

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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Revision 2

December 2010

Table of Contents

1	Product Comparison	1
1.1	Overview	1
1.1.1	Unparalleled PowerEdge Flexibility	1
1.1.2	Uncompromised Performance	1
1.1.3	Simplified Systems Management	1
1.2	Product Comparison	2
2	New Technologies.....	4
2.1	Overview	4
3	System Information	5
3.1	Overview	5
4	Mechanical	8
4.1	Chassis Description.....	8
4.2	Dimensions and Weight.....	8
4.3	Internal Module View	9
4.4	Security.....	9
4.5	Cover Latch	9
4.6	TPM (Trusted Platform Module).....	9
4.7	Power Off Security.....	9
4.8	USB Key	10
4.9	Battery.....	10
4.10	Field Replaceable Units (FRU).....	10
4.11	User Accessible Jumpers, Sockets, and Connectors.....	10
5	Power, Thermal, Acoustic	11
5.1	Power Supplies	11
5.2	Power Efficiency	11
5.3	Thermal Operating and Storage Specifications	11
5.4	Acoustics	12
6	Processors	14
6.1	Overview	14
6.2	Features	14
6.3	Supported Processors	16
6.4	Processor Installation.....	16
7	Memory	17
7.1	Overview	17
7.2	DIMMs Supported	17
7.3	Memory Features.....	18
7.4	Memory Speed Limitations.....	18
8	Chipset	20
8.1	Overview	20
8.2	I/O Hub (IOH).....	20
8.2.1	QuickPath Interconnect (QPI)	20
8.2.2	PCI Express.....	20
8.2.3	Direct Media Interface (DMI)	20
8.2.4	I/O Controller Hub 9 (ICH9).....	20
8.2.5	PCI Express Mezzanine Connectors	21
9	BIOS.....	22
9.1	Overview	22
9.2	Supported ACPI States.....	22

10	Embedded NICs/LAN on Motherboard (LOM)	23
10.1	Overview	23
10.2	Platform Networking LAN on Motherboard (LOM) Technology Overview	23
10.3	I/O Slots (I/O Mezzanine Card Options for M1000e)	24
10.3.1	Overview	24
10.3.2	Options	24
10.3.3	PCIe Card Support	24
10.3.4	NVIDIA Cards	24
10.3.5	Fusion-io Cards	25
11	Storage	26
11.1	Overview	26
11.2	Hard Disk Drive Carriers	26
11.3	Empty Drive Bays	26
11.4	Diskless Configuration Support	26
11.5	Hard Drive LED Indicators	27
11.6	Optical Drives	27
11.7	RAID Cards	28
11.7.1	SATA Repeater	28
11.7.2	PERC6/i	28
11.7.3	H200	28
11.7.4	H700 and H800	28
11.8	LED Indicators	28
11.9	Optical Drives	28
12	Video (PCI Video)	29
13	Rack Information	30
14	Operating Systems	31
15	Virtualization	32
15.1	Resources	32
15.2	Advanced Infrastructure Manager by Scalent	32
15.3	Vizioncore	32
16	Systems Management	34
16.1	Overview	34
16.2	Server Management	34
16.3	Embedded Server Management	35
16.4	Lifecycle Controller and Unified Server Configurator	35
16.5	The iDRAC6 Enterprise	36
16.6	Chassis Management Controller (CMC)	37
17	Peripherals	38
17.1	USB Peripherals	38
17.2	External Storage	38
Appendix A.	Standards Compliance	39
Appendix B.	Regulatory Certifications	41
Appendix C.	Additional Technical Specifications	42

Tables

Table 1.	Product Comparisons	2
Table 2.	Product Features	5
Table 3.	Operating and Storage Specifications	12
Table 4.	Typical Configuration for Acoustical Performance Analysis	13
Table 5.	Comparison of Processor Technology	15

