PowerEdge M610x

Technical Guide

PCIe expansion capabilities in the PowerEdge M610x bring a new dimension of flexibility and performance to the Dell M-Series.

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1.1 Overview

With PCI Express® (PCIe) expansion options and a feature rich Chassis Management Controller, the Dell™ PowerEdge™ M610x allows you to efficiently run applications, consolidate your data center, and simplify data management.

The PowerEdge M610x enables you to incorporate a vast array of PCIe-based products into the blade chassis framework with enough power and cooling to efficiently deploy even the most feature-rich, expansion-card-based solutions. With the addition of the PCIe expansion module, the PowerEdge M610x blade server is an ideal solution for organizations that need maximum flexibility and performance with high reliability. Maximized PCIe Generation 2 (Gen2) expansion is finally realized within a blade.

1.1.1   Unparalleled PowerEdge Flexibility

The PowerEdge M610x PCIe expansion module includes two full-length x16 PCIe Gen2 slots with supplemental power connectors that enable maximum wattage for one 300W dual-slot card or two 250W single-slot cards. These PCIe slots are capable of supporting everything from H-series external RAID controllers to general-purpose computing-on-graphics processing units (GPGPU).

Now, a single M610x, equipped with a NVIDIA® Tesla™ or AMD ATI FirePro™ GPU card, can perform over 400 Gigaflops of double-precision computations for demanding, floating-point-intensive workloads. Communication between the host system and the GPU processors is maximized by providing x16 PCIe Gen2 bandwidth, while the efficient Dell M1000e chassis powers and cools the solution to its maximum 247 W TDP (Thermal Design Power).

1.1.2   Uncompromised Performance

The PowerEdge M610x is an energy-efficient, optimized full-height two-socket server for virtualization and database applications. Additional manageability features make it easy to use, manage and deploy. As an ideal PCIe Host server, the M610x features the reliability of two 2.5" SAS or SSD hot-swappable hard drives and the I/O throughput of a dual-port embedded gigabit NIC and two additional network daughtercards. Intel® Xeon® processors 5600 series, plus up to 192 GB of DDR3 memory, offer high performance with low-power consumption for a variety of dense-environment workloads. The Platinum level (+94%) powered and modularly cooled PCIe expansion module delivers up to 8 GB per second of application throughput.

1.1.3   Simplified Systems Management

Spend more time on your business and less on maintaining your IT with embedded system management features on the PowerEdge M610x and the Chassis Management Controller (CMC). Simplified server and chassis management is achieved through automated discovery that automates configuration of new hardware through a one-to-many relationship and enables pre-provisioning of LAN/SAN resources.

In addition, one-to-many updating through the CMC and Virtual File Share simplifies the update process for BIOS, firmware and drivers without additional software. Proactive management provides immediate access to system status, issues and alerts through a single, easy-to-use interface that includes one-click key functions to help quickly resolve issues.

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1.2 Product Comparison

Table 1 compares the PowerEdge M610x blade server to the PowerEdge M610x, M710HD, and M710 servers.

Table 1.   Product Comparisons

	M610x	**M610**	**M710HD**	**M710**
Description	Special purpose full-height 2S	General purpose half-height 2S	General purpose half-height 2S	General purpose full-height 2S
Processor	Intel® Xeon® Processor 5500 or 5600 Series			
Front Side Bus	Two Intel QuickPath Interconnect (QPI)			
Sockets	Two			
Cores per Socket	Up to six			
L2/L3 Cache	8 MB (5500 Series) or 12 MB (5600 Series)			
Chipset	Intel 5520			
DIMMs	12 x DDR3 DIMMs (800/1066/1333MT/s)		18 x DDR3 DIMMs (800/1066/1333MT/s)	
Min/Max RAM	1 GB – 192 GB (16 GB DIMMS)			
Form Factor	Full-Height Blade, Dual Socket/Expansion module	Half-Height Blade, Dual Socket	Half-Height Blade, Dual socket	Full-Height Blade, Dual Socket
HDD Bays (2.5" only)	SAS: Two hot-pluggable 2.5" SATA: One 2.5"		SAS: Two hot-pluggable 2.5" SSD SATA: Two 2.5"	SAS: Four hot-pluggable 2.5" SSD SATA: Two 2.5"
HDD Types	SAS/SSD			
HDD Controller	PERC H200 PERC H700 PERC H800 SAS6/E	PERC H200 PERC H700 PERC 6/i SAS6/iR CERC 6/i	Embedded PERC H200	PERC H200 PERC H700 CERC 6/i
Optional HD Controller	SAS6/iR PERC6/i with RAID battery	SAS6/iR PERC6/i with RAID battery	Embedded H200	SAS6/iR PERC6i with RAID battery
Availability			Hot-plug hard drives ECC memory Single Device Data Correction (SDDC) Supports memory demand and patrol scrubbing High-availability failover cluster support	
Server	Integrated Dell Remote Access Controller iDRAC6 Express/Enterprise (both standard) with			

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	M610x	M610	M710HD	M710
Management	IPMI 2.0 +vMedia/vKVM, and CMC (on the PowerEdge M1000e chassis)			
Mezz Slots	Two x8 PCIe Gen2; Fabric B limited to a small form factor (SFF) mezzanine card	Two x8 PCIe Gen2; Fabric B limited to a small form factor (SFF) mezzanine card	Two x8 PCIe mezzanine cards	One x4 and three x8 PCIe mezzanine cards
I/O slots	Two x16 PCIe Gen2 H800/6 GB SAS NVIDIA® M2050-204, M2070, and M2070Q AMD FirePro™ V7800P	NA	NA	NA
RAID	0,1	0,1	0,1	0,1,5
NIC/LOM	Two-port Broadcom® 5709S 1 Gb with TOE plus optional iSCSI accelerator	Two-port Broadcom 5709S 1 Gb with TOE plus optional iSCSI accelerator	Four 1 GbE dual Broadcom BCM5709S	Four TOE with optional iSCSI offload
USB	Two external USB 2.0 ports at front bezel One internal USB port			Three external USB 2.0 ports at front bezel One internal USB port
SD Card	Two: One for Persistent Storage One for Management	Two: One for Persistent Storage One for Management	Two internal SD slots One for Persistent Storage One for Management (can also be configured as redundant SD cards for embedded hypervisor)	One internal SD slot One for Persistent Storage OR One for Management
TPM	Yes, except in China where TCM is the standard			
Video	Matrox® G200eW integrated into iDRAC chip			
Power Supplies	See the *PowerEdge M1000e Technical Guide*.			
Fans	See the *PowerEdge M1000e Technical Guide*.			
Chassis	See the *PowerEdge M1000e Technical Guide*.			

