H3C

H3C S12500 DataCenter Cloud Core Switch Series

Overview

The H3C S12500 DataCenter Cloud Core Switch Series is designed for cloud services data centers. It provides the following features:

- CLOS+ multi-grade multi-plane architecture

- Industry's highest performance core switch with 768 line-speed 40G/100G interface per chassis

- Integration of IRF2 (Intelligent Resilient Framework version 2), IRF3 (Intelligent Resilient Framework version 3) and MDC (Multi-tenant Device Context) to implement virtual resource pools

- Distributed ingress buffers (200 ms) to accommodate burst traffic in data centers

- Independent control, detection, and maintenance engines to implement 50ms failover and powerful control capabilities

- The S12500 switch series includes S12508, S12518, S12510-X, S12516-X, 12504X-AF, 12508X-AF, 12512X-AF and S12516X-AF, which meet various port density and performance requirements. The S12500 switch series can work with H3C routers, switches, security devices, IMC, and H3Cloud to provide a wide variety solutions

Features

Advanced CLOS+ multi-grade multi-plane switching architecture

- CLOS+ multi-grade multi-plane architecture, midplane free design, providing continuous bandwidth upgrade capability

- Supports industry first 48-port 40GE/ 100GE interfaces and can meet the existing and future application requirements of data centers

- Adopts independent switching fabric modules and MPU engines to improve device availability and ensure bandwidth expansion

Virtualization technologies - IRF2

IRF2 can virtualize up to four S12500 switches into one logical IRF fabric. IRF2 delivers the following benefits:

- High Availability (HA) - Patented hot standby technology provides data backup and non-stop forwarding on the control plane and data plane. It improves availability and performance eliminating single-point of failures, and ensure service continuity

- Distribution - Multi-chassis link aggregation to enable load sharing and backup over multiple uplinks, improving redundancy and link utilization

- Easy Management - A single IP address to manage the whole IRF fabric, which simplifies device and topology management, improving operating efficiency, and lowering network maintenance cost

Virtualization technologies - IRF3

IRF3 virtualizes core and access switches into one logical device. IRF3 delivers the following benefits:

- Increased I/O ports and centralized maintenance and management

- Reduced network management nodes

- Simplified cable deployment

- Data plane virtualization

Virtualization technologies - MDC

- MDC virtualizes one S12500 switch into multiple logical switches, enabling multiple services to share one core switch. The 1:N virtualization maximizes switch utilization, reduces network TCO, and ensures secure isolation of services

DC-oriented features

- TRILL/SPB - Designed for building large flat Layer 2 networks for data centers to accommodate more servers. TRILL or SPB integrates the simplicity and flexibility of Layer 2 with the stability, scalability, and high performance of Layer 3

- EVI - EVI is a MAC-in-IP technology that provides Layer 2 connectivity between distant Layer 2 network sites across an IP routed network. It is used for connecting geographically dispersed sites of a virtualized large-scale data center that requires Layer 2 adjacency

- FCOE - Integrates heterogeneous LANs and storage networks in data centers. FCOE and CEE integrate data, computing, and storage networks in data centers, reducing the costs for building and expanding data centers

- VXLAN (Virtual Extensible LAN) —VXLAN uses a MAC-in-UDP encapsulation method where the original Layer 2 package is added with a VXLAN header, and is then placed in a UDP-IP packet. With the help of MAC-in-UDP encapsulation, VXLAN tunnels Layer 2 network over Layer 3 network which provides two major benefits: higher scalability of Layer 2 segmentation and better utilization of available network paths

- MP-BGP EVPN (Multiprotocol Border Gateway Protocol Ethernet Virtual Private Network) uses standard-based BGP protocol as the control plane for VXLAN overlay networks, providing BGP based VTEP auto peer discovery and end-host reachability information distribution. MP-BGP EVPN delivers many benefits, such as eliminating traffic flooding, reducing full mesh requirements between VTEPs via the introduction of BGP RR, achieving optimal flow based end to end load sharing and more

