PowerEdge R220

Technical Guide

PowerEdge R220 — performance, data storage and protection, and intuitive systems management in a short-depth form factor optimized for constrained spaces.

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1 System Overview

Introduction

The PowerEdge R220 1U rack server is an excellent choice for growing businesses and organizations needing a short-depth rack-optimized chassis delivering performance, data protection and enterprise-class systems management. The R220 is ideal for web hosting, mail serving, file and print serving, video streaming, as well as a wide range of general-purpose productivity applications — and with a short chassis depth of 15.5" and quiet office acoustics, you can install it virtually anywhere.

Realize greater efficiency

Drive applications and media faster with powerful, multi-core Intel® Xeon® E3-1200 v3 processors — boasting 33% more cache per core than previous generation E3 processors. Or, choose from a range of Intel Celeron®, Pentium® or Core® processors to meet your specific performance and budget requirements.

- Experience faster response times with four DIMM slots for memory expansion up to 32GB.
- Drive fast I/O transfers and application performance with a latest-generation, widest-bandwidth PCIe 3.0 x16 expansion slot.
- Protect critical workloads requiring continuous access to data with hardware RAID options.

Discover greater versatility

Specifically designed for space-constrained environments, the PowerEdge R220 has a short-depth 15.5" chassis and quiet-office acoustics so it can operate unobtrusively virtually anywhere. And, with five USB ports, you can quickly and flexibly attach more devices.

Experience greater simplicity

Speed deployment and ease ongoing administration with simplified, intuitive, enterprise-class systems management. Dell OpenManage™ systems management saves time, reduces the number of steps taken to accomplish tasks, and reduces potential for error, helping IT administrators enhance their productivity and free up time to focus on more strategic tasks. The optional integrated Dell Remote Access Controller 7 (iDRAC7) with Lifecycle Controller provides agent-free management capabilities throughout the server lifecycle, without the hassle and potential for error involved with managing a software management agent.

New technologies

Table 1 summarizes new technologies featured on the Dell PowerEdge R220 rack server.

Table 1.   New technologies

New technology	Detailed description
Intel Xeon processor E3-1200 v3 product family and Intel C222 series chipset	The Intel Xeon processor E3-1200 v3 product family combined with the Intel C220 series chipset enables memory speeds of up to 1600MT/s, improved I/O throughput and power efficiency enhancements. See the Processor section for details.
Next-generation PERC options	The PowerEdge R220 supports the PERC8 controller cards with improved functionality and faster performance. See the Storage section for details.
Next-generation SW RAID	PERC S110 (SW RAID) supports RAID 0, 1, 5 and 10. PERC S110 supports up to four hot-swap SATA HDDs or SATA SSDs.

New technology	Detailed description
iDRAC7 with LifeCycle Controller	The new embedded system management solution for Dell PowerEdge servers features hardware and firmware inventory and alerting, in depth memory alerting, faster performance, dedicated gigabit port, email alerts, electronic licensing, enhanced power management features, editable user work notes log and more. See the Dell OpenManage Systems Management section for details.
PCI Express (PCIe) x16 3.0 slot	PCIe x16 3.0 expansion slot enables 2x the data throughput and faster response times over previous generations.

2 System features

The one-socket 1U PowerEdge R220 rack server delivers performance, data storage and protection, and intuitive systems management in a short-depth 15.5" form factor optimized for constrained spaces. It is an excellent server for web hosting, mail serving, file and print serving, video streaming, as well as a wide range of general-purpose productivity applications.

Comparison of PowerEdge systems

The R220 is the new generation PowerEdge server replacing the R210 II. Table 2 compares features of the R220 to those of the R210 II.

Table 2.   Comparing the PowerEdge R220 to PowerEdge R210 II

Feature	PowerEdge R210 II	PowerEdge R220
Chassis	1U rack	1U rack
Processors	Intel Xeon processor E3-1200 v2 product family Intel Pentium Intel Celeron	Intel Xeon processor E3-1200 v3 product family Intel Pentium Intel Celeron Intel Core
Memory	4 x DDR3 UDIMMs up to 32GB, 1066/1333MT/s	4 x DDR3 UDIMMs up to 32GB, 1333/1600MT/s
Hard drive bays	2 x 3.5" or 4 x 2.5"	2 x 3.5" or 2 x 2.5"
Embedded HDD controller	Chipset-based SATA, PERC S100 (Embedded SW RAID)	Chipset-based SATA, PERC S110 (Embedded SW RAID)
Optional storage controller	NON-RAID: • 6Gbps SAS HBA RAID: • PERC S100 • PERC S300 • PERC H200 External Storage: • PERC H800	Non-RAID • 6Gbps SAS HBA RAID: • PERC S110 • PERC H310 External Storage: • PERC H810
Dell OpenManage Systems Management	Basic management IPMI 2.0 compliant Optional iDRAC6 (Express or Enterprise) with Lifecycle Controller	OpenManage Essentials OMSA Agent OpenManage Power Center (requires iDRAC7 Enterprise with Lifecycle Controller) OpenManage Integrations and Connections Basic management (standard option)
PCI slot	1 PCIe 2.0 x16 full height, half length	1 PCIe 3.0 x16 full height, half length
Embedded NIC	Broadcom® 5720 dual-port 1Gb LOM	Broadcom 5720 dual-port 1Gb LOM

Power supply	Non-redundant, 250W Auto-ranging (100V~240V)	Non-redundant, 250W Auto-ranging (100V~240V)
Power efficiency	Bronze	Silver
Dimensions (H x W x D)	42.4 x 434.0 x 394.3 (mm) (w/o ear, w/o bezel) 1.66" x 17.09" x 15.52" (in)	42.4 x 434.0 x 394.3 (mm) (w/o ear, w/o bezel) 1.66" x 17.09" x 15.52" (in)
Weight	Max. 17.76 lb (8.058kg)	Max. 17.76 lb (8.058kg)

Specifications

Table 3 summarizes specifications for PowerEdge R220 features. For the latest information on supported features for the PowerEdge R220, visit Dell.com/PowerEdge.

Table 3.   Technical specifications

Feature	PowerEdge R220 technical specification	
Form factor	1U rack	
Processors	Intel Xeon processor E3-1200 v3 product family Intel Pentium Intel Celeron Intel Core	
Processor socket	1 socket	
Cache	2.0MB L3 per core; core options: 2, 4	
Chipset	Intel C222	
Memory[1]	,4 x DDR3 UDIMM, up to 32GB, up to 1600MT/s	
PCIe slot	1 PCIe riser (optional) 1 PCIe x16 3.0 slot	
RAID controller	**Internal controllers:** PERC S110 PERC H310 Chipset-based SATA	**External HBAs (RAID):** PERC H810 **External HBAs (non-RAID):** 6Gbps SAS HBA
Hard drives (hot-plug)	**Drive bay options:** Up to 2 x 2.5" Up to 2 x 3.5" 1 slim optical drive **Hard drive options:** 2 x 3.5" SATA, SAS, or NL SAS 2 x 2.5" SAS, NL SAS, or SSD	
Embedded NIC	Broadcom® 5720 dual-port 1Gb LOM	

Feature	PowerEdge R220 technical specification	
I/O adapter options	**1Gb/10Gb Ethernet:** Broadcom 5719 quad-port 1Gb NIC Broadcom 5720 dual-port 1Gb NIC Intel I350 dual-port 1Gb stand-up adapter Intel I350 quad-port 1Gb stand-up adapter Intel X520 dual-port 10Gb DA/SFP+ Intel X540 2x10Gb Base-T **10Gb Converged Ethernet:** Broadcom 57810S dual-port 10Gb Base-T Emulex® OCe14102-UX-D 2x PCIe 10GbE QLogic® QLE8262, 10Gb	**FC8 HBA:** Qlogic QLE2560 8Gb QLogic QLE1562, 8Gb Emulex LPe-12002 8Gb Emulex LPe-12000 8Gb
Power supply	Auto-ranging, Silver efficiency, 250W AC	
USB	5 total: 2 rear USB 3.0 2 front USB 2.0 1 internal USB 2.0	
Availability	High-efficiency, hot-plug, redundant power supplies; hot-plug hard drives; TPM; optional bezel; information tag; ECC memory; interactive LCD screen; extended thermal support; ENERGY STAR® compliant	
Dell OpenManage Systems Management	Basic management IPMI 2.0 compliant Dell OpenManage Essentials Dell OpenManage Mobile Dell OpenManage Power Center Dell OpenManage Integrations: • Dell OpenManage Integration Suite for Microsoft System Center • Dell OpenManage Integration for VMware® vCenter® Dell OpenManage Connections: • HP Operations Manager, IBM Tivoli®, Netcool® and CA Network and Systems Management • Dell OpenManage Plug-in for Oracle Database Manager	
Rack support	ReadyRails™ static rails for tool-less mounting in 4-post racks with square or unthreaded round holes or tooled mounting in 4-post threaded hole racks, with support for tooled mounting in 2-post racks.	
Operating systems	Microsoft® Windows Server® 2008 R2 SP1 Microsoft Windows Server 2012 Microsoft Windows Server 2012 R2 Red Hat® Enterprise Linux® 6.4 SUSE® Linux® Enterprise Server 11 SP3	**Virtualization:** VMware vSphere ESXi Microsoft Windows Server 2008 R2 SP1 (with Hyper-V® enabled) Microsoft Windows Server 2012 R3 (with Hyper-V enabled)

[1]GB means 1 billion bytes and TB equals 1 trillion bytes; actual capacity varies with preloaded material and operating environment and will be less.

