CloudEngine 6850 Series Data Center Switches

HUAWEI TECHNOLOGIES CO., LTD.

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Product Overview

Huawei CloudEngine 6850 (CE6850 for short) series switches are next-generation 10G Ethernet switches designed for data centers and high-end campus networks, providing high-performance, high-density 10GE ports, and low latency. The CE6850 series uses an advanced hardware architecture with 40GE uplink ports and the industry's highest density of 10GE access ports.

Using the Huawei VRP8 software platform, CE6850 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. CE6850 switches can work with CE12800 switches to build an elastic, virtualized, high-quality fabric that meets the requirements of cloud-computing data centers.

CE6850 switches provide high-density 10GE access 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 CE6850 comes in nine models.

CE6850U-48S6Q-HI

48*10GE SFP+ ports, or 2/4/8G FC ports, 6*40GE QSFP+ ports

CE6850U-24S2Q-HI

24*10GE SFP+ ports, or 2/4/8G FC ports, 2*40GE QSFP+ ports

CE6855-48S6Q-HI

48*10GE SFP+ ports, 6*40GE QSFP+ ports

CE6855-48T6Q-HI

48*10GE Base-T ports, 6*40GE QSFP+ ports

CE6851-48S6Q-HI

48*10GE SFP+ ports, 6*40GE QSFP+ ports

CE6850-48T6Q-HI

48*10GE Base-T ports, 6*40GE QSFP+ ports

CE6850-48S6Q-HI

48*10GE SFP+ ports, 6*40GE QSFP+ ports

CE6850-48T4Q-EI

48*10GE Base-T ports, 4*40GE QSFP+ ports

CE6850-48S4Q-EI

48*10GE SFP+ ports, 4*40GE QSFP+ ports

Product Characteristics

High-Density 10GE Access

- The CE6850 is the industry's highest-performing 1 U ToR switch. It provides 1080 Mpps forwarding performance and supports L2/L3 line-rate forwarding.
- The CE6850 provides 72*10GE ports, the highest 10GE port density among 1 U ToR switches, allowing for high-density 10GE server access.
- The CE6850 has a maximum of six 40GE QSFP+ ports. Each QSFP+ port can be used as four 10GE SFP+ ports, providing flexibility in networking. The uplink 40GE QSFP+ ports can be connected to CE12800 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 up to 768*10GE access ports that provide high-density server access in a data center.

  - » Multiple stacked switches 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, highly reliable stacking
  - » The CE6850 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.

Inter-device Link Aggregation, High Efficiency and Reliability

- The CE6850 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.

Vertical Virtualization Simplifies Management

- The CE6850 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 enables different types of switches to set up a vertical virtual system. In an SVF system, CE6850 switches can act as spine nodes and leaf nodes CE6810 are virtualized into remote line cards of the spine switches. This facilitates cabling and equipment management in equipment rooms.
- Huawei's SVF is the first in the industry to implement local forwarding on leaf switches. When horizontal traffic dominates in a data center, SVF improves the forwarding efficiency and reduces network delay.

Large-Scale Routing Bridge, On-Demand Scaling

- The CE6850 supports the IETF Transparent Interconnection of Lots of Links (TRILL) protocol and can connect to 10G and 1G servers simultaneously. CE6850 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 suboptimal path selection problem in STP and increase link bandwidth efficiency to 100 percent.

- The CE6850 supports TRILL-based Layer 2 equal-cost paths, greatly improving links' load balancing capabilities. The network has a fat-tree architecture that enhances expansion.

Hardware Overlay Gateway Achieves Fast Service Deployment

- The CE6850 can work with a mainstream virtualization platform and acts a hardware gateway on an overlay network (VXLAN) to support up to 16 million tenants.
- The CE6850 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 CE6850 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.

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

- CE6850 series switches support 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.
- CE6850 series switches support centralized FCoE/FC gateway deployment, which makes network O&M simpler.
- Various CE6850 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.

Fast VM Migration, Policy Mobility

- The CE6850 works with Huawei's Agile Controller to permit network policies to be dynamically deployed on the CE6850. Agile Controller also supports online VM migration.
- Agile Controller delivers network policies through high-speed RADIUS interfaces. Its online VM migration is 10 to 20 times the rate of other industry platforms, enabling large-scale VM migrations.
- Agile Controller is based on open APIs and is compatible with all major virtualization platforms including VMware.

