Dell EMC PowerEdge T640

Technical Guide

Regulatory Model: E47S
Regulatory Type: E47S001

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

Introduction

The PowerEdge T640 is the latest 2-socket, rack-capable tower (5U rack) server designed to run complex workloads using highly scalable memory, I/O, and network options. The system features the Intel Xeon Processor Scalable family, up to 24 DIMMs, PCI Express (PCIe) 3.0 enabled expansion slots, and a choice of network interface technologies to cover NIC and LOM.

The PowerEdge T640 is a general-purpose platform capable of handling demanding workloads and applications, such as:

- Data warehouse
- Ecommerce
- Databases
- High-performance computing (HPC)

The PowerEdge T640 is the most scalable 2-socket tower server in the Dell EMC portfolio. The T640 is suitable for Remote Office, Branch Office (ROBO) and Small Medium Business (SMB) usage in an office or data center environment that requires large amount of disk, memory space, I/O slots, and GPGPU.

New Technologies

Table 1. New technologies

Technology	Detailed Description
2nd Generation Intel® Xeon® Processor Scalable family	• 14nm process technology • Virtual address space: 48 bits • Physical address space 46 bits • Intel® Hyper-Threading Technology • Up to 28 cores • Up to 3.7 GHz • Max TDP: 205W
Intel® C620 Chipset	Intel® Platform Controller Hub (PCH)
Memory	• 6x DDR4 Channels per socket, 2 DIMMs per channel (2DPC) • Up to 2933 MT/s (configuration-dependent) • RDIMMs up to 32GB • LRDIMMs at 128GB supported. • NVDIMMs of 16GB supported
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
Wireless Management	The Quick Sync feature is an extension of NFC based low bandwidth of the previous generation Quick Sync interface. Quick Sync 2.0 will offer feature parity with previous generation server NFC interface with improved user experience. To extend this Quick Sync feature to wide variety of Mobile OS's with higher data throughput, the Quick Sync 2.0 version replaces previous generation NFC technology with wireless at-the-box system management.

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System features

Product comparison

Table 2. Product comparison

Feature	PowerEdge T640	PowerEdge T630
CPU	2x 2nd Generation Intel® Xeon® processor Scalable Family	2x Intel Xeon E5-2600 v3 (Haswell-EP), Broadwell
Memory	• 24 DDR4 DIMM slots • Supports RDIMMs/LRDIMMs • Speeds up to 2933MT/s, 3TB max • Up to 12 NVDIMM, 192GB max	• Up to 24 DDR4 DIMM slots • 1.5TB max memory • Speeds up to 2400MT/s
CPU Interconnect	Intel Ultra Path Interconnect (UPI)	Intel QuickPath Interconnect (QPI)
Hard drives	8x3.5 -inch, 18x3.5 -inch, 16x2.5 -inch, 16x2.5 -inch + 8x NVMe, 32x2.5 -inch - 12Gb SAS, 6Gb SATA	8x3.5 -inch, 18x3.5 -inch, 16x2.5 -inch, 32x2.5 -inch - 12Gb SAS, 6Gb SATA
Storage Controllers	Adapters: HBA330, H330, H730P, H740P, H840, 12Gb SAS HBA Mini Mono: HBA330, H330, H730P, H740P SW RAID: S140	Adapters: HBA330, H330, H730, H730P, H830 (ext) Mini Mono: HBA330, H330, H730, H730P SW RAID: S130
PCIe SSD	Up to 8x PCIe SSD (NVMe)	4x PCIe SSD
PCIe Slots	Max 8 PCIe 3.0 + 1 internal	Max 7 PCIe Gen3 + 1 internal
LOM	2x 10GbE (10GBASE-T) Broadcom 57416	2x 1GbE
USB Ports	Front: 1 port (USB 3.0), 1 port (USB 2.0), dedicated iDRAC, serial, video, 6x USB2.0/3.0	Front: 1 port (USB 3.0), 1 port USB2.0, dedicated iDRAC, serial, video,4x USB 2.0
Tower/Rack	5U (rack)	5U (rack)
Power Supplies	• 2400W Platinum (AC only) • 2000 Platinum (AC only) • 1600W Platinum (AC only) • 1100W Platinum (AC/DC) • 750W Platinum/Titanium (AC only) • 750W Platinum Mixed Mode DC (For china only) • 495W Platinum (AC only)	AC: 495W, 750W, 1100W DC: 1100W Mixed Mode: 750W 1100W DC, 1600W
Remote Management	iDRAC9	iDRAC8
Internal GPU	4x 300W (DW) Passive or 8x 150W (SW)	4x 300W (DW) Active or 7x 150w (SW)
Availability	• Hot-plug Drives • Hot-plug Redundant Cooling • Hot-plug Redundant Power Supplies • BOSS • IDSDM	• Hot-plug Drives • Hot-plug redundant Cooling • Hot-plug Redundant Power Supplies • IDSDM Support

Specifications

Table 3. Technical specifications

Feature	Specification
Form factor	5U rackable tower
Chassis dimension	• Width: 217.7 mm • Height: 443.23 mm • Depth: 707.8 mm
Chassis weight	• 16x2.5 inch hard drive with 8 fans: 38.42 kg/84.70 lb • 32x2.5 inch hard drive with 8 fans: 42.36 kg/93.38 lb • 18x3.5 inch hard drive with 8 fans: 49.65 kg/109.45 lb
Processors	2nd Generation Intel Xeon processors Scalable family
Processor sockets	2 sockets
Chipset	Intel® C620
Memory	• Maximum RAM: 3TB-24 DIMM slots • Minimum RAM: 8GB-one module • RDIMM-maximum system capacity: 768GB • LRDIMM-maximum system capacity: 3TB • NVDIMM-maximum system capacity: 192GB (up to 12 DIMMs per system) • Architecture: 2666 or 2933 MT/s DDR4, registered
RAID controller	• H330 • H730P • H840 • H740P • HBA 330 • 12Gb SAS HBA • Software RAID: S140 • Hardware RAID: M.2 SATA adapter (BOSS)
Drives bays	• Up to 8 x3.5 -inch SAS, SATA, and SSD drives • Up to 18 x3.5 -inch SAS, SATA, and SSD drives • Up to 32 x2.5 -inch SAS, SATA, and SSD drives • Up to 16 x2.5 -inch SAS, SATA, and SSD drives • Up to 16 x2.5 -inch SAS, SATA and SSD plus up to 8 NVMe drives
PCIe slots	• Slot 1: Full Length, Full Height, CPU1 - PCIe Gen3 x16 (x16 connector) • Slot 2: Full Length, Full Height, CPU1 - PCIe Gen3 x4 (x8 connector) • Slot 3: Full Length, Full Height, CPU1 - PCIe Gen3 x16 (x16 connector) • Slot 4: Half Length, Full Height, CPU2 - PCIe Gen3 x8 (x8 connector) • Slot 5: Full Length, Full Height, CPU2 - PCIe Gen3 (DMI) x4 (x8 connector) • Slot 6: Full Length, Full Height, CPU2 - PCIe Gen3 x16 (x16 connector) • Slot 7: Full Length, Full Height, CPU2 - PCIe Gen3 x8 (x8 connector) • Slot 8: Full Length, Full Height, CPU2 - PCIe Gen3 x16 (x16 connector) • Slot 9(internal): Half Length, Full Height, CPU1 - PCIe Gen3 x8 (x8 connector)
Power supply	• 495W AC, 86 mm-Platinum • 750W AC, 86 mm-Titanium • 750W AC, 86 mm -Platinum • 750W AC/HVDC, 86 mm-Platinum (Mixed mode China only) • 750W DC-Platinum 240 V DC (For china only) • 1100W AC, 86 mm-Platinum

Feature	Specification
	• 1100W DC, 86 mm-Gold • 1600W AC, 86 mm-Platinum • 2000W AC, 86 mm-Platinum • 2400W AC, 86 mm-Platinum
Availability	• Hot-plug hard drives • Hot-plug redundant cooling • Hot-plug redundant power • Internal Dual SD Module (IDSDM) • BOSS

Systems Management	• Dell EMC Systems management consoles and tools:
	  • OpenManage Essentials
	  • OpenManage Mobile 2.0 with Quick Sync 2
	  • OpenManage Power Center
	  • Repository Manager
	• iDRAC License options:
	  • iDRAC9 Basic (default)
	  • iDRAC9 Express (upgrade)
	  • iDRAC9 Enterprise (upgrade)
	  • vFlash with 16GB micro SD card (upgrade)
	• Dell EMC OpenManage Integrations :
	  • Dell OpenManage Integration Suite for Microsoft® System Center
	  • Dell OpenManage Integration for VMware vCenter
	  • BMC Software (available from BMC)
	• Dell EMC OpenManage Connections:
	  • HPE Operations Manager I (OMi)
	  • Nagios Core and Nagios XI

Operating systems	• Microsoft Windows Server® with Hyper-V • Citrix® XenServer® • SUSE® Linux Enterprise Server • Red Hat® Enterprise Linux • VMware® ESXi • Canonical® Ubuntu® LTS For more information on the specific versions and additions, visit Dell.com/OSsupport.
Internal GPU	4x 300W (DW) passive or 8x 150W (SW)

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Chassis views and features

Chassis view and features

Front panel view and features

The following components are located on the front of the PowerEdge T640:

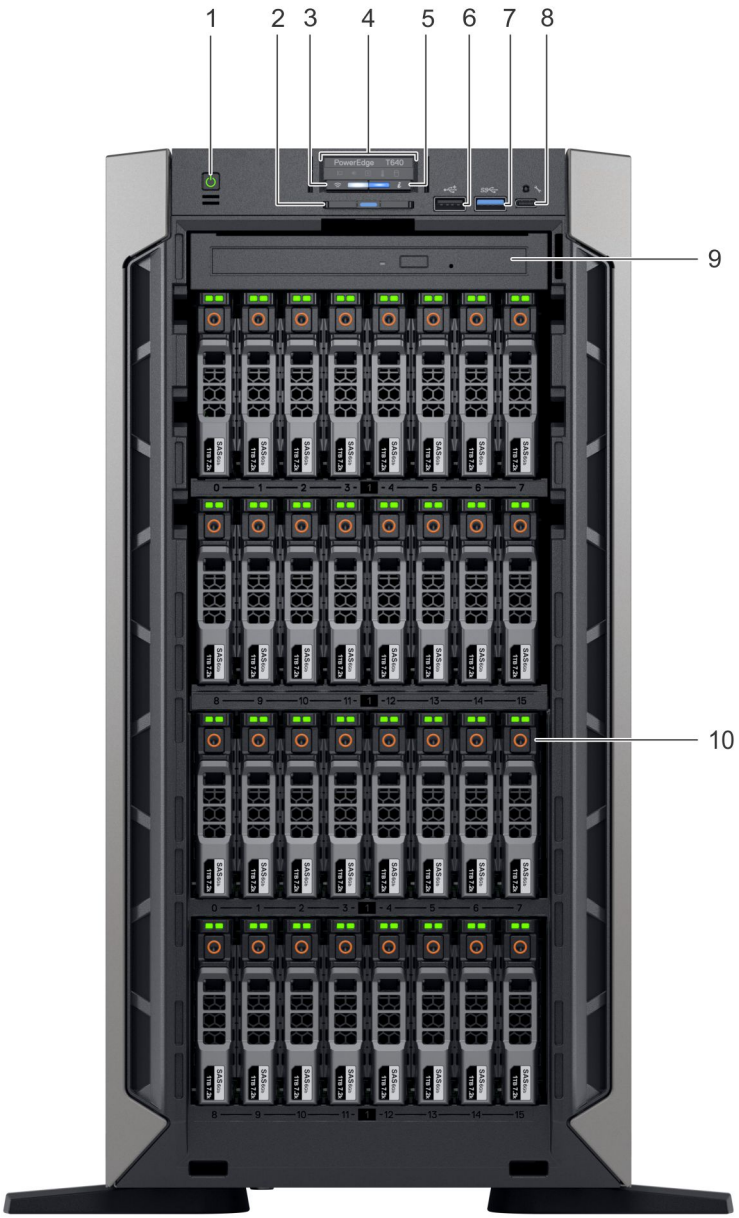


Figure 1. PowerEdge T640 front panel

1. Power button
2. System information tag

3. System health and system ID indicator
4. Status LED indicators
5. iDRAC Quick Sync 2 wireless indicator (optional)
6. USB port
7. USB port
8. Micro USB port
9. Optical drive (optional)
10. Hard drive slots

For more information on the HDD numbering or to view other configurations, see the PowerEdge T640 Hardware Owner's Manual on www.dell.com/support.

Back view and features

The following components are located on the back of the PowerEdge T640:

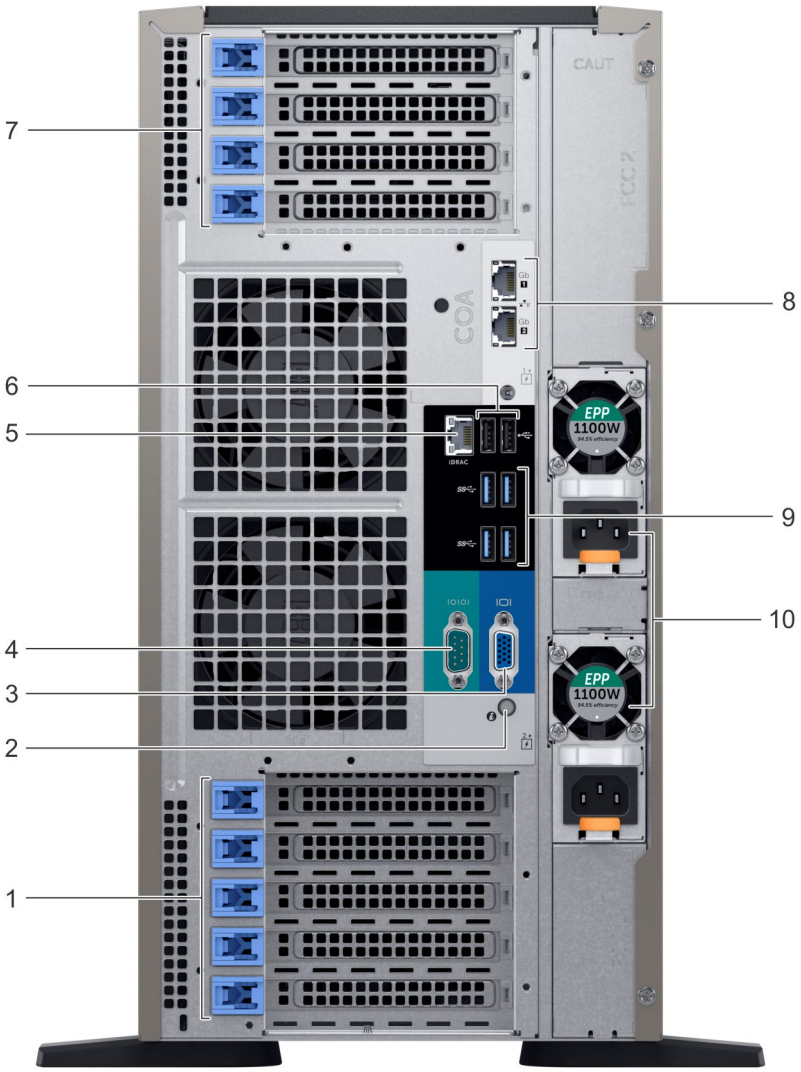


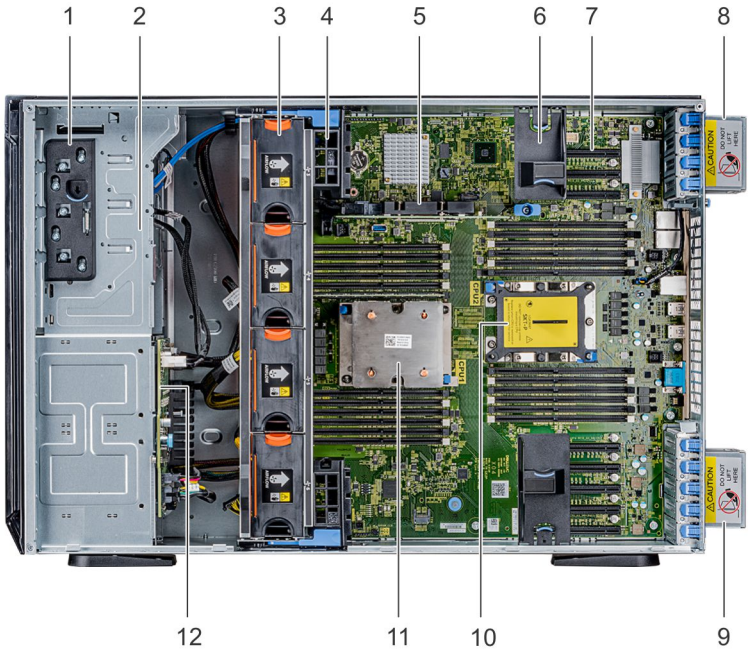
Figure 2. PowerEdge T640 back view

1. PCIe expansion card slot(s)
2. System health and system ID indicator
3. VGA port
4. Serial port
5. iDRAC9 Enterprise port
6. USB 2.0 port (2)

7. PCIe expansion card slot(s)
8. NIC port (2)
9. USB 3.0 port (4)
10. Power supply unit (2)

Inside the system

NOTE: Components that are hot swappable are marked orange and touch points on the components are marked blue.



1. release latch
2. drive cage
3. cooling fan assembly
4. GPU card holder
5. internal PERC
6. PCIe card holder
7. PCIe slots
8. left external fan
9. right external fan
10. CPU2 socket
11. CPU1
12. backplane

Control panels and LED

For more information about the PowerEdge T640 control panels, see the PowerEdge T640's Owner's Manual at Dell.com/Support/Manuals.

