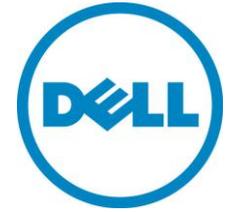


PowerEdge T710



Technical Guide



Inspired by IT professionals, the PowerEdge T710 is ideal for server consolidation.

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1 Product Comparison

1.1 Overview

The Dell™ PowerEdge™ T710 provides outstanding performance, availability, and value in a 2S tower server for large enterprises and organizations, remote workgroups, and growing businesses.

The T710 features the extensive performance range of Intel® Xeon® processors, DDR3 memory, excellent I/O bandwidth, internal storage expandability of up to 16 hard drives, and optional redundant power supplies.

The T710 was developed with a purposeful design—high, balanced performance; extensive expandability for growth; energy-optimized technologies, advanced virtualization capabilities, and simplified systems management.

1.1.1 Purposeful Design

The PowerEdge T710 takes advantage of Dell's outstanding system commonality and reliability. Consistent component layout and purposeful placement of interface ports and power supplies enable easy installation and redeployment. The PowerEdge T710 purposeful design provides a standard LCD screen positioned by the front of the bezel for ease of monitoring.

Robust, metal hard drive carriers and organized cabling are designed to improve component access and airflow across the server. Designed for easy rack installation, the PowerEdge T710 offers an all-steel cable management arm to help eliminate creep.

1.1.2 Energy-Optimized Technology

Energy efficiency is designed at the system level on the PowerEdge T710 to help reduce power consumption while increasing performance capacity. Improvements include enhanced power supply units, an efficient fan design, and policy-driven power management.

Energy Smart 90%+ efficient power supply units are provided on the PowerEdge T710. A robust fan cage design with a single pull fan module helps improve airflow and enable fast, easy maintenance. Power Management features include power capping, power inventory, and power budgeting to best manage power in your specific environment.

1.1.3 Advanced Virtualization

Featuring Intel Xeon processors 5500 series, embedded hypervisors, and expanded memory and I/O, Dell servers offer better overall system performance and virtual machine-per-server capacity than ever before.

Dell provides a smart path to virtualization that is grounded in choice and defined by industry standards. Choose your hypervisor from market leaders such as VMware and Microsoft, enabling virtualization with a few mouse clicks.

1.1.4 Simplified Systems Management

The next-generation of Dell OpenManage™ suite of management tools is designed to provide efficient operations and standards-based commands designed to integrate with existing systems for effective control.

Dell Management Console (DMC) helps simplify operations and create stability by shrinking infrastructure management to one console. This console delivers a single view and a common data

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source into the entire infrastructure management. Built on Symantec™ Management Platform, it has an easily extensible, modular foundation that can provide basic hardware management or more advanced functions, such as asset and security management. Dell Management Console is designed to reduce or eliminate manual processes, enabling you to save time and money for more strategic technology usage.

Secure and efficient, the Dell Lifecycle Controller delivers “Instant On” integrated manageability through a single access point. The Unified Server Configurator (USC) interface enables persistent access to the tool because it is embedded and integrated into the system for significant flexibility and capabilities. The Lifecycle Controller is a one-stop shop for deploying operating systems with built-in driver installations, BIOS and firmware update and rollback, hardware configuration, and diagnostics.

1.2 Comparison

Table 1. Comparison of PowerEdge T710 to T410 and T610

Feature	T410	T610	T710
Processor	Intel® Xeon® processor 5500 and 5600 series	Intel® Xeon® processor 5500 and 5600 series	Intel® Xeon® processor 5500 and 5600 series
Sockets	2	2	2
Cores	4 or 6	4 or 6	4 or 6
L2/L3 Cache	4MB, 8MB, and 12MB	4MB, 8MB, and 12MB	4MB, 8MB, and 12MB
Chipset	Intel® 5500	Intel® 5520	Intel® 5520
Front Side Bus	6.4 GT/s QuickPath Interconnect (QPI) links	6.4 GT/s QuickPath Interconnect (QPI) links	6.4 GT/s QuickPath Interconnect (QPI) links
DIMMs	8 x DDR3	12 x DDR3	18 x DDR3
Min/Max RAM	1GB/128GB	1GB/192GB	1GB/192GB
Drive Bays	Optional hot-plug 6 x 2.5” or 6 x 3.5”	Hot-plug 8 x 2.5” or 8 x 3.5”	Hot-plug 16 x 2.5” or 8 x 3.5”
Hard Drive Types	SATA SSD, SAS, nearline SAS, SATA	SAS SSD, SATA SSD, SAS, nearline SAS, SATA	SAS SSD, SATA SSD, SAS, nearline SAS, SATA
External Drive Bays	2 x 5.25”	2 x 5.25”	2 x 5.25”
Embedded Hard Drive Controller	PERC H200, PERC H700, SAS 6/iR, PERC 6/i, PERC S100, PERC S300	PERC H200, PERC H700, SAS 6/iR, PERC 6/i, PERC S100, PERC S300	PERC H200, PERC H700, SAS 6/iR, PERC 6/i, PERC S100, PERC S300

Feature	T410	T610	T710
Optional Storage Controller	<p>Non-RAID: SAS 5/E LSI 2032 (for tape backup unit only) 6Gbps SAS HBA</p> <p>RAID: SAS 6/iR PERC H200 PERC 6/i PERC H700 PERC 6/E PERC H800</p>	<p>Non-RAID: SAS 5/E LSI 2032 (for tape backup unit only) 6Gbps SAS HBA</p> <p>RAID: SAS 6/iR PERC H200 PERC 6/i PERC H700 PERC 6/E PERC H800</p>	<p>Non-RAID: SAS 5/E LSI 2032 (for tape backup unit only) 6Gbps SAS HBA</p> <p>RAID: SAS 6/iR PERC H200 PERC 6/i PERC H700 PERC 6/E PERC H800</p>
Availability	<p>Optional hot-plug hard drives Optional hot-plug redundant power ECC memory Memory mirroring Quad-pack LED or LCD diagnostic</p>	<p>Hot-plug hard drives Optional hot-plug redundant power Hot-plug redundant cooling ECC memory Memory mirroring LCD diagnostic One dual-port embedded NIC with TOE</p>	<p>Hot-plug hard drives Optional hot-plug redundant power Hot-plug redundant cooling ECC memory Memory mirroring LCD diagnostic Two dual-port embedded NICs with TOE</p>
Server Management	<p>Baseboard Management Controller (BMC), IPMI 2.0, Dell OpenManage™ Optional: iDRAC6 Express, iDRAC6 Enterprise, vFlash media</p>	<p>Baseboard Management Controller (BMC), IPMI 2.0, Dell OpenManage™, iDRAC6 Express Optional: iDRAC6 Enterprise, vFlash media</p>	<p>Baseboard Management Controller (BMC), IPMI 2.0, Dell OpenManage™, iDRAC6 Express Optional: iDRAC6 Enterprise, vFlash media</p>
I/O Slots	<p>4 PCIe x8 (x4 routing) 1 PCIe x16 (x8 routing)</p>	<p>2 PCIe x8 3 PCIe x4 Gen 2</p>	<p>1 PCIe x16 4 PCIe x8 1 PCIe x4</p>
NIC/LOM	<p>Broadcom® BCM5716 2 x GbE Optional: various NICs available</p>	<p>Broadcom® BCM5709c 2 x GbE with TOE Optional: various NICs available</p>	<p>Broadcom® BCM5709c 4 x GbE with TOE Optional: various NICs available</p>
USB	<p>2 front, 4 back, 1 internal</p>	<p>2 front, 6 back, 1 internal</p>	<p>2 front, 6 back, 1 internal</p>
Power Supplies	<p>Non-redundant 525W or Optional hot-plug redundant 2 x 580W</p>	<p>Hot-plug redundant 2 x 570W (Energy Smart) or 2 x 870W (high-output)</p>	<p>Hot-plug redundant 2 x 1100W</p>
Fans	<p>Non hot-plug, non-redundant</p>	<p>Optional hot-plug redundant</p>	<p>Hot-plug redundant</p>

2 Key Technologies

2.1 Overview

Key technologies of the Dell™ PowerEdge™ T710 include two quad-core or six-core Intel® Xeon® processors 5500 and 5600 series with QuickPath Interconnect (QPI), DDR3 memory, Intel 5520 I/O Hub (IOH), dual-port Gigabit Ethernet controller with TOE, PCI Express Generation 2, internal SD Module, and iDRAC6 Express or optional iDRAC6 Enterprise.

2.2 Processor Information

The Intel Xeon processors 5500 and 5600 series are designed specifically for servers and workstation applications. The processor features quad-core and six-core processing to maximize performance and performance/watt for demanding workloads. The processors also feature the Intel Core™ micro-architecture and Intel 64 architecture for flexibility in 64-bit and 32-bit applications and operating systems. Refer to section 6 for more details.

3 System Overview

Table 2 summarizes the features for the Dell™ PowerEdge™ T710. For the latest information on supported features for the PowerEdge T710, visit Dell.com.

Table 2. Product Features Summary

Feature	Technical Specification	
Form Factor	Tower or rack (5U height in rack orientation)	
Processors	Latest quad-core or six-core Intel® Xeon® processors 5500 and 5600 series	
Processor Sockets	2	
Front Side Bus or HyperTransport	Intel QuickPath Interconnect (QPI)	
Cache	4MB and 8MB	
Chipset	Intel 5520 Chipset	
Memory ¹	Up to 192GB (18 DIMM slots): 1GB/2GB/4GB/8GB/16GB DDR3 800MT/s, 1066MT/s or 1333MT/s	
I/O Slots	1 PCIe x16 4 PCIe x8 1 PCIe x4 (all PCIe Gen2 slots)	
RAID Controller	Internal: PERC H200 (6Gb/s) PERC H700 (6Gb/s) (non-volatile battery-backed cache: 512MB, 1GB) SAS 6/iR PERC 6/i (battery-backed cache: 256MB) PERC S100 (software based) PERC S300 (software based)	External: PERC H800 (6Gb/s) (non-volatile battery-backed cache: 512MB, 1GB) SAS 6/iR PERC 6/E (battery-backed cache: 256MB, 512MB) External HBAs (non-RAID): 6Gbps SAS HBA SAS 5/E HBA LSI2032 PCIe SCSI HBA
Drive Bays	16 x 2.5" hot-plug hard drives or 8 x 3.5" hot-plug hard drives 2 x 5.25" drive bays for DVD-ROM, DVD+/-RW, or tape backup unit (TBU)	
Maximum Internal Storage	Up to 32TB	
Hard Drives ¹	2.5" SAS SSD, SATA SSD, SAS (15K, 10K), nearline SAS (7.2K), SATA (7.2K)	3.5" SAS (15K, 7.2K), nearline SAS (7.2K), SATA (7.2K)

Feature	Technical Specification
Communications	Dual embedded Broadcom® NetXtreme II™ 5709c Gigabit Ethernet NIC with failover and load balancing (4 total ports). TOE (TCPIP Offload Engine) supported on Microsoft® Windows Server® 2003, SP1 or higher with Scalable Networking Pack Intel® Ethernet X520 DA2 Dual-Port 10 Gigabit Server Adapter Optional 1GBe and 10GBe add-in NICs: Broadcom® NetXtreme II® 57711 Dual Port Direct Attach 10Gb Ethernet PCI-Express Network Interface Card with TOE and iSCSI Offload Intel® Gigabit ET Dual Port Server Adapter and Intel® Gigabit ET Quad Port Server Adapter Dual Port 10GB Enhanced Intel® Ethernet Server Adapter X520-DA2 (FCoE Ready for Future Enablement) Brocade® CNA dual-port adapter; Emulex® CNA iSCSI HBA stand up adapter OCE10102-IX-D Optional Add-in HBAs: Brocade® FC4 and 8 GB HBAs
Power Supply	Two redundant hot-plug 1100W
Availability	DDR3 memory; hot-plug hard drives; optional hot-plug redundant power supplies; hot-plug redundant cooling; dual embedded NICs with failover and load balancing support (4 total ports); optional PERC 6/i integrated daughtercard controller with battery-backed cache; toolless chassis; fibre and SAS cluster support; validated for Dell/EMC SAN
Video	Integrated Matrox® G200
Remote Management	iDRAC6 Express, optional iDRAC6 Enterprise
Systems Management	Dell™ OpenManage™ suite of systems management solutions
Rack Support	ReadyRails™ sliding rails with optional cable management arm for 4-post racks (optional adapter brackets required for threaded hole racks)

