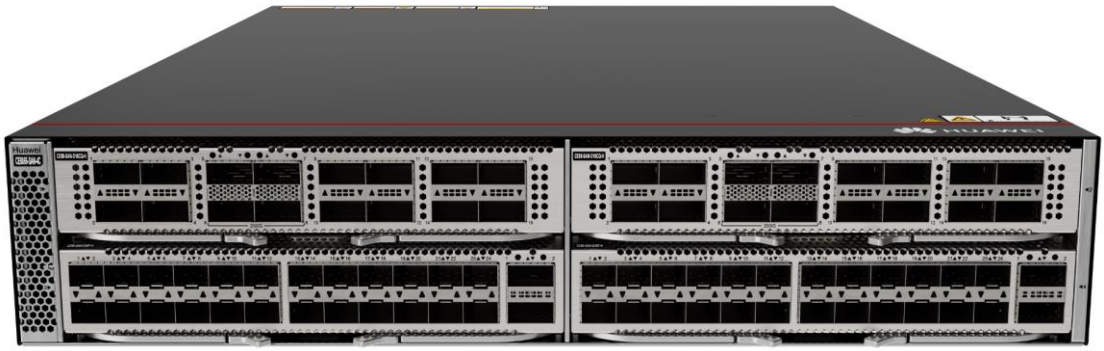
Huawei CloudEngine 8865-SAN-4C Data Center Switch Datasheet

Huawei CloudEngine 8865-SAN-4C series switches are next-generation fixed switches that support flexible cards ranging from GE to 100GE and are designed for all-flash storage networks of data centers (DCs).



Product Overview

Huawei CloudEngine 8865-SAN-4C series switches are next-generation fixed switches that support flexible cards ranging from GE to 100GE and are designed for all-flash storage networks of DCs. They feature high performance, high reliability, low latency, and easy operations and maintenance (O&M). They adopt an advanced hardware structure design, provide five types of cards, enable flexible selection of airflow directions, and support the exclusive iLossless algorithm, making NVMe more efficient and fully unleashing the potential of all-flash. They also support NOF+ technology to implement plug-and-play of the storage network and fast fault detection.

CloudEngine 8865-SAN-4C series switches can work with CloudEngine 16800-X series switches to build an intelligent lossless data center network (DCN), meeting storage network requirements in the all-flash era.

Product Models and Appearances

CloudEngine 8865 series switches fall into the following models:

CloudEngine 8865-SAN-4C

Product Appearance	Description
 **Port side**  **Fan module and power module side**	2 U high, supporting four half-width flexible cards and flexible combination of two types of cards ● 24 x 25GE + 2 x 100GE ● 16 x 100GE

Product Features

High-Density Access, Providing Superior Capacity

- 16 x 100GE (CE88-SAN-D16CQ-H): A CloudEngine 8865-SAN-4C series switch supports 16 x 100GE ports by default, and four of the ports can be upgraded to 200GE ports by using RTU licenses, supporting 12 x 100GE + 4 x 200GE. A 200GE port can be split into four 50GE, 25GE, or 10GE ports or two 100GE ports. A 100GE Gearbox port can be split into four 25GE or 10GE ports (if two ports form a SerDes group and one of them is split, the other port becomes unavailable).
- 24 x 25GE + 2 x 100GE (CE88-SAN-D26F-H): The ports can be upgraded to downlink 50GE ports and uplink 200GE ports by using RTU licenses. A 25GE port can work at the rate of 10 Gbit/s or Gbit/s, and a 100GE port can work at the rate of 40 Gbit/s. An uplink 200GE port can be split into four 50GE, 25GE, or 10GE ports, or two 100GE ports.

Inter-Device Link Aggregation, Ensuring High Efficiency and Reliability

- CloudEngine 8865 series switches support Multichassis Link Aggregation Group (M-LAG) to implement link aggregation among multiple devices, improving link reliability from the card level to the device level.
- Switches in an M-LAG 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.

