

Dell EMC PowerEdge R640

Technical Guide

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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Product overview

Introduction

The PowerEdge R640 is a general purpose platform expandable up to 7.68TB of memory, up to twelve 2.5 inch drives, and flexible I/O options. The R640 can handle demanding workloads such as virtualization, dense private cloud, High Performance Computing (HPC) and software-defined storage.

The Dell EMC PowerEdge R640 is the ideal dual-socket, 1U platform for dense scale-out data center computing. The R640 combines density, performance and scalability to optimize application performance and data center density.

The PowerEdge R640 features:

- 2nd Generation Intel® Xeon® Scalable Processor product family (with up to 28 cores and two threads per core)
- Up to six DDR4 memory channels with two DIMMs per channel per CPU and 24 DIMMs (supports DDR4 RDIMM/LRDIMM/NVDIMM-N/DCPMM)
- PCI Express® (PCIe) 3.0 enabled expansion slots (with up to 48 lanes per CPU)
- Networking technologies, such as Ethernet, Infiniband, OCP, OPA

New technologies

The following are the new technologies featured on the PowerEdge R640

New technology	Detailed description
2nd Generation Intel® Xeon® Scalable Processor	The processor product family has embedded PCIe lanes for improved I/O performance. For details, see the Processor section .
Intel® C620 series chipset	The R640 system uses the Intel Lewisburg chip. It is a 2 chip platform - CPU and PCH.
2933 MT/s DDR4 memory	The Intel® Xeon® Scalable Processor product family that supports 2933 MT/s memory and twenty-four 288-pin DIMMs. The R640 system supports: <ul style="list-style-type: none"> • Two DIMMs per channel for single - rank and/or dual - rank DIMMs • One or two DIMMs per channel for quad - rank DIMMs For details, see the Memory section . See the Memory section for details.
Intel® Optane™ DC persistent memory	Up to 6 per CPU socket. Max 12 for 2S configuration. <ul style="list-style-type: none"> • 256GB, 512GB per DIMM • 1866, 2133, 2400, 2666 MT/s • Up to 6.14TB max, (7.68TB max with DCPMM and LDRIMM)
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 .
2.5-inch PCIe SSD	Supports up to ten CPU Direct Attach PCIe SSD
LCD bezel	The PowerEdge R640 LCD control panel is embedded in the front bezel for easy access and management.

System features

Compared to previous generations, the PowerEdge R640 offers faster processing power and advanced system management.

The R640 system is a powerhouse 2S/1U rack system, which emphasizes performance and reliability in areas such as virtualization, power, thermal and systems management, and usability. It is designed for mid-size to large data centers that require high memory capacity and performance.

The R640 system consists of the planar subsystem with control panel, SAS backplane, storage card, riser card, VGA port, Storage Enclosure Processor (SEP) (4 x HDD back plane, 8x HDD backplane, 10x HDD backplane, 10x NVMe backplane and 2 x rear backplane). It is a two-chip platform (CPU and PCH) because this family of processors includes an Integrated Memory Controller (IMC) and Integrated I/O (IIO) (such as PCI Express and DMI3) on a single silicon die.

Topics:

- [Product comparison](#)
- [Technical specifications](#)

Product comparison

The following table shows the comparison between the R640 with the predecessor R630:

Feature	PowerEdge R640	PowerEdge R630
Processors	2nd Generation Intel® Xeon® Scalable Processor Family	Intel® Xeon® processor E5-2600 v3 or E5- 2600 v4
Chipset	Intel® C620	Intel® C610
Memory	<ul style="list-style-type: none"> • 24x DDR4 RDIMM/LR-DIMM 12x NVDIMM + 12 x RDIMM • 12 x DCPMM + 12 x RDIMM or 12 x LRDIMM 	24x DDR4 RDIMM/LR-DIMM
Chassis	Storage design modularity <ul style="list-style-type: none"> • 4 Hard Drive Chassis • 8 Hard Drive Chassis • 10 Hard Drive Chassis • 10 NVMe Drive Chassis 	Three individual chassis for three SKU <ul style="list-style-type: none"> • 8 Hard Drive Chassis • 1 Hard Drive Chassis • 24 Hard Drive Chassis
Disk Drives	Front drive bays: <ul style="list-style-type: none"> • Up to 10 x 2.5 -inch with up to 8 NVMe, SAS/SATA/SSD/NVMe, max 76.8TB , or up to 10 NVMe drives max 64TB. Or up to 4 x 3.5" SAS/SATA, max 64TB Rear drive bays: <ul style="list-style-type: none"> • Up to 2 x 2.5 -inch SAS/SATA/SSD/NVMe, max 15.36TB 	<ul style="list-style-type: none"> • 8 x 2.5 -inch SAS/SATA or SATA only • 10 x2. 5 -inch SAS/SATA or SAS/SATA/NVMe (NVMe up to 4) • 24 x 1.8 inch SATA (single PERC or dual PERCs)
PCIe SSD	Up to 10 CPU Direct Attach PCIe SSD	Up to 4x PCIe SSD from PCIe bridge card
RAID Controller	S140, HBA330, H330, H730, H730P, H740P, H840P, 12Gbps SAS HBA(External)	S130, H330, H730, H730P, H830 (External) Support for 2 internal RAID controllers for x24 SSD configuration only
LCD Module	LCD module option in bezel	LCD by default in base x8 chassis, not available on x10 and x24 chassis.

Feature	PowerEdge R640	PowerEdge R630
Backplane	<ul style="list-style-type: none"> 10 x 2.5 inch SATA/SAS/NVMe (up to 8 NVMe) 10 x 2.5 inch NVMe 8 x 2.5 inch SATA/SAS/NVMe 4 x 3.5 inch SATA/SAS 	<ul style="list-style-type: none"> 8 x 2.5 inch SAS/SATA 10 x 2.5 inch SAS/SATA 10 x 2.5 inch SAS/SATA/PCIeSSD 24 x 1.8 inch SATA
Riser	Up to 2 riser connectors (left/right)	Up to 3 riser connectors (left/center/right)
PCIe Slots	Up to 3x PCIe Gen3 (x16/x16/x16)	Up to 3x PCIe Gen3 (x16/x8/x16)
Embedded NIC	<ul style="list-style-type: none"> 4 x 1GbE 2 x 10GbE + 2 x 1GbE 4 x 10GbE 2 x 25GbE 	<ul style="list-style-type: none"> Broadcom 5730 Base-T Intel 1350 Base-T Broadcom 57800 SFP+ Broadcom 57800 Base-T Intel X540 Base-T
Power supplies	<ul style="list-style-type: none"> 495W Platinum 750W Platinum 750W 240HVDC Platinum* (China only) 1100W - 48VDC 1100W Platinum 1100W 380HVDC Platinum* (Available in China and Japan only) 1600W Platinum 750W Titanium 	<ul style="list-style-type: none"> 495 W AC 750 W AC 1100 W AC 1100 W DC
Remote Management	iDRAC9	iDRAC8
TPM	TPM China, TPM1.2, TPM2.0	TPM China, TPM1.2, TPM2.0
USB 3.0 Hub board	Extra USB3.0 connector to front plane	None
iDRAC Direct front port	Micro USB	USB type A
Fan	Up to eight FAN support. (1X6 type)	Up to seven FAN support (2X3 type)
IDSDM Module	Internal Dual SD Module (IDSDM) and vFlash	Internal Dual SD Module (IDSDM)
BOSS Module	M.2 SATA interface	None
PERC	Mini-PERC 10	Mini-PERC 9
NVDIMM Battery	External 12 V power bank for NVDIMM used	None
ODD/TBU	ODD via NPIO	TBU and ODD via 7-pin connectors
On board PCH SATA Connectors	4x NPIOs	2x Mini SAS_HDs

Technical specifications

The following table shows the technical specifications of the PowerEdge R640:

Features	Technical Specification
Form factor	1U rack
Processor	2nd Generation Intel® Xeon® Scalable Processors family
Internal interconnect	Up to 3 Intel Ultra Path Interconnect (Intel® UPI); up to 11.2 GT/s
Memory	DIMM speed: <ul style="list-style-type: none"> Up to 2933 MT/s Memory type:

