

PowerEdge R820



Technical Guide



The R820, a 4-socket, 2U rack server, is designed for dense virtualization and scalable database applications.

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1 System overview

Introduction

Designed to excel at running a wide range of applications and virtualization environments for both mid-size and large enterprises, the Dell™ PowerEdge™ R820 rack server is a compute-intensive performance platform with highly scalable memory (up to 1.5TB) and impressive I/O capabilities to match. With four Intel® Xeon® E5-4600 processors and the ability to support dual RAID controllers, the R820 can readily handle very demanding, mission critical workloads, like data warehousing, e-commerce, virtual desktop infrastructure (VDI), databases, and data node high performance computing (HPC).

Manage data overload

Keep pace with the explosion of data in the virtual age with the flexible, powerful I/O and storage capabilities of the R820. Up to 16 internal hard drives and integrated PCI Express® (PCIe) 3.0 enabled expansion slots greatly increase your capacity, while optional hot-plug, front-access Express Flash PCIe solid-state drives (up to four) enable performance-enhancing, in-box storage tiering. Moreover, Dell Select Network Adapters, our flexible NIC technology, let you choose the right network fabric to match your needs without using up a valuable PCIe slot.

Accelerate the solution

Boost the performance of your HPC or 2D VDI environment by combining the PowerEdge R820's memory density with an optional graphics processing unit (GPU) accelerator. Choose from a range of GPU options for greater assisted performance.

Virtualize more with the R820

Maximize your data center's application capacity by expanding your virtual environment using the PowerEdge R820's large memory footprint, I/O options, flexible fabric choices, and up to 32 cores in a four-processor configuration. Choose an industry-leading hypervisor and take advantage of our system management capability to manage both physical and virtual assets. The R820 can also help maximize your virtual machines' uptime using redundant failsafe hypervisors on its internal dual SD module. Finally, the Dell Virtual Integrated System (VIS) solution lets you enable complex virtualization environments in just a few mouse clicks.

Dell OpenManage systems management

The Dell OpenManage™ systems management portfolio includes the Integrated Dell Remote Access Controller 7 (iDRAC7) with Lifecycle Controller. Innovative embedded management features help IT administrators manage Dell servers in physical, virtual, local, and remote environments, operating in-band or out-of-band, with or without a systems management software agent. OpenManage integrates and connects to third-party systems management solutions so you can maintain your single point of control and capitalize on your existing investment. OpenManage simplifies the lifecycle of deploying, updating, monitoring, and maintaining your Dell PowerEdge servers.

New technologies

Table 1 summarizes the newest technologies used in the Dell PowerEdge R820 rack server.

Table 1. New technologies

| New technologies | Detailed descriptions |
|--|---|
| Intel Xeon processor E5-4600 product family | This new family of Intel processors has embedded PCIe lanes for improved I/O performance. See the Processor section for details. |
| Intel C600 series chipset | The Intel Platform Controller Hub (PCH) chip is implemented on the R820 server. |
| 1600 MT/s DDR3 memory | Certain models of E5-4600 series processors support 1600 MT/s memory. The R820 supports four DIMMs per channel at 1600 MT/s with these processors. See the Memory section for details. |
| LRDIMM | This new memory option, load-reduced DIMM (LRDIMM), is designed with a buffer chip (or chips) to replace the register to help minimize loading. LRDIMMs can increase overall server system memory capacity and speed. See the Memory section for details. |
| Flexible LOM | The Dell Select Network Adapter options allow you to customize your LAN port combinations from your choice of controller vendors. See the Networking and PCIe section for details. |
| Next generation PERC options | The R820 supports the new PERC controller cards with improved functionality and faster performance. See the Storage section for details. |
| PERC S110 software RAID Solution | This new software RAID solution supports RAID 0, 1, 5 and 10; supports maximum of four hot-plug SATA hard drives or SATA solid-state drives. See the Storage section for details. |
| Express Flash drives | Dell Express Flash PCIe solid-state drives provide fast performance without requiring processor resources or capturing DRAM. The R820 supports up to four Express Flash drives. See the Storage section for details. |
| iDRAC7 with Lifecycle Controller | The new embedded system management solution for Dell servers features hardware and firmware inventory and alerting, in-depth memory alerting, faster performance, a dedicated gigabit port, and many more features. See the Dell OpenManage systems management section for details. |
| Internal GPU support | The R820 supports internal graphics processing units (GPUs) for extreme computing power to solve HPC needs. See the Processor section for details. |
| DC power supply | A new 1100W DC power supply option is available for the R820. See the Power, thermal, and acoustics section for details. |
| Advanced power management | The R820 supports advanced power monitoring and power capping tools that can help manage power consumption. See the Power, thermal, and acoustics section for details. |
| Fresh Air cooling | Dell has tested and validated an integrated data center solution that enables you to operate at higher temperatures or even chiller-less. See the Power, thermal, and acoustics section for details. |
| Failsafe hypervisors | The internal dual SD module is a modular fail-safe design that is dedicated for an embedded ESX hypervisor or other embedded operating system. See the Supported virtualization for details. |



2 System features

Compared to the previous generation of Dell PowerEdge servers, the R820 has more drive bay options, more PCIe slots, PCIe 3.0 support, more memory, a dual RAID controller option, optional Express Flash PCIe solid-state drives, internal graphics processing unit (GPU) support, advanced system management, and hot-plug redundant cooling.

Comparison of PowerEdge systems

The PowerEdge R820 is a direct replacement for the R810. Table 2 compares some of the features of the R820 to the R810. For the latest information on supported features, visit Dell.com.

Table 2. Comparing the PowerEdge R810 to PowerEdge R820

| | PowerEdge R810 | PowerEdge R820 (new) |
|-----------------------------------|--|--|
| Chassis | 2U rack | 2U rack |
| Processors | Intel Xeon processors 6500, 7500, E7-2800, E7-4800 and E7-8800 series | Intel Xeon processor E5-4600 product family |
| Internal interconnect | Intel QuickPath Interconnect | Intel QuickPath Interconnect |
| Memory¹ | 32 x DDR3 RDIMM and UDIMM Up to 1TB | 48 x DDR3 RDIMM, UDIMM, and LRDIMM Up to 1.5TB |
| Hard drive bays (hot-plug) | 6 x 2.5" | 16 x 2.5" |
| RAID controller | PERC H200, H700, H800 | PERC H310, H710, H710P, H810 Dual PERC option |
| Express Flash drives | N/A | Up to 4 Flash Express drives |
| PCI slots | 7 PCIe 2.0 slots | 7 PCIe 3.0 slots |
| Embedded NICs | 4 x 1GbE with optional TOE | Select Network Adapter: minimum configuration of 4 x 1GbE, 10GbE (optional) |
| Power supplies | Hot-plug, redundant 1100W AC | Hot-plug, redundant 750W AC, 1100W AC, 1100W DC ² |
| Systems management | Dell OpenManage Dell Management Console Lifecycle Controller 1.x | Dell OpenManage Essentials Dell Management Console Lifecycle Controller 2.x |
| Remote management | iDRAC6 (Express or Enterprise) with Lifecycle Controller 1.x | iDRAC7 (Express or Enterprise) with Lifecycle Controller 2.x |
| Support for internal GPU | No | Yes |
| Power efficiency | Gold | Platinum |
| Availability | Hot-plug drives Hot-plug redundant cooling Hot-plug redundant power supply units Internal dual SD modules | Hot-plug drives Hot-plug redundant cooling Hot-plug redundant power supply units Internal dual SD modules |

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



Specifications

Table 3 summarizes the specifications for each of the PowerEdge R820 features. For the latest information on supported features for the PowerEdge R820, visit Dell.com.

Table 3. Technical specifications

| Feature | PowerEdge R820 technical specification | |
|-------------------------------|---|--|
| Form factor | 2U rack | |
| Processors | Intel Xeon processor E5-4600 product family | |
| Processor sockets | 4 | |
| Internal interconnect | 2 Intel QuickPath Interconnect (QPI) links: 6.4 GT/s, 7.2 GT/s, 8.0 GT/s | |
| Cache | 2.5MB per core with core options of 4, 6, or 8 | |
| Chipset | Intel C600 | |
| Memory¹ | Up to 1.5TB (48 DIMM slots): 2GB/4GB/8GB/16GB/32GB DDR3 up to 1600 MT/s | |
| PCIe slots | 7 PCIe slots: <ul style="list-style-type: none"> • 2 x16 full-height, half-length • 1 x8 full-height, half-length • 3 x8 half-height, half-length • 1 x8 full-height, half-length for the RAID controller | |
| RAID controller | Internal controllers: PERC H310 PERC H710 PERC H710P | External HBAs (RAID): PERC H810 External HBAs (non-RAID): 6Gbps SAS HBA |
| Hard drives (hot-plug) | Drive bay options: Up to 16 x 2.5-inch hot-plug SAS, SATA, or SSD Hard drive options: 2.5-inch Express Flash, SAS SSD, SATA SSD, SAS (15K, 10K), nearline SAS (7.2K), SATA (7.2K); self-encrypting drives (SEDs) available | |
| Embedded NIC | Select Network Adapter options: Broadcom® 5720 1GbE 4P Base-T Intel I350 1GbE 4P Base-T Broadcom 57810S 2x1Gb+2x10Gb Base-T Broadcom 57810S 2x1Gb+2x10Gb SFP+ Intel X540 2x1Gb+2x10Gb Base-T | |
| Power supply | Auto-ranging, Platinum efficiency 495W, 750W, or 1100W AC Gold efficiency 1100W DC | |
| Availability | High-efficiency, hot-plug, redundant power supplies; hot-plug hard drives; TPM; dual internal SD support; hot-plug redundant fans; optional bezel; information tag; ECC memory; interactive LCD screen; extended thermal support; ENERGY STAR® compliant; switch independent partitioning | |
| Remote management | iDRAC7 with Lifecycle Controller iDRAC7 Express (default), iDRAC7 Enterprise (upgrade option) 8GB vFlash media (upgrade option), 16GB vFlash media (upgrade option) | |



| Feature | PowerEdge R820 technical specification |
|---------------------------|---|
| Systems management | <p>Dell OpenManage Essentials and Dell Management Console Dell OpenManage Power Center Dell OpenManage Integrations and Connections:</p> <ul style="list-style-type: none"> • OpenManage Integration Suite for Microsoft® System Center • Dell Management Plug-in for VMware® vCenter™ • Connections for HP Operations Manager, IBM Tivoli® Netcool® and CA Network and Systems Management <p>IPMI 2.0 compliant</p> |
| Rack support | <p>ReadyRails™ sliding rails with optional cable management arm for 4-post racks (optional adapter brackets required for threaded hole racks)</p> |
| Operating systems | <p>Microsoft Windows Server® 2008 R2 SP1, x64 (includes Hyper-V™ v2) SUSE® Linux® Enterprise Server Red Hat® Enterprise Linux®</p> <p>Optional embedded hypervisors: Citrix® XenServer™ VMware vSphere™ Red Hat Enterprise Virtualization®</p> <p>For more information on the specific versions and additions, visit Dell.com/OSsupport.</p> |

