Dell PowerEdge XE9680

Technical Guide

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DELL Technologies

Notes, cautions, and warnings

NOTE: A NOTE indicates important information that helps you make better use of your product.

CAUTION: A CAUTION indicates either potential damage to hardware or loss of data and tells you how to avoid the problem.

WARNING: A WARNING indicates a potential for property damage, personal injury, or death.

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System overview

The Dell PowerEdge XE9680 is Dell's latest 2-socket, 6U air-cooled rack server that is designed to train most demanding ML/DL large models.

The system features:

- Two 4th Generation Intel Xeon Scalable Processor (up to 56C/350 W).
- Up to 32 DDR5 DIMM slots.
- Up to 10 PCIe Gen5 slots to support the latest Gen5 PCIe devices and networking, enabling flexible networking design.
- Up to eight U.2 SAS4/SATA SSDs (with fPERC12)/ NVMe drives (PSB direct) or up to 16 E3.S NVMe drives (PSB direct)

Topics:

- Key workloads
- New technologies

Key workloads

The versatile XE9680 is designed to train most demanding ML/DL large models including:

- Generative AI Training.
- Large natural language processing models, recommendation engines, speech recognition models, conversational AI and chatbots
- AI/ML/DL Training - especially large model training with large datasets
- HPC - Accelerate compute and simulation workloads with industry leading NVLink interconnected GPUs

New technologies

Table 1. New technologies

Technology	Detailed Description
4th Generation Intel Xeon Scalable Processor (Socket E)	Core count: Up to 56 core per processor
	UPI speed: Up to 4 x UPIs/socket @ 16 GT/s or 20 GT/s
	Maximum number of PCIe lanes: Integrated 80 PCIe 5.0 lanes @ 32 GT/s PCIe Gen5
	Maximum TDP: 350 W
4800 MT/s DDR5 Memory	Maximum 16 DIMM slots per processor, eight channel
	Supports up to 4800 MT/s (1 DPC) / 4400 MT/s (2 DPC)
Flex I/O	1 x LOM board,1 GbE x 2 with BCM5720 LAN controller
	Rear I/O with: • 1 GbE Dedicated Management Network Port • USB 3.0 x1 • USB 2.0 x1 • VGA port
	Serial port option
	OCP Mezz 3.0 (supported by x8 PCIe lanes)
	Front I/O with:

Table 1. New technologies (continued)

Technology	Detailed Description
	• USB 2.0 x1 • Micro USB x1(optional)
CPLD 1-wire	Supports payload data of Front PERC, PSB Riser, BP and Rear IO to BOSS-N1 and iDRAC
Dedicated PERC	• fPERC12 (x8, SAS4) • fPERC12 (x8, SATA)
Power Supplies	86 mm dimension is the new PSU form factor design on 16G 54V design
	Six Titanium 2800 W AC with 5+1 PSU redundancy or 3+3 FTR redundancy

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System features

The following table shows the features of the PowerEdge XE9680.

Table 2. Features

Features	PowerEdge XE9680
Processors	Two 4th Generation Intel Xeon Scalable processors with up to 56 cores
Memory	DIMM Speed • Up to 4800 MT/s (1 DPC) • Up to 4400 MT/s (2 DPC) Memory Type • RDIMM Memory module slots • 32 DDR5 DIMM slots • Supports DDR5 registered DIMMs (RDIMMs) slots Maximum RAM • RDIMM 4TB
Storage Controllers	• PERC12 (SAS4/SATA) • Internal Boot: Boot Optimized Storage Subsystem (NVMe BOSS-N1): HWRAID 2 x M.2 SSDs
Drive Bays	Front bays: • 16 x E3.S EDSFF direct from PSB (x4 Gen5) • 8 x U.2 SAS/SATA with fPERC • 8 x U.2 NVME direct from PSB
Power Supplies	• 2800 W AC Titanium
Cooling Options	• Air Cooling
Fans	High performance (HPR) Gold fans
	Six HPR fans on mid tray and Ten HPR GPU fans on rear of the system
Dimension	Height: 263.2 mm (10.36 inches)
	Width: 482.0 mm (18.97 inches)
	Depth: 1008.77 mm (39.71 inches) with bezel
	995 mm (39.17 inches) without bezel
Form Factor	6U rack server
Embedded Management	• iDRAC9 • iDRAC Direct • iDRAC RESTful with Redfish • iDRAC Service Manual
Bezel	Optional LCD bezel or security bezel
OpenManage Software	• CloudIQ for PowerEdge plug in • OpenManage Enterprise • OpenManage Enterprise Integration for VMware vCenter • OpenManage Integration for Microsoft System Center • OpenManage Integration with Windows Admin Center

Table 2. Features (continued)

Features	PowerEdge XE9680	
	• OpenManage Power Manager plug-in • OpenManage Service plugin • OpenManage Update Manager plug-in	
Mobility	Not supported	
OpenManage Integrations	• BMC TrueSight • Microsoft System Center • OpenManage Integration with ServiceNow • Red Hat Ansible Modules • Terraform Providers • VMware vCenter and vRealize Operations Manager	
Security	• Cryptographically signed firmware • Data at Rest Encryption (SEDs with local or external key mgmt) • Secure Boot • Secured Component Verification (Hardware integrity check) • Secure Erase • Silicon Root of Trust • System Lockdown (requires iDRAC9 Enterprise or Datacenter) • TPM 2.0 FIPS, CC-TCG certified, TPM 2.0 China NationZ	
Embedded NIC	2 x 1 GbE LOM	
Networking Options	OCP x8 Mezz 3.0	
GPU Options	8x NVIDIA HGX H100 80GB 700W SXM5 GPUs or 8x NVIDIA HGX A100 80GB 500W SXM4 GPUs	
Ports	Front Ports • 1 x USB 2.0 • 1 x iDRAC Direct (Micro-AB USB) port • 1 x VGA	Rear Ports • 1 x USB 2.0 • 1 x iDRAC Direct ethernet port • 1 x USB 3.0 • 1 x VGA
PCIe	10 Gen5 PCIe slots • 8 x16 Gen5 (x16 PCIe) Full-height, Half-length • 2 x16 Gen5 (x16 PCIe) Full-height, Half-length - Slots 31 and 40 supports NIC	
Operating System and Hypervisors	• Canonical Ubuntu Server LTS • Red Hat Enterprise Linux • SUSE Linux Enterprise Server For specifications and interoperability details, see Dell Enterprise Operating Systems on Servers, Storage, and Networking page at Dell.com/OSsupport.	

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Chassis views and features

Topics:

- Chassis views
- Quick Resource Locator for PowerEdge XE9680 system

Chassis views

Front view of the system

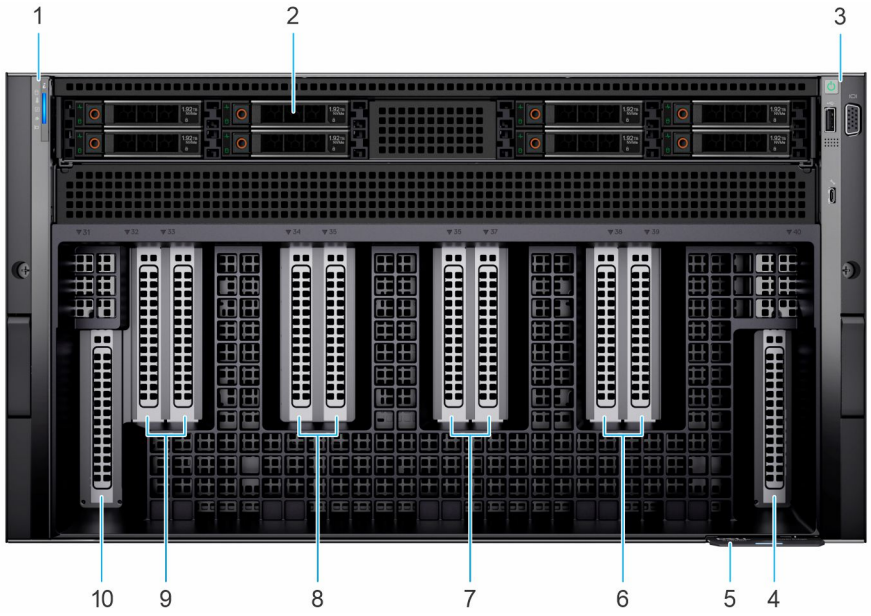

Figure 1. 8 x U.2 NVME or 2.5-inch SAS4/SATA SSD Drives

Table 3. Features available on the front of the 8 x U.2 NVME or 2.5-inch system

Item	Ports, panels, and slots	Icon	Description
1	Left control panel	N/A	Contains the system health, system ID, and the status LED indicator.
2	Drives	N/A	Enables you to install drives that are supported on your system.
3	Right control panel	N/A	Contains the power button, USB port, iDRAC Direct (Micro-AB USB) port.
4	PCIe (slot 40)	N/A	The expansion card riser enables you to connect PCI Express expansion cards.For more information , see the Expansion card installation guidelines section.
5	Information tag	N/A	The Express Service Tag is a slide-out label panel that contains system information such as Service Tag, NIC, MAC address, and so on. If you have opted for the secure default access to iDRAC, the Information tag will also contain the iDRAC secure default password.

Table 3. Features available on the front of the 8 x U.2 NVME or 2.5-inch system (continued)

Item	Ports, panels, and slots	Icon	Description
6	PCIe (slot 38 and 39)	N/A	The expansion card riser enables you to connect PCI Express expansion cards.For more information , see the Expansion card installation guidelines section.
7	PCIe (slot 36 and 37)	N/A	The expansion card riser enables you to connect PCI Express expansion cards.For more information , see the Expansion card installation guidelines section.
8	PCIe (slot 34 and 35)	N/A	The expansion card riser enables you to connect PCI Express expansion cards.For more information , see the Expansion card installation guidelines section.
9	PCIe (slot 32 and 33)	N/A	The expansion card riser enables you to connect PCI Express expansion cards.For more information , see the Expansion card installation guidelines section.
10	PCIe (slot 31)	N/A	The expansion card riser enables you to connect PCI Express expansion cards.For more information , see the Expansion card installation guidelines section.

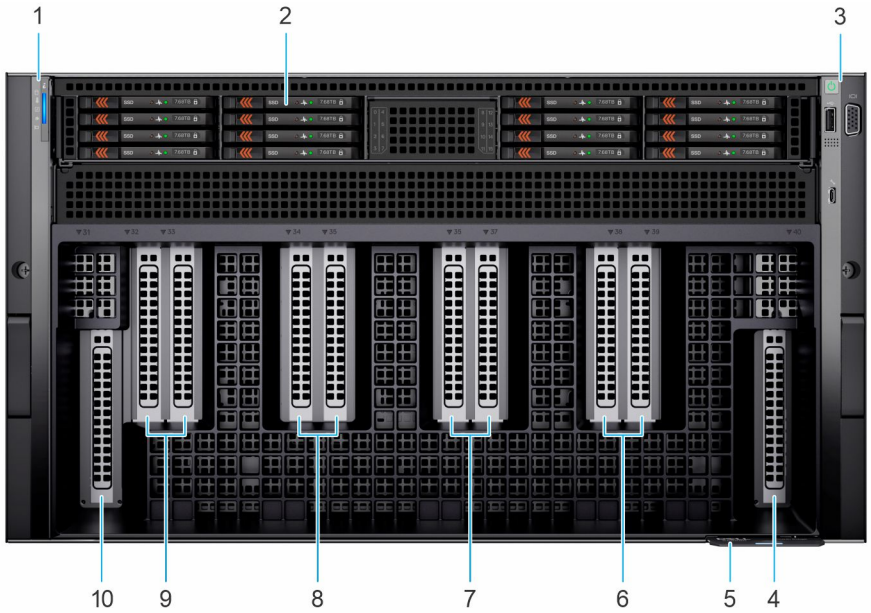

Figure 2. 16 x E3.S Thin NVME drives

Table 4. Features available on the front of the 16 x E3.S Thin NVME system

Item	Ports, panels, and slots	Icon	Description
1	Left control panel	N/A	Contains the system health, system ID, and the status LED indicator.
2	Drives	N/A	Enables you to install drives that are supported on your system.
3	Right control panel	N/A	Contains the power button, USB port, iDRAC Direct (Micro-AB USB) port.
4	PCIe (slot 40)	N/A	The expansion card riser enables you to connect PCI Express expansion cards.For more information , see the Expansion card installation guidelines section.
5	Information tag	N/A	The Express Service Tag is a slide-out label panel that contains system information such as Service Tag, NIC, MAC address, and so

Table 4. Features available on the front of the 16 x E3.S Thin NVME system (continued)

Item	Ports, panels, and slots	Icon	Description
			on. If you have opted for the secure default access to iDRAC, the Information tag will also contain the iDRAC secure default password.
6	PCIe (slot 38 and 39)	N/A	The expansion card riser enables you to connect PCI Express expansion cards.For more information , see the Expansion card installation guidelines section.
7	PCIe (slot 36 and 37)	N/A	The expansion card riser enables you to connect PCI Express expansion cards.For more information , see the Expansion card installation guidelines section.
8	PCIe (slot 34 and 35)	N/A	The expansion card riser enables you to connect PCI Express expansion cards.For more information , see the Expansion card installation guidelines section.
9	PCIe (slot 32 and 33)	N/A	The expansion card riser enables you to connect PCI Express expansion cards.For more information , see the Expansion card installation guidelines section.
10	PCIe (slot 31)	N/A	The expansion card riser enables you to connect PCI Express expansion cards.For more information , see the Expansion card installation guidelines section.

Rear view of the system

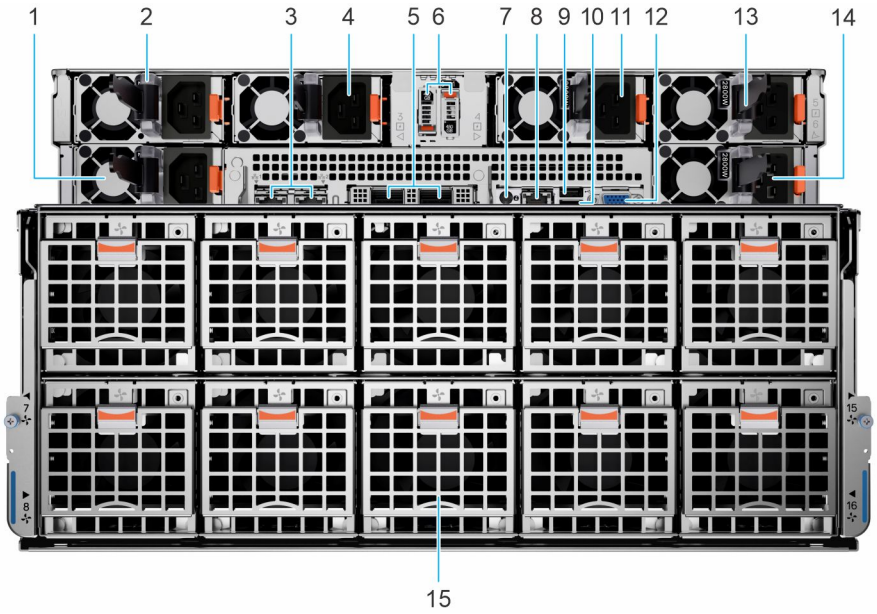

Figure 3. XE9680 chassis rear view

Table 5. Rear view of the system

Item	Ports, panels, or slots	Icon	Description
1	Power supply unit (PSU) 2	N/A	PSU2 of the system
2	Power supply unit (PSU) 1	N/A	PSU1 of the system
3	NIC Ports		The NIC ports are embedded on the LOM card that is connected to the system board.
4	Power supply unit (PSU) 3	N/A	PSU3 of the system

Table 5. Rear view of the system (continued)

Item	Ports, panels, or slots	Icon	Description
5	OCP NIC card	N/A	The OCP NIC card supports OCP 3.0. The NIC ports are integrated on the OCP card which is connected to the system board.
6	BOSS-N1	N/A	There are two M.2 connectors populated on the board and support two NVMe drives for boot.
7	System Identification (ID) button		The System Identification (ID) button is available on the front and back of the system. Press the button to identify a system in a rack by turning on the system ID button. You can also use the system ID button to reset iDRAC and to access BIOS using the step through mode. When pressed, the system ID LED in the back panel blinks until either the front or rear button is pressed again. Press the button to toggle between on or off mode. **NOTE:** If the server stops responding during POST, press and hold the **System ID** button for more than five seconds to enter the BIOS progress mode **NOTE:** To reset the iDRAC (if not disabled on the iDRAC setup page by pressing F2 during system boot), press and hold the **System ID** button for more than 15 seconds.
8	Dedicated iDRAC9 Ethernet port		Enables you to remotely access iDRAC. For more information, see the Integrated *Dell Remote Access Controller User's Guide* at www.dell.com/poweredgemanuals.
9	USB 2.0 port		The USB port is 4-pin, 2.0-compliant. This port enables you to connect USB devices to the system.
10	USB 3.0 port		The USB port is 9-pin and 3.0-compliant. This port enables you to connect USB devices to the system.
11	Power supply unit (PSU) 4	N/A	PSU4 of the system
12	VGA port		Enables you to connect a display device to the system.
13	Power supply unit (PSU) 5	N/A	PSU5 of the system
14	Power supply unit (PSU) 6	N/A	PSU6 of the system
15	Fan module unit	N/A	Fans for GPU and PCIe card cooling

