EMC® VNXe™ Series
VNXe3100™

Hardware Information Guide

EMC²

CONTENTS

Contents

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.

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About this book

This guide describes the EMC® VNXe3100™. The VNXe3100 platform supports a disk processor enclosure (DPE) with one to two storage processors (SPs).

In a single SP configuration, a Cache Protection Module is provided. This Cache Protection Module is used in the event of an outage. The data in the VNXe3100 platform write cache is safely stored in the Flash memory of the Cache Protection Module, eliminating time-limited battery backup and external power supplies. The Cache Protection Module capacity is 1 GB.

In the VNXe3100 platform, the DPE uses a 12 drive, 3.5-inch disk 2U enclosure. The DAEs in the VNXe3100 platform use either a 12 drive, 3.5-inch disk 2U enclosure or a 25 drive, 2.5-inch disk 2U enclosure (DAE5S).

Note: The 2U 25, (2.5-inch) disk drive DAE is only supported when you have VNXe Operating Environment (OE) software version 2.3.x and above installed.

In a dual SP configuration, a 2U, 12 drive (3.5-inch) DPE and DAE can support up to seven 2U, 12 drive (3.5-inch) DAEs, thus supporting a maximum of 96 disk drives. In a dual SP configuration, a 2U, 12 drive (3.5-inch) DPE with a 2U, 25 drive (2.5-inch) DAE and a 2U, 12 drive (3.5-inch) DAE, the configuration can support up to three 2U, 25 drive (2.5-inch) DAEs and one 2U, 12 drive (3.5-inch) DAE, thus supporting a maximum of 99 disk drives.

In a single SP configuration, a 2U, 12 drive (3.5-inch) DPE and DAE can support a maximum of three 2U, 12 drive (3.5-inch) DAEs or 48 disk drives. In a single SP configuration, a 2U, 12 drive (3.5-inch) DPE with a 2U, 25 drive (2.5-inch) DAE and a 2U, 12 drive (3.5-inch) DAE, thus supporting a maximum 49 disk drives.

IMPORTANT

In a dual SP system, when calculating the number of drives for your VNXe3100 platform, the DPE is included in the total drive slot quantity of from 96 to 99 drives in a dual SP system. If the total drive slot quantity exceeds from 96 to 99, you will not be able to add another DAE.

In a single SP system, when calculating the number of drives for your VNXe3100 platform, the DPE is included in the total drive slot quantity of from 48 to 49 drives in a single SP system. If the total drive slot quantity exceeds from 48 to 49, you will not be able to add another DAE.

The "Disk-array enclosure" section on page 36 provides details about the number of DAEs supported in a VNXe3100 platform.

This guide is available online at www.emc.com/vnxesupport. On this page, click **Documentation**. On the page that appears, under VNXe Series, click **VNXe3100**. On the next page that appears, under Content type, click **Manuals and Guides**. On the right side of the page that appears, a list of all the VNXe3100 product guides will appear. Select the *VNXe3100 Hardware Information Guide* from this list. The guide and other related VNX Series guides can be downloaded from here.

Revision history

The following table presents the revision history of this document:

Revision	Date	Description
A03	June, 2012	Following items were changed in this release: • First release of the *VNXe3100 Hardware Information Guide* in the new EMC look and feel • Added information about the "Two-port 10-Gb/s copper Ethernet I/O personality module" on page 28 • Added information about the "2U, 25 (2.5-inch) DAE" on page 45
A02	May, 2011	Added information to Table 3 on page 24.
A01	February, 2011	First release of the *VNXe3100 Hardware Information Guide*

How this document is organized

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

Title	Description
"Overview" on page 11	Describes the software and hardware features of a typical VNXe3100 along with a front view example of the VNXe3100.
"VNXe3100 platform" on page 11	Describes and shows the front and rear views of a typical VNXe3100.
"System component description" on page 14	Provides a description of the components that comprise a VNXe3100. Along with a description, illustrations of each component are also shown.
"Disk processor enclosure" on page 14	Describes and illustrates the front and rear views of a DPE and the components that comprise the DPE.
"Cache Protection Module" on page 35	Describes and illustrates the Cache Protection Module.
"Disk-array enclosure" on page 36	Describes and illustrates the two types of DAEs available for the VNXe3100.

Audience

This document is designed for personnel who install, configure, and maintain the VNXe3100. To use this hardware publication, you should be familiar with digital storage and networking equipment. Within the document an overview of the architecture, features, and components of the VNXe3100 platform are presented. The specific aspects of the VNXe3100 platform and its major components include the front and rear LED indicators and the connectors on the DPE and the DAE.

Related documentation

The following EMC publication provides additional information:

◆ *EMC VNXe3100 System Installation Guide*

This guide is available online at www.emc.com/vnxesupport. On this page, click **Documentation**. On the page that appears, under VNXe Series, click **VNXe3100**. On the next page that appears, under Content type, click **Manuals and Guides**. On the right side of the page that appears, a list of all the VNXe3100 product guides will appear. Select the guide you are interested in from this list.

Conventions used in this document

EMC uses the following conventions for special notices:

⚠DANGER

DANGER indicates a hazardous situation which, if not avoided, will result in death or serious injury.

⚠WARNING

WARNING indicates a hazardous situation which, if not avoided, could result in death or serious injury.

⚠CAUTION

CAUTION, used with the safety alert symbol, indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.

NOTICE

NOTICE is used to address practices not related to personal injury.

Note: A note presents information that is important, but not hazard-related.

IMPORTANT

An important notice contains information essential to software or hardware operation.

Typographical conventions

EMC uses the following type style conventions in this document:

Normal	Used in running (nonprocedural) text for: • Names of interface elements (such as names of windows, dialog boxes, buttons, fields, and menus) • Names of resources, attributes, pools, Boolean expressions, buttons, DQL statements, keywords, clauses, environment variables, functions, utilities • URLs, pathnames, filenames, directory names, computer names, filenames, links, groups, service keys, file systems, notifications
Bold	Used in running (nonprocedural) text for: • Names of commands, daemons, options, programs, processes, services, applications, utilities, kernels, notifications, system calls, man pages Used in procedures for: • Names of interface elements (such as names of windows, dialog boxes, buttons, fields, and menus) • What user specifically selects, clicks, presses, or types
Italic	Used in all text (including procedures) for: • Full titles of publications referenced in text • Emphasis (for example a new term) • Variables

`Courier`	Used for: • System output, such as an error message or script • URLs, complete paths, filenames, prompts, and syntax when shown outside of running text
`Courier bold`	Used for: • Specific user input (such as commands)
`Courier italic`	Used in procedures for: • Variables on command line • User input variables
< >	Angle brackets enclose parameter or variable values supplied by the user
[ ]	Square brackets enclose optional values
|	Vertical bar indicates alternate selections - the bar means "or"
{ }	Braces indicate content that you must specify (that is, x or y or z)
...	Ellipses indicate nonessential information omitted from the example

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Your comments

Your suggestions will help us continue to improve the accuracy, organization, and overall quality of the user publications. Please send your opinion of this document to:

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If you have issues, comments, or questions about specific information or procedures, please include the title and, if available, the part number, the revision (for example, A01), the page numbers, and any other details that will help us locate the subject you are addressing.

Overview

The VNXe Series provides an integrated storage platform for small and medium businesses as well as remote offices and departments in larger enterprise businesses. Providing significant advancements in efficiency and simplicity, the VNXe Series facilitates complete storage consolidation with advanced file and block functionality as well as a simple, application-driven approach to managing shared storage.

Supporting high availability through the use of redundant components—power supplies, fans, storage processors—as well as dynamic failover and failback, the VNXe Series also supports the ability to upgrade system software or hardware while the VNXe platform is running[1].

The VNXe3100 platform is one of three models that make up the VNXe Series. This platform is ideal for businesses with physical server infrastructures, as well as those making the move to server virtualization to drive consolidation and greater efficiency. The VNXe3100 platform also shares a comprehensive set of features including exceptional capacity utilization, data protection and availability solutions, and advanced support capabilities. Figure 1 shows an example of the VNXe3100 platform with a front bezel.

VNX-000098

Figure 1 Example of a VNXe3100 platform with front bezel

VNXe3100 platform

The VNXe3100 platform is available in two versions:

◆   A 2U DPE with a single storage processor (SP A) and a Cache Protection Module

◆   A 2U DPE with two storage processors (SP A and B)

This section shows an example of the front and rear views of a VNXe3100 platform with a single SP and Cache Protection Module as well as a dual SP version.

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1. Applies to a dual SP platform.

Note: A fully configured dual SP VNXe3100 platform includes up to seven DAEs supporting a maximum of from 96 to 99 disk drives depending on the type and mix of the DAEs used (for configuration information, see "DPE and DAE configuration rules" on page 37).

Front view

Figure 2 shows an example of the front view of the VNXe3100 platform having a 2U, 12 (3.5-inch) disk drive DPE.

