S12700 Series Agile Switches

HUAWEI TECHNOLOGIES CO., LTD.

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S12700 series is available in two models: S12708 and S12712.

S12700 Series Agile Switches

Huawei S12700 series agile switches are core switches designed for next-generation campus networks. Using a fully programmable switching architecture, the S12700 series allows fast, flexible function customization and supports a smooth evolution to software-defined networking (SDN). The S12700 series uses Huawei Ethernet Network Processor (ENP) and provides native wireless access controller (AC) to help build a wired and wireless converged network. Its native broadband remote access server (BRAS) capabilities deliver refined user and service management, and Huawei's Packet Conservation Algorithm for Internet (iPCA) supports hop-by-hop monitoring of any service flows, helping you manage services in a more refined way.The S12700 series runs Huawei Versatile Routing Platform (VRP), which provides high-performance L2/L3 switching services as well as rich network services, such as MPLS VPN, hardware IPv6, desktop cloud, and video conferencing. In addition, the S12700 series offers a variety of reliability technologies including in-service software upgrade, non-stop forwarding, CSS2 switch fabric hardware clustering that allows 1+N backup of MPUs, hardware Eth-OAM/BFD, and ring network protection. These technologies help you improve productivity and maximize network operation time, and therefore reduce the total cost of ownership (TCO).

The S12700 series is available in two models: S12708 and S12712.

S12712

S12708

Product Characteristics

Make your network more agile and service-oriented

- The high-speed ENP chip used in the S12700 series is tailored for Ethernet. The chip's flexible packet processing and traffic control capabilities can meet current and future service requirements, helping build a highly scalable network.
- In addition to providing all the capabilities of common switches, the S12700 series provides fully programmable open interfaces and supports programmable forwarding behaviors. Enterprises can use the open interfaces to develop new protocols and functions independently or jointly with other vendors to build campus networks that meet their needs.
- The ENP chip uses a fully programmable architecture, on which enterprises can define their own forwarding models, forwarding behaviors, and lookup algorithms. This architecture speeds up service innovation and makes it possible to provision a customized service within six months, without replacing hardware. In contrast, traditional ASIC chips use a fixed forwarding architecture and follow a fixed forwarding process. For this reason, new services cannot be provisioned until new hardware is developed to support the services, which can take 1 to 3 years.

Deliver abundant services more agilely

- The native ACs of the S12700 series allow enterprises to build a wireless network without additional AC hardware. Each S12700 switch can manage 4K APs and 64K users. It is the first core switch that provides T-bit AC capabilities, which avoid the performance bottleneck on independent AC devices. The native T-bit AC capabilities help you better cope with challenges in the high-speed wireless era.
- The native BRAS on the S12700 series authenticates both wired and wireless users, delivering the same user experience no matter they connect to the network through wired or wireless access devices. The native BRAS supports various authentication methods, including PPPoE, 802.1X, MAC, and Portal authentication, and is capable of managing users based on user groups, domains, and time ranges. These functions visualize management of users and services and enable the transformation from device-centered management to user-centered management.

Provide fine granular management more agilely

- iPCA, Packet Conservation Algorithm for Internet, changes the traditional method of using simulated traffic for fault location. iPCA technology can monitor network quality for any service flow at any network node, at any time, and without extra costs. It can detect temporary service interruptions within 1 second and can identify faulty ports accurately. This cutting-edge fault detection technology turns "extensive management" into "fine granular management."
- The Super Virtual Fabric (SVF) technology can not only virtualize fixed-configuration switches into line cards of an S12700 switch but also virtualize APs as ports of the switch. With this virtualization technology, a physical network with core/aggregation switches, access switches, and APs can be virtualized into a "super switch," offering the simplest network management solution.
- The S12700 series manages access switches in a similar way an AC manages APs, saving the trouble of laborious configuration on access switches. It manages access switches and APs uniformly through CAPWAP tunnels, allowing access switches and APs to connect to the network with zero configuration.