2 Key Technologies

2.1 Overview

The Dell™ PowerEdge™ M610x offers you expandability. The M610x is a half-height blade (based on the M610 server technology) and PCIe card expansion module within a PowerEdge M1000e full-height blade enclosure that provides the capability to use standard PCIe cards. Similar to the PowerEdge M610, the PowerEdge M610x features:

- Dual quad- and six-core Intel® Xeon® processor 5500 and 5600 series
- Intel IOH (24D I/O Hub)
- Intel QuickPath Architecture
- DDR3 memory
- DIMM thermal sensors
- PCI Express® Generation 2
- Internal SD Module
- iDRAC6 Express

The M610x incorporates the system board of the M610 plus a PCI module—two x16 PCIe slots. The module's 2nd Generation expansion slots can accommodate any standard full-length or full-height PCIe card. Supplemental power connectors allow, for the first time in the PowerEdge family, up to two 250W-PCIe cards or one 350W-PCIe card (inclusive of General-Purpose computation on Graphics Processing Units or GPGPU).

3 System Information

Table 2 summarizes the product features for the Dell™ PowerEdge™ M610x. For the latest information on supported features, visit Dell.com.

Table 2.   Product Features

Feature	Technical Specifications
Processors	Intel® Xeon® processor 5500 and 5600 series quad- and six-core 60 W, 80 W, 95 W, and 130 W TDP options
Chipset	Intel 5520
Memory[1]	1 GB, 2 GB, 4 GB, 8 GB, 16 GB 1066 MT/s and 1333 MT/s DDR3 12 DIMM slots with support for up to 192 GB using RDIMMs
Drive Bays	Two 2.5" SAS/Solid State hot-plug drives
Storage[1]	**Internal hot-plug hard drive options:** 2.5" SAS (10 K rpm): 146 GB, 300 GB, 600 GB, or 900 GB 2.5" SAS (15 K rpm): 146 GB 2.5" SATA (7.2 K rpm): 160 GB, 250 GB, or 500 GB Solid State Drives (SSD): 50 GB or 100 GB **Solid State Storage Cards:** Fusion-io® 160 GB ioDrive PCIe solid state storage card Fusion-io 640 GB ioDrive Duo PCIe solid state storage card Fusion-io 320GB ioDrive Mono PCIe solid state storage card Fusion-io 640GB ioDrive Mono PCIe solid state storage card Fusion-io 1.28TB ioDrive Duo PCIe solid state storage card **Maximum Internal Disk Storage:** Up to 1.8 TB using two 2.5" 900 GB hot-plug SAS hard drives
RAID Controller Options	PERC H200 Modular RAID Controller (6 Gb/s) PERC H700 Modular RAID Controller (6 Gb/s) with 512 MB battery-backed cache
I/O Mezzanine Card Options	Fully populated mezzanine card slots and switch modules will yield three redundant I/O fabrics per blade. **1 Gb and 10 Gb Ethernet:** Dual-Port Broadcom® Gb Ethernet with TOE (BCM-5709S) Quad-Port Intel Gb Ethernet Quad-Port Broadcom Gb Ethernet (BCM-5709S) Dual-Port Intel 10Gb Ethernet Dual-Port Broadcom 10Gb Ethernet (BCM-57711) **10Gb Enhanced Ethernet and Converged Network Adapters (CEE/DCB/FCoE):** Dual-Port Intel 10Gb Enhanced Ethernet (FcoE Ready for Future Enablement) Dual-Port Emulex® Converged Network Adapter (OCM10102-F-M; supports CEE/DCB

Feature	Technical Specifications
	10GbE + FcoE) Dual-Port Qlogic® Converged Network Adapter (QME8142; supports CEE/DCB 10GbE + FcoE) **Fibre Channel:** Dual-Port QLogic FC8 Fibre Channel Host Bus Adapter (HBA) (QME2572) Dual-Port Emulex FC8 Fibre Channel Host Bus Adapter (HBA) (LPe1205-M) Emulex 8 or 4 Gb/s Fibre Channel Pass-Through Module **InfiniBand™:** Dual-Port Mellanox® ConnectX®-2 Dual Data Rate (DDR) and Quad Data Rate (QDR) InfiniBand
Communications	Two embedded Broadcom NetXtreme II™ 5709 Gigabit Ethernet NICs with failover and load balancing. TOE (TCP/IP Offload Engine) supported on Microsoft® Windows Server® 2003 SP1 or higher with Scalable Networking Pack. iSCSI Offload supported on Windows Server® 2003 SP1 or higher, Red Hat® Enterprise Linux® 5, and SUSE® Linux® Enterprise Server 10. Scalable Networking Pack for Windows Server® 2003 is not required. Boot from SAN (iSCSI and FC) supported Optional add-in NICs: See I/O Mezzanine Card Options Optional add-in HBAs: See I/O Mezzanine Card Options
PCIe Expansion Bay	Two 2nd-generation full-length x16 slots with supplemental power for either two cards at 250 W draws or one card at a 300 W draw. **Supported GPU Options:** NVIDIA® Tesla™ M2050–204 448 core, double-width PCIe card with 3GB of memory NVIDIA Tesla M2070/M2070Q 448 core, double-width PCIe card with 6GB of memory AMD FirePro™ V7800P 1,440 core, single-width PCIe card with 2GB of memory **SAS/PERC Options:** Dell H800 PERC dual-port 6 Gb/s SAS RAID controller with up to 512MB cache Dell SAS6E HBA dual-port 6 Gb/s SAS HBA **Solid State Storage Options:** Fusion-io® 160GB ioDrive PCIe solid state storage card Fusion-io® 320GB ioDrive PCIe solid state storage card Fusion-io® 640GB ioDrive PCIe solid state storage card Fusion-io® 640GB ioDrive Duo PCIe solid state storage card Fusion-io® 1.28TB ioDrive Duo PCIe solid state storage card
Operating Systems	Microsoft Windows Server® 2012 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® Oracle® Solaris™

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Feature	Technical Specifications
	For more information on the specific versions and additions, visit Dell.com/OSsupport.
Virtualization OS Support	Citrix® XenServer® Microsoft Hyper-V through Microsoft Windows Server 2008 VMware® vSphere® including ESX™ and ESXi™ Red Hat Enterprise Virtualization®
Management Options	Dell OpenManage™ software tools Dell Management Console Integration with 3rd party management solutions via the Dell Certified Partner Program Altiris™ Deployment Solution for Dell Blade Servers Designed to help reduce deployment time from hours to minutes Integrated Dell Remote Access Controller (iDRAC) Out-of-Band alerting, status, inventory, and troubleshooting via Secure Web GUI / CLI (telnet/SSH) Console Redirection vMedia (virtual media)—Map optical or hard drives to the blade from remote workstations over a network vKVM (virtual KVM) out-of-band remote console redirection—supports Java or ActiveX plug-ins IPMI 2.0 support
Power Supply	Supplied by Dell PowerEdge M1000e Blade Chassis
Video	Integrated Matrox® G200 w/ 8 MB memory
Systems Management	BMC, IPMI2.0 compliant Dell OpenManage featuring Dell Management Console Unified Server Configurator Lifecycle Controller iDRAC6 Enterprise with optional vFlash
[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.	

