Dell PowerEdge T360

Technical Guide

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DELL Technologies

Notes, cautions, and warnings

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

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

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

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1

Dell PowerEdge T360 system overview

The PowerEdge T360 system is a single-socket 4.5U tower server that supports:

- One Intel Xeon E-2400 series processor with up to eight cores or Intel Pentium G7400/ G7400T processor with up to two cores
- Four UDIMM slots
- A Cabled AC or two redundant AC or DC power supply units
- Up to 8 x 3.5-inch SAS/SATA HDD/SSD drives
- Up to 4 x 3.5-inch SATA HDD/SSD drives
- Up to 8 x 2.5-inch SAS/SATA HDD/SSD drives with 3.5-inch to 2.5-inch adapter

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

CAUTION: Do not install GPUs, network cards, or other PCIe devices on your system that are not validated and tested by Dell. Damage caused by unauthorized and invalidated hardware installation will null and void the system warranty.

Topics:

- New technologies
- Key workloads

New technologies

Table 1. New technologies

Technology	Detailed Description
Intel Xeon E-2400 series processor	Core count: Up to eight core processor
	Maximum number of PCIe lanes: Integrated 16 PCIe Gen5 lanes @ 32 GT/s, 4 PCIe Gen4 lanes @ 16 GT/s
	Maximum TDP: 95 W
Intel Pentium G7400/ G7400T processor	Core count: Up to two core processor
	Maximum number of PCIe lanes: Integrated 16 PCIe Gen5 lanes @ 32 GT/s, 4 PCIe Gen4 lanes @ 16 GT/s
	Maximum TDP: 46 W
4400 MT/s DDR5 Memory	Max 4 DIMMs
	Supports DDR5 ECC UDIMM
Flex I/O	Onboard LOM board, 2x1Gb with BCM5720 LAN controller
	Rear I/O with: • 1 x Dedicated iDRAC Ethernet port • 3 x USB 3.2 Gen1 • 3 x USB 2.0 • 1 x VGA port
	Serial Port

Table 1. New technologies (continued)

Technology		Detailed Description
		Front I/O with: ● 1 x USB 3.2 Gen1 ● 1x iDRAC Direct (Micro-AB USB) port
CPLD 1-wire		Support payload data of PERC, BP, and Rear I/O to BOSS-N1 and iDRAC.
Dedicated PERC		PERC adapters with PERC11
Software RAID		Operating system RAID/S160
Power Supplies	60 mm dimension PSU	Platinum 600 W AC/VDC
		Titanium 700 W AC/VDC
	106 mm dimension PSU	Platinum 450 W AC

Key workloads

The DellPowerEdgeT360 is versatile enough to address many customer segments and workloads affordably, that includes:

- Collaboration/Sharing: Built-in features to enable collaborative applications between groups of people that share information and processes on-site or remotely
- ROBO Business/Database: Provide computing performance for ROBO business and database workloads including mailing, data process and analysis
- Near Edge: Suitable form-factor for near-edge computing with GPU applications, such as video and audio analysis, surveillance, and VDI

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Product comparison

The following table shows the comparison between the PowerEdge T360 with the PowerEdge T350.

Table 2. Features comparison

Features	PowerEdge T360	PowerEdge T350
Processor	Maximum one Intel® Xeon® E-2400 series processor with up to eight cores or Intel Pentium G7400/ G7400T processorwith up to two cores	Maximum one Intel® Xeon® E-2300 series processor with up to eight cores, or Intel Pentium processors with up to two cores
Memory	DIMM Speed • Up to 4400 MT/s Memory Type • UDIMM Memory module slots • Four DDR5 DIMM slots • Supports unregistered ECC DDR5 DIMM slots only Maximum RAM • UDIMM 128 GB	DIMM Speed • Up to 3200 MT/s Memory Type • UDIMM Memory module slots • Four DDR4 DIMM slots • Supports unregistered ECC DDR4 DIMM slots only Maximum RAM • UDIMM 128 GB
Storage Controllers	• Internal controllers: PERC H355 Adapter, PERC H755 Adapter, HBA355i Adapter • Internal Boot: Boot Optimized Storage Subsystem (BOSS-N1): HWRAID 2 x M.2 NVMe SSDs drives, or USB • External HBA (non-RAID): HBA355e Adapter • Software RAID:S160	• Internal controllers: PERC H345, PERC H355, HBA355i, PERC H755 • Internal Boot: Boot Optimized Storage Subsystem (BOSS-S2): HWRAID 2 x M.2 SSDs • External HBA (non-RAID): HBA355e • Software RAID: S150
Drive Bays	Front bays: • Up to 4 x 3.5-inch SATA HDD/SSD, max 64 TB • Up to 8 x 3.5-inch SAS/SATA HDD/SSD, max 128 TB • Up to 8 x 2.5 inch SAS/SATA HDD/SSD with adapter, max 61.44 TB **NOTE:** Supports 2.5-inch drive in 3.5-inch hybrid drive carrier.	Front bays: • Up to 8 x 3.5-inch SAS/SATA (HDD/SSD) • Maximum capacity 160 TB on 8 HDD configuration **NOTE:** Supports 2.5-inch drive in 3.5-inch hybrid drive carrier.
Power Supplies	• 450 W AC Platinum 100-240 V AC. Cabled. • 600 W Platinum 100-240 V AC or 600 W 240 HVDC, hot swap redundant. • 700 W Titanium 200-240 VAC or 700 W 240 HVDC, hot swap redundant.	• 450 W AC only Bronze 100-240 V AC. Cabled. • 600 W Mixed Mode Platinum 100-240 V AC or 240 V DC. Hot swap redundant. • 700 W Mixed Mode Titanium 200-240 V AC or 240 V DC. Hot swap redundant.
Cooling Options	Air cooling	Air Cooling
Fans	Standard (STD) fan and one optional High performance (HPR) fan	Standard (STD) fans /High performance (HPR) silver fans
	Up to two cabled fans	Up to one cabled fan
Dimension	Height: 382.5 mm (15.05 inches) (with feet)	Height: 382.5 mm (15.05 inches) (with feet)

Table 2. Features comparison (continued)

Features	PowerEdge T360	PowerEdge T350	
	369.5 mm (14.54 inches) (without feet)	369.5 mm (14.54 inches) (without feet)	
	Width—175.0 mm (6.88 inches)	Width—175.0 mm (6.88 inches)	
	Depth—579.72 mm (22.82 inches) (with bezel)	Depth—579.72 mm (22.82 inches) (with bezel)	
	562.12 mm (22.13 inches) (without bezel)	562.12 mm (22.13 inches) (without bezel)	
Form Factor	4.5U tower server	4.5U tower server	
Embedded Management	• iDRAC9 Enterprise • iDRAC Direct • Datacenter license options • iDRAC RESTful API with Redfish • iDRAC Service Module	• iDRAC9 • iDRAC Direct • iDRAC RESTful API with Redfish • iDRAC Service Module	
Bezel	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 and Connections	• 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 and vRealize Operations Manager	OpenManage Connections • IBM Tivoli Netcool/ OMNIbus • IBM Tivoli Network Manager IP Edition • Micro Focus Operations Manager • Nagios Core • 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 • Secured-core server • 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 1 GbE LOM	2 x 1 GbE LOM	

Table 2. Features comparison (continued)

Features	PowerEdge T360		PowerEdge T350	
Networking Options	Optional Network Card		Optional Network Card	
GPU Options	Up to one single-width 60 W accelerator		Not supported	
Ports	Front Ports • 1 x USB 3.2 Gen1 • 1 x iDRAC Direct (Micro-AB USB) port	Rear Ports • 3 x USB 2.0 • 3 x USB 3.2 Gen1 • 1 x Serial port • 1 x Dedicated iDRAC Ethernet port • 2 x Ethernet port • 1 x VGA port	Front Ports • 1 x iDRAC Direct (Micro-AB USB) port • 1 x USB 3.0	Rear Ports • 5 x USB 2.0 • 1 x iDRAC ethernet port • 1 x USB 3.0 • 1 x VGA • 1 x Serial
	Internal Port : • 1 x USB 3.2 Gen1		Internal Port : • 1 x USB 3.0 (Optional)	
PCIe	Slot 1: x8 Gen4 Full height, half length		Slot 1: x8 Gen4 Full height, half length	
	Slot 2: x16 Gen5 Full height, half length		Slot 2: x16 Gen4 Full height, full length	
	Slot 3: x1 Gen4 Full height, half length		Slot 3: x1 Gen3 Full height, half length	
	Slot 4: x8 Gen4 Full height, half length		Slot 4: x8 Gen3 Full height, half length	
Operating System and Hypervisors	• Canonical Ubuntu Server LTS • Microsoft Windows Server with Hyper-V • Red Hat Enterprise Linux • SUSE Linux Enterprise Server • VMware ESXi For specifications and interoperability details, see Dell.com/OSsupport.		• Canonical Ubuntu Server LTS • VMware ESXi • Microsoft Windows Server with Hyper-V • SUSE Linux Enterprise Server • Red Hat Enterprise Linux For specifications and interoperability details, see Dell EMC Enterprise Operating Systems on Servers, Storage, and Networking page at Dell.com/OSsupport.	

3

Chassis views and features

Topics:

- Chassis views

Chassis views

Front view of the system

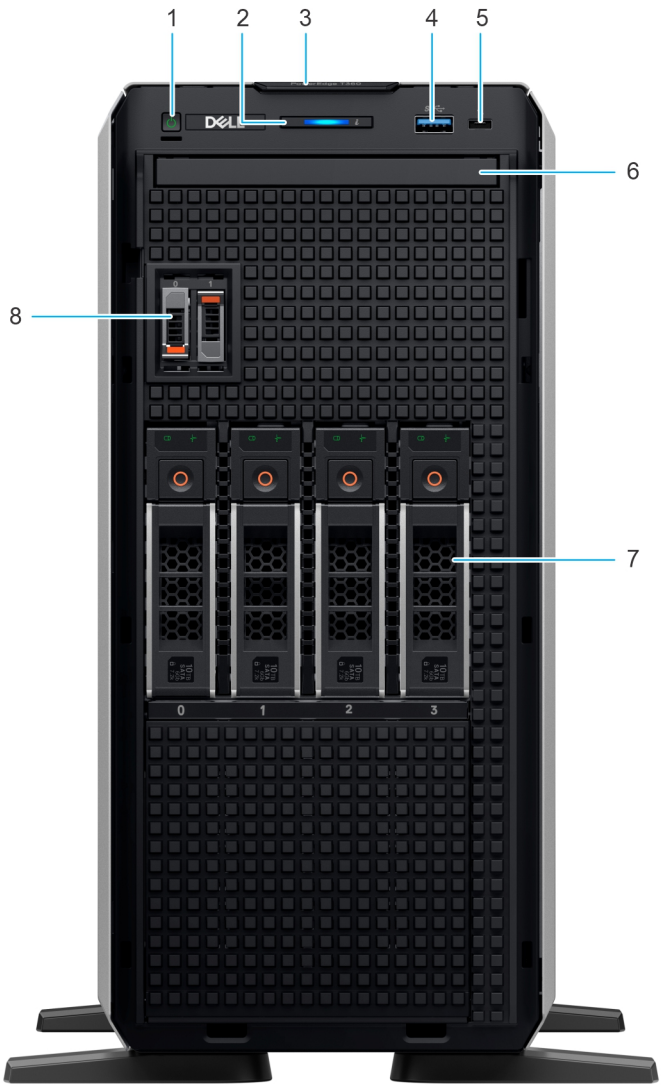


Figure 1. Front view of 4 x 3.5-inch drive system

Table 3. Features available on the front of the system

Item	Ports, panels, and slots	Icon	Description
1	Power button		Indicates if the system is powered on or off. Press the power button to manually power on or off the system.
2	Status LED indicators		Indicates the status of the system. For more information, see the Status LED indicators section.
3	Express Service Tag	N/A	A slide-out label panel that contains the Express Service Tag that has system information such as Service Tag, NIC, MAC address, and so on. If you have opted for the secure default access to iDRAC, the Information tag will also contain the iDRAC secure default password.
4	USB 3.2 port		Supports USB 3.2 compliant devices
5	iDRAC Direct (Micro-AB USB) port		The iDRAC Direct (Micro-AB USB) port enables you to access the iDRAC direct Micro-AB USB features. For more information, see the *Integrated Dell Remote Access Controller User's Guide* at www.dell.com/poweredgemanuals.
6	Optical drive	N/A	Enables you to retrieve and store data on optical discs such as compact discs (CD) and digital versatile discs (DVD). For more information, see the Technical specifications section.
7	Drive Bay	N/A	Enables you to install SAS/SATA drives that are supported on your system.
8	BOSS-N1 (optional)	N/A	BOSS-N1 (optional) for internal system boot.