Virtualized Hardware Gateway, Achieving Rapid Deployment

- CloudEngine 8865 series switches can work with the industry's mainstream virtualization platforms. When functioning as high-performance hardware gateways on an overlay network (VXLAN), CloudEngine 8865 series switches can support the operations of a DC with up to 16 million tenants.
- When functioning as hardware gateways on an overlay network, CloudEngine 8865 series switches can connect to cloud platforms through open APIs, facilitating unified management of virtual and physical networks.
- The hardware virtualized gateway solution achieves rapid service deployment without having to change the customer network, protecting customer investments.
- CloudEngine 8865 series switches support Border Gateway Protocol - Ethernet VPN (BGP-EVPN), which can run as the VXLAN control plane to simplify VXLAN configuration within and between DCs.

Standard Ports, Enabling Open Interconnection

- CloudEngine 8865 series switches support NETCONF and can interconnect with iMaster NCE-Fabric.
- CloudEngine 8865 series switches support Ansible — an automatic management and O&M tool — to implement unified provisioning of physical and virtual networks.
- CloudEngine 8865 series switches are integrated with mainstream cloud platforms (including commercial and open-source cloud platforms) and third-party controllers, enabling flexible service customization and automatic management.

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

- CloudEngine 8865 series switches support Zero Touch Provisioning (ZTP). ZTP enables the switches to automatically obtain and load version files from a file server, freeing network engineers from onsite configuration and deployment. ZTP reduces labor costs and improves device deployment efficiency.
- ZTP supports embedded script languages and provides them for users through open APIs. DC users can use a familiar programming language (such as Python) to centrally configure network devices.
- ZTP decouples the configuration time of new devices from device quantity and geographical distribution, shortening the service provisioning time and improving the service provisioning efficiency.

Intelligent O&M Through Collaboration with iMaster NCE-FabricInsight

- CloudEngine 8865 series switches support telemetry technology to collect device data in real time and send the collected data to iMaster NCE-FabricInsight — the DCN analysis component of Huawei iMaster NCE. Leveraging the intelligent fault identification algorithm, iMaster

NCE-FabricInsight can analyze network data, accurately display the real-time network status, locate faults and identify their root causes in a timely and effective manner, and detect network problems that can affect user experience, precisely guaranteeing user experience.

- CloudEngine 8865 series switches can insert IFIT extension headers into packets, visualize paths, and analyze interface-level packet loss, traffic, and latency to implement high-precision service-level packet loss measurement and facilitate fault demarcation.
- CloudEngine 8865 series switches support Packet Event. When a device discards packets due to reasons such as abnormal forwarding, specified packet discarding rules, a full buffer, or ACL rule deny actions, or when the latency of packets exceeds a specified threshold, the device reports related flow entries to the iMaster NCE-FabricInsight collector.
- CloudEngine 8865 series switches support application views. An application view clearly displays the applications, IP subnets, and their indicators and access relationships on the network.
- FabricInsight uses service telemetry to collect statistics on the storage- and computing-side I/O traffic measurement and latency breakdown by devices on the NoF network, analyzes the statistics, and displays them in a visualized manner, enabling intelligent O&M of the NoF network.

Simplified DCN Deployment via Collaboration with iMaster NCE-Fabric

- CloudEngine 8865 series switches can interconnect with iMaster NCE-Fabric through standard protocols such as NETCONF and SNMP to adapt to networks and implement automatic network management. This helps to provide more efficient and intelligent operation methods, simplifying network management and reducing the OPEX.

