

# DELL™ POWEREDGE™ M610

**TECHNICAL GUIDEBOOK**  
**INSIDE THE POWEREDGE M610**



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## THE DELL™ POWEREDGE™ M610

The Dell PowerEdge M-Series blade servers help cut operating expenses through energy efficiency, product flexibility, and efficient use of data center space. When combined with Dell's world-class storage, management, and support offerings, the result is a total enterprise solution that can help you simplify and save on IT expenses.

### Strong IT Foundation

To build the most efficient data center solutions, Dell sought input from IT professionals. You asked for reliability, scalability, energy efficiency, and a lower total cost of ownership. Our next-generation M610 blade servers deliver, becoming the cornerstone of a high-performance data center capable of keeping pace with your changing business demands.

### Purposeful Design

Designed with your needs in mind, these M-Series blades use the Intel® Xeon® 5500 Series Processor. This processor series adapts to your software in real time, processing more tasks simultaneously. Using Intel Turbo Boost Technology, the M-Series blades can increase performance during peak usage periods. When demand decreases, Intel Intelligent Power Technology helps reduce operating costs and energy usage by proactively putting your server into lower power states.

To enhance virtualization and database performance, the M610 is designed with 50% more memory capacity than its predecessor. This increased memory capacity saves money by enabling you to use smaller, less-expensive DIMMs to meet your computing needs.

### Scalability for Growth

As your application needs increase, M-Series blades allow you to scale up to 128 cores and 1536GB of memory per 10U chassis, with opportunities for even greater capacities in the future. To keep pace with changing requirements, you can effectively scale I/O application bandwidth with end-to-end 10Gbe or FC8 solutions. Virtualize I/O within your M-Series chassis using Cisco's Virtual Blade Switch technology, and manage up to nine Cisco Ethernet switches as a single switch.

Additionally, use NPIV and Port Aggregator modes on a variety of switches to virtualize Ethernet or Fibre Channel ports for integration into heterogeneous fabrics. By harnessing Dell's FlexIO modular switches, you can scale your I/O needs cost effectively, adding ports and functionality through switch modules, including 10Gb uplinks and stacking ports instead of needing to buy complete new switches.

### Simplified Systems Management

Gain more control with the next-generation Dell OpenManage™ suite of management tools. These tools provide enhanced operations and standards-based commands designed to integrate with existing systems for effective control. Dell Management Console (DMC) helps simplify operations and creates stability by shrinking infrastructure management to a single console. This delivers a single view and a common data source for your entire infrastructure management. Built on Symantec® Management Platform, it has an easily extensible, modular foundation that can provide basic hardware management all the way up to more advanced functions, such as asset and security management. Dell Management Console reduces or eliminates manual processes, enabling you to save time and money for more strategic technology usage.

The Dell Management Console integrates with the Chassis Management Controller allowing a single view of the chassis. The DMC allows the customer to manage the chassis as one entity, further simplifying management.

**SECTION 1. SYSTEM OVERVIEW****A. Overview / Description**

The PowerEdge M610 is the next generation of Intel single-slot blade with enhanced processors, RAM, and management while still taking advantage of the M1000e chassis architecture. Along with the M1000e, it leads the industry in high speed, redundant IO throughput and power consumption.

<b>FEATURE</b>	<b>DETAILS</b>
<b>Processor</b>	Nehalem EP - 2-Socket Intel® Xeon® 5500 Series
<b>Front Side Bus</b>	Intel Quickpath Interconnect (QPI) @ maximum of 6 GT/s
<b># Procs</b>	2S
<b># Cores</b>	4
<b>L2/L3 Cache</b>	4MB and 8MB
<b>Chipset</b>	Intel Tylersberg
<b>DIMMs</b>	12 DDR3 - RDIMM or UDIMM
<b>Min/Max RAM</b>	1GB - 96GB
<b>HD Bays</b>	2 (2.5" only)
<b>HD Types</b>	SAS/SATA/SSD
<b>Int. HD Controller</b>	SATA
<b>Opt. HD Controller</b>	CERC. PERC available end of June 2009
<b>Video</b>	Matrox G200 (8MB memory)
<b>Server Management</b>	OpenManage Dell Management Console CMC on chassis iDRAC Express iDRAC Enterprise, CMC (on M1000e)
<b>Mezz Slots</b>	2 x8 (PCI 2.0)
<b>RAID</b>	0, 1
<b>NIC/LOM</b>	2 Broadcom 5709 1Gb
<b>USB</b>	2 external 1 internal

## SECTION 2. MECHANICAL

### A. Dimensions and Weight (blade only)

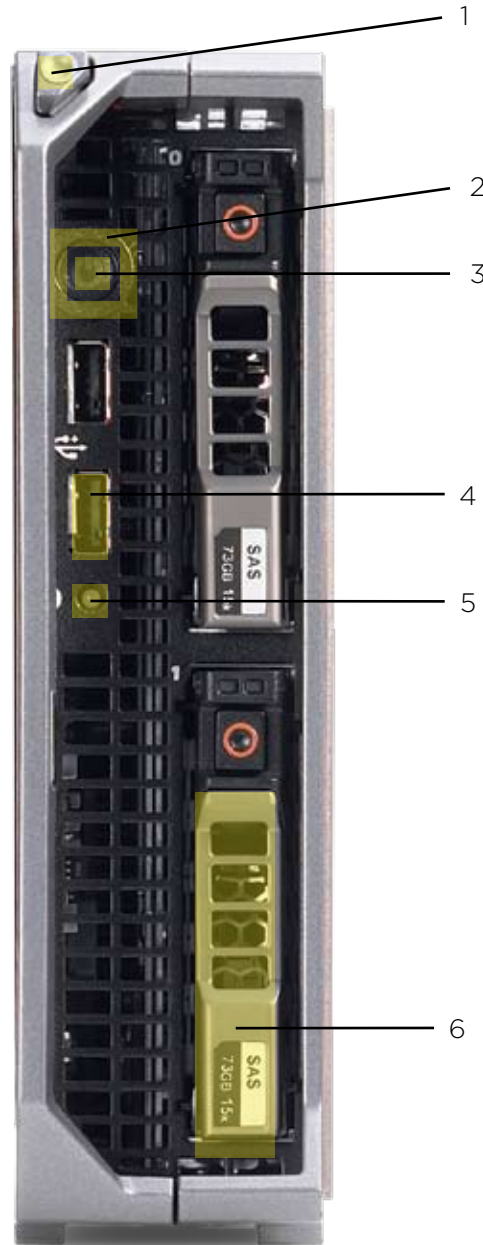
Height: 38.5cm (15.2in)

Width: 5cm (2in)