¹GB 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 R820 is a 2U, 4-socket rack server. For additional system views and features, see the *Dell PowerEdge R820 Systems Owner's Manual* on Support.Dell.com/Manuals.

Chassis views

Figure 1 shows the features on the front of the R820 chassis including sixteen 2.5-inch hard drives, control panel, USB connectors, power button, system identification button, optical drive, information tag, video connector, and vFlash media card slot.

Figure 1. Front view without bezel



Figure 2 shows the optional lockable bezel on the front of the R820 chassis.

Figure 2. Front view with bezel



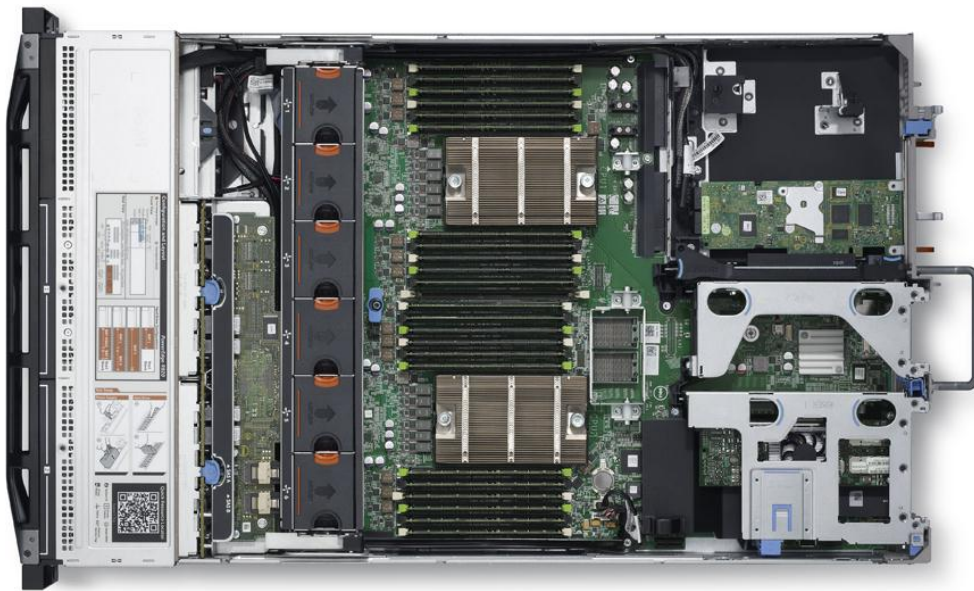
Figure 3 shows the features on the back panel of the R820 including USB connectors, Ethernet connectors, serial connector, video connector, system identification button connector, iDRAC7 Enterprise port, PCIe slots, and power supplies.

Figure 3. Back view



The chassis design of the R820 is optimized for easy access to components and for airflow for effective and efficient cooling. The R820 supports up to 48 DIMMs, 4 processors, hot-plug redundant fans, and many other components and features described in this guide.

Figure 4. Internal view



Chassis features

Table 4 lists the features on the R820 chassis. For additional information, see the *Dell PowerEdge R820 Systems Owner's Manual* on Support.Dell.com/Manuals.

Table 4. Chassis features

| Feature | Description |
|-------------------------------------|---|
| Power button | ACPI-compliant power button with an integrated green power LED |
| Front bezel | Covers the system's front-loading hard drives and locks for security |
| 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 |
| Hard drives | Up to sixteen 2.5-inch drives |
| USB connectors | Connects USB devices to the server |
| vFlash media reader | Activated when iDRAC Enterprise is enabled |
| Information tag | Slide-out label panel for recording system information |
| Video connector | Connects a monitor to the server |
| LCD panel and buttons | Displays system ID, status information, and system error messages; two navigation buttons to scroll through the menu on the LCD and one select button |
| Optical drive | Optional slim DVD or DVD+RW drive |
| Tape drive | Optional external tape drive through the SAS 6Gbps HBA |
| Power supply units | Supplies power to the server |
| Power supply indicators | Indicates whether server has power |
| NIC indicators | Indicates network activity and status |
| PCIe slots | Connects PCIe expansion cards to the server |
| Ethernet connectors | Connects integrated 10/100/1000 NICs to the server |
| Serial connector | Connects a serial device to the server |
| iDRAC7 Enterprise port | Dedicated management port for optional iDRAC Ports card |

Front control panel

The R820 control panel is located on the front of the chassis as shown in Figure 5. For more information about the LCD control panel, see the *Dell PowerEdge R820 Systems Owner's Manual* on Support.Dell.com/Manuals.



Figure 5. LCD control panel



Quick Resource Locator

A useful feature included with Dell PowerEdge 12th generation servers is the Quick Resource Locator (QRL)—a model-specific Quick Response (QR) code that is located inside the R820 chassis cover (see Figure 6). Use your smartphone to access the Dell QRL app to learn more about the server.

Figure 6. 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 | An optional 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. |
| 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. No TPM version is available for China or Russia. |
| 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 Dell PowerEdge R820 features the Intel Xeon processor E5-4600 product family, which offers an ideal combination of performance, power efficiency, and cost. These processors provide high performance no matter what your constraint is—floor space, power, or budget—and on workloads that range from the most complicated scientific exploration to crucial web-serving and infrastructure applications. In addition to providing raw performance gains, improved I/O is also made possible with Intel Integrated I/O, which can reduce latency by adding more lanes and doubling bandwidth. This helps to reduce network and storage bottlenecks, unleashing the processor's performance capabilities.

Processor features

The new Intel Xeon processor E5-4600 product family adds the following new features:

- Four-socket processor design with power and dimensions optimized for density
- Up to eight execution cores per processor
- Intel Hyper-Threading technology enables up to 16 computational threads
- Micro-architecture on 32nm process for greater performance per watt
- Support for more memory—14 additional DIMMs (up to 48 DIMM slots) and support for up to 32GB DIMMs, which increases memory capacity from 1 TB to 1.5 TB
- Integrated memory controller with four channels of DDR3 and 46-bit physical addressing facilitate greater memory capacity
- Intel Integrated I/O has support for up to 160 lanes of PCIe 3.0, which can reduce latency
- Faster connections throughout the system with support for DDR3 1600 MT/s memory and 8.0 GT/s QPI
- Intel Data Direct I/O (DDIO) allows I/O traffic to skip the main system memory and be directed straight to the processor cache, which can provide a significant reduction in latency as well as allowing memory to remain in a low-power state
- High bandwidth, low latency, bidirectional ring interconnect allows faster access to the 20MB multi-banked last level cache
- Intel Advanced Vector Extensions offer up to double the floating point operations per clock cycle by doubling the length of registers, which can be useful for addressing very complex problems or dealing with large-number calculations, which are integral to many technical, financial, and scientific computing problems
- Intel Turbo Boost Technology 2.0, which allows processor cores to run faster than the base operating frequency if it's operating below power, current, and temperature specification limits, delivers up to double the boost than the previous generation
- Continued improvements to both Intel TXT and AES-NI help to better protect systems and data

For more information on the Intel Xeon processor E5-4600 product family, visit Intel.com.

Supported processors

The R820 supports up to four processors with up to eight cores per processor. Table 6 lists the Intel Xeon processors supported by the PowerEdge R820. For the latest information on supported processors, visit Dell.com/PowerEdge.



Table 6. Supported processors

| Model | Speed | TDP | Cache | Cores/ threads | QPI | Turbo |
|-----------------|--------|------|-------|-------------------|----------|-------|
| E5-4650 | 2.7GHz | 130W | 20MB | 8/16 | 8.0 GT/s | Yes |
| E5-4650L | 2.6GHz | 115W | 20MB | 8/16 | 8.0 GT/s | Yes |
| E5-4640 | 2.4GHz | 95W | 20MB | 8/16 | 8.0 GT/s | Yes |
| E5-4620 | 2.2GHz | 95W | 16MB | 8/16 | 7.2 GT/s | Yes |
| E5-4617 | 2.9GHz | 130W | 15MB | 6/6 | 7.2 GT/s | Yes |
| E5-4610 | 2.4GHz | 95W | 15MB | 6/12 | 7.2 GT/s | Yes |
| E5-4607 | 2.2GHz | 95W | 12MB | 6/12 | 6.4 GT/s | NA |
| E5-4603 | 2.0GHz | 95W | 10MB | 4/8 | 6.4 GT/s | NA |

For information on processor installation and configuration, see the *Dell PowerEdge R820 Systems Owner's Manual* on Support.Dell.com/Manuals.