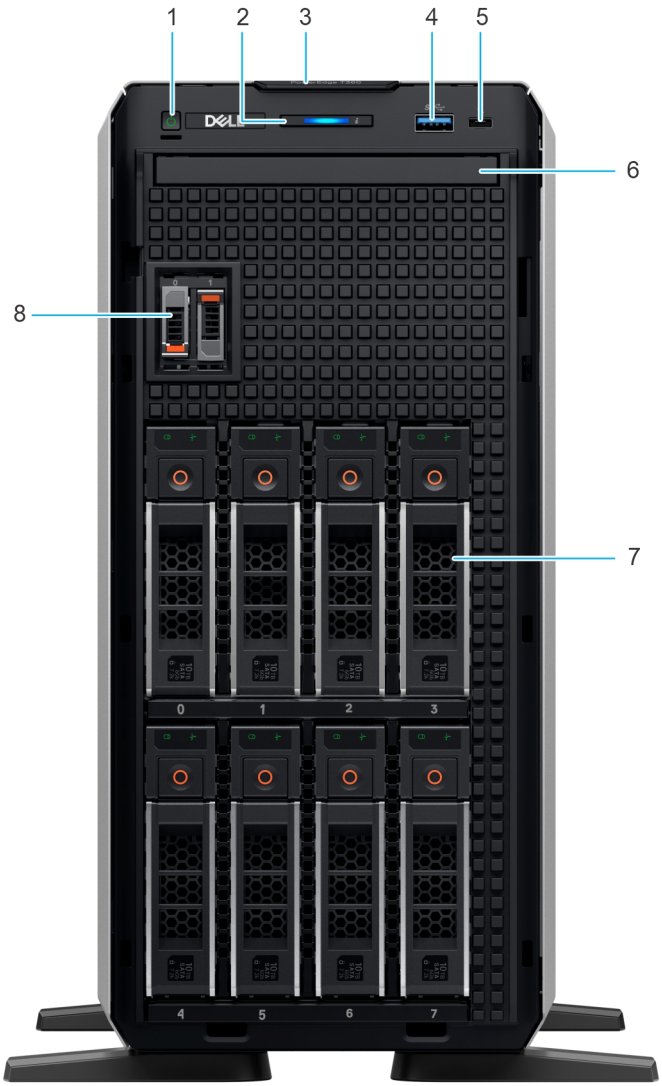


Figure 2. Front view of 8 x 3.5-inch drive system

Table 4. Features available on the front of the system

Item	Ports, panels, and slots	Icon	Description
1	Power button	⏻	Indicates if the system is powered on or off. Press the power button to manually power on or off the system.
2	Status LED indicators	🛈	Indicates the status of the system. For more information, see the Status LED indicators section.
3	Express Service Tag	N/A	A slide-out label panel that contains the Express Service Tag that has system information such as Service Tag, NIC, MAC address, and so on. If you have opted for the secure default access to iDRAC, the Information tag

Table 4. Features available on the front of the system (continued)

Item	Ports, panels, and slots	Icon	Description
			will also contain the iDRAC secure default password.
4	USB 3.2 port		Supports USB 3.2 compliant devices
5	iDRAC Direct (Micro-AB USB) port		The iDRAC Direct (Micro-AB USB) port enables you to access the iDRAC direct Micro-AB USB features. For more information, see the *Integrated Dell Remote Access Controller User's Guide* at www.dell.com/poweredgemanuals.
6	Optical drive	N/A	Enables you to retrieve and store data on optical discs such as compact discs (CD) and digital versatile discs (DVD). For more information, see the Technical specifications section.
7	Drive Bay	N/A	Enables you to install SAS/SATA drives that are supported on your system.
8	BOSS-N1 (optional)	N/A	BOSS-N1 (optional) for internal system boot.

Rear view of the system

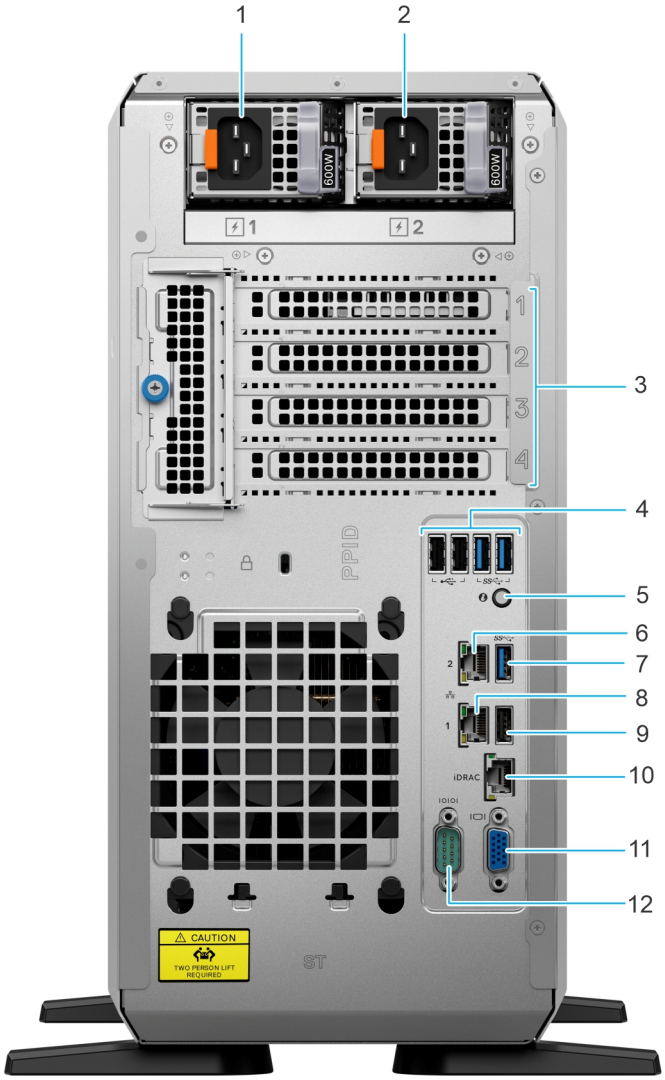


Figure 3. Rear view of the system

Table 5. Features available at the rear of the system

Item	Ports, panels, or slots	Icon	Description
1	Power supply unit (PSU 1)	1	PSU1 is the primary PSU of the system.
2	Power supply unit (PSU 2)	2	PSU2 is the secondary PSU of the system.
3	PCIe expansion card slots (4)	N/A	Enables you to connect PCI express expansion cards.
4	2 x USB 2.0 + 2 x USB 3.2 ports		Supports USB 2.0 and USB 3.2 compliant devices.
5	System Identification (ID) button		The System Identification (ID) button is available at the rear of the system. Press the button to identify a system by turning on the system ID button. You can also use the system ID button to reset

Table 5. Features available at the rear of the system (continued)

Item	Ports, panels, or slots	Icon	Description
			iDRAC and to access BIOS using the step-through mode. When pressed, the system ID LED in the back panel blinks until either the front or rear button is pressed again. Press the button to toggle between on or off mode.
6	NIC port (2)		The NIC ports that are integrated on the LOM card provide network connectivity which is connected to the system board.
7	USB 3.2 port		Supports USB 3.2 compliant devices.
8	NIC port (1)		The NIC ports that are integrated on the LOM card provide network connectivity which is connected to the system board.
9	USB 2.0 port		Supports USB 2.0 compliant devices.
10	Dedicated iDRAC Ethernet port	iDRAC	Enables you to remotely access iDRAC. For more information, see the Integrated Dell Remote Access Controller User's Guide at www.dell.com/poweredgemanuals.
11	VGA port		Enables you to connect a display device to the system.
12	Serial port		Enables you to connect a serial device to the system.

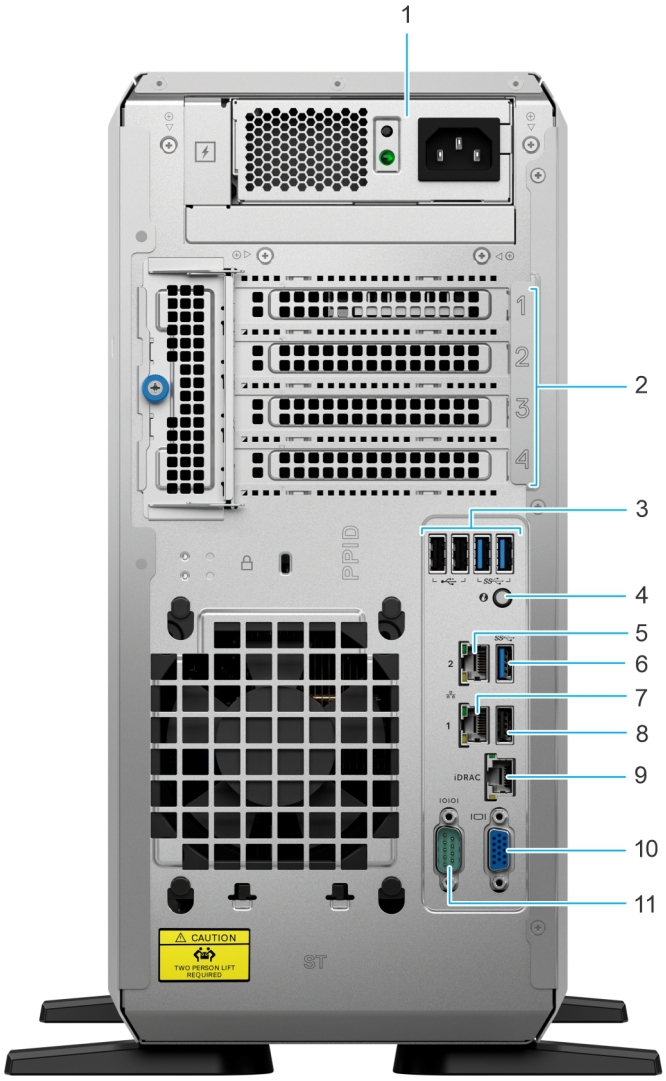


Figure 4. Rear view of the system with cable PSU

Table 6. Rear view of the system

Item	Ports, panels, or slots	Icon	Description
1	Cabled power supply unit		Enables you to connect to AC power source.
2	PCIe expansion card slots (4)	N/A	Enables you to connect PCI express expansion cards.
3	2 x USB 2.0 + 2 x USB 3.2 ports		Supports USB 2.0 and USB 3.2 compliant devices.
4	System Identification (ID) button		The System Identification (ID) button is available at the rear of the system. Press the button to identify a system by turning on the system ID button. You can also use the system ID button to reset iDRAC and to access BIOS using the step-through mode. When pressed, the system ID LED in the back panel blinks until either the front or rear