Depth: 48.6cm (19.2in)

Weight: 11.1kg (24.5lbs.) - Maximum configuration




### B. Front Panel View and Features



- 1. Blade Handle Release Button
- 2. Blade Power Indicator
- 3. Blade Power Button

- 4. USB Connectors (2)
- 5. Blade Status / Identification Indicator
- 6. Hard Drives (2)

Figure: Front Panel Features PowerEdge M610

FEATURE	ICON	DESCRIPTION
<b>Blade Power Indicator</b>		<p>Off - Power is not available to the blade, the blade is in standby mode, the blade is not turned on, or the blade is installed incorrectly. For detailed information on installing a blade, see "Installing a Blade."</p> <p>Green increasing from low brightness to full brightness - Blade power on request is pending.</p> <p>Green on - The blade is turned on.</p>
<b>Blade Status/ Identification Indicator</b>		<p>Off - The blade power is off.</p> <p>Blue - Normal operating state.</p> <p>Blue Blinking - The blade is being remotely identified via the CMC.</p> <p>Amber Blinking - Blade has either detected an internal error, or the installed mezzanine card(s) does not match the I/O modules installed in the M1000e enclosure. Check the CMC for an I/O configuration error message and correct the error.</p>
<b>Blade Power Button</b>	N/A	<p>Turns blade power off and on.</p> <ul style="list-style-type: none"> <li>• If you turn off the blade using the power button and the blade is running an ACPI-compliant operating system, the blade can perform an orderly shutdown before the power is turned off.</li> <li>• If the blade is not running an ACPI-compliant operating system, power is turned off immediately after the power button is pressed.</li> <li>• Press and hold the button to turn off the blade immediately.</li> </ul> <p>The blade power button is enabled by default by the System Setup program. (If the power button option is disabled, you can only use the power button to turn on the blade. The blade can then only be shut down using system management software.)</p>
<b>USB Connector</b>		Connects external USB 2.0 devices to the blade.

## C. Side Views and Features



## D. Security

### Trusted Platform Module (TPM)

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. There will be different part numbers to accommodate different TPM solutions around the world.

### Power Off Security

Through the CMC the front USB's and power button can be disabled so as to not allow any control of the system from the front of the blade.

### Intrusion Alert

A switch mounted on the left riser board is used to detect chassis intrusion. When the cover is opened, the switch circuit closes to indicate intrusion to ESM. When enabled, the software can provide notification to the customer that the cover has been opened.

### Secure Mode

BIOS has the ability to enter a secure boot mode via Setup. This mode includes the option to lock out the power and NMI switches on the Control Panel or set up a system password.



**E. USB KEY**

The PowerEdge M610 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)

**F. 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.

**G. Field Replaceable Units (FRU)**

The planar contains a serial EEPROM to contain FRU information including Dell part number, part revision level, and serial number. The Advanced Management Enablement Adapter (AMEA) also contains a FRU EEPROM. The backplane's SEP and the power supplies' microcontroller are also used to store FRU data.

**SECTION 3. ENVIRONMENTAL SPECIFICATIONS AND ACOUSTICS****A. Environmental Specifications**

<b>ENVIRONMENTAL</b>	
<b>Temperature</b>	
<b>Operating</b>	10° to 35°C (50° to 95°F) <small>NOTE: Decrease the maximum temperature by 1°C (18°F) per 300m (985 ft.) above 900m (2955 ft.)</small>
<b>Storage</b>	-40° to 65°C (-40° to 149°F)
<b>Relative Humidity</b>	
<b>Operating</b>	8% to 85% (noncondensing) with a maximum humidity gradation of 10% per hour
<b>Storage</b>	5% to 95% (noncondensing)
<b>Maximum Vibration</b>	
<b>Operating</b>	0.26 Grms at 10-350Hz for 15 mins
<b>Storage</b>	1.54 Grms at 10-250Hz for 15 mins
<b>Maximum Shock</b>	
<b>Operating</b>	One shock pulse in the positive z axis (one pulse on each side of the system) of 41 G for up to 2 ms
<b>Storage</b>	Six consecutively executed shock pulses in the positive and negative x, y, and z axes (one pulse on each side of the system) of 71 G for up to 2 ms
<b>Altitude</b>	
<b>Operating</b>	-16 to 3048 m (-50 to 10,000 ft.)
<b>Storage</b>	-16 to 10,600 m (-50 to 35,000 ft.)

## B. Acoustics

The acoustical design of the PowerEdge M610 reflects the following:

- Adherence to Dell’s high sound quality standards. Sound quality is different from sound power level and sound pressure level in that it describes how humans respond to annoyances in sound, like whistles, hums, etc. One of the sound quality metrics in the Dell specification is prominence ratio of a tone, and this is listed in the table below.
- Hardware configurations and types of applications affect system noise levels. Dell’s advanced thermal control provides for optimized cooling with varying hardware configurations and component utilizations. Most typical configurations will perform as listed in the table below. However, some less typical configurations and components can result in higher noise levels. Higher application loads, e.g., CPU utilization, can also result in higher noise levels.