3 Chassis views and features

The Dell PowerEdge R220 is a 1U, one-socket rack server. For additional system views and features, see the *Dell PowerEdge R220 Owner's Manual* on Dell.com/Support/Manuals.

Chassis views

Figure 1 shows the LED panel and optional locking bezel on the front of the R220 chassis.

Figure 1.   PowerEdge R220 front panel

Figure 2 shows the features on the back panel of the R220 including USB connectors, Ethernet connectors, serial connector, video connector, PCIe slot, power supply and many other components and features described in this guide.

Figure 2.   PowerEdge R220 back panel view

The PowerEdge R220 chassis is optimized for easy access to components and for airflow for effective and efficient cooling. The R220 supports up to four DIMMs, one processor and many other components and features described in this guide.

Figure 3 and Figure 4 detail key aspects of the internal chassis

Figure 3.   Internal view

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Figure 4.   Internal chassis view
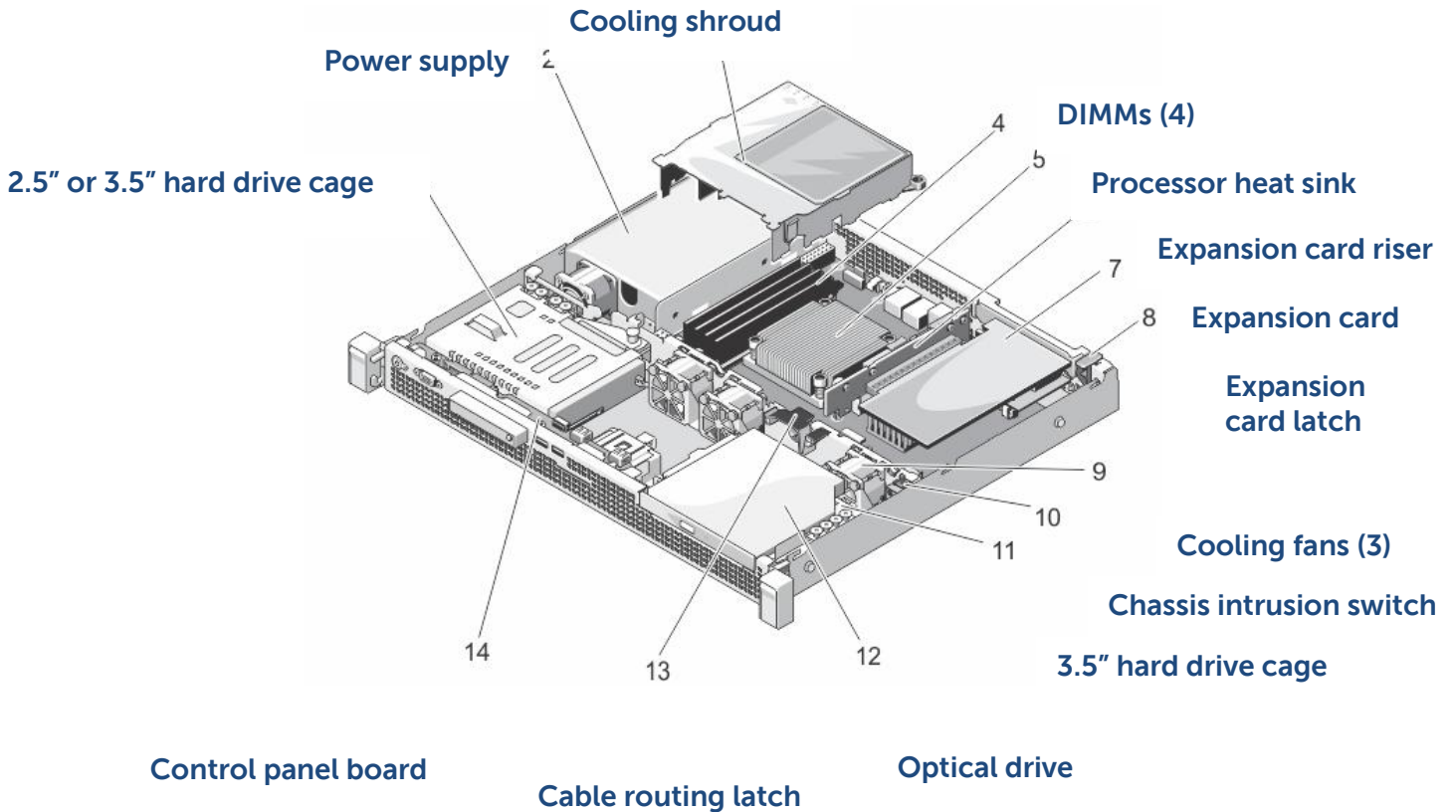
Chassis features

Table 4 lists the features on the R220 chassis. For additional information, see the *Dell PowerEdge R220 Owner's Manual* on Dell.com/Support/Manuals.

Table 4.   Chassis features

Feature	Description
Power button and indicator	ACPI-complaint power button with an integrated green power LED
Front bezel	Covers the system's front-loading hard drives; can be locked to prevent hard drives from being removed
NMI button	Recessed non-maskable interrupt (NMI) button used to troubleshoot software and device driver errors; use only if directed to do so by qualified support personnel or by the operating system's documentation
System identification button	Buttons on the back and front of a system to help identify the unit in a data center environment
Information tag	Slide-out label panel for recording system information
USB connectors	Up to five USB ports connect USB devices to the system
Video connector	Connects a monitor to the system
LCD control panel	Displays system ID, status information, and system error messages; two navigation buttons to scroll through the menu on the LCD and one select button
vFlash media reader	Supports one vFlash media card; functionality is activated only when iDRAC Enterprise is enabled
Hard drive bays	Up to 2 x 2.5" or 2 x 3.5"
Hard drive activity LEDs	Indicate the status and activity of the hard drives
Optical drive (optional)	Supports optional DVD drives; see the Storage section
Video connector	One connector on front panel for rack mount
PCIe slot	One PCIe x16 3.0 slot
Power supply unit	Non-redundant, 250W, auto-ranging (100V~240V)
Power supply indicators	Indicate whether system has power
NIC indicators	Indicate network activity and status
Ethernet connectors	Choice of network connectors through the Select Network Adapter family
Serial connector	Connects a serial device to the system
iDRAC7 Enterprise port	Dedicated management port for optional iDRAC7 Enterprise

Feature	Description
Quick Resource Locator (QRL)	This code on the chassis can be scanned by a phone application to access additional information and resources for the server, including videos, reference materials, service tag information, and Dell contact information.

Quick Resource Locator

Dell PowerEdge 12th generation servers feature a Quick Resource Locator (QRL) — a model-specific Quick Response (QR) code that is located inside the R220 chassis cover (see Figure 5). Use your smartphone to access the Dell QRL app to learn more about the server.

Figure 5.   QRL location

This QRL code allows you to:

- View step-by-step videos, including overviews of system internals and externals, as well as detailed, concise, task-oriented videos and installation wizards
- Locate reference materials, including searchable owner's manual content, LCD diagnostics and an electrical overview
- Look up your service tag so you can quickly gain access to your specific hardware configuration info and warranty information
- Contact Dell directly (by link) to get in touch with technical support and sales teams and provide feedback to Dell

These codes provide an easy way to retrieve the critical support information you need when you need it, making you more efficient and effective in managing your hardware.

Security features

The latest generation of PowerEdge servers has the features listed in Table 5 to help ensure the security of your data center.

Table 5.   Security features

Security feature	Description
Cover latch	A tooled latch is integrated in the side cover to secure it to the rack chassis.
Bezel	A metal bezel is mounted to the chassis front to provide the Dell ID. A lock on the bezel is used to protect un-authorized access to hard drives. System status is viewable on the LCD screen when the bezel is installed.
Hard drive	The front bezel on the system contains a lock which secures the hard drives.
TPM	The Trusted Platform Module (TPM) is used to generate/store keys, protect/authenticate passwords, and create/store digital certificates. It also supports the Intel Xeon TXT functionality. TPM can also be used to enable the BitLocker™ hard drive encryption feature in Windows Server 2008. TPM 1.2 is supported. The China TCM solution is not supported on the PowerEdge R220.
Power-off security	BIOS has the ability to disable the power button function.
Intrusion alert	An internal switch is used to detect chassis intrusion.
Secure mode	BIOS has the ability to enter a secure boot mode through system setup. This mode includes the option to lock out the power and NMI switches on the control panel or set up a system password.

4 Processor

The PowerEdge R220 offers powerful, multi-core Intel Xeon E3-1200 v3 processors — boasting 33% more cache per core than previous-generation E3 processors. Or, choose from a range of Intel Celeron, Pentium or Core processors to meet your specific performance and budget requirements.

