Dell EMC PowerEdge T440

The Dell EMC PowerEdge T440 tower server is quiet, powerful and expandable. The T440 can drive a wide variety of office workloads with flexible performance and capacity options in a worry-free infrastructure.

Notes, cautions, and warnings

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

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

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

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System overview

The Dell EMC PowerEdge T440 tower server delivers powerful 2-socket performance, expandability and quiet operations to your small-to mid-sized business (SMB) and remote office/branch office (ROBO) sites. The T440 brings you flexibility with a rackable tower form factor, short 22-inch depth and quiet acoustics that are right for your office or data center.

The PowerEdge T440 is an excellent fit for a wide range of office workloads, including work group collaboration and productivity applications, mail and messaging, file and print serving, and web serving.

A versatile workhorse

Featuring the powerful performance of the Intel™ Xeon™ processor Scalable family, and complemented by substantial memory capacity and broad I/O bandwidth, the T440 provides high, balanced performance and built-in room for growth. Its 16 DIMM slots and five PCI Express® (PCIe) 3.0 slots provide memory density and wide I/O bandwidth to support both memory and data-intensive applications and databases.

Built-in capacity for up to 4 or 8x3.5 inch or 16x2.5 inch hard drives accommodate data storage as your business or organization grows. These combined technology features are highly beneficial when implementing consolidated and virtualized environments.

To protect your virtualized workloads, the PowerEdge T440 offers dual SD media making your hypervisors redundant and failsafe. Other reliability and availability features include hot-plug hard drives, both hardware and software RAID options, redundant fans and hot-plug power supplies.

New technologies

The following are the new technologies featured on the PowerEdge T440:

Table 1. New technologies

New technology	Detailed description
Intel Xeon Scalable Processor	The processor product family has embedded PCIe lanes for improved I/O performance.
	• 14nm process technology
	• Intel Ultra Path Interconnect (UPI)
	• Up to 14 cores
	• Up to 3.7 GHz
	• Max TDP: 110W
	For details, see the Processor section.
Intel C620 series chipset	Intel Platform Controller Hub (PCH).
2666 MT/s DDR4 memory	The Intel Xeon Scalable Processor product family that supports 2666 MT/s memory and sixteen DIMMs.
	The T440 system supports:
	• CPU1 support 10 DDR4 DIMMs 2:2:1
	• CPU2 support 6 DDR4 DIMMs 1:1:1

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New technology	Detailed description
	• RDIMMs up to 32GB & LRDIMMs up to 64GB (available post-release) For details, see the Memory section.
iDRAC9 with Lifecycle Controller	The new embedded systems management solution for the Dell EMC systems features hardware and firmware inventory and alerting, data center level power monitoring, and faster performance. For details, see the Dell EMC OpenManage systems management section.

System features

Compared to previous generations, the PowerEdge T440 offers faster processing power and advanced system management.

The T440 system is a powerhouse 2S/5U tower system, which emphasizes performance and reliability in areas such as virtualization, power, thermal and systems management, and usability. It is designed for SMB and ROBO sites that require a balance of capacity and performance.

Product comparison

Table 2. Feature comparison

5U Tower Feature	PowerEdge T430	PowerEdge T440
Processors	Intel Xeon processor E5- 2600 v4	Intel Xeon processor Scalable Family
Chipset	Intel C610	Intel C620
Memory	12x DDR4 RDIMM/LRDIMM	16x DDR4 RDIMM/LRDIMM
Chassis	Storage design modularity • Up to four 3.5 inch cabled hard drives • Up to eight 3.5 inch hot-swappable hard drives • Up to sixteen 2.5 inch hot-swappable hard drives • Up to 2 GPUs	Storage design modularity • Up to four 3.5 inch cabled hard drives • Up to eight 3.5 inch hot-swappable hard drives • Up to sixteen 2.5 inch hot-swappable hard drives • Up to 1 GPU
PCIe slots	• 1 x PCIe Gen2 (4 lanes) • 1x PCIe Gen2 (1 lanes) • 2x PCIe Gen3 (16 lanes) • 2x PCIe Gen3 (8 lanes)	• 2x PCIe Gen3 (4 lanes) • 1x PCIe Gen3 (16 lanes) • 2x PCIe Gen3 (8 lanes)
RAID Controller	S130, H330, H730, H730P, H810/H830 (ext)	S140, H330P, H730P, HBA330, H740P, H840 and 12 Gbps Ext SAS HBA
Embedded NIC	2x 1GbE (LOM : BCM5720)	2x 1GbE (LOM : BCM5720)
Power Supplies	• 495W AC Platinum • 750W AC Platinum • 750W AC Titanium • 750W Mixed Mode HVDC Gold (for China only) • 1100W DC • 1100W Mixed Mode HVDC Platinum (for China and Japan only) • 1100W AC Platinum • 1600W Platinum	• 450W AC Bronze (cabled) • 495W AC Platinum • 750W AC Platinum • 750W Mixed Mode HVDC Platinum (for China only) • 1100W DC • 1100W Mixed Mode HVDC Platinum (for China and Japan only) • 1100W AC Platinum
Remote Management	iDRAC8	iDRAC9

5U Tower Feature	PowerEdge T430	PowerEdge T440
TPM	TPM China, TPM1.2, TPM2.0	TPM China, TPM1.2, TPM2.0
iDRAC Direct front port	Micro USB	USB type A
Fan	Up to two fans supported • Internal Fan (1X4 type) • External Fan (1X5 type)	Up to two fans supported • Internal Fan (1X4 type) • External Fan (1X5 type)
IDSDM Module	Internal Dual SD Module (IDSDM)	Internal Dual SD Module (IDSDM) and vFlash
BOSS Module	None	M.2 SATA interface
PERC	PERC 9	PERC 9 and 10
ODD/TBU	TBU and ODD via 7-pin connectors	ODD via 7-pin connector
On board PCH SATA Connectors	2x Mini SAS_HDs	2x NPIOs

Chassis views and features

The PowerEdge T440 is a two socket, 5U tower system that is available in three different chassis configurations:

- 4 hard drive chassis
- 8 hard drive chassis
- 16 hard drive chassis

Front panel view and features
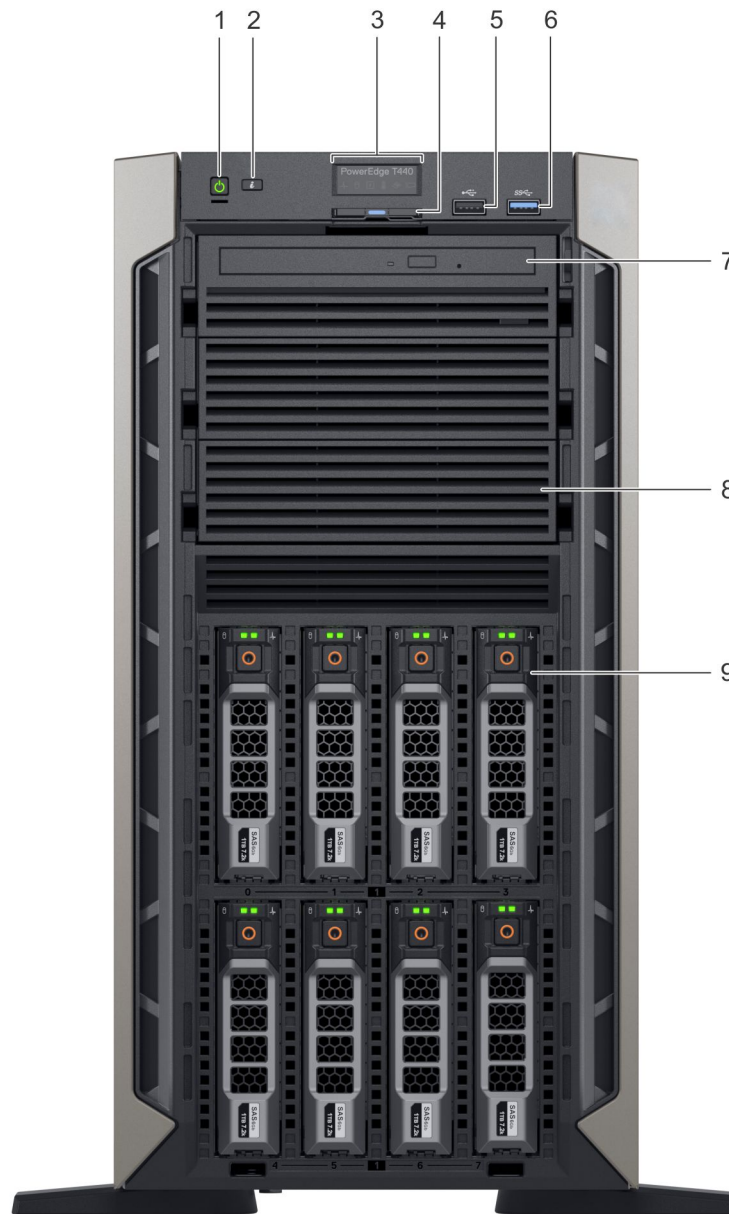
Figure 1. Front panel view of a 8 x 3.5-inch hot swappable drive system

Table 3. Front panel features

Item	Components - Indicator, Button, or Connector	Icon	Description
1	Power button	⏻	Indicates if the system is turned on or off. Press the power button to manually turn on or off the system.

Item	Components - Indicator, Button, or Connector	Icon	Description
		ⓘ	**NOTE: Press the power button to gracefully shut down an ACPI-compliant operating system.**
2	System identification button	ⓘ	The System Identification (ID) button is available on the front and back of the systems. Press the button to identify a system in a rack by turning on the system ID button. You can also use the system ID button to reset iDRAC and to access BIOS using the step through mode.
3	Status LED indicator panel	N/A	Indicate the status of the system. For more information, see the Status LED indicators section.
4	Information tag	N/A	The Information Tag is a slide-out label panel that contains system information such as Service Tag, NIC, MAC address, and so on. If you have opted for the secure default access to iDRAC, the Information tag also contains the iDRAC secure default password.
5	USB port 2.0	⊷	The USB ports are 4-pin, 2.0-compliant. These ports enable you to connect USB devices to the system.
6	USB port 3.0	ss⊷	The USB port is USB 3.0 compliant.
7	Optical drive bay	N/A	Enable you to install drives that are supported on your system. For more information about drives, see the Technical specifications section.
8	Drive slot	N/A	Enables you to install TBUs for 8x and 16x backplane configurations, or drive blank in the empty drive slot to maintain proper system cooling.
9	Physical drives	N/A	3.5 inch drives and 2.5 inch drives/SSDs.