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Table 6.	Supported Processors	16
Table 7.	Maximum Supported Memory Frequencies	19
Table 8.	Supported Video Modes	29
Table 9.	Unified Server Configurator Features and Description.....	35
Table 10.	Features List for BMC, iDrac, and vFlash	36
Table 11.	Standards Compliance and Specifications	39
Table 12.	Technical Specifications	42

Figures

Figure 1.	PowerEdge M1000e	8
Figure 2.	Internal View	9
Figure 3.	2.5” HDD Carrier	26

1 Product Comparison

1.1 Overview

With 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 Gen2 PCIe 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™ GPGPU card, can perform over 400 Gigaflops of double-precision computations for demanding, floating-point-intensive workloads. Communication between the host system and the Tesla processors is maximized by providing x16 Gen2 PCIe bandwidth while the efficient Dell M1000e chassis powers and cools the solution to its maximum 247W 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 IO throughput of a dual-port embedded gigabit NIC and two additional network daughtercards. Intel® Xeon® processors 5600 series, plus up to 192GBs 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 Gigabytes 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 which 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.

1.2 Product Comparison

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	2 Socket Intel® Xeon® Processor 5500 or 5600 Series			
Front Side Bus	Two Intel QuickPath Interconnect (QPI)			
# Proc Sockets	2			
Max # Cores per Socket	Up to 6			
L2/L3 Cache	8MB (5500 Series) or 12MB (5600 Series)			
Chipset	Intel 5500	Intel 5500	Intel 5520	Intel 5520
DIMMs	12 x DDR3 DIMMs (800/1066/1333MHz)	12 x DDR3 DIMMs (800/1066/1333MHz)	18 x DDR3 DIMMs (800/1066/1333MHz)	18 x DDR3 DIMMs (800/1066/1333MHz)
Min/Max RAM	1GB - 192GB (16GB DIMMS)	1GB - 192GB (16GB DIMMS)	1GB-192GB (16GB DIMMS)	1GB - 192GB (16GB 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: Hot-Pluggable 2 x 2.5" SATA: 1 x 2.5"	SAS: Hot-Pluggable 2 x 2.5" SATA: 1 x 2.5"	SAS: Hot-Pluggable 2 x 2.5" SSD SATA: 2 x 2.5"	SAS: Hot-Pluggable 4 x 2.5" SSD SATA: 2 x 2.5"
HDD Types	SAS/SSD			
HDD Controller	H200 H700 H800 SAS6E	H200 Non-RAID SATA (1 HDD only) SAS6/iR PERC6i with RAID battery	Embedded H200	H200 SAS6/iR PERC6i with RAID battery
Optional HD Controller	SAS6/iR PERC6i with RAID battery	SAS6/iR PERC6i 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	

	M610x	M610	M710HD	M710
Server Management	Integrated Dell Remote Access Controller iDRAC6 Express/Enterprise (both standard) w/ IPMI 2.0 +vMedia/vKVM, and CMC (on the PowerEdge M1000e chassis)			
Mezz Slots	2 x8 (PCI Gen 2); Fabric B limited to a small form factor (SFF) mezzanine card	2 x8 (PCI Gen 2); Fabric B limited to a small form factor (SFF) mezzanine card	2 x8 PCIe Mezzanine Cards	1 x4 and 3 x 8 PCIe Mezzanine Cards
IO slots	Two x16 PCIe Gen2 H800 / 6GB SAS NVIDIA® M1060 and M2050-204	NA	NA	NA
RAID	0,1	0,1	0,1	0,1,5
NIC/LOM	2-port Broadcom® 5709S 1Gb w/ TOE plus optional iSCSI Accelerator	2-port Broadcom® 5709S 1Gb w/ TOE plus optional iSCSI Accelerator	4 x 1GbE dual Broadcom® BCM5709S	4 x TOE with optional iSCSI offload
USB	2 external, 1 internal	2 external, 1 internal	2 x external USB 2.0 ports at front bezel 1 x internal USB port	3 x external USB 2.0 ports at front bezel 1 x internal USB port
SD Card	2: 1 for Persistent Storage 1 for Management	2: 1 for Persistent Storage 1 for Management	2 x internal SD slot 1 for Persistent Storage 1 for Management (can also be configured as redundant SD cards for embedded hypervisor)	1 x internal SD slot 1 for Persistent Storage 1 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 New Technologies

2.1 Overview

The 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 which 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, utilization of up to 2 x 250W or 1 x 350W PCIe cards (inclusive of GPGUs¹).

