

# Dell EMC PowerEdge R940xa

Technical Guide

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# System overview

## Introduction

The Dell EMC PowerEdge R940xa is designed to run complex workloads using highly scalable memory, I/O, and network options. The systems feature the 2nd Generation Intel Xeon Scalable processor family, with up to 48 DDR4 DIMMs, 12 PCI Express PCIe Gen3 enabled expansion slots, and a choice of embedded NIC technologies. The 4S, 4U PowerEdge R940xa accelerates applications to deliver real-time decisions. The PowerEdge R940xa combines four CPUs with four GPUs in a powerful 1:1 ratio to drive database acceleration. With up to 15.36 TB of memory and four-socket performance, the PowerEdge R940xa delivers consistent and fast response times.

The PowerEdge R940xa adds large storage capacity for high performance and GPU database acceleration, making it well suited for compute-intensive applications that require greater storage, while not sacrificing I/O performance.

## New technologies

The PowerEdge R940xa features the 2nd Generation Intel Xeon Processor Scalable family, gold, and platinum processors (up to 28 cores per socket) and supports up to 48 DIMMs (DDR4 RDIMM/LR-DIMM), DCPMM, and 12 NVDIMM.

The R940xa system has the following features:

- 2nd Generation Intel Xeon Scalable processors
- Simultaneous Multi-Threading (SMT) support
- High Reliability mode/profile support
- 12 PCIe slots for expansion and a choice of embedded NIC technologies
- Software RAID support for SATA and NVMe
- Ideal for compute-intensive applications that require greater storage, while not sacrificing I/O performance. Support for 4 double-width GPUs (in a 1: CPU to GPU ratio), or up to 4 double-width FPGAs, or up to 8 single-width FPGAs to accelerate business-critical workloads like AI and machine learning.

**Table 1. New technologies**

Technology	Detailed description
2nd Generation Intel Xeon Scalable Processor	<ul style="list-style-type: none"> <li>• 14 nm process technology</li> <li>• Intel Ultra Path Interconnect (UPI)</li> <li>• Up to 28 cores per socket</li> <li>• Up to 3.7 GHz</li> <li>• Max TDP: 205 W</li> </ul>
Intel C620 chipset	Intel Platform Controller Hub (PCH)
2933 MT/s DDR 4 memory	<p>The PowerEdge R940xa supports two DIMMs per channel at 2933 MT/s.</p> <ul style="list-style-type: none"> <li>• 6x DDR4 Channels per socket, 2 DIMMs per channel (2DPC)</li> <li>• Up to 2933 MT/s (configuration-dependent)</li> <li>• RDIMMs up to 32 GB and LRDIMMs at 64 GB and 128 GB supported</li> <li>• NVDIMMS of 16 GB and 32 GB supported</li> </ul>
Intel Optane DC persistent memory (DCPMM)	<p>A new class of memory with same DDR4 electrical and physical constraints and close to DRAM latency.</p> <ul style="list-style-type: none"> <li>• Up to 6 per CPU socket. Max 24 for 4S configuration</li> <li>• 256 GB, 512 GB per DIMM</li> <li>• 1866, 2133, 2400, 2666 MT/s</li> <li>• Up to 12.28 TB max (15.36 TB max with DCPMM and LDRIMM)</li> </ul>

## Technology

## Detailed description

iDRAC9 with Lifecycle Controller

The embedded systems management solution for PowerEdge servers features hardware and firmware inventory and alerting, in-depth memory alerting, faster performance, a dedicated gigabit port and many more features.

Wireless management

The Quick Sync feature is an extension of NFC-based low-bandwidth Quick sync interface. Quick Sync 2.0 will offer feature parity with NFC interface with improved user experience. Since the introduction of iDRAC in PowerEdge Server, the server management has been improved by adding different local and remote user interfaces (Web GUI, RACADM, WSMAN, BIOS F2 Setup, and LCD) to iDRAC. The addition of Quick Sync 1.0 (NFC) interface in 13G server with handheld devices (Mobile, tablet) and OMM Android application. To extend this Quick Sync feature to wide variety of Mobile OSs with higher data throughput, the Quick Sync 2.0 version replaces NFC technology.

## System features

### Product comparison

The following table shows the comparison between the PowerEdge R940xa and the R930:

**Table 2. Comparison table**

Feature	R940xa	R930
CPU	4x 2nd Generation Intel Xeon Processor Scalable Family (Gold and Platinum)	4x Intel Xeon E5-5600 v3
CPU interconnect	Intel Ultra Path Interconnect (UPI)	Intel QuickPath Interconnect (QPI)
Memory	<ul style="list-style-type: none"> <li>48x DDR4 RDIMM, LRDIMM, 12x NVDIMM</li> <li>Up to 6 TB with 48x 128 GB LRDIMM</li> <li>DCPMM 12.28 TB (15.36 TB with LRDIMM)</li> </ul>	<ul style="list-style-type: none"> <li>96 x DDR4 RDIMM, LRDIMM</li> <li>Up to 3 TB with 96x 32 GB LRDIMM</li> </ul>
Disk Drives	2.5 inches - 12 Gb SAS, 6 Gb SATA	2.5 inches - 12 Gb SAS, 6 Gb SATA
Storage Controllers	Adapters: HBA330, H330, H730P, H740P, 12G SAS HBA, and H840 SW RAID: S140	12 Gbps PERC-9 series
PCIe SSD	Up to 4x PCIe SSD	8x PCIe SSD with dedicated slots using two extender cards.
PCIe Slots	Max 12 PCIe 3.0	Max 10 PCIe 3.0
rNDC	4x 1 GB, 4x 10 GB, 2x 10 GB+2x 1 GB, or 2x 25 GB	4x 1 Gb, 4x 10 Gb, or 2x 10 Gb+2x 1 Gb
Accelerators	Up to 4 double-width GPUs or up to 4 double-width or up to 8 single-width FPGAs.	Not Available
USB Ports	Front: 2 ports (USB 2.0), 1 managed (micro-usb) Rear: 2 ports (USB 3.0) Internal: 1 port (USB 3.0) Optional: 1 Front port (USB 3.0) - only offered on 8-drive configuration	Front: 2 ports (USB 2.0) Rear: 2 ports (USB 2.0) Internal: 1 port (USB 2.0)
Rack Height	4U	4U
Power Supplies	<ul style="list-style-type: none"> <li>AC (Platinum): 750 W, 1100 W, 1600 W, 2000 W, 2400 W</li> <li>Mix Mode: 750 W PSU (DC input for China only)</li> <li>AC (Titanium): 750 W</li> <li>DC: 1100 W</li> <li>Mix Mode/HVDC: 750 W (for China only), 1100 W</li> </ul>	<ul style="list-style-type: none"> <li>AC: 750 W, 1100 W</li> <li>DC: 1100 W</li> <li>Mix Mode/HVDC: 750 W</li> </ul>
System Management	Lifecycle Controller 3.x, OpenManage, QuickSync2.0, OMPC3, Digital License Key, iDRAC Direct (dedicated micro-USB port), Easy Restore, vFlash	Lifecycle Controller 2.x, OpenManage, Digital License Key, iDRAC QuickSync, iDRAC Direct, Easy Restore
Availability	<ul style="list-style-type: none"> <li>Hot-plug Drives</li> <li>Hot-plug Redundant Cooling</li> <li>Hot-plug Redundant Power Supplies</li> </ul>	<ul style="list-style-type: none"> <li>Hot-plug Drives</li> <li>Hot-plug Redundant Cooling</li> <li>Hot-plug Redundant Power Supplies</li> </ul>