Back view of the system

The back panel of a PowerEdge system contains access to I/O connectors for both embedded and add-in devices, including networking, video, serial, USB, system ID, and system management access ports. Most add-in PCI cards are accessible through the back panel. It is also the default location for power supply units (PSU), including the points for AC connections.

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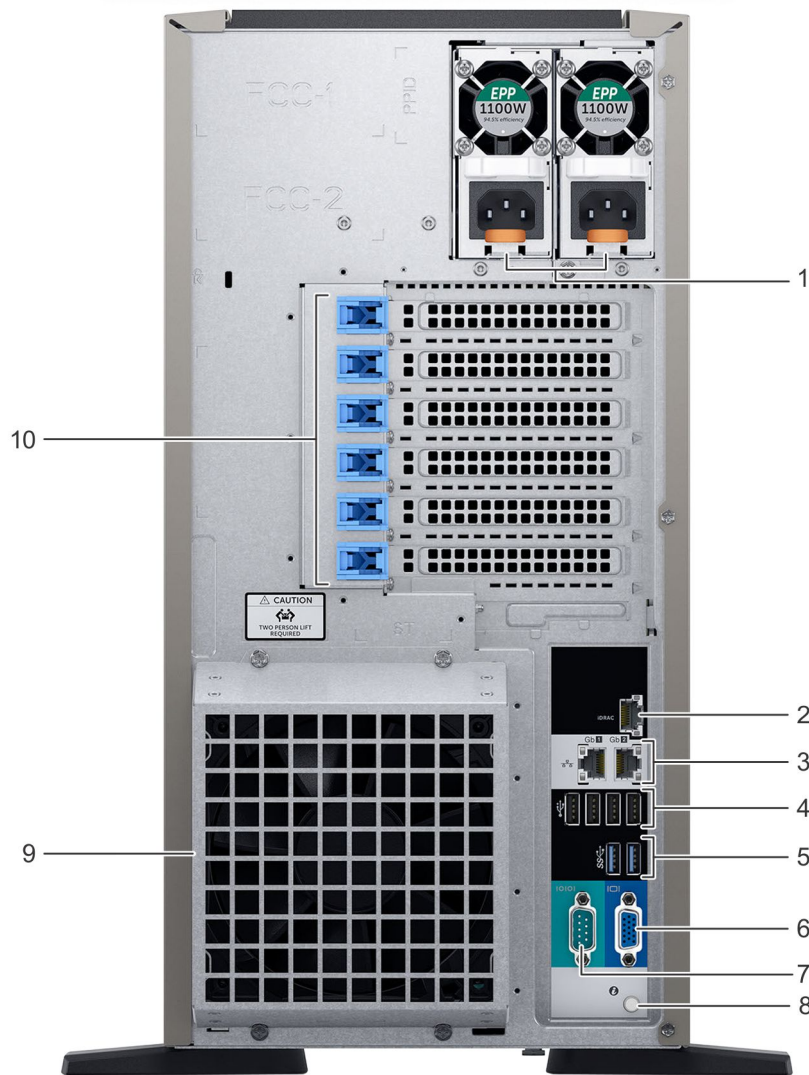
Figure 2. Back view of the system with optional redundant cooling fan

Table 4.

Item	Ports, panels, or slots	Icon	Description
1	Power supply unit (2)	N/A	For more information about the PSU configurations, see the Technical Specifications section
2	iDRAC9 Enterprise port	iDRAC	Enables you to remotely access iDRAC. For more information, see the iDRAC User's Guide at **Dell.com/idracmanuals**.
3	NIC port (2)	🖧	The NIC ports are integrated on the system board provide network connectivity. For more information about the supported configurations, see the Technical specifications section.
4	USB 2.0 port (4)	⛌	The USB ports are 4-pin, 2.0-compliant. These ports enable you to connect USB devices to the system.
5	USB 3.0 port (2)	SS⛌	The USB ports are 9-pin and 3.0-compliant. These ports enable you to connect USB devices to the system.

Item	Ports, panels, or slots	Icon	Description
6	VGA port	▯	Enables you to connect a display device to the system. For more information, see the Technical specifications section.
7	Serial port	IOIOI	Enables you to connect a serial device to the system. For more information, see the Technical specifications section.
8	System identification button	ⓘ	The System Identification (ID) button is available on the front and back of the systems. Press the button to identify a system in a rack by turning on the system ID button. You can also use the system ID button to reset iDRAC and to access BIOS using the step through mode.
9	External cooling fan (optional)	N/A	Enables you to connect an optional redundant cooling fan.
10	PCIe expansion card slot	N/A	The expansion slot(s) enable you to connect PCI Express expansion cards. For more information on the expansion cards that are supported on your system, see the Expansion card guidelines.

Internal chassis view

The chassis design of the PowerEdge T440 is optimized for easy access to components and for efficient cooling. The PowerEdge T440 supports up to 16 DIMMs, two processors, hot-plug redundant fans, system board and hard drive bays, and many other components and features. For more system views, see the Dell EMC PowerEdge T440 Installation and Service Manual at Dell.com/Support/Manuals.
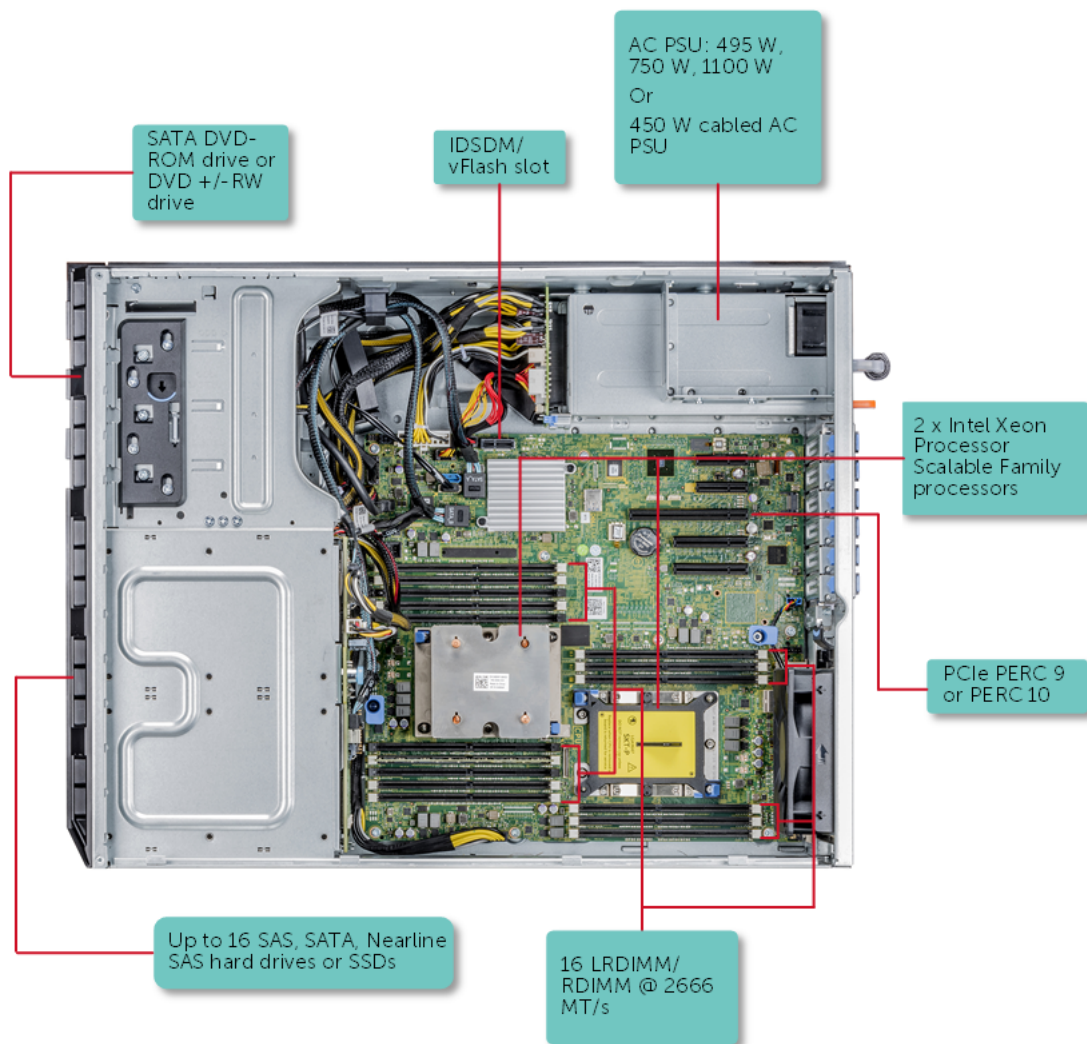
Figure 3. Supported configurations for a PowerEdge T440 system

Security features

The latest generation of PowerEdge servers has the features listed in the table to help ensure the security of your data center.

Table 5. Security features

Security feature	Description
Cover latch	A tooled latch is integrated in the top cover to secure it to the system.
Bezel	A standard bezel is an optional metal bezel mounted to the chassis front. A lock on the bezel protects unauthorized access to hard drives.
TPM	The Trusted Platform Module (TPM) is used to generate/store keys, protect/authenticate passwords, and create/store digital certificates.
Power-off security	BIOS has the ability to disable the power button function.

Processors

The PowerEdge T440 server features the exceptional performance, value, and power efficiency of the Intel Xeon Scalable Processor. These processors provide high performance no matter what your constraint—floor space, power, or budget—and on workloads that range from the most complicated scientific exploration to crucial web-serving and infrastructure applications. In addition to providing raw performance gains, improved I/O is also made possible with Intel Integrated I/O, which can reduce latency by adding more lanes and doubling bandwidth. This helps to reduce network and storage bottlenecks, which improves the processor performance capabilities.

