

# Dell PowerEdge C6600 and C6615

## 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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# System overview

The PowerEdge C6615 is Dell's latest 1-socket, 1U compute sled. It is designed to run complex workloads using highly scalable memory and capacity, I/O bandwidth, and network options.

The system features:

- One AMD EPYC™ processor with up to 64 cores
- Up to 6 DDR5 DIMM slots
- 2 x PCIe Gen5 enabled expansion slots
- Up to 16 x 2.5-inch SATA/SAS/NVMe hot-swappable hard drives or
- Up to 16 x 2.5-inch SATA/NVMe on Universal Backplane configuration
- Up to 16 x 2.5-inch on All NVMe backplane chassis
- Up to 8 x E3.s on NVMe Gen5 Backplane chassis
- Network interface technologies to cover Network Interface Card (NIC) and one x16 OCP 3.0 slot

The PowerEdge C6615 is a general-purpose platform capable of handling demanding workloads and applications, such as data warehouses, eCommerce, databases, and high-performance computing (HPC).

**⚠ WARNING: It is crucial that customers must use the Enterprise Infrastructure Planning Tool (EIPT) to determine the correct power supply size before making an order. See the EIPT webpage [here](#) for more information.**

## Topics:

- [Key workloads](#)
- [New technologies](#)

## Key workloads

The versatile C6615 is designed to address data-intensive, diverse workloads including:

- Highly dense and scalable
- Simplified Management
- Flexible offerings to suite workloads
- Robust platform security
- Improved Power

## New technologies

**Table 1. New technologies**

Technology	Detailed Description
AMD EPYC processor with up to	Core count: Up to 64 cores
	Maximum TDP: 225 W
4800 MT/s DDR5 Memory	6 x DDR5 channels per socket, 1 DIMM per channel (1DPC)
	Up to 4800 MT/s (configuration dependent)
	RDIMMs up to 576 GB max supported
OCP 3.0 card	Supports standard OCP 3.0 connector with PCIe x16 bus Gen5
M.2 BOSS card	Supports M.2 SSD solution with SATA/PCIe interface. Form factor: 22 x 80 mm

**Table 1. New technologies (continued)**

<b>Technology</b>	<b>Detailed Description</b>
NVMe hard drives	Supports two types of hard drive backplane chassis: <ul style="list-style-type: none"><li>● Up to 16 x 2.5-inch SAS/SATA hard drive backplane</li><li>● Up to 16 x 2.5-inch SATA/NVMe on Universal Backplane</li><li>● Up to 16 x 2.5-inch NVMe backplane</li><li>● Up to 8 x E3.s NVMe SSDs hard drive backplane</li></ul>
iDRAC9 w/ Lifecycle Controller	Each AMC includes iDRAC9 consistent with 16G behaviors. The embedded systems management solution for Dell servers features hardware and firmware inventory and alerting, in-depth memory alerting, faster performance, a dedicated gigabit port and many more features.

# System features and generational comparison

**Table 2. PowerEdge system comparison**

Feature	C6615	C6525
CPU	One AMD EPYC processor with up to 64 cores	2 x AMD EPYC processor SP3 : Rome and Milan per node (support for up to 2 x 280 W processor)
Memory	DIMM Speed: <ul style="list-style-type: none"> <li>Up to 4800 MT/s</li> </ul> Memory Type: <ul style="list-style-type: none"> <li>RDIMM</li> </ul> Memory module slots: <ul style="list-style-type: none"> <li>6 DDR5 DIMM slots</li> <li>Supports registered ECC DDR5 DIMM slots only</li> </ul> Maximum RAM: <ul style="list-style-type: none"> <li>RDIMM 576 GB</li> </ul>	DDR4: Up to 16 x RDIMMs, LRDIMMs NVDIMM: No
Disk bays	The C6600 chassis supports up to: <ul style="list-style-type: none"> <li>16 x 2.5-in SAS/SATA (HDD/SSD) drives.</li> <li>16 x 2.5-inch SATA/NVMe drives on Universal backplane configuration</li> <li>Up to 16 x 2.5-inch All NVMe backplane</li> <li>Up to 8 x E3.s NVMe SSDs hard drive backplane</li> </ul>	Front: 24 x 2.5-inch (4 x 6) or 12 x 3.5-inch options. 14G carriers Internal: Micro SD slot; 240 GB and 480 GB M.2 boot device (dual M.2 device post RTS)
Storage controllers	<ul style="list-style-type: none"> <li>Internal PERC: H755, H355, HBA355i</li> <li>Internal Boot: (NVMe BOSS-N1): HWRAID 1, 2 x M.2 SSDs or uSD card</li> <li>Software RAID: S160</li> </ul>	HW RAID: PERC 10.4 port for H745, H345, HBA345, HBA355i) Chipset SATA/SW RAID: Yes
PCIe SSD	N/A	Yes (on PCIe riser)
PCIe slots	Up to 2 x PCIe Gen5 Half-Height/Half-Length slots Slot 1: PCIe Gen5 x16 Riser 1A on CPU 1 Slot 2: PCIe Gen5 x16 Riser 2C on CPU 1	<ul style="list-style-type: none"> <li>Slot 1 : PCIe Gen4 x 16 with Riser 1A. (CPU1)</li> <li>PCIe Gen4 x16 with Riser 1B support SNAPI. (CPU1: x8/ CPU2: x8)</li> <li>Slot 2 : PCIe Gen4 x 16 with Riser 2A. (CPU2)</li> <li>Slot 3 : OCP3.0 SFF, PCIe Gen4 x16. (CPU1)</li> <li>Slot 4 : M.2, PCIe Gen4 x16. (CPU1/2)</li> </ul>
MicroSD	Yes (on PCIe riser)	Yes (on PCIe riser)
Embedded NIC	1 GbE x 1 LOM card	Single port 1 GbE LOM option
Networking options	1 x OCP 3.0 x16 Gen5	OCP 3.0 SFF x16 slot
Ports	Rear ports: <ul style="list-style-type: none"> <li>1 x USB 3.0</li> <li>1 x Mini-DisplayPort</li> <li>1 x Dedicated iDRAC management (RJ45) port</li> </ul>	1 USB3 1 USB2 (internal, default non-pop, need Dell confirm if remove from here)
GPU options	N/A	75W low profile PCIe x1
Rack height	2U	2U

**Table 2. PowerEdge system comparison (continued)**

Feature	C6615	C6525
Power supplies	<ul style="list-style-type: none"> <li>● 1800 W Titanium AC/200 - 240 V autoranging</li> <li>● 1800 W DC/240 V</li> <li>● 2400 W Platinum AC/100 - 240 V</li> <li>● 2400 W DC/240 V</li> <li>● 2800 W Titanium AC/200 - 240 V autoranging</li> <li>● 2800 W DC/240 V</li> <li>● 3200 W AC/277 V</li> <li>● 3200 W DC/336 V</li> </ul>	Hot swap drives, PSUs (support for 2 x 1600 W, 2000 W, 2400 W and 2000 W-240 V DC, 2600 W PSUs)
System management	BMC (includes virtual console /media), and iDRAC Basic, Express, Enterprise and Datacenter	iDRAC9 with BMC+ (includes virtual console/media), and Enterprise options
iDRAC direct	1 x Micro-AB USB 2.0-compliant port on the rear of the system	MicroUSB Type AB
Security	<ul style="list-style-type: none"> <li>● AMD Secure Encrypted Virtualization (SEV)</li> <li>● AMD Secure Memory Encryption (SME)</li> <li>● Cryptographically signed firmware</li> <li>● Data at Rest Encryption (SEDs with local or external key mgmt)</li> <li>● Secure Boot</li> <li>● Secured Component Verification (Hardware integrity check)</li> <li>● Secure Erase</li> <li>● Silicon Root of Trust</li> <li>● System Lockdown (requires iDRAC9 Enterprise or Datacenter)</li> <li>● TPM 2.0 FIPS, CC-TCG certified, TPM 2.0 China NationZ</li> </ul>	<ul style="list-style-type: none"> <li>● AMD Secure Encrypted Virtualization (SEV)</li> <li>● AMD Secure Memory Encryption (SME)</li> <li>● Cryptographically signed firmware</li> <li>● Data at Rest Encryption (SEDs with local or external key mgmt)</li> <li>● Secure Boot</li> <li>● Secured Component Verification (Hardware integrity check)</li> <li>● Secure Erase</li> <li>● Silicon Root of Trust</li> <li>● System Lockdown (requires iDRAC9 Enterprise or Datacenter)</li> <li>● TPM 2.0 FIPS, CC-TCG certified, TPM 2.0 China NationZ</li> </ul>
Availability	<ul style="list-style-type: none"> <li>● Cluster support</li> <li>● ECC memory, RDIMM</li> <li>● Hot-plug hard drives</li> <li>● Dual power supply</li> </ul>	<ul style="list-style-type: none"> <li>● Hot swap drives</li> <li>● Hot swap redundant cooling</li> </ul> <p> <b>NOTE:</b> Fan modules are not hot swappable</p> <ul style="list-style-type: none"> <li>● Hot swap redundant power supplies - for redundant configs</li> <li>● Micro SD card</li> <li>● BOSS-S1V5 (DPN: WMWJW)</li> </ul>

# Chassis views and features

## Topics:

- Chassis views

## Chassis views

### Front view of the system

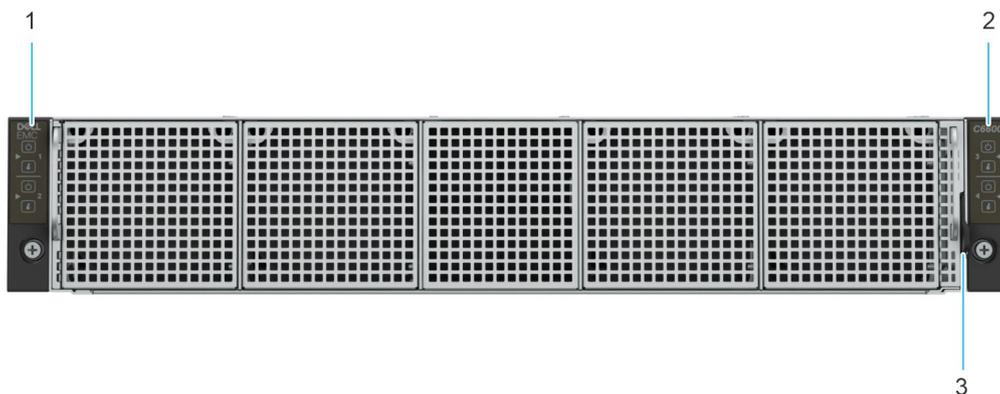


Figure 1. Chassis front view (diskless configuration)

