Dell PowerEdge R660

Technical Guide

Regulatory Model: E83S
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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.

Contents

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System overview

The PowerEdge R660 system is a 1U server that supports:

The system features:

- Up to two 4th Generation Intel Xeon Scalable or Intel® Xeon® Max processors with up to 56 cores and optional Intel ® QuickAssist Technology
- Up to two 5th Generation Intel Xeon Scalable processors with up to 64 cores.
- Up to 32 DDR5 DIMM slots
- Optional Direct Liquid Cooling
- Two redundant AC or DC power supply units
- Up to 10 x 2.5-inch or 8 x 2.5-inch SATA/SAS/NVMe (HDD/SSD) drives
- Also supports 14 x EDSFF E3.S or 16 x EDSFF E3.S drives.

NOTE: For more information about how to hot swap NVMe PCIe SSD U.2 device, see the *Dell Express Flash NVMe PCIe SSD User's Guide* at Dell Support page **> Browse all Products** > **Data Center Infrastructure** > **Storage Adapters & Controllers** > **Dell PowerEdge Express Flash NVMe PCIe SSD** > **Documentation** > **Manuals and Documents**.

NOTE: All instances of SAS, SATA drives are referred to as drives in this document, unless specified otherwise.

Topics:

Key workloads

The versatile R660 is designed to address data-intensive, diverse workloads including:

- High Density Virtualization
- Dense Database Analytics(VDI)
- Mixed Workload Standardization

New technologies

The table lists the new technologies that are featured on R660.

Table 1. New technologies

Technology	Detailed Description
5th Gen Intel® Xeon® Scalable Processors	Core count: Up to 64 core processor
	UPI speed: Up to 4 links per CPU, speed: 12.8 GT/s, 14.4 GT/s, 16 GT/s, 20 GT/s
	Maximum number of PCIe lanes per CPU: Integrated 80 PCIe 5.0 lanes @ 32 GT PCIe Gen5
	Maximum TDP: 350 W
5600 MT/s DDR5 Memory	Max 16 DIMMs per processor and 32 DIMMs per system
	Supports DDR5 ECC RDIMM

Table 1. New technologies (continued)

Technology	Detailed Description
4th Gen Intel® Xeon® Scalable or Intel® Xeon® Max Processors	Core count: Up to 56 core processor
	UPI speed: Up to 4 links per CPU, speed: 12.8 GT/s, 14.4 GT/s, 16 GT/s
	Maximum number of PCIe lanes per CPU: Integrated 80 PCIe 5.0 lanes @ 32GT/s PCIe Gen5
	Maximum TDP: 350 W
	Maximum TDP: 350 W
4800 MT/s DDR5 Memory	Max 16 DIMM per CPU and 32 DIMMs per System.
	Supports DDR5 ECC RDIMM up to 4800 MT/s (1 DPC) / 4400 MT/s (2 DPC)
Flex I/O	LOM board (optional), 2x1Gb with BCM5720 LAN controller
	Rear I/O with: ● 1 x Dedicated iDRAC Ethernet port ● 1 x USB 3.0 ● 1 x USB 2.0 ● 1 x VGA port (optional for liquid cooling configuration)
	Serial Port Option with STD RIO board
	OCP Mezz 3.0 (supported by x8 PCIe lanes)
	Front I/O with: ● 1 x Dedicated iDRAC Direct micro-USB ● 1 x USB 2.0 ● 1 x VGA port
CPLD 1-wire	Support payload data of Front PERC, Riser, BP, and Rear I/O to BOSS-N1 and iDRAC.
Dedicated PERC	Front Storage module PERC with Front PERC11 & PERC12
Software RAID	OS RAID/S160
Power Supplies	60 mm dimension is the new PSU form factor with 15G on 16G design.
	Titanium 700 W mixed mode HLAC
	Platinum 800 W mixed mode
	Titanium 1100 W 1100 W mixed mode
	Platinum 1400 W mixed mode
	1100 W -48 V DC
	Titanium 1800 W mixed mode HLAC
	800 W -48 V DC
	Titanium 1400 W mixed mode 277 VAC and HVDC

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System features and generational comparison

The following table shows the comparison between the PowerEdge R660 with the PowerEdge R650.

Table 2. Features comparison

Features	PowerEdge R660	PowerEdge R650
Processors	• Two 4th Generation Intel® Xeon® Scalable or Intel® Xeon® Max Processors • Two 5th Generation Intel® Xeon® Scalable Processors	Two 3rd Generation Intel® Xeon® (Socket P14) processors
CPU interconnect	Intel Ultra Path Interconnect (UPI)	Intel Ultra Path Interconnect (UPI)
Memory	• 32 DDR5 DIMM slots supports RDIMM 8 TB max, speeds up to 4800 MT/s. • Up to 5600 MT/s (1DPC) / 4400 MT/s (2 DPC) *	• 32 DDR4 DIMM slots supports RDIMM 2 TB max or LRDIMM 8 TB max, speeds up to 3200 MT/s. • Up to 16 Intel Persistent Memory 200 series (BPS) slots, 12 TB max
Storage Controllers	• Internal: PERC H965i, PERC H755, PERC H755N, PERC H355, PERC H965i • External: PERC H965e • SAS HBA non-RAID: HBA355i, HBA355e, HBA465i, • Software RAID: S160 • BOSS-N1	• Internal: PERC H755, PERC H755N, PERC H745, PERC H355, PERC H345 • External: PERC H840 • SAS HBA non-RAID: HBA355i ,HBA355e, HBA465i • Software RAID: S150 • BOSS-S1 • BOSS-S2
Drive Bays	Front bays: Front bays: • Up to 8 x 2.5-inch NVMe SSD max 122.88 TB • Up to 10 x 2.5-inch SAS/SATA/NVMe (HDD/SSD) max 153.6 TB • Up to 14 x EDSFF E3.S (NVMe Gen5) max 179.2 TB • Up to 16 x EDSFF E3.S (NVMe Gen5) max 204.8 TB Rear bays: • Up to 2 x 2.5-inch SAS4/SATA (HDD/SSD) max 30.72 TB • Up to 2 x EDSFF E3.S (NVMe Gen5) max 25.6 TB	Front bays: Front bays: • Up to 4 x 3.5-inch SAS/SATA (HDD/SSD) max 64 TB • Up to 8 x 2.5-inch NVMe SSD max 122.88 TB • Up to 10 x 2.5-inch SAS/SATA/NVMe (HDD/SSD) max 153.6 TB Rear bays: • Up to 2 x 2.5-inch SAS4/SATA (HDD/SSD) max 30.72 TB
Power Supplies	• 1800 W Titanium 200-240 HLAC or 240 HVDC • 1400 W Platinum 100-240 VAC or 240 HVDC • 1100 W Titanium 100-240 VAC or 240 HVDC • 1100 W -48 - -60 VDC • 800 W Platinum 100-240 VAC or 240 HVDC • 700 W Titanium 200-240 HLAC or 240 HVDC	• 1400 W Platinum 100-240 VAC or 240 HVDC • 1100 W Titanium 100-240 VAC or 240 HVDC • 1100 W LVDC -48 - -60 VDC • 800 W Platinum 100-240 VAC or 240 HVDC Hot swap PSUs with full redundancy.

Table 2. Features comparison (continued)

Features	PowerEdge R660	PowerEdge R650	
	• 800 W -48- -60 VDC • 1400 277 VAC or 336 HVDC Hot swap PSUs with full redundancy.		
Cooling Options	• Air Cooling • Optional Direct Liquid Cooling (DLC) **NOTE:** DLC is a rack solution and requires rack manifolds and a cooling distribution unit (CDU) to operate.	• Air Cooling • Optional Direct Liquid Cooling (DLC) **NOTE:** DLC is a rack solution and requires rack manifolds and a cooling distribution unit (CDU) to operate.	
Fans	Standard (STD) fans /High performance Gold (VHP) fans	Standard (STD) fans /High performance Silver (HPR) fans/ High performance Gold (VHP) fans	
	Up to 4 sets (dual fan module) hot plug fans	Up to 4 sets (dual fan module) hot plug fans	
Dimension	Height — 42.8 mm (1.68 inches)	Height — 42.8 mm (1.68 inches)	
	Width — 482 mm (18.97 inches)	Width — 482 mm (18.97 inches)	
	Depth — 822.88 mm (32.39 inches) with bezel	Depth — 772.11 (30.39 inches) with bezel	
	Depth — 809.04 mm (31.85 inches) without bezel	Depth — 758.27 mm (29.85 inches) without bezel	
Form Factor	1U rack server	1U rack server	
Embedded Management	• iDRAC9 • iDRAC Direct • iDRAC RESTful API with Redfish • iDRAC Service Module • Quick Sync 2 wireless module	• iDRAC9 • iDRAC Direct • iDRAC Service Module • Quick Sync 2 wireless module	
Bezel	Optional LCD bezel or security bezel	Optional LCD bezel or security bezel	
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 Manager plug-in • OpenManage SupportAssist plug-in • OpenManage Update Manager plug-in	
Mobility	OpenManage Mobile	OpenManage Mobile	
Integrations	• BMC Truesight • Microsoft System Center • OpenManage Integration with ServiceNow • Red Hat Ansible Modules • Terraform Providers • VMware vCenter and vRealize Operations Manager	OpenManage Integrations • BMC TrueSight • Microsoft System Center • Red Hat Ansible Modules • VMware vCenter	• IBM Tivoli Netcool/ OMNIbus • IBM Tivoli Network Manager IP Edition • Micro Focus Operations Manager • Nagios Core • Nagios XI
Connections	• IBM Tivoli Netcool/OMNIbus • IBM Tivoli Network Manager IP Edition • Micro Focus Operations Manager • Nagios Core		

Table 2. Features comparison (continued)

Features	PowerEdge R660		PowerEdge R650	
	• Nagios XI			
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		• Cryptographically signed firmware • Secure Boot • Secure Erase • Silicon Root of Trust • System Lockdown (requires iDRAC9 Enterprise or Datacenter) • TPM 1.2/2.0 FIPS, CC-TCG certified, TPM 2.0 China NationZ	
Embedded NIC	2 x 1GbE LOM card (optional)		2 x 1GbE LOM card (optional)	
Networking Options	1 x OCP card 3.0 (optional) **NOTE:** The system allows either LOM card or OCP card or both to be installed in the system.		1 x OCP card 3.0 (optional)	
GPU Options	Up to 3 x 75 W SW		Up to 3 x 75 W SW	
Ports	Front Ports • 1 x Dedicated iDRAC Direct micro-USB • 1 x USB 2.0 • 1 x VGA	Rear Ports • 1 x USB 2.0 • 1 x Serial port (optional) • 1 x USB 3.0 • 1 x Dedicated iDRAC Ethernet port • 1 x VGA (optional for liquid cooling configuration)	Front Ports • 1 x Dedicated iDRAC Direct micro-USB • 1 x USB 2.0 • 1 x VGA	Rear Ports • 1 x USB 2.0 • 1 x Serial port (optional) • 1 x USB 3.0 • 2 x RJ45 • 1 x VGA (optional for liquid cooling configuration)
	Internal Port: 1 x USB 3.0 (optional)		Internal Port: 1 x USB 3.0 (optional)	
PCIe	Up to three PCIe slots • 2 x PCIe Gen5 slots • 3 x PCIe Gen4 slots		Up to three PCIe slots • 3 x PCIe Gen4 slots	
Operating System and Hypervisors	• Canonical Ubuntu Server LTS • Windows Server with Hyper-V • Red Hat Enterprise Linux • SUSE Linux Enterprise Server • VMware ESXi For specifications and interoperability details, see Dell Enterprise Operating Systems on Servers, Storage, and Networking page at Dell.com/OSsupport.		• Canonical Ubuntu Server LTS • Citrix Hypervisor • Windows Server LTSC with Hyper-V • Red Hat Enterprise Linux • SUSE Linux Enterprise Server • VMware ESXi For specifications and interoperability details, see Dell Enterprise Operating Systems on Servers, Storage, and Networking page at Dell.com/OSsupport.	

NOTE: * Applicable for 5th Gen Intel® Xeon® Scalable Processors.

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Chassis views and features

Topics:

- Chassis views

Chassis views

Front view of the system

Figure 1. Front view of 8 x 2.5-inch drive system

Figure 2. Front view of 10 x 2.5-inch drive system

Figure 3. Front view of 14 EDSFF E3.S drive system

Figure 4. Front view of 16 EDSFF E3.Sdrive system

Rear view of the system

Rear view of the system

Figure 5. Rear view of the R660 with 3 x LP

Figure 6. Rear view of the R660 with 2 x 2.5 inches storage drives, 1x LP

Figure 7. Rear view of the R660 with x2 LP + rear blank

Figure 8. Rear view of the R660 with x2 FH

Figure 9. Rear view of the R660 with 2 x EDSFF E3.S drives

Inside the system

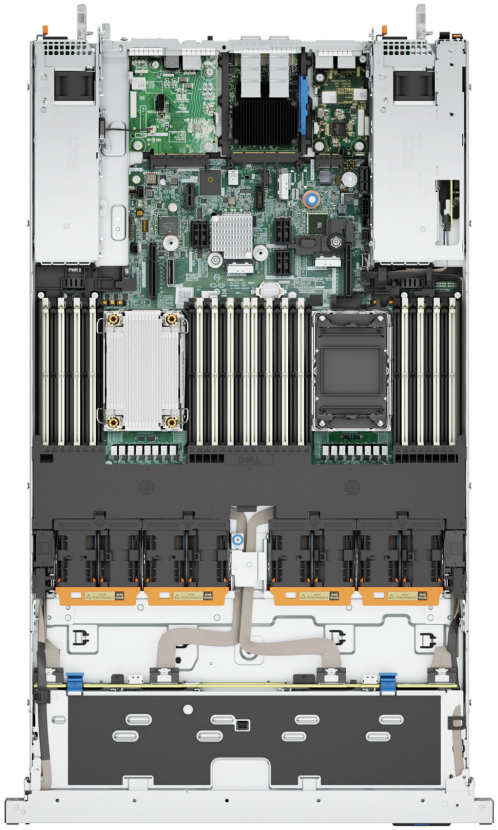

Figure 10. Inside view of the chassis without risers

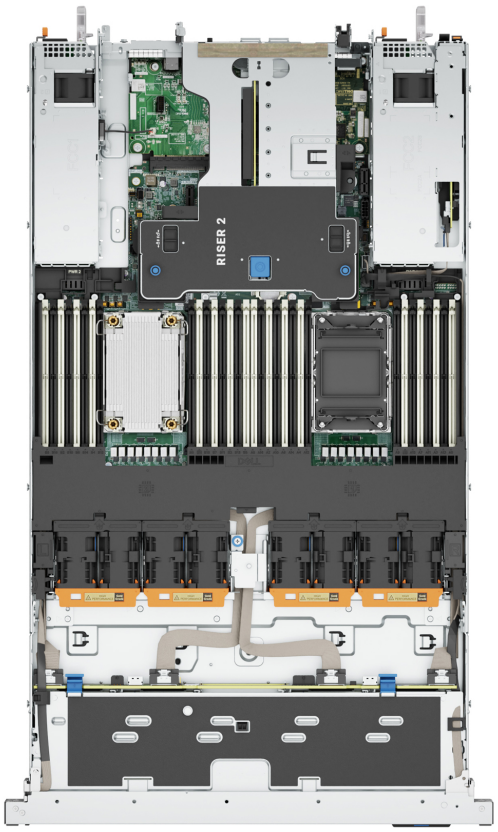

Figure 11. Inside view of the chassis with riser 2

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Processor

Topics:

Processor features

The Intel 4th Generation Xeon® 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 Generation Intel® Xeon Scalable Processor offering:

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

Supported processors

The following table shows the Intel Sapphire Rapids 4th Gen Intel® Xeon® Scalable or Intel® Xeon® Max Processors and Intel Emerald Rapids 5th Gen Intel® Xeon® Scalable Processors SKUs that are supported on the R660.

