

EMC® VNX™ Family  
VNX5300™

## Hardware Information Guide

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June 25, 2012

This guide describes one of five models available in the VNX Series, the EMC® VNX5300™. This document provides an overview of the architecture, components, and features of the VNX5300 platform. The specific aspects of the 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 1U standby power supply (SPS), the 1U Control Station, the 2U Data Mover Enclosure (DME), and the 3U, 15 (3.5-inch) or the 2U, 25 (2.5-inch) disk drive disk-array enclosure (DAE).

This guide is available online at <https://mydocs.emc.com/VNX/>. Go to the **About VNX** section, and then select **Learn about VNX**. Next, follow the steps in the wizard.

Topics include:

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## Product software and hardware release revisions

*As part of an effort to improve its product lines, EMC periodically releases revisions of its software and hardware. Therefore, some functions described in this document might not be supported by all versions of the software or hardware currently in use. The product release notes provide the most up-to-date information on product features.*

*Contact your EMC representative if a product does not function properly or does not function as described in this document.*

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**Note:** This document was accurate at publication time. New versions of this document might be released on the EMC online support website. Check the EMC online support website to ensure that you are using the latest version of this document.

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## Revision history

The following table presents the revision history of this document:

| Revision | Date          | Description   |
|----------|---------------|---|
| 01       | June 25, 2012 | First release of the <i>VNX5300 Hardware Information Guide</i> with a document part number. |

## Where to get help

EMC support, product, and licensing information can be obtained as follows:

**Product information** — For documentation, release notes, software updates, or information about EMC products, licensing, and service, go to the EMC online support website (registration required) at:

<https://Support.EMC.com>

**Technical support** — For technical support, go to EMC online support and select Support. On the Support page, you will see several options, including one to create a service request. Note that to open a service request, you must have a valid support agreement. Contact your EMC sales representative for details about obtaining a valid support agreement or with questions about your account.

# How this document is organized

The major sections of this guide are listed in the following table.

| Title  | Description  |
|--|--|
| <a href="#">“Overview” on page 4</a>                                   | Describes the software and hardware features of a typical VNX5300 along with a front view example of the VNX5300.  |
| <a href="#">“VNX5300 Block and File product description” on page 6</a> | Describes and shows the front and rear views of a typical VNX5300.   |
| <a href="#">“System component description” on page 11</a>              | Provides a description of the components that comprise a VNX5300. Along with a description, illustrations of each component are also shown.                      |
| <a href="#">“DPE front views” on page 11</a>                           | Describes and illustrates the front of a DPE and the components that comprise the front of the DPE.  |
| <a href="#">“DME front view” on page 18</a>                            | Describes and illustrates the front of the DME and the components that comprise the front of the DME.  |
| <a href="#">“Standby power supply rear view” on page 20</a>            | Describes and illustrates the 1U SPS used in the VNX5300.  |
| <a href="#">“DPE rear view” on page 25</a>                             | Describes and illustrates the rear of a DPE and the components that comprise the rear of the DPE.  |
| <a href="#">“Control Station rear view” on page 37</a>                 | Describes and illustrates the 1U SPS used in the VNX5300.  |
| <a href="#">“DME rear view” on page 42</a>                             | Describes and illustrates the rear of the DME and the components that comprise the rear of the DME.  |
| <a href="#">“Disk-array enclosure” on page 68</a>                      | Describes and illustrates the two types of DAEs available for the VNX5300.   |
| <a href="#">“VNX5300 DAE cabling” on page 86</a>                       | Describes the types of DAE cabling available for the VNX5300 platform. The cabling can be either interleaved or stacked depending on your specific requirements. |

## Related documentation

EMC provides the ability to create step-by-step planning, installation, and maintenance instructions tailored to your environment. To create VNX customized documentation, go to: <https://mydocs.emc.com/VNX/>.

To download a PDF copy of the desired publication, go to the following sections:

- ◆ For hardware-related books, go to the **About VNX** section, and then select **Learn about VNX**. Next, follow the steps in the wizard.
- ◆ For technical specifications, go to the **About VNX** section, and then select **View technical specifications**. Next, follow the steps in the wizard.
- ◆ For installation, adding, or replacing tasks, go to the **VNX tasks** section, and then select the appropriate heading. For example, to download a PDF copy of the *VNX5300 Block Installation Guide*, go to **Install VNX** and follow the steps in the wizard.

- ◆ For server-related tasks, go to the **Server tasks for the VNX5300, VNX5500, VNX5700, and VNX7500** section, and then select the appropriate heading. For example, to download a PDF copy of Adding or replacing hardware, go to **Add or replace hardware** and follow the steps in the wizard.

## Overview

The EMC VNX series implements a modular architecture that integrates hardware components for Block, File, and Object with concurrent support for native NAS, iSCSI<sup>1</sup> (Internet Small Computer System Interface), 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. 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

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

- ◆ **Block-only**—Includes a 3U disk processor enclosure (DPE), a 1U 1.2 KW standby power supply (SPS), and 2U or 3U 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 the 2U Data Mover enclosure (DME) and 1U Control Station (CS) to the 3U DPE, 1 U SPS, and 2U or 3U 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 3U DPEs and two types of DAEs. The 3U DPEs supported are a 15 drive 3.5-inch disk 3U enclosure (or DPE7) and a 25 drive 2.5-inch disk 3U enclosure (or DPE8). The DAEs supported are a 15 drive 3.5-inch disk 3U enclosure (or

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1. iSCSI is a protocol for sending SCSI packets over TCP/IP networks.

DAE6S) or a 25 drive 2.5-inch disk 2U enclosure (or DAE5S). 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 possible.

As a mid-range/entry level storage platform offering Block, File, 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 8.



VNX-000565

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

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

# VNX5300 Block and File product description

This section shows an example of the front and rear views of a Block and File (Unified) 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 (Unified) VNX5300 platform having a dual 1U SPS, a 3U, 15 (3.5-inch) disk drive 3U DPE, two 1U Control Stations (one optional), and one 2U Data Mover Enclosure with two Data Movers<sup>2</sup>. Each Data Mover includes two power supply/cooling (fan) modules and one CPU module.

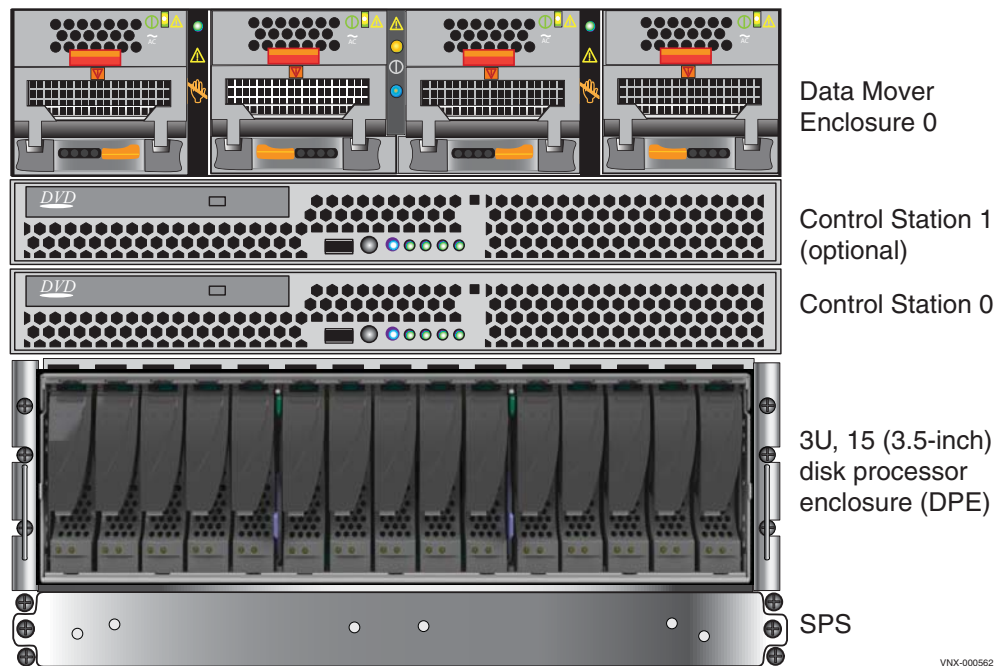


Figure 2 Example of a Block and File VNX5300 (Unified) platform with a 3U, 15 DPE (front view)

**Note:** Figure 2 and Figure 3 on page 7 are examples of a Block and File (Unified) VNX5300 platform (front and rear views). These figures are example of what a Block and File (Unified) 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 mean the same thing.

## Rear view

Figure 3 shows an example of the rear view of a Block and File (Unified) VNX5300 platform having a dual 1U SPS, a 3U DPE with two storage processors (SP A and B), two (one optional) 1U Control Stations, and one 2U Data Mover Enclosure with two Data Movers. Each Data Mover includes two power supply/cooling (fan) modules and one CPU module.

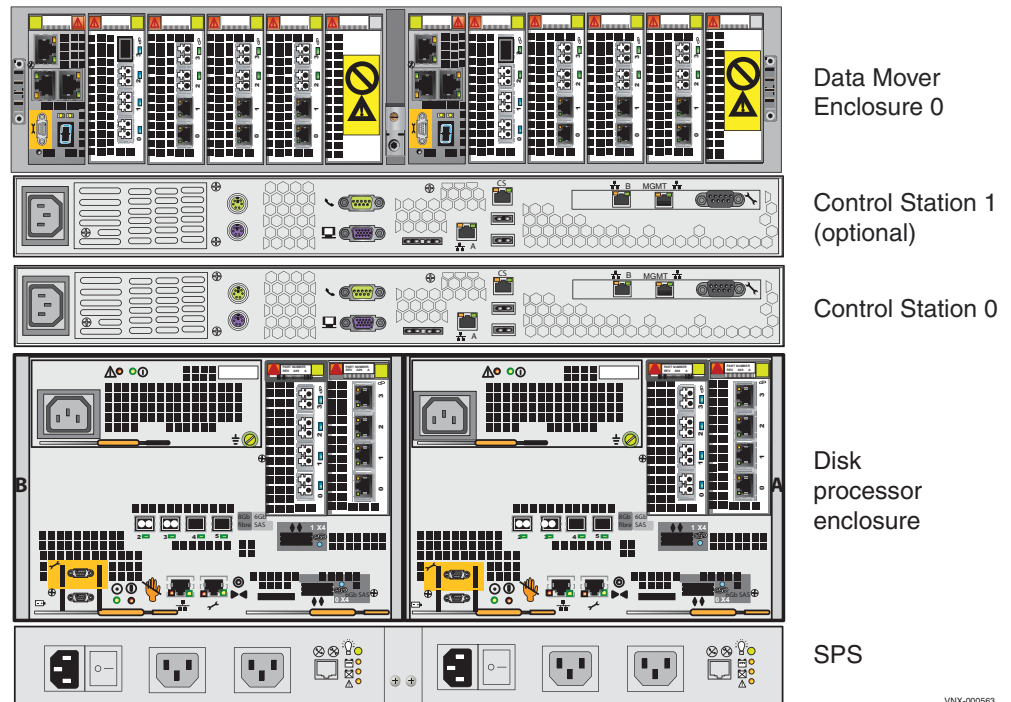


Figure 3 Example of a Block and File (Unified) VNX5300 platform (rear view)

## Hardware features

Contained in a 7 to 8U architecture, the Block and File (Unified) VNX5300 platform weighs approximately 206.7 lb (93.76 kg) to 229.7 lb (104.19 kg) fully loaded<sup>3</sup> depending on the type of disk drives used in the 3U DPE. With the 2U DME having the deepest dimension within the cabinet, the Block and File (Unified) VNX5300 measures 12.25 to 14 inches (7 to 8U) high x 18.92 inches wide x 24.25 inches deep (31.11 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 (Unified) VNX5300 platform (without any DAEs) includes two 1U Control Stations, a 3U DPE (with two SPSs), one dual 1U SPS, and one 2U Data Mover Enclosure with one to two Data Movers. In this fully loaded Block and File (Unified) VNX5300 platform, the DPE (with two SPSs) 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.

For physical, environmental, and power details, refer to the *VNX5300 Storage System Technical Specifications and Operating Limits* document.

**Table 1** VNX5300 hardware feature quick reference

| Minimum form factor | Maximum # of drives | Drive types                                      | File                             |             |                              |  | Block                    |   |     |                      |                     |
|---------------------|---------------------|--|----------------------------------|-------------|------------------------------|--|--------------------------|---|-----|----------------------|---------------------|
|                     |                     |  | 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 <sup>1</sup> and pNFS <sup>2</sup> | 2                        | 4 FC ports plus 2 BE <sup>3</sup> SAS ports | 2   | 12 GB                | FC, iSCSI, and FCoE |

1. MPFS = Multi-Path File System
2. pNFS = parallel-NFS
3. BE = back end

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

- ◆ One 3U DPE:

**IMPORTANT**

On the rear of the 3U 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 3U DPE.

- On the front of the 3U DPE, three types of disk drives are supported in two disk drive carrier types; 3U, 15 (3.5-inch) disk drive carrier ([Figure 4 on page 13](#)) or 3U, 25 (2.5-inch) disk drive carrier ([Figure 5 on page 14](#)). The disk drives supported are Serial attached-SCSI (SAS), near-line SAS (NL-SAS), and Flash.
- On the rear of the 3U DPE, each (hot-swappable) storage processor ([Figure 11 on page 22](#)) 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 of SDRAM for a total of 12 GB per SP
  - 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 6-Gb/s SAS x4 ports (labeled **6Gb SAS 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:
  - a.) Two-port 10-Gb/s optical or active Twinax<sup>4</sup> (w/iSCSI protocol); labeled **10 GbE** on the latch handle
  - b.) Two-port 10-Gb/s RJ-45 Base-T iSCSI/IP; labeled **10 GbE Base-T** on the latch handle

**Note:** The two-port 10-Gb/s RJ-45 Base-T/IP I/O module requires VNX OE for File version 7.1 or later.

  - c.) Four-port 1-Gb/s copper iSCSI; labeled **1 GbE iSCSI/TOE** on the latch handle
  - d.) Four-port 8-Gb/s optical Fibre Channel (running at 2, 4, or 8-Gb/s); labeled **8 GbE Fibre** on the latch handle
  - e.) Two-port 10-Gb/s optical or active Twinax<sup>3</sup> Fibre Channel over Ethernet (FCoE); labeled **10 GbE/FCoE** on the latch handle

**Note:** The two-port 10-Gb/s optical or active Twinax FCoE I/O module requires VNX OE for File version 7.0.35.3 or later.

  - 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 2U 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; labeled **8 GbE Fibre** on the latch handle
    - One to two of the following network I/O modules in any combination:
      - Two-port 10-Gb/s optical or active Twinax<sup>4</sup>; labeled **10 GbE v2** on the latch handle
      - Two-port 10-Gb/s optical or Twinax<sup>4</sup>; labeled **10 GbE v3** on the latch handle

**Note:** Version 3 of the two-port 10-Gb/s optical or active Twinax I/O module requires VNX OE File version 7.1 or later.

      - Four-port 1-Gb/s copper; labeled **1 GbE** on the latch handle

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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+ transceiver modules when so ordered.

- Two-port 1-Gb/s copper plus two-port 1-Gb/s optical; labeled **1 GbE** on the latch handle
- Two-port 10-Gb/s RJ45 Base-T iSCSI/IP; labeled **10 GbE Base-T** on the latch handle

**Note:** The two-port 10-Gb/s RJ-45 Base-T/IP I/O module requires VNX OE for File version 7.1 or later.

- 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 (Unified) VNX5300 platform, the 3U DPE is included in the total drive slot quantity of 120 to 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” on page 68](#) for more information about the available expansion DAEs for the Block and File (Unified) 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 describes the Block and File (Unified) VNX5300 platform components. These details include illustrations and descriptions of the front and rear connectors as well as the LED indicators.

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

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## VNX5300 front view

As previously described, the Block and File (Unified) VNX5300 platform is made up of a 3U DPE, a 1U SPS, one to two 1U Control Stations, and one 2U DME. The following sections will describe the front ([Figure 2 on page 6](#)) view of the VNX5300 platform components.

### DPE front views

The Block and File (Unified) VNX5300 platform can have one of two versions of the available 3U disk drive DPEs.

#### **IMPORTANT**

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When calculating the number of drives for your Block and File (Unified) 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 or 125, you will not be able to add another DAE. Refer to the [“Disk-array enclosure”](#) section on [page 68](#) for more information about the available expansion DAEs for the Block and File (Unified) VNX5300 platform.

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Each Block and File (Unified) VNX5300 platform 3U 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. The [“3U, 15 \(3.5-inch\) DPE”](#) section on [page 12](#) or the [“3U, 25 \(2.5-inch\) DPE”](#) section on [page 14](#) provides more information.

## Disk drives

Each disk drive consists of one disk drive in a carrier. You can visually distinguish between disk drive types by their different latch and handle mechanisms and by type, capacity, and speed labels on each disk drive. 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.

## 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 3U disk processor enclosure (DPE). Acting as the control center, each SP includes status LEDs, PCI Gen 2 I/O module slots, and LAN ports. The “DPE” section on [page 25](#) provides more information.

## 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. The “SP AC power supply” section on [page 27](#) provides more information.

