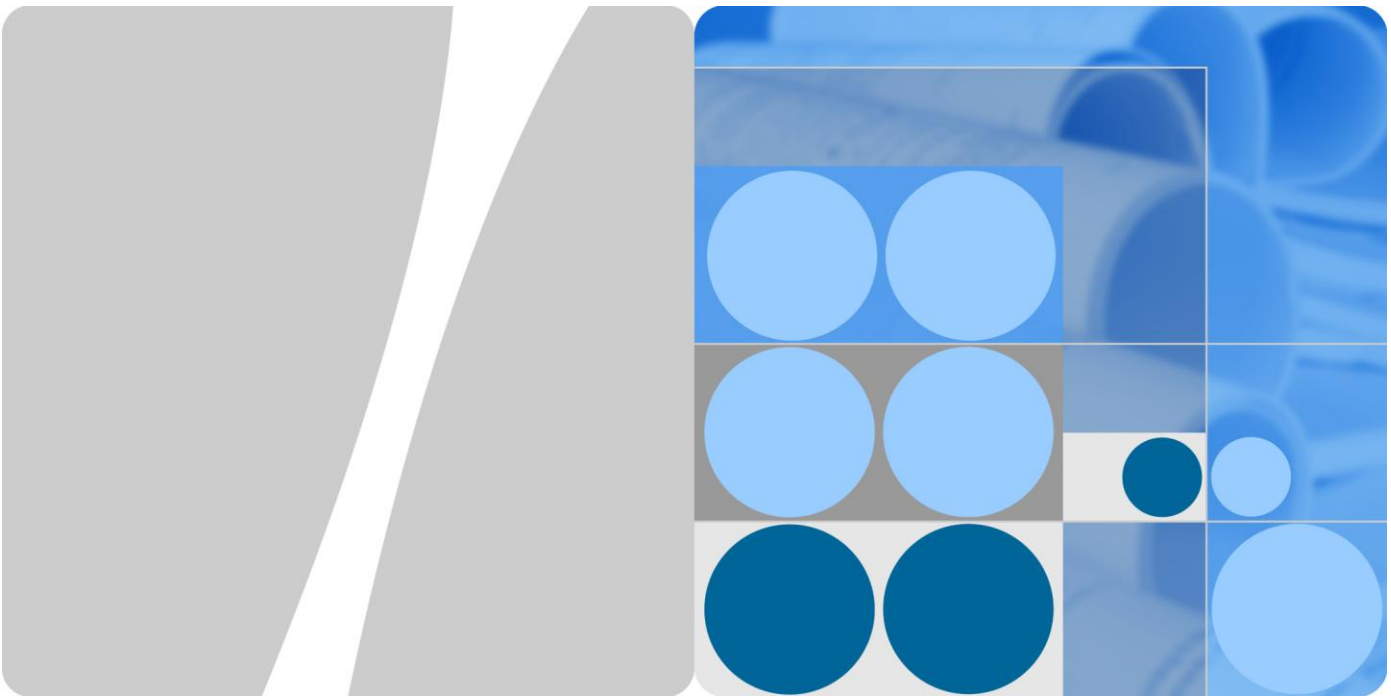

Huawei KunLun Mission Critical Server Technical White Paper

Issue 08

Date 2018-05-30

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About This Document

Purpose

This document delivers comprehensive information about Huawei KunLun mission critical servers in terms of their system architecture, hardware structure, features, ports, technical specifications, standards, and certifications.

Intended Audience

This document is intended for:

- Marketing engineers
- Technical support engineers
- Maintenance engineers

Symbol Conventions

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

Symbol	Description
 DANGER	Alerts you to a high risk hazard that could, if not avoided, result in serious injury or death.
 WARNING	Alerts you to a medium or low risk hazard that could, if not avoided, result in moderate or minor injury.
 CAUTION	Alerts you to a potentially hazardous situation that could, if not avoided, result in equipment damage, data loss, performance deterioration, or unanticipated results.
 TIP	Provides a tip that may help you solve a problem or save time.
 NOTE	Provides additional information to emphasize or supplement important points in the main text.

Change History

Changes between document issues are cumulative. The latest document issue contains all the changes made in earlier issues.

Issue 08 (2018-05-30)

This issue is the eighth official release, which incorporates the following changes:

- Added the support for 12P and 20P configurations.
- Added the support for uneven physical partitions.

Issue 07 (2017-12-26)

This issue is the seventh official release, which incorporates the following changes:

- Added the information about resource expansion enclosures (REEs).
- Added LPar feature description.

Issue 06 (2017-08-26)

This issue is the sixth official release, which incorporates the following changes:

- Added the 4-socket configuration of the KunLun 9008.
- Added the form factor of the KunLun 9016 without a cabinet.

Issue 05 (2016-11-18)

This issue is the fifth official release, which incorporates the following changes:

- Modified information about warranty in China.

Issue 04 (2016-05-13)

This issue is the fourth official release, which incorporates the following changes:

- Added KunLun 9008 product specifications, technical specifications, and advantages.

Issue 03 (2016-04-07)

This issue is the third official release, which incorporates the following changes:

- Updated information about server power consumption.
- Modified information about warranty in China.

Issue 02 (2016-03-10)

This issue is the second official release.

Issue 01 (2016-01-28)

This issue is the first official release.

Contents

1 Product Overview

1.1 Functions

Huawei KunLun mission critical servers are based on Intel® Xeon® E7 - 4800/8800 v3 or v4 4-processors and Huawei proprietary Hi1503 chips to implement Cache Coherent Non-Uniform Memory Access (CC-NUMA). The CC-NUMA systems support smooth expansion to a maximum of 32 processors based on service requirements, with a 4-processor unit as a node. KunLun servers include KunLun 9008, 9016, and 9032.

KunLun servers combine high computing performance with large memory capacity, easy management, and high scalability, reliability, and elasticity. They are ideal for enterprises' mission-critical applications, such as:

- Large Online Transaction Processing (OLTP) and Online Analytical Processing (OLAP) databases
- HANA in-memory databases
- Enterprise Resource Planning (ERP) and Customer Relationship Management (CRM) systems
- High-Performance Computing (HPC) fat nodes

KunLun servers leverage elastic partitioning technology to provide a multi-partition feature. With KunLun physical partitioning (K-Par) technology, KunLun server resources can be electrically isolated into multiple physical partitions by socket. Each physical partition can run independently. When compared with virtualization-based software partitioning, physical partitioning delivers higher reliability. With logical partitioning (L-Par) technology, KunLun server resources can be divided into multiple logical partitions by core. Compared with KPar, the LPar supports more flexible partition modes and dynamic allocation. The logical partitions are isolated by the firmware layer. The I/O device access does not require the intermediate layer to perform instruction conversion. Compared with the traditional virtualization software, logical partitioning delivers higher performance and reliability.

1.2 Appearance

Figure 1-1 shows the appearance of a KunLun server.

Figure 1-1 KunLun server with Huawei cabinet and acoustic doors

Figure 1-2, Figure 1-3, and Figure 1-4 show the front views of the servers. Table 1-1, Table 1-2, and Table 1-3 lists server components. Table 1-4 describes the functions of server components.

Figure 1-2 Front views of the 9032, 9016, and 9008 (single cabinet, without REEs)

Table 1-1 Server components

No.	Component	No.	Component
1	APD	2	SCE 4
3	SCE 3	4	CME
5	SCE 2	6	SCE 1

Figure 1-3 Front views of the 9016 and 9008 (single cabinet, with REEs)

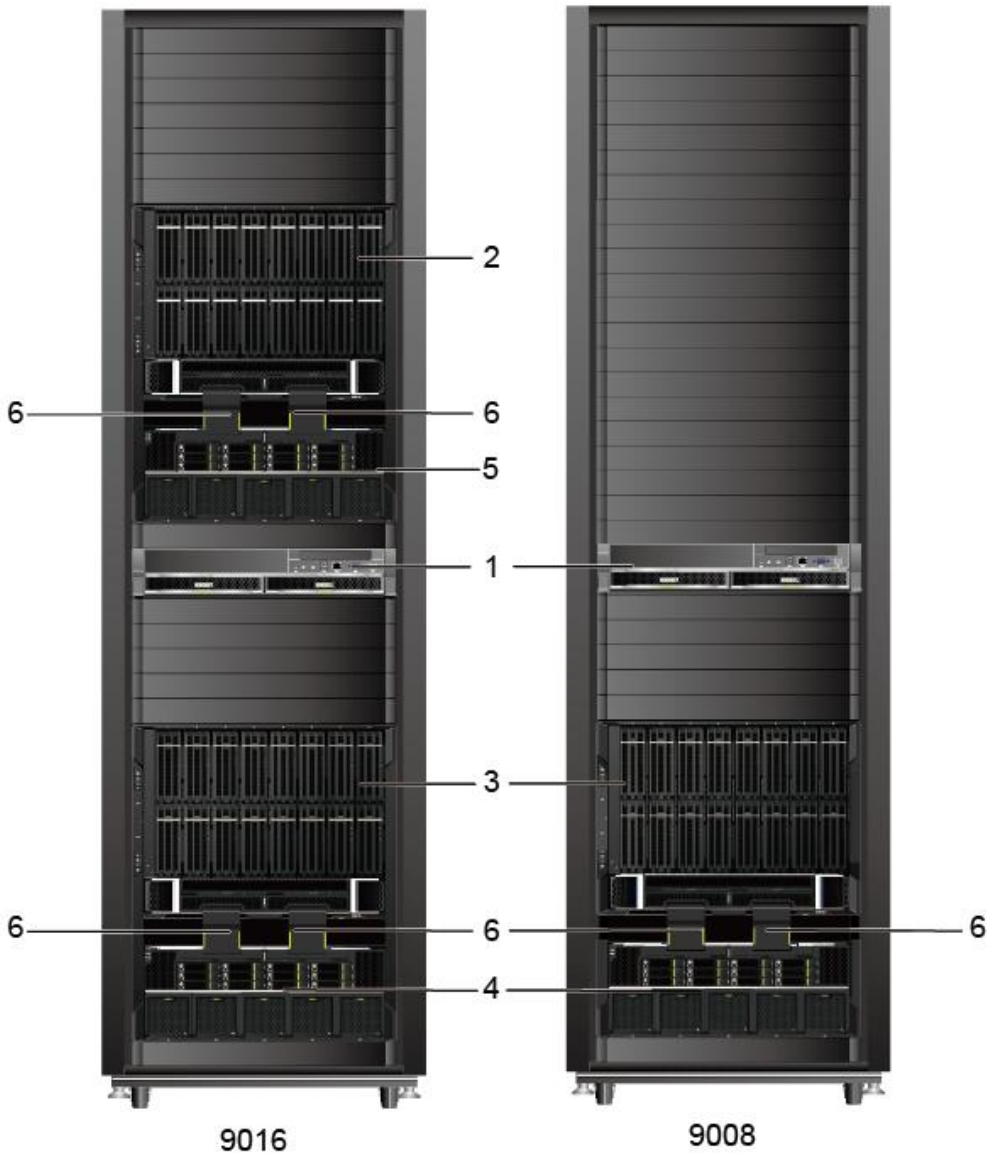

Table 1-2 Server components

No.	Component	No.	Component
1	CME	2	SCE 2
3	SCE 1	4	REE1
5	REE2	6	FPC

Figure 1-4 Front views of the 9032-32P and 9032-20P (combined cabinets, with REEs)

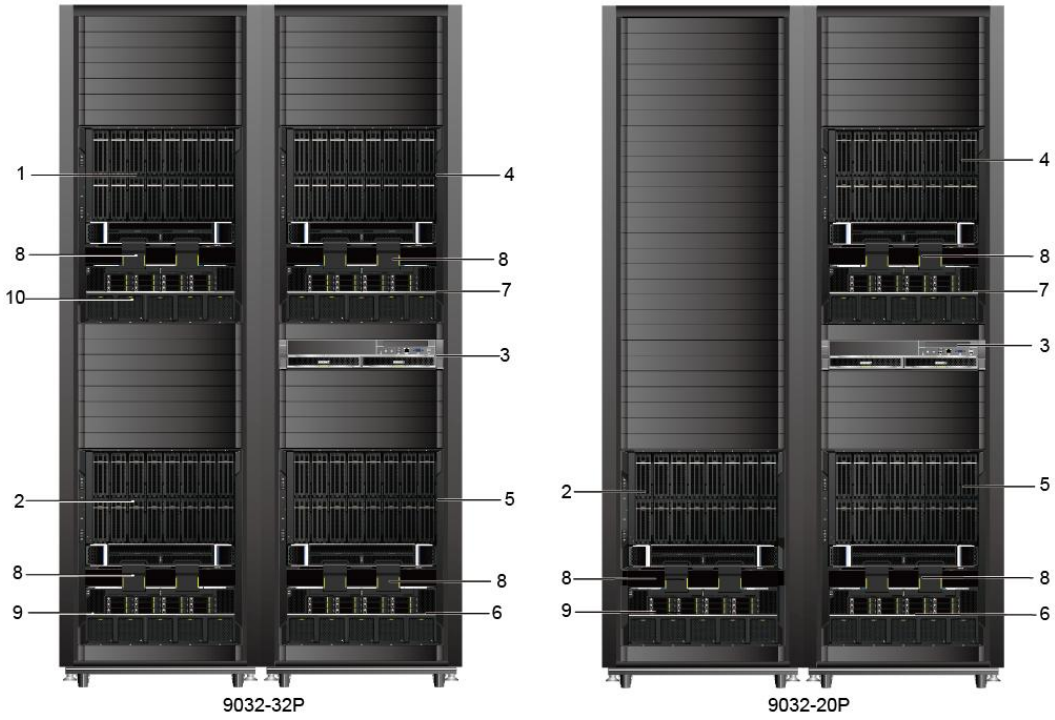

Table 1-3 Server components

No.	Component	No.	Component
1	SCE 4	2	SCE 3
3	CME	4	SCE 2
5	SCE 1	6	REE1
7	REE2	8	FPC
9	REE3	10	REE4

NOTE

When a 9032-20P is configured with 20 CPUs, SCMs 5 to 8 of SCE 3 are not configured. When a 9016-12P is configured with 12 CPUs, SCMs 5 to 8 of SCE 2 are not configured. When a 9008-4P is configured with four CPUs, SCMs 5 to 8 of SCE 1 are not configured.

Table 1-4 Functions of server components

Component	Qty. (9032)	Qty. (9016)	Qty. (9008)	Function
Cabinet	Single-cabinet or combined-cabinet		Single-cabinet	A KunLun server must be installed in standard 42U cabinets, which can be a single KunLun or third-party cabinet, or two combined KunLun cabinets. The cabinet is 2000 mm (78.74 in.) high and 1200 mm

Component	Qty. (9032)	Qty. (9016)	Qty. (9008)	Function
				(47.24 in.) deep. It is made of structural steel and is composed of the main body, side doors, guide rails, power distribution units (PDUs), panels, and decorations, with four rollers at the bottom. When the server is installed in a third-party cabinet, the cabinet must meet related technical requirements. For details, see the *KunLun Mission Critical Server Environment Checklist and Application Info Collection*.
System compute enclosure (SCE)	4 (32P) or 3 (20P)	2	1	An SCE contains the following components: • System compute module (SCM) • Memory board module (MBM) • Node controller module (NCM) • Front I/O module (FIO) • Back I/O module (BIO) Each SCE consists of two basic partition units (BPUs). The SCEs in a cabinet can be connected through NCMs and high-speed NI cables to form a single system. They can also be divided into multiple physical partitions.
Central Management Enclosure (CME)	1			• Enables centralized management of components in the cabinet. The CME allows users to query the information, status, and fault events of components in the cabinet by using the CMC web user interface (WebUI) or command line interface (CLI). • Provides local maintenance ports and remote virtual KVM that facilitate software installation, service deployment, preventive maintenance, and troubleshooting. • Enables partition management and monitoring. The CME allows users to create, modify, and delete partitions, and to monitor partition status in real time by using the CMC WebUI. • Provides redundant advanced clock modules (ACMs) and enables LCD-based management.
Acoustic door	Optional			A KunLun server can be equipped with front and rear acoustic doors to reduce noise and prevent electromagnetic interference (EMI). The front acoustic door comes with an 8-inch capacitive touchscreen LCD for local management and maintenance, such as device information query and status monitoring.
AC power distribution (APD)	Optional	N/A		• Provides standard single-phase industrial plugs to connect to the power supply equipment in the equipment room. • Supplies power to the SCEs through power cables. **NOTE**

Component	Qty. (9032)	Qty. (9016)	Qty. (9008)	Function
				A 9032-32P server uses an APD and PDUs for power supply. A 9032-20P, 9016, or 9008 server uses only PDUs for power supply.
REE	Optional			Contains the switch module, RAID controller card, hard disk, back I/O module (BIO), fan module, and PSU components. The REE increases the number of standard PCIe slots and supports RAID controller cards and hard disks. In this way, the local storage is not affected by I/O expansion. One SCE supports one REE.
Flexible printed circuit (FPC)	Optional Used when an REE is installed.			Adopts flexible circuit technology to connect an SCE to an REE and lead the PCIe and control resources of the SCE to the REE, facilitating PCIe resource extension and REE management. Each REE requires two FPCs.

NOTE

KunLun servers support shipment with or without cabinets. Cabinets and acoustic doors are delivered in shipment with cabinets, but are not delivered in shipment without cabinets. If the servers need to be installed in the customer's cabinets, the customer's cabinet must meet certain requirements. For details, see the *KunLun Mission Critical Server Ambient Environment and Application Information Checklist*.

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1.2.1 SCE

Figure 1-5 and Figure 1-6 show SCEs in different configurations.

Figure 1-5 Appearance of an SCE that is configured with FIO-A and does not support an REE

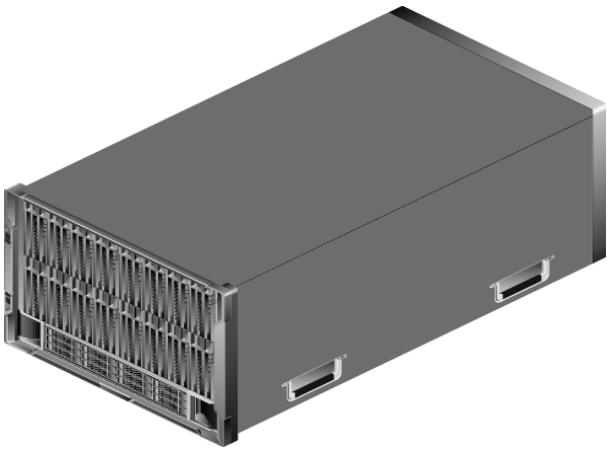


Figure 1-6 Appearance of an SCE that is configured with FIO-G and supports an REE

Front View

Figure 1-7 shows the front view of an SCE that does not support an REE. Table 1-5 describes the SCE components at the front. Table 1-6, Table 1-7, and Table 1-8 provide the slot layouts.

Figure 1-7 Front view of an SCE that is configured with FIO-A and does not support an REE

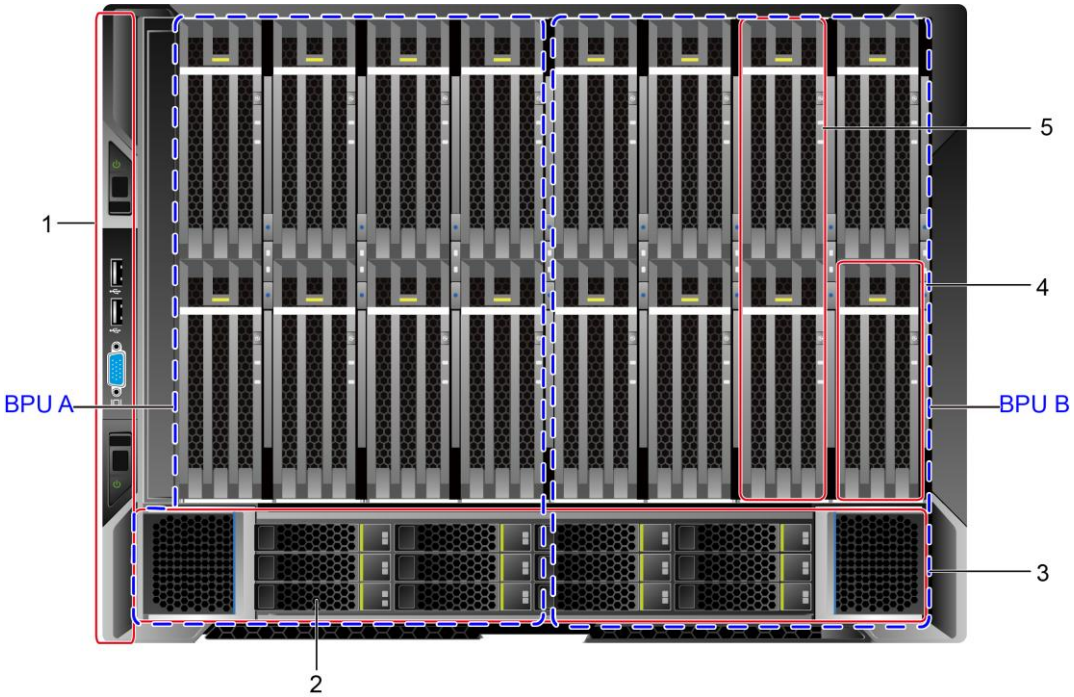


Table 1-5 SCE components at the front

No.	Component	No.	Component
1	Left mounting ear	2	Hard disk drive (HDD) or solid-state disk (SSD)
3	FIO-A	4	MBM
5	SCM	-	-

SCMs in an SCE are numbered 1 to 8 from left to right. Table 1-6 provides the SCM slot layout.

Table 1-6 SCM slot layout

SCM 1	SCM 2	SCM 3	SCM 4	SCM 5	SCM 6	SCM 7	SCM 8

Each SCM consists of two memory board modules (MBMs). Table 1-7 provides the MBM slot layout from left to right.

Table 1-7 MBM slot layout

MBM 1	MBM 3	MBM 5	MBM 7	MBM 9	MBM 11	MBM 13	MBM 15
MBM 2	MBM 4	MBM 6	MBM 8	MBM 10	MBM 12	MBM 14	MBM 16

Each SCE provides 12 hard disk slots. Table 1-8 provides the hard disk slot layout from left to right.

Table 1-8 Hard disk slot layout

HDD 0	HDD 3	HDD 6	HDD 9
HDD 1	HDD 4	HDD 7	HDD 10
HDD 2	HDD 5	HDD 8	HDD 11

NOTE

- When a 9008-4P is configured with four CPUs, SCMs 5 to 8 and MBMs 9 to 16 of SCE 1 are not configured.
- When a 9016-12P is configured with 12 CPUs, SCMs 5 to 8 and MBMs 9 to 16 of SCE 2 are not configured, and HDD slots 6 to 11 SCE 2 are unavailable.
- When a 9032-20P is configured with 20 CPUs, SCMs 5 to 8 and MBMs 9 to 16 of SCE 3 are not configured, and HDD slots 6 to 11 SCE 3 are unavailable.

Figure 1-8 shows the front view of an SCE that supports an REE. Table 1-9 describes the SCE components at the front. Except the FIO, other components are the same as those of an SCE that does not support an REE.

Figure 1-8 Front view of an SCE that is configured with FIO-G and supports an REE

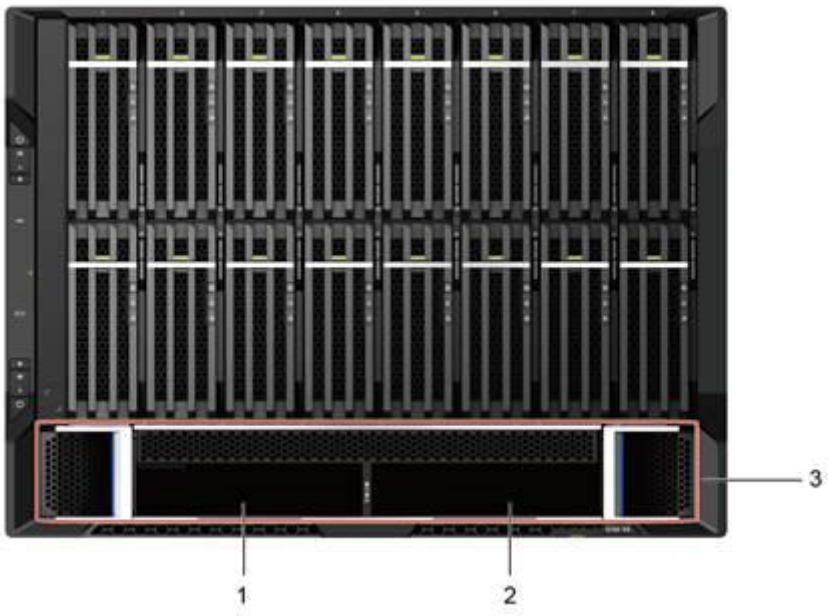


Table 1-9 Front view components of an SCE that is configured with FIO-G and supports an REE

No.	Component	No.	Component
1	FPC 1	2	FPC 2
3	FIO-G		

Rear View

Figure 1-9 shows the rear view of an SCE. Table 1-10 describes the SCE components at the rear.

Figure 1-9 SCE rear view

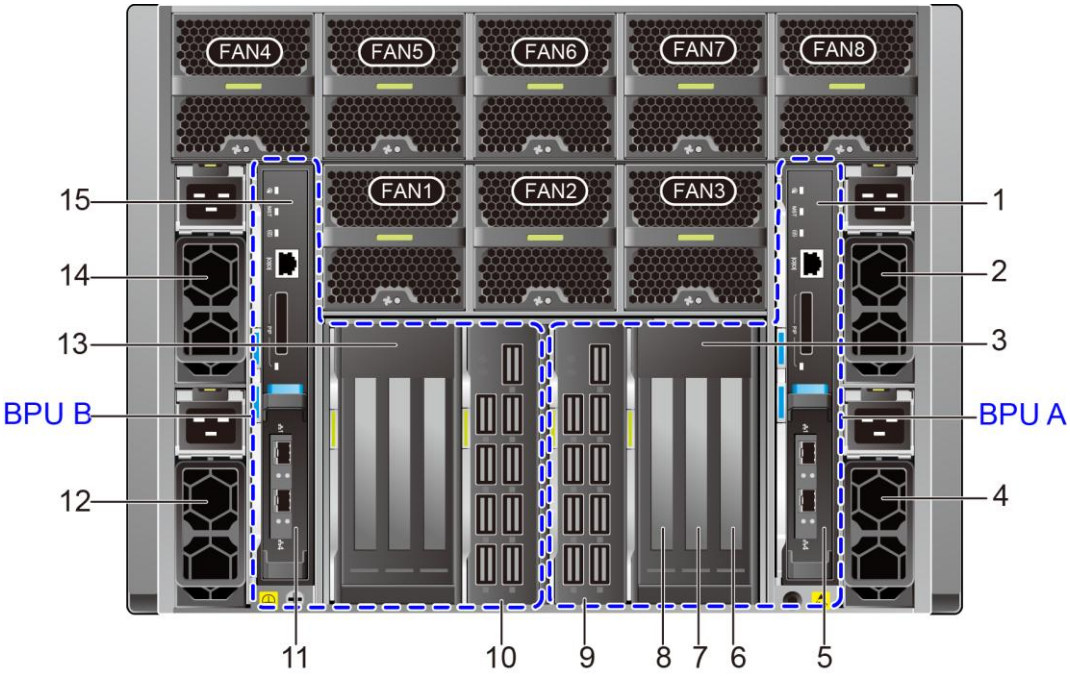


Table 1-10 SCE components at the rear

No.	Component	No.	Component
1	Local partition management module (LPM) 2	2	Power supply unit (PSU) 4
3	Back I/O module (BIO) 2	4	PSU 3
5	LOM	6	Non-hot-swappable PCIe3.0 x8 card in slot 3 on BIO 2
7	Non-hot-swappable PCIe3.0 x8 card in slot 2 on BIO 2	8	Non-hot-swappable PCIe3.0 x16 card in slot 1 on BIO 2
9	NCM 2	10	NCM 1
11	LOM	12	PSU 1
13	BIO 1	14	PSU 2
15	LPM 1	-	-

NOTE

- LPM is short for local partition management module.
- The number of PSUs is determined based on server configuration requirements.
- Two types of BIOs are available: BIO-A and BIO-B. BIO-A provides two standard slots for hot-swappable PCIe cards. BIO-B provides three standard slots for non-hot-swappable PCIe cards. The BIOs shown in Figure 1-9 are BIO-B modules. When a 9008 server is equipped with four CPUs, the PCIe slots of BIO 1 are unavailable.