Inside the system

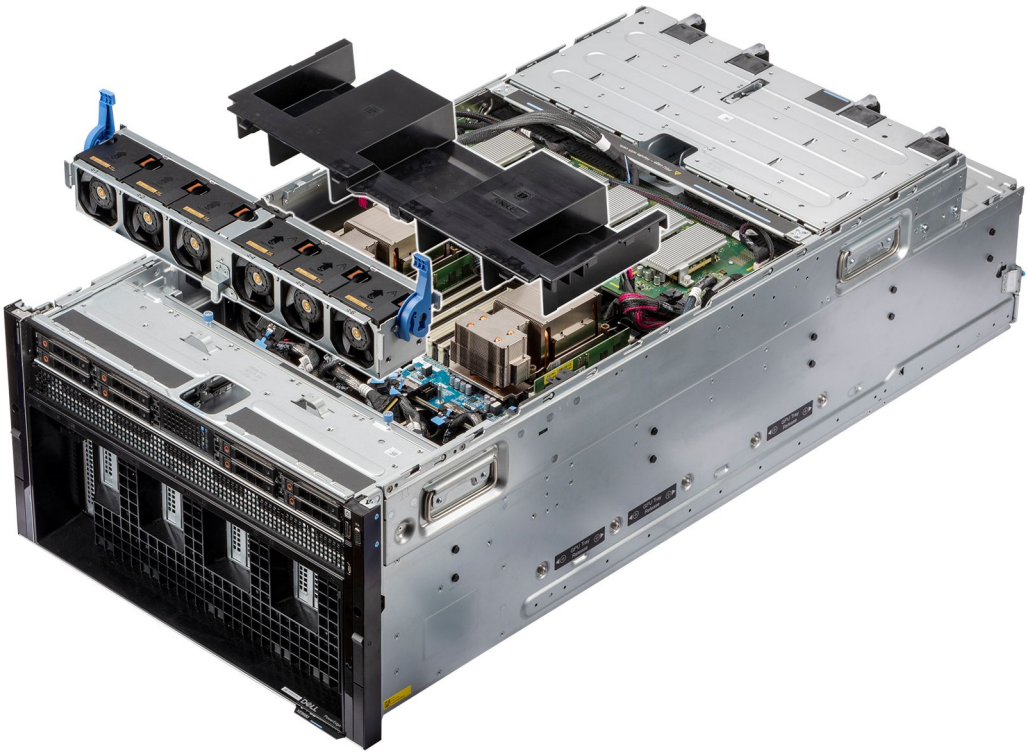

Figure 4. XE9680 inside the system

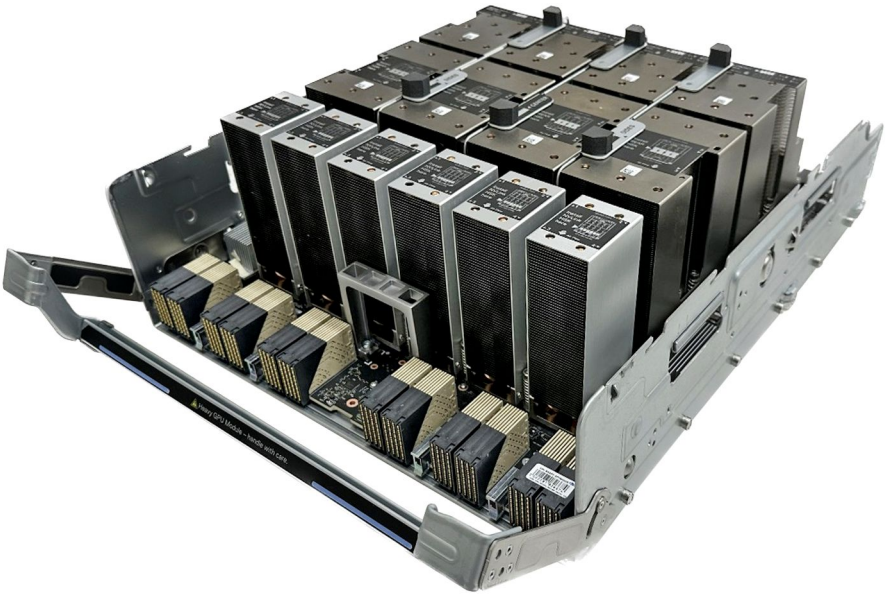

Figure 5. GPU A100 Inside view

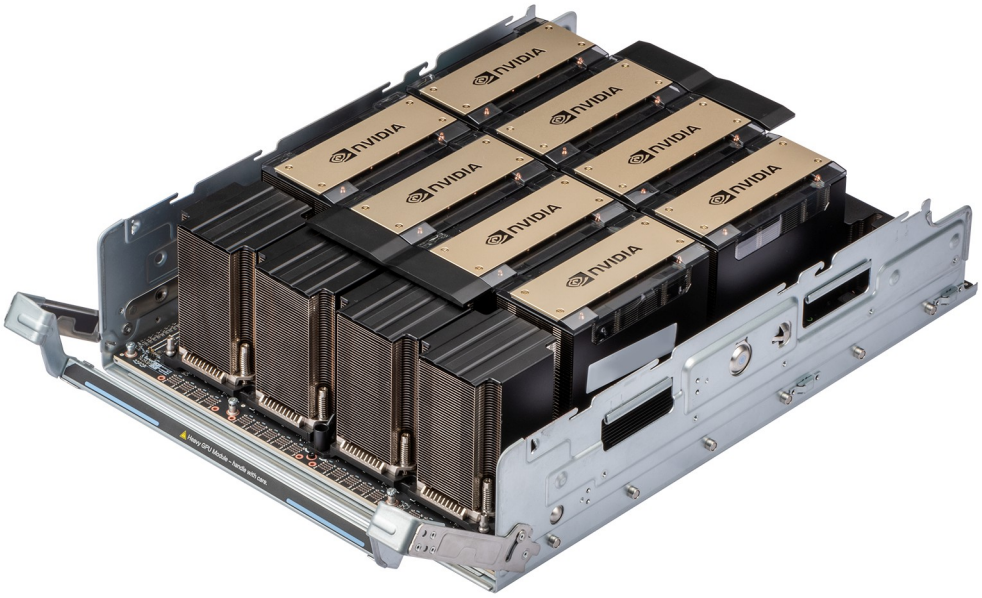

Figure 6. GPU H100 Inside view

Quick Resource Locator for PowerEdge XE9680 system

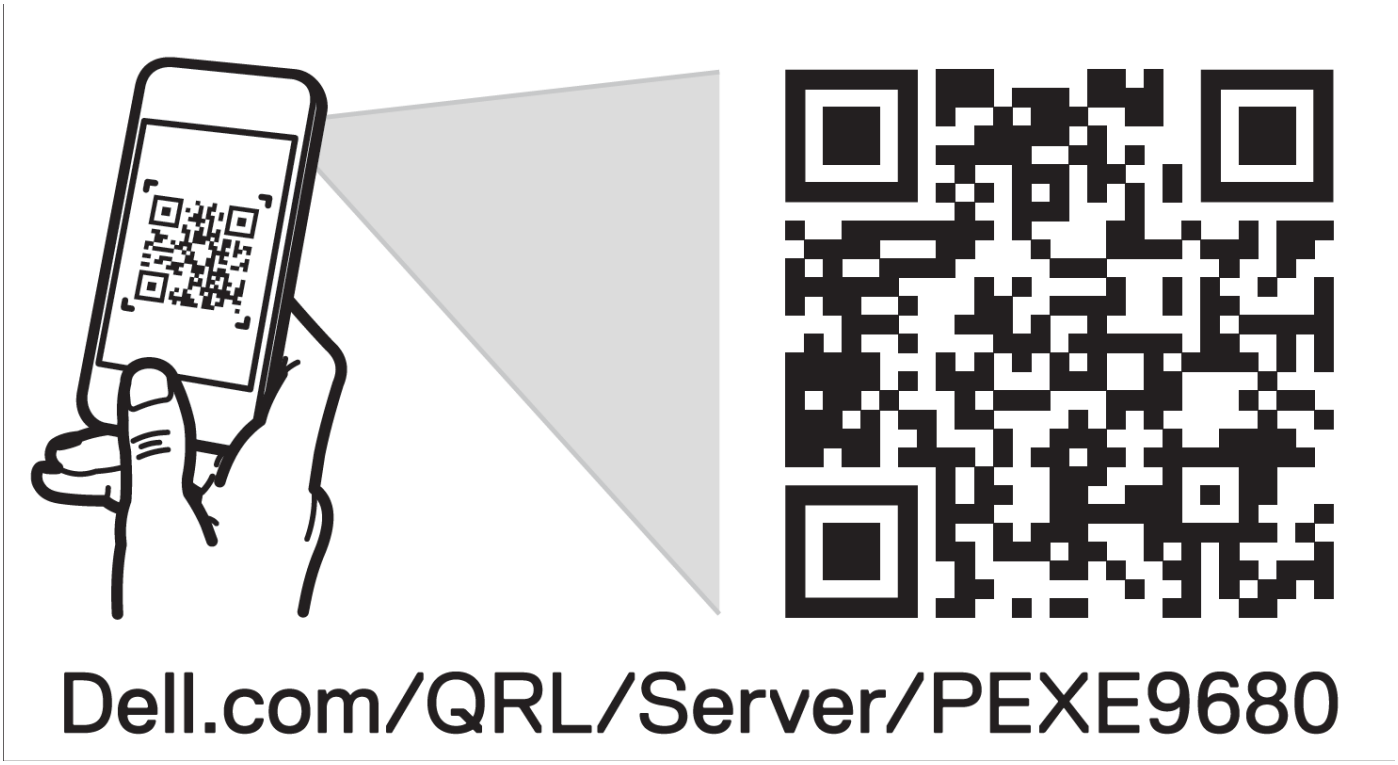

Figure 7. Quick Resource Locator for PowerEdge XE9680 system

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Processor

Topics:

- Processor features

Processor features

The Intel 4th Generation Xeon® Scalable Processors stack is the next generation data center CPU offering with significant performance increases, integrated acceleration, and next generation memory and I/O. Sapphire Rapids will accelerate customer usages with unique workload optimizations.

The following lists the features and functions included in the Sapphire Rapids offering:

- Faster UPI with up to 4 Intel Ultra Path Interconnect (Intel UPI) at up to 16GT/s, increasing multi-socket bandwidth
- More, Faster I/O with PCI Express 5 and up to 80 lanes (per socket)
- Enhanced Memory Performance with DDR5 support and memory speed up to 4800 MT/s (1DPC) and 4400 MTs (2DPC)
- New built-in accelerators for data analytics, networking, storage, crypto, and data compression

Supported processors

The following table shows the Intel Sapphire Rapids SKUs that are supported on the XE9680.

Table 6. Supported Processors for XE9680

Processor	Clock Speed (GHz)	Cache (M)	UPI (GT/s)	Cores	Threads	Turbo	Memory Speed (MT/s)	Memory Capacity	CPS Enabled	TDP
8480+	2	105	16	56	112	Turbo	4800	6 TB	Y	350 W
8470	2	98	16	52	104	Turbo	4800	6 TB	Y	350 W
8468	2.1	90	16	48	96	Turbo	4800	6 TB	Y	350 W
8462Y+	2.8	60	16	32	64	Turbo	4800	6 TB	Y	300 W
8460Y+	2	75	16	40	80	Turbo	4800	6 TB	Y	300 W
8452Y	2	67.5	16	36	72	Turbo	4800	6 TB	Y	300 W
6448Y	2.2	60	16	32	64	Turbo	4800	6 TB	Y	225 W
6442Y	2.6	45	16	24	48	Turbo	4800	6 TB	Y	225 W

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Memory subsystem

Topics:

- Memory specifications

Memory specifications

The PowerEdge XE9680 system supports the following memory specifications for optimized operation.

Table 7. Memory specifications

DIMM type	DIMM rank	DIMM capacity	Dual processors	
			Minimum system capacity	Maximum system capacity
RDIMM	Dual rank	32 GB	Not Supported	1 TB
	Dual rank	64 GB	1 TB	2 TB
	Quad rank	128 GB	2 TB	4 TB

Table 8. Memory module sockets

Memory module sockets	Speed
32, 288-pin	4800 MT/s 1DIMM per channel , 4400 MT/s 2DIMMs per channel

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Storage

Topics:

- Storage controller specifications
- Drives
- Internal storage configuration

Storage controller specifications

The PowerEdge XE9680 system supports the following controller cards:

Table 9. Storage controller cards

Supported storage controller cards
Internal controllers • PERC H965i
Internal Boot • Boot Optimized Storage Subsystem (NVMe BOSS-N1): HWRAID 1, 2 x M.2 SSDs
Software RAID • S160 NVMe

Drives

The PowerEdge XE9680 system supports:

- 8 x 2.5-inch hot-swappable NVMe SSD drives
- 8 x 2.5-inch hot-swappable SAS/SATA SSD drives
- 16 x E3.S hot-swappable EDSFF direct drives

NOTE: For more information about how to hot swap NVMe PCIe SSD U.2 device, see the *Dell Express Flash NVMe PCIe SSD User's Guide* at https://www.dell.com/support **> Browse all products** > **Infrastructure** > **Data Center Infrastructure** > **Storage Adapters & Controllers** > **Dell PowerEdge Express Flash NVMe PCIe SSD** > **Select This Product** > **Documentation** > **Manuals and Documents**.

Internal storage configuration

Table 10. Internal Storage Configuration Matrix

Supported Options	Total HDD/SSD (not BOSS)	NVMe	1st Front Storage	2nd Front Storage	3rd Front Storage	Rear Storage	PERC Qty	Storage Controller (s)	CPU Qty
C01	16	16 / 0	8 x E3.S NVMe direct attached (S160)	8x E3.S NVMe direct attached (S160)	N/A	N/A	0	Software RAID S160	2 CPU

Table 10. Internal Storage Configuration Matrix (continued)

Supported Options	Total HDD/SSD (not BOSS)	NVMe	1st Front Storage	2nd Front Storage	3rd Front Storage	Rear Storage	PERC Qty	Storage Controller (s)	CPU Qty
C02	8	0 / 8	8 x 2.5-inch SAS/ SATA Raid	N/A	N/A	N/A	1	fPERC H965i	2 CPU
C03	8	8 / 0	8 x 2.5-inch NVMe direct attached (S160)	N/A	N/A	N/A	0	Software RAID S160	2 CPU

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Networking

Topics:

- Overview
- OCP 3.0 support

Overview

PowerEdge offers a wide variety of options to get information moving to and from our servers. Industry best technologies are chosen, and systems management features are added by our partners to firmware to tie in with iDRAC. These adapters are rigorously validated for worry-free, fully supported use in Dell servers.

OCP 3.0 support

Table 11. OCP 3.0 feature list

Feature	OCP 3.0
Form factor	SFF
PCIe Gen	Gen4
Max PCIe width	x8
Max no.of ports	4
Port type	BT/SFP/SFP+/SFP28
Max port speed	25 GbE
NC-SI	Yes
SNAPI	Yes
WoL	Yes
Power consumption	35 W

Supported OCP cards

Table 12. Supported OCP cards

Form factor	Vendor	Port type	Port speed	Port count
OCP 3.0	Intel	SFP28	25 GbE	2
	Broadcom	SFP28	25 GbE	4
	Intel	BT	10 GbE	4
	Broadcom	BT	10 GbE	4
	Broadcom	SFP28	25 GbE	2
	Intel	SFP28	25 GbE	4

Table 12. Supported OCP cards (continued)

Form factor	Vendor	Port type	Port speed	Port count
	Intel	SFP28	25 GbE	2
	Intel	SFP28	25 GbE	4
	Intel	SFP28	10 GbE	4

OCP NIC 3.0 vs. rack Network Daughter Card comparisons

Table 13. OCP 3.0, 2.0, and rNDC NIC comparison

Form Factor	Dell rNDC	OCP 2.0 (LOM Mezz)	OCP 3.0	Notes
PCIe Gen	Gen 3	Gen 3	Gen 4	Supported OCP3 are SFF (small form factor)
Max PCIe Lanes	x8	Up to x16	Up to x16	See server slot priority matrix
Shared LOM	Yes	Yes	Yes	This is iDRAC port redirect
Aux Power	Yes	Yes	Yes	Used for Shared LOM

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PCIe subsystem

Topics:

- PCIe slot mechanical compatibility matrix

PCIe slot mechanical compatibility matrix

Table 14. PCIe Riser Configurations

Config No.	Riser configuration	No. of Processors	PERC type supported	Rear storage possible
2	RS1+RS2+RS3+RS4	2	With or without Front PERC	No

Table 15. Expansion card slots

Expansion card riser	PCIe slot	Processor Connection	PCIe slot height	PCIe slot length	PCIe slot width
Riser 4 (RS4)	32	Processor 2	Full height	Half length	x16
	33	Processor 2	Full height	Half length	x16
Riser 3 (RS3)	34	Processor 2	Full height	Half length	x16
	35	Processor 2	Full height	Half length	x16
Riser 2 (RS2)	36	Processor 1	Full height	Half length	x16
	37	Processor 1	Full height	Half length	x16
Riser 1 (RS1)	38	Processor 1	Full height	Half length	x16
	39	Processor 1	Full height	Half length	x16

PCIe slot	Processor Connection	PCIe slot height	PCIe slot length	PCIe slot width
31	Processor 2	Full height	Half length	x16
40	Processor 1	Full height	Half length	x16

NOTE: Slots 31 and 40 are also used to install NIC.

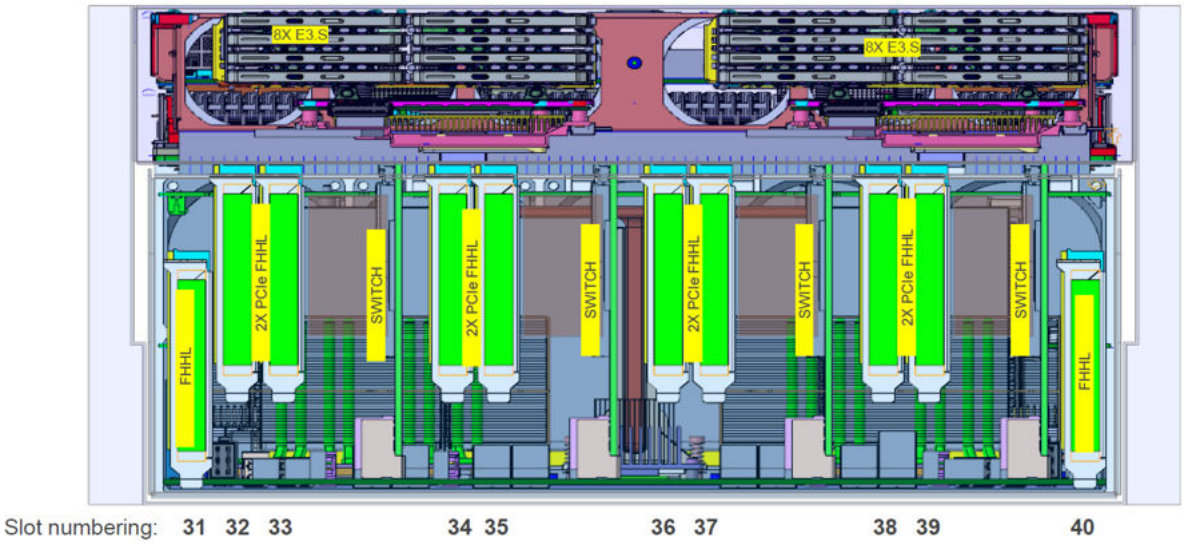


Figure 8. Slot numbering

9

Power, thermal, and acoustics

PowerEdge servers have an extensive collection of sensors that automatically track thermal activity, which helps regulate temperature thereby reducing server noise and power consumption. The table below lists the tools and technologies Dell offers to lower power consumption and increase energy efficiency.

