EMC® VNX5300™ Hardware Information Guide

The EMC VNX series implements a modular architecture that integrates hardware components for Block, File, and Object with concurrent support for native NAS, iSCSI, Fiber Channel, and Fibre Channel over Ethernet (FCoE) protocols. The VNX series is based on Intel® Xeon®-based PCI Express 2.0 processors and delivers File (NAS) functionality via two to eight Data Movers and Block (iSCSI, FCoE, and FC) storage via dual storage processors using a full 6-Gb/s SAS disk drive topology.

This guide describes one of five models available in the VNX series, the VNX5300.

The VNX5300 is a mid-range/entry level storage platform. It offers Block services, File services, or Unified Block and File services. These services consist of:

- **Block-only**—Includes a disk processor enclosure (DPE), a 1.2 KW standby power supply (SPS), and disk-array enclosures (DAEs) for holding hard disk drives that are integrated to facilitate Fibre Channel, Fibre channel over Ethernet (FCoE), and iSCSI Block services to Windows® and UNIX® hosts.
- **File-only**—Adds Data Mover enclosure (DME) and Control Station (CS) hardware to the SPE, SPS, and DAEs to facilitate file services to CIFS/NFS clients.
- **Unified Block and File**—Uses same hardware as the File-only configuration but adds FC, iSCSI, and FCoE I/O connectivity to provide Block services to host simultaneously so as to provide File services to clients.

The VNX5300 platform supports two types of DPEs and DAEs; a 15 drive 3.5-inch disk 3U enclosure and a 25 drive 2.5-inch disk 2U enclosure. Expansion of up to seven 3U DAEs (a maximum of 120 3.5-inch disk drives) or up to four 2U DAEs (a maximum of 125 2.5-inch disk drives) is supported.

IMPORTANT

When calculating the number of drives for your VNX5300 platform, the DPE is included in the total drive quantity of 125 drives. If the total drive quantity exceeds 125, you will not be able to add another DAE.

Topics covered include:

About this document

This document provides an overview of the architecture, components, and features of the VNX5300 platform. The specific aspects of the Block, File, and Unified VNX5300 platform and its major components include the front and rear connectors and LED indicators on the 3U, 15 (3.5-inch) or 3U, 25 (2.5-inch) disk processor enclosure (DPE), the standby power supply (SPS), the Control Station, the Data Mover Enclosure[1] (DME), and the 3U, 15 (3.5-inch) or 2U, 25 (2.5-inch) disk drive disk-array enclosure (DAE).

Organization

The following describes the arrangement of the component descriptions presented in this document:

1. The term Data Mover Enclosure is used throughout this guide. The term Data Mover Enclosure is also referred to as a blade enclosure. These terms are interchangeable and basically mean the same.

Overview

The VNX series is targeted at the entry-level to high-end/large-capacity storage environments that require advanced features, flexibility and configurability. The VNX series provides significant advancements in efficiency, simplicity, and performance.

Benefits include:

- Support for File (CIFS and NFS), Block (FC, iSCSI & FCoE) and Object
- Simple conversions when starting with a VNX series Block only platform by simply adding File services or starting with File only and adding Block services
- Support for both block and file auto-tiering with Fully Automated Storage Tiering (FAST) for Virtual Pools (VP - FAST VP)
- Unified replication with RecoverPoint support for both file and block data
- Updated unified management with Unisphere™ now delivering a more cohesive unified user experience

As an mid-range/entry level storage platform offering Block services, File service and Unified services, the VNX5300 platform (Figure 1) is one of the five models that make up the VNX series. For a quick look at the VNX5300 platform hardware features, see Table 1, "VNX5300 hardware feature quick reference," on page 6.

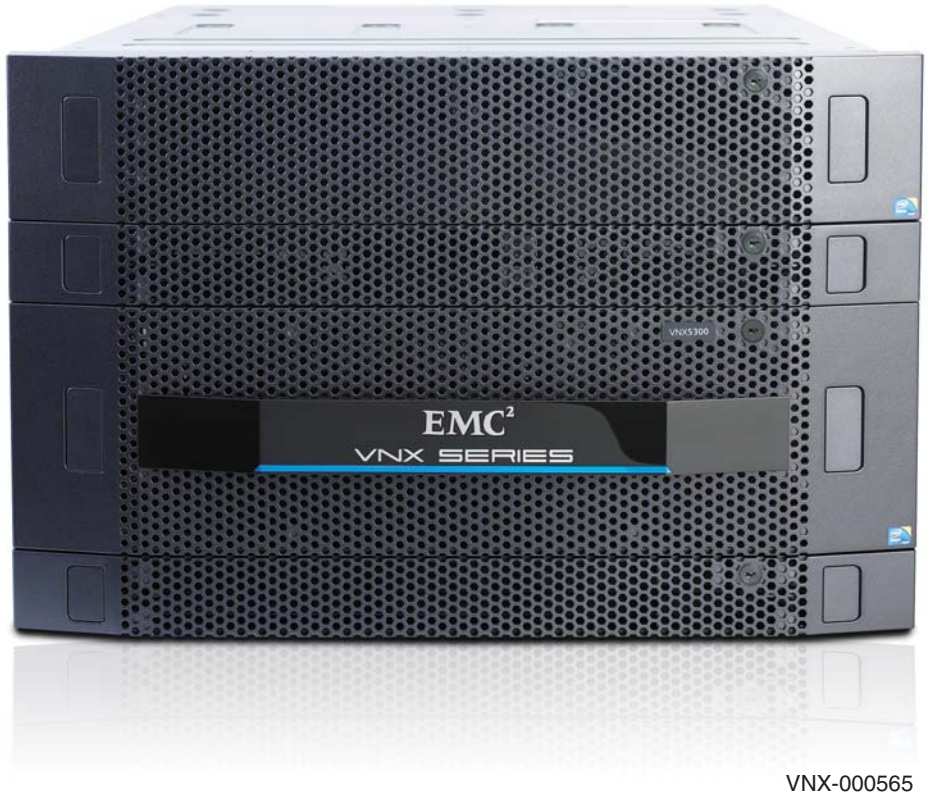


Figure 1 **Example of a Block and File VNX5300 platform with front bezel**

Note: A Block only VNX5300 platform only includes an SPS and a DPE.

VNX5300 Block and File front and rear views

This section shows an example of the front and rear views of a Block and File VNX5300 platform.

Note: A fully configured Unified VNX5300 platform includes up to seven 3U DAEs (a maximum of 120 3.5-inch disk drives) or up to four 2U DAEs (a maximum of 125 2.5-inch disk drives).

Front view

Figure 2 shows an example of the front view of a Block and File VNX5300 platform having a dual SPS; a 3U, 15 (3.5-inch) disk drive DPE; two Control Stations (one optional); and one Data Mover Enclosure with two Data Movers[2]. Each Data Mover includes two power supply/cooling (fan) modules and one CPU module.

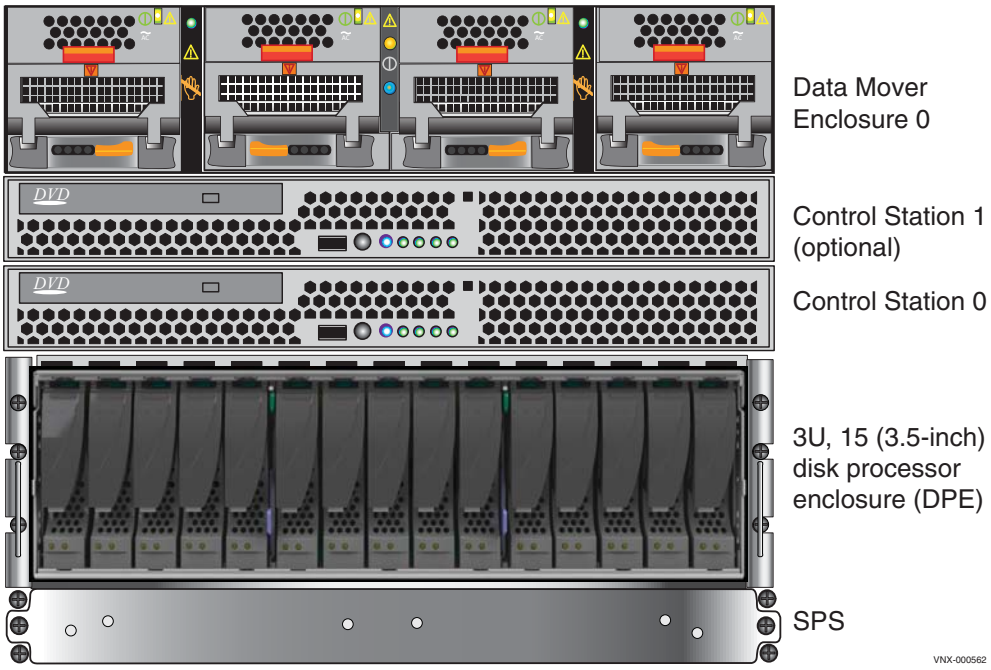


Figure 2 Example of a Block and File VNX5300 platform with a 3U, 15 DPE (front view)

Note: Figure 2 and Figure 3 on page 5 are examples of a Block and File VNX5300 platform (front and rear views). These figures are example of what a Block and File VNX5300 platform looks like and are for illustrative purposes only.

2. The term Data Mover is used throughout this guide. The term Data Mover is also referred to as a blade. These terms are interchangeable and basically mean the same.

Rear view

Figure 3 shows an example of the rear view of a Block and File VNX5300 platform having a dual SPS, a DPE with two storage processors (SP A and B), two (one optional) Control Stations, and one Data Mover Enclosure with two Data Movers. Each Data Mover includes two power supply/cooling (fan) modules and one CPU module.

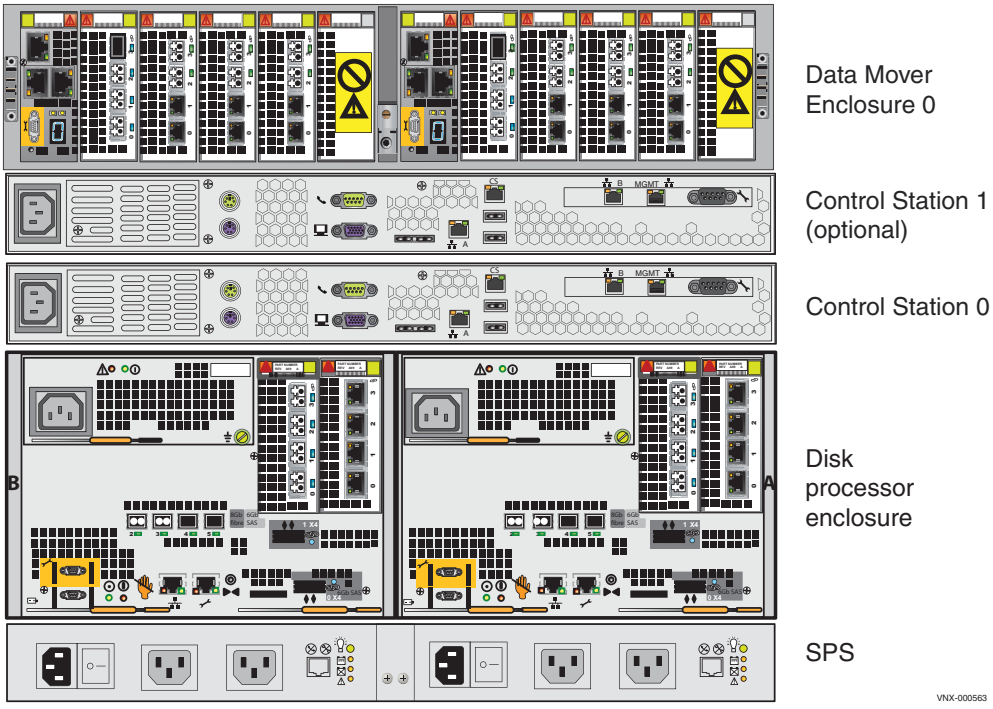


Figure 3 Example of a Block and File VNX5300 platform (rear view)

Hardware features

Contained in a 7 to 8U architecture, the Block and File VNX5300 platform weighs approximately 206.7 lb (93.76 kg) to 229.7 lb (104.19 kg) fully loaded[3] depending on the type of disk drives used in the DPE. With the DME having the deepest dimension within the cabinet, the Block and File VNX5300 measures 12.25 to 14 inches (7 to 8U) high x 18.92 inches wide x 24.25 inches deep (31.11 cm to 35.56 cm x 48.05 cm x 61.59 cm). Between the front and rear of the enclosure, a midplane distributes power and signals to all the enclosure components. The CPU modules and the power supply modules plug directly into the midplane connections.

Note: The previously mentioned dimensions are approximate and do not include the cabinet enclosure.

3. A fully loaded Block and File VNX5300 platform (without any DAEs) includes two Control Stations, a DPE (with two SPs), one dual SPS, and two Data Mover Enclosures (a second Data Mover Enclosure is optional). In this fully loaded Block and File VNX5300 platform, the DPE (with two SPs) can have either 15 (3.5-inch) drives or 25 (2.5-inch) drives. Separately, the 15 (3.5-inch) drives weigh 34 lb (15.42 kg) and the 25 (2.5-inch) drives weigh 13.5 lb (6.13 kg), respectively.

Table 1 VNX5300 hardware feature quick reference

			File				Block				
Minimum form factor	Maximum # of drives	Drive types	Config. I/O slots per Data Mover	Data Movers	System memory per Data Mover	Protocols	Config. I/O slots per SP	Built-in I/O ports	SPs	System memory per SP	Protocols
4U-7U	125	3.5 in. SAS, NL-SAS, Flash, and 2.5 in. 10 K SAS	3	1 or 2	6 GB	NFS, CIFS, MPFS[a] and pNFS[b]	2	4 FC ports plus 2 BE[c] SAS ports	2	8 GB	FC, iSCSI, and FCoE

a. MPFS = Multi-Path File System

b. pNFS = parallel-NFS

c. BE = back end

For physical, environmental, and power details, refer to "Specifications" on page 73.

Configured for AC-input power, the Block and File VNX5300 platform includes the following hardware features:

- One DPE:

IMPORTANT

On the rear of the DPE, each storage processor includes a CPU module and a power supply. Two latch handles on the bottom left and right provide each SP (SP A and SP B) with the means to secure the SP. The CPU and power supply modules can only be installed or removed after you remove the entire storage processor from the DPE.

  - On the front of the DPE, two types of disk drives are supported in two disk drive carrier types; 3U, 15 (3.5-inch) disk drive carrier (Figure 4 on page 11) or 3U, 25 (2.5-inch) disk drive carrier (Figure 5 on page 12). The disk drives supported are Serial attached-SCSI (SAS), near-line SAS (NL-SAS), and Flash or Enterprise SSD.
  - On the rear of the DPE, each (hot-swappable) storage processor (Figure 11 on page 18) consists of:
    - A CPU module with an Intel Xeon 4-core 1.66-GHz processor with three Double Data Rate Three (DDR3) synchronous dynamic RAM (SDRAM) slots supporting 4-GB SDRAM
    - Four integrated 8-Gb/s FC ports (labeled 2, 3, 4, and 5; supporting 2, 4, and 8 Gb/s having front end auto-negotiation with support for manual override)
    - Two integrated four lane 6-Gb/s SAS x4 ports (labeled 0 x4 and 1 x4); supported speeds are 1.5, 3, and 6 Gb/s
    - Two PCI Gen 2 x4 I/O module slots supporting a combination of the following UltraFlex™ I/O modules:

      Two-port 10-Gb/s optical or active Twinax[4] (w/iSCSI protocol)

4. The two-port 10-Gb/s and FCoE I/O modules can also use active twinaxial (Twinax) cables. Twinax is a type of cable similar to coax, but with two inner conductors instead of one. These cables will be supplied in lieu of SFP+ when so ordered.

Four-port 1-Gb/s 10/100/1000 copper iSCSI

Four-port 8-Gb/s optical Fibre Channel (running at 2, 4, or 8-Gb/s)

Two-port 10-Gb/s optical or active Twinax[2] Fibre Channel over Ethernet (FCoE)

  - One RS-232/EIA 232 serial (up to 115 K baud) service laptop (micro DB-9) port
  - One RS-232/EIA 232 serial management (micro DB-9) port
  - One 10/100/1000 LAN management (RJ-45) port
  - One 10/100/1000 LAN service (RJ-45) port
  - One power supply (hot-swappable)
- One (1U) standby power supply (SPS) with a second (optional) SPS available
- One DME with up to two Data Movers. Each Data Mover consists of:
  - One CPU module consisting of one Intel Xeon 4-core 2.13-GHz processor
  - Six DDR3 synchronous dynamic RAM (SDRAM) slots supporting up to 6 GB per CPU module
  - One Fibre Channel (FC) I/O module with a:
    - Four-port 8 Gb/s optical (running at 2, 4, or 8 Gb/s); in slot 0
  - One to two of the following network I/O modules in any combination:
    - Two-port 10-Gb/s optical or active Twinax[2] (w/iSCSI protocol)
    - Four-port 1-Gb/s copper iSCSI
    - Two-port 1-Gb/s copper plus two-port 1-Gb/s optical
    - Two-port 10-Gb/s optical or active Twinax[2] Fibre Channel over Ethernet (FCoE)

    Note: The maximum number of I/O modules for the VNX5300 is three per Data Mover and any combination of these I/O modules must be the same for each Data Mover.

  - Two management modules per DME (or, one per Data Mover)
  - Two power supply/cooling (fan) modules per CPU module
- One or two Control Stations. Each Control Station consists of the following features:
  - Intel 2.0 GHz single core Celeron processor with 800-MHz front side bus (FSB) and 512 KB cache
  - 2 GB of RAM
  - One 250 GB SATA hard drive
  - Two rear-mounted USB ports and one front-mounted USB port
  - Four 10BASE-T/100BASE-TX/1000BASE-T network interface (RJ-45) connectors (located on the rear panel)
  - Two integrated serial ports, one for laptop/console redirection and one for the CallHome modem
  - One DVD-ROM drive
- Expansion of up to seven 3U, 15 (3.5-inch) DAEs (a maximum of 120 drives) or up to four 2U, 25 (2.5-inch) DAEs (a maximum of 125 drives)

IMPORTANT

When calculating the number of drives for your Block and File VNX5300 platform, the DPE is included in the total drive slot quantity of 120 or 125 drives. If the total drive slot quantity exceeds 120 or 125, you will not be able to add another DAE. Refer to "Disk-array enclosure expansion" on page 57 for more information about the available expansion DAEs for the Block and File VNX5300 platform.

- Any required cables including LAN cables, modem cables, and serial DB-9 cable.
- Mounting rails with hardware
- Front bezel with VNX5300 badge

System component description

This section provides the exact details of the Block and File VNX5300 platform components. These details include illustrations and descriptions of the front and rear connectors and the LED indicators.

Note: A Unified VNX5300 platform uses the same hardware as the Block and File configuration but adds FC, iSCSI, and FCoE I/O connectivity to provide Block services to host simultaneously so as to provide File services to clients.

VNX5300 front view

As previously described, the Block and File VNX5300 platform is made up of a DPE, an SPS, one to two Control Stations, and one DME. The following sections will describe the front (Figure 2 on page 4) view of the VNX5300 platform components separately.

Note: In the following sections, the illustrations and corresponding tables describe these individual components. These descriptions are for illustrative purposes only.

DPE front views

The VNX5300 platform can have one of two versions of the 3U disk drive DPEs available.

IMPORTANT

When calculating the number of drives for your Block and File VNX5300 platform, the DPE is included in the total drive slot quantity of 120 to 125 drives. If the total drive slot quantity exceeds 120 to 125, you will not be able to add another DAE. Refer to "Disk-array enclosure expansion" on page 57 for more information about the available expansion DAEs for the Block and File VNX5300 platform.

Each Block and File VNX5300 platform DPE consists of the following components:

- Drive carrier
- Disk drives
- Midplane
- Storage processor (SP) CPU
- Storage processor (SP) power supply
- EMI shielding

Drive carrier

The disk drive carriers are metal and plastic assemblies that provide smooth, reliable contact with the enclosure slot guides and midplane connectors. Each carrier has a handle with a latch and spring clips. The latch holds the disk drive in place to ensure proper connection with the midplane. Disk drive activity/fault LEDs are integrated into the carrier. For detailed information, go to "3U, 15 DPE front view" on page 10 or "3U, 25 DPE front view" on page 12.

Disk drives

Each disk drive consists of one disk drive in a carrier. You can visually distinguish between module types by their different latch and handle mechanisms and by type, capacity, and speed labels on each module. You can add or remove a disk drive while the DPE is powered up, but you should exercise special care when removing modules while they are in use. Drive modules are extremely sensitive electronic components.

Midplane

A midplane separates the front-facing disk drives from the rear-facing SPs. It distributes power and signals to all components in the enclosure. SPs and disk drives plug directly into the midplane.

Storage processor (SP)

The SP is the intelligent component of the disk processor enclosure (DPE). Basically, it acts as the control center. Each SP includes status LEDs, PCI Gen 2 x4 I/O module slots, LAN ports, and so on. For detailed information, go to "DPE" on page 21.

Storage processor (SP) power supply

The SP power supply is located on the top, left side of the SP when viewed from the rear. This module is an auto-ranging, power-factor-corrected, multi-output, off-line converter with its own line cord. Each power supply includes status LEDs. A latch on the power supply locks it into place to ensure proper connection. For detailed information, go to "SP AC power supply" on page 23.

EMI shielding

EMI compliance requires a properly installed electromagnetic interference (EMI) shield in front of the DPE disk drives. When installed in cabinets that include a front door, the DPE includes a simple EMI shield. Other installations require a front bezel that has a locking latch and integrated EMI shield. You must remove the bezel/shield to remove and install disk drive modules.

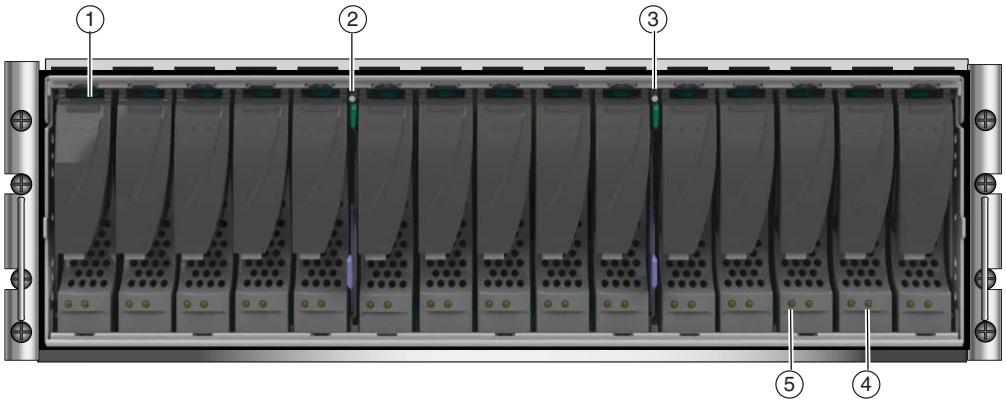
3U, 15 DPE front view

On the front, the Block and File VNX5300 platform 3U, 15 (3.5-inch) DPE carrier includes the following:

- 3.5-inch 6-Gb/s SAS or 6-Gb/s NL-SAS disk drives (hot-swappable)[5]
- Status LEDs

Figure 4 on page 11 shows the location of these disk drives and Status LEDs.

5. You can add or remove a disk drive while the DPE is powered up, but you should exercise special care when removing disk drives while they are in use. Drive modules are extremely sensitive electronic components.



1	3.5-inch 6-Gb/s SAS drives or 6-Gb/s NL-SAS disk drives	**4**	Disk drive fault LED (amber)
2	DPE fault LED (amber)	**5**	Disk drive on/activity LED (green)
3	DPE power on LED (blue)		

Figure 4 **VNX5300 platform 3U, 15 DPE carrier (front view)**

Table 2 describes the Block and File VNX5300 platform 3U, 15 DPE and the disk drive status LEDs.