## EMI shielding

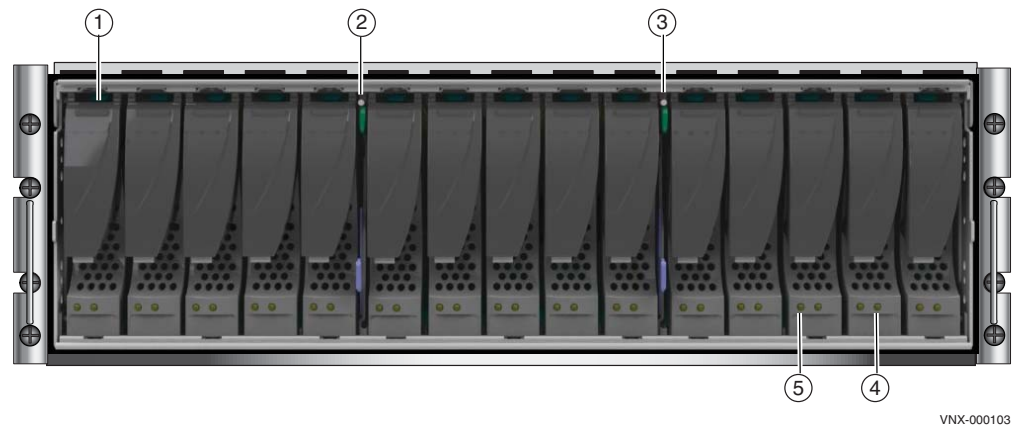
EMI compliance requires a properly installed electromagnetic interference (EMI) shield in front of the DPE disk drives. When installed in cabinets that include a front door, the DPE includes a simple EMI shield. Other installations require a front bezel that has a locking latch and integrated EMI shield.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

## 3U, 15 (3.5-inch) DPE

On the front, the Block and File (Unified) 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)
- ◆ Status LEDs

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



VNX-000103

|   |   |   |                                    |
|---|---|---|------------------------------------|
| 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 (Unified) 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<br><b>Note:</b> 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)

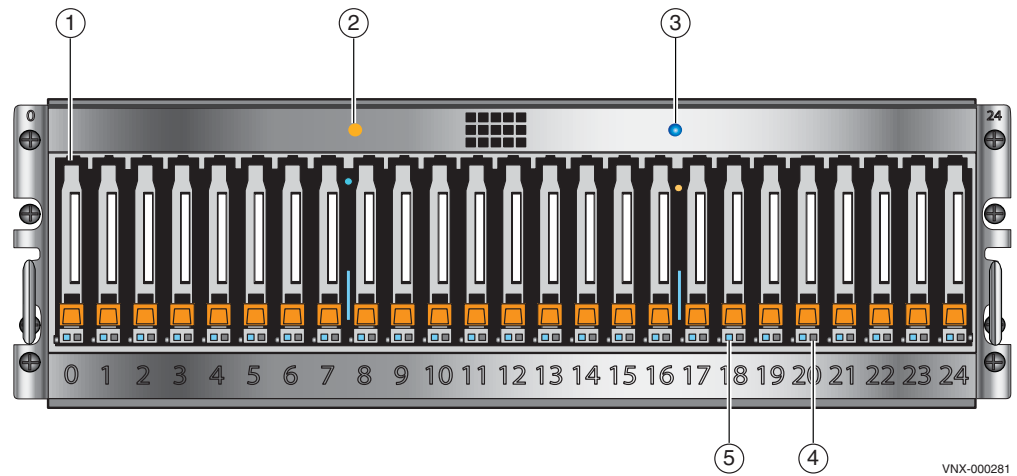
| LED                                 | Color | State                     | Description  |
|-------------------------------------|-------|---------------------------|--|
| Disk drive on/activity (location 5) | Green | On                        | Powering and powered up  |
|                                     |       | 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<br><b>Note:</b> 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 (2.5-inch) DPE

On the front, viewing from left to right, the Block and File (Unified) 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)
- ◆ 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 (Unified) VNX5300 platform 3U, 25 DPE and disk drive status LEDs.

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

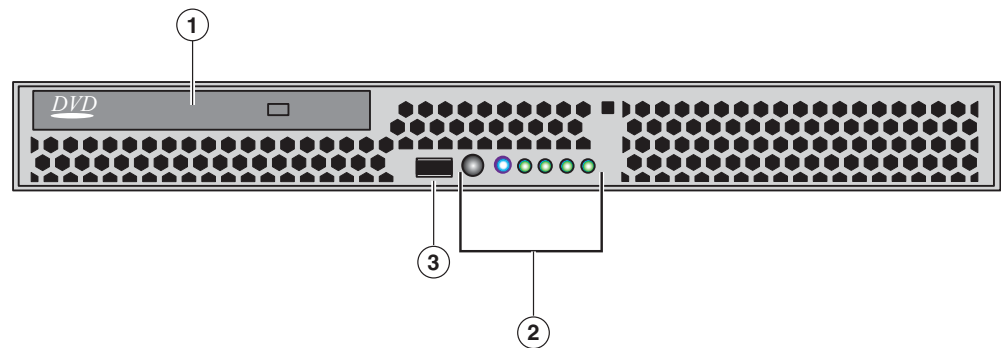
| LED                                 | Color | State    | Description             |
|-------------------------------------|-------|----------|-------------------------|
| DPE fault (location 2)              | Amber | On       | Fault has occurred      |
| DPE power (location 3)              | Blue  | 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, the Block and File (Unified) VNX5300 platform 1U 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.



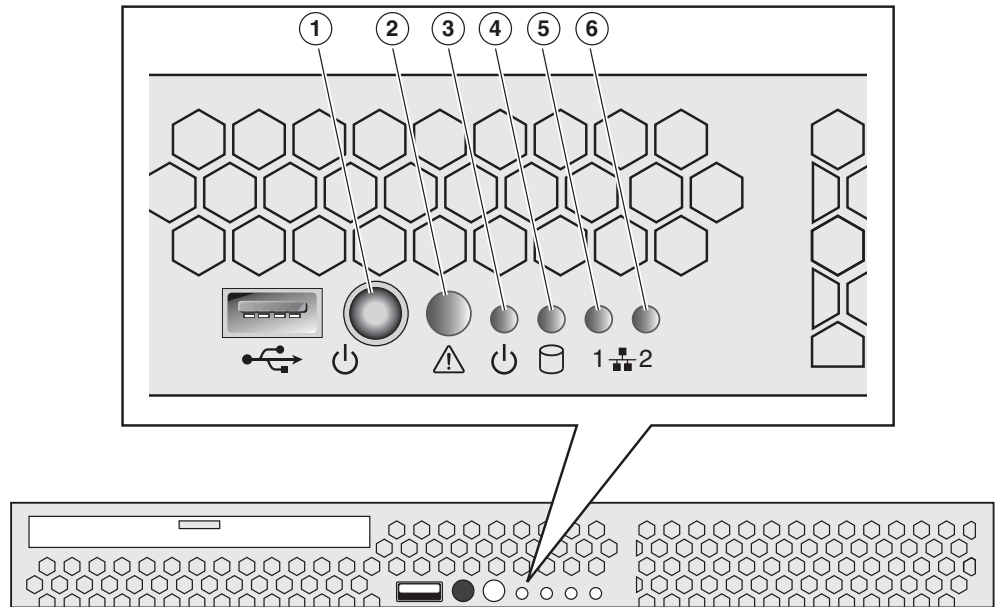
CNS-001740

|   |  |   |                              |
|---|--|---|------------------------------|
| 1 | DVD-ROM drive  | 3 | USB 2.0 connector (not used) |
| 2 | Control Station switch and status LEDs (for a closer view, see <a href="#">Figure 7 on page 16</a> ) |   |                              |

**Figure 6** VNX5300 platform Control Station (front view)

## Control Station switch and LEDs

Figure 7 on page 16 shows the location of the Block and File (Unified) VNX5300 platform 1U Control Station switch and LEDs on the front panel.



CNS-001744

**Figure 7** VNX5300 platform Control Station switch and LEDs

Table 4 on page 16 describes the switch located on the front panel.

**Table 4** Control Station switch

| Switch                         | Description  |
|--------------------------------|--|
| Power push-button (location 1) | Toggles the 1U Control Station power (push in and hold for about 10 seconds) |

Table 5 on page 17 describes the LEDs located on the front panel.



**Table 5** Control Station LEDs

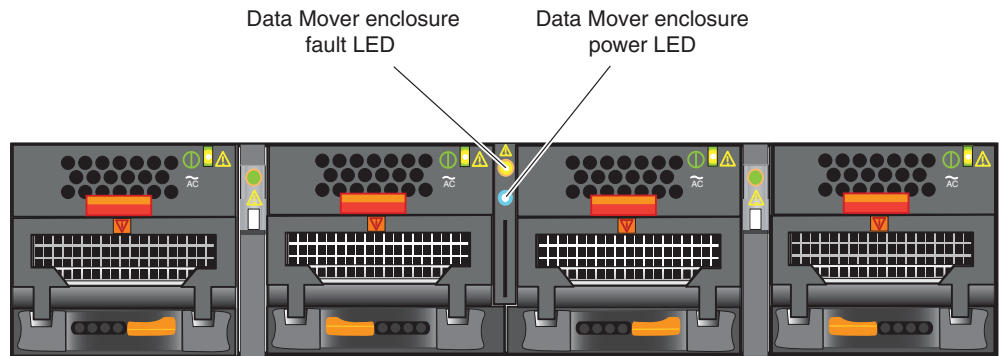
| LED   | Color | State     | Description  |
|---|-------|-----------|--|
| System status/boot<br>(location 2)  | Green | On        | Power on/system loaded and ready   |
|   |       | Blinking  | Booting up <sup>1</sup> or system degraded   |
|   | Amber | On        | Critical, non-recoverable error; system has failed due to: <ul style="list-style-type: none"> <li>• Themtrip asserted</li> <li>• IERR asserted</li> <li>• Non-recoverable temperature threshold asserted.</li> <li>• Non-recoverable voltage asserted.</li> <li>• Power fault/Power control failure</li> </ul> |
|   |       | Blinking  | Non-fatal alarm; system is likely to fail due to: <ul style="list-style-type: none"> <li>• Critical temperature threshold asserted.</li> <li>• Critical voltage threshold asserted.</li> <li>• Critical fan threshold asserted.</li> </ul>   |
| —   | Off   | Power off |  |
| System power/sleep or standby (location 3)                                  | Green | On        | Power on   |
|   |       | Blinking  | Sleep (standby)  |
|   | —     | 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  |

1. The system status LED flashes green while booting up.

## DME front view

The front of the Block and File (Unified) VNX5300 platform, the 2U DME contains two enclosure status (power and fault) LEDs (Figure 8).

**Note:** Figure 8 is an example of a Block and File (Unified) VNX5300 platform 2U DME with four power supply/cooling (fan) modules and two CPU modules installed.



CNS-001667

**Figure 8** Data Mover enclosure LEDs

Table 6 describes the 2U DME power and fault LEDs.

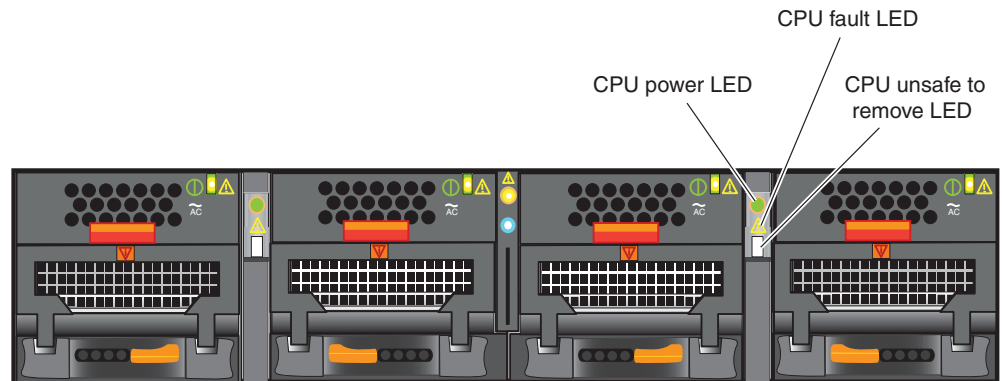
**Table 6** Data Mover Enclosure LEDs

| LED   | Color | State | Description  |
|-------|-------|-------|--|
| Power | Blue  | On    | DME is powered up and all the components in the enclosure are operating properly |
|       | —     | Off   | DME is powered down.   |
| Fault | Amber | On    | A replaceable component 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.



CNS-001669

Figure 9 CPU LEDs

Table 7 describes the 2U DME CPU power and fault LEDs.

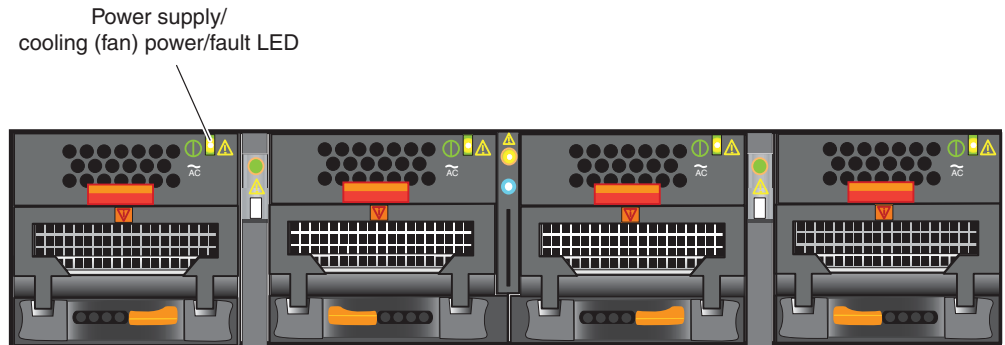
Table 7 CPU LEDs

| LED              | Color           | State    | Description  |
|------------------|-----------------|----------|--|
| Power            | Green           | On       | Data Mover is powered up and all components 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: <ol style="list-style-type: none"> <li>1. Executes a BIOS check, blinking once every 4 seconds</li> <li>2. Executes a POST check, blinking once every second</li> <li>3. Loads the operating system, blinking four times a second</li> </ol> |
|                  | Blue (see Note) |          | <ol style="list-style-type: none"> <li>4. Operating system loaded, blinking once every 4 seconds</li> <li>5. Operating system starting drivers, blinking once every second</li> <li>6. Operating system drivers operating, blinking four times a second</li> </ol>                           |
|                  | —               | 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.



CNS-001673

**Figure 10** Power supply/cooling (fan) module LED

[Table 8](#) describes the power supply/cooling module (fan) status 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, a Block and File (Unified) VNX5300 platform includes the following hardware components:

- ◆ One to two 1U SPSs
- ◆ One 3U DPE with two storage processors (SPs), each SP (A and B) having one CPU module and one power supply
- ◆ One to two 1U Control Stations
- ◆ One 2U Data Mover Enclosure with one to two Data Movers

## Standby power supply rear view

The Block and File (Unified) VNX5300 platform includes one to two 1U, 1.2-kilowatt standby power supplies (SPSs) to maintain power to the Block and File (Unified) 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 (Unified) 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 Block and File (Unified) VNX5300 platform SP ([Figure 11 on page 22](#)).

---

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

---

### **IMPORTANT**

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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 no AC input power is available 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 23](#)).

When power returns, the SPS starts recharging the DC battery pack. It might reach a state of full charge relatively quickly. If power remains off for a long period—days or weeks—the DC battery might require more time to charge fully.<sup>5</sup> 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 22](#) 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.

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:

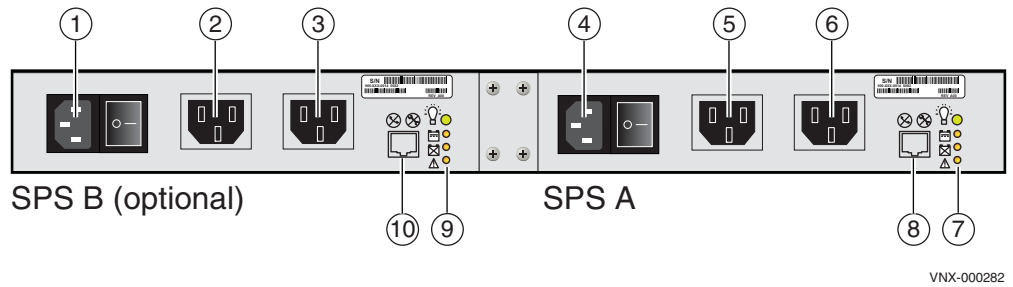
- ◆ SPS A (rear, right side)—Power-out and sense (management) cables connected to the SP A power supply.
- ◆ SPS B (rear, left side)—Power-out and sense (management) cables connected to the SP B power supply.

---

5. 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.

**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 the other way around), an error condition will occur when the SPS is tested or when it is charging.

Looking from left to right, [Figure 11 on page 22](#) shows an example of the rear view of a dual 1U SPS (B and A, respectively).

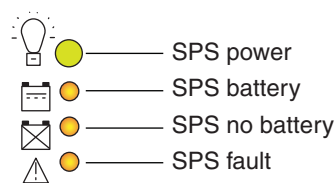


|   |   |    |  |
|---|---|----|--|
| 1 | SPS B AC power in (recessed plug)                       | 6  | AC power out socket (not used or to DAE A) |
| 2 | AC power out socket (not used or to DAE B)              | 7  | Four SPS A status LEDs (green and amber)   |
| 3 | AC power out socket to the SP B 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).