### POWEREDGE M610 TYPICALLY CONFIGURED BLADE IN AN M1000E CHASSIS

Condition in 23±2° C ambient	LwA-UL, bels	Tones
Idle	7.4	No prominent tones

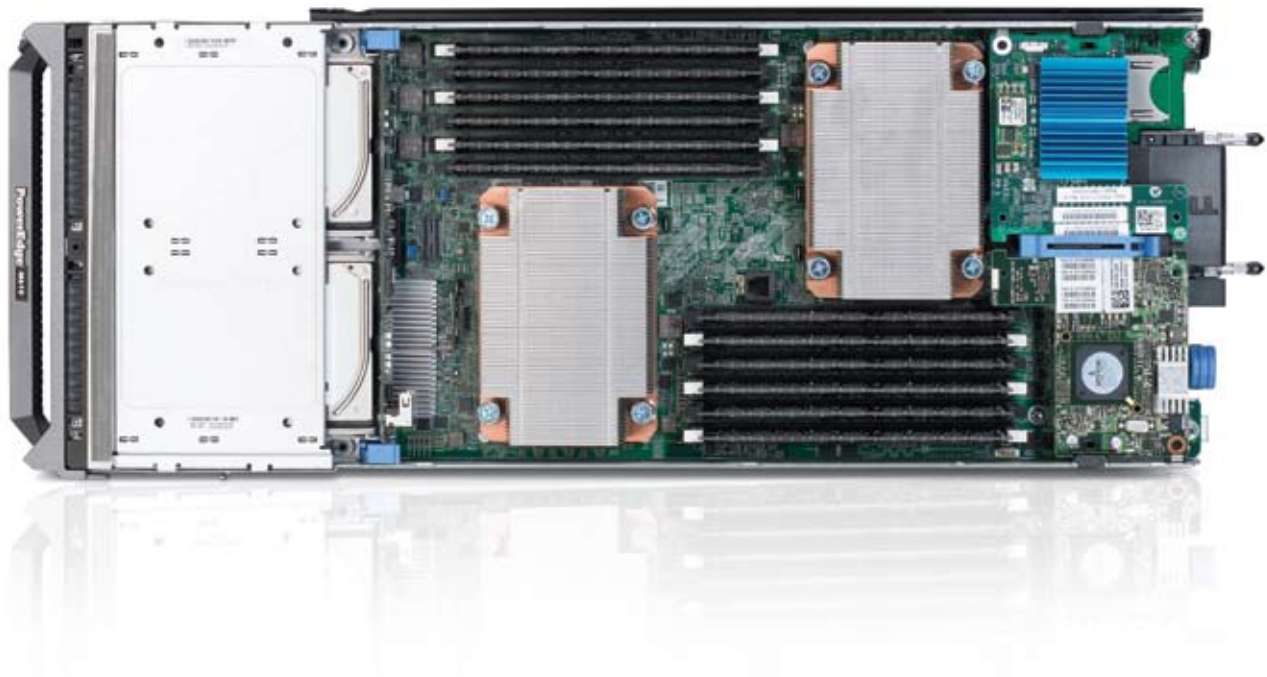
### Definitions

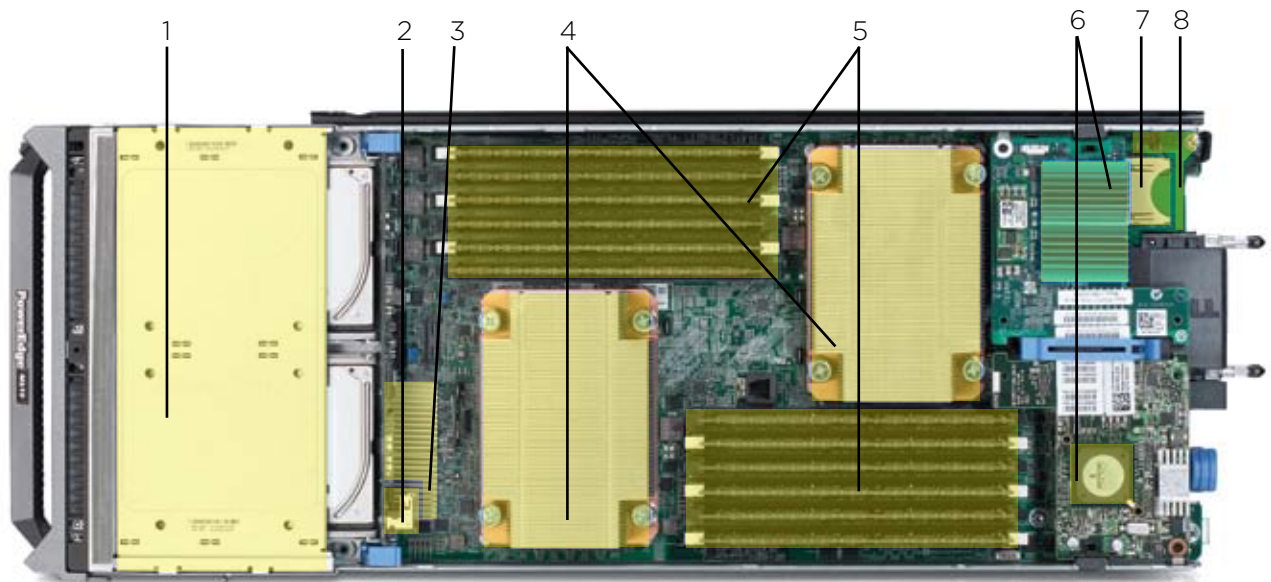
**Idle:** Reference ISO7779 (1999) definition 3.1.7; system is running in its OS but no other specific activity.

**LwA-UL:** The upper limit sound power level (LwA) calculated per section 4.4.2 of ISO 9296 (1988) and measured in accordance with ISO7779 (1999).

**Tones:** 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 acoustic transducer is at front bystander position, ref ISO7779 (1999), Section 8.6.2.

## SECTION 4. BLOCK DIAGRAM





- |   |  |
|---|--|
| <ul style="list-style-type: none"> <li>1. 2 2.5" Hard Drives<br/>Hard drive controller underneath</li> <li>2. Internal USB</li> <li>3. Chipset</li> <li>4. 2 Processor Sockets</li> </ul> | <ul style="list-style-type: none"> <li>5. 12 DDR3 DIMM Slots</li> <li>6. High-speed Mezz Card Slots<br/>On-board NICs underneath</li> <li>7. iDRAC6 Enterprise</li> <li>8. Persistent Storage (underneath iDRAC6)</li> </ul> |
|---|--|

**Figure: PowerEdge M610 Main Components**

## SECTION 5. PROCESSORS

### A. Overview / Description

The Intel® 5500 series 2S processor (Nehalem - Efficient Processor (EP)), is the microprocessor designed specifically for servers and workstation applications. The processor features quad-core processing to maximize performance and performance/watt for data center infrastructures and highly dense deployments. The Nehalem-EP 2S processor also features Intel's Core™ micro-architecture and Intel 64 architecture for flexibility in 64-bit and 32-bit applications and operating systems.

The 5500 series 2S processor (Nehalem EP) utilizes a 1366-contact Flip-Chip Land Grid Array (FC-LGA) package that plugs into a surface mount socket. PowerEdge M610 provides support for up to two 5500 series 2S processors (Nehalem EP).

NEHALEM-EP 2S PROCESSOR	FEATURES
<b>Cache Size</b>	32KB instruction, 32KB data, 4 or 8MB (shared)
<b>Multi-processor Support</b>	1-2 CPUs
<b>Package</b>	LGA1366

**Table: Nehalem-EP Features**

## B. Features

Key features of the 5500 series 2S processor (Nehalem EP) include:

- Four or two cores per processor
- Two point-to-point QuickPath Interconnect links at up to 6.4 GT/s
- 1366-pin FC-LGA package
- 45 nm process technology
- No termination required for non-populated CPUs (must populate CPU socket 1 first)
- Integrated three-channel DDR3 memory controller at up to 1333MHz
- 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 (Hyper-Threading) 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 for Virtualization
- Intel VT-x and VT-d Technology for Virtualization
- Demand-based switching for active CPU power management as well as support for ACPI P-States, C-States, and T-States

## C. Supported Processors

MODEL	SPEED	POWER	CACHE	CORES
X5570	2.93GHz	95W	8M	4
X5560	2.80GHz	95W	8M	4
X5550	2.66GHz	95W	8M	4
E5540	2.53GHz	80W	8M	4
E5530	2.40GHz	80W	8M	4
E5520	2.26GHz	80W	8M	4
L5520	2.26GHz	60W	8M	4
E5506	2.13GHz	80W	4M	4
L5506	2.13GHz	60W	4M	4
E5504	2.00GHz	80W	4M	4
E5502	1.86GHz	80W	4M	2

## D. Processor Configurations

### Single CPU Configuration

The PowerEdge M610 is designed such that a single processor placed in the CPU1 socket will function normally, however PowerEdge M610 systems require a CPU blank in the CPU2 socket for thermal reasons. The system will be held in reset if a single processor is placed in the CPU2 socket.

