CloudEngine 7800 Series Data Center Switches

HUAWEI TECHNOLOGIES CO., LTD.

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Product Overview

Huawei CloudEngine 7800 series (CE7800 for short) switches are next-generation 40G Ethernet switches designed for data centers and high-end campus networks, providing high-performance, high-density 40GE ports, and low latency. The CE7800 has an advanced hardware architecture with 40GE QSFP+ ports.

Using the Huawei VRP8 software platform, CE7800 switches provide extensive data center service features and high stacking capability. In addition, the airflow direction (front-to-back or back-to-front) can be changed. CE7800 switches can work with CE12800/8800/6800/5800 switches to build an elastic, virtualized, high-quality fabric that meets the requirements of cloud-computing data centers.

CE7800 switches can function as core or aggregation switches on data center networks to help enterprises and carriers build a scalable data center network platform in the cloud computing era. They can also be used as aggregation or core switches for enterprise campus networks.

Product Appearance

The CE7800 comes in one model.

CE7855-32Q-EI

32*40GE QSFP+ ports

Product Characteristics

High-density 40GE Access

- The CE7800 provides 2.56 Tbit/s switching capacity in a 1 U ToR, 1,440 Mpps forwarding performance, and supports L2/L3 line-rate forwarding.
- The CE7800 provides a maximum of 32*40GE QSFP+ ports, and can function as the core or aggregation switch on a data center or campus network.
- The QSFP+ port can be used as four 10GE SFP+ ports, providing a flexible network. CE7800 switches can work with CE12800/6800/5800 switches to build a non-blocking network platform.

Highly Reliable, High-Performance Stacking

- The industry's first 16-member stack system
  - » A stack system of 16 member switches has a maximum of 512*40GE access ports that provide high-density server access in a data center.
  - » Multiple switches in a stack system are virtualized into one logical device, making it possible to build a scalable, easy-to-manage data center network platform.

  - » A stack system separates the control plane from the data plane. This eliminates the risk of single-point failures and greatly improves system reliability.
- Long-distance stacking
  - » The CE7800 can use service ports as stack ports. A stack system can be established with switches in the same rack or different racks, and even over long distances.
  - » Service and stack bandwidths can be allocated based on the network's scale so that network resources can be used more efficiently.

Vertical Virtualization Simplifies Management

- The CE7800 supports Super Virtual Fabric (SVF), which can virtualize multiple physical switches of the same or different types into one logical switch to simplify network management and improve reliability.
- SVF implements vertical extension of heterogeneous switches and virtualizes multiple leaf switches into remote cards of the spine switch, making it easier to install cables in equipment rooms and manage devices. The CE7800 functions as the spine switch.
- Huawei's SVF is the first in the industry to implement local forwarding of leaf switches. When horizontal traffic is the mainstream traffic in a data center, SVF improves forwarding efficiency and reduces network delay.

Inter-device Link Aggregation, High Efficiency and Reliability

- The CE7800 supports multichassis link aggregation group (M-LAG), which enables links of multiple switches to aggregate into one to implement device-level link backup.
- Switches in an M-LAG system all work in active state to share traffic and back up each other, enhancing system reliability.
- Switches in an M-LAG system can be upgraded independently. During the upgrade, other switches in the system take over traffic forwarding to ensure uninterrupted services.
- M-LAG supports dual-homing to Ethernet, TRILL, VXLAN, and IP networks, allowing for flexible networking.

Large-Scale Routing Bridge, On-Demand Scaling

- The CE7800 supports the IETF Transparent Interconnection of Lots of Links (TRILL) protocol. A TRILL network can contain 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 suboptimal path selection problem in STP and increase link bandwidth efficiency to 100 percent.
- The CE7800 supports TRILL-based Layer 2 equal-cost paths, greatly improving links' load balancing capabilities. The network has a fat-tree architecture that enhances expansion.

Converged Enhanced Ethernet, Allowing for Data, Storage, and Computing Traffic on One Network

- The CE7800 supports Fibre Channel over Ethernet (FCoE), which permits storage, data, and computing services to be transmitted on one network, reducing the costs of network construction and maintenance.
- The CE7800 supports centralized FCoE/FC gateway deployment, which makes network O&M simpler.
- The CE7800 series switches support multiple data center features: Priority-based Flow Control (PFC), Enhanced Transmission Selection (ETS) and Data Center Bridging eXchange (DCBX). These features ensure low latency and zero packet loss for FC storage and high-speed computing services.

