DELL™

POWEREDGE™ R410

TECHNICAL GUIDEBOOK
INSIDE THE POWEREDGE R410

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1 Product Comparison

1.1 Overview

The PowerEdge R410 is Dell's entry 2-socket 1U rack server that supports the latest Intel chipset and processors. With the new Intel architecture, the memory controller is built in the processor and each processor in PowerEdge R410 supports 4 DIMMs. If two processors are installed, it supports 8 DIMMs max. Dell introduces four 3.5" hard drive bays to maximize the storage capacity in this product space. R410 also offers state-of-art features, including: hot-swap hard drive, redundant power supply, 2.5" SAS or SSD, and quad pack LED or active LCD for diagnostic. The PowerEdge R410 also supports Dell's latest remote server management controller and iDRAC6, to easily manage the server.

Table 1.   Comparison of R410 to SC1435 and R610

Feature/Spec	R410	SC1435 (Predecessors)	R610 (Next level up)
Processor	Two-Socket Intel® Xeon® processor 5500 series	AMD Opteron 2XXX series	Two-Socket Intel Xeon processor 5500 series
Front Side Bus	IQP at 6.4 GT/s	1 GBz HyperTransport	IQP at 6.4 GT/s
# Processors	1 to 2	1 or 2	1 to 2
# Cores	Dual or Quad	Dual or Quad	Dual or Quad
L2/L3 Cache	4 MB or 8 MB		4 MB or 8 MB
Chipset	Intel® 5500 chipset	HT2100 + HT1000	Intel® 5520 chipset
DIMMs	4+4 DDR3 Unbuffered with ECC or Registered with ECC 1333/1066/800M Hz	8 DDR2 Registered with ECC 667 MHz	6+6 DDR3 Unbuffered with ECC or Registered with ECC 1333/1066/800 MHz
Min/Max RAM	1 GB/64 GB	512 MB/32 GB	1 GB/96 GB
HD Bays	4 x 3.5" Optional Hot-Swap Support 2.5" HDDs via Hot-Swap tray	2x 3.5"	6 x 2.5" Hot-Swap
HD Types	Default SATA. Optional SAS and SSD via add-in controller	Default SATA. Optional SAS via add-in controller	SAS or SSD
Ext Drive Bay(s)	1 for slim ODD	1 for slim ODD	1 for slim ODD
Embedded HD Controller	Chipset based SATA	Chipset based SATA	SAS 6/iR
Optional Storage Controller	NON-RAID: SAS 5/E LSI 2032 (For TBU only) RAID: SAS 6/iR Modular PERC 6/i, PERC 6/E	SAS 5/iR SAS 6/iR	NON-RAID: SAS 5/E LSI 2032 (For TBU only) RAID: SAS 6/iR (Default) PERC 6/i, PERC 6/E

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Feature/Spec	R410	SC1435 (Predecessors)	R610 (Next level up)
Availability	Hot-swap HDD; Redundant PSU; Quad-pack LED diagnostic/LCD with Hot-swap HDD chassis; Memory mirroring	Tool-less chassis; quad-pack LED for diagnostic	Hot-swap HDD; Redundant PSU; LCD diagnostic; Memory mirroring or sparing; Internal SD card for embedded Hypervisor
Server Mgt.	BMC, IPMI 2.0 compliant; Full Open Manage suite Optional; iDRAC6 Express, iDRAC6 Enterprise, Vflash	BMC, IPMI 2.0 compliant; Dell Server Assistant	iDRAD 6 Express, BMC, IPMI 2.0 compliant; Full Open Manage suite Optional; iDRAC6 Enterprise, Vflash
I/O Slots	1 x PCIe x16 (True x16, Gen2); full height, half length	1 PCIe x8 or one PCI-X 64/133; full height, half length	2x PCIe x8; full height, half length
RAID	See optional Storage Controller	See optional Storage Controller	See optional Storage Controller
NIC/LOM	2x GbE LOM Optional: various NIC available	2x GbE LOM Optional: various NIC available	2x GbE LOM with TOE Optional: various NIC available
USB	Two front/two rear/two internal	Two front/two rear	Two front/two rear/one internal
Power Supplies	Non-Redundant, 480 W (80+ SILVER) Optional Redundant, 500 W (80+ GOLD) Auto Ranging (100V~240V)	Non-Redundant, 600 W Auto Ranging (90V~264V)	Redundant, 502 W High Efficiency PSU or 717 W High capacity PSU
Fans	Non-redundant, non-hot swappable	Non-redundant, non-hot swappable	Redundant, Hot swappable
Form Factor	1U Rack	1U Rack	1U Rack
Dimension (HxWxD)	43.0 x 434.0 x 627.1 (mm) (without ear, without bezel) 1.69 x 17.09 x 24.69 (in)	1.68" x 16.78" x 24"	42.6 x 482.4 x 772 (mm) (w latches, bezel and PSU handles) 1.68 x 18.99 x 30.39 (in)
Weight	Max: 35.02lbs (15.9Kg)	Max: 31.0lbs (14.1Kg)	Max: 39lbs (17.69Kg)

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2 New Technologies

2.1 Overview

- Intel 5500 chipset and Intel Xeon 5500 series processor (new Intel architecture)
- Memory RAS feature (mirroring)
- iDRAC6 (new Dell server remote management controller)
- Virtualization (support various virtualization applications)
- SSD advantage (support SSD drives)

3 System Overview

3.1 Overview

The PowerEdge R410 delivers the right combination of computing power and redundancy in an ultra-dense chassis. It is positioned to compete against HP's DL160/DL165, and IBM's x3450/x3455. The PowerEdge R410 provides:

- Outstanding price and feature set combination
- Industry leading features configurability without burdening the entry configuration price
- Industry leading server management with LifeCycle Controller available via optional iDRAC Express or iDRAC Enterprise
- Security features with TPM, internal USB, and IPv6
- Industry leading storage expandability and $/GB with 4 x 3.5"/2.5" HDD, cabled and hot-swap
- Industry leading serviceability and diagnostics with optional interactive LCD
- Industry leading chassis depth of only 24" in its class for SMB closets, shallow racks, mobile server enclosures, wall server enclosures, A/V racks and legacy server racks

3.2 Product Features Summary

Table 2.   PowerEdge R410 Features and Descriptions

Features	Descriptions
Chipset	Intel® 5500 chipset (5500 24 + ICH10R)
CPU	Intel Xeon® 5500 series processor (Intel 5500 EP)
DIMM	4+4 DDR3 Unbuffered with ECC or Registered with ECC 1333/1066/800 MHz
Memory Modules	1 GB UDIMM/RDIMM 2 GB UDIMM/RDIMM 4 GB RDIMM 8 GB RDIMM
TPM	TPM TCM/NO TPM
Expansion Slots	1 PCI slots Slot 1: PCIe x16 (True x16, Gen2), half length Slot 2: Propriety for SAS 6/iR Modular card only

Features	Descriptions
LOM	Two GbE (5716 dual port) without TOE
Management	Full Open Manage BMC, IPMI2.0 compliant Optional: iDRAC6-Express, iDRAC6-Enterprice and Vflash
USB	Two front/two rear/two internal
PSU	Non-Redundant, 480 W (80+ SILVER) Optional Redundant, 500 W (80+ GOLD) Auto Ranging (100V~240V)
Availability	Quad-pack LED diagnostic/LCD with Hot-swap HDD chassis
Embedded Graphics	Matrox G200eW with 8 MB
Resolution and Colors	1280x1024 at 85 Hz for KVM and 1600x1200 at 60 Hz for video out 640x480 (60/72/75/85 Hz; 8/16/32-bit color) 800x600 (60/72/75/85 Hz; 8/16/32-bit color) 1024x768 (60/72/75/85 Hz; 8/16/32-bit color) 1152x864 (75 Hz; 8/16/32-bit color) 1280x1024 (60/75/85 Hz; 8/16-bit color) 1280x1024 (60 Hz, 32-bit color) (note 32 bit color is only supported at 60 Hz for this resolution)
Audio	No speaker/no buzzer
Form Factor	1U Rack
Dimension (HxWxD)	43.0 x 434.0 x 627.1 (mm) (without ear, without bezel) 1.69 x 17.09 x 24.69 (in)
Max Weight	15.9Kg/35.02lbs
Bezel	Metal (Optional)
HDD Bays	4x 3.5" Optional Hot-Swap Support 2.5" HDDs via Hot-Swap tray
HDD/SATA	3.5"/7.2K 160 GB 250 GB 500 GB 750 GB 1000 GB 2000 GB (POST-RTS)
HDD/Near Line SAS	3.5"/7.2K 500 GB 750 GB 1000 GB 2000 GB (POST-RTS)
HDD/SAS	3.5"/15K 146 GB 300 GB 450 GB 3.5"/10K

Features	Descriptions
	600 GB 2.5"/10K (in 3.5" Bosshog) 73 GB 146 GB 300 GB
HDD/SSD	2.5" (in 3.5" Bosshog) 25 GB SATA SSD 50 GB SATA SSD 100 GB SATA SSD (POST-RTS)
Media Bay	1x slim ODD
RMSD	DVD-ROM DVD+/-RW USB DVD-ROM
Backup Devices	RD1000 (External) DAT-72 (External) LTO2-L (External) LTO3-060 (External) LTO3FH (External) LTO4-120 HH (External) LTO4-120 FH (External) PV114T (External, 2U)
Tape Automation	TL2000/TL4000 ML6000 PV124T
TBU Software	CommVault Galaxy Symantec Backup Exec including Backup Exec System Recovery Yosemite/Little Man
PV DAS/SAN	MD1000 MD1120 MD3000/MD300i
Storage HBA	**NON-RAID:** SAS 5/E LSI 2032 (For TBU only) **RAID:** SAS 6/iR Modular PERC 6/i PERC 6/E
NICs/Single Port	Intel PRO/1000 PT Server Adapter Intel 10 Gigabit AT Server Adapter Broadcom NetXtreme II 57710 Single Port 10GBase-T Ethernet PCI-Express Network Interface Card with TOE and iSCSI Offload
NICs/Dual Port	Intel PRO/1000 PT Dual Port Server Adapter Intel Gigabit ET Dual-Port Server Adapter Broadcom NetXtreme II 5709 Dual Port Ethernet PCIe Card with TOE

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Features	Descriptions
	Broadcom NetXtreme II 5709 Dual Port Ethernet PCIe Card with TOE and iSCSI Offload
NICs/Quad Port	Intel Gigabit VT Quad Port Server Adapter
	Intel Gigabit ET Quad-Port Server Adapter
	Broadcom ® NetXtreme II ® 5709 Quad Port Ethernet PCIe Card with TOE/iSCSI Offload
Infiniband NIC	Mellanox: ConnectX™ IB HCA Card, Dual Port 20Gb/s InfiniBand, wth PCIe Gen2, PCIe 2.0 x8 5.0GT/s, MemFree, tall bracket, RoHS (R5) Compliant
	QLogic : Pathscale DDR/QDR (whichever is current)
FC HBA	LPE1150-E LPe11002 LPe12000 LPe12002 QLE220 QLE2460 QLE2462 QLE2560 QLE2562
Solutions	**Database:** SQL2008 **Virtualization:** VMWare ESX 3.5/ESXi 3.5 and ESX 4.0/ESXi 4.0 Hyper-V (Veridian and standalone Viridian) *Dell will not support XenServer. Citrix XenServer Enterprise (Std and Embedded) is supported by Citrix.* **HPCC:** Microsoft HPC Server 2008 Red Hat Enterprise Linux 5 for HPC
Operating Systems	**Microsoft:** Essential Business Server (Centro) 64-bit Standard(DIB) and Premium(DIB) SBS2008 64-bit Standard and Premium (FI) WS2008 32-bit Web, Standard, Enterprise (FI) WS2008 64-bit Web, Standard, Enterprise, Datacenter, HPC Server 2008 (FI) SBS2003 R2 32-bit Standard and Premium(DIB) WS2003 R2 32-bit Standard, Enterprise WS2003 R2 64-bit Standard, Enterprise, Datacenter(DIB) WS2003 32-bit Web **Linux:** RHEL 4.7 ES/AS x86(DIB, NFI) (POST-RTS at Q2 block) RHEL 4.7 ES/AS 64-bit(DIB, NFI) (POST-RTS at Q2 block) RHEL 4.7 for HPC x86-64 (DIB) RHEL 5.2 Standard/AP x86(DIB, NFI) RHEL 5.2 Standard/AP 64-bit RHEL 5.2 for HPC x86-64 (DIB) SLES 10 SP2 64-bit(DIB, NFI) SLES 11 64-bit (POST-RTS at Q2 block)

