# PowerEdge R720 and R720xd

Technical Guide

Built to run complex workloads using highly scalable memory, I/O capacity, and flexible network options.

Table of contents

Tables

Figures

.

1 System overview

Introduction

The Dell™ PowerEdge™ R720 and R720xd are Dell's latest 2-socket, 2U rack servers that are designed to run complex workloads using highly scalable memory, I/O capacity, and flexible network options. Both systems feature the Intel® Xeon® processor E5-2600 product family, up to 24 DIMMS, PCI Express® (PCIe) 3.0 enabled expansion slots, and a choice of NIC technologies.

The PowerEdge R720 is a general-purpose platform with highly expandable memory (up to 768GB) and impressive I/O capabilities to match. The R720 can readily handle very demanding workloads, such as data warehouses, e-commerce, virtual desktop infrastructure (VDI), databases, and high-performance computing (HPC).

In addition to the R720's capabilities, the R720xd offers extraordinary storage capacity, making it well suited for data-intensive applications that require storage and I/O performance, like medical imaging and email servers.

Manage data overload

Keep pace with the explosion of data in the virtual age with the flexible I/O and storage capabilities of the R720 and R720xd. The R720 supports up to sixteen internal hard drives to 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.

The PowerEdge R720xd allows you to quickly access and process vast amounts of data with up to twenty-six internal hot-plug hard disks. The R720xd is a great solution for any mid-size or large business that requires scalability in storage capacity.

Tailor your network fabric

The R720 and R720xd allow you to tailor your network throughput to match your application needs, enabling added I/O performance. Select Network Adapters, Dell's flexible NIC technology, let you choose the right network fabric without using up a valuable PCI slot. You can pick speed, technology, vendor and other options, like switch independent partitioning that lets you share and manage bandwidth on 10GbE connections.

Virtualize more

Maximize your data center's application capacity by expanding your virtual environment using the large memory footprint of the R720 and R720xd. Choose an industry-leading hypervisor and take advantage of our system management capability to manage both physical and virtual assets. Redundant failsafe hypervisors can also help maximize your virtual machines' uptime. Dell's 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. Dell embedded server 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 also integrates with and connects to third-party systems management solutions so you can maintain your single point of control and capitalize on your existing investment. OpenManage solutions

simplify the lifecycle of deploying, updating, monitoring, and maintaining your Dell PowerEdge servers.

New technologies

New technologies featured on the PowerEdge R720 and R720xd systems are detailed in Table 1.

Table 1.   New technologies

New technologies	Detailed descriptions
Intel Xeon processor E5-2600 product family	This new family of Intel processors has embedded PCIe lanes for improved I/O performance. See the Processors section for details.
Intel C600 series chipset	The Intel Platform Controller Hub (PCH) chip is used on the R720 and R720xd.
1600 MT/s DDR3 memory	Certain models of E5-2600 series processors support 1600 MT/s memory. The R720 and R720xd support two 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 more information.
Flexible LOM	Dell's 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 R720 and R720xd support 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 and supports a maximum of four hot-plug SATA HDDs or SSDs. 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 R720 supports up to four Express Flash drives. The R720xd does not support Express Flash drives.
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 R720 supports internal graphics processing units (GPUs) for extreme computing power to solve high performance computing (HPC) needs. The R720xd does not support internal GPUs. See the Processors section for details.
Advanced power management	The R720 and R720xd support advanced power monitoring and power capping tools that can help manage power consumption.
DC power supply	A new 1100W DC power supply option is available for the R720 and R720xd.
Failsafe hypervisors	The internal dual SD module enables Dell's unique Failsafe Virtualization architecture, ensuring uptime by providing failover capability for embedded hypervisors, such as VMware® vSphere® ESXi™.

New technologies	Detailed descriptions
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.

2 System features

Compared to the previous generation of Dell PowerEdge servers, the R720 and R720xd have more drive bay options, more PCIe slots, a larger memory footprint, flexible I/O, Express Flash PCIe solid-state drives, and advanced system management. The R720 also supports optional dual internal RAID controllers and up to four optional internal GPUs.

Comparison of PowerEdge systems

The PowerEdge R720 and R720xd are replacements for the predecessor R710 system, three systems which are compared in Table 2. For the latest information on supported features, visit Dell.com.

Table 2.   Comparison of PowerEdge R710, R720, and R720xd

Feature	PowerEdge R710	PowerEdge R720	PowerEdge R720xd
Chassis	2U rack	2U rack	2U rack
Processors	Intel Xeon processors 5500 and 5600 series	Intel Xeon processor E5-2600 product family	Intel Xeon processor E5-2600 product family
Internal interconnect	Intel QuickPath Interconnect	Intel QuickPath Interconnect	Intel QuickPath Interconnect
Memory[1]	18 x DDR3 RDIMM and UDIMM Up to 288GB	24 x DDR3 RDIMM, UDIMM, and LRDIMM Up to 768GB	24 x DDR3 RDIMM, UDIMM, and LRDIMM Up to 768GB
Hard drive bays (hot plug)	Up to 8 x 2.5" or 6 x 3.5"	Up to 16 x 2.5" or 8 x 3.5"	Up to 24 x 2.5"+ 2 x 2.5" or 12 x 3.5" + 2 x 2.5"
RAID controller	PERC 6/i, SAS 6/iR, PERC 6/E, H200, H700, H800	PERC S110, H310, H710, H710P, H810 (external); supports multiple (2) internal RAID controllers	PERC H310, H710, H710P, H810 (external)
PCI slots	4 PCIe 2.0	7 PCIe 3.0	6 PCIe 3.0
Express Flash drives	Not supported	Up to 4	Not supported
Embedded NICs	4 x 1GbE with optional TOE	Select Network Adapter: minimum configuration of 4 x 1Gb Optional: 2 x 10GbE	Select Network Adapter: minimum configuration of 4 x 1Gb Optional: 2 x 10GbE
Power supplies	Hot-plug, redundant power supply units: 570W or 870W	Hot-plug, redundant power supply units: 495W, 750W, 1100W, 1100W DC	Hot-plug, redundant power supply units: 495W, 750W, 1100W, or 1100W DC
Power efficiency	Gold	Titanium	Titanium

Feature	PowerEdge R710	PowerEdge R720	PowerEdge R720xd
Dell OpenManage Systems Management	Dell OpenManage Dell Management Console Lifecycle Controller 1.x iDRAC6 (Express or Enterprise) with Lifecycle Controller 1.x	OpenManage Essentials Dell Management Console IT Assistant OMSA Agent OpenManage Power Center (requires iDRAC7 Enterprise with Lifecycle Controller) OpenManage Integrations and Connections iDRAC7 Express with Lifecycle Controller (standard option)	OpenManage Essentials Dell Management Console IT Assistant OMSA Agent OpenManage Power Center (requires iDRAC7 Enterprise with Lifecycle Controller) OpenManage Integrations and Connections iDRAC7 Express with Lifecycle Controller (standard option)
Internal GPU	Not supported	2 x 300W (double wide) or 4 x 150W (single wide)	Not supported
Availability	Hot-plug drives Hot-plug redundant cooling Hot-plug redundant PSUs	Hot-plug drives Hot-plug redundant cooling Hot-plug redundant PSUs Internal dual SD module	Hot-plug drives Hot-plug redundant cooling Hot-plug redundant PSUs Internal dual SD module

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

Specifications

Table 3 lists the technical specifications for the PowerEdge R720 and R720xd systems. For the latest information on supported features, visit Dell.com.

Table 3.   Technical specifications

Feature	Specification	
Form factor	2U rack	
Processors	Intel Xeon processor E5-2600 product family	
Processor sockets	2 sockets	
Internal interconnect	2 Intel QuickPath Interconnect (QPI) links; 6.4GT/s; 7.2GT/s; 8.0GT/s	
Cache	2.5MB per core; core options: 2, 4, 6, 8	
Chipset	Intel C600	
Memory[1]	Up to 768GB (24 DIMM slots): 2GB/4GB/8GB/16GB/32GB DDR3 up to 1600MT/s	
PCIe slots	R720: 7 PCIe slots: One x16 full-length, full-height Three x8 full-length, full-height Three x8 half-length, half-height	R720xd: 6 PCIe slots: Two x16 full-length, full-height One x8 full-length, full-height Three x8 half-length, half-height
RAID controller	Internal controllers: PERC S110 (software RAID; R720 only) PERC H310 PERC H710 PERC H710P	External HBAs (RAID): PERC H810 External HBAs (non-RAID): 6Gbps SAS HBA

