CloudEngine Series
Data Center
Switches

HUAWEI

CloudEngine Series Data Center Switches

Product and Solution Overview

Huawei CloudEngine (CE) series switches are high-performance cloud switches designed for next-generation data centers and high-end campus networks. This series includes Huawei's flagship CE12800 core switches with the world's highest performance, CE8800/7800/6800/5800 high-performance aggregation and access switches, and CE1800V distributed virtual switch. The CloudEngine series uses Huawei's next-generation VRP8 software platform and supports extensive data center and campus network service features.

Huawei has combined the CloudEngine series switches with Huawei transmission, routing, security, and network management products to create the Cloud Fabric Solution for next-generation cloud-computing data centers. This solution can build a stable network architecture that will support business growth and development for the next 10 years.

Product Series

CE12800 Series

CE12800 switches are high-performance core switches designed for data center networks and high-end campus networks.

Their advanced hardware architecture offers the highest performance of any currently available core switches, with as much as 178 Tbit/s per chassis switching capacity and up to 576*100GE, 576*40GE, 2,304*25GE, or 2,304*10GE line rate ports.

The CE12800 switches use an industry-leading Clos architecture and a front-to-back airflow design to provide industrial-grade reliability. The switches also provide comprehensive virtualization capabilities and data center service features. Moreover, their energy-saving designs greatly reduce power consumption.

The CE12800 series is available in six models: CE12816, CE12812, CE12808, CE12804, CE12808S, and CE12804S. They all use interchangeable modules to reduce costs of spare parts. This design ensures device scalability and provides investment protection.

Figure 1 CE12800 series

CE8800 Series

The CE8800 series switch is a high-performance 2U TOR switch released for data centers and high-end campus networks. It can act as an access node to support high-density 25GE/10GE server access, a compact core or aggregation node on a small-sized network, or connect to High-Performance Computing (HPC) servers.

The CE8800 is the industry's first 25GE access TOR switch and provides high-density 100GE/40GE uplink ports for connection with core switches. It provides up to 32*100GE, 64*40GE, or 128*25GE/10GE ports, which can be used in combinations through cards, delivering flexible, high-density access and aggregation capabilities.

The CE8800 comes in one model.

CE8860-4C-EI

Supports four half-width interface cards:
- 24-port 10GE SFP+ or 25GE SFP28 and 2-port 100GE QSFP28 interface card
- 24-port 10GE BASE-T and 2-port 100GE QSFP28 interface card
- 8-port 100GE QSFP28 interface card
- 16-port 40GE QSFP+ interface card

CE7800 Series

The CE7800 switches can be used as core or aggregation switches on data centers and campus networks.

Using an advanced hardware design, the CE7800 series provides high-density 40GE QSFP+ ports (each can be split into four 10GE SFP+ ports), L2/L3 line-rate forwarding, extensive data center features, high-performance stacking capability. CE7800 switches support front-to-back and back-to-front airflows for you to choose based on the airflow direction in your equipment room.

The CE7800 series includes two models.

CE7850-32Q-EI

32*40GE QSFP+ ports

CE7855-32Q-EI

32*40GE QSFP+ ports

CE6800 Series

The CE6800 switches provide high-density 10GE/25GE access in data centers and can also be used as core or aggregation switches on campus networks.

The CE6800 series has an advanced hardware design, which provides the industry's highest density of 10GE/25GE downlink ports as well as 100GE QSFP28 or 40GE QSFP+ uplink ports. (A 100GE QSFP28 port can be split into four 25GE SFP28 ports or work as a 40GE QSFP+ port. A 40GE QSFP+ port can be split into four 10GE SFP+ ports). The CE6800 switches provide L2/L3 line-rate forwarding on these interfaces and support extensive data center features, high-performance stacking capability. They support front-to-back and back-to-front airflows for you to choose based on the airflow direction in your equipment room.

