Huawei E9000 Server

V100R001

Device Management White Paper

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HUAWEI TECHNOLOGIES CO., LTD.

Huawei Technologies Co., Ltd.

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

Website: http://e.huawei.com

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1.1 E9000 Overview

1.1.1 Functions

The HUAWEI E9000 server (E9000 for short) is developed by Huawei and supports E9000 series compute nodes, storage nodes, and resource expansion nodes in a 12 U chassis. The E9000 server has the following characteristics:

● The E9000 chassis houses eight full-width compute nodes or 16 half-width compute nodes for flexible slot configuration.

● Six how-swappable power supply units (PSUs) are in N+1 or N+N redundancy mode.

● Fourteen how-swappable fan modules are in N+1 redundancy mode.

● Four (two pairs of) switching slots support multiple types of switching protocols, such as Ethernet, FC, FCoE, and IB, and support straight-out I/O interfaces.

● Two management modules (MMs) operate in active/standby mode, support active/standby failover and hot swap, and manage all the E9000 components.

● A liquid crystal display (LCD) in the chassis front panel is used to set basic chassis information or monitor the running status of the components in the chassis.

1.1.2 Appearance

Figure 1 and **Figure 2** show an E9000 server.

**Figure 1-1** Appearance

Figure 1-2 Front view and rear view

1.1.3 Logical Architecture

The HUAWEI Tecal E9000 blade server is a high-performance, high-end enterprise server designed for elastic computing and telecom computing. The server consolidates computing, storage, and networking resources to support high-end core applications of operators and enterprises. The E9000 is an industry-leading hardware computing platform that features reliability, availability, and serviceability (RAS), high computing density, energy saving, high midplane bandwidth, intelligent management and service, elastic configuration and flexible expansion for computing and storage resources, low network latency, and network acceleration. These features improve competitiveness of the E9000 server.

Figure 1-3 E9000 logical architecture
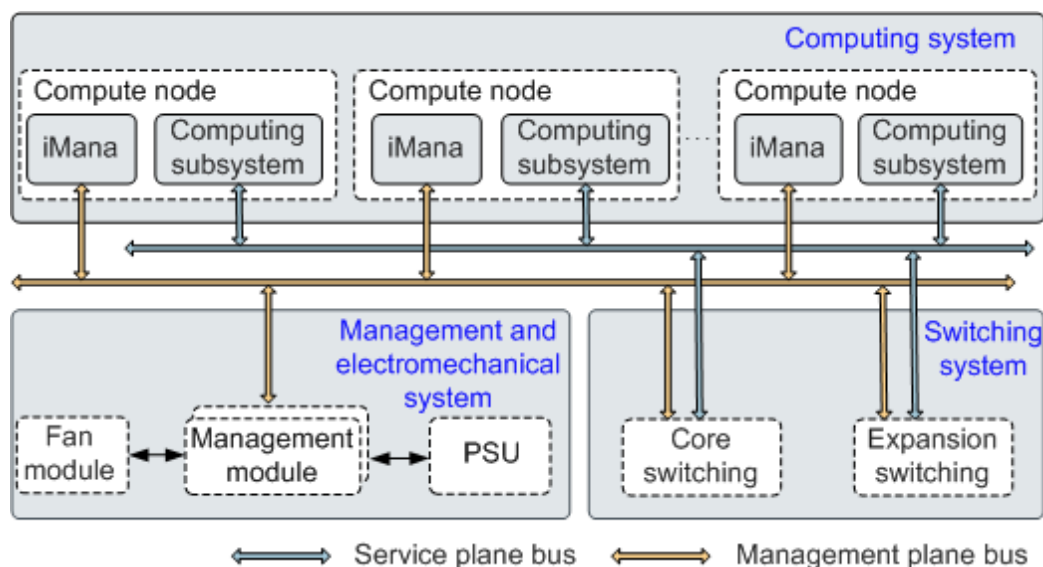
The E9000 system architecture logically consists of a computing system, switching system, and management & electromechanical system.

The three systems interwork with each other to form a unified switching architecture. The management & electromechanical provides unified user interfaces (UIs) for device management. Figure 1 shows the logical system architecture.

The computing system includes compute nodes and storage nodes. It provides external data ports through the input/output (I/O) module of the switching system and implements chassis-level or higher-level device management through the internal baseboard management controllers (BMCs).

The switching system includes core switching and expansion switching. It performs switching between computing subsystems and provides external data ports through the I/O module. By connecting the switching system and the management & electromechanical system, you can set up a physical network where service switching and service management switching are combined or separated.

The management & electromechanical system consists of the fan modules, PSUs, and management modules. The system supplies power and provides heat dissipation for all components in the chassis, as well as manages theses components. The management & electromechanical system also interconnects the basic management controllers (BMCs) on each compute node, storage mode, and switch module.

1.2 E9000 Device Management Architecture

E9000 device management consists of the management & electromechanical system and out-of-band management system for compute nodes and switch modules. The management functions involve asset management, environment monitoring, field replaceable unit (FRU) health monitoring, inband monitoring, channel commissioning, local physical keyboard, video, and mouse (KVM), KVM over IP, serial over LAN (SOL), and virtual media.

The management & electromechanical system provides active and standby management modules that support active/standby failover. The active and standby management modules manage the fan modules and PSUs by connecting to them over inter-integrated circuit (I^2C) channels, as shown in **Figure 1-4**. The system automatically adjusts the fan speed based on the fan partitions, ambient temperature in the chassis, and module temperatures. The PSUs support automatic protection in case of power failures.

The chassis management modules connect to the BMCs of compute nodes over Ethernet, and connect to the maintenance and management network through ports on the management modules or switching system.

Figure 1-4 Logical architecture of E9000 device management
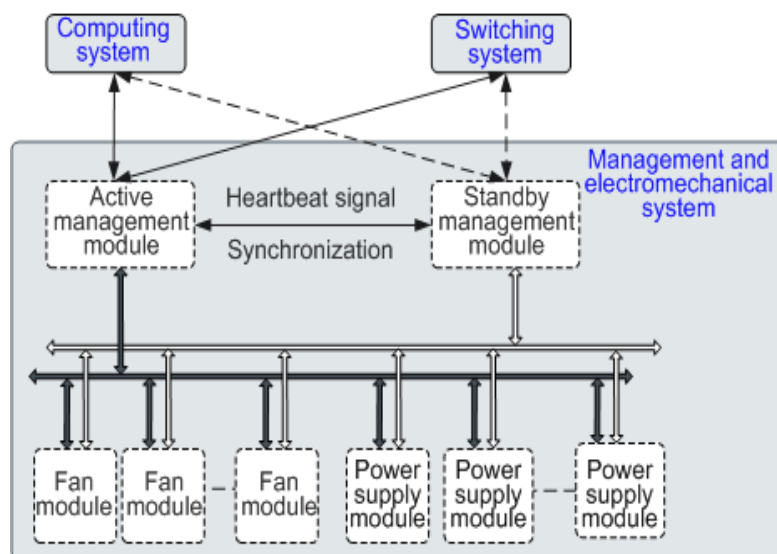
The Hyper Management Module (HMM) provides an external management network port, which can be used for logging in to any module (MM910, BMC on a compute node, or switch module) in the chassis.

