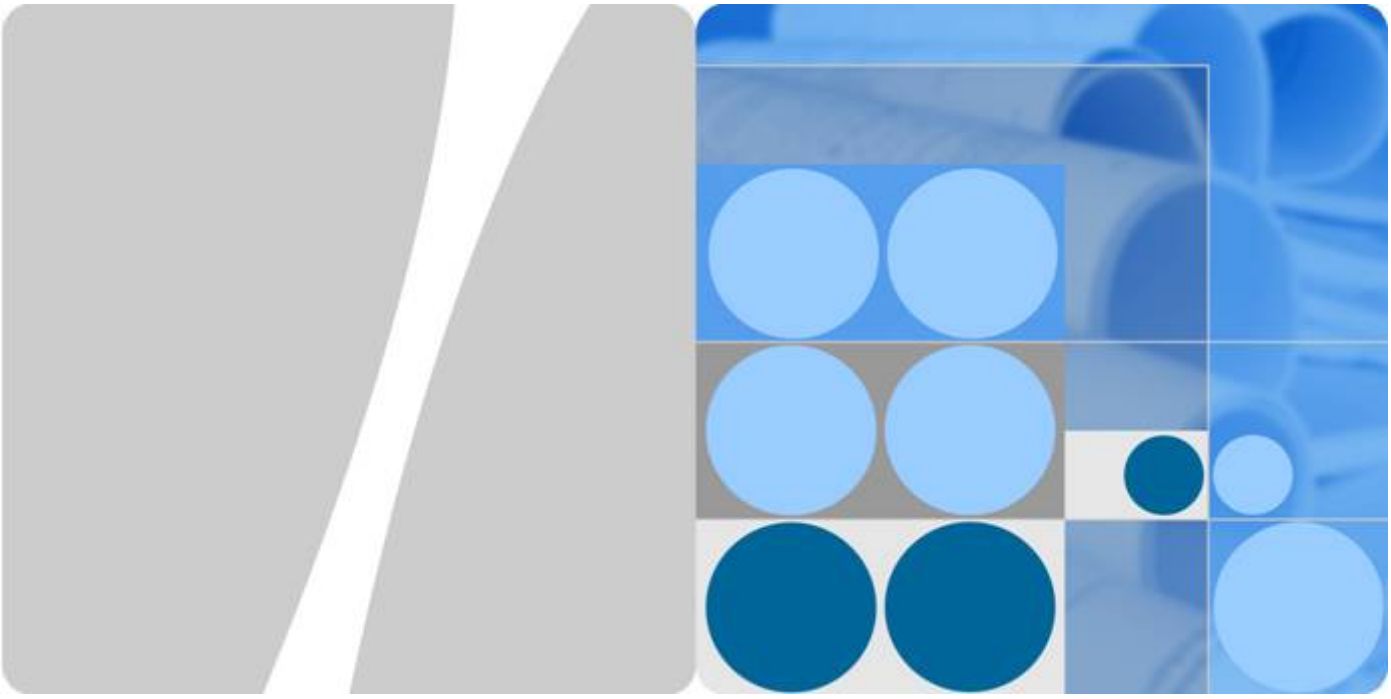

S5700 Series Ethernet Switches

Product Description

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HUAWEI TECHNOLOGIES CO., LTD.

Contents

1 About This Document

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.

The switch provides the NetStream function for network traffic statistics collection and advertisement, during which data of users may be accessed. You should take adequate measures, in compliance with the laws of the countries concerned and the user privacy policies of your company, to ensure that user data is fully protected.

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 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 with multiple functions enabled on the device.
- 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
NOTICE	Indicates a potentially hazardous situation which, if not avoided, could result in equipment damage, data loss, performance deterioration, or unanticipated results. NOTICE is used to address practices not related to personal injury.
NOTE	Calls attention to important information, best practices and tips. NOTE is used to address information not related to personal injury, equipment damage, and environment deterioration.

2 Product Characteristics

Huawei S5700 series Ethernet switches are next-generation energy-saving switches designed to provide high-bandwidth access and Ethernet multi-service aggregation. Based on cutting-edge hardware and Huawei Versatile Routing Platform (VRP) software, the S5700 provides a large switching capacity, high reliability (double power slots and hardware Ethernet OAM), and high-density GE ports to accommodate 10 Gbit/s upstream transmissions. It also supports Energy Efficient Ethernet (EEE) and iStack. 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 desktop switch to provide 1000 Mbit/s access for terminals.