Processor features

- Intel Hyper-Threading Technology increases processing efficiency and overall performance for demanding workloads.
- Faster connections throughout the system with support for up to DDR3 1600MT/s memory.
- Intel Rapid Storage Technology Enterprise to protect critical business information and recover quickly in the event of hard drive failure.
- New micro-architecture on 22nm process delivers higher performance and lower power.
- Intel Data Protection Technology to enhance the security of sensitive data and files.
- PCI Express 3.0 (PCIe 3.0) interface to increase data throughput up to 2x.
- Faster application response time by doubling data storage throughput with the SATA 3.0 interface.

For more information on the Intel Xeon processors, visit Intel.com.

Supported processors

Table 6 lists the Intel Xeon processors supported by the PowerEdge R220. For the latest information on supported processors, visit Dell.com/PowerEdge.

Table 6.   Supported processors

Model	Speed	TDP	Cores/threads	Cache	Turbo	Memory speed
Intel® Xeon® E3-1280 v3	3.6GHz	82W	4/8	8M	Yes	1600MT/s
Intel Xeon E3-1270 v3	3.5GHz	80W	4/8	8M	Yes	1600MT/s
Intel Xeon E3-1240 v3	3.4GHz	80W	4/8	8M	Yes	1600MT/s
Intel Xeon E3-1230 v3	3.3GHz	80W	4/8	8M	Yes	1600MT/s
Intel Xeon E3-1230L v3	1.8GHz	25W	4/8	8M	Yes	1600MT/s
Intel Xeon E3-1220 v3	3.1GHz	80W	4/4	8M	Yes	1600MT/s
*Intel Core® I3-4330	3.5GHz	54W	2/4	4M	No	1600MT/s
**Intel Core I3-4130	3.4GHz	54W	2/4	3M	No	1600MT/s
Intel Pentium® G3430	3.3GHz	54W	2/2	3M	No	1600MT/s
*Intel Pentium G3420	3.2GHz	54W	2/2	3M	No	1600MT/s
Intel Celeron® G1820	2.7GHz	54W	2/2	2M	No	1600MT/s

   *OEM only
   **OEM and Dell-branded

For information on processor installation and configuration, see the *Dell PowerEdge R220 Systems Owner's Manual* on Dell.com/Support/Manuals.

Chipset

The PowerEdge R220 uses the Intel C222 Chipset. Designed for use in small business servers, entry workstations, micro-servers, and data center graphics servers, this chipset delivers dependability and productivity by providing new levels of cost-effective data protection, performance, expanded security, virtualization and power management options. For more information, visit Intel.com.

5 Memory

The Dell PowerEdge R220 provides a high performance, high-speed memory interface capable of low latency response and high throughput. Intel-based R220 systems offer up to 4 DIMMs and up to 32GB memory.

Supported memory

The R220 supports the memory technologies shown in Table 7.

Table 7.   Memory technologies supported

Feature	UDIMM
Register	No
Buffer	No
Frequencies*	1600MT/s
Ranks supported	2
Capacity per DIMM	4 or 8GB
Maximum DIMMs per channel	2
DRAM technology	2Gb and 4Gb
Temperature sensor	Yes
Unbuffered UDIMM Error Correction Code (ECC)	Yes
Single Device Disable Code (SDDC)	No
Address parity	Yes

*Although the R220 supports DIMM speeds lower than 1600MT/s, you can only purchase this system with DIMM speeds of 1333MT/s and 1600MT/s on Dell.com/PowerEdge.

The R220 supports the DIMMs listed in Table 8. For the latest information on supported memory, visit Dell.com/PowerEdge.

Table 8.   DIMMs supported

Capacity (GB)	Speed MT/s	Type	RANKS per DIMM	Data width	Mirroring	Advanced ECC	Voltage
4GB	1600	UDIMM	2	X8	NA	NA	1.35V
4GB	1600	UDIMM	2	x8	NA	NA	1.35V
4GB	1600	UDIMM	2	x8	NA	NA	1.35V

Capacity (GB)	Speed MT/s	Type	RANKS per DIMM	Data width	Mirroring	Advanced ECC	Voltage
8GB	1600	UDIMM	2	X8	NA	NA	1.35V
8GB	1600	UDIMM	2	X8	NA	NA	1.35V
8GB	1600	UDIMM	2	X8	NA	NA	1.35V

Memory configurations

The PowerEdge R220 supports UDIMM memory only. For information on memory configuration options, see the *Dell PowerEdge R220 Systems Owner's Manual* on Dell.com/Support/Manuals.

6 Storage

The PowerEdge R220 supports up to two 3.5-inch cabled SATA from motherboard SATA connector or 2 x 3.5" cabled SATA or SAS via add on storage controller.

Supported hard drives

The R220 supports up to two 2.5-inch or 3.5-inch hard drives or solid-state drives. Table 10 lists more information about these drives. For an up-to-date list of supported hard drives for the R220, see Dell.com/PowerEdge.

Table 10.   Supported hard drives

Form factor	Type	Speed	Capacities
2.5"	SATA	7.2K	250GB, 500GB, 1TB
	Nearline SAS	7.2K	500GB, 1TB,
	SAS	10K	300GB, 600GB, 900GB, 1.2TB
	SAS	15K	146GB, 300GB, 600GB
	SATA MLC SSD	N/A	100GB, 200GB, 400GB, 800GB
	SATA RI MLC SSD	N/A	160GB, 300GB, 480GB, 800GB
3.5"	SATA	7.2K	500GB, 1TB, 2TB, 3TB, 4TB
	Nearline SAS	7.2K	1TB, 2TB, 3TB, 4TB
	SAS	15K	300GB, 600GB

External storage

External storage for the R220 is available through optional host bus adapters for SAS and iSCSI. For more information, see Dell.com/Storage.

Storage controllers

The newest line of PERC (PowerEdge RAID Controller) cards offers high I/O performance for database applications and streaming digital media environments. Internal RAID controllers have a dedicated connection to the system board. The R220 supports the new PERC 8 family of controllers with improved functionality and faster performance.

The PowerEdge R220 supports the PERC cards listed in Table 11. For more information about the latest PERC offerings, see Dell.com/PERC.

Table 11.   Supported RAID controllers

Controller	Description	Features	RAID modes supported	Form factor	Usage model
PERC H810 External	8-port, external and 6Gb/s PCIe RAID controller	Includes 1GB NV DDR3 cache, premium performance and feature set, security SED/EKMS, and SSD as cache	0, 1, 10, 5, 50, 6, 60	Adapter	Premium performance
PERC H310 Internal	8-port, internal 6Gb/s PCIe RAID	No hot-swap. No support for tape or RAID 10, 5, 50	0, 1	Integrated mini-type	Value
PERC S110 Software RAID	3Gb/s SATA software RAID controller	Supports up to 2 drives maximum. No expansion, Microsoft Windows only. No hot-swap. No support for tape or RAID 10, 5	0, 1	System board-embedded SATA	Entry-level

Optical drive

The PowerEdge R220 supports one SATA interface DVD-ROM or DVD+/-RW.

Tape drive

The PowerEdge R220 does not support internal tape drives.

7 Networking and PCIe

The Dell PowerEdge R220 offers balanced, scalable I/O capabilities, including one full-height, half-length PCIe x16 3.0 expansion slot.

Embedded NIC controller

The PowerEdge R220 offers onboard Broadcom 5720 dual-port controller-based LAN on Motherboard (LOM) to provide dual 10/100/1000 BASE-T Gigabit Ethernet, an IEEE 802.3-compliant media access controller (MAC), and a UTP copper physical layer transceiver solution for high-performance network applications.

PCIe expansion cards

The R220 supports a variety of add-in NICs and HBAs outlined in Table 12.

Table 12.   Supported NICs and HBAs

Type	Adapter
1Gb/10Gb NICs	Broadcom 57810 2x10Gb Base-T
	Broadcom 5720 2x1Gb
	Broadcom 57810 2x10Gb DA/SFP+
	Intel Ethernet I350 2x1Gb
	Emulex OneConnect OCe14102-UX-D 2x PCIe 10GbE
	Intel X520 DP 10Gb DA/SFP+
	Intel Ethernet I350 quad-port 1Gb server adapter
	Broadcom 5719 quad-port 1Gb NIC
	Intel X540 2x10Gb Base-T
FC8/FC10 HBAs	QLogic QLE2560 8Gb
	QLogic QLE8262, 10Gb
	Emulex LPe12002 8Gb
	Emulex LPe12000 8Gb
	QLogic QLE1562, 8Gb

For the latest information on all supported add-in PCIe expansion cards for the R220, visit Dell.com/PowerEdge.

8 Power, thermal and acoustics

Lower overall system-level power draw is a result of breakthrough system design. The Dell PowerEdge R220 server maximizes performance per watt through a combination of power and cooling, energy-efficient technologies and tools. Additionally, the PowerEdge R220 has 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 center space.