# Performance Enhancements

## Intel Xeon® 5500 Series Processor (Nehalem-EP)

### Intel® Turbo Boost Technology

Increases performance by increasing processor frequency and enabling faster speeds when conditions allow

**Normal**

All cores operate at rated frequency

**4C Turbo**

All cores operate at higher frequency

**<4C Turbo**

Fewer cores may operate at even higher frequencies

**Higher performance on demand**

### Intel® Hyper-Threading Technology

Increases performance for threading applications delivering greater throughput and responsiveness

Up to 30% higher†

**Higher performance for threaded workloads**

## Intel® Turbo Boost Technology

	Cores / Threads	TURBO Freq BASE Freq	BENEFIT
	<p><b>16</b> (2 socket/HT on)</p>	<p><b>3.20 GHz</b></p> <p><b>2.93 GHz</b></p>	<p>up to <b>6%<sup>†</sup></b> for <b>16</b> concurrent software threads</p>
<p><b>OR</b></p>	<p><b>2</b> (2 socket/HT on)</p>	<p><b>3.33 GHz</b></p> <p><b>2.93 GHz</b></p>	<p>up to <b>10%</b> for <b>2</b> software threads</p>

**Improves application responsiveness**  
**Delivers higher processor frequency on demand**

MODEL	SPEED	POWER	CACHE	CORES
X5570	2.93GHz	95W	8M	4
X5560	2.80GHz	95W	8M	4
X5550	2.66GHz	95W	8M	4
E5540	2.53GHz	80W	8M	4
E5530	2.40GHz	80W	8M	4
E5520	2.26GHz	80W	8M	4
L5520	2.26GHz	60W	8M	4
E5506	2.13GHz	80W	4M	4
L5506	2.13GHz	60W	4M	4
E5504	2.00GHz	80W	4M	4
E5502	1.86GHz	80W	4M	2

### CPU Power Voltage Regulation Modules (EVRD 11.1)

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

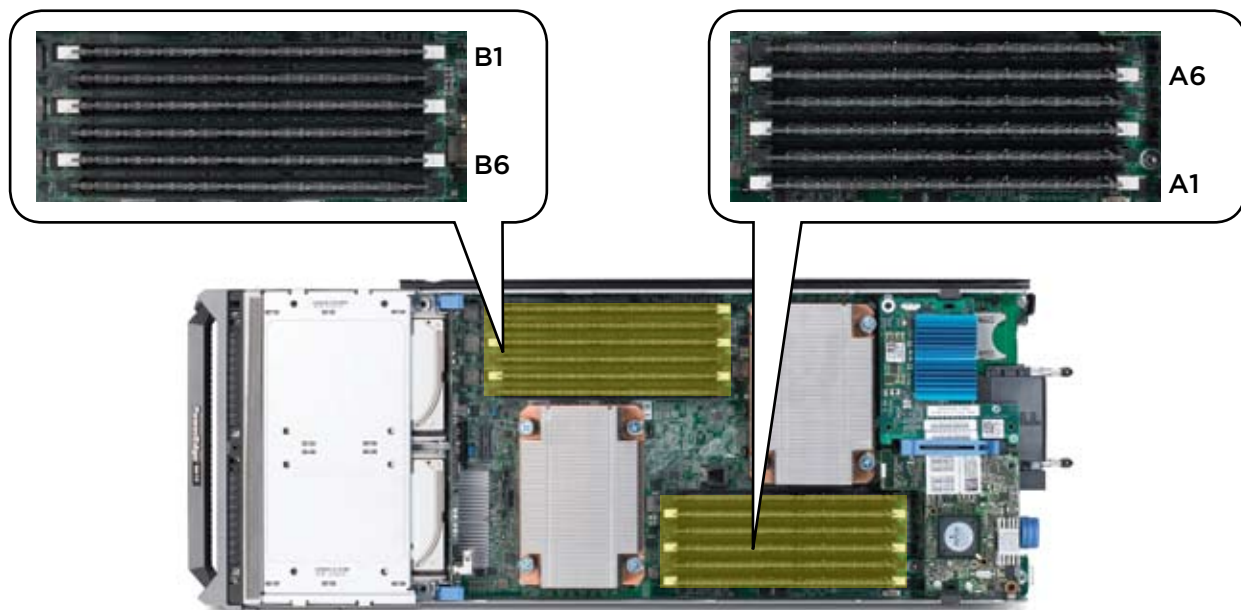
## SECTION 6. MEMORY

### A. Overview / Description

The PowerEdge M610 utilizes DDR3 memory providing a high performance, high-speed memory interface capable of low latency response and high throughput. The PE M610 supports registered ECC DDR3 DIMMs (RDIMM) or unbuffered ECC DDR3 DIMMs (UDIMM).

Key features of the PowerEdge M610 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 8GB RDIMMs)
- Support for up to 24GB of UDIMM memory (with twelve 2GB UDIMMs)
- Support for 1066/1333MHz single and dual-rank DIMMs
- Support for 1066MHz quad rank DIMMs Single DIMM configuration only with DIMM in socket A1
- Support ODT (On Die Termination) Clock gating (CKE) to conserve power when DIMMs are not accessed
- DIMMs enter a low-power self-refresh mode
- I<sup>2</sup>C 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
- Support for Memory Sparing



**Figure: Memory Locations for Poweredge M610**

## B. DIMMs Supported

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 2GB, 4GB, or 8GB RDIMMs. 1GB, or 2GB 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, service) features.
- All three channels must be populated identically.
- Users wanting memory sparing must also populate the DIMMs in this method, but one channel is the spare and is not accessible as system memory until it is brought online to replace a failing channel.
- 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 — writes go to both channels and reads alternate between the two channels.
- One channel per CPU populated
  - This is a simple memory optimized mode. No mirroring or sparing is supported.