Feature	Technical Specification
<p>Operating Systems</p>	<p>Microsoft® Windows Server® 2012 Microsoft Windows® Small Business Server 2011 Microsoft Windows Small Business Server 2008 Microsoft Windows Server 2008 SP2, x86/x64 (x64 includes Hyper-V®) Microsoft Windows Server 2008 R2 SP1, x64 (includes Hyper-V v2) Microsoft Windows HPC Server 2008 Novell® SUSE® Linux Enterprise Server Red Hat® Enterprise Linux®</p> <p>Optional Embedded Hypervisors: Citrix® XenServer® VMware® vSphere® including ESX™ and ESXi™ Red Hat Enterprise Virtualization®</p> <p>For more information on the specific versions and additions, visit Dell.com/OSsupport.</p>
<p>Featured Database Applications</p>	<p>Microsoft SQL Server® solutions (see Dell.com/SQL) Oracle® database solutions (see Dell.com/Oracle)</p>

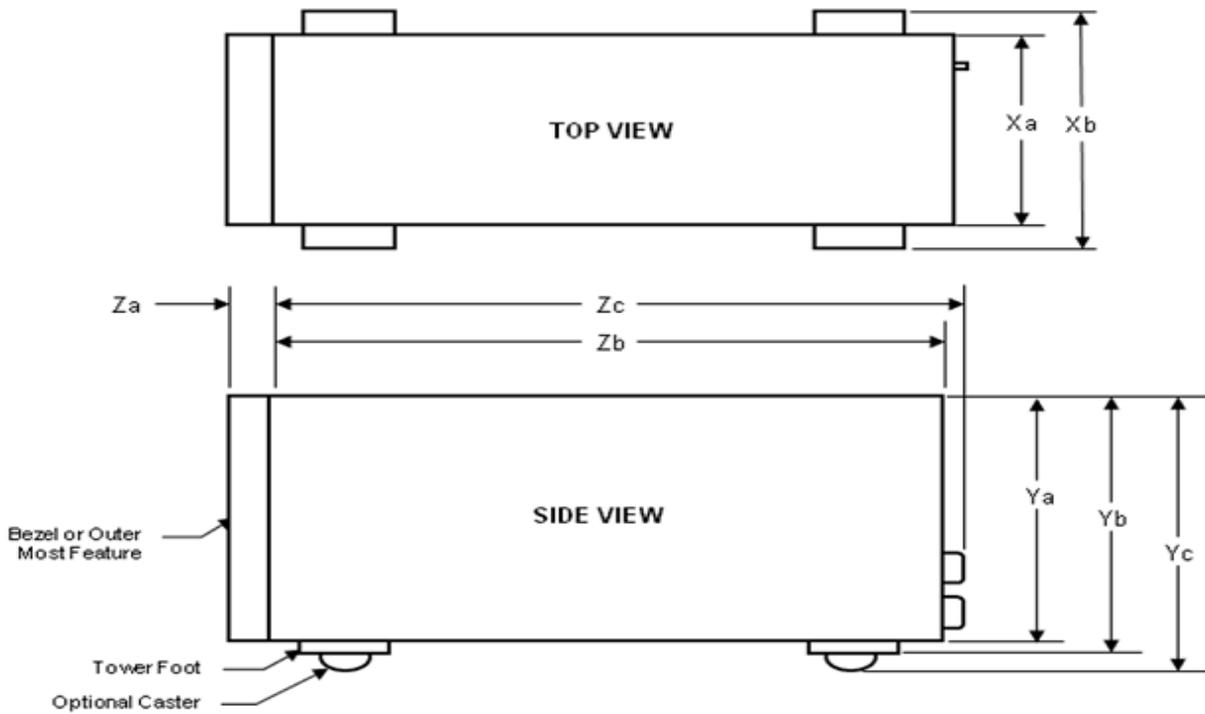
¹GB means 1 billion bytes and TB equals 1 trillion bytes; actual capacity varies with preloaded material and operating environment and will be less.

4 Mechanical

4.1 Chassis Description

The Dell™ PowerEdge™ T710 system uses a tower or rack-mount 5U chassis. It is classified by Dell as a rackable tower, meaning it is optimized for tower operation.

4.2 Dimensions



Xa	Xb	Ya	Yb	Yc	Za (with bezel)	Za (without bezel)	Zb*	Zc
217.9mm	304.4mm	431.3mm	466.3mm	471.3mm	37mm	35mm	659.6mm	694.8mm

*Note: Zb goes to the nominal rear wall external surface where the motherboard I/O connectors reside.

Figure 1. Chassis Dimensions

4.3 Weight

The maximum configuration weight of the PowerEdge T710 is 35.3 kg (78 lb).

4.4 Front Panel View and Features

Figure 2 and Figure 3 show the front views of the PowerEdge T710.



Figure 2. Front View (Tower Configuration)



Figure 3. Front View (Rack Configuration)

See the Front-Panel Features and Indicators section in the About Your System chapter of the *PowerEdge T710 Hardware Owner's Manual* on Support.Dell.com for more information.

4.5 Back Panel View and Features

Figure 4 shows the back view of the PowerEdge T710.



Figure 4. Back View

See the Back-Panel Features and Indicators section in the About Your System chapter of the *PowerEdge T710 Hardware Owner’s Manual* on Support.Dell.com for more information.

4.6 Power Supply Indicators

The PowerEdge T710 redundant power supplies have one status bi-color LED: green for AC power present and amber for a fault as detailed in Table 3.

Table 3. Power Supply Status

LED	Power Supply Status
	AC Power is not present
	AC Power is present
	Fault of any kind is detected
	DC Power is applied to the system
	Redundant power supply mismatch (when hot-plugged/swapped)

See the Power Indicator Codes section in the About Your System chapter of the *PowerEdge T710 Hardware Owner’s Manual* on Support.Dell.com for more information.

4.7 Internal Chassis View

Figure 5 shows the internal view of the PowerEdge T710 server.

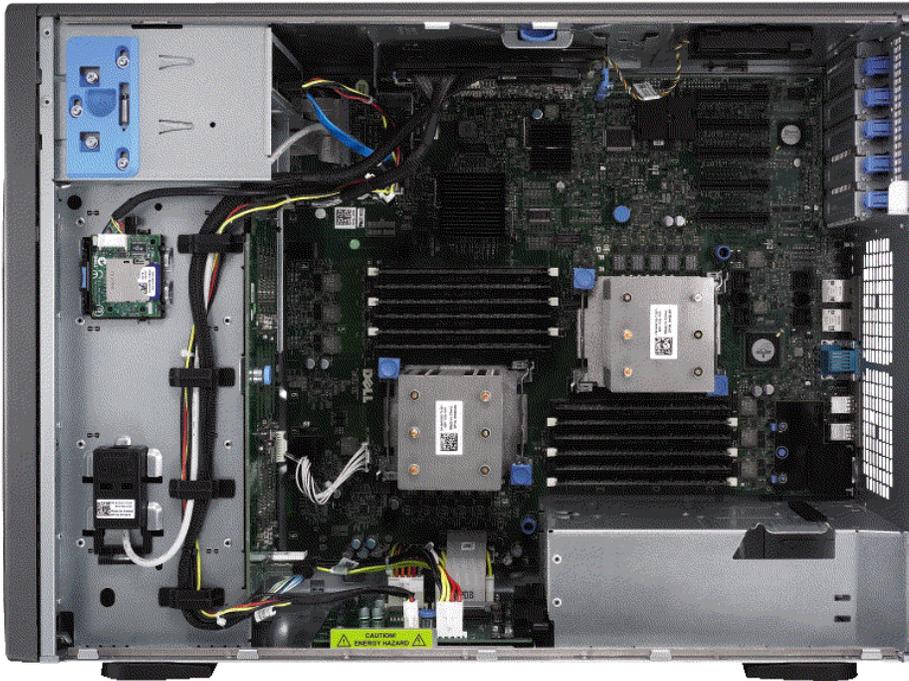


Figure 5. Internal Chassis View

4.8 Rails and Cable Management

ReadyRails™ Sliding Rails for 4-post racks support the following:

- Toolless installation in 19" EIA-310-E compliant square or unthreaded round hole 4-post racks including all generations of Dell racks
- Toolled installation in 19" EIA-310-E compliant threaded hole 4-post racks (requires the 2U Threaded Rack Adapter Brackets Kit)
- Full extension of the system out of the rack to allow serviceability of key internal components
- Optional cable management arm (CMA); optional adapter brackets required for threaded hole racks

See section 14 for more details.

4.9 Fans

Two or four 92 mm single-rotor fans are mounted in the back of the cooling shroud. Each fan has a single-wire harness that plugs into the planar fan connectors. In a non-redundant configuration, two fans must be installed towards the back of the chassis.

The iDRAC6 controls and monitors the speed of the fans. A fan speed fault or over-temperature condition results in a notification by iDRAC6.

The T710 power supply units have integrated fans that cool the units. The fans are located in the front section of the server. The system requires a blank module in place of an empty power supply slot.

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All system fans are pulse-width modulated (PWM) fans. The T710 supports optional redundant cooling.

4.10 LCD Control Panel

The LCD control panel is located on the front of the system chassis to provide user access to buttons, display, and I/O interfaces. See Figure 6. The control panel includes the following features:

- ACPI-compliant power button with an integrated green power LED (controlled by iDRAC6)
- 128x20 pixel LCD with controls:
 - Two navigation buttons
 - Select button
 - System ID button
- Non-maskable Interrupt (NMI) button (recessed)
- Ambient temperature sensor



Figure 6. LCD Control Panel

For more information on the LCD panel, see the LCD Panel Features section in the About Your System chapter in the *PowerEdge T710 Hardware Owner's Manual* on Support.Dell.com.

4.11 Security

The PowerEdge T710 supports the security features listed in Table 4. For additional information regarding the following security features, see the *PowerEdge T710 Hardware Owner's Manual* on Support.Dell.com.

Table 4. Security Features

Feature	Description
Cover Latch	A tooled latch with lock on the side cover secures it to the chassis
Bezel	A metal bezel mounted to the front of the chassis with a lock to protect unauthorized access to remove or install an optional tape backup unit, optical disk drives, or hot-plug hard drives. System status on the LCD control panel is visible even when the bezel is installed.
Hard Drive	The front bezel of the system contains a lock which secures the system hard drives.
TPM	The Trusted Platform Module (TPM) is used to generate and store keys, protect and authenticate passwords, and create and store digital certificates. The TPM can also be used to store Microsoft® BitLocker™ keys for hard drive encryption features in Microsoft Windows Server® 2008. TPM is enabled through a BIOS option.

Power Off Security	The control panel is designed so the power switch cannot be accidentally activated. The lock on the bezel secures the switch behind the bezel. In addition, there is a setting in the CMOS setup that disables the power button function.
Intrusion Alert	A switch mounted on the inside of the chassis on the cooling shroud, is used to detect chassis intrusion. When the cover is opened, the switch circuit closes to indicate intrusion.
Secure Mode	BIOS has the ability to enter a secure boot mode through Setup. This mode includes the option to lock out the power and NMI switches on the control panel or set up a system password. For more information, see System and Setup Password Features section in the About Your System chapter in the <i>PowerEdge T710 Hardware Owner's Manual</i> on Support.Dell.com .

4.11.1 USB Key

The port on the motherboard is for an optional USB key and is located inside the chassis. Some possible applications of the USB key are listed as follows:

- User custom boot and pre-boot OS for ease of deployment or diskless environments
- USB license keys for software applications like eToken™ or Sentinel Hardware Keys
- Storage of custom logs or scratch pads for portable user defined information (not hot-pluggable)

4.12 Battery

A replaceable coin cell CR2032 3V battery is mounted on the planar to provide backup power for the Real-Time Clock and CMOS RAM on the ICH chip.