Full Openness and Programmability, Flexible Customization

- The CE6850 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 CE6850 supports Puppet automation software, which enables unified provisioning of physical and virtual networks.
- CE6850 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).

Zero Touch Provisioning, Automatic O&M

- The CE6850 supports Zero Touch Provisioning (ZTP). ZTP enables the CE6800 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.

Flexible Airflow Design, High Energy Efficiency

- Flexible front-to-back/back-to-front airflow design
  - » The CE6850 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.
- Energy-saving technology
  - » The CE6850 series switches have energy-saving chips and can measure system power consumption in real time. Fan speeds 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.
  - » CE6850 series switches support 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	CE6850U		CE6850						
	CE6850U-48S6Q-HI	CE6850U-24S2Q-HI	CE6855-48T6Q-HI	CE6855-48S6Q-HI	CE6851-48S6Q-HI	CE6850-48T6Q-HI	CE6850-48S6Q-HI	CE6850-48T4Q-EI	CE6850-48S4Q-EI
10G Base-T ports	0	0	48	0	0	48	0	48	0
SFP+ ports	48	24	0	48	48	0	48	0	48
FC ports	48	24	0	0	0	0	0	0	0
QSFP+ ports	6	2	6	6	6	6	6	4	4
Switching capacity	1.44 Tbit/s	640 Gbit/s	1.44 Tbit/s	1.44 Tbit/s	1.44 Tbit/s	1.44 Tbit/s	1.44 Tbit/s	1.28 Tbit/s	1.28 Tbit/s
Forwarding rate	1080 Mpps	480 Mpps	1080 Mpps	1080 Mpps	1080 Mpps	1080 Mpps	1080 Mpps	960 Mpps	960 Mpps
Airflow design	Front-to-back or back-to-front								
Device virtualization	iStack[1]								
	Super Virtual Fabric (SVF)[2]								
Network virtualization	M-LAG								
	TRILL								
	VXLAN routing and bridging (CE6800HI)								
	BGP-EVPN (CE6800HI)								
VM awareness	Agile Controller								
Network convergence	FCoE								
	DCBX, PFC, ETS								

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	CE6850U		CE6850						
	CE6850U-48S6Q-HI	CE6850U-24S2Q-HI	CE6855-48T6Q-HI	CE6855-48S6Q-HI	CE6851-48S6Q-HI	CE6850-48T6Q-HI	CE6850-48S6Q-HI	CE6850-48T4Q-EI	CE6850-48S4Q-EI
Program-mability	OpenFlow								
	OPS								
	Puppet, and OVSDB plugins released on open source websites								
	Linux container for open source and customization programming								
Traffic analysis	NetStream								
	sFlow								
VLAN	Adding access, trunk, and hybrid interfaces to VLANs								
	Default VLAN								
	QinQ								
	MUX VLAN								
	GVRP								
ACL	Ingress 3750 Egress 1000	Ingress 3750 Egress 1000	Ingress 14750 Egress 1000	Ingress 14750 Egress 1000	Ingress 3750 Egress 1000	Ingress 3750 Egress 1000	Ingress 3750 Egress 1000	Ingress 2250 Egress 1000	Ingress 2250 Egress 1000
MAC address table	Maximum : 288k	Maximum : 288k	Maximum : 288k	Maximum : 288k	Maximum : 288k	Maximum: 288k	Maximum : 288k	Maximum : 128k	Maximum: 128k
	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	128k	128k	128k	128k	128k	128k	16k	16k
IPv4 FIB (Maximum)	256k	256k	256k	256k	256k	256k	256k	16k	16k
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	IPv6 Neighbor Discovery (ND)								
	Path MTU Discovery (PMTU)								
	TCP6, ping IPv6, tracert IPv6, socket IPv6, UDP6, and Raw IP6								
IPv6 FIB (Maximum)	128k	128k	128k	128k	128k	128k	128k	8k	8k

