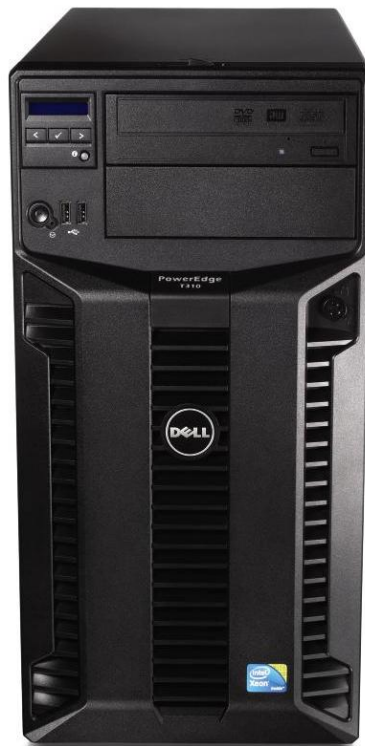# PowerEdge T310

Technical Guide

The T310 delivers enterprise-class performance, redundancy and comprehensive manageability options in a 1-socket tower.

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Revision 1   August 2011

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1 Product Overview

The Dell™ PowerEdge™ T310 server delivers enterprise-class performance, redundancy, and comprehensive manageability options in a 1-socket tower. The PowerEdge T310 features DDR3 memory, advanced systems management, and the availability of up to four hard drives (3.5" or 2.5") in a compact tower chassis.

1.1 Flexible Technology

The Dell PowerEdge T310 is designed to meet the needs of growing small businesses and remote offices of larger organizations and enterprises by offering more features and performance than a basic, entry-level server. With its space-efficient chassis, built-in redundancy features, and comprehensive systems management, the PowerEdge T310 is the ideal reliable 1-socket tower server.

1.2 Customer-Inspired Design

Dell delivers value through tailored solutions based on industry standards as well as innovative, customer-inspired designs. As part of the eleventh-generation PowerEdge server portfolio, the T310 shares system design commonality and reliability. All eleventh-generation servers are designed and built with external ports, power supplies, LEDs, and LCD screens in the same location for familiar user experience and easy installation and deployment.

Robust, metal hard-drive carriers and organized cabling improve component access and airflow across the server. The PowerEdge T310 design provides quiet acoustics and an optional interactive LCD screen on the front bezel for ease of monitoring. With a chassis depth of 20.5", the PowerEdge T310 chassis is ideal for use in a back office, retail, or small office settings where space and acoustics matter.

1.3 Energy Smart

Energy Smart technologies are at the core of the PowerEdge T310 design. These energy-optimized technologies increase energy efficiency within the server while continuing to deliver peak performance. Built with lower wattage power supplies than its predecessor, the PowerEdge T310 offers highly efficient power supply options. The T310 also includes highly efficient fans designed to spin faster or slower in response to server workload demands, and to help reduce unnecessary noise. The component layout inside the T310 improves airflow, which in turn helps cool the server more efficiently and reduces noise.

1.4 Easy to Manage

The Dell PowerEdge T310 lets you focus on running your business rather than running your servers. Dell OpenManage™ systems management software helps to automate common management tasks, thereby enhancing efficiency, improving productivity, and reducing the potential for error, which can cause downtime.

The Dell OpenManage Lifecycle Controller is the engine for advanced embedded management and is part of the optional iDRAC Express or iDRAC Enterprise in the PowerEdge T310. The Lifecycle Controller helps to deliver faster server deployment and update capabilities from a bare-metal, pre-operating system environment. With the Unified Server Configurator (USC) interface, the USC tool provides a single interface that enables efficient operating system deployment with built-in driver installations, firmware updates, hardware configuration, and diagnostics for the system. Servers with hot-pluggable hard drives also benefit from an interactive LCD with remote access using optional iDRAC Express or iDRAC Enterprise for system alerts, power usage, and select boot options.

1.5 Comparison

Table 1.   Comparison of PowerEdge T310 to T110 II and T410

Feature	T110 II	T310	T410
Processor	Intel® Xeon® processor E3-1200 series Intel Core™ i3-2100 product family Intel Pentium® processors	Intel Xeon processor 3400 series Intel Celeron® G1101 Intel Pentium G6950 Intel Core i3 processor 500 series	Intel Xeon processor 5500 and 5600 series
Front Side Bus	Direct Media Interface (DMI) II	DMI	6.4 GT/s Intel QuickPath Interconnect (QPI) links
Sockets	1	1	2
Cores	2 or 4	2 or 4	4 or 6
L2/L3 Cache	3MB or 8MB	8MB	4MB, 8MB, or 12MB
Chipset	Intel C202	Intel 3400	Intel 5500
DIMMs	4 DDR3 Unbuffered with ECC 1333/1066MHz	6 DDR3 Unbuffered or registered with ECC 1333/1066MHz	8 DDR3 Unbuffered or registered with ECC 1333/1066MHz
Min/Max RAM	1GB/32GB	1GB/32GB	1GB/128GB
Drive Bays	4 x 3.5" or 6 x 2.5"	Optional hot-plug 4 x 2.5" or 4 x 3.5"	Optional hot-plug 6 x 2.5" or 6 x 3.5"
Hard Drive Types	SSD, SAS, nearline SAS, SATA	SSD, SAS, nearline SAS, 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 S100 PERC S300	PERC H200 PERC S100 PERC S300 PERC H700 PERC 6/i SAS 6/iR	PERC H200 PERC S100 PERC S300 PERC H700 PERC 6/i SAS 6/iR

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Feature	T110 II	T310	T410
Optional Storage Controller	**Non-RAID:** 6GB SAS HBA **RAID:** PERC S300 PERC H200	**Non-RAID:** SAS 5/E LSI 2032 (for tape backup unit only) 6Gbps SAS HBA **RAID:** PERC H200 PERC H700 PERC H800 SAS 6/iR PERC 6/i PERC 6/E PERC S300 (software-based)	**Non-RAID:** SAS 5/E LSI 2032 (for tape backup unit only) 6Gbps SAS HBA **RAID:** PERC H200 PERC H700 PERC H800 SAS 6/iR PERC 6/i PERC 6/E
Availability	ECC memory Add-in RAID TPM/CTPM	Optional hot-plug hard drives Optional hot-plug redundant power ECC memory Quad-pack LED or LCD diagnostic	Optional hot-plug hard drives Optional hot-plug redundant power ECC memory Memory mirroring Quad-pack LED or LCD diagnostic
Server Management	Baseboard Management Controller (BMC), IPMI 2.0 compliant Dell OpenManage™	Baseboard Management Controller (BMC), IPMI 2.0 compliant Dell OpenManage Optional: iDRAC6 Express, iDRAC6 Enterprise, vFlash media	Baseboard Management Controller (BMC), IPMI 2.0 compliant Dell OpenManage Optional: iDRAC6 Express, iDRAC6 Enterprise, vFlash media
I/O Slots	1 PCIe x16 (x8 routing) (under 25W only) 1 PCIe x8 1 PCIe x8 (x4 routing) 1 PCIe x1	2 PCIe x1 1 PCIe x8 (x8 routing) 1 PCIe x8 (x4 routing) 1 PCIe x16 (x8 routing)	4 PCIe x8 (x4 routing) 1 PCIe x16 (x8 routing)
NIC/LOM	1 x GbE LOM Optional: various NICs available	2 x GbE LOM Optional: various NICs available	2 x GbE LOM Optional: various NICs available
USB	2 front 4 back 2 internal	2 front 4 back 2 internal	2 front 4 back 2 internal
Power Supplies	Non-redundant, auto-sensing, 305W (80+)	Non-redundant 375W or optional hot-plug redundant 2 x 400W	Non-redundant 525W or optional hot-plug redundant 2 x 580W
Fans	Non-redundant Non-hot pluggable	Non-redundant Non-hot pluggable	Non-redundant Non-hot pluggable

2 Key Technologies

The key technologies of the Dell™ PowerEdge™ T310 include the following:

- Quad-core Intel® Xeon® processor 3400 series, dual-core Intel Celeron® G1101, Intel Pentium® G6950, and dual-core Intel Core™ i3 processor 500 series
- Up to 32 GB of DDR3 memory
- Support for virtualization applications
- Support for SSD drives
- Support for optional iDRAC6 Express, iDRAC6 Enterprise, and vFlash media
- Support for optional hot-pluggable hard drives and drive bays

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3 System Features

Table 2 summarizes the product features for the Dell™ PowerEdge™ T310. For the latest information on supported features for the PowerEdge T310, visit Dell.com.