Table 2 **VNX5300 platform 3U, 15 DPE and disk drive LEDs**

LED	Color	State	Description
DPE fault (location 2)	Amber	On	Fault has occurred **Note:** LED is always on at powerup, until it is initialized.
DPE power (location 3)	Green	On	Powering and powered up with backend bus running at 2 Gb/s
	Blue	On	Powering and powered up with backend bus running at 6Gb/s
	—	Off	Powered down
Disk drive fault (location 4)	Amber	On	Fault has occurred
	—	Off	No fault has occurred

Table 2 **VNX5300 platform 3U, 15 DPE and disk drive LEDs (continued)**

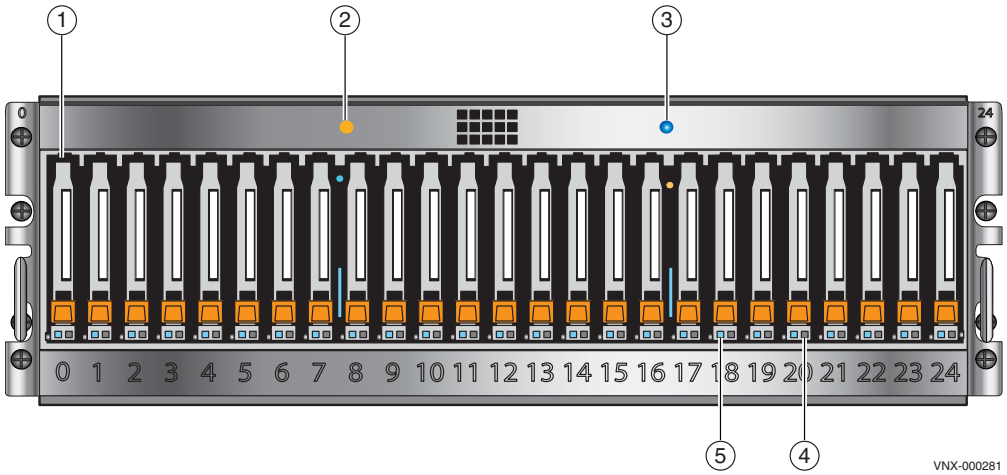
LED	Color	State	Description
Disk drive on/activity (location 5)	Green	On	Powering and powered up
		Blinking, mostly on	Disk drive is on with I/O activity
		Blinking at constant rate	Disk drive is spinning up or down normally
		Blinking, mostly off	Disk drive is powered up but not spinning **Note:** This is a normal part of the spin-up sequence, occurring during the spin-up delay of a slot.
	—	Off	Disk is powered down

3U, 25 DPE front view

On the front, viewing from left to right, the Block and File VNX5300 platform 3U, 25 (2.5-inch) disk drive DPE includes the following:

- 2.5-inch 6-Gb/s SAS or 6-Gb/s NL-SAS drives (hot-swappable)[6]
- Status LEDs

Figure 5 shows the location of these disk drives and status LEDs.



1	2.5-inch 6-Gb/s SAS or 6-Gb/s NL-SAS disk drives	**4**	Disk drive fault LED (amber)
2	DPE fault LED (amber)	**5**	Disk drive status/activity (blue)
3	DPE power status LED (blue)		

Figure 5 **VNX5300 platform 3U, 25 DPE carrier (front view)**

Table 3 describes the Block and File VNX5300 platform 3U, 25 DPE and disk drive status LEDs.

6. You can add or remove a disk drive while the DPE is powered up, but you should exercise special care when removing disk drives while they are in use. Disk drives are extremely sensitive electronic components.

Table 3 VNX5300 platform 3U, 25 DPE and disk drive status LEDs

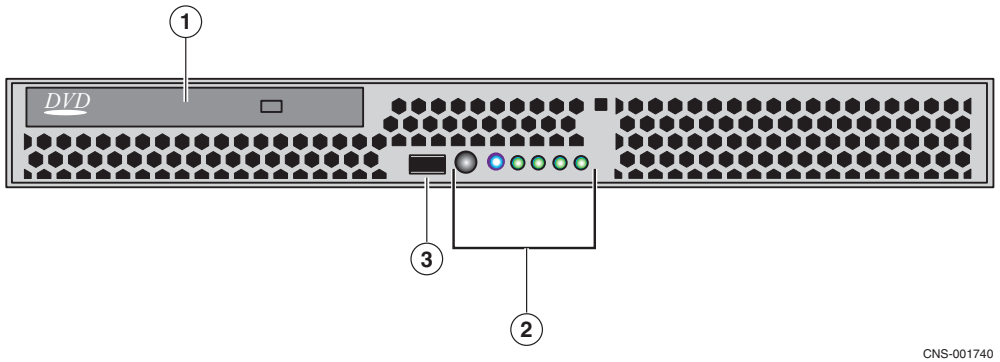
LED	Color	State	Description
DPE fault (location 2)	Amber	On	Fault has occurred
DPE power (location 3)	Blue	On	Powering and powered up
	—	Off	Powered down
Disk drive fault (location 4)	Amber	On	Fault has occurred
	—	Off	No fault has occurred
Disk drive on/activity (location 5)	Blue	On	Powering and powered up
		Blinking	Disk drive activity

Control Station front view

On the front, viewing from left to right, the Block and File VNX5300 platform Control Station includes the following:

- DVD-ROM drive
- USB 2.0 connector (not used)
- Control switch and status LEDs

Figure 6 shows the orientation of these components.



1	DVD-ROM drive	3	USB 2.0 connector (not used)
2	Control Station switch and status LEDs (for a closer view, see Figure 7 on page 14)		

Figure 6 VNX5300 platform Control Station (front view)

Control Station switch and LEDs

Figure 7 shows the location of the Block and File VNX5300 platform Control Station switch and LEDs on the front panel. Table 4 describes the switch located on the front panel. Table 5 describes the LEDs located on the front panel.

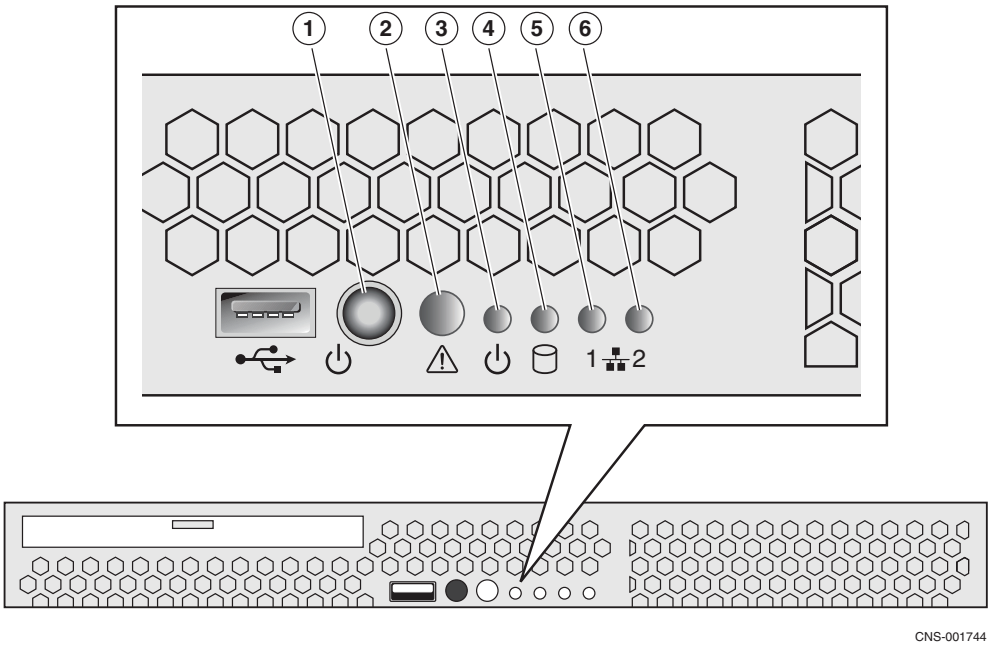


Figure 7 VNX5300 platform Control Station switch and LEDs

Table 4 Control Station switch

Switch	Description
Power push-button (location 1)	Toggles the Control Station power

Table 5 Control Station LEDs

LED	Color	State	Description
System status (location 2)	Not used		
System power/sleep (location 3)	Green	On	Power on
		Blinking	Sleep
	—	Off	Power off
Internal hard drive activity (location 4)	Green	Blinking	Hard drive access
	—	Off	No hard drive activity
Onboard (integrated) Ethernet NIC 1 and 2 (locations 5 and 6, respectively)	Green	On	NIC link/no access
		Blinking	NIC link/LAN access

DME front view

The front of the Block and File VNX5300 platform, the DME contains two enclosure status (power and fault) LEDs (Figure 8). Table 6 describes the DME power and fault LEDs.

Note: Figure 8 is a graphical representation of the Block and File VNX5300 platform DME with four power supply/cooling (fan) modules and two CPU modules installed.

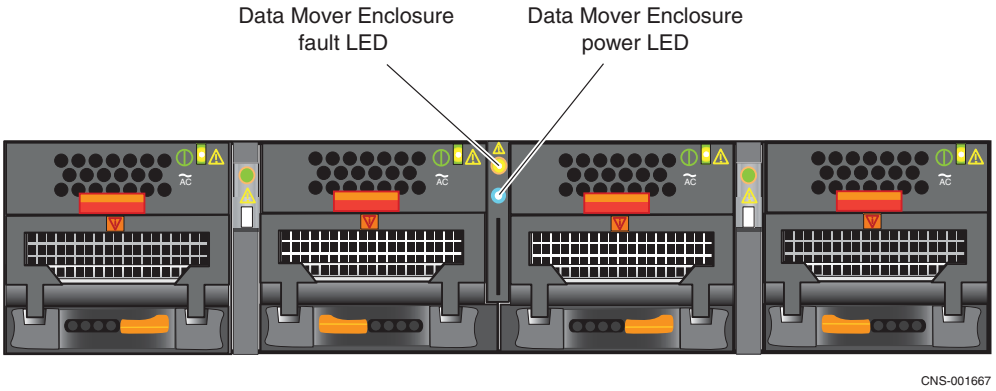


Figure 8 Data Mover enclosure LEDs

Table 6 Data Mover Enclosure LEDs

LED	Color	State	Description
Power	Blue	On	DME is powered up and all the FRUs in the enclosure are operating properly
	—	Off	DME is powered down.
Fault	Amber	On	A FRU failed within the enclosure.
	—	Off	DME operating normally.

CPU LEDs

The CPU modules in the DME contain the power, fault, and unsafe-to-remove LEDs. Figure 9 shows the CPU LEDs and Table 7 on page 16 describes them.

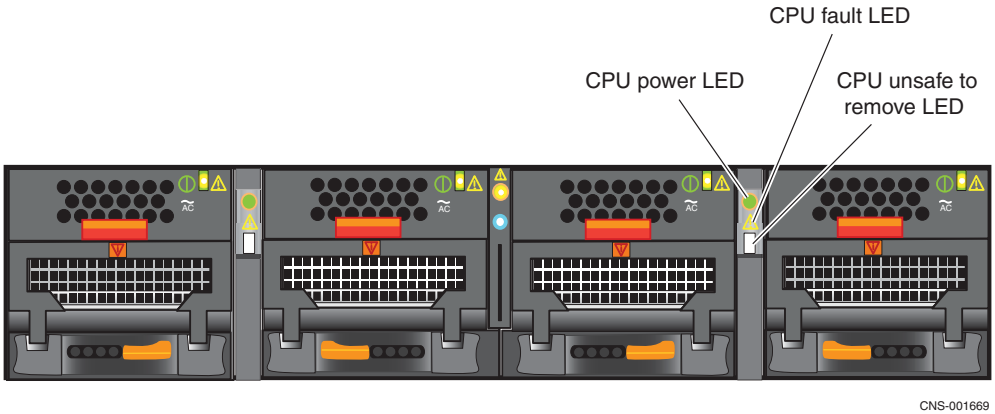


Figure 9 CPU LEDs

Table 7 CPU LEDs

LED	Color	State	Description
Power	Green	On	Data Mover is powered up and all FRUs in the Data Mover are operating properly.
	—	Off	Data Mover is powered down.
Fault	Amber	On	Data Mover has faulted.
		Blinking	Data Mover goes through six stages of power up: 1. Executes a BIOS check, blinking once every 4 seconds 2. Executes a POST check, blinking once every second 3. Loads the operating system, blinking four times a second
	Blue (see Note)		4. Operating system loaded, blinking once every 4 seconds 5. Operating system starting drivers, blinking once every second 6. Operating system drivers operating, blinking four times a second
	—	Off	Data Mover operating normally.
Unsafe-to-remove	White	On	Data Mover is unsafe to remove.
	—	Off	Data Mover is safe to remove.
Note: The fault LED changes color from amber to blue when the operating system is loading, see step 4 in the description.			

Power supply/cooling (fan) module LED

The power supply/cooling (fan) modules have a status LED on the front. Figure 10 shows the LEDs for the power supply/cooling (fan) modules and Table 8 describes them.

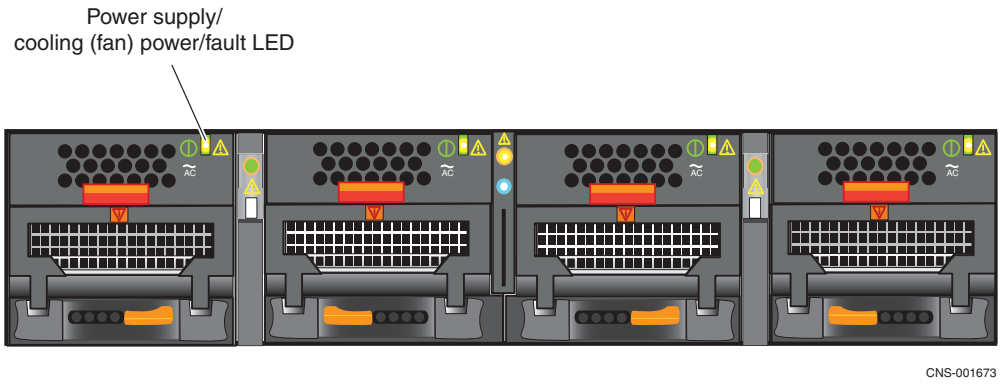


Figure 10 Power supply/cooling (fan) module LED

Table 8 Power supply/cooling (fan) module LED

LED	Color	State	Description
Power/Fault	Green	On	Normal (no faults detected)
	Amber	Blinking	Power supplied but external fault detected
	Amber	On	No power

VNX5300 rear view

On the rear, viewing from bottom to top, a Block and File VNX5300 platform includes the following hardware components:

- One to two SPSs
- One DPE with two storage processors (SPs), each SP (A and B) having one CPU module and one power supply
- One to two Control Stations
- One Data Mover Enclosure with one to two Data Movers

Standby power supply rear view

The Block and File VNX5300 platform includes one to two 1U, 1.2-kilowatt standby power supplies (SPSs) to maintain power to the Block and File VNX5300 platform SP during power loss. Within the SPS, a built-in DC battery pack is charged by way of an AC-DC converter. AC input power from the power distribution unit (PDU) goes into the SPS AC power inlet to the AC-DC converter. This converter then converts the AC power to DC power, which is then stored into the built-in DC battery pack. When emergency power is needed by the Block and File VNX5300 platform SP, a second DC-AC converter inside the SPS takes the DC power from the DC battery pack and then converts it to AC power. This AC power then goes from the SPS AC power outlet to the VNX5300 platform SP (Figure 11 on page 18).

Note: Two SPSs provide higher availability and allow write caching, which prevents data loss during a power failure, to continue.

IMPORTANT

A faulted or not fully charged SPS disables the write caching.

If AC power fails, the SPS provides backup power until the SP has flushed its write cache data to the DAE disks. The SP then shuts off SPS power. If the cache flush has not completed within 90 seconds—more than enough time to flush a full cache—or if the SP has failed, then the SPS shuts down to prevent a deep discharge. If there is no AC input power and the SPS is shut down, all the status lights will be off.

The output voltage, when the SPS is in the On-Line state, is a straight pass-through of the AC-line from inlet to outlets. When in the On-Battery state, the output voltage shall be at an AC level within the specified limits (see the SPS battery LED in Table 9 on page 19).

When power returns, the SPS starts recharging the DC battery pack. It may reach a state of full charge relatively quickly. If power remains off for a long period—days or weeks—the DC battery may require more time to charge fully.[7] The storage processor will not use the write cache unless it detects at least one fully charged SPS.

Battery lifetime depends on the number of discharge cycles and the depth of discharge. In a typical environment, a battery pack can last 3 to 5 years. The DC battery pack lifetime is shorter in locations that have frequent AC outages.

Looking from left to right, Figure 11 on page 18 shows an example of the rear view of two SPSs (B and A, respectively).

Two SPSs

An additional SPS can be added for redundancy. When only one SPS is used, the AC power out connectors for the SPS supply AC power to both SP A and SP B.

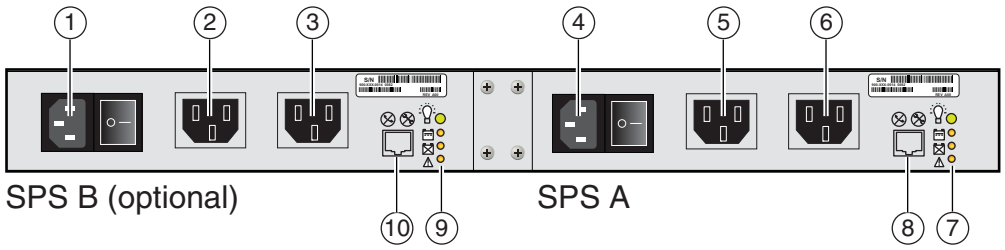
7. After a full power outage, an SPS typically requires 45 minutes or a maximum of 75 minutes to charge. To charge the SPS after being off-line usually requires at least 2 hours.

It is important to cable each SPS so that it connects completely to either the A side or the B side. For example, if you are looking at the SPSs from the rear, they should be configured as:

- SPS A (rear, right side)—Power-out and sense (management) cables connected to the SP A power supply.
- SPS B (rear, left side)—Power-out and sense (management) cables connected to the SP B power suppy.

Note: If an SPS is cabled with the SPS sense (management) cable going to the power supply on SP A and the power-out cable going to the power supply on SP B (or vice versa), an error condition will occur when the SPS is tested or when it is charging.

Looking from left to right, Figure 11 shows an example of the rear view of two SPSs (B and A, respectively).



1	SPS B AC power in (recessed plug)	**6**	AC power out socket
2	AC power out socket	**7**	Four SPS A status LEDs (green and amber)
3	AC power out socket to the SP B power supply on the DPE	**8**	SPS A to SP A management (RJ-12) connector
4	SPS A AC power in (recessed plug)	**9**	Four SPS B status LEDs (green and amber)
5	AC power out socket to the SP A power supply on the DPE	**10**	SPS B to SP B management (RJ-12) connector

Figure 11 Example of SPS B and A viewing from left to right (rear view)

SPS LEDs

Figure 12 shows the LEDs located on each SPS (A and B).

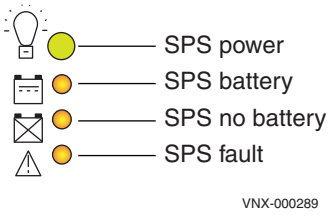


Figure 12 SPS LEDs

Table 9 describes the SPS LEDs.

Table 9 SPS LEDs

Led	Color	State	Description
SPS power	Green	On	SPS ready and operating normally; battery fully charged
		Blinking	On/battery charging
	—	Off	Off/disconnected
SPS battery	Amber	On	AC line power is no longer available and the SPS is supplying DC output power from the battery. **Note:** When battery power comes on, and no other online SPS is connected to the SP, the file server writes all cached data to disk, and the event log records the event.
SPS no battery	Amber	On	SPS battery is not fully charged and may not be able to serve its cache flushing function. With the battery in this state, and no other online SPS connected to the SP, the system disables write caching, and writes any modified pages to the disk first. Replace the SPS as soon as possible.
SPS fault	Amber	On	The SPS has an internal fault. The SPS may still be able to run online, but write caching cannot occur. Replace the SPS as soon as possible.

SPS RJ-12 connector

Figure 13 shows the SPS (RJ-12 or modular jack) management port (labeled with two symbols; one depicting a telephone handset with a line through it and the other depicting a rectangle with a line through it). Both symbols mean that you cannot connect telephone type circuits to this connector (see the following **WARNING**). This port connects the SPS (A and B) ports to the SP (A and B) ports, respectively.

WARNING

The SPS (RJ-12) port is a LAN port not a WAN port. LAN ports contain safety extra-low voltage (SELV) circuits, and WAN ports contain telephone-network voltage (TNV) circuits. An RJ-45 (or TNV-type) looks the same as the RJ-12 except for two very important differences. An RJ-45 is an 8-wire modular jack. The RJ-12 is a six-wire modular jack. The RJ-45 plugs and jacks are wider than their RJ-12 counterparts - 7/16"vs 3/8". An RJ-45 plug won't fit into an R-J12 jack. But an RJ-12 plug will fit into an RJ-45 jack. Use caution when connecting cables. To avoid electric shock, do not attempt to connect TNV circuits to SELV circuits.

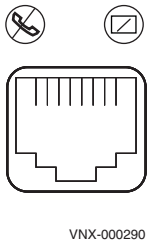


Figure 13 SPS RJ-12 port

Table 10 lists the SPS (RJ-12) pin signals used on the connector.

Table 10 SPS (RJ-12) port and connector pinout

RJ-45 pin	Signal	Description
1	RTS/DSR	Ready to send/Data transmit ready
2	Shield	Shield
3	TXD	Transmit data
4	RXD	Receive data
5	GND	Ground
6	CTS/DCD	Clear to send/Data

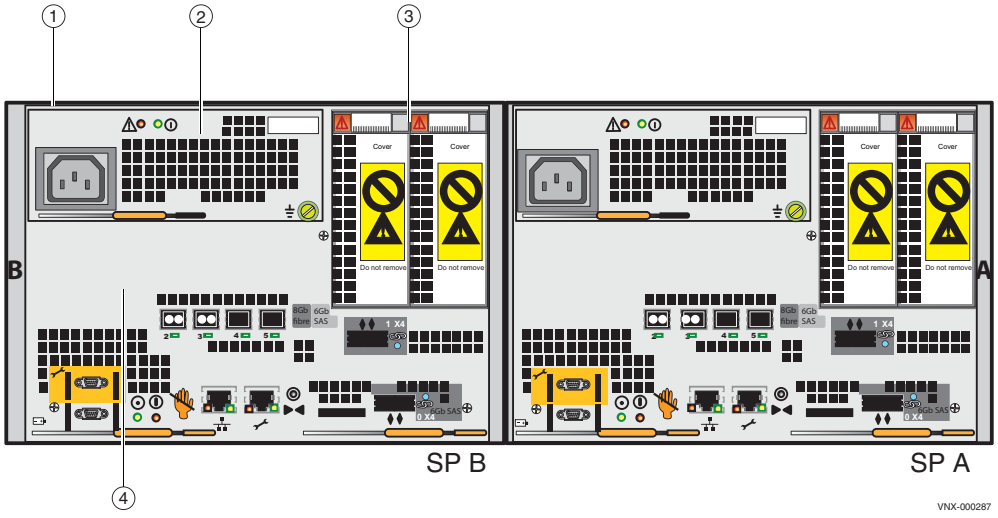
RJ-12 modular jack to micro DB-9 cable

The cable connecting the SPS to the SP is an RJ-12 to micro DB-9 cable (plug). It has an RJ-12 connector (SPS side) on one end and a micro DB-9 connector (SP side) on the other end. Figure 14 shows an example of an SPS A to SP A cable.

Figure 14 Example of SP A, MGMT A (micro DB-9) to SPS A (RJ-12) cable

DPE rear view

Figure 15 shows an example of a DPE with two SPs and the location of the major hardware components that make up each SP (A and B).