Feature	R940xa	R930
	<ul style="list-style-type: none"> <li>· IDSDM</li> </ul>	<ul style="list-style-type: none"> <li>· IDSDM</li> </ul>

## Specifications

**Table 3. Technical specifications**

Feature	PowerEdge R940xa
Processors	4x 2nd Generation Intel Xeon Processor Scalable Family Gold and Platinum
Chipset	Intel C620 - Intel Platform Controller Hub (PCH)
CPU Interconnect	Intel Ultra Path Interconnect (UPI)
Number of cores	Up to 28 cores per socket
Memory	<ul style="list-style-type: none"> <li>· 48x DDR4 RDIMM/LRDIMM</li> <li>· 12x NVDIMM</li> <li>· DCPMM 12.28 TB (15.36 TB with LRDIMM)</li> </ul>
Chassis	Storage design modularity <ul style="list-style-type: none"> <li>· Up to 32 Hard Drive Chassis</li> <li>· Up to 8 Hard Drive Chassis</li> </ul>
Accelerators	Up to 4 double-width GPUs or up to 4 double-width or up to 8 single-width FPGAs
Disk Drives	<ul style="list-style-type: none"> <li>· 4 x 2.5-inch NVMe only</li> <li>· 8 x 2.5-inch SAS/SATA or SATA only</li> <li>· 24 x 2.5-inch SAS/SATA</li> <li>· 32 x 2.5-inch SAS/SATA or SATA only</li> </ul>
PCIe SSD	Up to 4x CPU Direct Attach PCIe SSD
Storage Controller	S140, HBA330, H330, H730, H730P, H740P, H840 (external), and 12 Gbps SAS HBA (external)
LCD Module	LCD module option in bezel
PCIe Slots	Up to 12 x PCIe Gen3—x16/x16/x16
Embedded NIC	4x 1 GB, 4x 10 GB, 2x 10 GB+2x 1 GB, or 2x 25 GB
Power Supplies	AC (Platinum): <ul style="list-style-type: none"> <li>· 1100 W</li> <li>· 1600 W</li> <li>· 2000 W</li> <li>· 2400 W</li> </ul> AC (Titanium): <ul style="list-style-type: none"> <li>· 750 W</li> </ul> DC: <ul style="list-style-type: none"> <li>· 1100 W</li> <li>· Mix Mode: 750 W (for China only)</li> </ul> Mix Mode/HVDC (China and Japan only): <ul style="list-style-type: none"> <li>· 1100 W</li> </ul>
Remote Management	iDRAC9
Systems management	<b>Dell EMC Systems management consoles and tools:</b> <ul style="list-style-type: none"> <li>· OpenManage Enterprise</li> </ul>



**Feature****PowerEdge R940xa**

- OpenManage Mobile
- OpenManage Power Manager

**Embedded management:**

- iDRAC9
- iDRAC RESTful API with Redfish
- iDRAC Direct
- Quick Sync 2 BLE/wireless module

**Integrations:**

- BMC Truesight
- Microsoft System Center
- Red Hat Ansible Modules
- VMware vCenter

**Connections:**

- IBM Tivoli Netcool/OMNIBus
- IBM Tivoli Network Manager IP Edition
- Micro Focus Operations Manager I
- Nagios Core
- Nagios XI

TPM

TPM China, TPM1.2, TPM2.0

iDRAC Direct front port

Micro USB

Fan

Up to 6 fans

IDSDM Module

Internal Dual SD Module (IDSDM) and vFlash

BOSS Module

M.2 SATA interface

PERC

PERC 9 and 10

## Chassis views and features

### Front view of the system

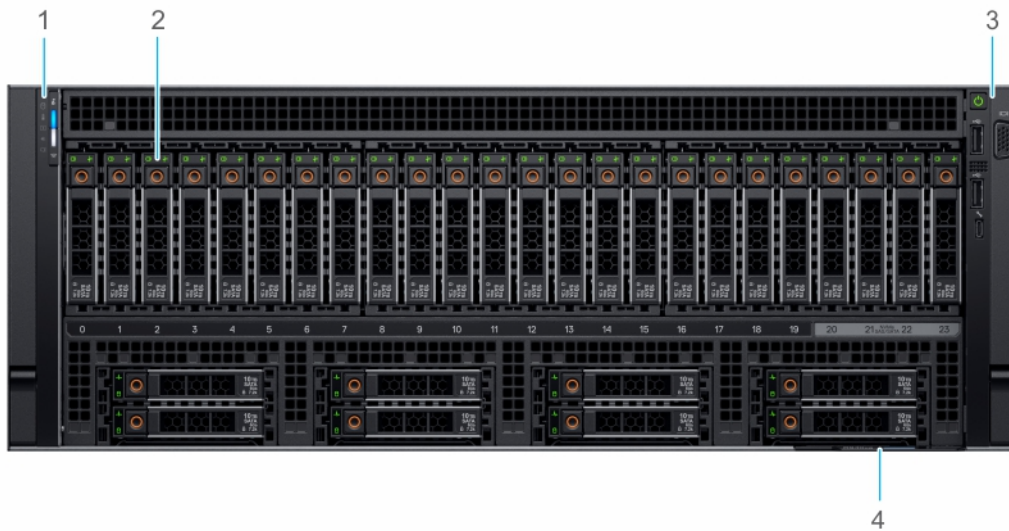


Figure 1. Front view of 32 x 2.5-inch drive system

- |                        |                    |
|------------------------|--------------------|
| 1. Left control panel  | 2. Drives (32)     |
| 3. Right control panel | 4. Information tag |

### Back view of the system

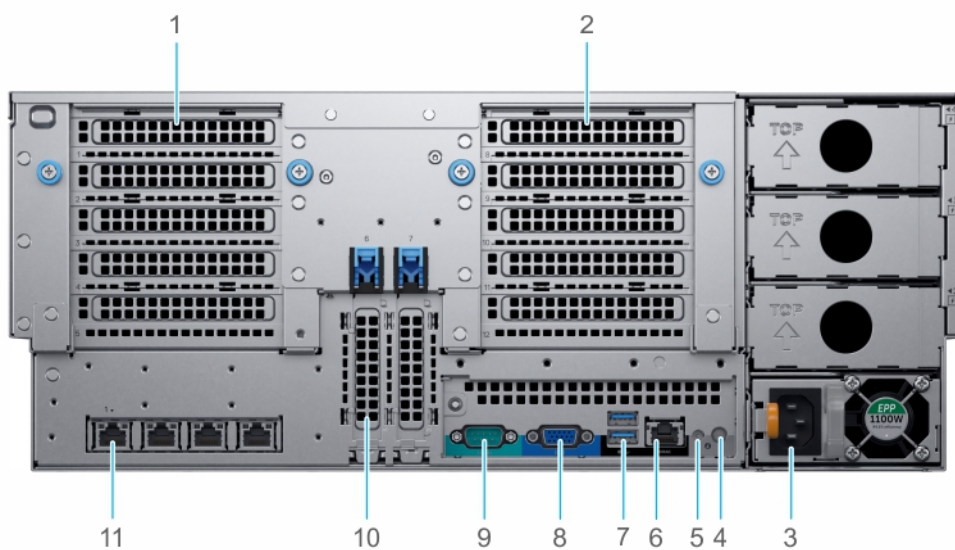


Figure 2. Back view of the system

- |                                  |                                  |
|----------------------------------|----------------------------------|
| 1. Full-height expansion riser 1 | 2. Full-height expansion riser 2 |
|----------------------------------|----------------------------------|