The CE6800 series comes in 17 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

CE6870-48S6CQ-EI

48*10GE SFP+ ports, 6*100GE QSFP28 ports

CE6870-24S6CQ-EI

24*10GE SFP+ ports, 6*100GE QSFP28 ports

CE6860-48S8CQ-EI

48*25GE SFP28 ports, 8*100GE QSFP28 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

CE6810-48S4Q-EI

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

CE6810-48S4Q-LI

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

CE6810-32T16S4Q-LI

32*10GE BASE-T ports, 16*10GE SFP+ ports, 4*40GE QSFP+ ports

CE6810-48S-LI

48*10GE SFP+ ports

CE6810-24S2Q-LI

24*10GE SFP+ ports, 2*40GE QSFP+ ports

CE5800 Series

The CE5800 switches provide high-density GE access in data centers and can also be used as aggregation or access switches on campus networks.

The CE5800 series is the first in the industry to provide 40GE uplink ports, and the advanced hardware design supports the industry's highest density of GE access ports. The CE5800 switches provide L2/L3 line-

speed forwarding, extensive data center features, and high-performance stacking capability. They support front-to-back and back-to-front airflows for you to choose based on the airflow direction in your equipment room.

The CE5800 series comes in six models.

CE5855-48T4S2Q-EI

48*GE BASE-T ports, 4*10GE SFP+ ports, 2*40GE QSFP+ ports

CE5855-24T4S2Q-EI

24*GE BASE-T ports, 4*10GE SFP+ ports, 2*40GE QSFP+ ports
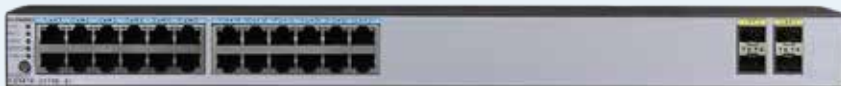
CE5850-48T4S2Q-HI

48*GE BASE-T ports, 4*10GE SFP+ ports, 2*40GE QSFP+ ports

CE5850-48T4S2Q-EI

48*GE BASE-T ports, 4*10GE SFP+ ports, 2*40GE QSFP+ ports

CE5810-48T4S-EI

48*GE BASE-T ports, 4*10GE SFP+ ports

CE5810-24T4S-EI

24*GE BASE-T ports, 4*10GE SFP+ ports

CloudEngine Series Data Center Switches

CloudEngine 1800V

CE1800V is a distributed virtual switch used in a virtualized data center environment.

The CE1800V vSwitch provides extensive functions, good interoperability, and is easy to manage. It can run on VMware, Software, and open-source virtualization platforms to provide high-speed distributed switching for VMs. Huawei CE1800V software switch, CloudEngine series hardware switches, and Agile Controller jointly build an integrated network virtualization solution.

Product and Solution Advantages

The CE series data center switches will assist you to build an elastic, virtualized, and high-quality agile network with their industry-leading performance, comprehensive virtualization capabilities, extensive data center features, and well-designed hardware architecture. The agile network is sustainable for business development.

Elastic CloudEngine

An elastic network to support business growth for the next 10 years: CE switches build a non-blocking switching network that supports data center server evolution from GE, 10GE, 25GE, 40GE, 50GE and, finally, to 100GE. This non-blocking switching platform removes the need to upgrade data center networks to meet requirements for 40GE, 50GE or even 100GE access.

World's highest-performance core switch: The CE12800 provides 11 Tbit/s per slot bidirectional bandwidth (scalable to 22 Tbit/s) and 178 Tbit/s switching capacity (scalable to 356 Tbit/s). Supporting 36*100GE and 36*40GE line cards, a CE12800 switch can provide as many as 576*100GE, 576*40GE, 2,304*25GE or 2,304*10GE line-rate ports. The high capacity and port density make the CE12800 an industry leader.

Industry's first 25GE access TOR switch: The CE8800 is the industry's first 25GE TOR switch, which supports 10GE, 25GE, 50GE, or even 100GE access, and can connect to core switches through high-density 100GE/40GE ports. The CE7800 provides high-density 40GE port for traffic aggregation. The CE6800 and CE5800 provide ultra-high densities of 25GE, 10GE, and GE access ports and 40GE or 100GE uplink ports. The CE6870 provides 4 GB buffer size, 10GE downlink ports, and 100GE uplink ports. All these TOR switches provide industry-leading forwarding capability to build high-performance networks.