Table 6. Rear view of the system (continued)

Item	Ports, panels, or slots	Icon	Description
			button is pressed again. Press the button to toggle between on or off mode.
5	NIC port (2)		The NIC ports that are integrated on the LOM card provide network connectivity which is connected to the system board.
6	USB 3.2 port		Supports USB 3.2 compliant devices.
7	NIC port (1)		The NIC ports that are integrated on the LOM card provide network connectivity which is connected to the system board.
8	USB 2.0 port		Supports USB 2.0 compliant devices.
9	Dedicated iDRAC Ethernet port	iDRAC	Enables you to remotely access iDRAC. For more information, see the Integrated Dell Remote Access Controller User's Guide at www.dell.com/poweredgemanuals.
10	VGA port		Enables you to connect a display device to the system.
11	Serial port		Enables you to connect a serial device to the system.

Inside the system

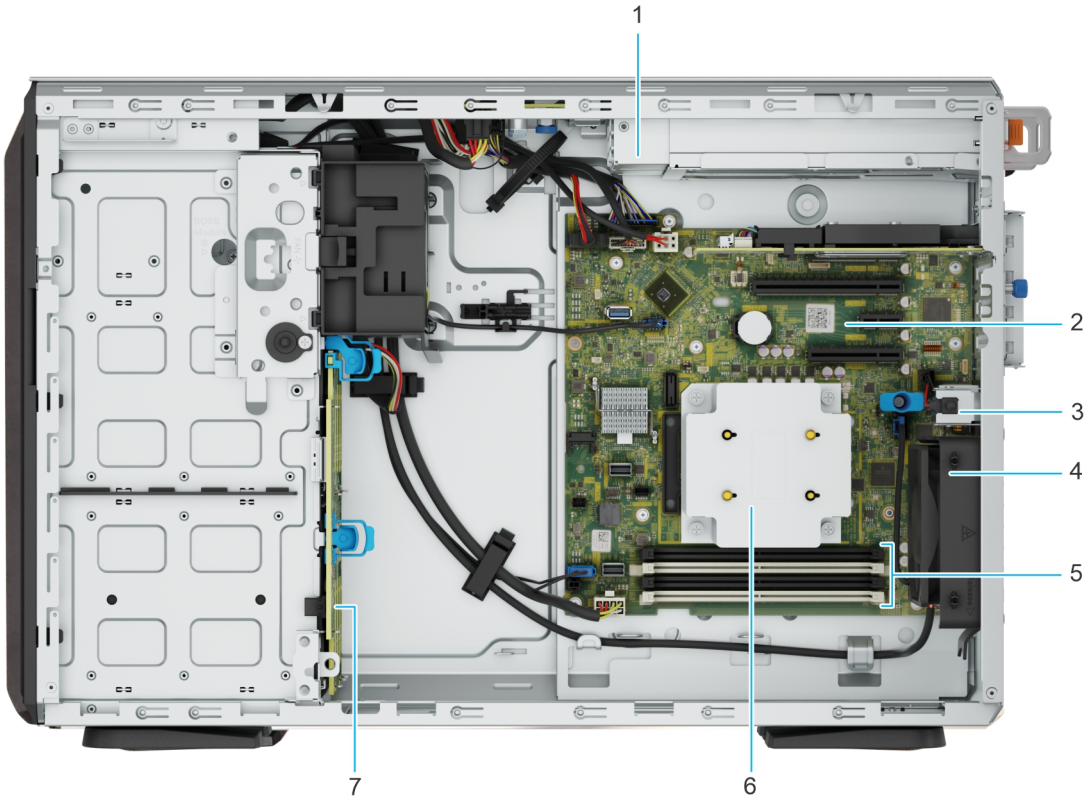


Figure 5. Inside view of the 8 x 3.5-inch configuration

1. PSU
2. System board
3. Intrusion switch
4. Cooling fan
5. Memory module sockets
6. Heat sink
7. Backplane

Quick Resource Locator

The QRL on everything (SILs, GSG, Owner's Manual except on the EST) is a generic QRL for T360 that leads to a webpage for that product. That webpage has links for things like setup and service videos, iDRAC manual, and other things that apply to the platform. The QRL on the EST is unique and specific to that service tag and will contain the Service Tag number and the iDRAC password. The label and the QRL code within it are printed on demand at the L10 factories. This QRL links to a webpage that shows the exact configuration as built for that customer, and the specific warranty purchased. It is one click away from the same content of generic information that applies to T360 that is available in the other QRLs.



Figure 6. Quick Resource Locator for PowerEdge T360 system

4

Processor

Topics:

- Processor features

Processor features

The following lists the features and functions that are in the upcoming Intel® Xeon E-2400 series processor offering:

- For small businesses, Xeon E provides a reliable solution with business-ready servers to support business-critical services and customer data needs.
- For cloud services, Xeon E is the perfect option for Bare Metal Instances & Code/Data Security, with a cost-effective solution for essential performance to support entry-level bare metal services.

Key updates for the E-2400 series include increased performance with a new processor core architecture:

- 4, 6, and 8 core option
- Up to 95 W TDP
- Up to 128 GB memory
- DDR5 up to 4800 MT/s

Supported processors

The following table shows the processors that are supported on the T360.

Table 7. Supported processors for T360

Processor	Clock Speed (GHz)	Cache (M)	Cores	Threads	Turbo	Memory Speed (MT/s)	Memory Capacity	TDP
E-2488	3.2	16	8	16	Turbo	4800	128 GB	95 W
E-2486	3.5	12	6	12	Turbo	4800	128 GB	95 W
E-2478	2.8	16	8	16	Turbo	4800	128 GB	80 W
E-2468	2.6	16	8	16	Turbo	4800	128 GB	65 W
E-2456	3.3	12	6	12	Turbo	4800	128 GB	80 W
E-2436	2.9	12	6	12	Turbo	4800	128 GB	65 W
E-2434	3.4	8	4	8	Turbo	4800	128 GB	55 W
E-2414	2.6	8	4	4	Turbo	4800	128 GB	55 W
G7400	3.7	4	2	4	No Turbo	4800	128 GB	46 W
G7400T	3.1	4	2	4	No Turbo	4800	128 GB	35 W

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Memory subsystem

Topics:

- Supported memory

Supported memory

Table 8. Memory technology comparison

Feature	PowerEdge T360 (DDR5)
DIMM type	UDIMM
Transfer speed	4400 MT/s
Voltage	1.1 V

The following table lists the supported DIMMs for T360. For the latest information on supported memory and memory configurations reference the latest SDL.

Table 9. Supported DIMMs

Rated DIMM Speed (MT/s)	DIMM Type	DIMM Capacity (GB)	Ranks per DIMM	Data Width	DIMM Volts
4800	UDIMM	16	1	8	1.1
4800	UDIMM	32	2	8	1.1

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Storage

Topics:

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

Storage controllers

- PowerEdge Hardware RAID controllers (PERC) series 11 is designed for:
  - Enhanced performance
  - Fault tolerance
  - Simplified management of RAID array drives
- PowerEdge controller series 11 supports older legacy SAS and SATA drive interfaces.
- Dell S160 is a software RAID solution for PowerEdge systems.

Table 10. PERC Series controller offerings

Performance Level	Controller and Description
Entry	S160 (Software RAID: SATA)
Value	H355, HBA355 (internal/external)
Performance	H755

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

NOTE: H355 replaces H345 as the entry raid controller.

Supported Drives

Table 11. Supported Drives

Form Factor	Type	Speed	Rotational Speed	Capacities
2.5 inches	vSAS	12 Gb	SSD	960 Gb, 1.92 TB, 3.84 TB, 7.68 TB
	SAS	24 Gb	SSD	800 Gb, 960 GB, 1.6 TB, 1.92 TB, 3.84 TB, 7.68 TB
	SATA	6 Gb	SSD	480 Gb, 960 Gb, 1.92 TB, 3.84 TB
3.5 inches	SAS	12 Gb	7.2 K	4 TB, 8 TB, 12 TB, 16 TB
	SATA	6 Gb	7.2 K	2 TB, 4 TB, 8 TB, 12 TB, 16 TB

Internal storage configuration

T360 supports the following internal storage configurations:

- 8 x 3.5 inch (8 x 2.5-inch with HDD adapter) (SAS/SATA) RAID
- 4 x 3.5 inch (SATA)

External Storage

The T360 supports the external storage device types listed in the table below.

Table 12. 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 12 Gb MD-series JBODs

7

Networking

Topics:

- Overview
- Supported network cards

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.

Supported network cards

Table 13. Supported OCP cards

Vendor	Port type	Port speed	Port count
Broadcom	F1	1 GbE	4
Intel	BT	10 GbE	2
Intel	BT	10 GbE	4
Broadcom	BT	10 GbE	2
Broadcom	BT	10 GbE	4
Intel	F1	1 GbE	4

8

PCIe subsystem

Topics:

- PCIe risers

PCIe risers

The T360 has a no riser option. Shown below are the riser offerings for the platform.

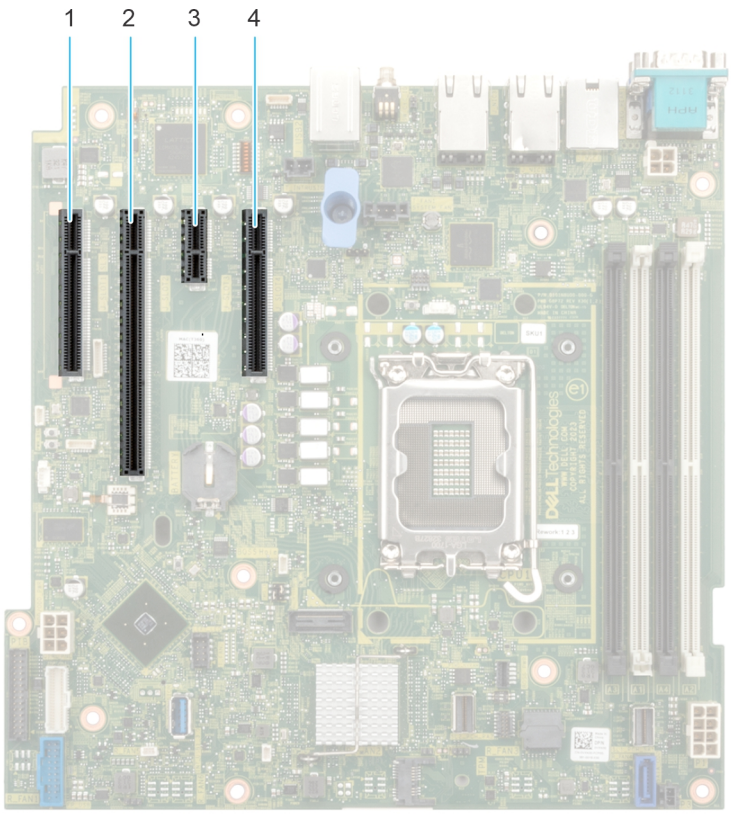


Figure 7. Riser connector slots on system board

1. PCIe Slot 1 (CPU 1)
2. PCIe Slot 2 (CPU 1)
3. PCIe Slot 3 (Platform Controller Hub)
4. PCIe Slot 4 (Platform Controller Hub)

Table 14. PCIe Riser Configurations

Config No.	Riser configuration	No. of Processors	PERC type supported	Rear storage possible
0	N/A	1	Adapter	No

NOTE: The expansion-card slots are not hot-swappable.