- When a 9008 server is equipped with four CPUs, NCMs are not configured.
- An SCE has two basic partition units (BPUs), BPU A and BPU B.
- A BPU consists of the following logical resources: four SCMs, one RAID controller card, six HDDs or SSDs, one LPM (including one south bridge PCH and one BMC), one LOM, one BIO, and one NCM. When the SCE is configured with an REE, the logical resources of the BPU also include the hard disks and I/O resources in the REE. For details, see the description if of the REE.

  A physical partition can include one or more BPUs, but has only one primary BPU. The primary BPU hosts the SCMs whose CPUs are connected to the legacy PCH. The legacy PCH in a physical partition is the only southbridge PCH that is working properly.
- In a 9008-4P, NCM 1 and NCM 2 are not configured.
- In a 9008-4P, the PCIe slots of BIO 1 of SCE 1 are unavailable. In a 9016-12P, the PCIe slots of BIO 1 of SCE 2 are unavailable. In a 9032-20P, the PCIe slots of BIO 1 of SCE 3 are unavailable.

1.2.2 CME

Appearance

Figure 1-10 shows a CME.

Figure 1-10 CME

Front View

Figure 1-11 shows the front view of a CME. Table 1-11 describes the CME components at the front.

Figure 1-11 CME front view

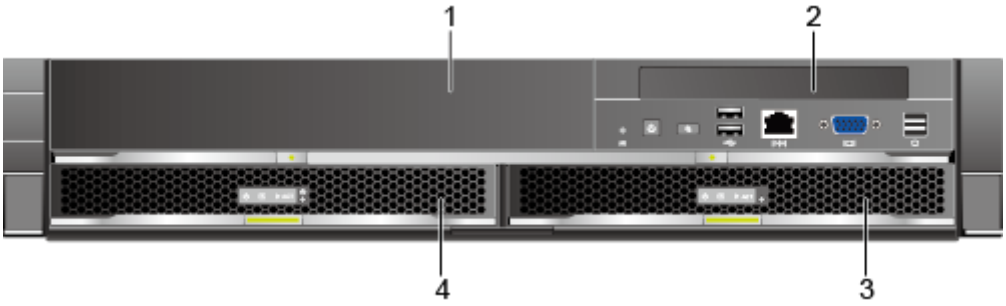


Table 1-11 CME components (front)

No.	Component	No.	Component
1	CIM	2	DVD drive
3	CMC 2	4	CMC 1

NOTE

- CMC stands for central management console.
- CIM stands for central interface module.

Rear View

Figure 1-12 shows the rear view of a CME. Table 1-12 describes the CME components at the rear.

Figure 1-12 CME rear view

Table 1-12 CME components (rear)

No.	Component	No.	Component
1	ACM 2	2	CPI 2
3	PFM 2	4	CPI 1

No.	Component	No.	Component
5	ACM 1	6	PFM 1

NOTE
- ACM stands for advanced clock module.
- CPI stands for central partition interconnect module.
- PFM stands for power and fan integrity module.

1.2.3 REE

Appearance

#EN-US_TOPIC_0090150743/it_kunlun_server_300006_fig01 shows a REE.

Figure 1-13 Appearance of an REE

Front View

Figure 1-14 shows the front view of an REE. Table 1-13 describes the REE components at the front.

Figure 1-14 Front view of an REE

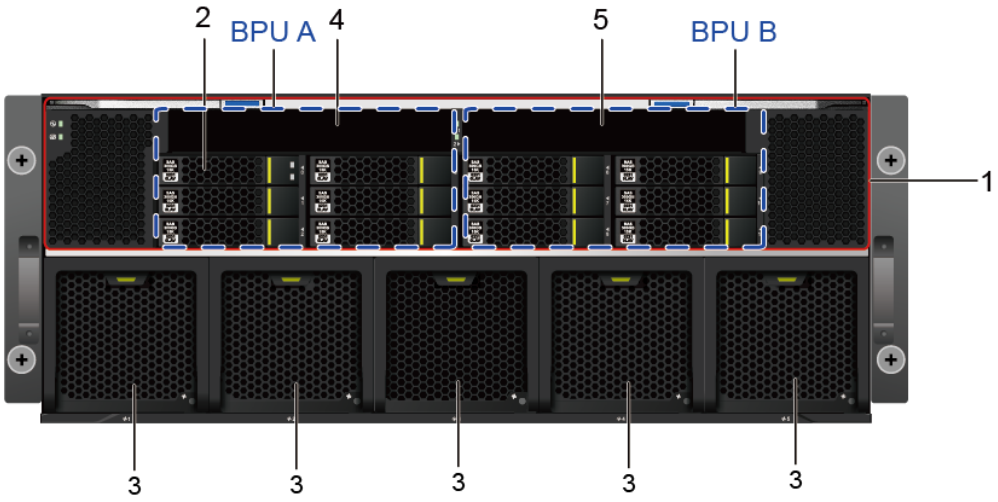


Table 1-13 REE components at the front

No.	Component	No.	Component
1	Switch module	2	Hard disk
3	Fan module	4	FPC 1
5	FPC 2		

Each REE provides 12 hard disk slots and five fan slots. Table 1-14 provides the hard disk slot layout from left to right and Table 1-15 provides the fan slot layout from left to right.

Table 1-14 Hard disk slot layout

HDD 0	HDD 3	HDD 6	HDD 9
HDD 1	HDD 4	HDD 7	HDD 10
HDD 2	HDD 5	HDD 8	HDD 11

NOTE

When a 9016-12P is configured with two REEs, HDD slots 6 to 11 of REE 2 are unavailable. When a 9032-20P is configured with three REEs, HDD slots 6 to 11 of REE 3 are unavailable.

Table 1-15 Fan slot layout

Fan 1	Fan 2	Fan 3	Fan 4	Fan 5

Rear View

The back I/O module (BIO) groups in an REE are classified into the following types:

- Non-hot-swappable BIO group that supports 15 non-hot-swappable PCIe cards: consists of one BIO-C that supports eight standard half-height non-hot-swappable PCIe3.0 x4 slots and one BIO-D that supports seven standard half-height non-hot-swappable PCIe3.0 x8 slots. The two BIOs can be installed in slots BIO 1 and BIO 2 or slots BIO 3 and BIO 4 in the REE.
- Hot-swappable BIO group that supports five hot-swappable PCIe slots: consists of one BIO-E that supports two standard full-height hot-swappable PCIe3.0 x16 slots and three standard full-height hot-swappable PCIe3.0 x8 slots. This BIO can be installed in slot BIO 1 or BIO 3 in the REE.

The REE supports two BIO groups, which can be flexibly configured with non-hot-swappable and hot-swappable BIOs. There are four optional combinations, as shown in Figure 1-15, Figure 1-16, Figure 1-17, and Figure 1-18.

Figure 1-15 REE rear view (with two hot-swappable BIO groups)

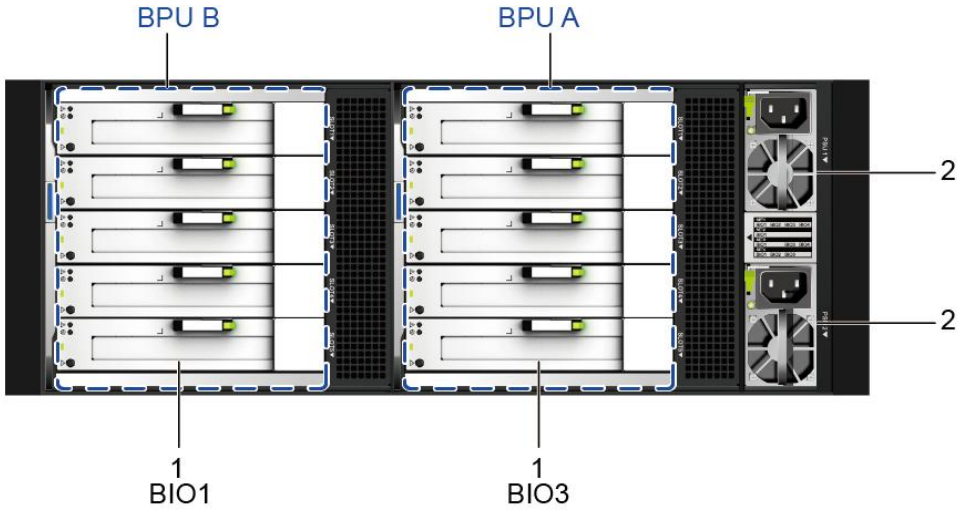


Table 1-16 REE components at the rear (with two hot-swappable BIO groups)

No.	Component	No.	Component
1	BIO-E	2	PSU

Table 1-17 BIO slot layout (with two hot-swappable BIO groups)

BIO1	BIO3
Slot 1, PCIe3.0 x16	Slot 1, PCIe3.0 x16
Slot 2, PCIe3.0 x16	Slot 2, PCIe3.0 x16
Slot 3, PCIe3.0 x8	Slot 3, PCIe3.0 x8

BIO1	BIO3
Slot 4, PCIe3.0 x8	Slot 4, PCIe3.0 x8
Slot 5, PCIe3.0 x8	Slot 5, PCIe3.0 x8

Figure 1-16 REE rear view (with two non-hot-swappable BIO groups)

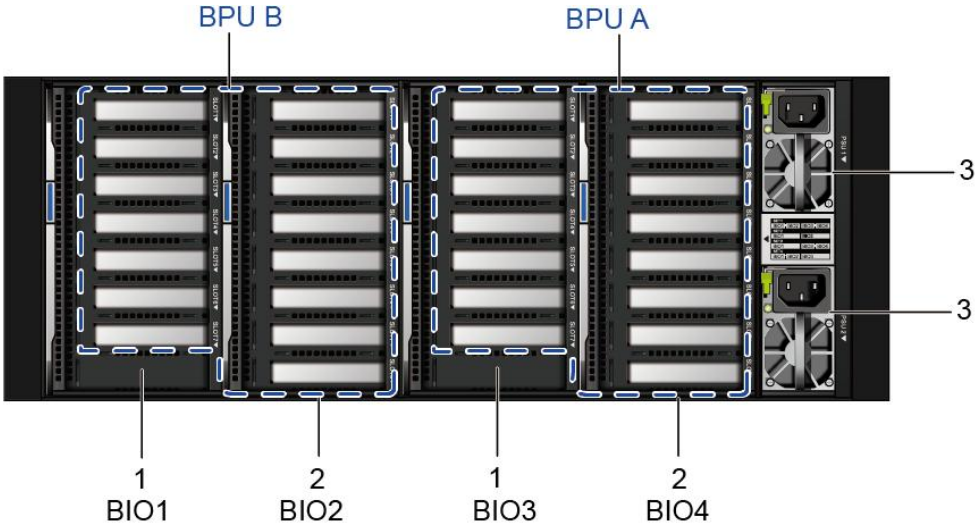


Table 1-18 REE components at the rear (with two non-hot-swappable BIO groups)

No.	Component	No.	Component
1	BIO-D (seven slots)	2	BIO-C (eight slots)
3	PSU		

Table 1-19 provides the slot layout from left to right.

Table 1-19 BIO slot layout (with two non-hot-swappable BIO groups)

BIO 1	BIO 2	BIO 3	BIO 4
Slot 1, PCIe3.0 x8	Slot 1, PCIe3.0 x4	Slot 1, PCIe3.0 x8	Slot 1, PCIe3.0 x4
Slot 2, PCIe3.0 x8	Slot 2, PCIe3.0 x4	Slot 2, PCIe3.0 x8	Slot 2, PCIe3.0 x4
Slot 3, PCIe3.0 x8	Slot 3, PCIe3.0 x4	Slot 3, PCIe3.0 x8	Slot 3, PCIe3.0 x4
Slot 4, PCIe3.0 x8	Slot 4, PCIe3.0 x4	Slot 4, PCIe3.0 x8	Slot 4, PCIe3.0 x4
Slot 5, PCIe3.0 x8	Slot 5, PCIe3.0 x4	Slot 5, PCIe3.0 x8	Slot 5, PCIe3.0 x4
Slot 6, PCIe3.0 x8	Slot 6, PCIe3.0 x4	Slot 6, PCIe3.0 x8	Slot 6, PCIe3.0 x4
Slot 7, PCIe3.0 x8	Slot 7, PCIe3.0 x4	Slot 7, PCIe3.0 x8	Slot 7, PCIe3.0 x4

BIO 1	BIO 2	BIO 3	BIO 4
	Slot 8, PCIe3.0 x4		Slot 8, PCIe3.0 x4

Figure 1-17 Rear view of an REE with one hot-swappable BIO group and one non-hot-swappable BIO group

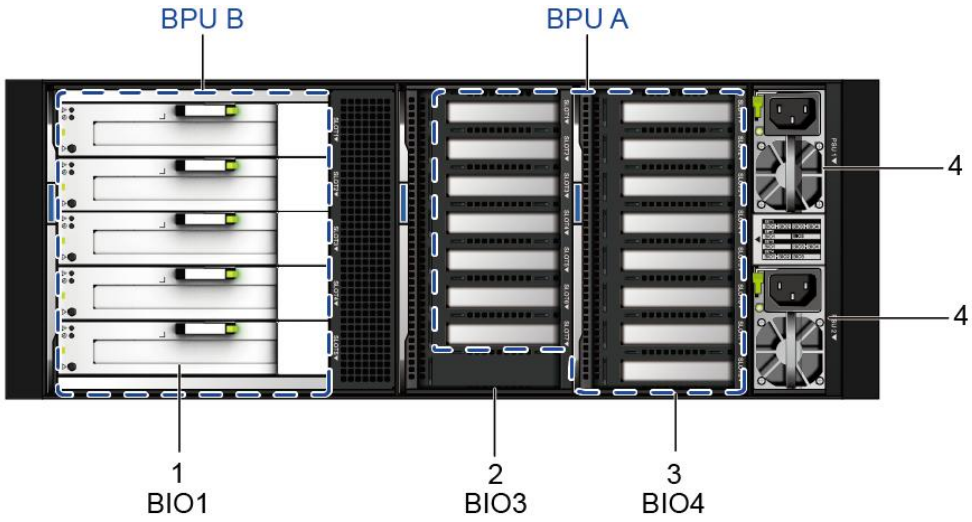


Table 1-20 Components at the rear of an REE with one hot-swappable BIO group and one non-hot-swappable BIO group

No.	Component	No.	Component
1	BIO-E	2	BIO-D (seven slots)
3	BIO-C (eight slots)	4	PSU

Table 1-21 BIO slot layout (with one hot-swappable BIO group and one non-hot-swappable BIO group)

BIO1	BIO3	BIO4
Slot 1, PCIe3.0 x16	Slot 1, PCIe3.0 x8	Slot 1, PCIe3.0 x4
Slot 2, PCIe3.0 x16	Slot 2, PCIe3.0 x8	Slot 2, PCIe3.0 x4
Slot 3, PCIe3.0 x8	Slot 3, PCIe3.0 x8	Slot 3, PCIe3.0 x4
Slot 4, PCIe3.0 x8	Slot 4, PCIe3.0 x8	Slot 4, PCIe3.0 x4
Slot 5, PCIe3.0 x8	Slot 5, PCIe3.0 x8	Slot 5, PCIe3.0 x4
	Slot 6, PCIe3.0 x8	Slot 6, PCIe3.0 x4
	Slot 7, PCIe3.0 x8	Slot 7, PCIe3.0 x4

BIO1	BIO3	BIO4
		Slot 8, PCIe3.0 x4

Figure 1-18 Rear view of an REE with one non-hot-swappable BIO group and one hot-swappable BIO group

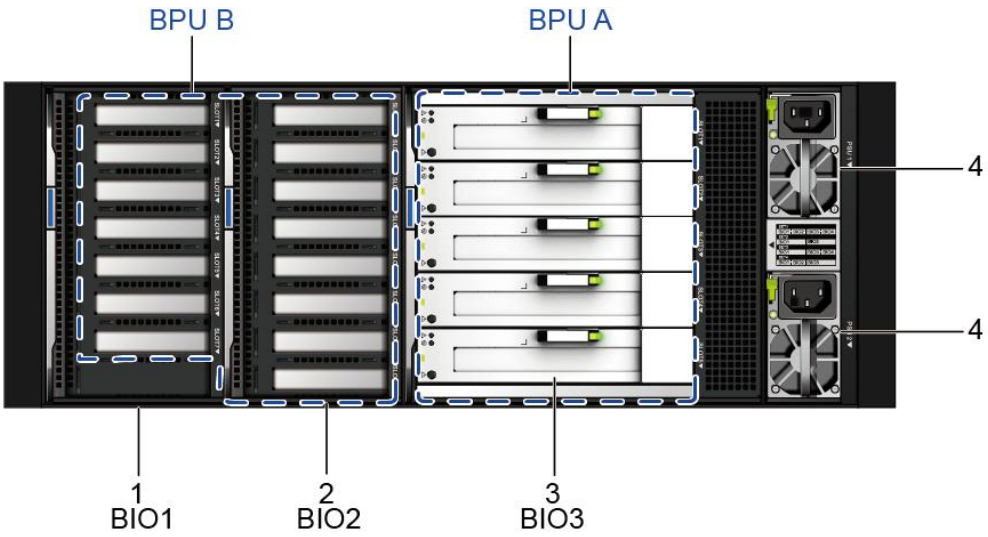


Table 1-22 Components at the rear of an REE with one non-hot-swappable BIO group and one hot-swappable BIO group

No.	Component	No.	Component
1	BIO-D (seven slots)	2	BIO-C (eight slots)
3	BIO-E	4	PSU

Table 1-23 BIO slot layout (with one non-hot-swappable BIO group and one hot-swappable BIO group)

BIO1	BIO 2	BIO3
Slot 1, PCIe3.0 x8	Slot 1, PCIe3.0 x4	Slot 1, PCIe3.0 x16
Slot 2, PCIe3.0 x8	Slot 2, PCIe3.0 x4	Slot 2, PCIe3.0 x16
Slot 3, PCIe3.0 x8	Slot 3, PCIe3.0 x4	Slot 3, PCIe3.0 x8
Slot 4, PCIe3.0 x8	Slot 4, PCIe3.0 x4	Slot 4, PCIe3.0 x8
Slot 5, PCIe3.0 x8	Slot 5, PCIe3.0 x4	Slot 5, PCIe3.0 x8
Slot 6, PCIe3.0 x8	Slot 6, PCIe3.0 x4	
Slot 7, PCIe3.0 x8	Slot 7, PCIe3.0 x4	

BIO1	BIO 2	BIO3
	Slot 8, PCIe3.0 x4	

NOTE

1. When a 9008-4P is configured with one REE, the PCIe slots of BIO 1 in the REE are unavailable. When a 9016-12P is configured with two REEs, the PCIe slots of BIO 1 and BIO 2 in REE 2 are unavailable. When a 9032-20P is configured with three REEs, the PCIe slots of BIO 1 and BIO 2 in REE 3 are unavailable.

2. When a SCE is configured with a REE, the logical resources of a BPU also include the hard disks and I/O resources in the REE. BPU A consists of six front HDD slots 0 to 5 and PCIe slots in BIO 3 and BIO 4. BPU B consists of six front HDD slots 6 to 11 and PCIe slots in BIO 1 and BIO 2.

1.2.4 Acoustic Doors

Appearance

Figure 1-19 shows a front acoustic door.

Figure 1-19 Front acoustic door

Front and Rear Acoustic Doors

Figure 1-20 shows front and rear acoustic doors. Table 1-24 describes their components.

Figure 1-20 Front and rear acoustic doors

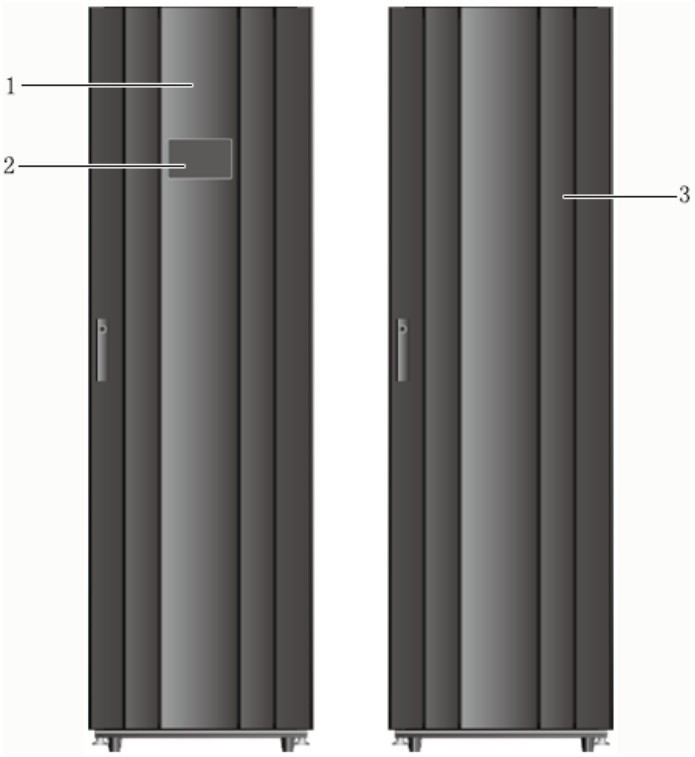


Table 1-24 Components of front and rear acoustic doors

No.	Component	No.	Component
1	Front acoustic door	2	8-inch LCD
3	Rear acoustic door	-	-

1.3 Ports

1.3.1 SCE Ports

Figure 1-21 shows the ports on the SCE front panel. Table 1-25 describes the ports.

Figure 1-21 Ports on the SCE front panel

Table 1-25 Ports on the SCE front panel

No.	Port	Connector	Qty. Per Module	Single-System Mode	Physical Partition Mode	Description
1	USB port	USB 2.0 - A Male	2	Only the USB ports on the primary SCE (SCE 1) are available.	Only the USB ports on the primary SCE of each physical partition are available. If the primary SCE is divided into two 4-socket physical partitions, the USB ports are assigned to the physical partition where BPU A is located, by default. **NOTE** To assign the USB ports to the physical partition where BPU B is located, use the Serial Over LAN (SOL) feature of the CMC to access the baseboard management controller (BMC) CLI, and then use the BMC CLI.	The USB ports allow USB devices (for example, a USB DVD drive, USB flash drive, USB mouse, and USB keyboard) to connect to the single system or a physical partition.
2	Video graphics	DB15	1	Only the VGA port on the	Only the VGA port on the primary SCE of	The VGA port allows a

No.	Port	Connector	Qty. Per Module	Single-System Mode	Physical Partition Mode	Description
	array (VGA) port			primary SCE (SCE 1) is available.	each physical partition is available. If the primary SCE is divided into two 4-socket physical partitions, the VGA port is assigned to the physical partition where BPU A is located, by default. **NOTE** To assign the VGA port to the physical partition where BPU B is located, use the SOL feature of the CMC and then use the BMC CLI.	monitor or a keyboard, video, and mouse (KVM) to connect to the single system or a physical partition to display the real-time desktop.

Figure 1-22 shows the ports on the SCE front panel. Table 1-26 describes the ports.

Figure 1-22 Ports on the SCE rear panel

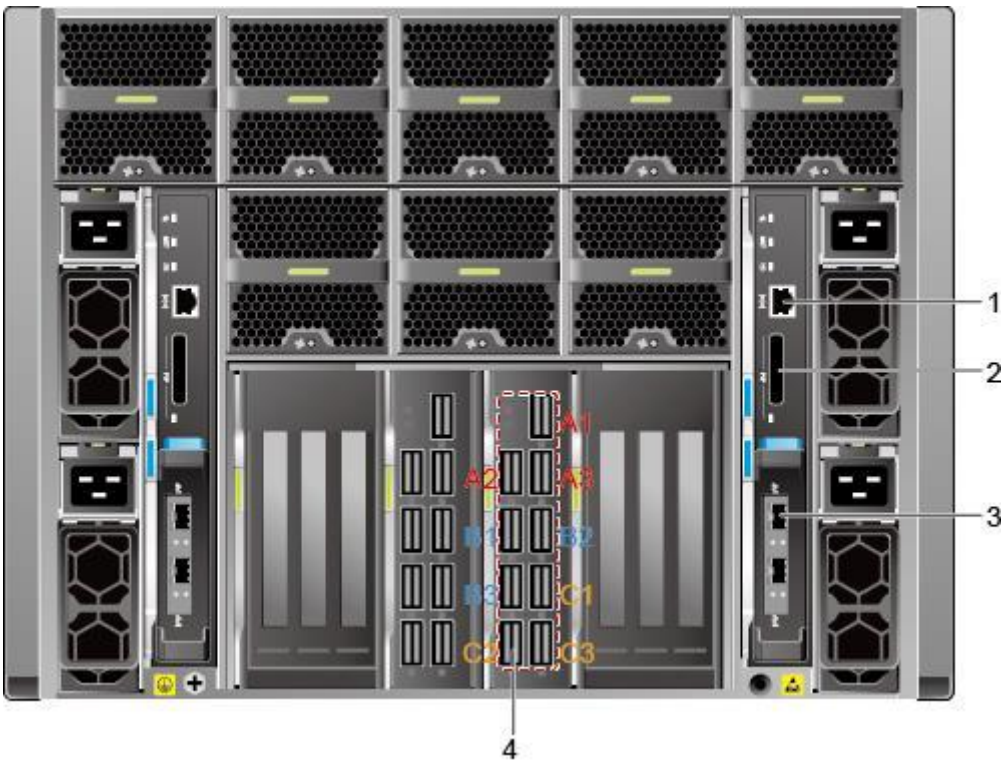


Table 1-26 Ports on the SCE rear panel

No.	Port	Connector	Qty. Per Module	Single-System Mode	Physical Partition Mode	Description
1	Serial port	RJ45	1	• If the serial port is set as the system serial port, only the serial port on LPM 2 in the primary SCE (SCE 1) is available. • If the serial port is set as the BMC serial port, the serial port on each BPU is available. **NOTE** To set the serial port of a BPU as the BMC serial port, use the BMC CLI of the BPU.	• If the serial port is set as the system serial port, only the serial port on the LPM of the primary BPU in each physical partition is available. • If the serial port is set as the BMC serial port, the serial port on each BPU is available. **NOTE** To set the serial port of a BPU as the BMC serial port, use the BMC CLI of the BPU.	The serial port functions as the system serial port by default, and can be set as the BMC serial port by using the BMC CLI.
2	Partition interconnect port (PIP)	PCIe 1.0	1	Available	Available	A PIP connects a CPI and an LPM. Each SCE has two LPMs. Each LPM has one PIP, and each SCE has two PIPs in active/standby mode. By default, the PIP in LPM 2 is active, and the PIP in LPM 1 is standby. PIPs manage and control the two BPUs in an SCE. To be specific, PIPs control physical partitions, manage hardware resources, and deliver system clock signals from the CME to SCEs.

No.	Port	Connector	Qty. Per Module	Single-System Mode	Physical Partition Mode	Description
3	LOM network port	GE or 10GE electrical port, or 10GE optical port	2 or 4	Available By default, the PXE functions of LOM network ports on LPM 2 in SCE 1 are enabled. **NOTE** The PXE functions of other LOM network ports and network ports on NICs in standard PCIe slots are disabled by default, and can be enabled by using the basic input/output system (BIOS).	Available By default, the PXE functions of LOM network ports on LPM 2 in the primary SCE in each physical partition are enabled. **NOTE** The PXE functions of other LOM network ports and network ports on NICs in standard PCIe slots are disabled by default, and can be enabled by using the BIOS.	An SCE supports two flexible LOMs. The GE or 10GE ports on LOMs, combined with the network ports on standard NICs in PCIe slots, allow access to and management of the in-band service system. The port type and quantity vary according to the configured LOM type.
4	Node interconnect (NI) port	Standard CXP	3	Available	Available	The NI ports connect NUMA nodes. **NOTE** Each NCM has three NI ports. Each NI port consists of three physical CXP ports. The nine CXP ports are numbered A1, A2, A3, B1, B2, B3, C1, C2, and C3.

1.3.2 CME Ports

Figure 1-23 shows the ports on the CME front panel. Table 1-27 describes the ports.