Features	Technical Specification
	<ul style="list-style-type: none"> RDIMM LRDIMM NVDIMM DCPMM <p>Memory module slots:</p> <ul style="list-style-type: none"> 24 DDR4 DIMM slots (12 NVDIMM or 12 DCPMM only) Supports registered ECC DDR4 DIMMs only <p>Maximum RAM:</p> <ul style="list-style-type: none"> RDIMM 1.53TB LRDIMM 3TB NVDIMM 192GB DCPMM* 6.14TB (7.68TB with LDRDIMM)
I/O slots	Up to 3 x PCIeGen slots plus a dedicated PERC and rNDC slot
Storage controllers	<ul style="list-style-type: none"> Internal controllers: PERC S140 (SW RAID SATA), PERC H330, PERC H730, PERC H730P, PERC H740P Internal HBA (RAID): PERC HBA330 External HBA—non-RAID: 12 Gb/s SAS HBA
Hard drives	<ul style="list-style-type: none"> 10 x 2.5 -inch SATA/SAS/NVMe (up to 8 NVMes) 10 x 2.5 -inch NVMe 8 x 2.5 -inch SAS/SATA/NVMe 4 x 3.5 -inch SAS/SATA 8 x 2.5 -inch SATA
Accelerators	Up to 3 single-width GPU (NVIDIA T4) or up to 1 FPGA
Embedded NIC	<ul style="list-style-type: none"> 4 x 1GbE 2 x 10GbE + 2 x 1GbE 4 x 10GbE 2 x 25GbE
Power supply	<ul style="list-style-type: none"> 495W Platinum 750W Platinum 750W 240HVDC Platinum* (Available in China only) 1100W - 48VDC 1100W Platinum 1100W 380HVDC Platinum* (Available in China and Japan only) 1600W Platinum 750W Titanium
Operating systems	<ul style="list-style-type: none"> Canonical® Ubuntu® Server LTS Citrix® Hypervisor Microsoft® Windows Server® LTSC with Hyper-V Oracle® Linux Red Hat® Enterprise Linux SUSE® Linux Enterprise Server <p>For more information on the specific versions and additions, visit Dell.com/OSsupport</p>
Systems management	<ul style="list-style-type: none"> Systems management: IPMI 2.0 compliant; Dell OpenManage Enterprise; Dell EMC OpenManage Mobile; Dell EMC OpenManage Power Center Remote management: iDRAC9; 8 GB vFlash media (upgrade), 16 GB vFlash media (upgrade) iDRAC Quick Sync Dell EMC OpenManage Integrations: Microsoft® System Center, VMware® vCenter™, BMC Truesight, Red Hat Ansible Modules.

Features

Technical Specification

Dimensions and weight

- **Dell EMC OpenManage Connections:** IBM Tivoli® Netcool/OMNIBus, IBM Tivoli® Network Manager IP Edition, Micro Focus® Operations Manager I, Nagios® Core, Nagios® XI

- Height: 42.8mm (1.69 -inch)
- Width: 482.0mm (18.98 -inch)
- Depth: 808.5mm (31.8 -inch)
- Weight: 21.9kg (48.3 lbs)

Dimensions include bezel

Recommended support

Dell EMC ProSupport Plus for critical systems or Dell EMC ProSupport for premium hardware and software support for your PowerEdge solution. Consulting and deployment offerings are also available. Contact your Dell EMC representative for more information. Availability and terms of Dell EMC Services vary by region. For more information, visit Dell EMC.com/ServiceDescriptions.

Chassis views and features

Front view and features

The images below illustrates the front view of the PowerEdge R640 with the types of supported chassis options:



Figure 1. Front view 4 x 3.5-inch drive chassis



Figure 2. Front view 8 x 2.5-inch drive chassis



Figure 3. Front view 10 x 2.5-inch drive chassis

Back view of the system

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

Depending on your system configuration, the drive backplanes supported in PowerEdge R640 are listed here:

- 2.5 inch (x8) SAS, SATA, or NVMe backplane
- 2.5 inch (x10) SAS, SATA, or NVMe backplane
- 2.5 inch (x10) SAS, SATA, or NVMe backplane and 2.5 inch (x2) SAS or SATA backplane (back)
- 3.5 inch (x4) SAS or SATA backplane



Figure 4. Back panel view of 2 x 2.5 inch hard drives with 1 PCIe expansion slot



Figure 5. Back panel view of system with 3 PCIe expansion slots



Figure 6. Back panel view of system with 2 PCIe expansion slots

Internal view of the system

The chassis design of the PowerEdge R640 is optimized for easy access to components and for efficient cooling. The PowerEdge R640 supports up to 24 DIMMs, two processors, hot-plug redundant fans, system board and hard drive bays, and many other components and features. For more system views, see the Dell EMC PowerEdge R640 Installation and Service Manual at Dell.com/Support/Manuals. ¶

