H3C S12500R Data Center Switch Router

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New H3C Technologies Co., Limited

Overview

H3C S12500R is a switch router product launched by H3C for WAN, 5G bearer network and data center DCI interconnection scenarios. Forwarding performance and very rich wide-area traffic scheduling features.

S12500R is currently the industry's leading switching router product. A single machine can provide 3072 line-speed 10G ports/25G ports or 768 line-speed 40G/100G/400G ports, providing ultra-high-density 10G and high-density 40G, 100G, 400G capabilities; Faced with the burst WAN traffic, the "distributed ingress cache" technology is innovatively adopted, which can realize data cache for 200ms and meet the requirements of burst traffic in IPRAN, DCI and other network scenarios; at the same time, it supports independent control engine, detection engine, Maintenance engine provides powerful control capability and 50ms high reliability guarantee for the system.

S12500R series include S12504R, S12508R, S12516R, S12500R-2L, S12508CR, S12516CR six models， which can adapt to the port density and performance requirements of different network scales, and provide a strong equipment guarantee for wide-area interconnection construction. At the same time, combined with H3C series routers, switches, security, iMC and SDN solutions, it provides a full range of solutions for wide-area convergence and interconnection scenarios.

H3C S12500R Series Switch Router

Features

Advanced CLOS+ multi-grade multi-plane switching architecture

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

- Supports high density 40GE/ 100GE/ 400GE interfaces and can meet the existing and future application requirements of data centers.
- With independent forwarding module, the control and data planes are separated. This can maximize the reliability of the equipment and guarantees the continuous upgrade of the bandwidth of subsequent products.
- Dynamic and variable cell fragmentation is strictly switching with non-blocking, which improves the overall forwarding performance.

Comware V9 Containerized Operating System

The S12500R adopts the new-generation operating system Comware V9 independently developed by H3C. Compared with the previous-generation operating system, on the basis of integrating rich network features, the S12500R has a further open architecture and modular software architecture, it supports containerized deployment and can carry third-party software applications.

- Rich network features: Comware has rich basic device functions, network functions and management functions, while Comware V9 provides comprehensive customization and tailoring capabilities: Linux infrastructure (Linux function modules, Docker capabilities), network functions, management functions (SNMP , NetConf, CLI...) can be tailored.
- Openness and Programmability: The native Linux kernel is used to facilitate kernel upgrades, and at the same time, it has better openness (it is more convenient to for users to use third-party software to integrate open source Linux software into COMWARE), provide the ability to run third-party software seamlessly, and provide the interface which is open to programmability and supports user-defined network services.
- Containerization: It supports containerization and integrates Docker. Comware can be deployed in Docker containers and run containerized Comware or third-party programs.

Smart Connection Based on SRv6

- SRv6 is a future-oriented new-generation protocol. It naturally supports IPv6 and satisfies access to massive address spaces. SRv6 can identify applications and tenants, realize intelligent routing based on index such as delay and bandwidth, and ensure SLA. At the same time, SRv6 implements a unified protocol, which simplifies configuration.
- SRv6 uses segments with a length of 128 bits to define network functions, and then by arranging the segments, a series of forwarding and processing behaviors of network devices can be implemented to complete service orchestration. Compared with MPLS SR protocol, it has stronger scalability and better compatibility with SDN controller, which is more conducive to deploying applications in DCI, MAN and other scenarios.
- The notable feature of SRv6 is that the forwarding plane adopts IPV6. Based on the reachability of IPV6, it is easier to realize the interconnection of different networks. SRV6 is used for forwarding within a domain, and only ordinary IPV6 forwarding is required between domains. It does not need to be like MPLS which need to convert MPLS to IP and do a lot of complicated configuration.

Application requirements for flexible connectivity

- The S12500R series switches support VXLAN (Virtual eXtensible LAN) technology, which is a Layer2 VPN technology based on IP networks and in the form of "MAC in UDP" encapsulation. VXLAN can provide Layer2 interconnection for decentralized physical sites based on existing service provider or enterprise IP networks, and can provide business isolation for different tenants.
- S12500R series switches support EVPN (Ethernet Virtual Private Network, Ethernet Virtual Private Network), EVPN is a Layer2 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 messages.
- S12500R series switches support large-capacity ARP/ND, MAC, ACL table entries, which can adapt to the flattening requirements of large data center networks.
- S12500R series switches support 400G 400km ZR+ transceiver, which is suitable for DCI connection scenarios, and can partially replace the transmission equipment through the ZR+ module, which is more convenient to manage.