Figure 1-23 Ports on the CME front panel

Table 1-27 Ports on the CME front panel

No.	Port	Connector	Qty.	Single-System Mode	Physical Partition Mode	Description
1	USB port	USB 2.0 - A Male	2	Available	Available	The USB ports allow USB devices (for example, a USB mouse and keyboard) to connect to the single system or a physical partition.
2	Serial port	RJ45	1	Available	Available	The serial port is used for console redirection. By default, the serial port enables console redirection to the CLI of the active CMC. The port can also be used to access the CLI of a physical partition or board in the server cabinet.
3	VGA port	DB15	1	Available	Available	The VGA port allows a monitor to connect to the single system or a physical partition.
4	LCD connector	MiniSAS 4x port	1	Available	Available	The LCD connector connects the LCD on the front acoustic door to the active CMC over the GE network.

Figure 1-23 shows the ports on the CME rear panel. Table 1-27 describes the ports.

Figure 1-24 Ports on the CME rear panel

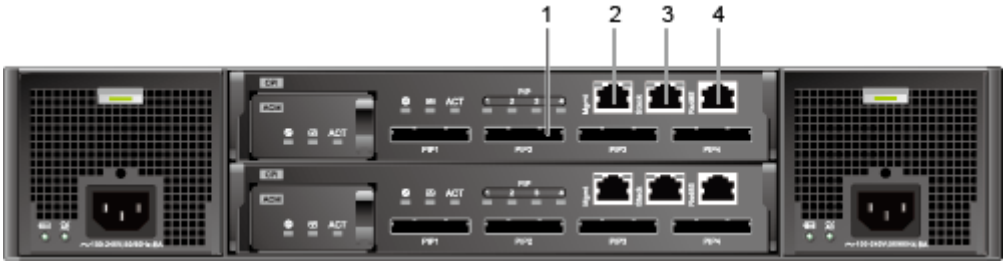


Table 1-28 Ports on the CME rear panel

No.	Port	Connector	Qty.	Single-System Mode	Physical Partition Mode	Description
1	PIP	PCIe 1.0	8	Available	Available	A PIP connects a CPI and an LPM. Each CPI has four PIPs.

No.	Port	Connector	Qty.	Single-System Mode	Physical Partition Mode	Description
						PIPs used by KunLun servers: • 9008: uses PIP 1. • 9016: uses PIPs 1 and 2. • 9032: uses PIPs 1 to 4. PIPs manage and control the two BPUs in an SCE. To be specific, PIPs control physical partitions, manage hardware resources, and deliver system clock signals from the CME to SCEs.
2	Management network port (MGMT)	RJ45	2	Available	Available	The MGMT port is a standard GE port used to manage components in the cabinet. The port supports 10/100/1000BASE-T auto-negotiation. **NOTE** The cable type is UTP5.
3	Stacking port (STACK)	RJ45	2	Available	Available	The STACK port is a standard GE port used to cascade multiple cabinets. The port supports 10/100/1000BASE-T auto-negotiation. **NOTE** The cable type is UTP5. To cascade cabinets, perform the following steps: 1. Connect the STACK ports on the two CPIs in the first cabinet to the MGMT ports on the two CPIs in the second cabinet. There is no restriction for the mapping between the CPIs in the two cabinets. 2. Connect the STACK ports on the two CPIs in the second cabinet to the MGMT ports on the two CPIs in the third cabinet. 3. Use the same cascading method to cascade the other cabinets.
4	RS485 serial port	RJ45	2	Unavailable	Unavailable	This serial port is reserved.

1.4 Indicators and Buttons

You can observe the indicators to determine server status.

1.4.1 SCE Indicators and Buttons

Figure 1-25 shows the indicators and buttons on the front panel of an SCE. Table 1-29 describes the indicators and buttons.

Figure 1-25 Indicators and buttons on the SCE front panel

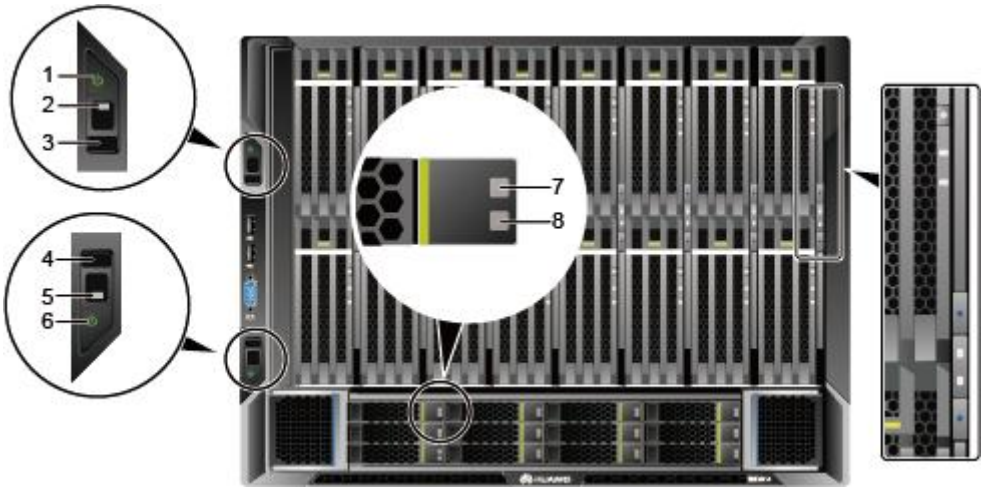


Table 1-29 Indicators and buttons on the SCE front panel

No.	Silk Screen	Location	Name	Color	Single-System Mode	Physical Partition Mode
1	⏻	Left mounting ear	Power button/indicator for BPU A	Yellow and green	Only the power button and indicator on SCE 1 function. • Off: There is no power supply to components in the cabinet. • Blinking yellow: The power supply to the service system is locked temporarily. Therefore, the service system cannot be powered on. In this state, the power button does not function. • Steady yellow: The service system is ready to be powered on.	The power button controls the power status of a physical partition, and the power indicator indicates the power status of the physical partition. The button and indicator will function only if BPU A is the primary BPU. • Off: There is no power supply to components in the cabinet. • Blinking yellow: The power supply to the physical partition is locked temporarily. Therefore, the physical partition

No.	Silk Screen	Location	Name	Color	Single-System Mode	Physical Partition Mode
					In this state, the power button functions. Pressing and holding down the power button for 1 to 3 seconds will power on the system. • Steady green: The service system has been powered on. In this state, the power button functions. Pressing and holding down the power button for 1 to 3 seconds during BIOS startup will power off the system. Pressing and holding down the power button for longer than 4 seconds will forcibly power off the system. **NOTE** The power button functions only once within 10 seconds.	cannot be powered on. In this state, the power button does not function. • Steady yellow: The physical partition is ready to be powered on. In this state, the power button functions. Pressing and holding down the power button for 1 to 3 seconds will power on the system. • Steady green: The physical partition has been powered on. In this state, the power button functions. Pressing and holding down the power button for 1 to 3 seconds during BIOS startup will power off the system. Pressing and holding down the power button for longer than 4 seconds will forcibly power off the system. If BPU A is the secondary BPU, this indicator and button do not function. **NOTE** The power button functions only once within 10 seconds.
2		Left mounting ear	Health indicator for BPU A	Red and green	The health indicator indicates the health status of BPU A in an SCE, regardless of the operating mode and partition mode. • Steady green: The	The status of this indicator is the same as that in single-system mode.

No.	Silk Screen	Location	Name	Color	Single-System Mode	Physical Partition Mode
					components in the BPU are operating properly. • Blinking red at 1 Hz: A major alarm has been generated for a component in the BPU. • Blinking red at 1 Hz: A critical alarm has been generated for a component in the BPU.	
3		Left mounting ear	UID button/indicator for BPU A	Blue	The UID button/indicator helps identify and locate BPU A in an SCE, regardless of the operating mode and partition mode. • Steady on: The UID button has been pressed on the SCE front panel to locate BPU A. • Off: BPU A is not being located. **NOTE** You can hold down the UID button for 6 seconds to reset the BMC on LPM 2.	The status of this indicator is the same as that in single-system mode.
4		Left mounting ear	UID button/indicator for BPU B	Blue	The UID button/indicator helps identify and locate BPU B in an SCE, regardless of the operating mode and partition mode. • Steady on: The UID button has been pressed on the SCE front panel to locate BPU B. • Off: BPU B is not being located. **NOTE** You can hold down the UID button for 6 seconds to reset the BMC on LPM 1.	The status of this indicator is the same as that in single-system mode.
5		Left mounting ear	BPU B Health	Red and green	This indicator indicates the health status of BPU B in an SCE, regardless of	The status of this indicator is the same as that in single-system

No.	Silk Screen	Location	Name	Color	Single-System Mode	Physical Partition Mode
			indicator		the operating mode and partition mode. • Steady green: The components in the BPU are operating properly. • Blinking red at 1 Hz: A major alarm has been generated for a component in the BPU. • Blinking red at 1 Hz: A critical alarm has been generated for a component in the BPU.	mode.
6		Left mounting ear	Power button/indicator for BPU B	Yellow and green	This indicator and button do not function.	This button controls the power status of the physical partition, and this indicator indicates the power status of the physical partition. This button and indicator function only if BPU B is the primary BPU (in 4-socket physical partition mode). • Off: There is no power supply to components in the cabinet. • Blinking yellow: The power supply to the physical partition is locked temporarily. Therefore, the physical partition cannot be powered on. In this state, the power button does not function. • Steady yellow: The physical partition is ready to be powered on. In this state, the power button functions. Pressing

No.	Silk Screen	Location	Name	Color	Single-System Mode	Physical Partition Mode
						and holding down the power button for 1 to 3 seconds will power on the system. • Steady green: The physical partition has been powered on. In this state, the power button functions. Pressing and holding down the power button for 1 to 3 seconds during BIOS startup will power off the physical partition. Pressing and holding down the power button for longer than 4 seconds will forcibly power off the physical partition. **NOTE** The power button functions only once within 10 seconds. If BPU B is the secondary BPU, this button and indicator do not function.
7	-	Hard disk panel	Hard disk fault indicator	Yellow	• Off: The hard disk is operating properly, or the hard disk cannot be detected in a RAID array. • Blinking yellow: The hard disk is located, or RAID is being rebuilt. • Steady yellow: The hard disk is faulty or cannot be detected.	The status of this indicator is the same as that in single-system mode.
8	-	Hard disk panel	Hard disk activity indicator	Green	• Off: The hard disk is faulty or cannot be detected. • Blinking green: Data is being read from or written to the hard disk, or data is being	The status of this indicator is the same as that in single-system mode.

No.	Silk Screen	Location	Name	Color	Single-System Mode	Physical Partition Mode
					synchronized between hard disks. • Steady green: The hard disk is inactive.	

Figure 1-26 shows the indicators and buttons on the rear panel of an SCE. Table 1-30 describes the indicators and buttons.

Figure 1-26 Indicators and buttons on the SCE rear panel

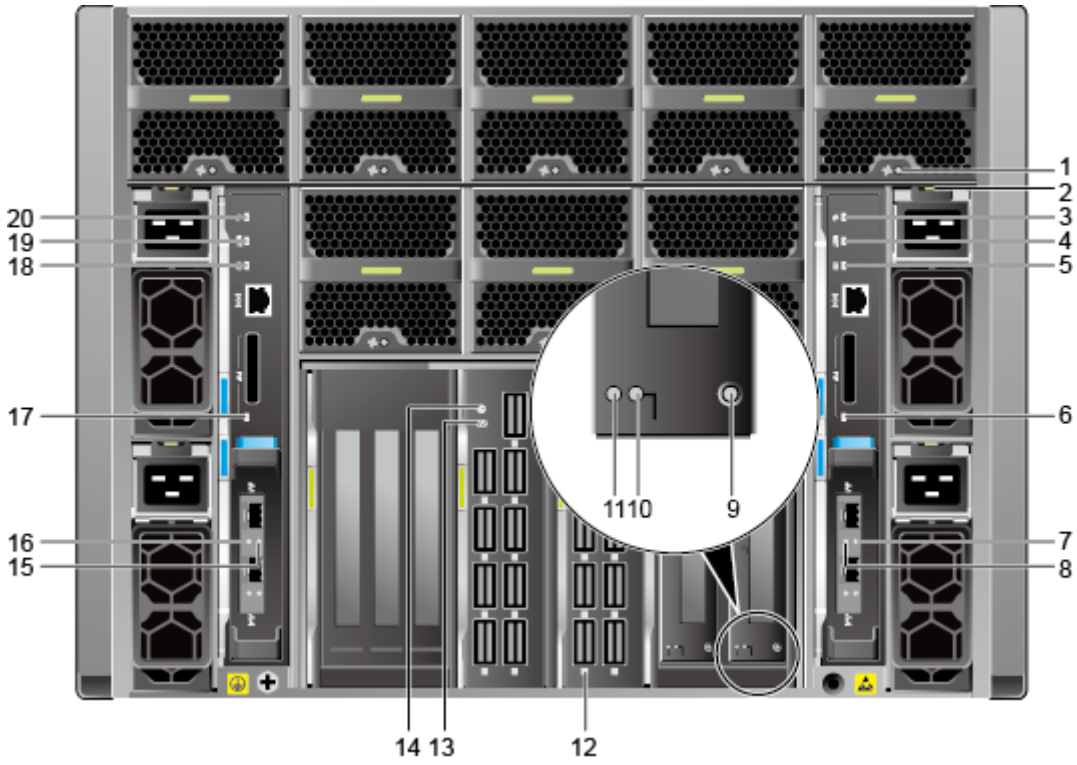


Table 1-30 Indicators and buttons on the SCE rear panel

No.	Silk Screen	Location	Name	Color	Single-System Mode	Physical Partition Mode
1		Fan module	Fan module status indicator	Red and green	• Off: There is no power supply to components in the cabinet. • Blinking red at 0.5 Hz: An alarm is generated for the server, but the system cannot determine whether	The status of this indicator is the same as that in single-system mode.

No.	Silk Screen	Location	Name	Color	Single-System Mode	Physical Partition Mode
					the server needs repair. • Steady red: A fan module is faulty and needs repair. • Steady green: The fan module is faulty or is in the online upgrade state. (An online upgrade takes about 3 minutes.) • Blinking green at 0.5 Hz: The fan module is properly communicating with the BMC. • Blinking green at 4 Hz: The fan module fails to communicate with the BMC.	
2	–	PSU	PSU status indicator	Red and green	• Steady green: The PSU is operating properly. • Blinking green at 0.5 Hz: The management software has not started and has not managed the PSU. • Steady red: A fault alarm is generated for the PSU.	The status of this indicator is the same as that in single-system mode.
3		LPM 2	Health indicator for BPU A	Red and green	The status of this indicator is the same as that of the health indicator for BPU A on the left mounting ear. This indicator facilitates maintenance at the rear of the cabinet.	The status of this indicator is the same as that of the health indicator for BPU A on the left mounting ear. This indicator facilitates maintenance at the rear of the cabinet.
4		LPM 2	UID indicator for BPU A	Blue	The status of this indicator is the same as that of the UID indicator for BPU A on the left mounting ear. This indicator facilitates maintenance at the rear of the cabinet.	The status of this indicator is the same as that of the UID indicator for BPU A on the left mounting ear. This indicator facilitates

No.	Silk Screen	Location	Name	Color	Single-System Mode	Physical Partition Mode
						maintenance at the rear of the cabinet.
5/18	MST	LPM 1/2	Indicator for the primary BPU	Green	• Off: BPU A where the LPM is located is the secondary BPU. • Steady green: BPU A where the LPM is located is the primary BPU.	The status of this indicator is the same as that in single-system mode.
6	-	LPM 2	Partition interconnect cable (PIC) installation status/health indicator for LPM 2	Red and green	• Off: The PIC cannot be detected. • Steady green: The PIC can be detected and the cable channel between LPM 2 and the CME is working properly. • Steady red: The PIC can be detected, but the cable channel between LPM 2 and the CME is working abnormally.	The status of this indicator is the same as that in single-system mode.
7/16	-	LOM	Network port data transmission status indicator	Orange	• Off: No data is being transmitted. • Blinking: Data is being transmitted.	The status of this indicator is the same as that in single-system mode.
8/15	-	LOM	Network port connection status indicator	Green	• Steady on: The network port is properly connected. • Off: The network port is not connected.	The status of this indicator is the same as that in single-system mode.
9	⚠	BIO	PCIe card hot swap button	–	• You can hot-swap a PCIe card when the system is operating properly. • Press this button when the PCIe card is operating properly. The PCIe card is removable 10 seconds after the PWR indicator turns off. • Press this button after you install a PCIe card. The PCIe card is operating properly 10 seconds later	The status of this indicator is the same as that in single-system mode.

No.	Silk Screen	Location	Name	Color	Single-System Mode	Physical Partition Mode
					after the PWR indicator becomes steady green.	
10		BIO	PCIe card power indicator	Green	• Steady green: The power supply to the PCIe card is normal. • Blinking green: The PCIe card is in the power-on or power-off process. • Off: The PCIe card is powered off.	The status of this indicator is the same as that in single-system mode.
11		BIO	PCIe card status indicator	Yellow	• On: The PCIe card is abnormal or the server is in the power-on self-test (POST) phase. • Off: The PCIe card is operating properly.	The status of this indicator is the same as that in single-system mode.
12	-	NCM	NI port status indicator	Red and green	• Off: No cable is connected to the port. • Steady green: The port is working properly. • Steady red: An alarm is generated for the port.	The status of this indicator is the same as that in single-system mode.
13	PWR	NCM	NCM startup indicator	Green	• Off: The NCM is not powered on. • Blinking green at 1 Hz: The NCM is powered on, but configuration is incomplete. • Steady green: The NCM is powered on, and configuration is complete.	The status of this indicator is the same as that in single-system mode.
14	HLY	NCM	NCM health indicator	Red and green	• Off: The NCM is not powered on. • Steady green: The NCM is operating properly. • Blinking red at 1 Hz: The NCM is working abnormally.	The status of this indicator is the same as that in single-system mode.
17	-	LPM 1	PIC installation status/health indicator for LPM 1	Red and green	• Off: The PIC cannot be detected. • Steady green: The PIC can be detected and the cable channel between LPM 1	The status of this indicator is the same as that in single-system

No.	Silk Screen	Location	Name	Color	Single-System Mode	Physical Partition Mode
					and the CME is working properly. • Steady green: The PIC can be detected and the cable channel between LPM 1 and the CME is working properly.	mode.
19		LPM 1	UID indicator for BPU B	Blue	The status of this indicator is the same as that of the UID indicator for BPU B on the left mounting ear. This indicator facilitates maintenance at the rear of the cabinet.	The status of this indicator is the same as that of the UID indicator for BPU B on the left mounting ear. This indicator facilitates maintenance at the rear of the cabinet.
20		LPM 1	Health indicator for BPU B	Red and green	The status of this indicator is the same as that of the health indicator for BPU B on the left mounting ear. This indicator facilitates maintenance at the rear of the cabinet.	The status of this indicator is the same as that of the health indicator for BPU B on the left mounting ear. This indicator facilitates maintenance at the rear of the cabinet.

Figure 1-27 shows the indicators and button on an SCM panel. Table 1-31 describes the indicators and button.

Figure 1-27 Indicators and button on an SCM panel

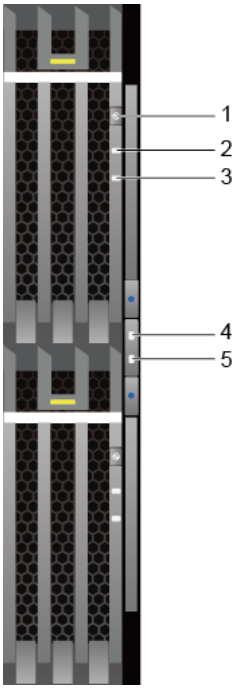


Table 1-31 Indicators and button on an SCM panel

No.	Silk Screen	Name	Color	State Description
1		MBM power button/status indicator	Red and green	• Button: hot swaps the MBM. • Off: The MBM is ready to be powered on. • Steady green: The MBM is operating properly. • Blinking green at 1 Hz: The MBM is in the intermediate state of hot swap. • Blinking red at 1 Hz: The MBM is faulty.
2		MBM ATTN indicator	Yellow	• On: The hot insertion or removal operation has failed. • Off: The hot insertion or removal operation is successful. • Blinking: The MBM is in the hot swap process and waiting to cancel the hot swap operation. To cancel the operation, press the MBM button again within 5 seconds.
3		MBM backup indicator	Green	This indicator is reserved.
4		CPU board module status indicator	Red and green	• Blinking red at 1 Hz: The CPU board module is faulty. • Green: The CPU board module is operating

No.	Silk Screen	Name	Color	State Description
				properly. • Off: The CPU board module is not powered on.
5	⚠ ATTN	CPU board module ATTN indicator	Yellow	• On: The hot insertion or removal operation has failed. • Off: The hot insertion or removal operation is successful. • Blinking: The CPU board module is in the hot swap process. During this process, manual insertion or removal of the CPU board module is not allowed.

KunLun servers can indicate a faulty DIMM on an MBM even after the MBM is removed. Figure 1-28 shows the indicator and button on an MBM. Table 1-32 describes the indicator and button.

Figure 1-28 Indicator and button on an MBM

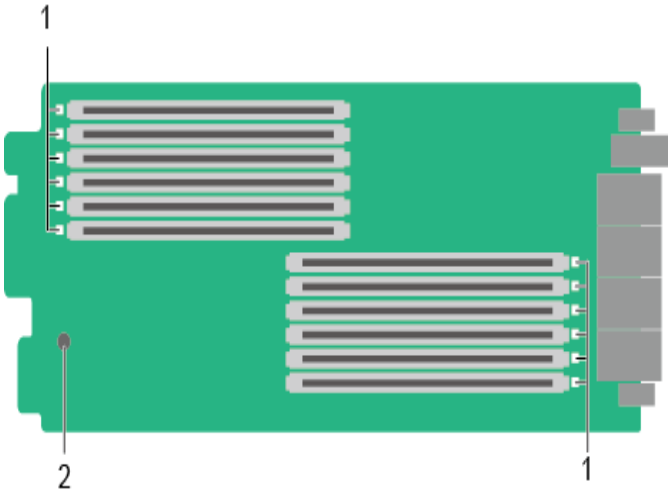


Table 1-32 Indicator and button on an MBM

No.	Silk Screen	Name	Color	State Description
1	-	DIMM fault indicator	Red	• On: The DIMM is faulty. • Off: The DIMM is operating properly.
2	-	DIMM fault locating button	-	This button helps locate a faulty DIMM. When a DIMM on an MBM in the power-on state is faulty, the indicator turns on for the faulty DIMM. After you power off the server and remove the

No.	Silk Screen	Name	Color	State Description
				MBM, press and hold down this button to turn on the indicator for the faulty DIMM.

1.4.2 CME Indicators and Buttons

Figure 1-29 shows the indicators and buttons on the CME front panel. Table 1-33 describes the indicators and buttons.

Figure 1-29 Indicators and buttons on the CME front panel

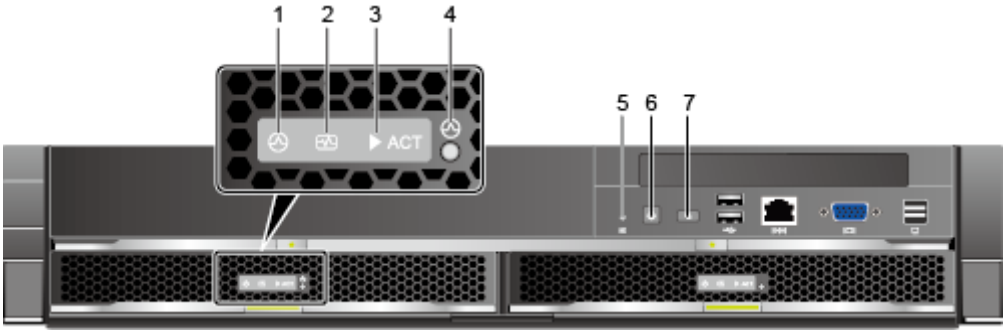


Table 1-33 Indicators and buttons on the CME front panel

No.	Silk Screen	Location	Name	Color	Single-System Mode	Physical Partition Mode
1		CMC	CMC power-on indicator	Green	• Off: The CMC is not powered on. • Blinking green: The CMC is being powered on. • Steady green: The CMC is powered on.	The status of this indicator is the same as that in single-system mode.
2		CMC	CMC health indicator	Red and green	• Off: The CMC is not powered on. • Steady green: The CMC is operating properly. • Blinking red at 1 Hz: A major alarm is generated for the CMC. • Blinking red at 4 Hz: A critical alarm is generated for the CMC.	The status of this indicator is the same as that in single-system mode.
3	ACT	CMC	CMC	Green	• Off: The CMC is	The status of this

No.	Silk Screen	Location	Name	Color	Single-System Mode	Physical Partition Mode
			active/standby indicator		standby. • Steady green: The CMC is active.	indicator is the same as that in single-system mode.
4		CMC	CMC reset button	N/A	Pressing this button resets the CMC.	The status of this indicator is the same as that in single-system mode.
5		CIM	System health indicator	Red and green	• Off: The system is not powered on. • Steady green: The system is operating properly. • Blinking red at 1 Hz: A major alarm is generated for the system. • Blinking red at 4 Hz: A critical alarm is generated for the system.	The status of this indicator is the same as that in single-system mode.
6		CIM	System power button/indicator	Yellow Green	• Off: There is no power supply to components in the cabinet. • Blinking yellow: The power supply to the service system is locked temporarily. Therefore, the service system cannot be powered on. In this state, the power button does not function. Generally, the power supply to the service system is automatically unlocked after the CMC starts, completes system self-check and configuration, and delivers partition information. • Steady yellow: The service system is ready to be powered on. In this state, the power	This indicator and button do not function.

No.	Silk Screen	Location	Name	Color	Single-System Mode	Physical Partition Mode
					button functions. • Steady green: The service system is powered on. In this state, the power button functions. • Pressing the power button for 1 second powers on the service system or powers off the service system during BIOS startup. • Holding down the power button for longer than 4 seconds forcibly powers off the service system. **NOTE** The power button functions only once within 10 seconds.	
7		CIM	System UID button/indicator	Blue	• Steady on: The system UID button has been pressed on the CME front panel or clicked on the CMC WebUI to locate the entire cabinet. • Off: The system UID button is not triggered.	The status of this indicator is the same as that in single-system mode.

Figure 1-30 shows the indicators and buttons on the CME rear panel. Table 1-34 describes the indicators and buttons.

Figure 1-30 Indicators and buttons on the CME rear panel

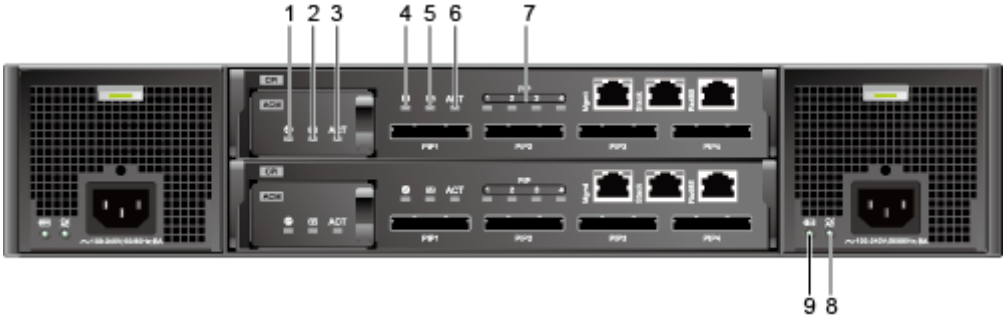


Table 1-34 Indicators and buttons on the CME front panel

No.	Silk Screen	Location	Name	Color	Single-System Mode	Physical Partition Mode
1		ACM	Startup indicator	Green	• Off: The ACM is not powered on. • Blinking green: The ACM is being powered on, the clock chip is not configured, or the clock is not delivered. • Steady green: The ACM is powered on, the clock chip is configured, and the clock is delivered. The ACM is then ready to be powered on.	The status of this indicator is the same as that in single-system mode.
2		ACM	Health indicator	Red and green	• Off: The ACM is not powered on. • Steady green: The ACM is operating properly. • Steady red: The ACM is operating abnormally.	The status of this indicator is the same as that in single-system mode.
3	ACT	ACM	Active/Standby indicator	Green	• Off: The ACM is standby. • Steady green: The ACM is active.	The status of this indicator is the same as that in single-system mode.
4		CPI	Startup indicator	Green	• Off: The CPI is not powered on after it is inserted, or is powered off and removable after a hot swap operation is triggered. • Blinking green: The CPI is being powered on after it is inserted. • Steady green: The CPI is powered on and system configuration is delivered. That is, the CPI is ready for power-on.	The status of this indicator is the same as that in single-system mode.
5		CPI	Health indicator	Red and green	• Off: The CPI is not powered on after it is inserted, or is powered off and removable after a hot swap operation is triggered. • Steady green: The CPI is operating properly.	The status of this indicator is the same as that in single-system mode.

