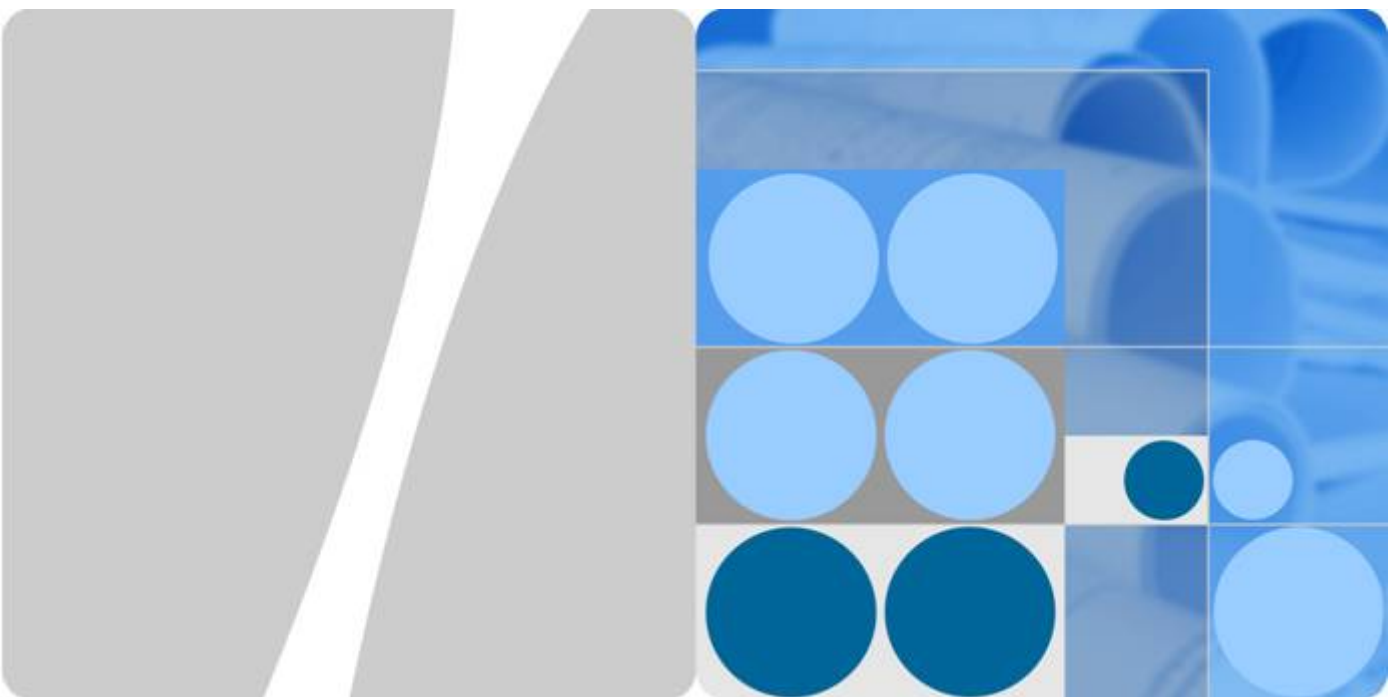




## CloudEngine S5700 Series Switches

# Product Description (V600)

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# 1 About This Document

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## Intended Audience

This document is intended for network engineers responsible for network design and deployment. You should understand your network well, including the network topology and service requirements.

## Privacy Statement

The switch provides the mirroring function for network monitoring and fault management, during which communication data may be collected. Huawei will not collect or save user communication information independently. Huawei recommends that this function be used in accordance with applicable laws and regulations. You should take adequate measures to ensure that users' communications are fully protected when the content is used and saved.