Table 3. 4thGen Intel® Xeon® Scalable or Intel® Xeon® Max Processors for R660

Processor	Clock Speed (GHz)	Cache (M)	UPI (GT/s)	Cores	Threads	Turbo	Memory Speed (MT/s)	Memory Capacity	TDP
9480[1]	1.9	113	16	56	112	Turbo	4800	64 GB	350 W
9470[1]	2	105	16	52	104	Turbo	4800	64 GB	350 W
9460[1]	2.2	98	16	40	80	Turbo	4800	64 GB	350 W
9462[1]	2.7	75	16	32	64	Turbo	4800	64 GB	350 W
8480+[1]	2	105	16	56	112	Turbo	4800	4 TB	350 W
8471N[1]	1.8	98	16	52	104	Turbo	4800	4 TB	300 W
8470Q[1]	2.1	105	16	52	104	Turbo	4800	4 TB	350 W
8470N[1]	1.7	98	16	52	104	Turbo	4800	4 TB	300 W
8470[1]	2	105	16	52	104	Turbo	4800	4 TB	350 W
8468[1]	2.1	105	16	48	96	Turbo	4800	4 TB	350 W
8460Y+[1]	2	105	16	40	80	Turbo	4800	4 TB	300 W
8452Y[1]	2	68	16	36	72	Turbo	4800	4 TB	300 W

Table 3. 4thGen Intel® Xeon® Scalable or Intel® Xeon® Max Processors for R660 (continued)

Processor	Clock Speed (GHz)	Cache (M)	UPI (GT/s)	Cores	Threads	Turbo	Memory Speed (MT/s)	Memory Capacity	TDP
6454S[1]	2.2	60	16	32	64	Turbo	4800	4 TB	270 W
6430[1]	2.1	60	16	32	64	Turbo	4800	4 TB	270 W
6414U[1]	2	60	16	32	64	Turbo	4800	4 TB	250 W
8462Y+[1]	2.8	60	16	32	64	Turbo	4800	4 TB	300 W
6458Q[1]	3.1	60	16	32	64	Turbo	4800	4 TB	350 W
6448Y[2]	2.2	60	16	32	64	Turbo	4800	4 TB	225 W
6444Y[1]	3.5	45	16	16	32	Turbo	4800	4 TB	270 W
6442Y[2]	2.6	60	16	24	48	Turbo	4800	4 TB	225 W
6438Y+[2]	2	60	16	32	64	Turbo	4800	4 TB	205 W
6438N[2]	2	60	16	32	64	Turbo	4800	4 TB	205 W
6438M[2]	2.2	60	16	32	64	Turbo	4800	4 TB	205 W
6434[2]	3.7	23	16	8	16	Turbo	4800	4 TB	205 W
6428N[2]	1.8	60	16	32	64	Turbo	4800	4 TB	185 W
6426Y[2]	2.6	38	16	16	32	Turbo	4800	4 TB	185 W
6421N[2]	1.8	60	16	32	64	Turbo	4800	4 TB	185 W
5420+[2]	2	53	16	28	56	Turbo	4400	4 TB	205 W
5418Y[2]	2	45	16	24	48	Turbo	4400	4 TB	185 W
5418N[2]	1.8	45	16	24	48	Turbo	4400	4 TB	165 W
5416S[2]	2	30	16	16	32	Turbo	4400	4 TB	150 W
5415+[2]	2.9	23	16	8	16	Turbo	4400	4 TB	150 W
5412U[2]	2.1	45	16	24	48	Turbo	4400	4 TB	185 W
5411N[2]	1.9	45	16	24	48	Turbo	4400	4 TB	165 W
4416+[2]	2	38	16	20	40	Turbo	4000	4 TB	165 W
4410Y[2]	2	30	16	12	24	Turbo	4000	4 TB	150 W
3408U[2]	1.8	23	16	8	16	No Turbo	4000	4 TB	125 W

Table 4. 5thGen Intel® Xeon® Scalable Processors supported in R660

Processor	Clock Speed (GHz)	Cache (M)	UPI (GT/s)	Cores	Threads	Turbo	Memory Speed (MT/s)	Memory Capacity	TDP
8592+[1]	1.9	320	20	64	128	Turbo	5600	4 TB	350 W
8580[1]	2.0	300	20	60	120	Turbo	5600	4 TB	350 W
8568Y+[1]	2.3	300	20	48	96	Turbo	5600	4 TB	350 W
8562Y+[1]	2.8	60	20	32	64	Turbo	5600	4 TB	300 W
8558U[1]	2.0	260	N/A	48	96	Turbo	4800	4 TB	300 W
6548N [1]	2.8	60	20	32	64	Turbo	5200	4 TB	250 W
6548Y+[1]	2.5	60	20	32	64	Turbo	5200	4 TB	250 W
6542Y[1]	2.9	60	20	24	48	Turbo	5200	4 TB	250 W

Table 4. 5thGen Intel® Xeon® Scalable Processors supported in R660 (continued)

Processor	Clock Speed (GHz)	Cache (M)	UPI (GT/s)	Cores	Threads	Turbo	Memory Speed (MT/s)	Memory Capacity	TDP
6534[2]	3.9	22.5	20	8	16	Turbo	4800	4 TB	195 W
6526Y[2]	2.8	37.5	20	16	32	Turbo	5200	4 TB	195 W
5512U[2]	2.1	52.5	N/A	28	56	Turbo	4800	4 TB	185 W
4514Y[2]	2.0	30	16	16	32	Turbo	4400	4 TB	150 W
4510[2]	2.4	30	16	12	24	Turbo	4400	TBD	150 W
4509Y[2]	2.6	23	16	8	16	Turbo	4400	TBD	125 W

NOTE: The platform supports Maximum (MAX) and Mainstream (MS) system boards.

- [1] supports MAX system board
- [2] supports MS system board

NOTE: 9480, 9470, 8470Q and 6458Q are supported only in liquid cooling configuration.

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Memory subsystem

Topics:

- Supported memory

Supported memory

Table 5. Memory technology comparison

Feature	PowerEdge R660 (DDR5)
DIMM type	RDIMM
Transfer speed	4800 MT/s for 1 DIMM per channel(DPC), 4400 MT/s for 2 DIMMs per channel
	5600 MT/s (1DPCDPC), 4400 MT/s (2DPC)*
Voltage	1.1 V

NOTE: *Applicable for 5th Gen Intel® Xeon® Scalable Processors.

The following table lists the supported DIMMs for the R660. For the latest information about supported memory and memory configurations, reference the latest SDL.

Table 6. Supported memory matrix

DIMM type	Rank	Capacity	DIMM rated voltage and speed	Operating Speed	
				1 DIMM per channel (DPC)	2 DIMMs per channel (DPC)
RDIMM	1 R	16 GB	DDR5 (1.1 V), 4800 MT/s	4800 MT/s	4400 MT/s
	2 R	32 GB, 64 GB	DDR5 (1.1 V), 4800 MT/s	4800 MT/s	4400 MT/s
	4 R	128 GB	DDR5 (1.1 V), 4800 MT/s	4800 MT/s	4400 MT/s
	8 R	256 GB	DDR5 (1.1 V), 4800 MT/s	4800 MT/s	4400 MT/s
	1 R	16 GB	DDR5 (1.1 V), 5600 MT/s	5600 MT/s	4400 MT/s
	2 R	32 GB, 64 GB, 96 GB	DDR5 (1.1 V), 5600 MT/s	5600 MT/s	4400 MT/s
	4 R	128 GB	DDR5 (1.1 V), 5600 MT/s	5600 MT/s	4400 MT/s

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

NOTE: The processor may reduce the performance of the rated DIMM speed.

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Storage

Topics:

Storage controllers

Dell RAID controller options offer performance improvements, including the fPERC solution. fPERC 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.

16G PERC Controller offerings are a heavy leverage of the 15G PERC family. The Value and Value Performance levels carry over to 16G from 15G. New to 16G is the Avenger-based Premium Performance tier offering. This high-end offering drives IOPs performance and enhanced SSD performance.

NOTE: The size of the RAID 1 drives must be less than that of the second RAID container.

Table 7. PERC Series controller offerings

Performance Level	Controller and Description
Entry	S160
Value	H355, HBA355 (internal/external), HB465i, HB465e(internal, external)
Value Performance	H755, H755N
Premium Performance	H965i, H965e Avenger 1 Memory: 8 GB DDR4 3200 MT/s cache 72-bit memory 2133 MHz Low profile form factors Dual A15 1.2 GHz CPU Gen4 x16 24 Gbps SAS, 12 Gbps SAS, and 6 Gbps SATA/SAS. Gen3 (8 GT/s) and Gen4 (16 GT/s) NVMe

NOTE: For more information about 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 Storage Controller Manuals.

NOTE: From December 2021, H355 replaces H345 as the entry raid controller. H345 is deprecated in January 2022.

HBA465e is available post-RTS.

Supported Drives

The table shown below lists the internal drives supported by the R660.

Table 8. Supported Drives

Form Factor	Type	Speed	Rotational Speed	Capacities
2.5 inches	vSAS	12 Gb	SSD	1.92 TB, 3.84 TB, 960 GB, 7.62 TB
2.5 inches	SAS	24 Gb	SSD	1.92 TB, 1.6 TB, 800 GB, 3.84 TB, 960 GB, 7.68 TB
2.5 inches	SATA	6 Gb	SSD	1.92 TB, 480 GB, 960 GB, 3.84 TB,
2.5 inches	NVMe	Gen4	SSD	1.6 TB, 3.2 TB, 6.4 TB, 1.92 TB, 3.84 TB, 15.63 TB, 7.68 TB, 800 GB, 400 GB
2.5 inches	DC NVMe	Gen4	SSD	3.84 TB, 960 GB
2.5 inches	SAS	12 Gb	10 K	600 GB, 1.2 TB, 2.4 TB
EDSFF E3.S	NVMe	Gen5	SSD	3.84 TB, 7.68 TB

Internal storage configuration

R660 available internal storage configurations:

- Zero drives (no backplane)
- 8x2.5-inch (NVMe Direct)
- 8x2.5-inch (NVMe RAID)
- 8x2.5-inch (SAS4/SATA)
- 8x2.5-inch Universal (SAS/SATA HWRAID + NVMe Direct)
- 10x2.5-inch (SAS4/SATA)
- 10x2.5-inch (SAS4/SATA) + 2x2.5-inch (SAS4/SATA)
- 10x2.5-inch (SAS4/SATA w/ 4 Universal (SAS/SATA HWRAID + NVMe Direct)
- 10x2.5-inch (NVMe Direct)
- 10x2.5-inch (NVMe) + 2 x 2.5-inch (NVMe Direct)
- 10x2.5-inch (SAS4/SATA w/ 2 Universal
- 14x EDSFF E3.S (Gen 5 x4 NVMe Direct)
- 14x EDSFF E3.S + 2x EDSFF E3.S (Gen5 x4 NVMe Direct)
- 16 EDSFF E3.S Dual RAID NVMe RAID)

External Storage

The R660 support the external storage device types listed in the table below.

Table 9. Support 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 12Gb 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 10. OCP 3.0 feature list

Feature	OCP 3.0
Form factor	SFF
PCIe Gen	Gen4
Max PCIe width	x8, x16 (with OCP cable)
Max no. of ports	4
Port type	BT/SFP/SFP+/SFP28
Max port speed	25 GbE , 100 GbE (with OCP cable)
NC-SI	Yes
SNAPI	Yes
WoL	Yes
Power consumption	15 W–35 W

Supported OCP cards

Table 11. Supported OCP cards

Form factor	Vendor	Port type	Port speed	Port count
OCP 3.0	Broadcom	QSFP56	100 GbE	2
	Mellanox	QSFP56	100 GbE	2
	Intel	SFP28	25 GbE	4
	Broadcom	SFP28	25 GbE	4
	Intel	SFP28	25 GbE	2
	Broadcom	SFP28	25 GbE	2

Table 11. Supported OCP cards (continued)

Form factor	Vendor	Port type	Port speed	Port count
	Mellanox	SFP28	25 GbE	2
	Broadcom	BT	10 GbE	4
	Intel	BT	10 GbE	2
	Intel	BT	10 GbE	4
	Broadcom	BT	10 GbE	2
	Broadcom	BT	1 GbE	4
	Intel	BT	1 GbE	4

NOTE: A 100 GbE OCP card of PCIe width x16 can be used by connecting the OCP cable from SL11_CPU1_PB7 to SL13_CPU1_PB7 on the MAX system board.

NOTE: For storage configurations that already use the SL11_CPU1_PB7 or SL13_CPU1_PB7 connector on the Max system board, there is a restriction on supporting OCP cable.

OCP NIC 3.0 vs. rack Network Daughter Card comparisons

Table 12. 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 x8	See server slot priority matrix
Shared LOM	Yes	Yes	Yes	This is iDRAC port redirect
Aux Power	Yes	Yes	Yes	Used for Shared LOM

8

PCIe subsystem

The R660 supports up to 3 x16 low profile slots by riser2 and riser3.

Topics:

- PCIe risers

PCIe risers

The PowerEdge R660 have a no riser option. Shown below are the riser offerings for the PowerEdge R660.