Figure 1-5 E9000 internal network connection
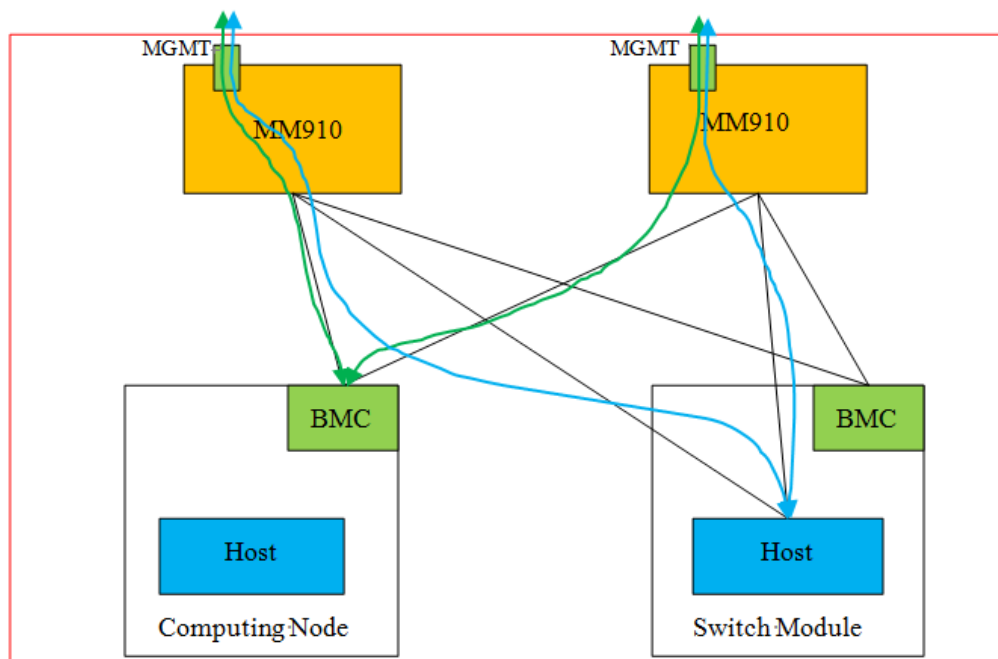
With the management network ports (MGMT) on the MM910s, you can log in to the HMM for chassis management. You can also use the ports to log in to the BMC on a compute node over the CLI, WebUI, or IPMI to manage the compute node, or to the Host on a switch module over the CLI, SNMP, and Netconf to manage the switch module. **The HMM network ports enable you to manage all modules in the E9000 chassis.**

As shown in **Figure 1-5**, the management network ports (MGMT) on the MM910s can be used to log in to a switch module (see blue lines), to iBMC (BMC on a compute node) (see green lines), or to the MM910s.

The E9000 uses the iBMC system. For details, see the *HUAWEI iBMC intelligent Management System White Paper*.

2 E9000 Device Management Functions

About This Chapter

2.1 Device Management Module Overview

This section describes the E9000 chassis management module HMM.

2.2 Basic Management Functions

This section describes device management and monitoring functions provided by the HMM.

2.3 User Management Functions

This section describes the rights- and domain-based user management functions provided by the HMM.

2.4 Power Management Functions

This section describes the power management functions for the E9000.

2.5 Switch Management Functions

This section describes the switch module management functions provided by the HMM.

2.6 Security Management Functions

This section describes the security management functions provided by the HMM.

2.7 Stateless Computing Management Functions

This section describes the stateless computing management functions provided by the HMM.

2.10 Other Management Functions

This section describes other management functions (such as logging and upgrades) provided by the HMM.

2.1 Device Management Module Overview

The E9000 supports two HMMs that are deployed on MM1 and MM2 respectively and work in active/standby mode. The HMM hardware name is MM910.

Figure 2-1 Rear view of the E9000
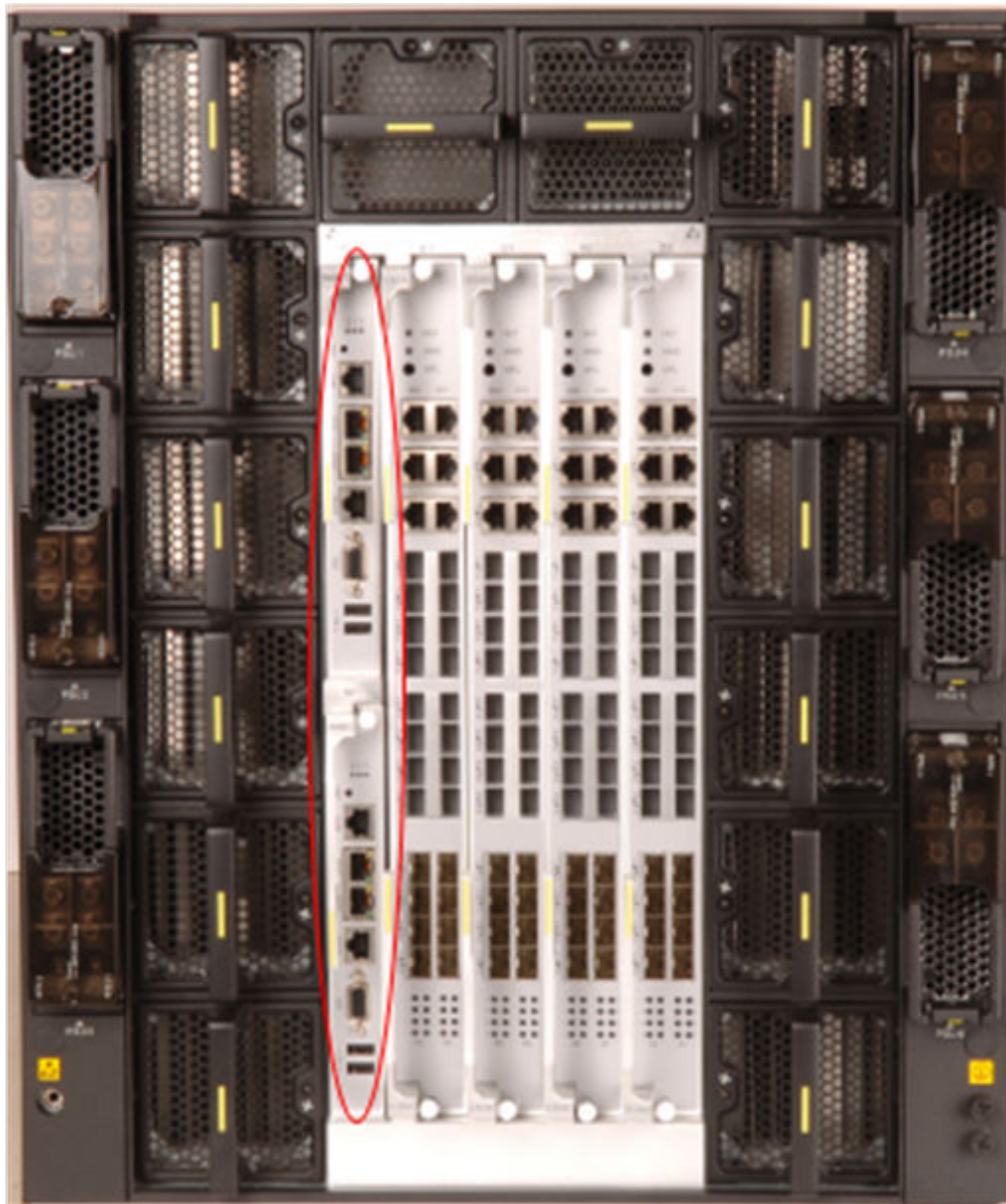
The MM910 panel provides a RS232 management serial port, management network port (MGMT), stacking network port (stack), PDU RS485 management serial port, VGA port, and two USB ports.

