Huawei FusionServer 2288H V5

White Paper

Issue 01

Date 2017-08-07

HUAWEI TECHNOLOGIES CO., LTD.

Huawei Technologies Co., Ltd.

Address: Huawei Industrial Base
            Bantian, Longgang
            Shenzhen 518129
            People's Republic of China

Website: http://e.huawei.com

Contents

1 Overview
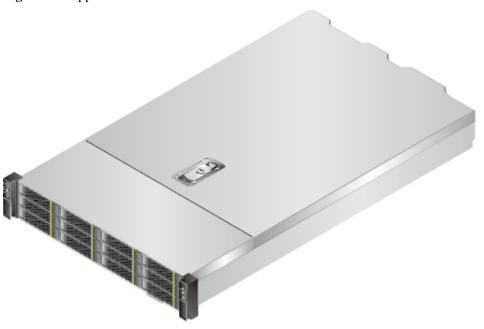
The Huawei FusionServer 2288H V5 is a 1U 2-socket rack server developed for Internet, Internet data center (IDC), cloud computing, enterprise, and telecom service applications.

Marked H22H-05 on the nameplate, the 2288H V5 is ideal for IT core services, cloud computing virtualization, high-performance computing, distributed storage, big data processing, enterprise or telecom service applications, and other complex workloads. It combines low power consumption with high scalability and reliability, and easy deployment and management.

Figure 1-1 shows the appearance of a server with 12 hard disks.

Figure 1-1 Appearance

2 Features

Performance and Scalability

The 2288H V5 offers the following features to boost performance and improve scalability:

- Intel® Xeon® Scalable series processors ensure high processing performance by providing up to 28 cores, 3.6 GHz frequency, 38.5 MB L3 cache, and two 10.4 GT/s Ultra Path Interconnect (UPI) links between processors.

  - Each 2288H V5 supports two processors with 56 cores and 112 threads to maximize the concurrent execution of multithreaded applications.

  - Intel® Xeon® Scalable series processors support L2 cache. Each core can exclusively use a maximum of 1 MB L2 cache or 1.375 MB L3 cache.

  - Intel® Turbo Boost Technology 2.0 enables processor cores to run at maximum speeds during peak hours by temporarily going beyond the processor thermal design power (TDP).

  - Intel® Hyper-Threading Technology enables each processor core to run up to two threads, improving parallel computation capability.

  - Intel® Virtualization Technology integrates hardware-level virtualization functions to allow OS vendors to better use hardware to address virtualization workloads.

- Twenty-four DDR4 error checking and correcting (ECC) RDIMMs or load-reduced DIMMs (LRDIMMs) provide a maximum memory speed of 2666 MT/s and a maximum memory capacity of 1,536 GB, featuring high speed and availability. The maximum memory bandwidth is 249.9375 GB/s in theory.

- 12 Gbit/s internal SCSI (SAS) storage connection doubles the data transmission rate compared with the 6 Gbit/s SAS storage connection, maximizing the performance of I/O-intensive applications.

- The 2288H V5 supports flexible hard disk configurations and provides elastic and scalable memory capacities to satisfy storage capacity and upgrade requirements.

- Intel® Advanced Vector Extensions 2.0 (AVX 2.0 and AVX-512) improve floating-point computing performance for computing-intensive applications.

- The I/O performance of pure SSDs is higher than that of mixed configuration of SSDs and HDDs and 100 times that of pure HDDs.

- The 2288H V5 supports various integrated network interface cards (NICs) and flexible NICs to provide rich network ports.

- The 2288H V5 supports up to eight PCIe 3.0 slots.

- The Intel® Xeon® Scalable series processors incorporate the PCIe 3.0 controller using the Intel Integrated I/O. This remarkably shortens I/O latency and enhances overall system performance.

Availability and Serviceability

The 2288H V5 provides the following features to improve availability and serviceability:

- The 2288H V5 uses carrier-class components and follows the engineering process, which dramatically improves system reliability.

- The 2288H V5 uses hot-swappable SATA and SAS HDDs. It supports redundant array of independent disks (RAID) 0, 1, 1E, 10, 5, 50, 6, and 60 and offers RAID cache. A supercapacitor is used to protect RAID cache data from power failures.

- SSDs offer better reliability than HDDs, prolonging system uptime.

- The web user interface (WebUI) of the Intelligent Baseboard Management Controller (iBMC) and the UID and HLY indicators on the panel help technical support personnel promptly obtain the status of key components and locate failed (or failing) components. This simplifies servicing, accelerates troubleshooting, and helps improve system availability.

- The iBMC monitors system parameters in real time, triggers alarms, and performs recovery actions in case of failures, minimizing system downtime.

- Huawei provides a three-year warranty for parts replacement and onsite repair for the servers used in China. Huawei provides a 10-hour-a-day, 5-day-a-week support program. Service requests will be handled the next business day. Optional service upgrades are available.

- Huawei provides a three-year warranty for parts replacement and repair for the servers used outside China. Huawei provides a 9-hour-a-day, 5-day-a-week support program. Service requests will be handled the next business day. Huawei delivers the repaired or new parts within 45 calendar days after receiving the defective parts.

Manageability and Security

The 2288H V5 provides the following features to enhance manageability and security:

- The built-in iBMC module monitors server operating status and provides remote management.

- The Network Controller Sideband Interface (NC-SI) feature enables a network port to function as a management network port and a service port, which maximizes the return on investment (ROI) for customers. NC-SI is disabled by default. You can enable it on the iBMC WebUI or in the BIOS.

- The integrated industry-standard Unified Extensible Firmware Interface (UEFI) increases setup, configuration, and update efficiency, and simplifies fault handling.

- The front bezel in the server chassis is locked to ensure local data security and reliability.

- The Intel® Advanced Encryption Standard–New Instructions (AES NI) support faster and stronger encryption.

- The Intel® Execute Disable Bit (EDB) function prevents certain types of malicious buffer overflow attacks when working with a supported OS.

- The Intel® Trusted Execution technology provides enhanced security by using hardware-based defense against malicious software attacks, allowing an application to run in an isolated space from all other applications running on the OS.

📖 **NOTE**

The service network port supporting NC-SI has the following features:

- The service network port can be bound to a network port (host network port 1 by default) on a flexible or standard NIC.

- The service network port allows you to enable, disable, and configure a VLAN ID. A VLAN ID is disabled by default, and the default VLAN ID is 0.

- The service network port supports IPv4 and IPv6 addresses. You can set an IP address, subnet mask, default gateway, and IPv6 address prefix length for the service network port.

Energy Efficiency

The 2288H V5 offers the following features to save energy:
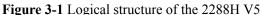
- The 2288H V5 supports 80 Plus Platinum power supply units (PSUs). The PSUs provide 94% power efficiency at 50% loads.

- The 2288H V5 supports active-standby power supplies and high-voltage DC (HVDC), improving power supply efficiency.

- Efficient VRD PSUs reduce the loss in DC/DC power conversion.

- The 2288H V5 supports area-based and intelligent fan speed adjustment, Proportional-Integral-Derivative (PID) speed adjustment, and intelligent processor frequency adjustment, reducing power consumption.

- The improved thermal design with energy-efficient fans ensures optimal heat dissipation and reduces system power consumption.

- The 2288H V5 supports power capping and power control.

- Hard disks are not powered on simultaneously, which reduces the server startup power consumption.