Table 13 outlines 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
Power supply unit (PSU) portfolio (hot-plug PSU only)	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	**Dell Energy Smart Solution Advisor (ESSA)** is a tool that helps you determine the most efficient configuration possible. With 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	Dell PowerEdge servers are compliant with relevant industry certifications and guidelines, including 80 PLUS. Additionally, the PowerEdge R220 server has earned ENERGY STAR® Server designation.
Power monitoring accuracy (hot-plug PSU only)	PSU power 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 (hot-plug PSU only)	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 Intel Node Manager for circuit-breaker fast capping.
Systems management (hot-plug PSU only)	• **iDRAC7 Enterprise** 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.

Feature	Description
Active power management (hot-plug PSU only)	• **Intel Node Manager:** Dell offers a complete power management solution comprised of Intel Node Manager accessed through Dell iDRAC7 Enterprise and OpenManage Power Center that allows policy-based management of power and thermals at the individual server, rack, and data center level. Intel Node Manager is an embedded technology that provides individual server-level power reporting and power limiting functionality. • **Hot spare** reduces power consumption of redundant power supplies. • **Thermal control of fan speed** optimizes the thermal settings for your environment to reduce fan consumption and lower system power consumption. • **Idle power** enables Dell servers to run as efficiently when idle as when at full workload.
Dell Fresh Air cooling (Dual PSUs required)	With the thermal design and reliability of Dell products, certain configurations have the capability to operate at excursion-based temperatures beyond the industry standard of 35°C (95°F) up to 45°C (113°F) for excursionary periods of time and up to a 26°C dew point at 90% relative humidity without impacting your availability model. Find additional information at Dell.com/FreshAir.
Rack infrastructure	Dell offers some of the industry's highest-efficiency power infrastructure solutions, including: • Power distribution units • Uninterruptible power supplies • Energy Smart containment rack enclosures Find additional information at content.dell.com/us/en/enterprise/ power-and-cooling-technologies-components-rack-infrastructure.aspx.

For additional information, visit: Dell.com/PowerAndCooling.

Power supply units

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

The R220 power supply subsystem consists of one non-redundant AC-DC 250W power supply AC-DC power supply. Power cycling is enabled by a switch on the front of the chassis or controlled via iDRAC7 with Lifecycle Controller.

The following power supply options are available for the R220:

• 250W AC, cabled, non-redundant

Figure 5 highlights the PowerEdge R220 power supply features.

Figure 5.   PowerEdge R220 power supply
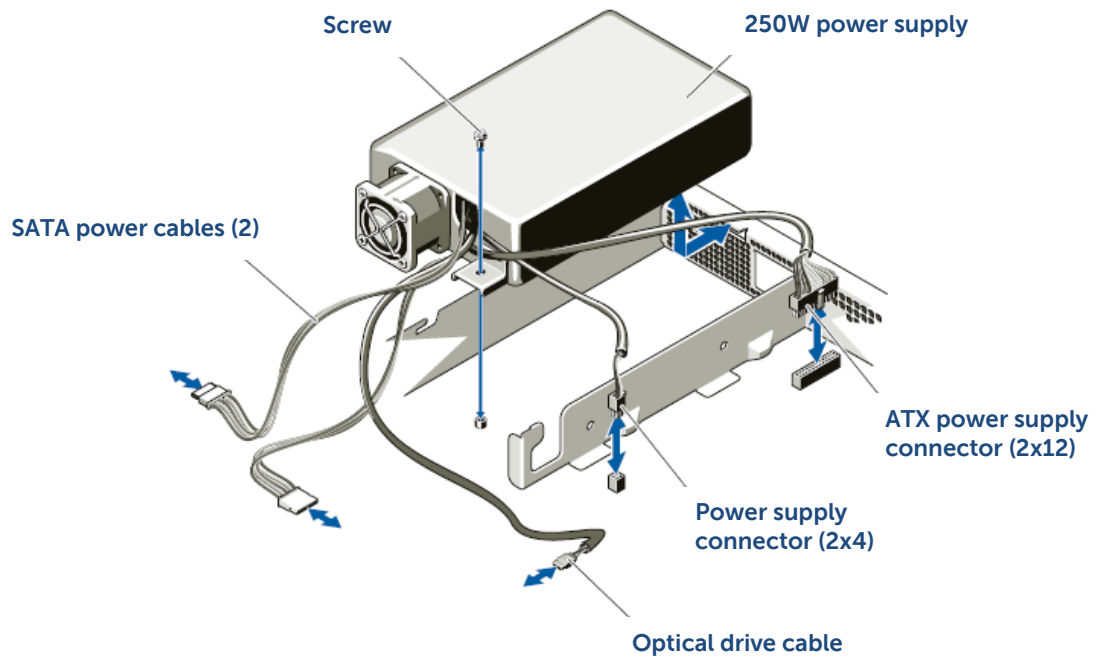
Dell PSUs have achieved Silver efficiency levels as shown in Table 14.

Table 14.   Power supply efficiency

Form factor	Output	Class	Minimum efficiency by load			
			10%	20%	50%	100%
Non-redundant	250W AC	Silver	N/A	85.0%	88.0%	85.0%

Thermal and acoustics

The PowerEdge R220 was designed with the goal to offer a class leading chassis depth all while meeting the acoustical requirements for office environment.

Thermal design

The system's PWM fan is controlled by the iDRAC. The thermal sensor on front control board senses the ambient temperature and adjusts the fan speed accordingly. In a normal office environment the fan spins slower, resulting in low acoustics. The fan RPM begins to ramp up with temperature to satisfy cooling requirements at higher ambient temperatures, and different system configuration (e.g. RAID card installation).

Optimized thermal management makes PowerEdge R220 cool and quiet with efficiency improvements that save energy. Benefiting from a smart cooling thermal control algorithm, R220 can keep both high performance and good acoustics across a wide range of ambient temperatures (10 °C ~ 35 °C).

Acoustical design

The acoustical design of the PowerEdge R220 reflects the following:

- **Versatility:** The PowerEdge R220 saves you power draw in the data center, but is quiet enough for the office environment in typical and minimum configurations. Compare the values for LpA in Table 15 for these configurations, and note that they are lower than ambient measurements of typical office environments.

- **Adherence to Dell's high sound quality standards:** Sound quality is different from sound power level and sound pressure level in that it describes how humans respond to annoyances in sound, like whistles and hums. One of the sound quality metrics in the Dell specification is prominence ratio of a tone, which is listed in Table 15.

- **Noise ramp and descent during bootup from power off:** Fan speeds and noise levels ramp during the boot process (from power off to power on) in order to add a layer of protection for component cooling in the case that the system were not to boot properly. To keep bootup as quiet as possible, the fan speed reached during bootup is limited to about half of full speed.

Table 15 details the acoustical performance for the R220.

Table 15. Acoustical performance

Configuration (23 $\pm$ 2°C ambient)	CPU	Hard drives	Power supply unit	Memory		Operating mode	L_{WA}-UL[1] (B-A)	L_{pA}[2] (dBA)	Prominent tones[3]
Typical	1 (80W)	1 x 3.5" 500GB SATA	1 x 250W	2 x 4GB UDIMM 1600MT/s		Standby[4]	2.7	15	None
						Idle[5]	4.7	29	None
						Stress[6]	5.0	31	None
Feature-rich	1 (80W)	2 x 3.5" 1TB SATA	1 x 250W	2 x 8GB 1600MT/s	1 x PERC H310	Standby[4]	2.7	15	None
						Idle[5]	4.7	30	None
						Stress[6]	5.1	33	None

[1]L_{WA}-UL is the upper limit sound power levels (L_{WA}) calculated per section 4.4.1 of ISO 9296 (1988) and measured in accordance to ISO 7779 (2010).

[2]L_{pA} is the average bystander position A-weighted sound pressure level calculated per section 4.3 of ISO9296 (1988) and measured in accordance with ISO7779 (2010). The system is placed within a rack enclosure (base of system is 75 cm above floor).

[3]Prominent tone: Criteria of D.6 and D.11 of ECMA-74 11th ed. (2010) are followed to determine if discrete tones are prominent. The system is placed on a standard table in 75 cm height and acoustic transducer, binaural head, is at front operator position; reference ISO 7779 (2010) Section 8.6.1.

[4]Standby: AC power is connected to power supply Units but system is not turned on.

[5]Idle: Reference ISO 7779 (2010) definition 3.1.7; system is running in its operating system but no other specific activity.

[6]Stress: An operating mode per ISO 7779 (2010) definition 3.1.6. The software Intel PTU at 50% is activated to stress the processors and DIMMs.

For more information on Dell's acoustical design, see the Dell Enterprise Acoustics white paper.

9 Rack rails and cable management

ReadyRails™ static rail system provides tool-less tool-less mounting in 19"-wide, EIA-310-E compliant square hole and unthreaded round hole racks via the ReadyRails mounting interface. The rails also offer tooled mounting support for 4-post threaded and 2-post (Telco) racks for added versatility.

Figure 6.   R220 static rails

ReadyRails for the R220 are designed so that the inner chassis must first be attached to the sides of the system and then inserted into the outer cabinet in the rack.

Figure 7.   R220 mounted in a 4-post square hole rack

Table 16 lists the rack types supported on the R220.

