Huawei CX920 Switch Module

V100R001

White Paper

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About This Document

Overview

This white paper describes the CX920 multi-plane switch module in terms of the functions, advantages, appearance, specifications, internal chassis networking, and standards and certifications compliance. You can learn about the CX920 by reading this document.

Intended Audience

This document is intended for:

- Huawei presales engineers
- Channel partner presales engineers
- Enterprise presales engineers

Symbol Conventions

The symbols that may be found in this document are defined as follows.

Symbol	Description
⚠ DANGER	Indicates a hazard with a high level or medium level of risk which, if not avoided, could result in death or serious injury.
⚠ WARNING	Indicates a hazard with a low level of risk which, if not avoided, could result in minor or moderate injury.
⚠ CAUTION	Indicates a potentially hazardous situation that, if not avoided, could result in equipment damage, data loss, performance deterioration, or unanticipated results.
⚐ TIP	Provides a tip that may help you solve a problem or save time.
📖 NOTE	Provides additional information to emphasize or supplement important points in the main text.

Change History

Changes between document issues are cumulative. The latest document issue contains all the changes made in earlier issues.

Issue 05 (2017-03-27)

This issue is the fifth official release.

Mode	Change Description
Added	Added product model descriptions to **1.3 Appearance**.

Issue 04 (2017-03-03)

This issue is the fourth official release.

Mode	Change Description
Modified	Changed the altitude in **1.8 Technical Specifications**.

Issue 03 (2017-01-27)

This issue is the third official release.

Mode	Change Description
Modified	Added the link to the networking assistant in **1.6 Internal Chassis Networking**.

Issue 02 (2016-11-22)

This issue is the second official release.

Mode	Change Description
Modified	Added the description about the working temperature's compliance with the ASHRAE Class A3 standard in **1.8 Technical Specifications**.

Issue 01 (2016-10-08)

The issue is the first official release.

Contents

1 Overview

About This Chapter

1.1 Functions

This topic describes the CX920 multi-plane switch module in terms of the functions, protocols, and ports.

The CX920 switch module (hereinafter referred to as CX920) is the switching control unit that provides data switching for server blades and provides external service and management ports in a centralized manner. The 10GE and 40GE switching planes are physically isolated from each other and work independently. The 10GE switching plane connects to the LOMs of blades (Currently only the CH121H V3 server supports LOMs). The 40GE switching plane connects to mezzanine card 1 or 2 of blades.

The CX920s are installed in the rear slots of the E9000 chassis. They are usually installed in slots 2X and 3X. If they are installed in slots 1E and 4E, the 10GE switching plane is unavailable. Through the E9000 chassis midplane, the CX920s are connected to the compute nodes, storage nodes, and management modules to implement switching for internal data packets and management packets, providing high-speed data transmission for users.

Table 1-1 describes the functions of the CX920.

Table 1-1 Ethernet switching plane function description

Function		Description
Ethernet features	Ethernet	- Full-duplex and autonegotiation working modes 10GE and 40GE (supported by Ethernet ports) NOTE 10GE optical ports support passive cables. 10GE optical ports support multi-mode and single-mode optical modules (GE or 10GE). 10GE optical ports support SFP electrical modules. - Ports connected to compute nodes can be dynamically set to 40GE or 10GE. 40GE optical ports on the panel support multi-mode optical cables, single-mode optical cables, and passive cables. Each 40GE optical port can be dynamically divided into four 10GE optical ports. - Port traffic control NOTE 10GE optical ports do not support traffic control negotiation. - Jumbo frames - Link aggregation - Load balancing among links of a trunk - Port isolation and forwarding restriction on ports 40G port splitting - Protocol-based packet statistics on a port - Broadcast storm suppression - M-LAG

Function	Description	
	VLAN	- Multiple access modes: access, trunk, and hybrid - Port-based, MAC address-based, and IP subnet-based VLAN assignment - VLAN aggregation - MUX VLAN - Transparent transmission of protocol packets in a VLAN - Batch configuration of VLANs
	QinQ	- Basic QinQ - Flexible QinQ
	VLAN Mapping	1 to 1 VLAN mapping 2 to 1 VLAN mapping 2 to 2 VLAN mapping
	GVRP	GARP VLAN Registration Protocol (GVRP)
	MAC	- Sticky MAC - Automatic MAC address learning and aging - Static, dynamic, and blackhole MAC address entries - Filtering based on source MAC addresses - Port-based MAC learning limiting
	Link Layer Discovery Protocol (LLDP)	LLDP
Ethernet loop protection	Multiple Spanning Tree Protocol (MSTP)	- Spanning Tree Protocol (STP) - Rapid Spanning Tree Protocol (RSTP) - MSTP - VBST - Bridge protocol data unit (BPDU), root, and loop protection - Partitioned STP and layer-2 protocol transparent transmission
	ERPS	G.8032 v1 or v2

Function		Description
IP features	Address Resolution Protocol (ARP)	- Static and dynamic ARP entries - ARP in a VLAN - ARP entry aging - Gratuitous ARP - Proxy ARP - ARP-Ping - ARP gateway anti-collision
	IPv6	- IPv4/IPv6 dual-stack - Neighbor Discovery (ND) - IPv6 over IPv4 manual tunnel - IPv6 over IPv4 GRE tunnel 6to4 tunnel
	Dynamic Host Configuration Protocol (DHCP)	- DHCP server - DHCP snooping - DHCP relay - DHCPv6 relay
IP forwarding	Unicast routing	- IPv4 and IPv6 static routing - Routing Information Protocol Version 1/2 (RIP-1/RIP-2) and RIPng - OSPFv2 and OSPFv3 - Intermediate System to Intermediate System (IS-IS) - Border Gateway Protocol Version 4 (BGP4) and BGP4+ - Routing policies - Policy-based routing - Unicast Reverse Path Forwarding (URPF) check
	MPLS	**NOTE** Only the 40GE switching plane supports this feature. - LDP - MPLS QoS: Uniform, Pipe, and Short Pipe
	VPN	- Multi-VPN-Instance CE (MCE) and IPv6 MCE - GRE tunneling