VNX-000080
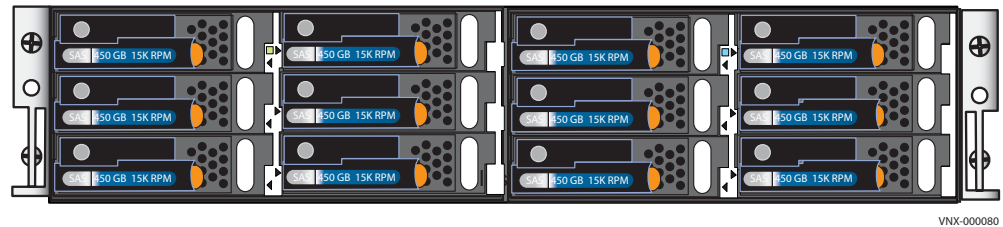
Figure 2 Example of a VNXe3100 platform with a 2U, 12 (3.5-inch) disk drive DPE (front view)

Rear view

Looking from left to right, Figure 3 shows an example of the rear view of a VNXe3100 platform having a 2U DPE with a Cache Protection Module and a single storage processor (SP A), respectively.
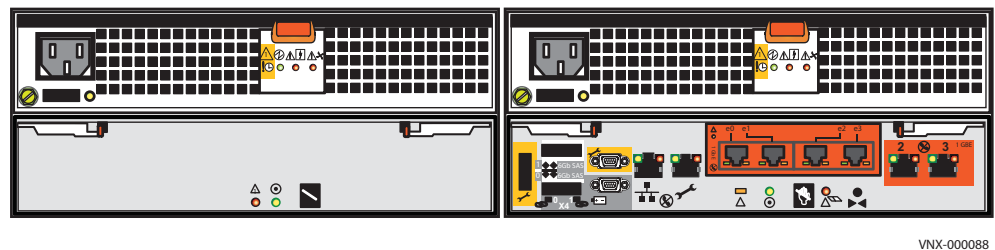

VNX-000088

Figure 3 Example of a VNXe3100 2U DPE with a Cache Protection Module and a single SP, respectively (rear view)

Looking from left to right, Figure 4 shows an example of the rear view of a VNXe3100 platform having a 2U DPE with two storage processors (SP B and A), respectively.
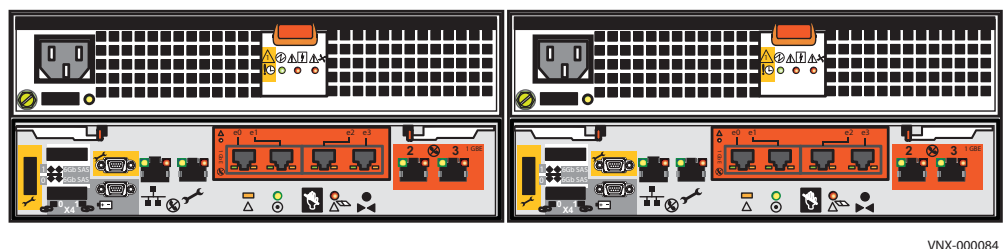

VNX-000084

Figure 4 Example of a VNXe3100 2U DPE with two SPs (rear view)

Hardware features

Contained in a 2U platform architecture, the VNXe3100 platform weighs approximately 60.5 lb (26.4 kg). It measures 3.5 inches high x 17.5 inches wide x 19.75 inches deep (8.89 cm x 44.45 cm x 50.16 cm). Between the front and rear of the enclosure, a midplane distributes power and signals to all the enclosure components. The VNXe3100 platform 2U DPE SPs and the power supply modules plug directly into the midplane connections.

Note: The previously mentioned dimensions are approximate and do not include a rack or cabinet enclosure.

provides the physical, environmental, and power details that make up the VNXe3100 platform.

Configured for AC-input power, the VNXe3100 platform includes the following hardware features:

◆ One 2U DPE:

- On the front of the 2U DPE, two types of disk drives are supported in one type of disk drive carrier; a 2U, 12 (3.5-inch) disk drive carrier. The disk drives supported are Serial attached-SCSI (SAS) and near-line SAS (NL-SAS). For more information about the supported disk drives for the VNXe3100, refer to the *EMC® VNXe™ Series Storage Systems Disk and OE Matrix* document.

- On the rear of the 2U DPE, a single SP (SP A) with a hot-swappable 1-GB Cache Protection Module or a dual SP (A and B) is supported; each SP consists of:

  – A CPU module with an Intel Xeon Dual Core 1.73-GHz processor with two Double Data Rate Three (DDR3) synchronous dynamic RAM (SDRAM) slots supporting 4 GB of memory per SP; an optional 8-GB memory upgrade for a dual SP configurations is available

    Note: The SDRAM or memory modules reside on the SP printed circuit board (motherboard) within the SP. To replace or upgrade a memory module, you must first remove the SP from the DPE, and then remove the top cover on the SP to gain access to the SP components. The *Replacing a VNXe3100 Memory Module* document provides more information.

  – One four-port 1-Gb/s copper Ethernet I/O personality module

    Note: A two-port 10-Gb/s copper Ethernet I/O personality module is available as an upgrade. However, this I/O personality module is only supported in a dual SP configuration.

  – Two 1-GbE iSCSI (host IP connect) ports

  – Two integrated four lane 6-Gb/s SAS x4 ports (labeled **6GB 0 x4** and **1 x4**); supported speeds are 1.5, 3, and 6 Gb/s

    Note: 6GB SAS port 1 x4 is not used at this time.

  – One RS-232/EIA 232 serial (up to 115 K baud) service laptop (micro DB-9) port

  – One RS-232/EIA 232 serial standby power supply (SPS) management (micro DB-9) port

  – One 10/100/1000 LAN management (RJ-45) port

- One 10/100/1000 LAN service (RJ-45) port (not used)

- One USB port (not used)

- One power supply module

◆ Either a 2U, 12 (3.5-inch) disk drive DAE or a 2U, 25 (2.5-inch) disk drive DAE is supported in several configurations (for more DPE/DAE configuration information, see Table 16 on page 37 or Table 17 on page 37)

Note: The 2U 25, (2.5-inch) disk drive DAE is only supported when you have VNXe Operating Environment (OE) software version 2.3.x and above installed.

◆ Any required cables including a serial mini-DB-9 cable.

◆ Mounting rails with hardware

◆ Front bezel with VNXe3100 badge

System component description

This section describes the VNXe3100 platform components. These details include illustrations and descriptions of the front and rear connectors and the LED indicators.

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

Disk processor enclosure

As previously described, the VNXe3100 platform consists of a 2U disk processor enclosure (DPE). Up to seven 2U, 12 (3.5-inch) disk drive DAEs with a maximum of 99 disk drives[2] in a dual SP configuration.

IMPORTANT

In a dual SP system, when calculating the number of drives for your VNXe3100 platform, the DPE is included in the total drive slot quantity of from 96 to 99 drives. If the total drive slot quantity exceeds from 96 to 99, you will not be able to add another DAE.

In a single SP system, when calculating the number of drives for your VNXe3100 platform, the DPE is included in the total drive slot quantity of from 48 to 49 drives. If the total drive slot quantity exceeds from 48 to 49, you will not be able to add another DAE.

"Disk-array enclosure" on page 36 provides details about the available DAEs for the VNXe3100 platform.

Each VNXe3100 2U DPE consists of the following components:

◆ Drive carrier

◆ Disk drives

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2. In a single SP configuration, the VNXe3100 platform can support up to three DAEs or a maximum of 49 disk drives.

- Midplane
- Storage processor (SP)
- Power supply module
- Cache Protection Module (single SP configuration only)
- EMI shielding

Drive carrier

Disk drive carriers are 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. The "Front view" section on page 16 shows the disk drive ready LEDs that are integrated into the chassis that the carrier is in. These LEDs primarily show the disk drive readiness as well as activity.

Disk drives

You can visually distinguish between drive types by their different latch and handle mechanisms and by the type, capacity, and speed labels on each drive. You can add or remove a disk drive while the DPE is powered up, but you should exercise special care when removing drives while they are in use. Disk drives are extremely sensitive electronic components. For more information about the supported disk drives for the VNXe3100, refer to the *EMC® VNXe™ Series Storage Systems Disk and OE Matrix* document.

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

The storage processor (SP) is the intelligent component of the disk processor enclosure (DPE). Basically, it acts as the control center. Each SP includes status LEDs, an I/O personality module, LAN ports, and so on. Two latches on the SP lock it into place to ensure proper connection. The "SP" section on page 19 provides more information about the location and description of the connectors and LEDs.

Power supply module

When viewed from the rear, the power supply module is located on the top, left and right of the DPE. This module is an auto-ranging, power-factor-corrected, multi-output, off-line converter with its own line cord. Each power supply module includes status LEDs. A latch on the power supply module locks it into place to ensure proper connection. The "AC power supply/cooling module" section on page 21 provides more information about the location and description of the connectors and LEDs.

Cache Protection Module

In a single SP configuration, the Cache Protection Module provides mirrored VNXe Operating Environment (OE) cache memory that is not possible with a single SP. The Cache Protection Module capacity is 1 GB.

In the event of a power failure, the backup battery in the Cache Protection Module provides the power necessary to write the entire contents of the mirrored cache memory to non-volatile storage or Flash memory in the Cache Protection Module. The "Cache Protection Module" section on page 35 provides move information about the location and description of the connectors and LEDs.

EMI shielding

EMI compliance requires a properly installed electromagnetic interference (EMI) shield in front of the DPE disk drives. The VNXe3100 platform requires a front bezel that has a locking latch and integrated EMI shield. You must remove the bezel/shield to remove and install disk drives.