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4   Mechanical

4.1 Chassis Description

The PowerEdge R410 chassis design provides customers low-cost compute power with some hardware redundancy ability. It is a new chassis design for two incoming chassis offering cabled hard drive with LED module, and high-availability features such as hot-plug hard drives and LCD module. Features include four 3.5" SATA or SAS hard drives (cabled or hot-swap), power supply (non-redundant or redundant), dual Gigabit LOMs without TOE acceleration, four DIMM slots support each CPU, TPM, one riser card for optional PCIe expansion card, optional iDRAC6 Enterprise and iDRAC6 Express card mounted on planar without PCI slot occupied, and support 11G slim static and slim sliding rails.

4.2 Dimensions and Weight

Table 3.   R410 Dimensions

Dimension *(HxWxD)* (without ear, without bezel)	43.0 x 434.0 x 627.1 (mm) 1.69 x 17.09 x 24.69 (in)
Max Weight	15.9Kg/35.02lbs

Table 4.   Detailed Dimensions

		Dimensions (mm)								
Development Name	**Model Number**	**Xa**	**Xb**	**Y**	**Za with bezel**	**Za without bezel**	**Zb***	**Zc**	**Max Sys Weight**	**Chassis U**
The PowerEdge R410	PE R410	482.4	434.0	43.0	35.0	20.1	606.0	641.9	15.9Kg/35.02lbs	1U

Note

Zb goes to the nominal rear wall external surface where the motherboard I/O connectors reside.
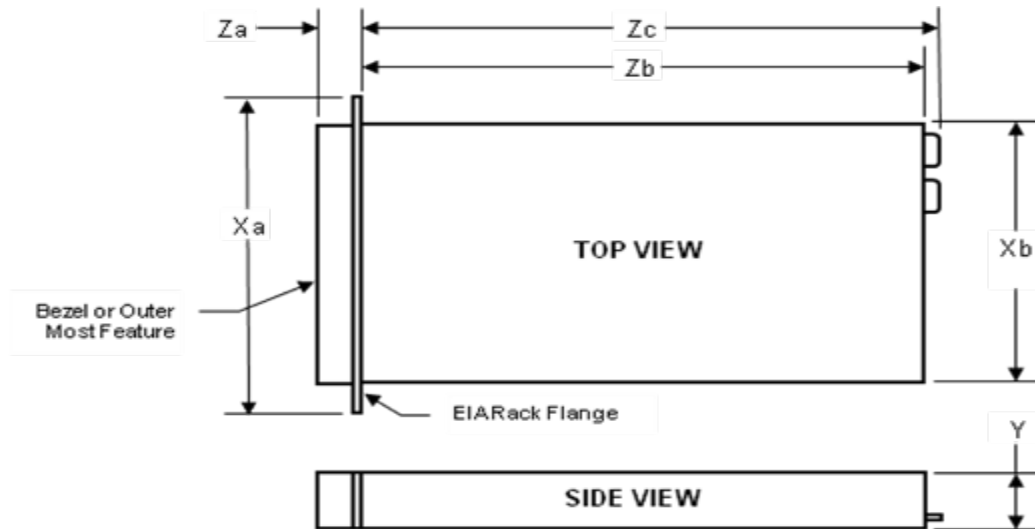
Figure 1.   R410 Top and Side Measurement Key

4.3 Front Panel View and Features

Figure 2. **Hot-Swap HDD view**

Figure 3. **Cabled HDD View**

Figure 4. **With Bezel View**

Figure 5. **Front Panel Controller**

- Front control panel: 11G control panel
    - o Front KVM (2x USB, 1x Video)
    - o Diagnostic indicator (quad-pack LED with cabled HDD configuration; 11G LCD with hot-swap HDD configuration)
    - o System ID button
    - o Power button
    - o HDD activity LED
    - o NMI button
    - o Asset Tag

4.4 Back Panel View and Features

Figure 6. **With Redundant Power Supply**

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Figure 7.   With Non-redundant Power Supply

Figure 8.   Rear Panel Connectors and LEDs

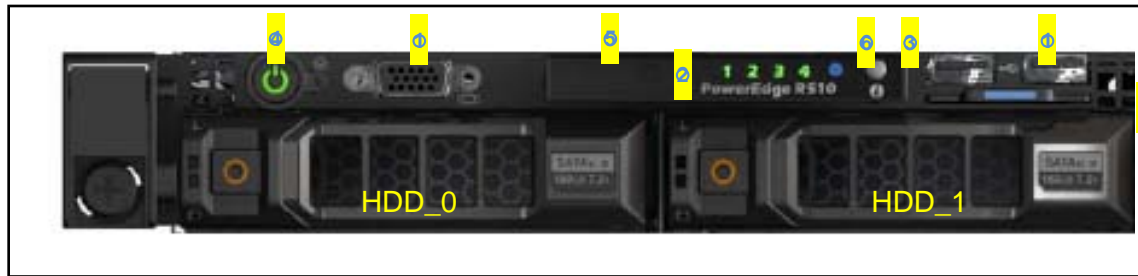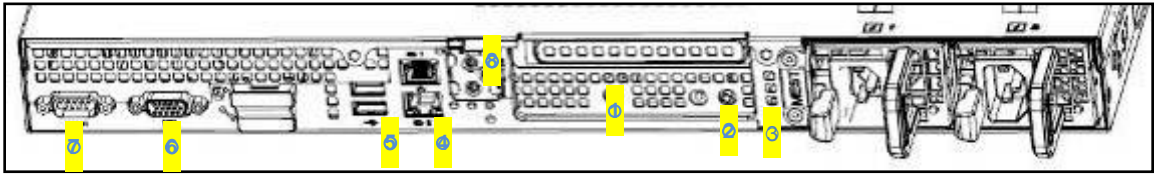Rear I/O ports: layout follows 11G family look.
- o Active ID CMA Jack
- o System ID button
- o Bi-color system ID LED
- o (2) Gigabit NIC ports
- o (2) USB ports
- o Video
- o Serial port
- o RJ45 Connector on iDRAC6 Enterprise (optional)

4.5 Power Supply Indicators
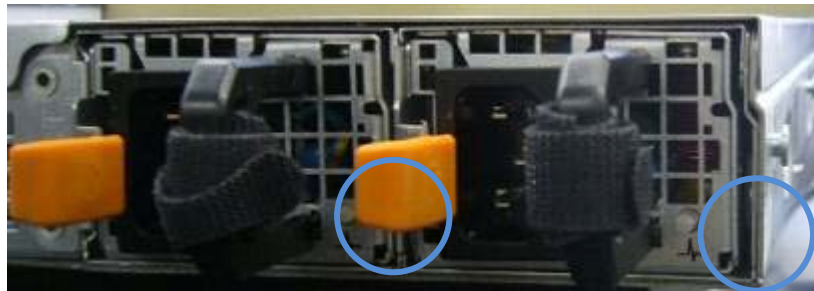
Figure 9.   Redundant PSU

Not lit — AC power is not connected.

Green — In standby mode, a green light indicates a valid AC source is connected to the power supply and the power supply is operational. When the system is on, a green light also indicates that the power supply is providing DC power to the system.

 Amber — Indicates a problem with the power supply.

 Alternating green and amber — When hot-adding a power supply, this indicates that the power supply is mismatched with the other power supply (Ex. a High Output 500-W power supply and a 400-W power supply are installed in the same system). Replace the power supply that has the flashing indicator with a power supply that matches the capacity of the other installed power supply.

4.6 NIC Indicators
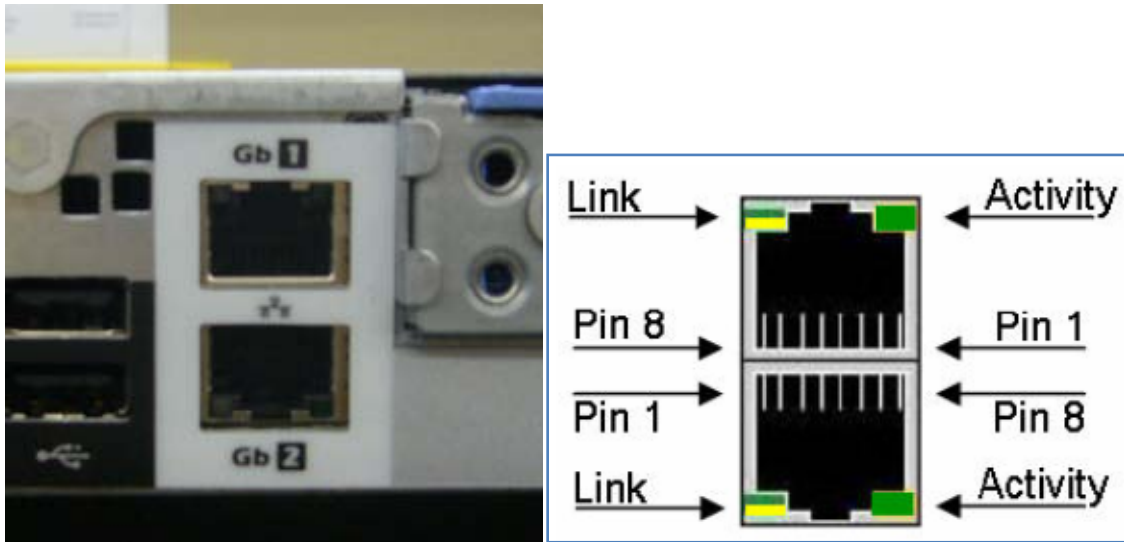
Figure 10.   Dual-Stacked RJ45 Connectors

Table 5.   LED States

State		Link LED (Green/Yellow)	Activity LED (Green)
No link		Off	Off
D0uninitalized (out of box), D3cold, S4 (hibernation)	WOL disabled	Off	Off
	WOL enabled, link, no activity	Green if the port is operating at maximum port speed; Yellow otherwise Green if the port is operating at maximum port speed; Yellow otherwise	Off
	WOL enabled, link, activity		On (blinking at speed related to packet density)
Pre-OS POST or OS without driver	Link, no activity		Off
	Link, activity		On (blinking at speed related to packet density)
OS with driver	Link, no activity		Off
	Link, activity		On (blinking at speed related to packet density)

4.7 Side Views and Features

Figure 11.   Left Side View

Figure 12.   Right Side View

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4.8 Rails and Cable Management

Table 6.   Rails and Cable Management Descriptions

Rails	Support for low cost static rails
	Support sliding rails
	Support for tool-less installation in CEA-310-E compliant square hole 4-post racks Including
	Support for Dell 2410 24U Rack
	Support for Dell 4210 Rack
	Support for HP/Compaq 10xxx series
	Support for tooled or tool-less installation in CEA-310-E compliant round hole 4-post racks (tool-less preferred)
	Support for flush and center mount installation in CEA-310-E compliant 2-post racks (1U and 2U only)
	Full extension required (to allow serviceability of key internal components)
Cable Management Arm (CMA)	Support for maximum number of cables supported by system
	Support for status indicator cable
	To be shipped separately from rail kit
	If sliding rails are supported, then require CMA.

