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**Bezpieczeństwo,
Efektywność,
Optymalizacja**





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 rich IPv4 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 large-capacity ARP/ND, MAC, and ACL entries, which can adapt to the flat networking requirements of large data center networks.
- S12500G-AF series switches support ROCE, offering lossless transport, including PFC/ECN/IPCC technologies.

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 OSPF/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 M-LAG architecture

- S12500G-AF series switches support M-LAG (DRNI) 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

Product Specifications

Hardware Specifications

Item	S12504G-AF	S12508G-AF	S12516G-AF
Buffer		32M(T series LPU) 36M(S series LPU)	
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		
Temperature	Operating temperature: 0°C to 45°C (32°F to 113°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		

Software Specifications

Item	Feature description
Device Virtualization	IRF2.0
	M-LAG(DRNI)
	S-MLAG
Network Virtualization	BGP-EVPN
	VxLAN



VxLAN	L2 VxLAN gateway
	L3 VxLAN gateway
	Distributed VxLAN gateway
	Centralized VxLAN gateway
	EVPN VxLAN
	manual configured VxLAN
	IPv4 VxLAN tunnel
	IPv6 VxLAN tunnel
	QinQ VxLAN access
	VxLAN DCI, vxlan mapping and route regeneration to interconnect DCs by L2 and L3
	VxLAN multicast
	EVPN-VxLAN multicast
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	
SDN	H3C SeerEngine-DC
Lossless network	PFC and ECN
	DCBX
	RDMA and ROCE
	PFC deadlock watchdog
	ECN overlay
Programmability	Openflow1.3
	Netconf
	Ansible
	Python//TCL/Restful API to realize DevOps automated operation and maintenance
Traffic analysis	Sflow
	Netstream (TE LPU and S series LPU)
VLAN	Port-based VLANs
	Mac-based VLAN ,Subnet-based VLAN and Protocol VLAN
	VLAN mapping
	QinQ
	MVRP(Multiple VLAN Registration Protocol)
	Super VLAN
	PVLAN
MAC address	Dynamic learning and aging of mac address entries
	Dynamic,static and blackhole entries
	Mac address limiting on ports
IPv4 routing	RIP(Routing Information Protocol) v1/2



	OSPF (Open Shortest Path First) v1/v2
	ISIS(Intermediate System to Intermediate system)
	BGP (Border Gateway Protocol)
	Routing policy
	VRRP
	PBR
IPv6 routing	RIPng
	OSPFv3
	IPv6 IS IS
	BGP4+
	Routing policy
	VRRP
	PBR
Multicast	IGMP snooping
	MLD snooping
	IPv4 and IPv6 multicast VLAN
	IPv4 and IPv6 PIM snooping
	IGMP and MLD
	PIM and IPv6 PIM
	MSDP
Multicast VPN	
Reliability	LACP
	LLDP
	STP/RSTP/MSTP protocol, PVST compatible
	STP Root Guard and BPDU Guard
	RRPP and ERPS
	Ethernet OAM
	Smartlink
	DLDP
	BFD for OSPF/OSPFv3, BGP/BGP4, IS-IS/IS-ISv6, PIM/IPM for IPv6 and Static route
VRRP and VRRPE	
QOS	Weighted Random Early Detection (WRED) and tail drop
	Flexible queue scheduling algorithms based on port and queue, including strict priority (SP), Weighted Round Robin (WRR), Weighted Fair Queuing (WFQ), SP + WRR, and SP + WFQ.
	Traffic shaping
	Packet filtering at L2 (Layer 2) through L4 (Layer 4); flow classification based on source MAC address, destination MAC address, source IP (IPv4/IPv6) address, destination IP (IPv4/IPv6) address, port, protocol, and VLAN to apply Qos policy, including mirroring, redirection, priority remark etc.
	Committed access rate (CAR)
	Account by packet and byte
Telemetry	COPP
	gRPC
	ERSPAN
	Mirror on drop



	Telemetry Stream
	INT
	iNQA
	Packet trace
	Packet capture
Configuration and maintenance	Console telnet and SSH terminals
	SNMPv1/v2/v3
	ZTP
	System log
	File upload and download via FTP/TFTP
	BootRom update and remote update
	NQA
	ping,tracert
	VxLAN ping and VxLAN tracert
	NTP
	PTP(1588v2)
	GIR Graceful Insertion and Removal
	Security and management
Hierarchical management and password protection of users	
Authentication methods,including AAA,RADIUS and HWTACACS	
Support DDos, ARP attack and ICMP attack function	
IP-MAC-port binding and IP Source Guard	
SSH 2.0	
HTTPS	
SSL	
PKI	
Boot ROM access control (password recovery)	
RMON	

