



Intel® Remote Management Module 4

Technical Product Specification

A document providing an overview of the features available with the Intel® RMM4 and RMM4 Lite accessory kit options

Revision 4.0

June 2020

Revision History

Date	Revision Number	Modifications
January 2011	1.0	Initial release.
December 2011	1.1	Updated for Intel® Server Boards and Systems Platforms Based on Intel® Xeon® Processor E5-4600/2600/2400/1600/1400 Product Families.
	1.2	Update for new speed POR.
June 2012	1.3	Corrected description of NIC.
July 2014	1.5	Updated for Intel® Server Boards and Systems Based on Intel® Xeon® Processor E5-2600 (V3) – S2600WT, S2600KP, S2600TP and S2600CW Product Families.
March, 2017	2.0	Updated for Intel® Server Boards and Systems Based on Intel® Xeon® Processor E5-2600 (V4) – S2600WT, S2600KP, S2600TP and S2600CW Product Families. Update for Intel® Server Boards and Systems Based on Intel® Xeon® Processor E3-1200 (V5) – S1200SP and Intel® Xeon Phi™ Processor S7200AD Product Families. Update RMM4 Lite 2
July, 2017	3.0	Update for Intel® Server Boards and Systems Based on Intel® Xeon® Processor Scalable Performance Family.
June, 2020	4.0	Add feature iKVM over HTML5 Added feature Virtual Media over HTML5 Updated Network port Usage Updated chapter 4.2.8.1 Availability Updated chapter 4.2.4 4.2.8 Media Redirection Updated chapter 4.2.6 Usage Updated chapter 4.2.5 Security Updated chapter 4.2.4 Availability Updated chapter 4.2.2 Remote Console Updated chapter 4.2.1 Keyboard, Video, Mouse (KVM) Redirection Updated chapter 4.1 Embedded Web Server "Supported boards" Updated chapter 1.2 added "S9200WK" Updated chapter 1.1 added "E5-9200 Platinum"

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1. Overview

Most Intel server boards and systems include support for a standard server management feature set. Additional functionality can be supported with a dedicated management port and/or the additional of an advanced feature enablement key.

The following table identifies both “Standard” and “Advanced” server management features.

Note: The full feature set in the following table may or may not be supported on all Intel server boards. Reference the appropriate Intel server board and Intel server system TPS for supported management features.

Table 1. Standard and Advanced Management Feature Set

Feature	Standard	RMM4-Lite (Advanced)
IPMI 2.0 Feature Support	X	X
In-circuit BMC Firmware Update	X	X
FRB 2	X	X
Chassis Intrusion Detection	X	X
Fan Redundancy Monitoring	X	X
Hot-Swap Fan Support	X	X
Acoustic Management	X	X
Diagnostic Beep Code Support	X	X
Power State Retention	X	X
ARP/DHCP Support	X	X
PECI Thermal Management Support	X	X
E-mail Alerting	X	X
Embedded Web Server	X	X
SSH Support	X	X
Integrated KVM		X
Integrated Remote Media Redirection		X
Lightweight Directory Access Protocol (LDAP)	X	X
Intel® Intelligent Power Node Manager Support	X	X

A dedicated management port provides access to the management features of the BMC. The dedicated management port is not shared with the operating system. Depending on which generation of Intel Server is used, a Dedicated Management Port may or may not be included as a standard on-board feature. Intel server boards and systems that do not include a Dedicated Management Port down on the board will have an on-board connector to support an optional Dedicated Management Port module.

Advanced KVM and media sharing features can be enabled on all Intel server boards and systems that support Intel® RMM4 server management. These features can be enabled with an optional Intel® RMM4 Lite key installed.

1.1 Intel® Server Boards and Systems with no dedicated management port

The following Intel server boards and systems do NOT include a dedicated management port down on the server board. By default, these Intel server products have support for Standard server management features.

- Intel® server boards and system port based on Intel® Xeon® Processor: E5-9200 Platinum/E5-4600/2600/2400/1600/1400 (V1 & V2)
- Intel® Server S1200V3RP product family
- Intel® Server S1200BTL product family

The following table identifies the management support levels available with or without optional accessories installed.

Table 2. Server Management Support Levels – Systems with no Dedicated Management Port

Accessory Kit	Intel Product Code	Standard Management Features	Advanced KVM \ Media Features	Shared NIC/Mgmt Port (BMC channel 1 or 2)	Dedicated Management Port (BMC channel 3)
No accessory kit installed	-	Yes	No	Yes	No
Intel® RMM4 Lite Advanced Feature Enablement Key	AXXRMM4LITE	Yes	Yes	Yes	No
Intel® RMM4 Full Edition • Management Port Card • RMM4 Lite Key	AXXRMM4	Yes	Yes	Yes	Yes

Intel® RMM4 full edition (AXXRMM4)

Intel® accessory kit AXXRMM4 includes both a Dedicated Management Port module and an RMM4 Lite enablement key. With this kit installed, all server management features can be accessed through a dedicated management port hidden from the operating system. The dedicated management port is accessible when the system is operational or not. As long as AC power is supplied to the system, a stand-by voltage is always present on the management port.

Intel® RMM4 Lite (AXXRMM4LITE)

Advanced KVM and media sharing features are available when the RMM4 Lite enablement key is installed to a dedicated connector on the server board.

1.2 Intel® Server Boards and Systems with on-board dedicated management port

The following Intel server boards and systems include a dedicated management port down on the server board. By default, these Intel server products have support for Standard server management features.

- Intel® Server Boards and Systems Based on Intel® Xeon® Processor Scalable Performance Family
 - Intel Server S2600WF product family
 - Intel Server S2600BP product family
 - Intel Server S2600ST product family
 - Intel Server S2600BT product family
 - Intel Server S9200WK product family
- Intel® Server Boards and Systems Based on Intel® Xeon® Processor E5-2600 (V3/V4)
 - Intel Server S2600WT product family
 - Intel Server S2600KP/S2600TP product families
 - Intel Server S2600CW product family
- Intel® Server Boards and Systems Based on Intel® Xeon® Processor E3-1200(V5)
 - Intel Server S1200SP product family
- Intel Server Boards and Systems based on the Intel® Xeon Phi™ Processor
 - Intel Server S7200AD product family

The following table identifies the management support levels available with or without optional accessories installed.

