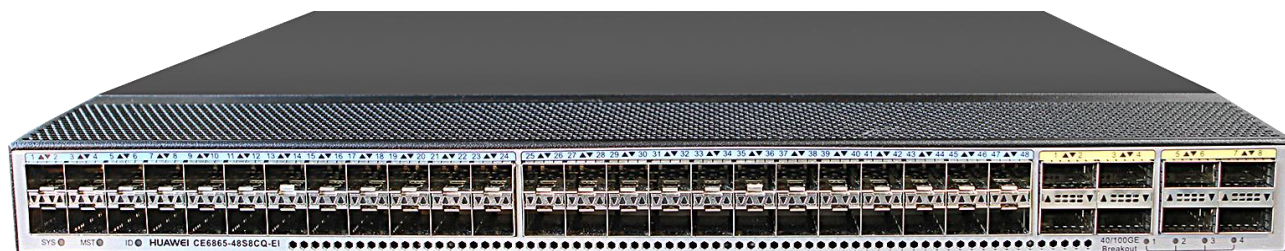# Huawei CloudEngine 6865 Switch Datasheet

Huawei CloudEngine 6865 series switches have advanced hardware architecture with 100GE uplink ports and high-density 25GE access ports.

Product Overview

Huawei CloudEngine 6865 series switches are next-generation 25GE Ethernet switches designed for data centers and high-end campus networks, providing high-performance, high-density 25GE ports, and low latency. The CloudEngine 6865 series have advanced hardware architecture with 100GE uplink ports and high-density 25GE access ports.

Using the Huawei VRP8 software platform, CloudEngine 6865 series 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. CloudEngine 6865 series can work with CloudEngine 16800 or CloudEngine 12800 switches to build an elastic, virtualized, high-quality 100GE fully-connected fabric that meets the requirements of cloud-computing data centers.

CloudEngine 6865 series provide high-density 10GE/25GE 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 CloudEngine 6865-48S8CQ-EI switches provide 48x25GE SFP28 ports and 8x100GE QSFP28 ports.

Product Characteristics

High-Density 25GE Access

- CloudEngine 6865 series (1 U) provide 2000Mpps forwarding performance and supports L2/L3 line-rate forwarding.

- CloudEngine 6865 series provide up to 48*25GE ports, allowing for high density 10G/25G server access and smooth evolution.

- CloudEngine 6865 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.

Inter-device Link Aggregation, High Efficiency and Reliability

- CloudEngine 6865 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 6865 series can work with a mainstream virtualization platform. As the high-performance, hardware gateway of an overlay network (VXLAN), CloudEngine 6865 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 6865 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 6865 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 6865 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 6865 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 6865 series support Zero Touch Provisioning (ZTP). ZTP enables CloudEngine 6865 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 Lossless DCN, 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 flow visibility

- Analyze RoCE flow KPIs, including the flow 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.

FabricInsight-based Intelligent O&M

- The CloudEngine 6865 provides telemetry technology to collect device data in real time and send the data to Huawei data center network analyzer iMaster NCE-FabricInsight. The iMaster NCE-FabricInsight analyzes network data based on the intelligent fault identification algorithm, accurately displays the real-time network status, effectively demarcates and locates faults in a timely manner, and identifies network problems that affect user experience, accurately guaranteeing user experience.

iMaster NCE-based Simplified Network Deployment

- CloudEngine 6865 series switches can interconnect with iMaster NCE-Fabric through standard protocols such as NetConf and SNMP to implement network automatic management and control, providing more efficient and intelligent operation methods, simplifying network management, and reducing the OPEX.

Flexible Airflow Design, High Energy Efficiency

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

- CloudEngine 6865 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 6865 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.

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 6865 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.

Licensing

CloudEngine 6865 supports both the traditional feature based licensing mode and the latest Huawei IDN One Software (N1 Huawei IDN One Software (N1 mode for short) licensing mode. The CloudFabric N1 business model combines the NCE controller, analyzer, and CloudEngine switch software for use in a range of common scenarios. This simplifies transactions, provides customers with more functions and value, and protects their software investment with Software License Portability.