The PowerEdge M610 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. If DIMMs of different speeds are mixed, all channels will 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 DIMM sockets are placed 450 mils (11.43 mm) apart, center-to-center in order to provide enough space for sufficient airflow to cool stacked DIMMs.
- The PowerEdge M610 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.
  - Memory Optimized: {1, 2, 3}, {4, 5, 6}, {7, 8, 9}
  - Advanced ECC or Mirrored: {2, 3}, {5, 6}, {8, 9}
  - Quad Rank or UDIMM: {1, 2, 3}, {4, 5, 6}, {7, 8, 9}

**C. Speed**

**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

The table below shows the memory populations and the maximum frequency achievable for that configuration.

DIMM TYPE	DIMM 0	DIMM 1	DIMM 2	NUMBER 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			
RDIMM	SR	DR		2			
	DR	DR		2			
	QR	SR		2			
	QR	DR		2			
	QR	QR		2			
	SR	SR	SR	3			
	SR	SR	DR	3			
	SR	DR	DR	3			
	DR	DR	DR	3			

Note: For QR mixed with a SR/DR DIMM, the QR needs to be in the white DIMM connector. There is no requirement in the order of SR and DR DIMMs.

 Supported

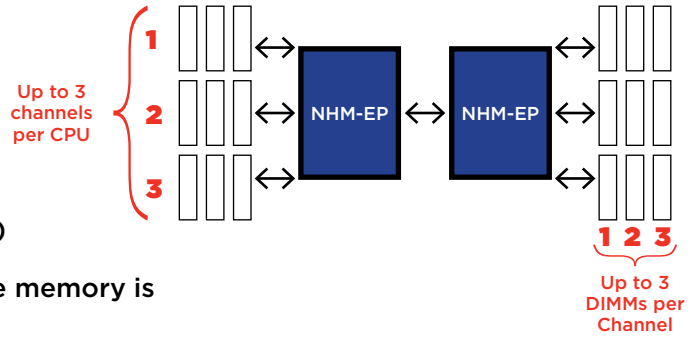
 Not Supported

NOTE: For Quad-Rank DIMMs mixed with single- or dual-rank DIMMs, the 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 SR and DR DIMMs



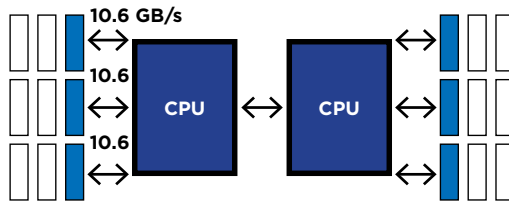
# NHM-EP Platform Memory Overview

- Platform capability (18 DIMMs):
  - Up to 3 channels per CPU
  - Up to 3 DIMMS per channel
- Memory Types Supported:
  - DDR 1333, 1066, and 800
  - Registered (RDIMM) and unbuffered (UDIMM)
  - Single-rank (SR), dual-rank (DR), quad-rank (QR)
- System memory Speed (i.e. the speed at which the memory is *actually* running) is set by BIOS depending on:
  - CPU capability
  - DIMM type(s) used (memory speed, U/RDIMM, SR/DR/QR)
  - DIMM populated per channel
- All channels in a system will run at the fastest *common* frequency



## Memory Population Scenarios

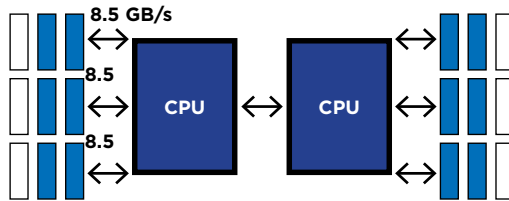
- Maximum B/W:**
  - DDR3 1333 across 3 channels
  - 1 DPC (6 DIMMs)
  - Max capacity: 48 GB+



### CPUs

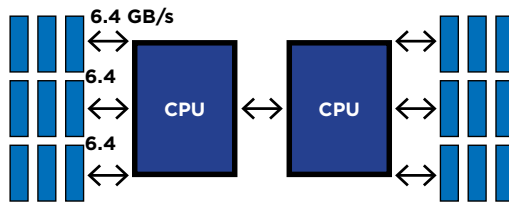
**E5550**  
and above

- Balanced Performance:**
  - DDR3 1066 across 3 channels
  - Up to 2 DIMMs per Channel (DPC) (12 DIMMs)
  - Max capacity: 96 GB+



**E5520**  
and above

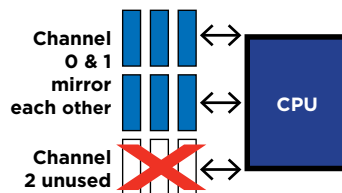
- Maximum capacity:**
  - DDR3 800 across 3 channels
  - Up to 3 DPC (18 DIMMs total)
  - Max capacity: 144 GB+



