meta brain® Server NF5468M6

White Paper

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Technical Support

Global Service Hotline:	(+1) 844-860-0011/(+1) 325-880-0011
Address:	East side of Floor 9, No. 801, Caoshanling South Road, High-tech Zone, Jinan, Shandong, P.R.China
Website:	https://en.ieisystem.com
Email:	serversupport@ieisystem.com

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Preface

Abstract

This white paper describes the NF5468M6 server's appearance, features, performance parameters, and software and hardware compatibility, providing in-depth information of NF5468M6.

Intended Audience

This white paper is intended for pre-sales engineers.

Symbol Conventions

The symbols that may be found in this document are defined as follows.

Symbol	Description
 DANGER	A potential for serious injury, or even death if not properly handled
 WARNING	A potential for minor or moderate injury if not properly handled
 CAUTION	A potential loss of data or damage to equipment if not properly handled
 IMPORTANT	Operations or information that requires special attention to ensure successful installation or configuration
 NOTE	Supplementary description of document information

Revision History

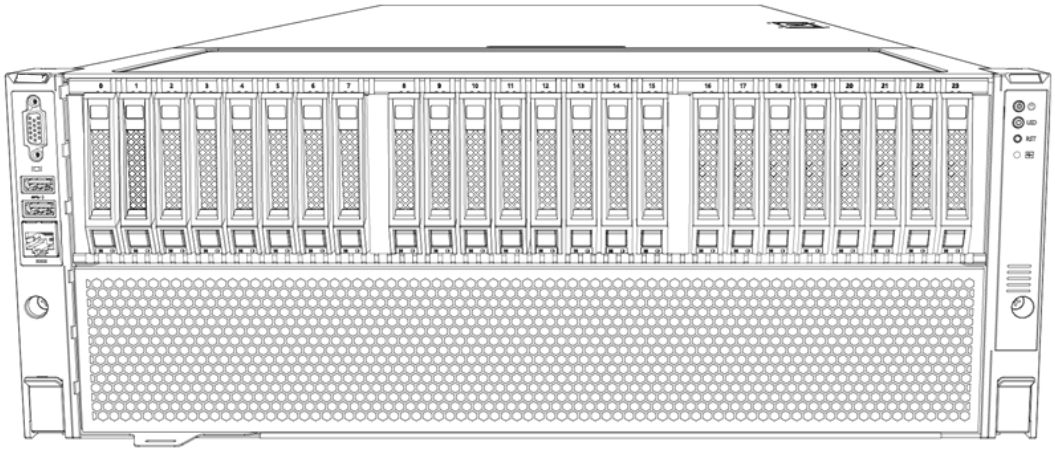
Version	Date	Description of Changes
V1.0	2024/04/17	Initial release

Table of Contents

1 Product Overview

The NF5468M6 is an industry-leading AI cloud infrastructure server designed for mainstream AI computing scenarios such as AI public cloud, enterprise-level AI cloud platform, smart security, and video encoding/decoding. It supports PCIe 4.0, twice as fast as PCIe 3.0. In addition, the NF5468M6 is compatible with accelerator cards in different PCIe form factors and supports topology switch between Balance, Common, and Cascade, meeting customers' performance requirements for different AI application scenarios. With up to twenty-four 2.5-inch drives or twelve 3.5-inch drives at the front, the server provides a high storage capacity.

Figure 1-1 NF5468M6



2 Features

2.1 Super Computing Power

- Up to two 3rd Gen Intel Xeon Scalable processors (code-named “Ice Lake”) with a TDP of up to 270 W in a standard 4U space.
- 3 UPI links per CPU.
- 32 DDR4 DIMMs.
- 4 or 8 dual-slot FHFL PCIe GPU cards or 16 Tesla T4 graphics cards.
- With wide compatibility to support various GPU cards.

2.2 Increased Communication Performance

- Supports PCIe 4.0 x16 accelerator cards with a bandwidth of up to 64 GB/s.
- Backward compatible with PCIe 3.0 accelerator cards.
- Supports NVLink Bridges, further enhancing the P2P performance.

2.3 Multiple Topologies Supported

The NF5468M6 supports Balance, Common, and Cascade topologies. Topology switching can be achieved by BMC commands to meet performance requirements for different AI application scenarios in the most convenient way.

2.4 Large Local Storage Capacity

The NF5468M6 supports twenty-four 2.5-inch drives or twelve 3.5-inch drives at the front, with up to 8 U.2 NVMe drives supported, delivering efficient data access. Besides, it supports 2 internal M.2 SSDs, further expanding the system storage capacity.

2.5 Multi-Host Technology

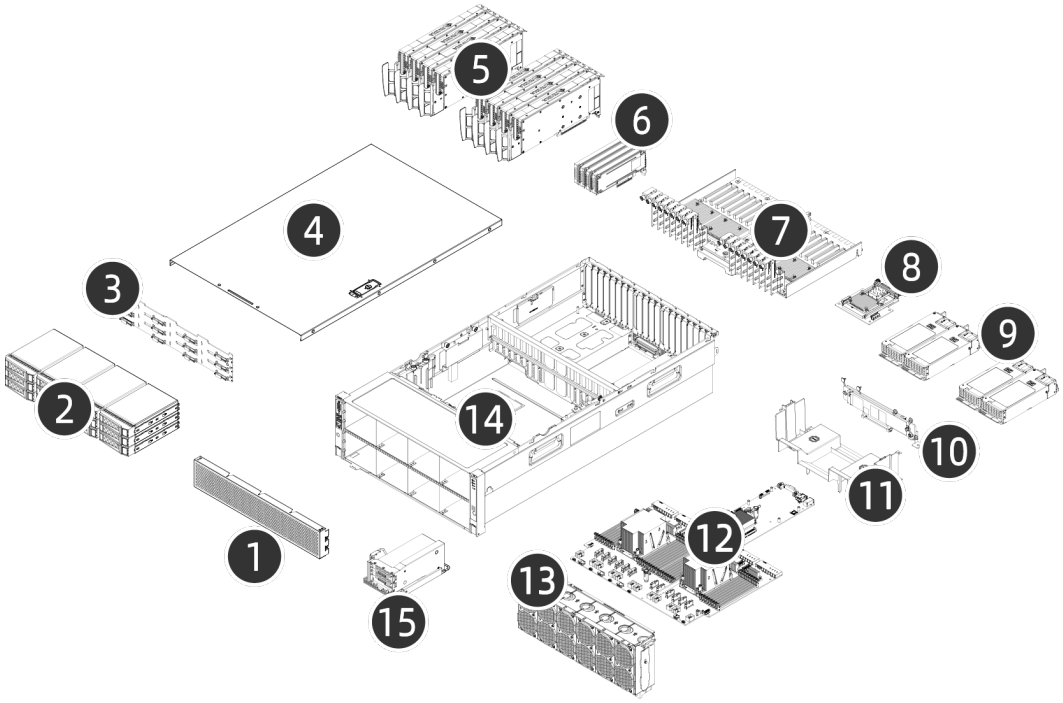
Multi-Host technology enables direct connectivity from multiple compute or storage hosts to a single network controller, reducing capital and operating expenses by reducing the quantity of switches, network cards, and cables. Besides, Multi-Host technology can balance the performance of network communication among the cores of multiple processors, providing an efficient network communication environment.

2.6 Security

- Supports Trusted Platform Module (TPM 2.0) and Trusted Cryptography Module (TCM) that provide advanced encryption functions.
- Supports Intel Trusted Execution Technology that provides hardware-based mechanisms to help protect against software-based attacks.
- Supports Intel Software Guard Extensions (SGX) technology that allows applications to run in enclaves to help prevent malicious theft and modification of critical codes and data.
- Supports the firmware update mechanism based on digital signatures to prevent unauthorized firmware updates.
- Supports UEFI Secure Boot to protect the system from malicious boot loaders.
- Supports hierarchical password protection in BIOS to ensure system boot and management security.
- Supports BIOS Secure Flash and BIOS Lock Enable (BLE) to reduce attacks from malicious software on the BIOS flash regions.
- Supports dual-image mechanism for BMC and BIOS to recover firmware upon the detection of corrupted firmware.
- Supports BMC Secure Boot to protect BMC from malicious tampering.
- Supports flexible BMC access control policies to improve BMC management security.
- Supports chassis intrusion detection to enhance physical security.

3 System Parts Breakdown

Figure 3-1 NF5468M6 Exploded View (12 × 3.5-inch Drive Configuration)



Item	Feature	Item	Feature
1	Front Bezel	9	PSUs
2	Drives	10	M.2 SSDs
3	Drive Backplane	11	Air Duct
4	Top Cover	12	Motherboard
5	GPUs	13	Fans
6	PCIe Expansion Cards	14	Chassis
7	GPU Board and Tray	15	RAID Controller Card Module
8	OCP 3.0 Card		

4 Logical Structure

4.1 System Topology Overview

The NF5468M6 supports two 3rd Gen Intel Xeon Scalable processors (code-named "Ice Lake") and 32 DDR4 DIMMs. The 2 processors are interconnected by 3 UPI links at up to 11.2 GT/s. Each processor is connected to 16 Slimline x8 connectors on the motherboard via the PCIe bus to provide PCIe signal.

The server supports 1 RAID riser card which supports up to 2 RAID controller cards and is connected to Slimline x8 connectors of CPU0 via the PCIe cable. The RAID controller cards can be connected to different drive backplanes via SAS/SATA signal cables to provide multiple local storage solutions. NVMe SSDs can be connected to a tri-mode RAID controller card, supporting hardware RAID.

There are 3 Slimline x4 connectors directly routed from the PCH that can be connected to 12 SATA drives on the drive backplane via SATA cables, providing a low-cost local storage solution. Mixing drives directly attached to a PCH with drives directly attached to a RAID controller card is not supported, because wrong drive sequence issue will occur if storage controllers from different manufacturers are used in the same system. The motherboard supports up to 8 NVMe SSDs directly connected to CPUs, via connecting the drive backplane to Slimline x8 connectors directly routed from the CPU on the motherboard.

The OCP 3.0 riser card supports an OCP 3.0 card in Single-Host or Multi-Host mode. In Single-Host mode, the OCP 3.0 riser card is connected to CPU0 via their Slimline x8 connectors. In Multi-Host mode, the OCP 3.0 riser card is connected to CPU0 and CPU1 via connecting its 2 Slimline x8 connectors with the Slimline x8 connectors of CPU0 and CPU1 respectively.

The NF5468M6 supports 8 GPUs in P configuration, 4 GPUs in T configuration, and 16 GPUs in V configuration. The GPU board is connected to the motherboard via a Slimline x8 cable.

Figure 4-1 Motherboard Logic Block Diagram

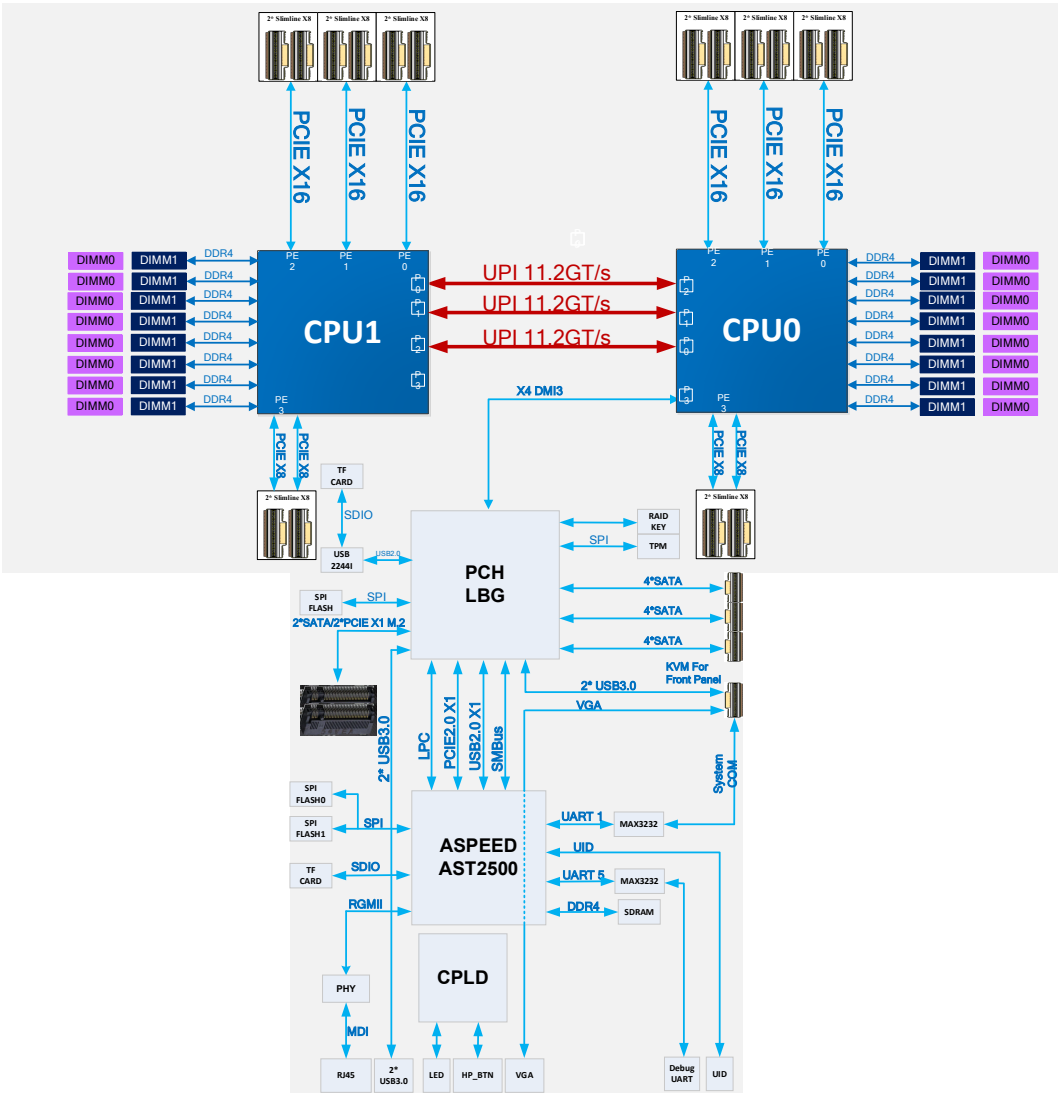
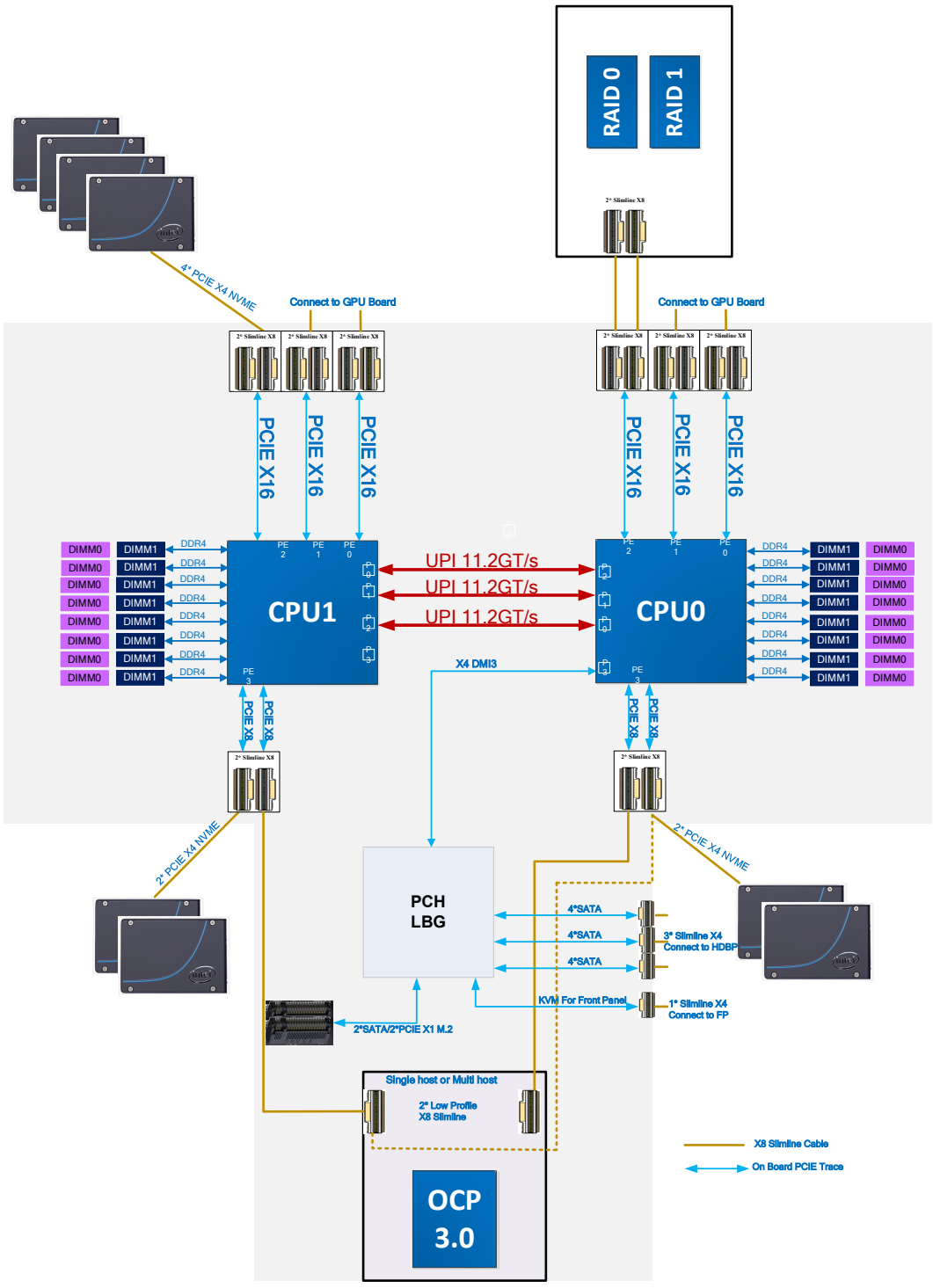


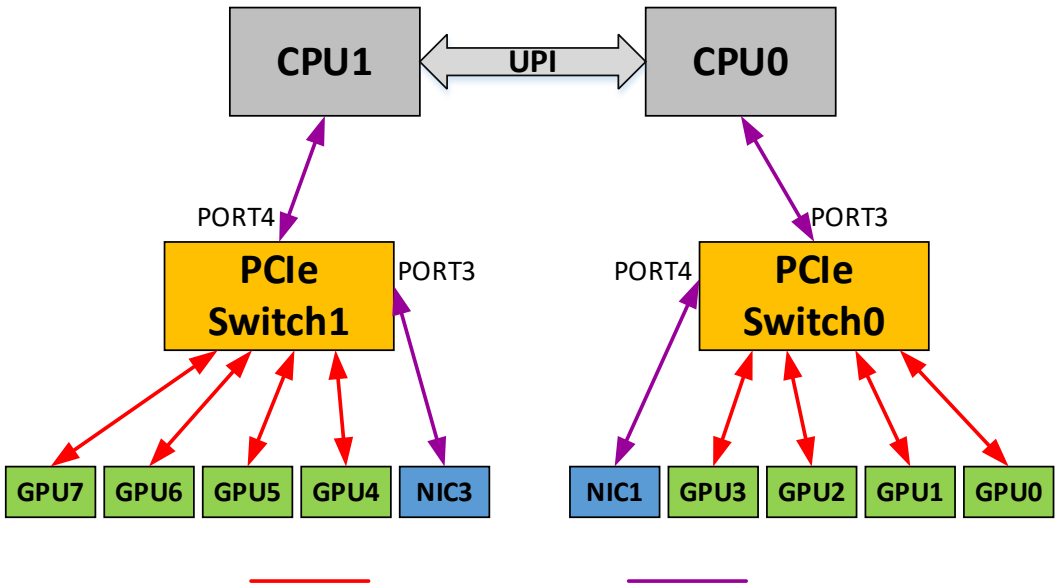
Figure 4-2 PCIe Topology Logic Block Diagram



4.2 PCIe Topologies of NF5468M6 - P Configuration

NF5468M6 - P configuration supports remote topology switching between Balance, Common, and Cascade modes by BMC commands, thereby meeting the needs of AI computing in different business scenarios.

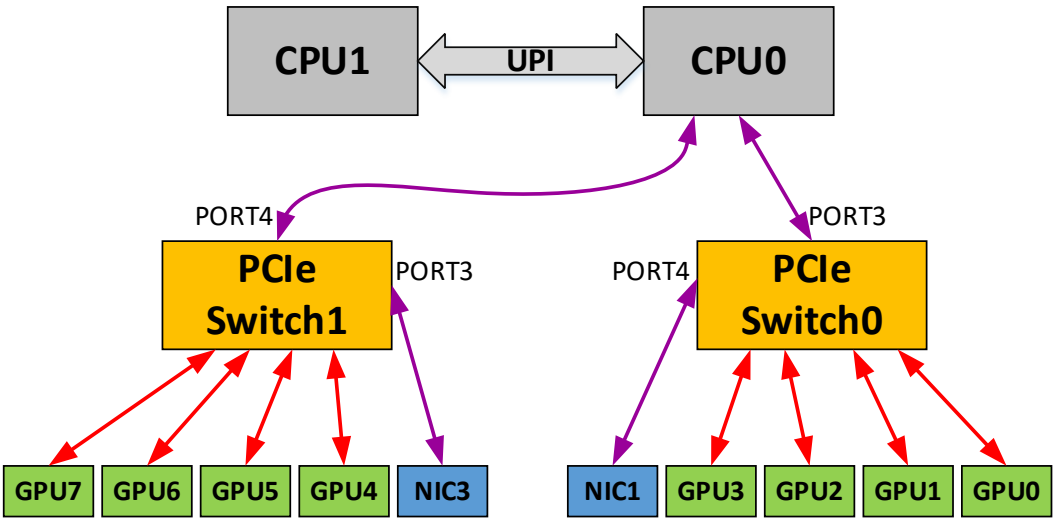
Figure 4-3 Balance Topology



Features: Each CPU has a PCIe switch, which is then connected to 4 GPUs. This topology maximizes CPU utilization and provides a greater upstream bandwidth. But in this topology, the P2P communication between 2 GPUs connected to different CPUs is limited by the UPI link speed.

Applicable business scenarios: As the mainstream topology of NF5468M6 servers, it is applicable to high performance computing (HPC), virtual desktop infrastructure (VDI), public cloud, AI training and other scenarios.

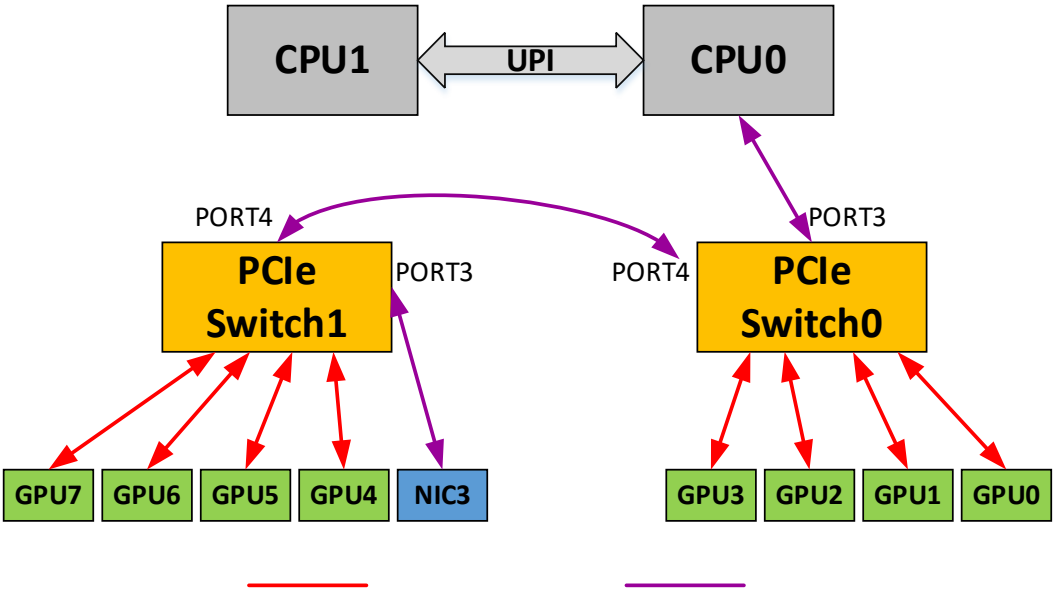
Figure 4-4 Common Topology



Features: CPU0 is connected to 2 PCIe switches. Each PCIe switch is connected to 4 GPUs. The communication between 2 GPUs connected to different PCIe switches can be accomplished without cross-CPU communication, delivering better P2P communication and higher data throughput.