- Large capacities for storing ARP/ND, MAC, and ACL entries

Innovative multi-engine design

Independent control, detection, and maintenance engines provide powerful control capability and millisecond-level HA:

- Independent control engine - Uses a powerful CPU system that can efficiently process protocol and control packets, providing refined control for protocol packets and comprehensive protection against protocol packet attacks

- Independent detection engine - Provides highly reliable Fast Fault Detection and Restoration (FFDR) such as BFD and OAM, which can interact with protocols on the control plane to implement millisecond-level failover and convergence, ensuring service continuity

- Independent maintenance engine - Uses an intelligent Embedded Maintenance Subsystem (EMS), a CPU system that provides smart power management, including sequential power-on and power-off and device status check. Sequential power-on and power-off reduces power impulse, electromagnetic radiation, power consumption, and extends the device lifespan

DC-class HA

FFDR provides BFD and OAM functions to implement fast failover and convergence. The following lists the DC-class HA features:

- BFD for VRRP/BGP/IS-IS/RIP/OSPF/RSVP/static routing
- NSR/GR for OSFP/BGP/IS-IS/RSVP
- Separation of control and data planes through independent control engine and switching fabric module
- 1+1 redundancy for control engines
- N+1 redundancy for switch fabric modules
- 1+1 redundancy for fan trays
- N+M redundancy for power modules

Multi-level security protection

- The S12500 switch series use QoS policies to filter and limit traffic from data plane to control plane. During a DoS attack, the switch can identify and protect important packets and discard attack packets, ensuring normal operation

- Supports a large numbers of ACLs while ensuring line-speed forwarding. ACLs can identify and control L2/IPv4/IPv6/MPLS traffic by using combinations of packet fields

Distributed buffering and precise QoS

- Distributed ingress buffers accommodate burst traffic. Each port performs a precise bandwidth assignment and traffic shaping for incoming traffic, and distributes the traffic to ingress buffers. Distributed buffering can fully utilize the buffers of line cards to ensure best buffering performance

- A network model change from C/S to B/S leads to increased volumes of burst traffic. Network devices must have larger buffering capabilities to support this. The S12500 series supports 200ms buffering of burst traffic per 10G interface, which can meet the burst traffic requirements of large data centers

- Each chip can support 4GB buffer, maximum of 24GB buffer per line card

- Each line card supports a maximum of 96K hardware queues, refined QoS, and traffic management. QoS can assign different priorities and queues to different users to provide differentiated services

Comprehensive maintenance and monitoring

- Online state monitoring - Uses a dedicated engine to monitor the state of switch fabric modules, backplane channels, service communication channels, key chips, and storage. Once a failure occurs, it reports the failure to the system through EMS

- Card isolation - Isolates specified cards from the forwarding plane. The isolated cards still work on the control plane, allowing the user to perform management operations such as real-time diagnosis and CPLD upgrade on the isolated cards without affecting system operation

- Ethernet OAM provides multiple device-level and network-level fault detection methods

OAA

- OAA provides an open service platform that supports multiple service cards, including next generation firewall and netstream cards. The integration of these cards to the switch allows for unified network security solutions

Green

- Intelligent EMS engine system - Provides smart power management that supports sequential power-on and power-off and device status check. Sequential power-on and power-off reduces power impulse and electromagnetic radiation, and increases the lifetime of the device. Additionally, device status checks can isolate faulty and idle cards to reduce power consumption

- Smart fan management - Collects fan temperature, calculates fan speed, and assigns the calculated speed to the fan tray. In addition, it detects fan speeds, fault alarms, and performs speed adjustment based on configurations and area, reducing power consumption and noise, increasing the fan's lifetime

- Internal interface monitoring - Automatically shuts down unused internal interfaces to reduce power consumption

- RoHS compliance - The S12500 switch series meets the EU RoHS safety standards

- The S12500 switch series is designed with front to back air flow, satisfying highly efficient heat dissipation requirements in data centre