Item	CE6850U		CE6850						
	CE6850U-48S6Q-HI	CE6850U-24S2Q-HI	CE6855-48T6Q-HI	CE6855-48S6Q-HI	CE6851-48S6Q-HI	CE6850-48T6Q-HI	CE6850-48S6Q-HI	CE6850-48T4Q-EI	CE6850-48S4Q-EI
Multicast FIB (Maximum)	8k	8k	8k	8k	8k	8k	8k	4k	4k
Multicast	IGMP, PIM-SM, PIM-DM, MSDP, and MBGP								
	IGMP snooping								
	IGMP proxy								
	Fast leave of multicast member interfaces								
	Multicast traffic suppression								
	Multicast VLAN								
MPLS	MPLS (CE6800HI)								
Reliability	LACP								
	STP, RSTP, VBST, 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								
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								

Item	CE6850U		CE6850						
	CE6850U-48S6Q-HI	CE6850U-24S2Q-HI	CE6855-48T6Q-HI	CE6855-48S6Q-HI	CE6851-48S6Q-HI	CE6850-48T6Q-HI	CE6850-48S6Q-HI	CE6850-48T4Q-EI	CE6850-48S4Q-EI
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								
	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, mm)	442 x 600 x 43.6		442 x 600 x 43.6	442 x 420 x 43.6		442 x 600 x 43.6			
Weight (fully loaded)	12.6 kg (27.8lb)	12 .3kg (27.1lb)	8.7 kg (19.2lb)	12.6 kg (27.8lb)	8.7 kg (19.2lb)	12.6 kg (27.8lb)	11.6kg (25.6lb)	11.4kg (25.1 lb)	11kg (24.2lb)
Environmental 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: 90-290V DC: 240V & 380V		AC: 90-290V DC: 240V & 380V	AC: 90-290V DC: -38.4V to -72V		AC: 90-290V DC: 240V & 380V		AC: 90-290V	AC: 90-290V DC: -38.4V to -72V
Max. power consumption	339W	282W	346 W	216 W	245 W	379W	272 W	380 W	272 W

Ordering Information

Mainframe	
CE6855-HI-B-B0A	CE6855-48S6Q-HI Switch (48-Port 10G SFP+, 6-Port 40GE QSFP+, 2*AC Power Module, 2*FAN Box, Port-side Intake)
CE6855-HI-F-B0A	CE6855-48S6Q-HI Switch (48-Port 10G SFP+, 6-Port 40GE QSFP+, 2*AC Power Module, 2*FAN Box, Port-side Exhaust)
CE6855-48S6Q-HI	CE6855-48S6Q-HI Switch (48-Port 10G SFP+, 6-Port 40GE QSFP+, 2*FAN Box, Without Fan and Power Module)
CE6855-48T6Q-HI	CE6855-48T6Q-HI Switch (48-Port 10GE RJ45, 6-Port 40GE QSFP+, 2*FAN Box, Without Fan and Power Module)
CE6855-HI-B-B00	CE6855-48T6Q-HI Switch (48-Port 10GE RJ45, 6-Port 40GE QSFP+, 2*AC Power Module, 2*FAN Box, Port-side Intake)
CE6855-HI-F-B00	CE6855-48T6Q-HI Switch (48-Port 10GE RJ45, 6-Port 40GE QSFP+, 2*AC Power Module, 2*FAN Box, Port-side Exhaust)
CE6850-HI-B00	CE6850-48S6Q-HI Switch (2*600W AC Power Module, 2*FAN Box, Port Side Exhaust)
CE6850-EI-B00	CE6850-48S4Q-EI Switch (2*350W AC Power Module, 2*FAN Box, Port side exhaust)
CE6850-EI-B01	CE6850-48T4Q-EI Switch (2*600W AC Power Module, 2*FAN Box, Port side exhaust)
CE6850U-48S6Q-HI	CE6850U-48S6Q-HI Switch (48-Port 10GE SFP+, support 2/4/8G FC, 6-Port 40GE QSFP+, Without Fan and Power Module)
CE6850U-24S2Q-HI	CE6850U-24S2Q-HI Switch (24-Port 10GE SFP+, support 2/4/8G FC, 2-Port 40GE QSFP+, Without Fan and Power Module)
CE6851-48S6Q-HI	CE6851-48S6Q-HI Switch (48-Port 10GE SFP+, 6-Port 40GE QSFP+, Without Fan and Power Module)
CE6850-48T6Q-HI	CE6850-48T 6Q-HI Switch (48-Port 10GE RJ45, 6-Port 40GE QSFP+, Without Fan and Power Module)
CE6850-48S6Q-HI	CE6850-48S6Q-HI Switch (48-Port 10GE SFP+, 6-Port 40GE QSFP+, Without Fan and Power Module)
CE6850-48S4Q-EI	CE6850-48S4Q-EI Switch (48-Port 10GE SFP+, 4-Port 40G QSFP+, Without Fan and Power Module)
CE6850-48T4Q-EI	CE6850-48T4Q-EI Switch (48-port 10GE RJ45, 4-port 40G QSFP+, Without Fan and Power Module)