Figure 2-2 MM910
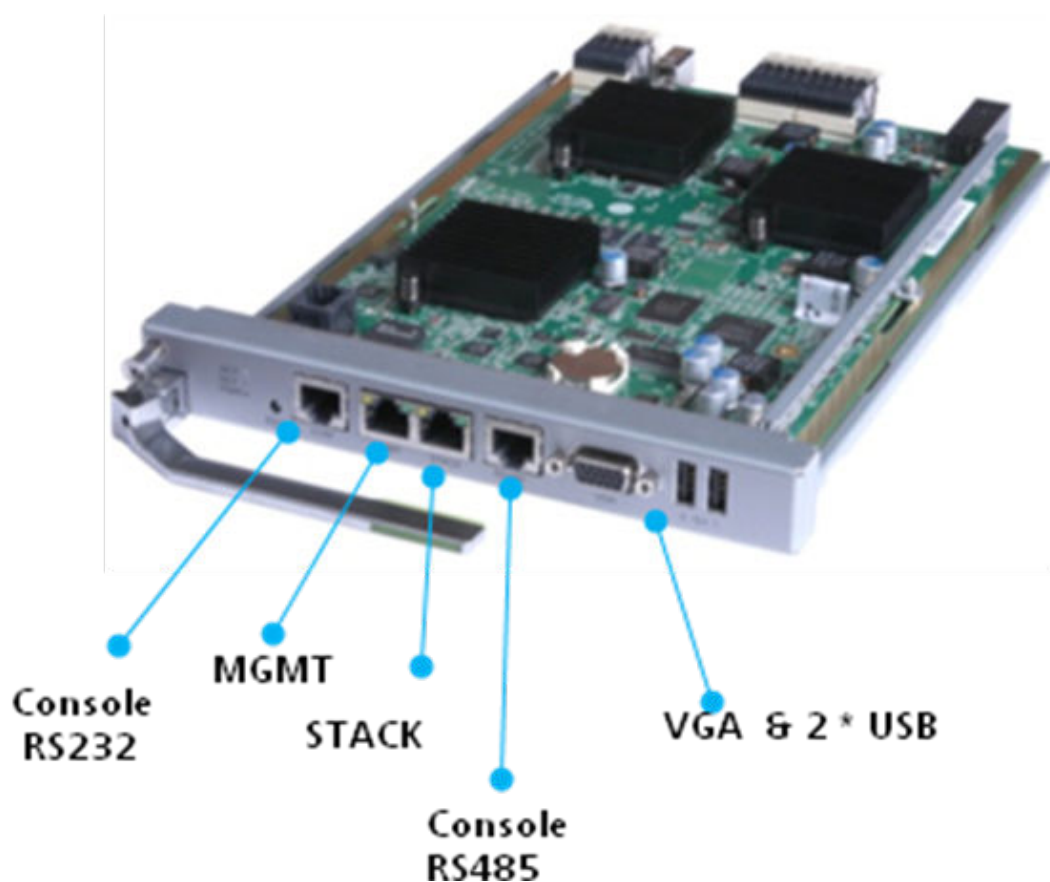
Panel Port	Port Type	Function
COM	RS232	System serial port
MGMT	RJ45	Management network port
STACK	RJ45	Stacking port (STACK)
RS485	RS485	PSU management port
VGA	VGA	KVM monitor port
USB	USB	Mouse, keyboard, and DVD-ROM drive

Indicator	Function
HLY	The indicator shows system health status. If it is blinks red, a fault alarm is generated. If it is steady green, the system is operating properly.

ACT	The indicator shows the active or standby state of a device. If it is steady green, the device is active.
PWR	The indicator shows the system power supply status. If it is steady green, the device is being powered on.

2.2 Basic Management Functions

The HMM performs out-of-band device management for the E9000 chassis. To be specific, it supplies power the chassis and components, cools internal components, and monitors the chassis operating, and provides a LCD/KVM. In addition, the HMM shows the internal hardware status. The HMM enables the E9000 to be an intelligent computing platform that is managable, monitorable, and configurable.

2.2.1 Setting Chassis Information

The HMM allows you to set and query chassis information, which helps to identify and maintain a chassis remotely.

Chassis name: name of a chassis.

Chassis number: unique ID for identifying a chassis.

Chassis location: You can set it to an alias or location.

Figure 2-3 Setting chassis information
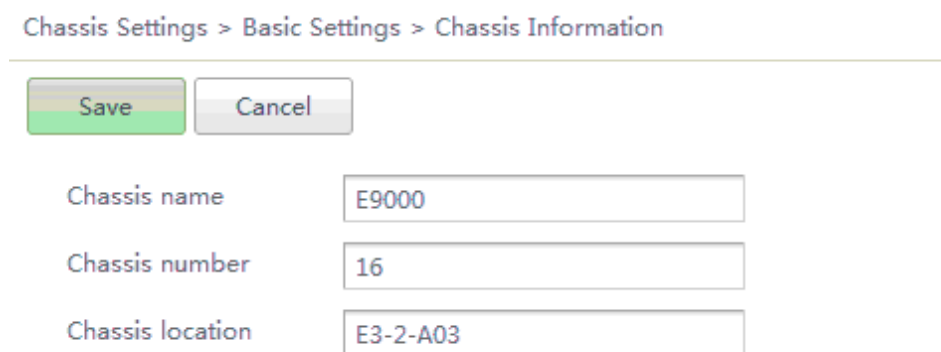
2.2.2 Monitoring a Chassis

The HMM monitors the following health status of each node in the chassis:

Chassis events: inserting, removing, and powering on or off a node or module; inserting and removing a fan module or PSU.

Electromechanical faults: fan module or PSU faults

Temperatures: ambient temperature and node temperatures

Node faults: CPU, memory, or hard disk faults of a compute node; power supply, voltage, and other hardware faults on each compute node.

Commissioning support: serial over LAN (SOL) for each node

Figure 2-4 Monitoring a chassis
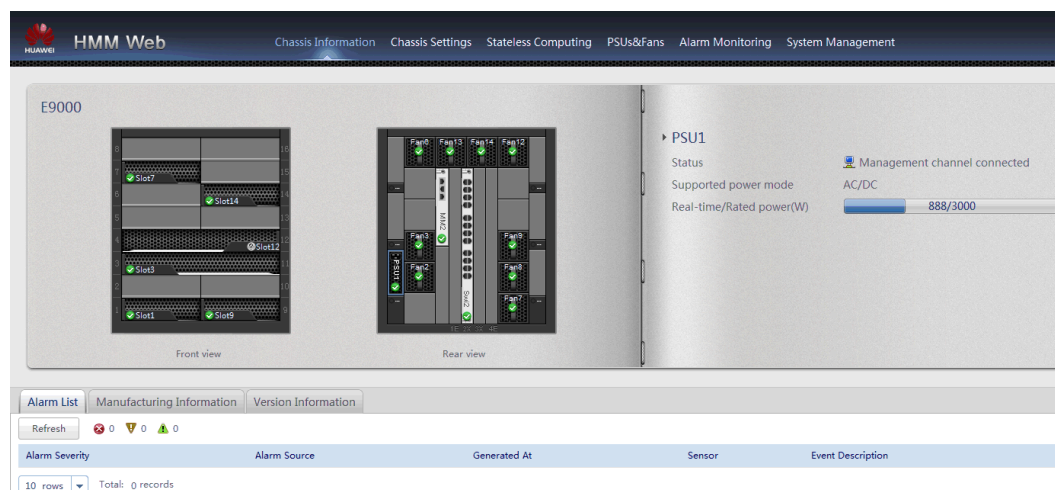
2.2.3 Managing Fan Modules

The E9000 heat dissipation system contains 14 fan modules that are divided into three zones. Each fan module has two fans. Each fan module zone supports the N+1 redundancy mode, that is, heat dissipation for the entire system is not affected if one fan or fan module fails. The E9000 adopts the forced air-cooling technology and front-to-rear ventilation channels. That is, the E9000 draws air in on the front and exhausts air on the rear.

