



Centauri Storage Expansion Unit

OSS-EXS-C4B



User Manual

SKU: OSS-EXS-C4B



OSS
ONE STOP SYSTEMS

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Preface

Advisories

Five types of advisories are used throughout this manual to provide helpful information, or to alert you to the potential for hardware damage or personal injury.



NOTE

Used to amplify or explain a comment related to procedural steps or text.



IMPORTANT

Used to indicate an important piece of information or special “tip” to help you



CAUTION

Used to indicate and prevent the following procedure or step from causing damage to the equipment.



WARNING

Used to indicate and prevent the following step from causing injury.



DANGER or STOP

Used to indicate and prevent the following step from causing serious injury or significant data loss

Disclaimer: We have attempted to identify most situations that may pose a danger, warning, or caution condition in this manual. However, One Stop Systems does not claim to have covered all situations that might require the use of a Caution, Warning, or Danger indicator.

Safety Instructions

Always use caution when servicing any electrical component. Before managing the One Stop Systems Expansion chassis, read the following instructions and safety guidelines to prevent damage to the product and to ensure your own personal safety. Refer to the "Advisories" section for advisory conventions used in this manual, including the distinction between Danger, Warning, Caution, Important, and Note.

Always use caution when handling/operating the computer. Only qualified, experienced, authorized electronics personnel should access the interior of the computer and expansion chassis.



WARNING

Never modify or remove the radio frequency interference shielding from your workstation or expansion unit. To do so may cause your installation to produce emissions that could interfere with other electronic equipment around your system.

When Working Inside a Computer

Before taking covers off a computer, perform the following steps:

- Turn off the computer and any peripheral devices.
- Disconnect the computer and peripheral power cords from their AC outlets or inlets in order to prevent electric shock or system board damage.
- In addition, take note of these safety guidelines when appropriate:

To help avoid damage to systems boards, wait five seconds after turning off the computer before removing a component, removing a system board, or disconnecting a peripheral device from the computer.

When you disconnect a cable, pull on its connector or on its strain-relief loop, not on the cable itself. Some cables have a connector with locking tabs. If you are disconnecting this type of cable, press in on the locking tabs before disconnecting the cable. As you pull connectors apart, keep them evenly aligned to avoid bending any connector pins. Also, before connecting a cable, make sure both connectors are correctly oriented and aligned.



CAUTION

Do not attempt to service the system yourself except as explained in this manual. Follow installation instructions closely.

Protecting Against Electrostatic Discharge



Electrostatic Discharge (ESD) Warning

Electrostatic Discharge (ESD) is the enemy of semiconductor devices. You should always take precautions to eliminate any electrostatic charge from your body and clothing before touching any semiconductor device or card by using an electrostatic wrist strap and/or rubber mat.

Static electricity can harm system boards. Perform service at an ESD workstation and follow proper ESD procedures to reduce the risk of damage to components. One Stop Systems strongly encourages you to follow proper ESD procedures, which can include wrist straps and smocks, when servicing equipment.

You can also take the following steps to prevent damage from electrostatic discharge (ESD):

When unpacking a static-sensitive component from its shipping carton, do not remove the component's anti-static packaging material until you are ready to install the component in a computer. Just before unwrapping the anti-static packaging, be sure you are at an ESD workstation or are grounded.

When transporting a sensitive component, first place it in an anti-static container or packaging.

Manage all sensitive components at an ESD workstation. If possible, use anti-static floor pads and workbench pads.

Handle components and boards with care. Do not touch the components or contacts on a board. Hold a board by its edges or by its metal mounting bracket.

1 General Specification

Centauri is designed to meet MIL-STD-810G ruggedization requirements. With its 3U form factor, half rack width, and short 20" depth, Centauri is the ideal system for fast storage and easy media removability in autonomous trucks, military vehicles, and aircraft. Additional features include dynamic fan speed control, lightweight aluminum enclosure, and IPMI 2.0 based system monitoring on dedicated Ethernet.

Item	Description
Dimensions	Dimensions: 3U, 8.5" W x 20" D x 5.25" H Aesthetics: Aluminum Chassis, black liquid paint exterior Capacity: 256TB per 3U system using 32TB NVMe drives
Weight	13lb with drives
Storage Options	Drives: Up to eight (8) U.2/U.3 PCIe 3.0 or 4.0 x4 NVMe solid-state drives (SSD)
Expansion	Multiple Centauri can be connected through available PCIe x16 slots in a host server
System Management	IPMI 2.0 compliant BMC monitors and controls fans, power supplies, temperature sensors & I2C devices
Management GUI	Web server accessible over RJ-45 Ethernet port on rear of chassis
LED Indicators	LEDs on the front panel indicating drive activity, power status and system ID
RAID	Software RAID level support provided by the server.
Service Management	1 Ethernet connector for connection to system monitoring tool Supports CLI, web GUI and SNMP management options.
Power Supply	Dual 1600-Watt Common Redundant Power Supply (CRPS) Input voltage Options: 100-240 VAC Full Range 48V DC Frequency range: 50/60 Hz Amperage: 10A (RMS) for 115V, 5A (RMS) for 208V (estimated) Efficiency: Typical 90%
Vibration	Operating vibration: 5-17 Hz 0.5" double amplitude displacement; 7-2000Hz, 1.5g acceleration Storage/transport vibration: 2g @ 5-500 Hz. Operating shock: 20g @ 11 msec Storage/transport shock: 30g @ 11 msec
Operating Environment	10° to 50°C with maximum temperature gradation of 5°C per hour, -16 to 3048 meters (-50 to 10,000 feet) 5% to 90% (non-condensing) with maximum humidity gradation of 10% per hour
Storage Environment	-40° to 70°C (-40° to 158° F) with maximum temperature gradation of 20°C per hour 5% to 95% (non-condensing)
Agency Compliance	FCC - Verified to comply with Part 15 of the FCC Rules, Class A Canada ICES-003, issue 4, Class A UL/IEC 60950-1 CSA C22.2 No. 60950-1 IEC 60950-1 (CB Certificate and CB Test Report) CE Mark (EN55022 Class A, EN60950-1, EN55024, EN61000-3-2, EN61000-3-3) CISPR 22, Class A WEEE (EU 2012/19) & RoHS 3 (EU 2015/863) China CCC (GB4943), GB9254 Class A, GB17625.1 Taiwan BSMI CNS13438, Class A; CNS14336-1 Korea KN22, Class A; KN24 Russia/GOST ME01, IEC-60950-1, GOST R 51318.22, GOST R 51318.24, GOST R 51317.3.2, GOST R 51317.3.3 TUV-GS (EN60950-1 /IEC60950-1,EK1-ITB2000)
Compliance	RoHS 3, WEEE
Operating Systems	Supports servers and initiators running Microsoft Windows, Windows Server, and Linux

2 Product Information

2.1 Features

- Bulk Removable 8-Bay Storage Canister
- Up to 256 TB of storage capacity per canister
- Unique half-rack, short-depth form factor
- PCIe 4.0 x16 SFF-8643 Host Uplink
- BMC and fan control

Built as a modular storage expansion to the OSS 3U SDS, Centauri can store up to 256 TB in its 8-drive canister.

- These canisters allow for tool-less bulk or individual drive removal and can be hot-swapped for ease of use in fast-paced environments.
- The system is compatible with both NVMe drives, and its PCIe Gen4 hardware facilitates high-speed storage throughput.

NOTE: SATA Drive is not supported

Centauri is designed to meet MIL-STD-810G ruggedization requirements. With its 3U form factor, half rack width, and short 20" depth, Centauri is the ideal system for fast storage and easy media removability in autonomous trucks, military vehicles, and aircraft.

- Additional features include dynamic fan speed control, lightweight aluminum enclosure, and IPMI 2.0 based system monitoring on dedicated Ethernet.

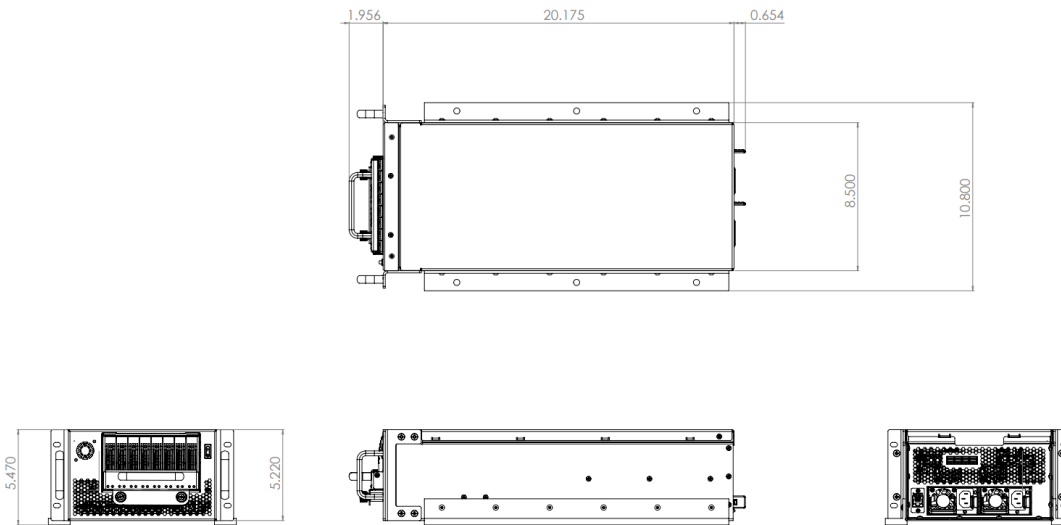
2.2 Chassis Description

- Aluminum Enclosure, frame-in-frame
- Designed to meet MIL-STD-810G
- Mountable using rack slides or flange mounting
- Removable rack ears
- System is fan cooled
 - Airflow is front to rear
 - Temperature monitoring and fan control through BMC
 - Designed to withstand 0° - 50° C

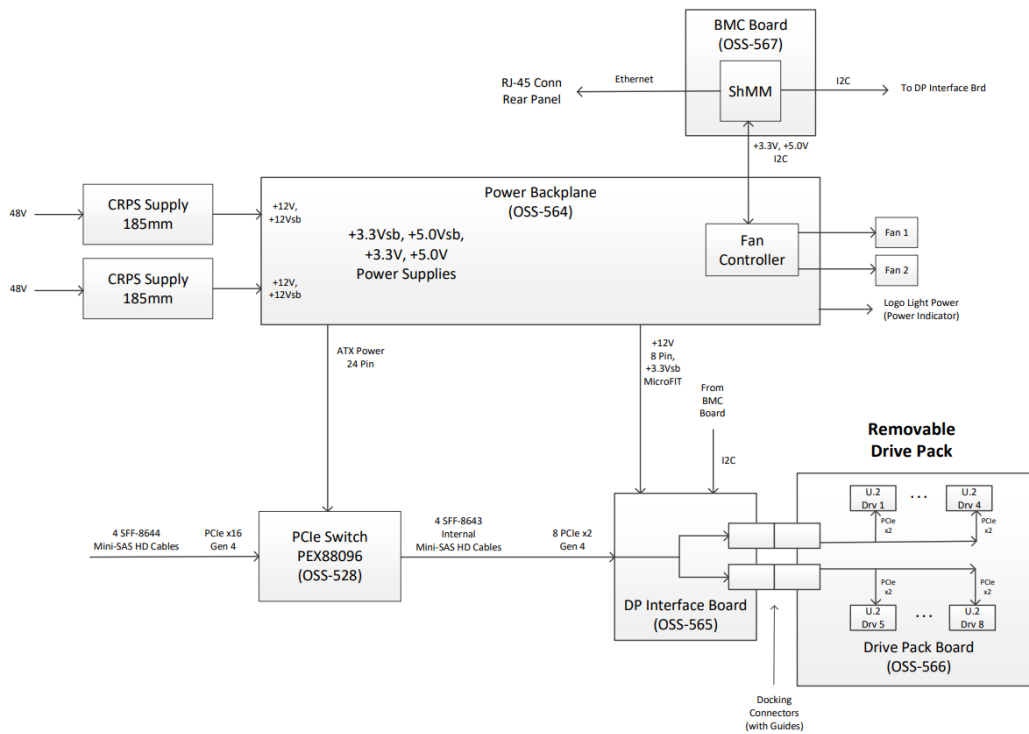
2.3 Storage Description

- Centauri reuses the 8-drive storage canister from 3U SDS
- Drives can be hot-swapped and configured for bulk/individual removability
- System uses PCIe Gen4 x16 expansion upstream

2.4 Chassis Dimension

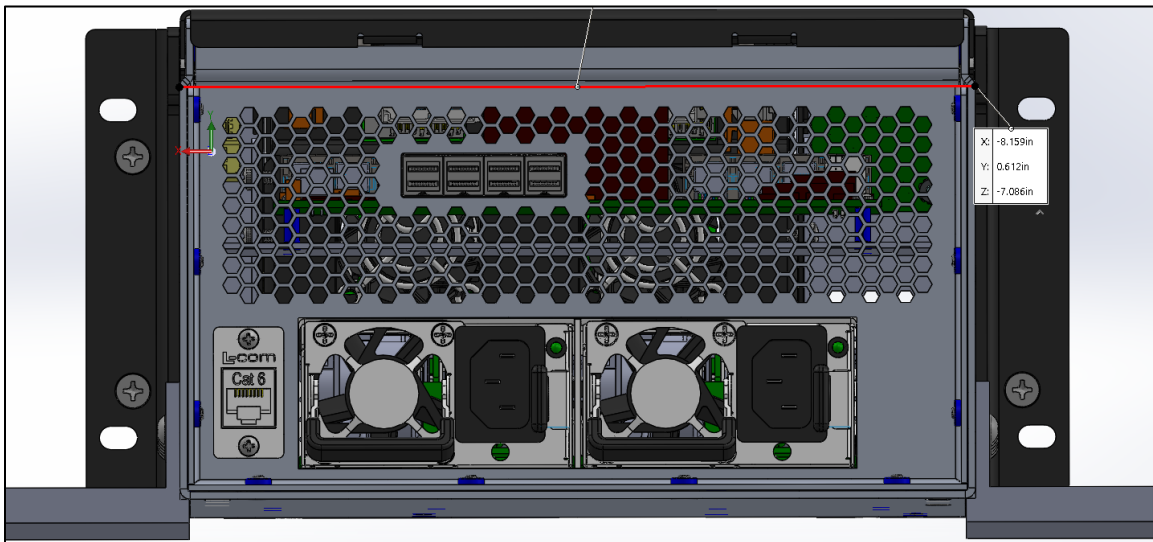


2.5 Block Diagram

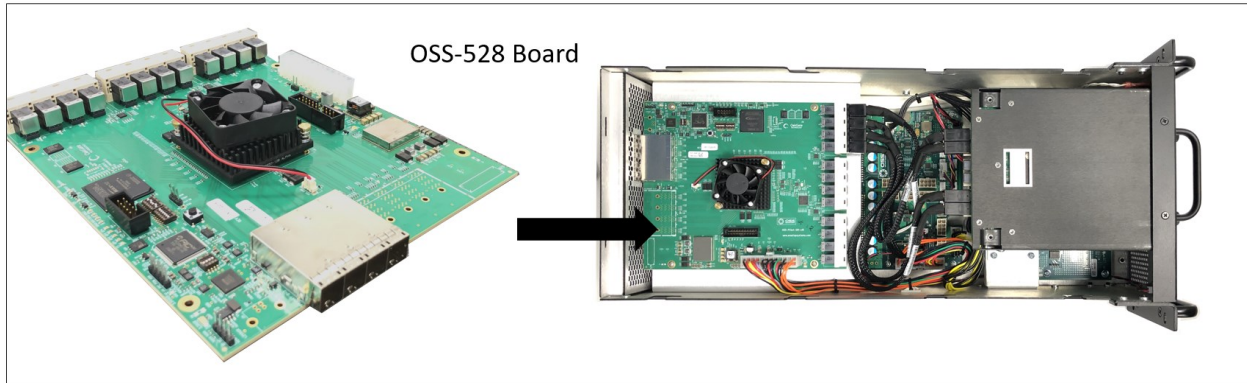


2.6 Power

Centauri	Part Type	Power Type	Power Max	Qty	Ext Typ Power (Watts)	Ext Max Power (Watts)
	NVME SSDs	24	31	8	192	250
	PCIe Card	528	44	1	44	56
	Misc.	565, 565, 566, 567	10	1	10	15
	Fans	San Ace or Delta 40x40x28	10	2	20	24
	CRPS Supply	Power consumed in CRPS (assume 90% efficiency)			27	34
	Total Power (Watts)				293	379



2.7 OSS-528 Board LEDs



528 LED	Color	Notes	Normal State	Visible (not visible outside Chassis)
CR1	Red	PEX Fatal Error	OFF	528 Board Only
CR2	Green	PEX Heartbeat LED	Flashing	528 Board Only
CR3	Green	PCIe Reset Asserted	OFF	528 Board Only
CR5	Red	FPGA CRC Error	OFF	528 Board Only
D1	Green	528 Board Power Good	ON	528 Board Only
D2	Green	SSD's Reset Asserted	OFF	528 Board Only
D10	Green	PEX Reset Asserted	OFF	528 Board Only
D25	Green	PEX Switch Core Voltage Power Good	ON	528 Board Only
D26	Green	Board 1.8V Power Good	ON	528 Board Only
D27	Green	Aux Power Good	ON	528 Board Only
D5	Green	SFF-8643 Link Status	ON if linked	528 Board Only
D15	Green	Drive Slot 1 Link Status	ON if linked	528 Board Only
D16	Green	Drive Slot 2 Link Status	ON if linked	528 Board Only
D17	Green	Drive Slot 3 Link Status	ON if linked	528 Board Only
D18	Green	Drive Slot 4 Link Status	ON if linked	528 Board Only
D6	Green	Drive Slot 5 Link Status	ON if linked	528 Board Only
D7	Green	Drive Slot 6 Link Status	ON if linked	528 Board Only
D8	Green	Drive Slot 7 Link Status	ON if linked	528 Board Only
D9	Green	Drive Slot 8 Link Status	ON if linked	528 Board Only

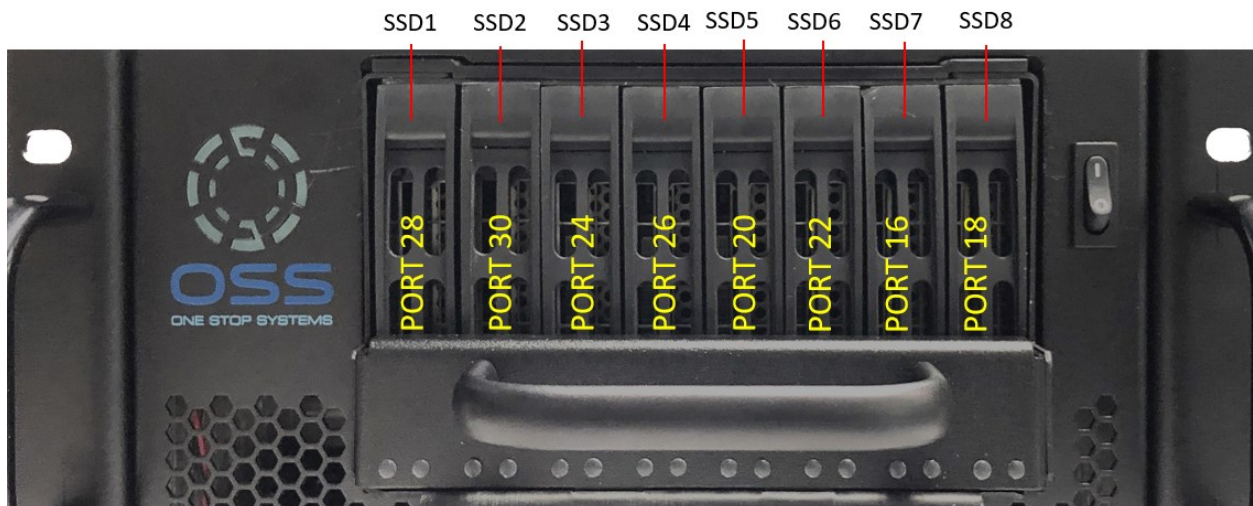
2.8 OSS-528 FPGA Dipswitch Settings

OSS-528	Shipping		DIP Switch	Signal	Function	Setting
DIP Switch Position	Setting		DIP Switch	Signal	Function	Setting
SW1 Pos 1	OFF		SW1	GPSW1	Flash Select: GPSW1: High GPSW2: Low	Low: BSw High: SSw
SW1 Pos 2	ON		SW1	GPSW2		Low (ON)
SW1 Pos 3	OFF		SW1	GPSW3	Not used in FPGA	High
SW1 Pos 4	OFF		SW1	GPSW4	Not used in FPGA	High
SW1 Pos 5	ON		SW1	GPSW5	88K COM Select: Low: UART High: SDB	Low/High
SW1 Pos 6	OFF		SW1	GPSW6	ATX Power Control: Low: Force ATX Power ON High: ATX Power not forced ON	High
SW2 Pos 1	OFF		SW2	GPSW7	Not used in FPGA	High
SW2 Pos 2	OFF		SW2	GPSW8	Not used in FPGA	High
SW2 Pos 3	OFF		SW2	SWSP1	Unconnected Spare	High
SW2 Pos 4	OFF		SW2	SWSP2	Unconnected Spare	High
SW2 Pos 5	OFF		SW2	CONFIG_SEL	FPGA Prog Select	High
SW2 Pos 6	OFF		SW2	FPGA_RST	Active Low Reset	High
SW4 Pos 1	OFF		SW4	OPTION_SW_1	Not used in FPGA	High
SW4 Pos 2	OFF		SW4	OPTION_SW_2	Not used in FPGA	High
SW4 Pos 3	OFF		SW4	OPTION_SW_3	Not used in FPGA	High
SW4 Pos 4	OFF		SW4	OPTION_SW_4	Not used in FPGA	High

2.9 SSD Slot vs. Port Mapping

Each SSD slot in the drivepack is assigned with a hardcoded PCIe port.

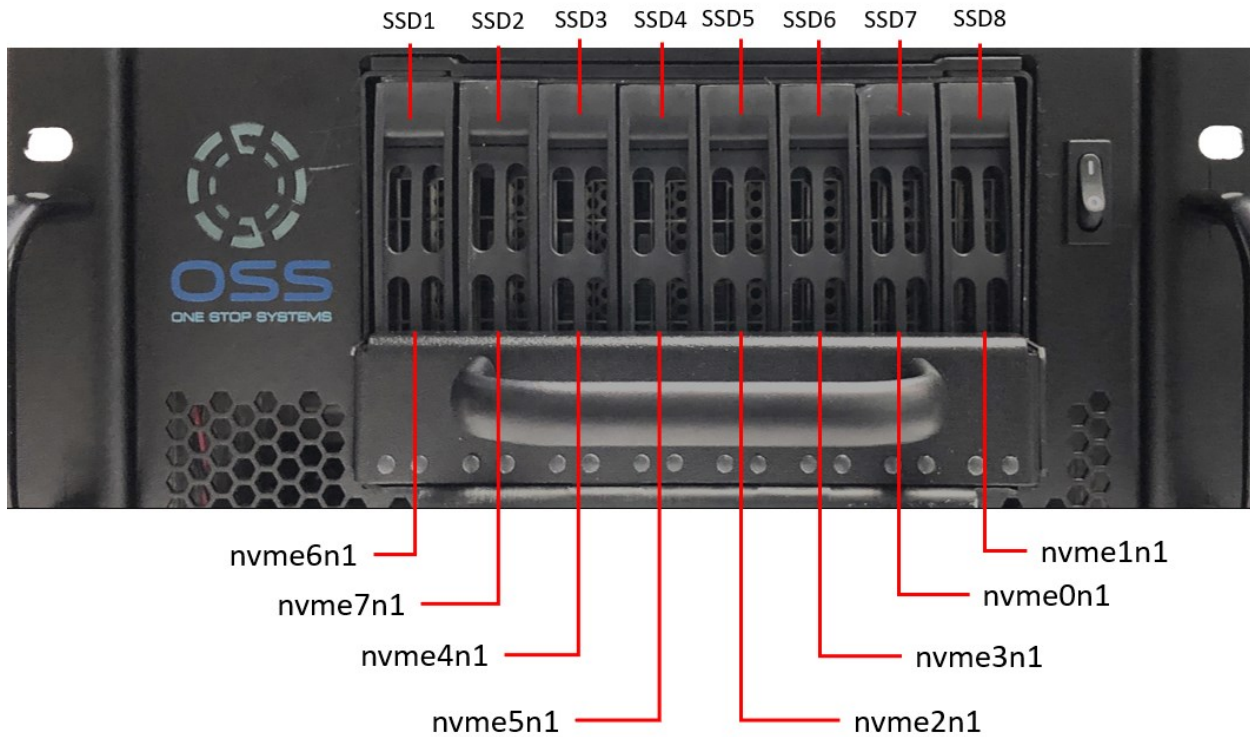
SSD Slot	PCIe Port
SSD1	Port 28
SSD2	Port 30
SSD3	Port 24
SSD4	Port 26
SSD5	Port 20
SSD6	Port 22
SSD7	Port 16
SSD8	Port 18
SFF-8644	PCIe Port
J1	Port 0



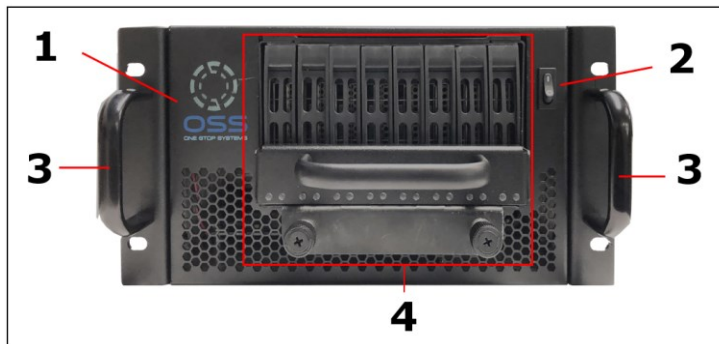
2.10 SSD Slot vs. nvme# Assignment

Applicable only to Centauri units with an 8-drive configuration (all 8 SSD slots populated with NVME drives).