Front view

On the front of the VNXe3100 platform, the 2U, 12 (3.5-inch) disk drive DPE carrier includes the following:

◆ 3.5-inch 6-Gb/s SAS or 6-Gb/s NL-SAS disk drives (hot-swappable)[3]

◆ Status LEDs

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

Figure 5 shows the location of these disk drives and the status LEDs.
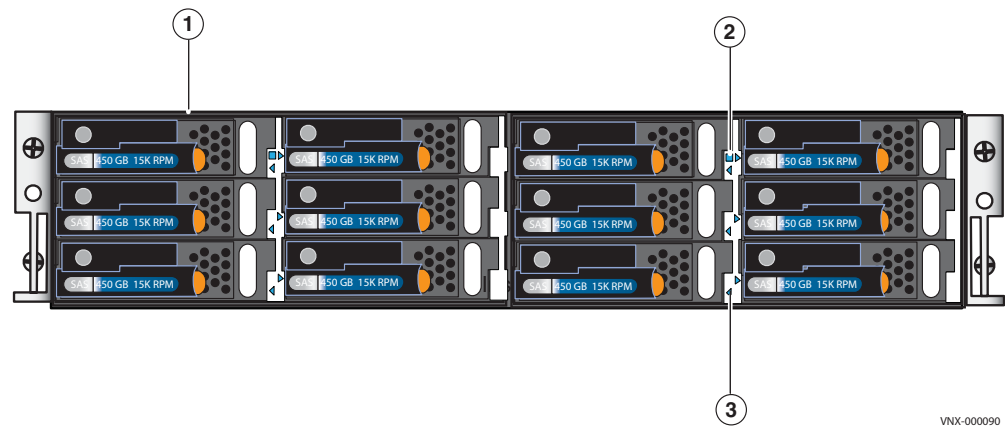
1	3.5-inch SAS drives[1]	3	Disk drive ready/activity LED (blue)
2	DPE power on LED (blue)		

1. The VNXe3100 platform also supports 6-Gb/s NL-SAS drives. For more information about the disk drives supported in the VNXe3100, refer to the *EMC® VNXe™ Series Storage Systems Disk and OE Matrix* document.

Figure 5 VNXe3100 platform DPE (front view)

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

Table 1 describes the VNXe3100 platform 2U DPE and the disk drive status LEDs.

Table 1 VNXe3100 platform 2U, 12 (3.5-inch) DPE and disk drive LEDs

LED	Color	State	Description
DPE power (location 2)	Blue	On	Powering and powered up
	—	Off	Powered down
Disk drive ready/activity (location 3) **Note:** The disk drive LED (a left or right triangle symbol) points to the disk drive that it refers to.	Blue	On	Powering and powered up
		Blinking, mostly on	Disk drive is on with I/O activity
		Blinking at constant rate	Disk drive is spinning up or down normally
		Blinking, mostly off	Disk drive is powered up but not spinning **Note:** This is a normal part of the spin-up sequence, occurring during the spin-up delay of a slot.
	—	Off	Disk drive is powered down

Rear view

On the rear, the VNXe3100 platform includes one of two versions of the following hardware components:

◆ One 2U DPE with a single storage processor (SP A):

- One SP

- Two power supply modules

- One Cache Protection Module; 1 GB

◆ One 2U DPE with two storage processors (SP A and B):

- Two SPs

- Two power supply modules

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

Figure 6 shows an example of the rear view of a 2U DPE with a Cache Protection Module and a single storage processor (SP A), respectively.
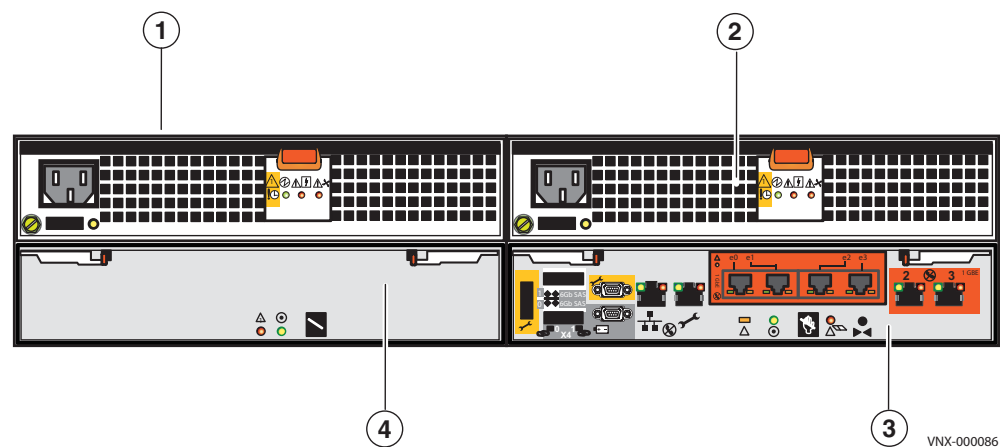
1	DPE	3	SP (for a closer view, see Figure 8 on page 20)
2	Power supply module (for a closer view, see Figure 9 on page 21)	4	Cache Protection Module (for a closer view, see Figure 23 on page 35)

Figure 6 Example of a VNXe3100 platform 2U DPE with a Cache Protection Module and a single SP, respectively (rear view)

Figure 7 shows an example of the rear view of a 2U DPE with two storage processors (SP B and SP A), respectively.
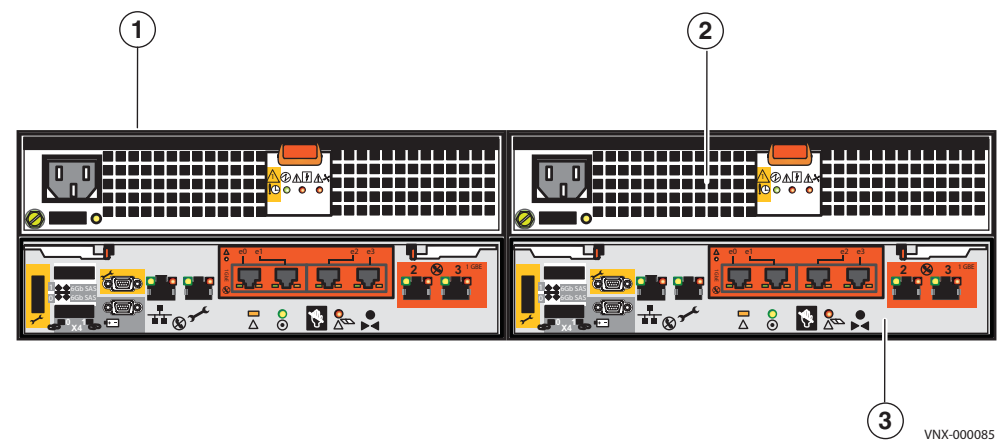
1	DPE	3	SP A (for a closer view, see Figure 8 on page 20)
2	Power supply module (for a closer view, see Figure 9 on page 21)		

Figure 7 Example of a VNXe3100 platform 2U DPE with two SPs (rear view)

SP

Viewing from the rear of the DPE, each SP (B and A), respectively, consists of connectors, status LEDs, latch handles, and so on.

◆ AC power supply module:

- Power in (recessed) connector (plug)

- Power supply status LEDs (power on and fault)

- Power supply latch handle

◆ SP B and A:

- USB

- Two 1-GbE iSCSI (host IP connect) ports

- Two 6-Gb/s SAS x4 ports (labeled **6Gb SAS 0 x4** and **1 x4**)

    Note: 6Gb SAS port 1 x4 is not used at this time.

- Optional four-port 1-Gb/s copper Ethernet I/O personality module

- Two (RJ-45) LAN connectors (labeled with a network management symbol and a wrench symbol)

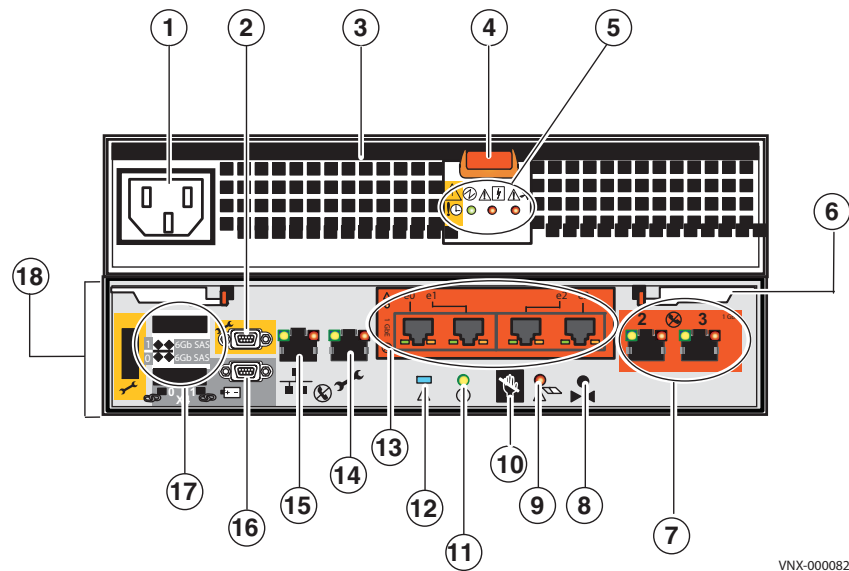   **Note:** The RJ-45 LAN connector with a wrench symbol is not used at this time.

- Two (micro DB-9) RS-232/EIA connectors (labeled with a battery symbol and a wrench symbol)

    Note: The DB-9 connector with a battery symbol is not used at this time.

- SP status LEDs

- RS-232/EIA

- SP latch handles (top of SP left and right)

Figure 8 on page 20 shows the location of these SP components.

VNX-000082

1	AC power in connector (recessed plug)	10	SP unsafe to remove LED (white)
2	RS-232/EIA (micro DB-9) connector (labeled with a wrench symbol)	11	SP power LED (green)
3	Power supply module	12	SP status/fault LED (amber/blue[1])
4	Power supply latch handle (top, middle)	13	1. Shows an example of a four-port 1-Gb/s copper Ethernet I/O personality module (labeled **e0**, **e1**, **e2**, and **e3**)[2]
5	Power supply module status LEDs	14	Service LAN (RJ-45) port (labeled with a wrench symbol); not used at this time
6	SP latch handle (middle, left and right)	15	Management LAN (RJ-45) port (labeled with a network management symbol)
7	Two 1-GbE iSCSI (host IP connect) ports (labeled **2** and **3**)	16	RS-232/EIA (micro DB-9) connector (labeled with a battery symbol); not used at this time
8	NMI[3] (password reset) push button	17	Two 6-Gb/s SAS ports (labeled **6Gb SAS 0 x4** and **1 x4**); 1 x4 is not used
9	CRU fault LED (amber)[4]	18	SP CPU

1. The SP fault status LED (amber or blue), flashes at different rates, depending on the current status of the SP. In a normal, operational state, it will be off.