Enabling networks to be more agile for services

The high-speed Ethernet Network Processor (ENP) embedded in the S5720-HI, S5730-HI, CloudEngine S5731-S, CloudEngine S5731S-S, CloudEngine S5731-H, CloudEngine S5731S-H, and CloudEngine S5732-H is tailored for Ethernet.

- The flexible packet processing and traffic control capabilities of ENP can meet current and future service requirements, helping build a highly scalable network.
- The ENP has a fully programmable architecture, on which enterprises 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 of replacing the hardware. In contrast, traditional ASIC chips use a fixed forwarding architecture and follow a fixed forwarding process. For this reason, new services cannot be provisioned until new hardware is developed to support the services one to three years later.
- In addition to capabilities of traditional switches, they provide fully programmable open interfaces and support user-defined forwarding behavior. 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

- The S5720-HI, S5730-HI, CloudEngine S5731-H, CloudEngine S5731S-H, and CloudEngine S5732-H integrate the AC function, so customers do not need to buy independent AC devices or hardware components.
- With the unified user management function, the S5720-HI, S5730-HI, CloudEngine S5731-H, CloudEngine S5731S-H, and CloudEngine S5732-H can authenticate both

wired and wireless users, ensuring a consistent user experience no matter whether they are connected to the network through wired or wireless access devices. The unified user management function supports various authentication methods, including 802.1X, MAC address, and Portal authentication, and is capable of managing users based on user groups, domains, and time ranges. These functions visualize user and service management and boost the transformation from device-centric management to user-centric management.

- The S5700 provides excellent quality of service (QoS) capabilities and support 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.

Providing fine granular network management more agilely

- The S5720-HI, S5730-HI, CloudEngine S5731-S, CloudEngine S5731S-S, CloudEngine S5731-H, CloudEngine S5731S-H, and CloudEngine S5732-H use the Packet Conservation Algorithm for Internet (iPCA) technology that changes the traditional method of using simulated traffic for fault location. iPCA technology can monitor network quality for any service flow anywhere and anytime, without extra costs. It can detect temporary service interruptions in a very short time and can identify faulty ports accurately. This cutting-edge fault detection technology turns "extensive management" to "fine granular management."
- The S5720-EI, S5720-HI, S5730-HI, CloudEngine S5731-S, CloudEngine S5731S-S, CloudEngine S5731-H, CloudEngine S5731S-H, and CloudEngine S5732-H support a simple structure of Two-Way Active Measurement Protocol (TWAMP Light) to accurately check any IP link and obtain the entire network's IP performance. This protocol eliminates the need of using a dedicated probe or a proprietary protocol.
- With the Super Virtual Fabric (SVF), a physical network with the "Small-sized core/ aggregation switches + Access switches + APs" structure can be virtualized into a "super switch", offering the industry's simplest network management solution.
- With the Easy Deploy function, a similar way an AC manages APs, access switches and APs can go online with zero-touch configuration. In the Easy Deploy solution, the Commander collects topology information about the connected clients and stores the clients' startup information based on the topology. Clients can be replaced with zero-touch configuration. The Commander can deliver configurations and scripts to clients in batches and query the delivery results. In addition, the Commander can collect and display information about power consumption on the entire network.

Intelligent Stack

The intelligent stack (iStack) technology combines multiple stacking-capable switches into a logical switch. The entire stack works as a single entity to the network.

- Member switches in a stack back up each other to improve device reliability and establish inter-device link aggregation to improve link reliability.
- iStack provides high network scalability and allows for flexible expansion of ports, bandwidth, and processing capacity by simply adding member switches to the stack.
- iStack also simplifies device configuration and management by virtualizing multiple physical switches into one logical device. You can log in to any member switch to manage all the stack member switches.

Cloud-based Management

Huawei provides the CloudCampus Solution based on a public cloud, switches can be managed by the CloudCampus@AC-Campus is called the cloud-managed switches.

- The cloud-managed switches are plug-and-play.
- The cloud-managed switches can automatically connect to the CloudCampus@AC-Campus and use bidirectional certificate authentication to ensure management channel security.
- The cloud-managed switches provide the NETCONF and YANG interfaces, through which the CloudCampus@AC-Campus delivers configurations to them.
- In addition, remote maintenance and fault diagnosis can be performed on the cloud-managed switches using the CloudCampus@AC-Campus.

VXLAN Features

The S5720-HI, S5730-HI, CloudEngine S5731-S, CloudEngine S5731S-S, CloudEngine S5731-H, CloudEngine S5731S-H, and CloudEngine S5732-H support VXLAN L2 gateway, VXLAN L3 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 or 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 efficiency.