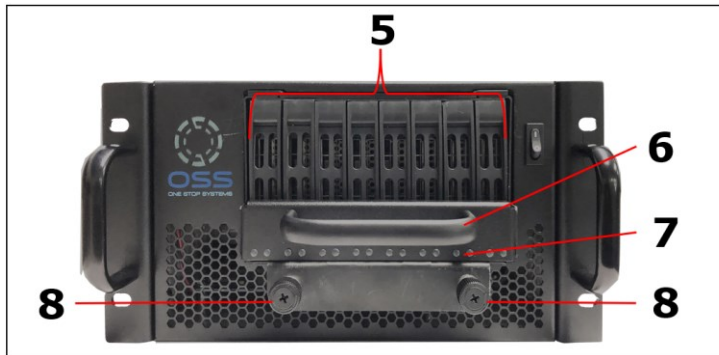
SSD Slot	NVME#
SSD1	nvme6n1
SSD2	nvme7n1
SSD3	nvme4n1
SSD4	nvme5n1
SSD5	nvme2n1
SSD6	nvme3n1
SSD7	nvme0n1
SSD8	nvme1n1



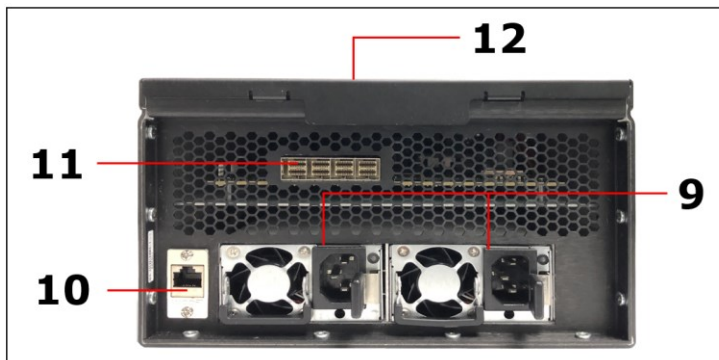
2.11 Centauri Overview



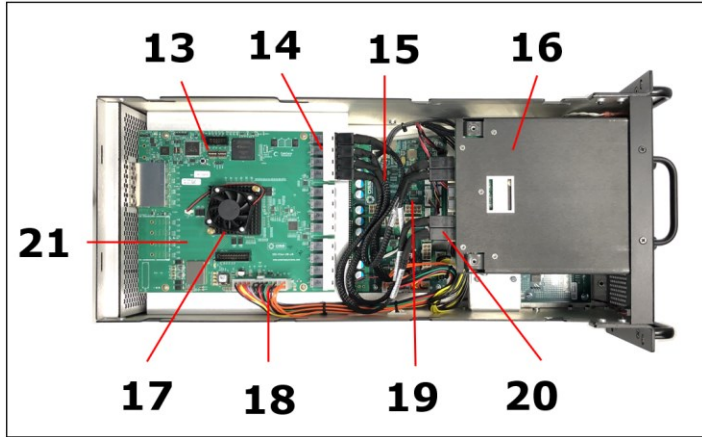
Number	Description
1	OSS LOGO-Power LED
2	Front Power Switch
3	Unit Front Handles
4	8-bay storage canister (Drivepack)



Number	Description
5	Drive Trays
6	Storage Canister Handle
7	Drive Power / Activity LEDs
8	Thumbscrews



Number	Description
9	Power Supplies
10	RJ-45 Port (For IPMI Access)
11	SFF-8643 Cable Ports / OSS-528 Board
12	Top Cover



Number	Description
13	Dipswitches
14	SFF-8643 Connectors on OSS-528 board
15	SFF-8643 Cables
16	Storage Bay Housing
17	Fan / PCIe Switch
18	ATX Power Supply Cable
19	Power Distribution Board
20	SFF-8643 Connectors on OSS-565 board
21	OSS-528 Board

3 Setting Up

3.1 Installation Overview

- Remove Top cover
- Verify SW1 dipswitch setting on OSS-528 board
- Plug in power cords
- Install OSS Host adapter card
- Connect LINK Cables
- Power UP the Centauri
- Power UP the host
- Verify hardware

3.2 Remove Top Cover

Remove two screws on each side of the unit.



Grab the metal handle from the rear of the top cover, see photos below.



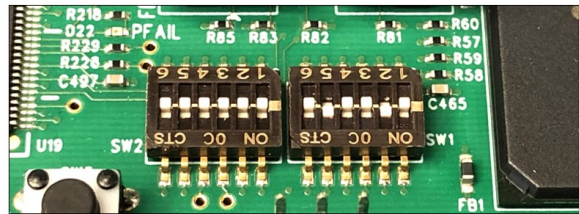
Gently pull the top cover then lift it up.



3.3 Verify SW1 Dipswitch Setting



Check the SW1 dipswitch settings on the OSS-528 BOARD. Make sure the switches are set correctly. Refer to the photos below for the correct settings.



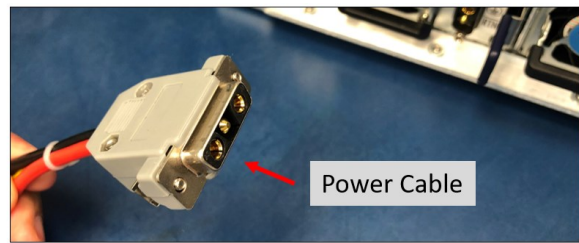
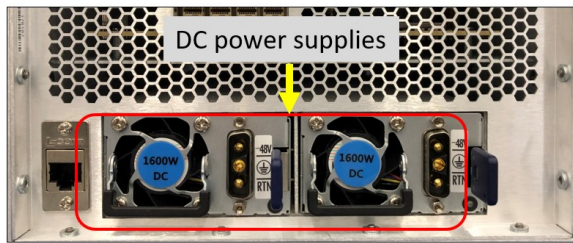
3.4 Connect Power Cords

3.4.1 Plug-in the power cords to the storage expansion unit.

AC Power Supply: Plugin the AC power cords to the power supply receptacles, see photos below.



DC Power Supply: Use a DC power cables. The DC power cables are not included with the unit.

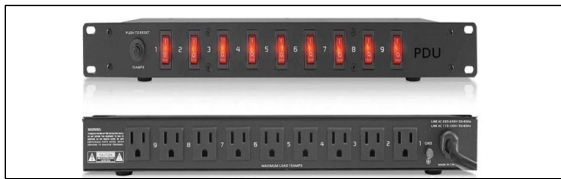


Mount the DC power cable to each power supply.



3.4.2 Plug in power cords to a PDU Power Strip

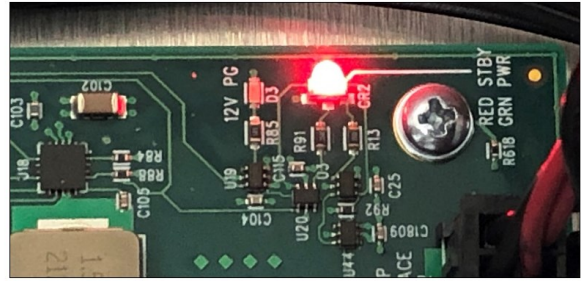
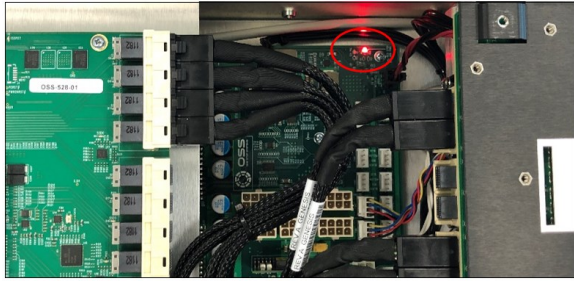
Connect the other end of the power cords to a PDU (Power Distribution Unit) power strip. It is highly recommended to use PDU with surge protection. Photo below is an example of PDU power strip.



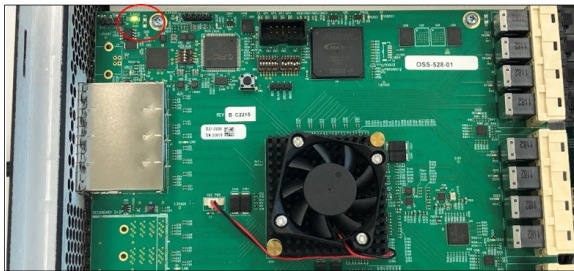
Turn ON the PDU power strip, upon switching ON, the LEDs on the power supply will illuminate from solid amber to blinking green.



In the storage expansion unit, the CR2 RED LED on the "PDB-Power Distribution Board" will illuminate as solid RED (standby mode).



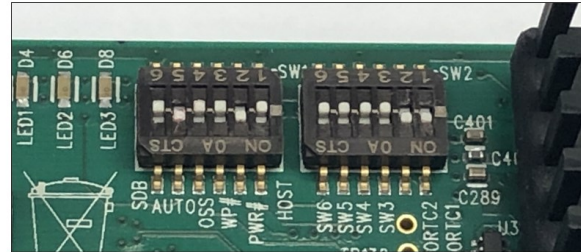
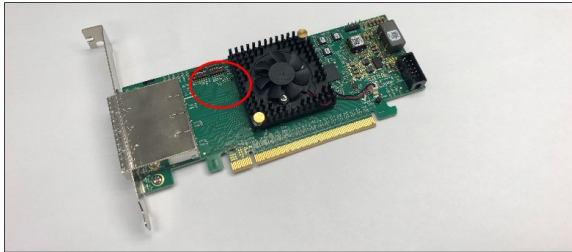
3.3AUX on the OSS-528 board will illuminate as solid green, see photos below.



3.5 Install OSS-518 Host Adapter Card



Set the dipswitches on the OSS host card to x16 host mode first.



Make sure the host computer is fully powered OFF before installing the host card as this can cause the board to short out.

Plug in the OSS host card in the computer's motherboard, use available x16 PCIe slot Gen4.



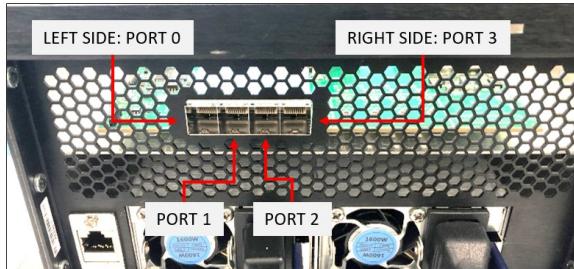
Secure the card. Photo below shows the position of the OSS host card in the server.



3.6 Connect LINK Cables

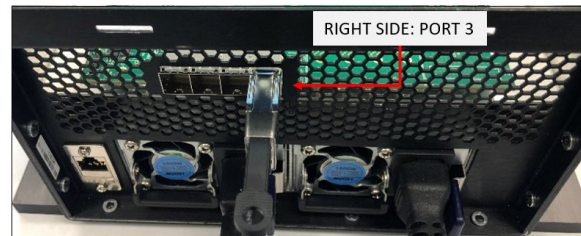
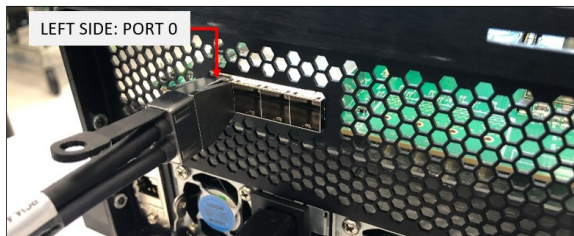
3.6.1 Connect SFF-8643 cables to storage expansion unit

Plug-in all four SFF-8643 LINK cables to the cable ports on the back of storage expansion unit, see following photos below.

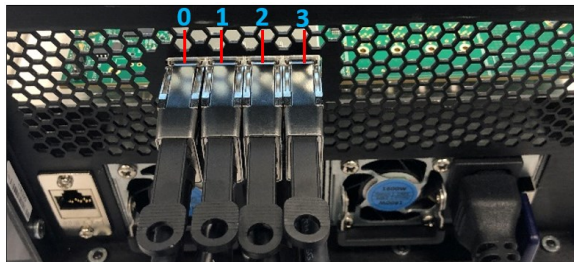


Start connecting the 1st cable to the primary "Port 0" located on the left side of the unit.

- o 2nd cable to Port 1
- o 3rd cable to Port 2
- o 4th cable to Port 3 which is located on the right side of the unit.



All four link cables are connected to the storage expansion unit as shown from the photo below.



Avoid forcing the link cables during installation. If the cable is not sliding in properly, do not force it in as this can damage the connector in the OSS-528 board. Check the cable-end connector for bent or protruding metal piece.

3.6.2 Connect SFF-8643 cables to Host card

Connect the other end of the cables to the OSS host card.

- Start connecting the 1st cable to Primary port 0, located on the TOP side.
 - 2nd cable to Port 1
 - 3rd cable to Port 2
 - 4th cable to Port 3 on the BOTTOM side.

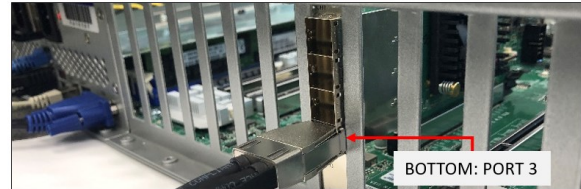
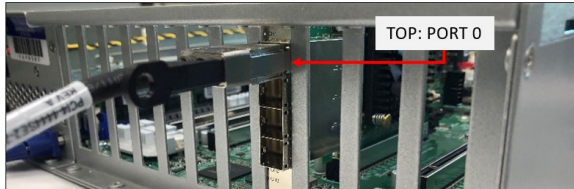
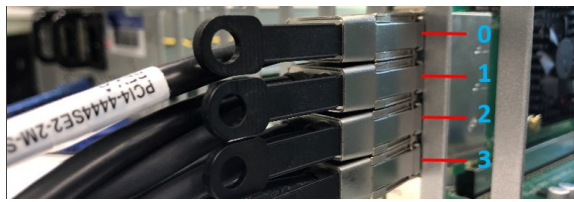
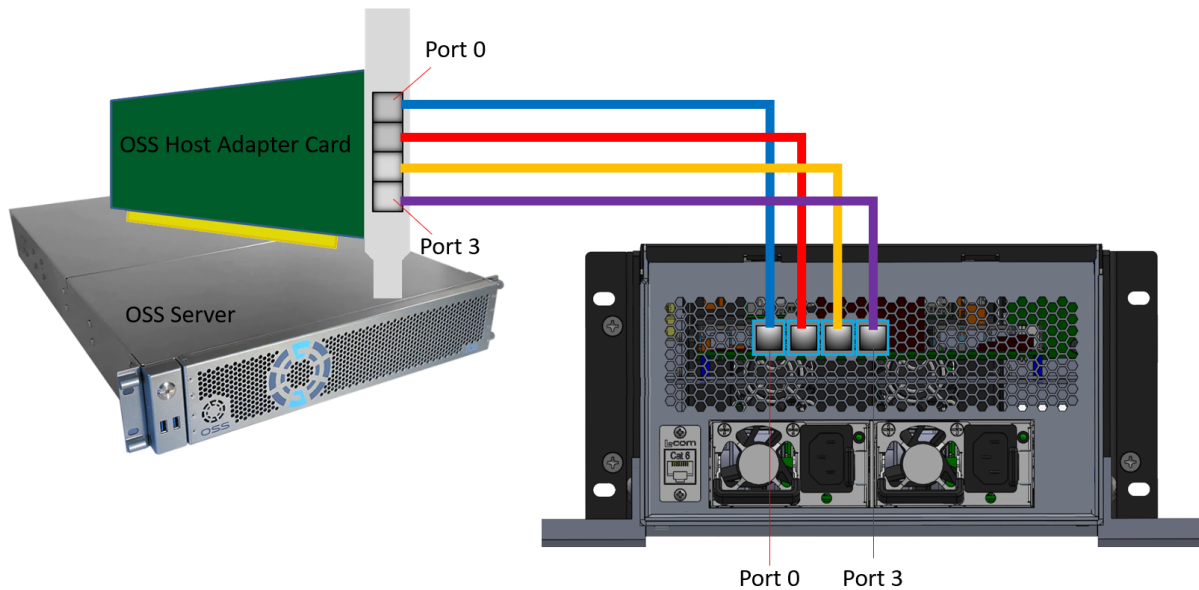


Photo below showing all link cables attached to the adapter card.



Use the diagram below as reference for connecting the SFF-8643 cables between the host card and storage expansion unit.



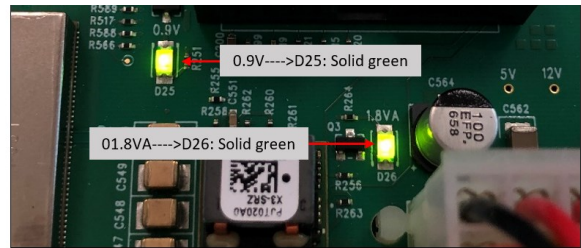
3.7 Turn ON the Storage Expansion Unit

Press the front switch to ON position.

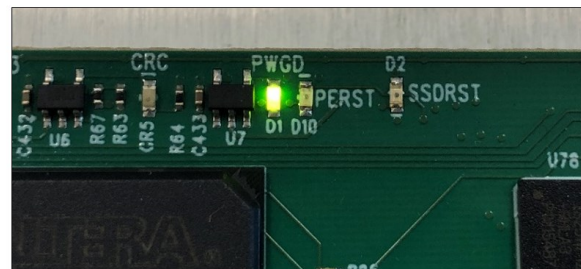
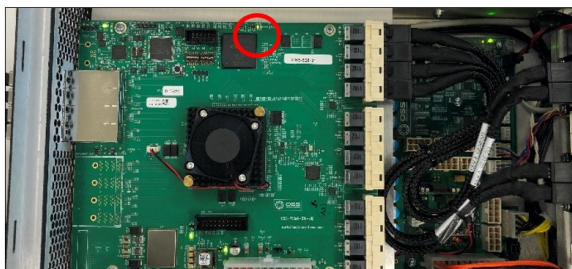


Upon powering ON the storage expansion unit, the following LEDs on the OSS-528 board will illuminate.

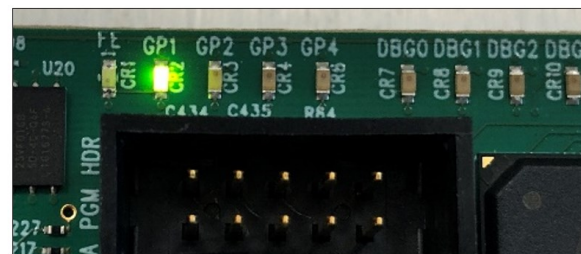
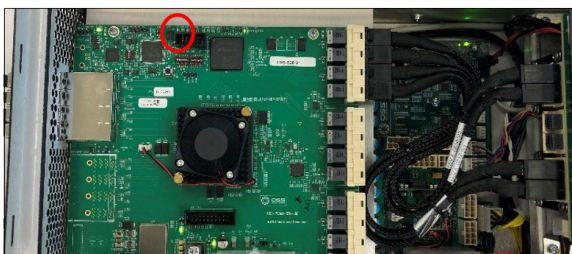
1.8VA----->D26: Solid green
0.9V----->D25: Solid green



PWGD----->D1: Solid green

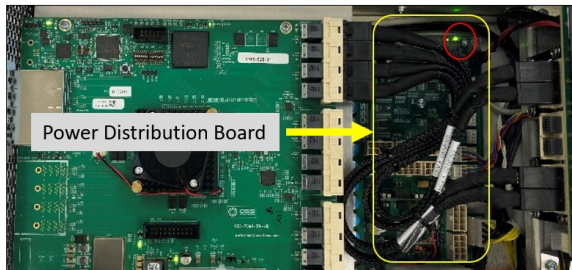


GPI----->CR2: Blinking green



The following LEDs will illuminate on the Power Distribution Board.

12V PG----->Solin green
CR2-----> Solid green



With the unit fully powered ON, the OSS LOGO LED will illuminate as solid blue and the power supply LEDs will illuminate as solid green. See photos below.

Front LED Logo----->Blue
Power Supply----->Solid green

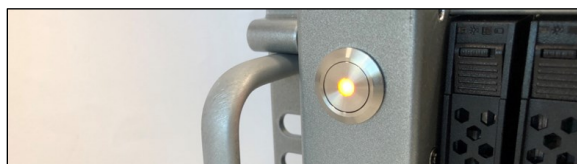


3.8 Turn ON the server

Connect the power cords to the host computer. In this setup, photo below is an example of OSS-2U server.

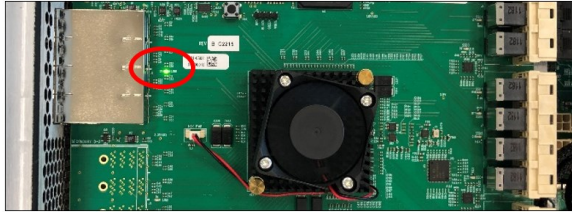


Power ON the host computer, press the main power button.



Upon powering UP the host computer the **LINK LED on the OSS-528 board will illuminate as solid green.**

D5-----Link LED is Solid green.



If the LINK LED is not coming ON, this indicates that there is NO connection between the computer and a storage expansion device. The handshaking is failed to materialize to allow both computer and the storage device to send protocols to each other.

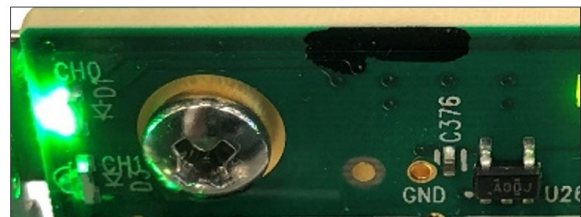
- Quick troubleshooting: Check the SFF-8643 cables, make sure all cables are inserted in the correct ports. Try reseating the cables.

The OSS host adapter card will illuminate the following LEDs after powering ON the computer

CHO (LINK STATUS LED)----->D1: solid bright green.



This indicates a good link between the host and storage expansion unit.



Quick troubleshooting:

- If the LINK STATUS LED is not illuminated on the host card, check all four link cables, make sure all cables are correctly and firmly seated on the host card and on the storage expansion unit.
- Verify the dipswitch settings on the host card is correct, it must be set to host mode x16.

CE (CARD EDGE)----->D11: solid green.

- This indicates a solid signal between the PCIe host card and the CPU.

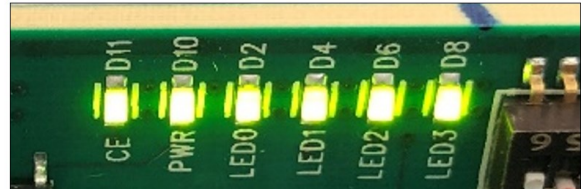
PWR----->D10: Blinking green (7 times interval).

LED0----->D2: solid green

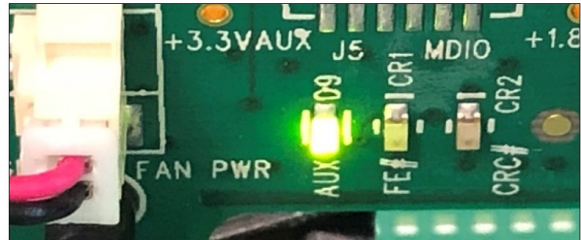
LED1----->D4: solid green

LED2----->D6: solid green

LED3----->D8: solid green



AUX----->D9: solid green



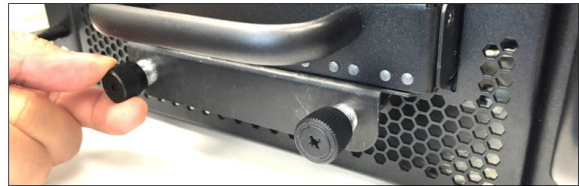
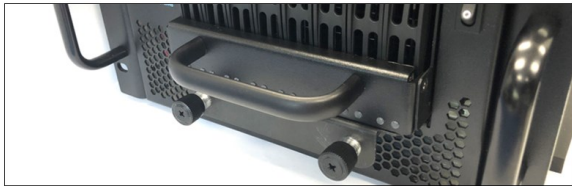
4 Drive Installation

4.1 Remove the Drive pack

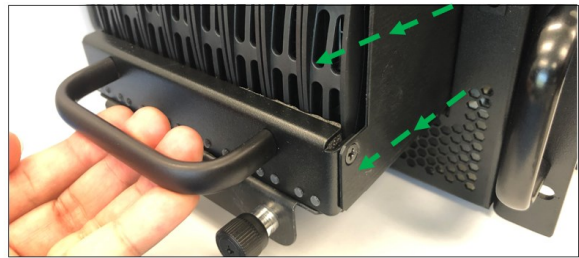


Turn OFF the storage expansion unit prior to installation of the Drive pack.