- The Intel® Intelligent Power Capability allows a single processor to be powered on or off based on site requirements.

- Low-voltage Intel® Xeon® Scalable series processors consume less energy and apply to data centers and telecommunication environments that have power and thermal limitations.

- SSDs consume 80% less power than HDDs.
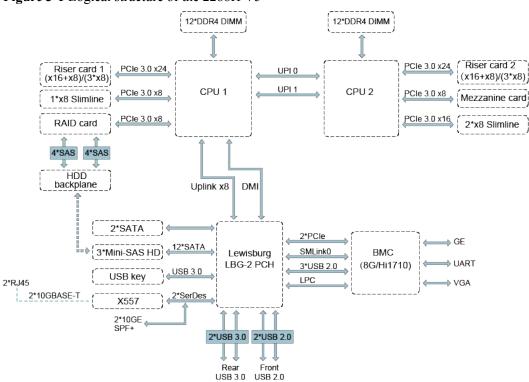
Support for Customization

The 2288 V5 is a Huawei proprietary server. Huawei also provides customized development in a timely manner.

3 Logical Structure

Figure 3-1 shows the logical structure of the 2288H V5.

Figure 3-1 Logical structure of the 2288H V5

- The 2288H V5 supports two Intel® Xeon® Scalable series CPUs and 24 DDR4 DIMMs. The CPUs interconnect with each other through two Ultra Path Interconnect (UPI) buses at speeds of up to 10.4 GT/s.

- The CPUs connect to three PCIe riser cards through PCIe buses and the riser cards provide various PCIe slots.

- The RAID controller card on the mainboard connects to CPU 1 through PCIe buses, and to the hard disk backplanes through SAS signal cables. The hard disk backplanes support various local storage configurations.

- The LBG-2 bridge chip provides two GE electrical ports, and two 10GE optical ports or two 10GE electrical ports (through the X557 PHY).

- The Huawei Hi1710 management chip provides a VGA port, management network port, and debugging serial port.

4 Hardware Description
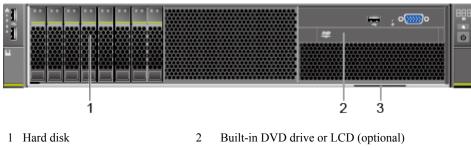
4.1 Appearance

Front Panel

- **Figure 4-1** shows the front panel of a server with eight hard disks.

Figure 4-1 Front panel of a server with eight hard disks
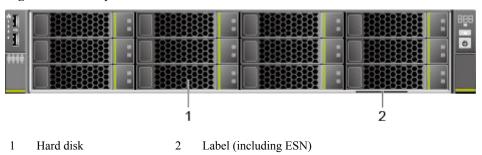
1	Hard disk	2	Built-in DVD drive or LCD (optional)
3	Label (including ESN)	—	—

For details about how to use the LCD, see the *2288H V5 Server LCD V100R005 User Guide*.

- **Figure 4-2** shows the front panel of a server with 12 hard disks.

Figure 4-2 Front panel of a server with 12 hard disks

1	Hard disk	2	Label (including ESN)

- **Figure 4-3** shows the front panel of a server with 24 hard disks.

Figure 4-3 Front panel of a server with 24 hard disks

1	Hard disk	2	Label (including ESN)
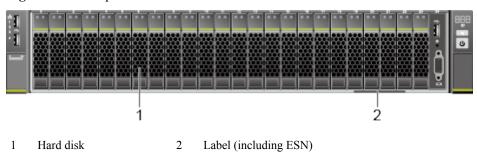
- **Figure 4-4** shows the front panel of a server with 25 hard disks.

Figure 4-4 Front panel of a server with 25 hard disks

| 1 | Hard disk | 2 | Label (including ESN) |

ESN

An Equipment Serial Number (ESN) is a string that uniquely identifies a server. An ESN is required when you apply for technical support to Huawei.

Figure 4-5 shows the ESN format by using the example 2102310QPD10F3001263.

Figure 4-5 ESN example
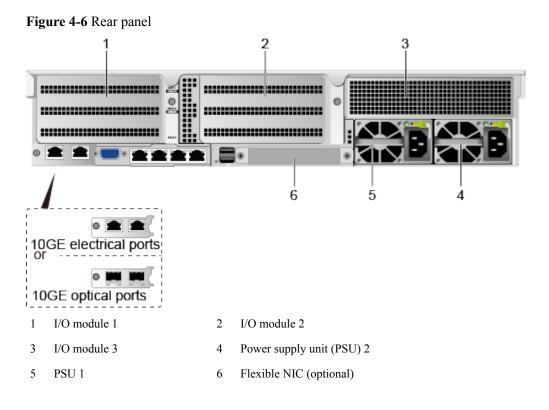
Table 4-1 ESN description

No.	Description
1	ESN ID
2	Material identification code (eight characters)
3	Vendor ID
4	Year and month
5	Serial number

Rear Panel

Figure 4-6 shows the rear panel of a server.

Figure 4-6 Rear panel

1	I/O module 1	2	I/O module 2
3	I/O module 3	4	Power supply unit (PSU) 2
5	PSU 1	6	Flexible NIC (optional)

☐**NOTE**
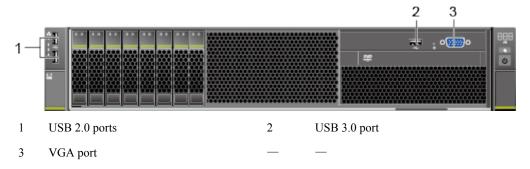
A hard disk module or riser module can be installed on I/O modules 1 and 2, and only a riser module can be installed on I/O module 3. The preceding figure is for reference only.

4.2 Ports

Front Panel

● **Figure 4-7** shows the ports on the front panel of a server with eight hard disks.

Figure 4-7 Front panel of a server with eight hard disks

1	USB 2.0 ports	2	USB 3.0 port
3	VGA port	—	—
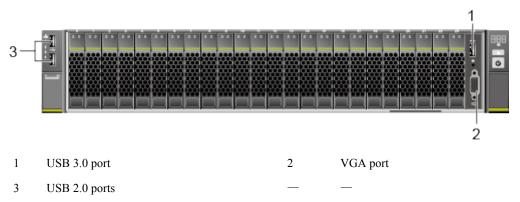
● **Figure 4-8** shows the ports on the front panel of a server with 12 hard disks.

Figure 4-8 Front panel of a server with 12 hard disks

| 1 | USB 2.0 ports | — | — |

- **Figure 4-9** shows the ports on the front panel of a server with 24 hard disks.

Figure 4-9 Front panel of a server with 24 hard disks

| 1 | USB 3.0 port | 2 | VGA port |
| 3 | USB 2.0 ports | — | — |

- **Figure 4-10** shows the ports on the front panel of a server with 25 hard disks.

Figure 4-10 Front panel of a server with 25 hard disks

| 1 | USB 2.0 ports | — | — |

Table 4-2 describes the ports on the front panel.
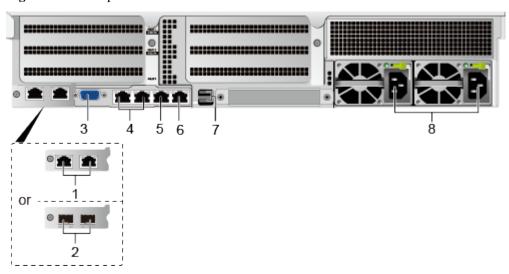
Table 4-2 Ports on the front panel

Port	Type	Description
VGA port	DB15	The VGA port is used to connect a terminal, such as a monitor or KVM.
USB port	USB2.0 and USB3.0	The USB ports allow USB devices to be connected to the server. **NOTE** Before connecting an external USB device, check that the USB device functions properly. A server may operate abnormally if an abnormal USB device is connected.