Topics:

- Power
- Thermal
- PowerEdge XE9680 acoustics

Power

Table 16. Power tools and technologies

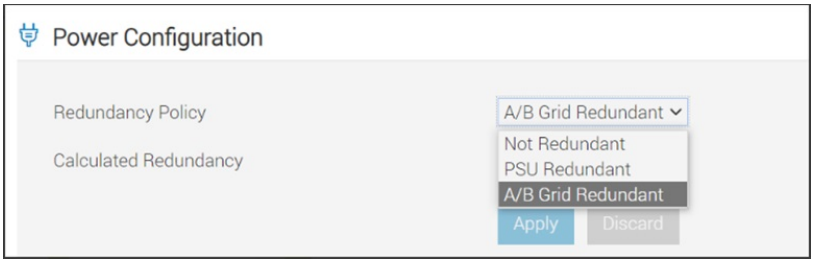
Feature	Description
Power Supply Units(PSU) portfolio	Dell's PSU portfolio includes intelligent features such as dynamically optimizing efficiency while maintaining availability and redundancy. Find additional information in the Power supply units section.
PSU redundancy options	• Not Redundant • PSU Redundant (5+1) FR (System can get full performance) • A/B Grid Redundant (Not supported in power configuration of iDRAC GUI)  **Figure 9. PSU redundancy options**
Tools for right sizing	Enterprise Infrastructure Planning Tool (EIPT) is a tool that can help you determine the most efficient configuration possible. With Dell's EIPT, you can calculate the power consumption of your hardware, power infrastructure, and storage at a given workload. Learn more at www.dell.com/calc.
Industry Compliance	Dell's servers are compliant with all relevant industry certifications and guide lines, including 80 PLUS.
Power monitoring accuracy	PSU power monitoring improvements include: • Dell's power monitoring accuracy is currently 1%, whereas the industry standard is 5% • More accurate reporting of power • Better performance under a power cap
Power capping	Use Dell's systems management to set the power cap limit for your systems to limit the output of a PSU and reduce system power consumption. Dell is the first hardware vendor to leverage Intel Node Manager for circuit-breaker fast capping.

Table 16. Power tools and technologies (continued)

Feature	Description
Systems Management	iDRAC Enterprise and Datacenter provides server-level management that monitors, reports and controls power consumption at the processor, memory and system level. Dell OpenManage Power Center delivers group power management at the rack, row, and data center level for servers, power distribution units, and uninterruptible power supplies.
Active power management	Intel Node Manager is an embedded technology that provides individual server-level power reporting and power limiting functionality. Dell offers a complete power management solution comprised of Intel Node Manager accessed through Dell iDRAC9 Datacenter and OpenManage Power Center that allows policy-based management of power and thermal at the individual server, rack, and data center level. Hot spare reduces power consumption of redundant power supplies. Thermal control off a speed optimizes the thermal settings for your environment to reduce fan consumption and lower system power consumption. Idle power enables Dell servers to run as efficiently when idle as when at full workload.
Fresh Air cooling	Refer to ASHRAE A3/A4 Thermal Restriction.
Rack infrastructure	Dell offers some of the industry's highest-efficiency power infrastructure solutions, including: ● Power distribution units (PDUs) ● Uninterruptible power supplies (UPSs) ● Energy Smart containment rack enclosures Find additional information at: https://www.delltechnologies.com/en-us/servers/power-and-cooling.htm.

The power cap policy setting in iDRAC configuration page controls CPU related power consumption. In XE9680 systems, most of the power is consumed by GPU which cannot be controlled by this setting. Enabling power cap feature will drive CPU to run at very low or lowest frequency speed.

NOTE: Dell recommends user to not enable Power Cap feature in iDRAC configuration page for XE9680 systems.

Power Supply Units

Energy Smart power supplies have intelligent features, such as the ability to dynamically optimize efficiency while maintaining availability and redundancy. Also featured are enhanced power-consumption reduction technologies, such as high-efficiency power conversion and advanced thermal-management techniques, and embedded power-management features, including high-accuracy power monitoring. The table below shows the power supply unit options that are available for the XE9680.

Table 17. PSU specifications for the PowerEdge XE9680 system

PSU	Class	Heat dissipation (maximum)	Frequency	Voltage	Current
2800 W Mixed Mode	Titanium	10500 BTU/hr	50/60 Hz	200 - 240 V AC	15.6 A
	N/A	10500 BTU/hr	N/A	240 V DC	13.6 A

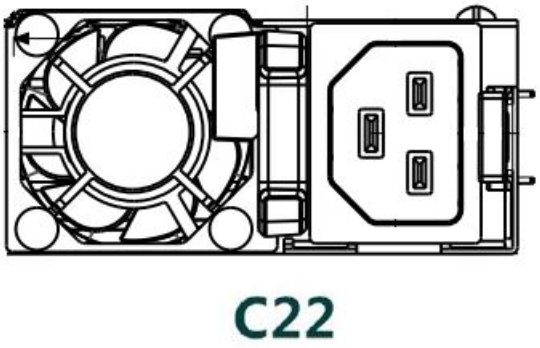


Figure 10. PSU power cord

Table 18. PSU power cord

Form factor	Output	Power cord
Redundant 86 mm	2800 W AC	C22/C21

NOTE: 2800W 54V PSU has a C22 input socket that requires C21 to C20 jumper cord to connect it to PDU in the rack. Traditional high amperage power cords C20/C19 cannot be inserted into the PSU.

Thermal

PowerEdge servers have an extensive collection of sensors that automatically track thermal activity, which helps regulate temperature thereby reducing server noise and power consumption.

Thermal design

Thermal management of the platform helps deliver high performance with the right amount of cooling to components, while maintaining the lowest fan speeds possible. This is done across a wide range of ambient temperatures from 10°C to 35°C (50°F to 95°F) and to extended ambient temperature ranges.

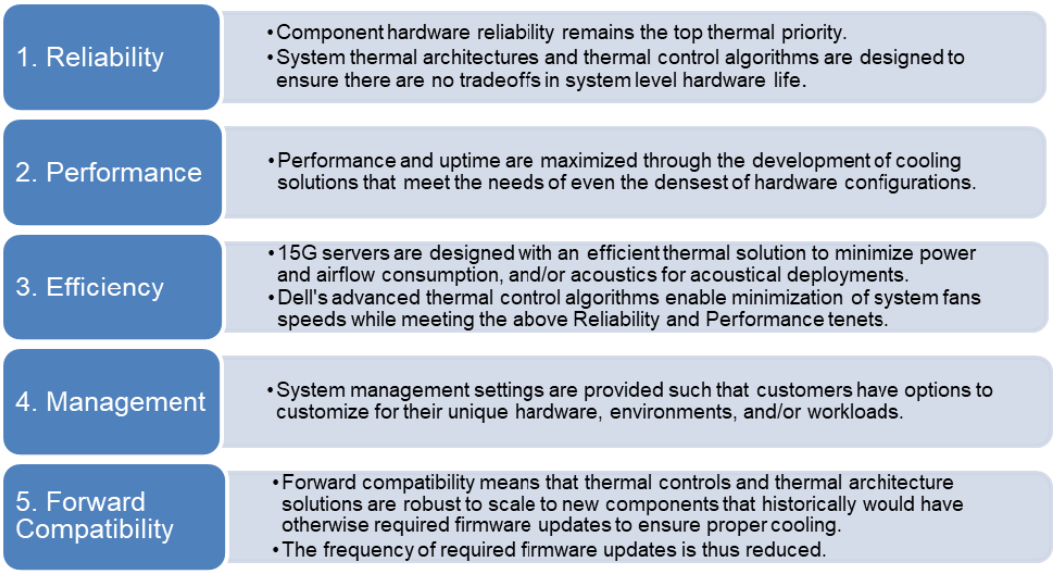


Figure 11. Thermal design characteristics

The thermal design of the PowerEdge XE9680 reflects the following:

- Optimized thermal design: The system layout is architected for optimum thermal design.
- System component placement and layout are designed to provide maximum airflow coverage to critical components with minimum expense of fan power.
- Comprehensive thermal management: The thermal control system regulates the fan speed based on several different responses from all system-component temperature sensors, as well as inventory for system configurations. Temperature monitoring includes components such as processors, DIMMs, chipset, the inlet air ambient, hard disk drives, and OCP.
- Open and closed loop thermal fan speed control: Open loop thermal control uses system configuration to determine fan speed based on inlet air ambient temperature. Closed loop thermal control method uses feedback temperatures to dynamically determine proper fan speeds.
- User-configurable settings: With the understanding and realization that every customer has unique set of circumstances or expectations from the system, in this generation of servers, we have introduced limited user- configurable settings residing in the iDRAC BIOS setup screen. For more information, see the Dell PowerEdge XE9680 Installation and Service Manual at www.dell.com/poweredgemanuals and "Advanced Thermal Control: Optimizing across Environments and Power Goals" on Dell.com.
- Cooling redundancy: The PowerEdge XE9680 allows N+1 fan redundancy, allowing continuous operation with one rotor failure in the system.
- Environmental Specifications: The optimized thermal management makes the PowerEdge XE9680 reliable under a wide range of operating environments.

PowerEdge XE9680 acoustics

Dell PowerEdge XE9680 is a rack data center server whose acoustical output ranges from that appropriate unattended data centers, it is designed to meet Category 5 requirement. Acoustical performance is provided in terms of two configurations: Feature Rich with A100 and H100 configuration details, and acoustical performance data associated with each configuration of XE9680. Each configuration has been tested according to Dell acoustical standards for blades data center servers. Configuration details are provided in the below table:

Table 19. Acoustical configurations of XE9680

Configuration	Feature Rich with H100 GPU	Feature Rich with A100 GPU
CPU Type	Intel	
CPU TDP	350 W	
CPU Quantity	2 CPU	
RDIMM Memory	128 GB	
Memory Quantity	32	
Backplane Type	NVMe	
SSD Type	SSDR,NVRII,15.36TB,U.2,CM6	
SSD Quantity	8	
PSU Type	2800 W	
PSU Quantity	6	
Mezz 1	25Gb Mezz.	
BOSS Card	BOSS-N1	
PERC	N/A	
GPU	H100 GPU board	A100 GPU board
Adapter Card-1	8 x CX7 400Gb PCIe FH Card	
Adapter Card-2	2 x 100GbE 2P Intel PCIe FH	

Acoustical performance data associated with each configuration of XE9680 is provided in the below table:

Table 20. Acoustical performance of XE9680

Configuration		Feature Rich with H100 GPU	Feature Rich with A100 GPU
Acoustical Performance: Idle/ Operating @ 25 °C Ambient			
$L_{wA,m}$(B)	Idle	6.6	6.6
	CPU Operating	6.7	6.6
	GPU Operating	10	10
K_v(B)	Idle	0.4	0.4
	Operating	0.4	0.4
$L_{pA,m}$(dB)	Idle	52	52
	CPU Operating	52	52
	GPU Operating	82	84
Prominent tones		No prominent tones in Idle and Operating	
Acoustical Performance: Idle @ 28 °C Ambient			
$L_{wA,m}$ (B)		7.2	7.2
K_v (B)		0.4	0.4
$L_{pA,m}$ (dB)		59	59
Acoustical Performance: Max. Loading @ 35 °C Ambient			
$L_{wA,m}$ (B)		10.2	10.1
K_v (B)		0.4	0.4
$L_{pA,m}$ (dB)		86	86

- $L_{wA,m}$: The declared mean A-weighted sound power level (LwA) is calculated per section 5.2 of ISO 9296 with data collected using the methods described in ISO 7779. Data presented here may not be fully compliant with ISO 7779.
- $L_{pA,m}$: The declared mean A-weighted emission sound pressure level is at the bystander position per section 5.3 of ISO 9296 and measured using methods described in ISO 7779. The system is placed in a 24U rack enclosure, 25cm above a reflective floor. Engineering data presented here may not be fully compliant with ISO 7779 declaration requirements.
- **Prominent discrete tones:** Criteria of Annex D of ECMA-74 & Prominence Ratio method of ECMA-418 are followed to determine if discrete tones are prominent and to report them, if so.
- **Idle mode:** The steady-state condition in which the server is energized but not operating any intended function.
- **Operating mode:** Operating mode is represented by the maximum of the steady state acoustical output at 50% of CPU TDP or active storage drives for the respective sections of Annex C of ECMA-74.
- **GPU Operating mode:** 8 x H100 NVIDIA SXM5 NVLink GPUs often push the limits of power and cooling requirements in GPU fan zone. To accommodate the increased power of GPUs may be significantly louder due to higher fan speeds, than systems without GPU stressed. The increased acoustical output of GPUs may be particularly noticeable (beyond acoustical target of category 5) during the GPUs run with heavy workload to guarantee GPUs remain their optimal performance.

Category 1: Table-top in Office Environment

When Dell determines that a specific Enterprise product is to be used on a Table-top in Office Environment, e.g., on a desk around a seated user's head height, then the acoustical specification of the below table applies. Small, light-weight towers are examples of these types of products.

Table 21. Dell Enterprise Category 1, "Table-top in Office Environment" acoustical specification category

Measurement Position re AC0158	Metric, re AC0159	Test Modes, re AC0159 (note must be in steady state, see AC0159, except where noted below)			
		Standby in 23±2° C Ambient	Idle in 23±2° C Ambient	Operating in 23±2° C Ambient – if not otherwise specified in the	Simulate (i.e., set fan speeds representative) for Idle at 28 & 35° C Ambient, and for 100% loading and maximum configuration, at 35° C Ambient

Table 21. Dell Enterprise Category 1, "Table-top in Office Environment" acoustical specification category (continued)

				program's configuration document, then processor and hard drive operating modes are required	
Sound Power	LWA,m, B	≤ 4.2	≤ 4.7	≤ 5.0	Report
Sound Quality (both positions must meet limits): Front Binaural HEAD and Rear Microphone	Tones, Hz, dB	No prominent tones per criteria D.10.6 and D.10.8 of ECMA-74			Report tones
	Tonality, tu	≤ 0.35	≤ 0.35	≤ 0.35	Report
	Dell Modulation, %	≤ 35	≤ 35	≤ 35	Report
	Loudness, sones	Report	Report	Report	Report
	LpA-single point, dBA	Report	Report	Report	Report
Front Binaural HEAD	Transients	• Oscillation (see AC0159), if observed, during 20-minute steady-state observation, must adhere to the following two criteria: ○ Max. {ΔLpA} < 3.0 dB ○ Event count < 3 for "1.5 dB < ΔLpA < 3.0 dB" • Acoustical Jump (see AC0159), during air mover speed transition from Idle to Operating Mode must be ≤ 15dB. • Startup behavior ○ Report Startup behavior re. AC0159 ○ Startup must proceed smoothly, i.e., no sudden or large jumps, and fan speed during startup must not exceed 50% of its maximum • Transient inputs: Report time-history sound pressure levels re AC0159 "Train of Step Functions on Processor"				N/A
Any	Other	No rattles, squeaks, or unexpected noises Sound should be "even" around the EUT (one side should not be dramatically louder than another) Unless otherwise specified, the "default" thermal-related settings shall be selected for BIOS and iDRAC. Specific operating conditions will be defined in "Configurations & Configuration Dependencies" for each platform.			
Sound Pressure	LpA-reported, dBA, re AC0158 and program configuration document	Report for all mics	Report for all mics	Report for all mics	Report for all mics

Category 2: Floor-standing in Office Environment

When Dell determines that a specific Enterprise product is to be used primarily when it is sitting on the floor, i.e., next to a user's feet, then the acoustical specification of the below table applies. Noise from the product should not annoy or otherwise interfere with the user's thoughts or speech, e.g., on the telephone.

Table 22. Dell Enterprise Category 2, "Floor-standing in Office Environment" acoustical specification category

Measurement Position re AC0158	Metric, re AC0159	Test Modes, re AC0159 (note must be in steady state, see AC0159, except where noted below)			
		Standby in 23±2° C Ambient	Idle in 23±2° C Ambient	Operating in 23±2° C Ambient – if not otherwise specified in the program's configuration document, then processor and hard drive operating modes are required	Simulate (i.e., set fan speeds representative) for Idle at 28 & 35° C Ambient, and for 100% loading and maximum configuration, at 35° C Ambient
Sound Power	LWA,m, B	≤ 4.9	≤ 5.1	≤ 5.4	Report
Sound Quality (both positions must meet limits): Front Binaural HEAD and Rear Microphone	Tones, Hz, dB	No prominent tones per criteria D.10.6 and D.10.8 of ECMA-74			Report tones
	Tonality, tu	≤ 0.35	≤ 0.35	≤ 0.35	Report
	Dell Modulation, %	≤ 35	≤ 35	≤ 35	Report
	Loudness, sones	Report	Report	Report	Report
	LpA-single point, dBA	Report	Report	Report	Report
Front Binaural HEAD	Transients	• Oscillation (see AC0159), if observed, during 20-minute steady-state observation, must adhere to the following two criteria: ○ Max. {ΔLpA} < 3.0 dB ○ Event count < 3 for "1.5 dB < ΔLpA < 3.0 dB" • Acoustical Jump (see AC0159), during air mover speed transition from Idle to Operating Mode must be ≤ 15dB. • Startup behavior ○ Report Startup behavior re. AC0159 ○ Startup must proceed smoothly, i.e., no sudden or large jumps, and fan speed during startup must not exceed 50% of its maximum ∞ Transient inputs: Report time-history sound pressure levels re AC0159 "Train of Step Functions on Processor"			N/A
Any	Other	No rattles, squeaks, or unexpected noises Sound should be "even" around the EUT (one side should not be dramatically louder than another) Unless otherwise specified, the "default" thermal-related settings shall be selected for BIOS and iDRAC. Specific operating conditions will be defined in "Configurations & Configuration Dependencies" for each platform.			
Sound Pressure	LpA-reported, dBA, re AC0158 and program	Report for all mics	Report for all mics	Report for all mics	Report for all mics

Table 22. Dell Enterprise Category 2, "Floor-standing in Office Environment" acoustical specification category (continued)

	configuration document				

Category 3: General Use Space

When Dell determines that a specific Enterprise product is to be predominantly used in a general use space, then the acoustical specification of the below table applies. These products could be found in laboratories, schools, restaurants, open office space layouts, small ventilated closets, etc., though not in close proximity to any particular person nor in quantities greater than a few in any location. People within proximity of a few of these products should not experience any impact to speech intelligibility or annoyance from the noise of the product. A rack product sitting on a table in a common area is an example.