Turn the Thumbscrew counterclockwise to loosen the Drive pack.



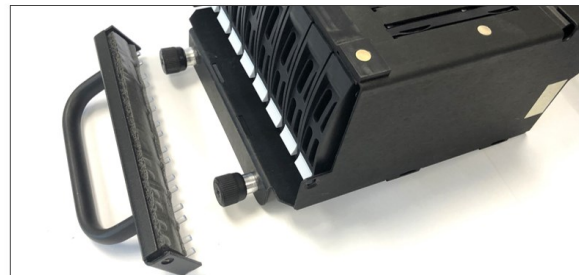
Grab the Drive pack front handle and gently pull the Drive pack away from the enclosure.



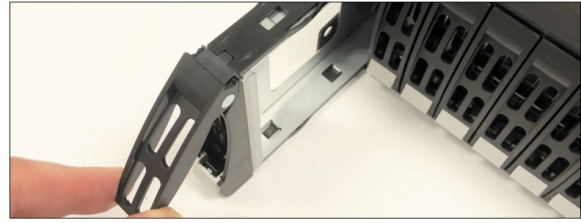
Set the Drive pack on a solid surface. Remove the mounting screw on each side.



Dismount the handle to access the drive trays.

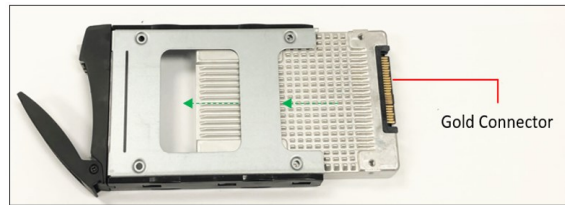
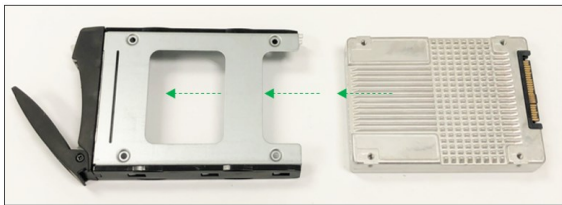


Press the eject button, grasp the handle, and gently pull the drive tray out.



4.2 Mount the Drives

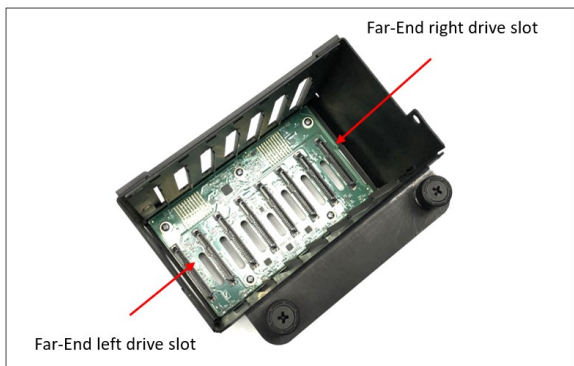
Place the hard drive tray on a flat, stable surface such as a desk, table, or work bench. Slide the hard drive into the tray with the gold-connector facing upward, see photos below.



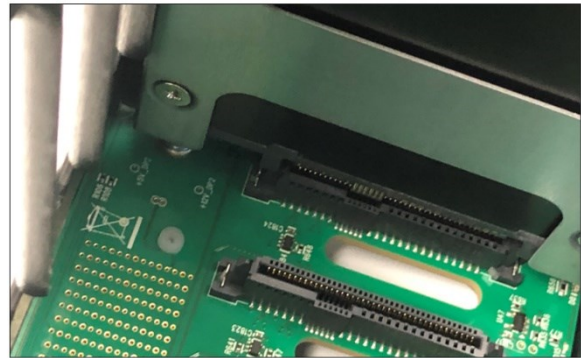
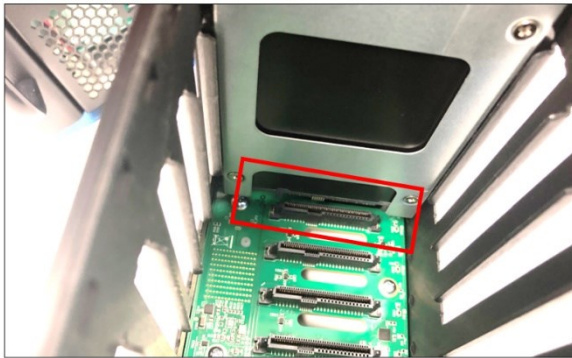
Carefully align the mounting holes between the hard drive and the tray. Secure the hard drive with all four screws.



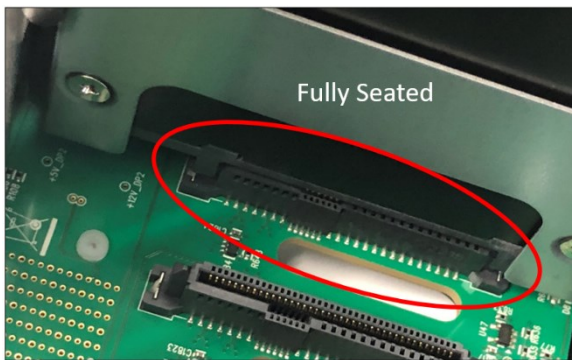
Place the Drive pack on a solid surface in a vertical position. When installing 8 drives, start installing the drive tray from the far-end right drive slot. This would give you visibility on the board slot during the drive tray installation.



Slowly insert the drive tray and check proper alignment between the drive connectors and the drive slot.



Make sure the drive connector is fully seated in the drive slot, see photo below

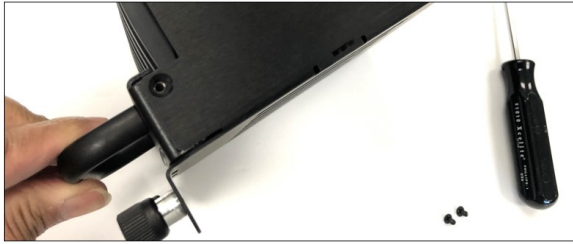


Push the drive tray into the hard drive bay as illustrated below, until the drive tray clicks into the locked position. Using the thumb, push against the lower part of the hard drive handle.



4.3 Reinstall the Drive pack

Reinstall the front handle and secure it (with two mounting screws, one per side).



Push the Drive pack into the enclosure. Turn both thumbscrews clockwise to secure.



4.4 Connect Power Cords

Plug in the AC power cords or DC power cords to the unit (located on the back).

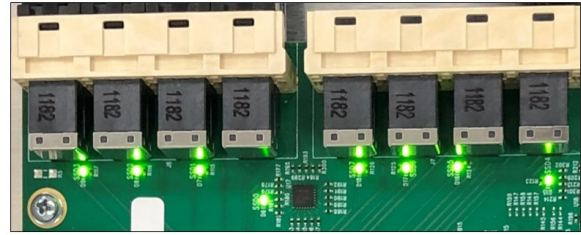
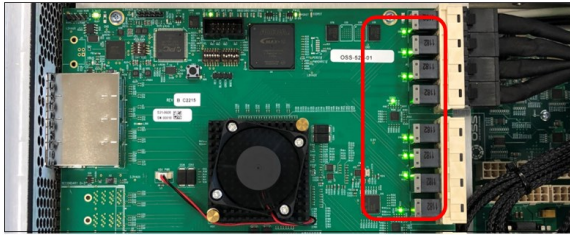
4.5 Connect LINK Cables

If link cables are not connected, reconnect the cables.

- Start connecting the cable from left to right on the storage expansion unit.
- Plug in the other cable to the host card in the computer. Start connecting cable from top to bottom.

4.6 Power UP the System

Flip the front power switch on the Centauri unit. Eight additional LEDs on the OSS-528 board will instantly illuminate as solid green, see photos below.



Eight Drive LEDs located on the front will illuminate as solid AMBER.

- If there is no IPMI module installed, the drive front LEDs will only illuminate solid amber.

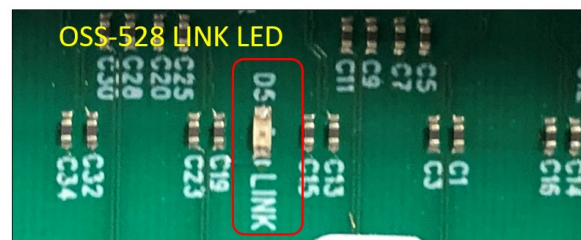
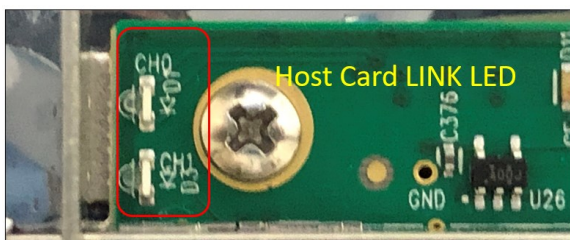


- If the expansion storage unit is equipped with IPMI, the drive front LEDs will illuminate as solid blue and amber, see photo below.



4.7 Turn ON the host computer / server

- Host card will link up with the Centauri unit.
- Host card LINK LED (CHO) will illuminate as solid green, see photo below.
- LINK LED (D5) on OSS-528 will illuminate as solid green, see photo below.



4.8 The unit is ready

- You can now start using the storage devices.

Check and verify all storage devices are properly detected and enumerated.

- On WINDOWS OS: Launch "Windows Disk Management" to check if all 8 drives are detected and to reinitialize each drive.
- On Linux: You need to install nvme application. Run "nvme list" command on the terminal windows to list all the drives.

For more information go to "Post Installation" section.

5 Post Installation

5.1 Linux: How to Check OSS Storage Expansion unit

To check the OSS devices, type `lspci -vvv | grep c010` on Linux terminal windows. Run the command as root user.

- The output below shows 16 c010 devices. It indicates that the CPU is detecting both OSS-518 host adapter cards and the OSS-528 board in the storage expansion unit.
- The c010 is the device ID for both OSS-518 Host adapter card and OSS-528 board.

```
oss@OSSSuperServer:~$ su root
Password:
root@OSSSuperServer:/home/oss# lspci -vvv | grep c010
86:00.0 PCI bridge: Broadcom / LSI Device c010 (rev b0) (prog-if 00 [Normal decode])
87:00.0 PCI bridge: Broadcom / LSI Device c010 (rev b0) (prog-if 00 [Normal decode])
87:1c.0 PCI bridge: Broadcom / LSI Device c010 (rev b0) (prog-if 00 [Normal decode])
88:00.0 PCI bridge: Broadcom / LSI Device c010 (rev b0) (prog-if 00 [Normal decode])
89:10.0 PCI bridge: Broadcom / LSI Device c010 (rev b0) (prog-if 00 [Normal decode])
8a:00.0 PCI bridge: Broadcom / LSI Device c010 (rev b0) (prog-if 00 [Normal decode])
8b:00.0 PCI bridge: Broadcom / LSI Device c010 (rev b0) (prog-if 00 [Normal decode])
8b:01.0 PCI bridge: Broadcom / LSI Device c010 (rev b0) (prog-if 00 [Normal decode])
8b:02.0 PCI bridge: Broadcom / LSI Device c010 (rev b0) (prog-if 00 [Normal decode])
8b:03.0 PCI bridge: Broadcom / LSI Device c010 (rev b0) (prog-if 00 [Normal decode])
8b:04.0 PCI bridge: Broadcom / LSI Device c010 (rev b0) (prog-if 00 [Normal decode])
8b:05.0 PCI bridge: Broadcom / LSI Device c010 (rev b0) (prog-if 00 [Normal decode])
8b:06.0 PCI bridge: Broadcom / LSI Device c010 (rev b0) (prog-if 00 [Normal decode])
8b:07.0 PCI bridge: Broadcom / LSI Device c010 (rev b0) (prog-if 00 [Normal decode])
8b:1f.0 PCI bridge: Broadcom / LSI Device c010 (rev b0) (prog-if 00 [Normal decode])
95:00.0 Mass storage controller: Broadcom / LSI Device c010 (rev b0)
```

If you run the `lspci -vvv | grep c010` and it is only showing "6" c010 device IDs, it is an indication that the CPU is only detecting the OSS-518 Host adapter card, see photo below.

```
root@OSSSuperServer:~# lspci -vvv | grep c010
86:00.0 PCI bridge: Broadcom / LSI Device c010 (rev b0) (prog-if 00 [Normal decode])
87:00.0 PCI bridge: Broadcom / LSI Device c010 (rev b0) (prog-if 00 [Normal decode])
87:1c.0 PCI bridge: Broadcom / LSI Device c010 (rev b0) (prog-if 00 [Normal decode])
88:00.0 PCI bridge: Broadcom / LSI Device c010 (rev b0) (prog-if 00 [Normal decode])
89:10.0 PCI bridge: Broadcom / LSI Device c010 (rev b0) (prog-if 00 [Normal decode])
8b:00.0 Mass storage controller: Broadcom / LSI Device c010 (rev b0)
```

To view the OSS devices in a hierarchy or tree-like structure, type `lspci -vvtt | grep -i 'Broadcom'` on Linux terminal window. See output below.

- Run the command as root user.

```

+00.4 Intel Corporation Device 0998
|-02.0-[86-95]----00.0-[87-95]--+00.0-[88-94]----00.0-[89-94]----10.0-[8a-94]----00.0-[8b-94]--+00.0-[8c]----00.0 Broadcom / LSI Device 02b2
|+01.0-[8d]----00.0 Broadcom / LSI Device 02b2
|+02.0-[8e]----00.0 Broadcom / LSI Device 02b2
|+03.0-[8f]----00.0 Broadcom / LSI Device 02b2
|+04.0-[90]----00.0 Broadcom / LSI Device 02b2
|+05.0-[91]----00.0 Broadcom / LSI Device 02b2
|+06.0-[92]----00.0 Broadcom / LSI Device 02b2
|+07.0-[93]----00.0 Broadcom / LSI Device 02b2
|+1f.0-[94]----00.0 Broadcom / LSI Device 00b2
|+1c.0-[95]----00.0 Broadcom / LSI Device c010
+--[0000:84]--+00.0 Intel Corporation Device 09a2
+--00.1 Intel Corporation Device 09a4

```

To check and view the link speed and link width of the OSS device.

- First, run `lspci -vvv | grep c010` on the terminal window to see all PCI Bus Numbers assigned for c010 devices.
- Next is to grep the LinkStat and LnkCap for the specific PCI Bus Number, in this example we will use the 86:00.00.
- Run `lspci -vvv - 86:00.00 | grep 'LnkSta\|LnkCap'`.
 - *Replace the "86:00.00" with the BUS ID Number from your systems's `lspci -vvv | grep c010` output.*

```

root@OSSuperServer:/home/oss# lspci -vvv | grep c010
86:00.0 PCI bridge: Broadcom / LSI Device c010 (rev b0) (prog-if 00 [Normal decode])
87:00.0 PCI bridge: Broadcom / LSI Device c010 (rev b0) (prog-if 00 [Normal decode])
87:1c.0 PCI bridge: Broadcom / LSI Device c010 (rev b0) (prog-if 00 [Normal decode])
88:00.0 PCI bridge: Broadcom / LSI Device c010 (rev b0) (prog-if 00 [Normal decode])
89:10.0 PCI bridge: Broadcom / LSI Device c010 (rev b0) (prog-if 00 [Normal decode])
8a:00.0 PCI bridge: Broadcom / LSI Device c010 (rev b0) (prog-if 00 [Normal decode])
8b:00.0 PCI bridge: Broadcom / LSI Device c010 (rev b0) (prog-if 00 [Normal decode])
8b:01.0 PCI bridge: Broadcom / LSI Device c010 (rev b0) (prog-if 00 [Normal decode])
8b:02.0 PCI bridge: Broadcom / LSI Device c010 (rev b0) (prog-if 00 [Normal decode])
8b:03.0 PCI bridge: Broadcom / LSI Device c010 (rev b0) (prog-if 00 [Normal decode])
8b:04.0 PCI bridge: Broadcom / LSI Device c010 (rev b0) (prog-if 00 [Normal decode])
8b:05.0 PCI bridge: Broadcom / LSI Device c010 (rev b0) (prog-if 00 [Normal decode])
8b:06.0 PCI bridge: Broadcom / LSI Device c010 (rev b0) (prog-if 00 [Normal decode])
8b:07.0 PCI bridge: Broadcom / LSI Device c010 (rev b0) (prog-if 00 [Normal decode])
8b:1f.0 PCI bridge: Broadcom / LSI Device c010 (rev b0) (prog-if 00 [Normal decode])
95:00.0 Mass storage controller: Broadcom / LSI Device c010 (rev b0)

```

- The output below shows the Link Speed is 16GT/s and Link Width is x16.

```

root@OSSuperServer:/home/oss# lspci -vvv -s 86:00.0 | grep 'LnkSt\|LnkCap'
LnkCap: Port #0, Speed 16GT/s, Width x16, ASPM L0s L1, Exit Latency L0s <4us, L1 <32us
LnkSta: Speed 16GT/s (ok), Width x16 (ok)
LnkSta2: Current De-emphasis Level: -3.5dB, EqualizationComplete+, EqualizationPhase1+
root@OSSuperServer:/home/oss#

```

To check the link speed and link width of the OSS Broadcom device, use the following command.

- `lspci -vvv -s 94:00.0 | grep 'LnkSta\\|LnkCap'`
- Replace the PCI BUS Number 94:00.00 with the PCI BUS number assigned to your device (from your system).

Follow these steps:

- First, run `lspci -vvvt | grep -i 'NVME\\|Broadcom'`
 - o This will show the hierarchy or tree-like structure with their corresponding PCIe Bus Number.
- Next, write down the PCIe Bus Number that you choose to check, in this example it is 94:00.0
- On the terminal window, type `lspci -vvv -s 94:00.0 | grep 'LnkSta\\|LnkCap'`
 - o It will display the Link Speed and Link Width, the drive slot runs at Gen4 (x16GT/s speed), and the Link Width is @ x16, see output below.

```
root@OSSuperServer:~# lspci -vvvt | grep -i 'NVME\\|Broadcom'
|-02.0-[86-95]----00.0-[87-95]----+00.0-[88-94]----00.0-[89-94]----10.0-[8a-94]----00.0-[8b-94]--+00.0-[8c]----00.0 KIOXIA Corporation NVMe SSD Controller Cx6
+--01.0-[8d]----00.0 KIOXIA Corporation NVMe SSD Controller Cx6
+--02.0-[8e]----00.0 KIOXIA Corporation NVMe SSD Controller Cx6
+--03.0-[8f]----00.0 KIOXIA Corporation NVMe SSD Controller Cx6
+--04.0-[90]----00.0 KIOXIA Corporation NVMe SSD Controller Cx6
+--05.0-[91]----00.0 KIOXIA Corporation NVMe SSD Controller Cx6
+--06.0-[92]----00.0 KIOXIA Corporation NVMe SSD Controller Cx6
+--07.0-[93]----00.0 KIOXIA Corporation NVMe SSD Controller Cx6
|-1c.0-[95]----00.0 Broadcom / LSI Device c010
|-05.0-[82]----00.0 Phison Electronics Corporation E16 PCIe4 NVMe Controller
|-1f.0-[94]----00.0 Broadcom / LSI Device 00b2

root@OSSuperServer:~# lspci -vvv -s 94:00.0 | grep 'LnkSta\\|LnkCap'
LnkCap: Port #0, Speed 16GT/s, Width x16, ASPM not supported
LnkSta: Speed 16GT/s (ok), Width x16 (ok)
LnkSta2: Current De-emphasis Level: -6dB, EqualizationComplete-, EqualizationPhase1-
root@OSSuperServer:~#
```

5.2 Linux: How to Check the NVME Drives

Run `nvme -list` to check if all 8 NVME drives are detected.

- You need to install `nvme cli` application first to run the `nvme -list` command.
- Run the command as root user.

#`nvme -list`, output below shows 9 NVME drives are detected. Out of the 9 drives, the eight are the nvme drives in the OSS Drive pack. The 9th drive is the primary boot device in the computer.

8 NVME Drives detected (Installed in the Drivepack)

```
oss@OSSSuperServer:~$ su
Password:
root@OSSSuperServer:/home/oss# nvme -list
-----
Node          SN              Model              Namespace Usage              Format              FW Rev
-----
/dev/nvme0n1  SH220501337    NS1563UF13T8      1 3.84 TB / 3.84 TB          512 B + 0 B        0A101200
/dev/nvme1n1  SH220501287    NS1563UF13T8      1 3.84 TB / 3.84 TB          512 B + 0 B        0A101200
/dev/nvme2n1  SH220501263    NS1563UF13T8      1 3.84 TB / 3.84 TB          512 B + 0 B        0A101200
/dev/nvme3n1  SH220501394    NS1563UF13T8      1 3.84 TB / 3.84 TB          512 B + 0 B        0A101200
/dev/nvme4n1  SH220501312    NS1563UF13T8      1 3.84 TB / 3.84 TB          512 B + 0 B        0A101200
/dev/nvme5n1  SH220501270    NS1563UF13T8      1 3.84 TB / 3.84 TB          512 B + 0 B        0A101200
/dev/nvme6n1  SH220501380    NS1563UF13T8      1 3.84 TB / 3.84 TB          512 B + 0 B        0A101200
/dev/nvme7n1  SH220501315    NS1563UF13T8      1 3.84 TB / 3.84 TB          512 B + 0 B        0A101200
/dev/nvme8n1  7F600714089D89301194 Sabrent Rocket 4.0 1TB 1 1.00 TB / 1.00 TB          512 B + 0 B        RKT401.3
root@OSSSuperServer:/home/oss#
```

This is the M.2 NVME bootable drive in the computer

To identify the primary or main nvme bootable device from the list (above), use the command `df -ht | grep /$`.

The output below shows the `/dev/nvme8n1` is the main bootable drive.

```
oss@OSSSuperServer:~$ su
Password:
root@OSSSuperServer:/home/oss# nvme -list
-----
Node          SN              Model              Namespace Usage              Format              FW Rev
-----
/dev/nvme0n1  SH220501337    NS1563UF13T8      1 3.84 TB / 3.84 TB          512 B + 0 B        0A101200
/dev/nvme1n1  SH220501287    NS1563UF13T8      1 3.84 TB / 3.84 TB          512 B + 0 B        0A101200
/dev/nvme2n1  SH220501263    NS1563UF13T8      1 3.84 TB / 3.84 TB          512 B + 0 B        0A101200
/dev/nvme3n1  SH220501394    NS1563UF13T8      1 3.84 TB / 3.84 TB          512 B + 0 B        0A101200
/dev/nvme4n1  SH220501312    NS1563UF13T8      1 3.84 TB / 3.84 TB          512 B + 0 B        0A101200
/dev/nvme5n1  SH220501270    NS1563UF13T8      1 3.84 TB / 3.84 TB          512 B + 0 B        0A101200
/dev/nvme6n1  SH220501380    NS1563UF13T8      1 3.84 TB / 3.84 TB          512 B + 0 B        0A101200
/dev/nvme7n1  SH220501315    NS1563UF13T8      1 3.84 TB / 3.84 TB          512 B + 0 B        0A101200
/dev/nvme8n1  7F600714089D89301194 Sabrent Rocket 4.0 1TB 1 1.00 TB / 1.00 TB          512 B + 0 B        RKT401.3
root@OSSSuperServer:/home/oss# df -ht | grep /$
/dev/nvme8n1p5_ext4 916G 12G 858G 2% /
root@OSSSuperServer:/home/oss#
```

This is the M.2 NVME bootable drive in the computer

5.2.1 Drive & Slot Hierarchy - Linux

To check 8 NVME drivers in hierarchy or tree-like structure, use `lspci -vvt | grep -I 'NVME|Broadcom'`.

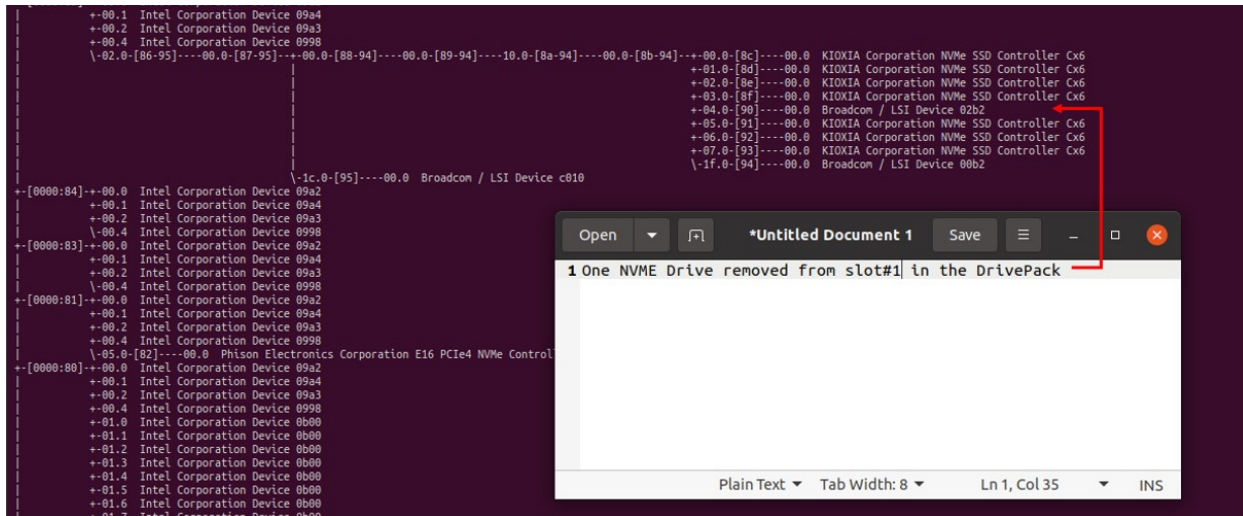
```

root@OSSuperServer:~# lspci -vvt | grep -I 'NVME|Broadcom'
|-02.0-[86-95]----00.0-[87-95]----00.0-[88-94]----00.0-[89-94]----10.0-[8a-94]----00.0-[8b-94]---+00.0-[8c]----00.0 KIOXIA Corporation NVMe SSD Controller Cx6
|-----+01.0-[8d]----00.0 KIOXIA Corporation NVMe SSD Controller Cx6
|-----+02.0-[8e]----00.0 KIOXIA Corporation NVMe SSD Controller Cx6
|-----+03.0-[8f]----00.0 KIOXIA Corporation NVMe SSD Controller Cx6
|-----+04.0-[90]----00.0 KIOXIA Corporation NVMe SSD Controller Cx6
|-----+05.0-[91]----00.0 KIOXIA Corporation NVMe SSD Controller Cx6
|-----+06.0-[92]----00.0 KIOXIA Corporation NVMe SSD Controller Cx6
|-----+07.0-[93]----00.0 KIOXIA Corporation NVMe SSD Controller Cx6
|-----\1f.0-[94]----00.0 Broadcom / LSI Device 00b2
|-----\1c.0-[95]----00.0 Broadcom / LSI Device c010
|-05.0-[82]----00.0 Phison Electronics Corporation E16 PCIe4 NVMe Controller
    
```

The following screenshots represent the virtual spot or location when individual NVME drive is ejected or removed from the occupied slot in the Drive pack while the Linux OS is running. Using `lspci -vvt` command on the terminal window will display the nvme drive slot hierarchy order.