4 Mechanical

4.1 Chassis Description

The Dell™ PowerEdge™ M610x is a full-height blade server that requires an M1000e chassis to operate.

Figure 1.   PowerEdge M1000e

The M610x server occupies two slots in the M1000e rack chassis for a maximum of eight blades in one M1000e chassis. It can be mixed with other existing Dell blades and is designed to mix with possible future half- and full-height double-wide blades. Some highlights are:

- Two full-size standard PCIe x16
- Front-cable access provided for add-in cards
- Support for RAID
- Support for persistent storage (internal USB connector and two external SD card slots)

Refer to the *PowerEdge M1000e Technical Guide* for information on fans, power and power supply, racks, security, and other chassis information.

4.2 Dimensions and Weight

The PowerEdge M610x dimensions and weight are as follows:

- **Height:** 38.5cm (15.2in)
- **Width:** 5cm (2in)
- **Depth:** 48.6cm (19.2in)
- **Weight (Maximum Configuration):** 11.1kg (24.5lb)

4.3 Internal Module View

A view of the internal module is shown in Figure 2. See the Opening and Closing the Blade in the *Dell PowerEdge Modular Systems Hardware Owner's Manual* on Support.Dell.com/Manuals for more information.

Figure 2.   Internal View

4.4 Security

The M610x offers a configurable client IP address range for clients connecting to iDRAC6. For additional information regarding the PowerEdge M610x security features, see the *Dell PowerEdge Modular Systems Hardware Owner's Manual* on Support.Dell.com/Manuals.

4.5 Cover Latch

The blade module includes a latch for the cover. See the Opening and Closing the Blade in the *Dell PowerEdge Modular Systems Hardware Owner's Manual* on Support.Dell.com/Manuals for more information.

4.6 Trusted Platform Module

The Trusted Platform Module (TPM) is used to generate/store keys, protect/authenticate passwords, and create/store digital certificates. TPM can also be used to enable the BitLocker™ hard drive encryption feature in Windows Server 2008. TPM is enabled through a BIOS option and uses HMAC-SHA1-160 for binding. TCM is available in China.

4.7 Power Off Security

Through the BIOS, the front blade server USB ports and power button can be disabled so as to not allow any control of the system from the front of the blade. The enclosure video can also be restricted.

The BIOS System Setup program's system security screen allows administrators to set the system password, control TPM activation and reporting, clear the TPM's memory, and disable the power button and USB ports.

4.8 USB Key

The M610x provides an internal USB connector for a USB flash memory key. The USB memory key can be used as a boot device, security key, or mass storage device.

4.9 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 ICH9 chip

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4.10 Field Replaceable Units

The planar contains a serial EEPROM to contain Field Replaceable Units (FRU) information including Dell part number, part revision level, and serial number.

4.11 User Accessible Jumpers, Sockets, and Connectors

For information, see the System Board Information chapter in the *Dell PowerEdge Modular Systems Hardware Owner's Manual* on Support.Dell.com/Manuals.

5 Power, Thermal, Acoustic

5.1 Power Supplies

See the *PowerEdge M1000e Technical Guide* for information on power supplies and power supply specifications.

5.2 Power Efficiency

One of the main features of blade servers is enhanced power efficiency. The Dell™ PowerEdge™ M610x achieves higher power efficiency by implementing the following features:

- User-configurable power options through the M1000e Chassis Management Controller (CMC) (see the M1000e documentation online at Support.Dell.com for further details)
- Improved power budgeting
- Voltage Regulator (VR) efficiency improvements
- CPU VR dynamic phase shedding
- Switching regulators instead of linear regulators
- Closed loop thermal throttling
- Use of DDR3 memory (lower voltage compared to DDR2)
- Memory VR static phase shedding
- BIOS Power/Performance options page
- Active Power Controller (BIOS-based CPU P-state manager)
- Ability to throttle memory
- Ability to disable a CPU core
- Ability to turn off embedded NICs or PCIe lanes when not being used
- Energy Smart components at the M1000e chassis level to selectively enable more computing performance with less power consumption.

5.3 Thermal Operating and Storage Specifications

The M610x thermal solution includes:

- Optimized airflow impedance for individual blade and chassis level airflow balancing
- Custom air baffling directs airflow through the components to maintain proper cooling
- Custom designed heat sinks maintain CPU, DIMM, and board-level chip temperatures within thermal design targets
- Separate airflow cooling path for the two full-length x16 PCIe Gen2 slots.
- Support for dual slot NVIDIA® GPU cards up to 250 W.
- Highly Optimized Fan Control Algorithm
  - Base fan speeds are a function of hardware configuration and ambient temperature to minimize airflow for a given environment.
  - Component algorithms: CPU PID, DIMMs, HW Configuration, IOH, GPU, and External Ambient.
  - The highest fan speed request from the above algorithms is used to set the appropriate fan speed for the blade.
  - Ambient and HW Configuration sets the minimum; other algorithms increase fan speed to maintain proper cooling.

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Thermal specifications for the PowerEdge M610x are detailed in Table 3 along with other important operating and storage information.

Table 3.   Operating and Storage Specifications

Temperature	
Operating	10° to 35^oC (50° to 95° F) with a maximum temperature gradation of 10° C per hour Note: For altitudes above 2950 feet, the maximum operating temperature is derated 1^oF/500ft
Storage	-40° to 65^oC (-40° to 149^oF) with a maximum temperature gradation of 20^oC per hour
Relative Humidity	
Operating	20% to 80% (noncondensing) with a maximum humidity gradation of 10% per hour
Storage	5% to 95% (noncondensing) with a maximum humidity gradation of 10% per hour
Maximum Vibration	
Operating	0.26 Grms at 5-350 Hz in operational orientations
Storage	1.54 Grms at 10-250 Hz in all orientations
Maximum Shock	
Operating	Half sine shock in all operational orientations of 31 G +/- 5% with a pulse duration of 2.6 ms +/- 10%
Storage	Half sine shock on all six sides of 71 G +/- 5% with a pulse duration of 2 ms +/- 10%
Altitude	
Operating	-15.2m to 3048 m (-50 to 10,000 ft) **Note:** For altitudes above 2950 ft, the maximum temperature is derated 1° F/550 ft
Storage	-16 to 10,600 m (-50 to 35,000 ft)
Airborne contaminant level	
Class G1 or lower as defined by ISA-S71.04-1985 (G1 maximum corrosive contaminant levels measured at ≤ 50% relative humidity)	

5.4 Acoustics

The acoustical design of the PowerEdge M610x reflects 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 or hums. Definitions for acoustical performance data are as follows:

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

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Table 4 shows the acoustical performance for a typical configuration of the M1000e chassis with four PowerEdge M610x blade servers installed. Acoustical performance varies with hardware configurations.