<p align="center">**Table 2.　　Product Features Summary**</p>

Feature	Technical Specification	
Form Factor	Tower	
Processor Options	Quad-core Intel® Xeon® processor 3400 series Dual-core Intel Celeron® G1101 Intel Pentium® G6950 Dual-core Intel Core™ i3 processor 500 series	
Processor Socket	One	
Front Side Bus	Direct Media Interface (DMI)	
Cache	8MB	
Chipset	Intel 3420 Chipset	
Memory[1]	Up to 32GB (6 DIMM slots): 1GB/2GB/4GB/8GB[2] DDR3 up to 1333MHz	
I/O Slots	Five PCIe G2 slots: two x8 slots, one x4 slot, two x1 slots	
RAID Controller	**Internal Controller:** PERC H200 (6Gb/s) PERC H700 (6Gb/s) with 512MB battery-backed cache; 512MB, 1GB non-volatile battery-backed cache SAS 6/iR PERC 6/i with 265MB battery-backed cache PERC S100 (software-based) PERC S300 (software-based)	**External Controller:** PERC H800 (6Gb/s) with 512MB battery-backed cache; 512MB, 1GB non-volatile battery-backed cache PERC 6/E with 265MB or 512MB battery-backed cache **External HBAs (non-RAID):** 6Gbps SAS HBA SAS 5/E HBA LSI2032 PCIe SCSI HBA
Drive Bays	4 x 3.5" cabled hard drives or 4 x 3.5" hot-plug hard drives or 4 x 2.5" hot-plug hard drives	
Maximum Internal Storage[1]	Up to 12TB	
Hard Drives	**Hot-plug Hard Drive Options:** 2.5" SATA SSD, SAS (10K) 3.5" SAS (15K, 10K), nearline SAS (7.2K), SATA (7.2K)	**Cabled Hard Drive Options:** 3.5" SAS (15K, 10K), nearline SAS (7.2K), SATA (7.2K)

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Feature	Technical Specification	
Communications	Broadcom® NetXtreme® 5709 Dual Port Gigabit Ethernet NIC, Copper, w/TOE PCIe x4 Broadcom NetXtreme 5709 Dual Port Gigabit Ethernet NIC, Copper, TOE/iSCSI PCIe x4 Intel PRO/1000 PT Single Port Adapter, Gigabit Ethernet NIC, PCIe x 1 Intel Gigabit ET Dual Port Adapter, Gigabit Ethernet NIC, PCIe x4 Intel Gigabit ET Quad Port Adapter, Gigabit Ethernet NIC, PCIe x4 Intel Gigabit ET Dual Port Server Adapter and Intel Gigabit ET Quad Port Server Adapter	Optional add-in HBA/CNA: QLogic® QLE 2462 FC4 Dual Port 4 Gbps Fiber Channel HBA QLogic QLE 2460 FC4 Single Port 4 Gbps Fiber Channel HBA Emulex® LPe-11002 FC4 Dual Port 4 Gbps Fiber Channel HBA, PCIe x4 Emulex LPe-1150 FC4 Single Port 4 Gbps Fiber Channel HBA, PCIe x4
Power Supply	Single-cabled power supply (375W) Optional redundant power supply (400W)	
Availability	Quad-pack LED diagnostic Interactive LCD with hot-plug hard drive chassis Hot-plug hard drive Redundant power supply	
Video	Matrox® G200eW with 8MB memory	
Remote Management	iDRAC6	
Systems Management	Dell OpenManage™ BMC, IPMI 2.0 compliant Unified Server Configurator Lifecycle Controller enabled through optional iDRAC6 Express, iDRAC6 Enterprise, and vFlash media	
Operating Systems	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) Novell® SUSE® Linux® Enterprise Server Red Hat® Enterprise Linux For more information on the specific versions and additions, visit Dell.com/OSsupport.	
Featured Database Application	Microsoft SQL Server® solutions (see Dell.com/SQL)	

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

[2]A maximum of 4 x 8GB UDIMMS is supported (32GB total).

4 Mechanical

4.1 Chassis

The Dell™ PowerEdge™ T310 is a tower form-factor server that supports the following features:

- Flexible power supply (redundant or non-redundant)
- Common power-supply bay to accommodate two power supplies (non-redundant and redundant)
- Two fixed hard drive cages (cabled and hot-plug chassis)
- User-friendly chassis—most devices are toolless:
    - Hard drives (cabled and hot-plug)
    - Optical drive and tape backup unit
    - Fans
    - Expansion cards
    - Planar
    - Backplane
    - Power distribution board
    - Redundant power supply (non-redundant power supply is secured with three screws)

4.1.1 Dimensions and Weight
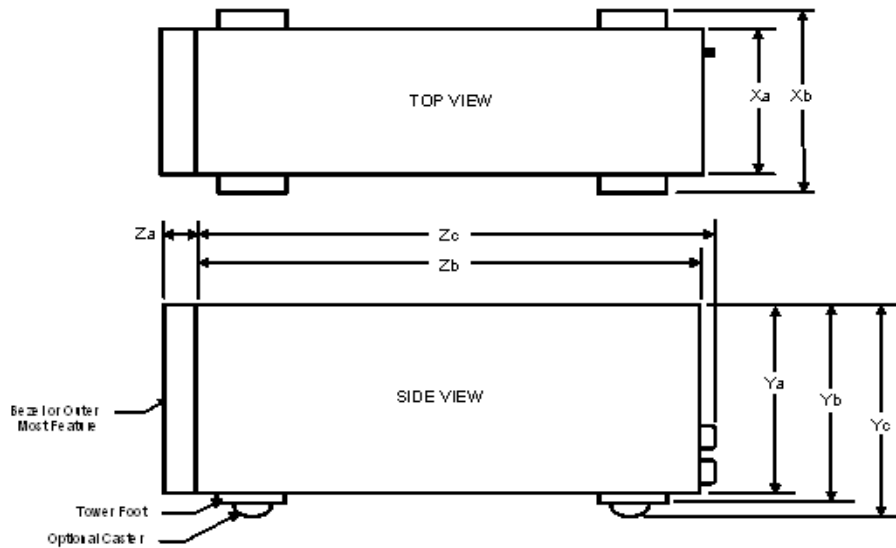
Xa	Xb	Ya	Yb	Yc	Za (with bezel)	Za (without bezel)	Zb*	Zc	Max Weight
217.9mm	N/A	430.3mm	440.1mm	N/A	37.0mm	21.5mm	483.5mm	517.0mm	23.5kg (51.8lbs)

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

Figure 1.   **Chassis Dimensions and Weight**

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4.1.2 Front Panel View

Figure 2 shows the front view of the PowerEdge T310.

Figure 2.   **Front View**

See the Front-Panel Features and Indicators section in the About Your System chapter of the *PowerEdge T310 Hardware Owner's Manual* on Support.Dell.com/Manuals for more information.

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4.1.3 Back Panel View

Figure 3 shows the back view of the PowerEdge T310.

Figure 3.   **Back View**

See the Back-Panel Features and Indicators section in the About Your System chapter of the *PowerEdge T310 Hardware Owner's Manual* on Support.Dell.com/Manuals for more information.

4.2 Hard Drive LED Indicators

Each disk drive carrier has two LED indicators visible from the front of the system. One is a green LED for disk activity and the other is a bicolor (green/amber) LED for status information. The activity LED is driven by the disk drive during normal operation. The bicolor LED is controlled by the storage enclosure processor device on the backplane. Both LEDs are used to indicate certain conditions under direction of a storage controller.