Industry-leading line cards

- Using Huawei advanced ENP chips, the S12700 series supports several million hardware entries, leaving traditional switches far behind. The S12700 series provides 1M MAC address entries and 3M FIB entries, meeting requirements of route-intensive scenarios, such as the metropolitan area network (MAN) for a television broadcasting network or education network. The capability to provide 1M NetStream entries enables the S12700 series to provide fine granular traffic statistics on collage campus networks and large-scale enterprise campus networks.
- The S12700 series provides a 1.5 GB buffer on each line card to prevent packet loss upon traffic bursts, delivering high-quality video services. Traditional switches only provide 4 MB buffer per card, which cannot ensure high-quality video stream transmission.
- The S12700 series supports high-density line-speed cards, such as 48*10GE and 8*100GE line cards. Each S12700 chassis can provide a maximum of 576 10GE ports and 96 100GE ports. This large port capacity fully meets the requirements of bandwidth-consuming applications, such as multimedia video conferencing, well protecting customer investments.

End-to-end reliability design

Device-level reliability: CSS2 switch fabric hardware clustering technology

- Based on back-to-back clustering technology that has been widely used on high-end core routers, the S12700 series employs the second generation switch fabric hardware clustering technology, CSS2, an enhancement to CSS switch fabric clustering technology.
- CSS2 technology connects cluster member switches through hardware channels of switch fabric units. Therefore, control packets and data packets of a cluster only need to be forwarded once by the switch fabric units and do not go through service cards. Compared with traditional service port clustering technologies, CSS2 minimizes the impact of software failures, reduces the risk of service interruption caused by service cards, and also significantly shortens the transmission latency.
- CSS2 supports 1+N backup of MPUs. This means a cluster can run stably as long as one MPU of any chassis in the cluster is working normally. In a cluster connected by service ports, each chassis must have at least one MPU working normally. Therefore, CSS2 is more reliable than traditional service port clustering technologies.
- CSS2 prevents a cluster from splitting. Control packets and data packets of a cluster are transmitted over independent channels. Even if all links between switch fabric units fail, the cluster will not split because these packets can still be transmitted over the control channels between MPUs. In a cluster connected by service ports, control packets and data packets are forwarded through links between service cards. Once a link between member devices fails, control packets and data packets will be lost, causing the cluster to split.

Network-level reliability: end-to-end hardware protection switching

- The S12700 uses a series of link detection and protection switching technologies, such as hardware Eth-OAM, BFD, G.8032, and Smart Ethernet Protection (SEP), to realize 50 ms end-to-end protection switching. These technologies help build a campus network that responds quickly to topology changes and provides the most reliable services.

Product Specifications

Item	S12708	S12712
Switching capacity	12.32/27.04 Tbps	17.44/37.28 Tbps
Packet forwarding rate	6240 /9120 Mpps	9120/12960 Mpps
MPU slots	2	2
SFU slots	4	4
Service card slots	8	12
Redundancy design	MPUs, SFUs, power supplies, and fan modules	
CSS2	1+N backup of MPUs in a cluster	
	Up to 1.92 Tbps cluster bandwidth, 21 us inter-chassis transmission latency	
Wireless network management	Native AC	
	AP access control, AP region management, and AP profile management	
	Radio profile management, uniform static configuration, and centralized dynamic management	
	Basic WLAN services, QoS, security, and user management	
	Deployment of ACs on different network layers	
User management	Native BRAS	
	PPPoE, 802.1X, MAC, and Portal authentication	
	Traffic- and time-based accounting	
	User authorization based on user groups, domains, and time ranges	
VLAN	LNP, access, trunk, and hybrid interface type	
	Default VLAN	
	VLAN switching	
	QinQ and selective QinQ	
	MAC address-based VLAN assignment	
ARP	256K ARP entries	