Adjusting the Fan Speed

Based on the operating temperature of compute nodes in the chassis, the fan modules automatically adjust the fan speed or the fan speed is controlled by the MM.

If a fan module properly communicates with the HMM, its fan speed is controlled by the HMM. If the communication between them is abnormal, the fan module adjusts its fan speed based on the ambient temperature.

When a node or module is inserted into the E9000 chassis, the node or module reports its fan speed adjustment request. Then the HMM monitors the sensor of the node or module according to its submitted request, and accurately adjusts the fan speed based on the monitored temperature. This ensures normal operating temperatures for nodes and modules.

Viewing Fan Status

The HMM monitors fan health status, installation status, and fan speed.

Figure 2-5 Viewing fan status

2.2.4 Chassis LCD

The E9000 provides an LCD for monitoring and configuring the chassis by using the HMM.

Figure 2-6 LCD location

Figure 2-7 LCD operating screen

The LCD provides the following functions:

Queries the chassis information and current alarms.

Sets chassis information, including the chassis name, number, and location.

Sets an IP address (floating or static) for the HMM.

Sets power capping.

Queries the information and status of a node, module, fan module, or PSU.

2.2.5 Chassis KVM

The E9000 chassis provides the KVM function to implement integrated management of compute nodes, switch modules, and management modules in the chassis. The MM910 provides VGA and USB ports. You can connect a KVM to the E9000 through the ports and use the KVM to log in to any node or module, including a switch module or HMM without a video card, for management.

Figure 2-8 KVM/VMM interface
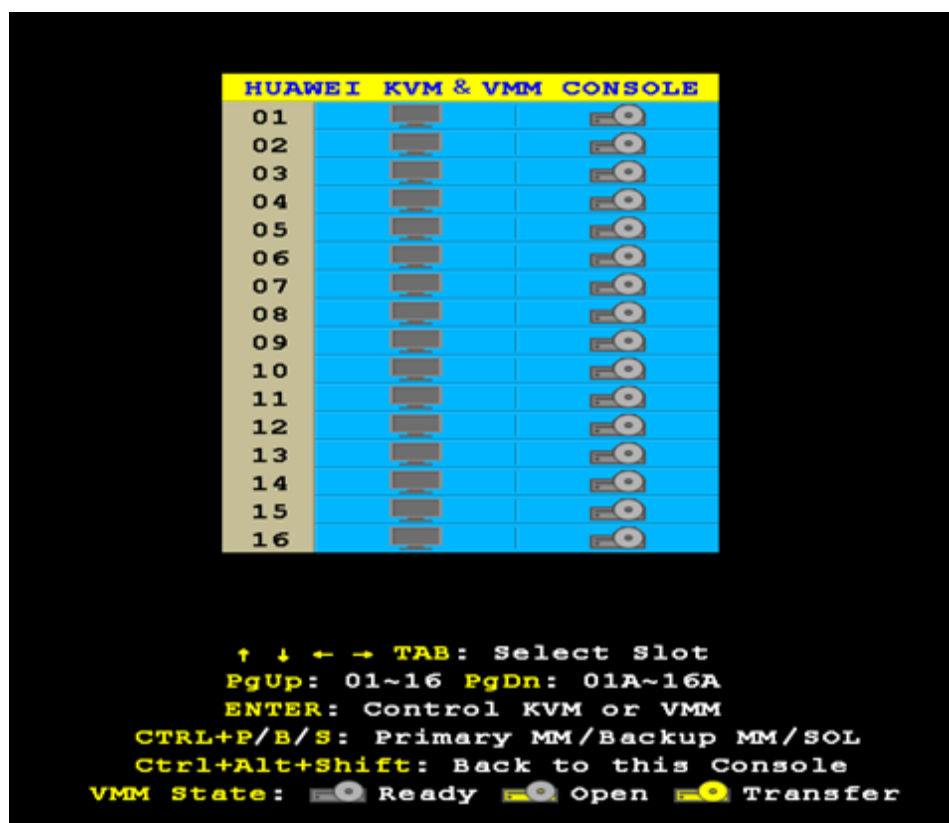
In addition to the KVM function, the E9000 chassis also provides the virtual media (VMM) function. You can connect a DVD-ROM drive to the MM910 through a USB port and mount the DVD-ROM drive to any compute node. The VMM function enables the DVD-ROM drive to serve as a local device of a compute node. At present, the MM910 supports only DVD-ROM drives but not other media. The VMM function does not apply to switch or management modules.

2.2.6 NIC Information Display

The HMM performs alarm monitoring and displays status and manufacturing information about compute nodes. It also provides information about network interface cards (NICs) and connections between NICs and switch modules.

NIC information includes slot numbers and names of NICs, port types, port MAC addresses or WWNs, and connections between NICs and switch modules.

Figure 2-9 NIC information (1)
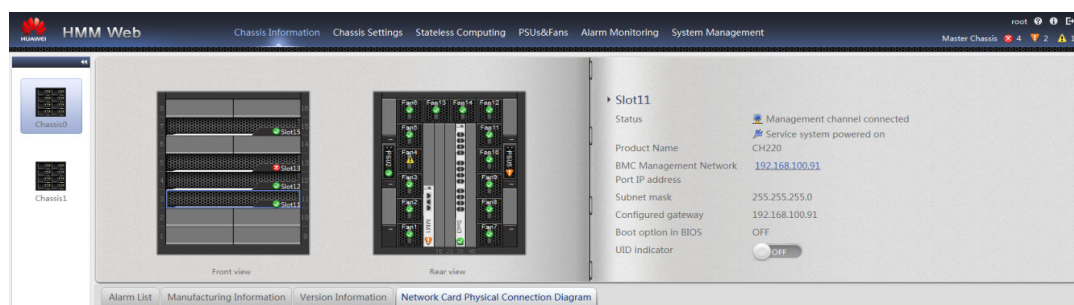
Figure 2-10 NIC information (2)
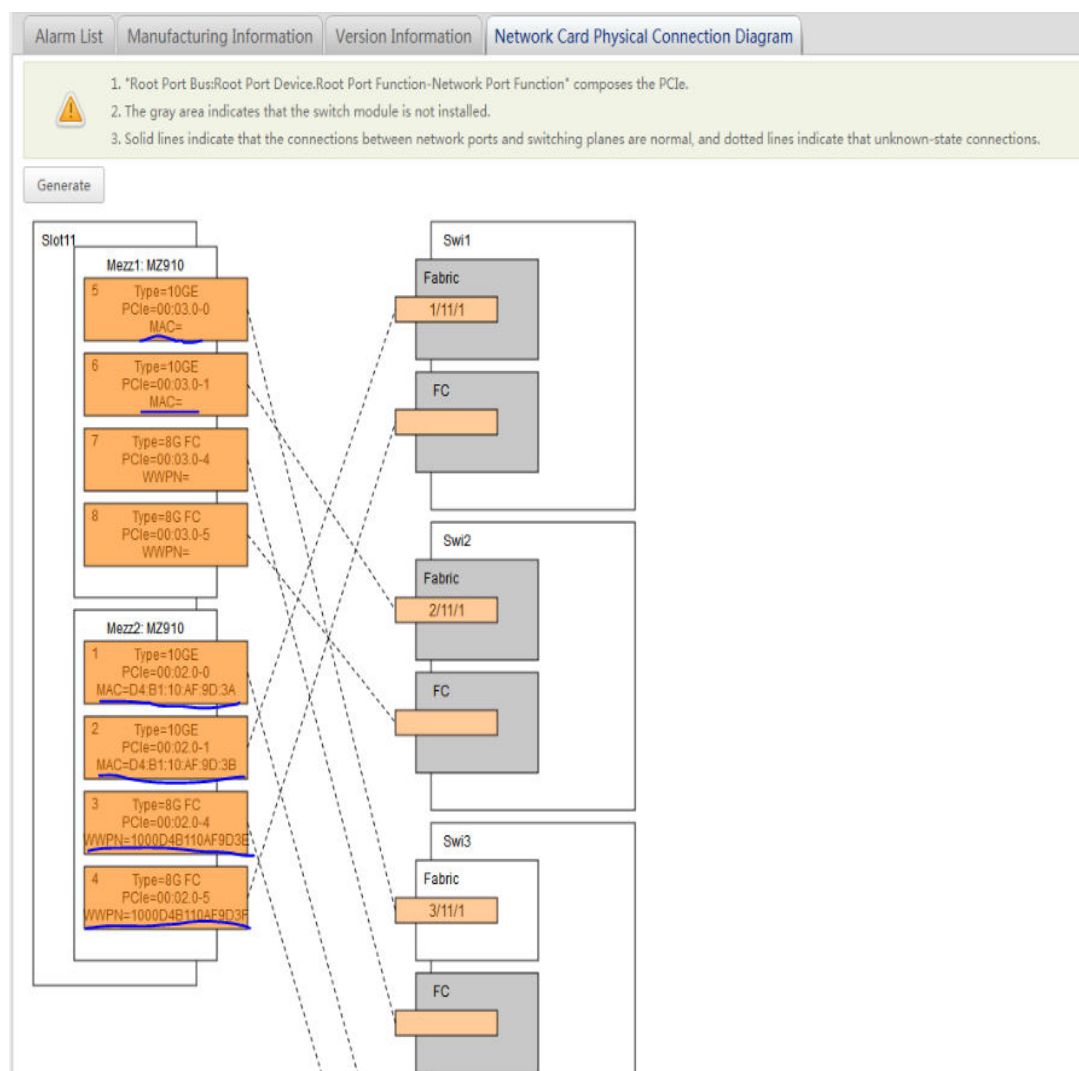
2.3 User Management Functions