Function		Description
	Multicast routing	• Internet Group Management Protocol Version 1/2/3 (IGMPv1/v2/v3) • Protocol Independent Multicast-Sparse Mode PIM-SM(IPv4) and PIM-SM (IPv6) • Protocol Independent Multicast Source-Specific Multicast (PIM-SSM) (IPv4) and PIM-SSM (IPv6) • MLDv1 and MLDv2 • MLD SSM mapping • Multiprotocol BGP (MBGP) • Multicast Source Discovery Protocol (MSDP) • Multicast routing policies • Reverse Path Forwarding (RPF) • Bidirectional PIM (IPv4) and Bidirectional PIM (IPv6)
Device reliability	Bidirectional Forwarding Detection (BFD)	• BFD (IPv4) and BFD (IPv6) • Association between BFD and Eth-Trunk ports • Association between BFD and OSPF • Association between BFD and OSPFv3 • Association between BFD and IS-IS • Association between BFD and IS-IS IPv6 • Association between BFD and BGP • Association between BFD and BGP4+ • Association between BFD and PIM (IPv4) • Association between BFD and PIM (IPv6) • Association between BFD and IPv4 static routing • Association between BFD and IPv6 static routing • Association between BFD and VRRP • Association between BFD and VRRP6
	Others	• Virtual Router Redundancy Protocol (VRRP) and VRRP6 • DLDP • Smart Link • Smart Channel • EFM (802.3ah)
Layer 2 multicasting feature	Layer 2 multicasting	• IGMP snooping • IGMP Proxy • User fast leave mechanism • Multicast traffic control • Multicast VLAN

Function		Description
QoS features	Traffic classification	● Traffic classification based on the combination of the L2 protocol header, IP quintuple information, outbound port, and 802.1p priority ● Traffic classification based on the C-VID and C-PRI of QinQ packets ● Matching internal packet information encapsulated in a GRE tunnel ● Matching internal packet information encapsulated in a TRILL tunnel ● Matching internal packet information encapsulated in an MPLS or VXLAN tunnel (supported by the 40GE switching plane)
	Traffic behavior	● Access control after traffic classification ● Traffic policing based on traffic classification ● Re-marking based on the results of traffic classification ● Class-based packet queuing ● Association between traffic classification and traffic behavior
	Priority mapping	**NOTE** Only the 40GE switching plane supports this feature. ● Mapping from 802.1p priorities to PHBs and colors ● Mapping from PHBs and colors to 802.1p priorities ● Mapping from DSCP to PHBs and colors ● Mapping from PHBs and colors to DSCP ● Mapping from EXP priorities to PHBs and colors
	Queue scheduling	● Priority queuing (PQ) scheduling ● Deficit round robin (DRR) scheduling ● PQ+DRR scheduling ● Weighted round robin (WRR) scheduling ● PQ+WRR scheduling
	Congestion avoidance	● Tail-drop algorithm (supported by the 10GE switching plane) ● Weighted Random Early Detection (WRED) drop algorithm
	Outbound port rate limiting	Outbound port rate limiting
	ACL-based simplified traffic policies	● ACL-based packet filtering ● ACL-based redirection ● ACL-based traffic statistics

Function		Description
Virtualization	Many-to-one virtualization	● Intelligent Stack (iStack) ● iStack split and merge ● iStack dual-active detection ● iStack version and configuration synchronization
Data center features	TRILL	● TRILL ● TRILL NSR ● TRILL ECMP ● IGMP over TRILL ● TRILL active-active multi-homing ● Association between TRILL and MSTP (supported by the 10GE switching plane) ● TRILL gateway (supported by the 10GE switching plane)
	DCB	● Data Center Bridging Exchange Protocol (DCBX) ● Priority-based Flow Control (PFC) ● Enhanced Transmission Selection (ETS)
	FCoE	FIP Snooping Bridge (FSB) ● FCF ● NPV ● FSB
	VXLAN	● Manual VXLAN tunnel configuration ● Dynamic VXLAN tunnel configuration through EVPN BGP
	Virtualization awareness	**NOTE** Only the 10GE switching plane supports this feature. ● Virtualization awareness ● Automatic deployment of policies ● Automatic migration of policies ● NLB cluster association ● Association between one multicast MAC address and multiple outbound ports
	Server cluster	**NOTE** Only the 40GE switching plane supports this feature. NLB cluster association ● NLB cluster association ● Association between one multicast MAC address and multiple outbound ports
	VEPA forwarding	Virtual Ethernet Port Aggregator (VEPA)-based traffic forwarding

Function		Description
Configuration and maintenance	Terminal services	- Command line configuration - Prompt and help information in English - Terminal services such as Console and Telnet - Information sending between terminal users
	File systems	- File systems, file directories, and file management - Uploading and downloading files through File Transfer Protocol (FTP), Trivial File Transfer Protocol (TFTP), and Secure File Transfer Protocol (SFTP)
	Debugging and maintenance	- Unified management of logs, alarms, and commissioning information - Electronic labels - User operation logs - Detailed debugging information for network fault diagnosis - Network testing tools such as Tracert and Ping - Port mirroring and traffic mirroring
	Version upgrading	- Device software loading and online software loading - Online upgrade through the basic input/output system (BIOS) menu - Online patching **NOTE** To ensure service security, upgrade the switch module software version regularly.

Function		Description

Security and management	System Security	• Command line-based hierarchical protection to prevent unauthorized access to switching modules
		• Secure Shell (SSH)
		• RADIUS (IPv4) and RADIUS (IPv6) user login authentication
		• HWTACACS (IPv4) and HWTACACS (IPv6) user login authentication
		• Access control list (ACL) filtering
		• Dynamic ARP inspection (DAI)
		• DHCP packet filtering (with the Option 82 field)
		• Prevention of control packet attacks
		• Attack defense
		   – Defense against flood attacks without IP payloads, attacks from IGMP null payload packets, LAND attacks, Smurf attacks, and attacks from packets with invalid TCP flag bits
		   – Defense against attacks from many fragments, attacks from many packets with offsets, attacks from repeated packet fragments, Tear Drop attacks, Syndrop attacks, NewTear attacks, Bonk attacks, Nesta attacks, Rose attacks, Fawx attacks, Ping of Death attacks, and Jolt attacks
		   – Defense against TCP SYN flood attacks, UDP flood attacks (including Fraggle attacks and UDP diagnosis port attacks), and ICMP flood attacks
		• Logs about attacking MAC addresses
		• URPF
		• 802.1x authentication

	Network management	• ICMP-based Ping and Tracert • Simple Network Management Protocol Version 1/2c/3 (SNMPv1/v2c/v3) • Standard Management Information Base (MIB) • Remote Network Monitoring (RMON) • NETCONF interfaces • Network Quality Analysis (NQA)

1.2 Advantages

This topic describes the advantages of the CX920: high performance and high port density; multi-plane switching (10GE and 40GE) and support for large-scale data center networks;

high-performance stacking and ease of deployment and maintenance; abundant data center features.

