Dell PowerEdge R760xd2

Technical Guide

Regulatory Model: E93S Series
Regulatory Type: E93S001
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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 R760xd2 is Dell's latest 2-socket storage-optimized rack server that is designed to run complex workloads using highly scalable memory, I/O, and network options.

The system features:

- Up to two 4th Generation Intel Xeon Scalable Processors and optional Intel ® QuickAssist Technology
- Up to 16 DDR5 DIMM slots
- Two redundant AC or DC power supply units
- PCI Express® (PCIe) 4.0 enabled expansion slots
- Up to 24 x 3.5-inch SAS/SATA + 4 x 3.5-inch SAS/SATA or 4 x 2.5-inch PCIe NVMe with 3.5-inch carrier adapter or 2 x 2.5-inch NVMe SSD or 4 x E3.S NVMe SSD
- Network interface technologies to cover Network Interface Card (NIC)

Topics:

- Key workloads
- New technologies

Key workloads

Target workloads are:

- File and object storage
- Video capturing & surveillance
- Video streaming

R760xd2 meets dynamic performance and capacity requirements with flexible storage options.

New technologies

Table 1. New technologies

Technology	Detailed Description
4th Gen Intel Sapphire Rapids Processor (Socket E, LGA-4677)	Core count: Up to 32 core processor
	UPI speed: Up to 3x UPIs/Socket at 12.8 GT/s or 14.4 or 16 GT/s
	Maximum number of PCIe lanes: Integrated 80 PCIe 5.0 lanes @ 32 GT/s PCIe Gen5
	Maximum TDP: 185 W
5th Gen Intel Emerald Rapids Processor (Socket E, LGA-4677)	Core count: Up to 28 core processor
	UPI speed: Up to 3x UPIs/Socket at 12.8 GT/s or 14.4 or 16 GT/s
	Maximum number of PCIe lanes: Integrated 80 PCIe 5.0 lanes @ 32 GT/s PCIe Gen5
	Maximum TDP: 185 W
5600 MT/s DD5 Memory	Maximum 8 DIMM slots per processor and 16 slots per system
	Supports DDR5 ECC RDIMM up to 4800 MT/s (depending on processor SKU configured)

Table 1. New technologies (continued)

Technology	Detailed Description
Flex I/O	LOM board, 2x 1 GB with BCM5720 LAN controller
	Rear I/O with: ● 1 GB Dedicated Management Network Port ● USB 3.0 x1 ● USB 2.0 x1 ● VGA port
	OCP 3.0 Mezz (supported by x8 PCIe Gen4 lanes)
	Front I/O with: ● USB 2.0 x1 ● Dedicated iDRAC Direct micro-USB x 1
CPLD 1-wire	Support payload data of Riser, BOSS-N1, BP, and Rear I/O to BIOS and iDRAC.
Dedicated PERC	PERC 11 and PERC 12
Power Supplies	60 mm dimension is the new PSU form factor design.
	700 W mixed mode HLAC Titanium
	1100 W mixed mode Titanium
	1400 W mixed mode Platinum
	1400 W 277 Vac and HVDC Titanium
	1800 W mixed mode HLAC Titanium
	1100 W -48 V DC

NOTE: HLAC: High-Line AC 200-240 VAC (lower voltages are not supported).

NOTE: HVDC: High - Voltage DC 336 VDC.

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System features and generational comparison

The following table shows the comparison between the PowerEdge R760xd2 with the PowerEdge R740xd2.

Table 2. Features comparison

Features	PowerEdge R760xd2	PowerEdge R740xd2
Processors	Up to two 4th or 5th Generation Intel® Xeon® Scalable processors with up to 32 cores per processor. Support for up to 2 x 185 W processors.	Up to two 2nd Generation Intel® Xeon® Scalable processors with up to 22 cores per processor. Support for up to 2 x 140 W processors.
CPU interconnect	Intel® Ultra Path Interconnect (UPI) @ 16 GT/s	Intel® Ultra Path Interconnect (UPI) @ 10.4 GT/s
Memory	Up to 16 x DDR5 RDIMMs DIMM Speed: Up to 4800 MT/s(depending on processor SKU configured)	Up to 16 x DDR4 RDIMMs DIMM Speed: Up to 3200 MT/s
Storage Controllers	PERC 12: H965i	PERC H740P or HBA330
	PERC 11: HBA355i, H755, H355	
	External PERC: HBA355e, H965e	
Drive Bays	Front: Up to 12 x 3.5 inch SAS/SATA Middle: Up to 12 x 3.5 inch SAS/SATA Rear: Up to 4 x 3.5 inch Universal or Up to 2 x 2.5 inch U.2 NVMe or 4 x E3.S NVMe	Front: Up to 24 x 3.5 inch SAS/SATA Rear: Up to 2 x 3.5 inch SAS/SATA 3.5 inch or SSD
Power Supplies	15G/16G 60 mm PSUs 48Vdc/1100W, 700 W, 1100 W, 1400 W, 1400 W 277 Vac and HVDC, 1800 W	750 W, 1100 W
Cooling Options	Air cooled	Air cooled
Fans	Up to 6 STD fans	Up to 6 HPR fans
Dimension	H x W x D: 2U x 481.6 mm x 837 mm	H x W x D: 2U x 482 mm x 810.26 mm
Form Factor	2U	2U
Embedded Management	iDRAC9 Enterprise, Datacenter license options; OpenManage Enterprise and Plugins	iDRAC9 Enterprise, Datacenter license options; OpenManage Enterprise and Plugins
OpenManage Software	• OpenManage Enterprise • OpenManage Power Manager plugin • OpenManage Service plugin • OpenManage Update Manager plugin • CloudIQ for PowerEdge plug in • OpenManage Enterprise Integration for VMware vCenter • OpenManage Integration for Microsoft System Center • OpenManage Integration with Windows Admin Center	• OpenManage Enterprise • OpenManage Power Center • OpenManage Mobile

Table 2. Features comparison (continued)

Features	PowerEdge R760xd2	PowerEdge R740xd2	
Mobility	OpenManage Mobile	OpenManage Mobile	
Integrations and Connections	OpenManage Integrations • BMC Truesight • Microsoft System Center • OpenManage Integration with ServiceNow • Red Hat Ansible Modules • Terraform Providers • VMware vCenter and vRealize Operations Manager	Integrations: • Microsoft® System Center • VMware® vCenter™ • BMC Truesight • Red Hat Ansible Modules	Connections: • Nagios Core & Nagios XI • Micro Focus Operations Manager i (OMi) • IBM Tivoli Netcool/ OMNIbus • IBM Tivoli® Network Manager IP Edition
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	• TPM 1.2/2.0, TCM 2.0 optional • Cryptographically signed firmware • Silicon Root of Trust • Secure Boot • System Lockdown (requires iDRAC Enterprise or Datacenter)	
Embedded NIC	2 x 1 GbE LOM	2 x 1 GbE LOM	
Networking Options	OCP 3.0 x8 (Optional)	OCP (Optional)	
GPU Options	Up to 2 x 75 W SW , 1 x 75 W SW + 1 x 150 W SW or 1 x180 W DW	None	
Ports	Front:1 x USB 2.0, 1x iDRAC Direct (Micro-USB) Rear: 1 x VGA, 1 x USB2.0 + 1 x USB3.0 Internal : USB3.0 (Optional)	Front: 2 x USB 2.0, 1 managed (micro USB) + front VGA Rear: 1 x Gen2 + 1 x Gen3 USB Optional Internal USB	
PCIe	Up to 5 x PCIe Slots Gen4 (mix of LP, HL, FL, DW)	Up to 2 x PCIe Slots Gen3	
Operating System and Hypervisors	• Canonical Ubuntu Server LTS • Microsoft Windows Server with Hyper-V • Red Hat Enterprise Linux • SUSE Linux Enterprise Server • VMware ESXi For specifications and interoperability details, see Dell.com/OSsupport.	• Canonical® Ubuntu® LTS • Citrix® Hypervisor • Microsoft® Windows Server® LTSC with Hyper-V • Oracle® Linux • Red Hat® Enterprise Linux • SUSE® Linux Enterprise Server • VMware® ESXi For specifications and interoperability details, see Dell.com/OSsupport	

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Chassis views and features

Topics:

- Front view of the system
- Rear view of the system
- Inside the system
- Quick Resource Locator

Front view of the system



Figure 1. Front view of 12 x 3.5-inch drive system



Figure 2. Front view of 24 x 3.5-inch drive system

Rear view of the system



Figure 3. 3 x PCIe Low-Profile Slots with 4 x 3.5-inch SAS/SATA or 4 x 2.5-inch NVMe Drives



Figure 4. 2 x PCIe Low-Profile Slots + 4 x 3.5-inch SAS/SATA Drives with 1 CPU



Figure 5. 5 x PCIe Low-Profile Slots



Figure 6. 3 x PCIe Low-Profile Slots with 1 CPU



Figure 7. 5 x PCIe Low-Profile Slots + 2 x 2.5-inch NVMe Drives



Figure 8. 3 x PCIe Low-Profile Slots + 2 x 2.5-inch NVMe Drives with 1 CPU

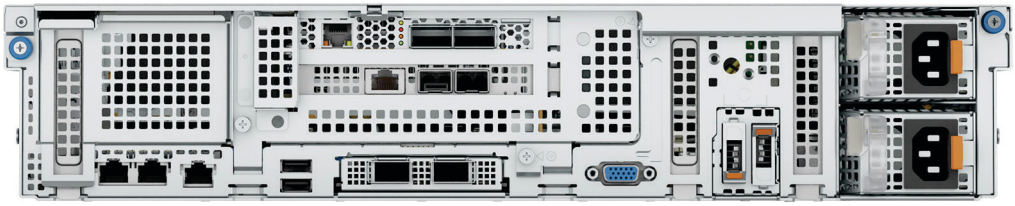

Figure 9. 3 x PCIe Low-Profile Slots + 2 x PCIe FH/FL Slots

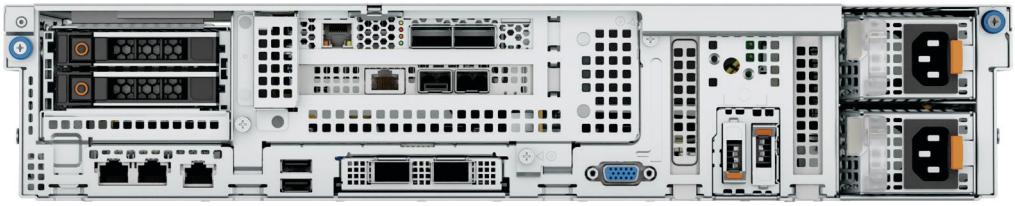

Figure 10. 2 x PCIe Low-Profile Slots + 2 x PCIe x16 FH/FL Slots + 2 x 2.5-inch NVMe Drives

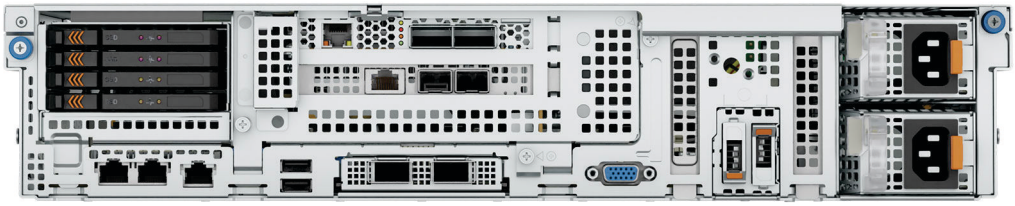

Figure 11. 2 x PCIe Low-Profile Slots + 2 x PCIe x16 FH/FL Slots + 4 x E3.S NVMe Drives

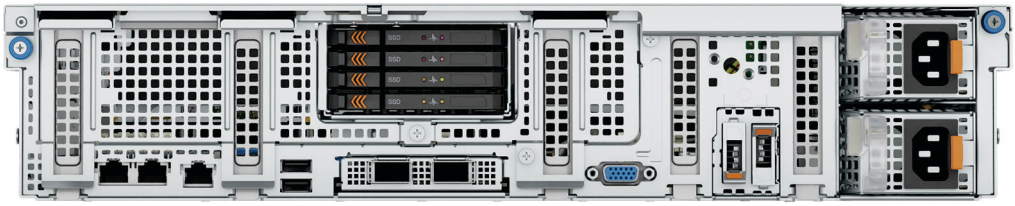

Figure 12. 5 x PCIe Low-Profile Slots + 4 x E3.S NVMe Drives

Inside the system

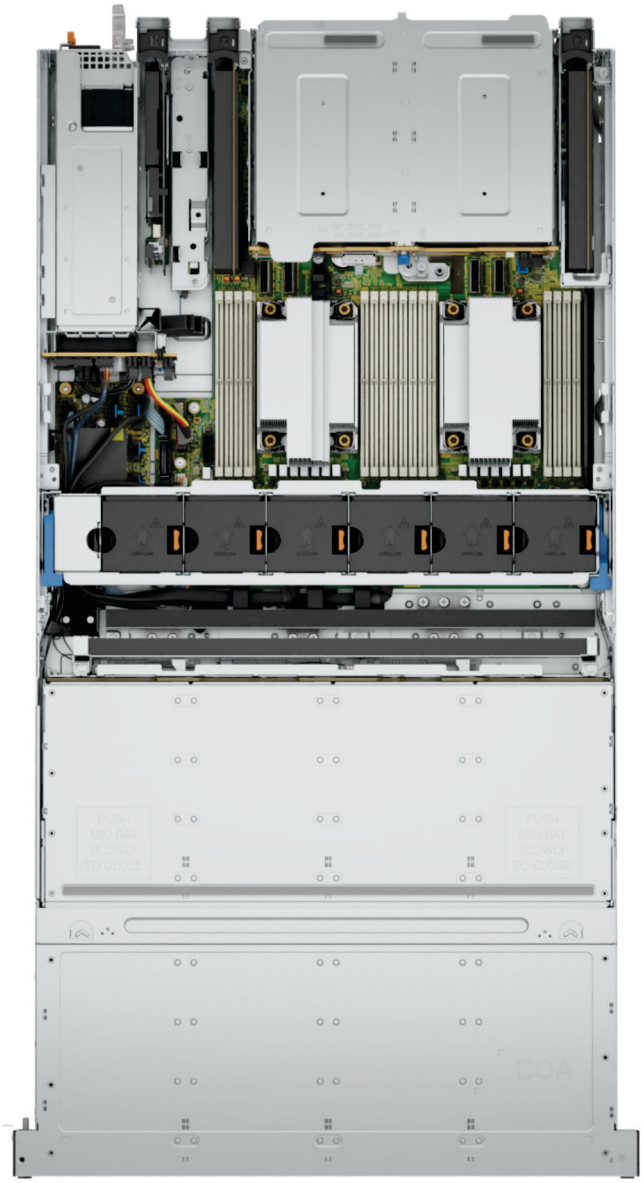

Figure 13. 3 x PCIe Low-Profile Slots with 4 x 3.5-inch SAS/SATA or 4 x 2.5-inch NVMe Drives