Feature	Specification
Hard drives (hot-plug)	**R720 drive bay options:** • Up to 16 x 2.5" • Up to 8 x 2.5" + 8 x 2.5" (with dual RAID controllers) • Up to 8 x 2.5" • Up to 8 x 2.5" + 4 x 2.5" Express Flash • Up to 8 x 3.5" **R720xd drive bay options:** • Up to 24 x 2.5" (front) + 2 x 2.5" (back) • Up to 12 x 3.5" (front) + 2 x 2.5" (back) **Hard drive options:** • 2.5" SAS SSD, SATA SSD, SAS (15K, 10K), nearline SAS (7.2K), SATA (7.2K) • 2.5" Express Flash PCIe SSD (R720 only) • 3.5" SAS (15K), nearline SAS (7.2K), SATA (7.2K) Self-encrypting drives (SEDs) available
Embedded NIC	**Select Network Adapter options:** Broadcom® 5720 4x1Gb Base-T Intel I350 4x1Gb Base-T Intel X540 2x1Gb + 2x10Gb Base-T Broadcom 57800S 2x1Gb + 2x10Gb Base-T Broadcom 57800S 2x1Gb + 2x10Gb SFP+
Power supply	Auto-ranging Titanium efficiency 750W AC power supply Auto-ranging Platinum efficiency 495W, 750W or 1100W AC power supply 1100W DC power supply
Availability	High-efficiency, hot-plug, redundant power supplies; hot-plug drive bays; TPM; dual internal SD support; hot-plug redundant fan; optional bezel; information tag; ECC memory, interactive LCD screen (R720 only); extended thermal support; ENERGY STAR® compliant configuration; switch independent partitioning

Dell OpenManage Systems Management (Agent-free or with OpenManage Server Administrator [OMSA] Agent)	• OpenManage Essentials
	• Dell Management Console
	• IT Assistant
	• OMSA Agent
	• OpenManage Power Center (requires iDRAC7 Enterprise with Lifecycle Controller)
	• OpenManage Integrations and Connections:
	  – 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
	• iDRAC7 Express with Lifecycle Controller (standard option)
	  – Upgrade to iDRAC7 Enterprise with Lifecycle Controller
	  – Upgrade to 8GB vFlash media or 16GB vFlash media for iDRAC7 Enterprise with Lifecycle Controller
	  – Trial evaluation available for IDRAC7 Enterprise with Lifecycle Controller

Rack support	• ReadyRails™ sliding rails for tool-less mounting in 4-post racks with square or unthreaded round holes or tooled mounting in 4-post threaded hole racks, with support for optional tool-less cable management arm • ReadyRails static rails for tool-less mounting in 4-post racks with square or unthreaded round holes or tooled mounting in 4-post threaded and 2-post

Feature	Specification
	(Telco) racks
Operating systems	Microsoft Windows Server® 2012 Microsoft Windows Server 2008 R2 SP1, x64 (includes Hyper-V® v2) Microsoft Windows® HPC Server 2008 Microsoft Windows Small Business Server 2011 SUSE® Linux® Enterprise Server Red Hat® Enterprise Linux® **Optional embedded hypervisors:** Citrix® XenServer® VMware vSphere including ESX™ and ESXi Red Hat Enterprise Virtualization® For more information on the specific versions and additions, visit Dell.com/OSsupport.

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

3 Chassis views and features

The Dell PowerEdge R720 and R720xd implement a new chassis design which supports an increased number of DIMMs, PCIe slots, and hard drives, relative to their predecessor servers. The following sections provide external and internal views of the systems and describe the chassis features.

For information on features and descriptions for these systems, see the *Dell PowerEdge R720 and R720xd Owner's Manual* on Support.Dell.com/Manuals.

Chassis views

The R720 and R720xd are available in several chassis options with varying numbers of drive bays.

Note: A chassis cannot be reconfigured or upgraded after point of purchase.

R720 front views

The R720 supports up to 16 2.5-inch or up to 8 3.5-inch front-accessible, hot-plug hard drives that are secured by a removable front bezel. Other front-panel features include an interactive LCD control panel, 2 USB connectors, a video connector, and a vFlash media card slot.

Figure 1.   R720 front view (2.5" chassis with bezel)

Figure 2.   R720 front view (2.5" chassis without bezel)

R720xd front views

The R720xd supports up to 24 2.5-inch or up to 12 3.5-inch front-accessible, hot-plug hard drives that are secured by a removable front bezel. Other front-panel features include an LED control panel, a USB connector, and a video connector.

Figure 3.   R720xd front view (with bezel)

Figure 4.   R720xd front view (2.5-inch chassis without bezel)

R720 back view

The R720 back panel includes features such as redundant hot-plug power supply units (PSUs), 4 Ethernet connectors, PCI expansion slots, and many other features that are described in the rest of this guide.

Figure 5.   R720 back view

R720xd back view

In addition to the R720 back-panel features, the R720xd also includes 2 optional 2.5-inch hot-plug drives in the back of the system.

Figure 6.   R720xd back view

Internal chassis views

The chassis design of the R720 and R720xd is optimized for easy access to components and for airflow for effective and efficient cooling. The R720 and R720xd support up to 24 DIMMs, 2 processors, hot-plug redundant fans, and many other components and features that are described in this guide.

Figure 7.   R720 internal chassis view
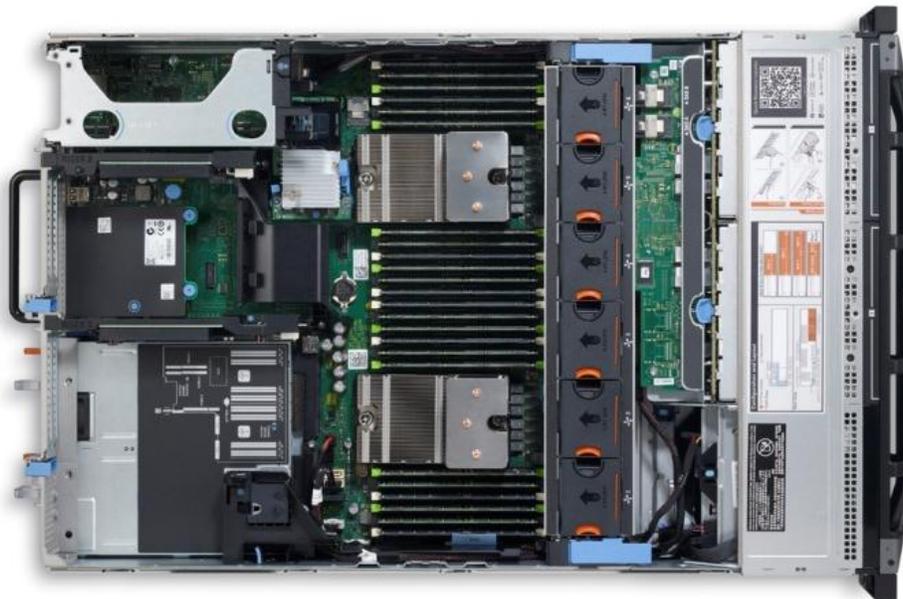
Figure 8.   R720xd internal chassis view

For additional system views, see the *Dell PowerEdge R720 and R720xd Owner's Manual* on Support.Dell.com/Manuals.

Chassis features

Table 4 lists the chassis features for the R720 and R720xd systems. For additional information on these features, see the *Dell PowerEdge R720 and R720xd Owner's Manual* on Support.Dell.com/Manuals.

Table 4.   Chassis features

Feature	Description
Power button and indicator	ACPI-complaint power button with an integrated green power LED
NMI button	Recessed non-maskable interrupt (NMI) button used to troubleshoot software and device driver errors; use only if directed to do so by qualified support personnel or by the operating system's documentation
System identification button	Buttons on the back and front of a system to help identify the unit in a data center environment
Hard drive activity LEDs	Indicate the status and activity of the hard drives
USB connectors	Two (R720) or one (R720xd) front, two back, and one internal USB connector
vFlash media reader	Supports one vFlash media card (the R720 slot is located in the front of the system and the R720x slot is located in the back); functionality is activated only when iDRAC7 Enterprise is enabled
Video connector	Connects a monitor to the system

Feature	Description
LCD control panel	Provides user access to buttons, display, and I/O interfaces (R720 only)
LED panel	Indicates the status of system conditions (R720xd only)
Hard drives	Front-accessible, hot-plug hard drives plus two optional back-accessible hot-plug hard drives (R720xd only)
Optical drive (optional)	The R720 supports one optional slimline SATA DVD-ROM drive or DVD+/-RW drive; R720xd does not support an internal optical drive
System identification panel	Slide-out label panel for system information
Serial connector	Connects a serial device to the system and for console redirect
iDRAC7 Enterprise port	Dedicated management port for optional iDRAC7 Enterprise
PCIe expansion card slots	The R720 supports up to seven PCIe expansion cards; R720xd supports up to six PCIe expansion cards
Ethernet connectors	Choice of network connectors through Select Network Adapter family
Power supply units	Up to two back-accessible, hot-plug power supplies
Power supply indicators	Indicate whether system has power
NIC indicators	Indicate network activity and status
Quick Resource Locator (QRL)	This code on the chassis can be scanned by a phone application to access information about the server

LCD control panel (R720)

The R720 system control panel is located on the front of the chassis to provide user access to buttons, display, and I/O interfaces. For more information on the R720 LCD control panel, see the *Dell PowerEdge R720 and R720xd Owner's Manual* on Support.Dell.com/Manuals.