Processor features

The Intel Xeon Processor Scalable Family provides the foundation for a powerful datacenter platform. The key features are as follows:

- Higher Per-Core Performance: Up to 28 cores, delivery high performance and scalability for compute-intensive workloads across compute, storage & network usages
- Greater Memory Bandwidth/Capacity: 50% increased memory bandwidth and capacity. 6 memory channels vs. 4 memory channels of previous generation for memory intensive workloads
- Expanded I/O: 48 lanes of PCIe 3.0 bandwidth and throughput for demanding I/O-intensive workloads
- Intel Ultra Path Interconnect (UPI): Up to three Intel UPI channels increase scalability of the platform to as many as eight sockets, as well as improves inter-CPU bandwidth for I/O intensive workloads
- Intel Advanced Vector Extensions 512 (AVX-5120): With double the flops per clock cycle compared to previous generation Intel AVX2. Intel AVX-512 boosts performance and throughput for the most demanding computational tasks in applications
- Security without Compromise: Near-zero encryption overhead enables higher performance on all secure data transactions

Supported processors

Table 6. Supported processors for PowerEdge T440

Medal	Processor	Frequency (GHz)	Cores/ Threads	Cache (M)	UPI (GT/s)	Turbo	TDP (W)
Gold	5122	3.6	4/8	16.5	10.4	Y	105
Gold	5120	2.2	14/28	19	10.4	Y	105
Gold	5118	2.3	12/24	16	10.4	Y	105
Gold	5115	2.4	10/20	14	10.4	Y	85
Silver	4116	2.1	12/24	16	9.6	Y	85
Silver	4114	2.2	10/20	14	9.6	Y	85
Silver	4112	2.6	4/24	8.25	9.6	Y	85
Silver	4110	2.1	8/16	11	9.6	Y	85
Silver	4109T	2.0	8/16	11	9.6	Y	70
Silver	4108	1.8	8/16	11	9.6	Y	85
Bronze	3106	1.7	8/8	11	9.6	N	85

| Bronze | 3104 | 1.7 | 6/6 | 8 | 9.6 | N | 85 |

Processor configurations

The PowerEdge T440 supports up to two processors and up to 14 cores per processor.

Single CPU configuration

The PowerEdge T440 functions normally if there only a single processor placed in the CPU1 socket. However, CPU and memory blanks associated with CPU2 are required to be populated to maintain thermal efficiency. The system will not boot if only CPU2 socket is populated.

Processor installation

For processor installation instructions, see the Dell EMC PowerEdge T440 Installation and Service Manual at Dell.com/Support/ Manuals.

GPU support

The PowerEdge T440 supports GPU technology, providing accelerated performance for a variety of applications.

GPU Cards

The T440 supports one full-length, single-width or one full-length, single-width GPU. GPU cards are available through certified factory installation (CFI) or field upgrade only.

Each GPU supports up to 8 GB of dedicated GDDR5 memory and is actively cooled. Each GPU has one or two power connectors to meet the high demand for power delivery. The power connectors are located on the back of the card. GPU configurations require 2 processors.

Chipset

The PowerEdge T440 systems use the Intel C620 chipset, which provides extensive I/O support.

The functions and capabilities of the Intel C620 chipset include:

- ACPI Power Management Logic Support, Revision 4.0a
- PCI Express Base Specification, Revision 3.0
- Integrated Serial ATA host controller, supports data transfer rates of up to 6 GB/s on all ports
- xHCI USB controller with SuperSpeed USB 3.0 ports
- Direct Media Interface
- Enhanced Serial Peripheral Interface
- Flexible I/O - Allows some high-speed I/O signals to be configured as the PCIe root ports, the PCIe uplink for use with certain PCH, SATA (and sSATA), or USB 3.0.
- General Purpose Input Output (GPIO)
- Low Pin Count interface, interrupt controller, and timer functions
- System Management Bus Specification, Version 2.0
- Integrated Clock Controller, Real Time Clock Controller
- Intel® High Definition Audio and Intel® Smart Sound Technology
- Integrated 10/1 Gb Ethernet
- Supports Intel® Rapid Storage Technology Enterprise
- Supports Intel® Active Management Technology and Server Platform Services
- Supports Intel® Virtualization Technology for Directed I/O

- Supports Intel® Trusted Execution Technology
- JTAG Boundary Scan support
- Intel® QuickAssist Technology
- Intel® Trace Hub for debug

For more information, visit Intel.com

Memory

The PowerEdge T440 supports up to 768 GB of memory with 16 DIMMs, and at speeds up to 2666 MT/s, providing high performance in various applications. High memory density ensures that there is no compromise in virtualization.

The PowerEdge T440 supports both registered DIMMs (RDIMM) and load-reduced DIMMs (LRDIMMs), which use a buffer to reduce memory loading and provide greater density, allowing for the maximum platform memory capacity.

The system supports:

- Up to six channels with two DPC and total 16 DIMMs
- DDR4 RDIMM/LRDIMM
- Only registered ECC DDR4 DIMMs
- DDR4 speeds up to 2666 MT/s

DIMMs supported

Table 7. Memory technologies

Feature	RDIMM	LRDIMM
Register	Yes	Yes
Buffer	No	Yes
Frequencies	Up to 2666 MT/s	Up to 2666 MT/s
Ranks supported	Single or dual rank	Quad rank
Capacity per DIMM	4 GB, 8 GB, 16 GB or 32 GB	64 GB (available post-release)
Maximum DIMMs per channel	2	1, 2
DRAM technology	x4 or x8	x4
Temperature sensor	Yes	Yes
Error Correction Code (ECC)	Yes	Yes
Single Device Disable Code (SDDC)	Yes	Yes
Address parity	Yes	Yes

Memory population guidelines

Both systems support a flexible memory configuration, according to the following population guidelines:

- Speed: If DIMMs of different speeds are mixed, all channels across all processors operate at the common frequency of the slowest DIMM.
- DIMM type: Maximum two types of DIMMs allowed per system and RDIMMs are supported. RDIMM with LRDIMM cannot be mixed.
- DIMMs with different data widths can be mixed. For 14G, DIMMs with x4 and x8 data widths are supported and mixing is allowed.

- Can mix DIMMs with different capacities:

  - Population rules require the largest capacity DIMM be placed first (slot A1 populated first, then A2, and so on. The second CPU mirrors the first CPU population).
  - Maximum of two different capacity DIMMs allowed in a system
- Can mix DIMMs with different ranks:

  - Maximum of two different rank DIMMs allowed in a system

For more information on memory configuration and population, see the Dell EMC PowerEdge T440 Installation and Service Manual at Dell.com/Support/Manuals.

Memory RAS features

Reliability, Availability, and Serviceability (RAS) features help keep the system online and operational without significant impact to performance. RAS can decrease data loss and crashing due to errors. RAS helps in rapid, accurate diagnosis of faults that requires servicing.

Table 8. Supported RAS features

Feature	Description
Dense configuration optimized profile	Increased memory reliability can be a result from this selectable platform profile that adjusts parameters to reduce faults regarding refresh rates, speed, temperature, and voltage.
Memory demand and patrol scrubbing	Demand scrubbing is the ability to write corrected data back to the memory once a correctable error is detected on a read transaction. Patrol scrubbing proactively scans the system memory, detecting and repairing correctable errors.
Recovery from Single Device Data Correction (SDDC)	Single Device Data Correction provides error checking and correction that protects against any single memory chip failure and multi-bit errors from any portion of a single memory chip.
Failed DIMM isolation	This feature helps identify a specific failing DIMM channel pair, enabling the user to replace only the failed DIMM pair.
Memory mirroring	Memory mirroring is a method of keeping a duplicate (secondary or mirrored) copy of the contents of memory as a redundant backup for use if the primary intrasocket memory fails. The mirrored copy of the memory is stored in memory of the same processor socket.
Memory address parity protection	This feature helps detect transient errors on the address lines of the DDR channel.
Memory sparing—rank	Memory sparing allocates one rank per channel as a spare. If excessive correctable errors occur in a rank or channel, they are moved to the spare area while the operating system is running to prevent the errors from causing an uncorrectable failure.
Memory thermal throttling	This feature helps to optimize power/performance and can also be used to prevent DIMMs from overheating.

For information on memory mirroring and sparing configurations, see the Dell EMC PowerEdge T440 Installation and Service Manual at Dell.com/Support/Manuals.

Storage

The PowerEdge T440 provides scalable storage that allows you to adapt to your workload and operational requirements. With comprehensive storage options, the PowerEdge T440 offers various internal and external storage controllers, drive types, and different chassis and backplanes for varied numbers of drives. Features such as PERC H740P, and H840 RAID controllers provide vastly accelerated performance compared to the previous technologies.

Storage controllers

The new PERC Controller offerings is a heavy leverage of previous generation PERC family. The Value Performance level controllers, carried-over from previous generation to PowerEdge T440, are a high-end offering that drives Input/Output Operations Per Second (IOPs) performance and enhance the SSD performance.

> NOTE: On-board SATA ports (S140) are not accessible if mini PERC is installed.

Table 9. PERC series controller offerings

Performance Level	Controller and Description
Entry	S140-Software RAID SATA
Value	H330 Internal, 12Gb SAS HBA-external
Value Performance	H730P
Premium Performance	H740P and H840

Supported drives

Table 10. Supported drives - SAS and SATA

Form factor	Capacities
2.5-inch	• EC, HDD, 12Gbps SAS, 2.5, 10K, 512n, 300GB, 600GB
	• EC, HDD, 12Gbps SAS, 2.5, 15K, 512n, 300GB
	• EC, HDD, 12Gbps SAS, 2.5, 15K, 512e, Turbo, 900GB
	• EC, HDD, 12Gbps SAS, 2.5, 7.2K, 512n, 1TB
	• EC, HDD, 12Gbps SAS, 2.5, 7.2K, 4096n, 2TB
	• EC, HDD, 12Gbps SAS, 2.5, 10K, 512n, 300GB, 600GB
	• EC, HDD, 12Gbps SAS, 2.5, 10K, 512e, 1.8TB
	• EC, HDD, 12Gbps SAS, 2.5, 15K, 512n, 600GB
	• EC, HDD, 12Gbps SAS, 2.5, 15K, 4096n, 900G
	• EC, HDD, 12Gbps SAS, 2.5, 10K, 512n, FIPS-140, 1.2TB
	• EC, HDD, 6Gbps SATA, 2.5, 7.2K, 512n, 1TB
	• EC, SSD, 12Gbps SAS, 2.5, 512n, MU, 400GB, 480GB
	• EC, SSD, 12Gbps SAS, 2.5, 512n, RI, 960GB
	• EC, SSD, 12Gbps SAS, 2.5, 512n, WI, 400GB
	• EC, SSD, 12Gbps SAS, 2.5, 512n, FIPS-140, MU, 800G
	• EC, SSD, 6Gbps SATA, 2.5, 512n, RI, 480GB