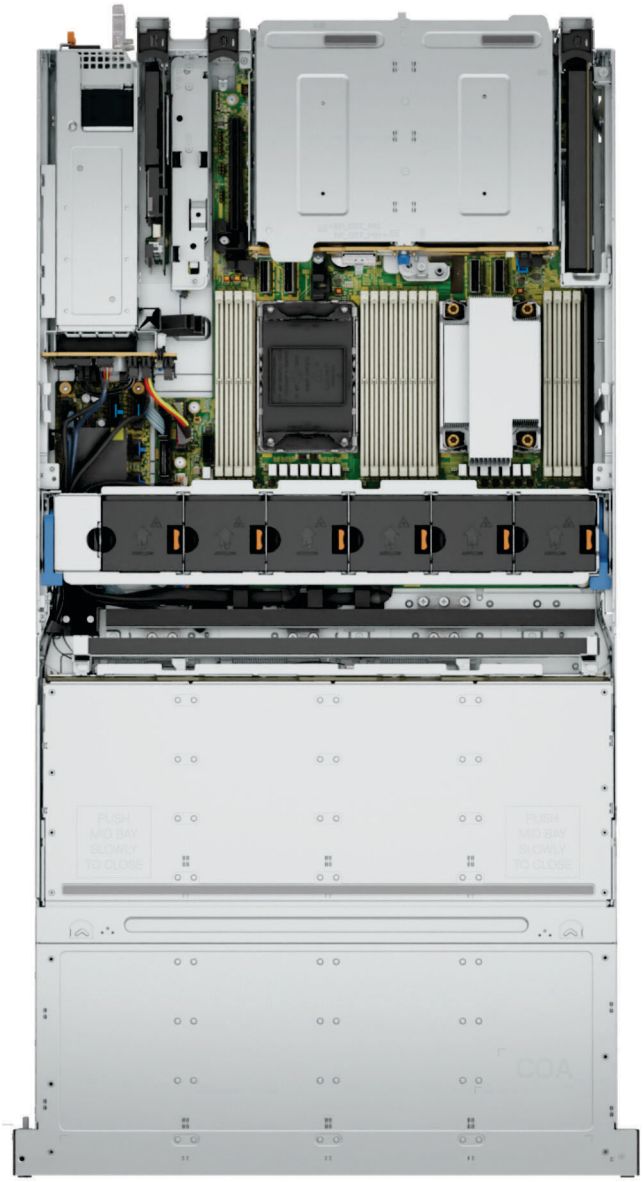

Figure 14. 2 x PCIe Low-Profile Slots + 4 x 3.5-inch SAS/SATA Drives with 1 CPU

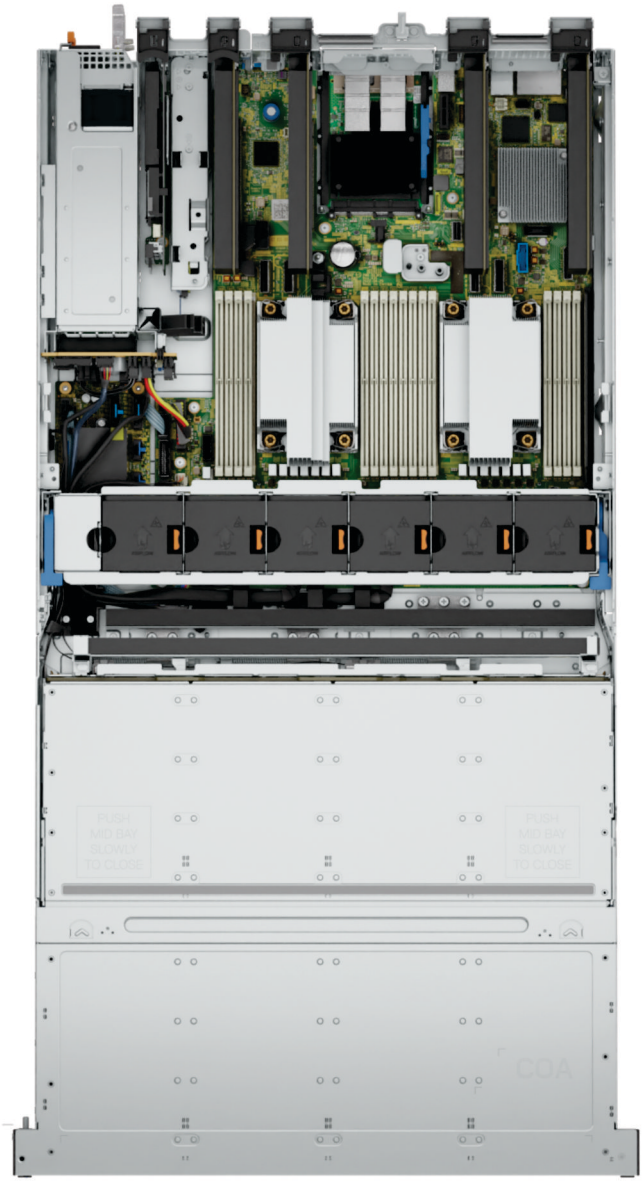

Figure 15. 5 x PCIe Low-Profile Slots

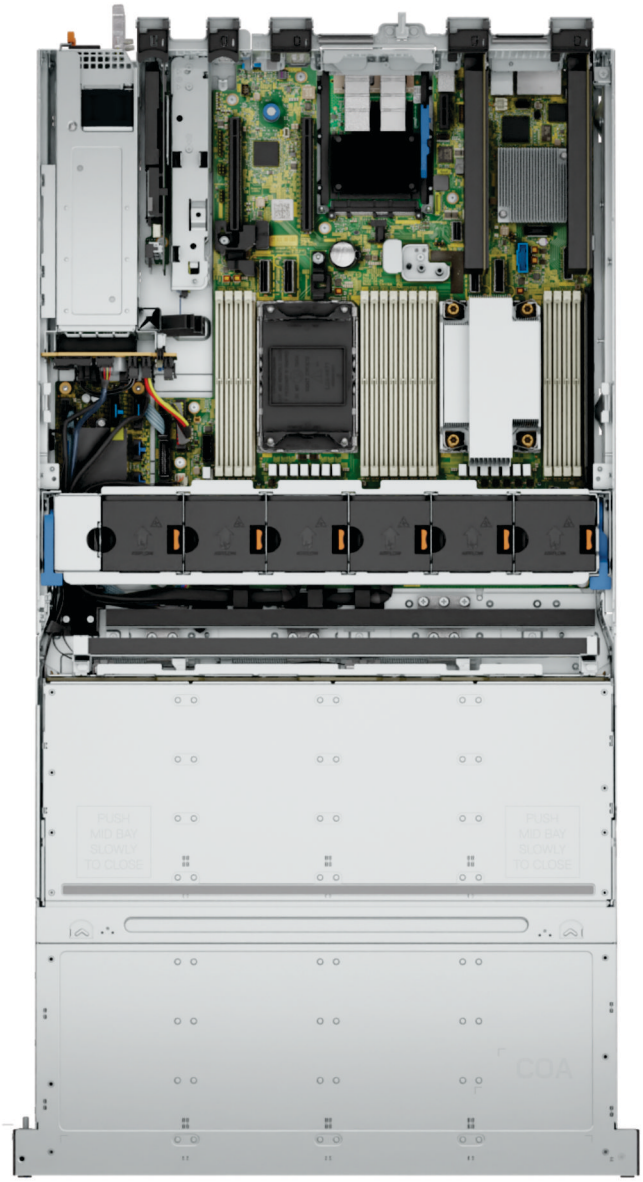

Figure 16. 3 x PCIe Low-Profile Slots with 1 CPU

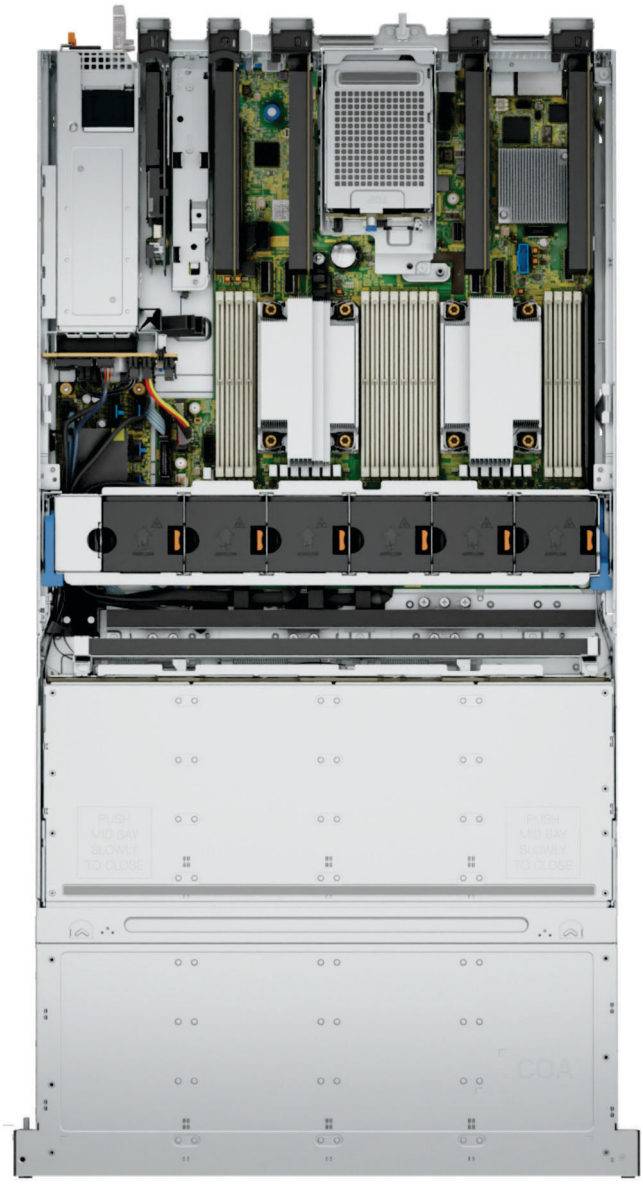

Figure 17. 5 x PCIe Low-Profile Slots + 2 x 2.5-inch NVMe Drives

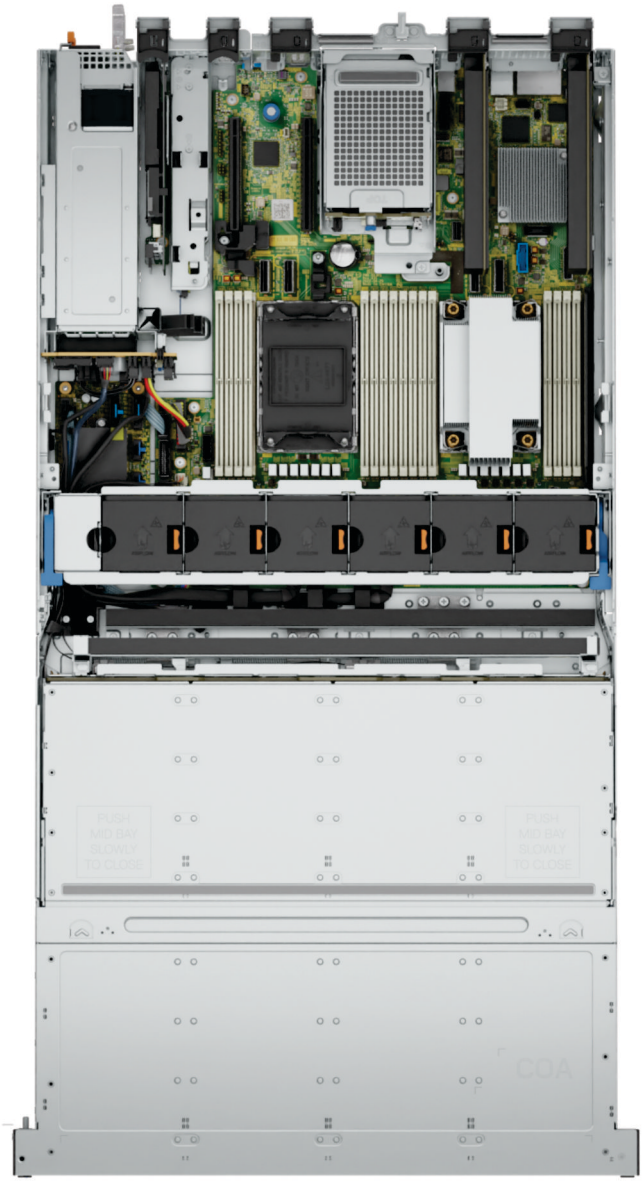

Figure 18. 3 x PCIe Low-Profile Slots + 2 x 2.5-inch NVMe Drives with 1 CPU

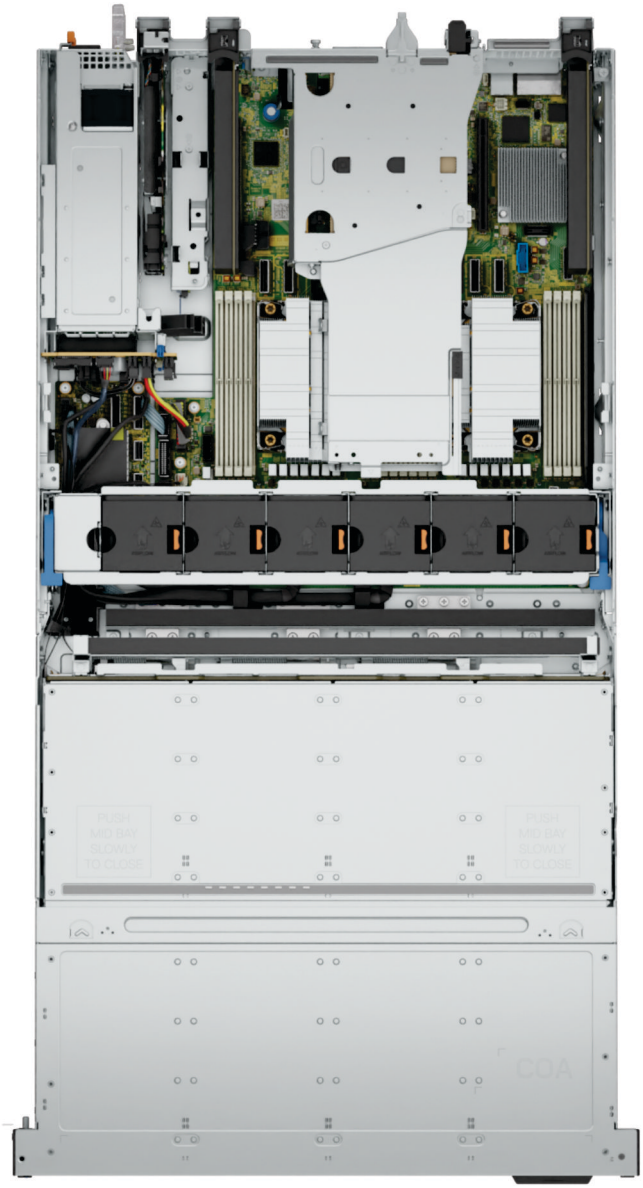

Figure 19. 3 x PCIe Low-Profile Slots + 2 x PCIe FH/FL Slots

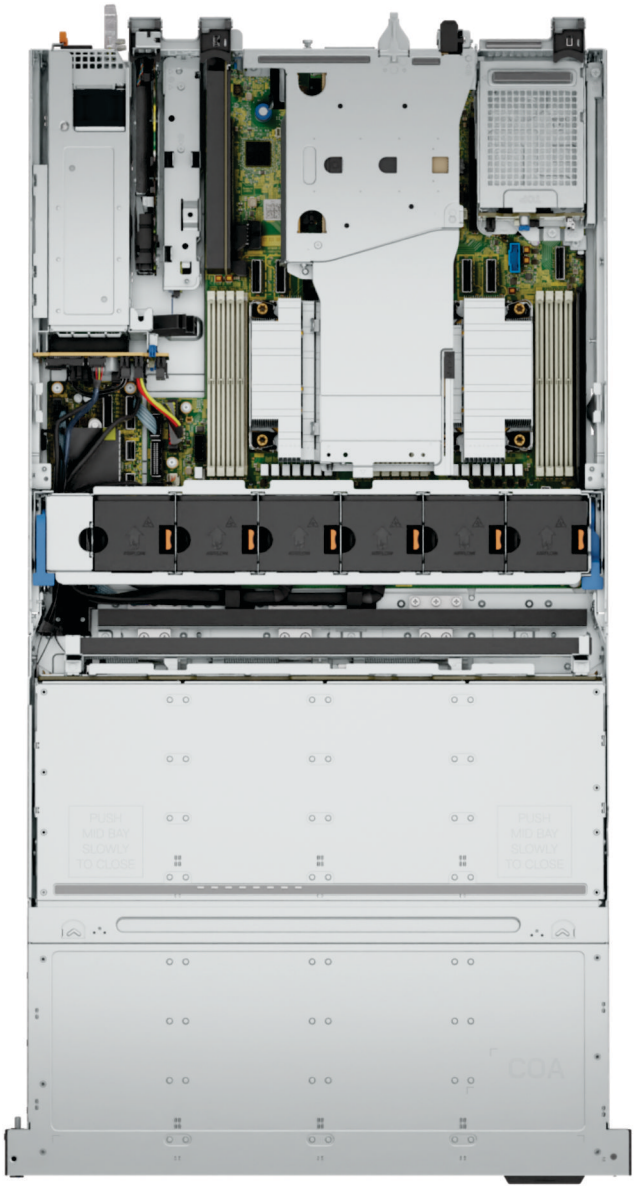

Figure 20. 2 x PCIe Low-Profile Slots + 2 x PCIe x16 FH/FL Slots + 2 x 2.5-inch NVMe Drives

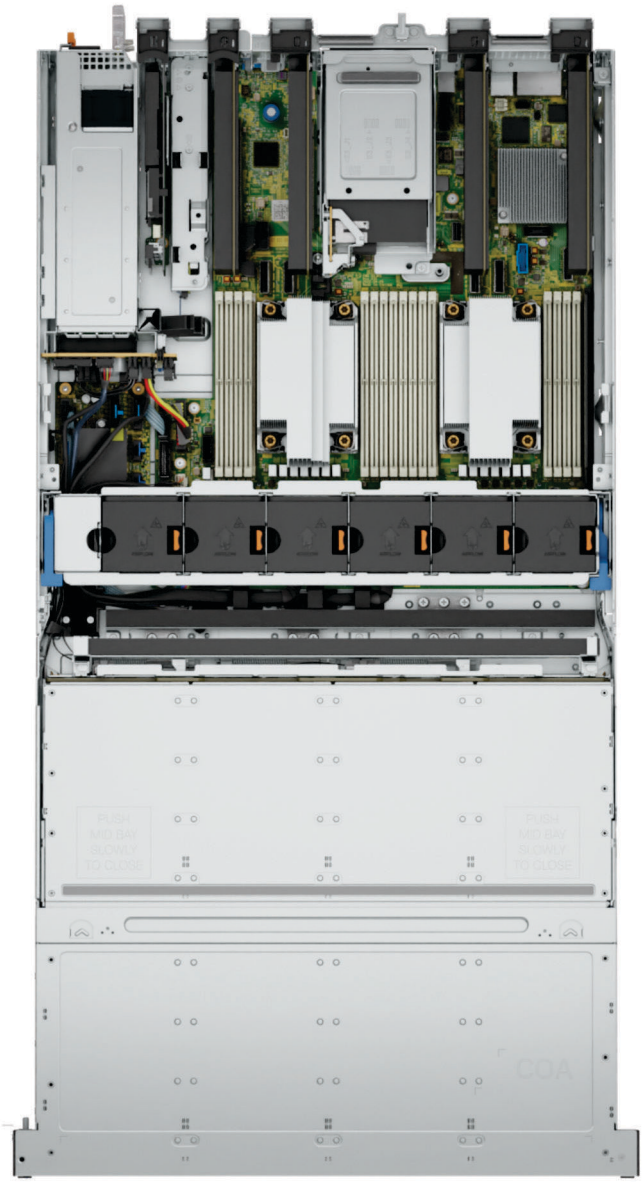

Figure 21. 5 x PCIe Low-Profile Slots + 4 x E3.S NVMe Drives

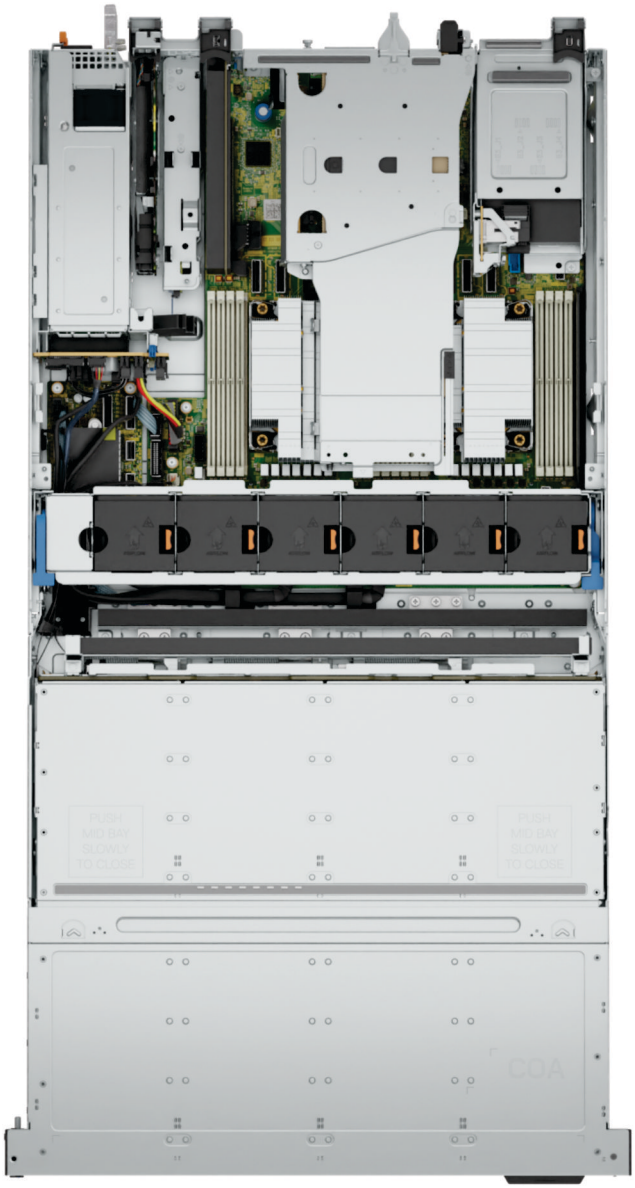

Figure 22. 2 x PCIe Low-Profile Slots + 2 x PCIe x16 FH/FL Slots + 4 x E3.S NVMe Drives

Quick Resource Locator

The QRL on everything (SILs, GSG, Owner's Manual except on the EST) is a generic QRL for R760xd2 that leads to a webpage for that product. That webpage has links for things like setup and service videos, iDRAC manual, and other things that apply to the platform. The QRL on the EST is unique and specific to that service tag and will contain the Service Tag number and the iDRAC password. The label and the QRL code within it are printed on demand at the L10 factories. This QRL links to a webpage that shows the exact configuration as built for that customer, and the specific warranty purchased. It is one click away from the same content of generic information that applies to R760xd2 that is available in the other QRLs.



Figure 23. Quick Resource Locator for PowerEdge R760xd2 system

4

Processor

Topics:

- Processor features

Processor features

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

The following lists the features and functions that are in the upcoming 4th Xeon Scalable Processor offering:

- Faster UPI with up to three Intel Ultra Path Interconnect (Intel UPI) at up to 16 GT/s, increasing multisocket bandwidth.
- More, faster I/O with PCI Express Gen4 and up to 80 lanes (per socket)
- Enhanced Memory Performance with DDR5 support and memory speed up to 4800 MT/s in one DIMM per channel (1DPC).
- New built-in accelerators for data analytics, networking, storage, crypto, and data compression

The 5th Generation Intel® Xeon® Scalable Processor stack is the next generation data center processor offering improved performance, standard increased memory speeds, expanded UPI speeds and enhanced security.