Applicable business scenarios: It is applicable to the P2P communication-intensive training algorithm models where CPUs are involved in many tasks, for example, ResNet101/50.

Figure 4-5 Cascade Topology



Features: Only CPU0 is connected to a PCIe switch and this PCIe switch interconnects with another one. Each PCIe switch is connected to 4 GPUs. The PCIe

switch interconnection provides more powerful GPU P2P communication but low data throughput from CPU to GPU.

Applicable business scenarios: It is applicable to the P2P parameter-intensive training algorithm models where CPUs are involved in few tasks, for example, VGG-16.

Based on the Balance, Common and Cascade topologies, there are a total of 14 PCIe topology options for the NF5468M6 - P configuration, which are as follows:

Figure 4-6 PCIe Topology Logic Block Diagram (Balance or Cascade GPU Topology/Single-Host OCP NIC 3.0)

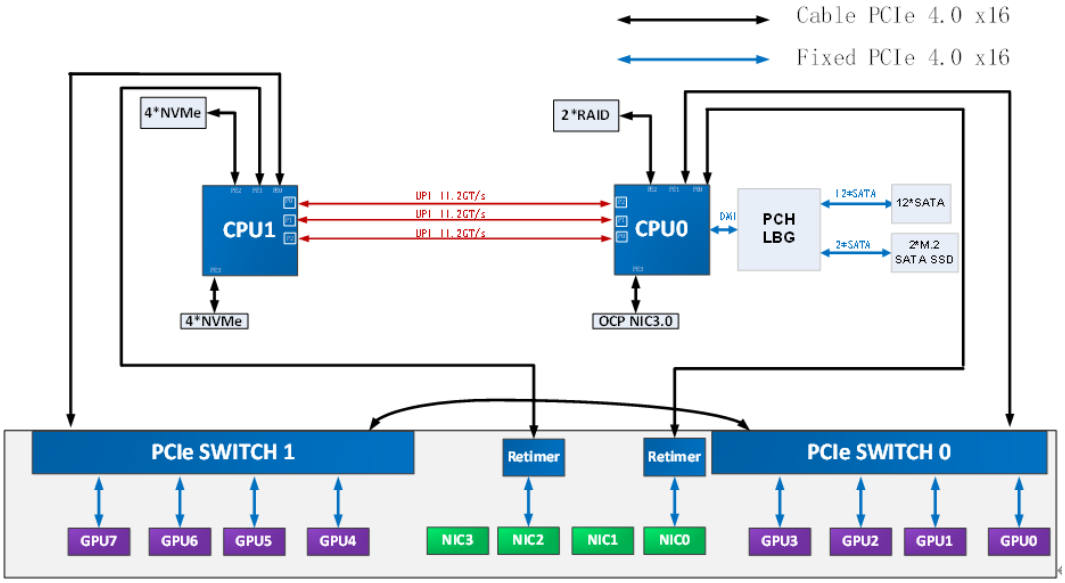


Figure 4-7 PCIe Topology Logic Block Diagram (Balance or Cascade GPU Topology/Multi-Host OCP NIC 3.0)

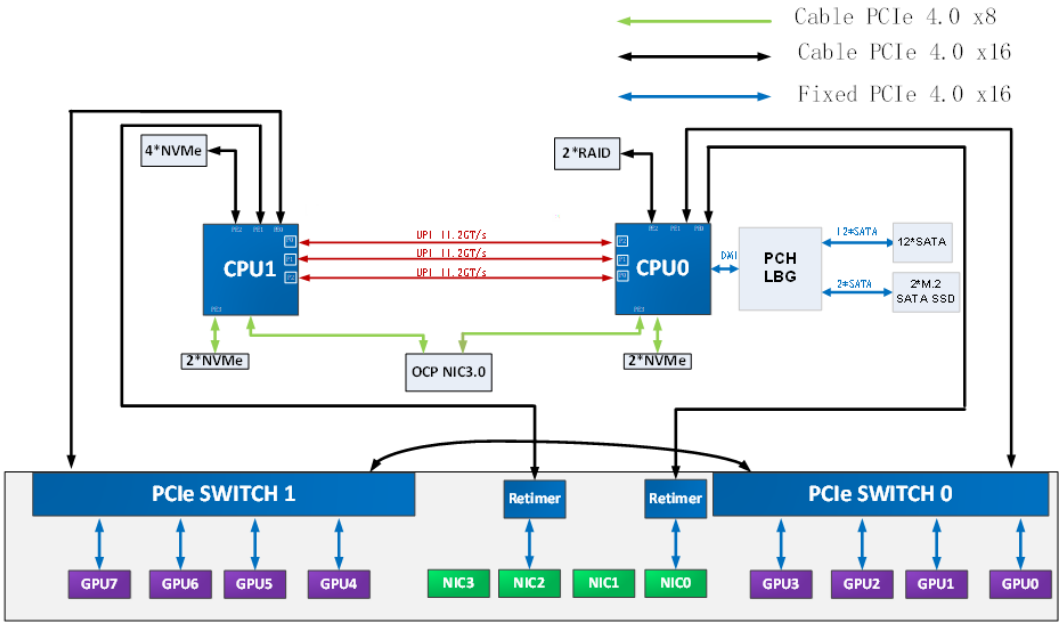


Figure 4-8 PCIe Topology Logic Block Diagram (Balance or Common GPU Topology/Single-Host OCP NIC 3.0)

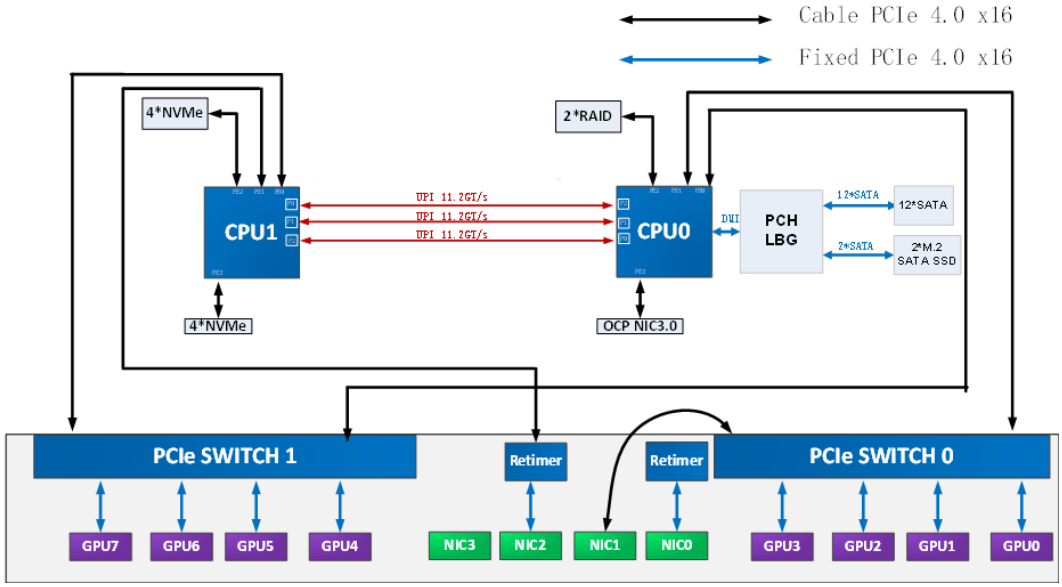


Figure 4-9 PCIe Topology Logic Block Diagram (Balance or Common GPU Topology/Multi-Host OCP NIC 3.0)

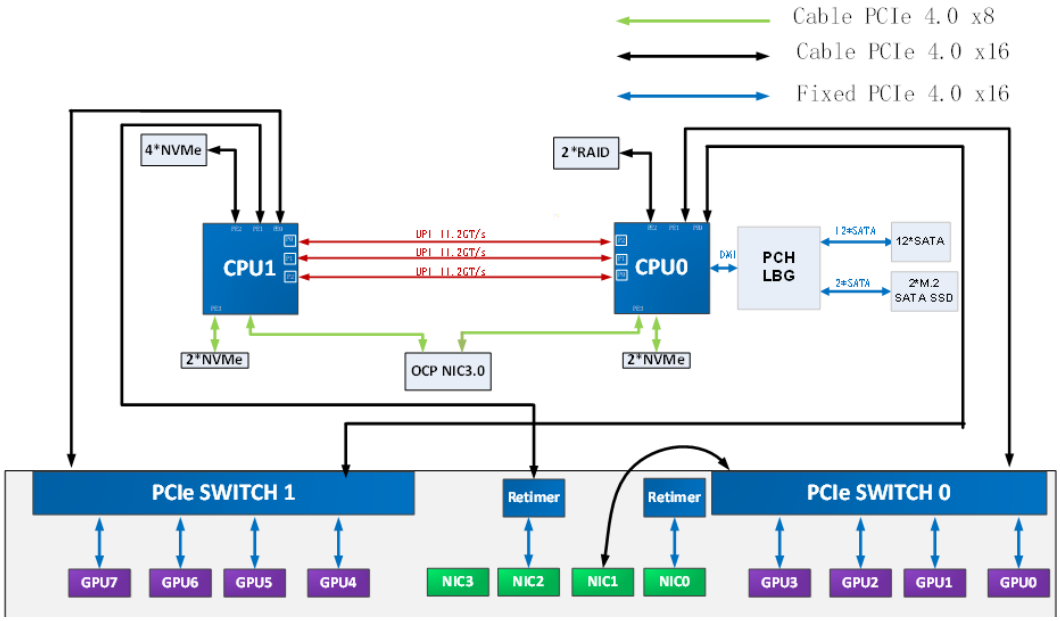


Figure 4-10 PCIe Topology Logic Block Diagram (Common or Cascade GPU Topology/Single-Host OCP NIC 3.0)

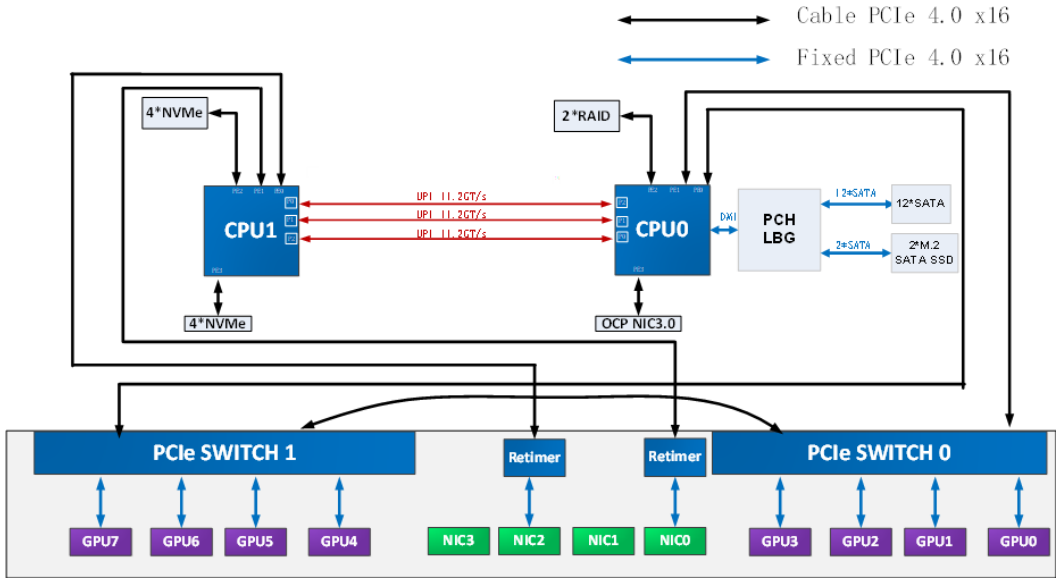


Figure 4-11 PCIe Topology Logic Block Diagram (Common or Cascade GPU Topology/Multi-Host OCP NIC 3.0)

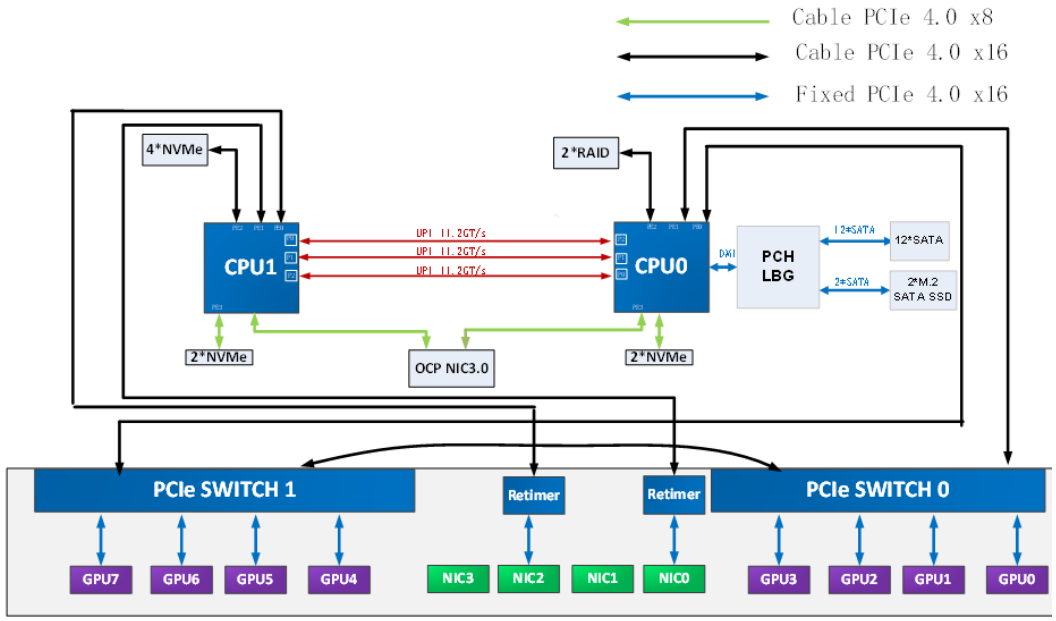


Figure 4-12 PCIe Topology Logic Block Diagram (Balance GPU Topology/Single-Host OCP NIC 3.0)

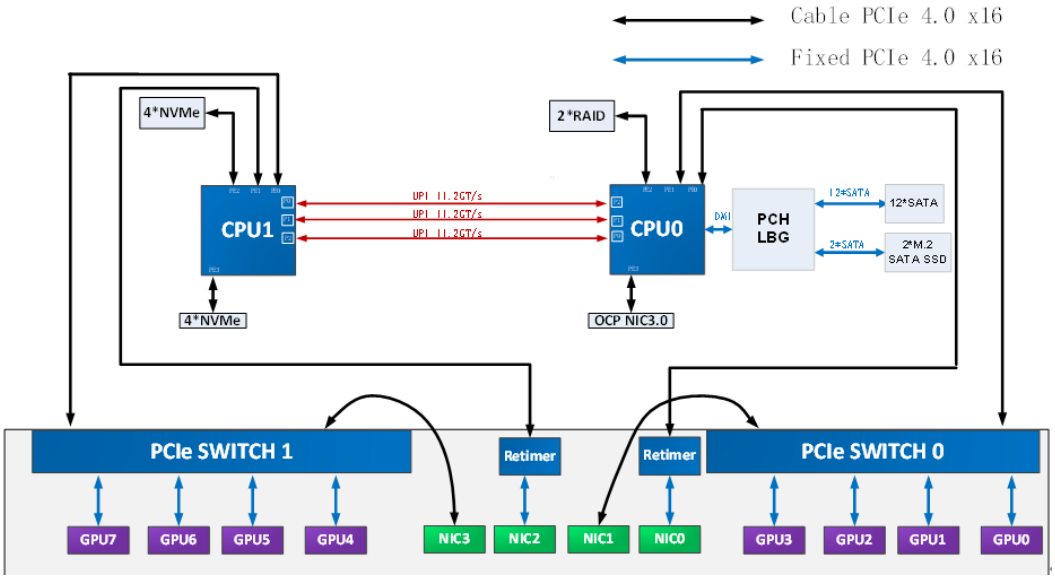


Figure 4-13 PCIe Topology Logic Block Diagram (Balance GPU Topology/Multi-Host OCP NIC 3.0)

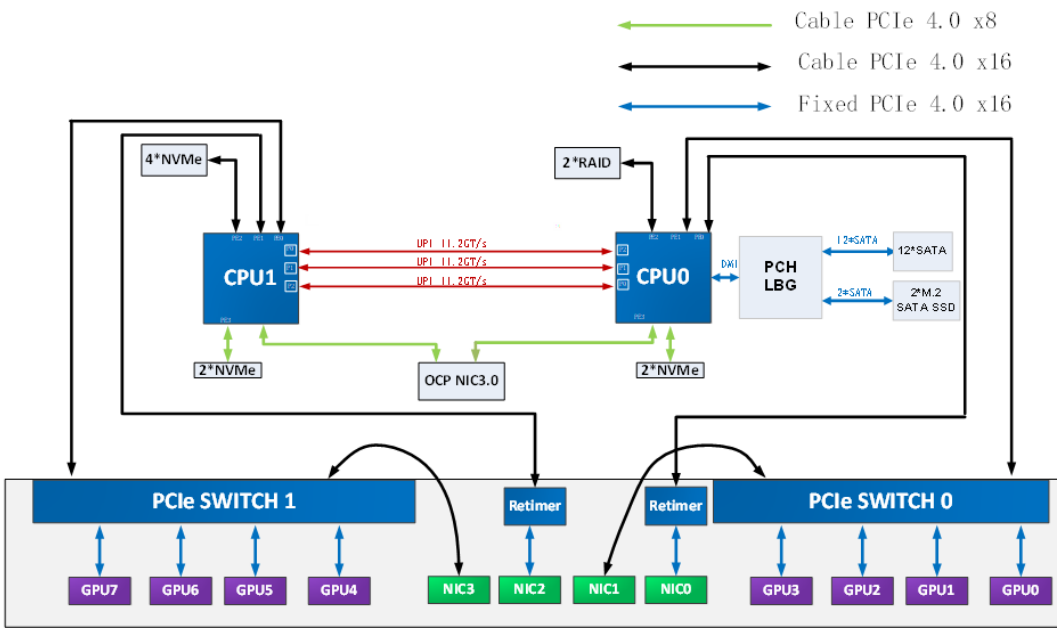


Figure 4-14 PCIe Topology Logic Block Diagram (Cascade GPU Topology/Single-Host OCP NIC 3.0)

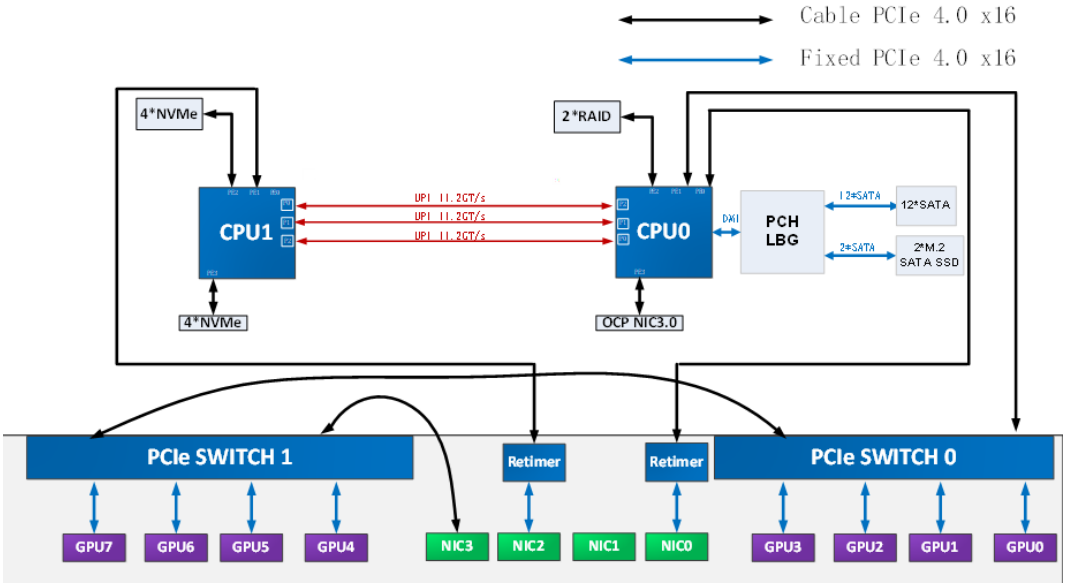


Figure 4-15 PCIe Topology Logic Block Diagram (Cascade GPU Topology/Multi-Host OCP NIC 3.0)

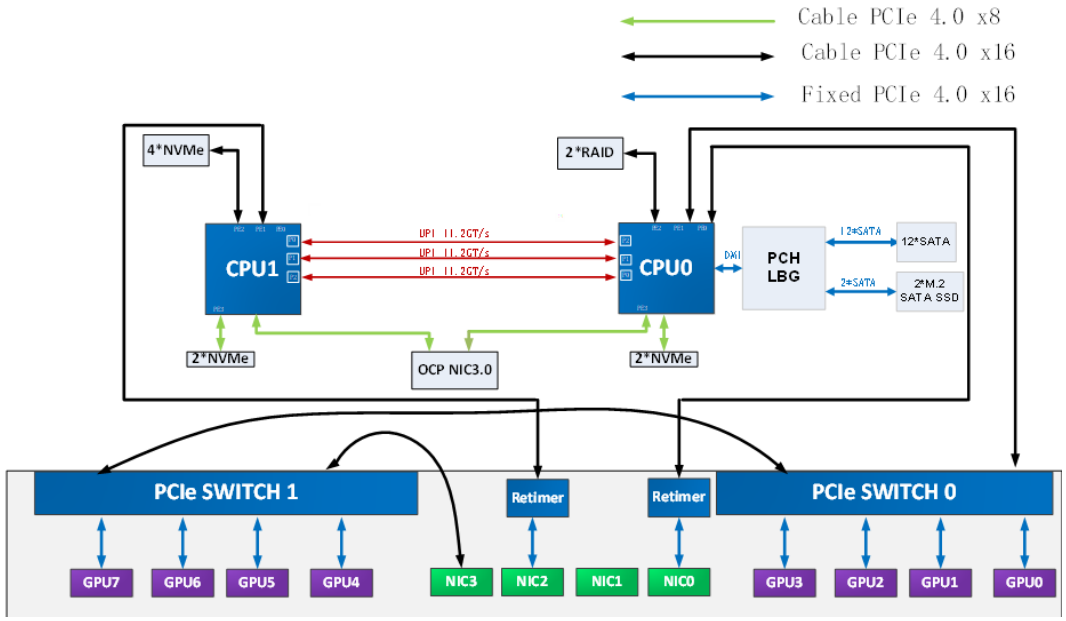


Figure 4-16 PCIe Topology Logic Block Diagram (Common GPU Topology/Single-Host OCP NIC 3.0)

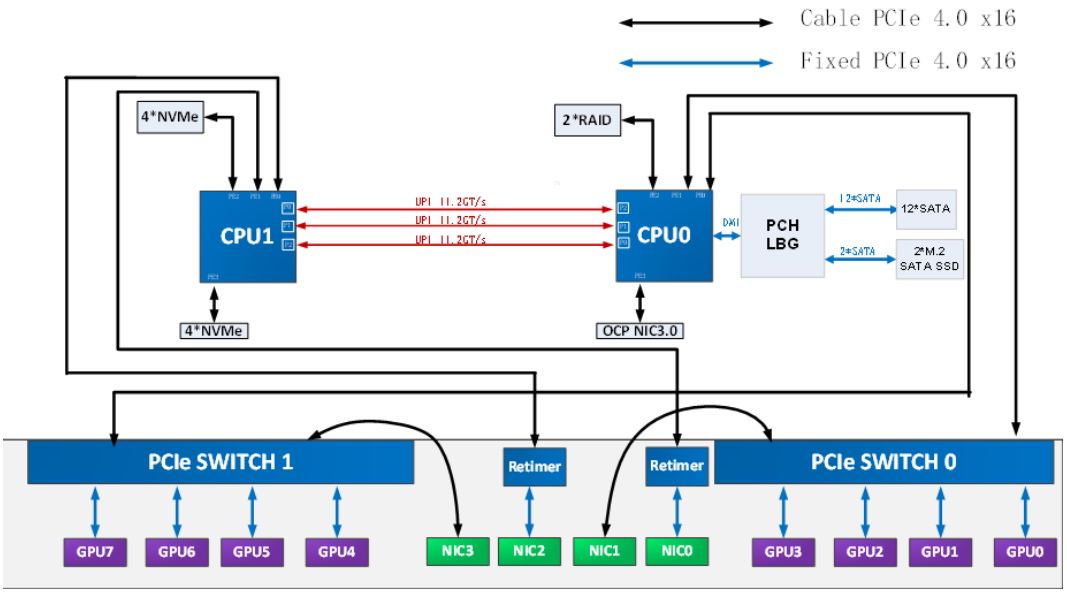


Figure 4-17 PCIe Topology Logic Block Diagram (Common GPU Topology/Multi-Host OCP NIC 3.0)

