Dell PowerEdge C6145 Rack Server

Technical Guide

- Deliver velocity with two 4-socket AMD Opteron™ 6200 and 6300 series processors in 2U space

- Shared infrastructure using less floor space, power and cooling

- Mix, match, and maximize connections; 5 PCIe slots/server node, 10 total

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1 System overview

The Dell™ PowerEdge™ C6145 is an ultra-dense 2U, shared infrastructure server that can support up to two 4-socket servers featuring the AMD Opteron™ 6100, 6200 and 6300 series processors. Each independent server features dual or quad AMD Opteron 6000 series 8-core 12-core, or 16-core processors, SR56x0 chipset with SP5100 for I/O connectivity, DDR3 memory, DIMM thermal sensors, PCI Express Generation 2 (PCIe 2.0), dual-port embedded gigabit Ethernet controllers, and the integrated Intelligent Platform Management Interface (IPMI) 2.0 baseboard management controller (BMC) with a dedicated RJ45 connection.

The PowerEdge C6145 is primarily used in high performance computing (HPC) environments, but has many applications for other uses including:

- HPC (large compute, graphics processing unit (GPU) compute)
  - Oil and gas
  - Life sciences
  - Computational/fluid dynamics
- Online gaming
- Engineering design assessment (EDA—large memory)
- Film/entertainment
- Dense, HPC cluster environment
- Core, memory, and I/O constrained applications
- I/O constrained GPU farm
  - PCIe 2.0 x16 delivers the maximum in the industry
- Large memory footprint
  - 32 DIMMs per server in 2U

Key technologies

The PowerEdge C6145 is designed to provide the highest performance — it is a perfect match for applications that take advantage of large core counts and large memory capacities and that have high I/O needs. The PowerEdge C6145 is the first PowerEdge C driven platform based on direct customer feedback. It is the premier dense server for high performance cluster computation, massive I/O expansion, and very large memory capacity in a flexible shared infrastructure chassis. Other features include:

- Best in class density
  - 96 cores and 64 DIMMs in 2U
  - 128 cores and 64 DIMMs in 2U
- 2 x 4-socket servers in 2U
- 6 x 3.5-inch or 12 x 2.5-inch hard drives for 2-node configuration
- 12 x 3.5-inch or 24 x 2.5-inch hard drives for 1-node configuration
- 3 x PCIe x16 slots, 1 x PCIe x8 mezzanine slot, 1 dedicated host interface card (HIC) slots
- Ideal platform for the C410x

Product comparison

Table 1 compares the features of the PowerEdge C6145 to the PowerEdge R815 and C6105.

Table 1.   Comparison of PowerEdge C6145, R815 and C6105

Specification	PowerEdge C6145	PowerEdge R815	PowerEdge C6105
Processors	AMD Opteron 6100, 6200, and 6300 series	AMD Opteron 6100, 6200, and 6300 series	AMD Opteron 4100, 4200, and 4300 series
Front side bus	N/A	N/A	N/A
Sockets	4	4	2
Cores	8, 12, 16	8, 12, 16	4, 6, 8
L2/L3 cache	L1 128K/core L2 1MB/core L3 16MB (shared)	L1 128K/core L2 1MB/core L3 16MB (shared)	L1 128K/core L2 1MB/core L3 8MB (shared)
Chipset	AMD SR5690	AMD SR5690	AMD SR5670
DIMMs	32 x DDR3 RDIMM 4GB/8GB/16GB/32GB LV at 1333MT/s; 4GB/8GB/16GB at 1600MT/s; 4GB/8GB/16GB LV at 1600MT/s	32 x DDR3 RDIMM, UDIMM 1GB/2GB/4GB/8GB at 1333/1600MT/s; 16GB QR at 1066MT/s	12 x DDR3 RDIMM 2GB/4GB/8GB/16GB LV at 1333MT/s
Min/Max RAM	4GB/1TB	4GB/1TB	2GB/192GB
Hard drive bays	24 x 2.5-inch or 12 x 3.5-inch	24 x 2.5-inch or 12 x 3.5-inch	24 x 2.5-inch or 12 x 3.5-inch
Hard drive types	SAS, SATA, SAS SSD	SAS, SATA, SAS SSD	SAS, NLSAS, SATA, SATA SSD
External drive bay	None	1	None
Embedded hard drive controller	AMD SP5100	Dell H700	AMD SP5100
Optional storage controller	N/A	Dell H800	N/A
Systems management	BMC, IPMI 2,0 compliant	iDRAC6 Express, Enterprise (Optional)	BMC, IPMI 2,0 compliant
I/O slots	5	6	2
RAID	LSI$^®$ 2008 or LSI9265-8i	Dell H700	LSI 2008 or LSI9260-8i

Specification	PowerEdge C6145	PowerEdge R815	PowerEdge C6105
NIC/LOM	2 x 1Gb LOMs	4 x 1Gb LOMs	2 x 1Gb LOMs
Power supplies	Hot-plug redundant 1100W (80+ Gold) Auto Ranging (100V-240V) Redundant, 1400W (80+ Platinum) (240V)	Hot-plug redundant 1100W (80+ Gold) Auto Ranging (90V-264V)	Hot-plug redundant 1100W (80+ Gold) Auto Ranging (100V-240V) Redundant, 1400W (80+ Platinum) (240V)
USB	3	3	2
Form factor	1 or 2 nodes in 30-inch 2U	24-inch 2U	2 or 4 nodes in 30-inch 2U
Dimension	W: 44.8 cm (17.6 in) D: 79 cm (31.1 in)	W: 48.2 cm (18.97in) D: 74.4 cm (29.29in)	W: 44.8 cm (17.6 in) D: 79 cm (31.1 in)
Weight	Min: 16.5 kg (36.38 lb) Max: 42 kg (92.61 lb)	Max: 24.1kg (53.13lb)	Max: 33.67kg (74.2lb) Min: 15.11kg (33.32lb)

Specifications

Table 2 summarizes the product features for the PowerEdge C6145 rack server. For the latest information on supported features, visit Dell.com/PowerEdgeC.