Table 16.   Supported rack types

Product	Rail identifier	Mounting interface	Rail type	Rack types supported				
				4-post			2-post	
				Square	Round	Thread	Flush	Center
R220	A4	ReadyRails	Static	✓	✓	✓	✓	✓
	A6	ReadyRails	Static	✓	✓	✓	✓	✓

For detailed information about static rails, see the Rack rail specifications section in Appendix A: Additional specifications. For more information on installing the R220 in a rack, see the *Rack Installation Instructions* on Dell.com/Support/Manuals.

Cable management arm

The static rails for the R220 support a wide variety of racks and mounting configurations but do not support the ability to extend the system out of the rack for service and do not provide support for a cable management arm (CMA).

10 Operating systems and virtualization

The Dell PowerEdge R220 supports a wide range of industry-standard operating systems and virtualization software.

Supported operating systems

Table 17 lists the primary operating systems supported on the R220. For the latest information on supported operating systems, see Dell.com/OSsupport.

Table 17.   Primary operating systems support

Operating systems	Platform	Edition
Microsoft Windows Server 2008 R2 SP1	x64	Standard Foundation Web
Microsoft Windows Server 2012	x64	Standard Foundation Essentials
Microsoft Windows Server 2012 R2	x64	Standard Foundation Essentials
Red Hat Enterprise Linux 6.4[2]	X86, x64	N/A
SUSE Linux Enterprise Server 11 SP3	X86, x64	N/A

[2]RHEL 6.1 is the minimum supported version. Current factory install is RHEL 6.4.

Supported virtualization

Table 18 highlights the virtualization support for the R220.

Table 18.   Virtualization support

Operating systems		Install version
VMware	vSphere v5.1U2	ESXi
	vSphere v5.5	ESXi
Microsoft Windows Server 2008 R2 SP1 (with Hyper-V enabled)		X64, Standard
Microsoft Windows Server 2012 R3 (with Hyper-V enabled)		X64, Standard

11 Dell OpenManage Systems Management

Whether your IT environment consists of a few servers or a few thousand servers, Dell OpenManage systems management solutions provide comprehensive management for evolving IT environments. OpenManage is based on open standards and provides agent-based and agent-free server lifecycle management functionality for Dell PowerEdge servers. OpenManage solutions help you automate and streamline essential hardware management tasks.

The advanced management capabilities of Dell OpenManage also integrates into offerings from other popular systems management solutions that you may already use, making Dell platforms easy to manage and deploy in any IT environment. This ensures your IT services are available when your business needs them. If you have already standardized on offerings from industry leaders, such as BMC Software, Microsoft, Symantec™, VMware, or other vendors, you can leverage OpenManage integration and connections developed for use with your existing systems management framework to efficiently manage Dell servers, storage, business-client PCs and network devices.

Start with a firm foundation for efficient hardware management using OpenManage tools, utilities and management consoles. OpenManage systems management solutions consist of a combination of embedded management features and software products that help you automate and simplify the entire server lifecycle: deploy, update, monitor and maintain. OpenManage solutions are innovatively designed for simplicity and ease of use to help you reduce complexity, save time, achieve efficiency, control costs and empower productivity.

Systems management solutions

Dell systems management solutions include a wide variety of tools, products, and services that enable you to leverage an existing systems management framework. As shown in Dell systems management solutions are centered around OpenManage server management, featuring iDRAC with Lifecycle Controller.

Figure 8.   Dell systems management solutions

OpenManage systems management

The Dell OpenManage systems management portfolio includes powerful hardware and software management tools and consoles. OpenManage simplifies the lifecycle of deploying, updating, monitoring and maintaining your Dell PowerEdge servers.

iDRAC7 with Lifecycle Controller

The Integrated Dell Remote Access Controller 7 (iDRAC7) with Lifecycle Controller is the heart of Dell's second generation of Dell PowerEdge server embedded management functionality. In addition to enabling agent-free management, iDRAC7 with Lifecycle Controller provides remote access to the system — whether or not there is a functioning operating system running on the server. These embedded features improve all aspects of a typical server lifecycle. Table 19 describes the functions and benefits of iDRAC7 with Lifecycle Controller.

Table 19.   iDRAC7 with Lifecycle Controller functions and benefits

Feature	Function	Benefit
Out of band (OOB)	iDRAC7 offers real-time OOB discovery, inventory, deployment monitoring, alerting and updates for servers and internal storage	Manage servers independent of the OS type or status — even if an OS is not installed
Single code base	All server types have the same embedded management hardware and firmware	Simplified and consistent maintenance across server platforms
Dedicated GigE port (PowerEdge rack and tower systems)	Gigabit Ethernet replaces 10/100 on predecessor iDRAC6	Fast throughput for better performance; compatibility with setup for switches
Email alerts	Simplified, more informative, and expanded coverage than previous versions of iDRAC	More detail allows IT administrators to be more efficient in diagnosing and remediating an issue; alerts include a direct, embedded URL in the email notification to further speed resolution
vFlash media	Enabled with iDRAC7 Enterprise	Allows for use of a non-Dell SD card
Enhanced power management	Integration with Intel Node Manager provides data center level power monitoring and capping (requires iDRAC7 Enterprise)	Fine tune data center power policies, capping, and usage; report on historical power usage by rack, row or room using Power Center Manager (new)

Feature	Function	Benefit
Electronic licensing	Upgrades to iDRAC7 Express or iDRAC7 Enterprise by software licensing key and license portal (may require installation of hardware option for 300-500 series servers)	Digital license installed in factory; free 30-day trial versions are available; uses a license management portal versus paper-based licenses and simplifies license management. For most server models, embedded server management and electronic licensing enables feature enhancements that do not require installation of additional hardware or system downtime.

iDRAC feature comparison

iDRAC7 Enterprise is available for the PowerEdge R220, and Dell also offers an option of iDRAC7 Express. Table 20 shows a detailed feature comparison for iDRAC7 Enterprise and iDRAC7.

Table 20.   Feature comparison for iDRAC7

Feature (function)	Basic management	iDRAC7 Enterprise	iDRAC7 Express	iDRAC Express for blades
IPMI 2.0	•	•	•	•
Embedded diagnostics	•	•	•	•
Local OS install	•	•	•	•
Local updates	•	•	•	•
Driver pack	•	•	•	•
Shared NIC (LOM)	•	•	•	•
Local Configuration via USC	•	•	•	•
Remote update		•	•	•
Power control		•	•	•
Encryption		•	•	•
Crash screen capture1		•	•	•
IPv6		•	•	•
Auto-discovery		•	•	•
Auto-recovery		•	•	•
Web GUI		•	•	•
Remote CLI		•	•	•
Local/SSH CLI		•	•	•
Serial redirection		•	•	•
Remote configuration		•	•	•
Email alerts		•	•	•
SNMP alerts		•	•	•

Feature (function)	Basic management	iDRAC7 Enterprise	iDRAC7 Express	iDRAC Express for blades
Power monitoring		•	•	•
Comprehensive monitoring		•	•	•
Dedicated NIC 1Gbps		•		•
Part replacement		•		
Backup and restore		•		
Virtual console (4 user)		•		•
Virtual console chat		•		
Virtual flash partitions		•		
Virtual media		•		•
Virtual folders		•		
Remote file share		•		
Crash video playback		•		
Boot record/playback		•		
Power capping		•		
Enterprise group power		•		
Directory services (AD,		•		
PK authentication		•		
Two-factor authentication2		•		

Agent-based systems management

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

OpenManage Server Administrator

The Dell OpenManage Server Administrator (OMSA) agent gives you a comprehensive, one-to-one systems management solution for both local and remote servers and their storage. OMSA can help simplify single-server monitoring with a secure command-line interface (CLI) or web-based management graphical user interface (GUI). It can also be used to view system configuration, inventory, health and performance.

Agent-free management

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

Dell consoles

The central console in a systems management solution is often referred to as the one-to-many console. The central console provides a rapid view and insight into the overall health of all systems in the IT environment. The Dell systems management portfolio includes several powerful consoles, depending upon your needs, including the following:

- **Dell OpenManage Essentials:** OpenManage Essentials (OME) is a systems management console that provides a comprehensive view of Dell systems, devices and components in an enterprise network. It is used to monitor Dell PowerEdge servers, EqualLogic™ and PowerVault™ storage and Dell Networking switches, to update and configure Dell servers, and to create asset reports. OpenManage Essentials also communicates health status alerts for Dell servers, storage and network devices to the KACE™ K1000 service desk. OpenManage Essentials is available as a no-charge software download from Dell.com/Support.