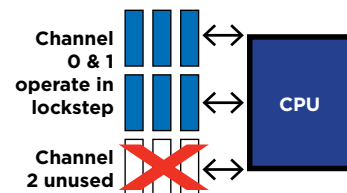
**All NHM-EP SKUs**

- RAS capabilities:**

### Mirroring



### Lockstep



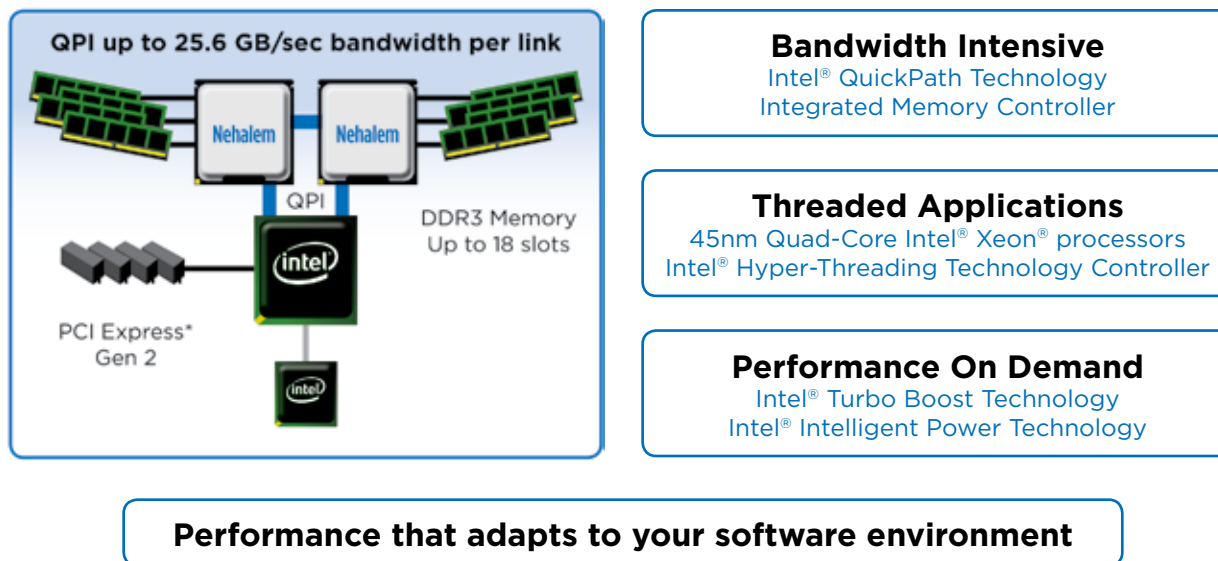
## SECTION 7. CHIPSET

### A. Overview / Description

The PowerEdge M610 planar incorporated the Intel 5520 chipset (code named Tylersburg) for I/O and processor interfacing. Tylersburg is designed to support Intel's 5500 series processors (code named Nehalem-EP), QPI interconnect, DDR3 memory technology, and PCI Express Generation 2. The Tylersburg chipset consists of the Tylersburg-36D IOH and ICH9.

## Delivering Intelligent Performance

### Next Generation Intel® Microarchitecture



### The Intel 5520 chipset (code named Tylersburg) I/O Hub (IOH)

The planar uses the The Intel® 5520 chipset (code named Tylersburg) I/O Hub (IOH)-36D IOH to provide a link between the 5500 series 2S processor (Nehalem EP) and I/O components. The main components of the IOH consist of two full-width QuickPath Interconnect links (one to each processor), 36 lanes of PCI Express Gen2, a x4 Direct Media Interface (DMI), and an integrated IOxAPIC.

### IOH QuickPath Interconnect (QPI)

The QuickPath Architecture consists of serial point-to-point interconnects for the processors and the IOH. The PowerEdge T610 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 up to 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.

### Intel Direct Media Interface (DMI)

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

## PCI Express Generation 2

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

In the Tylersburg-36D IOH, there are two x2 PCIe Gen2 ports (1Gb/s) and eight x4 PCIe Gen2 ports (2 Gb/s). The x2 ports can be combined as a x4 link; however, this x4 link cannot be combined with any of the other x4 ports. Two neighboring x4 ports can be combined as a x8 link, and both resulting x8 links can combine to form a x16 link.

## Intel I/O Controller Hub 9 (ICH9)

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

- Six x1 PCIe Gen1 ports, with the capability of combining ports 1-4 as a x4 link
  - These ports are unused on the PowerEdge M610
- PCI Bus 32-bit Interface Rev 2.3 running at 33MHz
- Up to six Serial ATA (SATA) ports with transfer rates up to 300 MB/s
  - The PowerEdge M610 features two SATA port for optional internal optical drive or tape backup
- Six UHCI and two EHCI (High-Speed 2.0) USB host controllers, with up to twelve USB ports
  - The PowerEdge M610 has eight external USB ports and two internal ports dedicated for UIPS. Refer to the Whoville Hardware/BIOS Specification for the USB assignments for each platform
- Power management interface (ACPI 3.0b compliant)
- Platform Environmental Control Interface (PECI)
- Intel Dynamic Power Mode Manager
- I/O interrupt controller
- SMBus 2.0 controller
- Low Pin Count (LPC) interface to Super I/O, Trusted Platform Module (TPM), and SuperVU
- Serial Peripheral Interface (SPI) support for up to two devices
  - The PowerEdge M610's BIOS is connected to the ICH using SPI

## SECTION 8. BIOS

### A. Overview / Description

The PowerEdge M610 BIOS is based on the Dell BIOS core, and supports the following features:

- Nehalem-EP 2S Support
- Simultaneous Multi-Threading (SMT) support
- CPU Turbo Mode support
- PCI 2.3 compliant
- Plug n' Play 1.0a compliant
- MP (Multiprocessor) 1.4 compliant
- Boot from hard drive, external optical drive, iSCSI drive, USB key, and SD card
- ACPI support
- Direct Media Interface (DMI) support
- PXE and WOL support for on-board NICs
- Memory mirroring and spare bank support
- SETUP access through <F2> key at end of POST
- USB 2.0 (USB boot code is 1.1 compliant)
- F1/F2 error logging in CMOS
- Virtual KVM, CD, and floppy support
- Unified Server Configurator (UEFI 2.1) support
- Power management support including DBS, Power Inventory and multiple Power Profiles

The PowerEdge M610 BIOS does not support the following:

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

## **B. I<sup>2</sup>C (Inter-Integrated Circuit)**

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

## **SECTION 9. EMBEDDED NICS/LOMS**

### **A. Overview/Description**

Embedded Gigabit Ethernet Controllers with TCP Offload Engine (TOE) support

One embedded dual-port Broadcom 5709C LAN controller is on the PowerEdge M610 planar as an independent Gigabit Ethernet interface device. 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
- 64KB receive buffer
- TOE (TCP Offload Engine)
- iSCSI controller (enabled through an optional hardware key)
- RDMA controller (RNIC) (enabled post-RTS through an optional hardware key)
- 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 - Used for offloading iSCSI traffic as an iSCSI accelerator/HBA

## **SECTION 10. MEZZANINE CARD SLOTS**

### **A. Overview/Description**

The PowerEdge M610 contains 2 PCIe x8 Gen 2 mezzanine card slots. Each card is a dual port.

Every M610 blade can support up to 4 I/O ports (2 from each of the 2 mezzanine cards) plus the two integrated NIC/LOM ports. PLEASE NOTE: For space, the size of new mezzanine cards has been reduced and in the M610 only ONE of some older size cards can fit. Fabric C can fit any card. Fabric B can NOT fit: FC4 HBAs, Infiniband HCAs or Broadcom 5708 1Gb NICs. Mezzanine card options include:

- Emulex and QLogic dual-port 8Gb FC HBA
- Broadcom 5709 dual-port Gb Ethernet w/ TOE and iSCSI offload
  - Supports IPv6 offloads, improved virtualization performance, enables M610 to support 2 Ethernet mezzanine cards, and lowers power consumption
- Mellanox ConnectX dual-port Double Data Rate (DDR - 20Gbps) Infiniband HCA or Quad Data Rate (QDR - 40Gbps) HCA
- Broadcom dual-port 10Gb Ethernet w/ TOE and iSCSI offload

## **SECTION 11. STORAGE**

### **A. Hard Drive Overview / Description**

The PowerEdge M610 supports 2 2.5" hard drives. These drives can be either SATA, SAS or SSD.