The following lists the features and functions that are in the 5th Generation Intel® Xeon® Scalable Processor offering:

- Increased core counts with up to 28 cores
- Enhanced memory performance with DDR5 and memory speed up to 4800 MT/s in one DIMM per channel (1DPC) , 24 Gb and 16 Gb DRAM
- Faster UPI with up to three Intel Ultra Path Interconnect (Intel® UPI) at up to 16 GT/s, increasing multi-socket bandwidth
- Enhanced security for virtualized environments with Intel Trust Domain Extensions (Intel® TDX) for confidential computing

Supported processors

Table 3. Supported processors for R760xd2

Processor	Clock Speed (GHz)	Cache (M)	UPI (GT/s)	Cores	Threads	Turbo	Memory Speed (MT/s)	Memory Capacity	TDP
6428N	1.8	60	16	32	64	Turbo	4800	4 TB	185 W
6426Y	2.6	38	16	16	32	Turbo	4800	4 TB	185 W
5418Y	2	45	16	24	48	Turbo	4400	4 TB	185 W
5418N	1.8	45	16	24	48	Turbo	4400	4 TB	165 W
5416S	2	30	16	16	32	Turbo	4400	4 TB	150 W
5415+	2.9	23	16	8	16	Turbo	4400	4 TB	150 W
5412U	2.1	45	16	24	48	Turbo	4400	4 TB	185 W
5411N	1.9	45	16	24	48	Turbo	4400	4 TB	165 W
4416+	2	38	16	20	40	Turbo	4000	4 TB	165 W
4410Y	2	30	16	12	24	Turbo	4000	4 TB	150 W
5512U	2.1	52.5	N/A	28	56	Turbo	4800	4 TB	185 W

Table 3. Supported processors for R760xd2 (continued)

Processor	Clock Speed (GHz)	Cache (M)	UPI (GT/s)	Cores	Threads	Turbo	Memory Speed (MT/s)	Memory Capacity	TDP
4514Y	2.0	30	16	16	32	Turbo	4400	4 TB	150 W
4510	2.4	30	16	12	24	Turbo	4400	4 TB	150 W
4509Y	2.6	23	16	8	16	Turbo	4400	4 TB	125 W

5

Memory subsystem

Topics:

- Supported memory

Supported memory

Table 4. Memory technology

Feature	PowerEdge R760xd2 (DDR5)
DIMM type	RDIMM
Transfer speed	4800MT/s (1DPC)
Voltage	1.1 V

The following table lists the supported DIMMs for R760xd2. For the latest information on supported memory and memory configurations reference the latest SDL.

Table 5. Supported DIMMs

Rated DIMM Speed (MT/s)	DIMM Type	DIMM Capacity (GB)	Ranks per DIMM	Data Width	DIMM Volts
4800	RDIMM	16	1	8	1.1
4800	RDIMM	32	2	8	1.1
4800	RDIMM	64	2	4	1.1
5600	RDIMM	16	1	8	1.1
5600	RDIMM	32	2	8	1.1
5600	RDIMM	64	2	4	1.1
5600	RDIMM	96	2	4	1.1

NOTE: The maximum memory speed the system will support is 4800 MT/s due to the limitation of the processor.

NOTE: 5600 MT/s RDIMMs are applicable for 5th Gen Intel Xeon Scalable Processors.

Table 6. Supported memory matrix

DIMM type	Rank	Capacity	DIMM rated voltage and speed	Operating Speed
				1 DIMM per channel (DPC)
RDIMM	1 R	16 GB	DDR5 (1.1 V), 4800 MT/s or 5600 MT/s	4800 MT/s
	2 R	32 GB, 64 GB, 96 GB	DDR5 (1.1 V), 4800 MT/s or 5600 MT/s	4800 MT/s

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Storage

Topics:

- Storage controllers
- Supported Drives
- Internal storage configuration
- External Storage

Storage controllers

Dell's RAID controller options offer performance improvements, including the Adapter PERC solution. Adapter PERC provides a base RAID HW controller without consuming a PCIe slot by using a small form factor and high-density connector to the base planar

Table 7. PERC Series controller offerings

Performance Level	Controller and Description
Entry	NA
Value	HBA355i Adapter (Internal)
Value Performance	H755 Adapter, H355 Adapter, H965i Adapter
External Controllers	HBA355e, H965e

NOTE: For more information on the features of the Dell PowerEdge RAID controllers (PERC), Software RAID controllers, or BOSS card, and on deploying the cards, see the storage controller documentation at www.dell.com/storagecontrollermanuals.

NOTE: From December 2021, H355 will replace H345 as the entry raid controller. H345 will be deprecated in January 2022.

Storage controller feature matrix

Table 8. Storage controller feature matrix

Model & Form Factors	Interface Support	PCI Support	SAS Connection	Cache Memory Size	Write Back Cache	RAID Levels	Max Drive Support	RAID Support
PowerEdge Server-Storage Controllers (PERC) Series 12								
H965i Adapter	24Gb/s SAS 6Gb/s SAS/SATA Gen3 (8 GT/s) NVMe Gen4 (16 GT/s) NVMe	PCIe Gen 4	16 ports/lanes - 2x8 Internal	8GB NV	Flash Backed Cache	0,1,5,6,10,50,60	16	Hardware
H965e Adapter	24Gb/s SAS 6Gb/s SAS/SATA	PCIe Gen 4	16 ports/lanes - 2x8 Internal	8GB NV	Flash Backed	0,1,5,6,10,50,60	16	Hardware

Table 8. Storage controller feature matrix (continued)

Model & Form Factors	Interface Support	PCI Support	SAS Connection	Cache Memory Size	Write Back Cache	RAID Levels	Max Drive Support	RAID Support
	Gen3 (8 GT/s) NVMe Gen4 (16 GT/s) NVMe				Cache			
PowerEdge Server-Storage Controllers (PERC & SAS HBA) Series 11								
H755 Adapter	12Gb/s SAS 6Gb/s SAS/SATA 3Gb/s SAS/SATA Gen3 (8 GT/s) NVMe Gen4 (16 GT/s) NVMe	PCIe Gen 4	16 ports- 2x8 Internal	8GB NV	Flash Backed Cache	0,1,5,6,10,50,60	16/ controller 50 with SAS Expander	Hardware
HBA355i Adapter	12Gb/s SAS 6Gb/s SAS/SATA 3Gb/s SAS/SATA	PCIe Gen 4	16 ports- 2x8 Internal	N/A	N/A	N/A	16/ controller 50 with SAS Expander	N/A
HBA355e Adapter	12Gb/s SAS 6Gb/s SAS/SATA 3Gb/s SAS/SATA	PCIe Gen 4	16 ports- 4x4 external	N/A	N/A	N/A	240	N/A
H355 Adapter	12Gb/s SAS 6Gb/s SAS/SATA	PCIe Gen 4	16 ports- 2x8 Internal	No Cache	No Cache	0,1, 10	Up to 32 RAID, or 32 Non- RAID	Hardware

NOTE:

1. RAID 5/50 removed from entry RAID card
2. SWRAID support for Linus provides a pre-boot configuration utility to configure MDRAID and degraded boot capability.
3. For information, post-RTS, see the Storage controller documentation at www.dell.com/stroagecontrollermanuals.

This document is updated as changes happen, so for the latest version be sure to bookmark it rather than downloading an offline copy or refer to the Storage Controller Matrix on sales portal.

Supported Drives

The table shown below lists the internal drives that are supported by the R760xd2. Refer to Agile for the latest SDL.

Table 9. Supported Drives

Form Factor	Type	Speed	Rotational Speed	Capacities
2.5 inches	NVMe	Gen4	SSD	1.6 TB, 1.92 TB, 3.2 TB, 3.84 TB, 6.4 TB, 7.68 TB
	DC NVMe	Gen4	SSD	960 GB, 3.84 TB
	vSAS	12 Gb	SSD	960 Gb, 1.92 TB, 3.84 TB, 7.68 TB
	SAS	24 Gb	SSD	800 Gb, 1.6 TB, 1.92 TB, 3.84 TB, 7.68 TB

Table 9. Supported Drives (continued)

Form Factor	Type	Speed	Rotational Speed	Capacities
	SATA	6 Gb	SSD	480 Gb, 960 Gb, 1.6 TB, 1.92 TB, 3.84 TB, 7.68 TB
	SAS	12 Gb	10 K	600 GB, 1.2 TB, 2.4 TB
3.5 inches	SAS	12 Gb	7.2 K	2 TB, 4 TB, 8 TB, 12 TB, 16 TB, 20 TB, 22 TB
	SATA	6 Gb	7.2 K	2 TB, 4 TB, 8 TB, 12 TB, 16 TB, 20 TB, 22 TB
E3.S	NVMe	Gen5	SSD	3.84 TB, 7.68 TB

Internal storage configuration

R760xd2 supports the following internal storage configurations:

- 2 x 12 x 3.5 inch SAS/SATA RAID
- 2 x 12 x 3.5 inch SAS/SATA RAID with rear 4 x 3.5 inch SAS/SATA
- 2 x 12 x 3.5 inch SAS/SATA RAID with rear 4 x 2.5 inch NVMe
- 2 x 12 x 3.5 inch SAS/SATA RAID with rear 2 x U.2 NVMe
- 2 x 12 x 3.5 inch SAS/SATA RAID with rear 4 x E3.S NVMe

External Storage

The R760xd2 support the external storage device types listed in the table below.

Table 10. Supported External Storage Devices

Device Type	Description
External Tape	Supports connection to external USB tape products
NAS/IDM appliance software	Supports NAS software stack
JBOD	Supports connection to 12 Gb MD-series JBODs

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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/SFP56
Max port speed	100 GbE
NC-SI	Yes
SNAPI	Yes
WoL	Yes
Power consumption	15 W–150 W

Supported OCP cards

Table 12. OCP cards

Form factor	Vendor	Port type	Port speed	Port count
OCP 3.0	Broadcom	BT	1 GbE	4 Port
	Broadcom	BT	1 GbE	4 Port
	Intel	BT	1 GbE	4 Port
	Broadcom	BT	10 GbE	2 Port
	Broadcom	BT	10 GbE	4 Port
	Intel	BT	10 GbE	2 Port

Table 12. OCP cards (continued)

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

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

OCP form factors

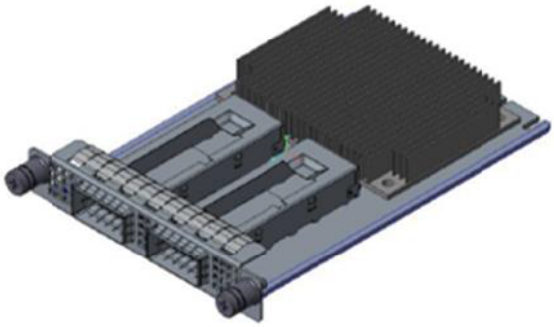

Figure 24. OCP 3.0 Small Card Form Factor (LS)

The process of removing the OCP card in R760xd2 system:

1. Open the blue latch to unlock the OCP card.
2. Push the OCP card towards the rear end of the system to disconnect from the connector on the system board.
3. Slide the OCP card out of the slot on the system.

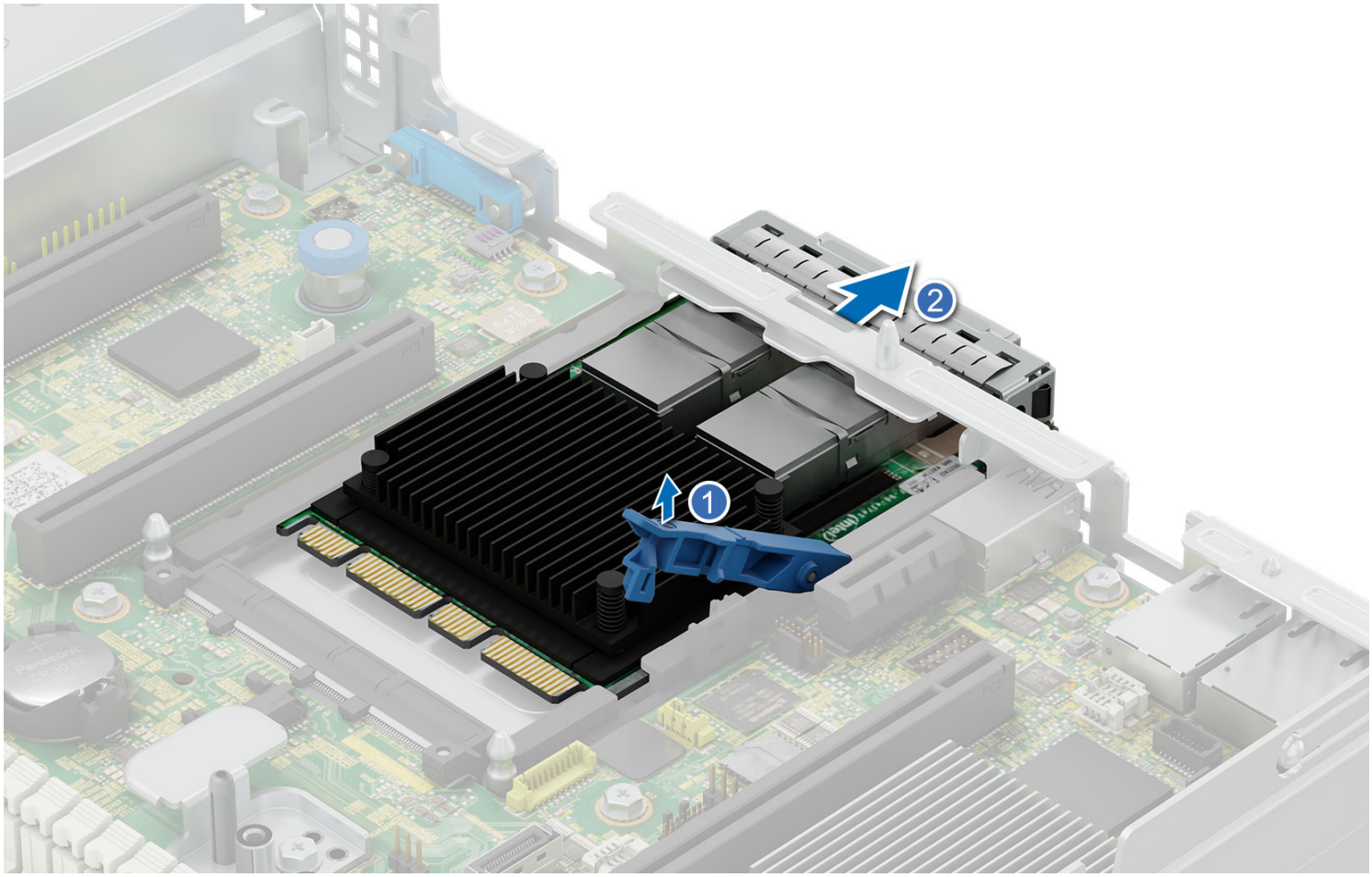

Figure 25. Removing the OCP Card in R760xd2

The process of installing the OCP card in R760xd2 system:

1. Open the blue latch on the system board.
2. Slide the OCP card into the slot in the system.
3. Push until the OCP card is connected to the connector on the system board.
4. Close the latch to lock the OCP card to the system.

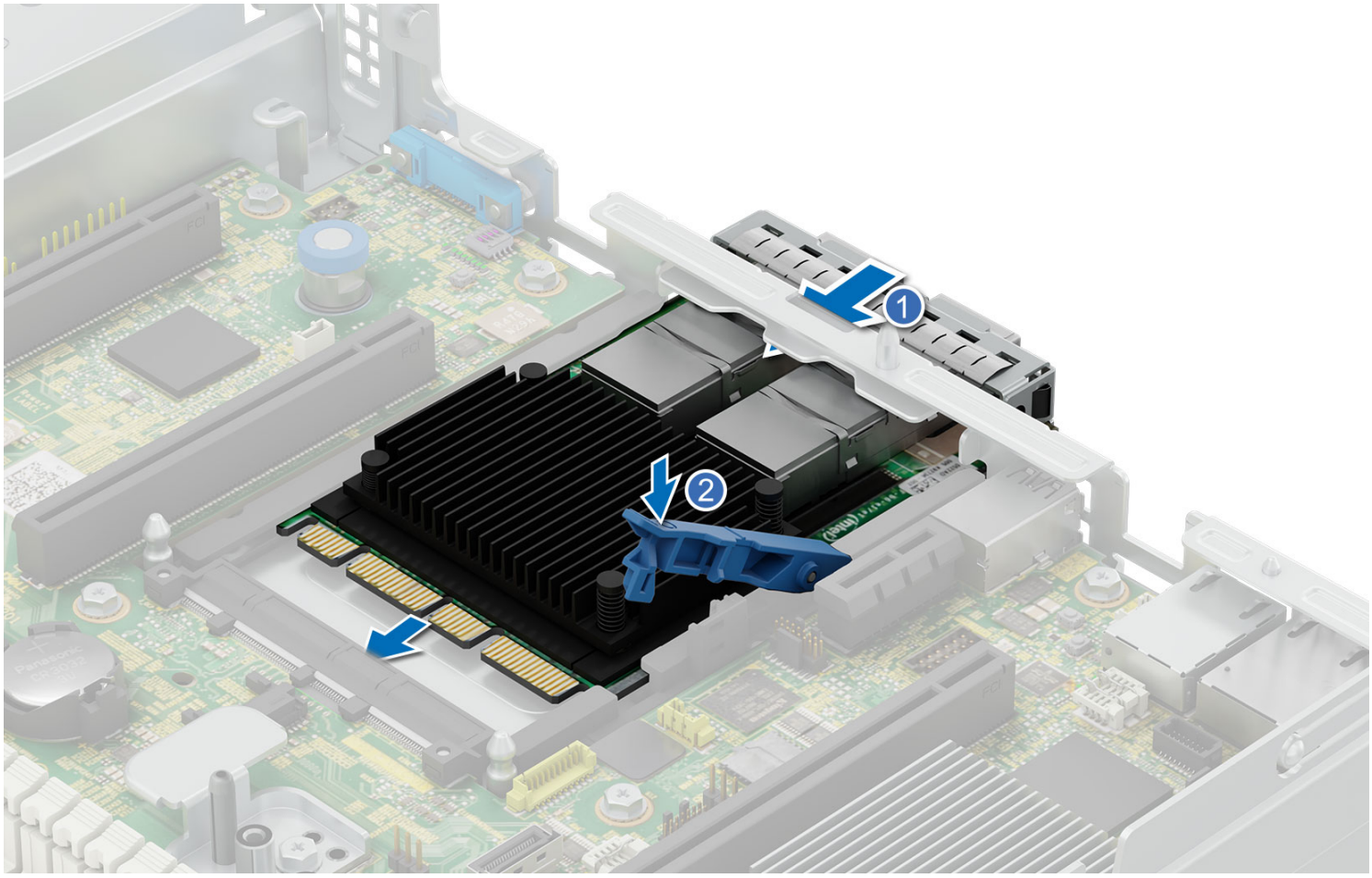

Figure 26. Installing the OCP Card in R760xd2

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PCIe subsystem

Topics:

- PCIe risers

PCIe risers

Shown below are the riser offerings for the platform. For a full list of supported cards and Slot priority, please see the Slot Priority Matrix - found in the Agile tool (P/N:R20W5)

Figure 27. Riser Offerings

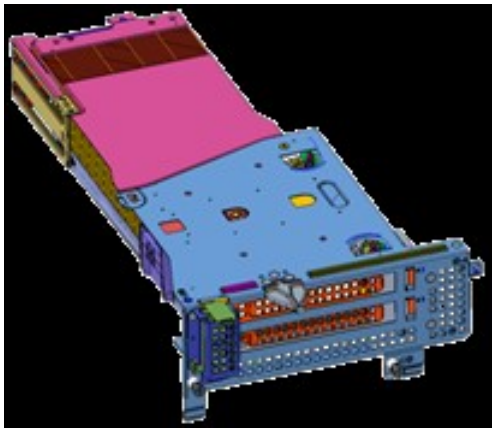

Figure 28. Config 3 FH FL Riser



Figure 29. Config 3 FH HL Riser

9

Power, thermal, and acoustics

PowerEdge servers have an extensive collection of sensors that automatically track thermal activity, which helps to regulate temperature by 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
- Acoustics

Power

Table 14. 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.
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, Climate Savers and ENERGY STAR.
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.
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.
Rack infrastructure	Dell offers some of the industry's highest-efficiency power infrastructure solutions, including:

Table 14. Power tools and technologies (continued)

Feature	Description
	• 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.

