



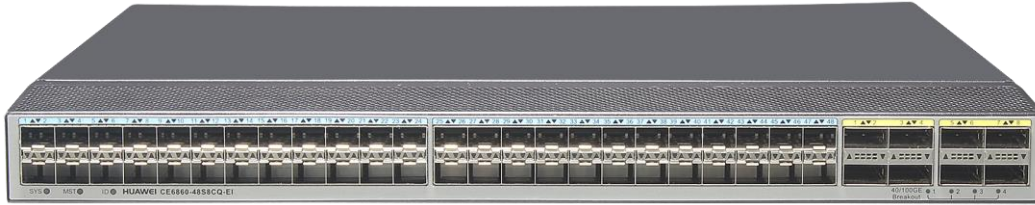
Huawei CloudEngine 6860 Switch Datasheet

Huawei CloudEngine 6860 series switches have advanced hardware architecture with 100GE uplink ports and high-density 25GE access ports.

Product Overview

Product Appearance

The CloudEngine 6860-48S8CQ-EI switches provide 48x25GE SFP28 ports and 8x100GE QSFP28 ports.



The CloudEngine 6865-48S8CQ-EI switches provide 48x25GE SFP28 ports and 8x100GE QSFP28 ports.



Product Characteristics

High-Density 25GE Access

- CloudEngine 6860 series (1 U) provide 3200Mpps forwarding performance and supports L2/L3 line-rate forwarding.
- CloudEngine 6860 series provide up to 48*25GE ports, allowing for high density 10G/25G server access and smooth evolution.
- CloudEngine 6860 series provide eight 100GE QSFP28 ports. Each QSFP28 port can be used as one 40GE QSFP+ port, four 25GE SFP28 ports, or four 10GE SFP+ ports, providing flexibility in networking. The 100GE uplink ports can be connected to CloudEngine 16800 or CloudEngine 12800 switches to build a non-blocking network platform.

Highly Reliable, Long-Distance Stacking

16-member stack system

- A stack system of 16 member switches has up to 768 x 25GE 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 and 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 stacking, highly reliable stacking

- CloudEngine 6860 series 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 scale to ensure that network resources are used more efficiently.

Inter-device Link Aggregation, High Efficiency and Reliability

- CloudEngine 6860 series support 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, VXLAN, and IP networks, allowing for flexible networking.
- With 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.

Hardware Overlay Gateway Achieves Fast Service Deployment

- CloudEngine 6860 series can work with a mainstream virtualization platform. As the high-performance, hardware gateway of an overlay network (VXLAN), CloudEngine 6860 series can support more than 16 million tenants.
- The hardware gateway deployment enables fast service deployment without changing the customer network, providing investment protection.
- CloudEngine 6860 series support Border Gateway Protocol - Ethernet VPN (BGP-EVPN), which can run as the VXLAN control plane to simplify VXLAN configuration within and between data centers.

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

- Various CloudEngine 6860 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

- CloudEngine 6860 series use 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.
- CloudEngine 6860 series support CE modules for Ansible, which enables unified provisioning of physical and virtual networks.
- The OPS provides seamless integration of data center service and network in addition to a service-oriented, software-defined networking (SDN).

ZTP, Implementing Automatic O&M

- CloudEngine 6860 series support Zero Touch Provisioning (ZTP). ZTP enables CloudEngine 6860 series 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

- CloudEngine 6860 series provide 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.
- CloudEngine 6860 series support visualization of all flows and congestion, improving service experience.
- CloudEngine 6860 series support global, precise time synchronization based on IEEE 1588v2, detecting delay with sub-microsecond accuracy.

Flexible Airflow Design, High Energy Efficiency

Flexible front-to-back/back-to-front airflow design

- CloudEngine 6860 series use a strict front-to-back/back-to-front airflow design that isolates cold air channels from hot air channels. This design improves heat dissipation efficiency and meets design requirements of data center equipment rooms.
- Air can flow from front to back or back to front depending on the fans and power modules that are used.
- Redundant power modules and fans can be configured to ensure service continuity.