1	SP (for closer view, see Figure 16 on page 22)	**3**	I/O module slots showing one four-port 8-Gb/s Fibre Channel (FC) I/O module (supports 2, 4, and 8 Gb/s) and one four-port 1-Gb/s iSCSI I/O module
2	Power supply (for closer view, see Figure 17 on page 23)	**4**	CPU module (for closer view, see Figure 16 on page 22)

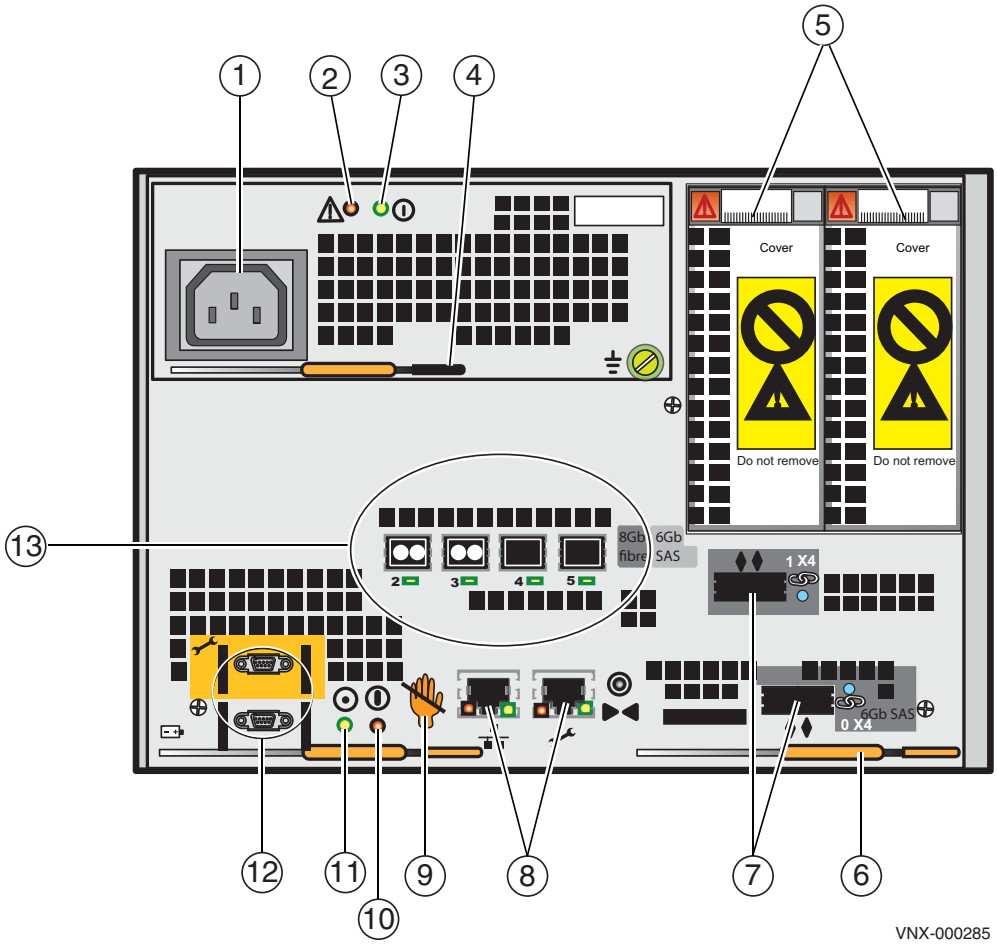
Figure 15 Example of the Block and File VNX5300 platform DPE with two SPs (rear view)

DPE

On the rear, viewing from left to right, each DPE includes the following hardware components:

- AC power supply/cooling module
  - Power in (recessed) connector (plug)
  - Power supply status LEDs (power on and fault)
  - Power supply latch handle
- SP B and A
  - Two PCI Gen 2 x4 I/O module slots (supporting several module types, see page 6)
  - Two 6-Gb/s SAS x4 ports (labeled 6Gb SAS 0 x4 and 1 x4); supported speeds are 1.5, 3, and 6 Gb/s
  - Four 8-Gb/s Fibre Channel ports (labeled 8Gb fibre 2, 3, 4, and 5)
  - Two (RJ-45) LAN connectors (labeled with a network management symbol and a wrench symbol)
  - Two (micro DB-9) RS-232/EIA connectors (labeled with a battery symbol and a wrench symbol)
  - RS-232/EIA status LEDs
  - SP latch handles (bottom, left and right)

Figure 16 shows the location of these components.



1	AC power in connector (recessed plug)	**8**	Two RJ-45 (management and service laptop) connectors (labeled with a network management symbol and a wrench symbol, respectively)
2	Power supply fault LED (amber)	**9**	SP unsafe to remove LED
3	Power supply power on LED (green)	**10**	SP fault LED (amber)
4	Power supply latch handle	**11**	SP power on LED (green)
5	Two I/O module slots showing one four-port 8-Gb/s Fibre Channel (FC) I/O module and one four-port 1-Gb/s iSCSI I/O module	**12**	Two RS-232/EIA (micro DB-9) connectors (labeled with a battery symbol and a wrench symbol, respectively)
6	Two SP latch handles (bottom left and right)	**13**	Four 8-Gb/s Fibre Channel ports (labeled 8Gb fibre 2, 3, 4, and 5)
7	Two 6-Gb/s SAS ports		

Figure 16 Example of SP components (rear view)

SP AC power supply

Figure 17 shows an example of the SP AC power supply/cooling module with a power in (recessed) connector (plug) and status LEDs. The SP is cooled by this power supply on top.

CAUTION

***Do not* remove the SP power supply/cooling module while the SP is plugged in. Power supply module removal for more than a few minutes can cause the SP to shut down due to lack of cooling.**

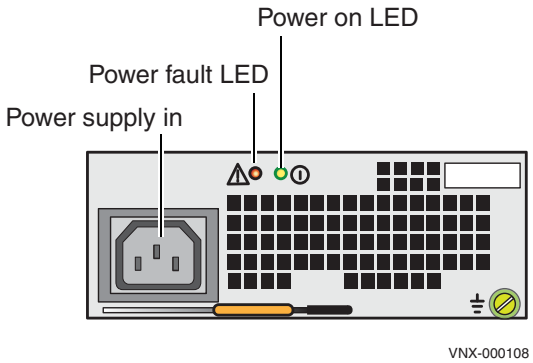


Figure 17 SP AC power supply module power in (recessed) connector (plug) and status LEDs

Table 11 describes the power supply module (fault and power on) LEDs.

Table 11 SP AC power supply/cooling module (fault and power on) LEDs

Led	Color	State	Description
Fault	Amber	On	Power supply or backup fault, check cable connection
		Blinking	BIOS, POST and OS booting up or system overheating
	—	Off	No fault or power off
Power	Green	On	Power on
	—	Off	Power off, verify source power

Table 12 describes the SP LEDs. The locations in Table 12 are shown in Figure 16 on page 22.

Table 12 SP LEDs

Led	Color	State	Description
Unsafe to remove (location 10)	White	On	*Do not* remove SP
	—	Off	Safe to remove SP

Table 12 SP LEDs (continued)

Led	Color	State	Description
Fault (location 11)	Amber	On	Fault
	—	Off	No fault or power off
Power (location 12)	Green	On	Power on
	—	Off	Power off, verify connection

SP Input/output ports and connectors

The Block and File VNX5300 platform SP supports the following I/O ports on the rear:

- Two 6-Gb/s SAS PCI Gen 2 x4 ports (labeled 6Gb SAS 0 x4 and 1 x4); supported speeds are 1.5, 3, and 6 Gb/s
- Four 8-Gb/s Fibre Channel (FC) ports (for front-end connectivity)
- One Ethernet (RJ-45) 10/100/1000 LAN (management) port
- One Ethernet (RJ-45) 10/100/1000 LAN (service laptop) port
- One RS-232/EIA 232 (micro DB-9) SPS connector
- One RS-232/EIA 232 (micro DB-9) service laptop connector

6-Gb/s SAS x4 ports — The Block and File VNX5300 platform SP supports two 6-Gb/s SAS x4 ports (labeled 6GB 0 x4 and 6GB 1 x4) on the rear of each SP (A and B). These ports provide an interface for SAS and NL-SAS drives on the DAE. This port is a 26-circuit SAS small form-factor 8088 (SFF-8088) specification (socket or receptacle) using an SFF-8088 specification mini-SAS HD 26-circuit cable (plug) with a pull tab.

Note: Each SAS cable is keyed with an *in* and *out* connection to prevent incorrect cabling.

Figure 18 shows an example of the port connector (socket) and cable connector (plug) with pull tab.

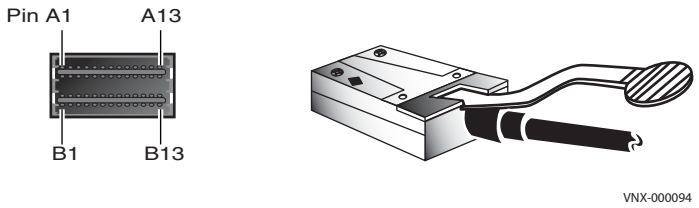


Figure 18 SP 6-Gb/s SAS port and cable connector

Table 13 lists the SP 6-Gb/s SAS port pin signals used on the connector.

Table 13 SP 6-Gb/s SAS port connector pinout

Pin	Signal	Pin	Signal
A1	GND	B1	GND
A2	Rx 0+	B2	Tx 0+
A3	Rx 0-	B3	Tx 0-

Table 13 SP 6-Gb/s SAS port connector pinout (continued)

Pin	Signal	Pin	Signal
A4	GND	B4	GND
A5	Rx 1+	B5	Tx 1+
A6	Rx 1-	B6	Tx 1-
A7	GND	B7	GND
A8	Rx 2+	B8	Tx 2+
A9	Rx 2-	B9	Tx 2-
A10	GND	B10	GND
A11	Rx 3+	B11	Tx 3+
A12	Rx 3-	B12	Tx 3-
A13	GND	B13	GND

SP 6-Gb/s SAS port LEDs — Figure 19 shows an example of the 0 x4 SP 6-Gb/s SAS port LED—a bi-color (blue/green) LED to the right of the connector—that indicates the link/activity of the SAS port.

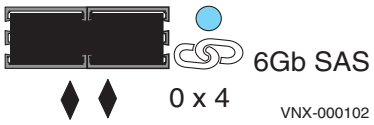


Figure 19 Example of the 0 x4 SP 6-Gb/s SAS port LED

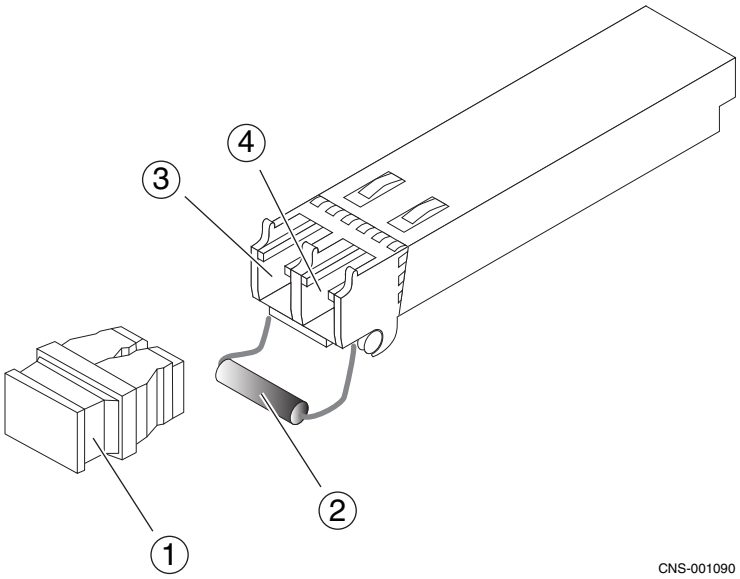
Table 14 describes the SP 6-Gb/s port LEDs.

Table 14 SP 6-Gb/s SAS port LEDs

Led	Color	State	Description
Link/activity	Blue	On	Powered on/activity
	Green	On	Up but not at full 6 Gb/s
	—	Off	No link activity

8-Gb/s FC ports

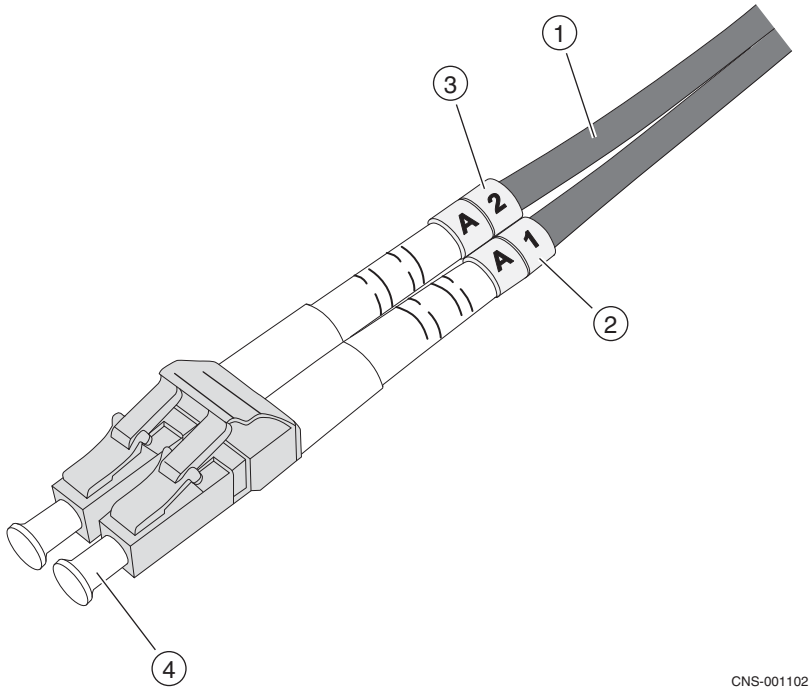
The Block and File VNX5300 platform SP comes with four optical (fibre) 8-Gb/s Fibre Channel (FC) ports (labeled 8GB fibre 2, 3, 4, and 5) on the rear of each SP (A and B). These ports provide an optical interface for connecting to the front end. These ports support 2-, 4-, and 8-Gb/s Fibre Channels using a small form-factor pluggable (SFP+) transceiver module. The SFP+ transceiver modules connect to Lucent Connector (LC) type optical fibre cables. These SFP+ transceiver modules are input/output (I/O) devices. These SFP+ modules are hot swappable. This means that you can install and remove an SFP+ module while the SP is operating. Figure 20 on page 26 shows an example of an SFP+ module.



1	Dust plug (protective cap)	**3**	Send or transmit (TX) optical bore
2	Bale clasp latch	**4**	Receive (RX) optical bore

Figure 20 Example of an SFP+ module

The LC type interface was developed by Lucent Technologies (hence, Lucent Connector). It uses a push-pull mechanism. LC connectors are normally held together in a multimode duplex configuration with a plastic clip. These cables are usually colored orange with the duplex connectors encased in a gray plastic covering. To determine the send or transmit (TX) and receive (RX) ferrules (connector ends), these cables will show a letter and numeral (for example A1 and A2 for the TX and RX, respectively) or a white and yellow rubber gasket (jacket) for the send or transmit (TX) and receive (RX) ends (Figure 21 on page 27).



1	Orange cable	**3**	Rubber gasket (jacket), receive (RX)
2	Rubber gasket (jacket), send or transmit (TX)	**4**	Ferrule (connector end to SFP+ module)

Figure 21 Example of LC-type connectors

Figure 22 shows an example of the SP 8-Gb/s FC connector with an SFP+ in slots 2 and 3.

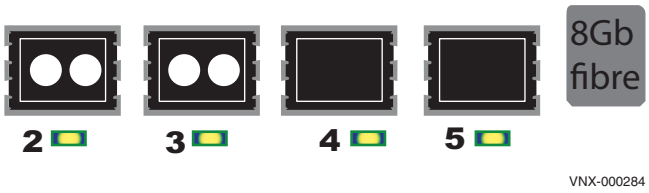


Figure 22 Example of SP 8-Gb/s FC connector with an SFP+ in slots 2 and 3

Table 15 describes the SP 8-Gb/s FC port LEDs.

Table 15 8-Gb/s FC port LEDs

Led	Color	State	Description
Link/Activity (each port has one LED)	Green	On	2- or 4-Gb/s link speed (suboptimal speed)
	Blue	On	8-Gb/s link speed (maximum speed)
	Green or Blue	Blinking	Small form-factor pluggable (SFP+[a]) transceiver module faulted, unsupported, or optical cable fault.
	—	Off	No network connection

a. Refer to the *VNX5300 Parts Guide* for the correct SFP+ part number.

Network management and service laptop Ethernet (RJ-45) ports

WARNING

The SP Ethernet (RJ-45) ports are LAN ports not WAN ports. LAN ports contain safety extra-low voltage (SELV) circuits, and WAN ports contain telephone-network voltage (TNV) circuits. Some LAN and WAN ports both use RJ-45 connectors. Use caution when connecting cables. To avoid electric shock, do not connect TNV circuits to SELV circuits.

The block and File VNX5300 platform SP comes with two integrated dual-port Ethernet ports (labeled with a network management symbol and a wrench symbol, respectively). These ports provide an interface for connecting to the public LAN and a service laptop computer, respectively. The ports are 8-pin MDI RJ-45 type ports for either IEEE 802.3 10BASE-T (10 Mb/s), IEEE 802.3u 100BASE-TX (100 Mb/s), or 1000BASE-T (1000 Mb/s) Ethernet connections.

Figure 23 shows an example of the SP network management and service laptop Ethernet (RJ-45) ports.

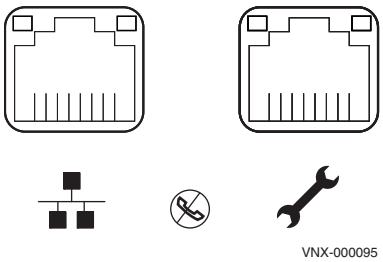


Figure 23 Network management and service laptop Ethernet (RJ-45) ports

IMPORTANT

The ports shown in Figure 23 are LAN ports. A symbol depicting a telephone handset with a line through it indicates that you should not connect WAN type RJ-45 telephone connectors to these ports.

To access the Ethernet ports, connect a Category 3, 4, 5, 5E, or 6 unshielded twisted-pair (UTP) cable to the RJ-45 connectors on the back of the SP, as described in Table 16.

Table 16 Ethernet cabling guidelines

Type	Description
10BASE-T	EIA Categories 3, 4, or 5 UTP (2 or 4 pairs) up to 328 ft (100 m)
100BASE-TX	EIA Category 5 UTP (2 pairs) up to 328 ft (100 m)
1000BASE-T	EIA Category 6 (recommended), Category 5E or 5 UTP (2 pairs) up to 328 ft (100 m)

Network management and service laptop Ethernet (RJ-45) port and connector (adapter) — Figure 24 shows an example of the Ethernet (RJ-45) port and cable connector.

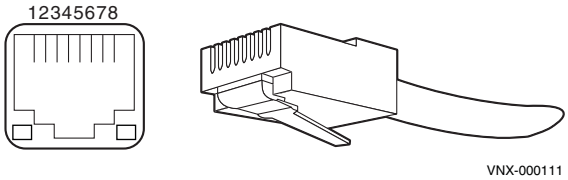


Figure 24 Network management and service laptop Ethernet (RJ-45) port and connector (adapter)

Table 17 lists the SP network management and service laptop Ethernet (RJ-45) pin signals used on the connector.

Table 17 Network management and service laptop Ethernet (RJ-45) port and connector pinout

RJ-45 pin	Signal	Description
1	BI_DA+	Bi-directional pair A +
2	BI_DA-	Bi-directional pair A -
3	BI_DB+	Bi-directional pair B +
4	BI_DC+	Bi-directional pair C +
5	BI_DC-	Bi-directional pair C -
6	BI_DB-	Bi-directional pair B -
7	BI_DD+	Bi-directional pair D +
8	BI_DD-	Bi-directional pair D -

Network management and service laptop Ethernet (RJ-45) port LEDs — Figure 25 shows the SP Ethernet (RJ-45) port LEDs—a green LED to the left of the connector and a bi-color (green/amber) LED to the right of the connector—that indicate the link/activity and speed of the Ethernet ports, respectively.

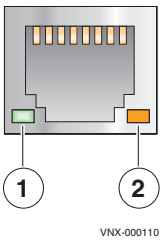


Figure 25 Network management and service laptop Ethernet (RJ-45) port LEDs

Table 18 describes the link/activity and connection speed associated with the SP Ethernet (RJ-45) port LEDs.

Table 18 Network management and service laptop Ethernet (RJ-45) port LEDs

Led	Color	State	Description
Left, link (location 1)	Green	On	Network/link connection
	Green	Blinking	Transmit/receive activity
	—	Off	No network/link connection
Right, link speed (location 2)	Green	On	100-Mb/s connection
	Amber	On	1000-Mb/s (or 1-Gb/s) connection
	—	Off	10-Mb/s connection (if left LED is on or blinking)

Serial RS-232/EIA 232 (micro DB-9) socket connector

The back of the Block and File VNX5300 platform SP includes a standard serial Electronics Industries Association (EIA) RS-232 interface (micro DB-9) connector (labeled with a symbol depicting a wrench on the upper left) to connect to a PC or service laptop computer. This serial connector (port) allows you to access the SP locally by connecting a terminal—either a PC running terminal-emulation software or an ASCII terminal—to the port.

Notice the orientation of the pins shown in Figure 26.

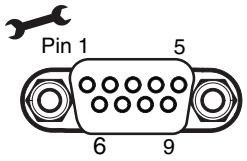


Figure 26 Serial RS-232/EIA 232 (micro DB-9) connector (socket) for service laptop

Table 19 lists the SP serial RS-232/EIA 232 (micro DB-9) pin signals used on the connector.

Table 19 Serial RS-232/EIA 232 (micro DB-9) connector (socket) pinout

DB-9 Pin	Signal	Description
1	CD	Carrier detect
2	RXD	Received data
3	TXD	Transmitted data
4	DTR	Data terminal ready
5	GND	Ground
6	DSR	Data set ready

Table 19 Serial RS-232/EIA 232 (micro DB-9) connector (socket) pinout (continued)

DB-9 Pin	Signal	Description
7	RTS	Request to send
8	CTS	Clear to send
9	RI	Ring indicator

SP null modem (micro DB-9 to DB-9 serial) cable

The cable connecting the SP to the PC or service laptop is a micro DB-9 cable (plug) to serial DB-9 (socket). It has a micro DB-9 plug (SP side) on one end and a serial DB-9 socket (PC or service laptop side) on the other end. Figure 27 shows an example of an SP to PC (service laptop) cable.

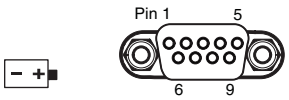
VNX-000093

Figure 27 Example of SP null modem (micro DB-9) to serial (DB-9) cable

Serial RS-232/EIA 232 (micro DB-9) connector (socket) for SPS management

The back of the Block and File VNX5300 platform SP includes a second standard serial RS-232/EIA 232 interface (micro DB-9) socket connector (labeled with a symbol depicting a battery to the left) to connect to the SPS management port (RJ-12). Notice the orientation of the pins shown in Figure 28.

Note: The included cable has a micro DB-9 connector (pins 1, 3, and 4 are used) on one end and an RJ-12 modular jack adapter (pins 1, 7, and 8 are used) on the other end. The RJ-12 modular jack adaptor end connects to the RJ-12 modular jack connector on the SPS (Figure 14 on page 20).



VNX-000105

Figure 28 Serial RS-232/EIA 232 (micro DB-9) connector (socket)

Table 20 lists the SP serial RS-232/EIA 232 (micro DB-9) pin signals used on the connector.