Figure 9.   R720 LCD control panel

LED panel (R720xd)

The R720xd LED panel is located on the front of the chassis to indicate the status of system conditions. For more information on the R720xd LED panel, see the *Dell PowerEdge R720 and R720xd Owner's Manual* on Support.Dell.com/Manuals.

Figure 10.   R720xd LED 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 on the server (shown in Figure 11). Just use your smartphone to access the Dell QRL application to learn more about the server.

Figure 11.   QRL code inside chassis

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 top cover to secure it to the rack chassis.
Front 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 or LED panel 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 Processors

The Dell PowerEdge R720 and R720xd feature the Intel Xeon processor E5-2600 product family, offering 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 E5-2600 product family not only adds new features, but also improves upon many features of the predecessor Intel Xeon processor 5600 series, including:

- Up to two additional cores and up to 8MB more last level cache
- More memory—six additional DIMMs and support for up to 32GB DIMMs, which increases memory capacity from 288GB (R710) to 768GB (R720/R720xd)
- Intel Integrated I/O has support for up to 80 lanes of PCIe 3.0, which can reduce latency
- Faster connections are provided throughout the system with support for DDR3 1600MT/s memory and 8.0GT/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
- 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 delivers up to double the boost than the previous-generation turbo technology
- Continued improvements to both Intel TXT and AES-NI help to better protect systems and data

For more information on the Intel Xeon processor E5-2600 product family, visit Intel.com.

Supported processors

The R720 and R720xd support up to two processors with up to eight cores per processor. Table 6 lists the Intel Xeon processors supported by the PowerEdge R720 and R720xd. For the latest information on supported processors, visit Dell.com.

Table 6.   Supported processors

Model	Speed	Cache	QPI	Cores	Turbo	TDP
E5-2690[1]	2.9GHz	20M	8.0GT/s	8	Yes	135W
E5-2680	2.7GHz	20M	8.0GT/s	8	Yes	130W
E5-2670	2.6GHz	20M	8.0GT/s	8	Yes	115W
E5-2667	2.9GHz	15M	8.0GT/s	6	Yes	130W
E5-2665	2.4GHz	20M	8.0GT/s	8	Yes	115W
E5-2660	2.2GHz	20M	8.0GT/s	8	Yes	95W
E5-2650L	1.8GHz	20M	8.0GT/s	8	Yes	70W
E5-2650	2.0GHz	20M	8.0GT/s	8	Yes	95W
E5-2643	3.3GHz	10M	8.0GT/s	4	Yes	130W
E5-2640	2.5GHz	15M	7.2GT/s	6	Yes	95W
E5-2637	3.0GHz	5M	6.4GT/s	2	Yes	80W
E5-2630	2.3GHz	15M	7.2GT/s	6	Yes	95W
E5-2630L	2.0GHz	15M	7.2GT/s	6	Yes	60W
E5-2620	2.0GHz	15M	7.2GT/s	6	Yes	95W
E5-2609	2.4GHz	10M	6.4GT/s	4	No	80W
E5-2603	1.8GHz	10M	6.4GT/s	4	No	80W

[1]Not supported on the R720xd 3.5-inch chassis.

For information on processor installation and configuration, see the *Dell PowerEdge R720 and R720xd Owner's Manual* on Support.Dell.com/Manuals.

GPU support

The R720 supports graphics processing unit (GPU) technology, which can provide accelerated performance for a variety of applications, including virtual desktop infrastructure (VDI) and HPC implementations.

The R720xd does not support internal or external GPUs.

Internal GPU support

The R720 can support two 300W, full-length, double-wide GPUs or up to four 150W, full-length, single-wide GPUs. Each GPU can support up to 6GB of dedicated GDDR5 memory. Active-cooled GPU cards are not supported. For a list of supported GPUs, see Table 18.

External GPU support

The R720 can connect to the PowerEdge C410x through a host interface card (HIC) and an iPass cable. Both the NVIDIA® and Dell x16 HIC require one x16 PCIe slot. Each HIC can support up to four GPUs. The R720 can support up to four GPUs maximum. For a list of supported GPU HICs, see Table 18.

Operating system support for GPUs

Some operating systems have not been validated to support GPUs. See Table 24 and Table 25 for more information on operating system support of GPUs.

Chipset

The Intel C600 chipset is implemented on the PowerEdge R720 and R720xd. For more information, visit Intel.com.

5 Memory

More memory options are available than ever before with the Dell PowerEdge R720 and R720xd—greater capacities, higher frequencies, and more flexibility. The R720 and R720xd support up to 768GB of memory (24 DIMMs) and speeds up to 1600MT/s, providing high performance in a variety of applications. High memory density means there is no compromise when it comes to virtualization.

Increase your uptime and reduce data loss due to Dell's focus on reliability, availability, and serviceability (RAS) features. RAS aids in the rapid and accurate diagnosis of faults which require service, increasing your memory reliability. System uptime is reinforced with RAS features like memory mirroring, sparing, and many others.

In addition to supporting existing unbuffered DIMMs (UDIMMs) and registered DIMMs (RDIMMs), the R720 and R720xd support load reduced DIMMs (LRDIMMs), which use a buffer to reduce memory loading and provide greater density, allowing for the maximum platform memory capacity.

Supported memory

Table 7 lists the memory technologies supported by the R720 and R720xd.

Table 7. 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
Error Correction Code (ECC)	Yes	Yes	Yes
Single Device Disable Code (SDDC)	Yes (with advanced ECC mode)	Yes	Yes
Address parity	Yes	Yes	Yes

*Although the R720 and R720xd support DIMM speeds of 800MT/s and 1066MT/s, you can only purchase these systems with DIMM speeds of 1333MT/s and 1600MT/s on Dell.com.

Table 8 lists the DIMMs supported on the R720 and R720xd. For the latest information on supported memory, visit Dell.com.

Table 8.   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	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

The R720 and R720xd servers support flexible memory configurations ranging from capacities of 2GB (minimum) to 768GB (maximum). The R720 and R720xd support up to 12 DIMMs per processor (up to 24 DIMMs in a dual-processor configuration). Each server has 4 memory channels per processor, with each channel supporting up to 3 DIMMs.

Both systems support a flexible memory configuration, according to the following 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, or LRDIMM. These types cannot be mixed.

The following additional memory-population guidelines apply to the R720 and R720xd:

- 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 and population, see the *Dell PowerEdge R720 and R720xd Owner's Manual* on Support.Dell.com/Manuals.

Memory speed

The R720 and R720xd support memory speeds of 1600MT/s, 1333MT/s, 1066MT/s, and 800MT/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 9 lists the memory configuration and performance details for the R720 and R720xd, based on the population of the number and type of DIMMs per memory channel.

Table 9.   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	•	•	•	
LRDIMM	QR			1		•	•	
	QR	QR		2		•	•	
	QR	QR	QR	3		•		

*Although the R720 and R720xd support DIMM speeds of 800MT/s and 1066MT/s, you can only purchase these systems with DIMM speeds of 1333MT/s and 1600MT/s on Dell.com.

Memory RAS features

Reliability, availability, and 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 which require service. Table 10 describes the memory RAS features supported on the R720 and R720xd.

Table 10.   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 (SDDC)	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, they are moved to the spare area while the operating system is running to prevent the errors 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 R720 and R720xd Owner's Manual* on Support.Dell.com/Manuals. Memory RAID is not supported.

6 Storage

The Dell PowerEdge R720 and R720xd provide storage expandability that allows you to adapt to your workload and operational demands. With comprehensive storage options, the R720 and R720xd offer various drive types, internal and external storage controllers, and different chassis and backplanes for varied numbers of drives.

Due to their massive internal storage capacities, the R720 and R720xd are optimized for a variety of implementations, including virtual desktop infrastructure (VDI) environments and collaboration solutions. The R720 supports up to 16 and the R720xd supports up to 26 internal 2.5-inch drives.

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

Internal storage

The R720 and R720xd are available in several hot-plug, hard-drive chassis options, as detailed in Table 11. Note that the chassis option must be selected at the point of purchase and cannot be changed or upgraded later.

Table 11.   Chassis options

PowerEdge server	Chassis option
R720	16 x 2.5" drives
	8 x 2.5" + 8 x 2.5" drives (with dual RAID controllers)
	8 x 2.5" drives
	8 x 2.5" + 4 x Express Flash drives
	8 x 3.5" drives
R720xd	24 x 2.5" drives (front) + 2 x 2.5" drives (back)[1]
	12 x 3.5" drives (front) + 2 x 2.5" drives (back)[1]

[1]Back-accessible 2.5" drives are optional

Supported hard drives

Table 12 lists the internal hard drives supported by the R720 and R720xd. For the latest information on supported hard drives, visit Dell.com/PowerEdge.