High Performance and High Port Density

Underpinned by the leading hardware platform, the CX920 provides high port density and wire-speed forwarding. It supports next-generation server applications that require super high performance and density.

The CX920 10GE switching plane provides eight 10GE SFP+ optical ports for connecting to uplink access aggregation or core switches, 16 10GE Ethernet ports for connecting to the LOMs of the high-performance blades, and one 40GE port for interconnecting 10GE switching planes. The 40GE plane provides eight 40GE QSFP+ optical ports for connecting to uplink access aggregation or core switches, 16 40GE ports for connecting to the mezzanine cards of the high-performance blades, and two 40GE ports for interconnecting 40GE switching planes.

The 10GE switching plane of the CX920 provides 560 Gbit/s wire-speed switching capacity (throughput), and supports wire-speed Ethernet frame forwarding. The forwarding latency for layer 2 Ethernet frames in cut through mode is less than 1.5 us.

The 40GE switching plane of the CX920 provides 2.08 Tbit/s wire-speed switching capacity (throughput), and supports wire-speed Ethernet frame forwarding. The forwarding latency for layer 2 Ethernet frames in cut through mode is less than 1.0 us.

Multiple Switching Planes and Support for Large Data Center Networks

The 40GE switching plane of the CX920 provides high specifications: up to 294,912 MAC addresses (large MAC address table mode) and 256,000 FIBs (large FIB table mode, which precludes the large MAC address table mode and large ARP table mode).

The 10GE switching plane of the CX920 provides high specifications: up to 131,072 MAC addresses (large MAC address table mode) and 16,384 FIBs.

High-Performance Stacking, Easy Deployment, and Simple Maintenance

The 10GE and 40GE switching planes of the CX920 both support stack systems of four devices. The advantages are as follows:

- High performance: A stack system of the 40GE switching plane provides over 16 40GE ports. The 10GE switching plane provides 16 10GE ports.

- High bandwidth: The 200GE stack bandwidth is supported.

- Easy deployment and maintenance
  - Pre-deployment and offline configuration are supported. The system can be pre-planned and pre-configured. Devices can be added as required.
  - The slot ID of a device is the ID in the stacking system, facilitating identification and maintenance.
  - Indicators on the front panel indicate the role and status of a stacking system. The stacking system can be maintained without a terminal.

- Simple upgrade operations: The stacking system supports quick and automatic software upgrades, simplifying upgrade operations and reducing the upgrade workload.
  - Rapid software upgrade: When two switch modules are stacked, the standby switch module is upgraded before the active switch module. This ensures that at least one switch module is operating.

– Automatic software upgrade: When two switch modules are stacked, the software version is automatically synchronized from the active switch module to the standby one.

Abundant Data Center Features

● Supports fibre channel over Ethernet (FCoE) and Data Center Bridging (DCB).

– Supports FCoE, DCBX, 802.1Qbb-compliant priority-based flow control (PFC), and 802.1Qaz-compliant Enhanced Transmission Selection (ETS). With these features, the FC architecture can run on the lossless enhanced Ethernet to achieve a converged network and reduce networking costs.

– Supports FCoE FCF or NPV to directly connect to FCoE storage or switches.

● Supports Virtual Extensible Local Area Network (VXLAN).

– VXLAN encapsulates data packets sent from virtual machines (VM) into UDP packets and encapsulates IP and MAC addresses used on the physical network into outer headers. The network is only aware of the encapsulated parameters. This greatly reduces the number of MAC address entries required on large Layer 2 networks.

– VXLAN uses a VXLAN network identifier (VNI) field similar to the VLAN ID field of IEEE 802.1Q. The VNI field has 24 bits and can identify a maximum of 16M [(2^24-1)/1024^2] VXLAN segments.

– When VXLAN is used to construct a large Layer 2 network, VM IP and MAC addresses can remain unchanged during VM migration.

● Supports virtualization/VM access.

– Supports server virtualization, improving data center utilization.

– Supports virtual awareness. During migration of VMs, network policies can be automatically migrated using virtual awareness so that network resources can be allocated as required. Working with the layer 2 network, VMs can be freely migrated within the data center.

● Supports the Transparent Interconnection of Lots of Links (TRILL) protocol.

– Complies with the Internet Engineering Task Force (IETF) standard, the TRILL protocol supports ultra-large networks and flexible networking modes.

– The TRILL protocol supports load balancing between paths, so that traffic can be shared by multiple paths according to service requirements.

– The TRILL protocol supports fast network convergence. Any changes on the network can be quickly sensed and fast convergence is performed.

● Supports convergence of the Ethernet and storage networks.

Convergence of the Ethernet and storage networks reduces switching planes and network interface cards (NICs) and facilitates network management. FSB is supported.

1.3 Appearance

This topic describes the CX920 in terms of its appearance, panel, and installation positions in the chassis.

Appearance

Figure 1-1 shows a CX920.

Figure 1-1 Appearance
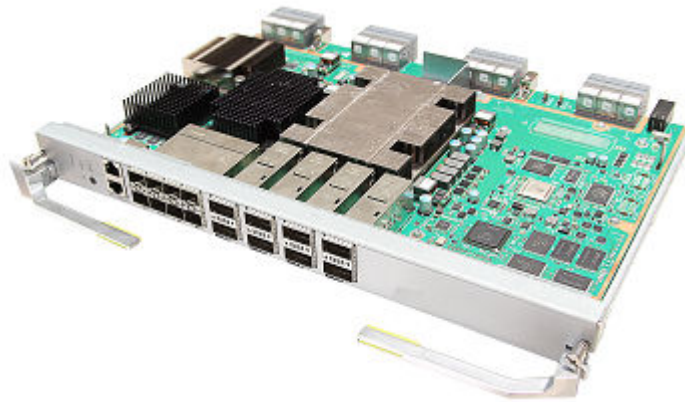
Installation position

The CX920s are usually installed in slots 2X and 3X at the rear of the E9000 chassis. If they are installed in slots 1E and 4E, the 10GE switching plane is unavailable. **Figure 1-2** shows the installation positions and slot numbers.

