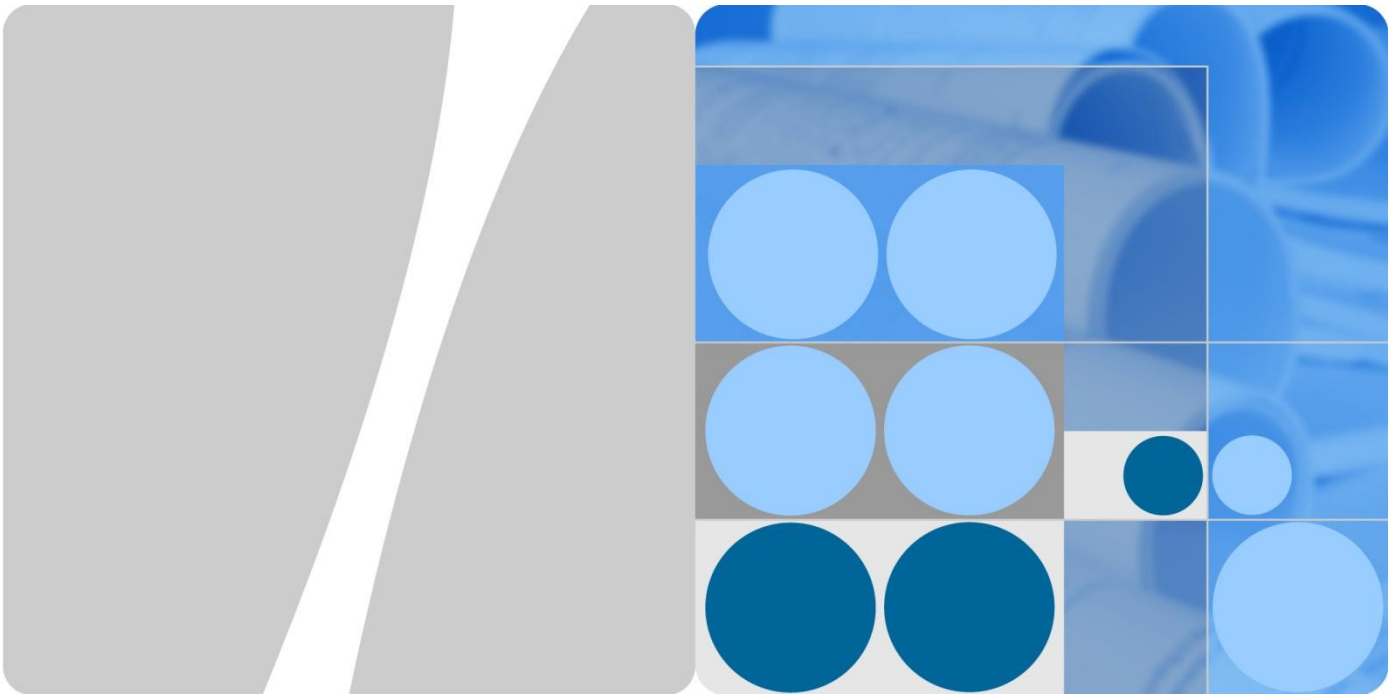

HUAWEI eSight

Server Management Technical White Paper

Issue 01

Date 2016-03-30

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Contents

1 Executive Summary

Server equipment is an IT infrastructure that every enterprise needs to maintain. As enterprises' computing requirements deepen, their server quantities increase and their workload in server management for reliable system operation is becoming increasingly complex. Enterprises face the following challenges in server management:

- Large quantity and variety of servers
- Long time to restore from server failures
- Complex and time-consuming server configuration and deployment
- Time-consuming and labor-intensive server upgrades

Server management has become effort-consuming and urgency-driven and can no longer rely only on a simple tool or a single person. A comprehensive server management solution is required.

Huawei eSight is a new-generation enterprise information and communications technology (ICT) device management solution provided by Huawei. As a component of Huawei eSight solution, the eSight Server helps O&M personnel manage servers throughout server life cycles to improve O&M efficiency and reduce O&M costs.