Big Data Security Collaboration

- S5720-HI, S5730-HI, CloudEngine S5731-S, CloudEngine S5731S-S, CloudEngine S5731-H, CloudEngine S5731S-H, and CloudEngine S5732-H support Encrypted Communication Analytics (ECA). It is a traffic identification and detection technology that identifies encrypted traffic and non-encrypted traffic on the network, and extracts and sends encrypted traffic characteristics to the Cybersecurity Intelligence System (CIS). The CIS uses the AI algorithm to train traffic models based on enormous data, compares the encrypted traffic characteristics sent by switches with the traffic models to identify malicious traffic, and automatically isolates threats by collaborating with Agile Controller-Campus, ensuring campus network security.
- S5720-HI, S5730-HI, CloudEngine S5731-S, CloudEngine S5731S-S, CloudEngine S5731-H, CloudEngine S5731S-H, and CloudEngine S5732-H support the deception technology. By responding to scanning requests for nonexistent IP addresses and unopened ports, the switches lure attackers to attack a fake target (Decoy, that is, CIS). Through interaction with attackers, the CIS obtains their attack behavior, extracts attack tools, analyzes suspicious traffic by means of traffic diversion to form a defense policy, and automatically isolates threats by collaborating with the Agile Controller-Campus to block the spread of attack behavior, ensuring campus network security.

Various Port Combinations

The S5700-EI, S5710-EI, S5720-EI (with subcards), S5730-SI, and S5730S-EI support various extension cards that provide high-density GE/10GE/40GE uplink ports. This flexibility in port combinations ensures that customer's bandwidth expansion requirements can be met in a cost effective way.

- The S5710-EI has four fixed 10GE SFP+ ports. With different extended subcards installed, the S5710-EI can provide different combinations of ports, such as 64xGE + 4x10GE, 48xGE + 8x10GE, and 56xGE + 6x10GE.
- The S5720EI with subcards has four fixed 10GE SFP+ ports. With different extended subcards installed, the S5720EI with subcards can provide different combinations of ports, such as 4x10GE optical ports, 6x10GE optical ports, and 4x10GE optical ports + 2x10GE electrical ports.
- The S5730-SI and S5730S-EI have four fixed 10GE SFP+ ports and support extended subcards with 4x40GE optical ports. With these subcards installed, the S5730-SI/ S5730S-EI can provide different combinations of ports, such as 48xGE + 4x10GE + 4x40GE and 48xGE + 16GE (each 40GE interface being split into four 10GE interfaces) + 4x10GE.

Comprehensive VPN Technologies

The S5700 supports the multi-VPN-instance CE (MCE) function, which allows users in different VPNs to connect to the same switch and isolates users through multi-instance routing. These users connect to a PE device through the same physical uplink port, which reduces the network deployment costs.

The S5710-EI, S5700-HI, S5710-EI, S5700-HI, S5710-HI, S5720-EI, S5720-HI, S5730-HI, CloudEngine S5731-H, CloudEngine S5731S-H, and CloudEngine S5732-H support Multiprotocol Label Switching (MPLS) QoS, MPLS traffic engineering (TE), virtual leased line (VLL), virtual private LAN service (VPLS), and Layer 3 virtual private network (L3VPN). They provide high-quality private line access services for enterprises and are cost-effective fixed MPLS switches.

Easy Operations and Maintenance

The S5700 supports EasyDeploy, USB-based deployment, batch remote upgrade and is a plug-and-play product. These functions facilitate device deployment, upgrade, service provisioning, and other management and maintenance operations. They also greatly reduce operations and maintenance costs. The S5700 can be managed and maintained using Simple Network Management Protocol (SNMP) V1, V2c, and V3, command line interface (CLI), web system, Telnet, or Secure Shell (SSH) V2.0. Additionally, it supports remote network monitoring (RMON), multiple log hosts, interface traffic statistics collection, and network quality analysis that help in network consolidation and reconstruction.

The S5700 can use the GARP VLAN Registration Protocol (GVRP) to dynamically distribute, register, and propagate VLAN attributes, reducing manual configuration workload and ensuring correct VLAN configuration. Moreover, the S5700 supports the MUX VLAN function, which involves a principal VLAN and multiple subordinate VLANs. Subordinate VLANs are classified as group and separate VLANs. Ports in the principal VLAN can communicate with ports in subordinate VLANs. Ports in a subordinate group VLAN can communicate with each other, whereas ports in a subordinate separate VLAN can communicate only with ports in the principal VLAN.

