CloudEngine 12800 Series
Data Center Core Switches

HUAWEI TECHNOLOGIES CO., LTD.

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Product Overview

The CloudEngine 12800 (CE12800 for short) series switches are next-generation, high-performance core switches designed for data center networks and high-end campus networks. Using Huawei's next-generation VRP8 software platform, CE12800 series switches provide stable, reliable, and secure high-performance L2/L3 switching capabilities to help build an elastic, virtualized, and high-quality network.

The CE12800 series switches use an advanced hardware architecture design and have the highest performance among all core switches in the industry. The CE12800 series provides as much as 178 Tbit/s (scalable to 1032 Tbit/s) switching capacity and has up to 576*100GE, 576*40GE, 2,304*25GE, or 2,304*10GE line-rate ports.

The CE12800 series switches use an industry-leading Clos architecture and provide industrial-grade reliability. The switches support comprehensive virtualization capabilities along with data center service features. Their front-to-back airflow design suits data center equipment rooms, and the innovative energy conservation technologies greatly reduce power consumption.

CloudEngine 12800 Platform Components

The CE12800 series is available in six models: CE12816, CE12812, CE12808, CE12804, CE12808S and CE12804S.

CloudEngine 12800 Platform Chassis

The CE12800 series is available in six models: CE12816, CE12812, CE12808, CE12804, CE12808S and CE12804S.

CE 12804: 4-Slot Chassis 	Up to 2 MPUs(Main Processing Unit) Up to 2 CMUs(Centralized Monitoring Unit) Up to 4 LPUs Up to 6 SFUs(Switch Fabric Unit) Up to 4 power modules Up to 9 fan modules.
CE 12808: 8-Slot Chassis 	Up to 2 MPUs(Main Processing Unit) Up to 2 CMUs(Centralized Monitoring Unit) Up to 8 LPUs Up to 6 SFUs(Switch Fabric Unit) Up to 8 power modules Up to 13 fan modules
CE 12812: 12-Slot Chassis 	Up to 2 MPUs(Main Processing Unit) Up to 2 CMUs(Centralized Monitoring Unit) Up to 12 LPUs Up to 6 SFUs(Switch Fabric Unit) Up to 12 power modules Up to 17 fan modules

CE 12816: 16-Slot Chassis 	Up to 2 MPUs (Main Processing Unit) Up to 2 CMUs (Centralized Monitoring Unit) Up to 16 LPUs Up to 6 SFUs (Switch Fabric Unit) Up to 20 power modules Up to 23 fan modules
CE 1284S: 4-Slot Chassis 	Up to 2 MPUs (Main Processing Unit) Up to 4 LPUs Up to 2 SFUs (Switch Fabric Unit) Up to 8 power modules Up to 6 fan modules
CE 1288S: 8-Slot Chassis 	Up to 2 MPUs (Main Processing Unit) Up to 4 LPUs Up to 4 SFUs (Switch Fabric Unit) Up to 8 power modules Up to 6 fan modules

CE 12800 Platform Centralized Monitoring Unit

The CE-CMU is the Centralized Monitoring Unit of the CE12804/CE12808/CE12812/CE12816 chassis and provides highly reliable device monitoring, management, and energy saving functions. A chassis can be configured with double CE-CMUs for 1:1 hot standby. This configuration improves system reliability.

CE-CMUs of the CE12804/CE12808/CE12812/CE12816 chassis include CE-CMUA and CE-CMUB. They differ in the following ways:

- The quantities of PMs and fan modules that they monitor and manage are different.
- They are applicable to different chassis models and installed in CMU slots with different slot IDs. The below table describes differences between the CE-CMUA and CE-CMUB.

CMU Model	Power Modules Monitored	Fan Modules Monitored	Applicable Chassis Model and Slot ID
CE-CMUA	A maximum of 12	A maximum of 17	• Slot 7 and slot 8 of the CE12804 chassis, as shown in Figure 2-5 • Slot 11 and slot 12 of the CE12808 chassis, as shown in Figure 2-14 • Slot 15 and slot 16 of the CE12812 chassis, as shown in Figure 2-23
CE-CMUB	A maximum of 20	A maximum of 23	Slot 19 and slot 20 of the CE12816 chassis, as shown in Figure 2-32

Different CE-CMU models look the same except that they have different card name labels. The below figure shows the appearance of the CE-CMUA as an example.

CE 12800 Platform Main Processing Units

The CE-MPUA is the main control unit of the CE12804/CE12808/CE12812/CE12816 chassis and is responsible for system control and management. A chassis can be configured with double CE-MPUA cards for 1:1 hot standby. This configuration improves system reliability. The below figure shows the appearance of the CE-MPUA.

CE 12800 Platform Power Supply

CE 12800 platform supports hot-swappable, AC, DC, and AC&high-voltage DC power supplies. N+1 and N+N redundancy modes are supported depending on the chassis configuration.

CE 12800 platform supports below power modules:

- 2700 W AC power module: 2700 W AC power module receives 110 V AC/220 V AC input power and provides 53.5 V DC/2700 W output power, which use a front-to-back airflow design
- 2200 W DC power module: 2200 W DC power module receives -48 V DC/-60 V DC input power and provides 48.5 V DC/2200 W output power, which use a front-to-back airflow design
- 3000 W AC&high-Voltage DC Power Module: 3000 W AC&high-voltage DC power module receives 220 V AC/110 V AC or 240 V DC input power and provides 53.5 V DC/3000 W output power, , which use a front-to-back airflow design

CE 12800 Platform Fan Trays

The hot-swappable fan trays support front-to-back cooling. Both fan trays work in 1+1 backup mode; each fan tray has two counter-rotating fans working in 1+1 backup mode, ensuring efficient heat dissipation.

NOTE

For detailed information of CloudEngine 12800 Platform information, visit https://support.huawei.com/enterprise/en/doc/EDOC1000013855?idPath=7919710%7C21782165%7C21782236%7C22318638%7C7542409

Product Characteristics

Next-Generation Core Engine with the Highest Performance

1032 Tbit/s Switching Capacity

- The CE12800 provides up to 178 Tbit/s (scalable to 1032 Tbit/s) switching capacity. This high capacity can support sustainable development of cloud-computing data centers for the next 10 years.
- The CE12800, together with the CE8800/CE7800CE6800/CE5800 series Top-of-Rack (ToR) switches, can implement the largest non-blocking switching network in the industry. This network can provide access for tens of thousands of 25GE/10GE/GE servers.

4T High-Density Line Cards

- The forwarding capacity of a line card can reach up to 3.6 Tbit/s.
- The CE12800 supports 36*40GE, 36*100GE, 144*25GE, and 144*10GE line cards, which provide line-rate forwarding.
- The CE12800 provides as many as 576*100GE, 576*40GE, 2,304*25GE, or 2,304*10GE line-rate ports.

Super-Large Buffer Size of 24 GB

- All service ports (100GE/40GE/10GE/GE) provide a super high buffer capacity (up to 200 ms).
- The distributed buffer mechanism on inbound interfaces can effectively handle incast traffic loads in data centers.
- A line card provides up to 24 GB buffer, which is dynamically shared by interfaces to improve usage efficiency.

4M FIB Entries

- The CE12800 series switches support up to 4 million FIB entries for use in large-scale container networks.
- MAC, FIB, ARP, and ACL entries can be changed flexibly to suit dynamic service requirements.

Comprehensive Virtualization Capabilities Implement Simple, Efficient Networking

VS Implements On-demand Resource Sharing

- Highest device virtualization capability: The CE12800 uses Virtual System (VS) technology to provide an industry-leading virtualization capability that enables one switch to be virtualized into as many as 16 logical switches. This 1:16 ratio enables one core switch to manage services for an enterprise's multiple service areas such as production, office, and DMZ, or for multiple tenants.
- Higher security and reliability: VS technology divides a network into separate logical areas for service isolation. The failure of one virtual switch does not affect other virtual switches, enhancing network security.
- Lower CAPEX: VS technology improves the use efficiency of physical devices by implementing on-demand resource allocation. This ensures network scalability and reduces investment in devices.
- Lower OPEX: Using one physical device to implement multiple logical devices saves space in a data center equipment room and reduces the cost of device maintenance.

CSS Simplifies Network Management

- The CE12800 uses industry-leading Cluster Switch System (CSS) technology, which can virtualize two physical switches into one logical switch to facilitate network management and improve reliability.
- The CE12800 provides a dedicated system inter-connect port and separates the control channel from the service channel, improving reliability.
- The CE12800 provides a cluster bandwidth of 3.2 Tbit/s. This super-high bandwidth prevents traffic bottlenecks on data center networks.
- The CE12800 combines CSS and VS technologies to turn a network into a resource pool, enabling network resources to be allocated on demand. This on-demand resource allocation is ideal for the cloud-computing service model.

Network-Wide Reliability, Ensuring Zero Service Interruptions

- The management and control planes on one Multichassis Link Aggregation Group (M-LAG) node are independent from that on the other, which substantially improves system reliability.
- The two nodes of an M-LAG can be upgraded independently from each other. During the upgrade of one node, the other node takes over forwarding the services on the first node, ensuring that the services remain uninterrupted.
- M-LAG is able to seamlessly collaborate with CSS, thus enabling highly reliable 4-to-1 virtualization.
- With the industry's most comprehensive inter-device link aggregation technology, the device networking coupling relationship evolves from stacking at the control plane to the use of M-LAG and then finally to coupling-free M-LAG Lite. This achieves active-active server access and zero interruption of services when upgrading switches.

MACsec Hardware Encryption Ensures High Security and Reliability

The CE12800 supports MACsec, which provides hop-by-hop data encryption and secure MAC-layer data sending and receiving services including user data encryption, data frame integrity check, and data source verification. The CE12800 is applicable to networks that require high data confidentiality, such as those of government and finance institutions.

Large-Scale Routing Bridge Supports Flexible Service Deployment

- The CE12800 supports the IETF Transparent Interconnection of Lots of Links (TRILL) protocol and can connect to 10G and 1G servers simultaneously. CE12800 switches can establish a large Layer 2 TRILL network with more than 500 nodes, enabling flexible service deployments and large-scale Virtual Machine (VM) migrations.
- The TRILL protocol uses a routing mechanism similar to IS-IS and sets a limited time to live (TTL) value in packets to prevent Layer 2 loops. This significantly improves network stability and speeds up network convergence.
- On a TRILL network, all data flows are forwarded quickly using Shortest Path First (SPF) and Equal-cost Multi-path (ECMP) routing. SPF and ECMP avoid the problem of suboptimal path selection in the Spanning Tree Protocol (STP) and increase link bandwidth efficiency to 100 percent.
- The CE12800 supports up to 32 TRILL-based Layer 2 equal-cost paths, greatly improving links' load-balancing capabilities. The network's fat-tree architecture supports easy expansion.