2 Product Overview

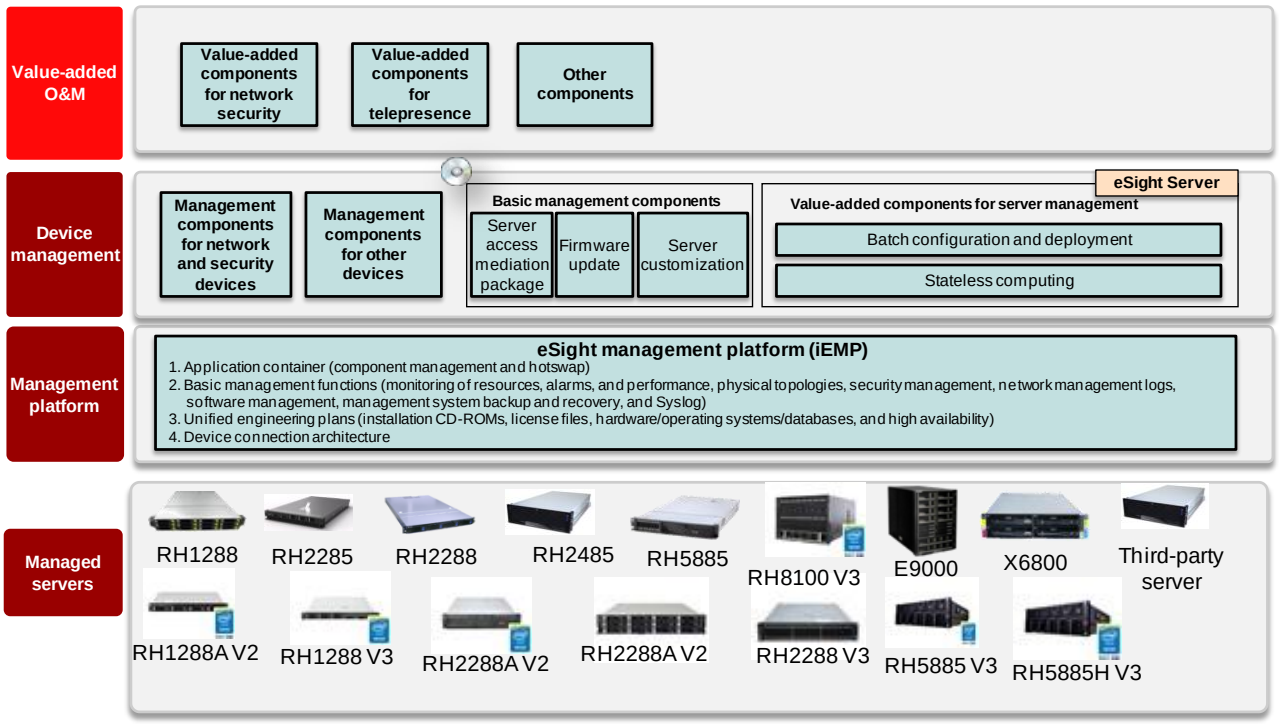
2.1 Overview

To meet enterprise customers' demands, Huawei eSight introduces:

- Technologies such as modular- and web-oriented designs
- Network-wide status monitoring and restoration measures, such as unified alarm and performance management
- Various optional service components

Huawei eSight helps enterprises build customized and easy-to-use O&M environments that allow enterprises to easily manage network-wide ICT devices with only eSight.

Figure 2-1 eSight Server management scheme



2.2 Key Technical Features

Network-wide Device Status Monitoring for Overall Service Control

The eSight Server provides basic server management and monitoring functions. It can monitor server hardware status and performance and detect faulty servers.

Batch Configuration and Deployment for Efficient Server Installation

The eSight Server allows operators to configure and deploy service systems on servers in batches for efficient server installation.

Device Plug-and-Play for More Efficient O&M

- Stateless computing

  By using hardware attributes and configuration virtualization, the eSight Server implements flexible hardware configuration updates, improving efficiency in device replacement and server expansion.

- Firmware version management

  The eSight Server implements batch upgrades of server firmware.

Multi-Vendor Device Integration for Unified Network-wide Device Management

The eSight Server can integrate and manage servers from various vendors. It allows users to customize basic, alarm, and performance information for third-party servers.

Layered eSight Deployment

The eSight Server supports layered eSight deployment to decentralize the management pressure of a large-scale network and break the resource management capability and performance restraints of a single eSight node.

3 Functions

3.1 Server Resource Management

3.1.1 Server Connection

Operators can connect servers to the eSight Server in any of the following modes:

- Single connection: An operator can configure basic server information and add a single device manually to the eSight Server.
- Automatic discovery: The eSight Server automatically searches for devices in a network segment and adds the devices to the eSight Server in batches.
- Batch import: An operator can configure key device information in a template and use the template to import devices to the eSight Server in batches.
- Automatic detection: After being connected to the management network, devices to be managed automatically search for a management system and request management.

