Technical Guide

Dell EMC PowerEdge T640

The Dell EMC PowerEdge T640 is a versatile, powerhouse server ideal for mid-sized offices, remote sites and data centers. The PowerEdge T640 combines powerful performance and massive internal storage capacity in a rack or tower platform. The T640 allows you to address data-heavy, diverse workloads including virtualization, database, analytics, imaging applications and SDS. Meet dynamic performance and capacity demands with flexible storage and I/O options. The following documentation is designed as both instructional aid and online reference material for the PowerEdge T640 rack-capable tower server. The material introduces new technologies and features specific to the PowerEdge T640 in an effort to better prepare technicians to provide outstanding support to our customers.

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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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:

- Server virtualization and desktop virtualization
- Consolidation
- Database, business analytics (BI), and intelligence
- Applications and imaging for medical finance, education, and science.
- ERP, CRM, and HPC
- Software-defined technologies

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
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 3.6 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 2666 MT/s (configuration-dependent) · RDIMMs up to 32GB · LRDIMMs at 64GB supported. · NVDIMMs of 16GB supported NOTE: 128GB LRDIMMs and 16GB NVDIMMs will be supported after the initial release.
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.

Technology	Detailed Description
	For details, see the Dell EMC OpenManage systems management section
Wireless Management	The Quick Sync 2 BLE/WiFi module offers secure, wireless access to the embedded iDRAC, SupportAssist Collections, remote RACADM, and VNC remote console connectivity.

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System features

Product comparison

Table 2. Product comparison

Feature	PowerEdge T640	PowerEdge T630
CPU	2x 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 2666MT/s, 3TB max · Up to 12 NVDIMM, 192GB max NOTE: 128GB LRDIMMs /3TB total memory and 16GB NVDIMMs are available post-initial release.	· 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	Upto 8x PCIe SSD (NVMe)	4x PCIe SSD
PCIe Slots	Max 8 PCIe 3.0 + 1 internal	Max 5 PCIe Gen3 + 2 PCIe Gen2 + 1 internal
LOM	2x 10GbE	2x 1GbE
USB Ports	Front: 1 port (USB 3.0), 1 port (USB 2.0), iDRAC Direct Micro AB, serial, video, 6x USB2.0/3.0	Front: 1 port (USB 3.0), 1 port USB2.0, iDRAC Direct, 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 only) · DC 1100W Gold (Telecom DC only) · 750W Platinum/Titanium (AC only) · 750W Platinum Mixed Mode (AC/HDVC) · 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	· Hot-plug Drives · Hot-plug redundant Cooling · Hot-plug Redundant Power Supplies

Feature	PowerEdge T640	PowerEdge T630
	· BOSS · IDSDM	· 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	Intel Xeon processors Scalable family
Processor sockets	2 sockets
Chipset	Intel C620
Memory	· Maximum RAM: 3TB-24 DIMM slots NOTE: 128GB DIMMs/3TB max are available post initial release. · Minimum RAM: 8GB-one module · RDIMM-384GB per socket · LRDIMM-768GB per socket · Architecture: 1866/2133/2400 or 2666 MHz 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)

Feature	Specification
	· 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) · 1100W AC, 86 mm-Platinum · 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)

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:

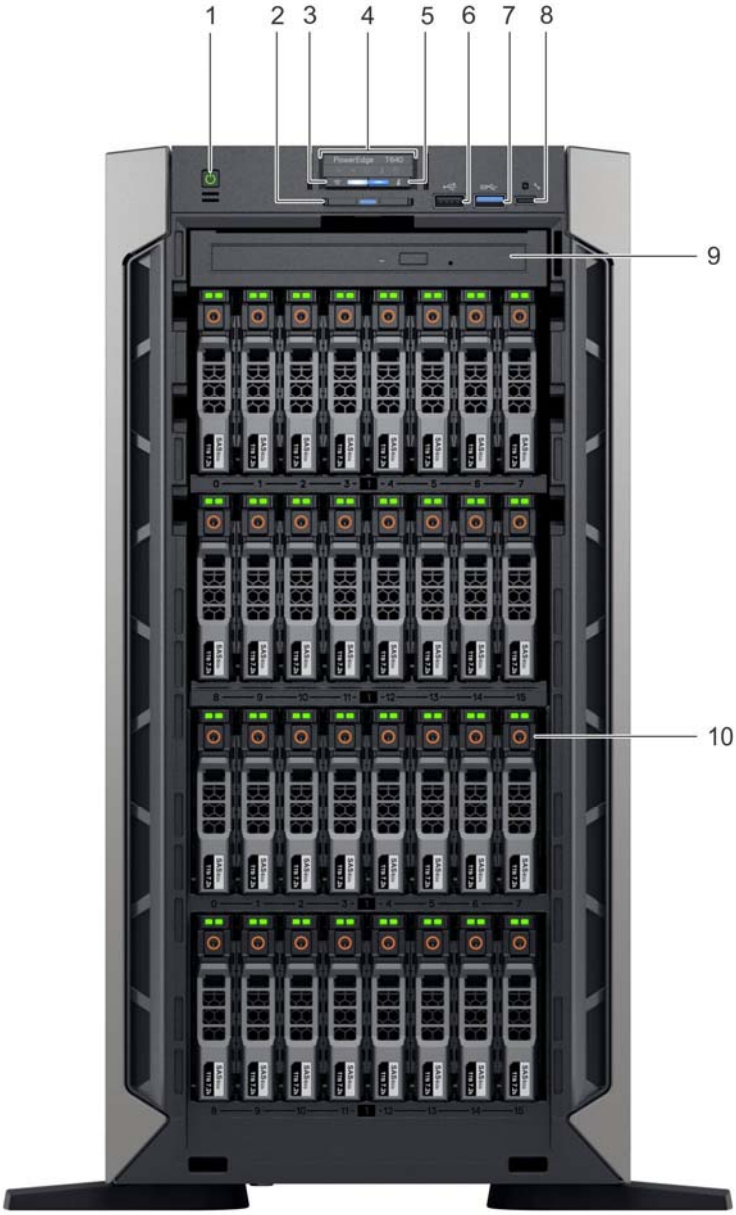


Figure 1. PowerEdge T640 front panel

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:

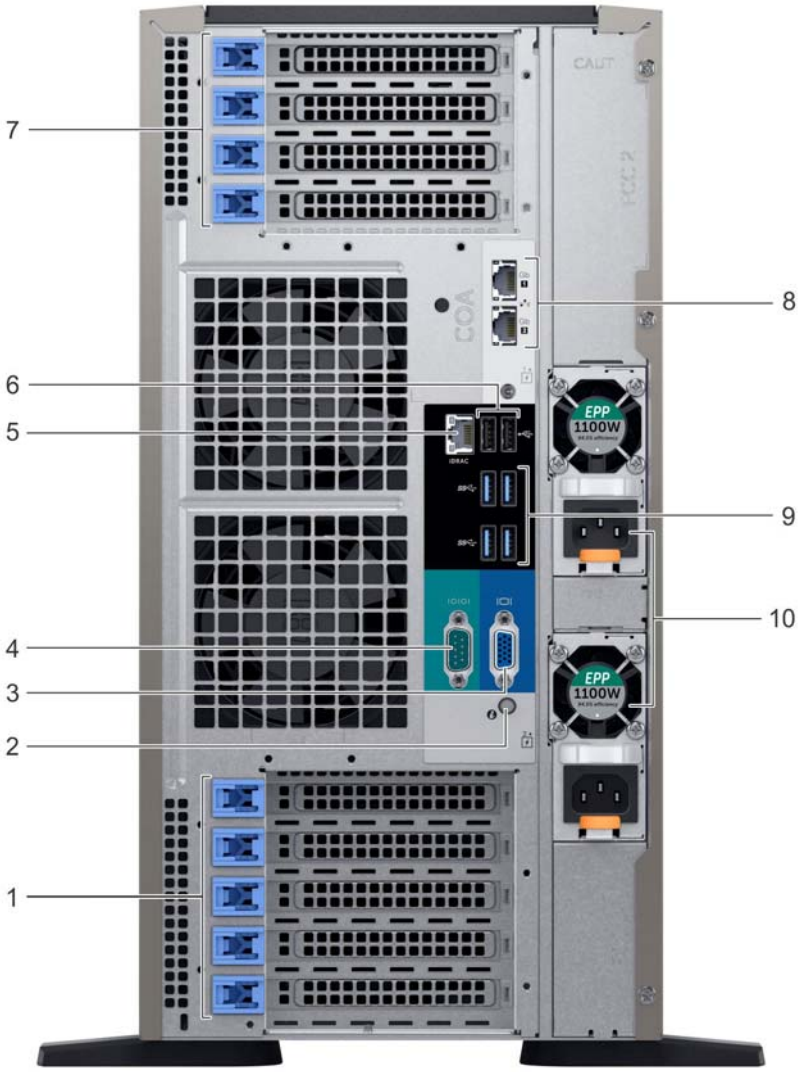
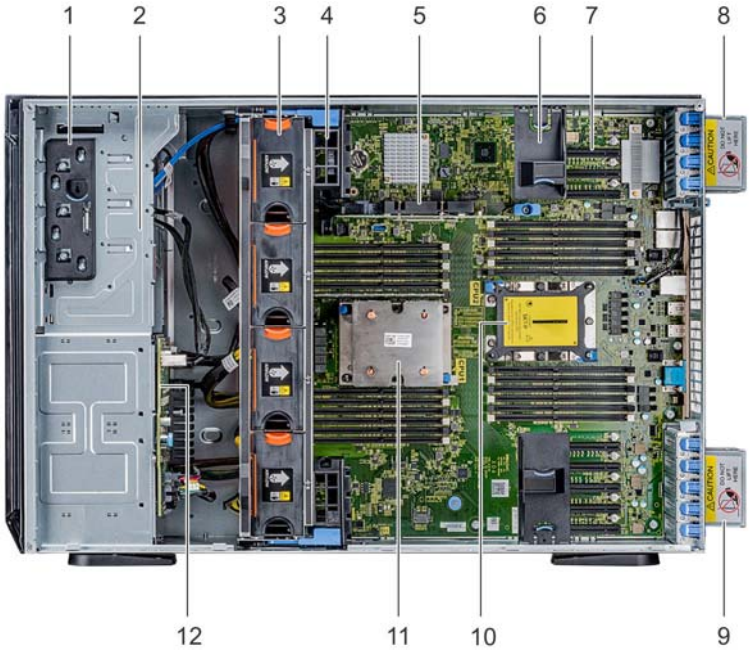