Rear Panel

Figure 4-11 shows the ports on the rear panel of a server.

Figure 4-11 Rear panel

1	10GE electrical ports	2	10GE optical ports
3	VGA port	4	GE electrical ports
5	Management network port	6	Serial port
7	USB 3.0 ports	8	PSU sockets

Table 4-3 describes the ports on the rear panel.

Table 4-3 Ports on the rear panel

Port	Type	Quantity	Description
10GE electrical port	10GBASE-T	2	The mainboard provides two 10GE electrical ports or two GE optical ports for you to select. **NOTE**
10GE optical port	10GE SFP+	2	● 10GE electrical ports and 10GE optical ports do not support 10 Mbit/s or 100 Mbit/s networks. ● The rate of a 10GE electrical port cannot be forcibly set to 1000 Mbit/s.
VGA port	DB15	1	The VGA port is used to connect a terminal, such as a monitor or KVM.
GE electrical port	1000BASE-T	2	Server service network port **NOTE** This port does not support forcible rates or 10 Mbit/s and 100 Mbit/s networks.

Port	Type	Quantity	Description
Serial port	RJ45	1	The serial port is used as the system serial port by default. You can set it as the iBMC serial port by using the iBMC command. This port is used for debugging.
Management network port	1000BASE-T	1	The 1000 Mbit/s Ethernet port is used to manage the server.
USB port	USB 3.0	2	The USB ports allow USB devices to be connected to the server. **NOTICE** Before connecting an external USB device, check that the USB device functions properly. A server may operate abnormally if an abnormal USB device is connected.
PSU socket	—	1 or 2	Determine the number of PSUs based on actual requirements, but ensure that the rated power of the PSUs is greater than that of the server. When one PSU is used, **Predicted PSU Status** cannot be set to **Active/Standby**.

4.3 Indicators and Buttons

Front Panel
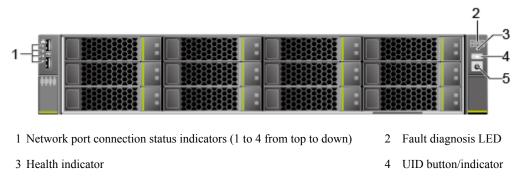
- **Figure 4-12** shows the indicators and buttons on the front panel of a server with eight hard disks.

Figure 4-12 Front panel of a server with eight hard disks

1 NMI button	2 Fault diagnosis LED
3 Health indicator	4 UID button/indicator
5 Power button/indicator	6 Network port connection status indicators (1 to 4 from top to down)

- **Figure 4-13** shows the indicators and buttons on the front panel of a server with 12 hard disks.

Figure 4-13 Front panel of a server with 12 hard disks

1	Network port connection status indicators (1 to 4 from top to down)	2	Fault diagnosis LED
3	Health indicator	4	UID button/indicator
5	Power button/indicator	—	—

● **Figure 4-14** shows the indicators and buttons on the front panel of a server with 24 hard disks.

Figure 4-14 Front panel of a server with 24 hard disks

1	Network port connection status indicators (1 to 4 from top to down)	2	Fault diagnosis LED
3	Health indicator	4	UID button/indicator
5	Power button/indicator	6	NMI button

● **Figure 4-15** shows the indicators and buttons on the front panel of a server with 25 hard disks.

Figure 4-15 Front panel of a server with 25 hard disks

1	Network port connection status indicators (1 to 4 from top to down)	2	Fault diagnosis LED
3	Health indicator	4	UID button/indicator
5	Power button/indicator	—	—

Table 4-4 describes the indicators and buttons on the front panel of a server.

Table 4-4 Indicators and buttons on the front panel

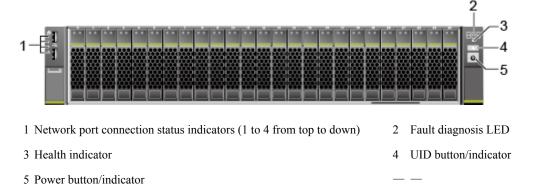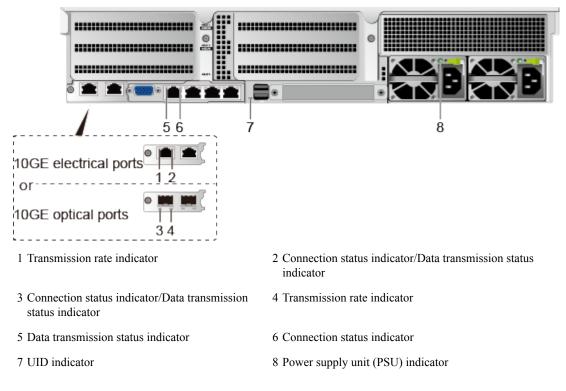| Silk Screen	Indicator and Button	State Description
⊞⊞⊞	Fault diagnosis LED	● ---: The server is operating normally. ● Fault code: A server component is faulty. FFor details about fault code, see the **HUAWEI Rack Server Alarm Handling (iBMC)**.

⏻	Power button/ indicator	Power indicator
		● Steady yellow: The server is ready to power on.
		● Steady green: The server is properly powered on.
		● Blinking yellow: The iBMC is starting.
		● Off: The server is not connected to a power source.
		Power button
		● When the server is powered on, you can press this button to shut down the OS.
		    NOTE
		    For RHEL 7.0, CentOS 7.0, and their later versions, set the response action of the power button to shutdown.
		● When the server is powered on, holding down this button for 6 seconds will power off the server.
		● When the server is ready to be powered on, you can press this button to start the server.

⍓	UID button/ indicator	The UID button/indicator helps identify and locate a server. You can turn on or off the UID indicator by pressing the UID button or remotely running a command on the iBMC CLI. UID indicator ● Steady blue/Blinking blue: The server is being located. ● Off: The server is not being located. UID button ● You can press this button to turn on or off the UID indicator. ● You can press and hold down this button for 4 to 6 seconds to reset the iBMC.
▥	Health indicator	● Steady green: The server is operating properly. ● Blinking red at 1 Hz: A major alarm has been generated on the server. ● Blinking red at 5 Hz: A critical alarm has been generated on the server.

Silk Screen	Indicator and Button	State Description
○	NMI button	The NMI button triggers a server to generate a non-maskable interrupt. You can press this button or control it remotely through the iBMC WebUI. **NOTICE** ● Press the NMI button only when the OS is abnormal. Do not press this button when the server is operating properly. ● Press the NMI button only for internal commissioning. Before pressing this button, ensure that the OS has the handler for NMI interrupts. Otherwise, the OS may crash. Exercise caution when pressing this button.
品	Network port connection status indicator	Each indicator shows the status of an Ethernet port on the network interface card (NIC). ● Steady green: The network port is properly connected. ● Off: The network port is not in use or has failed. **NOTE** The indicators correspond to two 10GE and two GE network ports on the mainboard.

Rear Panel

Figure 4-16 shows the indicators on the rear panel of a server.