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 4. Security features

Security feature	Description
Cover latch	A tooled latch is integrated in the top cover to secure it to the rack chassis.
TPM	The Trusted Platform Module (TPM) is used to generate/store keys, protect/authenticate passwords, and create/store digital certificates. Intel's TXT (Trusted Execution Technology) functionality along with Microsoft's Platform Assurance feature in Windows Server 2016 is supported. TPM can also be used to

Security feature	Description
	enable the BitLocker™ hard drive encryption feature in Windows Server 2012/2016. Three versions of TPMs are supported in 14G namely TPM 1.2, TPM 2.0(Rest of World, aka everywhere excluding China and Russia) and TPM 2.0. No TPMs are supported for Russia in 14G.
Front bezel	The front bezel of the system contains a lock. A locked bezel secures the system hard drives
Power-off security	BIOS has the ability to disable the power button function.
Intrusion alert	An internal switch is used to detect chassis intrusion.
Secure Boot mode	A switch mounted on the air shroud is used to detect chassis intrusion. When the cover is opened, the switch circuit closes to indicate intrusion to ESM. When enabled, the software will provide notification that the cover has been opened.

4

Processor

Processor Features

The 2nd Generation 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 (Intel AVX-512) with a single AVX512 fused multiply add (FMA) execution units. SKUs which support Advanced RAS enable a 2nd FMA execution unit.
- Security without Compromise: Near-zero encryption overhead enables higher performance on all secure data transactions.

Supported processors

Table 5. Supported Processors for T640

Model	Intel SKU	SKU type	Stepping	Speed(GHz)	Cache(MB)	QPI(GT/s)	Max Memory Speed(MT/s)	Cores	Turbo	TDP (W)
Intel Xeon Processor Scalable Family	6258R	Gold	XCC	2.7	38.5	10.4	2933	28	Turbo	205
Intel Xeon Processor Scalable Family	6238L	Gold	XCC	2.1	30.25	10.4	2933	22	Turbo	140
Intel Xeon Processor Scalable Family	6222V	Gold	XCC	1.8	27.5	10.4	2400	20	Turbo	115
Intel Xeon Processor Scalable Family	6230N	Gold	XCC	2.3	27.5	10.4	2933	20	Turbo	125
Intel Xeon Processor Scalable Family	6248M	Gold	XCC	2.1	30.25	10.4	2933	22	Turbo	140
Intel Xeon Processor Scalable Family	6248R	Gold	XCC	3.0	35.75	10.4	2933	24	Turbo	205
Intel Xeon Processor	6248	Gold	XCC	2.5	27.5	10.4	2933	20	Turbo	150

Model	Intel SKU	SKU type	Stepping	Speed(GHz)	Cache(MB)	QPI(GT/s)	Max Memory Speed(MT/s)	Cores	Turbo	TDP (W)
Scalable Family										
Intel Xeon Processor Scalable Family	6246R	Gold	XCC	3.4	22	10.4	2933	16	Turbo	205
Intel Xeon Processor Scalable Family	6246	Gold	XCC	3.3	24.75	10.4	2933	12	Turbo	165
Intel Xeon Processor Scalable Family	6242R	Gold	XCC	3.1	27.5	10.4	2933	20	Turbo	205
Intel Xeon Processor Scalable Family	6240R	Gold	XCC	2.4	35.75	10.4	2933	24	Turbo	165
Intel Xeon Processor Scalable Family	6240	Gold	XCC	2.6	24.75	10.4	2933	18	Turbo	150
Intel Xeon Processor Scalable Family	6238R	Gold	XCC	2.2	38.5	10.4	2933	28	Turbo	165
Intel Xeon Processor Scalable Family	6238	Gold	XCC	2.1	30.25	10.4	2933	22	Turbo	140
Intel Xeon Processor Scalable Family	6234	Gold	XCC	3.3	24.75	10.4	2933	8	Turbo	130
Intel Xeon Processor Scalable Family	6230R	Gold	XCC	2.1	35.75	10.4	2933	26	Turbo	150
Intel Xeon Processor Scalable Family	6230	Gold	XCC	2.1	27.5	10.4	2933	20	Turbo	125
Intel Xeon Processor Scalable Family	6226R	Gold	XCC	2.9	22	10.4	2933	16	Turbo	150
Intel Xeon Processor Scalable Family	6226	Gold	XCC	2.7	19.25	10.4	2933	12	Turbo	125
Intel Xeon Processor	5222	Gold	HCC	3.8	16.5	10.4	2933	4	Turbo	105

Model	Intel SKU	SKU type	Stepping	Speed(GHz)	Cache(MB)	QPI(GT/s)	Max Memory Speed(MT/s)	Cores	Turbo	TDP (W)
Scalable Family										
Intel Xeon Processor Scalable Family	5220R	Gold	HCC	2.2	35.75	10.4	2933	24	Turbo	150
Intel Xeon Processor Scalable Family	5220	Gold	HCC	2.2	24.75	10.4	2666	18	Turbo	125
Intel Xeon Processor Scalable Family	5218R	Gold	HCC	2.1	27.5	10.4	2933	20	Turbo	125
Intel Xeon Processor Scalable Family	5218	Gold	HCC	2.3	22	10.4	2666	16	Turbo	125
Intel Xeon Processor Scalable Family	5217	Gold	HCC	3.0	11	10.4	2666	8	Turbo	115
Intel Xeon Processor Scalable Family	5215	Gold	HCC	2.5	13.75	10.4	2666	10	Turbo	85
Intel Xeon Processor Scalable Family	4216	Silver	HCC	2.1	22	10.4	2400	16	Turbo	100
Intel Xeon Processor Scalable Family	4215R	Silver	HCC	3.2	11	9.6	2400	8	Turbo	130
Intel Xeon Processor Scalable Family	4215	Silver	HCC	2.5	11	10.4	2400	8	Turbo	85
Intel Xeon Processor Scalable Family	4214R	Silver	HCC	2.4	16.5	9.6	2400	12	Turbo	100
Intel Xeon Processor Scalable Family	4214	Silver	HCC	2.2	16.5	10.4	2400	12	Turbo	85
Intel Xeon Processor Scalable Family	4210R	Silver	HCC	2.4	13.75	9.6	2400	10	Turbo	100
Intel Xeon Processor	4210	Silver	HCC	2.2	13.75	10.4	2400	10	Turbo	85

Model	Intel SKU	SKU type	Stepping	Speed(GHz)	Cache(MB)	QPI(GT/s)	Max Memory Speed(MT/s)	Cores	Turbo	TDP (W)
Scalable Family										
Intel Xeon Processor Scalable Family	4208	Silver	HCC	2.1	11	10.4	2400	8	Turbo	85
Intel Xeon Processor Scalable Family	3206	Bronze	LCC	1.9	11	10.4	2133	10	Turbo	85
Intel Xeon Processor Scalable Family	3206R	Bronze	LCC	1.9	11	9.6	2400	8	No Turbo	85
Intel Xeon Processor Scalable Family	3204	Bronze	LCC	1.9	8.25	10.4	2133	6	Turbo	85
Intel Xeon Processor Scalable Family	8180	Platinum	XCC	2.5	38.5	10.4	2666	28	Turbo	205W
Intel Xeon Processor Scalable Family	6152	Gold	XCC	2.1	25	10.4	2666	22	Turbo	140W
Intel Xeon Processor Scalable Family	6148	Gold	XCC	2.4	27	10.4	2666	20	Turbo	150W
Intel Xeon Processor Scalable Family**	6140M	Gold	XCC	2.3	25	10.4	2666	18	Turbo	140W
Intel Xeon Processor Scalable Family	6140	Gold	XCC	2.3	25	10.4	2666	18	Turbo	140W
Intel Xeon Processor Scalable Family**	6134M	Gold	XCC	3.2	24.75	10.4	2666	8	Turbo	130W
Intel Xeon Processor Scalable Family	6134	Gold	XCC	3.3	24.75	10.4	2666	8	Turbo	130W
Intel Xeon Processor Scalable Family	6132	Gold	XCC	2.6	19.25	10.4	2666	14	Turbo	140W
Intel Xeon Processor	6128	Gold	XCC	3.4	19.25	10.4	2666	6	Turbo	115W

Model	Intel SKU	SKU type	Stepping	Speed(GHz)	Cache(MB)	QPI(GT/s)	Max Memory Speed(MT/s)	Cores	Turbo	TDP (W)
Scalable Family										
Intel Xeon Processor Scalable Family	6126	Gold	XCC	2.6	19.25	10.4	2666	12	Turbo	125W
Intel Xeon Processor Scalable Family	5122	Gold	XCC	3.6	16.5	10.4	2400	4	Turbo	105W
Intel Xeon Processor Scalable Family	5120	Gold	HCC	2.2	19.25	10.4	2400	14	Turbo	105W
Intel Xeon Processor Scalable Family	5118	Gold	HCC	2.3	16.5	10.4	2400	12	Turbo	105W
Intel Xeon Processor Scalable Family	5117	Gold	HCC	2.0	19.25	10.4	2666	14	Turbo	105W
Intel Xeon Processor Scalable Family	4116	Silver	HCC	2.1	16	9.6	2400	12	Turbo	85W
Intel Xeon Processor Scalable Family	4114	Silver	LCC	2.2	14	9.6	2400	10	Turbo	85W
Intel Xeon Processor Scalable Family	4112	Silver	LCC	2.6	8.25	9.6	2400	4	Turbo	85W
Intel Xeon Processor Scalable Family	4110	Silver	LCC	2.1	11	9.6	2400	8	Turbo	85W
Intel Xeon Processor Scalable Family	4108	Silver	LCC	1.8	11	9.6	2400	8	Turbo	85W
Intel Xeon Processor Scalable Family	3106	Bronze	LCC	1.7	11	9.6	2133	8	No Turbo	85W
Intel Xeon Processor Scalable Family	3104	Bronze	LCC	1.7	11	9.6	2133	6	No Turbo	85W

Processor configurations

The T640 supports two processors with up to 32 cores per processor.

