H3C S12500G-AF Data Center Intelligent Core Switch

Release Date: August, 2021

New H3C Technologies Co., Limited

Overview

H3C S12500G-AF is H3C's new generation of AI intelligent switches for the core scenarios of data centers, providing the industry's highest switching. It provides the following features:

- CLOS+ multi-grade multi-plane architecture
- High performance GPU, 100T+ floating-point computing capabilities
- Industry's first network-specific AI algorithm

The S12500G-AF series switch includes S12504G-AF, 12508G-AF and S12516G-AF, which can adapt to the port density and performance requirements of different network scales, provide strong equipment guarantee for data center network construction, and support INT and Seer Network.

H3C S12500G-AF Series Switch

Features

Advanced CLOS+ multi-grade multi-plane switching architecture

- CLOS+ multi-grade multi-plane architecture, midplane free design, providing continuous bandwidth upgrade capability , improve system bandwidth and evolution capabilities, and the capacity of the whole machine can be smoothly expanded.
- Supports 48-port 10G, 36-port 40GE/ 100GE interfaces and can meet the existing and future application requirements of data centers.

- Separation of control and data planes, Forwarding and control are separated, and the fabric slots supports 5+1 or 4+2 redundancy.
- Fans and power supplies are designed with redundancy.

AI-Inside drives intelligent networks

S12500G-AF series switch support Seerblade high-performance AI computing module, provides an intelligent computing platform that is deeply integrated with the network, and has high-performance CPU, GPU, and large storage capacity, to meet the lightweight deployment of AI + Big Data applications for small and medium-sized enterprises :

- Through the powerful computing power brought by high-performance GPU and high-speed network connection, it can achieve 123TFlops of floating-point computing power, which is a million times higher than traditional processors.
- The network-specific intelligent algorithm jointly launched by top units to improve the level of network intelligent management and performance standards .

Comprehensive IPv6 solution

- S12500G-AF series fully supports IPv6 protocol suite, supports IPv6 static routing, RIPng, OSPFv3, IS-ISv6, BGP4+ and other IPv6 routing protocols, and supports richIPv4 to IPv6 transition technology, including: IPv6 manual tunnel, 6to4 tunnel, ISATAP tunnel, GRE tunnel, IPv4-compatible automatic configuration tunnel and other tunnel technologies, guarantee the smooth transition from IPv4 to IPv6.

Comprehensive virtualization capabilities

- **IRF2** (The second generation of Intelligent Resilient Framework)
- S12500G-AF series switches support IRF2 technology, virtualizing up to 4 high-end devices into one logical device, which has powerful advantages in reliability, distribution and ease of management.
- Reliability: Through patented hot backup technology, redundant backup of all information on the control plane and data plane and uninterrupted data forwarding are realized in the entire virtual architecture, which greatly enhances the reliability and high performance of the virtual architecture, and eliminates A single point of failure is avoided and business interruption is avoided.
- Distribution: Through distributed cross-device link aggregation technology, load sharing and mutual backup of multiple uplinks are realized, thereby improving the redundancy of the entire network architecture and the utilization of link resources.
- Ease of management: The entire elastic architecture shares one IP management, which simplifies network equipment management, simplifies network topology management, improves operational efficiency, and reduces maintenance costs.

- **MDC** (Multitenant Devices Context)
- S12500G-AF series switches can achieve 1:N virtualization capability through MDC technology, that is, one physical switch is virtualized into N logical switches, and up to 16 logical switches can be virtualized to meet the needs of multiple customers sharing core switches; The ports of a single board are divided into different MDCs, which can make full use of the capabilities of the core switch and reduce the user's investment cost. The use of MDC technology realizes the safe isolation of services.

Application requirements for cloud computing data centers

- S12500G-AF series switches support VXLAN (Virtual eXtensible LAN) technology. VXLAN is a Layer2 VPN technology based on IP network and adopting "MAC in UDP" encapsulation. VXLAN can provide Layer2 interconnection for scattered physical sites based on existing service providers or enterprise IP networks, and can provide business isolation for different tenants.
- S12500G-AF series switches support EVPN (Ethernet Virtual Private Network). EVPN is a Layer 2 VPN technology. The control plane uses MP-BGP to advertise EVPN routing information, and the data plane supports the use of VXLAN encapsulation to forward packets.
- S12500G-AF series switches support the large-scale Layer 2 interconnection technology, which can realize the large-scale Layer 2 interconnection through EVPN+VXLAN, and realize the interconnection between multiple sites across the data center.
- S12500G-AF series switches support FCoE (FC over Ethernet) technology; FCoE technology is mainly used to solve the heterogeneous problem of cloud computing data center LAN network and FC storage network. It can be realized through the deployment of FCoE and CEE technology. The integration of the front-end network and back-end network architecture of the data center solves the technical problems of the separation of data, computing and storage, thereby greatly reducing the cost of data center procurement and capacity expansion
- S12500G-AF series switches support large-capacity ARP/ND, MAC, and ACL entries, which can adapt to the flat networking requirements of large data center networks.

Innovative multi-engine design

- Innovative hardware design is adopted to provide the system with powerful control capability and 50ms high reliability guarantee through independent control engine, detection engine and maintenance engine.
- Distributed control engine, all business boards provide a powerful control processing system, easily process various protocol messages and control messages, and support fine control of protocol messages, providing the system with a complete ability to resist protocol message attacks.