Form factor	Capacities
	• EC, SSD, 6Gbps SATA, 2.5, 512n, MU, 240GB
	• EC, SSD, 6Gbps SATA, 2.5, 512n, Boot, 120GB
	• EC, SSD, 12Gbps SAS, 2.5, 512n, MU, 960GB
	• EC, SSD, 6Gbps SATA, 2.5, 512n, MU, 200GB
	• EC, SSD, 6Gps SATA, 2.5 512n, RI, 480G
3.5-inch	• EC, HDD, 12Gbps SAS, 3.5, 7.2K, 512n, 1TB, 2TB
	• EC, HDD, 12Gbps SAS, 3.5, 7.2K, 4096n, 8TB
	• EC, HDD, 12Gbps SAS, 3.5, 7.2K, 512e, 10TB
	• EC, HDD, 12Gbps SAS, 3.5, 7.2K, 512n, FIPS-140, 4TB
	• EC, HDD, 6Gbps SATA, 3.5, 7.2K, 512n, 1TB, 2TB
	• EC, HDD, 6Gbps SATA, 3.5, 7.2K, 512e, 8TB, 10TB
	• EC, HDD, 12Gbps SAS, 3.5, 7.2K, 512e, 8TB
	• EC, HDD, 12Gbps SAS, 3.5, 7.2K, 4096n, 8TB
	• EC, HDD, 6Gbps SATA, 3.5, 7.2K, 512n, 1TB
	• EC, HDD, 6Gbps SATA, 3.5, 7.2K, 512e, 8TB

IDSDM or vFlash card

In the PowerEdge T440 system, the IDSDM module contains the Internal Dual SD Module (IDSDM) and vFlash card that are combined into a single card module. The following are options available for PowerEdge T440 system:

• vflash only
• vflash + IDSDM

The IDSDM with vFlash module has a dedicated slot at the back of the system chassis. This is a Dell EMC-proprietary PCIe x1 slot that uses a USB 3.0 interface to host. In the PowerEdge T440 systems, the IDSDM and vFlash card size changes from SD to microSD and the supported capacity for IDSDM microSD cards are 16 GB, 32 GB, or 64 GB, while for vFlash the capacity is 16 GB only. The write-protect switch is built onboard on the IDSDM module.

Boot Optimized Storage Subsystem (BOSS)

BOSS is offered as a means of booting 14G servers to a full OS in the following scenarios:

• A solution such as IDSDM may be desired, but the target OS is a full OS (not just hypervisor).
• The user does not wish to trade off the standard hot-plug hard drive slot for OS install.
• A separate hardware RAID is required for OS boot so that data drives can be in Passthrough mode with a HBA.

BOSS is a PCIe card located at the rear of the system to support up to two 80mm or 110mm M.2 SATA or PCIe x1 devices.

> NOTE: BOSS drives are not hot-plug capable.

Optical drives

The PowerEdge T440 supports one of the following internal optical drive options:

• DVD-ROM
• DVD

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Video

The Video Graphic Array (VGA) port enables you to connect the system to a VGA display. The T440 system supports one 15-pin VGA port at the back of the system.

Networking and PCIe

The PowerEdge T440 offers balanced, scalable I/O capabilities, including integrated PCIe 3.0-capable expansion slots.

PCIe expansion cards

The PowerEdge T440 system has one standard PCIe connector and four Speededge connectors.

PCIe expansion card riser configurations

Table 11. PCIe expansion card riser configurations for PowerEdge T440

PCIe slots	Height	Length	Link
Slot 1	Low Profile	Full Length	x4
Slot 2	Low Profile	Full Length	x4
Slot 3	Low Profile	Full Length	x16
Slot 4	Low Profile	Full Length	x8
Slot 5	Low Profile	Full Length	x8

PCIe expansion cards

Table 12. Optional add-in PCIe expansion cards for PowerEdge T440

Type	Adapter
NIC	• Intel PRO/1000 PT Dual Port Server Adapter, Gigabit, Copper, PCI-E x4 • Intel PRO/1000 VT Quad Port Server Adapter, Gigabit, Copper, PCI-E x4 • Intel 10GBase-T Copper Single Port NIC, PCI-E x8 • Intel Single Port Server Adapter, 10 Gigabit, SR Optical, PCI-E x8 • Broadcom® BMC57710 10Base-T Cooper Single Port NIC, PCI-E x8 • Broadcom® BMC5709C IPV6 Gigabit Copper Dual Port NIC with TOE and iSCSI Offload, PCI-E x4 • Broadcom® BMC5709C IPV6 Gigabit Copper Dual Port NIC with TOE, PCI-E x4 • Broadcom® NetXtreme® II 57711 Dual Port Direct Attach 10 Gb Ethernet PCI-Express Network Interface Card with TOE and iSCSI Offload • Intel® Gigabit ET Dual Port Server Adapter • Intel® Gigabit ET Quad Port Server Adapter • Broadcom 10 GbE NIC, Broadcom Dual Port 10 GbE SFP+
HBA	• QLogic® QLE 2462 FC4 Dual Port 4 Gbps Fiber Channel HBA • QLogic® QLE 220 FC4 Single Port 4 Gbps Fiber Channel HBA • QLogic® QLE 2460 FC4 Single Port 4 Gbps Fiber Channel HBA • QLogic® QLE 2562 FC8 Dual-channel HBA, PCI-E Gen 2 x4 • QLogic® QLE 2560 FC8 Single-channel HBA, PCI-E Gen 2 x4 • Emulex® LPe-1150 FC4 Single Port 4 Gbps Fiber Channel HBA, PCI-E x4

Type	Adapter
	• Emulex® LPe-11002 FC4 Dual Port 4 Gbps Fiber Channel HBA, PCI-E x4
	• Emulex® LPe-12000, FC8 Single Port 4 Gbps Fiber Channel HBA, PCI-E Gen 2 x4
	• Emulex® LPe-12002, FC8 Dual Port 4 Gbps Fiber Channel HBA, PCI-E Gen 2 x4
CNA	• QLogic: QLE8152 HBA (10 GbE – 2 Port, PCIe Gen 2) – FCoE
	• Emulex: OCE10102FM HBA (10 GbE – 2 Port, PCIe Gen 2) - FCoE
	• Emulex: OCE10102IM HBA (10 GbE – 2 Port, PCIe Gen 2 – iSCSI) - iSCSI
	• Broadcom 57711 NIC (10 GbE - 2 Port, PCIe Gen2) – iSOE
	• Intel DT (10 GbE – 2 Port, PCIe Gen 2) – FCoE
	• Intel DT (10 GbE – 2 Port, PCIe Gen 2) – FCoE

For the latest information on all supported add-in PCIe expansion cards for the PowerEdge T440, visit the PowerEdge T440 page at Dell.com.

For more information on server network adapters, visit www.dell.com/us/business/p/networking-cards.

9

Power, Thermal, and Acoustics

The lower overall system-level power draw is a result of the breakthrough system design developed by Dell EMC. The system aims to maximize performance per watt through a combination of energy efficient technologies, optimized thermal designs and intelligent fan control algorithms. The system fan control algorithms use an extensive array of sensors that automatically monitor power and thermal activity to minimize fan speeds based on system cooling requirements, reducing the power required for cooling.

Power consumption and energy efficiency

With the rise in the cost of energy coupled with increasing data center density, Dell EMC provides tools and technologies to help you realize greater performance with lower energy cost and wastage. More efficient data center usage can reduce costs by slowing the need for additional data center space. The following table lists the tools and technologies that Dell EMC offers to help you achieve your data center goals by lowering power consumption and increasing energy efficiency.

Table 13. Power tools and technologies

Feature	Description
Power supply units (PSU) portfolio	PSU portfolio includes intelligent features such as dynamically optimizing efficiency while maintaining availability and redundancy. For more information, see the *Power supply units* section.
Tools for right-sizing	Enterprise Infrastructure Planning Tool (EIPT) is a tool that helps you plan and tune your computer and infrastructure equipment for maximum efficiency by calculating hardware power consumption, power infrastructure and storage. Learn more at Dell.com/calc.
Power monitoring accuracy	PSU power monitoring improvements include: • Power monitoring accuracy of 1%, whereas the industry standard is 5% • More accurate reporting of power • Better performance under a power cap
Power capping	Use Dell EMC systems management tools such as OpenManage Power Center and iDRAC9 with an Enterprise license can be used to set a power limit for your server. This limits the output of a PSU and reduce system power consumption and help in constrained power situations.
Systems management	The integrated Dell Remote Access Controller 9 (iDRAC9) with Lifecycle Controller is embedded within every Dell EMC PowerEdge™ server and provides functionality that helps IT administrators deploy, update, monitor, and maintain servers with no need for any additional software to be installed. iDRAC functions regardless of operating system or hypervisor presence because from a pre-OS or bare-metal state, iDRAC is ready to work because it is embedded within each server from the factory.
Active power management	Dell EMC offers a complete power management solution accessed through the iDRAC9 with Enterprise licensing and OpenManage Power Center to implement policy-based management of power and thermal levels at the individual system, rack, or data center level. Hot spares reduce power consumption of redundant power supplies. Thermal

control of fan speed optimizes the thermal settings for your environment to reduce fan consumption and lower system power consumption.

Thermal and Acoustics

The system's thermal management delivers high performance through optimized cooling of components at the lowest fan speeds across a wide range of ambient temperatures from 10°C to 35°C (50°F to 95°F) and to extended ambient temperature ranges. These optimizations result in lower fan power consumption which translate to lower system power and data center power consumption.

Power supply units

Energy Smart power supplies have intelligent features, such as the ability to dynamically optimize efficiency while maintaining availability and redundancy. Also featured are enhanced power-consumption reduction technologies, such as high-efficiency power conversion and advanced thermal-management techniques, and embedded power-management features including high-accuracy power monitoring.

The system supports two hot-swappable AC power supplies with 1 + 1 redundancy, auto-sensing and auto-switching capability.

Acoustical design

Dell EMC focuses on sound quality in addition to sound power level and sound pressure level. Sound quality describes how disturbing or pleasing a sound is interpreted, and Dell EMC references a number of psychacoustical metrics and thresholds in delivering to it. Tone prominence is one such metric. Sound power and sound pressure levels increase with greater populations or higher utilization, while sound quality remains good even as the frequency content changes. A reference for comparison to sound pressure levels for familiar noise sources is given in the following table. An extensive description of Dell EMC Enterprise acoustical design and metrics is available in the Dell Enterprise Acoustics white paper.