For more information, see the Hard-Drive Indicator Patterns section in the About Your System chapter in the *Dell PowerEdge T310 Systems Hardware Owner's Manual* on Support.Dell.com/Manuals.

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4.3 Power Supply Indicators

The PowerEdge T310 non-redundant cabled power supply or optional redundant power supply has one status bi-color (green and amber) LED 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 T310 Hardware Owner's Manual* on Support.Dell.com/Manuals for more information.

4.4 NIC Indicators

See the NIC Indicator Codes section in the About Your System chapter of the *PowerEdge T310 Hardware Owner's Manual* on Support.Dell.com/Manuals for more information.

4.5 Rails and Cable Management

The PowerEdge T310 is not a rackable system and does not have a rack kit. However, the T310 can be stored in a rack using a third-party rack tray.

For information on power-cord cable-management, see the Installation and Configuration section in the *Dell PowerEdge T310 Getting Started Guide* on Support.Dell.com/Manuals.

4.6 Fans

The PowerEdge T310 has one cabled system fan on the back of the system. The fan is not hot-plug component.

4.7 Control Panel

The PowerEdge T310 is available with an LCD control panel (hot-plug hard drive chassis) or an LED control panel (cabled hard drive chassis).

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4.7.1 LCD Panel Configuration

Figure 4 shows the LCD control panel.

Figure 4.   **LCD Control Panel**

The LCD panel is located on the front of the system chassis to provide user access to buttons, display, and I/O interfaces. Features of the LCD panel include the following:

- Power button
- LCD screen with controls
- Two navigation buttons
- Select button
- System ID button
- Non-maskable Interrupt (NMI) button (recessed)

For more information on the LCD panel, see the LCD Panel Features (Optional) section in the About Your System chapter in the *PowerEdge T310 Hardware Owner's Manual* on Support.Dell.com/Manuals.

4.7.2 LED Panel Configuration

Figure 5 shows the LED control panel.

Figure 5.   **LED Control Panel**

For a complete description of LED indicators, their causes, and possible courses of action to take to resolve an error, see the Diagnostic Lights (Optional) section in the About Your System chapter in the *PowerEdge T310 Hardware Owner's Manual* on Support.Dell.com/Manuals.

4.8 Security

The PowerEdge T310 offers a variety of security features as detailed in Table 4. For additional information regarding the following security features, see the *PowerEdge T310 Hardware Owner's Manual* on Support.Dell.com/Manuals.

Table 4.   Security Features

Feature	Description
Cover Latch	Tooled latch with lock on the side cover secures it to the chassis
Bezel	Bezel mounted to the front of the chassis with a lock on the bezel to protect unauthorized access to remove or install an optional tape backup unit, optical disk drives, or hot-plug hard drives (hot-plug hard drive chassis only). System status on the LCD or LED control panel is visible even when the bezel is installed.
Hard Drive	For T310 systems with a hot-plug hard drive chassis, the front bezel of the system contains a lock which secures the system hard drives. For systems with a cabled hard drive chassis, the drives are secured by the cover-latch lock on the side of the system.
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, near the 5.25" drive bays, 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 *PowerEdge T310 Hardware Owner's Manual* on Support.Dell.com/Manuals.

4.9 USB Key

The PowerEdge T310 has two ports inside the system on the planar for optional USB keys. 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)

4.10 Battery

A replaceable coin cell CR2032 3V battery is mounted on the planar to provide backup power for the real-time clock (RTC) and CMOS RAM on the ICH chip.

There is also a battery holder for optional PERC cards which is located under the chassis cover.

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4.11 Field Replaceable Units

The planar contains a 16 K x 8 serial EEPROM to store field replaceable units (FRU) information including Dell part number, part revision level, and serial number. This part is also used as a system event log (SEL) to be used by the baseboard management controller (BMC).

4.12 User Accessible Jumpers, Sockets, and Connectors

See the Jumpers and Connectors chapter in the *PowerEdge T310 Hardware Owner's Manual* on Support.Dell.com/Manuals.

5 Power, Thermal, Acoustic

5.1 Power Supplies

The Dell™ PowerEdge™ T310 system includes a single non-redundant 375W power supply or an optional redundant 400W power supply.

The power supply subsystem provides power to the planar, four internal hard drive bays (cabled hard drive chassis), the hard drive backplane (hot-plug hard drive chassis), and the two 5.25" drive bays. Power is soft-switched, allowing power cycling using a switch on the front of the system enclosure or through software control (through server management functions). The power system is compatible with industry standards, such as ACPI and Server 2000.

For a redundant power supply configuration, the second power supply provides hot-pluggable power redundancy. In redundant mode, the system distributes the power load across both power supplies to maximize efficiency. When a power supply is removed with the system powered on, the full power load is picked up by the remaining power supply.

If using only one hot-plug power supply, the power supply is installed in the PS1 location and a blank module (metal cover) is installed in the PS2 location for factory consistency. Electrically, the system can operate with a single power supply in either bay. The power supply has automatic input voltage detection. An auxiliary power-out receptacle is not provided on this unit.

The type of power supply can be selected when ordering a system. After purchase, upgrading from a non-redundant to a redundant configuration, or vice-versa, is not possible.

5.2 Power Supply Specifications

Table 5 shows the power supply specifications.

Table 5. Power Supply Specifications

Feature	375W Power Supply (Non-redundant)	400W Power Supply (Redundant)
Dimensions	150mm x 140mm x 98mm	67.5mm x 180mm x 80mm
Status Indicators	One bi-color Light Emitting Diode	
Integrated Fans	One 92mm x 25mm	
Fixed Input Plug	Yes	
AC Cord Rating	15A @ 120 VAC, 10A @ 240 VAC	
Input Voltage	90–264 VAC	
Auto-ranging	Yes	
Line Frequency	47–63Hz	
Initial Inrush Current	140A per supply for 10ms or less	55A per supply for 10ms or less
Secondary Inrush Current	35A per supply for 10ms or less	25A per supply for 10ms or less
Hot-Plug Capability	No	Yes

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5.3 Heat Dissipation

Table 6 details heat dissipation for the PowerEdge T310.

Table 6.   Heat Dissipation

Description	Non-redundant Power Supply	Redundant Power Supply
Wattage	375W	400W
Heat Dissipation	1683 BTU/hr maximum	1672 BTU/hr maximum

5.4 Environmental Specifications

Table 7 summarizes the environmental specifications for the PowerEdge T310. For additional information for specific system configurations, see Dell.com/environmental_datasheets.

Table 7.   Environmental Specifications

Specification		Operating Requirements	Non-Operating Requirements
Temperature Ranges (For altitude ≤ 900m or 2952.75ft)		10°C to 35°C (50°F to 95°F)	-40°C to 65°C (-40°F to 149°F)
Temperature Ranges (For altitude > 900m or 2952.75ft)		10°C to T^1°C (50°F to T^1°F)	
Temperature Gradient (maximum per 60 minutes)		10°C	20°C
Humidity Percent Ranges (noncondensing)		20% to 80% (maximum wet bulb temperature is 29°C)	5% to 95% (maximum wet bulb temperature is 38°C)
Humidity Gradient (maximum per 60 minutes)		10%	10%
Altitude Ranges	Low Limits	-50ft (-15.2m)	-50ft (-15.2m)
	High Limits	10,000ft (3048m)	35,000ft (10,668m)

[1]Use 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	$35 - \dfrac{\text{Maximum Altitude (meters) - 900}}{300}$ °C	$35 - \dfrac{\text{Maximum Altitude (feet) - 2952.75}}{984.25}$ °C
Fahrenheit	$95 - \dfrac{\text{(Maximum Altitude (meters) - 900) x 1.8}}{300}$ °F	$95 - \dfrac{\text{(Maximum Altitude (feet) - 2952.75) x 1.8}}{984.25}$ °F

Table 9 shows the shock and vibration specifications for the PowerEdge T310.