The following table provides guidelines for installing expansion cards to ensure proper cooling and mechanical fit. The expansion cards with the highest priority should be installed first using the slot priority indicated. All the other expansion cards should be installed in the card priority and slot priority order.

Table 15. Configuration : No Riser

Card type	Slot priority	Maximum number of cards
FOXCONN (GPU)	2	1
FOXCONN (aPERC 11)	2,1	1
FOXCONN (aPERC HBA11)	2,1	1
FOXCONN (External Adapter)	2,1	2
Broadcom (NIC:1Gb)	2,1,4	3
Intel (NIC:10Gb)	2,1,4	3
Broadcom (NIC:10Gb)	2,1,4	3
Intel (NIC:1Gb)	2,1,4	3
FOXCONN (BOSS-N1)	INT	1

9

Power, thermal, and acoustics

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

Topics:

- Power
- Thermal
- Acoustics

Power

Table 16. Power tools and technologies

Feature	Description
Power Supply Units(PSU) portfolio	Dell's PSU portfolio includes intelligent features such as dynamically optimizing efficiency while maintaining availability and redundancy. Find additional information in the Power supply units section.
Tools for right sizing	Enterprise Infrastructure Planning Tool (EIPT) is a tool that can help you determine the most efficient configuration possible. With Dell's EIPT, you can calculate the power consumption of your hardware, power infrastructure, and storage at a given workload. Learn more at www.dell.com/calc.
Industry Compliance	Dell's servers are compliant with all relevant industry certifications and guide lines, including 80 PLUS, Climate Savers and ENERGY STAR.
Power monitoring accuracy	PSU power monitoring improvements include: ● Dell's power monitoring accuracy is currently 1%, whereas the industry standard is 5% ● More accurate reporting of power ● Better performance under a power cap
Power capping	Use Dell's systems management to set the power cap limit for your systems to limit the output of a PSU and reduce system power consumption. Dell is the first hardware vendor to leverage Intel Node Manager for circuit-breaker fast capping.
Systems Management	iDRAC Enterprise and Datacenter provides server-level management that monitors, reports and controls power consumption at the processor, memory and system level. Dell OpenManage Power Center delivers group power management at the rack, row, and data center level for servers, power distribution units, and uninterruptible power supplies.
Active power management	Intel Node Manager is an embedded technology that provides individual server-level power reporting and power limiting functionality. Dell offers a complete power management solution comprised of Intel Node Manager accessed through Dell iDRAC9 Datacenter and OpenManage Power Center that allows policy-based management of power and thermal at the individual server, rack, and data center level. Hot spare reduces power consumption of redundant power supplies. Thermal control off a speed optimizes the thermal settings for your environment to reduce fan consumption and lower system power consumption. Idle power enables Dell servers to run as efficiently when idle as when at full workload.
Rack infrastructure	Dell offers some of the industry's highest-efficiency power infrastructure solutions, including:

Table 16. Power tools and technologies (continued)

Feature	Description
	• Power distribution units (PDUs) • Uninterruptible power supplies (UPSs) • Energy Smart containment rack enclosures Find additional information at: https://www.delltechnologies.com/en-us/servers/power-and-cooling.htm.

PSU specifications

The PowerEdge T360 system supports up to two AC or DC power supply units (PSUs).

Table 17. PSU specifications

PSU	Class	Heat dissipation (maximum)	Frequency	Voltage	AC		DC	Current
					High line 200–240 V	Low line 100–120 V		
450 W	Platinum	1730 BTU/hr	50/60 Hz	100 V–240 V, autoranging	450 W	450 W	N/A	6.5 A - 3.5 A
600 W Mixed Mode	Platinum	2250 BTU/hr	50/60 Hz	100 V–240 V AC	600 W	600 W	N/A	7.1 A - 3.6 A
	N/A	2250 BTU/hr	N/A	240 V DC	N/A	N/A	600 W	2.9 A
700 W Mixed Mode	Titanium	2625 BTU/hr	50/60 Hz	200 V–240 V	700 W	N/A	N/A	4.1 A
	N/A	2625 BTU/hr	N/A	240 V DC	N/A	N/A	700 W	3.4 A

NOTE: This system is also designed to connect to the IT power systems with a phase-to-phase voltage not exceeding 240 V.

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 Dell Energy Smart Solution Advisor available at **Dell.com/ESSA**.

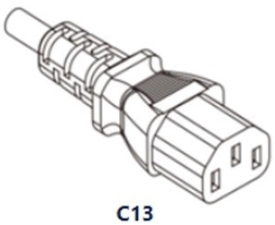


Figure 8. PSU power cord

Table 18. PSU power cords

Form factor	Output	Power cord
Cable PSU 106 mm	450 W AC	C13/C14
Redundant 60 mm	600 W AC	C13/C14
	700 W AC	C13/C14

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.

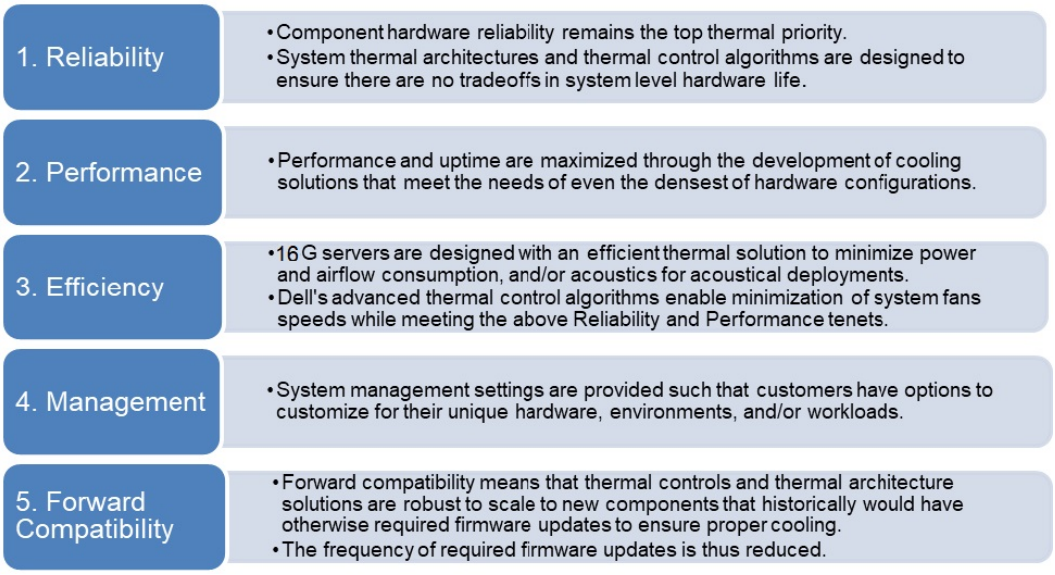


Figure 9. Thermal design characteristics

The thermal design of the PowerEdge T360 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, and 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 T360 Installation and Service Manual at www.dell.com/poweredgemanuals and “Advanced Thermal Control: Optimizing across Environments and Power Goals” on Dell.com.
- Cooling redundancy: The T360 allows N+1 fan redundancy, allowing continuous operation with one fan failure in the system.

- Environmental Specifications: The optimized thermal management makes the T360 reliable under a wide range of operating environments.

Acoustics

PowerEdge acoustical specifications

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

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

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

Category 1: Table-top in Office Environment

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

Table 19. Dell Enterprise Category 1, "Table-top in Office Environment" acoustical specification category.

Measurement Position re AC0158	Metric, re AC0159	Test Modes, re AC0159 (note must be in steady state, see AC0159, except where noted below)			
		Standby in 23±2° C Ambient	Idle in 23±2° C Ambient	Operating in 23±2° C Ambient – if not otherwise specified in the program's configuration document, then processor and hard drive operating modes are required	Simulate (that is, set fan speeds representative) for Idle at 28° C & 35° C Ambient, and for 100% loading and maximum configuration, at 35° C Ambient
Sound Power	LwA-m, bels	≤ 4.2	≤ 4.7	≤ 5.0	Report
Sound Quality (both positions must meet limits): Front Binaural HEAD and Rear Microphone	Tones, Hz, dB	No prominent tones per criteria D.10.6 and D.10.8 of ECMA-74			Report tones
	Tonality, tu	≤ 0.35	≤ 0.35	≤ 0.35	Report
	Dell Modulation, %	≤ 35	≤ 35	≤ 35	Report
	Loudness, sones	Report	Report	Report	Report
	LpA-single point, dBA	Report	Report	Report	Report
Front Binaural HEAD	Transients	• Oscillation (see AC0159), if observed, during 20-minute steady-state observation, must adhere to the following two criteria: ○ Max. {ΔLpA} < 3.0 dB ○ Event count < 3 for "1.5 dB < ΔLpA < 3.0 dB"			N/A

Table 19. Dell Enterprise Category 1, "Table-top in Office Environment" acoustical specification category. (continued)

Measurement Position re AC0158	Metric, re AC0159	Test Modes, re AC0159 (note must be in steady state, see AC0159, except where noted below)			
		Standby in 23±2° C Ambient	**Idle in 23±2° C Ambient**	**Operating in 23±2° C Ambient – if not otherwise specified in the program's configuration document, then processor and hard drive operating modes are required**	**Simulate (that is, set fan speeds representative) for Idle at 28° C & 35° C Ambient, and for 100% loading and maximum configuration, at 35° C Ambient**
		○ Acoustical Jump (see AC0159), during air mover speed transition from Idle to Operating Mode must be ≤ 15 dB. ● Startup behavior ○ Report Startup behavior re. AC0159 ○ Startup must proceed smoothly, that is, no sudden or large jumps, and fan speed during startup must not exceed 50% of its maximum ● Transient inputs: Report time-history sound pressure levels re AC0159 "Train of Step Functions on Processor"			
Any	Other	No rattles, squeaks, or unexpected noises Sound should be "even" around the EUT (one side should not be dramatically louder than another) Unless otherwise specified, the "default" thermal-related settings shall be selected for BIOS and iDRAC. Specific operating conditions will be defined in "Configurations & Configuration Dependencies" for each platform.			
Sound Pressure	LpA-reported, dBA, re AC0158 and program configuration document	Report for all mics	Report for all mics	Report for all mics	Report for all mics

Category 2: Floor-standing in Office Environment

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

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

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

Category 3: General Use Space

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

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

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

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

Measurement Position re AC0158	Metric, re AC0159	Test Modes, re AC0159 (note must be in steady state, see AC0159, except where noted below)			
		Standby in 23±2° C Ambient	Idle in 23±2° C Ambient	Operating in 23±2° C Ambient – if not otherwise specified in the program's configuration document, then processor and hard drive operating modes are required	Simulate (that is, set air mover speeds representative) for Idle at 28° C & 35° C Ambient and for 100% loading and maximum configuration, at 35° C Ambient
		Specific operating conditions will be defined in "Configurations & Configuration Dependencies" for each platform.			
Sound Pressure	LpA-reported, dBA, re AC0158 and program configuration document	Report for all mics	Report for all mics	Report for all mics	Report for all mics

Category 4: Attended Data Center

When Dell determines that a specific Enterprise product is to be predominantly used in an attended data center, then the acoustical specification of the table applies. The phrase "attended data center" is used to mean a space in which many (from tens to 1000s) of Enterprise products are deployed in proximity (that is, in the same room) to personnel whose speech (perhaps with raised voices) is expected to be intelligible over the data center noise. Hearing protection or hearing monitoring programs are not expected in these areas. Examples in this category include monolithic rack products.

