Huawei CloudEngine 9860-4C-EI-A Data Center Switch Datasheet

The CloudEngine 9860-4C-EI-A series are Huawei's next-generation Ethernet switches designed for data centers (DCs). They feature high performance, high port density, low latency, and flexible cards.

Product Overview

The CloudEngine 9860-4C-EI-A series are Huawei's next-generation Ethernet switches designed for DCs. They feature high performance, high port density, low latency, and flexible cards. They are built on an advanced hardware structure and provide high-density 400GE, 100GE, and 40GE ports. Running over the Huawei VRP8 software platform, they support abundant DC features. In addition, the CloudEngine 9860-4C-EI-A series switches can work with the CloudEngine 16800/8800/6800/5800 series switches to build an elastic, virtual, and high-quality data center network (DCN), meeting networking requirements of DCs in the cloud computing era.

CloudEngine 9860-4C-EI-A series switches can function as core or aggregation switches on DCNs to help enterprises and carriers build a DCN platform for cloud computing. They can also be used as aggregation or core switches on campus networks.

Product Models and Appearances

Model	Appearance
CE9860-4C-EI-A	 4 U high, supporting four full-width flexible cards

Card models of the CloudEngine 9860-4C-EI-A:

Model	Appearance
CE98-D32CQ-A	 32-port 100GE/40GE QSFP28 line processing unit (LPU)
CE98-D8DQ	 8-port 400GE QSFP-DD LPU

Key Features

Ultra-High Capacity: High-Density 400GE/100GE/40GE Aggregation

- 25.6 Tbit/s switching, 8000 Mpps forwarding, and L2/L3 full line-rate forwarding capabilities

- Up to 32 x 400GE QSFP-DD ports or 128 x 100GE QSFP28 ports, making the switches ideal for functioning as the core, aggregation, and access switches on DCNs and campus networks
- 100GE QSFP28 ports, supporting 100GE optical modules and 40GE QSFP+ optical modules

Large Buffer: Adequately Coping with Traffic Bursts

- Device-wide 65 MB buffer, effectively dealing with the incast scenario of the distributed system and minimizing the packet loss rate
- Buffer model configurable based on service needs to better adapt to different application scenarios

Network-Wide High Reliability and High Service Continuity During Network Faults

- CloudEngine 9860-4C-EI-A series switches support Multichassis Link Aggregation Group (M-LAG) technology to implement link aggregation among multiple devices, improving link reliability from the card level to the device level. Each node in an M-LAG can be upgraded independently. When a node is upgraded, other nodes in the group can still forward services, preventing service interruption.
- Leveraging the comprehensive inter-device link aggregation technology, CloudEngine 9860-4C-EI-A series switches evolve device coupling from control plane-based stacking to M-LAG and then finally to coupling-free M-LAG Lite. This achieves active-active server access and highly reliable switch upgrade.

Programmable Network Devices for Flexible Customization

- CloudEngine 9860-4C-EI-A series switches run over the VRP8 software platform, on which an Open Programmability System (OPS) module is embedded to provide control-plane programmability.
- Users or third-party developers can use open APIs to develop and deploy dedicated network management policies, implementing fast expansion of service functions, automatic service deployment, and intelligent device management. This ensures automatic operations and maintenance (O&M) and minimizes management costs.
- CloudEngine 9860-4C-EI-A series switches support Ansible, an automatic management and O&M tool. With this tool, they implement unified provisioning of physical and virtual networks.

Intelligent Lossless Network, Meeting High Performance Requirements of RoCEv2 Applications

- CloudEngine 9860-4C-EI-A series switches support the intelligent lossless (iLossless) algorithm, which can eliminate packet loss caused by traffic congestion on traditional Ethernet networks. Leveraging this algorithm, CloudEngine 9860-4C-EI-A series switches can build a network environment featuring zero packet loss, low latency, and high throughput, which is ideal for RoCEv2 traffic, thereby meeting high performance requirements of RoCEv2 applications.
- CloudEngine 9860-4C-EI-A series switches support priority-based flow control (PFC) deadlock prevention. They can identify service flows that may cause PFC deadlocks and change queue priorities to prevent PFC deadlocks.
- CloudEngine 9860-4C-EI-A series switches support Artificial Intelligence Explicit Congestion Notification (AI ECN), which intelligently adjusts the ECN thresholds of lossless queues based on the live-network traffic model, helping to ensure low latency and high throughput at zero packet loss and maximize the performance of loss-sensitive services.