Table 4.   **Acoustical Performance of M1000e Chassis with Four M610x Blades Installed**

Typical Configuration (per blade) @ 23±2˚C Ambient in M1000e Chassis				Operating Mode	LwA-UL (bels)
Processors	Hard Drives	DIMMs	Mezzanine Cards		
Two Intel® Xeon® E5620 (80W)	Two SAS 2.5" 146 GB (15 K)	12 4GB DDR3	Two dual-port GbE FC	Idle	8.2

6   Processors

6.1 Overview

The Intel® Xeon® processor 5500 and 5600 series are designed specifically for servers and workstation applications. These processors feature quad-core processing to maximize performance and performance/watt for data center infrastructures and highly dense deployments. They feature Intel Core™ micro-architecture and Intel 64 architecture for flexibility in 64-bit and 32-bit applications and operating systems and use a 1366-contact Flip-Chip Land Grid Array (FC-LGA) package that plugs into a surface-mount socket. The Dell™ PowerEdge™ M610x provides support for up to two processors.

6.2 Features

Key features of the Intel Xeon processor 5500 series include:

- Up to four cores per processor
- Two point-to-point QuickPath Interconnect links at 6.4 GT/s
- 45 nm process technology
- No termination required for non-populated CPUs (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
- Executes up to four instructions per clock cycle
- Simultaneous Multi-Threading (SMT) capability
- Support for CPU Turbo Mode (on certain SKUs)
- Increases CPU frequency if operating below thermal, power and current limits
- 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 CPU power management as well as support for ACPI P-States, C-States and T-States

The Intel Xeon processor 5600 series encompasses all the features of the 5500 series along with:
- New top BIN processors at 130W TDP
- Support for DDR3L, 1.35v DIMMs for even lower system power
- Support for memory sparing
- AES-NI (hardware encryption assist) for more efficient encryption for uses such as online transactions SSL
- Intel TXT (Trusted Execution Technology) provides hardware assisted protection against emerging software attacks

Table 5.   Comparison of Processor Technology

Intel Xeon Processor	5400 Series	5500 Series	5600 Series
Cores	Four	Four	Six
Last Level Cache	Two 6 MB shared	8 MB shared	12 MB shared
FSB (MT/s) / Link Frequency (GT/s)	1333 MT/s	Up to 6.4 GT/s	Up to 6.4 GT/s
Max TDP	120 W	130 W for WS 95 W for Server	130 W for WS and Server
Max Frequency	>3 GHz	>3 GHz	>3 GHz
Memory Controller	Separate in chipset	Integrated 3-channel DDR3	Integrated 3-channel DDR3
Process Technology	45 nm	45 nm	32 nm
Intel® Trusted Execution Technology	No	No	Yes
Intel® Advanced Encryption Security- New Instructions	No	No	Yes
Intel® Virtualization Technology	Yes	Yes	Yes
Intel® 64	Yes	Yes	Yes
Intel® Hyper-Threading Technology	No	Yes	Yes
Socket	LGA771	LGA1366	LGA1366

6.3 Supported Processors

Table 6.   Supported Processors

Model	Speed	TDP Power	Cache	Cores	Max Memory Speed	QPI Link Speed	Turbo Mode Enabled	Hyper-threading
X5690	3.46 GHz	130 W	12 M	6	1333 MT/s	6.4 GT/s	Yes	Yes
X5680	3.33 GHz	95 W	12 M	6	1333 MT/s	6.4 GT/s	Yes	Yes
X5675	3.06 GHz	95 W	12 M	6	1333 MT/s	6.4 GT/s	Yes	Yes
X5670	2.93 GHz	95 W	12 M	6	1333 MT/s	6.4 GT/s	Yes	Yes
X5660	2.8 GHz	95 W	12 M	6	1333 MT/s	6.4 GT/s	Yes	Yes
X5650	2.66 GHz	95 W	12 M	6	1333 MT/s	6.4 GT/s	Yes	Yes
L5640	2.26 GHz	60 W	12 M	6	1066 MT/s	5.86 GT/s	Yes	Yes
E5649	2.53 GHz	80 W	12 M	6	1333 MT/s	5.86 GT/s	Yes	Yes

Model	Speed	TDP Power	Cache	Cores	Max Memory Speed	QPI Link Speed	Turbo Mode Enabled	Hyper-threading
E5645	2.4 GHz	80 W	12 M	6	1333 MT/s	5.86 GT/s	Yes	Yes
X5687	3.6 GHz	130 W	12 M	4	1333 MT/s	6.4 GT/s	Yes	Yes
X5677	3.46 GHz	130 W	12 M	4	1333 MT/s	6.4 GT/s	Yes	Yes
X5672	3.2 GHz	95 W	12 M	4	1333 MT/s	6.4 GT/s	Yes	Yes
X5667	3.06 GHz	95 W	12 M	4	1333 MT/s	6.4 GT/s	Yes	Yes
X5647	2.93 GHz	130 W	12 M	4	1333 MT/s	5.86 GT/s	Yes	Yes
E5640	2.66 GHz	80 W	12 M	4	1066 MT/s	5.86 GT/s	Yes	Yes
E5630	2.53 GHz	80 W	12 M	4	1066 MT/s	5.86 GT/s	Yes	Yes
E5620	2.4 GHz	80 W	12 M	4	1066 MT/s	5.86 GT/s	Yes	Yes
L5630	2.13 Ghz	40 W	12 M	4	1066 MT/s	5.86 GT/s	Yes	Yes
L5609	1.86 GHz	40 W	12 M	4	1066 MT/s	4.8 GT/s	No	No
X5560	2.8 GHz	95 W	8 M	4	1333 MT/s	6.4 GT/s	Yes	Yes
E5530	2.4 GHz	80 W	8 M	4	1066 MT/s	5.86 GT/s	Yes	Yes
L5520	2.26 GHz	60 W	8 M	4	1066 MT/s	5.86 GT/s	Yes	Yes
E5507	2.13 GHz	80 W	4 M	4	800 MT/s	4.8 GT/s	No	No
E5506	2.13 GHz	60 W	4 M	4	800 MT/s	4.8 GT/s	No	No
E5503	2.0 GHz	80 W	4 M	2	800 MT/s	4.8 GT/s	No	No

6.4 Processor Installation

See the Processors section in the Installing Blade Components chapter in the *Dell PowerEdge Modular Systems Hardware Owner's Manual* on Support.Dell.com/Manuals.