Table 7.   MODs in BOM List

FU435	MOD,RCKRL,CMA,1U
MP488	CUS,RCKRL,CMA,1U
PT642	MOD,RCKRL,NO RAILS,1U
U944M	MOD,RCKRL,2/4PST,1U,STAT,SFF
W625M	CUS,RCKRL,2/4PST,1U,STAT,SFF
X196M	MOD,RCKRL,RDYRL,1U,SL,SFF
Y160M	CUS,RCKRL,RDYRL,1U,SL,SFF

4.9 Fans

There are total of six fans with redundant PSU in the system and four fans with non-redundant PSU.

Figure 13 shows:

- Four fans at right are the fans for the system, especially for the CPUs and memories.
- Two fans at left are there when the system is configured with redundant PSU. They cool down the redundant PSU.

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Figure 13.   R410 Fans

4.10 Control Panel/LCD

- Front control panel
- LCD Status Description

Internal USB connector

LCD module and cable/connector
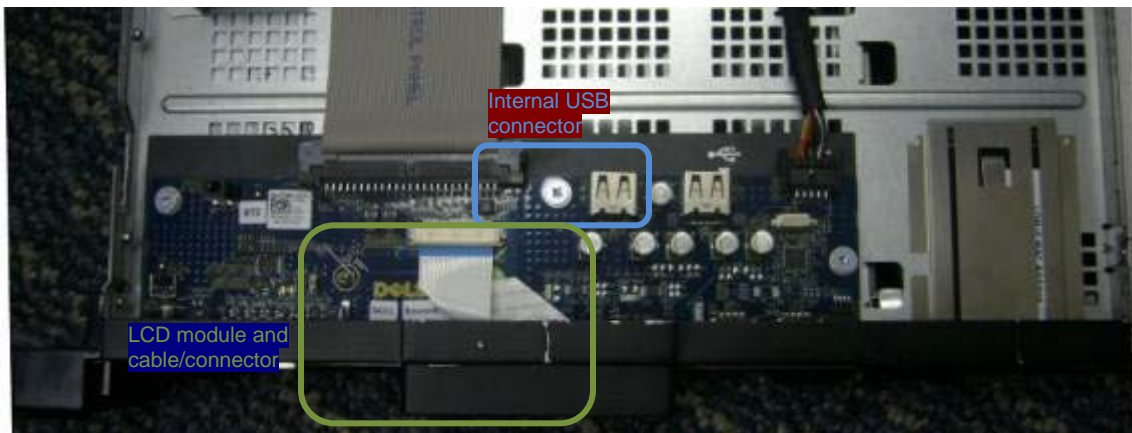
Figure 14.   Front Controller Board with LCD

LED module
No cable and
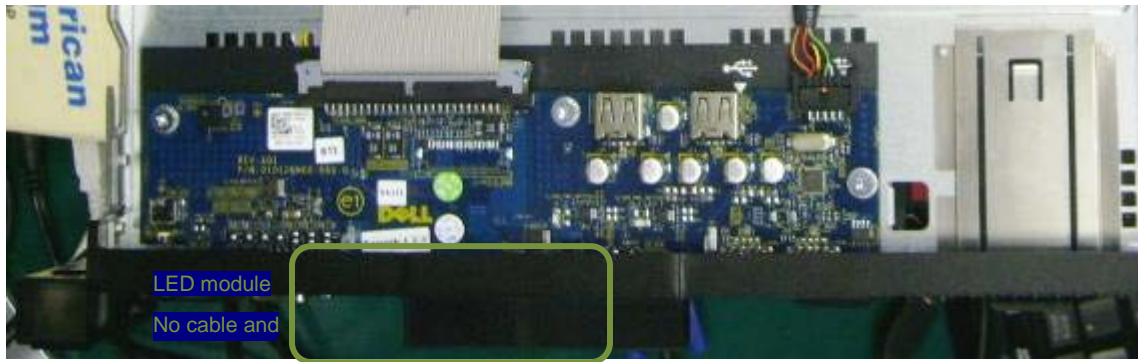
Figure 15.　Front Controller Board with LEDSecurity

4.10.1　Cover Latch
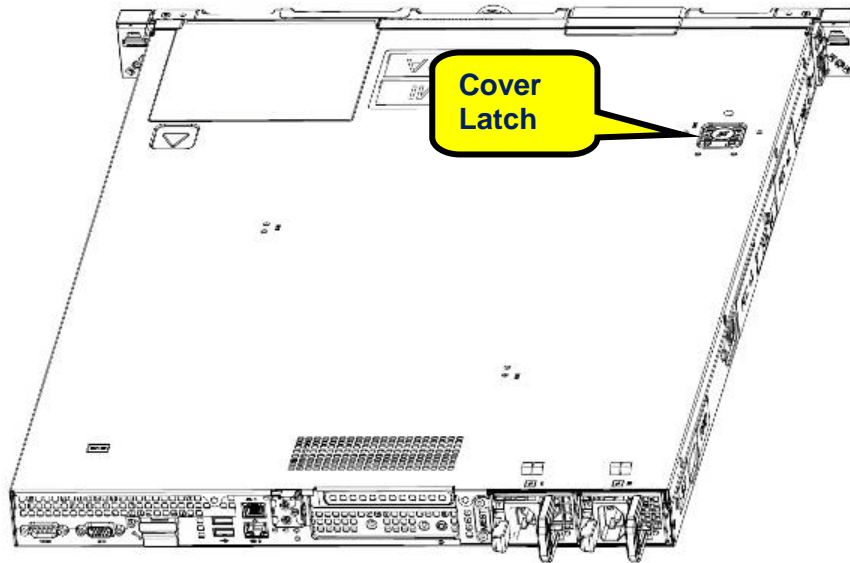
Cover
Latch

Figure 16.　Cover Latch

4.10.2　Bezel
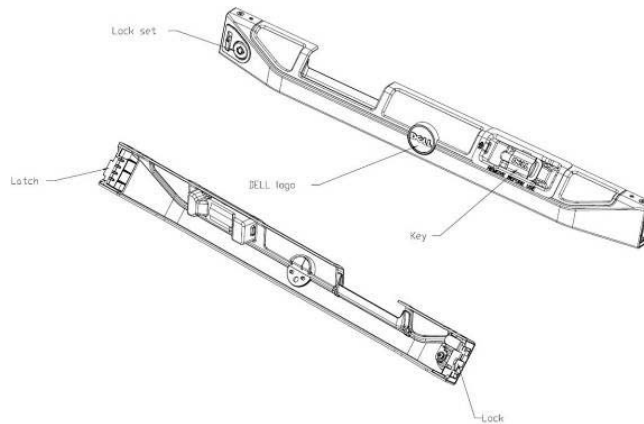
Figure 17.　Bezel

4.10.3 Hard Drive

Require bezel to avoid removing HDDs.

4.10.4 Trusted Platform Management (TPM)
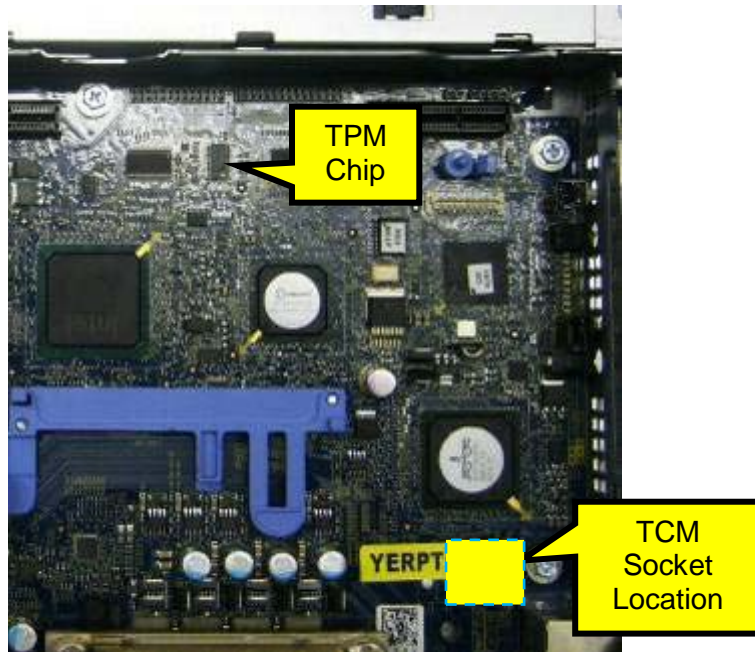
Figure 18.   TPM Module Location on the Motherboard

4.10.5 Power-Off Security

The control panel is designed so that the power switch cannot be accidentally activated. The lock on the bezel secures the switch behind the bezel. In addition, a setting in the CMOS setup disables the power button function.

4.10.6 Intrusion Alert

Chassis intrusion switch is located on the front panel board.

Figure 19.   Chassis Intrusion Switch

4.10.7 Secure Mode

BIOS can 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. See the BIOS specification in the HOM.

4.11 USB Key

Dell does not offer USB keys for factory installation.

4.12 Battery

Battery for the motherboard: CR2032
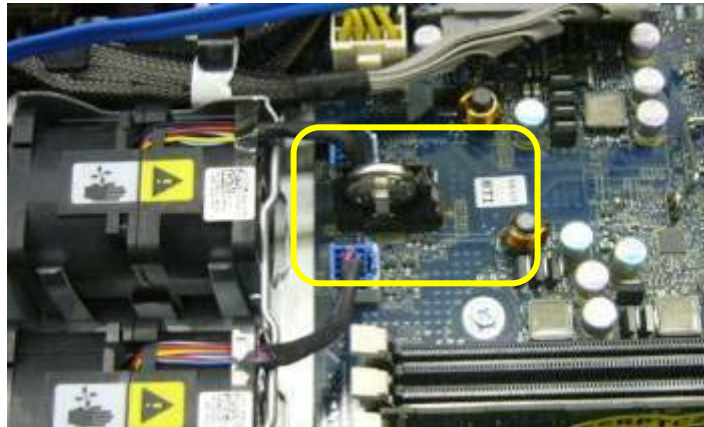
Figure 20.   Battery Holder for PERC 6/i
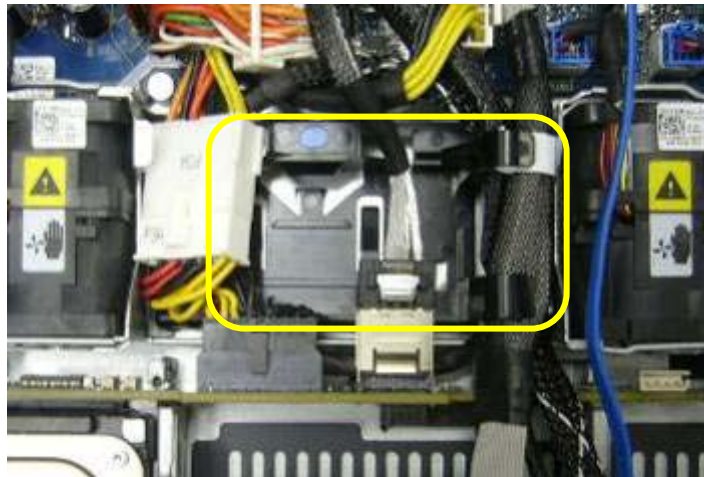
Figure 21.   Battery Holder for PERC

4.13 Field Replaceable Units (FRU)

Parts available for field replacement:

- Backplane
- CMOS battery
- Expansion card
- Front bezel

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- HDD
- I/O panel
- Memory
- ODD
- PDB
- Power supply
- Processor
- Processor shroud
- System board
- System cover
- System fan

5 Electrical

5.1 Volatility

The PowerEdge R410 contains volatile and non-volatile (NV) components. Volatile components lose their data immediately upon removal of power from the component. Non-volatile components continue to retain their data even after the power has been removed from the component. Components chosen as user-definable configuration options (those to the motherboard) are not included in the statement of volatility. Configuration option information (pertinent to options such as microprocessors, system memory, remote access controllers, and storage controllers) is available separately. The NV components present in the PowerEdge R410 server are discussed further in **Error! Reference source not found.**.