Table 14. Acoustical reference points and output comparisons

Value measured at your ears		Equivalent familiar noise experience
LpA, dBA, re 20 μPa	Loudness, sones	
90	80	Loud concert
75	39	Data center, vacuum cleaner, voice must be elevated to be heard
60	10	Conversation levels
45	4	Whispering, open office layout, normal living room
35	2	Quiet office
30	1	Quiet library
20	0	Recording studio

Rack rails

The T440 is a rack-capable tower server. When customers select rack mode chassis, T440 will support the optional sliding rail. The sliding rail system for the T440 provides tool-less support for racks with square or untreaded round mounting holes including all generations of Dell racks. The sliding rails for the T440 offers native support for threaded hole racks via the ReadyRails II mounting interface. The rails ship in the tool-less mounting configuration but can be converted to the tooled configuration very quickly and easily. An optional cable management arm (CMA) can be mounted on either the left or right side of the rails without the use of tools for fast and easy deployment.

Dell EMC OpenManage systems management

Whether your IT environment consists of a few servers or a few thousand servers, Dell EMC OpenManage systems management solutions provide comprehensive management for evolving IT environments. OpenManage is based on open standards and provides agent-based and agent-free server lifecycle management functionality for Dell EMC PowerEdge servers. OpenManage solutions help you automate and streamline essential hardware management tasks.

Start with a firm foundation for efficient hardware management using OpenManage tools, utilities and management consoles. OpenManage systems management solutions consist of a combination of embedded management features and software products that help you automate and simplify the entire server lifecycle: deploy, update, monitor and maintain. OpenManage solutions are innovatively designed for simplicity and ease of use to help you reduce complexity, save time, achieve efficiency, control costs and empower productivity. OpenManage centers around efficient management of server lifecycle.
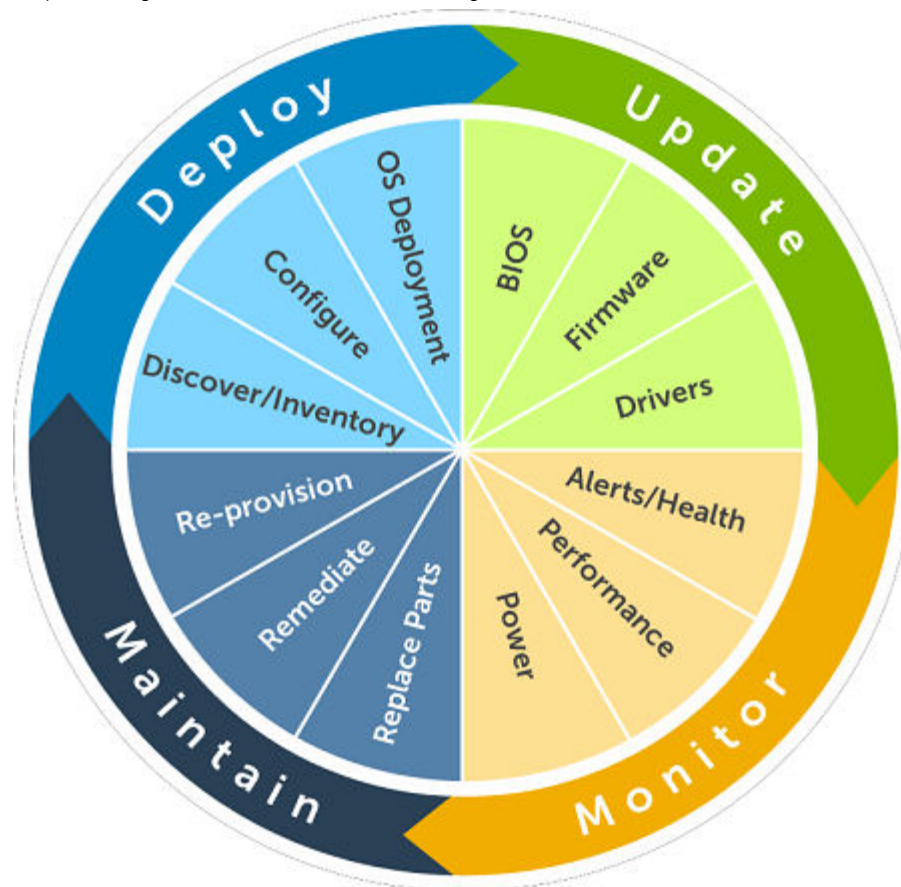
Figure 4. Server lifecycle management operations

OpenManage systems management

The Dell EMC OpenManage systems management portfolio includes powerful hardware and software management tools and consoles. OpenManage simplifies the lifecycle of deploying, updating, monitoring and maintaining your Dell EMC PowerEdge servers.

iDRAC lifecycle controller

iDRAC features and comparison

The integrated Dell Remote Access Controller 9 (iDRAC9) with Lifecycle Controller is embedded within every Dell EMC PowerEdge server and provides functionality that helps IT administrators deploy, update, monitor, and maintain servers with no need for any additional software to be installed. iDRAC functions regardless of operating system or hypervisor presence because from a pre-OS or bare-metal state, iDRAC is ready to work because it is embedded within each server from the factory.

iDRAC9 is available in Express and Enterprise on the T440.

> NOTE: The features listed in bold in the below table are new for iDRAC9.

Table 15. iDRAC feature comparison

Features	iDRAC8 Basic	iDRAC9 Basic	iDRAC8 Express	iDRAC9 Express	iDRAC8 Express for Blades	iDRAC9 Express for Blades	iDRAC8 Enterprise	iDRAC9 Enterprise
Interface/Standards								
Redfish	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
IPMI 2.0	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
DCMI 1.5	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Web-based GUI	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Racadm command line— local/remote	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
SMASH-CLP—SSH-only	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Telnet	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
SSH	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Serial redirection	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
WSMAN	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Network Time Protocol	No	No	Yes	Yes	Yes	Yes	Yes	Yes
Connectivity								
Shared NIC	Yes	Yes	Yes	Yes	N/A	N/A	Yes	Yes
Dedicated NIC	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
VLAN tagging	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
IPv4	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
IPv6	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
DHCP (new default; no static IP)	Yes	**Yes**	Yes	**Yes**	Yes	**Yes**	Yes	**Yes**
DHCP with Zero Touch	No	No	No	No	No	No	No	**Yes**
Dynamic DNS	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
OS pass-through	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Features	iDRAC8 Basic	iDRAC9 Basic	iDRAC8 Express	iDRAC9 Express	iDRAC8 Express for Blades	iDRAC9 Express for Blades	iDRAC8 Enterprise	iDRAC9 Enterprise
iDRAC Direct-Front panel USB	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Connection View	No	**Yes**	No	**Yes**	No	**Yes**	No	**Yes**
NFS v4	No	**Yes**	No	**Yes**	No	**Yes**	No	**Yes**
NTLM v1 and NTLM v2	No	**Yes**	No	**Yes**	No	**Yes**	No	**Yes**
Security								
Role-based authority	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Local users	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
SSL encryption	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
IP blocking	No	No	Yes	Yes	Yes	Yes	Yes	Yes
Directory services—AD, LDAP	No	No	No	No	No	No	Yes	Yes
Two-factor authentication	No	No	No	No	No	No	Yes	Yes
Single sign-on	No	No	No	No	No	No	Yes	Yes
PK authentication	No	No	Yes	Yes	Yes	Yes	Yes	Yes
FIPS 140-2	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Secure UEFI boot-certificate management	No	**Yes**	No	**Yes**	No	**Yes**	No	**Yes**
Lock down mode	No		No	No	No	No	No	**Yes**
Unique iDRAC default password	No	**Yes**	No	**Yes**	No	**Yes**	No	**Yes**
Customizable Security Policy Banner-login page	No	**Yes**	No	**Yes**	No	**Yes**	No	**Yes**
Remote Presence								
Power control	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Boot control	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Serial-over-LAN	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Virtual Media	No	No	No	No	Yes	Yes	Yes	Yes
Virtual Folders	No	No	No	No	No	No	Yes	Yes
Remote File Share	No	No	No	No	No	No	Yes	Yes
Virtual Console	No	No	No	No	Yes	Yes	Yes	Yes
HTML5 access to virtual console	No	No	No	No	Yes	Yes	Yes	Yes
VNC connection to OS	No	No	No	No	No	No	Yes	Yes
Quality/bandwidth control	No	No	No	No	No	No	Yes	Yes
Virtual Console collaboration—6 users	No	No	No	No	No	No	Yes	Yes

Features	iDRAC8 Basic	iDRAC9 Basic	iDRAC8 Express	iDRAC9 Express	iDRAC8 Express for Blades	iDRAC9 Express for Blades	iDRAC8 Enterprise	iDRAC9 Enterprise
Virtual Console chat	No	No	No	No	No	No	Yes	Yes
Virtual Flash partitions	No	No	No	No	No	No	Yes	Yes
Group manager	No	No	No	No	No	No	No	**Yes**
HTTP/HTTPS support along with NFS/CIFS	No	**Yes**	No	**Yes**	No	**Yes**	No	Yes
Power and Thermal								
Real-time power meter	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Power thresholds & alerts	No	No	Yes	Yes	Yes	Yes	Yes	Yes
Real-time power graphing	No	No	Yes	Yes	Yes	Yes	Yes	Yes
Historical power counters	No	No	Yes	Yes	Yes	Yes	Yes	Yes
Power capping	No	No	No	No	No	No	Yes	Yes
Power Center integration	No	No	No	No	No	No	Yes	Yes
Temperature monitoring	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Temperature graphing	No	No	Yes	Yes	Yes	Yes	Yes	Yes
Health Monitoring								
Predictive failure monitoring	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
SNMPv1, v2 and v3—traps and gets	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Email alerting	No	No	Yes	Yes	Yes	Yes	Yes	Yes
Configurable thresholds	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Fan monitoring	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Power Supply monitoring	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Memory monitoring	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
CPU monitoring	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
RAID monitoring	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
NIC monitoring	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
HD monitoring—enclosure	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Out of Band Performance Monitoring	No	No	No	No	No	No	Yes	Yes
Alerts for excessive SSD wear	No	**Yes**	No	**Yes**	No	**Yes**	No	**Yes**
Customizable settings for Exhaust Temperature	No	**Yes**	No	**Yes**	No	**Yes**	No	**Yes**
Update								
Remote agent-free update	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Embedded update tools	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Features	iDRAC8 Basic	iDRAC9 Basic	iDRAC8 Express	iDRAC9 Express	iDRAC8 Express for Blades	iDRAC9 Express for Blades	iDRAC8 Enterprise	iDRAC9 Enterprise
Sync with repository—scheduled updates	No	No	No	No	No	No	Yes	Yes
Auto update	No	No	No	No	No	No	Yes	Yes
Improved PSU firmware updates	No	**Yes**	No	**Yes**	No	**Yes**	No	**Yes**
Deployment and Configuration								
Local configuration via F10	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Embedded OS deployment tools	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Embedded configuration tools	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
AutoDiscovery	No	No	Yes	Yes	Yes	Yes	Yes	Yes
Remote OS deployment	No	No	Yes	Yes	Yes	Yes	Yes	Yes
Embedded driver pack	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Full configuration inventory	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Inventory export	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Remote configuration	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Zerotouch configuration	No	No	No	No	No	No	Yes	Yes
System Retire/Repurpose	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Server Configuration Profile in GUI	No	**Yes**	No	**Yes**	No	**Yes**	No	**Yes**
Diagnostics, Service and Logging								
Embedded diagnostic tools	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Part Replacement	No	No	Yes	Yes	Yes	Yes	Yes	Yes
Server Configuration Backup	No	No	No	No	No	No	Yes	Yes
Server Configuration Restore	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Easy Restore—system configuration	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Easy Restore Auto Timeout	No	**Yes**	No	**Yes**	No	**Yes**	No	**Yes**
LED health status indicator	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
iDRAC Direct—front USB mgmt port	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
iDRAC Service Module (iSM) embedded	No	**Yes**	No	**Yes**	No	**Yes**	No	**Yes**