## Disclaimer

- This document is designed as a reference for you to configure your devices. Its contents, including web pages, command line input and output, are based on laboratory conditions. It provides instructions for general scenarios, but does not cover all use cases of all product models. The examples given may differ from your use case due to differences in software versions, models, and configuration files. When configuring your device, alter the configuration depending on your use case.
- The specifications provided in this document are tested in a lab environment (for example, a certain type of cards have been installed on the tested device or only one protocol is run on the device). Results may differ from the listed specifications when you attempt to obtain the maximum values due to factors such as differences in hardware configurations and carried services.
- In this document, public IP addresses may be used in feature introduction and configuration examples and are for reference only unless otherwise specified.

## Symbol Conventions

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

| Symbol                                                                            | Description                                                                                                                                                                                                                                            |
|-----------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  | <p>Indicates a potentially hazardous situation which, if not avoided, could result in equipment damage, data loss, performance deterioration, or unanticipated results.</p> <p>NOTICE is used to address practices not related to personal injury.</p> |
|  | <p>Supplements the important information in the main text.</p> <p>NOTE is used to address information not related to personal injury, equipment damage, and environment deterioration.</p>                                                             |

# 2 Using the Specifications Query Tool to Query Product Specifications

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You can use the [Specification Query Tool](#) to:

- Query the features and specifications supported by a product.
- Compare the features and specifications supported by different products.
- Export the features and specifications supported by a product.

# 3 Product Characteristics

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CloudEngine S5700 series Ethernet switches (S5700 for short) are next-generation energy-saving gigabit Ethernet switches developed by Huawei to provide high-bandwidth access and Ethernet multi-service aggregation. Based on next-generation high-performance hardware, the S5700 provides large capacity, high reliability (two power slots and hardware-based Ethernet OAM), high-density GE and multi-GE ports, and 25GE or 100GE uplink ports, and supports Energy Efficient Ethernet (EEE) and stack. The S5700 can be used in extensive enterprise network scenarios. For example, it can function as an access or aggregation switch on a campus network, a gigabit access switch in an Internet Data Center (IDC), or a switch that provides gigabit to the desktop. In addition, the S5700 provides a wide variety of services, comprehensive security policies, and extensive quality of service (QoS) features to help customers build scalable, reliable, manageable, and secure data centers.

## Enabling Networks to Be More Agile for Services

The high-speed Ethernet network processor embedded in the S5700 is tailored for Ethernet.

- The flexible packet processing and traffic control capabilities of the Ethernet network processor can meet both current and future service requirements, helping build a highly scalable network.
- The processor has a fully programmable architecture, on which customers can define their own forwarding models, forwarding behaviors, and lookup algorithms. Microcode programmability makes it possible to provide new services within six months, without the need to replace hardware devices. In contrast, traditional devices use a fixed forwarding architecture and follow a fixed forwarding process. For this reason, new services cannot be provisioned until new hardware devices are developed to support the services one to three years later.
- In addition to capabilities of traditional switches, the S5700 switch provides fully programmable open interfaces and supports user-defined forwarding processes to meet service customization requirements of enterprises. Enterprises can use the open interfaces to develop new protocols and functions independently or jointly with equipment vendors to build campus networks meeting their own needs.

## Delivering Abundant Services More Agilely

- With the unified user management function, the S5700 can authenticate wired users, ensuring a consistent user experience regardless of differences in access device capabilities. In addition, various authentication methods are supported, including both 802.1X authentication and MAC address authentication. These functions visualize user and service management and accelerate the transformation of management from device-centric to user-centric.
- The S5700 provides excellent QoS capabilities and supports queue scheduling and congestion control algorithms. Additionally, it adopts innovative priority queuing and multi-level scheduling mechanisms to implement fine-grained scheduling of data flows, meeting service quality requirements of different user terminals and services.