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**Figure 12** SPS LEDs

Table 9 describes the SPS LEDs.

**Table 9** SPS LEDs

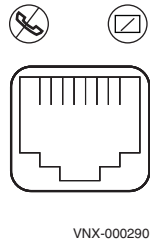
| Led            | Color | State    | Description  |
|----------------|-------|----------|--|
| SPS power      | Green | On       | SPS ready and operating normally; battery fully charged  |
|                |       | Blinking | On/battery charging  |
|                | —     | Off      | Off/disconnected   |
| SPS battery    | Amber | On       | AC line power is no longer available and the SPS is supplying DC output power from the battery.<br><br><b>Note:</b> When battery power comes on, and no other online SPS is connected to the SP, the system 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 might 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 might still be able to run online, but write caching cannot occur. Replace the SPS as soon as possible.   |

## SPS RJ-12 connector

Figure 13 on page 24 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.

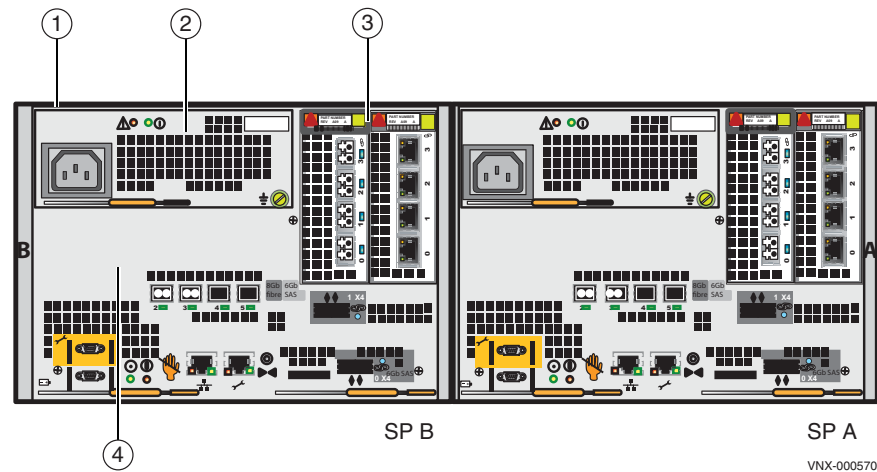


**Figure 14** Example of SP A (micro DB-9) to SPS (RJ-12) cable



## 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 a closer view, see <a href="#">Figure 16 on page 26</a> )           | 3 | I/O module slots showing a four-port 8-Gb/s Fibre Channel (FC) I/O module (supports 2, 4, and 8 Gb/s) and a four-port 1-Gb/s iSCSI I/O module |
| 2 | Power supply (for a closer view, see <a href="#">Figure 17 on page 27</a> ) | 4 | CPU module (for a closer view, see <a href="#">Figure 16 on page 26</a> )   |

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

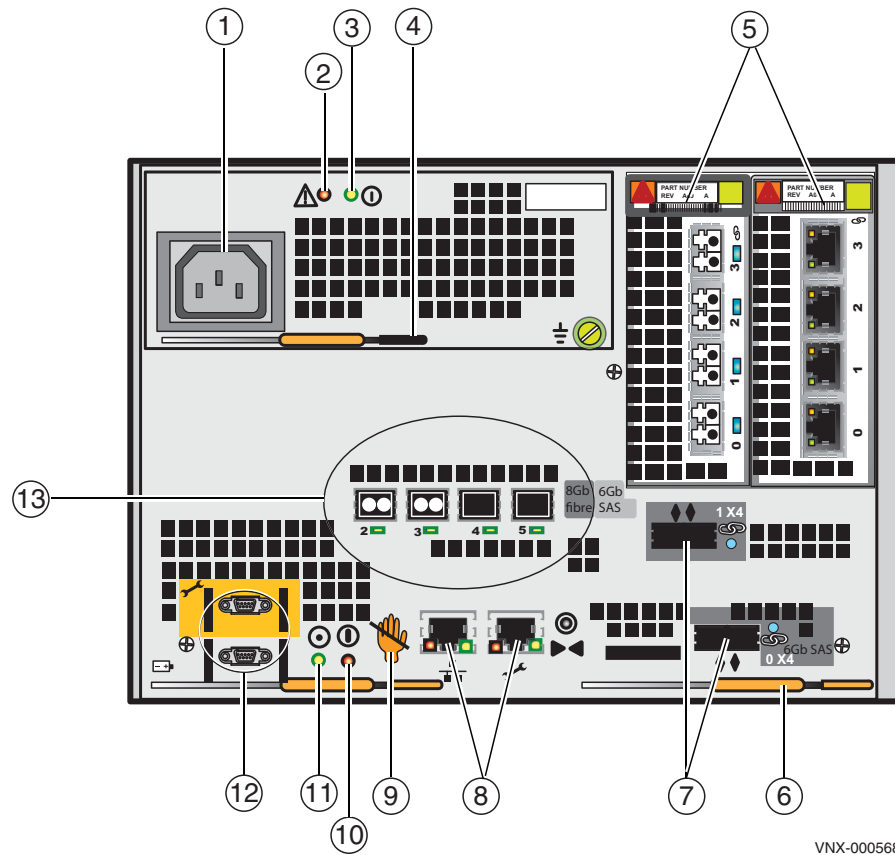
## DPE

On the rear, viewing from left to right, each 3U 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 9](#))
  - 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.



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|   |   |    |   |
|---|---|----|---|
| 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 a four-port 8-Gb/s Fibre Channel (FC) I/O module and a 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 <b>8Gb fibre 2, 3, 4, and 5</b> )  |
| 7 | Two 6-Gb/s SAS ports (labeled <b>6Gb SAS 0 x4 and 1 x4</b> )  |    |   |

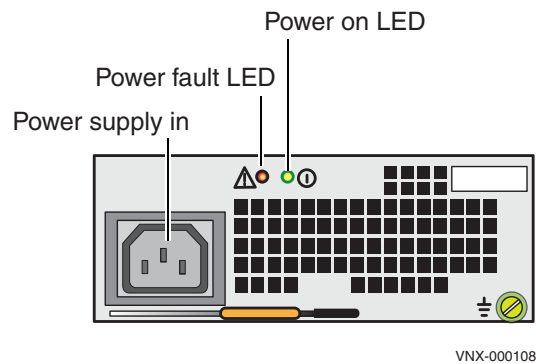
Figure 16 Example of SP components (rear view)

## 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 26.

**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<br>(location 11) | Amber | On    | Fault                        |
|                        | —     | Off   | No fault or power off        |
| Power<br>(location 12) | Green | On    | Power on                     |
|                        | —     | Off   | Power off, verify connection |

**SP Input/output ports and connectors**

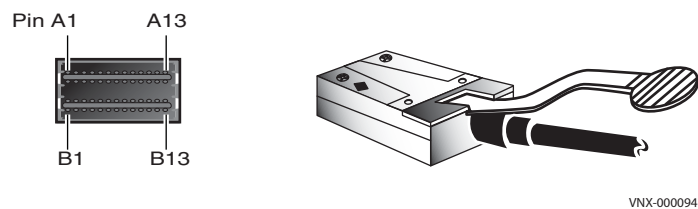
The Block and File (Unified) VNX5300 platform SP supports the following I/O ports on the rear:

- ◆ 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 (Unified) VNX5300 platform SP supports two 6-Gb/s SAS x4 ports (labeled **6Gb SAS 0 x4** and **6Gb SAS 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 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.



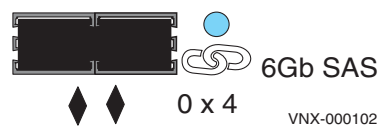
**Figure 18** SP 6-Gb/s SAS port and cable connector

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-  |
| 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 SP 6-Gb/s SAS 0 x4 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 SP 6-Gb/s SAS 0 x4 port LED

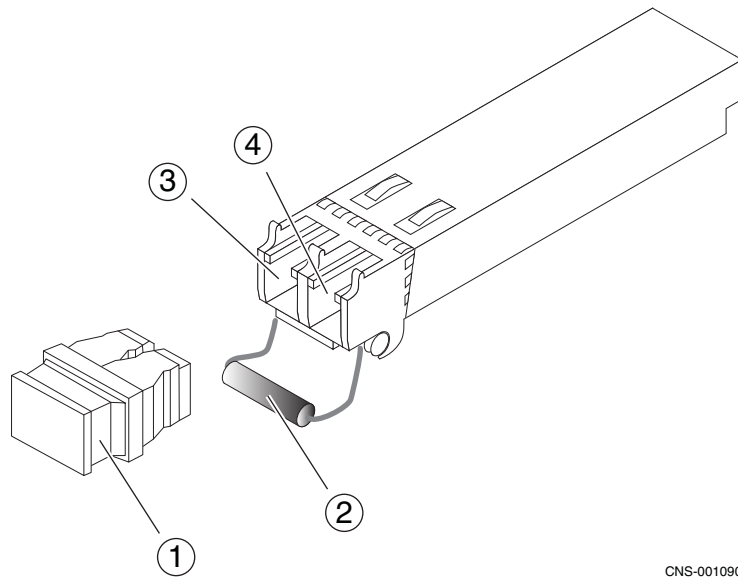
Table 14 describes the SP 6-Gb/s port LEDs.

**Table 14** SP 6-Gb/s SAS port LEDs

| LED           | Color                  | State    | Description  |
|---------------|------------------------|----------|--|
| Link/activity | Blue                   | On       | 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  |

### 8-Gb/s FC ports

The Block and File (Unified) 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](#) shows an example of an SFP+ module.

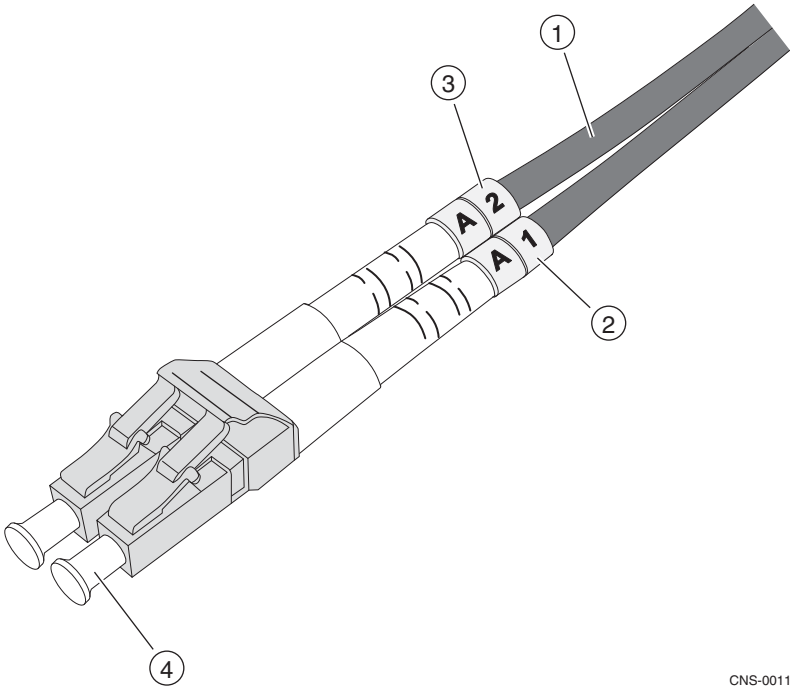


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|          |                            |          |                                    |
|----------|----------------------------|----------|------------------------------------|
| <b>1</b> | Dust plug (protective cap) | <b>3</b> | Send or transmit (TX) optical bore |
| <b>2</b> | Bale clasp latch           | <b>4</b> | 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 for OM2 multimode optical fiber type cables and aqua for OM3 multimode optical fiber type cables. These cables have 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 31](#)).

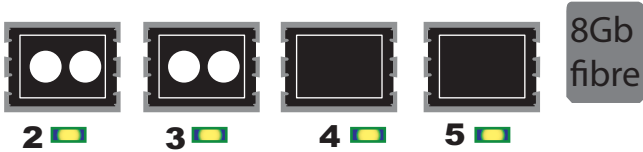


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|   |   |   |  |
|---|---|---|--|
| 1 | Orange cable                                  | 3 | Rubber gasket (jacket), receive (RX)   |
| 2 | Rubber gasket (jacket), send or transmit (TX) | 4 | Ferrule (connector end to SFP+ module) |

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.



VNX-000284

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+ <sup>1</sup> ) transceiver module faulted, unsupported, or optical cable fault. |
|                                       | —             | Off      | No network connection   |

1. Refer to the *VNX5300 Parts Location Guide* for part number label location for the SFP+ part number.

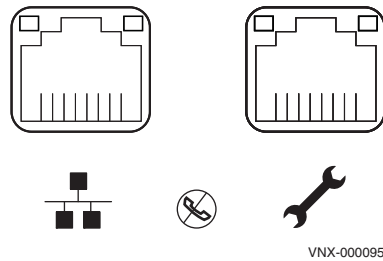
## Network management and service laptop Ethernet (RJ-45) ports



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 (Unified) 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.

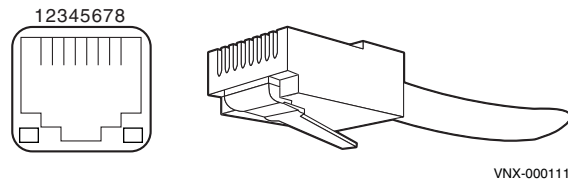
To access the Ethernet ports, connect a Category 3, 4, 5, 5E, or 6 unshielded twisted-pair (UTP) cable to the RJ-45 connectors on the back of the SP, as described in Table 16.

**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, up to 1,804 ft (550 m), Category 5E UTP (2 pairs) up to 1,148 ft (350 m)              |
| 10GBASE-T  | EIA Category 7 STP, backwards compatible with Cat 5 and 6, from 2,296.5 to 3,280.8 ft (700 to 1000 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.



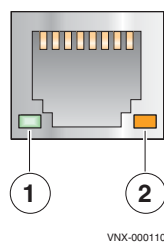
**Figure 24** Network management and service laptop Ethernet (RJ-45) port and connector (adapter)

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.

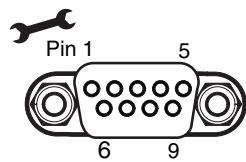
**Table 18 Network management and service laptop Ethernet (RJ-45) port LEDs**

| 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 (Unified) 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.



VNX-000079

**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.

**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 (Unified) 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 24](#)).

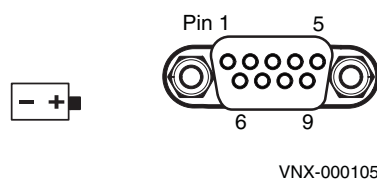
**Figure 28** Serial RS-232/EIA 232 (micro DB-9) connector (socket)

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

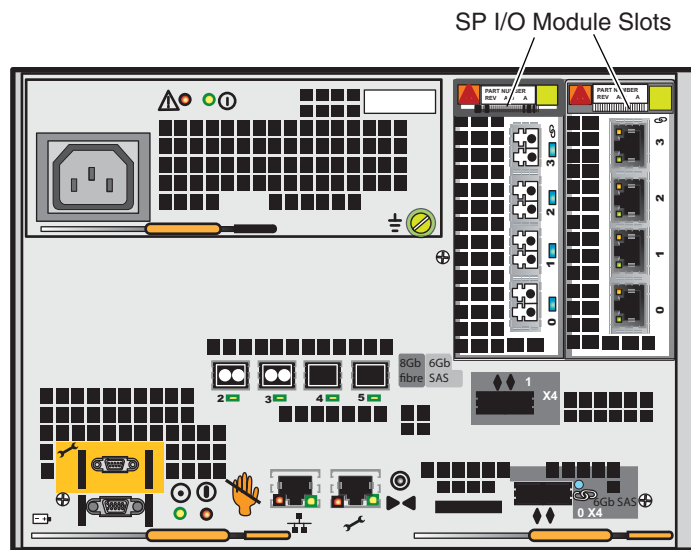
**Table 20** Serial RS-232/EIA 232 (micro DB-9) connector (socket) pinout

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

Two SP PCI Gen 2 x4 I/O module slots are available. 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 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 46](#).

## Control Station rear view

On the rear, viewing from left to right, the Block and File (Unified) VNX5300 platform 1U 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

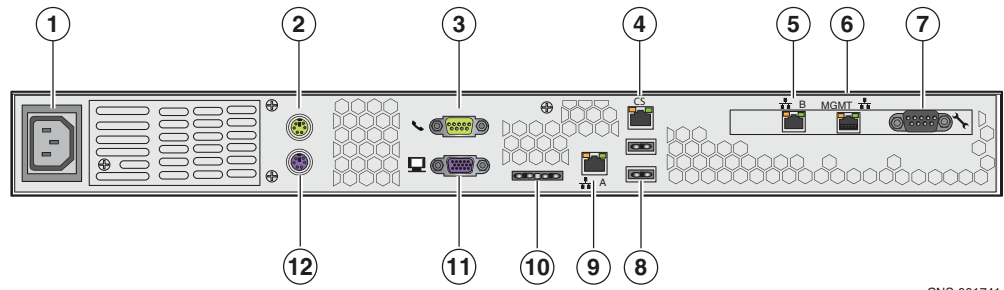
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**Note:** The RJ-45 NICs (labeled **A** and **CS**) are integrated into the rear of the 1U Control Station while the RJ-45 NICs (labeled **B** and **MGMT**) are on a PCI-e card in the expansion slot on the rear of the 1U Control Station.