5.2 ePPID

The ePPID is an electronic repository for information from the PPID label stored in non-volatile RAM. BIOS reports the ePPID information using SMBIOS data structures, and the ePPID includes:

- Dell part number
- Part revision level
- Country of origin
- Supplier ID code
- Date code (date of manufacture)
- Unique sequence number

Table 8.   R410 ePPID Descriptions and Locations

Component	Description	Storage Location
Board		
Planar	PWA, PLN, SV, DELL, T410	iDRAC FRU
6" x 2.5" Backplane	PWA, BKPLN, SV, T410, 2.5SASX6	SEP
6" x 3.5" Backplane	PWA, BKPLN, SV, T410, 3.5SASX6	SEP
580 W R410 PSU	PWR SPLY,580W,RDNT, DELTA	PSU Microcontroller
	PWR SPLY,580W,RDNT,EMERSON	PSU Microcontroller
R410 PDB	ASSY,PWA,PDB,T410	Microcontroller
Storage Card	**Description**	**Storage Location**
PERC 6/I Adapter	ASSY, CRD, PERC6I-ADPT, SAS	FRU
PERC 6/E External	PWA, CTL, PCIE, SAS, PERC6/E,ADPT	FRU
SAS 6/iR integrated	PWA, CTL, SAS, SAS6/IR, INTG	FRU

6   Power, Thermal, Acoustic

6.1   Power Supplies

The R410 is powered by a non-redundant 480 W power supply (Dell P/N F238K) and redundant 500 W power supply (Dell P/N F649J).

The power supply has automatic input voltage detection. An auxiliary power-out receptacle is not provided on this unit.

The power supply in the chassis has been rated as 82%, efficient at 20%, and 100% load, and 85% efficient at 50% load under 115V AC input line. Redundant power efficiency is 88% at 20% load, 100% load, 92% efficiency at 50% load under 230V AC input line.

The base system includes a single 480 W power supply. This unit provides power to the PowerEdge R410 planar, the four internal hard drive bays, and one slim optical disk drive bay. Power is soft-switched allowing power cycling via a switch on the front of the system enclosure or via software control (through server management functions). The power system is compatible with industry standards, such as ACPI and Server 2000.

The VRD is integrated onto the planar and is not field upgradeable. The VRD follows Intel's VRD11.1 specification. The PowerEdge R410 uses a four-phase design.

6.2   Power Supply Specifications

Single – 480 W power supply

Redundant – 500 W power supply

There are two separate power supply connectors on the planar: an ATX connector (2x12) and a 2x4 connector to provide an additional two pins for +12V. (The ATX connector pin definition is not standard, and it defined by power rating calculation).

The 2x12 ATX connector provides 3.3V, 5V, 12V, and 12V standby to the system. The 5V standby is provided to the system via a charge pump from 3.3V standby.
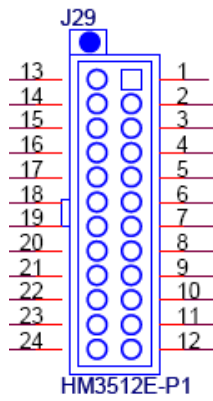
Figure 22.   Power Supply Connector (24 pins)

Table 9.   Power Supply Connector (24 pins) Signals

Pin	SIGNAL	Pin	SIGNAL
1	P5V	13	P3V3
2	P3V3	14	P3V3
3	P12VC	15	P12VC
4	P12VC	16	PS_ENABLE_CPLD_N
5	P12VE	17	P12VE
6	GND	18	GND
7	GND	19	GND
8	PS_PWROK	20	GND
9	SINGLE_PS_PRES_N	21	GND
10	GND	22	GND
11	GND	23	P12VD
12	P5V_AUX	24	P12VD
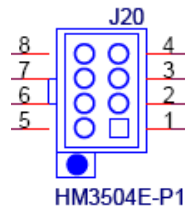
Figure 23.   Power Supply Connector (8 pins)

Table 10.   Power Supply Connector (8 pins) Signals

Pin	SIGNAL	Pin	SIGNAL
1	GND	5	P12VA
2	GND	6	P12VA
3	GND	7	P12VB
4	GND	8	P12VB

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6.3 Environmental Specifications

Table 11.   Operating/Non-operating Storage Requirements

	Operating Requirements	Non-Operating Requirements
Temperature Ranges (For Altitude ≤900 m or 2952.75 ft)	10 to 35 °C (50 to 95 °F)	-40 to 65 °C (-40 to 149 °F)
Temperature Ranges (For Altitude > 900 m or 2952.75 ft)	10 to Note[1] °C (50 to Note[2] °F)	
Temperature Gradient Maximum per 60 Min.	10 °C	20 °C
Humidity Percent Ranges Non-condensing	20 to 80 %[*] (*Max Wet bulb temperature= 29 °C)	5 to 95 %[+] ([+]Max Wet bulb temperature= 38 °C)
Humidity Gradient Maximum per 60 Min.	10 %	10 %
Altitude Ranges	**Low Limits**	-50 feet (-15.2 meters)	-50 feet (-15.2 meters)
	High Limits	10,000 feet (3048 meters)	35,000 feet (10,668 meters)

Use the following formulas to calculate the maximum operating temperature (in °C) for a given altitude. Use the first formula if the altitude is stated in meters and the second formula if the altitude is stated in feet.

$$35 - \frac{\text{Maximum Altitude(in meters)} - 900}{300}\,°C \; or \; 35 - \frac{\text{Maximum Altitude(in ft)} - 2952.75}{984.25}\,°C$$

Use the following formulas to calculate the maximum operating temperature (in °F) for a given altitude. Use the first formula if the altitude is stated in meters and the second formula if the altitude is stated in feet.

$$95 - \left(\frac{[\text{Maximum Altitude\{in meters\}} - 900]\; x\; 1.8}{300}\right)°F \; or \; 95 - \left(\frac{[\text{Maximum Altitude\{in ft\}} - 2952.75]\; x\; 1.8}{984.25} + 32\right)°F$$

6.4 Maximum Input Amps

The power supply is equipped with automatic input voltage detection.

Non-redundant power supply:

7.5 - 3.8 A at 100-240 VAC, 50/60 Hz

Redundant power supply:

7 - 3.5 A at 100-240 VAC, 50/60 Hz

6.5 Acoustics

The PowerEdge R410 has balanced acoustic and thermal performance. Thermal has to support a fully-configured system with Intel 5500-EP 95 W processor. The acoustic goal is driving to meet Dell Acoustic spec AC0142 Rev.A02 category II-D requirement.

This was accomplished by using an aluminum base passive heat sink with two embedded heat pipes for the processor cooling and four 40x56mm dual-rotor fans exhausting air through heat sink and out of the system. In SKU2 (RDN PSU SKU), there are two extra 40X56mm dual-rotor fans in the front of PDB for redundant power supply cooling.

The 40x56mm dual-rotor fan has an external PWM speed control, and it's integrated into MB and PDB. The thermal sensor on front control board senses the ambient temperature and adjusts the fan speed accordingly. In a normal office environment, the fans spin slower, resulting in low acoustics. The fan RPM begins to ramp up with ambient, CPU, IOH, and DIMM temperatures, CPU Temperature and different system configuration (e.g. Different CPU and RAID card installation), to satisfy cooling requirements at higher ambient temperatures.

Table 12.   Standard Acoustic Spec

	SPL	LwAd	N-By	Prom Tones	Dell Mod.	Tonality	Other
		Spec (Typical Config at 23+/-2 deg C ambient) - AC0142, Rev.A02, Category II-D ("Equipment for use in general business areas – more than 4-m distant from a work station")					
MODE	dBA	BA, re: 1 pW	sones	#	degree,%	tu	
Standby		6.5	4.5	None	35	0.25	
Idle		7.0	8.2	None	35	0.25	(critical value=2.355)
Stressed		7.0	8.2	None	35	0.25	

Table 13.   R410 Actual Test Results

Acoustic Metrics – The PowerEdge R410 Typical Configuration at 23C					
Mode	Loudness (Sone)	Tonality (tu)	Prominent Ratio	Modulation (%)	LwAd
Standby	0	0	None	15%	TBD
Idle	3.0	0.23	None	33%	TBD
Stress	3.0	0.24	None	33%	TBD