Specifications

Item	S12508	S12518	S12510-X	S12516-X	S12504X-AF	S12508X-AF	S12512X-AF	S12516X-AF
Switching capacity	20Tbps	45Tbps	86T/ 216Tbps	173T/ 346Tbps	57.6T/ 387Tbps	115.2T/ 516Tbps	172.8T/ 774Tbps	230.4T/ 1032Tbps
Throughput	5760 Mpps	12960 Mpps	48000 Mpps	76800 Mpps	28800 Mpps	57600 Mpps	86400 Mpps	115200 Mpps
MPU slots	2	2	2	2	2	2	2	2
LPU slots	8	18	10	16	4	8	12	16
Switching fabric module slots	9	9	6	6	6	6	6	6
Redundancy	Redundant MPUs, switching fabric modules, power modules, and fan trays							
Ethernet	IEEE 802.1Q							
	DLDP							
	LLDP							
	Static MAC configuration							
	Limited MAC learning							
	Port mirroring and traffic mirroring							
	Port aggregation, port isolation, and port mirroring							
	IEEE 802.1D (STP)/802.1w (RSTP)/802.1s (MSTP)							
	IEEE 802.3ad (dynamic link aggregation), static port aggregation, and multi-chassis link aggregation							
IPv4	Static routing, RIP, OSPF, IS-IS, and BGP4							
	VRRP, VRRP load balancing							
	ECMP							
	Policy-based routing							
	Routing policy							
	GRE, IPv4 in IPv4 tunneling							
IPv6	IPv4/IPv6 dual stack							
	IPv6 static routing, RIPng, OSPFv3, IS-ISv6, and BGP4+							
	VRRPv3 and VRRPv3 load balancing							
	ND and PMTUD							
	Pingv6, Telnetv6, FTPv6, TFTPv6, DNSv6, and ICMPv6							
	IPv4-to-IPv6 transition technologies, such as IPv6 manual tunnel, 6to4 tunnel, ISATAP tunnel, GRE tunnel, and auto IPv4-compatible IPv6 tunnel							
	ECMP							
	Policy-based routing							
	Routing policy							
Multicast	PIM-DM, PIM-SM, PIM-SSM, MSDP, MBGP, and Any-RP							
	IGMP V1/V2/V3 and IGMP V1/V2/V3 snooping							
	PIM6-DM, PIM6-SM, and PIM6-SSM							
	MLD V1/V2 and MLD V1/V2 snooping							
	Multicast policies and Multicast QoS							
	Multicast replication on switching fabrics and service cards							

Specifications (continued)

Item	S12508	S12518	S12510-X	S12516-X	S12504X-AF	S12508X-AF	S12512X-AF	S12516X-AF
MPLS VPN	P/PE function in accordance with RFC2547bis							
	Three inter-AS MPLS VPN modes: Option 1, Option 2 and Option 3							
	Hierarchy of PE (HoPE)							
	Multi-role host							
	VLL							
	VPLS/H-VPLS							
	Distributed multicast VPN							
ACLs	Standard and extended ACLs							
	Ingress and egress ACLs							
	VLAN ACLs							
	Global ACLs							
QoS	Diff-Serv QoS							
	SP/SDWRR							
	Traffic policing with 1K granularity							
	Traffic shaping							
	Congestion avoidance							
	Priority marking and remarking							
	802.1p, TOS, DSCP, and EXP priority mapping							
	VOQ							
SDN/OPENFLOW	Support OPENFLOW 1.3 standard							
	Support multi-controller (EQUAL mode, standby mode)							
	Support multi-table line							
	Support Group table							
	Support Meter							
VXLAN	VXLAN L2 switching							
	VXLAN L3 routing							
	VXLAN VTEP							
	IS-IS+ENDP distributed control plane							
	MP-BGP+EVPN distributed control plane							
	OpenFlow+Netconf centralized control plane							
HA	Independent switching fabric modules							
	1+1 redundancy or key components such as MPUs and power modules							
	N+1 redundancy for switching fabric modules							
	Passive backplane							
	CLOS+ midplane free design (12500X-AF)							
	Hot swapping for all components							
	Real-time data backup on active/standby MPUs							