Figure 1-2 Installation positions and slot numbers
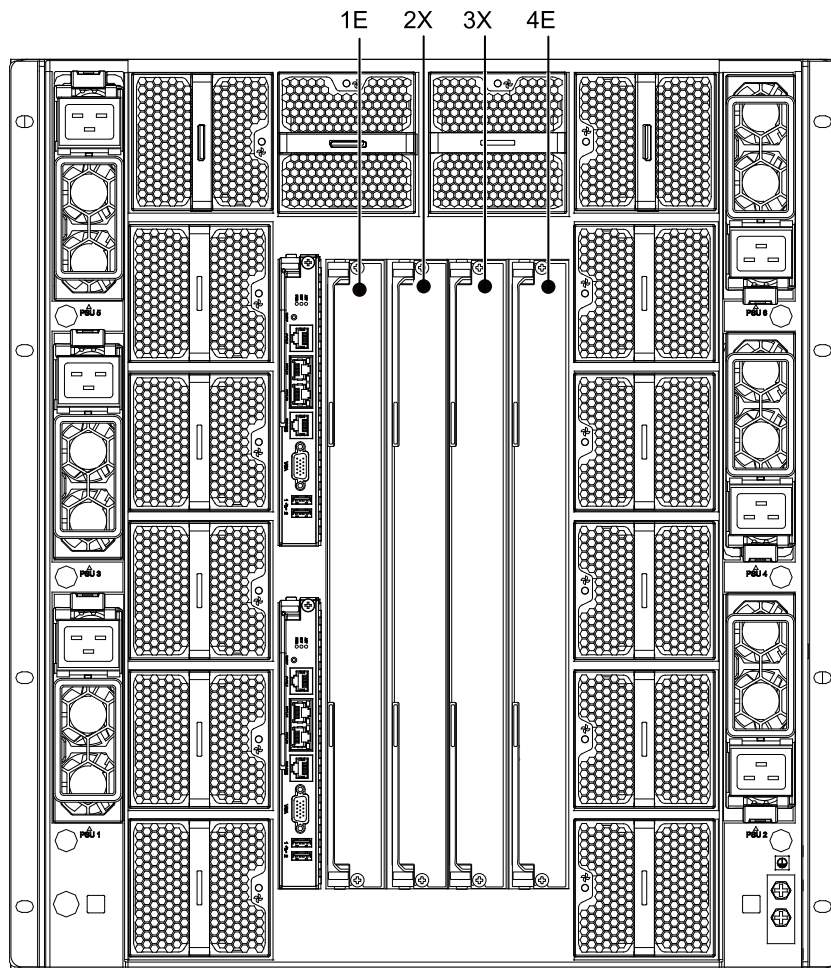
Front Panel

Figure 1-3 shows the CX920 front panel.

Figure 1-3 Front panel
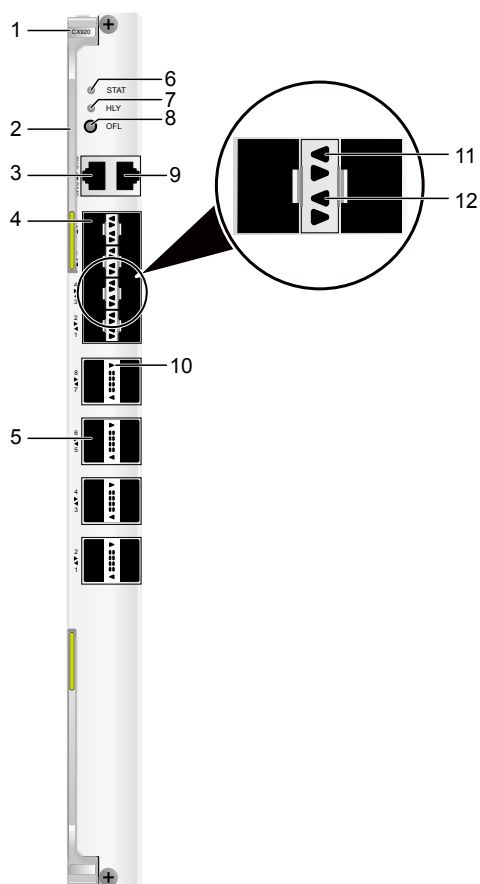
1	Product Model	2	Slide-out information label (with an ESN label)
3	BMC serial port	4	10GE optical port
5	40GE optical port	6	Stacking status indicator
7	Health indicator	8	Offline button/indicator
9	SYS serial port	10	40GE optical port indicator
11	Connection status indicator for the 10GE optical port	12	Data transmission status indicator for the 10GE optical port

📖**NOTE**

> The numbers on the left of the panel are port numbers. The triangle mark directions indicate the port positions.

ESNs

An Equipment Serial Number (ESN) is a string that uniquely identifies a server. An ESN is required when you apply for technical support from Huawei.

Figure 1-4 shows the ESN format.

Figure 1-4 ESN example

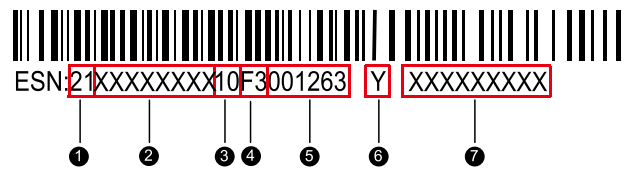| No.	Description
1	Indicates the ESN ID (two digits).
2	Indicates the item identification code (eight characters).
3	Indicates the vendor code (two characters).
4	Indicates the year and month (two characters). The first character indicates the year. The digits 1 to 9 indicate 2001 to 2009, and the letters A to Z indicate 2010 to 2035. The second character indicates the month. The digits 1 to 9 indicate January to September, and the letters A to C indicate October to December.
5	Indicates the sequence number (six digits).
6	Indicates RoHS compliance (one character).
7	Indicates the internal model number of the board.

1.4 Ports

This topic describes the features, numbering rules, names, types, and quantities of the CX920 ports.

The CX920 provides ports for users to operate and configure. The ports are used to send and receive data.

The CX920 Ethernet ports are numbered in *Slot number/Subcard number/Port number* format.