The HMM supports rights- and domain-based management. The users in a domain have different rights to manage the nodes specified by the domain.

2.3.1 Domain-based Management

The HMM allows you to create user domains (only one super domain by default) and specify the management scope (compute nodes and switch modules) for each user domain. The super domain has the rights to manage all electromechanical devices in the chassis, including the nodes, PSUs, and fan modules. The users in a domain manage only the nodes or modules specified by the domain. The users in a domain have rights to add, delete, or modify the nodes and modules specified by the domain. The operator of a user domain is the administrator of the super domain. A user must be grouped into a domain. You must delete or move the users in a domain before deleting the domain.

2.3.2 Rights-based Management

The HMM supports three user roles: administrator, operator, and common user.

Common users have only the query permission.

Operators have the rights to perform all device management except user management, restart, and upgrade.

Administrators have the full rights to perform all management functions.

2.4 Power Management Functions

The E9000 provides six PSU slots, and the PSUs are managed by the HMM. The HMM manages PSUs through the PMbus (I2C), and several independent hardware signals are used for starting or shutting down PSUs as well as reporting PSU faults.
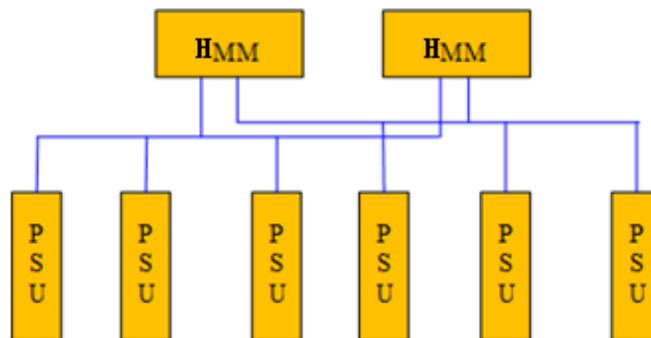
The HMM allows you to query PSU information and monitor PSU status only through the PMbus. Therefore, the PMbus is used for implementing message and command communication between the HMM and PSUs.

2.4.1 Querying PSU Information

Querying PSU Status

Log in to the HMM Web, and open the **Power Status** page. You can view and query the status (healthy, alarm, or hibernation), rated power, and current power of each PSU, namely, PSU 1 to PSU 6, as shown in **Figure 2**.

Figure 2-11 PSU Management
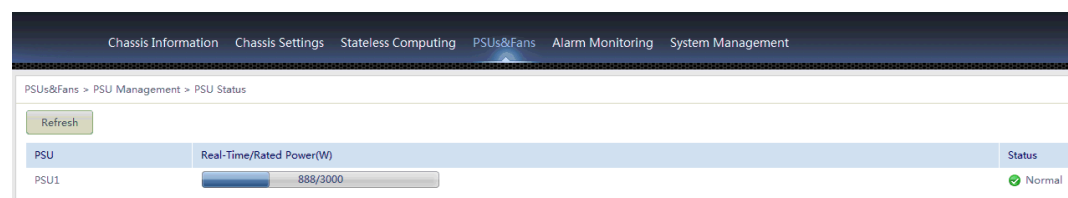
Querying PSU Alarms

- Fault alarm: An alarm is generated when an output fault occurs due to power input faults, power output faults, or internal faults.

- Installation status event: An event is reported when a PSU is removed from the chassis.

● Communication exception: An alarm is reported when the PMbus communication exception occurs.

2.4.2 Stagger Power-On

When the E9000 chassis is powered on, the system staggers the power-on operation for compute nodes in sequence, which reduces the instant power supply pressure caused by simultaneous power-on of all devices. The default stagger interval for powering on compute nodes is 500 ms. You can set the interval based on actual requirements. Rear modules do not support stagger power-on.

When the chassis is powered on, compute nodes send power-on requests to the HMM, and then the HMM sends a power-on command to each compute node to control the power-on time of compute nodes.

2.4.3 Handling Power Exceptions

Check the power requirements of the chassis periodically and calculate the total output power of all PSUs in the chassis. When a power exception occurs and PSUs cannot supply enough power for the chassis, the chassis power exception mode is triggered, and compute nodes are in low power consumption protection mode. After the power exception is handled, the system recovers automatically. The recommended interval for checking the total power in a chassis is 5s. The system responds to a power exception within 10 ms. This feature ensures that a quick response to a power or input fault, which prevents tripping in the equipment room, resulting in serious accidents.

You can manually disable the function. Then an alarm for all the compute nodes in the chassis is generated after a PSU exception occurs, requiring emergency handling.

2.4.4 PSU Hibernation

Multiple redundant PSUs waste power when the chassis power is low. The PSU hibernation function sets extra PSUs to the hibernation mode to save energy based on the PSU configurations and current chassis power. The 2000 W AC, 2500 W DC, and 3000 W AC PSUs all support this function at an appropriate voltage.

The PSU hibernation function automatically sets redundant PSUs to the hibernation mode. When the chassis power increases due to newly-installed components or a PSU exception occurs, the management software terminates the hibernation mode and wakes up all hibernated PSUs. When the chassis power increases or decreases, the management software compares the total rated power of all operating PSUs with the power consumption of the entire chassis and determines the number of PSUs to be hibernated based on the hibernation mode. **Table 1** describes the hibernation parameters on the HMM WebUI.

Table 2-1 Parameter description

Parameter	Description
Enable hibernation	Enable: Enables the PSU hibernation function. A hibernation mode needs to be selected.
	Disable: Disables the PSU hibernation function. It is disabled by default.