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<div align="center">**Table 9.**   **Shock and Vibration Specifications**</div>

Maximum Vibration	
Operating	0.26Grms at 5–500Hz for 15 minutes
Storage	1.88Grms at 10–250Hz for 15 minutes
Maximum Shock	
Operating	One shock pulse in the positive z axis (one pulse on each side of the system) of 31G for 2.6ms in the operational orientation
Storage	Six consecutively executed shock pulses in the positive and negative x, y, and z axes (one pulse on each side of the system) of 71G for up to 2ms.

5.5 ENERGY STAR Compliance

To learn more about Dell and ENERGY STAR® qualified configurations, go to [PowerEdge Servers Engineered with Energy Smart Technologies](#) on Dell.com.

5.6 Thermal

The thermal design of the PowerEdge T310 reflects the following:

- **Closed-loop thermal fan speed control:** The closed-loop thermal control method uses feedback temperatures to dynamically determine proper fan speeds.
- **Comprehensive thermal management:** The PowerEdge T310 controls system cooling fan speed based on several different responses from critical component sensors, such as processor temperature, inlet ambient temperature, and system configurations. The thermal management adjusts proper cooling for the system according to what the system really needs.
- **Environmental Specifications**: The optimized thermal management makes the T310 reliable under a wide range of operating environments.

5.7 Acoustics

The acoustical design of the PowerEdge T310 reflects the following:

- **Adherence to Dell's high standards for sound quality:** 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 10.
- **Hardware configurations affect system noise** levels: Dell's thermal control provides for cooling flexible to varying hardware configurations. Acoustical performances associated with two common configurations are listed in Table 10.
- **Noise ramp and descent at Boot-up:** Fan speeds (hence noise levels) ramp up during the boot process to add a layer of protection for component cooling (in the case that the system does not boot properly).

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Table 10.   Acoustical Performance

Typical Configuration @ 23°C Ambient					Operating Mode	LwA-UL (bels)	Prominent Tones
Processor	DIMM	Hard Drives	Power Supply	RAID Card			
Intel® Xeon® quad-core X3430 (2.4GHz)	4 x 1GB (1066MHz UDIMM)	4 x 3.5" SATA (7.2K) 500GB	1 x 375W cabled	None	Standby	2.7	N/A
					Idle	4.4	N/A
					Stressed Processor	4.4	N/A
Maximum Configuration @ 23°C Ambient					Operating Mode	LwA-UL (bels)	Prominent Tones
Processor	DIMM	Hard Drives	Power Supply	RAID Card			
Intel Xeon quad-core X3430 (2.66GHz)	4 x 8GB (1333MHz RDIMM)	4 x 3.5" SAS (15K) 450GB	2 x 400W redundant	PERC 6/i	Standby	2.7	None
					Idle	5.4	None
					Stressed Processor	5.4	None

Definitions

Standby: AC Power is connected to power supplies but the system is not turned on.

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

Stressed Processor: An operating mode per ISO7779 (1999) definition 3.1.6; Memory Bandwidth is used.

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

Prominent tones: 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 center of ISO7779 table and acoustic transducer is at front operator position, ref ISO7779 (1999) Section 8.6.1, Position P4.

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6 Processors

The Dell™ PowerEdge™ T310 system is a one-socket, entry-level server supporting the Intel® Xeon® processor 3400 series, the Intel Celeron® G1101, the Intel Pentium® G6950, and the Intel Core™ i3 500 series processor.

Table 11.   Processor Overview

Feature	Intel Celeron G1101	Intel Pentium G6950	Intel Core i3 500 Series	Intel Xeon 3400 Series
Cores	2	2	2	4
Intel® Smart Cache	2MB	3MB	4MB	8MB
Max Thermal Design Power (TDP)	73W	73W	95W	95W
Memory Controller	Integrated 2-channel DDR3 1066	Integrated 2-channel DDR3 1066	Integrated 2-channel DDR3 1066/1333	Integrated 2-channel DDR3 1066/1333
Process Technology	32nm	32nm	32nm	45nm
Intel Turbo Boost Technology	No	No	No	Yes
Intel Hyper-Threading Technology	No	No	Yes	Yes
Intel Virtualization Technology	Yes	Yes	Yes	Yes
Intel Trusted Execution Technology	No	No	No	Yes
Intel 64	Yes	Yes	Yes	Yes
Enhanced Intel SpeedStep® Technology	Yes	Yes	Yes	Yes
Socket	LGA1156	LGA1156	LGA1156	LGA1156

6.1 Features

Key features of the T310 processors include:
* Intel Turbo Boost Technology for dynamic frequency scaling
* Intel Hyper-Threading technology for 8-thread processing with quad core performance
* 8 MB of Intel Smart Cache
* Integrated memory controller (IMC)
  o Up to 4 x 8 GB U-DIMMs (32 GB total), up to 1333 MHz
  o Up to 6 x 4 GB R-DIMMs (24 GB total), up to 1333 MHz
* Flexible PCI Express Configurations

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6.2 Supported Processors

The PowerEdge T310 supports the processors in Table 12. For the latest information on supported processors for the PowerEdge T310, visit Dell.com.

Table 12.   Supported Processors

Model	Speed	Power	Cache	Cores
Intel Celeron® G1101	2.26GHz	73W	2M	2
Intel Pentium® G6950	2.80GHz	73W	3M	2
Intel Core™ i3 540	3.06GHz	73W	4M	2
Intel Core i3 550	3.20GHz	73W	4M	2
Intel Xeon® X3440	2.53GHz	95W	8M	4
Intel Xeon X3470	2.93GHz	95W	8M	4
Intel Xeon X3480	3.06GHz	95W	8M	4

6.3 Processor Configurations

The PowerEdge T310 operates with a single processor only. The memory controller is embedded in the processor.

6.4 Processor Installation

Refer to the Processors section in the Installing System Components chapter of the *Dell PowerEdge T310 Systems Hardware Owner's Manual* on Support.Dell.com/Manuals for processor installation and removal instructions.

7 Memory

The Dell™ PowerEdge™ T310 supports DDR3 memory, providing a high performance, high-speed memory interface capable of low latency response and high throughput. Key features of the T310 memory system include:

- 2 channels per processor
- 6 DIMM sockets
- Support for unbuffered ECC DDR3 DIMMs (UDIMM) or registered ECC DDR DIMMs (RDIMM)
  - o UDIMM maximum capacity of 32 GB (4 x 8 GB UDIMMs)
  - o RDIMM maximum capacity of 24 GB (6 x 4 GB RDIMMs)
- DDR3 speeds of 1066 MHz and 1333 MHz
- Support for single-, dual-, and quad-rank DIMMs

7.1 DIMMs Supported

The DDR3 memory interface consists of two channels with up to two RDIMMs or UDIMMs per channel for single or dual rank and up to two RDIMMs per channel for quad rank.

For information on the latest memory offerings for the T310, visit Dell.com.

7.2 DIMM Population Rules

The following DIMM population rules apply:

- If DIMMs of different speeds are mixed, all channels will operate at the fastest common frequency.
- RDIMMs and UDIMMs cannot be mixed.
- Mixing of ECC and non-ECC UDIMMs will force the system to function in non-ECC mode.
- Mixing quad-rank RDIMMs in one channel and 3DPC in another channel with the same processor socket is not supported.
- DIMMs must be installed in each channel starting with the DIMM slot farthest from the processor (slot 0)
- For each processor, Channel 0 supports up to two DIMMs and Channel 1 and 2 support one DIMM each

7.3 DIMM Slots

The T310 planar provides six 72-bit (240-pin) sockets per processor for DIMM memory modules. The DIMMs are configured as 72 bits wide to provide for ECC, which is performed by the memory controller in the processor.

7.4 Speed

The PowerEdge T310 supports 1066 MHz and 1333 MHz DDR3 memory. The actual memory frequency is determined by a variety of inputs:

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

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The memory speed of each channel depends on the memory configuration:

- For single- or dual-rank memory modules:
  - One memory module per channel supports up to 1333 MHz
  - Two memory modules per channel supports up to 1066 MHz

- For quad-rank memory modules:
  - One memory module per channel supports up to 1066 MHz
  - Two memory modules per channel are limited to 800 MHz, regardless of memory module speed

If memory modules with different speeds are installed, they will operate at the speed of the slowest installed memory module(s).