Virtualized Gateway Achieves Fast Service Deployment

- The CE12800 can work with a mainstream virtualization platform. As the high-performance, hardware gateway of an overlay network (VXLAN), a CE series switch can support more than 16 million tenants.
- The CE12800 can connect to a cloud platform using open API, allowing for unified management of software and hardware networks.
- This function implements fast service deployment without changing the customer network. It also protects customer investments.

VXLAN and EVPN Enable Flexible Expansion Within and Across Data Centers

- The CE12800 supports Border Gateway Protocol - Ethernet VPN (BGP-EVPN), which can run as the VXLAN control plane to simplify VXLAN deployment.
- BGP-EVPN triggers automatic VXLAN tunnel setup between virtual tunnel endpoints (VTEPs), removing the need for full-mesh tunnel configuration. BGP-EVPN also reduces flooding of unknown traffic by advertising MAC routes on the control plane. With this protocol, large Layer 2 networks can be established for data centers.
- Because BGP-EVPN is a standard protocol, the CE12800 is interoperable with devices from other vendors, enabling long-term network evolution.
- The CE12800 supports centralized and distributed VXLAN deployment and supports various VXLAN access modes, including QinQ access VXLAN and IPv6 over VXLAN. This allows for flexible customization of heterogeneous networks.
- EVPN and VXLAN can be used to set up Layer 2 interconnections between data centers, enabling active-active VXLAN deployment across data centers and conserving DCI link bandwidth.
- The CE12800 supports IP packet fragmentation and reassembling, enabling oversized IP packets to travel across a WAN network without limited by the MTU. The switch can also identify fragmented packets to seamlessly interconnect with routers.
- The CE12800 supports VXLAN mapping, implementing interconnection between multiple DCs at Layer 2, unified service provisioning and O&M, and inter-DC resource sharing.

Multicast-capable Distributed Gateways Implement On-demand Traffic Forwarding

VXLAN supports Layer 3 multicast. A multicast-capable gateway that functions as the VTEP node greatly reduces the east-west traffic bandwidth.

Openness and Programmability Enable Agile Deployment and O&M

OPS Implements Programmability at the Control Plane

- The CE12800 uses the Open Programmability System (OPS) embedded in the VRP8 software platform to provide programmability at the control plane.
- The OPS provides open APIs. APIs can be integrated with mainstream cloud platforms (including commercial and open cloud platforms). The OPS enables services to be flexibly customized and provides automatic management.
- Users or third-party developers can use open APIs to develop and deploy specialized network management policies to implement extension of fast service functions, automatic deployment, and intelligent management. The OPS also implements automatic operation and maintenance, and reduces management costs.
- The OPS provides seamless integration of data center service and network in addition to a service-oriented, software-defined networking .

Standard Interfaces Provide Openness and Interoperability

- The CE12800 supports NETCONF/OpenFlow. It can work with Huawei Agile Controller .
- The CE12800 provides the standard NETCONF interface for third-party software to invoke. This enables programming of functions and integration with third-party software, providing openness and flexibility.
- You can use CE modules for Ansible released on open-source websites and Ansible tools to automate network deployment, simplifying device management and maintenance. Through in-depth collaboration with mainstream cloud platforms, and O&M tools, the CE12800 series switches can be integrated into SDN and cloud computing platforms flexibly and quickly.

ZTP, Agile Network Deployment

- The CE12800 supports Zero Touch Provisioning (ZTP). ZTP enables the CE12800 to automatically obtain and load version files from a USB flash drive or file server, freeing network engineers from onsite configuration or deployment. ZTP reduces labor costs and improves device deployment efficiency.
- ZTP provides built-in scripts for users through open APIs. Data center personnel can use the programming language they are familiar with, such as Python, to provide unified configuration of network devices.
- ZTP decouples configuration time of new devices from device quantity and area distribution, which improves service provisioning efficiency.

Intelligent O&M with the FabricInsight Solution

- The CE12800 provides proactive path detection on the entire network. It periodically checks sample flows to determine connectivity of all paths on the network and locates failure points, enabling you to know the network health in real time.
- The CE12800 supports visualization of all flows and congestion, improving service experience.
- The Segment Routing (SR) capability of the CE12800 implements label-based packet forwarding, regardless of service types. This feature enables automatic optimization and switching of end-to-end links.

Advanced Architecture Ensures Industry-Leading Network Quality

High-Performance, Non-blocking Switching Architecture

- The CE12800 has a non-blocking switching architecture that is characterized by its orthogonal switch fabric design, Clos architecture, cell switching, Virtual Output Queuing (VoQ), and super-large buffer size.
- Orthogonal switch fabric design: CE12800 service line cards and switch fabric units (SFUs) use an orthogonal design in which service traffic between line cards is directly sent to the SFUs through orthogonal connectors. This approach reduces backplane cabling and minimizes signal attenuation. The orthogonal design can support signal rates as high as 25 Gbit/s per SerDes, which is 2.5 times the industry average. This design greatly improves system bandwidth and evolution capabilities, enabling the system switching capacity to scale to more than 100 Tbit/s.
- Clos architecture: The CE12800's three-level Clos architecture permits flexible expansion of switch fabric capacity. The architecture uses Variable Size Cell (VSC) and provides dynamic routing. Load balancing among multiple switch fabrics prevents the switching matrix from being blocked and easily copes with complex, volatile traffic in data centers.
- VoQ: The CE12800 supports 96,000 VoQ queues that implement fine-grained Quality of Service (QoS) based on the switch fabrics. With the VOQ mechanism and super-large buffer on inbound interfaces, the CE12800 creates independent VOQ queues on inbound interfaces to perform end-to-end flow control on traffic destined for different outbound interfaces. This method ensures unified service scheduling and sequenced forwarding and implements non-blocking switching.

Highly Reliable Industry-grade Hardware Architecture

- Hot backup of five key components: Main Processing Units (MPUs) and Centralized Monitoring Unit (CMUs) work in 1+1 hot backup mode. SFUs work in N+M hot backup mode. Power supplies support dual inputs and N+N backup and have their own fans. Both fan trays work in 1+1 backup mode; each fan tray has two counter-rotating fans working in 1+1 backup mode, ensuring efficient heat dissipation.
- Redundancy of three types of major buses: Monitoring, management, and data buses all work in 1+1 backup mode. Bus redundancy ensures reliable signal transmission.
- Independent triple-plane design: The independent control, data, and monitoring planes of the CE12800 improve system reliability and ensure service continuity.

High-Performance VRP8 Software Architecture

- The CE12800 takes advantage of Huawei's next-generation VRP8, a high-performance, highly reliable modular software platform that provides continuous services.
- Fine-grained distributed architecture: VRP8, the industry's high-end software platform, uses a fine-grained, fully distributed architecture that can process network protocols and services concurrently using multiple instances. This architecture takes full advantage of multi-core/multi-CPU processes to maximize performance and reliability.

Pioneering Energy-saving Technology

Strict Front-to-Back Airflow Design

- The CE12800 uses a patented front-to-back airflow design that isolates cold air channels from hot air channels. This design meets heat dissipation requirements in data center equipment rooms.
- Line cards and SFUs use independent airflow channels, which solve the problems of mixing hot and cold air and cascade heating, and effectively reduce energy consumption in equipment rooms.
- Each fan tray has two counter-rotating fans, ensuring efficient heat dissipation.
- The fan speed in each area can be dynamically adjusted based on the workload of line cards in the area. This on-demand cooling design lowers power consumption and reduces noise.

Low Power Consumption

- The CE12800 uses innovative energy saving technologies. The port power consumption is merely half of the industry average. It greatly reduces power consumption in the data center equipment room.
- Miercom has performed a series of strict tests for the CE12800, proving its low power consumption.

Efficient, Intelligent Power Supply System

- The CE12800 incorporates the industry's most efficient digital power modules, which provide power efficiency of 96 percent.
- The power supply system measures power consumption in real time and puts one or more power modules into sleep mode when system power demands are low.
- The CE12800 can save energy dynamically by adjusting the power consumption of components to adapt to changes in service traffic volume.

Product Specifications[1]

Item	CE 12804S	CE 12808S	CE 12804	CE 12808	CE 12812	CE 12816
Switching capacity (Tbit/s)	30/ 258[2]	59/ 516[2]	45/ 258[2]	89/ 516[2]	134/ 774[2]	178/ 1032[2]
Forwarding rate (mpps)	17,280	34,560	17,280	34,560	51,840	69,120
Service slots	4	8	4	8	12	16
Switching fabric module slots	2	4	6	6	6	6
Fabric architecture	Clos architecture, cell switching, VoQ, and distributed large buffer					
Airflow design	Strict front-to-back					
Device virtualization	Virtual System (VS)					
	Cluster Switch System (CSS) [3]					
Network virtualization	M-LAG					
	TRILL					
	VXLAN routing and bridging					
	EVPN					
	QinQ access VXLAN					
VM awareness	Agile Controller					
Network convergence	FCoE					
	DCBX, PFC, ETS					
Data center interconnect	BGP-EVPN					
	Ethernet Virtual Network (EVN) for inter-DC Layer 2 network interconnections					
	VXLAN mapping, implementing interconnection between multiple DCI networks at Layer 2					
Programma-bility	OpenFlow					
	OPS programming					
	Ansible-based automatic configuration and open-source module release					
Traffic analysis	NetStream					
	Hardware-based sFlow					

1. This content is applicable only to regions outside mainland China. Huawei reserves the right to interpret this content
2. Roadmap
3. For details about the configuration, please see: http://support.huawei.com/onlinetoolsweb/virtual/en/dc/stack_index.html?dcf

Item	CE 12804S	CE 12808S	CE 12804	CE 12808	CE 12812	CE 12816
VLAN	Adding access, trunk, and hybrid interfaces to VLANs					
	Default VLAN					
	QinQ					
	MUX VLAN					
	GVRP					
MAC address	Dynamic learning and aging of MAC addresses					
	Static, dynamic, and blackhole MAC address entries					
	Packet filtering based on source MAC addresses					
	MAC address limiting based on ports and VLANs					
IP routing	IPv4 routing protocols, such as RIP, OSPF, IS-IS, and BGP					
	IPv6 routing protocols, such as RIPng, OSPFv3, IS-ISv6, and BGP4+					
	IP packet fragmentation and reassembling					
IPv6	VXLAN over IPv6					
	IPv6 VXLAN over IPv4					
	IPv6 Neighbor Discovery (ND)					
	Path MTU Discovery (PMTU)					
	TCP6, ping IPv6, tracert IPv6, socket IPv6, UDP6, and Raw IP6					
Multicast	IGMP, PIM-SM, PIM-DM, MSDP, and MBGP					
	IGMP snooping					
	IGMP proxy					
	Fast leaving of multicast member interfaces					
	Multicast traffic suppression					
	Multicast VLAN					
	Multicast VXLAN					
MPLS	Basic MPLS functions					
	MPLS VPN/VPLS/VPLS over GRE					