No.	Silk Screen	Location	Name	Color	Single-System Mode	Physical Partition Mode
					• Steady red: The CPI is operating abnormally.	
6	ACT	CPI	Active/Standby indicator	Green	• Off: The CPI is standby. • Steady green: The CPI is active.	The status of this indicator is the same as that in single-system mode.
7	-	CPI	PIC installation status/health indicator	Red and green	• Off: The PIC cannot be detected. • Steady green: The PIC can be detected and the cable channel between the LPM and the CME is working properly. • Steady red: The PIC can be detected, but the cable channel between the LPM and the CME is working abnormally.	The status of this indicator is the same as that in single-system mode.
8		PFM	PFM status indicator	Red and green	• Off: There is no power supply. • Steady green: The PFM is operating properly. • Blinking green at 1 Hz: The management software has not started and has not managed the PFM. • Steady red: A fault alarm is generated for the PFM.	The status of this indicator is the same as that in single-system mode.
9		PFM	Battery backup unit (BBU) status indicator	Red and green	This indicator is reserved.	This indicator is reserved.

1.4.3 REE Indicators and Buttons

Figure 1-31 shows the indicators and buttons on the REE front panel. Table 1-35 describes the indicators and buttons.

Figure 1-31 Indicators and buttons on the REE front panel

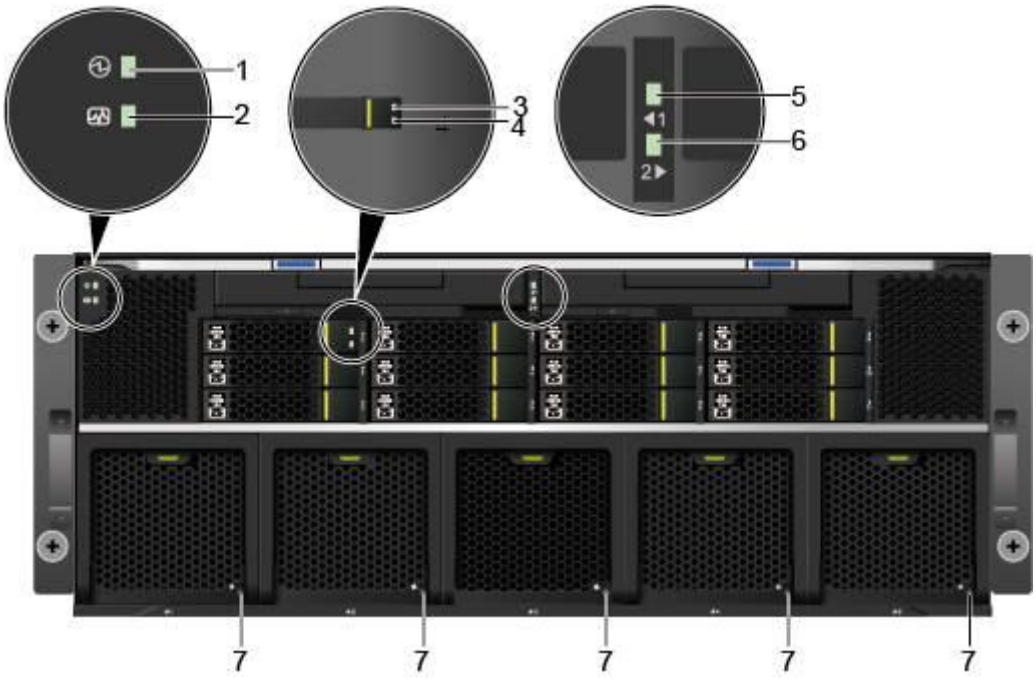


Table 1-35 Indicators and buttons on the REE front panel

No.	Silk Screen	Location	Name	Color	Description
1		Switch module	Switch module power indicator	Green	• Off: The switch module is not powered on. • Steady green: The switch module is operating properly
2		Switch module panel	Switch module health indicator	Red and green	• Off: The switch module is not powered on. • Steady green: The switch module is operating properly. • Blinking red at 1 Hz: A major alarm is generated. • Blinking red at 5 Hz: A critical alarm is generated.
3	-	Hard disk panel	Hard disk fault indicator	Yellow	• Off: The hard disk is operating properly or cannot be detected in a RAID array. • Blinking yellow: The hard disk is located, or RAID is being rebuilt. • Steady yellow: The hard disk is faulty or cannot be detected.
4	-	Hard	Hard	Green	• Off: The hard disk is faulty or cannot be

No.	Silk Screen	Location	Name	Color	Description
		disk panel	disk activity indicator		detected. • Blinking green: Data is being read from or written to the hard disk, or synchronized between hard disks. • Steady green: The hard disk is inactive.
5	-	Near the switch module FPC slot	FPC 1 health indicator	Red and green	• Off: The FIO-G is not powered on. • Steady green: The FPC is operating properly. • Steady red: The FPC is not installed, is not properly installed, or is unhealthy.
6	-	Near the switch module FPC slot	FPC 2 health indicator	Red and green	• Off: The FIO-G is not powered on. • Steady green: The FPC is operating properly. • Steady red: The FPC is not installed, is not properly installed, or is unhealthy.
7		Fan module	Fan module status indicator	Red and green	• Off: The device is not powered on. • Blinking red at 0.5 Hz: An alarm is generated for the server, but the system cannot determine whether the server needs repair. • Steady red: A fan module is faulty and needs repair. • Steady green: The fan module is faulty or is in the online upgrade state. (An online upgrade takes about 3 minutes.) • Blinking green at 0.5 Hz: The fan module is properly communicating with the BMC. • Blinking green at 4 Hz: The fan module fails to communicate with the BMC.

Figure 1-32 shows the indicators and buttons on the rear panel of an REE. Table 1-36 describes the indicators and buttons.

Figure 1-32 Indicators and buttons on the REE rear panel

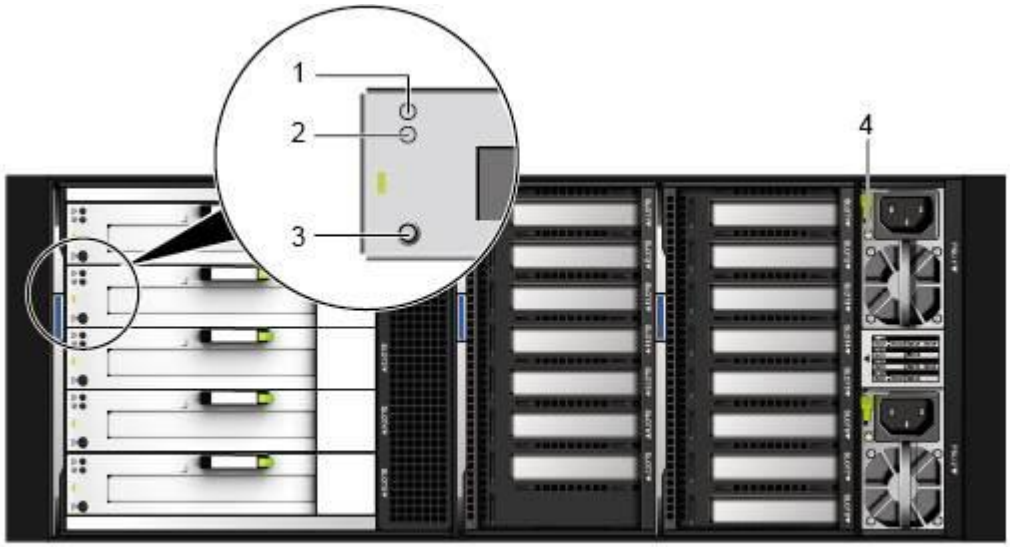


Table 1-36 Indicators and buttons on the REE rear panel

No.	Silk Screen	Location	Name	Color	Description
1	⚠	Each PCIe hot-swappable slot in a full-height hot-swappable BIO	PCIe card status indicator	Yellow	• On: The PCIe card is abnormal, or the server is in the power-on self-test (POST) phase. • Off: The PCIe card is operating properly.
2	⏻	Each PCIe hot-swappable slot in a full-height hot-swappable BIO	PCIe card power indicator	Green	• Steady green: The power supply to the PCIe card is normal. • Blinking green: The PCIe card is in the power-on or power-off process. • Off: The PCIe card is powered off.
3	⚠	Each PCIe hot-swappable slot in a full-height hot-swappable BIO	PCIe card hot swap button	-	• You can hot-swap a PCIe card when the system is operating properly. • Press this button when the PCIe card is operating properly. The PCIe card is removable 10 seconds after the PWR indicator turns off. • Press this button after you install a PCIe card. The PCIe card is operating properly 10 seconds later after the PWR indicator becomes steady green.

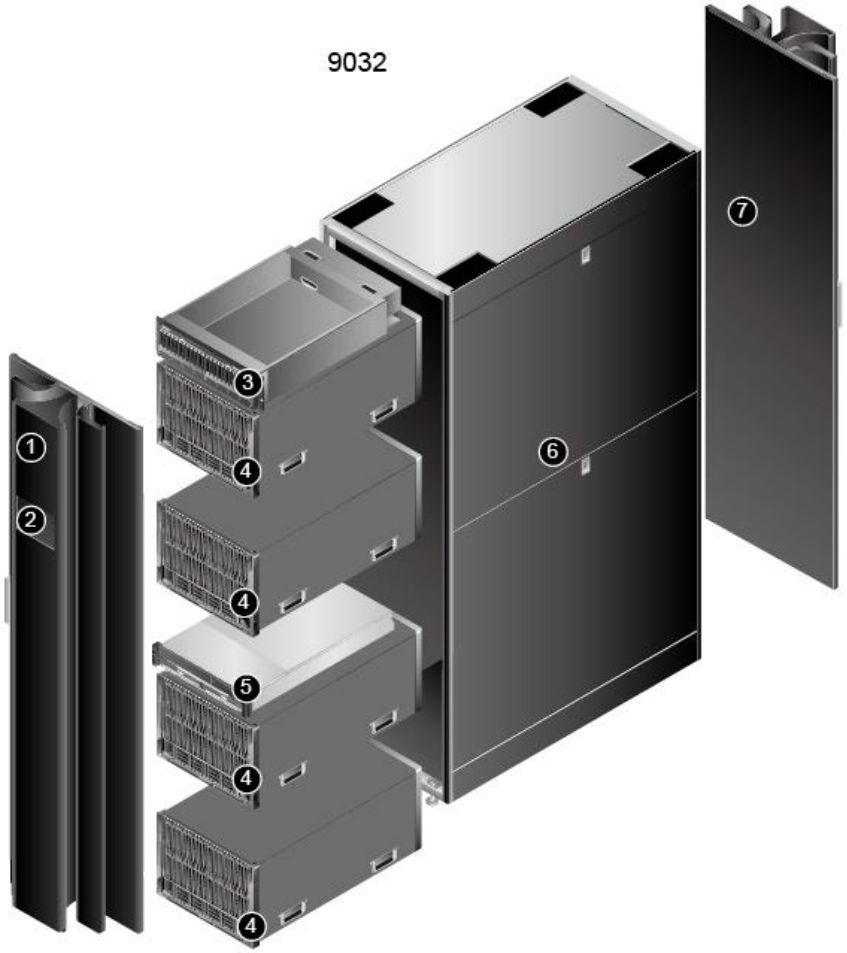
No.	Silk Screen	Location	Name	Color	Description
4	-	PSU	PSU status indicator	Green and orange	• Steady green: The PSU is operating properly. • Blinking green at 1 Hz: – The power input is normal, but the power output is stopped due to PSON or Present#. – The input is overvoltage or undervoltage. • Blinking green at 4 Hz: under online upgrade. • Steady orange: The input is normal, but no power output is supplied due to overheat protection, overcurrent protection, short circuit protection, output overvoltage protection, or some component failures. • Off: There is no AC input.

1.5 Physical Structure

1.5.1 Cabinet

Figure 1-33 shows the physical structures. Table 1-37 describes the components of KunLun servers.

Figure 1-33 Main components



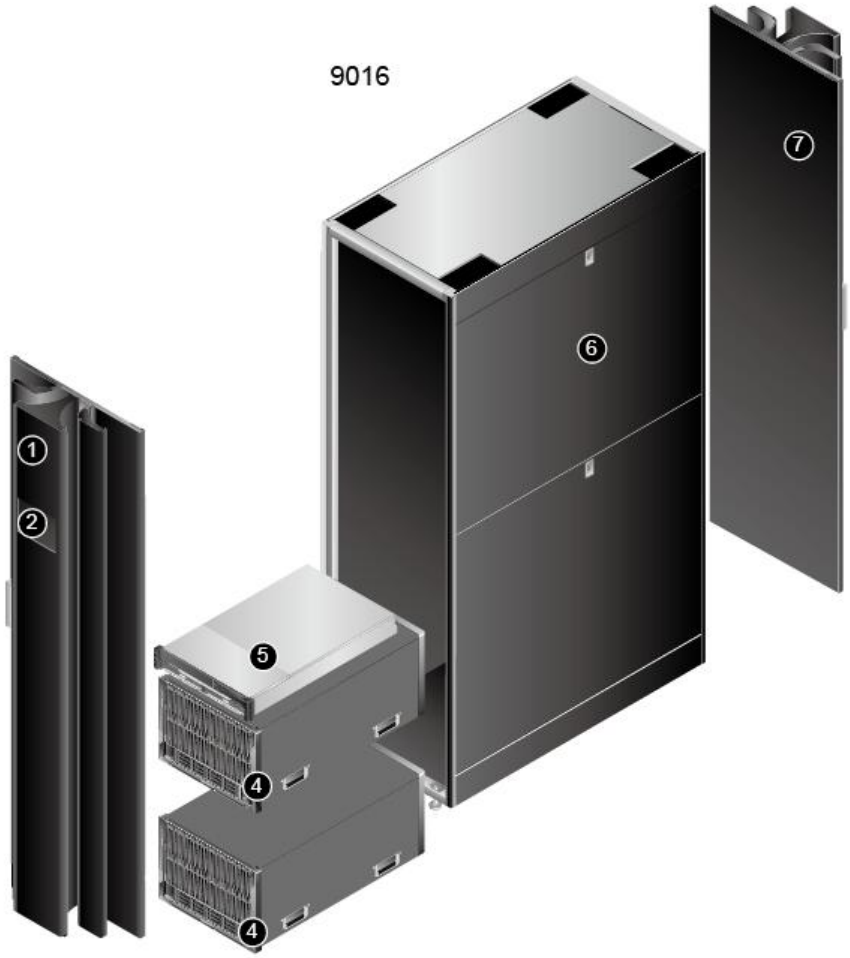


Table 1-37 Component description

No.	Name	Function
1	Front acoustic door	• Protects the server. • Reduces server noise.
2	LCD	Displays the installation status and running status of server components.
3	APD	Supplies power to the server.
4	SCE	• Houses and interconnects various components. • Provides power supply and cooling channels for the system. An SCE consists of the backplane, indicator board, fan modules, and enclosure.
5	CME	• Provides centralized management of intra-cabinet devices, partition-based management, and LCD-based management. • Houses redundant advanced clock modules (ACMs), central management consoles (CMCs), and central partition interconnect modules (CPIs).
6	Cabinet	Houses internal components. The cabinet is 2000 mm (78.74 in.) high and made of structural steel, with four casters at the bottom.

No.	Name	Function
7	Rear acoustic door	• Protects the server. • Reduces server noise.

Figure 1-34 shows the physical structures of 9016 and 9008 that support REEs, and Table 1-38 describes their components.

Figure 1-34 Main components

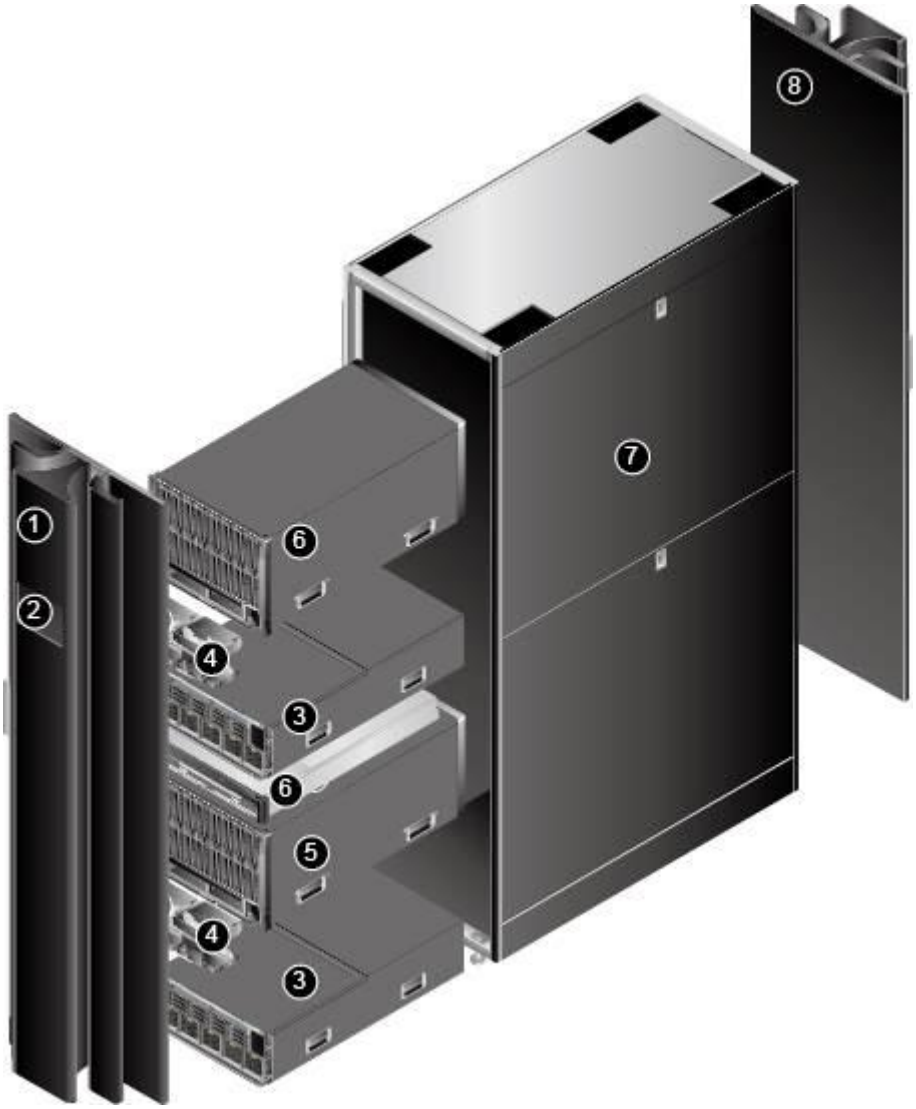


Table 1-38 Component description

No.	Name	Function
1	Front acoustic door	The door is used for reducing server noise.
2	LCD	The LCD displays the installation status and running status of server components.
3	REE	An REE contains the switching module, RAID controller card, hard disk, BIO, fan module, and PSU components. The REE increases the number of standard PCIe slots and supports RAID controller cards and hard disks.
4	FPC	An FPC connects an SCE to an REE and leads the PCIe and control resources of the SCE to the REE, facilitating PCIe resource extension and REE management.
5	SCE	An SCE consists of the backplane, indicator board,

No.	Name	Function
		fan modules, and enclosure. As the basic component, the SCE houses and interconnects various components, and provides power supply and cooling channels for the system.
6	CME	The CME implements centralized management of intra-cabinet devices, partition management, and LCD-based management, and provides redundant advanced clock modules (ACMs), central management consoles (CMCs), and central partition interconnect modules (CPIs).
7	Cabinet	The cabinet is 2000 mm (78.74 in.) high and made of structural steel, with four rollers at the bottom.
8	Rear acoustic door	The door is used for reducing server noise.

1.5.2 SCE (Front View)

Figure 1-35 shows the front view of an SCE that does not support an REE. Table 1-39 describes the SCE components at the front.

Figure 1-35 SCE components at the front (not supporting an REE)

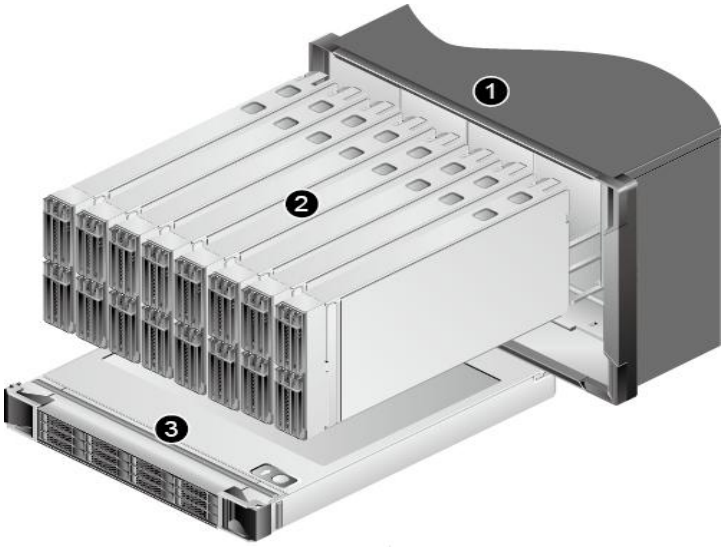


Table 1-39 SCE components at the front

No.	Name	Function
1	Enclosure	Houses and protects SCE components.
2	SCMs	Each SCM consists of two MBMs and a CPU board module. SCMs are numbered 1 to 8 from left to right. SCMs 1 to 4 belong to BPU A, and

No.	Name	Function
		SCMs 5 to 8 belong to BPU B.
3	FIO-A	An FIO-A consists of hard disks, RAID controller cards, PCIe riser modules (PRMs), PCIe cards, and supercapacitors. **NOTE** The PCIe slots in the FIO support only standard PCIe cards without external cables, such as PCIe SSD cards. PCIe cards with external cables, such as NICs, Fibre Channel (FC) cards, and InfiniBand (IB) cards, cannot be installed.

Figure 1-36 shows the front view of an SCE that supports an REE. Except the FIO, other components are the same as those of an SCE that does not support an REE.

Figure 1-36 SCE components at the front

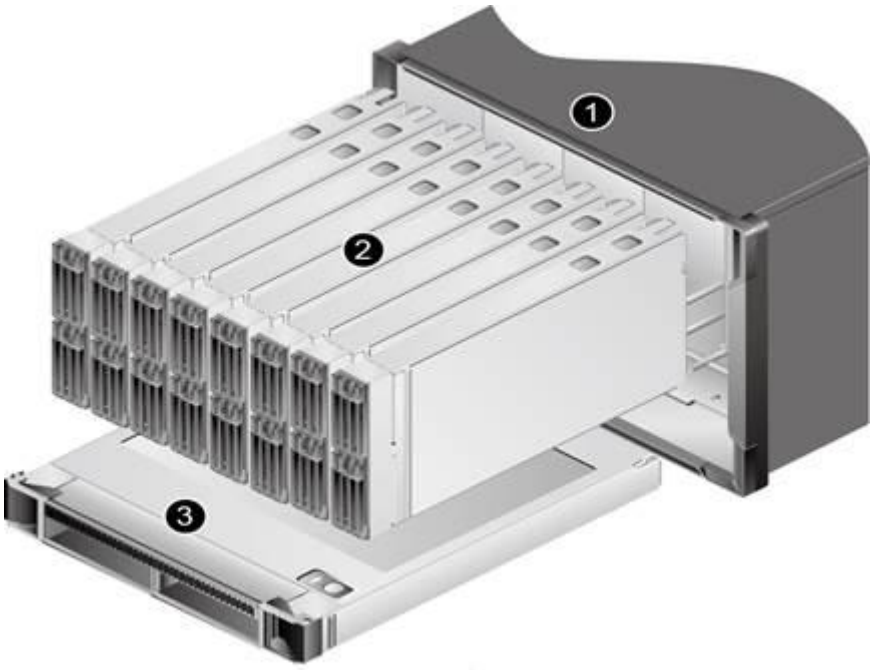


Table 1-40 SCE components at the front

No.	Name	Function
1	Enclosure	Houses and protects SCE components.
2	SCMs	Each SCM consists of two MBMs and a CPU board module. SCMs are numbered 1 to 8 from left to right. SCMs 1 to 4 belong to BPU A, and SCMs 5 to 8 belong to BPU B.
3	FIO-G	An FIO-G is used to repeat PCIe signals of SCEs and lead the signals to REEs.

1.5.3 SCE (Rear View)

Figure 1-37 shows the rear view of an SCE. Table 1-41 describes the SCE components at the rear.

Figure 1-37 SCE components at the rear

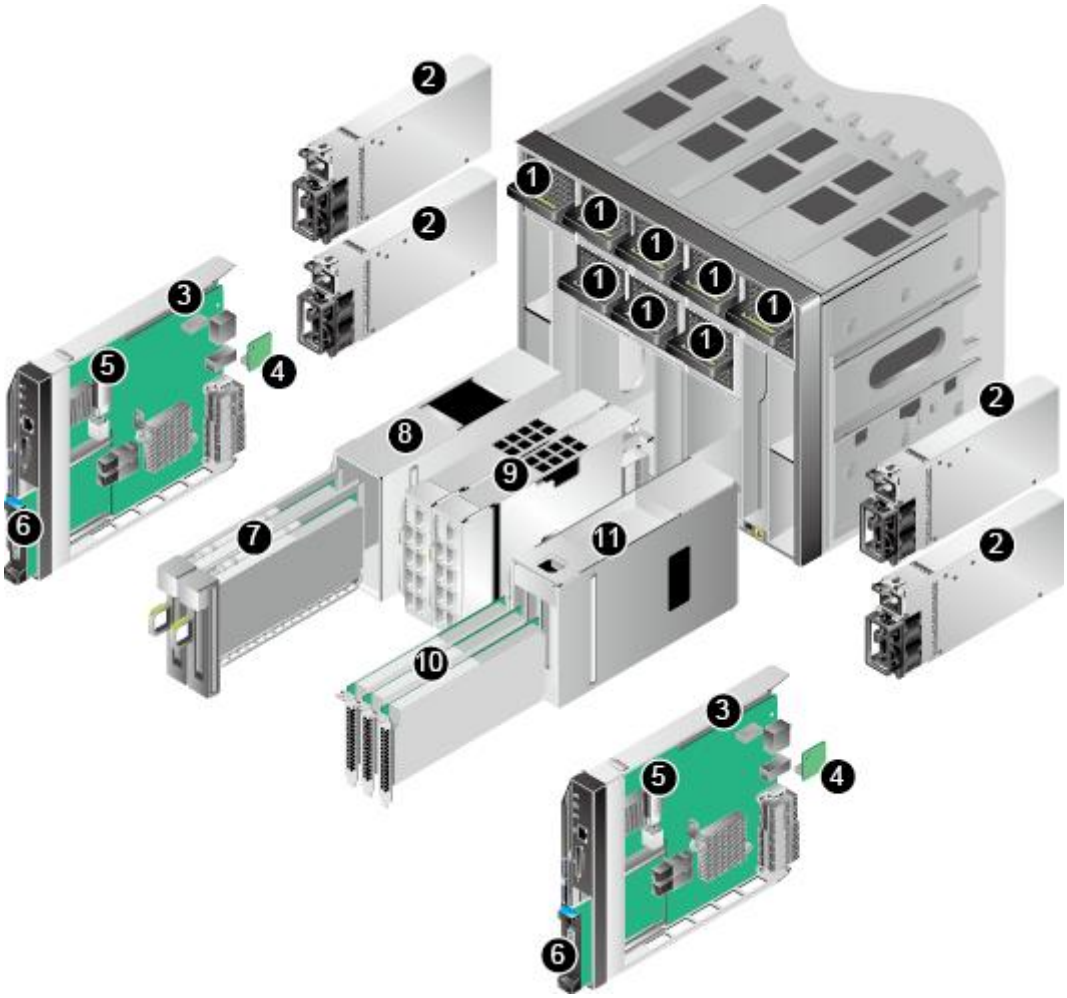


Table 1-41 SCE components at the rear

No.	Name	Function
1	Fan modules	Dissipate heat from the server. Fan modules are hot-swappable and redundant. If one fan module becomes faulty, the other fan modules run at full speed to balance heat dissipation for the server.
2	PSUs	Convert AC power into DC power. Each SCE has four 3000 W AC PSUs in 2+2 redundancy mode.
3	LPMs	Work with the CPIs to implement the physical partition feature and manage devices in BPUs.