4.13 Field Replaceable Units (FRU)

The planar contains a serial EEPROM to store FRU information including Dell part number, part revision level, and serial number. The backplane storage enclosure processor (SEP) and the power supply microcontroller are also used to store FRU data.

4.14 User Accessible Jumpers, Sockets, and Connectors

See the Jumpers and Connectors chapter in the *PowerEdge T710 Hardware Owner's Manual* on Support.Dell.com.

5 Power, Thermal, Acoustic

5.1 Power Efficiencies

The Dell™ PowerEdge™ T710 achieves a high-level of power efficiency by implementing the following features:

- User-selectable power cap (subsystems throttle to maintain the specified power cap)
- Improved power budgeting
- Larger heat-sinks for processors and IOH
- Accurate inlet temperature
- Power-supply and voltage-regulator (VR) efficiency improvements
- Use of switching regulators instead of linear regulators
- Closed-loop thermal throttling
- Increased rear venting and 3D venting
- Pulse-width modulated (PWM) fans with an increased number of fan zones and configuration-dependent fan speeds
- Use of DDR3 memory (lower voltage compared to DDR2, UDIMM)
- Processor VR dynamic phase shedding
- Memory VR static phase shedding
- Random time interval for system start
- Ability for an entire rack to power on without exceeding the available power
- BIOS Power/Performance options page
- BIOS-based processor P-state manager (power management in a virtualized environment)
- Active Power Controller (BIOS-based CPU P-state manager)
- Ability to power down or throttle memory
- Option to disable a processor core
- Ability to turn off embedded NICs or PCIe lanes when not being used
- Option to run PCIe at Gen1 speeds instead of Gen2

5.2 Power Supplies

The base redundant T710 system consists of two hot-plug 1100W power supplies in a 1+1 configuration.

The power supplies connect directly to the planar. There is a power cable to connect between the planar and the backplane. The T710 power supplies have embedded cooling fans.

Field replaceable unit (FRU) data is stored in the memory of the power supply microcontroller. Additionally, the power supply firmware can be updated by the iDRAC over the PMBus.

Power is soft-switched, allowing power cycling using a switch on the front of the system enclosure or by software control (through server management functions).

In a single power supply configuration, the power supply is installed in PS1 location and a power supply blank (metal cover) is installed in PS2 location for proper system cooling.

5.3 Power Supply Specifications

The T710 power supply is rated at 1100W. It operates on input voltages ranging from 90-264V, auto-switching to the sensed line level.

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- EMC classification is Light Industry
- FCC classification is Class A

The power supply specifications can be found in Table 5.

Table 5. Power Supply Specifications

Feature	Specification
Wattage	1100 Watt
Voltage	90-264 VAC, auto-ranging, 47Hz-63Hz
Maximum inrush current	Under typical line conditions and over the entire system ambient operating range, the inrush current may reach 55A per power supply for 10ms or less.

5.4 Power Supply Efficiency

Table 6. Power Supply Efficiency

Loading	Efficiency
115V Input Voltage	
20%	87%
50%	90%
100%	87%
230V Input Voltage	
10%	80%
20%	88%
50%	92%
100%	88%

5.5 Heat Dissipation

The maximum system heat dissipation at 115 VAC is 3412 BTU/hr.

The maximum system heat dissipation at 230 VAC is 3753 BTU/hr.

5.6 Environmental Specifications

Table 7. Environmental Specifications

Temperature	
Operating	10°C to 35°C (50°F to 95°F) with a maximum temperature gradation of 10°C per hour 10°C to T^1 °C (50°F to T^1 °F) for altitudes above 900m (2950ft)
Storage	-40°C to 65°C (-40°F to 149°F) with a maximum temperature gradation of 20°C per hour
Relative Humidity	
Operating	20% to 80% (non-condensing) with a maximum humidity gradation of 10% per hour
Storage	5% to 95% (non-condensing) with a maximum humidity gradation of 10% per hour
Maximum Vibration	
Operating	0.26Grms at 5Hz-350Hz in operational orientations
Storage	1.54Grms at 10Hz-250Hz in all orientations
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 @ 235 in/sec or greater
Altitude	
Operating	-16m to 3048m (-50 to 10,000ft) Note: For altitudes above 2950 feet, the maximum operating temperature is de-rated 1°F/550ft.
Storage	-16m to 10,600m (-50ft to 35,000ft)
Airborne contaminant level	
Class G1 or lower as defined by ISA-S71.04-1985 (G1 maximum corrosive contaminant levels measured at ≤ 50% relative humidity)	

¹Use the formulas in Table 8 to calculate the maximum operating temperature, T (°C or °F), for the given altitude (in meters or feet).

Table 8. Formulas for Maximum Operating Temperature at Given Altitude

Temperature Scale	Formula	
	Altitude in Meters	Altitude in Feet
Celsius	$35 - \frac{\text{Maximum Altitude (meters)} - 900}{300} \text{ } ^\circ\text{C}$	$35 - \frac{\text{Maximum Altitude (feet)} - 2952.75}{984.25} \text{ } ^\circ\text{C}$
Fahrenheit	$95 - \frac{(\text{Maximum Altitude (meters)} - 900) \times 1.8}{300} \text{ } ^\circ\text{F}$	$95 - \frac{(\text{Maximum Altitude (feet)} - 2952.75) \times 1.8}{984.25} \text{ } ^\circ\text{F}$

5.7 Maximum Input Amps

The T710 system exhibits the following maximum current draw at the stated voltages:

- 13.7 A @ 90 VAC
- 12.0 A @ 100 VAC
- 10.4 A @ 115 VAC
- 5.75 A @ 208 VAC
- 5.45 A @ 220 VAC
- 5.2 A @ 230 VAC

5.8 Energy Smart Enablement

The PowerEdge family of servers implements aspects of the Dell Energy Smart strategy. This strategy offers the following:

- Energy Smart components on a portfolio level, such as high-capacity and Energy Smart power supplies
- Systems with either a lowest power footprint configuration or a best performance per watt configuration
- Energy Smart components (such as DIMMs or hard drives) selected without cherry picking or screening individual manufacturer's components based on energy consumption

5.9 ENERGY STAR Compliance

ENERGY STAR® qualified configurations can be accessed from the [ENERGY STAR Compliance results](#) landing page on Dell.com.

5.10 Acoustics

The acoustical design of the PowerEdge T710 reflects the following:

- **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, and this is listed in Table 9 and Table 10.
- **Office environment acoustics:** Compare the values for LpA in the following tables to see that they are lower than ambient noise levels of typical office environments.

- **Hardware configurations affect system noise levels:** Dell’s advanced thermal control provides for optimized cooling with varying hardware configurations. Some less-intuitive but potentially important decision-making configuration examples are listed in the tables below.
- **Noise ramp and descent at boot:** Fan speeds, and therefore noise levels, ramp during the boot process in order to add a layer of protection for component cooling in the event that the system were not to boot properly.

Table 9. Acoustical Performance (2.5” Hard Drive System)

Typical Configuration @ 23 ± 2 °C				Operating Mode	L _{WA} -UL (Bels)	L _{pA} (dBA)	Prominent Tones
Processors	Hard Drives	Power Supplies	RAID Card				
2 x Intel® E5530 (80W)	5 x SAS (15K)	2 x 1100W	1 x PERC 6/i	Idle	5.7	38	None
				Standby	2.7	13	None
				Active Hard Drives	5.7	39	None

Table 10. Acoustical Performance (3.5” Hard Drive System)

Typical Configuration @ 23 ± 2 °C				Operating Mode	L _{WA} -UL (Bels)	L _{pA} (dBA)	Prominent Tones
Processors	Hard Drives	Power Supplies	Optical Drive				
2 x Intel E5530 (80W)	5 x SAS (15K)	2 x 1100W	1 x PERC 6/i	Idle	5.9	40	None
				Standby	2.7	13	None
				Active Hard Drives	6.0	42	None

Definitions

Standby: AC Power is connected to Power Supply Units but system is not turned on.

Idle: Reference ISO7779 (1999) definition 3.1.7; system is running in its OS but no other specific activity.

Active Hard Drives: An operating mode per ISO7779 (1999) definition 3.1.6; Section C.9 of ECMA-74 9th ed. (2005) is followed in exercising the hard disk drives.

Stressed Processor: An operating mode per ISO7779 (1999) definition 3.1.6. The software SPECPower_ssj2008 is utilized to stress the processors. SPECPower is set to 50% loading.

L_{WA}-UL: The upper limit sound power level (L_{WA}) calculated per section 4.4.2 of ISO 9296 (1988) and measured in accordance to ISO 7779 (1999).

L_{pA}: The average bystander position A-weighted sound pressure level calculated per section 4.3 of ISO9296 (1988) and measured in accordance with ISO7779 (1999). The system is placed in a rack with its bottom at 25-cm from the floor.

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 rack with its bottom at 75-cm from the floor. The acoustic transducer is at front bystander position, ref ISO7779 3rd (2010), Section 8.6.2.

6 Processors

6.1 Overview

The Intel® Xeon® processor 5500 and 5600 series 2S is the microprocessor designed specifically for servers and workstation applications. The Intel Xeon processor 5500 series features quad-core processing to maximize performance and performance/Watt for data center infrastructures and highly dense deployments. The Intel 5600 series features six-core processing, offering enhanced system-level performance, virtualization, and energy efficiency. The Intel Xeon processor also feature Intel's Core™ micro-architecture and Intel 64 architecture for flexibility in 64-bit and 32-bit applications and operating systems.

The Intel Xeon processor uses a 1366-contact Flip-Chip Land Grid Array (FC-LGA) package that plugs into a surface mount socket. The Dell™ PowerEdge™ T710 provides support for up to two processors.

Table 11. Intel Xeon Processor Features

Feature	5500 Series	5600 Series
# Cores	4	6
Last Level Cache	8MB shared	12MB shared
Multi-processor support	1-2 processors	1-2 processors
Front Side Bus Link Frequency (GT/s)	Up to 6.4 GT/s	Up to 6.4 GT/s
Maximum Thermal Design Power (TDP)	130W (workstation) 95W (server)	130W (workstation) 95W (server)
Maximum Frequency	>3GHz	>3GHz
Memory Controller	Integrated 3-channel DDR3	Integrated 3-channel DDR3
Process Technology	45nm	32nm
Intel® Trusted Execution Technology	No	Yes
Intel Advanced Encryption Security- New Instructions	No	Yes
Intel Virtualization Technology	Yes	Yes
Intel 64	Yes	Yes

Feature	5500 Series	5600 Series
Intel Hyper-Threading Technology	Yes	Yes
Socket	LGA1366	LGA1366

6.2 Features

Key features of the Intel Xeon processor 5500 and 5600 series include:

- Four or six cores per processor
- Two point-to-point QuickPath Interconnect links at 6.4 GT/s
- 1366-pin FC-LGA package
- 32 nm and 45 nm process technology
- No termination required for non-populated processors (must populate CPU socket 1 first)
- Integrated QuickPath DDR3 memory controller 64-byte cache line size RISC/CISC hybrid architecture
- Compatible with existing x86 code base
- MMX™ support—Execute Disable Bit Intel Wide Dynamic Execution
- Ability to execute up to four instructions per clock cycle
- Simultaneous Multi-Threading (SMT) capability
- Support for CPU Turbo Mode (on certain processors)—increases processor frequency if operating below thermal, power, and current limits for streaming SIMD (Single Instruction, Multiple Data) Extensions 2, 3, and 4
- Intel 64 Technology Intel VT-x and VT-d Technology for virtualization support Enhanced Intel SpeedStep® Technology
- Demand-based switching for active processor power management as well as support for ACPI P-States, C-States, and T-States
- Support for DDR3L, 1.35V DIMMs for even lower system power (5600 series)
- Support for memory sparing (5600 series)
- AES-NI (hardware encryption assist) for more efficient encryption for uses such as online transactions SSL (5600 series)
- Intel TXT (Trusted Execution Technology) provides hardware assisted protection against emerging software attacks (5600 series)

6.3 Supported Processors

For the latest information on supported processors for the Dell™ PowerEdge™ T710, visit Dell.com.

