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 five models.

CE6850U-48S6Q-HI

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

CE6855-48S6Q-HI/ CE6856-48S6Q-HI

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

CE6855-48T6Q-HI/ CE6856-48T6Q-HI

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

CE6851-48S6Q-HI

48*10GE SFP+ ports, 6*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 points of failure 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.
- 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.

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 an 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.

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 CE modules for Ansible, which enables unified provisioning of physical and virtual networks.
- CE6850 switches can seamlessly 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 networking (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.

Intelligent O&M with the FabricInsight Solution

- The CE6850 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 CE6850 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 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	CE6856-48T6Q-HI	CE6856-48S6Q-HI	CE6855-48T6Q-HI	CE6855-48S6Q-HI	CE6851-48S6Q-HI
10G Base-T ports	0	48	0	48	0	0
SFP+ ports	48	0	48	0	48	48
FC ports	48	0	0	0	0	0
QSFP+ ports	6					
Switching capacity	2.56 Tbit/s (Switching capacity after stacking: 40.96 Tbit/s)					
Forwarding rate	1080 mpps					
Airflow design	Front-to-back or back-to-front					
Device virtualization	iStack[1]					
	Super Virtual Fabric (SVF)[2]					
	M-LAG					
Network virtualization	TRILL					
	VXLAN routing and bridging					
	BGP-EVPN					
	QinQ access VXLAN					
Data center interconnect	VXLAN mapping, implementing interconnection between multiple DCI networks at Layer 2					
SDN Controller	Agile Controller					
	VMware NSX					
Network convergence	FCoE					
	DCBX, PFC, ETS					
Programmability	OPS					
	CE modules for Ansible released on open source websites					

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	CE6856-48T6Q-HI	CE6856-48S6Q-HI	CE6855-48T6Q-HI	CE6855-48S6Q-HI	CE6851-48S6Q-HI
Traffic analysis	NetStream					
	sFlow					
VLAN	Adding access, trunk, and hybrid interfaces to VLANs					
	Default VLAN					
	QinQ					
	MUX VLAN					
	GVRP					
ACL	Ingress3750 Egress 1000	Ingress14750 Egress 1000	Ingress14750 Egress 1000	Ingress14750 Egress 1000	Ingress14750 Egress 1000	Ingress3750 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	IPv6 Neighbor Discovery (ND)					
	IPv6 VXLAN over IPv4					
	Path MTU Discovery (PMTU)					
	TCP6, ping IPv6, tracert IPv6, socket IPv6, UDP6, and Raw IP6					
IPv6 FIB (Maximum)	128k					
Multicast FIB (Maximum)	8k					

Item	CE6850U	CE6850				
	CE6850U-48S6Q-HI	CE6856-48T6Q-HI	CE6856-48S6Q-HI	CE6855-48T6Q-HI	CE6855-48S6Q-HI	CE6851-48S6Q-HI
Multicast	IGMP, PIM-SM, PIM-DM, MSDP, and MBGP					
	IGMP snooping					
	Fast leaving of multicast member interfaces					
	Multicast traffic suppression					
	Multicast VLAN					
	Multicast VXLAN					
MPLS	MPLS					
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					
	BFD for VXLAN					
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					
O&M	Network-wide path detection					
	Telemetry					
	Statistics on the buffer microburst status					
	VXLAN OAM: VXLAN ping, VXLAN tracert					

Item	CE6850U	CE6850				
	CE6850U-48S6Q-HI	CE6856-48T6Q-HI	CE6856-48S6Q-HI	CE6855-48T6Q-HI	CE6855-48S6Q-HI	CE6851-48S6Q-HI
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)	442 mm x 600 mm x 43.6 mm	442 mm x 600 mm x 43.6 mm	442 mm x 420 mm x 43.6 mm	442 mm x 600 mm x 43.6 mm	442 mm x 420 mm x 43.6 mm	42 mm x 420 mm x 43.6 mm
Weight (fully loaded)	12.6 kg (27.8lb)	12.6 kg (27.8lb)	8.7 kg (19.2lb)	12.6 kg (27.8lb)	8.7 kg (19.2lb)	8.7 kg (19.2lb)
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 V to 290 V HDC: 240 V (188 V to ~288 V) 380 V (188 V ~to 400 V)	AC: 90 V to 290 V DC: –38.4 V to –72 V	AC: 90 V to 290 V HDC: 240 V (188 V to 288 V) 380 V (188 V to 400 V)	AC: 90 V to 290 V DC: –38.4 V to –72 V	AC: 90 V to 290 V HDC: 240 V (188 V to 288 V) 380 V (188 V to 400 V)	AC: 90 V to 290 V DC: –38.4 V to –72 V
Max. power consumption	339W	346 W	216 W	346 W	216 W	245 W

