



开放数据中心标准推进委员会
Open Data Center Committee

[No. ODCC-2019-0500X]

**OTII Server Technical
Specification**



VERSION 2019

开放数据中心标准推进委员会

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1 Summary

OTII (Open Telecom IT Infrastructure) , affiliated to the largest China open source hardware organization - Open Data Center Committee (ODCC), which was launched in November 2017 by China Mobile, China Telecom, China Unicom, China Telecom, Intel and other companies, it is the first server development cooperation project initiated by a number of CoSP. The primary goal is to build optimized, open standards and unified server solutions and products for 5G and edge computing.

This specification defines the design specifications, management interface and environmental adaptability requirements of the OTII server (hereinafter referred to as the server). It could be used by server users and suppliers to guide the product development, testing, procurement, operation and maintenance of the OTII servers.

2 Acronym/Term/Definitions

OTII	Open telecom IT infrastructure
NUMA	Non Uniform Memory Access
QAT	Intel QuickAssist Technology
NFV	Network Function Virtualization
AES	Advanced Encryption Standard
AEP DIMM	Intel Apache pass DIMM
SSD	Solid State Drive
NVMe	Non-Volatile Memory express
BMC	Board Management Controller
MCTP	Management Component Transport Protocol
RAS	Reliability/Availability/Serviceability
MCA	Machine Check Architectures
CRC	Cyclic Redundancy Check
OS	Operating System
PCIe	peripheral component interconnect express
NVDIMM	Nonvolatile D dual In-line memory module
BIOS	Basic Input/output System

TXT	Trusted Execution Technology
MANO	Management and Orchestration
RAID	Redundant Arrays of Independent Drives

3 General requirements

The OTII server has the characteristics of shallow depth, wider temperature adaptability, front maintenance and unified management interface, which have great significance for promoting the edge computing services and reducing the cost of transforming edge equipment rooms.

OTII Server general requirement:

- 1) Rack Server, fit for standard 19" width and 600mm depth cabinet;
 - 2) Switch, indicator Led, HDD, IO are maintained in the front side;
 - 3) Support 5~40°C long-term operation and -5~45°C short-term operation;
 - 4) Support unified management interface and enhanced management functions;
 - 5) Support current mainstream server operating systems and virtualization software;
- Specific technical requirements are presented in subsequent chapters.

4 Configuration requirements

According to the typical application scenarios, the server is divided into single socket server specification and dual sockets server specification.

4.1. Single Socket Server

Single socket servers specification are as follows:

Table 4.1 Single socket Server specification

Component	Description	Comment
CPU	Support latest Intel Xeon SOC processor Support TDP up to 110W Support up to 18 cores	
Memory	Support at least 4 channels Support at least 8 DIMMs Support RDIMM and LRDIMM, each DIMM support up to 32G capacity	Support at least 2400MHz when 2SPC configuration

	The memory bandwidth support at least 2667MHz Support ECC	
HDD	Support at least 6x2.5" SATA/SAS, support Hot Plug Support at least 2 NVMe, support Hot Plug	
RAID	2 OS HDD must support RAID 1, and OS HDD support SATA/SAS	
Networking	Support at least 6x10G or 6x25G ports Support 1x1Gbe management port (independent and Onboard design) Support 2x1GBASE-T (Onboard design)	
PCIe	Support at least 3xHHHL cards	
ODD	None	
USB/VGA	Support 2xUSB 3.0 and 1x VGA port	

4.2. Dual sockets server

Dual sockets serverspecification are as follows:

Table 4.2 Dual sockets Server specification

Component	Description	Comment
CPU	Support dual sockets Intel Xeon-SP processor Support TDP up to 165W	
Memory	Support at least 6 channels/socket and support at least 8 DIMMs/socket Support RDIMM and LRDIMM, each DIMM support up to 32G capacity Support memory bandwidth up to 2933MHz Support ECC Support Intel Optane DIMM	Support at least 2667MHz when 2SPC configuration
HDD	Support at least 6 x2.5" SATA/SAS, support Hot Plug Support at least 4 NVMe, support Hot Plug	
RAID	2 OS HDD must support RAID 1, and OS HDD support SATA/SAS	

Networking	Support at least 6x10G or 6x25G ports Support 1x1Gbe management port (independent and Onboard design) Support 2x1GBASE-T (Onboard design)	
PCIe	Support at least 4xHHHL PCIe cards Support at least 1xFHFL DW PCIe card + 3xLP PCIe cards	Support NUMA balance, the PCIe slots from CPU0 and CPU1 should be balanced
ODD	None	
USB/VGA	Support 2xUSB 3.0 and 1x VGA port	