7 Memory

7.1 Overview

The Dell™ PowerEdge™ M610x uses DDR3 memory providing a high-performance, high-speed memory interface capable of low latency response and high throughput. The M610x supports Registered ECC DDR3 DIMMs (RDIMM) as well as the low-voltage RDIMMs and Unbuffered ECC DDR3 DIMMs (UDIMM).

The DDR3 memory interface consists of three channels, with up to two RDIMMs or UDIMMs per channel for single/dual rank and up to two RDIMMs per channel for quad rank. The interface uses 2 GB, 4 GB, or 8 GB RDIMMs. 1 GB or 2 GB UDIMMs are also supported. The memory mode is dependent on how the memory is populated in the system:

- Three channels per CPU populated identically
  - o Typically, the system will be set to run in Memory Optimized (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, and serviceability) features.
  - o All three channels must be populated identically.
  - o Memory sparing is not supported on the M610x with 5500 series processors.
- The first two channels per CPU populated identically with the third channel unused
  - o 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).
  - o For Memory Mirroring, two channels operate as mirrors of each other—write functions go to both channels and read functions alternate between the two channels.
- One channel per CPU populated (This is a simple Memory Optimized mode. No mirroring or sparing is supported.)

The M610x 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 with SDDC in the Advanced ECC mode. Additionally, correction of a x4 device failure is possible in the Memory Optimized mode.

7.2 DIMMs Supported

The following memory requirements apply to the M610x:

- If DIMMs of different speeds are mixed, all channels operate at the fastest common frequency.

- RDIMMs and UDIMMs cannot be mixed.

- If memory mirroring is enabled, identical DIMMs must be installed in the same slots across both channels. The third channel of each processor is unavailable for memory mirroring.

- The first DIMM slot in each channel is color-coded with white ejection tabs for ease of installation.

- The M610x memory system supports up to 12 DIMMs. DIMMs must be installed in each channel starting with the DIMM farthest from the processor. Population order will be identified by the silkscreen designator and the System Information Label (SIL) located on the chassis cover.

7.3 Memory Features

Key features of the Dell™ PowerEdge™ M610x memory system include:

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

Memory sparing is not supported on 5500 series processors. It is supported on systems using 5600 series processors. While 800 MT/s DIMMs are not supported, the installation of two quad-rank 1066 MT/s DIMMs will operate at 800 MT/s.

7.4 Speed

The memory frequency is determined by a variety of inputs:

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

For quad-rank DIMMs mixed with single- or dual-rank DIMMs, the quad-rank (QR) DIMM needs to 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 (SR) and dual-rank (DR) DIMMs.

Table 7 shows the memory populations and the maximum frequency achievable for that configuration.

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Table 7.   Maximum Supported Memory Frequencies

DIMM Type	DIMM 0	DIMM 1	# of DIMMs	800	1066	1333
UDIMM	SR	—	1	✓	✓	✓
	DR	—	1	✓	✓	✓
	SR	SR	2	✓	✓	✗
	SR	DR	2	✓	✓	✗
	DR	DR	2	✓	✓	✗
RDIMM	SR	—	1	✓	✓	✓
	DR	—	1	✓	✓	✓
	QR	—	1	✓	✓	✗
	SR	SR	2	✓	✓	✗
	SR	DR	2	✓	✓	✗
	DR	DR	2	✓	✓	✗
	QR	SR	2	✓	✗	✗
	QR	DR	2	✓	✗	✗
	QR	QR	2	✓	✗	✗

8   Chipset

8.1 Overview

The Dell™ PowerEdge™ M610x system board incorporates the Intel 5500 chipset for I/O and processor interfacing which was designed to support Intel Xeon Processor 5500 and 5600 Series, QuickPath Interconnect, DDR3 memory technology, and PCI Express Generation 2. The chipset consists of the I/O Hub (IOH) and Intel I/O Controller Hub 9 (ICH9).

8.2 I/O Hub

The M610x system board uses the Intel 5520 chipset 24D I/O hub (IOH) to provide a link between the processor(s) and I/O components. The main components of the IOH consist of two full-width QuickPath Interconnect links (one to each processor), 24 lanes of PCI Express Gen2, a x4 Direct Media Interface (DMI), and an integrated IOxAPIC.

8.2.1   QuickPath Interconnect

The QuickPath Interconnect (QPI) architecture consists of serial point-to-point interconnects for the processors and the IOH. The M610x has a total of three QPI links: one link connecting the processors and two links connecting both processors with the IOH. 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 CPUs features four layers. The Physical layer consists of the actual connection between components. It supports Polarity Inversion and Lane Reversal for optimizing component placement and routing. The Link layer is responsible for flow control and the reliable transmission of data. The Routing layer is responsible for the routing of QPI data packets. Finally, the Protocol layer is responsible for high-level protocol communications, including the implementation of a MESIF (Modify, Exclusive, Shared, Invalid, Forward) cache coherence protocol.

8.2.2   PCI Express

PCI Express (PCIe) is a serial point-to-point interconnect for I/O devices. PCIe Generation 2 doubles the signaling bit rate of Generation 1 from 2.5 Gb/s to 5 Gb/s. Each of the PCIe Gen2 ports are backward-compatible with Gen1 transfer rates.

The IOH 24D has 24 PCI Express lanes. The lanes are partitioned as two x2 ports and combined as a x4 PCI Express Gen2 port for the LOM1. The next port is a x4 PCI Express Gen2 port for LOM2 and the remaining x4 ports are combined as two x8 PCI Express Gen2 ports for the mezzanine cards. These last two x8 Gen2 ports are the entities that provide communication for the M610x functionality.

8.2.3   Direct Media Interface

The Direct Media Interface (DMI) connects the IOH with the Intel I/O Controller Hub 9 (ICH9). The DMI is equivalent to a x4 PCIe Gen1 link with a transfer rate of 1 GB/s in each direction.

8.2.4   I/O Controller Hub 9

The I/O Controller Hub 9 (ICH9) is a highly integrated I/O controller, supporting the following functions:
- Six x1 PCI Express Gen1 ports, with the capability of combining ports 1-4 as a x4 link (The x4 link is routed to the storage controller card connector.)

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- PCI Bus 32-bit Interface Rev 2.3 running at 33 MT/s
- Serial ATA (SATA) ports with transfer rates up to 300 MB/s
- Six UHCI and two EHCI (high-speed 2.0) USB host controllers, with up to 12 USB ports (The M610x provides four of these ports for internal and external use.)
- Power management interface (ACPI 3.0b compliant)
- Platform Environmental Control Interface (PECI)
- I/O interrupt controller
- SMBus 2.0 controller
- Low Pin Count (LPC) interface to Trusted Platform Module (TPM), and SPI-VU
- Serial Peripheral Interface (SPI) support for up to two devices (The M610x BIOS is connected to the ICH9 using SPI.)