Table 12. Supported Processors

Model	Speed	Power	Cache	Cores	QPI Speed
X5672	3.20GHz	95W	12M	8	6.4GT/s
X5690	3.46GHz	130W	12M	6	6.4GT/s
X5675	3.06GHz	95W	12M	6	6.4GT/s
X5670	2.93GHz	95W	12M	6	6.4GT/s

Model	Speed	Power	Cache	Cores	QPI Speed
X5660	2.80GHz	95W	12M	6	6.4GT/s
E5649	2.53GHz	80W	12M	6	5.86GT/s
E5645	2.40GHz	80W	12M	6	5.86GT/s
L5640	2.26GHz	60W	12M	6	5.86GT/s
X5687	3.60GHz	130W	12M	4	6.4GT/s
X5647	2.93GHz	130W	12M	4	5.86GT/s
X5560	2.80GHz	95W	8M	4	6.4GT/s
E5640	2.66GHz	80W	12M	4	5.86GT/s
L5520	2.26GHz	60W	8M	4	5.86GT/s
L5630	2.13GHz	40W	12M	4	5.86GT/s

6.4 Processor Configurations

6.4.1 Single Processor Configuration

The PowerEdge T710 is designed so that a single processor placed in the CPU1 socket functions normally. The system will halt during power-on self-test (POST) if a single processor is placed in the CPU2 socket. If using a single processor, the T710 requires a heatsink blank in the CPU2 socket for thermal reasons.

6.4.2 Processor Power Voltage Regulation Modules (EVRD 11.1)

Voltage regulation to the Intel Xeon processor 5500 and 5600 series 2S is provided by EVRD (Enterprise Voltage Regulator-Down). EVRDs are embedded on the planar. Processor core voltage is not shared between processors. EVRDs support static phase shedding and power management through the PMBus.

6.5 Processor Installation

Refer to the Processors section in the Installing System Components chapter of the *Dell PowerEdge T710 Systems Hardware Owner's Manual* on Support.Dell.com for processor installation and removal instructions.

7 Memory

7.1 Overview

The Dell™ PowerEdge™ T710 uses DDR3 memory providing a high performance, high-speed memory interface capable of low latency response and high throughput. T710 supports Registered ECC DDR3 DIMMs (RDIMM) or Unbuffered ECC DDR3 DIMMs (UDIMM).

The DDR3 memory interface consists of three channels. The maximum number of supported DIMMs is dependent on the type of DIMM used.

Table 13. Maximum Configuration by DIMM Type

DIMM Type	Maximum Configuration
Single- or dual-rank RDIMM	3 per channel per processor (18 total)
Quad-rank RDIMM	2 per channel per processor (12 total)
Single- or dual-rank UDIMM	2 per channel per processor (12 total)

Key features of the T710 memory system include:

- Registered (RDIMM) and Unbuffered (UDIMM) DDR3 technology
- Each channel carries 64 data and eight ECC bits
- Support for up to 192 GB of RDIMM memory (twelve 16 GB RDIMMs)
- Support for up to 24 GB of UDIMM memory (twelve 2 GB UDIMMs)
- Support for 1333 MT/s single- and dual-rank DIMMs
- Support for 1066 MT/s quad-rank DIMMs
- Support for 1.35V low voltage (LV) DIMMs
- Single DIMM configuration with DIMM at socket DIMM A1
- Support ODT (On Die Termination)
- Clock gating (CKE) to conserve power when DIMMs are not accessed
- DIMMs will enter a low power self-refresh mode
- I²C access to SPD EEPROM and thermal sensors
- Single Bit Error Correction
- SDDC (Single Device Data Correction, x4 or x8 devices)
- Multi Bit Error Detection
- Support for Closed Loop Thermal Management on RDIMMs and UDIMMs
- Support for Advanced ECC mode
- Support for Memory Optimized mode
- Support for Memory Mirroring
- Support for Memory Sparing with 5600 series processors

7.2 DIMM Slots

T710 is equipped with 18 DIMM slots on the motherboard. No memory risers are utilized. Nine DIMM slots are associated with each processor. Both processors must be populated in order to utilize all 18 DIMM slots.

7.3 DIMMs Supported

The T710 DDR3 interface supports 2 GB, 4 GB, 8 GB, or 16 GB RDIMMs and 1 GB or 2 GB UDIMMs.

7.3.1 RDIMMS

The advantages of using RDIMMs include:

- Higher RAS capabilities
- Best for memory intensive applications
- More scalable
- Higher capacity

FBDIMMs are closer to RDIMMs since they both use some sort of buffer.

RDIMMs are recommended when the following are needed:

- Large amount of memory
- High RAS features
- Better future expansion

Key benefits of RDIMMS:

- Gain a slight performance advantage if the memory is being heavily utilized (for example: $\geq 70\%$). The 70% utilization is based upon the RDIMM maximum and a 75% read rate.
- Allow for larger capacities, up to 16 GB.
- Allow for more expansion since they can go to 3 DPC (DIMMs per channel) instead of 2 DPC.
- Have address parity, a new RAS feature that halts the system if an incorrect address is detected.

7.3.2 UDIMMs

UDIMMS are typically more cost effective and are lower power. UDIMMS have limited scalability up to 24 GB.

UDIMMs are recommended when the following are needed:

- Limited amount of memory (up to 24 GB)
- Lower cost
- Power savings

Key attributes of UDIMMS:

- UDIMMs are generally cheaper
- Use less power, saving about 1 Watt per DIMM
- Maximum size of 2 GB
- Limited to 2 DPC (only an issue in 18 slot systems)
- No support for address parity

7.4 Memory Modes

The memory mode is dependent on how the memory is populated in the system.

- Three channels populated per processor:
 - Typically, the system runs in Independent Channel mode in this configuration. This mode offers the most DIMM population flexibility and system memory capacity, but offers the least number of RAS (reliability, availability, service) features.
 - All three channels must be populated identically.
 - Maximum memory bus speed is 800 MT/s.
- Two channels (CH 2 and CH 1) are populated identically per CPU; the third channel is unused:
 - When mirroring is enabled, the memory image in Channel 2 is maintained the same as Channel 1.

- Typically, two channels operate in Advanced ECC (Lockstep) mode with each other by having the cache line split across both channels. This mode provides improved RAS features (SDDC support for x8-based memory).
- For memory mirroring, the two channels operate as mirrors of each other—writes go to both channels and reads alternate between the two channels. The channels are no longer in lockstep mode.
- One channel populated per CPU:
 - This is a simple Memory Optimized (Independent) mode. Mirroring is not supported.

The T710 memory interface supports memory demand and patrol scrubbing, single-bit correction and multi-bit error detection. Correction of a x4 or x8 device failure is also possible through the lockstep channel mode and the SDDC code. Additionally, correction of a x4 device failure is possible through the independent channel mode.

7.5 Memory Population

Across processor sockets, DIMM populations can be different as long as the population rules for each socket are followed. Additionally, both processor sockets operate in the same RAS mode and are set up with the same memory timing parameters.

The following memory population rules apply:

- If DIMMs of different speeds are mixed, all channels operate at the fastest common frequency.
- RDIMMs and UDIMMs cannot be mixed.
- The first DIMM slot in each channel is color-coded with white ejection tabs for ease of identification.
- The DIMM sockets are placed 450 mils (11.43 mm) apart, center-to-center, in order to provide enough space for sufficient airflow to cool stacked DIMMs.
- The T710 memory subsystem supports up to 18 DIMMs. DIMMs must be installed in each channel starting with the DIMM farthest from the processor. Population order is identified by the silkscreen designator and the System Information Label (SIL) located on the chassis cover. See Figure 7 for DIMM naming and numbering.

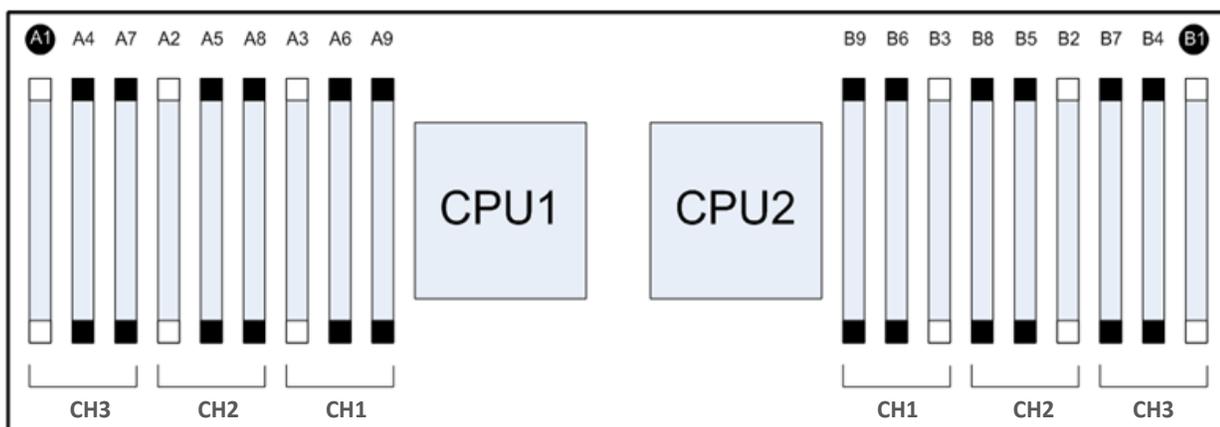


Figure 7. Memory Channel Organization

For more information on memory population requirements, see the System Memory section in the Installing System Components chapter of the *Dell PowerEdge T710 Systems Hardware Owner's Manual* on Support.Dell.com.

7.6 Memory Speed Limitations

The memory frequency is determined by a variety of inputs:

- Speed of the DIMMs
- Speed supported by the processors
- Configuration of the DIMMs

For quad-rank DIMMs mixed with single- or dual-rank DIMMs, the quad-rank DIMM must be in the slot with the white ejection tabs (the first DIMM slot in each channel). There is no requirement for the order of single-rank and dual-rank DIMMs.

Table 14 shows the memory populations and the maximum frequency achievable for each configuration.

Table 14. Memory Speed Limitations

DIMM Type	DIMM 0	DIMM 1	DIMM 2	# DIMMs	800 MT/s	1066 MT/s	1333 MT/s
UDIMM	SR	—	—	1	Yes	Yes	Yes
	DR	—	—	1	Yes	Yes	Yes
	SR	SR	—	2	Yes	Yes	No
	SR	DR	—	2	Yes	Yes	No
	DR	DR	—	2	Yes	Yes	No
RDIMM	SR	—	—	1	Yes	Yes	Yes
	DR	—	—	1	Yes	Yes	Yes
	QR	—	—	1	Yes	Yes	No
	SR	SR	—	2	Yes	Yes	No
	SR	DR	—	2	Yes	Yes	No
	DR	DR	—	2	Yes	Yes	No
	QR	SR	—	2	Yes	No	No
	QR	DR	—	2	Yes	No	No
	QR	QR	—	2	Yes	No	No
	SR	SR	SR	3	Yes	No	No
	SR	SR	DR	3	Yes	No	No
	SR	DR	DR	3	Yes	No	No
	DR	DR	DR	3	Yes	No	No

7.7 Sparing

The Intel Xeon processor 5500 series does not support memory sparing, but the Intel Xeon processor 5600 series does support memory sparing.

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7.8 Mirroring

Memory mirroring is supported on certain configurations. See the System Memory section in the Installing System Components chapter of the *Dell PowerEdge T710 Systems Hardware Owner's Manual* on Support.Dell.com.

7.9 RAID

Memory RAID is not supported on the PowerEdge T710.

8 Chipset

8.1 Overview

The Dell™ PowerEdge™ T710 planar incorporates the Intel® Xeon® 5520 processor series chipset for I/O and processor interfacing. This chipset is designed to support the Intel Xeon 5500 and 5600 processor series family, QuickPath Interconnect, DDR3 memory technology, and PCI Express Generation 2. The chipset consists of the Intel 5520 chipset I/O Hub (IOH) and ICH9.