Single processor configuration

The T640 will function normally if there is just a single processor placed in the processor1 socket. The system will not boot if only processor2 socket is populated.

Processor installation

For processor installation instructions, see the Disassembly and reassembly section.

Chipset

The Dell EMC PowerEdge T640 uses the Intel C620 chipset (PCH) that provides extensive I/O support. Functions and capabilities 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 6Gb/s on all ports.
- xHCI USB controller with SuperSpeed USB 3.0 ports
- Direct Media Interface
- Serial Peripheral Interface
- Enhanced Serial Peripheral Interface
- Flexible I/O-Allows some high speed I/O signals to be configured as PCIe root ports, PCIe uplink for use with certain PCH SKUs, 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 10/1Gb Ethernet
- Integrated 10/100/1000 Mbps Ethernet MAC
- 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 Trace Hub for debug

5

System memory

The PowerEdge T640 support up to 24 DIMMs. Depending on the Intel® CPU, memory speeds of up to 2933 MT/s with 1 DIMM per channel and 2666 MT/s with 2 DIMMs per channel are available. They support flexible memory configurations ranging from capacities of 8 GB minimum to 3 TB maximum. Each CPU has 12 memory DIMM slots. Those DIMMs are organized into 6 different channels so there are 2 DIMMs per channel. For best performance all memory channels should be populated with the same number of DIMMs, either 6 or 12 DIMMs per CPU.

Table 6. Supported memory

CPU Family	DIMM Type	DIMM Ranking	Capacity	Speed (MT/s)
Intel® Xeon® Scalable	RDIMM	1R/2R	8GB, 16GB, and 32GB	2666
2nd Generation Intel® Xeon® Scalable	RDIMM	1R	8GB	2666
2nd Generation Intel® Xeon® Scalable	RDIMM	2R	16GB, 32GB, and 64Gb	2933
Intel® Xeon® Scalable	LRDIMM	4R/8R	64GB and 128GB	2666
2nd Generation Intel® Xeon® Scalable	LRDIMM	8R	128GB	2666
Intel® Xeon® Scalable or 2nd Generation Intel® Xeon® Scalable	NVDIMM	1R	16GB	2666
Intel® Xeon® E-2100	ECC UDIMM	1R/2R	8GB, and 16GB	2666

Topics:

Memory speed

The PowerEdge T640 support memory speeds of 1866 MT/s, 2133 MT/s, 2400 MT/s, 2666 MT/s, and 2933 MT/s depending on the DIMM types installed and configured. All memory on all processors and channels run at the same speed and voltage. By default, highest common supported speed between the CPUs and DIMMs. The operating speed of the memory is also determined by the maximum speed supported by the processor, the speed settings in the BIOS, and the operating voltage of the system.

Table 7. DIMM performance details

DIMM type	Description
RDIMM	• Maximum frequency of 2933 MT/s • Maximum frequency using 2 DIMMs per channel of 2666 MT/s • Maximum capacity of 64GB per DIMM • Maximum system capacity of 768GB
LRDIMM	• Maximum frequency of 2666 MT/s • Maximum frequency using 2 DIMMs per channel of 2666 MT/s • Maximum capacity of 128GB per DIMM • Maximum system capacity of 1.5TB
NVDIMM	• Maximum frequency of 2666 MT/s • Maximum frequency using 2 DIMMs per channel of 2666 MT/s • Maximum capacity of 16GB per DIMM • Maximum system capacity of 192GB (up to 12 DIMMs per system)

Memory module installation guides

The list below are the PowerEdge T640's DIMM population requirements:

- Speed: If DIMMs of different speeds are mixed, all channels across all processors operate at the slowest DIMM's common frequency.
- DIMM type: Max two types of DIMMs allowed per system and they have to be NVDIMMs and RDIMMS. RDIMM/LRDIMM and LRDIMM/NVDIMM cannot be mixed.
- DIMMs with different data widths can be mixed. 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

Memory RAS

Reliability, Availability, and Serviceability (RAS) features help keep the system online and operational without significant impact to performance, and decreases data loss and crashing issues. RAS helps in rapid and accurate diagnosis of system faults.

Table 8. Supported RAS features

Feature	Description
Memory Optimized	Baseline RAS features for highest performance optimization.
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 searches the system memory, repairing correctable errors.
Recovery from single DRAM device failure (SDDC)	Recovery from Single DRAM Device Failure (SDDC) provides error checking and correction that protects against any single memory chip failure as well as multi- bit errors from any portion of a single memory chip.
Failed DIMM isolation	This feature provides the ability to identify a specific failing DIMM channel pair, thereby 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 intra-socket memory fails. The mirrored copy of the memory is stored in memory of the same processor socket.
Memory address parity protection	This feature provides the ability to 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.

6

Storage

The PowerEdge T640 provides storage expandability that allows you to adapt to your workload and operational demands. With comprehensive storage options, the T640 offer various drive types, internal and external storage controllers, and different backplanes for varied number of drives.

Topics:

Supported hard drives

The following table shows the internal hard drives that are supported by the T640

Table 9. Supported hard drives

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 • 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

Form factor	Capacities
	• EC, HDD, 6Gbps SATA, 3.5, 7.2K, 512e, 8TB • EC, HDD, 12Gbps, SAS, 3.5, 7.2K, 512e, 16TB • EC, HDD, 6Gbps, SATA, 3.5, 7.2K, 512e, 16TB
NVMe SSD	• 800GB 2.5 inch Device • 1.6TB 2.5 inch Device • 3.2TB 2.5 inch Device • 6.4TB 2.5 inch Device • KIT,CRD,NVM,1.6,HHHL,PM1725 • KIT,CRD,CTL,NVME,PM1725 • KIT,CRD,NVM,3.2,HHHL,PM1725

Storage controllers

In order to reduce complexity and provide manageable system storage, the PowerEdge T640 offers support for one version of PCIe low-profile form factor internal storage controller and four versions of external storage controllers-internal PCIe slot.

Table 10. PERC series offerings

Performance level	Controller and description
Entry	S140-Software RAID SATA
Value	H330 internal, 12Gb SAS HBA-external
Value performance	H730P
Premium performance	H740 and H840

IDSDM/vFlash card

This module contains the Internal Dual SD Module (IDSDM) and vFlash card that are combined into a single card module. There are two SKUs available:

- vFlash
- vFlash + IDSDM

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

Boot Optimized Storage Subsystem (BOSS)

BOSS is offered as a means of booting 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.

External storage

Table 11. Supported external storage devices

Device type	Description
External backup options	• PowerVAULT TL2000 and TL4000 Compact tape libraries • PowerVault ML6000 Modular tape libraries • PowerVault 124T Autoloader
External HBAs	12Gb SAS HBA full-height
External storage options	• Dell Storage PS series • PowerVault RD1000 • PowerVault MD3200 • PowerVault MD3200i • PowerVault MD1120 • Dell EMC AX4-5 • Dell EMC CX4-120 • Dell EMC CX4-240 • Dell EMC CX4-480 • Dell EMC CX4-960 • Dell EMC NX4 • Dell EMC NS120 • Dell EMC NS480 • DELL EMC DD140 • DELL EMC DD610 • DELL EMC DD640 • PowerVault NX300 • PowerVault NX3000 • PowerVault NX3100

7

Networking and PCIe

The PowerEdge T640 offers two Broadcom 57416 10GBase_T LOMs. The Broadcom 57416 (10GBase-T) onboard NIC ports are compliant with IEEE 802.3an (10GBase-T and IEEE 802.3ab (1000Base-T) standards only. There is no support for 10/100 Base-T. The Broadcom 57416 onboard NIC ports will only connect (link up) to a switch that supports 1000 Base-T or 10G Base-T.

Topics:

PCIe expansion slots

The PowerEdge T640 provides eight PCI Express expansion slots and one dedicated storage slot.

Table 12. PCIe expansion slots

Location	Width	Length	Bracket Height	CPU1 (PCIe Ports)	CPU2 (PCIe Ports)	CPU2 (DMI Ports)	Slot Width
PCIe Slot 1	DW	Full Length	Full Length	x16	Not supported	Not supported	X16
PCIe Slot 2	SW	Full Length	Full Length	x4	Not supported	Not supported	X8
PCIe Slot 3	DW	Full Length	Full Length	x16	Not supported	Not supported	X16
PCIe Slot 4	SW	Half Length	Full Length	Not supported	x8	Not supported	X8
PCIe Slot 5	SW	Full Length	Full Length	Not supported	Not supported	x4	X8
PCIe Slot 6	DW	Full Length	Full Length	Not supported	x16	Not supported	X16
PCIe Slot 7	SW	Full Length	Full Length	Not supported	x8	Not supported	X8
PCIe Slot 8	DW	Full Length	Full Length	Not supported	x16	Not supported	X16
Internal Slot (Slot 0)	SW	Half Length	NONE	x8	Not supported	Not supported	X8

NOTE: Slots 4, 5, 6, 7, and 8 will only work with CPU2 populated.