Item	CE 12804S	CE 12808S	CE 12804	CE 12808	CE 12812	CE 12816
Reliability	Link Aggregation Control Protocol (LACP)					
	STP, RSTP, VBST, and MSTP					
	BPDU protection, root protection, and loop protection					
	Smart Link and multi-instance					
	Device Link Detection Protocol (DLDP)					
	Ethernet Ring Protection Switching (ERPS, G.8032)					
	Hardware-based Bidirectional Forwarding Detection (BFD)					
	VRRP, VRRP load balancing, and BFD for VRRP					
	BFD for BGP/IS-IS/OSPF/Static route					
	BFD for VXLAN					
	Segment Routing (SR)					
QoS	Traffic classification based on Layer 2, Layer 3, Layer 4, and priority information					
	Actions including ACL, CAR, and re-marking					
	Queue scheduling modes such as PQ, WFQ, and PQ+WRR					
	Congestion avoidance mechanisms, including WRED and tail drop					
	Traffic shaping					
O&M	Network-wide path detection					
	Telemetry					
	Statistics on the buffer microburst status					
	VXLAN OAM: VXLAN ping, VXLAN tracert					
Configuration and maintenance	Console, Telnet, and SSH terminals					
	Network management protocols, such as SNMPv1/v2c/v3					
	File upload and download through FTP and TFTP					
	BootROM upgrade and remote upgrade					
	Hot patches					
	User operation logs					
	Zero Touch Provisioning (ZTP)					

Item	CE 12804S	CE 12808S	CE 12804	CE 12808	CE 12812	CE 12816
Security and management	802.1x authentication					
	RADIUS and HWTACACS authentication for login users					
	Command line authority control based on user levels, preventing unauthorized users from using commands					
	DoS, ARP, MAC address attacks, broadcast storms, and heavy-traffic and ICMP attack defenses					
	Ping and traceroute					
	Remote Network Monitoring (RMON)					

Hardware Specifications

Item	CE 12804S	CE 12808S	CE 12804	CE 12808	CE 12812	CE 12816
Dimensions (W x D x H, mm)	442 x 620 x 352.8 (8U)	442 x 620 x 708.4 (16U)	442 x 813 x 486.15 (11 U)	442 x 813 x 752.85 (17 U)	442 x 813 x 975.1 (22 U)	442 x 905 x 1597.4 (36 U)
Chassis weight (empty)	<60kg/ 132lb	<100kg/ 220lb	<110kg/ 242lb	<150kg/ 330lb	<190kg/ 418lb	<290kg/ 639lb
Operating voltage	AC: 90 V to 290 V DC: -38.4 V to -72 V HVDC: 240 V					
Hot swappable (Power Modules)	Yes					
Max. power supply (W)	6000	12000	6000	12000	18000	30000
Operating temperature	Long-term working temperature: 0°C to 40°C Short-term working temperature: -5°C to +55°C					
Nonoperating (storage) temperature	-40°C to +70°C					
Humidity	Long-term operating humidity: 5% to 85%, non-condensing Short-term operating humidity: 0% to 95%, non-condensing					
Altitude	Operating altitude:<1800m Storage altitude:<5000m					
MTBF	39.02 years	34.72 years	40.28 years	35.11 years	33.52 years	32.00 years
MTTR	1 hours					
MTTF	39.02 years	34.72 years	40.28 years	35.11 years	33.52 years	32.00 years
Availability	0.99999667	0.99999619	0.9999972	0.9999967	0.9999966	0.9999964326

Item	CE 12804S	CE 12808S	CE 12804	CE 12808	CE 12812	CE 12816
Power supply backup	Dual power supply systems: N+N (N ≤ 2) Single power supply system: N+1	Dual power supply systems: N+N (N ≤ 4) Single power supply system: N+1	Dual power supply systems: N+N (N ≤ 2) Single power supply system: N+1	Dual power supply systems: N+N (N ≤ 4) Single power supply system: N+1	Dual power supply systems: N+N (N ≤ 6) Single power supply system: N+1	Dual power supply systems: N+N (N ≤ 10) Single power supply system: N+1
Fan module backup	3 fan assemblies	6 fan assemblies	9 fan assemblies	13 fan assemblies	17 fan assemblies	23 fan assemblies
Device management backup	Two CANBuses on the backplane, in 1+1 hot backup					
MPU backup	MPUs in 1: 1 hot standby (HSB)					
SFU backup	SFUs in N+M backup					
CMU backup	1: 1 backup (CE12800S CMU is integrated in MPU slots)					
Hot swapping	Supported by power modules, fan modules, and cards					

Safety and Regulatory Compliance

The following table lists the safety and regulatory compliance of CE 12800.

Certification Category	Description
Safety	• EN 60950-1: 2006+A11: 2009+A1: 2010+A12: 2011 • EN 60825-1: 2007 • EN 60825-2: 2010 • UL 60950-1: 2007 2nd Edition • CSA C22.2 No.650: 2007 2nd Edition • IEC 60950-1: 2005+A1: 2009 • AS/NZS 60950-1: 2011 • GB4943: 2011
Electromagnetic Compatibility (EMC)	• FCC 47CFR Part15 CLASS A • ETSI EN 300 386 V1.6.1: 2012 • ICES-003: 2012 CLASS A • CISPR 22: 2008 CLASS A • CISPR 24: 2010 • EN 55022: 2010 CLASS A

Certification Category	Description
Electromagnetic Compatibility (EMC)	• EN 55024: 2010 • AS/NZS CISPR 22: 2009 CLASS A • IEC 61000-3-2: 2005+A1: 2008+A2: 2009/EN 61000-3-2: 2006+A1: 2009+A2: 2009 • IEC 61000-3-3: 2008/EN 61000-3-3: 2008 • CNS 13438: 2006 CLASS A • VCCI V-4: 2012 CLASS A • VCCI V-3: 2012 CLASS A • EC Council Directive 2004/108/EC • GB9254
Environment	• 2002/95/EC, 2011/65/EU • 2002/96/EC, 2012/19/EU • EC NO.1907/2006 • ETSI EN 300 019-1-1 V2.1.4 • ETSI EN 300 019-1-2 V2.1.4 • ETSI EN 300 019-1-3 V2.3.2 • ETSI EN 300753 V1.2.1
ROHS	• EN50419 • 2002/95/EC • 2011/65/EU

NOTE

- EMC: electromagnetic compatibility
- CISPR: International Special Committee on Radio Interference
- EN: European Standard
- ETSI: European Telecommunications Standards Institute
- CFR: Code of Federal Regulations
- FCC: Federal Communication Commission
- IEC: International Electrotechnical Commission
- AS/NZS: Australian/New Zealand Standard
- VCCI: Voluntary Control Council for Interference
- UL: Underwriters Laboratories
- CSA: Canadian Standards Association
- IEEE: Institute of Electrical and Electronics Engineers
- RoHS: restriction of the use of certain hazardous substances

MIB and Standards Compliance

Supported MIBs

The following table lists the MIBs supported by CE 12800.

Category	MIB
Public MIB	• BRIDGE-MIB • BGP4-MIB • BRIDGE-MIB • DISMAN-PING-MIB • DISMAN-TRACEROUTE-MIB • ENTITY-MIB • IF-MIB • IP-FORWARD-MIB • IP-MIB • IPMCAST-MIB • IPv6-ICMP-MIB • IPv6-MIB • IPv6-TCP-MIB • IPv6-UDP-MIB • ISIS-MIB • LAG-MIB • LLDP-EXT-DOT1-MIB • LLDP-EXT-DOT3-MIB • LLDP-MIB • MAU-MIB • MGMD-STD-MIB • MPLS-FTN-STD-MIB • MPLS-L3VPN-STD-MIB • MPLS-LDP-GENERIC-STD-MIB • MPLS-LDP-STD-MIB • MPLS-LSR-STD-MIB • MSDP-MIB • NOTIFICATION-LOG-MIB • NQA-MIB • OSPF-MIB • OSPF-TRAP-MIB • OSPFV3-MIB • P-BRIDGE-MIB • PIM-BSR-MIB • PIM-STD-MIB • Q-BRIDGE-MIB

Category	MIB
Public MIB	• RADIUS-AUTH-CLIENT-MIB • RFC1213-MIB • RIPv2-MIB • RMON-MIB • SNMP-FRAMEWORK-MIB • SNMP-MPD-MIB • SNMP-NOTIFICATION-MIB • SNMP-PROXY-MIB • SNMP-TARGET-MIB • SNMP-USER-BASED-SM-MIB • SNMPv2-MIB • SNMP-VIEW-BASED-ACM-MIB • TCP-MIB • UDP-MIB • VRRP-MIB
Huawei-proprietary MIB	• HUAWEI-AAA-MIB • HUAWEI-ACL-MIB • HUAWEI-ALARM-MIB • HUAWEI-BASE-TRAP-MIB • HUAWEI-BFD-MIB • HUAWEI-BGP-VPN-MIB • HUAWEI-BRAS-RADIUS-MIB • HUAWEI-CBQOS-MIB • HUAWEI-CE-PING-MIB • HUAWEI-CLOCK-MIB • HUAWEI-CONFIG-MAN-MIB • HUAWEI-CPU-MIB • HUAWEI-DAD-MIB • HUAWEI-DATASYNC-MIB • HUAWEI-DEVICE-MIB • HUAWEI-DEVICE-EXT-MIB • HUAWEI-DHCPR-MIB • HUAWEI-DHCP-SNOOPING-MIB • HUAWEI-DHCPV6-SERVER-MIB • HUAWEI-DLDP-MIB • HUAWEI-ENERGYMNGT-MIB • HUAWEI-ENTITY-TRAP-MIB • HUAWEI-ENTITY-EXTENT-MIB

