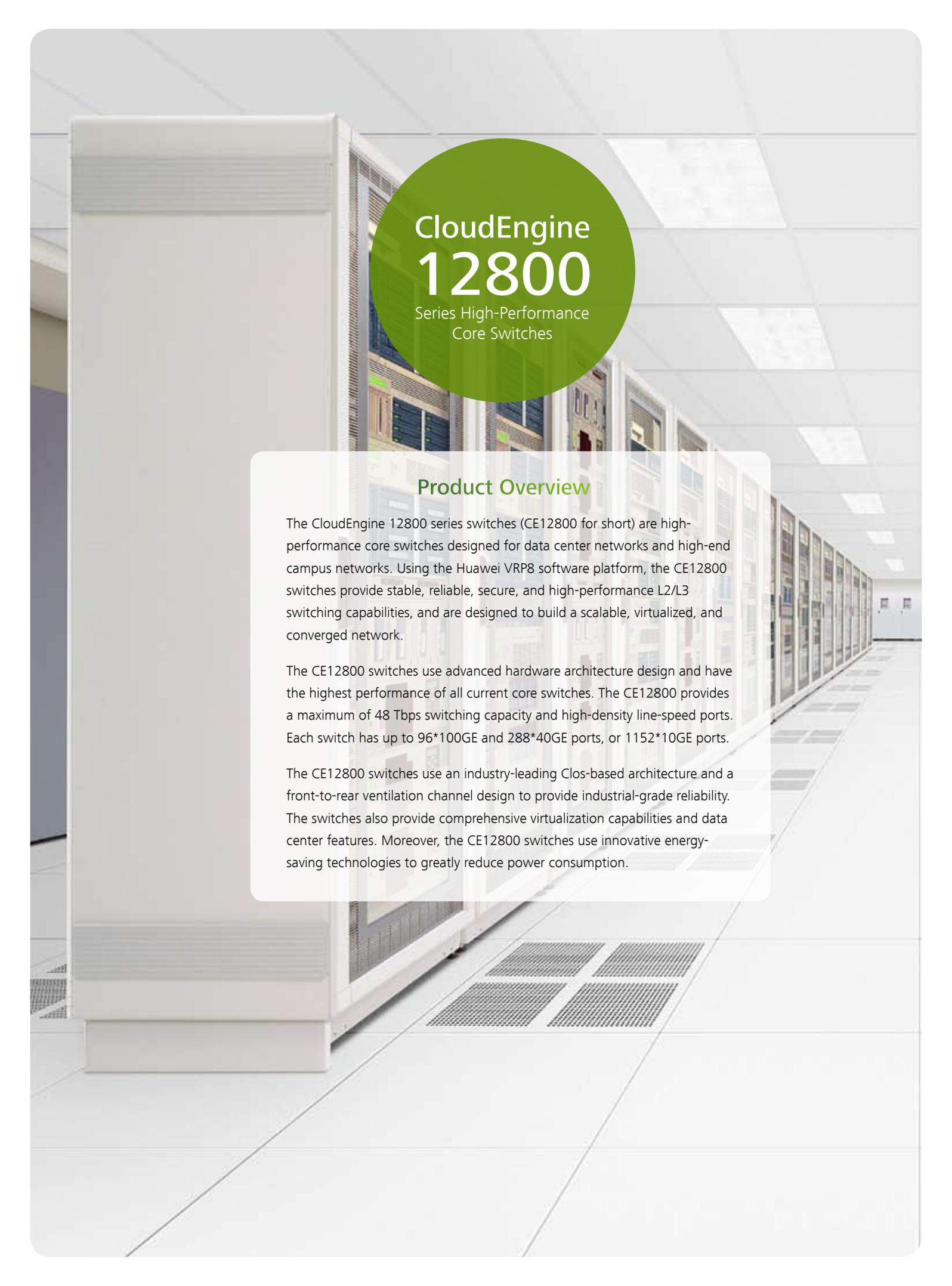


# CloudEngine 12800 Series High-Performance Core Switches





# CloudEngine 12800

Series High-Performance  
Core Switches

## Product Overview

The CloudEngine 12800 series switches (CE12800 for short) are high-performance core switches designed for data center networks and high-end campus networks. Using the Huawei VRP8 software platform, the CE12800 switches provide stable, reliable, secure, and high-performance L2/L3 switching capabilities, and are designed to build a scalable, virtualized, and converged network.

