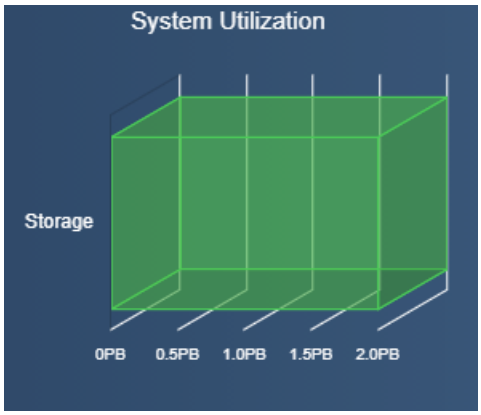
The **System Health** section provides an overview of the health of the fabric network. The interfaces of all devices on the same subnet as the Storage devices are queried when the page loads, and the pie chart is updated with their responses. If fabric devices respond with errors or faults, the system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

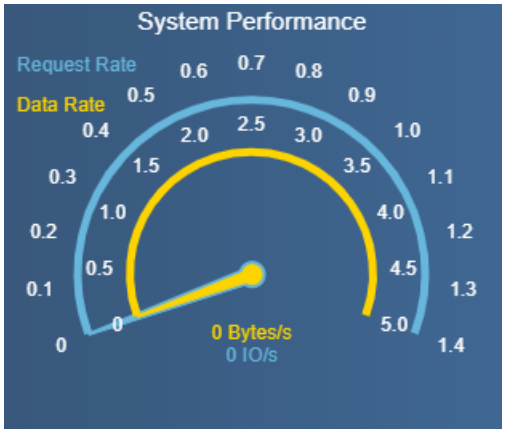


4.2.3.3 System Utilization



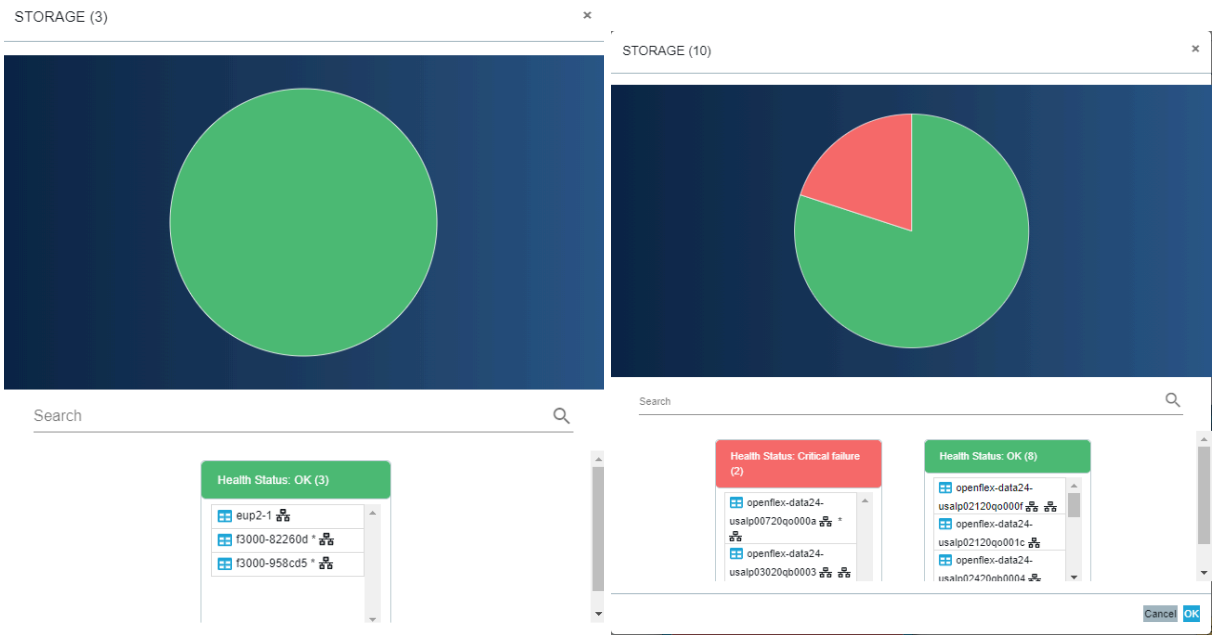
The **System Utilization** section displays the total, free, and used storage on the fabric. For the OpenFlex Data24, all storage capacity is presented as Used.

4.2.3.4 System Performance



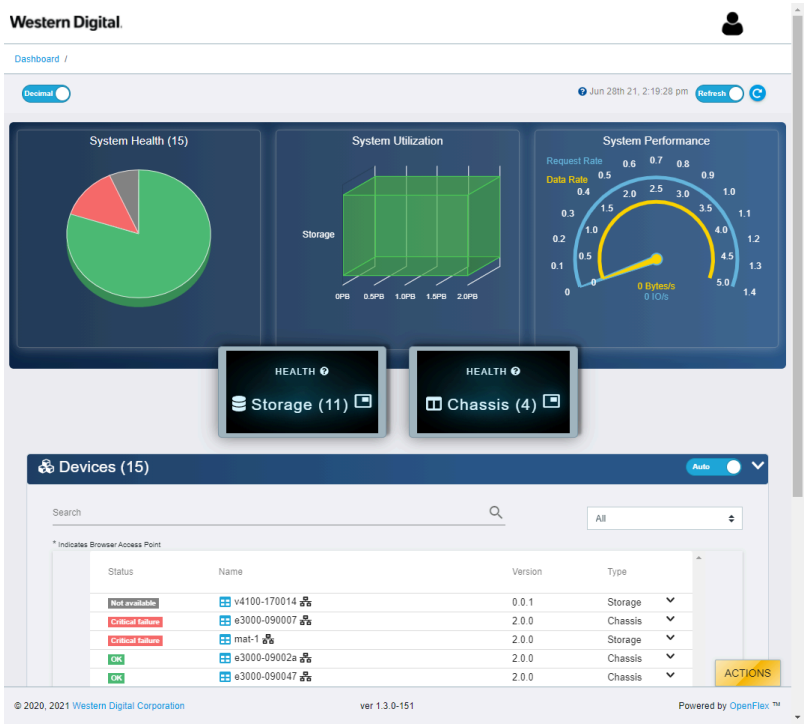
The **System Performance** section provides general, bitwise system performance information for all devices on the fabric. The GUI contains a System Performance gauge, but it will not provide performance for Data24. Other Systems may display performance using this gauge. Data24 can display performance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

4.2.3.5 Storage Health



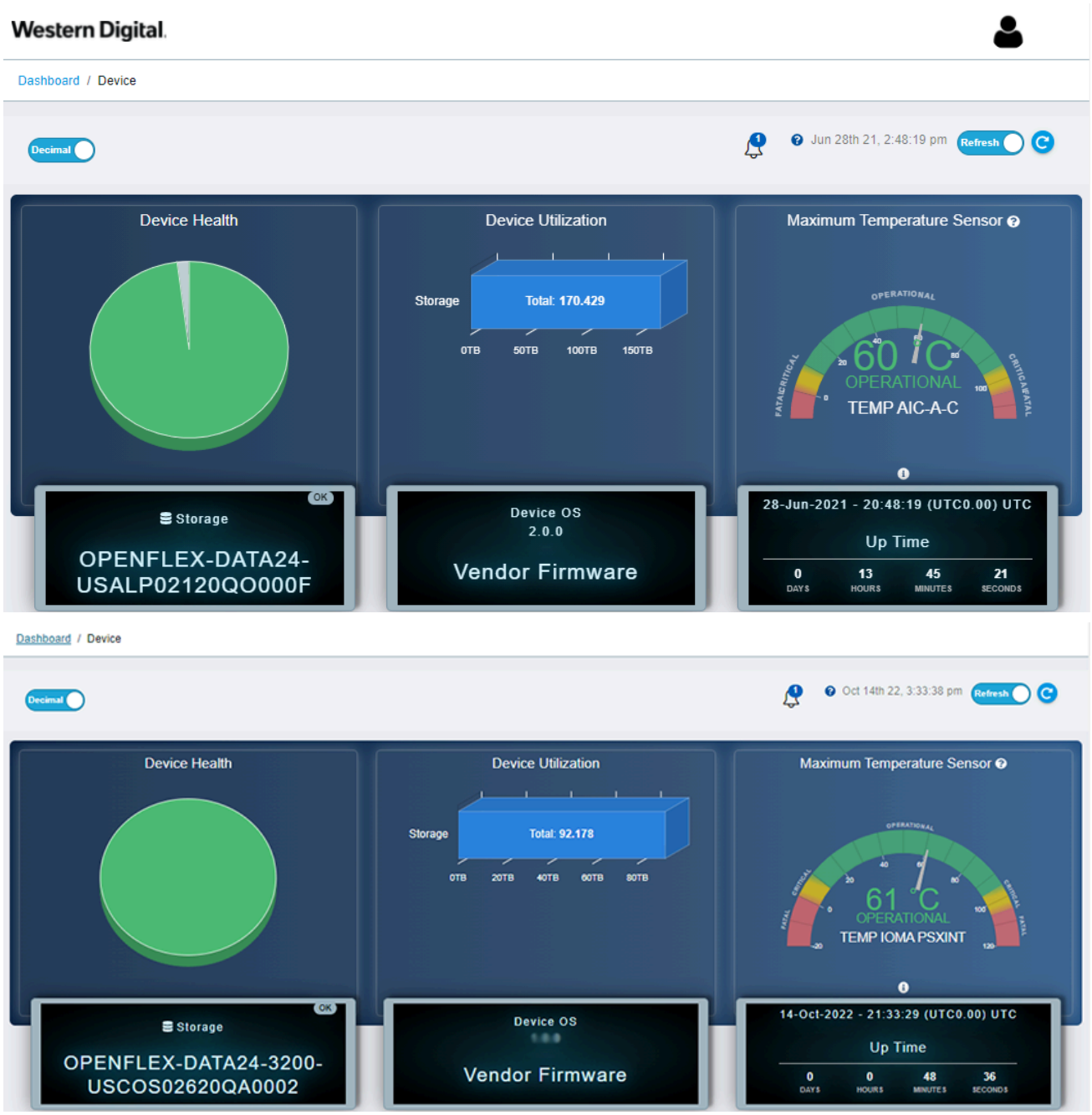
The **Storage Health** modal provides an overview of the health of all storage devices visible on the fabric (those in the subnets of what is configured on the enclosure). The modal provides separate tables for fabric devices that are presenting different health states up to the OCGUI.

4.2.3.6 Devices



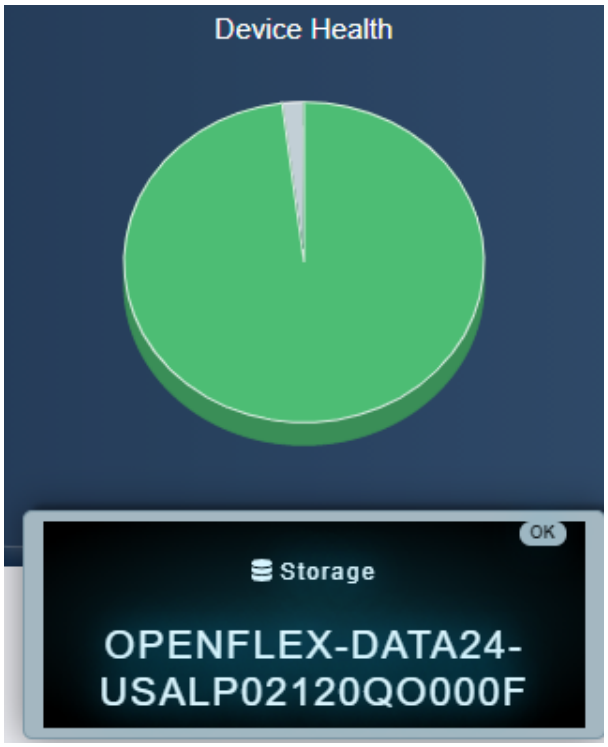
The **Devices** list provides summary details about all devices visible on the fabric. Users can also link to the device page for the device of their choosing for management purposes. Vital information is provided, such as the device ID, serial number, model, manufacturer, the type of device that was discovered, and the device capacity. 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



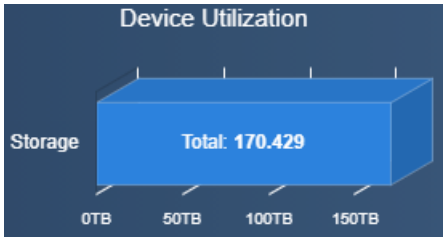
The storage device page presents all of the vital information related to a specific storage resource.

4.2.4.1 Storage Device Health



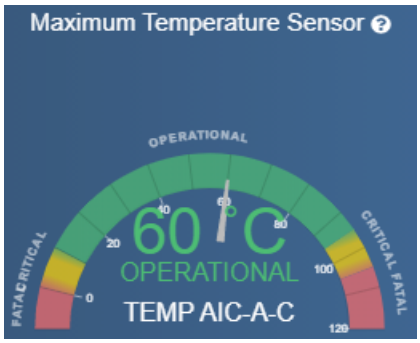
The storage **Device Health** section provides a visual summary of the health of the enclosure, including drives on the device.

4.2.4.2 Storage Device Utilization



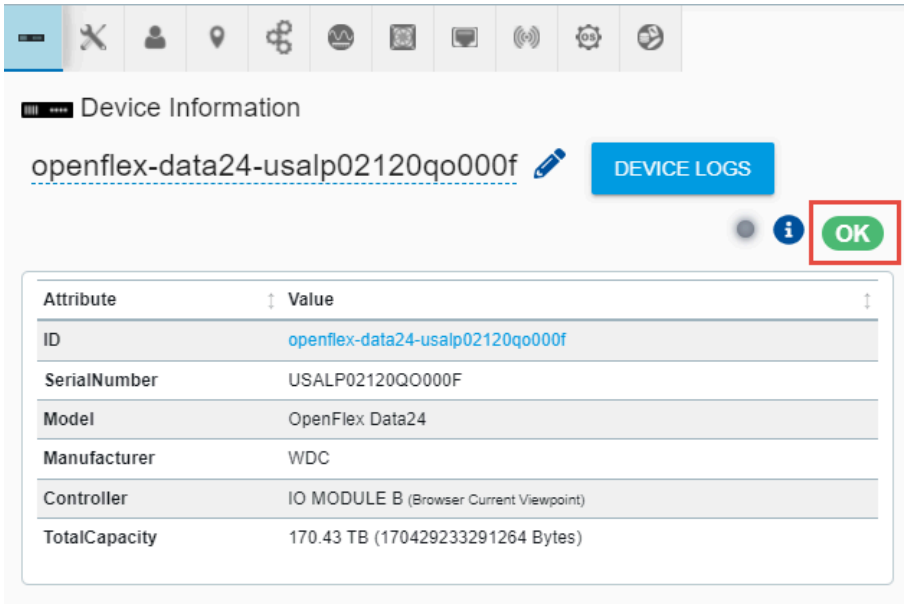
The storage **Device Utilization** section provides a visual summary of the available and used storage on the device.

4.2.4.3 Storage Device Temperature



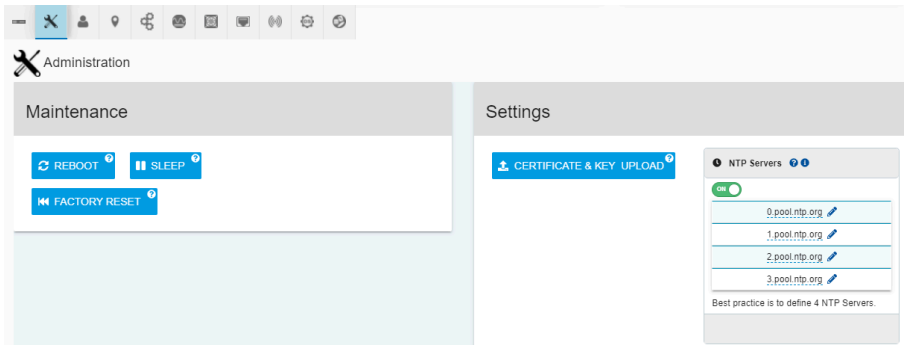
The storage **Maximum Temperature Sensor** section provides a visual summary of the current Maximum Temperature of the device. When the Maximum Temperature Sensor is selected it will display the device with the highest temperature.

4.2.4.4 Storage Device Information



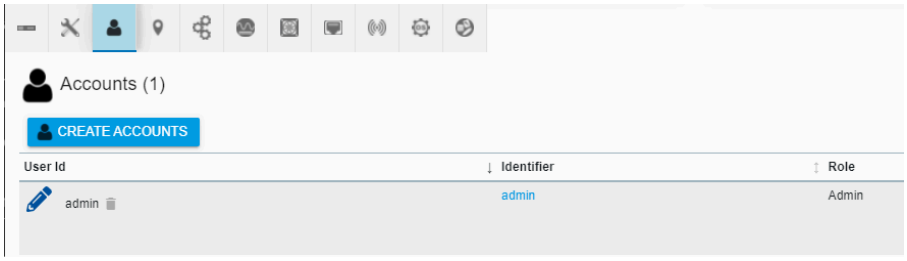
The storage **Device Information** section provides information about the device itself, such as the ID, Serial Number, and Model.

4.2.4.5 Storage Administration



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

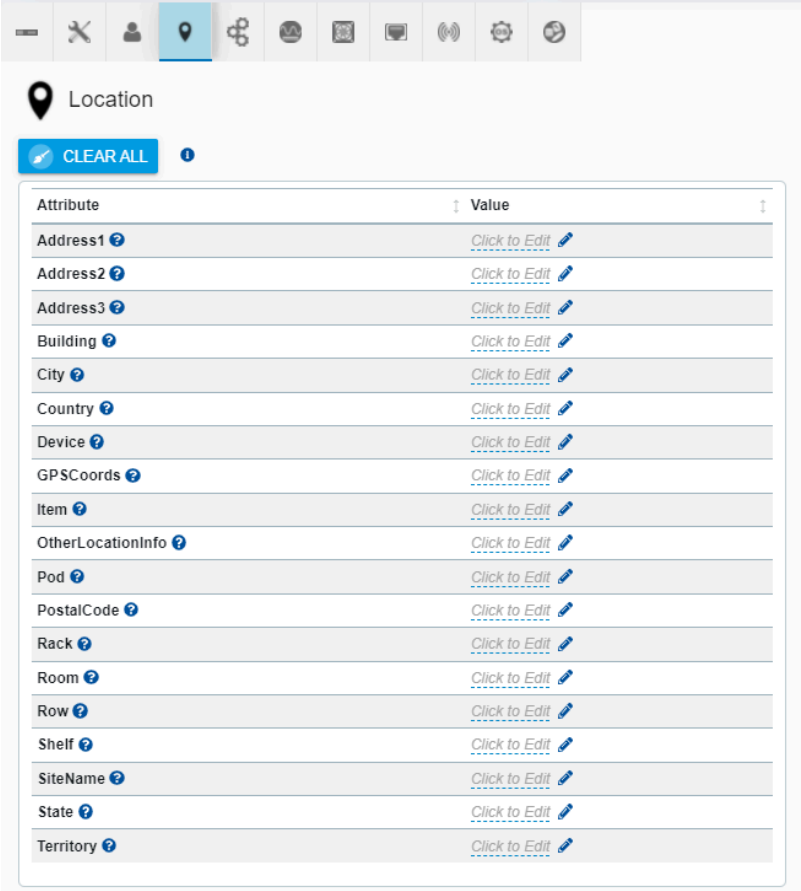
4.2.4.6 Storage Accounts



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.

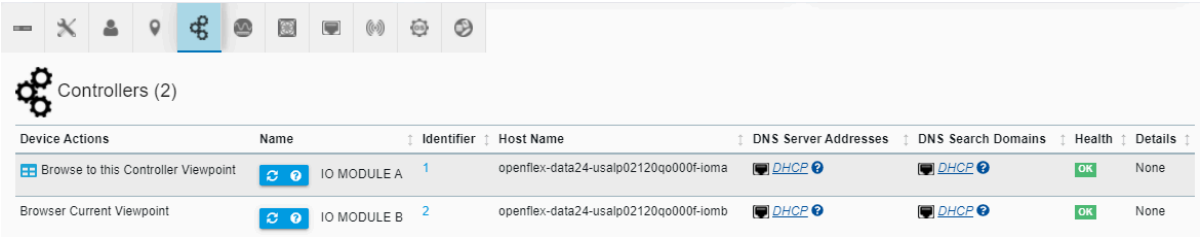
Note: Accounts must be created on both IOMs.

4.2.4.7 Storage Location



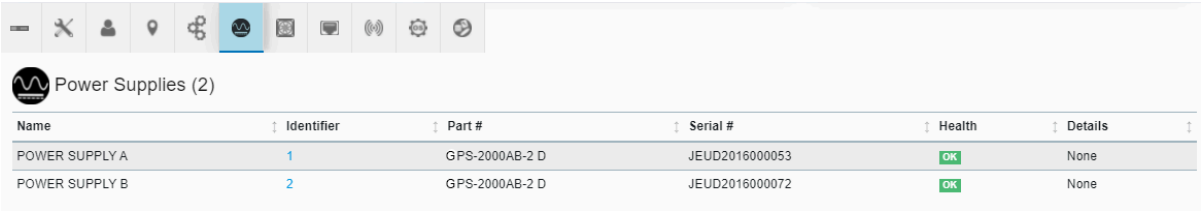
The storage device's **Location** section provides information about the physical location of the device and controls for setting or clearing location attributes.

4.2.4.8 Controllers



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

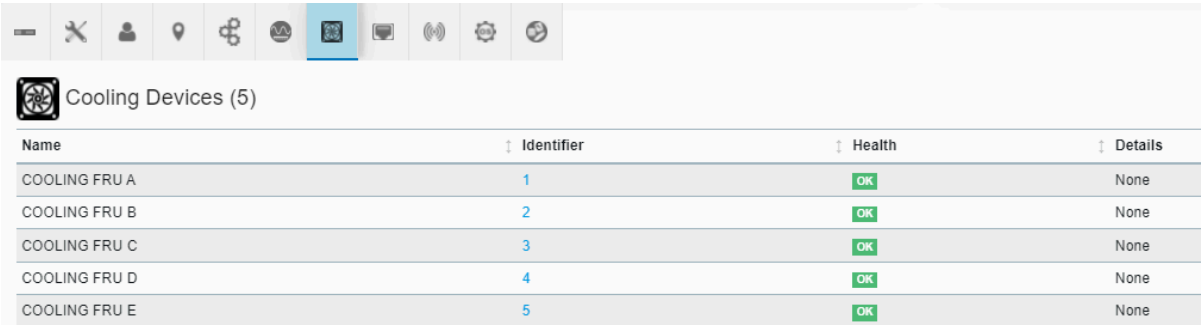


Power Supplies (2)

Name	Identifier	Part #	Serial #	Health	Details
POWER SUPPLY A	1	GPS-2000AB-2 D	JEUD2016000053	OK	None
POWER SUPPLY B	2	GPS-2000AB-2 D	JEUD2016000072	OK	None

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

4.2.4.10 Cooling Devices

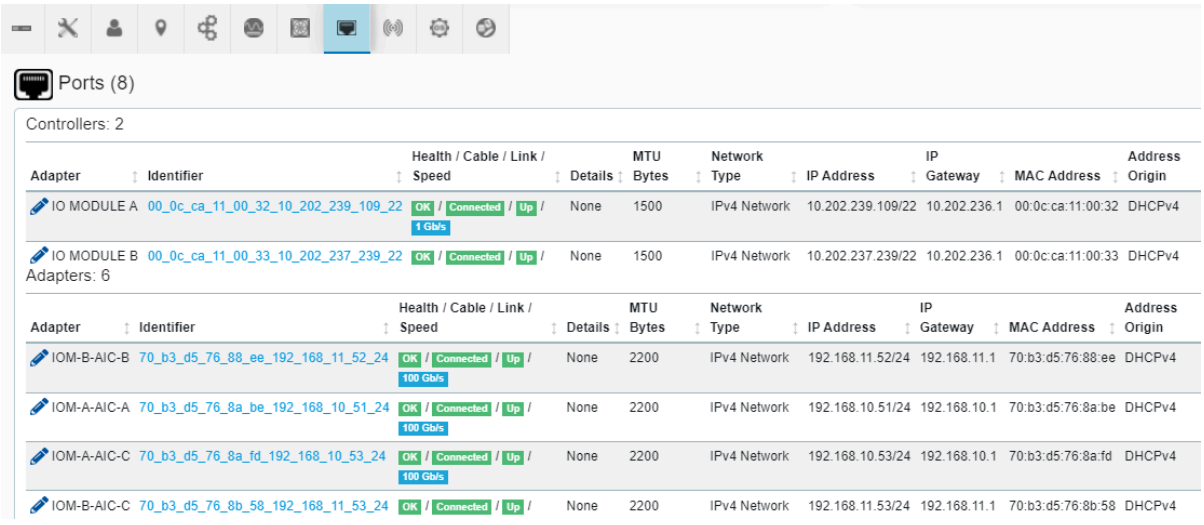


Cooling Devices (5)

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
COOLING FRU E	5	OK	None

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

4.2.4.11 Ports



Ports (8)

Controllers: 2

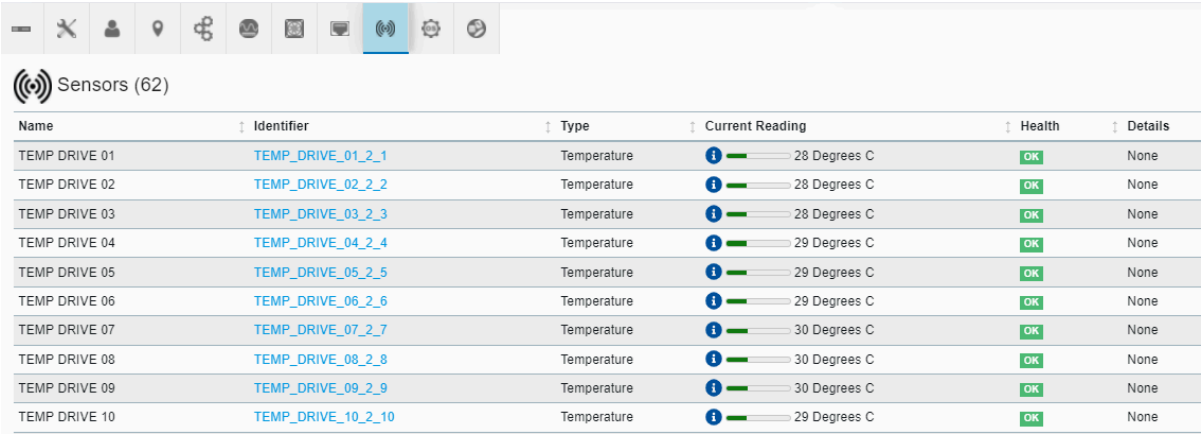
Adapter	Identifier	Health / Cable / Link / Speed	Details	MTU Bytes	Network Type	IP Address	IP Gateway	MAC Address	Address Origin
IO MODULE A	00_0c_ca_11_00_32_10_202_239_109_22	OK / Connected / Up / 1 Gb/s	None	1500	IPv4 Network	10.202.239.109/22	10.202.236.1	00:0c:ca:11:00:32	DHCPv4
IO MODULE B	00_0c_ca_11_00_33_10_202_237_239_22	OK / Connected / Up /	None	1500	IPv4 Network	10.202.237.239/22	10.202.236.1	00:0c:ca:11:00:33	DHCPv4

Adapters: 6

Adapter	Identifier	Health / Cable / Link / Speed	Details	MTU Bytes	Network Type	IP Address	IP Gateway	MAC Address	Address Origin
IOM-B-AIC-B	70_b3_d5_76_88_ee_192_168_11_52_24	OK / Connected / Up / 100 Gb/s	None	2200	IPv4 Network	192.168.11.52/24	192.168.11.1	70:b3:d5:76:88:ee	DHCPv4
IOM-A-AIC-A	70_b3_d5_76_8a_be_192_168_10_51_24	OK / Connected / Up / 100 Gb/s	None	2200	IPv4 Network	192.168.10.51/24	192.168.10.1	70:b3:d5:76:8a:be	DHCPv4
IOM-A-AIC-C	70_b3_d5_76_8a_fd_192_168_10_53_24	OK / Connected / Up / 100 Gb/s	None	2200	IPv4 Network	192.168.10.53/24	192.168.10.1	70:b3:d5:76:8a:fd	DHCPv4
IOM-B-AIC-C	70_b3_d5_76_8b_58_192_168_11_53_24	OK / Connected / Up /	None	2200	IPv4 Network	192.168.11.53/24	192.168.11.1	70:b3:d5:76:8b:58	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

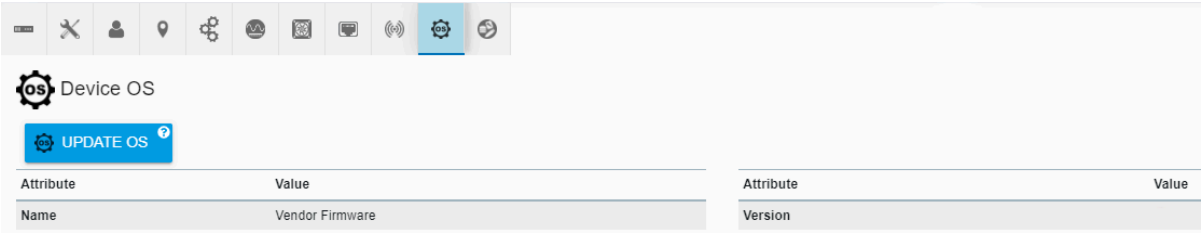


Sensors (62)

Name	Identifier	Type	Current Reading	Health	Details
TEMP DRIVE 01	TEMP_DRIVE_01_2_1	Temperature	28 Degrees C	OK	None
TEMP DRIVE 02	TEMP_DRIVE_02_2_2	Temperature	28 Degrees C	OK	None
TEMP DRIVE 03	TEMP_DRIVE_03_2_3	Temperature	28 Degrees C	OK	None
TEMP DRIVE 04	TEMP_DRIVE_04_2_4	Temperature	29 Degrees C	OK	None
TEMP DRIVE 05	TEMP_DRIVE_05_2_5	Temperature	29 Degrees C	OK	None
TEMP DRIVE 06	TEMP_DRIVE_06_2_6	Temperature	29 Degrees C	OK	None
TEMP DRIVE 07	TEMP_DRIVE_07_2_7	Temperature	30 Degrees C	OK	None
TEMP DRIVE 08	TEMP_DRIVE_08_2_8	Temperature	30 Degrees C	OK	None
TEMP DRIVE 09	TEMP_DRIVE_09_2_9	Temperature	30 Degrees C	OK	None
TEMP DRIVE 10	TEMP_DRIVE_10_2_10	Temperature	29 Degrees C	OK	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

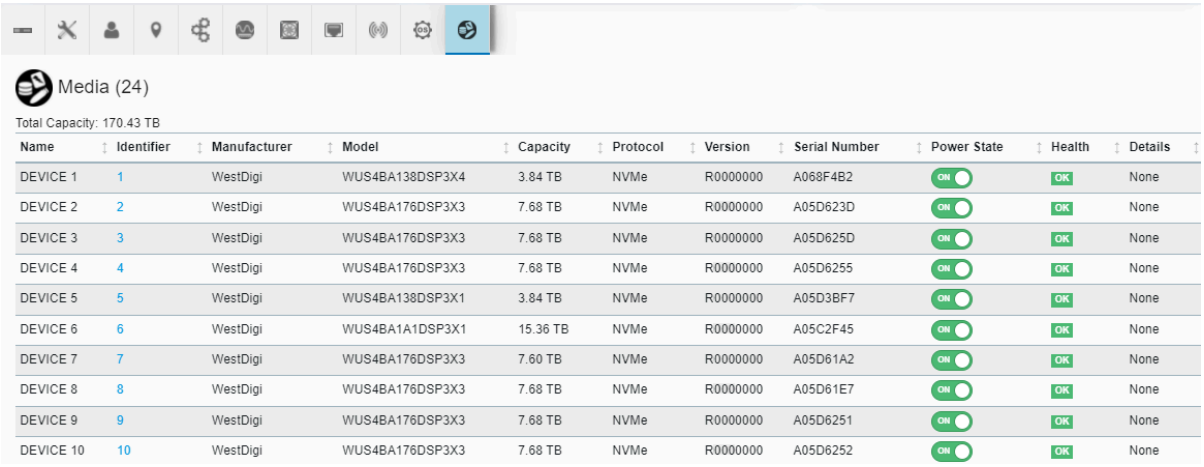
UPDATE OS

Attribute	Value
Name	Vendor Firmware

Attribute	Value
Version	

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: 170.43 TB

Name	Identifier	Manufacturer	Model	Capacity	Protocol	Version	Serial Number	Power State	Health	Details
DEVICE 1	1	WestDigi	WUS4BA138DSP3X4	3.84 TB	NVMe	R0000000	A068F4B2	ON	OK	None
DEVICE 2	2	WestDigi	WUS4BA176DSP3X3	7.68 TB	NVMe	R0000000	A05D623D	ON	OK	None
DEVICE 3	3	WestDigi	WUS4BA176DSP3X3	7.68 TB	NVMe	R0000000	A05D625D	ON	OK	None
DEVICE 4	4	WestDigi	WUS4BA176DSP3X3	7.68 TB	NVMe	R0000000	A05D6255	ON	OK	None
DEVICE 5	5	WestDigi	WUS4BA138DSP3X1	3.84 TB	NVMe	R0000000	A05D3BF7	ON	OK	None
DEVICE 6	6	WestDigi	WUS4BA1A1DSP3X1	15.36 TB	NVMe	R0000000	A05C2F45	ON	OK	None
DEVICE 7	7	WestDigi	WUS4BA176DSP3X3	7.60 TB	NVMe	R0000000	A05D61A2	ON	OK	None
DEVICE 8	8	WestDigi	WUS4BA176DSP3X3	7.68 TB	NVMe	R0000000	A05D61E7	ON	OK	None
DEVICE 9	9	WestDigi	WUS4BA176DSP3X3	7.68 TB	NVMe	R0000000	A05D6251	ON	OK	None
DEVICE 10	10	WestDigi	WUS4BA176DSP3X3	7.68 TB	NVMe	R0000000	A05D6252	ON	OK	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

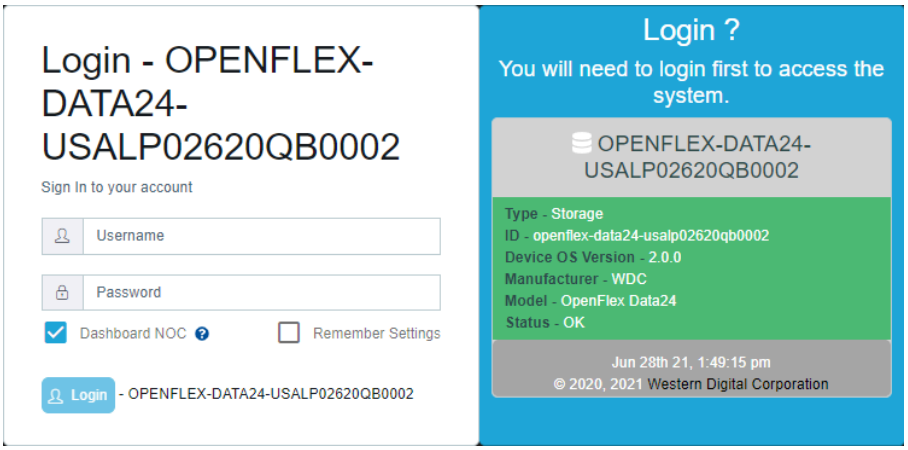
This section provides instructions for basic operational functions that the user is likely to perform during the initial operation of the OpenFlex Data24, such as checking the system health, creating a user account, etc.

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 of the Management port for any fabric-connected device into the **address bar**.