Table 2.   Technical specifications

Feature	PowerEdge C6145 technical specifications
Chassis	2U rack mount
Processor	AMD Opteron 6100, 6200, and 6300 series processors
Processor sockets	Up to two 4-socket servers
Front side bus	Intel® QuickPath Interconnect (QPI)
Number of cores	8, 12 or 16
L2/L3 cache	24MB, 28MB, or 32MB
Chipset	AMD SR5670 and SR5690
Memory	Up to 1TB (32 DIMM slots): 4GB/8GB/16GB/32GB DDR3 (1333MT/s 1.35V), 4GB/8GB/16GB (1600MT/s 1.5V and 1.35V)
Video	Integrated AST2050 with 64MB RAM
Maximum internal storage	48TB SATA or 48TB Nearline SAS

Dell PowerEdge C6145 Rack Server Technical Guide

Feature	PowerEdge C6145 technical specifications
I/O slots	1 PCIe x8 mezzanine slot 3 x PCIe x16 riser slot 1 dedicated HIC card Mellanox® ConnectX®-2 40Gb/sec dual-port QDR InfiniBand® adapter (optional) Intel 82559 dual-port 10GbE adapter (optional)
Drive controller	LSI 2008 6Gb SAS mezzanine (optional)
RAID controller	LSI 9265-8i add-in RAID controller
Drive bays and hard drives	Up to 24 x 2.5-inch SAS, SATA, or SSD drives or 12 x 3.5-inch SAS or SATA drives 2.5" SAS (15K): 146GB, 300GB 2.5" SAS (10K): 300GB, 600GB, 900GB, 1.2TB 2.5" SATA (7.2K): 500GB, 1TB 2.5" NL SAS (7.2K): 500GB, 1TB 2.5" SATA SSD (MLC): 300GB, 600GB 2.5" SATA (eMLC): 100GB, 200GB, 400GB 3.5" SATA (7.2K): 500GB, 1TB, 2TB, 3TB, 4TB 3.5" SAS (15K): 300GB, 600GB 3.5" NL SAS (7.2K): 1TB, 2TB, 3TB, 4TB
Connectivity	Embedded Intel Kawela™ 82576 gigabit Ethernet controller 1Gb Ethernet network interface card (NIC)
Power supply	Dual hot-plug redundant high-efficiency 1100W/1400W power supplies
Fans	Shared redundant cooling with 4 x 80mm speed fans detectable with PWM
USB	2 external ports
Operating systems	Microsoft® Windows® HPC Server 2008 R2 (64-bit) Microsoft Windows Server® 2008 Core R2 (64-bit) Microsoft Windows Server 2008 R2 Enterprise (64-bit) Novell® SUSE® Linux® Enterprise Server Red Hat® Enterprise Linux **Optional embedded hypervisors:** Citrix® XenServer® VMware® vSphere® ESXi™ Microsoft Hyper-V ® Server 2008 R2
Services (Availability varies by region. Please contact your sales representative for details.)	Infrastructure consulting services Rack integration (U.S. only, not available in China) Onsite deployment Basic support ProSupport for IT Keep your hard drive Enterprise wide contract Specialized onsite services

2 Chassis views and features

Front views

The PowerEdge C6145 is a 2U rack-mount server that can support up to two four-socket server nodes. The PowerEdge C6145 chassis supports up to twenty-four 2.5-inch SAS, SATA, or SSD drives, or twelve 3.5-inch SAS or SATA drives.

Figure 1.   PowerEdge C6145 front view with 2.5-inch hard drives

Figure 2.   PowerEdge C6145 front view with 3.5-inch hard drives

Back view

Figure 3.   PowerEdge C6145 back view

Internal view
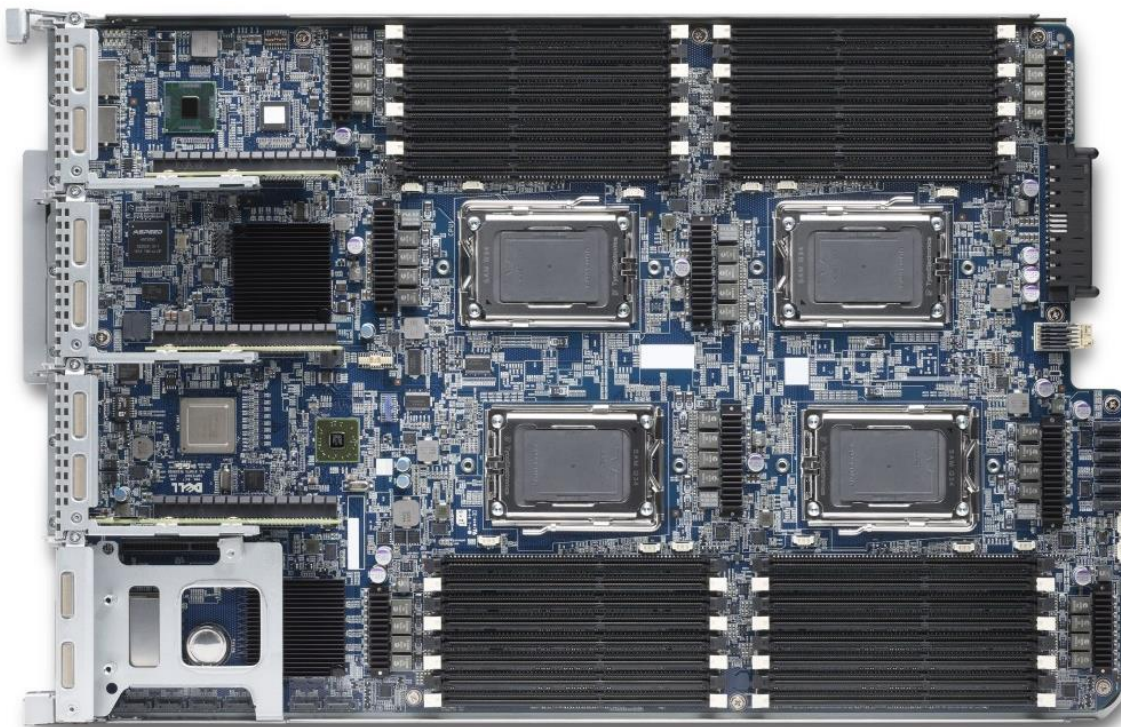
Chassis features

Table 3 lists the features on the PowerEdge C6145 rack server. For additional feature information, see the *Dell PowerEdge C6145 Systems Hardware Owner's Manual* on Dell.com/Support/Manuals.