Table 3. Server Management Support Levels – Systems with on-board Dedicated Management Port

Accessory Kit	Intel Product Code	Standard Management Features	Advanced KVM \ Media Features	Shared NIC/Mgmt Port (BMC channel 1 or 2)	Dedicated Management Port (BMC channel 3)
No accessory kit installed	-	Yes	No	Yes	Yes
Intel® RMM4 Lite Advanced Feature Enablement Key	AXXRMM4LITE AXXRMM4LITE2	Yes	Yes	Yes	Yes
Intel® RMM4 Full Edition <ul style="list-style-type: none"> • Management Port Card • RMM4 Lite Key 	AXXRMM4	Not Required			

Intel® RMM4 full edition (AXXRMM4)

The Intel server boards and systems identified in this section include a dedicated management port down on the server board. The full edition of the Intel® RMM4 accessory option is not needed in these products.

Intel® RMM4 Lite (AXXRMM4LITE/LITE2)

Advanced KVM and media sharing features are available when the Intel® RMM4 Lite enablement key is installed to a dedicated connector on the server board.

NOTE: In 2016, Intel released the AXXRMM4LITE2 accessory kit. This kit implemented a component change to conform to RoHS compliance requirements. Functionally, Intel® Accessory Kits AXXRMM4LITE and AXXRMM4LITE2 are the same.

2. Intel® RMM4 and Intel® RMM4 Lite Component Overview

2.1 Intel® RMM4 Dedicated Management Port Module

For Intel server boards and systems that do not include a dedicated management port down on the board, Intel® Accessory Kit AXRMM4 includes a dedicated management port module as shown below.



Figure 1. Intel® RMM4 Dedicated Management Port Module

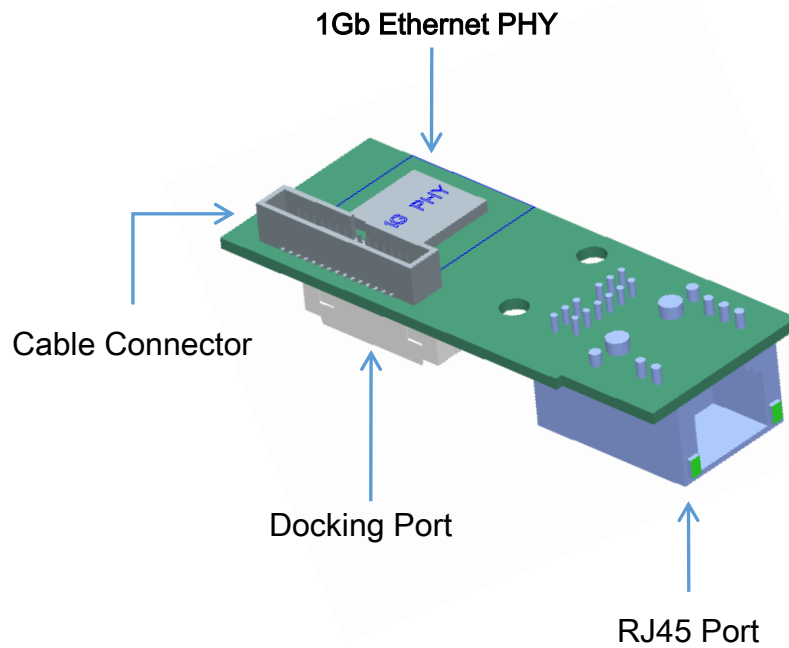


Figure 2. Intel® RMM4 Dedicated Management Port Module Component Identification

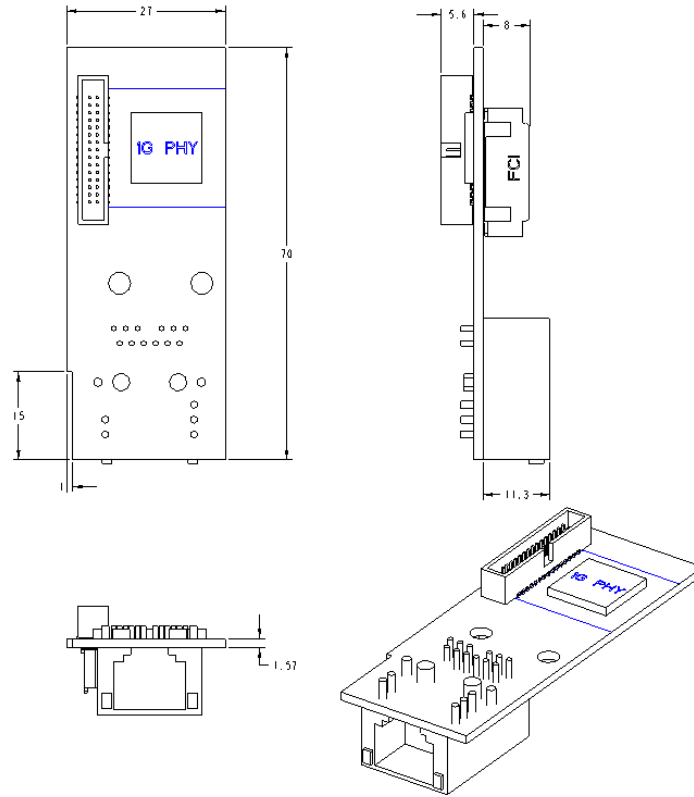
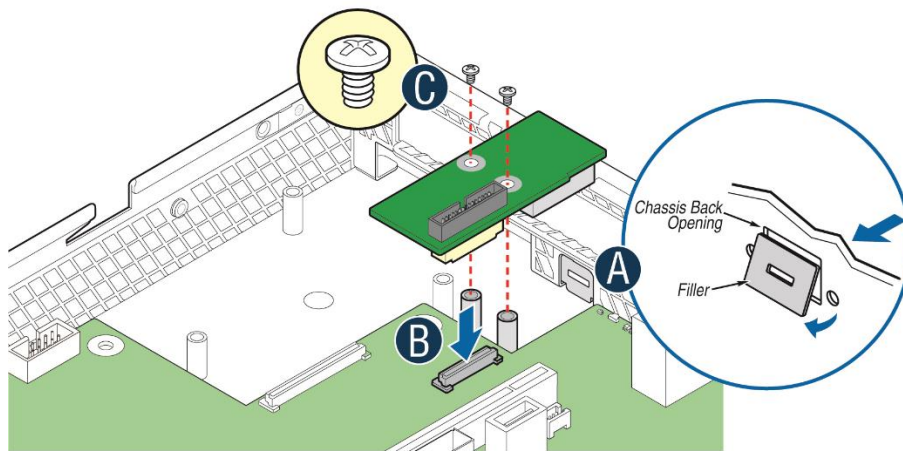


Figure 3. Intel® RMM4 Dedicated Management Port Module Mechanical Drawing

Depending on the chassis and server board, the Management Port Module either plugs directly into a dedicated connector down on the server board or in some chassis is mounted onto a bracket and is then cabled to a dedicated connector down on the server board.