The CE12800 switches use advanced hardware architecture design and have the highest performance of all current core switches. The CE12800 provides a maximum of 48 Tbps switching capacity and high-density line-speed ports. Each switch has up to 96\*100GE and 288\*40GE ports, or 1152\*10GE ports.

The CE12800 switches use an industry-leading Clos-based architecture and a front-to-rear ventilation channel design to provide industrial-grade reliability. The switches also provide comprehensive virtualization capabilities and data center features. Moreover, the CE12800 switches use innovative energy-saving technologies to greatly reduce power consumption.

# CloudEngine 12800 Series High-Performance Core Switches

## Product Appearance

The CE12800 is available in three models: CE12812, CE12808 and CE12804. The whole series uses interchangeable components to reduce the cost of spare parts. This design ensures device scalability while protecting customers' investments.



CE12804



CE12808



CE12812

## Product Characteristics

### Next-Generation Core Engine Provides the World's Highest Performance

#### 48 Tbps Switching Capacity

- CE12800 currently provides 2Tbps bandwidth per slot (scalable to 4Tbps in the future) and a maximum of 48Tbps of switching capacity. This can support the evolution of cloud-computing data centers for the next 10 years.
- The CE12800, together with the CE6800/5800 series of Top of Rack (TOR) switches, can build a 360Terabit non-blocking switching network platform that supports the evolution of four generations of data center servers (from GE to 10GE to 40GE and to 100GE).

#### Terabit High-density Line Cards

- Each slot has a forwarding capacity of 960Gbps.
- The CE12800 switches have line cards with the highest densities in the industry, including 8\*100GE and 24\*40GE/96\*10GE line cards.
- Each switch provides a maximum of 96\*100GE and 288\*40GE line-speed ports, or 1152\*10GE line-speed ports.

### Super Large Buffer on 100GE Ports

- All service ports (100GE/40GE/10GE) support 100 ms buffering.
- The distributed buffering mechanism on inbound interfaces can effectively handle the incast traffic loads found in data centers.
- Each line card has a 16 GB buffer and interfaces share the buffer dynamically to improve usage efficiency.

## Advanced Architecture to Enhance Efficiency and Reliability

### Non-blocking Clos Architecture

- Three-level Clos architecture: With an orthogonal design, the service line cards and switch fabric units of the CE12800 constitute a multi-level, multi-plane switch fabric. This switch fabric allows almost unlimited capacity expansion, helping implement the large-scale non-blocking switching required in data centers.
- Dynamic routing and load balancing: The CE12800 uses Variable Size Cell (VSC) for dynamic routing. A unified arbitration mechanism is used to ensure fair route selection and load balancing between switching paths so that links are used at 100%. Compared with static routing based on hash algorithms, dynamic routing prevents the congestion caused by unbalanced traffic distribution on the switch fabric.
- Virtual Output Queuing (VoQ): The VoQ mechanism adds packets with different destinations to multiple virtual output queues to prevent head of line blocking (HOL). This mechanism implements QoS control on the switch fabric and ensures real-time service transmission.

### Industrial-grade Reliability

- Super high reliability: The CE12800 series provide industrial-grade reliability, with a mean time between failures (MTBF) of 22.5 years. The high reliability and the In-Service Software Upgrade (ISSU) feature meet customer requirements for service continuity.
- Redundancy of all core components and hot swappable modules: The main control units work in 1+1 hot backup mode and switch fabric units work in N+M hot backup mode. The power supplies support N+N backup and have an independent heat dissipation system. Each fan tray has two counter-rotating fans working in 1+1 backup mode.
- Triple-plane design: The control plane, data plane and monitoring plane of the CE12800 are independent of each other. This design improves system reliability and ensures service continuity.

## Comprehensive Virtualization Capabilities to Support Flexible Deployment

### Virtual System (VS), Implementing On-Demand Resource Sharing

- Highest device virtualization capability: The CE12800 uses VS technology to provide an industry-leading virtualization capability of 1:8. One switch can be virtualized into a maximum of eight logical switches, allowing one core switch to manage the services of different areas (such as the production area, office area and Internet DMZ) or of multiple tenants.
- High security and reliability: The VS technology divides a network into multiple isolated logical areas for service isolation. The failure of one virtual system does not affect other virtual systems and therefore network security is enhanced.

- Lower CAPEX: The VS technology virtualizes a physical switch into multiple logical switches to implement on-demand resource allocation, improving the usage efficiency of physical devices. This technology ensures network scalability while reducing investment in devices.
- Lower OPEX: As one physical device can be used as multiple logical devices, space is saved in a data center equipment room, while the cost of device maintenance is also reduced.