Table 3. PowerEdge C6145 features

Feature	Description
Power indicator	Indicates the system power is on
System identification indicator	Used to locate a particular system within a chassis
Hard drives	Up to 12 hot-plug 3.5-inch hard drives Up to 24 hot-plug 2.5-inch hard drives
Drive cover	Covers the system's front-loading hard drives
Power supplies	1100W or 1400W
Thermal sensor	Monitors the inlet ambient temperature
NIC connectors	Embedded 10/100/1000 NIC connectors
NIC link/activity indicator	Indicates network activity and status

Feature	Description
Serial port	Connects a serial device to the system
VGA port	Connects a VGA display to the system
BMC management port	Dedicated management port
USB ports	Connects USB devices to the system; ports are USB 2.0-compliant
iPASS connector	Connects to external PCIe devices or a PCIe bus extender port

3 Processor

Dell PowerEdge servers featuring AMD Opteron 6100, 6200 and 6300 series processors are designed to handle the increasing complexity and demands of today's real-world workloads. The AMD Opteron 6100, 6200 and 6300 series processors deliver the world's first x86 16-core processor, delivering a rich mix of performance, scalability and efficiency for today's highly threaded computing environments.

Processor features

Table 4 highlights the features of the AMD Opteron 6100, 6200 and 6300 series processors.

Table 4.   AMD Opteron 6100, 6200 and 6300 series processor features

	Feature	Function	Benefits
AMD-P 2.0	Advanced Platform Management Link (APML)	Provides an interface for processor and systems management monitoring and controlling of system resources (in APML-enabled platforms); comprised of the Remote Power Management Interface (RPMI) and the precision thermal monitor.	RPMI in APML enabled platforms: • Ability to monitor and control platform power consumption through p-state limits • Access to processor identification and health Precision thermal monitor: • Provides accurate information about processor thermals to closely monitor power/cooling and proactively alert the BMC • Early notification helps save time and money by providing intelligence that can be used to more effectively monitor power and thermals to optimize cooling solutions in an IT data center
	Link Width PowerCap	Power efficiency capability (manually enabled thru BIOS) that changes all 16-bit links to 8-bit links	Helps improve performance-per-watt
	AMD CoolSpeed Technology	Reduces p-states when a temperature limit is reached	• Server can continue to operate if processor's thermal environment exceeds safe operational limits • Offers platform providers the ability to safely reduce system fan speeds, which helps deliver greater platform efficiency

	Feature	Function	Benefits
	C1E	An active sleep state invoked when all processor cores are idle	Delivers additional power savings (up to 10W for 2-processor servers) depending on system configuration, such as when the Northbridge and HyperTransport technology links are powered down and cores are at idle
	LV-DDR3 support	Lower memory voltage of 1.35V versus standard voltage memory of 1.5V	Helps reduce overall memory power consumption
	Ultra-low power platform	Specialized ultra-low power platforms are great for cloud/dense environments	Cooperative designs for specialized and ultra-low power platform provide power efficiency beyond just the processor
Direct Connect Architecture 2.0	Up to DDR3-1333 (1.333GHz) memory support	Provides higher peak throughput than earlier memory technologies	Enables improved overall system performance and investment protection compared to earlier technologies
	HyperTransport™ technology HT Assist	Helps increase coherent memory bandwidth and reduce latency in multi-node systems by reducing cache probe traffic between cores	Reduces the amount of cache probe bus traffic, enhancing a server's efficiency and scalability
	HyperTransport 3.0 technology (HT3)	Provides superior system bandwidth between processors and I/O, increasing interconnect rate from 2GT/s with HT1 in previous generations up to a maximum 6.4GT/s with HT3	Helps improves overall system balance and scalability
	Cache and core count	Choice of 4- or 6-core processors, with each core having its own L1 and L2 caches, and a shared 6MB L3 cache	Infrastructure designed to accommodate either single- or dual-socket servers providing server scalability from 4 cores to 12 cores per server platform
AMD Virtualization™ (AMD-V™) technology Features	I/O Virtualization	Supports I/O level virtualization, which provides direct control of devices by a VM (enabled by the SR5690/SR5670/SR5650 chipsets)	- Improved I/O performance within a virtual machine - Enables an I/O device to be directly assigned to a virtual machine (VM) - Improved security through VM address isolation
	AMD Extended Migration	AMD Extended Migration allows you to safely migrate a VM between various AMD64 processor revisions	Provides unprecedented flexibility in deploying, maintaining, and upgrading servers in live migration environments based on AMD64 processors

Supported processors

The PowerEdge C6145 rack server supports up to two four-socket servers featuring the AMD Opteron 6100, 6200, or 6300 series processors. The PowerEdge C6145 supports the processors listed in Table 5. For the latest information on supported processors, visit Dell.com/PowerEdgeC.