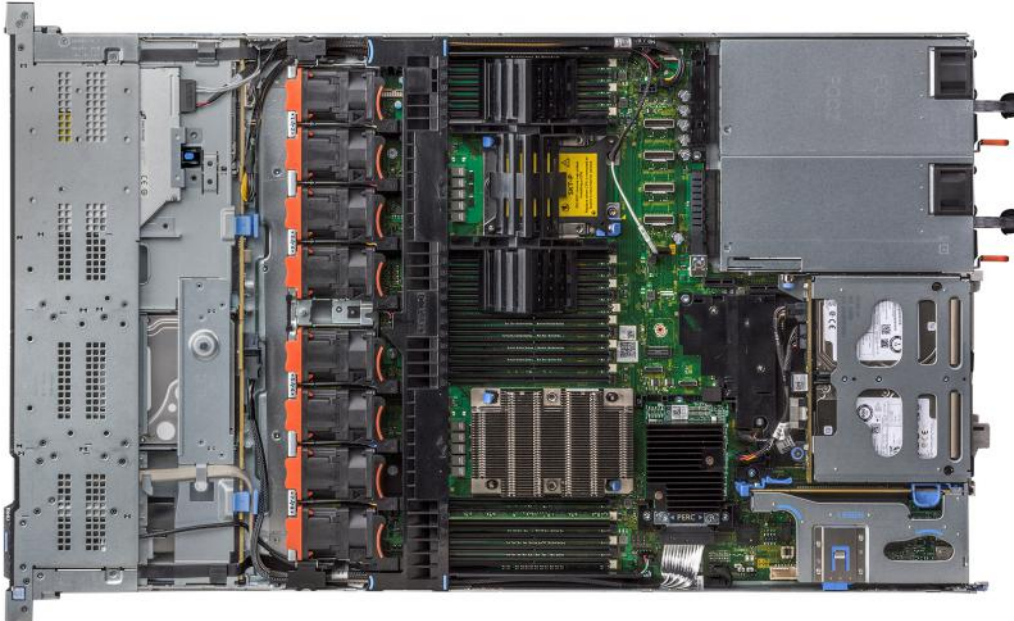


Figure 7. Inside the system with 1 PCIe expansion riser

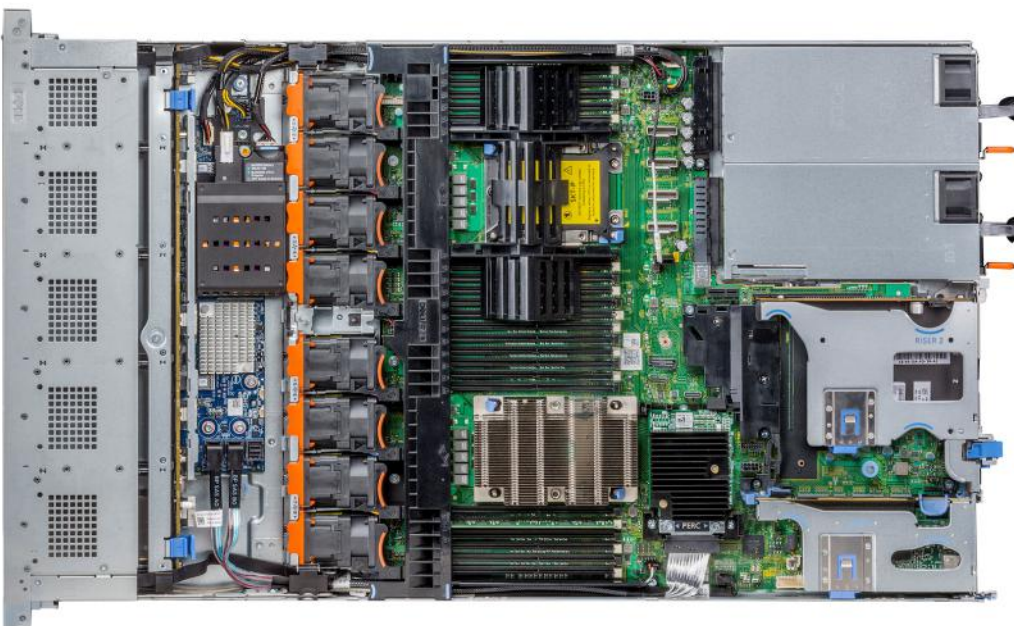


Figure 8. Inside the system with 2 PCIe expansion risers

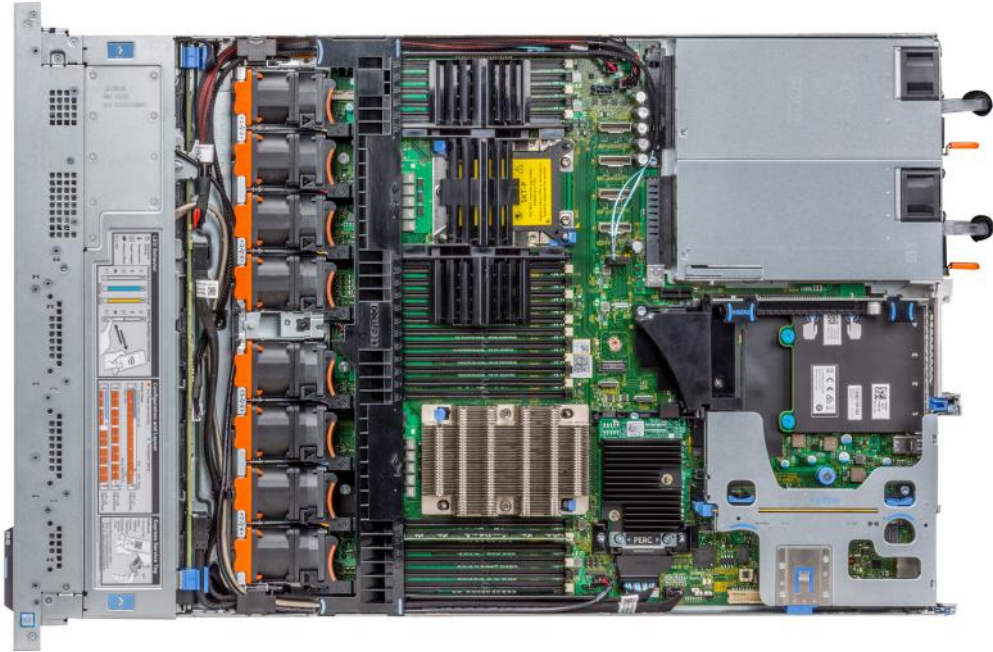


Figure 9. Inside the system with 3 PCIe expansion risers

Security features

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

Security feature	Description
Cover latch	A tooled latch is integrated in the top cover to secure it to the system.
Bezel	A standard bezel is an optional metal bezel mounted to the chassis front. A lock on the bezel protects unauthorized access to hard drives. The QuickSync NFC bezel enables the iDRAC QuickSync management function for managing the server from the front using an NFC-capable device and the Dell EMC OpenManage Mobile App. Available only from the factory and not supported after point of sale.
TPM	The Trusted Platform Module (TPM) is used to generate/store, protect/authenticate password, and create/store digital certificates.
Power-off security	BIOS has the ability to disable the power button function.

Processors

The PowerEdge R640 server features the exceptional performance, value, and power efficiency of the 2nd Generation Intel® Xeon® Scalable Processor. These processors provide high performance no matter what your constraint—floor space, power, or budget—and on workloads that range from the most complicated scientific exploration to crucial web-serving and infrastructure applications. In addition to providing raw performance gains, improved I/O is also made possible with Intel Integrated I/O, which can reduce latency by adding more lanes and doubling bandwidth. This helps to reduce network and storage bottlenecks, which improves the processor performance capabilities.

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. 2nd Generation Intel® Xeon® Processors can offer even greater core or frequencies, or both.
- **Large Memory Bandwidth/Capacity:** 6 memory channels and up to 6 DCPMMs per socket of Intel® Optane™ DC persistent memory for data-centric workloads on select processors.
- **AI capability:** Intel® Deep Learning Boost drives inferencing for vector neural networks right in your CPU
- **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 with enhanced hardware mitigation.

Topics:

- [Supported processors](#)
- [Chipset](#)

Supported processors

The following table lists the 1st and 2nd Generation Intel® Xeon® Scalable supported processors for the PowerEdge R640:

Table 1. 1st and 2nd Generation Intel® Xeon® Scalable supported processors

Medal	Processor	Frequency (GHz)	Cores/ Threads
Platinum	8280	2.70	28/56
Platinum	8280M	2.70	28/56
Platinum	8280L	2.70	28/56
Platinum	8276	2.20	28/56
Platinum	8276M	2.20	28/56
Platinum	8276L	2.20	28/56
Platinum	8270	2.70	26/52
Platinum	8268	2.90	24/48
Platinum	8260	2.40	24/48
Platinum	8260M	2.40	24/48
Platinum	8260L	2.40	24/48
Platinum	8253	2.20	16/32
Platinum	8180M	2.5	28/56

Medal	Processor	Frequency (GHz)	Cores/ Threads
Platinum	8180	2.5	28/56
Platinum	8176M	2.1	28/56
Platinum	8176	2.1	28/56
Platinum	8170M	2.1	26/52
Platinum	8170	2.1	26/52
Platinum	8168	2.7	24/48
Platinum	8164	2.0	26/52
Platinum	8160M	2.1	24/48
Platinum	8160	2.1	24/48
Platinum	8153	2.0	16/32
Gold	6254	3.10	18/36
Gold	6252	2.10	24/48
Gold	6248	2.50	20/40
Gold	6246	3.30	12/24
Gold	6244	3.60	8/16
Gold	6242	2.80	16/32
Gold	6240	2.60	18/36
Gold	6240M	2.60	18/36
Gold	6240L	2.60	18/36
Gold	6238	2.10	22/44
Gold	6238M	2.10	22/44
Gold	6238L	2.10	22/44
Gold	6234	3.30	8/16
Gold	6230	2.10	20/40
Gold	6226	2.70	12/24
Gold	6152	2.1	22/44
Gold	6150	2.7	18/36
Gold	6148	2.4	20/40
Gold	6146	3.2	12/24
Gold	6144	3.5	8/16
Gold	6142M	2.6	16/32
Gold	6142	2.6	16/32
Gold	6140M	2.3	18/36
Gold	6140	2.3	18/36
Gold	6138	2.0	20/40
Gold	6136	3.0	12/24
Gold	6134M	3.2	8/16
Gold	6134	3.2	8/16
Gold	6132	2.6	14/28
Gold	6130	2.1	16/32

Medal	Processor	Frequency (GHz)	Cores/ Threads
Gold	6128	3.4	6/12
Gold	6126	2.6	12/24
Gold	5222	3.80	4/8
Gold	5220S	2.70	18/36
Gold	5220	2.20	18/36
Gold	5218	2.30	16/32
Gold	5217	3.00	8/16
Gold	5215	2.50	10/20
Gold	5215M	2.50	10/20
Gold	5215L	2.50	10/20
Gold	5122	3.6	4/8
Gold	5120	2.2	14/28
Gold	5118	2.3	12/24
Gold	5117	2.0	14/28
Gold	5115	2.4	10/20
Silver	4216	2.10	16/32
Silver	4215	2.50	8/16
Silver	4214	2.20	12/24
Silver	4210	2.20	10/20
Silver	4208	2.10	8/16
Silver	4116	2.1	12/24
Silver	4114	2.2	10/20
Silver	4112	2.6	4/24
Silver	4110	2.1	8/16
Silver	4108	1.8	8/16
Bronze	3106	1.7	8/8
Bronze	3104	1.7	6/6
Bronze	3204	1.90	6/6

Table 2. Speed Select Technology- Performance Profile (SST-PP) (-Y) offerings

Processor Model #	Frequency	Cores- Threads
8260Y	• 2.40 GHz	• 24–48
	• 2.50 GHz	• 20–40
	• 2.70 GHz	• 16–32
6240Y	• 2.60 GHz	• 18–36
	• 2.80 GHz	• 14–28
	• 3.10 GHz	• 8 -16
4214Y	• 2.20 GHz	• 12–24
	• 2.30 GHz	• 10–20
	• 2.40 GHz	• 8–16

Table 3. Search Optimized (-S) offerings

Processor Model #	Frequency	Cores- Threads
5220S	2.70 GHz	18–32

Table 4. Single Socket (-U) offerings

Processor Model #	Frequency	Cores- Threads
6212U	2.40 GHz	24–48
6210U	2.50 GHz	20–40
6209U	2.10 GHz	20–40

Table 5. VM Density Optimized (-V) offerings

Processor Model #	Frequency	Cores- Threads
6262V	1.90 GHz	24–48
6222V	1.80 GHz	20–40

 **NOTE:** For the most up-to-date information on available processors, please visit <https://www.dell.com/en-us/work/shop/povw/poweredge-r640> (view configurations) or talk to your Dell EMC representative.