1. Left control panel
2. Right control panel
3. Information tag

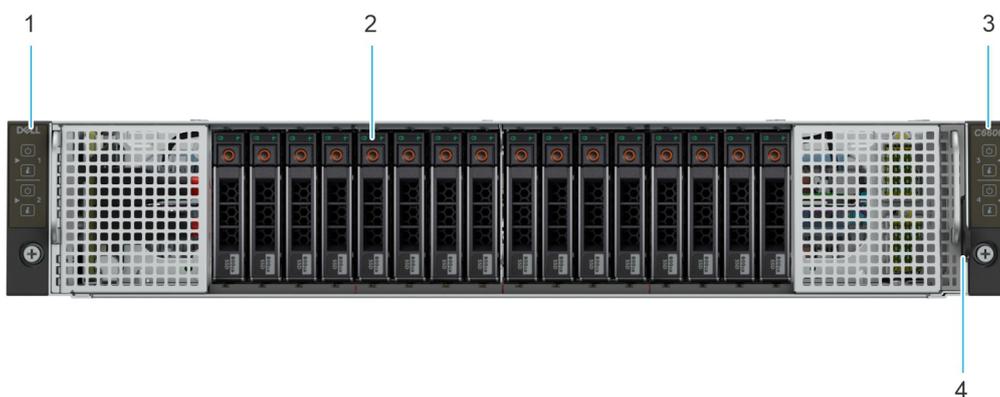
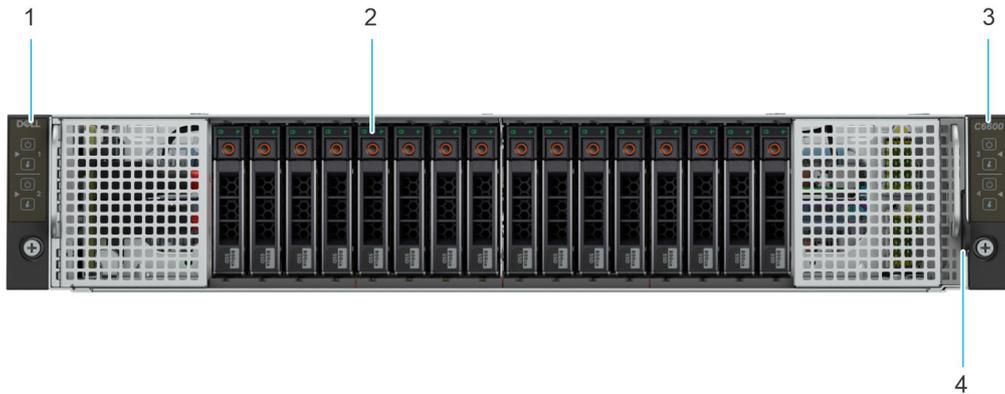


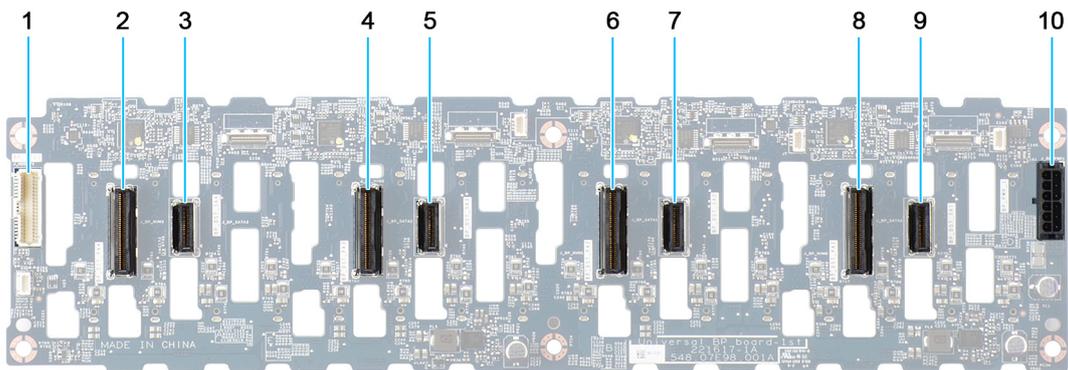
Figure 2. Chassis front view (16 x 2.5-inch SAS/SATA drive configuration)

1. Left control panel
2. Drive bay
3. Right control panel
4. Information tag



**Figure 3. Chassis front view (16 x 2.5-inch SATA/NVMe on Universal Backplane configuration)**

1. Left control panel
2. Drive bay
3. Right control panel
4. Information tag



**Figure 4. 16 x 2.5-inch drive Universal Backplane**

- |  |  |
|--|--|
| 1. BP_SIG_1 (Backplane signal cable to system board) | 2. BP_DST_PA4                            |
| 3. BP_DST_SA4  | 4. BP_DST_PA3                            |
| 5. BP_DST_SA3  | 6. BP_DST_PA2                            |
| 7. BP_DST_SA2  | 8. BP_DST_PA1                            |
| 9. BP_DST_SA1  | 10. BP_PWR_1 (Backplane Power connector) |

## System configurations - rear view for PowerEdge C6615

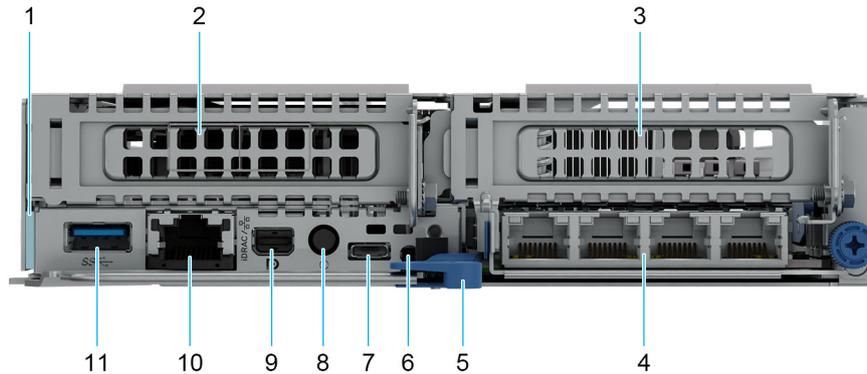


Figure 5. Rear view of the system (air cooling configuration)

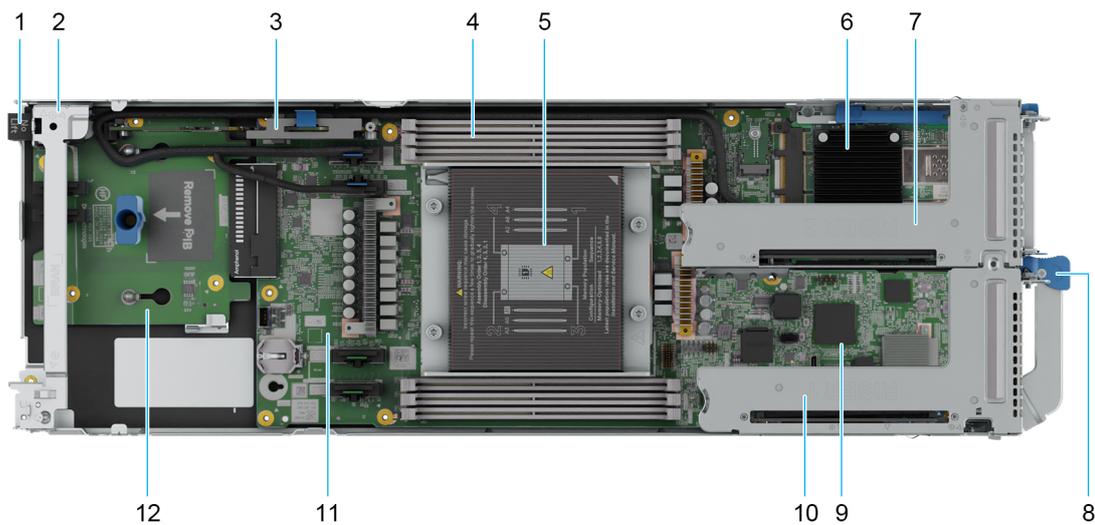
Table 3. Rear view of the system (air cooling configuration)

Item	Ports, panels, or slots	Icon	Description
1	Express Service Tag	N/A	The Express Service Tag is a slide-out label panel that contains system information such as Service Tag, NIC, MAC address, and so on. If you have opted for the secure default access to iDRAC, the Information tag will also contain the iDRAC secure default password.
2	PCIe expansion card riser 1 (R1A)	N/A	The expansion card riser enables you to connect PCI Express expansion cards.
3	PCIe expansion card riser 2 (R2C)	N/A	The expansion card riser enables you to connect PCI Express expansion cards
4	OCP 3.0	N/A	The OCP NIC card supports OCP 3.0. The NIC ports are integrated on the OCP card which is connected to the system board.
5	Lock release for sled handle	N/A	Enables you to release and then pivot the handle to remove the sled from the enclosure.
6	UID LED	N/A	When pressed, the system ID LED in the back panel blinks until either the front or rear button is pressed again. Press the button to toggle between on or off mode
7	iDRAC Direct port (Micro AB-USB)		The iDRAC Direct (Micro-AB USB) port enables you to access the iDRAC direct Micro-AB USB features. For more information, see the Integrated Dell Remote Access Controller User's Guide at <a href="#">PowerEdge Manuals</a> .
8	Sled power button	N/A	Enables you to power on the sled while accessing it from the rear.

**Table 3. Rear view of the system (air cooling configuration) (continued)**

Item	Ports, panels, or slots	Icon	Description
9	Mini-DisplayPort		Enables you to connect a display device to the system.
10	iDRAC or NIC or RJ45 port		The NIC ports that are integrated on the LOM card provide network connectivity which is connected to the system board.  or Enables you to remotely access iDRAC. For more information, see the Integrated Dell Remote Access Controller User's Guide at <a href="#">PowerEdge Manuals</a> .
11	USB 3.0 port		The USB ports are 9-pin, 3.0-compliant. These ports enable you to connect USB devices to the system.

## System configurations - inside view for PowerEdge C6615



**Figure 6. Inside view of the PowerEdge C6615 sled (air cooling configuration)**

1. Power connector
2. Support bracket
3. BOSS-N1: HWRAID 1, 2 x M.2 SSDs
4. Memory module sockets
5. Processor 1 and heat sink module
6. OCP 3.0 card
7. Expansion card riser (R2C)
8. Lock release for sled handle
9. LOM
10. Expansion card riser (R1A)
11. System board
12. Power Interposer Board (PIB)

# Processor

## Topics:

- [Processor features](#)
- [Power states](#)

## Processor features

The following lists the features and functions AMD CPU Siena SP6 processor offerings:

- New x86 “Zen4c” Cores
- 6x DDR5 memory channels with ECC
- 96 IO lanes capable of up to PCIe Gen 5 speeds for PCIe
- Highly integrated SOC solution – NO Chipset
- Next generation hardware encrypted security features and other security enhancements
- High-performance Integrated Server Controller Hub (SCH)
- Next Gen Enterprise class RAS
- Trusted hardware validated boot and Hardware memory encryption support

## Supported processors

**Table 4. Supported processors**

Processor model number	Base Frequency in GHz	Core/Threads	Default TDP in W	cTDP in W	L3 Cahce in MB	Max DDR frequency (1 DPC) MT/s
8324P	2.65	32/64	180 W	155-225 W	64	4800
8534P	2.3	64/128	200 W	155-225 W	128	4800

## Power states

This section provides power states information for C6615.

### Power states (S-states)

The table below lists all OS-initiated system Power states.

**Table 5. Power states (S-states)**

System state	Description
S0, C0	System is fully on. processor cores are full on, all system clocks active.
S0, C1/C1E	
S0, C6/C7	
	System is fully on, but processor cores are in Auto Halt. All system clocks active.

**Table 5. Power states (S-states) (continued)**

System state	Description
	System is fully on, but processor cores are in Deep Power Down, all systems clocks are active.
S5 (Shutdown state)	The machine has no memory state and is not performing any computational tasks. Restarting from S5 requires rebooting the system.

## CPU core states (C-states)

The table below lists all CPU core states.

**Table 6. CPU core states (C-states)**

Core state	Description
C0	Normal operation. Code is being executed.
C1/C1E	Low power state when all threads within a core execute a HLT or MWAIT instruction.
C6	Power off, voltage is reduced to 0 V

## Package C-states

All the above listed C-state also have package C-states (that is, PC0, PC1E, etc.).

The concept of package C-states relates to the state of all the shared resources on the socket, as a function of the individual C-states that the cores enter. When all cores enter one of the above Core C-states, package C-states are invoked by BIOS.

## Memory Power States

CKE is the basic DRAM power-save features. The CKE pin is an input to the DRAMs used to enter and exit power-down modes.

- Fast CKE: Power Down- Each rank can be powered down by the memory controller if no traffic is directed to that rank within a specified timeout. The timeout is configurable per channel, CKE\_LL0.cke\_idle\_timer.
- Opportunistic Self-Refresh- All channels can be placed in self-refresh. Individual channels cannot be placed in self-refresh mode. Power is removed from the processor memory controller but maintained to the DRAMs.