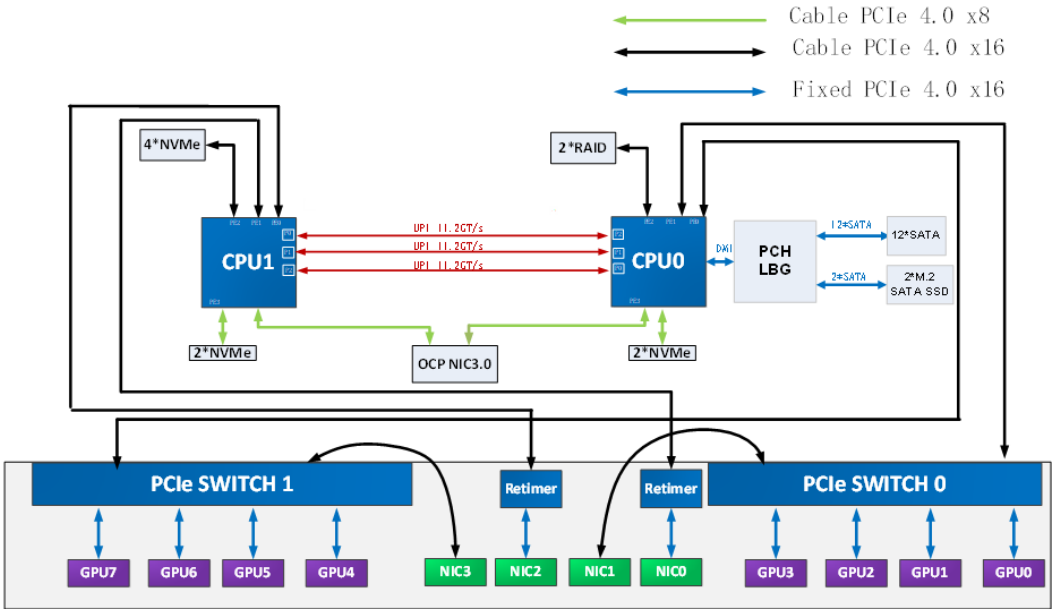


Figure 4-18 PCIe Topology Logic Block Diagram (Supporting N10X SmartNIC Topology)

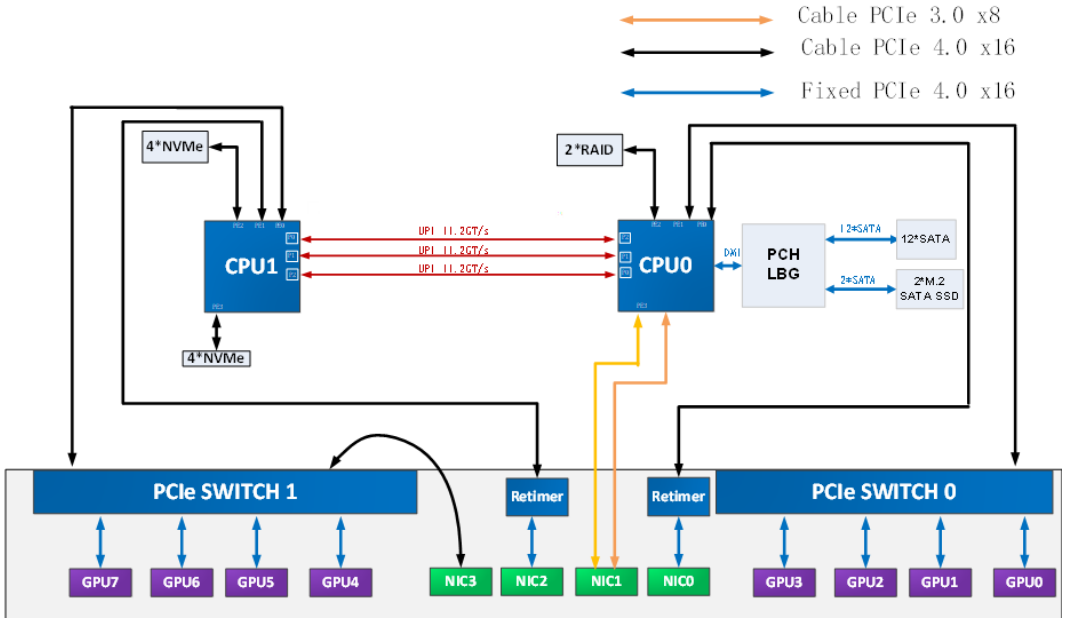
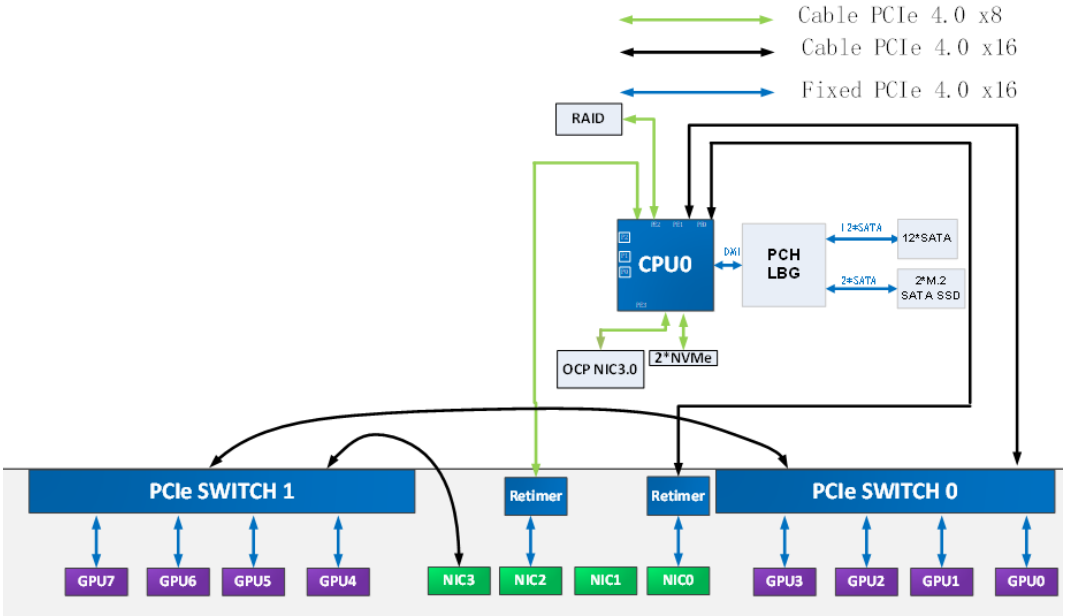


Figure 4-19 PCIe Topology Logic Block Diagram (Single-CPU Topology)



4.3 PCIe Topologies of NF5468M6 - T Configuration

NF5468M6 - T configuration supports the following Topology 1 and Topology 2.

Figure 4-20 PCIe Topology Logic Block Diagram (Topology 1)

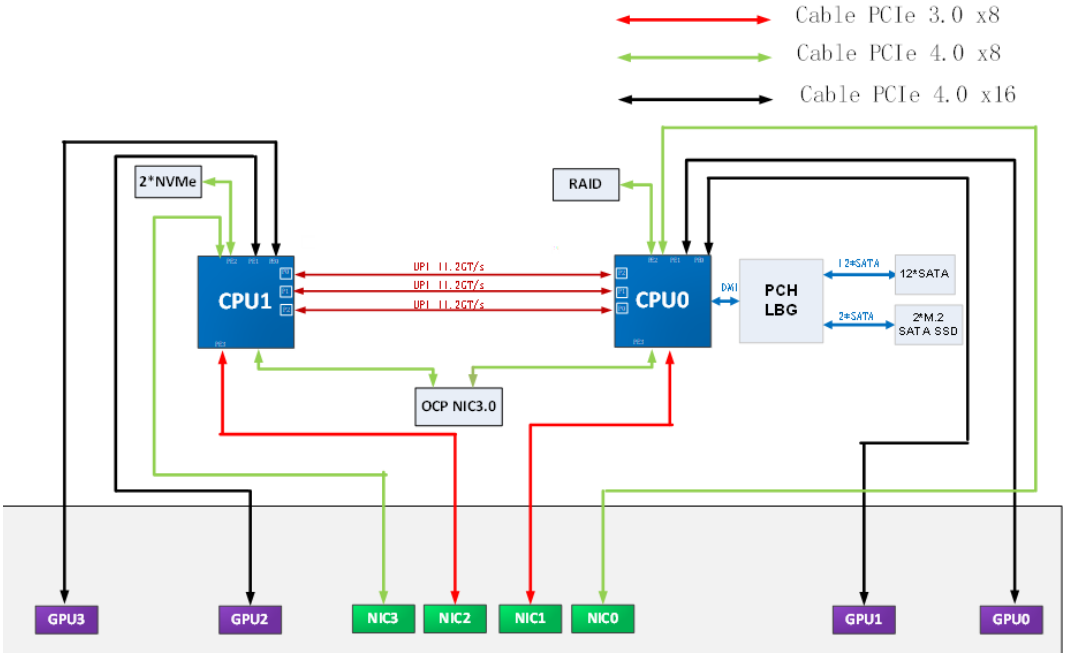
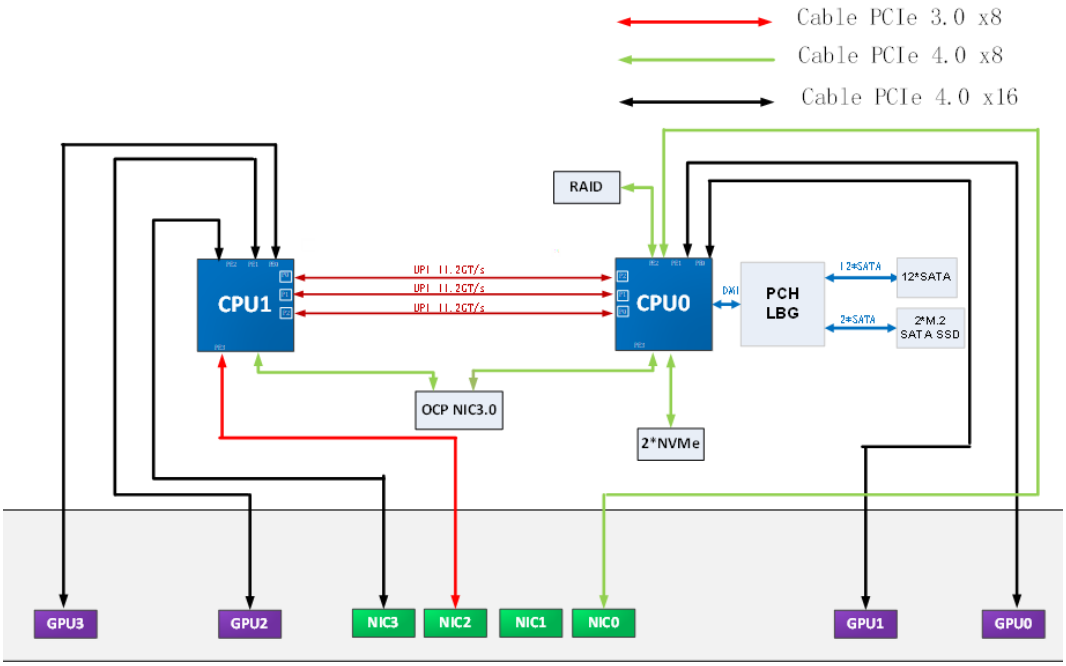


Figure 4-21 PCIe Topology Logic Block Diagram (Topology 2)



4.4 PCIe Topologies of NF5468M6 - V Configuration

NF5468M6 - V configuration supports both Multi-Host mode and Single-Host mode.

Figure 4-22 PCIe Topology Logic Block Diagram (PCIe 4.0 Switch/Single-Host)

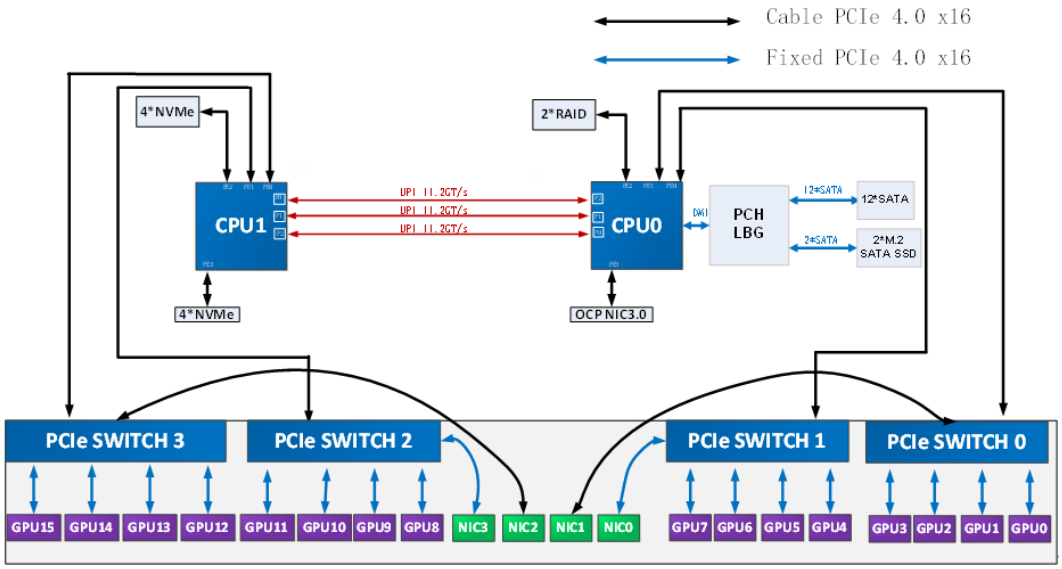
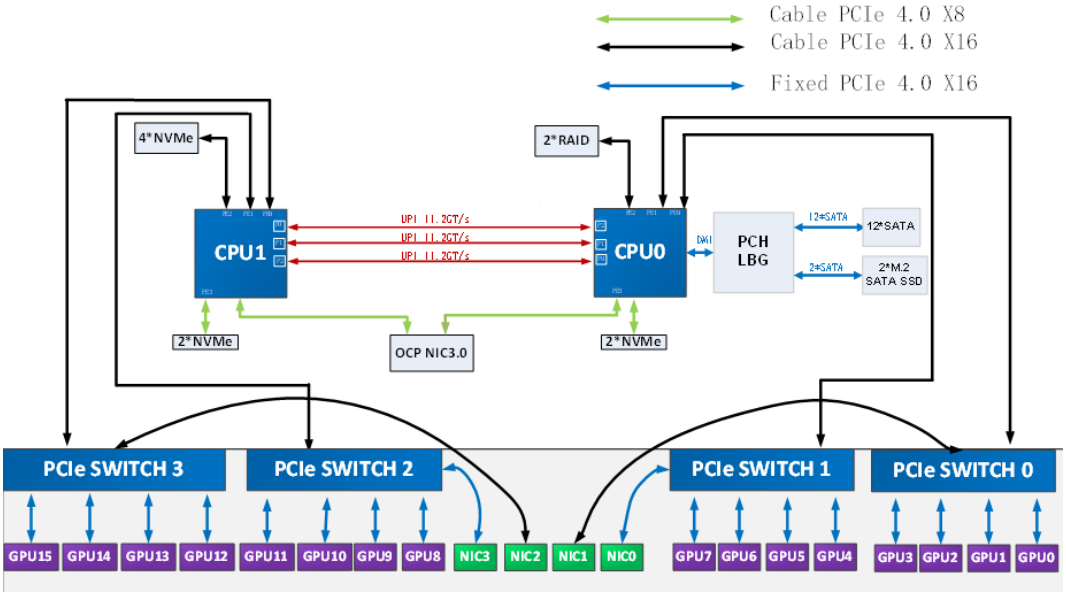


Figure 4-23 PCIe Topology Logic Block Diagram (PCIe 4.0 Switch/Multi-Host)



4.5 Topology Switching Settings for NF5468M6 - P Configuration

The actual shipping configuration of the NF5468M6 server varies with the customers' demands. Customers can select the GPU boards that support or do not support topology switching by part numbers. For example, the YZGP-02079-101 and YZGP-02397-101 GPU boards do not support topology switching, but the YZGP-02079-102 GPU board supports topology switching. You can preselect 2 types of topologies, for example Balance and Cascade, Balance and Common, or Common and Cascade, and can remotely switch between the 2 topologies by BMC commands.

4.5.1 Getting GPU Topology Features

Table 4-1 Getting GPU Topology Features

Get Protocol Support		
	Byte	Data Field
NetFn	0x3c	
Cmd	0x05	

Request Data	INT8U	0x38
Response Data	INT8U	CompleteCode 00h ok, normal, complete CCh invalid data field
	INT8U	10h Supports Balance→Cascade topology switching in Balance mode 11h Supports Cascade→Balance topology switching in Cascade mode 1fh Wiring method supports switching between Balance and Cascade, but the switch firmware is incorrect 20h Supports Balance→Common topology switching in Balance mode 21h Supports Common→Balance topology switching in Common mode 2fh Wiring method supports switching between Balance and Common, but the switch firmware is incorrect 30h Supports Cascade→Common topology switching in Cascade mode 31h Supports Common→Cascade topology switching in Common mode 3fh Wiring method supports switching between Common and Cascade, but the switch firmware is incorrect 40h Does not support topology switching from Balance to another 4fh Wiring method does not support topology switching from Balance to another, and the switch firmware is incorrect 50h Does not support topology switching from Cascade to another 5fh Wiring method does not support topology switching from Cascade to another, and the switch firmware is incorrect 60h Does not support topology switching from Common to another

		6fh Wiring method does not support topology switching from Common to another, and the switch firmware is incorrect ffh Unspecified error

Command example: ipmitool-I lanplus-H bmcip-U admin-P admin raw 0x3c 0x05 0x38

4.5.2 Setting GPU Topology Switching

Table 4-2 Setting GPU Topology Switching

Set GPU Board Topology		
	Byte	Data Field
NetFn	0x3c	
Cmd	0x04	
Request Data	byte0	0x38
	byte1	10h Supports Balance→Cascade topology switching in Balance mode 11h Supports Cascade→Balance topology switching in Cascade mode 20h Supports Balance→Common topology switching in Balance mode 21h Supports Common→Balance topology switching in Common mode 30h Supports Cascade→Common topology switching in Cascade mode 31h Supports Common→Cascade topology switching in Common mode 40h Does not support topology switching from Balance to another 50h Does not support topology switching from Cascade to another 60h Does not support topology switching from Common to another

Response Data	INT8U	CompleteCode 00h ok, normal, complete CCh invalid data field (not supported because the current wiring method does not support the request command) D5h not supported in current state (BIOS POST has not completed)

Command example: ipmitool -I lanplus -H bmcip -U admin -P admin raw 0x3C 0x04 0x38 0x10

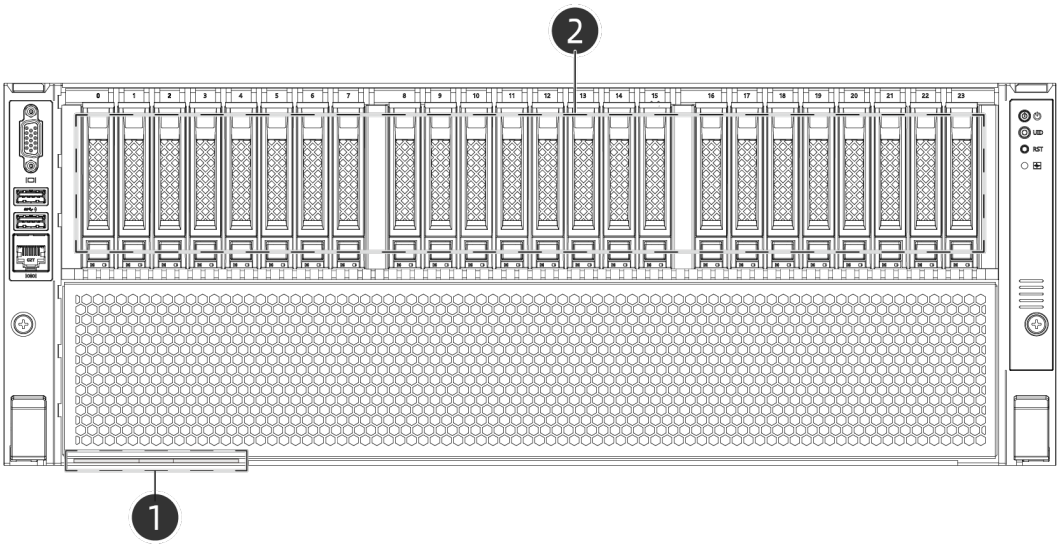
5 Hardware Description

5.1 Front Panel

5.1.1 Front View

- 24 × 2.5-inch Drive Configuration

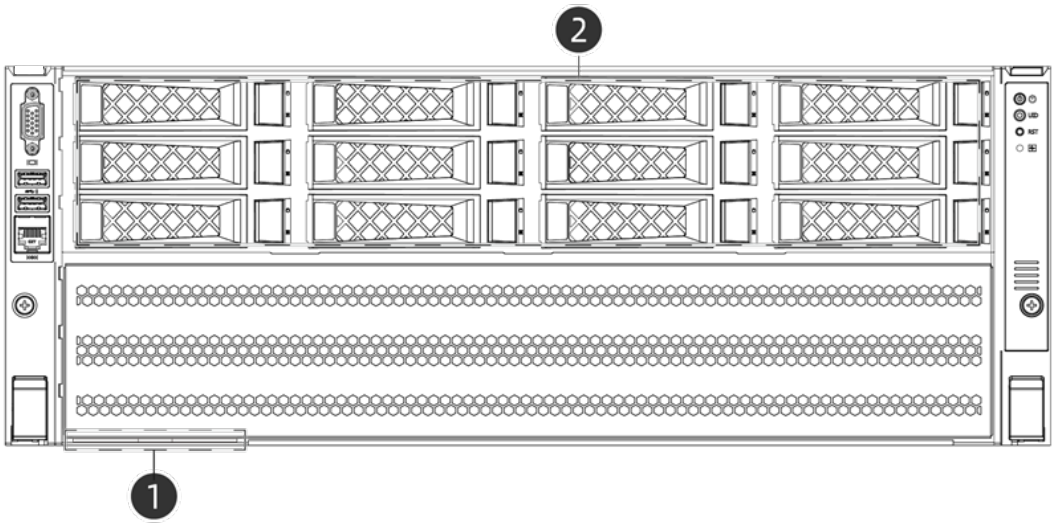
Figure 5-1 Front View



Item	Feature	Item	Feature
1	Serial Label Pull Tag (with an SN label and drive numbers)	2	Drive Bay × 24

- 12 × 3.5-inch Drive Configuration

Figure 5-2 Front View

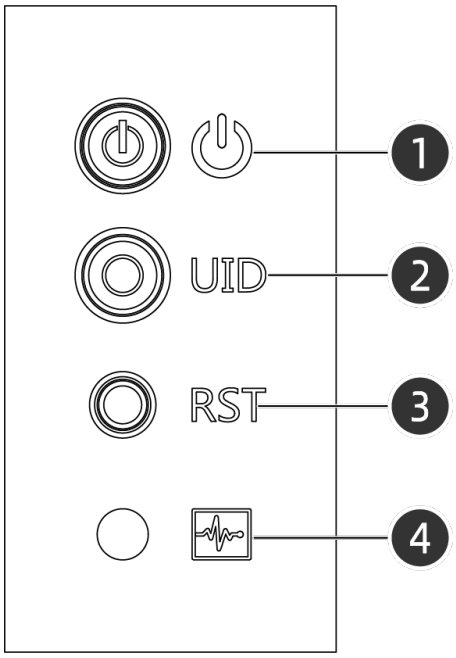


Item	Feature	Item	Feature
1	Serial Label Pull Tag (with an SN label and drive numbers)	2	Drive Bay × 12

5.1.2 Buttons and LEDs

1. Button and LED Locations

Figure 5-3 Front Panel Buttons and LEDs



Item	Feature	Item	Feature
1	Power Button and LED	2	UID/BMC RST Button and LED
3	System Reset Button	4	System Status LED

2. Button and LED Description

Table 5-1 Front Panel Button and LED Description

Icon	Button & LED	Description
⏻	Power Button and LED	Power LED: • Off = No power • Solid green = Power-on state • Solid orange = Standby state Power button: • Long press for 4 seconds to force a shutdown from the power-on state.