Highest server access capability in the industry: The CE12800 core switches and CE8800/CE7800/CE6800/CE5800 TOR switches can be connected using 100GE/40GE links to set up a two-layer flat data center network. This network provides an industry-leading server access capability, capable of accommodating tens of thousands of GE, 10GE, 25GE, 40GE, 50GE, or 100GE servers.
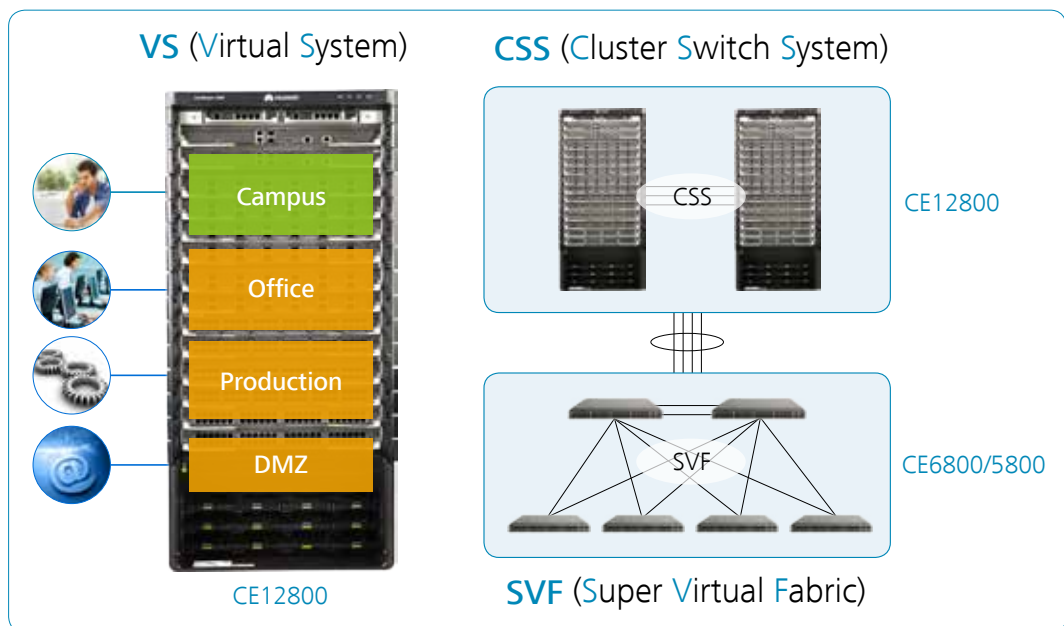
Virtualized CloudEngine

Comprehensive network virtualization capabilities:

1. The CloudEngine series uses Virtual System (VS), Cluster Switch System (CSS), and Super Virtual Fabric (SVF) technologies to flexibly adjust network boundaries that meet requirements for network virtualization.

2. The switches use Transparent Interconnection of Lots of Links (TRILL) to support service and server virtualization.

3. The switches use Ethernet Virtual Private Network (EVPN) technology to optimize Layer 2 interconnection between data centers and enable service resource sharing across data centers. Using the standard EVPN protocol enables the switches to seamlessly interoperate with devices from mainstream vendors.

4. The switches support BGP-EVPN, which can run as the VXLAN control plane to simplify VXLAN configuration within and between data centers.

VS for on-demand resource sharing: The CE12800 supports VS that can virtualize one switch into as many as 16 logical switches. This 1:16 virtualization capability allows one core switch to serve multiple business areas of an enterprise (such as production, office, and DMZ areas) or multiple tenants. VS technology improves efficiency of hardware resources and reduces network construction costs while maintaining high security.

Figure 2 Huawei's virtualized cloud engine architecture

SVF and CSS simplify network management: CloudEngine series switches support SVF and CSS, which can virtualize multiple homogeneous or heterogeneous physical switches into one logical switch to simplify network management and improve reliability. CSS is an industry-leading core switch cluster technology that virtualizes core devices horizontally into one logical switch. SVF is a vertical virtualization technology that virtualizes leaf switches into remote line cards of the spine switch, making it easier to cable equipment rooms and manage devices. Huawei's SVF technology exclusively implements local forwarding on leaf switches. When horizontal traffic dominates in a data center, SVF improves the forwarding efficiency and reduces network delay.