Figure 2. PowerEdge T640 back view

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 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.

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Processor

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 (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

Medal	Processor	Frequency (GHz)	Cores/ Threads	Cache (M)	UPI (GT/s)	Turbo	TDP (W)	Max Memory Speed(MHz)
Platinum	8180M	2.5	28/56	38	10.4	Y	205	2666
Platinum	8180	2.5	28/56	38	10.4	Y	205	2666
Platinum	8176M	2.1	28/56	38	10.4	Y	165	2666
Platinum	8176	2.1	28/56	38	10.4	Y	165	2666
Platinum	8170M	2.1	26/52	36	10.4	Y	165	2666
Platinum	8170	2.1	26/52	36	10.4	Y	165	2666
Platinum	8168	2.7	24/48	33	10.4	Y	205	2666
Platinum	8164	2.0	26/52	36	10.4	Y	205	2666
Platinum	8160M	2.1	24/48	33	10.4	Y	150	2666
Platinum	8160	2.1	24/48	33	10.4	Y	150	2666
Platinum	8153	2.0	16/32	22	10.4	Y	125	2666
Gold	6154	3.0	18/36	25	10.4	Y	200	2666
Gold	6152	2.1	22/44	30	10.4	Y	140	2666
Gold	6150	2.7	18/36	25	10.4	Y	165	2666
Gold	6148	2.4	20/0	27	10.4	Y	150	2666
Gold	6146	3.2	12/24	24.75	10.4	Y	165	2666

Medal	Processor	Frequency (GHz)	Cores/ Threads	Cache (M)	UPI (GT/s)	Turbo	TDP (W)	Max Memory Speed(MHz)
Gold	6144	3.5	8/16	24.75	10.4	Y	155	2666
Gold	6142M	2.6	16/32	22	10.4	Y	150	2666
Gold	6142	2.6	16/32	22	10.4	Y	150	2666
Gold	6140M	2.3	18/36	25	10.4	Y	140	2666
Gold	6140	2.3	18/36	25	10.4	Y	140	2666
Gold	6138	2.0	2040	27	10.4	Y	125	2666
Gold	6136	3.0	12/24	24.75	10.4	Y	150	2666
Gold	6134M	3.2	8/16	24.75	10.4	Y	130	2666
Gold	6134	3.2	8/16	24.75	10.4	Y	130	2666
Gold	6132	2.6	14/28	19	10.4	Y	140	2666
Gold	6130	2.1	16/32	22	10.4	Y	125	2666
Gold	6128	3.4	6/12	19.25	10.4	Y	115	2666
Gold	6126	2.6	12/24	19.25	10.4	Y	125	2666
Gold	5122	3.6	4/8	16.5	10.4	Y	105	2666
Gold	5120	2.2	14/28	19	10.4	Y	105	2400
Gold	5118	2.3	12/24	16	10.4	Y	105	2400
Gold	5115	2.4	10/20	14	10.4	Y	85	2400
Silver	4116	2.1	12/24	16	9.6	Y	85	2400
Silver	4114	2.2	10/20	14	9.6	Y	85	2400
Silver	4112	2.6	4/24	8.25	9.6	Y	85	2400
Silver	4110	2.1	8/16	11	9.6	Y	85	2400
Silver	4109T	2.0	8/16	11	9.6	Y	70	2400
Silver	4108	1.8	8/16	11	9.6	Y	85	2400
Bronze	3106	1.7	8/8	11	9.6	N	85	2133
Bronze	3104	1.7	6/6	8	9.6	N	85	2133
Platinum	8160T	2.1	24/48	38	10.4	Y	150	2666
Gold	6138T	2.0	20/40	27	10.4	Y	125	2666
Gold	6130T	2.1	16/32	22	10.4	Y	125	2666
Gold	6126T	2.6	12/24	16	10.4	Y	125	2666
Gold	5120T	2.2	14/28	19	10.4	Y	105	2400