Intelligent Lossless Network, Meeting High Performance Requirements of RoCEv2 Applications

- CloudEngine 8865 series switches support the iLossless algorithm to eliminate packet loss on the conventional Ethernet. This helps to build a lossless, low-latency, and high-throughput network environment for RoCEv2 traffic, meeting high performance requirements of RoCEv2 applications.
- CloudEngine 8865 series switches support PFC deadlock prevention. They can identify service flows that may cause PFC deadlocks and change queue priorities of these flows to prevent PFC deadlocks.
- CloudEngine 8865 series switches support Artificial Intelligence Explicit Congestion Notification (AI ECN). This future-oriented function can intelligently adjust the ECN thresholds of lossless queues based on the live-network traffic model to ensure low latency and high throughput with zero packet loss, maximizing the performance of lossless services.
- CloudEngine 8865 series switches support Explicit Congestion Notification (ECN) Overlay. ECN Overlay applies ECN to a VXLAN network, enabling the traffic receiver to detect congestion on the overlay network in a timely manner and instruct the traffic sender to reduce its packet sending rate to relieve network congestion.

Strict Front-to-Back Airflow Design, Achieving High Energy Efficiency

Flexible front-to-back or back-to-front airflow design:

- CloudEngine 8865-SAN-4C series switches use a strict front-to-back airflow design that isolates cold air channels from hot air channels, meet heat dissipation requirements in DC equipment rooms.
- Air can flow from front to back or from back to front depending on the fan modules and power modules in use.
- Redundant power modules and fan modules can be configured to ensure service continuity.

Innovative energy-saving technologies:

- CloudEngine 8865-SAN-4C series switches use energy-saving chips and an intelligent fan speed control scheme to measure system power consumption in real time. This can reduce O&M costs and help to build a green DC.

Clear Indicators, Simplifying O&M

Clear indicators:

- The innovative port indicators can clearly show the port status, port speed, and status of all sub-ports.
- State indicators on both the front and rear panels enable users to maintain the switch from either side.
- CloudEngine 8865-SAN-4C series switches support 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:

- The management port, fan modules, and power modules are on the front panel, which facilitates device maintenance.
- Data ports are located at the rear, facing servers. This facilitates cabling.

Licensing

Huawei CloudEngine 8865-SAN-4C series switches support the CloudFabric IDN One Software (N1) business model, which bundles iMaster NCE-Fabric, iMaster NCE-FabricInsight, and CloudEngine switches in a range of typical scenarios. This approach simplifies transactions, provides customers with more functions and value, and protects customers' software investment through Software License Portability.

Feature	AI Fabric Function Package for NOF+ Storage Scenarios (Mandatory)	
	NoF+ Foundation Package	NOF+ Advanced Package
Basic functions (including IPv6 and VXLAN)	•	•
MLAG hitless upgrade	•	•
Telemetry	•	•
Service Telemetry	•	•
AI ECN 2.0	•	•
Plug-and-play, second-level switchover (iNOF)	•	•
NOF+ long-distance lossless transmission (ABS) (200 km)	•	•
iMaster NCE-FabricInsight's basic analysis function	•	•
IFIT		•
Network health of iMaster NCE-FabricInsight		•
IFIT service assurance		•
Version mapping	Select either of them. The advanced package provides all features of the foundation package.	

Product Specifications

Item	CloudEngine 8865-SAN-4C
Device virtualization	M-LAG
Port	Jumbo frames
Network virtualization	VXLAN routing and VXLAN bridging
	BGP-EVPN
SDN	iMaster NCE-Fabric
Network convergence	PFC and AI ECN
	RDMA and RoCE (RoCE v1 and RoCE v2)
Programmability	OpenFlow
	OPS programming
Traffic analysis	NetStream
VLAN	Access, trunk, and hybrid ports
	Default VLAN
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	VXLAN over IPv6
	IPv6 VXLAN over IPv4
	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 IGMP, PIM-SM, and MSDP
	IGMP snooping and IGMP proxy
	IPv6 Layer 3 multicast and configuration of both Layer 2 and Layer 3 multicast services
	Fast leaving of multicast member interfaces
	Multicast traffic suppression
	Multicast NAT
Reliability	LACP
	STP, RSTP, VBST, and MSTP
	BPDU protection
	Smart link and multi-instance
	Hardware-based Bidirectional Forwarding Detection (BFD), with a minimum packet sending interval of 3.3 ms
	VRRP, VRRP load sharing, and BFD for VRRP
	BFD for BGP, IS-IS, OSPF, and static routing
	BFD for VXLAN
QoS	Traffic classification based on Layer 2 headers, Layer 3 protocols, and Layer 4 protocol priorities