Chipset

The following table shows the high level features supported by the chipset implemented on the PowerEdge R640:

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

For more information, visit [Intel.com](https://www.intel.com)

Memory

The PowerEdge R640 support up to 24 DIMMs. Depending on the 2nd Generation Intel® Xeon Scalable processor 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 7.68TB 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.

There are 4 different types of DIMMs:

- RDIMM: Registered DIMM – Provides for higher capacity options and advanced RAS features. It is the most commonly used DIMM type, and offers the best mix of frequency, capacity, and rank structure choices.
- LRDIMM: Load Reduced DIMM – Provides maximum capacity beyond that of an RDIMM but at a higher power consumption. Uses a buffer to reduce memory loading to a single load on all DDR signals, allowing for greater density.
- DCPMM (also known as Intel Optane DC persistent memory): Provides a large memory capacity at an affordable price. Any application can take advantage of DCPMM in Memory Mode with a compatible operating system. Unlock more performance as well as persistency when using an application that supports App Direct Mode. DCPMM is used in conjunction with RDIMMs or LRDIMMs and a maximum number of 6 DCPMMs can be used per CPU. This persistent memory technology does not require a battery.
- NVDIMM: Non-Volatile DIMM – Provides a persistent memory solution with NAND and DRAM that maintains data in power loss, system crash, or normal shutdown. This solution requires a battery as a power source for an AC loss condition. It can be used in conjunction with RDIMMs.

Intel® Optane™ DC Persistent Memory (DCPMM)

Intel® Optane™ DC Persistent Memory is a new memory technology that allows customers to reach a large memory capacity at an affordable price. Additionally, when operating the memory in “App Direct Mode” the memory is persistent.

DCPMM comes in 3 different memory sizes, 128GB, 256GB, and 512. RDIMMs and LRDIMMs are used in conjunction with Intel Optane DC persistent memory. Each channel will be populated with up to one DIMM of DRAM and one DIMM of DCPMM. That means that each CPU will have up to 6 DIMMs of DRAM and 6 DIMMs of DCPMM. For best performance it is recommended to have all 12 DIMMs slots per CPU populated

Intel Optane DC persistent memory operates in two modes, Memory Mode and Application Direct Mode.

Trait	Memory Mode	App Direct Mode
Application support	Any application	Application must state that it supports "App Direct Mode"
DRAM	Used as cache and is not available as system memory	Both DCPMM and DRAM are available as system memory
Persistence	No	Yes

Memory Operating Modes

Performance Optimized or Optimizer Mode: prioritizes performance and does not provide any RAS features beyond standard ECC (Error-Correcting Code).

Memory mirroring has two adjacent memory channels configured to write the same data to each channel. If one memory channel fails or encounters an error, the other channel continues to transmit data. It's an excellent safeguard for systems requiring uninterrupted operation, though it cuts memory capacity in half, can double the cost per gigabyte, and can increase power consumption.

Fault resilient memory is a Dell patented technology that works with the VMWare ESXi Hypervisor to provide a fault resilient zone that protects virtual machines from the ramifications of memory faults.

Memory sparing can reduce downtime from correctable errors by allocating one rank (64-bit wide data area on a DIMM) per channel (Single Rank Spare Mode) or two ranks per channel (Multi Rank Spare Mode) as memory spares. If a correctable error occurs in a rank or channel, it's moved to the spare rank while the OS is running. This prevents the error from causing a failure. Memory sparing reduces

memory capacity by one rank per channel or two ranks per channel (depending if Single Rank or Multi Rank is selected) and can increase the cost per gigabyte.

DIMM speed and frequency

The following table shows the PowerEdge memory speeds and CPU support:

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
2nd Generation Intel® Xeon® Scalable	DCPMM	N/A	128GB, 256GB, and 512GB	2666
Intel® Xeon® Scalable or 2nd Generation Intel® Xeon® Scalable	NVDIMM	1R	16GB	2666

Storage

The PowerEdge R640 provides scalable storage that allows you to adapt to your workload and operational requirements. With comprehensive storage options, the PowerEdge R640 offers various internal and external storage controllers, drive types, and different chassis and backplanes for varied numbers of drives. Features such as Express Flash PCIe SSDs, PERC H740P, and H840 RAID controllers provide vastly accelerated performance compared to the previous technologies.

PERC series controller offerings

The following table describes the PERC series controller supported by the PowerEdge R640:

Table 6. Perc offering

Performance level	Controller and description
Entry	<ul style="list-style-type: none"> S140-SATA, NVMe (SW RAID) SATA, NVMe
Value	<ul style="list-style-type: none"> HBA330-Internal, 12 Gbps SAS HBA-External H330, 12 Gbps SAS HBA-External
Value Performance	H730P
Premium Performance	H740P, H840

Supported drives - SAS and SATA

The following table lists the internal drives supported by the PowerEdge R640:

Table 7. Supported drives

Form factor	Type	Speed	Rotational speed	Capacity
2.5 -inch	SATA, SSD	6 Gb	N/A	240 GB, 400 GB, 480 GB, 800 GB, 960 GB, 1.6 GB, 1.9 GB, 3.2 GB, 3.8 GB
	SATA	6 Gb	7.2 K	1 TB, 2 TB
	SAS	12 Gb	7.2 K	1 TB, 2 TB, 2 TB-SED FIPS
	SAS, SSD	12 Gb	N/A	400 GB, 480 GB, 800 GB, 960 GB, 1.6 GB, 1.9 GB, 3.8 TB, 7.68 TB, 800 GB(SED FIPS), 1.6 GB-SED FIPS
	SAS	12 Gb	10 K	300 GB, 600 GB, 1.2 TB, 1.8 TB, 2.4 TB, 1.2 TB(SED FIPS), 2.4 TB-SED FIPS
	SAS	12 Gb	15 K	300 GB, 600 GB, 900 GB, 900 GB-SED FIPS
3.5 -inch	SATA	6 Gb	7.2 K	1 TB, 2 TB, 4 TB, 8 TB, 10 TB, 12 TB, 16 TB
	SAS	12 Gb	7.2 K	1 TB, 2 TB, 4 TB, 8 TB, 10 TB, 4 TB (SED FIPS), 8 TB-SED FIPS

Table 8. Supported drives - NVMe SSD

NVMe SSD drives description
375 GB 2.5-inch Device
1.6 TB 2.5-inch Device
3.2 TB 2.5-inch Device

NVMe SSD drives description

3.84TB 2.5 -inch Device

6.4TB 2.5 -inch Device

Table 9. External storage

Device Type	Description
External Tape	Supports connection to external USB tape products
NAS/IDM appliance	Software Supports NAS software stack
JBOD	Supports connection to 12 Gb MD-series JBODs

Topics:

- [Storage controllers](#)
- [Optical drives](#)
- [Tape drives](#)
- [IDSDM or vFlash card](#)

Storage controllers

The new PERC Controller offerings is a heavy leverage of previous generation PERC family. The Value Performance level controllers, carried-over from previous generation to PowerEdge R640, are a high-end offering that drives Input/Output Operations Per Second (IOPs) performance and enhance the SSD performance.

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

Performance Level	Controller and Description
Entry	S140-SATA, NVMe (SW RAID) SATA, NVMe
Value	HBA330-Internal, 12 Gbps SAS HBA-External H330, 12 Gbps SAS HBA-External
Value Performance	H730P
Premium Performance	H740P, H840

Optical drives

The PowerEdge R640 supports one of the following internal optical drive options:

- DVD-ROM
- DVD+ROM

Tape drives

The R640 does not support internal tape drives, however, external tape backup devices are supported.