3. Power supply units (4)
5. CMA power port
7. USB 3.0 ports (2)
9. Serial port
11. NIC ports (4)
4. System identification button
6. iDRAC9 dedicated port
8. VGA port
10. Low profile expansion card slots (2)

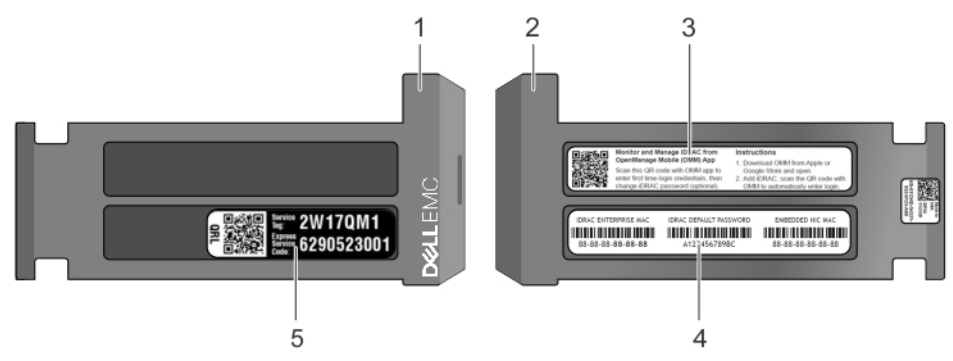
**NOTE:** The expansion card configurations are X8 PCIe Riser 1+X8 PCIe Riser 2 or X16 PCIe Riser 1+X16 PCIe Riser 2.

## Control panels

The control panels allow you to manually control the inputs to the server.

## Locating the information tag of your system

You can identify your system using the unique Express Service Code and Service Tag. Pull out the information tag in front of the system to view the Express Service Code and Service Tag. Alternatively, the information may be on a sticker on the back of the system chassis. The mini Enterprise Service Tag (EST) is found on the back of the system chassis. This information is used by Dell to route support calls to the appropriate personnel.



**Figure 3. Locating the information tag of your system**

1. Information tag (Top view)
2. Information tag (Bottom view)
3. OpenManage Mobile (OMM) label
4. iDRAC MAC address and iDRAC secure password label

**NOTE:** If you have opted for secure default access to iDRAC, the iDRAC secure default password is available on the back of the system Information tag. This label will be blank, if you have not opted for secure default access to iDRAC, then the default user name and password are root and calvin.

5. Service Tag

## Security features

A number of physical security features are present on the latest generation of the R940xa. Additional security features (non-physical) are included in the BIOS and iDRAC sections.

The following table shows the available security features for the R940xa:

**Table 4. Security features**

Features	Description
Cover latch	The system cover contains a non-keyed locking mechanism integrated into the latch.
Front bezel	An optional bezel may be mounted to the front of the chassis. The bezel includes a keyed lock to prevent its removal and to protect from unauthorized access to externally accessible media, such as

**Features****Description**

Intrusion detection switch

hard drives. The system status remains viewable even when the bezel is attached.

An internal intrusion detection switch allows for users to be alerted when the system cover has been removed.

Power button

The power button functionality can be disabled through BIOS.

# Processors

The PowerEdge R940xa server features the exceptional performance, value, and power efficiency of the 2nd Generation Intel Xeon Scalable Processor. These processors can 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.

## Topics:

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

## Processor features

The 2nd Generation Intel Xeon Processor Scalable Family provides the foundation for a powerful data center 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 and network usages. 2nd Generation Intel Xeon Processors can offer even greater core or frequencies, or both.
- Large Memory Bandwidth/Capacity: Six 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, and 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.

## Supported processors

**Table 5. Supported processors for PowerEdge R940xa**

Intel SKU	SKU type	Stepping	Speed (GHz)	Cache (MB)	Cores	Max Memory Speed (MT/s)	TDP (W)
5122	Gold	XCC	3.6	16.5	4	2666	105
5115	Gold	HCC	2.4	NA	10	2666	85
5117	Gold	XCC	2.0	19.25	10	2666	105
5118	Gold	HCC	2.3	NA	12	2666	105
5120	Gold	HCC	2.2	NA	14	2666	105
5222	Gold	XCC	3.8	16.5	4	2933	105
5220	Gold	XCC	2.2	24.75	18	2666	125
5218	Gold	XCC	2.3	22	16	2666	105
5217	Gold	HCC	3	NA	8	2933	125
5215	Gold	HCC	2.5	NA	10	2933	85

Intel SKU	SKU type	Stepping	Speed (GHz)	Cache (MB)	Cores	Max Memory Speed (MT/s)	TDP (W)
5215M	Gold	HCC	2.6	NA	10	2933	85
5215L	Gold	HCC	2.6	NA	10	2933	85
6126	Gold	XCC	2.6	19.25	12	2666	125
6128	Gold	XCC	3.4	NA	6	2666	NA
6132	Gold	XCC	2.6	19.25	14	2666	135
6130	Gold	XCC	2.1	22	16	2666	125
6142	Gold	XCC	2.6	22	16	2666	150
6138	Gold	XCC	2.0	27.5	20	2666	125
6136	Gold	XCC	3.0	24.75	12	2666	150
6140M	Gold	NA	2.3	1.5TB	18	2666	140
6140	Gold	XCC	2.3	24.75	18	2666	140
6150	Gold	XCC	2.7	24.75	18	2666	165
6148	Gold	XCC	2.4	27.5	20	2666	150
6142M	Gold	NA	2.6	1.5TB	16	2666	150
6154	Gold	XCC	3.0	24.75	18	2666	200
6134M	Gold	NA	3.2	24.75	8	2666	130
6134	Gold	XCC	3.2	24.75	8	2666	130
6152	Gold	XCC	2.1	30.25	22	2666	140
6262V	Gold	XCC	1.9	33	24	2400	135
6254	Gold	XCC	3.1	NA	18	2933	200
6252	Gold	XCC	2.1	NA	24	2933	150
6248	Gold	XCC	2.5	27.5	20	2933	150
6246	Gold	XCC	3.6	24.75	12	2933	165
6244	Gold	XCC	3.7	24.75	8	2933	150
6242	Gold	XCC	2.8	24.75	16	2933	150
6240	Gold	XCC	2.6	24.75	18	2933	150
6240M	Gold	XCC	2.6	NA	18	2933	150
6240L	Gold	XCC	2.6	NA	18	2933	150
6238	Gold	XCC	2.1	30.25	22	2933	140
6238M	Gold	XCC	2.1	NA	22	2933	140
6238L	Gold	XCC	2.1	NA	22	2933	140
6234	Gold	XCC	3.3	24.75	8	2933	130
6230	Gold	XCC	2.1	NA	20	2933	125
6222V	Gold	XCC	1.8	27.5	20	2400	115
6226	Gold	XCC	2.7	19.25	12	2933	125
8164	Platinum	NA	2.0	35.75	26	2666	150
8160M	Platinum	NA	2.1	1.5TB	24	2666	150