Innovative CSS + VS synergy technology: 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.

Large-scale routing bridge network to support flexible service deployment: All CloudEngine series switches support TRILL, a standard IETF protocol. The TRILL protocol helps set up a large Layer 2 network with more than 500 nodes. This network enables flexible service deployment and VM migration free from restrictions imposed by physical locations. A TRILL network supports both 10GE and GE servers.

Figure 3 VMs migrating on a large Layer 2 network

Agile Controller enables automatic migration of VMs: Huawei Agile Controller automatically delivers network configurations to devices when VMs migrate. Additionally, Agile Controller provides high-speed RADIUS interfaces to increase VM migration speeds to 10 to 20 times the industry average.

Figure 4 Automatic VM migration
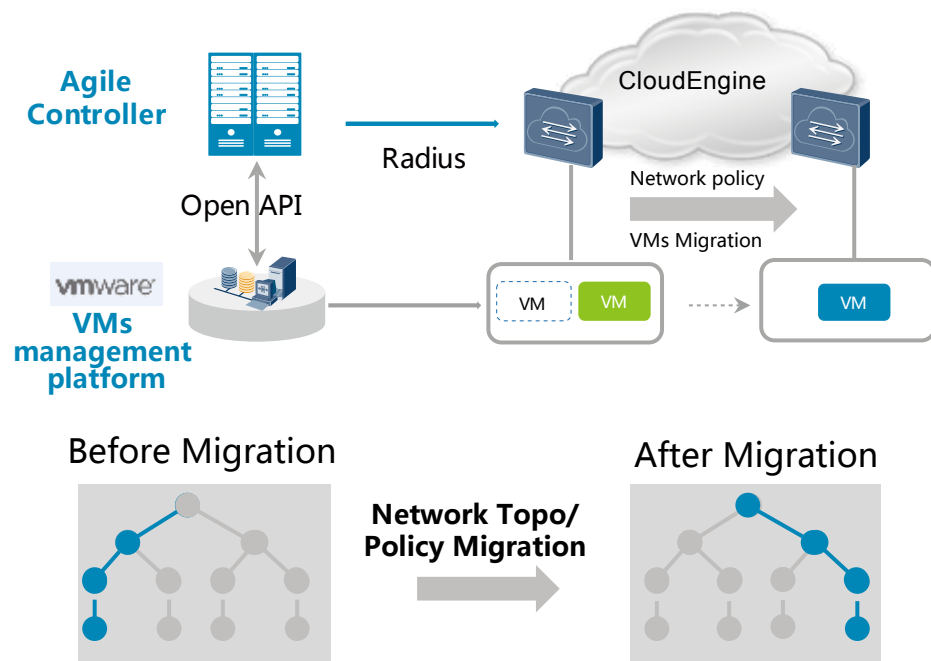
BGP-EVPN achieves resource sharing across data centers: The CloudEngine series switches support VXLAN and can use the standard BGP-EVPN protocol as the VXLAN control plane. EVPN-based VXLAN supports Layer 2 interconnection between data centers across an IP WAN, so that multiple data centers can be consolidated into a large IT resource pool to allow free VM migrations across data centers. Using this standard protocol, CloudEngine series switches can seamlessly connect to devices from mainstream vendors.