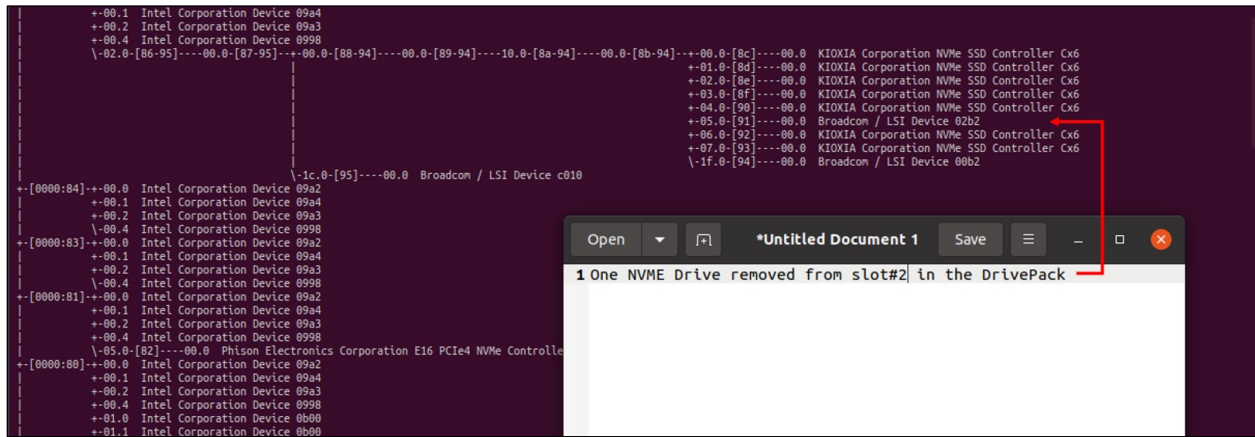
One NVME drive is ejected / removed from slot#1 in the Drive pack.

- Photo below shows the empty spot that was occupied by the NVME drive.



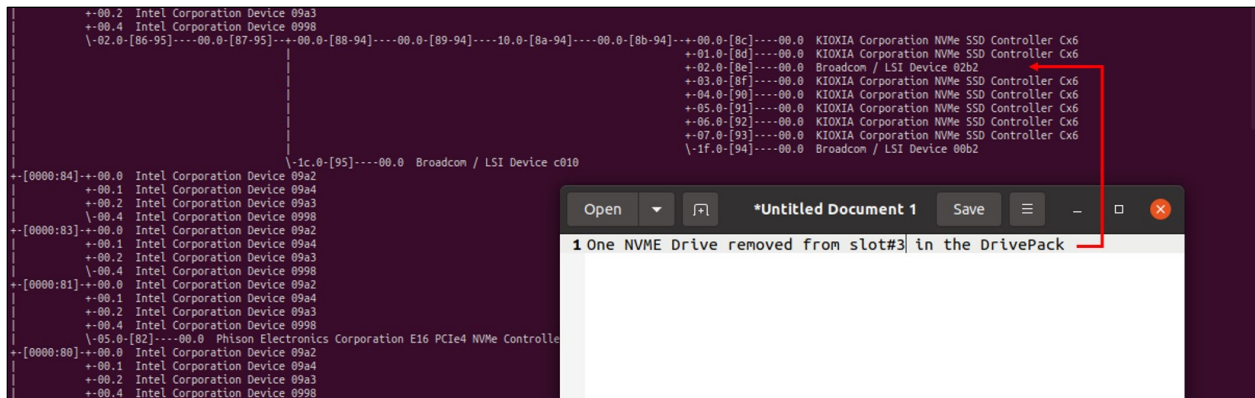
One NVME drive is ejected / removed from slot#2 in the Drive pack.

- Photo below shows the empty spot that was occupied by the NVME drive.



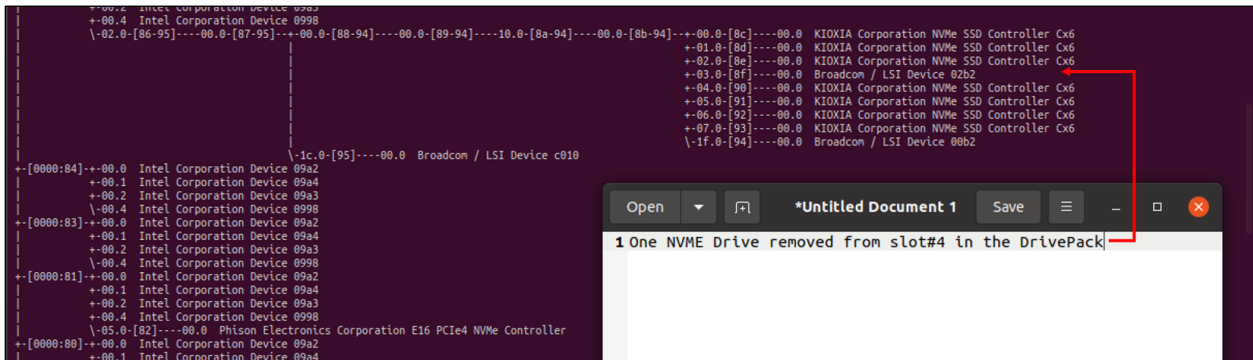
One NVME drive is ejected / removed from slot#3 in the Drive pack.

- Photo below shows the empty spot that was occupied by the NVME drive.



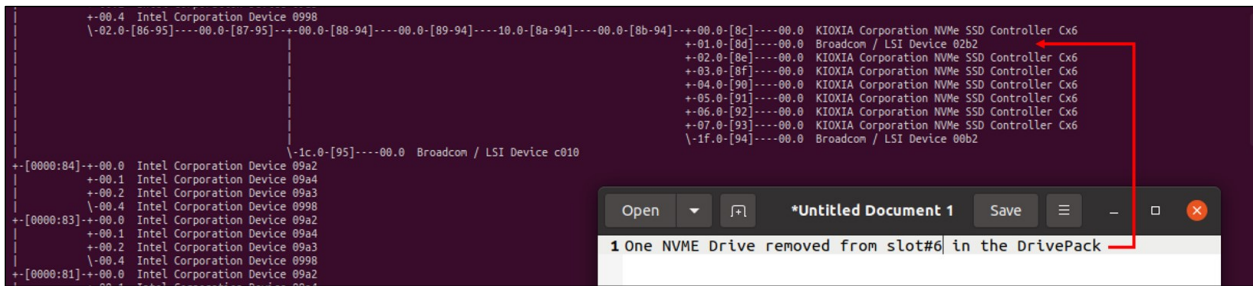
One NVME drive is ejected / removed from slot#4 in the Drive pack.

- Photo below shows the empty spot that was occupied by the NVME drive.



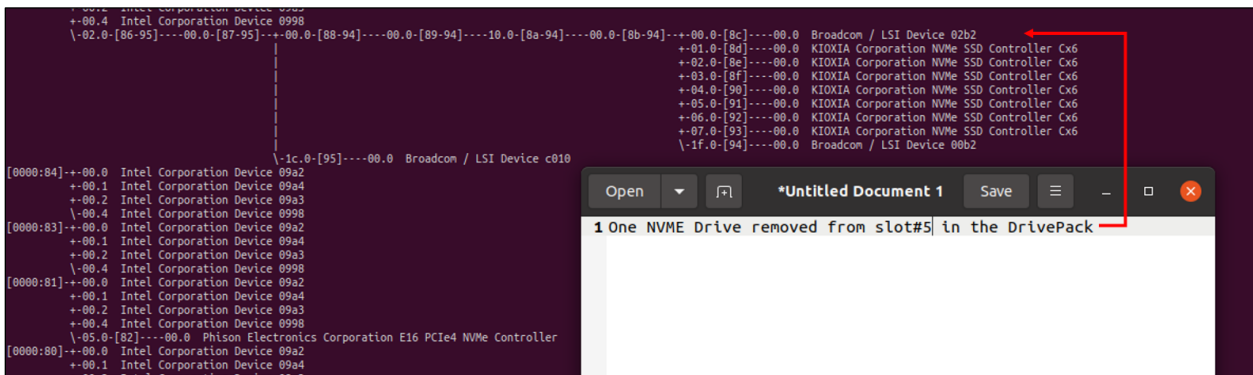
One NVME drive is ejected / removed from slot#6 in the Drive pack.

- Photo below shows the empty spot that was occupied by the NVME drive.



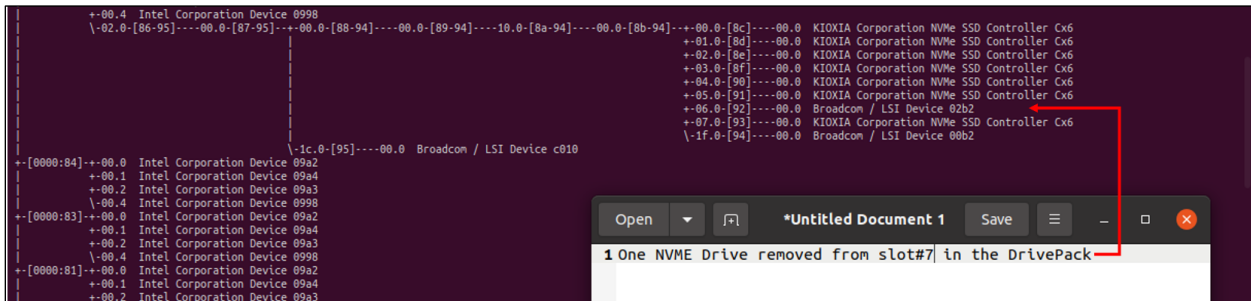
One NVME drive is ejected / removed from slot#5 in the Drive pack.

- Photo below shows the empty spot that was occupied by the NVME drive.



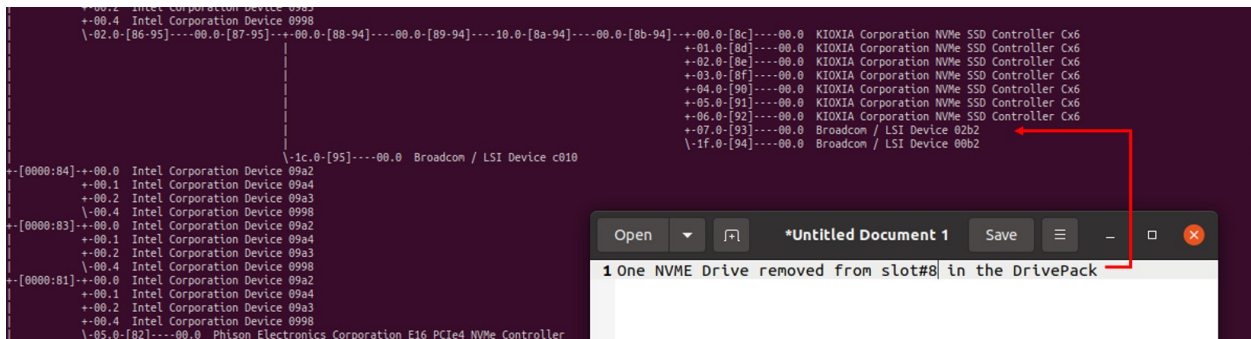
One NVME drive is ejected / removed from slot#7 in the Drive pack.

- Photo below shows the empty spot that was occupied by the NVME drive.



One NVME drive is ejected / removed from slot#8 in the Drive pack.

- Photo below shows the empty spot that was occupied by the NVME drive.



To check the link width of the drive slot where the NVME drive is actively seated, use the command below.

- `lspci -vvv -s 8c:00.0 | grep 'LnkSta\\|LnkCap'`
- Replace the PCI BUS Number 8c:00.00 with the PCI BUS number assigned to your drive (from your system).

Follow these steps:

- First, run `lspci -vvt | grep -i 'NVME\\|Broadcom'`
 - This will show the hierarchy or tree-like structure of the NVME drives with their corresponding PCIe Bus Number.
- Next, write down the PCIe Bus Number that you choose to check, in this example it is 8c:00.0

```
root@OSSuperServer:~# lspci -vvt | grep -i 'NVME\\|Broadcom'
|-02.0-[86-95]----00.0-[87-95]----00.0-[88-94]----00.0-[89-94]----10.0-[8a-94]----00.0-[8b-94]---+00.0-[8c]----00.0 KIOXIA Corporation NVMe SSD Controller Cx6
+01.0-[8d]----00.0 KIOXIA Corporation NVMe SSD Controller Cx6
+02.0-[8e]----00.0 KIOXIA Corporation NVMe SSD Controller Cx6
+03.0-[8f]----00.0 KIOXIA Corporation NVMe SSD Controller Cx6
+04.0-[90]----00.0 KIOXIA Corporation NVMe SSD Controller Cx6
+05.0-[91]----00.0 KIOXIA Corporation NVMe SSD Controller Cx6
+06.0-[92]----00.0 KIOXIA Corporation NVMe SSD Controller Cx6
+07.0-[93]----00.0 KIOXIA Corporation NVMe SSD Controller Cx6
|-1f.0-[94]----00.0 Broadcom / LSI Device 00b2
|-1c.0-[95]----00.0 Broadcom / LSI Device c010
|-05.0-[82]----00.0 Phison Electronics Corporation E16 PCIe4 NVMe Controller
root@OSSuperServer:~# lspci -vvv -s 8c:00.0 | grep 'LnkSta\\|LnkCap'
LnkCap: Port #0, Speed 16GT/s, Width x4, ASPM not supported
LnkSta: Speed 16GT/s (ok), Width x2 (downgraded)
LnkSta2: Current De-emphasis Level: -6dB, EqualizationComplete+, EqualizationPhase1+
root@OSSuperServer:~#
```

- On the terminal window, type `lspci -vvv -s 8c:00.0 | grep 'LnkSta\\|LnkCap'`
 - It will display the "Link Speed: and Link Width."
 - The drive slot runs at Gen4 (x16GT/s speed), and the Link Width is @ x2, see output below.

```
root@OSSuperServer:~# lspci -vvv -s 8c:00.0 | grep 'LnkSta\\|LnkCap'
LnkCap: Port #0, Speed 16GT/s, Width x4, ASPM not supported
LnkSta: Speed 16GT/s (ok), Width x2 (downgraded)
LnkSta2: Current De-emphasis Level: -6dB, EqualizationComplete+, EqualizationPhase1+
root@OSSuperServer:~#
```

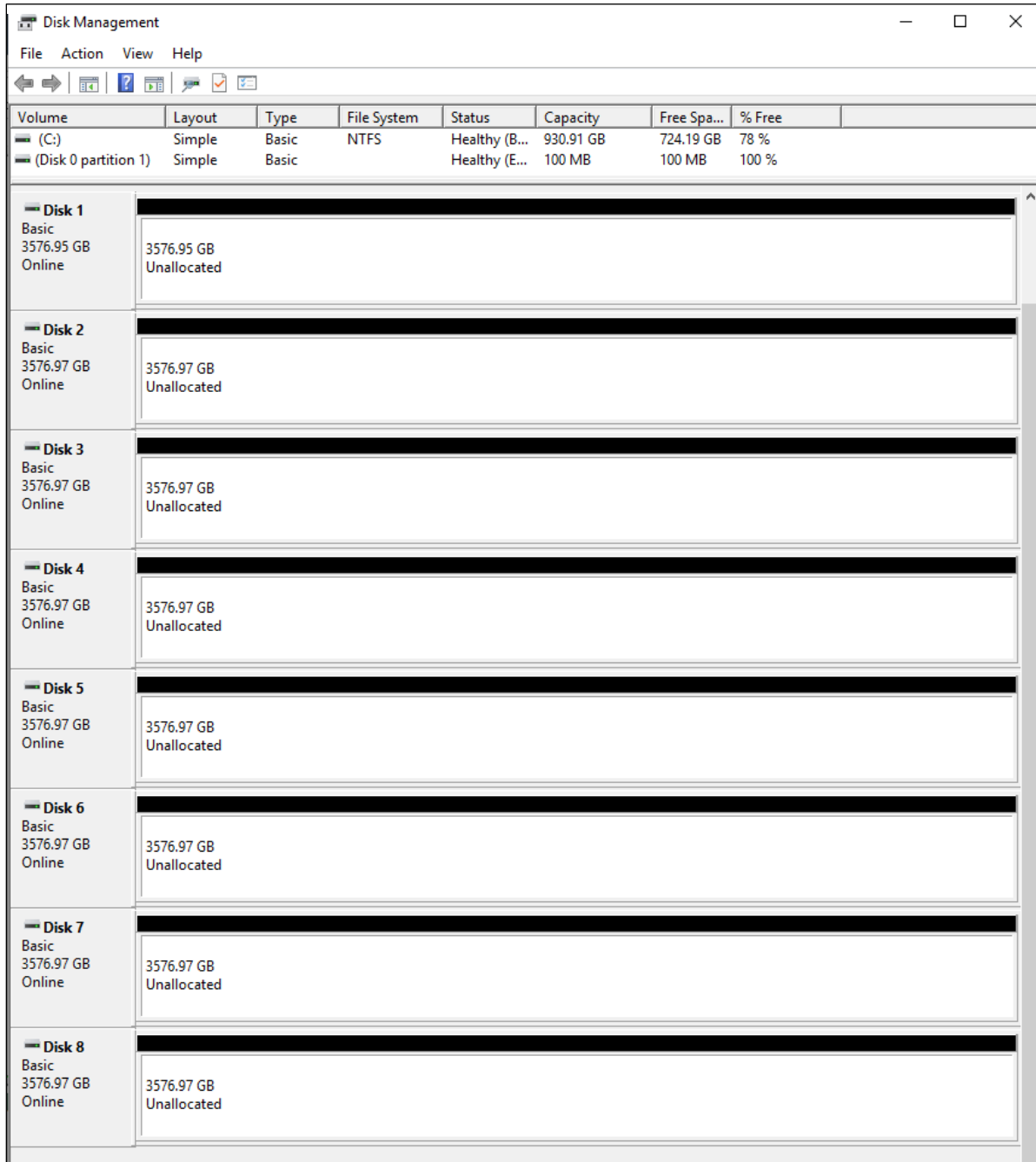
5.3 Windows OS: How to Check the NVME Drives

To check the NVME drives on Windows, there are multiple ways to do it. You can use the Windows Disk Management or the Windows Device Manager.

Using Windows Disk Management:

From the Windows desktop, right click on the Windows LOGO and select Disk Management.

- Screenshot below shows 8 NVME drives detected.



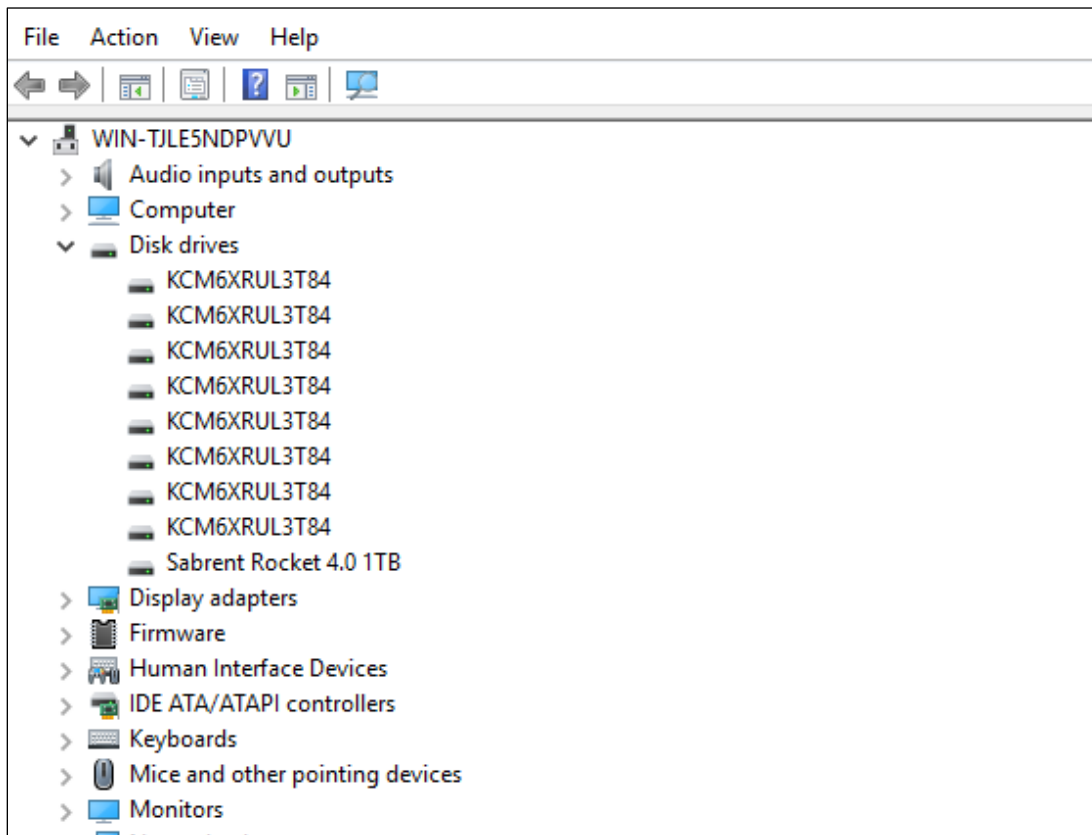
Using Windows Device Manager-Device by Type:

From the Windows desktop, right click on the Windows LOGO and select Device Manager.

- From the top menu, select VIEW, then select "Device by Type."
- Select Disk drives and expand or collapse the "arrow sign" or the "plus sign."



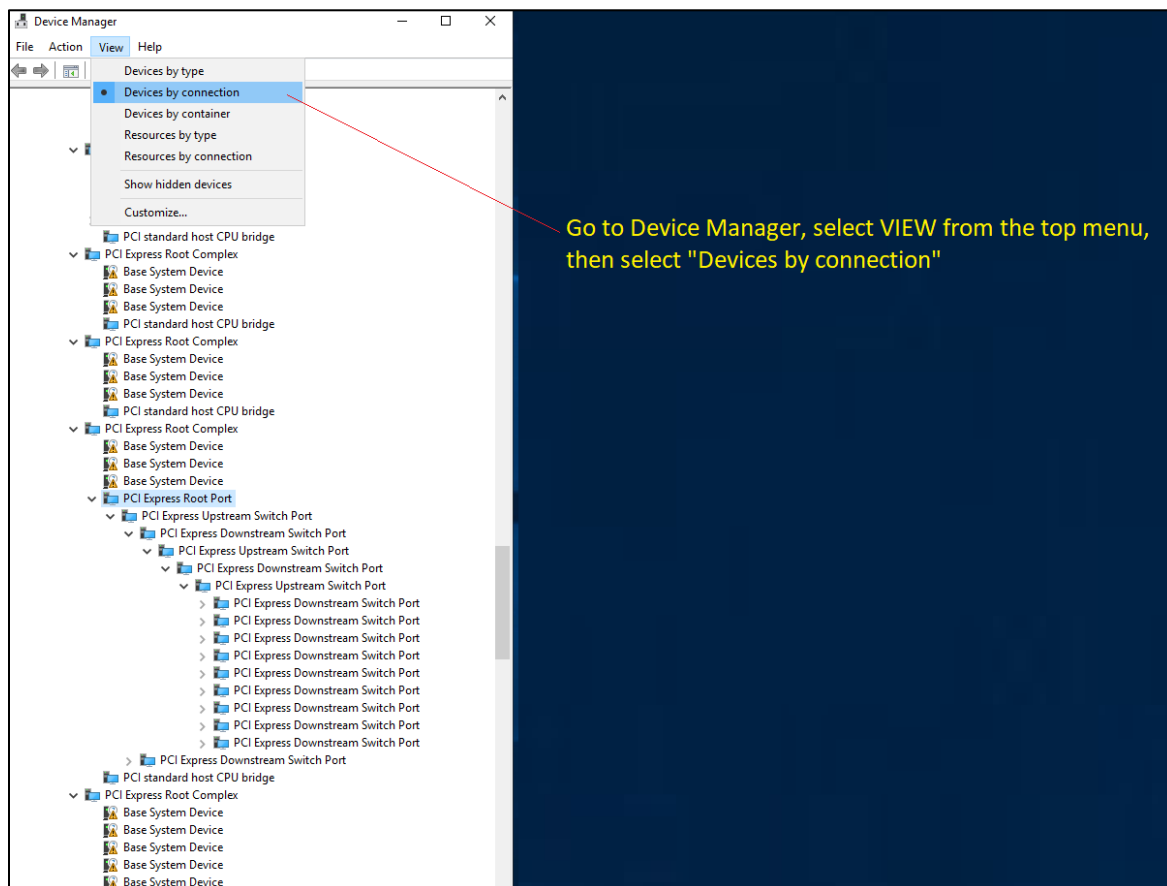
- Screenshot below shows 8 NVME drives detected.