Features	iDRAC8 Basic	iDRAC9 Basic	iDRAC8 Express	iDRAC9 Express	iDRAC8 Express for Blades	iDRAC9 Express for Blades	iDRAC8 Enterprise	iDRAC9 Enterprise
iSM to inband alert forwarding to consoles	No	**Yes**	No	**Yes**	No	**Yes**	No	**Yes**
Crash screen capture	No	No	Yes	Yes	Yes	Yes	Yes	Yes
Crash video capture	No	No	No	No	No	No	Yes	Yes
Boot capture	No	No	No	No	No	No	Yes	Yes
Remote reset for iDRAC—requires iSM	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Virtual NMI	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
OS watchdog	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
SupportAssist Report—embedded	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
System Event Log	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Lifecycle Log	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Enhanced logging in the Lifecycle controller log	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Work notes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Remote Syslog	No	No	No	No	No	No	Yes	Yes
License management	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Improved customer experience								
iDRAC -Faster processor, more memory	No	**Yes**	No	**Yes**	No	**Yes**	No	**Yes**
GUI rendered in HTML5	No	**Yes**	No	**Yes**	No	**Yes**	No	**Yes**
Add BIOS configuration to iDRAC GUI	No	**Yes**	No	**Yes**	No	**Yes**	No	**Yes**
iDRAC support for SW RAID licensing	No	**Yes**	No	**Yes**	No	**Yes**	No	**Yes**

Dell EMC consoles

The central console in a systems management solution is often referred to as the one-to-many console. The central console provides a rapid view and insight into the overall health of all systems in the IT environment. The Dell EMC systems management portfolio includes several powerful consoles, depending upon your needs, including the following:

Dell EMC OpenManage Essentials

OpenManage Essentials is the one-to-many management console for monitoring Dell HW infrastructure including server, storage and networking, as well as for lifecycle management of PowerEdge servers. It support Windows, Linux, VMware, and HyperV environments. OME provides a simple and easy interface for system administrators to maximize the uptime and health of Dell systems. It helps to

- Monitor health status and events for PowerEdge servers, EqualLogic or MD series storage, and PowerConnect and Force 10 switches.
- Provide hardware-level control and management for PowerEdge server, blade system, and internal storage arrays.

DELLEMC

- Link and Launch element management interfaces, such as, iDRAC, CMC, EQL group manager etc
- Integrate with the following Dell solutions:

  - Dell Repository Manager : Builds customized server update baselines that OpenManage Essentials can use.
  - OpenManage Power Center : Optimize power consumption in the servers.
  - SupportAssist : Enables automatic hardware failure notification to be sent securely to Dell technical support for intelligent analysis and diagnosis to optimize availability and reduce manual intervention. This solution is available as part of Dell ProSupport and ProSupport Plus at no additional cost.
- Provide REST interface API support for 3rd Party Integration.
- Manage Server Configuration - it is a fee-based license available on Dell's 14th generation of PowerEdge servers with iDRAC Enterprise or iDRAC Express licenses. The key features include the following:

  - Configure a server or chassis using a template and deploying an operating system on the PowerEdge bare metal servers.
  - During a server operation, automatically detect and notify any server or chassis drift from a customer-defined baseline configuration.
  - Boot a system from a network-mounted ISO using iDRAC.
  - Replicate of FN-IOM and M-IOA configurations within M1000e chassis.
  - Support VLAN Management for FN-IOM and M-IOA.
- For more information, see delltechcenter.com/OME

OpenManage Mobile

OpenManage Mobile(OMM) is a software application that enables easy, convenient, and secure monitoring and management of PowerEdge servers remotely, or at-the-server. With OpenManage Mobile, IT Administrators can securely perform several data center monitoring and remediation tasks using an Android or iOS mobile device. The OpenManage Mobile app is available as a free software download from the Apple Store and the Google Play Store.

OMM can also monitor and manage PowerEdge servers through a OpenManage Essentials console or by directly accessing the server's iDRAC.

The OpenManage Essentials console can be accessed through OpenManage Mobile over a secure IP network. This allows you to monitor all devices managed by OpenManage Essentials such as Dell EMC servers, storage, networking, firewall, and supported third party devices.

Key Features of OpenManage Mobile (When connected through OpenManage Essentials console):

- Connect to multiple servers which have OME installed, from a single mobile device.
- Connect to multiple servers individually through the iDRAC interface.
- Receive critical alert notification on your mobile device as they arrive into your OpenManage Essentials management console.
- Acknowledge, forward, and delete alerts from your mobile device.
- Browse through device details, firmware inventory, and event logs of individual systems.
- Perform several server management functions such as power-on, power cycle, reboot, and shutdown from the mobile application.

Key Features of OpenManage Mobile (When connected through iDRAC):

- Connect to any 14th gen, 13th gen, or 12th gen server remotely
- Assign IP address, change credentials, and update common BIOS attributes for Bare Metal Configuration
- Configure one server manually, or multiple servers simultaneously through a template.
- Browse server details, health status, hardware & firmware inventory, networking details, and System Event or LC logs. Share this information easily with other IT Administrators.
- Access SupportAssist reports, Last Crash screen and video (PowerEdge 14th gen servers)
- Access Virtual Console (and reduce the need for crash carts).
- Power On, Shut down, or Reboot your server from anywhere.
- Run any RACADM command

OpenManage Power Center

OpenManage Power Center is a one-to-many application that can read power usage and thermal readings information from Dell EMC servers, Power Distribution Units (PDU), and Uninterruptible Power Supplies (UPS). It can aggregate this information into rack, row, and room-level views. On servers with iDRAC Enterprise license, you can also cap or throttle the power consumption. You may need to set power caps to reduce the power consumption due to external events such as brownouts or failures of data-center cooling devices. You can also use power capping to safely increase the numbers of servers in a rack to match the power that is provisioned for that rack.

For more information, see OpenManage Power Center User's Guide available at **Dell.com/openmanagemanuals**.

Dell EMC OpenManage systems management tools, utilities and protocols

Dell EMC OpenManage systems management tools and utilities consist of the following:

Dell EMC Repository Manager:

Dell EMC Repository Manager (DRM) is an application that helps you to:

- Identify the updates that are relevant to the systems in your data center.
- Identify and notify when updates are available.
- Package the updates into different deployment format.

To automate the creation of baseline repositories, DRM provides advanced integration capabilities with iDRAC/LC, OpenManage Essentials, Chassis Management Controller, OpenManage Integration for VMware vCenter and OpenManage Integration for Microsoft System Center (OMIMSSC). Also, DRM packages updates into custom catalogs that can be used for deployment.

Dell EMC Repository Manager can create the following deployment tools:

- Custom catalogs
- Lightweight deployment pack
- Bootable Linux ISO
- Custom Server Update Utility (SUU)

For more information, see Dell EMC Repository Manager User's Guide available at **Dell.com/support/manuals**.

Dell Update Packages

Dell Update Packages (DUP) is a self-contained executable supported by Microsoft Windows or Linux that updates a component on a server and applications like OMSA, iSM, and DSET.

DUPs can be executed in GUI or in CLI mode.

For more information, see Dell EMC Update Packages User's Guide available at www.delltechcenter.com/DSU.

Dell Remote Access Controller Administration (RACADM) CLI

The RACADM command-line utility provides a scriptable interface to perform inventory, configuration, update, and health status check of PowerEdge servers. RACADM operates in multiple modes:·

- Local — supports running RACADM commands from the managed server's operating system.
- SSH or Telnet — known as Firmware RACADM; is accessible by logging in to iDRAC using SSH or Telnet
- Remote — supports running RACADM commands from a remote management station such as a laptop or desktop.

RACADM is supported by the iDRAC with Lifecycle Controller and by the Chassis Management Controller of the M1000e, VRTX and FX2 modular systems. Local and Remote RACADM is supported on Windows Server, Windows clients, and on Red Hat, SuSe and Ubuntu Linux.