OpenManage systems management tools and utilities

Dell OpenManage systems management tools and utilities consist of the following:

- **Dell Repository Manager:** The Dell Repository Manager (RM) is a standalone GUI-based productivity tool that helps simplify the process of managing downloads and baseline BIOS, firmware, and driver updates. Repository Manager can create deployment disks as well as create and manage customized repositories.
- **Dell OpenManage Server Update Utility:** The Dell Server Update Utility (SUU) is a DVD-based application for identifying and applying BIOS and firmware updates to your Dell PowerEdge servers.
- **Dell OpenManage Systems Build and Update Utility:** The Dell System Build and Update Utility (SBUU) provides one-to-one and one-to-many deployment and single-server update capabilities in the pre-operating system environment.
- **Dell Update Packages:** The Dell Update Packages (DUP) is a self-contained executable in a standard package format that updates a software element on a Dell server such as the BIOS, a driver, firmware and other software updates.
- **Dell OpenManage Deployment Toolkit:** The Dell OpenManage Deployment Toolkit (DTK) is a CLI-based tool that includes a set of utilities for configuring and deploying Dell PowerEdge systems, and can be used to build scripted, unattended OS installations to deploy large numbers of servers in a reliable fashion.
- **RACADM:** The RACADM command-line utility provides a scriptable interface that allows you to locally or remotely configure iDRAC7.
- **IPMITool:** IPMITool includes scriptable console application programs used to control and manage remote systems using the IPMI version 1.5 and later protocol.

Integration with third-party consoles

Dell OpenManage easily integrates with several leading third-party consoles, including:

- **Dell Server Management Pack Suite for Microsoft System Center Operations Manager (SCOM):** This suite of server management packs enables several functions through System Center Operations Manager, including in-band discovery and monitoring of racks and towers, out-of-band discovery and monitoring through iDRAC with Lifecycle Controller, as well as performance and advanced monitoring.
- **Dell Lifecycle Controller Integration (DLCI) for Microsoft System Center Configuration Manager (SCCM):** This pack contains Dell Lifecycle Controller Integration (DLCI), which integrates OpenManage functions in SCCM to manage the Dell PowerEdge servers, including

auto-discovery, operating system deployment and configuration of hardware elements, (RAID, NIC, BIOS, iDRAC), OS and hypervisor agnostic updates, firmware management and system viewer utilities.

- **Dell Server PRO Management Pack for Microsoft System Center Virtual Machine Manager (SCVMM):** This pack manages Dell physical servers and hosts of virtual machines (VMs) by using Microsoft System Center Operations Manager/System Center Essentials (SCOM/SCE) and System Center Virtual Machine Manager (SCVMM). It provides guidance for remedial actions based on alerts to best manage virtual machines and handle the impacts appropriately.
- **OpenManage Integration for VMware vCenter:** This plug-in allows IT administrators to monitor, provision, and manage the physical PowerEdge server hardware and firmware from a dedicated Dell menu accessed through the VMware vCenter console using the same role-based access control model as vCenter, combining physical server management.
- **BMC Software:** Dell and BMC Software work together to simplify IT by ensuring tight integration between Dell server, storage, and network management functionality and the BMC Software process and data center automation products.

OpenManage integration and connections with third-party consoles

Dell OpenManage provides integrations and connections with many third-party consoles, including:

- **Dell OpenManage Connection for Computer Associates Network and Systems Management:** This connection allows you to monitor PowerEdge servers and PowerVault storage arrays from within the Computer Associates Network and Systems Management (CANSM) console.
- **Dell OpenManage Connection for HP Operations Manager:** This connection enables several functions through HP Operations Manager, including auto-grouping, SNMP trap reception, global health monitoring and a context-sensitive launch of OpenManage Server Administrator.
- **Dell OpenManage Connection for IBM Tivoli Netcool/OMNIBus:** This connection provides event monitoring capabilities to monitor Dell PowerEdge servers and Dell EqualLogic systems. It allows event monitoring, automatic event correlation and launching device consoles from the Netcool/OMNIbus console.

Dell server management operations

Dell OpenManage systems management is centered on automating the server management lifecycle — deploy, update, monitor and maintain. To manage an infrastructure properly and efficiently, you must perform all of these functions easily and quickly. iDRAC7 with Lifecycle Controller technology provides you with these intelligent capabilities embedded within the server infrastructure. This allows you to invest more time and energy on business improvements and less on maintenance.

Figure 9 illustrates the various operations that can be performed during the server's lifecycle.
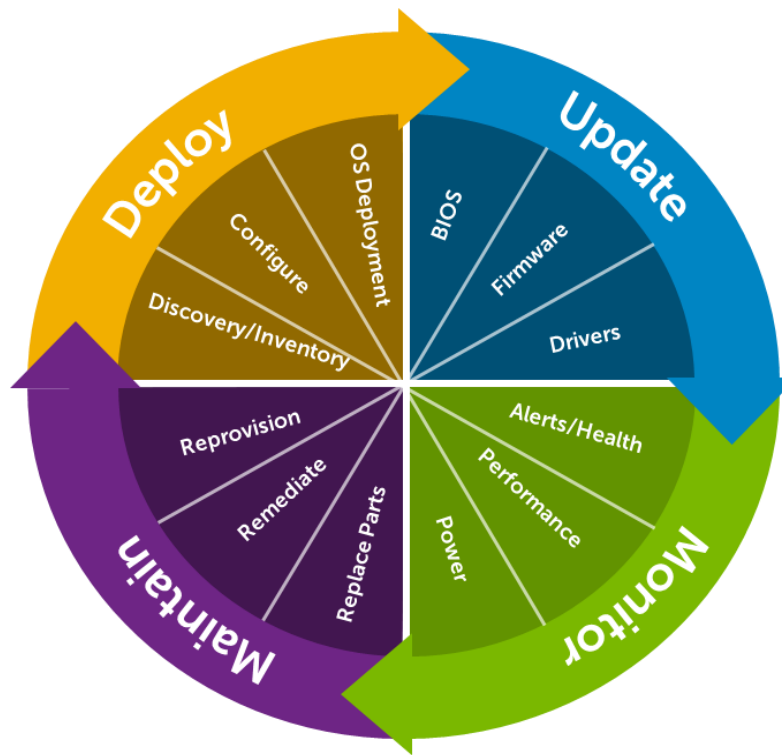
Figure 9.   Systems management server lifecycle

Table 21 lists the products that are available for one-to-one and one-to-many operations, and when they are used in the server's lifecycle.

Table 21.   One-to-one and one-to-many operations

Operation	One-to-one	One-to-many	
Deploy	• iDRAC7 with LifeCycle Controller GUI • DTK • SBUU	• Symantec Deployment Server • OpenManage Integration for VMware vCenter • KACE K1000 Appliance • Lifecycle Controller Remote Services • BMC BladeLogic integration with Lifecycle Controller	• Dell Server Deployment Pack (DSDP) for Microsoft System Center Configuration Manager and Dell Lifecycle Controller Integration (DLCI) for Microsoft System Center Configuration Manager

Operation	One-to-one	One-to-many	
Update	• iDRAC7 with LifeCycle Controller GUI • Repository Manager • DUP • SUU • SBUU • OpenManage Integration for VMware vCenter	• Dell OpenManage Essentials • Lifecycle Controller Remote Services	• Dell Update Catalogs for Microsoft System Center Configuration Manager • Dell Lifecycle Controller Integration (DLCI) for Microsoft System Center Configuration Manager
Monitor	• iDRAC7 with LifeCycle Controller • OMSA	• Dell OpenManage Essentials • BMC ProactiveNet Performance Management Integration with Lifecycle Controller • Dell OpenManage Power Center	• OpenManage Integration for VMware vCenter • BMC ProactiveNet Performance Management Integration with Lifecycle Controller • Dell Server Management Pack Suite for Microsoft System Center Operations Manager (SCOM)
Maintain	• iDRAC7 with Lifecycle Controller GUI	• Lifecycle Controller Remote Services	Remediate: • Dell Server PRO Management Pack for Microsoft System Center Virtual Machine Manager (SCVMM) Replace parts: • Dell Lifecycle Controller Integration (DLCI) for Microsoft System Center Configuration Manager

For additional detailed information on Dell's systems management portfolio, see the *Dell OpenManage Systems Management Overview Guide* on Dell.com/Support/Manuals
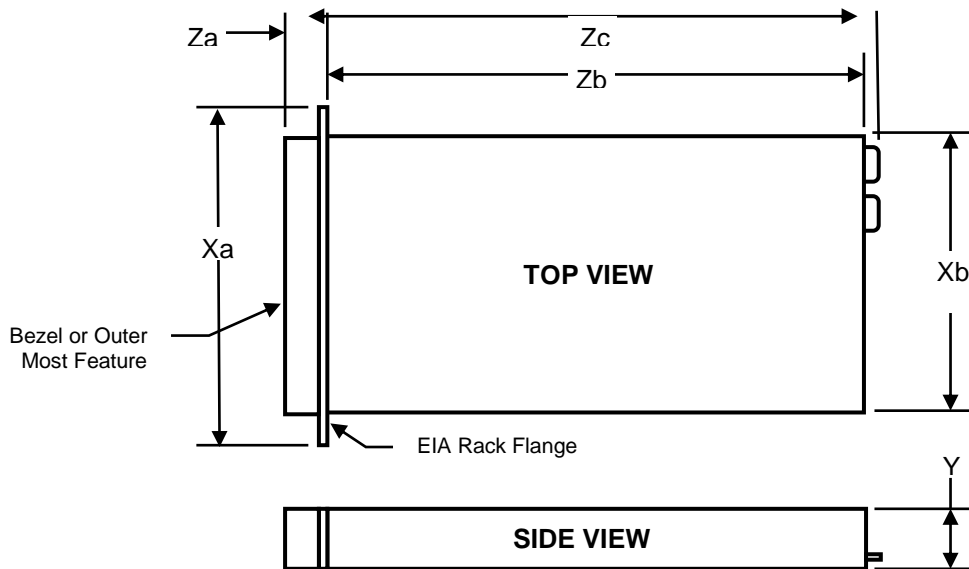
Appendix A. Additional specifications

Chassis dimensions and weight

Figure 6 details the dimensions of the Dell PowerEdge R220 chassis.