No.	Name	Function
4	(Optional) Trusted platform modules (TPMs)	Reserved
5	(Optional) USB flash drives	Reserved
6	Built-in NICs	Connect the server to a network. Two types of NICs are supported: • GE NICs: two or four GE ports • 10GE NICs: two 10GE ports Both GE and 10GE NICs support the Network Controller Sideband Interface (NC-SI).
7	Hot-swappable PCIe cards	Hot-swappable full-height 3/4-length standard PCIe cards
8	BIO-A	Supports two hot-swappable PCIe cards
9	NCMs	• Control access to the SCMs in the SCE where the NCMs are located. • Support high-speed interconnections with other SCEs to form a CC-NUMA system.
10	Non-hot-swappable PCIe cards	Non-hot-swappable full-height 3/4-length PCIe cards
11	BIO-B	Supports three non-hot-swappable PCIe cards.

1.5.4 SCM

Figure 1-38 shows the physical structure of an SCM. Table 1-42 describes the SCM components.

Each SCM consists of one CPU board module and two MBMs.

A CPU board module consists of the following components:

- One E7 CPU
- One dedicated heat sink (mandatory) for cooling a CPU

  The heat sink supports a maximum TDP of 165 W.

Each MBM has two scalable memory buffers (Jordan Creeks), and supports a maximum of 12 DDR4 DIMMs.

NOTE

- The RAS features of SCMs and memory are available only when the configurations of the system, MBMs, and DIMMs meet certain requirements. For details, see the *Huawei KunLun Mission Critical Server RAS White Paper* and *Huawei KunLun Mission Critical Server Troubleshooting*.
- When the system works in single-system mode, the same model of CPUs and the same model of DIMMs are required, and mixed configuration is not allowed. When the system works in physical partition mode, different CPUs and DIMMs can be configured for different physical partitions. However, mixed configuration is not allowed in the same physical partition.

Figure 1-38 Physical structure

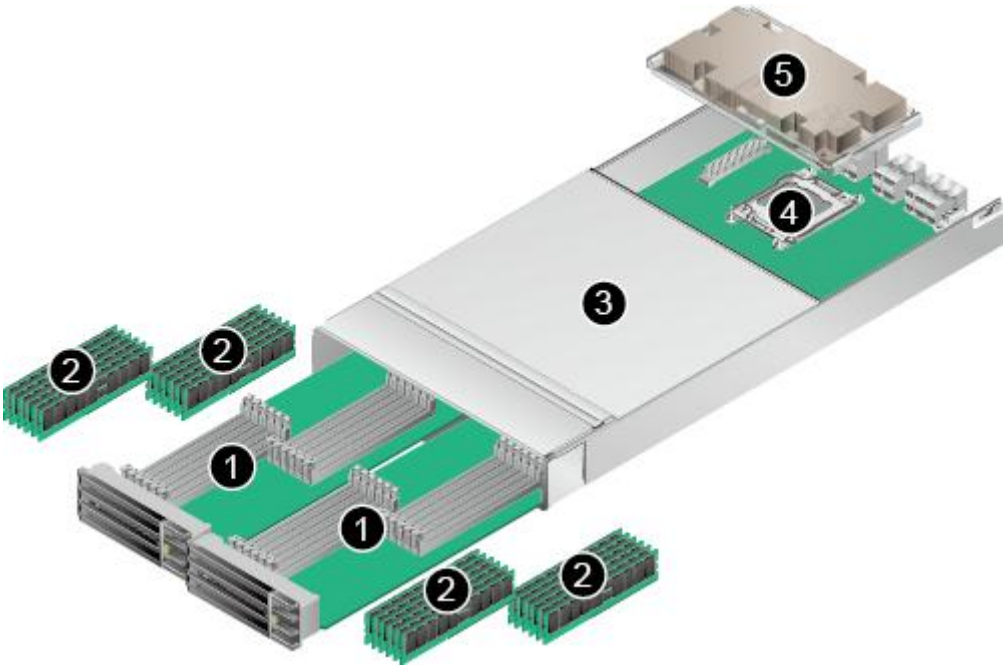


Table 1-42 SCM components

No.	Name	Function
1	DDR4 MBMs	Contain DDR4 DIMMs.
2	DDR4 DIMMs	Provide: • Up to 64 GB per DDR4 DIMM • Up to 1 TB per SCM
3	Enclosure	Houses one CPU board module and two MBMs. SCMs are numbered 1 to 8 from left to right, as identified by the silk screens on the SCE.
4	CPU	One Intel® Xeon® E7-4800 v3/v4 or E7-8800 v3/v4 series CPU per SCM
5	Heat sink	Dissipates heat from the CPU. A heat sink adopts foolproof design and supports screw-free installation. Each CPU is configured with one heat sink.

1.5.5 FIO

The SCE supports two types of FIOs.

- FIO-A: If no REE is configured, an FIO-A must be configured in an SCE.
- FIO-G: If an REE is configured, an FIO-G must be configured in an SCE.

Figure 1-39 shows the physical structure of an FIO-A. Table 1-43 describes the standard PCIe slots on an FIO-A.

- Hard disk backplane
- RAID controller card

  An FIO-A supports one or two RAID controller cards that support an iBBU or supercapacitor for power-off protection. The two RAID controller cards on the FIO-A must be of the same model.
- PRM

  An FIO-A supports two PRMs. Each PRM provides three standard PCIe 3.0 slots. Each PRM supports up to two PCIe SSD cards in slots 11 and 12 or in slots 14 and 15. If you install GPUs, only one dual-slot GPU can be installed in slot 13 or 16.

  PRMs do not support standard PCIe cards with external cables, such as NICs, FC cards, and IB cards.

NOTE

- In a 9008-4P, the PCIe slots in the right PRM of the FIO in SCE 1 are unavailable.
- In a 9016-12P, the PCIe slots in the right PRM of the FIO in SCE 2 is unavailable.
- In a 9032-20P, the PCIe slots in the right PRM of the FIO in SCE 3 is unavailable.

Figure 1-39 FIO-A components

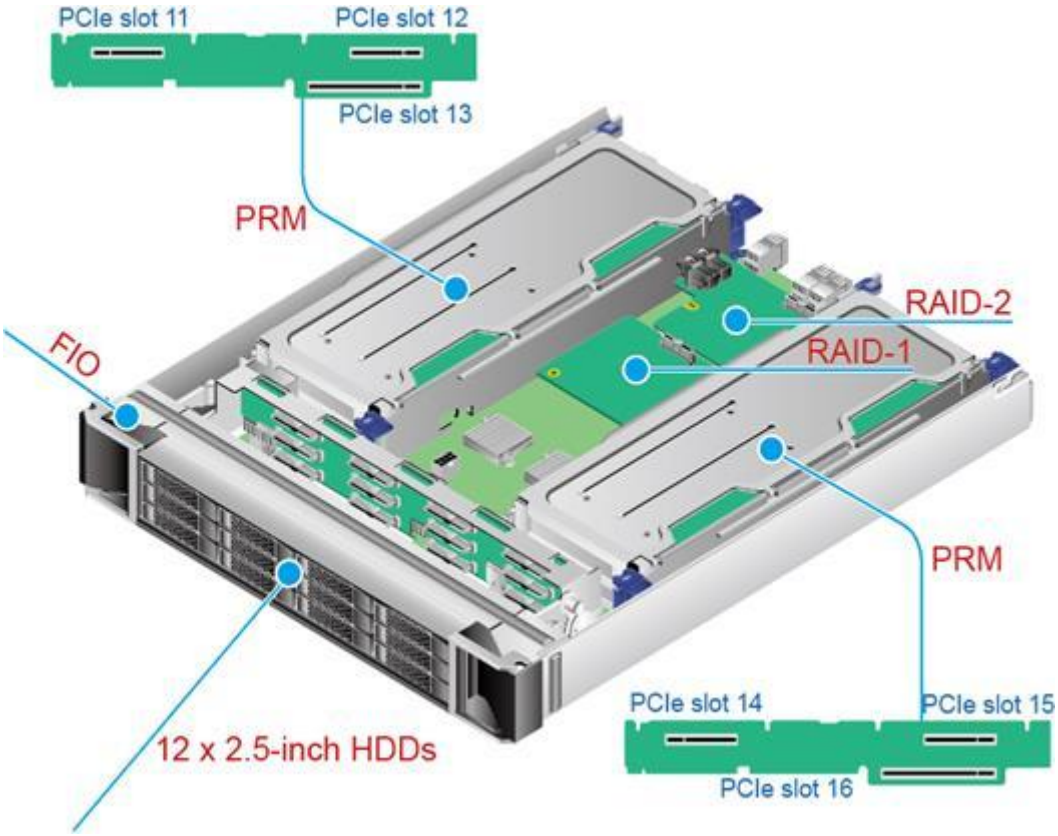


Table 1-43 Standard PCIe slots provided by PRMs on an FIO-A

PCIe Slot	SCM	PCIe Standard	Hot Swap

PCIe Slot	SCM	PCIe Standard	Hot Swap
Slot 11	SCM 4	PCIe 3.0 x8	No
Slot 12	SCM 4	PCIe 3.0 x8	No
Slot 13	SCM 1	PCIe 3.0 x16	No
Slot 14	SCM 8	PCIe 3.0 x8	No
Slot 15	SCM 8	PCIe 3.0 x8	No
Slot 16	SCM 5	PCIe 3.0 x16	No

Figure 1-40 shows the physical structure of an FIO-G.

Figure 1-40 FIO-G components

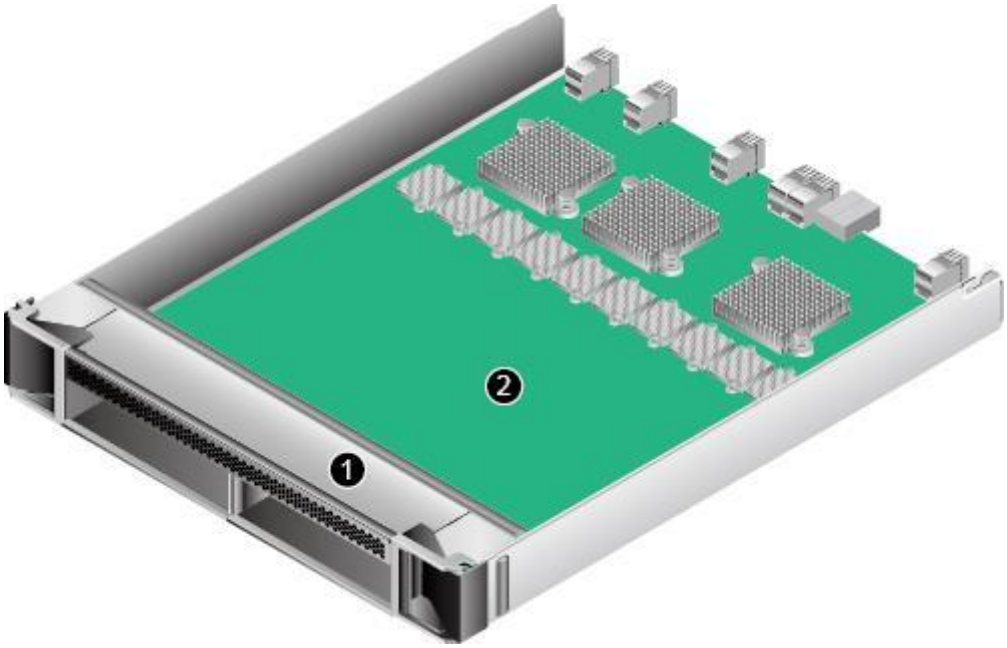


Table 1-44 FIO-G components

No.	Name	Function
1	FIO-G enclosure	Houses an FIO-G and provides two FPC slots to connect to an REE.
2	Front I/O board of model G	Contains components, such as the PCIe switch chip and PCIe Redriver, and supports signal relay.

1.5.6 BIO

KunLun servers support two types of BIOs:

- BIO-A with hot-swappable PCIe cards

  Figure 1-41 shows the physical structure of a BIO-A. Table 1-45 describes the BIO-A components.

Figure 1-41 BIO-A components

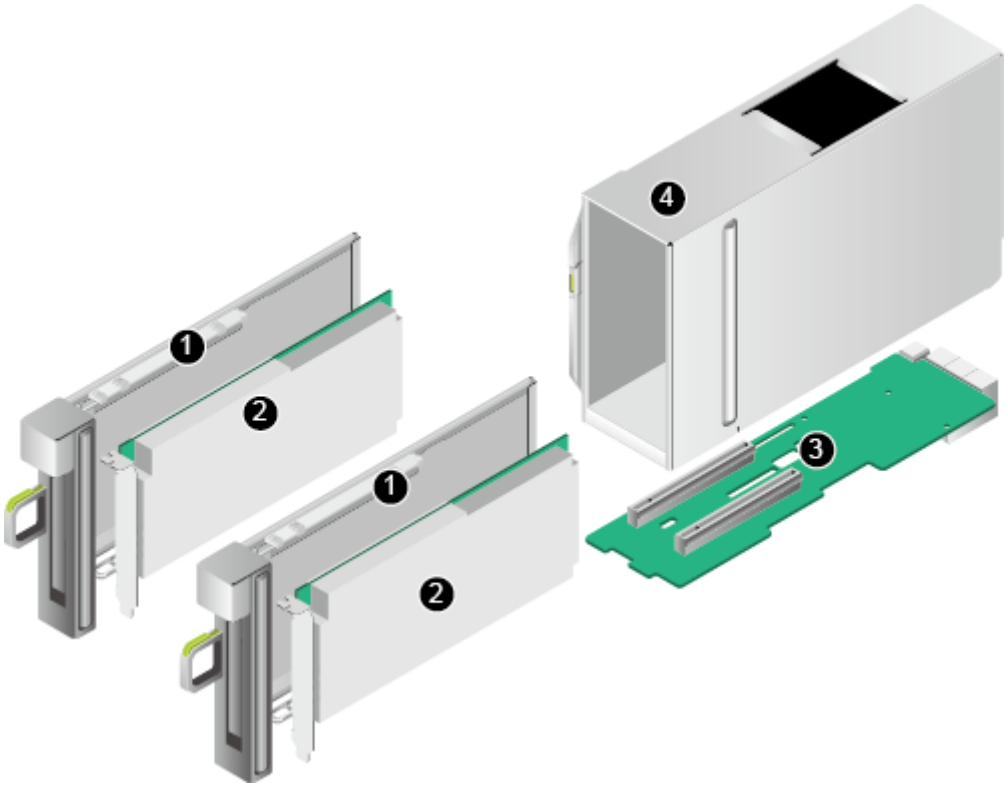


Table 1-45 BIO-A components

No.	Name	Function
1	PCIe card bracket	Secures a PCIe card.
2	PCIe cards	Hot-swappable standard PCIe card. Use Huawei Server Compatibility Checker to obtain the list of supported PCIe cards.
3	BIO-A support board	Provides PCIe slots.
4	BIO-A enclosure	Supports and protects a BIO-A.

- BIO-B with non-hot-swappable PCIe cards

  Figure 1-42 shows the physical structure of a BIO-B. Table 1-46 describes the BIO-B components.

Figure 1-42 BIO-B components

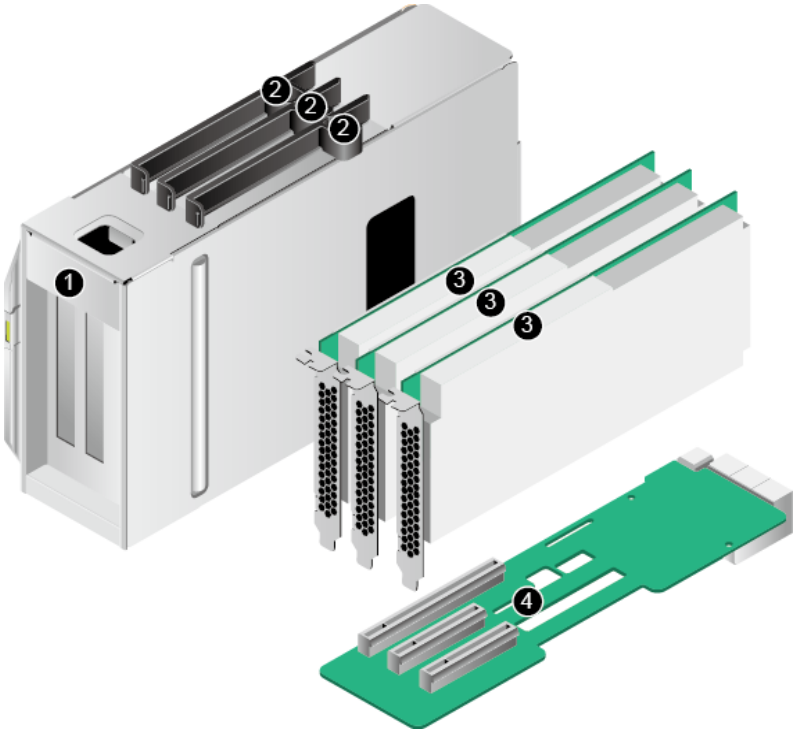


Table 1-46 BIO-B components

No.	Name	Function
1	BIO-B	Supports three non-hot-swappable PCIe cards.
2	Air baffles	Ensure heat dissipation if a PCIe slot is vacant or a PCIe card has a hollowed-out metal bar on its outer side.
3	PCIe cards	Standard PCIe cards
4	BIO-A support board	Provides PCIe slots.

1.5.7 CME

Figure 1-43 shows the physical structure of the CME. Table 1-47 describes the CME components.

Figure 1-43 CME components

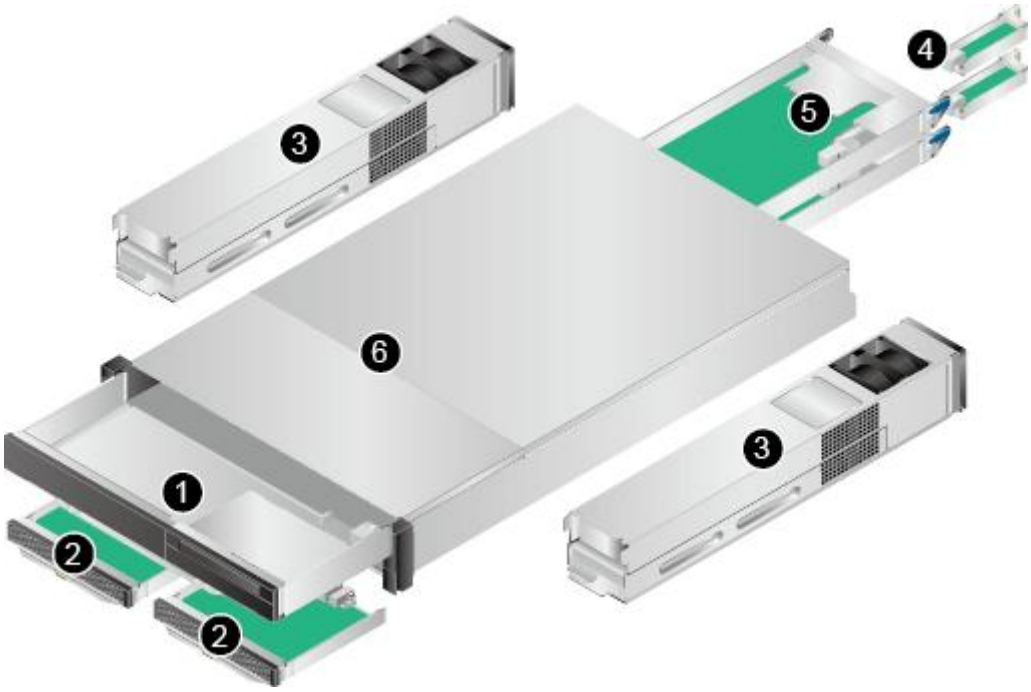


Table 1-47 CME components

No.	Name	Function
1	CIM	• Allows LCD access and centralized access to the virtual KVM in each physical partition for local maintenance. • Powers on and off the entire cabinet.
2	CMCs	• Manage components in the cabinet, sensors and events, users, fan modules, and PSUs. • Perform Intelligent Platform Management Interface (IPMI) processing and remote maintenance.
3	PFMs	• Supply power to the CME. • Dissipate heat from the CME.
4	ACM	Provide a single-source 100 MHz reference clock, which is used as by the QuickPath Interconnect (QPI), node interconnect (NI), and PCIe ports.
5	CPIs	Allow partition control, including: • CPU overheat protection • CPU hot swap control • Status and TSC clock verification • Synchronous power control, reset, and error isolation
6	CME	Houses the CIM, CMCs, PFMs, CPIs, and ACMs.

1.5.8 REE

1.5.8.1 REE Physical Structure (Front View)

Figure 1-44 shows the front view of an REE. Table 1-48 describes the REE components at the front.

Figure 1-44 REE components at the front

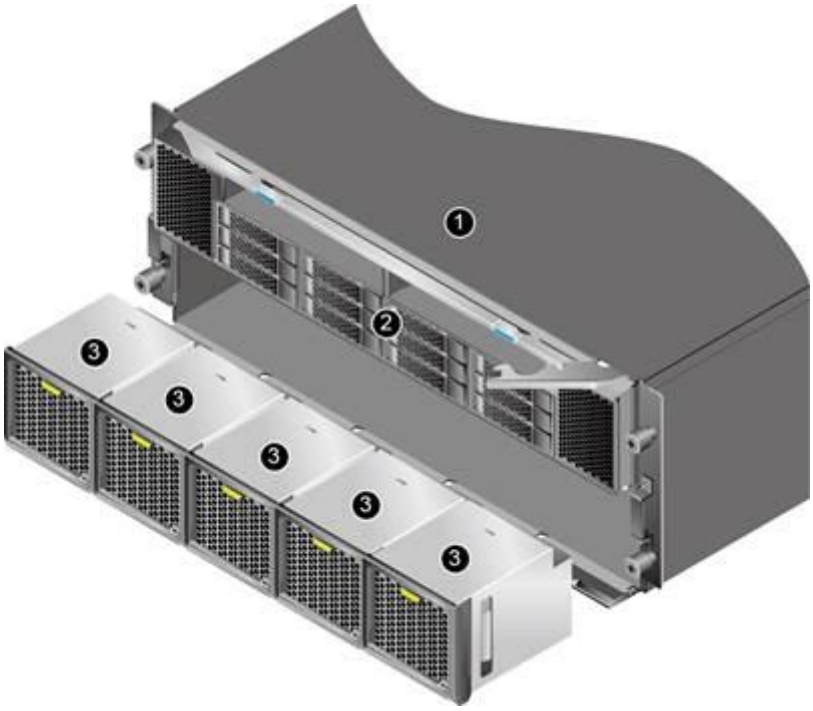


Table 1-48 REE components at the front

No.	Name	Function
1	Enclosure	Houses and protects REE components.
2	Switch module	Consists of hard disks, RAID controller cards, supercapacitors, and an air duct.
3	Fan modules	Dissipate heat from the REE. Fan modules are hot-swappable and redundant. If one fan module becomes faulty, the other fan modules run at full speed to balance heat dissipation for the REE.

1.5.8.2 REE Physical Structure (Rear View)

Figure 1-45 and Figure 1-46 show the rear views of REEs. Table 1-49 and Table 1-50 describes the REE components at the rear.

Figure 1-45 REE rear view (with non-hot-swappable BIO groups)

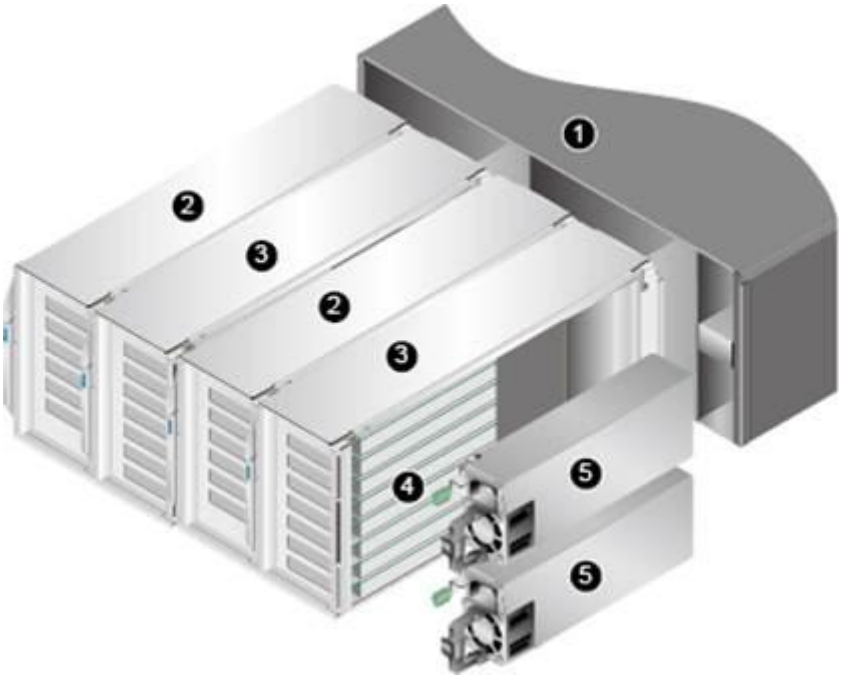


Table 1-49 REE components at the rear

No.	Name	Function
1	Enclosure	Houses and protects REE components.
2	BIO-Ds	Each BIO-D provides seven non-hot-swappable PCIe 3.0 x8 slots. BIO-Ds can be installed only in BIO slots 1 and 3.
3	BIO-Cs	Each BIO-C provides eight non-hot-swappable PCIe 3.0 x4 slots. BIO-Cs can be installed only in BIO slots 2 and 4.
4	PCIe cards	Non-hot-swappable PCIe cards. Use Huawei Server Compatibility Checker to obtain the list of supported PCIe cards.
5	PSUs	Each REE has two AC PSUs in 1+1 redundancy mode.

Figure 1-46 REE rear view (with hot-swappable BIO groups)

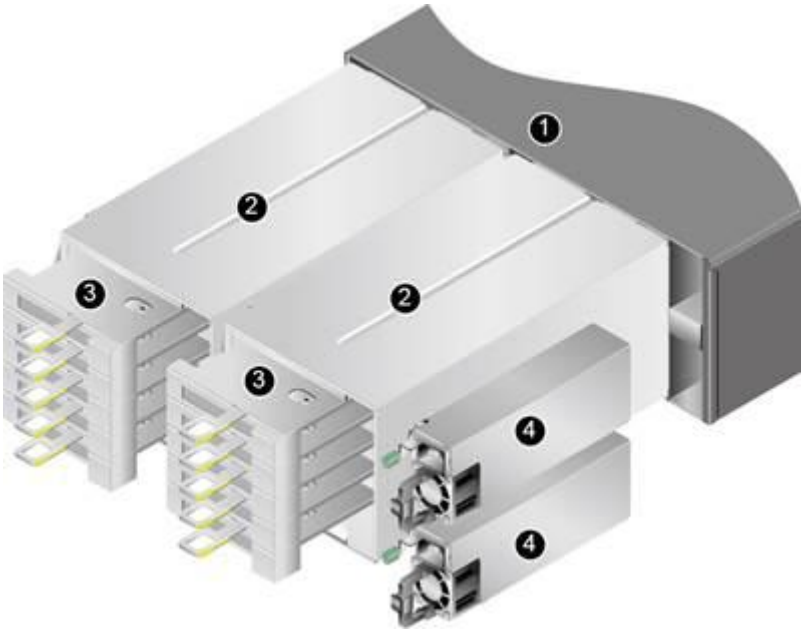


Table 1-50 REE components at the front

No.	Name	Function
1	Enclosure	Houses and protects REE components.
2	BIO-Es	Each BIO-E provides three PCIe 3.0 x8 slots and two PCIe 3.0 x16 slots to support hot-swappable PCIe cards.
3	PCIe cards	Hot-swappable PCIe cards. Use Huawei Server Compatibility Checker to obtain the list of supported PCIe cards.
4	PSUs	Each REE has two 1700 W AC PSUs in 1+1 redundancy mode.

1.5.8.3 FPC Physical Structure

The flexible printed circuit (FPC) is used to connect an SCE and an REE. It leads PCIe resources and control resources in the SCE to the REE, expanding the number of PCIe slots and enabling enclosure-level management.

Figure 1-47 shows the physical structure of an FPC. Table 1-51 describes the FPC components.