Parameter	Description
Hibernation mode	N+1: One PSU is configured as the backup. For example, if a chassis houses six PSUs and currently two PSUs are sufficient for the entire system, the number of hibernated PSUs is 6 – (2 + 1) = 3.
	N+N: When N PSUs are operating, another N PSUs are configured as backup PSUs. For example, if a chassis houses six PSUs and currently two PSUs are sufficient for the entire system, the number of hibernated PSUs is 6 – (2 + 2) = 2.

2.4.5 Power Capping

The power capping feature limits the total power for the entire chassis and improves the compute node density in the equipment room. The MM sets the maximum power for the entire chassis or for a single compute node.

Maximum power of a compute node = (Maximum power of the entire chassis – Operating power of rear modules – Operating power of fan modules and PSUs – Maximum power preset for some compute nodes)/(Number of total compute nodes in the chassis – Number of compute nodes whose maximum power has been set)

The maximum power of a compute node is refreshed once per 5s. If the power changes, set a new maximum power of a compute node. After you set the maximum power by using the MM, the settings take effect for the compute nodes about 3s later. Therefore, the maximum latency period or power capping is 8s. If no compute node is added, the total deviation is about 10%, considering the last actual power capping value.

- Power capping: The Intel management engine (ME) adjusts the power to the maximum value by adjusting the frequency and voltage (during the adjustment, iBMC on a compute node periodically sends the current power of the compute node to the Intel ME).

- You can use the MM to set the maximum power for the entire chassis or for a single compute node.

Example:

If the maximum power of the entire chassis configured with 10 CH121s is set to 5000 W, the detected real-time power is 4000 W and the sum of all compute node power is 3500 W, so that the reserved power for the other modules (rear modules, fan modules, and PSUs) is calculated as follows: Reserved power = Real-time power – Sum of all compute node power = 4000 W – 3500 W = 500 W.

Maximum power of compute nodes = Maximum power of the entire chassis – Reserved power = 5000 W – 500 W = 4500 W. Maximum power for each CH121 = 4500 W/10 = 450 W. This means that each compute node is evenly allocated 450 W power as the maximum power.

☐**NOTE**

The CH242 does not support power capping because of CPU platform limits. Therefore, the chassis equipped with the CH242 does not support power-capping.

2.4.6 Power History Line Chart

The HMM monitors the power history of a compute node or the entire chassis, and provides the power history line chart for 24 hours or a week. The HMM collect power data every 10 minutes for a compute node or 5 minutes for a chassis.

Figure 2-12 Power history line chart
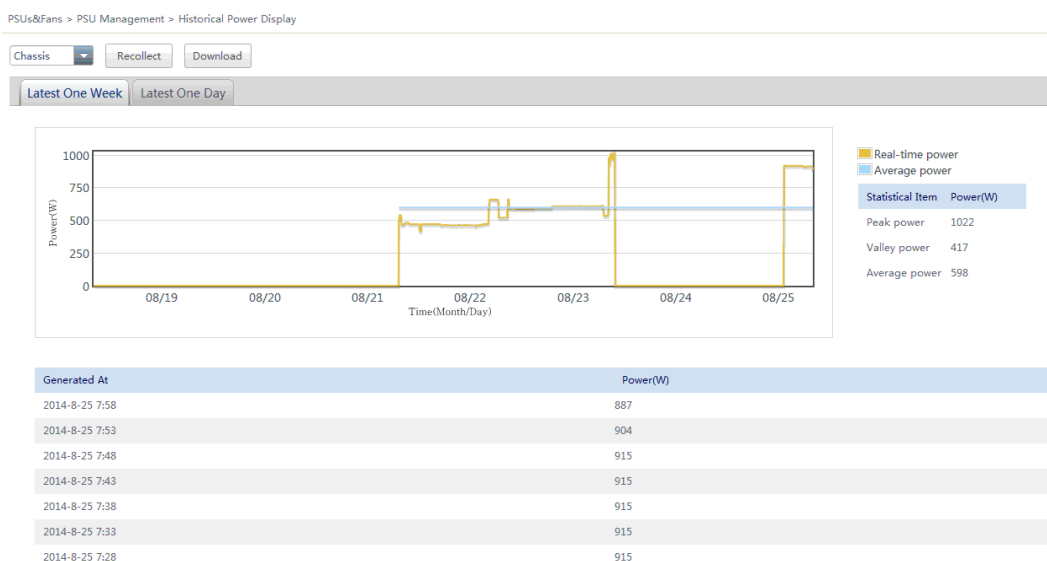
2.5 Switch Management Functions

The HMM supports switch module configuration restoration and sets the management IP address and gateway for a switch module.

2.5.1 Switch Management Functions

The HMM Web provides configuration interfaces for the following:

Management IP addresses of the Ethernet switching planes (including the GE and 10GE switching planes on the mainboard) on switch modules

The HMM CLI provides configuration interfaces for the following:

Management IP addresses of the Ethernet switching planes on switch modules

Management IP addresses of the Ethernet switching planes on switch modules

Route addresses of the Ethernet switching planes on switch modules

IP addresses of the FC switching planes on switch modules

Gateway addresses of the FC switching planes on switch modules

2.5.2 Configuration Restoration

After configuring services for switch modules and saving the configuration, the information will be saved to the HMM. When a switch module is replaced or restarted, the switch module automatically obtains the configuration from the HMM for restoration. The HMM saves and restores configuration by the E9000 switch module slot. If the HMMs are not detected, switch modules cannot start.

□NOTE

> The FC module on a switch module or an independent FC switch module does not support configuration restoration.

2.6 Security Management Functions

The HMM adopts secure configuration by default. It provides SSH, SNMPv3, SFTP, and HTTPS security services. Telnet, FTP, HTTP, and SNMPv1/SNMPv2 are disabled. To enable these services, check the security requirements first.

2.6.1 Maintenance Terminal Security Configuration

The HMM login terminals can be an SSH client, serial port, or web browser. If you do not perform any operations within the specified period, the HMM logs you out to ensure security. The default timeout period is 2 minutes for the system terminal (SSH client or serial port)and 5 minutes that for the web browser. You can change the timeout period based on site requirements.

You can set the timeout period on the CLI or on the HMM WebUI by choosing **System Management** > **System Configuration** > **Security Policy**.

When you attempt to use the HMM terminal (SSH client or web browser) for login, your account and IP address will be locked after five consecutive failures with wrong passwords. The default lock period is 5 minutes. The maximum number of login attempts and lock period can be changed.

For user login configuration, you can limit the login method of a user to SSH or other methods, and set the login rules (such as the login IP network segment, time period, and MAC address)

2.6.2 Changing the System Key

The HMM contains a default root key for encryption and decryption. To ensure security, you are advised to change the root key after the initial configuration and during routine maintenance. The root key change has no impact on authentication.

You can change the system root key on the CLI.

2.6.3 KVM/VMM Encryption Configuration

The HMM supports KVM and VMM (KVM over IP and virtual media). By default, the communication data sent from a client to the HMM is not encrypted. To ensure security, enable the data encryption.

To enable data encryption, log in to the HMM WebUI and choose **System Management** > **System Configuration** > **Security Policy**.

📖**NOTE**

> Before encryption configuration, ensure that the BMC version on a node matches the HMM version.

2.6.4 SNMP Authentication Encryption Algorithm Configuration

By default, the SNMPv3 authentication encryption algorithm on the HMM is MD5. SHA is recommended for SNMPv3 management.

You can set the algorithm on the HMM WebUI by choosing **System Management** > **System Configuration** > **Security Policy**.