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Figure 4. Intel® RMM4 Dedicated Management Port Module Installed to Server Board

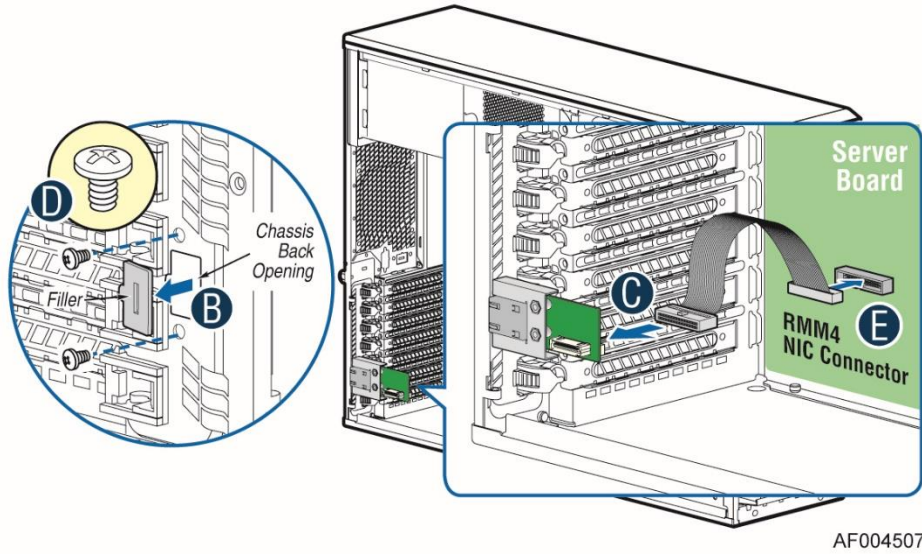


Figure 5. Intel® RMM4 Dedicated Management Port Module Cabled to Server Board

2.2 Intel® RMM4 Lite Advanced Feature Enablement Key

The Intel® RMM4 Lite enablement key provides systems that support Intel® RMM4 server management the option to enable advanced KVM and media shares features.



Figure 6. Intel® RMM4 Lite/ Lite2 Advanced Feature Enablement Key

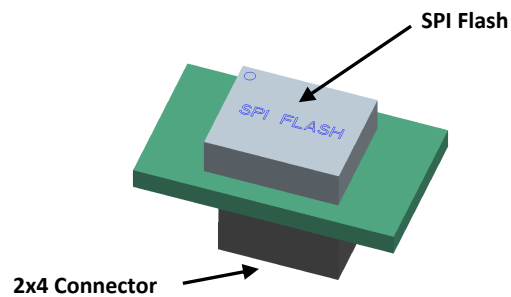


Figure 7. RMM4 Lite/RMM4 Lite2 Component Identification

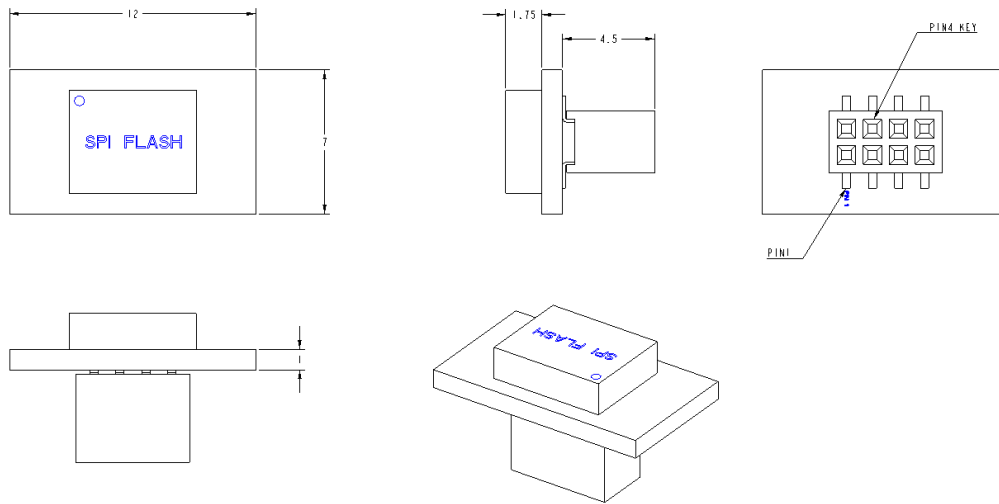


Figure 8. RMM4 Lite Key Mechanical Drawings

The Intel® RMM4 Lite key is installed into a matching 2x4 connector on the server board.

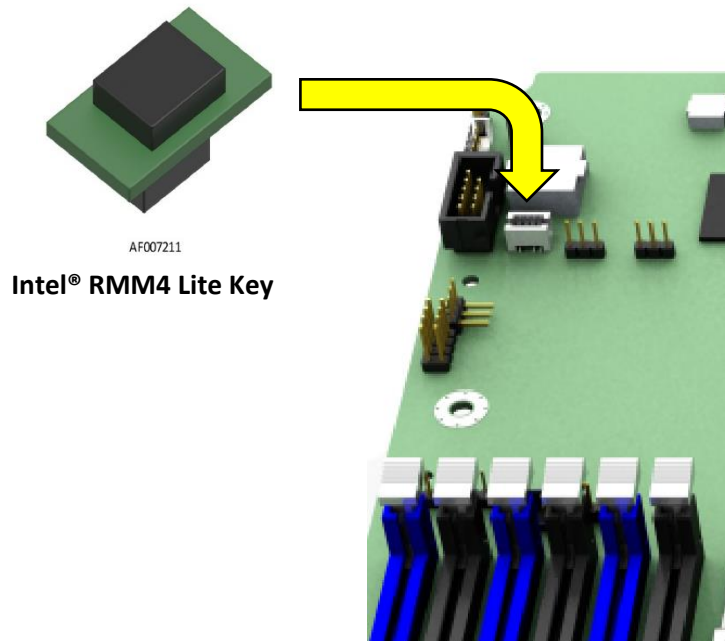


Figure 9. RMM4 Lite/RMM4 Lite2 Installation

Note: Reference the appropriate Intel server board TPS for the Intel® RMM4 Lite connector location on the given server board.