Server Type	Device Connection Mode				Connection Protocol
	Single Connection	Automatic Discovery	Batch Import	Automatic Detection	
Blade server	Supported	Supported	Supported	E9000	SNMP
Rack server	Supported	Supported	Supported	• RH1288 V3 • RH2288 V3 • RH2288H V3 • 5288 V3 • RH5885 V3C10 • RH5585H V3 • RH8100 V3	SNMP

Storage server	Supported	Supported	Supported	Not supported	IPMI
High-density server	Supported	Supported	Supported	X6800	SNMP+IPMI
Third-party server	Supported	Supported	Supported	Not supported	SNMP+IPMI

3.1.2 Server Status

The eSight Server allows operators to monitor server operating status and component status:

- Static information monitoring

  Server static information includes:

  - Basic server information: including the server name, IP address, online status, health status, type, model, description, and information update time
  - Server component information: including the power supply unit (PSU), fan modules, CPUs, dual in-line memory modules (DIMMs), hard disks, mainboard, and switch module information

- Status monitoring

  The eSight Server monitors different component status depending on the server type, and automatically updates the status of components on the UI. Table 3-1 lists the component status that the eSight Server can monitor for each server type.

Table 3-1 Status monitoring

Component Type / Supported Server Type	Entire Server	CPU	DIMM	Hard Disk	Fan Module	PSU	Switch Module
Rack Server	√	√	√	√	√	√	/
Blade Server	√	√	√	√	√	√	√
High-Density Server	√	√	√	√	√	√	/
Storage Server	√	--	--	--	--	--	/

NOTE: √ indicates supported. -- indicates not supported. / indicates N/A.

- Server panel view display

  The eSight Server can monitor the status of all Huawei server panels and display dynamic device health status in real time.