Table 22. Dell Enterprise Category 4, "Attended Data Center" acoustical specification category.

Measurement Position re AC0158	Metric, re AC0159	Test Modes, re AC0159 (note must be in steady state, see AC0159, except where noted below)				Simulate (that is, set fan speeds representative) for 100% loading and maximum configuration, at 35° C Ambient
		Standby in 23±2° C Ambient	Idle in 23±2° C Ambient	Operating in 23±2° C Ambient – if not otherwise specified in the program's configuration document, then processor and hard drive operating modes are required	Simulate (that is, set fan speeds representative) for Idle at 28° C & 35° C Ambient	
Sound Power	LwA-m, B	Report	≤ 6.9	≤ 7.1	Report	≤ 8.2
Front Binaural HEAD	Tones, Hz, dB	Report	< 15 dB	< 15 dB	Report	< 20 dB
	Tonality, tu	Report	Report	Report	Report	Report
	Dell Modulation, %	Report	Report	Report	Report	Report
	Loudness, sones	Report	Report	Report	Report	Report
	LpA-single point, dBA	Report	Report	Report	Report	Report

Table 22. Dell Enterprise Category 4, "Attended Data Center" acoustical specification category. (continued)

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

Category 5: Unattended Data Center

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

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

Measurement Position re AC0158	Metric, re AC0159	Test Modes, re AC0159 (note must be in steady state, see AC0159, except where noted below)				Simulate (that is, set air mover speeds representative) for 100% loading and maximum configuration, at 35° C Ambient
		Standby in 23±2° C Ambient	Idle in 23±2° C Ambient	Operating in 23±2° C Ambient – if not otherwise specified in the program's configuration document, then processor and hard drive operating modes are required	Simulate (that is, set air mover speeds representative) for Idle at 28° C & 35° C Ambient	
Sound Power	LwA-m, bels	Report	≤ 7.5	≤ 7.7	Report	≤ 8.7
Front Binaural HEAD	Tones, Hz, dB	Report	< 15 dB	< 15 dB	Report	< 20 dB
	Tonality, tu	Report	Report	Report	Report	Report
	Dell Modulation, %	Report	Report	Report	Report	Report
	Loudness, sones	Report	Report	Report	Report	Report
	LpA-single point, dBA	Report	Report	Report	Report	Report
Front Binaural HEAD	Transients	• Oscillation (see AC0159), if observed, during 20-minute steady-state observation, must adhere to the following two criteria: ○ Max. {ΔLpA} < 3.0 dB ○ Event count < 3 for "1.5 dB < ΔLpA < 3.0 dB" • Report Acoustical Jump (see AC0159) during air mover speed transition from Idle to Operating Mode. • Startup behavior ○ Report Startup behavior re. AC0159 ○ Startup must proceed smoothly, that is, no sudden or large jumps, and air mover speed during startup must not exceed 50% of its maximum • Transient inputs: Report time-history sound pressure levels re AC0159 "Train of Step Functions on Processor"			N/A	
Any	Other	No rattles, squeaks, or unexpected noises Sound should be "even" around the EUT (one side should not be dramatically louder than another) Unless otherwise specified, the "default" thermal-related settings shall be selected for BIOS and iDRAC. Specific operating conditions will be defined in "Configurations & Configuration Dependencies" for each platform.				

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

Measurement Position re AC0158	Metric, re AC0159	Test Modes, re AC0159 (note must be in steady state, see AC0159, except where noted below)				Simulate (that is, set air mover speeds representative) for 100% loading and maximum configuration, at 35° C Ambient
		Standby in 23±2° C Ambient	Idle in 23±2° C Ambient	Operating in 23±2° C Ambient – if not otherwise specified in the program's configuration document, then processor and hard drive operating modes are required	Simulate (that is, set air mover speeds representative) for Idle at 28° C & 35° C Ambient	
Sound Pressure	LpA-reported, dBA, re AC0158 and program configuration document	Report for all mics	Report for all mics	Report for all mics	Report for all mics	Report for all mics

Acoustical configurations of T360

Dell PowerEdge T360 is a tower server appropriate for typical office environments.

Table 24. Configurations tested for acoustical experience

Configuration	Quietest Config	Entry	Volume	Feature Rich with GPU	Feature Rich Max. Storage
Processor	Raptor Lake, 65 W	Raptor Lake, 65 W	Raptor Lake, 65 W	Raptor Lake, 95 W	Raptor Lake, 95 W
Processor Quantity	1	1	1	1	1
Memory	16 GB UDIMM	16 GB UDIMM	16 GB UDIMM	32 GB UDIMM	32 GB UDIMM
Memory Quantity	1	1	2	4	4
Storage	3.5" SATA 2-TB HDD	3.5" SATA 2-TB HDD	3.5" SATA 2-TB HDDs	3.5" SATA 2-TB HDDs	2.5" SAS 600 GB
Storage Quantity	1	1	2	4	8
Backplane	4x 3.5" hot swap	4x 3.5" hot swap	8x 3.5" hot swap	8x 3.5" hot swap	8x 3.5" hot swap
Power Supply Unit	450 W (106 mm)	450 W (106 mm)	600 W (60 mm)	600 W (60 mm)	600 W (60 mm)
Power Supply Quantity	1	1	2	2	2
PCIe Cards	PERC H355	PERC H355	PERC H355	PERC H755 2x 1 GbE NIC A2 GPU (60 W)	PERC H755 2x 1 GbE NIC
Bezel	N/A	N/A	Yes	Yes	Yes
Other	N/A	N/A	ODD	ODD	ODD

Table 25. Acoustical performance of T360 acoustical configurations

Configuration		Quietest Config	Entry	Volume	Feature Rich with GPU	Feature Rich Max. Storage
Acoustical Performance: Idle/ Operating @ 25 °C Ambient						
$L_{wA,m}$ (B)	Idle	3.6	3.6	3.8	5.4	3.5
	Operating	3.8	3.8	3.8	7.5	4.7
K_v (B)	Idle	0.4	0.4	0.4	0.4	0.4
	Operating	0.4	0.4	0.4	0.4	0.4
$L_{pA,m}$ (dB)	Idle	24	24	27	41	28
	Operating	27	27	28	63	37
Prominent tones		No prominent tones in Idle and Operating				
Acoustical Performance: Idle @ 28 °C Ambient						
$L_{wA,m}$ (B)		3.6	3.6	3.8	5.4	3.5
K_v (B)		0.4	0.4	0.4	0.4	0.4
$L_{pA,m}$ (dB)		24	24	27	41	28
Acoustical Performance: Max. Loading @ 35 °C Ambient						
$L_{wA,m}$ (B)		7.1	7.1	7.2	7.5	7.2
K_v (B)		0.4	0.4	0.4	0.4	0.4
$L_{pA,m}$ (dB)		61	61	61	63	61

(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). 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 on a standard table, 75 cm above a reflective floor. Data presented here may not be fully compliant with ISO 7779 declaration requirement.

(3)Prominent tones: Criteria of D.6 and D.11 of ECMA-74 (17th ed., Dec. 2019) 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 per C.9.3.2 in ECMA-74 (17th ed., Dec. 2019).

Power Capping

The PowerEdge T360 supports the NVIDIA A2 GPU, which provides enterprise-level performance, therefore, louder acoustic performance is expected. Power capping solutions provides better acoustic performance by limiting GPU performance by up to 20%.

Table 26. Acoustical performance of T360 on power capping

T360	Without Power Capping	With Power Capping
Acoustic Performance	7.5 bels	5.9 bels
Category	Category 5	Category 4

NOTE: PowerEdge T360 with GPU workload is not recommend for an acoustically sensitive environment.

10

Operating Systems and Virtualization

Topics:

- Supported Operating Systems

Supported Operating Systems

The PowerEdge system supports the following operating systems:

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

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

11

Dell OpenManage Systems Management

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

The OpenManage portfolio includes:

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

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

For more information about the entire OpenManage portfolio, see:

- The latest Dell Systems Management Overview Guide.

Topics:

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

Integrated Dell Remote Access Controller (iDRAC)

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

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

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

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

iDRAC9 offers following license tiers:

Table 27. iDRAC9 license tiers

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

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

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

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

Systems Management software support matrix

Table 28. Systems Management software support matrix

Categories	Features	PE mainstream
Embedded Management and In-band Services	iDRAC9 (Express, Enterprise, and Datacenter licenses)	Supported
	OpenManage Mobile	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 28. Systems Management software support matrix (continued)

Categories	Features	PE mainstream
	ServiceNow	Supported
	Ansible	Supported
	Third-party Connectors (Nagios, Tivoli, Microfocus)	Supported
Security	Secure Enterprise Key Management	Supported
	Secure Component Verification	Supported
Standard operating system	Red Hat Enterprise Linux, SUSE, Windows Server 2019 or 2022, Ubuntu, CentOS	Supported (Tier-1)

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Appendix D: Service and support

Topics:

- Default support levels
- Other services and support information

Default support levels

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

Default deployment levels

This system is defaulted to the ProDeploy Dell Server which includes onsite hardware installation and remote software configuration. Optionally, the customer may choose to any of the factory or field deployment offers listed below.