GPU support

The R820 supports graphics processing unit (GPU) technology, which provides accelerated performance for a variety of applications including virtual desktop infrastructure (VDI) and HPC implementations.

Internal GPU support

The R820 supports up to two 75W GPUs. Each GPU can support up to 1 GB of dedicated GDDR5 memory and is actively cooled. An internal GPU is available through certified factory installation (CFI) or field upgrade only. For a list of supported GPUs, see Table 7.

Table 7. GPU cards supported

| GPU card | Width | Power consumption |
|-----------------------------|--------|-------------------|
| NVIDIA® Quadro® 2000 | Single | 62W |

Operating system support for GPUs

Some operating systems have not been validated to support GPUs. See Table 22 and Table 23 for more information on operating system support of GPUs.

Chipset

The Intel C600 chipset is implemented on the PowerEdge R820. For more information, visit Intel.com.



5 Memory

More memory options are available than ever before with the Dell PowerEdge R820—greater capacities, higher frequencies, and more flexibility. The R820 supports up to 1.5 TB of memory (48 DIMM slots) and speeds of up to 1600 MT/s, providing high performance in a variety of applications.

In addition to supporting existing unbuffered DIMMs (UDIMM) and registered DIMMs (RDIMM), the R820 supports load-reduced DIMMs (LRDIMM), which use a buffer to reduce memory loading and provide greater density, allowing for the maximum platform memory capacity. High memory density provides a richer, no compromise virtualization environment. While the buffer in the LRDIMM reduces memory bus loading and allows 50% higher capacity in a system, the buffer does introduce additional latency, which will have a small impact on system performance.

Increase your uptime and reduce data loss with RAS features like memory mirroring, sparing, and many others. RAS aids in the rapid and accurate diagnosis of faults that require service, increasing your memory reliability.

Supported memory

The R820 supports the memory technologies shown in Table 8.

Table 8. Memory technologies supported

| Feature | UDIMM | RDIMM | LRDIMM |
|---------------------------|------------------------------|------------------------------|------------------|
| Register | No | Yes | Yes |
| Buffer | No | No | Yes |
| Frequencies | 800, 1066, or 1333MT/s | 800, 1066, 1333, or 1600MT/s | 1066 or 1333MT/s |
| Ranks supported | 1 or 2 | 1, 2, or 4 | 4 |
| Capacity per DIMM | 2 or 4GB | 2, 4, 8, 16, or 32GB | 32GB |
| Maximum DIMMS per channel | 2 | 3 | 3 |
| DRAM technology | x8 | x4 or x8 | x4 |
| Temperature sensor | Yes | Yes | Yes |
| ECC | Yes | Yes | Yes |
| SDDC | Yes (with advanced ECC mode) | Yes | Yes |
| Address parity | Yes | Yes | Yes |



The R820 supports the DIMMs listed in Table 9. For the latest information on supported memory, visit Dell.com.

Table 9. DIMMs supported

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

Memory configurations

Flexible memory configurations are supported on the R820, ranging from capacities of 2 GB to 1.5 TB. The system supports up to 12 DIMMs per processor (up to 48 DIMMs in a four-processor configuration). The R820 has four memory channels per processor, with each channel supporting up to three DIMMs.

The R820 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. UDIMM, RDIMM, and LRDIMM cannot be mixed.

The following additional memory population guidelines apply to the R820:

- Up to two quad-rank (QR) DIMMs and up to three dual-rank (DR) or single-rank (SR) DIMMs may be populated per channel. Although an LRDIMM is physically a QR DIMM, logic on the LRDIMM can make it appear as a DR DIMM to the system, allowing up to three LDRIMMs per channel.
- DIMMs must be installed in each channel, starting with the DIMM farthest from the processor.
- DIMMs should be installed with largest rank count to smallest. For example, if DR DIMMS are mixed with SR DIMMS, DR DIMMS should be placed in the lowest DIMM slots, followed by the SR DIMMS.

For more information on memory configuration, see the *Dell PowerEdge R820 Systems Owner's Manual* on Support.Dell.com/Manuals.



Memory speed

The R820 supports memory speeds of 1600 MT/s, 1333 MT/s, 1066 MT/s, and 800 MT/s depending on the DIMM types installed and the configuration. All memory on all processors and channels run at the same speed and voltage. By default, the systems run at the highest speed for the channel with the lowest DIMM voltage and speed. The operating speed of the memory is also determined by the maximum speed supported by the processor, the speed settings in the BIOS, and the operating voltage of the system.

Table 10 lists memory configuration and performance details for the R820 based on the population of the number and type of DIMMs per memory channel.

Table 10. Memory speed capabilities

| DIMM type | DIMM 0 | DIMM 1 | DIMM 2 | Number of DIMMs | Speed (MT/s) | | | |
|-----------|--------|--------|--------|-----------------|--------------|------|------|------|
| | | | | | 800 | 1066 | 1333 | 1600 |
| UDIMM | SR | | | 1 | • | • | • | |
| | DR | | | 1 | • | • | • | |
| | SR | SR | | 2 | • | • | • | |
| | SR | DR | | 2 | • | • | • | |
| | DR | DR | | 2 | • | • | • | |
| RDIMM | SR | | | 1 | • | • | • | • |
| | DR | | | 1 | • | • | • | • |
| | QR | | | 1 | • | • | | |
| | SR | SR | | 2 | • | • | • | • |
| | SR | DR | | 2 | • | • | • | |
| | DR | DR | | 2 | • | • | • | • |
| | QR | SR | | 2 | • | | | |
| | QR | DR | | 2 | • | | | |
| | QR | QR | | 2 | • | | | |
| | SR | SR | SR | 3 | • | • | | |
| | SR | SR | DR | 3 | • | • | | |
| | SR | DR | DR | 3 | • | • | | |
| | DR | DR | DR | 3 | • | • | | |
| | QR | | | 1 | | • | • | |
| | QR | QR | | 2 | | • | • | |
| | QR | QR | QR | 3 | | • | | |
| LRDIMM | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |



Memory RAS features

Reliability, availability, serviceability (RAS) features help keep the system online and operational without significant impact to performance, and can decrease data loss and crashing due to errors. RAS aids in rapid, accurate diagnosis of faults that require service. Table 11 describes the RAS features supported on the R820.

Table 11. Memory RAS features

| Feature | Description |
|---|---|
| Dense configuration optimized profile | Increased memory reliability can be a result from this selectable platform profile that adjusts parameters to reduce faults regarding refresh rates, speed, temperature and voltage |
| Memory demand and patrol scrubbing | Demand scrubbing is the ability to write corrected data back to the memory once a correctable error is detected on a read transaction. Patrol scrubbing proactively searches the system memory, repairing correctable errors. |
| Recovery from single DRAM device failure | Recovery from Single DRAM Device Failure (SDDC) provides error checking and correction that protects against any single memory chip failure as well as multi-bit errors from any portion of a single memory chip. |
| Failed DIMM isolation | This feature provides the ability to identify a specific failing DIMM channel pair, thereby enabling the user to replace only the failed DIMM pair. |
| Memory mirroring: intra-socket | Memory mirroring is a method of keeping a duplicate (secondary or mirrored) copy of the contents of memory as a redundant backup for use if the primary memory fails. The mirrored copy of the memory is stored in memory of the same processor socket. |
| Memory address parity protection | This feature provides the ability to detect transient errors on the address lines of the DDR channel. |
| Memory sparing (rank) | Memory sparing allocates one rank per channel as a spare. If excessive correctable errors occur in a rank or channel, it is moved to the spare area while the operating system is running to prevent the error from causing an uncorrectable failure. |
| Memory thermal throttling | This feature helps to optimize power/performance and can also be used to prevent DIMMs from overheating. |

For information on memory mirroring and sparing configurations, see the *Dell PowerEdge R820 Systems Owner's Manual* on [Support.Dell.com/Manuals](https://support.dell.com/Manuals).



6 Storage

The Dell PowerEdge R820 supports extensive internal and external storage options, internal and external storage controllers, and different chassis and backplane options for a varied number of drives.

Features such as Express Flash PCIe solid-state drives and CacheCade™ provide accelerated performance over previous technologies. Express Flash drives use PCIe lanes to connect directly to the processor and chipset and are easily accessible by hot-plug drive bay. CacheCade uses Dell PERC storage controllers to accelerate performance over hard drives or traditional solid-state drives.

Internal storage

The R820 supports the following internal storage options:

- 8 x 2.5-inch drives
- 8 x 2.5-inch drives plus 4 x 2.5-inch Express Flash PCIe solid-state drives
- 8 + 8 x 2.5-inch drives
- 16 x 2.5-inch drives

A system cannot be upgraded or reconfigured after point of purchase.

Supported hard drives

The R820 supports up to sixteen 2.5-inch hard drives or solid-state drives. Table 12 lists more information about these drives. For additional information, see Dell.com/PowerEdge.

Table 12. Supported hard drives

| Form factor | Type | Speed (rpm) | Capacities |
|-------------|------------------------------|-------------|--------------------------------|
| 2.5" | SATA (3Gb) | 7.2K | 250GB, 500GB, 1TB |
| | Nearline SAS (6Gb) | 7.2K | 500GB, 1TB, 1TB SED |
| | SAS (6Gb) | 10K | 300GB, 600GB, 900GB, 900GB SED |
| | SAS (6Gb) | 15K | 146GB, 300GB, 300GB SED |
| | SAS SSD (SLC, 6Gb) | N/A | 200GB, 400GB |
| | SATA SSD (MLC, 3Gb) | N/A | 100GB, 200GB |
| | Express Flash PCIe SSD (SLC) | N/A | 175GB, 350GB |



Express Flash drives

Express Flash drives use PCIe and SSD technologies to provide performance, scalability, and optimal serviceability. Accelerated performance with high IOPs is made possible without requiring processor resources or capturing DRAM. Also, Express Flash drives use a standardized 2.5-inch hot-plug form factor that saves critical PCIe slot space by moving drives from the back to the front of the system and allows a common management process for all drives.