Figure 4-16 Indicators on the rear panel

1 Transmission rate indicator	2 Connection status indicator/Data transmission status indicator
3 Connection status indicator/Data transmission status indicator	4 Transmission rate indicator
5 Data transmission status indicator	6 Connection status indicator
7 UID indicator	8 Power supply unit (PSU) indicator

Table 4-5 describes the indicators on the rear panel of a server.

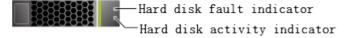Table 4-5 Indicators on the rear panel

Indicator		State Description
10GE electrical port	Transmission rate indicator	• Steady green: The data transmission rate is 10 Gbit/s. • Steady yellow: The data transmission rate is 1 Gbit/s. • Off: The network port is not connected.
	Connection status indicator/Data transmission status indicator	• Steady green: The network port is properly connected. • Blinking green: Data is being transmitted. • Off: The network port is not connected.
10GE optical port	Connection status indicator/Data transmission status indicator	• Steady green: The network port is properly connected. • Blinking green: Data is being transmitted. • Off: The network port is not connected.
	Transmission rate indicator	• Steady green: The data transmission rate is 10 Gbit/s. • Steady yellow: The data transmission rate is lower than 10 Gbit/s. • Off: The network port is not connected.
GE electrical port	Connection status indicator	• Steady green: The network port is properly connected. • Off: The network port is not connected.
	Data transmission status indicator	• Blinking yellow: Data is being transmitted. • Off: No data is being transmitted.
UID indicator		The UID indicator helps identify and locate a server. You can turn on or off the UID indicator by pressing the UID button or remotely running a command on the iBMC CLI. • Steady blue/Blinking blue: The server is being located. • Off: The server is not being located.

Indicator	State Description
PSU indicator	- Steady green: The power input and output are normal. - Blinking green at 1 Hz: The power input is normal, but the power output is stopped due to power-on or installation detection. An input overvoltage or undervoltage fault occurs. - Blinking green at 4 Hz: under online upgrade. - Steady orange: The input is normal, but no power output is supplied due to overheat protection, overcurrent protection, short circuit protection, output overvoltage protection, or some component failures. - Off: No AC power is supplied.

SAS/SATA Hard Disk Indicators

Figure 4-17 shows the SAS/SATA hard disk indicators.

Figure 4-17 SAS/SATA hard disk indicators

Table 4-6 describes the SAS/SATA hard disk indicators.

Table 4-6 SAS/SATA hard disk indicators

Indicator	State Description
Hard disk fault indicator	- Steady yellow: The hard disk is not detected, the hard disk is faulty, or the RAID array status of the hard disk is abnormal. - Blinking yellow: The server is locating the hard disk or rebuilding RAID. - Off: The hard disk is operating normally or is not detected in the RAID array. **NOTE** If the fault indicator is steady yellow, run a command to check the RAID status to determine whether the RAID array status is abnormal or whether the hard disk is faulty. For details about command description, see the HUAWEI V5 Server RAID Controller Card User Guide.

Indicator	State Description
Hard disk activity indicator	• Steady green: The hard disk is inactive. • Blinking green: Data is being read from or written to the hard disk, or synchronized between hard disks. • Off: The hard disk is faulty or not detected.

Flexible NIC Indicators
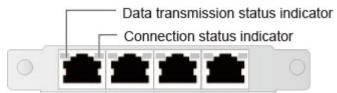
Supported flexible NICs include:

● SM210 with four GE electrical ports

● SM233 with two 10GE electrical ports

Use the **Huawei Server Compatibility Checker** to obtain the latest model list.

● **Figure 4-18** shows the indicators on SM210 with four GE electrical ports.

Figure 4-18 SM210 with four GE electrical ports

● **Figure 4-19** shows the indicators on SM233 with two 10GE electrical ports.

Figure 4-19 SM233 with two 10GE electrical ports
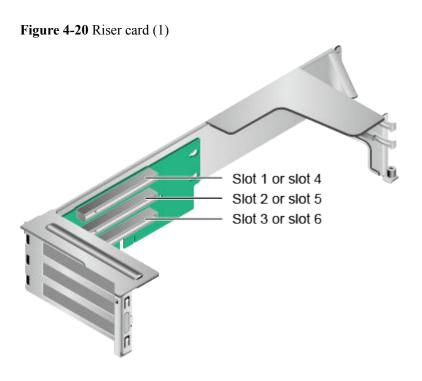
Table 4-7 Flexible NIC indicators

NIC Type	Indicator	State Description
Flexible NIC with four GE electrical ports	Data transmission status indicator	• Blinking yellow: Data is being transmitted. • Off: No data is being transmitted.

NIC Type	Indicator	State Description
	Connection status indicator	• Steady green: The network port is properly connected. • Off: The network port is not connected.
Flexible NIC with two 10GE electrical ports	Transmission rate indicator	• Steady green: The data transmission rate is 10 Gbit/s. • Steady yellow: The data transmission rate is 1 Gbit/s. • Off: The data transmission rate is 10/100 Mbit/s.
	Connection status indicator/Data transmission status indicator	• Steady green: The network port is properly connected. • Blinking green: Data is being transmitted. • Off: No data is being transmitted or the network port is not connected.

4.4 Riser Cards and PCIe Slots
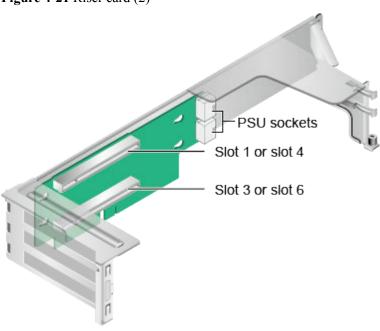
Figure 4-20, **Figure 4-21**, **Figure 4-22**, and **Figure 4-23** show the riser cards supported by the server.

Figure 4-20 Riser card (1)

Slot 1 or slot 4
Slot 2 or slot 5
Slot 3 or slot 6

📖**NOTE**

> When installed in I/O module 1, this riser card provides slots 1 to 3. When installed in I/O module 2, this riser card provides slots 4 to 6.

Figure 4-21 Riser card (2)

📖**NOTE**

> When installed in I/O module 1, this riser card provides slots 1 and 3. When installed in I/O module 2, this riser card provides slots 4 and 6.

Figure 4-22 Riser card (3)
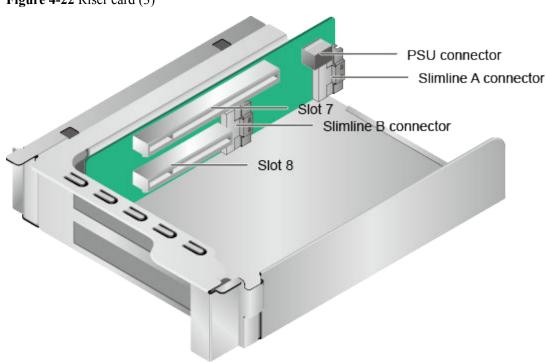
Figure 4-23 Riser card (4)

Figure 4-24 shows the PCIe slots on the rear panel.

Figure 4-24 PCIe slots

I/O module 1 provides slots 1 to 3, I/O module 2 provides slots 4 to 6, and I/O module 3 provides slots 7 and 8.

- If I/O module 1 uses a 2-slot PCIe riser module (PRM), slot 2 is unavailable.

- If I/O module 2 uses a 2-slot PRM, slot 5 is unavailable.

- If I/O module 3 uses a 1-slot PRM, slot 8 is unavailable.