Product	Feature	N1 Mandatory Software Packages			N1 Add on Software Packages
CloudEngine 6865 Series Switch		Management	Foundation	Advanced	AI Fabric Function Package
	Basic software	√	√	√	
	IPV6	√	√	√	
	VXLAN	√	√	√	
	Telemetry		√	√	
	PTP		√	√	
	MPLS			√	
	LLETH				√
iMaster NCE-Fabric Controller	SDN Automation		√	√	
iMaster NCE-FabricInsight Analyzer	Basic network analysis functions of Telemetry		√	√	
	Network Health (Intelligent O&M 1-3-5)			√	
Version Mapping		Select one from the three options. The Foundation software package contains functions from the Management software package, and the Advanced software package contains functions from the Foundation software package.			It is used with the Management, Foundation, or Advanced software package.
For details about product function differences, refer to the product documentation.					

Note: For detailed information of Huawei CloudFabric N1 Business Model, visit
https://e.huawei.com/en/material/networking/dcswitch/03a0e69bfa2c4f168323ba94a75f1f09

Product Specifications

Note: This content is applicable only to regions outside mainland China. Huawei reserves the right to interpret this content.

Functions and Features

Item	CloudEngine 6865-48S8CQ-EI
Device virtualization	iStack

Item	CloudEngine 6865-48S8CQ-EI
	M-LAG
Network virtualization	QinQ access VXLAN
	VXLAN routing and bridging
	BGP-EVPN
Data center interconnect	VXLAN mapping, implementing interconnection between multiple DCI networks at Layer 2
SDN	iMaster NCE-Fabric
	VMware NSX
Network convergence	DCBX, PFC, ETS
	RDMA and RoCE (RoCE v1 and RoCE v2)
Programmability	OPS
	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
	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 tracert, 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

Item	CloudEngine 6865-48S8CQ-EI
	Multicast over VXLAN
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
	Telemetry
	ERSPAN+
	Statistics on the buffer microburst status
	VXLAN OAM: VXLAN ping and VXLAN tracert
Intelligent and Lossless DCN	VIQ
	Dynamic ECN
	Fast CNP
	Dynamic load balancing (DLB)
	RoCE flow visibility
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)

Item	CloudEngine 6865-48S8CQ-EI	
Security and management	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)	

Performance and Scalability

Item	CloudEngine 6865-48S8CQ-EI
Maximum number of MAC address entries	288K
Maximum number of Forwarding routes (FIB IPv4/ IPv6)	380K/256K
ARP table size	168K
Maximum number of VRF	4096
IPv6 ND (Neighbor Discovery) table size	64K
Maximum number of multicast routes (Multicast FIB IPv4/IPv6)	8K/2K
Maximum VRRP groups	1000
Maximum number of ECMP paths	128
Maximum ACL number	ingress 7662, egress 2000
Maximum Number of broadcast domains	16K
Maximum number of BDIF	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	56

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

Hardware Specifications

Item		CloudEngine 6865-48S8CQ-EI
Physical Features	Dimensions (W × D ×H, mm)	442 * 420 * 43.6
	Weight (excluding optical transceivers, power modules, and fan	6.2/8.8

Item		CloudEngine 6865-48S8CQ-EI
	assemblies/ including AC power modules and fan assemblies, excluding optical transceivers, kg)	
	Switching capacity (Tbps)	4
	Forwarding performance (Mpps)	2000
10/25GE SFP28 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	4GB
	NOR Flash	32MB
	NAND Flash	2GB
System	System buffer	32MB
Power Supply System	Power modules	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
	Maximum input current	60W AC power module: 100V to 240V 9A 600W DC power module: – 48V to – 60V DC 20A
	Typical power	265W (100% traffic load, copper cable, normal temperature, dual power modules) 327W (100% traffic load, short-distance optical transceivers, normal temperature, dual power modules)
	Maximum power	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)	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

Item		CloudEngine 6865-48S8CQ-EI
	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: < 65 dBA Back-to-front airflow: < 65 dBA
	Sound power at 40°C (dBA)	Front-to-back airflow: < 83 dBA Back-to-front airflow: < 81 dBA
	Sound pressure at 27°C (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)	38.85
	MTTR (hour)	1.48
	Availability	0.999997178

Note: For detailed information of CloudEngine 6865 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	• 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)	• 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

Certification Category	Description
	• VCCI- CISPR32: CLASS A • GB9254 CLASS A
Environment	• 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
https://support.huawei.com/hedex/hdx.do?docid=EDOC1100101219&lang=en&idPath=24030814%7C21782165%7C21782239%7C22318540%7C7597815.