Table 20 Serial RS-232/EIA 232 (micro DB-9) connector (socket) pinout

DB-9 Pin	Signal	Description
1	CD	Carrier detect
2	RXD	Received data
3	TXD	Transmitted data
4	DTR	Data terminal ready

Table 20 Serial RS-232/EIA 232 (micro DB-9) connector (socket) pinout (continued)

DB-9 Pin	Signal	Description
5	GND	Ground
6	DSR	Data set ready
7	RTS	Clear to send
8	CTS	Request to send
9	RI	Ring indicator

SP I/O module slots

There are two SP PCI Gen 2 x4 I/O module slots. These slots support the following I/O modules (Figure 29):

- Two-port 10-Gb/s optical or active Twinax (w/iSCSI protocol)
- Four-port 1-Gb/s 10/100/1000 copper iSCSI
- Four-port 8-Gb/s optical Fibre Channel (running at 2, 4, or 8-Gb/s)
- Two-port 10-Gb/s optical or active Twinax Fibre Channel over Ethernet (FCoE)

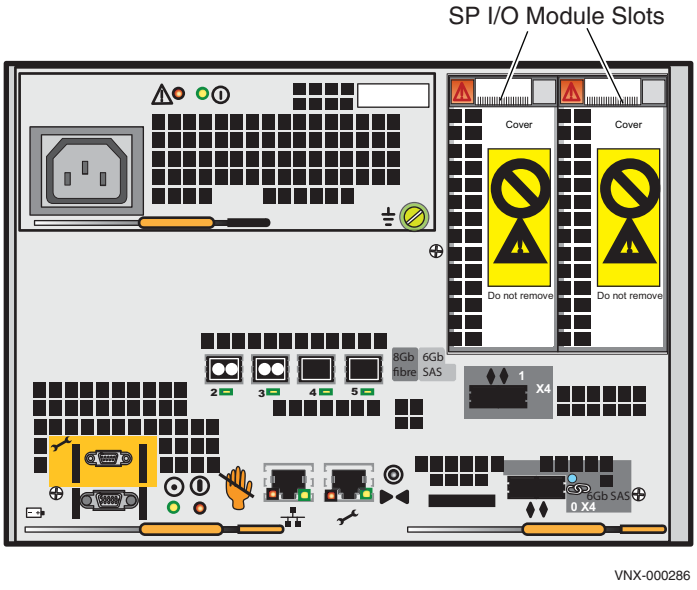


Figure 29 Example of SP with a Fibre Channel (FC) I/O module and an iSCSI I/O module

For a full description of the I/O module types used in the SP, go to"I/O modules" on page 41.

Control Station rear view

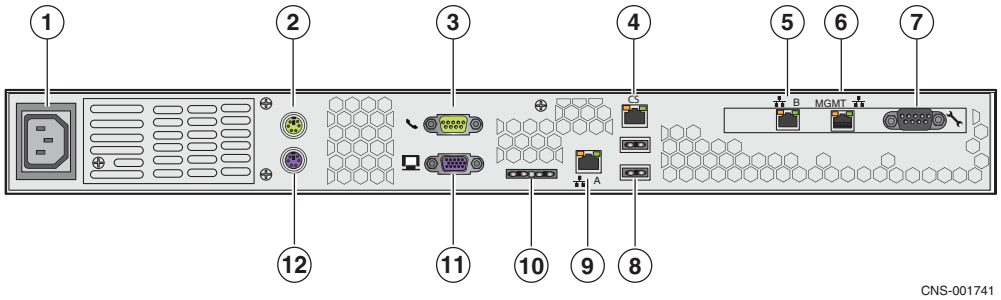
On the rear, viewing from left to right, the Block and File VNX5300 platform Control Station includes the following hardware components:

- AC power in connector
- Two PS/2 connectors (keyboard and mouse)—not used
- One (DB-9 plug) serial modem connector
- One (DB-15) video (VGA socket) connector—not used
- Four (RJ-45) NIC (labeled A, CS, B, and MGMT) connectors

Note: The RJ-45 NICs (labeled A and CS) are integrated into the rear of the Control Station while the RJ-45 NICs (labeled B and MGMT) are on a PCI-e card in the expansion slot on the rear of the Control Station.

- One (DB-9 plug) serial console (RS-232/EIA-232) connector
- Two USB 2.0 connectors—not used
- POST diagnostic LEDs
- Two CAT-5E/6 panel-mount Ethernet cable extensions

Figure 30 shows the orientation of these components.



1	AC power in connector	**7**	DB-9 serial console plug connector
2	PS/2 connector (mouse)—not used	**8**	Two USB 2.0 connectors—not used
3	DB-9 serial modem plug connector	**9**	RJ-45 Ethernet NIC port (labeled A)
4	RJ-45 Ethernet NIC port (labeled CS[a])	**10**	POST diagnostic LEDs[b]
5	RJ-45 Ethernet NIC port (labeled B)[c]	**11**	DB-15 Video (VGA) socket connector—not used
6	RJ-45 Ethernet NIC port (labeled MGMT)[d]	**12**	PS/2 connector (keyboard)—not used

a. The CS port uses an IPMI (Intelligent Platform Management Interface) cable to connect to a standby Control Station).

b. These LEDs might light during power on self test (POST); they are not important for the administration or maintenance of the Control Station.

c. An extension cable with a label (CS 0 B) is provided with this connector (see the cable kit).

d. An extension cable with a label (CS 0 MGMT) is provided with this connector (see the cable kit).

Figure 30 VNX5300 platform Control Station (rear view)

Control Station Input/output ports and connectors

The Block and File VNX5300 platform Control Station supports the following I/O ports on the rear of the Control Station:

- Four Ethernet (RJ-45) NIC ports
- One serial modem (DB-9) plug connector
- One serial console (DB-9) plug connector

WARNING

To avoid electric shock, do not connect safety extra-low voltage (SELV) circuits to telephone-network voltage (TNV) circuits. LAN ports contain SELV circuits, and WAN ports contain TNV circuits. Some LAN and WAN ports both use RJ-45 connectors. Use caution when connecting cables.

Control Station Ethernet (RJ-45) NIC ports

The Block and File VNX5300 platform Control Station comes with two integrated dual-port Ethernet ports (labeled A and CS) and two Peripheral Component Interconnect Express (PCI-E)[8] low profile card dual-port Ethernet ports (labeled B and MGMT) in an expansion slot on the rear of the Control Station. These ports provide an interface for connecting to 10-Mb/s, 100-Mb/s, or 1000-Mb/s networks and provide full-duplex (FDX) capability, which enables simultaneous transmission and reception of data on the Ethernet local-area network (LAN).

To access the Ethernet ports, connect a Category 3, 4, 5, 5E, or 6 unshielded twisted-pair (UTP) cable to the RJ-45 connectors on the back of the Control Station, as described in Table 21.

Table 21 Ethernet cabling guidelines

Type	Description
10BASE-T	EIA Categories 3, 4, or 5 UTP (2 or 4 pairs) up to 328 ft (100 m)
100BASE-TX	EIA Category 5 UTP (2 pairs) up to 328 ft (100 m)
1000BASE-T	EIA Category 6 (recommended), Category 5E or 5 UTP (2 pairs) up to 328 ft (100 m)

Control Station Ethernet (RJ-45) port and connector (adapter)

Figure 31 shows an example of the Ethernet RJ-45 port and cable connector.

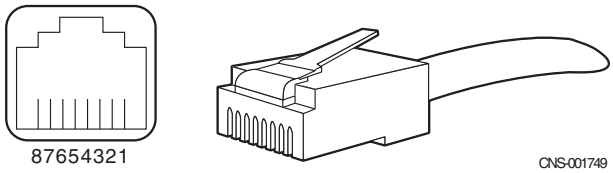


Figure 31 Control Station Ethernet (RJ-45) port and connector (adapter)

Table 22 lists the Control Station Ethernet (RJ-45) pin signals used on the connector.

Table 22 Control Station Ethernet (RJ-45) port and connector pinout

RJ-45 pin	Signal	Description
1	BI_DA+	Bidirectional pair A, +
2	BI_DA-	Bidirectional pair A, -
3	BI_DB+	Bidirectional pair B, +
4	BI_DC+	Bidirectional pair C, +
5	BI_DC-	Bidirectional pair C, -

8. PCI Express is used in consumer, server, and industrial applications, as a motherboard-level interconnect (to link motherboard-mounted peripherals) and as an expansion card interface for add-in boards.

Table 22 Control Station Ethernet (RJ-45) port and connector pinout

RJ-45 pin	Signal	Description
6	BI_DB-	Bidirectional pair B, -
7	BI_DD+	Bidirectional pair D, +
8	BI_DD-	Bidirectional pair D, -

Control Station Ethernet (RJ-45) port LEDs

The Control Station (RJ-45) NICs include LEDs—a green LED to the left of the connector and a bi-color (green/amber) LED to the right of the connector—that indicate the link/activity and speed of the Control Station (RJ-45) NIC ports, respectively, as shown in Figure 32.

Table 23 describes the link/activity and connection speed associated with the Control Station (RJ-45) port LEDs.

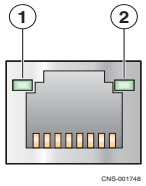


Figure 32 Control Station Ethernet (RJ-45) port LEDs

Table 23 Control Station RJ-45 port LEDs

Led	Color	State	Description
Left, link/activity (location 1)	—	Off	No network/link connection
	Green	On	Network/link connection
	Green	Blinking	Transmit/receive activity
Right, link speed (location 2)	—	Off	10-Mb/s connection (if left LED is on or blinking)
	Green	On	100-Mb/s connection
	Amber	On	1000-Mb/s (or 1-Gb/s) connection

Ethernet cable extensions for the Control Station B and MGMT ports

Each Block and File VNX5300 platform Control Station (CS 0) comes with two modular Ethernet cable extensions (or patch cords) for the RJ-45 ports (labeled on the CS as B and MGMT, respectively). These cables allow you to extend the length of the Ethernet cables from the CS 0, port B to Data Mover Enclosure 0, management module B, port 1 and CS 0, MGMT port to the public LAN. Each cable includes a corresponding label wrap to assist you during system cabling (Figure 33).

If your Block and File VNX5300 platform includes a second optional Control Station (CS 1), another set of Ethernet cable extensions for the RJ-45 ports is provided. These cables allow you to extend the length of the Ethernet cables from the CS 1, port B to Data Mover Enclosure 0, management module B, port 2 and CS 1, MGMT port to the public LAN. Each cable includes a corresponding label clip to assist you during system cabling.

Note: If you received the Block and File VNX5300 platform already installed in a cabinet rack with all of the Block and File VNX5300 platform components, all the cabling has already been installed.

Figure 33 **Example of Ethernet extension (modular plug to modular jack) cable**

Control Station serial console (DB-9) plug connector

The back of the Block and File VNX5300 platform Control Station includes a standard serial console Electronics Industries Association (EIA) RS-232 interface (DB-9) plug connector (labeled with a symbol depicting a wrench on the right). Notice the orientation of the pins (Figure 34).

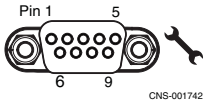


Figure 34 **Control Station serial console (DB-9) plug connector**

Table 24 lists the Control Station Ethernet (DB-9) pin signals used on the connector.

Table 24 **Control Station (DB-9) plug connector pinout**

DB-9 Pin	Signal	Description
1	CD	Carrier detect
2	RXD	Received data
3	TXD	Transmitted data
4	DTR	Data terminal ready
5	GND	Ground
6	DSR	Data set ready
7	RTS	Request to send
8	CTS	Clear to send
9	RI	Ring indicator

Control Station modem (DB-9) plug connector

The back of the Block and File VNX5300 platform Control Station includes a standard modem serial interface (DB-9) plug connector (labeled with a symbol depicting a telephone handset on the left). Notice the orientation of the pins (Figure 35 on page 37).

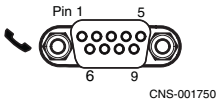


Figure 35 **Control Station modem (DB-9) plug connector**

Table 25 lists the Control Station Ethernet (DB-9) pin signals used on the connector.

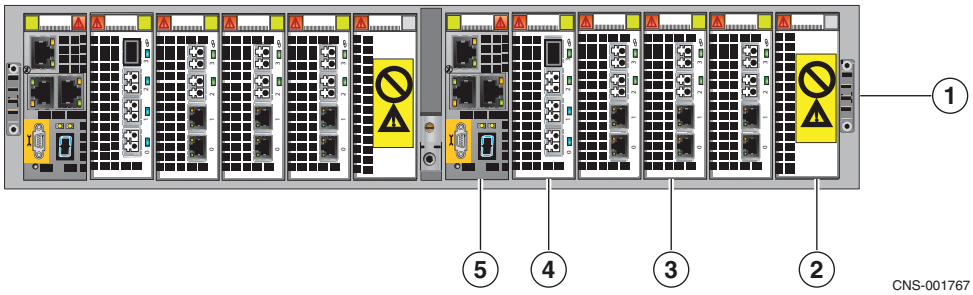
Table 25 **Control Station modem (DB-9) plug connector pinout**

DB-9 Pin	Signal	Description
1	CD	Carrier detect
2	RXD	Received data
3	TXD	Transmitted data
4	DTR	Data terminal ready
5	GND	Ground
6	DSR	Data set ready
7	RTS	Clear to send
8	CTS	Request to send
9	RI	Ring indicator

DME rear view

The rear of the Block and File VNX5300 platform DME does not contain any LEDs (Figure 36). Only the Data Mover management module and the I/O modules have LEDs.

Note: Figure 36 is a graphical representation of a Block and File VNX5300 platform DME rear view with two Data Movers (each Data Mover has one management module, one four-port 8-Gb/s FC I/O module, thee two-port 1-Gb/s plus two-port 1-Gb/s optical I/O modules, and one filler panel module).

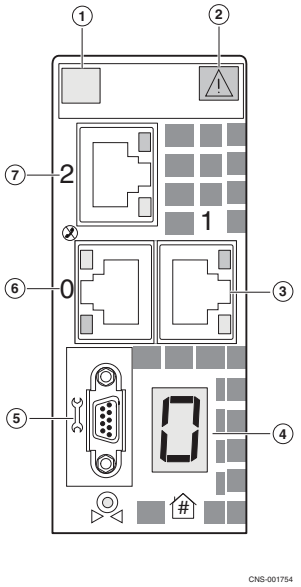


1	DME	**4**	Four-port 8-Gb/s FC I/O module
2	Filler panel module	**5**	Data Mover management module
3	Two-port 1-Gb/s copper plus two-port 1-Gb/s optical I/O module		

Figure 36 **DME (rear view)**

Data Mover management module

The Data Mover management module provides the management connections via three 10/100/1000 Ethernet (RJ-45) ports. The Data Mover management module also includes one RS-232 (EIA) DB-9 serial socket connector for service laptop connection and several LEDs (Figure 37)



1	Power/fault LED	**5**	DB-9 serial console socket connector
2	Data Mover management module push button latch handle	**6**	RJ-45 Ethernet NIC port (labeled 0)
3	RJ-45 Ethernet NIC port (labeled 1)	**7**	RJ-45 Ethernet NIC port (labeled 2)
4	DME ID numeric display		

Figure 37 Data Mover management module

Data Mover management module Ethernet (RJ-45) NIC ports

The Block and File VNX5300 platform Data Mover management module comes with three integrated dual-port Ethernet ports (labeled 0, 1, and 2) on the rear of the Data Mover management module. These ports provide an interface for connecting to 10-Mb/s, 100-Mb/s, or 1000-Mb/s networks and provide full-duplex (FDX) capability, which enables simultaneous transmission and reception of data.

WARNING

To avoid electric shock, do not connect safety extra-low voltage (SELV) circuits to telephone-network voltage (TNV) circuits. LAN ports contain SELV circuits, and WAN ports contain TNV circuits. Some LAN and WAN ports both use RJ-45 connectors. Use caution when connecting cables.

To access the Ethernet ports, connect a Category 3, 4, 5, 5E, or 6 unshielded twisted-pair (UTP) cable to the RJ-45 connector on the back of the Data Mover management module, as described in Table 16 on page 28.

Since the Control Station and the Data Mover management module have the same type of RJ-45 NIC ports, "Control Station Ethernet (RJ-45) NIC ports" on page 34 provides detailed information about the Data Mover management module NIC ports, connector, and adapter.

Data Mover management module LEDs

Figure 38 shows the LEDs and Table 26 describes them.

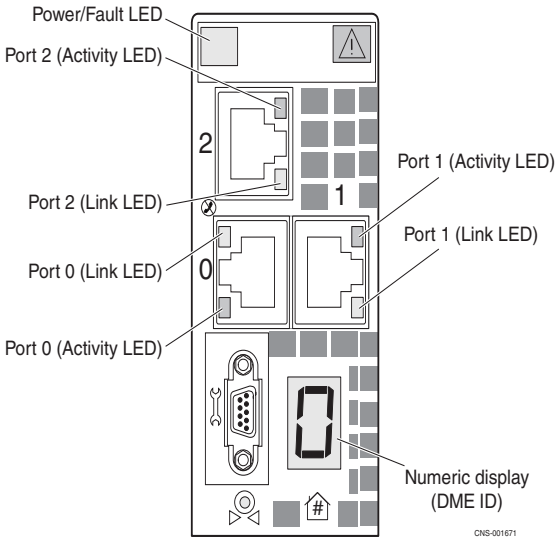


Figure 38 Data Mover management module LEDs

Table 26 Data Mover management module LEDs

LED	Color	State	Description
Power/Fault	Green	On	Data Mover management module is powered up.
	Amber	On	Data Mover management module has faulted. **Note:** LED is always illuminated at powerup, until it is initialized.
	—	Off	Data Mover management module is powered down.
Link (each port has one)	Green	On	Network connection
	—	Off	No network connection
Activity (each port has one)	Amber	Blinking	Transmit/receive activity
	—	Off	No network activity
numeric (7-segment) display for enclosure ID	—	On	Displays the enclosure ID assigned to the Data Mover Enclosure. **Note:** Each enclosure is assigned a number at installation.

Data Mover management module serial console (DB-9) socket connector

The back of the Block and File VNX5300 platform Data Mover management module includes a standard serial console Electronics Industries Association (EIA) RS-232 interface (DB-9) socket connector (labeled with a wrench tool icon on the left). Notice the orientation of the pins (Figure 39).

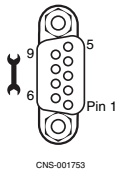


Figure 39 **Data Mover management module serial console (DB-9) socket connector**

Table 27 lists the Data Mover management module Ethernet (DB-9) pin signals used on the connector.

Table 27 **Data Mover management module (DB-9) socket connector pinout**

DB-9 Pin	Signal	Description
1	CD	Carrier detect
2	TXD	Transmitted data
3	RXD	Received data
4	DTR	Data terminal ready
5	GND	Ground
6	DSR	Data set ready
7	RTS	Clear to send
8	CTS	Request to send
9	RI	Ring indicator

I/O modules

There are several types of I/O modules supported in the Block and File VNX5300 platform. The SP supports four types of I/O modules (see "SP I/O module types") and the Data Mover supports four types (see "Data Mover I/O module types" on page 49). In this section, each I/O module description includes the type of port (copper or optical) as well as a description of the LEDs.

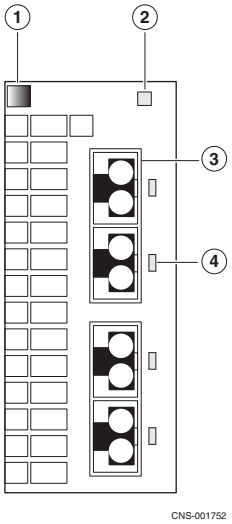
SP I/O module types

The following I/O module types are supported by the Block and File VNX5300 platform SP:

- "Four-port 8-Gb/s FC I/O module" on this page
- "Four-port 1-Gb/s copper iSCSI I/O module" on page 43
- "Two-port 10-Gb/s optical or active Twinax iSCSI I/O module" on page 45
- "Two-port 10-Gb/s optical or active Twinax Fibre Channel over Ethernet (FCoE) I/O module" on page 47

Four-port 8-Gb/s FC I/O module

The four-port 8-Gb/s FC I/O module comes with four optical (fibre) ports, one power/fault LED, and a link/activity LED for each optical port, as shown in Figure 40. This I/O module can interface at speeds of 2, 4, and 8 Gb/s.



1	Push button latch handle	3	SFP+ (optical) port (four)
2	Power/fault LED	4	SFP+ link/activity LED

Figure 40 Four-port 8-Gb/s FC I/O module

The four-port 8-Gb/s FC I/O module uses SFP+ transceiver modules to connect to LC-type optical fibre cables. These SFP+ transceiver modules are input/output (I/O) devices that plug into the FC port of the FC I/O modules. These SFP+ modules are hot swappable[9]. This means that you can install and remove an SFP+ module while the Block and File VNX5300 platform is operating.

Note: The Lucent Connector (LC) type interface was developed by Lucent Technologies (hence, Lucent Connector). It uses a push-pull mechanism. LC connectors are normally held together in a multimode duplex configuration with a plastic clip. These cables are usually colored orange with the duplex connectors encased in a gray plastic covering. To determine the send or transmit (TX) and receive (RX) ferrules (connector ends), these cables will show a letter and numeral (for example A1 and A2 for the TX and RX, respectively) or a white and yellow rubber gasket (jacket) for the send or transmit (TX) and receive (RX) ends.

Four-port 8-Gb/s FC I/O module LEDs

The four-port 8-Gb/s Fibre Channel (FC) I/O module has two different types of status LEDs. Figure 41 shows the LEDs and Table 28 describes them.

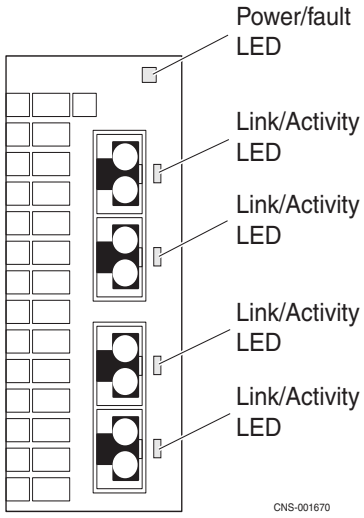


Figure 41 Four-port 8-Gb/s FC I/O module LEDs

Table 28 Four-port 8-Gb/s FC I/O module LEDs

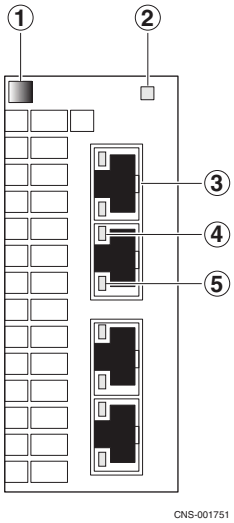
LED	Color	State	Description
Power/Fault	Green	On	I/O module is powered up.
	—	Off	I/O module is powered down.
	Amber	On	I/O module has faulted.
Link/Activity (each port has one LED)	Green	On	2- or 4-Gb link speed (suboptimal speed)
	Blue	On	8-Gb/s link speed (maximum speed)
	Green or Blue	Blinking	Small form-factor pluggable (SFP+[a]) transceiver module faulted, unsupported, or optical cable fault.
	—	Off	No network connection

a. Refer to the *VNX5300 Parts Guide* for the correct SFP+ part number.

9. Be careful when replacing or swapping out SFP+ modules, your Data Mover will lose access to the SP or tape drive to which it is connected.

Four-port 1-Gb/s copper iSCSI I/O module

The four-port 1-Gb/s copper iSCSI I/O module comes with four copper ports, one power/fault LED, and a link and activity LED for each copper port as shown in Figure 42. This I/O module can interface at speeds of 1 Gb/s.



1	Push button latch handle	4	RJ-45 NIC link LED
2	Power/fault LED	5	RJ-45 NIC activity LED
3	RJ-45 NIC (copper) port (four)		

Figure 42 Four-port 1-Gb/s copper iSCSI I/O module

Four-port 1-Gb/s copper iSCSI I/O module LEDs

The four-port 1-Gb/s copper iSCSI I/O module has three types of status LEDs. Figure 43 shows the LEDs and Table 29 describes them.