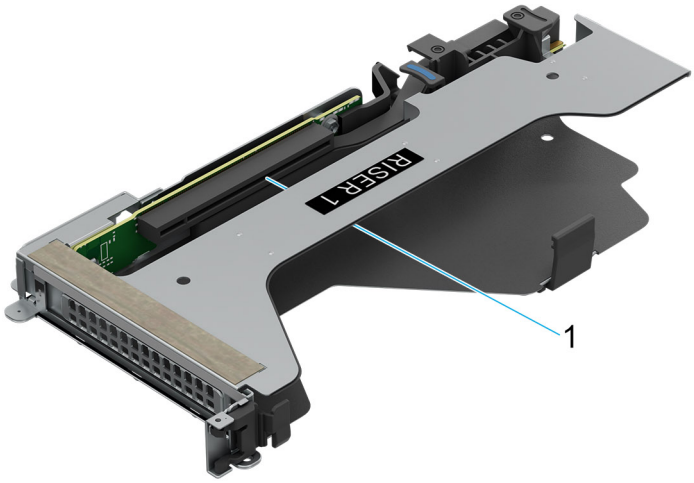

Figure 12. Riser 1P

1. Slot 1

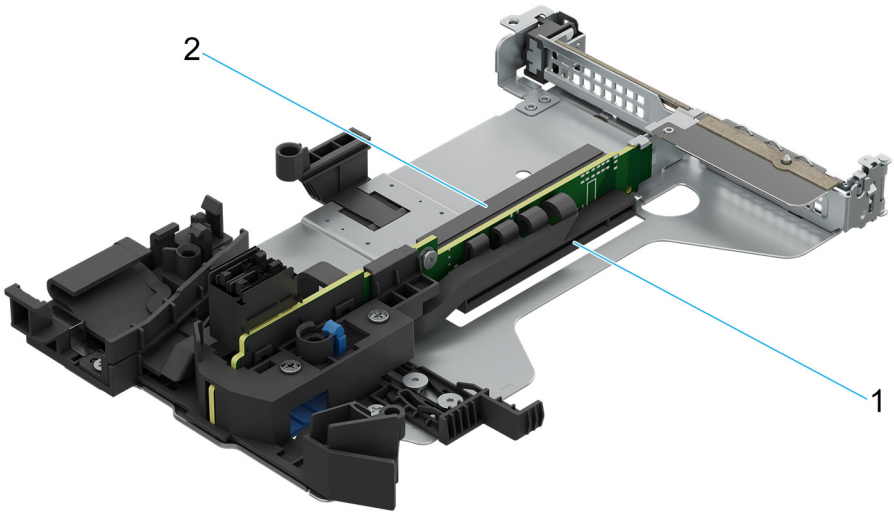

Figure 13. Riser 2P

1. Slot 1

2. Slot 2

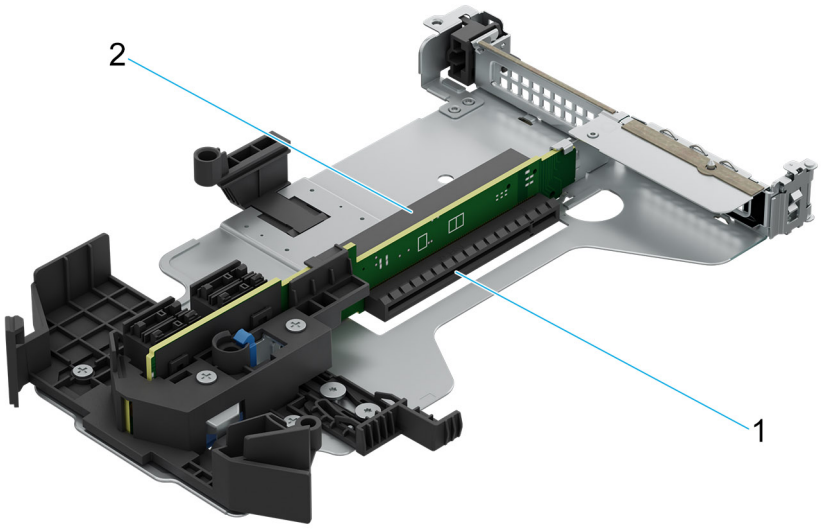

Figure 14. Riser 2A

1. Slot 1
2. Slot 2

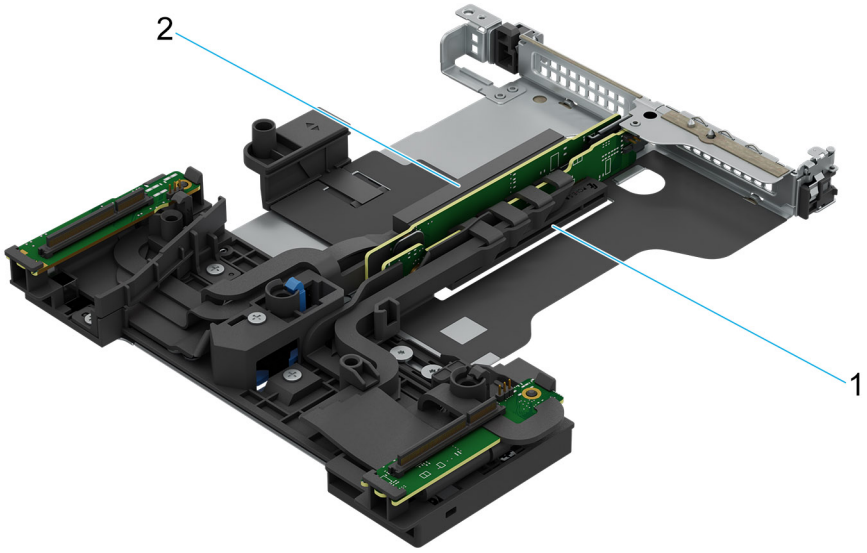

Figure 15. Riser 2Q

1. Slot 1
2. Slot 2

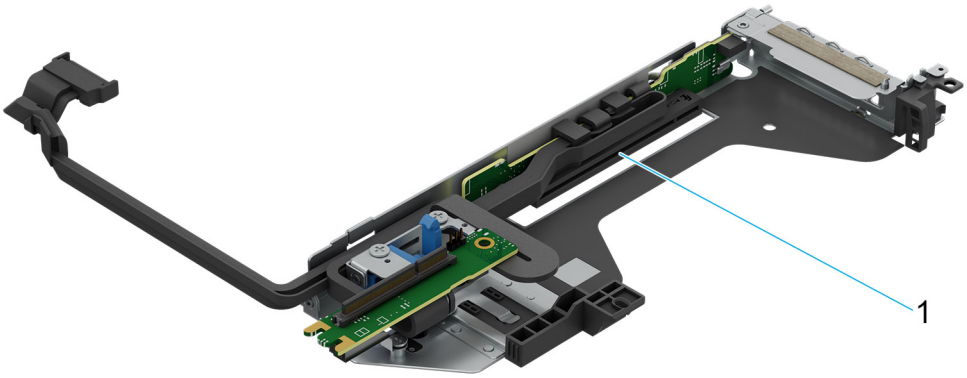

Figure 16. Riser 3P

1. Slot 3

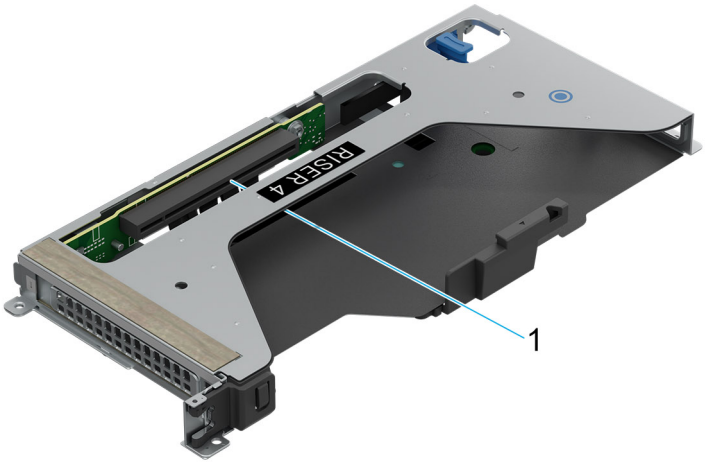

Figure 17. Riser 4P

1. Slot 2

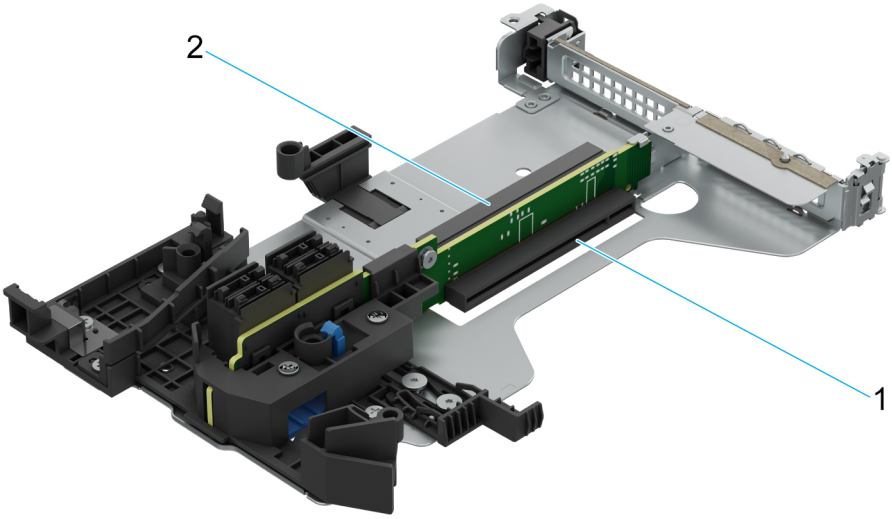

Figure 18. Riser 2R

1. Slot 1

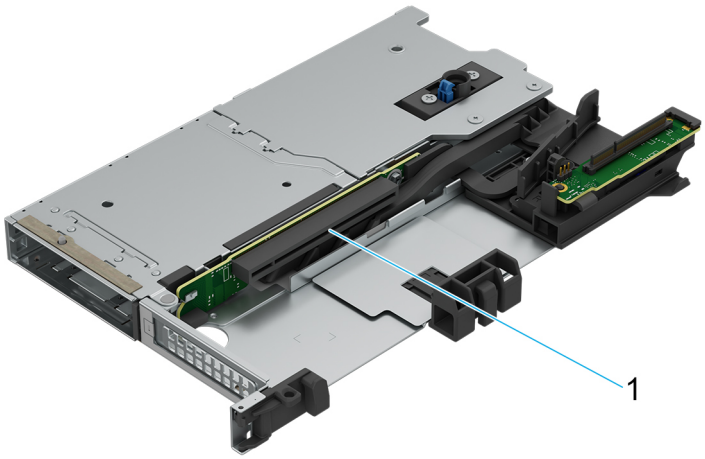

Figure 19. Riser 2S

1. Slot 1

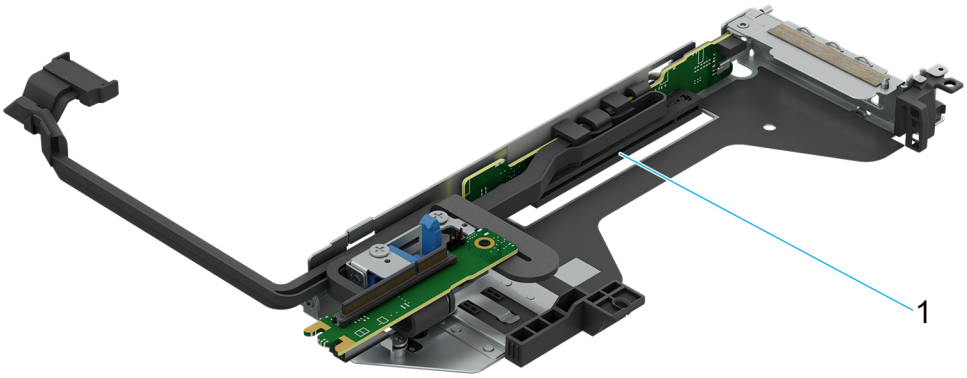

Figure 20. Riser 3Q

1. Slot 3

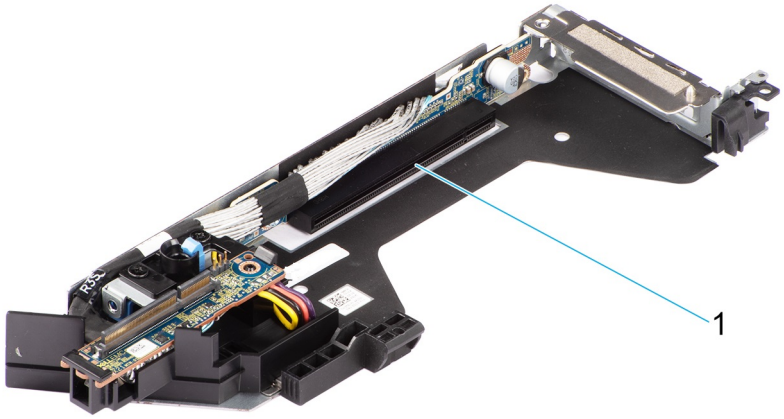

Figure 21. Riser 3S

1. Slot 3

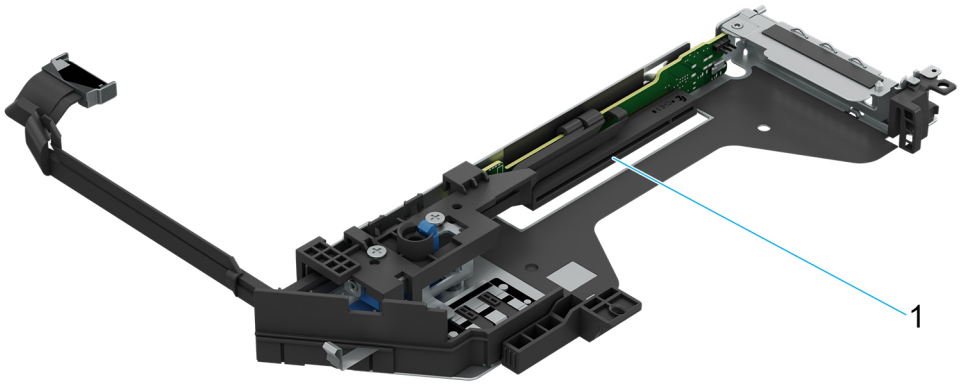

Figure 22. Riser 3R

1. Slot 3

Table 13. PCIe Riser Configuration

Config No.	Riser configuration	No. of Processors	PERC type supported	Rear Storage Possible
0	No RSR	2	Front PERC	No
1	R2A+R3A	2	Front PERC / PERC Adapter	No
2	R2P+R3P	2	Front PERC	No
3	R1P+R4P	2	Front PERC / PERC Adapter	No
4	R2R+R3R	1	N/A	No
5	R2A+R3Q	2	Front PERC / PERC Adapter	No
6-1	R2Q (non A2,L4)	2	Front PERC	No
6 -2	R2Q (only for A2,L4)	2	Front PERC	No
7	R3P	2	Front PERC	Yes
8	R2A	1	Front PERC / PERC Adapter	No
9	R2S+R3S	2	Front PERC / PERC Adapter	Yes

9

Power, thermal, and acoustics

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

Topics:

Power

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 Enterprise Infrastructure Planning Tool.
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 AMD's GUARDMI 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	AMD's GUARDMI is an embedded technology that provides individual server-level power reporting and power limiting functionality. Dell offers a complete power management solution comprised of AMD's GUARDMI accessed through Dell iDRAC9 Datacenter and OpenManage Power Center that allows policy-based management of power and thermal at the individual server, rack, and data center level. Hot spare reduces power consumption of redundant power supplies. Thermal control off a speed optimizes the thermal settings for your environment to reduce fan consumption and lower system power consumption. Idle power enables Dell servers to run as efficiently when idle as when at full workload.
Fresh Air cooling	See ASHRAE A3/A4 Thermal Restriction.

Table 14. Power tools and technologies (continued)

Feature	Description
Rack infrastructure	Dell offers some of the industry's highest-efficiency power infrastructure solutions, including: • Power distribution units (PDUs) • Uninterruptible power supplies (UPSs) • Energy Smart containment rack enclosures Find additional information at: Data Center Power and Cooling Solutions.

PSU specifications

The PowerEdge R660 system supports up to two AC or DC power supply units (PSUs).

Table 15. PSU specifications

PSU	Class	Heat dissipation (maximum) (BTU/hr)	Frequency (Hz)	AC Voltage			DC Voltage			Current (A)
				200–240 V	100–120 V	277 V	240 V	- (48 - 60) V	336 V	
700 W mixed mode HLAC	Titanium	2625	50/60	700 W	N/A	N/A	N/A	N/A	N/A	4.1
	N/A	2625		N/A	N/A	N/A	700 W	N/A	N/A	3.4
800 W mixed mode	Platinum	3000	50/60	800 W	800 W	N/A	N/A	N/A	N/A	9.2 - 4.7
	N/A	3000		N/A	N/A	N/A	800 W	N/A	N/A	3.8
1100 W mixed mode	Titanium	4100	50/60	1100 W	1050 W	N/A	N/A	N/A	N/A	12 - 6.3
	N/A	4100		N/A	N/A	N/A	1100 W	N/A	N/A	5.2
1400 W mixed mode	Platinum	5250	50/60	1400 W	1050 W	N/A	N/A	N/A	N/A	12 - 8
	N/A	5250		N/A	N/A	N/A	1400 W	N/A	N/A	6.6
1800 W mixed mode HLAC	Titanium	6750	50/60	1800 W	N/A	N/A	N/A	N/A	N/A	10
	N/A	6750		N/A	N/A	N/A	1800 W	N/A	N/A	8.2
800 W -48 V DC	N/A	3103	N/A	N/A	N/A	N/A	N/A	800 W	N/A	23.5
1100 W -48 V DC	N/A	4265	N/A	N/A	N/A	N/A	N/A	1100 W	N/A	27
1400 W mixed mode 277 VAC and HVDC	Titanium	5250	50/60	N/A	N/A	1400 W	N/A	N/A	N/A	5.8
		5250	N/A	N/A	N/A	N/A	N/A	N/A	1400 W	5.17

NOTE: Heat dissipation is calculated using the PSU wattage rating.

NOTE: When selecting or upgrading the system configuration, to ensure optimum power utilization, verify the system power consumption with the Enterprise Infrastructure Planning Tool available at calc.

NOTE: If a system with AC 1400 W or 1100 W PSUs operates at low line 100-120 V AC, then the power rating per PSU is degraded to 1050 W.

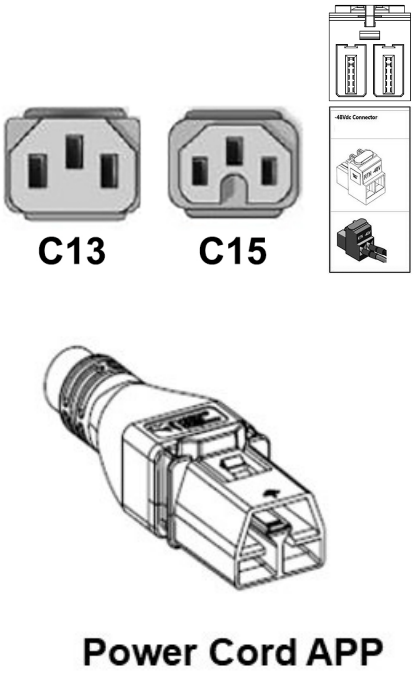

Figure 23. PSU power cables

Table 16. PSU power cables

Form factor	Output	Power cord
Redundant 60 mm	700 W mixed mode HLAC	C13
	800 W mixed mode	C13
	800 W -48 V DC	LOTES APOW0097
	1100 W mixed mode	C13
	1100 W -48 V DC	C13
	1400 W mixed mode	C13
	1800 W mixed mode HLAC	C15
	1400 W 277 VAC and HVDC	APP 2006G1

NOTE: C13 power cable combined with C14 to C15 jumper power cable can be used to adapt 1800 W PSU.

NOTE:

- HLAC stands for High-Line AC, with a range of 200 - 240 V AC
- HVDC stands for High-Voltage DC, with 336 V DC

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.

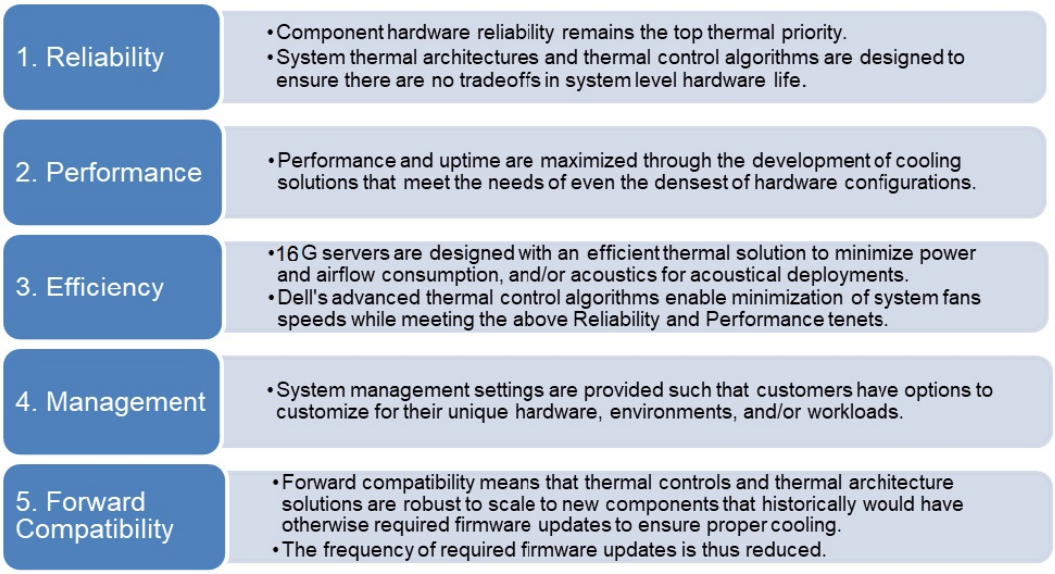

Figure 24. Thermal design characteristics

The thermal design of the PowerEdge R660 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 R660 Installation and Service Manual at PowerEdge Manuals and “Advanced Thermal Control: Optimizing across Environments and Power Goals” on Dell.com.
- Cooling redundancy: The R660 allows N+1 fan redundancy, allowing continuous operation with one fan failure in the system.
- Environmental Specifications: The optimized thermal management makes the R660 reliable under a wide range of operating environments.