2. Also available in a dual SP configuration is the two-port 10-Gb/s copper Ethernet I/O personality module (with the ports labeled **e0** and **e1**).

3. NMI = non-maskable interrupt

4. CRU fault LED lights amber when an internal CRU is faulted.

Figure 8 Example of SP components (rear view)

AC power supply/cooling module

Figure 9 on page 21 shows an example of the AC power supply module with a power in (recessed) connector (plug) and status LEDs. The SP is cooled by this power supply located on the top portion of the 2U DPE. The power supply/cooling module has a separate latch handle located on the top, middle portion of the module. Typically, this power supply/cooling module stays plugged into the 2U DPE when the SP is removed.
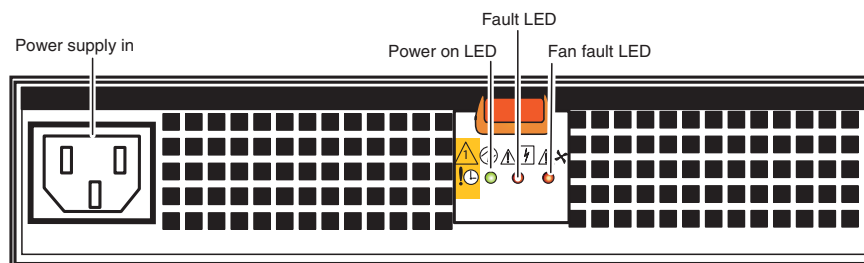
VNX-000083

Figure 9 AC power supply/cooling module power in (recessed) connector (plug) and status LEDs

Table 2 describes the power supply/cooling module LEDs.

Table 2 AC power supply module/cooling LEDs

LED	Color	State	Description
Power on	Green	On	Power on
	—	Off	Power off
Power fault	Amber	On	Power supply fault
		Blinking	Power off due to environmental condition (no SP inserted)
	—	Off	No fault or power off
Fan (blower) fault	Amber	Fault	Fault, not operating normally
	—	Off	No fault, fan operating normally

SP

Figure 10 on page 23 shows an example of the VNXe3100 platform SP. The SP has an Intel Xeon dual core 1.73-GHz processor with two Double Data Rate Three (DDR3) synchronous dynamic RAM (SDRAM) slots supporting 4 GB of memory per processor or optional 8 GB per processor.

The SP connectors, LEDs, and other components are:

- USB

- Two 1-GbE iSCSI (host IP connect) ports

- Two 6-Gb/s SAS x4 ports (labeled **6Gb SAS 0 x4** and **1 x4**)

  Note: 6Gb SAS port 1 x4 is not used at this time.

- Four-port 1-Gb/s copper Ethernet I/O personality module
- Two (RJ-45) LAN connectors (labeled with a network management symbol and a wrench symbol)

  Note: The RJ-45 LAN connector with a wrench symbol is not used at this time.

- Two (micro DB-9) RS-232/EIA connectors (labeled with a battery symbol and a wrench symbol)

  Note: The DB-9 connector with a battery symbol is not used at this time.

- SP status LEDs
- RS-232/EIA
- SP latch handles (top of SP left and right)

VNX-000099

1	RS-232/EIA (micro DB-9) connector (labeled with a wrench symbol)	7	CRU fault LED (amber[1])
2	Management LAN (RJ-45) port (labeled with a network management symbol)	8	SP unsafe to remove LED (white)
3	Service LAN (RJ-45) port (labeled with a wrench symbol); not used at this time	9	SP power LED (green)
4	Shows an example of a four-port 1-Gb/s (1000Base-T) copper Ethernet I/O personality module (labeled **e0**, **e1**, **e2**, and **e3**); a two-port 10-Gb/s copper Ethernet I/O personality module is also available but only supported in a dual SP configuration	10	SP status/fault LED (amber/blue[2])
5	SP latch handle (middle, left and right)	11	RS-232/EIA (micro DB-9) connector (labeled with a battery symbol); not used at this time
6	Two 1-GbE iSCSI (host IP connect) ports (labeled **2** and **3**)	12	Two 6-Gb/s SAS ports (labeled **6Gb SAS 0 x4** and **1 x4**); port 1 x4 is not used at this time

1. CRU fault LED lights amber when an internal CRU is faulted.

2. The SP fault status LED (amber or blue), flashes at different rates, depending on the current status of the SP. In a normal, operational state, it will be off.

Figure 10 SP connectors, status LEDs, latch handles, and so on

Table 3 describes the SP status LEDs. The locations in Table 3 are shown in Figure 10 on page 23.

Table 3 SP LEDs

LED	Color	State	Description
CRU fault (location 7)	Amber	On	Fault, lights amber when an internal customer replaceable unit (CRU) has faulted.
	—	Off	No fault or power off
Unsafe to remove (location 8)	White	On	*Do not* remove SP, data could be lost
	—	Off	Safe to remove SP
Power (location 9)	Green	On	Power on
	—	Off	Power off, verify connection
Status/fault (location 10)	Amber	Blinks once every four seconds	BIOS running
		Blinks once every second	POST running
		Blinks four times a second	Operating system boot started
		Blinks twice a second	Dump in progress
		On	SP or Solid State Disk (SSD) fault
	—	Off	No fault detected
	Blue	Blinks once every four seconds	Operating system booted
		Blinks once every second	Operating system driver starting
		Blinks four times a second	1. Operating system driver started 2. Fault, a system error has occurred, causing some storage resources to become unavailable. The SP is not operating and the status LED is blinking (see Note)
		On	System not initialized. A management IP address (static or dynamic) is assigned.

Table 3 SP LEDs (continued)

LED	Color	State	Description
Status/fault (location 10)	—	Off	Ready for I/O
	Blue with blinking amber once every three seconds		System not initialized. No management IP address is assigned.

Note: When the SP Fault/status LED starts blinking four times a second and the SP does not appear to be functioning, a cache-dirty condition has occurred. The LED indicates that the SP is waiting for the peer SP to boot to resolve the cache-dirty automatically.

An SP in this state can wait up to one hour for its peer SP to resolve the cache-dirty condition. When the condition is resolved, the SP continues its boot normally. If the condition is not resolved automatically, the SP will reboot into service mode. In most circumstances, no manual intervention is required, and the wait is much less than 1 hour.

When the SP performs a reboot or shutdown sequence, it *might* have system cache stored in memory, which can lead to the cache-dirty condition.

For more information about this condition, go to EMC Online Support at http://emc.com/vnxesupport. In the **Search** text box, type in emc263713.

SP Input/output ports and connectors — The VNXe3100 platform SP supports the following I/O ports on the rear:

◆ Two 6-Gb/s four lane SAS x4 ports (labeled **6Gb SAS 0 x4** and **1 x4**); supported speeds are 1.5, 3, and 6 Gb/s

   Note: 6Gb SAS port 1 x4 is not used at this time.

◆ One four-port 1-Gb/s copper Ethernet I/O personality module (for front-end connectivity)

   Note: A two-port 10-Gb/s copper Ethernet I/O personality module is available as an upgrade. However, this I/O personality module is only supported in a dual SP configuration. For more information about this I/O personality module, see "Two-port 10-Gb/s copper Ethernet I/O personality module" on page 28.

◆ One Ethernet (RJ-45) 10/100/1000 LAN (network management) port

◆ One Ethernet (RJ-45) 10/100/1000 LAN (service laptop) port

   Note: This connector is not used at this time.

◆ One RS-232/EIA 232 (micro DB-9) to standby power supply (SPS) connector

   Note: This connector is not used at this time.

◆ One RS-232/EIA 232 (micro DB-9) to service laptop connector

6-Gb/s SAS ports — The VNXe3100 platform SP has two 6-Gb/s SAS 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 connector (socket or receptacle) using an SFF-8088 specification mini-SAS 26-circuit cable (plug) with a pull tab.

Note: The 6GB SAS port 1 x4 is not used at this time.

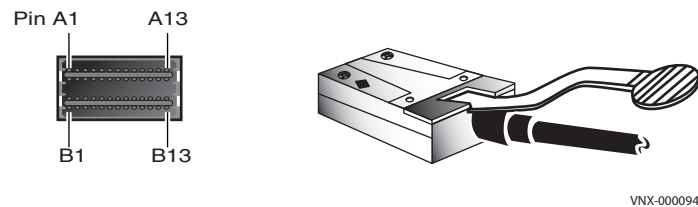Figure 11 shows an example of the port connector (socket) and cable connector (plug) with pull tab.

Figure 11 6-Gb/s SAS port and cable connector

Note: Each SAS cable is keyed with an *in* (or one black circle, ●) and *out* (or one black diamond, ◆) connection to prevent incorrect cabling.

Table 4 lists the 6-Gb/s SAS port pin signals used on the connector.

Table 4 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 12 shows an example of the SP 6-Gb/s SAS ports (labeled **6-Gb SAS 0 x4** and **1 x4**) LEDs (blue) below the bottom connector. These LEDs indicate the link/activity of the 0 x4 and 1 x4 6-Gb/s SAS ports.

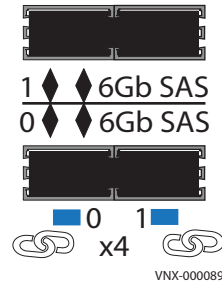**Note:** The 6GB SAS port 1 x4 is not used at this time.