- Distributed detection engine, all service boards can perform distributed BFD, OAM and other fast fault detection, and implement linkage with the control plane protocol, support fast protection switching and fast convergence, can achieve millisecond fault detection
- Distributed maintenance engine, intelligent CPU system supports intelligent power management, and can support sequential power-on and power-off of single boards (reduce the power impact caused by simultaneous power-on of single boards, improve equipment life, reduce electromagnetic radiation, and reduce system power consumption)

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

HA — based on DRNI architecture

- S12500G-AF series switches support DRNI (Distributed Resilient Network Interconnect) technology, which realizes cross-device link aggregation by virtualizing two physical devices into one device at the forwarding level, keeping the control plane independent of each other, and realizing dual-active access of the device. Provide equipment-level redundancy protection and traffic load sharing, while improving the reliability of the system.

Multi-level security protection

- The S12500G-AF series switch 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

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

Hardware Specifications

Item	S12504G-AF	S12508G-AF	S12516G-AF
Switching capacity	57.6T/387Tbps	115.2T/516Tbps	230.4T/1032Tbps
Throughput	21600Mpps	43200Mpps	86400Mpps
MPU slots	2	2	2
LPU slots	4	8	16
Maximum power consumption	5800 W	12000 W	22400W

Weight (full configuration)	≤ 110 kg ≤ 242.5 lb	≤ 190 kg ≤ 418.9 lb	≤ 352 kg ≤ 776 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	LSXM1SUP04T2	LSXM2SUPT2	
MPU processor	Quad Core 2.2GHz	Quad Core 2.2GHz	
MPU SDRAM	16 GB	16 GB	
MPU Flash	8 GB	4 GB	
MPU Console Port	1	1	
MPU MGMT Ports	2	2	
MPU USB Port	1	1	
Redundancy	Redundant MPUs, switching fabric modules, power modules, and fan trays		

Software Specifications

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

	ECMP Policy-based routing Routing policy
IPv6	IPv4/IPv6 dual stack IPv6 static routing, RIPng, OSPFv3, IS-ISv6, and BGP4+ VRRPv3 and VRRPv3 load balancing 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 IP message fragmentation and reassembly
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
MPLS/VPLS	Support L3 MPLS VPN Support L2 VPN: VLL (Martini, Kompella) Support MCE Support MPLS OAM Support VPLS, VLL Support hierarchical VPLS and QinQ+VPLS access Support P/PE function Support LDP protocol
ACLs	Standard and extended ACLs Ingress and egress ACLs VLAN ACLs Global ACLs
QoS	Diff-Serv QoS SP/WRR/SP+WRR

	Traffic policing Traffic shaping Congestion avoidance Priority marking and remarking 802.1p, TOS, DSCP, and EXP priority mapping
Programmable and Automated	Support Ansible automation technology Support automated network orchestration through Python/NETCONF/TCL/Resful API to realize DevOps automated operation and maintenance
SDN/OPENFLOW	Support OPENFLOW 1.3 standard Support multi-controller (EQUAL mode, standby mode) Support multi-table line Support Group table Support Meter
Lossless network	Support RDMA, PFC, ECN and other lossless Ethernet features
VXLAN	VXLAN L2 switching VXLAN L3 routing IS-IS+ENDP distributed control plane OpenFlow+Netconf centralized control plane VxLAN/RoCE over VxLAN/BGP EVPN
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 Hot swapping for all components Real-time data backup on active/standby MPUs 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 10 milliseconds RRPP

	DLDP VCT Smart-Link Micro-Segmentation
Security	Support EAD security solutions Support Portal authentication Support MAC authentication Support IEEE 802.1x and IEEE 802.1x SERVER Support AAA/Radius Support HWTACACS, support command line authentication Support SSHv1.5/SSHv2 Support ACL flow filtering mechanism Supports plain text and MD5 cipher text authentication of OSPF, RIPv2 and BGPv4 messages Support the command line with hierarchical protection to prevent unauthorized users from intruding illegally, and have different configuration permissions for users of different levels Support DDos, ARP attack and ICMP attack function Telnet login and password mechanism supporting restricted IP address Support multiple combinations of IP address, VLAN ID, MAC address and port binding Support uRPF Support main and backup data backup mechanism Support fault alarm and automatic fault recovery Support system log
System management	Support FTP, TFTP, Xmodem Support SNMP v1/v2/v3 Support sFlow traffic statistics Support RMON Support NTP clock, support SNTP Support NetStream traffic statistics function Support gRPC Support Telemetry traffic visualization function

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)
Green	Support 802.3az energy efficient Ethernet
Safety	UL 60950-1 CAN/CSA C22.2 No 60950-1 IEC 60950-1 EN 60950-1 AS/NZS 60950-1 FDA 21 CFR Subchapter J GB 4943.1
EMC	FCC Part 15 (CFR 47) CLASS A ICES-003 CLASS A 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-12504G-AF	H3C S12504G-AF Ethernet Switch Host
LS-12508G-AF	H3C S12508G-AF Ethernet Switch Host
LS-12516G-AF	H3C S12516G-AF Ethernet Switch Host

LSXM1SUP04T2	H3C S12504G-AF Supervisor Engine Module
LSXM2SUPT2	H3C S12500G-AF Supervisor Engine Module
LSXM1SFT04F2	H3C S12504G-AF Fabric Module, Type T(Class F)
LSXM1SFT08F2	H3C S12508G-AF Fabric Module, Type T(Class F)
LSXM1SFT16F2	H3C S12516G-AF Fabric Module, Type H(Class F)
LSXM1CGQ18TD2	H3C S12500 18-PORT 100GBASE Ethernet Optical Interface(QSFP28)(TD)
LSXM1QGS36TD2	H3C S12500 36-Port 40GBASE Ethernet Optical Interface Module(QSFP+)(TD)
LSXM1TGS48TD2	H3C S12500 48-Port 10GBASE Ethernet Optical Interface Module(SFP+,LC)(TD)
LSXM1CGQ36TE2	H3C S12500 36-Port 100GBASE Ethernet Optical Interface Module(QSFP28)(TE)
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

The Leader in Digital Solutions

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