The PowerEdge R820 has an option to support up to four 2.5-inch, hot-plug Express Flash drives with capacities of 175GB or 350GB.

External storage

External storage for the R820 is available through optional HBAs for SAS, iSCSI, and Fibre Channel. For more information, see Dell.com/Storage.

Storage controllers

Dell provides highly capable RAID options for you to ensure that your data remains safe. Dell's RAID controller options offer impressive performance improvements, including the following features:

- FastPath™ I/O: This feature can help accelerate performance when operating on SSDs.
- Split mirror: This function allows you to break mirrored disk connection in order to quickly replace a drive.
- Physical disk power management (Dimmer Switch™): This feature allows for power control of spare or idle drives, which can save energy and operating expenses.

Supported RAID controllers

The newest line of PERC (PowerEdge RAID Controller) cards offer high I/O performance for database applications and streaming digital media environments. The internal RAID controllers have a dedicated connection to the motherboard. The R820 supports the new PERC 8 family of controllers with improved functionality and faster performance.

The default PERC for the R820 is a mini-type PERC. However, for a system with an internal GPU card or a card between half-length and $\frac{3}{4}$ -length, use the adapter-type PERC. The R820 also supports the new software RAID solution that supports RAID 0, 1, 5 and 10. The R820 supports the PERC cards listed in Table 13. For more information about the latest PERC offerings, see Dell.com/PERC.

Table 13. Supported RAID controllers

| Controller | Description | Features | RAID modes supported | Form factor | Usage model |
|------------------------------|---|--|------------------------|-------------|---------------------|
| PERC H810 External | Eight-port, external and 6Gp/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 |



| Controller | Description | Features | RAID modes supported | Form factor | Usage model |
|-----------------------------------|---|---|------------------------|--|---------------------|
| PERC H710P Internal | Eight-port, internal 6Gb/s PCIe RAID controller that supports up to 32 SATA and SAS hard drives or SSDs | Includes 1GB NV DDR3 cache, premium performance and feature set, security SED/EKMS, and SSD | 0, 1, 10, 5, 50, 6, 60 | Integrated mini-type and adapter-type ¹ | Premium performance |
| PERC H710 | Eight-port, internal 6Gb/s PCIe RAID controller that supports up to 32 SATA and SAS hard drives or SSDs | Includes 512MB DDR3 cache, advanced feature set, security SED/EKMS, and SSD as cache | 0, 1, 10, 5, 50, 6, 60 | Integrated mini-type and adapter-type ¹ | Performance |
| PERC H310 | Eight-port, internal 6Gb/s PCIe RAID that supports up to 32 SATA and SAS hard drives or SSDs | Supports hot-plug drives, expansion, pass-thru | 0, 1, 10, 5, 50 | Integrated mini-type and adapter-type ¹ | Value |
| PERC S110 Software RAID | 3Gb/s SATA software RAID controller that supports up to 4 physical disks or 8 virtual disks | Supports hot-plug SATA drives (4 drive maximum); no expansion; Microsoft Windows only | 0, 1, 5, 10 | Motherboard-embedded SATA | Entry-level |

¹Adapter-type required with the two-PCIe slot chassis and required when configuring an internal GPU or ¾-length PCIe card

CacheCache

CacheCache is a technology that provides automated storage tiering on SSDs with the PERC H810 and H710P. It works by detecting the most often accessed data and copying it over time to the CacheCache SSD(s) where that cached data is accessed directly, instead of accessing the hard disk drives. This can dramatically increase how your applications respond when they are under peak traffic times and how they perform when response time is critical.

CacheCache provides cost-effective performance scaling for database-type applications that perform lots of random reads, and saves the cost of adding extra drives.

Optical drive

The R820 supports one slim, internal optical drive on the system board embedded SATA. The R820 supports DVD-ROM and DVD+/-RW.

Tape drive

The R820 does not support internal tape drives.



7 Networking and PCIe

The Dell PowerEdge R820 offers balanced, scalable I/O capabilities, including integrated PCIe 3.0 capable expansion slots. Dell Select Network Adapters, Dell's network daughter cards, let you choose the right network fabric without using up a valuable PCI slot. Pick the speed, technology, vendor, and other options such as switch independent partitioning, which lets you share and manage bandwidth on 10GbE connections.

Select Network Adapter

The Select Network Adapter family includes flexible LAN on Motherboard (LOM) card options for the Dell PowerEdge 12th generation servers. The Select Network Adapter form factor delivers the value of LOM integration with the system, including BIOS integration and shared port for manageability while providing the flexibility of a modular card.

The R820 supports one custom rack network daughter card (NDC), as part of the Select Network Adapter family, to house the complete LOM subsystem. The NDC is a custom form factor card that contains a complete NIC subsystem. The NDC options supported on the R820 include a selection of 1GbE and 10GbE port cards, such as 1000Base-T, 10GBASE-T and 10Gb SFP+.

Figure 7. Rack network daughter card



Table 14 lists the available Select Network Adapter options and supported features for the R820.

Table 14. Supported Select Network Adapter options and features

| Features | Broadcom 5720 Base-T (default) | Intel I350 Base-T | Broadcom 57800 SFP+ ¹ | Broadcom 57800 Base-T ¹ | Intel X540 Base-T ¹ |
|--|--------------------------------|-------------------|----------------------------------|------------------------------------|--------------------------------|
| Ports x link speed | 4 x 1Gb/s | 4 x 1Gb/s | 2 x 1Gb/s + 2 x 10Gb/s | 2 x 1Gb/s + 2 x 10Gb/s | 2 x 1Gb/s + 2 x 10Gb/s |
| Supported speed | 1Gb/s | 1Gb/s | 1Gb/s 10Gb/s | 1Gb/s 10Gb/s | 1Gb/s 10Gb/s |
| SR-IOV | Not supported | Not supported | Not supported | Not supported | Supported (10GbE only) |
| iSCSI HBA | Not supported | Not supported | Supported ² | Supported ² | Not supported |
| EEE | Supported | Supported | Not supported | Not supported | Not supported |
| FCoE | Not supported | Not supported | Supported | Not supported ³ | Not supported ³ |
| Switch independent partitioning | Not supported | Not supported | Supported ⁴ | Supported ⁴ | Not supported |
| DCB | Not supported | Not supported | Supported ⁵ | Supported ⁵ | Supported ⁵ |
| iSCSI TLV | Not supported | Not supported | Not supported | Not supported | Supported ⁶ |

¹These port cards have two chipsets that offer the choice of either 10GbE or 1GbE.

²Only 10GbE ports have iSCSI HBA support.

³Only 10GbE ports have FCoE support.

⁴Only 10GbE ports have switch independent partitioning support. The maximum number of partitions supported is four (two partitions per 10GbE port). 1GbE ports do not support switch independent partitioning.

⁵Only 10GbE ports have DCB support.

⁶Only 10GbE ports have iSCSI TLV support.

Table 15. Select Network Adapter selection for racks

| | 10Gb Ethernet | 10Gb Converged | | | 1Gb Ethernet | 1Gb Converged |
|--------------------------|---------------|----------------|--------------|--------------------|--------------|---------------|
| Running Protocols | LAN | LAN+ iSCSI | LAN+ FCoE | LAN+iSCSI+ FCoE | LAN | LAN+iSCSI |



| | 10Gb Ethernet | 10Gb Converged | | | 1Gb Ethernet | 1Gb Converged |
|-------|--------------------------------------|--------------------------------------|---|---|------------------------|------------------------|
| Racks | Broadcom 57800 2x1Gb+2x10 Gb SFP+ | Broadcom 57800 2x1Gb+2x10 Gb SFP+ | - | - | Broadcom 5720 4x1Gb BT | Broadcom 5720 4x1Gb BT |
| | Intel i540 2x1Gb+32x10Gb BT | Intel i540 2x1Gb+32x10Gb BT | - | - | Intel i350 4x1Gb BT | Intel i350 4x1Gb BT |

System management integration

With R820, the job of deploying, updating, monitoring, and maintaining the Select Network Adapters is fast and easy. System management integration features include the following:

- Pre-boot: Use the Dell Lifecycle Controller graphical user interface (GUI) to set configuration such as bandwidth allocation or firmware revision level.
- Post-boot: Agent-free out-of-band or high-speed in-band connection over LOM through the Operating System/BMC pass-thru feature for sensory information
- Automation of firmware and driver version deployment upon component replacement
- Automatic monitoring of NIC status and notification on SNMP traps
- Local or remote re-configuration of any NIC, physical or virtual
- PXE boot enabled on all LOM and NDCs for ease of use
- Boot from SAN (iSCSI, FCoE) configuration for networking devices through the USC.

PCIe expansion

The R820 provides expanded PCIe slot capability over the previous servers. This is made possible by the 40 PCIe lanes available from each processor in the system. Dell designed the R820 to be PCIe 3.0-compliant in order to take full advantage of the processor capabilities.

PCIe slots

PCIe connectivity is integrated with the processor in that the number of processors in a system impacts the number of PCIe slots and the bandwidth of each PCIe slot.

For an R820 system with one processor, three PCIe slots are available:

- One half-length, low-profile PCIe x8 (x16 connector) slot
- One half-length, full-height PCIe x16 (x16 connector) slot
- One half-length, full-height PCIe x8 (x8 connector) slot for PERC

For an R820 system with two processors, four additional PCIe slots are available:

- One half-length, full-height PCIe x16 (x16 connector) slot
- One half-length, full-height PCIe x8 (x16 connector) slot
- Two half-length, low-profile PCIe x8 (x16 connector) slots



PCIe expansion cards

The R820 supports a variety of PCIe expansion cards. Table 16 lists the supported add-in NICs and HBAs.