Icon	Button & LED	Description
		Notes: • Follow the prompt under the OS to shut it down. • Short press the power button to power on the system in standby state.
UID	UID/BMC RST Button and LED	The UID LED is used to identify the device to be operated. • Off = System unit not identified • Solid blue = System unit identified Notes: • The UID LED turns on when activated by the UID button or via ISBMC remotely. • Long press the UID button for over 6 seconds to reset the BMC.
RST	System Reset Button	Press the button to reset the system.
	System Status LED	• Off = Normal • Solid red = A system error occurs

5.1.3 Ports

1. Port Locations

- 24 × 2.5-inch Drive Configuration & 12 × 3.5-inch Drive Configuration

Figure 5-4 Front Panel Ports (24 × 2.5-inch Drive Configuration)

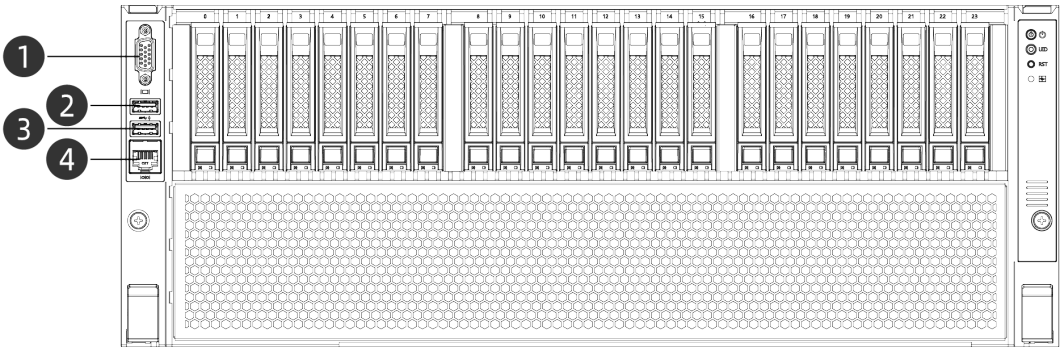


Figure 5-5 Front Panel Ports (12 × 3.5-inch Drive Configuration)

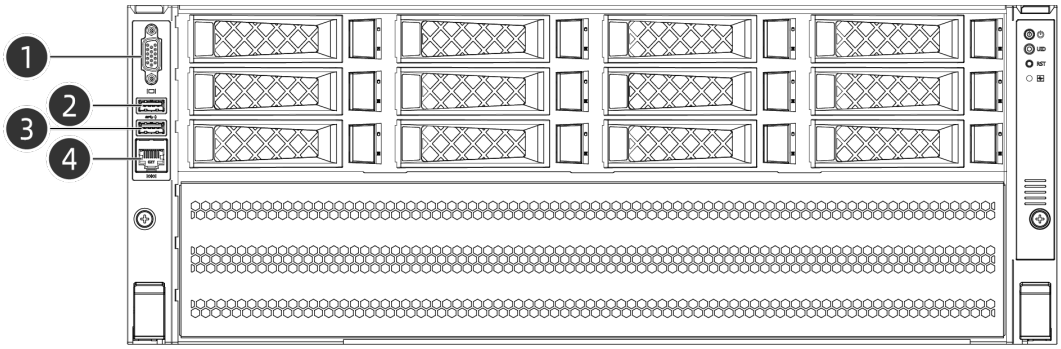


Table 5-2 Front Panel Port List

Item	Feature	Item	Feature
1	VGA Port	2	USB 3.0 Port
3	USB 3.0 Port	4	BMC Serial Port

2. Port description

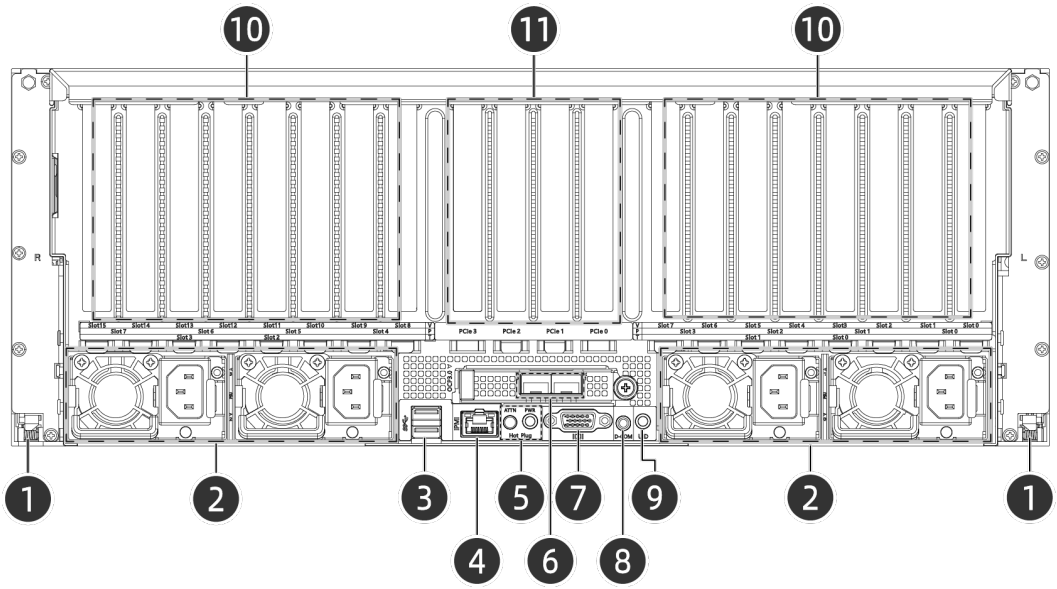
Table 5-3 Front Panel Port Description

Feature	Type	Quantity	Description
VGA Port	DB15	1	Enables you to connect a display terminal, for example, a monitor or KVM, to the system.
USB 3.0 Port	USB 3.0	2	Enables you to connect a USB 3.0 device to the system. Note: Make sure that the USB device is in good condition or it may cause the server to work abnormally.
BMC Serial Port	RJ45	1	Enables you to capture BMC logs and use the BMC debugging function.

5.2 Rear Panel

5.2.1 Rear View

Figure 5-6 Rear View

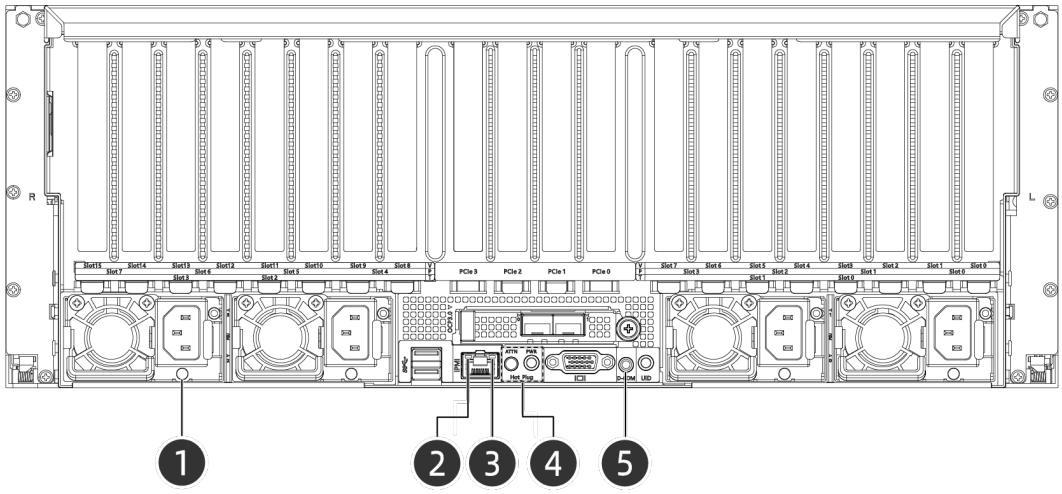


Item	Feature	Item	Feature
1	Ear Latch	7	VGA Port
2	PSU × 4	8	BMC Serial Port
3	USB 3.0 Port × 2	9	UID/BMC RST Button and LED
4	BMC Management Network Port	10	GPU Slots • 4 Slots (T Configuration) • 8 Slots (P Configuration) • 16 Slots (V Configuration)
5	OCP Hot-Plug Power Button and Attention LED	11	PCIe Slot × 4
6	OCP 3.0 Slot		

5.2.2 Buttons and LEDs

1. Button and LED Locations

Figure 5-7 Rear Panel Buttons and LEDs



Item	Feature	Item	Feature
1	PSU LED × 4	2	Management Network Port Link Speed LED
3	Management Network Port Link Activity LED	4	OCP Hot-Plug Power Button and Attention LED
5	UID/BMC RST Button and LED		

2. Button and LED Description

Table 5-4 Rear Panel Button and LED Description

Icon	Button & LED	Description
UID	UID/BMC RST Button and LED	The UID LED is used to identify the device to be operated. • Off = System unit not identified • Solid blue = System unit identified • Flashing blue = System unit being operated remotely Notes: • The UID LED turns on when activated by the UID button or via ISBMC remotely. • Long press the UID button for over 6 seconds to reset the BMC.

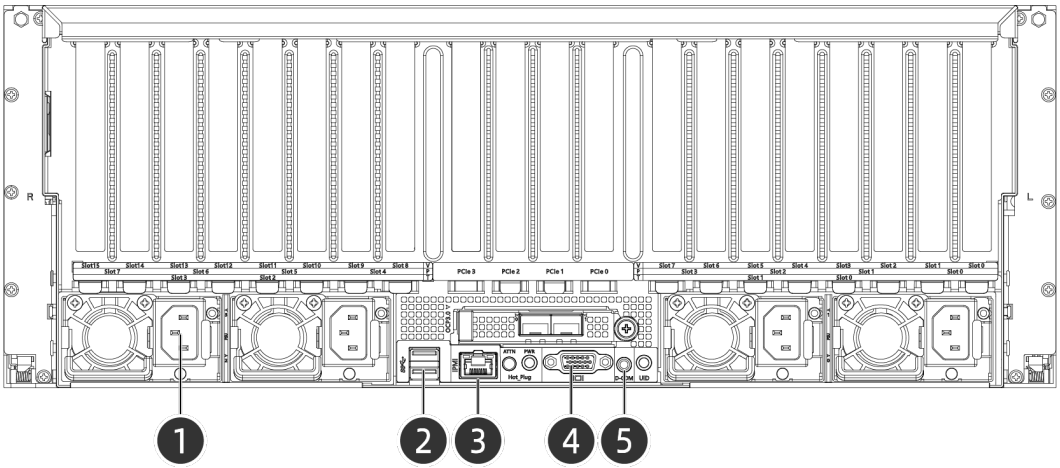
Icon	Button & LED	Description
Hot_Plug	OCP Hot-Plug Power Button and Attention LED	• The button is used to support the hot-plug function of the OCP 3.0 card. The power button has an LED with it. • Power LED: - Solid blue = OCP NIC card is powered on and cannot be removed - Flashing blue = The hot-plug program is being configured and the OCP NIC card cannot be removed - Off = OCP NIC card is powered off and can be removed and reinstalled • Attention LED: - Solid orange = OCP NIC card is abnormal - Flashing orange = OCP NIC card is being configured as per instructions - Off = Normal
N/A	Management Network Port Link Speed LED	• Off = No network connection • Solid green = Network connected with link speed at 1,000 Mbps • Solid orange = Network connected with link speed at 10/100 Mbps
N/A	Management Network Port Link Activity LED	• Off = No network connection • Solid green = Network connected without data being transmitted • Flashing green = Network connected with data being transmitted
N/A	PSU LED	• Off = No AC power to PSU • Flashing green (1 Hz) = PSU operating in standby state with normal AC input

Icon	Button & LED	Description
		• Flashing green (2 Hz) = PSU firmware updating • Flashing green (off for 1 second and on for 2 seconds) = PSU in cold redundant state • Solid green = Normal input and output • Flashing amber (1 Hz) = PSU warning event where the PSU continues to operate (possible causes: PSU overtemperature, PSU output overcurrent, excessively high or low fan speed) • Solid amber = PSU critical event causing a shutdown (possible causes: PSU overtemperature protection, PSU output overcurrent or short circuit, output overvoltage, short circuit protection, component (not all components) failure)

5.2.3 Ports

1. Port Locations

Figure 5-8 Rear Panel Port Locations



Item	Feature	Item	Feature
1	PSU Socket × 4	2	USB 3.0 Port × 2
3	BMC Management Network Port	4	VGA Port
5	BMC Serial Port		

2. Port Description

Table 5-5 Rear Panel Port Description

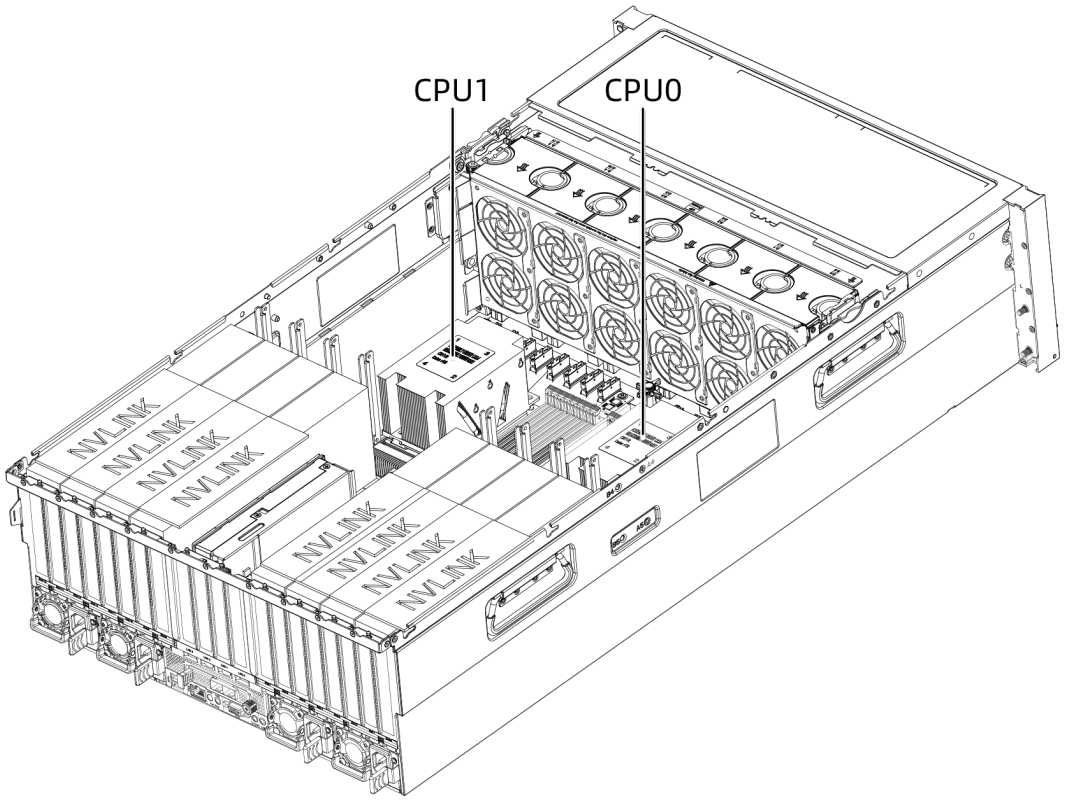
Feature	Type	Quantity	Description
BMC Serial Port	Audio jack	1	Enables you to capture BMC logs and use the BMC debugging function. Note: The serial port a 3.5 mm audio jack with a default baud rate of 115,200 bit/s.
USB Port	USB 3.0	2	Enables you to connect a USB 3.0 device to the system. Notes: • The maximum current supported by the USB port is 0.9 A. • Make sure that the USB device is in good condition or it may cause the server to work abnormally.
Management Network Port	RJ45	1	ISBMC management network port, used to manage the server. Note: It is a Gigabit Ethernet port that supports 100 Mbps and 1,000 Mbps auto-negotiation.
VGA Port	DB15	1	Enables you to connect a display terminal, for example, a monitor or KVM, to the system.
PSU Socket	N/A	4	Connected through a power cord. Users can select the PSUs as needed. Note: Make sure that the total rated power of the PSUs is greater than that of the server.

5.3 Processors

- Supports up to two 3rd Gen Intel Xeon Scalable processors (code-named “Ice Lake”).

- The processors used in a server must be of the same model.
- TDP up to 270W.
- For specific system processor options, consult your local sales representative or refer to 7.2.1 CPU Specifications.

Figure 5-9 Processor Locations



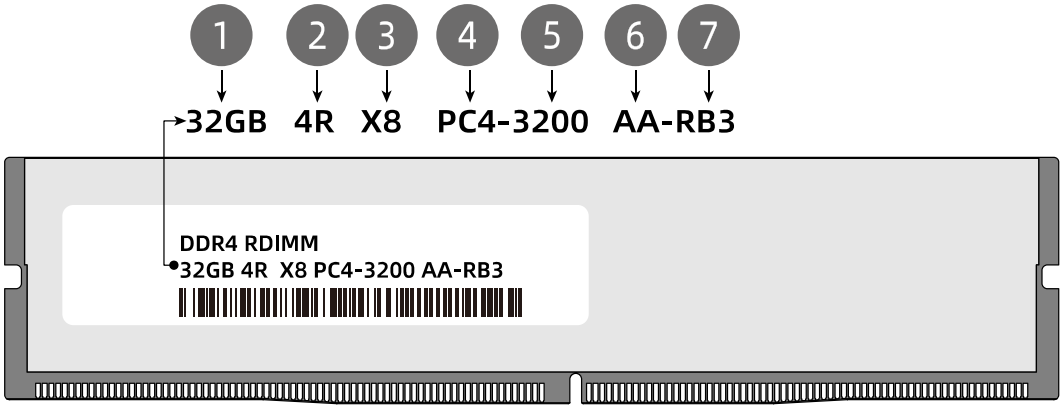
5.4 Memory

5.4.1 DDR4 DIMMs

1. Identification

To determine DIMM characteristics, refer to the label attached to the DIMM and the following figure and table.

Figure 5-10 DIMM Identification



Item	Description	Example
1	Capacity	• 32 GB • 64 GB • 128 GB
2	Rank(s)	• 1R = Single rank • 2R = Dual rank • 2S2R = Two ranks of two high stacked 3DS DRAM • 4DR = Four ranks of dual die packaged DRAM • 4R = Quad rank
3	Data width of DRAM	• x4 = 4 bits • x8 = 8 bits
4	DIMM slot type	PC4 = DDR4
5	Maximum memory speed	3,200 MT/s
6	CAS latency	SDP-chip-based • V = CAS-19-19-19 • Y = CAS-21-21-21 • AA = CAS-22-22-22 3DS-chip-based

Item	Description	Example
		• V = CAS-22-19-19 • Y = CAS-24-21-21 • AA = CAS-26-22-22
7	DIMM type	• R = RDIMM • L = LRDIMM

2. Memory Subsystem Architecture

The server provides 32 DIMM slots. Each processor supports 8 memory channels and each channel supports 2 DIMM slots.

Within a channel, populate the DIMM slot with its silk screen ending with D0 first and second the DIMM slot with its silk screen ending with D1. For instance, within CPU0 Channel 0, populate CPU0_C0D0 first and second CPU0_C0D1.

Table 5-6 DIMM Slot List

CPU	Channel ID	Silk Screen
CPU0	Channel 0	CPU0_C0D0
		CPU0_C0D1
	Channel 1	CPU0_C1D0
		CPU0_C1D1
	Channel 2	CPU0_C2D0
		CPU0_C2D1
	Channel 3	CPU0_C3D0
		CPU0_C3D1
	Channel 4	CPU0_C4D0
		CPU0_C4D1
	Channel 5	CPU0_C5D0
		CPU0_C5D1
	Channel 6	CPU0_C6D0
		CPU0_C6D1
	Channel 7	CPU0_C7D0
		CPU0_C7D1
CPU1	Channel 0	CPU1_C0D0
		CPU1_C0D1
	Channel 1	CPU1_C1D0
		CPU1_C1D1

CPU	Channel ID	Silk Screen
	Channel 2	CPU1_C2D0
		CPU1_C2D1
	Channel 3	CPU1_C3D0
		CPU1_C3D1
	Channel 4	CPU1_C4D0
		CPU1_C4D1
	Channel 5	CPU1_C5D0
		CPU1_C5D1
	Channel 6	CPU1_C6D0
		CPU1_C6D1
	Channel 7	CPU1_C7D0
		CPU1_C7D1

3. Compatibility

Refer to the following rules to configure the DDR4 DIMMs.

IMPORTANT

- Mixing DDR4 DIMM types (RDIMM, LRDIMM) or mixing DDR4 DIMM specifications (capacity, bit width, rank, height, etc.) on the same server is not supported.
- Installing 2 processors can maximize the total memory capacity.
- The memory capacity is 1.5 times that of the GPU memory by default.
- It is not recommended to install 5, 7, 9, 10, or 11 memory modules with only 1 CPU configured, or install 10, 14, 18, 20, or 22 memory modules with 2 CPUs configured.
- A technical evaluation is required if NVDIMMs must be used.
- For specific system memory options, consult your local sales representative or refer to 7.2.2 DIMM Specifications.

Table 5-7 DDR4 DIMM Specifications

Item	Value		
Capacity per DDR4 DIMM (GB)	32	64	128
Type	RDIMM/LRDIMM	RDIMM/LRDIMM	RDIMM/LRDIMM
Rated speed (MT/s)	3,200	3,200	3,200
Operating voltage (V)	1.2	1.2	1.2

Item		Value		
Maximum number of DDR4 DIMMs supported in a server[a]		32	32	32
Maximum capacity of DDR4 DIMMs supported in a server (GB)[b]		1,024	2,048	4,096
Actual speed (MT/s)	1DPC[c]	3,200	3,200	2,933
	2DPC	3,200	3,200	2,666
a: The maximum number of DDR4 DIMMs supported is based on the 2-processor configuration. The number is halved for the 1-processor configuration. b: It indicates the maximum DDR4 memory capacity supported when all DIMM slots are populated. The maximum DDR4 capacity varies with the CPU type. c: DIMM Per Channel (DPC) is the number of DIMMs per memory channel. The above information is for reference only, consult your local sales representative for details.				

4. Population Rules

General population rules for DDR4 DIMMs:

- Install DIMMs only when the corresponding processor has been installed.
- Mixing LRDIMMs and RDIMMs is not supported.
- Install dummies in the empty DIMM slots.

5. DIMM Slot Layout

Up to 32 DDR4 DIMMs can be installed in a server. Balance the total memory capacity between the installed processors for optimal memory performance. DIMM configuration must be compliant with the DIMM population rules.

IMPORTANT

CPU0 must have at least 1 DDR4 DIMM installed.