Ordering Information

Mainframe	
CE6856-48S6Q-HI	CE6856-48S6Q-HI Switch(48-Port 10G SFP+,6-Port 40GE QSFP+,2*FAN Box, Without Fan and Power Module)
CE6856-HI-B-B0A	CE6856-48S6Q-HI Switch(48-Port 10G SFP+,6-Port 40GE QSFP+, 2*AC Power Module, 2*FAN Box, Port-side Intake)
CE6856-HI-F-B0A	CE6856-48S6Q-HI Switch(48-Port 10G SFP+,6-Port 40GE QSFP+,2*AC Power Module,2*FAN Box,Port-side Exhaust)
CE6856-48T6Q-HI	CE6856-48T6Q-HI Switch(48-Port 10GE RJ45,6-Port 40GE QSFP+,2*FAN Box,Without Fan and Power Module)
CE6856-HI-B-B00	CE6856-48T6Q-HI Switch(48-Port 10GE RJ45,6-Port 40GE QSFP+,2*AC Power Module,2*FAN Box,Port-side Intake)
CE6856-HI-F-B00	CE6856-48T6Q-HI Switch(48-Port 10GE RJ45,6-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-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)
CE6855-48T6Q-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)
CE6851-48S6Q-HI-X	CE6851-48S6Q-HI Switch(48-Port 10G SFP+,6-Port 40GE QSFP+,2*FAN Box,Without Fan and Power Module)
CE6851-HI-B-B0A	CE6851-48S6Q-HI Switch(48-Port 10G SFP+,6-Port 40GE QSFP+,2*AC Power Module,2*FAN Box,Port-side Intake)
CE6851-HI-F-B0A	CE6851-48S6Q-HI Switch(48-Port 10G SFP+,6-Port 40GE QSFP+,2*AC Power Module,2*FAN Box,Port-side Exhaust)
CE6850U-48S6Q-HI	CE6850U-48S6Q-HI Switch(48-Port UP SFP+,6-Port 40GE QSFP+,Without Fan and Power Module)
CE6850U-HI-B-B0A	CE6850U-48S6Q-HI Switch(48-Port 10GE SFP+,support 2/4/8G FC,6-Port 40GE QSFP+,2*AC Power Module,2*FAN Box,Port-side Intake)
CE6850U-HI-F-B0A	CE6850U-48S6Q-HI Switch(48-Port 10GE SFP+,support 2/4/8G FC,6-Port 40GE QSFP+,2*AC Power Module,2*FAN Box,Port-side Exhaust)
CE6850-HI-B-B00	CE6850-48T6Q-HI Switch(48-Port 10GE RJ45,6-Port 40GE QSFP+,2*AC Power Module,2*FAN Box,Port-side Intake)

CE6850-HI-F-B00	CE6850-48T6Q-HI Switch(48-Port 10GE RJ45,6-Port 40GE QSFP+,2*AC Power Module,2*FAN Box,Port-side Exhaust)

Fan box

Part Number	Product Description	Support Product
FAN-060A-F	Fan box (F, FAN panel side intake)	CE6850U-48S6Q-HI, CE6855-48T6Q-HI, CE6856-48T6Q-HI
FAN-060A-B	Fan box (B, FAN panel side exhaust)	CE6850U-48S6Q-HI, CE6855-48T6Q-HI, CE6856-48T6Q-HI
FAN-40EA-F	Fan box (EA, Front to Back, FAN panel side intake)	CE6851-48S6Q-HI, CE6855-48S6Q-HI, CE6856-48S6Q-HI
FAN-40EA-B	Fan box (EA, Back to Front, FAN panel side exhaust)	CE6851-48S6Q-HI, CE6855-48S6Q-HI, CE6856-48S6Q-HI

Power

Part Number	Product Description	Support Product
PDC-1K2WA-F	1200W DC Power Module (Front to Back, Power panel side intake)	CE6850U-48S6Q-HI, CE6850-48S6Q-HI, CE6855-48T6Q-HI, CE6856-48T6Q-HI
PDC-1K2WA-B	1200W DC Power Module (Back to Front, Power panel side exhaust)	CE6850U-48S6Q-HI, CE6850-48S6Q-HI, CE6855-48T6Q-HI, CE6856-48T6Q-HI
PAC-600WB-F	600W AC&240V DC Power Module (Power panel side intake)	CE6850U-48S6Q-HI, CE6855-48T6Q-HI, CE6856-48T6Q-HI
PAC-600WB-B	600W AC&240V DC Power Module (Power panel side exhaust)	CE6850U-48S6Q-HI, CE6855-48T6Q-HI, CE6856-48T6Q-HI
PHD-600WA-F	600W HVDC Power Module (Power panel side intake)	E6850U-48S6Q-HI, CE6855-48T6Q-HI, CE6856-48T6Q-HI
PHD-600WA-B	600W HVDC Power Module (Power panel side exhaust)	CE6850U-48S6Q-HI, CE6855-48T6Q-HI, CE6856-48T6Q-HI
PAC-600WA-F	600W AC Power Module (Front to Back, Power panel side intake)	CE6851-48S6Q-HI, CE6855-48S6Q-HI, CE6856-48S6Q-HI
PAC-600WA-B	600W AC Power Module (Back to Front, Power panel side exhaust)	CE6851-48S6Q-HI, CE6855-48S6Q-HI, CE6856-48S6Q-HI
PDC-350WA-F	350W DC Power Module (Front to Back, Power panel side intake)	CE6851-48S6Q-HI, CE6855-48S6Q-HI, CE6856-48S6Q-HI
PDC-350WA-B	350W DC Power Module (Back to Front, Power panel side exhaust)	CE6851-48S6Q-HI, CE6855-48S6Q-HI, CE6856-48S6Q-HI