Innovative energy-saving technologies

- CloudEngine 6860 series have innovative energy-saving chips and can measure system power consumption in real time. The 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.

AI Fabric, Improving Reliability of High-Performance Computing

Automatic buffer configuration, eliminating packet loss

- The packet buffer of the forwarding chip is automatically configured at boot time.
- The threshold for the buffer of the forwarding chip is configurable, ensuring the optimal application performance for specific network topologies and traffic models.

Dynamic traffic priority adjustment

- The scheduling priority of latency-sensitive microflows can be dynamically adjusted to preferentially schedule them, guaranteeing the performance of latency-sensitive applications.

Traffic congestion control

- Dynamic ECN is supported. When any packet leaves a queue, the ECN flag is set according to the congestion status of the queue. This shortens the delay caused by the queue depth.
- Fast CNP is supported. A switch directly sends the CNP to the NIC of the source server, shortening the CNP feedback path.
- The dynamic ECN threshold is supported. The ECN threshold can be dynamically adjusted for a queue according to traffic changes.

Dynamic load balancing (DLB)

- The ECMP and LAG support the DLB function.

Monitoring prioritized lossless traffic under control

- The PFC can be mapped based on DSCP.

RoCE traffic visualization

- Analyze RoCE traffic KPIs, including the traffic path, RTT, throughput, packet loss rate, abnormal sessions, and top sessions, and display the RoCE network topology of each node and ECN thresholds of Huawei AI Fabric. In this way, more proper network parameters can be configured and network faults can be quickly located, improving configuration and O&M efficiency.

Clear Indicators, Simplifying Maintenance

Clear indicators

- Port indicators clearly show the port status and port rate. The 40GE port indicators can show the states of all ports derived from the 40GE ports.
- State and stack indicators on both the front and rear panels enable users to maintain the switch from either side.
- CloudEngine 6860 series support remote positioning. Remote positioning indicators enable users to easily identify the switches they want to maintain 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

Functions and Features

Item	CloudEngine 6860-48S8CQ-EI	CloudEngine 6865-48S8CQ-EI
Device virtualization	iStack ¹	
	M-LAG	
Network virtualization	TRILL (Supported by CloudEngine 6860-48S8CQ-EI)	
	VXLAN routing and bridging	
	BGP-EVPN	
	QinQ access VXLAN	
Data center interconnect	VXLAN mapping, implementing interconnection between multiple DCI networks at Layer 2	
SDN	Agile Controller	
	VMware NSX (Supported by CloudEngine 6865-48S8CQ-EI)	
Network convergence	FCoE	
	DCBX, PFC, ETS	
Programmability	OPS	
	OpenFlow	
	Ansible-based automatic configuration and open-source module release	
Traffic analysis	NetStream	
	sFlow	
VLAN	Adding access, trunk, and hybrid interfaces to VLANs	
	Default VLAN	
	QinQ	
	MUX VLAN	
	GVRP	
MAC address table	Dynamic learning and aging of MAC address entries	
	Static, dynamic, and blackhole MAC address entries	
	Packet filtering based on source MAC addresses	

Item	CloudEngine 6860-48S8CQ-EI	CloudEngine 6865-48S8CQ-EI
	MAC address limiting based on ports and VLANs	
IP routing	IPv4 routing protocols, such as RIP, OSPF, IS-IS, and BGP	
	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, IPv6 ping, IPv6 tracer, IPv6 socket , UDP6, and Raw IP6	
Multicast	Multicast routing protocols such as IGMP, PIM-SM, PIM-DM, MSDP, and MBGP	
	IGMP snooping	
	IGMP proxy	
	Fast leaving of multicast member interfaces	
	Multicast traffic suppression	
	Multicast VLAN	
	Multicast VXLAN	
MPLS	Multi-Protocol Label Switching	
Reliability	Link Aggregation Control Protocol (LACP)	
	STP, RSTP, VBST, and MSTP	
	BPDU protection, root protection, and loop protection	
	Smart Link and multi-instance	
	Device Link Detection Protocol (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 information	
	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	
	IEEE 1588v2 (supported by CloudEngine 6865-48S8CQ-EI)	
	Telemetry	
	INT (IOAM) and ERSPAN+ (supported by CloudEngine 6865-48S8CQ-EI)	
	Statistics on the buffer microburst status	