Figure 5-11 DIMM Slot Layout

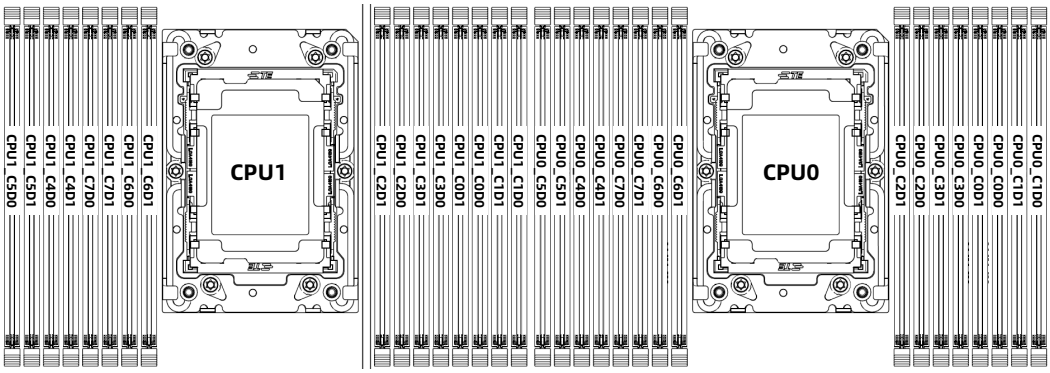


Table 5-8 DDR4 Population Rules

DDR4 Qty.			1	2	4	8	12	16	24	32
CPU0	C0	D0	v	v	v	v	v	v	v	v
		D1							v	v
	C1	D0					v	v	v	v
		D1							v	v
	C2	D0				v	v	v	v	v
		D1							v	v
	C3	D0						v		v
		D1								v
	C4	D0			v	v	v	v	v	v
		D1							v	v
	C5	D0					v	v	v	v
		D1							v	v
	C6	D0				v	v	v	v	v
		D1							v	v
	C7	D0						v		v
		D1								v
CPU1	C0	D0		v	v	v	v	v	v	v
		D1							v	v
	C1	D0					v	v	v	v
		D1							v	v
	C2	D0				v	v	v	v	v
		D1							v	v
	C3	D0						v		v
		D1								v

DDR4 Qty.			1	2	4	8	12	16	24	32
	C4	D0			v	v	v	v	v	v
		D1							v	v
	C5	D0					v	v	v	v
		D1							v	v
	C6	D0				v	v	v	v	v
		D1							v	v
	C7	D0						v		v
		D1								v

Table 5-9 DDR4 and BPS Population Rules

DDR4 + BPS Qty. per CPU				4+4	6+1	8+1	8+4	8+8	12+2
CPU0	iMC0	C0	D0	D	D	D	D	D	D
			D1			B	B	B	D
		C1	D0	B	D	D	D	D	B
			D1					B	
	iMC1	C2	D0	D	D	D	D	D	D
			D1				B	B	D
		C3	D0	B	B	D	D	D	D
			D1					B	D
	iMC2	C4	D0	D	D	D	D	D	D
			D1				B	B	D
		C5	D0	B	D	D	D	D	B
			D1					B	
	iMC3	C6	D0	D	D	D	D	D	D
			D1				B	B	D
		C7	D0	B		D	D	D	D
			D1					B	D
CPU1	iMC0	C0	D0	D	D	D	D	D	D
			D1			B	B	B	D
		C1	D0	B	D	D	D	D	B
			D1					B	
	iMC1	C2	D0	D	D	D	D	D	D
			D1				B	B	D
		C3	D0	B	B	D	D	D	D
			D1					B	D
	iMC2	C4	D0	D	D	D	D	D	D

DDR4 + BPS Qty. per CPU				4+4	6+1	8+1	8+4	8+8	12+2
			D1				B	B	D
		C5	D0	B	D	D	D	D	B
			D1					B	
	iMC3	C6	D0	D	D	D	D	D	D
			D1				B	B	D
		C7	D0	B		D	D	D	D
			D1					B	D

5.5 Storage

5.5.1 Drive Configurations

IMPORTANT

In addition to the front drives, the server also supports up to 2 internal M.2 SSDs with a maximum capacity of 960 GB per M.2 SSD.

Table 5-10 Drive Configurations

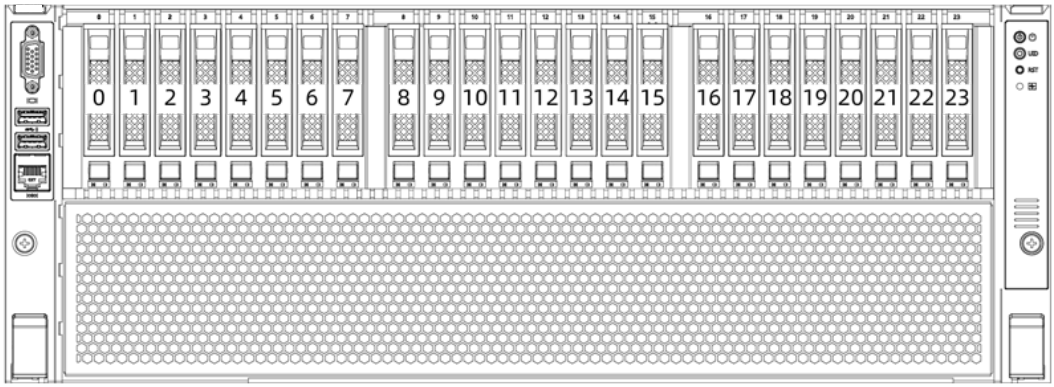
Drive Type	Drive Qty.	Configuration		Slot		Drive Management Mode
		NVMe	SAS/ SATA	NVMe	SAS/ SATA	
2.5-inch Drive	4	4	/	0 - 3	/	Directly connected to CPU1
	8	/	8	/	0 - 7	1 × 8i standard RAID controller card
	12	4	8	0 - 3	8 - 15	SAS/SATA drives: 1 × 8i standard RAID controller card NVMe drives: directly connected to CPU1
	16	/	16	/	0 - 15	2 × 8i/1 × 16i standard RAID controller card
	18	2	16	0 - 1	8 - 23	SAS/SATA drives: 1 × 16i/2 × 8i standard RAID controller card NVMe drives: directly connected to CPU1

	20	4	16	0 - 3	8 - 23	SAS/SATA drives: 1 × 16i standard RAID controller card NVMe drives: directly connected to CPU1
	24	/	24	/	0 - 23	1 × 8i + 1 × 16i standard RAID controller card (it is recommended to use cards of the same series from the same manufacturer.)
3.5-inch Drive	4	4	/	0 - 3	/	Directly connected to CPU1
	8	/	8	/	0 - 7	1 × 8i standard RAID controller card
	12	/	12	/	0 - 11	2 × 8i/1 × 16i standard RAID controller card
	12	4	8	0 - 3	4 - 11	SAS/SATA drives: 1 × 8i standard RAID controller card NVMe drives: directly connected to CPU1

5.5.2 Drive Numbering

- 24 × 2.5-inch Drive Pass-Through Configuration (24 × SAS/SATA Drive)

Figure 5-12 Drive Numbering



Physical Drive No.	Drive No. Identified by the ISBMC	Drive No. Identified by the 8i + 16i Standard RAID Controller Card
0	0	0
1	1	1
2	2	2

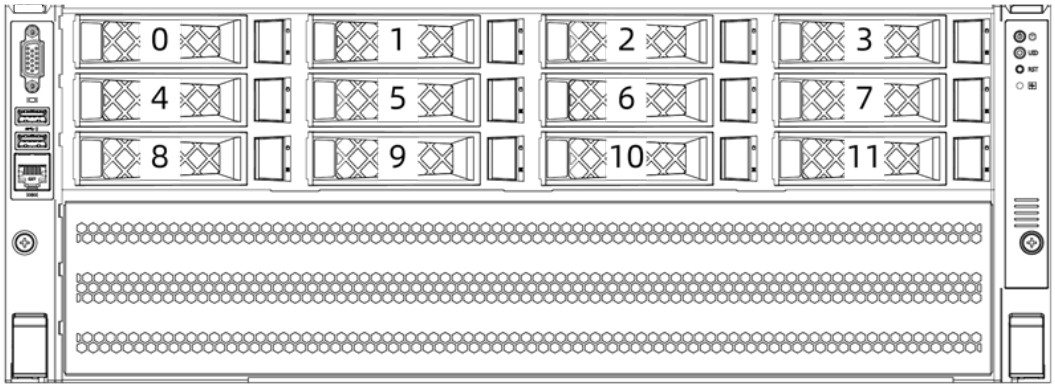
Physical Drive No.	Drive No. Identified by the ISBMC	Drive No. Identified by the 8i + 16i Standard RAID Controller Card
3	3	3
4	4	4
5	5	5
6	6	6
7	7	7
8	8	0
9	9	1
10	10	2
11	11	3
12	12	4
13	13	5
14	14	6
15	15	7
16	16	8
17	17	9
18	18	10
19	19	11
20	20	12
21	21	13
22	22	14
23	23	15

 CAUTION

For the 2.5-inch drive configurations, mixing NVMe SSDs with SAS/SATA drives is allowed when the total number of drives is 8 or less. When the number is greater than 8, mixing NVMe SSDs with SAS/SATA drives on the same backplane is not allowed.

- 12 × 3.5-inch Drive Pass-Through Configuration (12 × SAS/SATA Drive)

Figure 5-13 Drive Numbering



Physical Drive No.	Drive No. Identified by the ISBMC	Drive No. Identified by the 8i Standard RAID Controller Card
0	0	0
1	1	1
2	2	2
3	3	3
4	4	4
5	5	5
6	6	6
7	7	7
8	8	0
9	9	1
10	10	2
11	11	3

CAUTION

For the 3.5-inch drive configurations, do not install the NVMe SSDs and SAS/SATA drives in the same row.

5.5.3 Drive LEDs

1. SAS/SATA Drive LEDs

Figure 5-14 SAS/SATA Drive LEDs

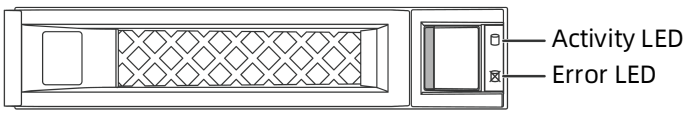
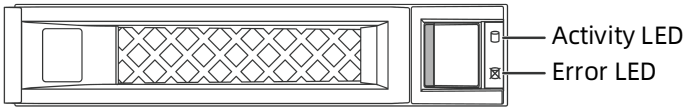


Table 5-11 SAS/SATA Drive LEDs

Activity LED (Green)	Error LED (Blue/Red)			Description
	Blue	Red		
Off	Off	RAID	No RAID	Drive absent
		Solid on	Off	
Solid on	Off	Off		Drive present but not in use
Flashing	Off	Off		Drive present and in use
Flashing	Solid pink			Copyback/Rebuild in progress
Solid on	Solid on	Off		Drive selected but not in use
Flashing	Solid on	Off		Drive selected and in use
Any status	Off	Solid on		Drive failed

2. NVMe Drive LEDs

Figure 5-15 NVMe Drive LEDs



When the VMD function is enabled with the latest VMD driver installed, the NVMe drives support surprise hot swap.

Table 5-12 NVMe Drive LEDs (VMD Enabled)

Activity LED (Green)	Error LED (Blue/Red)		Description
	Blue	Red	
Off	Off	Off	Drive absent
Solid on	Off	Off	Drive present but not in use
Flashing	Off	Off	Drive present and in use
Flashing	Solid pink		Copyback/Rebuild/Initializing/ Verifying in progress
Solid on	Solid on	Off	Drive selected but not in use

Activity LED (Green)	Error LED (Blue/Red)		Description
	Blue	Red	
Flashing	Solid on	Off	Drive selected and in use
Any status	Off	Solid on	Drive failed

5.5.4 RAID Controller Cards

The RAID controller card provides functions such as RAID configuration, RAID level migration, and drive roaming. For specific RAID controller card options, consult your local sales representative or refer to 7.2.4 SAS/RAID Controller Card Specifications.

5.6 Network

OCP 3.0 cards provide network expansion capabilities.

- The OCP 3.0 slot supports the OCP 3.0 card. Users can select the OCP 3.0 card as needed.
- For specific network options, consult your local sales representative or refer to 7.2.5 NIC Specifications.
- For details about the OCP 3.0 card, please refer to the OCP 3.0 card documentation.

5.7 I/O Expansion

5.7.1 PCIe Cards

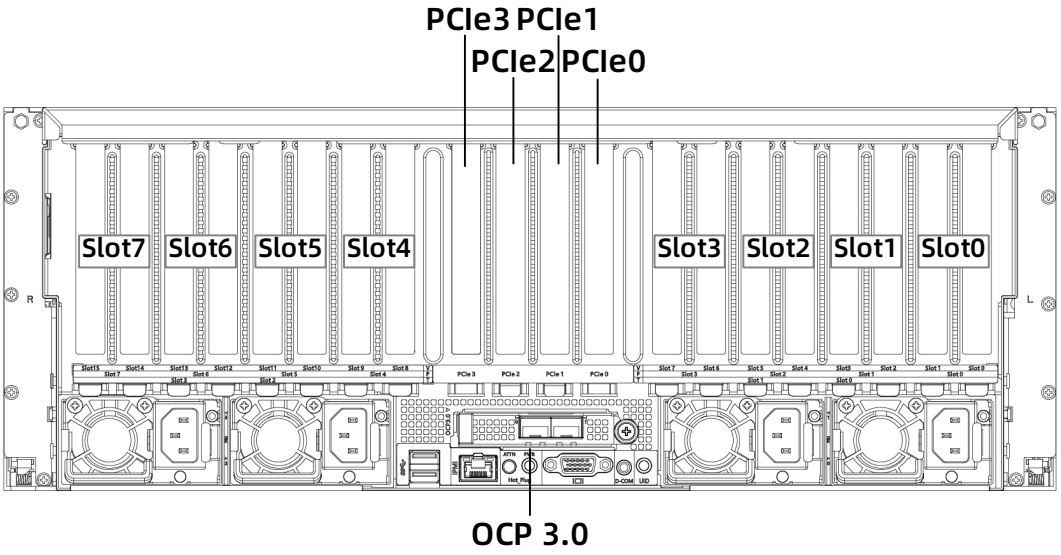
PCIe cards provide system expansion capabilities.

- Supports up to 4 PCIe 4.0 x16 expansion slots, 2 PCIe 4.0 x8 expansion slots, and 1 dedicated slot for the OCP 3.0 card.
- For specific PCIe card options, consult your local sales representative or refer to 7.2 Hardware Compatibility.

5.7.2 PCIe Slots

1. NF5468M6 - P Configuration PCIe Slot Locations

Figure 5-16 PCIe Slots - Standard Configuration



- Slot 0, Slot 1, Slot 2, Slot 3, Slot 4, Slot 5, Slot 6 and Slot 7 are GPU slots.
- PCIe0, PCIe1, PCIe2 and PCIe3 are standard PCIe card slots.

Table 5-13 PCIe Slot Description

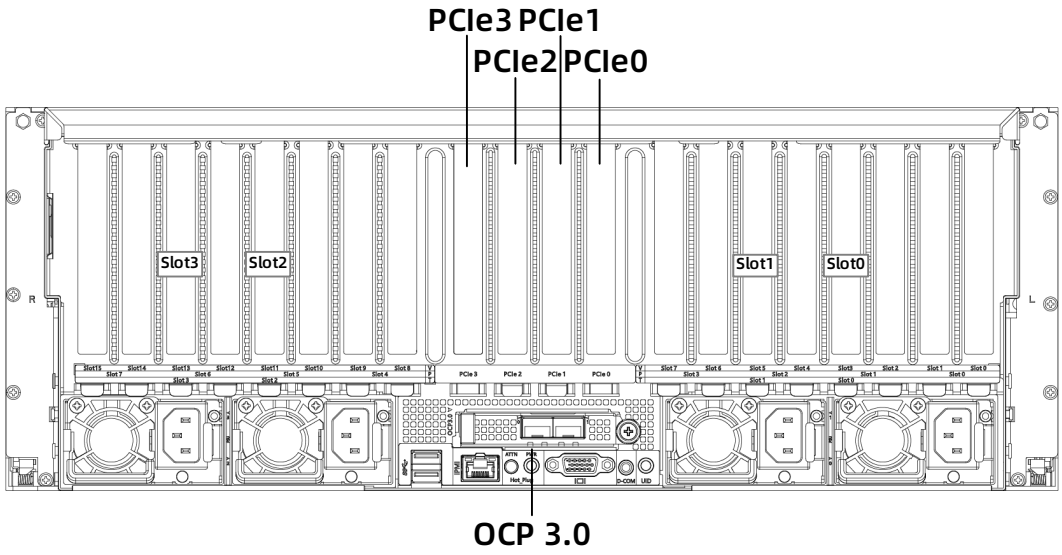
PCIe Slot	Owner	PCIe Standard	Connector Width	Bus Width	Form Factor
Slot 0	CPU0	PCIe 4.0	x16	x16	FHFL
Slot 1	CPU0	PCIe 4.0	x16	x16	FHFL
Slot 2	CPU0	PCIe 4.0	x16	x16	FHFL
Slot 3	CPU0	PCIe 4.0	x16	x16	FHFL
Slot 4	CPU0/1	PCIe 4.0	x16	x16	FHFL
Slot 5	CPU0/1	PCIe 4.0	x16	x16	FHFL
Slot 6	CPU0/1	PCIe 4.0	x16	x16	FHFL
Slot 7	CPU0/1	PCIe 4.0	x16	x16	FHFL
PCIe0	CPU0/1	PCIe 4.0	x16	x16	FHHL
PCIe1	CPU0	PCIe 4.0	x16	x16	FHHL
PCIe2	CPU0/1	PCIe 4.0	x16	x8	FHHL
PCIe3	CPU0/1	PCIe 4.0	x16	x16	FHHL
OCP 3.0 Slot	CPU0	PCIe 4.0	x16	x16/x8+x8	Standard OCP 3.0 specs

NOTE

For different PCIe topologies of NF5468M6 - P configuration, the owner CPUs and actual widths of slot 4 to slot 7 and PCIe0 to PCIe3 differ. Please refer to 4.2 PCIe Topology of NF5468M6 - P Configuration for details.

2. NF5468M6 - T Configuration PCIe Slot Locations

Figure 5-17 PCIe Slots - Standard Configuration



- Slot 0, Slot 1, Slot 2 and Slot 3 are GPU slots.
- PCIe0, PCIe1, PCIe2 and PCIe3 are standard PCIe card slots.

Table 5-14 PCIe Slot Description

PCIe Slot	Owner	PCIe Standard	Connector Width	Bus Width	Form Factor
Slot 0	CPU0	PCIe 4.0	x16	x16	FHFL
Slot 1	CPU0	PCIe 4.0	x16	x16	FHFL
Slot 2	CPU1	PCIe 4.0	x16	x16	FHFL
Slot 3	CPU1	PCIe 4.0	x16	x16	FHFL
PCIe0	CPU0	PCIe 4.0	x16	x8	FHHL
PCIe1	CPU0	PCIe 3.0	x16	x8	FHHL
PCIe2	CPU1	PCIe 3.0	x16	x8	FHHL
PCIe3	CPU1	PCIe 4.0	x16	x8/x16	FHHL

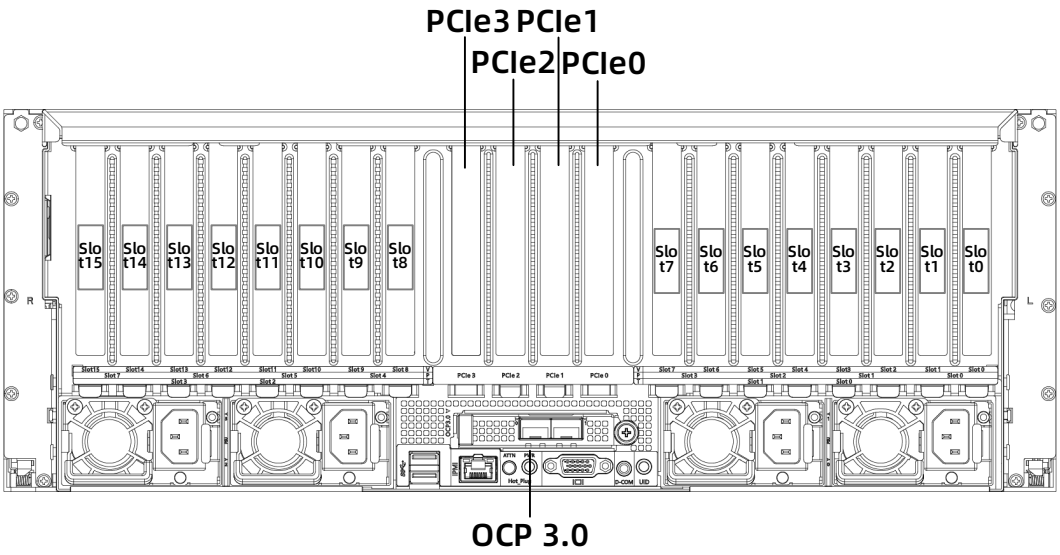
PCIe Slot	Owner	PCIe Standard	Connector Width	Bus Width	Form Factor
OCP 3.0 Slot	CPU0/1	PCIe 4.0	x16	x8+x8	Standard OCP 3.0 specs

NOTE

For different PCIe topologies of NF5468M6 – T configuration, the owner CPUs and actual widths of PCIe0 to PCIe5 differ. Please refer to 4.3 PCIe Topology of NF5468M6 - T Configuration or details.

3. NF5468M6 – V Configuration PCIe Slot Locations

Figure 5-18 PCIe Slots – Standard Configuration



- Slot 0, Slot 1, Slot 2, Slot 3, Slot 4, Slot 5, Slot 6, Slot 7, Slot 8, Slot 9, Slot 10, Slot 11, Slot 12, Slot 13, Slot 14 and Slot 15 are GPU slots.
- PCIe0, PCIe1, PCIe2 and PCIe3 are standard PCIe card slots.

Table 5-15 PCIe Slot Description

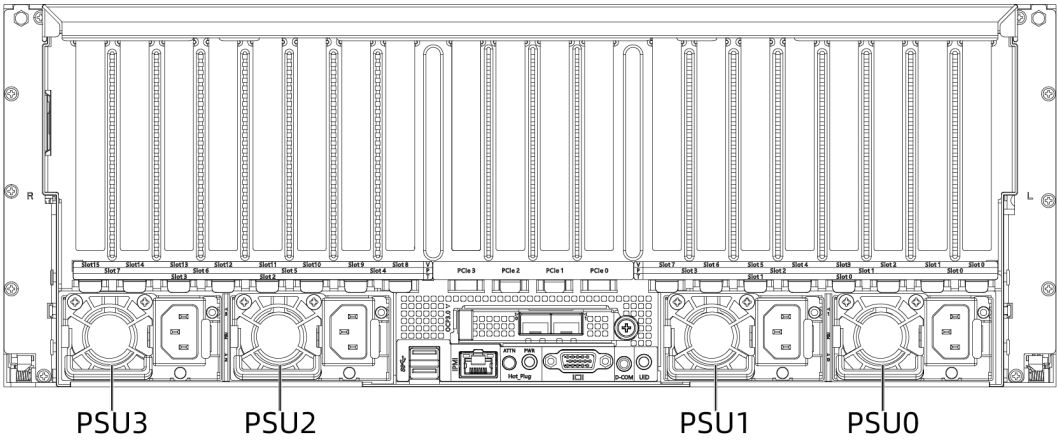
PCIe Slot	Owner	PCIe Standard	Connector Width	Bus Width	Form Factor
Slot 0	CPU0	PCIe 4.0	x16	x16	FHFL
Slot 1	CPU0	PCIe 4.0	x16	x16	FHFL

PCIe Slot	Owner	PCIe Standard	Connector Width	Bus Width	Form Factor
Slot 2	CPU0	PCIe 4.0	x16	x16	FHFL
Slot 3	CPU0	PCIe 4.0	x16	x16	FHFL
Slot 4	CPU0	PCIe 4.0	x16	x16	FHFL
Slot 5	CPU0	PCIe 4.0	x16	x16	FHFL
Slot 6	CPU0	PCIe 4.0	x16	x16	FHFL
Slot 7	CPU0	PCIe 4.0	x16	x16	FHFL
Slot 8	CPU1	PCIe 4.0	x16	x16	FHFL
Slot 9	CPU1	PCIe 4.0	x16	x16	FHFL
Slot 10	CPU1	PCIe 4.0	x16	x16	FHFL
Slot 11	CPU1	PCIe 4.0	x16	x16	FHFL
Slot 12	CPU1	PCIe 4.0	x16	x16	FHFL
Slot 13	CPU1	PCIe 4.0	x16	x16	FHFL
Slot 14	CPU1	PCIe 4.0	x16	x16	FHFL
Slot 15	CPU1	PCIe 4.0	x16	x16	FHFL
PCIe0	CPU0	PCIe 4.0	x16	x16	FHHL
PCIe1	CPU0	PCIe 4.0	x16	x16	FHHL
PCIe2	CPU0	PCIe 4.0	x16	x16	FHHL
PCIe3	CPU0	PCIe 4.0	x16	x16	FHHL
OCP 3.0 Slot	CPU0	PCIe 3.0	x16	x16/x8+x8	Standard OCP 3.0

5.8 PSUs

- The server supports up to 4 PSUs.
- The server supports AC power input.
- The PSUs are hot-swappable.
- The server supports 4 PSUs in 2+2 redundancy.
- The server must use PSUs with the same part number (P/N code).