Acoustics

Acoustical performance

Dell PowerEdge R660 is a rack-mount server appropriate for attended data center environment. However, lower acoustical output is attainable with proper hardware or software configurations.

Table 17. Acoustical Configurations of R660

Configuration	Volume - 1 (HPC)	Margin Rich
Acoustical Category	Category 4	Category 5

Table 17. Acoustical Configurations of R660 (continued)

Configuration	Volume - 1 (HPC)	Margin Rich
CPU TDP	165 W	300 W
CPU Quantity	2	2
Memory Type	64 GB DDR5 RDIMM	128 GB DDR5 RDIMM
DIMM Quantity	16	32
Backplane Type	10 x 2.5 inches	10 x 2.5 inches
HDD Type	2.5 inches NVMe SSD	2.5 inches NVMe SSD
HDD Quantity	10	10
PSU Type	1400 W	1400 W
PSU Quantity	2	2
PCI 1	Dual Port 25 GbE	N/A
PCI 2	Dual Port 25 GbE	N/A
Front PERC	N/A	N/A
OCP	Dual Port 25GbE	Dual Port 200GbE
M.2	Boss-N1	BOSS-N1

Table 18. Acoustical experience of R660 configurations

Configuration		Volume - 1 (HPC)	Feature Rich
Acoustical Performance: Idle/ Operating @ 25°C Ambient			
$L_{wA,m}$ (B)	Idle[4]	5.3	6.4
	Operating/Customer usage operating[5] [6]	5.3	6.5
K_v (B)	Idle [4]	0.4	0.4
	Operating/Customer usage operating[5] [6]	0.4	0.4
$L_{pA,m}$ (dB)	Idle[4]	41.3	52.3
	Operating/Customer usage operating[5] [6]	41.3	52.5
Prominent tones[3] Acoustical Performance: Idle @ 28°C Ambient			
$L_{wA,m}$[1] (B)		1/6~1/13	7.0
K_v (B)		0.4	0.4
$L_{pA,m}$[2] (dB)		1/6~1/13	55.4
Acoustical Performance: Max. loading @ 35°C Ambient			
$L_{wA,m}$[1] (B)		1/6~1/13	8.5
K_v (B)		0.4	0.4
$L_{pA,m}$[2](dB)		1/6~1/13	72.2

[1]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 that are described in ISO 7779 (2010). Engineering data presented here may not be fully compliant with ISO 7779 declaration requirement.

[2]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 that are described in ISO 7779 (2010). The system is placed in a 24U rack enclosure, 75 cm above a reflective floor. Engineering data presented here may not be fully compliant with ISO 7779 declaration requirement.

(3)Prominent tones: Criteria of Annex D of ECMA-74 and Prominence Ratio method of ECMA-418 are followed to determine if discrete tones are prominent and to report them, if so.

(4)Idle mode: The steady-state condition in which the server is energized but not operating any intended function.

(5)Operating mode: 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.

(6) Customer Usage Operating mode: The operating mode is represented by the maximum of the steady state acoustical output at 25%~30% of CPU TDP, 2.5%~10% IOPs load, and >80% GPU load as the components showed in the above configurations.

10

Rack, rails, and cable management

Topics:

Rails and cable management information

The rail offerings for the PowerEdge R660 consist of two general types: sliding and static. The cable management offerings consist of an optional cable management arm (CMA) and an optional strain relief bar (SRB).

See Dell Technologies Enterprise Systems Rail Sizing and Rack Compatibility Matrix for information regarding:

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

Key factors governing proper rail selection include the following:

- 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

Sliding rails features summary

The sliding rails allow the system to be fully extended out of the rack for service. There are two types of sliding rails available, ReadyRails II sliding rails and Stab-in/Drop-in sliding rails. The sliding rails are available with or without the optional cable management arm (CMA) or strain relief bar (SRB).

A15 ReadyRails II sliding rails for 4-post racks

- Supports drop-in installation of the chassis to the rails.
- Support for tool-less installation in 19" EIA-310-E compliant square or unthreaded round hole 4-post racks including all generations of the Dell racks.
- Support for tooled installation in 19" EIA-310-E compliant threaded hole 4-post racks.
- Support full extension of the system out of the rack to allow serviceability of key internal components.
- Support for optional strain relief bar (SRB).
- Support for an optional cable management arm (CMA).

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

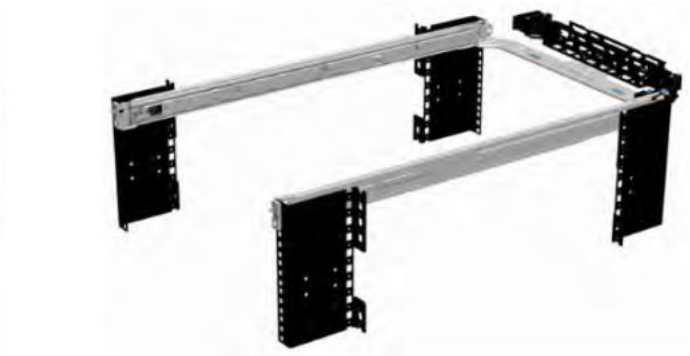

Figure 25. Sliding rails with optional CMA

Figure 26. Sliding rails with optional SRB

A16 Stab-in/Drop-in sliding rails for 4-post racks

- Supports drop-in or 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 full extension of the system out of the rack to allow serviceability of key internal components.
- Support for an 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 sliding rails. This reduces the overall length of the rails and eliminates the potential interferences with rear-mounted PDUs or the rear rack door.

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

A14 static rails summary

The static rails offer a greater adjustability range and a smaller overall mounting footprint than the sliding rails because of their reduced complexity and lack of need for CMA support. The static rails support a wider variety of racks than the sliding rails. However, they do not support serviceability in the rack and are thus not compatible with the CMA. The static rails are also not compatible with SRB.

Figure 27. Static rails

Static rails features summary

Static rails for 4-post and 2-post racks:

- Supports Stab-in installation of the chassis to the rails.
- Support tool-less installation in 19" EIA-310-E compliant square or unthreaded round hole 4-post racks including all generations of Dell racks.
- Support tooled installation in 19" EIA-310-E compliant threaded hole 4-post and 2-post racks.
- Support for tooled installation in Dell Titan or Titan-D rack.

NOTE:

- Screws are not included with the static rail kit since racks are offered with various thread types. The screws are provided for mounting static rails in racks with threaded mounting flanges.
- Screw head diameter should be 10 mm or less.

2-Post racks installation

If installing to 2-Post (Telco) racks, the ReadyRails II static rails (A14) must be used. Sliding rails support mounting in 4-post racks only.

Figure 28. Static rails in 2-post center mount configuration

Installation in the Dell Titan or Titan-D racks

For tool-less installation in Titan or Titan-D racks, the Stab-in/Drop-in sliding rails (A16) must be used. This rail collapses down sufficiently to fit in the rack with mounting flanges that are spaced about 24 inches apart from front to back. The Stab-in/Drop-in sliding rail allows bezels of the servers and storage systems to be aligned when installed in these racks. For tooled installation, Stab-in static rails (A14) must be used for bezel alignment with storage systems.

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.
- CMA is not supported in Direct Liquid Cooling (DLC) 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.

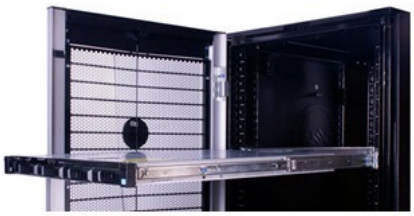

Figure 29. Sliding rails with CMA

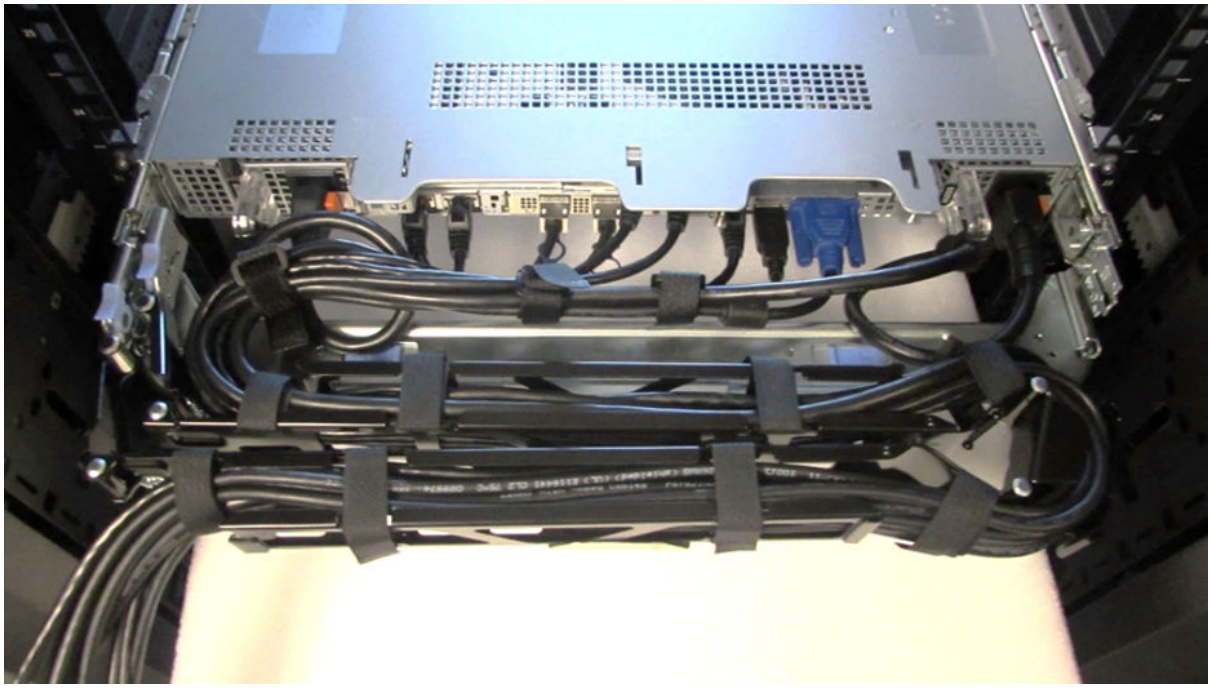

Figure 30. CMA Cabling

Strain Relief Bar (SRB)

The optional strain relief bar (SRB) for the PowerEdge R660 organizes and supports cable connections at the rear end of the server to avoid damage from bending.

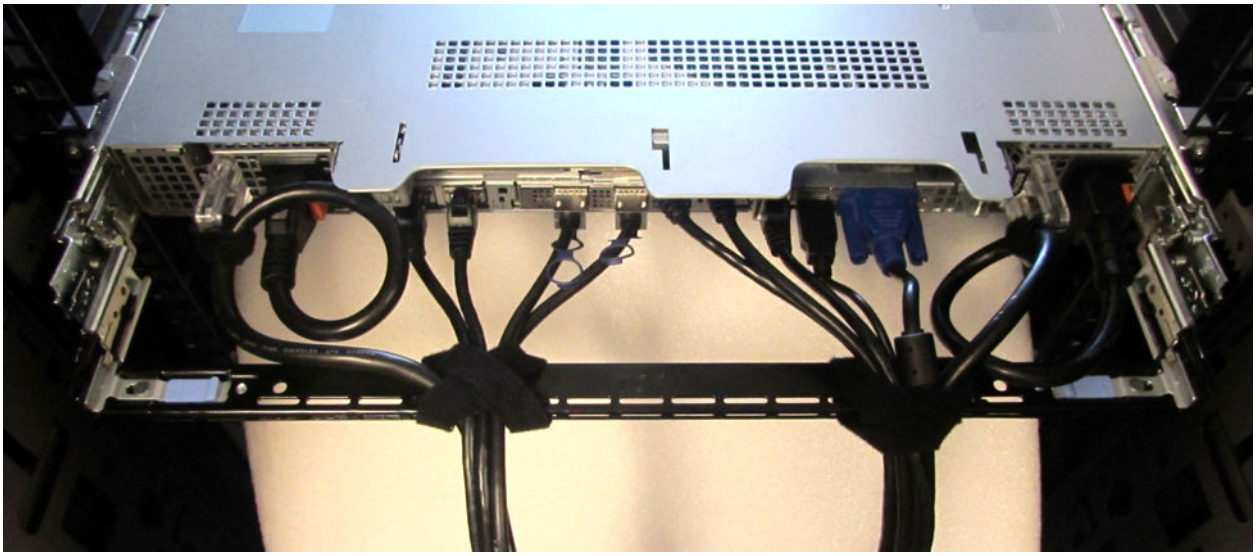

Figure 31. Cabled strain relief bar

- 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

Drop-in design means that the system is installed vertically into the rails by inserting the standoffs on the sides of the system into the J-slots in the inner rail members with the rails in the fully extended position. The recommended method of installation is to first insert the rear standoffs on the system into the rear J-slots on the rails to free up a hand and then rotate the system down into the remaining J-slots while using the free hand to hold the rail against the side of the system.

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 (option A: Drop-In)

1. Pull the inner rails out of the rack until they lock into place.

Figure 32. Pull out inner rail

2. Locate the rear rail standoff on each side of the system and lower them into the rear J-slots on the slide assemblies.
3. Rotate the system downward until all the rail standoffs are seated in the J-slots.

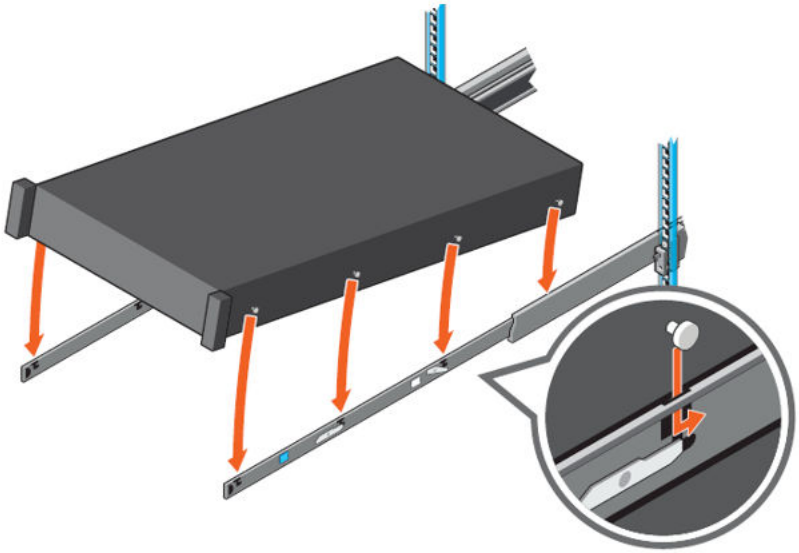

Figure 33. Rail standoffs seated in J-slots

4. Push the system inward until the lock levers click into place.
5. Pull the blue side release lock tabs forward or backward on both rails and slide the system into the rack until the system is in the rack.

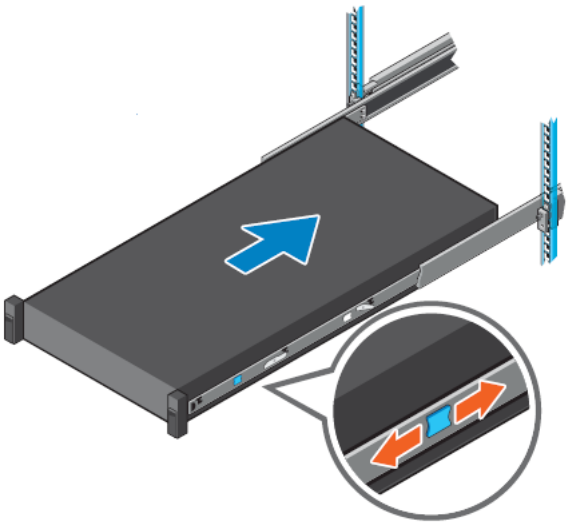

Figure 34. Slide system into the rack

Installing the system into the rack (option B: 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.

