CloudEngine S5331-H Series Switches

CloudEngine S5331-H series switches are next-generation enhanced gigabit switches that provide GE electrical access ports and 10GE uplink ports.

Product Overview

The CloudEngine S5331-H series switches are the next-generation agile fixed switches developed by Huawei. The CloudEngine S5331-H series switches are developed based on Huawei Versatile Routing Platform (VRP), comprehensive VPN tunnel solutions, various security control methods, intelligent deployment, and simple operation & maintenance. The CloudEngine S5331-H series switches are the best choices for the branches of high-quality large- and middle-sized campus networks, the core layer of small-sized campus networks, and the access layer of data center networks.

Models and Appearances

The following models are available in the CloudEngine S5331-H series.

Models and Appearances	Description
 CloudEngine S5331-H24T4XC	• 24 10/100/1000Base-T Ethernet ports,4 10GE SFP+ ports • One extended slot, reserved for future use • 1+1 power backup • Switching capacity: 672 Gbit/s
 CloudEngine S5331-H24P4XC	• 24 10/100/1000Base-T Ethernet ports,4 10GE SFP+ ports • One extended slot, reserved for future use • 1+1 power backup • PoE+ • Switching capacity: 672 Gbit/s
 CloudEngine S5331-H48T4XC	• 48 10/100/1000Base-T Ethernet ports,4 10GE SFP+ ports • One extended slot, reserved for future use • 1+1 power backup • Switching capacity: 672 Gbit/s
 CloudEngine S5331-H48P4XC	• 48 10/100/1000Base-T Ethernet ports,4 10GE SFP+ ports • One extended slot, reserved for future use • 1+1 power backup • PoE+ • Switching capacity: 672 Gbit/s

Features and Highlights

Enabling Networks to Be More Agile for Services

- CloudEngine S5331-H has a built-in high-speed and flexible processor chip. The chip's flexible packet processing and traffic control capabilities can meet current and future service requirements, helping build a highly scalable network.
- In addition to capabilities of traditional switches, the CloudEngine S5331-H provides open interfaces and supports 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.
- CloudEngine S5331-H series switches, on which enterprises can define their own forwarding models, forwarding behavior, 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.

Delivering Abundant Services More Agilely

- With the unified user management function, the CloudEngine S5331-H authenticates 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 CloudEngine S5331-H provides excellent quality of service(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.

Providing Fine Granular Network Management More Agilely

- The CloudEngine S5331-H uses 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 CloudEngine S5331-H supports Two-Way Active Measurement Protocol(TWAMP) 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.
- The CloudEngine S5331-H supports SVF and functions as a parent switch. With this virtualization technology, 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, the CloudEngine S5331-H manages access switches in a similar way an AC manages APs. In deployment, 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.

Comprehensive VPN Technologies

- The CloudEngine S5331-H supports the MPLS function, and can be used as access devices of high-quality enterprise leased line.
- The CloudEngine S5331-H allows users in different VPNs to connect to the same switch and isolates users through multi-instance routing. Users in multiple VPNs connect to a provider edge (PE) device through the same physical port on the switch, which reduces the cost on VPN network deployment.

Flexible Ethernet Networking

- In addition to traditional Spanning Tree Protocol (STP), Rapid Spanning Tree Protocol (RSTP), and Multiple Spanning Tree Protocol (MSTP), the CloudEngine S5331-H 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 topology, closed ring topology, and cascading ring topology. This protocol is reliable, easy to maintain, and implements fast protection switching within 50 ms. ERPS is defined in ITU-T G.8032. It implements millisecond-level protection switching based on traditional Ethernet MAC and bridging functions.

- The CloudEngine S5331-H supports Smart Link and Virtual Router Redundancy Protocol (VRRP), which implement backup of uplinks. One CloudEngine S5331-H switch can connect to multiple aggregation switches through multiple links, significantly improving reliability of access devices.
- The CloudEngine S5331-H has large entry sizes and 512MB buffers, coping with the fast growth of data volume in the big data era. With the support for 288K MAC addresses, 512K FIB entries, the CloudEngine S5331-H meets the requirements of educational networks and metro area networks and allows the access of a large number of terminals. The CloudEngine S5331-H is the best choice in cloud computing era.