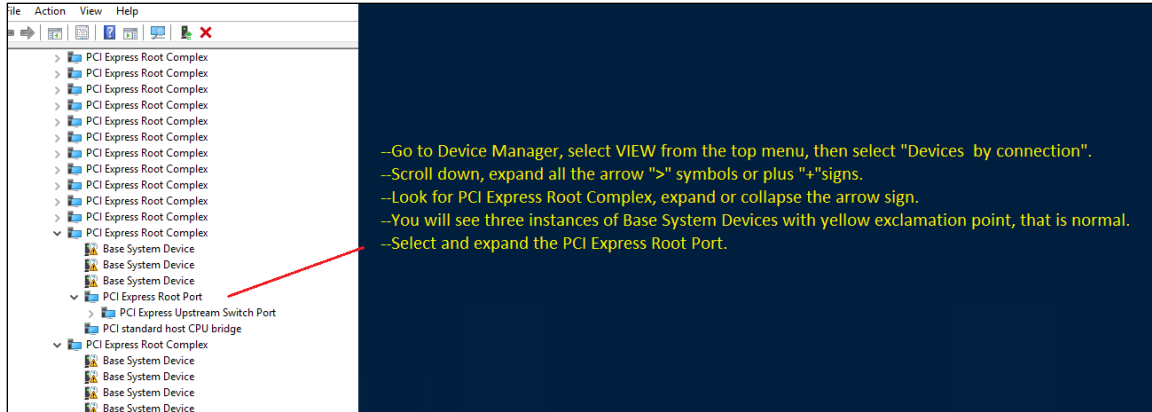


5.4 Windows OS: How to Check OSS Storage Expansion unit

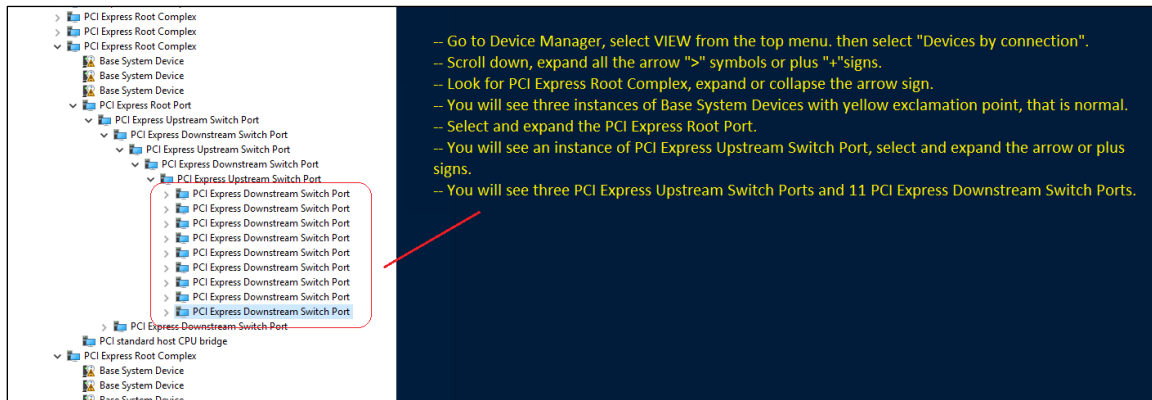
Using Windows Device Manager - Devices by Connection:

1. Start Device Manager
2. From the top menu, click View; from the list select "Devices by connection".
3. Scroll down, expand all the arrow ">" signs or plus "+" signs
4. Look for PCI Express Root Complex; click all the arrow ">" signs to expand or collapse. Three instances of "Base Systems Devices" will appear with a yellow exclamation point, this is normal.
 - a. Expand all PCI Express Root Port, an instance of PCI Express Upstream Switch Port will be visible; expand the arrow ">" or plus "+" signs next to it; 3 instances of PCI Express Upstream Switch Port and 11 PCI Express Downstream Switch Port will be visible.
 - b. Click all the arrow ">" or plus "+" signs to expand or collapse the PCI Express Downstream Switch Port; 8 instances of "Standard NVME Express Controller" will appear.
 - c. Click all the arrow ">" or plus "+" signs to expand or collapse the NVME Express Controller, an NVME storage drive will appear.

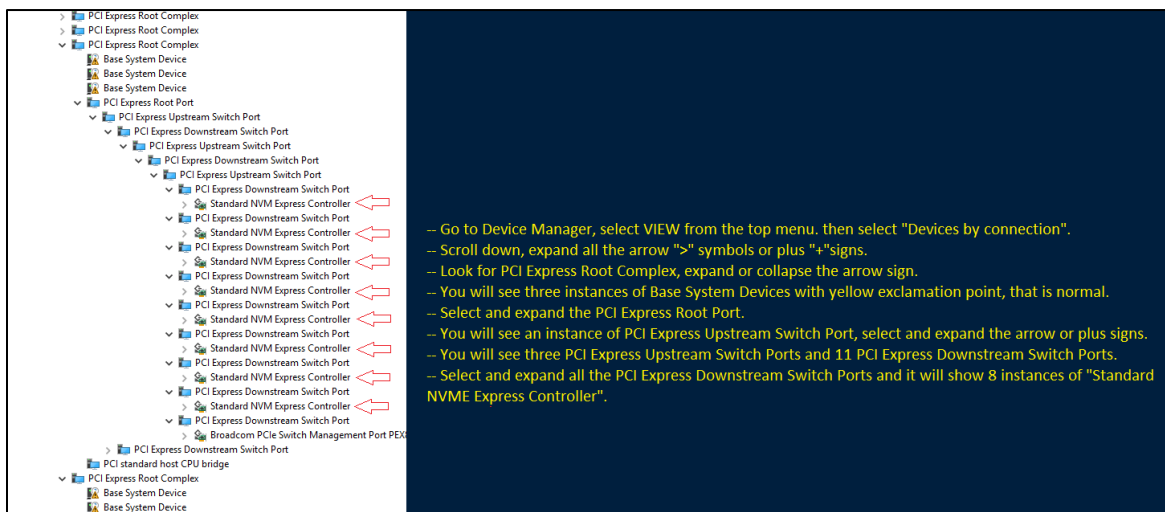




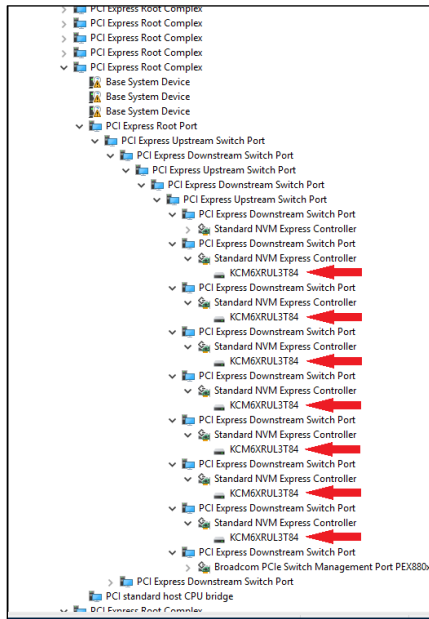
The PCI Express Downstream Switch Port encircled below indicates that the "storage-expansion" unit is detected.



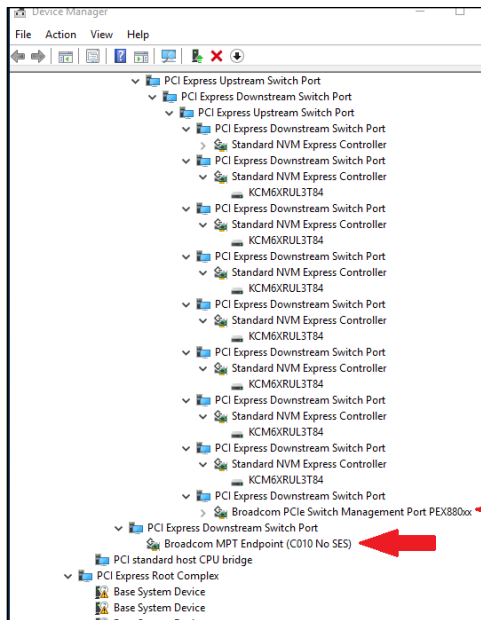
Screenshot below shows the NVME drive controllers.



Screenshot below shows all 8 NVME drives detected and no yellow exclamation mark symbol. These 8 drives are installed in the Drive pack.



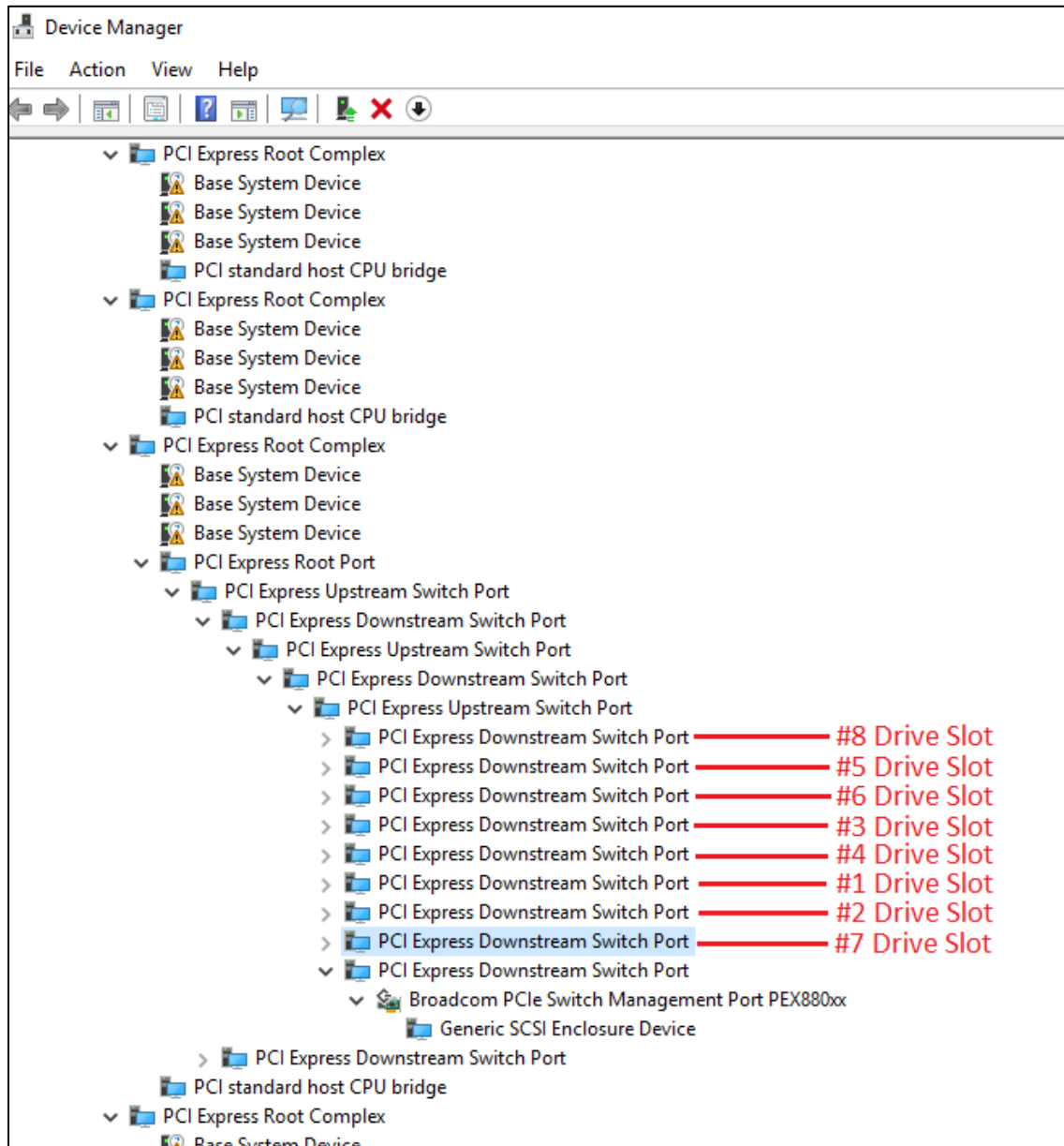
-- Go to Device Manager, select VIEW from the top menu, then select "Devices by connection".
 -- Scroll down, expand all the arrow ">" symbols or plus "+" signs.
 -- Look for PCI Express Root Complex, expand or collapse the arrow sign.
 -- You will see three instances of Base System Devices with yellow exclamation point, that is normal.
 -- Select and expand the PCI Express Root Port.
 -- You will see an instance of PCI Express Upstream Switch Port, select and expand the arrow or plus signs.
 -- You will see three PCI Express Upstream Switch Ports and 11 PCI Express Downstream Switch Ports.
 -- Select and expand all the PCI Express Downstream Switch Ports and it will show 8 instances of "Standard NVME Express Controller".
 -- Select and expand all the arrow signs on the Standard NVME Express Controller.
 -- It will display all detected NVME drives.



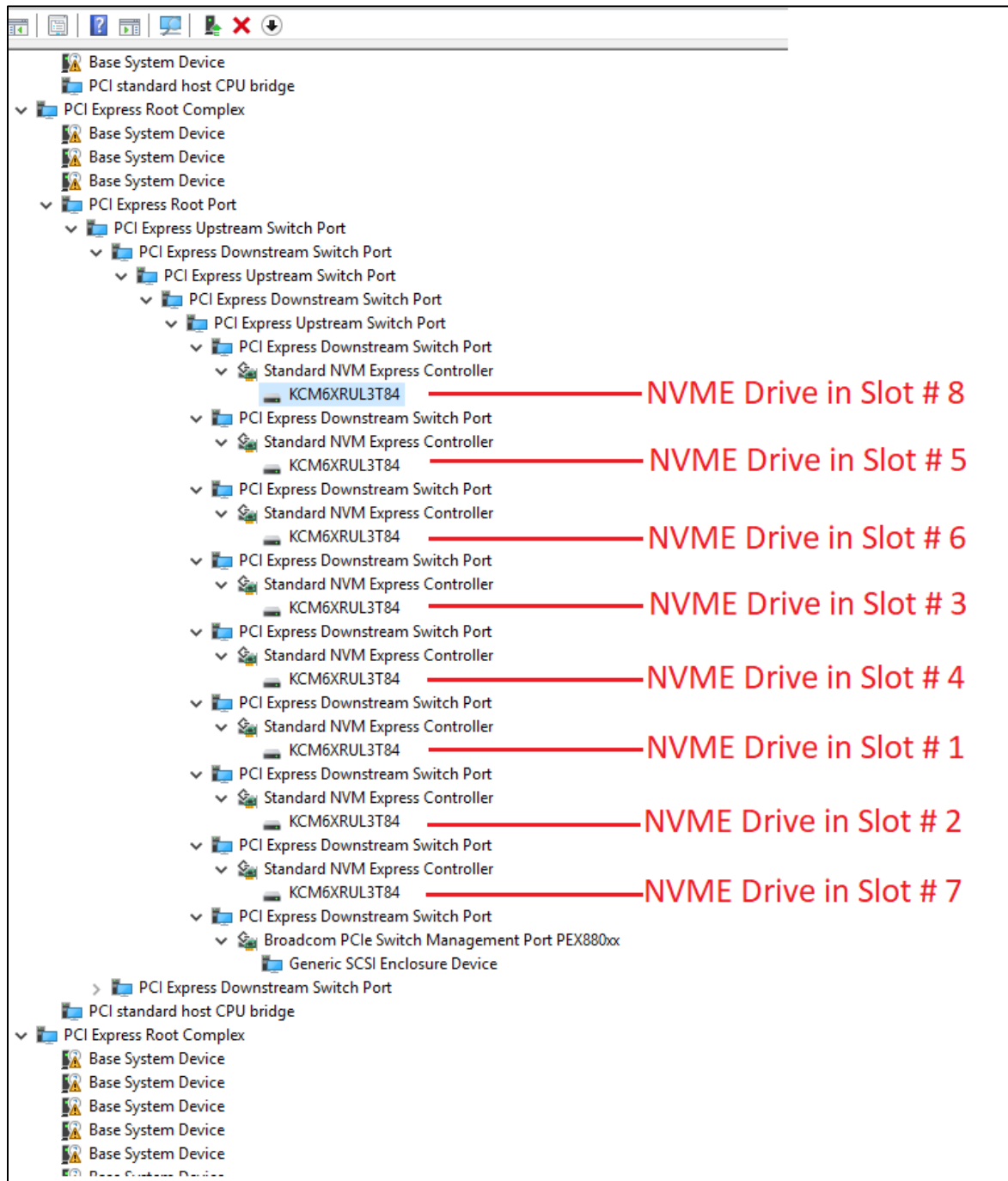
Under or beneath the last two PCI Express Downstream Switch Ports will appear an instance of Broadcom devices.
 -- Broadcom PCIe Switch Management Port
 -- Broadcom MPT Endpoint

5.4.1 Drive & Slot Hierarchy - Windows OS

The screenshot below shows the drive slot hierarchy in Windows Device Manager.



The screenshot below shows 8 NVME drives hierarchy in Windows Device Manager.

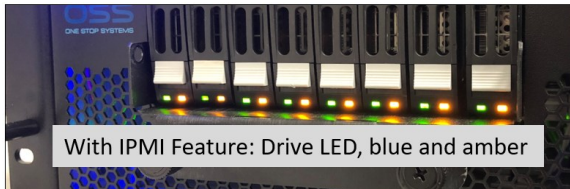


6 Troubleshooting

Issue: NVME Drive is not detected

Troubleshooting Steps:

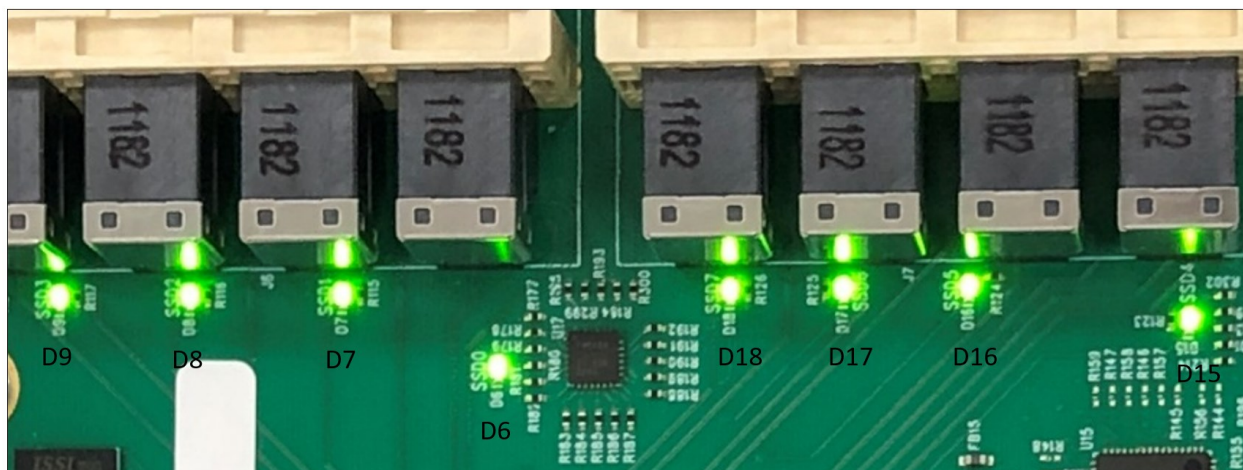
1. **Check the front LEDs**, make sure all the LEDs are properly illuminated.
 - a. Solid green and amber LEDs-->If your unit is equipped with IPMI.
 - b. Solid amber LED only----->if your unit does not have the IPMI feature.



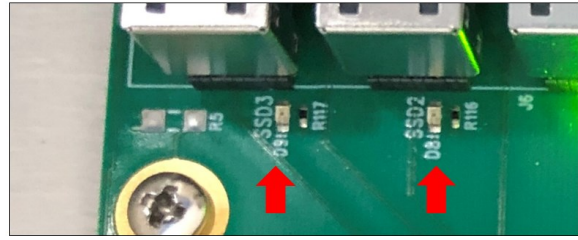
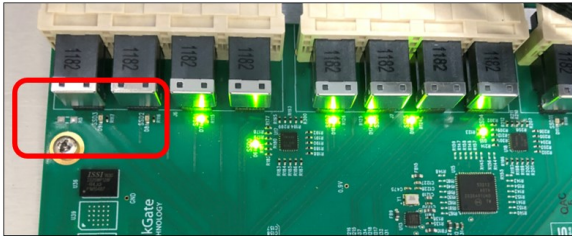
- Solid green (presence of drive) indicates that there is a drive installed in the carrier slot.
- Solid Amber: No Activity.
- Blinking Amber: Activity
 - o If your unit is equipped with IPMI and only AMBER LEDs are illuminated, this symptom indicates that the IPMI module is malfunctioning, or the firmware is corrupted / not correctly programmed. Contact OSS-Support to service the unit.

2. Check Drive LINK LEDs

- a. Remove the top cover, check the drive LINK LEDs on the OSS-528 and see which one is not coming UP (not illuminated). A fully functional unit will have 8 drive LINK LEDs illuminated as solid green, see photos below.



- b. For example, from the photo below D8 and D9 are OFF, this signifies that OSS-528 board is not recognizing one of the drives in the Drive pack.



3. **Check and reseal the "SFF-8643 to SFF-8643" cable** between the OSS-528 and Drive pack, see photos below. If this cable is not fully seated, the NVME drives will not be recognized.

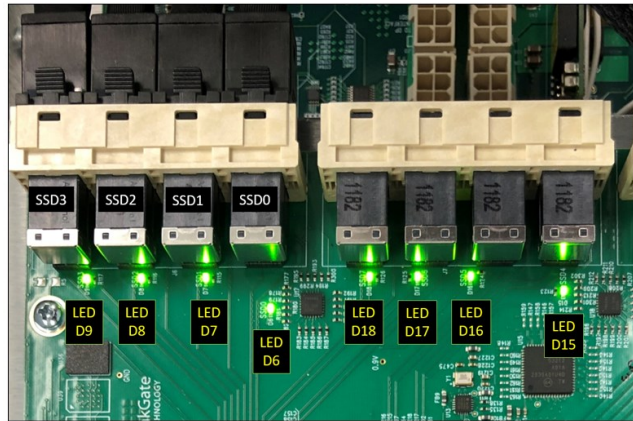


- a. Once you have reseated the cable, the D8 and D8 LEDs should be ON.
 b. Apply the same troubleshooting steps with other NVME drives that are exhibiting the same issue.
 c. **If you are still having the same issue, remove and reseal the Drive pack, and reboot or restart the expansion storage unit and server.**

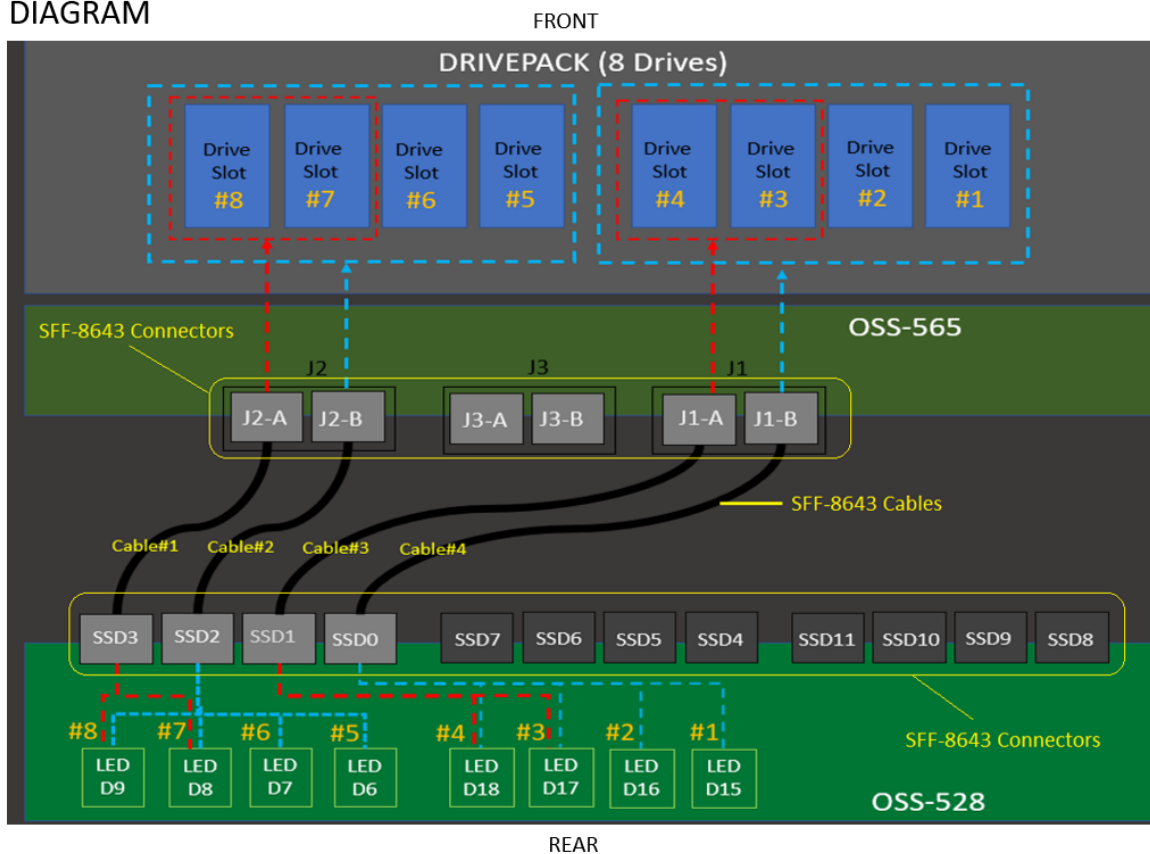
6.1 OSS-528 Drive LINK LEDs

There are 8 Drive LINK LEDs on the OSS-528 boards.