3. Intel Server Board Management Architecture

Standard and Advanced Intel® RMM4 Server Management features are a component of an overall server management system designed into most Intel server boards and systems. The following diagram is representative of the server management system architecture designed into Intel server boards and systems.

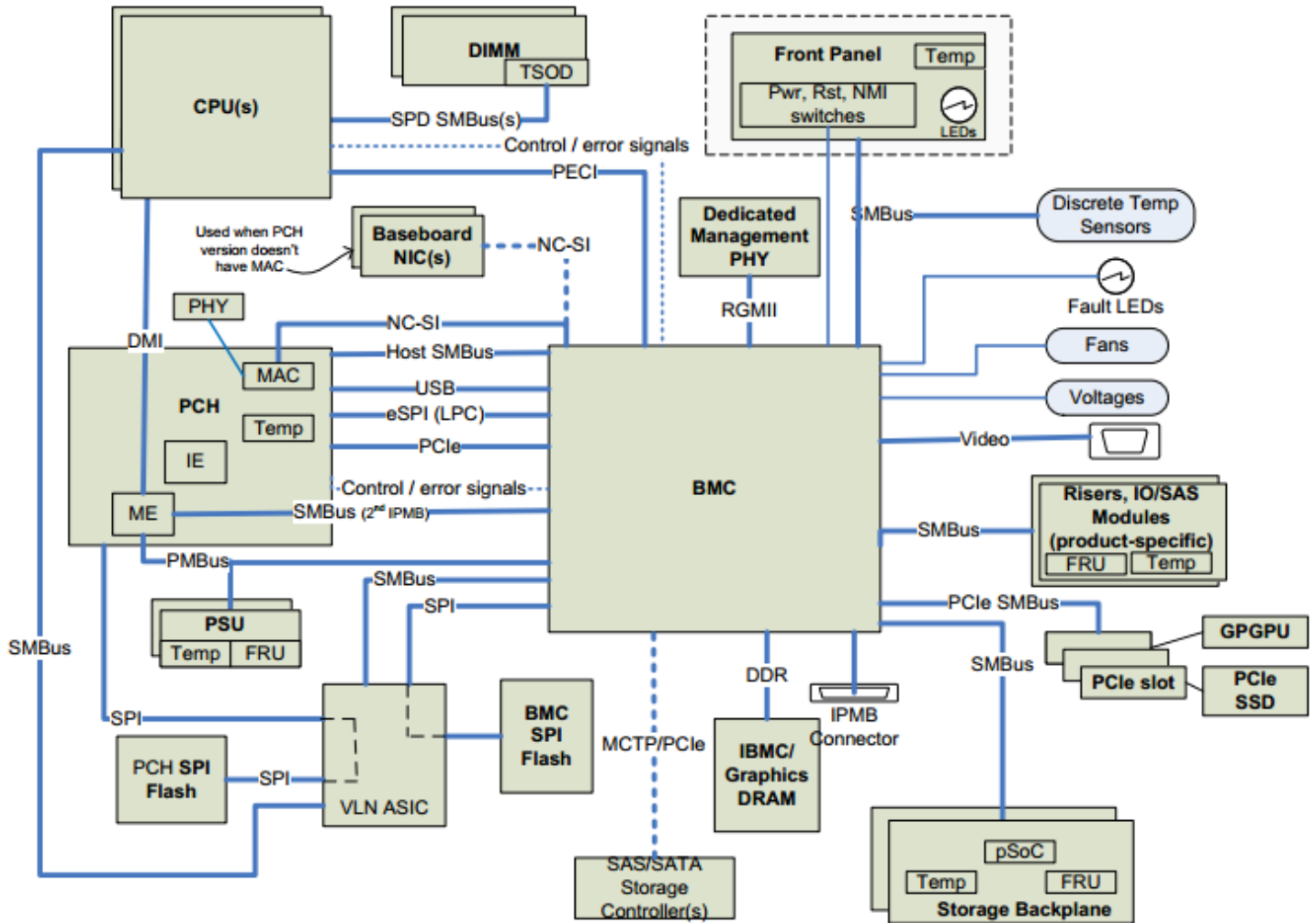


Figure 10. Server Management Architecture Diagram

Note: Reference the appropriate Intel server board TPS and/or the appropriate Intel server product family BMC Firmware EPS (NDA Required) for complete server management support details and server management architecture block diagrams relevant to the specific Intel server board or system.

3.1 Intel® RMM4 Management Port and Intel® RMM4 Lite Support Block Diagrams

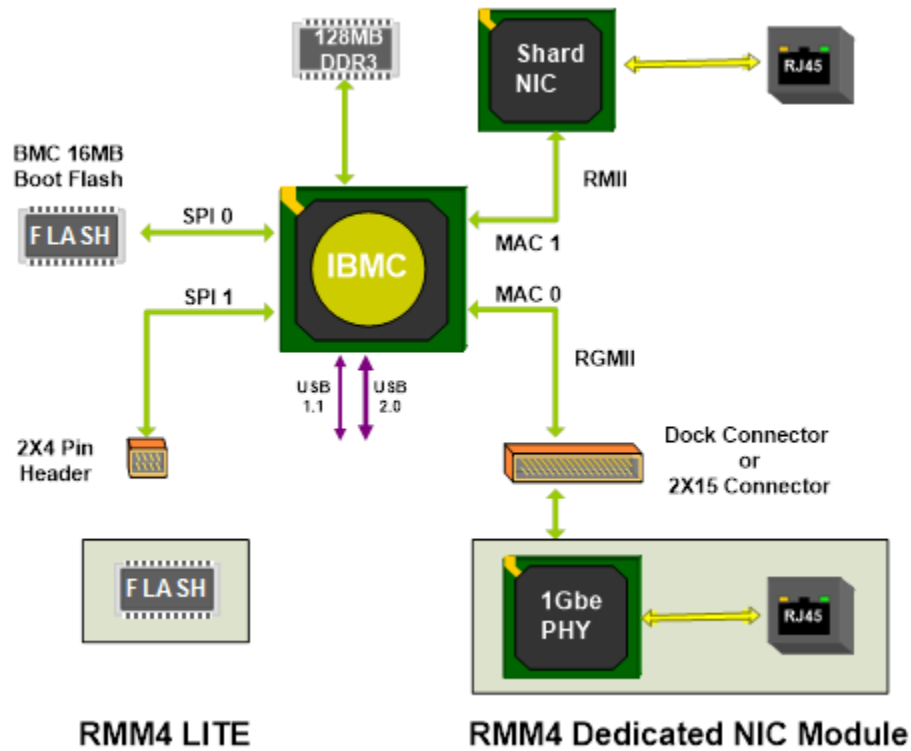


Figure 11. Block Diagram for Intel® Server Boards with no Dedicated Management Port