Table 5.   Supported processors

Model	Speed	Power	Cache	Core
6180SE	2.5GHz	140W	6M L2, 12MB L3	12
6176	2.3GHz	115W	6M L2, 12MB L3	12
6172	2.1GHz	115W	6M L2, 12MB L3	12
6164HE	1.7GHz	85W	6M L2, 12MB L3	12
6128HE	2.0GHz	85W	6M L2, 12MB L3	8
6136	2.4GHz	115W	6M L2, 12MB L3	8
6132HE	2.2GHz	85W	6M L2, 12MB L3	8
6280	2.6GHz	140W	8M L2, 16MB L3	16
6276	2.3GHz	115W	8M L2, 16MB L3	16
6274	2.2GHz	115W	8M L2, 16MB L3	16
6234	2.4GHz	115W	8M L2, 16MB L3	12
6212	2.6GHz	85W	8M L2, 16MB L3	8
6262HE	1.6GHz	85W	8M L2, 16MB L3	16
6386SE	2.8GHz	140W	8x2M L2, 16MB L3	16
6380	2.5GHz	115W	8x2M L2, 16MB L3	16
6378	2.4GHz	115W	8x2M L2, 16MB L3	16
6376	2.3GHz	115W	8x2M L2, 16MB L3	16
6348	2.8GHz	115W	6x2M L2, 16MB L3	12
6344	2.6GHz	115W	6x2M L2, 16MB L3	12
6328	3.2GHz	115W	4x2M L2, 16MB L3	8
6320	2.8GHz	115W	4x2M L2, 16MB L3	8
6366HE	1.8GHz	85W	8x2M L2, 16MB L3	16

Processor configurations

The PowerEdge C6145 supports dual and quad-processor configurations. All processors must match in all configurations.

The PowerEdge C6145 uses only 3.5-inch hard drives with limited configurations and 140W AMD Opteron processors.

Processor installation

For information on processor installation, see the *Dell PowerEdge C6145 Systems Hardware Owner's Manual* on Dell.com/Support/Manuals.

Chipset

The PowerEdge C6145 uses the AMD SR5690 and SR5670 chipsets. For more information, visit AMD.com.

4 Memory

The PowerEdge C6145 uses DDR3 memory to provide a high-performance, high-speed memory interface capable of low latency response and high throughput. The PowerEdge C6145 supports registered ECC DDR3 DIMMs (RDIMMs); standard-voltage and low-voltage RDIMMs are available.

The PowerEdge C6145 has 32 memory sockets split into 4 sets of 8 sockets with one set of memory sockets per processor. Each 8-socket set is organized into 4 channels, with 2 memory sockets per channel.

Supported memory

The DDR3 memory interface consists of 4 channels, with up to 2 RDIMMs per channel for dual rank (DR). The PowerEdge C6145 supports 4GB, 8GB, 16GB and 32GB low-voltage RDIMMs at 1066/1333/1600MT/s DDR3 frequencies.

The PowerEdge C6145 supports the DIMMs listed in Table 6. For the latest information on supported memory, visit Dell.com/PowerEdgeC.

Table 6.   DIMMs supported

Capacity (GB)	Speed (MT/s)	Type	Ranks per DIMM	Data width	SDDC support	Voltage
4	1333	RDIMM	2	x8	Advanced ECC	1.35
4	1333	RDIMM	1	x4	All modes	1.35
4	1600	RDIMM	2	x8	Advanced ECC	1.5
8	1333	RDIMM	2	x4	All modes	1.35
8	1600	RDIMM	2	x4	All modes	1.5
16	1066	RDIMM	4	x4	All modes	1.35
16	1333	RDIMM	2	x4	All modes	1.35
16	1600	RDIMM	2	x4	All modes	1.35
32	1333	LRDIMM	4	x4	All modes	1.35

Memory configurations

The PowerEdge C6145 server supports flexible memory configurations ranging from capacities of 4GB to 512GB (or 1TB per chassis). The PowerEdge C6145 supports a flexible memory configuration according to these basic rules:

- Speed: If DIMMs of different speeds are mixed, all channels across all processors operate at the slowest DIMM's common frequency.
- DIMM type: Only one type of DIMM is allowed per system. RDIMM and UDIMM cannot be mixed.

For more information on memory configuration, see the *Dell PowerEdge C6145 Systems Hardware Owner's Manual* on Dell.com/Support/Manuals.

Memory speed

The PowerEdge C6145 supports up to 1600MT/s memory performance with all channels and DIMMs fully populated as long as the memory speed is 1600MT/s.

The memory frequency is determined by a variety of inputs, including the speed of the DIMMs. The configuration of the DIMMs affects the speed of the processor.

Table 7 lists memory configuration and performance details for the PowerEdge C6145 based on the population of the number and type of DIMMs per memory channel.

Table 7.   Memory speed capabilities

DIMM type	DIMM 1	DIMM 2	Maximum GB/channel	Maximum speed (MT/s)		
				1.5V DIMMs	1.35V DIMMs	1.25V DIMMs
UDIMM	SR or DR	Empty	8GB	1600	1333	1333
	SR	SR	8GB	1600	1333	1333
	SR or DR	SR or DR	16GB	1333	1333	1066*
RDIMM	SR or DR	Empty	16GB	1600	1333	1333
	SR	SR	16GB	1600	1333	1333
	SR or DR	DR	32GB	1600	1333	1066*
	QR	Empty	32GB	1333	1066*	1066*
	QR	SR, DR, or QR	64GB	1066*	800*	800*

*Although the PowerEdge C6145 supports DIMM speeds of 800MT/s and 1066MT/s, you can only purchase these systems with DIMM speeds of 1333MT/s and 1600MT/s on Dell.com/PowerEdgeC.

5 Storage

Each server node can have up to a maximum of 12 hard drives, depending on the number of independent server nodes and drive type (3.5-inch or 2.5-inch) that are installed in each PowerEdge C6145 chassis. To accommodate the supported drive options, the PowerEdge C6145 has one backplane type for 12 x 3.5-inch drives, and one for 24 x 2.5-inch drives. These drive slots are divided equally across two independent midplanes with dedicated power and controller connections for each of the two nodes. All drive slots can be hot-swapped, and each Serial Attached SCSI (SAS) or Serial ATA (SATA) slot has an LED indicator to indicate drive status and health.