8.2 Intel Dual I/O Hub (IOH)

The T710 motherboard incorporates the Intel 5520 chipset IOH to provide a link between the Intel Xeon processor(s) 5500 and 5600 series and I/O components. The main components of the IOH consist of two full-width QPI links (one to each processor), 72 lanes of PCIe Gen2, and a x4 ESI link to connect directly to the South Bridge.

The IOH supports a special mode to work with DP processors that allows two IOHs to appear as a single IOH to the processors in the system. This mode results in special behavior in the link and protocol layers. Each IOH will have a unique NodeID for communication between each other, but only the legacy IOH's NodeID will be exposed to the processor.

8.3 Intel Quickpath Architecture (QPI)

The QuickPath Architecture consists of serial point-to-point interconnects for the processors and the IOH. The T710 has a total of four QuickPath Interconnect (QPI) links including one link connecting the processors and links connecting both processors with the IOH and links connecting both IOHs. Each link consists of 20 lanes (full-width) in each direction with a link speed of 6.4 GT/s. An additional lane is reserved for a forwarded clock. Data is sent over the QPI links as packets.

The QuickPath Architecture implemented in the IOH and processors features four layers:

- **Physical layer**—Consists of the actual connection between components. Supports Polarity Inversion and Lane Reversal for optimizing component placement and routing.
- **Link layer**—Responsible for flow control and the reliable transmission of data.
- **Routing layer**—Responsible for the routing of QPI data packets.
- **Protocol layer**—Responsible for high-level protocol communications, including the implementation of a MESIF (Modify, Exclusive, Shared, Invalid, Forward) cache coherence protocol.

8.4 PCI Express Generation 2

PCI Express is a serial point-to-point interconnects for I/O devices. PCIe Gen2 doubles the signaling bit rate of each lane from 2.5 Gb/s to 5 Gb/s. Each of the PCIe Gen2 ports are backwards-compatible with Gen1 transfer rates.

8.5 Intel Direct Media Interface (DMI)

The DMI (previously called the Enterprise Southbridge Interface) connects the IOH with the Intel I/O Controller Hub (ICH). The DMI is equivalent to a x4 PCIe Gen1 link with a transfer rate of 1 GB/s in each direction.

8.6 Intel I/O Controller Hub 9 (ICH9)

ICH9 is a highly integrated I/O controller, supporting the following functions:

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- Six x1 PCIe Gen1 ports, with the capability of combining ports 1-4 as a x4 link (ports are unused on T610)
- PCI Bus 32-bit Interface Rev 2.3 running at 33 MT/s
- Up to six Serial ATA (SATA) ports with transfer rates up to 300 MB/s (T710 features two SATA port for optional internal optical drive or tape backup)
- Six UHCI and two EHCI (high-speed 2.0) USB host controllers, with up to twelve USB ports
- Eight external USB ports and two internal ports dedicated for Unmanaged Internal Persistent Storage (UIPS)
- Power management interface (ACPI 3.0b compliant)
- Platform Environmental Control Interface (PECI)
- Intel Dynamic Power Mode Manager
- I/O interrupt controller
- SMBus 2.0 controller
- Low Pin Count (LPC) interface to Super I/O, Trusted Platform Module (TPM), and SuperVU
- Serial Peripheral Interface (SPI) support for up to two devices (T710 BIOS is connected to the ICH9 using SPI)

8.7 Super I/O Controller

The T710 system planar incorporates a SMSC LPC47M534 Super I/O controller to provide support for the serial port and the keyboard controller.

The LPC47M534 is a Plug and Play compatible device that interfaces directly to the ICH through an embedded LPC bus.

9 BIOS

9.1 Overview

The T710 BIOS is based on the Dell BIOS core and supports the following features:

- Simultaneous Multi-Threading (SMT) support
- Processor Turbo Mode support
- PCI 2.3 compliant
- Plug and Play 1.0a compliant
- MP (Multiprocessor) 1.4 compliant
- Ability to boot from hard drive, optical drive, iSCSI drive, USB key, and SD card
- ACPI support
- Direct Media Interface (DMI) support
- PXE and WOL support for on-board NICs
- Memory mirroring support
- SETUP access through <F2> key at end of POST
- USB 2.0 (USB boot code is 1.1 compliant)
- F1/F2 error logging in CMOS
- Virtual KVM, CD, and floppy support
- Unified Extensible Firmware Interface (UEFI) 2.1 support

The T710 BIOS does not support the following:

- Embedded Diagnostics
- BIOS language localization
- BIOS recovery after bad flash (but can be recovered with iDRAC Express)

9.2 BIOS Settings and Defaults

Refer to the *Dell PowerEdge T710 Systems Hardware Owner's Manual* on Support.Dell.com for detailed information on navigating the BIOS screens.

9.3 Power Management Modes

9.3.1 OS Control

Intel processors support Demand Based Switching (DBS) which enables the processor to dynamically change its operating frequency in response to workload changes. The industry standard implementation of this power management feature is in the Operating System (OS). The OS monitors process/thread level utilization of the processor and uses processor controls to change the operating frequency. For heavy workloads, the OS will run the processor at higher frequencies for additional performance. Lighter workloads do not need high performance, thus the OS will run the processor at lower frequencies.

9.3.2 Active Power Controller

The Dell Active Power Controller (DAPC) is a Dell proprietary implementation that provides improved performance/watt over the operating system implementation of Intel's DBS. DAPC was first released with the eleventh-generation server platforms. DAPC is implemented in system BIOS and uses hardware level counters and so forth to determine hardware utilization. The BIOS uses this information to determine when to change the processor's operating frequency.

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DAPC is operating system independent. The operating system no longer has control. This provides a consistent power management solution regardless of the installed operating system. Some operating systems, particularly hypervisors, do not support power management, thus DAPC provides a solution when there otherwise would not be one.

9.3.3 Maximum Performance

The Maximum Performance Mode disables power management. In this mode, the processor frequency is statically set to the highest supported frequency.

9.4 Supported ACPI States

PowerEdge T710 conforms to Advance Configuration and Power Interface Specification, v2.0c. I provides support for ACPI P-States, C-States, and T-States.

10 Embedded NICs/LAN on Motherboard (LOM)

The Dell™ PowerEdge™ T710 system board has two embedded dual-port Broadcom® 5709C Gigabit Ethernet controllers as independent Ethernet interface devices. This provides four LOM ports for the server. Both controllers enabled for TCP Offload Engine (TOE), with optional iSCSI offload engine (iSOE).

The following information details the features of the LAN device:

- x4 PCI Express Gen2 capable interface (controllers operated at Gen1 speed)
- Integrated MAC and PHY
- 3072x18 byte context memory
- 64 KB receive buffer
- TOE (TCP Offload Engine)
- iSCSI controller (enabled through an optional hardware key)
- RDMA controller (RNIC) (enabled through an optional hardware key)
- NC-SI (Network Controller-Sideband Interface) connection
- Wake-On-LAN (WOL)
- PXE 2.0 remote boot
- iSCSI boot
- IPv4 and IPv6 support
- Bare-metal deployment support

11 PCI Slots

11.1 Overview

The T710 comes standard with six PCIe (gen 2) expansion slots on the motherboard. A separate dedicated slot is provided on the motherboard for the hard drive controller. All PCIe slots are x8 connectors, except for one x16 slot.

For more information on slot specifications, see the Expansion Cards section in the Installing System Components chapter of the *Dell PowerEdge T710 Systems Hardware Owner's Manual* on Support.Dell.com.

11.2 Express Card Specifications

The PowerEdgeT710 supports x16 cards that meet the following requirements:

- Support for full bandwidth of x16 Gen2 link
- No support for hot-plug or hot-removal
- Maximum power of 25W
- A card must only occupy the space of one slot; cards that occupy the space of two slots are not supported
- A card is limited to 25W initial start-up power until it is configured as a high-power device; if no value is set for the Slot Power Limit, the card is limited to 25W, and the card must then either scale down to 25W or disable operation
- The x16 card must be able to support a maximum operating temperature of 55°C; the T710 provides a minimum transverse air velocity of “x” LFM (linear feet per minute) to the x16 card

11.3 Quantities and Priorities

Refer to the Expansion Cards and Expansion-Card Risers section in the Installing System Components chapter of the *Dell PowerEdge T710 Systems Hardware Owner's Manual* on Support.Dell.com.

11.4 PCI Card Dimensions

For information about PCIe slots and card dimensions, see the Expansion Cards and Expansion-Card Risers section in the Installing System Components chapter in the *Dell PowerEdge T710 Systems Hardware Owner's Manual* on Support.Dell.com.

12 Storage

12.1 Overview

The Dell™ PowerEdge™ T710 is available in two different hard-drive configurations:

- 16 x 2.5” hard drives
- 8 x 3.5” hard drives

Each configuration has a unique chassis and hard-drive backplane. Each chassis has hot-pluggable, Serial Attached SCSI (SAS) or Serial ATA (SATA) drive slots with two LED indicators per slot, two mini-SAS cable connectors for connecting the backplane to the integrated SAS 6/iR or PERC 6/i, a 10-pin planar signal connector, and an 8-pin PDB power connector. The SAS 6/iR controller is supported only on the 3.5” drive backplane.

12.2 Eight-Drive 3.5” Backplane

The 3.5” backplane supports the following:

- 3.5” hard drives
- 2.5” SSD drives in 3.5” carriers
- Maximum of 2 x 2.5” SAS drives in 3.5” carriers

Two mini-SAS cables can be used to connect both channels of the integrated SAS 6/iR or PERC 6/i card to the 3.5” backplane. For SATA/SAS mixing, two SAS drives are supported (one pair of drives is SAS and the remaining six drives are SATA).

12.3 Sixteen-Drive 2.5” Backplane

The 2.5” backplane supports the following:

- 2.5” drives only
- One mini-SAS cable is used to connect one channel of the integrated PERC 6/i (only) card to the 2.5” backplane
- A SAS expander is used to map 16 drives to the PERC (x4) controller

For SATA/SAS mixing, two SAS drives are supported (one pair of drives is SAS and the remaining fourteen drives are SATA).

12.4 Internal Hard Disk Drives

The T710 supports up to sixteen 2.5” or eight 3.5” hard disk drives. See Table 15 for information on supported hard drives. For the most up-to-date information on supported hard drives, visit Dell.com.

Table 15. Supported Hard Drives

Form Factor	Capacity	Speed	Type
2.5”	160GB, 250GB, 500GB, 1TB	7.2K	SATA
2.5”	500GB, 1TB	7.2K	NL SAS
2.5”	146GB, 300GB, 600GB, 900GB	10K	SAS
2.5”	73GB, 146GB	15K	SAS
2.5”	50GB, 100GB	N/A	SATA SSD

Form Factor	Capacity	Speed	Type
2.5"	149GB	N/A	SAS SSD
3.5"	250GB, 500GB, 1TB, 2TB, 4TB	7.2K	SATA
3.5"	500GB, 1TB, 2TB, 3TB, 4TB	7.2K	NL SAS
3.5"	146GB	10K	SAS
3.5"	146GB, 300GB, 450GB, 600GB	15K	SAS

12.4.1 Hard Disk Drive Carriers

The T710 supports the Dell 2.5" and 3.5" hard drive carriers. See Figure 8.



Figure 8. Dell 2.5" Hard Drive Carrier

12.4.2 Empty Drive Bays

For the slots that are not occupied by drives, a carrier blank is provided to maintain proper cooling, maintain a uniform appearance to the unit, and provide EMI shielding.

12.5 RAID Configurations

See Table 16 for information on factory RAID configurations. For information on additional configurations, visit Dell.com.