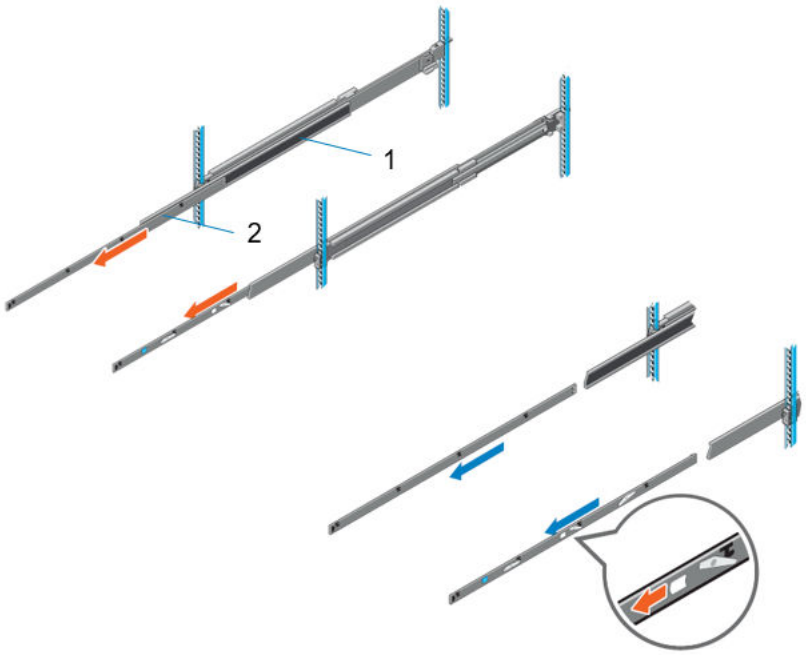

Figure 35. Pull out the intermediate rail

Table 19. Rail component label

Number	Component
1	Intermediate rail
2	Inner rail

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

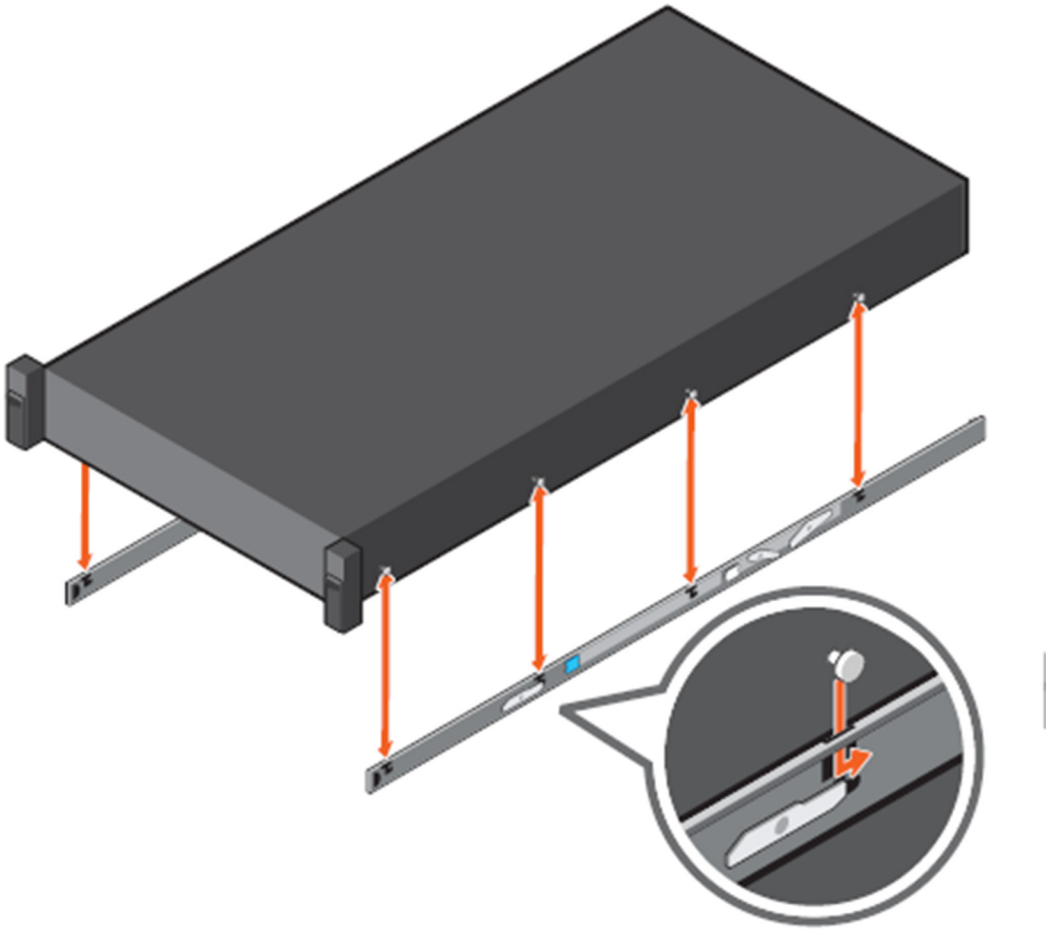

Figure 36. Attach the inner rails to the system

4. With the intermediate rails extended, install the system into the extended rails.

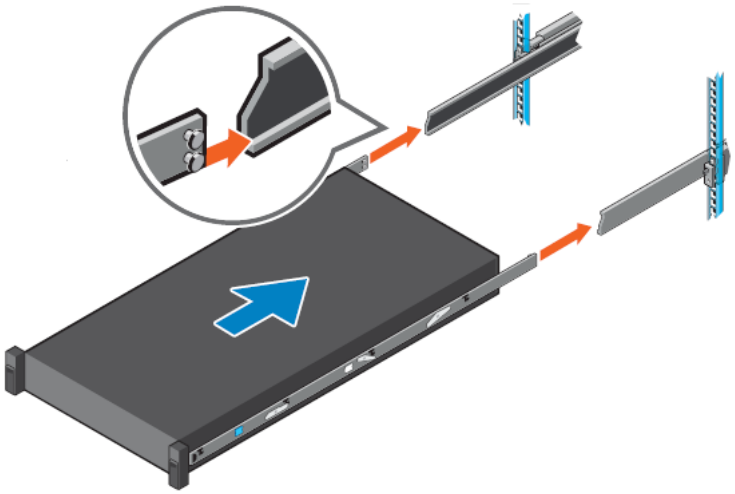

Figure 37. Install system into the extended rails

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

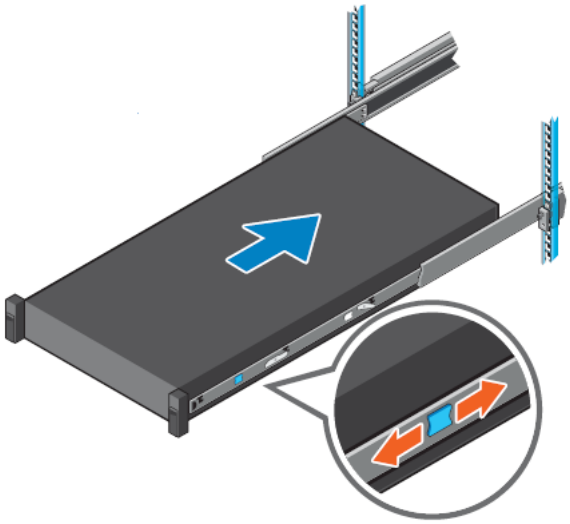

Figure 38. Slide system into the rack

11

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 Systems Management

Dell delivers management solutions that help IT administrators effectively deploy, update, monitor, and manage IT assets. Dell 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)

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 20. 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 21. 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 21. 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: Service and support

Topics:

Why attach service contracts

Dell PowerEdge servers include a standard hardware warranty that highlights our commitment to product quality by guaranteeing repair or replacement of defective components. While industry-leading, our warranties are limited to 1 or 3 years, depending on model, and do not cover software assistance. Call records show that failure rates for servers are roughly 1% and more commonly, customers seek Dell technical support for software-related issues like configuration guidance, troubleshooting, upgrade assistance, or performance tuning. Encourage customers to purchase ProSupport service contracts to supplement warranty coverage and ensure optimal support for both hardware and software. ProSupport provides a complete hardware guarantee beyond the original warranty period (up to 12 years: including seven years standard support and an additional five years of Post-Standard Support). Details of the ProSupport Suite and benefits are listed below.

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. It is an industry-leading, enterprise-class support that aligns with the criticality of your systems, the complexity of your environment, and the allocation of your IT resources.

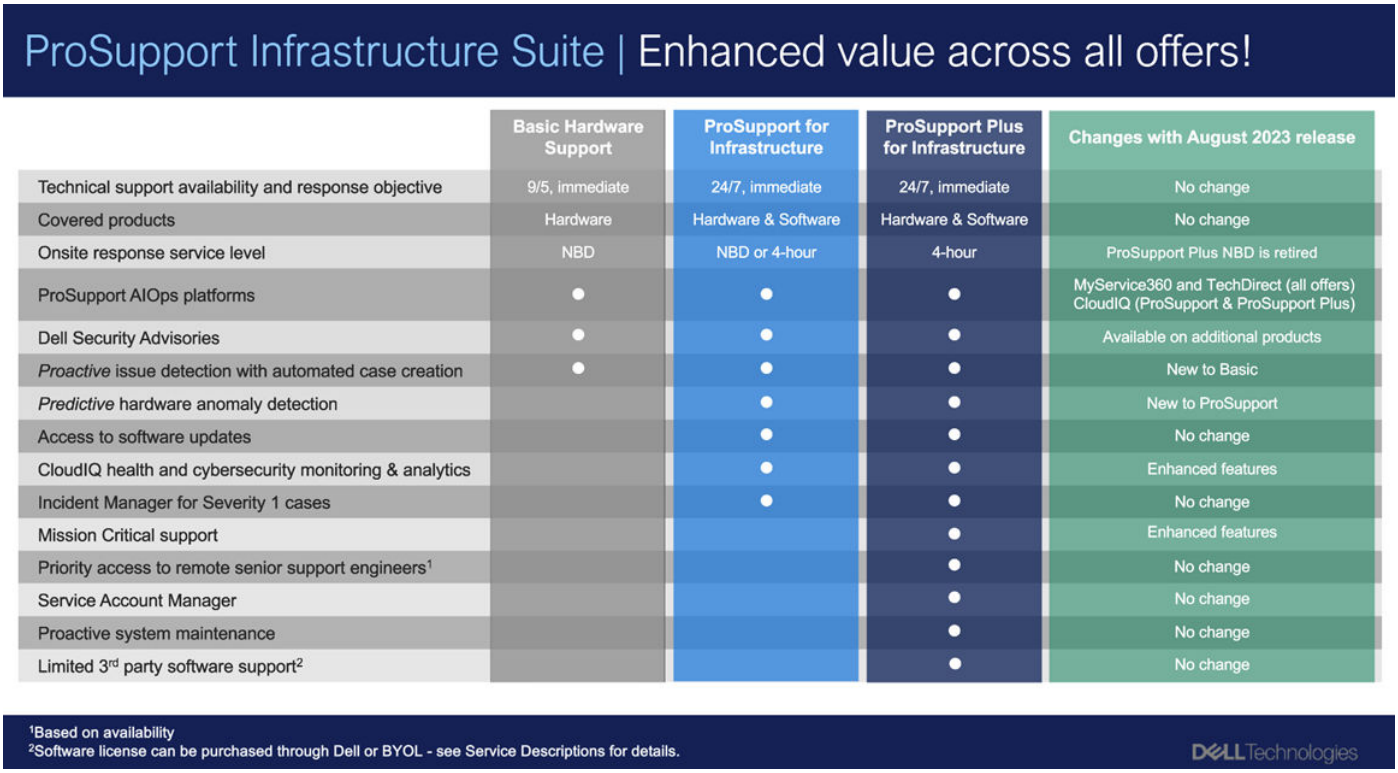

Figure 39. ProSupport Enterprise Suite

ProSupport Plus for Infrastructure

ProSupport Plus for Infrastructure is the ultimate solution for customers seeking preventative maintenance and optimal performance on their business-critical assets. The service 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 ProSupport Plus (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 do all that 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 semiannual 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. **Third-party software support:** Dell is a customer's single point of accountability for any eligible third-partysoftware that is 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 that they speak.

Basic Hardware Support

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

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), Keep Your Component (KYC), or Keep Your GPU:**

  Normally if a device fails under warranty, Dell replaces it using a one-for-one exchange process.KYHD/KYCC/KYGPU 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, or GPU 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 has it installed and operational within 4 hours for Severity 1 issues. Dell incurs penalties and fees if SLAs are not met.

Personalized Support and Supplemental Site-wide Expertise

- **Technical Account Manager:**

  Designated technology lead who monitors and manages the performance and configuration of specific technology sets.
- **Designated Remote Support:**

  Personalized support expert who manages all troubleshooting and resolution of IT assets.
- **Multivendor Support Service:**

  Support your third-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 and others).

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, so forth). 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 that are enabled by ProSupport AIOps tools (MyService360, TechDirect, and CloudIQ)
  - Flexible onsite support and parts options that fit their operational model
  - A tailored support plan and training for their operations staff
- **ProSupport One for CSPs (Cloud Serviced Providers)**

  ProSupport One for CSPs is a unique offer that is designed for a limited set of Dell accounts purchasing Gen AI computing solutions greater than 1,000 servers and $250M in sales. PS1 for CSPs improves the entire services experience combining support, deployment (rack integration), residency services, a designated support engineer and the LOIS parts locker as one holistic bundle. Special pricing has been determined to compete effectively against competitors and provide the best customer experience. PS1 for CSPs can only be sold with XE Servers and all networking platforms (Dell and NVIDIA). All other products would be eligible for the standard PS1DC not this special bundle offer. More details on PS1 for CSPs here.
- **Logistics Online Inventory Solution (LOIS)**

  Ideal for large organizations that have their own staff to support their data center. Dell offers a service that is 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 the 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.

ProDeploy Infrastructure Suite

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

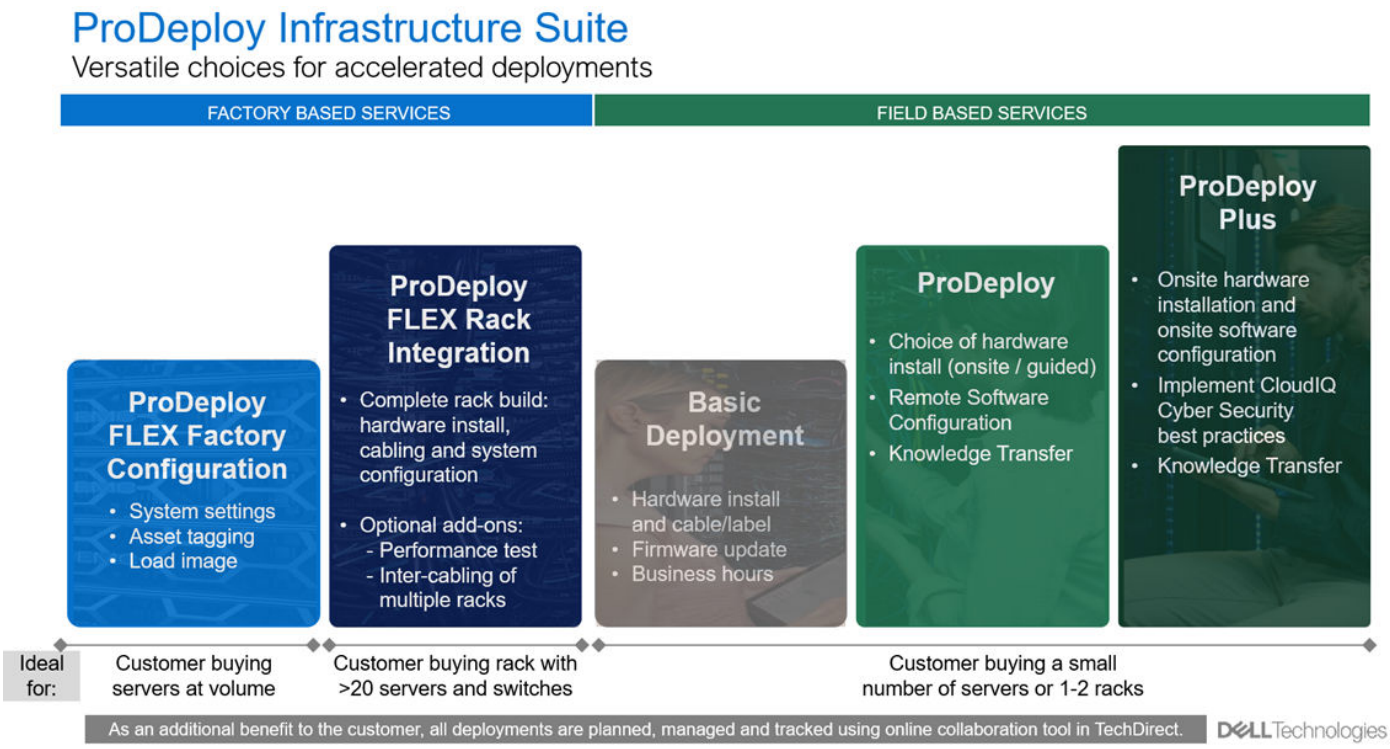

Figure 40. ProDeploy Infrastructure Suite

Factory-based Services

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

ProDeploy FLEX FactoryConfiguration

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 FLEX Rack Integration

Ideal for customers seeking to build out fully integrated racks prior to shipping. These rack builds include hardware install, cabling, and full system configuration. You can also add-on a factory stress test and optional on-site final rack configuration to complete the rack installation.

- STANDARD SKUs for Rack Integration is available in USA only and requires:
  - 20 or more devices (R and C series servers, VxRail, and all Dell or non-Dell switches.
  - 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 fewer than 20 servers
  - Any rack that includes Storage.