¹ General-Purpose computation on Graphics Processing Units
Dell PowerEdge M610x Technical Guide

3 System Information

3.1 Overview

Table 2. Product Features

Feature	Technical Specifications
Processors	Intel® Xeon® processor 5500 and 5600 series quad and six-core 60W, 80W, and 95W TDP options
Chipset	Intel® 5520
Memory ¹	1GB/2GB/4GB/8GB/16GB 1066 and 1333MHz DDR3 12 DIMM Slots with support for up to 192GBs using RDIMMs
Drive Bays	Two 2.5" SAS/Solid State hot-swappable drives
Storage ¹	<p>Internal Hot-Swappable Drives: 2.5" SAS (10K rpm): 146GB, 300GB, or 600GB 2.5" SAS (15K rpm): 73GB or 146GB 2.5" SATA (7.2k rpm): 80GB, 120GB, 160GB or 250GB, or 500GB Solid State Drives (SSD): 100GB</p> <p>Solid State Storage Cards: Fusion-io® 160IDSS—160GB ioDrive PCIe solid state storage card Fusion-io® 640IDSS—640GB ioDrive Duo PCIe solid state storage card</p> <p>Maximum Internal Disk Storage: Up to 1.2TB using two 2.5" 600GB hot-plug SAS hard drives</p>
RAID Controller Options	PERC H200 Modular RAID Controller (6Gb/s) PERC H700 Modular RAID Controller (6Gb/s) with 512 MB battery-backed cache
I/O Mezzanine Card Options	<p>Fully populated mezzanine card slots and switch modules will yield 3 redundant I/O fabrics per blade.</p> <p>1Gb and 10Gb Ethernet: Dual-Port Broadcom® Gb Ethernet w/ 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)</p> <p>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 10GbE + FCoE Dual-Port Qlogic® Converged Network Adapter (QME8142) - Supports CEE/DCB 10GbE + FCoE</p>

	<p>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)</p> <p>Infiniband: Dual-Port Mellanox® ConnectX-2™ Dual Data Rate (DDR) and Quad Data Rate (QDR) InfiniBand</p>
Communications	<p>Two embedded Broadcom® NetXtreme II™ 5709 Gigabit Ethernet NICs with failover and load balancing.</p> <p>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.</p> <p>Boot from SAN (iSCSI and FC) supported</p> <p>Optional add-in NICs: See I/O Mezzanine Card Options</p> <p>Optional add-in HBAs: See I/O Mezzanine Card Options</p>
PCIe Expansion Bay	<p>Two 2nd-generation full-length x16 slots with supplemental power for either two cards at 250 watt draws or one card at a 300watt draw.</p> <p>GPGPU Options: NVIDIA® Tesla™ M1060-240 core, double-width PCIe card with 4GB of memory NVIDIA® Tesla™ M2050/M2070-448 Core, double-width PCIe card with 3/6GB of ECC memory</p> <p>SAS/PERC Options: Dell™ H800 PERC-Dual-port 6Gb/s SAS RAID controller with up to 512MB cache Dell™ SAS6E HBA-Dual-port 6Gb/s SAS HBA</p> <p>Solid State Storage Options: Fusion-io® 160IDSS—160GB ioDrive PCIe solid state storage card Fusion-io® 640IDSS—640GB ioDrive Duo PCIe solid state storage card</p>
Operating Systems	<p>Microsoft® Windows® Essential Business Server 2008 Microsoft® Windows Server® 2008 SP2, x86/x64 (x64 includes Hyper-V™) Microsoft® Windows Server® 2008 R2, x64 (includes Hyper-V™ v2) Microsoft® Windows® HPC Server 2008 Novell® SUSE® Linux® Enterprise Server Red Hat® Enterprise Linux® Sun® Solaris™</p> <p>For more information on the specific versions and additions, visit http://www.dell.com/OSsupport.</p>
Virtualization OS Support	<p>Microsoft® Windows Server® 2008, with Hyper-V™ VMware® vSphere™ Version 4.0 (including ESX v4.0/ ESXi™ v4.0)</p> <p>Optional Embedded Hypervisors: Citrix® XenServer™ Microsoft® Windows Server® 2008, with Hyper-V™ VMware® ESXi™ 4.1</p>