Category	MIB
Huawei-proprietary MIB	• HUAWEI-ETHOAM-MIB • HUAWEI-ERPS-MIB • HUAWEI-ERRORDOWN-MIB • HUAWEI-ETHARP-MIB • HUAWEI-EVC-MIB • HUAWEI-FCOE-MIB • HUAWEI-FLASH-MAN-MIB • HUAWEI-FTP-MIB • HUAWEI-FWD-RES-TRAP-MIB • HUAWEI-FWD-PAF-TRAP-MIB • HUAWEI-GTL-MIB • HUAWEI-HWTACACS-MIB • HUAWEI-INFOCENTER-MIB • HUAWEI-IF-EXT-MIB • HUAWEI-IPFPM-MIB • HUAWEI-ISIS-CONF-MIB • HUAWEI-L2IF-MIB • HUAWEI-L2MAM-MIB • HUAWEI-L2MULTICAST-MIB • HUAWEI-L2VLAN-MIB • HUAWEI-L3VPN-EXT-MIB • HUAWEI-LDT-MIB • HUAWEI-LINE-MIB • HUAWEI-LLDP-MIB • HUAWEI-M-LAG-MIB • HUAWEI-MACSEC-MIB • HUAWEI-MEMORY-MIB • HUAWEI-MFLP-MIB • HUAWEI-MIB • HUAWEI-MPLS-EXTEND-MIB • HUAWEI-MPLSLSR-EXT-MIB • HUAWEI-MSTP-MIB • HUAWEI-ND-MIB • HUAWEI-NETCONF-MIB • HUAWEI-NETSTREAM-MIB • HUAWEI-NTP-TRAP-MIB • HUAWEI-NVO3-MIB

Category	MIB
Huawei-proprietary MIB	• HUAWEI-OPENFLOW-MIB • HUAWEI-OSPFV2-MIB • HUAWEI-OSPFV3-MIB • HUAWEI-OVSDB-MIB • HUAWEI-PERFMGMT-MIB • HUAWEI-PIM-STD-MIB • HUAWEI-PORT-MIB • HUAWEI-PTP-MIB • HUAWEI-RIPv2-EXT-MIB • HUAWEI-RM-EXT-MIB • HUAWEI-SECURITY-MIB • HUAWEI-SMARTLINK-MIB • HUAWEI-SNMP-EXT-MIB • HUAWEI-SSH-MIB • HUAWEI-STACK-MIB • HUAWEI-SWITCH-L2MAM-EXT-MIB • HUAWEI-SYS-CLOCK-MIB • HUAWEI-SYS-MAN-MIB • HUAWEI-TASK-MIB • HUAWEI-TCP-MIB • HUAWEI-TRILL-CONF-MIB • HUAWEI-TRNG-MIB • HUAWEI-VBST-MIB • HUAWEI-VP-MIB • HUAWEI-VPLS-EXT-MIB • HUAWEI-VRRP-EXT-MIB • HUAWEI-XQOS-MIB

NOTE

For detailed information of MIB information, visit http://support.huawei.com/hedex/hdx.do?docid=EDOC1100020534&lang=en or contact your local Huawei sales office.

Standard Compliance

The following table lists the standards the CE 12800 complies with.

Standard Organization	Standard or Protocol
IETF	• RFC 768: UDP Basic • RFC 791: IPv4 Basic • RFC 792: ICMPv4 Basic • RFC 793: TCP Basic • RFC 813: TCP FlowControl-Basic • RFC 826: Ethernet • RFC 854: Telnet • RFC862: NQA Echo • RFC879: TCP Basic-MSS • RFC896: IP Common-CongestionControl • RFC919: IPv4 Basic-Broadcast • RFC922: IPv4 Basic-Broadcast • RFC950: IPv4 Address-Subnet • RFC959: FILE TRANSFER PROTOCOL (FTP) • RFC988: Host extensions for IP multicasting. S.E. Deering • RFC 1027: Proxy ARP • RFC 1034: Domain names - concepts and facilities • RFC 1035: Domain names - concepts and facilities • RFC 1042: Standard for the transmission of IP datagrams over IEEE 802 networks • RFC 1054: Host extensions for IP multicasting. S.E. Deering • RFC 1058: RIP v1 • RFC1071: IPv4 Basic-Checksum • RFC1091: TELNET • RFC 1112: IGMP v1 • RFC 1122: Host Requirements • RFC 1123: Host Requirements • RFC 1131: OSPF • RFC 1155: SNMP • RFC 1157: SNMP • RFC1191:IPv4 PMTU • RFC1195: ISIS • RFC1212: SNMP • RFC1214: SNMP • RFC1215: SNMP • RFC1245: OSPF • RFC1247: OSPF

Standard Organization	Standard or Protocol
IETF	• RFC1247: OSPF • RFC1264: BGP • RFC1305: NTP • RFC1321: Security • RFC1350: TFTP • RFC1389:RIP • RFC1403:BGP • RFC1493: Bridges MIB • RFC 1757: RMON • RFC1701/RFC1702:GRE • RFC1721/RFC1722/RFC1723/RFC1724: RIP • RFC 1765: OSPF Database Overflow • RFC 1771: Border Gateway Protocol 4 • RFC 1772: Application of the Border Gateway Protocol in the Internet • RFC 1773: Experience with the BGP-4 protocol • RFC 1774: BGP-4 Protocol Analysis • RFC 1812: Requirements for IP Version 4 Routers • RFC1829: The ESP DES-CBC Transform • RFC1850: OSPF Version 2 Management Information Base • RFC1851: The ESP Triple DES Transform • RFC1860: Variable Length Subnet Table For IPv4 • RFC1878: Variable Length Subnet Table For IPv4 • RFC1901: Introduction to Community-based SNMPv2 • RFC1918: Address Allocation for Private Internets • RFC1930: Guidelines for creation, selection, and registration of an Autonomous System (AS) • RFC 1981: Path maximum transmission unit (MTU) discovery for IPv6 • RFC 1997: BGP Communities Attribute • RFC 1998: An Application of the BGP Community Attribute in Multi-home Routing • RFC 2080: RIPng for IPv6 • RFC 2081: RIPng Protocol Applicability Statement • RFC 2082: RIP-2 MD5 Authentication • RFC2104: HMAC: Keyed-Hashing for Message Authentication • RFC2104: HMAC: Keyed-Hashing for Message Authentication • RFC2113: IP Router Alert Option

Standard Organization	Standard or Protocol
IETF	• RFC2117: Protocol Independent Multicast-Sparse Mode (PIM-SM): Protocol Specification • RFC2131: Dynamic Host Configuration Protocol • RFC2132: DHCP Options and BOOTP Vendor Extensions • RFC 2236: IGMP v2 • RFC 2246: The TLS Protocol Version 1.0 • RFC 2270: Using a Dedicated AS for Sites Homed to a Single Provider • RFC 2285: Benchmarking Terminology for LAN Switching Devices • RFC 2328: OSPF v2 (Edge mode) • RFC 2329: OSPF Standardization Report • RFC 2338: VRRP • RFC 2365: Administratively Scoped IP Multicast • RFC 2385: TCP MD5 Authentication for BGPv4 • RFC 2401: Security Architecture for the Internet Protocol • RFC 2402: IP Authentication Header • RFC2403: The Use of HMAC-MD5-96 within ESP and AH • RFC2404: The Use of HMAC-SHA-1-96 within ESP and AH • RFC2405: The ESP DES-CBC Cipher Algorithm With Explicit IV • RFC2410: The NULL Encryption Algorithm and Its Use With IPsec • RFC 2439: BGP Route Flap Damping • RFC 2451: The ESP CBC-Mode Cipher Algorithms • RFC 2452: IP Version 6 Management Information Base for the Transmission Control Protocol • RFC 2453: RIP v2 • RFC 2453: IP Version 6 Management Information Base for the User Datagram Protocol • RFC 2454: IP Version 6 Management Information Base for the User Datagram Protocol • RFC2464: Transmission of IPv6 Packets over Ethernet Networks • RFC 2465: Management Information Base for IP Version 6: Textual Conventions and General Group • RFC2466: Management Information Base for IP Version 6: ICMPv6 Group • RFC2472: IP Version 6 over PPP • RFC2519: A Framework for Inter-Domain Route Aggregation • RFC 2545: Use of BGP-4 Multiprotocol Extensions for IPv6 Interdomain Routing • RFC 2547: BGP/MPLS VPNs • RFC 2576: Coexistence between Version 1, Version 2, and Version 3 of the Internet-standard Network Management Framework

Standard Organization	Standard or Protocol
IETF	• RFC2578: Structure of Management Information Version 2 (SMIv2) • RFC2579: Textual Conventions for SMIv2 • RFC2580: Conformance Statements for SMIv2 • RFC2618: RADIUS Authentication Client MIB • RFC2644: Changing the Default for Directed Broadcasts in Routers • RFC 2710: Multicast Listener Discovery (MLD) for IPv6 • RFC 2711: IPv6 Router Alert Option • RFC 2715: Interoperability Rules for Multicast Routing Protocols • RFC 2763: Dynamic Hostname Exchange Mechanism for IS-IS • RFC 2764: A Framework for IP Based Virtual Private Networks • RFC 2784: Generic Routing Encapsulation (GRE) • RFC 2787: Definitions of Managed Objects for the Virtual Router Redundancy Protocol • RFC2819: Remote Network Monitoring Management Information Base • RFC2863: The Interfaces Group MIB • RFC2865: Remote Authentication Dial In User Service (RADIUS) • RFC2866: Radius Accounting • RFC2873: TCP Processing of the IPv4 Precedence Field • RFC2903: Generic AAA Architecture • RFC2904: AAA Authorization Framework • RFC2906: AAA Authorization Requirements • RFC2906: AAA Authorization Requirements • RFC2917: A Core MPLS IP VPN Architecture • RFC2918: Route Refresh Capability for BGP-4 • RFC2934: Domain-wide Prefix Distribution with Two-Level IS-IS • RFC2966: Domain-wide Prefix Distribution with Two-Level IS-IS • RFC2973: IS-IS Mesh Groups • RFC3014: Notification Log MIB • RFC3031: Multiprotocol Label Switching Architecture • RFC 3036: LDP Specification • RFC 3037: LDP Specification • RFC 3039: VLAN Aggregation for Efficient IP Address Allocation • RFC 3101: The OSPF Not-So-Stubby Area (NSSA) Option • RFC3152: Delegation of IP6.ARPA • RFC3162: RADIUS and IPv6 • RFC3170: IP Multicast Applications: Challenges and Solutions • RFC3195: Reliable Delivery for syslog