Table 16. Supported NICs and HBAs

| Type | Adapter |
|---------------------|---|
| 1Gb/10Gb NIC | Broadcom 5720 Dual Port 1GbE Base-T |
| | Broadcom 5720 Quad Port 1GbE Base-T |
| | Intel I350 Dual Port 1GbE Base-T |
| | Intel I350 Quad Port 1GbE Base-T |
| | Broadcom 57810S Dual Port 10GbE SFP+ |
| | Broadcom 57810S Dual Port 10GbE Base-T |
| | Intel X520 Dual Port 10GbE SFP+ |
| | Intel X540 Dual Port 10GbE Base-T |
| | QLogic® QLE8262 Dual Port 10GbE SFP+ |
| | Brocade® BR1020 Dual Port 10GbE SFP+ |
| FC4/FC8 HBA | QLogic QLE2460 Single Port 4Gb HBA |
| | QLogic QLE2462 Dual Port 4Gb HBA |
| | QLogic QLE2560 Single Port 8Gb FC HBA |
| | QLogic QLE2562 Dual Port 8Gb FC HBA |
| | Emulex® LPe12000 Single Port 8Gb FC HBA |
| | Emulex LPe12002 Dual Port 8Gb FC HBA |
| | Brocade BR815 Single Port 8Gb FC HBA |
| | Brocade BR825 Dual Port 8Gb FC HBA |

Table 17 lists additional supported PCIe expansion cards for the R820.

Table 17. Additional supported PCIe expansion cards

| Type | Adapter |
|--------------------|--|
| PCIe SSD | Fusion-io® IoDrive® 640GB V1 |
| | Fusion-io PCIe SSD V2 |
| PCIe bridge | PCIe bridge adapter for front-accessible, hot-plug Express Flash PCIe SSDs |

For the latest information on all supported add-in PCIe expansion cards for the R820, visit [Dell.com](https://www.dell.com).



8 Power, thermal, and acoustics

Lower overall system-level power draw is a result of breakthrough system design. The Dell PowerEdge R820 server maximizes performance per watt through a combination of power and cooling, energy efficient technologies, and tools. Additionally, the PowerEdge R820 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 18 lists the tools and technologies Dell offers to help you achieve your data center goals by lowering power consumption and increasing energy efficiency.

Table 18. Power tools and technologies

| Feature | Description |
|---|--|
| Power supply units (PSU) portfolio | Dell's PSU portfolio includes intelligent features such as dynamically optimizing efficiency while maintaining availability and redundancy. Find additional information in the Power supply units section. |
| Tools for right-sizing | <p>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/calc.</p> <p>Energy Smart Data Center Assessment is a Dell Services offering that uses infrastructure and thermal analysis to help maximize system efficiency. Learn more at Dell.com/EnergySmart.</p> |
| Industry compliance | Dell's servers are compliant with all relevant industry certifications and guidelines, including 80 PLUS, Climate Savers, and ENERGY STAR. |
| Power monitoring accuracy | <p>PSU power monitoring improvements include:</p> <ul style="list-style-type: none">• 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 PSU and reduce system power consumption. Dell is the first hardware vendor to leverage Intel Node Manager for circuit-breaker fast capping. |
| Systems management | <p>iDRAC7 Enterprise provides server-level management that monitors, reports, and controls power consumption at the processor, memory, and system level.</p> <p>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.</p> |



| Feature | Description |
|--------------------------------|--|
| Active power management | <p>Intel Node Manager is an embedded technology that provides individual server-level power reporting and power limiting functionality. Dell offers a complete power management solution comprised of Intel Node Manager accessed through Dell iDRAC Enterprise and OpenManage Power Center that allows policy-based management of power and thermals at the individual server, rack and data center level.</p> <p>Hot spare reduces power consumption of redundant power supplies.</p> <p>Thermal control of fan speed optimizes the thermal settings for your environment to reduce fan consumption and lower system power consumption.</p> <p>Idle power enables Dell servers to run as efficiently when idle as when at full workload.</p> |
| Fresh Air cooling | <p>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.</p> |
| Rack infrastructure | <p>Dell offers some of the industry's highest-efficiency power infrastructure solutions, including:</p> <ul style="list-style-type: none"> • Power distribution units (PDUs) • Uninterruptible power supplies (UPS) • Energy Smart containment rack enclosures <p>Find additional information at http://content.dell.com/us/en/enterprise/power-and-cooling-technologies-components-rack-infrastructure.aspx.</p> |

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

Power supply units

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

The following power supply unit options are available for the R820:

- 750W AC
- 1100W AC
- 1100W DC



Figure 8 shows a 750W power supply unit extended from the R820 chassis.

Figure 8. 750W power supply unit



The PowerEdge R820 supports up to two AC-DC or DC-DC power supplies with 1 + 1 redundancy, auto-sensing, and auto-switching capability.

Dell PSUs have achieved Platinum efficiency levels as shown in Table 19.

Table 19. Power supply efficiency

| Form factor | Output | Class | Efficiency targets by load | | | |
|----------------|----------|----------|----------------------------|-------|-------|-------|
| | | | 10% | 20% | 50% | 100% |
| Redundant 86mm | 750W AC | Platinum | 82.0% | 90.0% | 94.0% | 91.0% |
| | 1100W AC | Platinum | 89.0% | 93.0% | 94.5% | 92.0% |
| | 1100W DC | Silver | 80.0% | 88.0% | 91.0% | 88.0% |

Thermal and acoustics

Optimized thermal management makes the PowerEdge R820 cool and quiet. Benefiting from smart cooling fan speed control, the R820 can keep both high performance and good acoustics across a wide range of ambient temperatures from 10°C to 35°C (50°F to 95°F) and to extended ambient temperature ranges (see Table 29). Operating environments for the R820 can vary from the data center to general-use spaces. In typical a configuration, the R820 is suitable for an open office environment.

Thermal design

The thermal design of the PowerEdge R820 reflects the following:

- **Multiple sensors are monitored for thermal feedback control:** The PowerEdge R820 dynamically controls system cooling fan speed based on responses from all component temperature sensors, including processors, hard disk drives, DIMMs, storage cards, and the inlet ambient temperature. Thermal control detects and responds to hardware configuration. Thermal management adjusts cooling according to what the system really needs, and draws lower fan power draw and generates lower acoustical noise levels than servers without such controls.
- **User-configurable settings:** An R820 thermal control design target is to minimize the contribution of fan power to overall system power. However, with the understanding and realization that every customer has a unique set of circumstances or expectations of the system, in this generation of servers, we are introducing limited user-configurable settings in the iDRAC7



BIOS setup screen. For more information, see the *Dell PowerEdge R820 Systems Owner's Manual* on Support.Dell.com/Manuals and "Advanced Thermal Control: Optimizing across Environments and Power Goals" on Dell.com.

- **Cooling redundancy:** The R820 allows continuous operation with a fan failure in the system.
- **Environmental specifications:** The optimized thermal management makes the R820 reliable under a wide range of operating environments as shown in the environmental specifications in Table 29. Many configurations are also compliant under expanded operating temperature environments, but a few are not.

Acoustical design

The acoustical design of the PowerEdge R820 reflects the following:

- **Versatility:** The PowerEdge R820 saves you power draw in the data center, but it also is quiet enough for the office environment in typical and minimum configurations.
- **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 20.
- **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.
- **Noise level dependencies:** If acoustics is important to you, you may want to make the following configuration choices and settings for the PowerEdge R820 because they result in quieter operation:
 - iDRAC7 BIOS settings: Performance Per Watt (DAPC or OS) may be quieter than Performance or Dense Configuration (iDRAC Settings > Thermal > Max. Exhaust Temperature or Fan speed offset)
 - Hot spare feature of power supply unit: In system default setting, the Hot Spare Feature is disabled; acoustical output from the power supplies is lowest in this setting

However, some components cause significant but not necessarily intuitive increases in loudness when they are installed in the R820. Contributors to acoustical output can include:

- PCIe SSD cards (such as Fusion-io)
- GPUs
- Express Flash PCIe SSDs
- 10Gb NIC
- Dell Select Network Adapter
- Dell PERC cards
- Number of installed processors
- Number of installed PCIe cards
- Number of hard drives



Table 20 details the acoustical performance for the R820.

Table 20. Acoustical performance

| Configuration (23 ± 2°C ambient) | CPUs | Hard drives | Power supply unit | Memory | PCI card/HDD controller | Operating mode | L _{WA} -UL ¹ (bels) | L _{pA} ² (dBA) | Prominent tones ³ |
|--|------|-------------------------------|-------------------------|-----------------------|---|---------------------|--|---------------------------------------|---------------------------------|
| Typical | 4 | 8 x 300GB SAS (10K) | 2 x 1100W | 32 x 8GB 1600Hz | 2 x 1GbE NIC | Idle ⁴ | 5.5 | 39 | None |
| | | | | | 2 x FC8 1 x PERC H710 1 x H810 | Stress ⁵ | 6.1 | 48 | None |
| Feature rich | 4 | 12 x 300GB SAS (10K) | 2 x 1100W | 32 x 8GB 1600Hz | 2 x 1GbE NIC | Idle ⁴ | 5.6 | 40 | None |
| | | | | | 2 x FC8 1 x PERC H710 1 x H810 | Stress ⁵ | 6.2 | 49 | None |

¹L_{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).

²L_{pA} is A-weighted sound pressure level at front bystander position measured by binaural head in accordance with ISO7779 (2010) Section 8.6.2. The system is placed inside rack in 75 cm height.