- These LED indicators will serve as a hardware tool for diagnosing and troubleshooting NVME drive issues (i.e., not detected).
- 8 Drive LEDs on the OSS-528 boards, see photo below
 - D9, D8, D7, D6, D18, D17, D16 and D15

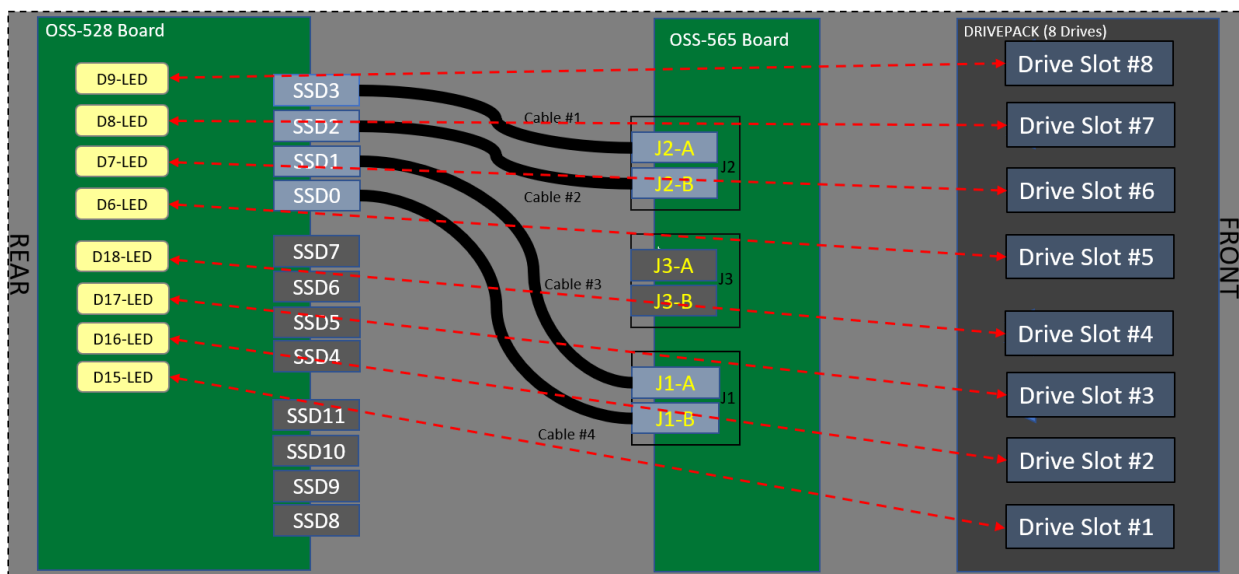


DIAGRAM



As shown from the diagram below, each LED on the OSS-528 board is mapped to individual drive slot in the drive pack.

- When drive is present in drive Slot#8, D9 LED will illuminate.
 - OFF when drive slot is empty.
- When drive is present in drive Slot#7, D8 LED will illuminate.
 - OFF when drive slot is empty.
- When drive is present in drive Slot#6, D7 LED will illuminate.
 - OFF when drive slot is empty.
- When drive is present in drive Slot#5, D6 LED will illuminate.
 - OFF when drive slot is empty.
- When drive is present in drive Slot#4, D18 LED will illuminate.
 - OFF when drive slot is empty.
- When drive is present in drive Slot#3, D17 LED will illuminate.
 - OFF when drive slot is empty.
- When drive is present in drive Slot#2, D16 LED will illuminate.
 - OFF when drive slot is empty.
- When drive is present in drive Slot#1, D15 LED will illuminate.
 - OFF when drive slot is empty.

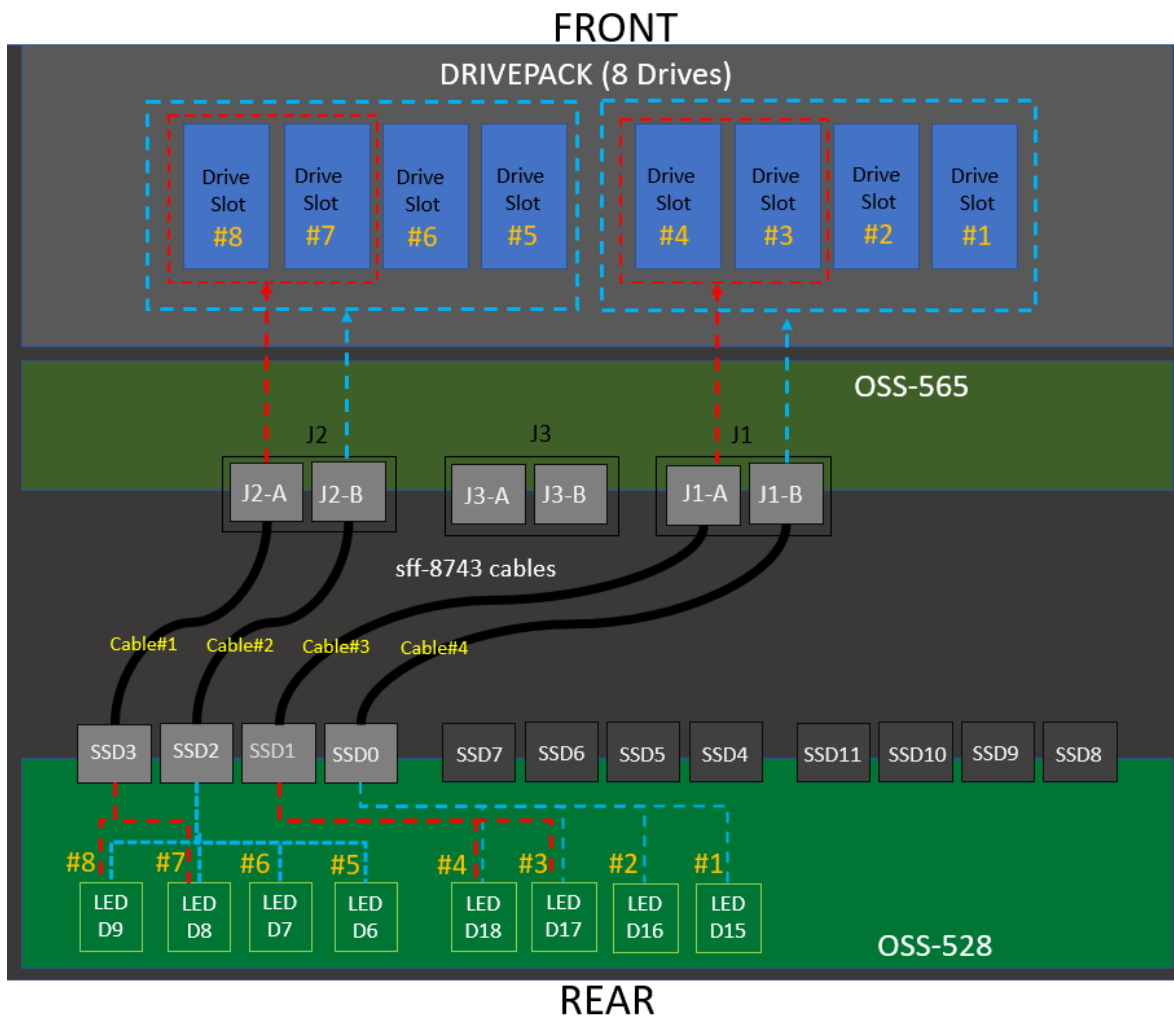


The diagram below is the connection between the SFF-8643 connector on the OSS-528 board and OSS-565 board.

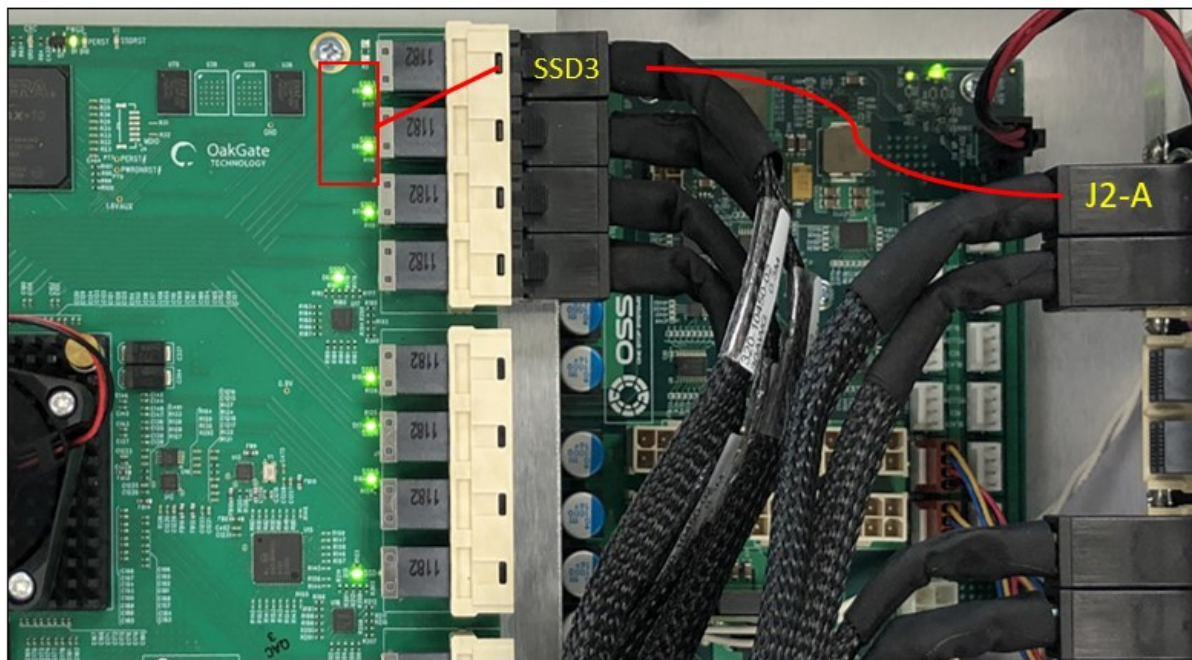
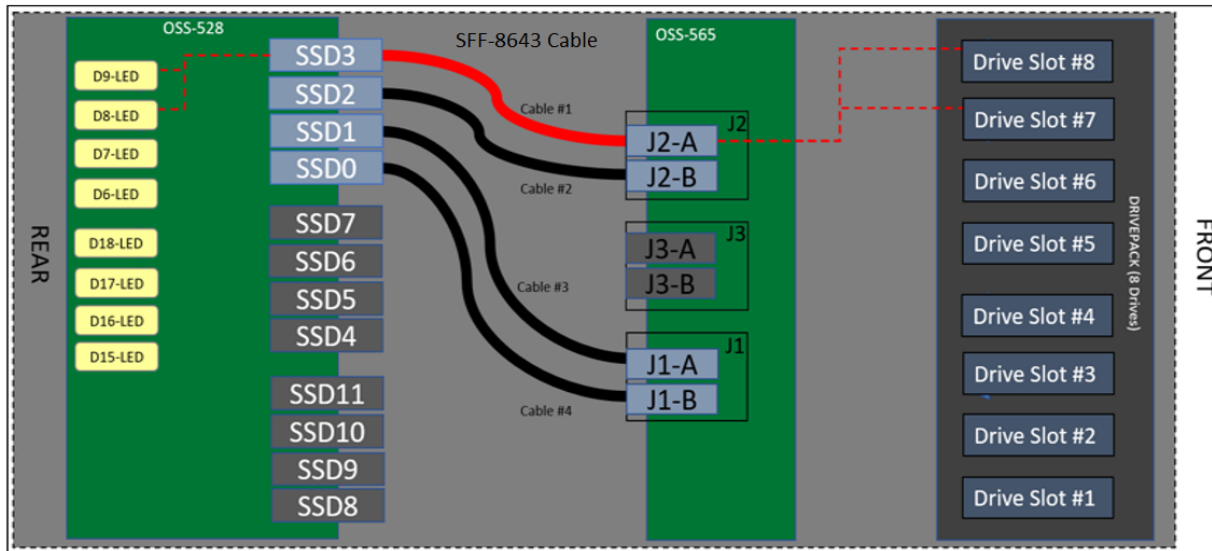


The sff-8643 connector on the OSS-528 board is tied to the drive LED indicator. The SFF-8643 connector on the OSS-565 board is tied to the drive slots in the Drive pack.

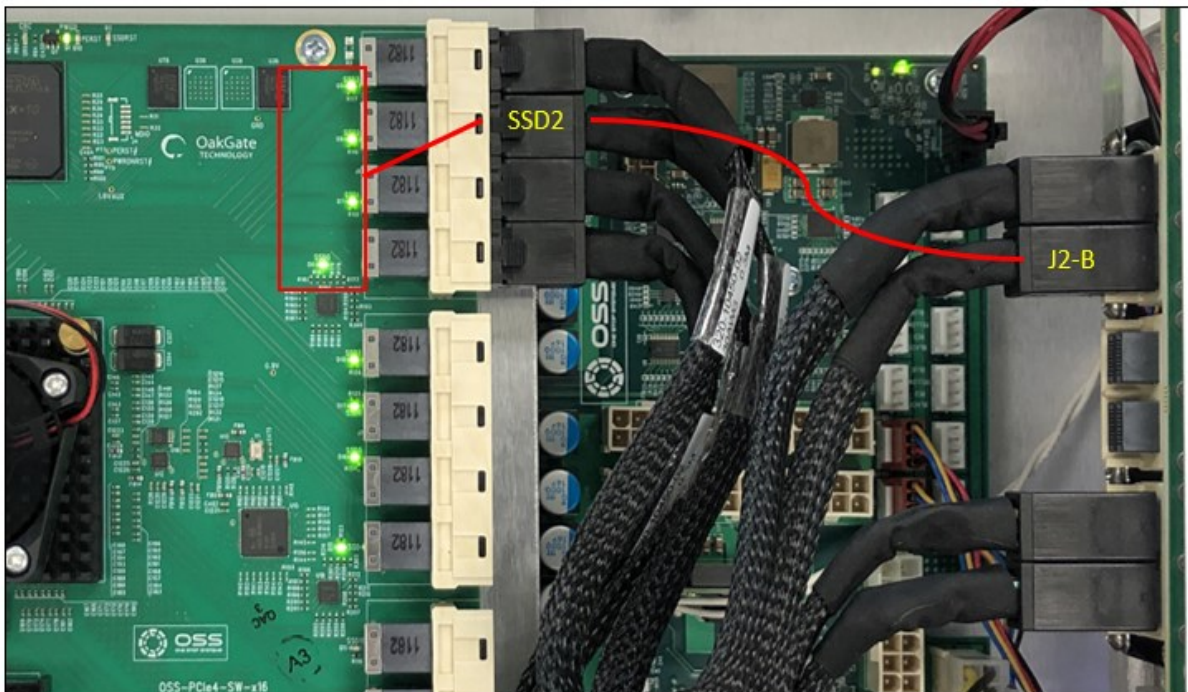
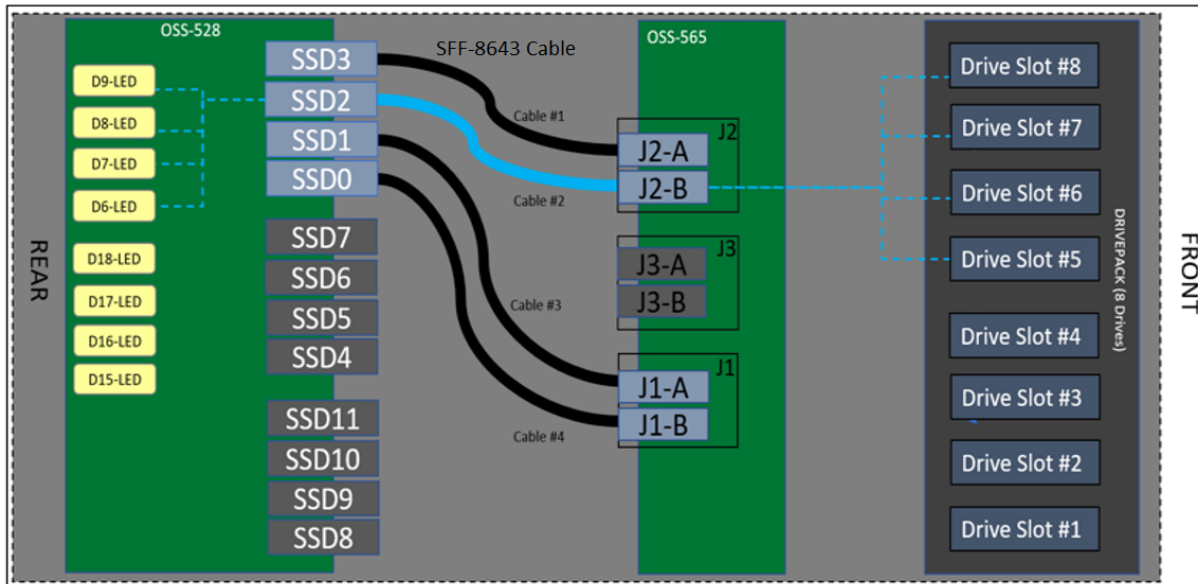
- D9 and D8 LEDs are tied to SSD3
 - SSD3---> connected to-----> J2-A-----> mapped to drive slots #8 and #7.
- D9, D8, D7 and D6 LEDs are tied to SSD2
 - SSD2---> connected to-----> J2-B --> mapped to drive slots #8, #7, #6 and #5.
- D18 and D17 LEDs are tied to SSD1
 - SSD1---> connected to -----> J1-A-----> mapped to drive slots #4 and #3.
- D18, D17, D16 and D15 LEDs are tied to SSD0
 - SSD0--->connected to --> J1-B ---> mapped to drive slots #4, #3, #2 and #1.



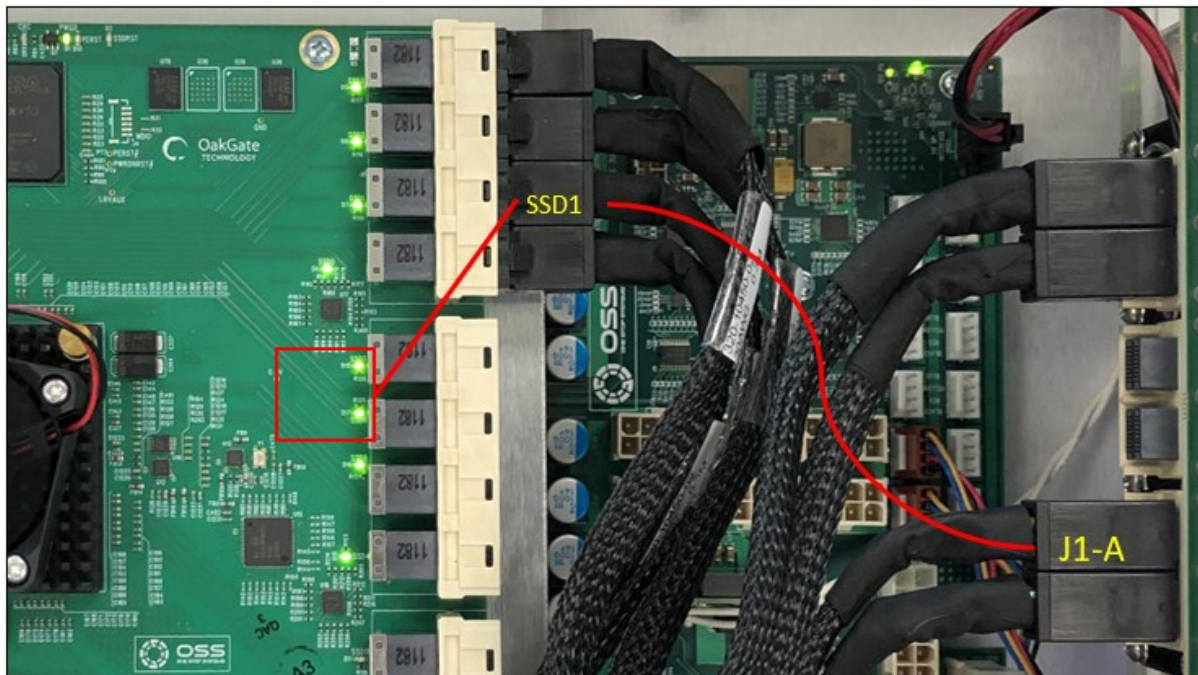
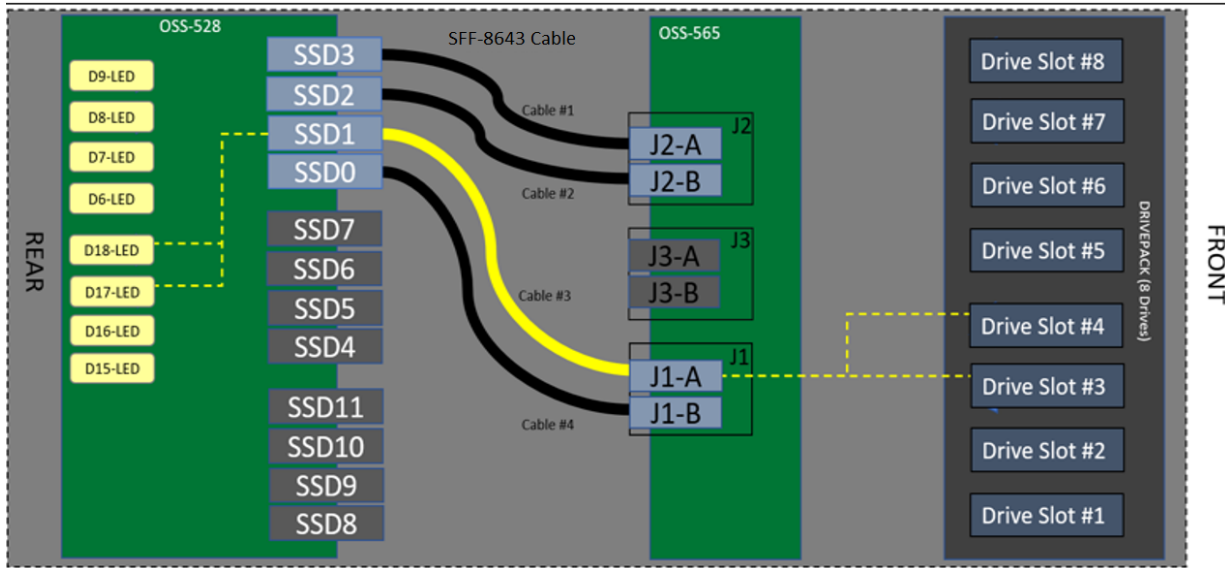
- When cable #1 is detached between SSD3 & J2-A.
 - o LEDs D9 & D8 will be OFF, no drives will be detected in drive slots #8 and #7.