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 QuickAssist Technology
- Intel Trace Hub for debug

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System memory

- The PowerEdge T640 supports two DIMMs or one DIMM per channel for quad-rank DIMMs. There are 24 sockets-288 pins in total.
- T640 supports RDIMM, LRDIMM and NVDIMM memory technologies at up to 2666 MHz-DDR4.
- T640 does not support mixing of DIMM types other than RDIMMs and NVDIMMs. Either the platform is populated with RDIMMs (with or without NVDIMMs) or LRDIMMs.

Table 6. Supported memory

Capacity	Data width	DIMM max speed	Rated voltage	SDDC support	Ranks per DIMM
8	x8	2666 MHz	1.2	Advanced ECC	1
16	x8	2666 MHz	1.2	Advanced ECC	2
32	x4	2666 MHz	1.2	All modes	2
64	x4	2666 MHz	1.2	All modes	4
16	x4	2666 MHz	1.2	All modes	1
32	x4	2666 MHz	1.2	All modes	2

Memory speed

The PowerEdge T640 support memory speeds of 1866 MT/s, 2133 MT/s, 2400 MT/s, and 2666 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 2666 MT/s · Maximum frequency using 2 DIMMs per channel of 2666 MT/s · Maximum capacity of 32GB 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 64GB per DIMM · Maximum system capacity of 1.5TB NOTE: 128GB LRDIMMs/Max capacity 3TB are available post-initial release.
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)

DIMM type	Description
	NOTE: 16GB NVDIMMs are available post-initial release.

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. 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

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.

Feature	Description
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.

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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.

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
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 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.

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

PCIe slots

The PowerEdge T640 offer balanced, scalable I/O capabilities including integrated PCIe 3.0 expansion slots. It offers the capability of accommodating full-height or half-height PCIe cards.

PCIe expansion slots

The PowerEdge T640 provides eight PCI Express expansion slots and one dedicated storage slot. The list below are the supported slots for the T640:

- Slot-1: one x16 PCIe Gen3 for FL/FH card from CPU1
- Slot-2: one x8 PCIe Gen3 for FL/FH card from CPU1 (x4 lanes)
- Slot-3: one x16 PCIe Gen3 for FL/FH card from CPU1
- Slot-4: one x8 PCIe Gen3 for HL/FH card from CPU2
- Slot-5: one x8 PCIe Gen3 for FL/FH card from CPU2 (DMI x4 lanes)
- Slot-6: one x16 PCIe Gen3 for FL/FH card from CPU2
- Slot-7: one x8 PCIe Gen3 for FL/FH card from CPU2
- Slot-8: one x16 PCIe Gen3 for FL/FH card from CPU2
- Slot-9 (Internal PERC Slot): one x8 PCIe Gen3 for HL/FH card from CPU1

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

PCIe slot restrictions

The list below are restrictions and population rules on the PCIe slots:

- Dual width cards in slot 3, 6, and 8 obstructs slot 2, 5, and 7 respectively.
- 2 PCIe bridge cards consume slot 1, 3, for NVMe configurations.
- GPU are only allowed in slot 1, 3, 6, 8, two external fans are installed only (and required) for GPU ready configurations. If a GPU is installed in slot 1, 3, Fan Ext R is blocking, no cards with external IO is allowed in slot 1~3.
- If a GPU are installed in slot 6, 8, Fan Ext R and Ext L are blocking, no cards with external IO is allowed in slot 1~3, 5~8.
- Only slot 4 will not be blocked by external fans and IO ports will be accessible.

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. 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 12. 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.

Power supply units

The PowerEdge T640 supports up to 2 AC or DC power supplies with 1+1 redundancy, auto sensing, and auto-switching capability.

Table 13. Power supply specifications

Power supply	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 HDVC (for China only)	Platinum	2891 BTU/hr	50/60 Hz	100-240 V AC, autoranging	10 A-5 A
	N/A	2891 BTU/hr	N/A	240 V DC, autoranging	4.5 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	-	-(48-60) V DC, autoranging	32 A
1600 W AC	Platinum	6000 BTU/hr	50/60 Hz	100-240 V AC, autoranging	10 A
2000 W AC	Platinum	7500 BTU/hr	50/60 Hz	100-240 V AC, autoranging	11.5 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.

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 14. 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

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.

