



H3C S12500X-AF Data Center Cloud Core Series Switches

Release Date: April, 2021



Overview

The H3C S12500X-AF 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), 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 S12500X-AF switch series includes S12504X-AF, 12508X-AF and S12516X-AF, which meet various port density and performance requirements. The S12500X-AF switch series can work with H3C routers, switches, security devices, IMC, and H3Cloud to provide a wide variety solutions



H3C S12500X-AF Switch Series

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 two S12500X-AF 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, eliminates single-point of failures, and ensures 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 - MDC

- MDC virtualizes one S12500X-AF 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

- 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) MP-BGP EVPN 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 S12500X-AF 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
- The S12500X-AF switch series supports hardware level encryption technology MACsec (802.1ae), which is an industry-standard security technology that provides secure communication for all traffic on Ethernet links.

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 S12500X-AF series supports 200 ms 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

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 configuration sand 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 S12500X-AF switch series meets the EU RoHS safety standards.
- The S12500X-AF switch series is designed with front to back air flow, satisfying highly efficient heat dissipation requirements in data center.

Hardware Specifications

Item	S12504X-AF	S12508X-AF	S12516X-AF
Switching capacity	57.6T/387Tbps	115.2T/516Tbps	230.4T/1032Tbps
Throughput	28800Mpps	57600Mpps	115200Mpps
MPU slots	2	2	2
LPU slots	4	8	16
Maximum power consumption	4800 W	9600 W	19200W
Weight (full configuration)	≤ 100 kg ≤ 220.5 lb	≤ 190 kg ≤ 418.9 lb	≤ 350 kg ≤ 771.6 lb
Dimensions (H x W x D)	264 x 440 x 857 mm (6U) 10.4 x 17.3 x 33.7 in	531 x 440 x 857 mm (12U) 20.9 x 17.3 x 33.7 in	931 x 440 x 857 mm (21U) 36.7 x 17.3 x 33.7 in
Switching fabric module slots	6	6	6

MPU Name	LSXM1SUP04B1	LSXM1SUP04H1	LSXM1SUPB1	LSXM1SUPH1	LSXM1SUPB1	LSXM1SUPH1
MPU processor	Quad Core 1.2 GHz		Quad Core 1.2 GHz		Quad Core 1.2 GHz	
MPU SDRAM	8 GB	16 GB	8 GB	16 GB	8 GB	16 GB
MPU Flash	1 GB		1 GB		1 GB	
MPU Console Port	1		1		1	
MPU MGMT Ports	2x 10/100/1000M Base-T 2x 1000M SFP		2x 10/100/1000 M Base-T 2x 1000M SFP	1x 10/100/1000 M Base-T 1x 1000M SFP	2x 10/100/1000 M Base-T 2x 1000M SFP	1x 10/100/1000 M Base-T 1x 1000M SFP
MPU USB Port	1		1		1	
Redundancy	Redundant MPUs, switching fabric modules, power modules, and fan trays					

Software Specifications

Ethernet	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> Static routing, RIP, OSPF, IS-IS, and BGP4 VRRP, VRRP load balancing ECMP Policy-based routing

	<p>Routing policy</p> <p>GRE, IPv4 in IPv4 tunneling</p>
IPv6	<p>IPv4/IPv6 dual stack</p> <p>IPv6 static routing, RIPng, OSPFv3, IS-ISv6, and BGP4+</p> <p>VRRPv3 and VRRPv3 load balancing</p> <p>ND and PMTUD</p> <p>Pingv6, Telnetv6, FTPv6, TFTPv6, DNSv6, and ICMPv6</p> <p>IPv4-to-IPv6 transition technologies, such as IPv6 manual tunnel, 6to4 tunnel, ISATAP tunnel, GRE tunnel, and auto IPv4-compatible IPv6 tunnel</p> <p>ECMP</p> <p>Policy-based routing</p> <p>Routing Policy</p>
Multicast	<p>PIM-DM, PIM-SM, PIM-SSM, MSDP, MBGP, and Any-RP</p> <p>IGMP V1/V2/V3 and IGMP V1/V2/V3 snooping</p> <p>PIM6-DM, PIM6-SM, and PIM6-SSM</p> <p>MLD V1/V2 and MLD V1/V2 snooping</p> <p>Multicast policies and Multicast QoS</p> <p>Multicast replication on switching fabrics and service cards</p>
MPLS VPN	<p>P/PE function in accordance with RFC2547bis</p> <p>Three inter-AS MPLS VPN modes: Option 1, Option 2 and Option 3</p> <p>Hierarchy of PE (HoPE)</p> <p>Multi-role host</p> <p>VPLS</p> <p>Distributed multicast VPN</p>
ACLs	<p>Standard and extended ACLs</p> <p>Ingress and egress ACLs</p> <p>VLAN ACLs</p> <p>Global ACLs</p>
QoS	<p>Diff-Serv QoS</p> <p>SP/SDWRR</p> <p>Traffic policing</p> <p>Traffic shaping</p>