7 Block Diagram
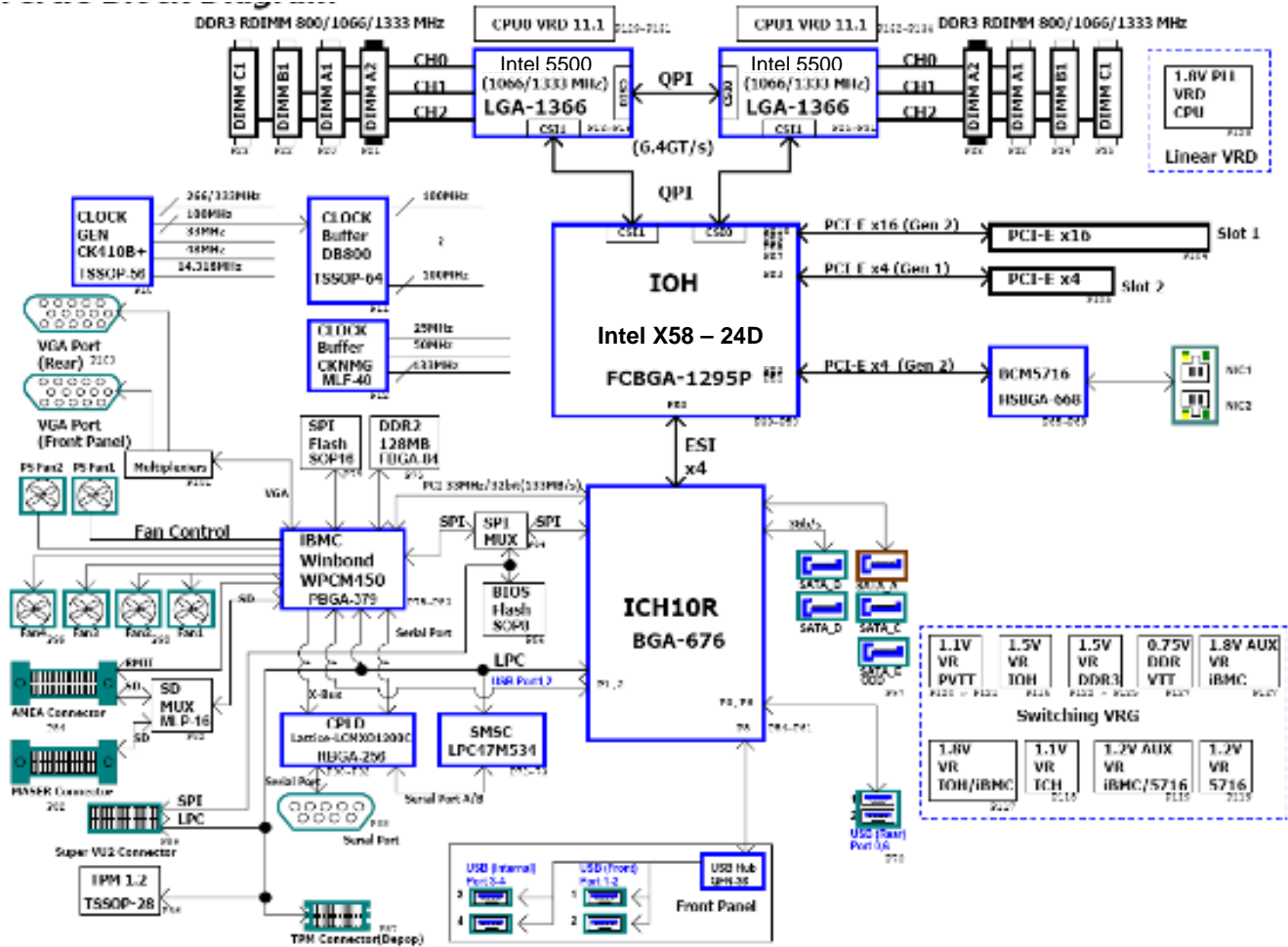
Figure 24.   R410 Motherboard Block Diagram
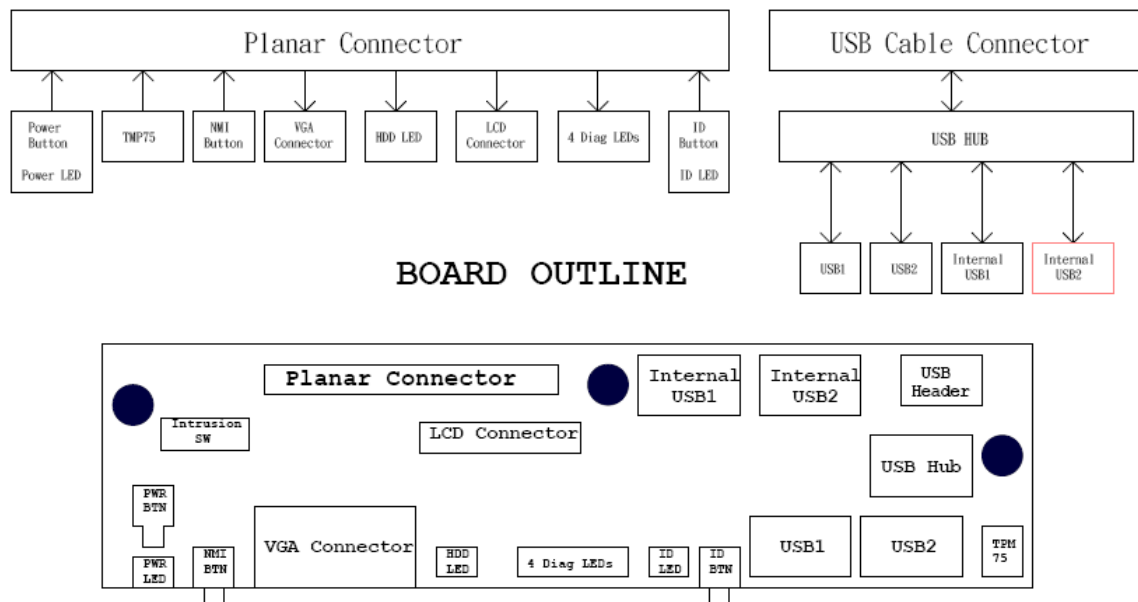
Figure 25.   Front IO Board Block Diagram
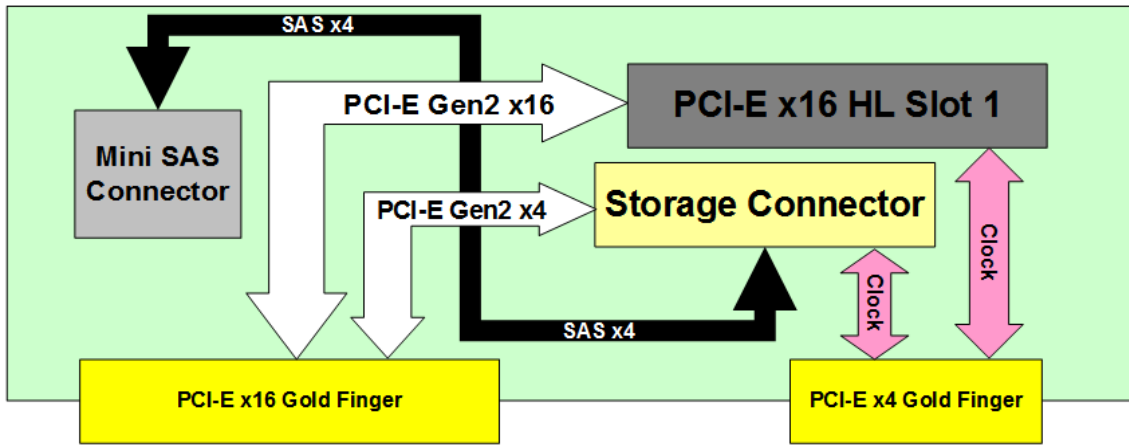
Figure 26.   Riser Card Block Diagram
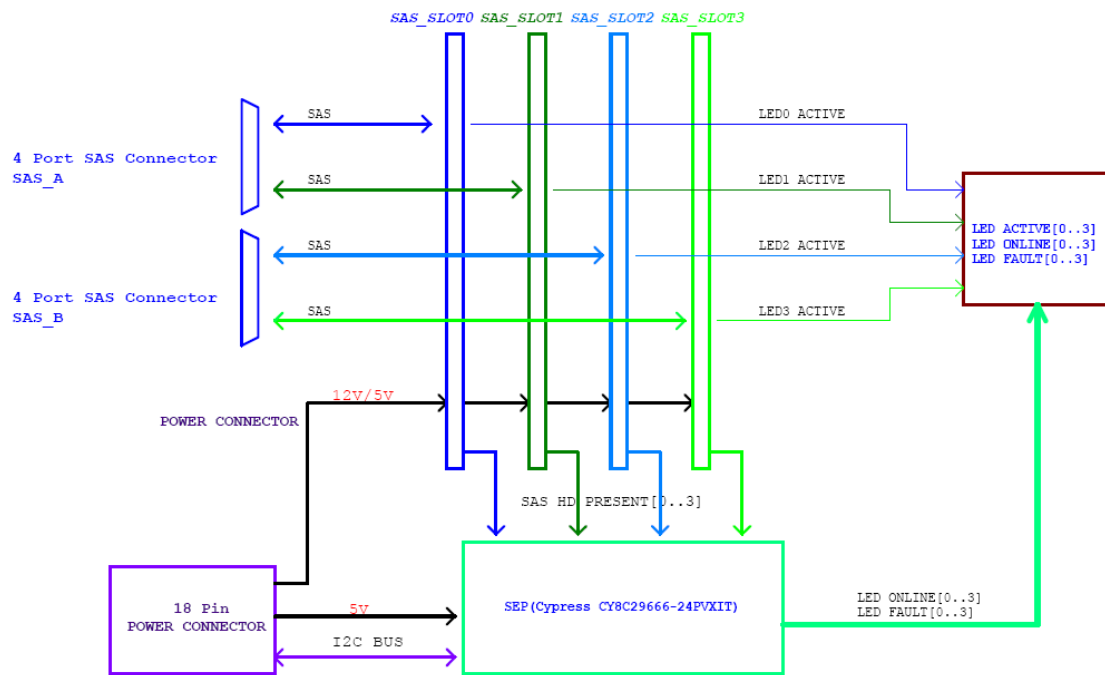
Figure 27.   Hard Drive Backplane Board Block Diagram

8 Processors

8.1 Overview

The PowerEdge R410 supports the Intel Xeon 5500 series processors originally released to the industry on March 30, 2009.

8.2 Supported Processors

Supported Intel Xeon 5500 series processors:

- X5570, 2.93G Hz/8M,4C 95W
- X5560, 2.80G Hz/8M,4C 95W

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- X5550, 2.66G Hz/8M,4C 95W
- E5540, 2.53G Hz/8M,4C 80W
- E5530, 2.40G Hz/8M,4C 80W
- L5520, 2.26G Hz/8M,4C 60W
- L5506, 2.13G Hz/4M,4C 60W
- E5520, 2.26G Hz/8M,4C 80W
- E5506, 2.13G Hz/4M,4C 80W
- E5504, 2.00G Hz/4M,4C 80W
- E5502, 1.86G Hz/4M,2C 80W

Table 14.   Supported Processor Descriptions and Features

| On-Line Processor Descriptions	Additional Features not Included in Description	
Intel® Xeon® X5570 2.93G Hz, 8M cache, 6.4 GT/s QPI, Turbo, HT	DDR3 Memory bus speed: up to 1333 MHz	95 W
Intel® Xeon® X5560 2.80G Hz, 8M cache, 6.4 GT/s QPI, Turbo, HT	DDR3 Memory bus speed: up to 1333 MHz	95 W
Intel® Xeon® X5550 2.66G Hz, 8M cache, 6.4 GT/s QPI, Turbo, HT	DDR3 Memory bus speed: up to 1333 MHz	95 W
Intel® Xeon® E5540 2.53G Hz, 8M cache, 5.86 GT/s QPI, Turbo, HT	DDR3 Memory bus speed: up to 1066 MHz	80 W
Intel® Xeon® E5530 2.40G Hz, 8M cache, 5.86 GT/s QPI, Turbo, HT	DDR3 Memory bus speed: up to 1066 MHz	80 W
Intel® Xeon® E5520 2.26G Hz, 8M cache, 5.86 GT/s QPI, Turbo, HT	DDR3 Memory bus speed: up to 1066 MHz	80 W
Intel® Xeon® L5520 2.26G Hz, 8M cache, 5.86 GT/s QPI, Turbo, HT	DDR3 Memory bus speed: up to 1066 MHz	60 W
Intel® Xeon® E5506 2.13G Hz, 4M cache, 4.8 GT/s QPI	DDR3 Memory bus speed: 800 MHz	80 W
Intel® Xeon® L5506 2.13G Hz, 4M cache, 4.8 GT/s QPI	DDR3 Memory bus speed: 800 MHz	60 W
Intel® Xeon® E5504 2.00G Hz, 4M cache, 4.8 GT/s QPI	DDR3 Memory bus speed: 800 MHz	80 W
Intel® Xeon® E5502 1.86G Hz, 4M cache, 4.8 GT/s QPI	DDR3 Memory bus speed: 800 MHz	80 W

- QPI – Quick Path Interconnect is a point-to-point processor interconnect developed by Intel to compete with AMD's Hyper Transport; it is defined using Gigatranfers (GT/s) per second referring to a number of data transfers or operations
- Turbo – Feature that increases the speed of the processor on demand (from OS) if the CPU is operating below power/thermal specifications
- DDR-3 Memory bus speed: 800 MHz, 1066 MHz, or 1333 MHz
- HT – Intel Hyper-threading technology

8.3 Processor Configurations

R410 operates in single processor or dual processors. However, because the memory controller is embedded in the processor when only one processor is installed in the system, it supports 4 DIMMs, min. 1 GB and max 32 GB. When two processors are installed in the system, it supports 8 DIMMs, min. 2 GB and max 64 GB.