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MAC address	1M MAC address entries	
	Dynamic MAC address learning and aging	
	Static, dynamic, and blackhole MAC address entries	
	Source MAC address filtering	
	MAC address limiting based on ports and VLANs	
Ring network protection	STP (IEEE 802.1d), RSTP (IEEE 802.1w), and MSTP (IEEE 802.1s)	
	SEP	
	BPDU protection, root protection, and loop protection	
	BPDU tunnel	
	G.8032 Ethernet Ring Protection Switching (ERPS)	
IP routing	3M IPv4 routing entries	
	1M IPv6 routing entries	
	IPv4 dynamic routing protocols, such as RIP, OSPF, IS-IS, and BGP	
	IPv6 routing protocols, such as RIPng, OSPFv3, IS-ISv6, and BGP4+	
Multicast	128K multicast routing entries	
	IGMPv1/v2/v3 and IGMP v1/v2/v3 snooping	
	PIM-DM, PIM-SM, and PIM-SSM	
	MSDP and MBGP	
	Fast leave	
	Multicast traffic control	
	Multicast querier	
	Multicast protocol packet suppression	
	Multicast CAC	
	Multicast ACL	

Item	S12708	S12712
MPLS	Basic MPLS functions	
	MPLS OAM	
	MPLS TE	
	MPLS VPN/VLL/VPLS	
Reliability	LACP and E-Trunk	
	VRRP and BFD for VRRP	
	BFD for BGP/IS-IS/OSPF/static route	
	NSF and GR for BGP/IS-IS/OSPF/LDP	
	TE FRR and IP FRR	
	Eth-OAM 802.3ah and 802.1ag (hardware)	
	ITU-Y.1731	
	DLDP	
	In-service software upgrade (ISSU)	
QoS	256K ACLs	
	Traffic classification based on Layer 2 headers, Layer 3 protocols, Layer 4 protocols, and 802.1p priority	
	ACLs and actions like CAR, re-marking, and scheduling	
	Queuing algorithms, such as PQ, WRR, DRR, PQ+WRR, and PQ+DRR	
	Congestion avoidance mechanisms, including WRED and tail drop	
	5-level H-QoS	
	Traffic shaping	
Configuration and maintenance	Terminal access services such as console port login, Telnet, and SSH	
	Network management protocols, such as SNMPv1/v2/v3	
	File uploading and downloading through FTP and TFTP	
	BootROM upgrade and remote in-service upgrade	
	Hot patches	
	User operation logs	

Item	S12708	S12712
Security and management	MAC address, Portal, 802.1x, and DHCP snooping triggered authentication	
	RADIUS and HWTACACS authentication for login users	
	Command line authority control based on user levels, preventing unauthorized users from using command configurations	
	Defense against DoS attacks, TCP SYN Flood attacks, UDP Flood attacks, broadcast storms, and heavy traffic attacks	
	1 K CPU hardware queues for hierarchical scheduling and protection of protocol packets on the control plane	
	Remote network monitoring (RMON)	
Value-added services	Firewall	
	NAT	
	IPSec	
	Intrusion protection system (IPS)	
	Load balancing ADC	
Buffer capacity	1.5 GB per card	
Energy saving	Energy Efficient Ethernet (802.3az)	
Dimensions (H x W x D, mm)	663.95 x 442 x 489, 15U	832.75 x 442 x 489, 19U
Weight (empty chassis)	19.8 kg	38.45 kg
Operating voltage	DC: –38.4 V to –72V AC: 90 V to 290 V	
Total power capacity	6600 W	6600 W