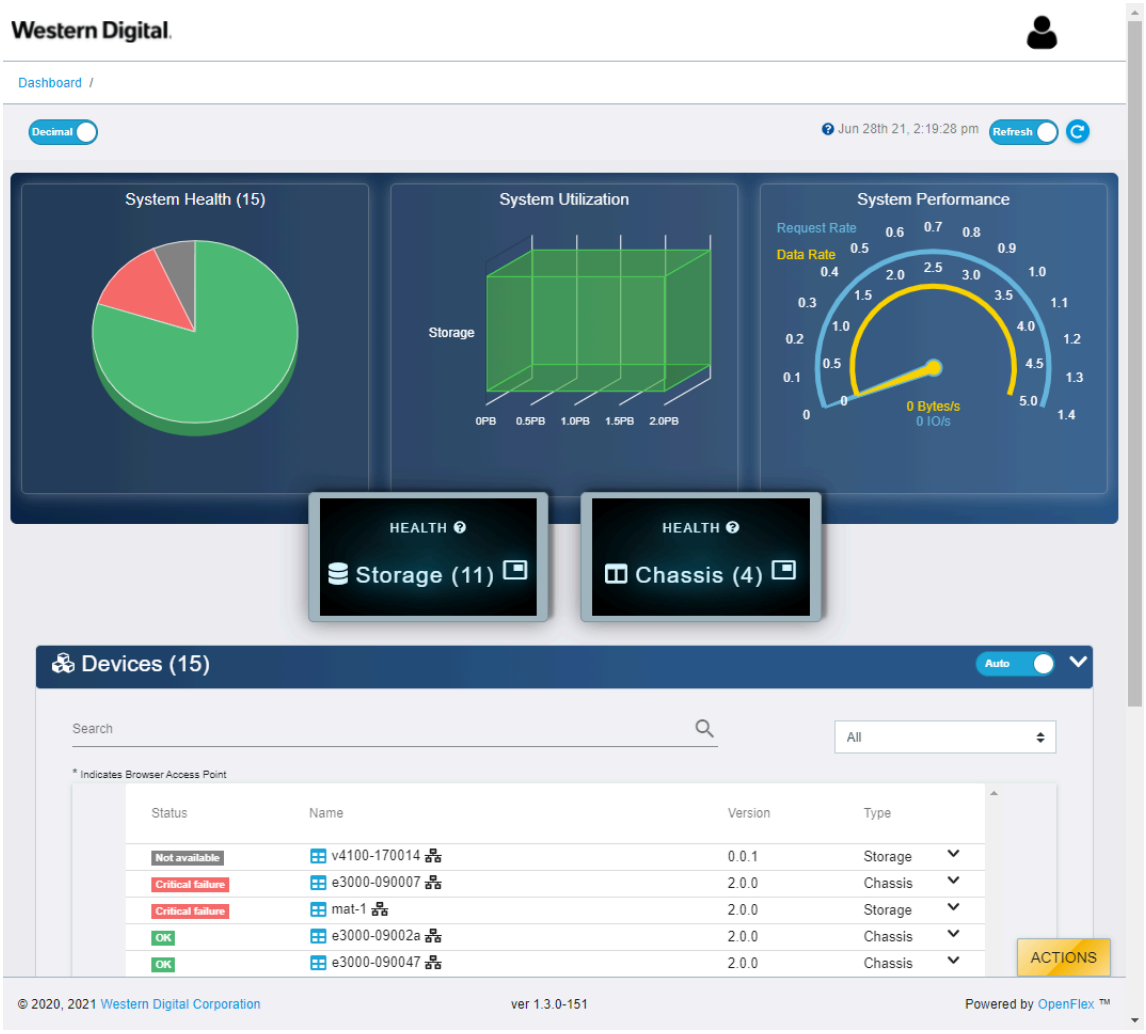
The login page for the device appears:



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

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

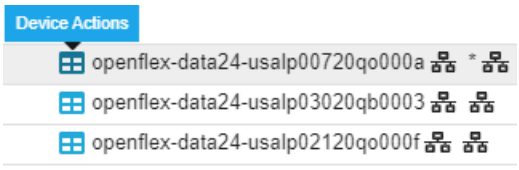
The system dashboard appears. In addition, the **Devices** section provides access to all other fabric-connected devices:



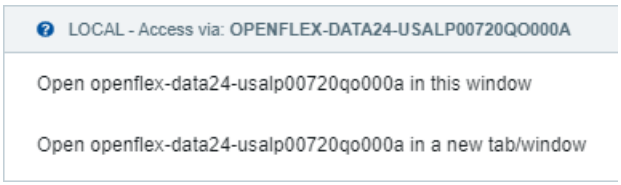
Step 3 : If needed, click the **Devices** banner to expand the list of all connected devices:

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.

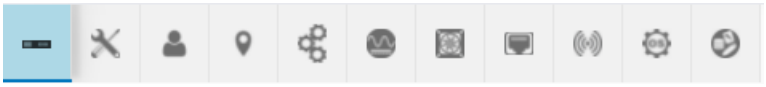
4.2.5.2 Checking System Health

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

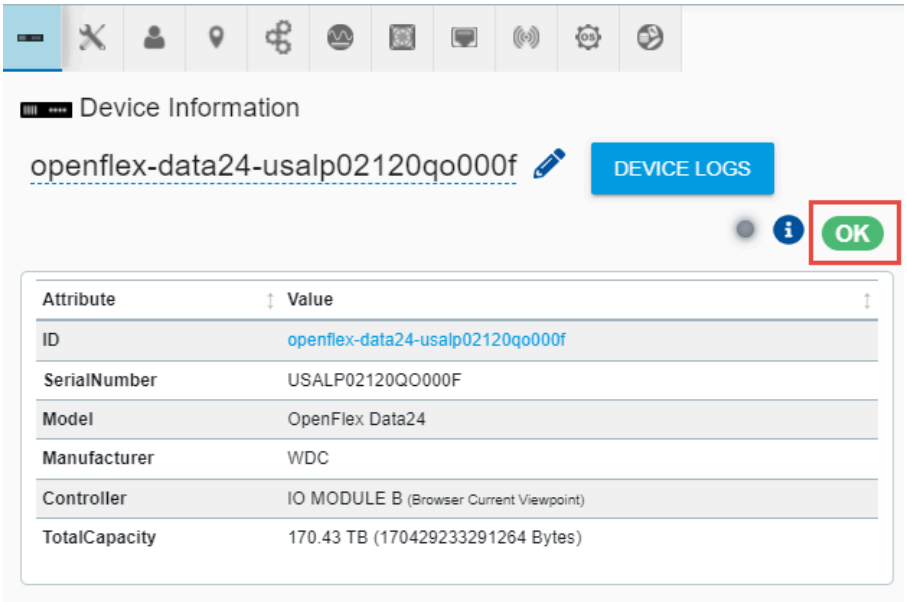
- Device Information
- Device Logs
- Power Supplies
- Cooling Devices
- Ports
- Sensors
- Media
- Operating System (OS)

Checking the Device Information

Step 1: Navigate to the device. See Navigating to a Device *(page 128)*.
Step 2: Click the storage **Device Information** icon:



The **Device Information** appears:

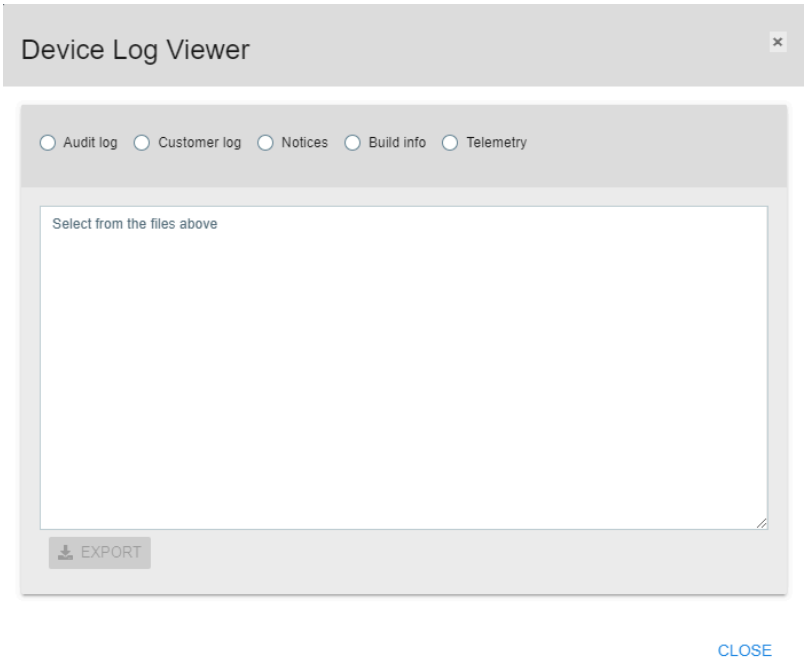


Step 3: Review the device information and ensure that its health status reports **OK** in the header.

Checking the Device Logs

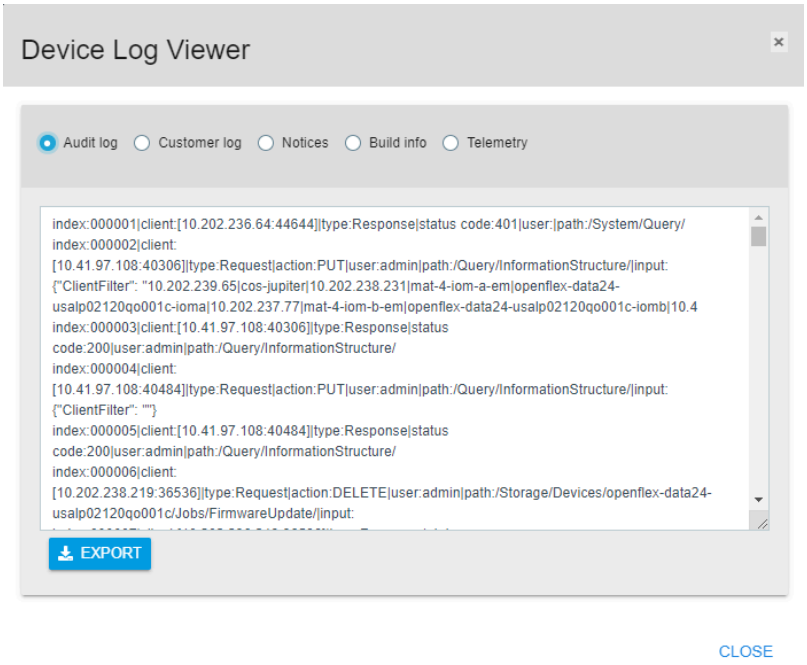
Step 4: Click the **Device Logs** button:

The **Device Log Viewer** appears:



Step 5 : Select one of the log types by clicking its radio button.

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



Checking the Power Supplies

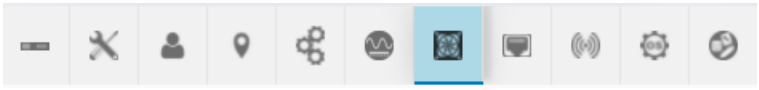
Step 6 : Click the chassis's **Power Supplies** icon:

The **Power Supplies** information appears:

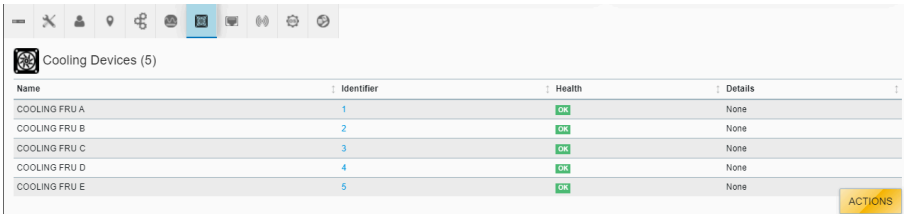
Step 7 : Review the power supply information and ensure that both PSUs report **OK** in the **Health** column.

Checking the Fans

Step 8 : Click the **Cooling Devices** icon:



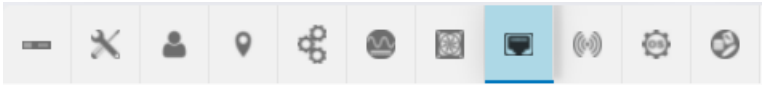
The **Cooling Devices** information appears:



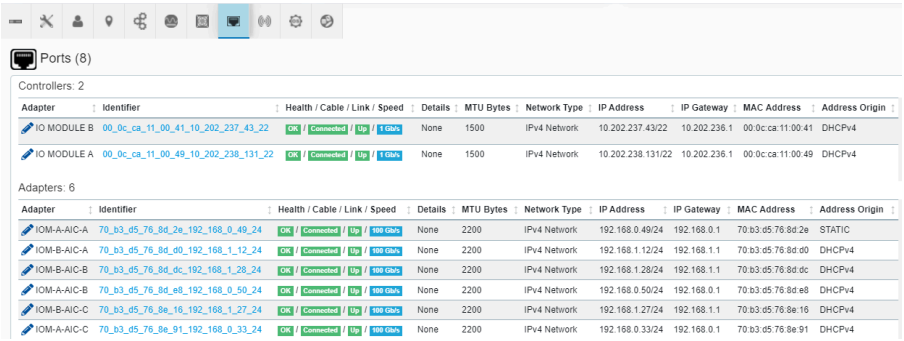
Step 9 : Review the cooling devices information and ensure that each fan reports **OK** in the **Health** column.

Checking the Ports

Step 10 : Click the chassis's **Ports** icon:



The **Ports** information appears:



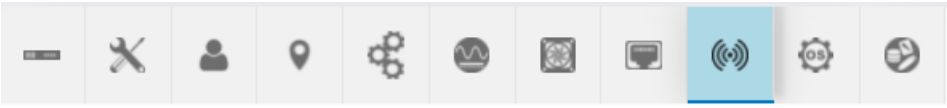
Step 11 : Review the port information and ensure that each port is reporting **OK** in the **Health** column.

Checking the Sensors

Step 12 : Navigate to the storage device (see Navigating to a Device *(page 128)*).

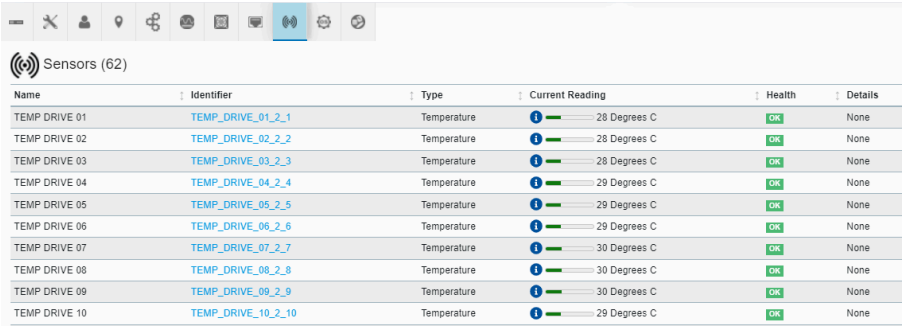
Step 13 : Click the device's **Sensors** icon:

Figure 182: Storage Device Sensors Icon



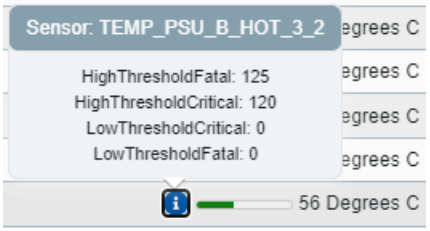
The **Sensors** information appears:

Figure 183: Storage Device Sensors Information



Step 14 : 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 184: Threshold Information Example



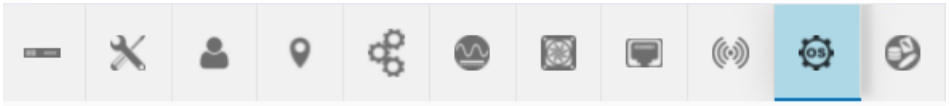
Attention: The System Health Status can also be checked in the Controllers tab.

Checking the Operating System (OS)

Step 15 : Navigate to the storage device (see Navigating to a Device *(page 128)*).

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

Figure 185: Storage Device OS Icon



The **Device OS** information appears:

Figure 186: Storage Device OS Information

Step 17 : Review the operating system information for the device. If the OS requires updating, see Upgrading Firmware *(page 159)*.

4.2.5.3 Creating a Secure HTTPS Connection

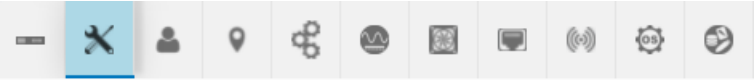
This task provides instructions for creating a secure HTTPS connection for the OpenFlex Data24 using the OCGUI.

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.

Step 1 : Navigate to the storage device (see Navigating to a Device *(page 128)*).

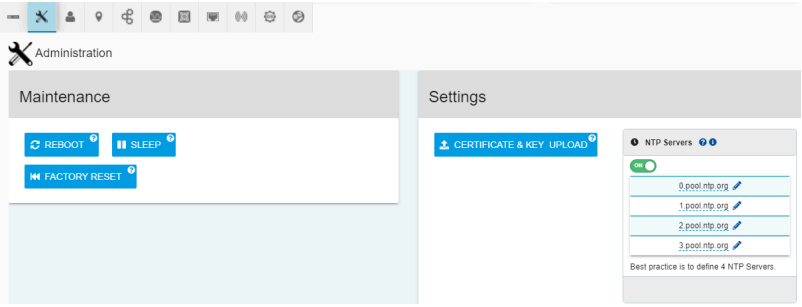
Step 2 : Click the device's **Administration** icon:

Figure 187: Storage Device Administration Icon



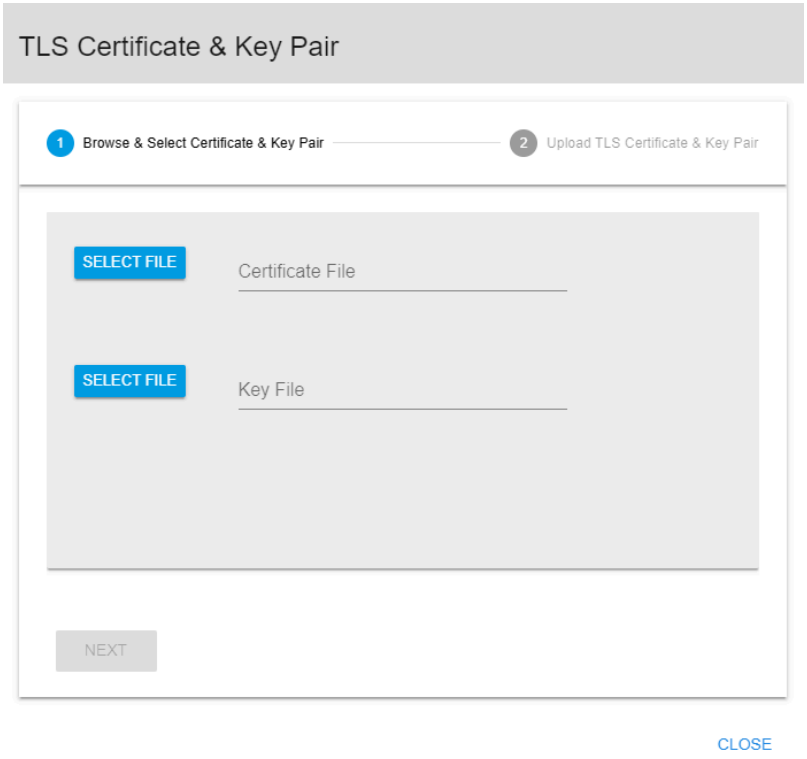
The **Administration** information appears:

Figure 188: Storage Device Administration Information



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

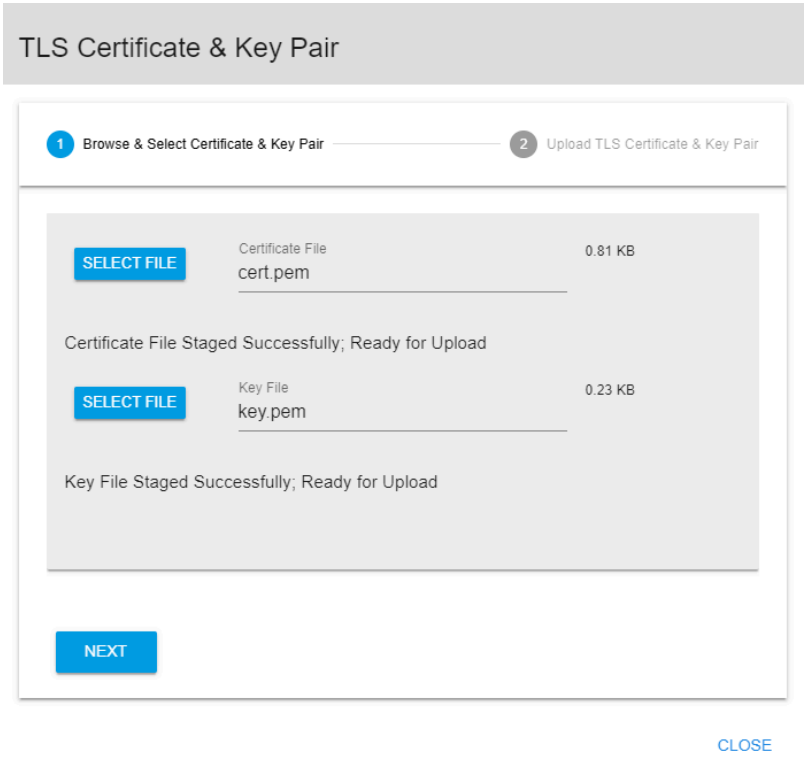
The **TLS Certificate & Key Pair** window appears, showing the **Browse & Select Certificate & Key Pair** step:



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

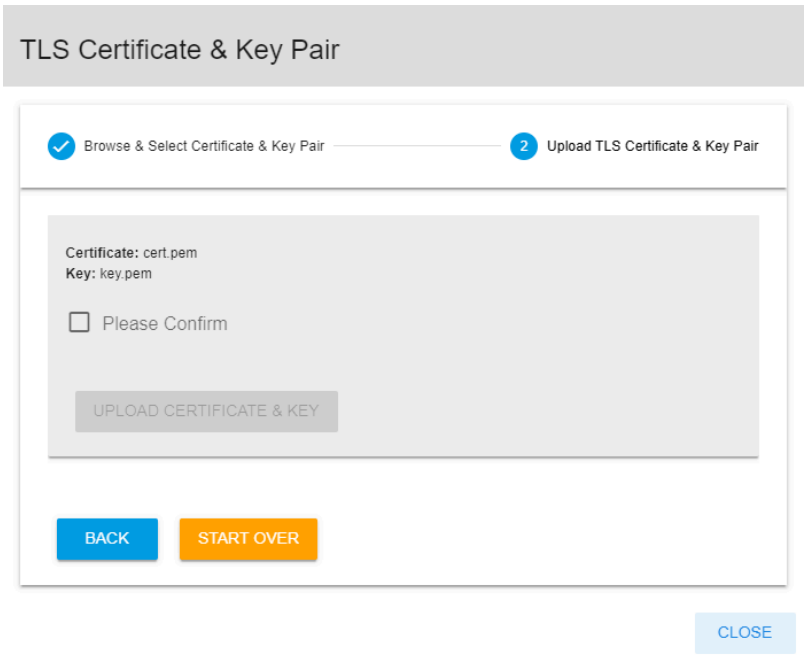
Step 5: Navigate to the location of the appropriate PEM files for the **Certificate File** and **Key File** fields:

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.

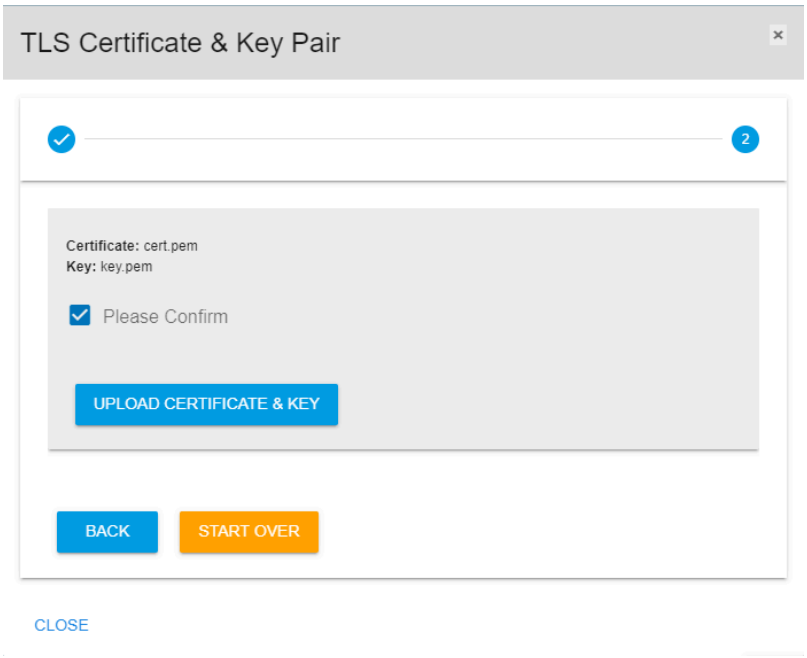


Step 6: Click the **Next** button:

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



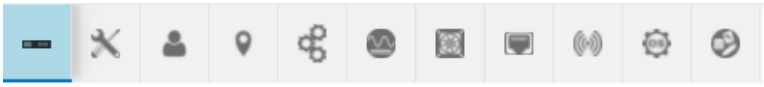
Step 7 : Confirm that the correct files are listed for **Certificate** and **Key**. If so, select the **Please Confirm** checkbox and click the **Upload Certificate & Key** button:



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

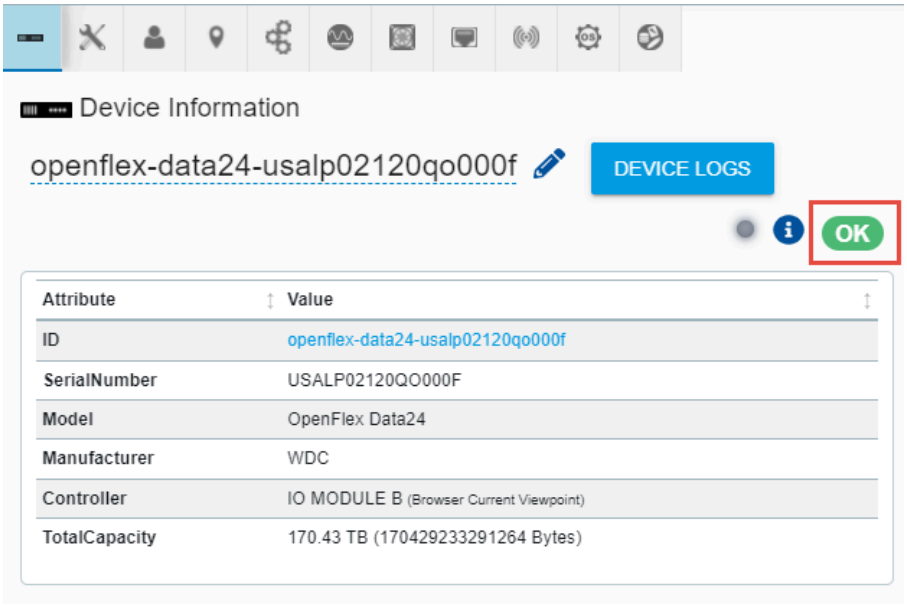
Step 8 : Click the **Device Information** icon:

Figure 193: Storage Device Information Icon



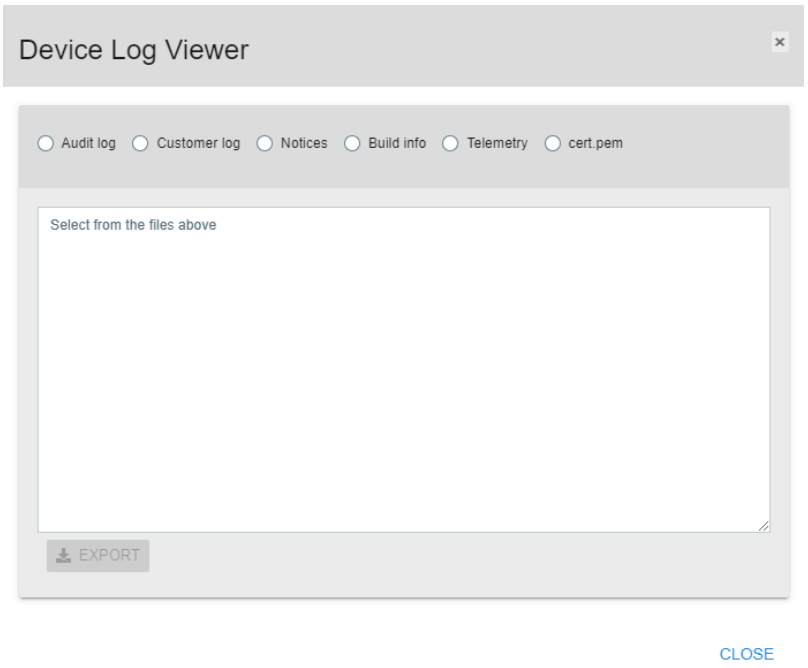
The **Device Information** appears:

Figure 194: Storage Device Information

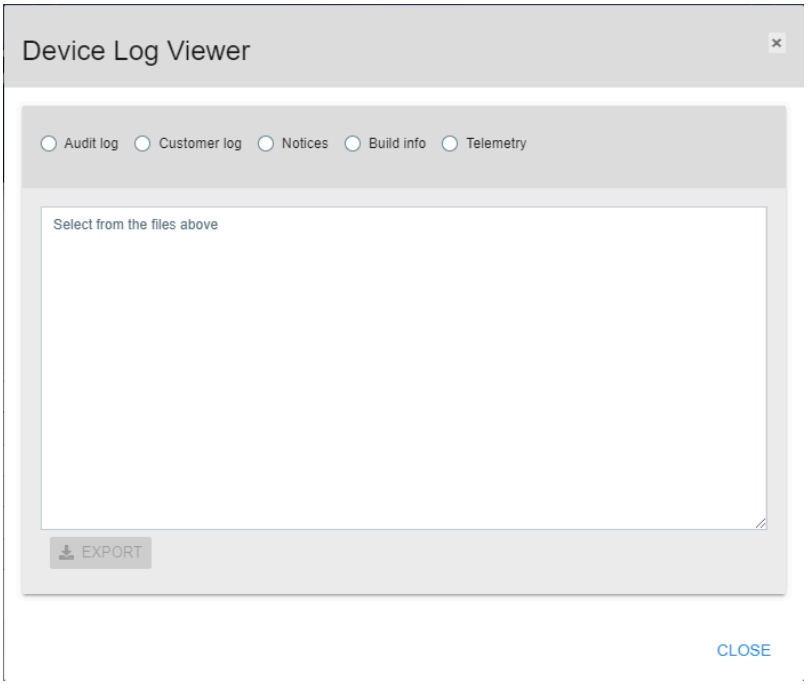


Step 9 : Click the **Device Logs** button:

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:



4.2.5.4 Creating Accounts

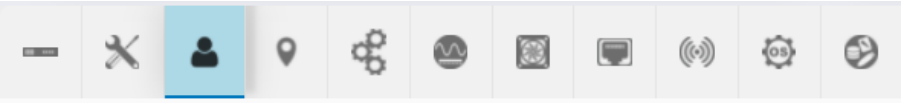
This task provides instructions for creating a user account on the OpenFlex Data24 using the OCGUI.

Note: Accounts must be created on both IOMs.

Step 1: Navigate to the storage device (see Navigating to a Device *(page 128)*).

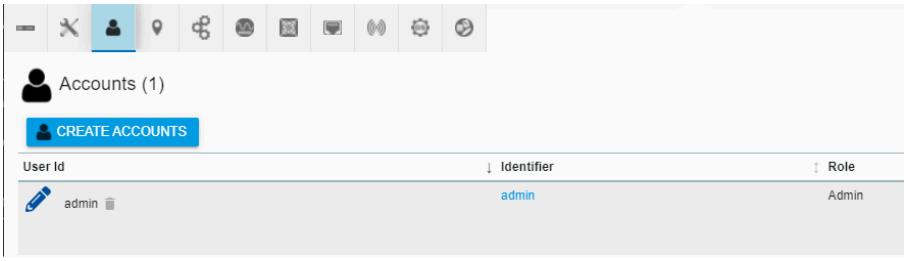
Step 2: Click the device's **Accounts** icon:

Figure 197: Storage Device Accounts Icon



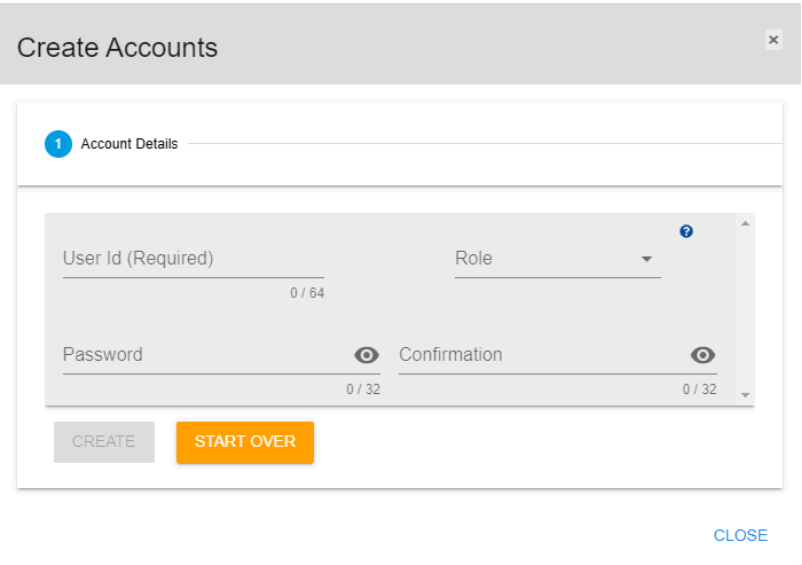
The **Accounts** information appears:

Figure 198: Storage Device Accounts Information

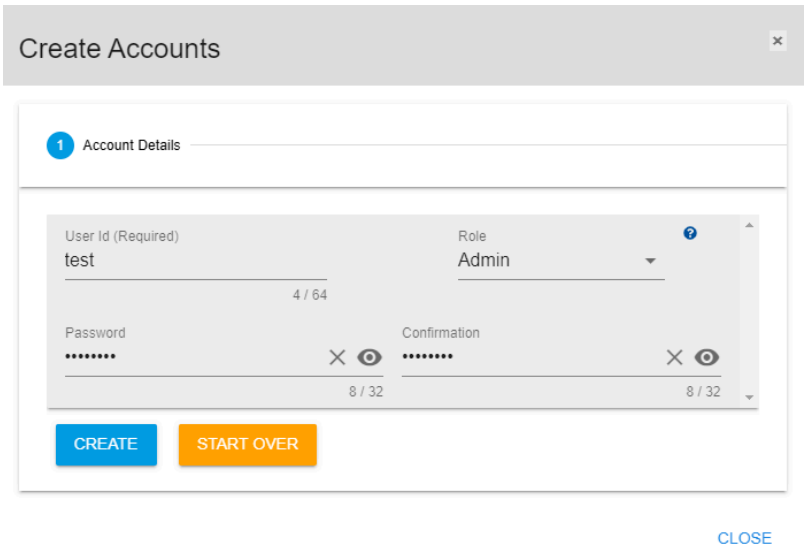


Step 3: Click the **Create Accounts** button:

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



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



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

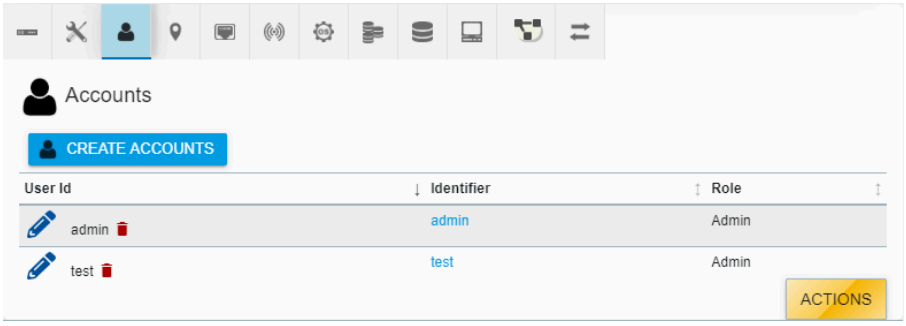
- **Admin**: This option allows for full access to all account options when logged into the GUI.
- **ReadOnly**: This option allows for read only access when logged into the GUI.