8.2.5 PCI Express Mezzanine Connectors

The Planar Mezzanine connectors provide connection to the Mezzanine I/F Card.

9 BIOS

9.1 Overview

The M610x BIOS is based on the Dell BIOS core, and supports the following features:

- Intel Xeon processor 5500 and 5600 series 2S support
- Simultaneous Multi-Threading (SMT) support
- CPU 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, USB key, and SD card
- ACPI support
- Direct Media Interface (DMI) support
- PXE, ISCSI, and WOL support for on-board NIC
- Memory mirroring
- 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 Server Configurator (UEFI 2.1) support
- Power management support including DBS, Power Inventory and multiple Power Profiles

9.2 Supported ACPI States

The M610x supports the standard Advanced Configuration and Power Interface (ACPI) states.
To learn more see http://www.acpi.info/.

10 Embedded NICs/LAN on Motherboard

Two embedded Broadcom® 5709S dual-port LAN controllers are on the Dell™ PowerEdge™ M610x planar as independent Gigabit Ethernet interface devices. The following information details the features of the LAN devices:

- x4 PCI Express Gen2 capable interface
- The M610 operates this controller at Gen1 speed
- Integrated MAC and PHY
- 3072x18 Byte context memory
- 64 KB receive buffer
- TOE (TCP Offload Engine)
- NC-SI (Network Controller-Sideband Interface) connection for manageability
- Wake-On-LAN (WOL)
- PXE 2.0 remote boot
- iSCSI boot
- IPv4 and IPv6 support
- Bare metal deployment support
- ISCSI offload accelerator: used for offloading ISCSI traffic as an ISCSI accelerator/HBA – Optionally enabled through a hardware key

The embedded NICs are not sharable with iDRAC since the blade iDRAC has a dedicated 100Mbps link (Fabric D).

11 I/O Mezzanine Card Options

11.1.1 Overview

The M610x contains two PCIe Gen2 mezzanine slots. Installation of mezzanine cards requires an M1000e I/O Module (IOM) of the same fabric technology to be installed in the corresponding fabric slot of the mezzanine to support data flow through that fabric/slot.

For more information, refer to the *PowerEdge M1000e Technical Guide*.

11.1.2 Options

Available options include:

- Broadcom Dual-Port 5709
- Broadcom Quad-Port 5709
- Intel® ET Quad-Port 82576
- Broadcom Dual-Port 57711
- Intel Ethernet X520 10GbE x/k
- QLogic® CNA QME8142
- Emulex® CNA OCM10102FM
- QLogic QME2572 (FC8)
- Emulex LPe1205 (FC8)
- Mellanox® ConnectX®-2 DDR IB (SFF)
- Mellanox ConnectX-2 QDR IB (SFF)

11.1.3 PCIe Card Support

The following cards are supported:
- Dell cards
    - H800 controller
    - 6GB SAS controller
- Fusion-io® cards (drop in the box)
    - Fusion-io 160GB ioDrive PCIe solid state storage card
    - Fusion-io 320GB ioDrive PCIe solid state storage card
    - Fusion-io 640GB ioDrive PCIe solid state storage card
    - Fusion-io 640GB ioDrive Duo PCIe solid state storage card
    - Fusion-io 1.28TB ioDrive Duo PCIe solid state storage card
- NVIDIA® cards (cards installed, drivers available on NVIDIA site)
    - Tesla™ M2050-204 448 core, double-width card with 3GB of memory
    - Tesla M2070/M2070Q 448 core, double-width card with 6GB of memory
- AMD FirePro™ V7800P 1,440 core, single-width card with 2GB of memory

11.1.4 GPGPU Cards

General-Purpose computation on Graphics Processing Units (GPGPU) are high-performance many-core processors that can be used to accelerate a wide range of applications. General-purpose acceleration provides performance boosts for many applications in energy exploration, science, and financial services and is commonly found in a high-performance computing (HPC) environment.

11.1.5   Fusion-io Cards

Fusion-io's family of products is based on a new solid state technology that increases bandwidth and application performance, reduces latency, and simplifies IT infrastructure. Fusion-io products:

- Integrate with servers at the system bus and kernel level, creating a new Flash memory tier
- Accelerate applications, improves response times, and boosts efficiency
- Reduce storage latencies and eliminates I/O bottlenecks
- Deliver the performance of thousands of disk drives in a single server

12 Storage

12.1 Overview

All enterprise-class 2.5" storage drives sold by Dell are qualified, including those that offer Self Encrypting Drive functionality as well as the 6 Gb SAS drives. All storage drives used with the PERC H700 must be purchased from Dell.

12.2 Hard Disk Drive Carriers

The Dell™ PowerEdge™ M610x supports the 11G 2.5" hard drive carrier.

Figure 3.   2.5" HDD Carrier

12.3 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.

12.4 Diskless Configuration Support

The system supports diskless configuration with no storage controller (H200/PERC 7i) installed in the system. A 2.5" hard drive backplane is installed in this configuration.

12.5 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 SEP device on the backplane. Both LEDs are used to indicate certain conditions under direction of a storage controller.

12.6 Optical Drives

Optical drives are optional in all M610x systems and connect to the blade through the front USB interface. The following internal slim-line drives are available on the M610x: DVD-ROM and DVD+RW. PATA (IDE) optical drives are not supported.

12.7 RAID Cards

The M610x will support a variety of RAID cards.

12.7.1 SATA Repeater

The PE M610x internal SATA Repeater HBA is an expansion card that plugs into the dedicated storage controller slot. It is connected to the ICH9 SATA port via that slot for support of one SATA 2.5" hard drive. The SATA drives are NOT hot pluggable.

12.7.2 PERC6/i

For customers who want a hardware RAID solution, the PERC6i is an option, as a customer kit. The PERC6i uses the LSI 1078 ROC (RAID on Chip) processor with a PCI Express host interface and DDR2 memory. A battery is available with this card. For details of this card, see the PERC6 Hardware Product Specification.

12.7.3 H200

The M610x supports the latest SAS solution called H200.

12.7.4 H700 and H800

The M610x supports the latest PERC solutions: the H700 and H800. Details of the PERC H700M can be found in the [PERC H700 and H800 Technical Guidebook](). Both offer a battery-backed cache.

12.8 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 SEP device on the backplane. Both LEDs are used to indicate certain conditions under direction of a storage controller.

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13 Video

The Dell™ PowerEdge™ M610x Integrated Dell Remote Access Controller 6 (iDRAC6) incorporates an integrated video subsystem, connected to the 32-bit PCI interface of the ICH9. This logic is based on the Matrox® G200 with 8 MB of cache. The device only supports 2D graphics.