## Innovative Energy-Saving Chip Achieves Intelligent Power Consumption Control

- The S5700 uses innovative energy-saving chips capable of dynamically adjusting power on all ports based on traffic volume, with idle ports entering sleep mode to reduce power consumption.
- Compliance with energy conservation and emission reduction regulations:
  - Directive 2011/65/EU and Directive 2015/863/EU on the Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment (RoHS)
  - Regulation (EC) No 1907/2006 concerning the Registration, Evaluation, Authorization and Restriction of Chemicals (REACH)
  - Directive 2012/19/EC on waste electrical and electronic equipment (WEEE)
- Power consumption management functions:
  - Power supply management
  - Power consumption query for the device and cards
  - Configuration and query of the energy conservation mode
- Power consumption reduction design:
  - Fan modules can automatically adjust the fan speed based on the ambient temperature to reduce power consumption.
  - Unused subcards and interfaces on service cards can be shut down using commands.
  - Dynamic energy conservation for unused modules
  - Dynamic energy conservation based on service loads
  - The front-to-back airflow meets the ventilation requirements in equipment rooms to avoid cascade heating.
- Energy conservation suggestions:
  - It is recommended that the cold and hot aisles be separated in the equipment room and an air intake vent be located in a cold aisle to prevent hot air from entering the air intake vent.
  - Select the best suited AC power modules to prevent high power consumption resulted from AC power light load (load ratio is less than 30%).

- Cover vacant slots with filler panels and cap unused ports with rubber plugs to help ensure efficient heat dissipation of the S5700.

## Cloud-based Management

In the Huawei CloudCampus Solution, switches can be managed by the iMaster NCE-Campus management and control system.

- The switches can automatically connect to the management and control system and use bidirectional certificate authentication to ensure management channel security.
- The switches provide standard NETCONF and YANG interfaces for the management and control system to remotely deliver configurations.
- Remote maintenance and fault diagnosis can be performed on the switches using the management and control system.

## VXLAN Feature

The S5700 supports Layer 2 VXLAN gateway, Layer 3 VXLAN gateway, and BGP EVPN functions, which can be configured using NETCONF/YANG. Based on this feature, multiple service networks or tenant networks can be deployed together on the same physical network. Service networks and tenant networks are isolated from each other, achieving one network for multiple purposes. This helps meet data bearing requirements of different services or customers while reducing network construction costs and improving network resource utilization.

## Stack

Stack technology virtualizes multiple stack-capable switches into one logical switch for data forwarding.

- Member devices in a stack implement redundancy to improve device reliability and use inter-device link aggregation to improve link reliability.
- Stack technology provides high network scalability. You can easily increase the number of ports, bandwidth, and processing capability of a stack by adding member devices.
- Stack technology simplifies configuration and management. After a stack is established, multiple physical devices are virtualized into one logical device. You can log in to any member device in the stack to uniformly configure and manage all the member devices.

## Large-Capacity High-Density Multi-GE Access, 40GE and even 100GE Uplink

To provide sufficient service bandwidth for users, many servers use 10GE network adapters, especially servers in data centers. The S5700 can be used in data centers to provide high forwarding performance and 10GE ports.

When compared with similar devices on the market, the S5700 offers the highest density of multi-GE ports and the largest switching capacity in the industry. The ports support flexible GE and 10GE access. Customers can purchase licenses for corresponding rates based on service requirements to implement dynamic capacity expansion without interrupting services.

The S5700 has a large buffer capacity and uses an advanced buffer scheduling mechanism to ensure non-blocking transmission of high traffic volume in data centers.

## Comprehensive Security Control Policies

The S5700 provides multiple security measures to defend against Denial of Service (DoS) attacks (such as SYN Flood, Land, Smurf, and ICMP Flood attacks), attacks to networks (STP BPDU/root attacks), and attacks to users (bogus DHCP server attacks, man-in-the-middle attacks, IP/MAC spoofing attacks, DHCP request flood attacks, and attacks with variable CHADDR field of packets). The S5700 discards invalid packets that do not match binding entries, such as ARP spoofing packets and IP spoofing packets, preventing hackers from launching man-in-the-middle attacks through ARP packets.