Note: Mixing SAS and SATA drives is not supported.

Internal storage

The PowerEdge C6145 system supports up to 12 hard disk drives per server node, depending on the number of installed nodes (1-2) and drive type (2.5-inch or 3.5-inch). The number of drives that can be installed depends on the processor TDP wattage. Hard drives must use the PowerEdge C6145 specific drive carrier.

The PowerEdge 6145 supports the following hard drive types:

- 7.2K, 10K and 15K RPM 2.5-inch and 3.5-inch SAS drives
- 7.2K RPM Enterprise 2.5-inch and 3.5-inch SATA
- The following hard disk drive configurations are for a two-node solution:
  - Up to 6 x 3.5-inch SATA (6 HD-85W, 4 HD–115W, 4HD-140W)
  - Up to 6 x 3.5-inch SAS (6 HD-85W, 4 HD–115W, 4HD-140W)
  - Up to 12 x 2.5-inch SATA (12 HD-85W, 9 HD-115W, no 140W processor support)
  - Up to 12 x 2.5-inch SAS (12 HD-85W, 9 HD-115W, no 140W processor support)
  - Up to 12 x 2.5-inch SSD
- The following hard disk drive configurations are for a single-node solution:
  - Up to 12 x 3.5-inch SATA (12 HD-85W, 8 HD–115W, 8HD-140W)
  - Up to 12 x 3.5-inch SAS (12 HD-85W, 8 HD–115W, 8HD-140W)
  - Up to 24 x 2.5-inch SATA (12 HD-85W, 9 HD-115W, no 140W processor support)
  - Up to 24 x 2.5-inch SAS (12 HD-85W, 9 HD-115W, no 140W processor support)
  - Up to 24 x 2.5-inch SSD

Supported hard drives

Table 8 lists the hard drive options for the PowerEdge C6145 rack server. For additional information, see Dell.com/PowerEdgeC.

Table 8.   Supported hard drives on the PowerEdge C6145

Form factor	Type	Speed (rpm)	Capacities
3.5"	SATA	7.2K	500GB, 1TB, 2TB, 3TB, 4TB
	Nearline SAS (6Gb)	7.2K	1TB, 2TB, 3TB, 4TB
	SAS (6Gb)	15K	300GB, 600GB

Form factor	Type	Speed (rpm)	Capacities
2.5"	SATA	7.2K	500GB, 1TB
	Nearline SAS (6Gb)	7.2K	500GB, 1TB
	SAS (6Gb)	10K	300GB, 600GB, 900GB, 1.2TB
	SAS (6Gb)	15K	146GB, 300GB
	SATA SSD (MLC)	NA	300GB, 600GB
	SATA SSD (eMLC)	NA	100GB, 200GB, 400GB

RAID configurations

The PowerEdge C6145 supports RAID configurations, but only as a user-configurable option. See the available RAID options in Table 9.

Table 9.   RAID support

Controller	Supported RAID levels
Embedded SP5100 SATA Controller	RAID 0, 1, 10
LSI 2008 mezzanine	RAID 0,1, 10
LSI MegaRAID SAS 9265-8i SGL PCIe card	RAID 0, 1, 5, 6, 10, 50, 60

Storage controllers

LSI 9265-8i PCIe card

The PowerEdge C6145 supports a SAS daughtercard option if you need high performance SAS drives but do not require higher-end resiliency features such as battery backup for NVRAM. Other features include:

- Storage controller: LSI MegaRAID SAS 9265-8i
- Maximum quantity of storage devices: 6 hard drives
- RAID level: RAID 0, 1, 5, and 6
- RAID spans: 10, 50, and 60
- Device type: PCIe add-in controller
- PCI interface: PCIe 2.0 x8 lanes
- SAS interface type: Two MiniSAS SFF-8087 x4 connectors
- SAS interfaces transfer rate: Up to 6 Gb/second per port
- Max ambient when this card is installed is 30°C

Table 10 lists the features for the RAID support.

Table 10.   Detailed RAID support

	Product	Usage	Slot	PCI connector	PCI bracket	I/O connector	RAID	Battery backup unit
SAS HBA SAS/SATA	LSI 9265-8i SGL	Internal backplane storage RAID (HDD, SDD)	PCIe slot	x8	Yes	2 mini-SAS x4	RAID 0, 1, 5, 6, 10, 50, 60	Yes
	LSI 2008 mezzanine card	Internal backplane storage (HDD, SDD)	Mezzanine connector	x8	N/A	1 mini-SAS x4 + 2 SAS	RAID 0, 1, 10	N/A
SP5100	On planar through chipset	Internal SATA HDDs only	N/A	N/A	N/A	6x internal	N/A	N/A

Optical drive

The PowerEdge C6145 chassis does not support optical drives. If needed, any external USB 2.0 compliant drive can be used, although no specific vendors have been qualified.

Tape drive

The PowerEdge C6145 chassis does not support an internal tape drive. External storage peripherals are not directly validated with PowerEdge C6145, but customers can use any supported network-based storage options validated with our network and fabric card matrix.

6 Networking and I/O

For the latest information on PowerEdge C6145 supported cards, visit Dell.com/PowerEdgeC.

Embedded NICs/LAN on motherboard (LOM)

The PowerEdge C6145 has a single Intel 82576 dual-port Gigabit Ethernet controller installed on its system board as an independent Ethernet interface device. From a board perspective, the LOM refers to this controller. Other features include:

- x4 PCIe 2.0 capable interface
- 2.8W maximum power
- 64KB packet buffer
- NC-SI (network controller-sideband interface) connection for shared manageability connection with the BMC
- Wake-on-LAN (WOL)
- PXE 2.0 remote boot
- iSCSI boot
- IPv4 and IPv6 support
- VMDq support (8 VMs)
- PCI-SIG single root I/O virtualization (direct assignment)
- Queues per port: 16 TX queues and 16 RX queues
- Supports teaming

I/O slots

The PowerEdge C6145 supports up to three add-in cards and one mezzanine card, as well as one iPASS cable connector (dedicated HIC).