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

7.5 Supported Configurations

Supported memory configurations for the T310 are listed in Table 13. For the latest information on memory options, visit Dell.com.

Table 13.   Supported Memory Configurations

System Capacity (GB)	DIMM Slot					
	DIMM B1 (2)	DIMM B2 (4)	DIMM B3 (6)	DIMM A1 (1)	DIMM A2 (3)	DIMM A3 (5)
1	—	—	—	1GB	—	—
2	1GB	—	—	1GB	—	—
2	—	—	—	2GB		—
4	1GB	1GB	—	1GB	1GB	—
4	2GB	—	—	2GB	—	—
4	—	—	—	4GB	—	—
6*	1GB	1GB	1GB	1GB	1GB	1GB
8	2GB	2GB	—	2GB	2GB	—
8	4GB	—	—	4GB	—	—
12*	4GB	4GB	4GB	4GB	4GB	4GB
16	4GB	4GB	—	4GB	4GB	—
16	8GB	—	—	8GB	—	—
24*	4GB	4GB	4GB	4GB	4GB	4GB
32	8GB	8GB	—	8GB	8GB	—

*RDIMMs only

8   Chipset

The Dell™ PowerEdge™ T310 planar incorporates the Intel® 3420 processor series chipset and the Intel 3420 or Platform Controller Hub (PCH), a highly integrated I/O controller. A number of high-level features are supported by the chipset on PowerEdge T310, as detailed in the following sections.

8.1 Direct Media Interface

Direct Media Interface (DMI) is the chip-to-chip connection between the processor and chipset. This high-speed interface integrates advanced priority-based servicing allowing for concurrent traffic and true isochronous transfer capabilities. Base functionality is completely software-transparent, permitting current and legacy software to operate normally.

8.2 PCI Express 2.0 Interface

The Intel 3420 provides up to 8 PCI Express Root Ports, supporting the PCI Express Base Specification, Revision 2.0. Each Root Port supports up to 2.5GT/s for fast access to peripheral devices and networking with up to eight PCI Express 2.0 x1 ports, configurable as x2 and x4 depending on motherboard designs.

8.3 SATA Interface

The Intel 3420 chipset has two integrated Serial ATA (SATA) host controllers that support independent DMA operation on up to six ports, supports data transfer rates of up to 3Gb/s (300MB/s), and offers two modes of operation:

- Legacy mode that uses I/O space
- Advanced Programmable Interrupt Controller (APIC) mode that uses memory space (software that uses legacy mode will not have AHCI capabilities)

8.4 PCI Interface

The Intel 3420 PCI interface provides a 33MHz, Revision 2.3 PCI interface implementation. The chipset integrates a PCI arbiter that supports up to four external PCI bus masters in addition to the internal Intel 3420 chipset requests. This allows for combinations of up to four PCI down devices and PCI slots.

8.5 Low Pin Count Interface

The Intel 3420 implements an LPC Interface as described in the LPC 1.1 Specification. The Low Pin Count (LPC) bridge function of the Intel 3420 resides in PCI Device 31:Function 0. In addition to the LPC bridge interface function, D31:F0 contains other functional units including DMA, interrupt controllers, timers, power management, system management, GPIO, and RTC.

8.6 Serial Peripheral Interface

The Intel 3420 implements a Serial Peripheral Interface (SPI) as an alternative interface for the BIOS flash device. An SPI flash device can be used as a replacement for the FWH, and is required to support Gigabit Ethernet, Intel® Active Management Technology, and integrated Intel Quiet System Technology.

The Intel 3420 chipset supports up to two SPI flash devices with speed up to 50MHz using two-chip select pins.

8.7 Compatibility Module

The DMA controller incorporates the logic of two 82C37 DMA controllers, with seven independently programmable channels. Channels 0–3 are hardwired to 8-bit, count-by-byte transfers, and channels

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5–7 are hardwired to 16-bit, count-by-word transfers. Any two of the seven DMA channels can be programmed to support fast Type-F transfers.

Channel 4 is reserved as a generic bus master request.

The Intel 3420 chipset supports LPC DMA, which is similar to ISA DMA, through the Intel 3420's DMA controller. LPC DMA is handled through the use of the LDRQ# lines from peripherals and special encoding on LAD[3:0] from the host. Single, Demand, Verify, and Increment modes are supported on the LPC interface.

The timer/counter block contains three counters that are equivalent in function to those found in one 82C54 programmable interval timer. These three counters are combined to provide the system timer function. The 14.31818 MHz oscillator input provides the clock source for these three counters.

The Intel 3420 chipset provides an ISA-Compatible Programmable Interrupt Controller (PIC) that incorporates the functionality of two, 82C59 interrupt controllers. The two interrupt controllers are cascaded so that 14 external and two internal interrupts are possible. In addition, the Intel 3420 chipset supports a serial interrupt scheme.

All of the registers in these modules can be read and restored. This is required to save and restore system state after power has been removed and restored to the platform.

8.8 USB Controllers

The Intel 3420 chipset supports 12 USB 2.0 ports that support high-speed, full-speed, and low-speed USB devices. The chipset contains up to two EHCI Host Controllers (EHCI#1 with eight ports and EHCI#2 with six ports) and up to seven Universal Host Controller Interface (UHCI) controllers that support USB full-speed and low-speed signaling. Each EHCI has an integrated USB 2.0 Rate Matching Hub (RMH). The RMHs replace the functionality of the UHCI controllers by converting high-speed traffic into low- and full-speed traffic. When the RMHs are enabled, the UHCI controllers are disabled.

8.9 Real-time Clock

The Intel 3420 chipset contains a Motorola MC146818A-compatible real-time clock (RTC) with 256 bytes of battery-backed RAM. The real-time clock performs two key functions: keeping track of the time of day and storing system data, even when the system is powered down. The RTC operates on a 32.768KHz crystal and a 3V battery.

The RTC supports two lockable memory ranges. By setting bits in the configuration space, two 8-byte ranges can be locked to read and write accesses to prevent unauthorized reading of passwords or other system security information. The RTC supports a date alarm that allows for scheduling a wake up event up to 30 days in advance, rather than just 24 hours in advance.

8.10 Enhanced Power Management

The power management functions include enhanced clock control and various low-power (suspend) states (for example, Suspend-to-RAM and Suspend-to-Disk). A hardware-based thermal management circuit permits software-independent entrance to low-power states. The Intel 3420 chipset contains full support for the Advanced Configuration and Power Interface (ACPI) Specification, Revision 3.0a.

8.11 Manageability

The Intel 3420 chipset integrates several functions designed to manage the system and lower the total cost of ownership (TCO) of the system. These system management functions are designed to report errors, diagnose the system, and recover from system lockups without the aid of an external microcontroller. See Table 14 for details of the Intel 3420 chipset manageability functions.

Table 14.   Intel 3420 Chipset Manageability Functions

Feature	Description
TCO Timer	The chipset's integrated programmable TCO timer is used to detect system locks. The first expiration of the timer generates an SMI# that the system can use to recover from a software lock. The second expiration of the timer causes a system reset to recover from a hardware lock.
Processor Present Indicator	The chipset looks for the processor to fetch the first instruction after reset. If the processor does not fetch the first instruction, the chipset will reboot the system.
ECC Error Reporting	When detecting an ECC error, the host controller has the ability to send one of several messages to the chipset. The host controller can instruct the chipset to generate either an SMI#, NMI, SERR#, or TCO interrupt.
Function Disable	The chipset provides the ability to disable the following integrated functions: LAN, USB, LPC, Intel HD Audio, SATA, PCI Express or SMBus. Once disabled, these functions no longer decode I/O, memory, or PCI configuration space. Also, no interrupts or power management events are generated from the disabled functions.
Intruder Detect	The chipset provides an input signal (INTRUDER#) that can be attached to a switch that is activated by the system case being opened. The chipset can be programmed to generate an SMI# or TCO interrupt due to an active INTRUDER# signal.