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 R760xd2.

Table 15. Power Supply Unit Options

Wattage	Frequency	Voltage/Current	Class	Heat dissipation
700 W mixed mode HLAC	50/60 Hz	200-240 Vac/4.1 A	Titanium	2625 BTU/hr
	NA	240 Vdc/3.4 A	NA	
1100 W mixed mode	50/60 Hz	100-240 Vac/12-3.6 A	Titanium	4125 BTU/hr
	NA	240 Vdc/5.2 A	NA	
1400 W mixed mode	50/60 Hz	100-240 Vac/12-8 A	Platinum	5250 BTU/hr
	NA	240 Vdc/6.6 A	NA	
1400 W 277 Vac and HVDC	50/60 Hz	277 Vac/5.8 A	Titanium	5250 BTU/hr
	NA	336 vdc/5.17 A	Titanium	
1800 W mixed mode HLAC	50/60 Hz	200-240 Vac/10 A	Titanium	6610 BTU/hr
	NA	240 Vdc/8.2 A	NA	
1100 W -48 V DC	NA	(-48) — (-60) Vdc/ 27 A	NA	4265 BTU/hr

NOTE: HLAC: High-Line AC 200-240 VAC (lower voltages are not supported).

NOTE: HVDC: High - Voltage DC 336 VDC.

NOTE: If a system with AC 1100 W or 1400 W PSUs operate at a low line 100 ~ 120 Vac, then the power rating per PSU is de-rated to 1050 W.

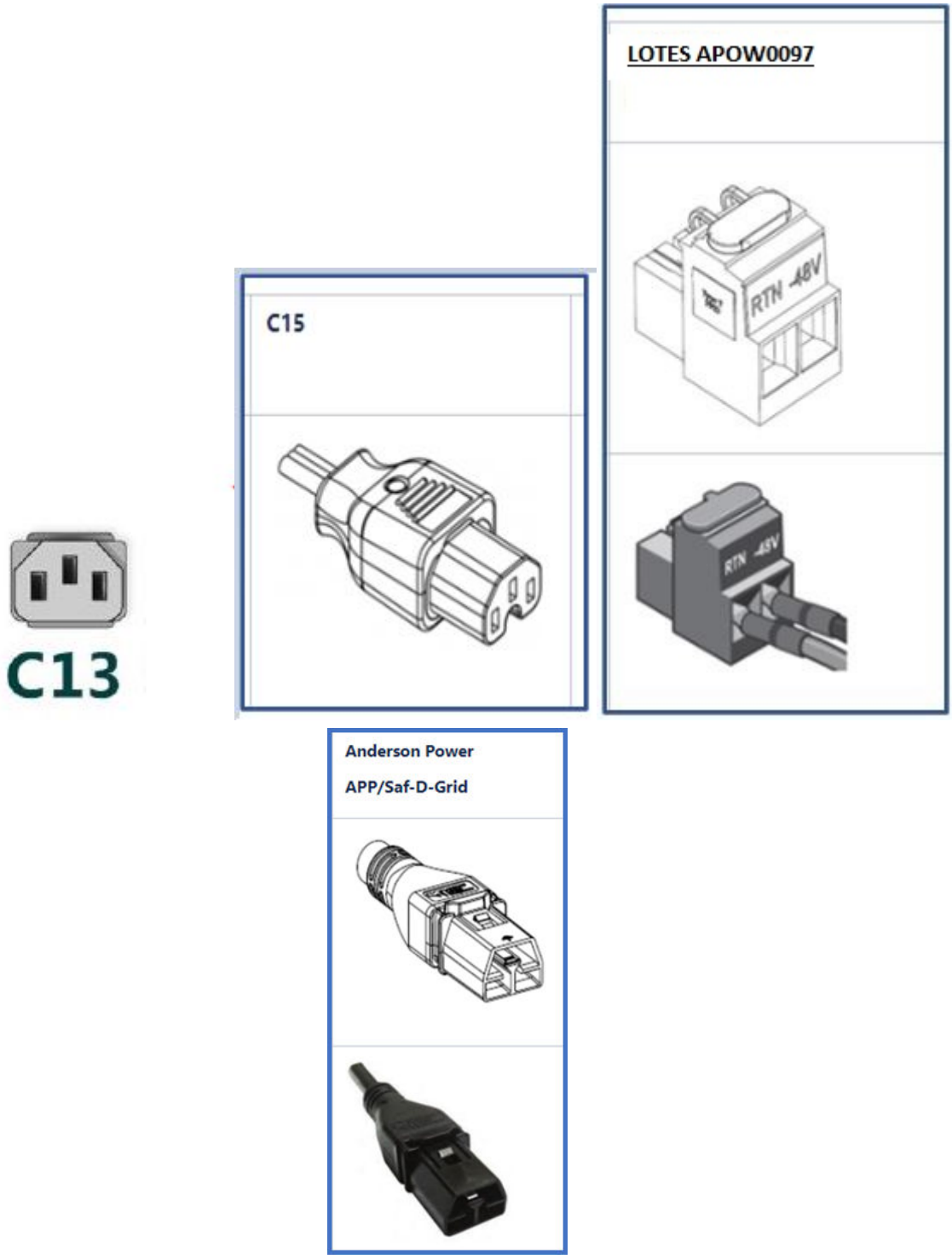

Figure 30. PSU power cord

Table 16. PSU power cords

Form factor	Output	Power cord
Redundant 60 mm	700 W mixed mode HLAC	C13
	1100 W mixed mode	
	1400 W mixed mode	
	1400 W 277 Vac and HVDC	APP 2006G1

Table 16. PSU power cords (continued)

Form factor	Output	Power cord
	1100 W -48 V DC	LOTES APOW0097.
	1800 W mixed mode HLAC	C15

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.

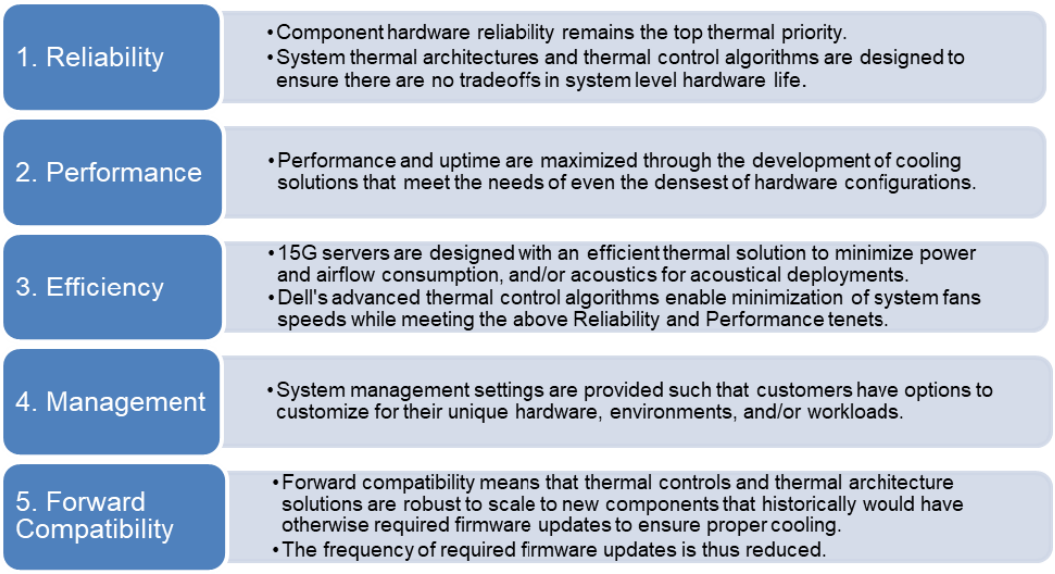

Figure 31. Thermal design characteristics

The thermal design of the PowerEdge R760xd2 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 R760xd2 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 R760xd2 allows N+1 fan redundancy, allowing continuous operation with one fan failure in the system.
- Environmental Specifications: The optimized thermal management makes the PowerEdge R760xd2 reliable under a wide range of operating environments.

Acoustics

Acoustical performance

Dell EMC PowerEdge R760xd2 is a rack server appropriate for attended data center environment. However, lower acoustical output is attainable with proper hardware or software configurations.

Table 17. Hardware and software configurations for lower acoustical output

Configuration	Quietest	Quietest GPU	Hadoop	SDS typical	SDS + acceleration
Processor Type	Intel Xeon Scalable processor	Intel Xeon Scalable processor	Intel Xeon Scalable processor	Intel Xeon Scalable processor	Intel Xeon Scalable processor
Processor TDP	185 W	185 W	185 W	150 W	185 W
Processor Quantity	1	2	2	2	2
RDIMM Memory	16 GB DDR5	16 GB DDR5	16 GB DDR5	8 GB DDR5	16 GB DDR5
Memory Quantity	2	2	16	8	16
Backplane Type	12 x 3.5-inch BP	12 x 3.5-inch BP	12 x 3.5-inch + 12 x 3.5-inch + Rear SSD x 2	12 x 3.5-inch + 12 x 3.5-inch + Rear 4 x 3.5 inch	12 x 3.5-inch + 12 x 3.5-inch
HDD Type	12 x 3.5 inch 8TB	12 x 3.5 inch 8TB	14 x 3.5 inch front 8 TB, 2 x 2.5 inch rear SSD	28 x 3.5 inch front 16 TB	24 x 3.5 inch 8 TB
HDD Quantity	12	12	14 + 2	28	24
Flash Drives	N/A	N/A	PCIe SSD	N/A	N/A
Flash Quantity	N/A	N/A	2	N/A	N/A
PSU Type	1100 W	1100 W	1100 W	1100 W	1100 W
PSU Quantity	2	2	2	2	2
OCP	N/A	N/A	Dual Port 10/25GbE	Dual Port 10/25GbE	Dual Port 10/25GbE
PCI 1	Intel 10 GbE	Intel 10 GbE	Intel 25 GbE	Intel 10 GbE	Intel 25 GbE
PCI 2	N/A	N/A	N/A	N/A	N/A
PCI 3	N/A	A30 GPU	N/A	H755	A30 GPU
PCI 4	N/A	HBA 355	HBA 355	HBA 355	PERC 965
PCI 5	HBA 355	N/A	N/A	N/A	N/A

Table 18. Acoustical performance of R760xd2 acoustical configurations

Configuration		Quietest	Quietest GPU	Hadoop	SDS typical	SDS + acceleration
Acoustical Performance: Idle/ Operating @ 25 °C Ambient						
$L_{wA,m}$ (B)	Idle	5.0	6.9	6.6	6.6	7.1
	Operating	5.2	7.3	6.6	6.6	7.5
K_v (B)	Idle	0.4	0.4	0.4	0.4	0.4
	Operating	0.4	0.4	0.4	0.4	0.4
$L_{pA,m}$ (dB)	Idle	35	54	51	51	56

Table 18. Acoustical performance of R760xd2 acoustical configurations (continued)

Configuration		Quietest	Quietest GPU	Hadoop	SDS typical	SDS + acceleration
	Operating	37	58	51	51	60
Prominent tones		No prominent tones in Idle and Operating				
Acoustical Performance: Idle @ 28 °C Ambient						
$L_{wA,m}$ (B)		5.8	7.2	7.0	7.0	7.4
K_v (B)		0.4	0.4	0.4	0.4	0.4
$L_{pA,m}$ (dB)		42	58	54	55	59
Acoustical Performance: Max. Loading @ 35 °C Ambient						
$L_{wA,m}$ (B)		7.7	8.1	7.6	8.1	8.1
K_v (B)		0.4	0.4	0.4	0.4	0.4
$L_{pA,m}$ (dB)		60	66	60	66	66

LwA,m: The declared mean A-weighted sound power level (LwA) is calculated per section 5.2 of ISO 9296 (2017) with data collected using the methods described in ISO 7779 (2010). Data presented here may not be fully compliant with ISO 7779.

LpA,m: The declared mean A-weighted emission sound pressure level is at the bystander position per section 5.3 of ISO 9296 (2017) and measured using methods described in ISO 7779 (2010). The system is placed on standard test table and in a 24U rack enclosure, 25cm above a reflective floor. Data presented here may not be fully compliant with ISO 7779.

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.

Customer Usage Operating mode: The operating mode is represented by the maximum of the steady state acoustical output at 0%~40% of CPU TDP, 5%~50% IOPs load, 0%~20% Memory load, and 10 0% GPU load as the components showed in the above configurations

PowerEdge acoustical specifications

For more information on acoustical specifications, see ENG0019663. (See the category definitions.)

Dell typically categorizes servers in five categories of acoustically acceptable usage:

- Category 1: Table-top in Office Environment
- Category 2: Floor-standing in Office Environment
- Category 3: General Use Space
- Category 4: Attended Data Center
- Category 5: Unattended Data Center

Category 1: Floor-standing in Office Environment

When Dell determines that a specific Enterprise product is to be used on a table-top in office environment, for example, on a desk around a seated user's head height, then the acoustical specification of the following table applies. Small, light-weight towers are examples of these types of products.

Table 19. 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 program's configuration document, then processor and hard drive operating modes are required**	**Simulate (that is, set fan speeds representative) for Idle at 28° C & 35° C Ambient, and for 100% loading and maximum configuration, at 35° C Ambient**
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 ≤ 15 dB. • Startup behavior ○ Report Startup behavior re. AC0159 ○ Startup must proceed smoothly, that is, 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, that is, next to a user's feet, then the acoustical specification in the table below applies. Noise from the product should not annoy or otherwise interfere with the user's thoughts or speech, for example, on the telephone.

Table 20. 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 (that is, set fan speeds representative) for Idle at 28° C & 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 ≤ 15 dB. • Startup behavior ○ Report Startup behavior re. AC0159 ○ Startup must proceed smoothly, that is, 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 are defined in "Configurations and Configuration Dependencies" for each platform.			
Sound Pressure	LpA-reported, dBA, re AC0158	Report for all mics	Report for all mics	Report for all mics	Report for all mics

Table 20. Dell Enterprise Category 2, "Floor-standing in Office Environment" acoustical specification category (continued)

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 (that is, set fan speeds representative) for Idle at 28° C & 35° C Ambient, and for 100% loading and maximum configuration, at 35° C Ambient
	and program 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 table below 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 21. 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 (that is, set air mover speeds representative) for Idle at 28° C & 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"			N/A

Table 21. Dell Enterprise Category 3, "General Use" acoustical specification category (continued)

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 (that is, set air mover speeds representative) for Idle at 28° C & 35° C Ambient and for 100% loading and maximum configuration, at 35° C Ambient**

		• 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, that is, no sudden or large jumps, and air mover 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, 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 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 (that is, 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 the above 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 22. 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 (that is, 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 (that is, set fan speeds representative) for Idle at 28° C & 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" ○ Acoustical Jump (see AC0159), during air mover speed transition from Idle to Operating Mode must be ≤ 15 dB. ○ Startup behavior ▪ Report Startup behavior re. AC0159 ▪ Startup must proceed smoothly, that is, 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

Category 5: 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 in the table below 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 23. 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 (that is, set air mover 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 (that is, set air mover speeds representative) for Idle at 28° C & 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
	LpA-single point, dBA	Report	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" • 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, that is, 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.				

Table 23. Dell Enterprise Category 5, "Unattended Data Center" acoustical specification category (continued)

Measurement Position re AC0158	Metric, re AC0159	Test Modes, re AC0159 (note must be in steady state, see AC0159, except where noted below)				Simulate (that is, set air mover 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 (that is, set air mover speeds representative) for Idle at 28° C & 35° C Ambient	
		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	Report for all mics

10

Rack, rails, and cable management

Topics:

- Rails and cable management information

Rails and cable management information

The rail offerings for the PowerEdge R760xd2 consist of general type: Stab-in sliding. The cable management offerings consist of an optional cable management arm (CMA) and an optional strain relief bar (SRB).

See the *Enterprise Systems Rail Sizing and Rack Compatibility Matrix* available at https://i.dell.com/sites/csdocuments/Business_solutions_engineering-Docs_Documents/en/rail-rack-matrix.pdf 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:

- Spacing between the front and rear mounting flanges of the rack.
- Type and location of any equipment that is mounted in the back of the rack such as power distribution units (PDUs).
- Overall depth of the rack.

Stab-in sliding rails features summary

The stab-in sliding rails allow the system to be partially extended out of the rack for service. The R760xd2 supports Stab-in sliding rails. The stab-in sliding rails are available with or without the optional cable management arm (CMA) or strain relief bar (SRB).