Supported external tape drives:

- External RD1000 USB
- External LTO-5, LTO-6, LTO-7, and 6 Gb SAS tape drives
- 114X rack mount chassis with LTO-5, LTO-6, and LTO-7 6 Gb SAS tape drives
- TL1000 with LTO-5, LTO-6, and LTO-7 6 Gb SAS tape drives
- TL2000 with LTO-5, LTO-6, and LTO-7 6 Gb SAS tape drives
- TL4000 with LTO-5, LTO-6, and LTO-7 6 Gb SAS tape drives
- TL4000 with LTO-5, LTO-6, and LTO-7 8 Gb FC tape drives
- ML6000 with LTO-5, LTO-6, 6 Gb SAS tape drives
- ML6000 with LTO-5, LTO-6, LTO-7 8 Gb FC tape drives

IDSDM or vFlash card

In the PowerEdge R640 system, the IDSMD module contains the Internal Dual SD Module (IDSMD) and vFlash card that are combined into a single card module. The following are options available for PowerEdge R640 system:

- vflash only
- IDSMD only
- vflash + IDSMD

i **NOTE: The IDSMD only option is available with vFlash hardware and requires an iDRAC Enterprise license to enable this feature.**

The IDSMD with vFlash module has a dedicated slot at the back of the system chassis. This is a Dell EMC-proprietary PCIe x1 slot that uses a USB 3.0 interface to host. In the PowerEdge R640 systems, the IDSMD and vFlash card size changes from SD to microSD and the supported capacity for IDSMD microSD cards are 16 GB, 32 GB, or 64 GB, while for vFlash the capacity is 16 GB only. The write-protect switch is built onboard on the IDSMD module.

Boot Optimized Storage Subsystem (BOSS)

BOSS is offered as a means of booting 14G servers to a full OS when:

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

The HW RAID BOSS card is a RAID controller with a limited feature set that presents M.2 SATA-only SSDs as either Non-RAID disks or a single RAID1 volume.

Networking and PCIe

The PowerEdge R640 offers balanced, scalable I/O capabilities, including integrated PCIe 3.0-capable expansion slots. Dell EMC Network Daughter Cards allow you to choose the right network fabric without using up a valuable PCI slot. You can pick the speed, technology, vendor, and other options, such as switch-independent partitioning, which allows you to share and manage bandwidth on 10 GbE connections.

For details on the various networking cards available, talk to Dell representative or visit <https://www.dell.com/en-us/work/shop/povw/poweredge-r640> and choose the green view configurations button at the top for a full list of options.

Topics:

- [PCIe riser and options](#)

PCIe riser and options

The PowerEdge R640 system has one standard PCIe connector and four Speededge connectors. The PowerEdge R640 system has the following four riser cards:

- Right Riser 1A - One x16 PCIe Gen3 for low-profile cards on left side and one x16 PCIe Gen3 for low-profile card on right side – connected to CPU1—Top and bottom.
- Right Riser 1B - One x16 PCIe Gen3 for low-profile card on left side – connected to CPU1—Top and bottom.
- Left Riser 2A - One x16 PCIe Gen3 for low-profile cards - connected to CPU2.
- Left Riser 2B - One x16 PCIe Gen3 for full-height cards, may be used for full-height 3/4 length PCIe cards - connected to CPU2.

With all the risers, the PowerEdge R640 system board provides one x8 PCIe Gen3 slot for dedicated storage controller card connected to the CPU1 and one x8 PCIe Gen3 slot for dedicated NDC connected to the CPU1.

PCIe expansion card riser configurations

The following table shows the PCIe expansion card riser configurations for PowerEdge R640:

Expansion card riser	PCIe slots on the riser	Height	Length	Link
Riser 1A	Slot 2	Low Profile	Half Length	x16
	Slot 1	Low Profile	Half Length	x16
Riser 1B	Slot 1	Low Profile	Half Length	x16
Riser 2A	Slot 3	Low Profile	Half Length	x16
Riser 2B	Slot 2	Full Height	3/4 Length	x16

Power, thermal and acoustics

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 10. 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 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 .
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: <ul style="list-style-type: none"> • Power monitoring accuracy of 1%, whereas the industry standard is 5% • More accurate reporting of power • Better performance under a power cap
Power capping	Use Dell EMC systems management tools such as OpenManage Power Center and iDRAC9 with an Enterprise license can be used to set a power limit for your server. This limits the output of a PSU and reduce system power consumption and help in constrained power situations.
Systems management	The integrated Dell Remote Access Controller 9 (iDRAC9) with Lifecycle Controller is embedded within every Dell EMC PowerEdge™ server and provides functionality that helps IT administrators deploy, update, monitor, and maintain servers with no need for any additional software to be installed. iDRAC functions regardless of operating system or hypervisor presence because from a pre-OS or bare-metal state, iDRAC is ready to work because it is embedded within each server from the factory.
Active power management	Dell EMC offers a complete power management solution accessed through the iDRAC9 with Enterprise licensing and OpenManage Power Center to implement policy-based management of power and thermal levels at the individual system, rack, or data center level. Hot spares reduce power consumption of redundant power supplies. Thermal control of fan speed optimizes the thermal settings for your environment to reduce fan consumption and lower system power consumption.

Thermal and Acoustics

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

Power supply units

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

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

Acoustical design

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

Table 11. Acoustical performance

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

Rack rails

The rail offerings for the R640 system consist of two types of rails—sliding and static.

The sliding rails allow the system to be fully extended out of the rack for service. They are available with or without the optional cable management arm (CMA).

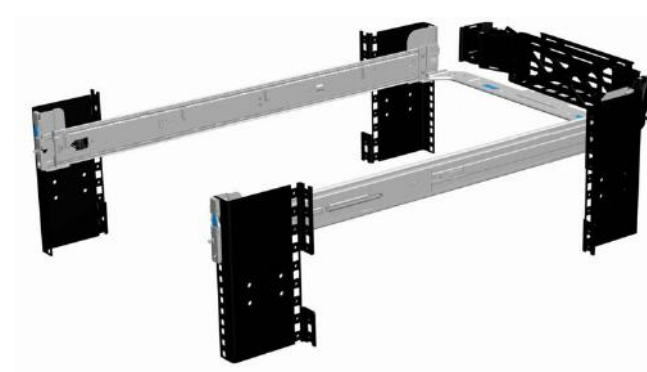


Figure 10. Sliding rails

The static rails support a wider variety of racks than the sliding rails. However, they do not support serviceability in the rack and are thus not compatible with the CMA.

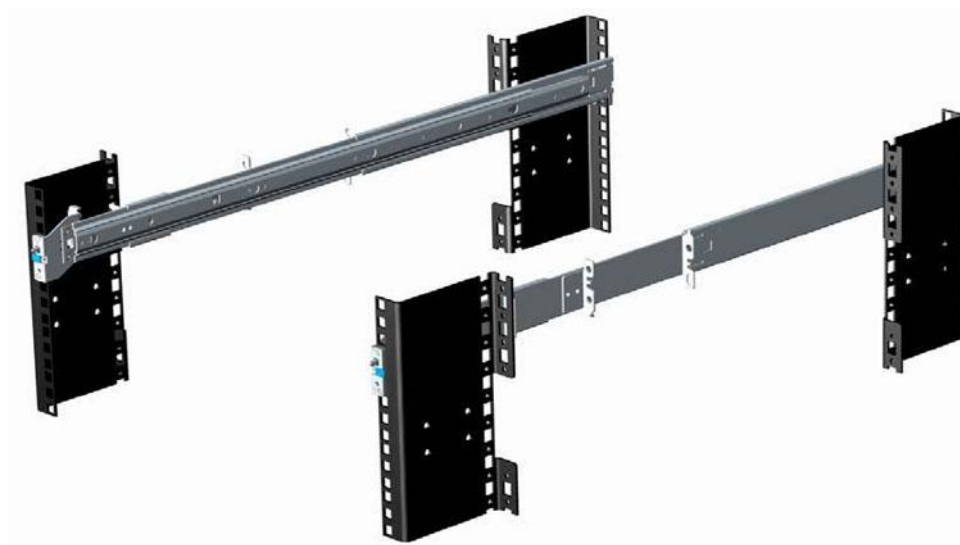


Figure 11. Static rails

One key factor in selecting the proper rails is identifying the type of rack in which they are installed. Both the sliding rails and the static rails support tool-less mounting in 19 inch-wide, EIA-310-E-compliant square hole and unthreaded round hole 4-post racks. Both also support tool-ed mounting in threaded hole 4-post racks, but only the static rails, as the more universal solution, support mounting in 2-post (Telco) racks.