Intel SKU	SKU type	Stepping	Speed (GHz)	Cache (MB)	Cores	Max Memory Speed (MT/s)	TDP (W)
8160	Platinum	XCC	2.1	33	24	2666	150
8158	Platinum	XCC	3.0	NA	12	2666	150
8156	Platinum	NA	3.6	16.5	4	2666	105
8168	Platinum	XCC	2.7	33	24	2666	205
8170M	Platinum	NA	2.1	1.5TB	26	2666	165
8170	Platinum	XCC	2.1	35.75	26	2666	165
8176M	Platinum	NA	2.1	NA	28	2666	165
8176	Platinum	XCC	2.1	38.5	28	2666	165
8180M	Platinum	NA	2.5	NA	28	2666	205
8180	Platinum	XCC	2.5	38.5	28	2666	205
8153	Platinum	XCC	2.0	NA	16	2666	125
8280L	Platinum	XCC	2.7	38.5	28	2933	205
8280M	Platinum	XCC	2.7	38.5	28	2933	205
8280	Platinum	XCC	2.7	38.5	28	2933	205
8276L	Platinum	XCC	2.2	NA	28	2933	165
8276M	Platinum	XCC	2.2	NA	28	2933	165
8276	Platinum	XCC	2.2	NA	28	2933	165
8270	Platinum	XCC	2.7	NA	26	2933	205
8268	Platinum	XCC	2.9	NA	24	2933	205
8260L	Platinum	XCC	2.4	NA	24	2933	165
8260M	Platinum	XCC	2.4	NA	24	2933	165
8260	Platinum	XCC	2.4	NA	24	2933	165
8256	Platinum	XCC	3.8	NA	4	2933	105
8253	Platinum	XCC	2.2	NA	16	2933	125

**i** NOTE: The CPU SKUs ending with M can support up to 1.5TB of memory per socket

## Processor configurations

The PowerEdge R940xa supports four processors with up to 28 cores per processor.

## Processor Installation

For processor installation instructions see the PowerEdge R940xa Installation and Service Manuals.

## Chipset

The PowerEdge R940 systems use the Intel chipset 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 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 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 10/1 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 Server Platform Service firmware
- Supports Intel Virtualization Technology for Directed I/O
- Supports Intel Trusted Execution Technology
- JTAG Boundary Scan support
- Intel QuickAssist Technology
- Intel PCIe QuickAssist card
- Intel Trace Hub for debug

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



## System memory

Each CPU has 12 memory DIMM slots. Those DIMMs are organized into six 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.

### DIMM Type

There are four 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 and persistency when using an application that supports App Direct Mode. DCPMM is used along 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 along 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. Also, when operating the memory in "App Direct Mode" the memory is persistent.

DCPMM comes in 3 different memory sizes, 128 GB, 256 GB, and 512 GB.

RDIMMs and LRDIMMs are used along with Intel Optane DC persistent memory. Each channel is populated with up to one DIMM of DRAM and one DIMM of DCPMM. That means that each CPU has 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

Memory mirroring has two adjacent memory channels that are 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 is an excellent safeguard for systems requiring uninterrupted operation, though it cuts memory capacity in half, doubles the cost per gigabyte, and can increase power consumption.

**Fault resilient memory**

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**

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 is moved to the spare rank while the operating system 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 lists the PowerEdge R840 memory speeds and CPU support:

**Table 6. PowerEdge R840 memory speeds and CPU support**

CPU family	DIMM type	DIMM ranking	Capacity	Speed (MT/s)
Intel Xeon Scalable	RDIMM	1R/2R	8 GB, 16 GB, and 32 GB	2666
2nd Generation Intel Xeon Scalable	RDIMM	1R	8 GB	2666
2nd Generation Intel Xeon Scalable	RDIMM	2R	16 GB, 32 GB, and 64 Gb	2933
Intel Xeon Scalable	LRDIMM	4R/8R	64 GB and 128 GB	2666
2nd Generation Intel Xeon Scalable	LRDIMM	8R	128 GB	2666
2nd Generation Intel Xeon Scalable	DCPMM	N/A	128 GB, 256 GB, and 512 GB	2666
Intel Xeon Scalable or 2nd Generation Intel Xeon Scalable	NVDIMM	1R	16 GB	2666

## Storage

The Dell EMC PowerEdge R940xa provide scalable storage that allows you to adapt to your workload and operational demands. The Dell EMC PowerEdge R940xa offers storage expansion with the middle hard drive tray and rear hard drive cage. The hard drive bay supports up to 32 2.5-inch hard drives or SSDs.

### Drive

The PowerEdge R940xa system supports SAS, SATA, Nearline SAS hard drives/SSDs, or NVMe drives.

The supported drive options for the PowerEdge R940xa system are:

- **8 drives system** - Up to eight 2.5-inch (SAS, SATA, or Nearline SAS) front accessible drives in slots 0 through 7.
- **32 drives system** - Up to 24 2.5-inch (SAS, SATA, or Nearline SAS) including 4 NVMe front accessible drives (slots 20 to 23) in slots 0 to 23 of upper drives bay, and up to eight 2.5-inch (SAS, SATA, or Nearline SAS) front accessible drives in slots 24 to 31 of lower drives bay.

## Supported drives

**Table 7. Supported Drives - SAS and SATA or SSD**

Form Factor	Type	Speed	Rotational Speed	Capacities
2.5-inch	SATA, SSD	6 Gb	N/A	240 GB, 400 GB, 480 GB, 800 GB, 960 GB, 1600 GB, 1920 GB, 3200 GB, 3840 GB, 7680 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, 1600 GB, 1920 GB, 3840 GB, 800 GB(SED FIPS), 1600 GB(SED FIPS)
	SAS	12 Gb	10K	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)

The NVMe SSD drives supported by the Dell EMC PowerEdge R940xa are:

- 800 GB 2.5-inch device
- 1 TB 2.5-inch device
- 1.6 TB 2.5-inch device
- 2 TB 2.5-inch device
- 3.2 TB 2.5-inch device
- 4 TB 2.5-inch device
- 6.4 TB 2.5-inch device

## Storage Controller

Dell EMC's RAID controller options offer performance improvements, including the MiniPERC solution. Mini PERC provides a base RAID HW controller without consuming a PCIe slot by using a small form factor and high density connector to the base planar.

The new PERC controller offerings leverage heavily on previous generation PERC family. The premium performance PERC series controller drives better IOPs and enhanced the SSD performance.

**Table 8. PERC series controller offerings**

Performance Level	Controller & Description
<b>Entry</b>	S140 (SATA, NVMe) SW RAID SATA
<b>Value</b>	HBA330 (Internal), 12Gbps SAS HBA (External) Memory: None x8 12 Gb SAS x8 PCIe 3.0, H330, 12Gbps SAS HBA (External) Memory: None x8 12 Gb SAS x8 PCIe 3.0
<b>Value Performance</b>	H730P Memory: 2GB, NV 72-bit, 866MHz x8 12 Gb SAS x8 PCIe 3.0
<b>Premium Performance</b>	H740P, 8x8 ROC Memory: 4/8GB, NV 72-bit

## IDSDM with vFlash card

The Internal Dual microSD Module (IDSDM) and vFlash card are combined into a single card module in the latest PowerEdge systems. The following are SKUs available for PowerEdge R940xa systems:

- vFlash only
- IDSDM only
- vFlash and IDSDM

**NOTE:** The IDSDM only option come with vFlash hardware but required iDRAC Enterprise license to enable it.

The IDSDM with vFlash module sits in the back of the chassis, in a Dell-proprietary PCIe x1 slot using a USB 3.0 interface to host. In 14 Gen system, the IDSDM and/or vFlash card moves from SD to microSD and the supported capacity for IDSDM microSD cards are 16, 32, and 64 GB while for vFlash the capacity is 16 GB only. The write-protect switch is built onboard on the IDSDM with vFlash module.