## PCIe states

Supports L0, L1, and L3 link states (L0s, L0p, and L2 are not supported).

**Table 7. PCIe link states**

System state	Description
L0	Link on
L1	Low power state. Active State Power Management (ASPM)
L3	Ability to generate PME-TO message by writing to bit5 in the MISCCTRLSTS register

## Performance (P-states)

While a device or processor operates, it can be in one of several power-performance states. These states are implementation-dependent, but P0 is always the highest-performance state, with P1 to Pn being successively lower-performance states, up to an implementation-specific limit of n no greater than 16.

- P-states have become known as Speed Step in Intel processors
- P0 max power and frequency
- P1 less than P0, voltage/frequency scaled
- Pn less than P(n-1), voltage/frequency scaled

# Memory subsystem

## Topics:

- Supported memory

## Supported memory

**Table 8. Memory technology comparison**

Feature	PowerEdge Model (DDR5)	Previous Model (DDR4)
DIMM type	RDIMM	RDIMM LRDIMM
Transfer speed	4800 MT/s	3200 MT/s
Voltage	1.1 V	1.2 V

The following table lists the supported DIMMs for the C6615.

**Table 9. Supported DIMMs**

DIMM Speed (MT/s)	DIMM Type	DIMM Capacity (GB)	Ranks per DIMM
4800	RDIMM	16	1
4800	RDIMM	32	2
4800	RDIMM	64	2
4800	RDIMM	96	2

# Storage

## Topics:

- [Storage controllers](#)

## Storage controllers

Dell's RAID controller options offer performance improvements, including the fPERC solution. fPERC 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.

16G Products have a wider offering of Internal Storage controllers compared to previous server generations. In order to reduce complexity and provide manageable permutations that still meet customer needs, the C6615 will support PERC11/12 version.

The following table shows the controllers used in PERC11/12 family:

**Table 10. PERC Series controller offerings**

Controller type	Description
Internal controllers	PERC H755, PERC H355
Internal boot	Boot Optimized Storage Subsystem (BOSS-N1): HWRAID 2 X M.2 SSDs, uSD card
SAS Hot Bus Adapters (HBA)	HBA355i
Software RAID	S160

**NOTE:** For more information on the features of the Dell PowerEdge RAID controllers (PERC), Software RAID controllers, or BOSS card, and on deploying the cards, see the storage controller documentation at [Storage Control Manuals](#).

# Networking

## Topics:

- [Overview](#)
- [OCP 3.0 support](#)

## Overview

PowerEdge offers a wide variety of options to get information moving to and from our servers. Industry best technologies are chosen, and systems management features are added by our partners to firmware to tie in with iDRAC. These adapters are rigorously validated for worry-free, fully supported use in Dell servers.

## OCP 3.0 support

**Table 11. OCP 3.0 feature list**

Feature	OCP 3.0
Form factor	SFF
PCIe Gen	Gen5
Max PCIe width	x16
Max no.of ports	4
Port type	BT/SFP/SFP+/SFP28/SFP56
Max port speed	100 GbE
NC-SI	Yes
SNAPI	Yes
WoL	Yes
Power consumption	15 W - 80 W

## Supported OCP cards

**Table 12. OCP 3.0 NIC supported list**

Form factor	Type	Speed (GbE)	Port type	Vendor
OCP 3.0	NIC	25	SFP28	Broadcom
OCP 3.0	NIC	25	SFP28	Broadcom

## OCP NIC 3.0 vs. rack Network Daughter Card comparisons

Table 13. OCP 3.0, 2.0, and rNDC NIC comparison

Form Factor	Dell rNDC	OCP 2.0 (LOM Mezz)	OCP 3.0	Notes
PCIe Gen	Gen 3	Gen 3	Gen 4	Supported OCP3 are SFF (small form factor)
Max PCIe Lanes	x8	Up to x16	Up to x16	See server slot priority matrix
Shared LOM	Yes	Yes	Yes	This is iDRAC port redirect
Aux Power	Yes	Yes	Yes	Used for Shared LOM

### OCP form factors

The process of installing the OCP card in C6615 system:

1. Open the blue latch on the system board.
2. Slide the OCP card into the slot in the system.
3. Push until the OCP card is fully connected to the connector on the system board.
4. Close the latch to lock the OCP card to the system.

The process of removing the OCP card in C6615 system:

1. Open the blue latch to unlock the OCP card.
2. Push the OCP card towards the rear end of the system to disconnect from the connector on the system board.
3. Slide the OCP card out of the slot on the system

# PCIe subsystem

## Topics:

- PCIe risers

## PCIe risers

Shown below are the riser offerings for the platform.

**Table 14. Supported riser offerings**

Config	RSR configuration	Number of CPUs	PERC type supported	Rear storage possible	x16 CPU1 Slot 1 Low Profile	x16 CPU1 Slot 2 Low Profile
0	NO RSR	CPU1	NA	No	N	N
1	R1A	CPU1	Adapter PERC	No	Y	N
2	R1A + R2C	CPU1	Adapter PERC	No	Y	Y

**Table 15. Expansion cards Slot Mapping**

Configuration	Riser	Slot	Form factor	Controlling CPU	Slot's electrical bandwidth/Physical connector	Power
Config1. 1 x LP (Gen5)	R1A	1	Low profile	CPU1	PCIe Gen5 x16 (x16 connector)	75 W
Low profile PCIe slot 2	R1A	1	Low profile	CPU1	PCIe Gen5 x16 (x16 connector)	75 W
	R2C	2	Low profile	CPU1	PCIe Gen5 x16 (x16 connector)	75 W

## Riser 1A

### Major components

- Standard PCIe X16 connector, PCIe X16 source from CPU1.
- GL3224-OYI04 USB3.0 SD 3.0 Single LUN Memory Card Reader Controller. Supported MicroSD card capacities at RTS – 16G, 32G and 64G.
- API – the core of the Riser SAPI consists of the Silicon Labs EFM8BB1 microcontroller, and the MCU will periodically transmits pertinent riser data over a 1-wire UART to the host system (CPLD & BIOS).

The payload between riser MCU and host system includes two information: One is fixed riser information which is determined using a table structure that can be read through two MCU's ADC pin. Meanwhile, it is pre-programmed into the MCU code base. (e.g. riser type, slot width, slot source lanes, etc.) The other is dynamic riser information which can be read in through the MCU's GPIO pins and serialized down to the host system. (e.g. adapter presence detect, WAKE#, etc.)

### GL3224 and EFM8BB1 features

- Support USB Mass Storage Class Bulk-Only Transport (BOT)

- Super Speed USB/USB 2.0 transceiver macro (UTM), Serial Interface Engine (SIE), and embedded Power-On Reset (POR)
- Support Secure Digital v1.0 / v1.1 / v2.0/ SDHC / SDXC (Capacity up to 2TB)
- Support Serial Peripheral Interface (SPI) for firmware upgrade to SPI Flash Memory via USB interface

## Riser 1A dimension

Board size: 126.30 x 31.42 mm, 8 Layers

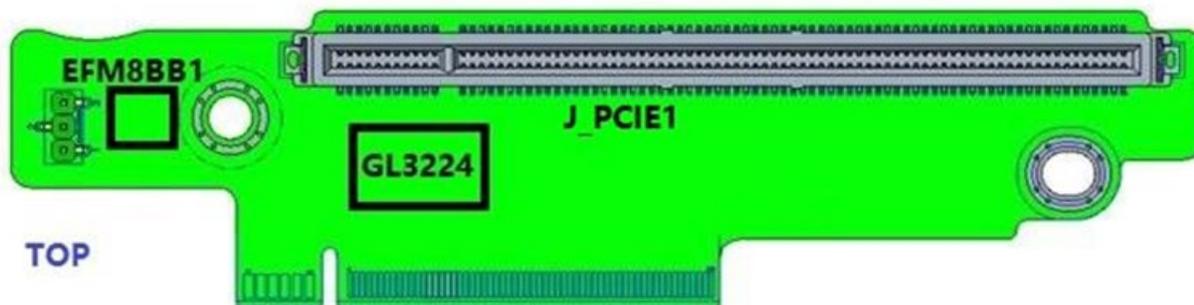


Figure 7. Riser 1A top view

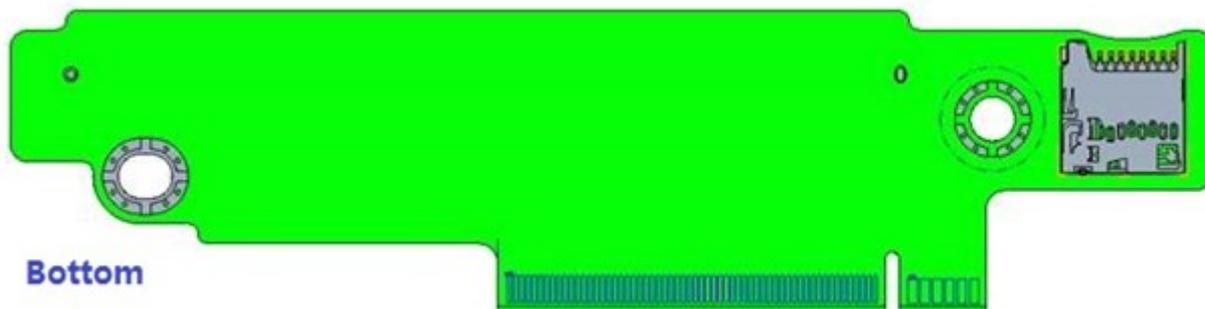


Figure 8. Riser 1A bottom view

## Riser 2C

### Major components

- Standard PCIe X16 connector, PCIe X16 source from CPU1.
- SAPI System API – the core of the Riser SAPI consists of the Silicon Labs EFM8BB1 microcontroller, and the MCU will periodically transmits pertinent riser data over a 1-wire UART to the host system (CPLD & BIOS).

The payload between riser MCU and host system includes two information: One is fixed riser information which is determined using a table structure that can be read through two MCU's ADC pin. Meanwhile, it is pre-programmed into the MCU code base. (e.g. riser type, slot width, slot source lanes, etc.). The other is dynamic riser information which can be read in through the MCU's GPIO pins and serialized down to the host system. (e.g. adapter presence detect, WAKE#, etc.)

### Riser 2C dimension

Board size: 159.48 x 35.87 mm, 8 layers.

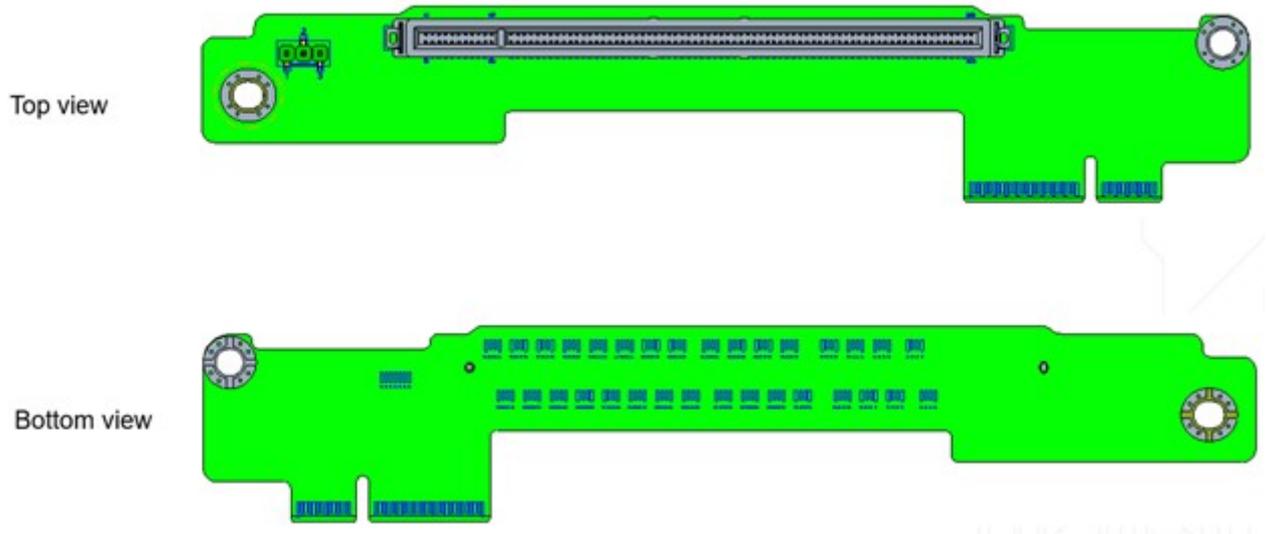


Figure 9. Riser 2C top and bottom view

# 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. The table below lists the tools and technologies Dell offers to lower power consumption and increase energy efficiency.