Excellent Network Traffic Analysis

The S5700 supports NetStream and can function as a NetStream data exporter. It periodically collects data traffic statistics, encapsulates the statistics in standard V5, V8, or V9 packets, and sends the packets to the NetStream data collector depending on how NetStream is configured. The collected statistics are then processed to dynamically generate reports,

analyze traffic attributes, and generate alarms on abnormal traffic. NetStream helps you optimize network structure and adjust resource deployment on-demand.

The S5700 also supports sFlow. Using a method defined in the sFlow standard, the switch samples traffic passing through it and sends sampled traffic to the collector in real time. The collected traffic statistics are used to generate statistical reports, helping enterprises maintain their networks.

Flexible Ethernet Networking

In addition to traditional Spanning Tree Protocol (STP), Rapid Spanning Tree Protocol (RSTP), and Multiple Spanning Tree Protocol (MSTP), the S5700 supports Huawei-developed Smart Ethernet Protection (SEP) technology and the latest Ethernet Ring Protection Switching (ERPS) standard.

SEP is a ring protection protocol specific to the Ethernet link layer, and applies to various ring network topologies, such as open ring, closed ring, and cascading ring. This protocol is reliable and easy to maintain.

ERPS is defined in ITU-T G.8032. It provides millisecond-level protection switching based on traditional Ethernet MAC and bridging functions.

The S5700 supports Smart Link and Virtual Router Redundancy Protocol (VRRP) for uplink backup. One S5700 switch can connect to multiple aggregation switches with multiple links, significantly improving access device reliability. In addition, the S5700 provides multiple connection fault detection mechanisms, including Ethernet OAM (IEEE 802.3ah/ 802.1ag /ITU Y.1731) and Bidirectional Forwarding Detection (BFD).

Diversified Security Control

The S5700 supports MAC address and 802.1X authentication and can dynamically deliver policies (VLAN, QoS, and ACL) for users.

The S5700 provides a series of mechanisms to defend against:

- DoS attacks: including SYN flood, Land, Smurf, and ICMP flood
- User-targeted attacks: including bogus DHCP server attacks, IP/MAC address spoofing, DHCP request flood, and attack packets with variable DHCP CHADDR values

The S5700 collects and maintains information about access users, such as IP addresses, MAC addresses, IP address leases, VLAN IDs, and access interfaces in a DHCP snooping binding table. With this information, it can defend against DHCP attacks on the network. You can specify trusted and untrusted interfaces to ensure that users connect only to the authorized DHCP server.

The S5700 supports strict ARP learning. This feature prevents ARP spoofing attackers from exhausting ARP entries so that users can connect to the Internet normally.

Mature IPv6 Technologies

The S5700 uses the Versatile Routing Platform (VRP) and supports IPv4/IPv6 dual-stack, IPv6 routing protocols (RIPng, OSPFv3, BGP4+, and IS-IS for IPv6), and IPv6 over IPv4 tunnels (manual, 6-to-4, and ISATAP tunnels). With these IPv6 features, the S5700 can be deployed on a pure IPv4 network, a pure IPv6 network, or a shared IPv4/IPv6 network, supporting a smooth evolution from IPv4 to IPv6.

Innovative Built-in Battery

The S5700-LI-BAT series (S5700-28P-LI-BAT and S5700-28P-LI-24S-BAT) is the industry's first switch model that has a built-in lithium battery as a backup power supply. It ensures uninterrupted services when power failures occur frequently at the access layer. The S5700-LI-BAT has the following advantages:

- Once a mains power outage occurs, the battery can power the switch to ensure nonstop services.
- The switch saves space in an equipment room and is easy to install.
- Intelligent power management ensures a long standby time.
- Battery LAN switches on the entire network can be managed centrally using a web system, facilitating network operations and maintenance. As the battery lifetime is predictable, there are no costs on unnecessary battery replacement.
- The built-in battery provides alarm and protection functions. It will trigger overtemperature protection when the temperature is beyond the operating temperature range.

Ground-Free Design

The S5720-12TP-LI-AC uses a ground-free design. Only the 220 V power module in the switch needs to be grounded. This design facilitates switch deployment in a place where grounding is difficult, such as corridor.

Suitable for outdoor extreme environment

The S5720I-SI supports broad operating temperature range. So the switch can be working in the outdoor cabinet in the very cold (low to -40°C) and very hot (up to +75°C) environments. The typical scenario is the access of the camera for outdoor video surveillance and ETTx.

The S5720I-SI supports ±6kV lightning protection, suitable for outdoor extreme environment.