High Precision Time Solution 1588v2

- IEEE 1588v2 is a master-slave synchronization system. During the synchronization process of the system, the master clock periodically publishes the PTP time synchronization protocol and time information. The slave clock port receives the timestamp information sent by the master clock port and the system calculates the line time delay and master-slave time difference accordingly, and use this time difference to adjust the local time, so that the slave device time keeps the same frequency and phase as the master device time. IEEE1588v2 can realize frequency synchronization and time synchronization at the same time. The accuracy of time transfer mainly depends on the accuracy of the frequency of the two condition counters and the symmetry of the link. Compared with traditional timing technology, IEEE1588v2 has obvious advantages(It adopts two-way channel and the precision is ns-level. The cost is low and it can adapt to different access environments and so on.) IEEE1588v2 has become an inevitable trend of development under the background of increasing precision requirement in different industries.

Innovative multi-engine control design

- It adopts innovative hardware design and provides powerful control capability and high reliability guarantee for the system through independent control engine, detection engine and maintenance engine.
- The independent control engine provides a powerful main control CPU system, which can easily handle various protocol packets and control packets and supports fine control of protocol packets, providing the system with a complete ability to resist protocol packet attacks;
- An independent detection engine provides a highly reliable and high-performance FFDR (Fast Fault Detection and Restoration-Fast Fault Detection and Restoration) system for fast fault detection such as BFD. It is linked with the control plane protocol to support fast protection switching and fast convergence, which can realize fast fault detection and ensure uninterrupted services;
- Independent maintenance engine, intelligent EMS (Embedded Maintenance Subsystem) CPU system, the CPU system supports intelligent power management, and can support sequential power-on and power-off of boards (reduces the power shock caused by power-on of boards at the same time) ,

improve equipment life, reduce electromagnetic radiation, reduce system power consumption), equipment online status check.

- The independent monitoring engine, completely separated from the service control plane, monitors the working status of the device hardware in real time, including power load and power adjustment, automatic fan speed adjustment and dynamic energy allocation of the whole machine.

Data Center Level Reliability Guarantee

- The S12500R series products provide a dedicated FFDR system for fast fault detection such as BFD, and cooperate with the control plane protocol to support fast protection switching and fast convergence.
- Support BFD for VRRP/BGP/IS-IS/RIP/OSPF static routes, etc.
- Support NSR/GR for OSFP/BGP/IS-IS etc.
- The hardware of the control engine and the switching fabric board is independent of each other, which realizes the physical separation of the control plane and the forwarding plane. The control engine is 1+1 redundant; the switching fabric board is N+M redundant; the fan system is redundantly designed; the power module is N+M redundant ; Maximize the fault isolation capability and reliability of the system.

Distributed caching mechanism and refined QoS

- In the face of the burst traffic of the next generation data center, the "distributed ingress cache" technology is innovatively adopted. Each port can precisely perform accurate bandwidth allocation and traffic shaping for all service flows flowing to the port, and the precise scheduling of the forwarding plane ensures that the distributed cache in the direction of ingress is supported, and the cache space distributed on each line card is effectively shared and utilized with a better caching effect.
- The network application model has been transformed from C/S to B/S model. The change of application mode has led to the increase of network burst traffic and the large cache mechanism has become an urgent requirement of network equipment. The S12500R supports 1600ms burst traffic per 10 Gigabit port, combined with the distributed ingress caching mechanism, it meets the needs of high burst traffic in large data centers.
- A single chip supports 8GB cache, and the line card supports a maximum of 32GB (4*8GB, each chip is independent and cannot be shared).
- The whole machine supports a maximum of 64K hardware queues, supports refined QoS and traffic management. It can be configured to assign different priorities and queues to different users and different service flows according to requirements, ensuring different bandwidth, service delay and jitter performance.

Comprehensive maintenance and inspection mechanism

- The online status detection mechanism works through a dedicated maintenance engine. It can detect the switching network board, backplane communication channel, business communication channel, key chips, memory and other parts of the device. Once the relevant module fails, it will be reported to the system through EMS.
- The board isolation function can isolate the designated board from the forwarding plane and no longer

participate in the forwarding. The isolated board is still in the control plane and can be managed. The board can perform real-time diagnosis, CPLD upgrade and other business processing, without affecting the business of the whole system.

- Supports Ethernet OAM and provides a variety of device-level and network-level fault detection methods.

Open Application Architecture

- The S12500R series products are designed based on the OAA (Open Application Architecture) concept and innovatively launch an open service platform.