Table 23. Dell Enterprise Category 3, "General Use" acoustical specification category

Measurement Position re AC0158	Metric, re AC0159	Test Modes, re AC0159 (note must be in steady state, see AC0159, except where noted below)			
		Standby in 23±2° C Ambient	Idle in 23±2° C Ambient	Operating in 23±2° C Ambient – if not otherwise specified in the program's configuration document, then processor and hard drive operating modes are required	Simulate (i.e., set fan speeds representative) for Idle at 28 & 35° C Ambient, and for 100% loading and maximum configuration, at 35° C Ambient
Sound Power	LWA,m, B	≤ 5.2	≤ 5.5	≤ 5.8	Report
Sound Quality (both positions must meet limits): Front Binaural HEAD and Rear Microphone	Tones, Hz, dB	No prominent tones per criteria D.10.6 and D.10.8 of ECMA-74			Report tones
	Tonality, tu	≤ 0.35	≤ 0.35	≤ 0.35	Report
	Dell Modulation, %	≤ 40	≤ 40	≤ 40	Report
	Loudness, sones	Report	Report	Report	Report
	LpA-single point, dBA	Report	Report	Report	Report
Front Binaural HEAD	Transients	• Oscillation (see AC0159), if observed, during 20-minute steady-state observation, must adhere to the following two criteria: ○ Max. {ΔLpA} < 3.0 dB ○ Event count < 3 for "1.5 dB < ΔLpA < 3.0 dB" • Acoustical Jump (see AC0159), during air mover speed transition from Idle to Operating Mode must be ≤ 15dB. • Startup behavior ○ Report Startup behavior re. AC0159 ○ Startup must proceed smoothly, i.e., no sudden or large jumps, and fan speed during startup must not exceed 50% of its maximum ∞ Transient inputs: Report time-history sound pressure levels re AC0159 "Train of Step Functions on Processor"			N/A
Any	Other	No rattles, squeaks, or unexpected noises			

Table 23. Dell Enterprise Category 3, "General Use" acoustical specification category (continued)

		Sound should be "even" around the EUT (one side should not be dramatically louder than another) Unless otherwise specified, the "default" thermal-related settings shall be selected for BIOS and iDRAC. Specific operating conditions will be defined in "Configurations & Configuration Dependencies" for each platform.			
Sound Pressure	LpA-reported, dBA, re AC0158 and program configuration document	Report for all mics	Report for all mics	Report for all mics	Report for all mics

Category 4: Attended Data Center

When Dell determines that a specific Enterprise product is to be predominantly used in an attended data center, then the acoustical specification of the below table applies. The phrase "attended data center" is used to mean a space in which many (from tens to 1000s) of Enterprise products are deployed in proximity (i.e., in the same room) to personnel whose speech (perhaps with raised voices) is expected to be intelligible over the data center noise. Hearing protection or hearing monitoring programs are not expected in these areas. Examples in this category include monolithic rack products. When Dell determines that a specific Enterprise product is to be predominantly used in a general use space, then the acoustical specification of Table 37 applies. These products could be found in laboratories, schools, restaurants, open office space layouts, small ventilated closets, etc., though not in close proximity to any particular person nor in quantities greater than a few in any location. People within proximity of a few of these products should not experience any impact to speech intelligibility or annoyance from the noise of the product. A rack product sitting on a table in a common area is an example.

Table 24. Dell Enterprise Category 4, "Attended Data Center" acoustical specification category

Measurement Position re AC0158	Metric, re AC0159	Test Modes, re AC0159 (note must be in steady state, see AC0159, except where noted below)				Simulate (i.e., set fan speeds representative) for 100% loading and maximum configuration, at 35° C Ambient
		Standby in 23±2° C Ambient	Idle in 23±2° C Ambient	Operating in 23±2° C Ambient – if not otherwise specified in the program's configuration document, then processor and hard drive operating modes are required	Simulate (i.e., set fan speeds representative) for Idle at 28 & 35° C Ambient	
Sound Power	LWA,m, B	Report	≤ 6.9	≤ 7.1	Report	Report
Front Binaural HEAD	Tones, Hz, dB	Report	< 15 dB	< 15 dB	Report	Report
	Tonality, tu	Report	Report	Report	Report	Report
	Dell Modulation, %	Report	Report	Report	Report	Report
	Loudness, sones	Report	Report	Report	Report	Report
	LpA-single point, dBA	Report	Report	Report	Report	Report
	Transients	• Oscillation (see AC0159), if observed, during 20-minute steady-state observation, must adhere to the following two criteria: ○ Max. {ΔLpA} < 3.0 dB ○ Event count < 3 for "1.5 dB < ΔLpA < 3.0 dB"			N/A	

Table 24. Dell Enterprise Category 4, "Attended Data Center" acoustical specification category (continued)

		• Acoustical Jump (see AC0159), during air mover speed transition from Idle to Operating Mode must be ≤ 15dB.
		• Startup behavior
		  ○ Report Startup behavior re. AC0159
		  ○ Startup must proceed smoothly, i.e., no sudden or large jumps, and fan speed during startup must not exceed 50% of its maximum
		∞ Transient inputs: Report time-history sound pressure levels re AC0159 "Train of Step Functions on Processor"				

Any	Other	No rattles, squeaks, or unexpected noises Sound should be "even" around the EUT (one side should not be dramatically louder than another) Unless otherwise specified, the "default" thermal-related settings shall be selected for BIOS and iDRAC. Specific operating conditions will be defined in "Configurations & Configuration Dependencies" for each platform.				
Sound Pressure	LpA-reported, dBA	Report for all mics	Report for all mics	Report for all mics	Report for all mics	Report for all mics

Unattended Data Center

When Dell determines that a specific Enterprise product is to be predominantly used in an unattended data center (and not blades or blade enclosures; these have their own category), then the acoustical specification of the below table applies. The phrase "unattended data center" is used to mean a space in which many (from tens to 1000s) of Enterprise products are deployed together, its own heating and cooling systems condition the space, and operators or servicers of equipment enter generally only to deploy, service, or decommission equipment. Hearing protection or hearing monitoring programs may be expected (per government or company guidelines) in these areas. Examples in this category include monolithic rack products.

Table 25. Dell Enterprise Category 5, "Unattended Data Center" acoustical specification category

Measurement Position re AC0158	Metric, re AC0159	Test Modes, re AC0159 (note must be in steady state, see AC0159, except where noted below)				Simulate (i.e., set fan speeds representative) for 100% loading and maximum configuration, at 35° C Ambient
		Standby in 23±2° C Ambient	Idle in 23±2° C Ambient	Operating in 23±2° C Ambient – if not otherwise specified in the program's configuration document, then processor and hard drive operating modes are required	Simulate (i.e., set fan speeds representative) for Idle at 28 & 35° C Ambient	
Sound Power	LWA,m, B	Report	≤ 7.5	≤ 7.7	Report	Report
Front Binaural HEAD	Tones, Hz, dB	Report	< 15 dB	< 15 dB	Report	Report
	Tonality, tu	Report	Report	Report	Report	Report
	Dell Modulation, %	Report	Report	Report	Report	Report
	Loudness, sones	Report	Report	Report	Report	Report

Table 25. Dell Enterprise Category 5, "Unattended Data Center" acoustical specification category (continued)

	LpA-single point, dBA	Report	Report	Report	Report	Report
	Transients	• Oscillation (see AC0159), if observed, during 20-minute steady-state observation, must adhere to the following two criteria: ○ Max. {ΔLpA} < 3.0 dB ○ Event count < 3 for "1.5 dB < ΔLpA < 3.0 dB" • Report Acoustical Jump (see AC0159), during air mover speed transition from Idle to Operating Mode. • Startup behavior ○ Report Startup behavior re. AC0159 ○ Startup must proceed smoothly, i.e., no sudden or large jumps. sound pressure levels re AC0159 "Train of Step Functions on Processor"			N/A	
Any	Other	No rattles, squeaks, or unexpected noises Sound should be "even" around the EUT (one side should not be dramatically louder than another) Unless otherwise specified, the "default" thermal-related settings shall be selected for BIOS and iDRAC. Specific operating conditions will be defined in "Configurations & Configuration Dependencies" for each platform.				
Sound Pressure	LpA-reported, dBA	Report for all mics	Report for all mics	Report for all mics	Report for all mics	Report for all mics

Data Center Modular/Modular Enclosure

When the product is a blade for or a blade enclosure itself, then the hosting blade enclosure must adhere to the acoustical specification of the below table applies. One underlying assumption is that blade enclosures are deployed in unattended data centers (see description in Category 5). If the parties responsible for selection of product acoustical specification category determine that a specific blade or blade enclosure will be deployed in a more stringent acoustical environment, then specific configurations, capabilities, and/or userships must be requested in formal documentation so that features to support the more restrictive performance may be designed as appropriate.

Table 26. Dell Enterprise Category 6, "Data Center Modular/Modular Enclosure" acoustical specification category

Measurement Position re AC0158	Metric, re AC0159	Test Modes, re AC0159 (note must be in steady state, see AC0159, except where noted below)				Simulate (i.e., set fan speeds representative) for 100% loading and maximum configuration, at 35° C Ambient
		Standby in 23±2° C Ambient	Idle in 23±2° C Ambient	Operating in 23±2° C Ambient – if not otherwise specified in the program's configuration document, then processor and hard drive operating modes are required	Simulate (i.e., set fan speeds representative) for Idle at 28 & 35° C Ambient	
Sound Power	LWA,m, B	Report	≤ 8.2	Report	Report	Report

Table 26. Dell Enterprise Category 6, "Data Center Modular/Modular Enclosure" acoustical specification category (continued)

Front Binaural HEAD	Tones, Hz, dB	Report	< 15 dB	< 15 dB	Report	Report
	Tonality, tu	Report	Report	Report	Report	Report
	Dell Modulation, %	Report	Report	Report	Report	Report
	Loudness, sones	Report	Report	Report	Report	Report
	LpA-single point, dBA	Report	Report	Report	Report	Report
	Transients	• Oscillation (see AC0159), if observed, during 20-minute steady-state observation, must adhere to the following two criteria: ○ Max. {ΔLpA} < 3.0 dB ○ Event count < 3 for "1.5 dB < ΔLpA < 3.0 dB" • Report Acoustical Jump (see AC0159), during air mover speed transition from Idle to Operating Mode. • Startup behavior ○ Report Startup behavior re. AC0159 ○ Startup must proceed smoothly, i.e., no sudden or large jumps. Transient inputs: Report time-history sound pressure levels re AC0159 "Train of Step Functions on Processor"			N/A	
Any	Other	No rattles, squeaks, or unexpected noises Sound should be "even" around the EUT (one side should not be dramatically louder than another) Unless otherwise specified, the "default" thermal-related settings shall be selected for BIOS and iDRAC. Specific operating conditions will be defined in "Configurations & Configuration Dependencies" for each platform.				
Sound Pressure	LpA-reported, dBA	Report for all mics	Report for all mics	Report for all mics	Report for all mics	Report for all mics

10

Rack, rails, and cable management

Key factors in selecting the proper rails include, Identifying:

- Type of rack in which the rails will be installed
- Spacing between the front and rear mounting flanges of the rack
- Type and location of any equipment mounted on the rear of the rack such as power distribution units (PDUs), and the overall depth of the rack

Refer the Dell Enterprise Systems Rail Sizing and Rack Compatibility Matrix for the following information:

- Specific details about rail types and their functionalities
- Rail adjustability ranges for various rack mounting flange types
- Rail depth with and without cable management accessories
- Rack types supported for various rack mounting flange types

Topics:

- Rails and cable management information

Rails and cable management information

The rail offerings for the PowerEdge XE9680 consist of only one type which is sliding. The cable management offerings consist of an optional cable management arm (CMA).

See the *Dell Enterprise Systems Rail Sizing and Rack Compatibility Matrix* available at rail-rack-matrix for information regarding:

- Specific details about rail types.
- Rail adjustability ranges for various rack mounting flange types
- Rail depth with and without cable management accessories
- Rack types that are supported for various rack mounting flange types

Key factors governing proper rail selection include the following:

- Identifying the type of rack in which they will be installed.
- The spacing between the front and rear mounting flanges of the rack.
- The type and location of any equipment mounted in the back of the rack such as power distribution units (PDUs), and the overall depth of the rack
- Overall depth of the rack

Stab-in, Sliding features summary

The stab-in, sliding rail allow the system to be fully extended out of the rack for service. The stab-in, sliding rail are available with or without the optional cable management arm (CMA).

B28 Stab-in sliding rails for 4-post racks

- Supports stab-in installation of the chassis to the rails.
- Support for tool-less installation in 19" EIA-310-E compliant square, un-threaded round hole racks including all generations of the Dell racks. Also supports tool-less installation in threaded round hole 4-post racks.
- Support for tool-less installation in Dell Titan or Titan-D racks
- Support full extension of the system out of the rack to allow serviceability of key internal components.
- Support for optional cable management arm (CMA).
- The optional cable management arm (CMA) can be mounted on either the left side of the sliding rails without the use of tools for fast and easy deployment.

- **NOTE:** For situations where CMA support is not required, the outer CMA mounting brackets can be uninstalled from the sliding rails. This reduces the overall length of the rails and eliminates the potential interferences with rear mounted PDUs or the rear rack door.

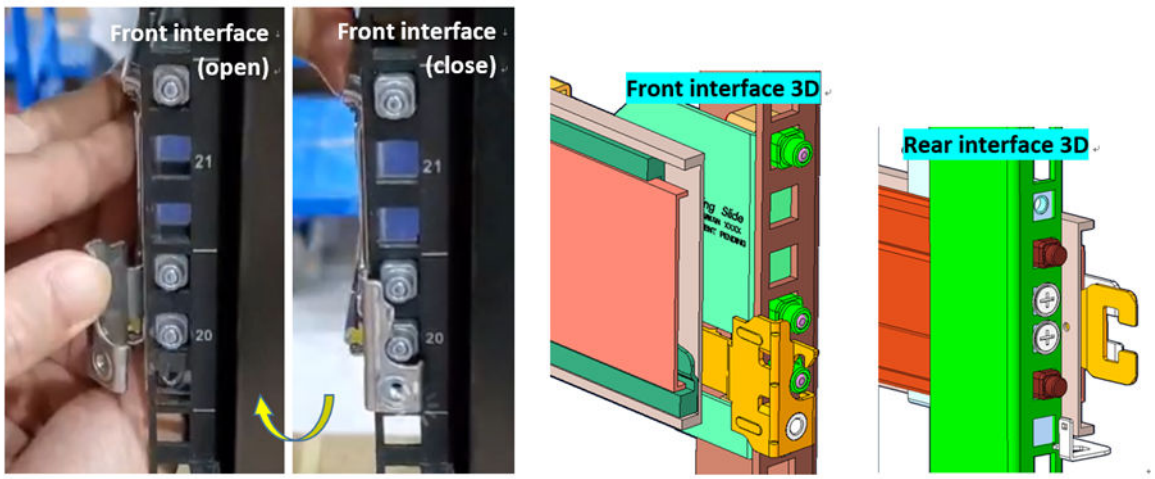


Figure 12. Stab-in Sliding Rail Mounting Interface

Scan the QRL code for the documentation and trouble-shooting information regarding the installation procedures for Drop-in/ Stab-in rail types.

Figure 13. Quick resource locator for combo rails

Cable management arm (CMA)

The optional cable management arm (CMA) organizes and secures the cords and cables exiting the back of the systems. It unfolds to allow the systems to extend out of the rack without having to detach the cables. Some key features of the CMA include:

- Large U-shaped baskets to support dense cable loads.
- Open vent pattern for optimal airflow.
- Ability to mount on either side by swinging the spring-loaded brackets from one side to the other.
- Utilizes hook-and-loop straps rather than plastic tie wraps to eliminate the risk of cable damage during cycling.
- Includes a low-profile fixed tray to both support and retain the CMA in its fully closed position.
- Both the CMA and the tray mount without the use of tools by simple and intuitive snap-in designs.

The CMA can be mounted to either side of the sliding rails without the use of tools or the need for conversion. For systems with one power supply unit (PSU), it is recommended to mount on the side opposite to that of the power supply to allow easier access to it and the rear drives (if applicable) for service or replacement.

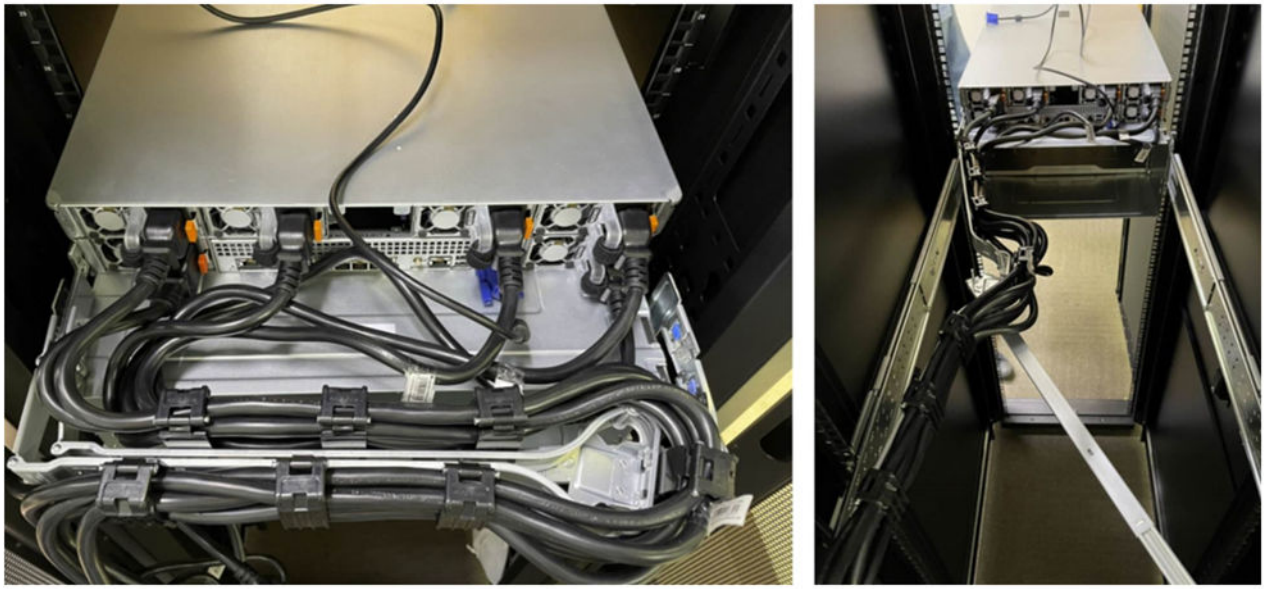


Figure 14. Stab-in Sliding rails with CMA cabling

Rack Installation

Installing Stab-in Rails to the system

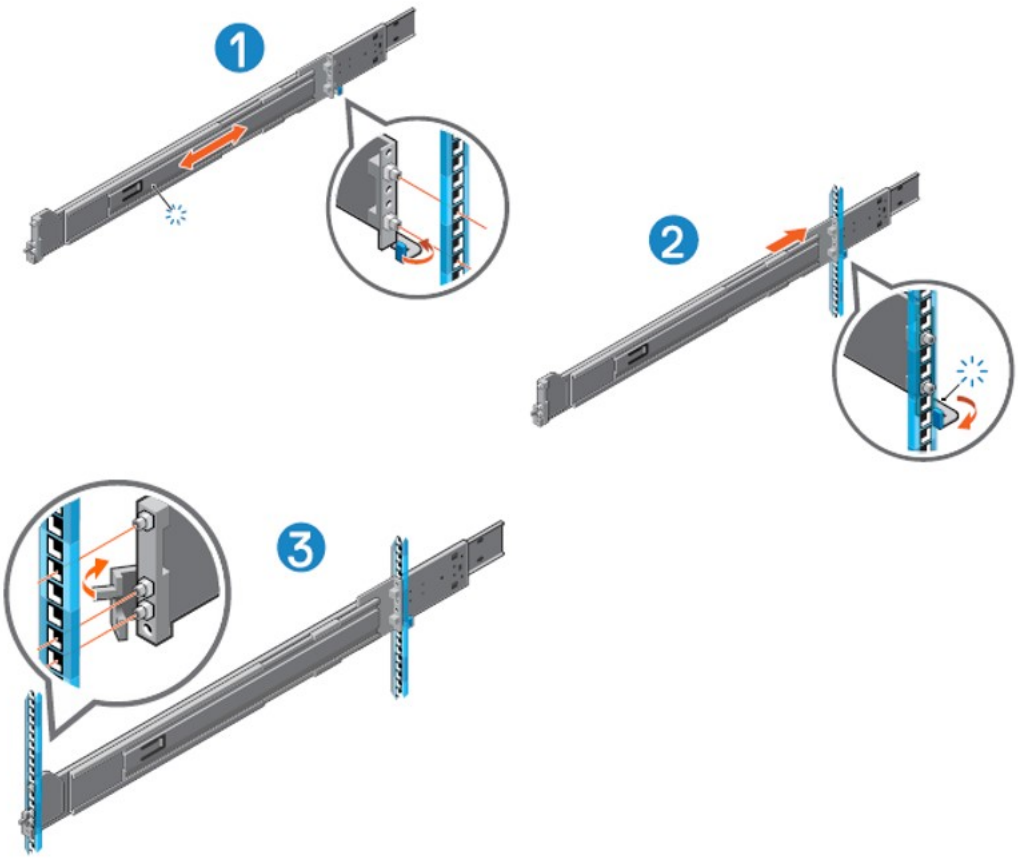


Figure 15. Installing the rail 4-POST racks

NOTE: To secure the rails to square hole or unthreaded round hole rack for shipping or in unstable environments, install supplied hardware to the rails.