### Cluster Switch System (CSS), Facilitating Network Management

- The CE12800 uses industry-leading CSS technology, which can virtualize a maximum of four physical switches into one logical switch to better facilitate network management and improve overall reliability.
- The CE12800 provides a cluster bandwidth of 640Gbps; this super high bandwidth prevents traffic bottlenecks on data center networks.
- The CE12800 switches establish a cluster using service ports and allow a maximum distance of 80 km between cluster member switches.
- The CE12800 series innovatively uses CSS+VS synergy technology to turn a network into a resource pool so that network resources can be allocated on demand. This on-demand resource allocation is perfect for the cloud-computing service model.

### Large-scale Routing Bridge, Supporting Flexible Service Deployment

- All CloudEngine series switches support Transparent Interconnection of Lots of Links (TRILL), a standard IETF protocol. The TRILL protocol helps build a large Layer 2 network with more than 500 nodes, which allows flexible service deployment and VM migration. 10GE/GE servers can also be used on a TRILL network.
- 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 Tree (SPF) and Equal-Cost Multipath (ECMP) routing. SPF and ECMP avoid the suboptimal path selection problem found in STP and increase link bandwidth efficiency to 100%.
- The CE12800 supports up to 32 TRILL-based Layer 2 equal-cost paths, greatly improving load balancing capabilities of links. The network has a flat tree architecture to support smooth expansion.

## Innovative Energy Saving Technologies to Build a Green Data Center

### Efficient Power Supply System, Flexible Redundancy

- The CE12800 is equipped with the industry's most efficient digital power modules, which have a power efficiency of 96%.
- The system measures power consumption in real time and sets one or more power modules in sleep mode to save power when the system power consumption is low.
- The CE12800 can adjust the power consumption of components to adapt to changes in service traffic volume, saving energy dynamically.

## Patented Ventilation Channel Design, Smart Heat Dissipation

- The CE12800 uses a patented front-to-rear ventilation channel design that isolates cold air channels from hot air channels, meeting heat dissipation requirements in data center equipment rooms.
- The straight ventilation channels of line cards eliminate channel cascading and separate cold air from hot air to improve heat dissipation efficiency.
- The CE12800 supports a maximum of 17 fan trays and each fan tray has two counter-rotating fans. The fan trays are divided into several groups, with each group serving line cards in a specific area. The fan speed in each area can be dynamically adjusted based on workload of line cards in this area. This on-demand cooling design lowers power consumption and reduces noises.

## Product Specifications

Item	CE12804	CE12808	CE12812
Total Switching capacity	16 Tbps	32 Tbps	48 Tbps
Total Forwarding performance	4800 Mpps	9600 Mpps	14400 Mpps
Service slots	4	8	12
Device virtualization	Virtual system (VS)		
	Cluster switch system (CSS)		
L2 multipath protocol	TRILL		
VLAN	Adding access, trunk, and hybrid interfaces to VLANs		
	Default VLAN		
	802.1ad (QinQ) Stacked VLANs		
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		
STP	STP, RSTP, and MSTP		
	BPDU protection, root protection and loop protection		
IP routing	IPv4 routing protocols, such as RIP, OSPF, BGP and IS-IS		

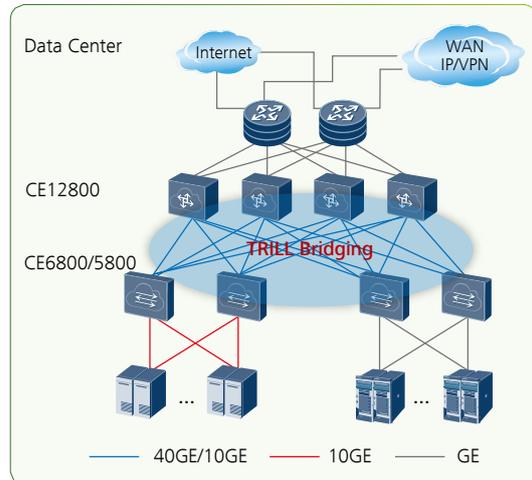
Item	CE12804	CE12808	CE12812
Reliability	LACP		
	VRRP and BFD for VRRP		
	BFD for BGP/IS-IS/OSPF/static route		
	DLDP		
	In-service software upgrade (ISSU)		
QoS	Traffic classification based on Layer 2, Layer 3, Layer 4, and 802.1p information		
	Actions include ACL, CAR and re-marking		
	Queue scheduling modes including PQ, WFQ and PQ+WRR		
	Congestion avoidance mechanisms, including WRED and tail drop		
	Traffic shaping		
Configuration and maintenance	Console, Telnet and SSH terminals		
	Network management protocols, such as SNMPv1/v2/v3		
	File upload and download through FTP and TFTP		
	BootROM upgrade and remote upgrade		
	Hot patches		
	User operation logs		
Security and management	RADIUS and HWTACACS authentication for login users		
	Command line authority control based on user levels, preventing unauthorized users from using commands		
	Defense against MAC address attacks, broadcast storms and heavy-traffic attacks		
	Ping and traceroute		
	Remote network monitoring		
Dimensions (W x D x H)	442 mm x 938 mm x 486 mm (including cable divider)	442 mm x 938 mm x 752 mm (including cable divider)	442 mm x 938 mm x 975 mm (including cable divider)
Chassis weight (empty)	< 75 kg	< 90 kg	< 110 kg
Operating voltage	AC: 90 V to 290 V		
Max. power consumption	≤ 5400 W	≤ 10800 W	≤ 16200 W