Green

- Through the intelligent EMS engine system, the S12500R series products support the intelligent management of power supply, and can support the sequential power-on of single boards (reduce the power shock caused by the simultaneous power-on of single boards, improve equipment life, and reduce electromagnetic radiation), and can control power-off of the singleboard, isolate faulty/idle boards, and reduce system power consumption.
- The fans of the S12500R series are high-efficiency PWM speed-adjustable fans, which support stepless speed regulation. The system can automatically collect the board temperature, calculate the fan speed adjustment curve according to the actual situation of the device, and deliver the speed adjustment command to the fan. The system supports fan status monitoring (speed monitoring, fault alarm, etc.), which can automatically adjust the speed according to the ambient temperature and board configuration, reduce equipment power consumption and operating noise, effectively reduce ambient noise and prolong fan life.
- S12500R series products support automatic detection of internal ports. When a slot is not configured with an interface board, or when a port is not connected to a cable, the system can automatically close the corresponding internal port, saving the power consumption of the whole machine.
- The minimum power consumption of 10G port is less than 3.4W, the minimum power consumption of 40G port is less than 10.4W, the minimum power consumption of 100G port is less than 13.8W, and the minimum power consumption of 400G port is less than 20.3W
- S12500R series products adopt front-to-rear straight-through ventilation and strict front-to-rear air duct design, high ventilation and heat dissipation efficiency, energy saving and environmental protection, and can meet the requirements of efficient heat dissipation and energy consumption of data center equipment rooms.

Hardware Specifications

Item	S12504R	S12508R	S12516R	S12500R-2L	S12508CR	S12516CR
Switching capacity	387T/1161T	645T/1935T	1290T/3870T	172T/516T	967T/2903T	1935T/5806T
Throughput	115,200Mpps	230,400Mpps	460,800Mpps	57,600Mpps	460,800Mpps	921,600Mpps
MPU slots	2	2	2	2	2	2
LPU slots	4	8	16	2	8	16
Switching fabric module slots	6	6	6	/	9	9
Weight (full configuration)	≤100kg	≤190kg	≤350 kg	≤70 kg	≤400kg	≤620kg
Dimensions (H x W x D) mm	264 x 440 x 845 (6U)	531 x 440 x 845 (12U)	931x440x845 (21U)	133 x 440 x 895 (3U)	842 x442 x920 (19U)	1331 x442 x920 (30U)
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 flow mirroring Port aggregation and port isolation IEEE 802.1D (STP)/802.1w (RSTP)/802.1s (MSTP) IEEE 802.3ad (dynamic link aggregation), static port aggregation, and multi-chassis link aggregation
WAN	SR SR-TE/SR-TE Traffic Statistics SR-TE tunnel BFD detection SRv6 1588v2 SyncE
IPv4	Static routing, RIP, OSPF, IS-IS, and BGP4 VRRP and VRRP load balance ECMP Policy-based routing Routing policy
	GRE Tunnel IPv4 in IPv4 Tunnel
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 6PE 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	IGMP V1/V2/V3 and IGMP V1/V2/V3 snooping IGMP Snooping Fast-leave、IGMP Snooping Group-policy PIM-DM, PIM-SM, PIM-SSM, MSDP, MBGP, and Any-RP PIM6-DM, PIM6-SM, and PIM6-SSM MLD V1 snooping MSDP
MPLS	Support P/PE Support hierarchical PE Supports cross-domain MPLS VPN modes (Option1/Option2/Option3) Support multi-role hosts Support VLL, realize point-to-point L2 MPLS VPN Support VPLS/H-VPLS to realize point-to-multipoint Layer 2 MPLS VPN function Support distributed multicast VPN
ACLs	Standard and extended ACLs Ingress and egress ACLs VLAN ACLs Global ACLs support up to 2M ACL on each board
QoS	Diff-Serv QoS Traffic policing Traffic shaping Congestion avoidance Priority marking and remarking
	802.1p, TOS, DSCP, and EXP priority mapping VOQ SP/WRR/SP+WRR
SDN/OPENFLOW	Cloud MPU supports running SDN controller Support multi-table line Support OPENFLOW Support multi-controller (EQUAL mode, standby mode) Support Group table Support Meter

	Support Netconf Support OVSDB
VXLAN	VXLAN gateway IS-IS+ENDP distributed control plane OpenFlow+Netconf centralized control plane MP-BGP+EVPN distributed control plane IPv6 VXLAN over IPv4
HA	Independent switching fabric modules 1+1 redundancy for MPUs and power supply modules N+M redundancy for switching fabric modules Passive backplane Heat dissipation hole design on the board panel Hot pluggable for all components Real-time data backup on active/standby MPUs Hot patching NSR/GR for OSFP/BGP/IS-IS/RSVP BFD for VRRP/BGP/IS-IS/OSPF/RSVP/static routing Support IP FRR、TE FRR, service switching time is less than 50ms
Security	Support user hierarchical management and password protection Support SSHv2 Support FTP login and password mechanism based on restricted IP address Support standard and extended ACL, ACL flow filtering mechanism Support to prevent ARP, unknown multicast packets, broadcast packets, unknown unicast packets, local network segment route scan packets, TTL=1/0 packets, protocol packets and other attack functions Support uRPF
	Support IEEE 802.1x, Radius/AAA Supports plain and MD5 authentication of OSPF, RIPv2 and BGPv4 messages
	Support SNMPv3, SSHv2 Support unknown unicast, unknown multicast, broadcast packet suppression Support data backup mechanism
System management	Support Console/AUX Modem/Telnet/SSH2.0 Support FTP, TFTP, Xmodem，SFTP Support SNMP v1/v2/v3 Support RMON, support 1, 2, 3, 9 groups Support NTP clock Support NQA Support alarm and self-recovery Support system work log
	Support Telemetry