Both RAID 0 and RAID 1 are supported as long as a RAID card is included.

#### **Hard Disk Drive Carriers**

Hard drives must use the new Dell drive carrier for 2.5" drives.

#### **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.

#### **Diskless Configuration Support**

The system supports diskless configuration with no storage controller installed in the system.

#### **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 bi-color (green/amber) LED for status information. The activity LED is driven by the disk drive during normal operation. The bi-color LED is controlled by the SEP device on the backplane. Both LEDs are used to indicate certain conditions under direction of a storage controller.

### **B. Storage Controllers**

The PowerEdge M610 will support a variety of RAID cards

- A SATA controller comes standard and supports both the SATA drives and some SSD.
- CERC6 - The M610 supports this card with 128MB of RAID cache.

## SECTION 12. VIDEO

### A. Overview / Description

The PowerEdge M610 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 video device outputs are multiplexed between the front and rear video ports. If a monitor is connected to the front video connector, it will take precedence over the rear connection, thereby removing the display from the rear connection.

The PowerEdge M610 system supports the following 2D graphics video modes:

RESOLUTION	REFRESH RATE (Hz)	COLOR DEPTH (BIT)
640 x 480	60, 72, 75, 85	8, 16, 32
800 x 600	56, 60, 72, 75, 85	8, 16, 32
1024 x 768	60, 72, 75, 85	8, 16, 32
1152 x 864	75	8, 16, 32
1280 x 1024	60, 75, 85	8, 16
1280 x 1024	60	32

**SECTION 13. OPERATING SYSTEMS****A. Overview / Description**

The PowerEdge M610 supports Windows®, Linux®, and Solaris™ Operating Systems.

**Windows® Support:**

<b>X86 OR X64</b>	<b>INSTALLATION</b>	<b>FACTORY INSTALLATION</b>	<b>LOGO CERTIFICATION</b>	<b>SCHEDULE</b>	<b>TEST/VALIDATE</b>	<b>SUPPORT</b>
<b>Windows® Essential Business Server 2008</b>						
x64	Standard/ Premium	Yes	Windows Hardware Quality Labs - Windows 2008	Shipping	Yes	Yes
<b>Windows Server® 2008 (x64 includes Hyper-V™)</b>						
x64	Standard	Yes	Windows Hardware Quality Labs - Windows 2008	Shipping	Yes	Yes
	Enterprise					
	Datacenter					
<b>Windows Server® 2008</b>						
x86	Standard	Yes	Windows Hardware Quality Labs - Windows 2008	Shipping	Yes	Yes
	Enterprise					
<b>Windows® Web Server 2008</b>						
x86 and x64	Web	Yes	Windows Hardware Quality Labs - Windows 2008	Shipping	Yes	Yes
<b>Windows Server® 2008, SP2 (x64 includes Hyper-V™)</b>						
x64	Standard	Yes	Windows Hardware Quality Labs - Windows 2008	Available in August - October 2009	Yes	Yes
	Enterprise					
	Datacenter					
<b>Windows Server® 2008, SP2</b>						
x86	Standard	Yes	Windows Hardware Quality Labs - Windows 2008	Available in August - October 2009	Yes	Yes
	Enterprise					
<b>Windows® Web Server 2008, SP2</b>						
x86 and x64	Web	Yes	Windows Hardware Quality Labs - Windows 2008	Available in August - October 2009	Yes	Yes

<b>X86 OR X64</b>	<b>INSTALLATION</b>	<b>FACTORY INSTALLATION</b>	<b>LOGO CERTIFICATION</b>	<b>SCHEDULE</b>	<b>TEST/VALIDATE</b>	<b>SUPPORT</b>
<b>Windows Server® 2008, R2, (x64 includes Hyper-V™)</b>						
x64	Standard	Yes	Windows Hardware Quality Labs - Windows 2008 Release 2	Available in November 2009 - January 2010	Yes	Yes
	Enterprise					
	Datacenter					

**Linux support:**

<b>Red Hat® Enterprise Linux 4.7</b>						
x86 and x64	ES/AS	Available in June 2009	N/A	Available in June 2009	Yes	Yes
<b>Red Hat Enterprise Linux 5.2</b>						
x86 and x64	Standard/AP	Yes	N/A	Shipping	Yes	Yes
<b>Red Hat Enterprise Linux 5.3</b>						
x86 and x64	Standard/AP	Available in June 2009	N/A	Available in June 2009	Yes	Yes
<b>Novell® SUSE® Linux Enterprise Server 10 SP2</b>						
x64	Enterprise	Yes	N/A	Shipping	Yes	Yes
<b>Novell SUSE Linux Enterprise Server 11</b>						
x64	Enterprise	Available in June 2009	N/A	Available in June 2009	Yes	Yes
<b>Solaris™ 10 05/09</b>						
x64	Enterprise	Drop in the box	N/A	Available in June 2009	Yes	Yes



## SECTION 14. VIRTUALIZATION

Supported embedded hypervisors:

- Microsoft® Windows Server® 2008 Hyper-V™
- VMware® ESXi Version 4.0 and 3.5 update 4
- Citrix® XenServer™ 5.0 with Hotfix 1 or later

## SECTION 15. SYSTEMS MANAGEMENT

### A. Overview / Description

Dell is focused on delivering open, flexible, and integrated solutions that help our customers reduce the complexity of managing disparate IT assets. We build comprehensive IT management solutions. Combining Dell PowerEdge Servers with a wide selection of Dell-developed management solutions, we provide customers 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

We offer IT management solutions for organizations of all sizes – priced right, sized right, and supported right.

### B. 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. The following sections briefly describe the 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 include: 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 Acrobat 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.

### **C. Embedded Server Management**

The PowerEdge M610 implements circuitry for the next generation of Embedded Server Management. It is Intelligent Platform Management Interface (IPMI) v2.0 compliant. The iDRAC6 (Integrated Dell Remote Access Controller) is responsible for acting as an interface between the host system and its management software and the periphery devices. These periphery devices consist of the PSUs, the storage backplane, integrated SAS HBA or PERC 6/i and control panel with semi-intelligent display.

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

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

### **I. Unmanaged Persistent Storage**

The unmanaged persistent storage consists of two ports:

- one located on the control panel board
- one located on the Internal SD Module (formerly UIPS).

The port on the control panel is for an optional USB key and is located inside the chassis. Some of the possible applications of the USB key are:

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

The Internal SD Module is dedicated for an SD Flash Card with embedded Hypervisor for virtualization. The SD Flash Card contains a bootable OS image for virtualized platforms.