Figure 5 EVN implementing resource sharing across data centers
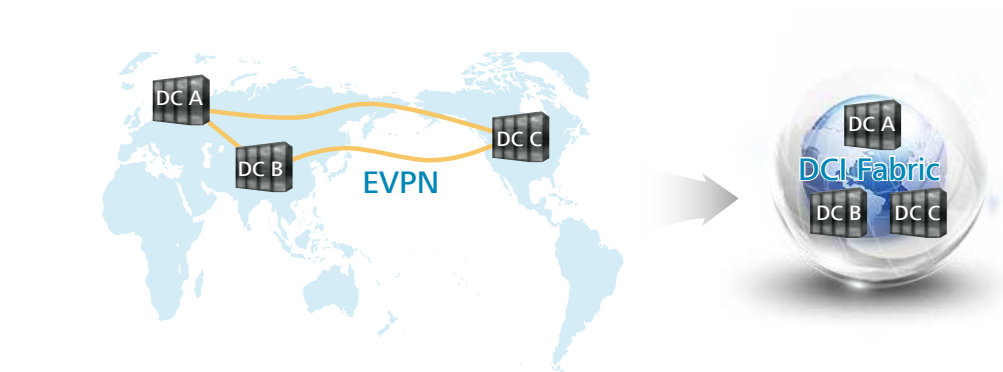
Agile CloudEngine

Fully programmable, agile switch: Huawei CloudEngine series switches enable programmability on the forwarding and control planes. Huawei's line cards that use Ethernet Network Processor (ENP) provide programmability on the forwarding plane, allowing for fast development of network functions. The Open Programmability System (OPS) of the CloudEngine series switches provides programmability on the control plane and has various open APIs to connect to mainstream cloud platforms and third-party controllers, building an open and controllable network.

Figure 6 Programmability of Huawei CloudEngine series switches
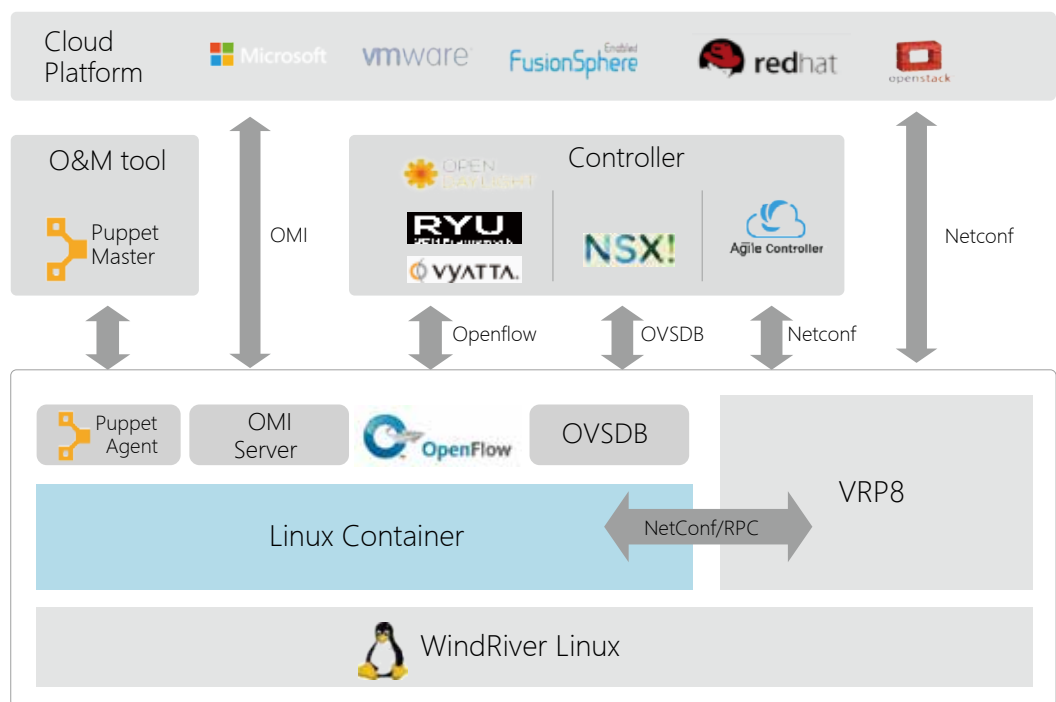
Linux Containers Technology Provides Openness and Programmability: The CloudEngine series switch supports Linux containers technology and allows customers to run standard Linux Shell scripts for programming. Linux containers set up virtual network connections with the VRP8 system, enabling third-party software to invoke the standard Netconf and OpenFlow interfaces of the VRP system. In this way, the CE12800 can be integrated with third-party software, meeting customers' requirements for openness and flexibility.Customers can load various third-party software to containers to expand network functions and simplify device management and maintenance. Through in-depth collaboration with mainstream cloud platforms, controllers, and O&M tools, the CE12800 series switches can be integrated into SDN and cloud computing platforms flexibly and quickly.