Intelligent O&M Through Interworking with iMaster NCE-FabricInsight

- CloudEngine 9860-4C-EI-A series switches provide telemetry technology to collect device data in real time and send the data to iMaster NCE-FabricInsight — Huawei's analyzer for DCNs. iMaster NCE -FabricInsight then 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.
- CloudEngine 9860-4C-EI-A series switches support intelligent traffic analysis to perform in-depth analysis on a specified service flow, obtain data about high-precision performance indicators such as the packet loss rate and latency (nanosecond-level) of the service flow, and export the analysis results to iMaster NCE-FabricInsight for further display and analysis. This makes it easier for O&M personnel to monitor the network condition and quickly locate network faults.

Zero Touch Provisioning (ZTP), Implementing Automatic O&M

- CloudEngine 9860-4C-EI-A series switches support ZTP. With this feature, the switches can automatically obtain and load version files from a USB flash drive or file server, freeing network engineers from onsite configuration and deployment. The benefits include minimized labor costs and maximized deployment efficiency.

- ZTP provides built-in scripts through open APIs. DC users can use a programming language they are familiar with, such as Python, to centrally configure network devices.

- ZTP decouples the configuration time of devices from the device quantity and area distribution, which improves service provisioning efficiency.

Flexible Airflow Design, Improving Energy Efficiency

- Strict back-to-front airflow design (air intake from the port side):

  a. The CloudEngine 9860-4C-EI-A series uses a strict 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 DC equipment rooms.

  b. Redundant power modules and fan modules can be configured to ensure service continuity.

- Innovative energy-saving technologies:

  a. The CloudEngine 9860-4C-EI-A series uses energy-saving chips and an intelligent fan speed adjustment scheme to measure system power consumption in real time. These energy-saving technologies reduce O&M costs and contribute to a greener DC.

Clear Indicators, Simplifying O&M

- Clear indicators:

  a. The innovative port indicators clearly show the port status, port speed, and states of all sub-interfaces.

  b. State and stack indicators on both the front and rear panels enable users to maintain the switch from either side.

  c. The CloudEngine 9860-4C-EI-A series supports remote positioning. Users can turn on the remote positioning indicator through the network management system (NMS) or console to easily identify the switches they want to maintain in an equipment room full of devices.

- Simple maintenance:

  a. The management port, fan modules, and power modules are on the front panel, which facilitates device maintenance.

  b. Data ports are located at the rear, facing servers. This simplifies cabling.

Licensing

CloudEngine 9860-4C-EI-A series switches support Huawei IDN One Software (N1) business model, which bundles iMaster NCE-Fabric, iMaster NCE-FabricInsight, and CloudEngine switches in typical scenarios to simplify transactions. This provides customers with more functions and value, and protects customers' software investment through Software License Portability.

Product Series	Feature	N1 Software Package (Mandatory)			N1 Add-On Package (Optional)			
CloudEngine 9860-4C-EI-A series		Foundation package	Advanced package	Premium package	AI Fabric function package	Multi-cloud, multi-DC scenario package	Value-added package of network traffic analysis	Digital map
	Base software	√	√	√				
	IPv6	√	√	√				
	Hitless upgrade	√	√	√				
	Telemetry	√	√	√				
	LLETH				√			
iMaster NCE-Fabric	Automation functions	√	√	√				
	Basic digital map							√

Product Series	Feature	N1 Software Package (Mandatory)			N1 Add-On Package (Optional)			
	functions							
	Basic intent functions			√				
	Runbook		√	√				
	Multi-cloud and multi-DC automation scenario package				√			
iMaster NCE-FabricInsight	Telemetry and basic network analysis functions	√	√	√				
	Network health evaluation		√	√				
	Value-added functions of network traffic analysis (100 VMs)			·√				
	IFIT service assurance function			√				
	Value-added functions of network traffic analysis (1000 VMs)					√		
	Multi-cloud and multi-DC analysis scenario package				√			
Mapping		Select one from the three packages. The Advanced package contains features of the Foundation package, and the Premium package contains features of the Advanced package.			Used together with the Foundation, Advanced, or Premium package.			
For details about product function differences, see the product documentation.								