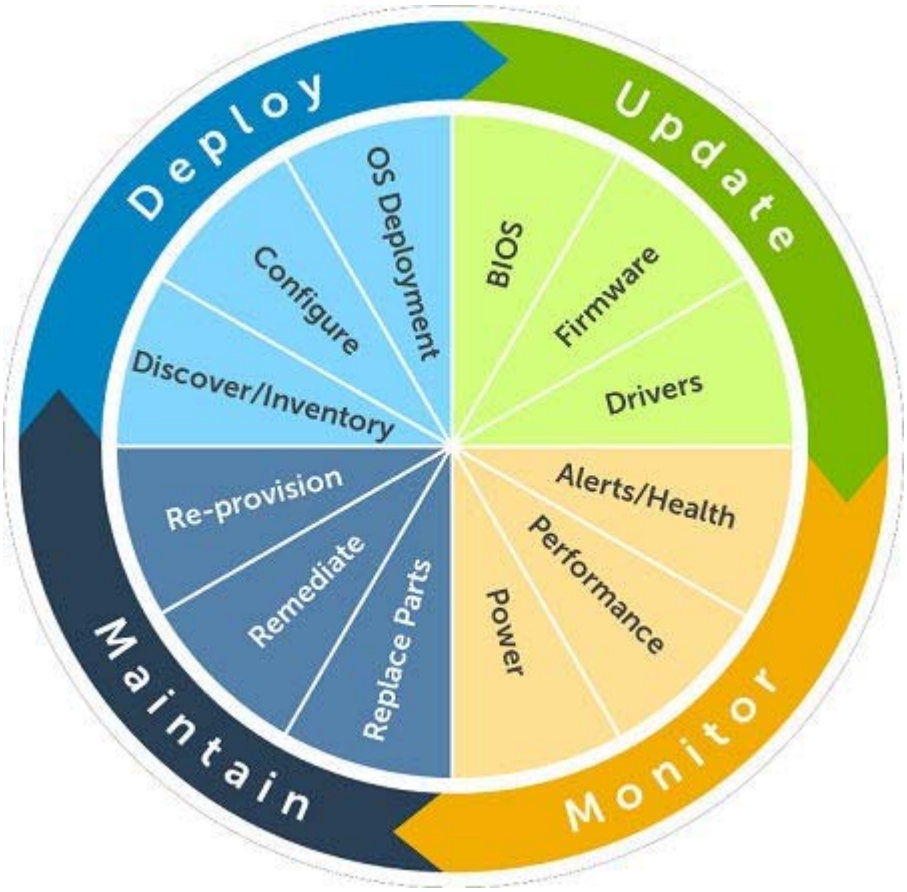

Figure 3. Server lifecycle management operations

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

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.

iDRAC features and comparison

iDRAC9 is available in Express and Enterprise on the T640.

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
Quick Sync 2.0-optional auth for read operations	No	Yes	No	Yes	No	Yes	No	Yes
Quick Sync 2.0-add mobile device number to LCL	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

Features	iDRAC8 Basic	iDRAC9 Basic	iDRAC8 Express	iDRAC9 Express	iDRAC8 Express for Blades	iDRAC9 Express for Blades	iDRAC8 Enterprise	iDRAC9 Enterprise
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
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

Features	iDRAC8 Basic	iDRAC9 Basic	iDRAC8 Express	iDRAC9 Express	iDRAC8 Express for Blades	iDRAC9 Express for Blades	iDRAC8 Enterprise	iDRAC9 Enterprise
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
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

Features	iDRAC8 Basic	iDRAC9 Basic	iDRAC8 Express	iDRAC9 Express	iDRAC8 Express for Blades	iDRAC9 Express for Blades	iDRAC8 Enterprise	iDRAC9 Enterprise
LED health status indicator	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Quick Sync—require NFC bezel (13 G only)	Yes	No	Yes	No	N/A	No	Yes	No
Quick Sync 2.0—requires BLE/WiFi hardware	No	Yes	No	Yes	No	N/A	No	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
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.
- 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.

If you are remote, you can access iDRAC over a secure IP network. If you are at-the-server, an iDRAC can be accessed directly by tapping an NFC-enabled android mobile device on a PowerEdge "Quick Sync" bezel to perform several basic bare-metal configuration tasks such as assigning an IP address, and changing server credentials or the boot order.