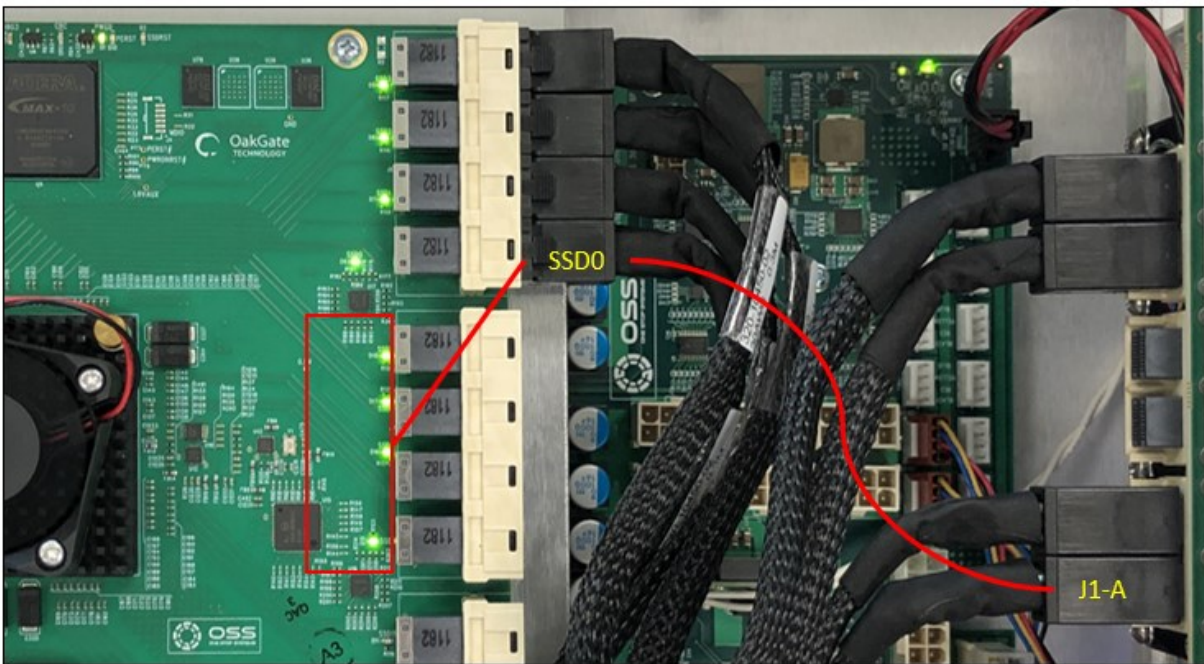
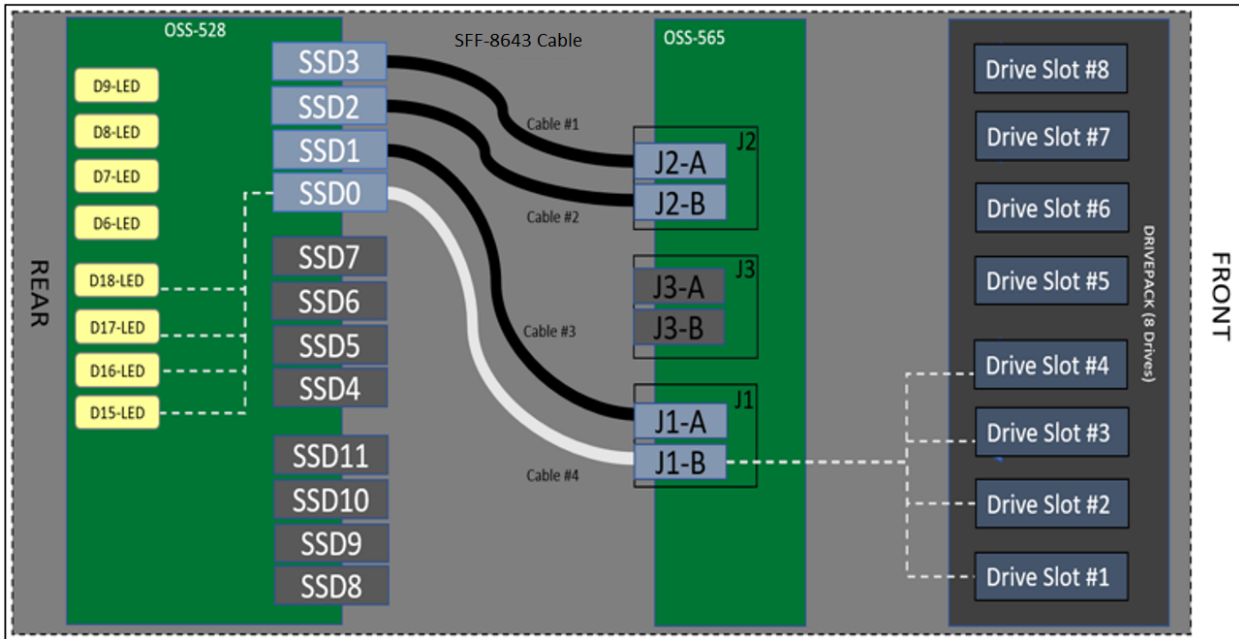
- When cable #2 is detached between SSD2 and J2-B.
 - o LEDs D9, D8, D7 and D6 LEDs will be OFF, no drives will be detected in drives slots #8, #7, #6 and #5.



- When cable #3 is detached between SSD1 and J1-A.
 - LEDs D18 and D17 will be OFF, no drives will be detected in drive slots #4 and #3.



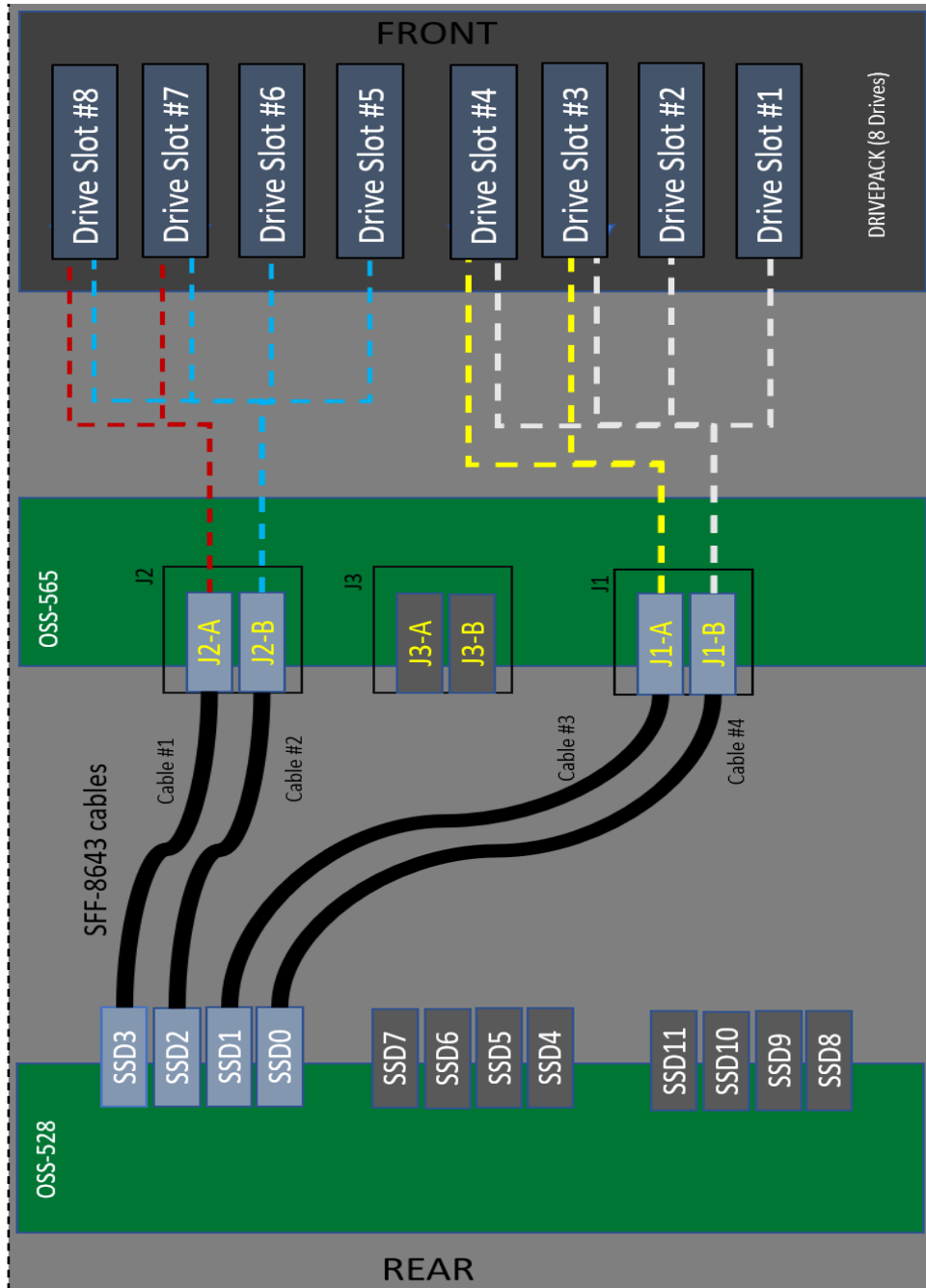
- When cable #4 is loose or detached between SSD0 and J1-B.
 - LEDs D18, D17, D16 and D15 will be OFF, no drives will be detected in slots #4, #3, #2 and 1.



6.2 OSS-565 board: SFF-8643 Connectors

There are **six SFF-8643** connectors on the OSS-565 board.

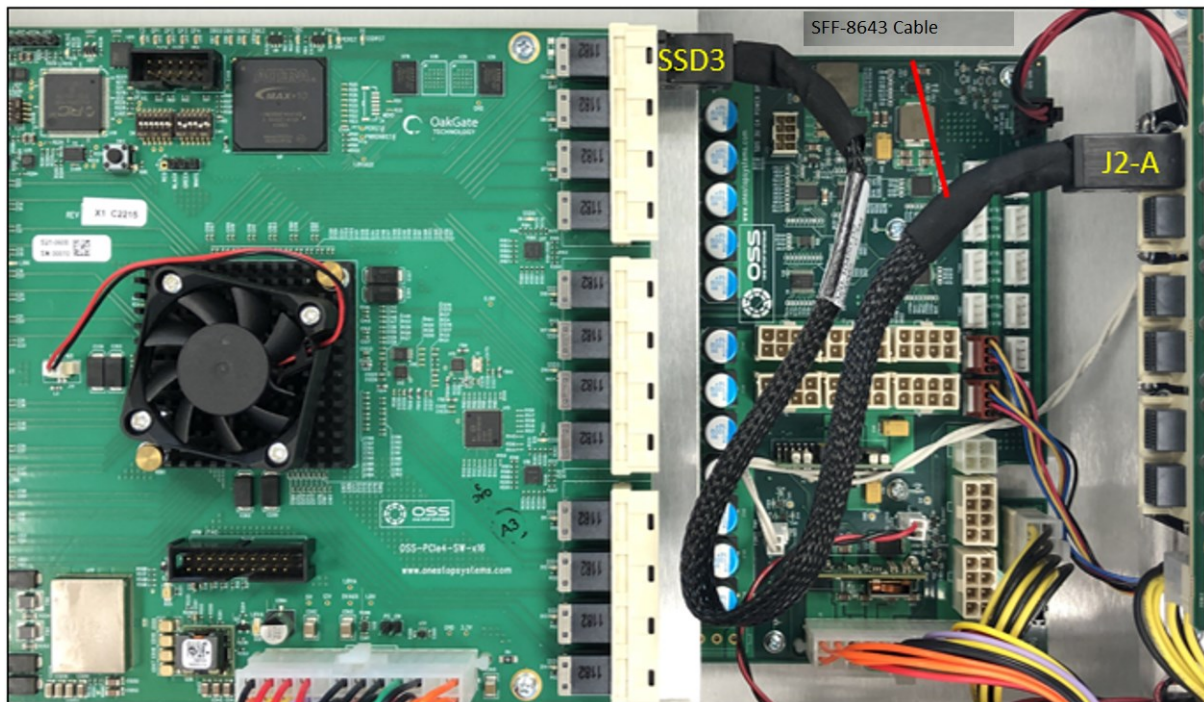
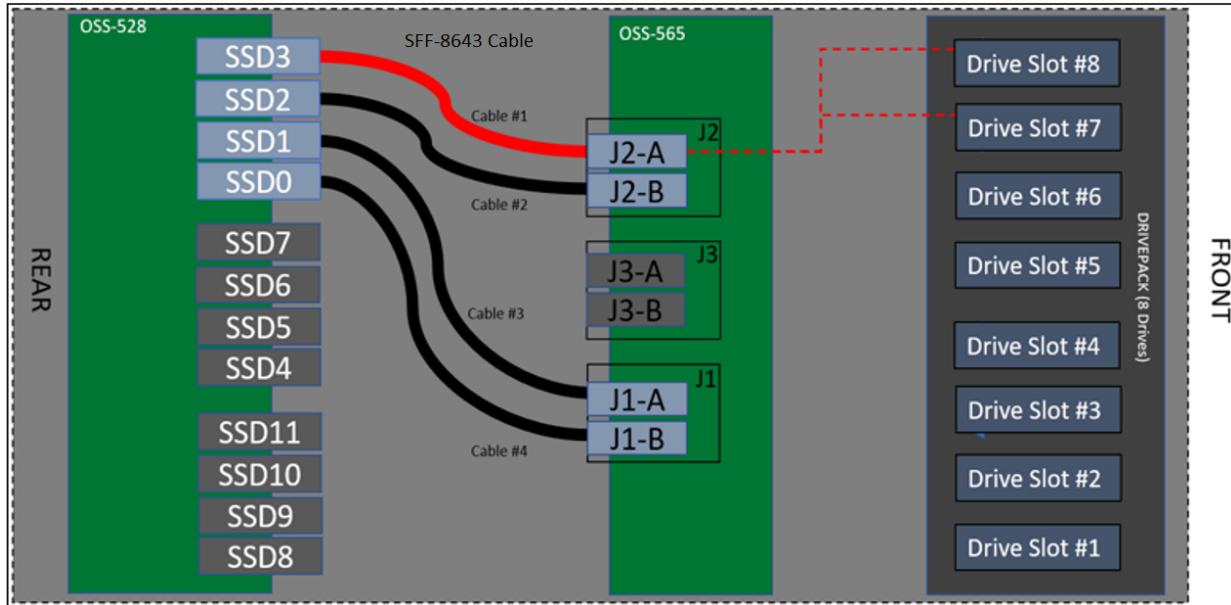
- Only four SFF-8643 connectors are needed for NVME drives. These connectors are J2-A, J2-B, J1-A and J1-B.
- The remaining two connectors J3-A and J3-B are for SATA connection.



See following screenshots for further details.

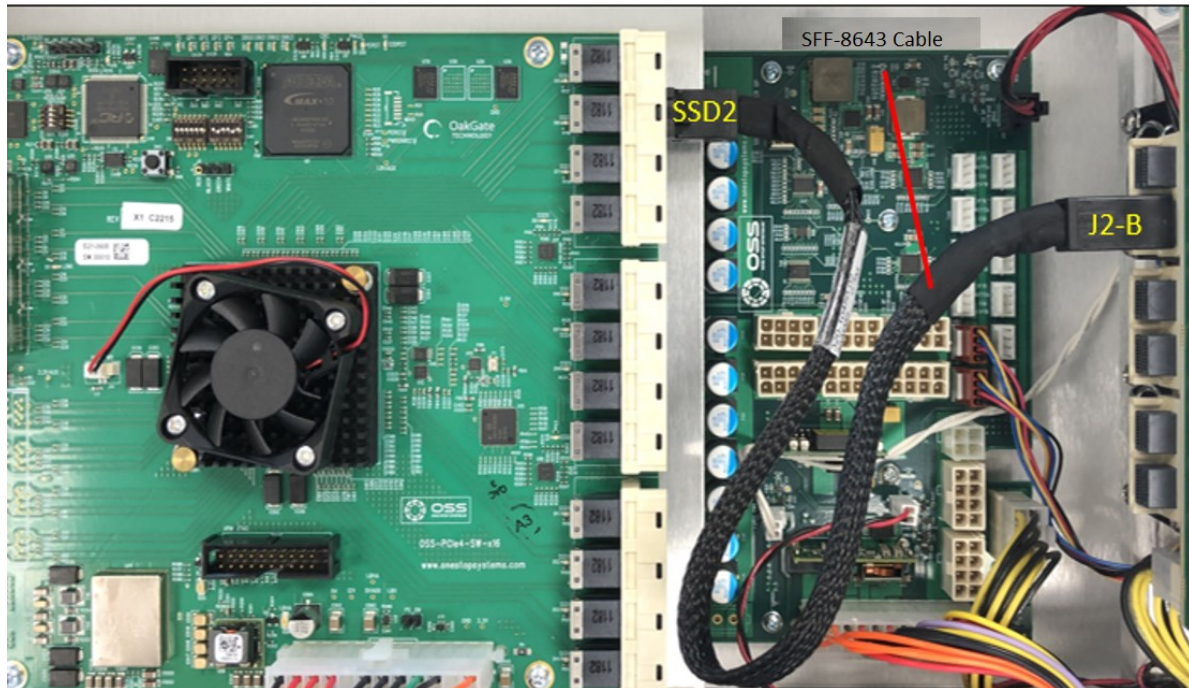
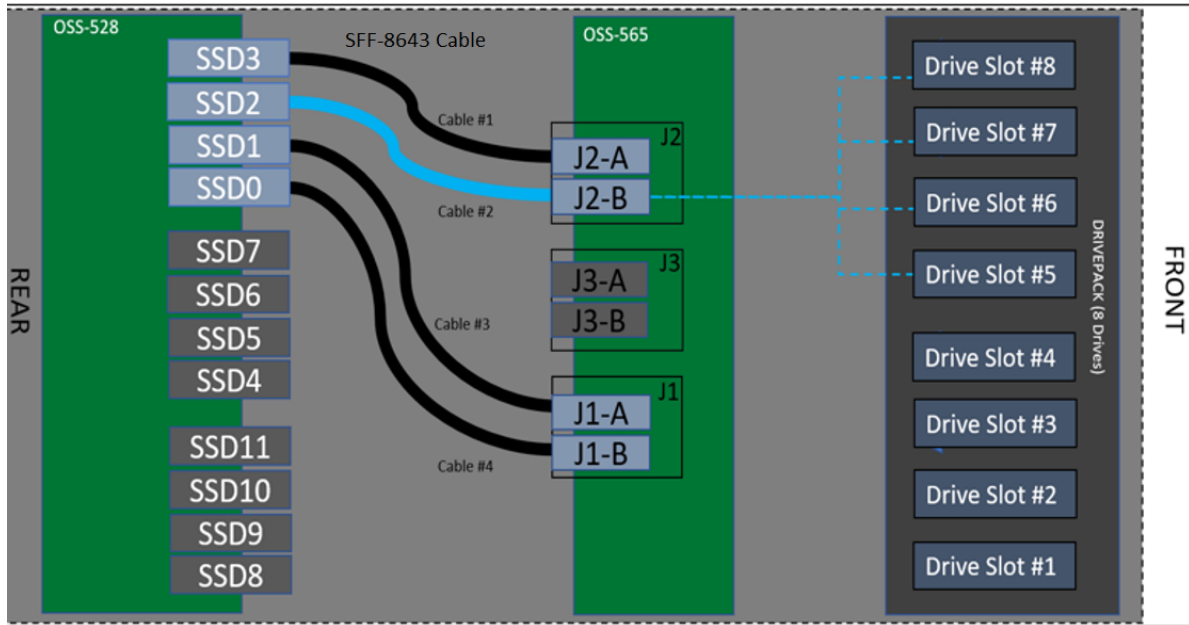
SSD3----->connected to J2-A --->mapped to Drive slots #8 and #7.

- When cable#1 is detached between J2-A and SSD3, no drives will be detected in drive slots#8 and #7.



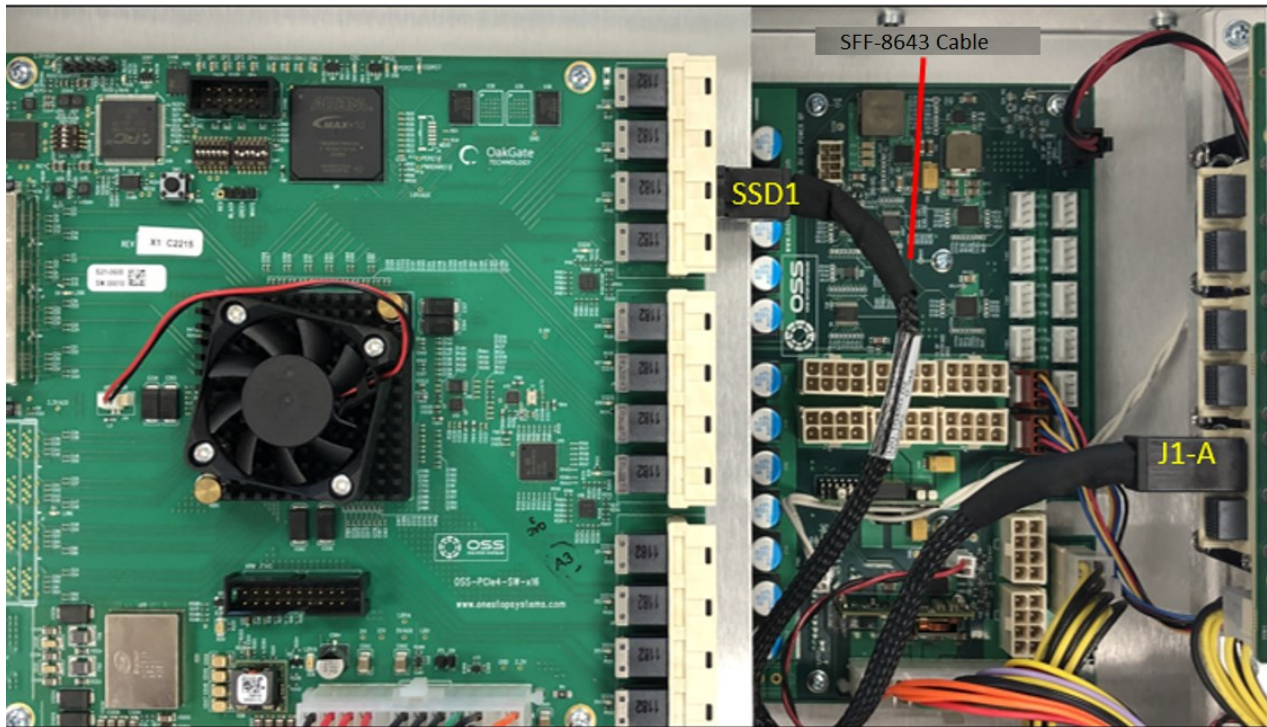
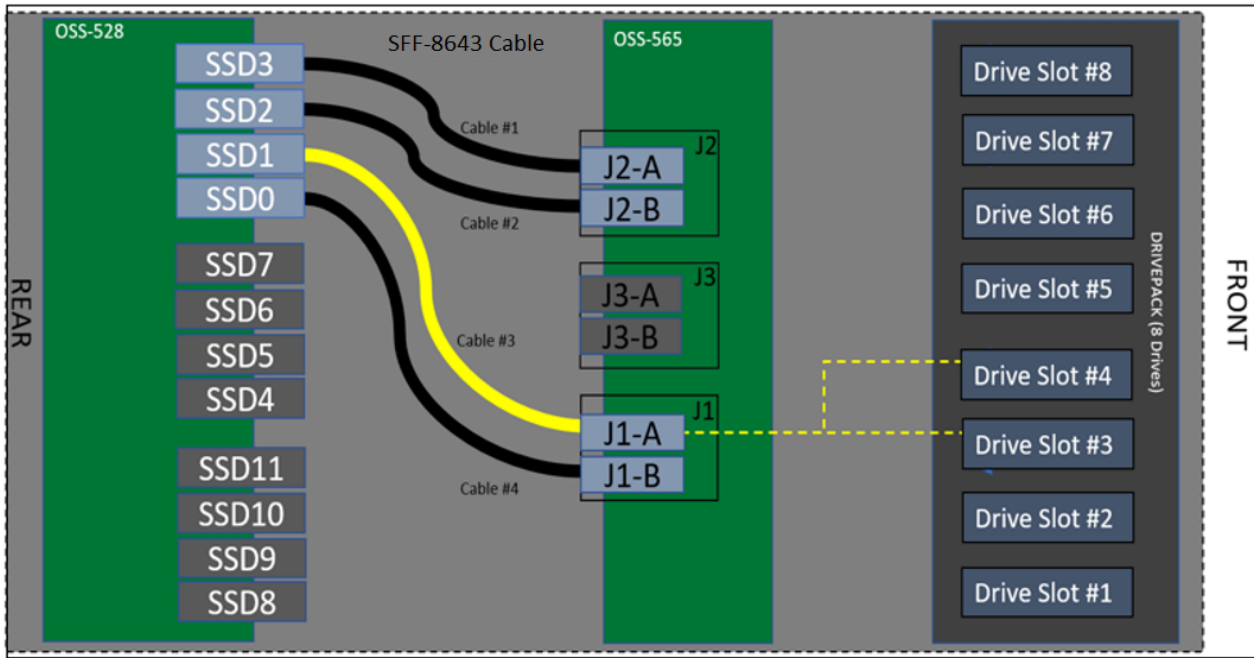
SSD2----->connected to J2-B-----> mapped to Drive slots #8, #7, #6 and #5.

- When cable#2 is detached between J2-B and SSD2, no drives will be detected in drive slots #8, #7, #6 and #5.