Figure 3-1 Blade server front view

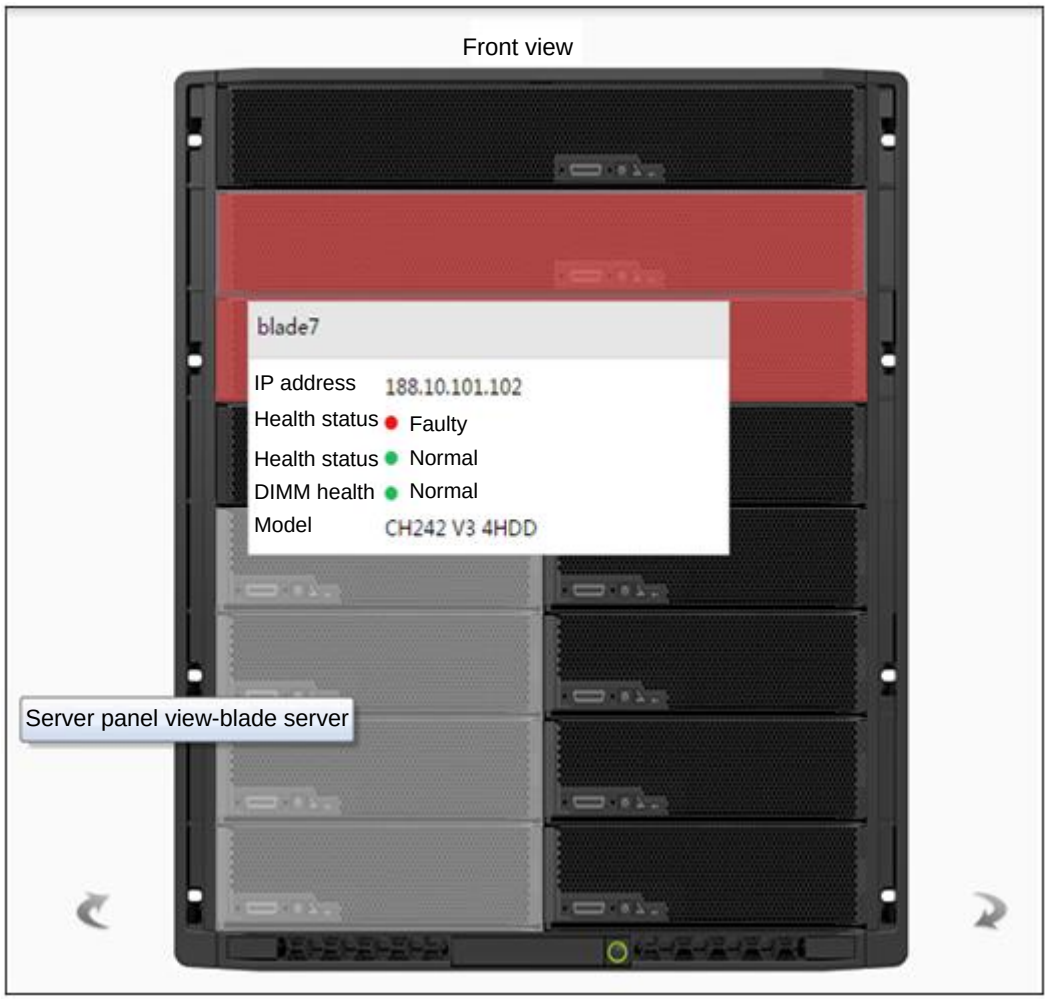
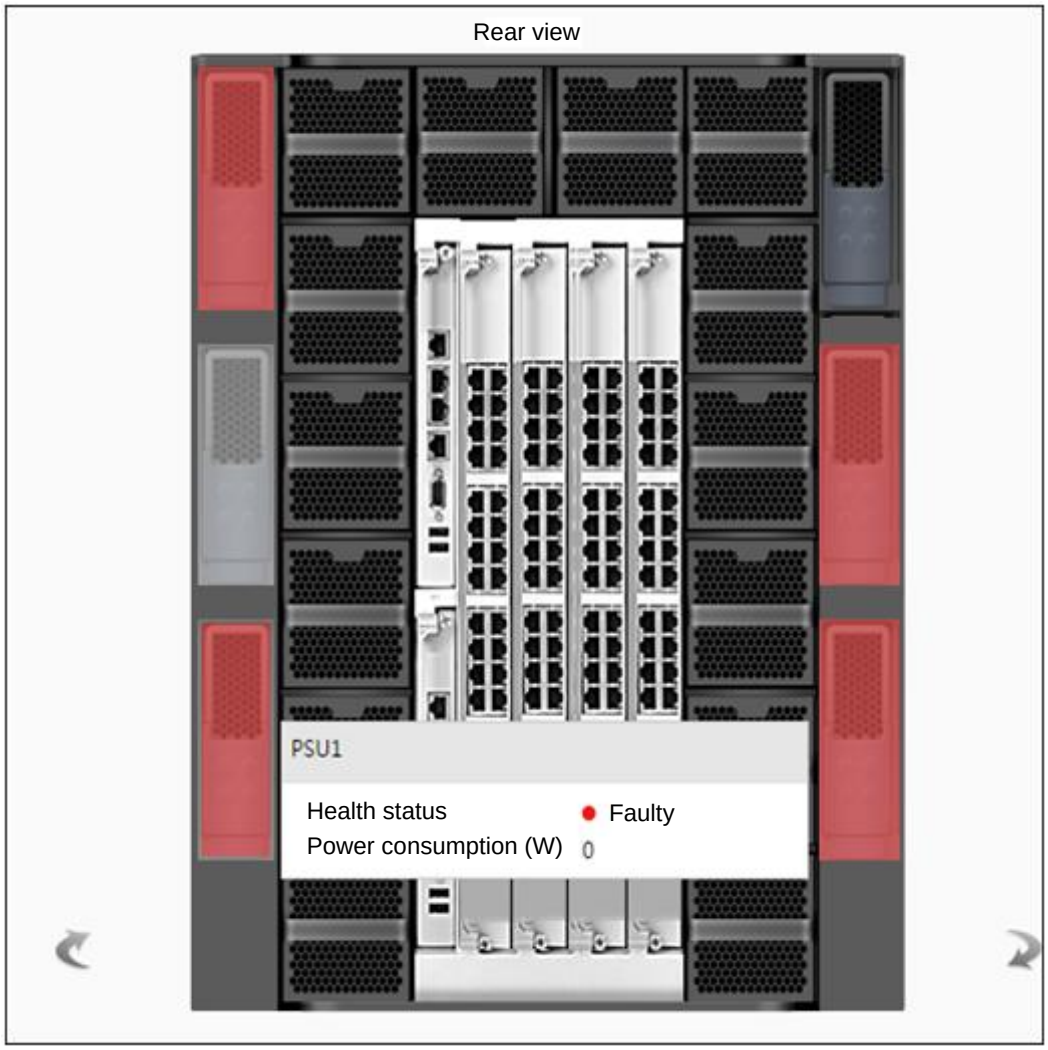


Figure 3-2 Blade server rear view



3.1.3 Server Asset Information Export

The eSight Server can export server asset information such as asset information about servers, CPUs, DIMMs, hard disks, and network interface cards (NICs). This enables operators to query server hardware asset information promptly.

Server information is stored in the memory. When exporting asset information, the eSight Server directly reads data from the memory. This improves the export efficiency. Table 3-2 is an example of exported asset information.