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

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

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

Figure 203: Storage Device New Account



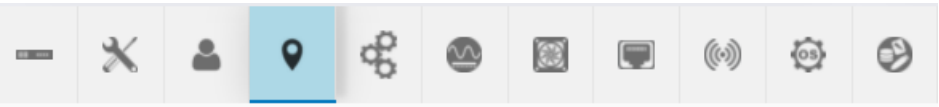
4.2.5.5 Configuring a Location

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

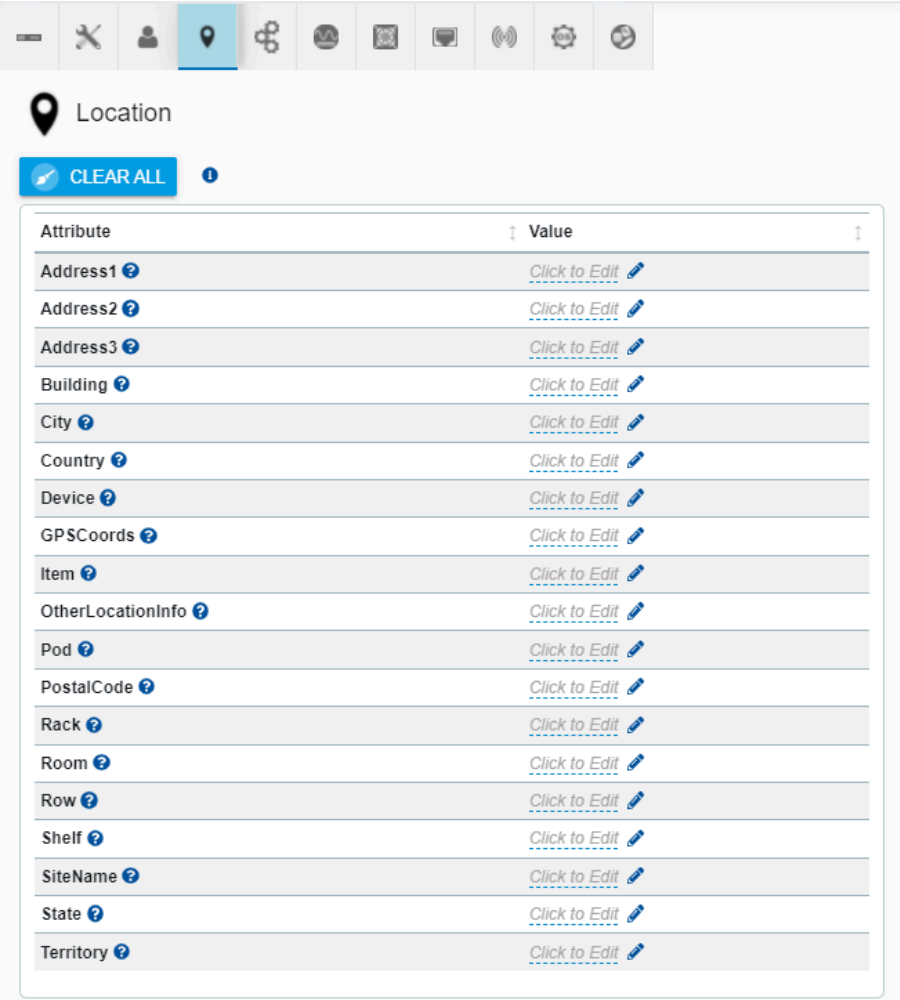
Step 1: Navigate to the storage device (see Navigating to a Device *(page 128)*).

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

Figure 204: Storage Device Location Icon



The **Location** information appears:



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.

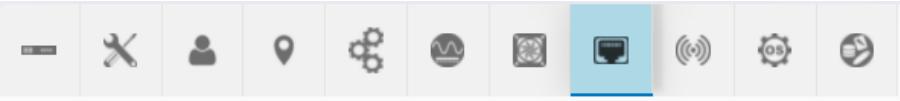
4.2.5.6 Editing Port Information

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

Step 1: Navigate to the storage device (see Navigating to a Device *(page 128)*).

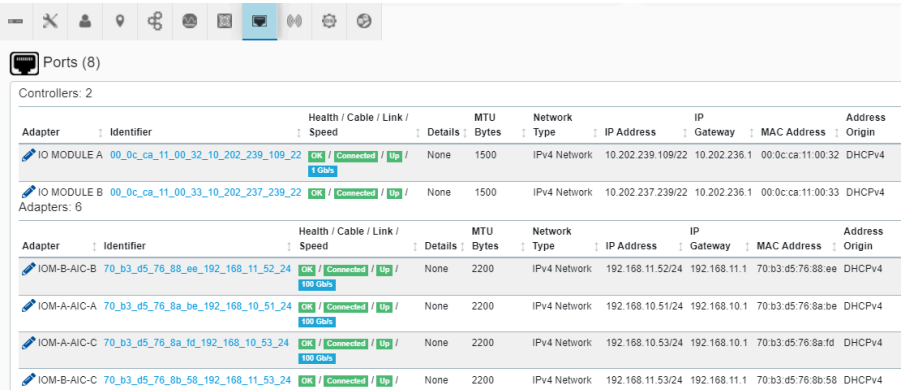
Step 2: Click the device's **Ports** icon:

Figure 206: Storage Device Ports Icon



The **Ports** information appears:

Figure 207: Storage Device Ports Information



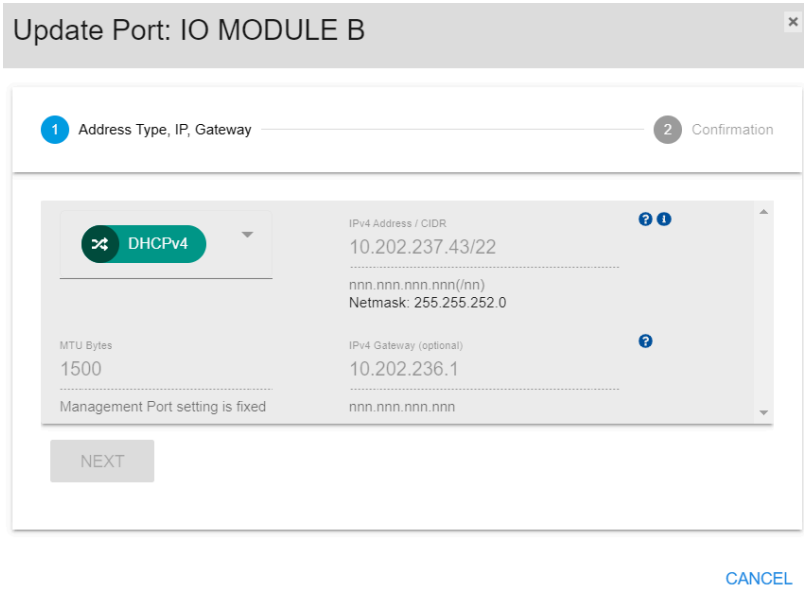
Step 3: To edit the port information for an IOM, click the pencil icon next to that port's **Adapter** name.

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 and cannot be changed.

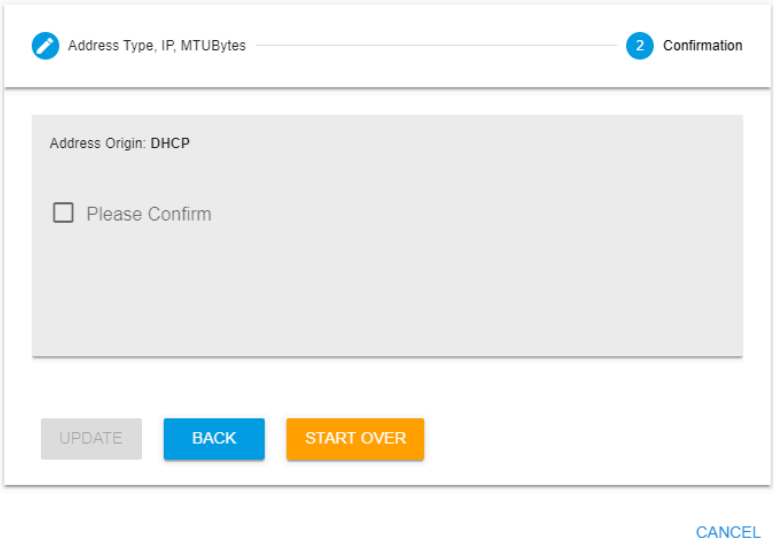
The **Update Port** window appears, showing the **Address Type, IP, MTUBytes** step:

Figure 208: IOM Device Update Port Window

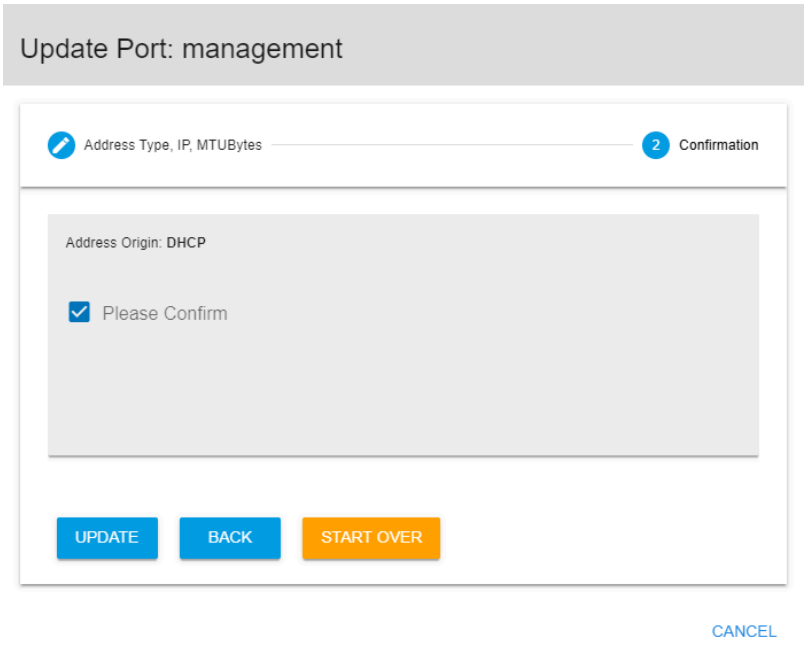


Step 4: Edit the port information for the device and click the **Next** button:

The **Confirmation** step appears:



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



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

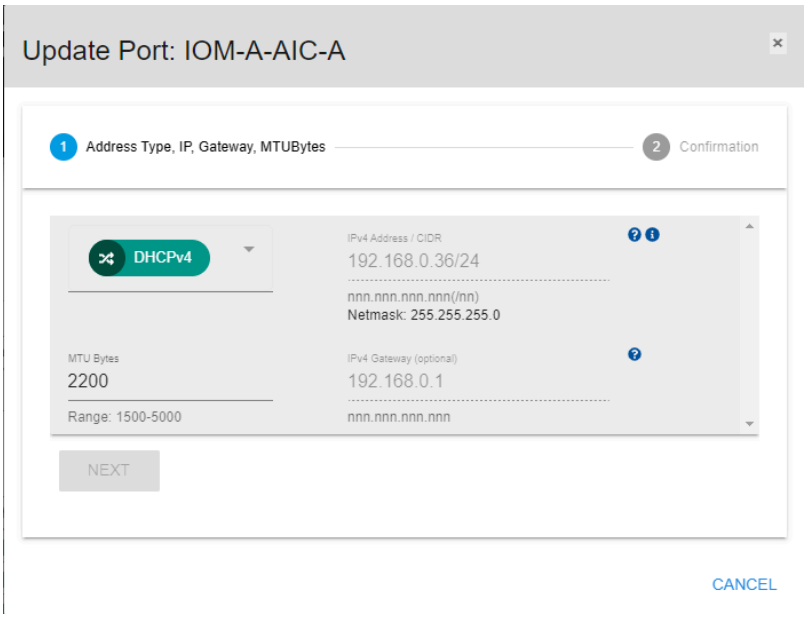
Step 7 : To edit the port information for an Add-in Card (AIC), click the pencil icon next to that port's **Adapter** name.

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

Attention: The MTU Bytes for the IOM 100Gbs data ports (AIC) default to a value of 2200. This is recommended setting for the component, but it can be changed with the range of 1500 and 5000.

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

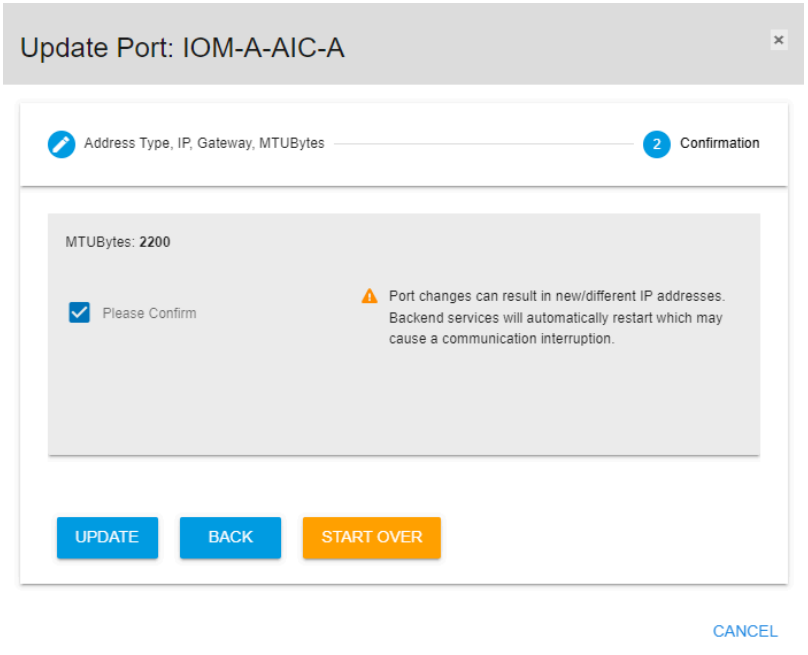
Figure 210: Add-in Card Device Update Port Window



Step 8 : Edit the port information for the device and click the **Next** button:

The **Confirmation** step appears.

Step 9 : Select the **Please Confirm** checkbox to confirm the edits:



Step 10 : Click the **Update** button to save the updates:

4.2.6 Maintenance

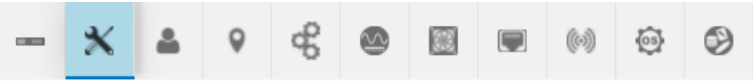
For the OpenFlex Data24, maintenance includes the options to reboot, put a device to sleep, and factory reset the enclosure..

4.2.6.1 Rebooting a Storage Device

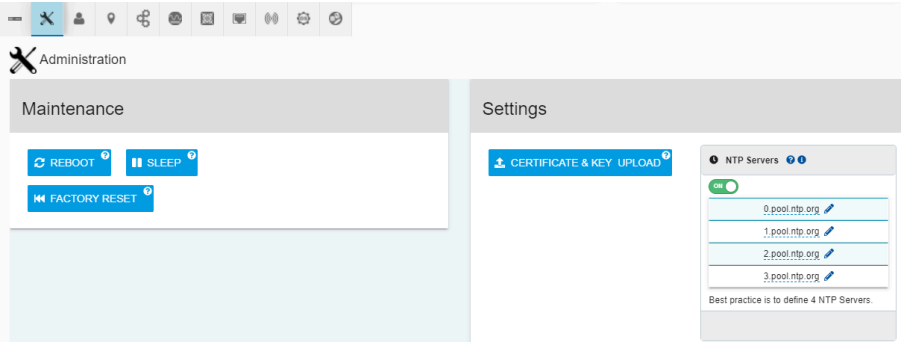
This task provides instructions for rebooting an OpenFlex™ Data24 storage device using the OCGUI.

Step 1: Navigate to the storage device (see Navigating to a Device *(page 128)*).

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

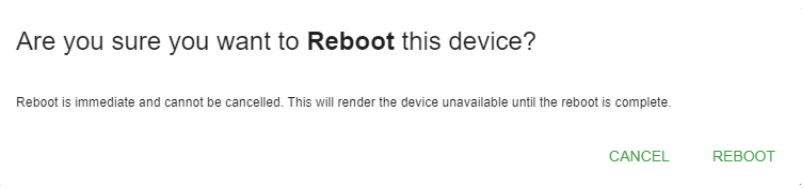


The **Administration** information appears:



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

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



Step 4: Click **Reboot**:

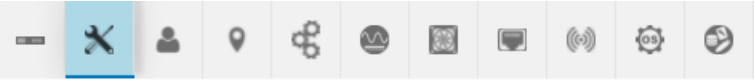
Step 5: The storage device will reboot, rendering it unavailable until the reboot is complete.

4.2.6.2 Putting the Storage Device to Sleep

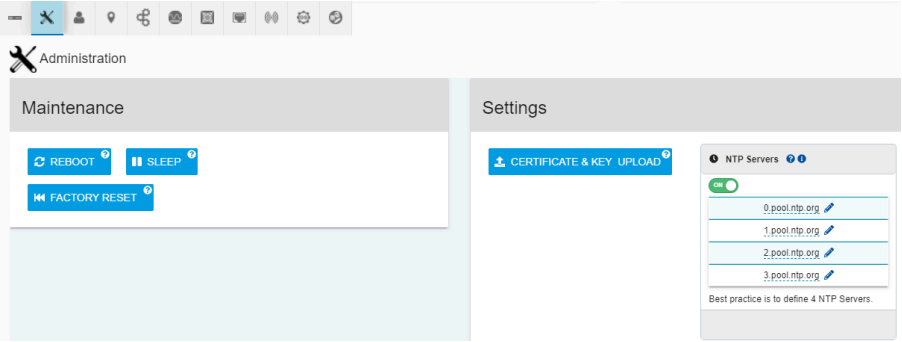
This task provides instructions for putting the storage device to sleep using the OCGUI.

Step 1: Navigate to the storage device (see Navigating to a Device *(page 128)*).

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:

Step 4: Click **Sleep**:

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

4.2.6.3 Factory Reseting a Storage Device

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

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

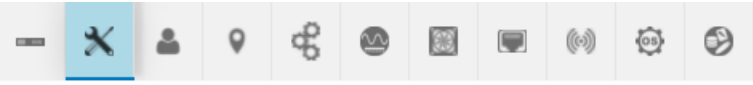
- Sets the network setting back to default (100G and 1G ports on both IOMs)
- Set NTP time settings back to the default (Management port)
- All devices will be powered on (default)
- Re-enables disabled drives (power on drives upon factory reset)
- Set enclosure name back to default
- Reset user accounts 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.

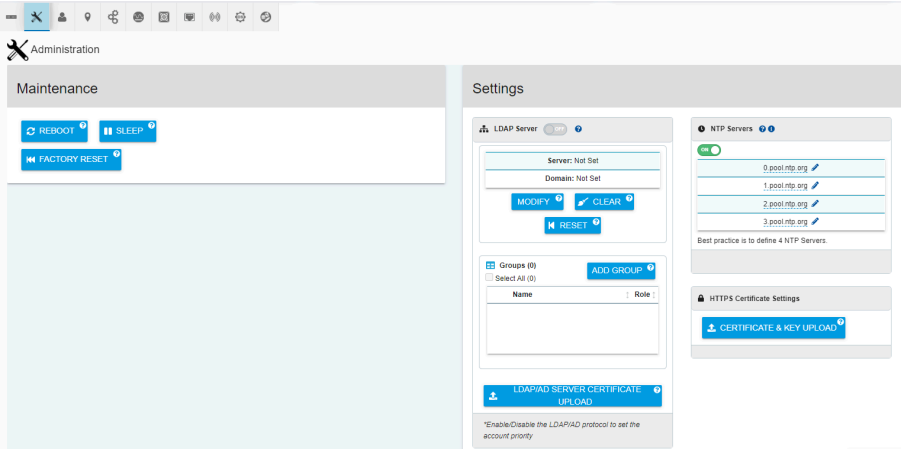
Step 1: Navigate to the storage device (see Navigating to a Device *(page 128)*).

Performing the Factory Reset

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

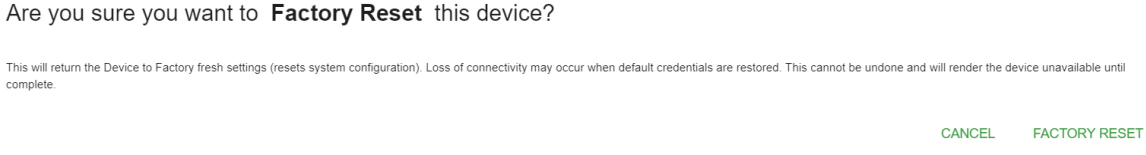


The **Administration** information appears.:



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

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



Step 4: Click **Factory Reset**:

FACTORY RESET

The GUI session will end and the enclosure will reboot.

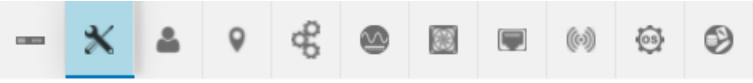
Result: The enclosure will shut down and automatically restart once the factory reset procedure is complete.

4.2.6.4 Enabling LDAP on a Storage Device

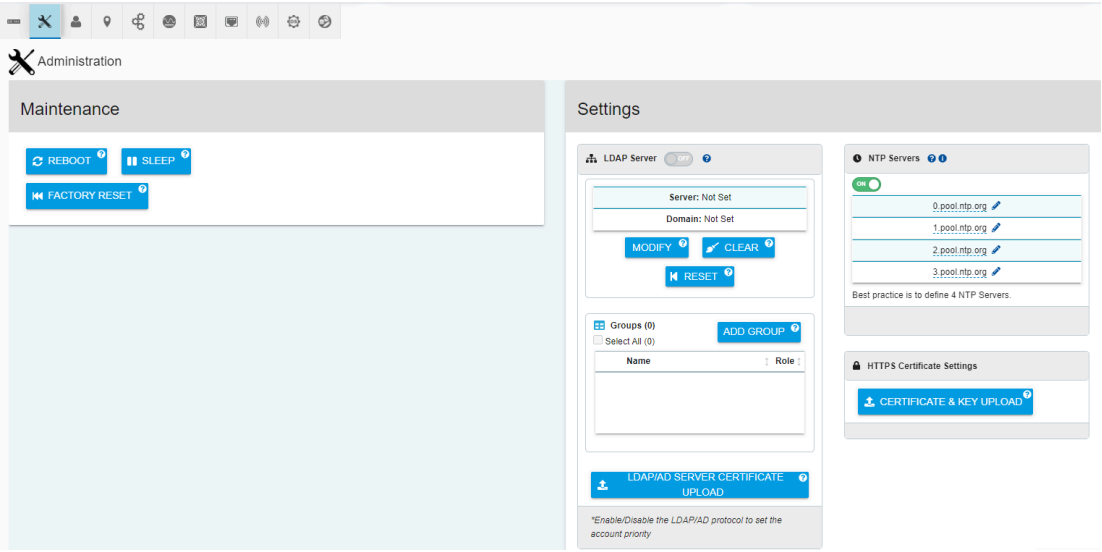
This task provides instructions to enable LDAP on a OpenFlex Data24 storage device using the OCGUI.

Step 1: Navigate to the storage device (see Navigating to a Device *(page 128)*).

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

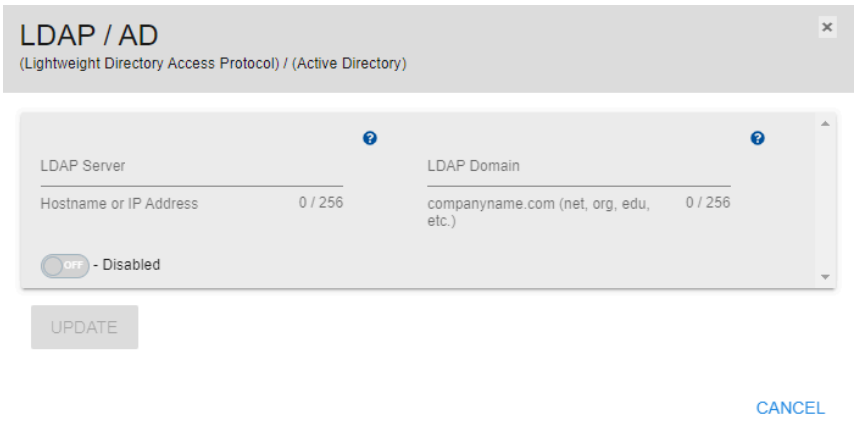


The **Administration** information appears.:

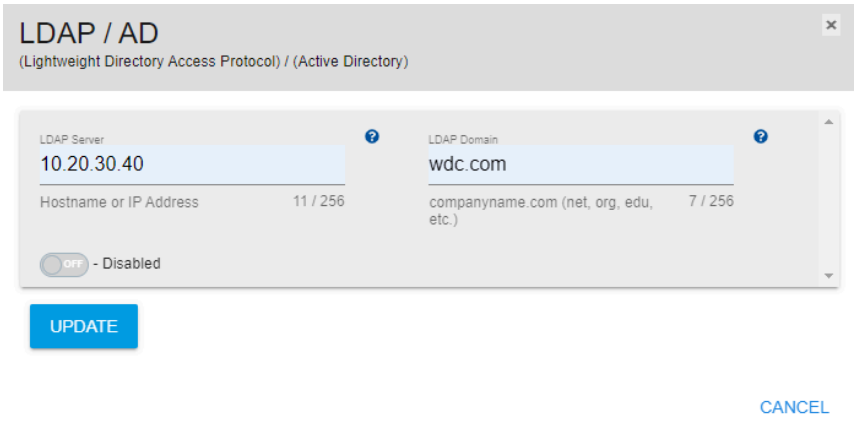


Step 3: From the LDAP Server section, click **MODIFY** .

The LDAP / AD window will appear.

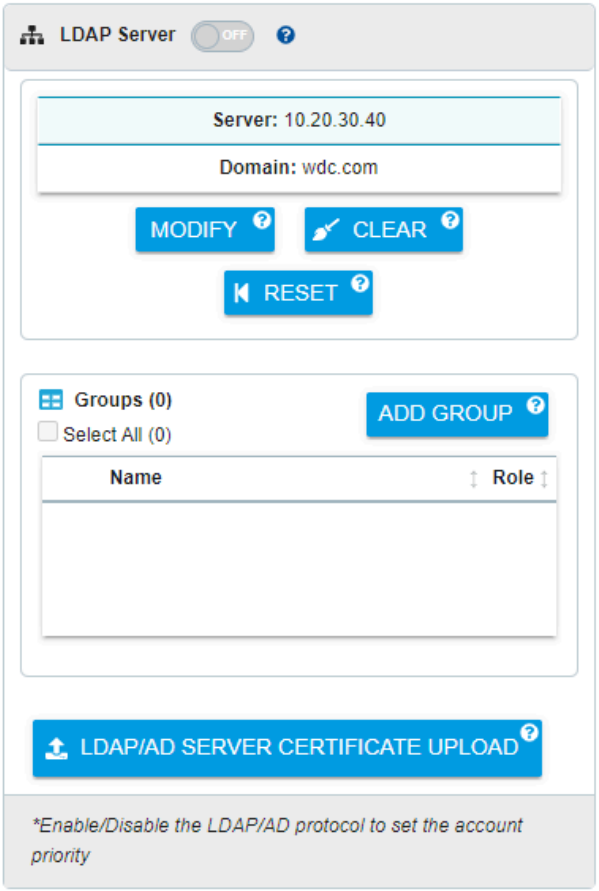


Step 4 : Type a Hostname or IP Address and LDAP Domain in the fields of the LDAP / AD window.



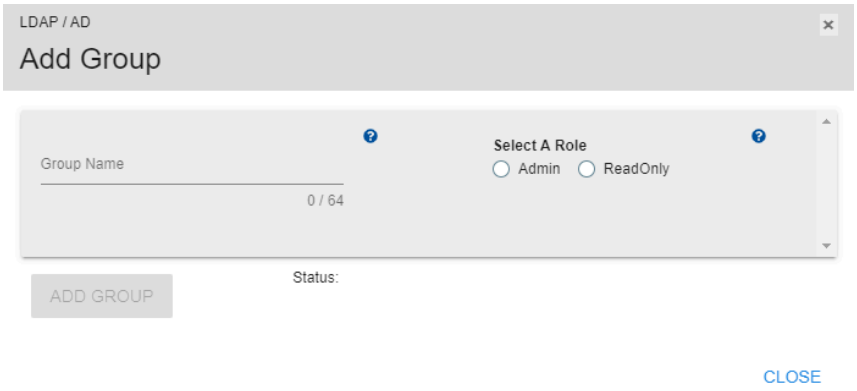
Step 5 : Click **UPDATE**.

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

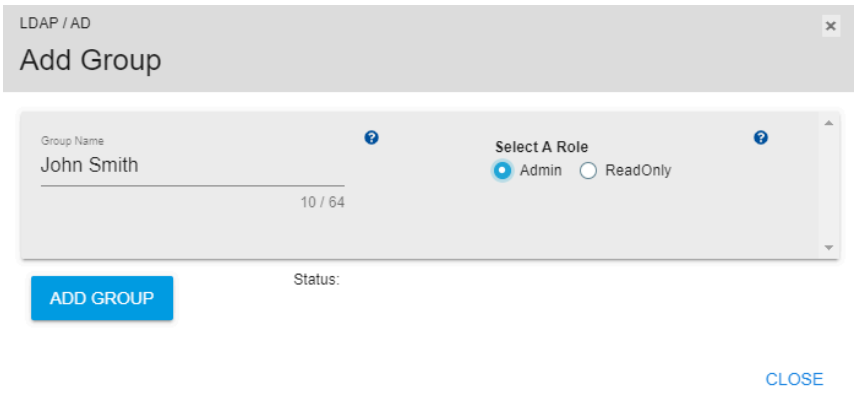


Step 6 : Click **ADD GROUP**.

The Add Group window will appear.

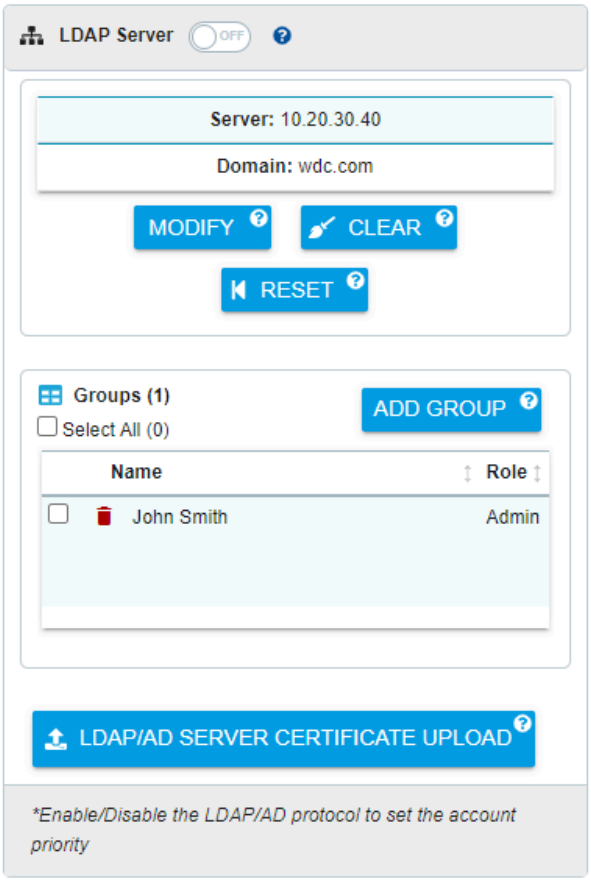


Step 7 : Type a Group Name and select a role from the options.



Step 8 : Click **ADD GROUP**.

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



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

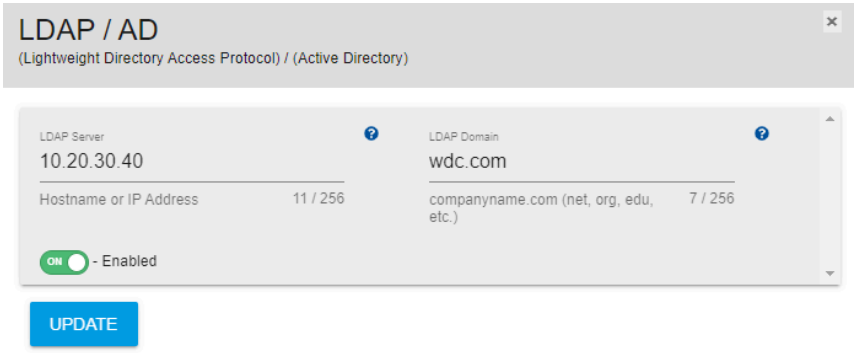
CLOSE

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

The LDAP / AD window appears.

CANCEL

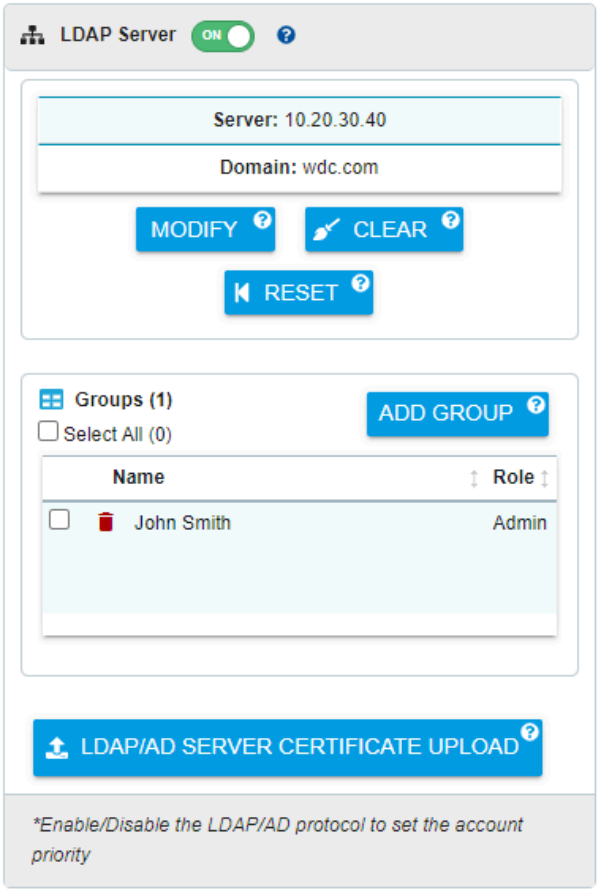
Step 11 : From the LDAP / AD window, click the **Disabled** option slider to enable the LDAP Server. The slider option will now display as Enabled.



CANCEL

Step 12 : Click **UPDATE**.