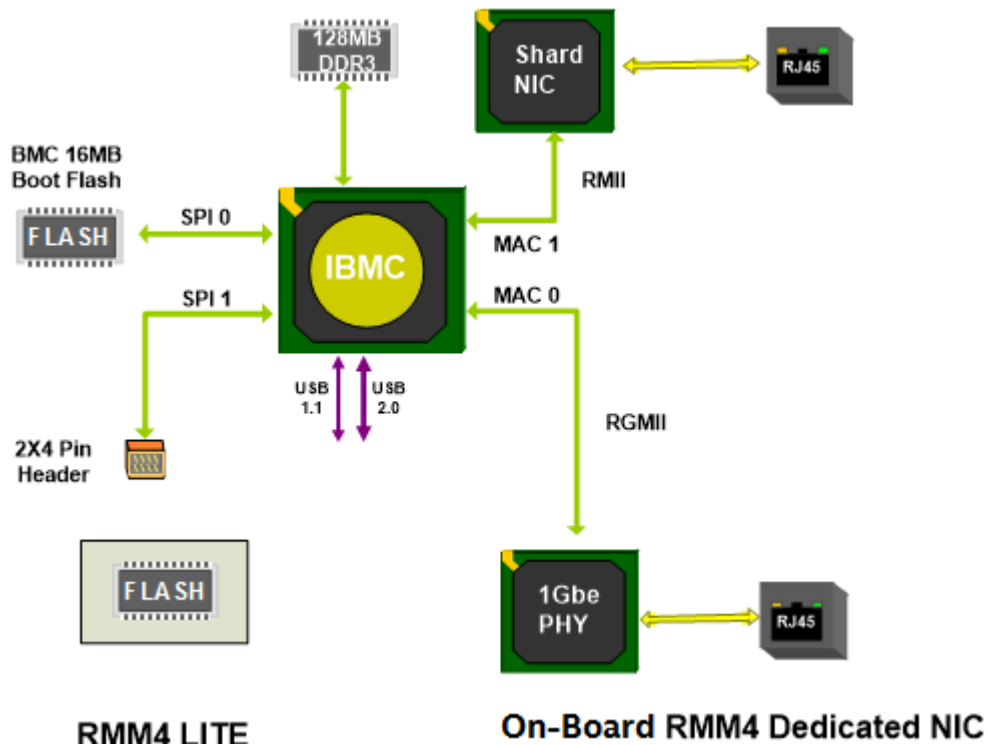


Figure 12. Block Diagram for Intel® Server Boards with Dedicated Management Port

3.2 Electrical Specification

3.2.1 Intel® RMM4 Lite/RMM4 Lite2 Connector Pin-out

Table 4. RMM4 Lite/RMM4 Lite2 Pin-outs

Pin	Signal Description	Pin	Signal Description
1	DI	2	VCC
3	CLK	4	KEY
5	GND	6	DO
7	GND	8	CS_N

3.2.2 Dedicated Management Port Module Connector Pinout

Table 5. Management Port Module Docking Connector (J1L1) Pin-out

Pin	Signal Description	Pin	Signal Description
1	3V3_AUX	2	MDIO
3	3V3_AUX	4	MDC
5	GND	6	TXD_0
7	GND	8	TXD_1
9	GND	10	TXD_2
11	GND	12	TXD_3
13	GND	14	TX_CTL
15	GND	16	RX_CTL
17	GND	18	RXD_0
19	GND	20	RXD_1
21	GND	22	RXD_2
23	GND	24	RXD_3
25	GND	26	TX_CLK
27	GND	28	RX_CLK
29	GND	30	PRESENT
31	Reserved	32	Reserved
33	Reserved	34	Reserved
35	Reserved	36	Reserved
37	Reserved	38	Reserved
39	Reserved	40	Reserved

Table 6. Management Port Module Cable Connector (J1A1) Pin-out

Pin	Signal Description	Pin	Signal Description
1	3V3_AUX	2	MDIO
3	3V3_AUX	4	MDC
5	GND	6	TXD_0
7	GND	8	TXD_1
9	GND	10	TXD_2
11	GND	12	TXD_3
13	GND	14	TX_CTL
15	GND	16	RX_CTL
17	GND	18	RXD_0
19	GND	20	RXD_1
21	GND	22	RXD_2
23	GND	24	RXD_3
25	GND	26	TX_CLK
27	GND	28	RX_CLK
29	GND	30	PRESENT

3.3 Dedicated Management Port LED Functionality

The dedicated management port includes LEDs to identify Link Speed and Link Activity

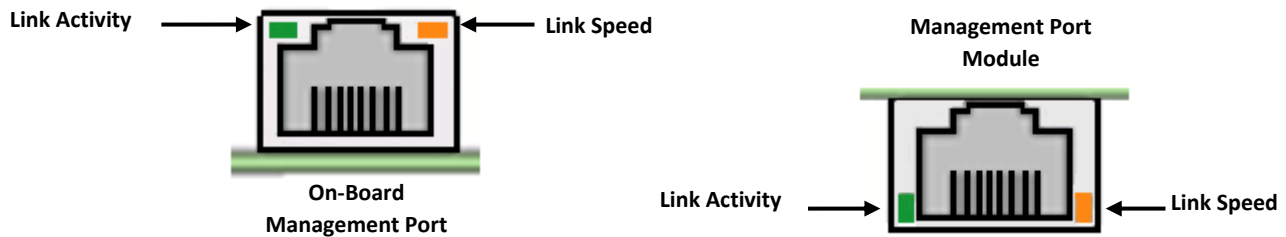


Figure 13 . Dedicated Management Port LED Identification

The following tables identify the different operating states for each LED

Note that the maximum network interface speed will be platform dependent. Reference the specific *Intel® Server Board Technical Product Specification (TPS)* for details.