## Topics:

- [Power](#)
- [Thermal](#)
- [Acoustics](#)

## Power

**Table 16. Power tools and technologies**

Feature	Description
Power Supply Units(PSU) portfolio	Dell's PSU portfolio includes intelligent features such as dynamically optimizing efficiency while maintaining availability and redundancy. Find additional information in the Power supply units section.
Tools for right sizing	Enterprise Infrastructure Planning Tool (EIPT) is a tool that can help you determine the most efficient configuration possible. With Dell's EIPT, you can calculate the power consumption of your hardware, power infrastructure, and storage at a given workload. Learn more at <a href="#">Enterprise Infrastructure Planning Tool</a> .
Industry Compliance	Dell's servers are compliant with all relevant industry certifications and guide lines, including 80 PLUS, Climate Savers and ENERGY STAR.
Power monitoring accuracy	PSU power monitoring improvements include: <ul style="list-style-type: none"> <li>• Dell's power monitoring accuracy is 1%, whereas the industry standard is 5%.</li> <li>• More accurate reporting of power</li> <li>• Better performance under a power cap</li> </ul>
Power capping	Use Dell's systems management to set the power cap limit for your systems to limit the output of a PSU and reduce system power consumption. Dell is the first hardware vendor to leverage Dell Unified Power Manager (UPM) for circuit breaker fast capping.
Systems Management	iDRAC Enterprise and Datacenter provides server-level management that monitors, reports and controls power consumption at the processor, memory and system level.  Dell OpenManage Power Center delivers group power management at the rack, row, and data center level for servers, power distribution units, and uninterruptible power supplies.
Active Power Management	Dell Unified Power Manager (UPM) is an embedded technology that provides individual server-level power reporting and power limiting functionality. Dell offers a complete power management solution that is consisted of UPM accessed through Dell iDRAC9 Datacenter and OpenManage Power Center that allows policy-based management of power and thermal at the individual server, rack, and data center level. Hot spare reduces power consumption of redundant power supplies. Thermal control off a speed optimizes the thermal settings for your environment to reduce fan consumption and lower system power consumption.  Idle power enables Dell servers to run as efficiently when idle as when at full workload
Fresh Air cooling	See ASHRAE A3/A4 Thermal Restriction.

**Table 16. Power tools and technologies (continued)**

Feature	Description
Rack infrastructure	<p>Dell offers some of the industry's highest-efficiency power infrastructure solutions, including:</p> <ul style="list-style-type: none"> <li>• <a href="#">Power distribution units (PDUs)</a></li> <li>• <a href="#">Uninterruptible power supplies (UPSs)</a></li> <li>• <a href="#">Energy Smart containment rack enclosures</a></li> </ul> <p>Find additional information at: <a href="#">Data Center Power and Cooling Solutions</a>.</p>

## PSU specifications

The PowerEdge C6615 system supports up to two AC or DC power supply units (PSUs).

**Table 17. PSU specifications**

PSU	Class	Heat dissipation (maximum) (BTU/hr)	Frequency (Hz)	Voltage	AC		DC	Current (A)
					High line wattage	Low line wattage		
3200 W	NA	12000 BTU/hr	50/60 Hz	277 V AC	3200 W	NA	NA	13.0 A
	Titanium		NA	336 V DC	NA	NA	3200 W	11.5 A
2800 W	NA	10500 BTU/hr	NA	240 V DC	NA	NA	2800 W	13.6 A
	Titanium		50/60 Hz	200-240 V AC	2800 W	NA	NA	15.6 A
2400 W	NA	9000 BTU/hr	NA	240 V DC	NA	NA	2400 W	11.2 A
	Platinum		50/60 Hz	100-240 V AC	2400 W	1400 W	NA	16-13.5 A
1800 W	NA	6610 BTU/hr	NA	240 VDC	NA	NA	1800 W	8.2 A
	Titanium		50/60 Hz	200-240 V AC	1800 W	NA	NA	10 A

- NOTE:** Heat dissipation is calculated using the PSU wattage rating.
- NOTE:** When selecting or upgrading the system configuration, to ensure optimum power utilization, verify the system power consumption with the Enterprise Infrastructure Planning Tool available at [calc](#).
- NOTE:** If a system with AC 2400 W PSUs operates at low line 100-120 Vac, then the power rating per PSU is degraded to 1400 W.



**Figure 10. PSU power cords**

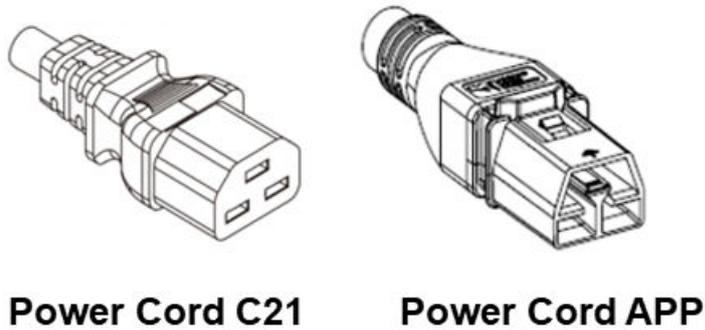


Figure 11. Types of PSU power cords

Table 18. PSU power cords

Form factor	Output	Power cord
Redundant 60 mm	1800 W AC	C15
Redundant 86 mm	2400 W AC	C19
	2800 W AC	C21
	3200 W AC	APP 2006G1

**NOTE:** C19 power cord combined with C20 to C21 jumper power cord can be used to adapt 2800 W PSU.

**NOTE:** C13 power cord combined with C14 to C15 jumper power cord can be used to adapt 1800 W PSU.

## Thermal

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

### Thermal design

Thermal management of the platform helps deliver high performance with the right amount of cooling to components, while maintaining the lowest fan speeds possible. This is done across a wide range of ambient temperatures from 10°C to 35°C (50°F to 95°F) and to extended ambient temperature ranges (see Environmental Specifications).

### Thermal restrictions

**NOTE:** Not available: Indicates the configuration is not offered by Dell Technologies.

**NOTE:** Not supported: Indicates the configuration is not thermally supported.

**NOTE:** All components including the DIMMs, communication cards, M.2 SATA, and PERC cards can be supported with sufficient thermal margin if the ambient temperature is equal to or below the maximum continuous operating temperature listed in these tables.

### Processor/DIMM/HDD/M.2 blanks requirement

All component slots listed below must be fully populated or blanked.

- Sled slot
- HDD slot
- BOSS slot
- PSU slot
- EDSFF slot

**Table 19. DIMM blank requirements**

<b>CPU installed</b>	<b>1x socket configuration</b>
<b>DIMM slots of</b>	<b>CPU1 slot</b>
DIMM blank requirement	Yes

## ASHRAE A3/A4 configuration restriction

- NVMe SSD and EDSFF are not supported
- A2 GPU is not supported
- 96GB Samsung, 128GB and 256GB DIMM is not supported
- CPU TDP Restriction
  - Air cooled, 2.5-inch chassis
    - Maximum supported CPU TDP is 150W

## Sled restriction

**Table 20. Supported ambient temperature- 2.5-inch Chassis, air cooled**

Processor	TDP	Mac cTDP	Core	DIMM Capacity ≤ 64GB/DIMM
8534P	200 W	225 W	64	35
8434P	200 W	225 W	48	35
8324P	180 W	225 W	32	35
8224P	160 W	225 W	24	35
8124P	125 W	150 W	16	35
8024P	90 W	100 W	8	35

 **NOTE:** Does not support 96GB Samsung DIMM.

**Table 21. Supported ambient temperature- No BP chassis and E3.s chassis, air cooled**

Processor	TDP	Mac cTDP	Core	CPU1 HSK	DIMM Capacity ≤ 64GB/DIMM
8534P	200 W	225 W	64	98TYN	35
8434P	200 W	225 W	48	98TYN	35
8324P	180 W	225 W	32	98TYN	35
8224P	160 W	225 W	24	98TYN	35
8124P	125 W	150 W	16	98TYN	35
8024P	90 W	100 W	8	98TYN	35

 **NOTE:** Does not support 96GB Samsung DIMM.

# Acoustics

## Acoustical performance

Dell PowerEdge C6615 is a rack-mount server whose acoustical out ranges from that appropriate for an office to that of data centers. Acoustical performance is provided in terms Scale-Out Webtech configuration and acoustical performance data that are described in the following two tables:

**Table 22. C6615 configurations tested for acoustical experience**

Configuration	Webtech
CPU Type	AMD
CPU TDP / Cores	225 W
CPU Quantity	1pc x 4 sleds (4 CPUs)
RDIMM Memory	16GB RDIMM DDR5
Memory Quantity	6 x 4 sleds (24 pcs)
Backplane Type	16x 2.5-inch SAS/SATA
HDD Type	1.2 TB SAS
HDD Quantity	16
PSU Type	1800 W
PSU Quantity	2
OCP	2-port 10Gbe x 4 sleds
PCI1	25GBE 2P(NIC card) x 4 sleds
PCI 2	None
BOSS	1pc Modular BOSS NVMe x 4 sleds
Others	None

**Table 23. Acoustical experience of C6615 configurations**

Configuration	Webtech	
<b>Acoustical Performance: Idle/ Operating @ 23 ± 2 °C Ambient</b>		
L <sub>wA,m</sub> (B)	Idle	6.9
	Operating	6.9
K <sub>v</sub> (B)	Idle	0.4
	Operating	0.4
L <sub>pA,m</sub> (dB)	Idle	53
	Operating	53
Prominent Tones	No prominent tones in idle and operating	
Acoustical Performance: Idle @ 28°C:		
L <sub>wA,m</sub> (B)	7.2	
K <sub>v</sub> (B)	0.4	
L <sub>pA,m</sub> (dB)	58	
Acoustical Performance: Idle @ 35°C:		
L <sub>wA,m</sub> (B)	8.7	

**Table 23. Acoustical experience of C6615 configurations (continued)**

<b>Configuration</b>	<b>Webtech</b>
<b>Acoustical Performance: Idle/ Operating @ 23 ± 2 °C Ambient</b>	
K <sub>v</sub> (B)	0.4
L <sub>pA,m</sub> (dB)	74

L<sub>wA,m</sub>: The declared mean A-weighted sound power level (L<sub>wA</sub>) is calculated per section 5.2 of ISO 9296 (2017) with data collected using the methods described in ISO 7779 (2010). Data presented here may not be fully compliant with ISO 7779.

L<sub>pA,m</sub>: The declared mean A-weighted emission sound pressure level is at the bystander position per section 5.3 of ISO 9296 (2017) and measured using methods described in ISO 7779 (2010). The system is placed on standard test table and in a 24U rack enclosure, 25cm above a reflective floor. Data presented here may not be fully compliant with ISO 7779.

Prominent tones: Criteria of D.6 and D.11 of ECMA-74 (17th ed., Dec. 2019) are followed to determine if discrete tones are prominent and to report them, if so.

Idle mode: The steady-state condition in which the server is energized but not operating any intended function.