- The three x16 PCIe 2.0 slots are used as follows:
    - PCIe x16 Slot 1: for low-profile card on riser card
    - PCIe x16 Slot 2: for half-length/half-height card on riser card
    - PCIe x16 Slot 3: for half-length/half-height card on microSD riser card
- One x16 mezzanine slot
- One x16 iPASS external port
- Onboard PLX PEX8647

Three expansion slots are supported by two kinds of riser cards, including:

- Standard riser card
- MicroSD riser card

For information on card installation, requirements, and slot priorities, see the *Dell PowerEdge C6145 Systems Hardware Owner's Manual* on Dell.com/Support/Manuals.

Table 11 lists the supported mezzanine and add-in cards.

Table 11.   Supported mezzanine and add-in cards

Card type	Interface
LSI 2008 6-port SAS	Mezzanine slot
Intel 82559 dual-port 10GbE (SFP+)	Mezzanine slot
Mellanox ConnectX-2 dual-port QDR InfiniBand	Mezzanine slot
Intel X520 DA dual-port 10GbE SFP+, PCIe-8 NIC	Riser slot
QLogic® single-port QDR InfiniBand QLE7340	Riser slot
LSI 9265-8i	Riser slot
Intel 1Gb ET quad-port	Riser slot
Mellanox QDR dual-port (QSFP)	Riser slot
QLogic QDR single-port (QSFP)	Riser slot
Dell HIC (PLX)	Riser slot
NVIDIA® HIC	Riser slot

NIC cards

Table 12 lists the supported NIC add-in cards.

Table 12.   Supported NIC add-in cards

Card type	Interface
Intel 82559 dual-port 10GbE, PCIe x8	PCIe x8 mezzanine slot
Intel Gb ET quad-port 1GbE	Add-in x16 riser

Intel 82559 dual-port 10GbE NIC card

The Intel 82559 (SFP+) fast Ethernet controller with an integrated 10/100 Mbps physical layer device is Intel's leading solution for PCI board LAN designs. The Intel 82559 is designed to use in NICs, LOM designs, embedded systems and networking system products. The Intel 82559 combines a low-power, small package design, which is ideal for environments with power and space constraints.

Intel Gb ET quad-port 1GbE NIC card

The Intel Gb ET quad-port 1GbE NIC card has the following features:

- Two Intel NH82546GB Gigabit controllers
- Remote management support
- IEEE 802.3ab compatibility

- Support for most network operating systems
- Auto-sensing self-configuring 10/100/1000 Mbps performance

PCI card dimensions

The PowerEdge C6145 server nodes accept half-height/half-length and low-profile PCIe add-in card options.

7 Power

Lower overall system-level power draw is a result of Dell's breakthrough system design. PowerEdge servers maximize performance per watt through a combination of power and cooling, energy efficient technologies, and tools. Additionally, PowerEdge servers have an extensive collection of sensors that automatically track thermal activity, which helps regulate temperature thereby reducing server noise and power consumption.

Power consumption and energy efficiency

With the rise in the cost of energy coupled with increasing data center density, Dell provides tools and technologies to help you realize greater performance with less energy cost and waste. More efficient data center usage can reduce costs by slowing the need for additional data center space. Table 13 lists the tools and technologies Dell offers to help you achieve your data center goals by lowering power consumption and increasing energy efficiency.

Table 13.   Power tools and technologies

Feature	Description
Tools for right-sizing	**Energy Smart Solution Advisor (ESSA)** is a tool that can help you determine the most efficient configuration possible. With Dell's ESSA, you can calculate the power consumption of your hardware, power infrastructure, and storage. ESSA can help you determine exactly how much power your server will use at a given workload, and the PSU Advisor can help you choose the best, most efficient PSU for your workload. Learn more at Dell.com/ESSA.
Industry compliance	The PowerEdge C6145 is compliant with industry certification 80 PLUS.
Power monitoring accuracy	Power supply monitoring improvements include: • Dell's power monitoring accuracy is currently 1%, whereas the industry standard is 5% • More accurate reporting of power • Better performance under a power cap
Power capping	Use Dell's systems management to set the power cap limit for your systems to limit the output of a power supply and reduce system power consumption. Dell is the first hardware vendor to leverage Intel Node Manager for circuit-breaker fast capping.
Active power management	**Intel Node Manager** is an embedded technology that provides individual server-level power reporting and power limiting functionality. **Thermal control of fan speed** optimizes the thermal settings for your environment to reduce fan consumption and lower system power consumption. **Idle power** enables Dell servers to run as efficiently when idle as when at full workload.

Feature	Description
Dell Fresh Air cooling	With the thermal design and reliability of Dell products, you can have the capability to operate at excursion-based temperatures beyond the industry standard of 35°C (95°F) without impacting your availability model. This solution takes into account servers, networking, storage, and other infrastructure. Find additional information at Dell.com/FreshAir.

Find additional information at Dell.com/PowerAndCooling and Power.com/PowerCenter.

Power supplies

The base redundant system consists of two hot-plug power supplies in a 1+1 configuration available at 1100W and 1400W. Dell power supplies have achieved Platinum efficiency levels as shown in Table 14.

Table 14.   Power supply efficiency

Form factor	Output	Class	Efficiency targets by load			
			10%	**20%**	**50%**	**100%**
Redundant 86mm	1400W AC	Platinum+	89.0%	93.0%	94.5%	92.0%
	1100W AC	Gold	89.0%	93.0%	94.5%	92.0%

System power supply throttling feature

The PowerEdge C6145 supports a power supply throttling feature that protects the system if power consumption exceeds the maximum for the supply (either 1400W or 1100W). In configurations where power consumption is greater than the maximum, redundancy is lost, and the PowerEdge C6145 throttles power consumption of the two- or four-independent nodes to stay within the power budget. Performance is degraded in this mode, but the system continues to operate. After you replace the failed power supply, redundancy is restored and all nodes resume normal operation.