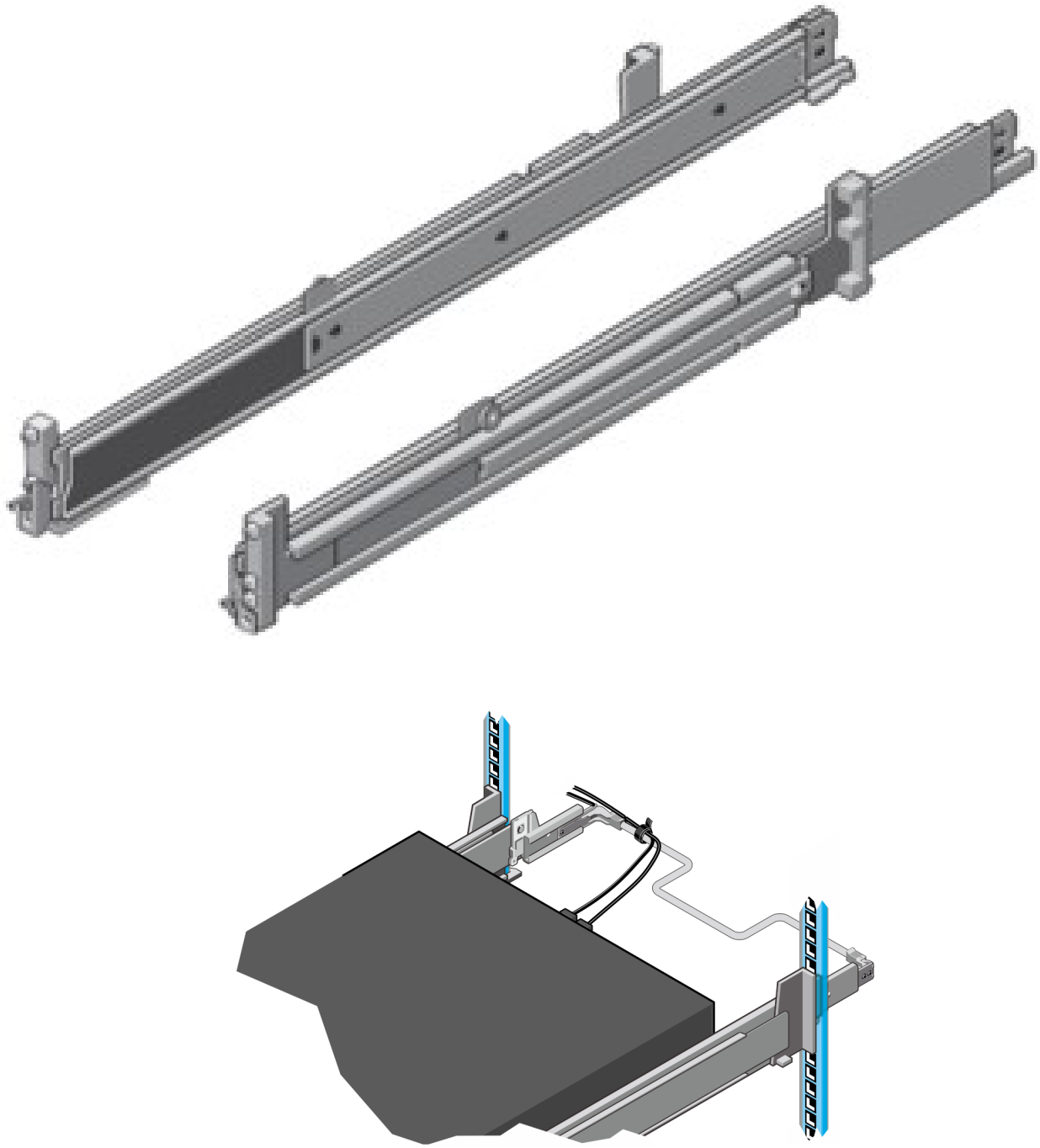

Figure 32. Stab-in sliding rails with optional SRB

B23 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, unthreaded 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 partial extension of the system out of the rack to allow serviceability of key internal components.
- Support for optional cable management arm (CMA).
- Support for optional strain relief bar (SRB).

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

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.

NOTE: CMA is not supported in Direct Liquid Cooling configuration.

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.

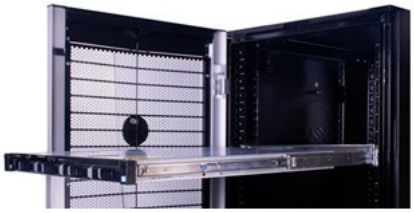

Figure 33. Sliding rails with CMA

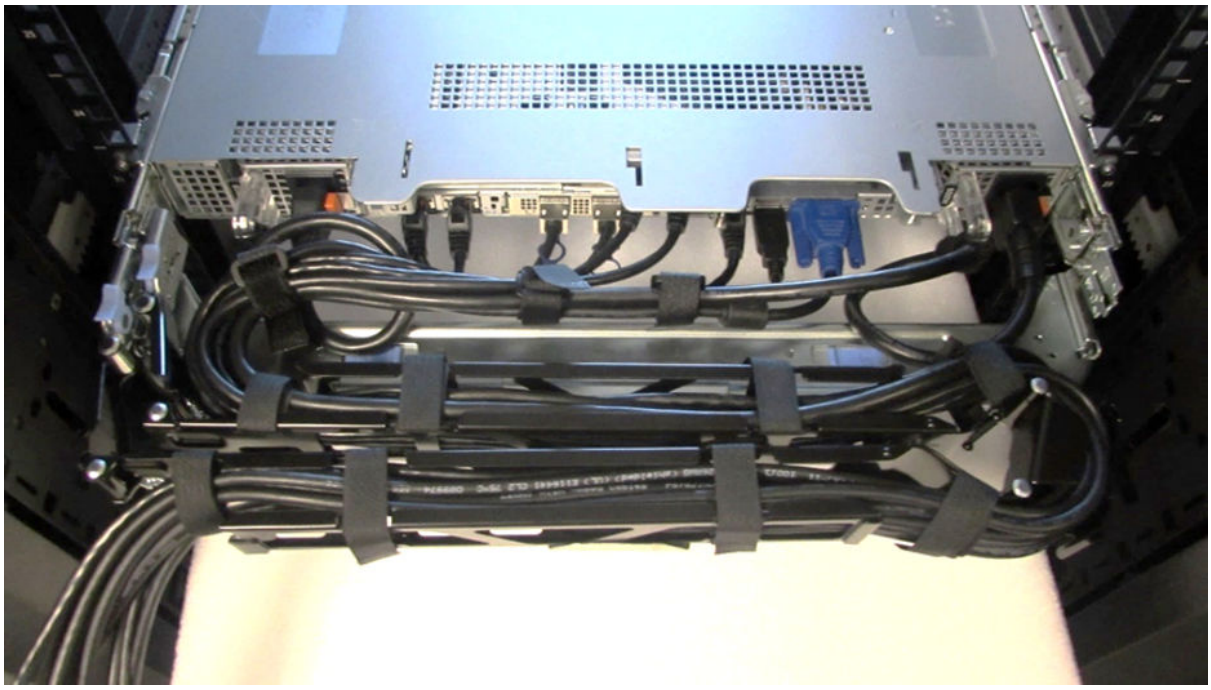

Figure 34. CMA Cabling

Strain Relief Bar (SRB)

The optional strain relief bar (SRB) for the PowerEdge R760xd2 organizes and supports cable connections at the rear end of the server to avoid damage from bending.

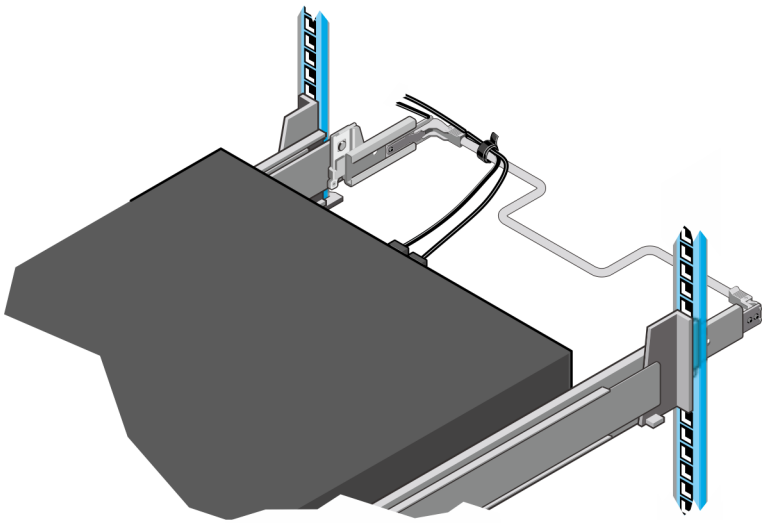

Figure 35. Cabled strain relief bar

- Tool-less attachment to the rails
- Two depth positions to accommodate various cable loads and rack depths
- Supports cable loads and controls stresses on server connectors.
- Cables can be segregated into discrete purpose-specific bundles.

Rack Installation

Stab-in design means that the inner (chassis) rail members must first be attached to the sides of the system and then inserted into the outer (cabinet) members installed in the rack.

Installing the system into the rack : Stab-In

1. Pull the intermediate rails out of the rack until they lock into place.
2. Release the inner rail lock by pulling forward on the white tabs and sliding the inner rail out of the intermediate rails.

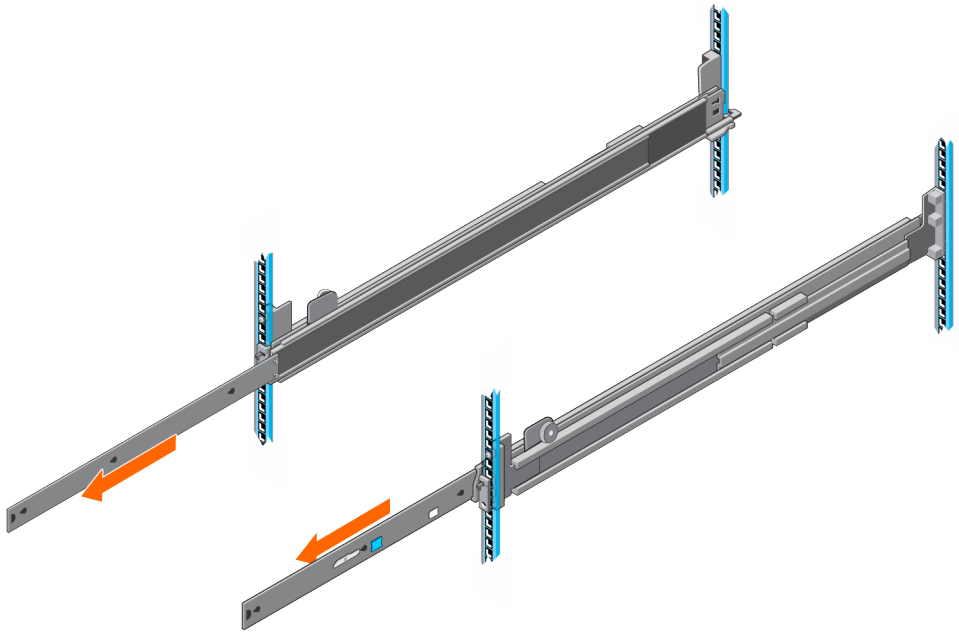

Figure 36. Pull out the intermediate rail

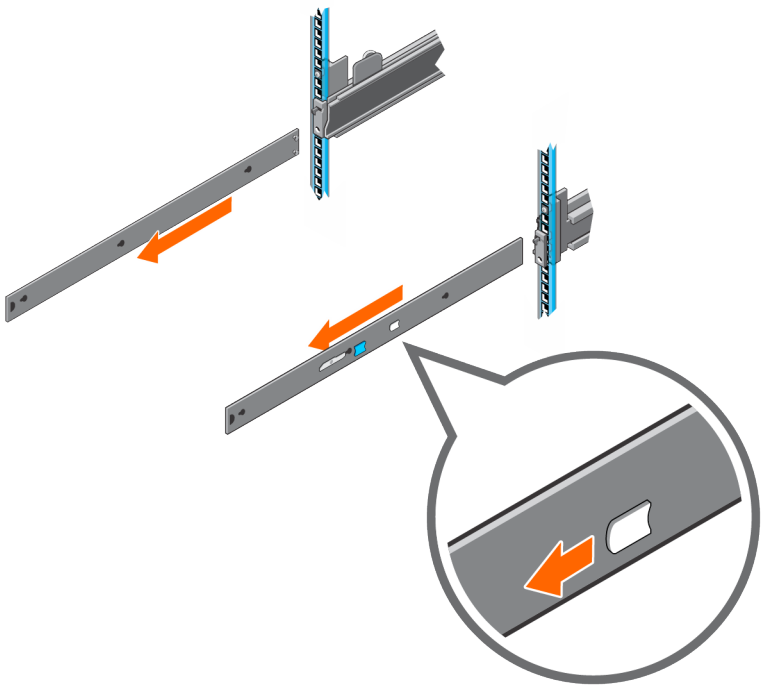

Figure 37. Pull out the intermediate rail

Table 24. Rail component label

Number	Component
1	Intermediate rail

Table 24. Rail component label (continued)

Number	Component
2	Inner rail

3. Attach the inner rails to the sides of the system by aligning the mounting hole on the rail with the standoffs on the system and sliding forward on the system until they lock into place.

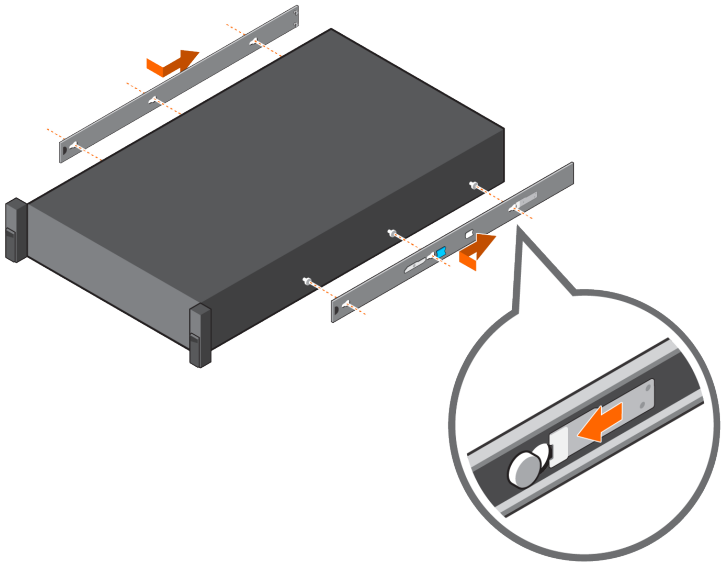

Figure 38. Attach the inner rails to the system

4. Install the system into the extended rails.

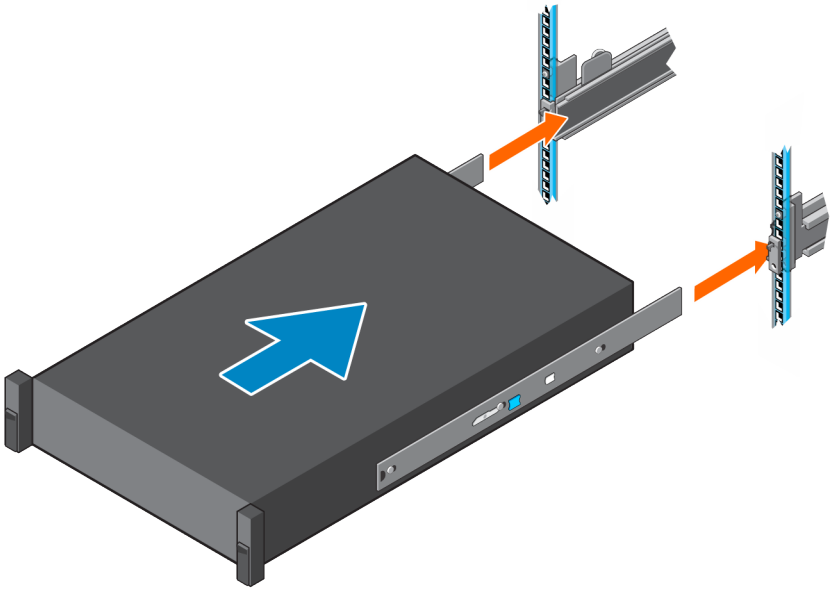

Figure 39. Install system into the extended rails

5. Pull blue slide release lock tabs forward or backward on both rails, and slide the system into the rack.

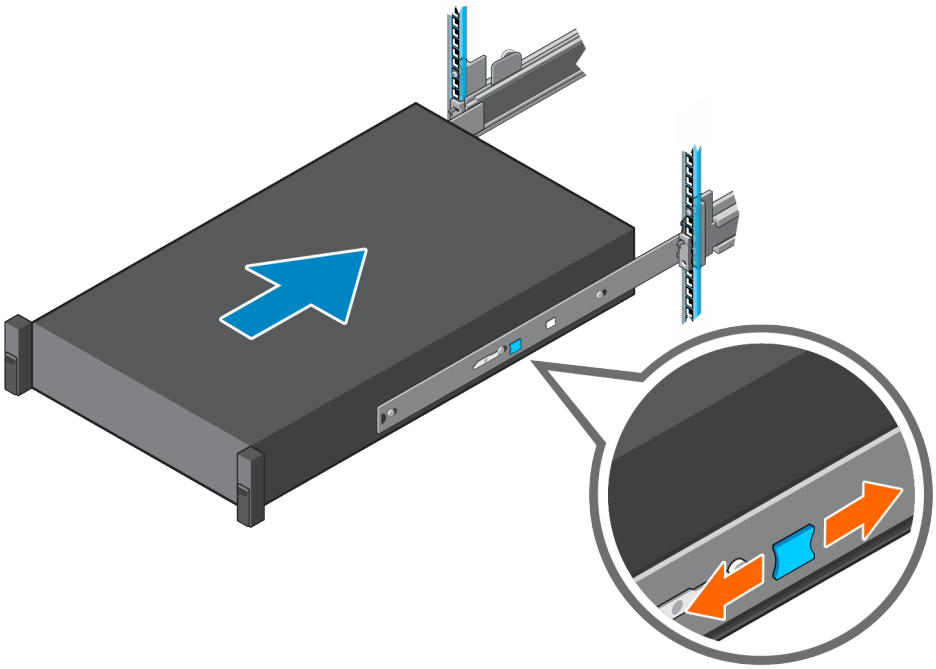

Figure 40. Slide system into the rack

11

Operating Systems and Virtualization

Topics:

- Supported Operating Systems

Supported Operating Systems

The PowerEdge system supports the following operating systems:

- Canonical® Ubuntu® Server LTS
- Microsoft® Windows Server® with Hyper-V
- Red Hat® Enterprise Linux
- SUSE® Linux Enterprise server
- VMware® ESXi®

Links to specific OS versions and editions, certification matrices, Hardware Compatibility Lists (HCL) portal, and Hypervisor support are available at Dell Enterprise Operating Systems.

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 25. 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 26. Systems Management software support matrix

Categories	Features	PE mainstream
Embedded Management and In-band Services	iDRAC9 (Express, Enterprise, and Datacenter licenses)	Supported
	OpenManage Mobile	Supported
	OM Server Administrator (OMSA)	Supported
	iDRAC Service Module (iSM)	Supported
	Driver Pack	Supported
Change Management	Update Tools (Repository Manager, DSU, Catalogs)	Supported
	Server Update Utility	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)	Supported
	Integrations with Microsoft System Center and Windows Admin Center (WAC)	Supported

Table 26. 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, Windows Server 2019 or 2022, Ubuntu, CentOS	Supported (Tier-1)

13

Appendix D: Services

Topics:

- Default service levels
- ProDeploy Infrastructure Suite
- Supplemental Deployment Services
- Unique Deployment Scenarios
- DAY 2 - Automation Services with Ansible
- ProSupport Infrastructure Suite
- Specialty Support Services
- Consulting Services
- Resources

Default service levels

ProDeploy Infrastructure Suite

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

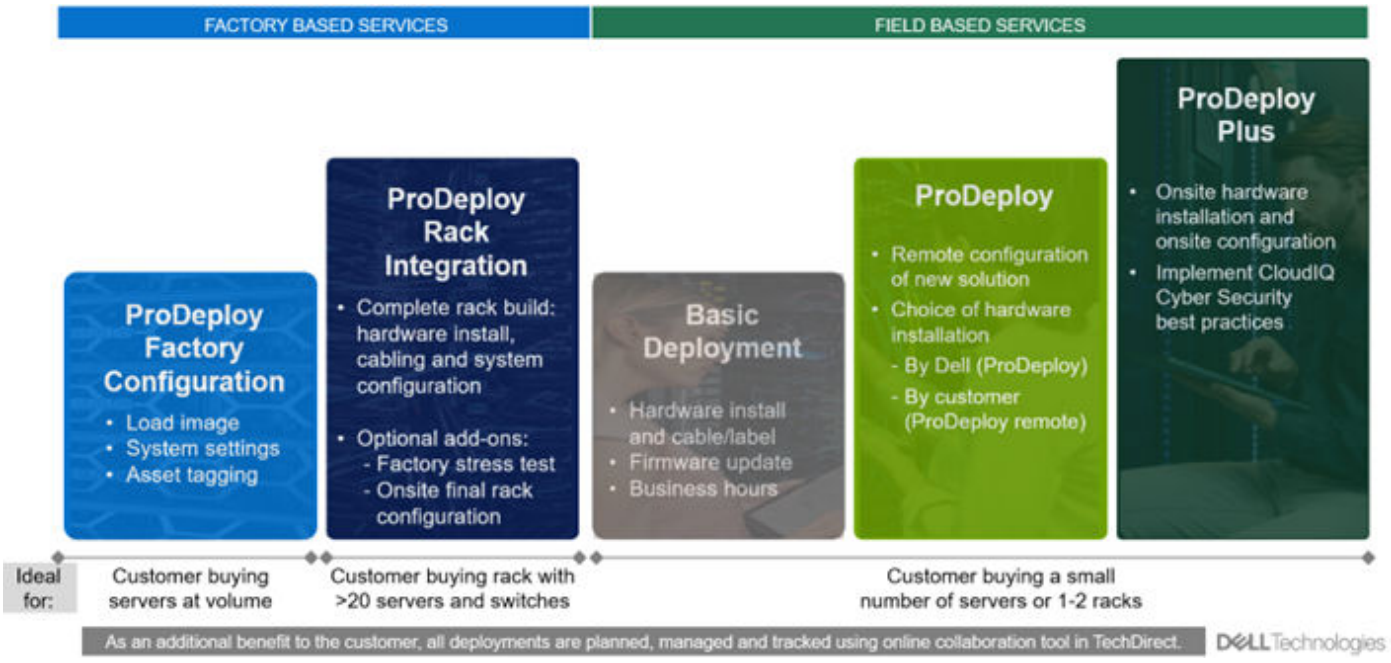

Figure 41. ProDeploy Infrastructure Suite

Factory Based Services

Pre-configured systems or complete racks, customized prior to shipping to the customer's site.