Figure 6.   System dimensions

Xa	Xb	Y	Za with bezel	Za w/o bezel	Zb[1]	Zc
482.0mm	434.00mm	42.4mm	35.0mm	20.1mm	390.7mm	394.3mm

[1]Zb goes to the nominal back wall external surface where the motherboard I/O connectors are located.

The R220 chassis at maximum configuration is 8.05 kg (17.76 lb).

Video specifications

The R220 is equipped with a Matrox G200eW with 8MB memory integrated in Nuvoton WPCM450 (BMC controller) and supports the 2D graphics video modes listed in Table 22.

Table 22.   Supported video modes

Resolution	Refresh rate (Hz)	Color depth (bit)
640 x 480	60, 70	8, 16, 32
800 x 600	60, 75, 85	8, 16, 32
1024 x 768	60, 75, 85	8, 16, 32
1280 x 1024	60, 75, 85	8, 16, 32

Environmental specifications

Table 23 details the environmental specifications for the R220. For additional information about environmental measurements for specific system configurations, see Dell.com/environmental_datasheets.

Table 23. Environmental specifications

Fresh Air: temperature, humidity, altitude de-rating	
Continuous operation	10°C to 35°C (50°F to 95°F) at 10% to 80% relative humidity with 29°C (84.2°F) maximum dew point (maximum wet bulb temperature). De-rate maximum allowable dry bulb temperature at 1°C per 300m above 950m (1°F per 547ft above 3117ft).
Expanded operation	When operating in the expanded temperature range, system performance may be impacted, and ambient temperature warnings may be reported on the LCD and in the System Event Log.
	≤ 10% of annual operating hours: 5°C to 10°C and 35°C to 40°C (with no direct sunlight on the equipment) at 5% to 85% relative humidity with 26°C dew point (maximum wet bulb temperature). Outside the standard operating temperature (10°C to 35°C), the system can operate down to 5°C or up to 40°C for a maximum of 10% of its annual operating hours. For temperatures between 35°C and 40°C (95°F to 104°F), de-rate maximum allowable dry bulb temperature by 1°C per 175m above 950m (1°F per 319ft above 3117ft).
	≤ 1% of annual operating hours: −5°C to 5°C and 40°C to 45°C (with no direct sunlight on the equipment) at 5% to 90% relative humidity with 26°C dew point (maximum wet bulb temperature). Outside the standard operating temperature (10°C to 35°C), the system can operate down to −5°C or up to 45°C for a maximum of 1% of its annual operating hours. For temperatures between 40°C and 45°C (104°F to 113°F), de-rate maximum allowable dry bulb temperature by 1°C per 125m above 950m (1°F per 228ft above 3117ft).
	Expanded operation restrictions:
	• No cold startup below 5°C
	• Maximum altitude for the operating temperature must be 3050m (10,000ft)
	• Not supported:
	— Peripheral cards not qualified by Dell
	— Peripheral cards greater than 25W
	— PCIe SSD drives
	— GPU cards
	— Express flash
	— LRDIMM
	— Non-redundant PSU configurations
Temperature	
Operating	See Fresh Air for temperature information
Storage	−40°C to 65°C (−40°F to 149°F) with a maximum temperature gradation of 20°C per hour
Relative humidity	
Operating	See Dell Fresh Air for relative humidity information
Storage	5% to 95% at a maximum wet bulb temperature of 33°C (91°F); atmosphere must be non-condensing at all times
Maximum vibration	
Operating	0.26 Grms at 5–350Hz for 15 min (in all operation orientations)
Storage	1.87 Grms at 10Hz to 500Hz for 15 minutes (all six sides tested)
Maximum shock	

Operating	One shock pulse in the positive z axis (one pulse on each side of the system) of 31 G 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 71 G for up to 2 ms. Six consecutively executed shock pulses in the positive and negative x, y and z axes (one pulse on each side of the system) of 32 G faired square wave pulse with velocity change at 270 inches/second (686 centimeters/second).

Altitude	
Operating	−15.2m to 3048m (−50ft to 10,000ft)
Storage	−15.2m to 10,668m (−50ft to 35,000ft)

Airborne contaminant level
Class G1 or lower as defined by ISA-S71.04-1985

Power supply specifications

Table 24 lists power supply specifications for the PowerEdge R220.

Table 24.   Power supply specifications

Specification	Non-redundant 250W
Current consumption	4.0−2.0A
Supply voltage	100−240V AC
Frequency	50/60Hz
Heat dissipation (BTU/hr max)	1040

Rack rail specifications

Table 25 lists the spacing dimensions for the R220 static rails.

Table 25.   ReadyRails adjustability range

Product	Rail identifier	Mounting interface	Rail type	Rail adjustability range (mm)						Rail depth (mm)	
				Square		Round		Threaded		without CMA	with CMA
				Min	Max	Min	Max	Min	Max		
R220	A4	ReadyRails	Static	608	879	594	872	604	890	622	NA
	A6	ReadyRails	Static	508[1]	751	494[1]	744	519[1]	762	515[1] 376[2]	NA

[1]With middle brackets removed

[2]With rear brackets removed (2-post or cantilever mount only)

The adjustment range of the rails is a function of the type of rack in which they are being mounted. The min-max values listed above represent the allowable distance between the front and rear mounting flanges in the rack. Rail depth represents the minimum depth of the rail as measured from the rack front mounting flanges when the rail rear bracket is positioned all the way forward.

USB peripherals

The PowerEdge R220 supports the following USB-based peripherals:

- USB key (Bootable)
- Keyboard (1)
- Mouse (1)
- Optional USB DVD-ROM

Appendix B. Standards compliance

The Dell PowerEdge R220 conforms to the industry standards listed in Table 26.

Table 26.   Industry standard documentation

Standard	URL for information and specifications
ACPI Advance Configuration and Power Interface Specification, v2.0c	acpi.info
Ethernet IEEE 802.3-2005	standards.ieee.org/getieee802/802.3.html
HDG Hardware Design Guide Version 3.0 for Microsoft Windows Server	microsoft.com/whdc/system/platform/pcdesign/desguide/serverdg.mspx
IPMI Intelligent Platform Management Interface, v2.0	intel.com/design/servers/ipmi
DDR3 Memory DDR3 SDRAM Specification, Rev. 3A	jedec.org/download/search/JESD79-3C.pdf
LPC Low Pin Count Interface Specification, Rev. 1.1	developer.intel.com/design/chipsets/industry/lpc.htm
PCI Express PCI Express Base Specification Rev. 2.0 and 3.0	.pcisig.com/specifications/pciexpress
SAS Serial Attached SCSI, v1.1	t10.org
SATA Serial ATA Rev. 2.6; SATA II, SATA 1.0a Extensions, Rev. 1.2	sata-io.org
SMBIOS System Management BIOS Reference Specification, v2.7	dmtf.org/standards/smbios/
TPM Trusted Platform Module Specification, v1.2	trustedcomputinggroup.org
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 27 provides a list of documents and websites that provide for more information on the Dell PowerEdge R220.

Table 27.   Resource documents and websites

Resource	Description of content	Location
PowerEdge R220 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
PowerEdge R220 Getting Started Guide	This guide ships with the system, and is also available in PDF format. This guide provides the following information: • Initial setup steps • Key system features • Technical specifications	Dell.com/Support/Manuals
Rack Installation Instructions	This document ships with the rack kits, and provides instructions for installing a server in a rack.	Dell.com/Support/Manuals
Cable Management Arm Installation Instructions	This document ships with the rack kits, and provides instructions for installing a cable management arm on a rack.	Dell.com/Support/Manuals
Information Update	This document ships with the system, is also available in PDF format online, and provides information on system updates.	Dell.com/Support/Manuals
System Information Label	The system information label documents the system board layout and system jumper settings. Text is minimized due to space limitations and translation considerations. The label size is standardized across platforms.	Inside the system chassis cover
Quick Resource Locator (QRL)	This code on the chassis can be scanned by a phone application to access additional information and resources for the server, including videos, reference materials, service tag information, and Dell contact information.	Inside the system chassis cover

Energy Smart Solution Advisor	The Dell online 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
Operating system matrix for Dell PowerEdge systems	Provides updated information on which operating systems are available on which PowerEdge systems.	Dell.com/OSsupport
Processor and chipset	Provides more information about the R220 processors and chipset.	Intel.com
Dell PowerEdge RAID controllers	Provides more information on Dell PowerEdge RAID controllers (PERC).	Dell.com/PERC
Power distribution unit	Provides help selecting a rack-based power distribution unit (rPDU).	DellPDU.com
Uninterruptible power supply	Provides help selecting a UPS model.	DellUPS.com
Volatility information	Contact your Dell sales representative.	Dell.com
Dell Enterprise Acoustics	White paper that explores the mechanisms of, people's reaction to, language of, and Dell's work to control noise from Enterprise products.	Dell.com/downloads/global/products/pedge/en/acoustical-education-dell-enterprise-white-paper.pdf

Appendix D. Dell Global Support and Deployment Services

Dell Global Services include a wide, customizable range of service choices to simplify the assessment, design, implementation, management and maintenance of your IT environment and to help you transition from platform to platform. Depending on your current business requirements and the level of service you want, we can provide you with factory, on-site, remote, modular and specialized services that fit your needs and budget. We'll help you with a little or a lot — your choice — and provide you with access to our global resources.