	<p>Congestion avoidance</p> <p>Priority marking and remarking</p> <p>802.1p, TOS, DSCP, and EXP priority mapping</p> <p>VOQ</p>
SDN/OPENFLOW	<p>Support OPENFLOW 1.3 standard</p> <p>Support multi-controller (EQUAL mode, standby mode)</p> <p>Support multi-table line</p> <p>Support Group table</p> <p>Support Meter</p>
VXLAN	<p>VXLAN L2 switching</p> <p>VXLAN L3 routing</p> <p>VXLAN VTEP</p> <p>IS-IS+ENDP distributed control plane</p> <p>MP-BGP+EVPN distributed control plane</p> <p>OpenFlow+Netconf centralized control plane</p>
HA	<p>Independent switching fabric modules</p> <p>1+1 redundancy or key components such as MPUs and power modules</p> <p>N+1 redundancy for switching fabric modules</p> <p>Passive backplane</p> <p>CLOS+ midplane free design (12500X-AF)</p> <p>Hot swapping for all components</p> <p>Real-time data backup on active/standby MPUs</p> <p>Hot patching</p> <p>NSR/GR for OSFP/BGP/IS-IS/RSVP</p> <p>Port aggregation and multi-card link aggregation</p> <p>BFD for VRRP/BGP/IS-IS/OSPF/RSVP/static routing, with a failover time less than 50 milliseconds</p> <p>IP FRR and TE FRR with a switchover time less than 50 millisecond</p>
Security	<p>Hierarchical user management and password protection</p> <p>SSHv2</p> <p>FTP login controlled by IP addresses</p> <p>Basic and advanced ACLs for packet filtering</p>

	<p>Protection against ARP, unknown multicast packets, broadcast packets, unknown unicast packets, local network scanning packets, packets with TT=1, and protocol packets attacks</p> <p>MAC address control and IP+MAC binding</p> <p>uRPF</p> <p>802.1X</p> <p>Portal authentication and RADIUS authentication</p> <p>OSPF, RIPv2, BGPv4 plain text and MD5 authentication</p> <p>Secure network management via SNMPv3 and SSHv2</p> <p>Broadcast packet suppression</p> <p>Active/standby data backup</p>
System management	<p>Command line configuration via console/AUX Modem/Tenet/SSH2.0</p> <p>File uploading and downloading via FTP, TFTP, Xmodem, and SFTP</p> <p>SNMP V1/V2/V3</p> <p>RMON and groups 1, 2, 3 and 9</p> <p>NTP clocks</p> <p>Network Quality Analyzer (NQA)</p> <p>Fault alarm and automatic fault recovery</p> <p>System logs</p>
Temperature	<p>Operating temperature: 0°C to 40°C (32°F to 104°F)</p> <p>Storage temperature: -40°C to 70°C (-40°F to 158°F)</p>
Humidity	5% to 95% (non-condensing)
Environmental protection	WEEE and RoHS
Safety	<p>UL 60950-1</p> <p>CAN/CSA C22.2 No 60950-1</p> <p>IEC 60950-1</p> <p>EN 60950-1</p> <p>AS/NZS 60950-1</p> <p>FDA 21 CFR Subchapter J</p> <p>GB 4943.1</p>
EMC	<p>FCC Part 15 (CFR 47) CLASS A</p> <p>ICES-003 CLASS A</p>

VCCI CISPR 32 CLASS A
CISPR 22 CLASS A
EN 55022 CLASS A
AS/NZS CISPR22 CLASS A
CISPR 32 CLASS A
EN 55032 CLASS A
AS/NZS CISPR32 CLASS A
CISPR 24
EN 55024
EN 61000-3-2
EN 61000-3-3
ETSI EN 300 386