8

GPU and FPGA

The T640 supports up to 4 double wide GPUs, up to 300W each, or up to 8 single wide GPUs, up to 150W each, with the following restrictions:

- Must have 2 CPUs installed
- GPUs must be identical
- CPU TDPs of 150W/8C, 165W/12C(WS SKU), 200W and 205W have an ambient limit of 30C

GPUs on the T640 support scientific computing, co-processing and VDI/Flex (Virtual Desktop Infrastructure) architectures. The T640 can support four 300W, full-length, double-wide GPUs. Each GPU can support of dedicated memory and is either actively cooled or passively cooled. The GPUs are installed on the PCIe x16 Gen 3 interfaces available on Slot 1, 3, 6 and 8. (Slot 6 and 8 will only work with CPU2 populated.)

If a GPU is on slot 1/3, only 1x 5.25" RMSD device (ODD/RD1000/half-height tape is supported). 300W GPUs only support the maximum ambient 30 degree C condition.

Requires a GPU-ready chassis in a rack form factor (GPUs are only supported in rack mode). 3.5 inch x18 HDD chassis is not supported. Dual PERC (x32) configuration is not supported. Fresh Air configuration is not supported.

The GPU ready chassis has to be chosen during the initial purchase transactions.

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.

Topics:

Power consumption and energy efficiency

With the rise in the cost of energy that is 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.
Tools for right-sizing	Enterprise Infrastructure Planning Tool (EIPT) is a tool that helps you to plan and tune your computer and infrastructure equipment for maximum efficiency. EIPT helps you by calculating hardware power consumption, power infrastructure, and storage. You can learn more at Dell.com/calc
Industry compliance	Dell EMC's servers are compliant with all relevant industry certifications and guidelines, including 80 PLUS, Climate Savers, and ENERGY STAR.
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'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	Dell EMC's servers are compliant with all relevant industry certifications and guidelines, including 80 PLUS, Climate Savers, and ENERGY STAR. 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

Feature	Description
	that is comprised of Intel Node Manager that is accessed through Dell iDRAC9 Enterprise and OpenManage Power Center that allows policy- based management of power and thermals at the individual server, rack, and data center level. Hot spare reduces 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. Idle power enables Dell servers to run as efficiently when idle as when at full workload.
Fresh Air cooling	FAC is supported with certain configuration limitations. With the thermal design and reliability of Dell products, you can have the capability to operate at excursion- based temperatures beyond the industry standard of 35°C (95°F) without impacting your availability model. This solution takes into account servers, networking, storage, and other infrastructure.
Rack infrastructure	Dell EMC offers some of the industry's highest- efficiency power infrastructure solutions, including: • Power distribution units (PDUs) • Uninterruptible power supplies (UPSs) • Energy smart containment rack enclosures

PSU specifications

The Dell EMC PowerEdge T640 system supports up to two AC or DC redundant power supply units (PSUs).

Table 14. PSU specifications

PSU	Class	Heat dissipation (maximum)	Frequency	Voltage	Current
495 W AC	Platinum	1908 BTU/hr	50/60 Hz	100–240 V AC, autoranging	6.5 A–3 A
750 W AC	Platinum	2891 BTU/hr	50/60 Hz	100–240 V AC, autoranging	10 A–5 A
750 W AC	Titanium	2843 BTU/hr	50/60 Hz	200–240 V AC, autoranging	5 A
750 W Mixed Mode HVDC (for China only)	Platinum	2891 BTU/hr	50/60 Hz	100-200 V AC, autoranging	10 A–5 A
	Platinum	2891 BTU/hr	NA	240 V DC, autoranging	4.5 A
750 W Mixed Mode	Platinum	2891 BTU/hr	50/60 Hz	100-200 V AC, autoranging	10 A–5 A
	Platinum(For China only)	2891 BTU/hr	NA	240 V DC, autoranging	5 A
1100 W AC	Platinum	4100 BTU/hr	50/60 Hz	100–240 V AC, autoranging	12 A–6.5 A
1100 W DC	Gold	4416 BTU/hr	-	(-48 V to –60 V) DC, autoranging	32 A
1600 W AC	Platinum	6000 BTU/hr	50/60 Hz	100–240 V AC, autoranging	10 A
2000 W Mix Mode	Platinum	7500 BTU/hr	50/60 Hz	100–200 V AC, autoranging	11.5 A
2000 W Mix Mode	Platinum	7500 BTU/hr	50/60 Hz	240 V AC, autoranging	11.8 A
2400 W AC	Platinum	9000 BTU/hr	50/60 Hz	100–240 V AC, autoranging	16 A

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

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

NOTE: If a system with 2400 W AC PSU operates at low line 100–120 V AC, then the power rating per PSU is derated to 1400 W.

NOTE: If a system with 2000 W AC PSU operates at low line 100–120 V AC, then the power rating per PSU is derated to 1000 W.

NOTE: If a system with 1600 W AC PSU operates at low line 100–120 V AC, then the power rating per PSU is derated to 800 W.

NOTE: If a system with 1100 W AC PSU operates at low line 100–120 V AC, then the power rating per PSU is derated to 1050 W.

Thermal and acoustics

Thermal design

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 management of PowerEdge T640 delivers high performance for the right amount of cooling to 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 (see Environmental Specifications). The benefits to you are lower fan power consumption (lower server system power and data center power consumption) and greater acoustical versatility.

Acoustical design

The acoustical design of the PowerEdge T640 reflects the following:

- Versatility: The T640 saves power draw in the data center but are also quiet enough for office environment in typical and minimum configurations. You may find that the system is sufficiently quiet where the sound it emits blends into the environment.
- Adherence to Dell's high sound quality standards: Sound quality is different from sound power level and sound pressure level in that it describes how humans respond to annoyances in sound, like whistles and hums. One of the sound quality metrics in the Dell specification is prominence ratio of a tone.
- Noise ramp and descent at boot-up from power off: Fan speeds and noise levels ramp during the boot process (from power- off to power- on) in order to add a layer of protection for component cooling in the event that the system were not to boot properly. In order to keep the boot-up process as quiet as possible, the fan speed reached during boot-up is limited to about half of full speed.
- Noise level dependencies: If acoustics is important to you, several configuration choices and settings are important to consider:
  - For lower acoustical output, use a small number of lower rotational- speed SATA hard drives, nearline SAS hard drives, or non-rotational devices like SSDs. 15k hard drives generate more acoustic noise than that of lower rotational- speed hard drives, and noise increases with number of hard drives.
  - Fan speeds and noise may increase from baseline factory configurations if certain profiles are changed by the user or the system configurations are updated. The following is a list of items that impact fan speeds and acoustical output:
    - iDRAC9 BIOS settings: Performance Per Watt (DAPC or OS) may be quieter than Performance or Dense Configuration (iDRAC Settings > Thermal > Max. Exhaust Temperature or Fan speed offset).
    - The quantity and type of PCIe cards installed: This affects overall system acoustics. Installation of more than two PCIe cards results in an increase in overall system acoustics.
    - Using a GPU card: This results in an increase in overall system acoustics.
    - PCIe controller-based SSD drives: Drives such as Express flash drives and Fusion- IO cards require greater airflow for cooling, and result in significantly higher noise levels.
    - Systems with an H330 PERC: This configuration may be quieter than those with an H730P PERC with battery backup. However, higher noise levels result when a system is configured as non-RAID.
    - Hot spare feature of power supply unit: In the system default setting, the Hot Spare Feature is disabled; acoustical output from the power supplies is lowest in this setting.

The T640 is a rack-capable tower server appropriate for typical office environment. However, for HPC usage with GPGPU, it is recommended to install T640 in an unattended data center environment.

10 Rack rails

The T640 is a rack-capable tower server. When the customers select rack mode chassis, T640 will support the optional sliding rail and CMA.

The sliding rail system for the T640 provides tool-less support for racks with square or unthreaded round mounting holes including all generations of Dell racks. The sliding rails for the T640 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.

The 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.

Cable arm management (CMA)

The optional cable management arm (CMA) for the T640 organizes and secures the cords and cables exiting the back of the server and unfolds to allow the server to extend out of the rack without having to detach the cables. Some key features of the T640 CMA include:

- Large U-shaped baskets to support dense cable loads.

  Both the CMA and the tray mount without the use of tools via simple and intuitive snap-in designs.
- Open vent pattern for optimal airflow.
- Can be mounted on either side by simply swinging the attachment housings from one side to the other.
- Utilizes hook-and-loop straps rather than plastic tie wraps to eliminate the risk of cable damage during cycling.
- Includes a low profile fixed tray to both support and retain the CMA in its fully closed position.

Rails

The ReadyRails II sliding rails for the T640 support tool-less mounting in 19 inch-wide, EIA-310-E compliant square hole and unthreaded round hole 4-post racks. They also support tooled mounting in threaded hole 4-post racks and are available with or without the optional cable management arm (CMA).