8.4 Processor Installation

Please refer to the PowerEdge R410 owner's manual for information on processor installation. (Downloadable from www.support.dell.com)

9 Memory

9.1 Overview

- Three channels per processor
- Supports registered ECC DDR3 DIMMs or Unbuffered ECC DDDR3 DIMMs.
- DDR3 speeds of 800/1066/1333 supported
- 8 (2/1/1) DIMM sockets (64 GB Maximum capacity)
- Single rank, dual rank, and quad rank DIMMs supported

9.2 DIMMs Supported

- 1 GB, DDR3 UDIMM, 1066 with ECC
- 1 GB, DDR3 UDIMM, 1333 with ECC
- 1 GB, DDR3 RDIMM, 1066 with ECC
- 2 GB, DDR3 UDIMM, 1066 with ECC
- 2 GB, DDR3 UDIMM, 1333 with ECC
- 2 GB, DDR3 RDIMM, 1066 with ECC
- 2 GB, DDR3 RDIMM, 1333 with ECC
- 4 GB, DDR3 RDIMM, 1066 with ECC
- 4 GB, DDR3 RDIMM, 1333 with ECC
- 8 GB, DDR3 RDIMM, 1066 with ECC

9.3 Slots/Risers

The PowerEdge R410 planar provides four 72-bit (240-pin) sockets for DIMM memory modules. These modules are DDR3-800/1066/1333 registered DDR SDRAM DIMMs. The modules are configured as 72-bits wide to provide for ECC. The memory controller in the CPU performs the ECC. The PowerEdge R410 planar supports a minimum of 1 GB upgradable to 64 GB of RAM, using the DIMM sizes:

- 1 GB, DIMM Module
- 2 GB, DIMM Module
- 4 GB, DIMM Module
- 8 GB, DIMM Module
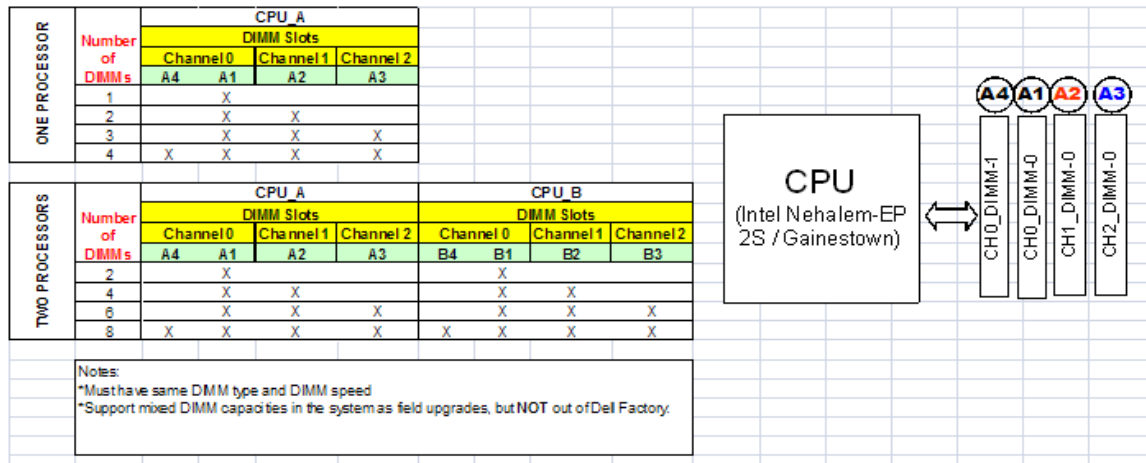
Figure 28. DIMM Installation Specifications
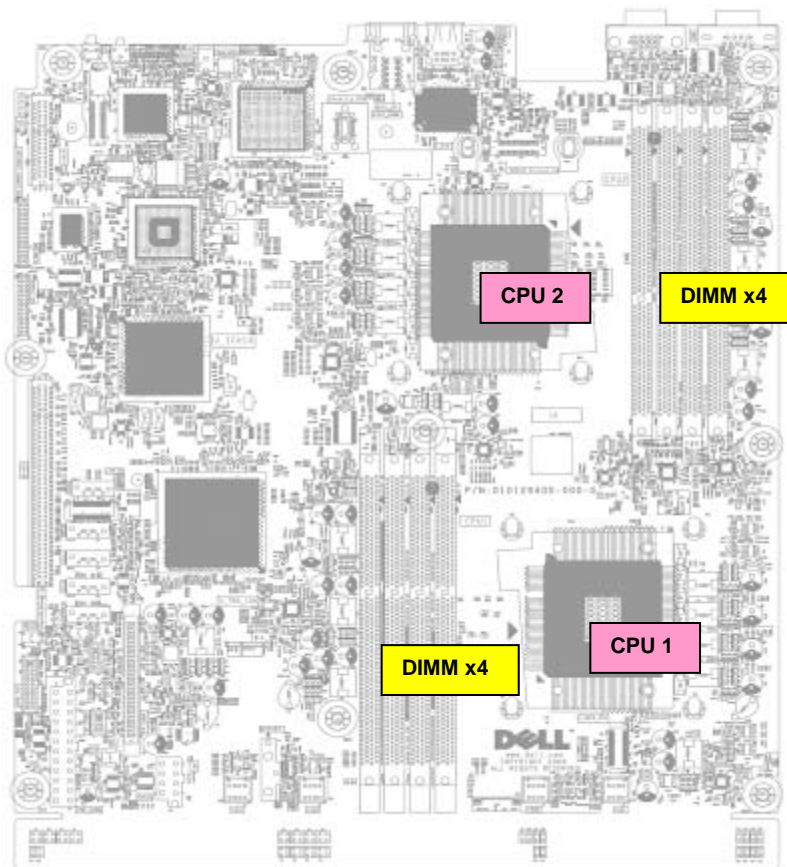
Figure 29. DIMM Installation View

9.4 Mirroring

In mirroring mode, the R410 must have identical memory configuration in Channel_0 and Channel_1, but must not have memory in Channel_3. When mirroring mode is enabled, usable memory capacity is half of the physical memory installed.

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10 Chipset

10.1 Overview

Intel 5500 24 Chipset (North Bridge)

- Intel QuickPath interconnect: 2 ports
- ESI interface: x4 lanes
- Intel Virtualization Technology
- 24 PCIe Gen2 lanes
- Riser card(x16 slot + x8 slot) → IOH PCIe x16 gen2 + IOH PCIe x4 gen2
- Integrated Intel Management Engine
- JTAG support

Intel ICH10R Chipset (South Bridge)

- Integrated USB 2.0 – 12 ports capability
    - Two rear ports from ICH10R
    - Two front ports and two internal port from USB Hub(1 port from ICH10R) on front panel board
- Integrated storage controllers
    - SATA – 6 channels (via ICH10R)
    - Max of one SATA drive (300 MB/s) Gen-2 on each channel

11 BIOS

11.1 Overview

The R410/T410 BIOS is based on the Dell BIOS core, and supports the following features:

- Intel 5500-EP Two-Socket 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, optical drive, iSCSI drive, and USB key
- ACPI support
- Direct Media Interface (DMI) support
- PXE and WOL support for on-board NICs
- Memory mirroring support
- SETUP access through <F2> key at end of POST
- USB 2.0 (USB boot code is 1.1 compliant)
- F1/F2 error logging in CMOS
- Virtual KVM, CD, and floppy support (up-sell for MASER)
- Unified Server Configurator support
- Power management support including DBS, Power Inventory and multiple Power Profiles

- UEFI support
- The R410/T410 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)
- Refer to the PE R410/T410 BIOS Specification document for information related to BIOS.

11.2 Supported ACPI States

- ACPI compliance: OS, S4, S5 supported
- NO S1, S2, S3 (STR) support

Table 15.   Wake-Up States

Wake-Up Events	States Can Wake From
RTC	OS-S4
Power Button	S5
RI#	Not supported
PME#	S5
KB	Not supported
MOUSE	Not supported
USB	Not supported
WOL	OS-S4

11.3 I^{2}C (Inter-Integrated Circuit)

 I^{2}C is a simple bi-directional two-wire bus for efficient inter-integrated circuit control. All I^{2}C -bus compatible devices incorporate an on-chip interface that allows them to communicate directly with each other via the I^{2}C-bus. This solves the many interfacing problems encountered when designing digital control circuits. These I^{2}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.

12 Embedded NICs/LAN on Motherboard (LOM)

12.1 Overview

There is BROADCOM 5716 chip on the PowerEdge R410 motherboard. The 5716 chip is connected to the IOH via a PCI Express x4 gen2 link. The chip provides a two-gigabit Ethernet port. There are two RJ-45 connectors with integrated magnetic on the rear of the system. The firmware for the LOM chip resides in a flash part. The PowerEdge R410 supports Wake-On-LAN (WOL) from either port.
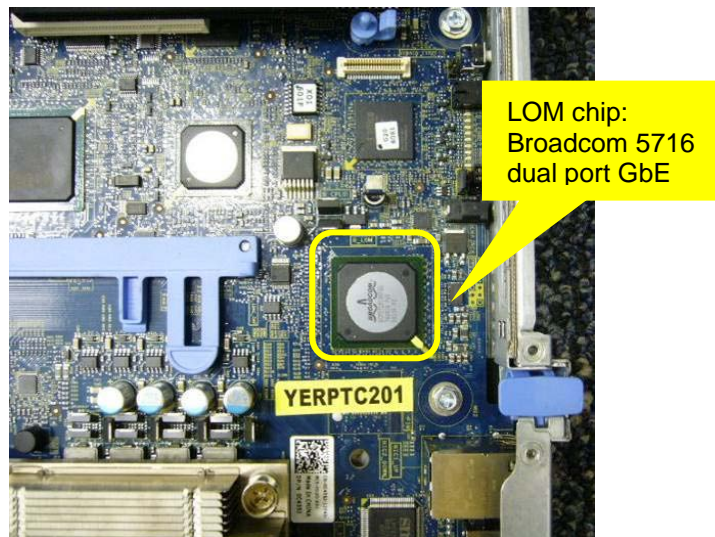
Figure 30.   Embedded NICs/LAN on Motherboard

13 I/O Slots

13.1 Overview with Description

Table 16.   Insert I/O Slot information

PCI Slot #	Mechanical	Electrical	Height	Length
1 (Gen2)	PCIe x16	PCIe x16	Full Height	Half Length

There is a second slot on the riser card dedicated for SAS 6/iR modular. Other than SAS 6/iR modular, no other cards should be installed in this slot.