³Prominent 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 inside rack in 75 cm height and acoustic transducer, binaural head, is at front bystander position, ref ISO7779 (2010) Section 8.6.2.

⁴Idle: Reference ISO 7779 (2010) definition 3.1.7; system is running in its operating system but no other specific activity.

⁵Stressed processor: An operating mode per ISO 7779 (2010) definition 3.1.6. The software SPECPower at 50% is activated to stress the processors and DIMM.

For more information on Dell's acoustical design, see the [Dell Enterprise Acoustics](#) white paper.



9 Rack rails and cable management

The sliding and static rail systems for the Dell PowerEdge R820 provide toolless support for 4-post racks with square or unthreaded round mounting holes. Both rail systems also support tooled mounting in 4-post threaded racks, and the static rails support tooled mounting in 2-post (Telco) racks as well for added versatility.

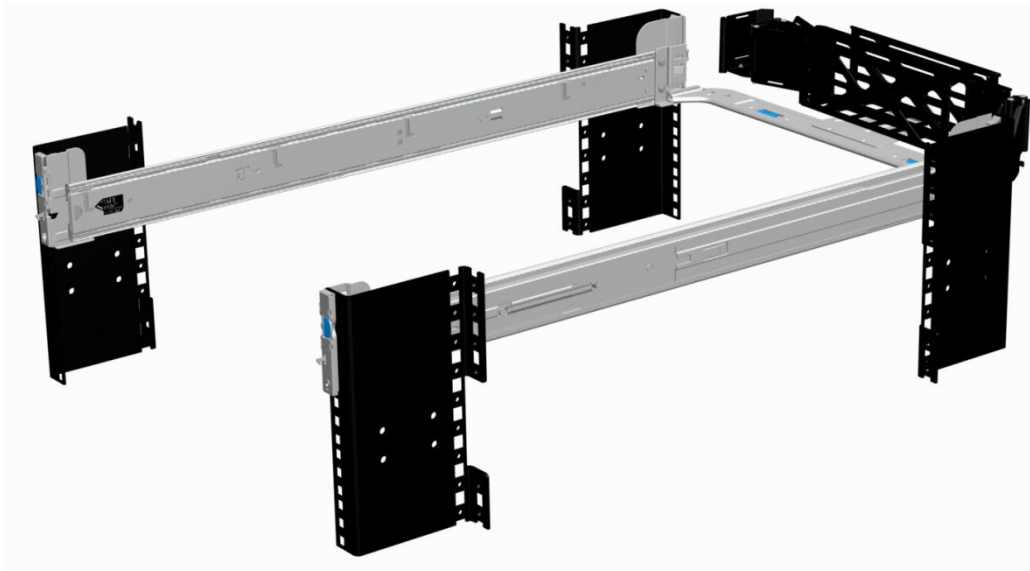
Compared to the R810 sliding rails that required the use of adapter brackets, the sliding rails for the R820 now offer support for threaded hole racks with the ReadyRails II mounting interface. The optional cable management arm (CMA) can be mounted on either the left or right side of the sliding rails without the use of tools for fast and easy deployment.

Sliding and static rail systems

The R820 supports both sliding rails and static rails. Both rails have a new slim rail design that supports the wide system chassis. The rails ship in the toolless mounting configuration, but can be converted to the tooled configuration very quickly and easily.

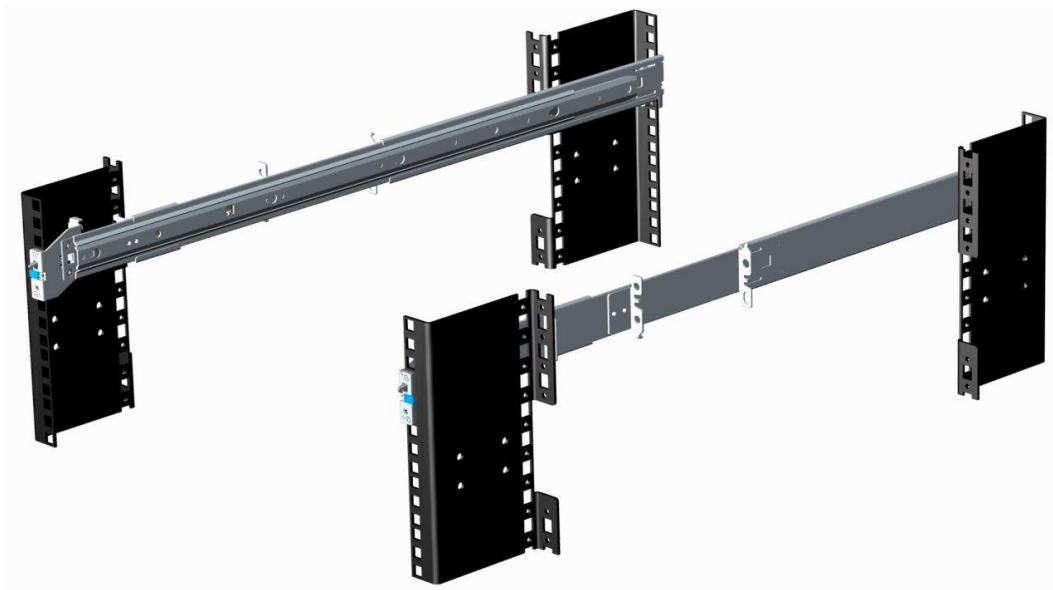
Sliding rails include a self-adjusting feature to allow the rails to be shared across multiple systems and accommodate various chassis depths. The sliding rail system allows you to fully extend the server out the rack for easy access for service. The sliding rails are available with or without the optional CMA. Figure 9 shows the sliding rails with the CMA.

Figure 9. Sliding rails with optional CMA



The static rails (shown in Figure 10) support a wider variety of racks than the sliding rails but do not support serviceability in the rack and are therefore are not compatible with the CMA.

Figure 10. Static rails



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

Table 21 lists the rack types that the R820 supports. The R820 is not compatible with any other Dell rails or CMAs including previous generation rails.

Table 21. Supported rack types

| Product | Rail Identifier | Mounting Interface | Rail Type | Rack Types Supported | | | | |
|---------|-----------------|--------------------|-----------|----------------------|--------|---|--------|---|
| | | | | Square | 4-Post | | 2-Post | |
| R820 | B6 | ReadyRails II | Sliding | ✓ | ✓ | ✓ | X | X |
| | B4 | ReadyRails | Static | ✓ | ✓ | ✓ | ✓ | ✓ |

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

For detailed information about static and sliding rails, see the Rack rail specifications section in Appendix A. For more information on installing the R820 in a rack, see the *Rack Installation Instructions* on [Support.Dell.com/Manuals](https://support.dell.com/Manuals).



Cable management arm

The optional CMA organizes and secures the cords and cables exiting the back of the server and unfolds to allow the server to extend out of the rack without having to detach the cables. Some key features of the R820 CMA include:

- Large U-shaped baskets to support dense cable loads
- Open vent pattern for optimal airflow
- Ability to be mounted on either side
- Use of hook-and-loop straps rather than plastic tie wraps to eliminate the risk of cable damage during cycling
- Low-profile fixed tray to both support and retain the CMA in its fully closed position
- Ability to mount the CMA and tray without the use of tools, due to snap-in designs



10 Operating systems and virtualization

The Dell PowerEdge R820 supports a wide range of industry-standard operating systems and virtualization software.

Supported operating systems

Table 22 lists the primary operating systems supported on the R820. For the latest information on supported operating systems, see Dell.com/OSsupport.

Table 22. Primary operating system support

| Operating System | Platform | Edition |
|---|---------------------------------------|---|
| Red Hat Enterprise Linux 5.8 ¹ | x32 | N/A |
| | x64 | |
| Red Hat Enterprise Linux 6.2 ² | x64 | N/A |
| Red Hat Enterprise Linux 6.2 for HPC | x64 | N/A |
| SUSE Linux Enterprise Server 11 SP2 | x64 | N/A |
| SUSE Linux Enterprise Server 10 SP4 | x64 | N/A |
| Windows Server 2008 SP2 | X86 | Web Standard Enterprise |
| | x64 (with Hyper-V role enabled) | Web Standard Enterprise Data center |
| Windows Server 2008 R2 with SP1 | x64 (with Hyper-V role enabled) | Web Standard Enterprise Data center HPC Foundation |

¹RHEL 5.7 is the minimum supported version. Current drop in box option is RHEL 5.8.

²RHEL 6.1 is the minimum supported version. Current factory install is RHEL 6.2.



Support of the operating systems listed in Table 23 is limited to a virtual environment as a guest operating system. Please contact the software vendor for additional support or questions about running the operating system in a virtualized environment.

Table 23. Virtual guest operating system support

| Operating System | Platform | Edition |
|------------------------------------|----------|---------------------------------------|
| Microsoft Windows 2003 | x86 | Web |
| Microsoft Windows 2003 R2 with SP2 | x86 | Standard Enterprise |
| | x64 | Standard Enterprise Data center |

Supported virtualization

One of the key features for virtualization on the PowerEdge R820 is the support for a fail-safe hypervisor. By running a hypervisor on an optional SD card and installing a backup copy on the other mirrored SD card, you can protect against hardware failure and maximize virtualization uptime.

Table 24 highlights the virtualization support for the R820.

Table 24. Virtualization support

| Operating systems | Version | Options |
|----------------------|----------------------------------|------------------------------|
| VMware ¹ | vSphere v4.1 U2 | ESX Classic DIB |
| | vSphere v4.1 U2 | ESXi Installable DIB |
| | vSphere v4.1 U2 | ESXi Embedded FI |
| | vSphere v5.0 | ESXi (one version) FI/DIB |
| | vSphere v5.0 U1 | ESXi (one version) FI/DIB |
| Citrix | XenServer 6.0 | N/A DIB |
| Red Hat ² | Enterprise Virtualization 3.0 | N/A DIB |

FI = factory install; DIB = drop in box

¹vSphere Fault Tolerance is supported with these versions

²No OpenManage support; drop in box license registration card only.