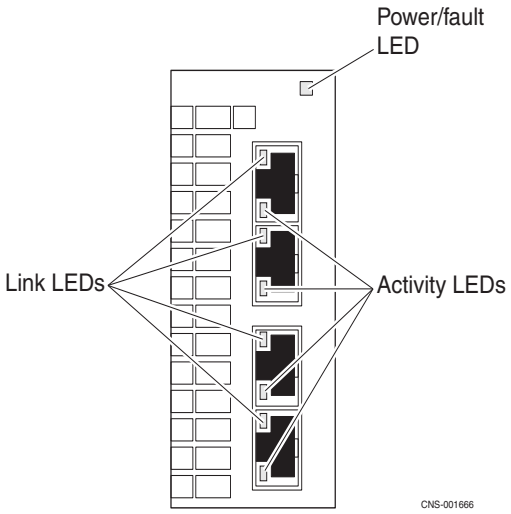


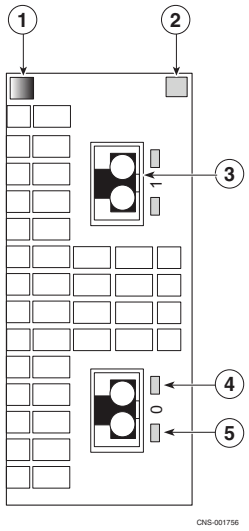
Figure 43 Four-port 1-Gb/s copper iSCSI I/O module LEDs

Table 29 Four-port 1-Gb/s copper iSCSI I/O module LEDs

LED	Color	State	Description
Power/Fault	Green	On	I/O module is powered up.
	—	Off	I/O module is powered down.
	Amber	On	I/O module has faulted.
Link (each port has one)	Green	On	Network connection
	—	Off	No network connection
Activity (each port has one)	Amber	Blinking	Transmit/receive activity
	—	Off	No activity

Two-port 10-Gb/s optical or active Twinax iSCSI I/O module

The two-port 10-Gb/s optical or active Twinax[10] iSCSI I/O module comes with two optical or active twisted pair ports, one power/fault LED, and a link and activity LED for each port (Figure 44). The optical ports on this I/O module can interface at speeds of 10 Gb/s for iSCSI (Internet Small Computer System Interface) networks[11]. The two-port 10-Gb/s optical I/O module uses the SFP+ transceiver module (see the section describing the SFP+ "Four-port 8-Gb/s FC I/O module" on page 41 for more information about the SFP+ modules). The two-port 10-Gb/s optical I/O module uses iSCSI protocol, hence the required SFP+ transceiver module (for part number, see the *VNX5300 Parts Guide*).



1	Push button latch handle	**4**	SFP+ link LED (right)
2	Power/fault LED	**5**	SFP+ NIC activity LED (left)
3	SFP+ (optical) port (two)		

Figure 44 Two-port 10-Gb/s optical I/O module

10. The two-port 10-Gb/s I/O module can also use active twinaxial (Twinax) cables. Twinax is a type of cable similar to coax, but with two inner conductors instead of one. These cables will be supplied in lieu of the SFP+ when so ordered.
11. iSCSI is a protocol for sending SCSI packets over TCP/IP networks.

Two-port 10-Gb/s optical I/O module LEDs

The two-port 10-Gb/s optical I/O module has three types of status LEDs. Figure 45 shows the LEDs and Table 30 describes them.

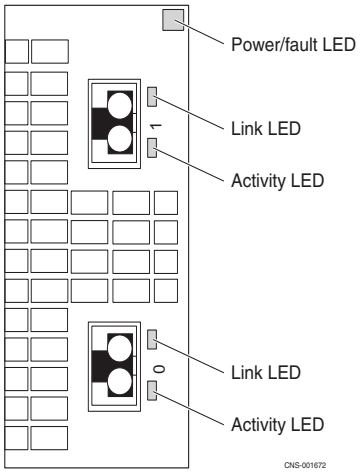


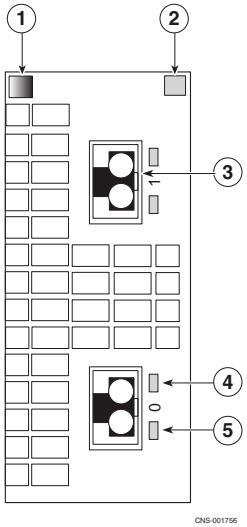
Figure 45 **Two-port 10-Gb/s optical I/O module LEDs**

Table 30 **Two-port 10-Gb/s optical I/O module LEDs**

LED	Color	State	Description
Power/Fault	Green	On	I/O module is powered up.
	—	Off	I/O module is powered down.
	Amber	On	I/O module has faulted.
Link	Green	On	Network connection
	—	Off	No network connection
Activity	Amber	Blinking	Transmit/receive activity
	—	Off	No activity

Two-port 10-Gb/s optical or active Twinax Fibre Channel over Ethernet (FCoE) I/O module

The two-port 10-Gb/s optical or active Twinax[12] FCoE I/O module comes with two FCoE ports, one power/fault LED, and a link and activity LED for each port, as shown in Figure 46. The ports on this I/O module can interface at speeds up to 10 Gb/s for Fibre Channel over Ethernet networks. The two-port 10-Gb/s FCoE I/O module uses the SFP transceiver module. The two-port 10-Gb/s FCoE I/O module uses FCoE protocol, hence the required SFP+ transceiver module uses a different part number (for part number, see the *VNX5300 Parts Guide*).



1	Push button latch handle	**4**	SFP+ link LED (right)
2	Power/fault LED	**5**	SFP+ activity LED (left)
3	SFP+ (optical) port (two)		

Figure 46 Two-port 10-Gb/s FCoE I/O module

12. The FCoE I/O module can also use active twinaxial (Twinax) cables. Twinax is a type of cable similar to coax, but with two inner conductors instead of one. These cables will be supplied in lieu of the SFP+ when so ordered.

Two-port 10-Gb/s FCoE I/O module LEDs

The two-port 10-Gb/s FCoE I/O module has three types of status LEDs. Figure 47 shows the LEDs and Table 31 describes them.

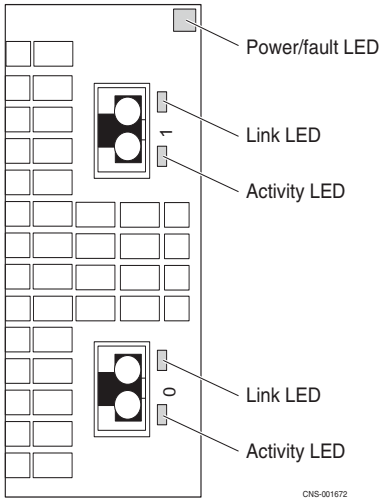


Figure 47 Two-port 10-Gb/s FCoE I/O module LEDs

Table 31 two-port 10-Gb/s FCoE I/O module LEDs

LED	Color	State	Description
Power/Fault	Green	On	I/O module is powered up.
	—	Off	I/O module is powered down.
	Amber	On	I/O module has faulted.
Link	Green	On	Network connection
	—	Off	No network connection
Activity	Amber	Blinking	Transmit/receive activity
	—	Off	No activity

Data Mover I/O module types

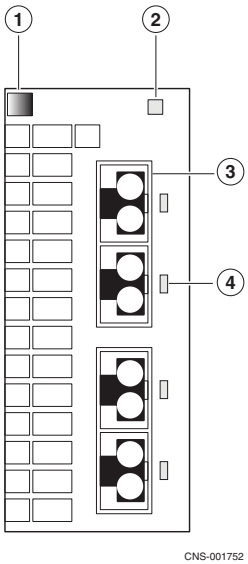
The following I/O module types are supported by the Block and File VNX5300 platform Data Mover:

- "Four-port 8-Gb/s FC I/O module" on this page
- "Four-port 1-Gb/s copper I/O module" on page 51
- "Two-port 1-Gb/s copper plus two-port 1-Gb/s optical I/O module" on page 53
- "Two-port 10-Gb/s optical or active Twinax I/O module" on page 55

Note: For SP module types, go to "SP I/O module types" on page 41.

Four-port 8-Gb/s FC I/O module

The four-port 8-Gb/s FC I/O module comes with four optical (fibre) ports, one power/fault LED, and a link/activity LED for each optical port, as shown in Figure 48. This I/O module can interface at speeds of 2, 4, and 8 Gb/s.



1	Push button latch handle	3	SFP+ (optical) port (four)
2	Power/fault LED	4	SFP+ link/activity LED

Figure 48 Four-port 8-Gb/s FC I/O module

The four-port 8-Gb/s FC I/O module uses SFP+ transceiver modules to connect to LC-type optical fibre cables. These SFP+ transceiver modules are input/output (I/O) devices that plug into the FC port of the FC I/O modules. These SFP+ modules are hot swappable[13]. This means that you can install and remove an SFP+ module while the Block and File VNX5300 platform is operating.

13. Be careful when replacing or swapping out SFP+ modules, your Data Mover will lose access to the SP or tape drive to which it is connected.

Note: The Lucent Connector (LC) type interface was developed by Lucent Technologies (hence, Lucent Connector). It uses a push-pull mechanism. LC connectors are normally held together in a multimode duplex configuration with a plastic clip. These cables are usually colored orange with the duplex connectors encased in a gray plastic covering. To determine the send or transmit (TX) and receive (RX) ferrules (connector ends), these cables will show a letter and numeral (for example A1 and A2 for the TX and RX, respectively) or a white and yellow rubber gasket (jacket) for the send or transmit (TX) and receive (RX) ends.

Four-port 8-Gb/s FC I/O module LEDs

The four-port 8-Gb/s Fibre Channel (FC) I/O module has two different types of status LEDs. Figure 49 shows the LEDs and Table 32 describes them.

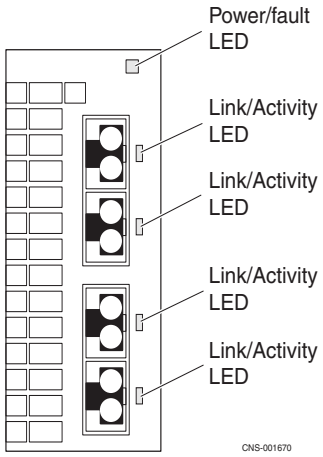


Figure 49 Four-port 8-Gb/s FC I/O module LEDs

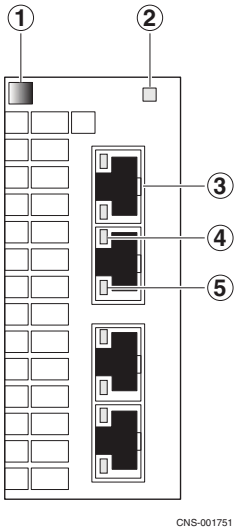
Table 32 Four-port 8-Gb/s FC I/O module LEDs

LED	Color	State	Description
Power/Fault	Green	On	I/O module is powered up.
	—	Off	I/O module is powered down.
	Amber	On	I/O module has faulted.
Link/Activity (each port has one LED)	Green	On	2- or 4-Gb link speed (suboptimal speed)
	Blue	On	8-Gb/s link speed (maximum speed)
	Green or Blue	Blinking	Small form-factor pluggable (SFP+[a]) transceiver module faulted, unsupported, or optical cable fault.
	—	Off	No network connection

a. Refer to the *VNX5300 Parts Guide* for the correct SFP+ part number.

Four-port 1-Gb/s copper I/O module

The four-port 1-Gb/s copper I/O module comes with four copper ports, one power/fault LED, and a link and activity LED for each copper port as shown in Figure 50. This I/O module can interface at speeds of 10 Mb/s, 100 Mb/s, and 1000 Mb/s (1 Gb/s). Another way to describe this type of module is that it runs Ethernet over twisted pair.



1	Push button latch handle	4	RJ-45 NIC link LED
2	Power/fault LED	5	RJ-45 NIC activity LED
3	RJ-45 NIC (copper) port (four)		

Figure 50 Four-port 1-Gb/s copper I/O module

Four-port 1-Gb/s copper I/O module LEDs

The four-port 1-Gb/s copper I/O module has three types of status LEDs. Figure 51 shows the LEDs and Table 33 describes them.

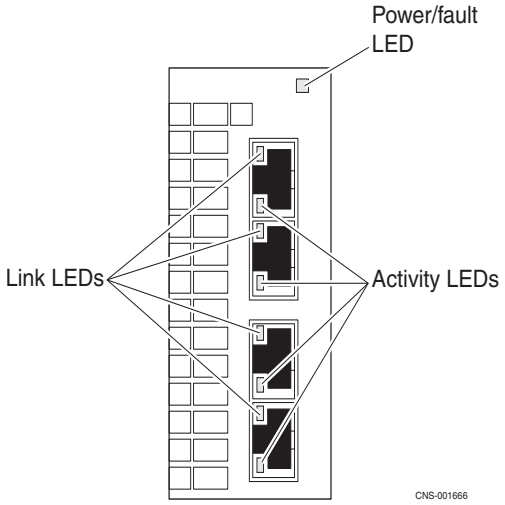


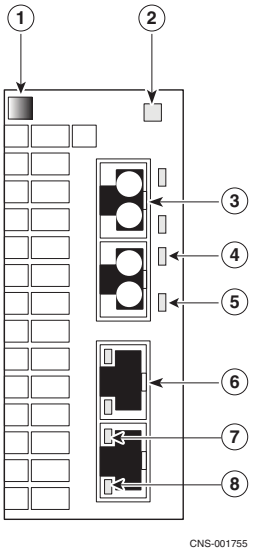
Figure 51 Four-port 1-Gb/s copper I/O module LEDs

Table 33 Four-port 1-Gb/s copper I/O module LEDs

LED	Color	State	Description
Power/Fault	Green	On	I/O module is powered up.
	—	Off	I/O module is powered down.
	Amber	On	I/O module has faulted.
Link (each port has one)	Green	On	Network connection
	—	Off	No network connection
Activity (each port has one)	Amber	Blinking	Transmit/receive activity
	—	Off	No activity

Two-port 1-Gb/s copper plus two-port 1-Gb/s optical I/O module

The two-port 1-Gb/s copper plus two-port 1-Gb/s optical I/O module comes with two copper ports and two optical ports, one power/fault LED, and a link and activity LED for each port, as shown in Figure 52. The copper ports on this I/O module can interface at speeds of 10 Mb/s, 100 Mb/s, and 1000 Mb/s (1 Gb/s). While the optical ports can interface at a speed of 1 Gb/s.



1	Push button latch handle	5	SFP+ activity LED (left)
2	Power/fault LED	6	RJ-45 (copper) port (two)
3	SFP+ (optical) port (two)	7	RJ-45 link LED (right)
4	SFP+ link LED (right)	8	RJ-45 activity LED (left)

Figure 52 Two-port 1-Gb/s copper plus two-port 1-Gb/s optical I/O module

Two-port 1-Gb/s copper plus two-port 1-Gb/s optical I/O module LEDs

The two-port Gb/s copper plus two-port Gb/s optical I/O module has three types of status LEDs. Figure 53 shows the LEDs and Table 34 describes them.

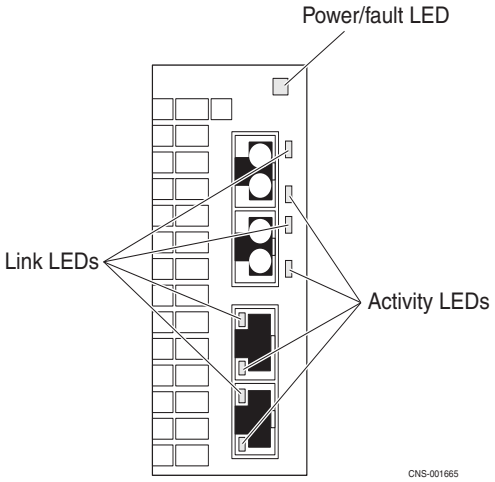


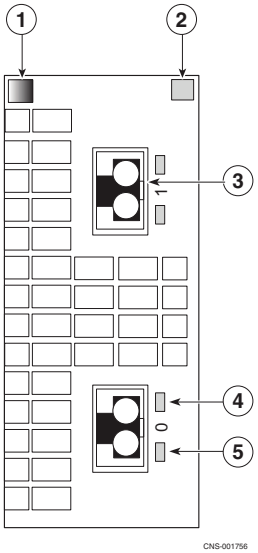
Figure 53 **Two-port 1-Gb/s copper plus two-port 1-Gb/s optical I/O module LEDs**

Table 34 **Two-port 1-Gb/s copper plus two-port 1-Gb/s optical I/O module LEDs**

LED	Color	State	Description
Power/Fault	Green	On	I/O module is powered up.
	—	Off	I/O module is powered down.
	Amber	On	I/O module has faulted.
Link (each port has one)	Green	On	Network connection
	—	Off	No network connection
Activity (each port has one)	Amber	Blinking	Transmit/receive activity
	—	Off	No activity

Two-port 10-Gb/s optical or active Twinax I/O module

The two-port 10-Gb/s optical or active Twinax[14] I/O module comes with two optical ports, one power/fault LED, and a link and activity LED for each port (Figure 54). The optical ports on this I/O module can interface at speeds of 10 Gb/s. The two-port 10-Gb/s optical I/O module uses the SFP+ transceiver module (see the section describing the SFP+ "Four-port 8-Gb/s FC I/O module" on page 41 for more information about the SFP+ modules). The two-port 10-Gb/s optical I/O module uses iSCSI protocol, hence the required SFP+ transceiver module uses a different part number (for part number, see the *VNX5300 Parts Guide*).



1	Push button latch handle	**4**	SFP+ link LED (right)
2	Power/fault LED	**5**	SFP+ NIC activity LED (left)
3	SFP+ (optical) port (two)		

Figure 54 Two-port 10-Gb/s optical I/O module

14. The two-port 10-Gb/s I/O module can also use active twinaxial (Twinax) cables. Twinax is a type of cable similar to coax, but with two inner conductors instead of one. These cables will be supplied in lieu of the SFP+ when so ordered.

Two-port 10-Gb/s optical I/O module LEDs

The two-port 10-Gb/s optical I/O module has three types of status LEDs. Figure 55 shows the LEDs and Table 35 describes them.

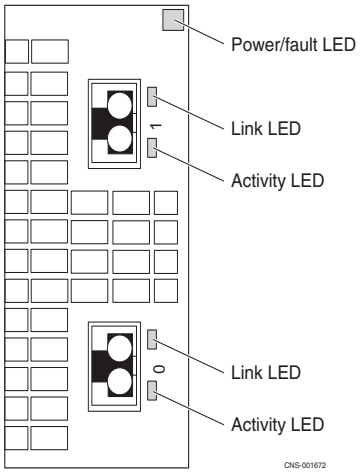


Figure 55 Two-port 10-GbE optical I/O module LEDs

Table 35 Two-port 10-Gb/s optical I/O module LEDs

LED	Color	State	Description
Power/Fault	Green	On	I/O module is powered up.
	—	Off	I/O module is powered down.
	Amber	On	I/O module has faulted.
Link	Green	On	Network connection
	—	Off	No network connection
Activity	Amber	Blinking	Transmit/receive activity
	—	Off	No activity

Disk-array enclosure expansion

The Block and File VNX5300 platform supports the expansion of two types of disk-array enclosures (DAEs) across a 6-Gb/s SAS bus:

- 3U, 15 (3.5-inch) DAE
- 2U, 25 (2.5-inch) DAE

The Block and File VNX5300 platform supports up to seven 3U, 15 (3.5-inch) DAEs (120 3.5-inch disk drives) or up to four 2U, 25 (2.5-inch) DAEs (125 2.5-inch disk drives).

IMPORTANT

When calculating the number of drives for your system, the DPE is included in the total drive slot quantity of up to 125 drives. If the total drive slot quantity exceeds 125, you will not be able to add another DAE. Refer to "Overview" on page 3 for more information about the Block and File VNX5300 platform DPEs.

Each DAE consists of the following components:

- Drive carrier
- Disk drives
- Midplane
- Link control cards (LCCs)
- Power supply/cooling modules
- EMI shielding

Drive carrier

The disk drive carriers are metal and plastic assemblies that provide smooth, reliable contact with the enclosure slot guides and midplane connectors. Each carrier has a handle with a latch and spring clips. The latch holds the disk drive in place to ensure proper connection with the midplane. Disk drive activity/fault LEDs are integrated into the carrier (Figure 56 on page 59 and Figure 63 on page 66).

Disk drives

Each disk drive consists of one disk drive in a carrier. You can visually distinguish between module types by their different latch and handle mechanisms and by type, capacity, and speed labels on each module. You can add or remove a disk drive while the DAE is powered up, but you should exercise special care when removing modules while they are in use. Drive modules are extremely sensitive electronic components.

Midplane

A midplane separates the front-facing disk drives from the rear-facing LCCs and power supply/cooling modules. It distributes power and signals to all components in the enclosure. LCCs, power supply/cooling modules, and disk drives plug directly into the midplane.

LCCs

An LCC supports, controls, and monitors the DAE, and is the primary interconnect management element. Each LCC includes connectors for input and expansion to downstream devices. An enclosure address (EA) indicator is located on each LCC (Figure 62 on page 65 and Figure 69 on page 72)[15]. Each LCC includes a bus (loop) identification indicator (Figure 62 on page 65 and Figure 69 on page 72).

15. The EA is sometimes referred to as an enclosure ID.

Power supply

The power supply/cooling module integrates independent power supply and blower cooling assemblies into a single module.

Each power supply is an auto-ranging power-factor-corrected, multi-output, off-line converter with its own line cord. The drives and LCC have individual soft-start switches that protect the disk drives and LCC if you install them while the disk enclosure is powered up. A disk or blower with power-related faults will not affect the operation of any other device.

Each power/cooling module has three status LEDs (Figure 58 on page 62 and Figure 63 on page 66).

Cooling modules

The enclosure cooling system consists of dual-blower modules in each power supply/cooling module.

EMI shielding

EMI compliance requires a properly installed electromagnetic interference (EMI) shield in front of the DAE disk drives. When installed in cabinets that include a front door, the DAE includes a simple EMI shield. Other installations require a front bezel that has a locking latch and integra ed EMI shield. You must remove the bezel/shield to remove and install disk drive modules.

The 3U, 15 (3.5-inch) DAE front view

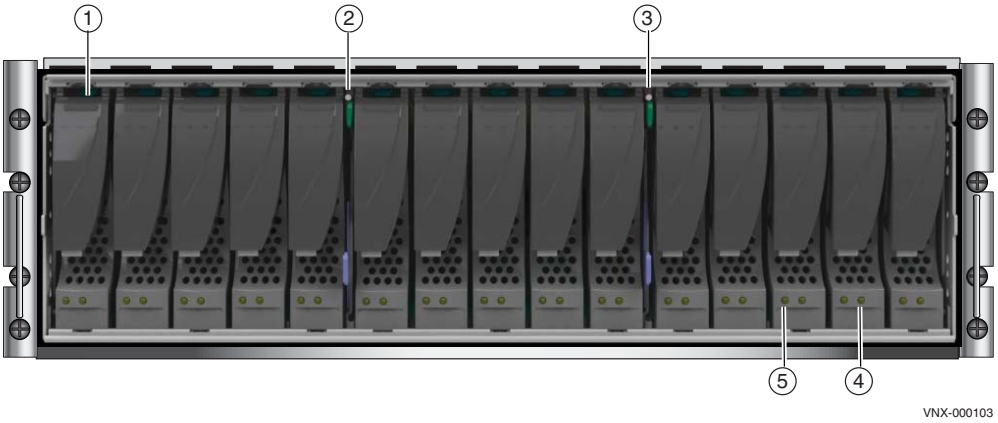
On the front, viewing from left to right, the Block and File VNX5300 platform 3U, 15 (3.5-inch) disk drive DAE carrier includes the following hardware components:

- 3.5-inch 6-Gb/s SAS, 6-Gb/s NL-SAS, or Flash disk drives (hot-swappable)[16]
- Status LEDs

Figure 56 on page 59 shows the location of these components.

Note: In a Block and File VNX5300 platform, when using the 3U, 15 (3.5-inch) disk drive carrier, the maximum amount of disk drives is 120 (including DPE and expansion DAEs).

16. You can add or remove a disk drive while the DAE is powered up, but you should exercise special care when removing modules while they are in use. Drive modules are extremely sensitive electronic components.