Item	CloudEngine 6860-48S8CQ-EI	CloudEngine 6865-48S8CQ-EI
	VXLAN OAM: VXLAN ping and VXLAN tracet	
AI Fabric	VIQ (supported by CloudEngine 6865-48S8CQ-EI)	
	Dynamic ECN (supported by CloudEngine 6865-48S8CQ-EI)	
	Fast CNP (supported by CloudEngine 6865-48S8CQ-EI)	
	Dynamic load balancing (DLB) (supported by CloudEngine 6865-48S8CQ-EI)	
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	
	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	
	Defense against DoS address attacks, ARP storms, and ICMP attacks	
	Port isolation, port security, and sticky MAC	
	Binding of the IP address, MAC address, port number, and VLAN ID	
	Authentication methods, including AAA, RADIUS, and HWTACACS	
	Remote Network Monitoring (RMON)	

1. For details about the configuration, please see: http://support.huawei.com/online/tools/web/virtual/en/dc/stack_index.html?dcb

Performance and Scalability

Item	CloudEngine 6860-48S8CQ-EI	CloudEngine 6865-48S8CQ-EI
Maximum number of MAC address entries	136K	288K
Maximum number of Forwarding routes (FIB IPv4/ IPv6)	192K/128K	380K/256K
ARP table size	84K	168K
Maximum number of VRF	1024	4096
IPv6 ND (Neighbor Discovery) table size	32K	64K
Maximum number of multicast routes (Multicast FIB IPv4/IPv6)	8K/2K	
Maximum VRRP groups	256	1000
Maximum number of ECMP paths	128	
Maximum ACL number	ingress 2750, egress 1000	ingress 7662, egress 2000

Item	CloudEngine 6860-48S8CQ-EI	CloudEngine 6865-48S8CQ-EI
Maximum Number of broadcast domains	8K	16K
Maximum number of BDIF	4K	12K
Maximum number of tunnel endpoints (VTEP)	2K	
Maximum number of lag group	1024\512\256\128\64	
Maximum number of links in a lag group	2\4\8\16\32	
Maximum number of MSTP instance	64	
VBST (Maximum number of VLANs where VBST can be configured)	500	
Maximum number of PTP slaves	NA	56

Note: This specification may vary between different scenarios. Please contact Huawei for details.

Hardware Specifications

Item	CloudEngine 6860-48S8CQ-EI	CloudEngine 6865-48S8CQ-EI	
Physical Features	Dimensions (W x D xH, mm)	442 * 420 * 43.6	
	Weight (excluding optical modules, power modules, and fan assemblies/ including AC power modules and fan assemblies, excluding optical modules, kg)	5.9/8.8	6.2/8.8
	Switching capacity (Tbit/s)	4	
	Forwarding performance (Mpps)	3200	2000
20GE SFP+ ports		48	
100GE QSFP28 ports		8	
Management interface	Out-of-band management port	1*GE management interface	
	Console port	1*RJ45 interface	
	USB port	1	
CPU	Main frequency (GHZ)	1.5	
	Number of cores	8	
Storage	RAM	2GB	4GB
	NOR Flash	32MB	32MB
	NAND Flash	1GB	2GB
System	System buffer	22MB	32MB
Power Supply System	Power modules	600W AC/350W DC	600W AC /600W -48V DC
	Rated voltage range(V)	100V to 240V AC	- 48V to -60V DC
	Maximum voltage range(V)	90V to 290V AC	- 38.4V to -72V DC