O&M	Support INT Support micro-burst statistics Support VXLAN OAM, including VXLAN ping, VXLAN tracert Support Puppet, Ansible
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	Operating Humidity: 5% to 95% (non-condensing) Storage Humidity: 5% to 95% (non-condensing)
Green	WEEE,RoHS
Safety	CE, UL/cUL, FCC-PART15, VCCI,etc.

Ordering information

Product ID	Product Description
LS-12500R-2L	H3C S12500R-2L Ethernet Switch Router Chassis
LS-12504R	H3C S12504R Ethernet Switch Router Chassis
LS-12508R	H3C S12508R Ethernet Switch Router Chassis
LS-12516R	H3C S12516R Ethernet Switch Router Chassis
LS-12508CR	H3C S12508CR Ethernet Switch Router Chassis
LS-12516CR	H3C S12516CR Ethernet Switch Router Chassis
LSXM1CMUR1	H3C S12500CR Switch Environment Management Module
LSXM1SUPKR1	H3C S12500CR Supervisor Engine Unit
LSXM1SUP04TR1	H3C S12504R Supervisor Engine Unit
LSXM1SUPER1	H3C S12500R Supervisor Engine Unit
LSXM1SFH04DR1	H3C S12504R Fabric Module,Type H(Class D)
LSXM1SFK04FR1	H3C S12504R Fabric Module,Type K(Class F)
LSXM1SFH08CR1	H3C S12508R Fabric Module,Type H(Class C)
LSXM1SFH08DR1	H3C S12508R Fabric Module,Type H(Class D)
LSXM1SFK08ER1	H3C S12508R Fabric Module,Type K(Class E)
LSXM1SFK08FR1	H3C S12508R Fabric Module,Type K(Class F)
LSXM1SFK08GR1	H3C S12508R Fabric Module,Type K(Class G)
LSXM1SFK16GR1	H3C S12516R Fabric Module,Type K(Class G)
LSXM1SFK08ER1	H3C S12508R Fabric Module,Type K(Class E)
LSXM1SFK08FR1	H3C S12508R Fabric Module,Type K(Class F)
LSXM1SFK08GR1	H3C S12508R Fabric Module,Type K(Class G)
LSXM1CGQ18QGHFR1	H3C S12500R 18-Port 100GBASE Ethernet Optical Interface(QSFP28)/36-Port 40GBASE Ethernet Optical Interface Module(QSFP+)(HF)
LSXM1TGS48HFR1	H3C S12500R 48-Port 10GBASE Ethernet Optical Interface Module(SFP+,LC)(HF)
LSXM1CGQ6QGHFR1	H3C S12500R 6-Port 100GBASE Ethernet Optical Interface(QSFP28)/12-Port 40GBASE Ethernet Optical Interface Module(QSFP+)(HF)
LSXM1CDQ24KBR1	H3C S12500R 24-Port 400GBASE Ethernet Optical Interface Module(QSFP-DD)(KB)
LSXM1CGQ48KBR1	H3C S12500R 48-Port 100GBASE Ethernet Optical Interface Module(QSFP28)(KB)
PSR3000-54AHD	3000W AC & 240V-380V HVDC Power Supply

PSR3000-54A	3000W AC Power Supply Module
PSR2400-54A	AC Power Module,2400W
PSR2400-54D	DC Power Module,2400W
CR-PEM-AC3000	AC 3000W Power Tray
CR-PEM-HVDC3000	HVDC 3000W Power Tray
LSXM104XFAN	H3C S12504X-AF Ethernet Switch Fan Module
LSXM104XFANH	H3C S12504X-AF Ethernet Switch High Power Fan Module
LSXM108XFAN	H3C S12508X-AF Ethernet Switch Fan Module
LSXM108XFANH	H3C S12508X-AF Ethernet Switch High Speed Fan Module
LSXM116XFAN	H3C S12516X-AF Ethernet Switch Fan Module
LSXM116XFANH	H3C S12516X-AF Ethernet Switch High Speed Fan Module
FAN-80-5-A	Fan Tray Module (5 Fans, Fan Panel Side Exhaust Airflow)

The Leader in Digital Solutions

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