Table 12.   Supported hard drives

Form factor	Type	Speed (rpm)	Capacities
3.5"	SATA (3Gb)	7.2K	250GB, 500GB, 1TB, 2TB
	Nearline SAS (6Gb)	7.2K	1TB, 2TB, 3TB
	SAS (6Gb)	15K	300GB, 600GB
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, which 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 R720 has an option to support up to four hot-plug Express Flash PCIe SSDs in the 2.5-inch chassis.

The R720xd does not support Express Flash drives.

External storage

The R720 and R720xd support the external storage devices types listed in Table 13. For more storage information, see Dell.com/Storage.

Table 13.   Supported external storage device types

Device type	Description
External tape	Supports connection to external USB tape products (supports boot from Dell PowerVault™ RD1000)
	Supports connection to external SAS tape products
	Supports connection to external FC tape products
	Supports connection to external SCSI tape products (legacy support only)
	Supports connection to external iSCSI tape products
NAS / IDM appliance software	Supports NAS software stack
Dell PowerVault NAS	Supports connection to current PowerVault NAS (Network Attached Storage) products
PowerVault DAS	Supports connection to current PowerVault direct-attach storage (DAS) (including JBOD and RBOD enclosures) products
PowerVault SAN	Supports connection to current PowerVault storage area network (SAN) (including Dell EqualLogic™, iSCSI, Dell-EMC arrays, and JBOD disk enclosures) products
PowerVault IDM	Supports connection to current PowerVault intelligent data management (IDM) (archive solutions, de-duplication, B2D, and data-protection appliances) products

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 PowerEdge RAID Controllers (PERCs) offer high I/O performance for a variety of uses, including database applications and streaming digital media environments. The internal RAID controllers have a dedicated connection to the system board. The PERC S110 is supported on the R720 (3.5-inch chassis only) and is not supported on the R720xd.

Table 14 lists the RAID controllers supported on the R720 and R720xd.

Table 14.   RAID controllers

Controller	Description	Features	RAID modes	Form factor	Usage model
PERC H810 External	Eight-port, external, 6Gb/s PCIe RAID controller that supports up to 192 SATA and SAS HDDs or SSDs	Includes 1GB NV DDR3 cache, premium performance and feature set, security SED/EKMS, and SSD as cache	0, 1, 10, 5, 50, 6, 60	Adapter	Premium performance
PERC H710P Internal	Eight-port, internal, 6Gb/s PCIe RAID controller that supports up to 32 SATA and SAS HDDs or SSDs	Includes 1GB NV DDR3 cache, premium performance and feature set, security SED/EKMS, and SSD as cache	0, 1, 10, 5, 50, 6, 60	Adapter	Premium performance
PERC H710	Eight-port, internal, 6Gb/s PCIe RAID controller that supports up to 32 SATA and SAS HDDs or SSDs	Includes 512MB DDR3 cache, advanced feature set, security SED/EKMS	0, 1, 10, 5, 50, 6, 60	Adapter	Performance
PERC H310	Eight-port, internal, 6Gb/s PCIe RAID controller that is a low-cost, entry-level solution supporting up to 32 SATA and SAS HDDs or SSDs	Supports hot-plug drives, expansion, pass-through	0, 1, 10, 5, 50	Adapter	Value
PERC S110 Software RAID (R720 only)	3Gb/s SATA software RAID controller that is a low-cost, entry-level solution, supporting up to 4 physical disks or eight virtual disks	Supports up to 4 hot-plug SATA drives, no expansion, Microsoft Windows only	0, 1, 5, 10	System board-embedded SATA	Entry-level

For more information about the latest PERC offerings, see Dell.com/PERC.

CacheCade

CacheCade 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 CacheCade 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.

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

Optical drives

The PowerEdge R720 supports one of the following internal optical drive options:

- DVD-ROM
- DVD+RW

The R720xd does not support an internal optical drive.

Tape drives

The R720 supports the Dell PowerVault RD1000 internal backup device on the 2.5-inch chassis only. Internal tape drives are not supported on the R720, and the R720xd does not support any internal backup device.

7 Networking and PCIe

The Dell PowerEdge R720 and R720xd offer 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 Adapters

The Select Network Adapter family is purpose-built and includes flexible LAN on Motherboard (LOM) card options for 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 PowerEdge R720 and R720xd support one custom network daughter card (NDC), as part of Select Network Adapters family, to house the complete LOM subsystem. There are two form factors of Select Network Adapters—one for blade servers and one for rack servers (shown Figure 12). The rack NDC options supported on the R720 and R720xd include a selection of 1GbE and 10GbE port cards, such as 1000 Base-T, 10Gb Base-T, and 10Gb SFP+.

Figure 12.   Rack network daughter card (NDC)

Table 15 lists the available Select Network Adapter options and supported features for the R720 and R720xd.

Table 15.   Supported Select Network Adapter options and features

Features	Broadcom 5720 Base-T	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	4 x 1Gb	2 x 1Gb + 2 x 10Gb	2 x 1Gb + 2 x 10Gb	2 x 1Gb + 2 x 10Gb
Supported speed	1Gb	1Gb	1Gb and 10Gb	1Gb and 10Gb	1Gb and 10Gb
SR-IOV	Not supported	Not supported	Not supported	Not supported	Supported (10Gb 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[3]	Supported[3]	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	Supported[6]	Supported[6]	Supported[6]

[1]These cards have two chipsets that offer the choice of either 10GbE or 1GbE.
[2]Only 10Gb ports have iSCSI HBA support.
[3]Only 10Gb ports have FCoE support.
[4]Only 10Gb ports have switch independent partitioning support. The maximum number of partitions supported is four (two partitions per 10Gb port). 1Gb ports do not support switch independent partitioning.
[5]Only 10Gb ports have DCB support.
[6]Only 10Gb ports have ISCSI TLV support.

System management integration

With R720 and R720xd, 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 Lifecycle Controller GUI

PCIe expansion

For information on card installation, requirements, and slot priorities, see the *PowerEdge R720 and R720xd Owner's Manual* on Support.Dell.com/Manuals.

PCIe slots

The R720 and R720xd provide greatly expanded PCIe slot capability over their predecessor servers. This is made possible by the 40 PCIe lanes available from each processor in the system. Two processors are required in the system to enable all PCIe slots. The R720 and R720xd have been designed to be PCIe 3.0 compliant in order to take full advantage of the processor capabilities. Table 16 details the R720 and R720xd PCIe slots.

Table 16.   PCIe expansion slots

System	R720	R720xd
Slots[1]	7	6
Slot types	One x16 full-length, full-height Three x8 full-length, full-height Three x8 half-length, half-height	Two x16 full-length, full-height One x8 full-length, full-height Three x8 half-length, half-height

[1]In a single-processor configuration, slots 1−4 are not usable.

PCIe expansion cards

The R720 and R720xd support a variety of PCIe expansion cards. Table 17 lists the supported add-in NICs and HBAs for the R720 and R720xd.

Table 17.   Supported NICs and HBAs

Type	Adapter
1Gb/10Gb NICs	Broadcom 5720 2x1Gb Base-T
	Broadcom 5719 4x1Gb Base-T
	Intel I350 2x1Gb Base-T
	Intel I350 4x1Gb Base-T
	Broadcom 57810S 2x10Gb SFP+
	Broadcom 57810S 2x10Gb Base-T
	Intel X520 2x10Gb SFP+
	Intel X540 2x10Gb Base-T
	QLogic® QLE8262 2x10Gb SFP+

Type	Adapter
	Brocade® BR1020 2x10Gb SFP+
FC4/FC8 HBAs	QLogic QLE2460 4Gb
	QLogic QLE2462 4Gb
	QLogic QLE2560 8Gb
	QLogic QLE2562 8Gb
	Emulex® LPe12000 8Gb
	Emulex LPe12002 8Gb
	Brocade BR815 8Gb
	Brocade BR825 8Gb

In addition to the NICs and HBAs listed in Table 17, the supported PCIe expansion cards for the R720 and R720xd are listed in Table 18.

Table 18.   Additional supported PCIe expansion cards

Type	Adapter
GPUs (R720 only)	NVIDIA M2090 (double wide)
	NVIDIA M2075 (double wide)
	NVIDIA M2070Q (double wide)
	NVIDIA M2070 (double wide)
	AMD V7800P FirePro™ (single wide)
GPU HICs (R720 only)	NVIDIA HIC
	Dell PLX HIC
PCIe SSDs	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 supported PCIe expansion cards for the R720 and R720xd, visit Dell.com.

8 Power, thermal, and acoustics

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

Power consumption and energy efficiency

With the rise in the cost of energy coupled with increasing data center density, Dell provides tools and technologies to help you realize greater performance with less energy cost and waste. More efficient data center usage can reduce costs by slowing the need for additional data center space. Table 19 lists the tools and technologies Dell offers to help you achieve your data center goals by lowering power consumption and increasing energy efficiency.