Item	CloudEngine 8865-SAN-4C
	ACL, CAR, re-marking, and scheduling
	Queue scheduling modes such as PQ, DRR, and PQ+DRR
	Congestion avoidance mechanisms such as WRED and tail drop
	Traffic shaping
	IEEE 1588v2 (PTP)
Intelligent O&M	Network-wide path detection
	Telemetry
	Enhanced ERSPAN
	In-situ Flow Information Telemetry (IFIT)
	Packet Event: packet loss visualization and ultra-long latency visualization
	Statistics collection on the buffer microburst status
	VXLAN OAM: VXLAN ping and VXLAN tracert
Intelligent lossless network	PFC deadlock prevention
	AI ECN
	ECN Overlay
	Enhanced NSLB
Configuration and maintenance	Terminal login through the console port, 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 patching
	User operation logs
	Configuration rollback
	ZTP
Security and management	MACsec
	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 ID, and VLAN ID
	Authentication methods, including AAA, LDAP, RADIUS, and HWTACACS
	RMON

Performance and Scalability

Item	Value
Maximum number of MAC address entries	640K
Maximum number of routes (FIB IPv4/IPv6)	1.5M/750K

ARP size	128K
Maximum number of VRFs	4096
IPv6 ND table size	128K
Maximum number of multicast routes (multicast FIB IPv4/IPv6)	32K/16K
Maximum number of VRRP groups	1024
Maximum number of ECMP paths	128
Maximum number of ACLs	34K@160 bits (inbound) + 2K@320 bits (outbound) (K = 1024)
Maximum number of VXLAN bridge domains	16K
Maximum number of BDIF interfaces	16K
Maximum number of virtual tunnel endpoints (VTEPs)	16K
Maximum number of LAGs	1024
Maximum number of links in a LAG	256
Maximum number of MSTIs	1000
Maximum number of VLANs where VBST can be configured	640K

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

Hardware Specifications

Item		CloudEngine 8865-SAN-4C
Physical features	Dimensions (H x W x D)	88.1 mm x 442.0 mm x 600.0 mm
	Weight without packaging (full configuration) [kg (lb)]	15.48
	Switching capacity (Tbps)	16
	Forwarding performance (Mpps)	2400
Management interface	Console port	1 x RJ45 interface
	USB port	1