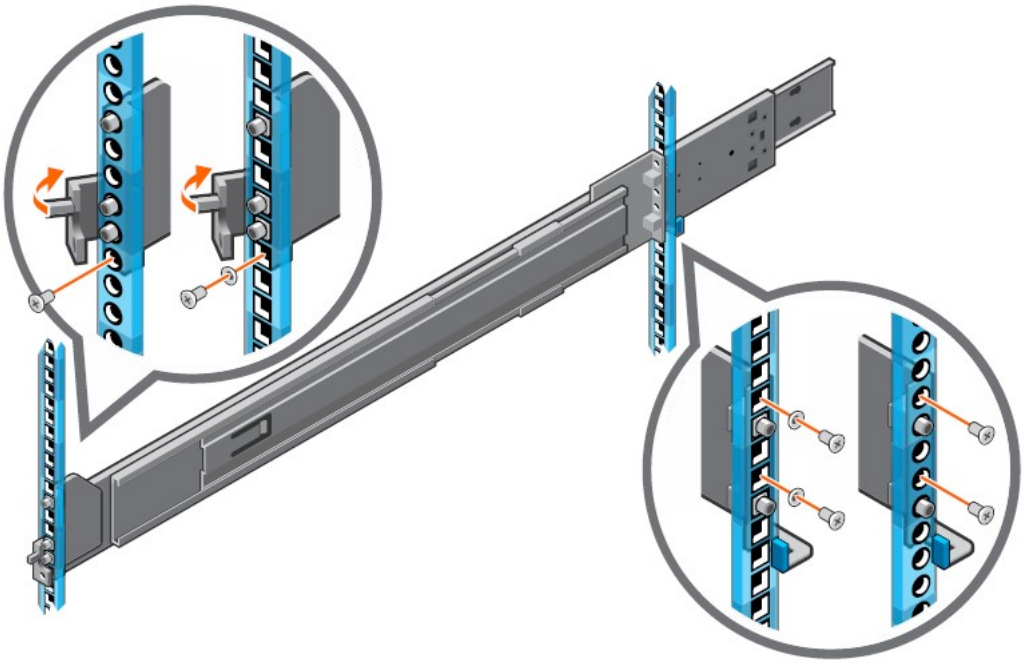


Figure 16. Securing rails on square or unthreaded round hole

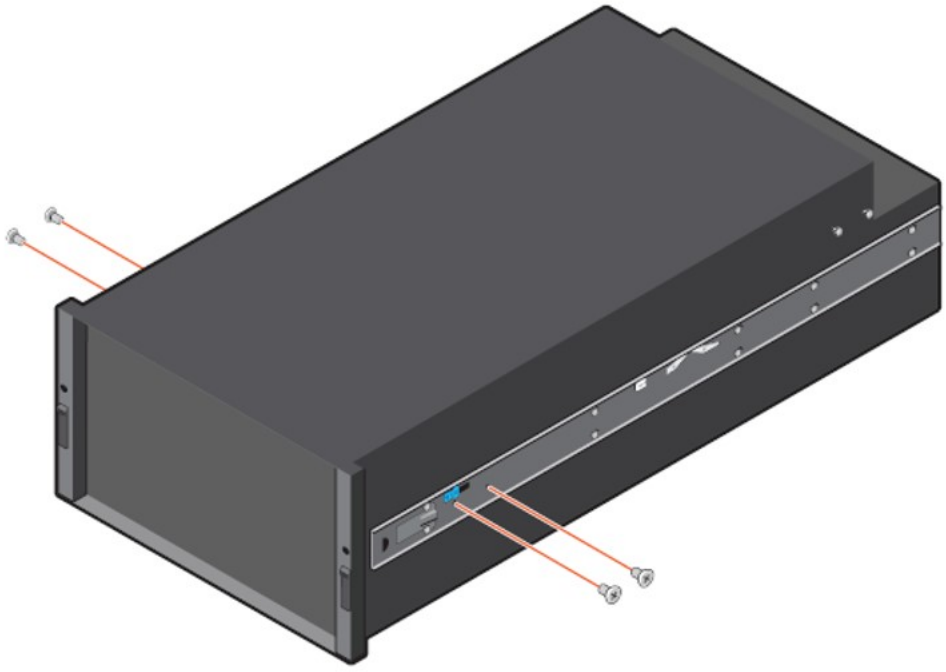


Figure 17. Shipping screws on the inner rails

NOTE: For rack level shipping, the shipping screws must be installed on the inner rails.

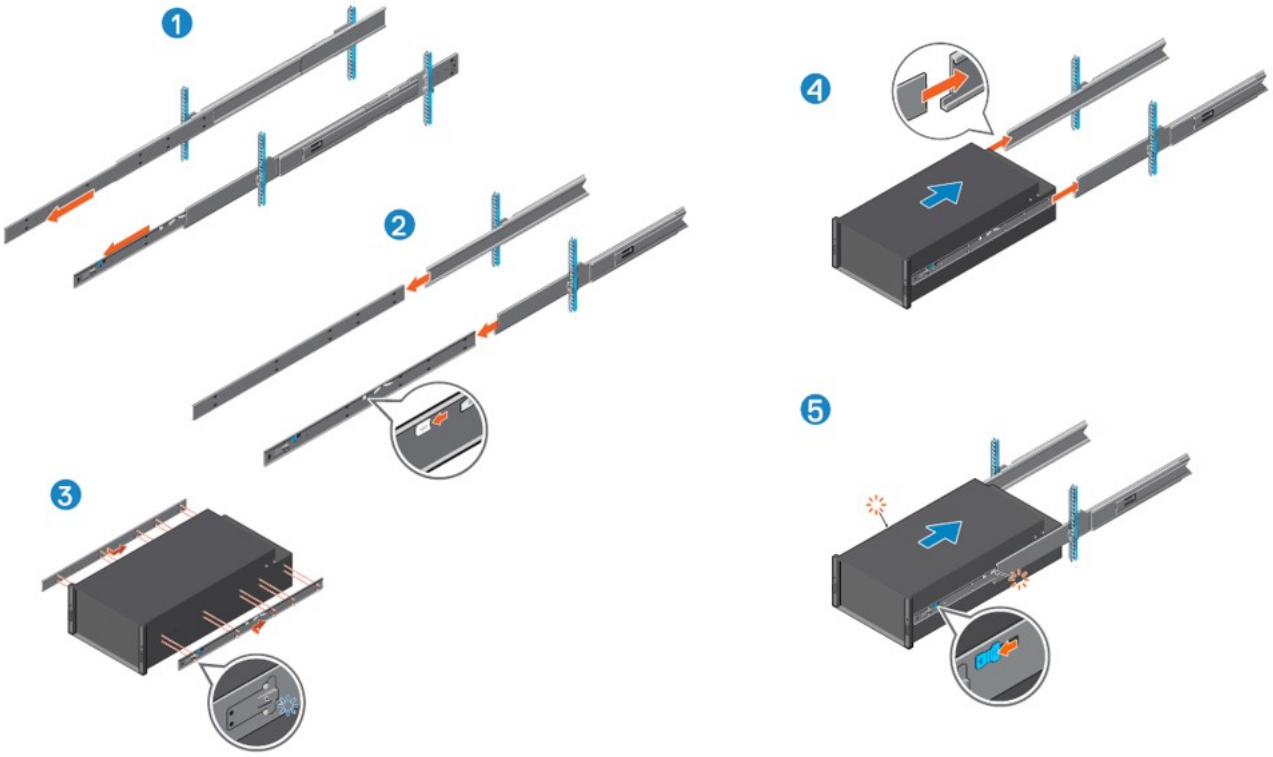


Figure 18. Installing Stab-in Rails to the system

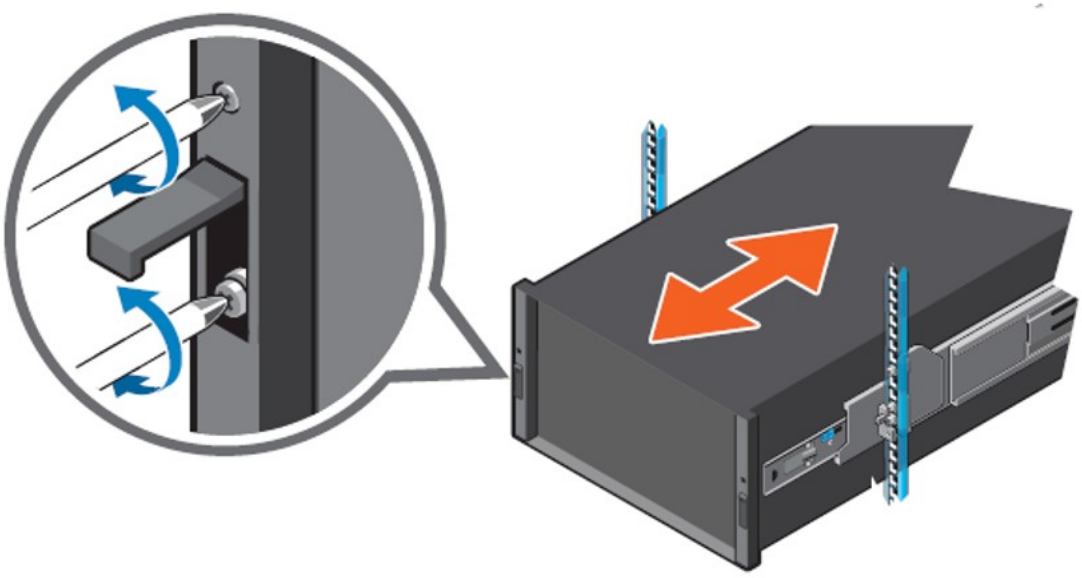


Figure 19. Securing the system to the rails

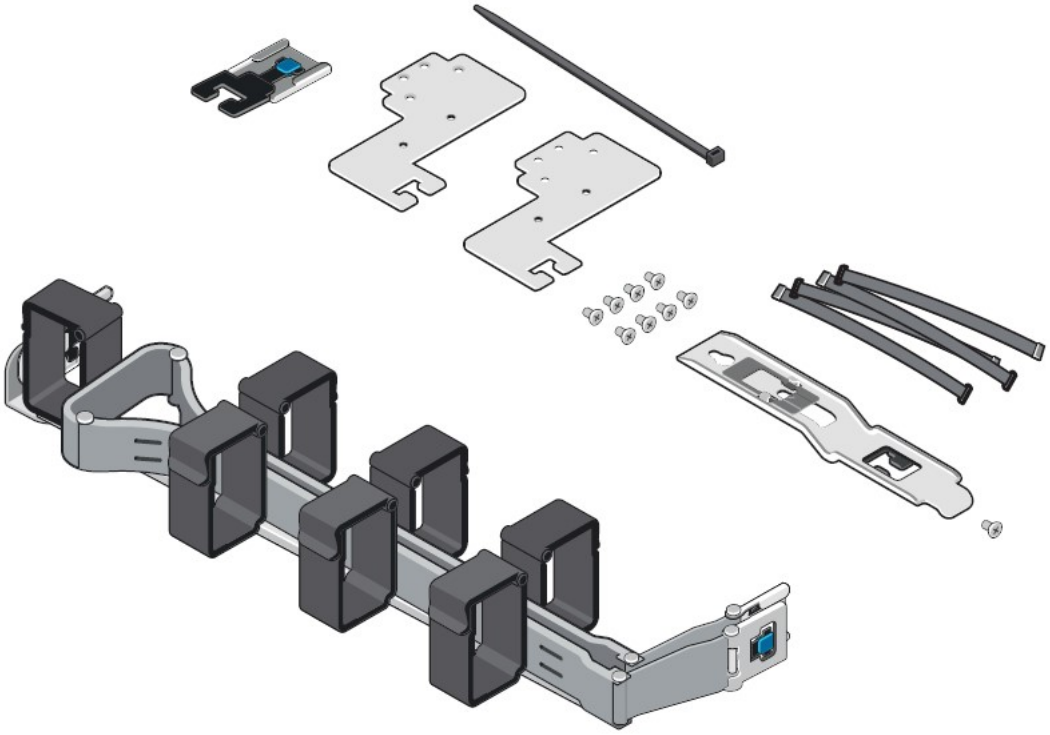


Figure 20. CMA kit contents

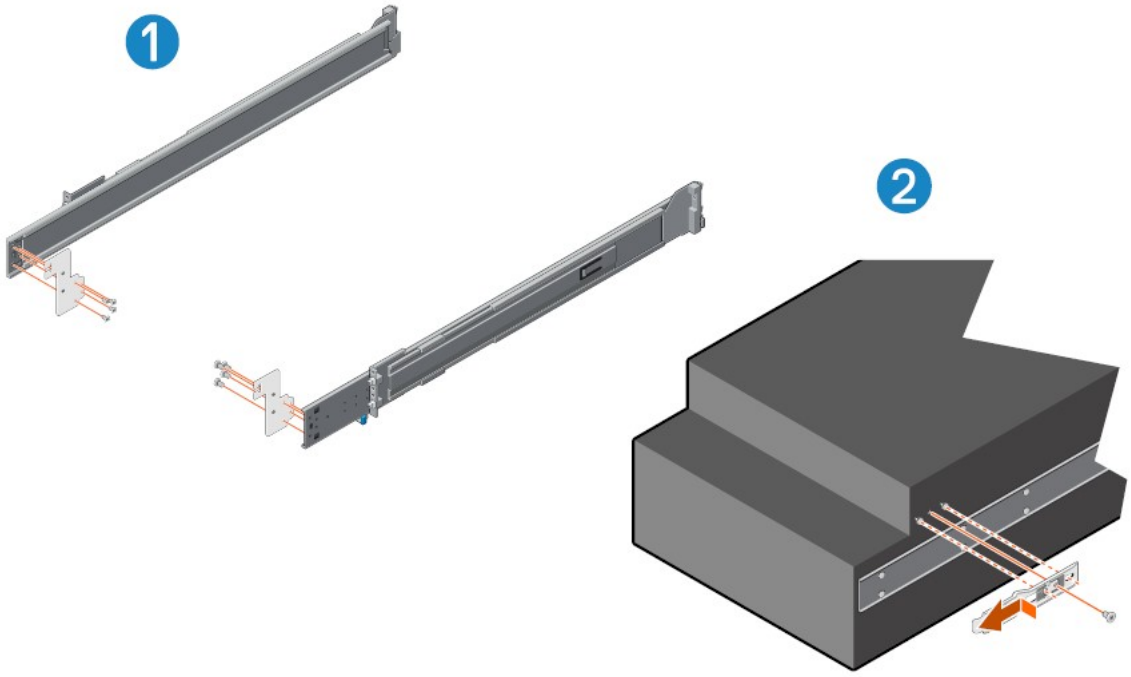


Figure 21. CMA bracket installation

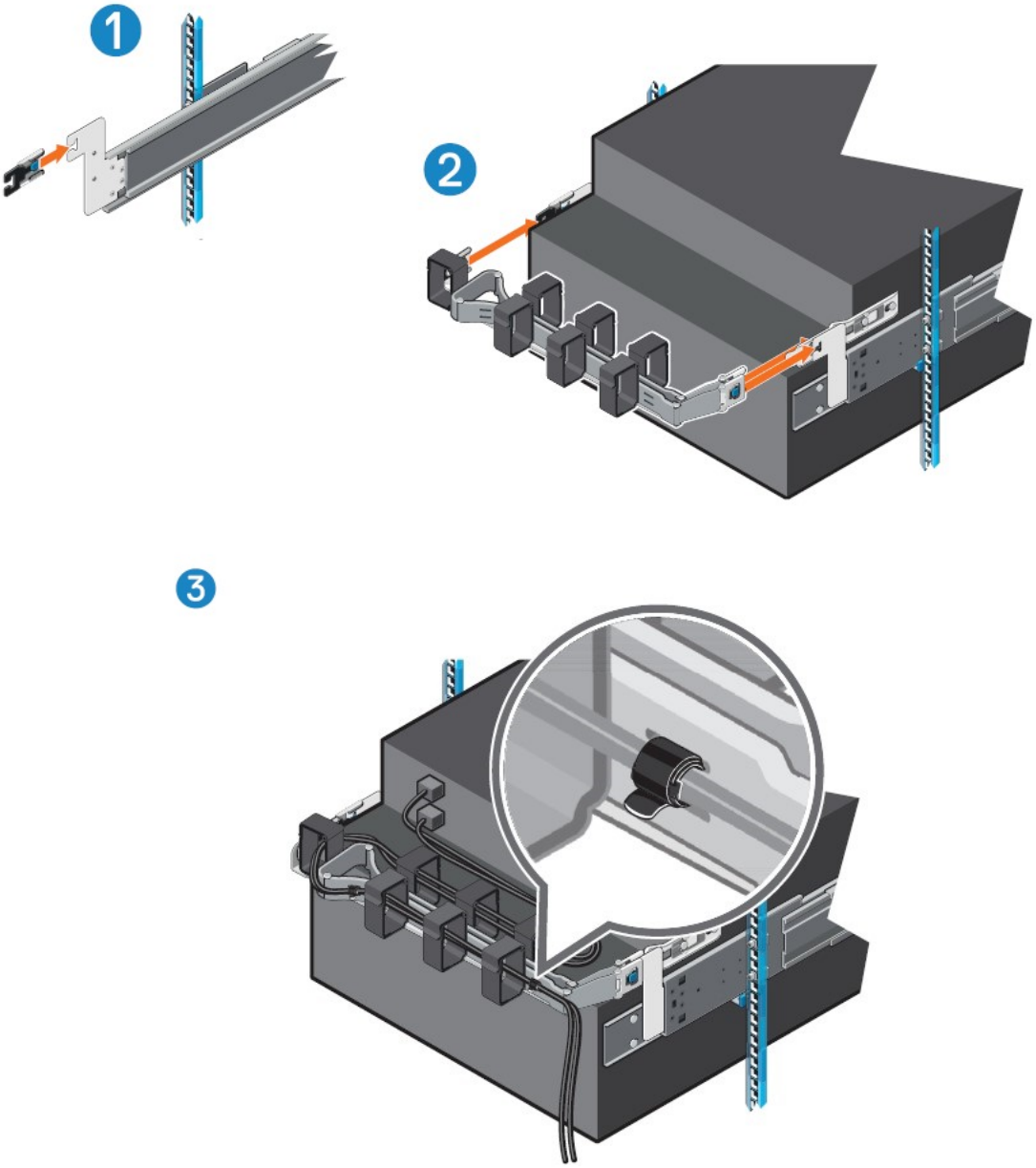


Figure 22. CMA attachment installations

NOTE: CMA attachment brackets are installed after installing system into the rack.