Table 7. Dedicated Management Port - Standard LED State Definition

LED	Color	Condition	Functionality
Link Speed	Green	On	1Gbps mode
	Amber	On	100Mbps mode
		Off	10Mbps mode
Link Activity	Green	On	LAN link and no access
	Green	Blink	LAN access

		Off	Idle
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Table 8. Dedicated Management Port LED State Definition for S1200BTL

LED	Color	Condition	Functionality
Link Speed	Amber	On	1Gbps mode
	Green	On	100Mbps mode
		Off	10Mbps mode
Link Activity	Green	On	LAN link and no access
	Green	Blink	LAN access
		Off	Idle

3.3.1 Dedicated Management Port MAC Address Assignment

The Dedicated Management NIC MAC Address is derived from the main boards MAC Address and is also dependent upon the number of NIC that are built onto the server board.

The Intel® Server Board S1200BTL has four MAC addresses assigned to it at the Intel factory. The printed MAC address is assigned to NIC1 on the server board.

NIC 1 MAC address (for OS usage)

NIC 2 MAC address = NIC 1 MAC address + 1 (for OS usage)

BMC LAN channel 1 MAC address = NIC1 MAC address + 2

BMC LAN channel 3 (Management Port) MAC address = NIC1 MAC address + 3

For all other Intel server boards and systems, the MAC address assignment is based on the system configuration. Based on the number of on-board NICs, server boards will have either five or seven MAC addresses assigned to it at the Intel factory. The printed MAC address is assigned to NIC1 on the server board.

If the platform has two NICs down on the board, then there will be five MAC addresses assigned to the server board as follows:

NIC 1 MAC address (for OS usage)

NIC 2 MAC address = NIC 1 MAC address + 1 (for OS usage)

BMC LAN channel 1 MAC address = NIC1 MAC address + 2

BMC LAN channel 2 MAC address = NIC1 MAC address + 3

BMC LAN channel 3 (Management Port) MAC address = NIC1 MAC address + 4

If the platform has four NICs down on the server board then there will be seven MAC addresses assigned as follows:

NIC 1 MAC address (for OS usage)

NIC 2 MAC address = NIC 1 MAC address + 1 (for OS usage)

NIC 3 MAC address = NIC 1 MAC address + 2 (for OS usage)

NIC 4 MAC address = NIC 1 MAC address + 3 (for OS usage)

BMC LAN channel 1 MAC address = NIC1 MAC address + 4

BMC LAN channel 2 MAC address = NIC1 MAC address + 5

BMC LAN channel 3 (Management Port) MAC address = NIC1 MAC address + 6

4. Standard and Advanced Server Management Features

The integrated BMC has support for Standard and Advanced server management features. Standard management features are available by default. Advanced management features are enabled with the addition of an optionally installed Intel® Remote Management Module 4 Lite (Intel® RMM4 Lite) enablement key.

4.1 Embedded Web Server

Standard manageability features provide an embedded web server and an OEM-customizable web GUI that exposes the manageability features of the BMC base feature set. It is supported over all on-board NICs that have management connectivity to the BMC, as well as from the optional Intel® RMM4 management port module and on-board dedicated management port. At least two concurrent web sessions, from up to two different users, is supported. The embedded web user interface is supported with the following client web browsers:

- Microsoft* Internet Explorer
- Mozilla* Firefox

The Intel® Server Board S2600WF,S2600BP,S2600BT,S2600ST, S9200WK can support more below client web browsers:

- Google chrome
- Safari from Apple MAC OS

The embedded web user interface supports strong security (authentication, encryption, and firewall support) since it enables remote server configuration and control. The user interface presented by the embedded web user interface shall authenticate the user before allowing a web session to be initiated. Encryption using 128-bit SSL is supported. The embedded web user interface shall support a two-step authentication processes.

- User authentication based on user id and password.
- User authentication using a private key for a digital certificate. System administrators may choose the device that is used to store the certificate and private keys.

The GUI presented by the embedded web server authenticates the user before allowing a web session to be initiated. It presents all functions to all users but disables those functions that the user does not have privilege to execute. For example, if a user does not have privilege to power control, then the item shall be displayed in a greyed-out font on that user's UI display. The web GUI also provides a launch point for advanced features, KVM and media redirection. These features are also grayed out in the GUI unless the system has been updated to support these advanced features. The embedded web server displays US English or Chinese language output only.

Additional features supported by the web GUI can:

- Display all Standard features
- Power on/Power off/reset the server and view current power state
- Display BIOS, BMC, ME and SDR version information

- Display overall system health.
- Display configuration of various IPMI over LAN parameters for both IPV4 and IPV6
- Display configuration of alerts (SNMP and SMTP)
- Display system asset information for the product, board, and chassis.
- Display BMC-owned sensors (name, status, current reading, enabled thresholds), including color-code status of sensors.
- Provide ability to filter sensors based on sensor type (Voltage, Temperature, Fan and Power supply related)
- Automatically refresh of sensor data with a configurable refresh rate
- Display online help
- Display/clear SEL (display is in easily understandable human readable format)
- Support major industry-standard browsers (Microsoft Internet Explorer* and Mozilla Firefox*)
- Automatically time out the GUI session after a user-configurable inactivity period. By default, this inactivity period is 30 minutes.
- Using the Embedded Platform Debug feature, allow the user to initiate a “debug dump” to a file that can be sent to Intel® for debug purposes
- Employ the Virtual Front Panel to provide the same functionality as the local front panel. The displayed LEDs match the current state of the local panel LEDs. The displayed buttons (for example, power button) can be used in the same manner as the local buttons.
- Display of ME sensor data. Only sensors that have associated SDRs loaded will be displayed.
- Save the SEL to a file
- Force HTTPS connectivity for greater security. This is provided through a configuration option in the UI.
- Display processor and memory information that is available over IPMI over LAN.
- Get and set Node Manager (NM) power policies
- Display power consumed by the server
- View and configure VLAN settings
- Warn users that the reconfiguration of IP address will cause a disconnect
- Block logins for a period of time after several consecutive failed login attempts. The lock-out period and the number of failed logins that initiates the lock-out period are configurable by the user.
- Employ Server Power Control to force boot-up into Setup on a reset
- Report System POST results. The web server provides the system’s Power-On Self Test (POST) sequence for the previous two boot cycles, including timestamps. The timestamps may be displayed as a time relative to the start of POST or the previous POST code.
- Allow customization of ports. The web server provides the ability to customize the port numbers used for SMASH, http, https, KVM, secure KVM, remote media, and secure remote media.