Ordering information

Product ID	Product Description
LS-12504X-AF	H3C S12504X-AF Ethernet Switch Host
LS-12508X-AF	H3C S12508X-AF Ethernet Switch Host
LS-12516X-AF	H3C S12516X-AF Ethernet Switch Host
LSXM1SUP04B1	H3C S12504X-AF Supervisor Engine Module
LSXM1SUP04H1	H3C S12504X-AF Supervisor Engine Unit
LSXM1SUPB1	H3C S12500X-AF Supervisor Engine Module
LSXM1SUPH1	H3C S12500X-AF Supervisor Engine Unit
LSXM1SFH04D1	H3C S12504X-AF Fabric Module,Type H(Class D)
LSXM1SFH08C1	Switching Fabric Module For S12508X-AF,Type H(Class C)
LSXM1SFH08D1	H3C S12508X-AF Fabric Module,Type H(Class D)
LSXM1SFH08E1	Switching Fabric Module For S12508X-AF,Type H(Class E)
LSXM2SFH16C1	H3C S12516X-AF Fabric Module,Type H(Class C)
LSXM1SFH16C1	H3C S12516X-AF Fabric Module,Type H(Class C+)
LSXM1SFH16E1	H3C S12516X-AF Fabric Module,Type H(Class E)
LSXM1CGQ18QGHF1	H3C S12500X-AF 18-PORT 100GBASE Ethernet Optical Interface(QSFP28)/36-Port 40GBASE Ethernet Optical Interface Module(QSFP+)(HF)
LSXM1CGQ18QGHB1	H3C S12500X-AF 18-Port 100GBASE (QSFP28)/36-Port 40GBASE Ethernet Optical Interface Module (QSFP+)(HB)
LSXM1TGS24QGMODHB1	H3C S12500X-AF 24-Port 10GBASE Ethernet Optical

	Interface(SFP+,LC)+4-Port 40GBASE Ethernet Optical Interface Module(QSFP+)(HB),With 1 Expansion Slot
LSXM1CGQ36HB1	H3C S12500X-AF 36-Port 100GBASE Ethernet Optical Interface Module(QSFP28)(HB)
LSXM1QGS36HB1	H3C S12500X-AF 36-Port 40GBASE Ethernet Optical Interface Module(QSFP+)(HB)
LSXM1TGS48HB1	H3C S12500X-AF 48-Port 10GBASE Ethernet Optical Interface Module(SFP+,LC)(HB)
LSXM1QGS48HB1	H3C S12500X-AF 48-Port 40GBASE Ethernet Optical Interface Module(QSFP+)(HB)
LSXM1CGQ48HB1	H3C S12500X-AF 48-Port 100GBASE Ethernet Optical Interface Module(QSFP28)(HB)
LSXM1CGQ6QGHB1	H3C S12500X-AF 6-Port 100GBASE Ethernet Optical Interface(QSFP28)/12-Port 40GBASE Ethernet Optical Interface Module(QSFP+)(HB)
LSXM1TGS48C2HB1	H3C S12500X-AF,48-Port 10G BASE Ethernet Optical Interface(SFP+,LC)+2-Port 100GBASE Ethernet Optical Interface Module(QSFP28)(HB)
LSXM1BFP16A	16 Fabric Blank Filler Panel
LSXM1BFP08A	08 Fabric Blank Filler Panel
LSXM1BFP04A	04 Fabric Blank Filler Panel
LSXM116XFAN	H3C S12516X-AF Ethernet Switch Fan Module
LSXM108XFAN	H3C S12508X-AF Ethernet Switch Fan Module
LSXM104XFAN	H3C S12504X-AF Ethernet Switch Fan Module
LSXM116XFANH	H3C S12516X-AF Ethernet Switch High Speed Fan Module
LSXM108XFANH	H3C S12508X-AF Ethernet Switch High Speed Fan Module
LSXM104XFANH	H3C S12504X-AF Ethernet Switch High Power Fan Module
PSR2400-54A	AC Power Module,2400W
PSR2400-54D	DC Power Module,2400W
PSR3000-54A	3000W AC Power Supply Module
PSR3000-54AHD	3000W AC & 240V-380V HVDC Power Supply

New H3C Technologies Co., Limited

Beijing Headquarters
 Tower 1, LSH Center, 8 Guangshun South Street, Chaoyang District, Beijing, China
 Zip: 100102

Hangzhou Headquarters
 No.466 Changhe Road, Binjiang District, Hangzhou, Zhejiang, China
 Zip: 310052
 Tel: +86-571-86760000
 Fax: +86-571-86760001

Copyright ©2021 New H3C Technologies Co., Limited Reserves all rights

Disclaimer: Though H3C strives to provide accurate information in this document, we cannot guarantee that details do not contain any technical error or printing error. Therefore, H3C cannot accept responsibility for any inaccuracy in this document. H3C reserves the right for the modification of the contents herein without prior notification

<http://www.h3c.com>



The Leader in Digital Solutions