1	3.5-inch 6-Gb/s SAS drives or 6-Gb/s NL-SAS disk drives	**4**	Disk drive fault LED (amber)
2	DAE fault LED (amber)	**5**	Disk drive on/activity LED (green)
3	DAE power on LED (blue)		

Figure 56 **3U, 15 (3.5-inch) DAE (front view)**

Table 36 describes the Block and File VNX5300 platform DAE and the 3.5-inch disk drive status LEDs

Table 36 **3U, 15 (3.5-inch) DAE and disk drive LEDs**

LED	Color	State	Description
DAE fault (location 2)	Amber	On	Fault has occurred
DAE power (location 3)	Green	On	Powering and powered up with backend bus running at 2 Gb/s
	Blue	On	Powering and powered up with backend bus running at 6 Gb/s
	—	Off	Powered down
Disk drive fault (location 4)	Amber	On	Fault has occurred
	—	Off	No fault has occurred
Disk drive on/activity (location 5)	Green	On	Powering and powered up
		Blinking, mostly on	Disk drive is on with I/O activity
		Blinking at constant rate	Disk drive is spinning up or down normally
		Blinking, mostly off	Disk drive is powered up but not spinning **Note:** This is a normal part of the spin-up sequence, occurring during the spin-up delay of a slot.
	—	Off	Disk is powered down

The 3U, 15 (3.5-inch) DAE rear view

On the rear, viewing from top to bottom (Figure 57 on page 61), a 3U, 15 (3.5-inch) DAE includes the following hardware components:

- Two 6-Gb/s SAS LCCs (A and B)
- Two power supply/cooling modules

6-Gb/s SAS LCC

The LCC supports and controls one 6 Gb/s SAS bus and monitors the DAE. A blue link active LED indicates a DAE operating at 6 Gb/s.

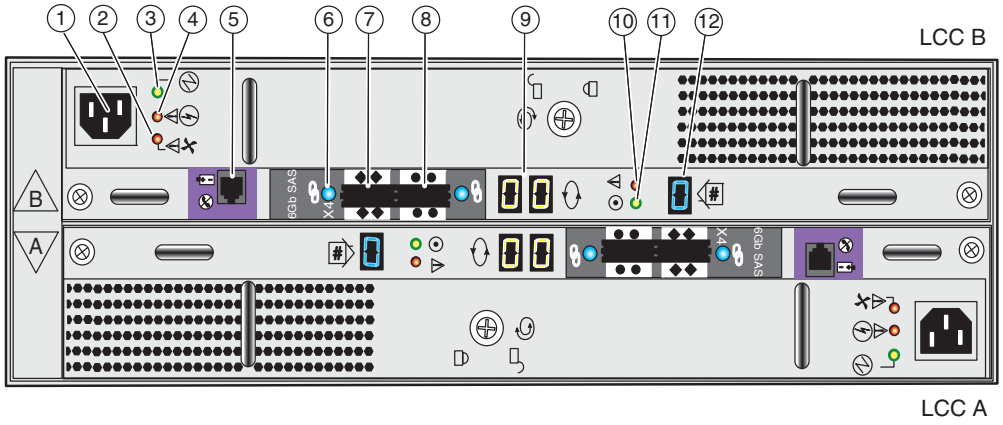
The LCCs in a DAE connect to the DPE and other DAEs with 6 Gb/s cables. The cables connect the LCCs in a system together in a daisy-chain (loop) topology.

Internally, each DAE LCC connects to the drives in its enclosure in a point-to-point fashion through a switch. The LCC independently receives and electrically terminates incoming signals. For traffic from the system's storage processors, the LCC switch passes the signal from the input port to the drive being accessed; the switch then forwards the drive output signal to the port.

Note: If the target drive is not in the LCC's enclosure, the switch passes the input signal directly to the output port.

Each LCC independently monitors the environmental status of the entire enclosure, using a microcomputer-controlled monitor program. The monitor communicates the status to the storage processor, which polls disk enclosure status. LCC firmware also controls the SAS PHYs and the disk-module status LEDs.

Figure 57 shows an example of the rear view of a 3U, 15 (3.5-inch) DAE.



1	LCC B AC power supply power in (recessed plug)	**7**	LCC B SAS connector (output)[a]
2	LCC B power supply fan fault LED (on, amber)	**8**	LCC B SAS connector (input)[b]
3	LLC B power supply LED (on, green)	**9**	LCC B bus ID
4	LCC B power supply fault LED (on, amber)	**10**	LCC B bus LED (fault, amber)
5	LCC B management (RJ-12) connector to SPS (not used)	**11**	LCC B bus LED (on, green)
6	LCC B SAS connector link LED	**12**	DAE enclosure ID[c]

a. The SAS connector (output) is labeled with a double diamond symbol.

b. The SAS connector (input) is labeled with a double circle (or dot) symbol.

c. The DAE enclosure ID is sometimes referred to as the enclosure address (EA).

Figure 57 3U, 15 (3.5-inch) DAE with two LCCs and two power supply/cooling modules (rear view)

As shown in Figure 57, an enclosure ID[17] indicator is located on each LCC. Each LCC also includes a bus (back-end port) identification indicator. The SP initializes the bus ID when the operating system is loaded.

Note: An LCC may be in either the A slot, as shown, or the B slot above it, depending on the DAE placement within a system. For example, the front DAE in some systems is in slot A; the rear enclosure LCC is inverted, and in slot B.

17. The enclosure ID is sometimes referred to as the enclosure address (EA).

3U, 15 (3.5-inch) DAE AC power supply/cooling module

Figure 58 shows an example of the 3U, 15 (3.5-inch) DAE AC power supply/cooling module with a power in recessed connector (plug) and status LEDs.

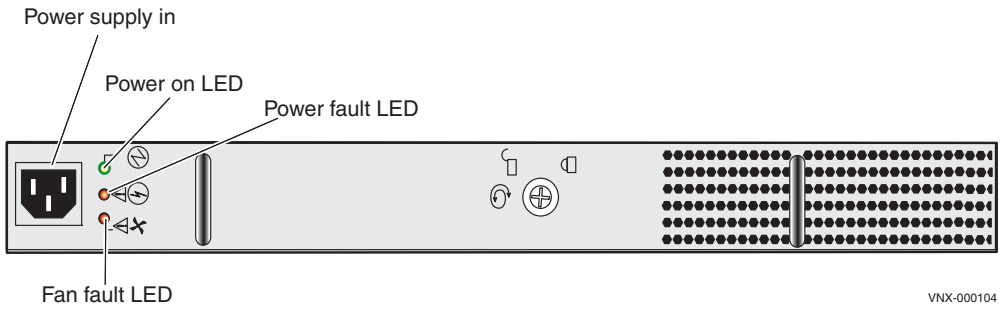


Figure 58 Example of 3U, 15 (3.5-inch) DAE AC power supply/cooling module (power in) recessed connector (plug) and status LEDs

Table 37 describes the 3U, 15 (3.5-inch) DAE power supply/cooling module LEDs.

Table 37 3U, 15 (3.5-inch) DAE AC power supply/cooling module LEDs

Led	Color	State	Description
Power on	Green	On	Power on
	—	Off	Power off
Power fault	Amber	On	Fault
		Blinking	During power shutdown and during overvoltage and undervoltage protection (OVP/UVP) fault
	—	Off	No fault or power off
Fan fault	Amber	On	Fault, one or both not operating normally
	—	Off	No fault, fans operating normally

The power supply/cooling modules are located above and below the LCCs. The units integrate independent power supply and dual-blower cooling assemblies into a single module.

Each power supply is an auto-ranging, power-factor-corrected, multi-output, offline converter with its own line cord. Each supply supports a fully configured DAE and shares load currents with the other supply. The drives and LCCs have individual soft-start switches that protect the disk drives and LCCs if they are installed while the disk enclosure is powered up.

The enclosure cooling system includes two dual-blower modules.

The 3U, 15 (3.5-inch) DAE LCC input/output ports and connectors

The 3U, 15 (3.5-inch) DAE LCC supports the following I/O ports on the rear:

- Two 6-Gb/s SAS x 4 ports
- One management (RJ-45) connector

6-Gb/s SAS x4 ports

The 3U, DAE LCC supports two 6-Gb/s SAS x4 ports (labeled 6GB 0 x4) on the rear of each SP (A and B). This port provides an interface for SAS and NL-SAS drives on the DAE. This port is a 26-circuit SAS small form-factor 8088 (SFF-8088 specification (socket or receptacle) using an SFF-8088 specification mini-SAS HD 26-circuit cable (plug) with a pull tab.

Note: Each SAS cable is keyed with an *in* and *out* connection to prevent incorrect cabling.

Figure 59 shows an example of the port connector (socket) and cable connector (plug) with pull tab.

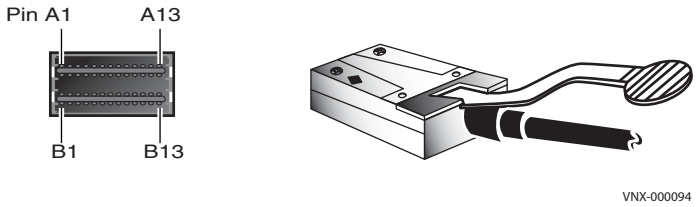


Figure 59 6-Gb/s SAS port and cable connector

Table 38 lists the 3U, DAE LCC 6-Gb/s SAS port pin signals used on the connector.

Table 38 6-Gb/s SAS port connector pinout

Pin	Signal	Pin	Signal
A1	GND	B1	GND
A2	Rx 0+	B2	Tx 0+
A3	Rx 0-	B3	Tx 0-
A4	GND	B4	GND
A5	Rx 1+	B5	Tx 1+
A6	Rx 1-	B6	Tx 1-
A7	GND	B7	GND
A8	Rx 2+	B8	Tx 2+
A9	Rx 2-	B9	Tx 2-
A10	GND	B10	GND
A11	Rx 3+	B11	Tx 3+
A12	Rx 3-	B12	Tx 3-
A13	GND	B13	GND

6-Gb/s SAS port LEDs and port direction (input or output)

Figure 60 shows the LCC 6-Gb/s SAS port LED—a bi-color (blue/green) LED next to the connector, either left or right—that indicates the link/activity of the SAS port. Figure 60 also shows a double circle (or dot) symbol (for input) or a double diamond symbol (for output).

Note: Looking from the rear of the DAE, LCC B is located on the top and LCC A is located on the bottom (Figure 60).

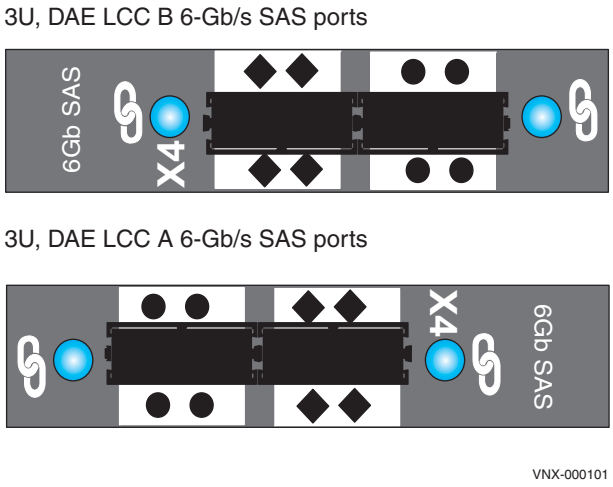


Figure 60 LCC 6-Gb/s SAS port LED

Table 39 describes the 3U, DAE LCC 6-Gb/s SAS port LEDs.

Table 39 LCC 6-Gb/s SAS port LEDs

LED	Color	State	Description
Link/activity	Blue	On	All lanes are running at 6 GB/s
	Green	On	One or more lanes is not running at full speed or disconnected
	Alternating Blue/Green	Blinking	Port is being marked by the host
	—	Off	Not connected

Management (RJ-12) connector

Note: The management Ethernet (RJ-12) LCC to SPS connector is not used at this time.

Figure 61 on page 65 shows the management port connector (labeled with two symbols; one depicting a telephone handset with a line through it and the other depicting a battery). The telephone handset with a line through it symbol means that you cannot connect telephone type circuits to this connector (see the following **WARNING**). This port connects the LCC (A and B) ports to the SPS (A and B) ports, respectively.

WARNING

The SPS (RJ-12) port is a LAN port not a WAN port. LAN ports contain safety extra-low voltage (SELV) circuits, and WAN ports contain telephone-network voltage (TNV) circuits. An RJ-45 (or TNV-type) looks the same as the RJ-12 except for two very important differences. An RJ-45 is an 8-wire modular jack. The RJ-12 is a six-wire modular jack. The RJ-45 plugs and jacks are wider than their RJ-12 counterparts - 7/16"vs 3/8". An RJ-45 plug won't fit into an R-J12 jack. But an RJ-12 plug will fit into an RJ-45 jack. Use caution when connecting cables. To avoid electric shock, do not attempt to connect TNV circuits to SELV circuits.

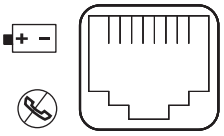


Figure 61 LCC RJ-12 port

The cable connecting the LCC to the SPS is an RJ-12 to RJ-12. It has an RJ-45 adapter (LCC side) on one end and a RJ-12 (SPS side) adapter on the other end.

LCC enclosure ID (enclosure address) and bus ID

On the rear of the LCC (A and B), an LCC enclosure ID indicator is provided. This ID indicator is a seven-segment LED display for displaying decimal numbers. The LCC enclosure ID appears on both LCCs (A and B) which is the same ID number. The enclosure ID is set at installation (Figure 62).

Each LCC includes a bus (loop) identification indicator. This indicator includes two seven-segment LED displays for displaying decimal numbers. The SP initializes the bus ID when the operating system is loaded (Figure 62).

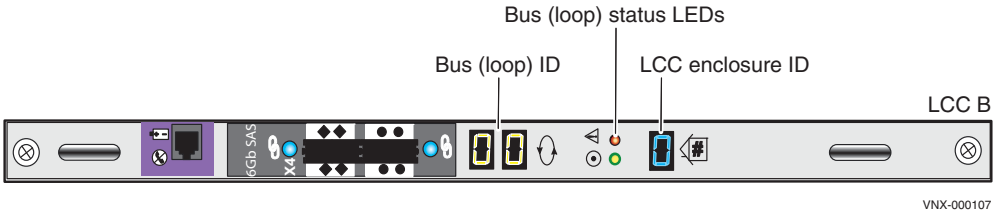


Figure 62 Example of LCC B enclosure ID and bus ID

Table 40 describes the bus (loop) indicator status LEDs.

Table 40 LCC bus (loop) status LEDs

Led	Color	State	Description
Power fault	Amber	On	Fault
	—	Off	No fault or power off
Power on	Green	On	Power on
	—	Off	Power off

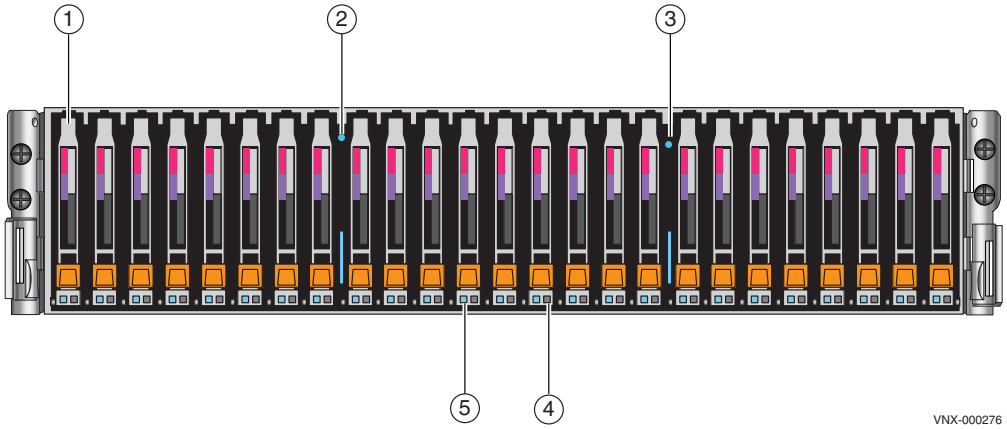
2U, 25 (2.5-inch) DAE front view

On the front, viewing from left to right, the Block and File VNX5300 2U, 25 (2.5-inch) DAE includes the following hardware components:

- 2.5-inch 6-Gb/s SAS, 6-Gb/s NL-SAS, or Flash disk drives (hot-swappable)[18]
- Status LEDs

Figure 63 shows the location of these components.

Note: In a Block and File VNX5300 platform, when using the 2U, 25 (2.5-inch) disk drive carrier, the maximum amount of disk drives is 125 (includes DPE and expansion DAEs).



1	2.5-inch 6-Gb/s SAS or 6-Gb/s NL-SAS drives	**4**	Disk drive fault LED (amber)
2	DAE fault LED (amber)	**5**	Disk drive status/activity (blue)
3	DAE power status LED (blue)		

Figure 63 2U, 25 (2.5-inch) DAE (front view)

Table 41 describes the 2U, 25 (2.5-inch) DAE and disk drive status LEDs.

Table 41 2U, 25 (2.5-inch) DAE and disk drive status LEDs

LED	Color	State	Description
DAE fault (location 2)	Amber	On	Fault has occurred
DAE power (location 3)	Blue	On	Powering and powered up
	—	Off	Powered down

18. You can add or remove a disk drive while the DAE is powered up, but you should exercise special care when removing modules while they are in use. Drive modules are extremely sensitive electronic components.

Table 41 2U, 25 (2.5-inch) DAE and disk drive status LEDs (continued)

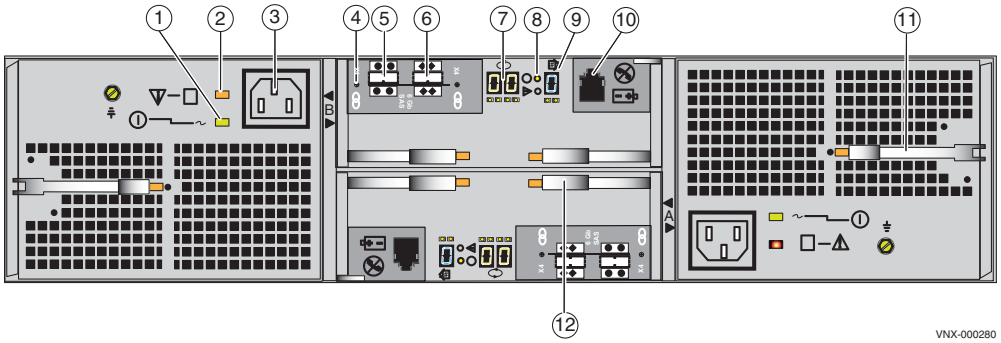
LED	Color	State	Description
Disk drive fault (location 4)	Amber	On	Fault has occurred
	—	Off	No fault has occurred
Disk drive on/activity (location 5)	Blue	On	Powering and powered up
		Blinking	Disk drive activity

2U, 25 (2.5-inch) DAE rear view

On the rear, viewing from top to bottom, a 2U, 25 (2.5-inch) DAE includes the following hardware components:

- Two LCCs (A and B)
- Two power supply/cooling modules

Figure 64 shows an example of the rear view of a 2U, 25 (2.5-inch) disk drive DAE.



1	LLC B power supply LED (on, green)	7	LCC B bus ID
2	LCC B power supply fault LED (on, amber)	8	LCC B power and fault LEDs
3	LCC B AC power supply power in (recessed plug)	9	DAE enclosure ID[a]
4	LCC B SAS connector link LED (on, blue)	10	LCC B management (RJ-12) connector to SPS (not used)
5	LCC B SAS connector (input)[b]	11	LCC A power supply latch handle
6	LCC B SAS connector (output)[c]	12	LCC A right latch handle

a. The DAE enclosure ID is sometimes referred to as the enclosure address (EA).
b. The SAS connector (input) is labeled with a double circle (dot) symbol.
c. The SAS connector (output) is labeled with a double diamond symbol.

Figure 64 Example of a 2U DAE with two LCCs and two power supply/cooing modules (rear view)

6-Gb/s SAS LCC

The 6-Gb/s SAS LCC supports, controls, and monitors the DAE, and is the primary interconnect management element. Each LCC includes connectors for input and output to downstream devices.

As described previously, the LCCs in a DAE connect to the DPE and other DAEs with 6-Gb/s cables. The cables connect the LCCs in a system together in a daisy-chain (loop) topology.

Internally, each DAE LCC connects to the drives in its enclosure in a point-to-point fashion through a switch. The LCC independently receives and electrically terminates incoming signals. For traffic from the system's storage processors, the LCC switch passes the signal from the input port to the drive being accessed; the switch then forwards the drive output signal to the port.

Note: If the target drive is not in the LCC's enclosure, the switch passes the input signal directly to the output port.

Each LCC independently monitors the environmental status of the entire enclosure, using a microcomputer-controlled monitor program. The monitor communicates the status to the storage processor, which polls disk enclosure status. LCC firmware also controls the SAS PHYs and the disk-module status LEDs.

As shown in Figure 64 on page 67, an enclosure ID[19] indicator is located on each LCC. Each LCC also includes a bus (back-end port) identification indicator. The SP initializes the bus ID when the operating system is loaded.

2U, 25 (2.5-inch) DAE AC power supply/cooling module

Figure 65 shows an example of the 2U, 25 (2.5-inch) DAE AC power supply/cooling module with a power in recessed connector (plug) and status LEDs.

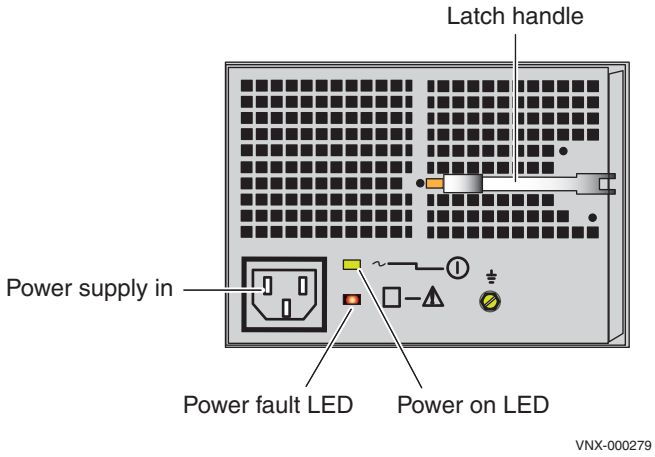


Figure 65 Example of a 2U, 25 (2.5-inch) DAE AC power supply/cooling module (power in) recessed connector (plug) and status LEDs

19. The enclosure ID is sometimes referred to as the enclosure address (EA).

Table 42 describes the 2U, 25 (2.5-inch) DAE power supply/cooling module LEDs.

Table 42 2U, 25 (2.5-inch) DAE AC power supply/cooling module LEDs

Led	Color	State	Description
Power fault	Amber	On	Fault
		Blinking	During power shutdown and during overvoltage and undervoltage protection (OVP/UVP) fault
	—	Off	No fault or power off
Power on	Green	On	Power on
	—	Off	Power off

The power supply/cooling modules are located to the left and right of the LCCs. The units integrate independent power supply and dual-blower cooling assemblies into a single module.

Each power supply is an auto-ranging, power-factor-corrected, multi-output, offline converter with its own line cord. Each supply supports a fully configured DAE and shares load currents with the other supply. The drives and LCCs have individual soft-start switches that protect the disk drives and LCCs if they are installed while the disk enclosure is powered up.

The enclosure cooling system includes two dual-blower modules.

The 2U, 25 (2.5-inch) DAE LCC input/output ports and connectors

The 2U, 25 (2.5-inch) DAE LCC supports the following I/O ports on the rear:

- Two 6-Gb/s SAS x4 ports
- One management (RJ-12) connector

6-Gb/s SAS x4 ports

The DAE LCC supports two 6-Gb/s SAS x4 ports (labeled 6Gb 0 x4) on the rear of each SP (A and B). This port provides an interface for SAS and NL-SAS drives on the DAE. This port is a 26-circuit SAS small form-factor 8088 (SFF-8088) specification (socket or receptacle) using an SFF-8088 specification mini-SAS HD 26-circuit cable (plug) with a pull tab.

Note: Each SAS cable is keyed with an *in* and *out* connection to prevent incorrect cabling.

Figure 66 shows an example of the port connector (socket) and cable connector (plug) with pull tab.

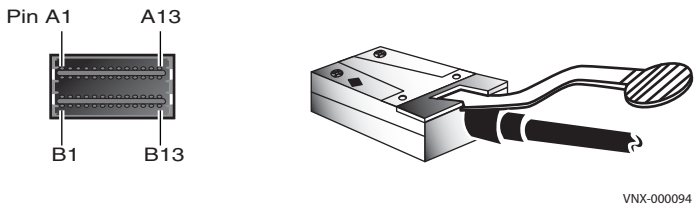


Figure 66 6-Gb/s SAS port and cable connector

Table 43 lists the 6-Gb/s SAS port pin signals used on the connector.