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
- Access 14th gen rack or tower server through Quick Sync 2 module.
- 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

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 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 16. Power efficiency levels

Form factor	Output	Class	10%	20%	50%	100%
Redundant 86 mm	495 W AC	Platinum	82%	90%	94%	91%
	750 WAC	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

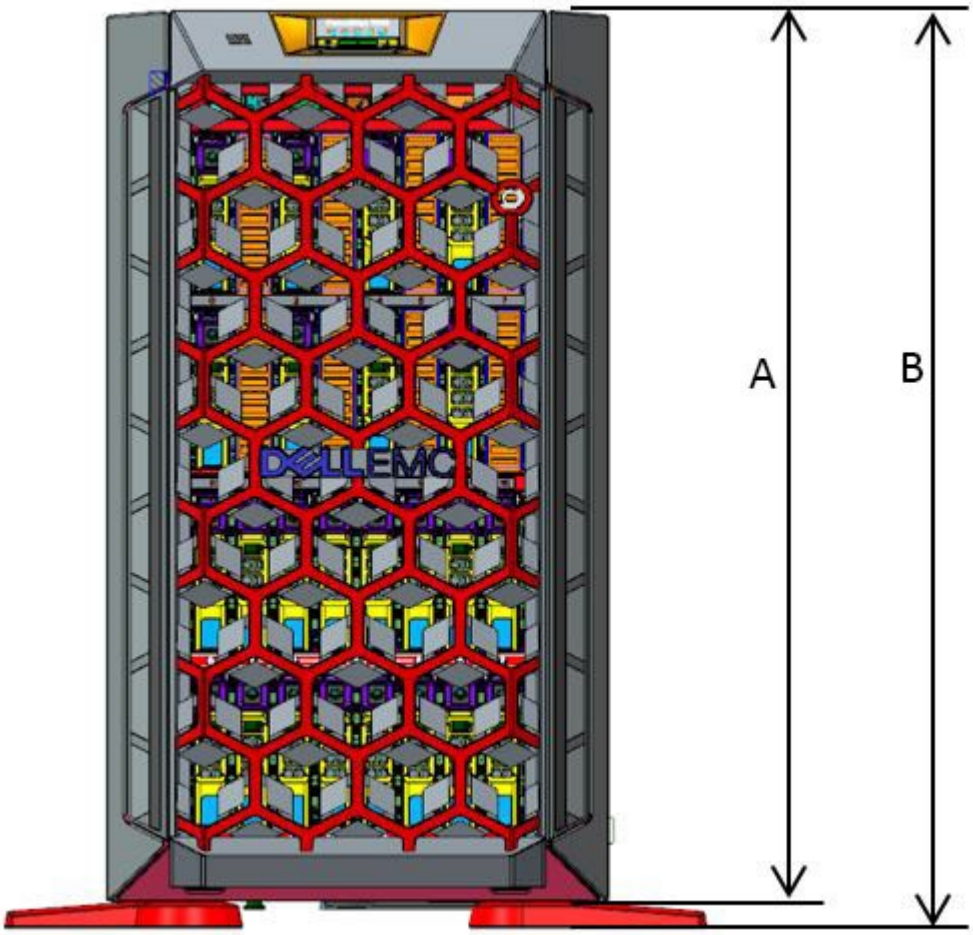

Figure 4. Chassis base and top cover/foot height