Table 3-2 Example of exported asset information

RH1288 V3-188.10.5.170			
Device Name	**Device Status**	**Device Type**	**--**
RH1288 V3-188.10.5.170	Normal	Rack server	--

IP Address	Serial Number	Asset Label	--
188.10.5.170	RH1288V3CCCCC	--	--
Mainboard information			
Serial Number	**Part No.**	**Manufacturer**	**--**
201411061550	--	Huawei Technologies Co., Ltd.	--
CPU information			
Quantity	**Model**	**Manufacturer**	**Frequency**
2	Intel(R) Xeon(R) CPU E5-2620 v3 @ 2.40 GHz	Intel(R) Corporation	2400 MHz
DIMM information			
Quantity	**Manufacturer**	**Capacity**	**Frequency**
15	--	--	--
1	Micron	8192 MB	2133 MHz

3.2 Server Monitoring

3.2.1 Performance

The eSight Server provides a variety of performance management functions such as performance data collection, real-time resource monitoring, historical performance analysis, and visual display. These functions help IT personnel analyze and predict service resource bottlenecks, effectively evaluate the resource utilization rate and service efficiency, and so on. Then IT personnel can optimize device performance and configurations accordingly to improve IT system productivity and service competitiveness.

Customer benefits f these performance management functions are as follows:

- Simplified performance monitoring helps O&M personnel eliminate potential system faults in advance so that less time and effort are required for fault diagnosis. The statistical analysis function helps improve device maintenance efficiency.
- Real-time performance and historical performance data is displayed in line graphs. Performance data files (CSV files) can be exported to meet O&M personnel's requirements for data viewing and statistics collection.
- Operators can customize performance data collection cycles based on different device configurations to meet various performance data analysis requirements.

The eSight Server collects and displays various device performance counters to help operators determine device operation health status. These counters are reliable for decision-making about device deployment and service adjustment.
Performance management includes the following:

- Preset performance collection template: When creating performance collection tasks, operators can directly load preset performance data collection templates to quickly configure performance counters.
- Task-based management: Operators can create tasks to collect performance data. After such tasks are executed, operators can view the historical performance data of the device.
- Performance counter monitoring: The eSight Server can detect and report service resource performance threshold alarms promptly.
- Historical performance data viewing: The eSight Server shows the historical performance trend in charts to help decision-making.

Table 3-3 Server component performance counters

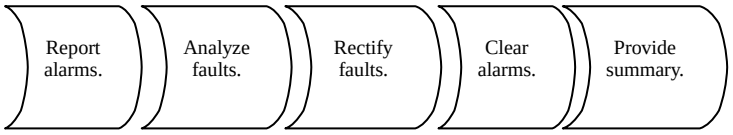
Object	Performance Counter
PSU	Power
DIMM	Usage and available physical memory capacity
CPU	Usage
Hard disk	Used capacity and usage
Network port	Packet transmit rate, packet receive rate, inbound traffic rate, outbound traffic rate, received packet error rate, transmitted packet error rate

3.2.2 Alarm

The eSight Server provides a unified alarm management mechanism to help O&M personnel quickly locate and rectify faults.

The eSight Server monitors alarms in a unified manner and allows O&M personnel to be promptly informed by an audible and visual alarm, SMS, or email. The eSight Server also supports real-time information updates on the GUI. As a result, the O&M personnel can take measures promptly to restore services.

Figure 3-3 Alarm diagnosis process



The eSight Server monitors comprehensive and refined hardware alarm information of servers and alarm information of the eSight system. The alarms include CPU hardware alarms, high temperature alarms, mainboard voltage alarms, fan module alarms, PSU alarms, bus alarms, memory alarms, hard disk alarms, system operating alarms, device management alarms, switch module alarms, device offline alarms, performance threshold alarms, and network management system performance alarms.

The eSight Server also monitors hard disk self-monitoring, analysis and reporting technology (S.M.A.R.T.) alarms. Hard disks are main data storage units. A faulty hard disk will cause user data loss. Hard disk S.M.A.R.T. is an important measure for hard disk warning.