## External storage

**Table 9. External storage device types**

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

## Optical drives

The PowerEdge R940xa supports one of the following internal optical drive options:

- DVD-ROM
- DVD+RW

## Tape drives

The PowerEdge R940xa does not support internal tape drives. However, external tape drives are supported. The supported external tape drives are as mentioned below:

- 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
- TL2000 with LTO-5, LTO-6, and LTO-7 8Gb FC 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 8Gb FC tape drives
- ML6000 with LTO-5, LTO-6, 6 Gb SAS tape drives

- ML6000 with LTO-5, LTO-6, LTO-7 8Gb FC tape drives

# PCIe subsystem

The section below contains information about the PCIe Risers and PCIe slot power.

## Topics:

- [PCIe risers](#)
- [PCIe slot power](#)

## PCIe risers

The R940xa must have Riser 1 to be installed. The list below are the riser offerings for R940xa:

**Table 10. Expansion card riser specifications**

PCIe slot	Riser	Processor connection	Height	Length	Slot width
1	X8 PCIe Riser 1	CPU 4	Full Height	Full Length	x8
2	X16 PCIe Riser 1	CPU 4	Full Height	Half Length	x16
2	X8 PCIe Riser 1	CPU 4	Full Height	Full Length	x8
3	X8 PCIe Riser 1	CPU 1	Full Height	Full Length	x8
4	X16 PCIe Riser 1	CPU 1	Full Height	Half Length	x16
4	X8 PCIe Riser 1	CPU 1	Full Height	Full Length	x8
5	X16 PCIe Riser 1	CPU 4	Full Height	Half Length	x8
6	X16 PCIe Riser 1	CPU 1	Low Profile	Half Length	x16
7	X16 PCIe Riser 2	CPU 2	Low Profile	Half Length	x16
7	X16 PCIe Riser 2	CPU 2	Low Profile	Half Length	x16
8	X8 PCIe Riser 2	CPU 3	Full Height	Full Length	x8
9	X16 PCIe Riser 2	CPU 3	Full Height	Half Length	x16
9	X8 PCIe Riser 2	CPU 3	Full Height	Full Length	x8
10	X8 PCIe Riser 2	CPU 2	Full Height	Half Length	x8
11	X16 PCIe Riser 2	CPU 2	Full Height	Half Length	x16
11	X8 PCIe Riser 2	CPU 2	Full Height	Full Length	x8
12	X16 PCIe Riser 2	CPU 3	Full Height	Half Length	x8
12	X8 PCIe Riser 2	CPU 3	Full Height	Full Length	x8

## PCIe slot power

Each Slot is designed to allow 75W for each card edge connector. In addition to this there are a total of two auxiliary PCIe power connectors available—one each for Riser1 and Riser 2. Riser 1C/2C and 1D/2D auxiliary PCIe power connectors are populated on the riser itself, whereas Riser 1A/2A/1B/2B connect to auxiliary power connectors on the system board.

**Table 11. PCIe Riser Slot-Power and Aux Power Matrix**

Slots/Riser	Riser 1		Riser 2		LP Slots	
	1C	1D	2C	2D	Slot 3(6)	Slot 4(7)
Slot 1		75W				
Slot 2	300W	75W				
Slot 3		75W				
Slot 4	300W	75W				
Slot 5	75W	75W				
Slot 6					75W	
Slot 7						75W
Slot 8				75W		
Slot 9			300W	75W		
Slot 10				75W		
Slot 11			300W	75W		
Slot 12			75W	75W		

# Power, thermal and acoustics

PowerEdge servers have an extensive collection of sensors that automatically track thermal activity, which helps regulate temperature thereby reducing server noise and power consumption.

## Topics:

- [Power consumption and energy efficiency](#)
- [Power supply units](#)
- [Thermal and acoustics](#)
- [Acoustical design](#)

## 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
<b>Power supply units (PSU) portfolio</b>	PSU portfolio includes intelligent features such as dynamically optimizing efficiency while maintaining availability and redundancy. For more information, see the <i>Power supply units</i> section.
<b>Tools for right-sizing</b>	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 <a href="http://Dell.com/calc">Dell.com/calc</a> .
<b>Power monitoring accuracy</b>	PSU power monitoring improvements include: <ul style="list-style-type: none"> <li>• Power monitoring accuracy of 1%, whereas the industry standard is 5%</li> <li>• More accurate reporting of power</li> <li>• Better performance under a power cap</li> </ul>
<b>Power capping</b>	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.
<b>Systems management</b>	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.
<b>Active power management</b>	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

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 table below shows the power supply unit options that are available for R940xa:

Wattage	Frequency	Voltage	Class	Heat dissipation
<b>750W AC</b>	50/60 Hz	100–240 V AC	Platinum	2891 BTU/hr
<b>750W Mix Mode AC</b>	50/60 Hz	100–240 V AC	Platinum	2891 BTU/hr
<b>750W Mix Mode DC (China only)</b>	50/60 Hz	240 V DC	Platinum	2891 BTU/hr
<b>1100W DC</b>	-	1-48--60Vdc/32A	N/A	4416 BTU/hr
<b>1100W</b>	50/60Hz	100-240Vac/12-6.5A	Platinum	4100 BTU/hr
<b>1100W Mix Mode/ HVDC(China and Japan Only)</b>	50/60Hz	100-240Vac/12A-6.5A	Platinum	4100 BTU/hr
N/A	200-380Vdc/6.4A-3.2A	N/A		4100 BTU/hr
<b>1600W</b>	50/60Hz	100-240Vac/10A	Platinum	6000 BTU/hr
<b>2000W</b>	50/60Hz	100-240Vac/11.5A	Platinum	7500 BTU/hr
<b>2400W</b>	50/60Hz	100-240Vac/16A	Platinum	9000 BTU/hr

**NOTE:** If a system with AC 1100 W PSUs operate at low line 100-120 Vac, then the power rating per PSU is derated to 1050 W.

**NOTE:** If a system with AC 1600 W PSUs operate at low line 100-120 Vac, then the power rating per PSU is derated to 800 W.

**NOTE:** If a system with AC 2000 W PSUs operate at low line 100-120 Vac, then the power rating per PSU is derated to 1000 W.

The PowerEdge R940xa support up to 2 AC or DC power supplies with 1+1 redundancy, auto sensing, and auto-switching capability.

If two PSUs are present during POST, a comparison is made between the wattage capacities of the PSUs. In the event that the PSU wattages don't match, the larger of the two PSU's is enabled. Also, there is a PSU mismatch warning displayed in BIOS, iDRAC, or on the System LCD.

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

Dell EMC PSUs have achieved Platinum and Titanium efficiency levels as shown in the table below:

**Table 13. PSU efficiency level**

Form factor	Efficiency target by load					
	Output	Class	10	20	50	100
Redundant 86mm	1100W AC	Platinum	89.00%	93.00%	94.50%	92.00%
	1100W DC	Gold	0.00%	88.00%	91.00%	88.00%
	1600W AC	Platinum	87.00%	90.00%	94.00%	91.00%
	2000W AC	Platinum	89.00%	93.0 0%	94.00%	91.00%
	2400W AC	Platinum	89.00%	93.0 0%	94.00%	92.00%

# 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.

## Thermal design

The thermal design of the system reflects the following:

- Optimized thermal design: The system layout is architected for optimum thermal design. System component placement and layout are designed to provide maximum airflow coverage to critical components with minimal expense of fan power.
- Comprehensive thermal management: The thermal control system regulates the system fan speeds based on feedback from system component temperature sensors, as well as for system inventory and subsystem power draw. Temperature monitoring includes components such as processors, DIMMs, chipset, system inlet air ambient, hard disk drives, NDC, and GPU.
- Open and closed loop fan speed control: Open loop fan control uses system configuration to determine fan speed based on system inlet air temperature. Closed loop thermal control uses temperature feedback to dynamically adjust fan speeds based on system activity and cooling requirements.
- User-configurable settings: With the understanding and realization that every customer has a unique set of circumstances or expectations from the system, in this generation of servers, we have introduced limited user-configurable settings in the iDRAC9 BIOS setup screen. For more information, see the Dell EMC PowerEdge system Installation and Service Manual on [Dell.com/Support/Manuals](http://Dell.com/Support/Manuals) and “Advanced Thermal Control: Optimizing across Environments and Power Goals” on [Dell.com](http://Dell.com).
- Cooling redundancy: The system allows N+1 fan redundancy, allowing continuous operation with one fan failure in the system.
- Environmental Specifications: The optimized thermal management makes the R940xa reliable under a wide range of operating environments.