# Networking and Application

## Application in a Data Center

In a typical data center network, CE12800 switches work as core switches and CE6800/CE5800 switches work as TOR switches. CE6800/CE5800 switches connect to CE12800 switches through 40GE/10GE ports. The CE12800 and CE6800/CE5800 switches use the TRILL protocol to build a non-blocking Layer 2 network, which allows large-scale VM migration and flexible service deployment.

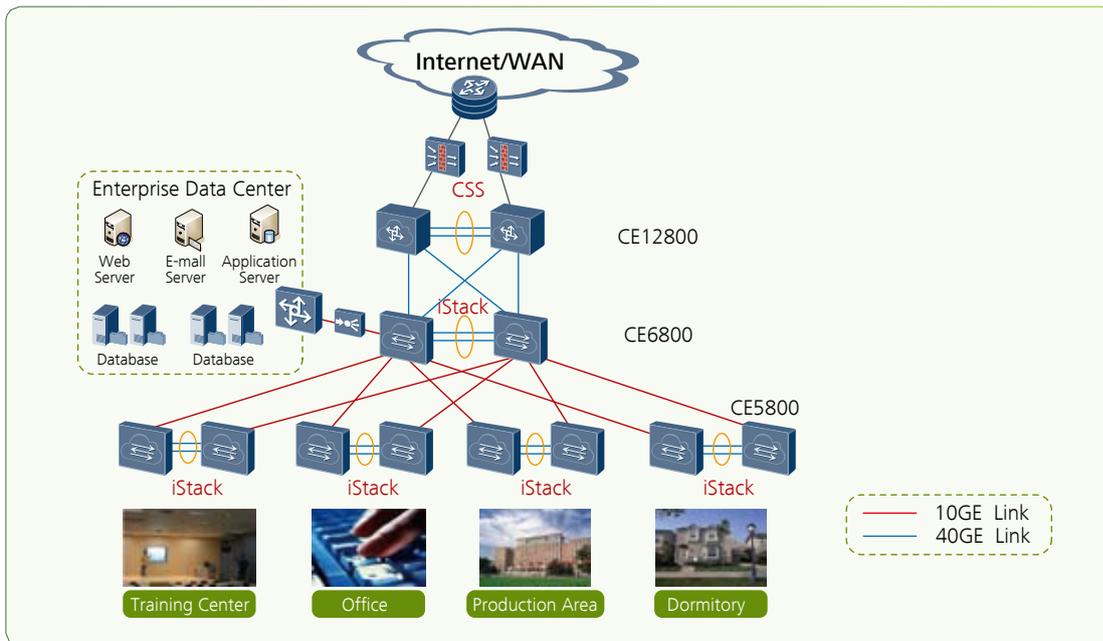
Note: The TRILL protocol can also be used on campus networks to support flexible service deployment in different service areas.



## Application on a Campus Network

In a typical campus network, two CE12800 switches are virtualized into a logical core switch using CSS technology. Multiple CE6800 switches at the aggregation layer form a logical switch using the iStack technology. Together, the CSS and iStack technologies improve network reliability and simplify network management. At the access layer, CE5800 switches are stacked using iStack technology to provide high-densities of line-speed ports.

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



HUAWEI TECHNOLOGIES CO.,LTD.  
 Huawei Industrial Base  
 Bantian Longgang  
 Shenzhen 518129,P.R.China  
 Tel: +86 755 28780808