Item		CloudEngine 8865-SAN-4C
CPU	Number of cores	16
Buffer	System Buffer	65 MB
Power supply	Power modules	2000 W AC&240 V DC power module 1800 W AC&240 V DC power module 2000 W high-voltage DC power module
	Rated input voltage [V]	2000 W AC&240 V DC power module: AC: 100 V AC to 240 V AC, 50/60 Hz; DC: 240 V DC 1800 W AC&240 V DC power module: AC: 100 V AC to 240 V AC, 50/60 Hz; DC: 240 V DC 2000 W high-voltage DC power module: 336 V DC
	Input voltage range [V]	2000 W AC&240 V DC power module: AC: 90 V AC to 290 V AC, 45 Hz to 66 Hz; DC: 190 V DC to 290 V DC 1800 W AC&240 V DC power module: AC: 90 V AC to 290 V AC, 45 Hz to 66 Hz; DC: 190 V DC to 290 V DC 2000 W high-voltage DC power module: 260 V DC to 400 V DC
	Maximum input current	2000 W AC&240 V DC power module: 10 A (100 V AC to 240 V AC); 10 A (240 V DC) 1800 W AC&240 V DC power module: 10 A (100 V AC to 240 V AC); 10 A (240 V DC) 2000 W high-voltage DC power module: 10 A (336 V DC)
	Typical power	Configured with four CE88-SAN-D16CQ-H cards: - 650 W (100% traffic load, copper cables on 32 x 100GE ports, normal temperature, dual AC power modules) - 728 W (100% traffic load, short-distance optical modules on 32 x 100GE ports, normal temperature, dual AC power modules) Configured with four CE88-SAN-D26F-H cards: - 305 W (100% traffic load, copper cables on 48 x 25GE + 4 x 100GE ports, normal temperature, dual AC power modules) - 338 W (100% traffic load, short-distance optical modules on 48 x 25GE + 4 x 100GE ports, normal temperature, dual AC power modules)
	Maximum power	Configured with four CE88-SAN-D16CQ-H cards: - 888 W (100% traffic load, short-distance optical modules on 64 x 100GE ports, normal temperature, dual AC power modules) - 1318 W (100% traffic load, long-distance optical modules on 64 x 100GE ports, high temperature, dual AC power modules) - 1376 W (100% traffic load, long-distance optical modules on 48 x 100GE + 16 x 200GE ports, high temperature, dual AC power modules) Configured with four CE88-SAN-D26F-H cards: - 410 W (100% traffic load, short-distance optical modules on 96 x 25GE + 8 x 100GE ports, normal temperature, dual AC power modules) - 718 W (100% traffic load, long-distance optical modules on 96 x 25GE + 8 x 100GE ports, high temperature, dual AC power modules)
	Frequency (AC, Hz)	50/60
Heat dissipation	Heat dissipation mode	Air cooling
	Number of fans	3
	Heat dissipation airflow	Front-to-back or back-to-front airflow

Item		CloudEngine 8865-SAN-4C
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)	Port-side air intake: < 64.3 dB(A) Port-side air exhaust: < 65.2 dB(A)
	Noise at high temperature (40°C, sound pressure) (dBA)	Port-side air intake: < 86.1 dB(A) Port-side air exhaust: < 87.9 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)	48.4
	MTTR (hour)	1.86
	Availability	0.9999964621

Safety and Regulatory Compliance

The following table lists the safety and regulatory compliance of CloudEngine 6800 series switches.

Certification Category	Description
Safety	EU CE: 2006/95/EC, EN 60950-1 Germany GS: EN 60950-1 CB: IEC 60950-1 USA UL: UL 60950-1 Canada CUL: CSA C22.2 No. 60950-1 Australia RCM: AS/NZS 60950-1 China CCC: GB 4943
Electromagnetic Compatibility (EMC)	EU CE: 2014/30/EU, EN55032, EN 55024, and EN 300386 US FCC: 47CFR Part 15 Canada IC: ICES-003 Australia C-Tick: AS/NZS CIPSR22 Japan VCCI: VCCI-3 and VCCI-4 China CCC: GB 9254
Environment	EU ROHS: 2002/95/EC & 2011/65/EU EU REACH: 1907/2006/EC EU WEEE: 2002/96/EC China RoHS: GB/T 26572