## Expanded operating temperature restrictions

- The operating temperature is for a maximum altitude of 950 m for fresh air cooling
- No cold start-ups below 5°C due to hard drive constraints
- Apache Pass DIMM, NVDIMM, PCIeSSD and NVME are not supported
- GPGPU configuration are not supported
- LRDIMM > 32 GB are not supported in x4 socket configurations
- Redundant power supply units are required
- Non Dell qualified peripheral cards and /or peripheral cards greater than 25 W are not supported

## Acoustical design

The acoustical design of the PowerEdge R940xa reflect the following:

- Versatility: The R940xa save you 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 EMC'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 EMC 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).

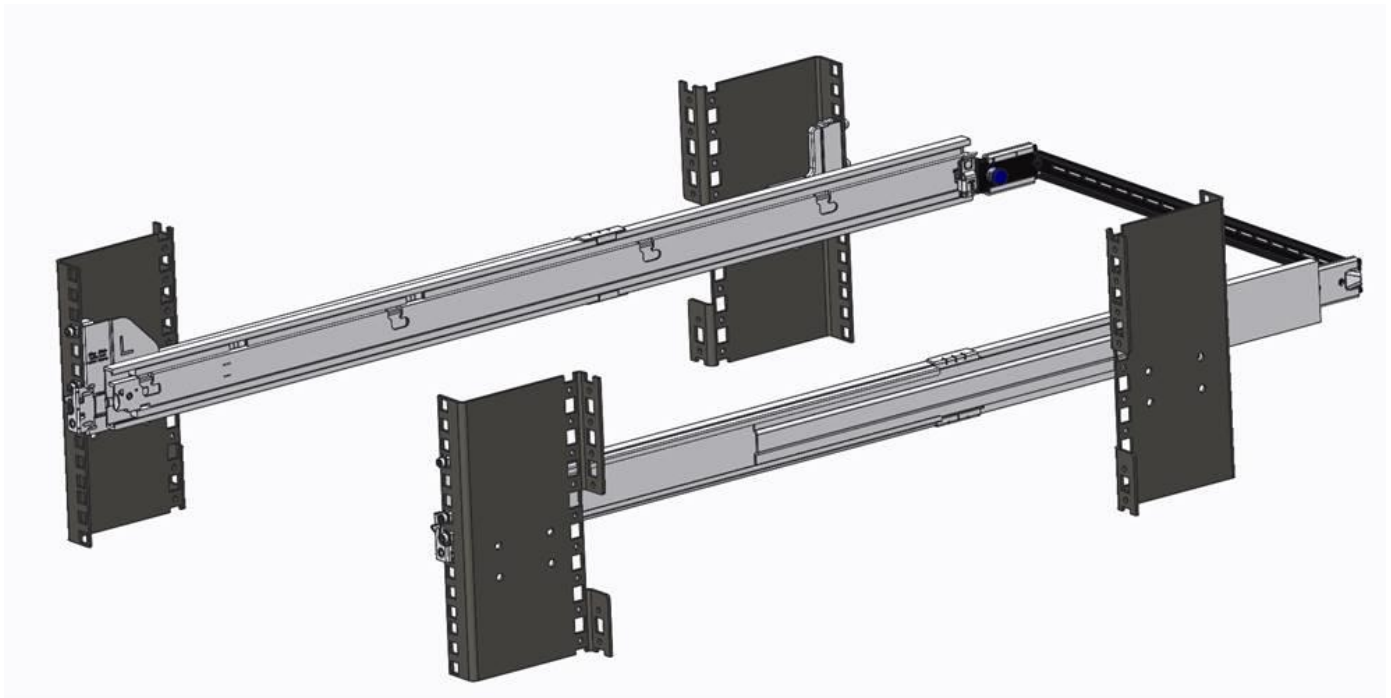
- The quantity and type of PCIe cards installed: This affects overall system acoustics. Installation of more than two PCIe cards results in an increase in overall system acoustics.
- Using a GPU card: This results in an increase in overall system acoustics.
- PCIe controller-based SSD drives: Drives 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.

## Rack rails

Stab-in/Drop-in sliding rails are offered for the R940xa. The R940xa does not have a static rail option.

### Sliding rails features summary

Sliding rails allow the system to be fully extended out of the rack for service. A strain relief bar (SRB) is provided with each rail kit to organize and secure cables exiting the back of the server. A cable management arm (CMA) is not available.



**Figure 4. Sliding rails with SRB**

#### **Stab-in/Drop-in sliding rails for 4-post racks (New for 14G systems)**

- Supports drop-in or stab-in installation of the chassis to the rails.
- Supports tool-less installation in 19" EIA-310-E compliant 4-post square hole racks, including all generations of the Dell racks.
- Supports tool-less installation in 19" EIA-310-E compliant 4-post round hole racks and threaded hole racks.
- Required for installing R940xa in a Dell EMC Titan or Titan-D rack.
- Support full extension of the system out of the rack to allow serviceability of key internal components.
- Support for strain relief bar.
- Minimum rail mounting depth without the SRB: 846 mm.
- Minimum rail mounting depth with the SRB: 903 mm.
- Square-hole rack adjustment range: 602-928 mm.
- Round-hole rack adjustment range: 602-928 mm.
- Threaded-hole rack adjustment range: 602-928 mm.

#### **Strain Relief Bar**

- Tool-less attachment to rails.
- Two depth positions to accommodate various cable bundle sizes and rack depths.
- Supports cable bundle weight and controls stresses on server connectors.
- Cables can be segregated into discrete, purpose specific bundles.

# Supported operating systems

The supports the following operating systems:

- Canonical Ubuntu LTS
- Citrix Hypervisor
- Microsoft Windows Server LTSC with Hyper-V
- Oracle Linux
- Red Hat Enterprise Linux
- SUSE Linux Enterprise Server
- VMware ESXi

For more information on the specific versions and additions, visit [Dell.com/OSsupport](https://Dell.com/OSsupport).