---

- ◆ 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.



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|   |   |    |   |
|---|---|----|---|
| 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 <b>A</b> ) |
| 4 | RJ-45 Ethernet NIC port (labeled <b>CS</b> <sup>1</sup> )   | 10 | POST diagnostic LEDs <sup>2</sup>           |
| 5 | RJ-45 Ethernet NIC port (labeled <b>B</b> ) <sup>3</sup>    | 11 | DB-15 Video (VGA) socket connector—not used |
| 6 | RJ-45 Ethernet NIC port (labeled <b>MGMT</b> ) <sup>4</sup> | 12 | PS/2 connector (keyboard)—not used          |

1. The CS port uses an IPMI (Intelligent Platform Management Interface) cable to connect to a standby Control Station.
2. These LEDs might light during power on self test (POST); they are not important for the administration or maintenance of the Control Station.
3. An extension cable with a label (**CS O B**) is provided with this connector (see the cable kit).
4. An extension cable with a label (**CS O 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 (Unified) VNX5300 platform 1U Control Station supports the following I/O ports on the rear of the 1U 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 (Unified) VNX5300 platform 1U Control Station comes with two integrated dual-port Ethernet ports (labeled **A** and **CS**) and two Peripheral Component Interconnect Express (PCI-E)<sup>6</sup> 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).

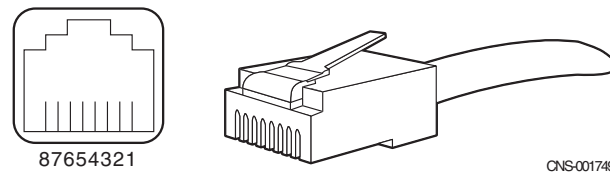
To access the Ethernet ports, connect a Category 3, 4, 5, 5E, or 6 unshielded twisted-pair (UTP) cable to the RJ-45 connectors on the back of the Control Station, as described in [Table 21](#).

**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, up to 1,804 ft (550 m), Category 5E UTP (2 pairs) up to 1,148 ft (350 m)              |
| 10GBASE-T  | EIA Category 7 STP, backwards compatible with Cat 5 and 6, from 2,296.5 to 3,280.8 ft (700 to 1000 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, - |

- 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.

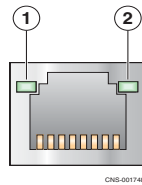
**Table 22** Control Station Ethernet (RJ-45) port and connector pinout (continued)

| 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 1U 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 1U Control Station (RJ-45) NIC ports, respectively (Figure 32).

Table 23 describes the link/activity and connection speed associated with the 1U 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) | 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) |

**Ethernet cable extensions for the Control Station B and MGMT ports**

Each Block and File (Unified) VNX5300 platform 1U 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 on page 41).



If your Block and File (Unified) VNX5300 platform includes a second optional 1U 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.

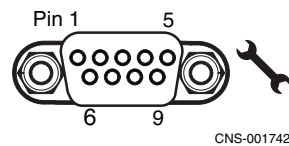
**Note:** If you received the Block and File (Unified) VNX5300 platform already installed in a cabinet rack with all of the Block and File (Unified) VNX5300 platform components, all the cabling has already been installed.



**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 (Unified) VNX5300 platform 1U 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

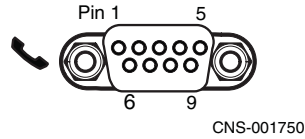
[Table 24](#) lists the Control Station Ethernet (DB-9) pin signals used on the connector.

**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 (not used) |

### Control Station modem (DB-9) plug connector

The back of the Block and File (Unified) VNX5300 platform 1U 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](#)).



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

[Table 25](#) lists the 1U Control Station Ethernet (DB-9) pin signals used on the connector.

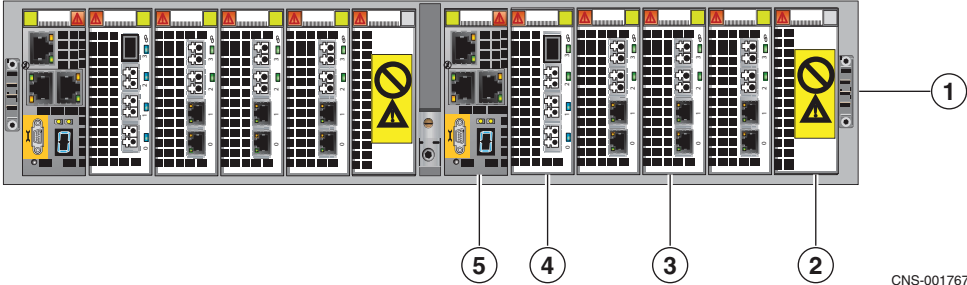
**Table 25** Control Station modem (DB-9) plug connector pinout

| 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 (not used) |

### DME rear view

The rear of the Block and File (Unified) VNX5300 platform 2U 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 (Unified) VNX5300 platform 2U DME rear view with two Data Movers (each Data Mover has one management module, one four-port 8-Gb/s FC I/O module, three two-port 1-Gb/s plus two-port 1-Gb/s optical I/O modules, and one filler panel module).



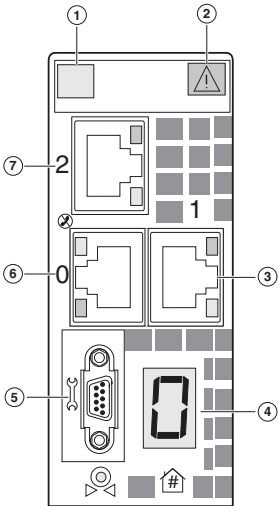
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|   |  |   |                                |
|---|--|---|--------------------------------|
| 1 | DME  | 4 | Four-port 8-Gb/s FC I/O module |
| 2 | Filler panel module  | 5 | Data Mover management module   |
| 3 | Two-port 1-Gb/s copper plus two-port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



CNS-001754

|   |   |   |                                      |
|---|---|---|--------------------------------------|
| 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 support 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.



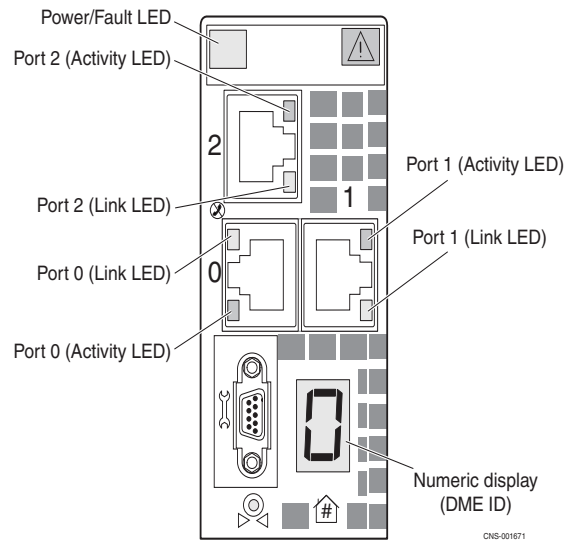
**To avoid electric shock, do not connect safety extra-low voltage (SELV) circuits to telephone-network voltage (TNV) circuits. LAN ports contain SELV circuits, and WAN ports contain TNV circuits. Some LAN and WAN ports both use RJ-45 connectors. Use caution when connecting cables.**

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 32](#).

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 38](#) provides detailed information about the Data Mover management module NIC ports.

### Data Mover management module LEDs

[Figure 38](#) shows the LEDs and [Table 26](#) describes them.



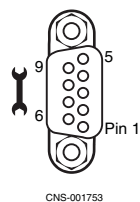
**Figure 38** Data Mover management module LEDs

**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.<br><b>Note:</b> 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.<br><b>Note:</b> 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 (Unified) 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 |

**Table 27** Data Mover management module (DB-9) socket connector 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 (not used) |

## I/O modules

Several types of I/O modules are supported in the Block and File (Unified) VNX5300 platform. The SP supports five types of I/O modules (see the [“SP I/O module types”](#) section on [page 46](#)) and the Data Mover supports five types of I/O modules (see the [“Data Mover I/O module types”](#) section on [page 56](#)). In each of these sections, an I/O module description is included with the type of port (copper, optical, or other) as well as a description of the LEDs on the I/O module.

### IMPORTANT

When adding new I/O modules, always install I/O modules in pairs—one module in SP A and one module in SP B. Both SPs must have the same type of I/O modules in the same slots. For more information, refer to the *Adding I/O modules and SFPs to the DPE* document.

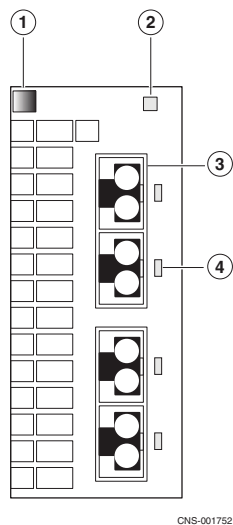
## SP I/O module types

The following I/O module types are supported in the Block and File (Unified) 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 48](#)
- ◆ [“Two-port 10-Gb/s optical or active Twinax iSCSI I/O module”](#) on [page 50](#)
- ◆ [“Two-port 10-Gb/s optical or active Twinax Fibre Channel over Ethernet \(FCoE\) I/O module”](#) on [page 52](#)
- ◆ [“Two-port 10-Gb/s RJ-45 Base-T iSCSI/IP I/O module”](#) on [page 54](#)

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

The four-port 8-Gb/s FC I/O module (labeled **8 GbE Fibre** on the latch handle) comes with four optical (fibre) ports, one power/fault LED, and a link/activity LED for each optical port ([Figure 40 on page 47](#)). This I/O module can interface at speeds of 2, 4, and 8 Gb/s. Besides optical SFP or SFP+, it uses OM2/OM3 multimode optical fiber type cabling to connect directly to a host HBA or FC switch. OM2 cabling can usually be distinguished by the orange color of the cable. While, OM3 cabling can be distinguished by the aqua color of the cable.



|   |                          |   |                            |
|---|--------------------------|---|----------------------------|
| 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

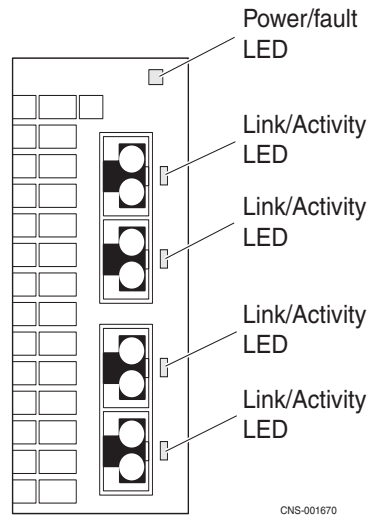
The four-port 8-Gb/s FC I/O module uses SFP+ transceiver modules to connect to LC-type optical fibre cables. These SFP+ transceiver modules are input/output (I/O) devices that plug into the FC port of the FC I/O modules. These SFP+ modules are hot swappable.

This means that you can install and remove an SFP+ module while the Block and File (Unified) 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 for OM2 type cables and aqua for OM3 type cables. These cables have 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

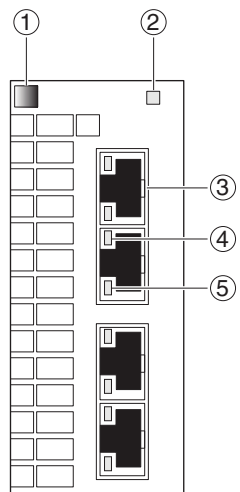
| LED  | Color            | State    | Description   |
|--|------------------|----------|---|
| Power/Fault                                    | Green            | On       | I/O module is powered up.   |
|  | Amber            | On       | I/O module has faulted.   |
|  | —                | Off      | I/O module is powered down.   |
| Link/Activity<br>(each port<br>has one<br>LED) | Green            | On       | 2- or 4-Gb link speed (suboptimal speed)  |
|  | Blue             | On       | 8-Gb/s link speed (maximum speed)   |
|  | Green or<br>Blue | Blinking | Small form-factor pluggable (SFP+ <sup>1</sup> ) transceiver module faulted, unsupported, or optical cable fault. |
|  | —                | Off      | No network connection   |

1. Refer to the *VNX5300 Parts Location Guide* for the part number label location for the SFP+ part number.

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

The four-port 1-Gb/s copper iSCSI I/O module with IPv6 (labeled **1 GbE iSCSI/TOE** on the latch handle) comes with four 1 Gb/s Ethernet Base-T copper ports, one power/fault LED, and a link and activity LED for each copper port ([Figure 42](#)). This iSCSI I/O module can interface at speeds of 1 Gb/s. The 1 Gb/s Ethernet Base-T copper ports connect to Cat 6 cabling (see [Table 16, “Ethernet cabling guidelines,”](#) on [page 32](#) or [Table 21, “Ethernet cabling guidelines,”](#) on [page 39](#)) to an Ethernet switch. This I/O module also includes a TCP offload engine (or TOE).





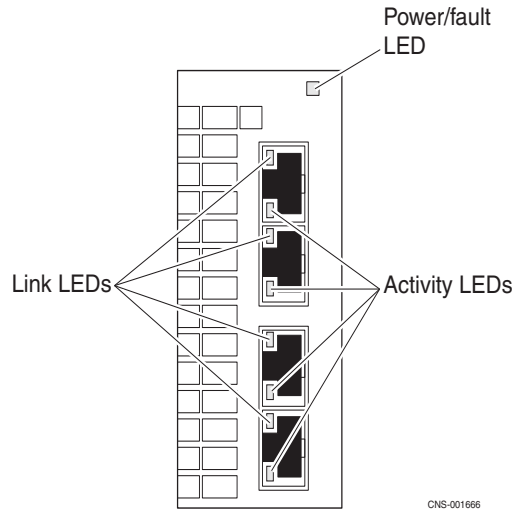
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|   |                                |   |                        |
|---|--------------------------------|---|------------------------|
| 1 | Push button latch handle       | 4 | RJ-45 NIC link LED     |
| 2 | Power/fault LED                | 5 | RJ-45 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 on page 50](#) 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

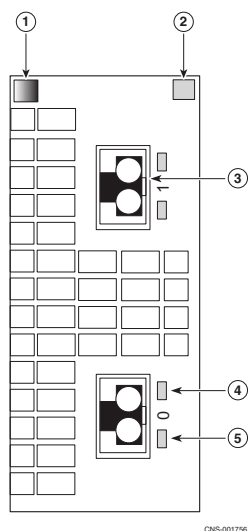
| LED                          | Color | State    | Description                 |
|------------------------------|-------|----------|-----------------------------|
| Power/Fault                  | Green | On       | I/O module is powered up.   |
|                              | Amber | On       | I/O module has faulted.     |
|                              | —     | Off      | I/O 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 activity                 |

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

The two-port 10-Gb/s optical or active Twinax<sup>7</sup> iSCSI I/O module (labeled **10 GbE iSCSI** on the latch handle) comes with two optical or active Twinax (twisted pair) copper ports, one power/fault LED, and a link and activity LED for each port ([Figure 44 on page 51](#)). The optical ports on this I/O module can interface at speeds of 10 Gb/s for iSCSI networks. 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 46](#) for more information about the SFP+ modules). The two-port 10-Gb/s optical I/O module uses

7. 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.

iSCSI protocol, hence the required SFP+ transceiver module uses a different part number (for part number label location, see the *VNX5300 Parts Location Guide*). This I/O module also includes a TCP offload engine (or TOE).

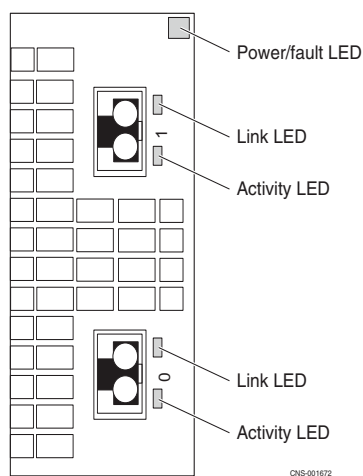


|   |                           |   |                              |
|---|---------------------------|---|------------------------------|
| 1 | Push button latch handle  | 4 | SFP+ link LED (right)        |
| 2 | Power/fault LED           | 5 | SFP+ NIC activity LED (left) |
| 3 | SFP+ (optical) port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

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

### 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 on page 52](#) describes them.



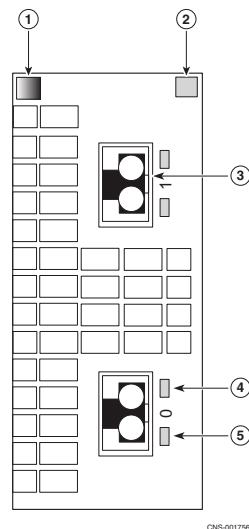
**Figure 45** Two-port 10-Gb/s optical I/O module LEDs

**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.   |
|             | Amber | On       | I/O module has faulted.     |
|             | —     | Off      | I/O module is powered down. |
| 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<sup>8</sup> FCoE I/O module (labeled **10 GbE/FCoE** on the latch handle) 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. For part number label location, see the *VNX5300 Parts Location Guide*.