Specifications (continued)

Item	S12508	S12518	S12510-X	S12516-X	S12504X-AF	S12508X-AF	S12512X-AF	S12516X-AF
	Hot patching							
	NSR/GR for OSFP/BGP/IS-IS/RSVP							
	Port aggregation and multi-card link aggregation							
	BFD for VRRP/BGP/IS-IS/OSPF/RSVP/static routing, with a failover time less than 50 milliseconds							
	IP FRR and TE FRR with a switchover time less than 50 millisecond							
Security	Hierarchical user management and password protection							
	SSHv2							
	FTP login controlled by IP addresses							
	Basic and advanced ACLs for packet filtering							
	Protection against ARP, unknown multicast packets, broadcast packets, unknown unicast packets, local network scanning packets, packets with TT=1, and protocol packets attacks							
	MAC address control and IP+MAC binding							
	uRPF							
	802.1X							
	Portal authentication and RADIUS authentication							
	OSPF, RIPv2, BGPv4 pain text and MD5 authentication							
	Secure network management via SNMPv3 and SSHv2							
	Broadcast packet suppression							
	Active/standby data backup							
System management	Command line configuration via console/AUX Modem/Tenet/SSH2.0							
	File uploading and downloading via FTP, TFTP, Xmodem, and SFTP							
	SNMP V1/V2/V3							
	RMON and groups 1, 2, 3 and 9							
	NTP clocks							
	Network Quality Analyzer (NQA)							
	Fault alarm and automatic fault recovery							
	System logs							
Temperature	Operating temperature: 0°C to 40°C (32°F to 104°F)							
	Storage temperature: -40°C to 70°C (-40°F to 158°F)							
Humidity	5% to 95% (non-condensing)							
Environmental protection	WEEE and RoHS							
Safety	CE, U/cUL, FCC-PART15, VCCI							
Maximum power consumption	7446 W	14726 W	8000 W	12000 W	4800 W	9600 W	14400 W	19200W
Weight (full configuration)	≤ 200 kg	≤ 335 kg	≤ 200 kg	≤ 300 kg	≤ 100 kg	≤ 190 kg	≤ 300 kg	≤ 350 kg
Dimensions (H x W x D)	975 × 442 × 740 mm (22U)	1686 × 442 × 740 mm (38U)	935 x 440 x 830 mm (21U)	1024 x 440 x 830 mm (23U)	264 x 440 x 845 mm (6U)	531 x 440 x 845 mm (12U)	753 x 440 x 845mm (17U)	931 x 440 x 845 mm (21U)

Network applications

New IT Cloud solution

As core switches in new IT Cloud solution, the S12500 series features the following:

- Provides comprehensive VXLAN L3 routing function.
- Provides large table size of MAC, ARP and routing.
- Integrate with other H3C switches, routers, security devices, hypervisor, VCFC controller and cloud OS to offer a complete cloud solution.
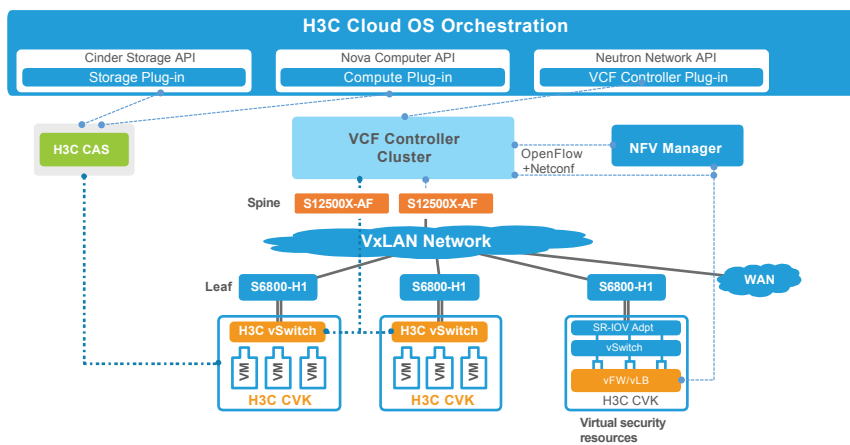
Enterprise DC application