ProDeploy Flex | Modular deployment (built in factory, onsite or remote)

Pre -deployment	Single point of contact for project management	●
	Expanded end-to-end project management	Selectable
	Site readiness review and implementation planning	●
Deployment	Deployment service hours	24/7
	Hardware installation options [1]	Onsite, factory[2,5] or remote[3]
	System software installation and configuration options [1]	Onsite, factory[2,5] or remote[3]
	Multivendor networking deployment [4]	Onsite, factory[2,5] or remote[3]
	Onsite Deployment in remote locations	Selectable
	Onsite Deployment in challenging environments	Selectable
	Onsite Deployment with special site-based protocols or requirements	Selectable
	Install connectivity software based on Secure Connect Gateway technology	●
	Dell NativeEdge Orchestrator deployment	Selectable
	Configure 3rd party software applications and workloads [4]	Selectable
Post -deployment	Deployment verification, documentation, and knowledge transfer	●
	Configuration data transfer to Dell support	●
Online collaboration	Online collaborative environment - Planning, managing and tracking delivery process	●

[1] Hardware and Software delivery methods can be independently chosen; selecting Rack integration for software requires hardware Rack integration to also be selected.
[2] Factory Rack Integration for server and VxRail; includes associated Dell network switches; final onsite rack installation available.
[3] Remote hardware option includes project specific instructions, documentation and live expert guidance for hardware installation.
[4] Select 3rd party multivendor networking and software applications.
[5] Pair with Field Onsite Hardware service for final installation.

Figure 41. ProDeploy Flex modular services

Field-based services

- **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 that is needed to successfully perform demanding deployments in today's complex IT environments. The deployment starts with a site readiness review and implementation plan. Certified deployment experts perform the software configuration to include setup of leading operating systems and hypervisors. Dell will also configure PowerEdge software tools to include iDRAC and OpenManage system utilities and support AIOps platforms: MyService360, 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 that is mentioned in ProDeploy Plus except it does not include the added value, cybersecurity implementation and best practices.

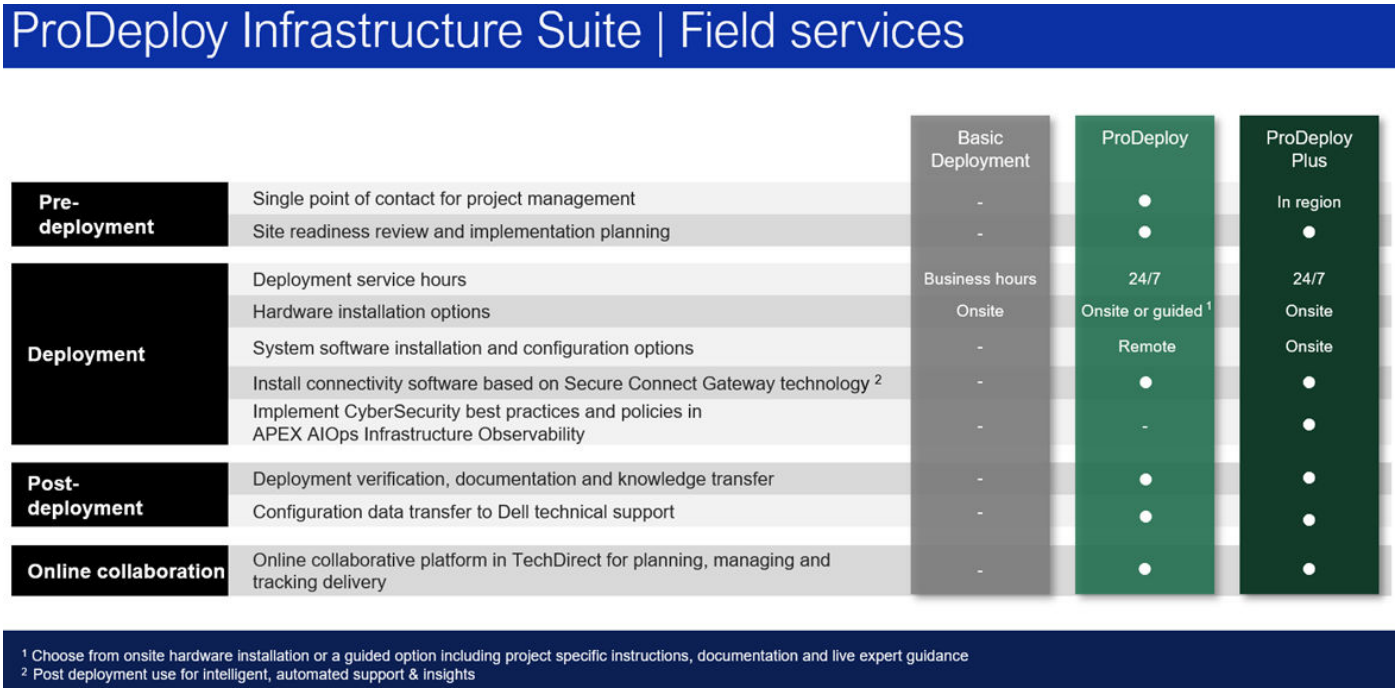

Figure 42. ProDeploy Infrastructure Suite - Field services

Supplemental Deployment Services

Additional ways to expand scope or deploy for unique scenarios.

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 that 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 covers 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 help 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
- Residency is available for project management needs, and many different technology skills sets such as: Server, storage, Gen AI, networking, security, multi-cloud, data mgmt., and modern workforce application residents

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 customer unique requirements. The Dell custom deployment team is staffed with solution architects who will 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 modular 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:

NOTE: Available as standard SKUs in US and Canada. Custom Service would be required for all other regions.

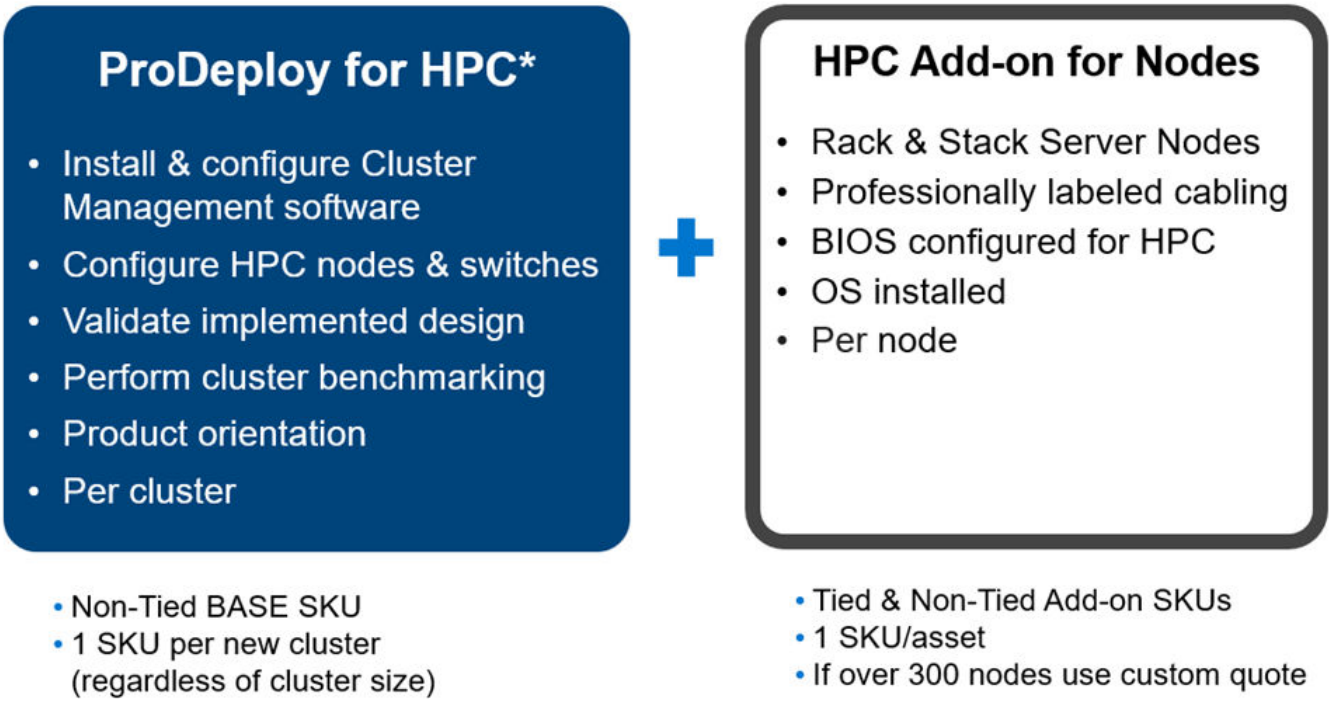

Figure 43. Standard deliverables of ProDeploy for HPC

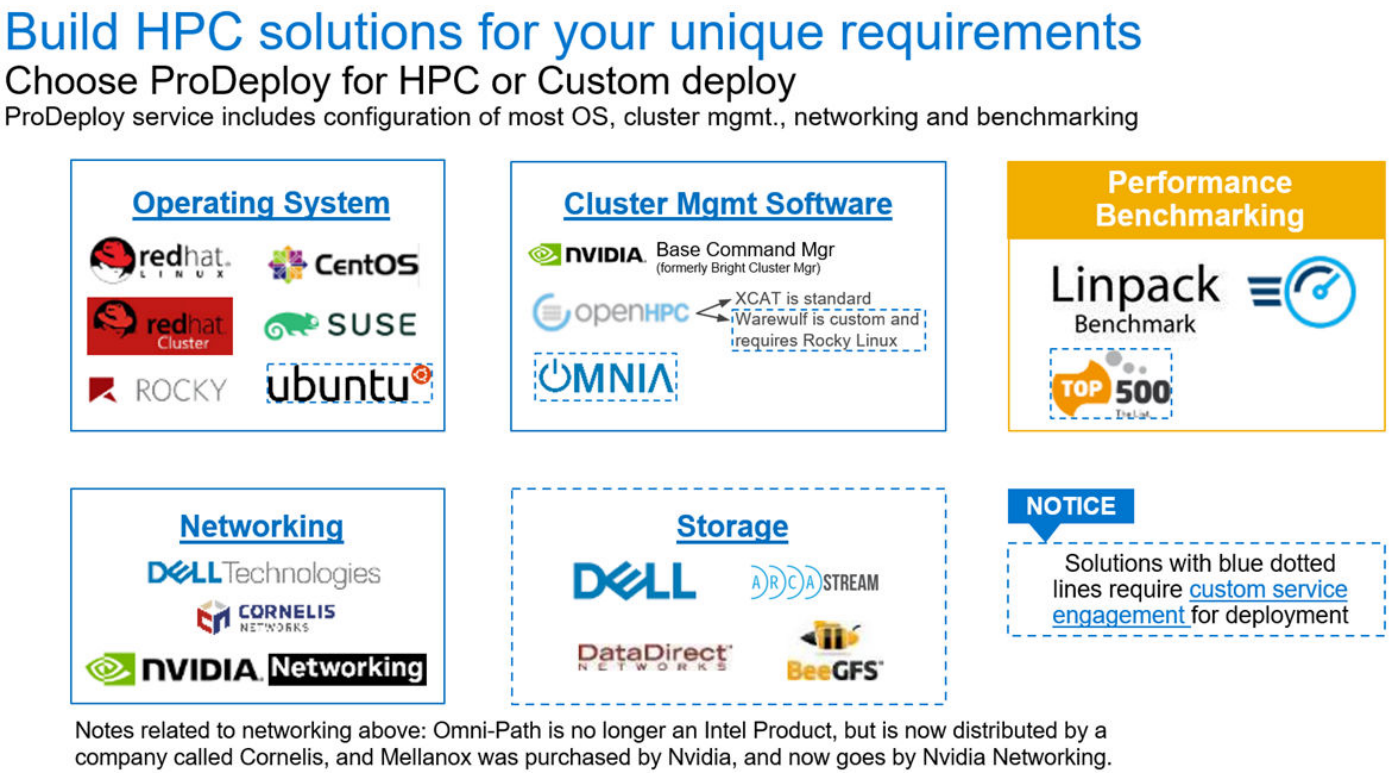

Figure 44. Visual view of HPC deployment options to include hardware and software

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).

Dell Technologies Consulting Services

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

Dell Managed Services

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

Figure 45. 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 & investigation
- Up to 40hrs per quarter of response and active remediation activities
- If the customer experiences a breach, we will provide up to 40hrs per year of Cyber incident response initiation
- Quarterly reviews with the customer to review the data

Dell Technologies Education Services

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Appendix A: Additional specifications

Topics:

Chassis dimension

The R660 has the following dimensions:

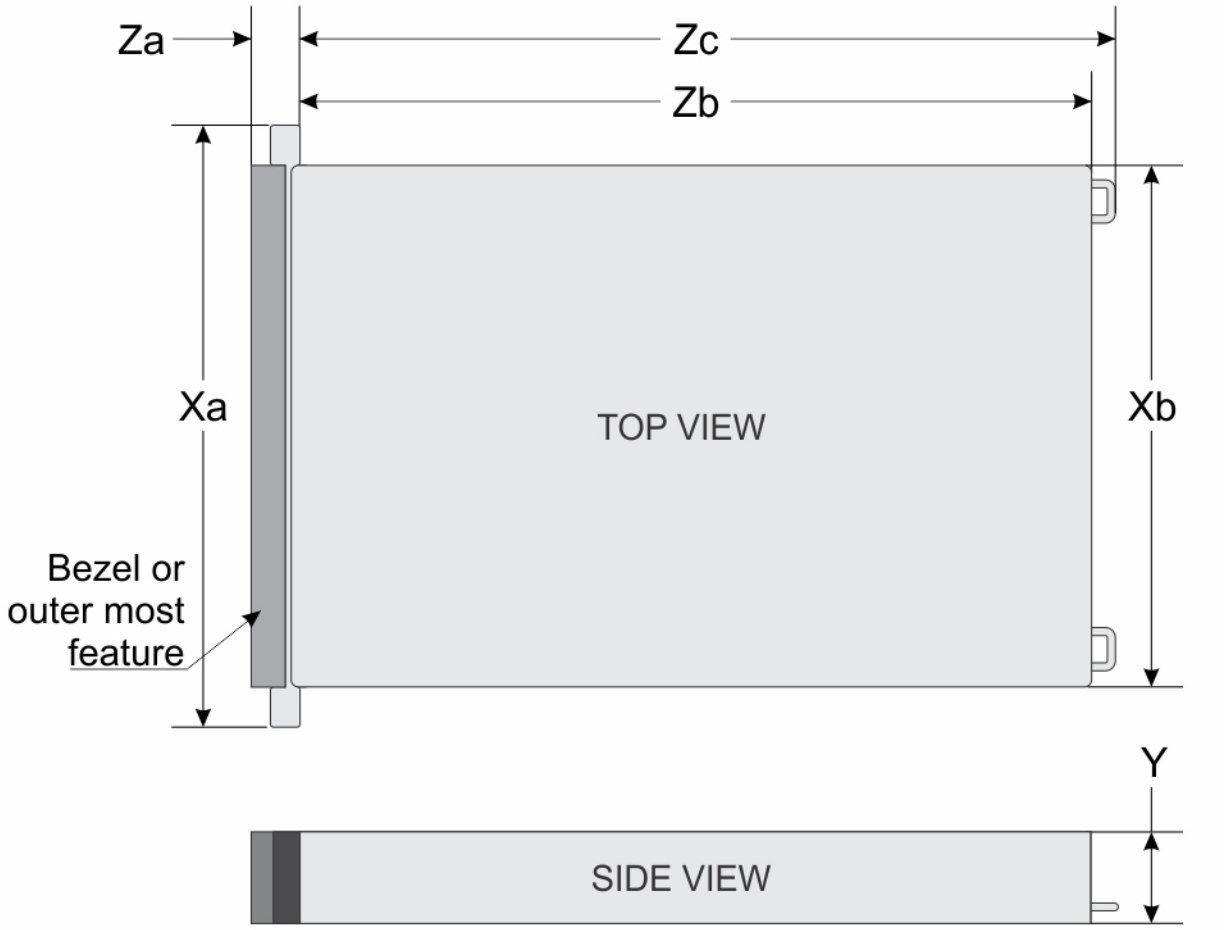

Figure 46. Chassis dimensions

Table 22. PowerEdge R660 system chassis dimension

Drives	Xa	Xb	Y	Za	Zb	Zc
8 x 2.5 inch drives / 10 x 2.5 inch drives	482.0 mm (18.97 inches)	434.0 mm (17.08 inches)	42.8 mm (1.68 inches)	35.84 mm (1.41 inches) With bezel 22 mm (0.86 inches) Without bezel	751.47 mm (17 inches) Ear to rear wall	787.04 mm (30 inches) Ear to PSU handle
0 drive	482.0 mm (18.97 inches)	434.0 mm (17.08 inches)	42.8 mm (1.68 inches)	35.84 mm (1.41 inches) With bezel 22 mm (0.86 inches) Without bezel	700.7 mm (27.5 inches) Ear to rear wall	736.27 mm (28 inches) Ear to rear wall
14 x EDSFF E3.S drives/ 16 x EDSFF E3.S drives	482.0 mm (18.97 inches)	434.0 mm (17.08 inches)	42.8 mm (1.68 inches)	35.84 mm (1.41 inches) With bezel 22 mm (0.86 inches) Without bezel	751.47 mm (17 inches) Ear to rear wall	787.04 mm (30 inches) Ear to PSU handle

NOTE: E3.S drives are supported post RTS.