4.2 Advanced Management Feature Support (Intel® RMM4 Lite)

The integrated baseboard management controller has support for advanced management features which are enabled when an optional Intel® Remote Management Module 4 Lite (RMM4 Lite) is installed. The Intel RMM4-lite option offers convenient, remote KVM access and control through LAN and internet. It captures, digitizes, and compresses video and transmits it with keyboard and mouse signals to and from a remote computer. Remote access and control software runs in the integrated baseboard management controller, utilizing expanded capabilities enabled by the Intel RMM4 hardware.

Key Features of the RMM4-lite enablement key are:

- KVM redirection from either the dedicated management NIC or the server board NICs used for management traffic; up to two KVM sessions. Automatically senses video resolution for best possible screen capture, high performance mouse tracking and synchronization. It allows remote viewing and configuration in pre-boot POST and BIOS setup.
- Media Redirection – The media redirection feature is intended to allow system administrators or users to mount a remote IDE or USB CDROM, floppy drive, or a USB flash disk as a remote device to the server. Once mounted, the remote device appears just like a local device to the server allowing system administrators or users to install software (including operating systems), copy files, update BIOS, or boot the server from this device.

4.2.1 Keyboard, Video, Mouse (KVM) Redirection

The BMC firmware supports keyboard, video, and mouse redirection (KVM) over LAN. This feature is available remotely from the embedded web server as a Java applet. This feature is only enabled when the Intel® RMM4 Lite is present. The client system must have a Java Runtime Environment (JRE) version 6.0 or later to run the KVM or media redirection applets.

The BMC supports an embedded KVM application (*Remote Console*) that can be launched from the embedded web server from a remote console. USB1.1 or USB 2.0 based mouse and keyboard redirection are supported. It is also possible to use the KVM-redirection (KVM-r) session concurrently with media-redirection (media-r). This feature allows a user to interactively use the keyboard, video, and mouse (KVM) functions of the remote server as if the user were physically at the managed server. KVM redirection console supports the following keyboard layouts: English, Chinese (traditional), Japanese, German, French, Spanish, Korean, Italian, and United Kingdom.

KVM redirection includes a “soft keyboard” function. The “soft keyboard” is used to simulate an entire keyboard that is connected to the remote system. The “soft keyboard” functionality supports the following layouts: English, Dutch, French, German, Italian, Russian, and Spanish.

The KVM-redirection feature automatically senses video resolution for best possible screen capture and provides high-performance mouse tracking and synchronization. It allows remote viewing and configuration in pre-boot POST and BIOS setup, once BIOS has initialized video.

Other attributes of this feature include:

- Encryption of the redirected screen, keyboard, and mouse
- Compression of the redirected screen.
- Ability to select a mouse configuration based on the OS type.
- Support user definable keyboard macros.
- KVM redirection feature supports the following resolutions and refresh rates:
 - 640x480 at 60Hz, 72Hz, 75Hz, 85Hz, 100Hz
 - 800x600 at 60Hz, 72Hz, 75Hz, 85Hz
 - 1024x768 at 60Hz, 72Hz, 75Hz, 85Hz
 - 1280x960 at 60Hz
 - 1280x1024 at 60Hz
 - 1600x1200 at 60Hz
 - 1920x1080 (1080p) at 60Hz
 - 1920x1200 (WUXGA+) at 60Hz
 - 1650x1080 (WSXGA+) at 60Hz

4.2.2 Remote Console

The Remote Console is the redirected screen, keyboard and mouse of the remote host system. To use the Remote Console window of your managed host system, the browser must include a Java* Runtime Environment plug-in. If the browser has no Java support, such as with a small handheld device, the user can maintain the remote host system using the administration forms displayed by the browser.

The Remote Console window is a Java* Applet that establishes TCP connections to the BMC. The protocol run over these connections is a unique KVM protocol and not HTTP or HTTPS. By default, this protocol uses ports #5900 for KVM and #623 for Floppy/USB media redirection. When encryption is enabled, by default the protocol uses ports #5902 for KVM and #627 for Floppy/USB media redirection. The local network environment must permit these connections to be made, and the firewall and in case of a private internal network the NAT (Network Address Translation) settings have to be configured accordingly.

4.2.3 Performance

The remote display accurately represents the local display. The feature adapts to changes to the video resolution of the local display and continues to work smoothly when the system transitions from graphics to text or vice-versa. The responsiveness may be slightly delayed depending on the bandwidth and latency of the network.

Enabling KVM and/or media encryption will degrade performance. Enabling video compression provides the fastest response while disabling compression provides better video quality.

For the best possible KVM performance, a 2Mb/sec link or higher is recommended.

The redirection of KVM over IP is performed in parallel with the local KVM without affecting the local KVM operation.

4.2.4 Availability

The remote KVM session is available even when the server is powered off (in stand-by mode). No restart of the remote KVM session shall be required during a server reset or power on/off. A BMC reset (for example, due to a BMC Watchdog initiated reset or BMC reset after BMC FW update) will require the session to be re-established. KVM sessions persist across system reset, but not across an AC power loss.

4.2.5 Security

The KVM redirection feature supports the following encryption algorithms that are available from the OpenSSL library on the server side, and the Java cryptographic library on the client side.

1. None
2. AES-128
3. AES-256 (default)

The server side application dynamically links to the OpenSSL library, and defaults to AES-256. The encryption algorithm is configurable via the BMC EWS, and includes an option for selecting the use of a hardware encryption engine if available.

4.2.6 Usage

As the server is powered up, the remote KVM session displays the complete BIOS boot process. The user is able to interact with BIOS setup, change and save settings as well as enter and interact with option ROM configuration screens.

Up to four concurrent remote KVM sessions are supported (one full and three view-only). It is possible for four different users to connect to the same server and start remote KVM sessions.