- *Slot number*: indicates the slot number of the current switch module. The value ranges from 1 to 4, mapping to slot numbers 1E, 2X, 3X, and 4E.
- *Subcard number*: indicates the number of a subcard supported by service ports. The value ranges from 1 to 19.
- *Port number* indicates the serial number of the port on the subcard.

For details about the values, see **Figure 1-5**, **Table 1-2**, and **Table 1-3**.

For example, if the CX920 is in slot 2X, the first 10GE optical port on the upper right on the panel is numbered 10GE 2/17/8, as shown in **Figure 1-5**.
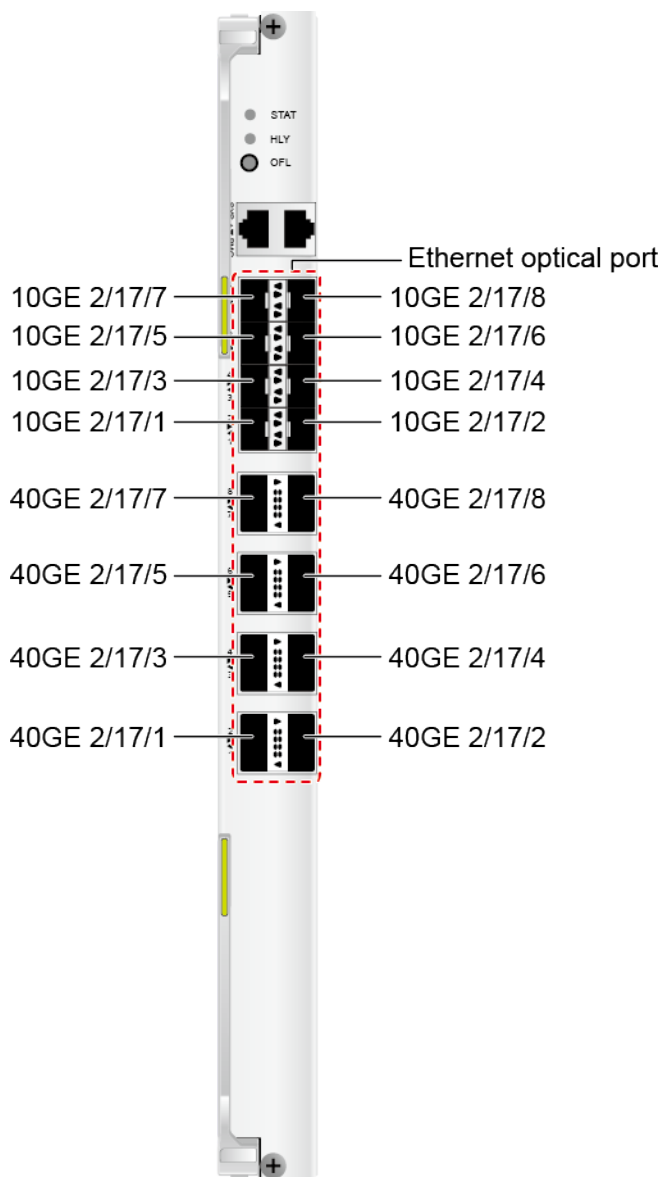
Figure 1-5 Port numbers

Table 1-2 lists the external ports on the CX920.

Table 1-2 External ports

Name	Type	Quantity	Subcard Number	Port Number	Description
Serial port	RJ45	2	-	-	The serial ports include a BMC port and a SYS port. These two ports comply with RS232 and have no indicators. ● BMC port: used to log in to the BMC CLI. ● SYS serial port: used to locally manage, maintain, and commission the 10GE switching plane and 40GE switching plane. The serial port baud rate of the BMC and 10GE switching plane is 115200 bit/s. The serial port baud rate of the 40GE switching plane is 9600 bit/s.
10GE optical port	SFP+	8	17	The value ranges from 1 to 8.	The 10GE switching plane provides eight 10GE optical ports to connect to external networks. Each port has two indicators: the orange one indicates data transmission status, and the green one indicates the port connection status.
40GE optical port	QSFP+	8	17	The value ranges from 1 to 8.	The 40GE switching plane provides 40GE optical ports to connect to external aggregation and core switches or to stack switch modules. Each port provides one indicator. Ports 1 to 6 can be split into four 10GE ports. Ports 7 and 8 cannot be split. Naming rules for split ports: If port 40 GE1/17/1 is split, the numbers of the four split ports are 40GE 1/17/1:1 to 40GE 1/17/1:4.

Table 1-3 describes the internal ports of the 10GE switching plane of the CX920. Table 1-4 describes the internal ports of the 40GE switching plane.

Table 1-3 Internal ports of the 10GE switching plane

Name	Type	Quantity	Subcard Number	Port Number	Description	Example
10GE port	-	16	1 to 16	The port number is 1.	The ports connect to the LOMs of the front blades in slots 01 to 16. The 16 subcard numbers of the ports map to the 16 front slot numbers. Theses ports are available only when the switch module is in slot 2X or 3X.	If the CX920 is in slot 2X, the port connected to the compute node in slot 1 is numbered 10GE 2/1/1.
40GE port	-	1	18	The port number is 1.	The port is used to interconnect the switch modules in slots 1E and 4E or in slots 2X and 3X.	If the CX920 is in slot 2X, the port is numbered 40GE 2/18/1.
GE port	-	2	19	The port number ranges from 1 to 2.	The two GE ports connect to and communicate with two MM910s. The two GE ports can communicate with the MM910s only when the switch module is in slot 2X or 3X. The two ports can communicate with the MM910s only when the switch module is in slot 2X or 3X.	If the CX920 is in slot 2X, the ports are numbered GE 2/19/1 and GE 2/19/2.

Table 1-4 Internal ports of the 40GE switching plane

Name	Type	Quantity	Subcard Number	Port Number	Description	Example
40GE port	-	16	1 to 16	The port number is 1.	The ports are connected to front half-width slots 01 to 16. The 16 subcard numbers of the ports map to the 16 front slot numbers.	If the CX920 is in slot 2X, the port connected to the compute node in slot 1 is numbered 40GE 2/1/1.
40GE port	-	2	18	The port number ranges from 1 to 2.	The port is used to interconnect the switch modules in slots 1E and 4E or in slots 2X and 3X. This port can be used as a stack port.	If the CX920 is in slot 2X, the ports are numbered 40GE 2/18/1 and 40GE 2/18/2.