Performance and scalability

Item	Feature description	12500G-AF (TD/TE LPU)	12500G-AF (SF-LPU)
Virtualization	IRF2.0 stack	2	2
	M-LAG device number	2	2
	ED group	8	8
ACL	max number of ingress ACL	5.25K	IPv4: 26K IPv6: 8K
	max number of egress ACL	2048	IPv4: 2K IPv6: 1K
Forwarding table	Jumbo frame length(byte)	9216	13312
	Mirroring group	4	8
	PBR policy	1000	1000

	PBR node	256	256
	max number of MAC per switch	288K	576K
	max number of ARP entries IPv4	136K	94K-26
	max ND table size for IPv6	67690	78584
	max number of unicast routes IPv4	360267	762k
	max number of unicast routes IPv6	144179	256k
	IPv4 I2 multicast group	16K	8k
	IPv4 I3 multicast group	16K	Standard: 4094 maximum: 8177
	IPv4 multicast routing	256K	16K
	IPv6 I2 multicast group	8K	4k
	IPv6 I3 multicast group	8K	Standard: 4094 maximum: 6832
	IPv6 multicast routing	8K	8K
	LAGG group	1000	256
	LAGG member per group	32	255
	ECMP group	max 4K	max 2K
	ECMP member per group	2-128	2-128
	VRF	4095	4k
	Interface	Loopback interface number	1K
L3 sub interface number		500	4096
SVI interface number		4094	4094
SVI second ip		1K	1K
VxLAN AC number		16K	8K
VxLAN number		16K	8K
VxLAN tunnel number		9K	4K
VSI interface number		8K	8K
IPv4 tunnel number		2K	4K
IPv6 tunnel number		2K	2K
VLAN number		4096	4096
Performance	RIB	1M	1M
	MSTP instance	64	64
	PVST instance	510	126
	PVST logical port number	2000	2000
	VRRP VRID	255	255
	VRRP group	256	256
	NQA group	32	32
Static table	static mac-address	20k	48k
	static ARP	136K	94k-26
	static ND	1K	1K
Static table	static IPv4 routing table	360267	762k
	static IPv6 routing table	144179	256k

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
LSXM3SUP04S2	H3C S12504 Supervisor Engine Unit,Type S
LSXM2SUPT2	H3C S12500G-AF Supervisor Engine Unit
LSXM3SUPS2	H3C S12500 Supervisor Engine Unit,Type S
LSXM1SUP04T2	H3C S12504 Supervisor Engine Unit
LSXM1YGS24CGMODTE2	H3C S12500 24-Port 25G Ethernet Optical Interface(SFP28)+4-Port 100G Ethernet Optical Interface Module (QSFP28)(TE),With 1 Expansion Slot
LSXM1TGS24XT24C4Q2TE2	H3C S12500 24-Port 10G Ethernet Optical Interface(SFP+)+24-Port Multigigabit Ethernet (10G/1Gbps) Copper Interface(RJ45)+4-Port 100G Ethernet Optical Interface(QSFP28)+2-Port 40G Ethernet Optical Interface Module (QSFP+)(TE)
LSXM3CGQ18SF2	H3C S12500 18-Port 100G Ethernet Optical Interface Module (QSFP28)(SF)
LSXM3CGQ36SF2	H3C S12500 36-Port 100G Ethernet Optical Interface Module (QSFP28)(SF)
LSXM3QGS36SF2	H3C S12500 36-Port 40G Ethernet Optical Interface Module (QSFP+)(SF)
LSXM3YGS48SF2	H3C S12500 48-Port 25G Ethernet Optical Interface Module (SFP28,LC) (SF)
LSXM3TGS48SF2	H3C S12500 48-Port 10G Ethernet Optical Interface Module (SFP+,LC)(SF)
LSXM3TGT48CQSF2	H3C S12500 48-Port Multigigabit Ethernet (10G/5G/2.5G/1G/100Mbps) Copper Interface (RJ45)+2-Port 100G Ethernet Optical Interface Module (QSFP28)(SF)
LSXM3CDQ8SF2	H3C S12500 8-Port 400G Ethernet Optical Interface Module (QSFP-DD)(SF)
LSXM2SFT08E2	H3C S12508 Fabric Module,Type T(Class E)
LSXM3SFS08F2	H3C S12508 Fabric Module,Type S(Class F)
LSXM3SFS08G2	H3C S12508 Fabric Module,Type S (Class G)
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
LSTM2KSGD0	Slide Rail Accessories,500mm-800mm
LSXM1BSR	1U Bottom-Support Rails,630mm~900mm



CAB-CON-1.8m	Single Cable, Console Serial Port Cable, 1.8m, D9F, 28UL20276(4P)(P296U), MPH-8P8C
CAB-Console-1.8m-W31R	Console Cable, 1.8m, RJ45P, UL2725(3C28AWG), USB AP



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