Fan box

Part Number	Product Description	Support Product
FAN-060A-F	Fan box (F, FAN panel side intake)	CE6850-48S6Q-HI, CE6850U-48S6Q-HI, CE6850-48T6Q-HI, CE6850U-24S2Q-HI, CE6855-48T6Q-HI

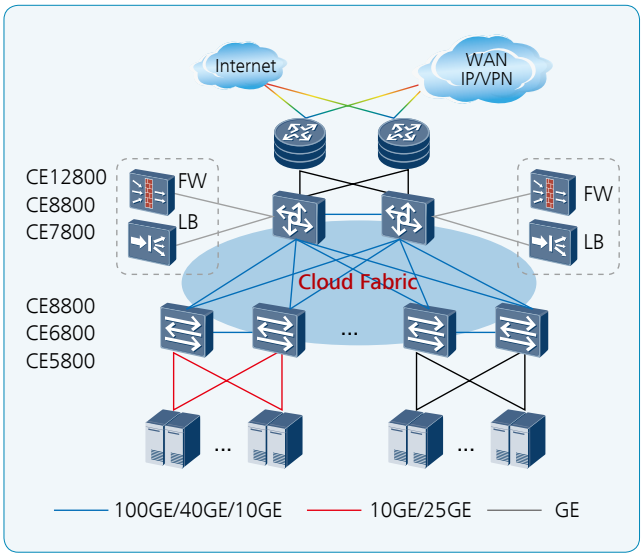
FAN-060A-B	Fan box (B, FAN panel side exhaust)	CE6850-48S6Q-HI, CE6850U-48S6Q-HI, CE6850-48T6Q-HI, CE6850U-24S2Q-HI, CE6855-48T6Q-HI
FAN-40EA-F	Fan box (EA, Front to Back, FAN panel side intake)	CE6850-48T4Q-EI, CE6850-48S4Q-EI, CE6851-48S6Q-HI, CE6855-48S6Q-HI
FAN-40EA-B	Fan box (EA, Back to Front, FAN panel side exhaust)	CE6850-48T4Q-EI, CE6850-48S4Q-EI, CE6851-48S6Q-HI, CE6855-48S6Q-HI
Power		
Part Number	Product Description	Support Product
PAC-600WB-F	600W AC&240V DC Power Module (Power panel side intake)	CE6850-48S6Q-HI, CE6850U-48S6Q-HI, CE6850-48T6Q-HI, CE6850U-24S2Q-HI, CE6855-48T6Q-HI
PAC-600WB-B	600W AC&240V DC Power Module (Power panel side exhaust)	CE6850-48S6Q-HI, CE6850U-48S6Q-HI, CE6850-48T6Q-HI, CE6850U-24S2Q-HI, CE6855-48T6Q-HI
PHD-600WA-F	600W HVDC Power Module (Power panel side intake)	CE6850-48S6Q-HI, CE6850U-48S6Q-HI, CE6850-48T6Q-HI, CE6850U-24S2Q-HI, CE6855-48T6Q-HI
PHD-600WA-B	600W HVDC Power Module (Power panel side exhaust)	CE6850-48S6Q-HI, CE6850U-48S6Q-HI, CE6850-48T6Q-HI, CE6850U-24S2Q-HI, CE6855-48T6Q-HI
PAC-350WA-F	350W AC Power Module (Front to Back, Power panel side intake)	CE6850-48S4Q-EI
PAC-350WA-B	350W AC Power Module (Back to Front, Power panel side exhaust)	CE6850-48S4Q-EI
PAC-600WA-F	600W AC Power Module (Front to Back, Power panel side intake)	CE6850-48T4Q-EI, CE6851-48S6Q-HI, CE6855-48S6Q-HI
PAC-600WA-B	600W AC Power Module (Back to Front, Power panel side exhaust)	CE6850-48T4Q-EI, CE6851-48S6Q-HI, CE6855-48S6Q-HI
PDC-350WA-F	350W DC Power Module (Front to Back, Power panel side intake)	CE6850-48S4Q-EI, CE6851-48S6Q-HI, CE6855-48S6Q-HI
PDC-350WA-B	350W DC Power Module (Back to Front, Power panel side exhaust)	CE6850-48S4Q-EI, CE6851-48S6Q-HI, CE6855-48S6Q-HI
Software		
CE68-LIC-VXLAN	CloudEngine 6800 VXLAN Function	
CE68-LIC-FCF16	CloudEngine 6800 FCF 16 Ports	
CE68-LIC-FCFAL	CloudEngine 6800 FCF All Ports	
CE6800-LIC-NPV	CloudEngine 6800 FCOE NPV Function	