Below is a summary of the rack types supported by the T640 rails:

Table 15. Supported rack type

Product	Identifier	Mounting Interface	Rail type	Rack types supported				
				4-post			2-post	
				Square	Round	Thread	Flush	Center
T640	C4	ReadyRails II	Sliding	Yes	Yes	Yes	No	No

11

Dell EMC OpenManage systems management

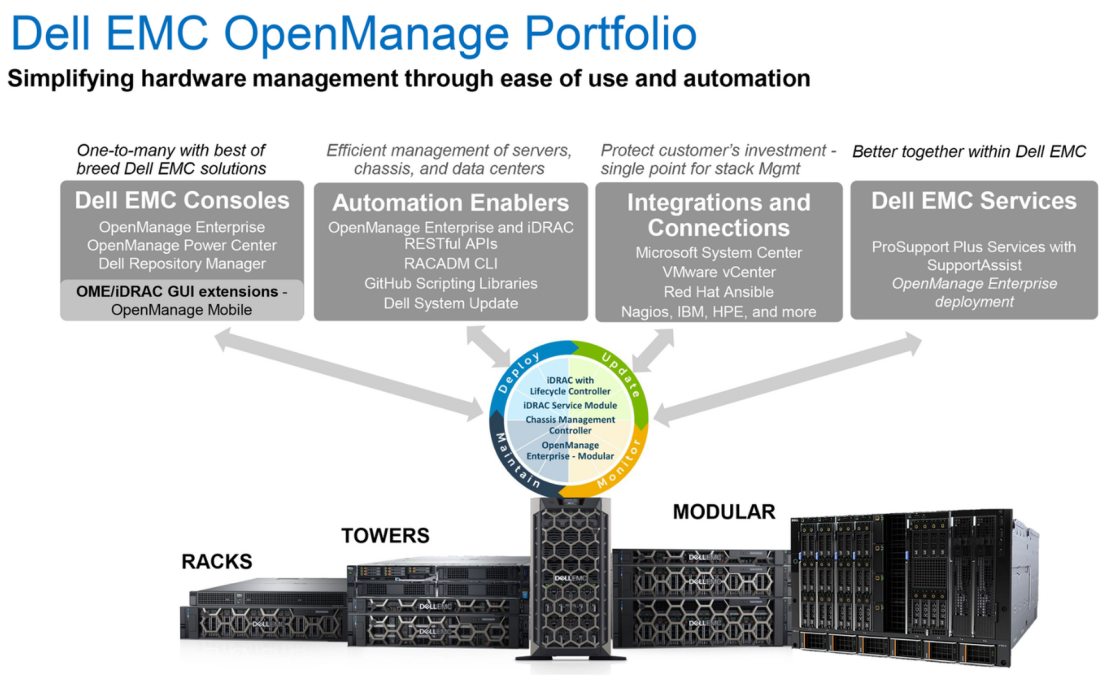


Figure 3. Dell EMC OpenManage Portfolio

Dell EMC 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 EMC servers effectively and efficiently; in physical, virtual, local, and remote environments, operating in-band, and out-of-band (agent-free). The OpenManage portfolio includes innovative embedded management tools such as the integrated Dell Remote Access Controller (iDRAC), Chassis Management Controller and Consoles like OpenManage Enterprise, OpenManage Power Manager plug in, and tools like Repository Manager.

Dell EMC has developed comprehensive systems management solutions based on open standards and has integrated with management consoles that can perform advanced management of Dell hardware. Dell EMC has connected or integrated the advanced management capabilities of Dell hardware into offerings from the industry's top systems management vendors and frameworks such as Ansible, thus making Dell EMC platforms easy to deploy, update, monitor, and manage.

The key tools for managing Dell EMC PowerEdge servers are iDRAC and the one-to-many OpenManage Enterprise console. OpenManage Enterprise helps the system administrators in complete lifecycle management of multiple generations of PowerEdge servers. Other tools such as Repository Manager, which enables simple yet comprehensive change management.

OpenManage tools integrate with systems management framework from other vendors such as VMware, Microsoft, Ansible, and ServiceNow. This enables you to use the skills of the IT staff to efficiently manage Dell EMC PowerEdge servers.

Topics:

Server and Chassis Managers

- Integrated Dell Remote Access Controller (iDRAC)
- iDRAC Service Module (iSM)

Dell EMC consoles

- Dell EMC OpenManage Enterprise
- Dell EMC Repository Manager (DRM)
- Dell EMC OpenManage Enterprise Power Manager plugin to OpenManage Enterprise
- Dell EMC OpenManage Mobile (OMM)

Automation Enablers

- OpenManage Ansible Modules
- iDRAC RESTful APIs (Redfish)
- Standards-based APIs (Python, PowerShell)
- RACADM Command Line Interface (CLI)
- GitHub Scripting Libraries

Integration with third-party consoles

- Dell EMC OpenManage Integrations with Microsoft System Center
- Dell EMC OpenManage Integration for VMware vCenter (OMIVV)
- Dell EMC OpenManage Ansible Modules
- Dell EMC OpenManage Integration with ServiceNow

Connections for third-party consoles

- Micro Focus and other HPE tools
- OpenManage Connection for IBM Tivoli
- OpenManage Plug-in for Nagios Core and XI

Dell EMC Update Utilities

- Dell System Update (DSU)
- Dell EMC Repository Manager (DRM)
- Dell EMC Update Packages (DUP)
- Dell EMC Server Update Utility (SUU)
- Dell EMC Platform Specific Bootable ISO (PSBI)

Dell resources

For additional information about white papers, videos, blogs, forums, technical material, tools, usage examples, and other information, go to the OpenManage page at www.dell.com/openmanagemanuals or the following product pages:

Table 16. Dell resources

Resource	Location
Integrated Dell Remote Access Controller (iDRAC)	www.dell.com/idracmanuals
iDRAC Service Module (iSM)	www.dell.com/support/article/sln310557
OpenManage Ansible Modules	www.dell.com/support/article/sln310720
OpenManage Essentials (OME)	www.dell.com/support/article/sln310714

Resource	Location
OpenManage Mobile (OMM)	www.dell.com/support/article/sln310980
OpenManage Integration for VMware vCenter (OMIVV)	www.dell.com/support/article/sln311238
OpenManage Integration for Microsoft System Center (OMIMSSC)	www.dell.com/support/article/sln312177
Dell EMC Repository Manager (DRM)	www.dell.com/support/article/sln312652
Dell EMC System Update (DSU)	www.dell.com/support/article/sln310654
Dell EMC Platform Specific Bootable ISO (PSBI)	Dell.com/support/article/sln296511
OpenManage Connections for Partner Consoles	www.dell.com/support/article/sln312320
OpenManage Enterprise Power Manager	www.dellemc.com/solutions/openmanage/power-management.htm
OpenManage Integration with ServiceNow (OMISNOW)	Dell.com/support/article/sln317784

NOTE: Features may vary by server. Please refer to the product page on www.dell.com/manuals for details.

Appendix A. Additional specifications

Power supply specifications

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 management features including high accuracy power monitoring.

The following power supply unit options are available for the T640:

- 495 W
- 750 W, 750 W Titanium, 750 W Mixedmode, 750 W HVDC
- 1100 W, 1100 W DC
- 1600 W
- 2000 W
- 2400 W

The T640 support up to 2 AC or DC power supplies with redundancy, auto sensing, and auto switching capability.

Table 17. Power efficiency levels

Form factor	Output	Class	10%	20%	50%	100%
Redundant 86 mm	495 W AC	Platinum	82%	90%	94%	91%
	750 W AC	Titanum	90%	94%	96%	91%
	750 W AC	Platinum	82%	90%	94%	91%
	750 W HVDC	Platinum	82%	90%	94%	91%
	1100 W AC	Platinum	89%	93%	94.5%	92%
	1100 W DC	Gold	80%	88%	91%	88%
	1600 W AC	Platinum	87%	90%	94%	91%
	2000 W AC	Platinum	89%	93%	94%	91%
	2400 W AC	Platinum	89%	93%	94%	92%