5 Design Requirement

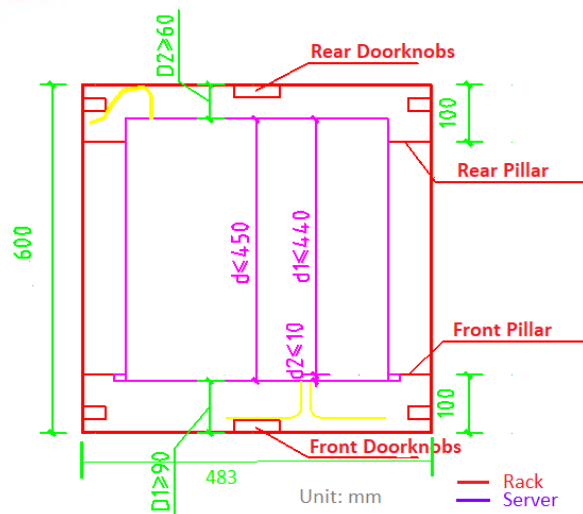
5.1. Cabinet

5.1.1. Mechanical requirement

Server chassis must follow the design requirement as below:

- Width: Standard 19inch Rack server;
- Height \leq 2U ;
- Depth \leq 450mm ;

Picture 5.1 Top view of Server dimension and cabinet location



$d \leq 450\text{mm}$: Server depth;

$d1 \leq 10\text{mm}$: the distance from server ear to front panel;

$d2 \leq 440\text{mm}$: the distance from server ear to rear wall;

$d1 \geq 90\text{mm}$: the distance from server front panel to cabinet front door;

$d2 \geq 60\text{mm}$: the distance from rear wall to cabinet rear door;

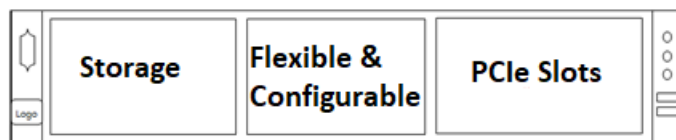
Note: $d1, d2$ requirement is just for reference, if the distance between cabinet front column to cabinet front door less than 100mm, server can meet the $D1, D2$ distance by change the ear location.

5.1.2. Front Panel placement

Server front panel placement must meet the following requirements:

- Single socket server and dual socket server adopt a unified style
- The front panel suggest take the color of black
- The front panel is divided into three areas, from left to right, the hard disk area, the flexible configuration area, and the PCIe extended area. The following is a dual socket server placement:
 - Left is HDD area, support at least 6x2.5" HDD
 - Right is PCIe extended area, support at least 3xLP or 1xFHFL DW PCIe card
 - Middle is flexible configuration area, support PCIe card or 2.5" HDD, suggest also support OB NIC, management NIC and debug UART in this area.
- It is recommended to reserve the pull label at the front side for pasting machine asset information, serial number (printing QR code), etc.
- Suggest left ear support:
 - Power Button/Indicator
 - UID Button/ Indicator
 - Healthy status LED
 - 2xUSB
- Suggest right ear support:
 - 1xVGA
 - Vendor logo

Picture 5.2 Front Panel Layout(front view)



Note: if there is IO port Indicator or button, suggest to put in the ear or in the middle flexible configuration area.

5.1.3. Rear Wall placement

Server rear wall must meet the following requirements:

- The rear wall is divided into 2 areas, from left to right there are fan area and PSU area

Picture 5.3 Rear Panel Layout (back view)






Note: the picture above mainly indicates the location relationship of Fan and PSU. The Fan and PSU exact number is decided by real configuration.

5.1.4. Button and Indicator

Button and Indicator should meet the following requirements:

Table 5.1 Button and Indicator requirement

Button and Indicator	Sign	Status Description
Power Button/Indicator		<p>Power indicator description:</p> <ul style="list-style-type: none"> • Green (solid on) : indicate server power on. • Yellow (solid on): indicate server standby for power on. • Yellow (blink): indicate the management system is booting up. • Off: indicate system power off. <p>Power button description:</p> <ul style="list-style-type: none"> • When system boot up, pull the button shortly, OS normally shut down. • When system boot up, pull the button 6s, server power off. • When system power-on standby, pull the button shortly can power on the system.
UID Button/Indicator		<p>The UID button/indicator is used to conveniently locate the server to be operated. The LED can be turned off or lit by manually pressing the UID button or remote control by the management command.</p> <p>UID indicator description:</p> <ul style="list-style-type: none"> • Blue (Solid on/blink) : indicate the server is located. • Off: indicate the server is un-located.