8 Rack information

Rack installation components such as rails are provided with the PowerEdge C6145 rack kit. The components consist of a static rail system; there is no support for cable management arms.

Rails

The static rails allow for tool-less installation in 19-inch EIA-310-E compliant square or unthreaded round hole 4-post racks. These include all Dell 42xx and 24xx racks. (Note: APC racks are also supported.) Other specifications include:

- Rail depth: 602mm
- Square-hole and round-hole rack adjustment range: 582–822mm

9 Operating systems and virtualization

The Dell PowerEdge C6145 supports a wide range of industry-standard operating systems and virtualization software.

Supported operating systems

The PowerEdge C6145 supports the following operating systems:

- Microsoft Windows HPC Server 2008 R2 (64-bit)
- Microsoft Windows Server 2008 Core R2 (64-bit)
- Microsoft Windows Server 2008 R2 Enterprise (64-bit)
- Novell SUSE Linux Enterprise Server 11 SP2
- Red Hat Enterprise Linux

Supported virtualization

The PowerEdge C6145 supports the following virtualization hypervisors:

- VMware vSphere ESXi
- Citrix XenServer
- Microsoft Hyper-V Server 2008 R2

10 Systems management

Systems management for the PowerEdge C6145 is through third-party solutions only. There is no Dell OpenManage support for server management at this time.

Embedded server management

The PowerEdge C6145 supports BMCs that comply with IPMI v2.0. The PowerEdge C6145 BMC provides the following features for managing the server remotely or in data center lights-out environments:

- Views of hardware sensors (temperature, voltage, presence, error)
- Error alerts (server reset, critical sensor values, and others) using email traps, paging and more.
- Option to share embedded NIC Ethernet ports
- WSMan CLI/SMASH CLP
- IPMI 2.0 monitoring and management functionality
- Server reset, reboot and power-on/off/cycle
- Remote KVM-over-IP console support for up to three simultaneous users

Appendix A. Additional specifications and options

System dimensions

Figure 5 detail the dimensions of the PowerEdge C6145.

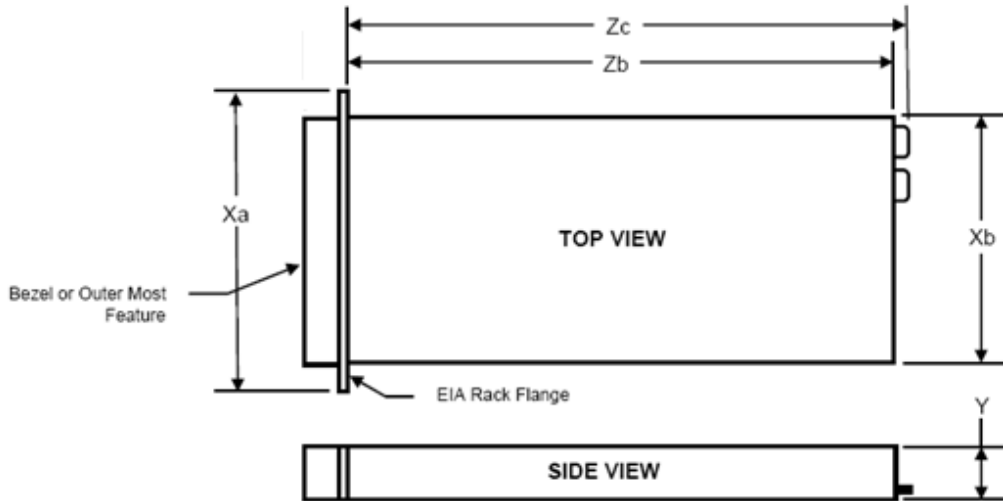**Figure 5.   PowerEdge C6145 chassis dimensions**

Table 15.   PowerEdge C6145 chassis dimensions

Xa	Xb	Xa without bezel	Y	Zb	Zc
48.23cm	44.8cm	48.16cm	8.68cm	75.94cm	78.42cm

System weight

Table 16 lists the weight of the PowerEdge C6145 rack server at minimum and maximum configuration.

Table 16.   System weight

Maximum configuration	Minimum configuration
42Kg (92.61lb)	16.5Kg (36.38lb)

Environmental specifications

Table 17 details the environmental specifications for the PowerEdge C6145 rack server. For the most up-to-date information, see the *Dell PowerEdge C6145 Getting Started With Your System* on Dell.com/Support/Manuals. For additional information about environmental measurements for specific system configurations, see Dell.com/environmental_datasheets.

Table 17.   Environmental specifications

Temperature	
Operating	10° to 35° C (50° to 95° F) with a maximum temperature gradation of 10° C per hour. Note: For altitudes above 2950 feet, the maximum operating temperature is de-rated 1°F/550 ft
Storage	-40° to 65° C (-40° to 149° F) with a maximum temperature gradation of 20° C per hour
Relative humidity	
Operating	20% to 80% (non-condensing) with a maximum humidity gradation of 10% per hour
Storage	5% to 95% (non-condensing) with a maximum humidity gradation of 10% per hour
Maximum vibration	
Operating	0.26 Grms at 5Hz to 350Hz for 5 minutes in operational orientations
Storage	1.88 Grms at 10Hz to 500Hz for 15 minutes in all orientations
Maximum shock	
Operating	One shock pulse in the positive z-axis (one pulse on each side of the system) of 31G for 2.6ms in the operational orientation
Storage	Six consecutively executed shock pulses in the positive and negative x, y, and z axes (one pulse on each side of the system) of 71G for up to 2ms. Six consecutively executed shock pulses in the positive and negative x, y, and z axes (one pulse on each of the system) of 27G faired square wave pulse with velocity change at 235in/second (597cm/sec)
Altitude	
Operating	-16 to 3048 m (-50 to 10,000 ft) Note: For altitudes above 2950 feet, the maximum operating temperature is de-rated 1°F/550 ft
Storage	-16 to 10,600 m (-50 to 35,000 ft)
Airborne contaminant level	
Class G1 or lower as defined by ISA-S71.04-1985	

Video specifications

The baseboard management controller (BMC) for the PowerEdge C6145 incorporates an integrated video subsystem that is connected to the 32-bit PCI interface of the ICH10R. The logic is based on the ATS2050 and supports 2D graphics only. The video device output is available only as a rear video port. The integrated video core shares its video memory with the BMC's 64MB DDR2 application space memory. This memory is also used for the KVM buffer. Table 18 lists the supported video modes.