Table 4-8 describes the PCIe slots.

📖**NOTE**

If CPU 2 is not installed, the PCIe slots provided by I/O modules 2 and 3 and the flexible NIC are unavailable.

Table 4-8 PCIe slot description

PCIe Device	CPU	PCIe Standard	Connector Bandwidth	Bus Bandwidth	Port Number	ROOT PORT (B/D/F)	Device (B/D/F)	Slot Size
Slot 1	CPU 1	PCIe 3.0	x16	● 2-slot PRM: x16 ● 3-slot PRM: x8	Port 2A	3a/00/0	3b/00/0	Full-height full-length
Slot 2	CPU 1	PCIe 3.0	x16	● 2-slot PRM: N/A ● 3-slot PRM: x8	Port2C	3a/02/0	3c/00/0	Full-height full-length
Slot 3	CPU 1	PCIe 3.0	x16	x8	Port 3A	5d/00/0	5e/00/0	Full-height half-length
Slot 4	CPU 2	PCIe 3.0	x16	● 2-slot PRM: x16 ● 3-slot PRM: x8	Port 1A	85/00/0	86/00/0	Full-height full-length
Slot 5	CPU 2	PCIe 3.0	x16	● 2-slot PRM: N/A ● 3-slot PRM: x8	Port1C	85/02/0	87/00/0	Full-height full-length
Slot 6	CPU 2	PCIe 3.0	x16	x8	Port 2C	ae/02/0	b2/00/0	Full-height half-length
Slot 7	CPU 2	PCIe 3.0	x16	● 1-slot PRM: x16 ● 2-slot PRM: x8	Port 3A	D7/00/0	D8/00/0	Full-height half-length
Slot 8	CPU 2	PCIe 3.0	x8	● 1-slot PRM: N/A ● 2-slot PRM: x8	Port 3C	D7/02/0	Db/00/0	Full-height half-length
RAID controller card	CPU 1	PCIe 3.0	x8	x8	Port1C	17/02/0	1B/00/0	—
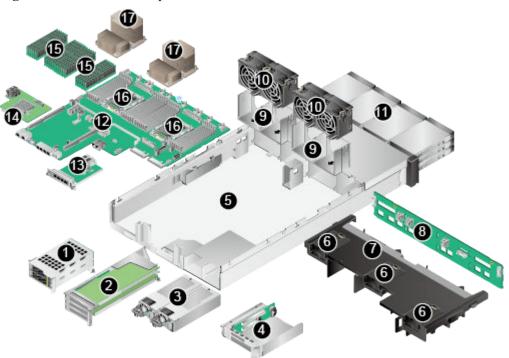
PCIe Device	CPU	PCIe Standard	Connector Bandwidth	Bus Bandwidth	Port Number	ROOT PORT (B/D/F)	Device (B/D/F)	Slot Size
Flexible NIC	CPU 2	PCIe 3.0	x8	x8	Port1A	17/00/0	1a/00/0	—

- Note 1: B/D/F, Bus/Device/Function Number.
- Note 2: **ROOT PORT (B/D/F)** indicates the bus number of a CPU internal PCIe root port. **Device (B/D/F)** indicates the bus number (displayed on the OS) of an onboard or external PCIe port.
- Note 3: The PCIe slots that support full-height full-length PCIe cards are backwards compatible with full-height half-length or half-height half-length PCIe cards.
- Note 4: The PCIe slots that support PCIe x16 cards are backwards compatible with PCIe x8, PCIe x4, and PCIe x1 cards.
- Note 5: **Table 4-8** lists the default values of **B/D/F**. If CPUs are not in full configuration or a PCIe card with a PCI bridge is configured, the values of **B/D/F** may differ.

4.5 Physical Structure

Figure 4-25 shows the components of a server.

Figure 4-25 2288H V5 components

1	I/O module 1	2	I/O module 2
3	Power supply unit (PSU)	4	I/O module 3
5	Chassis	6	Supercapacitor tray
7	Air duct	8	Front hard disk backplane
9	Fan module bracket	10	Fan module
11	Front hard disk	12	Mainboard
13	Flexible NIC	14	RAID controller card
15	DIMM	16	CPU
17	Heat sink	—	—

5 Product Specifications

5.1 Technical Specifications

Table 5-1 Technical specifications

Item	Specifications
Form factor	2U rack server
CPU	One or two Intel® Xeon® Scalable 3100, 4100, 5100, 6100, and 8100 series processors ● A maximum of 28 cores (2.5 GHz) ● Maximum frequency: 3.6 GHz (four cores) ● Two UPI links: 10.4 GT/s ● Maximum L3 cache capacity per core: 1.375 MB ● Maximum thermal design power (TDP): 205 W
Chipset	Intel C622
Memory	● Supports a maximum of 24 DDR4 RDIMMs or LRDIMMs. ● RDIMM: twenty-four 32 GB RDIMMs for two CPUs, with a maximum memory capacity of 768 GB ● LRDIMM: twenty-four 64 GB LRDIMMs for two CPUs, with a maximum memory capacity of 1536 GB ● Maximum memory speed: 2666 MT/s ● Memory protection: Error Checking and Correcting (ECC), Mirrored Channel Mode, Single Device Data Correction (SDDC), Rank Sparing Mode, and Lockstep **NOTE** DIMMs of different types (RDIMMs and LRDIMMs) and specifications (such as the capacity, bit width, rank, and height) cannot be installed on one server. The DIMMs on one server must have the same BOM number. For details about BOM numbers, see the **Huawei Server Compatibility Checker**.
Storage	● The server supports various hard disk configurations. For details, see **Table 6-5**. ● Supports hard disk hot swap. ● Supports RAID 0, 1, 10, 1E, 5, 50, 6, and 60, provides a supercapacitor to protect cache data from power failures, and supports RAID state migration, RAID configuration memory, self-diagnosis, and web-based configuration. ● Allows a SAS card or SAS RAID controller card (with a maximum of 4 GB cache) to be configured on the mainboard to improve hard disk storage performance and ensure user data security. **NOTE** If the BIOS is in Legacy mode, the server does not support 4Kn hard disks.

Item	Specifications
Network port	● Two onboard 10GE electrical or optical ports (provided by the PCH), supporting NC-SI, WOL, and PXE ● Two onboard GE electrical ports (provided by the PCH), supporting NC-SI, WOL, and PXE ● Network ports provided by the flexible NIC: 　− Four GE electrical ports, supporting NC-SI, WOL, and PXE 　− Two 10GE electrical ports, supporting NC-SI, WOL, and PXE
RAID controller card	The RAID controller card does not occupy a standard PCIe slot, which improves system scalability. The RAID controller card supports RAID level migration and RAID configuration memory. The server supports the following RAID controller cards: ● LSI SAS3008 (SR130-M): supports the IT mode and does not support RAID arrays. ● LSI SAS3108 (SR430C-M): supports RAID 0, 1, 10, 5, 50, 6, and 60, and supports a supercapacitor for power-off protection.
PCIe slot	● I/O modules 1 and 2 provide the following PCIe slots: 　- Two standard full-height full-length PCIe 3.0 x16 slots (bandwidth: PCIe 3.0 x8) and one standard full-height half-length PCIe 3.0 x16 slot (bandwidth: PCIe 3.0 x8) 　- One standard full-height full-length PCIe 3.0 x16 slot and one standard full-height half-length PCIe 3.0 x16 slot (bandwidth: PCIe 3.0 x8) ● I/O module 3 provides the following PCIe slots: 　- One standard full-height half-length PCIe 3.0 x16 slot (bandwidth: PCIe 3.0 x8) and one standard full-height half-length PCIe 3.0 x8 slot 　- One standard full-height half-length PCIe 3.0 x16 slot ● One Huawei SSD card, which greatly improves I/O performance for search, cache, and download services **NOTE** Use the **Huawei Server Compatibility Checker** to check the PCIe cards supported by the server. For PCIe cards not listed in the **Huawei Server Compatibility Checker**, contact your local Huawei sales representative or Huawei technical support.