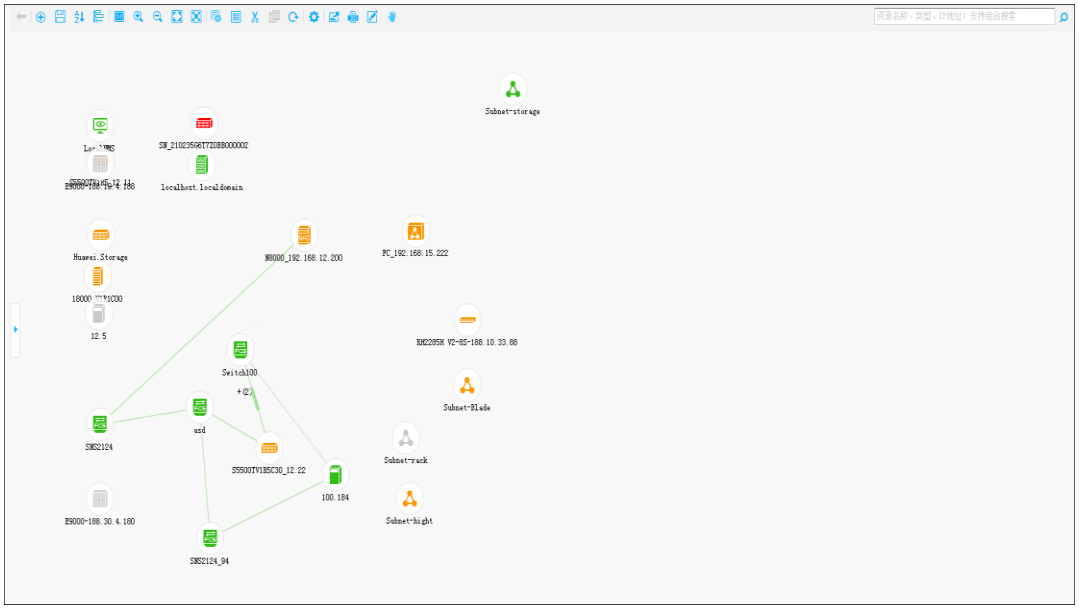
The eSight Server provides the following unified and centralized alarm management functions:

- Convenient alarm information query and retrieval: User-defined alarm filtering, refreshing, sorting by attribute, and severity redefinition meet requirements in various scenarios.
- Alarm consolidation: automatically consolidates duplicate alarms to simplify alarm processing.
- Various remote notification modes: including emails, SMSs, and audible and visual (alarm boxes), meet different alarm notification requirements and ensure troubleshooting efficiency.
- Alarm management knowledge base: provides alarm management experience, including experience in alarm masking and maintenance, to improve alarm handling accuracy and efficiency.
- Other features: alarm statistics, export, deletion, and dump.

3.2.3 Topology

The topology view displays the layout and status of network elements, subnets, and links to help IT personnel determine network topology and monitor network operating status in real time. The topology view automatically updates based on devices that are connected.

Figure 3-4 Topology view



3.3 Server Service Management

3.3.1 Configuration and Deployment

The eSight Server provides the batch configuration and deployment functions to help management personnel to simplify server configuration and management for efficiency improvement. The eSight Server optimizes configuration and deployment in the following aspects:

- Graphical configuration
- Batch configuration
- Efficient replicable template-based configuration
- Task-based configuration management

Table 3-4 Supported configuration and deployment types

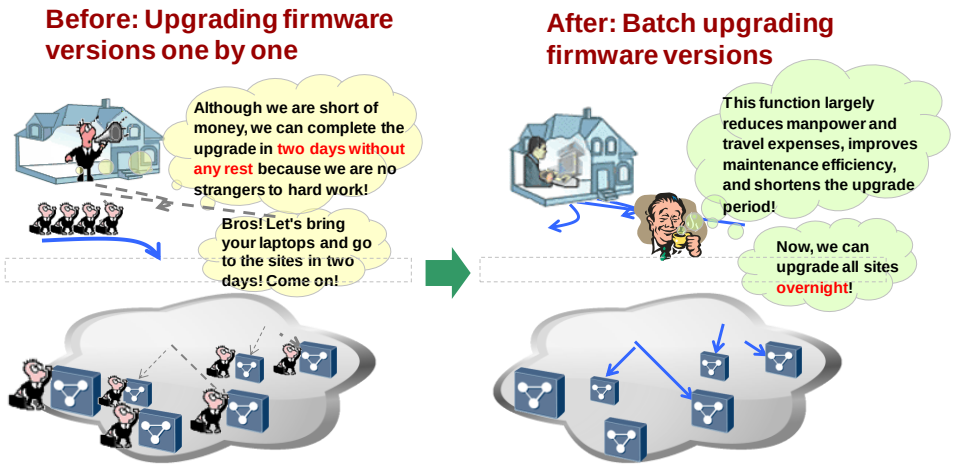
Configuration or Deployment Type	Description
Power control	Servers can be powered on, powered off, and restarted in batches.
BIOS configuration	Server boot options can be configured in batches, enabling users to start systems from different media.
Network port configuration	Management network ports can be configured for servers in batches, facilitating network planning and adjustment.
RAID configuration	RAID configuration can be performed for servers in batches, facilitating RAID configuration planning and modification, simplifying RAID configuration, and improving configuration efficiency.
Batch OS installation	The eSight Server provides ServiceCD-based batch OS installation and hard disk partitioning functions. This unified and unattended installation mode simplifies OS installation, improves installation efficiency, and reduces maintenance costs.
Application installation	This type of task distributes or installs applications.
HBA configuration	This type of task configures HBAs, which provide I/O processing and physical connections between servers and storage devices.
CNA configuration	This type of task configures CNAs, which use network ports to provide I/O processing and physical connections between servers and storage devices.
iBMC configuration	This type of task defines the integrated baseboard management controller (iBMC) configuration for a network element.