Various Security Control Methods

- The CloudEngine S5331-H supports 802.1x authentication, MAC address authentication, Portal authentication, and hybrid authentication, and can dynamically delivery user policies such as VLANs, QoS policies, and access control lists (ACL). It also supports user management based on user groups.
- The CloudEngine S5331-H provides a series of mechanisms to defend against DoS and user-targeted attacks. DoS attacks are targeted at switches and include SYN flood, Land, Smurf, and ICMP flood attacks. User-targeted attacks include bogus DHCP server attacks, IP/MAC address spoofing, DHCP request flood, and change of the DHCP CHADDR value.
- The CloudEngine S5331-H sets up and maintains a DHCP snooping binding table, and discards the packets that do not match the table entries. You can specify DHCP snooping trusted and untrusted ports to ensure that users connect only to the authorized DHCP server.
- The CloudEngine S5331-H supports strict ARP learning, which prevents ARP spoofing attackers from exhausting ARP entries.

Mature IPv6 Features

- The CloudEngine S5331-H is developed based on the mature, stable VRP and supports IPv4/IPv6 dual stacks, IPv6 routing protocols (RIPng, OSPFv3, BGP4+, and IS-IS for IPv6). With these IPv6 features, the CloudEngine S5331-H can be deployed on a pure IPv4 network, a pure IPv6 network, or a shared IPv4/IPv6 network, helping achieve IPv4-to-IPv6 transition.

Intelligent Stack (iStack)

- The CloudEngine S5331-H supports the iStack function that combines multiple switches into a logical switch. Member switches in a stack implement redundancy backup to improve device reliability and use inter-device link aggregation to improve link reliability. iStack provides high network scalability. You can increase a stack's ports, bandwidth, and processing capacity by simply adding member switches. iStack also simplifies device configuration and management. After a stack is set up, up to nine physical switches can be virtualized into one logical device. You can log in to any member switch in the stack to manage all the member switches in the stack.

PoE Power Supply

- Perpetual PoE: When a PoE switch is rebooted after the software version is upgraded, the power supply to PDs is not interrupted. This capability ensures that PDs are not powered off during the switch reboot.
- Fast PoE: PoE switches can supply power to PDs within 10s after they are powered on. This is different from common switches that generally take 1 to 3 minutes to start to supply power to PDs. When a PoE switch reboots due to a power failure, the PoE switch continues to supply power to the PDs immediately after being powered on without waiting until it finishes reboot. This greatly shortens the power failure time of PDs.

Cloud-based Management

- The Huawei cloud management platform allows users to configure, monitor, and inspect switches on the cloud, reducing on-site deployment and O&M manpower costs and decreasing network OPEX. Huawei switches support both cloud management and on-premise management modes. These two management modes can be flexibly switched as required to achieve smooth evolution while maximizing return on investment (ROI).

VXLAN Features

- VXLAN is used to construct a Unified Virtual Fabric(UVF). As such, multiple service networks or tenant networks can be deployed on the same physical network, and service and tenant networks are isolated from each other. This capability truly

achieves 'one network for multiple purposes'. The resulting benefits include enabling data transmission of different services or customers, reducing the network construction costs, and improving network resource utilization.

- The CloudEngine S5331-H series switches are VXLAN-capable and allow centralized and distributed VXLAN gateway deployment modes. These switches also support the BGP EVPN protocol for dynamically establishing VXLAN tunnels and can be configured using NETCONF/YANG.

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.

Intelligent Upgrade

- Switches support the intelligent upgrade feature. Specifically, switches obtain the version upgrade path and download the newest version for upgrade from the Huawei Online Upgrade Platform (HOUP). The entire upgrade process is highly automated and achieves one-click upgrade. In addition, preloading the version is supported, which greatly shortens the upgrade time and service interruption time.
- The intelligent upgrade feature greatly simplifies device upgrade operations and makes it possible for the customer to upgrade the version independently. This greatly reduces the customer's maintenance costs. In addition, the upgrade policies on the HOUP platform standardize the upgrade operations, which greatly reduces the risk of upgrade failures.