Chassis dimensions

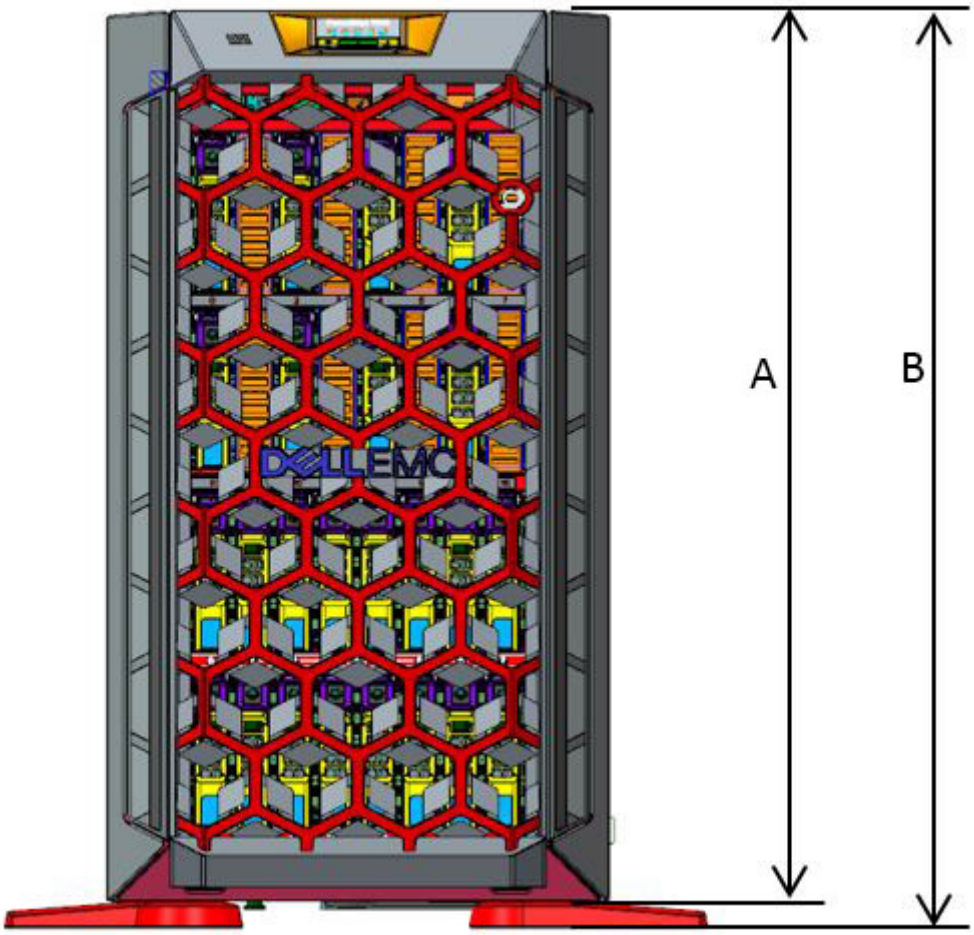


Figure 4. Chassis base and top cover/foot height

- A: 430.48 mm-chassis base height
- B: 443.48 mm-top cover/foot height

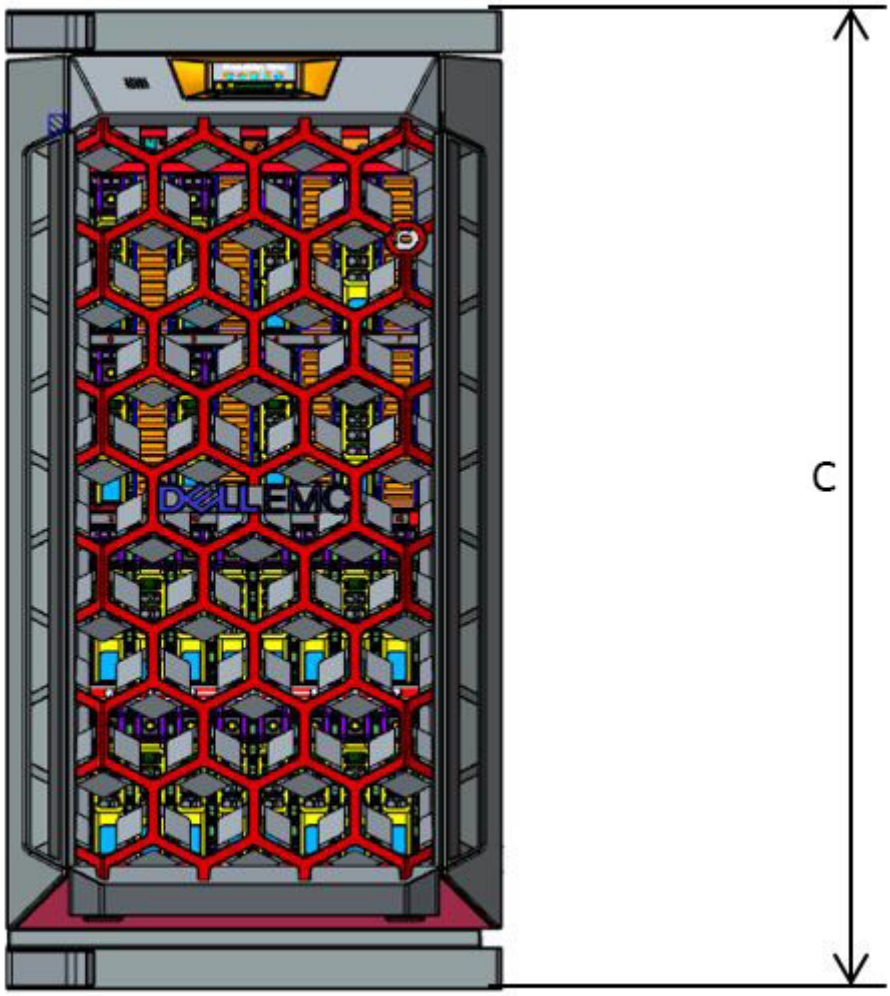


Figure 5. Left slam latch handle outer surface to right slam handle outer surface height

- C: 481.8288 mm

Figure 6. Chassis base width and foot to foot width

- D: 217.92 mm-chassis base width
- E: 302.5365 mm-foot to foot width

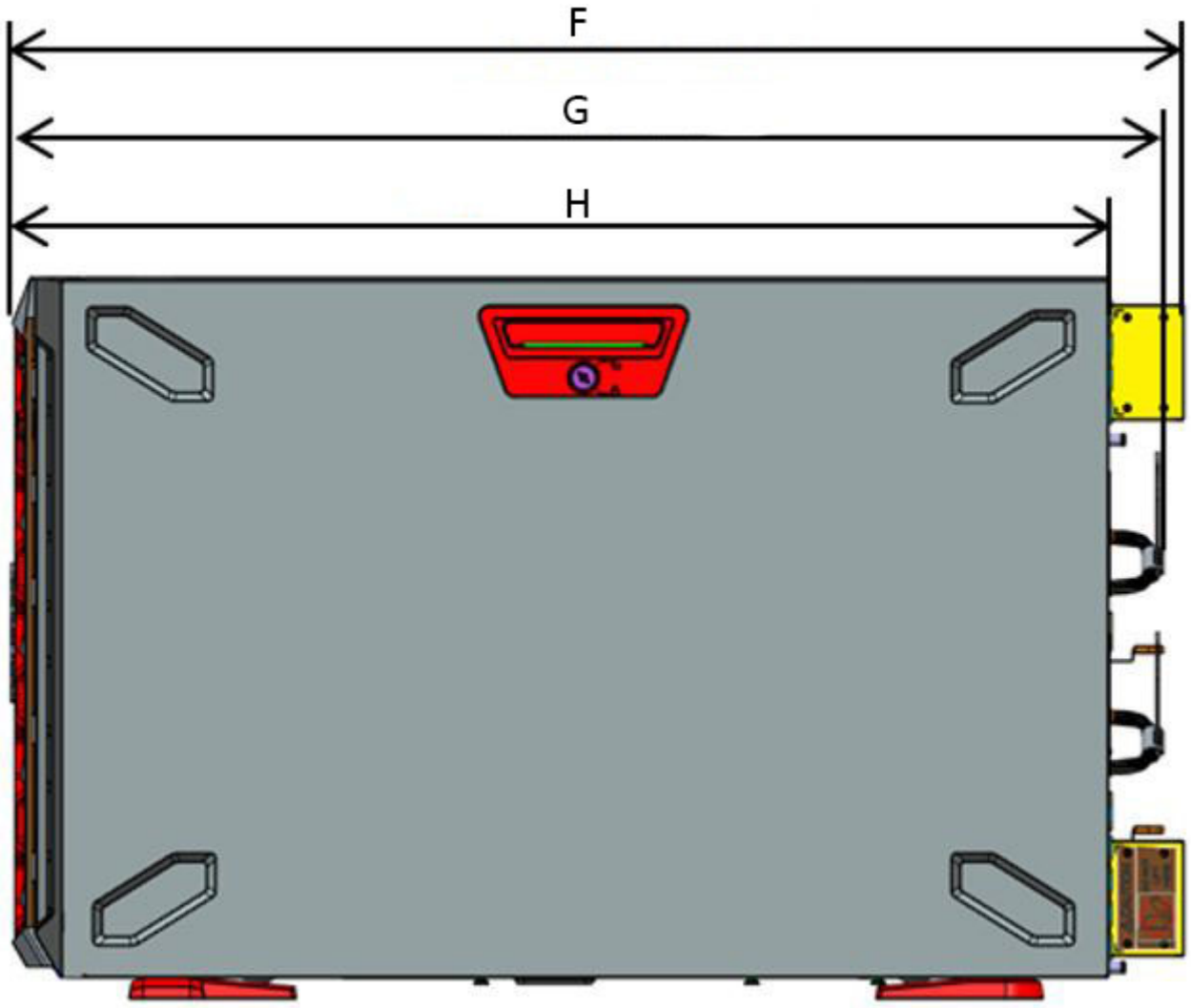


Figure 7. Bezel to rear wall/Bezel to rear power supply handle/Bezel to rear fan depth

- A: 673.60 mm-bezel to rear wall
- B: 702.358 mm-bezel to rear power supply handle
- C: 719.758 mm-bezel to rear fan

Chassis weight

System Maximum weight (with all hard drives/SSDs):

- 2.5 -inch hard drives x 32 = 42.36 Kg (93.38 lb)
- 3.5 -inch hard drives x 18 = 49.65 Kg (109.45 lb)

Environmental specifications

The table below details the environmental specifications for the PowerEdge T640:

Table 18. Temperature specifications

Storage	-40°C to 65°C (-40°F to 149°F)
Continuous operation (for altitude less than 950 m or 3117 ft)	10°C to 35°C (50°F to 95°f) with no direct sunlight on the equipment.

Maximum temperature gradient (operating and storage)	20°C/h (68°C/h)

Table 19. Relative humidity specifications

Storage	5% to 95% RH with 33°C (91°F) maximum dew point. Atmosphere must be non-condensing at all times.
Operating	10% to 80% relative humidity with 29°C (84°F) maximum dew point.