Configuration or Deployment Type	Description
Switch module configuration	Operators can configure switch modules in batches, and configuration combination is supported. Switch module configuration capabilities include the following: • Stack configuration You can create a stack between two switch modules, add switch module ports to a stack, delete a stack, and configure stacks in batches. • VLAN configuration You can create or delete a single VLAN or a batch of VLANs. • Customized configuration You can create a customized template for batch switch module configuration. Different types of configurations can be delivered at a time. Multiple templates can be delivered to multiple devices at the same time for batch configuration.

3.3.2 Firmware Batch Upgrade

The eSight Server supports batch upgrade of iBMC, BIOS, RAID, CNA, MM, CPLD, LCD, PCIe SSD, NVDIMM, and IB. This feature greatly reduces labor and traveling costs, increases maintenance efficiency, shortens upgrade periods, and improves user experience.

Figure 3-5 Comparison of traditional firmware upgrade and batch firmware upgrade



NOTE

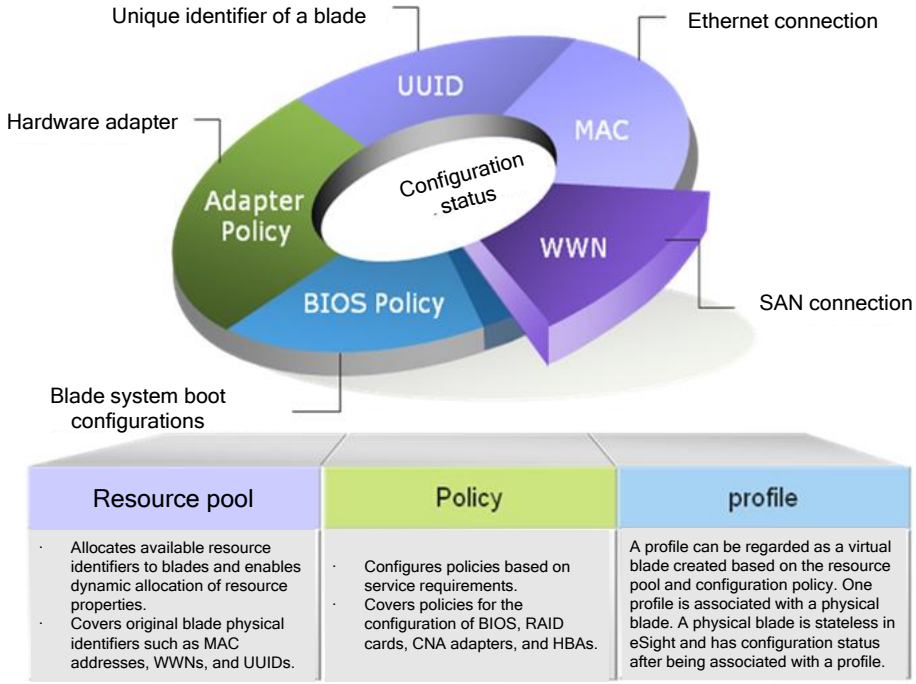
The firmware upgrade feature applies only to Huawei servers. It does not apply to third-party servers and storage servers.

3.3.3 Stateless Computing

The eSight Server adopts the Huawei stateless computing technology for data center O&M operations. It provides mutli- and cross-subrack functions including server configuration retention, configuration migration, offline configuration, configuration replication, and cross-subrack configuration migration. These functions facilitate the configuration and management of common complex computing attributes in O&M scenarios such as server replacement, migration, and quick configuration. The eSight Server makes the maintenance of data center computing equipment more simple, easy, quick, and efficient. It achieves device statelessness during maintenance and supports the plug-and-play feature, which simplifies management and reduces O&M cost.

Configuration Attributes

Figure 3-6 Configuration attributes



NOTE

Profile configuration attributes include computing resource attributes (UUIDs), HBA (such as WWN and other attributes), CNA (MAC address/WWN, NIC PFs, PF bandwidth, PF VLAN, and SAN boot), RAID (RAID array configuration), and BIOS (such as the system startup sequence, IPMI attributes, and serial port configuration).

Customer Benefits

Stateless computing allows automated configuration and unified management of hardware by abstracting hardware attribute information about servers and network and storage devices. It hides hardware difference from systems. It enables rapid service restoration when a hardware fault occurs or service migration is performed, minimizing system downtime. The eSight Server provides the following functions to implement stateless computing:

1. Configuration retention: eliminates the need for hardware reconfiguration after parts replacement.

   When a compute node is faulty, eSight sends the original configuration data to the new compute node after parts replacement. Users do not need to manually reconfigure data for the newly installed device.