The S5700 supports strict ARP learning, which prevents ARP spoofing from exhausting ARP entries and ensures Internet access of authorized users. The switch also provides IP source check to prevent DoS attacks caused by MAC address spoofing, IP address spoofing, and MAC/IP spoofing. The unicast reverse path forwarding (URPF) function protects a network against source address spoofing attacks by reversely checking packet transmission paths.

The S5700 supports centralized MAC address authentication and 802.1X authentication. It authenticates users based on static or dynamic bindings of information such as the user name, IP address, MAC address, VLAN ID, port number, and antivirus software installation flag on clients. VLANs, QoS policies, and ACLs can be applied to users dynamically. The S5700 can limit the number of MAC addresses learned on a port to prevent attackers from exhausting MAC address entries using forged source MAC addresses. This function minimizes packet flooding that occurs when MAC addresses of users cannot be found in the MAC address table.

## Comprehensive Security Mechanisms Protect Against Internal and External Security Threats

Comprehensive Network Admission Control (NAC) solutions for enterprise networks: The S5700 supports MAC address authentication, 802.1X authentication, policy association, and free mobility to ensure the security of various access modes, such as dumb terminal access, mobile access, and centralized IP address allocation.

Two-level CPU protection mechanism: The S5700 supports CPU hardware queues and separates the data plane from the control plane, which helps to defend against DoS attacks and unauthorized access while preventing control plane overloading.

## Comprehensive Reliability Protection Mechanism

The S5700 supports redundant power modules. You can flexibly use one or two power modules to ensure power reliability. With two swappable fans, the S5700 has a longer mean time between failures (MTBF) than similar devices in the industry. The S5700 supports multi-process MSTP, which enhances the existing STP, RSTP, and MSTP implementation by increasing the number of MSTIs supported on a network.

## Extensive QoS Control Mechanisms

The S5700 implements multi-field traffic classification based on packet information such as the 5-tuple, IP precedence, ToS, DSCP, IP protocol type, ICMP type, TCP source port, VLAN ID, Ethernet protocol type, and CoS. ACLs can be applied to the inbound, outbound, or both inbound and outbound directions to filter packets. The S5700 supports a per flow two-rate three-color CAR. Each port supports eight priority queues, multiple queue scheduling algorithms and congestion avoidance algorithm WRED. All of these features combined ensure the quality of voice, video, and data services.

## Convenient Management

The S5700 supports various device management and maintenance methods, such as SNMPv1, SNMPv2c, SNMPv3, and CLI. The S5700 supports NTP, SSHv2.0, HWTACACS, RMON, multiple log hosts, port-based traffic statistics collection, and NQA, facilitating network planning and reconstruction.

The S5700 supports BFD, which provides millisecond-level fault detection for protocols such as OSPF, IS-IS, VRRP, and PIM to improve network reliability. Complying with IEEE 802.1ag, the S5700 supports point-to-point Ethernet fault management and can detect faults on user links. Ethernet OAM improves the Ethernet network management and maintenance capabilities and ensures a stable network.

## Various IPv6 Features

The S5700 supports the IPv4/IPv6 dual stack and can be upgraded smoothly. The S5700 hardware supports the IPv4/IPv6 dual stack. S5700 switches can be deployed on IPv4 networks, IPv6 networks, or networks that run both IPv4 and IPv6. This makes networking flexible and enables smooth network transition from IPv4 to IPv6.

The S5700 supports various IPv6 routing protocols including RIPng and OSPFv3. It uses the IPv6 Neighbor Discovery Protocol (NDP) to manage packets exchanged between neighbors. It also provides the Path MTU Discovery (PMTU) mechanism for selecting a proper MTU on the path from the source to the destination, optimizing network resource usage.

## OPS

The Open Programmability System (OPS) is an open programmable system based on the Python language. IT administrators can program the O&M functions of a switch through Python scripts to quickly innovate functions and implement intelligent O&M, reducing O&M costs and operation complexity.