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

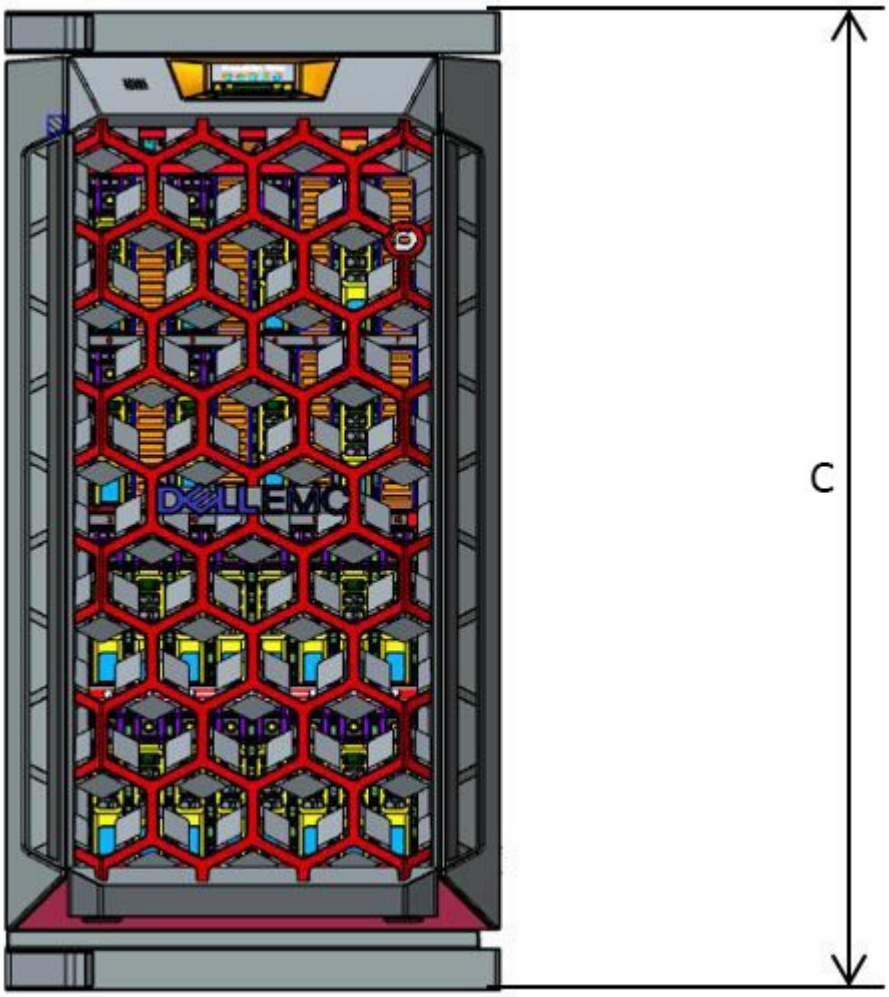

Figure 5. Left slam latch handle outer surface to right slam handle outer surface height

- 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

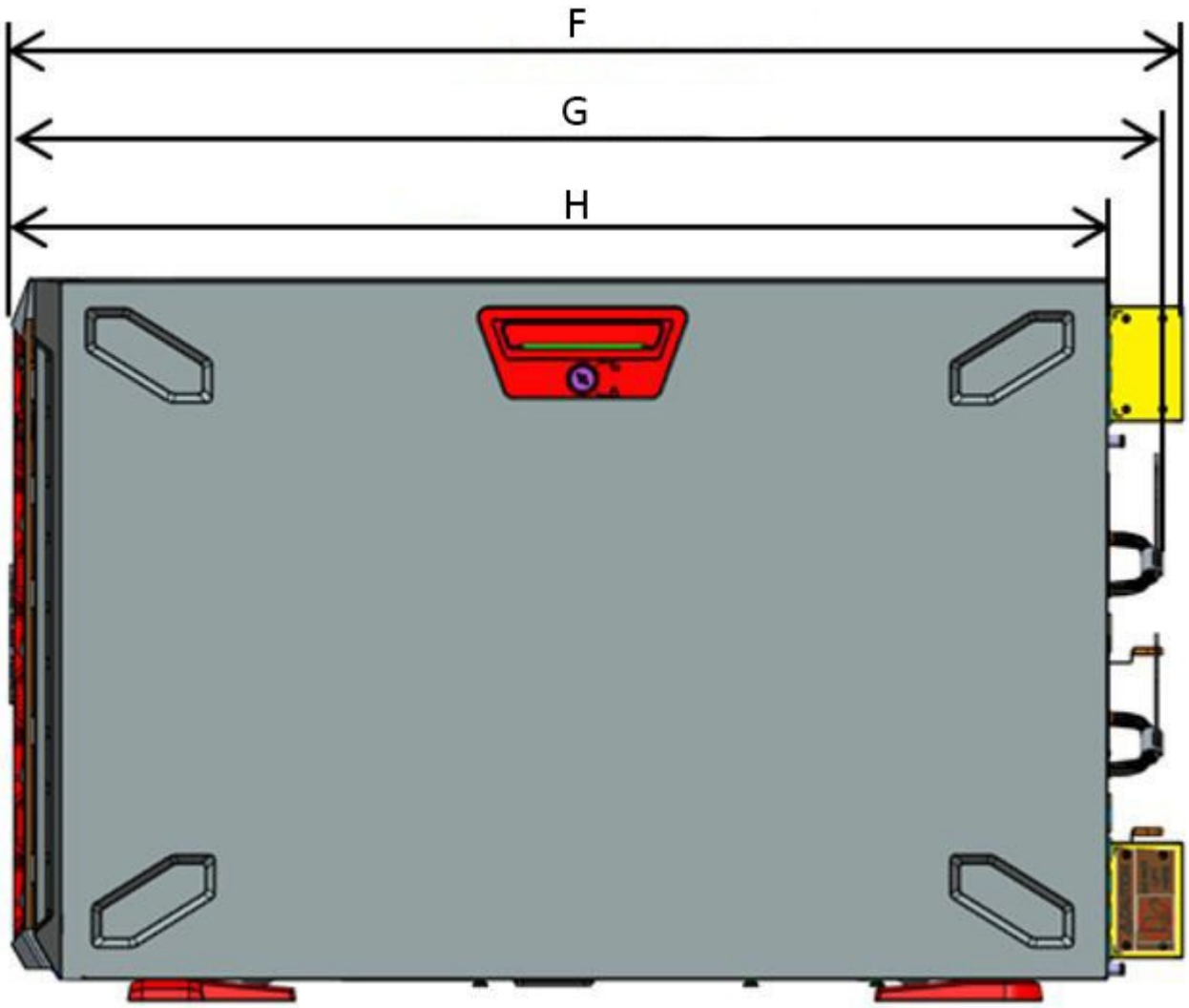

Figure 7. Bezel to rear wall/Bezel to rear power supply handle/Bezel to rear fan depth

- 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

Environmental specifications

Sell the PowerEdge T640 Owner's Manual on Dell.com/support/manuals for detailed environmental specifications.