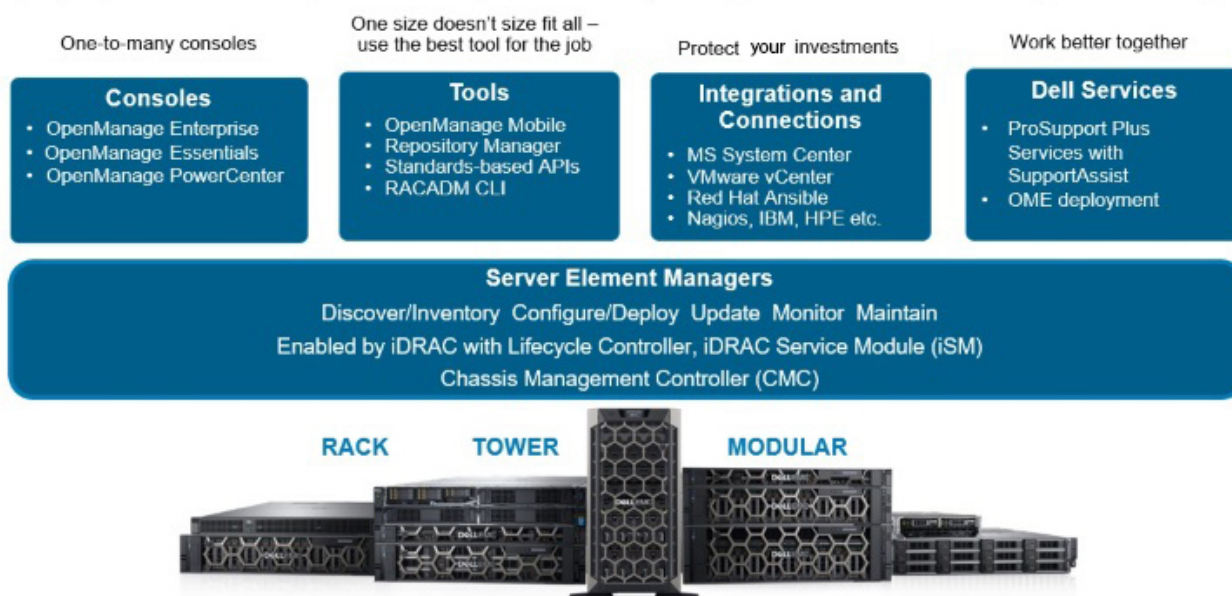
# Dell EMC OpenManage systems management

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 5. Server lifecycle management operations**

### Topics:

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

## 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 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 R940xa supports the following iDRAC licenses – Basic (default), Express (upgrade) and Enterprise (upgrade).

**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	<b>Yes</b>	Yes	<b>Yes</b>	Yes	<b>Yes</b>	Yes	<b>Yes</b>
DHCP with Zero Touch	No	No	No	No	No	No	No	<b>Yes</b>
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
<b>Connection View</b>	No	<b>Yes</b>	No	<b>Yes</b>	No	<b>Yes</b>	No	<b>Yes</b>
<b>NFS v4</b>	No	<b>Yes</b>	No	<b>Yes</b>	No	<b>Yes</b>	No	<b>Yes</b>
<b>NTLM v1 and NTLM v2</b>	No	<b>Yes</b>	No	<b>Yes</b>	No	<b>Yes</b>	No	<b>Yes</b>
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
<b>Secure UEFI boot-certificate management</b>	No	<b>Yes</b>	No	<b>Yes</b>	No	<b>Yes</b>	No	<b>Yes</b>
<b>Lock down mode</b>	No		No	No	No	No	No	<b>Yes</b>
<b>Unique iDRAC default password</b>	No	<b>Yes</b>	No	<b>Yes</b>	No	<b>Yes</b>	No	<b>Yes</b>
<b>Customizable Security Policy Banner-login page</b>	No	<b>Yes</b>	No	<b>Yes</b>	No	<b>Yes</b>	No	<b>Yes</b>
<b>Quick Sync 2.0-optional auth for read operations</b>	No	<b>Yes</b>	No	<b>Yes</b>	No	<b>Yes</b>	No	<b>Yes</b>
<b>Quick Sync 2.0-add mobile device number to LCL</b>	No	<b>Yes</b>	No	<b>Yes</b>	No	<b>Yes</b>	No	<b>Yes</b>
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
<b>Group manager</b>	No	No	No	No	No	No	No	<b>Yes</b>
<b>HTTP/HTTPS support along with NFS/CIFS</b>	No	<b>Yes</b>	No	<b>Yes</b>	No	<b>Yes</b>	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
<b>Alerts for excessive SSD wear</b>	No	<b>Yes</b>	No	<b>Yes</b>	No	<b>Yes</b>	No	<b>Yes</b>
<b>Customizable settings for Exhaust Temperature</b>	No	<b>Yes</b>	No	<b>Yes</b>	No	<b>Yes</b>	No	<b>Yes</b>
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
<b>Improved PSU firmware updates</b>	No	<b>Yes</b>	No	<b>Yes</b>	No	<b>Yes</b>	No	<b>Yes</b>
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
<b>Server Configuration Profile in GUI</b>	No	<b>Yes</b>	No	<b>Yes</b>	No	<b>Yes</b>	No	<b>Yes</b>
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
<b>Easy Restore Auto Timeout</b>	No	<b>Yes</b>	No	<b>Yes</b>	No	<b>Yes</b>	No	<b>Yes</b>
<b>LED health status indicator</b>	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
<b>LCD screen—iDRAC9 requires optional bezel</b>	<b>Yes</b>	<b>Yes</b>	<b>Yes</b>	<b>Yes</b>	N/A	N/A	<b>Yes</b>	<b>Yes</b>
Quick Sync—require NFC bezel (13 G only)	Yes	No	Yes	No	N/A	No	Yes	No
<b>Quick Sync 2.0—requires BLE/WiFi hardware</b>	No	<b>Yes</b>	No	<b>Yes</b>	No	N/A	No	<b>Yes</b>
iDRAC Direct—front USB mgmt port	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
<b>iDRAC Service Module (iSM) embedded</b>	No	<b>Yes</b>	No	<b>Yes</b>	No	<b>Yes</b>	No	<b>Yes</b>
<b>iSM to inband alert forwarding to consoles</b>	No	<b>Yes</b>	No	<b>Yes</b>	No	<b>Yes</b>	No	<b>Yes</b>
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								
<b>iDRAC -Faster processor, more memory</b>	No	<b>Yes</b>	No	<b>Yes</b>	No	<b>Yes</b>	No	<b>Yes</b>
<b>GUI rendered in HTML5</b>	No	<b>Yes</b>	No	<b>Yes</b>	No	<b>Yes</b>	No	<b>Yes</b>
<b>Add BIOS configuration to iDRAC GUI</b>	No	<b>Yes</b>	No	<b>Yes</b>	No	<b>Yes</b>	No	<b>Yes</b>
<b>iDRAC support for SW RAID licensing</b>	No	<b>Yes</b>	No	<b>Yes</b>	No	<b>Yes</b>	No	<b>Yes</b>

## 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

### 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](https://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](https://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](https://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](https://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](https://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](https://www.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](https://delltechcenter.com/iDRAC) and [delltechcenter.com/LC](https://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](http://delltechcenter.com/omivv)

**i** **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](http://Dell.com/openmanage).

## Appendix A. Additional specifications

This section contains information about additional specifications for the PowerEdge R940xa.

### Topics:

- [System dimensions](#)
- [Environmental specifications](#)
- [Video specifications](#)
- [USB peripherals](#)

## System dimensions

This section describes the physical dimensions of the system.