4.2.7 Force-enter BIOS Setup

KVM redirection can present an option to force-enter BIOS Setup. This enables the system to enter F2 setup while booting which is often missed by the time the remote console redirects the video.

4.2.8 Media Redirection

The embedded web server provides a Java applet to enable remote media redirection. This may be used in conjunction with the remote KVM feature, or as a standalone applet.

The media redirection feature is intended to allow system administrators or users to mount a remote IDE or USB CD-ROM, floppy drive, or a USB flash disk as a remote device to the server. Once mounted, the remote device appears just like a local device to the server, allowing system administrators or users to install software (including operating systems), copy files, update BIOS, and so on, or boot the server from this device.

The following capabilities are supported:

- The operation of remotely mounted devices is independent of the local devices on the server. Both remote and local devices are useable in parallel.
- Either fixed devices (CD/DVD-ROM, floppy) or USB devices can be mounted as a remote device to the server.
- It is possible to boot all supported operating systems from the remotely mounted device and to boot from disk IMAGE (*.IMG) and CD-ROM or DVD-ROM ISO files. See the Tested/supported Operating System List for more information.
- Media redirection supports redirection for both a virtual CD device and a virtual Floppy/USB device concurrently. The CD device may be either a local CD drive or else an ISO image file; the Floppy/USB device may be either a local Floppy drive, a local USB device, or else a disk image file.
- The media redirection feature supports the usage of no encryption or AES-128/192/256 encryption algorithms. The algorithm that is used is configurable via the BMC EWS.
- A remote media session is maintained even when the server is powered-off (in standby mode). No restart of the remote media session is required during a server reset or power on/off. A BMC reset (for example, due to a BMC reset after BMC firmware update) will require the session to be re-established

- The mounted device is visible to (and useable by) managed system's OS and BIOS in both pre-boot and post-boot states.
- The mounted device shows up in the BIOS boot order and it is possible to change the BIOS boot order to boot from this remote device.
- It is possible to install an operating system on a bare metal server (no OS present) using the remotely mounted device. This may also require the use of KVM-r to configure the OS during install.
- Mounted USB storage devices will support installation of device drivers during OS installation.

USB storage devices will appear as floppy disks over media redirection. This allows for the installation of device drivers during OS installation.

If either a virtual IDE or virtual floppy device is remotely attached during system boot, both the virtual IDE and virtual floppy are presented as bootable devices. It is not possible to present only a single-mounted device type to the system BIOS.

4.2.8.1 Availability

The default inactivity timeout is 30 minutes and is not user-configurable. Media redirection sessions persist across system reset but not across an AC power loss or BMC reset. Up to four virtual storage devices can be connected simultaneously. Note that a firmware update may require one of the four connections as a virtual USB device. This means that a fourth virtual device may fail to connect during a firmware update or a firmware update may fail with four virtual devices connected.

4.2.8.2 Network Port Usage

The KVM and media redirection features use the following ports:

- 5120 – CD Redirection
- 623 – FD Redirection
- 5124 – CD Redirection (Secure)
- 627 – FD Redirection (Secure)
- 5900 – Video Redirection
- 5902 – Video Redirection (Secure)

4.2.8.3 iKVM over HTML5

The iKVM over HTML5 feature provides a HTML5 web page to use the keyboard, video, and mouse function of the remote server, similar to “Keyboard, Video, Mouse (KVM) Redirection”.

iKVM over HTML5 includes a “soft keyboard” function. The “soft keyboard” is used to simulate an entire keyboard that is connected to the remote system. The “soft keyboard” functionality supports the following layouts: English (US), Chinese (simplified), Chinese (traditional), Japanese, German, French, Spanish, Korean, Italian, and English (UK)

iKVM over HTML5 provides the following power control functions: Power On, Power Off, Shutdown, Power Reset for the remote server

4.2.8.4 Browser

iKVM over HTML5 feature requires Browser to support the features of Websocket and HTML5

The below browsers are tested and iKVM over HTML5 is workable.

- Ubuntu 16.04 64bit: Chrome 69.0.3497.100
- Ubuntu 16.04 64bit: Firefox 64.0

- Windows Server 2016 64bit: Chrome 73.0.3683.86 64bit
- Windows Server 2016 64bit: Firefox 66.0.2

4.2.8.5 Virtual Media over HTML5

Virtual Media over HTML5 provides a HTML5 web page to mount a remote drive image file (.img or .iso) as a remote device to the server, similar to **“Error! Reference source not found.”**

Once Virtual Media over HTML5 mounted a remote driver image file, the remote device appears just like a local device to the server, allowing system administrators to install software (including operating systems), copy files, update BIOS, and so on, or boot the server from this device.

4.2.8.6 Browser

Virtual Media over HTML5 feature requires Brower to support the features of Websocket and HTML5

The below browsers are tested and Virtual Media over HTML5 is workable.

- Ubuntu 16.04 64bit: Chrome 69.0.3497.100
- Ubuntu 16.04 64bit: Firefox 64.0
- Windows Server 2016 64bit: Chrome 73.0.3683.86 64bit
- Windows Server 2016 64bit: Firefox 66.0.2

Glossary

Word/Acronym	Definition
ARP	Address resolution protocol
BMC	Baseboard Management Controller
CLI	Command line interface
DDC	Display Data Channel
DHCP	Dynamic Host Configuration Protocol
DMN	Dedicated Management Nic
DVC	Dambrackas Video Compression
DVO	Dynamic Visual Output
FPGA	Field Programmable Gate Array
ICMP	Internet Control Message Protocol
Intel® RMM4	Intel® Remote Management Module 4
Intel® RMM4 Lite	Intel® Remote Management Module 4 Lite
Intel® RMM4 Lite2	Intel® Remote Management Module 4 Lite2 (RoHS free version)
Intel® DMN	Intel® Dedicated Management NIC
IPMI	Intelligent Platform Management Interface
ITE	Information Technology Equipment
KVM	Keyboard, video and mouse
MAC	Media Access Controller
OOB	Out-Of-Band- No operating system interaction on Server
PBDE	Polybrominated Biphenyls Diphenyl Ethers
RMII	Reduced Media Independent Interface
RGMII	Reduced Giga bit Media Independent Interface
RTC	Real-Time Clock
TCP/IP	Transmission Control Protocol/Internet Protocol
TPS	Technical Product Specification
UART	Universal asynchronous receiver transmitter
UDP	User Datagram Protocol