Standard Organization	Standard or Protocol
IETF	• RFC3209: RSVP-TE: Extensions to RSVP for LSP Tunnels • RFC3215: LDP State Machine • RFC3272: Overview and Principles of Internet Traffic Engineering • RFC3277: Intermediate System to Intermediate System (IS-IS) Transient Blackhole Avoidance • RFC3315: Dynamic Host Configuration Protocol for IPv6 (DHCPv6) • RFC3358: Optional Checksums in Intermediate System to Intermediate System (ISIS) • RFC3359: Reserved Type, Length and Value (TLV) Codepoints in Intermediate System to Intermediate System • RFC3363: Representing Internet Protocol version 6 (IPv6) Addresses in the Domain Name System (DNS) • RFC 3446: Anycast Rendevous Point (RP) Mechanism using PIM and MSDP • RFC3469: Framework for Multi-Protocol Label Switching (MPLS)-based Recovery • RFC 3478: Graceful Restart for Label Distribution Protocol • RFC3479: Fault Tolerance for the Label Distribution Protocol (LDP) • RFC 3484: Default Address Selection for IPv6 • RFC 3512: Configuring Networks and Devices with Simple Network Management Protocol (SNMP). • RFC 3569: PIM-SSM PIM Source Specific Multicast • RFC 3587: IPv6 Global Unicast Address Format • RFC3596: DNS Extensions to Support IP Version 6 • RFC3602: The AES-CBC Cipher Algorithm and Its Use with IPsec • RFC 3618: Multicast Source Discovery Protocol (MSDP) • RFC 3623: OSPF Graceful Restart • RFC 3630: Traffic Engineering (TE) Extensions to OSPF Version 2 • RFC3682: The Generalized TTL Security Mechanism (GTSM) • RFC3719: Recommendations for Interoperable Networks using Intermediate System to Intermediate System (IS-IS) • RFC3756: IPv6 Neighbor Discovery (ND) Trust Models and Threats • RFC3768: Virtual Router Redundancy Protocol (VRRP) • RFC3785: Use of Interior Gateway Protocol (IGP) Metric as a second MPLS Traffic Engineering (TE) Metric • RFC3787: Recommendations for Interoperable IP Networks using Intermediate System to Intermediate System (IS-IS) • RFC3809: Generic Requirements for Provider Provisioned Virtual Private Networks(PPVPN) • RFC3810: Multicast Listener Discovery Version 2 (MLDv2) for IPv6

Standard Organization	Standard or Protocol
IETF	• RFC3813: Multiprotocol Label Switching (MPLS) Label Switching Router (LSR) Management Information Base (MIB) • RFC3814: Multiprotocol Label Switching (MPLS) Forwarding Equivalence Class To Next Hop Label Forwarding Entry (FEC-To-NHLFE) Management Information Base (MIB) • RFC 3815: Definitions of Managed Objects for the Multiprotocol Label Switching (MPLS), Label Distribution Protocol (LDP) • RFC3826: The Advanced Encryption Standard (AES) Cipher Algorithm in the SNMP User-based Security Model • RFC3879: Deprecating Site Local Addresses • RFC3906: Calculating Interior Gateway Protocol (IGP) Routes Over Traffic Engineering Tunnels • RFC3916: Requirements for Pseudo-Wire Emulation Edge-to-Edge (PWE3) • RFC3936: Procedures for Modifying the Resource reSerVation Protocol(RSVP) • RFC3954: Cisco Systems NetFlow Services Export Version 9 • RFC3956: Embedding the Rendezvous Point (RP) Address in an IPv6 Multicast Address • RFC3971: SEcure Neighbor Discovery (SEND) • RFC3972: Cryptographically Generated Addresses (CGA) • RFC3973: Protocol Independent Multicast - Dense Mode (PIM-DM):Protocol Specification (Revised) • RFC3985: Pseudo Wire Emulation Edge-to-Edge (PWE3) Architecture • RFC3988: Maximum Transmission Unit Signalling Extensions for the Label Distribution Protocol • RFC4007: IPv6 Scoped Address Architecture • RFC4022: Management Information Base for the Transmission Control Protocol(TCP) • RFC4023: Encapsulating MPLS in IP or Generic Routing Encapsulation (GRE) • RFC4026: Provider Provisioned Virtual Private Network (VPN) Terminology • RFC4031: Service Requirements for Layer 3 Provider Provisioned Virtual Private Networks (PPVPNs) • RFC4090: Fast Reroute Extensions to RSVP-TE for LSP Tunnels • RFC4105: Requirements for Inter-Area MPLS Traffic Engineering • RFC4110: A Framework for Layer 3 Provider-Provisioned Virtual Private Networks (PPVPNs) • RFC4113: Management Information Base for the User Datagram Protocol (UDP) • RFC4133: Entity MIB (Version 3)

Standard Organization	Standard or Protocol
IETF	• RFC4188: Definitions of Managed Objects for Bridges • RFC4191: Default Router Preferences and More-Specific Routes • RFC 4213: Basic Transition Mechanisms for IPv6 Hosts and Routers • RFC4216: MPLS Inter-Autonomous System (AS) Traffic Engineering (TE) Requirements • RFC4245: High-Level Requirements for Tightly Coupled SIP Conferencing • RFC4250/ RFC4251/ RFC4252/ RFC4253/ RFC4254:SSH • RFC4264: BGP Wedgies • RFC4265: Definition of Textual Conventions for Virtual Private Network (VPN) Management • RFC4271/ RFC4272/ RFC4273/ RFC4274/ RFC4276/ RFC4277: BGP • RFC4291: IP Version 6 Addressing Architecture • RFC4292: IP Forwarding Table MIB • RFC4293: Management Information Base for the Internet Protocol (IP) • RFC4294: IPv6 Node Requirements • RFC4302/ RFC4303: IPSec • RFC4344/ RFC4345: SSH • RFC4360: BGP Extended Communities Attribute • RFC4363: Q-BRIDGE-MIB • RFC4364/ RFC4365/ RFC4382: L3VPN • RFC4379: NQA MPLS-LSP Ping/Trace • RFC4385/ RFC4446/ RFC4447/ RFC4448: L2VPN • RFC4419: Diffie-Hellman Group Exchange for the Secure Shell (SSH) Transport Layer Protocol • RFC4443: Internet Control Message Protocol (ICMPv6) for the Internet Protocol Version 6 (IPv6) Specification • RFC4451/ RFC4486:BGP • RFC4541: Considerations for Internet Group Management Protocol (IGMP)and Multicast Listener Discovery (MLD) Snooping Switches • RFC4552/ RFC4576/ RFC4577:OSPF v3 • RFC4560: Definitions of Managed Objects for Remote Ping, Traceroute, and Lookup Operations • RFC4562: MAC-Forced Forwarding: A Method for Subscriber Separation on an Ethernet Access Network • RFC4576: OSPF as the Provider/Customer Edge Protocol for BGP/ MPLS IP Virtual Private Networks (VPNs) • RFC4602/ RFC4607/ RFC4608/ RFC4609/ RFC4610: PIM

Standard Organization	Standard or Protocol
IETF	• RFC4604: Using Internet Group Management Protocol Version 3 (IGMPv3) and Multicast Listener Discovery Protocol Version 2 (MLDv2) for Source-Specific Multicast • RFC4611/ RFC4624:MSDP • RFC4632: Classless Inter-domain Routing (CIDR): The Internet Address Assignment and Aggregation Plan • RFC4649: Dynamic Host Configuration Protocol for IPv6 (DHCPv6) Relay Agent Remote-ID Option • RFC4659: BGP-MPLS IP Virtual Private Network(VPN) Extension for IPv6 VPN • RFC4664/ RFC4665:L2VPN • RFC4724: Graceful Restart Mechanism for BGP • RFC4741: NETCONF Configuration Protocol • RFC4742: Using the NETCONF Configuration Protocol over Secure SHell (SSH) • RFC4750: OSPF Version 2 Management Information Base • RFC4762: Virtual Private LAN Service (VPLS) Using Label Distribution Protocol (LDP) Signaling • RFC4781: Graceful Restart Mechanism for BGP with MPLS • RFC4798: Connecting IPv6 Islands over IPv4 MPLS using IPv6 Provider Edge Routers (6PE) • RFC4822: RIPv2 Cryptographic Authentication • RFC4829: Label Switched Path (LSP) Preemption Policies for MPLS Traffic Engineering • RFC 4861: Neighbor Discovery for IPv6 • RFC 4862: IPv6 Stateless Address Autoconfiguration • RFC4868: Using HMAC-SHA-256, HMAC-SHA-384, and HMAC-SHA-512 with IPsec • RFC4874: Exclude Routes - Extension to Resource ReserVation Protocol-Traffic Engineering (RSVP-TE) • RFC4884: Extended ICMP to Support Multi-Part Messages • RFC4893: BGP Support for Four-octet AS Number Space • RFC4906: Transport of Layer 2 Frames Over MPLS • RFC4940: IANA Considerations for OSPF • RFC4950: ICMP Extensions for Multiprotocol Label Switching • RFC5004: Avoid BGP Best Path Transitions from One External to Another • RFC5015: Bidirectional Protocol Independent Multicast • RFC5036: LDP Specification • RFC5059: Bootstrap Router (BSR) Mechanism for Protocol Independent Multicast (PIM)

Standard Organization	Standard or Protocol
IETF	• RFC5060: Protocol Independent Multicast MIB • RFC5063: Extensions to GMPLS Resource Reservation Protocol RSVP Graceful Restart • RFC5085: Pseudowire Virtual Circuit Connectivity Verification (VCCV): A Control Channel for Pseudowires • RFC5095: Deprecation of Type 0 Routing Headers in IPv6 • RFC5110: Overview of the Internet Multicast Routing Architecture • RFC5130: A Policy Control Mechanism in IS-IS Using Administrative Tags • RFC5132: IP Multicast MIB • RFC5156: Special-Use IPv6 Addresses • RFC5176: Dynamic Authorization Extensions to Remote Authentication Dial In User Service (RADIUS) • RFC5186: Internet Group Management Protocol Version 3 (IGMPv3) / Multicast Listener Discovery Version 2 (MLDv2) and Multicast Routing Protocol Interaction • RFC5187: OSPFv3 Graceful Restart • RFC5227: IPv4 Address Conflict Detection • RFC5240: Protocol Independent Multicast (PIM) Bootstrap Router MIB • RFC5250: The OSPF Opaque LSA Option • RFC5277: NETCONF Event Notifications • RFC5286: Basic Specification for IP Fast Reroute: Loop-Free Alternates • RFC5291: Outbound Route Filtering Capability for BGP-4 • RFC5292: Address-Prefix-Based Outbound Route Filter for BGP-4 • RFC5294: Host Threats to Protocol Independent Multicast (PIM) • RFC5301/ RFC5302/ RFC5303/ RFC5304/ RFC5305/ RFC5306/ RFC5308/ RFC5309/ RFC5310/ RFC5311: ISIS • RFC5340: OSPF for IPv6 • RFC5342: IANA Considerations and IETF Protocol Usage for IEEE 802 Parameters • RFC5396: Textual Representation of Autonomous System (AS) Numbers • RFC5398: Autonomous System (AS) Number Reservation for Documentation Use • RFC5424/ RFC5425/ RFC5426: Information Management • RFC5443: LDP IGP Synchronization • RFC5462: Multiprotocol Label Switching (MPLS) Label Stack Entry: "EXP" Field Renamed to "Traffic Class" Field • RFC5492: Capabilities Advertisement with BGP-4 • RFC5495: Description of the Resource Reservation Protocol - Traffic-Engineered (RSVP-TE) Graceful Restart Procedures