Table 18.   Supported video modes

Resolution	Refresh Rate (Hz)	Color Depth (bit)
640 x 480	60, 72, 75, 85	8, 16, 32
800 x 600	56, 60, 72, 75, 85	8, 16, 32
1024 x 768	60, 72, 75, 85	8, 16, 32
1152 x 864	75	8, 16, 32
1280 x 1024	60, 75, 85	8, 16

Resolution	Refresh Rate (Hz)	Color Depth (bit)
1280 x 1024	60	32
1600 x 1200	60	32

Power supply specifications

Table 19 lists power supply specifications for the PowerEdge C6145.

Table 19.   Power supply specifications

Specification	1400W AC power supply	1100W AC power supply
Current consumption	8.6-7.2A	12.0-6.7A
Supply voltage	200−240VAC	100−240VAC (auto ranging)
Frequency	50/60Hz	50/60Hz
Heat dissipation	5432 BTU/hour maximum	4575 BTU/hour maximum
Maximum inrush current	Initial in-rush current cannot exceed 55A (peak). Secondary inrush current cannot exceed 35A (peak).	Initial in-rush current cannot exceed 55A (peak). Secondary inrush current cannot exceed 35A (peak).

USB peripherals

The PowerEdge C6145 supports the following USB 2.0 compliant devices through the two front ports:

- DVD (bootable)
- USB key (bootable)
- Keyboard (only one USB keyboard is supported)
- Mouse (only one USB mouse is supported)

Appendix B. Standards compliance

The PowerEdge C6145 rack server conforms to the industry standards listed in Table 20.

Table 20.   Industry standard documents

Standard	URL for information and specifications
ACPI Advance Configuration and Power Interface Specification, v2.0c	acpi.info
Ethernet IEEE 802.3-2005	standards.ieee.org/getieee802/802.3.html
HDG Hardware Design Guide Version 3.0 for Microsoft Windows Server	microsoft.com/whdc/system/platform/pcdesign/desguide/serverdg.mspx
DDR3 Memory DDR3 SDRAM Specification, Rev. 3A	jedec.org/download/search/JESD79-3C.pdf
PCI Express PCI Express Base Specification Rev. 2.0 and 3.0	pcisig.com/specifications/pciexpress
PMBus Power System Management Protocol Specification, v1.2	pmbus.info/specs.html
SAS Serial Attached SCSI, v1.1	t10.org
SATA Serial ATA Rev. 2.6; SATA II, SATA 1.0a Extensions, Rev. 1.2	sata-io.org
SMBIOS System Management BIOS Reference Specification, v2.7	dmtf.org/standards/smbios
UEFI Unified Extensible Firmware Interface Specification, v2.1	uefi.org/specs
USB Universal Serial Bus Specification, Rev. 2.0	usb.org/developers/docs
Windows Logo Windows Logo Program System and Device Requirements, v3.10	microsoft.com/whdc/winlogo/hwrequirements.mspx

Appendix C. Additional resources

Table 21 provides a list of documents and websites that provide for more information on the Dell PowerEdge C6145 rack server.

Table 21.   Additional resources

Resource	Description of contents	Location
Dell PowerEdge C6145 Systems Hardware Owner's Manual	This manual, available in PDF format, provides the following information: • Chassis features • System Setup program • System messages • System codes and indicators • System BIOS • Remove and replace procedures • Troubleshooting • Diagnostics • Jumpers and connectors	Dell.com/Support/Manuals
Dell PowerEdge C6145 Getting Started With Your System	This guide is printed and shipped with the system, and is also available in PDF format on the Dell support site. This guide provides information on the following: • Initial setup steps • Key system features • Technical specifications	Dell.com/Support/Manuals
Dell PowerEdge 2420, 4220, and 4820 Rack Enclosures Technical Guide	This document provides details about the PowerEdge rack enclosures.	Dell.com/us/Enterprise
Rack Installation Instructions	This printed document is provided with the rack kits. The document provides the instructions for installing the server in a rack.	Dell.com/Support/Manuals
Using the Baseboard Management Controller	This document is available in PDF format on the Dell support site. This document provides information on the BMC.	Dell.com/Support/Manuals
Information Update	This document is printed and shipped with the system, and is also available in PDF format on the Dell support site. This document provides information on system updates.	Dell.com/Support/Manuals

Resource	Description of contents	Location
Energy Smart Solution Advisor	The Dell Energy Smart Solution Advisor (ESSA) enables easier and more meaningful estimates to help you determine the most efficient configuration possible. Use ESSA to calculate the power consumption of your hardware, power infrastructure, and storage.	Dell.com/ESSA
Power and cooling technologies	Provides details for improving energy efficiency in the data center.	Dell.com/PNC
Energy management	Provides information on Dell's Fresh Air cooling solutions.	Dell.com/FreshAir
Processor and chipset	Provides more information about the PowerEdge C6145 processors and chipset.	AMD.com
Power distribution unit	Provides help selecting a rack-based power distribution unit.	DellPDU.com
Uninterruptible power supply	Provides help selecting an uninterruptible power supply model.	DellUPS.com
Volatility information	Contact your Dell sales representative.	Dell.com/Support/Manuals