Figure 1-47 FPC components

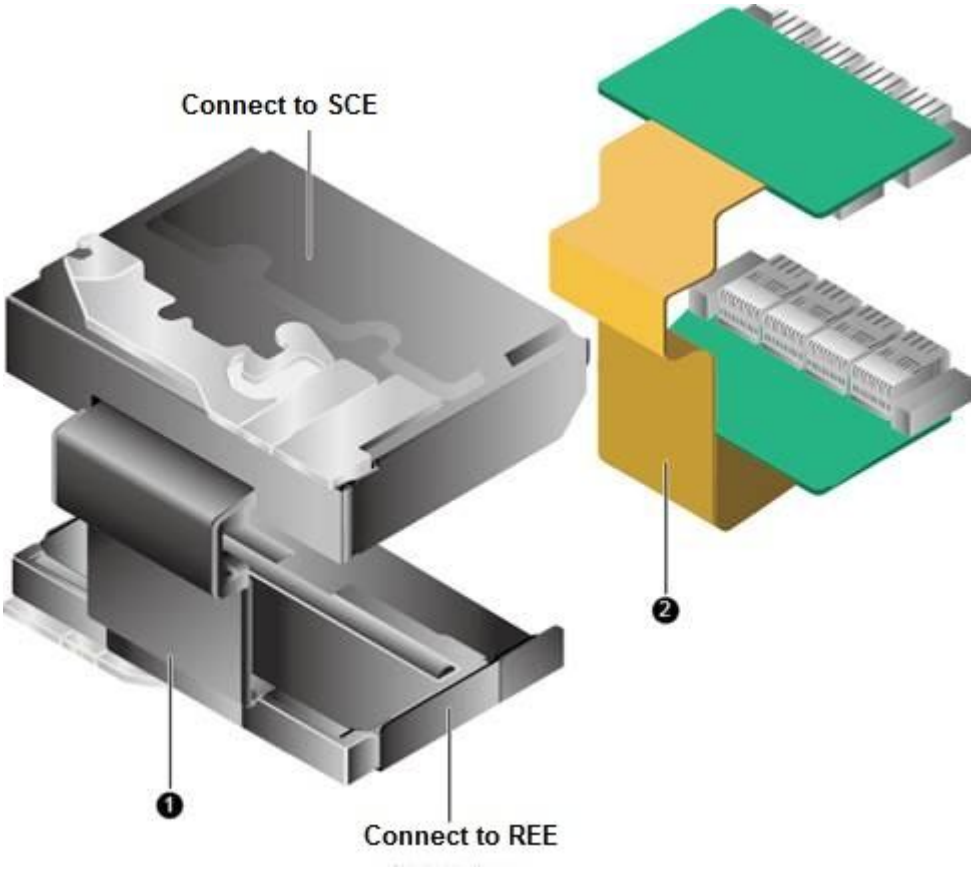


Table 1-51 FPC components

No.	Name	Function
1	Mechanical part	Carries and protects the FPC. One end is connected to the FIO-G of an SCE, and the other end is connected to the switch module of an REE.
2	Printed circuit board (PCB)	Adopts high-speed passive design to ensure reliability, leading the PCIe resources and management interfaces of an SCE to an REE and facilitating PCIe resource extension and REE management.

1.5.8.4 Switch Module Physical Structure

Figure 1-48 shows the physical structure of a switch module. Table 1-52 describes the witch module components.

Figure 1-48 Switch module components

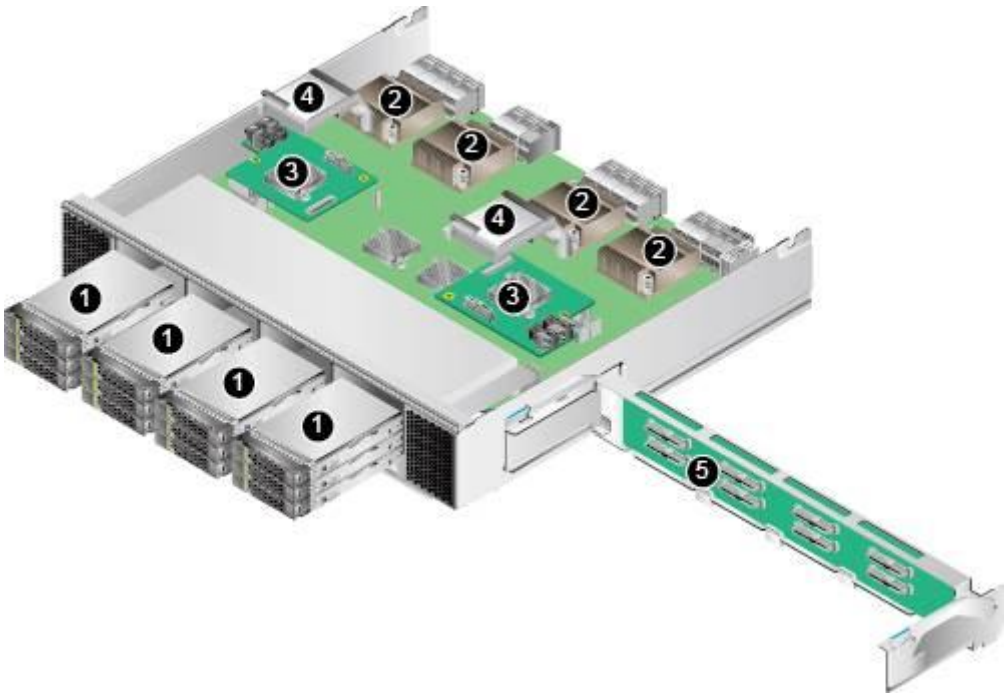


Table 1-52 Switch module components

No.	Name	Function
1	Hard disks	Store data. Up to 12 hot-swappable 2.5-inch SAS HDDs or SSDs
2	PCIe chips	Implement PCIe signal switching.
3	RAID controller cards	Use LSI SAS3108 chips and support RAID level migration and RAID configuration memory. Support two types of RAID controller cards: • RAID controller card that supports RAID 0, 1, 10, 1E with up to 1 GB cache • RAID controller card that supports RAID 0, 1, 10, 5, 50, 6, and 60 with up to 1 GB cache Support BBUs or supercapacitors for 24/3 power-off protection.
4	Supercapacitors	Protect cache data from power failures for the LSI SAS3108 controller cards.
5	Hard disk backplane	Supplies power to hard disks and provides data transmission channels.

1.5.8.5 REE BIO Physical Structure

Figure 1-49 Physical structure of BIO-E

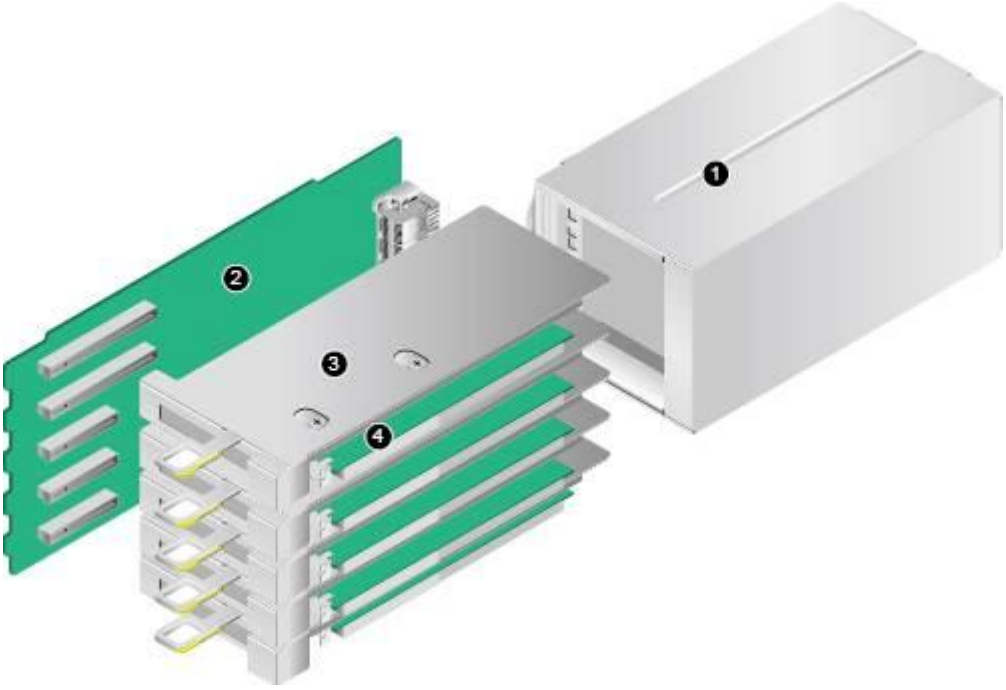


Table 1-53 BIO-E components

No.	Name	Function
1	BIO-E enclosure	Supports and protects a BIO-E.
2	BIO-E support board	Provides PCIe slots.
3	PCIe card brackets	Secure a PCIe cards.
4	PCIe card	Hot-swappable standard PCIe card. Use Huawei Server Compatibility Checker to obtain the list of supported PCIe cards.

Figure 1-50 Physical structure of BIO-C

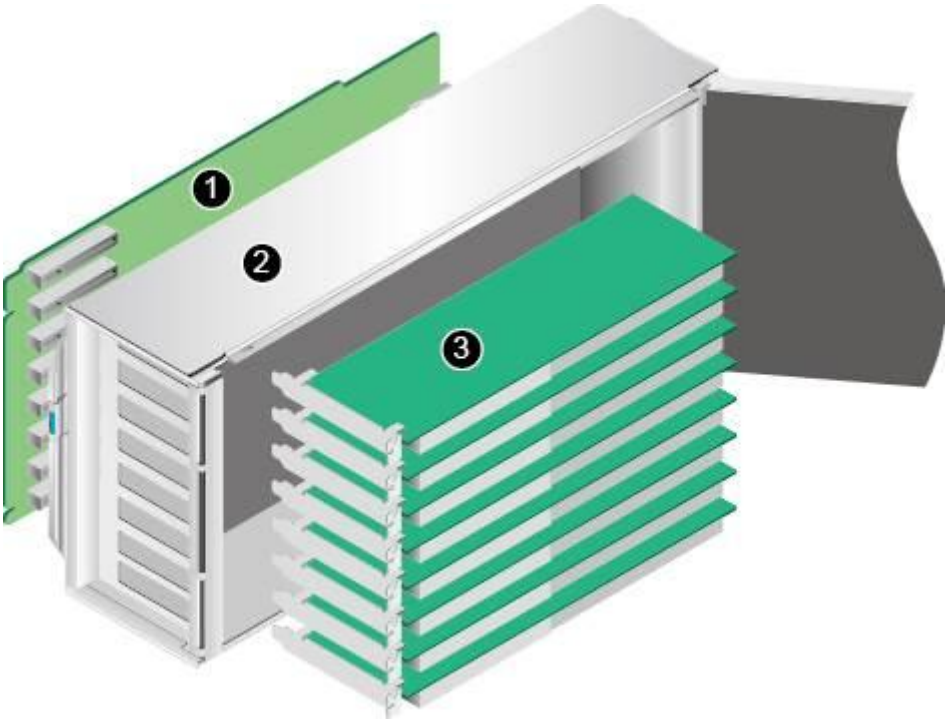


Figure 1-51 Physical structure of BIO-D

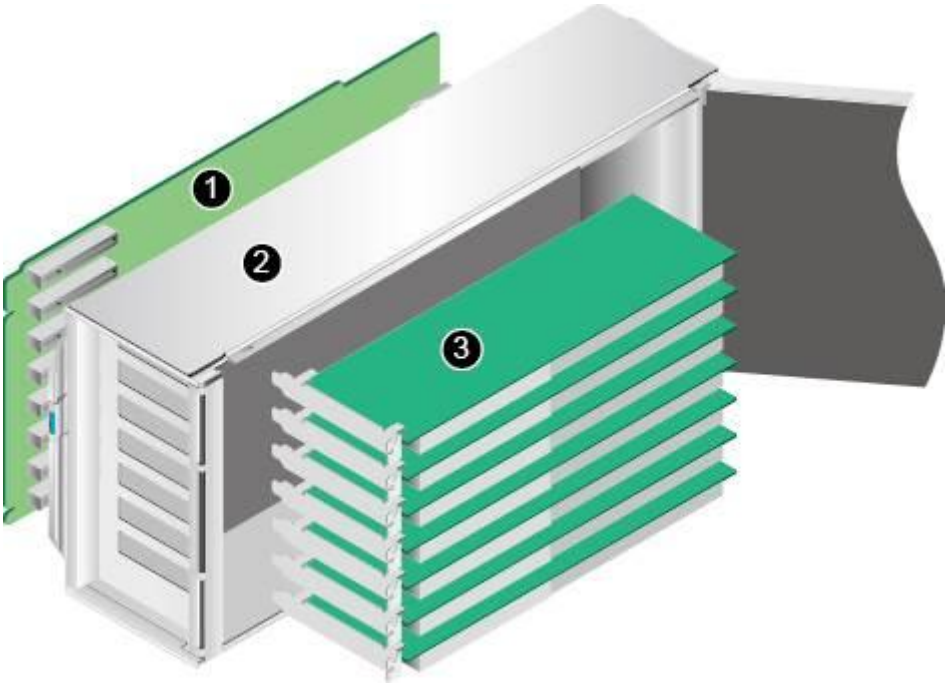


Table 1-54 BIO-C and BIO-D components

No.	Name	Function
1	BIO support board	Provides PCIe slots.
2	Half-height BIO enclosure	Supports and protects a BIO.
3	PCIe card	Non-hot-swappable standard PCIe card. Use Huawei Server Compatibility Checker to obtain the list of supported PCIe cards.

1.6 Logical Structure

A KunLun server logically consists of the following modules:

- Cabinet module

  This module consists of the backplane, indicator board, fan modules, and cabinet. It houses and interconnects various components, and provides power supply and cooling channels for the system.
- SCM

  As the core computing unit of a KunLun server, each SCM consists of one CPU board module and two MBMs to provide one CPU and a maximum of 24 DIMMs respectively.
- FIO

  An FIO house hard disks, RAID controller cards, and internal PCIe riser cards. When an REE is configured, the FIO leads the PCIe resources to the REE.
- BIO

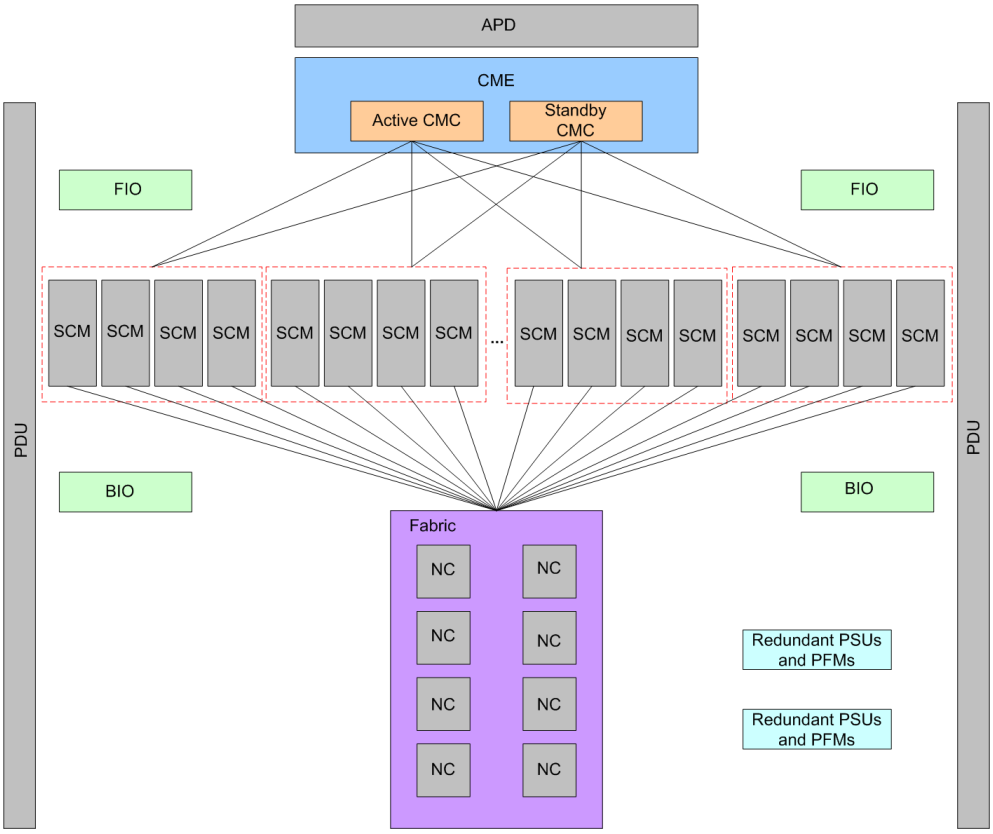
  Both SCEs and REEs can be equipped with BIOs to provide standard PCIe slots at the rear for installing standard PCIe cards.
- CMC

  A KunLun server requires two CMCs in active/standby mode. As the core control unit of the server, the CMCs power on and off the server, and perform system configuration and management.

1.6.1 Cabinet Logical Structure

Figure 1-52 shows the logical structure of the cabinet.

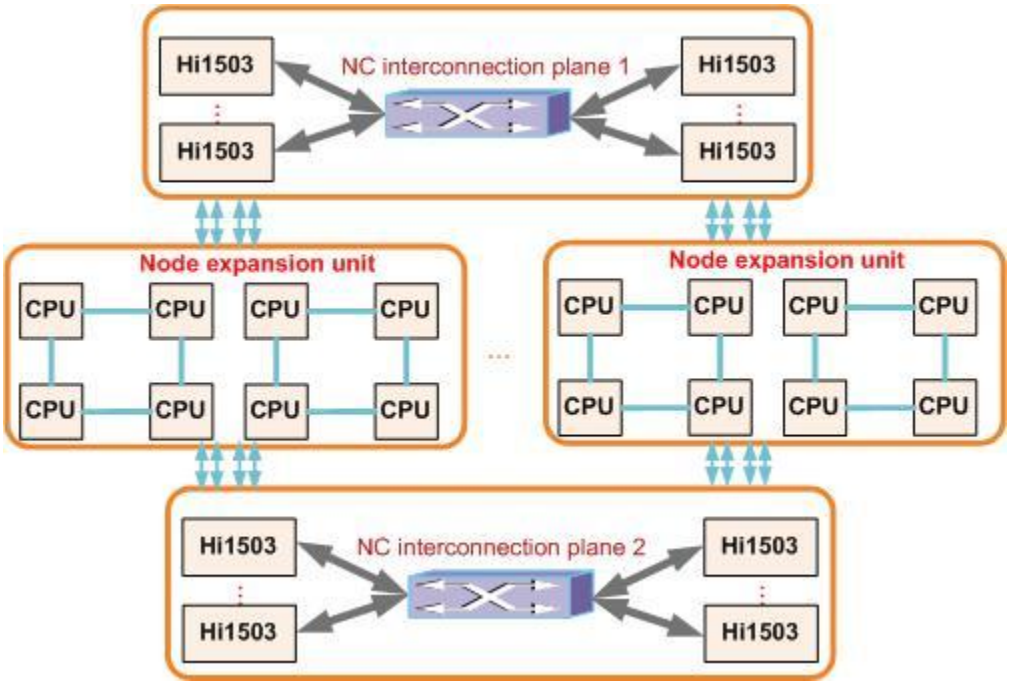
Figure 1-52 Cabinet logical structure



1.6.2 Logical Structure for CPU Interconnection

Figure 1-53 shows the logical structure for CPU interconnection.

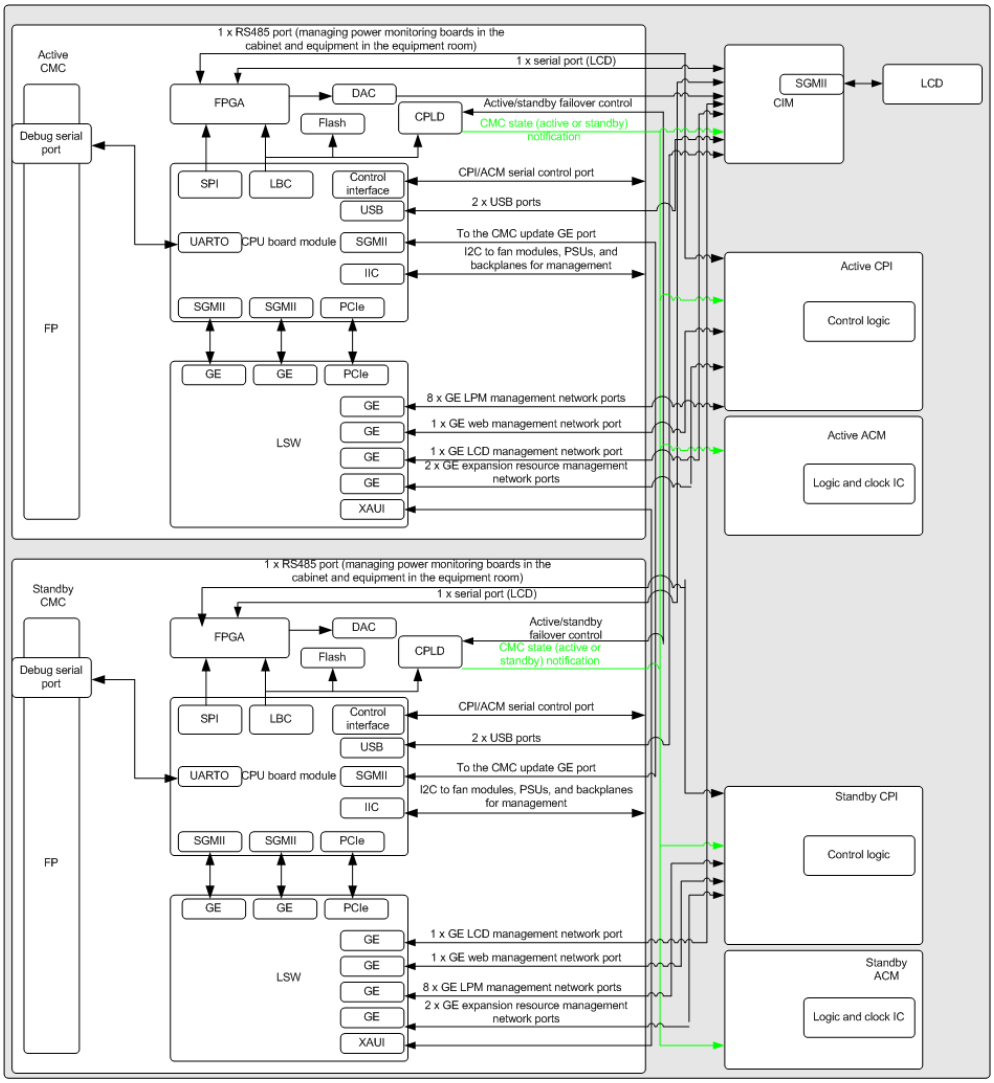
Figure 1-53 Logical structure for CPU interconnection



1.6.3 CME Logical Structure

Figure 1-54 shows the CME logical structure.

Figure 1-54 CME logical structure



1.6.4 SCE Logical Structures

Figure 1-55, Figure 1-56, Figure 1-57, and Figure 1-58 show the logical structures of modules in an SCE.