Table 43 6-Gb/s SAS port connector pinout

Pin	Signal	Pin	Signal
A1	GND	B1	GND
A2	Rx 0+	B2	Tx 0+
A3	Rx 0-	B3	Tx 0-
A4	GND	B4	GND
A5	Rx 1+	B5	Tx 1+
A6	Rx 1-	B6	Tx 1-
A7	GND	B7	GND
A8	Rx 2+	B8	Tx 2+
A9	Rx 2-	B9	Tx 2-
A10	GND	B10	GND
A11	Rx 3+	B11	Tx 3+
A12	Rx 3-	B12	Tx 3-
A13	GND	B13	GND

6-Gb/s SAS port LEDs and port direction (input or output)

Figure 67 shows the 6-Gb/s SAS port LED—a bi-color (blue/green) LED next to the connector, either left or right—that indicates the link/activity of the SAS port.

Note: Looking from the rear of the 2U, DAE, LCC B is located on the left and LCC A is located on the right (Figure 67).

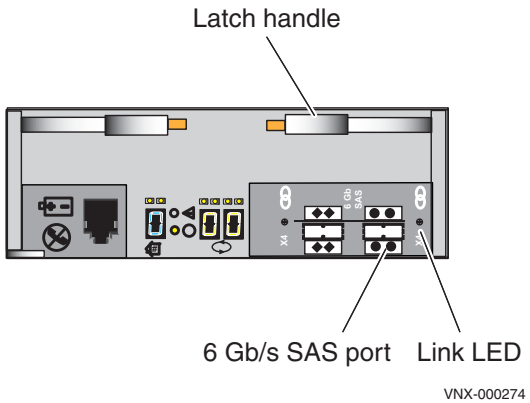


Figure 67 6-Gb/s SAS port LED

Table 44 describes the 6-Gb/s SAS port LEDs.

Table 44 6-Gb/s SAS port LEDs

LED	Color	State	Description
Link/activity	Blue	On	All lanes are running at 6 GB/s
	Green	On	One or more lanes is not running at full speed or disconnected
	Alternating Blue/Green	Blinking	Port is being marked by the host
	—	Off	Not connected

Management (RJ-12) port connector

Note: The management Ethernet (RJ-12) LCC to SPS port connector is not used at this time.

Figure 68 shows the management port (labeled with two symbols; one depicting a telephone handset with a line through it and the other depicting a battery). The telephone handset with a line through it symbol means that you cannot connect telephone type circuits to this connector (see the following **WARNING**). This port connects the LCC (A and B) ports to the SPS (A and B) ports, respectively.

WARNING

The SPS (RJ-12) port is a LAN port not a WAN port. LAN ports contain safety extra-low voltage (SELV) circuits, and WAN ports contain telephone-network voltage (TNV) circuits. An RJ-45 (or TNV-type) looks the same as the RJ-12 except for two very important differences. An RJ-45 is an 8-wire modular jack. The RJ-12 is a six-wire modular jack. The RJ-45 plugs and jacks are wider than their RJ-12 counterparts - 7/16"vs 3/8". An RJ-45 plug won't fit into an R-J12 jack. But an RJ-12 plug will fit into an RJ-45 jack. Use caution when connecting cables. To avoid electric shock, do not attempt to connect TNV circuits to SELV circuits.

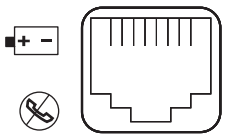


Figure 68 LCC RJ-12 port

The cable connecting the LCC to the SPS is an RJ-12 to RJ-12. It has an RJ-12 adapter (LCC side) on one end and a RJ-12 (SPS side) adapter on the other end.

LCC enclosure ID (enclosure address) and bus ID

On the rear of the LCC (A and B), an LCC enclosure ID indicator is provided. This ID indicator is a seven-segment LED display for displaying decimal numbers. The LCC enclosure ID appears on both LCCs (A and B) which is the same ID number. The enclosure ID is set at installation (Figure 69 on page 72).

Each LCC includes a bus (loop) identification indicator. This indicator includes two seven-segment LED displays for displaying decimal numbers. The SP initializes the bus ID when the operating system is loaded (Figure 69 on page 72).

IMPORTANT

You can add or remove a disk drive while the DAE is powered up, but you should exercise special care when removing disk drives while they are in use. Disk drives are extremely sensitive electronic components.

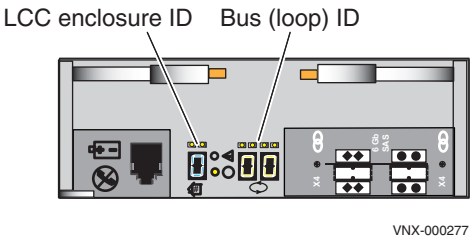


Figure 69 Example of LCC B enclosure ID and bus ID

Table 45 describes the bus (loop) status LEDs.

Table 45 LCC bus (loop) status LEDs

Led	Color	State	Description
Power fault	Amber	On	Fault
	—	Off	No fault or power off
Power on	Green	On	Power on
	—	Off	Power off

Specifications

Table 46 lists the Block and File VNX5300 platform physical specifications, operating environment, and power requirements.

Table 46 VNX5300 platform specifications

Parameter	Characteristics
Dimensions (approximate)	
Height	14 in. (35.56 cm) 8 NEMA units (U) total, disk processor enclosure (DPE, 3U, standby power supply (SPS) 1U, Control Station 1U, Data Mover Enclosure 2U, including mounting rails (fully configured with two Control Stations and one Data Mover Enclosure having two Data Movers)
Width	18.92 in. (48.06 cm); mounting bars fit standard 19-inch NEMA cabinets
Depth	Chassis to rear: 21.30 or 24.25 in. (54.10 or 61.60 cm), depending on disk drive carrier size
Weight	206.7 lb (93.76 kg) to 229.7 lb (104.19 kg); one DPE, one SPS, two Control Stations, and one Data Mover Enclosure, depending on the amount and the size of the disk drive modules
Operating environment	
Temperature	50-104° F (10-40° C)
Temperature gradient	18° F/hr (10° C/hr)
Relative humidity	20% to 80% (non-condensing)
Altitude	7,500 ft (2286 m) @ 104° F (40° C) max.
AC power and dissipation	
AC line voltage	100 to 240 VAC (47-63 Hz), single phase
AC line voltage tolerance	Voltage ± 10%, frequency ± 3 Hz
AC line current	4.8 A max at 100 VAC, 2.4 A max at 200 VAC[a] 4.7 A max at 100 VAC, 2.3 A max at 200 VAC[b] 4.6 A max at 100 VAC, 2.3 A max at 200 VAC[c]
Power consumption	480 VA (454 W) max[a]; 465 VA (440 W) max[b], 460 VA (450 W) max[c]
Startup surge current	22 A rms max for 50 ms, at any line voltage
Power factor	0.98 min at full load, low voltage
Heat dissipation	1.58 x 10^6 J/hr, (1,500 Btu/hr) max[c]; 1.62 x 10^6 J/hr, (1,540 Btu/hr) max[b]; 1.64 x 10^6 J/hr, (1,560 Btu/hr) max[a];
In-rush current	15 A max for ½ line cycle, per line cord at 240 VAC 15 A max for ½ line cycle, per line cord at 120 VAC
AC protection	12.5 A fuse on each power supply, both phases[ac] 7.8 A fuse on each power supply, both phases[b]

Table 46 VNX5300 platform specifications (continued)

Parameter	Characteristics
AC inlet type (receptacle)	IEC320-C14 appliance coupler (per power supply)
Ride-through	30 ms minimum at full load
Current sharing	± 15% of full load, between power supplies

a. DPE with 15 disk drives.

b. DME with 2 Data Movers.

c. DPE with 25 disk drives.

Note: All ratings assume fully configured systems.

Cabling

This section shows examples of the DAE cabling you will need to do for your VNX series platform. The descriptions are presented in illustrations and text. Each illustration shows an example of the cable connection points (ports) located on the DAE and DPE of the VNX5300 platform. DAE cabling for the Block VNX5300 platform is shown first and then cabling for the File version of the VNX5300 platform is shown.

For all other cabling of your VNX5300 platform including SPS power cabling, DPE power cabling, DAE power cabling, PDU power cabling, LAN cabling, and so on, refer to the *VNX5300 Installation Guide*.

Cable label wraps

Each VNX series platform comes with a cable label wrap guide or set of cable label wraps to affix to the cables on your VNX series platform. These labels should be affixed to the appropriate cables as you connect the cables to your VNX series platform. Figure 70 shows an example of the cable wrap guide and how to affix the cable label wrap to a cable.

Note: If your VNX series platform was assembled at the factory, all the cable labels have been affixed to the cables except for any DAEs you have ordered. Additionally, if your VNX series platform was not assembled at the factory, the cable kit supplied with your product will have all the required cables already labeled except for the DAEs.

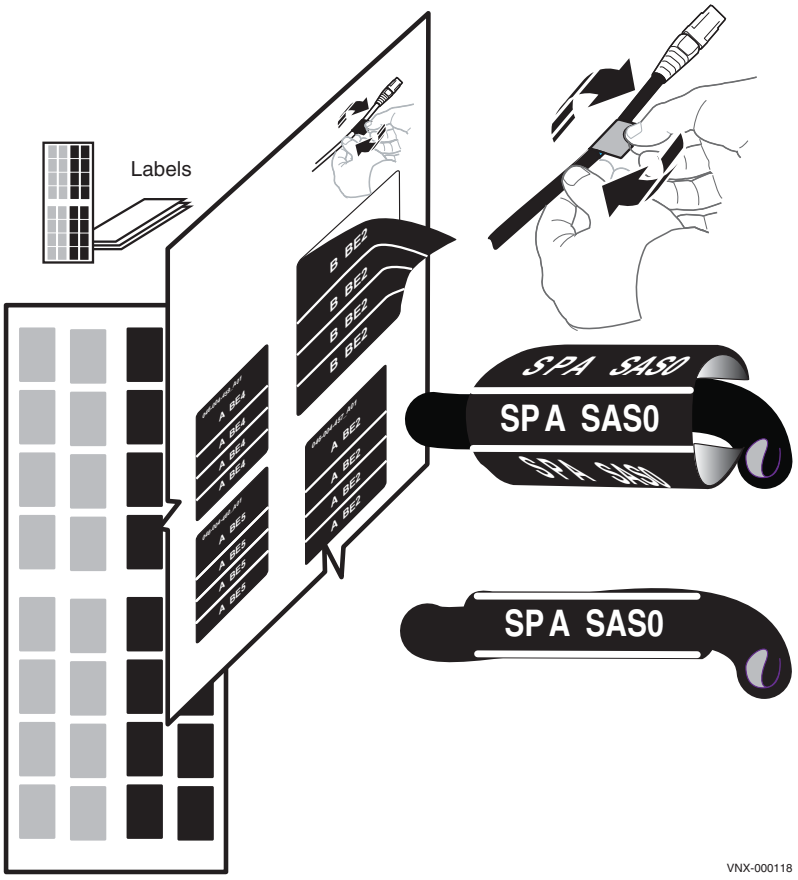


Figure 70 Example of a cable label wrap

VNX5300 DAE cabling

IMPORTANT

The DAE(s) that are to be directly connected to the DPE need to be located close enough to the DPE so that the DPE-to-DAE interconnect cables (that are provided with every DAE) can be routed and connected to the DPE.

Shown in the upcoming figures (Figure 71 on page 77 and Figure 72 on page 79) are graphical representations of SAS cabling in a DPE-based VNX storage platform, the VNX5300 Block. The Storage Processors connect to the DAEs with SAS cables. The cables connect LCCs in the DAEs of a storage platform together in a daisy-chain topology.

The DPE is automatically Enclosure 0 (EA0). The DAE connected to SAS output port 0 is Enclosure 1 (EA1).

Cabling with two DAEs in VNX5300 Block platform

The first DAE connected to the Storage Processor SAS output port 1 is designated Enclosure 0 (EA0). Each DAE connected after the first DAE increments the enclosure number by one. All enclosures connected to SAS Port 0 will be on ID 0, but the addresses will increment.

Figure 71 on page 77 shows the first example of a VNX5300 Block platform with two DAEs (one 3U, 15 disk drive DAE and the other a 2U, 25 disk drive DAE) or a VNX5300 platform with a total of from 55 disk drives (if the DPE is a 3U, 15 disk drive device) or 65 disk drives (if the DPE is a 3U, 25 disk drive device).

The SAS ports on the VNX5300 platform DPE are labeled 0 and 1. SAS 0 is connected internally to the SAS expander that connects the internal DPE disks. Since SAS 0 is already connected internally to the DPE disks, the first DAE is connected to SAS 1 to balance the load on the SAS ports. The second DAE is connected to SAS 0, the third DAE is connected to SAS 1, and so on.

In Figure 71 on page 77, notice that each DAE device supports two completely redundant buses (LCC A and LCC B).

The rule of load or bus balancing is applied to all DAEs. That is, Bus 0 is Enclosure Address 0 (EA0), Bus 1 is EA0, and so on. In the case of the VNX5300 platform, Bus 0 EA0 is the DPE (SP A and B). So, to balance the load, Bus 1 EA0 becomes the first DAE (LCC A and B) in the cabinet with the next DAE (LCC A and LCC B) as Bus 0 EA1, and so on. If you have several DAEs in your VNX5300 platform, you can daisy chain them within that particular bus. However, it is recommended that you balance each bus. In other words, always optimize your environment by using every available bus, and spreading the number of enclosures as evenly as possible across the buses.

Note: On the DPE and DAE, each cable connector includes a symbol to denote the direction the cable needs to connect to. The cable connector that has a double circle symbol is the input to the device. The cable connector with the double diamond symbol is the output from the device.

IMPORTANT

Notice the description of the cable labels affixed to the SP to DAE cables.

The cables shown in Figure 71 on page 77 are:

Note: The cable colors shown in the example are orange for Bus 0 and blue for Bus 1.

- Cable 1, blue, DPE to 1st DAE (labels SP A SAS 1 to LCC A)
- Cable 2, blue, DPE to 1st DAE (labels SP B SAS 1 to LCC B)
- Cable 3, orange, DPE to 2nd DAE (labels SP A SAS 0 to LCC A)
- Cable 4, orange, DPE to 2nd DAE (labels SP B SAS 0 to LCC B)

Note: If your VNX5300 platform was not cabled at the factory, refer to the cable wrap guide ("Cable label wraps" on page 75) that came with your VNX5300 platform for the correct cable labels.

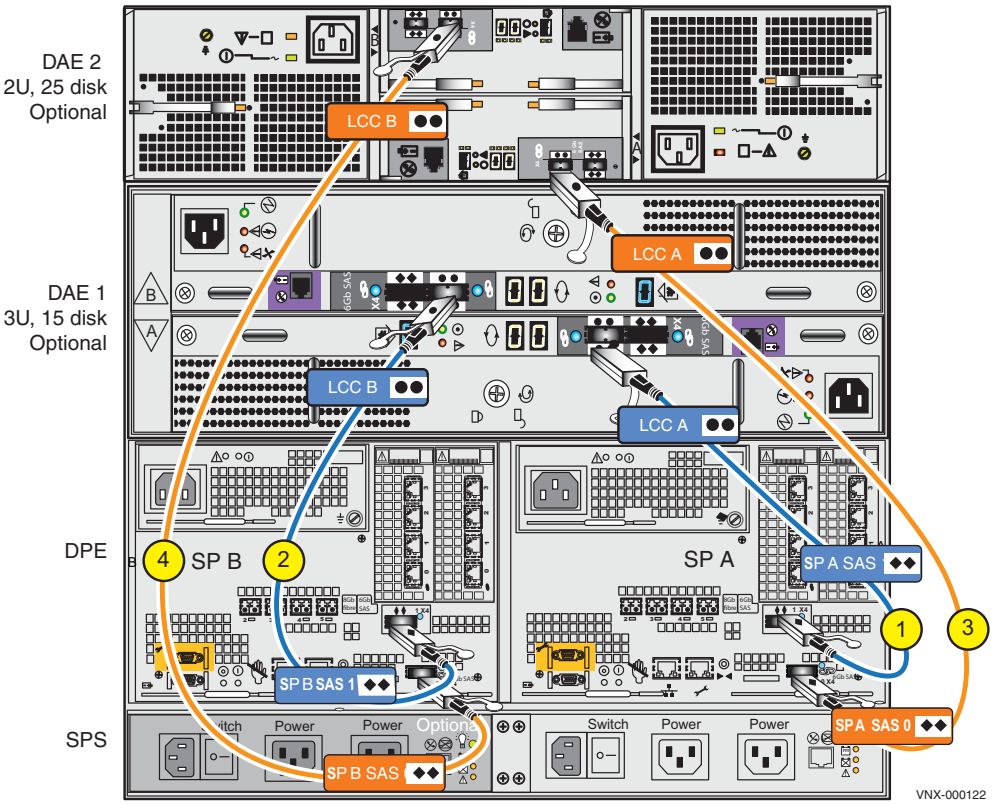


Figure 71 Example of the VNX5300 Block platform with two DAEs (3U, 15 disks and 2U, 25 disks) cabling

Note: Each cable end includes a symbol to denote the direction the cable needs to connect to. The cable end that has a single circle symbol is the input end. While the cable connector with the single diamond symbol is the output end.

Interleaved cabling with seven DAEs in a VNX5300 Block platform

Figure 72 on page 79 shows a second example of a VNX5300 Block platform with seven DAEs (all are 3U, 15 disk drive DAEs) or a VNX5300 platform with a total of 120 disk drives (with the DPE a 3U, 15 disk drive device).

In this example, as described previously, the SAS ports on the VNX5300 platform DPE are labeled 0 and 1. SAS 0 is connected internally to the SAS expander that connects to the internal DPE disks. However, since there are seven DAEs for a maximum of 120 disk drives, it is recommended that the DAEs be load balanced. To do this, it is recommended that you daisy-chain the DAEs for the most efficient load balancing. So, in Figure 72 on page 79, there are two buses (Bus 0 and Bus 1).

The cables shown in Figure 72 on page 79 are:

Note: The cable colors shown in the example are orange for Bus 0 and blue for Bus 1.

- Cable 1, blue, DPE to 1st DAE (labels SP A SAS 1 to LCC A)
- Cable 2, blue, DPE to 1st DAE (labels SP B SAS 1 to LCC B)
- Cable 3, orange, DPE to 2nd DAE (labels SP A SAS 0 to LCC A)
- Cable 4, orange, DPE to 2nd DAE (labels SP B SAS 0 to LCC B)

The remaining cables are daisy-chained for load balancing. So, the blue cable for Bus 1 is interleaved and daisy-chained through the remaining DAEs:

- EA 1/Bus 1
- EA 2/Bus 1
- EA 3/Bus 1

While the orange cable for Bus 0 is interleaved and daisy-chained through the remaining DAEs:

- EA 2/Bus 0
- EA 3/Bus 0

Note: Figure 72 on page 79 shows 4U of reserved space to allow for upgrading your VNX5300 Block to VNX5300 File/Unified platform. If you might be planning to upgrade your Block platform to a File/Unified platform, it is recommended that at least 4U of rack space be reserved for adding one to two Controls Stations and one Data Mover enclosure.

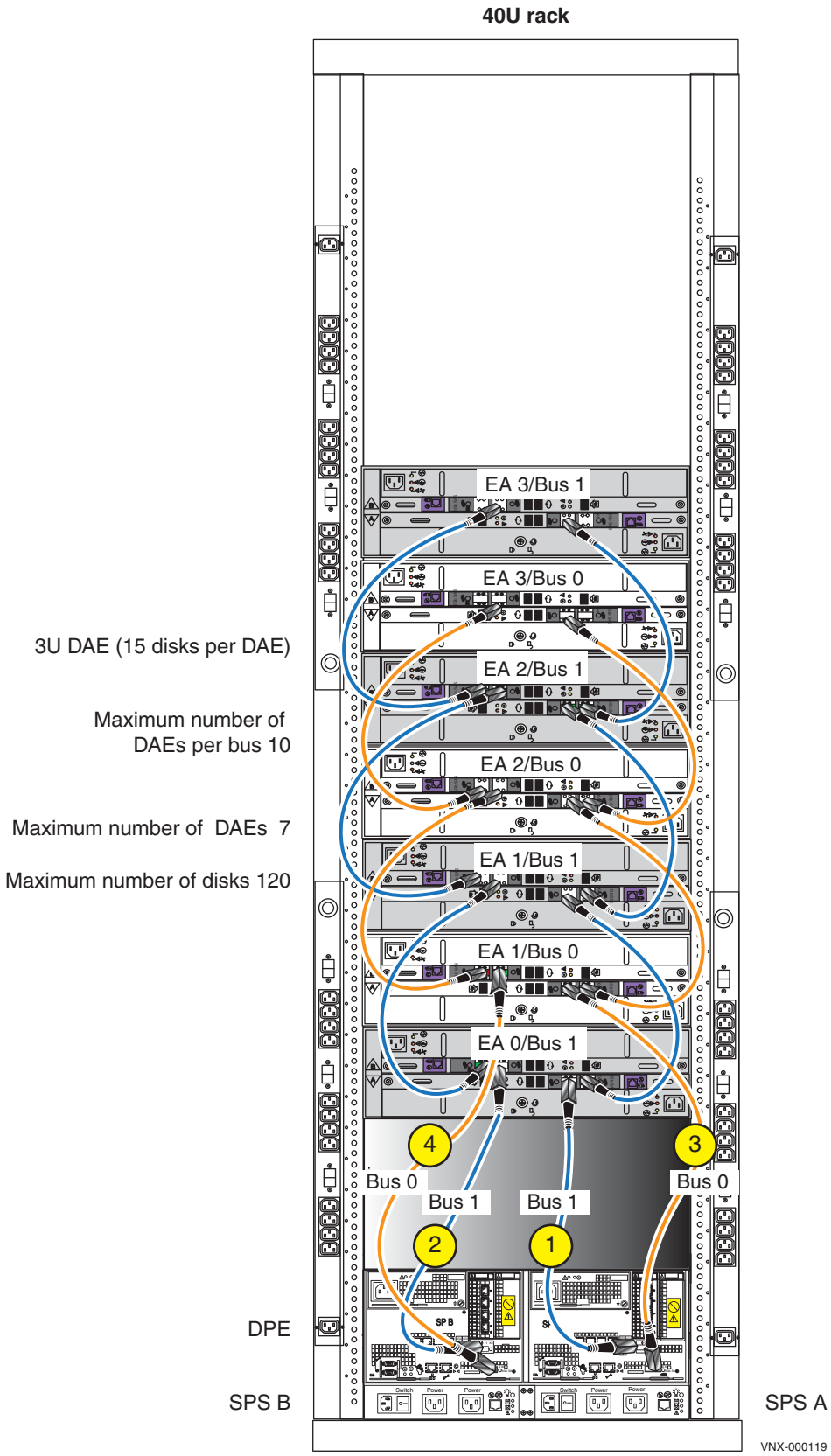


Figure 72 **Example of the VNX5300 Block platform with seven DAEs (3U, 15 disks) interleaved cabling**

Stacked cabling with seven DAEs in VNX5300 Block platform

Figure 73 on page 81 shows a third example of a VNX5300 Block platform with seven DAEs (all are 3U, 15 disk drive DAEs) or a VNX5300 platform with a total of 120 disk drives (with the DPE a 3U, 15 disk drive device). This example shows the stacked cabling with one 40U rack having seven DAEs.

In this example, as described previously, the SAS ports on the VNX5300 platform DPE are labeled 0 and 1. SAS 0 is connected internally to the SAS expander that connects to the internal DPE disks. However, since there are seven DAEs for a maximum of 120 disk drives, it is recommended that the DAEs be load balanced. To do this, it is recommended that you daisy-chain the DAEs for the most efficient load balancing. So, in Figure 73 on page 81, there are two buses (Bus 0 and Bus 1).