Note: For details about the N1 business model,
visit:https://e.huawei.com/en/material/enterprise/f3272debb1c04015a538915657a89797

Specifications

Item	CloudEngine 9860-4C-EI-A
Airflow design	Standard back-to-front airflow
Device virtualization	M-LAG
Network convergence	Data Center Bridging Exchange Protocol (DCBX) and PFC
	Remote direct memory access (RDMA) and RoCE (RoCE v1 and RoCE v2)
Programmability	OPS programming
	Ansible-based automatic configuration and open-source module release
Traffic analysis	NetStream
	sFlow
VLAN	Access, trunk, and hybrid
	Default VLAN
	GARP VLAN Registration Protocol (GVRP)
MAC address table	Automatic MAC address learning and aging
	Static, dynamic, and blackhole MAC address entries
	Source MAC address filtering
	MAC address learning limiting based on ports and VLANs
IP routing	IPv4 dynamic routing protocols such as RIP, OSPF, IS-IS, and BGP
	IPv6 dynamic routing protocols such as RIPng, OSPFv3, IS-ISv6, and BGP4+
IPv6	IPv6 neighbor discovery (ND)
	Path MTU Discovery (PMTU)
	TCP6, IPv6 ping, IPv6 tracert, IPv6 socket, UDP6, and raw IPv6
Multicast	Multicast routing protocols, such as Internet Group Multicast Protocol (IGMP), Protocol Independent Multicast-Sparse Mode (PIM-SM), and Protocol Independent Multicast-Dense Mode (PIM-DM)
	Fast leaving of multicast member interfaces
	Multicast traffic suppression
Reliability	Link Aggregation Control Protocol (LACP)
	STP, RSTP, VBST, and MSTP
	BPDU protection, root protection, and loop prevention
	Device Link Detection Protocol (DLDP)
	VRRP, VRRP load balancing, and BFD for VRRP
	BFD for BGP, IS-IS, OSPF, and static routes
	Traffic classification based on Layer 2 headers, Layer 3 headers, and Layer 4 protocol priorities
	ACL, CAR, re-marking, and scheduling

Item	CloudEngine 9860-4C-EI-A	
QoS	Queue scheduling modes such as PQ, WRR, DRR, PQ+WRR, and PQ+DRR	
	Congestion avoidance mechanisms such as WRED and tail drop	
	Traffic shaping	
Intelligent O&M	Network-wide path detection	
	Telemetry	
	INT (IOAM) enhancement	
Intelligent lossless network	PFC deadlock prevention	
	AI ECN	
Configuration and maintenance	Terminal access services such as console port login, Telnet, and SSH	
	Network management protocols, such as SNMPv1/v2/v3	
	File upload and download through FTP and TFTP	
	Boot Read-Only Memory (BootROM) upgrade and remote online upgrade	
	Hot patches	
	User operation logs	
	ZTP	
Security and management	Command line authority control based on user levels, preventing unauthorized users from using commands	
	Defense against DoS, ARP, 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	
	RMON	

Hardware Specifications

Item		CloudEngine 9860-4C-EI-A
Physical features	Dimensions (H x W x D)	635mm×1025mm×370mm
	Weight without packaging (full configuration) [kg (lb)]	26.9kg
	Switching capacity (Tbps)	25.6 Tbit/s
	Forwarding performance (Mpps)	8000
Management interface	Console port	1 x RJ45 interface
	USB port	1
CPU	Number of cores	16
Buffer	System Buffer	65 MB