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



4.3 Firmware Upgrade

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

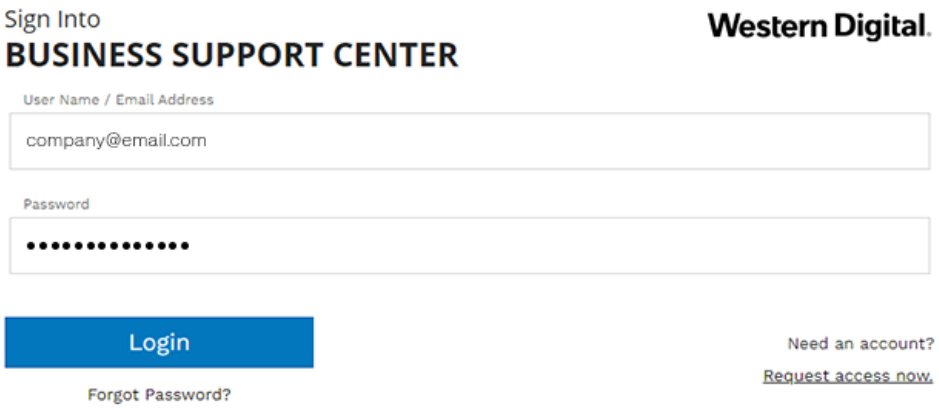
4.3.1 Downloading Firmware from the Support Portal

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

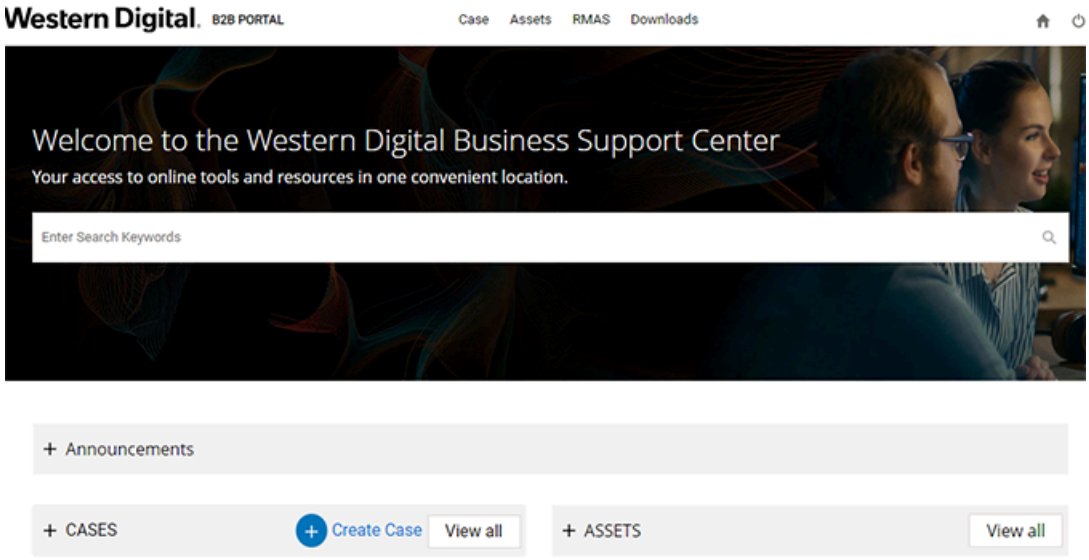
Step 1: Open a web browser and go to: https://portal.wdc.com/Support/s/.
The **Western Digital Enterprise Support Center** will appear.

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

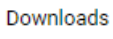
Note: If you do not have registered Western Digital account, you may request one by clicking **Request access now** and selecting **Enterprise Support** from the access options before proceeding with the request.



The support portal will appear.

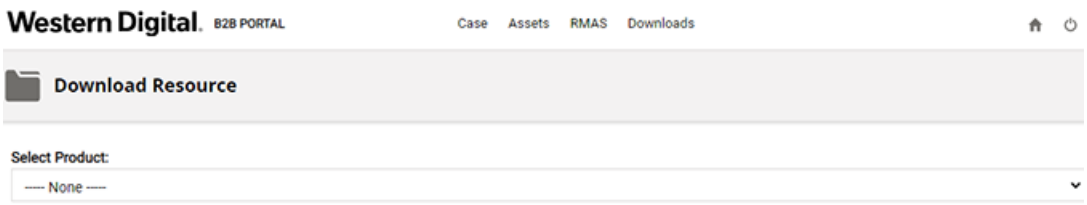


Step 3 : Click the **Downloads** option from the top banner.



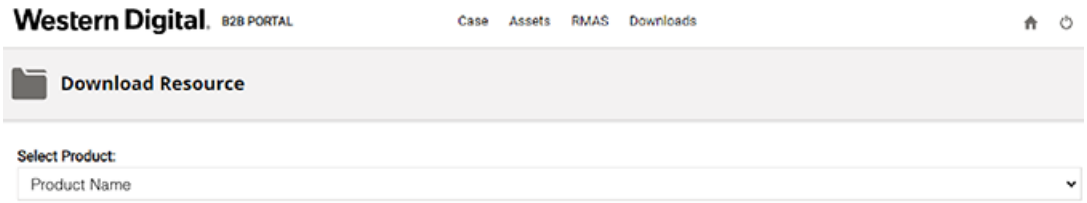
The Western Digital downloads page will appear.

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

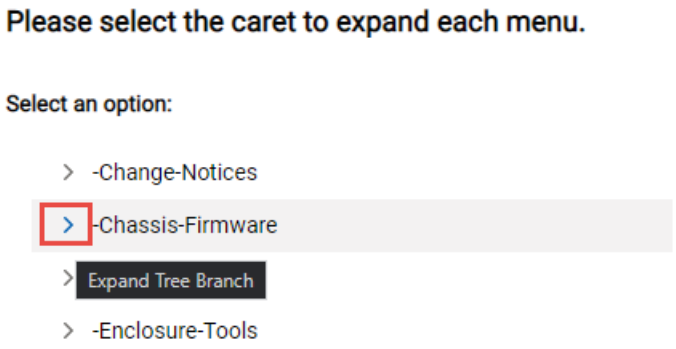


Note: Filenames will vary, depending on the options chosen from the **Select Product** section.

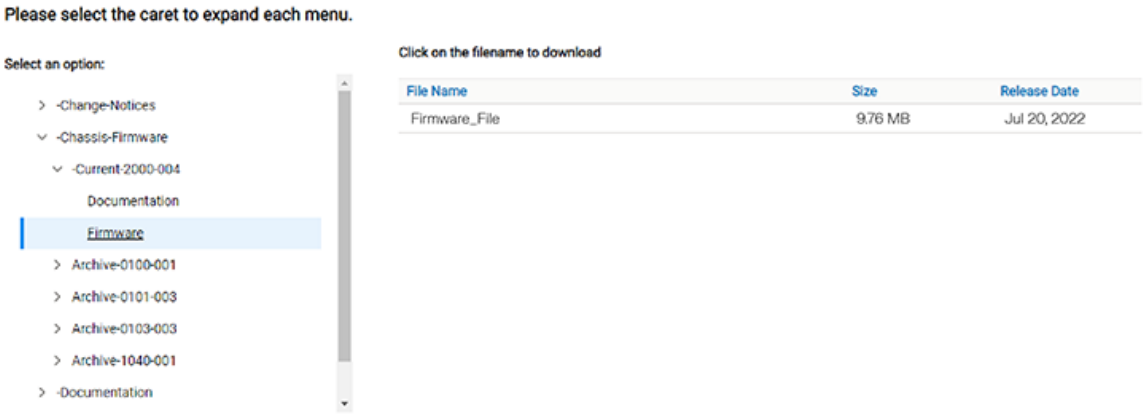
The product specific downloads will appear in the Download Resources section.



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



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



The file will automatically download.

4.3.2 Upgrading Firmware

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

Before you begin:

Attention: The firmware upgrade must be completed on both IOMs. Wait 5 minutes in between each IOM update. Verify the health of the IOM after each firmware update.

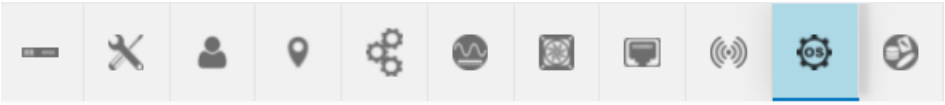
Step 1: The latest version of firmware must be downloaded before continuing this upgrade procedure. If the firmware has not been downloaded, follow the instructions in Downloading Firmware from the Support Portal *(page 156)*.

Step 2: Navigate to the chassis.

Attention: IOM A and IOM B firmware updates will need to be completed separately.

Step 3: Click the device's **OS** icon:

Figure 243: Storage Device OS Icon

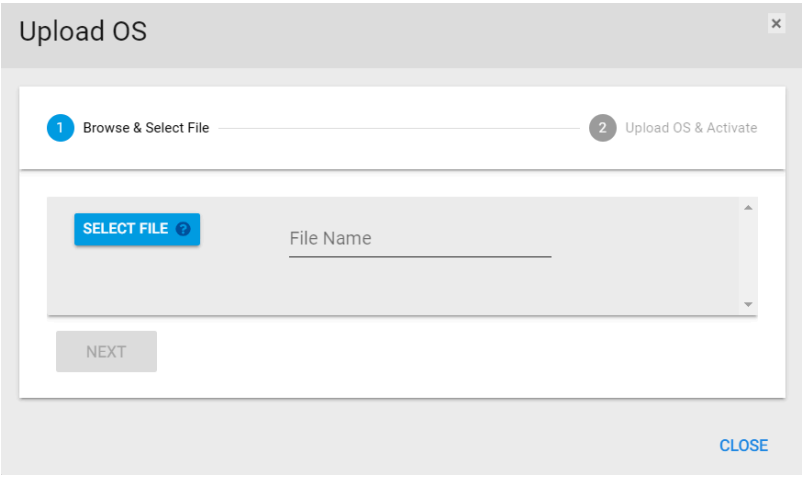


The **Device OS** information appears:

Figure 244: Storage Device OS Information

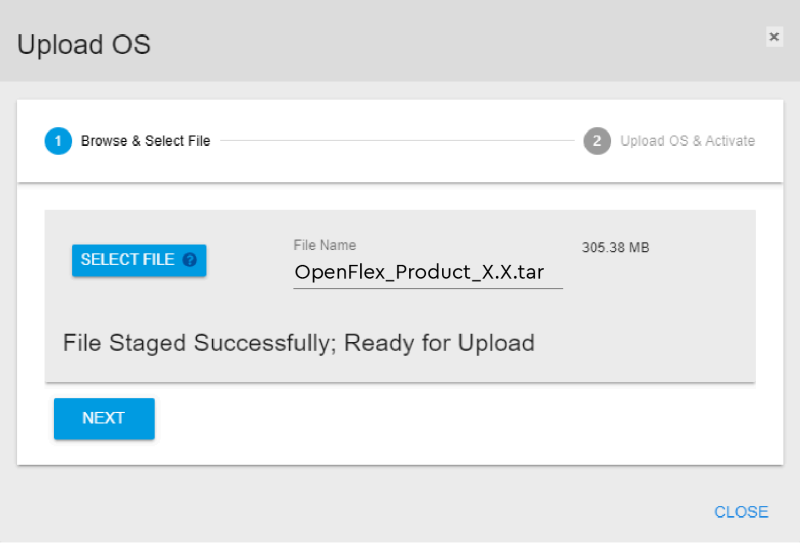
Step 4 : Click the **Update OS** button:

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



Step 5 : 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:

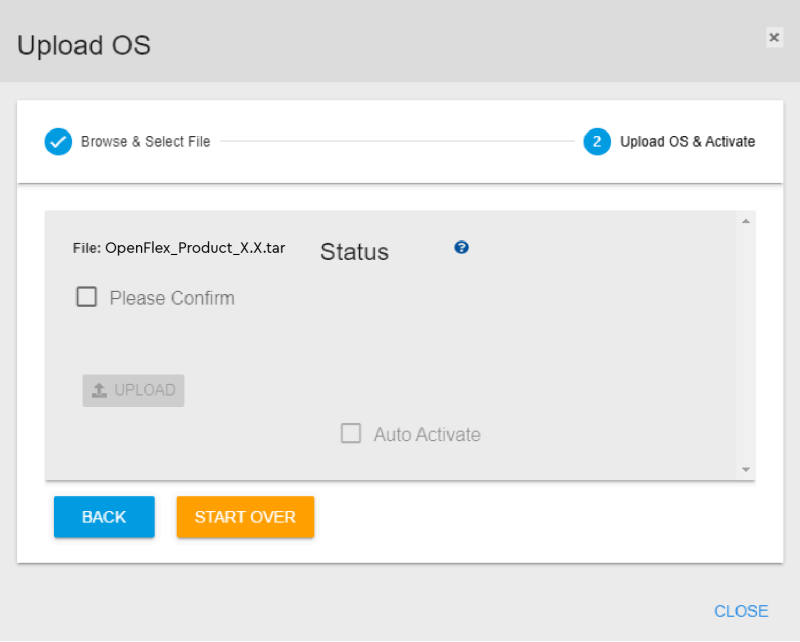


Step 6 : Click the **Next** button:

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

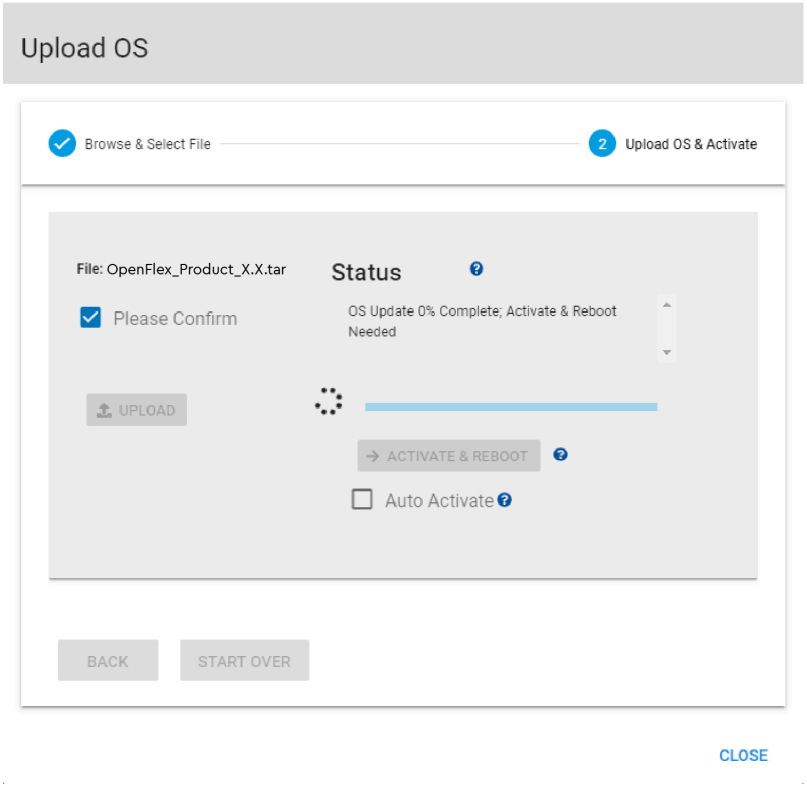
NEXT

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



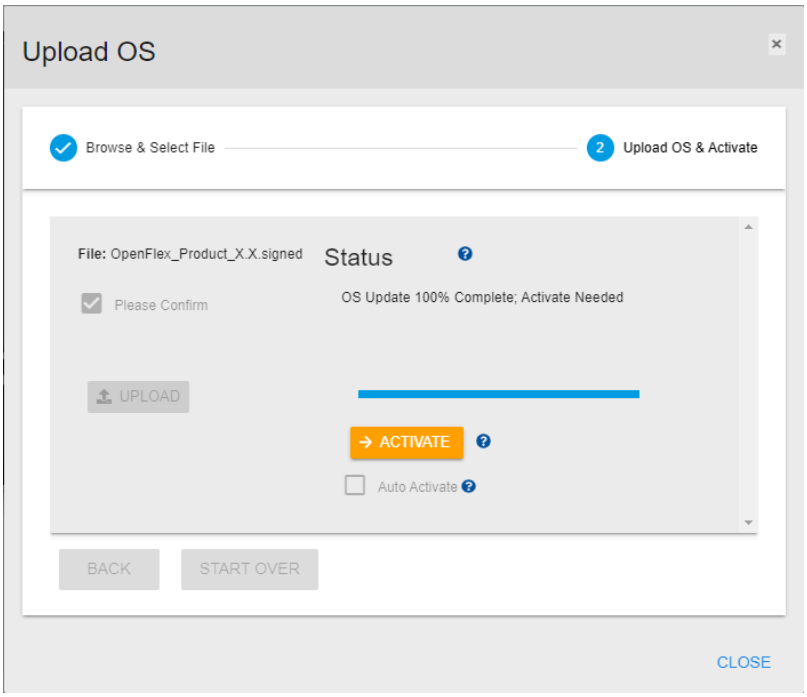
Step 7 : Click the checkbox beside **Please Confirm**. Then click the **Upload** button:

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

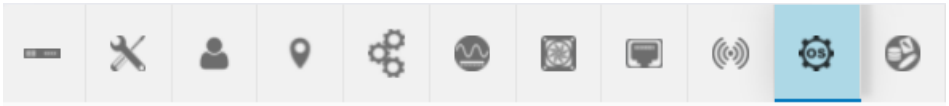


Step 8 : An activation and reboot cycle will be required after the upload is complete. Choose one of the following options:

- Click the **Auto Activate** checkbox to automatically activate the firmware and reboot the device after the upload is complete.
- Wait until the upload is complete; then click the **Activate** button.



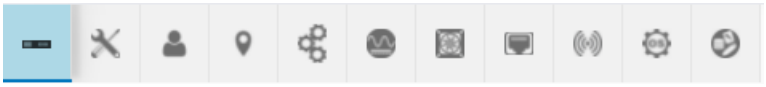
Step 9 : After the device has rebooted, click the storage device's **OS** icon:



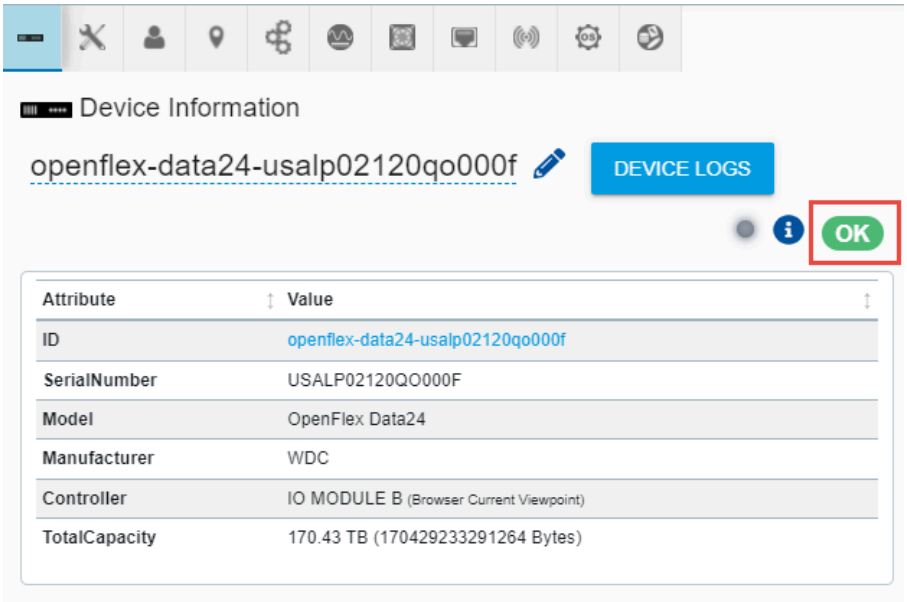
The **Device OS** information appears:

Step 10 : Review the **Device OS** information to verify the firmware version by selecting the device and going to the Device Logs.

Step 11 : Click the storage **Device Information** icon:

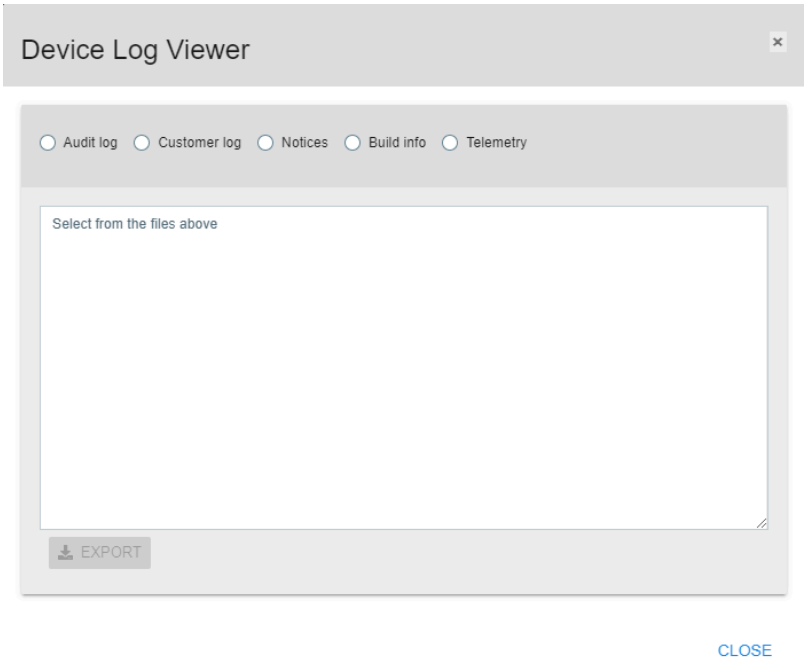


The **Device Information** appears:



Step 12 : Click the **Device Logs** button:

The **Device Log Viewer** appears:



Step 13 : 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:

Step 14 : Repeat the previous steps to update the remaining IOM to the latest version of of Firmware.

4.3.3 Drive Firmware Upgrade

This section provides instructions for updating drives firmware on the OpenFlex Data24 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 on OpenFlex Data24 *(page 169)*

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 156)* 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. 0x**2**2)
- The second afi number **0x**, occurring after the, represents the firmware slot that will be active after next drive reset/restart (e.g. 0x3**3**). '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 ouput.

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

The NVMe device firmware information is displayed.

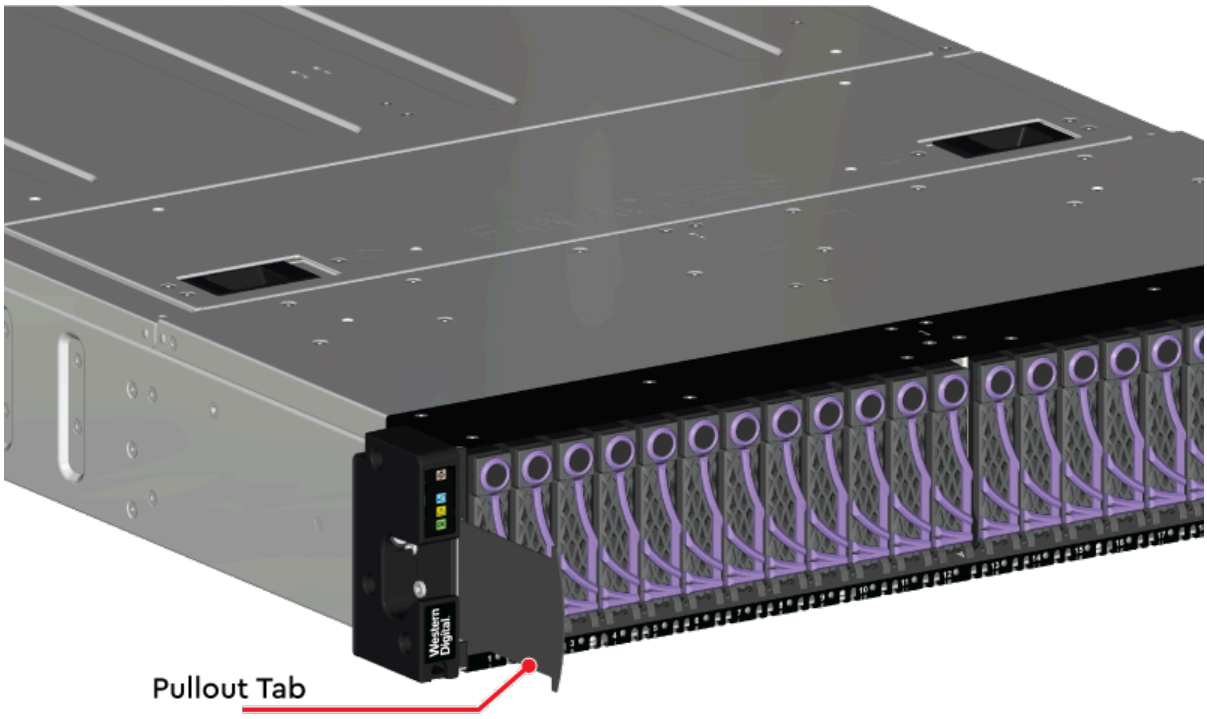
```
Firmware Log for device:nvme3
afi  : 0x33
frs1 : 0x3330303930313252 (R2109003)
frs2 : 0x3330303930313252 (R2109003)
frs3 : 0x3030323930323252 (R2209200)
frs4 : 0x3330303930313252 (R2109003)
```

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.

4.4 Platform Details Pullout Tab

There is a small plastic tab that can be pulled out to show the vital system details such as the SKU number and single Top Level Serial Number. This is the only location for the product SN. The pullout tab is located on the front of the platform in the location shown in the following image.

Figure 258: Pullout Tab Location



4.5 In-band Enclosure Management

The OpenFlex Data24 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` . For details on how to install the openflex-api on a host to perform in-band enclosure management, see Installing Standalone OpenFlex-api for In-Band Management *(page 180)*

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 supports a minimum version of NVMe-CLI 1.13.

To install NVMe-CLI on Ubuntu 18.04.4 LTS:

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

To Install NVMe-CLI on CentOS 8.5 or RHEL 8.5:

```
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

4.6.1 Supported NVMe-CLI Commands

Table 37: NVMe-CLI Fabric Commands

Command	Support Details
connect	Supported
connect-all	Supported
disconnect	Supported
disconnect-all	Supported (Not supported on RHEL 8.2 with kernel 4.18)
discover	Supported. Only authorized targets reported. Also discovers In-Band management device (one per IOM). Example: nvme discover -t rdma -a 10.10.10.230 -s 4420 -q nqn.host.com
fw-download (drives only)	Supported
fw-activate (drive only)	Supported
fw-log	Supported
nvme-device-self-tes	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.

Table 38: Usupported NVMe

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

4.6.3 Discovering and Connecting to NVMe™ Devices on OpenFlex Data24

This procedure will provide information on discovering and Connecting to NVMe devices on OpenFlex Data24 using the REST protocol over the 1Gb Management Port. This process assumes the user knows the IP address of the 1 Gb Ethernet Management port of the enclosure IOM. The IOM MAC address is available on the pull-out tab located on each of the IOMs at the rear of the system and can be used to determine the IP address. Examples where REST commands are required will display cURL commands.

Step 1: Open a terminal and use the adapter's IPv4 address to discover all nvme devices installed on the fabric.

```
sudo nvme discover -t rdma -a <IP of IOM Data Port>
```

Note: The port defaults to rdma for RoCE, but it can be defaulted to TCP also. Ensure that the Operating System requirements for TCP are met. See: Supported Operating Systems *(page 22)* for details related to TCP. Review the port information to determine protocol being used. When configuring RoCE, PFC flow control is automatically enabled. When configuring TCP, Global Pause flow control is automatically enabled.

Step 2: Review the output to locate the subnqn number associated with the device that will be connected. The following example shows two devices, the In-Band management device, as well as the device (SSD) intended for connection.

```
Discovery Log Number of Records 2, Generation counter 0
=====Discovery Log Entry 0======
trtype:  rdma
adrfam:  ipv4
subtype: nvme subsystem
treq:    not specified
portid:  0
trsvcid: 4420
subnqn:  nqn.1992-05.com.wdc.openflex-data24-usalp00000bb000b:MI.AA (In-Band
 Management Device)
traddr:  192.168.10.51
rdma_prtype: roce-v2
rdma_qptype: connected
rdma_cms:    rdma-cm
rdma_pkey: 0x0000
=====Discovery Log Entry 1======
trtype:  rdma
adrfam:  ipv4
subtype: nvme subsystem
treq:    not specified
portid:  0
trsvcid: 4420
subnqn:  nqn.1992-05.com.wdc.openflex-data24-usalp00000aa000a:nvme.1 (subnqn
 for NVMe device)
traddr:  192.168.10.51
rdma_prtype: roce-v2
rdma_qptype: connected
rdma_cms:    rdma-cm
```

```
rdma_pkey: 0x0000
```

Note: This example calls out the IOM-A and AIC-A with the result AA, bolded above. The example also calls out the device number with the numeral 1 at the end of the string, bolded in the following example: subnqn: nqn.1992-05.com.wdc.openflex-data24-usalp00000aa000a:nvme.**1**. The **1** indicates the device (SSD) system slot number.

Step 3: Connect to the device using the subnqn.

```
sudo nvme connect -t rdma -i 16 -a 192.168.10.51 -n
 nqn.1992-05.com.wdc.openflex-data24-usalp00000aa000a:nvme.1
```

Step 4: Verify the connection using `nvme list -v`.

```
root:~$ sudo nvme list -v
NVM Express Subsystems

Subsystem        Subsystem-NQN                                    Controllers
------------ ------------------------------------------------
 ----------------
nvme-subsys0 nqn.1992-05.com.wdc.openflex-data24-usalp00000aa000a:nvme.1
                                 nvme0

NVM Express Controllers

Device   SN                   MN                                FR       TxPort
 Address        Subsystem    Namespaces
-------- -------------------- ------------------------------ -------- ------
 -------------- ------------ ----------------
nvme0    AXXXXXXX             WUSxxxxxxx                      R2109003 rdma
 traddr=192.168.10.51 trsvcid=4420 nvme-subsys0 nvme0n1