Item		CloudEngine 6860-48S8CQ-EI	CloudEngine 6865-48S8CQ-EI
	Maximum input current	600W AC power module: 100V to 240V 9A 350W DC power module: – 48V to – 60V DC 11 A	60W AC power module: 100V to 240V 9A 600W DC power module: – 48V to – 60V DC 20A
	Typical power	253W(100% traffic load, copper cable, normal temperature, dual power modules) 318W(100% traffic load, short-distance optical modules, normal temperature, dual power modules)	265W(100% traffic load, copper cable, normal temperature, dual power modules) 327W(100% traffic load, short-distance optical modules, normal temperature, dual power modules)
	Maximum power	458W	470W
	Frequency (AC ,HZ)	50/60	
Heat Dissipation	Heat dissipation mode	Air cooling	
	Number of fans	2	
	Heat dissipation airflow	Front-to-back or back-to-front airflow	
	Maximum heat consumption (BTU/hr)	1563	1604
Environment specifications	Long-term operating temperature(°C)	0°C to 40°C (0-1800m) The temperature decreases by 1°C each time the altitude increases by 220 m	
	Storage temperature(°C)	-40°C to +70°C	
	Relative humidity	5% to 95%	
	Operating altitude(m)	Up to 5000	
	Sound power at 27°C (dBA)	Front-to-back airflow: < 63 dBA Back-to-front airflow: < 62 dBA	Front-to-back airflow: < 65 dBA Back-to-front airflow: < 65 dBA
	Sound power at 40°C (dBA)	Front-to-back airflow: < 82 dBA Back-to-front airflow: < 83 dBA	Front-to-back airflow: < 83 dBA Back-to-front airflow: < 81 dBA
	Sound pressure at 27°C (dBA)	Front-to-back airflow: 47 dBA in average (maximum: 52 dBA) Back-to-front airflow: 49 dBA in average (maximum: 51 dBA)	Front-to-back airflow: 51 dBA in average (maximum: 53 dBA) Back-to-front airflow: 51 dBA in average (maximum: 55 dBA)
	Surge protection	AC power supply protection: 6 kV in common mode and 6 kV in differential mode DC power supply protection: 2 kV in common mode and 1 kV in differential mode	
Reliability	MTBF (year)	51.5	38.85
	MTTR (hour)	1.67	1.48
	Availability	0.99999629199	0.999997178

Note: For detailed information of CloudEngine 6860 Platform hardware information, visit

<https://support.huawei.com/enterprise/en/doc/EDOC1000019246?idPath=7919710%7C21782165%7C21782239%7C22318540%7C7597815>

Safety and Regulatory Compliance

The following table lists the safety and regulatory compliance of CloudEngine switches.

Certification Category	Description
Safety	<ul style="list-style-type: none"> • EN 60950-1 • EN 60825-1 • EN 60825-2 • UL 60950-1 • CSA-C22.2 No. 60950-1 • IEC 60950-1 • AS/NZS 60950-1 • GB4943
Electromagnetic Compatibility (EMC)	<ul style="list-style-type: none"> • EN 300386 • EN 55032: CLASS A • EN 55024 • IEC/EN 61000-3-2 • IEC/EN 61000-3-3 • FCC 47CFR Part15 CLASS A • ICES-003: CLASS A • CISPR 32: CLASS A • CISPR 24 • AS/NZS CISPR32 • VCCI- CISPR32: CLASS A • GB9254 CLASS A
Environment	<ul style="list-style-type: none"> • 2011/65/EU EN 50581 • 2012/19/EU EN 50419 • (EC) No.1907/2006 • GB/T 26572 • ETSI EN 300 019-1-1 • ETSI EN 300 019-1-2 • ETSI EN 300 019-1-3 • ETSI EN 300 753 GR63

Note

EMC: electromagnetic compatibility

CISPR: International Special Committee on Radio Interference

EN: European Standard

ETSI: European Telecommunications Standards Institute

CFR: Code of Federal Regulations

FCC: Federal Communication Commission

IEC: International Electrotechnical Commission

AS/NZS: Australian/New Zealand Standard

VCCI: Voluntary Control Council for Interference

UL: Underwriters Laboratories

CSA: Canadian Standards Association

Supported MIBs

For details about the MIB information, visit

<http://support.huawei.com/hedex/hdx.do?docid=EDOC1100020548&lang=en&idPath=7919710%7C21782165%7C21782239%7C22318540%7C7597815>

Standard Compliance

For details about the standard compliance information, visit

<https://e.huawei.com/ca/material/onLineView?MaterialID=821895aad0bd48e6aa079c06e82fb7f8> or contact your local Huawei sales office.