Intelligent O&M

- The CloudEngine S5331-H provides telemetry technology to collect device data in real time and send the data to Huawei campus network analyzer CampusInsight. The CampusInsight analyzes network data based on the intelligent fault identification algorithm, accurately displays the real-time network status, effectively demarcates and locates faults in a timely manner, and identifies network problems that affect user experience, accurately guaranteeing user experience.
- The CloudEngine S5331-H supports a variety of intelligent O&M features for audio and video services, including the enhanced Media Delivery Index (eMDI). With this eDMI function, the switch can function as a monitored node to periodically conduct statistics and report audio and video service indicators to the CampusInsight platform. In this way, the CampusInsight platform can quickly demarcate audio and video service quality faults based on the results of multiple monitored nodes.

Product Specifications

Item	CloudEngine S5331-H24T4XC	CloudEngine S5331-H24P4XC	CloudEngine S5331-H48T4XC	CloudEngine S5331-H48P4XC
Fixed port	24 10/100/1000Base-T ports, 4 10GE SFP+ ports	24 10/100/1000Base-T (PoE+) ports, 4 10GE SFP+ ports	48 10/100/1000Base-T ports, 4 10GE SFP+ ports	48 10/100/1000Base-T(PoE+) ports, 4 10GE SFP+ ports
Dimensions (W x D x H)	442 mm x 420 mm x 43.6 mm	442 mm x 420 mm x 43.6 mm	442 mm x 420 mm x 43.6 mm	442 mm x 420 mm x 43.6 mm
Chassis height	1U	1U	1U	1U
Chassis weight (full configuration weight)	8.4kg	8.6kg	8.55kg	8.8kg
Extended slot	One extended slot, reserved for future use	One extended slot, reserved for future use	One extended slot, reserved for future use	One extended slot, reserved for future use
Input voltage	• Rated voltage range: 100 V AC to 240 V AC, 50/60 Hz • Maximum voltage range: – AC input: 90 V	• Rated voltage range: 100 V AC to 240 V AC, 50/60 Hz • Maximum voltage range: – AC input: 90 V	• Rated voltage range: 100 V AC to 240 V AC, 50/60 Hz • Maximum voltage range: – AC input: 90 V	• Rated voltage range: 100 V AC to 240 V AC, 50/60 Hz • Maximum voltage range: – AC input: 90 V

Item	CloudEngine S5331-H24T4XC	CloudEngine S5331-H24P4XC	CloudEngine S5331-H48T4XC	CloudEngine S5331-H48P4XC
	AC to 290 V AC, 45 Hz to 65 Hz – High-Voltage DC input: 190 V DC to 290 V DC	AC to 290 V AC, 45 Hz to 65 Hz – High-Voltage DC input: 190 V DC to 290 V DC	AC to 290 V AC, 45 Hz to 65 Hz – High-Voltage DC input: 190 V DC to 290 V DC	AC to 290 V AC, 45 Hz to 65 Hz – High-Voltage DC input: 190 V DC to 290 V DC
Maximum power consumption	114 W	• 121 W (without PDs); • 977 W (with PDs, PDs: 740 W)	124 W	• 132 W (without PDs); • 1750 W (with PDs, PDs: 1440 W)
Noise	• Under normal temperature (sound power): 57.5dB(A) • Under high temperature (sound power): 70.9dB(A) • Under normal temperature (sound pressure): 47.5dB(A)	• Under normal temperature (sound power): 62.3dB(A) • Under high temperature (sound power): 71.8dB(A) • Under normal temperature (sound pressure): 52.8dB(A)	• Under normal temperature (sound power): 57.5dB(A) • Under high temperature (sound power): 70.9dB(A) • Under normal temperature (sound pressure): 47.5dB(A)	• Under normal temperature (sound power): 62.3dB(A) • Under high temperature (sound power): 71.8dB(A) • Under normal temperature (sound pressure): 52.8dB(A)
Operating temperature	• 0-1800 m altitude: -5°C to 45°C • 1800-5000 m altitude: The operating temperature reduces by 1ºC every time the altitude increases by 220 m.	• 0-1800 m altitude: -5°C to 45°C • 1800-5000 m altitude: The operating temperature reduces by 1ºC every time the altitude increases by 220 m.	• 0-1800 m altitude: -5°C to 45°C • 1800-5000 m altitude: The operating temperature reduces by 1ºC every time the altitude increases by 220 m.	• 0-1800 m altitude: -5°C to 45°C • 1800-5000 m altitude: The operating temperature reduces by 1ºC every time the altitude increases by 220 m.
Storage temperature	-40℃～70℃	-40℃～70℃	-40℃～70℃	-40℃～70℃
Relative humidity	5% to 95% (non-condensing)	5% to 95% (non-condensing)	5% to 95% (non-condensing)	5% to 95% (non-condensing)
Surge protection specification (service port)	Common mode: ±6 kV	Common mode: ±6 kV	Common mode: ±6 kV	Common mode: ±6 kV
Surge protection specification (power port)	• Differential mode: ±6 kV • Common mode: ±6 kV	• Differential mode: ±6 kV • Common mode: ±6 kV	• Differential mode: ±6 kV • Common mode: ±6 kV	• Differential mode: ±6 kV • Common mode: ±6 kV
Heat dissipation	Air cooling heat dissipation, intelligent speed adjustment, and pluggable fans	Air cooling heat dissipation, intelligent speed adjustment, and pluggable fans	Air cooling heat dissipation, intelligent speed adjustment, and pluggable fans	Air cooling heat dissipation, intelligent speed adjustment, and pluggable fans