Operating mode: The maximum of the steady state acoustical output at 50% of CPU TDP or active HDDs or 100% of GPU per C.9.3.2 in ECMA-74 (17th ed., Dec. 2019).

# Rack, rails, and cable management

Key factors in selecting the proper rails include:

- Identifying the type of rack in which they will be installed.
- The spacing between the front and rear mounting flanges of the rack.
- The type and location of any equipment mounted in the back of the rack such as power distribution units (PDUs), and the overall depth of the rack.

See the [Dell EMC Enterprise Systems Rail Sizing and Rack Compatibility Matrix](#) for the following information:

- Specific details about rail types and their functionalities.
- Rail adjustability ranges for various rack mounting flange types.
- Rail depth with and without cable management accessories.
- Rack types supported for various rack mounting flange types.

## Topics:

- [Rails information](#)

## Rails information

The rack rail system for C6600 server provides tool-less support for 4-post racks with square or unthreaded round holes. There is no support for a cable management arm (CMA) or a strain relief bar (SRB). The static rails support a wide variety of racks.

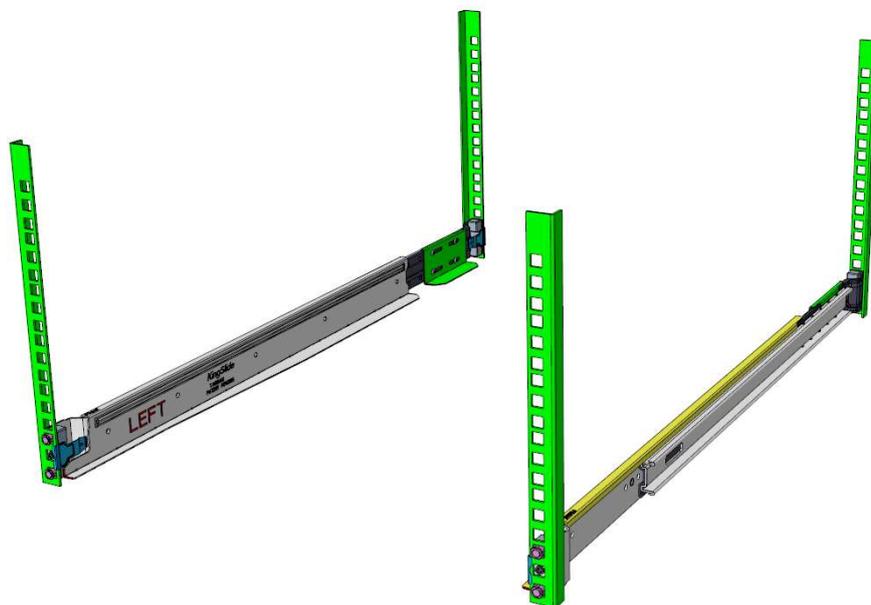


Figure 12. Static rail

The key factor in selecting the proper rails is identifying the type of rack in which they are installed. The static rail supports tool-less mounting in 19"-wide, EIA-310-E compliant square-hole and unthreaded round-hole 4-post racks. The static rail does not support mounting in threaded-hole racks.

**NOTE:** APC racks are also not supported.

**Table 24. Rail adjustability range**

Rail Adjustability range (mm)							
Product	Rail Identifier	Mounting Interface	Rail Type	Square		Round	
				Min	Max	Min	Max
C6600	N/A	Tool-less	Static	603 mm*	917 mm	603 mm*	917 mm

 **NOTE:** \* – minor conversion required

Other key factors governing proper rail selection include the spacing between the front and rear mounting flanges of the rack, the type and location of any equipment mounted in the back of the rack, such as power distribution units, and the overall depth of the rack. Due to their reduced complexity and lack of CMA and SRB support, the static rails offer a greater adjustability range and a smaller overall mounting footprint than sliding rails.

For information about installing the system in a rack, see the *Dell PowerEdge Rack Installation Guide* on [Dell.com/Support/Manuals](https://www.dell.com/support/manuals).

# Supported Operating Systems

The PowerEdge system supports the following operating systems:

- Canonical® Ubuntu® Server LTS
- Microsoft® Windows Server® with Hyper-V
- Red Hat® Enterprise Linux
- SUSE® Linux Enterprise server
- VMware® ESXi®

Links to specific OS versions and editions, certification matrices, Hardware Compatibility Lists (HCL) portal, and Hypervisor support are available at [Dell EMC Enterprise Operating Systems](#).

# Dell OpenManage Systems Management

Dell delivers management solutions that help IT administrators effectively deploy, update, monitor, and manage IT assets. OpenManage solutions and tools enable you to quickly respond to problems by helping them to manage Dell servers efficiently; in physical, virtual, local, and remote environments; all without the need to install an agent in the operating system.

## Topics:

- [Integrated Dell Remote Access Controller \(iDRAC\)](#)
- [Systems Management software support matrix](#)

## Integrated Dell Remote Access Controller (iDRAC)

iDRAC9 delivers advanced, agent-free, local and remote server administration. Embedded in every PowerEdge server, iDRAC9 provides a secure means to automate a multitude of common management tasks. Because iDRAC is embedded within every PowerEdge server, there is no additional software to install; just plug in power and network cables, and iDRAC is ready to go. Even before installing an operating system (operating system) or hypervisor, IT administrators have a complete set of server management features at their fingertips.

With iDRAC9 in-place across the Dell PowerEdge portfolio, the same IT administration techniques and tools can be applied throughout. This consistent management platform allows easy scaling of PowerEdge servers as an organization's infrastructure grows. Customers can use the iDRAC RESTful API for the latest in scalable administration methods of PowerEdge servers. With this API, iDRAC enables support for the Redfish standard and enhances it with Dell extensions to optimize at-scale management of PowerEdge servers. By having iDRAC at the core, the entire OpenManage portfolio of Systems Management tools allows every customer to tailor an effective, affordable solution for any size environment.

Zero Touch Provisioning (ZTP) is embedded in iDRAC. ZTP - Zero Touch Provisioning is Intelligent Automation Dell's agent-free management puts IT administrators in control. Once a PowerEdge server is connected to power and networking, that system can be monitored and fully managed, whether you're standing in front of the server or remotely over a network. In fact, with no need for software agents, an IT administrator can: · Monitor · Manage · Update · Troubleshoot and remediate Dell servers With features like zero-touch deployment and provisioning, iDRAC Group Manager, and System Lockdown, iDRAC9 is purpose-built to make server administration quick and easy. For those customers whose existing management platform utilizes in-band management, Dell does provide iDRAC Service Module, a lightweight service that can interact with both iDRAC9 and the host operating system to support legacy management platforms.

When ordered with DHCP enabled from the factory, PowerEdge servers can be automatically configured when they are initially powered up and connected to your network. This process uses profile-based configurations that ensure each server is configured per your specifications. This feature requires an iDRAC Enterprise license.

iDRAC9 offers following license tiers:

**Table 25. iDRAC9 license tiers**

License	Description
iDRAC9 Basic	<ul style="list-style-type: none"> <li>• Available only on 100-500 series rack/tower</li> <li>• Basic instrumentation with iDRAC web UI</li> <li>• For cost conscious customers that see limited value in management</li> </ul>
iDRAC9 Express	<ul style="list-style-type: none"> <li>• Default on 600+ series rack/tower, modular, and XR series</li> <li>• Includes all features of Basic</li> <li>• Expanded remote management and server life-cycle features</li> </ul>
iDRAC9 Enterprise	<ul style="list-style-type: none"> <li>• Available as an upsell on all servers</li> <li>• Includes all features of Basic and Express. Includes key features such as virtual console, AD/LDAP support, and more</li> <li>• Remote presence features with advanced, Enterprise-class, management capabilities</li> </ul>

**Table 25. iDRAC9 license tiers (continued)**

License	Description
iDRAC9 Datacenter	<ul style="list-style-type: none"> <li>• Available as an upsell on all servers</li> <li>• Includes all features of Basic, Express, and Enterprise. Includes key features such as telemetry streaming, Thermal Manage, automated certificate management, and more</li> <li>• Extended remote insight into server details, focused on high end server options, granular power, and thermal management</li> </ul>

For a full list of iDRAC features by license tier, see [Integrated Dell Remote Access Controller 9 User's Guide](#) at [Dell.com](#).

For more details on iDRAC9 including white papers and videos, see:

- [Support for Integrated Dell Remote Access Controller 9 \(iDRAC9\)](#) on the [Knowledge Base](#) page at [Dell.com](#)

## Systems Management software support matrix

**Table 26. Systems Management software support matrix**

Categories	Features	PE mainstream
Embedded Management and In-band Services	iDRAC9 (Express, Enterprise, and Datacenter licenses)	Supported
	OpenManage Mobile	Supported
	OM Server Administrator (OMSA)	Supported
	iDRAC Service Module (iSM)	Supported
	Driver Pack	Supported
Change Management	Update Tools (Repository Manager, DSU, Catalogs)	Supported
	Server Update Utility	Supported
	Lifecycle Controller Driver Pack	Supported
	Bootable ISO	Supported
Console and Plug-ins	OpenManage Enterprise	Supported
	Power Manager Plug-in	Supported
	Update Manager Plug-in	Supported
	SupportAssist Plug-in	Supported
	CloudIQ	Supported
Integrations and connections	OM Integration with VMware Vcenter/vROps	Supported
	OM Integration with Microsoft System Center (OMIMSC)	Supported
	Integrations with Microsoft System Center and Windows Admin Center (WAC)	Supported
	ServiceNow	Supported
	Ansible	Supported
	Third-party Connectors (Nagios, Tivoli, Microfocus)	Supported
Security	Secure Enterprise Key Management	Supported
	Secure Component Verification	Supported
Standard operating system	Red Hat Enterprise Linux, SUSE, Windows Server 2019 or 2022, Ubuntu, CentOS	Supported (Tier-1)

## Appendix A. Additional specifications

### Topics:

- Chassis and sled dimension
- System weight
- Video specifications
- PSU specifications
- Environmental specifications

### Chassis and sled dimension

The PowerEdge C6600 chassis has the following dimensions:

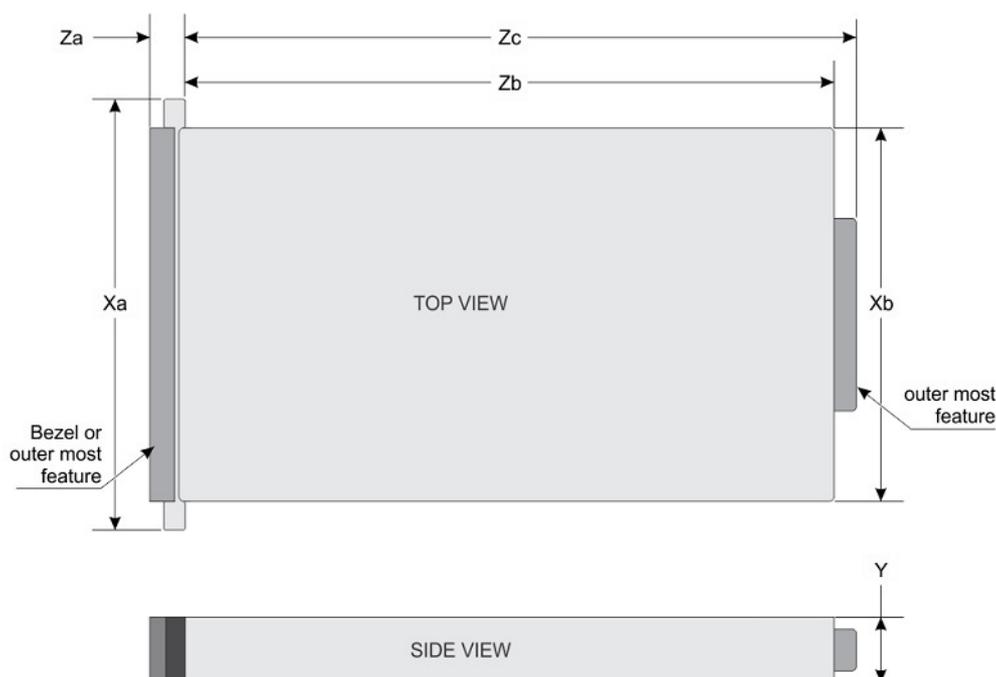


Figure 13. Chassis dimension

Table 27. PowerEdge C6600 chassis dimensions

Drives	Xa	Xb	Y	Za	Zb	Zc
Diskless/ 8 drives/ 16 drives	489.0 mm (19.25 inches)	448.0 mm (17.63 inches)	86.8 mm (3.41 inches)	42.0 mm (1.65 inches)	763.2 mm (30.04 inches) ear to rear wall	799.97 mm (31.49 inches) ear to PSU handle  802.4 mm (31.60 inches) ear to handle velcro