Other services and support information

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

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

Dell deployment services

Dell ProDeploy Infrastructure Suite

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

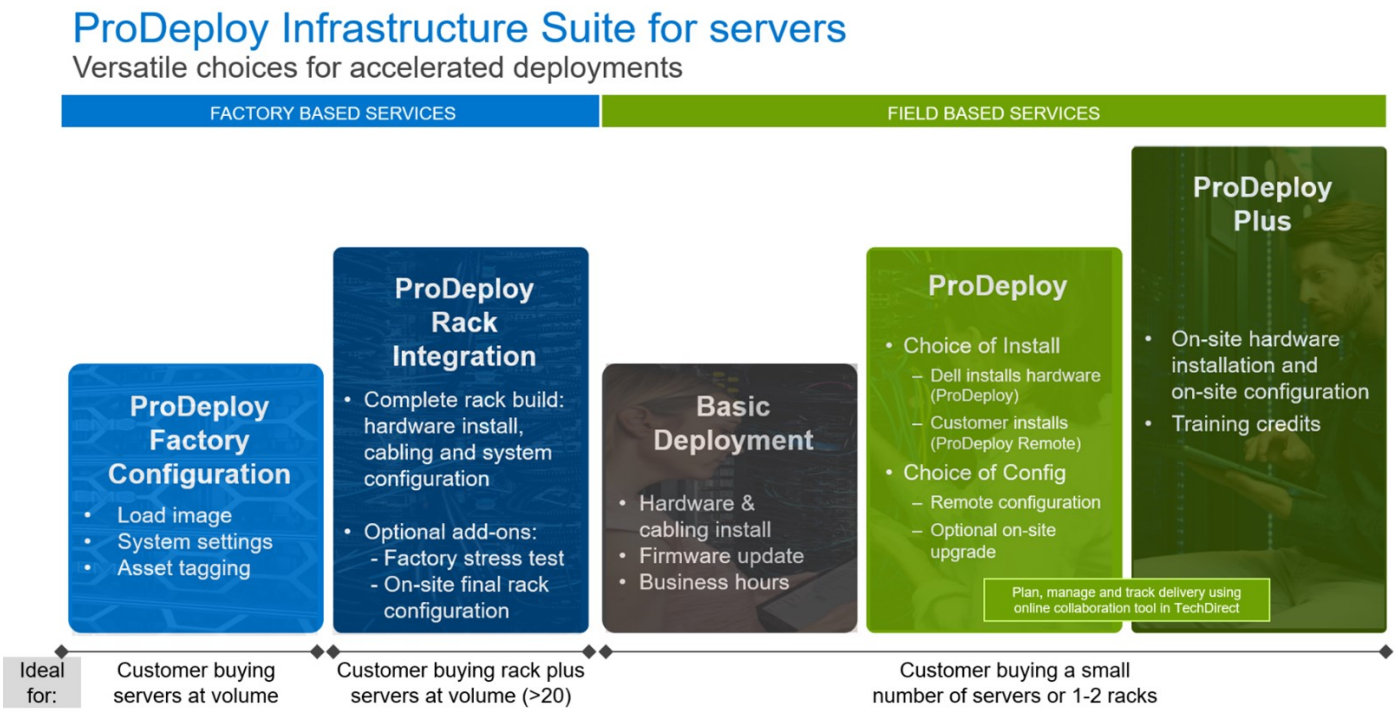


Figure 10. ProDeploy Infrastructure Suite for servers

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

Factory Based Services:

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

Field Based Services:

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

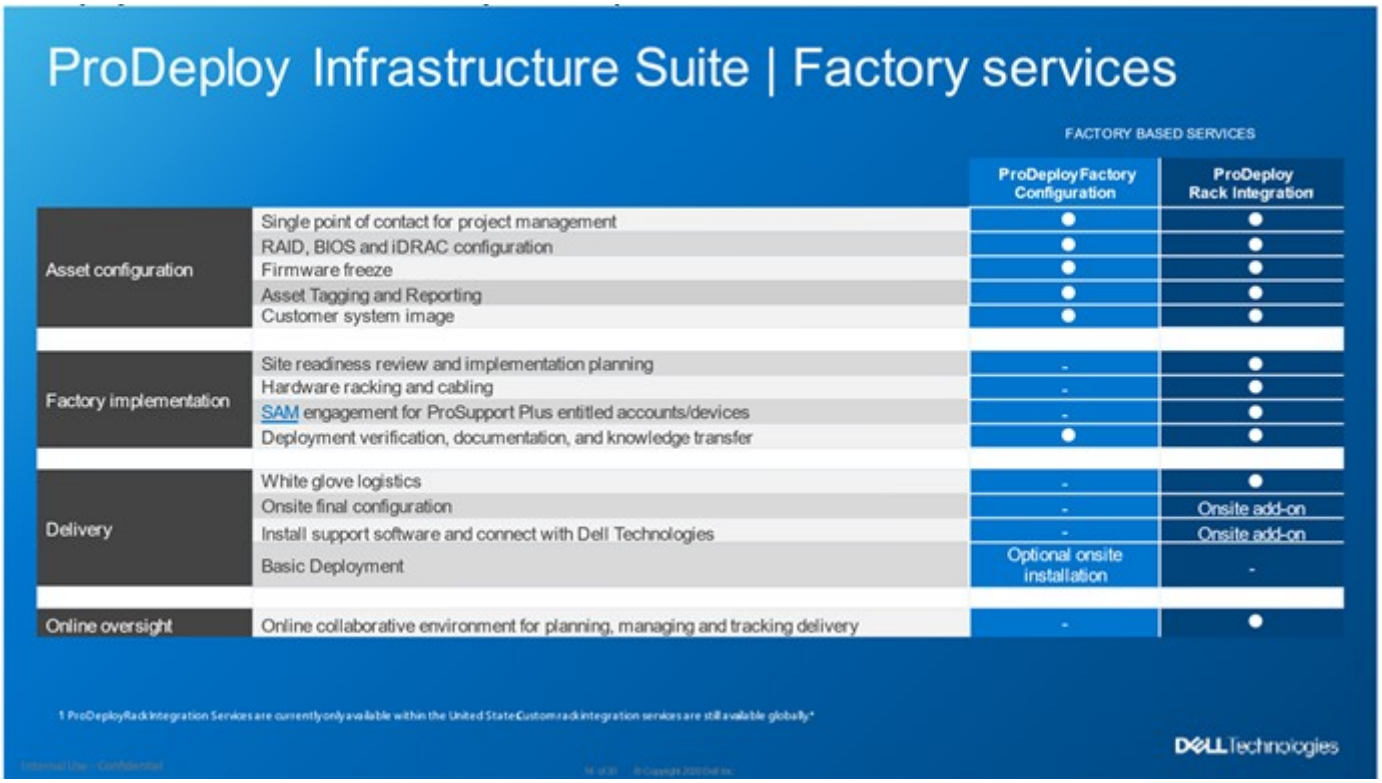


Figure 11. ProDeploy Infrastructure Suite - Factory services

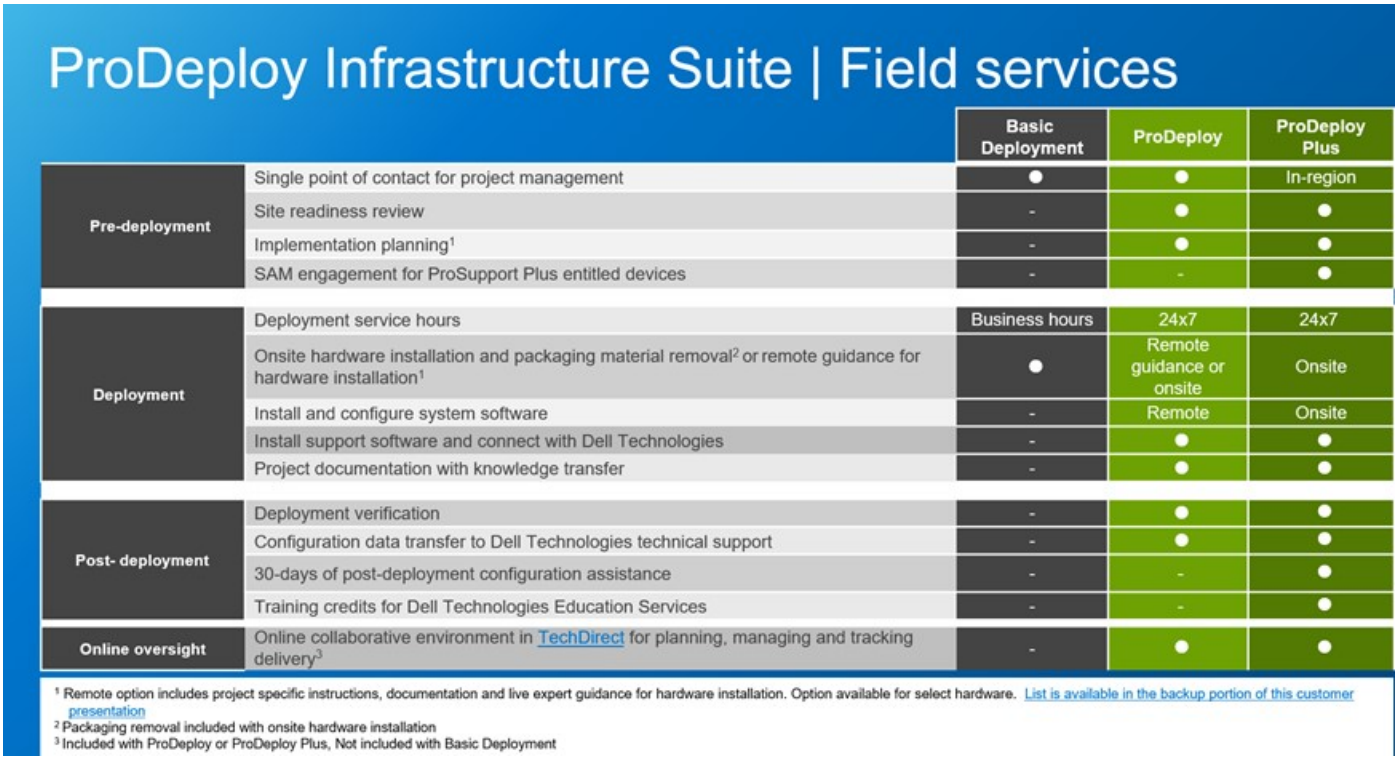


Figure 12. ProDeploy Infrastructure Suite - Field services

Dell ProDeploy Plus for Infrastructure

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

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

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

Dell ProDeploy for Infrastructure

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

Dell Basic Deployment

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

Additional Deployment Services

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

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

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

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

Learn more at Dell.com/HPC-Services.