Optical Transceivers and Cable

For details about the optical transceivers and cables information, visit

<https://e.huawei.com/en/material/networking/dcs/switch/f6d91cf16df0474998087676a33fd41e>

Ordering Information

Mainframe	
CE6860-48S8CQ-EI	CE6860-48S8CQ-EI Switch (48-Port 25GE SFP28, 8*100GE QSFP28, Without Fan and Power Module)
CE6860-EI-F-B0B	CE6860-48S8CQ-EI Switch (48-Port 25GE SFP28, 8*100GE QSFP28, 2*AC Power Module, 2*FAN Box, Port-side Exhaust)
CE6860-EI-B-B0B	CE6860-48S8CQ-EI Switch (48-Port 25GE SFP28, 8*100GE QSFP28, 2*AC Power Module, 2*FAN Box, Port-side Intake)
CE6865-48S8CQ-EI	CE6865-48S8CQ-EI Switch(48-Port 25GE SFP28,8*100GE QSFP28,Without Fan and Power Module)
CE6865-EI-F-B0B	CE6865-48S8CQ-EI Switch(48-Port 25GE SFP28,8*100GE QSFP28,2*AC Power Module,2*FAN Box, Port-side Exhaust)
CE6865-EI-B-B0B	CE6865-48S8CQ-EI Switch(48-Port 25GE SFP28,8*100GE QSFP28,2*AC Power Module,2*FAN Box, Port-side Intake)

Fan Tray

Model	Description	Applicable Product
FAN-40HA-F	Fan box (HA, Front to Back, FAN panel side intake)	CE6860-48S8CQ-EI and CE6865-48S8CQ-EI
FAN-40HA-B	Fan box (HA, Back to Front, FAN panel side exhaust)	CE6860-48S8CQ-EI and CE6865-48S8CQ-EI

Power

Model	Description	Applicable Product
PAC-600WA-F	600W AC Power Module (Front to Back, Power panel side intake)	CE6860-48S8CQ-EI and CE6865-48S8CQ-EI
PAC-600WA-B	600W AC Power Module (Back to Front, Power panel side exhaust)	CE6860-48S8CQ-EI and CE6865-48S8CQ-EI