## Sled dimensions

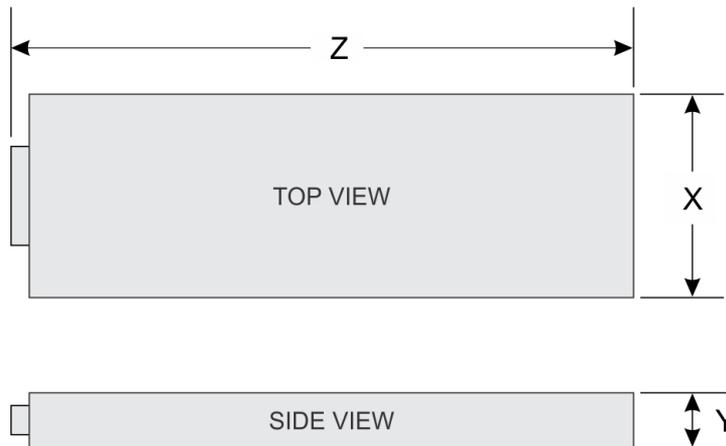


Figure 14. Sled dimensions

Table 28. PowerEdge C6615 sled dimensions

X	Y	Z
174.4 mm (6.86 inches)	40.0 mm (1.57 inches)	549.7 mm (21.64 inches) - diskless configuration 561.3 mm (22.10 inches) - SAS/SATA or NVMe or E3.S or Universal configuration

## System weight

Table 29. PowerEdge C6615 system weight

System configuration	Maximum weight
Air cooling	3.7 kg (8.15 pounds)

## Video specifications

The PowerEdge C6615 system supports integrated Matrox G200 graphics controller from mini-DP display port.

Table 30. Supported video resolution options

Resolution	Refresh rate (Hz)	Color depth (bits)
640 x 480	60	8, 16, 32
800 x 600	60	8, 16, 32
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
1600 x 900	60	8, 16, 32
1600 x 900	60	8, 16, 32

**Table 30. Supported video resolution options (continued)**

Resolution	Refresh rate (Hz)	Color depth (bits)
1680 x 1050	60	8, 16, 32
1920 x 1080	60	8, 16, 32
1920 x 1200	60	8, 16, 32

## PSU specifications

The PowerEdge C6615 system supports up to two AC or DC power supply units (PSUs).

**Table 31. PSU specifications**

PSU	Class	Heat dissipation (maximum) (BTU/hr)	Frequency (Hz)	Voltage	AC		DC	Current (A)
					High line wattage	Low line wattage		
3200 W	NA	12000 BTU/hr	50/60 Hz	277 V AC	3200 W	NA	NA	13.0 A
	Titanium		NA	336 V DC	NA	NA	3200 W	11.5 A
2800 W	NA	10500 BTU/hr	NA	240 V DC	NA	NA	2800 W	13.6 A
	Titanium		50/60 Hz	200-240 V AC	2800 W	NA	NA	15.6 A
2400 W	NA	9000 BTU/hr	NA	240 V DC	NA	NA	2400 W	11.2 A
	Platinum		50/60 Hz	100-240 V AC	2400 W	1400 W	NA	16-13.5 A
1800 W	NA	6610 BTU/hr	NA	240 VDC	NA	NA	1800 W	8.2 A
	Titanium		50/60 Hz	200-240 V AC	1800 W	NA	NA	10 A

- NOTE:** Heat dissipation is calculated using the PSU wattage rating.
- NOTE:** When selecting or upgrading the system configuration, to ensure optimum power utilization, verify the system power consumption with the Enterprise Infrastructure Planning Tool available at [calc](#).
- NOTE:** If a system with AC 2400 W PSUs operates at low line 100-120 Vac, then the power rating per PSU is degraded to 1400 W.



**Figure 15. PSU power cords**

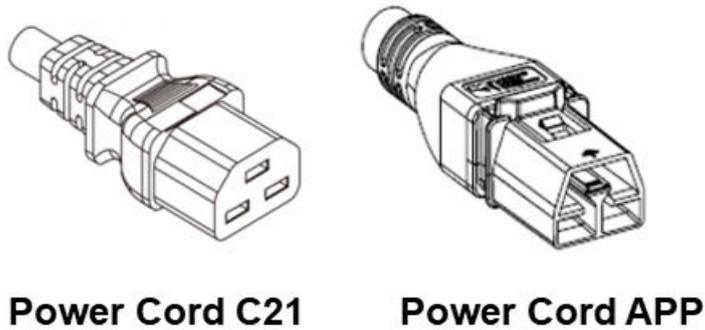


Figure 16. Types of PSU power cords

Table 32. PSU power cords

Form factor	Output	Power cord
Redundant 60 mm	1800 W AC	C15
Redundant 86 mm	2400 W AC	C19
	2800 W AC	C21
	3200 W AC	APP 2006G1

**NOTE:** C19 power cord combined with C20 to C21 jumper power cord can be used to adapt 2800 W PSU.

**NOTE:** C13 power cord combined with C14 to C15 jumper power cord can be used to adapt 1800 W PSU.

## Environmental specifications

Table 33. Continuous Operation Specifications for ASHRAE A3

Continuous Operation Specifications for ASHRAE A3	
Temperature range for altitudes ≤ 900 m (≤ 2953 ft)	5 — 40°C (41-104°F) with no direct sunlight on the equipment
Humidity percent range (non-condensing at all times)	8% RH with -12°C minimum dew point to 85% RH with 24°C (75.2°F) maximum dew point
Operational altitude de-rating	Maximum temperature is reduced by 1°C/175 m (33.8°F/574 Ft) above 900 m (2953 Ft)

Table 34. Continuous Operation Specifications for ASHRAE A4

Continuous Operation Specifications for ASHRAE A4	
Temperature range for altitudes ≤ 900 m (≤ 2953 ft)	5 — 45°C (41-113°F) with no direct sunlight on the equipment
Humidity percent range (non-condensing at all times)	8% RH with -12°C minimum dew point to 90% RH with 24°C (75.2°F) maximum dew point
Operational altitude de-rating	Maximum temperature is reduced by 1°C/125 m (33.8°F/410 Ft) above 900 m (2953 Ft)

**Table 35. Common Environmental Specifications for ASHRAE A3 and A4**

<b>Continuous Operation Specifications for ASHRAE A3</b>	
Maximum temperature gradient (applies to both operation and non-operation)	20°C in an hour* (36°F in an hour) and 5°C in 15 minutes (41°F in 15 minutes), 5°C in an hour* (41°F in an hour) for tape <i>i</i> <b>NOTE:</b> Per ASHRAE thermal guidelines for tape hardware, these are not instantaneous rates of temperature change.
Non-operational temperature limits	-40 to 65°C (-104 to 149°F)
Non-operational humidity limits	5% to 95% RH with 27°C (80.6°F) maximum dew point
Maximum non-operational altitude	12,000 meters (39,370 feet)
Maximum operational altitude	3,048 meters (10,000 feet)

## Thermal air restrictions

### Thermal air restrictions

#### ASHRAE A3/A4 configuration restriction

- NVMe SSD and EDSFF are not supported
- DIMMs with a capacity greater than 64GB are not supported
- PERC H755 is not supported
- A single sled can only hold up to two cards, including PCIe and OCP cards.
- A2 GPU is not supported
- 96GB Samsung, 128GB and 256GB DIMM is not supported
- CPU TDP Restriction
  - Air cooled, 2.5-inch chassis
    - Maximum supported CPU TDP is 150W
  - Air cooled, no backplane chassis
    - Maximum supported CPU TDP is 225W

**Table 36. DIMM blank requirements**

<b>CPU installed</b>	<b>1x socket configuration</b>
<b>DIMM slots of</b>	<b>CPU1 slot</b>
DIMM blank requirement	Yes

- All sled slots must be fully populated or blanked
- All HDD slots must be fully populated or blanked
- BOSS card slot must be populated or blanked
- All PSU slots must be fully populated or blanked
- All E3.s slots must be fully populated or blanked

## Appendix A. Standards compliance

The system conforms to the following industry standards.

**Table 37. Industry standard documents**

Standard	URL for information and specifications
<b>ACPI</b> Advance Configuration and Power Interface Specification, v6.4	<a href="#">Unified Extensible Firmware Interface Forum</a>
<b>Ethernet</b> IEEE Std 802.3-2022	<a href="#">IEEE Standards</a>
<b>MSFT WHQL</b> Microsoft Windows Hardware Quality Labs	<a href="#">Microsoft Windows Hardware Quality Labs</a>
<b>IPMI</b> Intelligent Platform Management Interface, v2.0	<a href="#">IPMI Specifications</a>
<b>DDR5 Memory</b> DDR5 SDRAM Specification	<a href="#">DDR5 SDRAM Specification</a>
<b>PCI Express</b> PCI Express Base Specification, v5.0	<a href="#">PCI Express Base Specification, v5.0</a>
<b>PMBus</b> Power System Management Protocol Specification, v1.2	<a href="#">Power System Management Protocol Specification</a>
<b>SAS</b> Serial Attached SCSI, 3 (SAS-3) (T10/INCITS 519)	<a href="#">SAS Serial Attached SCSI, 3 Specifications</a>
<b>SATA</b> Serial ATA Rev. 3.3	<a href="#">SATA Serial ATA Specifications</a>
<b>SMBIOS</b> System Management BIOS Reference Specification, v3.3.0	<a href="#">System Management BIOS Reference Specification, v3.3.0</a>
<b>TPM</b> Trusted Platform Module Specification, v1.2 and v2.0	<a href="#">Trusted Platform Module Specification, v1.2 and v2.0</a>
<b>UEFI</b> Unified Extensible Firmware Interface Specification, v2.7	<a href="#">Unified Extensible Firmware Interface Specification</a>
<b>PI</b> Platform Initialization Specification, v1.7	
<b>USB</b> Universal Serial Bus v2.0 and SuperSpeed v3.0 (USB 3.1 Gen1)	<a href="#">USB Implementers Forum, Inc.</a>
<b>NVMe</b> Express Base Specification. Revision 2.0c	<a href="#">NVMe Express Base Specifications</a>
<b>NVMe</b> Command Set Specifications	
1. NVMe Express NVMe Command Set Specification. Revision 1.1c	
2. NVMe Express Zoned Namespaces Command Set. Revision 1.0c	
3. NVMe Express® Key Value Command Set. Revision 1.0c	
<b>NVMe</b> Transport Specifications	
1. NVMe Express over PCIe Transport. Revision 1.0c	
2. NVMe Express RDMA Transport. Revision 1.0b	
3. NVMe Express TCP Transport. Revision 1.0c	
<b>NVMe</b> NVMe Express Management Interface. Revision 1.2c	
<b>NVMe</b> NVMe Boot Specification. Revision 1.0	

## Appendix C Additional resources

**Table 38. 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 indicator codes</li> <li>• System BIOS</li> <li>• Remove and replace procedures.</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> </ul>	<a href="https://Dell.com/Support/Manuals">Dell.com/Support/Manuals</a>
Rack Installation Guide	<p>This document ships with the rack kits, and provides instructions for installing a server in a rack.</p>	<a href="https://Dell.com/Support/Manuals">Dell.com/Support/Manuals</a>
System Information Label	<p>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.</p>	Inside the system chassis cover
QR code	<p>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.</p>	Inside the system chassis cover
Enterprise Infrastructure Planning Tool (EIPT)	<p>The Dell online EIPT enables easier and more meaningful estimates to help you determine the most efficient configuration possible. Use EIPT to calculate the power consumption of your hardware, power infrastructure, and storage.</p>	<a href="https://Dell.com/calc">Dell.com/calc</a>

## Appendix D: Services

### Topics:

- [Default service levels](#)
- [ProDeploy Infrastructure Suite](#)
- [Supplemental Deployment Services](#)
- [DAY 2 - Automation Services with Ansible](#)
- [ProSupport Infrastructure Suite](#)
- [Specialty Support Services](#)
- [Consulting Services](#)
- [Resources](#)

### Default service levels

Dell sales tools like DSA, OSC, Guided Journey, DellStar, and others are defaulted with standard configurations to make quoting easier. The system defaults for services for all C-Series platforms are listed below:

1. **Support default:** 3 years, ProSupport Next BusinessDay (NBD) Onsite service which includes comprehensive 24x7 predictive and reactive support for hardware and software.
2. **Deployment default:** ProDeploy for C-Series Compute Sled which includes onsite hardware installation and remote software configuration.