# 4 Application Scenarios

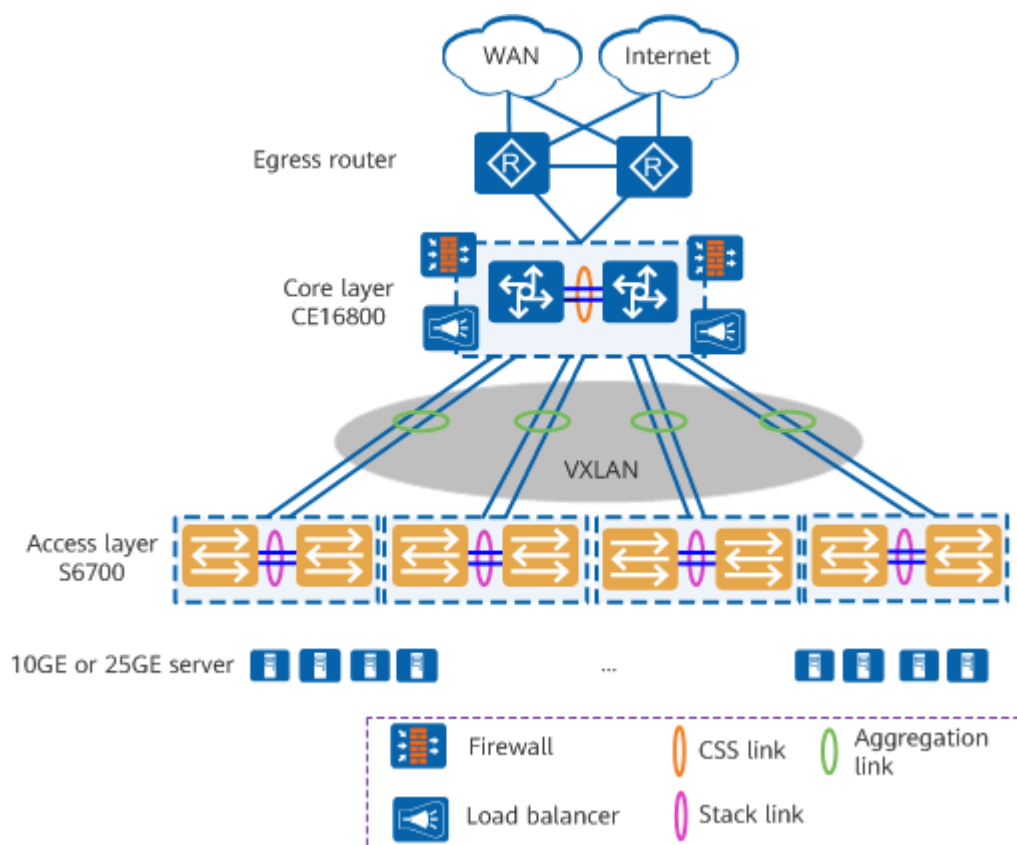
## 4.1 Application in a Data Center

### 4.2 Application in a Large Enterprise Campus

## 4.1 Application in a Data Center

S6700 switches can be deployed at the access layer to build a virtualized, highly reliable, non-blocking, and energy-saving data center network.