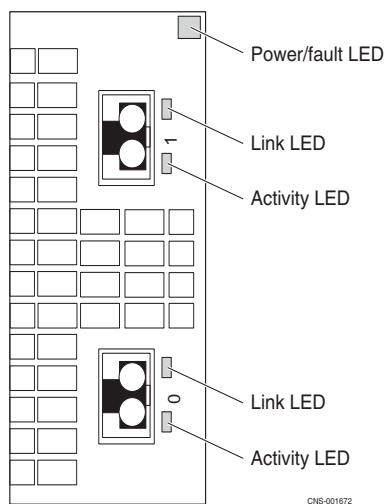
|          |                           |          |                          |
|----------|---------------------------|----------|--------------------------|
| <b>1</b> | Push button latch handle  | <b>4</b> | SFP+ link LED (right)    |
| <b>2</b> | Power/fault LED           | <b>5</b> | SFP+ activity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

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

8. 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.



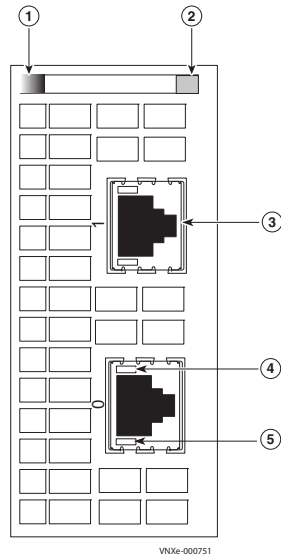
**Figure 47** Two-port 10-Gb/s FCoE I/O module LEDs

**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.   |
|             | Amber | On       | I/O module has faulted.     |
|             | —     | Off      | I/O module is powered down. |
| Link        | Green | On       | Network connection          |
|             | —     | Off      | No network connection       |
| Activity    | Amber | Blinking | Transmit/receive activity   |
|             | —     | Off      | No activity                 |

## Two-port 10-Gb/s RJ-45 Base-T iSCSI/IP I/O module

The two-port 10-Gb/s RJ-45 Base-T iSCSI/IP I/O module (labeled **10GBase-T iSCSI** on the latch handle) comes with two 10-Gb/s Base-T copper ports, one power/fault LED, and a link and activity LED for each port (Figure 48). The Base-T ports on this I/O module can interface at speeds of 10 Gb/s for iSCSI networks. The two-port 10-Gb/s Base-T I/O module uses EIA Category 6 or 6a Unshielded Twisted Pair (UTP) or EIA Category 7 fully Shielded Twisted Pair (STP) copper cabling (see Table 16, “Ethernet cabling guidelines,” on page 32 or Table 21, “Ethernet cabling guidelines,” on page 39).

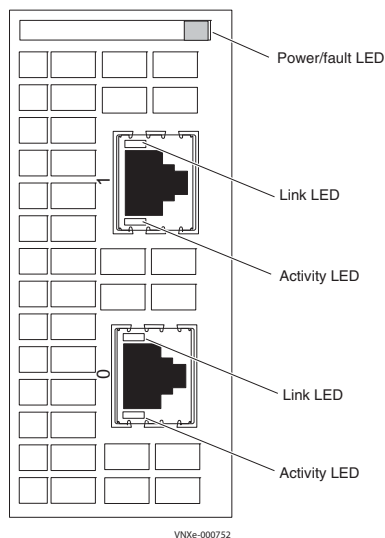


|          |                          |          |                     |
|----------|--------------------------|----------|---------------------|
| <b>1</b> | Push button latch handle | <b>4</b> | Link LED (right)    |
| <b>2</b> | Power/fault LED          | <b>7</b> | Activity LED (left) |
| <b>3</b> | RJ-45 Base-T port (2)    |          |                     |

**Figure 48** Two-port 10-Gb/s RJ-45 Base-T I/O module

## Two-port 10-Gb/s RJ-45 Base-T I/O module LEDs

The two-port 10-Gb/s RJ-45 Base-T I/O module has three types of status LEDs. [Figure 49](#) shows the LEDs and [Table 32](#) describes them.



**Figure 49** Two-port 10-Gb/s RJ-45 Base-T I/O module LEDs

**Table 32** Two-port 10-Gb/s RJ-45 Base-T I/O module LEDs

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

## Data Mover I/O module types

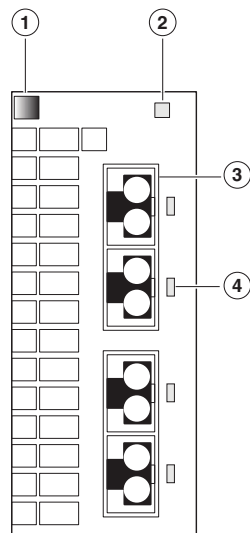
The following I/O module types are supported by the Block and File (Unified) VNX5300 platform Data Mover:

- ◆ “Four-port 8-Gb/s FC I/O module” on this page
- ◆ “Four-port 1-Gb/s copper I/O module” on page 58
- ◆ “Two-port 1-Gb/s copper plus two-port 1-Gb/s optical IP I/O module” on page 60
- ◆ “Two-port 10-Gb/s optical I/O module” on page 62
- ◆ “Two-port 10-Gb/s optical I/O module” on page 64
- ◆ “Two-port 10-Gb/s RJ-45 Base-T iSCSI/IP I/O module” on page 66

**Note:** For SP module types, go to “SP I/O module types” on page 46.

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

The four-port 8-Gb/s FC I/O module (labeled **8 GbE Fibre** on the latch handle) comes with four optical (fibre) ports, one power/fault LED, and a link/activity LED for each optical port (Figure 50). This I/O module can interface at speeds of 2, 4, and 8 Gb/s. Besides optical SFP or SFP+, it uses OM2/OM3 multimode optical fiber type cabling to connect directly to a host HBA or FC switch. OM2 cabling can usually be distinguished by the orange color of the cable. While, OM3 cabling can be distinguished by the aqua color of the cable.



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

**Figure 50** 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.

**CAUTION**

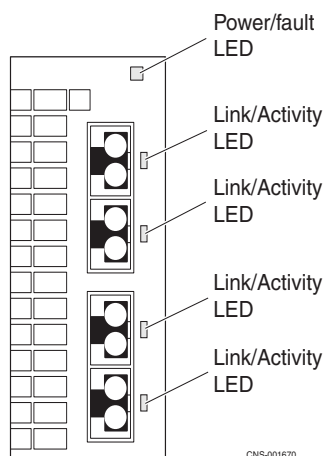
**Be careful when replacing or swapping out SFP+ modules, your Data Mover will lose access to the SP or tape drive to which it is connected**

This means that you can install and remove an SFP+ module while the Block and File (Unified) 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 for OM2 type cables and aqua for OM3 type cables. These cables have 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 51](#) shows the LEDs and [Table 33](#) describes them.



**Figure 51** Four-port 8-Gb/s FC I/O module LEDs

**Table 33** Four-port 8-Gb/s FC I/O module LEDs

| LED         | Color | State | Description                 |
|-------------|-------|-------|-----------------------------|
| Power/Fault | Green | On    | I/O module is powered up.   |
|             | Amber | On    | I/O module has faulted.     |
|             | —     | Off   | I/O module is powered down. |

**Table 33** Four-port 8-Gb/s FC I/O module LEDs (continued)

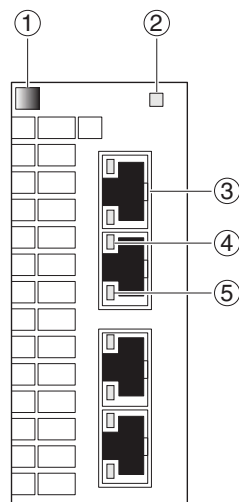
| LED                                   | Color         | State    | Description   |
|---------------------------------------|---------------|----------|---|
| Link/Activity (each port has one LED) | Green         | On       | 2- or 4-Gb link speed (suboptimal speed)  |
|                                       | Blue          | On       | 8-Gb/s link speed (maximum speed)   |
|                                       | Green or Blue | Blinking | Small form-factor pluggable (SFP+ <sup>1</sup> ) transceiver module faulted, unsupported, or optical cable fault. |
|                                       | —             | Off      | No network connection   |

1. Refer to the *VNX5300 Parts Location 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 (labeled **1 GbE** on the latch handle) comes with four 10/100/1000 Base-T copper ports, one power/fault LED, and a link and activity LED for each copper port (Figure 52). 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. This I/O modules uses EIA Category 6 Unshielded Twisted Pair (UTP) cabling to an Ethernet switch (see Table 16, “Ethernet cabling guidelines,” on page 32 or Table 21, “Ethernet cabling guidelines,” on page 39).

**Note:** The four-port 1-Gb/s copper I/O module and the two-port 1-Gb/s copper plus two-port 1-Gb/s optical IP I/O module (see “Two-port 1-Gb/s copper plus two-port 1-Gb/s optical IP I/O module” on page 60) have the same **1 GbE** label on the latch handle. The only distinguishing difference between these I/O modules will be the SFP transceiver modules used on ports 2 and 3.



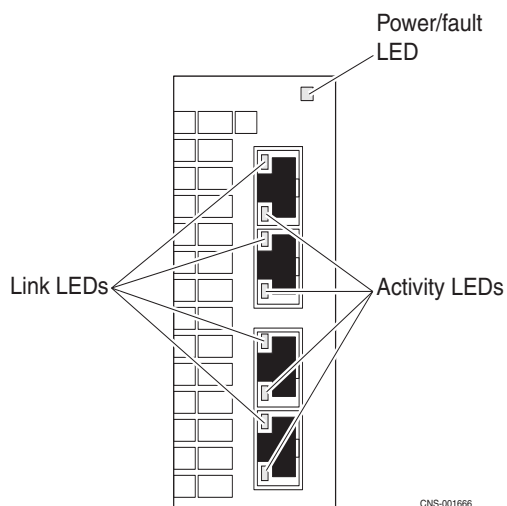
CNS-001751

|   |                                |   |                        |
|---|--------------------------------|---|------------------------|
| 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 52** 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 53](#) shows the LEDs and [Table 34](#) describes them.



**Figure 53** Four-port 1-Gb/s copper I/O module LEDs

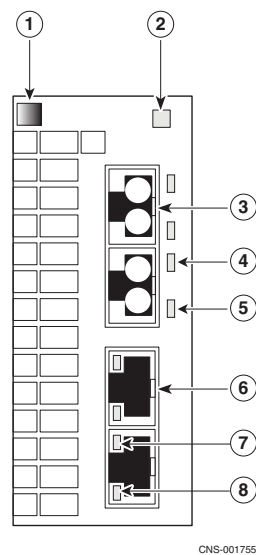
**Table 34** Four-port 1-Gb/s copper I/O module LEDs

| LED                          | Color | State    | Description                 |
|------------------------------|-------|----------|-----------------------------|
| Power/Fault                  | Green | On       | I/O module is powered up.   |
|                              | Amber | On       | I/O module has faulted.     |
|                              | —     | Off      | I/O 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 activity                 |

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

The two-port 1-Gb/s copper plus two-port 1-Gb/s optical IP I/O module (labeled **1 GbE** on the latch handle) comes with two 10/100/1000 Base-T copper ports and two 1 GbE optical ports, one power/fault LED, and a link and activity LED for each port (Figure 54). 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.

**Note:** The two-port 1-Gb/s copper plus two-port 1-Gb/s optical IP I/O module and the four-port 1-Gb/s copper I/O module (see “[Four-port 1-Gb/s copper I/O module](#)” on page 58) have the same **1 GbE** label on the latch handle. The only distinguishing difference between these I/O modules will be the SFP transceiver modules used on optical ports 2 and 3 of the two-port 1-Gb/s copper plus two-port 1-Gb/s optical I/O module.

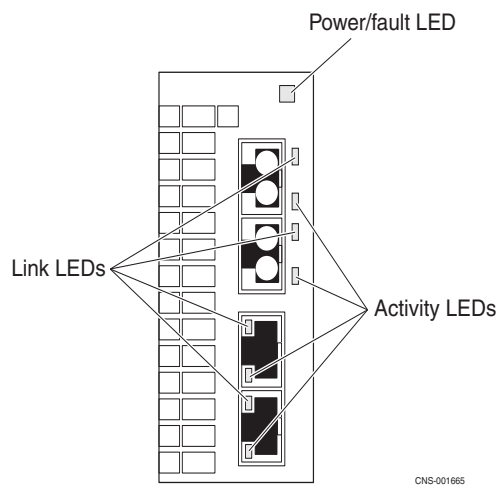


|   |                          |   |                           |
|---|--------------------------|---|---------------------------|
| 1 | Push button latch handle | 5 | SFP+ activity LED (left)  |
| 2 | Power/fault LED          | 6 | Two RJ-45 (copper) ports  |
| 3 | Two SFP+ (optical) ports | 7 | RJ-45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

**Figure 54** 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 1-Gb/s copper plus two-port 1-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 1-Gb/s copper plus two-port 1-Gb/s optical I/O module LEDs

**Table 35** Two-port 1-Gb/s copper plus two-port 1-Gb/s optical I/O module LEDs

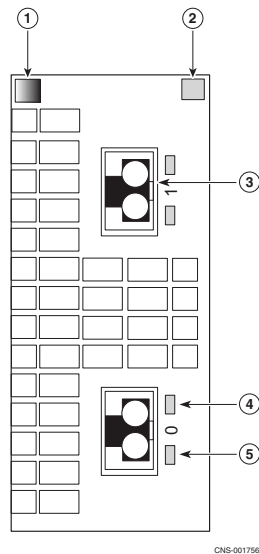
| LED                          | Color | State    | Description                 |
|------------------------------|-------|----------|-----------------------------|
| Power/Fault                  | Green | On       | I/O module is powered up.   |
|                              | Amber | On       | I/O module has faulted.     |
|                              | —     | Off      | I/O 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 activity                 |

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

The two-port 10-Gb/s optical or active Twinax<sup>9</sup> IP I/O module (labeled **10 GbE v2** on the latch handle) comes with two optical ports, one power/fault LED, and a link and activity LED for each port (Figure 56). 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 46 for more information about the SFP+ modules). The two-port 10-Gb/s optical uses the SFP+ transceiver module, hence a different part number (for part number label location, see the *VNX5300 Parts Location Guide*).

**Note:** This I/O module requires software release VNX OE for File 7.0 to function properly. It will not function properly in software release VNX OE for File 7.1. Use the newer version (version 3) of the two-port 10-Gb/s Ethernet optical or active Twinax I/O module as described in the “[Two-port 10-Gb/s optical I/O module](#)” section on page 64.



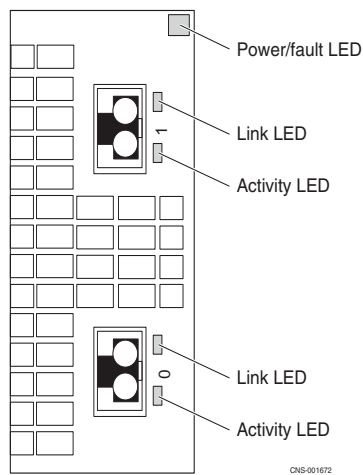
|   |                           |   |                              |
|---|---------------------------|---|------------------------------|
| 1 | Push button latch handle  | 4 | SFP+ link LED (right)        |
| 2 | Power/fault LED           | 5 | SFP+ NIC activity LED (left) |
| 3 | SFP+ (optical) port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

**Figure 56** Two-port 10-Gb/s optical I/O module

9. 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 57](#) shows the LEDs and [Table 36](#) describes them.



**Figure 57** Two-port 10-GbE optical I/O module LEDs

**Table 36** Two-port 10-Gb/s optical I/O module LEDs

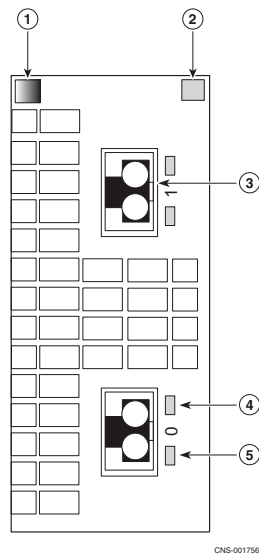
| LED         | Color | State    | Description                 |
|-------------|-------|----------|-----------------------------|
| Power/Fault | Green | On       | I/O module is powered up.   |
|             | Amber | On       | I/O module has faulted.     |
|             | —     | Off      | I/O module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

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

This new two-port 10-Gb/s Ethernet optical or active Twinax IP I/O module (labeled **10 GbE v3** on the latch handle) comes with two optical ports, one power/fault LED, and a link and activity LED for each port (Figure 56). The optical ports on this I/O module can interface at speeds of 10 Gb/s.

The two-port 10-Gb/s Ethernet 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 46) for more information about the SFP+ modules). The two-port 10-Gb/s optical uses the SFP+ transceiver module, hence a different part number (for part number label location, see the *VNX5300 Parts Location Guide*).

**Note:** This I/O module requires software release VNX OE for File 7.1 to function properly. Consequently, you cannot mix this I/O module version (version 3) with the two-port 10-Gb/s optical or active Twinax I/O module (version 2) as described in the “[Two-port 10-Gb/s optical I/O module](#)” section on page 62. If you replace a version 2 two-port 10-Gb/s optical or active Twinax I/O module that only functions in VNX OE for File 7.0 with a version 3 two-port 10-Gb/s Ethernet I/O module, you must replace all of the version 2s of the two-port 10-Gb/s Ethernet optical or active Twinax I/O modules with version 3s of the two-port 10-Gb/s Ethernet I/O module that function in VNX OE for File 7.1. To determine the correct version number, look at the label on the latch handle. It will say either v2 or v3 along with the name on the label. Also, refer to the *VNX5300 Parts Location Guide* for the location of the part number label.