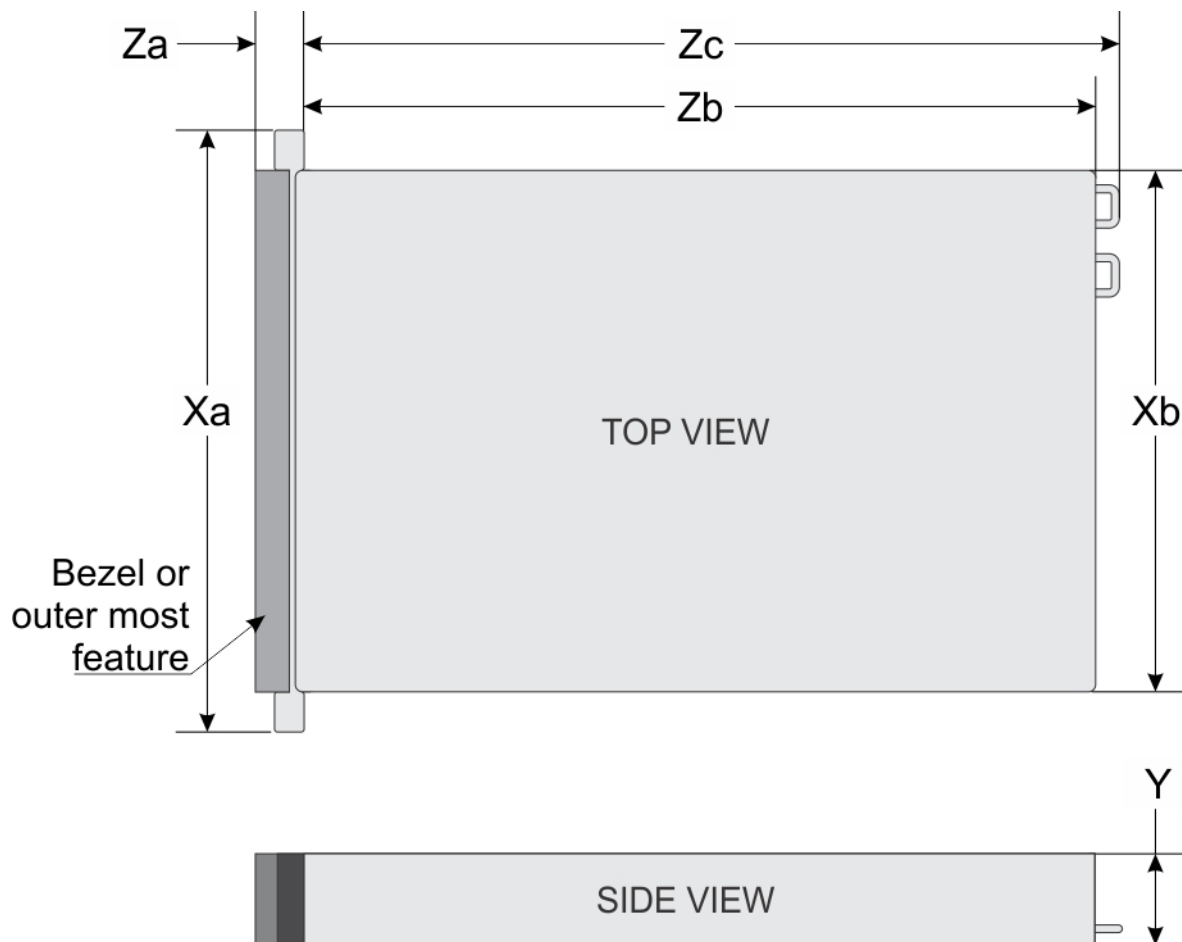


Figure 6. System dimensions of PowerEdge R940xa system

**Table 15. Dimensions**

System	Xa	Xb		Y	Za		Zb	Zc
		Upper	Bottom		(with bezel)	(without bezel)		
PowerEdge R940xa	482.0 mm (18.98 inches)	441.16 mm (17.37 inches)	422.5 mm (16.64 inches)	174.3 mm (6.87 inches)	35.84 mm (1.41 inches)	23.9 mm (0.94 inches)	812 mm (31.96 inches)	842 mm (33.14 inches)

## Environmental specifications

See Dell EMC PowerEdge R940xa installation service manuals on [Dell.com/Support/Manuals](http://Dell.com/Support/Manuals) for detailed environmental specifications.

## Video specifications

The PowerEdge R940xa system supports integrated Matrox G200eW3 graphics controller with 16 MB of video frame buffer.

**Table 16. Supported video resolution options**

Resolution	Refresh Rate	Color depth (bits)	Horizontal Freq.	Pixel Clock	Rear Panel	Front Panel	DVO DisplayPort
<b>1024 x 768</b>	60 Hz	8, 16, 32	48.4 kHz	65.0 MHz	Yes	Yes	Yes*
<b>1280 x 800</b>	60 Hz	8, 16, 32	49.7 kHz	83.5 MHz	Yes	Yes	Yes*
<b>1280 x 1024</b>	60 Hz	8, 16, 32	64.0 kHz	108.0 MHz	Yes	TBD	Yes*
<b>1360 x 768</b>	60 Hz	8, 16, 32	47.71 kHz	85.5 MHz	Yes	Yes	Yes*
<b>1440 x 900</b>	60 Hz	8, 16, 32	55.9 kHz	106.5 MHz	Yes	TBD	Yes*
<b>1600 x 900</b>	60 Hz (RB)	8, 16, 32	55.54 kHz	97.75 MHz	Yes	Yes	Yes*
<b>1600 x 1200</b>	60 Hz	8, 16, 32	75.0 kHz	162.0 MHz	TBD	TBD	Yes*
<b>1680 x 1050</b>	60 Hz (RB)	8, 16, 32	64.7 kHz	119.0 MHz	Yes	TBD	Yes*
<b>1920 x 1080</b>	60 Hz	8, 16, 32	67.158 kHz	173.0 MHz	TBD	No	No
<b>1920 x 1200</b>	60 Hz	8, 16, 32	74.556 kHz	193.25 MHz	TBD	No	No

**NOTE:** 1920 x 1080 and 1920 x 1200 resolutions are only supported in reduced blanking mode.

## USB peripherals

Front, rear, and internal USB ports are included in the base system for PowerEdge R940xa. Rear and internal ports support up to USB 3.0, while front ports support USB 2.0. The PowerEdge R940xa offer an upsell option that adds an additional USB 3.0 port to the front of the chassis. The optional USB module cable connects to the internal USB port on the planar and the default internal moves closer to the front of the chassis



## Appendix B. Standards compliance

**Table 17. Industry standard documents**

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

## Appendix C. Additional resources

**Table 18. 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"> <li>• Chassis features</li> <li>• System Setup program</li> <li>• System messages</li> <li>• System codes and indicators</li> <li>• System BIOS</li> <li>• Remove and replace procedures</li> <li>• Troubleshooting</li> <li>• Diagnostics</li> <li>• Jumpers and connectors</li> </ul>	<a href="https://Dell.com/Support/Manuals">Dell.com/Support/Manuals</a>
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"> <li>• Initial setup steps</li> <li>• Key system features</li> <li>• Technical specifications</li> </ul>	<a href="https://Dell.com/Support/Manuals">Dell.com/Support/Manuals</a>
Rack Installation Instructions	This document ships with the rack kits, and provides instructions for installing a server in a rack.	<a href="https://Dell.com/Support/Manuals">Dell.com/Support/Manuals</a>
Information Update	This document ships with the system, is also available in PDF format online, and provides information on system updates.	<a href="https://Dell.com/Support/Manuals">Dell.com/Support/Manuals</a>
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.	<a href="https://Dell.com/calc">Dell.com/calc</a>

## 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
Post-deployment	Project documentation with knowledge transfer		•	•
	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 7. 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 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 of your servers by experienced technicians who know Dell EMC servers inside and out.

## Residency Services

Residency Services helps customers transition to new capabilities quickly with the assistance of 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](http://Dell.com).

## Remote Consulting Services

When you are in the final stages of your PowerEdge server implementation, you can rely on Dell 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 gets 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
<b>ProSupport Plus</b>	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.
<b>ProSupport</b>	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.
<b>ProSupport One for Data Center</b>	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 8. 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
- 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 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 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 9. 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 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 10. SupportAssist model

Get started at [Dell.com/SupportAssist](http://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](http://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'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](http://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.