1.5 Indicators

This topic describes the names, meanings, colors and status of the indicators on the CX920.

By observing the indicators, you can determine the current operating status of the CX920. **Table 1-5** describes the indicators on the CX920 panel.

Table 1-5 Indicator description

Label	Meaning	Color	Description
STAT	Stacking status indicator for the 40GE switching plane	Green	● Off: The CX920 is not powered on. ● Blinking green for 10 times: The CX920 is being powered on. ● Blinking green: The CX920 is in the standby state in a stack and is operating properly. ● Steady green: The CX920 is in the active state in a stack or is not stacked, and is operating properly.

Label	Meaning	Color	Description
HLY	Health indicator	Red and green	● Off: The CX920 is not powered on. ● Steady green: The CX920 is operating properly or has minor alarms. ● Blinking red (1 Hz): A major alarm is generated. ● Blinking red (4 Hz): A critical alarm is generated. ● Blinking red (5 Hz): The CX920 is not securely installed. **NOTE** It is difficult to distinguish a blinking frequency of 4 Hz from a blinking frequency of 5 Hz. When the HLY indicator is quickly blinking red, you are advised to check whether the device is securely inserted and then check whether a critical alarm is generated.
OFL	Offline button/ indicator (reserved)	N/A	None.
◀ and ▶	Connection status indicator for the 10GE optical port	Green	● Off: The port is not properly connected. ● Steady green: The port is properly connected.
◀ and ▶	Data transmission status indicator for the 10GE optical port	Orange	● Off: No data is being transmitted over the port. ● Blinking orange: Data is being sent or received over the port.
◀ and ▶	40GE optical port indicator	Green	● Off: No data is being transmitted over or the port is not connected. ● Blinking green: Data is being sent or received over the port. ● Steady green: The port is properly connected.

1.6 Internal Chassis Networking

This topic describes connection relationships between the CX920 and mezzanine cards on compute nodes.

For details about the networking of the CX920 and Mezz cards on compute nodes, see *E9000 Blade Server Mezz Module-Switch Module Interface Mapping Tool*.

Figure 1-6 shows the internal chassis networking between the CX920 and compute nodes. Compute node ports for connecting to the CX920 are provided by two mezzanine cards and the LOM as follows:

● The mezz1 slot connects to the 40GE switching planes of the CX920s in slots 2X and 3X.

● The mezz2 slot connects to the 40GE switching planes of the CX920s in slots 1E and 4E.

Figure 1-6 Mapping between the CX920s and mezzanine cards on a compute node
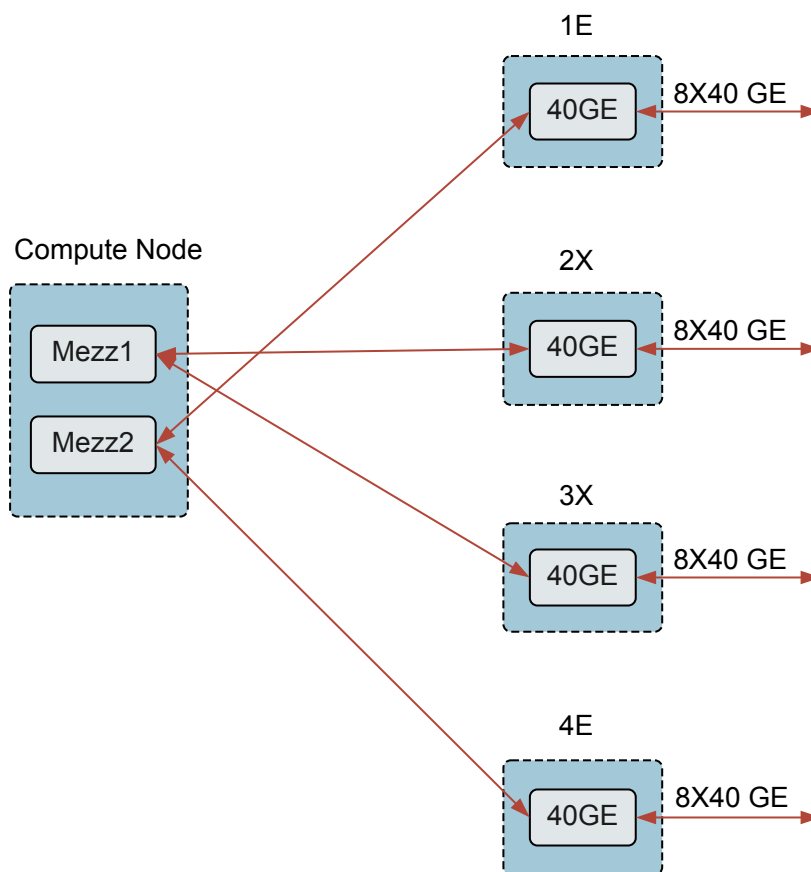
The LOM connects to the 10GE switching planes of the CX920s in slots 2X and 3X.

Figure 1-7 Mapping between the CX920s and a compute node LOM
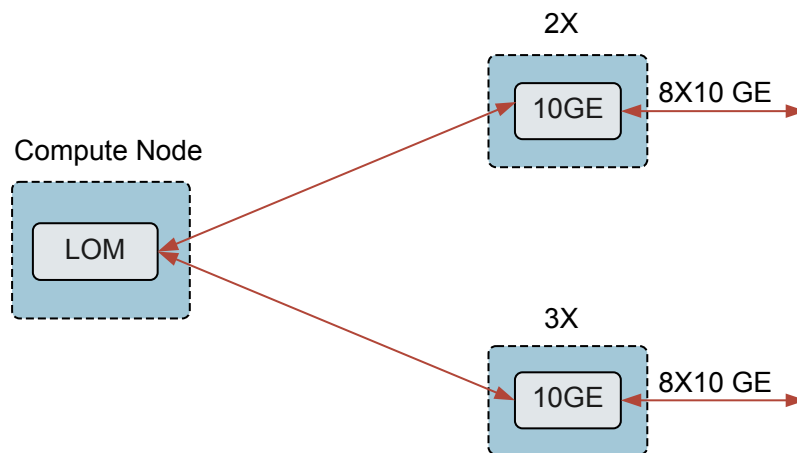
Mapping Between the CX920s and Ports on Mezzanine Cards

Mapping between the CX920s and ports on the MZ710

The MZ710 provides two 40GE ports (ports 1 and 2). Ports 1 and 2 map to the 40GE switching planes of the CX920s in slots 2X and 3X respectively, as shown in **Figure 1-8**.