## II. Lifecycle Controller / Unified Server Configurator

Embedded management is comprised of several pieces which are very interdependent.

- Lifecycle Controller
- Unified Server Configurator
- iDRAC6
- vFLASH

Lifecycle controller is the hardware component that 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 is a 1:1 user interface exposing utilities from Lifecycle Controller. Customers will use this interface to configure hardware, update server, run diagnostics, or deploy the operating system. This utility resides on Lifecycle Controller. To access the Unified Server Configurator, press <F10> key within 10 seconds of the Dell logo display during the system boot process. Current functionality enabled by the Unified Server Configurator includes:

FEATURE	DESCRIPTION
<b>Faster O/S Installation</b>	Drivers and the installation utility are embedded on system, so no need to scour DELL.COM
<b>Faster System Updates</b>	Integration with Dell support automatically directed to latest versions of the Unified Server Configurator
<b>More Comprehensive Diagnostics</b>	Diagnostic utilities are embedded on system
<b>Simplified Hardware Configuration</b>	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

## III. iDRAC6 Express/Enterprise

For the M610, all features of both the iDRAC6 Express and Enterprise are included with each server. The iDRAC6 is a managed persistent storage space for server provisioning data and consists of 1GB flash and VFlash. VFlash offers the hot-plug portability and increased storage capacity benefits of SD while still being managed by the system. iDRAC6 is currently partitioned to support the following applications:

- Unified Server Configurator Browser and System Services Module (SSM) (25MB): The Unified Server Configurator browser provides a consistent graphical user interface for bare metal deployment and is ideal for 1-to-1 deployment. The SSM supports automatic 1-to-N deployment
- Service Diagnostics (15MB): Formerly on the hard drive as the Utility Partition, this is a bootable FAT16 partition for Service Diagnostics
- Deployment OS Embedded Linux (100MB): Storage space to hold embedded Linux
- Deployment OS WinPE (200MB): Storage space to hold Windows Preinstallation Environment
- Driver Store (150MB): Holds all files required for OS deployment
- iDRAC6 firmware (120MB): Holds the two most recent versions of iDRAC6 firmware
- Firmware Images (160MB): Holds the two most recent versions of BIOS, RAID, embedded NIC, power supplies, and hard drive firmware. This partition also holds the BIOS and option ROM configuration data
- Life Cycle Log (2MB): Stores initial factory configuration as well as all detectable hardware and firmware changes to the server since its deployment. The Life Cycle Log is stored on the BMC SPI flash
- RJ-45 Management 10/100Mbps Ethernet port

- VFlash SD card connector - Launches with limited functionality but designed for future expansion
- Other iDRAC6 features:
  - Remote virtual floppy / CD / disk (with super floppy support)
  - Graphics console redirection (also called remote virtual KVM-KeyBoard / Video / Mouse) (For M Series part of the M1000e)
  - Virtual flash (requires VFlash card)
  - Rip and replace
  - RACADM Command Line Interface

Approximately 20% of the Flash space is reserved for wear leveling on the NAND Flash. Wear leveling is a method designed to extend the life of the NAND Flash by balancing the use cycles on the Flash's blocks.

For more information on iDRAC6 Express/Enterprise features see the table below.

<b>FEATURE</b>	<b>BMC</b>	<b>IDRAC6 ENTERPRISE</b>	<b>VFLASH MEDIA</b>
<b>Interface and Standards Support</b>			
<b>IPMI 2.0</b>	✓	✓	✓
<b>Web-based GUI</b>		✓	✓
<b>SNMP</b>		✓	✓
<b>WSMAN</b>		✓	✓
<b>SMASH-CLP</b>		✓	✓
<b>Racadm command-line</b>		✓	✓
<b>Conductivity</b>			
<b>Shared/Failover Network Modes</b>	✓	✓	✓
<b>IPv4</b>	✓	✓	✓
<b>VLAN tagging</b>	✓	✓	✓
<b>IPv6</b>		✓	✓
<b>Dynamic DNS</b>		✓	✓
<b>Dedicated NIC</b>		✓	✓
<b>Security &amp; Authentication</b>			
<b>Role-based Authority</b>	✓	✓	✓
<b>Local Users</b>	✓	✓	✓
<b>Active Directory</b>		✓	✓
<b>SSL Encryption</b>		✓	✓
<b>Remote Management &amp; Remediation</b>			
<b>Remote Firmware Update</b>	✓ <sup>1</sup>	✓	✓
<b>Server power control</b>	✓ <sup>1</sup>	✓	✓

FEATURE	BMC	IDRAC6 ENTERPRISE	VFLASH MEDIA
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			✓
<b>Monitoring</b>			
Sensor Monitoring and Alerting	✓ <sup>1</sup>	✓	✓
Real-time Power Monitoring		✓	✓
Real-time Power Graphing		✓	✓
Historical Power Counters		✓	✓
<b>Logging Features</b>			
System Event Log	✓	✓	✓
RAC Log		✓	✓
Trace Log		✓	✓

## SECTION 16. PERIPHERALS

### A. USB peripherals

The PowerEdge M610 supports the following USB devices with its 2 externally accessible USB ports:

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

## SECTION 17. DOCUMENTATION

### A. Overview, Description, and List

PowerEdge M610 and other 11G systems use the new Enterprise documentation set. The following is a summary of some of the documents slated for the M610 product. For the complete list of documents, including language requirements and delivery scheduling, refer to the Documentation Matrix and the Documentation Milestones in the InfoDev Functional Publications Plan.

- **Getting Started Guide:** This guide provides initial setup steps, a list of key system features, and technical specifications. This document is required for certain worldwide regulatory submittals. This guide is printed and shipped with the system, and is also available in PDF format on the Dell support site.
- **Hardware Owner's Manual:** This document provides troubleshooting and remove/replace procedures, as well as information on the System Setup program, system messages, codes, and indicators. This document is provided to customers in HTML and PDF format at the Dell support site.
- **System Information Label:** The system information label documents the system board layout and system jumper settings and is located on the system cover. Text is minimized due to space limitations and translation considerations. The label size is standardized across platforms.
- **Information Update:** This is a PDF document that provides information on late changes and issues having significant customer impact which were discovered after document signoff.
- **General System Information Placemat:** This is a paper document that is provided with every system. The document provides general information about the system, including software license agreement information and the location of the service tag.
- **Rack Placemat:** This is a paper document that is provided with the rack kits. The document provides an overview of procedures for setting up the rack.

## SECTION 18. PACKAGING OPTIONS

The PowerEdge M610 can ship in three ways:

1. Integrated into the M1000e chassis in one large box
2. In a multi-pack box holding up to eight single-slot blades
3. As a single server in one box