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 are packaged and bundled to meet specific shipping and distribution requirements for each customer location to facilitate the rollout process. Once the server is onsite , Dell can install and configure the server to the environment using any of the field-based deployment services outlined in the next section.

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 an optional on-site final rack configuration to complete the rack installation.

- STANDARD SKUs for Rack Integration is available in the USA only and requires:
  - 20 or more devices (R and C series servers, VxRail, and all Dell or non-Dell switches)
  - Use Informational SKUs for Dell switches or 3rd party products.
  - Shipping to contiguous USA
- USE CUSTOM QUOTE for Rack Integration scenarios that require:
  - Shipment to any country or region outside USA or shipping outside contiguous USA
  - Shipping to multiple locations
  - Racks containing less than 20 servers
  - Any rack that includes Storage

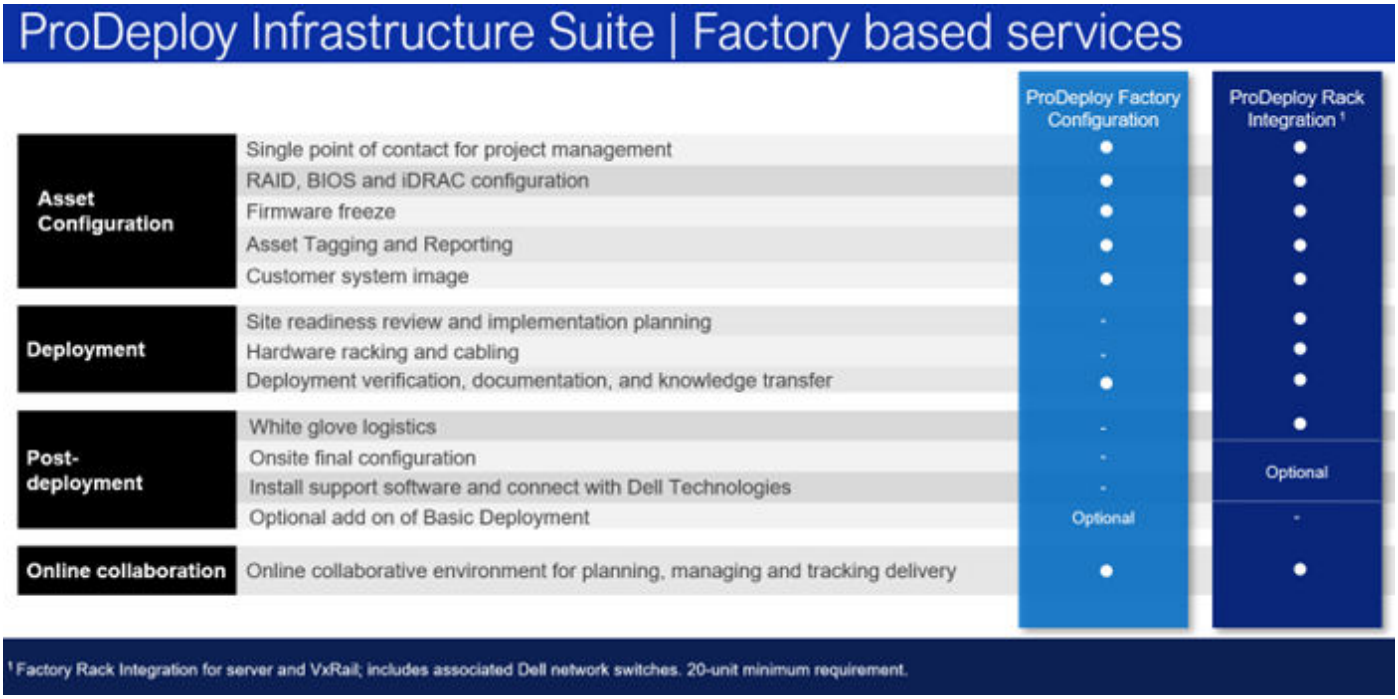

Figure 42. ProDeploy Infrastructure Suite - Factory services

Field-based Services

Put PowerEdge servers to work faster with Dell field-based deployment services. Whether we are deploying one server to one thousand – we have you covered. Dell provides versatile delivery options to fit every budget and operating model.

ProDeploy Plus

Elevate Infrastructure deployments with our most complete service from planning through onsite hardware installation and software configuration including the implementation of cybersecurity best practices. ProDeploy Plus provides the skill and scale

needed to successfully execute demanding deployments in today's complex IT . The deployment starts with a site readiness review and implementation plan. Certified deployment experts perform the software configuration to include set up of leading operating systems and hypervisors. Dell will also configure PowerEdge software tools to include iDRAC and OpenManage system utilities as well as support AIOps platforms: MenvironmentsyService360, TechDirect, and CloudIQ. Unique to ProDeploy Plus, the cybersecurity implementation helps customers understand potential security risks and make recommendations for reducing product attack surfaces. The system is tested, validated prior to completion. The customer will also receive full project documentation and knowledge transfer to complete the process.

ProDeploy

ProDeploy provides remote software configuration and choice of hardware installation (onsite or guided). ProDeploy is great for customers who are price sensitive or willing to participate in some portion of the deployment to include providing remote access to their network. The ProDeploy remote software implementation includes everything mentioned in ProDeploy Plus except it does not include the added value, cybersecurity implementation and best practices.

Basic Deployment

Basic Deployment delivers worry-free professional installation by experienced technicians. This service is often sold to Competency Enabled Partners who will have Dell do the hardware installation while they complete the software configuration. Furthermore, Basic Deployment tends to be purchased by large enterprises who have smart technical staff. These companies just need Dell to install the hardware and they will perform the software configuration. The last use case for Basic Deployment is when paired with Factory Configuration services. The servers are pre-configured in the factory and the basic deployment service will install the system into the rack to finalize the deployment.

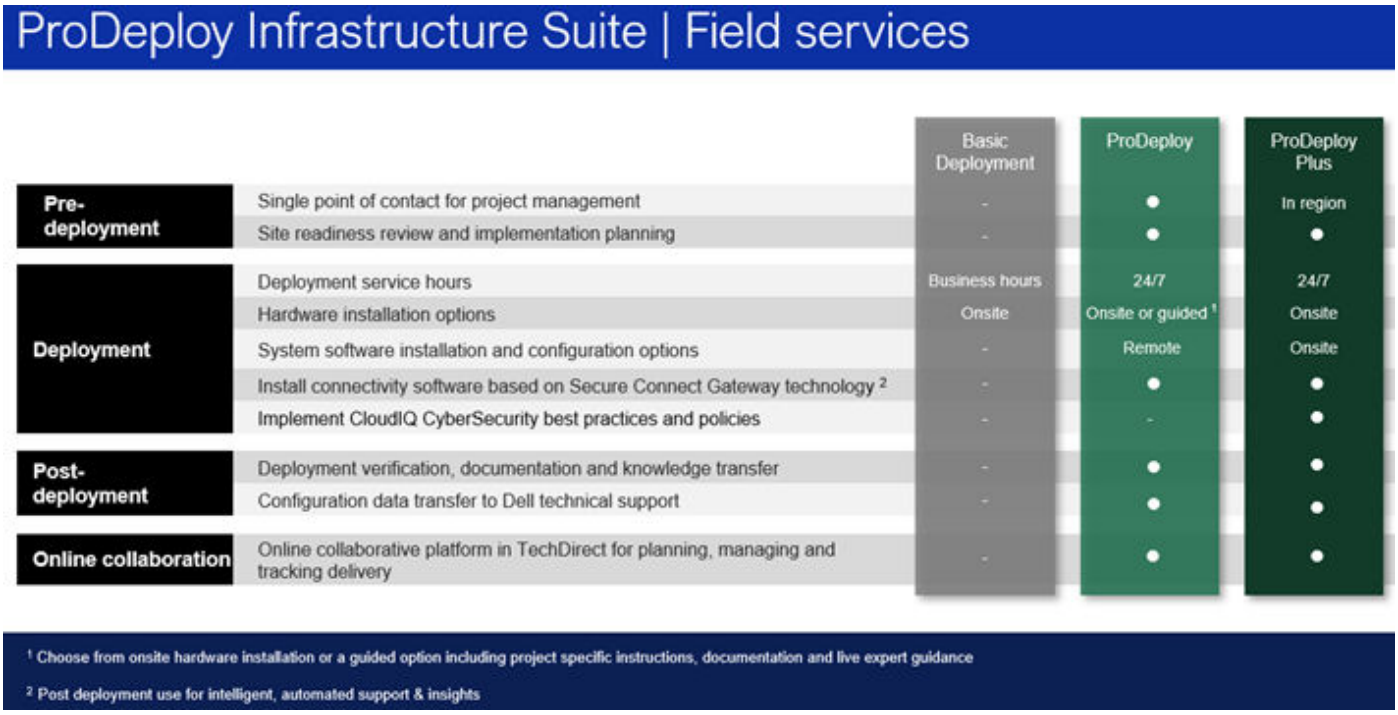

Figure 43. ProDeploy Infrastructure Suite - Field services

Supplemental Deployment Services

Additional ways to expand scope or deploy for unique scenarios.

Table 27. Expand scope and transition

Expand scope and transition	Unique deployment scenarios
Two Host Adder (requires PD/PDP)	"Custom" Service Engagement

Table 27. Expand scope and transition (continued)

Expand scope and transition	Unique deployment scenarios
Additional Deployment Time (ADT) (Sold with or without PD/PDP)	ProDeploy Add-on for HPC
Data Migration	ProDeploy Plus for Direct Liquid Cooling (DLC 3000)
Residency Services (onsite or remote)	ProDeploy for TELCO
-	ProDeploy FLEX

Two Host Adder (requires PD/PDP)

Deploying new storage, compute, or networking devices may require interconnection to other servers (also called hosts). The Dell delivery team will set up four hosts per device as part of every ProDeploy service. For example, if the customer is buying two storage arrays the ProDeploy service will automatically include connectivity of four hosts each (4x2=8 total hosts per project since there are two devices). This supplemental "Two Host Adder" service provides for the configuration of additional hosts above what is already provided as part of the ProDeploy service. In many cases, customers can work with us while we set up the included hosts, so they may understand how to do the rest themselves. Always ask the customer how many hosts are being connected and sell the host adder depending on the customer's technology skillset. Note this service applies to the connectivity of Dell devices not 3rd party devices.

Additional Deployment Services (ADT) - sold with or without PD/PDP

You can expand the scope of a ProDeploy engagement leveraging Additional Deployment Time (ADT). ADT will cover additional tasks above the normal deliverables of the ProDeploy offers. ADT can also be used as a standalone service without ProDeploy. SKUs are available for both Project Management and Technical Resource Expertise. SKUs are sold as blocks of four hours remote or eight hours onsite. The delivery team can assist in scoping the number of hours required for additional tasks.

Data Migration Services

Migrating data sets is no easy task. Our experts use proven tools and process to streamline data migrations and avoid compromising data. A customer project manager works with our experienced team of experts to create a migration plan. Data migration is part of every technology upgrade, platform change, and shift to the cloud. You can rely on Dell data migration services to perform a seamless transition.

Residency Services

Certified technical professionals act like an extension of your IT staff to enhance internal capabilities and resources and help you realize faster adoption and maximized ROI of new technology. Residency Services help customers transition to new capabilities quickly by leveraging specific technology skill sets. 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.

- Global experts available to serve in-person (onsite) or virtual (remote)
- Engagements starting at 2 weeks with flexibility to adjust

Unique Deployment Scenarios

Custom Deployment Services

When a deployment is beyond the scope of the ProDeploy Infrastructure Suite, you can turn to the custom deployment services team to address complex implementation scenarios and unique customer requirements. The Dell custom deployment team is staffed with solution architects who assist with customer scoping calls to define the project and develop the statement of work. Custom services can handle a wide range of deployments that can be performed in the factory or onsite. All custom engagement services are requested through SFDC.

ProDeploy FLEX

ProDeploy Flex is a new service and a powerful tool for you to attach more services and improve revenue and margins. The ProDeploy Flex modular offer allows sales teams to build and better tailor services by mixing factory and field delivery options. You can also select special deployment scenarios without going to the custom order desk. FLEX is ideal for unique deployments where ProDeploy or ProDeploy Plus are not an adequate answer to the customer needs.

Key features of ProDeploy FLEX

- Build deployment quotes using modular, selectable features for both hardware and software.
- The system automatically scales pricing based on volume.
- Ideal for customers who require NativeEdge Orchestrator or edge deployments
- Ability to add deployment services to third-party networking devices

Deployment of HPC

High-Performance Computing (HPC) implementations require specialists that understand advanced feature sets. Dell deploys the world's fastest systems and understands the nuances that make them perform. HPC deployments are most often scoped as custom service engagements, however we can do smaller HPC clusters under 300 nodes using a standard ProDeploy SKU. Any standard SKU for HPC deployment will be sold as one base SKU per cluster (ProDeploy for HPC Base) along with one ProDeploy for HPC Add-on for each device in the cluster (server nodes and switches).

- Scope of ProDeploy for HPC: *Available as standard SKUs in the US and Canada. Custom Service would be required for all other regions.

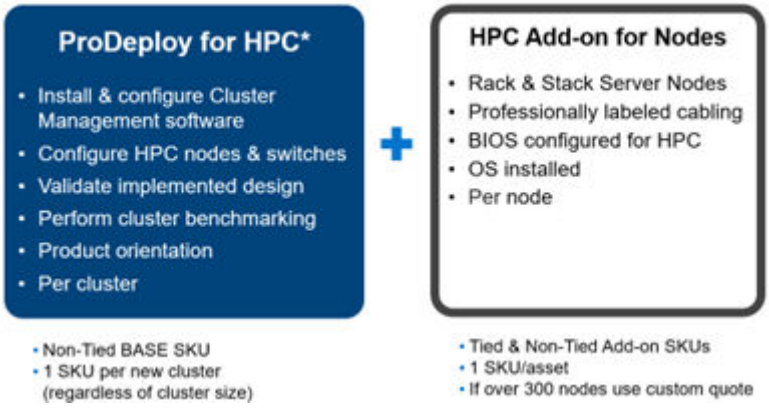

Figure 44. Standard deliverables of ProDeploy for HPC

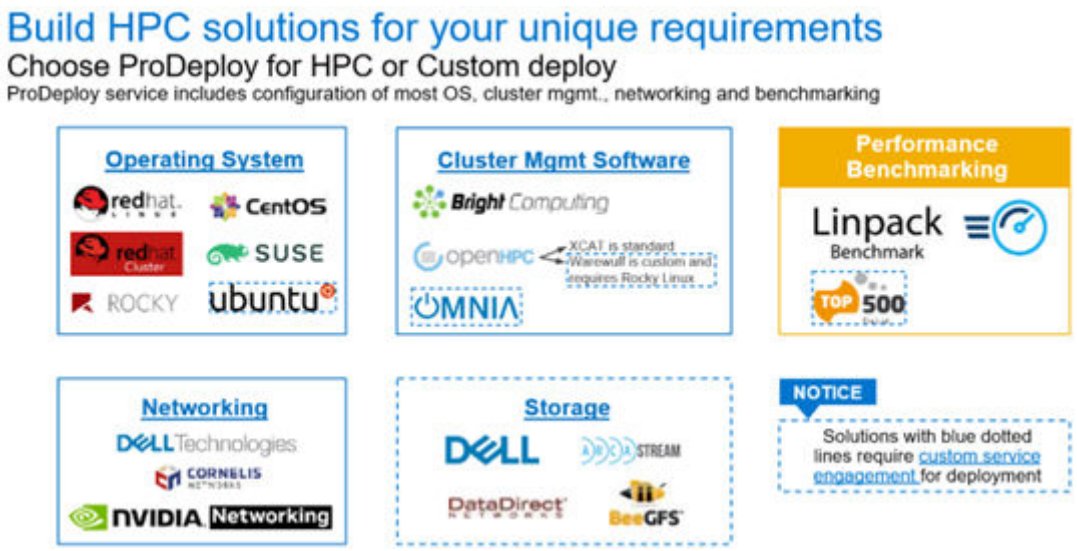

Figure 45. Visual view of HPC deployment options to include hardware and software

DAY 2 - Automation Services with Ansible

Dell solutions are built as "automation ready" with integrated APIs (Application Programming Interfaces) to allow customers to programmatically call actions on the product through code. Although Dell has published Anisble automation use cases, some customers need additional assistance with GitOps. By the end of the service, the customer will have the foundational components required to accelerate automation and understand how the programming works together: Day 1 and Day 2 use case automation scripts (ansible modules), CI/CD tool (Jenkins), and Version control (Git).

ProSupport Infrastructure Suite

ProSupport Infrastructure Suite is a set 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, customers can 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.

ProSupport Plus for Infrastructure

Service that caters to customers who require proactive, predictive, and personalized support for systems that manage critical business applications and workloads. 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, including the following "Top five reasons to buy PSP".

1. Priority access to specialized support experts - immediate, advanced troubleshooting from an engineer that understands Dell infrastructure solutions.
2. Mission Critical Support – when critical (Severity 1) support issues happen, the customer is assured that we will do all we can to get them back up and running as quickly as possible.
3. Service Account Manager – a customer's #1 support advocate, ensuring they get the best possible proactive and predictive support experience.
4. Systems maintenance – on a semi-annual basis, we will keep a customer's ProSupport Plus system(s) up to date by installing the latest firmware, BIOS, and driver updates to improve performance and availability.
5. 3rd party software support – Dell is a customer's single point of accountability for any eligible 3rd party software installed on their ProSupport Plus system, whether they purchased the software from us or not.