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<p>Management Options</p>	<p>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</p>
<p>Power Supply</p>	<p>Supplied by Dell™ PowerEdge™ M1000e Blade Chassis</p>
<p>Video</p>	<p>Integrated Matrox® G200 w/ 8MB memory</p>
<p>Systems Management</p>	<p>BMC, IPMI2.0 compliant Dell™ OpenManage™ featuring Dell Management Console Unified Server Configurator Lifecycle Controller iDRAC6 Enterprise with optional vFlash</p>
<p>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.</p>	

4 Mechanical

4.1 Chassis Description

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



Figure 1. PowerEdge M1000e

The M610x server occupies 2 slots in the M1000e rack chassis for a maximum of 8 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 PCI-E 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 section in the Installing Blade Components chapter of the *Dell PowerEdge Modular Systems Hardware Owner's Manual* 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*.

4.5 Cover Latch

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

4.6 TPM (Trusted Platform Module)

The 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. TPM 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.

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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

4.10 Field Replaceable Units (FRU)

The planar contains a serial EEPROM to contain 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*.

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 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 250W.
- 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.

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° C (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°F/500ft
Storage	-40° to 65°C (-40° to 149°F) with a maximum temperature gradation of 20°C 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)

5.4 Acoustics

- **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, hums, etc. One of the sound quality metrics in the Dell specification is prominence ratio of a tone.
- **Acoustical Performance of Typical Configuration.** When installed in the M1000e blade chassis, typical configuration² of M610x blade results in the following idle

² Typical configuration means projected average quantity, type, capacity, speed, etc., of components. Configuration for which data reported is listed in the following table.

acoustical performance in 23±2° C ambient: LwA-UL³ = 8.2 bels and no prominent tones⁴.

Table 4. Typical Configuration for Acoustical Performance Analysis

Chassis	Description	Quantity
Blade	M610x	4
Slots populated	1, 2, 3, 4	
Power supply	2360-W	6
Blanks		8
System Fans	M1000e fan	9
Blade Internals	Description	Quantity
CPU	Intel E5620 80W	2
DIMM	4 GB Dual Rank	12
Mezz Cards	Dual port GbE FC	2
HDD	SAS 2.5" 146 GB, 15 krpm	2

³ LwA – UL is 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).

⁴ Prominent tone: Criteria of D.5 and D.8 of ECMA-74 9th ed. (2005) are followed to determine if discrete tones are prominent. The system is placed in a rack with its bottom at **75 cm** from the floor. The acoustical transducer is at front bystander position, ref ISO7779 (1999) Section 8.6.2.

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 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

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- o Dell BIOS enablement in the future will include a test and development BIOS at launch, and a full production BIOS in Q4 of 2010

Table 5. Comparison of Processor Technology

Intel® Xeon® Processor	5400 Series	5500 Series	5600 Series
# Cores	4	4	6
Last Level Cache	2 x 6 MB shared	8 MB shared	12 MB shared
FSB (MHz) / Link Frequency (GT/s)	1333 MHz	Up to 6.4 GT/s	Up to 6.4 GT/s
Max TDP	120W	130W for WS 95W for Server	130W 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	45nm	45nm	32nm
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	LGA 771	LGA1366	LGA1366

6.3 Supported Processors

Supported processors are detailed in Table 6.