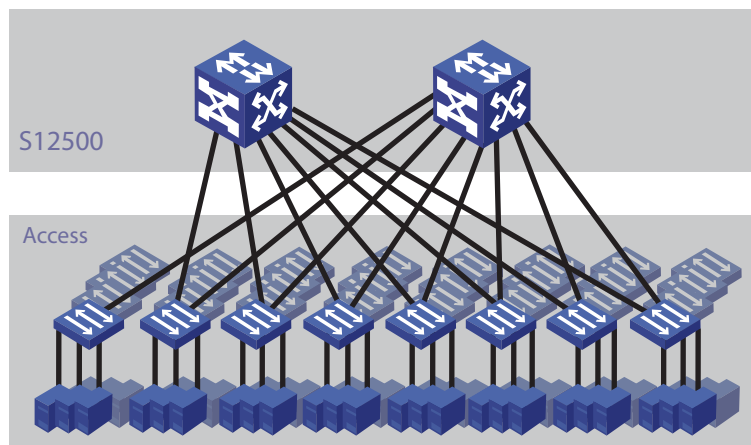As core devices in data center networks, the S12500 series features the following:

- Provides large-capacity forwarding through its multi-level switching fabric to completely meet the traffic forwarding requirements of large data centers.
- Provides HA mechanisms such as BFD and FRR to ensure the availability of data center networks.
- Work with other H3C switches, routers and security devices to offer a complete data center solution.
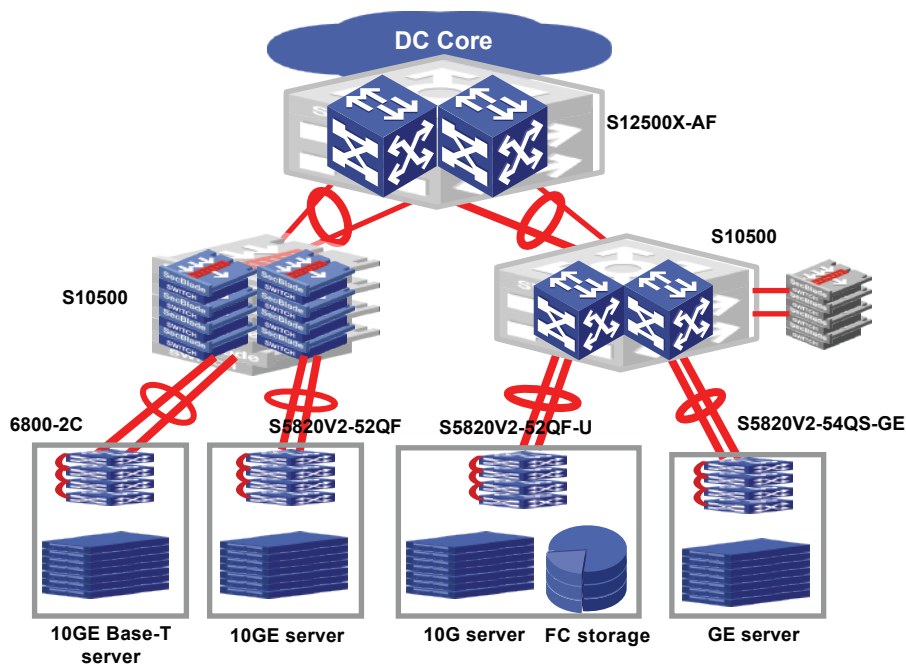
IDC Application

As the core devices in IDC networks, the S12500 switch series features the following:

- Provides up to 768 line-speed 40G/100G interfaces to meet the performance requirements of new generation IDCs.
- Supports virtualization technologies such as IRF and TRILL to implement large-scale network deployment.
- Supports large scale of MAC and ARP entries to meet flat network requirements.

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