Networking and Applications

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.

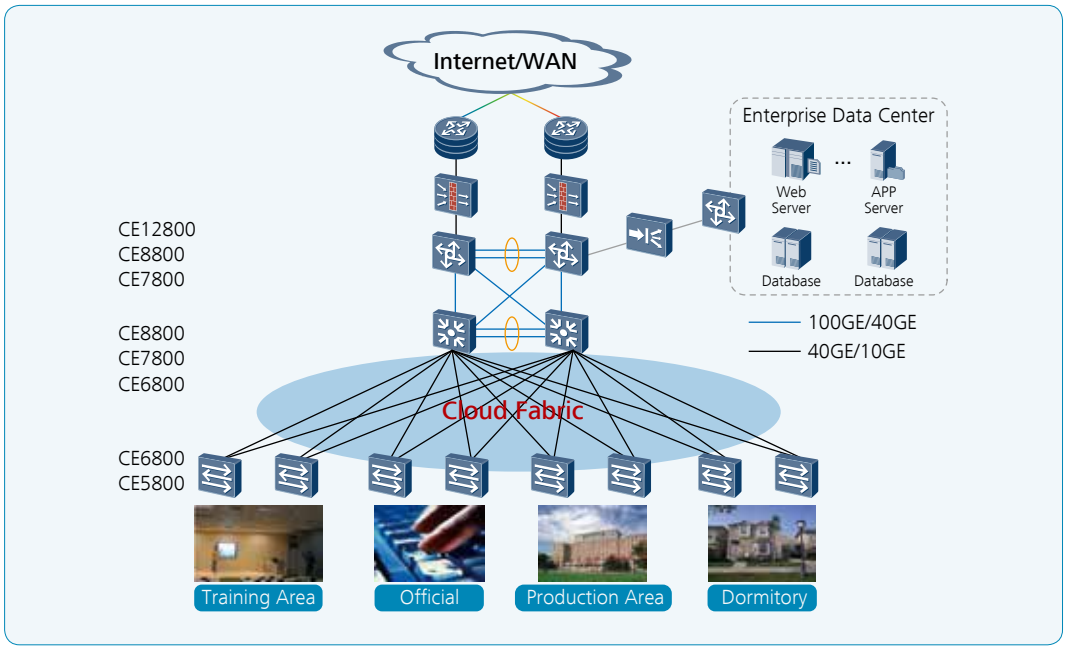


Campus Network Applications

CE6800 switches can be used as aggregation or core switches on a campus network. Their high-density, line-rate 10GE ports and high stacking capability can meet the ever-increasing demand for network bandwidth. CE6800 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 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. At the access layer, CE6800/CE5800 switches are virtualized with cloud fabric technology, such as SVF or M-LAG (vertical virtualization), to provide high-density line-rate ports.

Note: iStack technology is also widely used in data centers to facilitate network management.



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