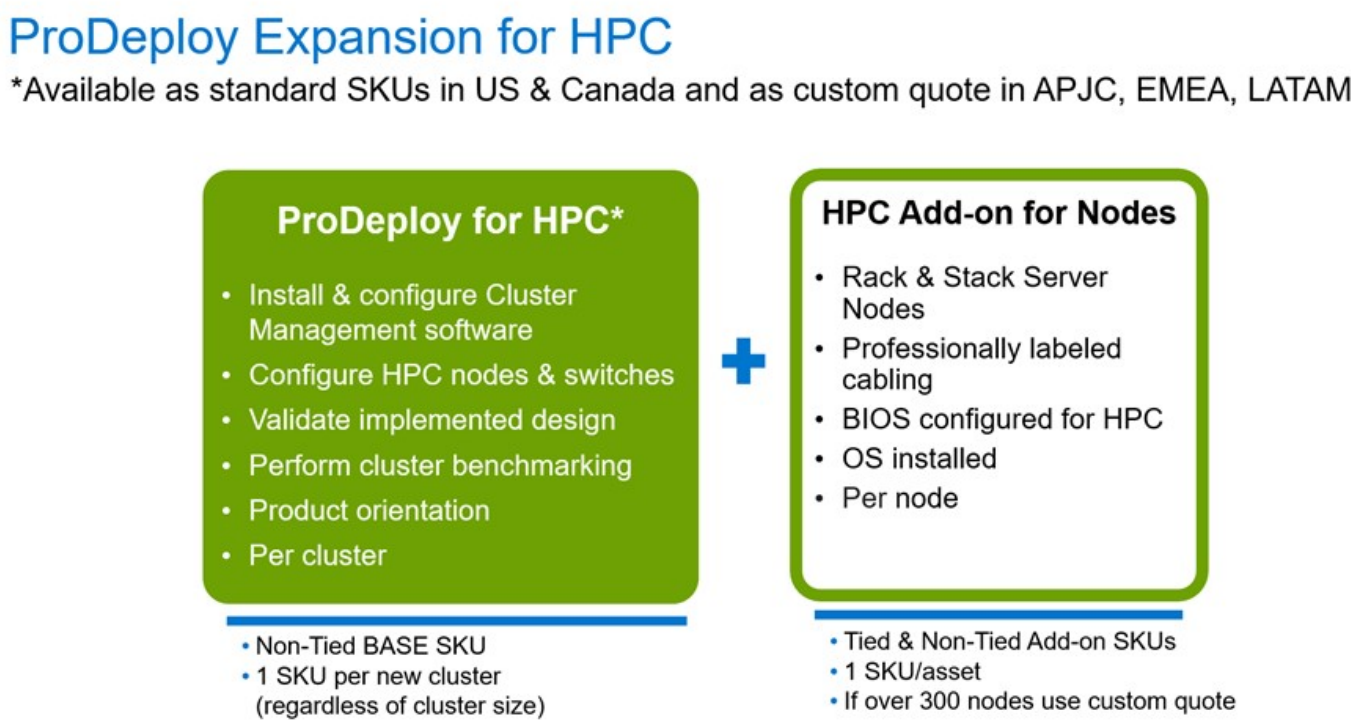


Figure 13. ProDeploy Expansion for HPC

Dell custom deployment Services

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

For more information, see Server Configuration Services.

Dell Residency Services

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

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

Dell Data Migration Services

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

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

Dell Enterprise Support Services

Dell ProSupport Enterprise Suite

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

Table 29. ProSupport Enterprise Suite

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

Dell ProSupport Plus for Enterprise

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

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

Dell ProSupport for Enterprise

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

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

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

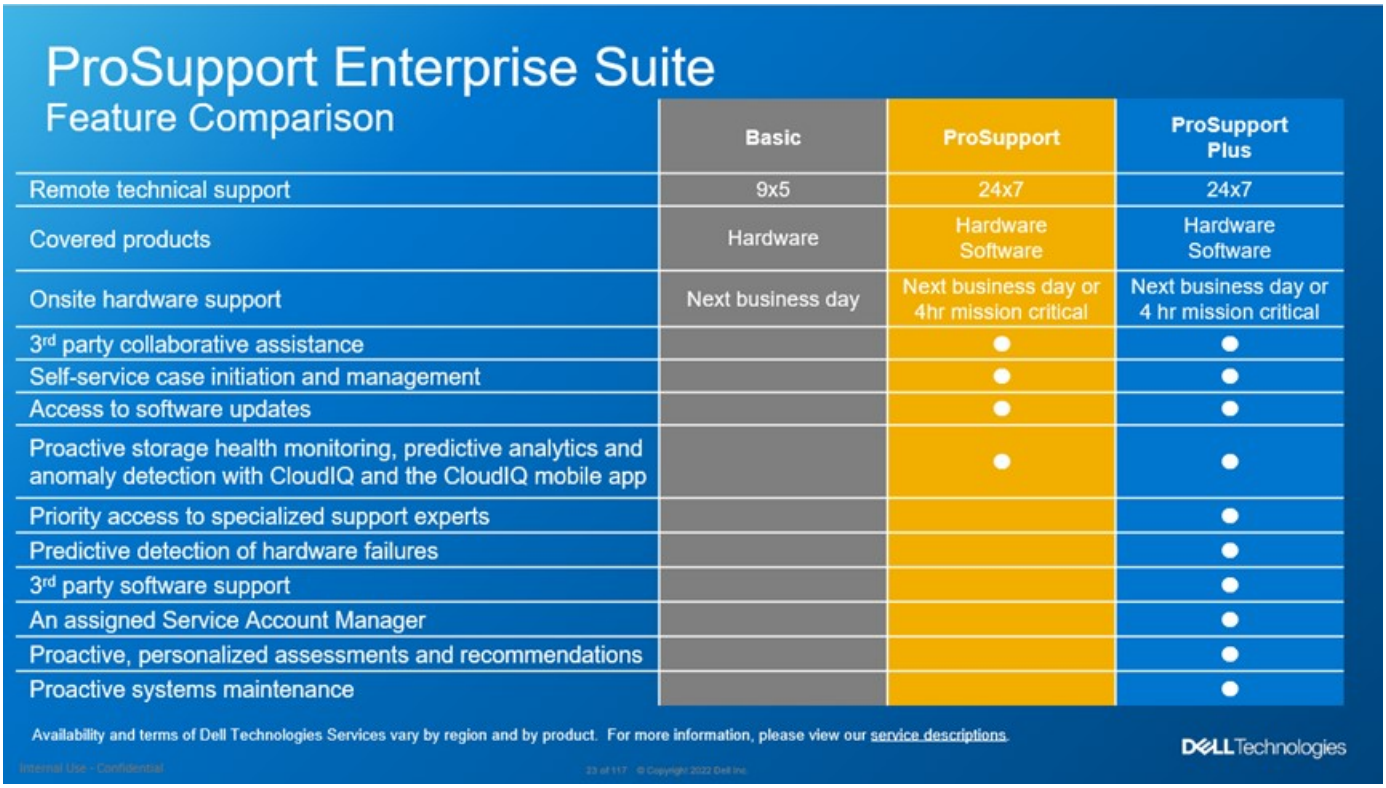


Figure 14. ProSupport Enterprise Suite

Dell ProSupport One for Data Center

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

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

Dell ProSupport Add-on for HPC

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

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

Learn more at Dell.com/HPC-Services.

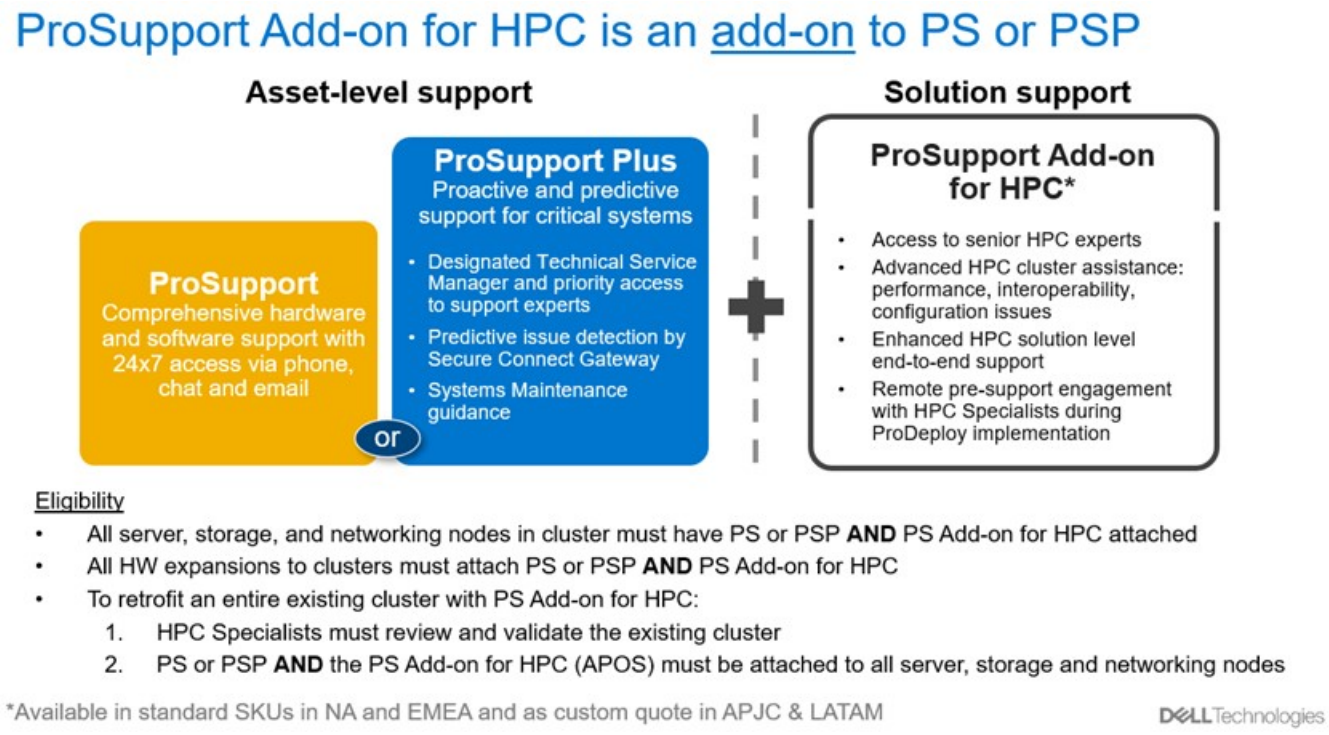


Figure 15. ProSupport Add-on for HPC is an add-on to PS or PSP

Support Technologies

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

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

Enterprise connectivity

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

Benefits include:

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

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

Table 30. Features enabled by connectivity

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

Table 30. Features enabled by connectivity (continued)

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

Get started at DellTechnologies.com/secureconnectgateway.

Dell TechDirect

TechDirect helps boost IT team productivity when supporting Dell systems.

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

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

Register at TechDirect.Dell.com.