Full Openness and Programmability, Flexible Customization

- The CE7800 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) and third-party controllers. 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 CE7800 supports CE modules for ansible, which enables unified provisioning of physical and virtual networks.
- CE7800 switches can seamless integrate with systems of F5, an industry-leading application delivery network provider, to build an active-active data center network.
- The OPS provides seamless integration of data center service and network in addition to a service-oriented, Software-Defined Network (SDN).

Hardware Overlay Gateway Achieves Fast Service Deployment

- The CE7800 can work with a mainstream virtualization platform. As the high-performance, hardware gateway of an overlay network (VXLAN), the CE7800 can support more than 16 million tenants.
- The CE7800 can connect to a cloud platform through open API to provide unified management of software and hardware networks.
- The hardware gateway deployment enables fast service deployment without changing the customer network, providing investment protection.
- The CE7800 supports Border Gateway Protocol - Ethernet VPN (BGP-EVPN), which can run as the VXLAN control plane to simplify VXLAN configuration within and between data centers.

Zero Touch Provisioning, Automatic O&M

- The CE7800 supports Zero Touch Provisioning (ZTP). ZTP enables the CE7800 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 CE6870 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 CE6870 supports visualization of all flows and congestion, improving service experience.

Flexible Airflow Design, High Energy Efficiency

- Flexible front-to-back/back-to-front airflow design
  - » The CE7800 uses a front-to-back/back-to-front airflow design that isolates cold air channels from hot air channels. This design meets heat dissipation requirements in data center equipment rooms.
  - » Air can flow from front to back, or back to front when different fans and power modules are used.
  - » Redundant power modules and fans can be configured to ensure uninterrupted service transmission.
- Innovative energy-saving technology
  - » The CE7800 has energy-saving chips and can measure system power consumption in real time. Fan speed can be adjusted dynamically based on system consumption. These energy-saving technologies reduce O&M costs and contribute to a greener data center.

Clear Indicators, Simple Maintenance

- Clear indicators
  - » Port indicators clearly show port status and port speeds. The 40GE port indicators can show the state of all the 10GE ports derived from the 40GE ports.
  - » State and stack indicators on both the front and rear panels enable operators to maintain the switch from either side.
  - » The CE7800 supports remote positioning. Operators can turn on remote positioning indicators on the switches they want to maintain, so that they can find switches easily in an equipment room full of devices.
- Simple maintenance
  - » The management port, fans, and power modules are on the front panel, which facilitates device maintenance.
  - » Data ports are located at the rear, facing servers. This simplifies cabling.

Product Specifications

Item	CE7855-32Q-EI
Ports	32 *40GE QSFP+
Switching capacity	2.56 Tbit/s
Forwarding rate	1,440 Mpps
Airflow design	Front-to-back or back-to-front
Device virtualization	iStack[1]
	SVF[2]
	M-LAG
Network virtualization	TRILL
	VXLAN routing and bridging
	BGP-EVPN
	QinQ access VXLAN
	IPv6 over VXLAN
Data center interconnect	VXLAN mapping, implementing interconnection between multiple DCI networks at Layer 2
SDN	Agile Controller
	VMware NSX
Network convergence	FCoE
	DCBX, PFC, ETS
Programmability	OPS
	CE modules for Ansible released on open source websites
Traffic analysis	NetStream
	sFlow
VLAN	Adding access, trunk, and hybrid interfaces to VLANs
	Default VLAN
	QinQ
	MUX VLAN
	GARP VLAN registration protocol(GVRP)

1 For details about the configuration, please see: http://support.huawei.com/onlinetoolsweb/virtual/en/dc/stack_index.html?dcb
2 For details about the configuration, please see: http://support.huawei.com/onlinetoolsweb/virtual/en/dc/svf_index.html?dcb