**NOTE:** Deployment of the C-Series chassis enclosure (the metal frame) is included at no additional charge as part of the C-Series deployment service for the sled. Optionally, the customer may choose any other factory or field deployment offers listed below.

### ProDeploy Infrastructure Suite

ProDeploy Infrastructure Suite provides a variety of deployment offerings to satisfy a customer's unique needs. It is made up of five sub-offers: **Configuration Services**, **Rack Integration**, **Basic Deployment**, **ProDeploy**, and **ProDeploy Plus**.

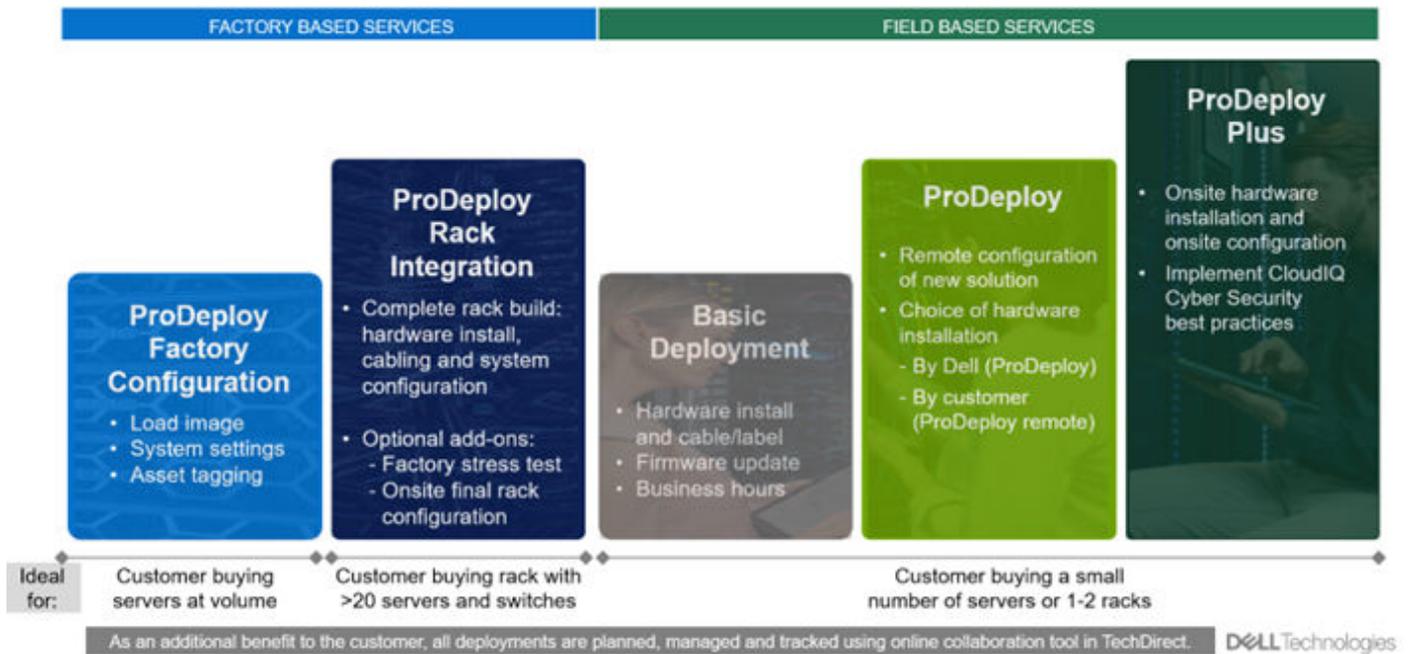


Figure 17. ProDeploy Infrastructure Suite

## Factory Based Services

Pre-configured systems or complete racks, customized prior to shipping to the customer's site.

### ProDeploy Factory Configuration

Ideal for customers buying servers in volume and seeking pre-configuration prior to shipping such as: custom image, system settings, and asset tagging so it arrives ready to use out of the box. Furthermore, servers are packaged and bundled to meet specific shipping and distribution requirements for each customer location to facilitate the rollout process. Once the server is onsite, Dell can install and configure the server to the environment using any of the field-based deployment services outlined in the next section.

### ProDeploy Rack Integration

Ideal for customers seeking to build out fully integrated racks prior to shipping. These rack builds include hardware install, cabling, and full system configuration. You can also add-on a factory stress test and an optional on-site final rack configuration to complete the rack installation.

- STANDARD SKUs for Rack Integration is available in the USA only and requires:
  - 20 or more devices (R and C series servers, VxRail, and all Dell or non-Dell switches)
  - Use Informational SKUs for Dell switches or 3rd party products.
  - Shipping to contiguous USA
- USE CUSTOM QUOTE for Rack Integration scenarios that require:
  - Shipment to any country or region outside USA or shipping outside contiguous USA
  - Shipping to multiple locations
  - Racks containing less than 20 servers
  - Any rack that includes Storage

# ProDeploy Infrastructure Suite | Factory based services

		ProDeploy Factory Configuration	ProDeploy Rack Integration <sup>1</sup>
<b>Asset Configuration</b>	Single point of contact for project management	•	•
	RAID, BIOS and iDRAC configuration	•	•
	Firmware freeze	•	•
	Asset Tagging and Reporting	•	•
	Customer system image	•	•
<b>Deployment</b>	Site readiness review and implementation planning	-	•
	Hardware racking and cabling	-	•
	Deployment verification, documentation, and knowledge transfer	•	•
<b>Post-deployment</b>	White glove logistics	-	•
	Onsite final configuration	-	-
	Install support software and connect with Dell Technologies	-	Optional
	Optional add on of Basic Deployment	Optional	-
<b>Online collaboration</b>	Online collaborative environment for planning, managing and tracking delivery	•	•

<sup>1</sup> Factory Rack Integration for server and VxRail; includes associated Dell network switches. 20-unit minimum requirement.

Figure 18. ProDeploy Infrastructure Suite - Factory services

## Field-based Services

Put PowerEdge servers to work faster with Dell field-based deployment services. Whether we are deploying one server to one thousand – we have you covered. Dell provides versatile delivery options to fit every budget and operating model.

## ProDeploy Plus

Elevate Infrastructure deployments with our most complete service from planning through onsite hardware installation and software configuration including the implementation of cybersecurity best practices. ProDeploy Plus provides the skill and scale needed to successfully execute demanding deployments in today's complex IT . The deployment starts with a site readiness review and implementation plan. Certified deployment experts perform the software configuration to include set up of leading operating systems and hypervisors. Dell will also configure PowerEdge software tools to include iDRAC and OpenManage system utilities as well as support AIOps platforms: MenvironmentsyService360, TechDirect, and CloudIQ. Unique to ProDeploy Plus, the cybersecurity implementation helps customers understand potential security risks and make recommendations for reducing product attack surfaces. The system is tested, validated prior to completion. The customer will also receive full project documentation and knowledge transfer to complete the process.

## ProDeploy

ProDeploy provides remote software configuration and choice of hardware installation (onsite or guided). ProDeploy is great for customers who are price sensitive or willing to participate in some portion of the deployment to include providing remote access to their network. The ProDeploy remote software implementation includes everything mentioned in ProDeploy Plus except it does not include the added value, cybersecurity implementation and best practices.

## Basic Deployment

Basic Deployment delivers worry-free professional installation by experienced technicians. This service is often sold to Competency Enabled Partners who will have Dell do the hardware installation while they complete the software configuration. Furthermore, Basic Deployment tends to be purchased by large enterprises who have smart technical staff. These companies just need Dell to install the hardware and they will perform the software configuration. The last use case for Basic Deployment is when paired with Factory Configuration services. The servers are pre-configured in the factory and the basic deployment service will install the system into the rack to finalize the deployment.

# ProDeploy Infrastructure Suite | Field services

		Basic Deployment	ProDeploy	ProDeploy Plus
<b>Pre-deployment</b>	Single point of contact for project management	-	●	In region
	Site readiness review and implementation planning	-	●	●
<b>Deployment</b>	Deployment service hours	Business hours	24/7	24/7
	Hardware installation options	Onsite	Onsite or guided <sup>1</sup>	Onsite
	System software installation and configuration options	-	Remote	Onsite
	Install connectivity software based on Secure Connect Gateway technology <sup>2</sup>	-	●	●
	Implement CloudIQ CyberSecurity best practices and policies	-	-	●
<b>Post-deployment</b>	Deployment verification, documentation and knowledge transfer	-	●	●
	Configuration data transfer to Dell technical support	-	●	●
<b>Online collaboration</b>	Online collaborative platform in TechDirect for planning, managing and tracking delivery	-	●	●

<sup>1</sup> Choose from onsite hardware installation or a guided option including project specific instructions, documentation and live expert guidance

<sup>2</sup> Post deployment use for intelligent, automated support & insights

Figure 19. ProDeploy Infrastructure Suite - Field services

## Supplemental Deployment Services

Additional ways to expand scope or deploy for unique scenarios.

### Two Host Adder (requires PD/PDP)

Deploying new storage, compute, or networking devices may require interconnection to other servers (also called hosts). The Dell delivery team will set up four hosts per device as part of every ProDeploy service. For example, if the customer is buying two storage arrays the ProDeploy service will automatically include connectivity of four hosts each (4x2=8 total hosts per project since there are two devices). This supplemental “Two Host Adder” service provides for the configuration of additional hosts above what is already provided as part of the ProDeploy service. In many cases, customers can work with us while we set up the included hosts, so they may understand how to do the rest themselves. Always ask the customer how many hosts are being connected and sell the host adder depending on the customer’s technology skillset. Note that this service applies to the connectivity of Dell devices not 3rd party devices.

### Additional Deployment Services (ADT) - sold with or without PD/PDP

You can expand the scope of a ProDeploy engagement leveraging Additional Deployment Time (ADT). ADT covers additional tasks above the normal deliverables of the ProDeploy offers. ADT can also be used as a standalone service without ProDeploy. SKUs are available for both Project Management and Technical Resource Expertise. SKUs are sold as blocks of four hours remote or eight hours onsite. The delivery team can assist in scoping the number of hours required for additional tasks.

### Data Migration Services

Migrating data sets is no easy task. Our experts use proven tools and processes to streamline data migrations and avoid compromising data. A customer project manager works with our experienced team of experts to create a migration plan. Data migration is part of every technology upgrade, platform change, and shift to the cloud. You can rely on Dell data migration services to perform a seamless transition.