Figure 12 6-Gb/s SAS port LEDs

Note: Each SAS port is keyed with an *out* (or two black diamonds, ◆◆) connection to prevent incorrect cabling. For information about the SAS cable, see the note under Figure 11 on page 26.

Table 5 describes the 6-Gb/s SAS port LEDs.

Table 5 6-Gb/s SAS port LEDs

LED	Color	State	Description
Link/activity	Blue	On	Port linked at 6 Gb/s with all four lanes
	Green	On	Port linked but at 1.5 Gb/s, 3 Gb/s, or 6 Gb/s without all four lanes
	—	Off	No link activity

Four-port 1-Gb/s copper Ethernet I/O personality module — Figure 13 on page 28 shows the VNXe3100 platform SP optional four-port 1-Gb/s copper Ethernet (RJ-45) personality module. These ports are labeled **e0**, **e1**, **e2**, and **e3** and are used for front-end connectivity. These ports support speeds of 10-, 100-, and 1000-Mb/s Ethernet transmission rates over copper wiring.

⚠️WARNING

The four-port 1-Gb/s copper Ethernet (RJ-45) ports on the four-port 1-Gb/s Ethernet I/O personality module 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.
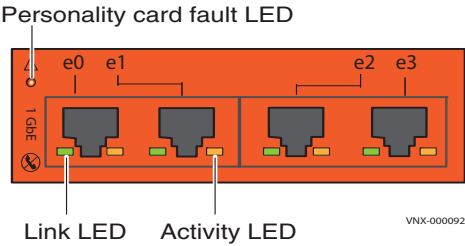
Figure 13 1-Gb/s copper Ethernet I/O personality module (RJ-45) port LEDs

Table 6 describes the SP optional 1-Gb/s copper Ethernet I/O personality module (RJ-45) fault and port LEDs.

Table 6 1-Gb/s copper Ethernet I/O personality module (RJ-45) fault and port LEDs

LED	Color	State	Description
Fault	Amber	On	Fault, replace personality module
Link, left	Green	On	Network/link connection (any speed)
	—	Off	No network/link connection
Activity, right	Amber	Blinking	Transmit/receive activity
	—	Off	No activity

IMPORTANT

The ports shown in Figure 13 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 5, 5E, or 6 unshielded twisted-pair (UTP) cable to the RJ-45 connectors on the back of the SP 1-Gb/s copper Ethernet personality module, as described in Table 7.

Table 7 Ethernet cabling guidelines

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

Two-port 10-Gb/s copper Ethernet I/O personality module — Figure 14 shows an example of the VNXe3150 platform SP optional two-port 10-Gb/s copper Ethernet (RJ-45) personality module. The ports are labeled **e0** and **e1** and are used for front-end connectivity. These ports support speeds of up to 10 Gb/s Ethernet transmission rates over copper wiring.

⚠️**WARNING**

The two-port 10-Gb/s copper Ethernet (RJ-45) ports on the two-port 10-Gb/s copper Ethernet I/O personality module 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.Figure 14 shows an example of the VNXe3150 platform SP optional two-port 10-Gb/s copper Ethernet personality module. The ports are labeled e0 and e1 and are used for front-end connectivity. These ports support speeds up to 10-Gb/s Ethernet transmission rates over copper wiring.
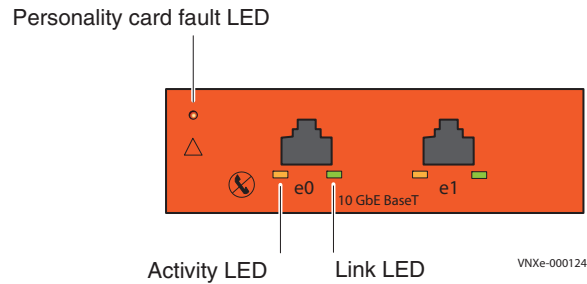

Figure 14 Two-port 10-Gb/s copper Ethernet I/O personality module LEDs

Table 8 describes the SP optional 10-Gb/s copper Ethernet personality module fault and port LEDs.

Table 8 10-Gb/s copper Ethernet personality module fault and port LEDs

LED	Color	State	Description
Fault	Amber	On	Fault, replace personality module
Activity, left	Amber	Blinking	Transmit/receive activity
	—	Off	No activity
Link, right	Green	On	Network/link connection (any speed)
	—	Off	No network/link connection

IMPORTANT

The ports shown in Figure 14 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 6 unshielded twisted-pair (UTP) cable to the RJ-45 connectors on the back of the SP 1-Gb/s copper Ethernet personality module, as described in Table 7 on page 28.

Two 1-Gb/s iSCSI host IP connect (RJ-45) ports

IMPORTANT

The ports shown in Figure 15 are 1-Gb/s iSCSI 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.

The VNXe3100 platform SP comes with two integrated 1-Gb/s iSCSI ports (labeled **2** and **3 1 GBE**). These ports provide an interface for connecting 1-Gb/s iSCSI protocol for host IP connect.

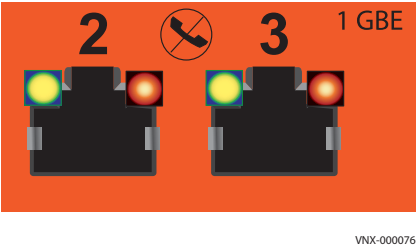Figure 15 shows an example of the SP 1 Gb/s iSCSI (RJ-45) host IP connect ports.

VNX-000076

Figure 15 1 Gb/s iSCSI (RJ-45) host IP connect ports

1-Gb/s iSCSI host IP connect (RJ-45) port LEDs — Figure 16 shows the SP 1-Gb/s iSCSI host IP connect (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 ports, respectively.

VNX-000096
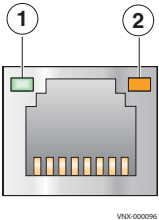
Figure 16 1-Gb/s iSCSI host IP connect (RJ-45) port LEDs

Table 9 describes the link/activity and connection speed associated with the SP 1-GB/s iSCSI host IP connect (RJ-45) port LEDs.

Table 9 1-Gb/s iSCSI host IP connect (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

Table 9 1-Gb/s iSCSI host IP connect (RJ-45) port LEDs (continued)

LED	Color	State	Description
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)

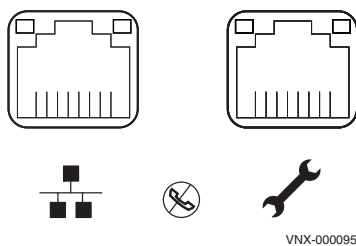**Network management and service laptop Ethernet (RJ-45) ports**

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

The VNXe3100 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 17 shows an example of the SP network management and service laptop Ethernet (RJ-45) ports.

VNX-000095

Figure 17 Network management and service laptop Ethernet (RJ-45) ports

IMPORTANT

The ports shown in Figure 17 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 10.

Table 10 Ethernet cabling guidelines

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

Network management and service laptop Ethernet (RJ-45) port and connector (adapter) — Figure 18 shows an example of the Ethernet (RJ-45) cable connector and port.

87654321

VNX-000097
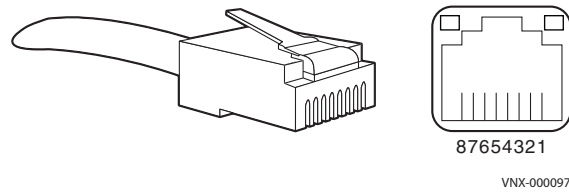
Figure 18 Network management and service laptop Ethernet (RJ-45) connector (adapter) and port

Table 11 lists the SP network management and service laptop Ethernet (RJ-45) pin signals used on the connector.

Table 11 Network management and service laptop Ethernet 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 19 shows the SP network management and service laptop 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.
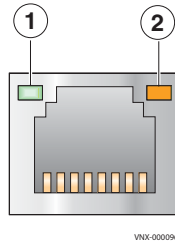

VNX-000096

Figure 19 Network management and service laptop Ethernet (RJ-45) port LEDs

Table 12 describes the link/activity and connection speed associated with the SP network management and service laptop Ethernet (RJ-45) port LEDs.

Table 12 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 for service laptop

The back of the VNXe3100 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.
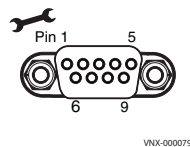
Notice the orientation of the pins shown in Figure 20.

VNX-000079

Figure 20 Serial RS-232/EIA 232 (micro DB-9) connector (socket) for service laptop

Table 13 lists the SP serial RS-232/EIA 232 (micro DB-9) pin signals used on the connector.

Table 13 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	Request to send
8	CTS	Clear to send
9	RI	Ring indicator

Null modem RS-232/EIA 232 (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 21 shows an example of an SP to PC (service laptop) cable.

VNX-000093

Figure 21 Example of null modem RS-232/EIA 232 (micro DB-9 to serial DB-9) cable

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

The back of the VNXe3100 platform SP includes a second standard serial RS-232/EIA 232 interface (micro DB-9) socket connector (labeled with a symbol depicting a battery on the bottom, left) to connect to the SPS management port (RJ-12). Notice the orientation of the pins shown in Figure 22.

Note: This connector is not used at this time.
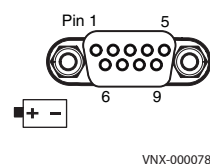

VNX-000078

Figure 22 Serial RS-232/EIA 232 (micro DB-9) connector (socket)

Table 14 lists the SP serial RS-232/EIA 232 (micro DB-9) pin signals used on the connector.

Table 14 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

Cache Protection Module

The Cache Protection Module is hot-swappable with a capacity of 1 GB.

Each Cache Protection Module provides mirrored VNXe OE cache memory for a single SP configuration.