**Figure 4-1** S6700 switches in a data center

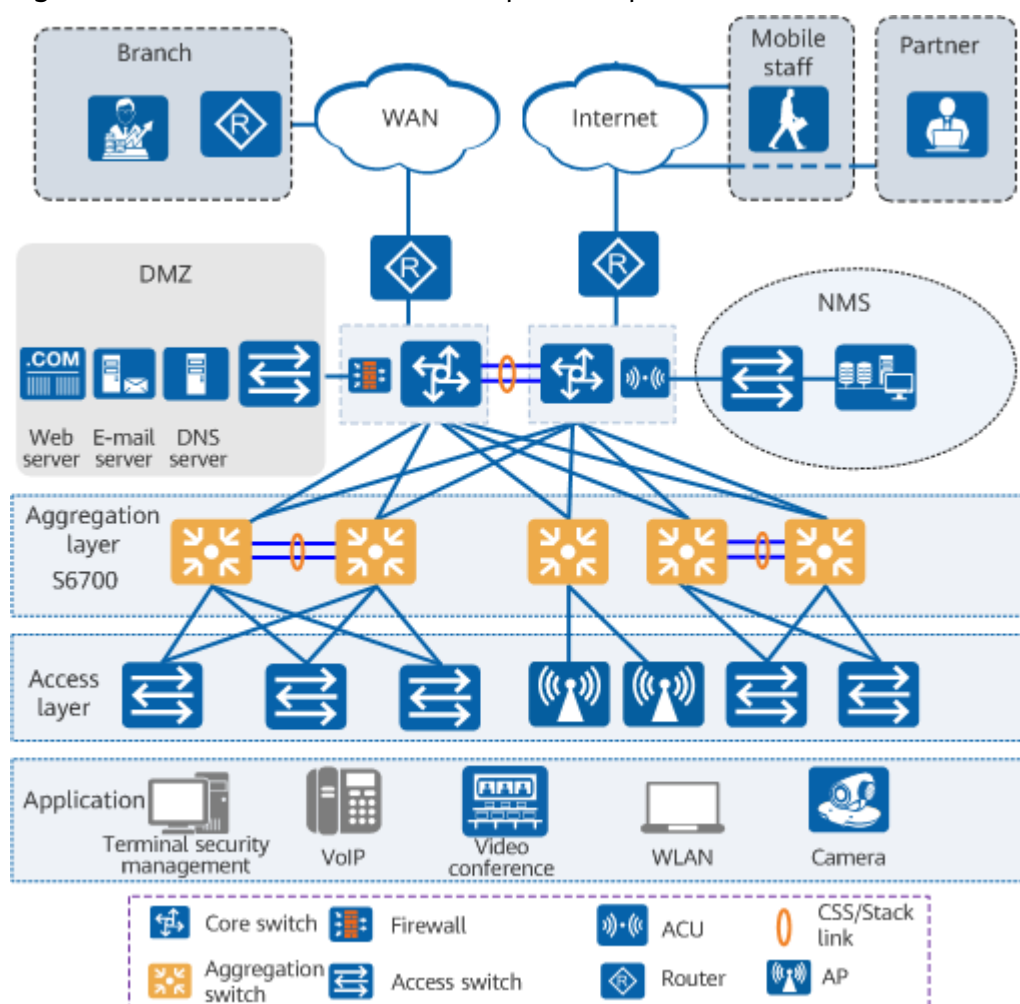


In the data center network shown in the preceding figure, CE16800 switches are deployed as core switches, and S6700 switches are deployed as access switches to provide 10 Gbit/s access for servers. Eth-Trunk is used to implement link-level reliability. No reliability protocol, such as STP or VRRP, needs to be configured. VXLAN is used to build a non-blocking large Layer 2 network, reducing the fault probability.

## 4.2 Application in a Large Enterprise Campus

As shown in the following figure, S6700 switches are deployed at the aggregation layer of a large enterprise campus network, enabling the network to be highly reliable, scalable, and easy-to-manage.

**Figure 4-2** S6700 switches on an enterprise campus network



On enterprise networks and campus networks, S6700 switches connect to access switches through 10GE ports to provide high-performance and large-capacity switching, and connect to core switches through 40GE optical ports to provide 10 Gbit/s backbone and 100 Mbit/s-to-desktop services, meeting high-bandwidth and multi-service requirements.

# 5 Hardware Information

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For the version mappings, appearance and structure, port description, indicator description, power supply configuration, heat dissipation, specifications, power modules, fan modules, cards, cables, pluggable modules for interfaces, and other information, see the [S5700 Series Switches Hardware Description](#).