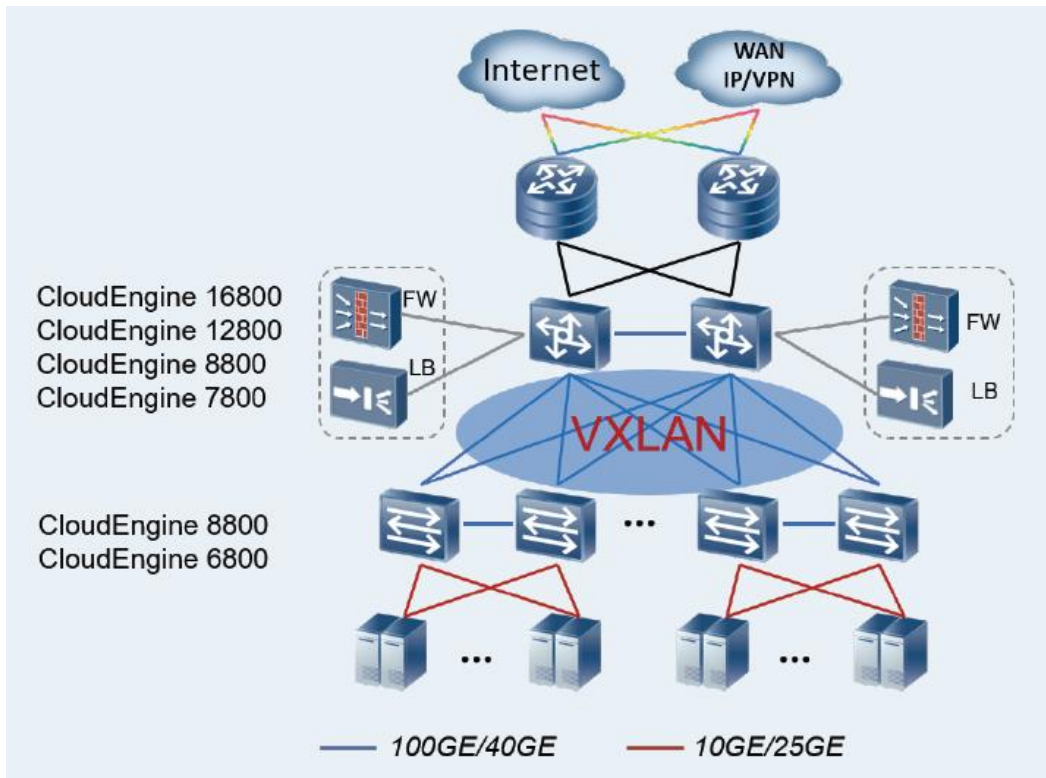
Model	Description	Applicable Product
PDC-350WA-F	350W DC Power Module (Front to Back, Power panel side intake)	CE6860-48S8CQ-EI
PDC-350WA-B	350W DC Power Module (Back to Front, Power panel side exhaust)	CE6860-48S8CQ-EI
PDC600S12-CF	600W DC Power Module(Front to Back, Power panel side intake)	CE6865-48S8CQ-EI
PDC600S12-CB	600W DC Power Module(Back to Front, Power panel side exhaust)	CE6865-48S8CQ-EI

Software	
CE68-LIC-BUN01	CE6800 Function License Bundle 1
CE68-LIC-TLM	CE6800 Telemetry Function
CE68-LIC-PTP	CE6800 Precision Time Protocol Function
CE68-LIC-AIF	CloudEngine 6800 AI Fabric Function
CE68-LIC-PTP	CE6800 Precision Time Protocol Function
N1-CE68LIC-CFMM	N1-CloudFabric Management SW License for CloudEngine 6800
N1-CE68CFMM-SnS1Y	N1-CloudFabric Management SW License for CloudEngine 6800 -SnS-1 Year
N1-CE68LIC-CFFD	N1-CloudFabric Foundation SW License for CloudEngine 6800 (N1-CE68LIC-CFFD software is applicable to single DC scenarios, includes basic L2/L3 functions and features such as VXLAN, EVPN, Telemetry and Agile Controller-DCN)
N1-CE68CFFD-SnS1Y	N1-CloudFabric Foundation SW License for CloudEngine 6800-SnS-1 Year
N1-CE68LIC-CFAD	N1-CloudFabric Advanced SW License for CloudEngine 6800 (N1-CE68LIC-CFAD software is applicable to multiple DC scenarios, includes all the functions of the N1-CE68LIC-CFFD software package and NSH function)
N1-CE68CFAD-SnS1Y	N1-CloudFabric Advanced SW License for CloudEngine 6800-SnS-1 Year
N1-CE68LIC-AIF	N1-CloudEngine 6800 AI Fabric Function
N1-CE68AIF- SnS1Y	N1-CloudEngine 6800 AI Fabric Function-SnS-1 Year

Networking and Application

Data Center Applications

On a typical data center network, CloudEngine 16800/CloudEngine 12800/CloudEngine 8800/CloudEngine 7800 switches work as core switches, and CloudEngine 6860 switches work as ToR switches. CloudEngine 6860 switches use 100GE ports to set up 100GE full connections with CloudEngine 16800/CloudEngine 12800/CloudEngine 8800 core switches, or use 40GE ports to connect to CloudEngine 7800 switches. The core and ToR 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: VXLAN can also be used on campus networks to support flexible service deployment in different service areas.

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