		<p>UID button description:</p> <ul style="list-style-type: none"> • Short press this button to turn the location LED on/off. • Press and hold the button for 4 to 6 seconds to reset the server's management system.
Healthy status indicator		<ul style="list-style-type: none"> • Green (solid on): indicate system normal operation • Yellow (blinking 1Hz): Indicate that the system has a general alarm. • Red (blinking 1Hz): Indicate that the system has a critical alarm.
10GE/25GE ETH port indicator		<p>Connection status / data transmission status indicator specific description:</p> <ul style="list-style-type: none"> • Green (solid on), indicate the network connection is normal • Green (Blinking), indicate there is data transferring • Off, indicates the network is not connected <p>The rate indicator specifies:</p> <ul style="list-style-type: none"> • Green (solid on), indicate the network is transferring under the rate of 10Gbps • Yellow (solid on), indicate the network is transferring under the other transfer speed • Off, indicate the network is not connected
GE ETH port indicator		<p>Connection status indicator specific description:</p> <ul style="list-style-type: none"> • Green (solid on), indicate the network connection is normal • Off, indicate the network is not connected <p>The rate indicator specifies:</p> <ul style="list-style-type: none"> • Yellow (blinking), indicate there is data transferring • Off, indicate the network is not connected
PSU indicator		<ul style="list-style-type: none"> • Green (Solid on): PSU working normal • Green (blinking 1Hz): PSU input normal, system doesn't power on in standby mode • Orange (Solid on):PSU fail • Off: PSU on input
FAN indicator		<ul style="list-style-type: none"> • Green (Solid on): indicate FAN module normal • Red (Solid on):indicate FAN module warning • Off: FAN power off

5.1.5. Server installation

For fast on-site installation and maintenance, the server supports the following requirements:

- Support rail kit to in stall on the brakit

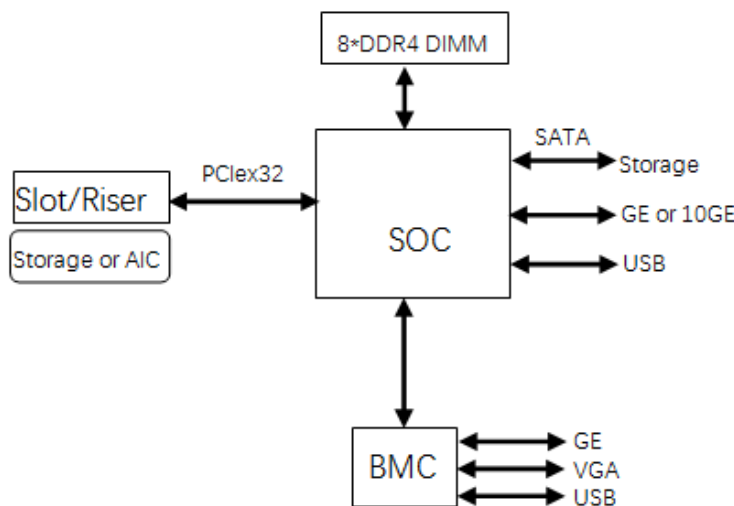
- The top cover support toolless

5.2. Component

5.2.1. System Diagram

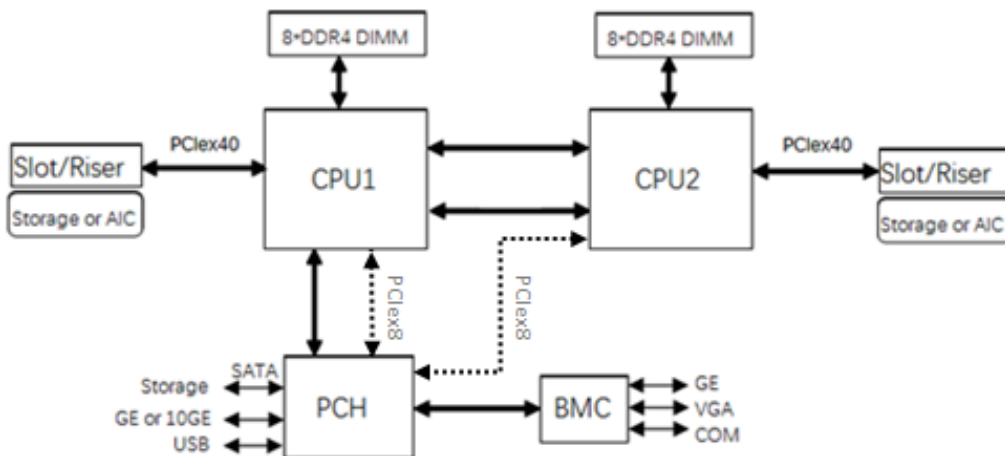
Single socket server system diagram as following:

Picture 1.4 Single Socket Server Logic Diagram example



Dual sockets server logic diagram as following:

Picture 5.5 Dual Sockets Server Logic Diagram example



5.2.2. CPU

The CPU is a core component of the server and is the computing unit for all data processing. The server's CPU meets the following technical requirements:

- Adopt the latest generation of CPU platforms, such as Intel® Xeon Scalable Processors and Intel® Xeon-D Processors;
- Support mainstream models of Xeon-SP and Xeon-D series;
- CPU Cache support ECC error correction or parity

5.2.3. Memory

The specific requirements for the server's memory are as follows:

- Support DDR4 RDIMM/LRDIMM
- Support 2400MHz and above
- Support the capacity of 16G and 32G for each DIMM
- Support ECC

5.2.4. Storage

The server's storage needs to meet the following technical requirements:

- The server supports SAS/SATA HDD and NVMe drives. Supports a variety of local storage configurations, making it easy for users to choose. Refer the table 5.2 for more detail information:

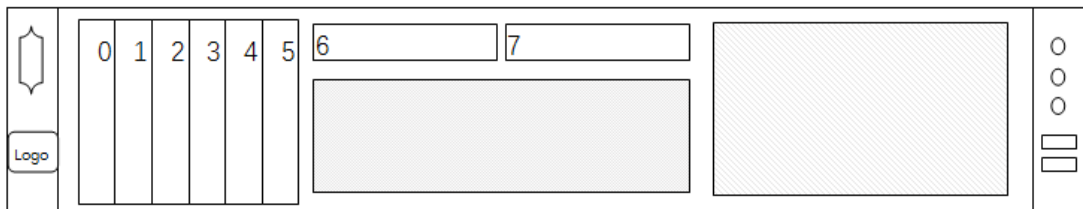
Table 5.2 HDD configuration

Server	Server model	HDD configuration
Single socket server	6x2.5" config	6x2.5" SAS/SATA
	8x2.5" config	8x2.5" SAS/SATA
	8x2.5" high performance config	6x2.5" SAS/SATA + 2x2.5" NVMe
Dual sockets server	6x2.5" config	6x2.5" SAS/SATA
	8x2.5" config	8x2.5" SAS/SATA
	8x2.5" high performance config	4x2.5" SAS/SATA + 4x2.5" NVMe

- Support JBOD, meet the mass storage requirement of customer
- Except the PCIe SSD in AIC form factor, all installed disks must support hot swap, including SATA SSD, SATA HDD and U.2 NVMe SSD;
- The hard disk ID is used to indicate the location of the hard disk. It is the same as the disk ID displayed on the server panel and the hard disk ID displayed in the management software.

The examples are as follows:

Picture 5.6 HDD ID proposal



Note: the middle area HDD location is just suggestion.

- The hard disk indicator indicates the status of the hard disk. The specific requirements are as follows:

Picture 5.7 HDD indicator location



Table 5.3 HDD/SSD indicator requirement

SAS/SATA HDD indicator	<p>HDD location/Error indicator:</p> <ul style="list-style-type: none"> Yellow(solid on), indicate HDD fail Blue(solid on),indicate HDD location Yellow(Blinking),indicate create RAID Off, indicate HDD normal operation or not install <p>HDD operation indicator:</p> <ul style="list-style-type: none"> Green (Solid on), indicate HDD inactive Green (blinking), indicate HDD R/W Off, indicate HDD not install or fail
NVMe indicator	<p>Driver location/Error indicator:</p> <ul style="list-style-type: none"> Yellow (solid on), indicate NVMe fail Blue (solid on), indicate NVMe location Yellow (blinking in 2Hz), indicate NVMe plug-in Yellow (blinking in 0.5HZ), indicate NVMe finish Hot plug and NVMe can be pulled out Off, indicate NVMe normal or not install <p>Driver operation indicator:</p> <ul style="list-style-type: none"> Green (solid on), indicate the driver in idle mode Green (blinking), indicate the driver R/W active Off, indicate the driver not installed or fail