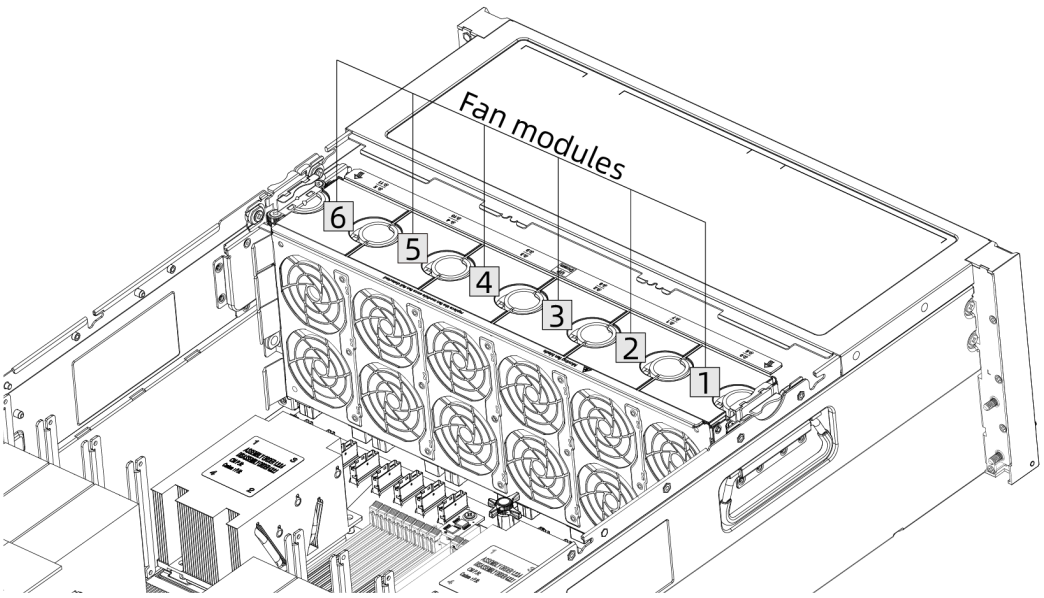
Figure 5-19 PSU Locations



5.9 Fans

- The server supports 6 pairs of 12 fan modules (6056).
- The fans are hot-swappable.
- The server supports fans in N+1 redundancy, which means that the server can continue working properly when a single fan fails.
- The server supports intelligent fan speed control.
- The server must use fans with the same part number (P/N code).

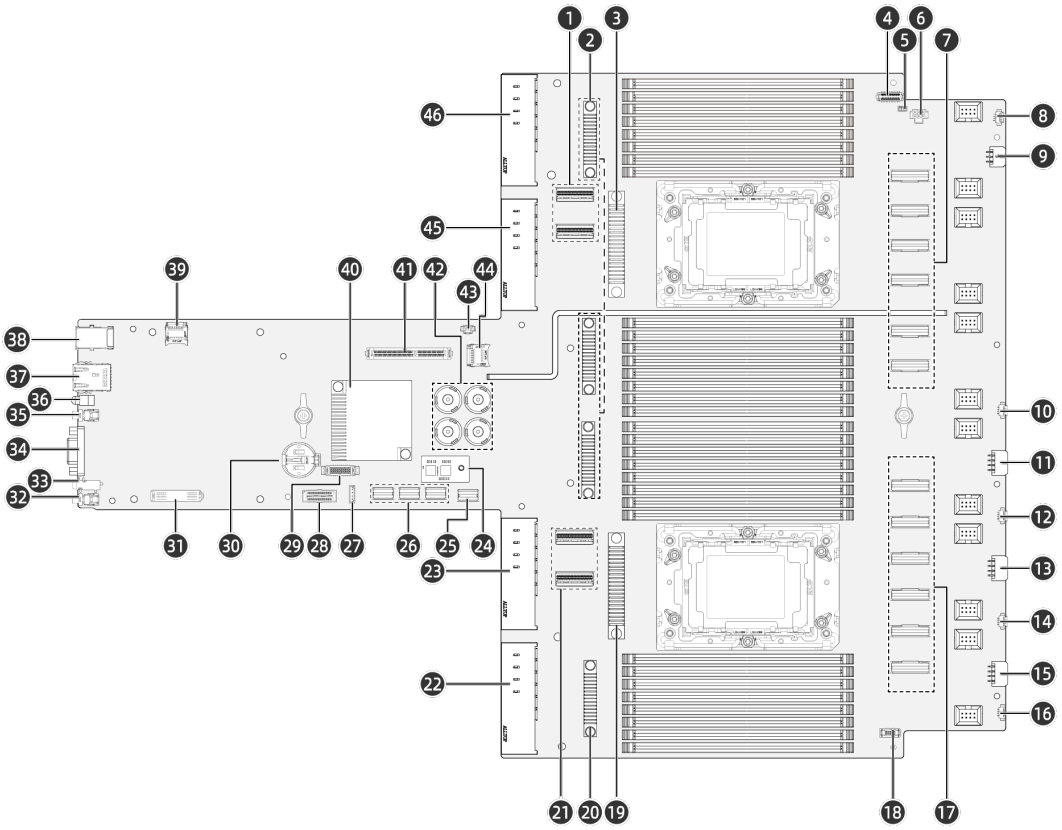
Figure 5-20 Fan Module Locations



5.10 Boards

5.10.1 Motherboard

Figure 5-21 Motherboard Layout

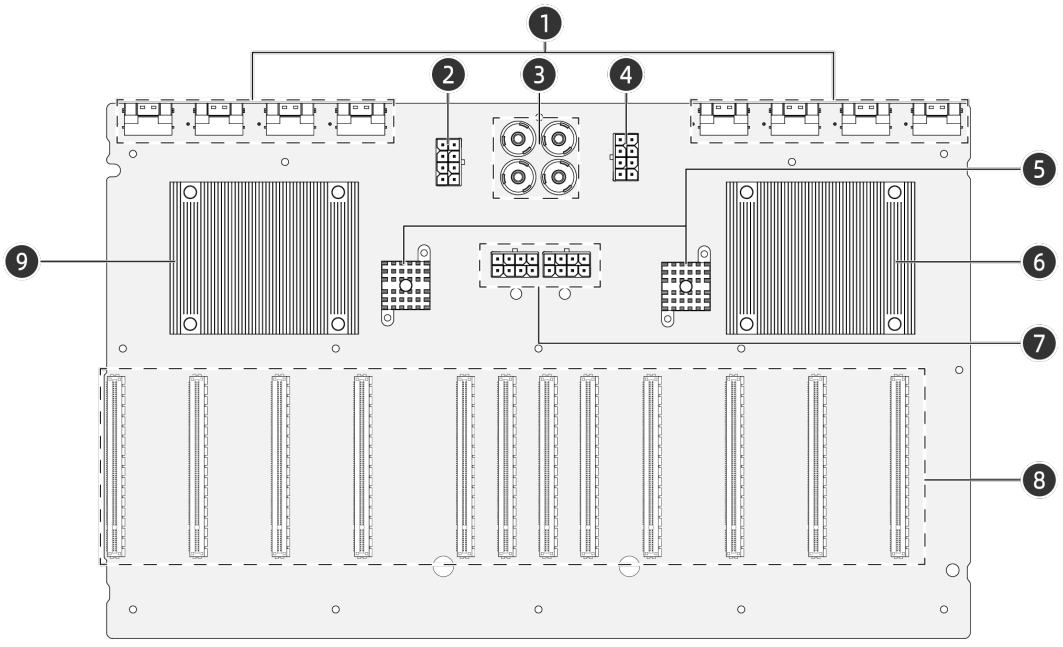


Item	Feature	Item	Feature	Item	Feature
1	Slimline x8 Connectors (CPU1)	17	Slimline x8 Connectors (CPU0)	33	BMC Serial Port
2	Memory VR Heatsink	18	VPP Connector	34	VGA Port
3	CPU1 VR Heatsink	19	CPU0 VR Heatsink	35	OCP Hot-Plug Power Button
4	Right Control Panel Connector	20	Memory VR Heatsink	36	OCP Hot-Plug Attention LED
5	Intrusion Switch Connector	21	Slimline x8 Connectors (CPU0)	37	BMC Management Network Port
6	SmartNIC Power Connector	22	PSU0 Connector	38	USB 3.0 Port × 2
7	Slimline x8 Connectors (CPU1)	23	PSU1 Connector	39	BMC TF Card Slot

Item	Feature	Item	Feature	Item	Feature
8	Chassis Temperature Sensor Connector	24	TPM Connector	40	PCH Heatsink
9	RAID Controller Card Power Connector	25	Left Control Panel Connector	41	M.2 Riser Connector
10	Backplane I²C Connector	26	SATA/sSATA Connectors	42	Radsok Connectors & Busbars
11	Backplane Power Connector	27	RAID Key Connector	43	100MHz Clock Connector
12	Backplane I²C Connector	28	XDP Debug Connector	44	System TF Card Slot
13	Backplane Power Connector	29	NC-SI Connector	45	PSU2 Connector
14	Backplane I²C Connector	30	Battery Socket	46	PSU3 Connector
15	Backplane Power Connector	31	OCP Interposer Connector		
16	Backplane I²C Connector	32	UID Button and LED		

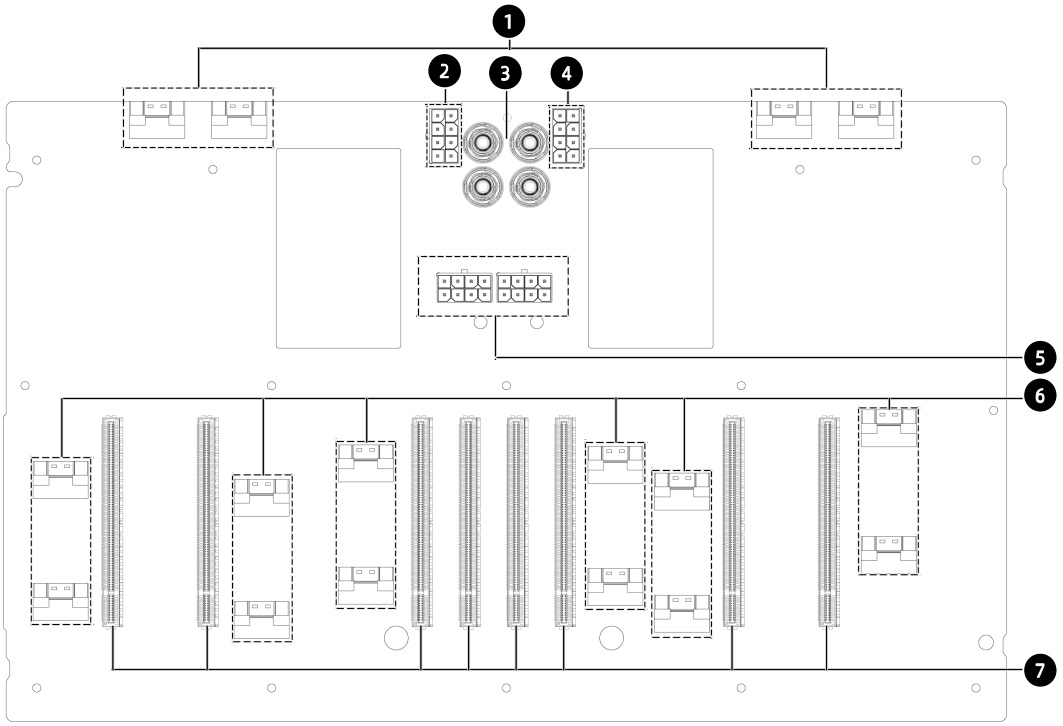
5.10.2 GPU Boards

Figure 5-22 GPU Board Layout (NF5468M6 - P Configuration)



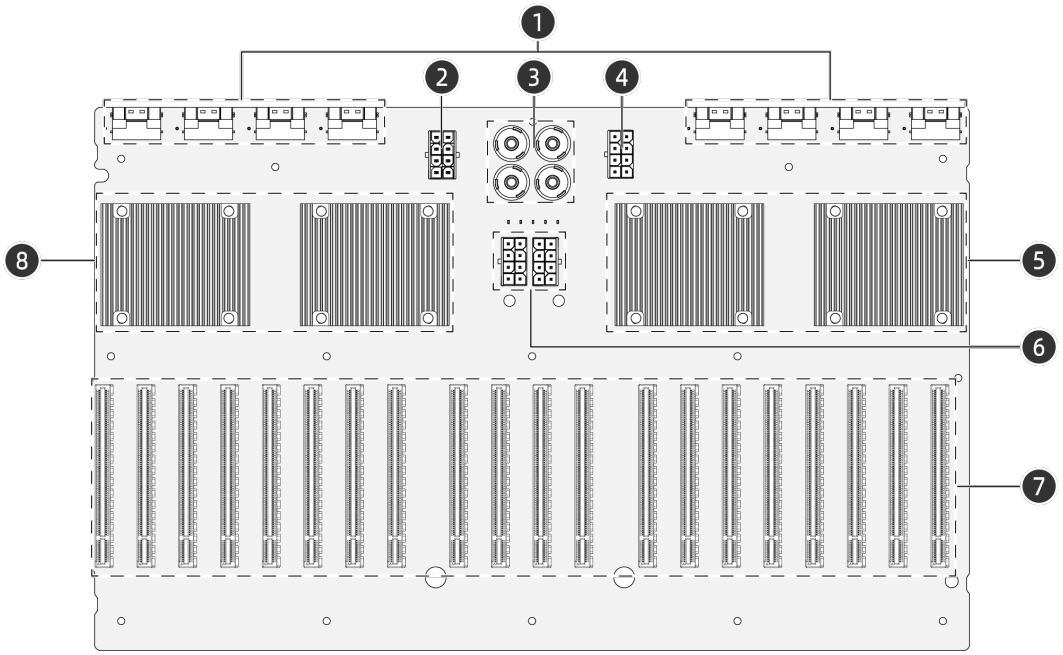
Item	Feature	Item	Feature
1	Slimline x8 Connectors	6	PCIe Switch Heatsink
2	GPU Power Connector	7	GPU Power Connectors
3	Radsok Connectors & Busbars	8	GPU Slots
4	GPU Power Connector	9	PCIe Switch Heatsink
5	Retimer Heatsinks		

Figure 5-23 GPU Board Layout (NF5468M6 - T Configuration)



Item	Feature	Item	Feature
1	Slimline x8 Connectors	5	GPU Power Connectors
2	GPU Power Connector	6	Slimline x8 Connectors
3	Radsok Connectors & Busbars	7	GPU Slots
4	GPU Power Connector		

Figure 5-24 GPU Board Layout (NF5468M6 - V Configuration)



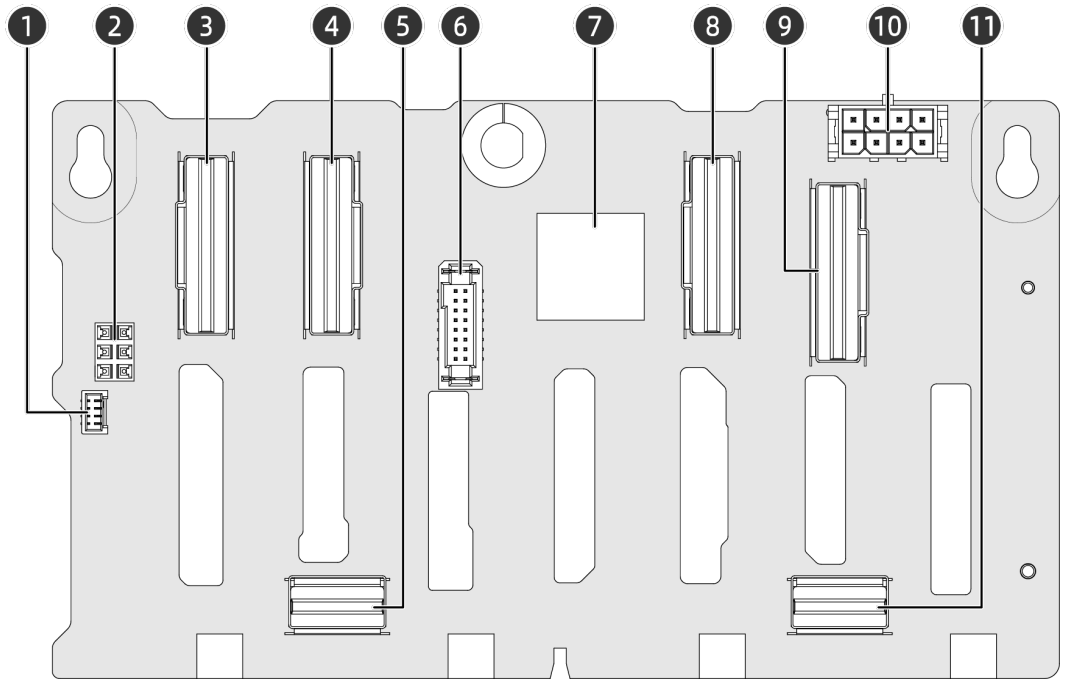
Item	Feature	Item	Feature
1	Slimline x8 Connectors	5	PCIe Switch Heatsinks
2	GPU Power Connector	6	GPU Power Connectors
3	Radsok Connectors & Busbars	7	PCIe Slots
4	GPU Power Connector	8	PCIe Switch Heatsinks

5.10.3 Drive Backplanes

1. Front Drive Backplanes

- 8 × 2.5-inch Drive Pass-Through Backplane

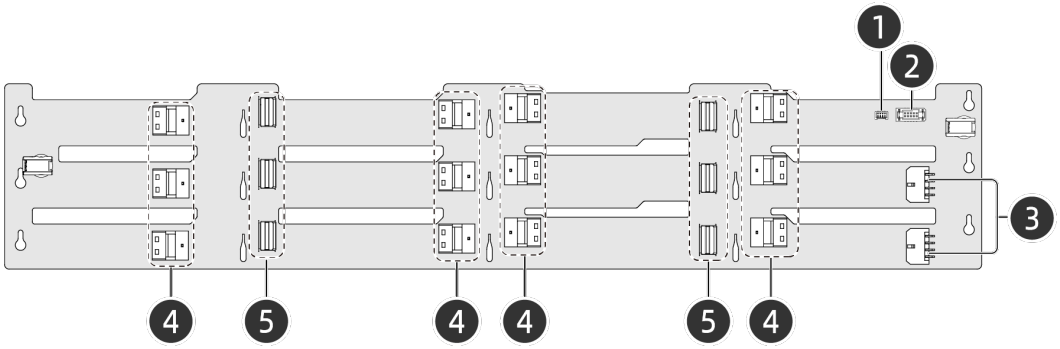
Figure 5-25 8 × 2.5-inch Drive Pass-Through Backplane



Item	Feature	Item	Feature
1	BMC I^2C Connector	2	CPLD JTAG Connector
3	Slimline x8 Connector 1	4	Slimline x8 Connector 2
5	Slimline x4 Connector 1	6	VPP Connector
7	CPLD	8	Slimline x8 Connector 3
9	Slimline x8 Connector 4	10	Power Connector
11	Slimline x4 Connector 2		

- 12 × 3.5-inch Drive Pass-Through Backplane

Figure 5-26 12 × 3.5-inch Drive Pass-Through Backplane



Item	Feature	Item	Feature
1	BMC I²C Connector	2	VPP Connector
3	Power Connector × 2	4	Slimline Connector × 12
5	Mini SAS Connector × 6		

2. Internal Drive Backplanes

- M.2 Drive Pass-Through Backplane (2 × SATA/NVMe Drive)

Figure 5-27 Front of the 2 × M.2 Drive Pass-Through Backplane (2 × SATA/NVMe Drive)

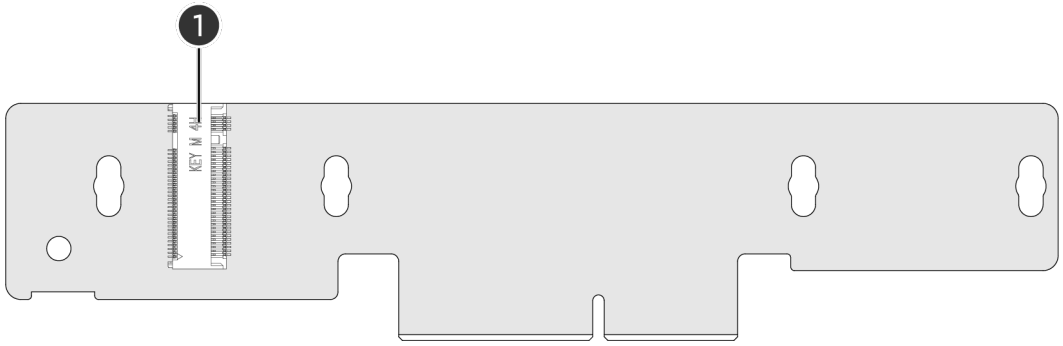
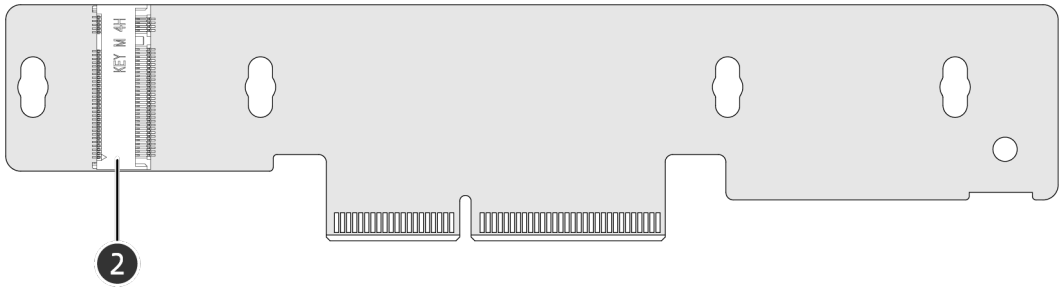


Figure 5-28 Back of the 2 × M.2 Drive Pass-Through Backplane (2 × SATA/NVMe Drive)



Item	Feature	Item	Feature
1	M.2_1 Connector	2	M.2_2 Connector

6 Product Specifications

6.1 Technical Specifications

Table 6-1 Technical Specifications

Item	Description
Form Factor	4U rack server
Processor	• Two 3rd Gen Intel Xeon Scalable processor (code-named “Ice Lake”) • Up to 40 cores (with a base frequency of 2.3 GHz) • 3 UPI links per CPU at up to 11.2 GT/s • TDP up to 270 W
GPU/Coprocessor	• 8 × NVIDIA Tesla PCIe A100 or • 8 × NVIDIA Tesla PCIe A30 or • 8 × NVIDIA Quadro A40 or • 16 × NVIDIA Tesla A10 or • 16 × NVIDIA Tesla T4 or • 8 × FHFL dual-slot or 16 × FHFL single-slot AI accelerator card of a different type For other supported GPUs or coprocessors, contact us.
Chipset	Intel C621
Memory	• 32 × DDR4 DIMM (RDIMM/LRDIMM/3DS-RDIMM /3DS-LRDIMM/BPS) • Up to 3,200 MT/s • Total memory capacity up to 4.0 TB
Storage	Front panel: NF5468M6 - P/V configuration: • 8 × 2.5-inch SATA/SAS/NVMe drive + 16 × 2.5-inch SATA/SAS drive or