Table 19.   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	**Energy Smart Solution Advisor (ESSA)** is a tool that can help you determine the most efficient configuration possible. With Dell's ESSA, you can calculate the power consumption of your hardware, power infrastructure, and storage. ESSA can help you determine exactly how much power your server will use at a given workload, and the PSU Advisor can help you choose the best, most efficient PSU for your workload. Learn more at Dell.com/calc. **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.
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	PSU power monitoring improvements include: • Dell's power monitoring accuracy is currently 1%, whereas the industry standard is 5% • More accurate reporting of power • Better performance under a power cap
Power capping	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	**iDRAC7 Enterprise** provides server-level management that monitors, reports, and controls power consumption at the processor, memory, and system level. **Dell OpenManage Power Center** delivers group power management at the rack, row, and data center level for servers, power distribution units, and

Feature	Description
	uninterruptible power supplies.
Active power management	**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 iDRAC7 Enterprise and OpenManage Power Center that allows policy-based management of power and thermals at the individual server, rack, and data center level.
	Hot spare reduces power consumption of redundant power supplies.
	Thermal control of fan speed optimizes the thermal settings for your environment to reduce fan consumption and lower system power consumption.
	Idle power enables Dell servers to run as efficiently when idle as when at full workload.
Fresh Air cooling	With the thermal design and reliability of Dell products, you can have the capability to operate at excursion-based temperatures beyond the industry standard of 35°C (95°F) without impacting your availability model. This solution takes into account servers, networking, storage, and other infrastructure. Find additional information at Dell.com/FreshAir.
Rack infrastructure	Dell offers some of the industry's highest-efficiency power infrastructure solutions, including:
	• Power distribution units (PDUs)
	• Uninterruptible power supplies (UPSs)
	• Energy Smart containment rack enclosures
	Find additional information at: http://content.dell.com/us/en/enterprise/ power-and-cooling-technologies-components-rack-infrastructure.aspx.

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 R720 and R720xd:

- 495W AC
- 750W AC
- 1100W AC
- 1100W DC

Figure 13 shows a 750W power supply unit extended from an R720 system.

Figure 13.   750W power supply unit

The PowerEdge R720 and R720xd support up to two AC or DC power supplies with 1 + 1 redundancy, auto sensing, and auto-switching capability.

Dell PSUs have achieved Platinum and Titanium efficiency levels as shown in Table 20.

Table 20.   Power supply efficiency

Form factor	Output	Class	Efficiency targets by load			
			10%	20%	50%	100%
	495W AC	Platinum	82.0%	90.0%	94.0%	91.0%
	750W AC	Titanium	90.0%	94.0%	96.0%	91.0%
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	N/A	80.0%	88.0%	91.0%	88.0%

Thermal and acoustics

Thermal management of PowerEdge R720 and R720xd delivers high performance for the right amount of cooling to components at the lowest fan speeds across a wide range of ambient temperatures from 10°C to 35°C (50°F to 95°F) and to extended ambient temperature ranges (see Table 31) . The benefits to you are lower fan power consumption (lower server system power and data center power consumption) and greater acoustical versatility. The PowerEdge R720 is quiet enough to be used in an office environment in typical and minimum configurations, and the R720xd can also operate at a similar level in certain configurations.

Thermal design

The thermal design of the PowerEdge R720 and R720xd reflect the following:

- **Optimized thermal design:** The system layout is architected for optimum thermal design. System component placement and layout are designed to provide maximum airflow coverage to critical components with minimum expense of fan power.
- **Comprehensive thermal management:** The thermal control system regulates the fan speed based on several different responses from all system-component temperature sensors, as well as

inventory for system configurations. Temperature monitoring includes components such as processors, DIMMs, chipset, the inlet air ambient, hard disk drives, NDC, and GPU.

- **Open and closed loop thermal fan speed control:** Open loop thermal control uses system configuration to determine fan speed based on inlet air ambient temperature. Closed loop thermal control method uses feedback temperatures to dynamically determine proper fan speeds.

- **User-configurable settings:** With the understanding and realization that every customer has unique set of circumstances or expectations from the system, in this generation of servers, we have introduced limited user-configurable settings residing in the iDRAC7 BIOS setup screen. For more information, see the *PowerEdge R720 and R720xd Owner's Manual* on Support.Dell.com/Manuals and "Advanced Thermal Control: Optimizing across Environments and Power Goals" on Dell.com.

- **Cooling redundancy**: The R720 and R720xd allow N+1 fan redundancy, allowing continuous operation with one fan failure in the system.

- **Environmental specifications:** The optimized thermal management makes the R720 and R720xd reliable under a wide range of operating environments as shown in Table 31.

Acoustical design

The acoustical design of the PowerEdge R720 and R720xd reflect the following:

- **Versatility:** The R720 and R720xd save you power draw in the data center but are also quiet enough for office environment in typical and minimum configurations. Compare the values for LpA in Table 21 and Table 22 for these configurations, and note that they are lower than ambient measurements of typical office environments. You may find that the system is sufficiently quiet where the sound it emits blends into the environment.

- **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 21 and Table 22.

- **Noise ramp and descent at 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 event that the system were not to boot properly. In order to keep the bootup process 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, several configuration choices and settings are important to consider:

    For lower acoustical output, use a small number of lower rotational-speed SATA hard drives, nearline SAS hard drives, or non-rotational devices like SSDs. 15k hard drives generate more acoustic noise than that of lower rotational-speed hard drives, and noise increases with number of hard drives.

    Fan speeds and noise may increase from baseline factory configurations if certain profiles are changed by the user or the system configurations are updated. The following is a list of items that impact fan speeds and acoustical output:

    - > **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).

    - > **The quantity and type of PCIe cards installed:** This affects overall system acoustics. Installation of more than two PCIe cards results in an increase in overall system acoustics.

> **Using a GPU card:** This results in an increase in overall system acoustics.
> **PCIe controller-based SSD drives:** Drives such as Express flash drives and Fusion-io cards require greater airflow for cooling, and result in significantly higher noise levels.
> **Systems with an H310 PERC:** This configuration may be quieter than those with an H710 PERC with battery backup. However, higher noise levels result when a system is configured as non-RAID.
> **Hot spare feature of power supply unit:** In the system default setting, the Hot Spare Feature is disabled; acoustical output from the power supplies is lowest in this setting.

Table 21 and Table 22 detail the acoustical performance for the R720 and R720xd.

Table 21.   R720 acoustical performance (2.5-inch chassis)

Configuration (23 ± 2°C ambient)	CPUs	Hard drives	Power supply unit	Memory	PCI card/HDD controller	Operating mode	LWA-UL1 (bels)	LpA2 (dBA)	Prominent tones3
Minimum	1	1 x 250GB SATA (7.2k)	1 x 495W	1 x 8GB	1 x PERC H310	Idle	4.0	20	None
						Stressed[4]	4.1	20	None
Typical	2	6 x 300GB SAS (10K)	2 x 750W	8 x 8GB	1 x PERC H710, 1 x GbE NIC	Idle	4.4	25	None
						Stressed[4]	4.5	26	None

Table 22.   R720xd acoustical performance (2.5-inch chassis)

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]
Minimum	1	1 x 250GB SATA (7.2k)	1 x 495W	1 x 8GB	1 x PERC H310	Idle[4]	4.7	28	None
						Stressed[5]	4.8	28	None
Typical	2	14 x 300GB SAS (10K)	2 x 750W	8 x 8GB	1 x PERC H710, 1 x GbE NIC	Idle[4]	4.8	28	None
						Stressed[5]	5.0	30	None

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

[2]LpA is the average A-weighted sound pressure level from the four bystander positions calculated per section 4.3 of ISO9296 (1988) and measured in accordance with ISO 7779 (2010). The system is placed in a half rack enclosure (base of system is 25 cm above reflective floor).

[3]Prominent tone: Criteria of D.6 and D.11 of ECMA-74 11th ed. (2010) are followed to determine if discrete tones are prominent. The system is placed in a half rack enclosure (base of system is 75 cm above reflective floor) and acoustic transducer is at front bystander position, ref ISO 7779 (2010 Section 8.6.2).

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

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

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

9 Rack rails and cable management

The rack rail systems for the Dell PowerEdge R720 and R720xd provide tool-less support for 4-post racks with square or unthreaded round mounting holes, including all generations of Dell racks. Compared to the predecessor R710 sliding rails that required the use of adapter brackets, the sliding rails for the R720 and R720xd now offer native support for threaded-hole racks with the new 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 R720 and R720xd support both sliding rails and static rails. Both rails have a new slim rail design that supports the wide system chassis.

The sliding rails (shown in Figure 14) allow the system to be fully extended out of the rack for service and are available with or without the optional CMA.