CNS-001756

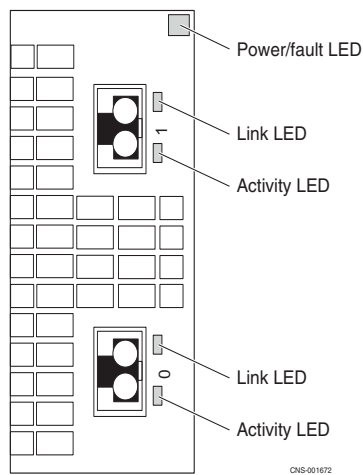
|   |                           |   |                              |
|---|---------------------------|---|------------------------------|
| 1 | Push button latch handle  | 4 | SFP+ link LED (right)        |
| 2 | Power/fault LED           | 5 | SFP+ NIC activity LED (left) |
| 3 | SFP+ (optical) port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

**Figure 58** Two-port 10-Gb/s optical I/O module



## 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 57](#) shows the LEDs and [Table 36](#) describes them.



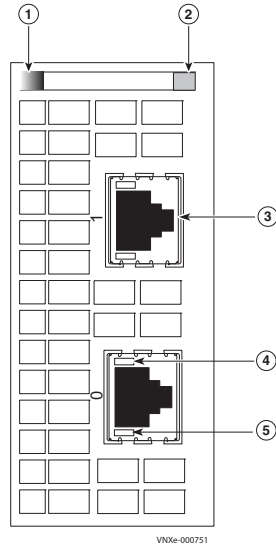
**Figure 59** Two-port 10-GbE optical I/O module LEDs

**Table 37** Two-port 10-Gb/s optical I/O module LEDs

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

## Two-port 10-Gb/s RJ-45 Base-T iSCSI/IP I/O module

The two-port 10-Gb/s RJ-45 Base-T iSCSI/IP I/O module (labeled **10 GbE Base-T** on the latch handle) comes with two 10-Gb/s Base-T copper ports, one power/fault LED, and a link and activity LED for each port (Figure 48). The Base-T ports on this I/O module can interface at speeds of 10 Gb/s for iSCSI networks. The two-port 10-Gb/s Base-T I/O module uses EIA Category 6 or 6a Unshielded Twisted Pair (UTP) or EIA Category 7 fully Shielded Twisted Pair (STP) copper cabling (see Table 16, “Ethernet cabling guidelines,” on page 32 or Table 21, “Ethernet cabling guidelines,” on page 39).

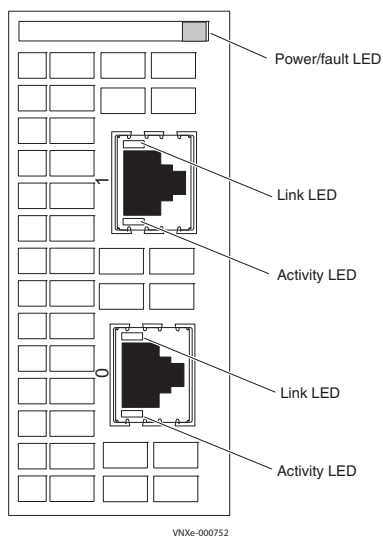


|   |                          |   |                     |
|---|--------------------------|---|---------------------|
| 1 | Push button latch handle | 4 | Link LED (right)    |
| 2 | Power/fault LED          | 5 | Activity LED (left) |
| 3 | RJ-45 Base-T port (2)    |   |                     |

**Figure 60** Two-port 10-Gb/s RJ-45 Base-T I/O module

## Two-port 10-Gb/s RJ-45 Base-T I/O module LEDs

The two-port 10-Gb/s Base-T I/O module has three types of status LEDs. [Figure 49](#) shows the LEDs and [Table 32](#) describes them.



**Figure 61** Two-port 10-Gb/s RJ-45 Base-T I/O module LEDs

**Table 38** Two-port 10-Gb/s RJ-45 Base-T I/O module LEDs

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

# Disk-array enclosure

**CAUTION**

Lifting the DAE and installing it to a rack or removing it from a rack is a two-person job. If needed, use an appropriate lifting device. A fully loaded 2U or 3U DAE weighs approximately 45 lb (20.41 kg) or 68 lb (30.84 kg), respectively.

The Block and File (Unified) 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 (or DAE6S)
- ◆ 2U, 25 (2.5-inch) DAE (or DAE5S)

The Block and File VNX5300 platform supports up to seven 3U, 15 (3.5-inch) DAEs (a maximum of 120 3.5-inch disk drives) or up to four 2U, 25 (2.5-inch) DAEs (a maximum of 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 from up to 120 to 125 drives. If the total drive slot quantity exceeds from 120 or 125, you will not be able to add another DAE. Refer to [“Overview” on page 4](#) for more information about the Block and File (Unified) 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 62 on page 70](#) and [Figure 69 on page 77](#)).

## 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 68 on page 76](#) and [Figure 75 on page 84](#))<sup>10</sup>. Each LCC includes a bus (loop) identification indicator ([Figure 68 on page 76](#) and [Figure 75 on page 84](#)).

## 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 64 on page 73](#) and [Figure 69 on page 77](#)).

## 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 integrated EMI shield. You must remove the bezel/shield to remove and install the disk drive modules.

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

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

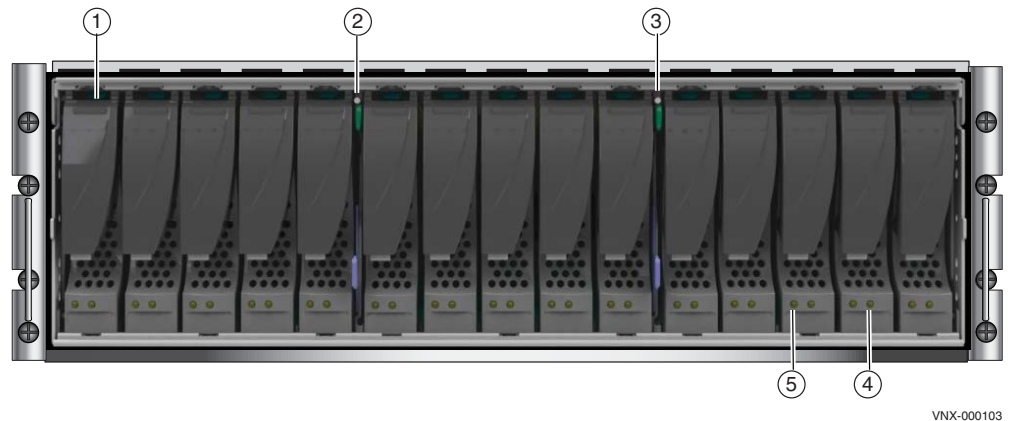
- ◆ 3.5-inch 6-Gb/s SAS, 6-Gb/s NL-SAS, or Flash disk drives (hot-swappable)
- ◆ Status LEDs

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<sup>10</sup>. The EA is sometimes referred to as an enclosure ID.

Figure 62 on page 70 shows the location of these components.

**Note:** In a Block and File (Unified) 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).



|   |   |   |                                    |
|---|---|---|------------------------------------|
| 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 62 3U, 15 (3.5-inch) DAE (front view)

Table 39 describes the Block and File (Unified) VNX5300 platform DAE and the 3.5-inch disk drive status LEDs.

Table 39 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                                      |

**Table 39** 3U, 15 (3.5-inch) DAE 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<br><br><b>Note:</b> 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 63 on page 72](#)), 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/activity LED indicates a DAE operating at 6 Gb/s.

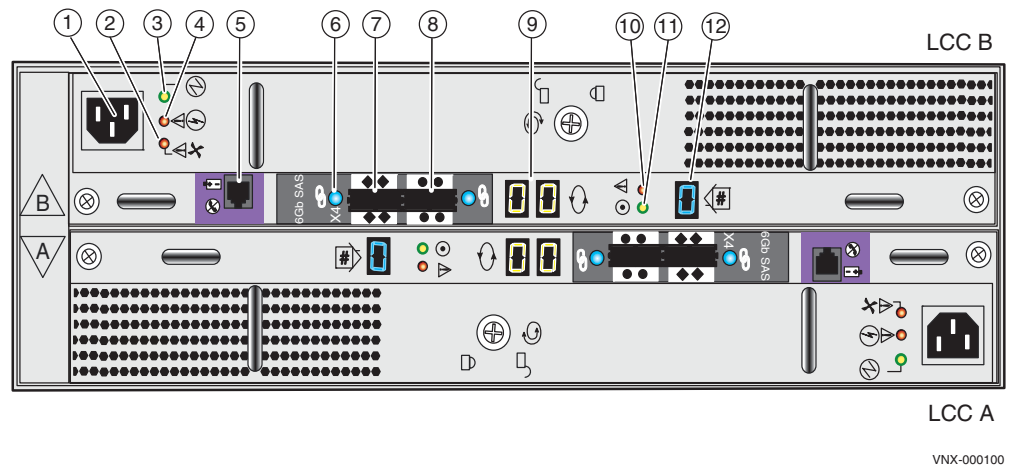
The LCCs in a DAE connect to the DPE and other DAEs with 6-Gb/s cables. The cables connect the LCCs in a system in a daisy-chain (loop) topology.

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 63 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); labeled with a double diamond symbol ◆◆ .        |
| 2 | LCC B power supply fan fault LED (on, amber)         | 8  | LCC B SAS connector (input); labeled with a double circle (or dot) symbol ●● . |
| 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 or enclosure address  |

Figure 63 3U, 15 (3.5-inch) DAE with two LCCs and two power supply/cooling modules (rear view)

As shown in Figure 63, an enclosure ID<sup>11</sup> 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.

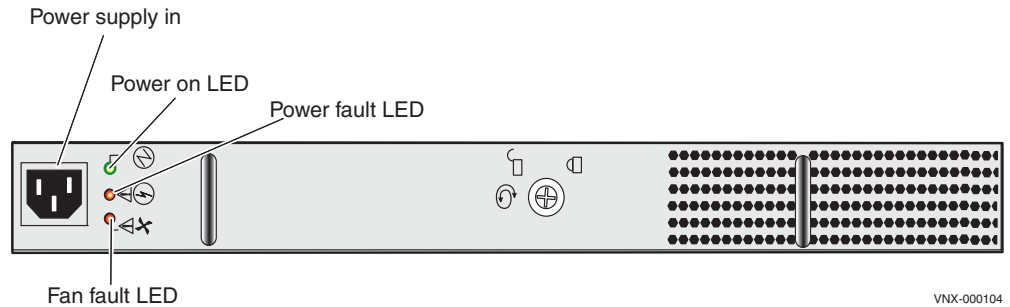
**Note:** An LCC might be in either the A slot, as shown, or the B slot above it, depending on the DAE placement within a system. For example, the front DAE in some systems is in slot A; the rear enclosure LCC is inverted, and in slot B.

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



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

Figure 64 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 64** Example of 3U, 15 (3.5-inch) DAE AC power supply/cooling module power in (recessed) connector (plug) and status LEDs

Table 40 describes the 3U, 15 (3.5-inch) DAE power supply/cooling module LEDs.

**Table 40** 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/UVF) fault |
|             | —     | Off      | No fault or power off  |
| Fan fault   | Amber | On       | Fault, one or both not operating normally  |
|             |       | —        | 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:

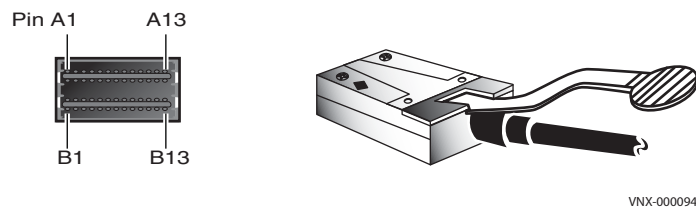
- ◆ Two 6-Gb/s SAS x 4 ports
- ◆ One management (RJ-45) connector

### 6-Gb/s SAS x4 ports

The 3U, DAE LCC supports two (one input and one output) 6-Gb/s SAS x4 ports (labeled **6Gb 0 x4** and **1 x4**) on the rear of each LCC (A and B) on the DAE. 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 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 65 shows an example of the port connector (socket) and cable connector (plug) with pull tab.



VNX-000094

**Figure 65** 6-Gb/s SAS port and cable connector

Table 41 lists the 3U, DAE LCC 6-Gb/s SAS port pin signals used on the connector.

**Table 41** 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    |

**Table 41** 6-Gb/s SAS port connector pinout (continued)

| Pin | Signal | Pin | Signal |
|-----|--------|-----|--------|
| 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)**

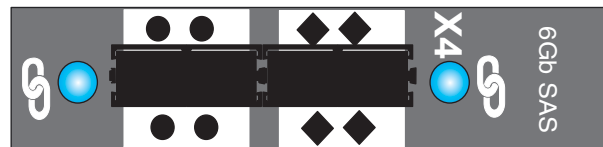
Figure 66 shows the LCC 6-Gb/s SAS port LED—a bi-color (blue/green) LED next to the connector, either left or right—that indicates the link/activity of the SAS port. Figure 66 also shows a double circle (or dot) symbol (for input) or a double diamond symbol (for output).

**Note:** Looking from the rear of the DAE, LCC B is located on the top and LCC A is located on the bottom (Figure 66).

3U, DAE LCC B 6-Gb/s SAS ports



3U, DAE LCC A 6-Gb/s SAS ports



VNX-000101

**Figure 66** LCC 6-Gb/s SAS port LED

Table 42 describes the 3U, DAE LCC 6-Gb/s SAS port LEDs.

**Table 42** 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 67 on page 76 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-12 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.

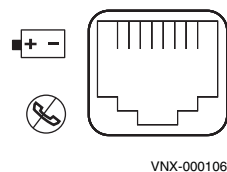


Figure 67 LCC RJ-12 port

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 68).

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 68).

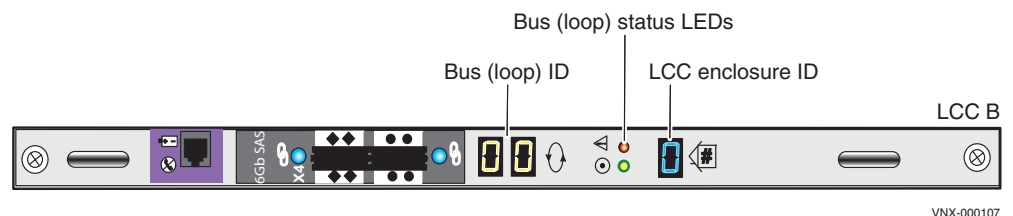


Figure 68 Example of LCC B enclosure ID and bus ID

Table 43 describes the bus (loop) indicator status LEDs.

**Table 43** 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             |

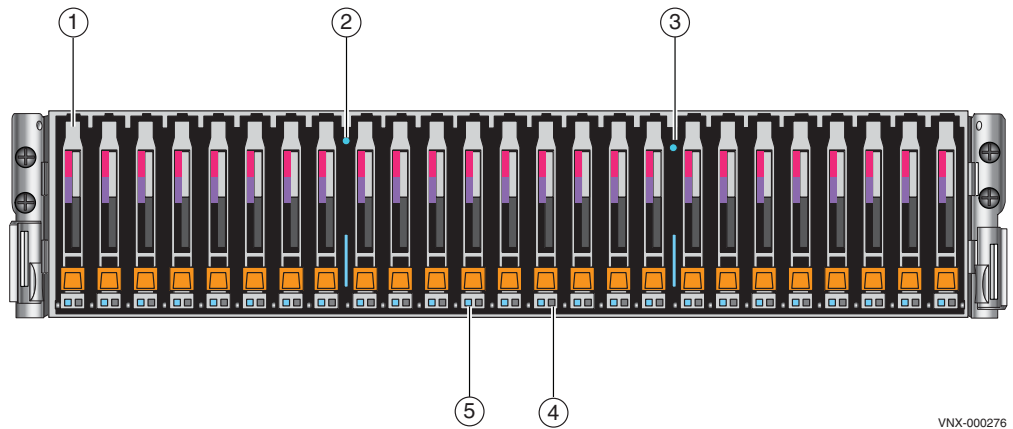
## 2U, 25 (2.5-inch) DAE front view

On the front, viewing from left to right, the Block and File (Unified) 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)
- ◆ Status LEDs

Figure 69 shows the location of these components.

**Note:** In a Block and File (Unified) 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 69** 2U, 25 (2.5-inch) DAE (front view)

[Table 44](#) describes the 2U, 25 (2.5-inch) DAE and disk drive status LEDs.