8.12 Enhanced Intel® Virtualization Technology

The Intel 3420 chipset supports hardware assist for I/O virtualization using Intel Virtualization Technology for Directed I/O (Intel VT-d). Intel VT-d Technology consists of technology components that support the virtualization of platforms based on Intel Architecture Processors. Intel VT-d Technology enables multiple operating systems and applications to run in independent partitions. A partition behaves like a virtual machine and provides isolation and protection across partitions. Each partition is allocated its own subset of host physical memory.

8.13 Intel Anti-Theft Technology

The Intel 3420 chipset introduces a new hardware-based security technology, Intel Anti-Theft Technology, that encrypts data stored on any SATA-compliant hard drive in AHCI Mode. This feature gives the end-user the ability to restrict access to the hard drive data by unknown parties. This technology can be used alone or can be combined with software encryption applications to add protection against data theft. The technology requires a correctly configured system, including an appropriate processor, Intel Management Engine firmware, and system BIOS support.

8.14 System Management Bus

The Intel 3420 chipset contains a system management bus (SMBus 2.0) host interface that allows the processor to communicate with SMBus slaves. This interface is compatible with most I^2C devices. Special I^2C commands are implemented.

The chipset's SMBus host controller provides a mechanism for the processor to initiate communications with SMBus peripherals (slaves). Also, the chipset supports slave functionality, including the Host Notify protocol. Hence, the host controller supports eight command protocols of the SMBus interface (see System Management Bus (SMBus) Specification, Version 2.0): Quick

Command, Send Byte, Receive Byte, Write Byte/Word, Read Byte/Word, Process Call, Block Read/Write, and Host Notify.

The chipset's SMBus also implements hardware-based Packet Error Checking for data robustness and the Address Resolution Protocol (ARP) to dynamically provide address to all SMBus devices.

8.15 JTAG Boundary-Scan

The Intel 3420 chipset adds the industry standard JTAG interface and enables Boundary-Scan in place of the XOR chains used in previous generations of the chipset. Boundary-Scan can be used to ensure device connectivity during the board manufacturing process. The JTAG interface allows system manufacturers to improve efficiency by using industry available tools to test the chipset on an assembled board. Since JTAG is a serial interface, it eliminates the need to create probe points for every pin in an XOR chain. This eases pin breakout and trace routing and simplifies the interface between the system and a bed-of-nails tester.

9 BIOS

The Dell™ PowerEdge™ T310 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
- Boot from hard drive, optical drive, iSCSI drive, and USB key
- ACPI support
- Direct Media Interface (DMI) support
- PXE and WOL support for on-board NICs
- 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 (up-sell for MASER)
- Unified Server Configurator (USC) support
- Power management support including:
  - DBS
  - Power Inventory
  - Multiple Power Profiles
- UEFI support

The T310 BIOS does *not* support the following:

- Embedded Diagnostics (embedded in MASER)
- BIOS language localization
- BIOS recovery after bad flash (but can be recovered from iDRAC6 Express)

9.1 Supported ACPI States

Advanced Configuration and Power Interface (ACPI) is a standard interface for enabling the operating system to direct configuration and power management. The PowerEdge T310 BIOS is compliant with ACPI version 2.0a.

9.2 BIOS Power Management

Power management features come in two flavors: fixed or generic.

Fixed features use bits defined in the ACPI specification for specific capabilities. The fixed feature bits give the OS complete control over the power management of a device since the location of the bits is given to the OS in the FACP table. Thus, a driver can directly access bits to control a device's power management.

Generic features have defined enable and status bits, but the functionality is not fully visible to the OS. Dell provides ASL code to handle the details of generic features, allowing the OS to intelligently communicate with system-specific hardware.

Table 15 summarizes the power management features on this system.

Table 15.   Power Management Features

Feature	Type	Enable/Status/ Ctrl bit location	Description
ACPI Mode Switch	Fixed	PCH	OS uses the SCI_EN bit in PCH to switch from legacy mode to ACPI mode
Sleep States	Fixed	PCH	**Supported states:** S0 (Working) S4 (Hibernation) S5 (Soft-off) **Not supported:** S1 and S3 (standby)
Power Button	Fixed	PCH	In ACPI mode, OS has control of the power button; in non-ACPI mode, SMI handler owns power button events
Real-Time Clock	Fixed	PCH	OS can configure the system to wake on the RTC alarm
Power Mgmt. Timer	Fixed	PCH	24-bit power management timer
Power Mgmt. Event (PME)	Generic	PCH	When a device signals PME, the system wakes (if necessary), the OS detects the event, and a Dell-defined ASL routine handles the event; wake-on-LAN is an example of a PME
USB Wake	Generic	N/A	Not supported since S1 is not supported
DBS	N/A	Processor MSRs	Handles P state transition under Windows
C State Support	N/A	Processor and PCH registers	Allows multiple C-state support for the processor; works under Windows and an ACPI OS that understands C states
Power Profile Support	N/A	Processor and PCH chipset registers	In addition to P, C, and T states, the BIOS exposes the power profiles to the OS; each power profile has specific settings and will fine tune the processor, MCH, and IOH

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The eleventh-generation BIOS exposes the following power profiles in the BIOS setup.

Table 16.   Power Profiles

Power Profile	Description
Static MAX Performance	Disable DBPM: BIOS sets P-State to MAX Memory frequency = MAX Fan algorithm = performance (UI)
OS /Hypervisor DBPM Control	Enable OS DBPM Control: BIOS exposes all possible P-states to OS Memory frequency = MAX Fan algorithm = power
Active Power Controller	Enable Dell System DBPM (BIOS will not make all P states available to OS) Memory frequency = MAX Fan algorithm = power
Custom	CPU Power and Performance Management: Max Performance | Minimum Power | OS DBPM | System DBPM Memory Power and Performance Management: Max Performance |1333MHz |1067 MHz |800 MHz | Min Power Fan Algorithm Performance | Power

9.3 I2C Block Diagram

I^{2}C is a simple bi-directional two-wire bus for efficient inter-integrated circuit control. All I^{2}C-bus compatible devices incorporate an on-chip interface which allows them to communicate directly with each other via the I^{2}C bus. This design concept solves the many interfacing problems encountered when designing digital control circuits. These I^{2}C devices perform communication functions between intelligent control devices (such as microcontrollers), general-purpose circuits (such as LCD drivers, remote I/O ports, memories) and application-oriented circuits.

The PowerEdge T310 BIOS accesses the I^{2}C through the PCH (Intel Platform Controller Hub 3420). There are two multiplexers (MUX) on the PCH I^{2}C bus.

- One MUX (U60) controls the DIMM SPDs through four split segments.
- One MUX (U44) controls the clock, TOE, and USB Hub through four split segments.

The BIOS controls both the MUXes through the two select lines using GPIO pins. The clock chip, USB hub, and the front panel EEPROM device addresses are located on the IOH I^{2}C bus.

10 Embedded NICs/LAN on Motherboard (LOM)

The Dell™ PowerEdge™ T310 has an embedded dual-port Gigabit Ethernet. The embedded Broadcom® 5716 LAN controller is on the T310 planar as an independent Gigabit Ethernet interface device. There is one RJ-45 connector on the back of the system. The firmware for the LOM chip resides in a flash part.