Table 6. Supported Processors

Model	Speed	TDP Power	Cache	Cores	Usage Type	Max Memory Speed	QPI Link Speed	Turbo Mode Enabled	Hyper-threading
X5680	3.33GHz	95W	12M	6	Advanced	1333MHz	6.4GT/s	Yes	Yes
X5667	3.06GHz	95W	12M	4	Advanced	1333MHz	6.4GT/s	Yes	Yes
X5670	2.93GHz	95W	12M	6	Advanced	1333MHz	6.4GT/s	Yes	Yes
X5660	2.80GHz	95W	12M	6	Advanced	1333MHz	6.4GT/s	Yes	Yes
X5650	2.66GHz	95W	12M	6	Advanced	1333MHz	6.4GT/s	Yes	Yes
E5640	2.66GHz	80W	12M	4	Standard	1066MHz	5.86GT/s	Yes	Yes
L5640	2.26GHz	60W	12M	6	Low Voltage	1066MHz	5.86GT/s	Yes	Yes
E5630	2.53GHz	80W	12M	4	Standard	1066MHz	5.86GT/s	Yes	Yes
E5620	2.4GHz	80W	12M	4	Standard	1066MHz	5.86GT/s	Yes	Yes
L5609	1.86GHz	40W	12M	4	Low Voltage	1066MHz	4.8GT/s	No	No
X5560	2.80GHz	95W	8M	4	Advanced	1333MHz	6.4GT/s	Yes	Yes
E5530	2.40GHz	80W	8M	4	Standard	1066MHz	5.86GT/s	Yes	Yes
L5520	2.26GHz	60W	8M	4	Standard LV	1066MHz	5.86GT/s	Yes	Yes
E5507	2.13GHz	80W	4M	4	Basic	800MHz	4.8GT/s	No	No
E5506	2.13GHz	60W	4M	4	Basic LV	800MHz	4.8GT/s	No	No
E5503	2.0GHz	80W	4M	2	Basic	800MHz	4.8GT/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*.

7 Memory

7.1 Overview

The M610xD utilizes 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
 - 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.
 - All three channels must be populated identically.
 - 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
 - Typically, two channels operate in Advanced ECC (Lockstep) mode with each other by having the cache line split across both channels. This mode provides improved RAS features (SDDC support for x8-based memory).
 - For Memory Mirroring, 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 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 96GB of RDIMM memory (with twelve 8 GB RDIMMs)
- Support for up to 24 GB of UDIMM memory (with twelve 2 GB UDIMMs)
- Support for 1066/1333 MHz single and dual rank DIMMs
- Support for 1066 MHz quad rank DIMMs
- Single DIMM configuration only with DIMM in socket A1
- ODT support (On Die Termination)
- Clock gating (CKE) to conserve power when DIMMs are not accessed (DIMMs enter a low-power self-refresh mode)
- I²C 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 800MHz DIMMs are not supported, the installation of two quad-rank 1066MHz DIMMs will operate at 800MHz.

7.4 Memory Speed Limitations

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.

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 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 (IOH)

The M610x system board uses the Intel 5520 chipset 24D 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 (QPI)

The QuickPath Interconnect architecture consists of serial point-to-point interconnects for the processors and the IOH. The M610x has a total of three QuickPath Interconnect (QPI) links: one link connecting the processors and 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 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 (DMI)

The 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 (ICH9)

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.)
- PCI Bus 32-bit Interface Rev 2.3 running at 33 MHz

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- 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 (LOM)

10.1 Overview

Two embedded Broadcom® 5709S dual-port LAN controllers are on the 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).

10.2 Platform Networking LAN on Motherboard (LOM) Technology Overview

The PowerEdge M610x has two Ethernet ports because they include two built-in dual-port 1GbE converged networking (CNIC) LOMs based on Broadcom 5709 controllers. The M610x supports multiple functions over a unified fabric to help manage Ethernet, iSCSI and remote management traffic on each port simultaneously.

Enterprise networks that use multiple protocols and multiple network fabrics benefit from the Broadcom C-NICs LOMs' ability to combine network traffic, storage, and clustering over a single Ethernet fabric by boosting server CPU processing performance and memory utilization while alleviating I/O bottlenecks.