The Cache Protection Module includes the following status LEDs:

◆ Power (green)

◆ Fault (amber)

◆ Unsafe to remove (white)

Figure 23 shows the location of the Cache Protection Module status LEDs.

Fault LED   Unsafe to remove LED

Power LED
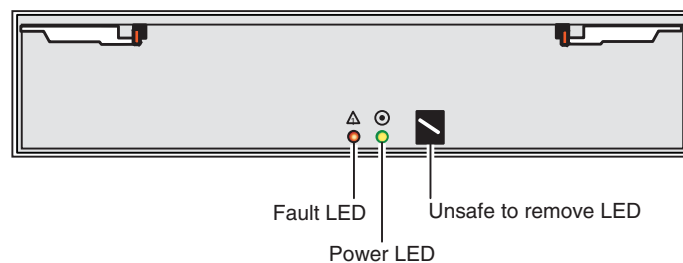
VNX-000077

Figure 23 Cache Protection Module status LEDs

Table 15 lists the Cache Protection Module LEDs.

Table 15 Cache Protection Module status LEDs

LED	Color	State	Description
Power	Green	On	Power on
	—	Off	Power off
Fault	Amber	On	Fault
	—	Off	No fault
Unsafe to remove	White	On	*Do not* remove; data could be lost
	—	Off	Safe to remove; data will not be lost

Disk-array enclosure

> **⚠CAUTION**
>
> **Lifting the DAE and installing it to or removing it from a rack is a two-person job. If needed, use an appropriate lifting device (mechanical lift). A fully loaded 2U, 12 (3.5-inch) DAE or 2U, 25 (2.5-inch) DAE weighs approximately 52 lb (23.6 kg) or 45 lb (20.5 kg), respectively.**

The VNXe3100 platform supports two types of disk-array enclosures (DAEs) across a 6-Gb/s SAS bus. The DAEs used in the VNXe3100 platform are the:

◆ 2U, 12 (3.5-inch) disk drive DAE

◆ 2U, 25 (2.5-inch) disk drive DAE

> **Note:** The 2U 25, (2.5-inch) disk drive DAE is only supported when you have software VNXe Operating Environment (OE) version 2.3.x and above installed.

In a dual SP system, when the 2U, 12 (3.5-inch) disk drive DAE is used with a 2U, 12 (3.5-inch) disk drive DPE, the VNXe3100 platform supports up to seven 2U, 12 (3.5-inch) disk drive DAEs or a maximum of 96 (3.5-inch) disk drives.[4]

In a dual SP system, when the 2U, 25 (2.5-inch) disk drive DAE is used with a 2U, 12 (3.5-inch) disk drive DPE, the VNXe3100 platform supports up to three 2U, 25 (2.5-inch) disk drive DAEs and one 2U, 12 (3.5-inch) disk drive DAE or a maximum of 99 disk drives.[5]

---

4. In a single SP configuration, the VNXe3100 platform can support up to three 2U, 12 (3.5-inch) disk drive DAEs or a maximum of 48 disk drives.
5. In a single SP configuration, the VNXe3100 platform can support up to one 2U, 25 (2.5-inch) disk drive DAEs and one 2U, 12 (3.5-inch) disk drive DAEs or a maximum of 49 disk drives.

IMPORTANT

When calculating the number of drives for your VNXe3100 platform, the 2U DPE is included in the total drive slot quantity of from 96 to 99 drives in a dual SP system. If the total drive slot quantity exceeds from 96 to 99, you will not be able to add another DAE.

When calculating the number of drives for your VNXe3100 platform, the 2U DPE is included in the total drive slot quantity of from 48 to 49 drives in a single SP system. If the total drive slot quantity exceeds from 48 to 49, you will not be able to add another 2U DAE.

DPE and DAE configuration rules

Table 16 and Table 17 provide a matrix describing what types and how many 2U DAEs can be used in either a dual SP VNXe3100 platform or in a single SP VNXe3100 platform.

As shown in each table, the first column shows the number 12 (Table 16), which refers to the 2U, 12 (3.5-inch) disk drive 2U DPE. Across the top of each matrix, the number of DAEs (DAE1, DAE2, and so on up to DAE7) are listed. Within the body of the matrix (Table 16 or Table 17), the number 12 refers to the 2U, 12 (3.5-inch) disk drive DAE and the number 25 refers to the 2U, 25 (2.5-inch) disk drive DAE. The letter X in the matrix indicates that there is no 2U DAE available (supported) beyond that point. Note that the **Total** column in Table 16 or Table 17 shows the total number of disks available (supported) using a combination of the 2U DPE and the 2U DAE for that particular configuration.

Table 16 DPE and DAE configuration rules for dual SP configuration

VNXe3100 Dual SP platform								
DPE	DAE1	DAE2	DAE3	DAE4	DAE5	DAE6	DAE7	Total
12	12	12	12	12	12	12	12	96
12	12	12	12	12	12	25	X	97
12	12	12	12	12	25	12	X	97
12	12	12	12	25	25	X	X	98
12	12	12	12	25	12	12	X	97
12	12	12	25	25	12	X	X	98
12	12	25	25	25	X	X	X	99
12	25	25	25	12	X	X	X	99

Table 17 DPE and DAE configuration rules for single SP configuration

VNXe3100 Single SP platform								
DPE	DAE1	DAE2	DAE3	DAE4	DAE5	DAE6	DAE7	Total
12	12	12	12	X	X	X	X	48
12	12	25	X	X	X	X	X	49
12	25	12	X	X	X	X	X	49

DAE description

Each DAE consists of the following components:

◆ Drive carrier

◆ Disk drives

◆ Midplane

◆ Link control cards (LCCs)

◆ Power supply/cooling modules

◆ EMI shielding

Drive carrier

Disk drive carriers are 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. Figure 24 on page 39 shows the disk drive ready LEDs that are integrated into the chassis that the carrier is in. These LEDs primarily show the disk drive readiness as well as activity.

Disk drives

You can visually distinguish between drive types by their different latch and handle mechanisms and by the type, capacity, and speed labels on each drive. You can add or remove a disk drive while the DAE is powered up, but you should exercise special care when removing drives while they are in use. Disk drives are extremely sensitive electronic components. For more information about the supported disk drives for the VNXe3100, refer to the *EMC® VNXe™ Series Storage Systems Disk and OE Matrix* document.

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. Figure 29 on page 44 shows an enclosure address (EA) indicator that is located on each LCC. Figure 29 on page 44 shows an example of an LCC bus (loop) identification indicator.

Power supply/cooling module

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 power supply with power-related faults will not affect the operation of any other device.

shows the three status LEDs on the power supply/cooling module.

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. The VNXe3100 platform requires a front bezel that has a locking latch and integrated EMI shield. You must remove the bezel/shield to remove and install disk drives.

2U, 12 (3.5-inch) DAE

On the front, the 2U, 12 (3.5-inch) disk drive DAE carrier includes the following hardware components:

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

◆ Status LEDs

shows the location of these components.
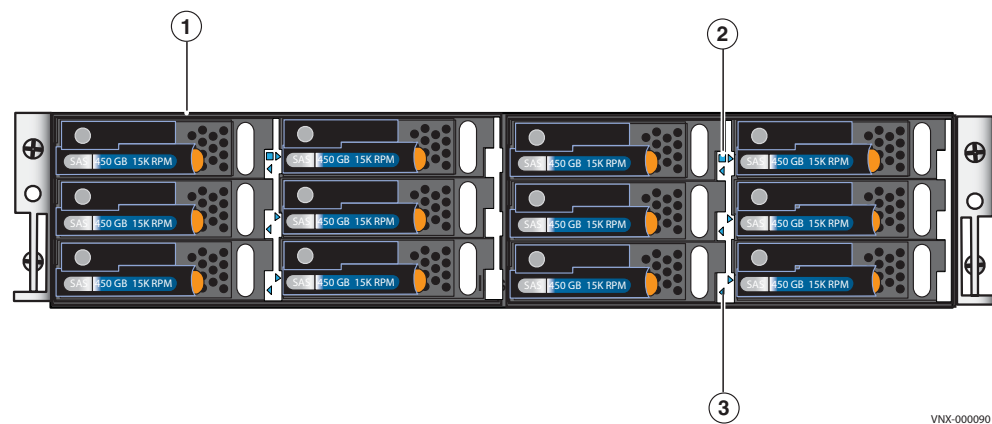
1	3.5-inch SAS drives[1]	3	Disk drive ready/activity LED (blue)
2	DAE power on LED (blue)		

1. The VNXe3100 platform also supports 6-Gb/s NL-SAS drives. For more information about the disk drives supported in the VNXe3100, refer to the *EMC® VNXe™ Series Storage Systems Disk and OE Matrix* document.

Figure 24 2U, 12 (3.5-inch) DAE (front view)

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

Table 18 describes the DAE and the 3.5-inch disk drive status LEDs

Table 18 2U, 12 (3.5-inch) DAE and disk drive LEDs

LED	Color	State	Description
DAE power (location 2)	Blue	On	Powering and powered up
	—	Off	Powered down
Disk drive on/activity (location 3) **Note:** The disk drive LED (a left or right triangle symbol) points to the disk drive that it refers to.	Blue	On	Powering and powered up
		Blinking, mostly on	Disk drive is on with I/O activity
		Blinking at constant rate	Disk drive is spinning up or down normally
		Blinking, mostly off	Disk drive is powered up but not spinning **Note:** This is a normal part of the spin-up sequence, occurring during the spin-up delay of a slot.
	—	Off	Disk drive is powered down

Rear view

On the rear, viewing from top to bottom, a 2U, 12 (3.5-inch) DAE includes the following hardware components (Figure 25 on page 41):

◆ Two power supply/cooling modules

◆ Two 6-Gb/s SAS LCCs (A and B)

6-Gb/s SAS LCC

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

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

Looking from left to right, Figure 25 shows an example of the rear view of a 2U, 12 (3.5-inch) disk drive DAE.