2. Configuration migration: eliminates the need for hardware reconfiguration after service migration.

   If service migration is required, eSight implements rapid configuration migration. Users do not need to manually reconfigure data for the destination compute node.

3. Offline configuration: allows profiles to be allocated to offline compute nodes.

   To facilitate configuration, eSight can allocate a profile to an empty slot. Once a compute node is installed in the slot, the profile is automatically loaded to the compute node.

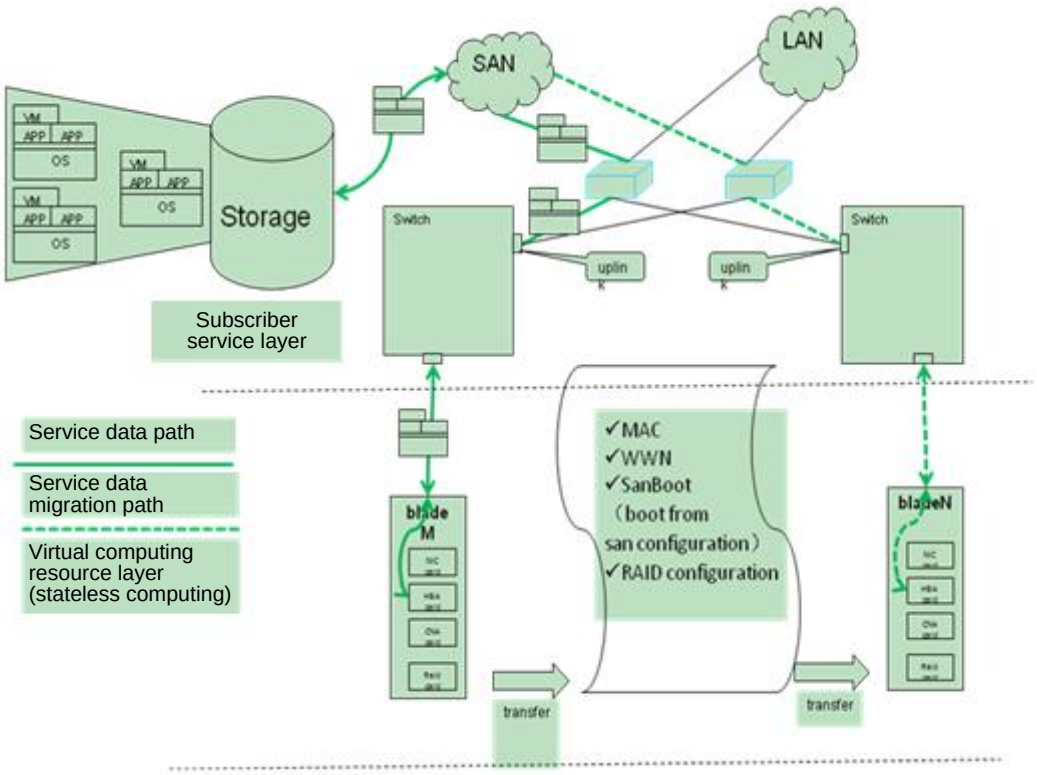
4. Configuration replication: eSight allows users to replicate and modify data configuration based on service requirements. This simplifies the configuration process and increases configuration efficiency.

5. Cross-subrack configuration migration: eSight provides configuration replication and migration across subracks. This helps implement stateless computing for devices in multiple subracks.

6. Automatic configuration migration (failover): Server hardware is separated from server configurations. When a fault occurs on a server, eSight automatically migrates its configuration to a matching standby server, and then the standby server becomes the active server and runs services.

Application Scenario Example

Figure 3-7 Typical application: server replacement



The eSight Server supports stateless computing. Stateless computing abstracts server hardware configurations as configuration files and supports the flexible scheduling of the configuration files. During device replacement, the eSight Server retains all the configurations of faulty devices and loads the configurations to the new devices when the device replacement is complete, fastening device replacement.

A Acronym and Abbreviation

B	
BIOS	Basic Input Output System
C	
CPLD	Complex Programmable Logical Device
D	
DHCP	Dynamic Host Configuration Protocol
I	
iBMC	Baseboard Management Controller
K	
KVM	Key, video, mouse
M	
MM	Management Module
N	
NVDIMM	Non-volatile Dual In-line Memory Module
P	
PCIe	PCI Express
PXE	Pre-boot Execution Environment

R

RAID	Redundant Array of Independent Disks

S

SSD	Solid State Disk