Figure 14.   Sliding rails with optional CMA
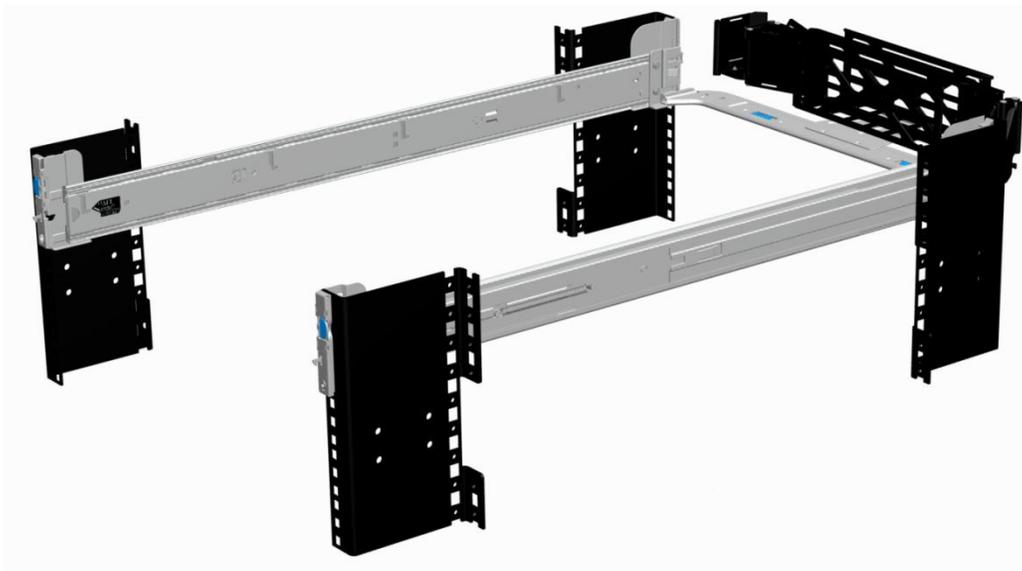
The static rails (shown in Figure 15) support a wider variety of racks than the sliding rails, but do not support serviceability in the rack and are not compatible with the CMA.

Figure 15.   Static rails
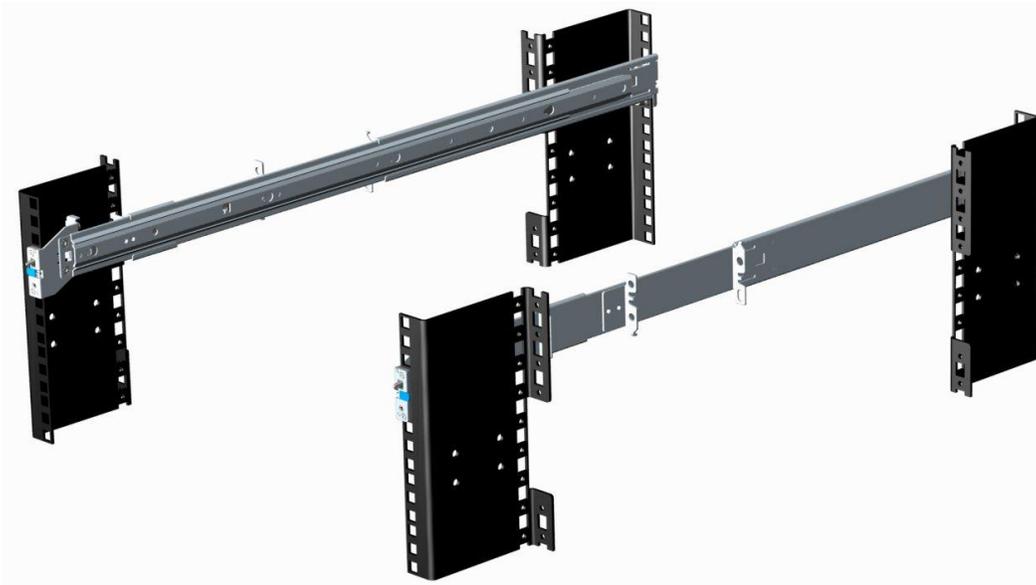
One key factor in selecting the proper rails is identifying the type of rack in which they will be installed. Both the sliding rails and the static rails support tool-less mounting in 19"-wide, EIA-310-E compliant square hole and unthreaded round-hole 4-post racks. Both also support tooled mounting in threaded hole 4-post racks, but only the static rails, as the more universal solution, support mounting in 2-post (Telco) racks.

Table 23 lists the rack rail systems that the R720 and R720xd support.

Table 23.   Supported rack rail system

System	Rail identifier	Mounting interface	Rail type	Rack types supported				
				4-post			2-post	
				Square	Round	Thread	Flush	Center
R720/R720xd	B6	ReadyRails II	Sliding	✓	✓	✓	X	X
	B4	ReadyRails	Static	✓	✓	✓	✓	✓

For detailed information about rail dimensions, see the Rack rail specifications section in Appendix A. For more information on installing the T620 in a rack, see the *Rack Installation Instructions* on Support.Dell.com/Manuals.

Cable management arm

The optional cable management arm (CMA) for the R720 and R720xd 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 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

For more information on installing the R720 and R720xd in a rack, see the *Rack Installation Instructions* on Support.Dell.com/Manuals.

10 Operating systems and virtualization

The Dell PowerEdge R720 and R720xd support a wide range of industry-standard operating systems and virtualization software.

Supported operating systems

Table 24 lists the primary operating systems supported on the R720 and R720xd. For the latest information on supported operating systems, see Dell.com/OSsupport.

Table 24.   Primary operating system support

Operating System	Platform	Edition
Red Hat Enterprise Linux 5.8[1]	x32 x64	N/A
Red Hat Enterprise Linux 6.2[2]	x64	N/A
Red Hat Enterprise Linux for HPC	x64	N/A
SUSE Linux Enterprise Server 11 SP2	x64	N/A
SUSE Linux Enterprise Server 10 SP4	x64	N/A
Microsoft Windows Server 2012	x64	Standard Data center
Microsoft Windows Small Business Server 2011[3]	x64	Standard Premium add-on
Microsoft Windows Server 2008 with SP2	x86	Web Standard Enterprise
	x64 (with Microsoft Hyper-V role enabled)	Web Standard Enterprise Data center
Microsoft Windows Server 2008 R2 with SP1	x64 (with Hyper-V role enabled)	Web Standard Enterprise Data center HPC

[1]RHEL 5.7 is the minimum supported version. Current drop in box option is RHEL 5.8.
[2]RHEL 6.1 is the minimum supported version. Current factory install is RHEL 6.2.
[3]Not validated for use with GPUs.

Support of the operating systems listed in Table 25 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 25.　Virtual guest operating system support

Operating System	Platform	Edition
Microsoft Windows 2003[1]	x86	Web
Microsoft Windows 2003 R2 with SP2[1]	x86	Standard Enterprise
	x64	Standard Enterprise Data center

[1]Not validated for use with AMD® GPUs

Supported virtualization

One of the key features for virtualization on the R720 and R720xd is the support for a failsafe hypervisor. By running the 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 26 highlights the virtualization support for the R720 and R720xd.

Table 26.　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)	DIB
	vSphere v5.0 U1	ESXi (one version)	FI/DIB
	vSphere v5.1	ESXi (one version)	DIB
Red Hat[2]	Enterprise Virtualization 3.0	N/A	DIB
Citrix	XenServer v6.0	N/A	DIB

FI = factory install; DIB = drop in box
[1]vSphere Fault Tolerance is supported with these versions.
[2]No 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 16, Dell systems management solutions are centered around OpenManage server management, featuring iDRAC7 with Lifecycle Controller.

Figure 16.   Dell systems management solutions
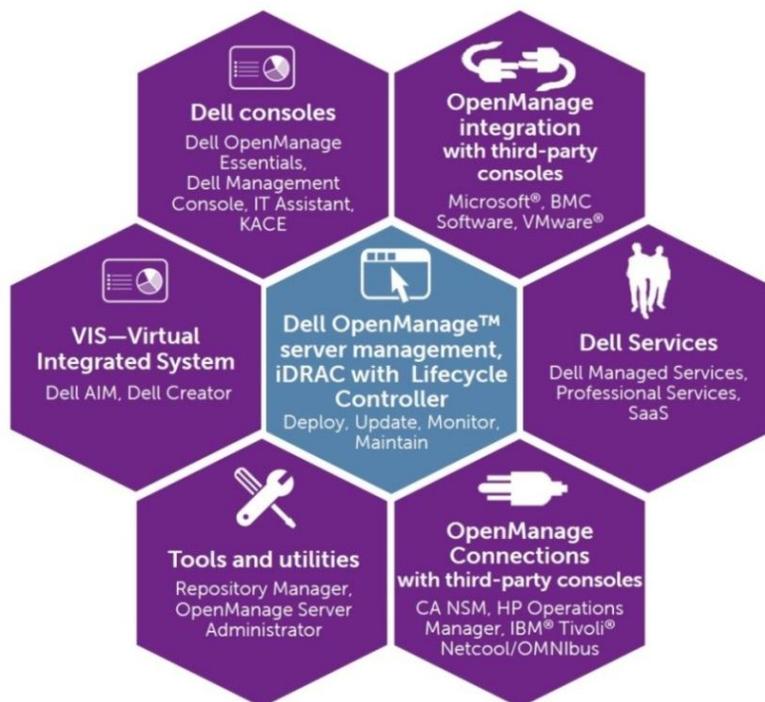
OpenManage systems management

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 the 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 27 describes the functions and benefits of iDRAC7 with Lifecycle Controller.