Each BCM5709S LOM provides dual 10/100/1000BASE-T Gigabit Ethernet functions, an IEEE802.3-compliant media access controller (MAC), and a UTP copper physical layer transceiver solution for high-performance network applications. It enables simultaneous convergence of all networked communications possible in a server, such as data network (LAN), storage network (e.g., block, iSCSI, or file [e.g., CIFS/NFS]), and clustering (e.g., High-Performance Computing [HPC]).

10.3 I/O Slots (I/O Mezzanine Card Options for M1000e)

10.3.1 Overview

The M610X contains four 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

10.3.2 Options

Available options for slots include:

Available options for slots 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)

10.3.3 PCIe Card Support

The following cards are supported:

- Dell cards
 - H800 controller
 - 6GB SAS controller
- Fusion-io® cards (drop in the box)
 - 160GB SLC
 - 640GB MLC
- NVIDIA® cards (cards installed, drivers available on NVIDIA site)
 - M1060 (takes up both slots)
 - M2050-204 (takes up both slots)

10.3.4 NVIDIA Cards

GPGPU stands for **General-Purpose computation on Graphics Processing Units**. Graphics Processing Units (GPUs) are high-performance many-core processors that can be used to accelerate a wide range of applications

The NVIDIA® Tesla™ M10 and 20-series are designed for high-performance computing. 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.

10.3.5 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

11 Storage

11.1 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 6Gb SAS drives. All storage drives used with the PERC H700 must be purchased from Dell.

11.2 Hard Disk Drive Carriers

The M610x supports the 11G 2.5” hard drive carrier. See Figure 3.



Figure 3. 2.5” HDD Carrier

11.3 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.

11.4 Diskless Configuration Support

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

11.5 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.

11.6 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.

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11.7 RAID Cards

The M610x will support a variety of RAID cards.

11.7.1 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.

11.7.2 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

11.7.3 H200

The M610x supports the latest SAS solution called H200.

11.7.4 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.

11.8 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.

11.9 Optical Drives

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12 Video (PCI Video)

The 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 8MB 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

13 Rack Information

For information on rack and cable accessories for the M610x, see the [PowerEdge M1000e Technical Guide](#) and the [M1000e Rack and Cable Advisor Tool](#).

14 Operating Systems

The 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.

15 Virtualization

15.1 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.

15.2 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 www.dell.com/aim.

15.3 Vizioncore

Vizioncore's easy-to-use virtualization software products support business continuity and disaster recovery, high availability, monitoring, automation, P2V and optimization. The software is agent-less and can co-exist with other leading backup software vendors, or can be used as a standalone solution.

- vRanger™ Pro is a backup and restore solution for virtualized environments.
- vFoglight™ Standard and Professional editions help organizations monitor, understand and analyze their virtual infrastructure by managing the relationships and interaction between all the components in the virtual environment.

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- vConverter™ helps convert servers to the VMware®, Microsoft®, XenServer™ or Virtual Iron platforms.
- vReplicator is a host-level software-based replication solution for VMware infrastructure which enables companies to leverage virtualization to support High Availability (HA) and Disaster Recovery (DR) strategies.
- Vizioncore™ vOptimizer Pro helps administrators understand storage utilization so they can make real-time adjustments in allocations. It presents the financial impact of reclaimed storage per virtual machine (VM), per host, and cumulative cost savings across the enterprise through historical detailed reports.
- vControl is a VM management solution that provides self-service provisioning, multi-VM control and task-based automation. vControl lets VM consumers build and deploy VMs for themselves, while providing administrators a single interface for task-based administration of VMs.
- Vizioncore vEssentials™ is a software bundle of vFoglight Pro, vRanger Pro and vReplicator.