Figure 23. System Information Label

11

Operating Systems and Virtualization

Topics:

- Supported operating systems

Supported operating systems

The PowerEdge XE9680 supports the following operating systems:

- Canonical Ubuntu Server LTS
- Red Hat Enterprise Linux
- SUSE Linux Enterprise Server

12

Dell OpenManage Systems Management

Dell delivers management solutions that help IT administrators effectively deploy, update, monitor, and manage IT assets. OpenManage solutions and tools enable you to quickly respond to problems by helping them to manage Dell servers efficiently; in physical, virtual, local, and remote environments; all without the need to install an agent in the operating system.

The OpenManage portfolio includes:

- Innovative embedded management tools - integrated Dell Remote Access Controller (iDRAC)
- Consoles - OpenManage Enterprise
- Extensible with plug-ins - OpenManage Power Manager
- Update tools - Repository Manager

Dell has developed comprehensive systems management solutions that are based on open standards and has integrated with management consoles from partners such as Microsoft and VMware, allowing advanced management of Dell servers. Dell management capabilities extend to offerings from the industry's top systems management vendors and frameworks such as Ansible, Splunk, and ServiceNow. OpenManage tools automate the full span of server life cycle management activities along with powerful RESTful APIs to script or integrate with your choice of frameworks.

For more information about the entire OpenManage portfolio, see:

- The latest Dell Systems Management Overview Guide.

Topics:

- Integrated Dell Remote Access Controller (iDRAC)
- Systems Management software support matrix

Integrated Dell Remote Access Controller (iDRAC)

iDRAC9 delivers advanced, agent-free, local and remote server administration. Embedded in every PowerEdge server, iDRAC9 provides a secure means to automate a multitude of common management tasks. Because iDRAC is embedded within every PowerEdge server, there is no additional software to install; just plug in power and network cables, and iDRAC is ready to go. Even before installing an operating system (operating system) or hypervisor, IT administrators have a complete set of server management features at their fingertips.

With iDRAC9 in-place across the Dell PowerEdge portfolio, the same IT administration techniques and tools can be applied throughout. This consistent management platform allows easy scaling of PowerEdge servers as an organization's infrastructure grows. Customers can use the iDRAC RESTful API for the latest in scalable administration methods of PowerEdge servers. With this API, iDRAC enables support for the Redfish standard and enhances it with Dell extensions to optimize at-scale management of PowerEdge servers. By having iDRAC at the core, the entire OpenManage portfolio of Systems Management tools allows every customer to tailor an effective, affordable solution for any size environment.

Zero Touch Provisioning (ZTP) is embedded in iDRAC. ZTP - Zero Touch Provisioning is Intelligent Automation Dell's agent-free management puts IT administrators in control. Once a PowerEdge server is connected to power and networking, that system can be monitored and fully managed, whether you're standing in front of the server or remotely over a network. In fact, with no need for software agents, an IT administrator can: · Monitor · Manage · Update · Troubleshoot and remediate Dell servers With features like zero-touch deployment and provisioning, iDRAC Group Manager, and System Lockdown, iDRAC9 is purpose-built to make server administration quick and easy. For those customers whose existing management platform utilizes in-band management, Dell does provide iDRAC Service Module, a lightweight service that can interact with both iDRAC9 and the host operating system to support legacy management platforms.

When ordered with DHCP enabled from the factory, PowerEdge servers can be automatically configured when they are initially powered up and connected to your network. This process uses profile-based configurations that ensure each server is configured per your specifications. This feature requires an iDRAC Enterprise license.

iDRAC9 offers following license tiers:

Table 27. iDRAC9 license tiers

License	Description
iDRAC9 Basic	• Available only on 100-500 series rack/tower • Basic instrumentation with iDRAC web UI • For cost conscious customers that see limited value in management
iDRAC9 Express	• Default on 600+ series rack/tower, modular, and XR series • Includes all features of Basic • Expanded remote management and server life-cycle features
iDRAC9 Enterprise	• Available as an upsell on all servers • Includes all features of Basic and Express. Includes key features such as virtual console, AD/LDAP support, and more • Remote presence features with advanced, Enterprise-class, management capabilities
iDRAC9 Datacenter	• Available as an upsell on all servers • Includes all features of Basic, Express, and Enterprise. Includes key features such as telemetry streaming, Thermal Manage, automated certificate management, and more • Extended remote insight into server details, focused on high end server options, granular power, and thermal management

For a full list of iDRAC features by license tier, see Integrated Dell Remote Access Controller 9 User's Guide at Dell.com.

For more details on iDRAC9 including white papers and videos, see:

- Support for Integrated Dell Remote Access Controller 9 (iDRAC9) on the Knowledge Base page at Dell.com

Systems Management software support matrix

Table 28. Systems Management software support matrix

Categories	Features	PE mainstream
Embedded Management and In-band Services	iDRAC9 (Express, Enterprise, and Datacenter licenses)	Supported
	OpenManage Mobile	Not Supported
	OM Server Administrator (OMSA)	Supported
	iDRAC Service Module (iSM)	Supported
	Driver Pack	Not Supported
Change Management	Update Tools (Repository Manager, DSU, Catalogs)	Supported
	Server Update Utility	Not Supported
	Lifecycle Controller Driver Pack	Supported
	Bootable ISO	Supported
Console and Plug-ins	OpenManage Enterprise	Supported
	Power Manager Plug-in	Supported
	Update Manager Plug-in	Supported
	SupportAssist Plug-in	Supported
	CloudIQ	Supported
Integrations and connections	OM Integration with VMware Vcenter/vROps	Supported
	OM Integration with Microsoft System Center (OMIMSC)	Not Supported
	Integrations with Microsoft System Center and Windows Admin Center (WAC)	Not Supported

Table 28. Systems Management software support matrix (continued)

Categories	Features	PE mainstream
	ServiceNow	Supported
	Ansible	Supported
	Third-party Connectors (Nagios, Tivoli, Microfocus)	Supported
Security	Secure Enterprise Key Management	Supported
	Secure Component Verification	Supported
Standard operating system	Red Hat Enterprise Linux, SUSE, Ubuntu	Supported (Tier-1)

13

Appendix D: Service and support

Topics:

- Default support levels
- Other services and support information

Default support levels

This system offers 3 years Dell ProSupport Next Business Day (NBD), including 24x7 phone support and NBD parts and labor support.

Default deployment levels

This system offers **Dell Basic Deployment** including onsite hardware installation and software configuration. Optionally, the customer may choose to any of the factory or field deployment offers listed below.

Other services and support information

Dell Technologies Services include a wide, customizable range of service options to simplify the assessment, design, implementation, management and maintenance of IT environments and to help transition from platform to platform.

Depending on the current business requirements and correct level of service for customers, we provide factory, onsite, remote, modular, and specialized services that fit the customer requirements and budget. We will help with a little or a lot, based on the customers choice, and provide access to our global resources.

Dell deployment services

Dell ProDeploy Infrastructure Suite

ProDeploy Infrastructure Suite provides a variety of deployment offerings that satisfy a customer's unique needs. It is made up of 5 offers: ProDeploy Configuration Services, ProDeploy Rack Integration Services, Basic Deployment, ProDeploy, and ProDeploy Plus.

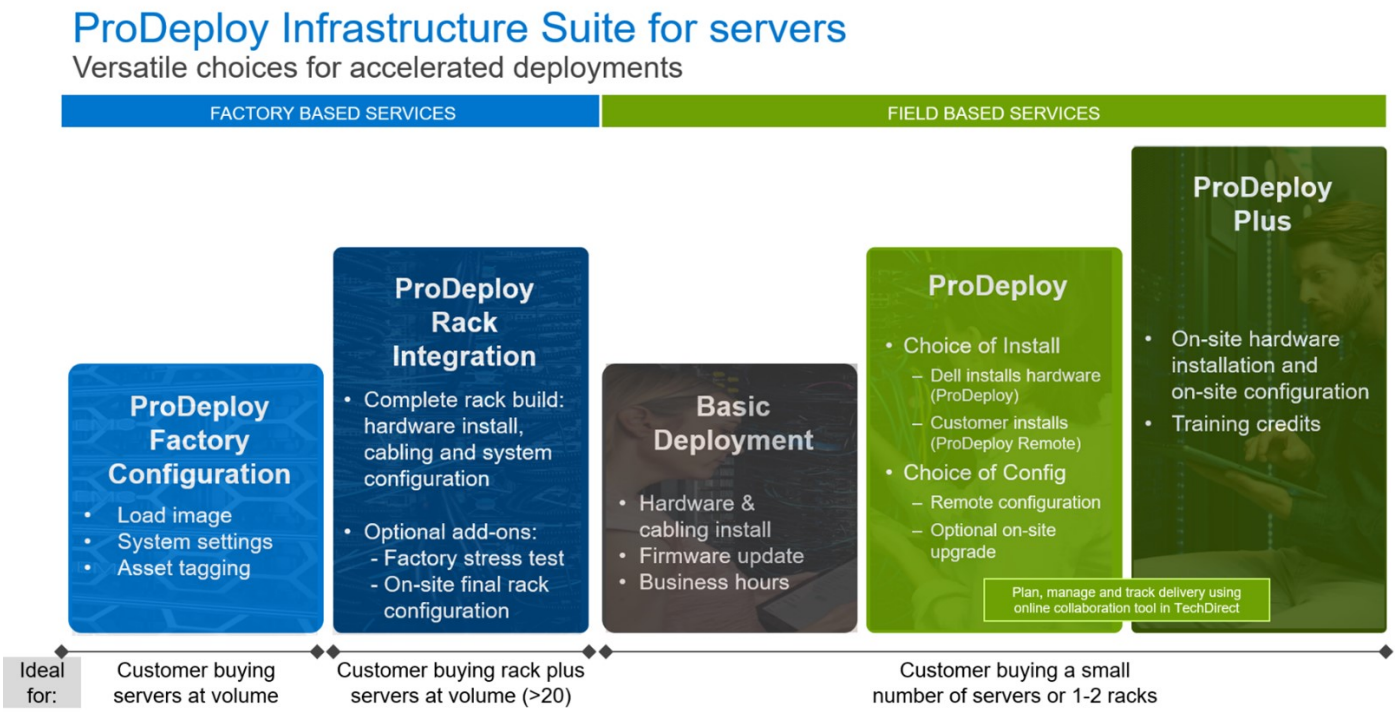


Figure 24. ProDeploy Infrastructure Suite for servers

The new Factory Services consist of two tiers of deployment that happen prior to shipping to the customer's site.

Factory Based Services:

- ProDeploy Factory Configuration - Ideal for customers buying servers in volume and seeking pre-configuration prior to shipping such as: custom image, system settings, and asset tagging so it arrives ready to use out of the box. Furthermore, servers can be packaged and bundled to meet specific shipping and distribution requirements for each customer location to facilitate the rollout process. Upsell one of the field based services (below) if a customer needs assistance with the final server installation.
- ProDeploy Rack Integration - Ideal for customers seeking to build out fully integrated racks prior to shipping. These rack builds include hardware install, cabling, and full system configuration. You can also add-on a factory stress test and optional on-site final rack configuration to complete the rack installation.
  - STANDARD SKUs for Rack Integration is available in US only and requires:
    - 20 or more devices (R and C series servers and all Dell or non-Dell switches). Use Informational SKUs for Dell switches or 3rd party products
    - Shipping to contiguous US
  - USE CUSTOM QUOTE for Rack Integration for:
    - All countries except USA
    - Racks containing less than 20 servers
    - Any rack that includes VxRail or Storage
    - Shipping outside contiguous US
    - Shipping to multiple locations

Field Based Services:

- Basic Deployment consists of the hardware installation, cabling and firmware update during normal standard business hours. Basic Deployment is traditionally sold to Competency Enabled Partners. Competency enabled partners often have Dell do the hardware installation while they complete the software configuration.
- ProDeploy consists of your hardware installation and configuration of the software using offshore resources. ProDeploy is great for customers who are price sensitive or who are remote from their data centers and don't require an onsite presence.
- ProDeploy Plus will give you in-region or onsite resources to complete the engagement for the customer. It also comes with additional features such as Post Deployment Configuration Assistance and Training Credits.