Software

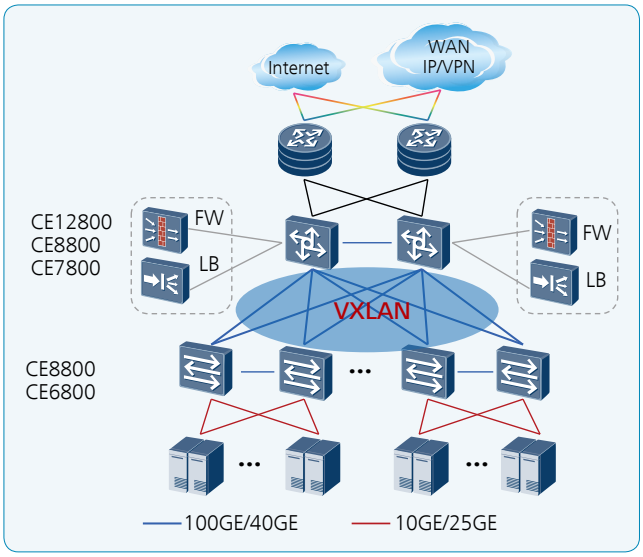
CE68-LIC-VXLAN	CloudEngine 6800 VXLAN Function
CE68-LIC-FCF16	CloudEngine 6800 FCF 16 Ports
CE68-LIC-FCFAL	CloudEngine 6800 FCF All Ports
CE6800-LIC-NPV	CloudEngine 6800 FCOE NPV Function
CE68-LIC-TLM	CE6800 Telemetry Function
CE68-LIC-BASE	CE6800 Basic Software Function

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.

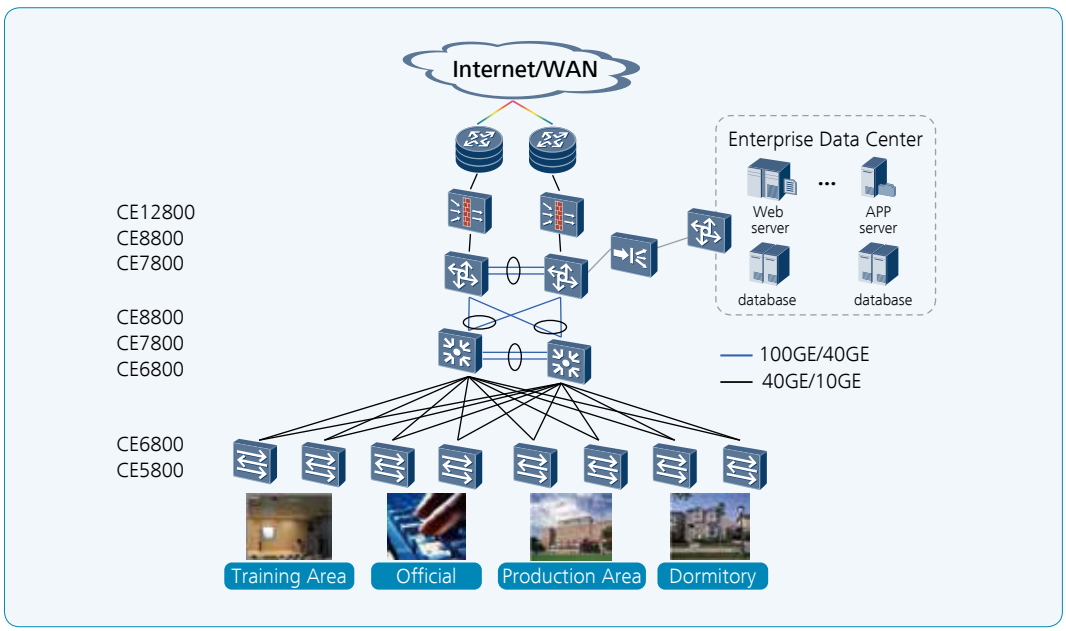


Campus Network Applications

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 CloudFabric 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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