Item	Specifications
Port	- Two USB 2.0 ports, one USB 3.0 port, and one DB15 VGA port on the front panel **NOTE** Only servers with eight 2.5-inch hard disks and twenty-four 2.5-inch hard disks provide the VGA port and USB 3.0 port on the front panel. - Two USB 3.0 ports, one DB15 VGA port, one RJ45 serial port, one RJ45 system management port, two GE electrical ports, and two 10GE electrical ports or two 10GE optical ports on the rear panel - One built-in USB 3.0 port and two built-in SATA ports **NOTE** The built-in USB port cannot be used for installing Windows OSs.
Fan module	Four hot-swappable fan modules, allowing one-fan failures
System management	- UEFI - iBMC Uses an independent port. Supports Simple Network Management Protocol (SNMP) v1/v2c/v3 and IMPI 2.0, and provides the GUI, virtual KVM, virtual media, Serial Over LAN (SOL), intelligent power supply, remote control, hardware monitoring, and LCD features. - NC-SI - Supports Huawei eSight management software and integration with third-party management systems, such as VMware vCenter, Microsoft SystemCenter, and Nagios.
Security	- Power-on password - Administrator password - Front bezel
GPU	Integrates an SM750 graphics card chip to the mainboard to provide a memory capacity of 32 MB and support a maximum resolution of 1920 x 1200 at 60 Hz with 16 M colors. **NOTE** If a resolution higher than 1280 x 1024 is required, you need to install a dedicated graphics card driver.

5.2 Physical and Environmental Specifications

Physical Specifications

Table 5-2 Physical specifications

Item	Specifications
Dimensions (H x W x D)	● Chassis with 3.5-inch hard disks: 43 mm x 436 mm x 748 mm (1.69 in. x 17.17 in. x 29.45 in.) ● Chassis with 2.5-inch hard disks: 43 mm x 436 mm x 708 mm (1.69 in. x 17.17 in. x 27.87 in.)
Installation space	The server fits into a universal cabinet that complies with the IEC 297 standard. ● Cabinet width: 19 in. ● Cabinet depth: > 1000 mm (39.37 in.) Requirements for guide rail installation: ● L-shaped guide rails: apply only to a Huawei cabinet. ● Adjustable guide rails: apply to a cabinet with a distance of 543.5 mm to 848.5 mm (21.40 in. to 33.41 in.) between the front and rear mounting bars. ● Holding rails: apply to a cabinet with a distance of 610 mm to 914 mm (24.02 in. to 35.98 in.) between the front and rear mounting bars.
Weight in full configuration	Net weight: ● With eight 2.5-inch hard disks: 17.3 kg (38.15 lb) ● With four 3.5-inch hard disks: 18.4 kg (40.57 lb) Packaging materials: 5 kg (11.03 lb)
Power consumption	The power consumption varies with the server configuration. Use the **Huawei Server Power Calculator** to calculate the power consumption.

Item	Specifications
Acoustic noise	The data listed in the following is the declared A-weighted sound power levels (LWAd) and declared average bystander position A-weighted sound pressure levels (LpAm) when the server is operating in a 23°C (73.4°F) ambient environment. Noise emissions are measured in accordance with ISO 7999 (ECMA 74) and declared in accordance with ISO 9296 (ECMA 109). ● Idle: – LWAd: 5.92 Bels – LpAm: 42.3 dBA ● Operating: – LWAd: 6.14 Bels – LpAm: 46.3 dBA **NOTE** The actual sound levels generated when the server is operating vary depending on the server configuration, workload, and ambient temperature.

Environmental Specifications

- **Temperature**
  - Operating temperature: 5°C to 45°C (41°F to 113°F) (meeting the ASHRAE CLASS A3 and A4 standards). For details, see **Table 5-3**.
  - Storage temperature: -40°C to +65°C (-104°F to +149°F).
  - Temperature change rate: < 20°C/h (36°F/h).

Table 5-3 Operating temperature specifications

Model	5°C to 35°C (41°F to 95°F)	5°C to 40°C (41°F to 104°F) (ASHRAE CLASS A3 compliant)	5°C to 45°C (41°F to 113°F) (ASHRAE CLASS A4 compliant)
Server with eight 2.5-inch hard disks	Supports all configurations.	● Does not support PCIe SSD cards. ● Supports only Intel® Xeon® Platinum 8180/8168 and Gold 6154 CPUs.	● Does not support PCIe SSD cards. ● Supports only Intel® Xeon® Platinum 8153 and Gold 6152/6140/6126/5118 CPUs, and CPUs lower than 105 W.
Server with four 3.5-inch hard disks			

Model	5°C to 35°C (41°F to 95°F)	5°C to 40°C (41°F to 104°F) (ASHRAE CLASS A3 compliant)	5°C to 45°C (41°F to 113°F) (ASHRAE CLASS A4 compliant)
Note: If one fan fails, the highest operating temperature of the server is 5°C (9°F) lower than that in normal cases.			

- **Humidity**
  - Operating humidity: 8% RH to 90% RH
  - Storage humidity: 5% to 95% RH
  - Humidity change rate: < 20% RH/h
- **Altitude**
  - ≤ 3048 m (9999.88 ft). For altitudes above 900 m (2952.72 ft), the operating temperature decreases by 1°C (1.8°F) every 300 m (984.24 ft).
  - HDDs are not supported when the altitude is higher than 3000 m (9842.4 ft).
- **Corrosive gaseous contaminant**
  - Copper corrosion rate test requirements: The corrosion product thickness growth rate is lower than 300 Å/month (meeting level G1 requirements of the ANSI/ISA-71.04-2013 standard on gaseous corrosion).
  - Silver corrosion rate test requirements: The corrosion product thickness growth rate is lower than 200 Å/month.
- **Particle contaminant**
  - The equipment room environment meets the requirements of ISO 14664-1 Class 8.

    You are advised to hire a professional organization to monitor particle contaminants in the equipment room.
  - The equipment room is free from explosive, conductive, magnetic conductive, and corrosive dust.

6 Component Compatibility

Use the **Huawei Server Compatibility Checker** to check the software and hardware supported by the server.

6.1 CPU

One or two Intel® Xeon® Scalable 3100, 4100, 5100, 6100, and 8100 series processors

- A maximum of 28 cores (2.5 GHz)

- Maximum frequency: 3.6 GHz (four cores)

- Two UPI links: 10.4 GT/s

- Maximum L3 cache capacity per core: 1.375 MB

- Maximum thermal design power (TDP): 205 W

NOTE

- For details about component options, consult the local Huawei sales representatives.

- CPUs on the same server must be of the same model.

- For details about CPUs, visit **https://www.intel.com/content/www/us/en/homepage.html? _ga=2.147254654.87461959.1499832773-883924506.1499832773**.