High-Density Access and Increased Bandwidth on CSFP Ports

The S5700 CSFP models support CSFP modules on downlink ports. Each downlink port with a CSFP GE optical module and a pair of fibers can provide 2 Gbit/s bidirectional bandwidth, which is twice the bandwidth of a standard SFP optical module. The 24 CSFP downlink ports can provide 48 Gbit/s bidirectional bandwidth, allowing for high-density access (equivalent to 48 standard SFP ports) and saving costs of fibers and optical modules.

PoE++ power supply

The S5720-LI, S5720I-SI, and S5730-HI provide a maximum of 90 W, 60 W, or 30 W PoE output power on a single PoE++ interface, and can provide power for high-power terminals such as APs and surveillance cameras. This solves the problem of power supply in specific scenarios.

Open Programmability System (OPS)

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.

Related Content

Support Community

- **Introduction to Huawei Fixed Switches**

Videos

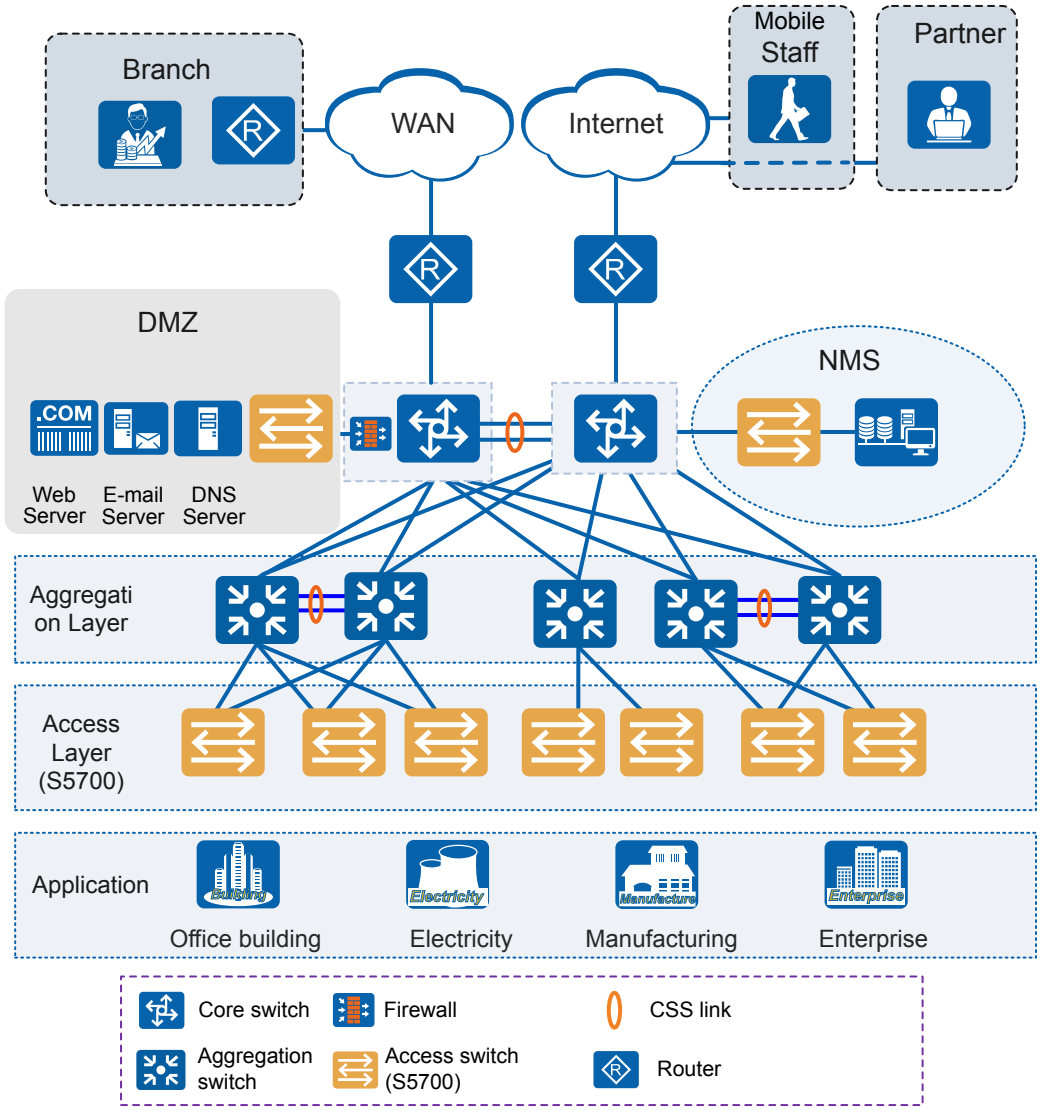
- **Huawei S5720HI Agile Switch Allows Services to Change On Demand**
- **Huawei Next-Generation Enhanced Gigabit Ethernet Switch S5720-EI**
- **S5720-SI Series Layer 3 Gigabit Ethernet Switches**
- **Huawei S5720-LI Series Gigabit Access Switches**
- **Huawei UPoE+ Switch Delivers High-Power PoE**

3 Usage Scenarios

3.1 Large-Scale Enterprise Campus Network

As shown in **Figure 3-1**, S5700 switches are deployed at the access layer of a campus network to build a high-performance and highly reliable enterprise network.