Item	CE7855-32Q-EI
ACL	Ingress14750; Egress 1000
MAC address table	Maximum:288k
	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
ARP	Maximum:128k
ND	Maximum:48k
IPv4 FIB	Maximum:256k
IP routing	IPv4 routing protocols, such as RIP, OSPF, BGP, and IS-IS
	IPv6 routing protocols, such as RIPng, OSPFv3, IS-ISv6, and BGP4+
IPv6 FIB	Maximum:128k
IPv6	IPv6 Neighbor Discovery (ND)
	Path MTU Discovery (PMTU)
	TCP6, ping IPv6, tracert IPv6, socket IPv6, UDP6, and Raw IP6
Multicast FIB	Maximum:8k
Multicast	IGMP, PIM-SM, PIM-DM, MSDP, and MBGP
	IGMP snooping
	Fast leave of multicast member interfaces
	Multicast traffic suppression
	Multicast VLAN
MPLS	MPLS
Reliability	LACP
	STP, RSTP, VBST, and MSTP
	BPDU protection, root protection, and loop protection
	Smart Link and multi-instance
	DLDP
	ERPS (G.8032)
	VRRP, VRRP load balancing, and BFD for VRRP
	BFD for BGP/IS-IS/OSPF/Static route
	BFD for VXLAN

Item	CE7855-32Q-EI
O&M	Network-wide path detection
	Telemetry
	Statistics on the buffer microburst status
	VXLAN OAM: VXLAN ping, VXLAN tracert
QoS	Traffic classification based on Layer 2 headers, Layer 3 protocols, Layer 4 protocols, and 802.1p priority
	Actions of ACL, CAR, re-marking, and scheduling
	Queue scheduling algorithms, including PQ, WRR, DRR, PQ+WRR, and PQ+DRR
	Congestion avoidance mechanisms, including WRED and tail drop
	Traffic shaping
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
	802.3az Energy Efficient Ethernet (EEE)
	Hot patches
	User operation logs
	Zero Touch Provisioning (ZTP)
Security and management	802.1x authentication
	Command line authority control based on user levels, preventing unauthorized users from using commands
	DoS, ARP, and ICMP attack defenses
	Port isolation, port security, and sticky MAC
	Binding of the IP address, MAC address, interface number, and VLAN ID
	Authentication methods, including AAA, RADIUS, and HWTACACS
	Remote Network Monitoring (RMON)
Dimensions (W x D x H)	442 mm x 607 mm x 43.6 mm
Weight (fully loaded)	11.2 kg (24.7 lb)
Environment parameters	Operating temperature: 0°C to 40°C (32°F to 104°F) (0 m to 1,800 m) Storage temperature: -40°C to +70°C (-40°F to 158°F) Relative humidity: 5% RH to 95% RH, non-condensing
Operating voltage	AC: 90 V to 290 V
Maximum power consumption	444 W

Ordering Information

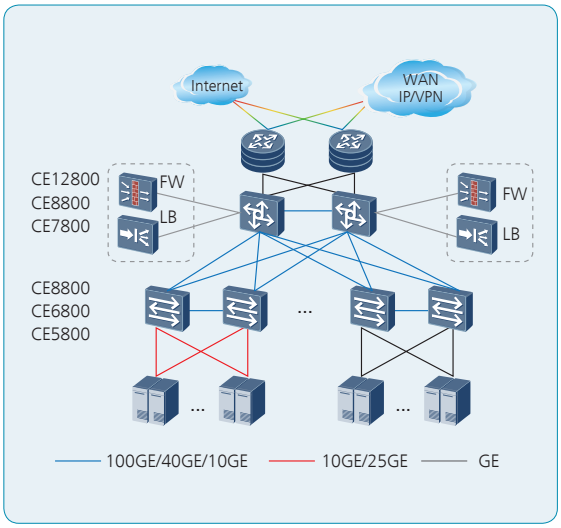
Mainframe		
CE7855-32Q-EI	CE7855-32Q-EI Switch (32-Port 40GE QSFP+, Without Fan and Power Module)	
CE7855-EI-F-B00	CE7855-32Q-EI Switch (32-Port 40GE QSFP+, 2*AC Power Module, 2*FAN Box, Port-side Exhaust)	
CE7855-EI-B-B00	CE7855-32Q-EI Switch (32-Port 40GE QSFP+, 2*AC Power Module, 2*FAN Box, Port-side Intake)	
Fan box		
Part Number	Product Description	Support Product
FAN-40HA-F	Fan box (HA, Front to Back, FAN panel side intake)	CE7855-32Q-EI
FAN-40HA-B	Fan box (HA, Back to Front, FAN panel side exhaust)	CE7855-32Q-EI
Power		
Part Number	Product Description	Support Product
PAC-600WA-F	600W AC Power Module (Front to Back, Power panel side intake)	CE7855-32Q-EI
PAC-600WA-B	600W AC Power Module (Back to Front, Power panel side exhaust)	CE7855-32Q-EI
Software		
CE-LIC-VXLAN	VXLAN function	
CE78-LIC-FCF16	CloudEngine 7800 FCF 16 Ports license	
CE78-LIC-FCFAL	CloudEngine 7800 FCF All Ports	
CE78-LIC-NPV	CloudEngine 7800 FCOE NPV Function	