Ordering Information

S12700 basic configuration	
LE2BN66ED000	N66E DC assembly rack (eight 60A outputs, maximum 2200W per output, 600 x 600 x 2200 mm)
LE2BN66EA000	N66E AC assembly rack (four 16A Outputs, maximum 2500W per output, 600 x 600 x 2200 mm)
ET1BS12708S0	S12708 assembly chassis
ET1BS12712S0	S12712 assembly chassis
Monitoring unit	
EH1D200CMU00	Centralized monitoring unit
Main processing unit	
ET1D2MPUA000	S12700 main control unit A, optional clock
Switch fabric unit	
ET1D2SFUA000	S12700 switch fabric unit A
ET1D2SFUC000	S12700 switch fabric unit C
ET1D2SFUD000	S12700 switch fabric unit D
100M/1000M Ethernet electrical interface cards	
ET1D2G48TEA0	48-port 10/100/1000BASE-T interface card (EA, RJ45)
ET1D2G48TEC0	48-port 10/100/1000BASE-T interface card (EC, RJ45)
ET1D2G48TX1E	48-port 10/100/1000BASE-T interface card (X1E, RJ45)*
100M/1000M Ethernet optical interface cards	
ET1D2G24SEC0	24-port 100/1000BASE-X interface card (EC, SFP)
ET1D2G48SEA0	48-port 100/1000BASE-X interface card (EA, SFP)
ET1D2G48SEC0	48-port 100/1000BASE-X interface card (EC, SFP)
ET1D2G48SX1E	48-port 100/1000BASE-X interface card (X1E, SFP)
100M/1000M Ethernet electrical and optical interface cards	
ET1D2T36SEA0	36-port 10/100/1000BASE-T and 12-port 100/1000BASE-X interface card (EA, RJ45/SFP)

S12700 basic configuration	
10GE optical interface cards	
ET1D2X04XEA0	4-port 10GBASE-X interface card (EA, XFP)
ET1D2X04XEC1	4-port 10GBASE-X interface card (EC, XFP)
ET1D2S04SX1E	4-port 10GBASE-X and 24-port 100/1000BASE-X and 8-port 10/100/1000BASE-T combo interface card (X1E, RJ45/SFP/SFP+)
ET1D2S08SX1E	8-port 10GBASE-X and 8-port 100/1000BASE-X and 8-port 10/100/1000BASE-T combo interface card (X1E, RJ45/SFP/SFP+)
ET1D2X12SSA0	12-port 10GBASE-X interface card (SA, SFP+)
ET1D2X16SSC0	16-port 10GBASE-X interface card (SC, SFP+)
ET1D2X48SEC0	48-port 10GBASE-X interface card (EC, SFP+)
40GE optical interface cards	
ET1D2L02QSC0	2-port 40GBASE-X interface card (SC, QSFP+)
ET1D2L08QSC0	8-port 40GBASE-X interface card (SC, QSFP+)
Cluster service subcard	
EH1D2VS08000	8-port 10G cluster switching system service unit (SFP+)
Service processing cards	
EH1D2PS00P00	Open service platform (OSP) card**
ET1D2FW00S00	Firewall service card-10G
ET1D2FW00S01	Firewall service card-20G
ET1D2FW00S02	Firewall service card-40G
ET1D2IPS0S00	IPS service card
ACU2	WLAN ACU2 wireless access controller card
Optical transceivers	
FE-SFP optical transceiver	
S-SFP-FE-LH40-SM1310	Optical transceiver, eSFP, FE, single-mode module (1310 nm, 40 km, LC)
S-SFP-FE-LH80-SM1550	Optical transceiver, eSFP, FE, single-mode module (1550 nm, 80 km, LC)