For more information, see the RACADM Command Line Reference Guide for iDRAC and CMC available at **Dell.com/support/ manuals**.

iDRAC with Lifecycle Controller Embedded Management APIs

iDRAC with Lifecycle Controller provides a range of standards-based applications programming interfaces (APIs) that enable scalable and automated management of PowerEdge servers. Standard systems management APIs have been developed by organizations such as the Institute of Electrical and Electronics Engineers (IEEE) and Distributed Management Task Force (DMTF). These APIs are widely used by commercial systems management products and by custom programs and scripts developed by IT staff to automate management functions such as discovery, inventory, health status checking, configuration, update, and power management. The APIs supported by iDRAC with Lifecycle Controller include:

- **Redfish** - In 2015, the DMTF Scalable Platforms Management Forum published Redfish, an open industry-standard specification and schema designed to meet the needs of IT administrators for simple, modern, and secure management of scalable platform hardware. Dell is a key contributor to the Redfish standard, acting as co-chair of the SPMF, promoting the benefits of Redfish, and working to deliver those benefits within industry-leading systems management solutions. Redfish is a next generation management standard using a data model representation inside a hypermedia RESTful interface. The data model is defined in terms of a standard, machine-readable schema, with the payload of the messages expressed in JSON and the OData v4 protocol.
- **WSMan** -The Web Services For Management (WSMan) API, first published by the DMTF in 2008, is the most mature and robust API provided by iDRAC with Lifecycle Controller. WSMan uses a Simple Object Access Protocol (SOAP) with data modeled using the Common Information Model. WSMan provides interoperability between management applications and managed resources, and identifies a core set of web service specifications and usage requirements that expose a common set of operations central to all systems management.
- **IPMI** - The Intelligent Platform Management Interface (IPMI) is a message-based, hardware-level interface specification that can operate over both LAN and serial interfaces. IPMI is supported broadly by server vendors, systems management solutions, and open source software.
- **SNMP** - The Simple Network Management Protocol (SNMP) helps in standardizing the management of network devices. SNMP allows commercial management consoles created for monitoring network switches and routers to also monitor X86 severs. SNMP is primarily used to deliver event messages to alert administrators of problems on their systems but can also be used to discover, inventory and configure servers.

To assist automating system management tasks and simplify API integration, Dell provides PowerShell and Python libraries and script examples utilizing the WSMan interface. The iDRAC with LC pages of Dell Techcenter offer a library of technical white papers detailing the use of the embedded management APIs. For more information, see delltechcenter.com/iDRAC and delltechcenter.com/LC.

Integration with third-party consoles

Dell EMC OpenManage provides integration with several leading third-party consoles, including:

OpenManage Integration Suite for Microsoft System Center

The combination of Dell OpenManage Integration Suite and Microsoft System Center simplifies and enhances deployment, configuration, monitoring and updating of Dell servers and storage in physical and virtual environments. Our agent-free and agent-based plug-ins deliver a unique level of integration and efficiency when managing Dell hardware within a System Center environment.

The OpenManage Integration Suite for Microsoft System Center includes: Dell Server and Storage Management Packs for System Center Operations Manager (SCOM); Dell Server Deployment Packs and Update Catalogs for System Center Configuration Manager (SCCM); and tools for optimizing management of Dell PowerEdge servers in virtual environments using System Center Virtual Machine Manager (SCVMM).

OpenManage Integration for VMware vCenter

The OpenManage Integration for VMware vCenter allows you to monitor, provision, and manage PowerEdge server hardware and firmware. You can perform these tasks through a dedicated Dell menu that can be accessed directly through the VMware vCenter

console. OMIVV also allows granular control and reporting for the hardware environment using the same role-based access control model as vCenter. The OpenManage Management Pack for vRealize Operations Manager is available with OMIVV v4.0 onwards. This helps in checking hardware health and alerting into vRealize operations, which also includes dashboard and reporting on the server environment.

You can manage and monitor Dell hardware within the virtualized environment

- Alerting and monitoring environment for servers and chassis
- Monitoring and reporting for servers and chassis
- Updating firmware on servers
- Deploying enhanced options

For more information, see delltechcenter.com/omivv

NOTE: The Dell EMC Repository Manager integrates with OpenManage Integration for VMware vCenter. The Dell EMC Repository Manager provides advanced functionality, simplifies the discovery, and deployment of new updates.

BMC Software

Dell EMC and BMC Software work together to simplify IT by ensuring tight integration between Dell EMC server, storage, and network management functionality and the BMC Software process and data center automation products.

OpenManage connections with third-party consoles

Dell EMC OpenManage Connections gives you an easy path to adding support for third-party devices, so you can continue to use your existing management tools while easily adding Dell EMC server systems to your existing IT environment. Integrate new systems at your own pace. Manage new Dell EMC servers and storage with your legacy management tools, while extending the useful life of your existing resources. With OpenManage Connections you can add monitoring and troubleshooting of Dell EMC assets to your IT infrastructure.

- OpenManage Connection for Nagios Core and Nagios XI
- OpenManage Connection for HPE Operations Manager i (OMi)

For more information on these OpenManage Connections, visit **Dell.com/openmanage**.

Appendix A. Additional specifications

PSU specifications

The PowerEdge T440 system supports the following AC redundant power supply units (PSU).

Table 16. PSU specifications

PSU	Class	Heat dissipation (maximum)	Frequency	Voltage
1100 W AC	Platinum	4100 BTU/hr	50/60 Hz	100–240 V AC, autoranging
750 W AC	Platinum	2891 BTU/hr	50/60 Hz	100–240 V AC, autoranging
495 W AC	Platinum	1908 BTU/hr	50/60 Hz	100–240 V AC, autoranging
450 W	Bronze	1871 BTU/hr	50/60 Hz	100-240 V AC, cabled PSU

This system is also designed to connect to the IT power systems with a phase to phase voltage not exceeding 230V
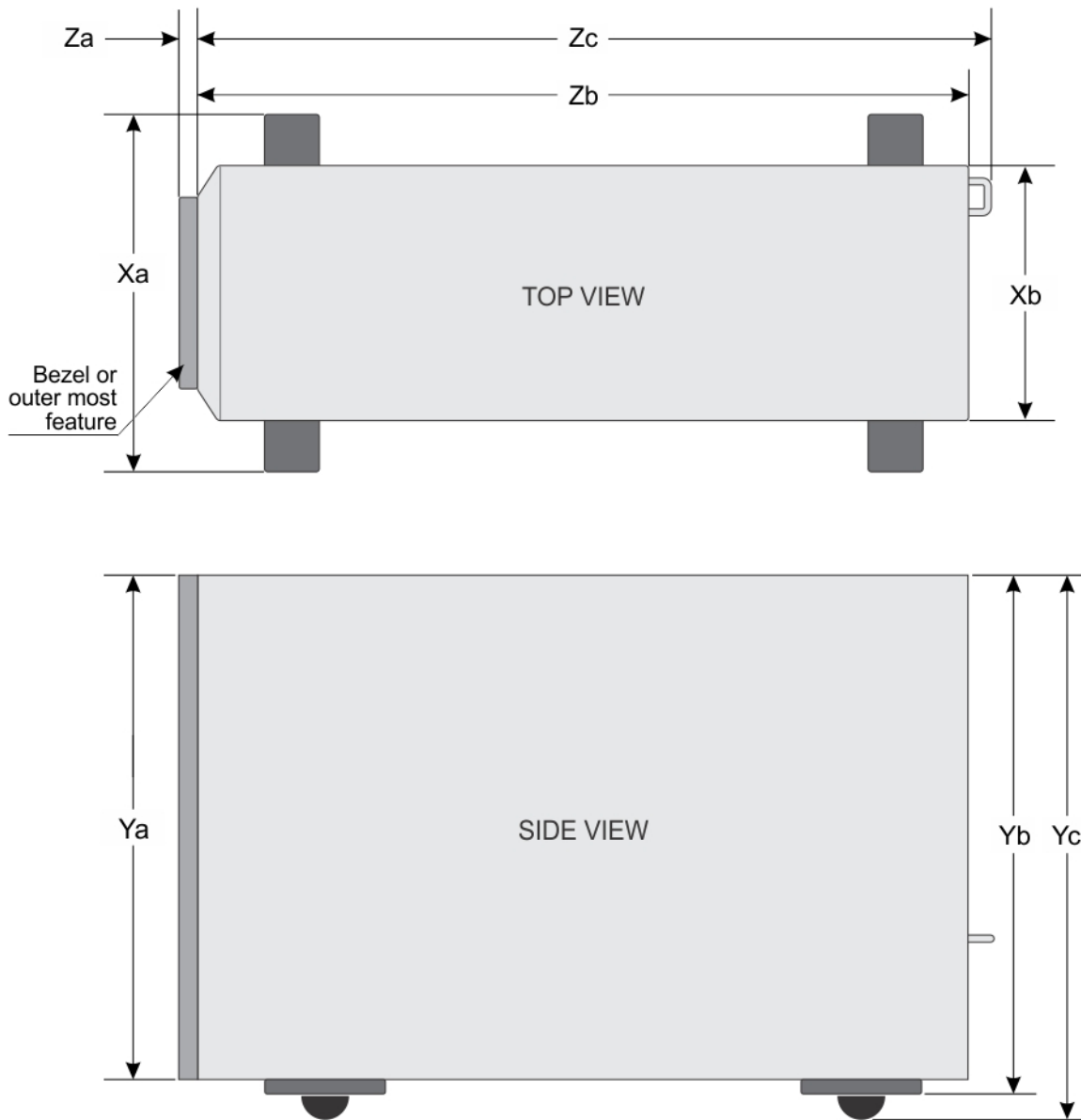
System dimensions

Figure 5. Details the dimensions of the PowerEdge T440 system

Table 17. Dimensions of PowerEdge T440 system

Xa	Xb	Ya	Yb	Yc	Za	Zb	Zc
218 mm (8.58 in)	307.9 mm (12.12 in)	430.3 mm (16.94 in)	464.362 mm (18.28 in)	471.333 mm (17.37 in)	(with bezel) 37.065 mm (1.45 in) (without bezel) 21.165 mm (0.83 in)	538.4 mm (21.19 in)	573.636 mm (22.58 in)

Chassis weight

Table 18. Chassis weight

System configuration	Maximum weight
4 x 3.5 inch drive system	23.9 Kg (52.69 lb)
8 x 3.5 inch drive system	29.5 Kg (65.03 lb)
16 x 2.5 inch drive system	27.7 Kg (61.06 lb)

Environmental specifications

See Dell EMC PowerEdge T440 Installation and Service Manual on Dell.com/Support/Manuals for detailed environmental specifications.

Video specifications

The PowerEdge T440 systems support integrated Matrox G200eW3 graphics card with 4 MB SPI capacity.

Table 19. Supported video resolution options

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

USB ports

The table provides information about the supported USB port specifications.

Table 20. USB specifications

System	Front panel	Back panel
PowerEdge T440	• One USB 2.0-compliant port • One USB 3.0-compliant port	• Four USB 2.0-compliant rear ports • Two USB 3.0-compliant rear ports

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Appendix B. Standards compliance

The system conforms to the following industry standards.