Optical Transceivers and Cable

For details about the optical transceivers and cables information, visit
https://e.huawei.com/en/material/networking/dcswitch/f6d91cf16df0474998087676a33fd41e.

Ordering Information

Mainframe	
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)	CE6865-48S8CQ-EI
FAN-40HA-B	Fan box (HA, Back to Front, FAN panel side exhaust)	CE6865-48S8CQ-EI

Power

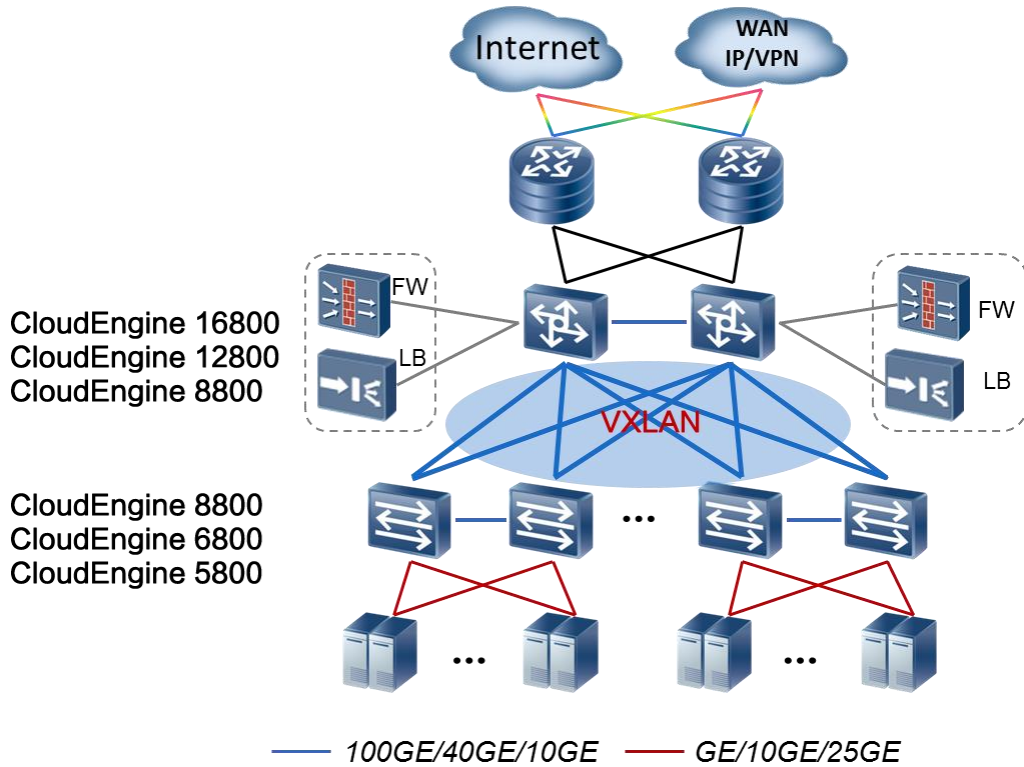| Model	Description	Applicable Product
PAC-600WA-F	600W AC Power Module (Front to Back, Power panel side intake)	CE6865-48S8CQ-EI
PAC-600WA-B	600W AC Power Module (Back to Front, Power panel side exhaust)	CE6865-48S8CQ-EI
PDC-350WA-F	350W DC Power Module (Front to Back, Power panel side intake)	CE6865-48S8CQ-EI
PDC-350WA-B	350W DC Power Module (Back to Front, Power panel side exhaust)	CE6865-48S8CQ-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-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-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 switches work as core switches, and CloudEngine 6865 switches work as ToR switches. CloudEngine 6865 switches use 100GE ports to set up 100GE full connections with CloudEngine 16800/CloudEngine 12800/CloudEngine 8800 core switches. The core and ToR switches use fabric technology such as 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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