**Table 44** 2U, 25 (2.5-inch) DAE and disk drive status LEDs

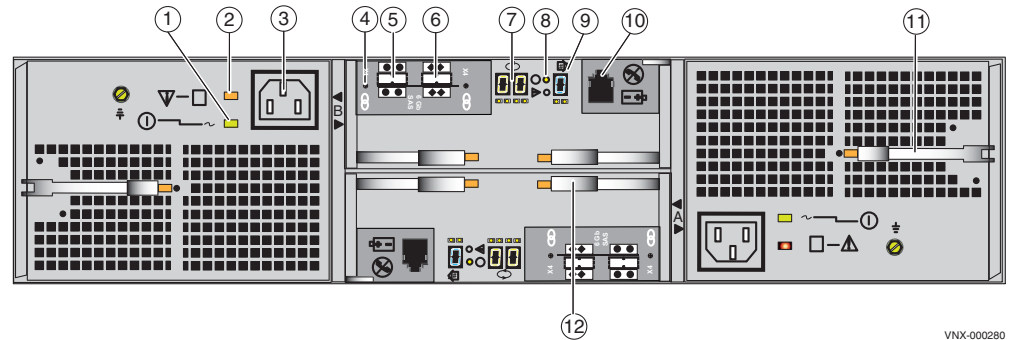
| LED                                 | Color | State    | Description             |
|-------------------------------------|-------|----------|-------------------------|
| DAE fault (location 2)              | Blue  | On       | No fault has occurred   |
|                                     | Amber | On       | Fault has occurred      |
| DAE 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     |

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



|   |   |    |  |
|---|---|----|--|
| 1 | LCC 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 <sup>1</sup>                        |
| 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); labeled with a double circle (or dot) symbol ●●. | 11 | LCC A power supply latch handle                      |
| 6 | LCC B SAS connector (output); labeled with a double diamond symbol ◆◆.        | 12 | LCC A right latch handle                             |

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

**Figure 70** Example of a 2U DAE with two LCCs and two power supply/cooling 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 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.

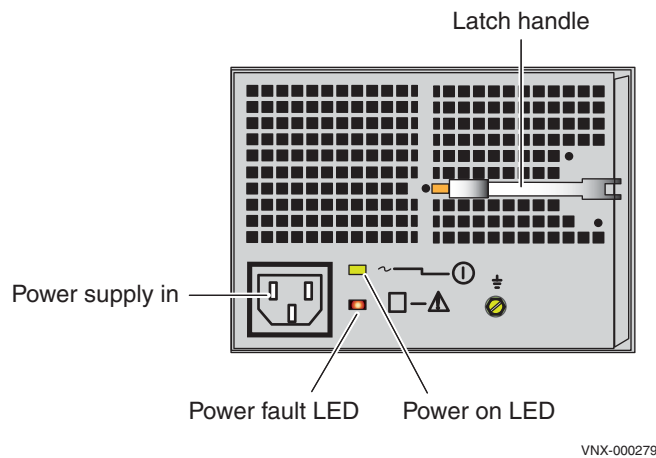
**Note:** If the target drive is not in the LCC’s enclosure, the switch passes the input signal directly to the output port.

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 70 on page 79](#), an enclosure ID<sup>12</sup> 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 71](#) 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 71** Example of a 2U, 25 (2.5-inch) DAE AC power supply/cooling module power in (recessed) connector (plug) and status LEDs

[Table 45](#) describes the 2U, 25 (2.5-inch) DAE power supply/cooling module LEDs.

**Table 45** 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  |

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



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:

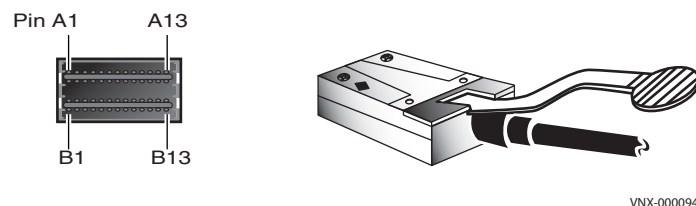
- ◆ Two 6-Gb/s SAS x4 ports
- ◆ One management (RJ-12) connector

### 6-Gb/s SAS x4 ports

The DAE LCC supports two (one input and one output) 6-Gb/s SAS x4 ports (labeled **6Gb 0 x4** and **1 x4**) on the rear of each LCC (A and B) on the DAE. 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 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 72 shows an example of the port connector (socket) and cable connector (plug) with pull tab.



**Figure 72** 6-Gb/s SAS port and cable connector

Table 46 lists the 6-Gb/s SAS port pin signals used on the connector.

**Table 46** 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    |

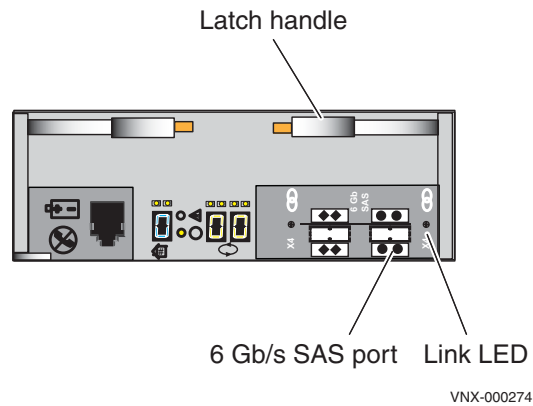
**Table 46** 6-Gb/s SAS port connector pinout (continued)

| Pin | Signal | Pin | Signal |
|-----|--------|-----|--------|
| 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 73 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 73).



**Figure 73** 6-Gb/s SAS port LED

Table 47 describes the 6-Gb/s SAS port LEDs.

**Table 47** 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  |

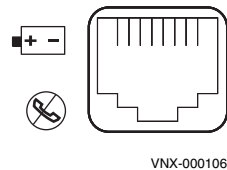
## Management (RJ-12) port connector

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

Figure 74 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 74** 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.

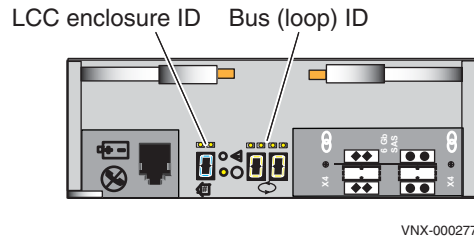
## LCC enclosure ID (enclosure address) and bus ID

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 75 on page 84).

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 75 on page 84).

**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 75** Example of LCC B enclosure ID and bus ID

Table 48 describes the bus (loop) status LEDs.

**Table 48** 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             |

# Cabling

This section shows examples of the type of DAE cabling you will need to connect the DAEs in 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 in the VNX5300 platform.

For all other cabling of your VNX5300 platform, the *VNX5300 Installation Guide* provides information about the SPS power cabling, DPE power cabling, DAE power cabling, PDU power cabling, LAN cabling, and so on.

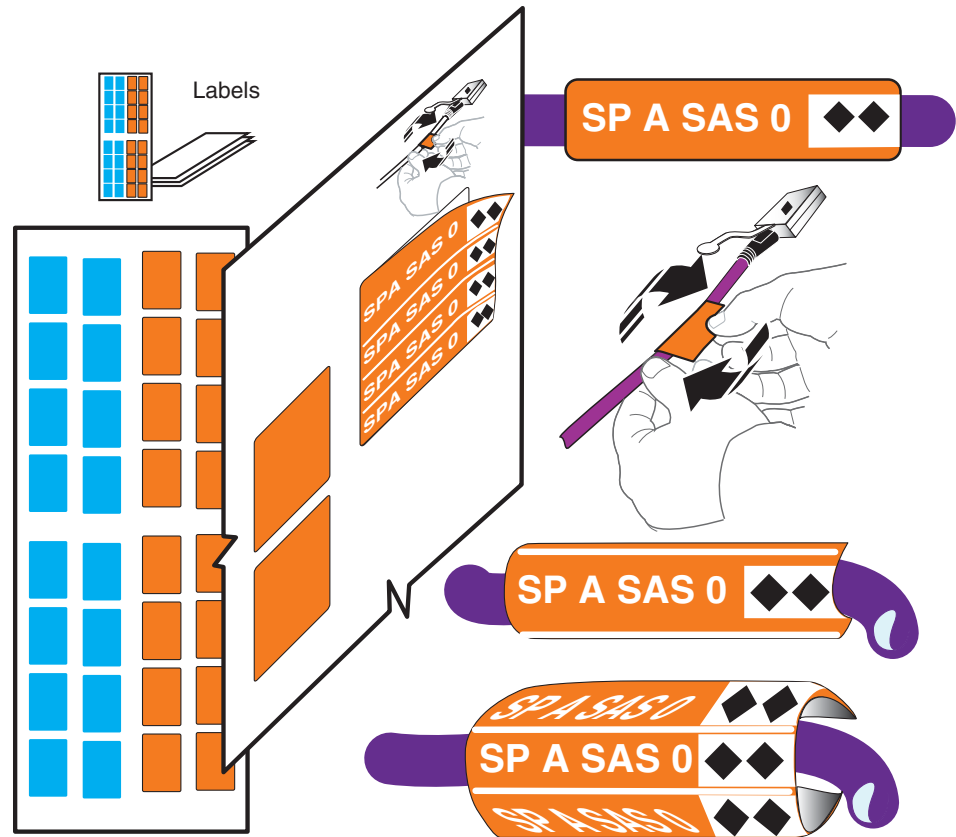
## Cable label wraps

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 76](#) 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.

---



VNX-000687

Figure 76 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 easily.

Shown in the upcoming figures (Figure 77 on page 88, Figure 78 on page 90, and Figure 79 on page 92) 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 the LCCs in the DAEs of a storage platform in a daisy-chain topology.

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

**IMPORTANT**

*Do Not* connect more DAEs than the VNX5300 platform can support. When calculating the number of drives for your 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 or 125, you will not be able to add another DAE.

## 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 77 on page 88](#) 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 3U 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 77 on page 88](#), 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**

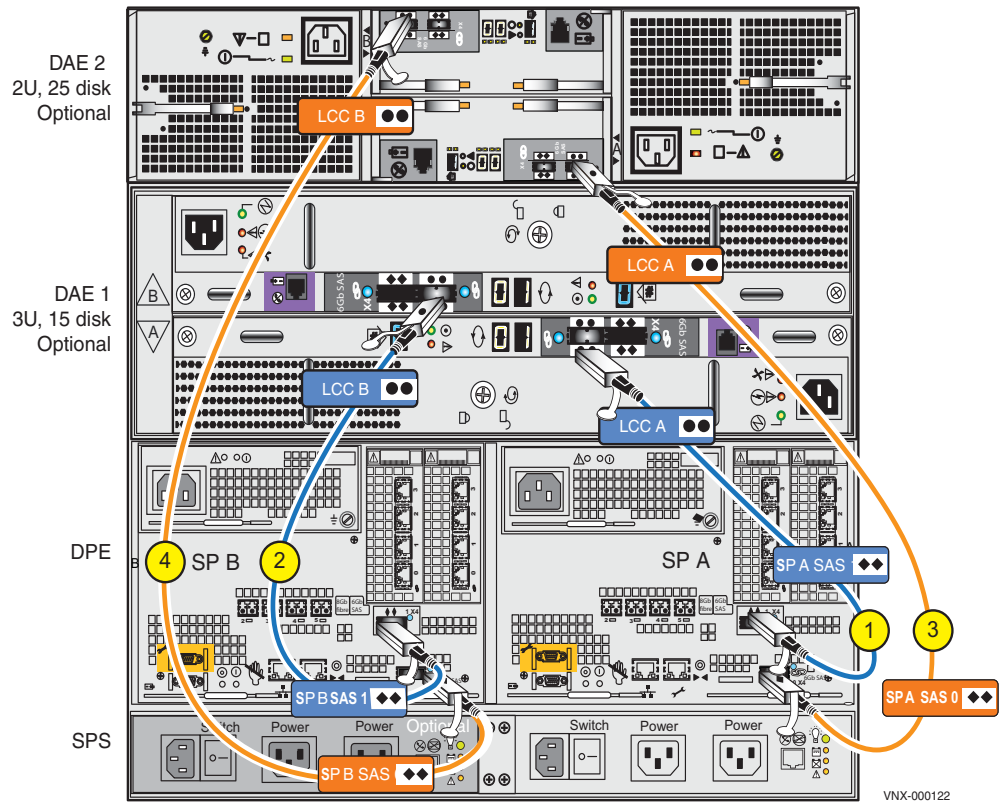
Notice the description of the cable labels affixed to the SP to DAE cables.

The cables shown in [Figure 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 1<sup>st</sup> DAE (labels SP A SAS 1 to LCC A)
- ◆ Cable 2, blue, DPE to 1<sup>st</sup> DAE (labels SP B SAS 1 to LCC B)
- ◆ Cable 3, orange, DPE to 2<sup>nd</sup> DAE (labels SP A SAS 0 to LCC A)
- ◆ Cable 4, orange, DPE to 2<sup>nd</sup> 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 85](#)) that came with your VNX5300 platform for the correct cable labels.



**Figure 77** 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 78 on page 90](#) 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 3U DPE are labeled **0** and **1**. SAS 0 is connected internally to the SAS expander that connects to the internal DPE disks. However, since seven DAEs are available or 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 78 on page 90](#), two buses (Bus 0 and Bus 1) are available.

The cables shown in [Figure 78 on page 90](#) are:

---

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

---

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

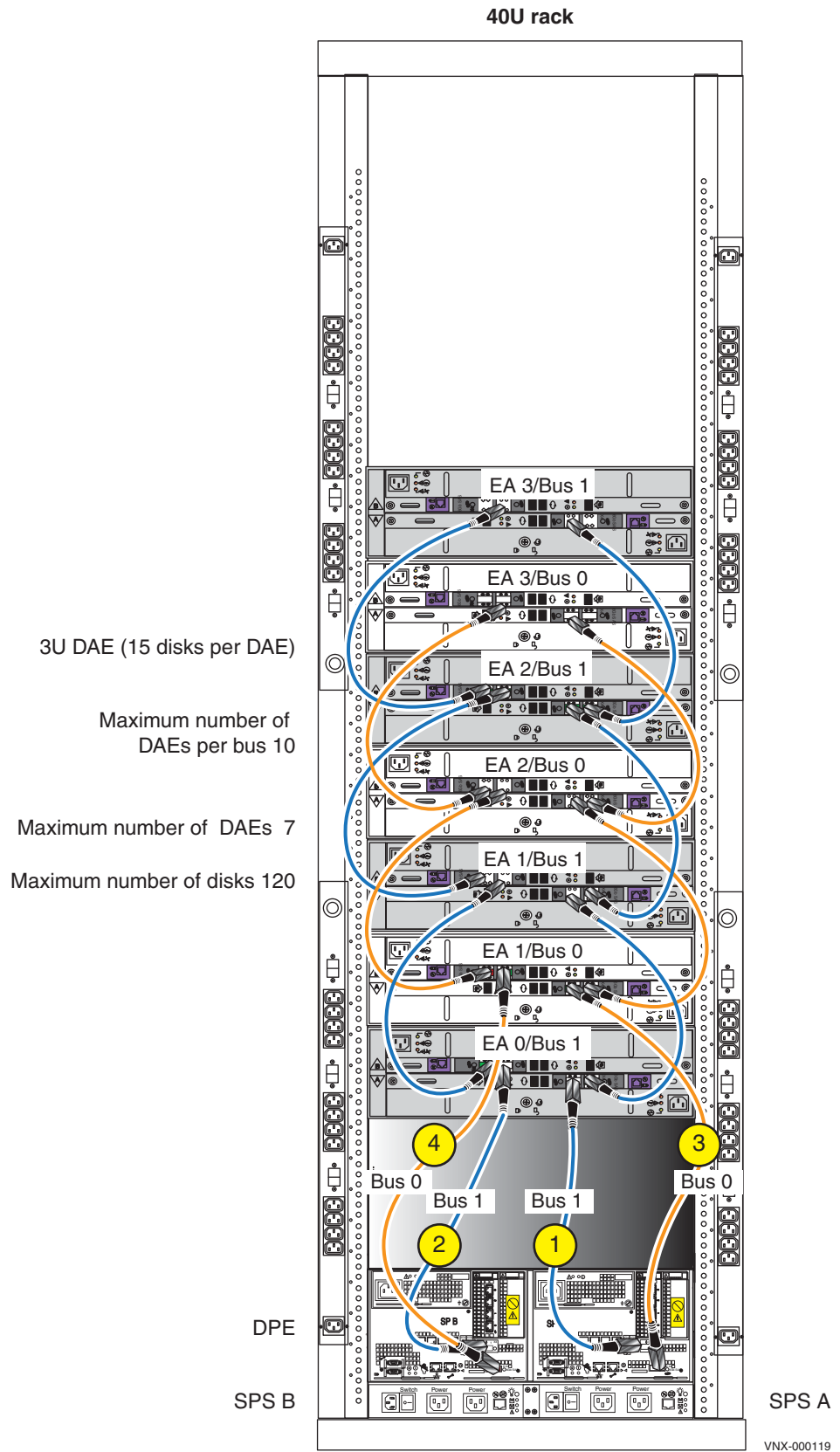
While the orange cable for Bus 0 is interleaved and daisy-chained through the remaining DAEs:

- ◆ EA 2/Bus 0
- ◆ EA 3/Bus 0

---

**Note:** [Figure 78 on page 90](#) 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 78** Example of the VNX5300 Block platform with seven DAEs (3U, 15 disks) interleaved cabling

## Stacked cabling with seven DAEs in VNX5300 Block platform

[Figure 79 on page 92](#) 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 3U DPE are labeled **0** and **1**. SAS 0 is connected internally to the SAS expander that connects to the internal DPE disks. However, since seven DAEs are available 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 79 on page 92](#), two buses (Bus 0 and Bus 1) are available.