NVM Express Namespaces

Device       NSID     Usage                      Format           Controllers
------------ -------- -------------------------- ----------------
 ----------------
nvme0n1      1          3.84  TB /   3.84  TB    512   B +  0 B   nvme0
```

Result: The connection to the NVMe devices on the OpenFlex Data24 have been made.

Configuration

In This Chapter:

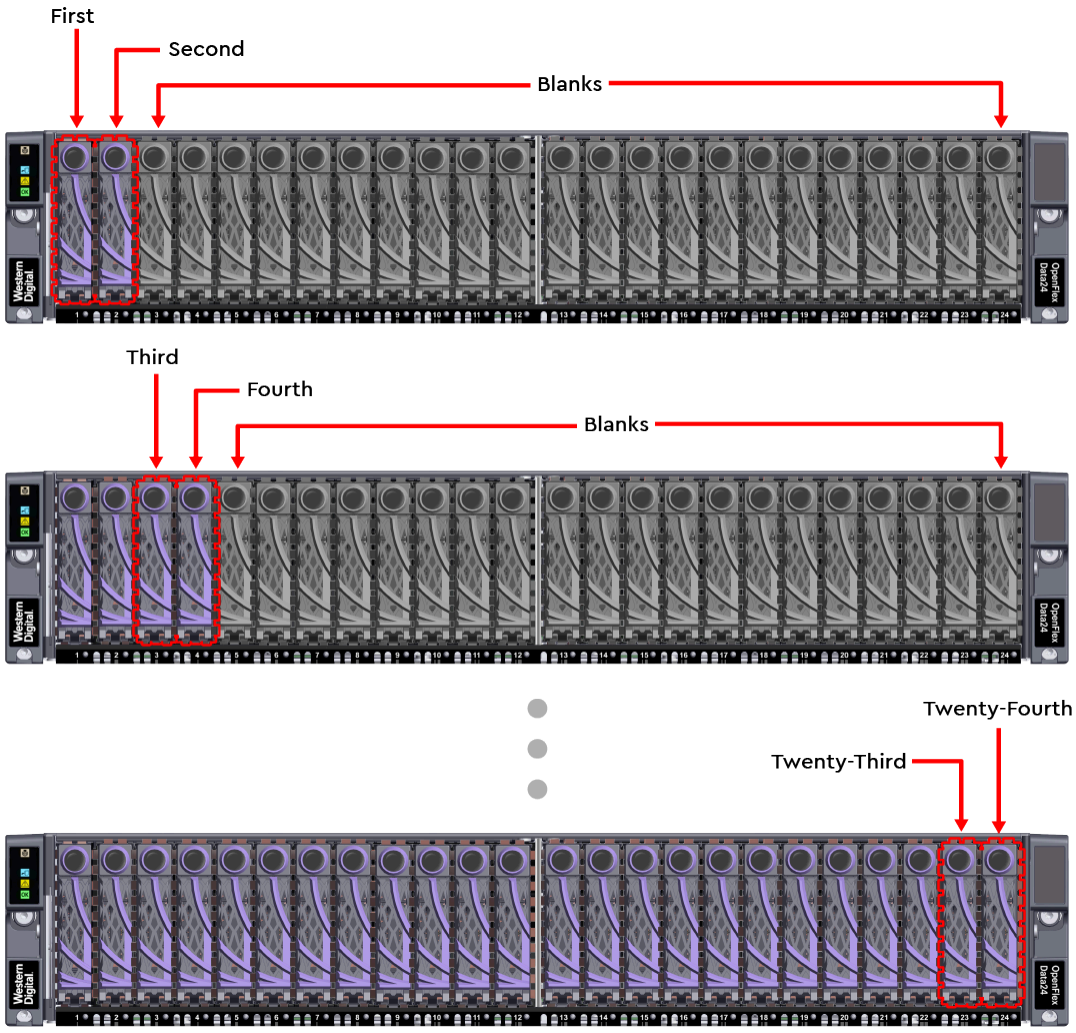
5.1 Device Installation Order

The OpenFlex Data24 holds 1-24 storage drive assemblies. The minimum number of drives required is 1, and drives can be installed in increments of 1 at a time. However, there is a specific installation order that is recommended in order to optimally balance data load distribution.

Single Add-in Card Configuration

The AIC controls drives 1-24. To balance the IO load optimally, install in the pattern shown in the following image.

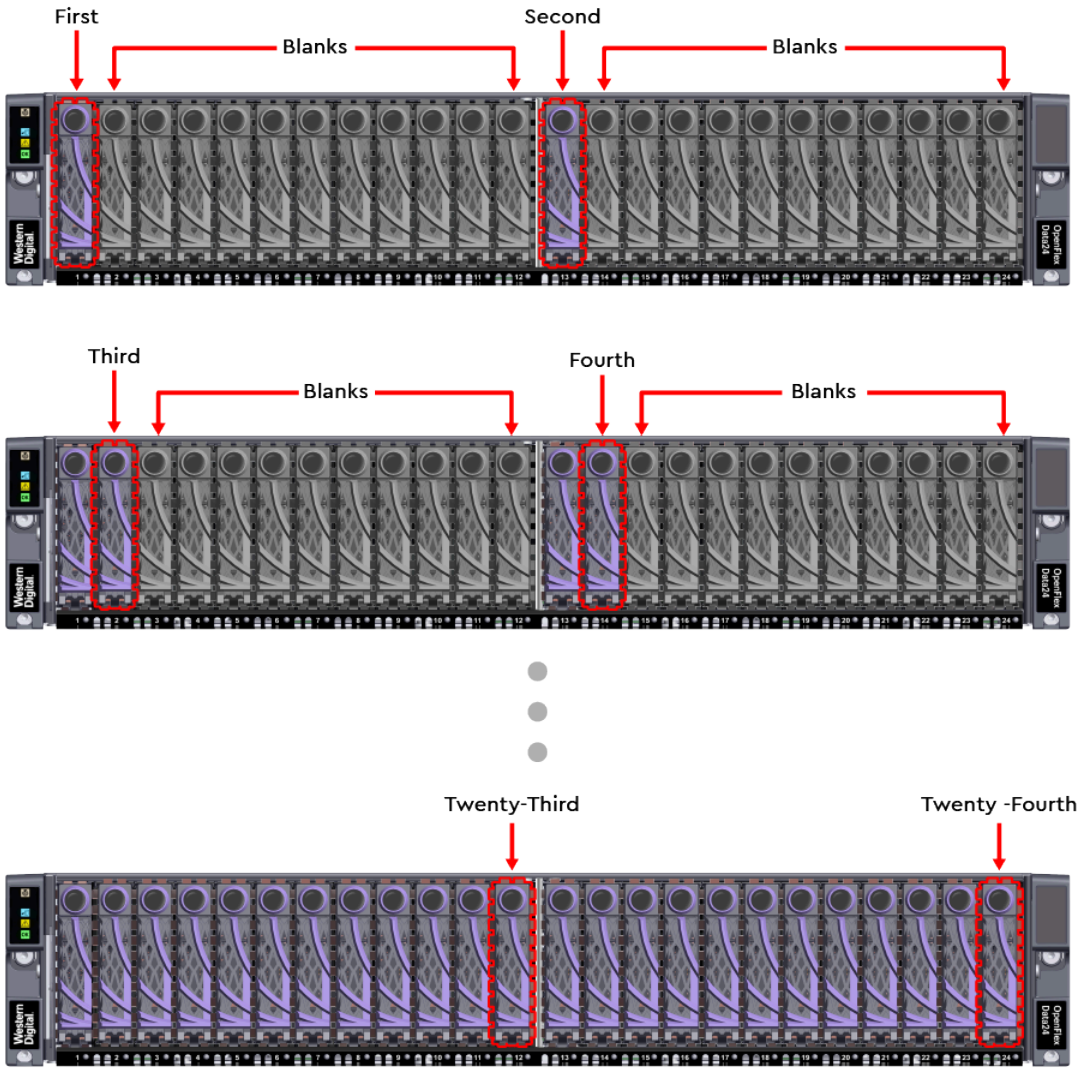
Figure 259: Single Add-in Card Drive Installation Order



Two Add-in Card Configuration

Each AIC controls 12 drives. The first AIC controls drives 1 - 12 and the second controls drives 13 - 24. To balance the IO load optimally, install in the pattern shown in the following image.

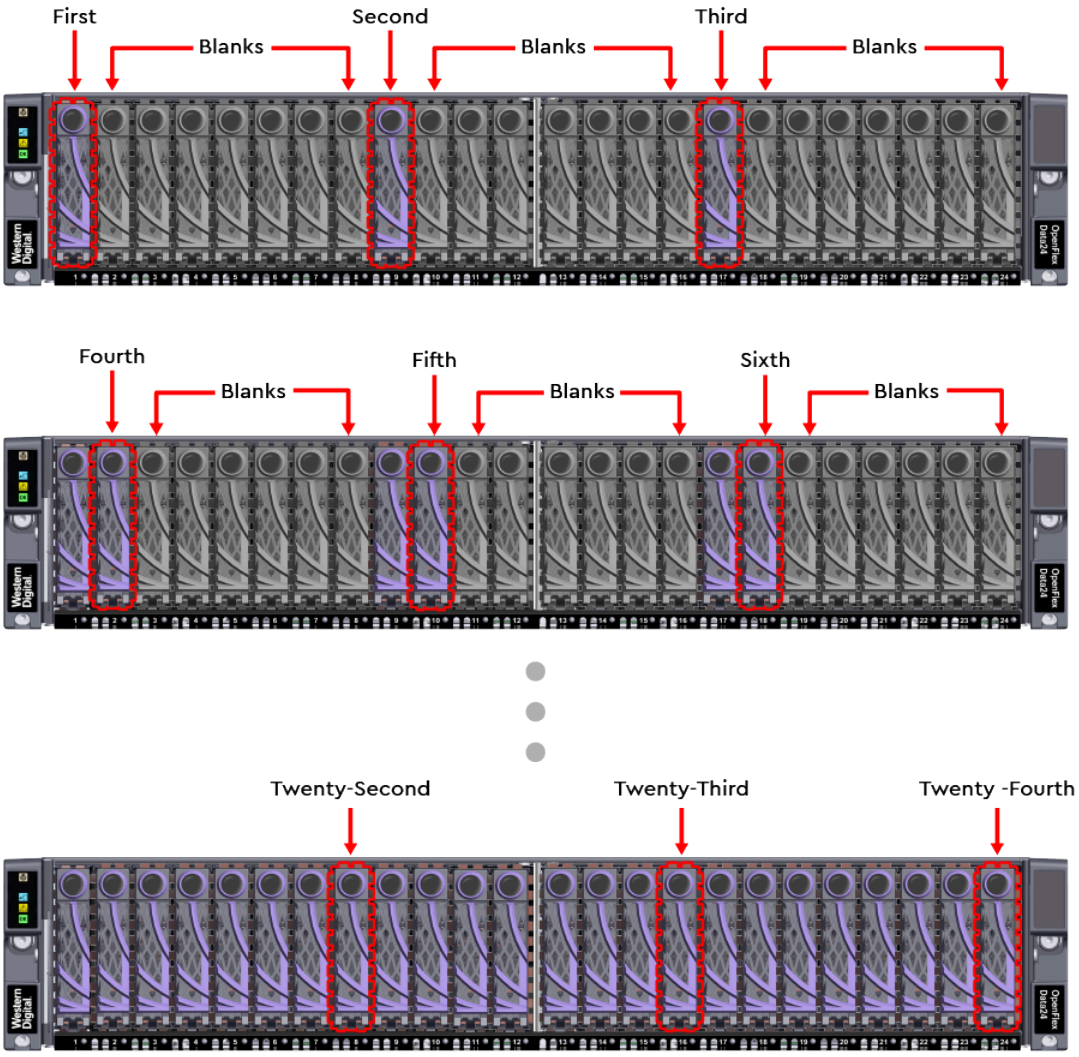
Figure 260: Two Add-in Card Drive Installation Order



Three Add-in Card Configuration

Each AIC controls 8 drives. The first AIC controls drives 1 - 8, the second controls drives 9 - 16, and the third controls drives 17-24. To balance the IO load optimally, install in the pattern shown in the following image.

Figure 261: Three Add-in Card Drive Installation Order

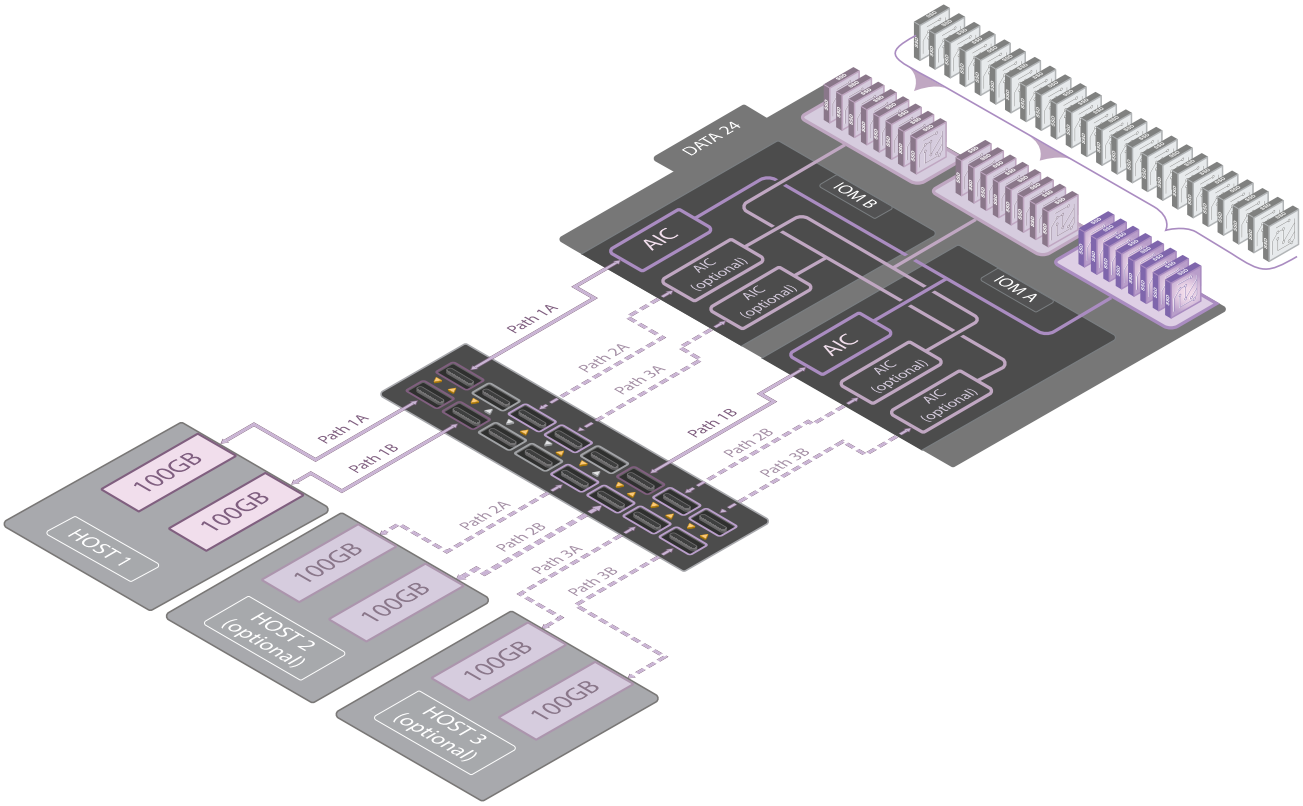


5.2 System Topology

The OpenFlex Data24 supports four different topologies for connecting to hosts. The following diagrams provide detailed connections for each option.

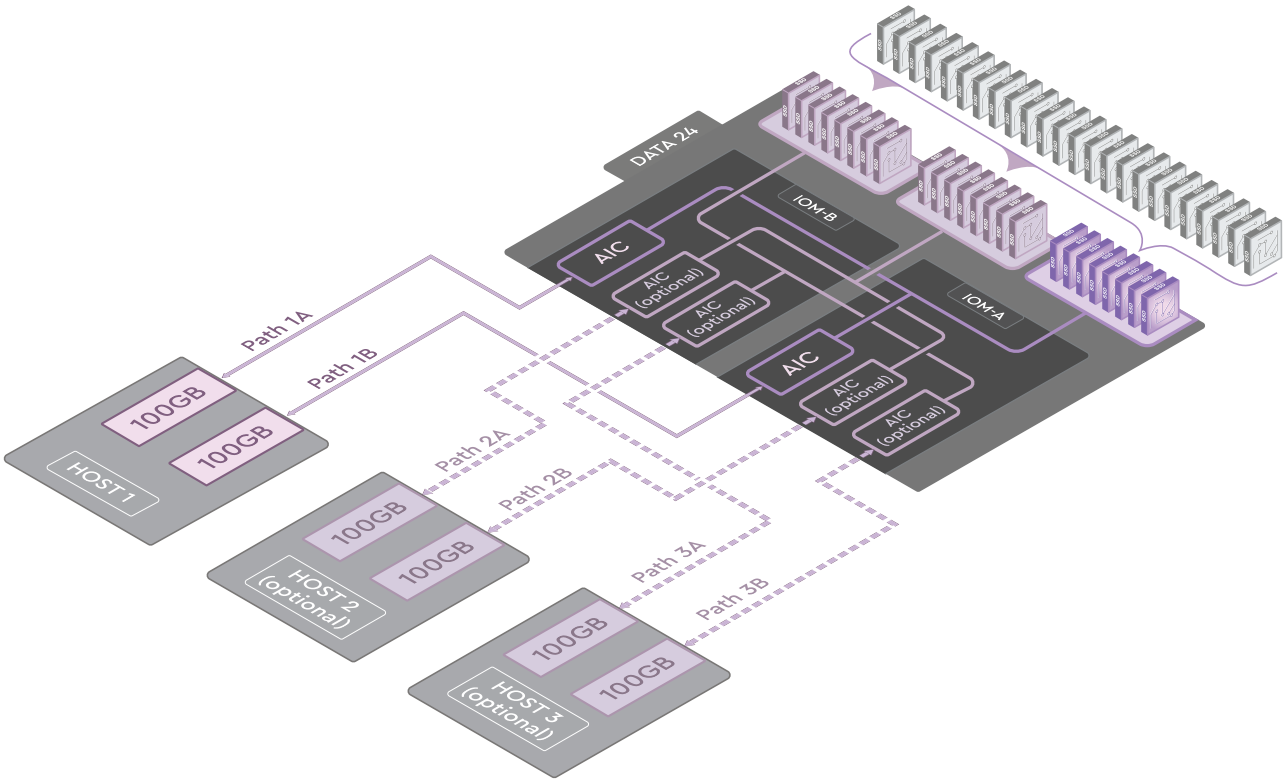
High Availability Switched Topology

Each connection is based on the three add-in card (AIC) configuration. This configuration assumes that multi-path software is loaded on the host.



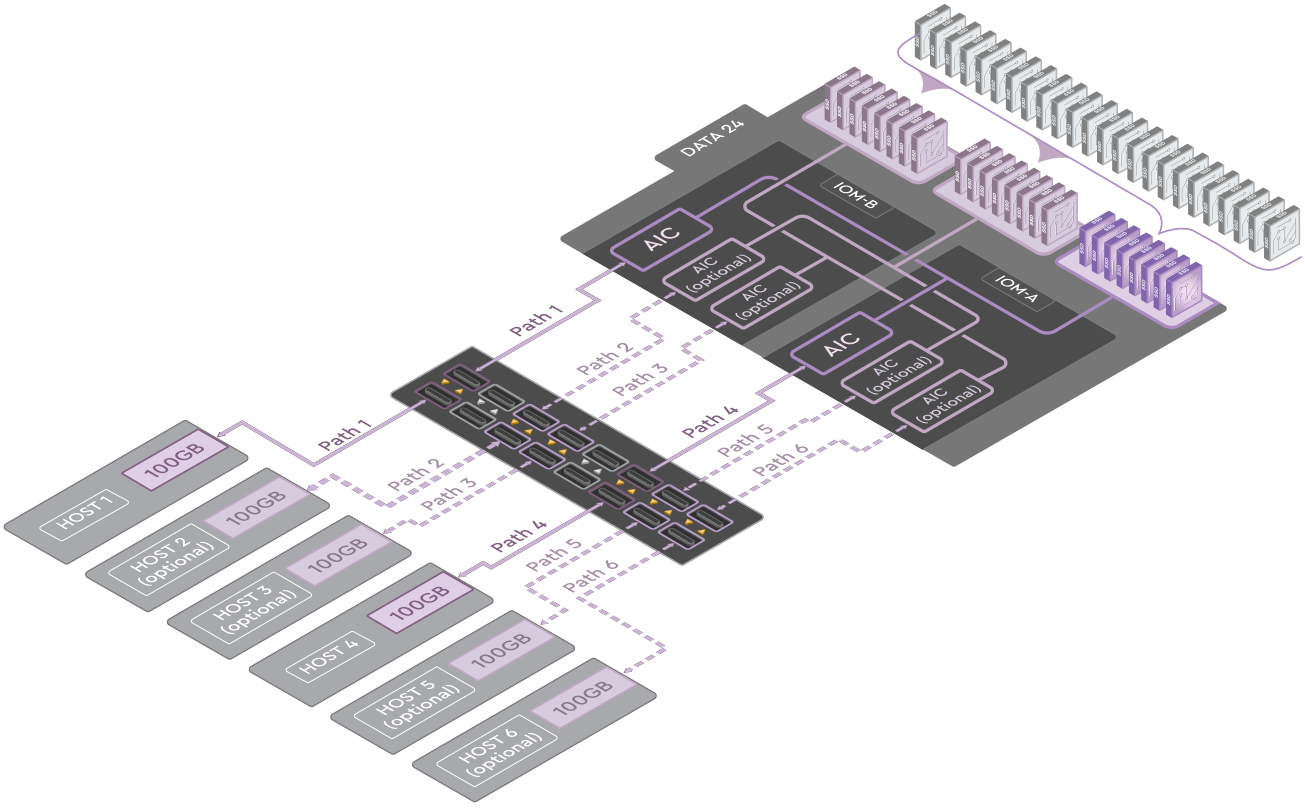
High Availability Direct Attached Topology

Hosts require at least two add-in cards (AIC). This configuration assumes that multi-path software is loaded on the host.



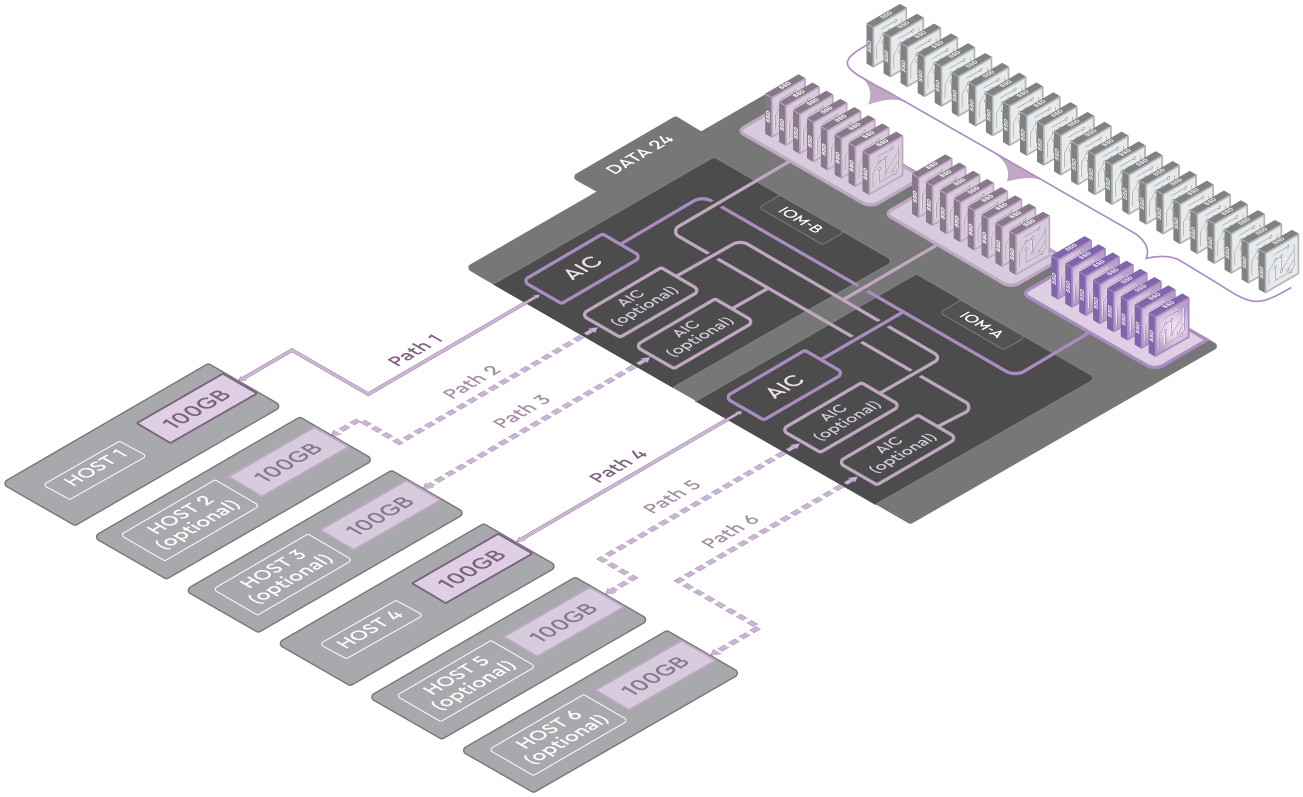
Non-High Availability Switched Topology

Each connection is based on the three add-in card (AIC) configuration. This configuration assumes that volume mapping to the SSD has been configured.



Non-High Availability Direct Attached Topology

Each connection is based on the three add-in card (AIC) configuration. This configuration assumes device namespaces have been connected to the hosts using the NVMe CLI.



5.3 Installing Standalone OpenFlex-api for In-Band Management

Before you begin: The target OpenFlex Data24 must be either directly connected or visible on the network.

The OCAPI standalone distribution runs on an initiator or host, to which an NVMe device like OpenFlex Data24 is connected. The standalone OCAPI uses IOCTLs to send in-band commands to the in-band management interface on the NVME devices in the OpenFlex Data24, and returns the data to the caller. This procedure provides instructions on how to install the OCAPI on a Linux initiator or host. Between the openflex-api server and the target the HTTP response data is compressed for less network traffic.

Step 1: Download the latest firmware bundle available at https://portal.wdc.com/Support/s/. The bundle will contain a compressed archive called `OpenFlex_Data24_api_5.0.2.tgz` from the OpenFlex Data24.

Step 2: Untar the `openflex-api.tgz` file to the desired directory on the Linux host, and into that directory.

Step 3: If `systemctl` will be used to manage the OCAPI service, use the following command to extract the binary:

```
sudo tar -xzf OpenFlex_Data24_api_5.0.2.tgz -C /
```

Step 4: If `systemctl` will not be used, remove the `-C /` command modifier.

```
sudo tar -xzf OpenFlex_Data24_api_5.0.2.tgz
```

Step 5: Run the binary using the desired system service and parameters.

Step 6: Make the first discovery and connection to the OpenFlex Data24 by issuing the NVMe-CLI `discover` and `connect`.

```
sudo nvme discover -t rdma -a <Data24_IpAddress>
sudo nvme connect -t rdma -a <Data24_IpAddress> -i 1 -n
 nqn.1992-05.com.wdc.openflex-data24-<Data24_Name>:MI.AC
```

Step 7: Make the second discovery and connection to the OpenFlex Data24 by issuing the NVMe-CLI `discover` and `connect`.

```
sudo nvme discover -t rdma -a <Data24_IpAddress>
sudo nvme connect -t rdma -a <Data24_IpAddress> -i 1 -n
 nqn.1992-05.com.wdc.openflex-data24-<Data24_Name>:MI.BC
```

Step 8: Use `id-ctrl` to verify the connection.