The M610 system supports the 2D graphics video modes listed in Table 8.

Table 8.   Supported 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

For information on rack and cable accessories for the Dell™ PowerEdge™ M610x, see the *PowerEdge M1000e Technical Guide* and the M1000e Rack and Cable Advisor Tool.

15 Operating Systems

The Dell™ PowerEdge™ M610x is designed to meet the MSFT WinLogo 3.0 design specifications. For the most up-to-date information, see the Operating System Support Matrix for Dell PowerEdge Systems on Dell.com.

16 Virtualization

16.1 Resources

The Dell™ Support site has extensive information designed to help you configure virtualization software with PowerEdge servers. For more information, visit the following sites:

- Dell Virtualization Solution Advisor: Advisement for configuring a complete virtualization solution.
- Supported virtualization platforms: Detailed listing of virtualization platforms supported by Dell OpenManage™.
- Support.dell.com: Other blade-related virtualization documents.

For information about which versions of VMware software have been certified on this server, see the compatibility list maintained by VMware.

It is possible to order the server with an SD card that does not contain ESXi.

16.2 Advanced Infrastructure Manager by Scalent

Dell Advanced Infrastructure Manager (AIM) allows IT organizations to manage networking, storage, and servers (as well as server workloads) that can be dynamically reconfigured and deployed to meet the changing needs of today's data center environment. Specifically, AIM provides IT professionals the ability to:

- Combine new and existing networking, storage devices, and servers into a holistic computing solution that enables dynamic allocation of resources to meet application workload requirements.
- Manage physical and virtual resources with a single solution that includes the ability to move workloads seamlessly across hardware platforms for increased availability and scalability.
- Provide virtualization-like functionality to non-virtual (physical) servers, including automated failover, dynamic load balancing, and business continuity.
- Integrate existing infrastructure (networking, storage devices, and servers) into an AIM solution to provide investment protection and extend the useful life of existing data center assets.
- Significantly decrease the amount of time and people required to deploy hardware and get applications up and running by providing a repeatable, scalable framework for hardware implementation using AIM.

More information can be found at Dell.com/AIM.

17 Systems Management

17.1 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.

17.2 Server Management

A Dell Systems Management and Documentation DVD, Dell Management Console DVD, and ISO images are included with the product. See Table 9 for a description of the available content.

Table 9.   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.

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Title	Description
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.

17.3 Embedded Server Management

The PowerEdge M610x 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.

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.

17.4 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 10 details current functionality enabled by the USC.

Table 10.   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

Feature	Description
	choose virtual disk as boot device, eliminating the need to launch a separate utility. Also provides configuration for iDRAC, BIOS, and NIC/LOM.

17.5 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 different country.

iDRAC6 Enterprise is a standard feature on the M610x, and Virtual Flash (vFlash) media is a purchasable option.

17.6 iDRAC6 Enterprise

The iDRAC6 Enterprise card provides access to advanced iDRAC6 features. The iDRAC6 Enterprise connects directly to the M610x 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

17.7 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 base management functionality, iDRAC6 Enterprise, and vFlash media is shown in Table 11.

Table 11.　Features List for Base Management Functionality, iDRAC, and vFlash Media

Feature	Base Management Functionality	iDRAC6 Enterprise	vFlash Media
Interface and Standards Support			
IPMI 2.0	✓	✓	✓
Web-based GUI		✓	✓

Feature	Base Management Functionality	iDRAC6 Enterprise	vFlash Media
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		✓	✓
Virtual console		✓	✓
Virtual console sharing		✓	✓
Virtual flash			✓
Monitoring			
Sensor Monitoring and Alerting	✓	✓	✓
Real-time Power Monitoring		✓	✓
Real-time Power Graphing		✓	✓
Historical Power Counters		✓	✓

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Feature	Base Management Functionality	iDRAC6 Enterprise	vFlash Media
Logging Features			
System Event Log	✓	✓	✓
RAC Log		✓	✓
Trace Log		✓	✓

17.8 Chassis Management Controller (CMC)

See the *PowerEdge M1000e Technical Guide*.

18 Peripherals

18.1 USB Peripherals

The Dell™ PowerEdge™ M610x supports the following USB devices:

- DVD (bootable; requires two USB ports)

- USB Key (bootable)

- Keyboard (only one USB keyboard is supported)

- Mouse (only one USB mouse is supported)

18.2 External Storage

By use of the appropriate IOMs in the M1000e chassis and mezzanine card(s) in the M610x blade, the following external storage options are available:

- Disk Storage Options:
  - Dell EqualLogic™ PS5000 Series
  - PowerVault™ NX1950 Unified Storage Solution
  - PowerVault MD3000i
- Dell/EMC fibre channel and/or iSCSI external storage, including:
  - CX300
  - CX3-10c
  - CX3-20
  - CX3-40
  - CX3-80
  - CX4-120
  - CX4-240
  - CX4-480
  - CX4-960

Appendix A.   Statement of Volatility

The Dell™ PowerEdge™ M610x blade and its configurable modules contain 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. Dell PowerEdge blades may contain hard disk drives that retain customer data after the system is powered off. Data should be removed from these hard disk drives using locally approved methods before they are removed from a secured environment.

Table 12.   PowerEdge M610x Statement of Volatility

Server BIOS Memory	Details
Size	4 MB
Type	SPI Flash
Purpose	There is boot code and application code. The code is vital to the system booting to the OS. Contains the BIOS code.
Can user programs or operating system write data to it during normal operation?	No
How is data input to this memory?	Flashed in the factory or using Dell flash utility
How is this memory write protected?	Software write protected
System FRU	**Details**
Size	256 Kb
Type	Serial I2C EEPROM, nonvolatile
Purpose	This chip stores some system configuration information (system type, board PPID information, etc.)
Can user programs or operating system write data to it during normal operation?	Yes; a user can enter a username and password which will be stored in the chip
How is data input to this memory?	I2C bus from the iDRAC6
How is this memory write protected?	Only the iDRAC6 can write to the chip
Server CMOS (Complementary Metal-Oxide Semiconductor) Memory	**Details**
Size	256 bytes
Type	CMOS
Purpose	BIOS configurations
Can user programs or operating system write data to it during normal operation?	Using BIOS setup
How is data input to this memory?	BIOS defaults, BIOS setup
How is this memory write protected?	NA
Remarks	RTC is inside ICH9; jumper on motherboard can be

	used to reset to factory default settings
Server LOM Memory	**Details**
Size	4 Mb (1 MB)
Type	Flash
Purpose	Contains LOM boot code and config data
Can user programs or operating system write data to it during normal operation?	Yes, under software control
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
Broadcom Integrated LOM Hardware License Key (optional)	**Details**
Size	256 bytes (dual port)
Type	Serial Flash
Purpose	TOE + iSCSI Offload Licensing
Can user programs or operating system write data to it during normal operation?	No
Does it retain data when powered off?	Yes
How is data input to this memory?	Serial write-through external interface during factory process
How is this memory write protected?	None
Server Video Memory	**Details**
Size	64 M x16
Type	DDR2 SDRAM
Purpose	Graphics Buffer
Can user programs or operating system write data to it during normal operation?	Yes
How is data input to this memory?	Normal Operation
How is this memory write protected?	No
CPLD	**Details**
Size	2280 logic elements; 7.5 Kbits RAM; 27.6 Kbits EBR SRAM
Type	Programmable Logic Device
Purpose	Provide blade power sequencing and other blade control logic
Can user programs or operating system write data to it during normal operation?	Yes; customer can use DOS program to update CPLD image