More information can be found at <http://vizioncore.com/asg/>

16 Systems Management

16.1 Overview

Dell aims on delivering open, flexible, and integrated solutions that help you reduce the complexity of managing disparate IT assets by building comprehensive IT management solutions. Combining Dell PowerEdge Servers with a wide selection of Dell-developed management solutions gives you choice and flexibility, so you can simplify and save in environments of any size. To help you meet your server performance 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, sized, and supported right.

16.2 Server Management

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

- **Dell Systems Build and Update Utility:** Dell Systems Build and Update Utility assists in OS install and pre-OS hardware configuration and updates.
- **OpenManage Server Administrator:** The OpenManage Server Administrator (OMSA) tool provides a comprehensive, one-to-one systems management solution, designed for system administrators to manage systems locally and remotely on a network. OMSA allows system administrators to focus on managing their entire network by providing comprehensive one-to-one systems management.
- **Management Console:** Our legacy IT Assistant console 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 BMC Management Utility.
- **Active Directory Snap-in Utility:** The Active Directory Snap-in Utility provides an extension snap-in to the Microsoft Active Directory. This allows you to manage Dell specific Active Directory objects. The Dell-specific schema class definitions and their installation are also included on the DVD.
- **Dell Systems Service Diagnostics Tools:** Dell Systems Service and Diagnostics tools deliver the latest Dell optimized drivers, utilities, and operating system-based diagnostics that you can use to update your system.
- **eDocs:** The section includes files for PowerEdge systems, storage peripheral, and OpenManage software.
- **Dell Management Console DVD:** The Dell Management Console is a Web-based systems management software that enables you to discover and inventory devices on your network. It also provides advanced functions, such as health and performance monitoring of networked devices and patch management capabilities for Dell systems.
- **Server Update Utility:** In addition to the Systems Management Tools and Documentation and Dell Management Console DVDs, customers have the option to obtain Server Update Utility DVD. This DVD has an inventory tool for managing updates to firmware, BIOS and drivers for either Linux or Windows varieties.

16.3 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.

16.4 Lifecycle Controller and Unified Server Configurator

Embedded management is comprised of several interdependent pieces:

- Lifecycle Controller
- Unified Server Configurator
- iDRAC6
- vFlash

Lifecycle controller powers the embedded management features. It is integrated and tamperproof storage for system-management tools and enablement utilities (firmware, drivers, etc.). It is flash partitioned to support multiple, future-use cases.

Dell Unified Server Configurator (USC) is a local 1:1 graphical user interface embedded on Lifecycle Controller that aids in local server provisioning in a pre-OS environment. For servers with iDRAC Express, the Lifecycle Controller offers OS install, platform updates, platform configuration, and diagnostics capabilities. For servers without iDRAC Express, this utility has limited functionality and offers OS install and diagnostics capabilities only.

To access the Unified Server Configurator, press the <F10> key within 10 seconds of the Dell logo's appearance during the system boot process. Current functionality enabled by the Unified Server Configurator includes:

Table 9. Unified Server Configurator Features and Description

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

16.5 The iDRAC6 Enterprise

In addition to upgrading the system with a Lifecycle Controller, the iDRAC6 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
- Scripting capability with Dell's Racadm command-line
- Remote video, keyboard, and mouse (KVM) control with Virtual Console
- Remote media access with Virtual Media
- Dedicated network interface

Additionally, the iDRAC6 can be upgraded by adding the vFlash Media card. This is a 1 GB Dell branded SD card that enables a persistent 256 MB virtual flash partition.

A more detailed feature list for iDRAC6 and vFlash is included in the table below.