Video specifications

Table 17. 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

Resolution	Refresh rate	Rear panel	Front panel
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:
  - 1 x USB 2.0
  - 1 x USB 3.0
- Rear ports:
  - 2 x USB 2.0
  - 4 x USB 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

Appendix B. Standards compliance

Table 18. 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 19. Additional resources

Resource	Description of contents	Location
Owner's 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

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 8. 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 Development

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.

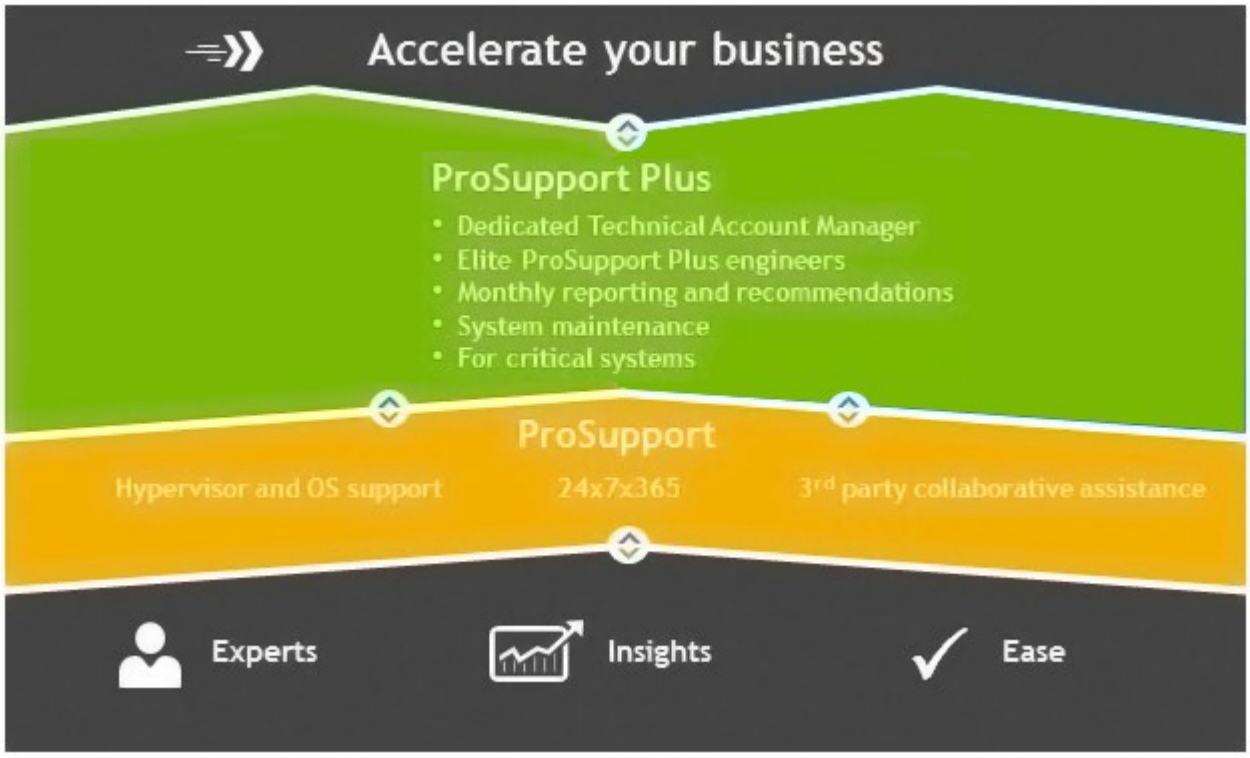

Figure 9. ProSupport Enterprise Suite

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 10. 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.

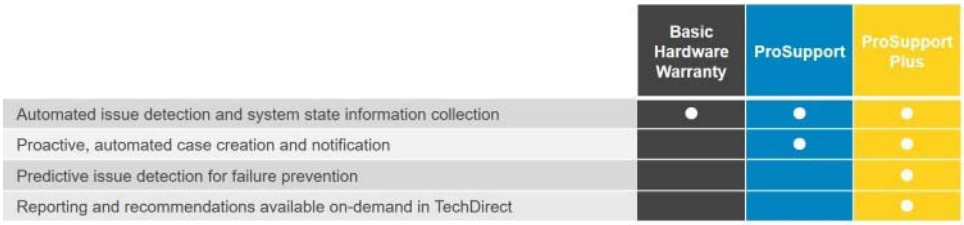

Figure 11. SupportAssist model

Get started at Dell.com/SupportAssist

TechDirect

Boost your IT team's 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.