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 Figure 11, Dell systems management solutions are centered around OpenManage server management, featuring iDRAC with Lifecycle Controller.

Figure 11. 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 25 describes the functions and benefits of iDRAC7 with Lifecycle Controller.

Table 25. 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 R820, and Dell also offers an option of iDRAC7 Express. A detailed feature comparison for iDRAC7 Enterprise and iDRAC7 Express is shown in Table 26.

Table 26. Feature comparison for iDRAC7 Express and Enterprise

| Feature (function) | iDRAC7 Enterprise | iDRAC7 Express |
|-----------------------------------|-------------------|----------------|
| Local configuration with USC | • | • |
| IPMI 2.0 | • | • |
| Embedded diagnostics | • | • |
| Local OS install | • | • |
| Local updates | • | • |
| Driver pack | • | • |
| Shared NIC (LOM) | • | • |
| Remote update | • | • |
| Power control | • | • |
| Encryption | • | • |
| Crash screen capture ¹ | • | • |
| IPv6 | • | • |
| Auto-discovery | • | • |
| Auto-recovery | • | • |
| Web GUI | • | • |
| Remote CLI | • | • |
| Local/SSH CLI | • | • |
| Serial redirection | • | • |
| Remote configuration | • | • |
| Email alerts | • | • |



| Feature (function) | iDRAC7 Enterprise | iDRAC7 Express |
|---|-------------------|----------------|
| SNMP alerts | • | • |
| Power monitoring | • | • |
| Comprehensive monitoring | • | • |
| Dedicated NIC 1Gbps (100MB in iDRAC6) | • | |
| Part replacement | • | |
| Backup and restore configurations | • | |
| Virtual console (4 user) | • | |
| Virtual console chat | • | |
| Support for customer-supplied SD cards for vFlash media | • | |
| Virtual flash partitions | • | |
| Virtual media | • | |
| Virtual folders | • | |
| Remote file share | • | |
| Crash video playback | • | |
| Boot record/playback | • | |
| Power capping | • | |
| Enterprise group power management | • | |
| Directory services (AD, LDAP) | • | |
| PK authentication | • | |
| Two-factor authentication ² | • | |

¹Requires OMSA agent on target server

²Uses Microsoft ActiveX[®] on Internet Explorer[®] only

Agent-based management

Most systems management solutions require pieces of software, called agents, to be installed on each node in order to be managed within the IT environment. Additionally, the same agent is often used as a local interface into the hardware health and may be accessed remotely as a management interface, typically referred to as a one-to-one interface. For customers that continue to use agent-based solutions, Dell 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 recently released 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 PowerConnect™ 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 Support.Dell.com.
- **Dell Management Console**—Dell Management Console (DMC) offers sophisticated data-center management capabilities with comprehensive reporting features. DMC can perform basic hardware management and can manage operating systems and applications using various plug-ins from Symantec.
- **Dell IT Assistant**—Dell IT Assistant (ITA) is a console for managing Dell servers, storage arrays, and other components distributed throughout a network. Dell IT Assistant allows for easy identification of system issues through alerts, helping to reduce system downtime. Systems administrators can easily monitor systems anywhere within their network using ITA. ITA is supported on the R820, however, enhanced functionality is now available with OpenManage Essentials.

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.
- **Dell Management Plug-in 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 12 illustrates the various operations that can be performed during the server’s lifecycle.

Figure 12. Systems management server lifecycle

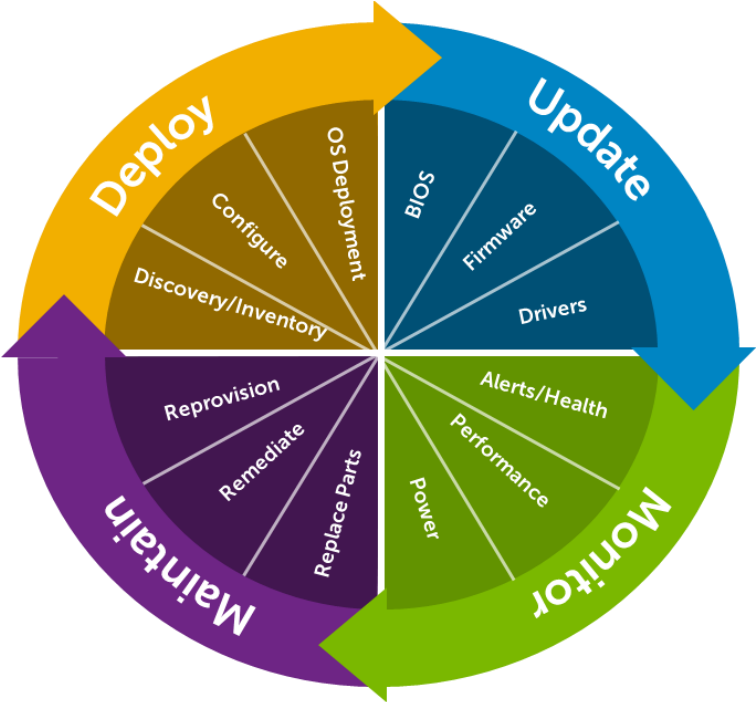


Table 27 lists the products that are available for one-to-one and one-to-many operations, and when they are used in the server’s lifecycle.

Table 27. One-to-one and one-to-many operations

| Operation | One-to-one | One-to-many |
|-----------|---|--|
| Deploy | <ul style="list-style-type: none">• Lifecycle Controller GUI• DTK• SBUU | <ul style="list-style-type: none">• Symantec Deployment Server• Dell Management Plug-in 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 | <ul style="list-style-type: none"> • iDRAC7 with LifeCycle Controller • Lifecycle Controller GUI • Repository Manager • DUP • SUU • SBUU • Dell Management Plug-in for VMware vCenter | <ul style="list-style-type: none"> • Dell OpenManage Essentials • Dell OpenManage ITA • Dell Management Console • Lifecycle Controller Remote Services | <ul style="list-style-type: none"> • Dell Update Catalogs for Microsoft System Center Configuration Manager • Dell Lifecycle Controller Integration (DLCI) for Microsoft System Center Configuration Manager |
| Monitor | <ul style="list-style-type: none"> • iDRAC7 • OMSA | <ul style="list-style-type: none"> • Dell OpenManage Essentials • Dell OpenManage ITA • BMC ProactiveNet Performance Management • Dell OpenManage Power Center • Dell Management Console | <ul style="list-style-type: none"> • Dell Management Plug-in for VMware vCenter • BMC ProactiveNet • Dell Server Management Pack Suite for Microsoft System Center Operations Manager (SCOM) |
| Maintain | <ul style="list-style-type: none"> • iDRAC7 • Lifecycle Controller GUI | <ul style="list-style-type: none"> • Lifecycle Controller Remote Services | <p>Remediate:</p> <ul style="list-style-type: none"> • Dell Server PRO Management Pack for Microsoft System Center Virtual Machine Manager (SCVMM) <p>Replace parts:</p> <ul style="list-style-type: none"> • Dell Lifecycle Controller Integration (DLCI) for Microsoft System Center Configuration Manager |

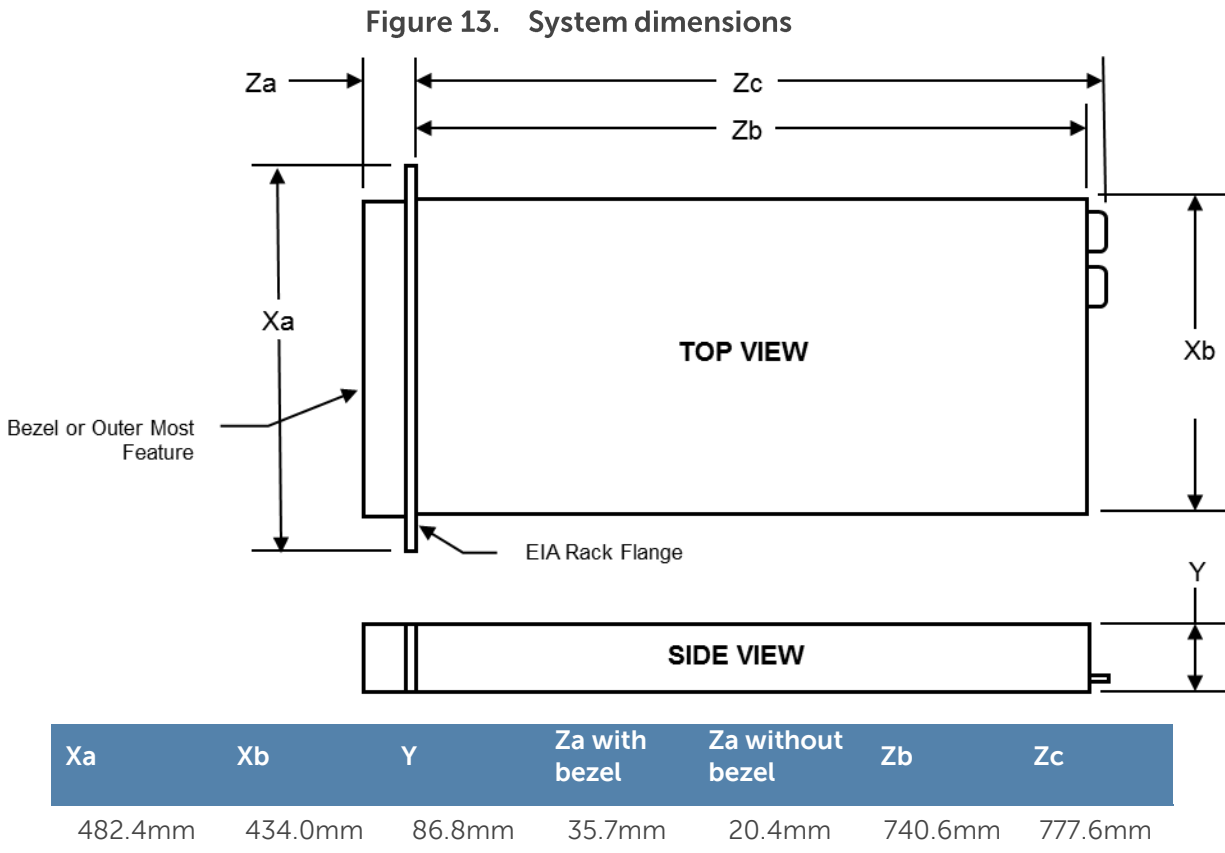
For additional detailed information on Dell's systems management portfolio, see the *Dell Systems Management Overview Guide* on Support.Dell.com/Manuals.