Item		CloudEngine 9860-4C-EI-A
	Power modules	1200 W AC&240 V DC power module
	Rated input voltage [V]	- 1200 W AC&240 V DC power module: 100 V AC to 240 V AC, 50/60 Hz; 240 V DC
		- 1200 W DC power module: −48 V DC: −48 V DC to −60 V DC; +48 V DC: +40 V DC to +57 V DC
	Input voltage range [V]	- 1200 W AC&240 V DC power module: AC: 90 V AC to 290 V AC, 45 Hz to 65 Hz; DC: 190 V DC to 290 V DC
		- 1200 W DC power module: -48 V DC: -38.4 V DC to -72 V DC; +48 V DC: +38.4 V DC to +60 V DC
	Maximum input current	- 1200 W AC&240 V DC power module: 10 A (100 V AC to 130 V AC); 8 A (200 V AC to 240 V AC); 8 A (240 V DC)
		- 1200 W DC power module: 38 A (−48 V DC to −60 V DC); 38 A (+48 V DC)
	Typical power	Configured with four CE98-D32CQ-A cards: 1291 W
		(100% traffic load, short-distance 100GE optical modules on 64 ports, normal temperature, fully configured with AC power modules)
		Configured with four CE98-D8DQ cards: 953 W
		(100% traffic load, short-distance 400GE optical modules on 16 ports, normal temperature, fully configured with AC power modules)
		Configured with four CE98-D32CQ-F cards: 1313 W
		(100% traffic load, short-distance 100GE optical modules on 64 ports, normal temperature, fully configured with AC power modules)
		Configured with four CE98-D8DQ-F cards: 961 W
		(100% traffic load, short-distance 400GE optical modules on 16 ports, normal temperature, fully configured with AC power modules)
	Maximum power	1753 W (100% traffic load, long-distance 400GE optical modules on 32 ports, high temperature, fully configured with AC power modules)
Heat dissipation	Heat dissipation mode	Air cooling
	Number of fans	4
	Heat dissipation airflow	Front-to-back or back-to-front airflow
Environment specifications	Long-term operating temperature (°C)	0°C to 40°C (0-1800 m) The temperature decreases by 1°C each time the altitude increases by 220 m.
	Storage temperature (°C)	-40°C to +70°C
	Storage relative humidity (RH)	5% to 95%
	Operating altitude (m)	Up to 5000
	Noise at normal temperature (27°C, sound pressure) (dBA)	Back-to-front airflow: maximum: 66 dB(A)

Item		CloudEngine 9860-4C-EI-A
	Noise at high temperature (40°C, sound pressure) (dBA)	Back-to-front airflow: maximum: 81 dB(A)
	Surge protection	AC power supply protection: 6 kV in common mode and 6 kV in differential mode
		DC power supply protection: 4 kV in common mode and 2 kV in differential mode
Reliability	MTBF (year)	42.79
	MTTR (hour)	1.73
	Availability	0.999997861

Performance and Scalability

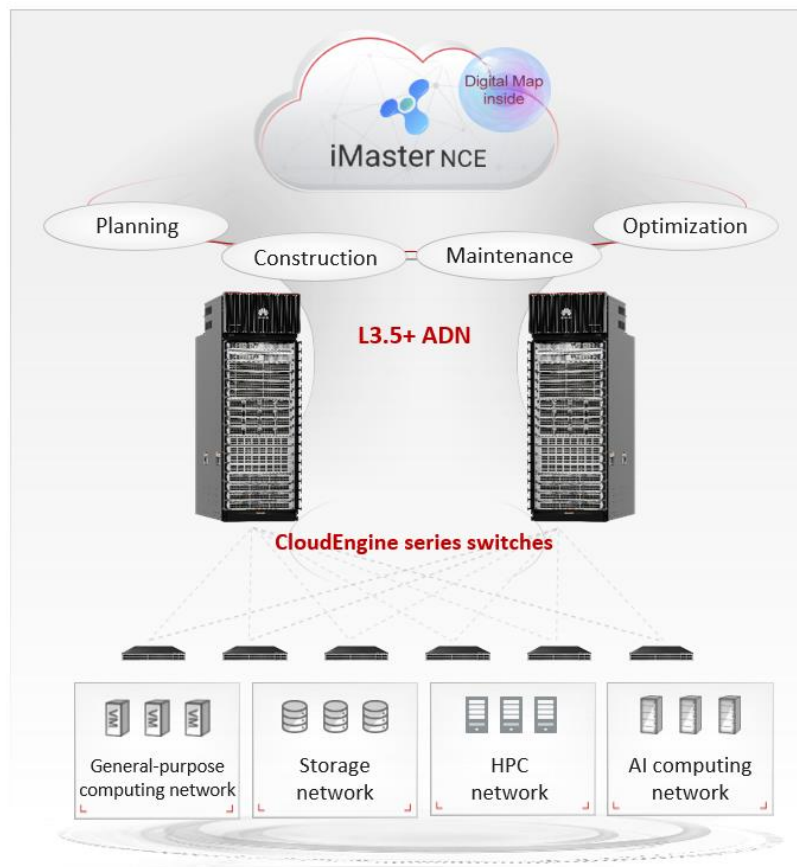| Item	CloudEngine 9860-4C-EI-A
Maximum number of MAC address entries	8K
Maximum number of routes (FIB IPv4/IPv6)	920K/520K
ARP size	32K
Maximum number of VRFs	1600
IPv6 ND table size	32K
Maximum number of multicast routes (multicast FIB IPv4/IPv6)	511/511
Maximum number of VRRP groups	256
Maximum number of ECMP paths	128
Maximum number of ACLs	ingress 500 + 2300/egress 500
Maximum number of LAGs	144
Maximum number of links in a LAG	64
Maximum number of MSTIs	64
Maximum number of VLANs where VBST can be configured	60