Figure 25 DAE with two LCCs and two power supply/cooling modules (rear view)
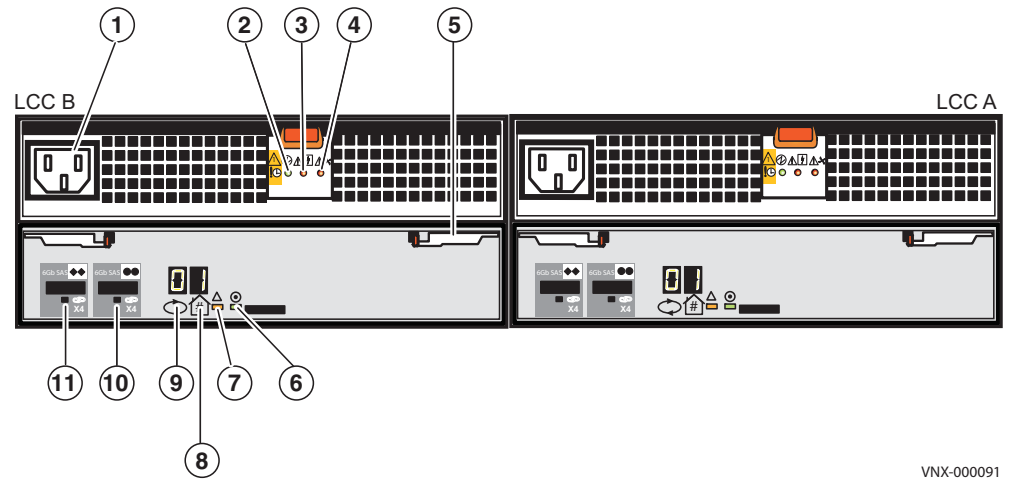
VNX-000091

1	LCC B AC power supply power in (recessed plug)	7	LCC B fault LED (on, amber)
2	LCC B power supply LED (on, green)	8	DAE enclosure ID[1]
3	LCC B power supply fault LED (on, amber)	9	LCC B loop bus ID
4	LCC B power supply fan fault LED (on, amber)	10	LCC B SAS connector (input); labeled with a double circle (or dot) symbol ●●.
5	LCC B right latch handle	11	LCC B SAS connector (output); labeled with a double diamond symbol ◆◆.
6	LCC B power LED (on, green)		

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

Note: On the rear of the DAE, looking from left to right, Figure 25 shows LCC B and LCC A, respectively.

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 (physical links) and the disk-drive status LEDs.

Figure 25 shows the location of the enclosure ID indicator[7] 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.

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

DAE AC power supply/cooling module

Figure 26 shows an example of the 2U, 12 (3.5-inch) disk drive DAE AC power supply/cooling module with a power in (recessed) connector (plug) and status LEDs.
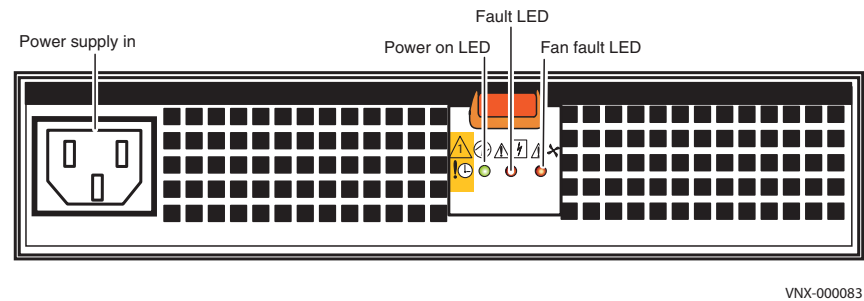

VNX-000083

Figure 26 Example of a DAE AC power supply/cooling module power in (recessed) connector (plug) and status LEDs

Table 19 describes the DAE power supply/cooling module LEDs.

Table 19 DAE AC power supply/cooling module LEDs

LED	Color	State	Description
Power	Green	On	Power on
	—	Off	Power off
Power fault	Amber	On	Power supply fault, check cable connection
		Blinking	BIOS, POST and OS booting up or system overheating
	—	Off	No fault or power off
Fan fault	Amber	Fault	Fault, not operating normally
	—	No fault	No fault, fan operating normally

The power supply/cooling modules are located above the LCCs. The units integrate independent power supply and 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.

Note: Each line cord should be plugged into a different AC power distribution unit (PDU) for high availability (the *VNXe3100 Installation Guide* provides more information).

DAE LCC input/output ports and connectors

The 2U, 12 (3.5-inch) DAE LCC supports two 6-Gb/s SAS x 4 ports on the rear of the device.

6-Gb/s SAS x4 ports — The 2U, DAE LCC supports two 6-Gb/s SAS x4 ports (labeled **6GB SAS x4**) on the rear of each LCC (A and B). This port is a 26-circuit SAS small form-factor 8088 (SFF-8088) specification connector (socket or receptacle) using an SFF-8088 specification mini-SAS 26-circuit cable (plug) with a pull tab.

Figure 27 shows an example of the port connector (socket) and cable connector (plug) with pull tab.
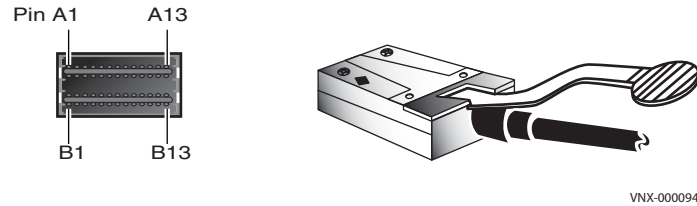

VNX-000094

Figure 27 6-Gb/s SAS port and cable connector

Note: Each SAS cable is keyed with an *in* (or one black circle, ●) and *out* (or one black diamond, ◆) connection to prevent incorrect cabling.

Table 20 lists the DAE LCC 6-Gb/s SAS port pin signals used on the connector.

Table 20 6-Gb/s SAS port connector pinout

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

6-Gb/s SAS port LEDs and port direction (input or output) — Figure 28 shows the LCC 6-Gb/s SAS port LED—a bi-color (blue/green) LED below the connector, either left or right—that indicates the link of the SAS port. Figure 28 also shows a double black circle (or dot) ●● symbol (for input) or a double black diamond ◆◆ symbol (for output).
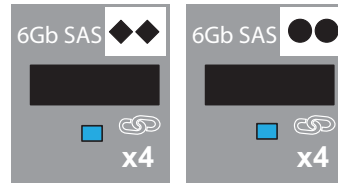
VNX-000087

Figure 28 DAE LCC 6-Gb/s SAS port LED

Table 21 describes the DAE LCC 6-Gb/s SAS port LED.

Table 21 DAE LCC 6-Gb/s SAS port LED

LED	Color	State	Description
Link	Blue	On	All lanes are running at 6 GB/s
	Green	On	One or more lanes running at 1.5 or 3 Gb/s
	Alternating Blue/Green	Blinking	Port is being marked by the host
	—	Off	Not connected

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 for displaying decimal numbers. The LCC enclosure ID appears on both LCCs (A and B) which is the same ID number. Figure 29 shows the enclosure ID is set at installation.

Each LCC includes a bus (loop) identification indicator. This indicator is a seven-segment LED for displaying decimal numbers. Figure 29 shows the SP initializes the bus ID when the operating system is loaded.
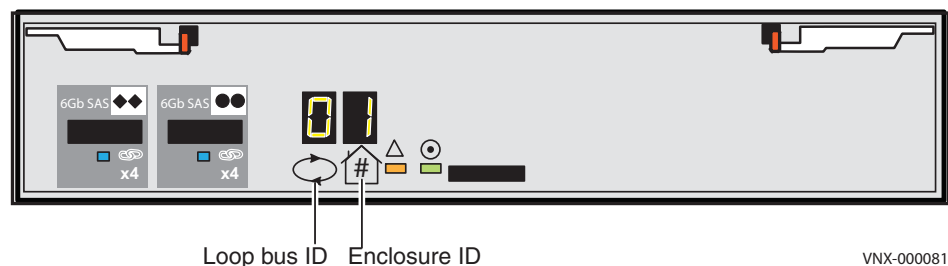
Loop bus ID   Enclosure ID   VNX-000081

**Figure 29** Example of LCC loop bus ID and enclosure ID

2U, 25 (2.5-inch) DAE

On the front, the 2U, 25 (2.5-inch) disk drive DAE carrier includes the following hardware components:

◆ 2.5-inch 6-Gb/s SAS or 6-Gb/s NL-SAS disk drives (hot-swappable)[8]

◆ Status LEDs

Note: The 2U 25, (2.5-inch) disk drive DAE is only supported when you have VNXe Operating Environment (OE) software version 2.3.x and above installed.

Figure 30 shows the location of these components.