ProSupport for Infrastructure

Comprehensive 24x7 support for hardware and software - best for production, but not critical, workloads and applications. The 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
- A central point of accountability for all hardware and software issues
- Hypervisor, operating system and application support
- Dell security advisories
- Onsite response service levels 4 hour or Next Business Day options
- Proactive issue detection with automated case creation
- Predictive hardware anomaly detection
- Incident Manager assigned for Severity 1 cases
- Collaborative third-party support
- Access to AIOps Platforms - (MyService360, TechDirect, and CloudIQ)
- Consistent experience regardless of where customers are located or what language they speak.

Basic Hardware Support

Provides reactive hardware support during normal business hours, excluding local national holidays. No software support or software related guidance. For improved levels of support choose ProSupport or ProSupport Plus.

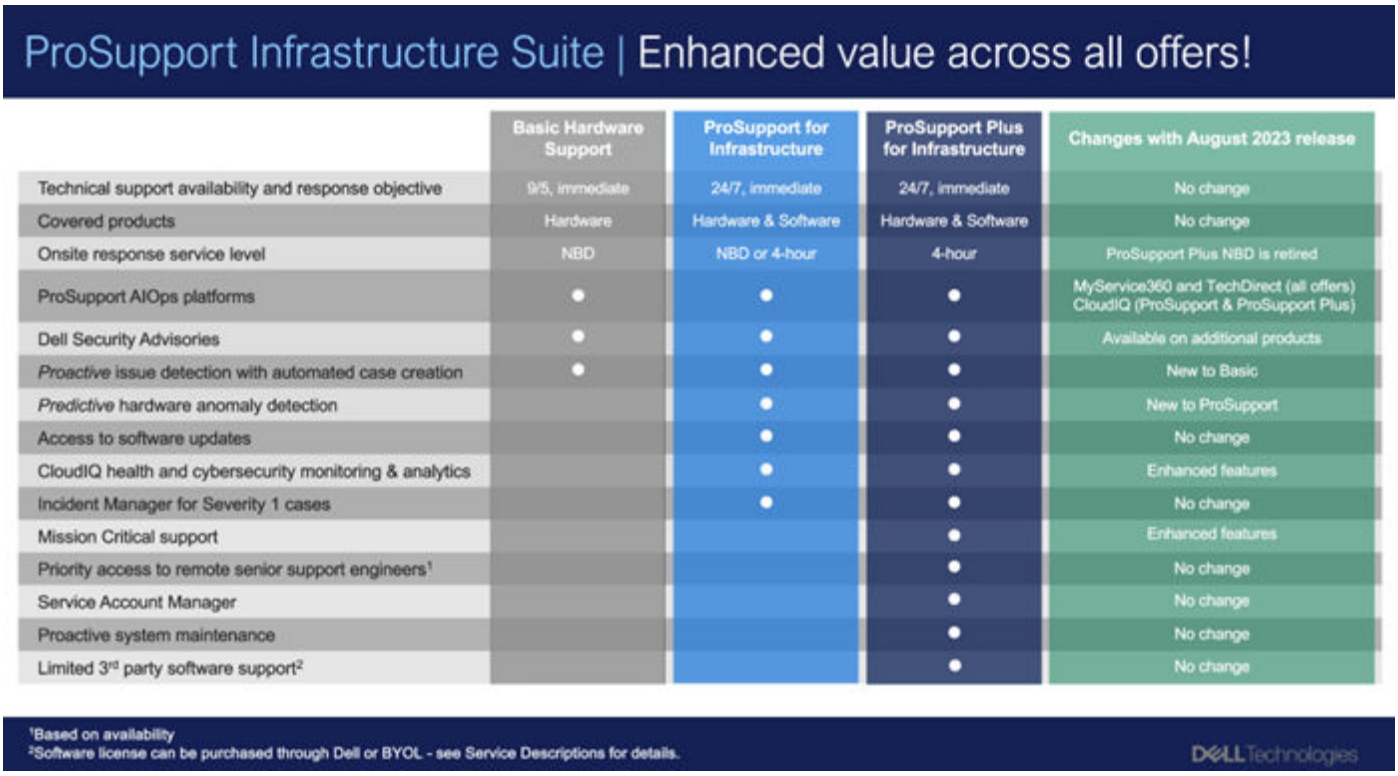

Figure 46. ProSupport Enterprise Suite

Specialty Support Services

Optional specialty support services complement the ProSupport Infrastructure Suite to provide additional proficiencies that are critical for modern data center operations.

Hardware coverage add-ons to ProSupport

- **Keep Your Hard Drive (KYHD) and Keep Your Component (KYC):** Normally if a device fails under warranty, Dell replaces it using a one-for-one exchange process. KYHD / KYC gives you the option to retain your device. It provides full control of sensitive data and minimizes security risk by letting you retain possession of failed drives / components when receiving replacement parts without incurring additional cost.
- **Onsite Diagnosis Service:** Ideal for sites with non-technical staff. Dell field technician performs initial troubleshooting diagnosis onsite and transfers to Dell remote engineers to resolve the issue.
- **ProSupport Add-on for HPC:** Sold as an add-on to a ProSupport service contract, the ProSupport Add-on for HPC provides solution-aware support to cover the additional requirements that are required to maintain an HPC environment such as:
  - Access to senior HPC experts
  - Advanced HPC cluster assistance: performance, interoperability, and configuration
  - Enhanced HPC solution level end-to-end support
  - Remote pre-support engagement with HPC Specialists during ProDeploy implementation
- **ProSupport Add-on for Telco (Respond & Restore):** An add-on service designed for the top 31 TELCO customers globally, Respond & Restore provides direct access to Dell solution experts who specialize in TELCO carrier-grade support. This add-on also provides a hardware uptime guarantee, meaning if a system fails, Dell will have it installed and operational within 4 hours for Severity 1 issues. Dell incurs penalties and fees if SLAs are not met.

Supplemental Site-wide Expertise

- **Multivendor Support Service:** Support your 3rd party devices as one service plan for servers, storage and networking (includes coverage for: Broadcom, Cisco, Fujitsu, HPE, Hitachi, Huawei, IBM, Lenovo, NetApp, Oracle, Quanta, SuperMicro & others).
- **Technical Account Manager:** Designated technology lead who monitors and manages performance and configuration of specific technology sets.
- **Designated Remote Support:** Personalized support expert who manages all troubleshooting and resolution of IT assets

Services for large enterprises

- **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 (combined total of server, storage, networking, etc.). This offering is built on standard ProSupport features that leverage our global scale and are tailored to specific customer needs. While not for everyone, this service option offers a truly unique solution for our largest customers with the most complex environments.
  - Team of assigned Services Account Managers with remote or onsite options
  - Assigned technical and field engineers who are trained on the customer's environment and configurations
  - On-demand reporting and recommendations enabled by ProSupport AIOps tools (MyService360, TechDirect & CloudIQ)
  - Flexible onsite support and parts options that fit their operational model
  - A tailored support plan and training for their operations staff
- **Logistics Online Inventory Solution (LOIS):**Ideal for large organizations that have their own staff to support their data center. Dell offers a service called Logistics Online Inventory Solution which is an onsite parts locker that provides self-maintainers with a local inventory of common replacement components. Having access to these parts lockers allows the self-maintainer to replace a failed component immediately without delay. Each replacement part would automatically initiate a replenishment of the parts inventory that is shipped next day or delivered onsite by Dell during a regular scheduled visit (called Scheduled Onsite Service). As part of the LOIS system, customers can integrate their systems directly to Dell TechDirect using APIs to help streamline the support management process.

End-of-Life Services

- **Post Standard Support (PSS):** Extend service life beyond the initial seven years of ProSupport, adding up to five more additional years of hardware coverage
- **Data Sanitization & Data Destruction:** Renders data unrecoverable on repurposed or retired products, ensuring security of sensitive data and enabling compliance and provides NIST compliant certification.
- **Asset Recovery Services:**Recycle, resale, and disposal of hardware. Helps you securely and responsibly retire IT assets that are no longer needed while protecting both your business and the planet.

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. We are here to help guide your next transformation that could address multi-cloud environments, business applications, DevOps, business resiliency, data center modernization, analytics, workforce collaboration, and user experiences.

Managed Services

Some customers prefer Dell to manage the complexity and risk of daily IT operations. Dell Managed Services utilizes proactive, artificial intelligence to improve operations and modern automation. This helps customers realize desired business outcomes from their infrastructure investments. With these technologies, our experts run, update, and fine-tune customer environments. You decide the service level requirements and we provide oversight of the environment. There are two types of managed service offers. First the outsourcing model, or CAPEX model, where Dell manages customer owned assets using our people and tools. The second is the "as-a-Service" model, or OPEX model, which we call 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 47. Dell Managed Services

- **Managed Detection and Response (MDR):** Dell Technologies Managed Detection and Response (MDR) is powered by Secureworks Taegis XDR software platform. MDR is a managed service that secures the customer's IT environment against malicious actors and provides remediation if and when a threat is identified. When a customer purchases MDR, they will receive the following features from our team:
  - Dell badge resources
  - Agent rollout assistance to help deploy the Secureworks Endpoint Agent.
  - 24x7 threat detection and investigation
  - Up to 40 hrs per quarter of response and active remediation activities
  - If the customer experiences a breach, we will provide up to 40 hrs per year of Cyber incident response initiation.
  - Quarterly reviews with the customer to review the data

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

Resources

Services for PowerEdge.

14

Appendix A: Additional specifications

Topics:

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

Chassis dimensions

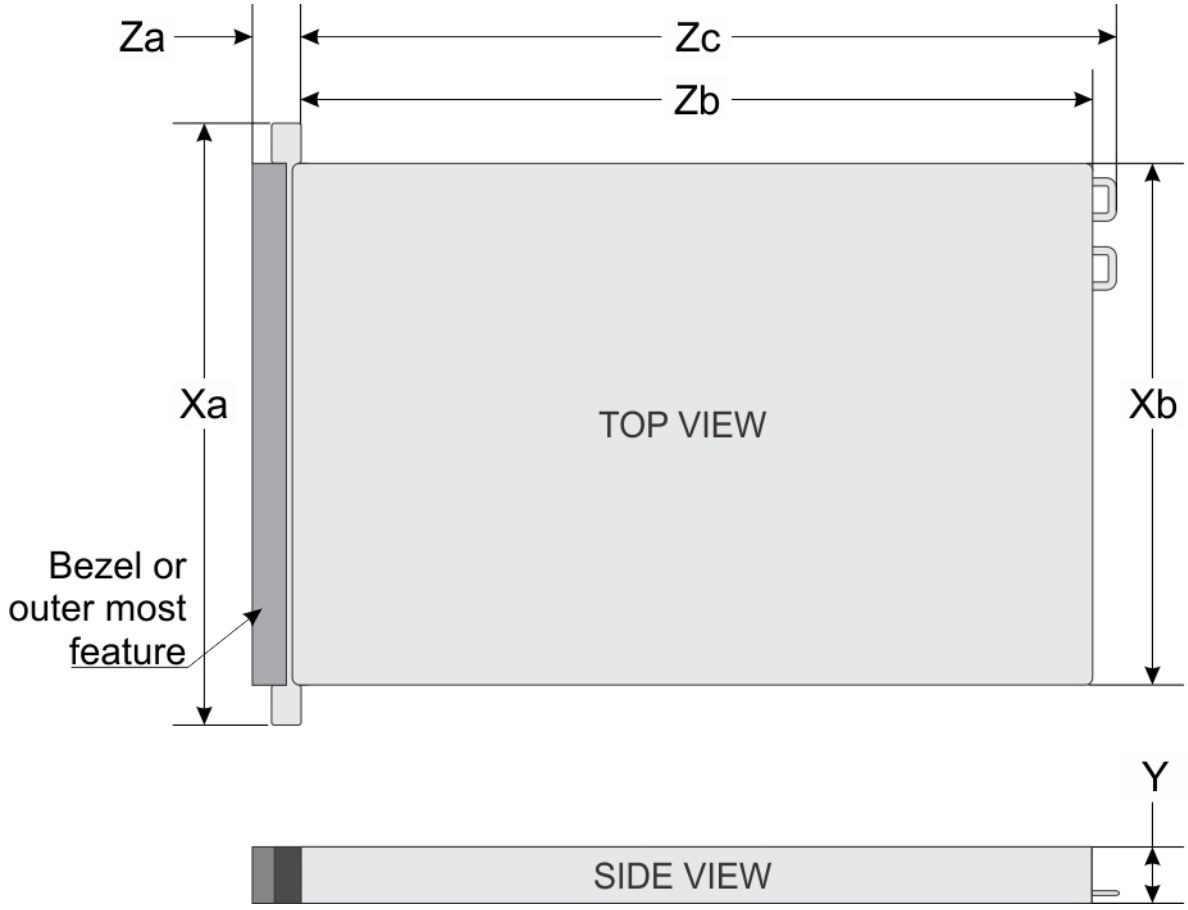

Figure 48. Chassis dimensions

Table 28. PowerEdge R760xd2 chassis dimensions

Drives	Xa	Xb	Y	Za	Zb	Zc
12 drives	481.6 mm (18.960 inches)	448.0 mm (17.637 inches)	86.8 mm (3.417 inches)	35 mm (1.378 inches)	837.0 mm (32.952 inches)	872.74 mm (34.36 inches)

Table 28. PowerEdge R760xd2 chassis dimensions

Drives	Xa	Xb	Y	Za	Zb	Zc
		CC: 434.0 mm (17.08 inches)			Ear to PSU Surface	Ear to PSU handle

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

NOTE: Xb is unique to this system and has two values for the Storage module (SM) and the Compute Module (CC) .

Chassis weight

Table 29. PowerEdge R760xd2 system weight

System configuration	Maximum weight (with all drives/SSDs)
A server with fully populated drives	46.3 kg (102.07 pounds)
A server without drives and PSU installed	23.72 kg (52.29 pounds)

NIC port specifications

The 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 OCP cards.

Table 30. NIC port specification for the system

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

Video specifications

The PowerEdge R760xd2 system supports integrated Matrox G200 graphics controller with 16 MB of video frame buffer.