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

Chassis weight

Table 23. PowerEdge R660 system weight

System configuration	Maximum weight (with all drives/SSDs)
A server with fully populated drives	22.51 kg (49.62 lbs)
A server without drives and PSU installed	18.5 kg (40.78 lbs)

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 24. NIC port specification for the system

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

NOTE: The system allows either LOM card or an OCP card or both to be installed in the system.

NOTE: On the system board, the supported OCP PCIe width is x8; when x16 PCIe width is installed, it is downgraded to x8.

Video specifications

The platform supports the following video resolution and refresh rates:

Table 25. Video specifications for R660

Resolution	Refresh Rate	Freq.	Pixel Clock	DVO DisplayPort
1024 x 768	60 Hz	48.4 kHz	65.0 MHz	Yes*
1280 x 800	60 Hz	49.7 kHz	83.5 MHz	Yes*
1280 x 1024	60 Hz	64.0 kHz	108.0 MHz	Yes*
1360 x 768	60 Hz	47.71 kHz	85.5 MHz	Yes*
1440 x 900	60 Hz	55.9 kHz	106.5 MHz	Yes*
1600 x 900	60 Hz	55.54 kHz	97.75 MHz	Yes*
1600 x 1200	60 Hz	75.0 kHz	162.0 MHz	Yes*
1680 x 1050	60 Hz	64.7 kHz	119.0 MHz	Yes*
1920 x 1080	60 Hz (RB)	67.158 kHz	173.0 MHz	No
1920 x 1200	60 Hz (RB)	74.556 kHz	193.25 MHz	No

*DVO - DP is for investigation only, dependent on Nuvoton DVO capabilities to support up to 165MHz. Rear Panel Performance is TBD subject to final board design and losses to rear VGA connector.

*(RB) - Reduced Blanking for Digital Displays requiring less blank time. This was introduced for Signal Integrity improvements by reducing Pixel Clock rates for VGA- Analog input devices.

USB ports specifications

Table 26. PowerEdge R660 USB specifications

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

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

Front USB 2.0 port only supports output current up to 0.5A and can't support high power consumption devices such as CD-ROM. The bottom port of the rear USB connector can support USB3.0 to supply output current up to 0.9A.

Figure 47. R660 Front USB

Figure 48. R660 Rear USB

PSU rating

Table 27. PSUs Highline and Lowline ratings

Features	700 W Titanium	800 W Platinum	1100 W Titanium	1100 W -48VDC	1400 W Platinum	1800 W Platinum	800 W -48VDC	1400 W Titanium
Peak Power (Highline/-72 VDC)	1190 W	1360 W	1870 W	1870 W	2380 W	3060 W	1360 W	2380 W
Highline /-72 VDC	700 W	800 W	1100 W	1100 W	1400 W	1800 W	800 W	1400 W
Peak Power (Lowline/-40 VDC)	N/A	1360 W	1785 W	1785 W	1785 W	N/A	1360 W	1785 W
Lowline /-40 VDC	N/A	800 W	1050 W	1100 W	1050 W	N/A	800 W	1050 W
Highline 240 VDC	700 W	800 W	1100 W	N/A	1400 W	1800 W	N/A	1400 W
DC -48- -60 V	N/A	N/A	N/A	1100 W	N/A	N/A	800 W	N/A

The PowerEdge R660 supports up to two AC or DC 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 the event that the PSU wattages don't match, the larger of the two PSU's is enabled. Also, there is a PSU mismatch warning displayed in 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 will be flagged as unmatched in iDRAC and the second PSU will not be enabled.

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

Table 28. PSU Efficiency Levels

Efficiency Targets by Load						
Form factor	**Output**	**Class**	**10%**	**20%**	**50%**	**100%**
Redundant 60mm	700 W AC	Titanium	90.00%	94.00%	96.00%	91.50%
	800 W AC	Platinum	89.00%	93.00%	94.00%	91.50%
	1100 W AC	Titanium	90.00%	94.00%	96.00%	91.50%
	1100 W -48 VDC	N/A	85.00%	90.00%	92.00%	90.00%
	1400 W AC	Platinum	89.00%	93.00%	94.00%	91.50%
	1800 W AC	Titanium	90.00%	94.00%	96.00%	94.00%
	800 W -48 VDC	N/A	85.00%	90.00%	92.00%	90.00%
	1400 W AC	Titanium	90.00%	94.00%	96.00%	91.50%

Environmental Specifications

See the PowerEdge R660 Technical Specifications on PowerEdge manuals for detailed environmental specifications.

The table below details the environmental specifications for the platform. For additional information about environmental measurements for specific system configurations, see Product Safety, and Environmental datasheets.

An important feature of having a broad menu of different categories is to allow the same platform model to have different operational ranges depending on the MRD defined.

A list of range categories for different configurations shall be identified by thermal team as early in the project as possible. Post release, it may be found in the Dell PowerEdge R660 Installation and Service Manual.

Table 29. Operational climatic range categories

Category A2	Allowable Operation
Temperature Ranges (For Altitude <900 meters or 2953 feet)	10 to 35°C (50 to 95°F) with no direct sunlight on the platform
Humidity Percent Ranges (Non-Condensing at all times)	8%RH with -12°C minimum dew point to 80%RH with 21°C (69.8°F) maximum dew point
Operational Altitude De-Rating	Maximum temperature is reduced by 1°C/300 meters (1.8°F/984 feet) above 900 meters (2,953 feet)

Table 29. Operational climatic range categories

Category A3	Allowable Operation
Temperature Ranges (For Altitude <900 meters or 2953 feet)	5 to 40°C (41 to 104°F) with no direct sunlight on the platform
Humidity Percent Ranges (Non-Condensing at all times)	8%RH with -12°C minimum dew point to 85%RH with 24°C (75.2°F) maximum dew point
Operational Altitude De-Rating	Maximum temperature is reduced by 1°C/175 meters (1.8°F/574 feet) above 900 meters (2,953 feet)

Table 29. Operational climatic range categories

Category A4	Allowable Operation
Temperature Ranges (For Altitude <900 meters or 2953 feet)	5 to 40°C (41 to 104°F) with no direct sunlight on the platform
Humidity Percent Ranges (Non-Condensing at all times)	8%RH with -12°C minimum dew point to 85%RH with 24°C (75.2°F) maximum dew point
Operational Altitude De-Rating	Maximum temperature is reduced by 1°C/175 meters (1.8°F/574 feet) above 900 meters (2,953 feet)

The table below shows the requirements shared across all environmental categories

Table 30. Shared requirements

Allowable Operation	
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
Non-Operational Temperature Limits	-40 to 65°C (-40 to 149°F)
Non-Operational Humidity Limits (Non-Condensing at all times)	5% to 95%RH with 27°C (80.6°F) maximum dew point.
Maximum Non-Operational Altitude	12,000 meters (39,370 feet)
Maximum Operational Altitude	3,048 meters (10,000 feet)

Table 31. Maximum vibration specifications

Maximum vibration	Specifications
Operating	0.26Grms at 5Hz to 350Hz for 10min (all x, y, and z axes)
Storage	1.88Grms at 10Hz to 500Hz for 15min (all six sides tested)

Table 32. Maximum shock specifications

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

Thermal air restrictions

ASHRAE A2 environment

- CPU > 300W are not supported in 10 x 2.5 inch storage configuration.
- CPU > 270W are not supported in 10 x 2.5 inch storage with rear drive configuration.
- Maximum 30°C (86°F) for CPU > 270 W in10 x 2.5 inch storage configuration..
- Maximum 30°C (86°F) for CPU > 250 W with rear drive in 10 x 2.5 inch storage configuration.
- Maximum 30°C (86°F) for CPU > 250 W with 256G RDIMM in 10 x 2.5 inch storage configuration.
- Maximum 30°C (86°F) for CPU > 225 W with 256G RDIMM in 10 x 2.5 rear drive configuration.
- CPU > 350W are not supported in no BP chassis storage configuration.
- Maximum 30°C (86°F) for CPU > 300W in no BP chassis storage configuration.
- CPU > 350W are not supported in 8 x 2.5 inch storage configuration.
- Maximum 30°C (86°F) for CPU > 300 W in 8 x 2.5 inch storage configuration.

ASHRAE A3 environment

- CPU > 185W are not supported in 10 x 2.5 inch storage configuration.
- CPU > 205W are not supported in 8 x 2.5 inch and no BP chassis storage configuration.
- 128 GB or greater capacity RDIMMs are not supported.
- 2.5 inch NVMe storage are not supported in a 8 x 2.5 inch and 10 x 2.5 inch storage configuration.
- Rear drives are not supported.
- Non Dell qualified peripheral cards and/or peripheral cards greater than 25 W are not supported.
- GPU is not supported.
- 85°C (185°F) active optics cable is required.
- Two power supplies are required. System performance may be reduced in the event of a PSU failure.

ASHRAE A4 environment

- CPU > 125W are not supported in 10 x 2.5 inch storage configuration.
- 128 GB or greater capacity RDIMMs are not supported.
- Rear drives are not supported.
- 2.5 inch NVMe storage are not supported.
- BOSS N1 is not supported.
- GPU is not supported.
- Two power supplies are required. System performance may be reduced in the event of a PSU failure.
- Non Dell qualified peripheral cards and/or peripheral cards greater than 25 W are not supported.
- OCP 3.0 card is not supported.
- 85°C (185°F) active optics cable is required.

ASHRAE A3 environment for liquid cooling configuration

- 128 GB or greater capacity RDIMMs are not supported.
- Rear drives are not supported.
- GPU is not supported.
- Two power supplies are required. System performance may be reduced in the event of a PSU failure.
- Non Dell qualified peripheral cards and/or peripheral cards greater than 25 W are not supported.
- 85°C (185°F) active optics cable is required.

ASHRAE A4 environment for liquid cooling configuration

- 128 GB or greater capacity RDIMMs are not supported.
- Rear drives are not supported.
- 2.5 inch NVMe storage are not supported.
- BOSS N1 is not supported.
- GPU is not supported.
- Two power supplies are required. System performance may be reduced in the event of a PSU failure.
- Non Dell qualified peripheral cards and/or peripheral cards greater than 25 W are not supported.
- OCP 3.0 card is not supported.
- 85°C (185°F) active optics cable is required.

ASHRAE A2 environment for EDSFF

- CPU > 300W are not supported .
- CPU > 270W with rear drive are not supported.
- Maximum 30°C (86°F) for CPU > 270 W storage configuration..
- Maximum 30°C (86°F) for CPU > 250 W with rear drive storage configuration.
- Maximum 30°C (86°F) for CPU > 185 W with 256G RDIMM .
- Maximum 30°C (86°F) for CPU > 150 W with 256G RDIMM in 2.5 rear drive configuration.
- CPU > 250 W are not supported in storage configuration.
- CPU > 225 W with rear drive are not supported .

ASHRAE A3 environment for EDSFF

- CPU > 205W are not supported.
- 128 GB or greater capacity RDIMMs are not supported.
- Rear drives are not supported.
- Non Dell qualified peripheral cards and/or peripheral cards greater than 25 W are not supported.
- GPU is not supported.
- 85°C (185°F) active optics cable is required.
- Two power supplies are required. System performance may be reduced in the event of a PSU failure.
- CPU > 150 W are not supported in storage configuration.
- 128 GB or greater capacity RDIMMs are not supported.

ASHRAE A4 environment for EDSFF

- CPU > 150 W are not supported in storage configuration.
- CPU > 125W are not supported in storage configuration.
- 128 GB or greater capacity RDIMMs are not supported.
- Rear drives are not supported.
- BOSS N1 is not supported.
- GPU is not supported.
- Two power supplies are required. System performance may be reduced in the event of a PSU failure.
- Non Dell qualified peripheral cards and/or peripheral cards greater than 25 W are not supported.

- OCP 3.0 card is not supported.
- 85°C (185°F) active optics cable is required.

Thermal restriction matrix

Table 33. Processor and heat sink matrix

Heat sink	Processor TDP
STD HSK	≤ 185 W
L-type HSK	> 185 W

Table 34. Label reference

Label	Description
STD	Standard
HPR (Gold)	High performance (gold grade)
HSK	Heat sink
LP	Low profile
FH	Full height
DLC	Direct Liquid Cooling

Table 35. Thermal restriction matrix for air cooled configuration

Configuration		No Backplane	8 x 2.5-inch NVMe / SAS/ SATA	10 x 2.5-inch SAS/ SATA	10 x 2.5-inch SAS/ SATA	10 x 2.5-inch NVMe	10 x 2.5-inch NVMe	16 x EDSFF E3.S	14 x EDSFF E3.S	Ambient temperature
Rear storage		No Rear Drives	No Rear Drives	No Rear Drives	2 x 2.5-inch	No Rear Drives	2 x 2.5-inch	No Rear Drives	2 x EDSFF E3.S	
CPU TDP/ cTDP	T-Case max center (°C)	Fan								
125 W	79 (174.2°F)	STD fan	STD fan	STD fan	HPR Gold fan	STD fan	HPR Gold fan	HPR Gold fan	HPR Gold fan	35°C (95°F)
150 W	78 (172.4°F)/79 (174.2°F)	STD fan	STD fan	STD fan	HPR Gold fan	STD fan	HPR Gold fan	HPR Gold fan	HPR Gold fan	35°C (95°F)
165 W	82 (179.6°F)/84 (183.2°F)	STD fan	STD fan	STD fan	HPR Gold fan	STD fan	HPR Gold fan	HPR Gold fan	HPR Gold fan	35°C (95°F)
185 W	80 (176°F)/81 (177.8°F)/85 (185°F)	STD fan	STD fan	STD fan	HPR Gold fan	STD fan	HPR Gold fan	HPR Gold fan	HPR Gold fan	35°C (95°F)

Table 35. Thermal restriction matrix for air cooled configuration (continued)

Configuration		No Backplane	8 x 2.5-inch NVMe / SAS/ SATA	10 x 2.5-inch SAS/ SATA	10 x 2.5-inch SAS/ SATA	10 x 2.5-inch NVMe	10 x 2.5-inch NVMe	16 x EDSFF E3.S	14 x EDSFF E3.S	Ambient temperature
Rear storage		No Rear Drives	No Rear Drives	No Rear Drives	2 x 2.5-inch	No Rear Drives	2 x 2.5-inch	No Rear Drives	2 x EDSFF E3.S	
CPU TDP/ cTDP	T-Case max center (°C)	Fan								
195 W	64 (147.2°F)	HPR Gold fan	HPR Gold fan	HPR Gold fan	HPR Gold fan	HPR Gold fan	HPR Gold fan	HPR Gold fan	HPR Gold fan	35°C (95°F)
205 W	76 (168.8°F)/84 (183.2°F)/85 (185°F)	HPR Gold fan	HPR Gold fan	HPR Gold fan	HPR Gold fan	HPR Gold fan	HPR Gold fan	HPR Gold fan	HPR Gold fan	35°C (95°F)
225 W	79 (174.2°F)	HPR Gold fan	HPR Gold fan	HPR Gold fan	HPR Gold fan	HPR Gold fan	HPR Gold fan	HPR Gold fan	HPR Gold fan	35°C (95°F)
250 W	76 (172.4°F)	HPR Gold fan	HPR Gold fan	HPR Gold fan	HPR Gold fan	HPR Gold fan	HPR Gold fan	HPR Gold fan	HPR Gold fan	35°C (95°F)
270 W	75 (167°F)	HPR Gold fan	HPR Gold fan	HPR Gold fan	HPR Gold fan*	HPR Gold fan	HPR Gold fan*	HPR Gold fan	HPR Gold fan*	35°C (95°F)
270 W	71 (159.8°F)	HPR Gold fan	HPR Gold fan	HPR Gold fan	HPR Gold fan*	HPR Gold fan	HPR Gold fan*	HPR Gold fan	HPR Gold fan*	35°C (95°F)
300 W	81 (177.8°F)	HPR Gold fan	HPR Gold fan	HPR Gold fan*	Required DLC	HPR Gold fan*	Required DLC	HPR Gold fan*	Required DLC	35°C (95°F)
300 W	76 (172.4°F)	HPR Gold fan	HPR Gold fan	HPR Gold fan*	Required DLC	HPR Gold fan*	Required DLC	HPR Gold fan*	Required DLC	35°C (95°F)
300 W	77 (170.6°F)	HPR Gold fan	HPR Gold fan	HPR Gold fan*	Required DLC	HPR Gold fan*	Required DLC	HPR Gold fan*	Required DLC	35°C (95°F)
300 W	75 (172.4°F)	HPR Gold fan	HPR Gold fan	HPR Gold fan*	Required DLC	HPR Gold fan*	Required DLC	HPR Gold fan*	Required DLC	35°C (95°F)
300 W	76 (172.4°F)	HPR Gold fan	HPR Gold fan	HPR Gold fan*	Required DLC	HPR Gold fan*	Required DLC	HPR Gold fan*	Required DLC	35°C (95°F)
350 W	79 (174.2°F)	HPR Gold fan*	HPR Gold fan*	Required DLC	Required DLC	Required DLC	Required DLC	Required DLC	Required DLC	35°C (95°F)
350 W	57 (134.6°F)	HPR Gold fan*	HPR Gold fan*	Required DLC	Required DLC	Required DLC	Required DLC	Required DLC	Required DLC	35°C (95°F)