Table 16. Factory RAID Configurations

			Non Mixed Drives All SATA, all SAS, or all SSD		
Configuration Type	Configuration		Description	Min HDD	Max HDD
SAS/SATA— No RAID	0	MSS	Integrated SAS/SATA No RAID (SAS 6/iR)	2.5" = N/A 3.5" = 1	2.5" = N/A 3.5" = 8
SAS/SATA— RAID	1	MSSRO	Integrated SSD/SAS/SATA RAID 0 (SAS 6/iR)	3.5" = 2 2.5" = 2	2.5" = N/A 3.5" = 8
			Integrated SSD/SAS/SATA RAID 0 (PERC 6/i)	2.5" = 2 3.5" = 2	2.5" = 16/8 3.5" = 8

	2	MSSR1	Integrated SSD/SAS/SATA RAID 1 (SAS 6/iR)	2.5" = N/A 3.5" = 2	2.5" = N/A 3.5" = 2
			Integrated SSD/SAS/SATA RAID 1 (PERC 6/i)	2.5" = 2 3.5" = 2	2.5" = 2 3.5" = 2
	3	MSSR5	Integrated SSD/ SAS/SATA RAID 5 (PERC 6/i)	2.5" = 3 3.5" = 3	2.5" = 16/8 3.5" = 8
	4	MSSR6	Integrated SSD/SAS/SATA RAID 6 (PERC 6/i)	2.5" = 4 3.5" = 4	2.5" = 16/8 3.5" = 8
	5	MSSR10	Integrated SSD/SAS/SATA RAID 10 (PERC 6/i)	2.5" = 4 3.5" = 4	2.5" = 16/8 3.5" = 8
	6	MSSR50	Integrated SSD/SAS/SATA RAID 50 (PERC 6/i)	2.5" = 6 3.5" = 6	2.5" = 16/8 3.5" = 8
	7	MSSR60	Integrated SSD/SAS/SATA RAID 60 (PERC 6/i)	2.5" = 8 3.5" = 8	2.5" = 16/8 3.5" = 8
	8	MSSR1R1	Integrated SSD/SAS/SATA RAID 1/RAID 1 (SAS 6/iR, PERC 6/i)	2.5" = 2+2 3.5" = 2+2	2.5" = 2+2 3.5" = 2+2
	9	MSSR1R5	Integrated SSD/SAS/SATA RAID 1/RAID 5 (PERC 6/i)	2.5" = 2+3 3.5" = 2+3	2.5" = 2+14/6 3.5" = 2+6
13	MSSR1R6	Integrated SSD/SAS/SATA RAID 1/RAID 6 (PERC 6/i)	2.5" = 2+3 3.5" = 2+3	2.5" = 2+14/6 3.5" = 2+6	
Configuration Type	Configuration	Description	Mixed SAS/ SATA Min 2xSAS + 1xSATA 2.5" (2.5" chassis): Max 2xSAS + 14xSATA 2.5" (3.5" chassis): Max 2xSAS + 6xSATA 3.5": Max 2xSAS + 6xSATA		
			Min HDD	Max HDD	
SAS/SATA— No RAID	0	MSS	Integrated SAS/SATA No RAID (SAS 6/iR)	2.5" = N/A 3.5" = 3	2.5" = N/A 3.5" = 8
	10	MSS-X	Integrated SAS/SATA No RAID (SAS 6/iR)	2.5" = N/A 3.5" = 3	2.5" = N/A 3.5" = 6
SAS/SATA— RAID	11	MSSR1R1-X	Integrated SAS/SATA RAID 1/RAID 1 (SAS 6/iR)	2.5" = N/A 3.5" = 2+2	2.5" = N/A 3.5" = 2+2
			Integrated SAS/SATA RAID 1/RAID 1 (PERC 6/i)	2.5" = 2+2 3.5" = 2+2	2.5" = 2+2 3.5" = 2+2

	12	MSSR1R5-X	Integrated SAS/SATA RAID 1/RAID 5 (PERC 6/i)	2.5" = 2+3 3.5" = 2+3	2.5" = 2+14/6 3.5" = 2+6
Configuration Type	Configuration		Description	<u>Mixed SSD/SAS</u>	
				3.5" chassis uses 2.5" SSD in 3.5" carrier	
				Min HDD	Max HDD
SSD/SAS—RAID	14	MSSR0R1-X	Integrated SSD/SAS RAID 0/RAID 1 (PERC 6/i) RAID 0 set is SSD, RAID 1 set is SAS	2.5" = 1+2 3.5" = 1+2	2.5" = 14+2 3.5" = 6+2
	15	MSSR1R1-X	Integrated SSD/SAS RAID 1/RAID 1 (PERC 6/i) first RAID 1 set is SSD, second RAID 1 set is SAS	2.5" = 2+2 3.5" = 2 + 2	2.5" = 2+2 3.5" = 2 + 2
	16	MSSR1R5-X	Integrated SSD/SAS RAID 1/RAID 5 (PERC 6/i) RAID 1 set is SSD, RAID 5 set is SAS	2.5" = 2+3 3.5" = 2+3	2.5" = 2+14 3.5" = 2+6
	17	MSSR1R10-X	Integrated SSD/SAS RAID 1/RAID 10 (PERC 6/i) RAID 1 set is SSD, RAID 10 set is SAS	2.5" = 2+4 3.5" = 2+4	2.5" = 2+14 3.5" = 2+4
	18	MSSR1R50-X	Integrated SSD/SAS RAID 1/RAID 50 (PERC 6/i) RAID 1 set is SSD, RAID 50 set is SAS	2.5" = 2+6 3.5" = 2+6	2.5" = 2+14 3.5" = 2+6
	19	MSSR10R50-X	Integrated SSD/SAS RAID 10/RAID 50 (PERC 6/i) RAID 10 set is SSD, RAID 50 set is SAS	2.5" = 4+6 3.5" = N/A	2.5" = 8+8 3.5" = N/A
Configuration Type	Configuration		Description	<u>Mixed SSD/ SAS/SATA</u>	
				Min HDD	Max HDD
SSD/SAS/ SATA RAID	20	MSSR0R1R5-X	Integrated SSD/SAS/SATA RAID 0/RAID 1/RAID 5 (PERC 6/i) RAID 0 set is SSD, RAID 1 set is SAS, RAID 5 set is SATA	2.5" = 1+2+3+10 3.5" = 1+2+3+4	2.5" = 4+2 3.5" = 2+2
	21	MSSR1R1R5-X	Integrated SSD/SAS/SATA RAID 1/RAID 1/RAID 5 (PERC 6/i) RAID 1 set is SSD, second RAID 1 set is SAS, RAID 5 set is SATA	2.5" = 2+2+3 3.5" = 2+2+3	2.5" = 2+2+12 3.5" = 2+2+4
	22	MSSR10R1R5-X	Integrated SSD/SAS/SATA RAID 10/RAID 1/RAID 5 (PERC 6/i) RAID 10 set is SSD, RAID 1 set is SAS, RAID 5 set is SATA	2.5" = 4+2+3 3.5" = N/A	2.5" = 8+2+6 or 2.5" = 4+2+10 3.5" = N/A

12.6 Internal Storage Controllers

T710 supports a choice of internal hard drive controllers. The internal controller is placed in the dedicated storage slot on the motherboard.

12.6.1 PERC H200

The H200 SAS HBA is an expansion card that incorporates two four-channel 6 Gb/s SAS IOCs for connection to SAS hard disk drives.

12.6.2 PERC H700

The PERC H700 card has its own processor with a PCI Express Gen2 host interface and DDR2 memory and installs into the dedicated internal storage slot. A battery is also available for backup. It supports the internal 6 Gb/s backplane interface for internal storage options (SAS, SATA, or SSD HDD). The PowerEdge T610 supports both 512MB and 1GB cache options on the internal H700.

12.6.3 SAS 6/iR

The integrated SAS 6/iR HBA is a half-length expansion card that plugs into a dedicated PCIe x8 storage slot (only wired for x4). It incorporates two four-channel SAS IOCs for connection to SAS/SATA hard disk drives. It is designed in a form factor that will allow the same card to be used in the R710, R610 and T710 platforms. SAS 6/iR is only supported when the 3.5" x8 backplane is present.

12.6.4 PERC 6/i

The PERC 6/i is a half-length PCIe x8 expansion card that uses the LSI 1078 ROC (RAID on Chip) processor with a PCI Express host interface and 256MB cache. A battery is also available for backup.

12.7 Storage Card Support Matrix

Table 17. Storage Card Support Matrix

	Product	Usage	T710 Support	Slot	PCI Con	PCI Bracket	IO Con	RAID	Battery Backup
PERC SAS/SATA	PERC 6/i Integrated	Internal backplane storage (HDD, SSD)	Yes—Max 1	Storage slot	x8	No	x4 int.	0, 1, 5, 6, 10, 50, 60	Yes
	PERC 6/E Adapter	External SAS/SATA storage	Yes—Max 2 (MD1000 and MD1020)	PCIe slot	x8	Yes	x4 ext. x4 ext.	0, 1, 5, 6, 10, 50, 60	Yes
	PERC 5/E Adapter	External legacy storage	Yes—Max 2 (MD1000 only)	PCIe slot	x8	Yes	x4 ext. x4 ext.	0, 1, 5, 10, 50	Yes
SAS HBA SAS/SATA	SAS 6/iR Integrated	Internal backplane storage (No tape or SSD support)	Yes—Max 1	Storage slot	x8	No	x4 int. x4 int.	0, 1	No
	SAS 5/iR Adapter	Internal SAS tape	Yes—Max 1	PCIe slot	x8	Yes	x4 int.	—	No

	Product	Usage	T710 Support	Slot	PCI Con	PCI Bracket	IO Con	RAID	Battery Backup
ICH SATA	On planar via chipset	Internal SATA optical and/or tape (no hard drive)	Yes—2 ports for optical and/or tape	—	—	—	x1 int.	—	—
LSI 2032 SCSI	LSI 2032 Adapter	Internal/ External SCSI tape or external legacy SCSI storage	Yes—Max 2	PCIe slot	x4	Yes	SCSI int. SCSI ext.	—	—

12.8 Optical Drives

SATA optical drives are optional and connect to the planar via a SATA interface. IDE optical drives are no longer supported. The following optical drives are available on T710:

- DVD-ROM
- DVD+RW

If the optical drive is not ordered with the system, a blank is installed in its place. In the absence of tape drive, an optional second SATA optical drive is installed in the bay adjacent to the first optical drive.

12.9 Tape Drives

Tape drives are optional and connect to the planar via SATA/SCSI controller card/SAS controller card. IDE tape drives are no longer supported. The following tape drives are available for use on the T710:

- Internal SATA, SCSI, and SAS
- External SCSI and SAS

If the tape drive is not ordered with the system, a blank is installed in its place.

T710 supports a number of internal tape backup options. Only half-height backup options are supported.

13 Video

The T710 Integrated Dell Remote Access Controller (iDRAC6) incorporates an integrated video subsystem, connected to the 32-bit PCI interface of the ICH. This logic is based on the Matrox G200. The device only supports 2D graphics.

The integrated video core shares its video memory with the iDRAC 128 MB DDR2 application space memory. This memory is also used for the KVM buffer. The resolutions supported are listed in Table 18.

Table 18. Graphics Video Modes

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

14 Rack Information

14.1 Overview

The ReadyRails™ sliding rail system for the T710 provides tool-less support for racks with square or unthreaded round mounting holes including all generations of Dell racks. They also support tooled mounting in 4-post threaded racks via an optional adapter brackets kit. 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.

The T710 is not compatible with any other Dell rails including previous generation rails, but it does use the same rails as the T610. The T710 supports sliding rails only. Static rails are not supported. Mounting in 2-post racks is not supported.

14.2 Rails

The ReadyRails sliding rails for the T710 support tool-less mounting in 19"-wide, EIA-310-E compliant square hole and unthreaded round hole racks and are available with or without the optional cable management arm (CMA).