13.2 Quantities and Priorities

Table 17.   Descriptions of T410 Controllers

Category	Description	Bandwidth	Max Quantity	Slot Priority
Internal Controllers	PERC 6/i Adapter	x8	1	4
	SAS 6/iR	x8	2	4, 5
	SAS 5/iR	x4	2	4, 5
External Controllers	PERC 6/E 256	x8	2	5, 4
	PERC 6/E 512	x8	2	5, 4
	SAS 5/E	x8	2	4, 5
SCSI HBA	LSI2032 PCIe SCSI HBA	x4	2	4, 5

Category	Description	Bandwidth	Max Quantity	Slot Priority
1G NICs	Intel PRO/1000 PT Server Adapter	x1	4	2, 1, 3, 4
	Broadcom NetXtreme II 5709 Dual Port Ethernet PCIe Card with TOE	x4	4	2, 1, 3, 4
	Broadcom NetXtreme II 5709 Dual Port Ethernet PCIe Card with TOE and iSCSI Offload	x4	4	2, 1, 3, 4
	Intel Gigabit VT Quad Port Server Adapter	x4	4	2, 1, 3, 4

13.3 Boot Order

PCI express lane assignments and scan order in R410:

- IOH port 1, 2 (PCI Express Gen2 x4) – Broadcom BCM5716 Gigabit LOM
- IOH port 3 (PCI Express Gen1 x4) – Integrated PERC6i or SAS6i – Slot 2
- IOH port 7/8/9/10 (PCI Express Gen2 x16) – Slot 1

14 Storage

14.1 Overview with Description

R410 supports 4 HDDS.

- 4x 3.5" cabled or hot-swap SAS or SATA

Or

- 4x 2.5" hot-swap SAS or SATA or SSD

The 2.5" HDD requires hot-swap configuration with the 3.5" Boss Hogg tray and the retention kit.

You must choose between cabled or hot-swap configuration at point of purchase. This is not an upgrade option for APOS.
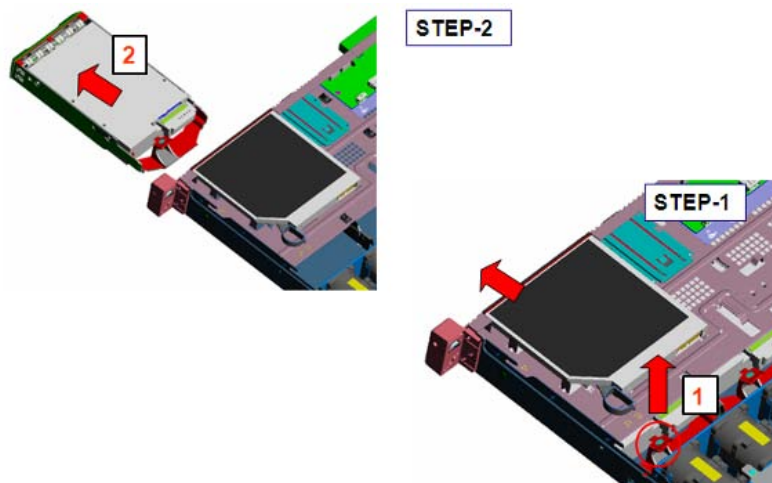
Figure 31. Cable HDD Carrier Chassis View

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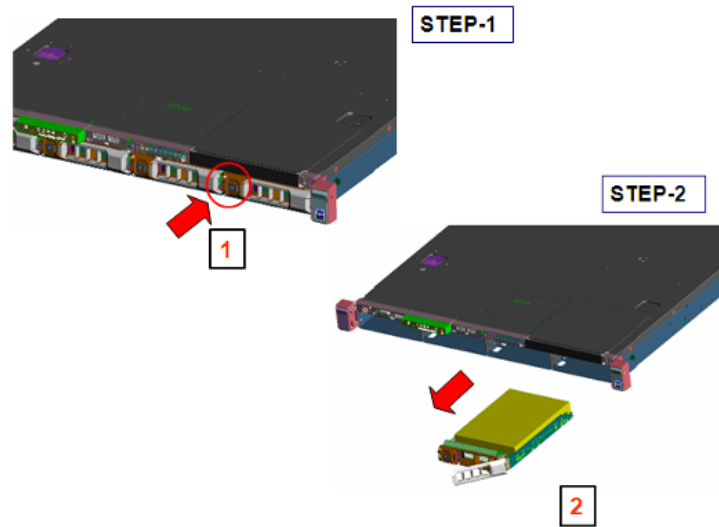
Figure 32.   Hot-Swap HDD Carrier Chassis View

Figure 33.   Hot-Swap HDD Configuration with Backplane

Figure 34.   Top-View for Hot-Swap HDD Connection

Figure 35. Top-View for Cabled HDD Connection

Figure 36. Cabled HDD Connectors

14.2 Drives

Refer to Section 3.2 "Product Features Summary" for supported type and capacities.

14.3 RAID Configurations

Table 18. RAID Configurations

Cabled/Hot Swap	Configuration Type	Configurations		Description	Min HDD	Max HDD	MOD
Cabled	NO HDD	C0 A	NCZCBL	No HDD, Cabled HDD Chassis	0	0	Y331 M
Hot-Swap	NO HDD	C0 B	NCZ	No HDD, Hot-Swap HDD Chassis	0	0	C537 N
Cabled	Embedded SATA	C1	MSTCBL	On-board SATA Controller (ICH10R)	1	4	Y332 M

Cabled/Hot Swap	Configuration Type	Configurations		Description	Min HDD	Max HDD	MOD
Cabled	SAS/SATA – NO RAID	C2	ASSCBL	Add-in SAS/SATA RAID card, No RAID (SAS 6/iR)	1	4	W976 M
Cabled	SAS/SATA – RAID0	C3	ASSR0CBL	Add-in SAS/SATA RAID card, RAID 0 (SAS 6/iR or PERC 6/i)	1	4	Y333 M
Cabled	SAS/SATA – RAID1	C4	ASSR1CBL	Add-in SAS/SATA RAID card, RAID 1 (SAS 6/iR or PERC 6/i)	2	2	X405 M
Cabled	SAS/SATA – RAID5	C5	ASSR5CBL	Add-in SAS/SATA RAID card, RAID 5 (PERC 6/i)	3	4	D143 N
Cabled	SAS/SATA – RAID6	C6	ASSR6CBL	Add-in SAS/SATA RAID card, RAID 6 (PERC 6/i)	4	4	W977 M
Hot-Swap	SAS/SATA /SSD– NO RAID	C7	ASS	Add-in SAS/SATA RAID card, No RAID (SAS 6/iR)	1	4	X406M
Hot-Swap	SAS/SATA /SSD– RAID0	C8	ASSR0	Add-in SAS/SATA RAID card, RAID 0 (SAS 6/iR or PERC 6/i)	1	4	Y334M
Hot-Swap	SAS/SATA /SSD– RAID1	C9	ASSR1	Add-in SAS/SATA RAID card, RAID 1 (SAS 6/iR or PERC 6/i)	2	2	C539N
Hot-Swap	SAS/SATA /SSD– RAID5	C10	ASSR5	Add-in SAS/SATA RAID card, RAID 5 (PERC 6/i)	3	4	D145N
Hot-Swap	SAS/SATA /SSD– RAID6	C11	ASSR6	Add-in SAS/SATA RAID card, RAID 6 (PERC 6/i)	4	4	W979M
Hot-Swap	SAS/SATA /SSD– RAID10	C12	ASSR10	Add-in SAS/SATA RAID card, RAID 10 (PERC 6/i)	4	4	X407M
Hot-Swap	SAS/SATA /SSD– RAID1+ RAID1	C13	ASSR1R1	Add-in SAS/SATA RAID card, RAID 1 + RAID 1 (SAS 6/iR or PERC 6/i)	2+2	2+2	Y336M

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Cabled/Hot Swap	Configuration Type	Configurations		Description	Min HDD	Max HDD	MOD
Hot-Swap	Mix SAS and SATA – No RAID	C14	ASS-X	Add-in SAS/SATA RAID card, No RAID (SAS 6/iR)	2xSAS + 1xSATA	2xSAS + 2xSATA	W980M
Hot-Swap	Mix SAS and SATA – RAID1 + RAID1	C15	ASSR1R1-X	Add-in SAS/SATA RAID card, RAID 1 + RAID 1 (SAS 6/iR or PERC 6/i)	2xSAS + 2xSATA	2xSAS + 2xSATA	C540N

14.4 Storage Controllers

Refer to Section 3.2 "Product Features Summary" and Section 13.2 "Quantities and Priorities".

14.5 LED Indicators
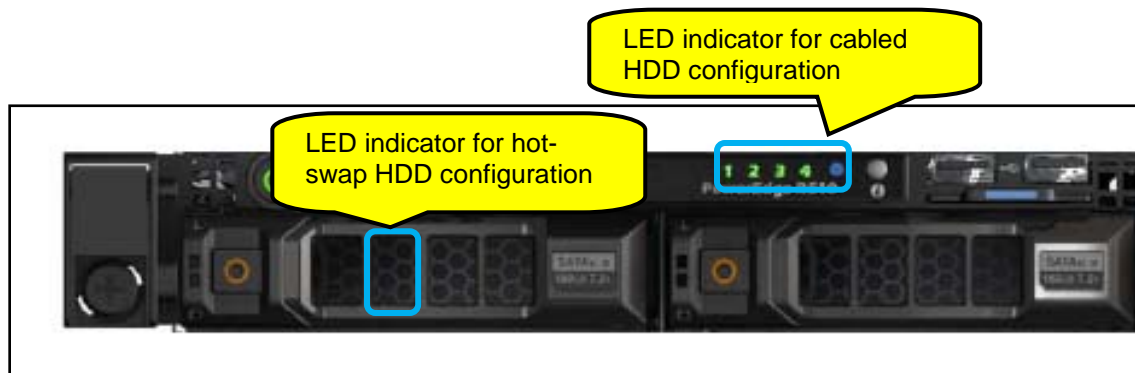
Figure 37.   LED Indicators

A green LED located on the system control panel in the front of the enclosure indicates when activity occurs on any integrated SATA device connected to the on board SATA ports. Using an add-in SAS 6/iR card, the HDD LED is also activated.

14.6 Optical Drives

R410 supports a SATA interface DVD-ROM or DVD+/-RW.

Refer to Section 3.2 "Product Features Summary".

14.7 Tape Drives

R410 does not support an internal backup device. Only external backup device is supported.

Refer to Section 3.2 "Product Features Summary" for the supported devices.

15 Video

15.1 Overview

Matrox G200eW with 8 MB memory integrated in Windbond WPCM450 (BMC controller)

- 1280x1024 at 85 Hz for KVM and 1600x1200 at 60 Hz for video out
  - 640x480 (60/72/75/85 Hz; 8/16/32-bit color)
  - 800x600 (60/72/75/85 Hz; 8/16/32-bit color)
  - 1024x768 (60/72/75/85 Hz; 8/16/32-bit color)
  - 1152x864 (75 Hz; 8/16/32-bit color)
  - 1280x1024 (60/75/85 Hz; 8/16-bit color)
  - 1280x1024 (60 Hz, 32-bit color) (32 bit color is only supported at 60 Hz for this resolution)

16 Audio

16.1 Overview

Not available for server.