6.2 Memory

Memory Configuration Rules

A server provides 24 DDR4 DIMM slots. Each processor supports six memory channels and each memory channel supports two DDR4 DIMMs.

Observe the following rules when configuring DIMMs:

1. DIMMs of different types (RDIMMs and LRDIMMs) cannot be installed on one server.

2. Each channel supports a maximum of eight ranks.

   NOTE

   A channel supports more than eight ranks for LRDIMMs, because a quad-rank LRDIMM generates the same electrical load as a single-rank RDIMM on a memory bus.

3. The maximum number of DIMMs to be installed on the server varies with the processor type, DIMM type, number of ranks, and operating voltage. For details, see **Maximum number of DIMMs** in the following tables.

   NOTE

   Restriction of the number of ranks supported by each channel on the maximum number of DIMMs supported by each channel:

   Number of DIMMs supported by each channel ≤ Number of ranks supported by each memory channel/Number of ranks supported by each DIMM

4. All DIMMs operate at the same speed, which is the smaller value of:

   – Memory speed supported by a CPU

   – Lowest maximum operating speed for the selected memory configuration. This speed varies with the rated speed, operating voltage, and number of DIMMs for each memory channel. For details, see **Maximum operating speed** in the following tables.

Table 6-1 RDIMM configuration

Item		Specifications
Rank		Dual-rank
Rated speed (MT/s)		2666
Operating voltage (V)		1.2
Maximum number of DIMMs		24
Maximum capacity per DIMM (GB)		32
Maximum memory capacity (GB)		768
Maximum memory capacity at maximum operating speed (GB)		768
Maximum operating speed (MT/s)	One DIMM per channel	2666
	Two DIMMs per channel	2666
Note 1: The maximum number of DIMMs listed in this table is based on dual-processor configuration. These values are halved for a server with only one processor.		

Table 6-2 LRDIMM configuration

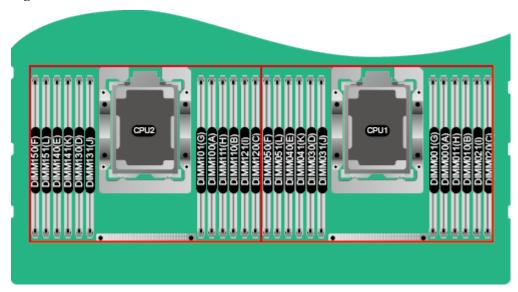| Item		Specifications
Rank		Quad-rank
Rated speed (MT/s)		2666
Operating voltage (V)		1.2
Maximum number of DIMMs		24
Maximum capacity per DIMM (GB)		64
Maximum memory capacity (GB)		1536
Maximum memory capacity at maximum operating speed (GB)		1536
Maximum operating speed (MT/s)	One DIMM per channel	2666
	Two DIMMs per channel	2666
Note 1: The maximum number of DIMMs listed in this table is based on dual-processor configuration. These values are halved for a server with only one processor.		

Memory Slot Configuration Rules

Figure 6-1 shows the DIMM slot numbers and positions.

Figure 6-1 DIMM slots

- The server supports DIMMs of 16 GB, 32 GB, and 64 GB. A server fully configured with DIMMs has up to 1536 GB of memory.
- The server provides 24 DDR4 DIMM slots. Each CPU supports six channels. **Table 6-3** lists channels for each CPU.

Table 6-3 Channels

CPU Socket	Channel	DIMM
CPU 1	A	DIMM000(A)
		DIMM001(G)
	B	DIMM010(B)
		DIMM011(H)
	C	DIMM020(C)
		DIMM021(I)
	D	DIMM030(D)
		DIMM031(J)
	E	DIMM040(E)
		DIMM041(K)
	F	DIMM050(F)

CPU Socket	Channel	DIMM
		DIMM051(L)
CPU2	A	DIMM100(A)
		DIMM101(G)
	B	DIMM110(B)
		DIMM111(H)
	C	DIMM120(C)
		DIMM121(I)
	D	DIMM130(D)
		DIMM131(J)
	E	DIMM140(E)
		DIMM141(K)
	F	DIMM150(F)
		DIMM151(L)

Table 6-4 lists the order in which the DIMMs are installed.

Table 6-4 Installation order

CPU	DIMM Installation Order
CPU 1	000(A), 010(B), 020(C), 030(D), 040(E), 050(F), 001(G), 011(H), 021(I), 031(J), 041(K), 051(L)
CPU 1 and CPU 2	000(A), 100(A), 010(B), 110(B), 020(C), 120(C), 030(D), 130(D), 040(E), 140(E), 050(F), 150(F), 001(G), 101(G), 011(H), 111(H), 021(I), 121(I), 031(J), 131(J), 041(K), 141(K), 051(L), 151(L)

Memory Protection Technologies

The server supports the following memory protection technologies:

- ECC
- Mirrored Channel Mode
- SDDC
- Rank Sparing Mode
- Lockstep

Supported DIMMs

📖**NOTE**

- For details about component options, consult the local Huawei sales representatives.
- DIMMs on one server must have the same BOM number.

6.3 Storage

Table 6-5 lists hard disk configurations supported by the server.

📖**NOTE**

The following table is for reference only. For details about component options, consult the local Huawei sales representatives.

Table 6-5 Hard disk configurations

Configuration	Maximum Front Hard Disks	Maximum Rear Hard Disks	Hard Disk Management Mode
8-disk configuration[1]	8 (SAS/SATA hard disk)	—	One RAID controller card
12-disk configuration (expander)	12 (SAS/SATA hard disk)	1. I/O module 1: 2 (SAS/SATA hard disk) 2. I/O module 2: 2 (SAS/SATA hard disk)	One RAID controller card
24-disk configuration (pass-through)[1]	24 (SAS/SATA hard disk)	—	Three RAID controller cards (one for eight hard disks)
25-disk configuration (expander)[1]	25 (SAS/SATA hard disk)	I/O module 1: 2 (SAS/SATA hard disk)	One RAID controller card
[1]: The front hard disks of an 8-disk, 24-disk (pass-through), or 25-disk (expander) server can only be 2.5-inch. The other disks can be 2.5-inch or 3.5-inch.			

The following figures show the hard disk slots for these configurations.
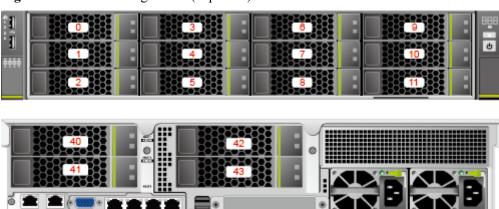
- 8-disk configuration

Figure 6-2 8-disk configuration

● 12-disk configuration (expander)

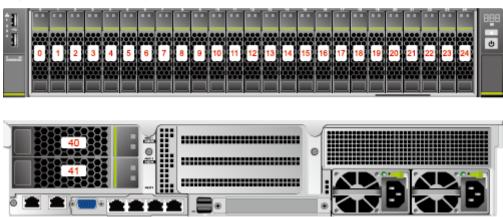**Figure 6-3** 12-disk configuration (expander)

● 24-disk configuration (pass-through)

Figure 6-4 24-disk configuration (pass-through)

● 25-disk configuration

Figure 6-5 25-disk configuration

Table 6-6 lists the comparison between RAID levels in performance and disk usage.