Standard Organization	Standard or Protocol
IETF	• RFC5512: The BGP Encapsulation Subsequent Address Family Identifier (SAFI) • RFC5519: Multicast Group Membership Discovery MIB • RFC5556: Transparent Interconnection of Lots of Links (TRILL): Problem and Applicability Statement • RFC5642/ RFC5643: OSPFv3 • RFC5656: Elliptic Curve Algorithm Integration in the Secure Shell Transport Layer • RFC5659: An Architecture for Multi-Segment Pseudowire Emulation Edge-to-Edge • RFC5668: 4-Octet AS Specific BGP Extended Community • RFC5681: TCP Congestion Control • RFC5709: OSPFv2 HMAC-SHA Cryptographic Authentication • RFC5711: Node Behavior upon Originating and Receiving Resource Reservation Protocol (RSVP) Path Error Messages • RFC5714: IP Fast Reroute Framework • RFC5722: Handling of Overlapping IPv6 Fragments • RFC5796: Authentication and Confidentiality in Protocol Independent Multicast Sparse Mode (PIM-SM) Link-Local Messages • RFC5798: Virtual Router Redundancy Protocol (VRRP) Version 3 for IPv4 and IPv6 • RFC5880/ RFC5881/ RFC5882/ RFC5883/ RFC5884:BFD • RFC5905: Network Time Protocol Version 4: Protocol and Algorithms Specification • RFC5952: A Recommendation for IPv6 Address Text Representation • RFC6020: YANG - A Data Modeling Language for the Network Configuration Protocol (NETCONF) • RFC6021/ RFC6022: NETCONF • RFC6037: Cisco Systems' Solution for Multicast in BGP/MPLS IP VPNs • RFC6073: Segmented Pseudowire • RFC6138: LDP IGP Synchronization for Broadcast Networks • RFC6204: Basic Requirements for IPv6 Customer Edge Routers • RFC6232: Purge Originator Identification TLV for IS-IS • RFC6239: Suite B Cryptographic Suites for Secure Shell (SSH) Not supported X-509 certificates • RFC6241/ RFC6242/ RFC6243: NETCONF • RFC6246: Virtual Private LAN Service (VPLS) Interoperability with Customer Edge (CE) Bridges • RFC6274: Security Assessment of the Internet Protocol Version 4 • RFC6286: Autonomous-System-Wide Unique BGP Identifier for BGP-4 • RFC6325/ RFC6326/ RFC6327:TRILL

Standard Organization	Standard or Protocol
IETF	• RFC6398: IP Router Alert Considerations and Usage • RFC6434: IPv6 Node Requirements • RFC6439: RBridges: Appointed Forwarders • RFC6472: Recommendation for Not Using AS_SET and AS_CONFED_SET in BGP • RFC6528: Defending against Sequence Number Attacks • RFC6536: Network Configuration Protocol (NETCONF) Access Control Model • RFC6540: IPv6 Support Required for All IP-Capable Nodes • RFC6563: Moving A6 to Historic Status • RFC6565: OSPFv3 as a Provider Edge to Customer Edge (PE-CE) Routing Protocol • RFC6607: Virtual Subnet Selection Options for DHCPv4 and DHCPv6 • RFC6633: Deprecation of ICMP Source Quench Messages • RFC6668: SHA-2 Data Integrity Verification for the Secure Shell (SSH) Transport Layer Protocol • RFC6676: Multicast Addresses for Documentation • RFC6691: TCP Options and Maximum Segment Size (MSS) • RFC6718: Pseudowire Redundancy • RFC6724: Default Address Selection for Internet Protocol Version 6 (IPv6) • RFC6774: Distribution of Diverse BGP Paths • RFC6793: BGP Support for Four-Octet Autonomous System (AS) Number Space • RFC6890: Special-Purpose IP Address Registries • RFC6905: Requirements for Operations, Administration, and Maintenance (OAM) in Transparent Interconnection of Lots of Links (TRILL) • RFC6918: Formally Deprecating Some ICMPv4 Message Types • RFC6938: Deprecation of BGP Path Attributes: DPA, ADVERTISER, and RCID_PATH / CLUSTER_ID • RFC6939: Client Link-Layer Address Option in DHCPv6 • RFC6987: OSPF Stub Router Advertisement • RFC6996: Autonomous System (AS) Reservation for Private Use • RFC7084: Basic Requirements for IPv6 Customer Edge Routers • RFC7130: Bidirectional Forwarding Detection (BFD) on Link Aggregation Group (LAG) Interfaces • RFC7153: IANA Registries for BGP Extended Communities • RFC7166: Supporting Authentication Trailer for OSPFv3 • RFC7174: Transparent Interconnection of Lots of Links (TRILL) Operations, Administration, and Maintenance (OAM) Framework

Standard Organization	Standard or Protocol
IETF	• RFC7178: Transparent Interconnection of Lots of Links (TRILL): RBridge Channel Support • RFC7196: Making Route Flap Damping Usable • RFC7223: A YANG Data Model for Interface Management • RFC7224: IANA Interface Type YANG Module • RFC7277: A YANG Data Model for IP Management • RFC7317: A YANG Data Model for System Management • RFC7348: Virtual eXtensible Local Area Network (VXLAN): A Framework for Overlaying Virtualized Layer 2 Networks over Layer 3 Networks • RFC7361: LDP Extensions for Optimized MAC Address Withdrawal in a Hierarchical Virtual Private LAN Service (H-VPLS) • RFC7365: Framework for Data Center (DC) Network Virtualization • RFC7379: Problem Statement and Goals for Active-Active Connection at the Transparent Interconnection of Lots of Links (TRILL) Edge • RFC7407: A YANG Data Model for SNMP Configuration • RFC7447: Deprecation of BGP Entropy Label Capability Attribute • RFC7455: Transparent Interconnection of Lots of Links (TRILL): Fault Management • RFC7540: Hypertext Transfer Protocol Version 2 (HTTP/2) • RFC7607: Codification of AS 0 Processing • RFC7705: Autonomous System Migration Mechanisms and Their Effects on the BGP AS_PATH Attribute • RFC7752: North-Bound Distribution of Link-State and Traffic Engineering (TE) Information Using BGP • RFC7761: Protocol Independent Multicast - Sparse Mode (PIM-SM): Protocol Specification (Revised). • RFC7770: Extensions to OSPF for Advertising Optional Router Capabilities • RFC7783: Coordinated Multicast Trees (CMT) for Transparent Interconnection of Lots of Links (TRILL) • RFC7895: YANG Module Library • RFC7938: Use of BGP for Routing in Large-Scale Data Centers • RFC7950: The YANG 1.1 Data Modeling Language • RFC7951: JSON Encoding of Data Modeled with YANG • RFC7964: Solutions for BGP Persistent Route Oscillation • RFC8022: A YANG Data Model for Routing Management • RFC8040: RESTCONF Protocol • RFC8077: Pseudowire Setup and Maintenance using the Label Distribution Protocol • RFC8093: Deprecation of BGP Path Attribute Values 30, 31, 129, 241, 242, and 243

Standard Organization	Standard or Protocol
IEEE	• 802.1A: Overview and Architecture • 802.1AB: Station and Media Access Control Connectivity Discovery • 802.1AC: Media Access Control Service revision • 802.1AG: IEEE Standard for Local and metropolitan area networks—Virtual Bridged Local Area Networks Amendment 5:Connectivity Fault Management • 802.1AP: Management Information Base (MIB) definitions for VLAN Bridges • 802.1AX: Link Aggregation • 802.1B: LAN/WAN Management • 802.1D: Media Access Control (MAC) Bridges • 802.1H: Media Access Control (MAC)Bridging of Ethernet V2.0 in LocalArea Networks • 802.1Q Virtual Bridged Local Area Networks • 802.1q 2005: Local and metropolitan area networks-Virtual Bridged Local Area Networks • 802.1QAZ: Enhanced Transmission Selection • 802.1QBB: Priority-based Flow Control • 802.1S: Multiple Spanning Trees • 802.1W: Rapid Reconvergence of Spanning Tree (RSTP) • 802.1X: Port Based Network Access Control • 802.2: IEEE Standards for Local Area Networks: Logical Link Control (LLC) • 802.3AC: VLAN tagging • 802.3AD: Port Trunk, LACP • 802.3AH: Operations, Administration, and Maintenance (OAM) • 802.3AX: (IEEE P802.1AX) Link Aggregation Task Force • ISO10598:ISIS
ITU	• Y.1344: Ethernet ring protection switching

NOTE

The listed standards and protocols are fully or partially supported by Huawei switches. For details, visit https://e.huawei.com/ca/material/onLineView?MaterialID=821895aad0bd48e6aa079c06e82fb7f8 or contact your local Huawei sales office.

Ordering Information

Mainframe	
Basic Configuration	
CE-RACK-A01	FR42812 Assembly Rack (800x1200x2000mm)
CE12804S-AC	CE12804S Assembly Chassis (with Fans)
CE12808S-AC	CE12808S Assembly Chassis (with Fans)
CE12804S-DC	CE12804S DC Assembly Chassis (with Fans)
CE12808S-DC	CE12808S DC Assembly Chassis (with Fans)
CE12804-AC	CE12804 AC Assembly Chassis (with CMUs and Fans)
CE12808-AC	CE12808 AC Assembly Chassis (with CMUs and Fans)
CE12812-AC	CE12812 AC Assembly Chassis (with CMUs and Fans)
CE12816-AC	CE12816 AC Assembly Chassis (with CMUs and Fans)
CE12804-DC	CE12804 DC Assembly Chassis (with CMUs and Fans)
CE12808-DC	CE12808 DC Assembly Chassis (with CMUs and Fans)
CE12812-DC	CE12812 DC Assembly Chassis (with CMUs and Fans)
CE12816-DC	CE12816 DC Assembly Chassis (with CMUs and Fans)
Main Processing Unit	
CE-MPU-S	CE12800S Main Processing Unit
CE-MPU	Main Processing Unit
Switch Fabric Unit[4]	
CE-SFU-S	CE12800S Switch Fabric
CE-SFU04	CE12804 Switch Fabric
CE-SFU08	CE12808 Switch Fabric
CE-SFU12	CE12812 Switch Fabric
CE-SFU16	CE12816 Switch Fabric
GE BASE-T Interface Card	
CE-L48GT	48-Port 10/100/1000BASE-T Interface Card (RJ45)