Figure 1-8 Mapping between the CX920s and ports on the MZ710
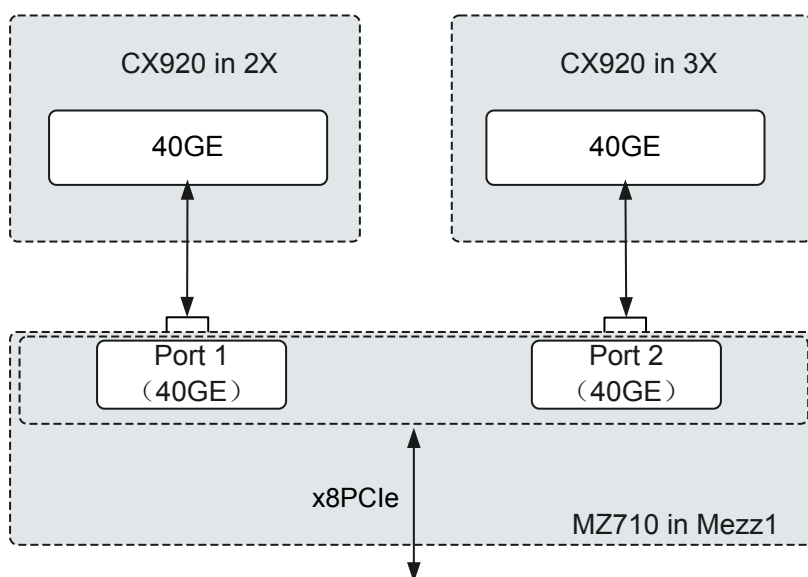
1.7 Software and Hardware Compatibility

This topic describes mezzanine cards that can work with the CX920 and pluggable modules and cables supported by ports on the CX920 panel.

For details about the software and hardware supported by the CX920, see the **Huawei Server Compatibility Checker**.

Supported mezzanine cards

The CX920 connects to mezzanine cards of compute nodes. **Table 1-6** describes models and specifications of the supported mezzanine cards.

Table 1-6 Supported mezzanine cards

Model	Specifications
MZ710	2–port 40GE RDMA over Converged Ethernet (RoCE) mezzanine card

Supported pluggable modules and cables

Table 1-7 Supported pluggable modules and cables

Type	Specifications
QSFP+ multi-mode optical module (40GE)	Supports 40GBASE-SR4.

Type	Specifications
QSFP+ single-mode optical module (40GE)	Indicates a 40G single-mode module (1310 nm, 10 km, MPO).
QSFP+ DAC cable (40GE)	Supports 40GBASE-CR4. The 1 m, 3 m, and 5 m passive DAC cables can be used.
QSFP+ to 4 x SFP+ DAC cable	Supports passive DAC splitter cables of 1 m, 3 m, and 5 m.
MPO to 4 x DLC multi-mode fiber (MMF)	Insert the MPO connector to a QSFP+ optical module, and insert the DLC connectors to SFP+ optical modules.
Multi-mode fiber (MMF)	Supports 850 nm OM1, OM2, and OM3 MPO MMFs.
Single-mode fiber (SMF)	Supports 1310 nm SMFs.
Cat-5 unshielded twisted pair (UTP) cable	Category 5 UTP cables that support RJ45 ports
Cat-5e UTP cable	Category 5e (Category 5 enhanced) UTP cables that support RJ45 ports
Console cable	Supports the RJ45 port and serves as the connection cable for RS232 serial ports.
This table is for reference only. For details about the components that can be purchased, consult the local Huawei sales representatives.	

CX920 supports multiple pluggable optical modules, fibers, and network cables. You can choose the modules and cables based on site requirements.

● The CX920 provides the following functions for 10GE applications:
    – Each port of ports 1 to 6 on the 40GE plane can be split into four 10GE ports and SS-OP-MPO12-4*DLC-M-5/15 optical fibers can be used to connect to 10GE switches. Ports 7 and 8 cannot be split.
    – The 40GE port for connecting to the compute node can be used as 2 x 10GE ports which can connect to the 10GE mezzanine cards, and the port is compatible with the existing 10GE device.
    – Provides SFP+ optical ports and supports multi-mode SFP+ optical modules.
    – Supports multi-mode SFP optical modules.
    – Supports SFP electrical modules.
● The CX920 supports the following 40GE applications:
    – Provides QSFP+ optical ports and supports single-mode and multi-mode QSFP+ optical modules.

1.8 Technical Specifications

This topic describes the physical, environmental, power, and network switching specifications of the CX920.

Table 1-8 describes the technical specifications of the CX920. Network switching specifications are described in **Table 1-9** and **Table 1-10**.

Table 1-8 Technical specifications

Category	Item	Specifications
Physical specifications	Dimensions (H x W x D)	388.55 mm x 35.06 mm x 272.15 mm (15.30 in. x 1.38 in. x 10.71 in.)
	Color	Silver white
	Weight	3 kg
Environmental specifications	Temperature	● Operating temperature: 5°C to 40°C (41°F to 104°F) (ASHRAE Class A3 compliant) ● Storage temperature: -40°C to +65°C (-40°F to +149°F) ● Long-term storage temperature: 21°C to 27°C (69.8°F to 80.6°F)
	Temperature change rate	15°C/h (27°F/h)
	Humidity	● Operating humidity: 5% RH to 85% RH (non-condensing) ● Storage humidity: 5% RH to 95% RH (non-condensing) ● Long-term storage humidity: 30% RH to 69% RH (non-condensing)
	Altitude	At an altitude of 900 m (2952.72 ft), the highest operating temperature is 40°C (104°F). When the device is used at an altitude of 900 m to 5000 m, the highest operating temperature decreases by 1°C (1.8°F) as the altitude increases by 300 m (984.24 ft).
Input power supply	Rated input voltage	12 V DC
Power consumption	Maximum power consumption	180 W

Table 1-9 10GE switching plane specifications

Attribute	Service Feature	Performance Specifications
Device performance	Number of ports on the panel	Eight 10GE optical ports
	Port rate	10GE and GE optical ports are supported.
	Service port stacking	Two switch modules are stacked through a 40GE port. (10GE and 40GE ports cannot belong to the same logical stack port.)
	Switching capacity (throughput)	560 Gbit/s
Ethernet service	Number of Media Access Control (MAC) addresses	131,072
	Number of VLANs	4063 **NOTE** The default value ranges from 4064 to 4094. Generally, 31 VLANs are reserved for a switch module. Reserve consecutive VLANs for easier configuration.
	Number of Eth-Trunk ports	64 (Each Eth-Trunk port supports up to 32 member ports.) or 128 (Each Eth-Trunk port supports up to 16 member ports.)
	Number of Address Resolution Protocols (ARPs) for the device	16,384
	Jumbo frame length (bytes)	Up to 12288 bytes are supported. The default length is 9216 bytes.
Quality of Service (QoS)	Number of queues per port	8
	Number of CARs	● Ingress: 2048 ● Egress: 1024
	Packet cache	9 MB
L3VPN	VRF	1024 (Multiprotocol Label Switching is not supported).