```
sudo nvme id-ctrl /dev/nvm#
```

5.4 Initial Network Configuration Setup

The initial network configuration of the OpenFlex Data24 requires use of the multicast DNS (mDNS) protocol to resolve hostnames to IP addresses within small networks. This is done by using a zero-configuration (Zeroconf) service that allows the user to bypass DHCP, DNS, or manual network configuration. Zeroconf automatically assigns numeric network addresses for networked devices, automatic distribution and resolution of system hostnames and automatic location of network services.

DHCP is enabled by default. The following section is only required if at least one of the IOMs needs to assume a static address. Any host on the same physical network as the IOM will be able to connect to the IOM using its <hostname>.local name (the mDNS name).

This procedure shows how to use the OCGUI to set IOMs to static IP addresses.

Step 1: Connect the IOM-A management port directly to a host/laptop using a standard Cat5 (or higher) Ethernet cable. The direct-connect method is highly recommended because a network switch may not route to the 169.254/16 IP address.

Step 2: On most operating systems, your host/laptop should automatically receive a link-local address on the interface directly connected to the IOM. If this is not the case, you manually assign a link-local address.

Note: The link-local address cannot be 169.254.**000**.xxx/16 or 169.254.**255**.xxx/16.

Step 3: Confirm connectivity to the system, with a ping test to the **openflex-data24-<serial number on pullout tab>-iom<a>.local** (e.g. # ping openflex-data24-USALP02121QA0001-ioma.local).

Note:

- If you are accessing the IOM-A Management Port, use **ioma**.
- The <hostname>**.local** name is the IOM's mDNS name. The IOM will be responsive by its mDNS name to pings and network connections from devices that are on the same physical network.

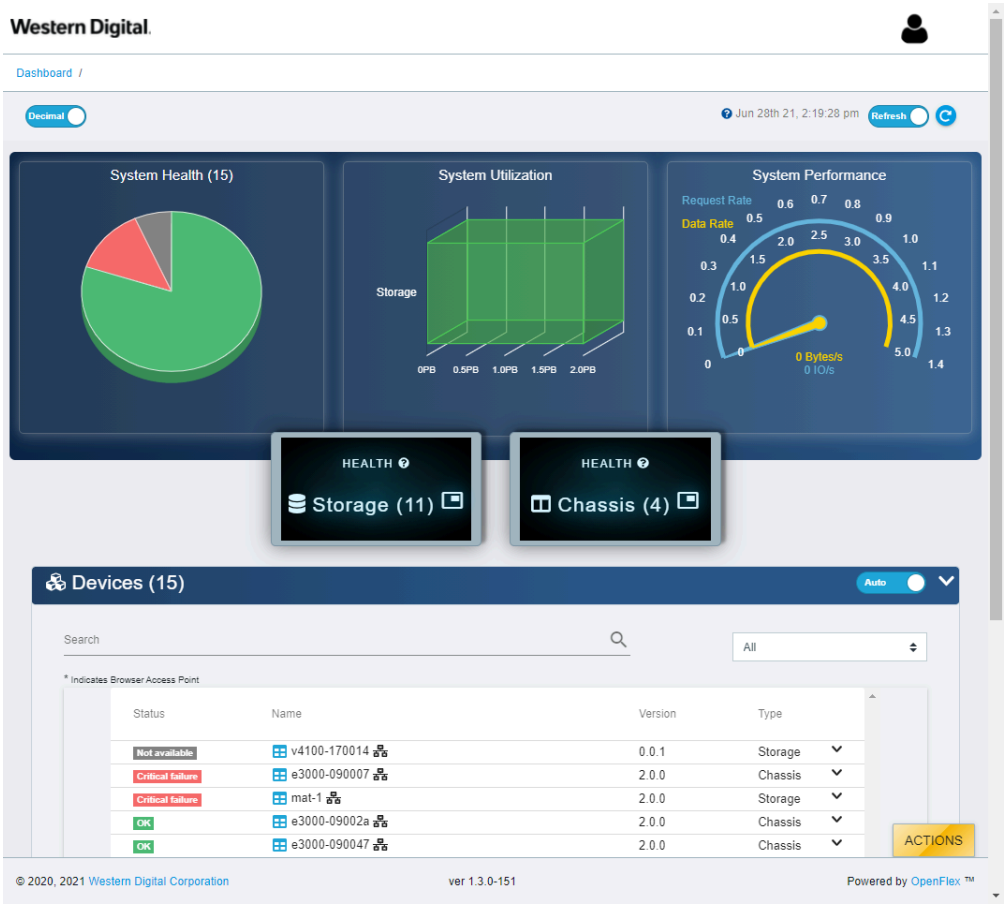
Step 4: Type the mDNS name into a web browser.

The web browser will display the GUI.

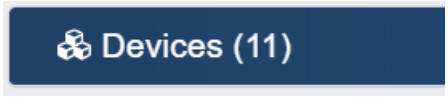
Step 5: Enter a valid username and password, and click the **Login** button:

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:

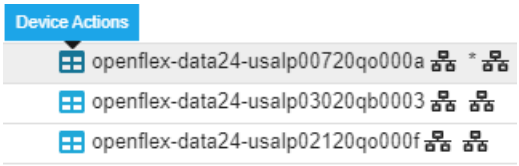


Step 6 : If needed, click the **Devices** banner to expand the list of all connected devices:

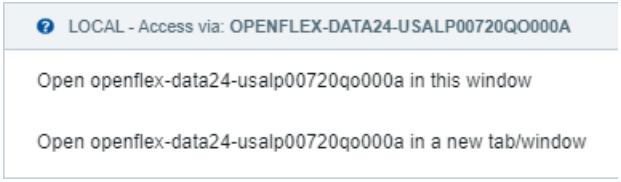


Step 7 : Select the IOM-A from the device list.

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



The **Device Actions** window appears:

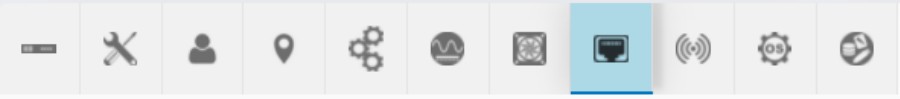


Step 9 : Click the **Open in a new tab/window** option to open the device page in a new window.

The device's dashboard appears in a new tab/window.

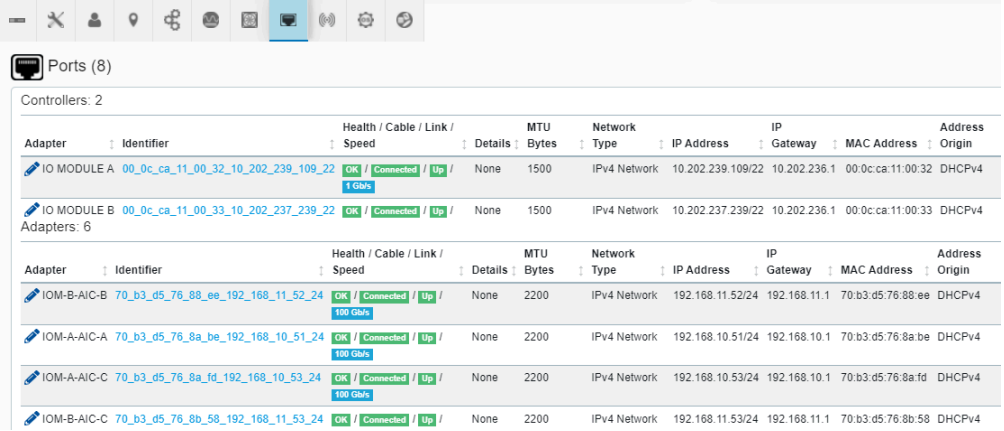
Step 10 : Click the device's **Ports** icon:

Figure 268: Storage Device Ports Icon



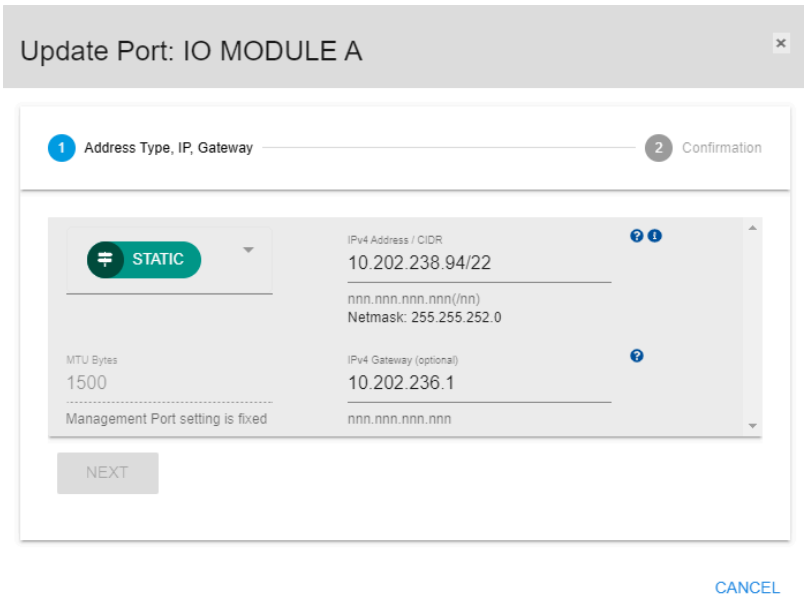
The **Ports** information appears:

Figure 269: Storage Device Ports Information

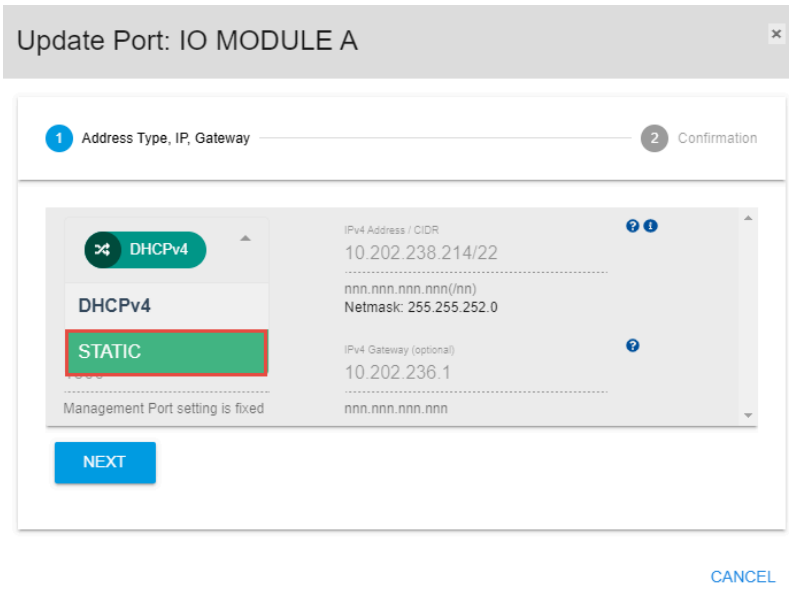


Step 11 : Click the edit option next to the IOM:

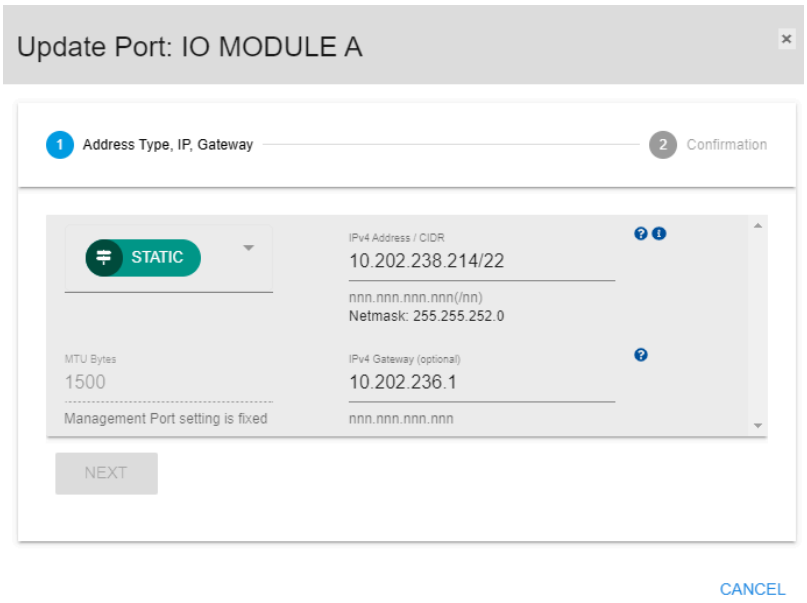
The **Update Port** window appears:



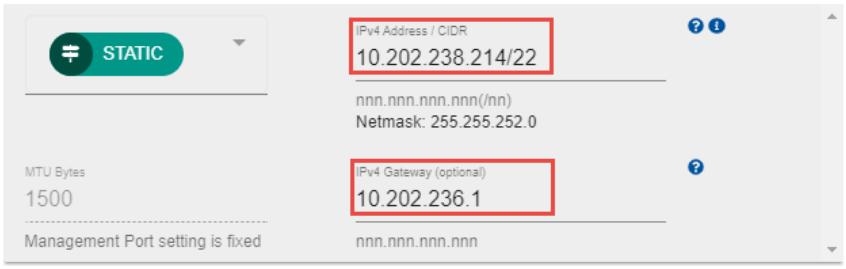
Step 12 : Click the arrow next to the **DHCPv4** option and select **Static** from the droplist:



The **Update Port** window updates with default information:

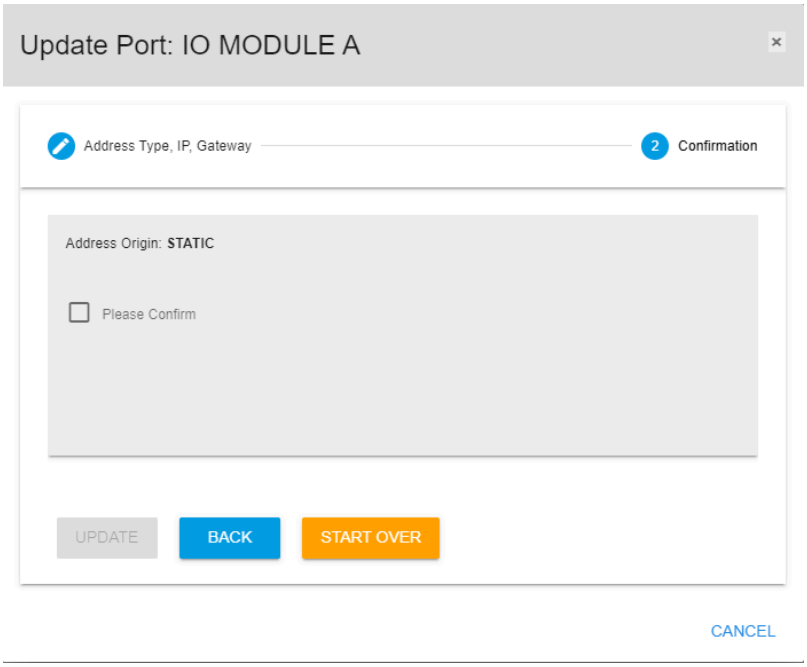


Step 13 : **(Optional)** If you have a specific IP Address, update the value in the IPv4 Address / CIDR IPv4 Gateway fields.

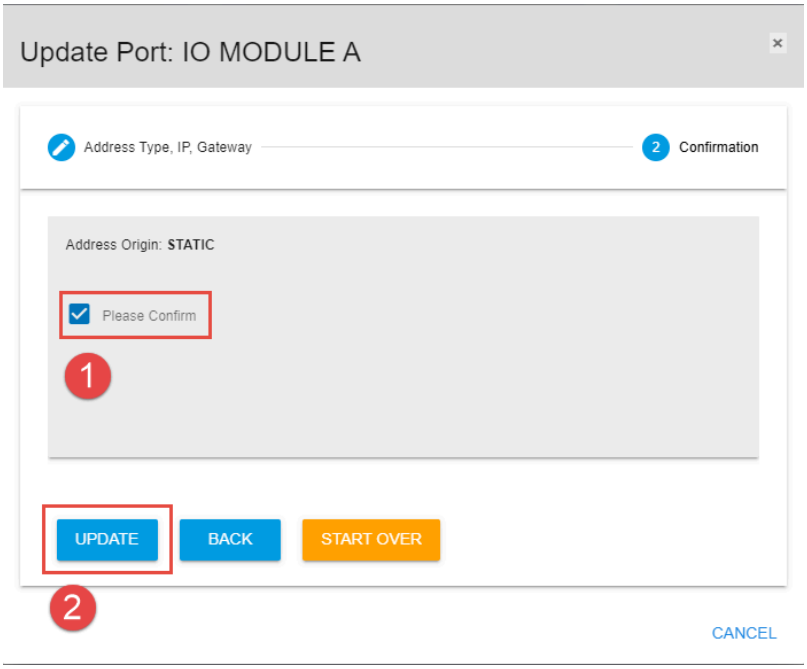


Step 14 : Click **Next**.

The **Update Port** window updates and requests a confirmation of the change:



Step 15 : Check the checkbox next to **Please Confirm** and click **Update**.



The Port is updated.

Step 16 : Disconnect the network cable from IOM-A and connect it the management port on IOM-B.

Step 17 : Confirm connectivity to the system, with a ping test to the **openflex-data24-<serial number on pullout tab>-iom<b>.local** (e.g. # ping openflex-data24-USALP02121QA0001-iomb.local).

Note:

- If you are accessing the IOM-B Management Port, use **iomb**.
- The <hostname>**.local** name is the IOM's mDNS name. The IOM will be responsive by its mDNS name to pings and network connections from devices that are on the same physical network.

Step 18 : Type the mDNS name into a web browser.

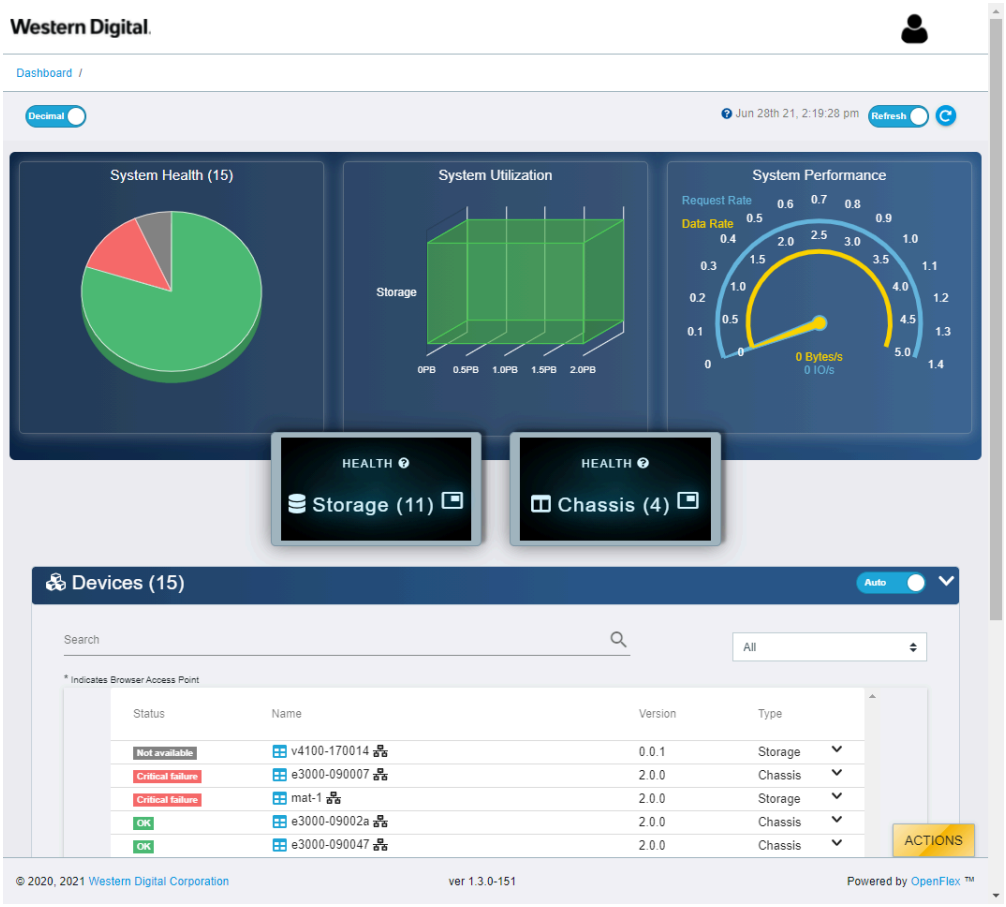
The web browser will display the GUI.

Step 19 : Enter a valid username and password, and click the **Login** button:

Login

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

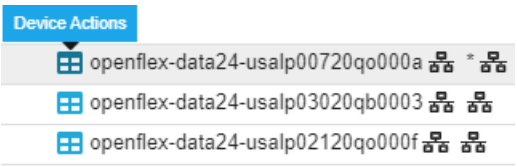
The system dashboard appears. In addition, the **Devices** section provides access to all other fabric-connected devices:



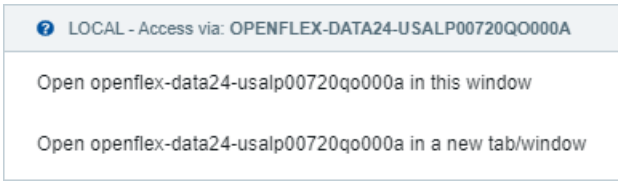
Step 20 : If needed, click the **Devices** banner to expand the list of all connected devices:

Step 21 : Select the IOM-B from the device list.

Step 22 : Click the **Device Actions** icon:



The **Device Actions** window appears:

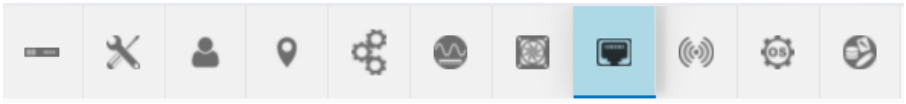


Step 23 : Click the **Open in a new tab/window** option to open the device page in a new window.

The device's dashboard appears in a new tab/window.

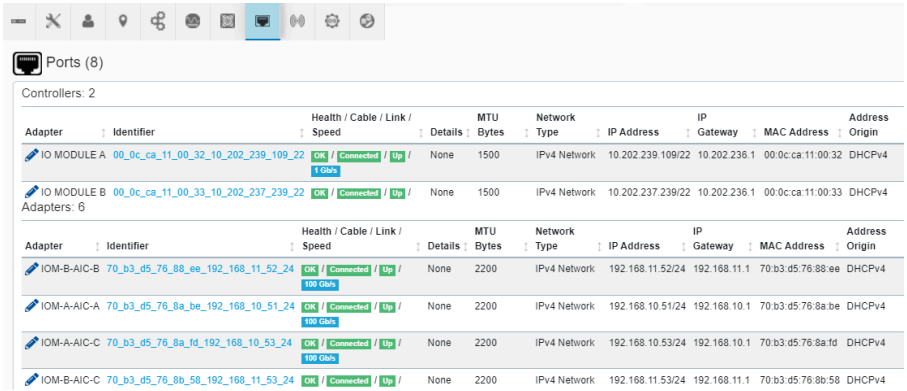
Step 24 : Click the device's **Ports** icon:

Figure 280: Storage Device Ports Icon

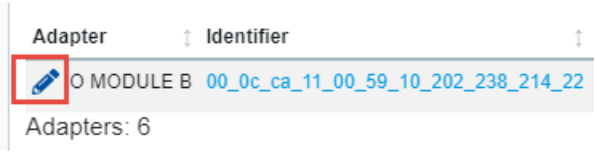


The **Ports** information appears:

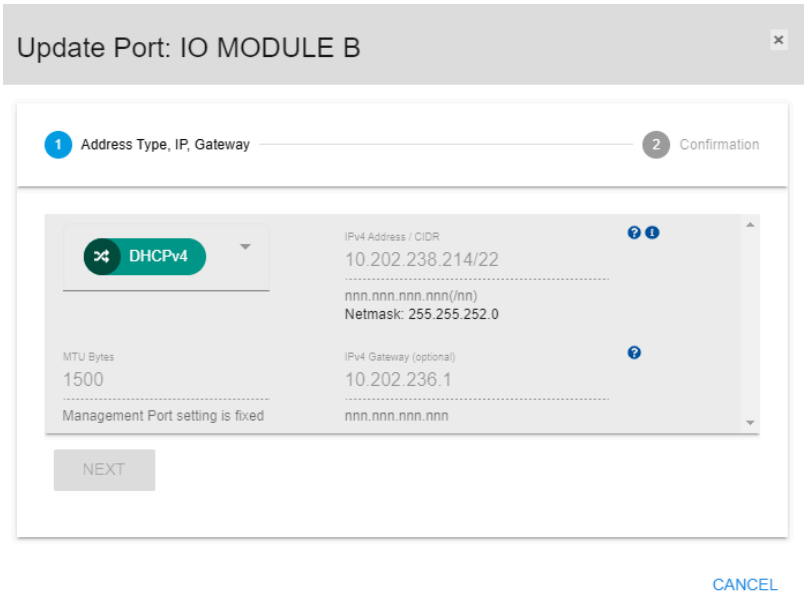
Figure 281: Storage Device Ports Information



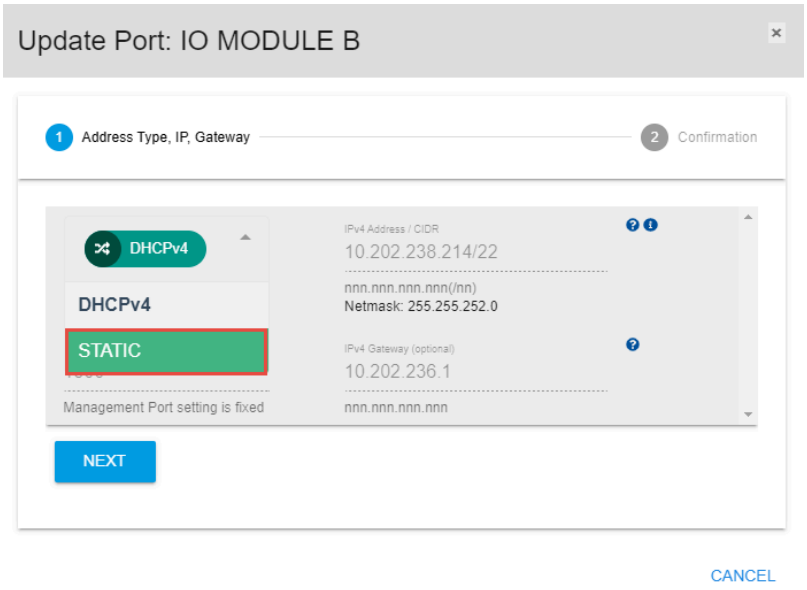
Step 25 : Click the edit option next to IOM-B:



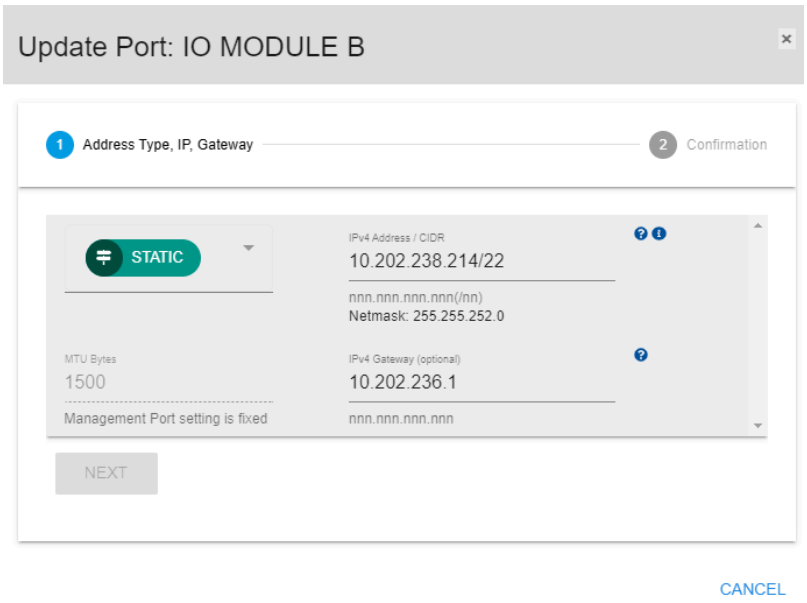
The **Update Port** window appears:



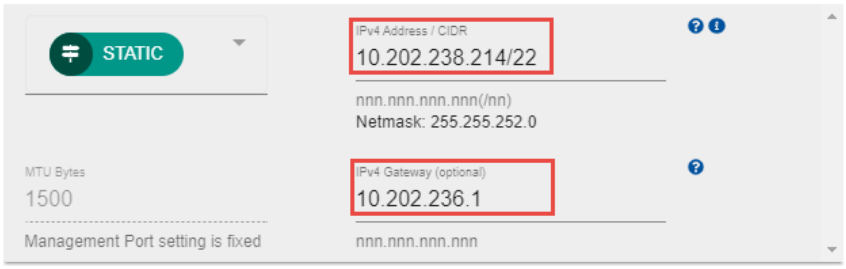
Step 26 : Click the arrow next to the **DHCPv4** option and select **Static** from the droplist:



The **Update Port** window updates with default information:

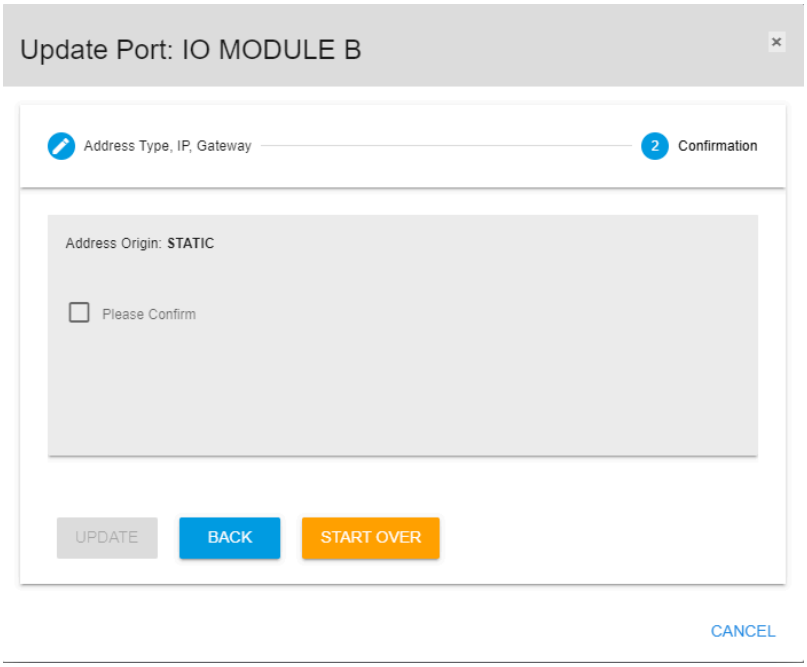


Step 27 : **(Optional)** If you have a specific IP Address, update the value in the IPv4 Address / CIDR IPv4 Gateway fields.

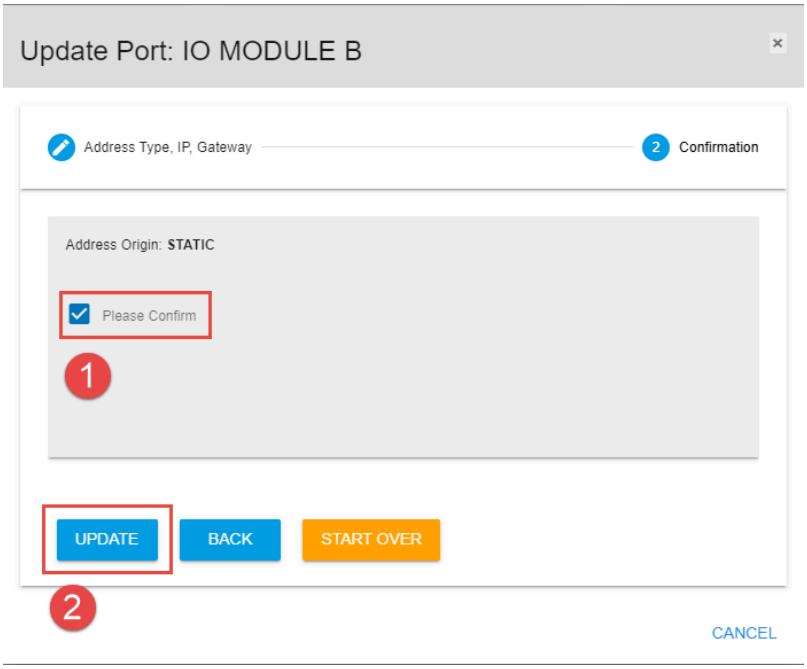


Step 28 : Click **Next**.

The **Update Port** window updates and requests a confirmation of the change:



Step 29 : Check the checkbox next to **Please Confirm** and click **Update**.



The Port is updated.

Step 30 : Once the management port is configured, switch the RJ45 IOM management port to a corporate network.

5.5 Initial Network Configuration

This section outlines the behavior of the OpenFlex Data24 when it is connected to a network. The RJ45 management ports and the QSFP28 data ports are designed to default to DHCP to assign IP addresses. If the network uses a DHCP server to perform network discovery, the platform will be configured with the settings generated by the DHCP server using the host naming conventions outlined in the following sections.

If there is no DHCP server available on the network to configure the platform, the platform will fall back to static link-local addresses in the 169.254.x.x/16 IP range for the IOM data and management ports. The initial network configuration will require local access through the RJ45 management port to a direct-connect host or laptop. Connecting in this way will allow users to apply their own desired network settings.

Enclosure ID and Link Local Address Patterns and Examples

The enclosure manager (EM) will configure a name and ID for the platform itself. The following list displays the default naming pattern of the Platform ID and Name that can be used to access management features and allow users to configure the platform for use.

- **Enclosure ID** - openflex-data24-<serial number>
- **Enclosure Name** - openflex-data24-<serial number>

The following table displays the IOM Port naming pattern.

Table 39: IOM Port Configuration Details

Port	Port Type	Port Speed	Naming Format	Example
IOM Managemer Port	RJ45	10/100/1000 Mbps	<encName>-iom< a | b>	`openflex-data24-usalp04619xx0000-ioma`

Further resources

Form more information related to the initial configuration of the network using the GUI, see: Setting Static IPs on Data Ports *(page 192)*.

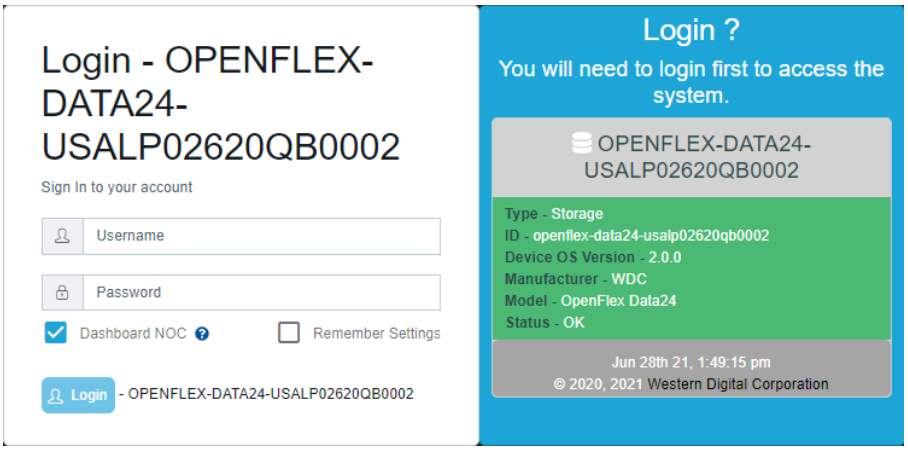
5.6 Setting Static IPs on Data Ports

This task provides instructions for setting static IP Addresses on data ports.

By default, the OpenFlex Data24 is set to use DHCP to assign IPv4 addresses to all of the adapter data ports. This procedure shows how to use the OCGUI to set the adapter ports to static IP addresses.

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

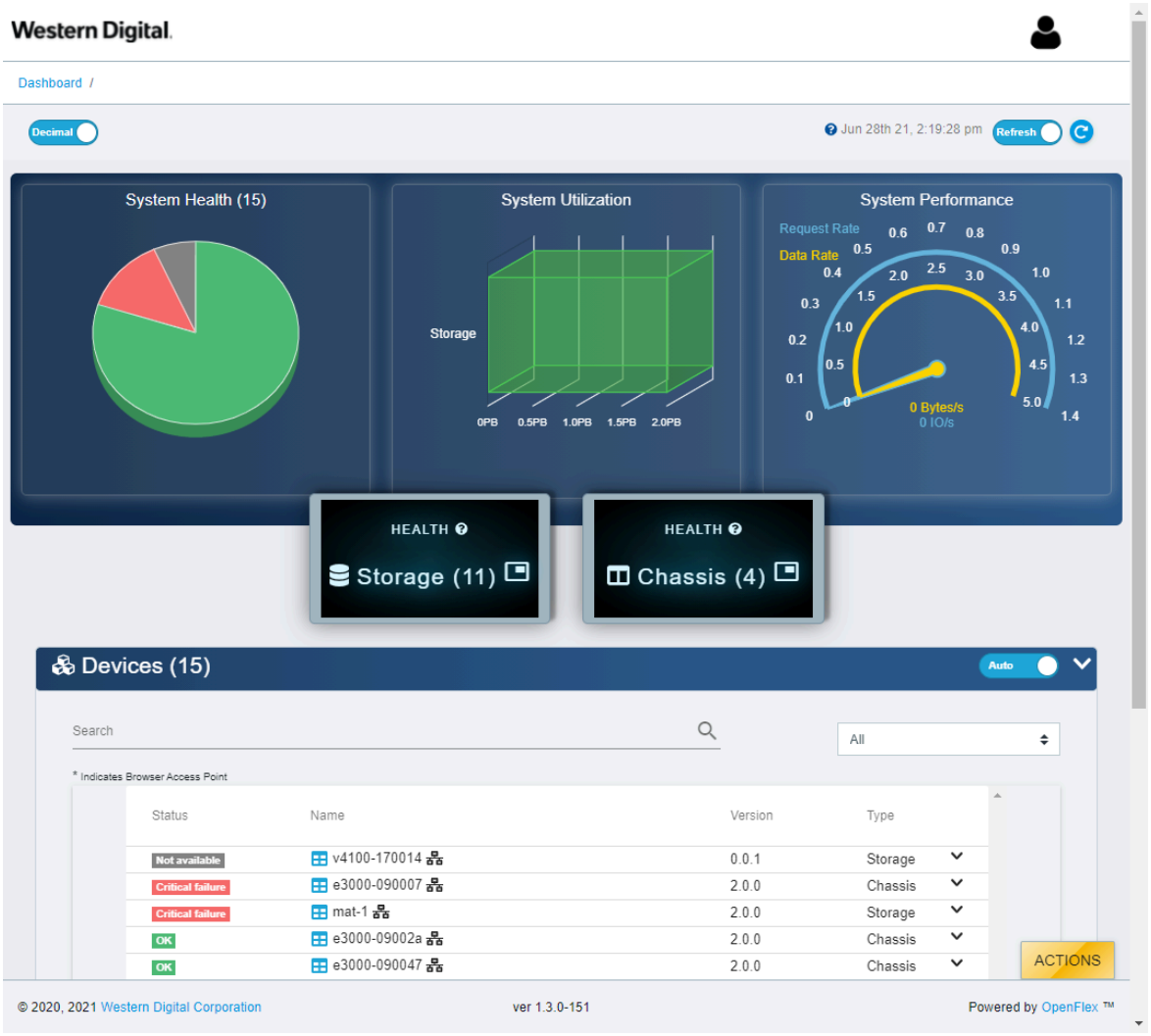
The login page for the device appears:



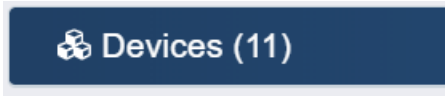
Step 2: Enter a valid username and password, and click the **Login** button:

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:

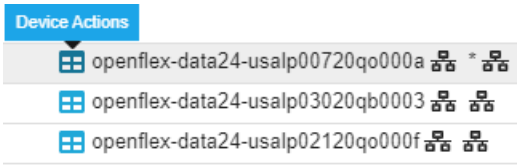


Step 3 : If needed, click the **Devices** banner to expand the list of all connected devices:

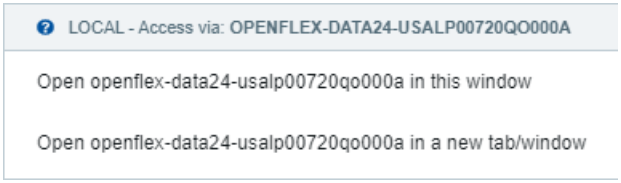


Step 4 : From the list, identify the device to which you want to navigate.

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

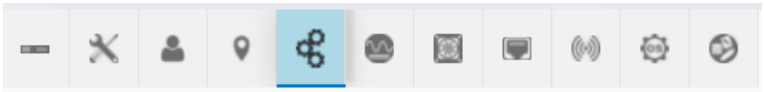


The **Device Actions** window appears:

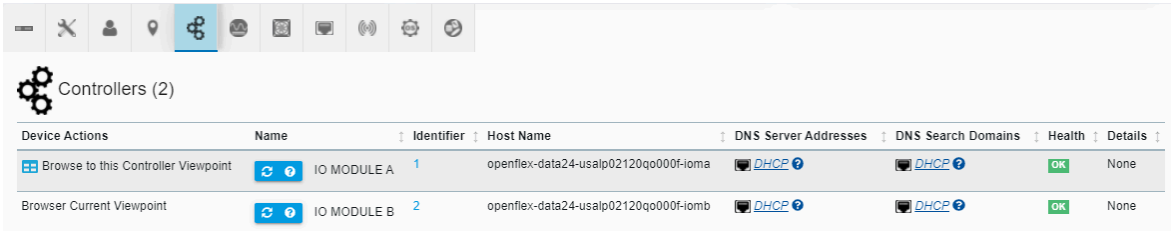


Step 6 : Click the **Open in a new tab/window** option to open the device page in a new window. The device's dashboard appears in a new tab/window.

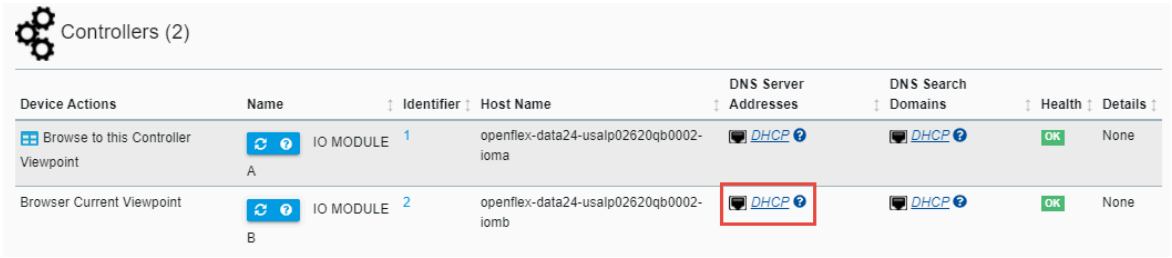
Step 7 : Click the storage **Controllers** icon:



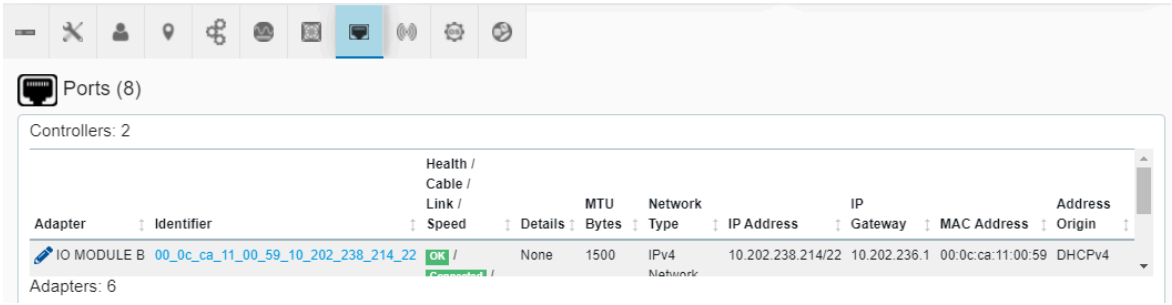
The device **Controller** information appears:



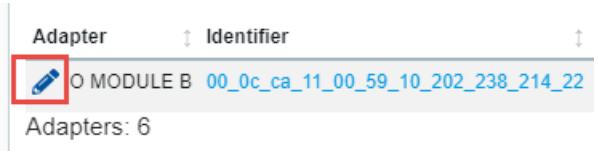
Step 8 : In the DNS Server Addresses column, click **DHCP**:



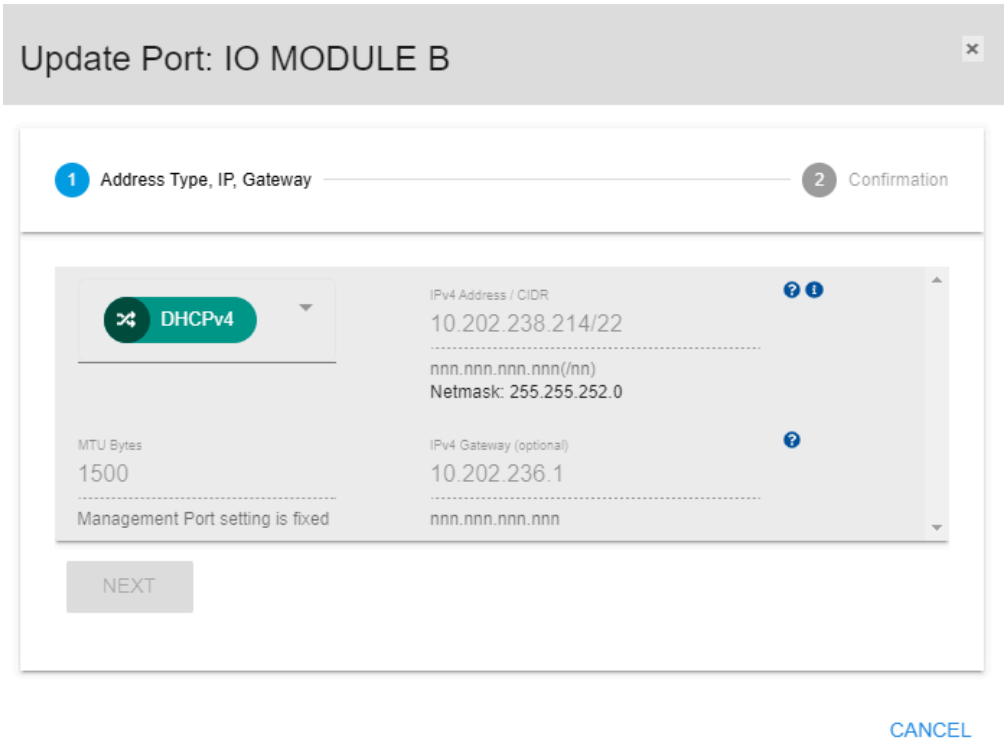
The device **Ports** information appears:



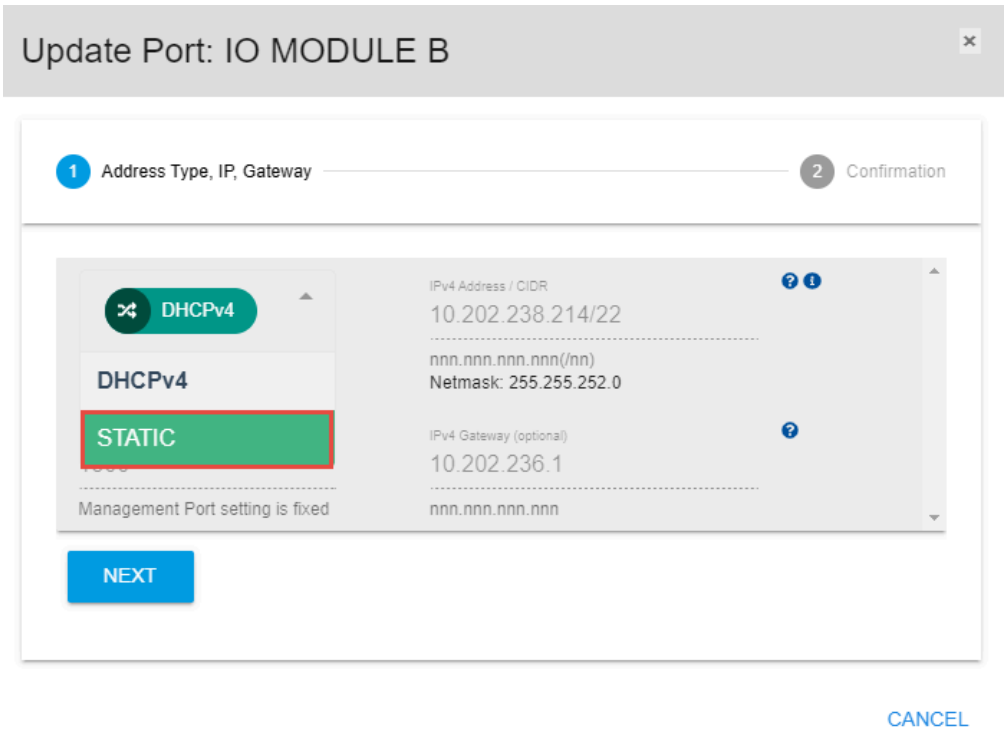
Step 9 : Click the edit option next to the IOM:



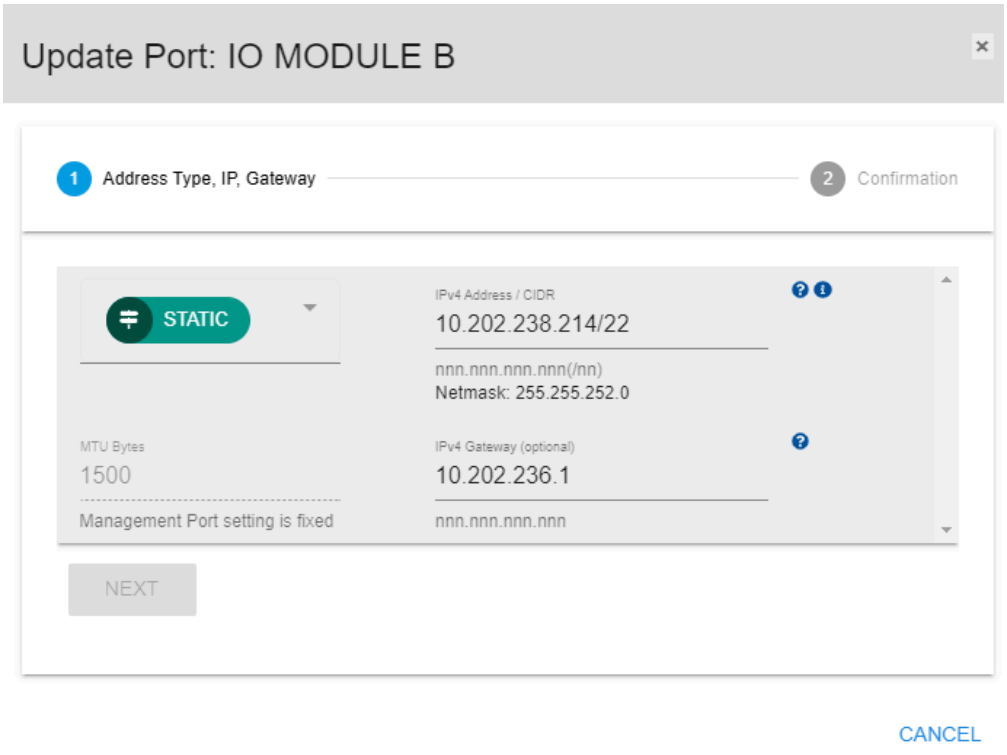
The **Update Port** window appears:



Step 10 : Click the arrow next to the **DHCPv4** option and select **Static** from the droplist:

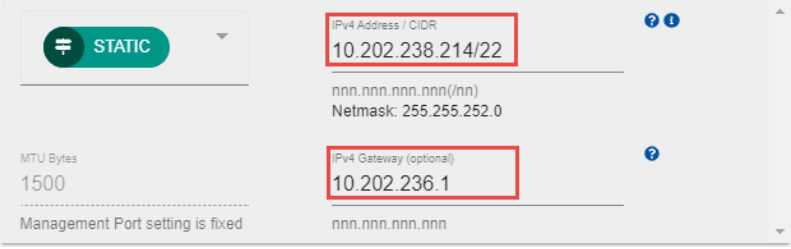


The **Update Port** window updates with default information:



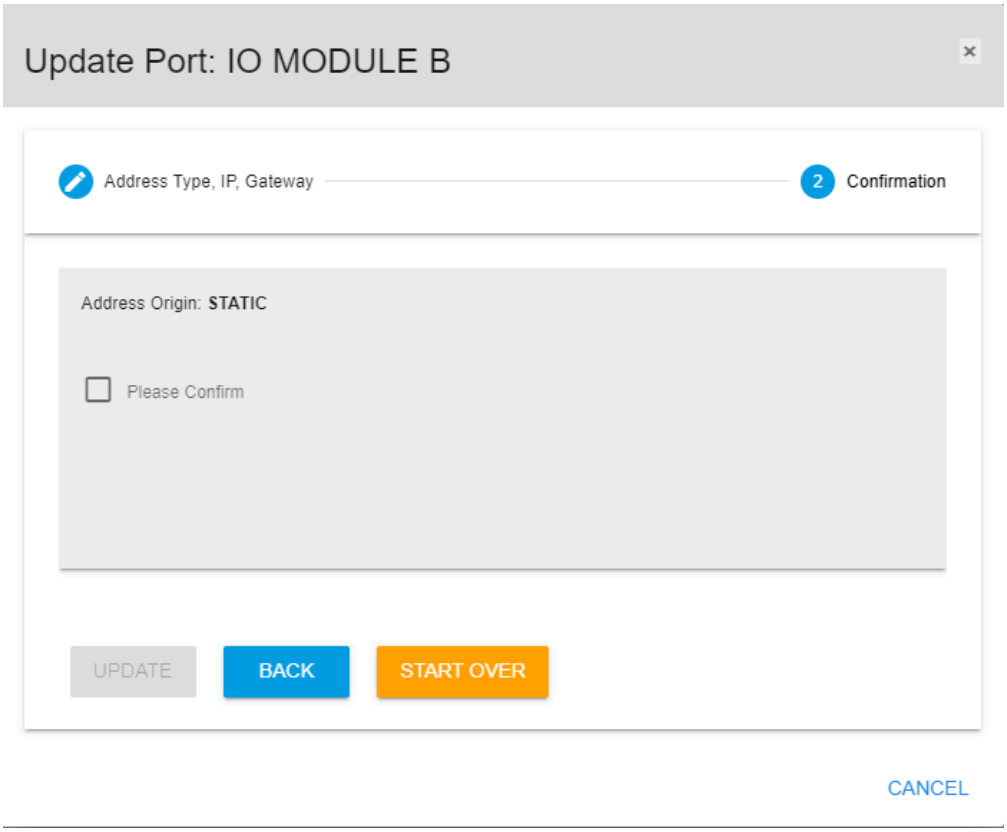
Step 11 : **(Optional)** It is highly recommended that you select

Step 12 : **(Optional)** If you have a specific IP Address, update the value in the IPv4 Address / CIDR IPv4 Gateway fields.

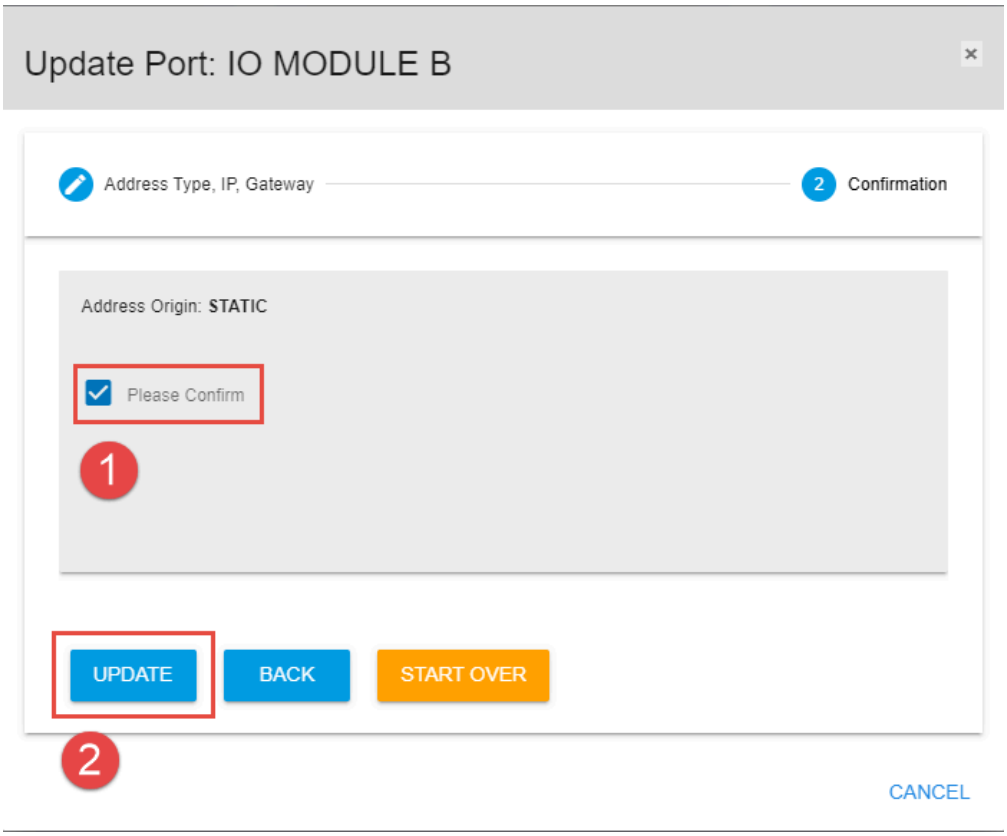


Step 13 : Click **Next**.

The **Update Port** window updates and requests a confirmation of the change:

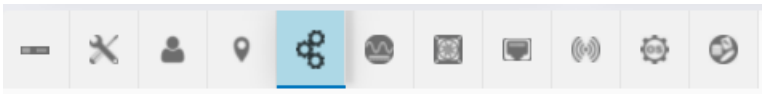


Step 14 : Check the checkbox next to **Please Confirm** and click **Update**.

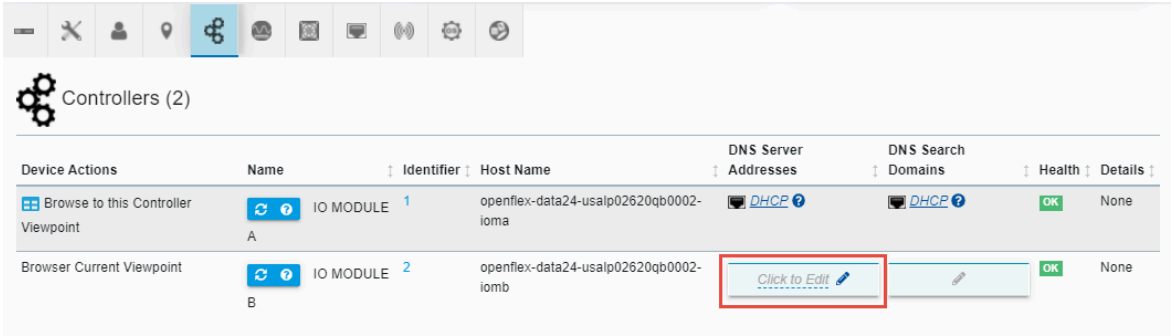


The Port is updated.

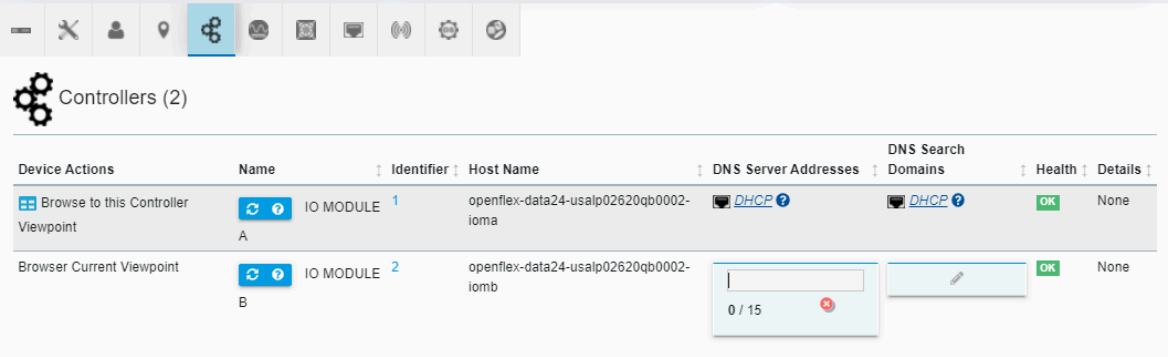
Step 15 : Click the storage **Controllers** icon:



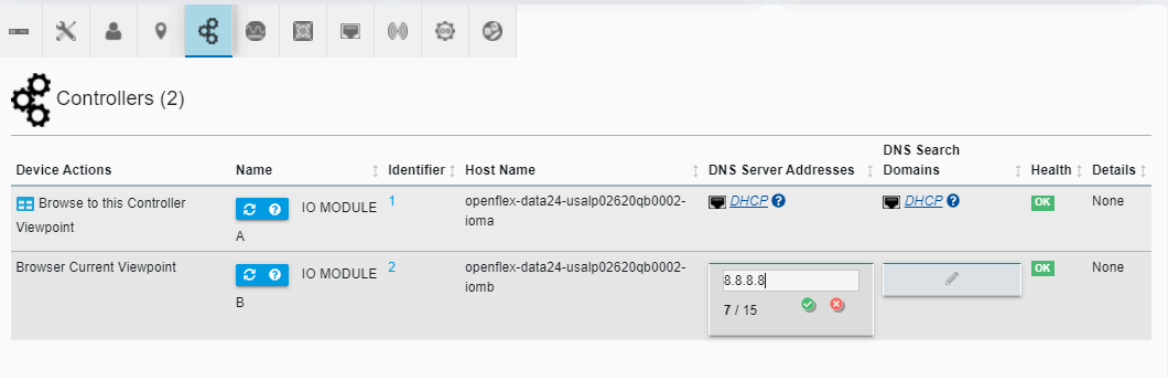
The device **Controller** information appears with an option to edit the value under the DNS Server Address:



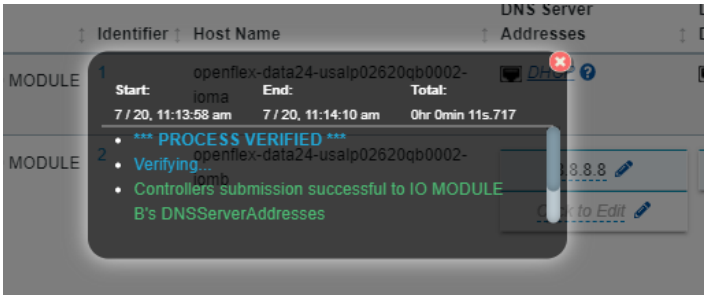
Step 16 : To update the DNS Server Addresses, click the edit option in the **DNS Server Addresses** column.



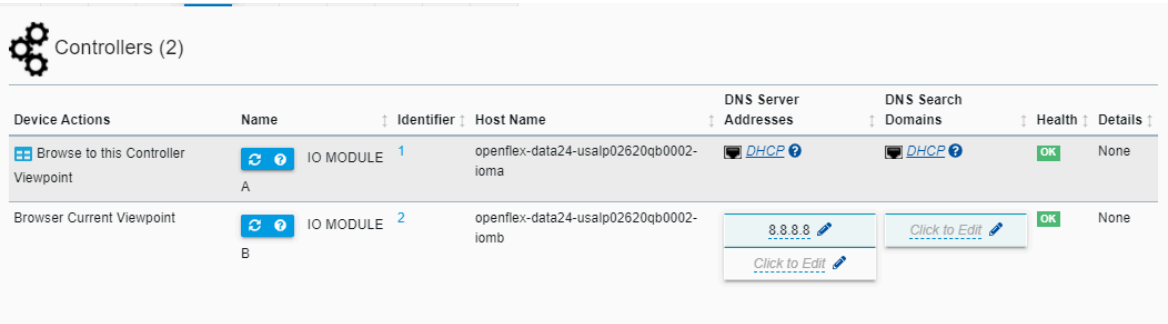
Step 17 : In the **DNS Server Addresses** field, type an IP Address and click the green check mark to save the setting.



A Process Verified message appears:



Step 18 : Close the Process Verified message and verify the IP Address appears correctly in the **Controllers** window.



Step 19 : Repeat the previous steps to set the remaining IOM port to a Static IP Address.

5.7 In-Band Management Setup

For in-band connections, to default to the IOM-A NVMe Management Interface (MI) Device connection, the nvme connections must be completed in the following order:

1. The "openflex-api" application must be installed and running on the Host Initiator server
2. Connect to Controller 1 Add-in-Card C (IOM-A AIC-C) MI Device device first (SlotNumber = 1 = IOM-A)
3. Connect to Controller 2 Add-in-Card C (IOM-B AIC-C) MI Device device second (SlotNumber = 2 = IOM-B)
4. This allows for any REST API and GUI connections to default down the IOM-A (SlotNumber=1) path, otherwise the default will be down the IOM-B path

Target IP Address Discovery

- The out-of-band (OOB) network IP Address to either Controller 1 or 2 (IOM-A or IOM-B) must be known and used for the initial out-of-band connection capability
- Method #1 - API via OOB Network Connection (using a Browser) *(page 202)* : Using a Browser to connect to the OOB management port of the Data24 to retrieve the two MI Device Target IP Addresses
- Method #2 - API via OOB Network Connection (using a CURL) *(page 204)* : Using "CURL" to connect to the OOB management port of the Data24 to retrieve the two MI Device Target IP Addresses
- Method #3 - GUI via OOB Network Connection *(page 206)* : Using the Data24 Device Page GUI via Browser to connect to the OOB management port of the Data24 to retrieve the two MI Device Target IP Addresses

Host Initiator NVMe Connection Process to the MI Devices to Enable the "in-band management paths" to the Data24

1. Discover the MI Device NQN Names using the Target IP Addresses
2. Connect to the MI Devices using the Target IP Addresses and the NQN Names
3. List the NVMe Connections to verify the connection process success, and to determine the local "Node Name" entries for the MI Device connections

Note: After the MI Device connection(s) are established, the OpenFlex API requires a "GET /Query/" for the API to discover the In-Band Path to communicate to the MI Device(s). This is also true if there are MI Device changes or if the MI Device(s) disconnect and then reconnect.

5.7.1 Installing Standalone OpenFlex-api for In-Band Management

Before you begin: The target OpenFlex Data24 must be either directly connected or visible on the network.

The OCAPI standalone distribution runs on an initiator or host, to which an NVMe device like OpenFlex Data24 is connected. The standalone OCAPI uses IOCTLs to send in-band commands to the in-band management interface on the NVME devices in the OpenFlex Data24, and returns the data to the caller. This procedure provides instructions on how to install the OCAPI on a Linux initiator or host. Between the openflex-api server and the target the HTTP response data is compressed for less network traffic.

Step 1: Download the latest firmware bundle available at https://portal.wdc.com/Support/s/. The bundle will contain a compressed archive called `OpenFlex_Data24_api_5.0.2.tgz` from the OpenFlex Data24.

Step 2: Untar the `openflex-api.tgz` file to the desired directory on the Linux host, and into that directory.

Step 3: If `systemctl` will be used to manage the OCAPI service, use the following command to extract the binary:

```
sudo tar -xzf OpenFlex_Data24_api_5.0.2.tgz -C /
```

Step 4: If `systemctl` will not be used, remove the `-C /` command modifier.

```
sudo tar -xzf OpenFlex_Data24_api_5.0.2.tgz
```

Step 5: Run the binary using the desired system service and parameters.

Step 6: Make the first discovery and connection to the OpenFlex Data24 by issuing the NVMe-CLI `discover` and `connect`.

```
sudo nvme discover -t rdma -a <Data24_IpAddress>
sudo nvme connect -t rdma -a <Data24_IpAddress> -i 1 -n
 nqn.1992-05.com.wdc.openflex-data24-<Data24_Name>:MI.AC
```

Step 7: Make the second discovery and connection to the OpenFlex Data24 by issuing the NVMe-CLI `discover` and `connect`.

```
sudo nvme discover -t rdma -a <Data24_IpAddress>
sudo nvme connect -t rdma -a <Data24_IpAddress> -i 1 -n
 nqn.1992-05.com.wdc.openflex-data24-<Data24_Name>:MI.BC
```

Step 8: Use `id-ctrl` to verify the connection.

```
sudo nvme id-ctrl /dev/nvm#
```

5.7.2 Target IP Address Discovery Methods

Method #1 - API via OOB Network Connection (using a Browser)

Determine the Data24 Host Adapter connection IP Address for Controller 1 (IOM-A) via out-of-band connection (IOM-A AIC-C = Adapter 3)

API Command: "GET /Storage/Devices/{id}/Ports/?Adapters=3"

Result: Target Add-in-Card IP Address = 192.168.0.53

EXAMPLE USAGE: Send this URI via the Browser Address Line: http://10.202.237.225/Storage/Devices/openflex-data24-usalp03020qb0007/Ports/?Adapters=3


```
{
    Self: "http://10.202.237.225:80/Storage/Devices/openflex-data24-usalp03020qb0007/Ports/",
  - Members: [
      - {
            Self: "http://10.202.237.225:80/Storage/Devices/openflex-data24-usalp03020qb0007/Ports/70_b3_d5_76_8e_ca_192_168_0_53_24/",
            ID: "70_b3_d5_76_8e_ca_192_168_0_53_24",
          - Status: {
              - State: {
                    ID: 16,
                    Name: "In service"
                },
              - Health: [
                  - {
                        ID: 5,
                        Name: "OK"
                    }
                ]
            },
          - Associations: {
              - Adapters: [
                    "3"
                ],
              - Ports: [
                    "70_b3_d5_76_8e_ca_192_168_0_53_24"
                ]
            },
          - AddressOrigin: {
                ID: 65536,
                Name: "DHCPv4"
            },
            CablePresent: true,
            IPv4Address: "192.168.0.53/24",
            IPv4Gateway: "192.168.0.1",
            LinkStatus: true,
            MACAddress: "70:b3:d5:76:8e:ca",
          - NetworkType: {
                ID: 8,
                Name: "IPv4 Network"
            },
            MTUBytes: 2200,
            Speed: 100000000000,
            Adapters: "http://10.202.237.225:80/Storage/Devices/openflex-data24-usalp03020qb0007/Adapters/?Ports=70_b3_d5_76_8e_ca_192_168_0_53_24"
        }
    ]
}
```


Determine the Data24 Host Adapter connection IP Address for Controller 2 (IOM-B) via out-of-band connection (IOM-B AIC-C = Adapter 6)

API Command: "GET /Storage/Devices/{id}/Ports/?Adapters=6"

Result: Target Add-in-Card IP Address = **192.168.1.53**

EXAMPLE USAGE: Send this URI via the Browser Address Line:

http://10.202.237.225/Storage/Devices/openflex-data24-usalp03020qb0007/Ports/?Adapters=6

```
{
    Self: "http://10.202.237.225:80/Storage/Devices/openflex-data24-usalp03020qb0007/Ports/",
  - Members: [
      - {
            Self: "http://10.202.237.225:80/Storage/Devices/openflex-data24-usalp03020qb0007/Ports/70_b3_d5_76_8e_2e_192_168_1_53_24/",
            ID: "70_b3_d5_76_8e_2e_192_168_1_53_24",
          - Status: {
              - State: {
                    ID: 16,
                    Name: "In service"
                },
              - Health: [
                  - {
                        ID: 5,
                        Name: "OK"
                    }
                ]
            },
          - Associations: {
              - Adapters: [
                    "6"
                ],
              - Ports: [
                    "70_b3_d5_76_8e_2e_192_168_1_53_24"
                ]
            },
          - AddressOrigin: {
                ID: 65536,
                Name: "DHCPv4"
            },
            CablePresent: true,
            IPv4Address: "192.168.1.53/24",
            IPv4Gateway: "192.168.1.1",
            LinkStatus: true,
            MACAddress: "70:b3:d5:76:8e:2e",
          - NetworkType: {
                ID: 8,
                Name: "IPv4 Network"
            },
            MTUBytes: 2200,
            Speed: 100000000000,
            Adapters: "http://10.202.237.225:80/Storage/Devices/openflex-data24-usalp03020qb0007/Adapters/?Ports=70_b3_d5_76_8e_2e_192_168_1_53_24"
        }
    ]
}
```


Method #2 - API via OOB Network Connection (using a CURL)

Determine the Data24 Host Adapter connection IP Address for Controller 1 (IOM-A) via out-of-band connection (IOM-A AIC-C = Adapter 3)

API Command: "GET /Storage/Devices/{id}/Ports/?Adapters=3"

Result: Target Add-in-Card IP Address = **192.168.0.53**

EXAMPLE USAGE:

```
$ curl -u admin:admin http://10.202.237.225/Storage/Devices/openflex-data24-
usalp03020qb0007/Ports/?Adapters=3
{
 "Self": "http://10.202.237.225:80/Storage/Devices/openflex-data24-usalp03020qb0007/
Ports/",
 "Members": [{
  "Self": "http://10.202.237.225:80/Storage/Devices/openflex-data24-usalp03020qb0007/
Ports/70_b3_d5_76_8e_ca_192_168_0_53_24/",
  "ID": "70_b3_d5_76_8e_ca_192_168_0_53_24",
  "Status": {
   "State": {
    "ID": 16,
    "Name": "In service"
   },
```

```
   "Health": [{
    "ID": 5,
    "Name": "OK"
   }]
  },
  "Associations": {
   "Adapters": ["3"],
   "Ports": ["70_b3_d5_76_8e_ca_192_168_0_53_24"]
  },
  "AddressOrigin": {
   "ID": 65536,
   "Name": "DHCPv4"
  },
  "CablePresent": true,
  "IPv4Address": "192.168.0.53/24",
  "IPv4Gateway": "192.168.0.1",
  "LinkStatus": true,
  "MACAddress": "70:b3:d5:76:8e:ca",
  "NetworkType": {
   "ID": 8,
   "Name": "IPv4 Network"
  },
  "MTUBytes": 2200,
  "Speed": 100000000000,
  "Adapters": "http://10.202.237.225:80/Storage/Devices/openflex-data24-
usalp03020qb0007/Adapters/?Ports=70_b3_d5_76_8e_ca_192_168_0_53_24"
 }]
}
```


Determine the Data24 Host Adapter connection IP Address for Controller 2 (IOM-B) via out-of-band connection (IOM-B AIC-C = Adapter 6)

API Command: "GET /Storage/Devices/{id}/Ports/?Adapters=6"

Result: Target Add-in-Card IP Address = **192.168.1.53**

EXAMPLE USAGE:


```
$ curl -u admin:admin http://10.202.237.225/Storage/Devices/openflex-data24-
usalp03020qb0007/Ports/?Adapters=6
{
 "Self": "http://10.202.237.225:80/Storage/Devices/openflex-data24-usalp03020qb0007/
Ports/",
 "Members": [{
  "Self": "http://10.202.237.225:80/Storage/Devices/openflex-data24-usalp03020qb0007/
Ports/70_b3_d5_76_8e_2e_192_168_1_53_24/",
  "ID": "70_b3_d5_76_8e_2e_192_168_1_53_24",
  "Status": {
   "State": {
    "ID": 16,
    "Name": "In service"
   },
   "Health": [{
    "ID": 5,
    "Name": "OK"
   }]
  },
  "Associations": {
   "Adapters": ["6"],
   "Ports": ["70_b3_d5_76_8e_2e_192_168_1_53_24"]
```

```
  },
  "AddressOrigin": {
   "ID": 65536,
   "Name": "DHCPv4"
  },
  "CablePresent": true,
  "IPv4Address": "192.168.1.53/24",
  "IPv4Gateway": "192.168.1.1",
  "LinkStatus": true,
  "MACAddress": "70:b3:d5:76:8e:2e",
  "NetworkType": {
   "ID": 8,
   "Name": "IPv4 Network"
  },
  "MTUBytes": 2200,
  "Speed": 100000000000,
  "Adapters": "http://10.202.237.225:80/Storage/Devices/openflex-data24-
usalp03020qb0007/Adapters/?Ports=70_b3_d5_76_8e_2e_192_168_1_53_24"
 }]
}
```


Method #3 - GUI via OOB Network Connection

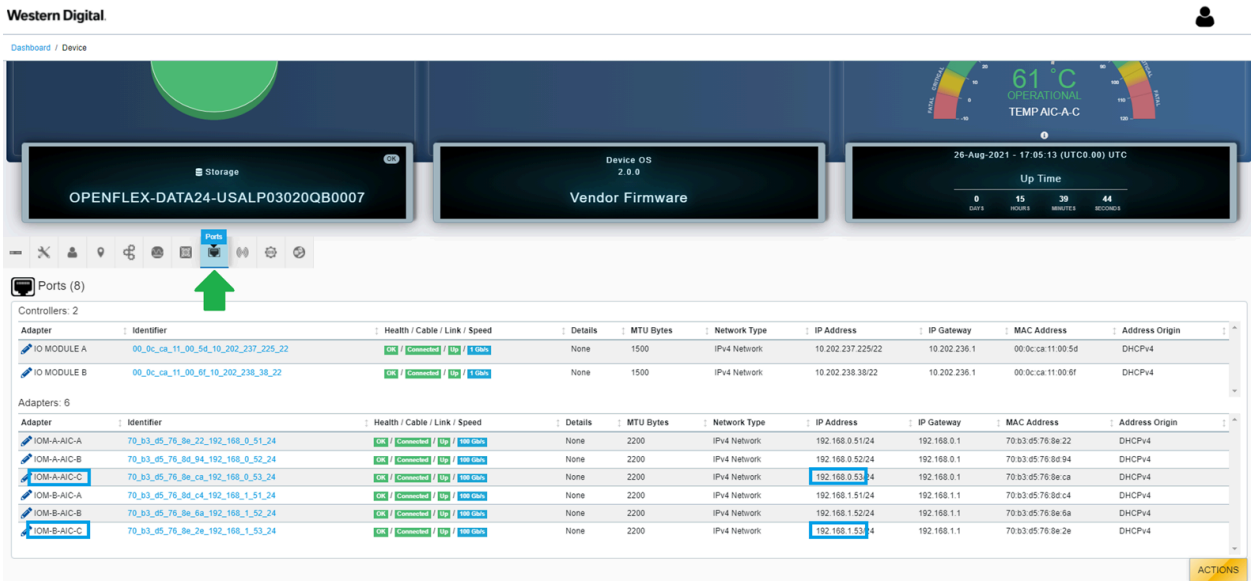
Determine the Data24 Host Adapter connection IP Addresses for Controllers 1 and 2 (IOM-A and IOM-B) via out-of-band connection (IOM-A-AIC-C and IOM-B-AIC-C)

GUI Command: "GET http://ipaddress/device?self=http://ipaddress/Storage/Devices/{id}/

Result: Target Add-in-Card IP Address for IOM-A-AIC-C = **192.168.0.53 and Target Add-in-Card IP Address for IOM-B-AIC-C = 192.168.1.53**

EXAMPLE USAGE:

1. Send this URI via the Browser Address Line: http://10.202.237.225/device?self=http://10.202.237.225/Storage/Devices/openflex-data24-usalp03020qb0007/
2. Login to the Data24 if requested.
3. Select the **Ports** Tab in the Storage Device Page to display all the Port entries.
4. Use the IP Address entries in the Storage Device Page **Ports** Table for IOM-A-AIC-C and IOM-B-AIC-C as see in the following image.


Western Digital.
Dashboard / Device
61 °C
OPERATIONAL
TEMP AIC-A-C
Storage
OPENFLEX-DATA24-USALP03020QB0007
Device OS
2.0.0
Vendor Firmware
26-Aug-2021 - 17:05:13 (UTC0.00) UTC
Up Time
0 DAYS
15 HOURS
39 MINUTES
44 SECONDS
Ports
Ports (8)
Controllers: 2
Adapter
Identifier
Health / Cable / Link / Speed
Details
MTU Bytes
Network Type
IP Address
IP Gateway
MAC Address
Address Origin
IO MODULE A
00_0c_ca_11_00_5d_10_202_237_225_22
OK / Connected / Up / 1 Gb/s
None
1500
IPv4 Network
10.202.237.225/22
10.202.236.1
00:0c:ca:11:00:5d
DHCPv4
IO MODULE B
00_0c_ca_11_00_6f_10_202_238_38_22
OK / Connected / Up / 1 Gb/s
None
1500
IPv4 Network
10.202.238.38/22
10.202.236.1
00:0c:ca:11:00:6f
DHCPv4
Adapters: 6
IOM-A-AIC-A
70_b3_d5_76_8e_22_192_168_0_51_24
OK / Connected / Up / 100 Gb/s
None
2200
IPv4 Network
192.168.0.51/24
192.168.0.1
70:b3:d5:76:8e:22
DHCPv4
IOM-A-AIC-B
70_b3_d5_76_8d_94_192_168_0_52_24
OK / Connected / Up / 100 Gb/s
None
2200
IPv4 Network
192.168.0.52/24
192.168.0.1
70:b3:d5:76:8d:94
DHCPv4
IOM-A-AIC-C
70_b3_d5_76_8e_ca_192_168_0_53_24
OK / Connected / Up / 100 Gb/s
None
2200
IPv4 Network
192.168.0.53/24
192.168.0.1
70:b3:d5:76:8e:ca
DHCPv4
IOM-B-AIC-A
70_b3_d5_76_8d_c4_192_168_1_51_24
OK / Connected / Up / 100 Gb/s
None
2200
IPv4 Network
192.168.1.51/24
192.168.1.1
70:b3:d5:76:8d:c4
DHCPv4
IOM-B-AIC-B
70_b3_d5_76_8e_6a_192_168_1_52_24
OK / Connected / Up / 100 Gb/s
None
2200
IPv4 Network
192.168.1.52/24
192.168.1.1
70:b3:d5:76:8e:6a
DHCPv4
IOM-B-AIC-C
70_b3_d5_76_8e_2e_192_168_1_53_24
OK / Connected / Up / 100 Gb/s
None
2200
IPv4 Network
192.168.1.53/24
192.168.1.1
70:b3:d5:76:8e:2e
DHCPv4
ACTIONS

Host Initiator NVMe Connection Process

Host Initiator NVMe Connection Process	Description
Discover Controller 1 (IOM-A) target devices (use the MI.AC Device NQN information) $ sudo nvme discover -t rdma -a 192.168.0.53 Discovery Log Number of Records 9, Generation counter 0 =====Discovery Log Entry 0====== {removed} =====Discovery Log Entry 1====== {removed} =====Discovery Log Entry 2====== {removed} =====Discovery Log Entry 3====== {removed} =====Discovery Log Entry 4====== {removed} =====Discovery Log Entry 5====== {removed} =====Discovery Log Entry 6====== {removed} =====Discovery Log Entry 7====== {removed}	Using the "nvme-cli" on the Host Initiator server, discover the MI.AC Device

Host Initiator NVMe Connection Process	Description
=====Discovery Log Entry 8======	
trtype: rdma	
adrfam: ipv4	
subtype: nvme subsystem	
treq: not specified	
portid: 0	
trsvcid: 4420	
subnqn: nqn.1992-05.com.wdc.openflex-data24-usalp03020qb0007:MI.AC	
traddr: 192.168.0.53	
rdma_prtype: roce-v2	
rdma_qptype: connected	
rdma_cms: rdma-cm	
rdma_pkey: 0x0000	

Host Initiator NVMe Connection Process	Description
Discover Controller 2 (IOM-B) target devices (use the MI.BC Device NQN information) $ sudo nvme discover -t rdma -a 192.168.1.53 Discovery Log Number of Records 9, Generation counter 0 =====Discovery Log Entry 0====== {removed} =====Discovery Log Entry 1====== {removed} =====Discovery Log Entry 2====== {removed} =====Discovery Log Entry 3====== {removed} =====Discovery Log Entry 4====== {removed} =====Discovery Log Entry 5====== {removed} =====Discovery Log Entry 6====== {removed} =====Discovery Log Entry 7====== {removed} =====Discovery Log Entry 8====== trtype: rdma adrfam: ipv4 subtype: nvme subsystem treq: not specified portid: 0 trsvcid: 4420 subnqn: nqn.1992-05.com.wdc.openflex-data24-usalp03020qb0007:MI.BC traddr: 192.168.1.53 rdma_prtype: roce-v2 rdma_qptype: connected rdma_cms: rdma-cm rdma_pkey: 0x0000	Using the "nvme-cli" on the Host Initiator server, discover the MI.BC Device

Host Initiator NVMe Connection Process	Description
Connect to Controller 1 MI Device first using IP Address and NQN for MI Device $ sudo nvme connect -t rdma -a 192.168.0.53 -i 1 -n nqn.1992-05.com.wdc.openflex-data24-usalp03020qb0007:MI.AC	Connects the Host Initiator to the Data24 MI Device located on Controller 1 via Add-in-Card "C"
Connect to Controller 2 MI Device second using IP Address and NQN for MI Device $ sudo nvme connect -t rdma -a 192.168.1.53 -i 1 -n nqn.1992-05.com.wdc.openflex-data24-usalp03020qb0007:MI.BC	Connects the Host Initiator to the Data24 MI Device located on Controller 2 via Add-in-Card "C"
List the NVMe Connections $ sudo nvme list Node SN Model Namespace Usage Format FW Rev ---------- ---------- ---------- ---------- ---------- ---------- /dev/nvme0n1 USALP03020QB0007AC OpenFlex Data24 1 68.72 GB / 68.72 GB 4 KiB + 0 B 0.0.1779 /dev/nvme1n1 USALP03020QB0007BC OpenFlex Data24 1 68.72 GB / 68.72 GB 4 KiB + 0 B 0.0.1779	Device **/dev/nvme0n1** is for the "AC" MI management connection to Controller 1's Adapter #3 (Slot A) = AC where the "A" indicates Controller 1 (IOM-A) and the "C" indicates the Add-in-Card position within Controller 1 Device **/dev/nvme1n1** is for the "BC" MI management connection to Controller 2's Adapter #6 (Slot A) = BC where the "B" indicates Controller 2 (IOM-B) and the "C" indicates the Add-in-Card position within Controller 2 **NOTE**: The "openflex-api" application running on the Host Initiator server will automatically default to the first MI Device connection entry in the NVMe List. In this case, the MI "AC" Device was connected first, so the default HTTP Tunnel path will go through Controller 1 (SlotNumber=1) unless otherwise specified as Controller 2 with the "?SlotNumber=2" query string added to the URI request entry. **EXAMPLE In-Band API Command to Controller 2 (IOM-B):** GET /Storage/Devices/{id}?SlotNumber=2 This will retrieve the top level Data24 Enclosure information via the Controller 2 (IOM-B) management path.

5.8 In-Band Management Usage

The following are requirements to use the in-band connections:

- The "openflex-api" application must be installed and running on the Host Initiator server
- At least one MI Device has been successfully connected

Note: After the MI Device connection(s) are established, the OpenFlex API requires a "GET /Query/" for the API to discover the In-Band Path to communicate to the MI Device(s). This is also true if there are MI Device changes or if the MI Device(s) disconnect and then reconnect.

In-Band Management Path Connectivity

- Method #1 - API via In-Band Network Connection (using a Browser) *(page 212)* : Using a Browser to connect to the In-Band management port via "Host" OpenFlex API to the Data24 to manage the enclosure over the AIC-C Target Port
- Method #2 - API via In-band Network Connection (using CURL) *(page 216)* : Using "CURL" to connect to the In-Band management port via "Host" OpenFlex API to the Data24 to manage the enclosure over the AIC-C Target Port
- Method #3 - GUI via In-band Network Connection *(page 226)* : Using the Data24 Device Page GUI via Browser via the "Host" OpenFlex API to the Data24 to manage the enclosure over the AIC-C Target Port

5.8.1 In-Band Management Path Connectivity

Method #1 - API via In-Band Network Connection (using a Browser)

Determine the API path to the Data24 using the Host Initiator OpenFlex API "doorbell"

API Command: "GET /Query/"

Result: Target URI Path List showing the Compute Proxy plus the 1 or 2 "in-band path URIs"

EXAMPLE USAGE:

Send this URI via the Browser Address Line: http://10.202.238.146/Query/