The following information details the features of the LAN device:

- Single-chip solution for LOM and NIC applications
  - Dual integrated 10BASE-T/1000BASE-T/1000BASE-T transceivers
  - 10/100/1000 triple-speed MAC
- x4 PCIe v1.1-compliant
- x4 PCIe 2.0 v1.0 ready
- Large on-chip memories:
  - Context =3072x18 bytes
  - Receive buffer = 64KB
  - Processor screech pad = 32KB
  - UMP receive buffer = 3KB
  - UMP transmit buffer = 3KB
  - Transmit buffer = 24KB payload buffer and 8KB header buffer
- Other performance features:
  - TCP, IP, UDP checksum
  - TCP segmentation
  - Adaptive interrupts
  - Receive Side Scaling
- Robust manageability:
  - Network controller—Sideband interface (NC-SI)
  - Legacy Universal Management Port (UMP)
  - 400Khz SMBus
  - PXE 2.0 remove boot
  - Alert Specification Form (ASF) 1.0 support
  - Wake-on-LAN (WOL) power switching circuit
  - IPMI network pass-through capability
  - Statistic gathering (SNMP MIB II, Ethernet-like MIB, [802.3x, clause30])
  - Comprehensive diagnostic and configuration
  - ACPI 1.1a-compliant: multiple power modes
  - MSI, MSI-X
- Advanced network features:
  - Virtual LANs (VLAN)—802.1q VLAN tagging; support for up to 64 VLANs
  - Jumbo frames (9KB)
  - 802.3x flow control
  - 802.3ap Ethernet Operation over Electrical Backplane
  - Remove PHY
- Low power CMOS design
- On-chip power circuit
- 668-pin 27mmx27mm PBGA+HS package
- 3.3V I/Os
- JTAG

11 PCI Expansion Cards and Slots

The Dell™ PowerEdge™ T310 planar provides four PCI Express (PCIe) expansion slots:

- Two x8 PCIe Gen2 slots for full-height cards, connected to the processor
- One x4 PCIe Gen2 slot for a full-height card, connected to the PCH
- Two x1 PCIe Gen2 slots for full-height cards, connected to the PCH

The system supports 25W maximum power for all four PCIe cards.

11.1 Card Quantities and Priorities

For information on card quantities and priorities, see the Expansion Cards section in the Installing System Components chapter of the *Dell PowerEdge T310 Systems Owner's Manual* on Support.Dell.com/Manuals.

11.2 Card and Slot Dimensions

For information about PCIe card and slot dimensions, see the Expansion Cards section in the Installing System Components chapter in the *Dell PowerEdge T310 Systems Owner's Manual* on Support.Dell.com/Manuals.

12 Storage

The Dell™ PowerEdge™ T310 supports up to four 3.5" internal hard drives or 2.5" internal hard drives. The following drive configurations are supported:

- 4 x 3.5" cabled SATA from motherboard SATA connector
- 4 x 3.5" cabled SAS or SATA with add-on storage controller
- 4 x 3.5" hot-plug SAS or SATA with add-on storage controller
- 4 x 2.5" hot-plug SAS, SATA, or SSD with add-on storage controller

12.1 Hard Drives

Table 17 lists the supported hard drives for the PowerEdge T310. For the latest information on supported hard drives, visit Dell.com.

Table 17.   Supported Hard Drives

Form Factor	Capacity	Speed	Type	Notes
3.5"	160GB, 250GB, 500GB, 1TB, 2TB	7.2K	SATA	
3.5"	500GB, 1TB	7.2K	NL SAS	
3.5"	146GB, 300GB, 450GB, 600GB	15K	SAS	
3.5"	600GB	10K	SAS	
2.5"	25GB, 50GB, 100GB	NA	SAS SSD	Hot-plug only; requires PERC 6/i, H200, or H700
2.5"	146GB, 300GB	10K	SAS	Hot- plug only

12.2 RAID Configurations

Table 18 details the factory RAID configurations for the PowerEdge T310.

Table 18.   RAID Configurations

Cabled/ Hot-plug	Config Type	Configs		Description	Min HDD	Max HDD
Cabled	NO HDD	C0A	NCZCBL	No HDD, Cabled HDD Chassis	0	0
Hot-plug	NO HDD	C0B	NCZ	No HDD, Hot-Plug HDD Chassis (SAS 6/iR, H200, PERC 6/i or H700)	0	0
Cabled	Embedded SATA - NO RAID	C1	MSTCBL	On-board SATA Controller – No RAID	1	4
Cabled	SATA— RAID0	C2A	MSTR0CBL	Embedded SATA SW RAID – RAID0 (PERC S100)	2	2
Cabled	SATA— RAID0	C2B	MSTR0CBL	Embedded SATA SW RAID – RAID0 (PERC S100)	3	4

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Cabled/ Hot-plug	Config Type	Configs		Description	Min HDD	Max HDD
Cabled	SATA—RAID1	C3	MSTR1CBL	Embedded SATA SW RAID – RAID1 (PERC S100)	2	2
Cabled	SATA—RAID5	C4	MSTR5CBL	Embedded SATA SW RAID – RAID5 (PERC S100)	3	4
Cabled	SATA—RAID10	C5	MSTR10CBL	Embedded SATA SW RAID – RAID10 (PERC S100)	4	4
Cabled	SAS/SATA—RAID5	C6	ASSR5CBL	Add-in SAS/SATA RAID card, RAID 5 (PERC S300)	3	4
Cabled	SAS/SATA—RAID10	C7	ASSR10CBL	Add-in SAS/SATA RAID card, RAID 10 (PERC S300)	4	4
Cabled	SAS/SATA—no RAID	C8	ASSCBL	Add-in SAS/SATA RAID card, No RAID (SAS 6/iR or H200)	1	4
Cabled	SAS/SATA—RAID0	C9	ASSR0CBL	Add-in SAS/SATA RAID card, RAID 0 (SAS 6/iR, H200, PERC 6/i or H700)	2	4
Cabled	SAS/SATA—RAID1	C10	ASSR1CBL	Add-in SAS/SATA RAID card, RAID 1 (SAS 6/iR, H200, PERC 6/i or H700)	2	2
Cabled	SAS/SATA—RAID5	C11	ASSR5CBL	Add-in SAS/SATA RAID card, RAID 5 (PERC 6/i or H700)	3	4
Cabled	SAS/SATA—RAID6	C12	ASSR6CBL	Add-in SAS/SATA RAID card, RAID 6 (PERC 6/i or H700)	4	4
Cabled	SAS/SATA—RAID10	C13	ASSR10CBL	Add-in SAS/SATA RAID card, RAID 10 (PERC 6/i, H200 or H700)	4	4
Hot-plug	SAS/SATA—RAID5	C14	ASSR5	Add-in SAS/SATA RAID card, RAID 5 (PERC S300)	3	4
Hot-plug	SAS/SATA—RAID10	C15	ASSR10	Add-in SAS/SATA RAID card, RAID 10 (PERC S300)	4	4
Hot-plug	SAS/SATA—no RAID	C16	ASS	Add-in SAS/SATA RAID card, No RAID (SAS 6/iR or H200)	1	4
Hot-plug	SAS/SATA—RAID0	C17	ASSR0	Add-in SAS/SATA RAID card, RAID 0 (SAS 6/iR, PERC 6/i, H200, or H700)	2	4
Hot-plug	SAS/SATA—RAID1	C18	ASSR1	Add-in SAS/SATA RAID card, RAID 1 (SAS 6/iR, PERC 6/i, H200, or H700)	2	2
Hot-plug	SAS/SATA—RAID5	C19	ASSR5	Add-in SAS/SATA RAID card, RAID 5 (PERC 6/i or H700)	3	4
Hot-plug	SAS/SATA—RAID6	C20	ASSR6	Add-in SAS/SATA RAID card, RAID 6 (PERC 6/i or H700)	4	4
Hot-plug	SAS/SATA—RAID10	C21	ASSR10	Add-in SAS/SATA RAID card, RAID 10 (PERC 6/i, H200, or H700)	4	4

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Cabled/ Hot-plug	Config Type	Configs		Description	Min HDD	Max HDD
Hot-plug	SAS/SATA —RAID1 + RAID1	C22	ASSR1R1	Add-in SAS/SATA RAID card, RAID 1 + RAID 1 (S300)	2 + 2	2 + 2
Hot-plug	SAS/SATA —RAID1 + RAID1	C23	ASSR1R1	Add-in SAS/SATA RAID card, RAID 1 + RAID 1 (SAS 6/iR, PERC 6/i, H200, or H700)	2 + 2	2 + 2

Additional restrictions for RAID configurations are listed as follows:

- Hard drives must be all 3.5" or 2.5"
- Hard drives must be all SAS, all SATA, or all SSD; hard drives cannot be mixed
- SSD support requires PERC 6/I, H200, or H700; PERC S100, SAS 6i/R, and PERC S300 do not support SSD

PERC S100 and PERC S300 do not support the following:
- Microsoft® Hyper-V™ server 2008 x64 (download version)
- Microsoft Windows Server® 2008 x64 (Hyper-V™ role enabled)
- Microsoft Windows Server 2008 SP2 x64 (Hyper-V™ role enabled)
- Microsoft Windows Server 2008 R2 (Microsoft Windows® 7 includes SP2 bits) x64 (Hyper-V role enabled)
- Linux® operating systems or VMware® virtualization software

12.3 Storage Controllers

12.3.1 SAS 6/iR

The T310 internal SAS 6/iR HBA is an expansion card that installs into the dedicated internal storage slot. It incorporates two four-channel SAS IOCs for connection to SAS or SATA hard disk drives.