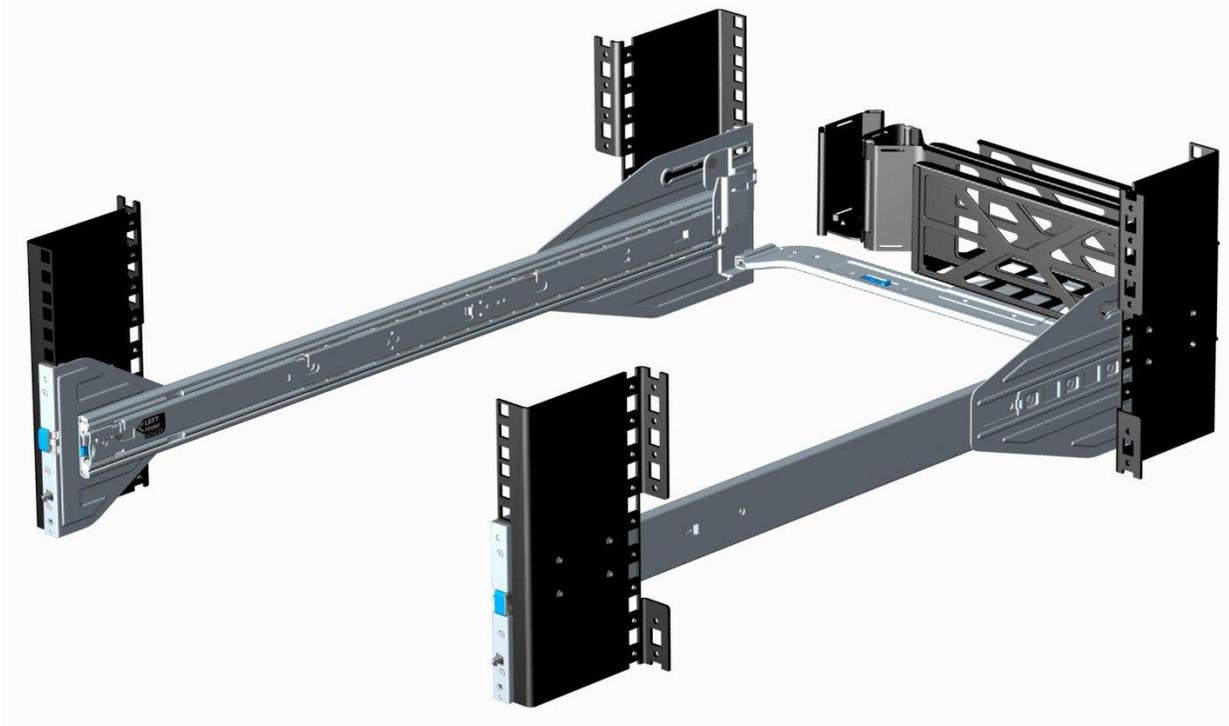


Figure 9. ReadyRails Sliding Rails with Optional CMA

The rails can be used in a threaded hole rack only if threaded rack adapter brackets are installed. The threaded rack adapter brackets are first mounted to the EIA flanges in the rack, and then the rails are mounted into the brackets. The design of the brackets has been optimized to limit the forward shift of the system in the rack to only 17.3 mm.

The adapter brackets kit includes 6 brackets to accommodate different rail lengths, plus 4 sets of custom screws in common thread sizes. A detailed 'Getting Started Guide' is included in the kit along with directions for installing the brackets and mounting the rails into the brackets.

Depending on the depth of the rack used, it may be necessary to remove the server's bezel in order to close the door of the rack. A minimum of 58 mm will be needed between the back surface of the

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door panel and the front face of the EIA flange for the front door to close with the 11G server bezel installed.

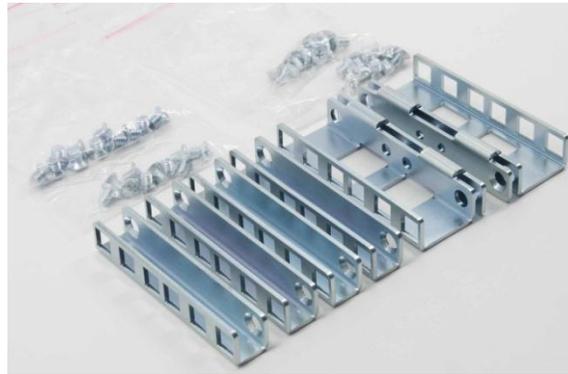


Figure 10. 2U Threaded Rack Adapter Brackets Kit

Below is a summary of the rack types supported by the T710 rails. Note that mounting in 2-post racks is not supported.

Table 19. Supported Racks

PowerEdge Server	Rail ID	Mounting Interface	Rail Type	Rack Types Supported				
				4-Post			2-Post	
				Square	Round	Thread	Flush	Center
T710	C1	ReadyRails	Sliding	✓	✓	✓*	✗	✗

*Requires the 2U Threaded Rack Adapter Brackets Kit (Dell part number PKCR1)

Other factors to consider when deploying the T710 include the spacing between the front and rear mounting flanges of the rack, the type and location of any equipment mounted in the back of the rack such as power distribution units (PDUs), and the overall depth of the rack.

Table 20. Rail Adjustability Ranges and Depth

PowerEdge Server	Rail ID	Mounting Interface	Rail Type	Rail Adjustability Range (mm)						Rail Depth (mm)	
				Square		Round		Threaded		without CMA	with CMA
				Min	Max	Min	Max	Min	Max		
T710	C1	ReadyRails	Sliding	692	756	678	749	657	770	760	840

The adjustment range of the rails is a function of the type of rack in which they are being mounted. The min-max values listed in Table 20 represent the allowable distance between the front and rear mounting flanges in the rack. Rail depth represents the minimum depth of the rail as measured from the rack front mounting flanges when the rail rear bracket is positioned all the way forward.

14.3 Cable Management Arm (CMA)

The optional cable management arm (CMA) for the T710 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 T710 CMA include:

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- Large U-shaped baskets to support dense cable loads
- Open vent pattern for optimal airflow
- Fully reversible (can be mounted on either side) with no conversion required
- Hook-and-loop straps rather eliminate the risk of cable damage during cycling
- A low profile fixed tray to both support and retain the CMA in its fully closed position
- Both the CMA and the tray mount without the use of tools via simple and intuitive snap-in designs

14.4 Rack View

The T710 ReadyRails sliding rails are a “drop-in” design, meaning that the system is installed vertically into the rails by inserting the shoulder nuts on the sides of the system into the J-slots in the inner rail members with the rails in the fully extended position.



Figure 11. T710 Mounted in the C1 Sliding Rails

The T710 CMA can be mounted to either side of the rails without the use of tools or the need for conversion.



Figure 12. T710 CMA Mounted on the Left Side

15 Operating Systems

Refer to the following operating systems support information for the Dell™ PowerEdge™ T710:

- [Operating System Support Matrix for Dell PowerEdge Systems](#) on Dell.com
- *Dell PowerEdge T710 Systems Getting Started Guide* on [Support.Dell.com](#)

16 Systems Management

16.1 Overview

Dell delivers open, comprehensive, and integrated solutions that help you reduce the complexity of managing disparate IT assets. Combining Dell™ PowerEdge™ Servers with a wide selection of Dell developed systems management solutions gives you choice and flexibility, so you can simplify and save in IT environments of any size. To help you meet your server management demands, Dell offers Dell OpenManage™ systems management solutions for:

- Deployment of one or many servers from a single console
- Monitoring of server and storage health and maintenance
- Update of system, operating system, and application software

Dell offers IT management solutions for organizations of all sizes—priced and sized appropriately, and supported comprehensively.

16.2 Server Management

A Dell Systems Management and Documentation DVD and a Dell Management Console DVD are included with the product. ISO images are also available. A brief description of available content:

- Dell Systems Build and Update Utility (SBUU): Dell Systems Build and Update Utility assists in OS install and pre-OS hardware configuration and updates.
- Server Update Utility (SUU): This DVD has an inventory tool for managing updates to firmware, BIOS, and drivers for either Linux or Windows varieties.
- OpenManage Server Administrator (OMSA): The OpenManage Server Administrator tool provides a comprehensive, one-to-one (one console to one server) systems management solution, designed for system administrators to manage systems locally and remotely over a network. OMSA allows system administrators to focus on managing their entire network by providing comprehensive one-to-one systems management.
- Management Console: Dell IT Assistant (ITA) is also included, as well as tools to allow access to our remote management products. These tools are Remote Access Service for iDRAC and the Baseboard Management Controller (BMC) Utility.
- Active Directory Snap-in Utility: The Active Directory Snap-in Utility provides an extension snap-in to the Microsoft Active Directory. This allows you to manage Dell specific Active Directory objects. The Dell-specific schema class definitions and their installation are also included on the DVD.
- Dell Systems Service Diagnostics Tools: Dell Systems Service and Diagnostics tools deliver the latest Dell optimized drivers, utilities, and operating system-based diagnostics that you can use to update your system.
- eDocs: The section includes PDF files for PowerEdge systems, storage peripherals, and Dell OpenManage™ software.
- Dell Management Console (DMC): The Dell Management Console is a systems management console that enables systems administrators to discover and inventory devices on your network. It provides functions such as health and performance monitoring of networked devices, and patch management capabilities for Dell systems. DMC differs from the IT Assistant management console (described above) in that with DMC, value-add plug-ins that enable advanced functionality can be purchased and added to the base DMC product.

16.3 Embedded Server Management

The PowerEdge T710 implements circuitry for the next generation of Embedded Server Management. It is Intelligent Platform Management Interface (IPMI) v2.0 compliant. The iDRAC (Integrated Dell Remote Access Controller) is responsible for acting as an interface between the host system and its management software and the periphery devices.

iDRAC6 provides features for managing the server remotely or in data center lights-out environments.

Advanced iDRAC features require the installation of the optional iDRAC6 Enterprise card.

16.4 Dell Lifecycle Controller and Unified Server Configurator

Embedded management is comprised of interdependent pieces:

- Dell Lifecycle Controller
- Unified Server Configurator
- iDRAC6

Dell Lifecycle Controller powers the embedded management features. It includes integrated and tamper-proof storage for system-management tools and enablement utilities (firmware, drivers, etc.). Lifecycle Controller enables pre-OS server deployment, OS installation, platform updates, platform configuration, and diagnostics capabilities.

Dell Unified Server Configurator (USC) is a graphical user interface (GUI) that aids in local server provisioning in a pre-OS environment. To access the Unified Server Configurator, press the <F10> key within 10 seconds of the Dell logo appearance during the system boot process. Table 21 details the current functionality enabled by the USC.

Table 21. Unified Server Configurator Features and Description

Feature	Description
Faster O/S Installation	Drivers and the installation utility are embedded on system, so no need to scour Dell.com.
Faster System Updates	Integration with Dell support automatically directed to latest versions of the Unified Server Configurator, iDRAC, RAID, BIOS, NIC, and power supply.
Update Rollback	Ability to recover to previous “known good state” for all updatable components.
More Comprehensive Diagnostics	Diagnostic utilities are embedded on system.
Simplified Hardware Configuration	Detects RAID controller and allows user to configure virtual disk and choose virtual disk as boot device, eliminating the need to launch a separate utility. Also provides configuration for iDRAC, BIOS, and NIC/LOM.

16.5 Integrated Dell Remote Access Controller

The integrated Dell Remote Access Controller (iDRAC6) provides IT Administrators comprehensive yet straightforward management of remote servers, by delivering “as if you are there” presence and control. iDRAC6 helps users to save time and money by eliminating travel to the remote server(s), whether that server is located in a different room, a different building, a different city, or in a

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different country. iDRAC6 is a purchasable option and is available as three offerings: iDRAC6 Express, iDRAC6 Enterprise, and Virtual Flash (vFlash) media:

- iDRAC6 Express is most appropriate for small-to-medium customers with limited remote management needs.
- iDRAC6 Enterprise is appropriate for large data center customers with distributed servers.
- iDRAC6 with vFlash Media is provided for large enterprise customers with requirements for system management automation.

16.6 iDRAC Express

The iDRAC Express is standard on the PowerEdge T710. In addition to providing a Lifecycle Controller, the iDRAC6 Express offers the following key features:

- Graphical web interface
- Standard-based interfaces
- Server Sensor monitoring and fault alerting
- Secure operation of remote access functions including authentication, authorization, and encryption
- Power control and management with the ability to limit server power consumption and remotely control server power states
- Advanced troubleshooting capabilities

For more information on iDRAC6 Express features, see Table 22.

16.7 iDRAC6 Enterprise

The optional iDRAC6 Enterprise card provides access to advanced iDRAC6 features. The iDRAC6 Enterprise connects directly to the T710 planar and is mounted parallel to the planar with stand-offs.