Appendix A. Additional specifications

Chassis dimensions

Figure 13 details the dimensions of the Dell PowerEdge R820 chassis.



Chassis weight

The R820 chassis at maximum configuration is 29.5 kg (65 lb).

Power supply specifications

Table 28 lists power supply specifications for the PowerEdge R820.

Table 28. Power supply specifications

| Specification | 1100W DC | 1100W AC | 750W AC |
|-------------------------------|--------------------|-------------------------|-------------------------|
| Current consumption | 32A (X2) | 12A–6.5A | 10A–5A |
| Supply voltage | -48V to -60V de CC | 100–240VAC ¹ | 100–240VAC ¹ |
| Frequency | -48V to -60V de CC | 50/60Hz | 50/60Hz |
| Heat dissipation (BTU/hr max) | 4416 | 4100 | 2891 |

¹Auto-ranging



Environmental specifications

Table 29 details the environmental specifications for the R820. For the most up-to-date information, see the *Dell PowerEdge R820 Systems Owner's Manual* and the *Dell PowerEdge R820 Getting Started Guide* on Support.Dell.com/Manuals. For additional information about environmental measurements for specific system configurations, see www.dell.com/environmental_datasheets.

Table 29. Environmental specifications

| Temperature | |
|-----------------------------|---|
| Continuous operation | 10°C to 35°C at 10% to 80% relative humidity (RH), with 26°C max dew point. De-rate maximum allowable dry bulb temperature at 1°C per 300m above 900m (1°F per 550 ft). |
| Expanded operation | <p>When operating in the expanded temperature range, system performance may be impacted. When operating in the expanded temperature range, ambient temperature warnings may be reported on the LCD and in the System Event Log.</p> <p>≤ 10% of annual operating hours: 5°C to 40°C at 5% to 85% RH with 26°C dew point. 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, de-rate maximum allowable dry bulb temperature by 1°C per 175m above 950m (1°F per 319 ft).</p> <p>≤ 1% of annual operating hours: –5°C to 45°C at 5% to 90% RH with 26°C dew point. 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, de-rate maximum allowable dry bulb temperature by 1°C per 125m above 950m (1 °F per 22 ft).</p> <p>Expanded operation restrictions:</p> <ul style="list-style-type: none">• Maximum 95W processors (two or four processors)• LRDIMMs not supported• Express Flash drives not supported• GPU not supported• Maximum 8 hard drives (no dual PERC)• x8 backplane only (restrict 2nd x8, x16 or x4 backplanes)• Requires two redundant power supplies, either 750W or 1100W• PCIe slot 1 and slot 2 cannot be populated |
| Storage | –40°C to 65°C (–40°F to 149°F) with a maximum temperature gradation of 20°C per hour |



| Relative humidity | |
|---|---|
| Operating | 20% to 80% (noncondensing) at a maximum wet bulb temperature of 29°C (84.2°F) |
| Storage | 5% to 95% at a maximum wet bulb temperature of 38°C (100.4°F) |
| Maximum vibration | |
| Operating | 0.26 Grms at 5-350Hz in all orientations |
| Storage | 1.87 Grms at 10-500Hz for 15 min (all six sides tested) |
| Maximum shock | |
| Operating | Half sine shock in all operational orientations of 31G +/- 5% with a pulse duration of 2.6 ms +/- 10% |
| Storage | Half sine shock on all six sides of 71G +/- 5% with a pulse duration of 2 ms +/- 10%; square wave shock on all six sides of 27G with velocity change at 235 in/sec or greater |
| Altitude | |
| Operating | -15.2m to 3048m (-50 to 10,000 ft); for altitudes above 2950 ft, the maximum operating temperature is de-rated 1°F/550 ft |
| Storage | -15.2m to 10,668m (-50 to 35,000 ft) |
| Airborne contaminant level | |
| Class G2 or lower as defined by ISA-S71.04-1985 | |

Video specifications

The Dell PowerEdge R820 iDRAC incorporates an integrated video subsystem. The graphics controller is the 2D Matrox® G200. The video frame buffer (16MB) is contained within the iDRAC RAM (256MB) device.

The R820 system supports the 2D graphics video modes listed in Table 30.

Table 30. 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 |
| 1152 x 864 | 60, 75, 85 | 8, 16, 32 |
| 1280 x 1024 | 60, 75 | 8, 16, 32 |



Rack rail specifications

Table 31 lists the spacing dimensions for the R820 sliding and static rails.

Table 31. Rail adjustability range

| Product | Rail identifier | Rail type | Rail adjustability range (mm) | | | | | | Rail depth (mm) | |
|---------|-----------------|-----------|-------------------------------|-----|-------|-----|----------|-----|-----------------|----------|
| | | | Square | | Round | | Threaded | | without CMA | with CMA |
| | | | Min | Max | Min | Max | Min | Max | | |
| R820 | B6 | Sliding | 676 | 868 | 662 | 861 | 676 | 883 | 714 | 845 |
| | B4 | Static | 608 | 879 | 594 | 872 | 604 | 890 | 622 | — |

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

USB peripherals

USB peripherals are supported through the front and back USB ports on the R820. These ports are USB 2.0 compliant.



Appendix B. Standards compliance

The Dell PowerEdge R820 conforms to the industry standards listed in Table 32.

Table 32. Industry standard documents

| Standard | URL for information and specifications |
|---|--|
| ACPI Advance Configuration and Power Interface Specification, v2.0c | www.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 | www.microsoft.com/whdc/system/platform/pcdesign/desguide/serverdg.msp |
| IPMI Intelligent Platform Management Interface, v2.0 | www.intel.com/design/servers/ipmi |
| DDR3 Memory DDR3 SDRAM Specification, Rev. 3A | www.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 | www.pcisig.com/specifications/pciexpress |
| PMBus Power System Management Protocol Specification, v1.2 | pmbus.info/specs.html |
| SAS Serial Attached SCSI, v1.1 | www.t10.org |
| SATA Serial ATA Rev. 2.6; SATA II, SATA 1.0a Extensions, Rev. 1.2 | www.sata-io.org www.sata-io.org |
| SMBIOS System Management BIOS Reference Specification, v2.7 | www.dmtf.org/standards/smbios |
| TPM Trusted Platform Module Specification, v1.2 | www.trustedcomputinggroup.org |
| UEFI Unified Extensible Firmware Interface Specification, v2.1 | www.uefi.org/specs |
| USB Universal Serial Bus Specification, Rev. 2.0 | www.usb.org/developers/docs |
| Windows Logo Windows Logo Program System and Device Requirements, v3.10 | www.microsoft.com/whdc/winlogo/hwrequirements.msp |



Appendix C. Additional resources

Table 33 provides a list of documents and websites that provide for more information on the Dell PowerEdge R820.

Table 33. Additional resources

| Resource | Description of contents | Location |
|---|--|--|
| PowerEdge R820 Systems Owner's Manual | <p>This manual is provided in HTML format on the CD provided with the R820 system, and also in HTML and PDF format at the Dell support site. A printed version is available in Asian languages as a customer-orderable option. This manual provides information on the following:</p> <ul style="list-style-type: none">• Chassis features• System Setup program• System messages• System codes and indicators• System BIOS• Remove and replace procedures• Troubleshooting• Diagnostics• Jumpers and connectors | Support.Dell.com/Manuals |
| PowerEdge R820 Getting Started Guide | <p>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:</p> <ul style="list-style-type: none">• Initial setup steps• Key system features• Technical specifications | Support.Dell.com/Manuals |
| Rack Installation Instructions | <p>This printed document is provided with the rack kits. The document provides the instructions for installing the server in a rack.</p> | Support.Dell.com/Manuals |
| Cable Management Arm Installation Instructions | <p>This printed document is provided with the CMA kits. The document provides the instructions for installing the cable management arm on the rails.</p> | Support.Dell.com/Manuals |
| Information Update | <p>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.</p> | Support.Dell.com/Manuals |
| System Information Label | <p>The system information label documents the system board layout and system jumper settings. Text is minimized due to space limitations and translation considerations. The label size is standardized across platforms.</p> | Inside the system chassis cover |



| Resource | Description of contents | Location |
|---|--|--|
| 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 |
| Dell Energy Smart Data Center Assessment | This tool uses infrastructure and thermal analysis to help maximize system efficiency. | Dell.com/EnergySmart |
| 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 |
| 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 R820 processors and chipset. | Intel.com |
| Dell PowerEdge RAID controllers | Provides more information about Dell PERCs. | Dell.com/PERC |
| 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 |
| 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. | www.dell.com/downloads/global/products/pedge/en/acoustical-education-dell-enterprise-white-paper.pdf |