Ordering Information

Active Device	
CE9860-4C-EI-A-B	CE9860-4C-EI-A mainframe (4*subcard slots, 4*AC power modules, port-side intake)
CE9860-4C-EI-A-B1	CE9860-4C-EI-A mainframe (4*subcard slots, 4*AC power modules, 4*fan modules, 4*32 Port 100GE QSFP28 Interface card,port-side intake)

Active Device	
CE9860-4C-EI-A	CE9860-4C-EI-A mainframe (4*subcard slots, without fan and power modules)
Subcard	
CE98-D32CQ-A	CE98: 32-port 100GE QSFP28 LPU
CE98-D8DQ	CE98: 8-port 400GE QSFPDD LPU
Power module	

Model	Description	Applicable product
PAC1K2S12-PB	1200W AC&240V DC Power Module (Back to Front,Power panel side exhaust)	CE9860-4C-EI-A
PDC1K2S12-CE	1200W DC Power Module (Back to Front,Power panel side exhaust)	CE9860-4C-EI-A

Fan module		
Model	Description	Applicable product
FAN-180C-B	Fan box(B,FAN panel side exhaust)	CE9860-4C-EI-A

Software	
N1-CE98LIC-CFFD	N1-CloudFabric Foundation SW License for CloudEngine 9800
N1-CE98CFFD- SnS1Y	N1-CloudFabric Foundation SW License for CloudEngine 9800-SnS-Year
N1-CE98LIC-CFAD	N1-CloudFabric Advanced SW License for CloudEngine 9800
N1-CE98CFAD-SnS1Y	N1-CloudFabric Advanced SW License for CloudEngine 9800-SnS-Year
N1-CE98LIC-CFPM	N1-CloudFabric Premium SW License for CloudEngine 9800
N1-CE98CFPM-SnS1Y	N1-CloudFabric Premium SW License for CloudEngine 9800 -SnS-Year
N1-CE98LIC-AIF	N1-CloudEngine 9800 AI Fabric Function
N1-CE98AIF-SnS1Y	N1-CloudEngine 9800 AI Fabric Function-SnS-Year
N1-CE-F-LIC-DM	N1-CloudEngine Digital Map Function-Fixed
N1-CEFDM-SnS1Y	N1-CloudEngine Digital Map Function, Per Fixed device-SnS-Year
N1-CE-LIC-AFP1KVM	N1-CloudEngine Network Intelligent Analysis Flow Advantage Per 1000 VM,Electronic
N1-CEAFP1KVM-SnS1Y	N1-CloudEngine Network Intelligent Analysis Flow Advantage Per 1000 VM-SnS-Year,Electronic
N1-CE-F-LIC-MDCA	N1-CloudEngine Data Center Switch Multi-cloud Multi-DC Value-added Package -Fixed
N1-CEFMDCA -SnS1Y	N1-CloudEngine Data Center Switch Multi-cloud Multi-DC Value-added Package, Per Fixed device-SnS-Year

Application in a DC

In a typical DC, the CloudEngine 16800, CloudEngine 9800, and CloudEngine 8800 series can function as core switches and can interconnect with the CloudEngine 6800 and CloudEngine 5800 series that function as ToR switches through 100GE, 40GE, or 10GE ports.

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