Table 10. Features List for BMC, iDrac, and vFlash

Feature	BMC	iDRAC6 Enterprise	vFlash Media
IPMI 2.0	✓	✓	✓
Web-based GUI		✓	✓
SNMP		✓	✓
WSMAN		✓	✓
SMASH-CLP		✓	✓
Racadm command-line		✓	✓
Shared/Failover Network Modes	✓	✓	✓
IPv4	✓	✓	✓
VLAN Tagging	✓	✓	✓
IPv6		✓	✓
Dynamic DNS		✓	✓
Dedicated NIC		✓	✓
Role-based Authority	✓	✓	✓
Local Users	✓	✓	✓
Active Directory		✓	✓
SSL Encryption		✓	✓
Remote Firmware Update	✓	✓	✓

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Feature	BMC	iDRAC6 Enterprise	vFlash Media
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			✓
Sensor Monitoring and Alerting	✓	✓	✓
Real-time Power Monitoring		✓	✓
Real-time Power Graphing		✓	✓
Historical Power Counters		✓	✓
System Event Log	✓	✓	✓
RAC Log		✓	✓
Trace Log		✓	✓

16.6 Chassis Management Controller (CMC)

See the [PowerEdge M1000e Technical Guide](#).

17 Peripherals

17.1 USB Peripherals

The 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)

17.2 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. Standards Compliance

The M610x system conforms to the industry standards shown in Table 11.

Table 11. Standards Compliance and Specifications

Standard	URL for information and specifications
ACPI Advance Configuration and Power Interface Specification, v2.0c	http://www.acpi.info/
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/ftp/t10/drafts/sas1/sas1r10.pdf
SATA Serial ATA Rev. 2.6; SATA II, Extensions to SATA 1.0a, Rev. 1.2	https://www.sata-io.org/secure/spec_download.asp http://www.sata-io.org/docs/S2Ext_1_2_Gold.pdf
SMBIOS System Management BIOS Reference Specification, v2.6	http://www.dmtf.org/standards/smbios/
TPM Trusted Platform Module Specification, v1.2	https://www.trustedcomputinggroup.org/downloads/specifications/tpm/tpm
UEFI Unified Extensible Firmware Interface Specification, v2.1	http://www.uefi.org/specs/
USB	http://www.usb.org/developers/docs/

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Standard	URL for information and specifications
Universal Serial Bus Specification, Rev. 2.0	
Windows Logo Windows Logo Program System and Device Requirements, v3.10	http://www.microsoft.com/whdc/winlogo/hwrequirements.msp

Appendix B. Regulatory Certifications

Please see the external Product Safety, EMC, and Environmental Datasheets on dell.com at:
http://www.dell.com/regulatory_compliance_datasheets

Appendix C. Additional Technical Specifications

Table 12. Technical Specifications

Processor	
Processor Type	2 Socket Intel® Xeon® Processor 5500 or 5600 Series
Expansion Bus	
Bus Type	PCI Express Generation 2
Mezzanine Slots	Two mezzanine PCIe x8 Gen-2
Network Daughtercard	2 x 1GbE dual Broadcom BCM5709S
Memory	
Architecture	1066 or 1333 MHz DDR3 and LV-DDR3 RDIMMs. Support for Advanced ECC or Memory Optimized operation.
Memory Module Sockets	Twelve
Memory Module Capacities	1 GB, 2 GB, 4 GB , 8 GB, or 16GB RDIMMs (single-, dual-, quad-rank dependent on capacity)
Minimum RAM	1 GB with a single CPU
Maximum RAM	192 GB (with 16 GB RDIMMs)
Drives	
Hard drives	Up to two 2.5-inch, hot-pluggable SAS hard drives or SATA SSD hard drives
Diskette drive	External optional USB 1.44-MB
Optical drive	External optional USB DVD Note: DVD devices are data only
Flash drive	Internal optional USB Internal optional SD Card Optional vFlash Card
Connectors	
Front	
USB	Two 4-pin, USB 2.0-compliant
Internal	
USB	One 4-pin, USB 2.0-compliant
Back	
SD	One internal SD card dedicated for Hypervisor One dedicated for future vFlash support
Video	
Video Type	Integrated Matrox® G200 with iDRAC6

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Video Memory	8 MB shared with iDRAC application memory
Power	
Batteries	
System battery	CR 2032 3.0-V lithium coin cell
Physical	
Blade	
Height	18.9cm (7.4in)
Width	5cm (2in)
Depth	48.6cm (19.2in)
Weight (maximum configuration)	7.4kg (16.3lb)