How is data input to this memory?	By way of specialized programming utilities used in the factory and possibly for field updates
How is this memory write protected?	Software control
HDD Backplane Firmware (SEP) Memory	**Details**
Size	32 KB
Type	Flash
Purpose	Interface between the RAID controller and the hard drives as well as a controller for the HDD status LED
Can user programs or operating system write data to it during normal operation?	No; a special (not available to customers) DOS utility is needed to flash the application code, and the boot block is cable flashed only
How is data input to this memory?	Cable flash to flash entire chip or a special utility (not available to customers) to flash in DOS
How is this memory write protected?	Software write protected; no hardware protection pin
iDRAC6 Enterprise SPI Flash	**Details**
Size	2MB
Type	SPI Flash
Purpose	There is boot code that is used by the iDRAC6 Enterprise management controller. Also contains the Life Cycle Log which contains server management data unique to the run-time events of the server itself.
Can user programs or operating system write data to it during normal operation?	No
How is data input to this memory?	Flashed in the factory or using Dell flash utility. Also written to by the iDRAC6 Enterprise controller to make Life Cycle Log (LCL) entries.
How is this memory write protected?	Software write protected
TPM (for boards shipped outside of China; boards sold to destinations in China do not have TPM at this time)	**Details**
Size	Unspecified size of user ROM, RAM, EEPROM; 128 bytes of OTP memory included
Type	ROM, RAM, EEPROM
Purpose	Trusted Platform Module NV storage; may be used to securely store user data
Can user programs or operating system write data to it during normal operation?	Yes, OSes 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
How is data input to this memory?	TCG TPM Specification defined command

	interface
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
iDRAC6 Enterprise Card FRU	**Details**
Size	2 KB (256 bytes)
Type	Serial I2C EEPROM, nonvolatile
Purpose	This chip stores some system configuration information (system type, board PPID information, etc.)
Can user programs or operating system write data to it during normal operation?	No; a special (not available to customers) DOS utility is needed to flash the application code
How is data input to this memory?	I2C bus from the iDRAC
How is this memory write protected?	Only the iDRAC can write to the chip
iDRAC6 Enterprise Card eMMC	**Details**
Size	1 GB
Type	NAND Flash
Purpose	Stores the iDRAC6 kernel and other data for system management
Can user programs or operating system write data to it during normal operation?	Yes, under software control
How is data input to this memory?	I2C bus from the iDRAC
How is this memory write protected?	Only the iDRAC can write to the chip
EDID FRU	**Details**
Size	2 Kb (256 bytes)
Type	Serial I2C EEPROM, nonvolatile
Purpose	Stores active video disply information
Can user programs or operating system write data to it during normal operation?	No
How is data input to this memory?	I2C bus from iDRAC6
How is this memory write protected?	Only the iDRAC can write to the chip to support its integrated video
Mezzanine Interface Card FRU	Details
Size	2 Kb (256 bytes)
Type	Serial I2C EEPROM, nonvolatile
Purpose	Stores system configuration information (system type, board PPID information, etc.)
Can user programs or operating system write data to it during normal operation?	No; a special (not available to customers) DOS utility is needed to flash the application code

How is data input to this memory?	I2C bus from iDRAC6
How is this memory write protected?	Only the iDRAC6 can write to the chip
PCIe Riser Card FRU	**Details**
Size	2 Kb (265 bytes)
Type	Serial I2C EEPROM, nonvolatile
Purpose	Stores system configuration information (system type, board PPID information, etc.)
Can user programs or operating system write data to it during normal operation?	No; a special (not available to customers) DOS utility is needed to flash the application code
How is data input to this memory?	I2C bus from iDRAC6
How is this memory write protected?	Only the iDRAC6 can write to the chip
PCIe Riser Card SPI EEPROM	**Details**
Size	128 KB
Type	Serial I2C EEPROM, nonvolatile
Purpose	Stores system configuration information used by the PCIe switch
Can user programs or operating system write data to it during normal operation?	Yes; a special DOS utility (potentially available to customers) is needed to flash the application code
How is data input to this memory?	Dedicated interface to the PCIe switch
How is this memory write protected?	Only the PCIe can write to the chip
Midplane Interface Card FRU	**Details**
Size	2 Kb (256 bytes)
Type	Serial I2C EEPROM, nonvolatile
Purpose	Stores system configuration information (system type, board PPID information, etc.)
Can user programs or operating system write data to it during normal operation?	No; a special (not available to customers) DOS utility is needed to flash the application code
How is data input to this memory?	I2C bus from iDRAC6
How is this memory write protected?	Only the iDRAC can write to the chip
Extended CPLD	**Details**
Size	1200 logic elements; 6.25 Kb RAM; 9 Kb EBR SRAM
Type	Programmable Logic Device
Purpose	Provide blade power sequencing and other blade control logic
Can user programs or operating system write data to it during normal operation?	Yes; customer can use DOS program to update CPLD image
How is data input to this memory?	By way of specializing programming utilities used in the factory and possibly for field updates

How is this memory write protected?	Software control

Appendix B.   Certifications

B 1. Regulatory Certifications

Regulatory compliance certificates can be located at the following sites:

- 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 13.

Table 13.   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 14.

Table 14.   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 15.

Table 15.   Ergonomics, Acoustics and Hygienics

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

Appendix C.   Industry Standards

The Dell™ PowerEdge™ M610x conforms to the industry standards shown in Table 16.

Table 16.   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

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Standard	URL for Information and Specifications
UEFI Unified Extensible Firmware Interface Specification, v2.1	http://www.uefi.org/specs/
USB Universal Serial Bus Specification, Rev. 2.0	http://www.usb.org/developers/docs/
Microsoft® Windows® Logo Windows Logo Program System and Device Requirements, v3.10	http://www.microsoft.com/whdc/winlogo/hwrequirements.mspx