GE BASE-X Interface Card	
CE-L48GS	48-Port 100/1000BASE-X Interface Card (SFP)
10GBASE-T Interface Card	
CE-L48XT	48-port 100M/1000M/10G BASE-T Interface Card (RJ45)
10GBASE-X Interface Card	
CE-L24XS	24-Port 10GBASE-X Interface Card (SFP/SFP+)
CE-L48XS	48-Port 10GBASE-X Interface Card (SFP/SFP+)
40GE Interface Card	
CE-L06LQ	6-Port 40G Interface Card (QSFP+)
CE-L12LQ	12-Port 40G Interface Card (QSFP+)
CE-L24LQ	24-Port 40G Interface Card (QSFP+)
CE-L36LQ	36-Port 40G Interface Card (QSFP+)
100GE Interface Card	
CE-L04CF	4-Port 100G Interface Card (CFP)
CE-L08CF	8-Port 100G Interface Card (CFPS)
CE-L12CF	12-Port 100G Interface Card (CFP2)
CE-L12CQ	12-Port 100G Interface Card (QSFP28)
CE-L16CQ	16-Port 100G Interface Card (QSFP28)
CE-L36CQ	36-Port 100G Interface Card (QSFP28)
Power	
PHD-3000WA	3000W HVDC Power Module
PDC-2200WA	2200W DC Power Supply
Software	
CE128-LIC-B25	CloudEngine 12800 Basic SW
CE128-LIC-TRILL	TRILL Function License
CE128-LIC-MPLS	MPLS Function License
CE128-LIC-VS	Virtual System Function License
CE128-LIC-IPV6	IPV6 Function License
CE128-LIC-EVN	EVN Function License
CE128-LIC-FCFAL	CloudEngine 12800 FCF All Ports

4 Fx series interface cards must be used with F or G series switch fabric units. For example, a CE-L36CQ-FD interface card must be used with CE-SFUxxG switch fabric units.

CE128-LIC-FCF48	CloudEngine 12800 FCF 48 Ports
CE128-LIC-TLM	CE12800 Telemetry Function
CE128-LIC-MACSEC	CE12800 MACsec Function
N1-CE128LIC-CFFD	N1-CloudFabric Foundation SW License for CloudEngine 12800
N1-CE128CFFD-SYS1Y	N1-CloudFabric Foundation SW License for CloudEngine 12800-SnS-1 Year
N1-CE128LIC-CFAD	N1-CloudFabric Advanced SW License for CloudEngine 12800
N1-CE128CFAD-SYS1Y	N1-CloudFabric Advanced SW License for CloudEngine 12800-SnS-1 Year
Document	
CE128-DOC	CloudEngine 12800 Series Switches Product Documentation

Optical transceivers and Cables

Part Number	Product Description
FE-SFP Optical Transceivers	
SFP-FE-SX-MM1310	Optical Transceiver,SFP,100M/155M,Multi-mode Module (1310nm, 2km,LC)
eSFP-FE-LX-SM1310	Optical Transceiver,eSFP,100M/155M,Single-mode Module (1310nm, 15km, LC)
S-SFP-FE-LH40-SM1310	Optical Transceiver, eSFP, FE, Single-mode Module (1310nm, 40km, LC)
GE-SFP Optical Transceivers	
SFP-1000BaseT	Electrical Transceiver, SFP, GE, Electrical Interface Module (100m, RJ45)
eSFP-GE-SX-MM850	Optical Transceiver, eSFP, GE, Multi-mode Module (850nm, 0.55km, LC)
SFP-GE-LX-SM1310	Optical Transceiver, eSFP, GE, Single-mode Module (1310nm, 10km,LC)
S-SFP-GE-LH40-SM1310	Optical Transceiver, eSFP, GE, Single-mode Module(1310nm,40km,LC)
S-SFP-GE-LH80-SM1550	Optical Transceiver, eSFP, GE, Single-mode Module(1550nm,80km,LC)
eSFP-GE-ZX100-SM1550	Optical Transceiver, eSFP, GE, Single-mode Module(1550nm,100km,LC)

BIDI-SFP Optical Transceivers	
SFP-FE-LX-SM1550-BIDI	Optical Transceiver, eSFP, FE, BIDI Single-mode Module (TX1550/RX1310, 15km, LC)
SFP-FE-LX-SM1310-BIDI	Optical Transceiver, eSFP, FE, BIDI Single-mode Module (TX1310/RX1550, 15km, LC)
SFP-GE-LX-SM1490-BIDI	Optical Transceiver, eSFP, GE, BIDI Single-mode Module (TX1490/RX1310, 10km,LC)
SFP-GE-LX-SM1310-BIDI	Optical Transceiver, eSFP, GE, BIDI Single-mode Module (TX1310/RX1490, 10km, LC)
LE2MGSC40ED0	Optical Transceiver, eSFP, GE, BIDI Single-mode Module (TX1490/RX1310, 40km, LC)
LE2MGSC40DE0	Optical Transceiver, eSFP, GE, BIDI Single-mode Module (TX1310/RX1490, 40km,LC)
SFP-10G-ER-SM1330-BIDI	Optical Transceiver,SFP+,10G,BIDI Single-mode Module(TX 1330nm/RX 1270nm,40km,LC)
SFP-10G-ER-SM1270-BIDI	Optical Transceiver,SFP+,10G,BIDI Single-mode Module(TX 1270nm/RX 1330nm,40km,LC)
SFP-10G-BXU1	10GBase,BIDI Optical Transceiver,SFP+,10G,Single-mode Module (TX1270nm/RX1330nm,10km,LC)
SFP-10G-BXD1	10GBase,BIDI Optical Transceiver,SFP+,10G,Single-mode Module (TX1330nm/RX1270nm, 10km, LC)
10G-SFP+ Optical Transceivers	
SFP-10G-USR	10GBase-USR Optical Transceiver,SFP+,10G,Multi-mode Module (850nm, 0.1km, LC)
OSXD22N00	Optical Transceiver,SFP+,10G,Multi-mode Module(1310nm,0.22km,LC,LRM)
OMXD30000	Optical Transceiver,SFP+,10G,Multi-mode Module(850nm,0.3km,LC)
SFP-10G-LR	Optical Transceiver,SFP+,10G,Single-mode Module(1310nm,10km,LC)
OSX040N01	Optical Transceiver,SFP+,10G,Single-mode Module(1550nm,40km,LC)
SFP-10G-ZR	10GBase-ZR Optical Transceiver, SFP+, 10G, Single-mode Module (1550nm, 80km, LC)
SFP-10G-iLR	Optical Transceiver,SFP+,9.8G,Single-mode Module(1310nm,1.4km,LC)
10G-SFP+ DWDM Optical Transceivers	
SFP-10G-ZDWT	Optical Transceiver,SFP+,10G,Single-mode Module(DWDM,1560.61-1529.16nm,60km,LC)

25GE-SFP28 Optical Transceivers	
SFP-25G-SR	Optical Transceiver,SFP28,25GE, Multi-mode Module(850nm,0.1km,LC)
40GE-QSFP+ Optical Transceivers	
QSFP-40G-SR-BD	40GBase-BD Optical Transceiver,QSFP+,40G,Multi-mode (850nm,0.1km,LC)
QSFP-40G-iSR4	40GBase-iSR4 Optical Transceiver, QSFP+, 40G, Multi-mode (850nm, 0.15km, MPO) (Connect to four SFP+ Optical Transceiver)
QSFP-40G-eSR4	40GBase-eSR4 Optical Transceiver, QSFP+, 40G, Multi-mode (850nm, 0.3km, MPO) (Connect to four SFP+ Optical Transceiver)
QSFP-40G-LX4	40GBase-LX4 Optical Transceiver, QSFP+, 40GE, Single-mode (1310nm, 2km, LC), Multi-mode(1310nm, 0.15km, LC)
QSFP-40G-eSM4	40GBase-eSM4 Optical Transceiver, QSFP+, 40G, Single-mode Module (1310nm, 10km, MPO) (Connect to four SFP+ Optical Transceiver)
QSFP-40G-LR4	40GBase-LR4 Optical Transceiver, QSFP+, 40GE, Single-mode Module (1310nm, 10km, LC)
QSFP-40G-LR4-Lite	40GBase-LR4 Lite Optical Transceiver,QSFP+,40G,Single-mode Module(1310nm,2km,LC)
QSFP-40G-ER4	40GBase-ER4 Optical Transceiver, QSFP+, 40G, Single-mode Module (1310nm, 40km, LC)
QSFP-40G-SDLC-PAM	40GBase-SDLC Optical Transceiver, QSFP+, 40G, Multi-mode (850nm, PAM4, 0.1km, LC)
QSFP-40G-eSDLC-PAM	40GBase-eSDLC Optical Transceiver, QSFP+, 40G, Multi-mode (850nm, PAM4, 0.3km, LC)
40GE-CFP Optical Transceivers	
CFP-40G-LR4	High Speed Transceiver, CFP, 40G, Single-mode Module (1310nm band, 41.25G, 10km, straight LC)
CFP-40G-ER4	High Speed Transceiver, CFP, 40G, Single-mode Module (1310nm band, 41.25G, 40km, straight LC)
100GE-CFP Optical Transceivers	
CFP-100G-SR10	High Speed Transceiver, CFP, 100G, Multimode Module (850nm, 10*10G, 0.1km, MPO)
CFP-100G-LR4	High Speed Transceiver,CFP,100G,Single-mode Module(1310nm band,4*25G,10km,stright LC)
CFP-100G-ER4	High Speed Transceiver,CFP,100G,Single-mode Module(1310nm band,4*25G,40km,stright LC)