Service Features

Feature	Description
MAC address table	IEEE 802.1d standards compliance
	MAC address learning and aging
	Static, dynamic, and blackhole MAC address entries
	Packet filtering based on source MAC addresses
VLAN	4094 VLANs
	Guest VLAN and voice VLAN
	GVRP
	MUX VLAN
	VLAN assignment based on MAC addresses, protocols, IP subnets, policies, and ports
	VLAN mapping
Ethernet loop protection	RRPP ring topology and RRPP multi-instance
	Smart Link tree topology and Smart Link multi-instance, providing millisecond-level protection switching
	SEP
	ERPS(G.8032)
	BFD for OSPF, BFD for IS-IS, BFD for VRRP, and BFD for PIM
	STP(IEEE 802.1d), RSTP(IEEE 802.1w), and MSTP(IEEE 802.1s)
	BPDU protection, root protection, and loop protection
MPLS	MPLS L3VPN
	MPLS L2VPN(VPWS/VPLS)
	MPLS-TE
	MPLS QoS
IP routing	Static routes, RIP v1/2, RIPng, OSPF, OSPFv3, IS-IS, IS-ISv6, BGP, BGP4+, ECMP, routing policy
Interoperability	VLAN-Based Spanning Tree(VBST), working with PVST, PVST+, and RPVST
	Link-type Negotiation Protocol(LNP), similar to DTP
	VLAN Central Management Protocol(VCMP), similar to VTP
IPv6 features	Neighbor Discover(ND)
	PMTU
	IPv6 Ping, IPv6 Tracert, and IPv6 Telnet
	ACLs based on source IPv6 addresses, destination IPv6 addresses, Layer 4 ports, or protocol types
	Multicast Listener Discovery snooping(MLDv1/v2)
	IPv6 addresses configured for sub-interfaces, VRRP6, DHCPv6, and L3VPN