ENP supports agile service innovation: The CE12800 uses Huawei's innovative ENP programmable chip. CE12800's line cards with this chip provide openness on the forwarding plane and support software-defined network functions. This programmability allows fast service provisioning without replacing hardware devices, and therefore reduces CAPEX. The service provisioning period is shortened from two years to six months.

OPS provides service customization: The CloudEngine series switches use the VRP8 software platform, on which an OPS module is embedded to provide programmability on the control plane. The OPS provides open APIs and can be integrated with mainstream cloud platforms (including commercial and open cloud platforms) and third-party controllers, implementing flexible customization of network functions and automatic network management. With the OPS, the CloudEngine series switches enable data center services to be seamlessly converged with the network and build a service-oriented, software-defined network.

Virtualized gateway achieves fast service deployment: The CloudEngine series switches can act as high-performance, hardware gateways on an overlay network (VXLAN/NVGRE) and work with mainstream virtualization platforms to support up to 16 million tenants. This multi-tenant data center solution implements fast service deployment without changing the original network, protecting customers' investment. When acting as a hardware overlay gateway, the CloudEngine series switches can connect to cloud platforms through open APIs to provide centralized management of software and hardware networks.

Virtual switch product assists in agile SDN network deployment: The CloudEngine 1800V virtual switch provides high virtualization capability. It supports standard northbound interfaces and multiple virtualization platforms, and can be managed together with physical network devices. The CloudEngine 1800V can be used with physical switches to build hybrid SDN networks and enable agile deployment of large Layer 2 networks.

ZTP removes the need for manual configuration: All the CloudEngine series switches support Zero Touch Provisioning (ZTP) and can automatically obtain and load version files from a USB flash drive or file server. The ZTP function frees network engineers from on-site configuration, reducing labor costs and improving the deployment efficiency. This function supports embedded script languages, which are open to users through open APIs. Data center users can use a familiar programming language (such as Python) to configure network devices.

Open ecosystem: The full openness of CloudEngine series switches enables Huawei and partners to set up a cloud data center ecosystem. Huawei CloudEngine switches and Agile Controller can seamlessly interoperate with VMware NSX and Brocade Vyatta controllers, as well as Puppet network automation software, to enable centralized provisioning of physical and virtual networks, service orchestration, and automatic network operations and maintenance.

An open ecosystem enables multi-vendor network construction: The full openness of CloudEngine series switches enables Huawei and partners to establish a cloud data center ecosystem. Huawei CloudEngine switches and Agile Controller can seamlessly interoperate with VMware NSX and Brocade Vyatta controllers, as well as Puppet network automation software, to enable unified provisioning of physical and virtual networks, service orchestration, and automatic network operations and maintenance.

High-Quality CloudEngine

High-reliability network designed for data centers: The CE12800 guarantees industrial-grade reliability and uses redundant designs for both hardware and software systems to ensure service continuity in data centers. The CE12800's industry-leading, non-blocking switching architecture ensures non-stop services. Additionally, the CloudEngine series switches can build a lossless, low-latency Ethernet network, which provides unified, lossless transmission for high-value services. All CloudEngine switches use a strict front-back airflow design, which meets data centers' heat dissipation requirements and greatly reduces power consumption in equipment rooms.