Table 27.   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)
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.

iDRAC7 feature comparison

iDRAC7 Enterprise is available for the PowerEdge R720 and R720xd, and Dell also offers an option of iDRAC7 Express. A detailed feature comparison for iDRAC7 Enterprise and iDRAC7 Express is shown in Table 28.

Table 28.   Feature comparison for iDRAC7 Express and Enterprise

Feature (function)	iDRAC7 Enterprise	iDRAC7 Express
Local configuration with Lifecycle Controller GUI	•	•
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	•	•
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	•	

Feature (function)	iDRAC7 Enterprise	iDRAC7 Express
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]	•	

[1]Requires OMSA agent on target server
[2]Uses 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 Dell 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 R720 and R720xd, 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 iDRAC7 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 connections with third-party consoles

Dell OpenManage provides 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 17 illustrates the various operations that can be performed during the server's lifecycle.

Figure 17.   Systems management server lifecycle

Table 29 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 29.   One-to-one and one-to-many operations

Operation	One-to-one	One-to-many	
Deploy	• Lifecycle Controller GUI • DTK • SBUU	• 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
Update	• iDRAC7 with LifeCycle Controller • Lifecycle Controller GUI • Repository Manager • DUP • SUU • SBUU • Dell Management Plug-in for VMware vCenter	• Dell OpenManage Essentials • Dell OpenManage ITA • Dell Management Console • Lifecycle Controller Remote Services	• Dell Update Catalogs for Microsoft System Center Configuration Manager • Dell Lifecycle Controller Integration (DLCI) for Microsoft System Center Configuration Manager

| Operation	One-to-one	One-to-many	
Monitor	• iDRAC7 • OMSA	• Dell OpenManage Essentials • Dell OpenManage ITA • BMC ProactiveNet Performance Management • Dell OpenManage Power Center • Dell Management Console	• Dell Management Plug-in for VMware vCenter • BMC ProactiveNet • Dell Server Management Pack Suite for Microsoft System Center Operations Manager (SCOM)
Maintain	• IPMI • iDRAC7 • Lifecycle Controller GUI	• Lifecycle Controller Remote Services	Remediate: • Dell Server PRO Management Pack for Microsoft System Center Virtual Machine Manager (SCVMM) Replace parts: • Dell Lifecycle Controller Integration (DLCI) for Microsoft System Center Configuration Manager

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

Appendix A. Additional specifications

Chassis dimensions

Figure 18 details the dimensions of the Dell PowerEdge R720 and R720xd chassis.

Figure 18.   Chassis dimensions
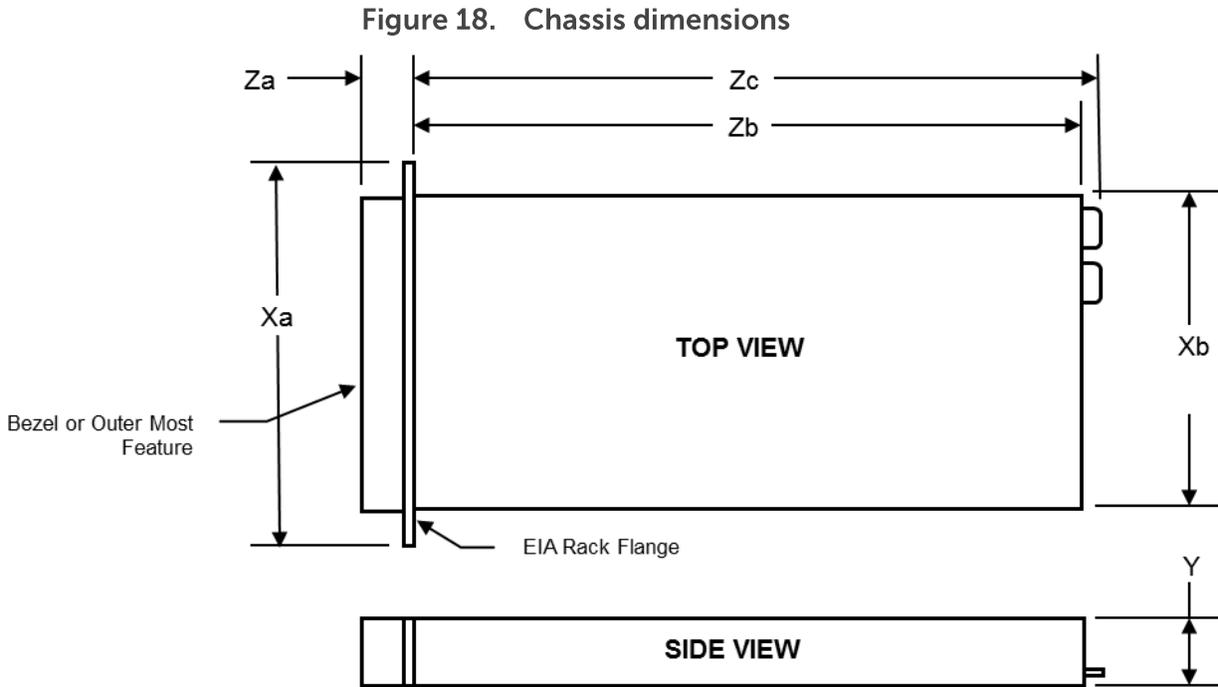
Xa	Xb	Y	Za (with bezel)	Za (without bezel)	Zb	Zc
482.4mm	444.0mm	87.3mm	32.0mm	18.0mm	684.0mm	723.0mm

Chassis weight

Table 30 lists the weight of the R720 and R720xd chassis at maximum configuration as well as empty of any hardware.

Table 30.   Chassis weight

Configuration	R720 (2.5" chassis)	R720 (3.5" chassis)	R720xd (2.5" chassis)	R720xd (3.5" chassis)
Maximum	29.5kg (64.9lbs)	29.2kg (64.3lbs)	29.5kg (64.9lbs)	32.5kg (71.5lbs)
Empty chassis	11.7kg (25.7lbs)	10.3kg (22.7lbs)	11.7kg (25.7 lbs)	10.3kg (22.7lbs)

Environmental specifications

Table 31 details the environmental specifications for the R720 and R720xd. For additional information about environmental measurements for specific system configurations, see Dell.com/environmental_datasheets.

Table 31.   Environmental specifications

Fresh Air: temperature, humidity, altitude de-rating	
Continuous operation	10°C to 35°C (50°F to 95°F) at 10% to 80% relative humidity with 26°C (78.8°F) maximum dew point (maximum wet bulb temperature). De-rate maximum allowable dry bulb temperature at 1°C per 300m above 950m (1°F per 547 ft above 3117 ft).
Expanded operation	When operating in the expanded temperature range, system performance may be impacted, and ambient temperature warnings may be reported on the LCD and in the System Event Log.
	≤ 10% of annual operating hours: 5°C to 10°C and 35°C to 40°C (with no direct sunlight on the equipment) at 5% to 85% relative humidity with 26°C dew point (maximum wet bulb temperature). Outside the standard operating temperature (10°C to 35°C), the system can operate down to 5°C or up to 40°C for a maximum of 10% of its annual operating hours. For temperatures between 35°C and 40°C (95°F to 104°F), de-rate maximum allowable dry bulb temperature by 1°C per 175m above 950m (1°F per 319 ft above 3117 ft).
	≤ 1% of annual operating hours: −5°C to 5°C and 40°C to 45°C (with no direct sunlight on the equipment) at 5% to 90% relative humidity with 26°C dew point (maximum wet bulb temperature). Outside the standard operating temperature (10°C to 35°C), the system can operate down to −5°C or up to 45°C for a maximum of 1% of its annual operating hours. For temperatures between 40°C and 45°C (104°F to 113°F), de-rate maximum allowable dry bulb temperature by 1°C per 125m above 950m (1°F per 228 ft above 3117 ft).
	Expanded operation restrictions:
	• No cold startup below 5°C
	• Maximum altitude for the operating temperature must be 3050m (10,000ft)
	• Redundant power supplies are required
	• Not supported:
	– Express Flash PCIe SSD
	– GPU
	– LRDIMM
	– 130W 4-core processors
	– Non-redundant power supplies
	– Peripheral cards not qualified by Dell
	– Peripheral cards greater than 25W
	• For the PowerEdge R720, a maximum 130W processor is supported in either the 8-drive bay or 16-drive bay chassis.
	• The following additional restrictions apply to PowerEdge R720xd:
	– Maximum 95W processor is supported on 3.5-inch hard drive chassis
	– Maximum 115 W processor is supported on 2.5-inch hard drive chassis
	– Only SSDs are supported in the hard drive slots on the back of the 3.5-inch hard drive chassis.
Temperature	
Operating	See Fresh Air for temperature information
Storage	−40°C to 65°C (-40°F to 149°F) with a maximum temperature gradation of 20°C per hour
Relative humidity	
Operating	See Fresh Air for relative humidity information
Storage	5% to 95% at a maximum wet bulb temperature of 33°C (91°F); atmosphere must be condensing at all times