Figure 1-55 Logical structure of a CPU board module

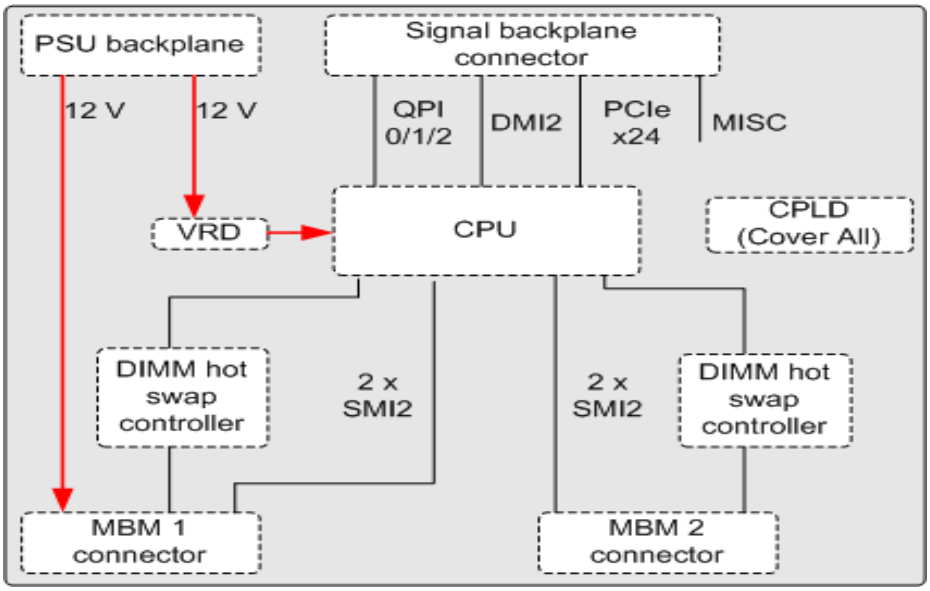


Figure 1-56 Logical structure of an MBM

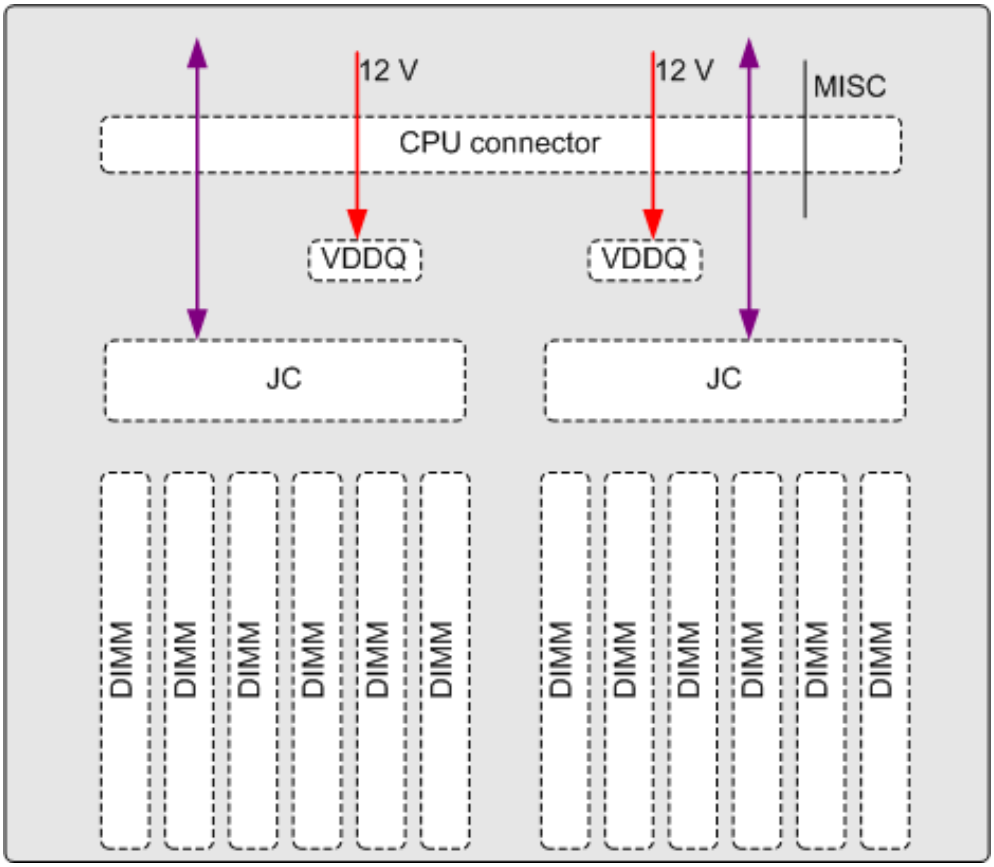


Figure 1-57 Logical structure of an LPM

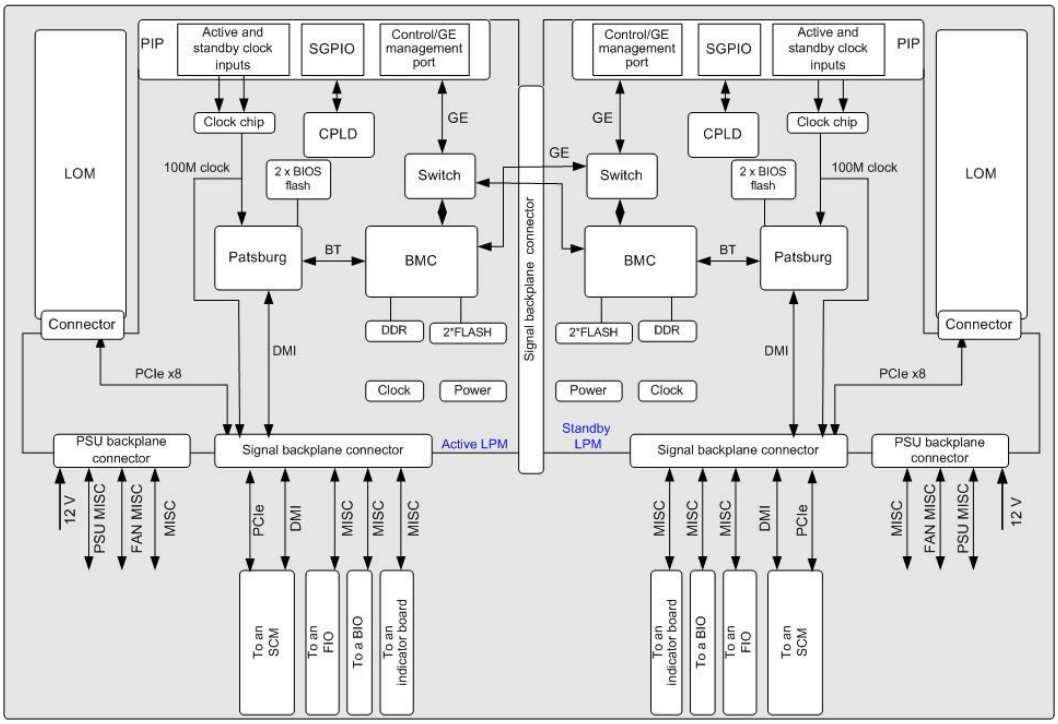
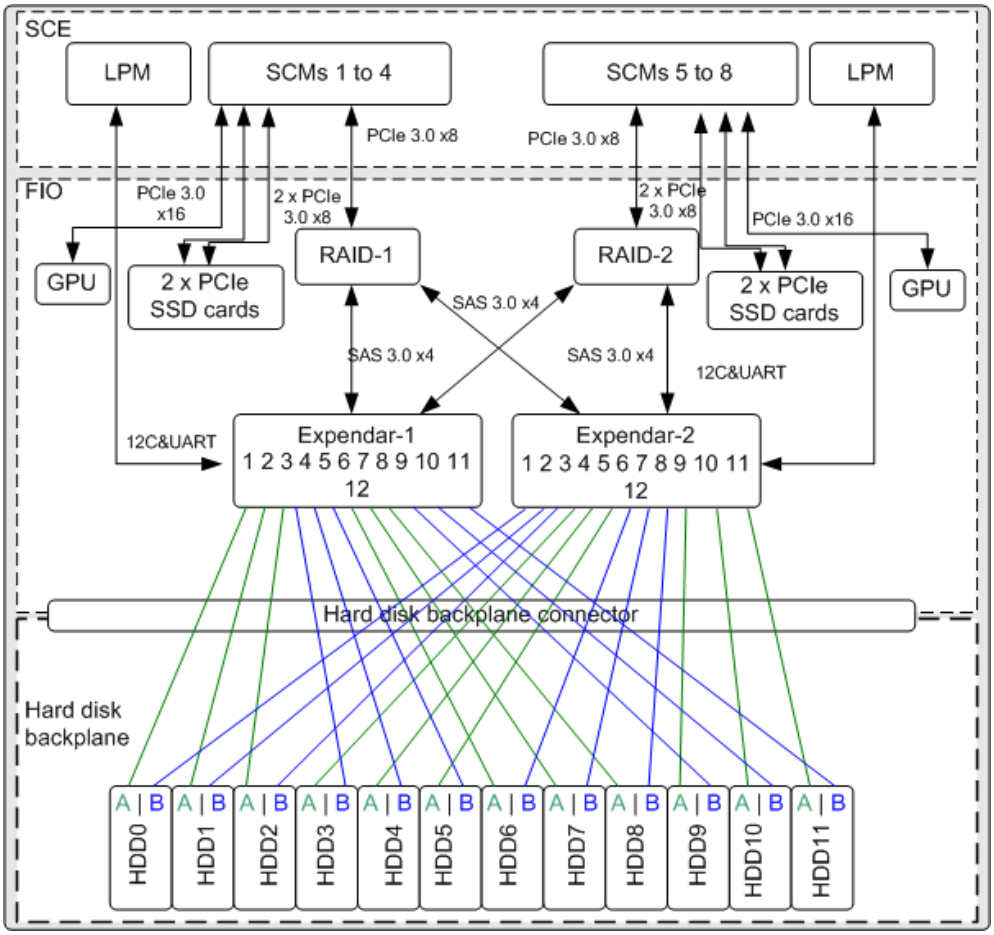


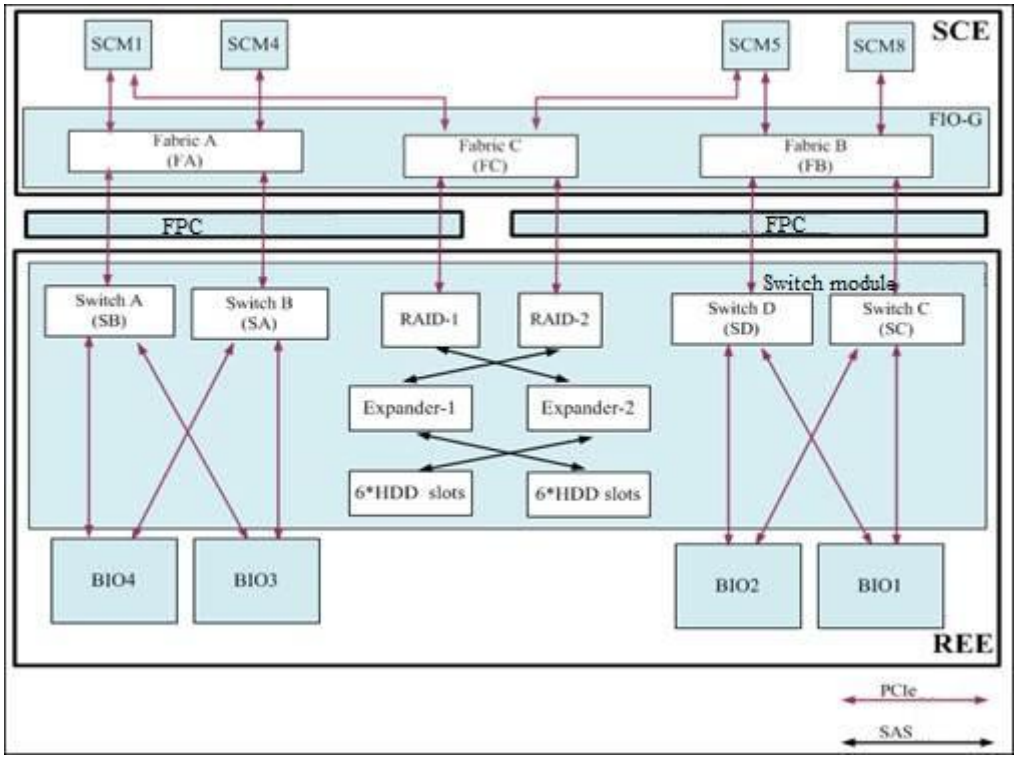
Figure 1-58 Logical structure of an FIO



1.6.5 REE Logical Structure

Figure 1-59 shows the REE logical structure.

Figure 1-59 REE logical structure



1.7 Physical Partitioning

KunLun servers leverage physical partitioning technology to provide a multi-partition feature.

With physical partitioning technology, a KunLun server can be configured as a single system or as multiple physical partitions based on service requirements to maximize return on investment (ROI).

NOTE

- Single-system mode: A non-partitioned server runs only one operating system (OS).
- Physical partition mode: A server's resources are divided into multiple physical partitions, and each partition runs one OS.

Main features:

- Easy switching

  One-click switching between the system operating modes using the CMC WebUI does not need any hardware changes or software upgrades.

- Unified management UI

  A unified CMC WebUI manages a KunLun server regardless of the server operating mode.

- Flexible service resource allocation

  Both even physical partitioning and uneven physical partitioning. When a KunLun server operates in physical partition mode, service resources, including CPUs, DIMMs, and

local storage resources, can be evenly allocated to each physical partition, or different hardware resources can be configured for physical partitions.

- High reliability

  The physical partitions are electrically isolated to achieve fault isolation, delivering higher reliability than the reliability of software- or firmware-based partitioning.

Physical partition rules:

- Number of physical partitions: A 9032-32P supports a maximum of eight physical partitions, and a 9032-20P supports a maximum of five physical partitions. A 9016-16P supports a maximum of four physical partitions, and a 9016-12P supports a maximum of three physical partitions. A 9008-8P supports a maximum of two physical partitions, and a 9008-4P is a single system and does not support physical partitioning.
- Physical partitioning type: even physical partitioning (the CPU and DIMM quantity and types of physical partitions in a KunLun server are the same) and uneven physical partitioning (the CPU and DIMM quantity and types of physical partitions in a KunLun server are the different).
- Physical partition granularity: The minimum granularity is 4P (resources included in one BPU). 4P, 8P, 12P, 16P, and 20P physical partitions are supported. The physical partitions are electrically isolated. CPU, memory, I/O, and storage resources in a partition are not shared. The same partition does not support mixed configurations of different types of CPUs and DIMMs, while different types of CPUs and DIMMs can be configured for different partitions. Each partition can run an OS independently.
- Physical partition operations: Physical partitions can be preconfigured before delivery or created and modified on site. You can create or modify a physical partition using a physical partition template. When you switch the physical partition mode, you need to power off the server and restore the default BIOS settings (except the password). After a physical partition is created or modified, the physical partition can be powered on and off independently. When two physical partitions on a server are configured with different types of CPUs or different types and quantity of DIMMs, the two physical partitions cannot be combined.

NOTE

1. If you need to create or change the system working mode (single system or physical partition mode) on site, use the single-system mode before delivery.
2. If the physical partition mode is used, a supported physical partition mode can be preset before delivery.
3. If you change the system working mode (single system or physical partition mode) on site, the original physical partitions may be split or combined. Therefore, you need to back up the data before changing the system working mode.

KunLun physical partitioning (KPAR) rules:

4P physical partition: consists of BPU A or BPU B of an SCE and its corresponding REE.

8P physical partition: consists of BPU A and BPU B of an SCE and its corresponding REE.

12P physical partition: consists of BPU A and BPU B of SCE 1/REE 1, as well as BPU A of SCE 2/REE 2. In this case, BPU B of SCE 2/REE 2 must be a 4P physical partition; or consists of BPU A and BPU B of SCE 3/REE 3, as well as BPU A of SCE 4/REE 4. In this case, BPU B of SCE 4/REE 4 must be a 4P physical partition.

16P physical partition: consists of BPU A and BPU B of SCE 1/REE 1 and those of SCE 2/REE 2, or consists of BPU A and BPU B of SCE3/REE3 and those of SCE4/REE4.

20P physical partition: consists of BPU A and BPU B of SCE 1/REE 1 and those of SCE 2/REE 2, and BPU A of the SCE 3/REE 3. In thise case, BPU B of SCE 3/REE 3 must be a 4P physical partition.

When a server needs to be divided into multiple physical partitions, BPU resources must be divided in descending order of physical partition modes from 20P, 16P, 12P, 8P, to 4P.

NOTE

1. SCE/REE combinations are numbered 1 to 4 from bottom to top or from right to left.

2. SCE 1 pairs with SCE 1, SCE 2 pairs with SCE 2, SCE 3 pairs with SCE 3, and SCE 4 pairs with SCE 4.

Physical partition specifications for KunLun mission critical servers

Product	Configuration	Physical Partition Mode 1	Physical Partition Mode 2	Physical Partition Mode 3	Physical Partition Mode 4	Physical Partition Mode 5	Physical Partition Mode 6	Physical Partition Mode 7	Physical Partition Mode 8	Physical Partition Mode 9	Physical Partition Mode 10	Physical Partition Mode 11	Physical Partition Mode 12	Physical Partition Mode 13	Physical Partition Mode 14	Physical Partition Mode 15	Physical Partition Mode 16
9008	4P	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	8P	4P+4P	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
9016	12P	8P+4P	3*4P	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	16P	12P+4P	2*8P	8P+2*4P	4*4P	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
9032	20P	16P+4P	12P+2x4P	2*8P+4P	8P+3x4P	5x4P	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	32P	4x8P	8x4P	2x16P	20P+4P+8P	20P+3x4P	16P+12P+4P	16P+2x8P	16P+8P+2x4P	16P+4x4P	12P+4P+12P+4P	12P+4P+2x8P	12P+3x4P+8P	4512P+5x4P	3x8P+2x4P	2x8P+4x4P	8P+6x4P

1.8 Logical Partitioning

KunLun servers support logical partitioning (L-Par), which enables more flexible partitioning. The hardware resources (CPU, memory, and I/O devices) used by a logical partition are

isolated. Compared with a physical partition, a logical partition is more flexible and provides more fine-grained partitioning capabilities.

Firmware is used to isolate hardware resources of logical partitions. It is a platform between the physical hardware and the logical partition OS to shield physical hardware differences for logical partitions and provide necessary hardware resources for users based on the configuration of the logical partition.

Logical partitioning technology has the following features:

- High performance
  - Logical partitions use independent CPU cores to prevent CPU contention, which reduces CPU response time.
  - I/O devices can be directly and exclusively used. Logical partition OS instructions for accessing I/O devices are directly sent to physical devices without conversion. This improves I/O performance.
- High availability
  - The physical hardware resources of logical partitions are isolated so that hardware faults of a logical partition do not affect other logical partitions.
  - L-Par supports HA and Oracle RAC to reduce the planned system downtime and improve logical partition availability.
- High security
  - L-Par performs security hardening on firmware.
  - L-Par supports CPU, memory, and I/O isolation to improve system stability.
- Manageability
  - Logical partitions can be managed with hardware devices on a unified WebUI.
  - The black box feature enables the system to automatically store the kernel logs, system snapshots, kernel diagnosis information, and lastword logs of logical partitions when the system is abnormal or breaks down, and save the logs to the non-volatile storage device.

Table 1-55 describes logical partition specifications for KunLun mission critical servers.

Table 1-55 Logical partition specifications

Indicator	Specifications	Remarks
Number of logical partitions supported by a physical partition	40	Maximum number of logical partitions that can be powered on in a single physical partition or a server.
Maximum memory of a logical partition	4TB	Maximum memory of a logical partition. The minimum memory is 1 GB. The memory can be adjusted with a step of 64 MB.
Maximum number of CPU cores of a logical partition	96	Maximum number of CPU cores of a logical partition. The unit is core.
Maximum number of local disks of logical partitions	60	• Local disks adopt two modes, Physical Raw Device Mapping (PRDM) and Virtual Raw Device Mapping (VRDM). The local disks refer to the disks that are mapped to logical partitions by firmware.

		You can use the local HDDs/SSDs or remote disk array disks for mapping. • The remote disk array disks that can be used by logical partitions through pass-through FC cards depend on the number of disks that can be identified by the Guest OS, but are irrelevant to the limit on the number of local disks.
Maximum number of PCI devices of a logical partition	28	Maximum number of PCI devices of a logical partition.

NOTE

For details about the KunLun logical partitioning feature, see the *Huawei KunLun Mission Critical Server L-Par Feature Description*.

1.9 RAS Features

KunLun servers support over 100 configurable RAS features to improve server RAS.

KunLun servers use an innovative, converged, and elastic dual-plane NC architecture to support interconnection between more than eight CPUs. This architecture also utilizes a series of enhanced RAS features to enable KunLun servers to deliver reliability comparable to conventional midrange computers.

KunLun servers support two types of RAS features:

- Key features
  - Memory reliability
  - CPU reliability
  - Integrated I/O (IIO) reliability
  - Fault diagnosis and management (FDM)
- Enhanced features
  - Physical partitioning technology
  - NI link protection
  - System clock redundancy
  - Online expansion and high scalability
  - Key memory address mirroring
  - Hot swap of CPU board modules

NOTE

- For details about RAS features, see the *KunLun Mission Critical Server RAS White Paper*.
- For details about how to configure RAS features in the BIOS, see the *KunLun Mission Critical Server V100R001 BIOS Parameter Reference*.

1.10 Technical Specifications

Table 1-56 describes the technical specifications for KunLun servers.

Table 1-56 Technical specifications

Category	Item	Technical Specifications
Mechanical specifications	Dimensions (H x W x D)	• KunLun 9032, 9016, or 9008 server with a cabinet and acoustic doors: 2000 mm x 600 mm x 1550 mm (78.74 in. x 23.62 in. x 61.02 in.) When configuring with REEs, a KunLun 9032 requires combined cabinets. • KunLun 9016 or 9008 server without a cabinet: – CME (H x W x D): 86.1 mm x 447 mm x 750 mm (3.39 in. x 17.60 in. x 29.53 in.) – SCE (H x W x D): 325.4 mm x 447 mm x 840 mm (12.81 in. x 17.60 in. x 33.07 in.) – REE (H x W x D): 175 mm x 447 mm x 790 mm (6.89 in. x 17.60 in. x 31.10 in.)
	Weight	• When configuring a KunLun cabinet: A fully loaded 9032 cabinet: ≤ 962 kg (2121.21 lb) The weight depends on the actual hardware configuration. A fully loaded 9016 cabinet: ≤ 725 kg (1598.63 lb) The weight depends on the actual hardware configuration. A fully loaded 9008 cabinet: ≤ 515 kg (1135.58 lb) The weight depends on the actual hardware configuration. • When configuring a KunLun cabinet: Fully loaded SCE: ≤ 153 kg (337.37 lb) Fully loaded CME: ≤ 25 kg (55.13 lb) Fully loaded REE: ≤ 60 kg (132.30 lb) The weight depends on the actual hardware configuration.
Environmental specifications	Temperature	• Operating temperature: 5 ℃ to 40 ℃ (41 ℉ to 104 ℉) (ASHRAE Class A3 compliant, some configurations support a maximum of 35 ℃ operating temperature) • Storage: –40 ℃ to +65 ℃ (–40 ℉ to +149 ℉)
	Relative humidity	• Operating: 10% to 90% (twmax = 29 ℃) • Storage: 5% to 95% (twmax = 38 ℃)
	Altitude	Operating: ≤ 3000 m (9842.40 ft) The maximum operating temperature decreases by 1 ℃ (1.8 ℉) with every increase of 300 m (984.24 ft) in an altitude above 900 m (2952.72 ft).
	Acoustic noise	The following values are the declared A-weighted sound power levels (LWAd) and declared average bystander position A-weighted sound pressure levels (LpAm) when the server is operating in a 23 ℃ (73.4 ℉) ambient environment. Noise emissions are measured in accordance with ISO 7779 (ECMA 74) and declared in accordance with ISO 9296 (ECMA 109).

Category	Item	Technical Specifications
		• Idle: – LWAd: 6.7 Bels (with a cabinet and acoustic doors) – LpAm: 50 dBA (with a cabinet and acoustic doors) • Operating: – LWAd: 6.9 Bels (with a cabinet and acoustic doors) – LpAm: 53 dBA (with a cabinet and acoustic doors) **NOTE** Actual sound levels generated during server operation vary depending on server configuration, load, and ambient temperature.
AC power input specifications	External sockets and cables	• KunLun 9032 server (single-cabinet without REEs): requires eight IEC60309 32 A single-phase three-core industrial plugs, with dual AC power supplies in 4+4 redundancy mode; or four IEC60309 32 A three-phase five-core industrial plugs, with dual AC power supplies in 2+2 redundancy mode. • KunLun 9032 server (combined-cabinet without REEs): requires two IEC60309 32 A three-phase five-core industrial plugs or four IEC60309 32 A single-phase three-core industrial plugs in each cabinet. • KunLun 9016 server (single-cabinet): REEs are optional. When no REEs are configured, the server requires four IEC60309 32 A single-phase three-core industrial plugs, with dual AC power supplies in 2+2 redundancy mode; when REEs are configured, the server requires two IEC60309 32 A three-phase five-core industrial plugs, with dual AC power supplies in 1+1 redundancy mode. • KunLun 9016 server (combined-cabinet without REEs): requires two IEC60309 32 A three-phase five-core industrial plugs or four IEC60309 32 A single-phase three-core industrial plugs in each cabinet. • KunLun 9008 server with a cabinet: REEs are optional. When no REEs are configured, the server requires two IEC60309 32 A single-phase three-core industrial plugs, with dual AC power supplies in 1+1 redundancy mode; when REEs are configured, the server requires four IEC60309 32 A single-phase three-core industrial plugs, with dual AC power supplies in 2+2 redundancy mode; or two IEC60309 32 A three-phase five-core industrial plugs, with dual AC power supplies in 1+1 redundancy mode. • KunLun server without a cabinet: The CME requires two PFMs and C13 AC power cables; each SCE requires two or four 3000 W AC PSUs and C19 AC power cables; each REE requires two AC PSUs and C13 AC power cables. **NOTE** KunLun 9032 or 9016 combined-cabinet configuration supports only KunLun cabinets. Third-party cabinets can be not used for combined-cabinet configuration.
	Input voltage	• KunLun 9032, 9016, or 9008 server without a cabinet: Each IEC60309 32 A single-phase three-core industrial plug supports an input voltage range of 200 V to 240 V AC at 50 Hz or 60 Hz, with up to 32 A input. Each IEC60309 32 A three-phase five-core industrial plug supports an input voltage range of 346 V to 415 V AC at 50 Hz or 60 Hz, with up to 32 A input. • KunLun server without a cabinet: Each CME, SCE, or REE PSU supports an

Category	Item	Technical Specifications
		input voltage range of 90 V to 264 V AC at 50 Hz or 60 Hz.
Power output specifications	Rated output voltage	• CME, SCE, or REE: 12 V DC • PDUs or APD: 200 V to 240 V AC
Power consumption	Maximum power consumption	• 9032: ≤ 9000 W • 9016: ≤ 4600 W • 9008: ≤ 2800 W **NOTE** The values are for typical configuration. Actual values depend on the hardware configuration.

1.11 Advantages

Stability and Reliability

- Has over 100 RAS features, which improves server availability to 99.999%.
- Supports hot swap of CPUs and MBMs to implement CPU and DIMM replacement without powering off the servers.
- Complies with carrier-grade component selection criteria, derating design standards, and reliability test requirements.
- Implements redundancy for key components such as the BIOS flash memory, management software image, PSUs, and fan modules.

Excellent Performance

- A 9032 server supports a maximum of 32 E7 v3/v4 CPUs, a 9016 server supports a maximum of 16 E7 v3/v4 CPUs, and a 9008 server supports 8 or 4 E7 v3/v4 CPUs. A single CPU supports up to 24 cores and 48 threads (v4 CPU). A 9032 server supports up to 768 cores and 1536 threads, a 9016 server supports up to 384 cores and 768 threads, and a 9008 server supports 192 cores and 384 threads or 96 cores and 192 threads.
- A 9032 server provides 768 DDR4 DIMM slots, supporting a maximum memory capacity of 32 TB (with 64 GB DIMMs configured). A 9016 server provides 384 DDR4 DIMM slots, supporting a maximum memory capacity of 16 TB (with 64 GB DIMMs configured). A 9008 server provides 192 DDR4 DIMM slots, supporting a maximum memory capacity of 8 TB (with 64 GB DIMMs and eight CPUs configured) or 96 DDR4 DIMM slots, supporting a maximum memory capacity of 4 TB (with 64 GB DIMMs and four CPUs configured).

Leading Architecture

- Adopts an innovative, converged, and elastic XShuttle dual-plane architecture to support smooth expansion of 4-socket, 8-socket, 16-socket, and 32-socket configurations, boosting scale-up capability for mission-critical applications and adapting to complex business integration environments.

- Uses Huawei physical partitioning technology, and supports flexible configuration of physical partition modes.
- Supports flexible, on-demand configurations of hardware modules, including LOMs, one or more RAID controller cards, and FIOs.
- Adopts modular design for easy upgrades, maintenance, and expansion.
- Stably operates at 40 ℃ (104 ℉) for a long time. For details, see Table 1-56.

Simple Maintenance

- Adopts modular design for easy maintenance.
- Supports tool-free installation and maintenance.
- Supports online replacement of hardware parts to facilitate maintenance. The parts include MBMs, PCIe cards, hard disks, fan modules, and PSUs.
- Uses the latest Huawei CMC management system that adopts Huawei-developed Hi1710 management chip and CMC management platform to provide comprehensive, one-stop device management, service configuration, and fault management.
- Provides an 8-inch touchscreen LCD for onsite maintenance.

2 Features

Performance and Scalability

KunLun servers provide the following features to enhance performance and scalability while reducing the total cost of ownership (TCO):

- A 9032 server supports up to 32 Intel® Xeon® E7-4800/8800 v3/v4 CPUs to ensure high processing performance by providing:
  - Up to 24 cores per CPU
  - L3 cache of 60 MB
  - Three 9.6 GT/s QPI links between CPUs
- Intel Turbo Boost Technology allows CPU cores to run faster than the frequency specified in the Thermal Design Power (TDP) configuration if they are operating below power, current, and temperature specification limits.
- Intel Hyper-Threading technology enables each CPU core to run up to two threads, improving parallel computing performance.
- Hardware-assisted Intel® Virtualization Technology (Intel® VT) allows operating system (OS) vendors to better use hardware to address virtualization workloads.
- KunLun servers provide large memory capacity and high memory bandwidth. For example, a 9032 server supports a maximum of 768 DDR4 DIMMs, allowing up to 1866 MT/s bandwidth when the server is configured with E7 CPUs.
- Multiple flexible LOMs provide GE or 10GE ports, and do not occupy standard PCIe slots.
- KunLun servers support PCIe 3.0, which increases the maximum I/O bandwidth by 60% compared with PCIe 2.0.
- KunLun servers support I/O expansion with up to four REEs. Each REE supports a maximum of 40 standard PCIe 3.0 slots. The I/O physical bandwidth can reach 64 GB.

Availability and Serviceability

KunLun servers provide over 100 RAS features to improve availability and serviceability:

- KunLun servers support memory migration, MBM hot swap, and CPU fault detection, online isolation and replacement.
- KunLun servers comply with carrier-grade component selection criteria, derating design standards, and reliability test requirements.

- A faulty DIMM on an MBM can be detected and indicated even after the MBM is removed.
- Key components (such as PSUs, fan modules, and hard disks) adopt redundancy design and support hot swap without opening the enclosure cover. This feature enables quick replacement of faulty components without interrupting system operation.
- Some PCIe cards support hot swap without opening the enclosure cover, which implements PCIe upgrades and replacement without interrupting system operation.
- Hot swap and RAID configuration of hard disks protect data on hard disks and maximize system uptime.
- The CMC monitors system parameters in real time, triggers alarms, and performs recovery actions upon failures to minimize system downtime.
- Integrated fault management and proactive failure analysis (PFA) improve fault locating efficiency and reduce unexpected downtime.
- An 8-inch touchscreen LCD facilitates fault locating and shortens the fault recovery time.
- Huawei provides a three-year warranty for parts replacement and onsite limited repair as well as a 9-hour-a-day, 5-day-a-week next business day (NBD) support program. Optional service upgrades are available.

Manageability and Security

KunLun servers provide the following features to simplify local and remote server management and improve security:

- The CMC on a KunLun server monitors server operating status, implements remote management and cascading management of multiple servers.
- The integrated industry-standard Unified Extensible Firmware Interface (UEFI) increases efficiency of setup, configuration, and updates and simplifies the fault handling process.
- KunLun servers adopt strict security test criteria and a chip-level Huawei proprietary management system to ensure secure system operations.

3 Product Specifications

Table 3-1 describes the product specifications for KunLun servers.