S12700 basic configuration	
GE-SFP optical transceiver	
SFP-1000BaseT	Copper transceiver, SFP, GE, electrical interface module (100 m, RJ45)
eSFP-GE-SX-MM850	Optical transceiver, eSFP, GE, multimode module (850 nm, 0.5 km, LC)
SFP-GE-LX-SM1310	Optical transceiver, SFP, GE, single-mode module (1310 nm,10 km, LC)
S-SFP-GE-LH40-SM1310	Optical transceiver, eSFP, GE, single-mode module (1310 nm, 40 km, LC)
S-SFP-GE-LH40-SM1550	Optical transceiver, eSFP, GE, single-mode module (1550 nm, 40 km, LC)
S-SFP-GE-LH80-SM1550	Optical transceiver, eSFP, GE, single-mode module (1550 nm, 80 km, LC)
eSFP-GE-ZX100-SM1550	Optical transceiver, eSFP, GE, single-mode module (1550 nm,100 km, LC)
10GE-XFP Optical transceiver	
XFP-SX-MM850	Optical transceiver, XFP, 10G, multimode module (850 nm, 0.3km, LC)
XFP-STM64-LX-SM1310	Optical transceiver, XFP, 10G, single-mode module (1310 nm,10 km, LC)
XFP-STM64-LH40-SM1550	Optical transceiver, XFP, 10G, single-mode module (1550 nm, 40 km, LC)
XFP-STM64-SM1550-80 km	Optical transceiver, XFP, 10G, single-mode module (1550 nm, 80 km, LC)
10GE-SFP+ Optical transceiver	
OMXD30000	Optical transceiver, SFP+, 10G, multimode module (850 nm, 0.3km, LC)
OSX010000	Optical transceiver, SFP+, 10G, single-mode module (1310 nm,10 km, LC)
OSX040N01	Optical transceiver, SFP+, 10G, single-mode module (1550 nm, 40 km, LC)
OSXD22N00	Optical transceiver, SFP+, 10G, single-mode module (1310 nm, 0.22km, LC,LRM)
LE2MXSC80FF0	Optical transceiver, SFP+, 10G, single-mode module (1550 nm, 80 km, LC) (only for 8-port 10GBASE interface cards)
SFP-10G-USR	Optical transceiver, SFP+, 10G, multimode module (850 nm, 0.1km, LC)
SFP-10G-ZR	Optical transceiver, SFP+, 10G, single-mode module (1550 nm, 80 km, LC)
SFP-10G-AOC3M	AOC optical transceiver, SFP+, 850 nm, 1G-10G, 0.003 km

S12700 basic configuration	
SFP-10G-AOC10M	AOC optical transceiver, SFP+, 850 nm, 1G-10G, 0.01 km
SFP-10G-BXU1	10GBase, BIDI optical transceiver, SFP, 10G, single-mode module (TX1270 nm/RX1330 nm, 10 km, LC)
SFP-10G-BXD1	10GBase, BIDI optical transceiver, SFP, 10G, single-mode module (TX1330 nm/RX1270 nm, 10 km, LC)
SFP-10G-ZCW1511	Optical transceiver, SFP+, 10G, single-mode module (CWDM,1511nm,70 km, LC)
SFP-10G-ZCW1471	Optical transceiver, SFP+, 10G, single-mode module (CWDM,1471nm,70 km, LC)
SFP-10G-ZCW1491	Optical transceiver, SFP+, 10G, single-mode module (CWDM,1491nm,70 km, LC)
SFP-10G-ZCW1531	Optical transceiver, SFP+, 10G, single-mode module (CWDM,1531nm,70 km, LC)
SFP-10G-ZCW1551	Optical transceiver, SFP+, 10G, single-mode module (CWDM,1551nm,70 km, LC)
SFP-10G-ZCW1571	Optical transceiver, SFP+, 10G, single-mode module (CWDM,1571nm,70 km, LC)
SFP-10G-ZCW1591	Optical transceiver, SFP+, 10G, single-mode module (CWDM,1591nm,70 km, LC)
SFP-10G-ZCW1611	Optical transceiver, SFP+, 10G, single-mode module (CWDM,1611nm,70 km, LC)
40GE-QSFP optical transceivers	
QSFP-40G-SR4	Optical transceiver, QSFP, 40G, multimode module (850 nm, 0.15 km, MPO) (connecting to one QSFP+ optical transceiver)
QSFP-40G-iSR4	Optical transceiver, QSFP, 40G, multimode module (850 nm, 0.15 km, MPO) (connecting to four SFP+ optical transceivers)
QSFP-40G-LR4	40GBase-LR4 optical transceiver, QSFP+, 40G, single-mode module (1310 nm, 10 km, LC)
QSFP-40G-eiSR4	40GBase-SR4 Optical transceiver, QSFP+, 40G, multimode module (850 nm, 0.3 km, MPO) (connecting to four SFP+ optical transceivers)
BIDI-SFP optical transceivers	
SFP-FE-LX-SM1310-BIDI	Optical transceiver, eSFP, FE, BIDI single-mode module (TX1310/RX1550,15km, LC)
SFP-FE-LX-SM1550-BIDI	Optical transceiver, eSFP, FE, BIDI single-mode module (TX1550/RX1310,15km, LC)
SFP-GE-LX-SM1310-BIDI	Optical transceiver, eSFP, GE, BIDI single-mode module (TX1310/RX1490,10 km, LC)
SFP-GE-LX-SM1490-BIDI	Optical transceiver, eSFP, GE, BIDI single-mode module (TX1490/RX1310,10 km, LC)