Figure 7 High-reliability architecture and components
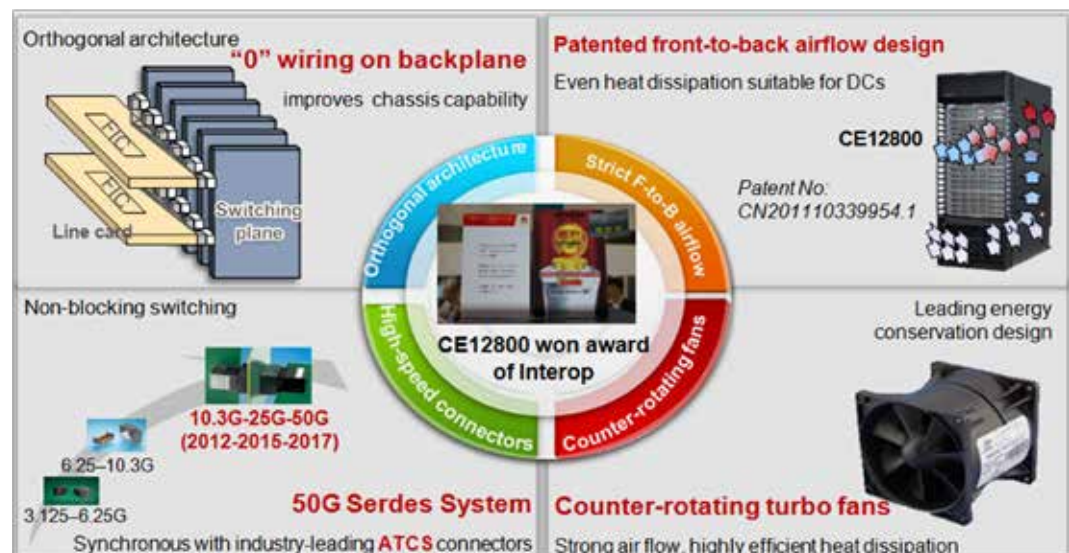
Non-stop core switches guarantee service continuity: The CE12800's hardware components (main processing units, switch fabric units, centralized monitoring units, power supplies, and fans) all use a hot standby design. The monitoring, management, and data buses work in redundancy mode to guarantee the high reliability of core nodes. By using Huawei's next-generation VRP8 software platform, the CE12800 supports In-Service Software Upgrade (ISSU), which ensures continuity of services during service switching and software upgrades.

Non-blocking switching architecture ensures non-stop services: 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. The orthogonal switch fabric design greatly improves system bandwidth and scalability, enabling the switching capacity to scale beyond 100 Tbit/s. The Clos architecture supports dynamic routing through cell switching, which enables traffic to be distributed to switch fabric units evenly. The VoQ mechanism, together with the super-large buffer size on inbound interfaces (as much as 24 GB per line card), provides fine-grained QoS control, implements unified service scheduling and ordered packet forwarding, achieving non-blocking switching.

Lossless switching network ensures unified service transmission: The CloudEngine series switches support Data Center Bridging (DCB), which ensures low latency and zero packet loss for Fibre Channel (FC) storage and high-speed computing services. The forwarding latency on the CE12800 core switches is only 2 μs, one-third of the industry average, making the CE12800 appropriate for latency-sensitive, high-value services such as online video and games. The CloudEngine series can build a lossless, low-latency Ethernet network to transmit storage, computing, and data services, reducing costs of network construction and maintenance.

Strict front-back airflow design greatly reduces power consumption: All CloudEngine series switches use a strict front-back airflow design, which meets data centers' strict heat dissipation requirements. The CE12800 core switch's airflow direction is front-to-back, and airflows of line cards and switch fabric units are isolated, which prevents mixing of hot and cold air and cascade heating. This design effectively reduces energy consumption in equipment rooms. The CE8800, CE7800, CE6800, and CE5800 TOR switches use a flexible front-to-back or back-to-front airflow design for a changeable airflow direction.

Why Huawei?

Huawei has 20 years' experience in the IP field and offers the largest data center product portfolio in the industry. Huawei's end-to-end data center solutions include network infrastructure, disaster recovery, security, and network management. Huawei data center products and solutions have been widely used in large enterprises, vertical industries, Internet corporations, and carrier networks.

As a world-leading network solutions provider, Huawei has a long-term plan for data center network development and a firm determination to invest in data centers for the long run. To support this plan, Huawei has extensive research capabilities, with world-class experts, vast experience in the research and development of data center standards, and broad chip development capabilities.

The CloudEngine series switches and Cloud Fabric Data Center Network Solution are products of Huawei's extensive experience in working with IP networks. They enable customers to build next-generation data center cloud networks that support sustainable development of cloud services into the foreseeable future.

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