	• 8 × 3.5-inch SATA/SAS/NVMe drive + 4 × 3.5-inch SATA/SAS drive NF5468M6 - T configuration: • 2 × 2.5-inch SATA/SAS/NVMe drive + 14 × 2.5-inch SATA/SAS drive or • 2 × 3.5-inch SATA/SAS/NVMe drive + 10 × 3.5-inch SATA/SAS drive Internal storage: • Up to 2 × SATA M.2 SSD • 1 × system TF card
Storage Controller	• PCIe 3.0/4.0 x8 SAS/RAID controller cards • SATA connectors directly routed from the PCH
Network	Rear: • 1 × 1/10/25/100 Gb OCP 3.0 card, NF5468M6 - P/V configuration supports both Single-Host mode and Multi-Host mode, and NF5468M6 - T configuration only supports Multi-Host mode • Up to 4 × 1/10/25/100/200 Gb Ethernet/IB card
I/O Expansion	NF5468M6 - P configuration: • 8 × PCIe 4.0 x16 FHFL double-width slot (rear) • Up to 4 × PCIe 4.0 x16 FHHL slot (rear) • 2 × PCIe 4.0 x8 HHHL slot (internal) • 1 × OCP 3.0 card (rear) NF5468M6 - T configuration: • 4 × PCIe 4.0 x16 FHFL double-width slot (rear) • 2 × PCIe 4.0 x8 FHHL slot + 2 × PCIe 3.0 x8 FHHL slot or 1 × PCIe 4.0 x16 FHHL slot + 1 × PCIe 4.0 x8 FHHL slot + 1 × PCIe 3.0 x8 FHHL slot (rear) • 1 × PCIe 4.0 x8 HHHL slot (internal) • 1 × OCP 3.0 card (rear, only for Multi-Host mode) NF5468M6 - V configuration:

	• 16 × PCIe 4.0 x16 FHFL single-width slot (rear) • 4 × PCIe 4.0 x16 FHHL slot (rear) • 2 × PCIe 4.0 x8 HHHL slot (internal) • 1 × OCP 3.0 card (rear)
Port	Front: • 2 × USB 3.0 port • 1 × VGA port • 1 × BMC serial port (RJ45) Rear: • 2 × USB 3.0 port • 1 × VGA port • 1 × BMC serial port (audio jack)
Fan	12 × 6056 fan, N+1 redundancy
Power Supply	• 2+2 redundancy • 1,600/2,000/2,200/3,000 W (vary with actual configuration)
System Management	Integrated with 1 × independent 1,000 Mbps network port, dedicated to IPMI remote management
Operating System	• RHEL 7.8/7.9 • RHEL 8.2/8.3 • CentOS 7.8/7.9 • CentOS 8.2/8.3 • Ubuntu 20.04.1 • SUSE 12.5/15.2 • Windows 2019

6.2 Environmental Specifications

Table 6-2 Environmental Specifications

Item	Description
Temperature[1,2]	• Operating: 5°C to 35°C (41°F to 95°F) • Storage (packed): -40°C to +70°C (-40°F to +158°F) • Storage (unpacked): -40°C to +55°C (-40°F to +131°F)
Relative Humidity (RH, non-condensing)	• Operating: 10% to 90% RH • Storage (packed): 10% to 93% RH • Storage (unpacked): 10% to 93% RH
Operating Altitude	≤3,050 m (10,007 ft)
Corrosive Gaseous Contaminants	Maximum growth rate of corrosion film thickness: • Copper coupon: 300 Å/month (compliant with the gaseous corrosivity level of G1 defined in ANSI/ISA-71.04-2013)
Particulate Contaminants	• Compliant with ISO 14664-1 Class 8. • The server room should be free from explosive, conductive, magnetic, and corrosive dust. Note: It is recommended to hire a professional organization to monitor the particulate contaminants in the server room.
Acoustic Noise[3, 4, 5]	Noise emissions are measured in accordance with ISO 7779 (ECMA 74) and declared in accordance with ISO 9296 (ECMA 109). Listed are the declared A-weighted sound power levels (LWAd) and the declared average bystander position A-weighted sound pressure levels (LpAm) at a server operating temperature of 23°C (73.4°F): • Idle – LWAd: 6.0 B – LpAm: 52.0 dBA • Operating

Item	Description
	– LWAd: 7.4 B – LpAm: 68.3 dBA

NOTE

1. 5°C to 35°C (41°F to 95°F) is the standard operating temperature. For temperatures between 5°C and 35°C (41°F and 95°F), de-rate the maximum allowable temperature by 1°C per 305 m (1°F per 556 ft) above sea level, no direct sustained sunlight. The maximum temperature gradient is 20°C/h (36°F/h) and the maximum operating altitude is 3,050 m (10,007 ft), both varying with server configuration.
2. Any fan failure or operations above 30°C (86°F) may lead to system performance degradation.
3. This document lists the LWAd and LpAm of the product at a 23°C (73.4°F) ambient environment. All measurements are conducted in conformance with ISO 7779 (ECMA 74) and declared in conformance with ISO 9296 (ECMA 109). The listed sound levels apply to the standard configuration. Additional options may result in increased sound levels. Contact your sales representative for more information.
4. The sound levels shown here were measured based on the specific configuration of a server. Sound levels vary with server configuration. These values are for reference only and subject to change without notice.
5. Product conformance to cited normative standards is based on sample testing, evaluation, or assessment. This product or family of products is eligible to bear the appropriate compliance logos and statements.

6.3 Physical Specifications

Table 6-3 Physical Specifications

Item	Description
Dimensions	• With mounting ears (W × H × D): 483 × 175.5 × 830 mm (19.02 × 6.91 × 32.68 in.) • Without mounting ears (W × H × D): 447.6 × 175.5 × 802.5 mm (17.62 × 6.91 × 31.59 in.) • Outer packaging (L × W × H): 1,200 × 800 × 473 mm (47.24 × 31.50 × 18.62 in.)

Weight	NF5468M6 - P Configuration	Net weight: • 12 × 3.5-inch drive configuration (max.): 52 kg (114.64 lbs) • 24 × 2.5-inch drive configuration (max.): 48 kg (105.82 lbs) Packaging materials: 32 kg (70.55 lbs) (packaging box + rails + accessory box + pallet)
	NF5468M6 - T Configuration	Net weight: • 12 × 3.5-inch drive configuration (max.): 47 kg (103.62 lbs) • 24 × 2.5-inch drive configuration (max.): 43 kg (94.80 lbs) Packaging materials: 32 kg (70.55 lbs) (packaging box + rails + accessory box + pallet)
	NF5468M6 - V Configuration	Net weight: • 12 × 3.5-inch drive configuration (max.): 54 kg (119.05 lbs) • 24 × 2.5-inch drive configuration (max.): 50 kg (110.23 lbs) Packaging materials: 40 kg (88.18 lbs) (packaging box + rails + accessory box + pallet)
Power Consumption		Power consumption varies with configurations.

7 Operating System and Hardware Compatibility

The software and hardware compatibility of the NF5468M6 is as follows:

- The PCH storage controller cannot be used together with any add-in RAID controller card or HBA card, which may cause wrong drive sequence issues.
- NF5468M6 - T configuration does not support OCP 3.0 cards in Single-Host mode.
- An Intel NIC shall be inserted into a PCIe slot directly routed from the CPU. If it is inserted into a PCIe switch slot, PXE boot in Legacy mode may fail (Note: PXE boot is normal in UEFI mode).
- A time out error will occur if an X710 card is inserted into a Retimer slot.
- NF5468M6 - P configuration supports up to 2 Intel NICs, which should be installed into PCIe slot 0 and PCIe slot 2.
- In Balance mode, system memory capacity should be at least 1.5 times (preferably 2 times) that of the video memory. In Common or Cascade mode, the memory capacity per CPU should be greater than 1.5 times that of the video memory.
- The NF5468M6 supports orderly hot swap of the OCP 3.0 card in Single-Host mode. When used with a Redhat 8.x OS, there will be a prompt "Failed to check link status". This error is caused by conflicts between the OCP NIC 3.0 specification and the PCIe hot-plug specification and will not affect the normal use of the server.
- For the NF5468M6 - P configuration, customers can specify 2 types of GPU topologies (such as Balance and Cascade) before shipment to implement the remote topology switching by BMC commands.
- For the NF5468M6 - P configuration, if topology switching is not required, select the GPU board with the part number ended with -101; if topology switching is required, select the GPU board with the part number ended with -102.
- An appropriate chassis should be configured to support the embedded LCD module.

For more detailed information on the compatible OSs and hardware, refer to the

compatibility lists in this chapter.

IMPORTANT

Using incompatible components may cause the server to work abnormally, and such failures are not covered by technical support or warranty. The server performance is strongly influenced by application software, middleware and hardware. The subtle differences in them may lead to performance variation in the application and test software.

- For requirements on the performance of specific application software, contact sales representatives to confirm the detailed hardware and software configurations during the pre-sales phase.
- For requirements on hardware performance consistency, define specific configuration requirements (for example, specific drive models, RAID controller cards, or firmware versions) during the pre-sales phase.

7.1 Supported Operating Systems

Table 7-1 Supported Operating Systems

OS	Version
Windows	Windows_Server_2019_64bit_limit
Red Hat	• RedHat_7.8_64bit • RedHat_7.9_64bit
	• RedHat_8.2_64bit • RedHat_8.3_64bit
CentOS	• CentOS_7.8_64bit • CentOS_7.9_64bit
	• CentOS_8.2_64bit • CentOS_8.3_64bit
SUSE	• SUSE_12.5_64bit • SUSE_15.2_64bit

OS	Version
Ubuntu	• Ubuntu_20.04_64bit • Ubuntu_20.04.1_64bit

7.2 Hardware Compatibility

7.2.1 CPU Specifications

- Up to two 3rd Gen Intel Xeon Scalable processors (code-named “Ice Lake”).
- Up to 40 cores (with a base frequency of 2.3 GHz).
- 3 UPI links per CPU at up to 11.2 GT/s.
- TDP up to 270 W.

Table 7-2 CPU Specifications

Model	Cores	Threads	Base Frequency (GHz)	Cache (MB)	TDP (W)
8380	40	80	2.3	60	270
8358	32	64	2.6	48	250
8368	38	76	2.4	57	270
8352V	36	72	2.1	54	195
8352Y	32	64	2.2	48	205
6354	27	54	3.0	27	205
6348	28	56	2.6	42	235
6346	16	32	3.1	24	205
6338	32	64	2.0	48	205

7.2.2 DIMM Specifications

The NF5468M6 supports up to 32 DDR4 DIMMs. Each processor supports 8 memory channels with 2 DIMM slots per channel. The server supports RDIMM/LRDIMM/BPS and the following memory protection technology:

- ECC (Error-Correcting Code)

Table 7-3 DIMM Specifications

Type	Capacity (GB)	Frequency (MHz)	Data Width	Organization
RDIMM	16	3,200	x72	2R x8
RDIMM	32	3,200	x72	2R x4/2R x8
RDIMM	64	3,200	x72	2R x4

NOTE

For specific LRDIMM or BPS options, consult our sales representative.

7.2.3 Drive Specifications

1. SATA/SAS HDD

Table 7-4 SATA/SAS HDD Specifications

Type	Speed in rpm	Capacity
2.5-inch SAS HDD	7.2K	1 TB/2 TB
	10K	300 GB/450 GB/600 GB/900 GB/1.2 TB/ 1.8 TB
	15K	600 GB
2.5-inch SATA HDD	7.2K	1 TB/2 TB
3.5-inch SAS HDD	7.2K	1 TB/2 TB/4 TB/6 TB/8 TB/10 TB
3.5-inch SATA HDD	7.2K	1 TB/2 TB/4 TB/6 TB/8 TB/10 TB

CAUTION

Mixing 2.5-inch drives installed in 3.5-inch drive trays with 3.5-inch drives is allowed, but mixing over 3 types of drives is not allowed.

2. SATA SSD

Table 7-5 SATA SSD Specifications

Type	Capacity
SATA SSD	240 GB
SATA SSD	480 GB

Type	Capacity
SATA SSD	960 GB
SATA SSD	1.92 TB
SATA SSD	3.84 TB

3. U.2 NVMe SSD

Table 7-6 U.2 NVMe SSD Specifications

Type	Capacity	Max. Qty.
U.2 NVMe SSD	1 TB	8
U.2 NVMe SSD	1.6 TB	8
U.2 NVMe SSD	2 TB	8
U.2 NVMe SSD	3.2 TB	8
U.2 NVMe SSD	4 TB	8

4. M.2 SSD

Table 7-7 M.2 SSD Specifications

Type	Capacity	Max. Qty.
M.2 SSD	240 GB	2
M.2 SSD	480 GB	2
M.2 SSD	240 GB	2
M.2 SSD	480 GB	2
M.2 SSD	960 GB	2

7.2.4 SAS/RAID Controller Card Specifications

Table 7-8 SAS/RAID Controller Card Specifications

Type	Model
SAS Controller Card	PM8222_8
RAID Controller Card	SAS3108_2GB
	9460-8i_2GB
	9460-16i_4GB
	9361-8i_2G
	PM8204_RA_8_2GB

7.2.5 NIC Specifications

Table 7-9 OCP NIC Specifications

Type	Model	Speed (Gbps)
OCP NIC	Andes-M6_X710_10G	10
	M_100G_MCX566ACDAB	100

Table 7-10 PCIe NIC Specifications

Type	Model	Speed (Gbps)	Port Qty.
PCIe NIC	Pyxis_X550_10G	10	2
	82599ES_10G	10	2
	I_10G_82599ES	10	1
	M_25G_MCX4121A-ACAT	25	2
	M_25G_MCX512A-CAT	25	4
	I_25G_E810XXVDA2	25	2
	M_100G_MCX516ACCAT	100	4
	BROADCOM_100G_508	100	1

7.2.6 HCA Card Specifications

Table 7-11 HCA Card Specifications

Model	Speed (Gbps)	Port Qty.
M_1-HDR200_MCX653105A-HDAT_PCIE	200	1
M_1-HDR100_MCX653105A-ECAT_PCIE	100	1

7.2.7 GPU Specifications

Table 7-12 GPU Specifications

Type	Model	Max. Qty.
GPU	NVIDIA-A100	8
	NVIDIA Tesla-A30	8
	NVIDIA Quadro-A40	8
	NVIDIA-A10	16
	Tesla-T4	16
	CAMBRICON-MLU270	16

7.2.8 PSU Specifications

The NF5468M6 supports up to 4 hot-swappable PSUs in 2+2 redundancy that follow the Intel Common Redundant Power Supply (CRPS) specification with standard electrical and structural design. The PSUs will lock automatically after being inserted into the power bay, enabling tool-less maintenance. The CRPS PSUs are 80 Plus Platinum rated, and offer various output powers, allowing customers to choose as needed.

The following rated 110 VAC/230 VAC and 240 VDC PSUs in 2+2 redundancy are supported:

- 1,600 W Platinum PSU: 1,000 W (110 VAC), 1,600 W (230 VAC), 1,600 W (240 VDC for China)
- 2,000 W Platinum PSU: 1,000 W (110 VAC), 2,000 W (230 VAC), 2,000 W (240 VDC for China)
- 2,200 W Platinum PSU: 1,000 W (110 VAC), 2,200 W (230 VAC), 2,200 W (240 VDC for China)
- 3,000 W Platinum PSU: 1,200 W (110 VAC), 3,000 W (230 VAC), 3,000 W (240 VDC for China)

Table 7-13 PSU Specifications

Type	Model	Max. Qty.
PSU	PSU_1600W_1U_P	4
	PSU_2000W_1U_P	4
	PSU_2200W_1U_P	4
	PSU_3000W_1U_P	4

CAUTION

- At a rated input voltage of 110 VAC, the output power of a 1,600/2,000/ 2,200/3,000 W PSU will be derated.
- Operating voltage range:
- 110 to 230 VAC: 90 to 264 VAC
- 240 VDC: 180 to 320 VDC

8 Regulatory Information

8.1 Safety

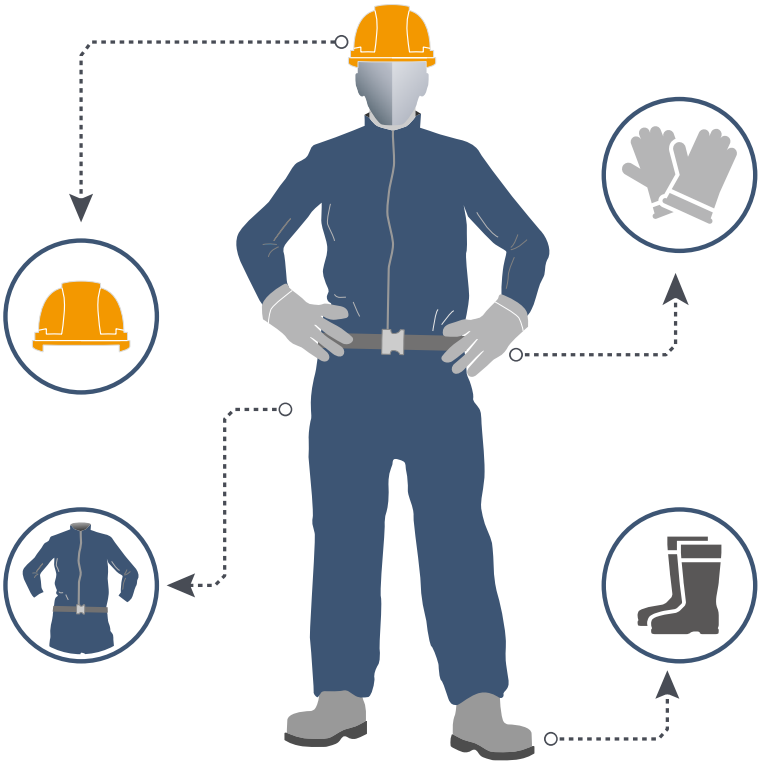
8.1.1 General

- Strictly comply with local laws and regulations while installing the equipment. The safety instructions in this section are only a supplement to local safety regulations.
- To ensure personal safety and to prevent damage to the equipment, all personnel must strictly observe the safety instructions in this section and on the device labels.
- People performing specialized activities, such as electricians and electric forklift operators, must possess qualifications recognized by the local government or authorities.

8.1.2 Personal Safety

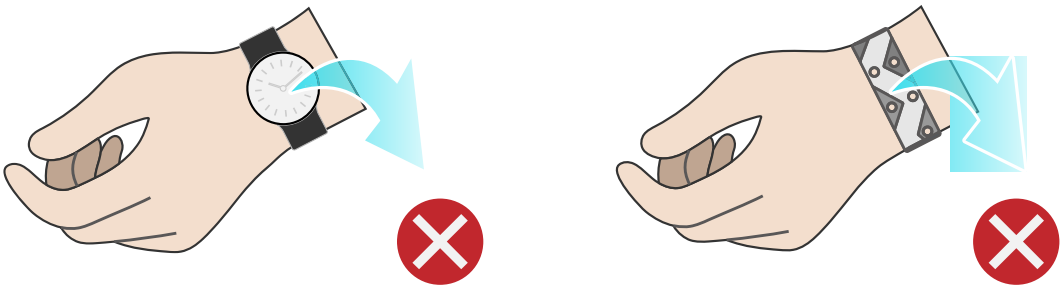
- Only personnel certified or authorized by us are allowed to perform the installation procedures.
- Stop any operation that could cause personal injury or equipment damage. Report to the project manager and take effective protective measures.
- Working during thunderstorms, including but not limited to handling equipment, installing cabinets and installing power cords, is forbidden.
- Do not carry the weight over the maximum load per person allowed by local laws or regulations. Arrange appropriate installation personnel and do not overburden them.
- Installation personnel must wear clean work clothes, work gloves, safety helmets and safety shoes, as shown in Figure 8-1

Figure 8-1 Protective Clothing



- Before touching the equipment, put on ESD clothes and ESD gloves or an ESD wrist strap, and remove any conductive objects such as wrist watches or metal jewelry, as shown in Figure 8-2, in order to avoid electric shock or burns.

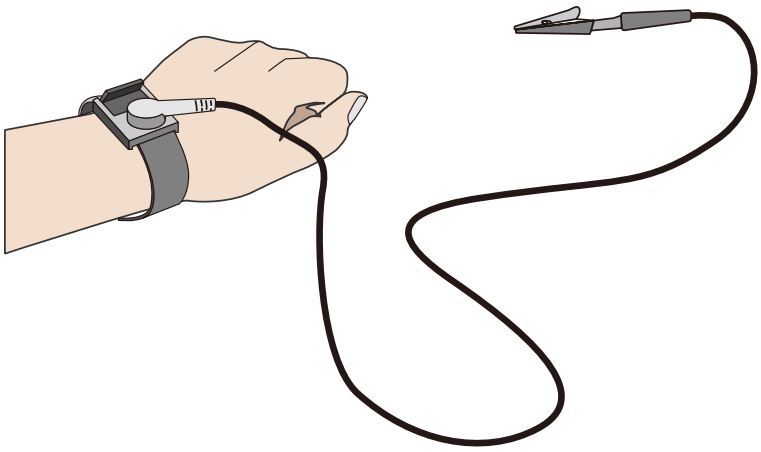
  Figure 8-2 Removing Conductive Objects



  How to put on an ESD strap (Figure 8-3).

  1. Put your hand through an ESD wrist strap.
  2. Tighten the strap buckle to ensure a snug fit.
  3. Plug the alligator clip of the ESD wrist strap into the corresponding jack on the grounded cabinet or grounded chassis.

Figure 8-3 Wearing an ESD Wrist Strap



- Use tools correctly to avoid personal injury.
- When moving or lifting equipment above shoulder height, use lifting devices and other tools as necessary to avoid personal injury or equipment damage due to equipment slippage.
- The power sources of the server carry a high voltage. Direct contact or indirect contact through damp objects with the high-voltage power source is fatal.
- To ensure personal safety, ground the server before connecting power.
- When using ladders, always have someone hold and guard the bottom of the ladders. In order to prevent injury, never use a ladder alone.
- When connecting, testing or replacing optical fiber cable, avoid looking into the optical port without eye protection in order to prevent eye damage from laser light.

8.1.3 Equipment Safety

- To ensure personal safety and prevent equipment damage, use only the power cords and cables that come with the server. Do not use them with any other equipment.
- Before touching the equipment, put on ESD clothing and ESD gloves to prevent static electricity from damaging the equipment.
- When moving the server, hold the bottom of the server. Do not hold the handles of any module installed in the server, such as PSUs, fan modules, drive modules, or motherboard. Handle the equipment with care at all times.
- Use tools correctly to avoid damage to the equipment.
- Connect the power cords of active and standby PSUs to different PDUs to ensure high system reliability.

- To ensure equipment safety, always ground the equipment before powering it on.

8.1.4 Transportation Precautions

Contact the manufacturer for precautions before transportation as improper transportation may damage the equipment. The precautions include but not limited to:

- Hire a trusted logistics company to move all equipment. The transportation process must comply with international transportation standards for electronic equipment. Always keep the equipment being transported upright. Avoid collision, moisture, corrosion, packaging damage or contamination.
- Transport the equipment in its original packaging.
- If the original packaging is unavailable, separately package heavy and bulky components (such as chassis, blade servers and blade switches), and fragile components (such as optical modules and PCIe cards).
- Power off all equipment before shipping.

8.1.5 Manual Handling Weight Limits

 CAUTION

Observe local laws or regulations regarding the manual handling weight limits per person. The limits shown on the equipment and in the document are recommendations only.

Table 8-1 lists the manual handling weight limits per person specified by some organizations.

Table 8-1 Manual Handling Weight Limit per Person

Organization	Weight Limit (kg/lbs)
European Committee for Standardization (CEN)	25/55.13
International Organization for Standardization (ISO)	25/55.13
National Institute for Occupational Safety and Health (NIOSH)	23/50.72
Health and Safety Executive (HSE)	25/55.13
General Administration of Quality Supervision, Inspection and Quarantine of the People's Republic of China (AQSIQ)	• Male: 15/33.08 • Female: 10/22.05

9 Limited Warranty

This limited warranty applies only to the original purchasers of our products who are direct customers or distributors of us (“Customer”).

We warrant all our hardware products, if properly used and installed, to be free from defects in material and workmanship within the warranty period. The term “Hardware Product” is limited to the hardware components and required firmware. The term “Hardware Product” DOES NOT include software applications or programs, and DOES NOT include products or peripherals that are not supplied by us. We may, at our discretion, repair or replace the defective parts. Repair or replacement parts may be new, used, or equivalent to new in performance and reliability. Repair or replacement parts are warranted to be free of defects in material or workmanship for ninety (90) calendar days or for the remainder of the warranty period of the product, whichever is longer.

Service offerings may vary by geographic region. Please contact your representative to identify service levels and needs for your region.

9.1 Warranty Service

Our warranty service includes 24 × 7 remote technical support, RMA (Return Material Authorization) Service, ARMA (Advanced Return Material Authorization) Service, 9 × 5 × NBD (Next Business Day) Onsite Service and 24 × 7 × 4 Onsite Service.