Table 6-6 RAID level comparison

RAID Level	Reliability	Read Performance	Write Performance	Hard Disk Usage
RAID 0	Low	High	High	100%
RAID 1	High	High	Low	50%
RAID 5	Relatively high	High	Medium	(N - 1)/N
RAID 6	Relatively high	High	Medium	(N - 2)/N
RAID 10	High	High	Medium	50%
RAID 1E	High	Medium	Medium	50%
RAID 50	High	High	Relatively high	(N - M)/N
RAID 60	High	High	Relatively high	(N - M x 2)/N
Note: N indicates the number of member disks in a RAID group, and M indicates the number of subgroups in a RAID group.				

6.4 IO Expansion

The server supports a wide range of PCIe cards for you to choose based on the card type and transmission speed:

- Fiber Channel (FC) host bus adapter (HBA)
- Converged network adapter (CNA)
- Network expansion card
- SSD card

📖 **NOTE**

For details about component options, consult the local Huawei sales representatives.

6.5 PSU

Table 6-7 lists the PSU supported by the server.

Table 6-7 Supported PSU

PSU Model	Rated Power	Rated Input Voltage
550 W AC Platinum PSU	550 W	100 V AC to 240 V AC, and 240 V DC

📖**NOTE**

- The PSUs are hot-swappable and work in 1+1 redundancy mode.
- **Table 6-7** is for reference only. For details about component options, see the **Huawei Server Compatibility Checker**.
- PSUs on one server must have the same BOM number.
- The PSUs provide short-circuit protection. The PSUs that support dual input live wires provide double-pole fuse.

6.6 OS and Software Support

For details about component options, see the **Huawei Server Compatibility Checker**.

7 System Management

The server uses Huawei's proprietary Intelligent Baseboard Management Controller (iBMC) to implement remote server management. The iBMC complies with Intelligent Platform Management Interface (IPMI) 2.0 and provides highly reliable hardware monitoring and management.

The iBMC supports the following features and protocols:

- KVM and text console redirection
- Remote virtual media
- IPMI
- Simple Network Management Protocol (SNMP)
- Redfish 1.0
- Login using a web browser

Table 7-1 describes the features of the iBMC.

Table 7-1 iBMC features

Feature	Description
Management interface	Integrates with any standard management system through the following interfaces: - IPMI - CLI - HTTPS - SNMP - Redfish
Fault detection	Detects faults and accurately locates faults in hardware, for example, an FRU.
Alarm management	Supports alarm management and reports alarms using the SNMP trap, Simple Mail Transfer Protocol (SMTP), and syslog service to ensure 24/7 continuous operation.

Feature	Description
Integrated virtual KVM	Provides remote maintenance measures for troubleshooting the system, and supports a maximum resolution of 1920 x 1200.
Integrated virtual media	Virtualizes local media devices, images, USB keys, and folders into media devices on a remote server, simplifying OS installation. (The virtual DVD-ROM drive supports a maximum transmission rate of 8 MB/s.)
WebUI	Provides a user-friendly graphical user interface (GUI), which simplifies users' configuration and query operations.
Fault reproduction	Reproduces faults to facilitate fault diagnosis.
Screen snapshots and screen videos	Allows you to view screenshots and videos without login, which facilitates routine preventive maintenance inspection (PMI)
Domain Name Service (DNS)/Active Directory (AD)	Supports the DNS and AD, significantly simplifying network and configuration management.
Dual-image backup	Starts software from a backup image if the software fails.
Asset management	Supports intelligent asset management.
Intelligent power management	Uses the power capping technology to increase deployment density, and uses dynamic energy saving to lower operating expenses.
IPv6	Supports IPv6 to ensure sufficient IP addresses.
Network Controller Sideband Interface (NC-SI)	Supports NC-SI, which allows you to access the iBMC through the service network port.

8 Warranty

According to the *Huawei Warranty Policy for Servers & Storage Products* (*Warranty Policy* for short), Huawei provides a three-year warranty for the server, a one-year warranty for DVD-ROM drives and iBBUs, and a three-month warranty for software media.

The *Warranty Policy* stipulates warranty terms and conditions, including the available services, response time, terms of service, and disclaimer.

The warranty terms and conditions may vary by country, and some services and/or parts may not be available in all countries. For more information about warranty services in your country, contact Huawei technical support or the local Huawei representative office.

Table 8-1 describes the warranty service response time.

Table 8-1 Response time

Service	Response Time	Description	Remarks
Help Desk	24/7	Available 24 hours a day, 7 days a week (00:00 to 24:00, Monday to Sunday)	None
Remote troubleshooting	24/7	Available 24 hours a day, 7 days a week (00:00 to 24:00, Monday to Sunday)	The response time is the period between the end of a customer's service request and beginning of the response by the technical support to offer troubleshooting services.

Service	Response Time		Description	Remarks
Online technical support	24/7		Huawei enterprise support website (http://e.huawei.com): available 24 hours a day, 7 days a week (00:00 to 24:00, Monday to Sunday)	None
Licensing of software updates	24/7		Available 9 hours a day, 5 days a week (09:00 to 18:00, Monday to Friday), excluding official holidays.	The repaired or replacement parts will be shipped within 45 calendar days after Huawei receives the defective parts.
Return for repair	Outside China	9/5 hours, shipment within 45 calendar days	Available 9 hours a day, 5 days a week (09:00 to 18:00, Monday to Friday), excluding official holidays.	The repaired or replacement parts will be shipped within 45 calendar days after Huawei receives the defective parts.
	In China	10/5 hours, next business day	Available 10 hours a day, 5 days a week (08:00 to 18:00, Monday to Friday), excluding official holidays. Arrival: NBD	1. Service requests submitted after 15:30 will be handled the next business day. 2. The response time starts when a remote decision is made to appoint an onsite engineer.

Table 8-2 describes warranty services provided by Huawei.

Table 8-2 Warranty services

Service	Description
Help Desk	Huawei provides 24-hour after-sales technical support (such as handling requests for troubleshooting and hardware repair), receives and handles customer inquiries, complaints, and suggestions through a dedicated hotline.
Remote troubleshooting	After receiving a service request for rectifying a network or system fault, Huawei engineers will analyze and handle the fault remotely and proceed to rectify it in the shortest possible time. There are two methods for remote troubleshooting: telephone support and remote access.
Online technical support	Huawei enterprise support website (http://e.huawei.com) provides product and technical materials, such as product manuals, configuration guides, networking case study, and maintenance experience collections. Registered users can access the website and download required documents.
Licensing of software updates	To ensure that the devices operate stably, Huawei provides software patches whenever necessary
Return for repair	Huawei provides repair or replacement services for customers within the promised time to meet customer needs for spare parts. You can return defective parts to the designated Huawei site after submitting a service request. Huawei provides a three-year warranty for parts replacement and limited onsite repair for the servers used in China. Huawei provides a 10-hour-a-day, 5-day-a-week NBD support program. Huawei provides a three-year warranty for parts replacement and repair for the servers used outside China. Huawei provides a 9-hour-a-day, 5-day-a-week NBD support program. Service requests will be handled the next business day. Huawei delivers the repaired or new parts within 45 calendar days after receiving the defective parts.

9 Certifications

No.	Country/ Region	Certification	Standards
1	China	CCC	GB4943.1-2011 GB9254-2008 (Class A) GB17625.1-2012

10 References

For more information about the product, see the following documents:

- **Server Data Sheet**
- **Server-related Documentation**
- **Huawei Server Information Self-Service Platform**