Table 3-1 Product Specifications

Item	9032-32P	9032-20P	9016-16P	9016-12P	9008-8P	9008-4P
Cabinet Configurations	Shipped with a standard 42U KunLun cabinet and acoustic doors or with no cabinet (server to be installed in a third-party cabinet).					
Basic configuration	One mandatory CME and different numbers of SCEs for 9032-32P/9032-20P/9016-16P/9016-12P/9008-8P/9008-4P: 4/3/2/2/1/1.					
CPU	9032-32P/9032-20P/9016-16P/9016-12P/9008-8P/9008-4P supports 32/20/16/12/8/4 Xeon® E7-4800/8800 v3/v4 CPUs, and a single CPU supports a maximum of 60 MB L3 Cache and 24 cores.					
Memory	Each CPU supports 24 DIMMs, the capacity of a DIMM can be 8 GB, 16 GB, 32 GB, or 64 GB, and maximum memory of a server is 32 TB (9032-32P), 20 TB (9032-20P), 16 TB (9016-16P), 12 TB (9016-12P), 8 TB (9008-8P), or 4 TB (9008-4P).					
Local storage	The number of 2.5-inch hot-swappable SAS HDDs or SSDs is 48 (9032-32P), 30 (9032-20P), 24 TB (9016-16P), 18 (9016-12P), 12 (9008-8P), and 12 (9008-4P). 9032-32P/9032-20P/9016-16P/9016-12P/9008-8P/9008-4P supports a maximum of 8/5/4/3/2/1 RAID controller cards. The RAID controller card is a daughter card and can be optionally configured. Two types of RAID controller cards are supported: • Supports RAID 0, 1, 10, 5, 50, 6, and 60, a maximum of 1 GB cache, and supports a supercapacitor for power failure protection. • Supports RAID 0, 1, 10, 5, 50, 6, and 60, supports a maximum of 2 GB Cache, and supports a supercapacitor for power failure protection.					
Network port	LAN on motherboards (LOMs) can be flexibly configured: • 9032-32P/9032-20P/9016-16P/9016-12P/9008-8P/9008-4P supports a maximum of 8/5/4/3/2/1 LAN on motherboard (LOMs.) • Four GE ports (RJ45), two 10GE ports (SFP+), and two 10GE ports					

Item	9032-32P	9032-20P	9016-16P	9016-12P	9008-8P	9008-4P
	(RJ45) per LOM					
Standard PCIe slot (SCE)	A SCE with FIO-A supports two PCIe3.0 x16 and four PCIe3.0 x8 slots for only GPUs and PCIe SSD cards when no REE is configured. When an REE is configured for the SCE, the SCE must be configured with an FIO-G and does not provide front PCIe slots.					
	Rear standard PCIe slots support standard PCIe cards (such as NICs, IB cards, and HBAs) with external cables or hot-swappable PCIe SSD cards. 9032-32P/9032-20P/9016-16P/9016-12P/9008-8P/9008-4P supports a maximum of 8/5/4/3/2/1 BIOs. The BIOs can be BIO-A (supporting two hot-swappable PCIe3.0 x16 slots) or BIO-B (supporting one PCIe3.0 x16 slot and two PCIe3.0 x8 slots).						
Standard PCIe slot (REE)	An REE supports a maximum of two BIO groups. There are two types of BIO groups: • Non-hot-swappable BIO group that supports 15 non-hot-swappable PCIe slots: BIO-C with seven half-height PCIe3.0 x8 slots + BIO-D with eight half-height PCIe3.0 x4 slots • Hot-swappable BIO group that support five hot-swappable PCIe slots: BIO-E with two full-height PCIe3.0 x16 and three full-height PCIe3.0 x8 slots 9032-32P/9032-20P/9016-16P/9016-12P/9008-8P/9008-4P supports a maximum of 8/5/4/3/2/1 BIOs.					
External port	SCE: • Each SCE provides two USB 2.0 ports, two power buttons/indicators, two UID buttons/indicators, and one VGA port on its front panel. • Each SCE has two LPMs on its rear panel. Each LPM provides one serial port, one UID indicator, and one LOM slot.					
	CME: • The CME provides two USB 2.0 ports, one system power button, one UID button, one VGA port, and one management serial port on its front panel. • The CME provides one GE management network port and one GE stacking port on its front panel.					
	NOTE Some ports are unavailable in a certain operating mode. For details, see 1.3 Ports.					
DVD drive	A shared Serial Advanced Technology Attachment (SATA) DVD-RW drive, which supports remote access to a virtual DVD drive from a physical partition.					
LCD	8-inch capacitive TFT touchscreen for local management					
Video card	A video card is integrated into an LPM, and supports 32 MB display memory. The maximum resolution of the KVM is 1280 x 1200.					
System management	Remote management, WebUI, virtual KVM, and standard protocols such as IPMI 2.0 and Simple Network Management Protocol (SNMP)					

Item	9032-32P	9032-20P	9016-16P	9016-12P	9008-8P	9008-4P
Security	Power-on password and administrator password					
OS/Virtualization Software Compatibility	• Red Hat Enterprise Linux/SUSE Linux Enterprise Server/Windows server/VMware/Fusionsphere **NOTE** Use Huawei Server Compatibility Checker to obtain the list of supported OS versions.					
Physical partitioning	9032-32P/9032-20P/9016-16P/9016-12P/9008-8P/9008-4P supports a maximum of 8/5/4/3/2/1 physical partitions.					

4 Component Compatibility

4.1 CPUs

KunLun servers use Intel® Xeon® E7-4800/8800 v3/v4 series CPUs.

A 9032 server supports 32 or 20 CPUs, a 9016 server supports 16 or 12 CPUs, and a 9008 server supports eight or four CPUs.

To query the latest compatibility information, use the Huawei Server Compatibility Checker.

NOTE
The CPU models configured for the same physical partition on a server must be the same. Different models of CPUs can be configured for different physical partitions.

4.2 Memory

DIMM Configuration Rules

KunLun servers support only DDR4 DIMMs and support RDIMMs or LRDIMM. The maximum memory operating speed is 1866 MT/s. The actual memory operating speed is determined by the number and working mode of a single memory channel.

The memory subsystem of a KunLun server provides two types of channels:

- SMI2 channel: is between a CPU and the memory buffer. Each CPU supports a maximum of four SMI2 channels. Each SMI2 channel uses a memory buffer, each memory buffer supports two memory channels, and each memory channel supports up to

three DIMM slots. KunLun servers support only DDR4 MBMs. Two MBMs must be configured for each SCM.

- DDR memory channel: is between the memory buffer and a DIMM. KunLun servers support DDR4 memory channels.

The operating speed of the memory depends on the memory operating mode as well. There are two memory operating modes:

- Performance mode (default)

  Each memory channel operates independently, and the speed of an SMI2 channel doubles the speed of a memory channel. The memory system in this mode delivers high performance.
- RAS (lockstep) mode

  Two memory channels on the same SMI2 channel operate synchronously, and an SMI2 channel operates at the same speed as a memory channel. The memory system in this mode delivers high reliability.

DIMM and MBM configuration rules are as follows:

- Each MBM must be configured with two DDR4 memory boards to support a maximum of 24 DDR4 DIMMs.
- DIMMs of different models and BOM codes cannot be configured mixedly in a KunLun single system or physical partition, and the memory is evenly distributed to each memory board in the single system or physical partition.
- If the numbers of MBMs in two physical partitions are different or different models of DIMMs are configured, the two physical partitions cannot be combined. If the configurations are the same, the two physical partitions can be combined.

To query the latest compatibility information, use the Huawei Server Compatibility Checker.

DDR4 DIMM Slot Configuration

Figure 4-1 shows the DIMM installation positions on each MBM.

Figure 4-1 DIMM installation positions

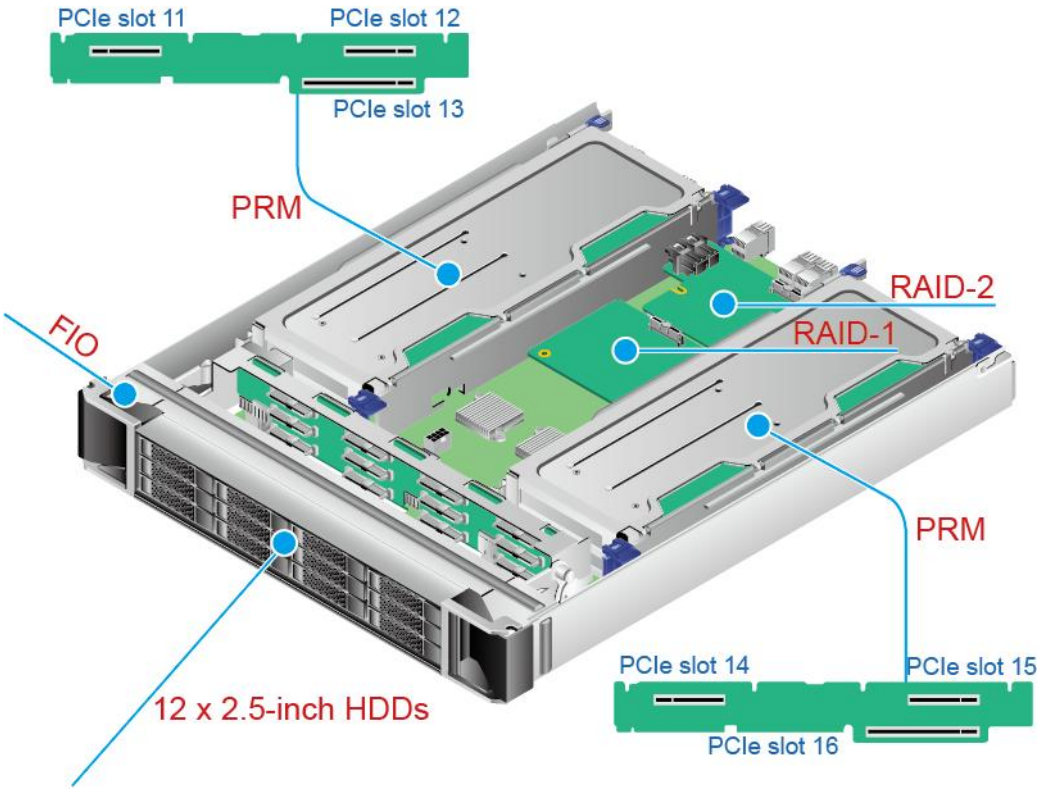


Table 4-1 describes the DIMM configuration rules.

Table 4-1 DIMM installation sequence

Number of DIMMs	DIMM Installation Sequence
1	DIMM 00
2	DIMM 00, DIMM 20
4	DIMM 00, DIMM 10, DIMM 20, and then DIMM 30
8	DIMM 00, DIMM 10, DIMM 20, DIMM 30, DIMM 01, DIMM 11, DIMM 21, and then DIMM 31
12	DIMM 00, DIMM 10, DIMM 20, DIMM 30, DIMM 01, DIMM 11, DIMM 21, DIMM 31, DIMM 02, DIMM 12, DIMM 22, and then DIMM 32

NOTE
DIMM 00, DIMM 10, DIMM 20, and DIMM 30 are the four primary memory channels.

Table 4-2 Memory configurations

9032-32P		9032-20P		9016-16P		9016-12P		9008-8P		9008-4P		DIMM
Capa	Quan	Capa	Quan	Capa	Quan	Capa	Quan	Capa	Quan	Capa	Quan	

city (GB)	tity	city (GB)	tity	city (GB)	tity	city (GB)	tity	city (GB)	tity	city (GB)	tity	Type
512	64	320	40	256	32	192	24	128	16	64	8	8GB
1024	128	640	80	512	64	384	48	256	32	128	16	
2048	256	1280	160	1024	128	768	96	512	64	256	32	
4096	512	2560	320	2048	256	1536	192	1024	128	512	64	
6144	768	3840	480	3072	384	2304	288	1536	192	768	96	
1024	64	640	40	512	32	384	24	256	16	128	8	16GB
2048	128	1280	80	1024	64	768	48	512	32	256	16	
4096	256	2560	160	2048	128	1536	96	1024	64	512	32	
8192	512	5120	320	4096	256	3072	192	2048	128	1024	64	
12288	768	7680	480	6144	384	4608	288	3072	192	1536	96	
2048	64	1280	40	1024	32	768	24	512	16	256	8	32GB
4096	128	2560	80	2048	64	1536	48	1024	32	512	16	
8192	256	5120	160	4096	128	3072	96	2048	64	1024	32	
16384	512	10240	320	8192	256	6144	192	4096	128	2048	64	
24576	768	15360	480	12288	384	9216	288	6144	192	3072	96	
4096	64	2560	40	2048	32	1536	24	1024	16	512	8	64GB
8192	128	5120	80	4096	64	3072	48	2048	32	1024	16	
16384	256	10240	160	8192	128	6144	96	4096	64	2048	32	
32768	512	20480	320	16384	256	12288	192	8192	128	4096	64	

Memory Protection Technologies

KunLun servers use the following memory protection technologies (for details, see the *Huawei Mission Critical Server RAS White Paper*):

- Error Checking and Correcting (ECC)
- Single Device Data Correction (SDDC) and Double Device Data Correction (DDDC)
- SDDC+1 and DDDC+1
- Memory mirroring
- Memory sparing
- Hot swap of MBMs
- Memory overheat protection
- SMI2 link retransmission and verification

4.3 Local Storage

To query the latest hard disk and RAID controller card compatibility information, use the Huawei Server Compatibility Checker.

Observe the following rules when configuring local storage for KunLun servers:

- RAID controller cards and hard disks are mandatory for local storage.
- A physical partition must use the same model of RAID controller cards.
- SATA and NL-SAS disks are not supported. Only SAS/SATA HDDs and SSDs are supported.
- It is recommended that the types of hard disks be the same in a single system, in a physical partition, or between physical partitions.

Table 4-3 lists the performance of different RAID levels, the minimum number of disks required, and disk usage.

Table 4-3 RAID level comparison

RAID Level	Reliability	Read Performance	Write Performance	Minimum Number of Hard Disks	Disk Usage
RAID 0	Low	High	High	1	100%
RAID 1	High	Low	Low	2	1/N
RAID 5	Relatively high	High	Medium	3	(N – 1)/N
RAID 6	Relatively high	High	Medium	3	(N – 2)/N
RAID 1E	High	Medium	Medium	3	M/N
RAID 10	High	Medium	Medium	4	M/N
RAID 50	High	High	Relatively high	6	(N – M)/N
RAID 60	High	High	Relatively high	6	(N – M x 2)/N
Note: N indicates the number of member disks in a RAID array, and M indicates the number of subgroups in a RAID array.					

4.4 LOMs

KunLun servers support LAN on motherboard (LOMs) to provide GE or 10GE network ports.

The LOM configuration rules are as follows:

- When the system works in single-system mode:
  - A 9032-32P supports a maximum of eight LOMs and four LOMs by default.
  - A 9032-20P supports a maximum of five LOMs and threeLOMs by default.
  - A 9016-16P supports a maximum of four LOMs and two LOMs by default.

  - A 9016-12P supports a maximum of three LOMs and two LOMs by default.
  - A 9008-8P supports a maximum of two LOMs and one LOMs by default.
  - A 9008-4P supports only one LOM.

  Different types of LOMs can be configured mixedly.
- When the system works in physical partition mode, each physical partition support one LOM by default.

Table 4-4 LOM type and functions

No.	LOM Type	Function
1	4 x GE-RJ45 electrical ports	• Preboot Execution Environment (PXE), Wake on LAN (WOL), and Internet Small Computer System Interface (iSCSI) boot • IPv6 Offloading • 802.1Q VLAN • IEEE1588 for time synchronization • Tx/Rx IP, SCTP, TCP, and UDP Checksum Offload • Transmit Segmentation Offload (TSO) • Tx TCP Segmentation Offload • Receive Side Scaling (RSS) • Jumbo frames • MSI and MSI-X • TCP/IP Stateless Offloading • NIC teaming
2	2 x 10GE SFP optical ports	• PXE, WOL, and iSCSI boot • Single-Root I/O Virtualization (SR-IOV) • Virtual Machine Device Queues (VMDq) • I/O Acceleration Technology (I/OAT) • IPv6 Offloading • 802.1Q VLAN • IEEE1588 for time synchronization • Tx/Rx IP, SCTP, TCP, and UDP Checksum Offload • TCP/IP Stateless Offloading • Tx TCP Segmentation Offload • Receive Side Scaling (RSS) • Jumbo frames • MSI and MSI-X • NIC teaming
3	2 x 10GE-RJ45 electrical ports	• Offload functions • IP, TCP, and UDP Checksum Offload (IPv4 and IPv6) • TCP Segmentation Offload (TSO) and Large Send Offload (LSO) (IPv4 and IPv6) • IP Security (IPsec) Offload

No.	LOM Type	Function
		• MACSec Offload • RSS for Windows and scalable I/O for Linux (IPv4, IPv6, and TCP/UDP) • Intel I/OAT and VMDq • IEEE 802.1Q VLAN, VLAN tagging, and untagging and package filtering of up to 4096 VLAN tags • IEEE 802.3x traffic control • IEEE 802.1p priority-based quality of service (QoS) • Advanced packet filtering • Jumbo frames (up to 9500 bytes) • UEFI and PXE boot • Feature combination • Adapter fault tolerance (AFT) • Switch fault tolerance (SFT) • Adaptive Load Balancing (ALB) • Virtual Machine Load Balancing (VMLB) • Direct Cache Access (DCA) • MSI-X • Low-latency interrupt • RSS and scalable I/O

To query the latest LOM compatibility information, use the Huawei Server Compatibility Checker.

4.5 Standard PCIe Cards

The following standard PCIe cards are supported:

- GE interface module
- 10GE interface module
- FC interface module
- PCIe-SSD card
- GPU card
- InfiniBand interface module

Observe the following rule when configuring PCIe cards for a KunLun server:

Use dedicated hot-swappable PCIe card brackets when installing PCIe cards in hot-swappable slots.

To query the latest PCIe card compatibility information, use the Huawei Server Compatibility Checker.

NOTE

KunLun servers support only the standard PCIe cards in the compatibility list. Compatibility with other standard PCIe cards has not been verified.

4.6 OS

To query the latest OS (including host OS and guest OS) compatibility information, use the Huawei Server Compatibility Checker.

5 Management

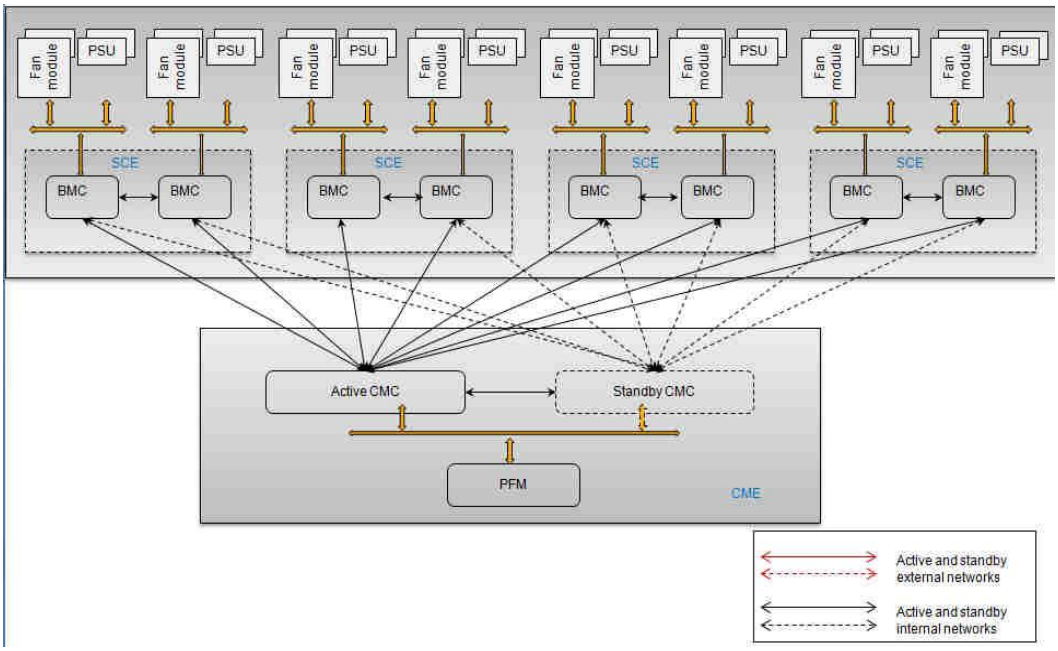
KunLun servers integrate the latest CMC out-of-band management system.

The CMCs provide the following out-of-band management functions:

- Manage the CME, SCEs, fan modules, and PSUs.
- Perform asset management, partition management, environment monitoring, field replaceable unit (FRU) health monitoring, and online maintenance.
- Provide channels for in-band monitoring and commissioning, and supports KVM, SOL, and virtual media.

The management system adopts unified networking. The CMCs are connected to the BMCs in the BPUs of each SCE by using Ethernet switch technology to implement system management. The CMCs instead of the BMCs provide management ports for connecting to the external management and maintenance network. See Figure 5-1.

Figure 5-1 Management architecture



The CMCs are Huawei's proprietary advanced software designed for remotely managing servers. The CMCs provide various user interfaces, such as the CLI and WebUI. All user interfaces adopt a highly secure encryption algorithm, ensuring access security. The CMCs monitor all aspects of the server and provide comprehensive alarms and detailed logs. The CMCs operate in active/standby mode. If the active CMC fails, an active/standby failover is automatically triggered so that the standby CMC can take over services from the active one.

Table 5-1 describes the CMC specifications.

Table 5-1 CMC specifications

Item	Specifications
Basic management functions	• UID indicator turning on and off, and host name and location setting and query • Cabinet health status • Board information query • System event and alarm query • SOL • KVM/VMM
User management	• User online status query • User creation, modification, and deletion • Rights-based management
PSU and fan module management	• Power and status monitoring for the CME and SCEs • Fan speed percentage and fan status monitoring for the CME and SCEs
Physical partition management	• Life cycle management: physical partition creation, modification, and deletion • Physical partition power-on and power-off
User interface	• HTTPS WebUI • CLI
Security	• User management • Role authentication • Data encryption • Scenario-based login restriction • Account security
LCD	• Cabinet name and location query and setting, and overall health status query
Others	• Network Time Protocol (NTP) time synchronization • Log query and download • Online maintenance • Upgrade management
Management tool	• eSight

6 Warranty

In accordance with the *Huawei Warranty Policy for Servers & Storage Products* (*Warranty Policy* for short), Huawei provides a three-year warranty for KunLun mission critical servers, a one-year warranty for DVD drives and supercapacitors, and a three-month warranty for software media. The *Warranty Policy* stipulates warranty terms and conditions, including the available services, response time, terms of service, and disclaimer.

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

Table 6-1 describes the warranty services provided by Huawei.

Table 6-1 Warranty services

Service	Description
Help Desk	Huawei provides 24-hour after-sales technical support (such as handling requests for troubleshooting and hardware repair), receives and handles customer inquiries, complaints, and suggestions through a dedicated hotline.
Remote troubleshooting	Upon receiving a service request to rectify a network or system fault, Huawei engineers remotely analyze and handle the fault in the shortest possible time through telephone support, remote access, or both.
Online technical support	The Huawei enterprise support website (http://support.huawei.com/enterprise) provides product and technical materials, such as product manuals, configuration guides, networking case studies, and maintenance experience collections. Registered users can access the website to download required documents.
Licensing of software updates	Huawei provides software patches whenever necessary to ensure stable device operation.
Hardware return for repair	Huawei provides repair or replacement services within the promised time to meet customer needs for spare parts. You can return defective parts to the designated Huawei site after submitting a service request. For servers used outside China, Huawei provides a three-year warranty for 9/5 responses to service requests on the next business day. Huawei delivers the repaired or new parts within 45 calendar days after receiving the defective parts. For servers used in China, Huawei provides a three-year warranty for 10/5 responses, on the next business day, to service requests for parts replacement and

Service	Description
	onsite limited repair.

Table 6-2 describes the warranty service response time.

Table 6-2 Response time

Service	Response Time		Description	Remarks
Help Desk	24/7		24/7: available 24 hours a day, 7 days a week (00:00 to 24:00, Monday to Sunday)	-
Remote troubleshooting	-	-	24/7: available 24 hours a day, 7 days a week (00:00 to 24:00, Monday to Sunday)	The response time is the period between the time when Huawei technical support accepts a customer's service request and the time when Huawei technical support contacts the customer for the first time to offer remote troubleshooting services.
Online technical support	-	-	Huawei enterprise support website (http://support.huawei.com/enterprise): available 24 hours a day, 7 days a week (00:00 to 24:00, Monday to Sunday)	-
Licensing of software updates	-	-	Huawei enterprise support website (http://support.huawei.com/enterprise): available 24 hours a day, 7 days a week (00:00 to 24:00, Monday to Sunday)	-
Hardware return for repair	Outside China	9/5 responses, shipment within 45 calendar days	Available 9 hours a day, 5 days a week (09:00 to 18:00, Monday to Friday), excluding official holidays.	Repaired or new parts will be shipped within 45 calendar days after Huawei receives the defective parts.
	In China	10/5 responses on the next business day	Available 10 hours a day, 5 days a week (08:00 to 18:00, Monday to Friday), excluding official holidays.	Service requests submitted after 15:30 will be handled the next business day.

7 Certifications

Table 7-1 lists the certifications that KunLun servers have passed.

Table 7-1 Certifications

No.	Country/Region	Certification	Standard	Remarks
1	China	RoHS	SJ/T 11363-2006 SJ/T 11364-2006 GB/T 26572-2011	
2	Europe	CE	Safety: IEC 60950-1: 2005 (2nd Edition) + A1: 2009 and/or EN 60950-1: 2006 + A11: 2009 + A1: 2010 + A12: 2011 EMC: EN 55022: 2010 CISPR 22: 2008 EN 55024: 2010 CISPR 24: 2010 ETSI EN 300 386 V1.5.1: 2010 ETSI ES 201 468 V1.3.1: 2005 IEC61000-3-2: 2005 + A1: 2008 + A2: 2009/EN 61000-3-2: 2006 + A1: 2009 + A2: 2009 IEC 61000-3-3: 2008/EN 61000-3-3: 2008 RoHS: 2002/95/EC REACH: EC 1907/2006	
3	Saudi Arabia	Multi-country	IEC/EN 61000-6-1	

No.	Country/Region	Certification	Standard	Remarks
			IEC/EN 61000-6-3 IEC/EN 60950-1 IEC 620401	
	Nigeria	Multi-country	IEC60950-1	
	Kuwait	Multi-country	IEC60950-1	
4	North America and multiple countries	CB	IEC 60950-1(ed.2), IEC 60950-1(ed.2);am1, IEC 60950-1(ed.2);am2	Delivered with a KunLun cabinet
5	North America and multiple countries	CB/UL	IEC 60950-1(ed.2), IEC 60950-1(ed.2);am1, IEC 60950-1(ed.2);am2	Delivered without a KunLun cabinet
6	America and Canada	FCC&IC	FCC CFR47 Part 15 Subpart B:2015 ICES-003 Issue 6:2016*	Delivered without a KunLun cabinet
7	Japan	VCCI	Safety	Delivered without a KunLun cabinet

8 Glossary

Table 8-1 Terms

Acronym or Abbreviation	Full Name	Description
-	acoustic door	-
ACM	advanced clock module	-
APD	AC power distribution	-
BIO	back I/O module	A BIO is installed in an SCE or REE to provide standard PCIe slots.
BPU	basic partition unit	A BPU is a 4-socket physical partition resource.
CIM	central interface module	-
CMC	central management console	-
CME	central management enclosure	-
CPI	central partition interconnect module	-
DIMM	dual in-line memory module	-
DMI	Direct Media Interface	DIM is developed by Intel for connecting a CPU and the PCH.
FIO	front I/O module	An FIO is installed in an SCE.
HA	home agent	The HA, an important module of an E7 CPU, processes all Dynamic Random Access Memory (DRAM) requests of the CPU.
HDD	hard disk drive	-

Acronym or Abbreviation	Full Name	Description
LPM	local partition management module	An LPM in a BPU implements device management and physical partition control for the BPU. The LPM is integrated with the Intel PCH, and Huawei management chip Hi1710, and Huawei LAN on motherboards (LOMs).
MBM	memory board module	Two MBMs are configured for each CPU.
NCM	node controller module	-
NI cable	node interconnect cable	-
NI port	node interconnect port	-
PCH	Platform Controller Hub	KunLun servers use the Patsburg-J PCH.
PDU	power distribution unit	-
PFM	power and fan integrity module	-
PIC	partition interconnect cable	-
PIP	partition interconnect port	-
QPI	QuickPath Interconnect	QPI is a point-to-point CPU interconnect developed by Intel.
RAID	redundant array of independent disks	-
RAS	Reliability, Availability, and Serviceability	RAS defines system availability, which is crucial for mission-critical applications.
SCE	system compute enclosure	-
SCM	system compute module	An SCM consists of the following: • Service resources: one CPU board module and 24 DIMMs • Board hardware: one CPU board module and two MBMs
SMI2	Scalable Memory Interface Gen 2	SMI2 is the second-generation memory

Acronym or Abbreviation	Full Name	Description
		expansion channel launched by Intel based on E7 v2 CPUs.
TDP	Thermal Design Power	-
REE	Resource Expansion Enclosure	-