## Residency Services

Certified technical professionals act like an extension of your IT staff to enhance internal capabilities and resources and help you realize faster adoption and maximized ROI of new technology. Residency Services help customers transition to new capabilities quickly by leveraging specific technology skill sets. Residency experts can provide post implementation management and knowledge transfer that is related to a new technology acquisition or day-to-day operational management of the IT infrastructure.

- Global experts available to serve in-person (onsite) or virtual (remote)
- Engagements starting at 2 weeks with flexibility to adjust

## DAY 2 - Automation Services with Ansible

Dell solutions are built as "automation ready" with integrated APIs (Application Programming Interfaces) to allow customers to programmatically call actions on the product through code. Although Dell has published Ansible automation use cases, some customers need additional assistance with GitOps. By the end of the service, the customer will have the foundational components required to accelerate automation and understand how the programming works together: Day 1 and Day 2 use case automation scripts (ansible modules), CI/CD tool (Jenkins), and Version control (Git).

## ProSupport Infrastructure Suite

ProSupport Infrastructure Suite is a set of support services that enable customers to build the solution that is right for their organization. It is an industry-leading, enterprise-class support that aligns with the criticality of your systems, the complexity of your environment, and the allocation of your IT resources.

ProSupport Infrastructure Suite   Enhanced value across all offers!				
	Basic Hardware Support	ProSupport for Infrastructure	ProSupport Plus for Infrastructure	Changes with August 2023 release
Technical support availability and response objective	9/5, immediate	24/7, immediate	24/7, immediate	No change
Covered products	Hardware	Hardware & Software	Hardware & Software	No change
Onsite response service level	NBD	NBD or 4-hour	4-hour	ProSupport Plus NBD is retired
ProSupport AIOps platforms	•	•	•	MyService360 and TechDirect (all offers) CloudIQ (ProSupport & ProSupport Plus)
Dell Security Advisories	•	•	•	Available on additional products
Proactive issue detection with automated case creation	•	•	•	New to Basic
Predictive hardware anomaly detection		•	•	New to ProSupport
Access to software updates		•	•	No change
CloudIQ health and cybersecurity monitoring & analytics		•	•	Enhanced features
Incident Manager for Severity 1 cases		•	•	No change
Mission Critical support			•	Enhanced features
Priority access to remote senior support engineers <sup>1</sup>			•	No change
Service Account Manager			•	No change
Proactive system maintenance			•	No change
Limited 3 <sup>rd</sup> party software support <sup>2</sup>			•	No change

<sup>1</sup>Based on availability

<sup>2</sup>Software license can be purchased through Dell or BYOL - see Service Descriptions for details.

Figure 20. ProSupport Enterprise Suite

## ProSupport Plus for Infrastructure

ProSupport Plus for Infrastructure is the ultimate solution for customers seeking preventative maintenance and optimal performance on their business-critical assets. The service caters to customers who require proactive, predictive, and personalized support for systems that manage critical business applications and workloads. When customers purchase

PowerEdge server, we recommend ProSupport Plus, our proactive and preventative support service for business-critical systems. ProSupport Plus provides all the benefits of ProSupport, including the following "Top five reasons to buy PSP".

1. Priority access to specialized support experts - immediate, advanced troubleshooting from an engineer that understands Dell infrastructure solutions.
2. Mission Critical Support – when critical (Severity 1) support issues happen, the customer is assured that we will do all we can to get them back up and running as quickly as possible.
3. Service Account Manager – a customer's #1 support advocate, ensuring they get the best possible proactive and predictive support experience.
4. Systems maintenance – on a semi-annual basis, we will keep a customer's ProSupport Plus system(s) up to date by installing the latest firmware, BIOS, and driver updates to improve performance and availability.
5. 3rd party software support – Dell is a customer's single point of accountability for any eligible 3rd party software installed on their ProSupport Plus system, whether they purchased the software from us or not.

## ProSupport for Infrastructure

Comprehensive 24x7 support for hardware and software - best for production, but not critical, workloads and applications. The ProSupport service offers highly trained experts around the clock and around the globe to address IT needs. We help minimize disruptions and maximize availability of PowerEdge server workloads with:

- 24x7 support through phone, chat and online
- A central point of accountability for all hardware and software issues
- Hypervisor, operating system and application support
- Dell security advisories
- Onsite response service levels 4 hour or Next Business Day options
- Proactive issue detection with automated case creation
- Predictive hardware anomaly detection
- Incident Manager assigned for Severity 1 cases
- Collaborative third-party support
- Access to AIOps Platforms - (MyService360, TechDirect, and CloudIQ)
- Consistent experience regardless of where customers are located or what language they speak.

## Basic Hardware Support

Provides reactive hardware support during normal business hours, excluding local national holidays. No software support or software related guidance. For improved levels of support choose ProSupport or ProSupport Plus.

## Specialty Support Services

Optional specialty support services complement the ProSupport Infrastructure Suite to provide additional proficiencies that are critical for modern data center operations.

## Hardware coverage add-ons to ProSupport

- **Keep Your Hard Drive (KYHD) and Keep Your Component (KYC):** Normally if a device fails under warranty, Dell replaces it using a one-for-one exchange process. KYHD / KYC gives you the option to retain your device. It provides full control of sensitive data and minimizes security risk by letting you retain possession of failed drives / components when receiving replacement parts without incurring additional cost.
- **Onsite Diagnosis Service:** Ideal for sites with non-technical staff. Dell field technician performs initial troubleshooting diagnosis onsite and transfers to Dell remote engineers to resolve the issue.
- **ProSupport Add-on for HPC:** Sold as an add-on to a ProSupport service contract, the ProSupport Add-on for HPC provides solution-aware support to cover the additional requirements that are required to maintain an HPC environment such as:
  - Access to senior HPC experts
  - Advanced HPC cluster assistance: performance, interoperability, and configuration
  - Enhanced HPC solution level end-to-end support
  - Remote pre-support engagement with HPC Specialists during ProDeploy implementation

- **ProSupport Add-on for Telco (Respond & Restore):** An add-on service designed for the top 31 TELCO customers globally, Respond & Restore provides direct access to Dell solution experts who specialize in TELCO carrier-grade support. This add-on also provides a hardware uptime guarantee, meaning if a system fails, Dell will have it installed and operational within 4 hours for Severity 1 issues. Dell incurs penalties and fees if SLAs are not met.

## Supplemental Site-wide Expertise

- **Multivendor Support Service:** Support your 3rd party devices as one service plan for servers, storage and networking (includes coverage for: Broadcom, Cisco, Fujitsu, HPE, Hitachi, Huawei, IBM, Lenovo, NetApp, Oracle, Quanta, SuperMicro & others).
- **Technical Account Manager:** Designated technology lead who monitors and manages performance and configuration of specific technology sets.
- **Designated Remote Support:** Personalized support expert who manages all troubleshooting and resolution of IT assets

## Services for large enterprises

- **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 (combined total of server, storage, networking, etc.). This offering is built on standard ProSupport features that leverage our global scale and are tailored to specific customer needs. While not for everyone, this service option offers a truly unique solution for our largest customers with the most complex environments.
  - Team of assigned Services Account Managers with remote or onsite options
  - Assigned technical and field engineers who are trained on the customer's environment and configurations
  - On-demand reporting and recommendations enabled by ProSupport AIOps tools (MyService360, TechDirect & CloudIQ)
  - Flexible onsite support and parts options that fit their operational model
  - A tailored support plan and training for their operations staff
- **Logistics Online Inventory Solution (LOIS):** Ideal for large organizations that have their own staff to support their data center. Dell offers a service called Logistics Online Inventory Solution which is an onsite parts locker that provides self-maintainers with a local inventory of common replacement components. Having access to these parts lockers allows the self-maintainer to replace a failed component immediately without delay. Each replacement part would automatically initiate a replenishment of the parts inventory that is shipped next day or delivered onsite by Dell during a regular scheduled visit (called Scheduled Onsite Service). As part of the LOIS system, customers can integrate their systems directly to Dell TechDirect using APIs to help streamline the support management process.

## End-of-Life Services

- **Post Standard Support (PSS):** Extend service life beyond the initial seven years of ProSupport, adding up to five more additional years of hardware coverage
- **Data Sanitization & Data Destruction:** Renders data unrecoverable on repurposed or retired products, ensuring security of sensitive data and enabling compliance and provides NIST compliant certification.
- **Asset Recovery Services:** Recycle, resale, and disposal of hardware. Helps you securely and responsibly retire IT assets that are no longer needed while protecting both your business and the planet.

## Consulting Services

Our expert consultants help customers transform faster, and quickly achieve business outcomes for the high value workloads Dell PowerEdge systems can handle. From strategy to full-scale implementation, Dell Technologies Consulting can help determine how to perform IT, workforce, or application transformation. We use prescriptive approaches and proven methodologies that are combined with portfolio and partner ecosystem of Dell Technologies to help achieve real business outcomes. We are here to help guide your next transformation that could address multi-cloud environments, business applications, DevOps, business resiliency, data center modernization, analytics, workforce collaboration, and user experiences.

## Managed Services

Some customers prefer Dell to manage the complexity and risk of daily IT operations. Dell Managed Services utilizes proactive, artificial intelligence to improve operations and modern automation. This helps customers realize desired business outcomes

from their infrastructure investments. With these technologies, our experts run, update, and fine-tune customer environments. You decide the service level requirements and we provide oversight of the environment. There are two types of managed service offers. First the outsourcing model, or CAPEX model, where Dell manages customer owned assets using our people and tools. The second is the "as-a-Service" model, or OPEX model, which we call APEX. In this service, Dell owns all technology and all the management of it. Many customers will have a blend of the two management types depending on the goals of the organization.

Managed	Outsourcing or CAPEX model	APEX	as-a-Service or OPEX model
<p>We manage your technology using our people and tools.<sup>1</sup></p> <ul style="list-style-type: none"> <li>• Managed detection and response*</li> <li>• Technology Infrastructure</li> <li>• End-user (PC/desktop)</li> <li>• Service desk operations</li> <li>• Cloud Managed (Pub/Private)</li> <li>• Office365 or Microsoft Endpoint</li> </ul>		<p>We own all technology so you can off-load all IT decisions.</p> <ul style="list-style-type: none"> <li>• APEX Cloud Services</li> <li>• APEX Flex on Demand elastic capacity</li> <li>• APEX Data Center Utility pay-per-use model</li> </ul>	

1 – Some minimum device counts may apply. Order via: [ClientManagedServices.sales@dell.com](mailto:ClientManagedServices.sales@dell.com)

\* Managed detection and response covers the security monitoring of laptops, servers, & virtual servers. Min. 50 devices combined. No Networking or Storage-only systems [SAN/NAS]. Available in 32 countries. [Details here](#)

Figure 21. Dell Managed Services

- **Managed Detection and Response (MDR):** Dell Technologies Managed Detection and Response (MDR) is powered by Secureworks Taegis XDR software platform. MDR is a managed service that secures the customer’s IT environment against malicious actors and provides remediation if and when a threat is identified. When a customer purchases MDR, they will receive the following features from our team:
  - Dell badge resources
  - Agent rollout assistance to help deploy the Secureworks Endpoint Agent.
  - 24x7 threat detection and investigation
  - Up to 40 hrs per quarter of response and active remediation activities
  - If the customer experiences a breach, we will provide up to 40 hrs per year of Cyber incident response initiation.
  - Quarterly reviews with the customer to review the data

## Education Services

Build the IT skills required to influence the transformational outcomes of the business. Enable talent and empower teams with the right skills to lead and perform transformational strategy that drives competitive advantage. Leverage the training and certification required for real transformation.

Dell Technologies Education Services offers PowerEdge server training and certifications that are designed to help customers achieve more from their hardware investment. The curriculum delivers the information and the practical, firsthand skills that their team must confidently install, configure, manage, and troubleshoot Dell servers.

To learn more or register for a class today, see [Education.Dell.com](http://Education.Dell.com)

## Resources

[Services for PowerEdge.](#)