2.6.5 Generating and Importing Certificates

By default, the HMM WebUI uses the HTTPS security access mode. HTTPS certificate management is supported.

SSL certificate management operations include viewing current certificate information (such as the user, issuing authority, validity period, and serial number), generating a CSR file, importing the signature certificate (in PKCS#7 format, containing only the public key) generated from the CSR file, and importing a self-defined certificate (in PKSC#12 format, containing public and private keys). When the certificate is successfully imported or the default setting is restored, the CSR file is deleted. Certificates support only the Base 64 X.509 format and can be encapsulated as PKCS#7 or PKCS#12 files. For certificates in PKCS#12, users can set the password for the private key.

By default, self-signed SSL certificates are used for servers. The self-signed SSL certificates use the SHA256RSA algorithm (2048-bit). For the sake of security, self-signed SSL certificates can be obtained using either of the following methods:

1. Use the HMM to generate a certificate.

2. Use a CA server to generate a certificate or purchase a certificate from CA.

Figure 2-13 Certificate management

2.7 Stateless Computing Management Functions

The E9000 HMM supports single-chassis stateless computing management, which involves stateless computing configuration of compute nodes, for example, configuration of the BIOS, network, and UUID. Stateless computing does not need to be configured again (such as the MAC address and WWPN) after a device is replaced. For details about how to configure stateless computing, see the *E9000 Single-Chassis Stateless Computing White Paper*.

2.8 easyLink Switch Management Functions

The easyLink feature provided by the HMM simplifies internal switch management and supports WebUI-based management. To configure the network within the chassis, users can use switch profiles to define VLANs and uplinks to external switches, and use NIC profiles to define NIC working modes and associated VLANs. The profile configuration greatly simplifies internal network management.

For details about this function, see the *E9000 Server V100R001 easyLink Feature White Paper (HMM)*.

2.9 Multi-Chassis Management Functions

The device management module MM910 in the E9000 can manage up to four chassis, including one master chassis and three slave chassis.

Multi-chassis management functions that are available:

- Unified management of stateless computing profiles for multiple chassis: Stateless computing profiles can be associated with multiple chassis or transferred from one chassis to another.
- Basic management operations: The master chassis management page allows users to manage slave chassis, for example, configure basic information and management information and query alarm status.

Multi-chassis management functions that are currently unavailable:

- Use the master chassis management page to operate the KVM or virtual media of slave chassis.
- Use the master chassis management page to upgrade the slave chassis firmware.
- Use the master chassis management page to perform centralized profile management of slave chassis.

Figure 2-14 Adding a slave chassis
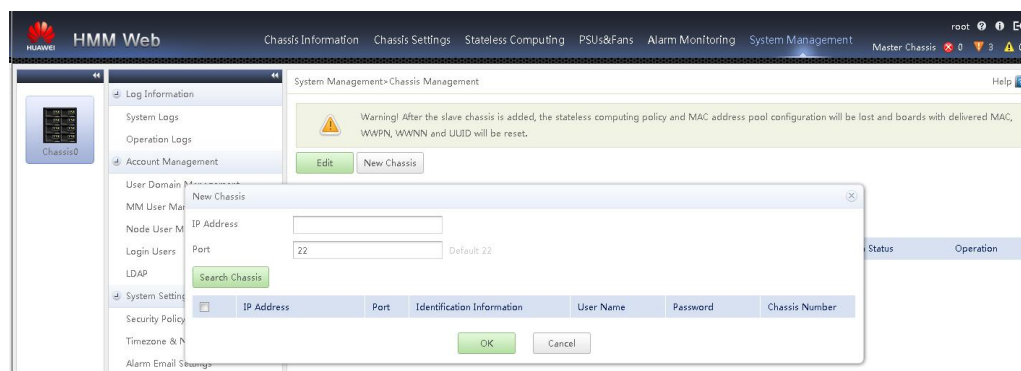
2.10 Other Management Functions

The E9000 also performs the following functions:

Time management

Log management

Firmware upgrade

Alarm email

Lightweight Directory Access Protocol (LDAP)

2.10.1 Time Management

The E9000 management system time is synchronized from the HMM, including the BMC on a node and switch module. The HMM hardware module contains the RTC for setting the time (including the time zone), and then other nodes can automatically synchronize time from the HMM.

The HMM supports NTP. After the NTP server is set, the HMM synchronizes time from the NTP server and then synchronizes the time to each node.

Figure 2-15 NTP setting
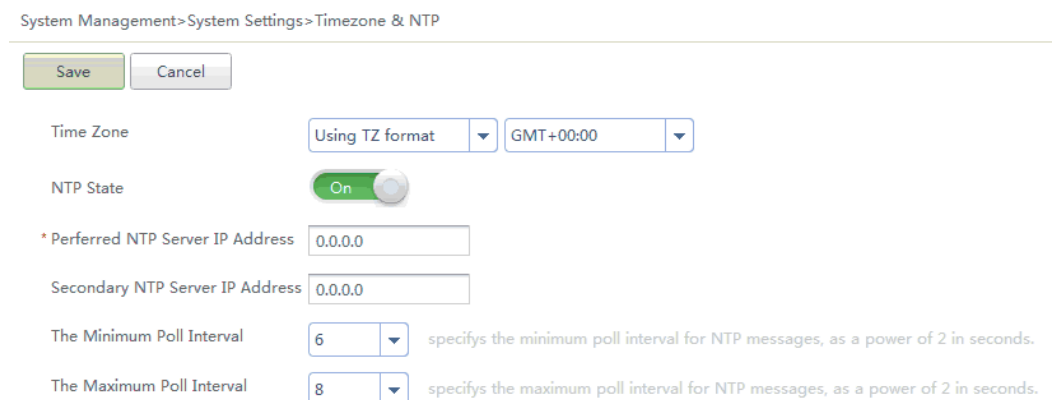
2.10.2 Log Management

The E9000 management system provides system event logs (SELs) and operation logs. You can view SELs and operation logs.

SELs are saved to 10 files, each contains up to 4050 log records.

Operation logs are saved to 10 files, and the size of each file is up to 128 KB.

Figure 2-16 Viewing SELs

2.10.3 Upgrade Management

The HMM can be used to upgrade the following components:

CPLD on a compute node

BMC firmware on a compute node

BIOS on a compute node

CPLD on a switch module

BMC firmware on a switch module

Ethernet module firmware on a switch module

Fan module firmware

CPLD on an MM

MM firmware

☷**NOTE**

- THe CX610 and CX611 do not support out-of-band upgrade.
- The FC module on a switch module or an independent FC switch module cannot be upgraded by using the HMM.
- The Ethernet module on a switch module cannot be upgraded across platform versions (upgrading from VRP5 to VRP8) by using the HMM. You can use other upgrade tools.

Figure 2-17 Switch module upgrade
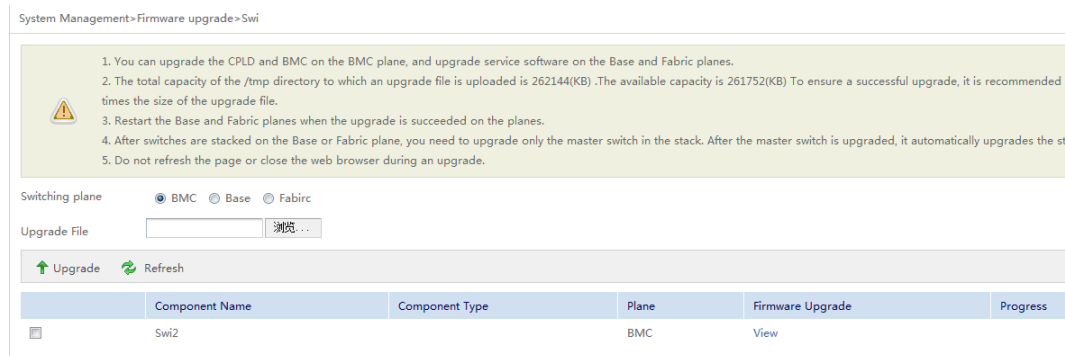
2.10.4 Alarm Email

After the alarm email notification function is enabled, set email addresses and minimum alarm severity for notification. Then the HMM sends alarm notification by email when it detects that an alarm of the preset severity is reported.