Dell Technologies Consulting Services

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

Dell Managed Services

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



Figure 16. Dell Managed Services

Dell Technologies Education Services

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

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

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

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Appendix A: Additional specifications

Topics:

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

Chassis dimensions

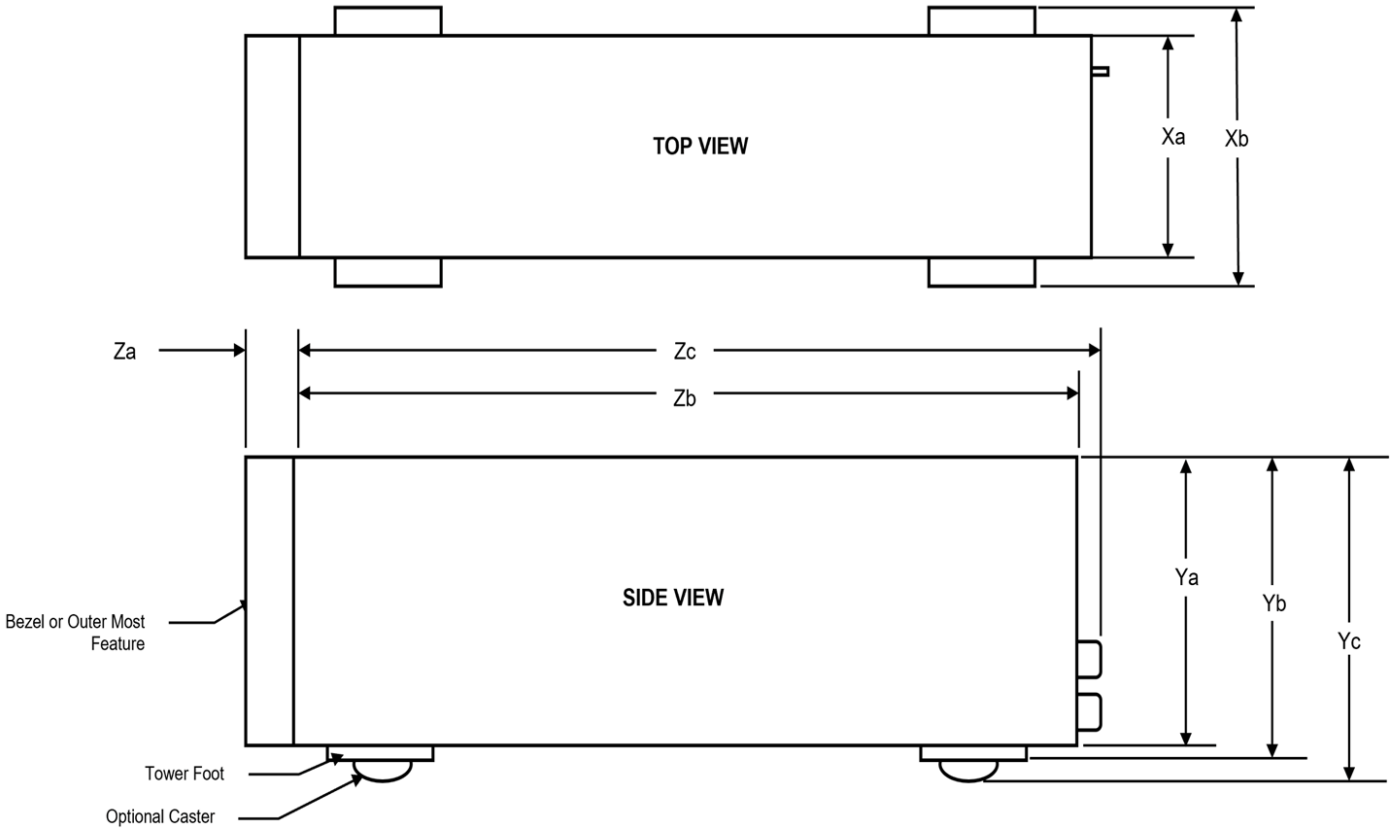


Figure 17. Chassis dimensions

Table 31. Chassis dimension for the system

Drives	Xa	Xb	Ya	Yb	Yc	Za (with bezel)	Za (without bezel)	Zb	Zc
8 x 3.5-inch SAS/SATA HDD/SSD	175.0 mm (6.89 inches)	N/A	369.5 mm (14.55 inches)	382.5 mm (15.06 inches)	N/A	19 mm (0.75 inches)	N/A	560.5 mm (22.07 inches)	562.12 mm (22.13 inches)

System weight

Table 32. PowerEdge T360 system weight

System configuration	Maximum weight (with all drives/SSDs)
A server with fully populated drives	25.10 kg (55.34 lbs)
A server without drives and PSU installed	18.29 kg (40.32 lbs)

NIC port specifications

The PowerEdge T360 system supports up to two 10/100/1000 Mbps Network Interface Controller (NIC) ports embedded on the LAN on Motherboard (LOM).

Table 33. NIC port specification for the system

Feature	Specifications
LOM on Planar	2 x 1 GbE
Network Card	1 GbE x 4, 10 GbE x 2, 10 GbE x 4

Video specifications

The PowerEdge T360 system supports integrated Matrox G200eW graphics controller with 16 MB of video frame buffer.

Table 34. Supported video resolution options

Resolution	Refresh rate (Hz)	Color depth (bits)
640 x 480	60 Hz	32
640 x 480	72 Hz	32
640 x 480	75 Hz	32
640 x 480	85 Hz	32
800 x 600	60 Hz	32
800 x 600	72 Hz	32
800 x 600	75 Hz	32
800 x 600	85 Hz	32
1024 x 768	60 Hz	32
1024 x 768	72 Hz	32
1024 x 768	75 Hz	32
1024 x 768	85 Hz	32
1280 x 800	60 Hz	32
1280 x 800	75 Hz	32
1280 x 1024	60 Hz	32
1280 x 1024	75 Hz	32
1360 x 768	60 Hz	32
1440 x 900	60 Hz	32
1440 x 900	60 Hz (RB)	32

Table 34. Supported video resolution options (continued)

Resolution	Refresh rate (Hz)	Color depth (bits)
1600 x 900	60 Hz (RB)	32
1600 x 900	60 Hz (RB)	32
1600 x 1200	60 Hz	32
1600 x 1200	60 Hz (RB)	32
1680 x 1050	60 Hz (RB)	32
1680 x 1050	60 Hz	32
1920 x 1080	60 Hz	32
1920 x 1080	60 Hz (RB)	32
1920 x 1200	60 Hz	32
1920 x 1200	60 Hz (RB)	32

USB Ports

Table 35. PowerEdge T360 USB port specifications

Front		Rear		Internal (Optional)	
Port type	No. of ports	Port type	No. of ports	Port type	No. of ports
USB 2.0	One	USB 2.0	Three	USB 3.2 Gen1	One
USB 3.2 Gen1	One	USB 3.2 Gen1	Three		

PSU rating

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

Table 36. PSUs High line and Low line ratings

—	450 W Platinum 106 mm	600 W Platinum 60 mm	700 W Titanium 60 mm
AC High Line	450 W	600 W	700 W
AC Low Line	450 W	600 W	N/A
High Line 240 VDC	N/A	600 W	700 W
High Line 200 - 380 VDC	N/A	N/A	N/A
DC -(48 to 60 V)	N/A	N/A	N/A

The PowerEdge T360 supports up to two AC power supplies with 1+1 redundancy, autosensing, and auto switching capability.

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

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

The PowerEdge T360 also supports a single cabled AC power supply unit.

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

Table 37. PSU efficiency level

Efficiency Targets by Load						
Form factor	**Output**	**Class @HLAC**	**10%**	**20%**	**50%**	**100%**
Redundant 60 mm	600 W	Platinum	-	90.00%	94.00%	91.00%
	700 W	Titanium	90.00%	94.00%	96.00%	91.00%
Cabled 106 mm	450 W	Platinum	-	90.00%	94.00%	91.00%

Environmental specifications

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

Table 38. Continuous Operation Specifications for ASHRAE A2

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

Table 39. Continuous Operation Specifications for ASHRAE A3

Temperature	Allowable continuous operations
Temperature range for altitudes <= 900 m (<= 2953 ft)	5–40°C (41–104°F) with no direct sunlight on the equipment
Humidity percent range (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 m (33.8°F/574 Ft) above 900 m (2953 Ft).

Table 40. Continuous Operation Specifications for ASHRAE A4

Temperature	Allowable continuous operations
Temperature range for altitudes <= 900 m (<= 2953 ft)	5–45°C (41–113°F) with no direct sunlight on the equipment
Humidity percent range (non-condensing at all times)	8% RH with -12°C minimum dew point to 90% RH with 24°C (75.2°F) maximum dew point
Operational altitude de-rating	Maximum temperature is reduced by 1°C/125 m (33.8°F/410 Ft) above 900 m (2953 Ft).

Table 41. Continuous Operation Specifications for Rugged Environment

Temperature	Allowable continuous operations
Temperature range for altitudes <= 900 m (<= 2953 ft)	5–55°C (41–131°F) with no direct sunlight on the equipment
Humidity percent range (non-condensing at all times)	8% RH with -12°C minimum dew point to 90% RH with 24°C (75.2°F) maximum dew point
Operational altitude de-rating	Maximum temperature is reduced by 1°C/125 m (33.8°F/410 Ft) above 900 m (2953 Ft).

Table 42. Common Environmental Specifications for ASHRAE A2, A3, A4, and Rugged

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

Table 43. Maximum vibration specifications

Maximum vibration	Specifications
Operating	0.26 G_{rms} at 5 Hz to 350 Hz (all operation orientations)
Storage	1.88 G_{rms} at 10 Hz to 500 Hz for 15 minutes (all six sides tested)

Table 44. Maximum shock pulse specifications

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

Thermal restriction matrix

Table 45. Label reference

Label	Description
STD	Standard
HPR	High performance
HSK	Heat sink

Table 46. Thermal restriction matrix

-	TDP	Number of Cores	Configuration 1: 4x3.5-inch SATA	Configuration 2: 8x3.5-inch SAS/SATA
			HSK/FAN type	HSK/FAN type
CPU TDP	95 W	8	HPR/STD	HPR/STD
	95 W	6	HPR/STD	HPR/STD
	80 W	8	STD/STD	STD/STD
	80 W	6	STD/STD	STD/STD
	70 W	4	STD/STD	STD/STD
	65 W	8	STD/STD	STD/STD
	65 W	6	STD/STD	STD/STD
	55 W	4	STD/STD	STD/STD
	46 W	2	STD/STD	STD/STD

Table 46. Thermal restriction matrix (continued)

-	TDP	Number of Cores	Configuration 1: 4x3.5-inch SATA	Configuration 2: 8x3.5-inch SAS/SATA
			HSK/FAN type	HSK/FAN type
	35 W	2	STD/STD	STD/STD

NOTE: If BOSS or A2 GPU or a PCIe card >25 W and Broadcom 10 G NIC is installed, an HPR PCI fan and PCIe shroud are needed for both configurations.

Thermal air restrictions

ASHRAE A3/A4 environment

- The operating temperature is for a maximum altitude of 950 m for ASHRAE A3/A4 Cooling
- Redundant power supplies are required
- BOSS module is not supported
- Cooling redundancy is not supported due to single fan in the system (cooling zone is separated)
- A2 GPU is not supported
- Non-Dell qualified peripheral cards and /or peripheral cards greater than 25 W are not supported

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Appendix A. Standards compliance

The system conforms to the following industry standards.

Table 47. Industry standard documents

Standard	URL for information and specifications
ACPIAdvance Configuration and Power Interface Specification, v2.0c	https://uefi.org/specsandtesttools
Ethernet IEEE 802.3-2005	https://standards.ieee.org/
HDGHardware Design Guide Version 3.0 for Microsoft Windows Server	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 Rev. 2.0 and 3.0	pcisig.com/specifications/pciexpress
PMBus Power System Management Protocol Specification, v1.2	http://pmbus.org/Assets/PDFS/Public/PMBus_Specification_Part_I_Rev_1-1_20070205.pdf
SAS Serial Attached SCSI, v1.1	http://www.t10.org/
SATA Serial ATA Rev. 2.6; SATA II, SATA 1.0a Extensions, Rev. 1.2	sata-io.org
SMBIOS System Management BIOS Reference Specification, v2.7	dmtf.org/standards/smbios
TPM Trusted Platform Module Specification, v1.2 and v2.0	trustedcomputinggroup.org
UEFI Unified Extensible Firmware Interface Specification, v2.1	uefi.org/specifications
USB Universal Serial Bus Specification, Rev. 2.7	usb.org/developers/docs

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Appendix C Additional resources

Table 48. Additional resources

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