5.2.5. PCIe Add-In-Card

PCIe Add-In-Card requirements are as follows:

Table 5.4 PCIe AIC Configuration

Server	Configuration	Method to realize
Single socket	Support at least 3xHHHL	On board or riser
Dual sockets	Support at least 4xHHHL	On board or riser
	1xFHFL double width 3xHHHL	Riser

5.2.6. Accelerated hardware

In Order to meet the requirements of edge computing for accelerated hardware in packet processing, artificial intelligence, video, security, etc., the server needs to support multiple acceleration hardware:

- Support FPGA accelerated card
- Support GPU card

- Support network co-processor
- Support ASIC accelerated card

5.2.7. Clock and Synchronization

The server needs a high-precision clock to meet the needs of mobile network applications.
(Can be implemented by PCIe Add-in-Card)

5.3. PSU

5.3.1. Specification

The PSU must meet the following technical requirements:

- Support 220VAC/110VAC input
- Support -48VDC input

5.3.2. PSU efficiency

Adopt PSU with 80Plus Platinum to meet the following performance indicators:

- Under 50% work load, the PSU efficiency $\geq 94\%$

5.3.3. Redundant and Hot Swap

The server supports dual PSU, and the PSU can be configured with 1+1 redundancy.
The server PSU should support hot swap.

5.3.4. Safety

PSU support over current and short circuit protection, and provides reliable grounding through the chassis.

PSU should pass 3C safety certification for China market. (IEC 60950 -1 for the others area)

5.3.5. PSU Management

- PSU support Active-Standby and Active-Active setting model
- Support query the PSU present and operation status by BMC Web UI or Command
- When the PSU fails, the system needs to provide the fault alarm information indicator, and there is an event record in the BMC

5.4. FAN

5.4.1. Specification and dimension

Horizontal air supply is used to dissipate the heat of server. The cold air comes from the front side and the hot air comes out from the rear side

The Fan wall install at the rear side. It includes one Fan bracket and several Fan modules. The Fan bracket is solid connected to the chassis

5.4.2. Redundancy and Hot-Swap

The fan module should meets the following requirements:

- Support N+1 redundant
- Support Hot-Swap. During the plugging and unplugging process, the normal operation of other fan modules and servers are not affected

5.4.3. Fan Speed Regulation

- Support fan speed auto regulation and fan speed overwrite

6 Environmental Requirement

The server meets the following environmental adaptability requirements:

- Operation Temperature:
 - 5 °C~40 °C in the long term, -5 °C~45 °C in the short term(Less than 1%, Test Duration 16h), meeting the requirements of ETSI class 3.1
- Relative Humidity:
 - 5%-85% in the long term and 5%-90% in the short term, meeting the requirements of ETSI class 3.1
- Chemically active substances/Corrosive gases:
 - Meeting GB4798-3C1 / IEC 60721-3-3 3C1 requirements*
- Mechanical active substances/ Level of air cleanliness:
 - Meeting GB4798 3S2 / IEC 60721-3-3 3S2 requirements*
- Electromagnetic emissions:
 - Class A of Telecom Center(non-residential), Class B of Non-Telecom Center(residential)*
- Vibration:
 - Meeting GB4798-3M2 / IEC 60721-3-3 3M2 requirements
- Earthquake resistance:

- Zone 4 (7.0- 8.3 Richter) (for telecommunication service)
- Altitude:
 - Maxium Altitude, 3000M

** Rack level and Room level solution is acceptable*

7 Management Requirement

Server must provide interface of state acquisition, operation control and management to support remote and automatic management. In order to facilitate management, a unified management interface supporting Redfish protocol is developed. Specific interface specification is referred to "OTII Server Management Interface Specification".

7.1. Out-Of-Band Management Requirement

The server achieves the following functions through out-of-band management interface: asset management, component information query, sensor monitoring, power supply and fan management, fault alarm, log management, remote firmware upgrade, remote configuration management, etc.