12.3.2 PERC 6/i

The PERC 6/i uses the LSI 1078 ROC (RAID on Chip) processor with a PCI Express host interface and DDR2 memory, and it installs into the dedicated internal storage slot. A battery is also available for backup.

12.3.3 PERC H200

The H200 SAS HBA is an expansion card that installs into the dedicated internal storage slot. It incorporates two four-channel 6 Gb/s SAS IOCs for connection to SAS hard disk drives.

12.3.4 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 T310 supports both 512MB and 1GB cache options on the internal H700.

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12.4 Optical Drives

The PowerEdge T310 supports two internal optical drives and an optional external USB DVD-ROM. The T110 II is able to boot from any internal optical drive. The following internal optical drives configurations are available on the PowerEdge T310:

- DVD-ROM (SATA)
- DVD+RW (SATA)

12.5 Tape Drives

Internal and external tape drives and tape libraries are supported. For more information on supported tape drives and tape libraries, see Dell.com/Storage.

13 Video

The Dell™ PowerEdge™ T310 is equipped with a Matrox® G200eW with 8MB memory integrated in the Nuvoton® WPCM450 (Baseboard Management Controller [BMC]). Supported resolutions are listed in Table 19.

Table 19.   Graphics Video Modes

Resolution	Refresh Rate (Hz)	Color Depth (bit)
640 x 480	60, 72, 75, 85	8, 16, 32
800 x 600	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[1]	60	32
1280 x 1024[2]	60, 75, 85	8, 16
[1]32 bit color only supported at 60Hz for this resolution. [2]85Hz for KVM and 1600x1200 at 60Hz for video out.		

14 Rack Information

Dell does not provide rack support for the Dell™ PowerEdge™ T310. However, the system can be placed in a rack enclosure using a third-party tray.

15 Operating Systems

See the following for operating systems support for the Dell™ PowerEdge™ T310:

- [Operating System Support Matrix for Dell PowerEdge Systems](#) on Dell.com
- *Dell PowerEdge T310 Systems Getting Started Guide* on [Support.Dell.com/Manuals](#)

16 Systems Management

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.

16.1 Server Management

A Dell Systems Management and Documentation DVD, Dell Management Console DVD, and ISO images are included with the product. See Table 20 for a description of the available content.

Table 20.　　Server Management Documentation and Information

Title	Description
Dell Systems Build and Update Utility (SBUU)	Assists in OS install and pre-OS hardware configuration and updates.
Server Update Utility (SUU)	Provides an inventory tool for managing updates to firmware, BIOS, and drivers for either Linux or Windows varieties.
OpenManage Server Administrator (OMSA)	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	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	Deliver the latest Dell optimized drivers, utilities, and operating system-based diagnostics that you can use to update your system.
eDocs	Includes PDF files for PowerEdge systems, storage peripherals, and Dell OpenManage™ software.
Dell Management Console (DMC)	Provides 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.

16.2 Embedded Server Management

The T310 implements circuitry for the next generation of Embedded Server Management. It is Intelligent Platform Management Interface (IPMI) v2.0 compliant. The optional 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. These periphery devices consist of the power supplies, the storage backplane, the integrated SAS HBA or PERC 6/I (PERC H700), and the control panel with LCD display.

The optional upgrade to 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.

16.3 Dell Lifecycle Controller and Unified Server Configurator

Embedded management is comprised of several 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). For servers with iDRAC6 Express, the Lifecycle Controller offers pre-OS server deployment, OS installation, platform updates, platform configuration, and diagnostics capabilities. For servers without iDRAC6 Express, this utility has limited functionality and offers OS installation and diagnostics capabilities only.

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.

16.4 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),

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whether that server is located in a different room, a different building, a different city, or in a 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 business 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.

16.5 iDRAC6 Express

The optional iDRAC6 Express is the first tier of iDRAC6 upgrades. In addition to upgrading the system with a Lifecycle Controller, 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.

16.6 iDRAC6 Enterprise

The optional iDRAC6 Enterprise card provides access to advanced iDRAC6 features. The iDRAC6 Enterprise connects directly to the T310 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

16.7 iDRAC6 Enterprise with Virtual Flash Media

The iDRAC6 Enterprise can be upgraded by adding the virtual flash (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, iDRAC6, and vFlash Media

Feature	Base Management Functionality	iDRAC6 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		✓	✓	✓

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Remote Management and Remediation				
Boot capture		✓	✓	✓
Serial-over-LAN		✓	✓	✓
Virtual 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™ T310 supports the following USB devices:

- DVD-ROM
- DVD+RW
- USB key (bootable)

Appendix A.   Statement of Volatility

The Dell™ PowerEdge™ T310 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 PowerEdge T310 server has the NV components detailed in Table 23.

Table 23.   System Volatility

Server BIOS Memory	Details
Size	4MB
Type	Flash EEPROM (SPI interface)
Can user programs or operating system write data to it during normal operation?	No
Purpose	Boot Code, System Configuration Information, EUFI environment
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	265 Bytes
Type	Battery backed NVRAM
Can user programs or operating system write data to it during normal operation?	No
Purpose	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

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LOM (LAN [Network Interface] on Motherboard) Memory	Details:
Size	512KB
Type	Flash (NOR)
Can user programs or operating system write data to it during normal operation?	No
Purpose	LAN on motherboard configuration and 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. LOMs loaded with arbitrary data in firmware memory would not operate.
How is this memory write protected?	Software control.
Server System FRU	**Details**
Size	16 KB
Type	SEEPROM
Can user programs or operating system write data to it during normal operation?	No
Purpose	Store System Events
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	SEEPROM
Can user programs or operating system write data to it during normal operation?	No
Purpose	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
Remarks	
TPM (Trusted Platform Module; boards sold to destinations in China do not have TPM at this time.)	**Details**
Size	128B
Type	EEPROM
Can user programs or operating system write data to it during normal operation?	Yes, OSs 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	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.
Remarks	
Backplane Firmware and FRU	**Details**
Size	32KB
Type	Flash
Can user programs or operating system write data to it during normal operation?	No
Purpose	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. A system loaded with arbitrary data in firmware memory would not operate.
Embedded Bootable Memory Device	**Details**
Size	1GB
Type	SD card
Can user programs or operating system write data to it during normal operation?	Yes
Purpose	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	SPI Flash
Can user programs or operating system write data to it during normal operation?	No
Purpose	Stores the BMC Firmware

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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.
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 following sites:

- http://ausreactorprd01/reactor/xCertSearch.asp
- http://www.dell.com/content/topics/global.aspx/about_dell/values/regulatory_compliance
  /dec_conform?c=us&l=en&s=corp

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

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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

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Appendix C.   Additional Information and Options

The Dell™ PowerEdge™ T310 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.AMD.com/design/chipsets/industry/lpc.htm
PCI Express PCI Express Base Specification Rev. 2.0	http://www.pcisig.com/specifications/pciexpress/
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.mspx