Key features for the iDRAC6 Enterprise include:

- Scripting capability with Dell's Racadm command-line
- Remote video, keyboard, and mouse control with Virtual Console
- Remote media access with Virtual Media
- Dedicated network interface

16.8 iDRAC6 Enterprise with Virtual Flash (vFlash) Media

The iDRAC6 Enterprise can be upgraded by adding the vFlash media card. This is an 8 GB Dell branded SD card that enables a persistent 256 MB virtual flash partition. The vFlash media delivers the following key features:

- Support for 8 GB SD storage media
- Can be used as a repository for a pre-OS image, eliminating the need to maintain a network infrastructure for OS deployment
- Can also be used for permanent diagnostics image for use after system failures, or permanent failsafe image for periodic configuration changes

A more detailed feature list for iDRAC6 Express, iDRAC6 Enterprise, and vFlash media is shown in Table 22.

Table 22. Features List for Base Management Functionality, iDRAC, and vFlash Media

Feature	Base Management Functionality	iDRAC 6 Express	iDRAC6 Enterprise	vFlash Media
Interface and Standards Support				
IPMI 2.0	✓	✓	✓	✓
Web-based GUI		✓	✓	✓
SNMP		✓	✓	✓
WSMAN		✓	✓	✓
SMASH-CLP		✓	✓	✓
Racadm command-line			✓	✓
Conductivity				
Shared/Failover Network Modes	✓	✓	✓	✓
IPv4	✓	✓	✓	✓
VLAN Tagging	✓	✓	✓	✓
IPv6		✓	✓	✓
Dynamic DNS		✓	✓	✓
Dedicated NIC			✓	✓
Security and Authentication				
Role-based Authority	✓	✓	✓	✓
Local Users	✓	✓	✓	✓
Active Directory		✓	✓	✓
SSL Encryption		✓	✓	✓
Remote Management and Remediation				
Remote Firmware Update	✓	✓	✓	✓
Server power control	✓	✓	✓	✓
Serial-over-LAN (with proxy)	✓	✓	✓	✓
Serial-over-LAN (no proxy)		✓	✓	✓
Power capping		✓	✓	✓
Last crash screen capture		✓	✓	✓
Boot capture		✓	✓	✓
Serial-over-LAN		✓	✓	✓
Virtual media			✓	✓

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Feature	Base Management Functionality	iDRAC 6 Express	iDRAC6 Enterprise	vFlash Media
Virtual console			✓	✓
Virtual console sharing			✓	✓
Virtual flash				✓
Monitoring				
Sensor Monitoring and Alerting	✓	✓	✓	✓
Real-time Power Monitoring		✓	✓	✓
Real-time Power Graphing		✓	✓	✓
Historical Power Counters		✓	✓	✓
Logging Features				
System Event Log	✓	✓	✓	✓
RAC Log		✓	✓	✓
Trace Log			✓	✓

17 Peripherals

The Dell™ PowerEdge™ T710 supports the following USB devices:

- DVD-ROM (bootable; requires two USB ports)
- USB Key (bootable)
- Keyboard (only one USB keyboard is supported)
- Mouse (only one USB mouse is supported)

Appendix A. Statement of Volatility

The Dell™ PowerEdge™ T710 contains both volatile and non-volatile (NV) components. Volatile components lose their data immediately upon removal of power from the component. Non-volatile components continue to retain their data even after the power has been removed from the component. Components chosen as user-definable configuration options (those not soldered to the motherboard) are not included in the Statement of Volatility. Configuration option information (pertinent to options such as microprocessors, system memory, remote access controllers, and storage controllers) is available by component separately. The NV components detailed in Table 23 are present in the PowerEdge T710 server.

Table 23. Volatility Table

Server BIOS Memory	Details
Size:	32Mbit
Type [Flash PROM, EEPROM]:	Flash EEPROM
Can user programs or operating system write data to it during normal operation?	No
Purpose? [boot code]	Boot Code and Configuration Information
How is data input to this memory?	Loading flash memory requires a vendor-provided firmware file and loader program which is executed by booting up the system from a floppy or OS-based executable containing the firmware file and the loader. A system loaded with arbitrary data in firmware memory would not operate.
How is this memory write protected?	Software write protected
Server CMOS (Complementary Metal-Oxide Semiconductor) Memory	Details
Size:	512 bytes
Type: [Flash PROM, EEPROM]:	Battery-backed NVRAM
Can user programs or operating system write data to it during normal operation?	No
Purpose? [boot code]	RTC and Configuration settings
How is data input to this memory?	F2 Setup Menu during POST
How is this memory write protected?	N/A
Remarks	Jumper on motherboard can be used to clear to factory default settings

LOM (LAN [Network Interface] on Motherboard) Memory	Details
Size:	4Mb (1MB)
Type: [Flash PROM, EEPROM]:	Flash
Can user programs or operating system write data to it during normal operation?	Yes, under software control.
Purpose? [boot code]	Contains LOM boot code and configuration data
How is data input to this memory?	Requires vendor provided firmware file and loader program used during factory assembly or possible field update. A system loaded with arbitrary data in firmware memory would not operate.
How is this memory write protected?	Software control
Server System FRU	Details
Size:	4KB
Type: [Flash PROM, EEPROM]:	SEEPROM
Can user programs or operating system write data to it during normal operation?	No
Purpose? [boot code]	Store System FRU
How is data input to this memory?	BMC controller write
How is this memory write protected?	Not write protected
Power Supply FRU	Details
Size:	256 bytes
Type: [Flash PROM, EEPROM]:	SEEPROM
Can user programs or operating system write data to it during normal operation?	No
Purpose? [boot code]	Store power supply information
How is data input to this memory?	Programmed by the power supply manufacturer
How is this memory write protected?	Not write protected

TPM (Trusted Platform Module; for boards shipped outside of China. Boards sold to destinations in China have S-TPM.)	Details
Size:	Unspecified size of user ROM, RAM, EEPROM; 128 bytes of OTP memory included
Type: [Flash PROM, EEPROM]:	ROM, RAM, EEPROM
Can user programs or operating system write data to it during normal operation?	Yes, operating systems and applications that conform to the TCG standard can write data to the TPM during normal operation. Access to the NV Storage is controlled by the TPM owner.
Purpose? [boot code]	Trusted Platform Module NV storage. May be used to securely storage of encryption keys.
How is data input to this memory?	TCG TPM Specification defined command interface or Using TPM Enabled operating systems
How is this memory write protected?	As defined by the TCG TPM Specification, protection of this NV memory area is configurable by the TPM owner.
Backplane Firmware and FRU	Details
Size:	32KB
Type: [Flash PROM, EEPROM]:	Flash
Can user programs or operating system write data to it during normal operation?	No
Purpose? [boot code]	Backplane Firmware and FRU data storage
How is data input to this memory?	Loading flash memory requires a vendor provided firmware file and loader program which is executed by booting up the system from a floppy or OS based executable containing the firmware file and the loader. System loaded with arbitrary data in firmware memory would not operate.

Embedded Bootable Memory Device	Details
Size:	1GB
Type: [Flash PROM, EEPROM]:	MMC
Can user programs or operating system write data to it during normal operation?	Yes
Purpose? [boot code]	Optional embedded boot device
How is data input to this memory?	Factory installed or via USB bus
How is this memory write protected?	Not write protected
Server BMC (Baseboard Management Controller) Firmware Flash Memory	Details
Size:	16MB Flash
Type: [Flash PROM, EEPROM]:	SPI Flash
Can user programs or operating system write data to it during normal operation?	No
Purpose? [boot code]	Stores the BMC Firmware
How is data input to this memory?	Loading flash memory requires a vendor provided firmware file and loader program which is executed by booting up the system from a floppy or OS based executable containing the firmware file and the loader. A system loaded with arbitrary data in firmware memory would not operate.
How is this memory write protected?	Software write protected

To obtain optional component information, please refer to the Dell Statement of Volatility for the individual components. Please direct any questions to your Dell Marketing contact.

Appendix B. Certifications

B 1. Regulatory Certifications

Regulatory compliance certificates can be located at the [Product Safety, EMC and Environmental Datasheets](#) site on Dell.com.

B 2. Product Safety Certifications

The product has been certified and bears the Mark, as applicable, of the Product Safety authorities as indicated in Table 24.

Table 24. Product Safety Certifications

Country/Region	Authority or Mark
Argentina	IRAM
Belarus	BELLIS
Canada	SCC
China	CNCA or CCC
Croatia	KONCAR
European Union	CE
Germany	TUV
IECEE	IECEE CB
Israel	SII
Kazakhstan	OTAN - CKT
Kenya	KEBS
Kuwait	KUCAS
Mexico	NYCE or NOM
Moldova	INSM
Nigeria	SONCAP
Norway	NEMKO
Russia	GOST
Saudi Arabia	KSA ICCP
South Africa	NRCS
Taiwan	BSMI
Ukraine	UKRTEST or UKRSERTCOMPUTER
United States	NRTL
Uzbekistan	STZ

B 3. Electromagnetic Compatibility

The product has been certified and bears the Mark, as applicable, of the EMC authorities as indicated in Table 25.

Table 25. Electromagnetic Compatibility Certifications

Country/Region	Authority or Mark	Class
Australia/New Zealand	ACMA or C-Tick	Class A
Belarus	BELLIS	Class A
Bosnia & Herzegovina, Montenegro, Serbia	KVALITET	Class A
Canada	ICES	Class A
China	CNCA or CCC	Class A
Croatia	KONCAR	Class A
European Union	CE	Class A
Israel	SII	Class A
Japan	VCCI	Class A
Kazakhstan	OTAN - CKT	Class A
Moldova	INSM	Class A
Norway	NEMKO	Class A
Russia	GOST	Class A
South Africa	SABS	Class A
South Korea	KCC	Class A
Taiwan	BSMI	Class A
Ukraine	UKRTEST or UKRSERTCOMPUTER	Class A
United States	FCC	Class A
Uzbekistan	STZ	Class A
Vietnam	ICT	Class A

B 4. Ergonomics, Acoustics and Hygienics

The product has been certified and bears the Mark, as applicable, of the Ergonomics, Acoustics and Hygienics authorities as indicated in Table 26.

Table 26. Ergonomics, Acoustics and Hygienics

Country/Region	Authority or Mark
Belarus	BELLIS
Germany	GS
Russia	GOST

Appendix C. Additional Information and Options

The Dell™ PowerEdge™ T710 system conforms to the industry standards detailed in Table 27.

Table 27. Industry Standards

Standard	URL for Information and Specifications
ACPI Advance Configuration and Power Interface Specification, v2.0c	http://www.acpi.info/
Energy Star EPA Version 1.0 of the Computer Server specification	http://www.energystar.gov/index.cfm?c=archives.enterprise_servers
Ethernet IEEE 802.3-2005	http://standards.ieee.org/getieee802/802.3.html
IPMI Intelligent Platform Management Interface, v2.0	http://www.intel.com/design/servers/ipmi/
DDR3 Memory DDR3 SDRAM Specification, Rev. 3A	http://www.jedec.org/download/search/JESD79-3A.pdf
LPC Low Pin Count Interface Specification, Rev. 1.1	http://developer.intel.com/design/chipsets/industry/lpc.htm
PCI Express PCI Express Base Specification Rev. 2.0	http://www.pcisig.com/specifications/pciexpress/
PMBus Power System Management Protocol Specification, v1.1	http://pmbus.info/specs.html
SAS Serial Attached SCSI, v1.1	http://www.t10.org/cgi-bin/ac.pl?t=f&f=sas1r10.pdf
SATA Serial ATA Rev. 2.6; SATA II, Extensions to SATA 1.0a, Rev. 1.2	http://sata-io.org/
SMBIOS System Management BIOS Reference Specification, v2.6	http://www.dmtf.org/standards/smbios/
TPM Trusted Platform Module Specification, v1.2	http://www.trustedcomputinggroup.org/resources/tpm_main_specification
UEFI Unified Extensible Firmware Interface Specification, v2.1	http://www.uefi.org/specs/

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Standard	URL for Information and Specifications
USB Universal Serial Bus Specification, Rev. 2.0	http://www.usb.org/developers/docs/
Windows Logo Windows Logo Program System and Device Requirements, v3.10	http://www.microsoft.com/whdc/winlogo/hwrequirements.msp