Table 12. Static and sliding rails

Sliding and static rail

Product	Rail identifier	Mounting interface	Rail type	Rack types supported				
				4-Post			2-Post	
				Square	Round	Thread	Flush	Center
R640	B6	ReadyRails II	Sliding	√	√	√	X	X
	B4	ReadyRails	Static	√	√	√	√	√

Screws are not included in either kit as threaded racks are offered with various thread designations. Users must therefore provide their own screws when mounting the rails in threaded racks.

NOTE: Screw head diameter for the sliding rails must be 10 mm or less.

Other key factors governing proper rail selection include the following:

- Spacing between the front and rear mounting flanges of the rack
- Type and location of any equipment mounted in the back of the rack such as power distribution units (PDUs)
- Overall depth of the rack

The static rails offer a greater adjustability range and a smaller overall mounting footprint than the sliding rails. This is because of their reduced complexity and lack of need for CMA support.

Table 13. Static rails adjustability

Product	Rail identifier	Rail type	Rail adjustable range (mm)						Rail depth—mm	
			Square		Round		Threaded		Without CMA	With CMA
			Min	Max	Min	Max	Min	Max		
R640	B6	Sliding	630	883	616	876	630	897	714	845
	B4	Static	608	879	594	872	604	890	622	N/A

The adjustment range of the rails is a function of the type of rack in which they are being mounted. The Min/Max values listed above represent the allowable distance between the front and rear mounting flanges in the rack. Rail depth without the CMA represents the minimum depth of the rail with the outer CMA brackets removed (if applicable) as measured from the front mounting flanges of the rack.

Supported operating system

The following lists the supported operating systems for the PowerEdge R740 and R740xd:

1. Canonical® Ubuntu® Server LTS
2. Citrix® Hypervisor
3. Microsoft® Windows Server® LTSC with Hyper-V
4. Oracle® Linux
5. Red Hat® Enterprise Linux
6. SUSE® Linux Enterprise Server
7. VMware® ESXi®

For specifications and interoperability details, see [Dell.com/OSsupport](https://www.dell.com/osupport).

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.

The Dell EMC OpenManage Portfolio

Simplifying hardware management through ease of use, intelligent automation and integrated security

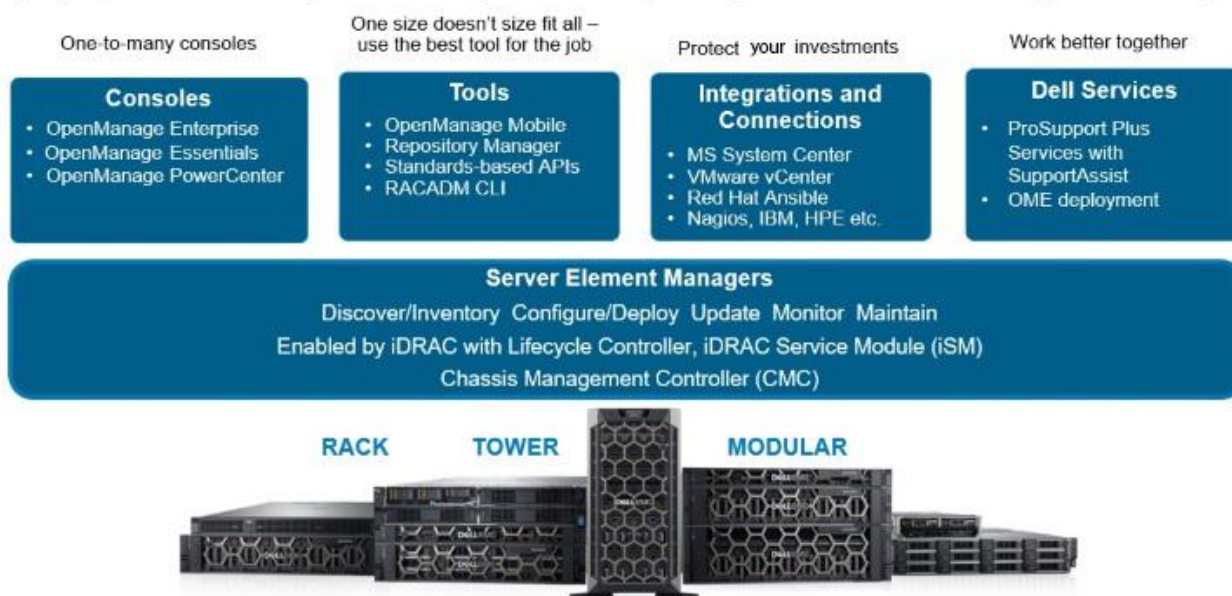


Figure 12. Server lifecycle management operations

Topics:

- iDRAC with Lifecycle controller
- Agent-free management
- Agent-based management
- Dell EMC consoles
- Dell EMC OpenManage systems management tools, utilities and protocols
- Integration with third-party consoles
- OpenManage connections with third-party consoles
- Dell EMC server management operations

iDRAC with 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

The R640 supports the following iDRAC licenses – Basic (default), Express (upgrade) and Enterprise (upgrade).

i | **NOTE: The features listed in bold in the below table are new for iDRAC9.**

Table 14. 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
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								

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

Features	iDRAC8 Basic	iDRAC9 Basic	iDRAC8 Express	iDRAC9 Express	iDRAC8 Express for Blades	iDRAC9 Express for Blades	iDRAC8 Enterprise	iDRAC9 Enterprise
Power thresholds & alerts	No	No	Yes	Yes	Yes	Yes	Yes	Yes
Real-time power graphing	No	No	Yes	Yes	Yes	Yes	Yes	Yes
Historical power counters	No	No	Yes	Yes	Yes	Yes	Yes	Yes
Power capping	No	No	No	No	No	No	Yes	Yes
Power Center integration	No	No	No	No	No	No	Yes	Yes
Temperature monitoring	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Temperature graphing	No	No	Yes	Yes	Yes	Yes	Yes	Yes
Health Monitoring								
Predictive failure monitoring	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
SNMPv1, v2 and v3—traps and gets	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Email alerting	No	No	Yes	Yes	Yes	Yes	Yes	Yes
Configurable thresholds	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Fan monitoring	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Power Supply monitoring	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Memory monitoring	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
CPU monitoring	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
RAID monitoring	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
NIC monitoring	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
HD monitoring—enclosure	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Out of Band Performance Monitoring	No	No	No	No	No	No	Yes	Yes
Alerts for excessive SSD wear	No	Yes	No	Yes	No	Yes	No	Yes
Customizable settings for Exhaust Temperature	No	Yes	No	Yes	No	Yes	No	Yes
Update								
Remote agent-free update	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Embedded update tools	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
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

Features	iDRAC8 Basic	iDRAC9 Basic	iDRAC8 Express	iDRAC9 Express	iDRAC8 Express for Blades	iDRAC9 Express for Blades	iDRAC8 Enterprise	iDRAC9 Enterprise
Embedded driver pack	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Full configuration inventory	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Inventory export	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Remote configuration	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Zerotouch configuration	No	No	No	No	No	No	Yes	Yes
System Retire/Repurpose	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Server Configuration Profile in GUI	No	Yes	No	Yes	No	Yes	No	Yes
Diagnostics, Service and Logging								
Embedded diagnostic tools	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Part Replacement	No	No	Yes	Yes	Yes	Yes	Yes	Yes
Server Configuration Backup	No	No	No	No	No	No	Yes	Yes
Server Configuration Restore	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Easy Restore—system configuration	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Easy Restore Auto Timeout	No	Yes	No	Yes	No	Yes	No	Yes
LED health status indicator	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
LCD screen—iDRAC9 requires optional bezel	Yes	Yes	Yes	Yes	N/A	N/A	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
Manual reset for iDRAC—LCD ID button	Yes	Yes	Yes	Yes	Yes	Yes	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

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

Agent-free management

As Dell EMC PowerEdge servers have embedded server lifecycle management, in many cases, there is no need to install an OpenManage systems management software agent into the operating system of a Dell EMC PowerEdge server. This greatly simplifies and streamlines the management footprint.

Agent-based management

Most systems management solutions require pieces of software, called agents, to be installed on each node in order to be managed within the IT environment. Additionally, the same agent is often used as a local interface into the hardware health and may be accessed remotely as a management interface, typically referred to as a one-to-one interface. For customers that continue to use agent-based solutions, Dell EMC provides OpenManage Server Administrator.