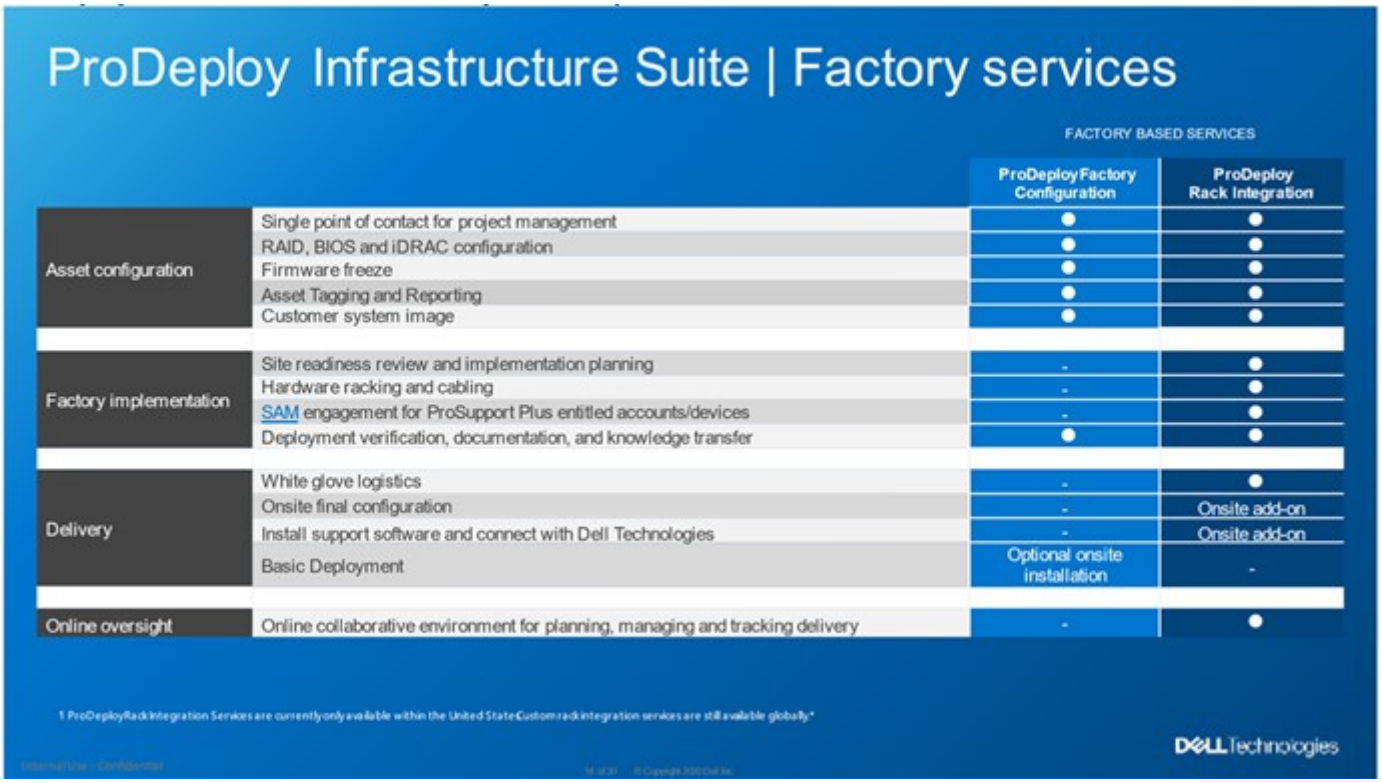


Figure 25. ProDeploy Infrastructure Suite - Factory services

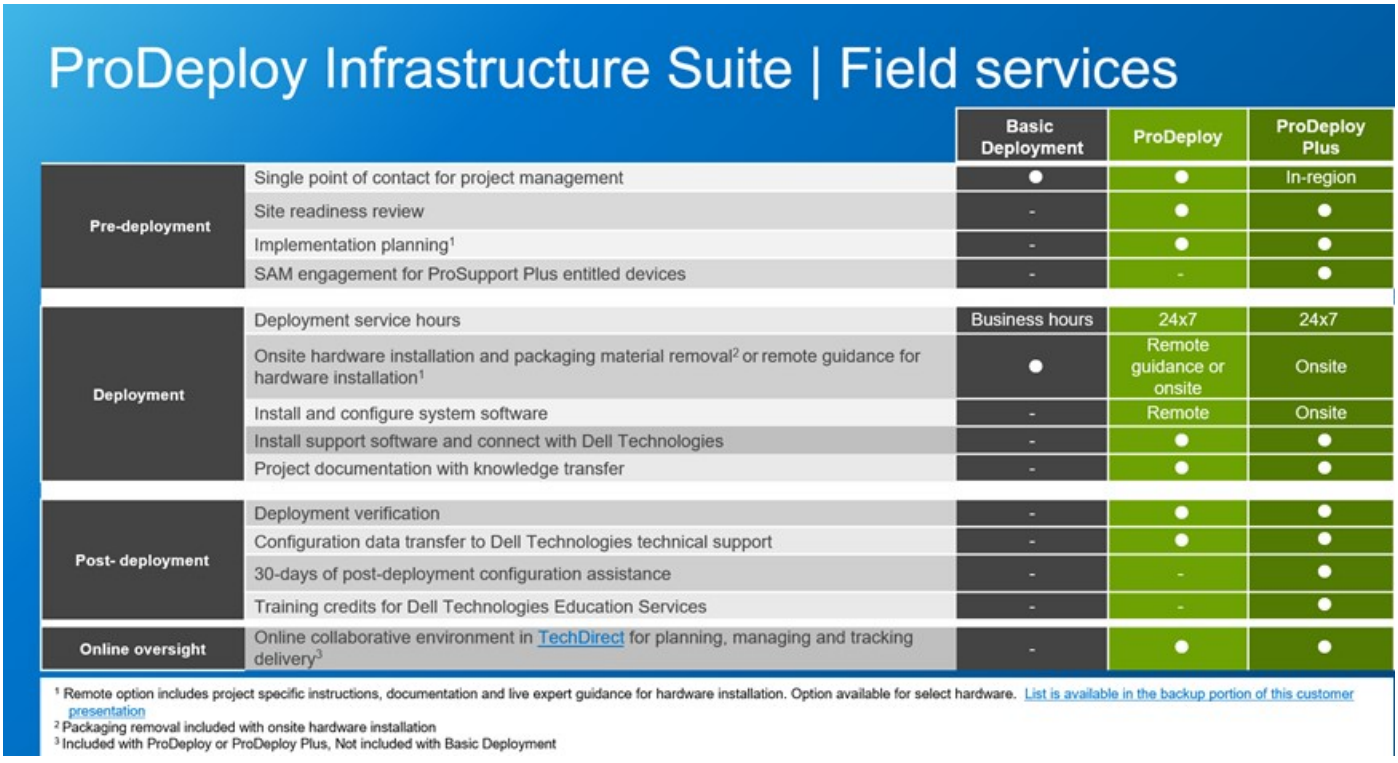


Figure 26. ProDeploy Infrastructure Suite - Field services

Dell ProDeploy Plus for Infrastructure

From beginning to end, ProDeploy Plus provides the skill and scale that is must successfully perform demanding deployments in today's complex IT environments. Certified Dell experts start with extensive environmental assessments and detailed migration

planning and recommendations. Software installation includes set up of our enterprise connectivity solution (secure connect gateway) and OpenManage system management utilities.

Postdeployment configuration assistance, testing, and product orientation services are also available.

Dell ProDeploy for Infrastructure

ProDeploy provides full-service installation and configuration of both server hardware and system software by certified deployment engineers including set up of leading operating systems and hypervisors as well our enterprise connectivity solution (secure connect gateway) and OpenManage system management utilities. To prepare for the deployment, we conduct a site readiness review and implementation planning exercise. System testing, validation, and full project documentation with knowledge transfer complete the process.

Dell Basic Deployment

Basic Deployment delivers worry-free professional installation by experienced technicians who know Dell servers inside and out.

Additional Deployment Services

You can tailor the ProDeploy Infrastructure Suite offer to meet your customer's unique needs by leveraging "Additional Deployment Time." ADT will cover additional tasks above the normal scope of the standard offers. ADT can be sold for Project Management or Technical Resources and is sold as blocks of four hours remote or eight hours on-site.

Dell ProDeploy for HPC (available in US/Canada only. All other regions use custom)

HPC deployments require specialists that understand that cutting edge is yesterday's news. Dell deploys the world 's fastest systems and understands the nuances that make them perform. ProDeploy for HPC provides:

- Global team of dedicated HPC specialists
- Proven track record, thousands of successful HPC deployments
- Design validation, benchmarking, and product orientation

Learn more at Dell.com/HPC-Services.

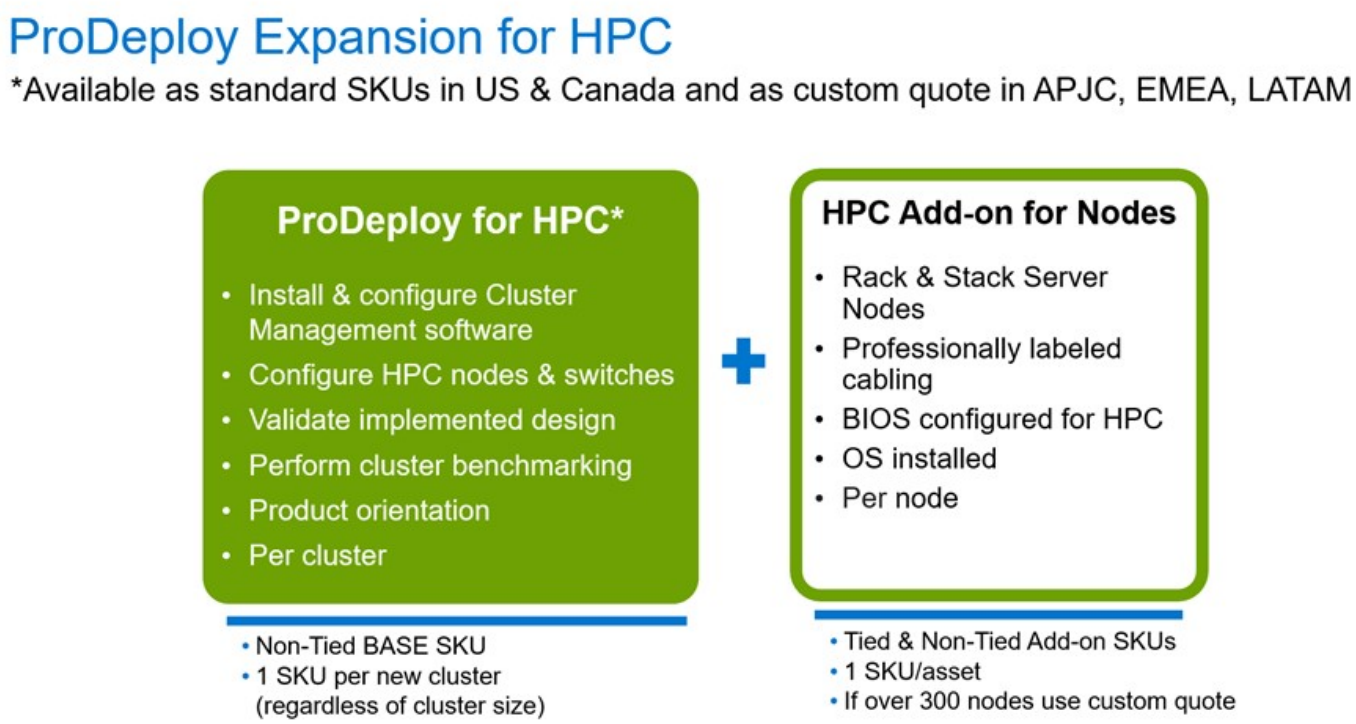


Figure 27. ProDeploy Expansion for HPC

Dell custom deployment Services

Dell custom rack integration and other Dell configuration services help customers save time by providing systems that are racked, cabled, tested, and ready to be integrated into the data center. Dell support preconfigure RAID, BIOS and iDRAC settings, install system images, and even install third-party hardware and software.

For more information, see Server Configuration Services.

Dell Residency Services

Residency Services help customers transition to new capabilities quickly with the assistance of onsite or remote Dell experts whose priorities and time they control.

Residency experts can provide post implementation management and knowledge transfer that is related to a new technology acquisition or day-to-day operational management of the IT infrastructure.

Dell Data Migration Services

Protect business and data of the customer with our single point of contact to manage data migration projects.

A customer project manager works with our experienced team of experts to create a plan using industry-leading tools and proven processes that are based on global best practices to migrate existing files and data, so business systems are up and running quickly and smoothly.

Dell Enterprise Support Services

Dell ProSupport Enterprise Suite

With the ProSupport Enterprise Suite, we help keep IT systems running smoothly, so customers can focus on running their business. We help maintain peak performance and availability of the most essential workloads. ProSupport Enterprise Suite is a suite of support services that enable customers to build the solution that is right for their organization. They choose support models that are based on how they use technology and where they want to allocate resources. From the desktop to the data center, address everyday IT challenges, such as unplanned downtime, mission-critical needs, data and asset protection, support planning, resource allocation, software application management and more. Optimize customer IT resources by choosing the right support model.

Table 29. ProSupport Enterprise Suite

Service	Support model	Description
ProSupport Enterprise Suite	ProSupport Plus for Enterprise	Proactive, predictive, and reactive support for systems that look after your business-critical applications and workloads
	ProSupport for Enterprise	Comprehensive 24 x 7 predictive and reactive support for hardware and software
	Basic hardware support	Reactive hardware support during normal business hours

Dell ProSupport Plus for Enterprise

When customers purchase PowerEdge server, we recommend ProSupport Plus, our proactive and preventative support service for business-critical systems. ProSupport Plus provides all the benefits of ProSupport, plus the following:

- An assigned Services Account Manager who knows their business and environment
- Immediate advanced troubleshooting from an engineer
- Personalized, preventive recommendations that are based on analysis of support trends and best practices from across the Dell Technologies infrastructure solutions customer base to reduce support issues and improve performance
- Predictive analysis for issue prevention and optimization that is enabled by secure connect gateway technology
- Proactive monitoring, issue detection, notification, and automated case creation for accelerated issue resolution enabled by secure connect gateway
- On-demand reporting and analytics-based recommendations that are enabled by secure connect gateway and TechDirect

Dell ProSupport for Enterprise

ProSupport service offers highly trained experts around the clock and around the globe to address IT needs. We help minimize disruptions and maximize availability of PowerEdge server workloads with:

- 24x7 support through phone, chat and online
- Predictive, automated tools and innovative technology
- A central point of accountability for all hardware and software issues
- Collaborative third-party support
- Hypervisor, operating system and application support
- Consistent experience regardless of where customers are located or what language they speak

  NOTE: Subject to service offer country or region availability.
- Optional onsite parts and labor response options including next business day or four-hour mission critical

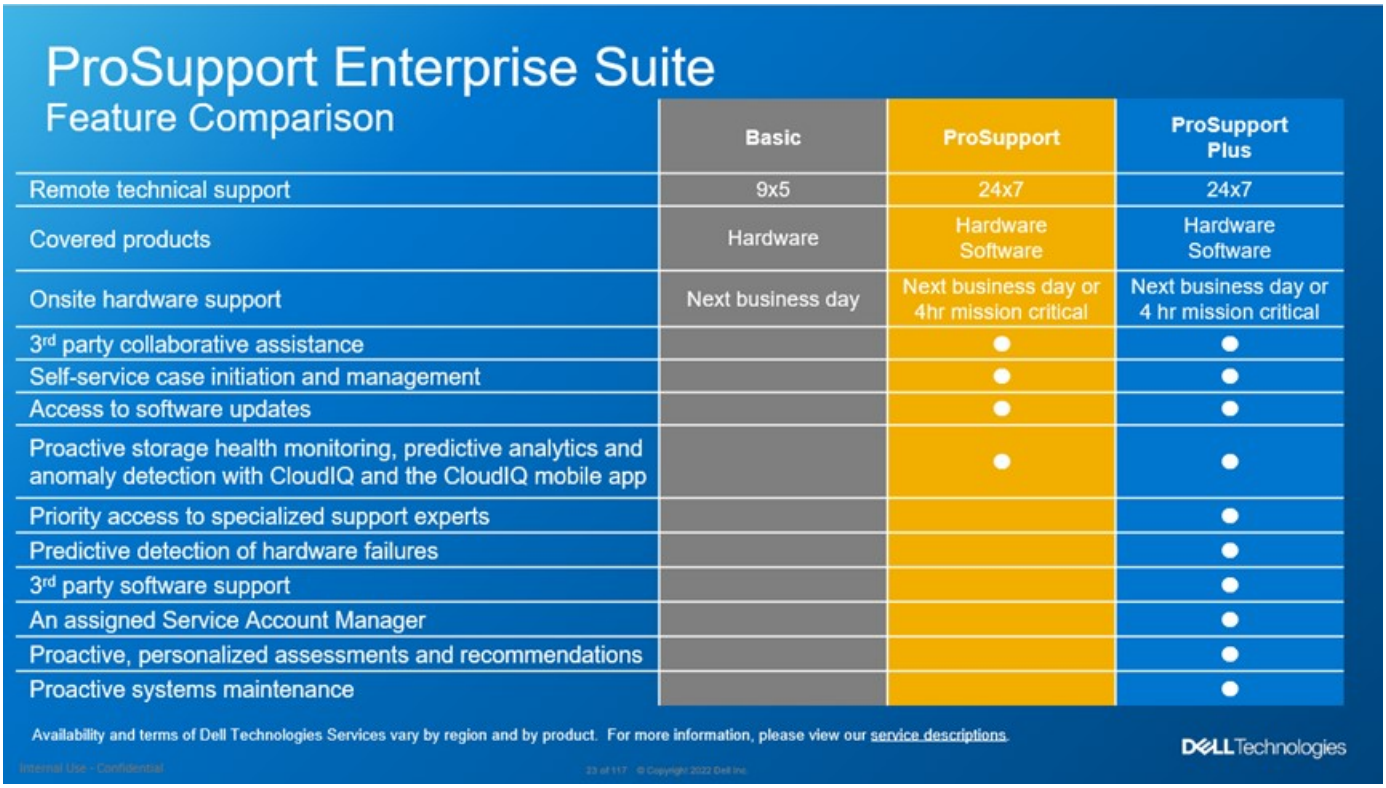


Figure 28. ProSupport Enterprise Suite

Dell ProSupport One for Data Center

ProSupport One for Data Center offers flexible site-wide support for large and distributed data centers with more than 1,000 assets. This offering is built on standard ProSupport components that leverage our global scale but are tailored to a customer's needs. While not for everyone, this service option offers a truly unique solution for Dell Technologies largest customers with the most complex environments.

- Team of assigned Services Account Managers with remote, on-site options
- Assigned ProSupport One technical and field engineers who are trained on the customer's environment and configurations
- On-demand reporting and analytics-based recommendations that are enabled by secure connect gateway and TechDirect
- Flexible on-site support and parts options that fit their operational model
- A tailored support plan and training for their operations staff

Dell ProSupport Add-on for HPC

The ProSupport Add-on for HPC provides solution-aware support including:

- Access to senior HPC experts
- Advanced HPC cluster assistance: performance, interoperability, and configuration
- Enhanced HPC solution level end-to-end support
- Remote presupport engagement with HPC Specialists during ProDeploy implementation

Learn more at Dell.com/HPC-Services.

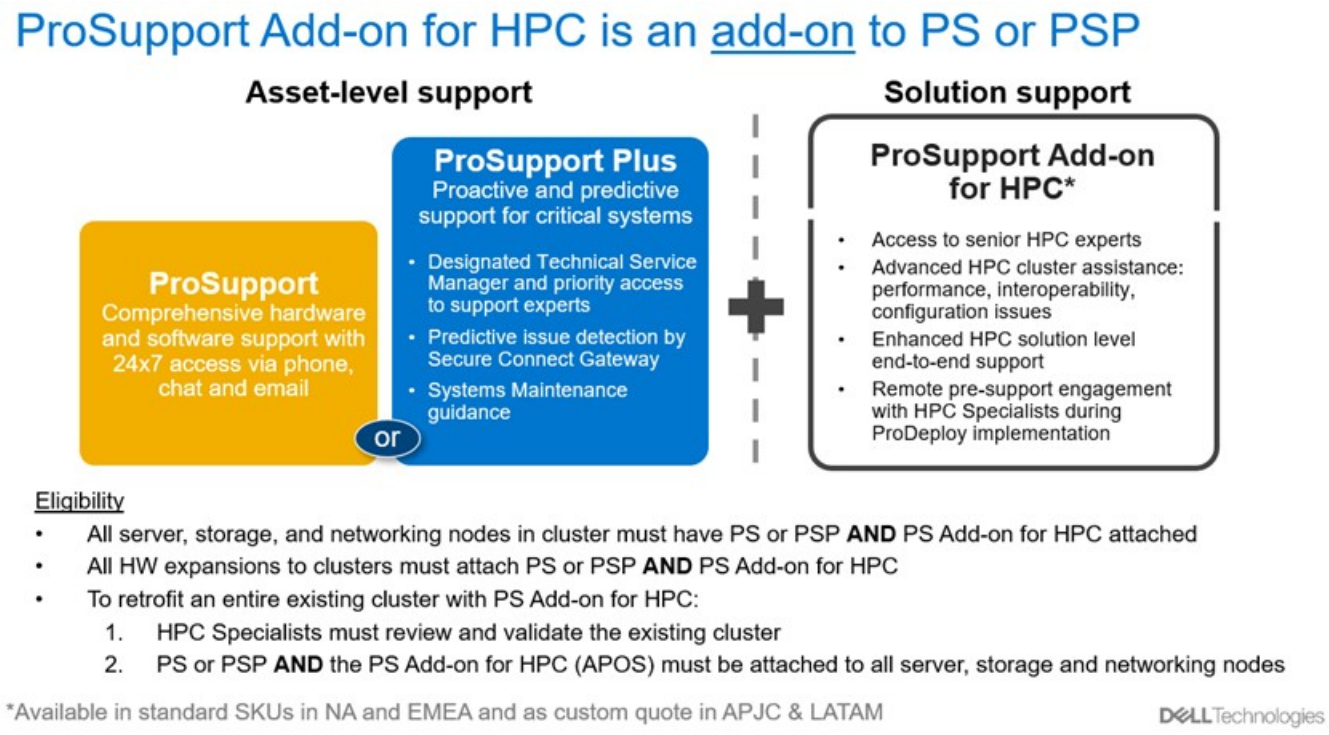


Figure 29. ProSupport Add-on for HPC is an add-on to PS or PSP

Support Technologies

Powering the support experience with predictive, data-driven technologies.