Figure 3-1 S5700 in a large-scale enterprise campus network



The S5700 switches provide various terminal security management features, and support PoE, voice VLAN, and QoS functions. They can provide gigabit-to-the-desktop access capability in the campus.

The S5700 switches ensure secure access of user terminals using security features such as ARP security, IP security, IP source guard, and access control policies (NAC and ACLs).

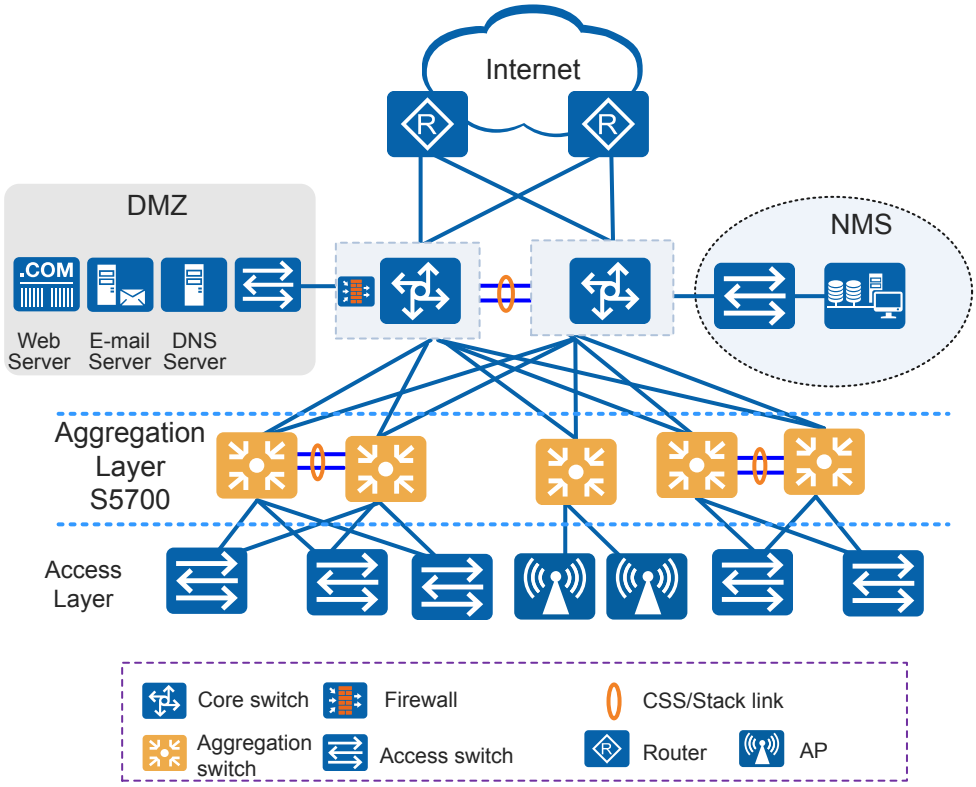
The S5700 switches support the Eth-Trunk feature and Link Aggregation Control Protocol (LACP) to provide multiple links for access of servers, improving link bandwidth and achieving link backup.

The Easy-Operation and USB-based deployment features facilitate deployment and management of the switches.

3.2 Small- or Medium-scale Enterprise Campus Network

As shown in **Figure 3-2**, the S5700 switches are deployed at the aggregation layer of a campus network to build a high-performance, multi-service, and highly reliable enterprise network.

Figure 3-2 S5700 in a small- or medium-scale enterprise campus network



On the enterprise campus network, the S5700 switches connect to access switches through 100M/1000M interfaces for high-performance switching and to the core switches through 10GE optical interfaces. The S5700 aggregation switches, together with the core and access switches, provide an enterprise network solution with 10 Gbit/s backbone and 100M-to-the-desktop capabilities, meeting requirements for high bandwidth and multi-service operation.