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:

OpenManage Enterprise

OpenManage Enterprise is the next generation of OpenManage Essentials. It simplifies, centralizes, and automates the full span of server lifecycle management activities. It helps in discovery, configuration, deployment, updates, and remediation. These tasks are performed within a single console that unifies management of tower, rack, and modular platforms. OpenManage Enterprise helps in standardizing and supporting IT management policies and practices.

The OpenManage Enterprise console simplifies and strengthens the current capability of OpenManage Essentials in the following areas:

- Reduced time and effort that is required to manage small and large-scale IT environments using HTML5 GUI
- Simplified GUI workflow to provide a single management layer that unifies the management of PowerEdge tower, rack, and modular platforms
- Packaged and delivered as virtual appliance and supports ESXi, HyperV, and KVM
- Redesigned architecture on CentOS with the PostgreSQL database. Operating system and database license are no longer required
- Centralized user management with role-based access control
- Enabled with customer automation and solution integration using Northbound API
- Enhanced policy-driven management

For more information, see www.dell.com/support/article/sln310714

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 Enterprise or Essentials console or by directly accessing the server's iDRAC.

The OpenManage Enterprise or Essentials console can be accessed through OpenManage Mobile over a secure IP network. This enables you to monitor all devices managed by OpenManage Enterprise or 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.

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

- Connect to multiple servers which have OpenManage Enterprise 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 Enterprise 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 legacy PowerEdge servers remotely. For more information, see OpenManage Mobile compatibility matrix at dell.com/support
- Access rack, tower and modular servers through Quick Sync 2 modules or Quick Sync bezels as applicable.
- 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 (For more information, see OpenManage Mobile compatibility matrix at dell.com/support)
- 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 servers. 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.

Dell EMC server management operations

Dell EMC OpenManage systems management is centered on automating the server management lifecycle — deploy, update, monitor and maintain. To manage an infrastructure properly and efficiently, you must perform all of these functions easily and quickly. iDRAC9 with Lifecycle Controller technology provides you with these intelligent capabilities embedded within the server infrastructure. This allows you to invest more time and energy on business improvements and less on maintenance.

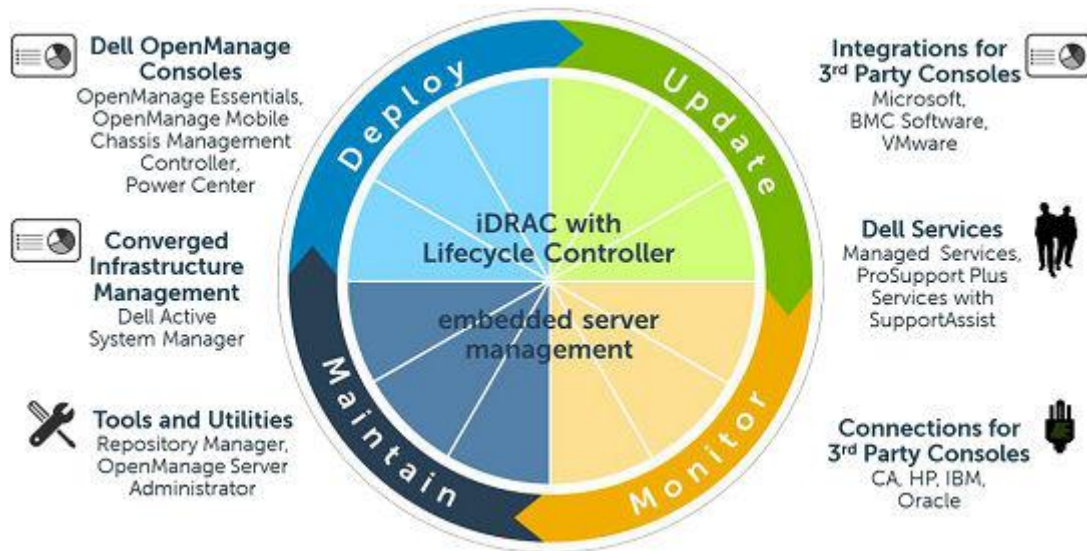


Figure 13. Systems management server lifecycle

Table 15. One-to-one and one-to-many operations

Operation	One-to-one	One-to-many
Deploy	<ul style="list-style-type: none"> • Lifecycle Controller GUI • DTK 	<ul style="list-style-type: none"> • OpenManage Integration for VMware vCenter • OpenManage Integration for BMC BladeLogic • OpenManage Integration for Microsoft System Center Configuration Manager
Update	<ul style="list-style-type: none"> • iDRAC9 with Lifecycle Controller • Repository Manager • DUP • SUU • OpenManage Integration for VMware vCenter 	<ul style="list-style-type: none"> • Dell EMC OpenManage Essentials • OpenManage Integration for Microsoft System Center Configuration Manager
Monitor	<ul style="list-style-type: none"> • iDRAC9 with Lifecycle Controller • OMSA 	<ul style="list-style-type: none"> • Dell EMC OpenManage Essentials • Dell EMC OpenManage Power Center • OpenManage Integration for VMware vCenter • OpenManage Integration for Microsoft System Center Operations Manager
Maintain	<ul style="list-style-type: none"> • iDRAC9 with Lifecycle Controller • IPMI 	<ul style="list-style-type: none"> • Lifecycle Controller Remote Services Remediate and replace parts: • OpenManage Integration for Microsoft System Center Virtual Machine Manager (SCVMM) • Server Pro Management Pack and Lifecycle Controller Integration (DLCI)

For additional detailed information on Dell EMC systems management portfolio, visit Dell.com/OpenManage.

Appendix A. Additional specifications

Topics:

- Chassis dimensions
- Video specifications
- USB
- Power supply specifications
- Environmental specifications

Chassis dimensions

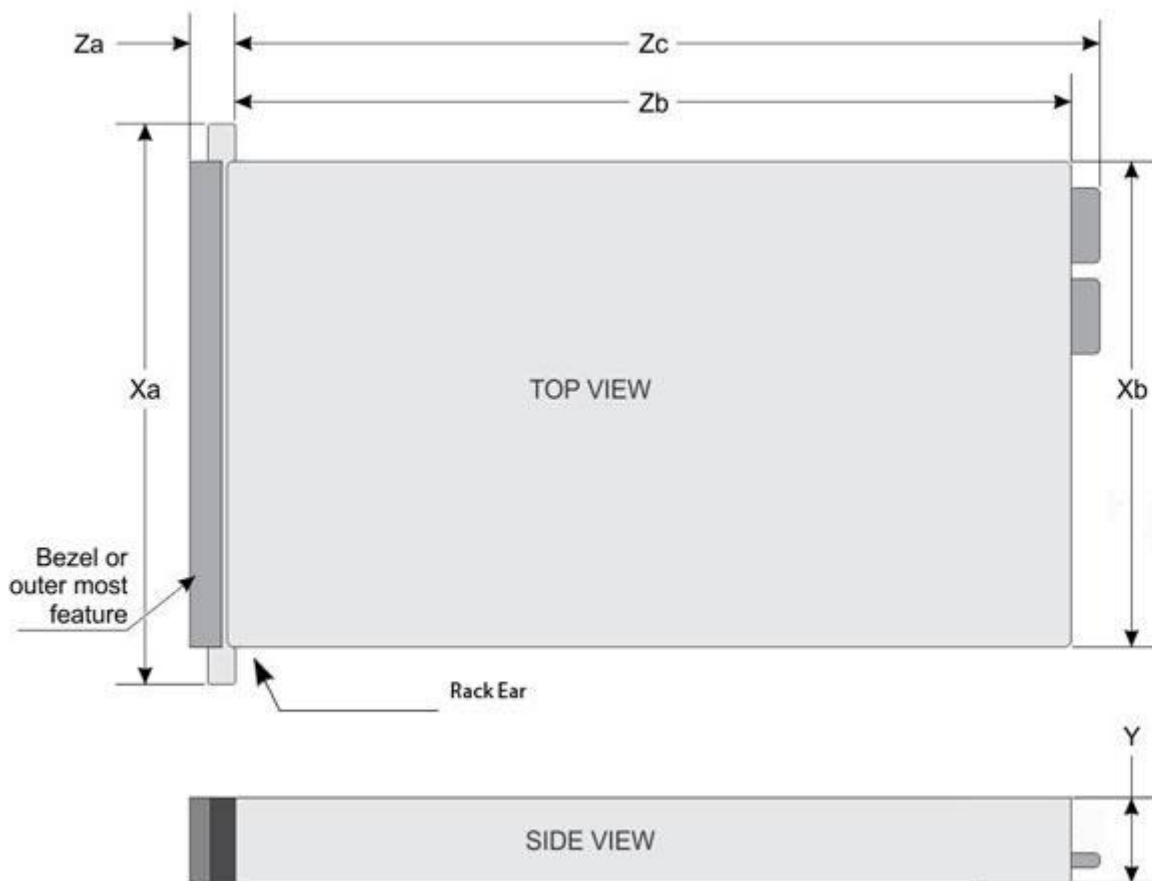


Figure 14. Chassis dimensions for PowerEdge R640

Table 16. Dimensions

System	Xa	Xb	Y	Za—with bezel	Za—without bezel	Zb*	Zc
4 x 3.5 inches	482.0 mm	434.0 mm	42.8 mm	35.84 mm	22.0 mm	733.82 mm	772.67 mm