The cables shown in Figure 73 on page 81 are:

Note: The cable colors shown in the example are orange for Bus 0 and blue for Bus 1.

- Cable 1, blue, DPE to 1st DAE (labels SP A SAS 1 to LCC A)
- Cable 2, blue, DPE to 1st DAE (labels SP B SAS 1 to LCC B)
- Cable 3, orange, DPE to 5th DAE (labels SP A SAS 0 to LCC A)
- Cable 4, orange, DPE to 5th DAE (labels SP B SAS 0 to LCC B)

So, the blue cable for Bus 1 is stacked and daisy-chained through the remaining DAEs:

- EA 1/Bus 1
- EA 2/Bus 1
- EA 3/Bus 1

While the orange cable for Bus 0 is stacked and daisy-chained through the remaining DAEs:

- EA 2/Bus 0
- EA 3/Bus 0

Note: Figure 73 on page 81 shows 4U of reserved space to allow for upgrading your VNX5300 Block to VNX5300 File/Unified platform. If you might be planning to upgrade your Block platform to a File/Unified platform, it is recommended that at least 4U of rack space be reserved for adding one to two Controls Stations and one Data Mover enclosure.

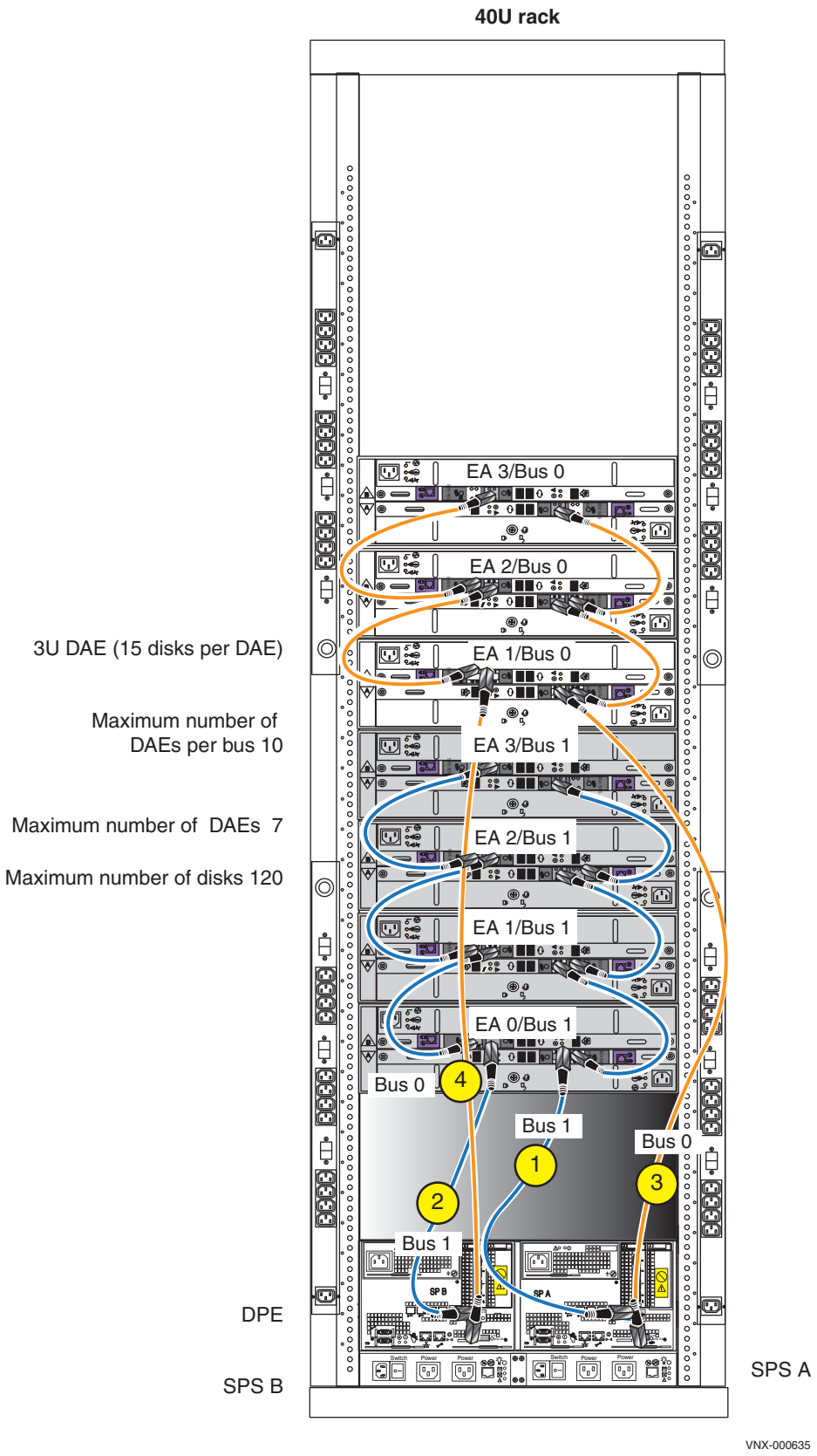


Figure 73 **Example of the VNX5300 Block platform with seven DAEs (3U, 15 disks) stacked cabling**

Cabling with two DAEs in a VNX5300 File/Unified platform

Shown in the upcoming figures (Figure 74 on page 83 and Figure 75 on page 85) are graphical representations of SAS cabling in a DPE-based VNX storage platform, the VNX5300 File. The Storage Processors connect to the DAEs with SAS cables. The cables connect LCCs in the DAEs of a storage platform together in a daisy-chain topology.

The DPE is automatically Enclosure 0 (EA0). The DAE connected to SAS output port 0 is Enclosure 1 (EA1).

The first DAE connected to the Storage Processor SAS output port 1 is designated Enclosure 0 (EA0). Each DAE connected after the first DAE increments the enclosure number by one. All enclosures connected to SAS Port 0 will display a ID of 0.

Figure 74 on page 83 shows the first example of a VNX5300 File platform with two DAEs (one 3U, 15 disk drive DAE and the other a 2U, 25 disk drive DAE) or a VNX5300 platform with a total of from 55 disk drives (if the DPE is a 3U, 15 disk drive device) or 65 disk drives (if the DPE is a 3U, 25 disk drive device).

The SAS ports on the VNX5300 platform DPE are labeled 0 and 1. SAS 0 is connected internally to the SAS expander that connects the internal DPE disks. Since SAS 0 is already connected internally to the DPE disks, the first DAE is connected to SAS 1 to balance the load on the SAS ports. The second DAE is connected to SAS 0, the third DAE is connected to SAS 1, and so on.

In Figure 74 on page 83, notice that each DAE device supports two completely redundant buses (LCC A and LCC B).

The rule of load or bus balancing is applied to all DAEs. That is, Bus 0 is Enclosure Address 0 (EA0), Bus 1 is EA0, and so on. In the case of the VNX5300 platform, Bus 0 EA0 is the DPE (SP A and B). So, to balance the load, Bus 1 EA0 becomes the first DAE (LCC A and B) in the cabinet with the next DAE (LCC A and LCC B) as Bus 0 EA1, and so on. If you have several DAEs in your VNX5300 platform, you can daisy chain them within that particular bus. However, it is recommended that you balance each bus. In other words, always optimize your environment by using every available bus, and spreading the number of enclosures as evenly as possible across the buses.

Note: On the DPE and DAE, each cable connector includes a symbol to denote the direction the cable needs to connect to. The cable connector that has a double circle symbol is the input to the device. The cable connector with the double diamond symbol is the output from the device.

IMPORTANT

Notice the description of the cable labels affixed to the SP to DAE cables.

The cables shown in Figure 75 on page 85 are:

Note: The cable colors shown in the example are orange for Bus 0 and blue for Bus 1.

- Cable 1, blue, DPE to 1st DAE (labels SP A SAS 1 to LCC A)
- Cable 2, blue, DPE to 1st DAE (labels SP B SAS 1 to LCC B)
- Cable 3, orange, DPE to 2nd DAE (labels SP A SAS 0 to LCC A)
- Cable 4, orange, DPE to 2nd DAE (labels SP B SAS 0 to LCC B)

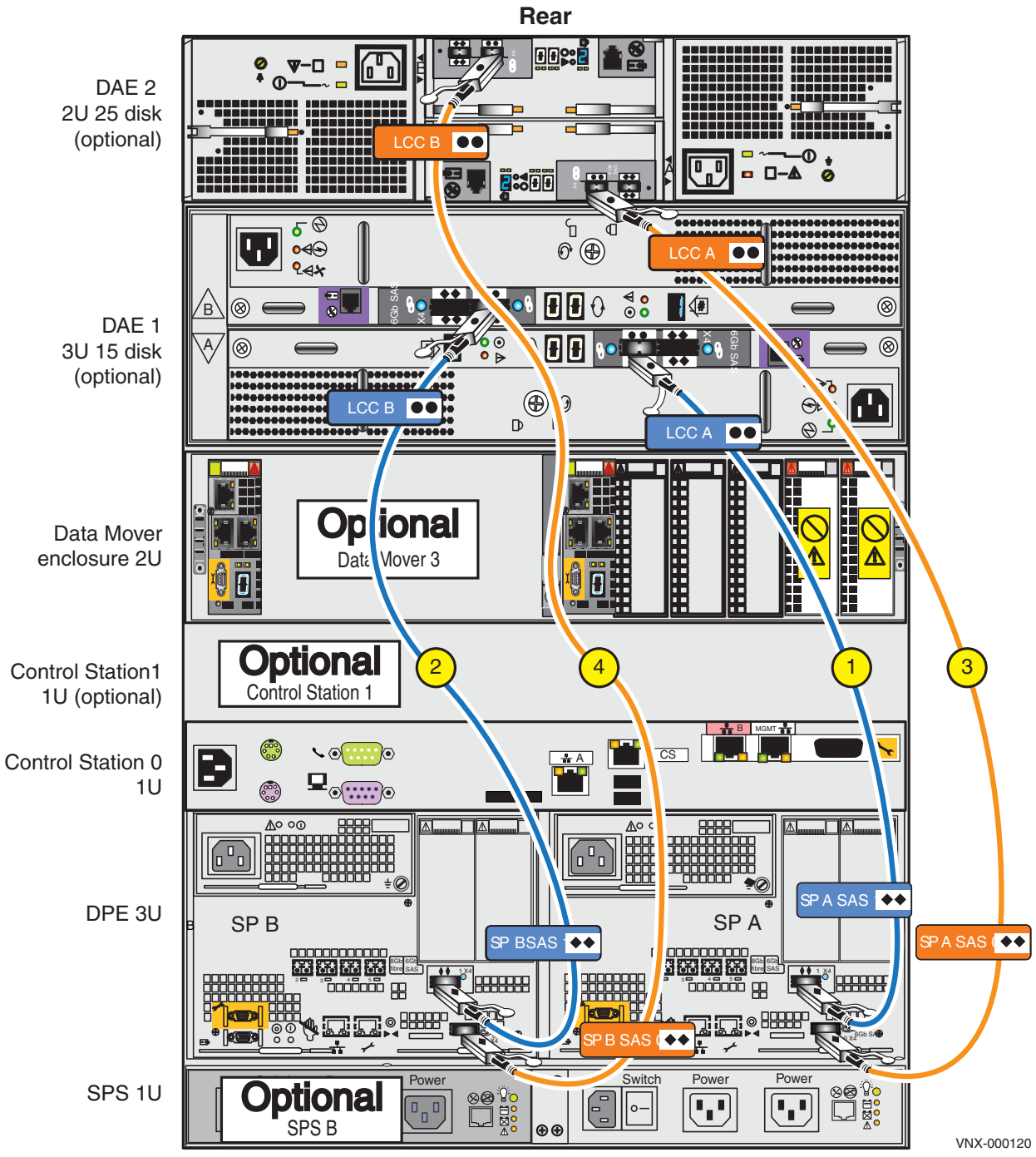


Figure 74 **Example of the VNX5300 File platform with two DAEs (3U, 15 disks) cabling**

Note: In Figure 74 the VNX5300 File platform shows a single SPS (with an optional SPS available), a DPE (with two SPs), a CS (with an optional CS available), a DME (with one DM), and a 3U 15 DAE and the 2U 25 DAE.

Interleaved cabling in a VNX5300 File/Unified platform with seven DAEs

Figure 75 on page 85 shows an example of a VNX5300 File/Unified platform with seven DAEs (all are 3U, 15 disk drive DAEs) or a VNX5300 File/Unified platform with a total of 120 disk drives (with the DPE a 3U, 15 disk drive device).

In this example, the SAS ports on the VNX5300 platform DPE are labeled 0 and 1. SAS 0 is connected internally to the SAS expander that connects to the internal DPE disks. However, since there are seven DAEs for a maximum of 120 disk drives, it is recommended that the DAEs be load balanced. To do this, it is recommended that you daisy chain the DAEs for the most efficient load balancing. So, in Figure 75 on page 85, there are two buses (Bus 0 and Bus 1) with the first DAE on Bus 1 designated as EA0/Bus 1 (blue cable). The second DAE continues Bus 0 and is designated as EA1/Bus 0 (orange cable) where it is then daisy-chained to the fourth DAE designated as EA2/Bus 0 and then to the sixth DAE designated as EA3/Bus 0, and so on.

The cables shown in Figure 75 on page 85 are:

Note: The cable colors shown in the example are orange for Bus 0 and blue for Bus 1.

- Cable 1, blue, DPE to 1st DAE (labels SP A SAS 1 to LCC A)
- Cable 2, blue, DPE to 1st DAE (labels SP B SAS 1 to LCC B)
- Cable 3, orange, DPE to 2nd DAE (labels SP A SAS 0 to LCC A)
- Cable 4, orange, DPE to 2nd DAE (labels SP B SAS 0 to LCC B)

The remaining cables are daisy-chained for load balancing. So, the blue cable for Bus 1 is interleaved and daisy-chained through the remaining DAEs:

- EA 1/Bus 1
- EA 2/Bus 1
- EA 3/Bus 1

While the orange cable for Bus 0 is interleaved and daisy-chained through the remaining DAEs:

- EA 2/Bus 0
- EA 3/Bus 0

Note: In Figure 75 on page 85 the VNX5300 File platform shows an dual SPS, a DPE (with two SPs), two CSs, a DME (with two DMs), and seven 3U 15 DAEs.

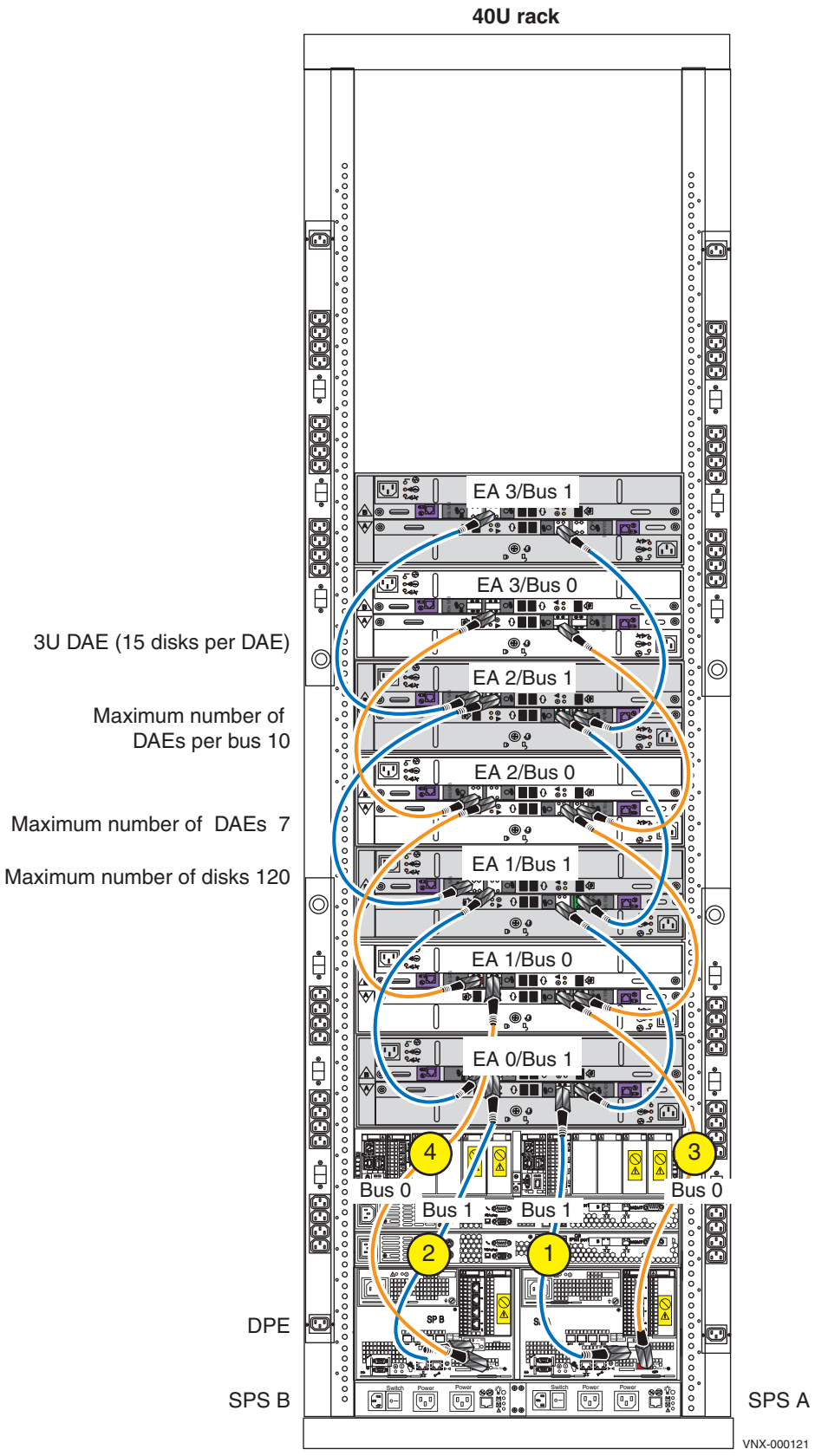


Figure 75 **Example of the VNX5300 File/Unified platform with seven DAEs (3U, 15 disks) interleaved cabling**

Stacked cabling in a VNX5300 File/Unified platform with seven DAEs

Figure 76 on page 87 shows an example of a VNX5300 File/Unified platform with seven DAEs (all are 3U, 15 disk drive DAEs) or a VNX5300 File/Unified platform with a total of 120 disk drives (with the DPE a 3U, 15 disk drive device). This example shows the stacked cabling with one 40U rack having seven DAEs.

In this example, the SAS ports on the VNX5300 platform DPE are labeled 0 and 1. SAS 0 is connected internally to the SAS expander that connects to the internal DPE disks. However, since there are seven DAEs for a maximum of 120 disk drives, it is recommended that the DAEs be load balanced. To do this, it is recommended that you daisy chain the DAEs for the most efficient load balancing. So, in Figure 76 on page 87, there are two buses (Bus 0 and Bus 1) with the first DAE on Bus 1 designated as EA0/Bus 1 (blue cable). The fifth DAE continues Bus 0 and is designated as EA1/Bus 0 (orange cable) where it is then daisy-chained to the sixth DAE designated as EA2/Bus 0 and then to the seventh DAE designated as EA3/Bus 0, and so on.

The cables shown in Figure 76 on page 87 are:

Note: The cable colors shown in the example are orange for Bus 0 and blue for Bus 1.

- Cable 1, blue, DPE to 1st DAE (labels SP A SAS 1 to LCC A)
- Cable 2, blue, DPE to 1st DAE (labels SP B SAS 1 to LCC B)
- Cable 3, orange, DPE to 5th DAE (labels SP A SAS 0 to LCC A)
- Cable 4, orange, DPE to 5th DAE (labels SP B SAS 0 to LCC B)

The remaining cables are daisy-chained for load balancing. So, the blue cable for Bus 1 is interleaved and daisy-chained through the remaining DAEs:

- EA 1/Bus 1
- EA 2/Bus 1
- EA 3/Bus 1

While the orange cable for Bus 0 is interleaved and daisy-chained through the remaining DAEs:

- EA 2/Bus 0
- EA 3/Bus 0

Note: In Figure 76 on page 87 the VNX5300 File platform shows an dual SPS, a DPE (with two SPs), two CSs, a DME (with two DMs), and seven 3U 15 DAEs.

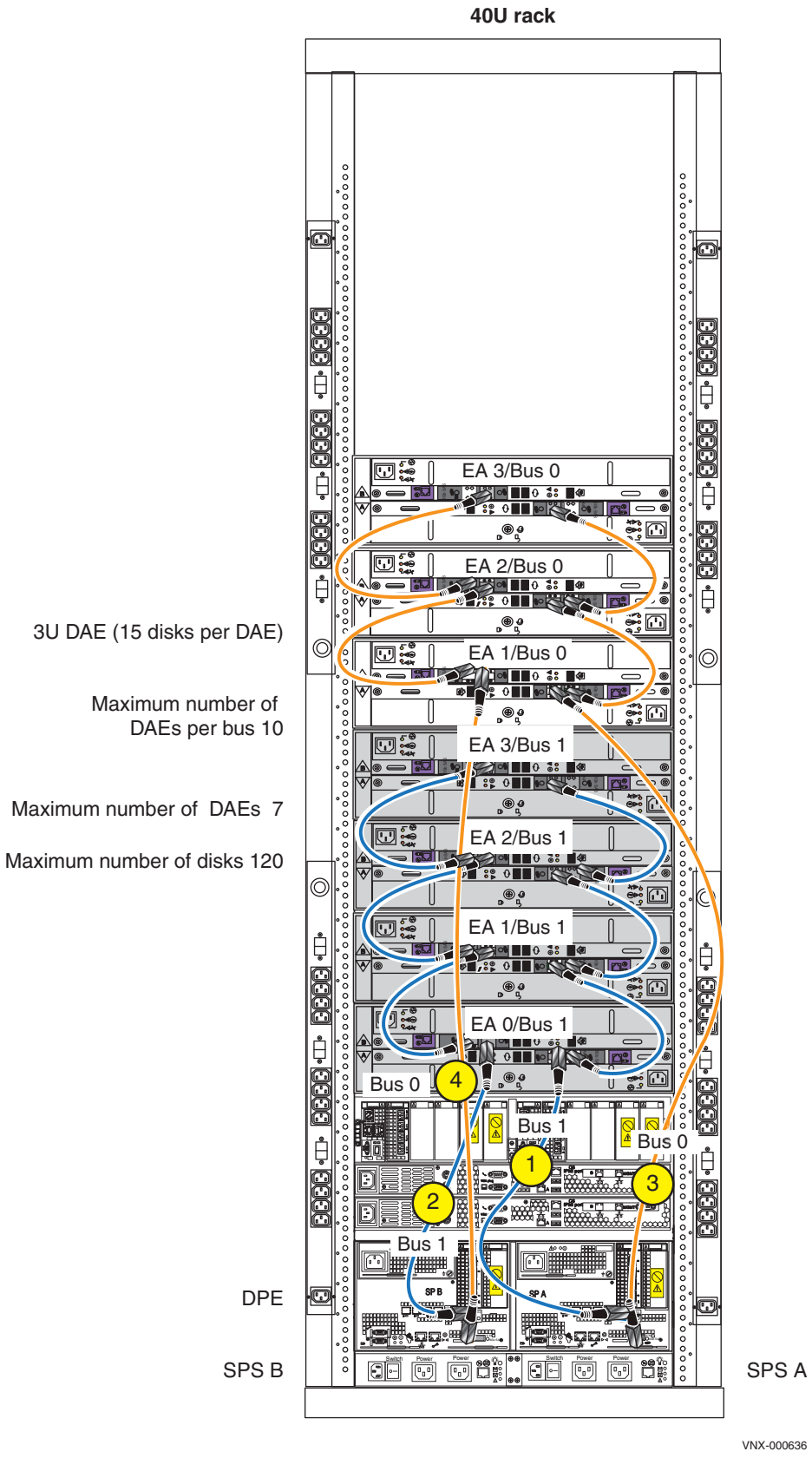


Figure 76 **Example of the VNX5300 File/Unified platform with seven DAEs (3U, 15 disks) stacked cabling**