Server deployment services

Our server deployment services can maximize the value of your servers quickly using our expert server deployment engineers. With more than 10,000 server deployment projects each year, we have experience, best practices and comprehensive deployment tools to install, configure and integrate your new solution optimally and correctly. Our deployment experts will assess your environment and understand your goals, then design and integrate your server solution for you.

Server Deployment Capabilities

	Server Installation	Server Integration
Place single server in target workspace	✓	
Rack, cable, and label servers	✓	
Install image	✓	
Connect to network	✓	✓
Test and validate connection	✓	✓
Install operating system		✓
Install applications		✓
Perform advanced configuration services		✓
Remote configuration services		✓
Virtualization		✓
Converged infrastructure		✓
Test and validate data center integration		✓

We are also experts at rack integration and solutions such as HPC, Openstack and Hadoop.

Dell's server deployment services help you optimize your server configurations and quickly and correctly install and integrate your solution — so you can be up and running faster with minimal disruption to day-to-day business operations. Our deployment experts provide:

- Single point of project management contact from beginning to end
- Evaluation of your environment with a detailed project plan
- Optimized configurations for your workloads and user environment
- Personalized documentation and orientation

Remote consulting services

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

Data migration service

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

ProSupport Enterprise Suite

With Dell ProSupport Services, we can help you keep your operation running smoothly, so you can focus on running your business. We'll help you maintain peak performance and availability of your most essential workloads.

Dell ProSupport is a suite of support services that enable you to build the solution that's right for your organization. Choose support models based on how you use technology and where you want to allocate resources. From the desktop to the data center, address everyday IT challenges, such as unplanned downtime, mission-critical needs, data and asset protection, support planning, resource allocation, software application management and more. Optimize your IT resources by choosing the right support model.
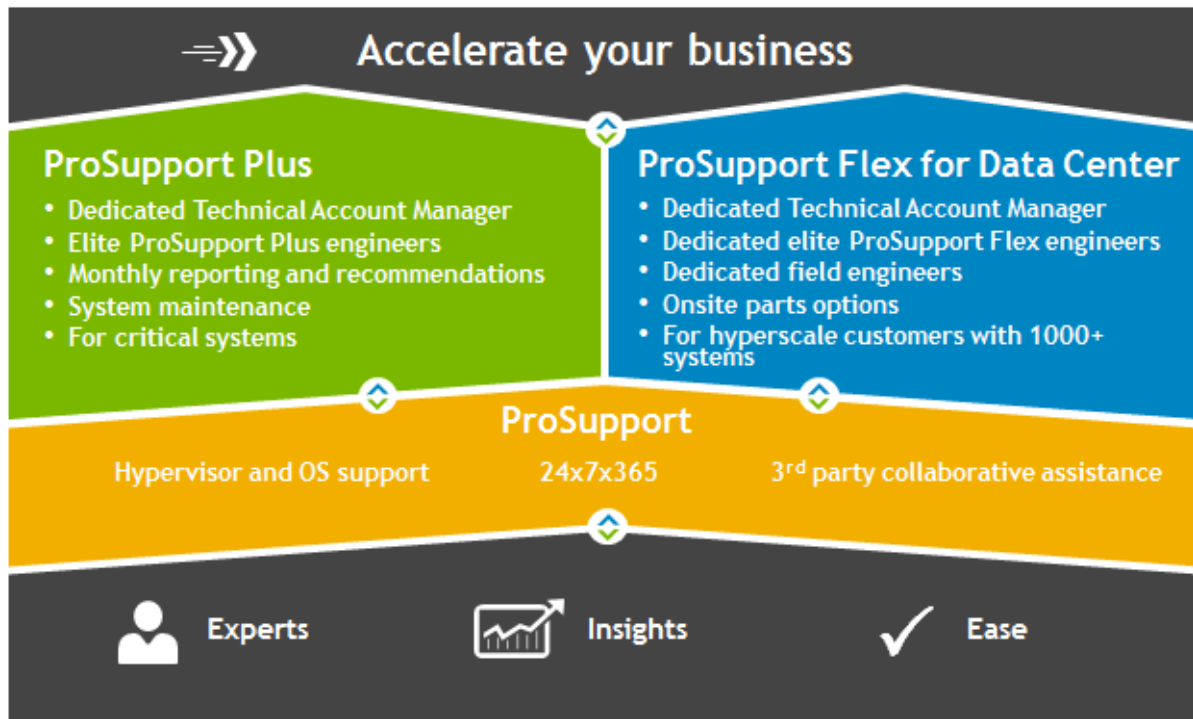
ProSupport Plus for business-critical servers

When you purchase your PowerEdge server, we recommend ProSupport Plus, our proactive and preventative support for your business-critical systems. Dell ProSupport Plus provides you with all the benefits of ProSupport, plus access to a dedicated Technical Account Manager and our elite ProSupport Plus engineers. ProSupport Plus gives you quick and efficient resolutions, working along

with our SupportAssist technology that enables us to get ahead of issues in your environment before they become problems.

ProSupport

Our ProSupport service offers highly trained experts around the clock and around the globe to address your IT needs. We'll help you minimize disruptions and maximize availability of your PowerEdge server workloads with

- 24x7x365 access to certified hardware experts
- Collaborative support assistance with over 195 third-party vendors
- Hypervisor and operating system support
- On-site parts and labor response options including next business day or four-hour mission critical

ProSupport Flex for Data Center

Dell ProSupport Flex for Data Center offers flexible site-wide support for hyperscale data centers with more than 1,000 assets. Built on standard Dell ProSupport components, Flex for Data Center leverages our global scale while being tailored to suit your needs. While not for everyone, it offers a flexible solution for those with large and complex environments.

When you choose Dell ProSupport Flex for Data Center, you'll get:

- Enterprise-wide support that covers your entire data center
- A dedicated Technical Account Manager with remote, on-site, part-time and full-time options
- Dedicated elite ProSupport Flex technical and field engineers who are trained on your environment and configurations
- Flexible onsite support and parts options that fit your operational model
- A tailored support plan for your operations staff

ProSupport Enterprise Suite comparison

	ProSupport	ProSupport Plus	ProSupport Flex for Data Center
Technical support access	24x7	24x7	24x7
Parts and labor response	NBD or Mission Critical	NBD or Mission Critical	Flexible
TechDirect online cases and dispatch	✓	✓	✓
SupportAssist remote monitoring	✓	✓	✓
Dispatch monitoring and crisis management	✓	✓	✓
Escalation management	✓	✓	✓
Hypervisor and OS support	✓	✓	✓
Collaborative 3rd party software support	✓	✓	✓
SupportAssist proactive resolution	✓	✓	✓
Direct access to elite ProSupport Plus engineers		✓	✓
Dedicated Technical Account Manager		✓	✓
Monthly health check and performance recommendations		✓	✓
Monthly contract renewal and service history reporting		✓	✓
System maintenance (as needed)		✓	✓
Dedicated technical and field support teams			✓
Site-wide entitlement and contract			✓
Case management API			✓

Additional professional services

Dell Training Services

Dell Education Services offers PowerEdge server training courses designed to help you achieve more with your hardware investment. The curriculum is designed in conjunction with the server development team, as well as Dell's technical support team, to ensure that the training delivers the information and practical, hands-on skills you and your team need to confidently manage and maintain your Dell Server solution. To learn more or register for a class today, visit learndell.com/server.

Dell IT Consulting Services

Dell Global Infrastructure Consulting Services use skilled solution architects, innovative tools, automated analysis and Dell's intellectual property to give you rapid insight into the root causes of unnecessary complexity. We seek better answers than traditional service models, and our strategy is to help you quickly identify high-impact, short-duration projects that deliver return on investment (ROI) and free up resources. The results are practical, action-oriented plans with specific, predictable, measurable outcomes. From Data Center optimization to server virtualization to Systems Management, our consulting services can help you build a more efficient enterprise.

Dell Managed Services

Dell Managed Services are a modular set of lifecycle services designed to help you automate and centrally configure, deploy and manage your day-to-day data center operations. These services extend your existing on-premise IT infrastructure with off-premise cloud services designed to better address challenges with mobility, highly distributed organizations, security, compliance, business continuity and disaster preparedness.