Or

System	Xa	Xb	Y	Za—with bezel	Za—without bezel	Zb*	Zc
10 x 2.5 inches	(18.97 inches)	(17.08 inches)	(1.68 inches)	(1.41 inches)	(0.87 inches)	(29.61 inches)	(30.42 inches)
8 x 2.5 inches	482.0 mm (18.97 inches)	434.0 mm (17.08 inches)	42.8 mm (1.68 inches)	35.84 mm (1.41 inches)	22.0 mm (0.87 inches)	683.05 mm (26.89 inches)	721.91 mm (28.42 inches)

Table 17. Chassis weight

Configuration	Maximum Weight
4 x 3.5 inch HDD	21.1 Kilograms
8 x 2.5 inch HDD	19.5 Kilograms
10 x 2.5 inch HDD	21.9 Kilograms

Video specifications

The PowerEdge R640 systems support integrated Matrox G200eW3 graphics card with 4 MB SPI capacity.

Table 18. Supported video resolution options

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

USB

Front, rear, and internal USB ports are included in the base system for R640. Rear and internal ports support up to USB 3.0, while front ports support USB 2.0. The R640 offers an option that adds an additional USB 3.0 port to the front of the chassis. The USB module cable connects to the internal USB port on the planar and the default internal moves closer to the front of the chassis

The front USB 3.0 port option is not available on the 4 x 3.5 -inch or 10 x 2.5 -inch storage configurations.

Power supply specifications

The PowerEdge R640 systems support up to two AC or DC power supply units (PSUs).

Table 19. 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

PSU	Class	Heat dissipation—maximum	Frequency	Voltage	Current
750 W AC	Platinum	2891 BTU/hr		100–240 V AC, autoranging	10 A – 5 A
750 W AC	Titanium	2843 BTU/hr		200–240 V AC, autoranging	5 A
750 W Mixed Mode HVDC— for China only	Platinum	2891 BTU/hr		100–240 V AC, autoranging	10 A – 5 A
1100 W AC	Platinum	4100 BTU/hr		100–240 V AC, autoranging	12 A – 6.5 A
1100 W Mixed Mode HVDC— for China and Japan only	Platinum	4100 BTU/hr		100–240 V AC, autoranging	12 A – 6.5 A
1600 W AC	Platinum	6000 BTU/hr		100–240 V AC, autoranging	10 A

Table 20. PSU specifications

PSU	Class	Heat dissipation—maximum	Frequency	Voltage	Current
750 W Mixed Mode HVDC— for China only	NA	2891 BTU/hr	50/60 Hz	240 V DC, autoranging	4.5 A
1100 W DC	NA	4416 BTU/hr		–(48–60) V DC, autoranging	32 A
1100 W Mixed Mode HVDC— for China and Japan only	NA	4100 BTU/hr		200–380 V DC, autoranging	6.4 A – 3.2 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 230 V.

Environmental specifications

See Dell EMC PowerEdge R640 Installation and Service Manual on [Dell.com/Support/Manuals](https://www.dell.com/support/manuals) for detailed environmental specifications.

Appendix B. Standards compliance

The system conforms to the following industry standards.

Table 21. Industry standard documents

Standard	URL for information and specifications
ACPI Advance Configuration and Power Interface Specification, v2.0c	acpi.info
Ethernet IEEE 802.3-2005	standards.ieee.org/getieee802/802.3.html
HDG Hardware Design Guide Version 3.0 for Microsoft Windows Server	microsoft.com/whdc/system/platform/pcdesign/design/desguide/serverdg.msp
IPMI Intelligent Platform Management Interface, v2.0	intel.com/design/servers/ipmi
DDR4 Memory DDR4 SDRAM Specification	jedec.org/standards-documents/docs/jesd79-4.pdf
PCI Express PCI Express Base Specification Rev. 2.0 and 3.0	pcisig.com/specifications/pciexpress
PMBus Power System Management Protocol Specification, v1.2	pmbus.info/specs.html
SAS Serial Attached SCSI, v1.1	t10.org
SATA Serial ATA Rev. 2.6; SATA II, SATA 1.0a Extensions, Rev. 1.2	sata-io.org
SMBIOS System Management BIOS Reference Specification, v2.7	dmtf.org/standards/smbios
TPM Trusted Platform Module Specification, v1.2 and v2.0	trustedcomputinggroup.org
UEFI Unified Extensible Firmware Interface Specification, v2.1	uefi.org/specifications
USB Universal Serial Bus Specification, Rev. 2.0	usb.org/developers/docs

Appendix C Additional resources

Table 22. Additional resources

Resource	Description of contents	Location
Installation and Service Manual	<p>This manual, available in PDF format, provides the following information:</p> <ul style="list-style-type: none"> • 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	<p>This guide ships with the system, and is also available in PDF format. This guide provides the following information:</p> <ul style="list-style-type: none"> • Initial setup steps • Key system features • Technical specifications 	Dell.com/Support/Manuals
Rack Installation Instructions	This document ships with the rack kits, and provides instructions for installing a server in a rack.	Dell.com/Support/Manuals
Information Update	This document ships with the system, is also available in PDF format online, and provides information on system updates.	Dell.com/Support/Manuals
System Information Label	The system information label documents the system board layout and system jumper settings. Text is minimized due to space limitations and translation considerations. The label size is standardized across platforms.	Inside the system chassis cover
Quick Resource Locator (QRL)	This code on the chassis can be scanned by a phone application to access additional information and resources for the server, including videos, reference materials, service tag information, and Dell EMC contact information.	Inside the system chassis cover
Energy Smart Solution Advisor (ESSA)	The Dell EMC online ESSA enables easier and more meaningful estimates to help you determine the most efficient configuration possible. Use ESSA to calculate the power consumption of your hardware, power infrastructure, and storage.	Dell.com/calc

Appendix D. Support and deployment services

ProDeploy Enterprise Suite 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. 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 15. 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 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 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. System testing, validation and full project documentation with knowledge transfer complete the process. We focus on getting you up and running so you can focus on your business and prepare for whatever comes next.

Basic Deployment

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

Residency Services

Residency helps customers transition to new capabilities quickly through on-site or remote Dell EMC experts whose priorities and time you control. Residency experts can provide post implementation management and knowledge transfer related to a new technology acquisition or day-to-day operational management of the IT infrastructure.

Deployment services

Deployment services details and exceptions can be found in service description documents at the Enterprise Configuration and Deployment page on Dell.com.

Remote Consulting Services

When you are in the final stages of your PowerEdge server implementation, you can rely on Dell EMC Remote Consulting and our certified technical experts to help you optimize your configuration with best practices for your software, virtualization, server, storage, networking, and systems management.

Data Migration Service

Protect your business and data with our single point of contact to manage your data migration project. Your project manager will work with our experienced team of experts to create a plan using industry-leading tools and proven processes based on global best practices to migrate your existing files and data, so your business system get up and running quickly and smoothly.

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.

The figure consists of three vertical rectangular boxes, each with a colored header and a white body. The first box has a blue header and contains text about ProSupport Plus. The second box has an orange header and contains text about ProSupport. The third box has a green header and contains text about ProSupport One for Data Center.

Service Name	Description
ProSupport Plus	Optimize your critical systems and free up staff to innovate the business. ProSupport Plus provides an assigned Technology Service Manager and access to senior technical engineers that quickly diagnose issues and provide personalized guidance to avoid problems before they ever impact your business.
ProSupport	Keep your hardware and software running smoothly with 24x7 access to technology engineers as well as proactive and preventive technologies to help you get ahead of issues.
ProSupport One for Data Center	Get a tailored, personalized support experience for your large IT environment, including an assigned service account management expert as well as flexible parts and labor options.

Figure 16. 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 17. 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 18. 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.