The cables shown in [Figure 79 on page 92](#) are:

---

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

---

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

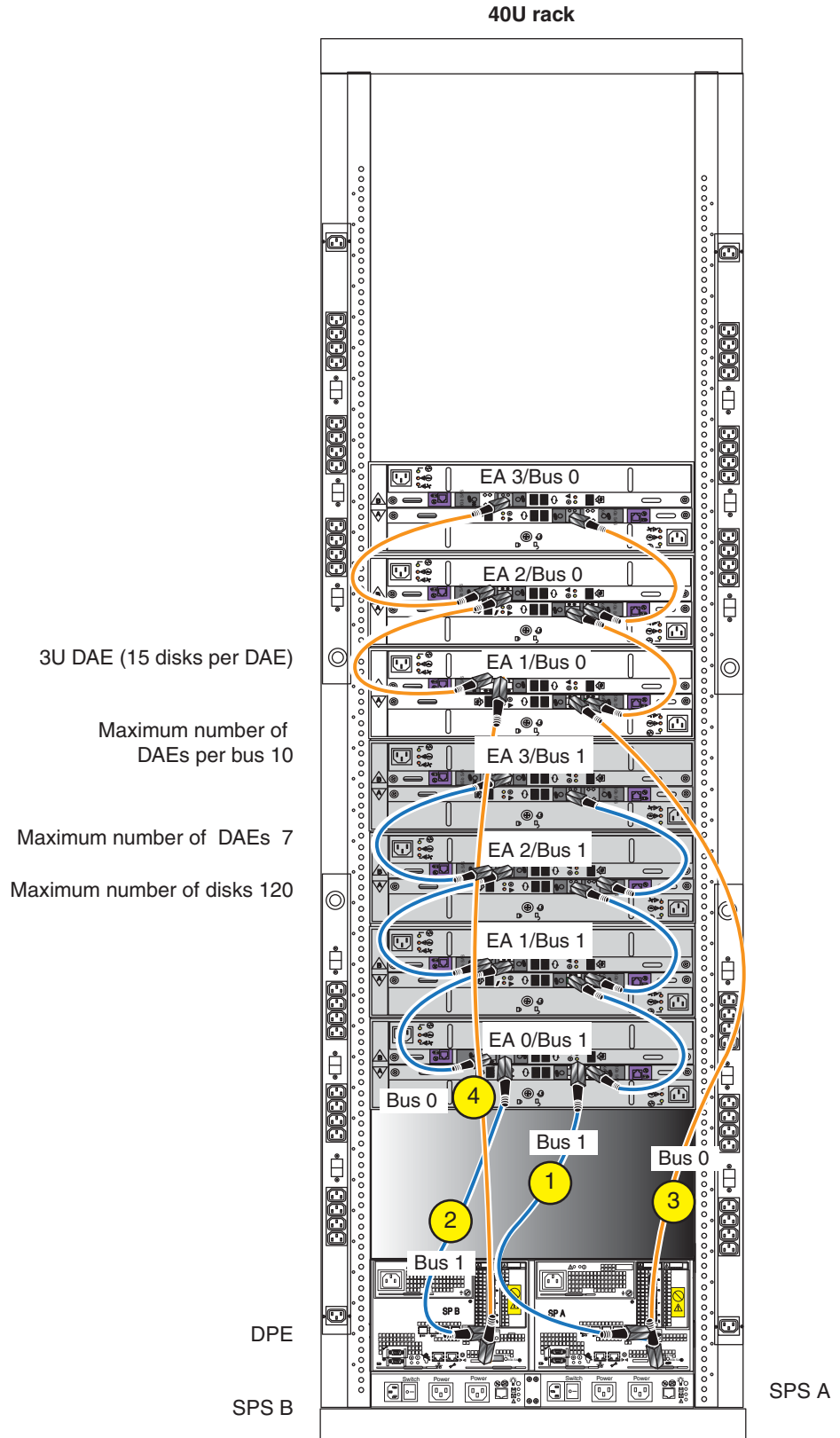
While the orange cable for Bus 0 is stacked and daisy-chained through the remaining DAEs:

- ◆ EA 2/Bus 0
- ◆ EA 3/Bus 0

---

**Note:** [Figure 79 on page 92](#) 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.

---



VNX-000635

**Figure 79** 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 80 on page 94](#) and [Figure 81 on page 96](#)) 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 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 show an ID of 0.

[Figure 80 on page 94](#) 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 3U 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 80 on page 94](#), 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**

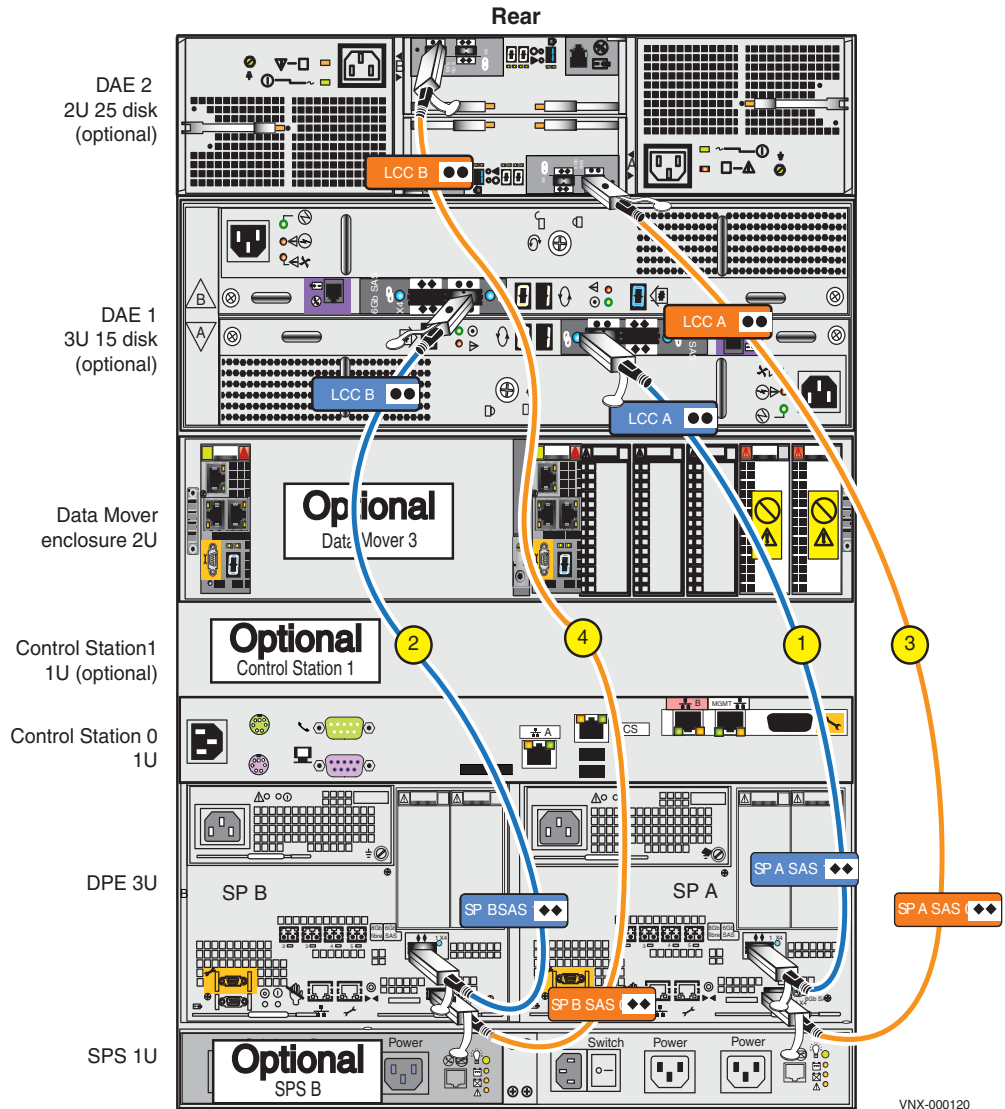
Notice the description of the cable labels affixed to the SP to DAE cables.

---

The cables shown in [Figure 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 1<sup>st</sup> DAE (labels SP A SAS 1 to LCC A)
- ◆ Cable 2, blue, DPE to 1<sup>st</sup> DAE (labels SP B SAS 1 to LCC B)
- ◆ Cable 3, orange, DPE to 2<sup>nd</sup> DAE (labels SP A SAS 0 to LCC A)
- ◆ Cable 4, orange, DPE to 2<sup>nd</sup> DAE (labels SP B SAS 0 to LCC B)



**Figure 80** Example of the VNX5300 File platform with two DAEs (3U, 15 disks) cabling

**Note:** In [Figure 80](#) 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 81 on page 96](#) 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 3U DPE are labeled **0** and **1**. SAS 0 is connected internally to the SAS expander that connects to the internal DPE disks. However, since seven DAEs are available 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 81 on page 96](#), two buses (Bus 0 and Bus 1) are available 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 81 on page 96](#) are:

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

---

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

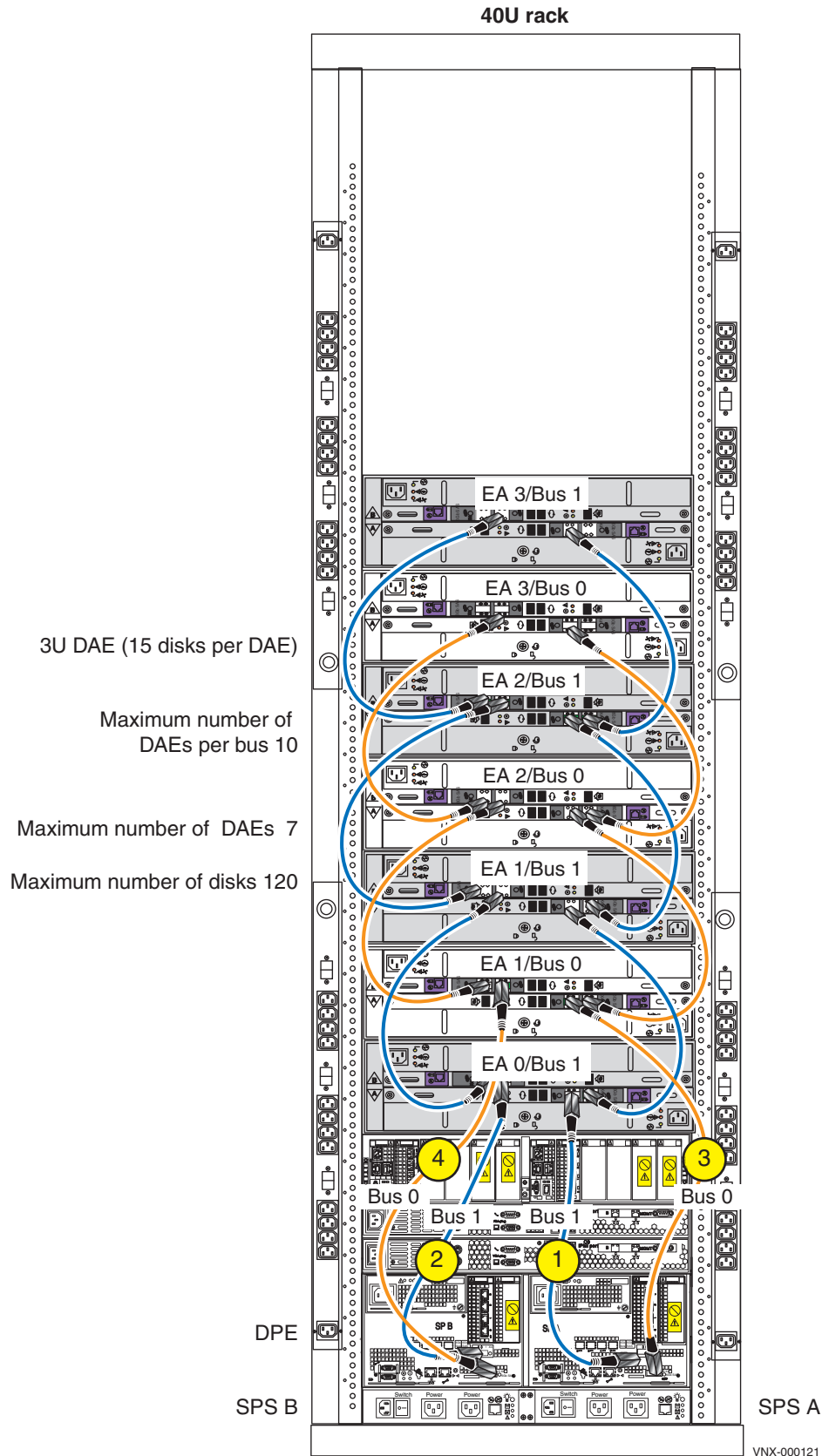
While the orange cable for Bus 0 is interleaved and daisy-chained through the remaining DAEs:

- ◆ EA 2/Bus 0
- ◆ EA 3/Bus 0

---

**Note:** In [Figure 81 on page 96](#) 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.

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**Figure 81** 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 82 on page 98](#) 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 3U DPE are labeled **0** and **1**. SAS 0 is connected internally to the SAS expander that connects to the internal DPE disks. However, since seven DAEs are available 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 82 on page 98](#), two buses (Bus 0 and Bus 1) are available 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 82 on page 98](#) are:

---

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

---

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

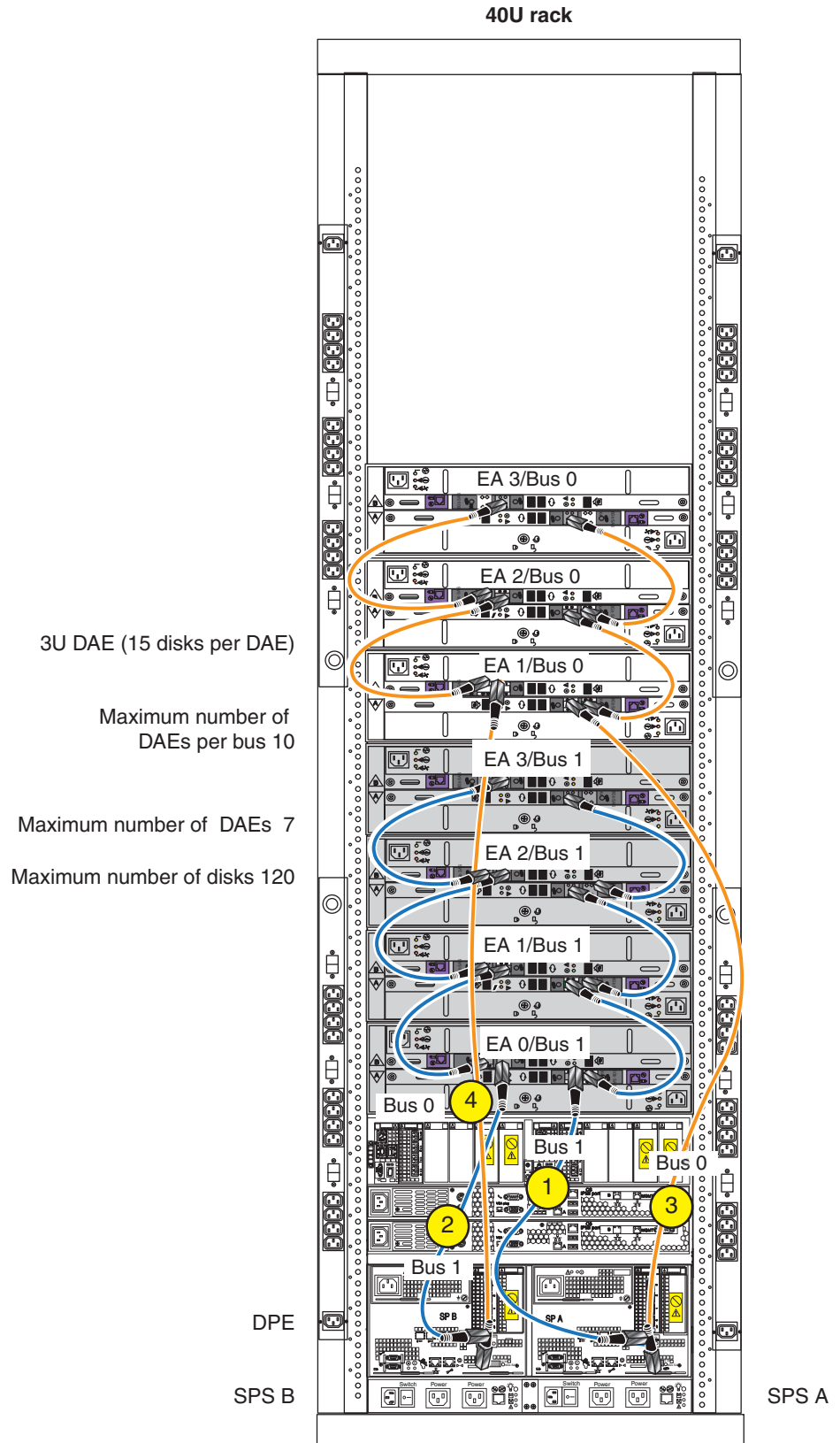
While the orange cable for Bus 0 is interleaved and daisy-chained through the remaining DAEs:

- ◆ EA 2/Bus 0
- ◆ EA 3/Bus 0

---

**Note:** In [Figure 82 on page 98](#) 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 82** Example of the VNX5300 File/Unified platform with seven DAEs (3U, 15 disks) stacked cabling



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