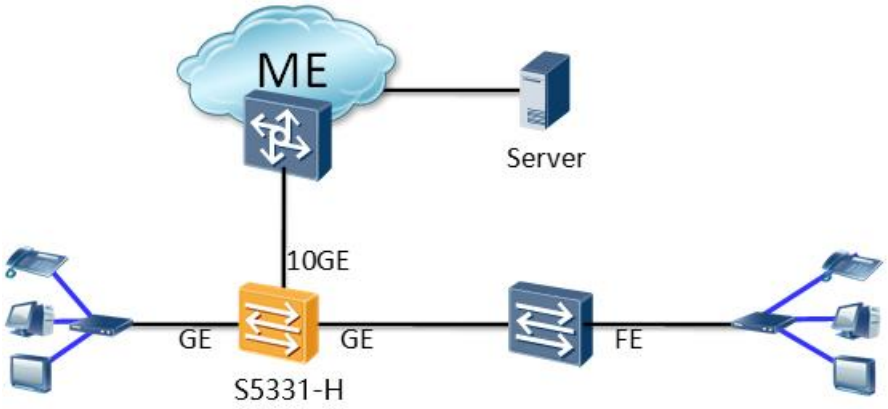
Feature	Description
Multicast	IGMP v1/v2/v3 snooping and IGMP fast leave
	Multicast forwarding in a VLAN and multicast replication between VLANs
	Multicast load balancing among member ports of a trunk
	Controllable multicast
	Port-based multicast traffic statistics
	IGMP v1/v2/v3, PIM-SM, PIM-DM, and PIM-SSM
	MSDP
	MVPN
QoS/ACL	Rate limiting in the inbound and outbound directions of a port
	Packet redirection
	Port-based traffic policing and two-rate three-color CAR
	Eight queues per port
	DRR, SP and DRR+SP queue scheduling algorithms
	WRED
	Re-marking of the 802.1p and DSCP fields of packets
	Packet filtering at Layer 2 to Layer 4, filtering out invalid frames based on the source MAC address, destination MAC address, source IP address, destination IP address, TCP/UDP port number, protocol type, and VLAN ID
	Queue-based rate limiting and shaping on ports
Security	Hierarchical user management and password protection
	DoS attack defense, ARP attack defense, and ICMP attack defense
	Binding of the IP address, MAC address, port number, and VLAN ID
	Port isolation, port security, and sticky MAC
	MAC Forced Forwarding(MFF)
	Blackhole MAC address entries
	Limit on the number of learned MAC addresses
	IEEE 802.1x authentication and limit on the number of users on a port
	AAA authentication, RADIUS authentication, and HWTACACS authentication
	NAC
	SSH V2.0
	HTTPS
	CPU protection
	Blacklist and whitelist
	Attack source tracing and punishment for IPv6 packets such as ND, DHCPv6, and MLD packets
Reliability	LACP

Feature	Description
	E-trunk
	Ethernet OAM(IEEE 802.3ah and IEEE 802.1ag)
	ITU-Y.1731
	DLDP
	LLDP
	BFD for BGP, BFD for IS-IS, BFD for OSPF, BFD for static route
VXLAN	VXLAN L2 and L3 gateways
	Centralized and distributed gateway
	BGP-EVPN
	Configured through the NETCONF protocol
Super Virtual Fabric(SVF)	Working as an SVF Parent to vertically virtualize downlink switches and APs as one device for management.
	A two-layer client architecture is supported.
	IGMP snooping can be enabled on access switches (ASs) and the maximum number of access users on a port can be configured.
	ASs can be independently configured. Services that are not supported by templates can be configured on the parent.
	Third-party devices are allowed between SVF parent and clients.
	Working as an SVF client that is plug-and-play with zero configuration
iPCA	Directly coloring service packets to collect real-time statistics on the number of lost packets and packet loss ratio
	Collection of statistics on the number of lost packets and packet loss ratio at network and device levels
TWAMP	Two-way IP link performance measurement
	Measurement on two-way packet delay, one-way packet loss rate, and one-way packet jitter
Management and maintenance	Cloud-based management
	iStack
	Virtual cable test
	SNMP v1/v2c/v3
	RMON
	Web-based NMS
	System logs and alarms of different levels
	GVRP
	MUX VLAN
	802.3az Energy Efficient Ethernet(EEE)
	NetStream

Feature	Description
	Dying gasp upon power-off
	Intelligent O&M

Networking and Applications

The CloudEngine S5331-H can function as the access device and aggregation device on Metro networks and improves network reliability by link binding, dual-homing, and ringing.



Ordering Information

The following table lists ordering information of the CloudEngine S5331-H series switches.

Model	Product Description
CloudEngine S5331-H24T4XC	CloudEngine S5331-H24T4XC (24*10/100/1000BASE-T ports, 4*10GE SFP+ ports, 1*expansion slot, without power module)
CloudEngine S5331-H24P4XC	CloudEngine S5331-H24P4XC (24*10/100/1000BASE-T ports, 4*10GE SFP+ ports, 1*expansion slot, PoE+, without power module)
CloudEngine S5331-H48T4XC	CloudEngine S5331-H48T4XC (48*10/100/1000BASE-T ports, 4*10GE SFP+ ports, 1*expansion slot, without power module)
CloudEngine S5331-H48P4XC	CloudEngine S5331-H48P4XC (48*10/100/1000BASE-T ports, 4*10GE SFP+ ports, 1*expansion slot, PoE+, without power module)
PAC600S12-CB	600W AC Power Module
PAC1000S56-CB	1000W AC PoE Power Module
FAN-023A-B	Fan Module

More Information

For more information, visit http://www.huawei.com/ or contact your local Huawei sales office.

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