Table 31. Video specifications for R760xd2

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

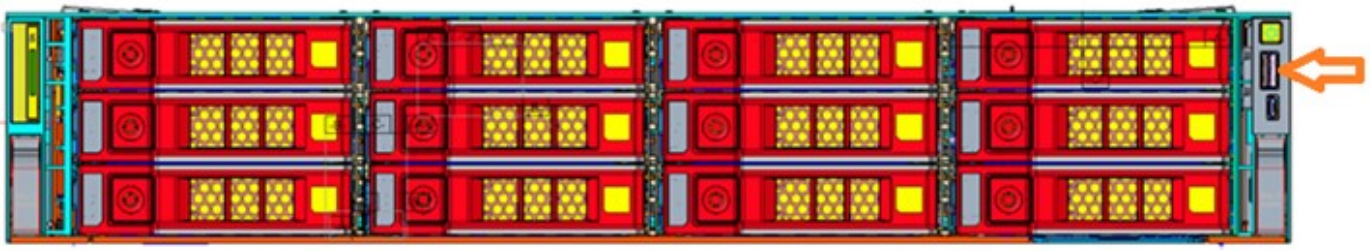

Figure 49. Front USB

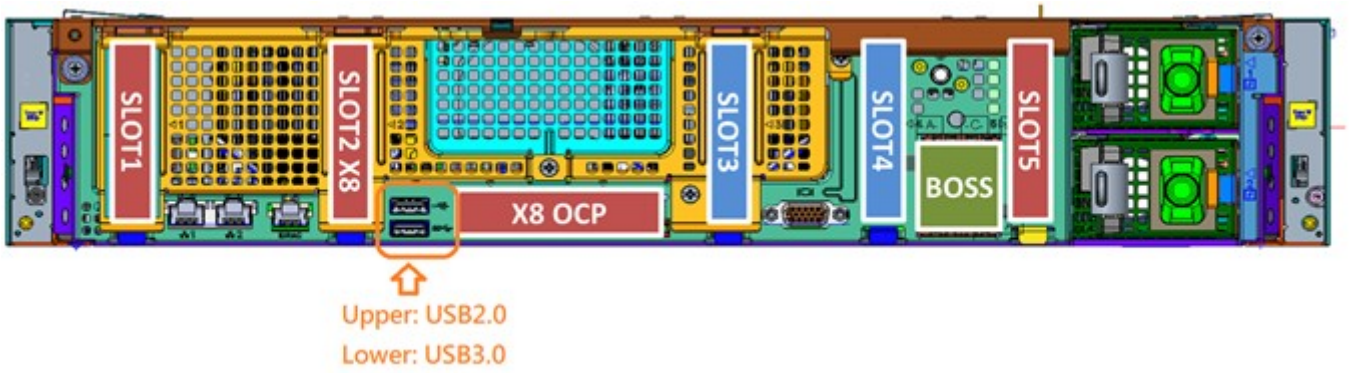

Figure 50. Rear USB

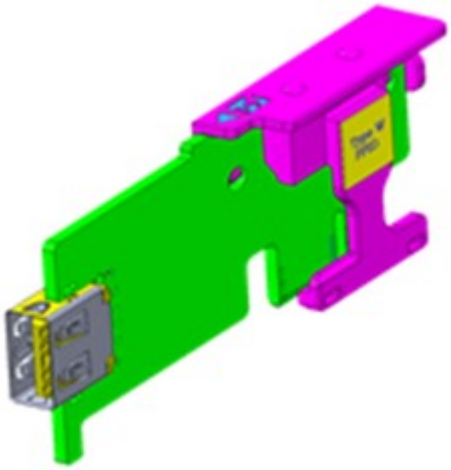

Figure 51. Internal USB

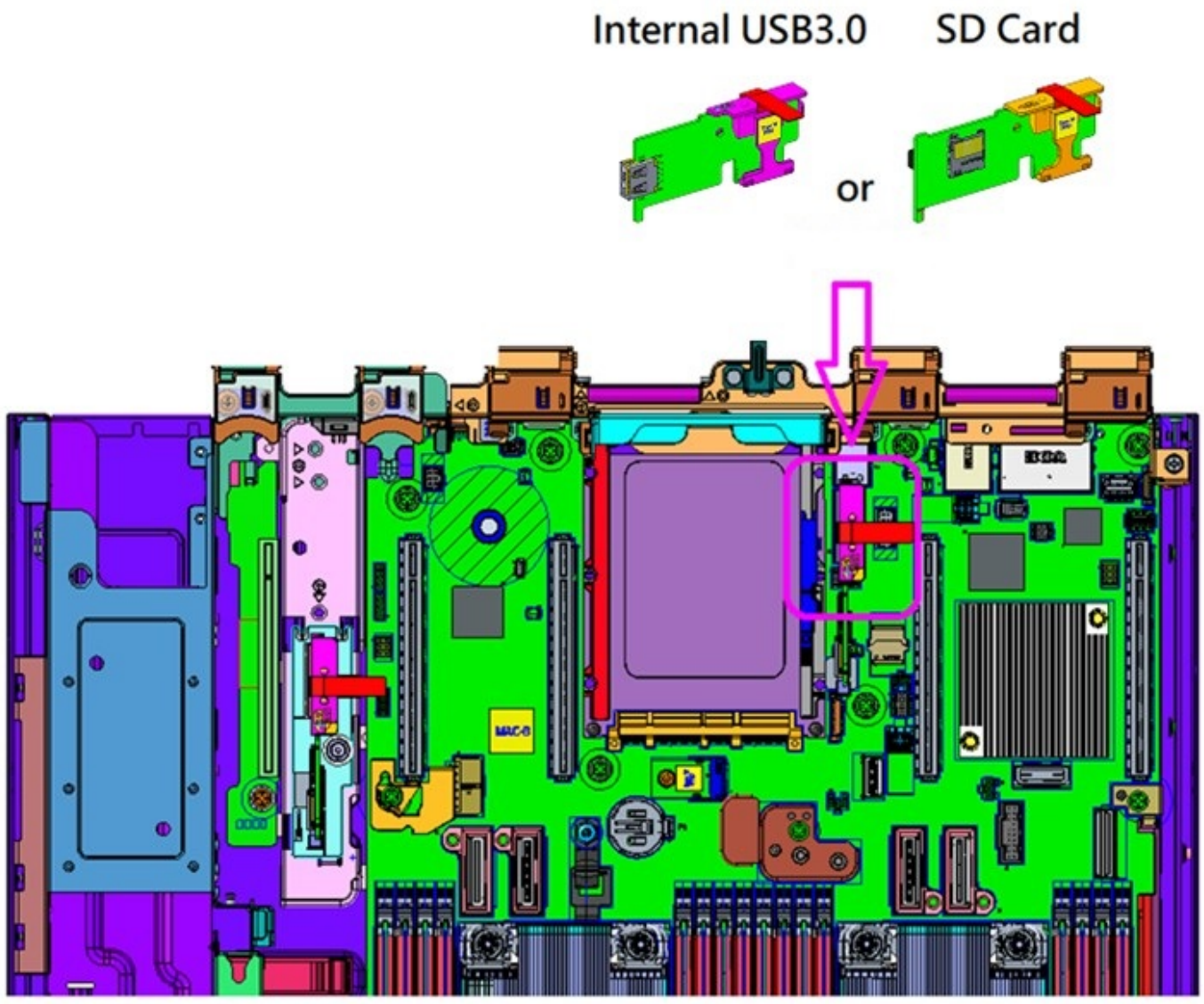

Figure 52. Internal USB Port for Configuration 2A,2B and 2C

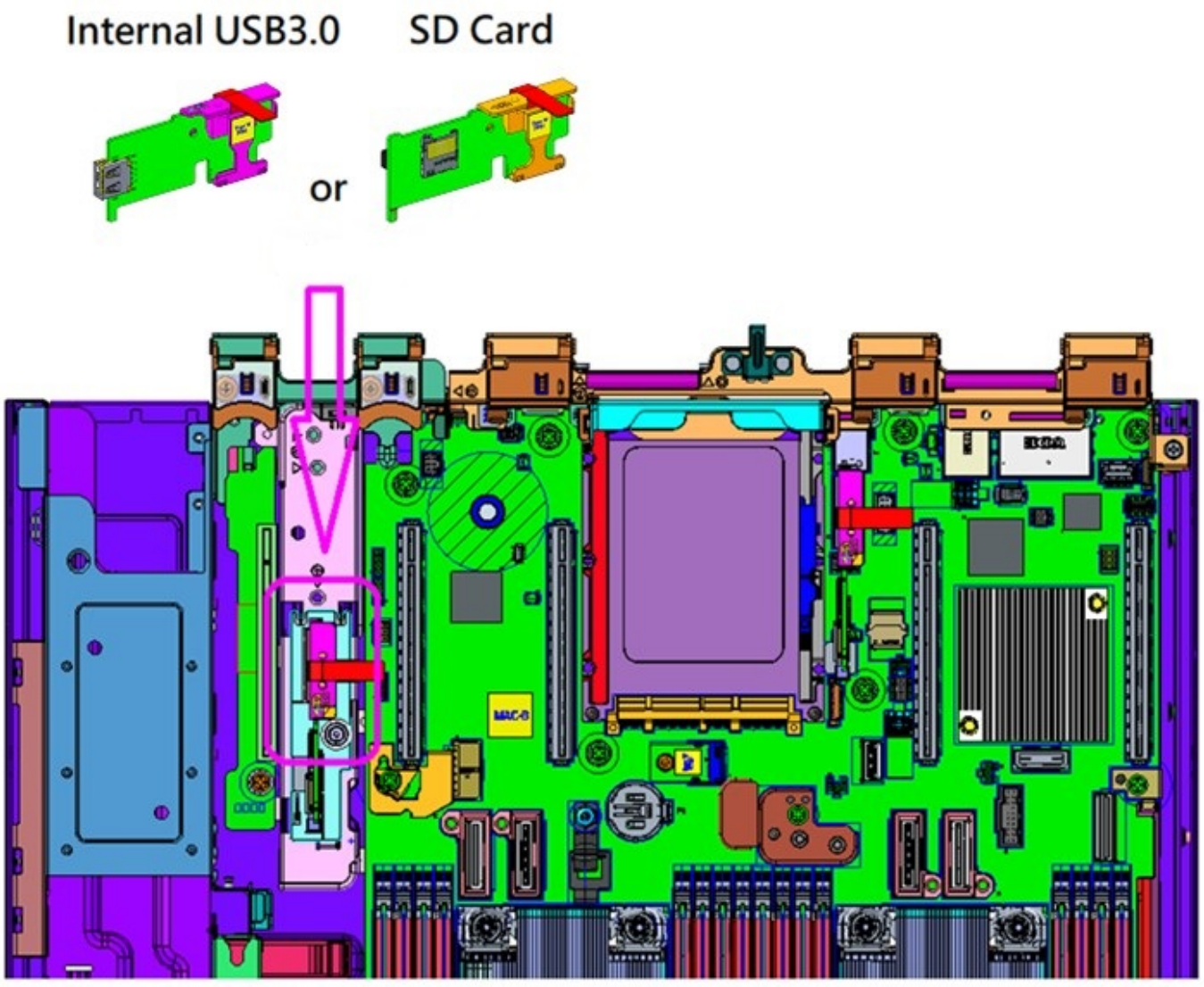

Figure 53. Internal USB Port for Configuration 1-SAS/SATA, 1-NVMe 3A,3B and 3C

Table 32. Systems USB Specifications

Front		Rear		Internal	
USB port type	No. of ports	USB port type	No. of ports	USB port type	No. of ports
USB x 2.0 – compliant port	1	USB x 2.0 – compliant port	1	USB x 3.0 – compliant port	1
		USB x 3.0 – compliant port	1		

Internal USB

The size of the internal USB card dongle is 40 x 16 x 8 mm (L x W x H).

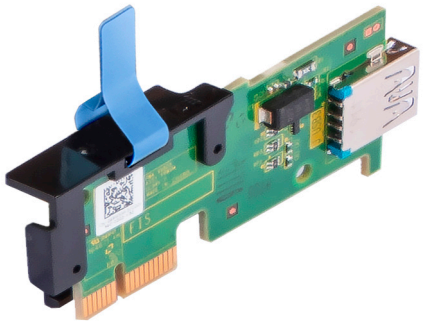

Figure 54. Internal USB

PSU rating

Below table lists the power capacity of the PSUs in high/low line operation mode.

Table 33. PSUs highline and lowline ratings

Peak Power	700 W mixed mode HLAC Titanium	1100 W mixed mode Titanium	1400 W mixed mode Platinum	1400 W 277 Vac and HVDC Titanium	1800 W mixed mode HLAC Titanium	1100 W -48 V DC
High Line 200 ~ 240 VAC	700 W	1100 W	1400 W	NA	1800 W	NA
Low Line 100 ~ 120 VAC	NA	1050 W	1050 W	NA	NA	NA
DC 240 VDC	700 W	1100 W	1400 W	NA	1800 W	NA
Extended High Line 277 VAC	NA	NA	NA	1400 W	NA	NA
DC 336 VDC	NA	NA	NA	1400 W	NA	NA
DC (-48)-(-60) VDC	NA	NA	NA	NA	NA	1100 W

The PowerEdge R760xd2 supports up to two AC power supplies with 1+1 redundancy, autosensing, and auto switching capability.

If two PSUs are present during POST, a comparison is made between the wattage capacities of the PSUs. In case the PSU wattages do not match, the larger of the two PSUs is enabled. Also, there is a PSU mismatch warning that is displayed in the BIOS, iDRAC, or on the system LCD.

If a second PSU is added at run-time, in order for that particular PSU to be enabled, the wattage capacity of the first PSU must equal the second PSU. Otherwise, the PSU is flagged as unmatched in iDRAC and the second PSU is not enabled.

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

Table 34. PSU efficiency level

Efficiency Targets by Load						
Form factor	**Output**	**Class**	**10%**	**20%**	**50%**	**100%**
Redundant 60 mm	700 W mixed mode HLAC	Titanium	90.00%	94.00%	96.00%	91.00%
	1100 W mixed mode	Titanium	90.00%	94.00%	96.00%	91.00%
	1100 W -48 V DC	(-48 Vdc)	85.00%	90.00%	92.00%	90.00%
	1400 W mixed mode	Platinum	NA	92.00%	94.00%	90.00%
	1400 W 277 VAC	Titanium	90.00%	94.00%	96.00%	91.00%
	1400 W 336 HVDC	Titanium	90.00%	94.00%	96.00%	91.00%
	1800 W mixed mode HLAC	Titanium	90.00%	94.00%	96.00%	91.00%

NOTE: HLAC: High-Line AC 200-240 VAC (lower voltages are not supported).

NOTE: HVDC: High - Voltage DC 336 VDC.

Environmental specifications

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

Table 35. Continuous Operation Specifications for ASHRAE A2

Temperature	Specifications
Allowable continuous operations	
Temperature range for altitudes <= 900 m (<= 2953 ft)	10–35°C (50–95°F) with no direct sunlight on the equipment
Humidity percent range (non-condensing at all times)	8% RH with -12°C (10.4°F) 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 (1.8°F/984 Ft) above 900 m (2953 Ft)

Table 36. Continuous Operation Specifications for ASHRAE A3

Temperature	Specifications	
Allowable continuous operations		
Temperature range for altitudes <= 900 m (<= 2953 ft)	5–40°C (41–104°F) with no direct sunlight on the equipment	
	Excursion Limited Operation	5-35°C (41-95°F) Continuous Operation
		35-40°C (95-104°F) 10% Annual Runtime
Humidity percent range (non-condensing at all times)	8% RH with -12°C (10.4°F) minimum dew point to 85% RH with 24°C (75.2°F) maximum dew point	

Table 36. Continuous Operation Specifications for ASHRAE A3 (continued)

Temperature	Specifications
Operational altitude de-rating	Maximum temperature is reduced by 1°C/175 m (1.8°F/574 Ft) above 900 m (2953 Ft)

Table 37. Continuous Operation Specifications for ASHRAE A4

Temperature	Specifications	
Allowable continuous operations		
Temperature range for altitudes <= 900 m (<= 2953 ft)	5–45°C (41–113°F) with no direct sunlight on the equipment	
	Excursion Limited Operation	5-35°C (41-95°F) Continuous Operation
		35-40°C (95-104°F) 10% Annual Runtime
		40-45°C (104-113°F) 1% Annual Runtime
Humidity percent range (non-condensing at all times)	8% RH with -12°C (10.4°F) minimum dew point to 90% RH with 24°C (75.2°F) maximum dew point	
Operational altitude de-rating	Maximum temperature is reduced by 1°C/125 m (1.8°F/410 Ft) above 900 m (2953 Ft)	

Table 38. Common Environmental Specifications for ASHRAE A2, A3 and A4

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 (9°F in 15 minutes), 5°C in an hour* (9°F in an hour) for tape hardware **NOTE:** * - Per ASHRAE thermal guidelines for tape hardware, these are not instantaneous rates of temperature change.
Non-operational temperature limits	-40 to 65°C (-40 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	3,050 meters (10,006 feet)

Table 39. Maximum vibration specifications

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

Table 40. 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	Six consecutively executed shock pulses in the positive and negative x, y, and z axis (one pulse on each side of the system) of 71 G for up to 2 ms

Particulate and gaseous contamination specifications

The following table defines the limitations that help avoid any equipment damage or failure from particulates and gaseous contamination. If the levels of particulates or gaseous pollution exceed the specified limitations and result in equipment damage

or failure, you may need to rectify the environmental conditions. Remediation of environmental conditions is the responsibility of the customer.

Table 41. Particulate contamination specifications

Particulate contamination	Specifications
Air filtration	Data center air filtration as defined by ISO Class 8 per ISO 14644-1 with a 95% upper confidence limit **NOTE:** This condition applies to data center environments only. Air filtration requirements do not apply to IT equipment designed to be used outside a data center, in environments such as an office or factory floor. **NOTE:** Air entering the data center must have MERV11 or MERV13 filtration.
Conductive dust	Air must be free of conductive dust, zinc whiskers, or other conductive particles **NOTE:** This condition applies to data center and non-data center environments.
Corrosive dust	• Air must be free of corrosive dust • Residual dust present in the air must have a deliquescent point less than 60% relative humidity **NOTE:** This condition applies to data center and non-data center environments.
Walk-Up Edge Data Center or Cabinet (sealed, closed loop environment)	Filtration is not required for cabinets that are anticipated to be opened 6 times or less per year. Class 8 per ISO 1466-1 filtration as defined above is required otherwise **NOTE:** In environments commonly above ISA-71 Class G1 or that may have known challenges, special filters may be required.

Table 42. Gaseous contamination specifications

Gaseous contamination	Specifications
Copper coupon corrosion rate	<300 Å/month per Class G1 as defined by ANSI/ISA71.04-2013
Silver coupon corrosion rate	<200 Å/month as defined by ANSI/ISA71.04-2013

Thermal restriction matrix

Table 43. Processor and heat sink matrix

Heat sink	Configuration No
2U HSK	Configuration 1, Configuration 2 and Configuration 3

NOTE: All GPU/FGPA cards require 2U L-type HSK and GPU shroud.

Table 44. Label reference

Label	Description
STD	Standard
HPR (Silver)	High performance (silver grade)
HPR (Gold)	High performance (gold grade)
HSK	Heat sink
LP	Low profile

Table 44. Label reference (continued)

Label	Description
FH	Full height

Table 45. Thermal restriction matrix

Configuration		Configuration 1 24 x 3.5 inch SAS/SATA		Configuration 2 24 x 3.5 inch SAS/SATA	Configuration 3 24 x 3.5 inch SAS/SATA	Ambient temperature
Rear storage		4 x 3.5 inch SAS/SATA	4 x 2.5 inch NVMe in Carrier Adapter	2 x 2.5 inch	2 x 2.5 inch	
CPU TDP/ cTDP	125 W	STD Fan 2U STD HSK	STD Fan 2U STD HSK	STD Fan 2U STD HSK	STD Fan 2U STD HSK	35°C (95°F)
	150 W	STD Fan 2U STD HSK	STD Fan 2U STD HSK	STD Fan 2U STD HSK	STD Fan 2U STD HSK	35°C (95°F)
	165 W	NA	NA	STD Fan 2U STD HSK	STD Fan 2U STD HSK	35°C (95°F)
	185 W	NA	NA	STD Fan 2U STD HSK	STD Fan 2U STD HSK	35°C (95°F)

NOTE: DDR5 DIMM blank is required for Configuration 3.

NOTE: HDD blank is required for all Configurations.

NOTE: Restrict HDD capacity up to 7.68 TB of 2 x 2.5 inch and 4 x 2.5 inch rear storage.

NOTE: System cannot support same type of 2.5 inch drive in front and rear storage (4 x 2.5 inch) when using 2.5 inch HDD adapter in Configuration 1.

NOTE: System can support PCIe cards with cooling Tier equal or lower than Tier 5 (300LFM at 55°C) requirement .

NOTE: Need optical transceiver with higher temperature spec (>85°C) supporting in rear OCP.

NOTE: Need 30C ambient restriction for 96 GB memory supporting of all configurations.

NOTE: Maximum CPU TDP supported is 185 W in configuration 2 and configuration 3.

NOTE: Need 30C ambient restriction for 960G BOSS module in Configuration 2 and Configuration 3.

NOTE: Single CPU support is there only for configuration 1, configuration 2A and configuration 2B.

NOTE: Need to restrict PERC H965e support to slot 3 for configuration 2

Table 46. GPU/FPGA thermal restriction matrix

Configuration		Configuration 1 24 x 3.5 inch SAS/SATA		Configuration 2 24 x 3.5 inch SAS/SATA	Configuration 3 24 x 3.5 inch SAS/SATA	Ambient temperature
Rear storage		4 x 3.5 inch SAS/SATA	4 x 2.5 inch NVMe in Carrier Adapter	2 x 2.5 inch	2 x 2.5 inch	
CPU TDP/ cTDP	125 W	NA	NA	NA	STD Fan 2U STD HSK	30°C (86°F)
	150 W	NA	NA	NA	STD Fan 2U STD HSK	30°C (86°F)
	165 W	NA	NA	NA	STD Fan 2U STD HSK	30°C (86°F)
	185 W	NA	NA	NA	STD Fan 2U STD HSK	30°C (86°F)

NOTE: Can support GPU in Configuration 3 Only .

NOTE: Support LP A2 GPU up to 30°C (86°F) ambient.

NOTE: DDR5 DIMM blank is required for Configuration 3.

NOTE: HDD blank is required for all Configurations.

NOTE: Restrict HDD capacity up to 7.68 TB of 2 x 2.5 inch and 4 x 2.5 inch rear storage.

NOTE: The system cannot support same type of 2.5 inch drive in front and rear storage (4 x 2.5 inch) when using 2.5 inch HDD adapter in Configuration 1.

NOTE: Need 30C ambient restriction for 96 GB memory supporting of all configurations.

NOTE: The maximum CPU TDP supported is 185 W in configuration 2 and configuration 3.

NOTE: Need 30C ambient restriction for 960G BOSS module in Configuration 2 and Configuration 3.

NOTE: Single CPU support is there only for configuration 1, configuration 2A and configuration 2B.

NOTE: Need to restrict PERC H965e support to slot 3 for configuration 2.

Thermal air restrictions

Fresh air environment

- Two PSUs are required in redundant mode. Single PSU failure is not supported.
- BOSS-N1 (M.2) module is not supported.
- GPU and FPGA are not supported.
- Rear storage module is not supported.
- Non-Dell qualified peripheral cards and/or peripheral cards greater than 25 W are not supported.
- OCP card with transmission rate higher than 25G is not supported.

- OCP transceiver spec less than or equal to 70°C (158°F) is not supported.

ASHRAE A3 environment

- Two PSUs are required in redundant mode. Single PSU failure is not supported.
- BOSS-N1 (M.2) module is not supported.
- GPU and FPGA are not supported.
- Rear storage module is not supported.
- Non-Dell qualified peripheral cards and/or peripheral cards greater than 25 W are not supported.
- OCP card with transmission rate higher than 25G is not supported.
- OCP transceiver spec less than or equal to 70°C (158°F) is not supported.

ASHRAE A4 environment

- Two PSUs are required in redundant mode. Single PSU failure is not supported.
- BOSS-N1 (M.2) module is not supported.
- GPU and FPGA are not supported.
- CPU TDP equal or greater than 185 W are not supported.
- Rear storage module is not supported.
- OCP card with transmission rate higher than 25G is not supported.
- OCP transceiver spec less than or equal to 70°C (158°F) is not supported.
- Non-Dell qualified peripheral cards and/or peripheral cards greater than 25 W are not supported.

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Appendix A. Standards compliance

The system conforms to the following industry standards.

Table 47. 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/
MSFT WHQL Microsoft Windows Hardware Quality Labs	microsoft.com/whdc/system/platform/pcdesign/desguide/serverdg.mspx
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 48. 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