7.1.1. Asset Management

The server supports the management and maintenance of asset status through an out-of-band management interface, including:

- Supports viewing server manufacturer, model and serial number information
- Support to view motherboard model and motherboard serial number information
- Writing and reading user-defined server asset tags (Asset Tags) should be supported

7.1.2. Component Information Query

The server supports get the critical component information through an out-of-band management interface, including:

- Support getting the number of CPU can be installed in the server and the number of CPU currently installed, CPU location, vender, sku, base frequency, number of cores, health status.
- Support getting the number of DIMM can be installed in the server and the number of DIMM currently installed, DIMM location, vender, type, capacity, bandwidth, health status;
- Support getting the number of HDD can be installed in the server and the number of HDD currently installed, HDD location, vender, sku, type, capacity, health status, service life (for SSD), HDD SMART information.
- Supports getting the Raid card model, firmware version, interface type, cache size, health status, BBU in-position information, and BBU health status.
- Supports getting the onboard NIC, Mezz NIC, or PCIe NIC manufacturer, model, interface type, chip manufacturer, firmware version, driver version, resource attribution (which CPU,

PCH or PCIe Switch), network port name, and port number, status, MAC address, network port type, IP address, mask, gateway, VLAN ID, port traffic (in-band, agent required), health status.

- Supports getting the number of fans can be installed and the current number of installed, fan position, speed, rate ratio, health status.
- Support getting the full number of power supplies and the current number of in-position, power supply location, manufacturer, model, rated power, input voltage, output voltage, current power rate, health status.
- Supports getting other PCIe standard cards installed in the server, quantity, manufacturer, model, resource ownership (which CPU, PCH or PCIe Switch), and health status, such as GPU cards, acceleration network cards, etc.

7.1.3. Sensor Monitoring

The server must support getting the sensor information by Out-Of-Band management port, including:

- Support getting the inlet temperature of MB
- Support getting the CPU temperature and the input voltage
- Support getting the DIMM temperature and the input voltage
- Support getting the critical power information on the MB
- The margin of temperature and voltage should be controlled in 5%

7.1.4. PSU and Fan Management

The server must support PSU management by Out-Of-Band management port, including:

- Support querying the server overall power consumption
- Support remote power on, power off and reset
- Support querying the power on/off status of server
- Support power capping. Support turn on/off the power capping, the threshold of the power capping can be set
- Support configuring the fan speed policy. Support manually set the fixed fan speed and also support the auto fan speed base on the workload and heat dissipation status

7.1.5. Fault Alarm

The server need to support reporting the following fail alarm:

- Support server power on, power off, reset alarm
- Support PSU, Fan, HDD present status change alarm
- Support server power check alarm, system OS alarm
- Support CPU, DIMM, HDD, ETH AIC, PCIe AIC, RAID card, PSU, Fan fail alarm
- Support CPU and DIMM pre-fail alarm
- Support inlet temperature, critical component temperature and voltage alarm. Support the system auto protect actions when high temperature alarm occurs
- Support PSU power cable disconnect alarm

7.1.6. Log Management

The server log management interface is implemented by SysLog protocol, including the following functions:

- Server must report server operation log, maintenance log and security log
- Supporting operation logs such as power on, power off, reset, setting power capping value, etc
- Supports reporting maintenance log, such as PSU plug-in/off alarm, fan plug-in/off alarm, CPU alarm, memory alarm, PCIe (network card) alarm, ambient temperature alarm and CPU temperature alarm
- Supporting reporting login, logout and SSH login security logs

7.1.7. Other Function

The server should support remote firmware upgrade, parameter configuration and monitoring, including the following functions:

- Support remote query and update the FW version, such as BIOS/BMC/CPLD
- Support remote query and update the parameter of BIOS and BMC
- Support NTP Server set the IP address and configure the sync cycle
- Support query and set the BMC IP address
- Support local KVM, remote KVM and SOL
- Support USB port to connect U disk and ODD to install the OS
- The ETH card should support Boot on Lan base on PXE

7.2. In-Band Management Function

For in-band management functions that need to be implemented through OS Agent, the server should provide relevant firmware, hardware drivers and development interfaces to ensure that third-party management software can achieve relevant in-band management functions.

Support in-band access to the following information:

- Server CPU usage rate
- Server total capacity of memory, the capacity of memory already used, memory usage rate
- ETH port sending rate and receiving rate
- ETH card FW version
- The IPV4 and IPV6 address list of server ETH port
- The MAC address and name of the ETH port
- HDD SMART information

8 SW Compatible

Supporting the current mainstream operating system:

- Microsoft Windows Server standard and server version (2012 and above version)
- Red Hat Enterprise Linux standard and server version (6.5 and above version)
- SuSE Linux Enterprise Server standard and server version (11.0 and above version)

9 History

Revision Number	Update Date	Description
0.0.1	2019/10/01	Initial release
0.1.0	2019/03/01	Updated environment requirement
0.1.2	2019/04/17	Updated management requirement



本页为规范最后一页