S12700 basic configuration	
LE2MGSC40ED0	Optical transceiver, SFP, GE, BIDI single-mode module (TX1490/RX1310, 40 km, LC)
LE2MGSC40DE0	Optical transceiver, SFP, GE, BIDI single-mode module (TX1310/RX1490, 40 km, LC)
SFP-GE-LX	1000Base-BIDI optical transceiver, SFP, GE, single-mode module (TX1490 nm/ RX1310 nm,10 km, LX)
Power modules	
PAC-2200WF	2200 W AC power module F (black)
PDC-2200WF	2200 W DC power module F (black)
Software	
ET1SBSM25000	S12700 V200R005C00 software
Documentation	
ET1IV2R5C0C0	S12700 Series Agile Switches Product Documentation (Chinese)
ET1IV2R5C0E0	S12700 Series Agile Switches Product Documentation (English)

*: The X1E series cards use ENP chips and provide native AC and BRAS functions.

**: The OSP card supports CheckPoint IPS and F5 ADC load balancer, and can run Windows, SUSE, and VMware operating systems.

Application

In an enterprise campus network

S12700 series switches are deployed on the core layer of an enterprise campus network. Native ACs provided by the S12700 enable customers to build wireless networks without additional AC hardware, reducing network construction costs. The S12700 is the first core switch that provides T-bit AC capabilities, avoiding the performance bottleneck on independent ACs. The native T-bit AC capabilities help customers migrate their wireless networks to 802.11ac. The S12700 series realizes wired and wireless convergence and delivers consistent experience to wired and wireless users through uniform device management, user management, and service management.

In a college campus network

S12700 series switches are deployed on the core layer of a college campus network. The native BRAS on the S12700 reduces network construction costs by removing the need to purchase new BRAS hardware. Each S12700 switch supports 64K users, allowing a large number of concurrent access users. Its 5-level H-QoS feature implements fine granular user and service management. The S12700 series realizes wired and wireless convergence and delivers consistent experience to wired and wireless users through uniform device management, user management, and service management.

In a bearer network for video conferencing, desktop cloud, and video surveillance applications

The S12700 series has a 1.5 GB buffer to prevent packet loss upon traffic bursts, delivering high-quality video streams. The S12700 series supports up to 1M MAC address entries and 3M FIB entries, which allow access from a large number of terminals and help evolution to IPv6 and the Internet of Things. Employing end-to-end hardware reliability technologies and iPCA technology, the S12700 series offers a highly reliable, high-quality, scalable video conferencing and surveillance solution.

On the core/aggregation layer of a MAN

S12700 series switches are used as core or aggregation switches on the MAN of a television broadcasting network or education network. The 3M FIB entries provided by the S12700 series are sufficient for large-scale routing on the MAN. CSS2 switch fabric hardware clustering technology, originating from clustering technology for high-end core routers, delivers carrier-class reliability on the MAN. Additionally, the S12700 series supports comprehensive L2/L3 MPLS VPN features, providing a highly reliable, secure, and scalable metropolitan bearer network solution.

In an enterprise data center

S12700 series switches are deployed on the core or aggregation layer of an enterprise data center network. The S12700 series has high-density line cards, such as 8*100GE and 48*10GE cards, meeting the requirements for large data throughput on core/aggregation nodes of a data center. Using CSS2 switch fabric hardware clustering technology, the S12700 series provides up to 1.92 Tbps cluster bandwidth and shortens the inter-chassis forwarding latency to 21 μs. This technology helps customers build a data center

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