Table 20. Maximum vibration specifications

Operating	0.26gms at 5 Hz to 350 Hz (all three axes)
Storage	1.88gms at 10 Hz to 500 Hz for 15 min (all six sides tested).

Table 21. Maximum shock specifications

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

Table 22. Maximum altitude specifications

Operating	3048 m (10 000 ft)
Storage	12000m (39370 ft)

Table 23. Operating temperature de-rating specifications

Up to 35°C (95°F)	Maximum temperature is reduced by 1°C/300 m (1°F/547 ft) above 950 m (3117 ft)
35°C to 40°C (95°F to 104°F)	Maximum temperature is reduced by1°C/175 m (1°F/319 ft) above 950 m (3117 ft)
40°C to 45°C (104°F to 113°F)	Maximum temperature is reduced by 1°C/125 m (1°F/228 ft) above 950 m (3117 ft)

Table 24. Standard operating temperature

Continuous operation (for altitude less than 950 m or 3117 ft)	10°C to 35°C (50°F to 95°f) with no direct sunlight on the equipment.

Table 25. Expanded operating temperature

Continuous operation	5°C to 40°C at 5% to 85% RH with 29°C dew point **NOTE: Outside the standard operating temperature (10°C to 35°C), the system can operate continuously in temperatures as low as 5°C and as high as 40°C.** For temperatures between 35°C to 40°C, de-rate maximum allowable temperature by 1°C per 175 m above 950 m (1°F per 319 ft)
less than or equal to 1% annual operating hours	-5°C to 45°C at 5% to 90% RH with 29°C dew point

NOTE: Outside the standard operating temperature (10°C to 35°C), the system can operate continuously in temperatures as low as -5°C and as high as 45°C.

For temperatures between 40°C to 45°C, de-rate maximum allowable temperature by 1°C per 125 m above 950 m (1°F per 228 ft)

NOTE: When operating in the expanded temperature range, system performance may be impacted.

NOTE: When operating in the expanded temperature range, ambient temperature warnings may be reported n the System Event.

Video specifications

Table 26. Video modes

Resolution	Refresh rate	Rear panel	Front panel
1024x768	60 Hz	Yes	Yes
1280x800	60 Hz	Yes	Yes
1280x1024	60 Hz	Yes	Yes
1360x768	60 Hz	Yes	Yes
1440x900	60 Hz	Yes	Yes
1600x900	60 Hz	Yes	Yes
1600x1200	60 Hz	Yes	Yes
1680x1050	60 Hz	Yes	Yes
1920x1080	60 Hz	Yes	Yes
1920x1200	60 Hz	Yes	Yes

USB peripherals

The following list the available USB ports on the PowerEdge T640:

- Front ports:
  - 1xUSB 2.0
  - 1xUSB 3.0
- Rear ports:
  - 2xUSB 2.0
  - 4xUSB 3.0

The T640 supports the peripherals below:

- DVD-ROM-bootable, requires 2 USB ports
- USB key-bootable
- Keyboard-only one USB keyboard is supported
- Mouse-only one USB mouse is supported
- Floppy-bootable

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Appendix B. Standards compliance

Table 27. 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

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Appendix C. Additional resources

Table 28. 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 contact information.	Inside the system chassis cover
Energy Smart Solution Advisor (ESSA)	The Dell 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 and Residency Services

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.

		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 8. ProDeploy Enterprise Suite capabilities

NOTE: Hardware installation not applicable on selected software products.

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. Software installation includes set up of most versions of Dell EMC SupportAssist and OpenManage system management utilities. Post-deployment configuration assistance, testing, and product orientation services are also available.

ProDeploy

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 as most versions of Dell EMC SupportAssist 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.

Basic Deployment

Basic Deployment delivers worry-free professional installation 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.

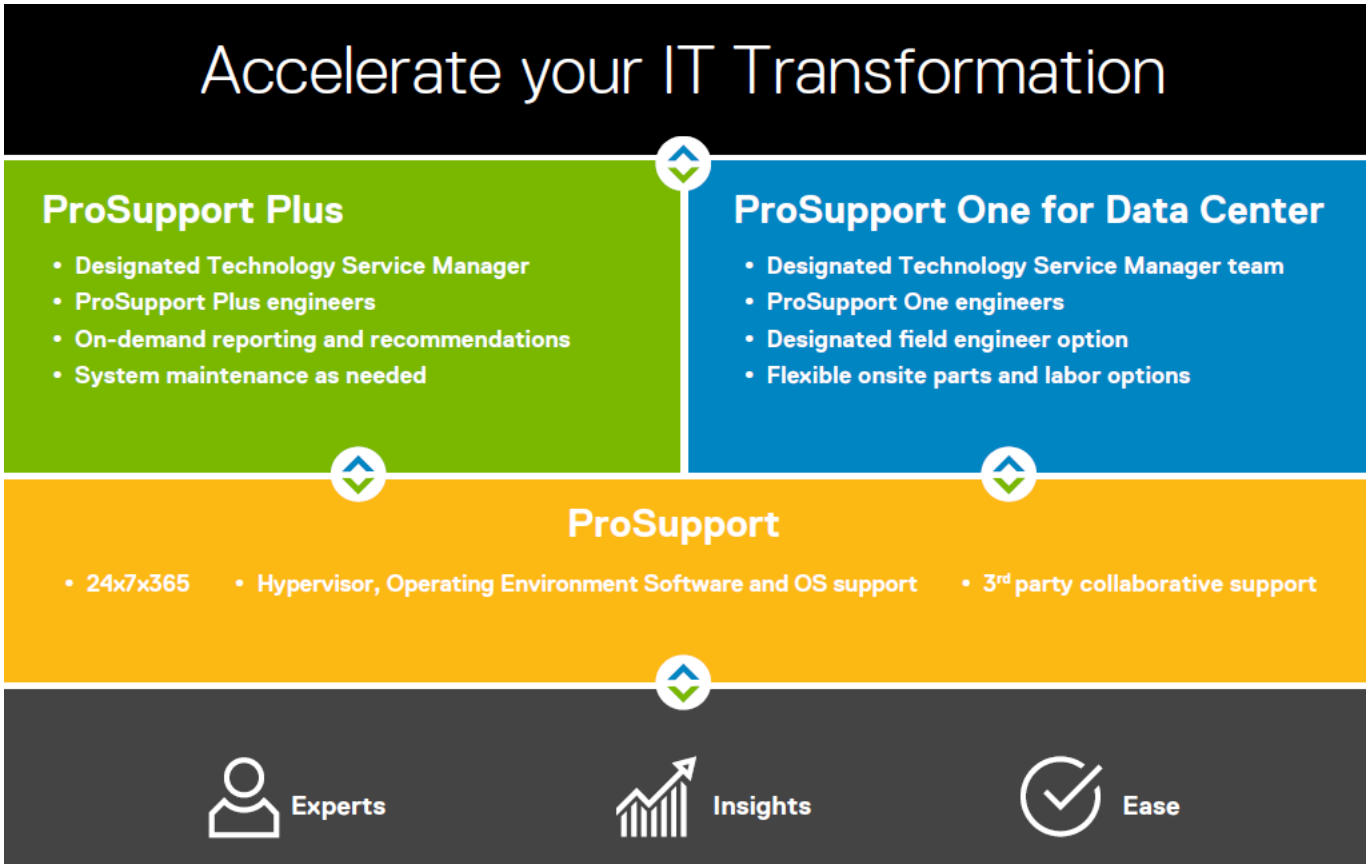

Figure 9. ProSupport Enterprise Suite

ProSupport Plus

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

- An assigned 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
- Proactive monitoring, issue detection, notification and automated case creation for accelerated issue resolution enabled by SupportAssist
- On-demand reporting and analytics-based recommendations enabled by SupportAssist and TechDirect

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 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 assigned Technology Services Managers with remote, on-site options
- Assigned ProSupport One technical and field engineers who are trained on your environment and configurations
- On-demand reporting and analytics-based recommendations enabled by SupportAssist and TechDirect
- 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
Parts and labor response options	Next business day or Mission Critical	Next business day or Mission Critical	Flexible
Automated issue detection and case creation	●	●	●
Self-service case initiation and management	●	●	●
Hypervisor and OS support.	●	●	●
Priority access to specialized support experts		●	●
Designated Technology Service Manager		●	●
Personalized assessments and recommendations		●	●
On-demand support and utilization reports		●	●
Systems Maintenance guidance		Semiannual	Optional
Designated technical and field support teams			●

Figure 10. Enterprise Support feature comparison

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 steps and time to resolution, often detecting issues before they become a crisis. Benefits include:

- Value - SupportAssist is 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 EMC 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			●
Recommendation reporting available on-demand in TechDirect			●

Figure 11. 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.dell.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 EMC'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 EMC server solution. To learn more or register for a class today, visit LearnDell.com/Server.

Dell EMC Global Infrastructure Consulting Services

Dell EMC Global Infrastructure Consulting Services use skilled solution architects, innovative tools, automated analysis and Dell EMC's intellectual property to give rapid insight into the root causes of unnecessary complexity. We seek better answers than traditional service models, and our strategy is to help 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 build a more efficient enterprise.

Dell EMC Managed Services

Dell EMC 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.