```
{
  "Self": "http://10.202.238.146:80/Query/",
  "SystemQuery": "http://10.202.238.146:80/System/Query/",
  "InformationStructure": {
    "Self": "http://10.202.238.146:80/Query/InformationStructure/",
    "AuthenticationType": {
      "ID": 0,
      "Name": "Basic"
    },
    "HTTPPort": 80,
    "HTTPSPort": 443,
    "LogLevel": "info",
    "MaximumThreads": 6,
    "Name": "OpenFlex API",
    "OwningOrganization": "Copyright 2023 Western Digital Corporation or its
 affiliates. All rights reserved.",
    "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": "1.3.0-204"
  },
  "Devices": {
    "Self": "http://10.202.238.146:80/Devices/",
    "Members": [
      {
        "Self": "http://10.202.238.146:80/Compute/Devices/
c11b3597bf4c41e9997d2df3e16d71e5/",
        "SystemType": {
          "ID": 1,
          "Name": "Compute"
        },
        "Name": "cos-r03-s2",
        "ID": "c11b3597bf4c41e9997d2df3e16d71e5",
        "Capabilities": {
          "Members": [
            {
              "ID": 47104,
              "Name": "Proxy",
              "CapabilityDescription": "This device provides proxy access to other
 devices."
            }
          ]
        },
        "Status": {
          "State": {
            "ID": 16,
            "Name": "In service"
          },
          "Health": [
            {
              "ID": 5,
              "Name": "OK"
            }
          ]
        },
        "IPAddresses": {
          "Members": [
            {
              "IPAddress": "10.202.238.146"
            },
            {
              "IPAddress": "192.168.0.43"
            },
            {
              "IPAddress": "fdf4:cfad:91f3:6060::45"
            },
            {
              "IPAddress": "fdf4:cfad:91f3:6060:526b:4bff:fe28:4940"
            },
            {
              "IPAddress": "192.168.1.46"
            },
```

```
            {
              "IPAddress": "fdf4:cfad:91f3:6061::2c"
            },
            {
              "IPAddress": "fdf4:cfad:91f3:6061:526b:4bff:fe28:4941"
            }
          ]
        }
      }
    ]
  }
}
```


Determine the "default in-band connection" path by sending the Self URI from either GET /Query/ entry

API Command: " GET /Storage/Devices/openflex-data24-usalp03020qb0007/"

Result: Response indicates the "SlotNumber: 1", therefore, the default in-band connection path is to Controller 1 (IOM-A)

EXAMPLE USAGE:

Send this URI via the Browser Address Line: http://10.202.238.146/Storage/Devices/openflex-data24-usalp03020qb0007/

```
{
    Self: "http://10.202.238.146:80/Storage/Devices/openflex-data24-usalp03020qb0007/",
  + SystemType: {…},
    Name: "openflex-data24-usalp03020qb0007",
    ID: "openflex-data24-usalp03020qb0007",
  + OperatingSystem: {…},
    SerialNumber: "USALP03020QB0007",
    Model: "OpenFlex Data24",
    Manufacturer: "WDC",
  + Capabilities: {…},
  + Status: {…},
  + IPAddresses: {…},
  + InformationStructure: {…},
  + PowerState: {…},
    SlotNumber: 1,
    TotalCapacity: 37475700097024,
  + IndicatorLED: {…},
  + Location: {…},
  + Accounts: {…},
  + Adapters: {…},
  + Controllers: {…},
  + CoolingDevices: {…},
  + Files: {…},
  + Jobs: {…},
  + Media: {…},
  + Ports: {…},
  + PowerSupplies: {…},
  + Sensors: {…},
  + Support: {…},
  + SystemClock: {…}
}
```


Connect to the Data24 via the non-default in-band connection path

API Command: " GET /Storage/Devices/openflex-data24-usalp03020qb0007/?SlotNumber=2"

Result: Response indicates the "SlotNumber: 2", therefore, the non-default in-band connection path is to Controller 2 (IOM-B)

EXAMPLE USAGE:

Send this URI via the Browser Address Line: http://10.202.238.146/Storage/Devices/openflex-data24-usalp03020qb0007/?SlotNumber=2

```
{
    Self: "http://10.202.238.146:80/Storage/Devices/openflex-data24-usalp03020qb0007/",
  + SystemType: {…},
    Name: "openflex-data24-usalp03020qb0007",
    ID: "openflex-data24-usalp03020qb0007",
  + OperatingSystem: {…},
    SerialNumber: "USALP03020QB0007",
    Model: "OpenFlex Data24",
    Manufacturer: "WDC",
  + Capabilities: {…},
  + Status: {…},
  + IPAddresses: {…},
  + InformationStructure: {…},
  + PowerState: {…},
    SlotNumber: 2,
    TotalCapacity: 37475700097024,
  + IndicatorLED: {…},
  + Location: {…},
  + Accounts: {…},
  + Adapters: {…},
  + Controllers: {…},
  + CoolingDevices: {…},
  + Files: {…},
  + Jobs: {…},
  + Media: {…},
  + Ports: {…},
  + PowerSupplies: {…},
  + Sensors: {…},
  + Support: {…},
  + SystemClock: {…}
}
```


Method #2 - API via In-band Network Connection (using CURL)

Determine the API path to the Data24 using the Host Initiator OpenFlex API "doorbell"

Result: Target URI Path List showing the Compute Proxy plus the 1 or 2 "in-band path URIs"

EXAMPLE USAGE:


```
$ curl http://10.202.238.146/Query/
{
 "Self": "http://10.202.238.146:80/Query/",
 "SystemQuery": "http://10.202.238.146:80/System/Query/",
 "InformationStructure": {
  "Self": "http://10.202.238.146:80/Query/InformationStructure/",
  "AuthenticationType": {
   "ID": 0,
   "Name": "Basic"
  },
  "HTTPPort": 80,
  "HTTPSPort": 443,
  "LogLevel": "info",
  "MaximumThreads": 4,
  "Name": "OpenFlex API",
  "OwningOrganization": "Copyright 2020,2021 Western Digital Corporation or its
 affiliates. All rights reserved.",
  "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": ""
 },
 "Devices": {
  "Self": "http://10.202.238.146:80/Devices/",
  "Members": [{
   "Self": "http://10.202.238.146:80/Compute/Devices/
c11b3597bf4c41e9997d2df3e16d71e5/",
   "SystemType": {
    "ID": 1,
    "Name": "Compute"
   },
   "Name": "cos-r03-s2",
   "ID": "c11b3597bf4c41e9997d2df3e16d71e5",
   "Capabilities": {
    "Members": [{
     "ID": 47104,
     "Name": "Proxy",
     "CapabilityDescription": "This device provides proxy access to other devices."
    }]
   },
   "Status": {
    "State": {
     "ID": 16,
     "Name": "In service"
    },
    "Health": [{
     "ID": 5,
     "Name": "OK"
    }]
   },
   "IPAddresses": {
    "Members": [{
     "IPAddress": "10.202.238.146"
    }, {
     "IPAddress": "192.168.0.43"
    }, {
     "IPAddress": "192.168.1.46"
    }]
   }
  }, {
   "Self": "http://10.202.238.146:80/Storage/Devices/openflex-data24-
usalp03020qb0007/",
   "SystemType": {
    "ID": 2,
    "Name": "Storage"
   },
   "Name": "openflex-data24-usalp03020qb0007",
   "ID": "openflex-data24-usalp03020qb0007",
   "OperatingSystem": {
    "Self": "http://10.202.238.146:80/Storage/Devices/openflex-data24-usalp03020qb0007/
OperatingSystem/",
    "Name": "Vendor Firmware",
    "OSType": {
```

```
     "ID": 59,
     "Name": "Dedicated"
    },
    "Version": "2.0.0"
   },
   "SerialNumber": "USALP03020QB0007",
   "Model": "OpenFlex Data24",
   "Manufacturer": "WDC",
   "Capabilities": {
    "Members": [{
     "ID": 3,
     "Name": "Storage",
     "CapabilityDescription": "This device is a storage provider."
    }, {
     "ID": 15,
     "Name": "Block Server",
     "CapabilityDescription": "This device provides block storage."
    }, {
     "ID": 28,
     "Name": "Management Controller",
     "CapabilityDescription": "This device provides specialized hardware dedicated to
 systems management."
    }, {
     "ID": 29,
     "Name": "Chassis Manager",
     "CapabilityDescription": "This is an aggregation point for management and may rely
 on subordinate management controllers for the management of constituent parts."
    }, {
     "ID": 31,
     "Name": "Storage Device Enclosure",
     "CapabilityDescription": "This device is a storage-based enclosure type."
    }, {
     "ID": 47201,
     "Name": "Flash Media Device",
     "CapabilityDescription": "This device provides flash-based storage volumes."
    }]
   },
   "Status": {
    "State": {
     "ID": 16,
     "Name": "In service"
    },
    "Health": [{
     "ID": 5,
     "Name": "OK"
    }],
    "Details": ["None"]
   },
   "IPAddresses": {
    "Members": [{
     "IPAddress": "10.202.237.225"
    }]
   },
   "SlotNumber": 1
  }, {
   "Self": "http://10.202.238.146:80/Storage/Devices/openflex-data24-
usalp03020qb0007/",
   "SystemType": {
    "ID": 2,
```

```
    "Name": "Storage"
   },
   "Name": "openflex-data24-usalp03020qb0007",
   "ID": "openflex-data24-usalp03020qb0007",
   "OperatingSystem": {
    "Self": "http://10.202.238.146:80/Storage/Devices/openflex-data24-usalp03020qb0007/
OperatingSystem/",
    "Name": "Vendor Firmware",
    "OSType": {
     "ID": 59,
     "Name": "Dedicated"
    },
    "Version": "2.0.0"
   },
   "SerialNumber": "USALP03020QB0007",
   "Model": "OpenFlex Data24",
   "Manufacturer": "WDC",
   "Capabilities": {
    "Members": [{
     "ID": 3,
     "Name": "Storage",
     "CapabilityDescription": "This device is a storage provider."
    }, {
     "ID": 15,
     "Name": "Block Server",
     "CapabilityDescription": "This device provides block storage."
    }, {
     "ID": 28,
     "Name": "Management Controller",
     "CapabilityDescription": "This device provides specialized hardware dedicated to
 systems management."
    }, {
     "ID": 29,
     "Name": "Chassis Manager",
     "CapabilityDescription": "This is an aggregation point for management and may rely
 on subordinate management controllers for the management of constituent parts."
    }, {
     "ID": 31,
     "Name": "Storage Device Enclosure",
     "CapabilityDescription": "This device is a storage-based enclosure type."
    }, {
     "ID": 47201,
     "Name": "Flash Media Device",
     "CapabilityDescription": "This device provides flash-based storage volumes."
    }]
   },
   "Status": {
    "State": {
     "ID": 16,
     "Name": "In service"
    },
    "Health": [{
     "ID": 5,
     "Name": "OK"
    }],
    "Details": ["None"]
   },
   "IPAddresses": {
    "Members": [{
```

```
     "IPAddress": "10.202.238.38"
    }]
   },
   "SlotNumber": 2
  }]
 }
}
```

Determine the "default in-band connection" path by sending the Self URI from either GET /Query/ entry

API Command: " GET /Storage/Devices/openflex-data24-usalp03020qb0007/"

Result: Response indicates the "SlotNumber: 1", therefore, the default in-band connection path is to Controller 1 (IOM-A)

EXAMPLE USAGE:

```
$ curl -u admin:admin http://10.202.238.146/Storage/Devices/openflex-data24-
usalp03020qb0007/
{
 "Self": "http://10.202.238.146:80/Storage/Devices/openflex-data24-usalp03020qb0007/",
 "SystemType": {
  "ID": 2,
  "Name": "Storage"
 },
 "Name": "openflex-data24-usalp03020qb0007",
 "ID": "openflex-data24-usalp03020qb0007",
 "OperatingSystem": {
  "Self": "http://10.202.238.146:80/Storage/Devices/openflex-data24-usalp03020qb0007/
OperatingSystem/",
  "Name": "Vendor Firmware",
  "OSType": {
   "ID": 59,
   "Name": "Dedicated"
  },
  "Version": "2.0.0"
 },
 "SerialNumber": "USALP03020QB0007",
 "Model": "OpenFlex Data24",
 "Manufacturer": "WDC",
 "Capabilities": {
  "Members": [{
   "ID": 3,
   "Name": "Storage",
   "CapabilityDescription": "This device is a storage provider."
  }, {
   "ID": 15,
   "Name": "Block Server",
   "CapabilityDescription": "This device provides block storage."
  }, {
   "ID": 28,
   "Name": "Management Controller",
   "CapabilityDescription": "This device provides specialized hardware dedicated to
 systems management."
  }, {
   "ID": 29,
   "Name": "Chassis Manager",
   "CapabilityDescription": "This is an aggregation point for management and may rely
 on subordinate management controllers for the management of constituent parts."
  }, {
```

```
   "ID": 31,
   "Name": "Storage Device Enclosure",
   "CapabilityDescription": "This device is a storage-based enclosure type."
  }, {
   "ID": 47201,
   "Name": "Flash Media Device",
   "CapabilityDescription": "This device provides flash-based storage volumes."
  }]
 },
 "Status": {
  "State": {
   "ID": 16,
   "Name": "In service"
  },
  "Health": [{
   "ID": 5,
   "Name": "OK"
  }],
  "Details": ["None"]
 },
 "IPAddresses": {
  "Members": [{
   "IPAddress": "10.202.237.225"
  }]
 },
 "InformationStructure": {
  "Self": "http://10.202.238.146:80/Storage/Devices/openflex-data24-usalp03020qb0007/
InformationStructure/",
  "AuthenticationType": {
   "ID": 0,
   "Name": "Basic"
  },
  "HTTPPort": 80,
  "HTTPSPort": 443,
  "LogLevel": "debug",
  "MaximumThreads": 4,
  "Name": "OpenFlex API",
  "OwningOrganization": "Copyright 2020,2021 Western Digital Corporation or its
 affiliates. All rights reserved.",
  "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": ""
 },
 "PowerState": {
  "ID": 2,
  "Name": "On"
 },
 "SlotNumber": 1,
 "TotalCapacity": 37475700097024,
 "IndicatorLED": {
  "ID": 4,
  "Name": "Off"
 },
 "Location": {
```

```
  "Self": "http://10.202.238.146:80/Storage/Devices/openflex-data24-usalp03020qb0007/
Location/"
 },
 "Accounts": {
  "Self": "http://10.202.238.146:80/Storage/Devices/openflex-data24-usalp03020qb0007/
Accounts/"
 },
 "Adapters": {
  "Self": "http://10.202.238.146:80/Storage/Devices/openflex-data24-usalp03020qb0007/
Adapters/"
 },
 "Controllers": {
  "Self": "http://10.202.238.146:80/Storage/Devices/openflex-data24-usalp03020qb0007/
Controllers/"
 },
 "CoolingDevices": {
  "Self": "http://10.202.238.146:80/Storage/Devices/openflex-data24-usalp03020qb0007/
CoolingDevices/"
 },
 "Files": {
  "Self": "http://10.202.238.146:80/Storage/Devices/openflex-data24-usalp03020qb0007/
Files/"
 },
 "Jobs": {
  "Self": "http://10.202.238.146:80/Storage/Devices/openflex-data24-usalp03020qb0007/
Jobs/"
 },
 "Media": {
  "Self": "http://10.202.238.146:80/Storage/Devices/openflex-data24-usalp03020qb0007/
Media/"
 },
 "Ports": {
  "Self": "http://10.202.238.146:80/Storage/Devices/openflex-data24-usalp03020qb0007/
Ports/"
 },
 "PowerSupplies": {
  "Self": "http://10.202.238.146:80/Storage/Devices/openflex-data24-usalp03020qb0007/
PowerSupplies/"
 },
 "Sensors": {
  "Self": "http://10.202.238.146:80/Storage/Devices/openflex-data24-usalp03020qb0007/
Sensors/"
 },
 "Support": {
  "Self": "http://10.202.238.146:80/Storage/Devices/openflex-data24-usalp03020qb0007/
Support/"
 },
 "SystemClock": {
  "Self": "http://10.202.238.146:80/Storage/Devices/openflex-data24-usalp03020qb0007/
SystemClock/"
 }
}
```


Connect to the Data24 via the non-default in-band connection path

API Command: " GET /Storage/Devices/openflex-data24-usalp03020qb0007/?SlotNumber=2"

Result: Response indicates the "SlotNumber: 2", therefore, the non-default in-band connection path is to Controller 2 (IOM-B)

EXAMPLE USAGE:

```
Connect to the Data24 via the non-default in-band connection path

API Command:  " GET /Storage/Devices/openflex-data24-usalp03020qb0007/?SlotNumber=2"

Result: Response indicates the "SlotNumber: 2", therefore, the non-default in-band
 connection path is to Controller 2 (IOM-B)

EXAMPLE USAGE
$ curl -u admin:admin  http://10.202.238.146/Storage/Devices/openflex-data24-
usalp03020qb0007/?SlotNumber=2


{
 "Self": "http://10.202.238.146:80/Storage/Devices/openflex-data24-usalp03020qb0007/",
 "SystemType": {
  "ID": 2,
  "Name": "Storage"
 },
 "Name": "openflex-data24-usalp03020qb0007",
 "ID": "openflex-data24-usalp03020qb0007",
 "OperatingSystem": {
  "Self": "http://10.202.238.146:80/Storage/Devices/openflex-data24-usalp03020qb0007/
OperatingSystem/",
  "Name": "Vendor Firmware",
  "OSType": {
   "ID": 59,
   "Name": "Dedicated"
  },
  "Version": "2.0.0"
 },
 "SerialNumber": "USALP03020QB0007",
 "Model": "OpenFlex Data24",
 "Manufacturer": "WDC",
 "Capabilities": {
  "Members": [{
   "ID": 3,
   "Name": "Storage",
   "CapabilityDescription": "This device is a storage provider."
  }, {
   "ID": 15,
   "Name": "Block Server",
   "CapabilityDescription": "This device provides block storage."
  }, {
   "ID": 28,
   "Name": "Management Controller",
   "CapabilityDescription": "This device provides specialized hardware dedicated to
 systems management."
  }, {
   "ID": 29,
   "Name": "Chassis Manager",
   "CapabilityDescription": "This is an aggregation point for management and may rely
 on subordinate management controllers for the management of constituent parts."
  }, {
   "ID": 31,
   "Name": "Storage Device Enclosure",
   "CapabilityDescription": "This device is a storage-based enclosure type."
  }, {
```

```
   "ID": 47201,
   "Name": "Flash Media Device",
   "CapabilityDescription": "This device provides flash-based storage volumes."
  }]
 },
 "Status": {
  "State": {
   "ID": 16,
   "Name": "In service"
  },
  "Health": [{
   "ID": 5,
   "Name": "OK"
  }],
  "Details": ["None"]
 },
 "IPAddresses": {
  "Members": [{
   "IPAddress": "10.202.238.38"
  }]
 },
 "InformationStructure": {
  "Self": "http://10.202.238.146:80/Storage/Devices/openflex-data24-usalp03020qb0007/
InformationStructure/",
  "AuthenticationType": {
   "ID": 0,
   "Name": "Basic"
  },
  "HTTPPort": 80,
  "HTTPSPort": 443,
  "LogLevel": "debug",
  "MaximumThreads": 4,
  "Name": "OpenFlex API",
  "OwningOrganization": "Copyright 2020,2021 Western Digital Corporation or its
 affiliates. All rights reserved.",
  "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": "1.3.0-187"
 },
 "PowerState": {
  "ID": 2,
  "Name": "On"
 },
 "SlotNumber": 2,
 "TotalCapacity": 37475700097024,
 "IndicatorLED": {
  "ID": 4,
  "Name": "Off"
 },
 "Location": {
  "Self": "http://10.202.238.146:80/Storage/Devices/openflex-data24-usalp03020qb0007/
Location/",
  "Address1": "",
  "Address2": "",
```

```
  "Address3": "",
  "Building": "",
  "City": "COS",
  "Country": "",
  "Device": "",
  "GPSCoords": "",
  "Item": "",
  "OtherLocationInfo": "",
  "Pod": "",
  "PostalCode": "",
  "Rack": "",
  "Room": "",
  "Row": "",
  "Shelf": "",
  "SiteName": "",
  "State": "",
  "Territory": ""
 },
 "Accounts": {
  "Self": "http://10.202.238.146:80/Storage/Devices/openflex-data24-usalp03020qb0007/
Accounts/"
 },
 "Adapters": {
  "Self": "http://10.202.238.146:80/Storage/Devices/openflex-data24-usalp03020qb0007/
Adapters/"
 },
 "Controllers": {
  "Self": "http://10.202.238.146:80/Storage/Devices/openflex-data24-usalp03020qb0007/
Controllers/"
 },
 "CoolingDevices": {
  "Self": "http://10.202.238.146:80/Storage/Devices/openflex-data24-usalp03020qb0007/
CoolingDevices/"
 },
 "Files": {
  "Self": "http://10.202.238.146:80/Storage/Devices/openflex-data24-usalp03020qb0007/
Files/"
 },
 "Jobs": {
  "Self": "http://10.202.238.146:80/Storage/Devices/openflex-data24-usalp03020qb0007/
Jobs/"
 },
 "Media": {
  "Self": "http://10.202.238.146:80/Storage/Devices/openflex-data24-usalp03020qb0007/
Media/"
 },
 "Ports": {
  "Self": "http://10.202.238.146:80/Storage/Devices/openflex-data24-usalp03020qb0007/
Ports/"
 },
 "PowerSupplies": {
  "Self": "http://10.202.238.146:80/Storage/Devices/openflex-data24-usalp03020qb0007/
PowerSupplies/"
 },
 "Sensors": {
  "Self": "http://10.202.238.146:80/Storage/Devices/openflex-data24-usalp03020qb0007/
Sensors/"
 },
 "Support": {
```

```
  "Self": "http://10.202.238.146:80/Storage/Devices/openflex-data24-usalp03020qb0007/
Support/"
 },
 "SystemClock": {
  "Self": "http://10.202.238.146:80/Storage/Devices/openflex-data24-usalp03020qb0007/
SystemClock/"
 }
}
```


Method #3 - GUI via In-band Network Connection

Discover the desired Data24 by connecting to the appropriate Compute Proxy OpenFlex API application installed on the Host Initiator that is connected to the Data24.

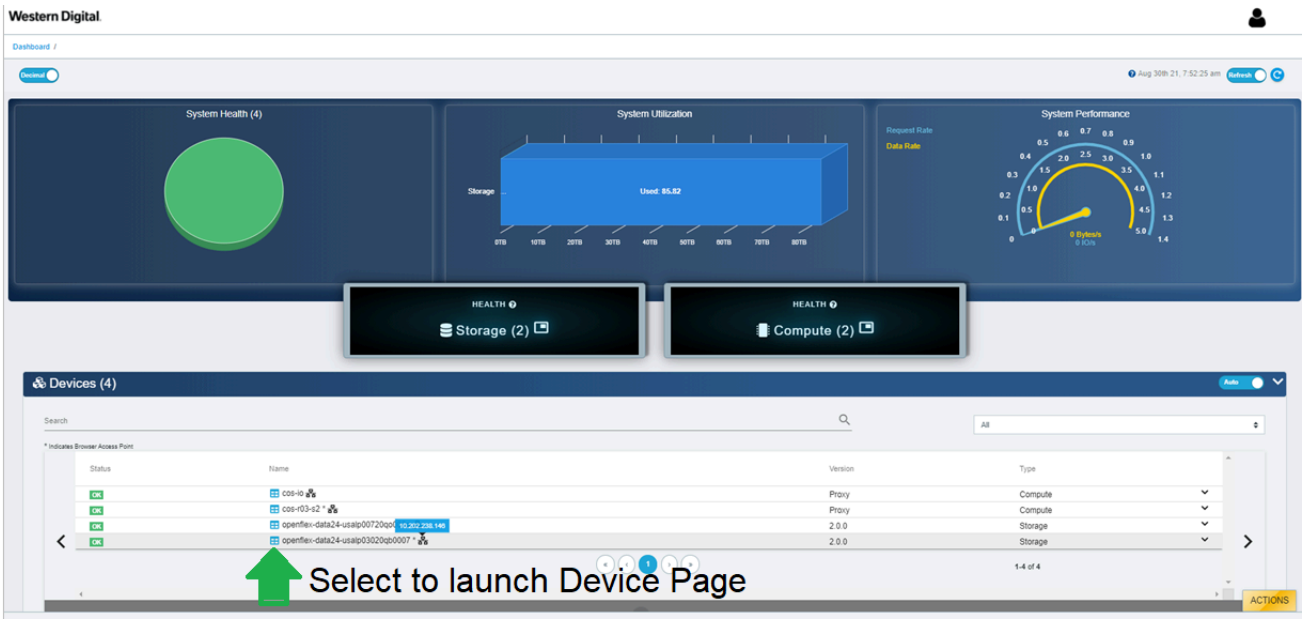
GUI Command: "IP Address for the Compute Proxy OpenFlex API Device"

Note: Log in first, if prompted.

Result: GUI Dashboard Page shows the Data24. Note the "hover" over the Network Icon indicates the "in-band IP Address" to get to the Data24's Device Page.

EXAMPLE USAGE:

Browser Address Line: http://10.202.238.146



GUI Command: "GET IN-BAND-ADDRESS/device?self=http://IN-BAND-ADDRESS/Storage/Devices/openflex-data24-usalp03020qb0007/"

Result: Response indicates the "IO MODULE A", therefore, the default in-band connection path is to Controller 1 (IOM-A)

Either launched from the Dashboard Page or direct URI entered on the Browser Address Line.

For Browser Address Line, the pattern is "In-band IP Address/device?self=In-Band Address/Storage/Devices/Data24_Enclosure_ID/"

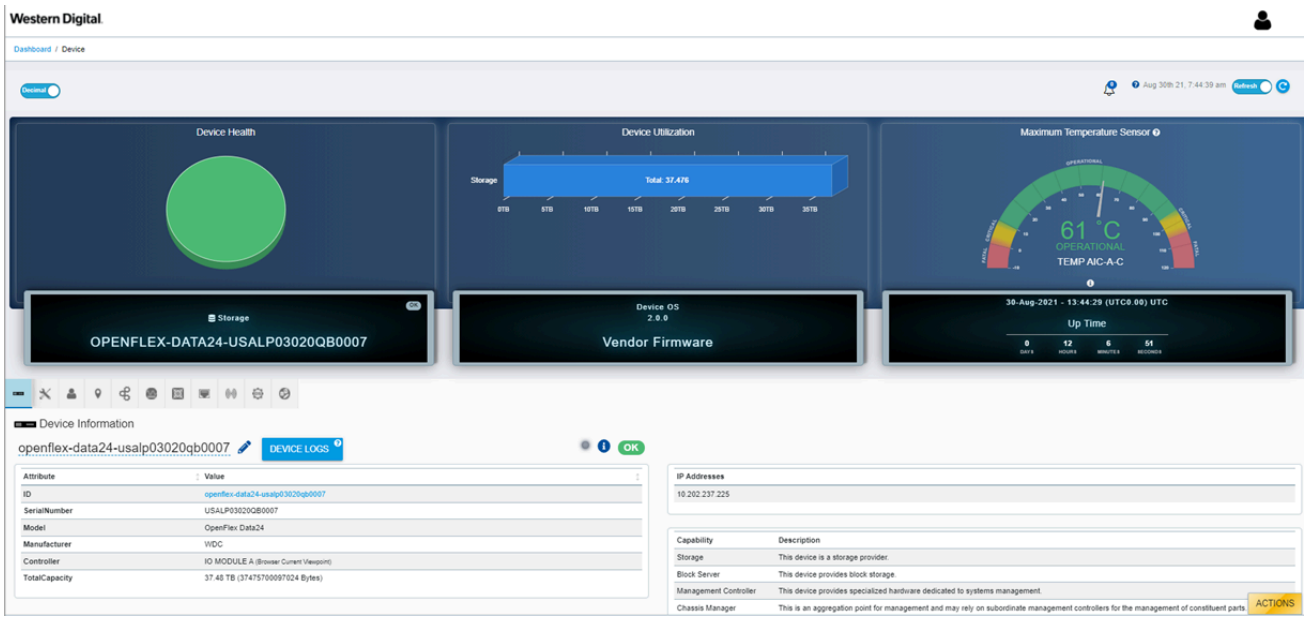
EXAMPLE USAGE:

Browser Address Line: http://10.202.238.146/device?self=http://10.202.238.146/Storage/Devices/openflex-data24-usalp03020qb0007/

Note:

- The connection to the "In-Band Path" is determined by the URI containing the Compute Proxy's IP Address along with the Data24 URI that includes its "Enclosure ID".
- The first "nvme connection" determines which Controller (IOM) MI Device is used for the Device Page information via the OpenFlex API.
- To explicitly connect the Device Page to either Controller (IOM) via the In-Band Path connection, the MI Device to the Controller (IOM) that is desired needs to be connected "first" (or is the only connection) when doing the NVMe connection process to guarantee the desired In-Band Path connection.

The GUI Pages (both Dashboard and Device Pages) **only connect to what is provided by the OpenFlex API**, which may be either an In-band or an out-of-band connection based on the Dashboard discovery process.



Safety

In This Chapter:

6.1 Electrostatic Discharge

CAUTION

Electrostatic discharge can harm delicate components inside Western Digital products.

Electrostatic discharge (ESD) is a discharge of stored static electricity that can damage equipment and impair electrical circuitry. It occurs when electronic components are improperly handled and can result in complete or intermittent failures.

Wear an ESD wrist strap for installation, service and maintenance to prevent damage to components in the product. Ensure the antistatic wrist strap is attached to a chassis ground (any unpainted metal surface). If possible, keep one hand on the frame when you install or remove an ESD-sensitive part.

Before moving ESD-sensitive parts, place them in ESD static-protective bags until you are ready to install the part.

6.2 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 that has extreme high temperatures or extreme low temperatures. Be aware of the proximity of the unit to heaters, radiators, and air conditioners.
- Position the unit so that there is adequate space around it for proper cooling and ventilation.
- Keep the unit away from direct strong magnetic fields, excessive dust, and electronic/electrical equipment that generate electrical noise.

6.3 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 close to the unit.

Always use properly grounded, unmodified electrical outlets and cables. Ensure all outlets and cables are rated to supply the proper voltage and current.

This unit has more than one power supply connection; both power cords must be removed from the power supplies to completely remove power from the unit. There is no switch or other disconnect device.

When power cycling the unit, wait 10 seconds before re-applying power. Failure to do so may cause the enclosure to boot up in an inaccessible state. If this is encountered, remove power, wait 10 seconds, and then reapply power.

6.4 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.

6.5 Rack-Mountable Systems

CAUTION: **Always install rack rails and storage enclosure according to OpenFlex Data24 product documentation. Follow all cautions, warnings, labels, and instructions provided within the rackmount instructions.**

Reliable grounding of rack-mounted equipment should be maintained.

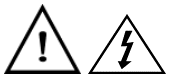
If installed in a closed or multi-unit rack assembly, the operating ambient temperature of the rack environment may be greater than room ambient. Therefore, consideration should be given to installing the equipment in an environment compatible with the maximum ambient temperature (Tma) specified by the manufacturer.

Observe the maximum rated ambient temperature, which is specified in the product documentation.

For safe operation of the equipment, installation of the equipment in a rack should be such that the amount of air flow is not impeded so that the safe operation of the equipment is not compromised.

6.6 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.

 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.

6.7 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:

7.1 Country Certifications

Table 41: 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

7.2 Electromagnetic Compatibility (EMC) Class A Compliance

The **DCS0010** 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

7.3 Restricted Access Location

The OpenFlex Data24 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

7.4 Regulatory Statement of Compliance

Product Name: **OpenFlex™ Data24**

Regulatory Model: **DCS0010**

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

7.5 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.

UK Import Representation Contact

Western Digital UK Limited
PO Box 471
Leatherhead KT22 2LU
UK

Telephone: +44 1372 366000

EU Import Representation Contact

Western Digital EU Limited
PO Box 13379
Swords, Co
Dublin, Ireland

7.6 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.

2. This device must accept any interference received, including interference that may cause undesired operation.

Note: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy, and if it is not installed and used in accordance with the instruction manual, it may cause harmful interference to radio communications. Any modifications made to this device that are not approved by Western Digital may void the authority granted to the user by the FCC to operate equipment.

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

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

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

7.8 Japanese Compliance Statement, Class A ITE

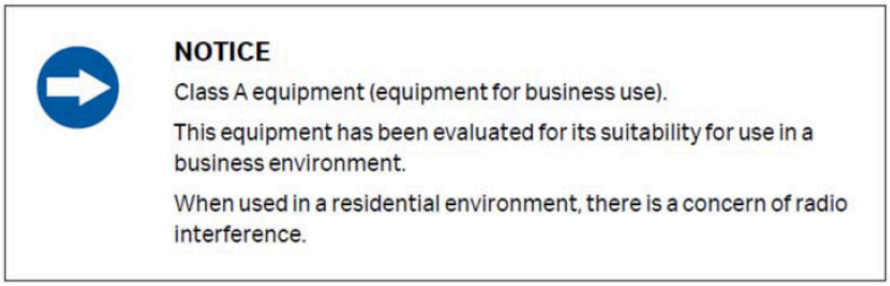
The following Japanese compliance statement pertains to VCCI EMI regulations:

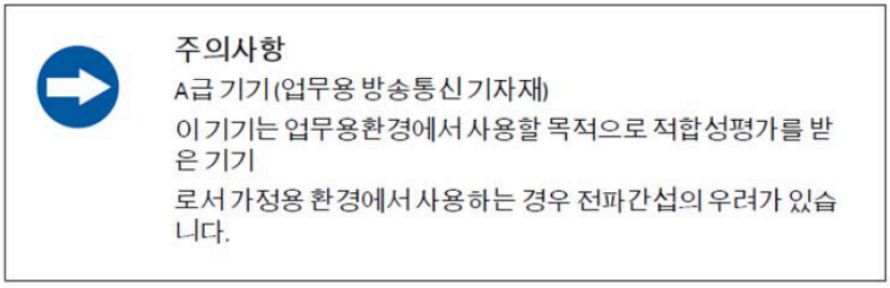
この装置は、クラスA情報技術装置です。この装置を家庭環境で使用すると電波妨害を引き起こすことがあります。この場合には使用者が適切な対策を講ずるよう要求されることがあります。 VCCI－A

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.

7.9 South Korea Warning Label Statement, Class A ITE





7.10 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.