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

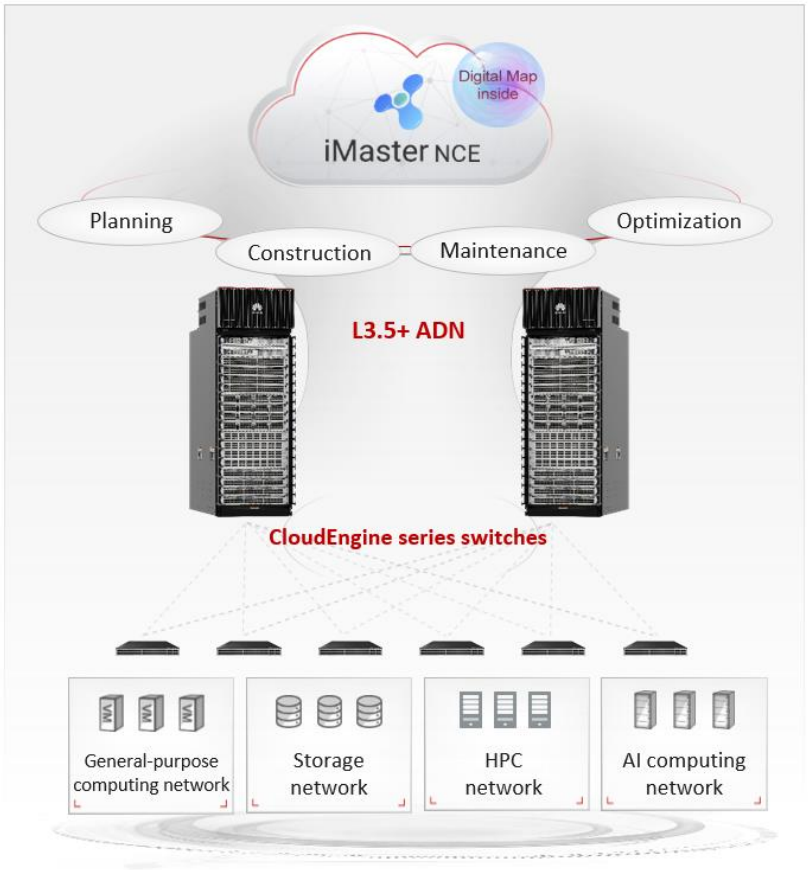
Ordering Information

Device	Description
CE8865-SAN-4C	CE8865-SAN-4C Mainframe (With 4 Subcard Slots, Without Fan and Power Modules)
CE8865-SAN-4C-B	CE8865-SAN-4C Mainframe (With 4 Subcard Slots, 2*AC Power Module, 3*Fans, Port-side Intake)
CE8865-SAN-4C-F	CE8865-SAN-4C Mainframe (With 4 Subcard Slots, 2*AC Power Module, 3*Fans, Port-side Exhaust)
Fan modules	
Model	**Description**
FAN-180E-B	Fan box (B,FAN panel side exhaust)
FAN-180E-F	Fan box (F,FAN panel side intake)
Power module	
Model	**Description**
PAC2KS12-PB	2000W AC&240V DC Power Module (Back to Front,Power panel side exhaust)
PAC1K8S12-PF	1800W AC&240V DC Power Module (Front to Back,Power panel side intake)
PDC2K2S12-PB	2200W DC Power Module (Back to Front, Power panel side exhaust)
PDC2K2S12-PF	2200W DC Power Module (Front to Back, Power panel side intake)
PHD2KS12-PB	2000W HVDC Power Module (Back to Front, Power panel side exhaust)
Hardware RTU	
CE88-RTU-U2CQ	100GE upgraded to 200GE
CE88-RTU-U24YS	25GE upgraded to 50GE
Software	
N1-CE88LIC-NOF-STANDARD	N1-CloudEngine 8800 Standard Package for the Centralized Storage Scenarios
N1-CE88LIC-NOF-ENHANCED	N1-CE88LIC-NOF-ENHANCED,N1-CloudEngine 8800 Enhanced Package for the Centralized Storage Scenarios

Networking and Applications

Typical Application in DCs

On a typical DCN, CloudEngine 16800-X or 16800 switches work as core switches, whereas CloudEngine 8865 series switches work as TOR switches and connect to the core switches through 40GE, 100GE, or 200GE ports to build an end-to-end and fully-connected 100GE/200GE/400GE network. The switches use VXLAN and other fabric protocols to establish a non-blocking large Layer 2 network, which allows large-scale VM migration and flexible service deployment.



More Information

For more information about Huawei products, visit http://e.huawei.com or contact Huawei's local sales office.

Alternatively, you can contact us through one of the following methods:

- Global service hotline: http://e.huawei.com/en/service-hotline
- Enterprise technical support website: http://support.huawei.com/enterprise/
- Service email address for enterprise users: support_e@huawei.com

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