VNX-000276
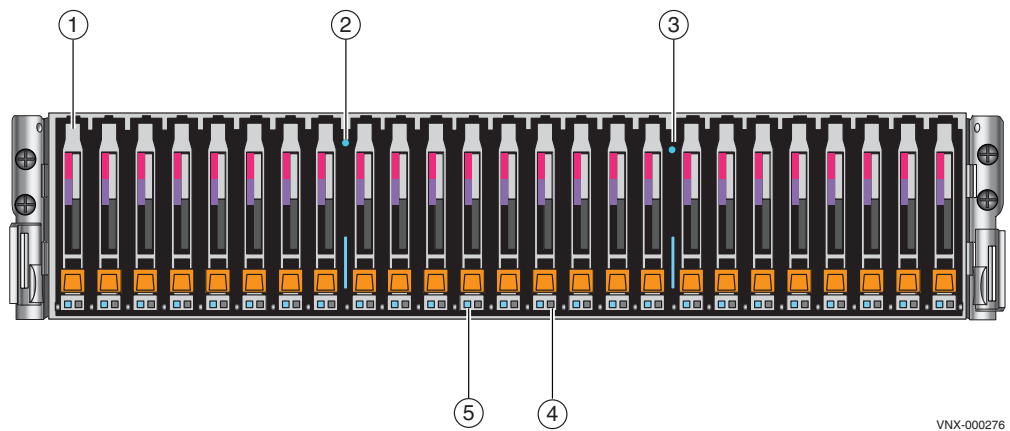
1	2.5-inch SAS disk drive	4	Disk drive fault LED (amber)
2	DAE fault LED (blue), amber if faulted	5	Disk drive ready/activity LED (blue)
3	DAE power status LED (blue)		

Figure 30 2U, 25 (2.5-inch) DAE (front view)

Table 22 describes the DAE and the 2.5-inch disk drive status LEDs

Table 22 Example of a 2U, 25 (2.5-inch) DAE and the disk drive 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

---

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

Table 22 Example of a 2U, 25 (2.5-inch) DAE and the disk drive LEDs (continued)

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

Rear view

On the rear, a 2U, 25 (2.5-inch) DAE includes the following hardware components (Figure 31 on page 47):

◆ Two 6-Gb/s SAS LCCs (A and B)

◆ Two power supply/cooling modules

6-Gb/s SAS LCC

The 6-Gb/s SAS LCC supports, controls, and monitors the DAE, and is the primary interconnect management element (Figure 31 on page 47). Each LCC includes connectors for input and output to downstream devices.

As described previously, the LCCs in a DAE connects to the DPE and other DAEs with 6-Gb/s SAS cables. The cables connect the LCCs in a system in a daisy-chain 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 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 31 on page 47, an enclosure ID[9] 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.

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

Figure 31 shows an example of the rear view of a 2U, 25 (2.5-inch) disk drive DAE.

VNX-000280
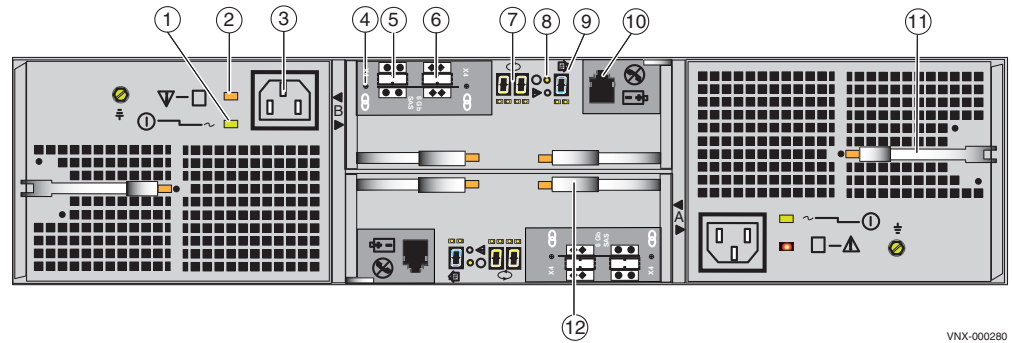
1	LLC B power supply LED (on, green)	7	LCC B bus ID
2	LCC B power supply fault LED (on, amber)	8	LCC B power and fault LEDs
3	LCC B AC power supply power in (recessed plug)	9	DAE enclosure ID or address
4	LCC B SAS connector link LED (on, blue)	10	LCC B management (RJ-12) connector to SPS (not used)
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

Figure 31 DAE with two LCCs and two power supply/cooling modules (rear view)

Note: Figure 25 on page 41, looking from the rear of the DAE, shows LCC B located on the top and LCC A located on the bottom.

DAE AC power supply/cooling module

Figure 32 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.
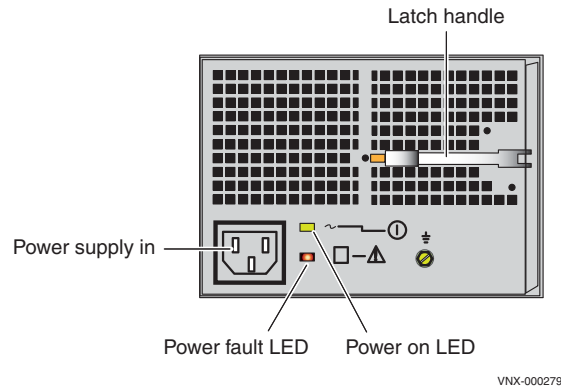

VNX-000279

Figure 32 Example of 2U, 25 (2.5-inch) DAE AC power supply/cooling module power in (recessed) connector (plug) and status LEDs

Table 23 describes the 2U, 25 (2.5-inch) DAE power supply/cooling module LEDs.

Table 23 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 (OVP) and undervoltage protection (UVP) fault
	—	Off	No fault or power off
Power on	Green	On	Power on
	—	Off	Power off

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

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

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 PCI Gen 2 SAS ports

◆ One management (RJ-12) connector to the SPS (not used)

6-Gb/s SAS x4 ports

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

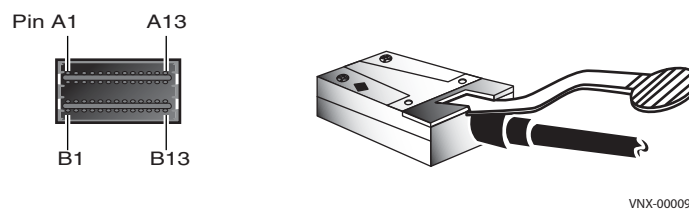Figure 33 shows an example of the port connector (socket) and cable connector (plug) with pull tab.

Figure 33 6-Gb/s SAS port and cable connector

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

Table 24 lists the 2U, DAE 6-Gb/s SAS port pin signals used on the connector.

Table 24 6-Gb/s SAS port connector pinout

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

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

Figure 34 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.
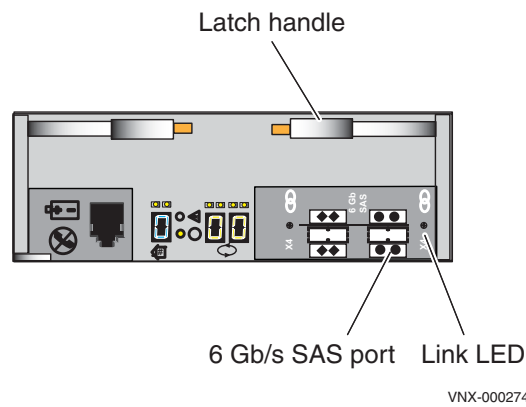

VNX-000274

Figure 34 6-Gb/s SAS port LED

Table 25 describes the 2U DAE LCC 6-Gb/s port LEDs.

Table 25 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 (not used)

Note: The management Ethernet (RJ-12) LCC to SPS port connector is not used in the VNXe3100 platform.

Figure 35 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.
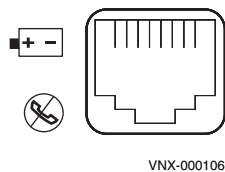
VNX-000106

Figure 35 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 36).

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 36).
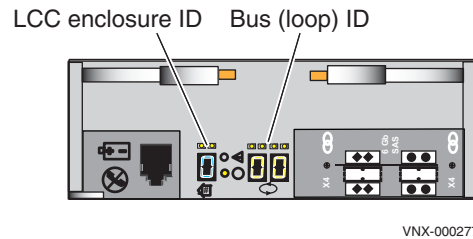
LCC enclosure ID   Bus (loop) ID

VNX-000277

Figure 36 Example of LCC B enclosure ID and bus ID

Table 26 describes the bus (loop) status LEDs.

Table 26 LCC bus (loop) status LEDs

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

Specifications

Table 27 lists the VNXe3100 platform physical specifications, operating environment, and power requirements.

Table 27 VNXe3100 platform specifications

Parameter	Characteristics
Dimensions (approximate)	
Height	28 in. (71.12 cm) or 16 NEMA units (U) total; one disk processor enclosure (DPE, 2U) and seven disk-array enclosures (2U, 12 [3.5-inch] DAE)
Width	17.5 in. (44.5 cm); mounting bars fit standard 19-inch NEMA cabinets
Depth	Chassis to rear: 19.5 in. (49.53 cm)
Weight	424.5 lb (192.55 kg) total; one DPE and seven 2U, 12 (3.5-inch) DAEs
Operating environment	
Temperature	50-104° F (10-40° C)
Temperature gradient	18° F/hr (10° C/hr)
Relative humidity	20% to 80% (non-condensing)
Altitude	8,000 ft (2,438 m) @ 104° F (40° C) max. 10,000 ft (3,048 m) @ 98.6° F (37° C) max.
AC power and dissipation	
AC line voltage	100 to 240 VAC (47-63 Hz), single phase
AC line current	4.0 A max at 100 VAC, 2.0 A max at 200 VAC[1] 2.5 A max at 100 VAC, 1.3 A max at 200 VAC[2]
Power consumption	395 VA (380 W) max[a] 250 VA (240 W) max[b]
Power factor	0.98 min at full load, low voltage
Heat dissipation	1.37×10^6 J/hr, (1,300 Btu/hr) max[a] 8.46×10^5 J/hr, (800 Btu/hr) max[b]
AC protection	15 A fuse on each power supply, both phases
AC inlet type (receptacle)	IEC320-C14 appliance coupler (per power supply)
Ride-through	30 ms minimum at full load
Current sharing	± 15% of full load, between power supplies

1. DPE

2. DAE