CFP-100GE-ZR4	100GBase,CFP Module,100G,Single-mode Module(1310nm band,4*25G,80km,stright LC)
100GE-CFP2 Optical Transceivers	
CFP2-100G-SR10	High Speed Transceiver, CFP2, 100G, Multimode Module(850nm, 10*10G, 0.1km, MPO)
CFP2-100G-LR4	High Speed Transceiver, CFP2, 100G, Single-mode Module(1310nm band, 4*25G, 10km, straight LC)
CFP2-100G-ER4	High Speed Transceiver, CFP2, 100G, Single-mode Module(1310nm, 4*25G, 40km, straight LC)
100GE-QSFP28 Optical Transceivers	
QSFP-100G-SWDM4	100GBase-SWDM4 Optical Transceiver,QSFP+,100GE,Multi-mode Module(850,0.0.075km-OM3,0.1km-OM4,LC)
QSFP28-100G-SR4	100GBase-SR4 Optical Transceiver, QSFP28, 100G, Multi-mode (850nm, 0.1km, MPO)
QSFP28-100G-LR4	100GBase-LR4 Optical Transceiver, QSFP28, 100G, Single-mode module (1310nm, 10km, LC)
QSFP28-100G-PSM4	100GBase-PSM4 Optical Transceiver, QSFP28, 100G, Single-mode module (1310nm, 0.5km, MPO)
QSFP-100G-CWDM4	100GBase-CWDM4 Optical Transceiver, QSFP28, 100G, Single-mode module (1310nm, 2km, LC)
QSFP-100G-eCWDM4	100GBase-eCWDM4 Optical Transceiver,QSFP28,100G,Single-mode module (1310nm,10km,LC)
QSFP-100G-ER4-Lite	100GBase-ER4-Lite Optical Transceiver,QSFP28,100G,Single-mode module (1310nm,30km(FEC OFF),40km(FEC ON),LC)
QSFP-100G-SR4-NT	100GBase-SR4 Optical Transceiver,QSFP28,100G,Multi-mode (850nm,0.1km,MPO,NT) ,20-60C
QSFP-100G-CWDM4-NT	100GBase-CWDM4 Optical Transceiver,QSFP28,100G,Single-mode module (1310nm,2km,LC,NT) ,20-65C
AOC High-Speed Cables	
SFP-10G-AOC-5M	Active Optical Cable , SFP+, 10G, (850nm, 5m, AOC)
SFP-10G-AOC-7M	Active Optical Cable , SFP+, 10G, (850nm, 7m, AOC)
SFP-10G-AOC10M	AOC Optical Transceiver, SFP+, 850nm, 1G~10G, 10m
SFP-10G-AOC20M	Optical transceiver, SFP+ AOC, 850nm, 2.5G~10.5G, 20m
SFP-10G-AOC-3M	Optical transceiver, SFP+, 1G~10.5G, (850nm, 3m, AOC)
QSFP-H40G-AOC10M	Optical transceiver, QSFP+, 40G, (850nm, 10m, AOC)

QSFP-4SFP10-AOC10M	Optical transceiver, QSFP+, 40G, (850nm, 10m, AOC)(Connect to four SFP+ Optical Transceiver)
SFP-25G-AOC-3M	Active Optical Cable , SFP28, 25G, (850nm, 3m, AOC)
SFP-25G-AOC-5M	Active Optical Cable , SFP28, 25G, (850nm, 5m, AOC)
SFP-25G-AOC-7M	Active Optical Cable , SFP28, 25G, (850nm, 7m, AOC)
SFP-25G-AOC-10M	Active Optical Cable , SFP28, 25G, (850nm, 10m, AOC)
QSFP-100G-AOC-10M	Active Optical Cable ,QSFP28,100G,(850nm,10m,AOC)
QSFP-100G-AOC-30M	Active Optical Cable ,QSFP28,100G,(850nm,30m,AOC)
Copper Cable	
SFP-10G-CU1M	SFP+, 10G, High Speed Direct-attach Cables, 1m, SFP+20M, CC2P0.254B(S), SFP+20M, Used indoor
SFP-10G-CU3M	SFP+, 10G, High Speed Direct-attach Cables, 3m, SFP+20M, CC2P0.254B(S), SFP+20M, Used indoor
SFP-10G-CU5M	SFP, 10G, High Speed Cable, 5m, SFP+20M, CC2P0.254B(S), SFP+20M, LSFRZH For Indoor
SFP-10G-AC7M	SFP, 10G, Active High Speed Cable, 7m, SFP+20M, CC2P0.254B(S), SFP+20M, LSFRZH For Indoor
SFP-10G-AC10M	SFP+, 10G, Active High Speed Cables, 10m, SFP+20M, CC2P0.32B(S), SFP+20M, Used indoor
SFP-25G-CU1M	SFP28, 25G, High Speed Direct-attach Cables, 1m, (SFP28), CC8P0.254B(S), SFP28
SFP-25G-CU3M	SFP28, 25G, High Speed Direct-attach Cables, 3m, (SFP28), CC8P0.254B(S), SFP28
SFP-25G-CU3M-N	SFP28, 25G, High Speed Direct-attach Cables, 3m, (SFP28), CC2P0.4B(S), SFP28
SFP28-25G-CU5M	SFP28, 25G, High Speed Direct-attach Cables, 5m, (SFP28), CC2P0.4B(S), SFP28
QSFP-40G-CU1M	QSFP+, 40G, High Speed Direct-attach Cables, 1m, QSFP+38M, CC8P0.254B(S), QSFP+38M, Used indoor
QSFP-40G-CU3M	QSFP+, 40G, High Speed Direct-attach Cables, 3m, QSFP+38M, CC8P0.32B(S), QSFP+38M, Used indoor
QSFP-40G-CU5M	QSFP+, 40G, High Speed Direct-attach Cables, 5m, QSFP+38M, CC8P0.40B(S), QSFP+38M, Used indoor
QSFP-4SFP10G-CU1M	QSFP+, 4SFP+10G, High Speed Direct-attach Cables, 1m, QSFP+38M, CC8P0.254B(S), 4*SFP+20M, Used indoor

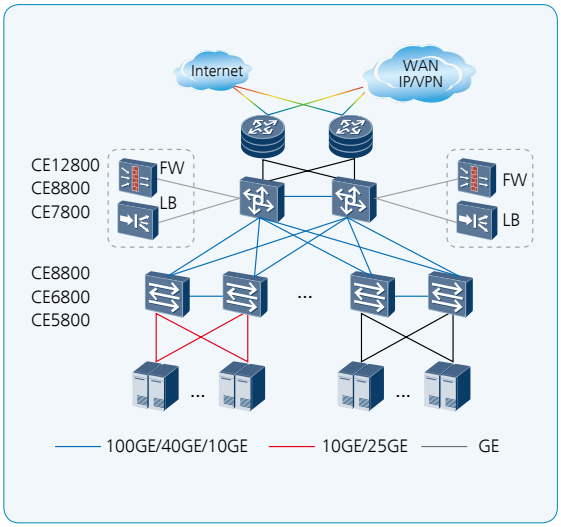
QSFP-4SFP10G-CU3M	QSFP+, 4SFP+10G, High Speed Direct-attach Cables, 3m, QSFP+38M, CC8P0.32B(S), 4*SFP+20M, Used indoor
QSFP-4SFP10G-CU5M	QSFP+, 4SFP+10G, High Speed Direct-attach Cables, 5m, QSFP+38M, CC8P0.4B(S), 4*SFP+20M, Used indoor
QSFP28-100G-CU1M	QSFP28, 100G, High Speed Direct-attach Cables, 1m, (QSFP28), CC8P0.254B(S), QSFP28, Used indoor
QSFP28-100G-CU3M	QSFP28, 100G, High Speed Direct-attach Cables, 3m, (QSFP28), CC8P0.254B(S), QSFP28, Used indoor
QSFP28-100G-CU5M	QSFP28, 100G, High Speed Direct-attach Cables, 5m, (QSFP28), CC8P0.4B(S), QSFP28, Used indoor
QSFP-4SFP25G-CU1M	100GE QSFP28-4SFP25G, High Speed Direct-attach Cables, 1m, (QSFP28), (4*(CC2P0.254B(S))), (4SFP28)
QSFP-4SFP25G-CU3M	100GE QSFP28-4SFP25G, High Speed Direct-attach Cables, 3m, (QSFP28), (4*(CC2P0.254B(S))), (4SFP28)
QSFP-4SFP25G-CU3M-N	100GE QSFP28-4SFP25G, High Speed Direct-attach Cables, 3m, (QSFP28), (4*(CC2P0.4B(S))), 4SFP28
QSFP-4SFP25G-CU5M	100GE QSFP28-4SFP25G, High Speed Direct-attach Cables, 5m, (QSFP28), (4*(CC2P0.4B(S))), 4SFP28

Networking and Application

Data Center Applications

On a typical data center network, CE12800/CE8800/CE7800 switches work as core switches, whereas CE8800/CE6800/CE5800 switches work as ToR switches and connect to the core switches using 100GE/40GE/10GE ports. These switches use a fabric protocols to establish a non-blocking large Layer 2 network, which allows large-scale VM migrations and flexible service deployments.

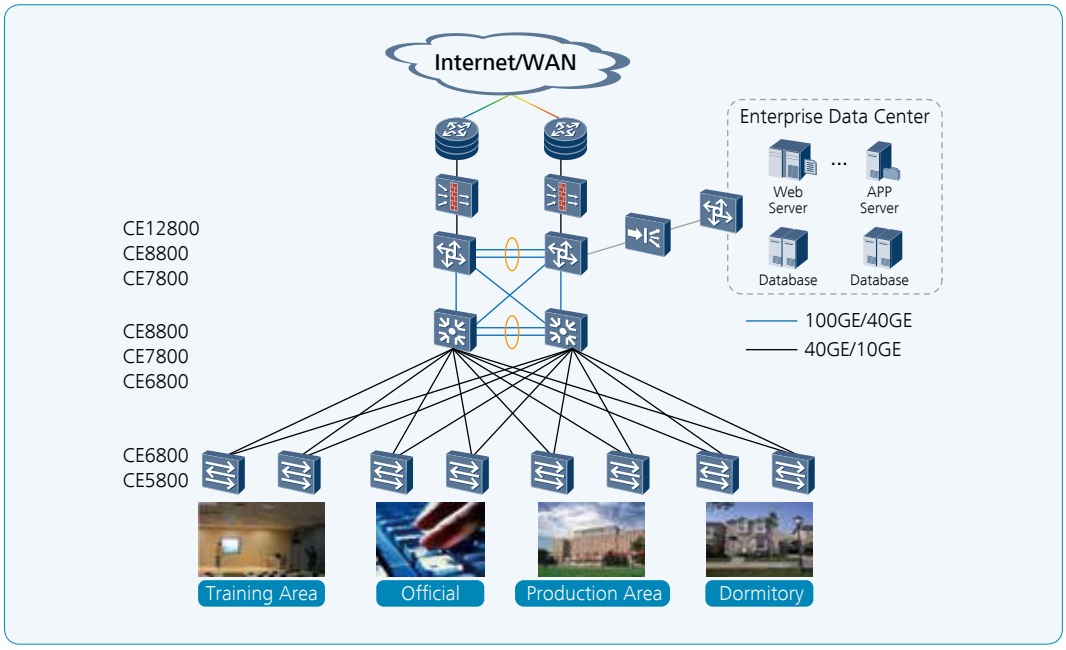
Note: TRILL and VXLAN can be also used on campus networks to support flexible service deployments in different service areas.



Campus Network Applications

On a typical campus network, multiple CE12800/CE8800/CE7800 switches are virtualized into a logical core switch using CSS or iStack technology. Multiple CE8800/CE7800/CE6800 switches at the aggregation layer form a logical switch using iStack technology. CSS and iStack improve network reliability and simplify network management.

Note: CSS, iStack, and M-LAG are also widely used in data centers to facilitate network management.



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