Networking and Application

Data Center Applications

On a typical data center network, CE12800/CE8800/CE7800 switches work as core switches, whereas CE6800 and CE5800 switches work as ToR switches and connect to the core switches using 100GE/40GE/10GE ports. These switches use fabric technology such as TRILL or VXLAN 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.

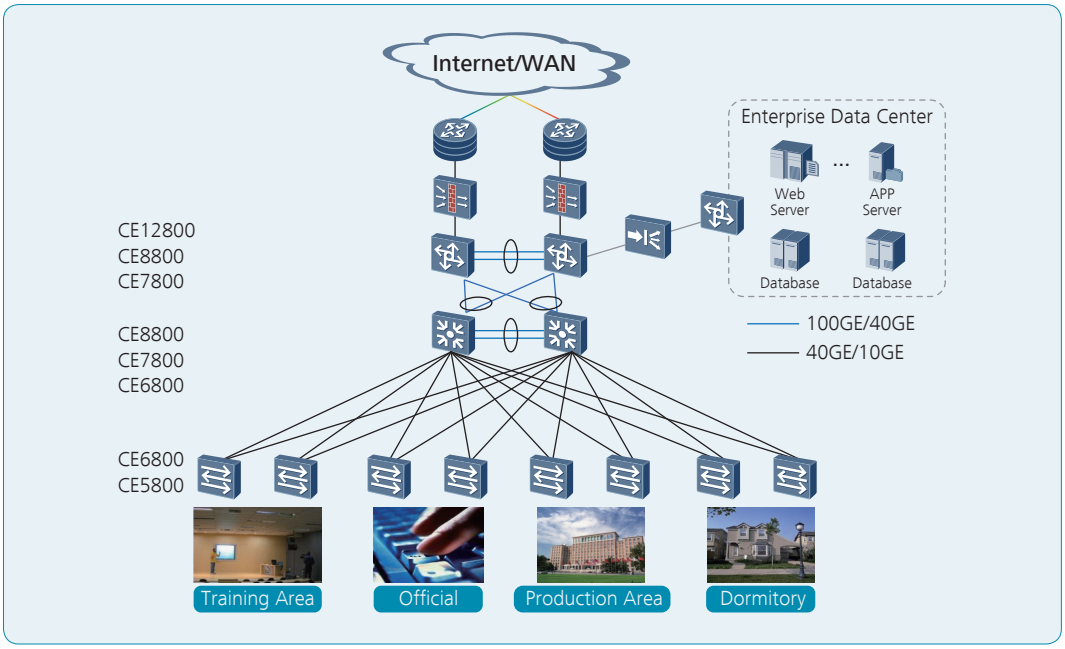


Campus Network Applications

The CE7800 can be used on a campus network. Its high-density, line-speed 40GE ports and high stacking capability can meet the ever-increasing demand for network bandwidth. CE7800 switches are cost-effective campus network switches, thanks to their extensive service features and innovative energy-saving technologies.

On a typical campus network, multiple CE12800/CE8800/CE7800 switches are virtualized into a logical core switch using CSS or iStack technology. Multiple CE6800 switches at the aggregation layer form a logical switch using iStack technology. CSS and iStack improve network reliability and simplify network management. At the access layer, CE5800 switches are virtualized with CloudFabric technology, such as SVF or M-LAG (vertical virtualization), to provide high-density line-rate ports.

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



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