NOTE: SupportAssist Enterprise capabilities are now part of the secure connect gateway technology.

Enterprise connectivity

The best time to solve a problem is before it happens. The automated proactive and predictive support features enabled by the secure connect gateway technology helps reduce steps and time to resolution, often detecting issues before they become a crisis. The gateway technology is available in virtual and application editions. It is also implemented as a direct connect version for select Dell hardware and a Services plugin within OpenManage Enterprise for PowerEdge servers. The legacy SupportAssist Enterprise solution has been retired and is now replaced by the secure connect gateway solutions.

Benefits include:

- Value: Our connectivity solutions are available to all customers at no additional charge
- Improve productivity: Replace manual, high-effort routines with automated support
- Accelerate time to resolution: Receive issue alerts, automatic case creation, and proactive contact from Dell experts
- Gain insight and control: Optimize enterprise devices with insights in portals reporting like TechDirect, and get predictive issue detection before the problem starts

NOTE: Connect devices can access these features. Features vary depending on the service level agreement for the connected device. ProSupport Plus customers experience the full set of automated support capabilities.

Table 30. Features enabled by connectivity

—	Basic hardware warranty	ProSupport	ProSupport Plus
Automated issue detection and system state information collection	Supported	Supported	Supported
Proactive, automated case creation and notification	Not supported	Supported	Supported

Table 30. Features enabled by connectivity (continued)

—	Basic hardware warranty	ProSupport	ProSupport Plus
Predictive issue detection for failure prevention	Not supported	Not supported	Supported

Get started at DellTechnologies.com/secureconnectgateway.

Dell TechDirect

TechDirect helps boost IT team productivity when supporting Dell systems.

Boost your productivity with online servoce for Dell products from TechDirect. From deployment to technical support, TechDirect lets you do more with less effort and faster resolution. You can:

- OPen and manage support requests or in-warranty systems
- Execute online self-service for parts dispatch
- Collaborate on ProDeploy infrastructure deployment projects online
- Manage proactive and preditive alerts from secure connect gateway technology that help maximize uptime
- Integrate services functionality into your help desk with TechDirect APIs
- Join over 10,000 companies that choose TechDirect

Register at TechDirect.Dell.com.

Dell Technologies Consulting Services

Our expert consultants help customers transform faster, and quickly achieve business outcomes for the high value workloads Dell PowerEdge systems can handle. From strategy to full-scale implementation, Dell Technologies Consulting can help determine how to perform IT, workforce, or application transformation. We use prescriptive approaches and proven methodologies that are combined with portfolio and partner ecosystem of Dell Technologies to help achieve real business outcomes. From multi cloud, applications, DevOps, and infrastructure transformations, to business resiliency, data center modernization, analytics, workforce collaboration, and user experiences-we are here to help.

Dell Managed Services

Some customers prefer Dell to manage the complexity and risk of daily IT operations, Dell Managed Services utilizes proactive, AI enabled delivery operations and modern automation to help customers realize desired business outcomes from their infrastructure investments. With these technologies, our experts run, update and fine-tune customer environments aligned with service levels, while providing environment-wide and down-to-the-device visibility. There are two types of managed service offers. First the outsourcing model or CAPEX model where Dell manages the customer owned assets using our people and tools. The second is the as-a-Service model or OPEX model called APEX. In this service, Dell owns all technology and all the management of it. Many customers will have a blend of the two management types depending on the goals of the organization.

Figure 30. Dell Managed Services

Dell Technologies Education Services

Build the IT skills required to influence the transformational outcomes of the business. Enable talent and empower teams with the right skills to lead and perform transformational strategy that drives competitive advantage. Leverage the training and certification required for real transformation.

Dell Technologies Education Services offers PowerEdge server training and certifications that are designed to help customers achieve more from their hardware investment. The curriculum delivers the information and the practical, firsthand skills that their team must confidently install, configure, manage, and troubleshoot Dell servers.

To learn more or register for a class today, see Education.Dell.com.

14

Appendix A. Additional specifications

Topics:

- Chassis dimensions
- System weight
- NIC port specifications
- Video specifications
- USB ports specifications
- PSU rating
- Environmental specifications

Chassis dimensions

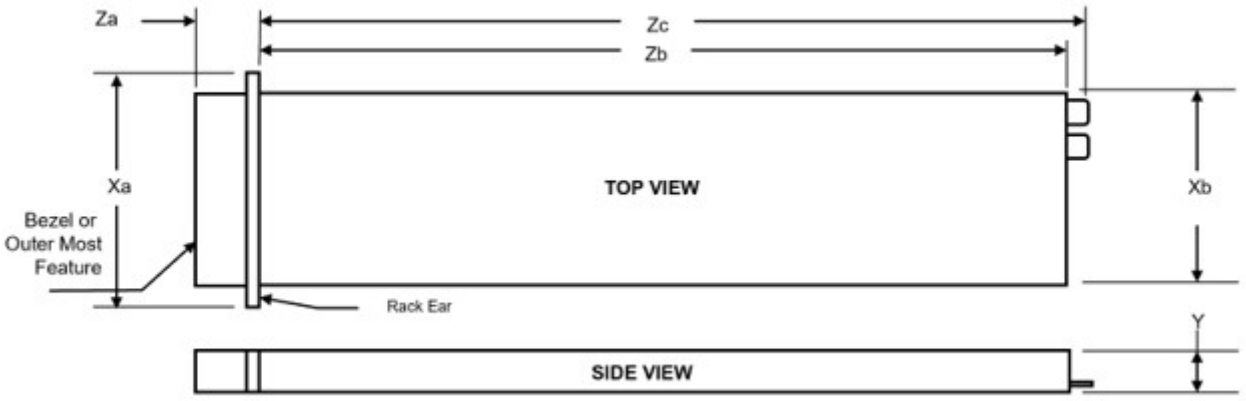


Figure 31. Chassis dimensions

Table 31. Chassis dimension for the PowerEdge XE9680 system

Drives	Xa	Xb	Y	Za	Zb	Zc
16 x E3.s or 8 x 2.5-inch NVMe drives or system with no backplane configuration	482.0 mm (18.97 inches)	447.0 mm (17.59 inches, top) 434.0 mm (17.08 inches, bottom)	263.2 mm (10.36 inches)	35.77 mm (1.4 inches)With bezel 22.0 mm (0.87 inches Without bezel	855.5 mm (33.68 inches, top) Ear to rear wall 966 mm (38.03 inches, bottom) Ear to rear GPU fan	973 mm (38.30 inches) Ear to Fan handle

NOTE: Zb is the nominal rear wall external surface where the system board I/O connectors reside.

NOTE: Chassis length is longer than usual, need to consider potential interferences with rear mounted PDU or the rear rack door when installed on rack.

System weight

Table 32. Weight for the PowerEdge XE9680 system with 8 x 2U SSDs

System configuration	Maximum weight (with all drives/SSDs)
XE9680 system with fully populated with H100	107 kg (235.89 pounds)
XE9680 system with fully populated with A100	105 kg (231.48 pounds)
XE9680 system L10, without 8 x U2 SSDs, 6 x PSUs, 1 x GPU module, 10 x PCIe cards, 1 x BOSS module	70.19 kg (154.74 pounds)

Table 33. Weight for the PowerEdge XE9680 system with 16 x E3.s SSDs

System configuration	Maximum weight (with all drives/SSDs)
XE9680 system with fully populated with H100	107.75 kg (237.55 pounds)
XE9680 system with fully populated with A100	106 kg (233.69 pounds)
XE9680 system L10, without 16 x E3.s SSDs, 6 x PSUs, 1 x GPU module, 10 x PCIe cards, 1 x BOSS module	70.76 kg (155.99 pounds)

Table 34. PowerEdge system weight handling recommendations

Chassis weight	Description
40 pounds - 70 pounds	Recommend two person to lift
70 pounds- 120 pounds	Recommend three person to lift
≥ 121 pounds	Recommend to use a server-lift

CAUTION: The system is heavy therefore can slide over and cause damage during installation and removal from a higher position on the rack.

NIC port specifications

The PowerEdge XE9680 system supports up to two 10/100/1000 Mbps Network Interface Controller (NIC) ports embedded on the LAN on Motherboard (LOM) and integrated on the optional Open Compute Project (OCP) cards.

Table 35. NIC port specification for the system

Feature	Specifications
LOM card	1 GbE x 2
OCP card (OCP 3.0)	Intel 25 GbE x 4, Intel 25 GbE x 2 , Intel 10 GbE x 4, Broadcom 25 GbE x 4, Broadcom 10 GbE x 4, Broadcom 25 GbE x 2

Video specifications

The system supports integrated Matrox G200 graphics controller with 16 MB of video frame buffer.

Table 36. Supported front video resolution options for the system

Resolution	Refresh rate (Hz)	Color depth (bits)
1024 x 768	60	8, 16, 32
1280 x 800	60	8, 16, 32
1280 x 1024	60	8, 16, 32

Table 36. Supported front video resolution options for the system (continued)

Resolution	Refresh rate (Hz)	Color depth (bits)
1360 x 768	60	8, 16, 32
1440 x 900	60	8, 16, 32
1600 x 900	60	8, 16, 32
1600 x 1200	60	8, 16, 32
1680 x 1050	60	8, 16, 32
1920 x 1080	60	8, 16, 32
1920 x 1200	60	8, 16, 32

Table 37. Supported rear video resolution options for the system

Resolution	Refresh rate (Hz)	Color depth (bits)
1024 x 768	60	8, 16, 32
1280 x 800	60	8, 16, 32
1280 x 1024	60	8, 16, 32
1360 x 768	60	8, 16, 32
1440 x 900	60	8, 16, 32
1600 x 900	60	8, 16, 32
1600 x 1200	60	8, 16, 32
1680 x 1050	60	8, 16, 32
1920 x 1080	60	8, 16, 32
1920 x 1200	60	8, 16, 32

USB ports specifications

Table 38. PowerEdge XE9680 USB specifications

Front		Rear	
USB port type	**No. of ports**	**USB port type**	**No. of ports**
USB 2.0-compliant port	One	USB 3.0-compliant port	One
iDRAC Direct port (Micro-AB USB 2.0-compliant port)	One	USB 2.0-compliant ports	One

NOTE: The micro USB 2.0 compliant port can only be used as an iDRAC Direct or a management port.

PSU rating

Below table lists the power capacity the PSUs in High/Low line operation mode.

Table 39. PSUs Highline and Lowline Ratings

Features	2800 W Platinum
Peak Power (Highline/-72 VDC)	4760 W
Highline/-72 VDC	2800 W

Table 39. PSUs Highline and Lowline Ratings (continued)

Features	2800 W Platinum
Peak Power (Lowline/-40 VDC)	N/A
Lowline/-40 VDC	N/A
Highline 240 VDC	2800 W
DC-48-60 V	N/A

The PowerEdge XE9680 supports six of AC or DC power supplies.

Dell PSUs have achieved Platinum efficiency levels as shown in the table below.

Table 40. PSU Efficiency Level

Form Factor	Output	Class	10%	20%	50%	100%
Redundant 86mm	2800 W AC	Titanium	90.00%	94.00%	96.00%	94%

Environmental specifications

NOTE: For additional information about environmental certifications, refer to the *Product Environmental Datasheet* located with the Manuals & Documents on www.dell.com/support/home.

Table 41. Operational climatic range category A2

Temperature	Specifications
Allowable continuous operations	
Temperature ranges for altitudes <= 900 m (<= 2953 ft)	10–35°C (50–95°F) with no direct sunlight on the equipment
Humidity percent ranges (non-condensing at all times)	8% RH with -12°C minimum dew point to 80% RH with 21°C (69.8°F) maximum dew point
Operational altitude de-rating	Maximum temperature is reduced by 1°C/300 m (33.8°F/984 Ft) above 900 m (2953 Ft)

NOTE: Certain system hardware configurations may require operating temperatures to be less than 28°C. For more information, see the Thermal air restrictions section.

Table 42. Shared requirements across all categories

Temperature	Specifications
Allowable continuous operations	
Maximum temperature gradient (applies to both operation and non-operation)	20°C in an hour* (36°F in an hour) and 5°C in 15 minutes (41°F in 15 minutes), 5°C in an hour* (41°F in an hour) for tape **NOTE:** * - Per ASHRAE thermal guidelines for tape hardware, these are not instantaneous rates of temperature change.
Non-operational temperature limits	-40 to 65°C (-104 to 149°F)
Non-operational humidity limits	5% to 95% RH with 27°C (80.6°F) maximum dew point
Maximum non-operational altitude	12,000 meters (39,370 feet)
Maximum operational altitude	3,048 meters (10,000 feet)

Table 43. Maximum vibration specifications

Maximum vibration	Specifications
Operating	0.21 G_{rms} at 5 Hz to 500 Hz (all operation orientations)
Storage	1.88 G_{rms} at 10 Hz to 500 Hz for 15 minutes

Table 44. Maximum shock pulse specifications

Maximum shock pulse	Specifications
Operating	Six consecutively executed shock pulses in the positive and negative x, y, and z axis of 6 G for up to 11 ms.
Storage	Executed shock pulses in z axis (one pulse) of 71 G for up to 2ms

Thermal restriction matrix

Table 45. Thermal Restriction Matrix

CPU (W)	Heat sink type	Fan Type	8 x 2.5-inch SAS/SATA/NVMe or 16 x E3.s			
			ASHRAE A2 (Max 35° C)	Ambient Limit (Max 30° C)	Ambient Limit (Max 25° C)	Ambient Limit (Max 20° C)
Intel SPR 56C 8480+ CPU (350W)	2U CPU HPR HSK	High Performance Gold Fan (CPU Fan)	Supported			
Intel SPR 52C 8470 CPU (350W)						
Intel SPR 48C 8468 CPU (350W)						
Intel SPR 32C 6448Y CPU (225W)						
Intel SPR 24C 6442Y CPU (225W)						
Intel SPR 36C 8452Y CPU (300W)						
Intel SPR 32C 8462Y+ CPU (300W)						
Intel SPR 40C 8460Y+ CPU (300W)						

Table 46. GPU/FPGA Thermal Restriction Matrix

TDP (W)	Heat sink type	Fan Type	8 x 2.5-inch SAS/SATA/NVMe or 16 x E3.s			
			ASHRAE A2 (Max 35° C)	Ambient Limit (Max 30° C)	Ambient Limit (Max 25° C)	Ambient Limit (Max 20° C)
Nvidia Delta Board (8x A100 500 W)	4U GPU HSK+NVLink HSK	High Performance Gold Fan (GPU Fan)	Supported			
Nvidia Delta-Next Board (8x H100 700 W)	NA					

NOTE: When the GPUs are installed, the iDRAC sets the thermal warning threshold to 38° C

NOTE: If System Board Inlet Temp reaches 38° C, a warning message is logged. It is possible the GPUs may lower power consumption to avoid thermal damage. This results in lower GPU performance.

Table 47. Processor and heat sink matrix

Heatsink	Processor TDP
2U HPR HSK	Supports all TDP

- All configurations support 35°C without any performance degradation.
- ASHRAE A3/A4 environments are not supported.
- The GPU fan service time should be limited to 30 seconds.
- Install an HDD blank if the slot is not equipped with an HDD.
- DIMM blank is not required when the DIMM population quantity is 16 pieces or more.

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Appendix B. Standards compliance

The system conforms to the following industry standards.

Table 48. Industry standard documents

Standard	URL for information and specifications
ACPIAdvance Configuration and Power Interface Specification, v6.4	https://uefi.org/specsandtesttools
Ethernet IEEE Std 802.3-2022	https://standards.ieee.org/
IPMI Intelligent Platform Management Interface, v2.0	intel.com/design/servers/ipmi
DDR5 Memory DDR5 SDRAM Specification	jedec.org/standards-documents/docs/jesd79-4.pdf
PCI Express PCI Express Base Specification, v5.0	pcisig.com/specifications/pciexpress
PMBus Power System Management Protocol Specification, v1.2	http://pmbus.org/Assets/PDFS/Public/PMBus_Specification_Part_I_Rev_1-1_20070205.pdf
SAS Serial Attached SCSI, 3 (SAS-3) (T10/INCITS 519)	http://www.t10.org/
SATA Serial ATA Rev. 3.3	sata-io.org
SMBIOS System Management BIOS Reference Specification, v3.3.0	DMTF SMBIOS
TPM Trusted Platform Module Specification, v1.2 and v2.0	trustedcomputinggroup.org
UEFI Unified Extensible Firmware Interface Specification, v2.7	uefi.org/specifications
PI Platform Initialization Specification, v1.7	
USB Universal Serial Bus v2.0 and SuperSpeed v3.0 (USB 3.1 Gen1)	USB Implementers Forum, Inc. https://usb.org/documents
NVMe Express Base Specification. Revision 2.0c	https://nvmexpress.org/specifications/
NVMe Command Set Specifications 1. NVM Express NVM Command Set Specification. Revision 1.1c 2. NVM Express Zoned Namespaces Command Set. Revision 1.0c 3. NVM Express® Key Value Command Set. Revision 1.0c	
NVMe Transport Specifications 1. NVM Express over PCIe Transport. Revision 1.0c 2. NVM Express RDMA Transport Revision. 1.0b 3. NVM Express TCP Transport. Revision 1.0c	
NVMe NVM Express Management Interface. Revision 1.2c	
NVMe NVMe Boot Specification. Revision 1.0	

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Appendix C Additional resources

Table 49. Additional resources

Resource	Description of contents	Location
Installation and Service Manual	This manual, available in PDF format, provides the following information: • Chassis features • System Setup program • System indicator codes • System BIOS • Remove and replace procedures • Diagnostics • Jumpers and connectors	Dell.com/Support/Manuals
Getting Started Guide	This guide ships with the system, and is also available in PDF format. This guide provides the following information: • Initial setup steps	Dell.com/Support/Manuals
Rack Installation Guide	This document ships with the rack kits, and provides instructions for installing a server in a rack.	Dell.com/Support/Manuals
System Information Label	The system information label documents the system board layout and system jumper settings. Text is minimized due to space limitations and translation considerations. The label size is standardized across platforms.	Inside the system chassis cover
Quick Resource Locator (QRL)	This code on the chassis can be scanned by a phone application to access additional information and resources for the server, including videos, reference materials, service tag information, and Dell contact information.	Inside the system chassis cover
Enterprise Infrastructure Planning Tool (EIPT)	The Dell online EIPT enables easier and more meaningful estimates to help you determine the most efficient configuration possible. Use EIPT to calculate the power consumption of your hardware, power infrastructure, and storage.	Dell.com/calc