Table 21. Industry standard documents

Standard	URL for information and specifications
ACPI Advance Configuration and Power Interface Specification, v2.0c	acpi.info
Ethernet IEEE 802.3-2005	standards.ieee.org/getieee802/802.3.html
HDG Hardware 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
DDR4 Memory DDR4 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	pmbus.info/specs.html
SAS Serial Attached SCSI, v1.1	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. 2.0	usb.org/developers/docs

Appendix C Additional resources

Table 22. 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 messages • System codes and indicators • System BIOS • Remove and replace procedures • Troubleshooting • 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 • Key system features • Technical specifications	Dell.com/Support/Manuals
Rack Installation Instructions	This document ships with the rack kits, and provides instructions for installing a server in a rack.	Dell.com/Support/Manuals
Information Update	This document ships with the system, is also available in PDF format online, and provides information on system updates.	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 EMC contact information.	Inside the system chassis cover
Energy Smart Solution Advisor (ESSA)	The Dell EMC online ESSA enables easier and more meaningful estimates to help you determine the most efficient configuration possible. Use ESSA to calculate the power consumption of your hardware, power infrastructure, and storage.	Dell.com/calc

Appendix D. Support and deployment services

ProDeploy Enterprise Suite

ProDeploy Enterprise Suite gets your server out of the box and into optimized production - fast. Our elite deployment engineers with broad and deep experience utilizing best-in-class processes along with our established global scale can help you around the clock and around the globe. From simple to the most complex server installations and software integration, we take the guess work and risk out of deploying your new server technology. Who's better suited to implement the latest Dell EMC servers than the Dell EMC elite deployment engineers who do it every day?

		Basic Deployment	ProDeploy	ProDeploy Plus
Pre-deployment	Single point of contact for project management		●	In-region
	Site readiness review		●	●
	Implementation planning		●	●
	Technology Service Manager (TSM) engagement for ProSupport Plus entitled devices			●
Deployment	Deployment service hours	Business hours	24x7	24x7
	Onsite hardware installation*	●	●	●
	Packaging materials disposal	●	●	●
	Install and configure system software		●	Onsite
	Project documentation with knowledge transfer		●	●
Post-deployment	Deployment verification		●	●
	Configuration data transfer to Dell EMC technical support		●	●
	30-days of post-deployment configuration assistance			●
	Training credits for Dell EMC Education Services			●

Figure 6. ProDeploy Enterprise Suite capabilities

ProDeploy Plus

From beginning to end, ProDeploy Plus provides the skill and scale needed to successfully execute demanding deployments in today's complex IT environments. Certified Dell EMC experts start with extensive environmental assessments and detailed migration planning and recommendations. Post-deployment configuration assistance, testing, and product orientation help you rest easy knowing your systems have been deployed and integrated by the best.

ProDeploy

ProDeploy provides full service installation and configuration of both server hardware and system software by certified deployment engineers. To prepare for the deployment, we conduct a site readiness review and implementation planning. System testing, validation and full project documentation with knowledge transfer complete the process. We focus on getting you up and running so you can focus on your business and prepare for whatever comes next.

Basic Deployment

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

ProSupport Enterprise Suite

With Dell EMC ProSupport Services, we can help you keep your operation running smoothly, so you can focus on running your business. We will help you maintain peak performance and availability of your most essential workloads. Dell EMC ProSupport is a suite of support services that enable you to build the solution that is right for your organization. Choose support models based on how you use technology and where you 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 your IT resources by choosing the right support model.
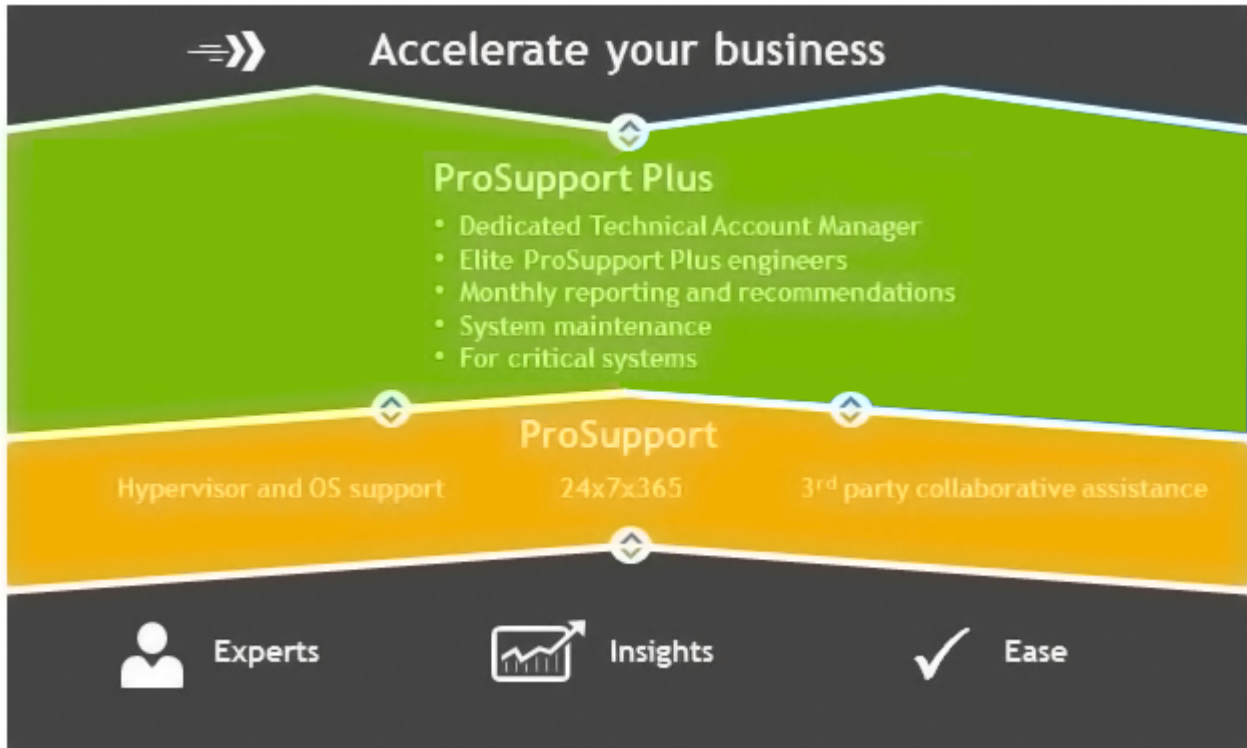

Figure 7. ProSupport Enterprise Suite

ProSupport Plus

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

- A designated Technology Service Manager who knows your business and your environment.
- Access to senior ProSupport engineers for faster issue resolution.
- Personalized, preventive recommendations based on analysis of support trends and best practices from across the Dell EMC customer base to reduce support issues and improve performance.
- Predictive analysis for issue prevention and optimization enabled by SupportAssist and Secure Remote Services.
- Proactive monitoring, issue detection, notification and automated case creation for accelerated issue resolution enabled by SupportAssist and Secure Remote Services.

ProSupport

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

- 24x7x365 access to certified hardware and software experts
- Collaborative 3rd party support
- Hypervisor and Operating Environment Software and OS support
- Consistent level of support available for Dell EMC hardware, software and solutions
- Onsite parts and labor response options including next business day or four-hour mission critical

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 your company's needs. While not for everyone, it offers a truly unique solution for Dell EMC's largest customers with the most complex environments.

- Team of designated Technology Services Managers with remote, on-site options
- Designated ProSupport One technical and field engineers who are trained on your environment and configurations
- On-demand reporting and analytics-based recommendations
- Flexible on-site support and parts options that fit your operational model
- A tailored support plan and training for your operations staff

	ProSupport	ProSupport Plus	ProSupport One for Data Center
Remote technical support	24x7	24x7	24x7
Onsite support	Next Business Day or Mission Critical	Next Business Day[1] or Mission Critical	Flexible
Automated issue detection and case creation	●	●	●
Self-service case initiation and management	●	●	●
Hypervisor, Operating Environment Software and OS support	●	●	●
Priority access to specialized support experts		●	●
Designated Technology Service Manager		●	Team
Personalized assessments and recommendations		●	●
On-demand support and utilization reports		●	●
Systems Maintenance guidance		Semiannual	Optional
Designated technical and field support teams			●

Figure 8. ProSupport One for Data Center model

Support Technologies

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

SupportAssist

The best time to solve a problem is before it happens. The automated proactive and predictive technology SupportAssist* helps reduce your steps and time to resolution, often detecting issues before they become a crisis. Benefits include:

- Value - SupportAssist is available to all customer 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 on-demand ProSupport Plus reporting in TechDirect and get predictive issue detection before the problem starts.

SupportAssist is included with all support plans but features vary based on service level agreement.

	Basic Hardware Warranty	ProSupport	ProSupport Plus
Automated issue detection and system state information collection	●	●	●
Proactive, automated case creation and notification		●	●
Predictive issue detection for failure prevention			●
Reporting and recommendations available on-demand in TechDirect			●

Figure 9. SupportAssist model

Get started at Dell.com/SupportAssist

TechDirect

Boost your IT teams productivity when supporting Dell EMC systems. With over 1.4 million self-dispatches processed each year, TechDirect has proven its effectiveness as a support tool. You can:

- Self-dispatch replacement parts
- Request technical support
- Integrate APIs into your help desk

Or, access all your Dell EMC certification and authorization needs. Train your staff on Dell EMC products as TechDirect allows you to:

- Download study guides
- Schedule certification and authorization exams
- View transcripts of completed courses and exams

Register at TechDirect.com

Additional professional services

Dell Education Services

Dell Education Services offers the PowerEdge server training courses designed to help you achieve more with your hardware investment. The curriculum is designed in conjunction with the server development team, as well as Dell's technical support team, to ensure that the training delivers the information and practical, hands-on skills you and your team need to confidently manage and maintain your Dell server solution. To learn more or register for a class today, visit LearnDell.com/Server.

Dell Global Infrastructure Consulting Services

Dell Global Infrastructure Consulting Services use skilled solution architects, innovative tools, automated analysis and Dell's intellectual property to give you rapid insight into the root causes of unnecessary complexity. We seek better answers than traditional service models, and our strategy is to help you quickly identify high-impact, short-duration projects that deliver return on investment (ROI) and free up resources. The results are practical, action-oriented plans with specific, predictable, measurable outcomes. From data center optimization to server virtualization to systems management, our consulting services can help you build a more efficient enterprise.

Dell managed services

Dell Managed Services are a modular set of lifecycle services designed to help you automate and centrally configure, deploy, and manage your day-to-day data center operations. These services extend your existing on-premise IT infrastructure with off-premise

cloud services designed to better address challenges with mobility, highly distributed organizations, security, compliance, business continuity, and disaster preparedness.

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