9.1.1 Remote Technical Support

The 24 × 7 remote technical support can be obtained through hotline, e-mail, and Service Portal*[1]. Through hotline and e-mail support, our engineers help customers diagnose the causes of malfunctions and provide solutions. Service Portal*[1] provides access to firmware, customized update files, and related manuals for Hardware Products. Customer may also access the Service Portal*[1] to submit an RMA request or an ARMA request for parts replacement or repair.

Information needed when requesting support:

- Contact name, phone number, e-mail address
- System serial number, part number, model and location (address) of the product needing service

- Detailed description of problem, logs (SELs and blackbox logs, and any other related logs from OS), screenshot of issue, pictures of damaged/faulty parts, etc.

9.1.2 RMA Service

Standard Replacement: When a hardware failure occurs, Customer may submit an RMA request to us via e-mail or Service Portal*1. We will review and approve the RMA submission at our own discretion, and provide an RMA number and return information that Customer may use to return the defective part(s) for the RMA service. We will ship out replacement part(s) within one (1) business day after receiving the defective part(s) and cover one-way shipment.

NOTE

- Customer should return the defective parts in their original packaging to our designated service center at their own expense.
- After our further diagnosing and testing, if the defective parts conform to our repair policy, we will ship out the repair or replacement parts at our own expense; otherwise, we will return the defective parts at Customer's expense.
- If Customer needs to designate a logistics company, allocation of the shipping cost to us/Customer will be redefined.

9.1.3 ARMA Service

Advanced Replacement: If a problem with our hardware products cannot be resolved via hotline or e-mail support and replacement part(s) are required, we will ship out replacement part(s) in advance within one (1) business day. Customer should return defective part(s) within five (5) business days after receiving the replacement(s). The shipping cost coverage varies by region. Contact your sales representative for details.

NOTE

- Customer should return the defective parts in their original packaging to our designated service center.
- We will ship out the replacement parts at our own expense after completing remote diagnosis.
- If Customer needs to designate a logistics company, allocation of the shipping cost to us/Customer will be redefined.

9.1.4 9 × 5 × NBD Onsite Service

When we ultimately determine that an onsite service call is required to repair or replace a defect, the call will be scheduled in accordance with the Response Time Commitment. The response time is measured from the time when the remote troubleshooting is completed and logged to the arrival of a service engineer and parts to Customer location for repair.

NOTE

9 × 5 × NBD: Our service engineer typically arrives at the customer's data center on the next business day. Service engineers are available on local business day from 9:00 am to 6:00 pm local time. Calls received/dispatches after 5:00 pm local time will require an additional day for the service engineer to arrive.

9.1.5 24 × 7 × 4 Onsite Service

When we ultimately determine that an onsite service call is required to repair or replace a defect, the call will be scheduled in accordance with the Response Time Commitment. The response time is measured from the time when the remote troubleshooting is completed and logged to the arrival of a service engineer and parts to Customer location for repair.

NOTE

24 × 7 × 4: Our service engineer typically arrives at the customer site within 4 hours. Service engineers are available at anytime, including weekends and local national holidays.

9.2 Our Service SLA

We offer a variety of Service Level Agreements (SLA)*[2] to meet customer requirements.

- RMA Service
- ARMA Service
- 9 × 5 × NBD Onsite Service
- 24 × 7 × 4 Onsite Service

9.3 Warranty Exclusions

We do not guarantee that there will be no interruptions or mistakes during the use of the products. We will not undertake any responsibility for the losses arising from any operation not conducted according to instructions intended for Hardware Products.

The Limited Warranty does not apply to

- expendable or consumable parts, such as, but not limited to, batteries or protective coatings that are designed to diminish over time, unless failure has occurred during DOA period due to a defect in material or workmanship;
- any cosmetic damage, such as, but not limited to, scratches, dents, broken plastics, metal corrosion, or mechanical damage, unless failure has occurred during DOA period due to a defect in material or workmanship;
- damage or defects caused by accident, misuse, abuse, contamination, improper or inadequate maintenance or calibration or other external causes;
- damage or defects caused by operation beyond the parameters as stipulated in the user documentation;
- damage or defects by software, interfacing, parts or supplies not provided by us;
- damage or defects by improper storage, usage, or maintenance;
- damage or defects by virus infection;
- loss or damage in transit which is not arranged by us;
- Hardware Products that have been modified or serviced by non-authorized personnel;
- any damage to or loss of any personal data, programs, or removable storage media;
- the restoration or reinstallation of any data or programs except the software installed by us when the product is manufactured;
- any engineering sample, evaluation unit, or non-mass production product that is not covered under warranty service;
- any solid-state drive (SSD) which has reached its write endurance limit.

In no event will we be liable for any direct loss of use, interruption of business, lost profits, lost data, or indirect, special, incidental or consequential damages of any kind regardless of the form of action, whether in contract, tort (including negligence), strict liability or otherwise, even if we have been advised of the possibility of such

damage, and whether or not any remedy provided should fail of its essential purpose.

*1 Service Portal availability is subject to customer type and customer location. Please contact your representative to learn more.

*2 Not all SLA offerings are available at all customer locations. Some SLA offerings may be limited to geolocation and/or customer type. Please contact your representative to learn more.

10 System Management

10.1 Intelligent Management System ISBMC

ISBMC, self-developed remote server management system, supports mainstream management specifications in the industry such as IPMI 2.0 and Redfish 1.8. ISBMC features high operational reliability, easy serviceability for different business scenarios, accurate and comprehensive fault diagnosis capabilities, and industry-leading security reinforcement capabilities.

ISBMC supports:

- IPMI 2.0
- Redfish 1.8
- SNMP v1/v2c/v3
- HTML5/Java remote consoles (Keyboard, Video, Mouse)
- Remote virtual media
- Login via web browsers
- Intelligent fault diagnosis

Table 10-1 ISBMC Features

Feature	Description
Management Interface	Supports extensive remote management interfaces for various server O&M scenarios. The supported interfaces include: • IPMI • SSH CLI • SNMP • HTTPS • Web GUI • Redfish • RESTful • DCMI • Syslog
Accurate and Intelligent Fault Location	IDL, a self-developed fault diagnosis system, offers accurate and comprehensive hardware fault location capabilities, and outputs detailed fault causes and handling suggestions.

Feature	Description
Alert Management	Supports rich automatic remote alert capabilities, including proactive alerting mechanisms such as SNMP Trap (v1/v2c/v3), email alerts and syslog remote alerts to ensure 24 × 7 reliability.
Remote Console KVM	Supports HTML5- and Java-based remote console to remotely control and operate the monitor/mouse/keyboard of the server, providing highly available remote management capabilities without on-site operation.
Virtual Network Console (VNC)	Supports mainstream third-party VNC clients without relying on Java, improving management flexibility.
Remote Virtual Media	Supports virtualizing images, USB devices, folders and local media devices as media devices of remote servers, simplifying OS installation, file sharing, and other O&M tasks.
Web GUI	Supports the visual management interface developed by us, displaying abundant information of the server and components, and offers easy-to-use Web GUIs.
Crash Screenshot and Manual Screenshot	Supports automatic crash screenshot with the last screen before crash saved, and provides manual screenshot, which can quickly capture the screen for easy inspection at scheduled time.
Dual Flash and Dual Image	Supports dual flash and dual image, enabling automatic flash failover in case of software faults or flash damage, improving operational reliability.
Power Capping	Supports power capping, increasing deployment density and reducing energy consumption.
IPv4/IPv6	Supports both IPv4 and IPv6, enhancing network deployment flexibility.
Auto-Switching of Management Network Port	Supports auto-switching between the dedicated management network port and shared management network port, providing customers with flexible network deployment solutions for different management network deployment scenarios.
ISBMC Self-Diagnosis and Self-Recovery System	• Supports the reliable dual watchdog mechanism for hardware and software, enabling automatic restoration of BMC in case of BMC abnormality. • Provides a thermal protection mechanism, which is automatically triggered when the BMC is abnormal to ensure that the fan operates at safe speeds to avoid system overheating. • Supports self-diagnosis of processors, memory modules, and storage devices of ISBMC, and automatically cleans

Feature	Description
	the workload to restore to normal when the device usage rate is too high.
Power Control	Supports virtual power buttons for power on/off, power cycle and reset.
UID LED and Remote Control of UID LED	Supports remote lighting of the UID LED for locating the server in the server room; supports remote control of UID LED. The UID LED flashes when a user remotely logs in via web, KVM, or SSH to inform the on-site personnel that an administrator is accessing the server.
Secure Firmware Update	Supports firmware update based on secure digital signatures, mismatch prevention mechanism for firmware from different manufacturers and firmware for different server models, and firmware update of BMC/BIOS/CPLD/PSU.
Serial Port Redirection	Supports remote redirection of the system serial port, BMC serial port, and other serial ports, and directs the server-side serial port output to the local administrator via the network for server debugging.
Storage Information Display	Displays RAID logical array information and drive information, supports remote RAID creation for improved deployment efficiency.
User Role Management	Supports user detail management based on user roles and flexible creation of user roles with different privileges, and provides more user roles to allow administrators to grant different privileges to O&M personnel.
Security Features	Adopts the industry-leading server security baseline standard V2.0. SSH, HTTPS, SNMP and IPMI use secure and reliable algorithms. ISBMC offers capabilities including secure update and boot and security reinforcement mechanisms such as anti-replay, anti-injection, and anti-brute force.

For detailed information on the BMC Web GUI, status and commands, refer to the BMC configuration manual.

10.2 InManage

The server is compatible with the latest version of InManage, a new-generation infrastructure O&M management platform for data centers.

Built on cutting-edge O&M concepts, InManage provides users with leading and efficient overall management solutions for data centers to ensure advanced

infrastructure management. This platform provides a rich set of functions such as centralized asset management, in-depth fault diagnosis, component fault early warning, intelligent energy consumption management, 3D automatic topologies, and stateless automatic deployment. With these functions, users can implement centralized O&M of servers, storage devices, network devices, security devices, and edge devices, effectively improving O&M efficiency, reducing O&M costs, and ensuring the secure, reliable, and stable operation of data centers. InManage offers:

- lightweight deployment in multiple scenarios and full lifecycle management of devices
- high reliability and on-demand scalability enabled by 1 to N data collectors
- intelligent asset management and real-time tracking of asset changes
- comprehensive monitoring for overall business control
- intelligent fault diagnosis for reduced maintenance time
- second-level performance monitoring for real-time status of devices
- batch configuration, deployment and update, shortening the time needed to bring the production environment online
- improved firmware version management efficiency
- standardized northbound interfaces for easy integration and interfacing

Table 10-2 InManage Features

Feature	**Description**
Home	Display of basic information (data centers, server rooms, cabinets, assets and alerts), quick addition of devices and custom home page

Feature	Description
Assets	• Batch asset import, automatic asset discovery, and full lifecycle management of assets • Management of the full range of our server family, including general-purpose rack servers, AI servers, multi-node servers, edge servers and all-in-one servers • Management of our general-purpose disk arrays and distributed storage devices • Management of network devices (switches, routers, etc.), security devices (firewalls, load balancers, etc.), cabinets and clouds • Management of data centers • Asset warranty information management, asset inventory reports for server acceptance, asset attribute expansion, etc.
Monitor	• Display of real-time alerts, history alerts, blocked alerts and events • Fault prediction of drives and memories • Custom inspection plan and inspection result management • Notification record viewing • Intelligent fault diagnosis and analysis, automatic fault reporting and repair ticket viewing • Trap management and Redfish management • Management of monitoring rules, such as alert rules, notification rules, blocking rules, alert noise reduction rules, compression rules and fault reporting rules, and redefinition of the above rules.
Control	• Quick start of firmware update, OS installation, power management, drive data erasing and stress test • Batch firmware update (BMC/BIOS/RAID Card/NIC/Drive/HBA Card/MB CPLD/BP CPLD/PSU)

Feature	Description
	• Batch firmware configuration (BMC/BIOS) • Batch RAID configuration and OS deployment for servers • Secure and quick drive data erasing • CPU and memory stress test • Automatic firmware baseline management • BMC and BIOS snapshot management • Repositories for update files
Energy Efficiency	• Overview of data center power consumption trend chart and carbon emission trend chart • Setting of server dynamic power consumption policies and minimum power consumption policies • Server temperature optimization, utilization optimization, power consumption characteristics analysis, power consumption prediction, load distribution, etc. • Carbon asset and carbon emission management
Log	• Fault log record management • Diagnosis record and diagnosis rule management
Topologies	• Centralized management of multiple data centers and panoramic 3D views, including dynamic display of power consumption, temperature, alerts and cabinet capacity of the data center • Network topologies
Reports	• Management of warranty information reports, alert reports, asset reports, hardware reports and performance reports • Export of reports in .xlsx format
System	• Password management, alert forwarding and data dump

Feature	Description
	• Customized InManage parameters
Security	Security control of InManage via a set of security policies such as user management, role management, authentication management (local authentication and LDAP authentication) and certificate management.

10.3 InManage Tools

Table 10-3 Features of InManage Tools

Feature	Description
InManage Kits	A lightweight automatic batch O&M tool for servers, mainly used for server deployment, routine maintenance, firmware update, fault handling, etc.
InManage Boot	A unified batch management platform for bare metals, with features including firmware management, hardware configuration, system deployment and migration, stress test and in-band management
InManage Server CLI	Fast integration with third-party management platforms, delivering a new O&M mode of Infrastructure as Code (IaC)
InManage Driver	Operates under the OS and gets system asset and performance information via the in-band mode, providing users with more comprehensive server management capabilities
InManage Server Provisioning	Offers users with RAID configuration, intelligent OS installation, firmware update, hardware diagnosis, secure erasing and software upgrade, using the TF card as the carrier

11 Certifications

Table 11-1 Certifications

Country/Region	Certification	Mandatory/Voluntary
China	China Environmental Labelling	Voluntary
International Mutual Recognition	CB	Voluntary
South Korea	KC	Mandatory

12 Appendix A

12.1 Operating Temperature Specification Limits

Table 12-1 Operating Temperature Specification Limits

Max. Operating Temperature: 35°C (95°F)	Max. Operating Temperature: 40°C (104°F)
All options supported	Options not supported: • CPU > 165 W • Passive cooling GPU & FPGA card • DIMM > 12 W

12.2 Model

Table 12-2 Model

Certified Model	Description
NF5468M6	Global

12.3 RAS Features

The NF5468M6 supports a variety of RAS (Reliability, Availability, and Serviceability) features. By configuring these features, the NF5468M6 can provide greater reliability, availability, and serviceability.

12.4 Sensor List

Table 12-3 Sensor List

Sensor	Description	Sensor Location
Inlet_Temp	Air inlet temperature	Right mounting ear
Outlet_Temp	Air outlet temperature	Motherboard

Sensor	Description	Sensor Location
CPUN_Temp	CPUn core temperature	CPUn n indicates the CPU number with a value of 0 - 1
CPUN_DTS	CPUn DTS value	CPUn n indicates the CPU number with a value of 0 - 1
CPUN_DDR_DIMM_T	CPUn DDR4 DIMM temperature	DIMM (CPUn) n indicates the CPU number with a value of 0 - 1
CPUN_NVDIMM_T	CPUn BPS temperature	DIMM (CPUn) n indicates the CPU number with a value of 0 - 1
PSUN_Temp	PSUn temperature	PSUn n indicates the PSU number with a value of 0 - 3
HDD_MAX_Temp	The maximum temperature among all drives	Drives attached to drive backplane
OCP_Temp	OCP NIC temperature	Motherboard OCP NIC
NVME_F_MAX_T	The maximum temperature among front NVMe drives	Front drive backplane
PCIEN_Card_Temp	PCIe slotN card temperature	Switch board
GPUN_Temp	GPUn temperature	Motherboard PCIe GPU
PCH_Temp	PCH temperature	Motherboard
SYS_12V	12 V voltage supplied by motherboard to CPU	Motherboard
SYS_3V3	3.3 V voltage supplied by motherboard to BMC	Motherboard
CPUN_Vcore	CPUn Vcore voltage	Motherboard n indicates the CPU number with a value of 0 - 1
CPUN_DDR_VDDQ1	CPUn DIMM VDDQ1 voltage	Motherboard n indicates the CPU number with a value of 0 - 1
CPUN_DDR_VDDQ2	CPUn DIMM VDDQ2 voltage	Motherboard n indicates the CPU number with a value of 0 - 1

Sensor	Description	Sensor Location
RTC_Battery	RTC battery voltage	RTC battery on motherboard
PSUN_VIN	PSUn input voltage	Motherboard n indicates the PSU number with a value of 0 - 3
PSUN_VOUT	PSUn output voltage	Motherboard n indicates the PSU number with a value of 0 - 3
FANN_F_Speed	FanN speed	FanN N indicates the fan module number with a value of 0 – 11 F/R indicates the front/rear rotor of a dual-rotor fan
FANN_R_Speed		
Total_Power	Total power	/
PSUN_POUT	PSUn output power	PSUn n indicates the PSU number with a value of 0 - 3
PSUN_PIN	PSUn input power	PSUn n indicates the PSU number with a value of 0 - 3
FAN_Power	Total fan power	Fans
CPU_Power	Total CPU power	CPUs
GPUN_Power	GPUn power	GPUn n indicates the GPU number with a value of 0 - 15
Memory_Power	Total memory power	DIMMs
Disk_Power	Total drive power	Drives
GPUN_Util	GPU utilization	GPUn n indicates the GPU number with a value of 0 - 15
CPUN_Status	CPUn status	CPUn n indicates the CPU number with a value of 0 - 1
CPU_Config	CPU configuration status	CPUs
PSUN_Status	PSUn status	PSUn n indicates the PSU number with a value of 0 - 3
DISKN_Status	DriveN failure status	DriveN N indicates the drive number with a value of 0 - 23

Sensor	Description	Sensor Location
Fan_Redundant	Fan redundancy lost alert status	Fans
PSU_Mismatch	PSU model mismatch	/
PSU_Redundant	PSU redundancy lost alert status	PSUs
Power_Button	Power button pressed	Power button
UID_Button	UID button status	Motherboard
PWR_On_TMOUT	Host power-on timeout	Motherboard
PWR_CAP_Fail	Power capping status	/
CPUN_CXDY	CPUn DIMM status	CPUn: n indicates the CPU number with a value of 0 – 1 CX: X indicates the memory channel number with a value of 0 – 7 DY: Y indicates the DIMM number with a value of 0 - 1
SysShutdown	Reason for system shutdown	/
ACPI_PWR	ACPI status	
PCIe_Status	PCIe card status	
System_Error	Emergency system failure (IERR and Error 0/1/2)	
Sys_Health	Server health status	
ME_FW_Status	ME health status	
PCIe_IERR_Status	A PCIe device is located as the fault source by fault diagnosis after an IERR occurs.	
MB_IERR_Status	The motherboard is located as the fault source by fault diagnosis after an IERR occurs.	
SysRuntimeStop	Reason for system runtime stop	
BIOS_Boot_Up	BIOS boot up complete	
POST_Status	POST status	

Sensor	Description	Sensor Location
BMC_Boot_Up	Record the BMC boot event	/
SEL_Status	Record the event that system event logs are almost full/cleared	
BMC_Status	BMC status	/
MOC related	For some customized projects	/

13 Appendix B - Acronyms and Abbreviations

A

AC	Alternating Current
ACPI	Advanced Configuration and Power Interface
AEP	Apache Pass
AES	Advanced Encryption Standard
AI	Artificial Intelligence
ANSI	American National Standards Institute
API	Application Programming Interface
AQSIQ	General Administration of Quality Supervision, Inspection and Quarantine of the People's Republic of China

B

BIOS	Basic Input Output System
BF16	Brain Float 16
BLE	BIOS Lock Enable
BMC	Baseboard Management Controller
BPS	Barlow Pass
BSMI	Bureau of Standards, Metrology and Inspection in Taiwan

C

CAS	Column Address Strobe
CB	Certification Body
CE	Conformite Europeenne
CEN	European Committee for Standardization
CISPR	Comite International Special des Perturbations Radioelectriques (CISPR), or the International Special Committee on Radio Interference
CLI	Command-Line Interface
CPLD	Complex Programmable Logic Device
CPU	Central Processing Unit
CRPS	Common Redundant Power Supply
CSA	Canadian Standards Association

D

3DS	Three-Dimensional Stacking
DC	Direct Current
DCMI	Data Center Manageability Interface
DDDC	Double Device Data Correction
DDR4	Double Data Rate 4
DFX	Design for X
DIMM	Dual In-line Memory Module
DPC	DIMM Per Channel
DRAM	Dynamic Random-Access Memory
DTS	Digital Thermal Sensor

E

EAC	Eurasian Conformity
ECC	Error-Correcting Code
ECMA	European Computer Manufacturer Association
EMC	Electromagnetic Compatibility
EN	European Norm
ESD	Electro-Static Discharge

F

FCC	Federal Communications Commission
FHFL	Full-Height Full-Length
FHHL	Full-Height Half-Length
FPGA	Field Programmable Gate Array
FP32	Floating Point 32 Bits
FW	Firmware

G

GPU	Graphics Processing Unit
GUI	Graphical User Interface

H

HA	High Availability
HBA	Host Bus Adapter
HCA	Host Channel Adapter
HDD	Hard Disk Drive

HHHL	Half-Height Half-Length
HPC	High Performance Computing
HSE	Health and Safety Executive
HTML	HyperText Markup Language
HTTP	Hypertext Transfer Protocol
HTTPS	Hypertext Transfer Protocol Secure

I

I/O	Input/Output
IB	InfiniBand
I^2C	Inter-Integrated Circuit
IEC	International Electrotechnical Commission
IEEE	Institute of Electrical and Electronics Engineers
IERR	Internal Error
iMC	Integrated Memory Controller
IP	Internet Protocol
IPMI	Intelligent Platform Management Interface
IPv4	Internet Protocol version 4
IPv6	Internet Protocol version 6
ISA	International Society of Automation
ISO	International Organization for Standardization

J

JTAG	Joint Test Action Group

K

KC	Korean Certification
KVM	Keyboard Video Mouse

L

LAN	Local Area Network
LCD	Liquid Crystal Display
LDAP	Lightweight Directory Access Protocol
LED	Light Emitting Diode
LRDIMM	Load-Reduced Dual In-line Memory Module

M

ME	Management Engine
MOC	Microserver On Card

N

NC-SI	Network Controller Sideband Interface
NIC	Network Interface Controller
NIOSH	National Institute for Occupational Safety and Health
NVDIMM	Non-Volatile Dual In-line Memory Module
NVMe	Non-Volatile Memory Express

O

OCP	Open Compute Project

ONNX	Open Neural Network Exchange
OpenVINO	Open Visual Inference and Neural Network Optimization
OS	Operating System

P

P2P	Point to Point
PCH	Platform Controller Hub
PCIe	Peripheral Component Interconnect Express
PDU	Power Distribution Unit
POST	Power-On Self-Test
PSU	Power Supply Unit
PXE	Preboot Execution Environment

R

RAID	Redundant Arrays of Independent Disks
RAS	Reliability Availability Serviceability
RDIMM	Registered Dual In-line Memory Module
RH	Relative Humidity
RHEL	Red Hat Enterprise Linux
RJ45	Registered Jack 45
ResNet	Residual Networks
RST	Reset
RTC	Real Time Clock

S

SAS	Serial Attached SCSI
SATA	Serial Advanced Technology Attachment
SCSI	Small Computer System Interface
SDP	System Demonstration Platform
SEL	System Event Log
SGX	Software Guard Extension
SII	Standards of Institution of Israel
SMBIOS	System Management BIOS
SN	Serial Number
SNMP	Simple Network Management Protocol
SOL	Serial Over LAN
SSD	Solid-State Drive
SSH	Secure Shell

T

TCM	Trusted Cryptography Module
TDP	Thermal Design Power
TF	TransFlash
TF32	TensorFloat-32
TLS	Transport Layer Security
TPM	Trusted Platform Module

U

UEFI	Unified Extensible Firmware Interface

UID	Unit Identification
UL	Underwriters Laboratories
UPI	Ultra Path Interconnect
USB	Universal Serial Bus

V

VDI	Virtual Desktop Infrastructure
VGA	Video Graphics Array
VGG-16	Visual Geometry Group-16
VNC	Virtual Network Console
VPP	Virtual Pin Port
VR	Voltage Regulator
VROC	Virtual RAID on CPU

X

XDP	eXtend Debug Port