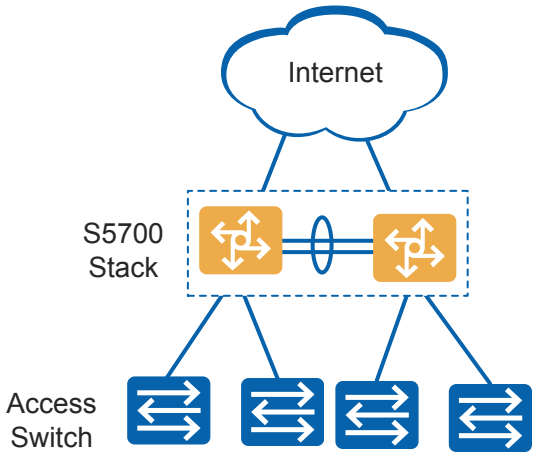
The S5700 switches support SEP and RRPP for millisecond-level protection switching. Two or more S5700 switches set up a stack using iStack technology to create a distributed forwarding structure and provide fast fault recovery. iStack technology increases the number of user interfaces and improves the packet processing capability. The stacked S5700 switches can be managed as one device to facilitate network management and maintenance.

3.3 Small-scale Enterprise Campus Network

With powerful aggregation and routing capabilities of S5700 switches make them suitable for use as core switches in a small-scale enterprise network, as shown in **Figure 3-3**. Two or more

S5700 switches use iStack technology to ensure high reliability. They provide a variety of access control policies to achieve centralized management and simplify configuration.