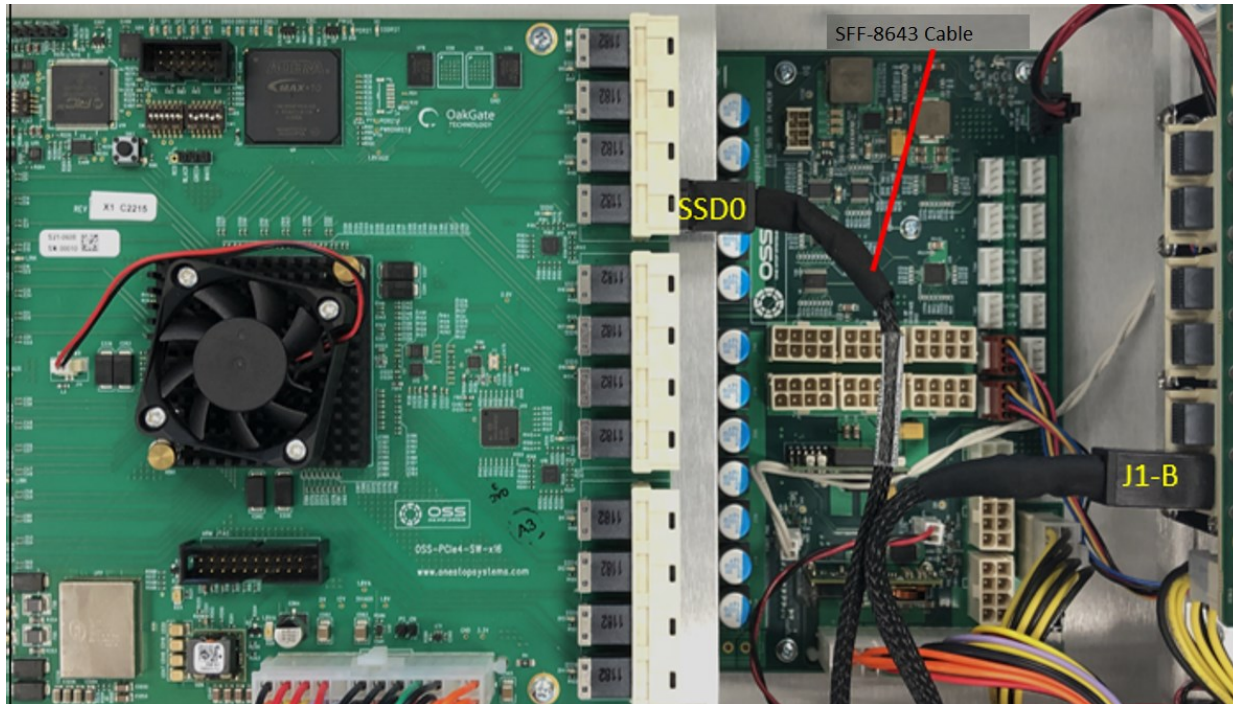
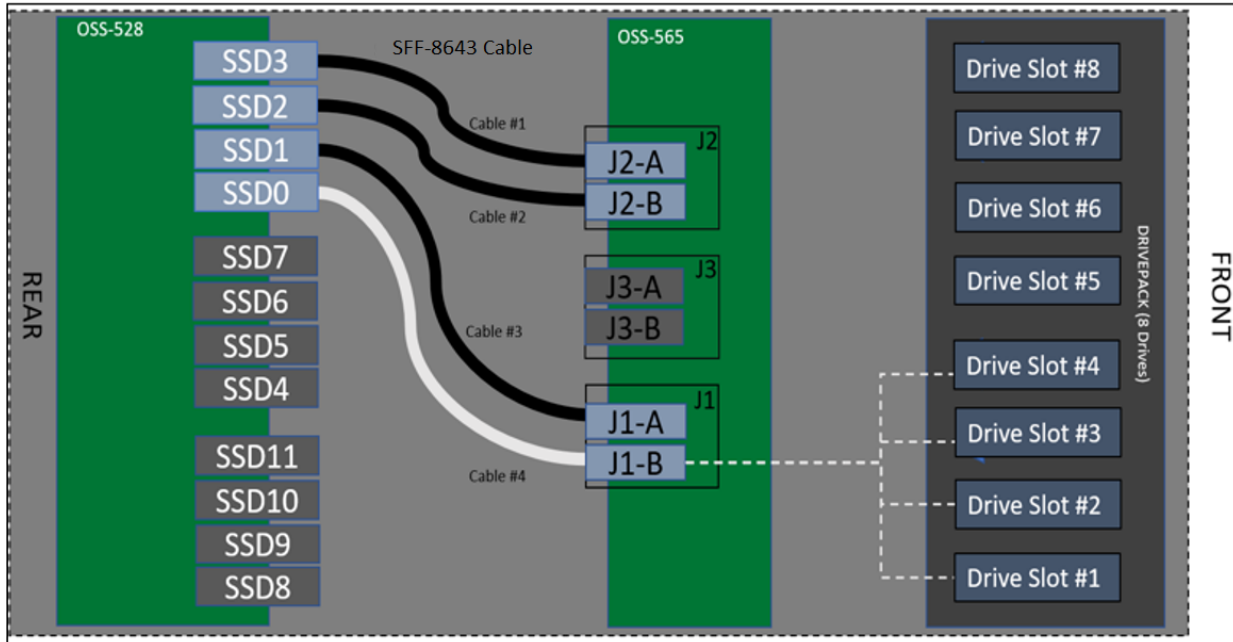
SSD1----->connected to J1-A---> mapped to Drive slots #4 and #3.

- When cable#3 is detached between J1-A and SSD1, no drives will be detected in drive slots#4 and #3.



SSD0----->connected to J1-B---> mapped to Drive slots #4, #3, #2 and #1.

- When cable#4 is detached between J1-B and SSD0, no drives will be detected in drive slots #4, #3, #2 and #1.



7 IPMI

IPMI 2.0 based system monitoring on dedicated Ethernet. IPMI monitors the status of the following hardware in the SDS unit and display it via Web interface.

- Fan status and speed
- Drive Backplane temperature
- Power supply voltage and temperature

IPMI is a configurable feature, and it is not included with the base model. The IPMI module is factory installed.

- If you require this feature, make sure to select this option when placing the order of the expansion storage unit.
- The IPMI module is not a field-replaceable-item.
 - It involves disassembling and reassembling of the unit to remove and install the module.

If your existing storage expansion unit does not have the IPMI feature and you require the module to be installed, you will need to send the unit to One Stop Systems for service (upgrade / update). Please contact sales representative at sales@onestopsystems.com to order the part and request an RMA (Return Material Authorization) to send unit to OSS for an upgrade.

The IPMI module is located under the Drive pack. It is visible through the front panel as shown from the photo below.

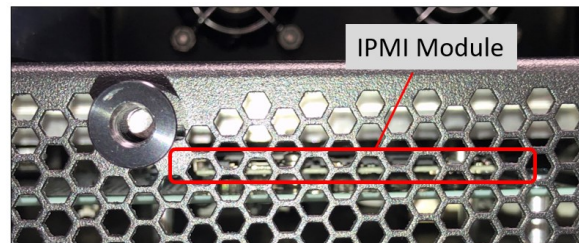
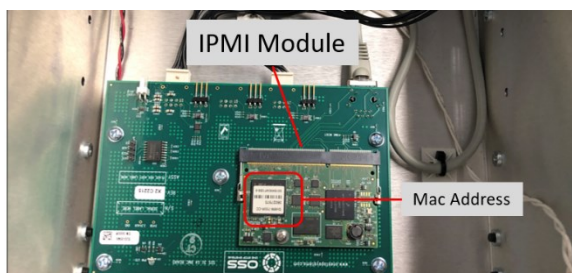


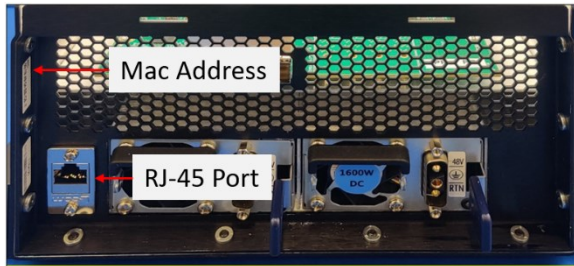
Photo below shows the actual and physical location of the IPMI module in the storage expansion unit, the Drive pack and metal bracket are removed from the photo.



8 How To Setup & Access IPMI

8.1 Connect Ethernet Cables

Connect Ethernet cable to Ethernet port located on the back of the storage expansion unit. You must plug-in the Ethernet cable first before connecting the power to storage expansion unit. Plug in the other end of the Ethernet cable to your network (running DHCP).

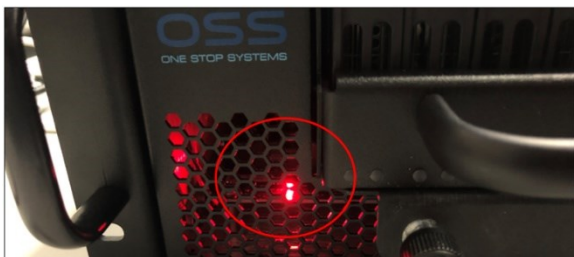


8.2 Apply Power

Connect the power cords on the back of the unit.



Upon connecting the power, observe the IPMI LED, it will illuminate from solid red to blinking green and to solid green. When the led status is solid green, the IPMI is ready. The IPMI LED is located on the front of the unit, see photos below.

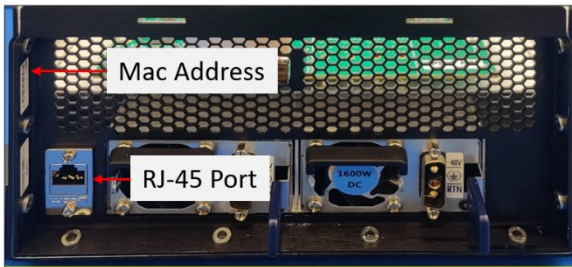


Press the front switch to ON position to power UP the storage expansion unit.

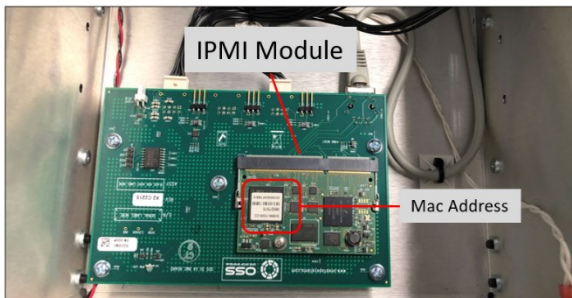


8.3 Locate Mac Address

Locate the Mac address sticker of the storage expansion unit. See photo below for the location of the Mac address sticker. It is mounted near the Ethernet port on the back of the unit.



If you do not see the label, check the IPMI module inside the unit that has a label containing the Mac address. The photo below shows the location of the label with the Mac address numbers. You need to disassemble and remove the front Drive pack and bracket to access the module. Contact OSS Support prior to disassembling the unit.



8.4 Discovering the Mac Address / IP Address

Use the Mac address to discover the IP address assigned to Eth0 on the IPMI module. When the device is connected in a network, it will eventually get an IP from DHCP server, then you need to find out which IP address assigned to it.

There are multiple ways to do this as follows:

1. Look in your DHCP server logfiles for a lease that matches the MAC address of the device.
2. A network or IP scanner, which can scan, retrieve, and resolve MAC addresses.
3. Simple Command prompt or Windows Terminal.

8.4.1 Using The DHCP To Find IP Addresses

In case you have access to the DHCP Server, you can look at all IP, MAC, and interface relationships, as well as the names of the devices and LAN lease times.

- Log into your DHCP server, and here we will be using the home gateway.
- If you are not aware of the IP address of the DHCP Server, you can run an ipconfig command on Windows or an ifconfig command on macOS or Linux.
- Type in the IP address within your browser and insert your credentials.
- Go to "DHCP" then to "DHCP Clients List" here, and you will be able to see how the MAC and IP addresses are mapped on the network.
- Match the IP with the MAC address.

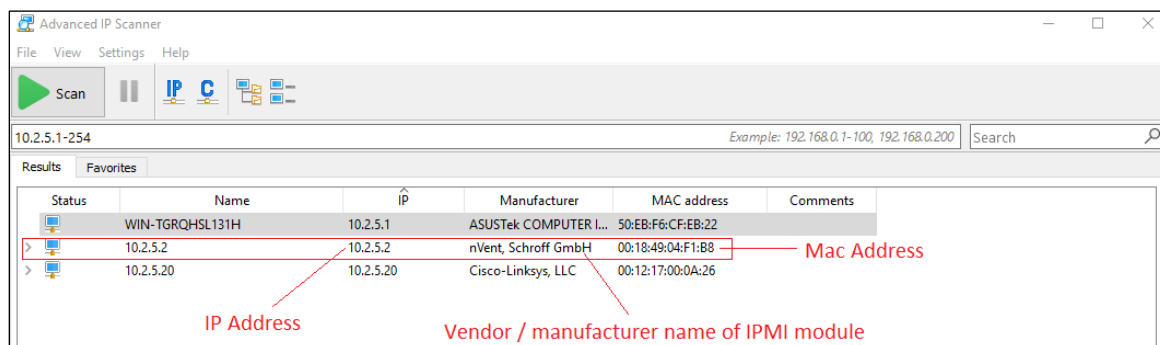
Navigate to Data management->DHCP->Leases->Current leases in the GUI and you can export it to check the list of clients involved.

8.4.2 Using A Network or IP scanner

Using a software tool such as an IP scanner to scan and retrieve all IP and Mac addresses on the network. Photo below displays the IP and Mac addresses after running the IP Scanner.

- Mac Address 00:18:49:04:F1:B8 and IP address of 10.2.5.2.

NOTE: The "nVent,Schroff GmbH" is the vendor / manufacture of the IPMI module.



8.4.3 Using Command Prompt or Windows Terminal

Windows:

Using Command Prompt: "arp -a" command

For example, your network IP has an address of 10.2.5.20 then the broadcast address will be 10.2.5.255 if you have a /24 subnet (255.255.255.0)

- Open a command prompt and type: "ping 10.2.5.255."
- You will not get a response, wait until all the pings have timed out!
- Then type this: "arp -a"

You should be able to find your MAC of your device, with its IP address. In this example, the MAC Address on the IPMI module Eth0 is 00-18-49-F1-B8. Match that with the IP address on the "arp" table, it is 10.2.5.2, see example photo below.

```

Administrator: Command Prompt

C:\Users\Administrator>ping 10.2.5.255

Pinging 10.2.5.255 with 32 bytes of data:
Request timed out.
Request timed out.
Request timed out.
Request timed out.

Ping statistics for 10.2.5.255:
    Packets: Sent = 4, Received = 0, Lost = 4 (100% loss),

C:\Users\Administrator>arp -a

Interface: 10.2.5.1 --- 0xa
Internet Address      Physical Address      Type
-----
10.2.5.2              00-18-49-04-f1-b8    dynamic
10.2.5.20             00-12-17-00-0a-26    dynamic
10.2.5.255            ff-ff-ff-ff-ff-ff    static
224.0.0.22            01-00-5e-00-00-16    static
224.0.0.251           01-00-5e-00-00-fb    static
224.0.0.252           01-00-5e-00-00-fc    static
255.255.255.255      ff-ff-ff-ff-ff-ff    static
  
```

Using Windows PowerShell: "Get-NetNeighbor" command

Start Windows PowerShell as administrator and type:

"Get-NetNeighbor -LinkLayerAddress 00-18-49-04-c1-2c. Replace the number with the Mac address from the Storage Expansion unit sticker.

- Below photo is an example of Windows PowerShell cmdlet for querying the IP address using the Mac address.
- This is just one an example of PowerShell command that you can utilize. There are more commands available that you can use.

```
PS C:\WINDOWS\system32> Get-NetNeighbor -LinkLayerAddress 00-18-49-04-c1-2c
```

ifIndex	IPAddress	LinkLayerAddress	State	PolicyStore
7	192.168.1.153	00-18-49-04-C1-2C	Reachable	ActiveStore

Linux:

Photos below are an example of Linux commands to query the IP address and Mac address.

```
root@oss:/home/oss# arp -a
? (10.2.5.1) at 00:18:49:04:f1:b8 [ether] on enp4s0
? (10.2.5.20) at 00:12:17:00:0a:26 [ether] on enp4s0
root@oss:/home/oss# ip neigh
10.2.5.1 dev enp4s0 lladdr 00:18:49:04:f1:b8 REACHABLE
10.2.5.20 dev enp4s0 lladdr 00:12:17:00:0a:26 DELAY
root@oss:/home/oss# arp -n
Address                Hwtype  Hwaddress          Flags Mask          Iface
10.2.5.1                ether   00:18:49:04:f1:b8  C                enp4s0
10.2.5.20               ether   00:12:17:00:0a:26  C                enp4s0
```

```
root@oss:/home/oss# arp-scan 10.2.5.0/20
Interface: enp4s0, type: EN10MB, MAC: 50:eb:f6:cf:eb:22, IPv4: 10.2.5.1
WARNING: host part of 10.2.5.0/20 is non-zero
Starting arp-scan 1.9.7 with 4096 hosts (https://github.com/royhills/arp-scan)
10.2.5.2    00:18:49:04:f1:b8    nVent, Schroff GmbH
10.2.5.20  00:12:17:00:0a:26    Cisco-Linksys, LLC

2 packets received by filter, 0 packets dropped by kernel
Ending arp-scan 1.9.7: 4096 hosts scanned in 17.249 seconds (237.46 hosts/sec). 2 responde
root@oss:/home/oss# arp -a | grep 00:18:49:04:f1:b8
? (10.2.5.2) at 00:18:49:04:f1:b8 [ether] on enp4s0
root@oss:/home/oss#
```

8.5 Start Internet Browser

Once the IP address is identified, launch your internet browser, and type the IP address for example 10.2.5.2.

Below photo is the Web interface of the IPMI displaying the status of the following hardware in the storage expansion unit.

- Fan status and speed
- Drive Backplane temperature
- Power supply voltage and temperature

OSS
One Stop Systems

Centauri, Delta (receive), single drive pack (dp1), 2 power supplies - 29 Sep 2022

BMC Temperature	22C
Fan 1 Status	OK
Fan 1 Speed	18810RPM
Fan 2 Status	OK
Fan 2 Speed	17765RPM

PSU Backplane Temperature	24C
3V3 Switcher Temperature	34C
3V3 Switcher Output Voltage	3.3V
3V3 Switcher Output Current	0A
Aux 3V3 Voltage	3.4V
Main 3V3 Voltage	3.38V
Standby 5V Voltage	5.17V
Main 5V Voltage	5.17V
Main 12V Voltage	12.18V

PSU 1 FRU Data	
PSU 1 Input Voltage	0V
PSU 1 Output Voltage	0.8V
PSU 1 Input Current	0A
PSU 1 Output Current	0A
PSU 1 Input Power	0W
PSU 1 Output Power	0W
PSU 1 Temperature 1	0C
PSU 1 Temperature 2	0C
PSU 1 Temperature 3	28C
PSU 1 Fan Speed	0RPM

PSU 2 FRU Data	
PSU 2 Input Voltage	118V
PSU 2 Output Voltage	12V
PSU 2 Input Current	1A
PSU 2 Output Current	3A
PSU 2 Input Power	60W
PSU 2 Output Power	40W
PSU 2 Temperature 1	27C
PSU 2 Temperature 2	29C
PSU 2 Temperature 3	25C
PSU 2 Fan Speed	7260RPM

Drive Pack Interface 1 Temperature	23C
5V Regulator 1 Output Voltage	N/A
5V Regulator 1 Output Current	N/A
5V Regulator 1 Temperature 2	N/A
5V Regulator 2 Output Voltage	N/A
5V Regulator 2 Output Current	N/A
5V Regulator 2 Temperature 2	N/A

9 How To Login to IPMI Console

To login to the IPMI console and make necessary changes such as the following:

1. Changing the fan speed
2. Setting the eth0 IP to either STATIC or DHCP
3. Reinstall or flash the IPMI software.

9.1 Start SSH

On windows:

- Press the Windows Start button at the bottom left.
- Type in "Command Prompt".
- Right click on Command Prompt and click "Run as administrator".
- Click Yes if the Windows 10 User Account Control prompt is displayed.
- The Command Prompt should appear

On Linux:

- Pressing Ctrl+Alt+T will instantly launch a Terminal window

Once you have the Terminal Window or the Command Prompt started:

- Type "ssh root@XXX.XXX.X.XXX". Press the ENTER key
 - NOTE: Replace the XXX.XXX.X.XXX with the address assigned to your OSS Storage Expansion unit.
- There is no password, press ENTER again.
- Once you have logged in, you can now change the fan speed and set the eth0 IP address to either static or DHCP.

9.2 Change Fan Speed Control

setfan

- You will be prompted to "Use fixed fan speed?"[y/n]
- If you prefer fixed fan speed, enter y
- You will be prompted to "Enter fan speed in percent (range 15-100), eg.:15, 30, 100. Note: 15 is the lowest fan speed.
- Enter 15 for example, you will be prompted "Is this correct?" [y/n]
- You will be prompted to "Need to reboot for the changes to take effect!"

reboot

9.3 Change IP address to Static or DHCP

```
# setip
```

- You will be prompted "Use static IP address for eth0 (rear)? [y/n]"
 - If you want to set to DHCP, enter n
 - You will be prompted "Need to reboot for the changes to take effect!"
 - # reboot
 - If you want to set to STATIC, enter y
 - You will be prompted "Enter IP address for eth0 (e.g.:192.168.0.23)". Enter the IP address you would like to use.
 - You will be prompted "Is this correct? [y/n]". Enter y
 - You will be prompted "Specify netmask for eth0 (rear), optional? [y/n]".
 - Enter N or Y
 - If you enter Y, you will be prompted to enter the netmask, for example 255.255.255.0
 - If you enter N, you will be prompted to "Need to reboot for the changes to take effect!"
- ```
reboot
```

### 9.4 Reinstall or reflash IPMI

Steps below show how to reflash or reload the software onto your IPMI module. You need to SSH first to perform the installation. Run or type the "setup" to initiate the installation.

```
setup
extracting tarball
setup environment variable

Select chassis type/configuration:
1. SDS
2. Centauri
Enter number to select chassis configuration: 2
Select receiving frame (drive pack) fan type:
1. SanAce
2. Delta
Enter number to select fan type: 2
Select power supply configuration:
1. single power supply (psu1, J22)
2. single power supply (psu2, J23)
3. dual power supply
Enter number to select power supply configuration: 3
Use static IP address for eth0 (rear)? [y/n]: n
Use fixed fan speed? [y/n]: n
Configured for Centauri, Delta (receive), single drive pack (dp1), 2 power supplies

Rebooting in 3 seconds
Connection to 10.2.5.2 closed by remote host.
Connection to 10.2.5.2 closed.
PS C:\Users\Administrator>
```

## 10 Contacting Technical Support

Our support department can be reached by fax at (858) 530-2733 or by phone at 760-745-9883. Support is available Monday through Friday, 8:00 AM to 5:00 PM PT. When contacting One Stop Systems Technical Support, please be sure to include the following information:

- |                  |                                                  |
|------------------|--------------------------------------------------|
| 1) Name          | 7) Serial Number                                 |
| 2) Company Name  | 8) Computer Make                                 |
| 3) Phone Number  | 9) Computer Model                                |
| 4) Fax Number    | 10) Operating System and Version                 |
| 5) Email Address | 11) Make/Model of PCI cards in expansion chassis |
| 6) Model Number  | 12) Detailed description of the problem          |

You can also visit our web site at: <https://www.onestopsystems.com/>

To submit a support ticket or case, use our OSS Online Support portal:

<https://onestopsystems.com/pages/support-form>

For a quick response, use the Technical Support and RMA Request Form available in the Support Section of the website. Simply complete the form with all required information. Please make sure that your problem description is sufficiently detailed to help us understand your problem.

For example: Do not say "Won't boot up." Do say "Tried all the steps in the Troubleshooting Section and it still won't boot up."

For faster diagnosis of your problem, please run the two utility programs described in the following sections and include the diagnostic files they generate with your email.

## 11 Returning Merchandise to One Stop Systems

If factory service is required, you must contact OSS Service Representative to obtain a Return Merchandise Authorization (RMA) number. Put this number and your return address on the shipping label when you return the item(s) for service. **One Stop Systems will return any product that is not accompanied by an RMA number.** Please note that One Stop Systems WILL NOT accept COD packages, so be sure to return the product freight and duties paid.

Ship the well-packaged product to the address below:

RMA # \_\_\_\_\_  
One Stop Systems  
2235 Enterprise Street, Suite#110  
Escondido, CA 92029  
USA

It is not required, though highly recommended, that you keep the packaging from the original shipment of your One Stop Systems product. However, if you return a product to One Stop Systems for warranty repair/ replacement or take advantage of the 30-day money back guarantee, you will need to package the product in a manner similar to the manner in which it was received from our plant.

One Stop Systems cannot be responsible for any physical damage to the product or component pieces of the product (such as the host or expansion interfaces for the PCIe expansion chassis) that are damaged due to inadequate packing. Physical damage sustained in such a situation will be repaired at the owner's expense in accordance with Out of Warranty Procedures. Please, protect your investment, a bit more padding in a good box will go a long way to ensuring the device is returned to use in the same condition you shipped it in. Please call for an RMA number first.

## 12 Shipping / transporting the card

Use appropriate packaging materials.



### **IMPORTANT**

PCIe cards should be removed (or not to be installed) prior to shipping to avoid or prevent damage, failure to do so, will void the warranty of the unit.

---

## 13 APPENDIX A Compliance

### FCC

NOTE: This equipment has been evaluated 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 not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the service personnel will be required to correct the interference at his own expense.

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, and (2) this device must accept any interference received including interference that may cause undesired operation.

Changes or modifications not expressly approved by the party responsible for compliance could void the service personnel's authority to operate the equipment.

**NOTE**

The assembler of a personal computer system may be required to evaluate the system and/or make necessary modifications if a system is found to cause harmful interferences or to be noncompliant with the appropriate standards for its intended use.

---

Industry Canada

This Class A digital apparatus complies with Canadian ICES-003. Cet appareil numérique de la classe A est conformé à la norme NMB-003 du Canada

### CE

The product(s) described in this manual complies with all applicable European Union (CE) directives. One Stop Systems will not retest or recertify systems or components that have been reconfigured by customers



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