Table 35. Thermal restriction matrix for air cooled configuration (continued)

Configuration		No Backplane	8 x 2.5-inch NVMe / SAS/ SATA	10 x 2.5-inch SAS/ SATA	10 x 2.5-inch SAS/ SATA	10 x 2.5-inch NVMe	10 x 2.5-inch NVMe	16 x EDSFF E3.S	14 x EDSFF E3.S	Ambient temperature
Rear storage		No Rear Drives	No Rear Drives	No Rear Drives	2 x 2.5-inch	No Rear Drives	2 x 2.5-inch	No Rear Drives	2 x EDSFF E3.S	
CPU TDP/ cTDP	T-Case max center (°C)	Fan								
350 W	66 (150.8°F)	Required DLC	Required DLC	Required DLC	Required DLC	Required DLC	Required DLC	Required DLC	Required DLC	35°C (95°F)
350 W	77/79 (170.6/174.2°F)	HPR Gold fan*	HPR Gold fan*	Required DLC	Required DLC	Required DLC	Required DLC	Required DLC	Required DLC	35°C (95°F)
350 W	77/77 (170.6/170.6°F)	HPR Gold fan*	HPR Gold fan*	Required DLC	Required DLC	Required DLC	Required DLC	Required DLC	Required DLC	35°C (95°F)
350 W	64/77 (147.2/170.6°F)	Required DLC	Required DLC	Required DLC	Required DLC	Required DLC	Required DLC	Required DLC	Required DLC	35°C (95°F)
350 W	64/76 (147.2/168.8°F)	Required DLC	Required DLC	Required DLC	Required DLC	Required DLC	Required DLC	Required DLC	Required DLC	35°C (95°F)

NOTE:

- *Supported ambient temperature is 30°C (86°F) .
- Required DLC requires <30°C (86°F)

Thermal restriction matrix for 5th Gen Intel® Xeon® Scalable Processors

Table 36. Thermal restriction matrix for air cooled configuration

Front Configuration			No BP	SAS/ SATA 8x2.5"(Smart Flow) NVMe/	10x2.5" SAS/SATA			10x2.5" NVMe				16 x EDSFF E3.S	14 x EDSFF E3.S
-Rear Configuration			3xLP/ 2xFH	2xLP/ 3xLP/ 2xFH	3xLP/ 2xFH	Rear 2x2.5"SAS/ SATA	3xLP	3xLP/ 2xFH	Rear 2x2.5 "NVMe	Rear 2xE3	3xLP/ 2xFH	3xLP/ 2xFH	2 x EDSFF E3.S
			Any (RC0, RC1, RC2, RC3)	Any	Non-Rear 2x2.5" (RC0, RC1, RC2, RC3)	Rear 2x2.5" (RC7)	Any (RC1)	Non-Rear 2x2.5" (RC0, RC1, RC2, RC3)	Rear 2x2.5 " (RC7)	Rear E3 (RC9)	Any (RC0, RC1,RC2,RC3.RC10)	Non-Rear 2x2.5" (RC0, RC0,RC1,RC2,RC3,	Rear E3 (RC9)
TDP	Core Count	Tcase Spec	DIMM<=128 GB							DIMM<=128 GB Tcase Spec			
125 W[1]	8	84	35°C	35°C	35°C	35°C	35°C	35°C	35°C	35°C	35°C	35°C	35°C
150 W[1]	12	84	35°C	35°C	35°C	35°C	35°C	35°C	35°C	35°C	35°C	35°C	35°C
150 W[1]	16	79	35°C	35°C	35°C	35°C	35°C	35°C	35°C	35°C	35°C	35°C	35°C
185 W[1]	28	89	35°C	35°C	35°C	35°C	35°C	35°C	35°C	35°C	35°C	35°C	35°C
195 W[1]	8	64	35°C	35°C	35°C	35°C	35°C	35°C	35°C	35°C	35°C	35°C	35°C
195 W[1]	16	82	35°C	35°C	35°C	35°C	35°C	35°C	35°C	35°C	35°C	35°C	35°C
250 W[1]	24	83	35°C	35°C	35°C	35°C	35°C	35°C	35°C	35°C	35°C	35°C	35°C
250 W[1]	32	83	35°C	35°C	35°C	35°C	35°C	35°C	35°C	35°C	35°C	35°C	35°C
250 W[1]	32	83	35°C	35°C	35°C	35°C	35°C	35°C	35°C	35°C	35°C	35°C	35°C
300 W [2]	32	81	35°C	35°C	30°C	N/A	N/A	30°C	N/A	N/A	N/A	30°C	N/A
270 W [2]	60	74	35°C	35°C	35°C	30°C	30°C	35°C	30°C	30°C	30°C	35°C	30°C
300 W [2]	48	78	35°C	35°C	30°C	N/A	N/A	30°C	N/A	N/A	N/A	30°C	N/A
350 W [2]	48	81	30°C	30°C	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
350 W [2]	60	81	30°C	30°C	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
350 W [2]	64	81	30°C	30°C	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Table 37. Thermal restriction for memory

Configuration	No Backplane	8 x 2.5-inch NVMe / SAS/ SATA	10x 2.5-inch SAS/SATA	10x 2.5-inch SAS/ SATA	10 x 2.5-inch NVMe	10 x 2.5-inch NVMe	16 x EDSFF E3.S	14 x EDSFF E3.S
Rear storage	No Rear Drives	No Rear Drives	No Rear Drives	2 x 2.5-inch	No Rear Drives	2 x 2.5-inch	No Rear Drives	2 x EDSFF E3.S
256 GB RDIMM	35°C (95°F)	35°C (95°F)	30°C (86°F)	30°C (86°F)	30°C (86°F)	30°C (86°F)	35°C (95°F)	35°C (95°F)

Table 37. Thermal restriction for memory

Configuration	No Backplane	8 x 2.5-inch NVMe / SAS/ SATA	10x 2.5-inch SAS/SATA	10x 2.5-inch SAS/ SATA	10 x 2.5-inch NVMe	10 x 2.5-inch NVMe	16 x EDSFF E3.S	14 x EDSFF E3.S
Rear storage	**No Rear Drives**	**No Rear Drives**	**No Rear Drives**	**2 x 2.5-inch**	**No Rear Drives**	**2 x 2.5-inch**	**No Rear Drives**	**2 x EDSFF E3.S**
			NOTE: 30°C (86°F) for CPU>250 W (CPU<=250W could support 35°C (95°F))	**NOTE:** 30°C (86°F) for CPU>225W (CPU<=225W could support 35°C (95°F))	**NOTE:** 30°C (86°F) for CPU>250W (CPU<=250W could support 35°C (95°F))	**NOTE:** 30°C (86°F) for CPU>225W (CPU<=225W could support 35°C (95°F))		

NOTE:

- Install all fan modules for single CPU configuration.

  NOTE: Not required for 8 x 2.5-inch NVMe /SAS/SATA configuration.

- All air-cooling configurations require a CPU shroud.
- Install PCH shroud for no riser configuration.
- Install Rear drive shroud for air-cooling with 2 x 2.5-inch rear drive configuration.
- Install A2 blank on R1p riser for FH riser configuration with A2 GPU.
- Install DIMM blanks in all empty DIMM slots for STD CPU heat sink or CPU TDP >=250W.

Table 38. Thermal restriction for L4 GPU

Configuration	No Backplane	8 x 2.5-inch NVMe / SAS/ SATA	10x 2.5-inch SAS/SATA	10x 2.5-inch SAS/ SATA	10 x 2.5-inch NVMe	10 x 2.5-inch NVMe	10 x 2.5-inch NVMe	16 x EDSFF E3.S	14 x EDSFF E3.S
Rear storage	**No Rear Drives**	**No Rear Drives**	**No Rear Drives**	**2 x 2.5-inch**	**No Rear Drives**	**2 x 2.5-inch**	**2 x EDSFF E3.S**	**No Rear Drives**	**2 x EDSFF E3.S**
L4 GPU	CPU>270 W not supported	CPU>270 W not supported	CPU>225 W not supported	CPU>205 W not supported	CPU>225 W not supported	CPU>205 W not supported	CPU>225 W not supported	CPU>225 W not supported	CPU>205 W not supported

NOTE:

- Installation of the GPU blank is necessary for the FH riser configuration (RC3) with an LP GPU card on R1P in order to stop the system's airflow.
- No additional thermal restriction to support in R1p+R4p (2x FHs) and R2q riser.
- For 3x LPs configuration, no additional thermal restriction to support 2x L4 GPUs in slot 1 and slot 2, and non-GPU card in slot 3.
- For 3x LPs configuration with 3x L4 GPU cards, it requires additional CPU SKUs to support restriction.
- For No BP and 8 x 2.5 inch configurations, CPU TDP higher than 270 W are not supported with 3x L4 GPUs.
- For 10x2.5 inch and 16 x EDSFF E3.S configurations, CPU TDP higher than 225 W are not supported with 3x L4 GPUs.

- For 10x2.5 inch and 16 x EDSFF E3.S configurations with rear drive configurations, CPU TDP higher than 205W are not supported.

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Appendix A. Standards compliance

The system conforms to the following industry standards.

Table 39. Industry standard documents

Standard	URL for information and specifications
ACPIAdvance Configuration and Power Interface Specification, v6.4	Uefi specifications and tools
Ethernet IEEE Std 802.3-2022	ieee standards
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	pmbus specification and revisions
SAS Serial Attached SCSI, 3 (SAS-3) (T10/INCITS 519)	SCSI storage interfaces information
SATA Serial ATA Rev. 3.3	sata-io.org page
SMBIOS System Management BIOS Reference Specification, v3.3.0	BIOS reference specification page
TPM Trusted Platform Module Specification, v1.2 and v2.0	trustedcomputinggroup org page
UEFI Unified Extensible Firmware Interface Specification, v2.7	UEFIF 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. USB document library
NVMe Express Base Specification. Revision 2.0c	NVME 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 40. 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
QR code for system resources	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

A

Dell PowerEdge R660 NEBS level 3

As IT and Operational Technologies converge, communications service providers are evaluating their infrastructures to meet the demands of digital transformation. Dell is uniquely positioned to assist both service providers and network equipment providers (NEPs) in succeeding. By working closely with customers to fully understand their needs, Dell offers global partnership and collaboration.

- Network Equipment-Building System (NEBS) Level 3 and ETSI validated
- Commercial off the shelf hardware
- Comprehensive, global availability, service, and support

Telecom server solution

NEBS compliance is an important requirement in your environment. Dell Solutions, a global leader in enterprise platforms, provides NEBS Level-3 (GR-63 and GR-1089) and ETSI compliant PowerEdge Servers with Intel® Xeon® Processors, ensuring top stability and global availability. Rack-mount systems are designed to deliver high performance, maximum scalability, and safe and reliable service.

Dell PowerEdge Servers offer:

1. Open standard systems:
   - Improved compatibility based on industry-leading Dell products
   - Rapidly scalable and expandable
2. Industry standards Solutions
   - Validated to NEBS Level 3 standards, VZ.TPR.9205, and various ETSI standards
   - Enabled for operation in warmer environments than traditional data centers – Designed for extreme conditions such as high humidity, earthquakes, and dust
3. Global regulatory support and availability

Following are the additional NEBS validated technology devices available:

- Intel i350 Quad Port 1 GbE BASE-T
- OCP NIC 3.0 [540-BCOE]
- Intel Ethernet i350 Quad Port 1 GbE BASE-T Adapter, PCIe Full Height, V2, FIRMWARE RESTRICTIONS APPLY [540-BDIW]
- Intel E810-XXVDA4 Quad Port 10/25GbE SFP28 Adapter, PCIe Full Height [540-BDDR]

NOTE: We cannot include the Serial Com card as it has not undergone testing on any platforms. Therefore, we cannot confirm it as an additional card.

Service and support

Bring game-changing innovations to market quickly with services including design, manufacturing, fulfillment, and global support. Refine products or design new ones with the right services, allowing focus on IP. Choose from services that can help:

- Conduct applications testing on the hardware
- Integrate hardware, images, applications, peripheral, and documents as your systems are built
- Consolidate, stage, deliver, and support your orders globally
- Deliver Customer Support anywhere with over 30,000 Dell employees in tech support, parts, and field services across 100+ countries

More Features

- Combine density, performance, and scalability to optimize application performance
- Manage your clients more efficiently with industry-leading support

- Ensure server security from the factory to you
  - Rely on a secure component supply chain to ensure protection from the factory to the data center
  - Maintain data safety with cryptographically signed firmware packages and Secure Boot
  - Prevent unauthorized or malicious changes with Server Lockdown
  - Wipe all data from nonvolatile media including hard drives, SSDs, and system memory quickly and securely with SystemErase

Table 41. Specifications

Feature	Technical Specification	
Processor: Available for the entire life cycle. Up to 2x 185W Intel Xeon SP	• Intel Xeon 6428N • Intel Xeon 5412U • Intel Xeon 5418N • Intel Xeon 5411N • Intel Xeon 4514Y • Intel Xeon 4410Y • Intel Xeon 6421N • Intel Xeon 4509Y • Intel Xeon 5415+ • Intel Xeon 5512U • Intel Xeon 3408U • Intel Xeon 6426Y • Intel Xeon 5416S • Intel Xeon 4416+ • Intel Xeon 5418Y • Intel Xeon 4510	
Memory	32 DDR4 DIMM slots supporting RDIMM, speeds up to 4800 8GB, 16GB, 32GB, 64GB capacities supported	
Storage controllers	Front Controllers: PERC H965i, PERC H755	
Drive bays	R660 Front Drive Bays: Up to 10 x 2.5 inch SAS or SATA SSD	
Power supplies	Titanium redundant hot swap 1100 W DC, 1400 W AC, and 1800 W AC power supply supported.	
Sizing	Form factor: 1. R660: Rack (1U)	Chassis depth: 1. R660: 822.88 mm with Bezel
Embedded management	iDRAC9 with Lifecycle Controller (Express, Enterprise)	
Bezel	NEBS Filtered, Dell branded	
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	
Integrations and connections	• BMC Truesight • Microsoft System Center • OpenManage Integration with ServiceNow • Red Hat Ansible Modules • Terraform Providers	• IBM Tivoli Netcool/OMNIbus • IBM Tivoli Network Manager IP Edition • Micro Focus Operations Manager • Nagios Core • Nagios XI

Table 41. Specifications (continued)

Feature	Technical Specification
	• VMware vCenter and vRealize Operations Manager
Security	• Cryptographically signed firmware • Data at Rest Encryption (SEDs with local or external key mgmt) • Secure Boot • Secured Component Verification (Hardware integrity check) • Secure Erase • Silicon Root of Trust • System Lockdown (requires iDRAC9 Enterprise or Datacenter) • TPM 2.0 FIPS, CC-TCG certified, TPM 2.0 China NationZ
Embedded NIC	Broadcom 5720 Dual Port 1 GbE LOM
I/O Adapter Options	Additional card options: • Intel Ethernet 100G 2P E810-C Adapter (FH and LP) • Broadcom NetXtreme-E P2100D BCM57508 2x100G QSFP PCIE Ethernet (LP) • Mellanox ConnectX-6 Dx Dual Port 100 GbE QSFP56 PCIe Adapter (FH and LP) • Mellanox Bluefield 2 DP 25 GbE SFP Crypto DPU (FH) • Broadcom NetXtreme-E P425D BCM57504 4x25G SFP28 PCIE Ethernet (FH) • Intel(R) Ethernet 25G 2P E810-XXV Adapter (LP) • NVIDIA ConnectX-6LX Dual Port 25G GbE SFP28 Network Adapter (LP) • Broadcom BCM57414 25G SFP Dual Port PCIE adapter (LP) • Intel(R) Ethernet 25G 4P E810-XXV OCP • Broadcom BCM57414 25G SFP Dual Port OCP3 Mezz • Intel(R) Ethernet 25G 4P E810-XXV OCP
Ports	• Front ports: 1x VGA, 1 x USB 2.0, 1x dedicated iDRAC Direct Micro-USB. • Rear ports: 1x VGA, 1x USB 2.0, 1 x USB 3.0, 1x Dedicated iDRAC Ethernet.
Fans	HPR Gold Fan
Rack rail support	Combo Rails
Environmental specs (NEBS Level-3 and ETSI)	• Temperature: Continuous operating temperature of -5C to 40C; 96 hour operating excursions from -5C to 55C • Humidity water/kg of dry air: Operating Humidity of 5% to 85% with excursions of 5% to 90%, but not to exceed 0.24 kg : • Altitude: Up to 4000m; -60m to 1800 m; -61m to 1829m at 40C; 1829m–3960m at 30C • Dust: Dust filter rated 80% per ASHRAE Std 52.1 • Seismic: Operational resiliency up to Richter 7.5 seismic event (Zone 4 seismic event) • EMI: Immunity up to 8kV contact or 15kV air discharge • Fire resistance: Constructed from fire-retardant materials designed to contain and extinguish any fires that may occur inside the box.