Figure 3-3 S5700 in a small-scale enterprise network

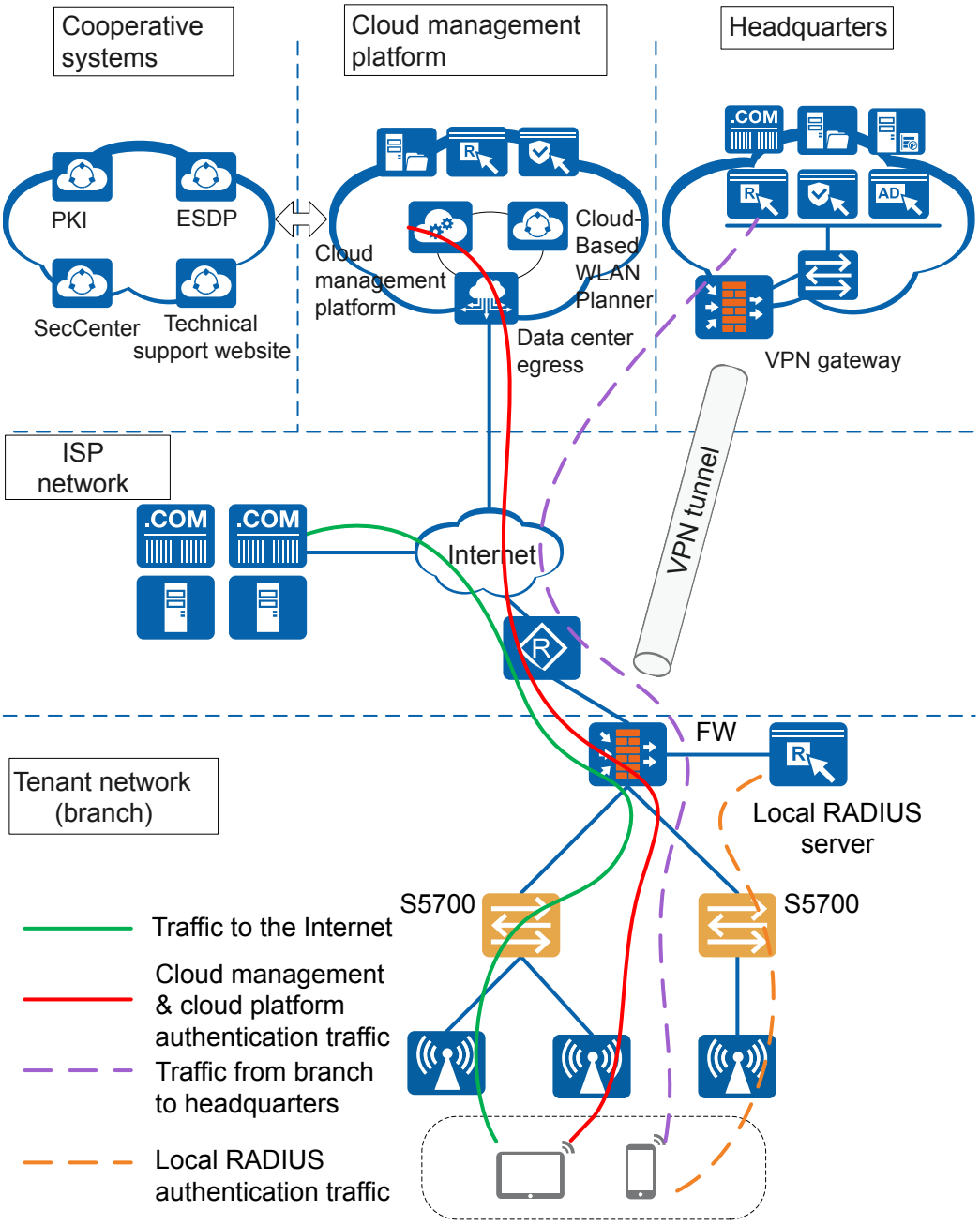


3.4 Application in Public Cloud

CloudCampus Solution is a network solution suite based on Huawei public cloud. The cloud-managed switches can be located at the access layer, as shown in **Figure 3-4**.

Cloud-managed devices are plug-and-play. They go online automatically after being powered on and connected with network cables, without the need for complex configurations. A cloud-managed device can connect to the CloudCampus@AC-Campus and use bidirectional certificate authentication to ensure management channel security. The cloud-managed device provides the NETCONF and YANG interfaces, through which the CloudCampus@AC-Campus delivers configurations to it. In addition, remote maintenance and fault diagnosis can be performed on the CloudCampus@AC-Campus.

Figure 3-4 Application in public cloud



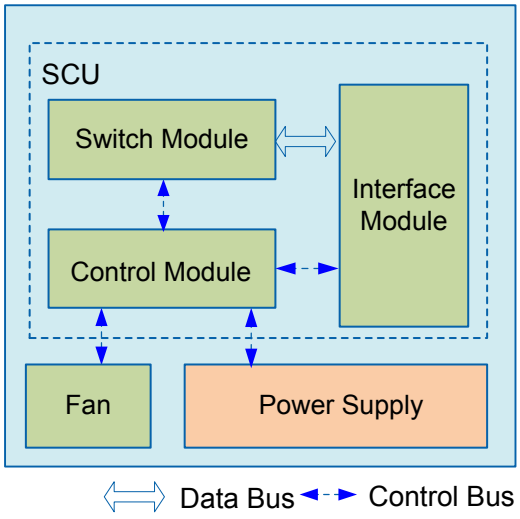
4 Hardware Information

For the version mappings, appearance and structure, port description, indicator description, power supply configuration, heat dissipation, and specifications of the S5700, see the Chassis section in the *S5700 Series Switches Hardware Description*.

Figure 4-1 shows the logical structure of hardware modules in the switch.

Hardware modules of the switch refer to the interface card, Switch Control Unit (SCU), power supply, and fan.

Figure 4-1 Logical structure of hardware modules



SCU

The S5700 switches are equipped with SCUs. Each switch has one SCU.

The SCU provides packet switching and device management. It integrates the main control module, switching module, and interface module.

Main Control Module

The main control module provides the following functions:

- Processes protocol packets.
- Manages the system and monitors the system performance according to instructions of the user, and reports the device running status to the user.
- Monitors and maintains the interface module and switching module.

Switching Module

The switching module (switching fabric) is responsible for packet exchange, multicast replication, QoS scheduling, and access control on the interface module of the SCU.

The switching module uses high-performance chips to provide line-rate forwarding and fast switching of data with different priorities.

Interface Module

The interface module provides Ethernet interfaces for Ethernet service transmission.

Power Supply

For details about power supply configurations on S5700-LI-BAT, see the Battery Modules section in the *S5700 Series Switches Hardware Description*.

For details about power supply configurations on other S5700 switches, see the Power Modules section in the *S5700 Series Switches Hardware Description*.

Cards

The S5700 supports service and stack cards. Service cards allow for flexible networking and provide cost-effective customized solutions. Stack cards connect multiple switches into one logical switch, which implements on-demand expansion, reduces costs, simplifies management, and improves network reliability.

For details about cards supported by the S5700, see the Cards section in the *S5700 Series Switches Hardware Description*.

Fan Modules

For details about fan modules in different models, see "Heat Dissipation" under Chassis in the *S5700 Series Switches Hardware Description*.

Pluggable Modules for Interfaces

For specifications of various pluggable modules for interfaces, see the Pluggable Modules for Interfaces section in the *S5700 Series Switches Hardware Description*.

5 Performance Specifications

The features mentioned in the "Product Characteristics" and "Usage Scenarios" sections are not supported on all S5700 models. For the features and specifications supported by different product models, use the **Specifications Query Tool** for query, or refer to related brochures, which are available at **Huawei official website**.