Figure 2-18 Setting the alarm email notification
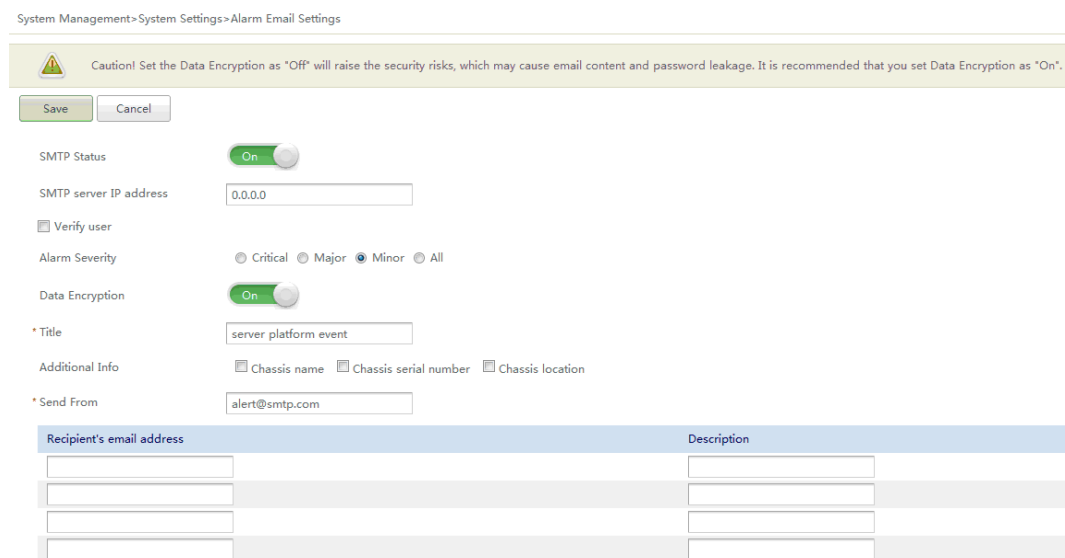
2.10.5 LDAP Authentication Management

LDAP provides different-level access control on the server, which ensures convenience and security.

The HMM Web supports LDAP access control and AD server interconnection.

Figure 2-19 LDAP configuration
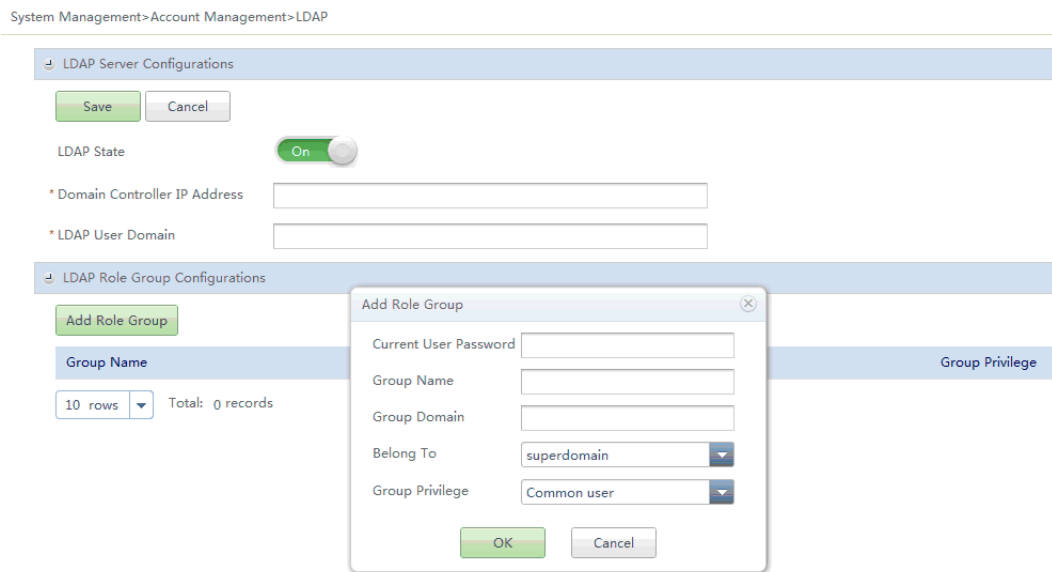
3 E9000 Device Management Function List

Category	Function Description	CLI	Web Interface
Basic management functions	Powering on or off and restarting a compute node	√	√
	Setting or querying a chassis name, number, or location	√	√
	Showing the chassis health status	x	√
	Querying node or module information, including the name, network topology, and e-label	x	√
	Querying system logs and alarms	√	√
	DHCP Client	√	√
	SOL	√	x
	KVM	x	√
	VMM (virtual DVD-ROM drive or folder)	x	√
User management functions	Querying user online status	x	√
	Basic user operations: creation, deletion, and logout	x	√

Category	Function Description	CLI	Web Interface
	Domain-based management: Users in a domain have the rights to manage the nodes or modules specified by the domain. Basic domain operations: domain scope creation, deletion, and modification	√	√
	Rights-based management: The HMM supports three user roles: administrator, operator, and common user.	√	√
	Compute node BMC user operations	√	√
Fan module management functions	Intelligent fan speed adjustment	-	-
	Fan speed percentage, and fan status monitoring	√	√
	Fan firmware upgrade	√	√
PSU management functions	Monitoring power and status	√	√
	Stagger power-on: Nodes and modules are not powered on simultaneously.	-	-
	Power capping	√	√
	Dynamic PSU hibernation	√	√
	PSU exception protection	√	x
	Power history line chart	x	√

Category	Function Description	CLI	Web Interface
Switch management functions	Ethernet module firmware upgrade	√	√
	Ethernet module configuration restoration	-	-
	Setting a management IP address for the Ethernet module	√	√
	Configuring the route for the Ethernet module	√	x
	Setting an IP address for the FC module	√	x
	Setting a gateway address for the FC module	√	x
	Setting a VLANIF IP address for the Ethernet module	√	x
	Monitoring Ethernet heartbeat	-	-
Security management functions	Generating and importing certificates	x	√
	Setting the SSH terminal timeout period and account lock times.	√	x
	Setting the web terminal timeout period and account lock times.	x	√
	Password complexity protection	-	-
	Security protocols SFTP, SSH, SNMPv3, and HTTPS	-	-

Category	Function Description	CLI	Web Interface
	Changing the system key	√	x
	Setting the SNMP authentication encryption algorithm	√	√
	KVM/VMM encryption configuration	x	√
Other management functions	NTP	√	√
	Viewing operation logs	x	√
	Viewing SELs	√	√
	Management system firmware upgrade	√	√
	Stateless computing	x	√
	Alarm email	x	√
	LDAP	x	√
LCD	Setting chassis information, including the name, number, and location	-	-
	Setting IP addresses for a management module	-	-
	Setting DHCP for a management module	-	-
	Displaying node or module information	-	-
	Setting power capping	-	-
	Setting virtual media	-	-
	Displaying chassis events and alarms	-	-
	Displaying PSU and fan module information	-	-