17 Rack Information

17.1 Overview

Table 19.   Rack Features and Descriptions

Products	Rail/CMA Type	Rail Identifier	MOD	CUS	Kit	Agile Description	Supplier	Req'd Chassis Width (mm)	Max Allowable Chassis Base Depth (mm)	Square Hole Mounting	Round Hole Mounting
PowerEdge R410 (R410) Samlam (R310) Horton (R210)			PT642			MOD, RCKRL, NO RAILS, 1U					
	1U Sliding (Slim)	A3	X196M	Y160M	C725M	MOD, RCKRL, RDYRL, 1U, SL, SFF CUS, RCKRL, RDYRL, 1U, SL, SFF KIT, RCKRL, RDYRL, 1U, SL, SFF	King Slide	434.0	TBD	Tool-less	Tool-less

Products	Rail/CMA Type	Rail Identifier	MOD	CUS	Kit	Agile Description	Supplier	Req'd Chassis Width (mm)	Max Allowable Chassis Base Depth (mm)	Square Hole Mounting	Round Hole Mounting
	1U Static (Slim)	A4	U94 4M	W62 5M	C597M	MOD, RCKRL, 2/4PST, 1U, STAT, SFF CUS, RCKRL, 2/4PST, 1U, STAT, SFF KIT, RCKRL, 2/4PST, 1U, STAT, SFF	CIS	434.0		Tool-less	Tool-less
	1U CMA		FU4 35	MP4 88	NN006	MOD, RCKRL, CMA, 1U CUS, RCKRL, CMA, 1U KIT, RCKRL, CMA, 1U	Amtek				

17.1.1 Slide Rails

- Support for tool-less installation in CEA-310-E compliant square hole 4-post racks including:
  - Support for Dell Clydesdale Racks (4220, 2420)
  - Support for Dell R2K Racks (4210, 2410)
  - Support for Dell Marconi Racks (4200, 2400) with louvered rear door
  - Support for HP/Compaq 10xxx series racks
  - Support for HP/Compaq 7xxx and 9xxx series racks without the CMA
- Support for tool-less installation in CEA-310-E compliant round hole 4-post racks
- Support full extension of the system out of the rack to allow serviceability of key internal components
- Min rail depth without the CMA
  - 743.1 mm (with outer CMA brackets attached)
  - 713.3 mm (with outer CMA brackets removed)
- Rail depth with CMA: 835 mm
- Square-hole rack adjustment range: 690-883 mm
- Round-hole rack adjustment range: 676-876 mm

17.1.2 Static Rails

- Support for tool-less installation in CEA-310-E compliant square hole 4-post racks including:
  - Support for Dell Clydesdale Racks (4220, 2420)
  - Support for Dell R2K Racks (4210, 2410)
  - Support for Dell Marconi Racks (4200, 2400)

o   Support for HP/Compaq 7xxx, 9xxx and 10xxx series racks
- Support for tool-less installation in CEA-310-E compliant round hole 4-post racks
- Support for tooled installation in CEA-310-E compliant threaded hole 4-post and 2-post racks (2-post support includes flush-mount and center-mount applications)
- CMA and full extension of the system out of the rack are **not** supported
- Minimum rail depth: 622 mm
- Square-hole rack adjustment range: 607-879 mm
- Round-hole rack adjustment range: 594-872 mm
- Threaded-hole rack adjustment range: 604-890 mm

17.2 Cable Management Arm (CMA)

The PowerEdge R410 uses the same CMA as R610, which supports the following cable load:

- Two power
- Four SAS
- Four CAT6
- One status indicator
- One KVM dongle (housing mounted external to basket, but Ethernet routed through CMA)

However, this configuration is extremely difficult to route through the CMA baskets. Cable flow must be straight with no twisting. Backing off to 2-3 SAS cables greatly eases the situation.

18 Operating Systems

18.1 Overview

R410 supports the N and N-1 version of OSes.

18.2 Operating Systems Supported

Table 20. Microsoft OS

Operating Systems	x86 or x64	Installation	Factory Install	Logo/ Certification	Schedule	Test /Validate	Support	Engineering Response
Small Business Server 2008	X64	Standard	FI	Covered in Server 2008 family	RTS	Yes	Yes	Yes
		Premium						
Small Business Server 2003 R2	32-bit x86	Standard	FI (SP2 only)	Covered in Server 2003 family	RTS	Yes	Yes	Logo Certification will require tests to be performed ONLY on Enterprise edition of Windows Server 2003 R2 and Windows Server 2008 with the latest service pack supported.
		Premium	DIB (SP2 only)					
Windows Server 2008[1]	x32-bit x86	Web Standard	FI	N/A	RTS	Yes	Yes	
		Enterprise		WHQL				
	x64	Web Standard		N/A		Yes	Yes	
		Enterprise		WHQL				
		Datacenter						
		HPC Server 2008		N/A		Yes	Yes	
Windows Server 2003	32-bit x86	Web	FI (SP2 only)	N/A	RTS	Yes	Yes	Windows Server 2003 can be removed for all SKUs expect Web edition. Support is only for Windows Server 2003 R2 and Windows Server 2008
		Standard	N/A					
		Enterprise						
	x64	Standard		N/A		Yes	Yes	
		Enterprise						
Windows Server 2003 R2	32-bit x86	Standard	FI (SP2 only)	N/A	RTS	Yes	Yes	
		Enterprise		WHQL				
	x64	Standard		N/A		Yes	Yes	
		Enterprise		WHQL				
		Datacenter	DIB (SP2 only)	N/A				
Windows Essential Business Server (Centro)	X64	Standard	DIB	Covered in Server 2008 family	RTS	Yes	Yes	Yes
		Premium						

1. Windows Server 2008 SP2 and R2 is POST-RTS support.

Table 21.   Linux OS

Operating Systems	Installation	Factory Install	Logo/ Certification	Schedule
Red Hat Enterprise Linux 4.7	Enterprise Server (ES) x86-64 Advance Server (AS) x86-64 Enterprise Server (ES) x86-32 Advance Server (AS) x86-32	DIB, NFI	Yes	POST_RTS (CY09 Q2 block)
Red Hat Enterprise Linux 5.2	Standard (2-sckt) x86-64 Advance Platform (4-sckt) x86-64	FI	Yes	RTS
	Standard (2-sckt) x86-32 Advance Platform (4-sckt) x86-32	DIB, NFI		
SLES10 SP2	x86-64	DIB, NFI	Yes	RTS
SLES 11	x86-64	FI	Yes	POST-RTS (CY09 Q2 block)
RHEL 4.7 for HPC	X86-64	DIB	Yes	PCR04 (The PowerEdge R410 only)
RHEL5.2 for HPC	X86-64	DIB	Yes	PCR04 (The PowerEdge R410 only)

19 Virtualization

19.1 Overview

Table 22.   Supported Virtualization OS

	The PowerEdge R410
VMWare ESX 4[1] *(Target RTS in June)*	RTS+ (Q2 block)
VMWare ESXi 4[1] *(Target RTS in June)*	RTS+ (Q2 block)
VMWare ESX 3.5[1]	DIB
VMWare ESXi 3.5[1]	Download version
Citrix XenServer Enterprise 4.X	N/A (Offer through Citrix)
Citrix XenServer Enterprise 4.X (embedded)	N/A
Hyper-V (Viridian)	FI
Hyper-V Server (Standalone Viridian)	Download version

1. T410 and R410 do not support Hypervisor (through the internal persistent storage via SD card).

20 Systems Management

20.1 Overview/Description

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.

20.2 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 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.

20.3 Embedded Server Management

The PowerEdge R410 implements circuitry for the next generation of Embedded Server Management. It is Intelligent Platform Management Interface (IPMI) v2.0 compliant. The optional iDRAC (Integrated Dell Remote Access Controller) is responsible for acting as an interface between the host system and its management software and the periphery devices. These periphery devices consist of the PSUs, the storage backplane, integrated SAS HBA or PERC 6/I, and control panel with display.

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

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

20.4 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 23.   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.

20.5 iDRAC Express

The optional iDRAC Express is the first tier of iDRAC6 upgrades. In addition to upgrading the system with a Lifecycle Controller, the iDRAC6 Express offers the following key features:

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

For more information on iDRAC6 Express features see table below.

20.6 iDRAC6 Enterprise

The optional iDRAC6 Enterprise card provides access to advanced iDRAC6 features. The iDRAC6 Enterprise connects directly to the R410 planar and is mounted parallel to the planar with stand-offs.

Key features for the iDRAC6 Enterprise include:

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

Additionally, the iDRAC6 Enterprise 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. In the future, vFlash will be expanded to include additional features.

A more detailed feature list for iDRAC6 Enterprise and vFlash is included in Table 24.

Table 24.   Features List for BMC, iDrac, and vFlash

Feature	BMC	iDRAC 6 Express	iDRAC6 Enterprise	vFlash Media
Interface and Standards Support				
IPMI 2.0	✔	✔	✔	✔
Web-based GUI		✔	✔	✔
SNMP		✔	✔	✔
WSMAN		✔	✔	✔
SMASH-CLP		✔	✔	✔
Racadm command-line			✔	✔
Conductivity				
Shared/Failover Network Modes	✔	✔	✔	✔
IPv4	✔	✔	✔	✔
VLAN Tagging	✔	✔	✔	✔

Feature	BMC	iDRAC 6 Express	iDRAC6 Enterprise	vFlash Media
IPv6		✓	✓	✓
Dynamic DNS		✓	✓	✓
Dedicated NIC			✓	✓
Security and Authentication				
Role-based Authority	✓	✓	✓	✓
Local Users	✓	✓	✓	✓
Active Directory		✓	✓	✓
SSL Encryption		✓	✓	✓
Remote Management and Remediation				
Remote Firmware Update	✓	✓	✓	✓
Server power control	✓	✓	✓	✓
Serial-over-LAN (with proxy)	✓	✓	✓	✓
Serial-over-LAN (no proxy)		✓	✓	✓
Power capping		✓	✓	✓
Last crash screen capture		✓	✓	✓
Boot capture		✓	✓	✓
Serial-over-LAN		✓	✓	✓
Virtual media			✓	✓
Virtual console			✓	✓
Virtual console sharing			✓	✓
Virtual flash				✓
Monitoring				
Sensor Monitoring and Alerting	✓	✓	✓	✓
Real-time Power Monitoring		✓	✓	✓
Real-time Power Graphing		✓	✓	✓
Historical Power Counters		✓	✓	✓
Logging Features				
System Event Log	✓	✓	✓	✓
RAC Log		✓	✓	✓
Trace Log			✓	✓

Dell

21 Peripherals

21.1 USB Peripherals

Optional USB 1.44 MB floppy drive

Optional USB DVD-ROM

21.2 External Storage

Refer to Section 3.2 "Product Features Summary".

22 Packaging Options

- Options for single pack and multipack are available.
- Multipack will support four units in one pack.
- Single Pack Dimensions and Weights:
    - o Inside Dimensions:
        - Length: 892 mm/35.13"
        - Width: 594 mm/23.38"
        - Depth: 232 mm 9.13"
    - o Outside Dimensions:
        - Length: 908 mm/35.75"
        - Width: 610 mm/24.00"
        - Depth: 264 mm/10.38"
    - o Weights:
        - System packed out weight: 58 lbs
        - Cushion weight: 2 lbs
        - Corrugated box weight: 8.5 lbs

Appendix A.   R410 Volatility Chart

Table 25.   R410 Volatility Table

Backplane Firmware and FRU	
Size	32 KB
Type	Flash
Can user programs or operating system write data to it during normal operation?	No
Purpose	Backplane Firmware and FRU data storage
How is data input to this memory?	Loading flash memory requires a vendor provided firmware file and loader program executed by booting up the system from a floppy- or OS-based executable containing the firmware file and the loader. System loaded with arbitrary data in firmware memory does not operate.
Embedded Bootable Memory Device	
Size	1 GB
Type	SD card
Can user programs or operating system write data to it during normal operation?	Yes
Purpose	Optional embedded boot device
How is data input to this memory?	Factory installed or via USB bus.
How is this memory write protected?	Not write protected
Server BMC (Baseboard Management Controller) Firmware Flash Memory	
Size	16 MB flash
Type	SPI flash
Can user programs or operating system write data to it during normal operation?	No
Purpose	Stores the BMC Firmware
How is data input to this memory?	Loading flash memory requires a vendor provided firmware file and loader program executed by booting up the system from a floppy or OS based executable containing the firmware file and the loader. System loaded with arbitrary data in firmware memory does not operate.
How is this memory write protected?	Software write protected