Maximum vibration	
Operating	0.26 Grms at 5Hz to 350Hz in all orientations
Storage	1.87 Grms at 10Hz to 500Hz for 15 minutes (all six sides tested)

Maximum shock	
Operating	Half sine shock in all operational orientations of 31G +/− 5% with a pulse duration of 2.6ms +/− 10%
Storage	Half sine shock on all six sides of 71G +/− 5% with a pulse duration of 2ms +/−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 ft to 10,000 ft)
Storage	−15.2m to 12,000m (−50 ft to 39,370 ft)

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

Power supply specifications

Table 32 lists power supply specifications for the PowerEdge R720 and R720xd.

Table 32.   Power supply specifications

Specification	1100W DC	1100W AC	750W AC	495W AC
Current consumption	32A	12A−6.5A	10A−5A	6.5A−3A
Supply voltage	-48V to -60V DC	100−240VAC[1]	100−240VAC[1]	100−240VAC[1]
Frequency	N/A	50/60Hz	50/60Hz	50/60Hz
Heat dissipation (BTU/hr max)	4416	4100	2843[2] / 2891[3]	1908

[1]Auto-ranging
[2]Titanium efficiency
[3]Platinum efficiency

Video specifications

The Dell PowerEdge R720 and R720xd iDRAC7 incorporates an integrated video subsystem. The graphics controller is the 2D Matrox® G200. The video frame buffer (16 MB) is contained within the iDRAC RAM (256 MB) device. The R720 and R720xd systems support the 2D graphics video modes listed in Table 33.

Table 33.   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 800 (UI)	—	—
1280 x 1024	60, 75	8, 16, 32
1440 x 900	60	8, 16, 32

Rack rail specifications

The rack rail adjustability ranges are listed in Table 34.

Table 34.   Rail adjustability ranges

Server	Rail identifier	Rail type	Rail adjustability range (mm)						Rail depth (mm)	
			Square		Round		Threaded		without CMA	with CMA
			Min	Max	Min	Max	Min	Max		
R720/R720xd	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 minimum and maximum 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 rail 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, back, and internal USB ports. They are USB 2.0 compliant.

Appendix B. Standards compliance

The R720 and R720xd systems conform to the industry standards in Table 35.

Table 35.   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.mspx
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
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.mspx

Appendix C. Additional resources

Table 36 provides a list of documents and websites that provide for more information on the Dell PowerEdge R720 and R720xd.

Table 36.   Additional resources

Resource	Description of contents	Location
PowerEdge R720 and R720xd Owner's Manual	This manual is provided in HTML format on the CD provided with the R720 or R720xd systems, 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: • 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 R720 and R720xd Getting Started Guide	This guide is printed and shipped with the system, and is also available in PDF format on the Dell support site. This guide provides information on the following: • Initial setup steps • Key system features • Technical specifications	Support.Dell.com/Manuals
Rack Installation Instructions	This printed document is provided with the rack kits. The document provides the instructions for installing the server in a rack.	Support.Dell.com/Manuals
Cable Management Arm Installation Instructions	This printed document is provided with the rack kits. The document provides the instructions for installing the cable management arm on the rack.	Support.Dell.com/Manuals
System Information Label	The system information label documents the system board layout and system jumper settings.	Inside the system chassis
Quick Resource Locator (QRL) code	This code 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
Information Update	This document provides updated system information and is printed and shipped with the system. It is also available in PDF format on the Dell support site.	Support.Dell.com/Manuals
Dell Energy Smart Data Center Assessment	uses infrastructure and thermal analysis to help maximize system efficiency	Dell.com/EnergySmart

Resource	Description of contents	Location
Energy Smart Solution Advisor (ESSA)	The Dell online advisor console 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 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 R620 processors and chipset.	Intel.com
Dell PowerEdge RAID controllers	Provides more information on Dell PowerEdge RAID controllers (PERC).	Dell.com/PERC
Power distribution unit (PDU)	Provides help selecting a power distribution unit (PDU).	DellPDU.com
Uninterruptible power supply (UPS)	Provides help selecting an uninterruptible power supply (UPS) model.	DellUPS.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
Volatility information	Contact your Dell Sales Representative.	

Appendix D. System board block diagram

Figure 19.   R720 system board block diagram
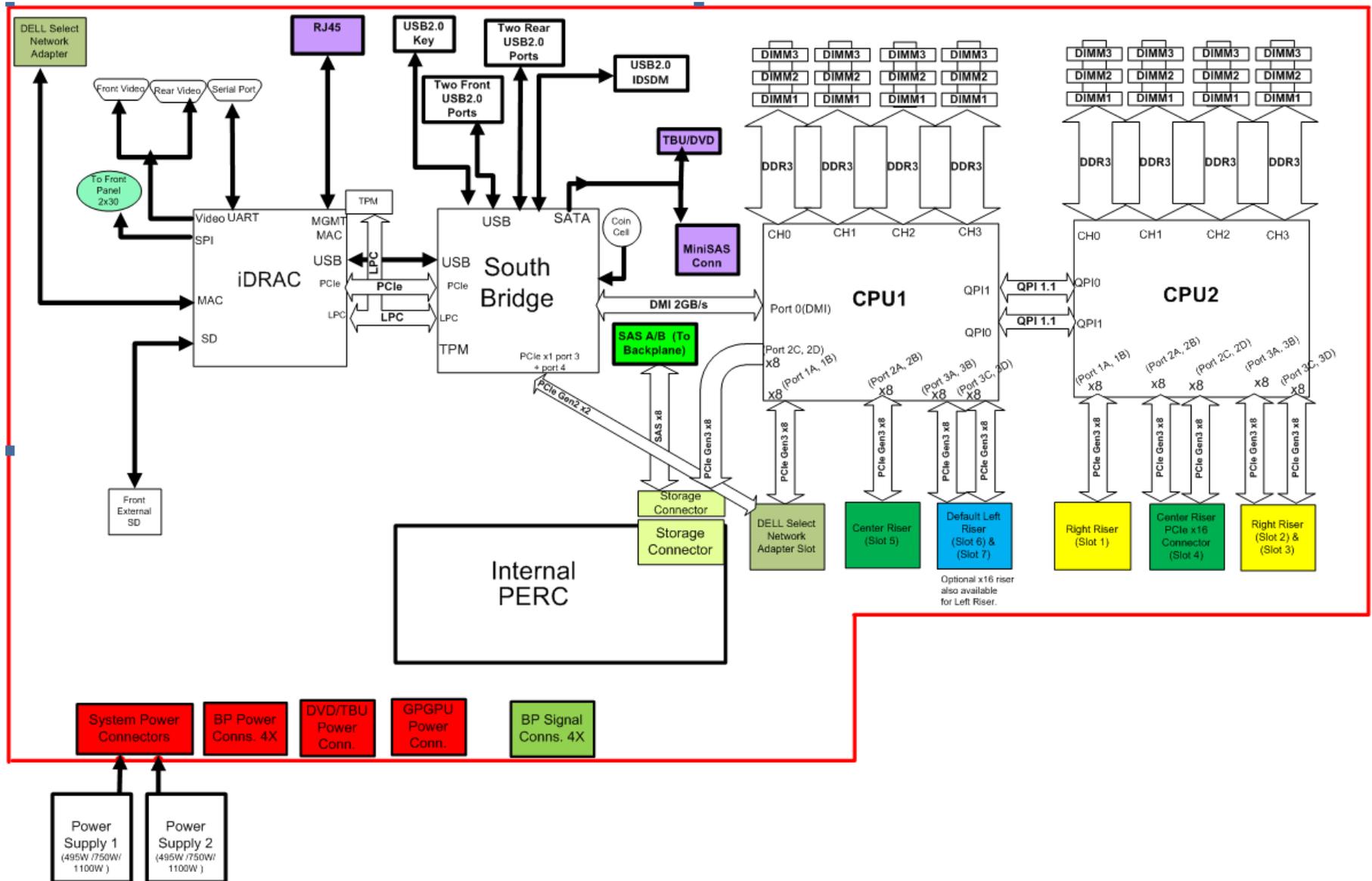
Figure 20.   R720xd system board block diagram