Attribute	Service Feature	Performance Specifications
	Number of virtual private network (VPN) routes	16,384
IP address unicast	Number of routing table entries	16,384
	Number of IPv4 forwarding information bases (FIBs)	16,384
	Number of IPv6 forwarding information bases (FIBs)	8000 (the mask length is not longer than 64)
Multicast	Number of layer 3 multicast forwarding entries	2000
Reliability services	Bidirectional Forwarding Detection (BFD)	● Number of BFD sessions: 200 ● Minimum interval for receiving and sending packets: 50 ms
	Virtual Router Redundancy Protocol (VRRP)	● Number of VRRP backup groups: 64 ● Number of VRRP management groups: 64 ● Number of virtual IP addresses for each VRRP backup group: 16
	Multiple Spanning Tree Protocol (MSTP)	Maximum number of instances in the device: 64
Enhanced Ethernet	Transparent Interconnection of Lots of Links (TRILL)	● Number of network nodes: 512 ● Number of CE-VLANs: 4062 ● Load-sharing specifications: 16 links

Table 1-10 40GE switching plane specifications

Attribute	Service Feature	Performance Specifications
Device performance	Number of ports on the panel	Eight 40GE optical ports
	Port rate	The ports for connecting to the compute node can be dynamically configured as 1 x 40GE or 2 x 10GE ports, and the 40GE port on the panel can be split into 4 x 10GE ports.
	Service port stacking	Switch modules can be stacked through one 40GE port on the panel or two 40GE internal ports.
	Switching capacity (throughput)	2.08 Tbit/s
Ethernet service	Number of Media Access Control (MAC) addresses	294,912 (in large MAC table mode)
	Number of VLANs	4063 **NOTE** The default value ranges from 4064 to 4094. Generally, 31 VLANs are reserved for a switch module. Reserve consecutive VLANs for easier configuration.
	Number of Eth-Trunk ports	64 (Each Eth-Trunk port supports up to 32 member ports.) or 128 (Each Eth-Trunk port supports up to 16 member ports.)
	Number of Address Resolution Protocols (ARPs) for the device	128,000 (in large ARP table mode)
	Jumbo frame length (bytes)	9216
Quality of Service (QoS)	Number of queues per port	8
	Number of CARs	● Ingress: 2048 ● Egress: 1024
	Packet cache	12 MB
L3VPN	VRF	1024

Attribute	Service Feature	Performance Specifications
	Number of virtual private network (VPN) routes	256,000
IP address unicast	Number of routing table entries	256,000 (in large FIB table mode)
	Number of IPv4 forwarding information bases (FIBs)	256,000 (in large FIB table mode)
	Number of IPv6 forwarding information bases (FIBs)	128,000 (the mask length is not longer than 64)
Multicast	Number of layer 3 multicast forwarding entries	8000
Reliability services	Bidirectional Forwarding Detection (BFD)	• Number of BFD sessions: 128 • Minimum interval for receiving and sending packets: 50 ms
	Virtual Router Redundancy Protocol (VRRP)	• Number of VRRP backup groups: 64 • Number of VRRP management groups: 64 • Number of virtual IP addresses for each VRRP backup group: 16
	Multiple Spanning Tree Protocol (MSTP)	Maximum number of instances in the device: 64
Enhanced Ethernet	Transparent Interconnection of Lots of Links (TRILL)	• Number of network nodes: 512 • Number of CE-VLANs: 4062 • Load-sharing specifications: 16 links

2 Standards and Certifications

About This Chapter

2.1 Standards Compliance

This topic describes the international and industry standards and communication protocols that the CX920 complies with.

International Standards

Table 2-1 lists the international standards.

Table 2-1 Standards and communication protocols

Standard	Protocol
DCBX	Data Center Bridging eXchange
IEEE 802.3x	Flow control and Back pressure
IEEE 802.1Qbb	Priority-based Flow Control (PFC)
IEEE 802.1Qaz	Enhanced Transmission Selection (ETS)
IEEE 802.1Q	Virtual Bridged Local Area Networks (VLAN)
IEEE 802.1s	Multiple Spanning Trees (MSTP)
IEEE 802.1w	Rapid Reconvergence of Spanning Tree (RSTP)
IEEE 802.1ab	Station and Media Access Control Connectivity Discovery (LLDP)
IEEE 802.1ad	Virtual Bridged Local Area Networks: Provider Bridges (QinQ)
IEEE 802.3ad	Link Aggregation Control Protocol (LACP)
IEEE 802.1Qbg	Edge Virtual Bridging (VEPA)
SFF-8436	QSFP+ 10 Gbs 4X PLUGGABLE TRANSCEIVER
SFF-8635	QSFP+ 4X 10 Gb/s Pluggable Transceiver Solution (QSFP10)
SFF-8636	Management Interface for Cabled Environments
draft-ietf-NVo3-framework-04	Framework for DC Network Virtualization
draft-ietf-NVo3-dataplane-requirements-02	NVo3 Data Plane Requirements
draft-mahalingam-dutt-dcops-vxlan-06	A Framework for Overlaying Virtualized Layer 2 Networks over Layer 3 Networks
SFF-8431	Enhanced Small Form Factor Pluggable Module SFP+

Industry Standards

Table 2-2 lists the industry standards.

Table 2-2 Industry standards

Organization	Standard
ECMA TR/70	Environmental protection
EN60950	Safety (Europe)
GR-929	Reliability
IEC 812	Failure Mode and Effects Analysis (FMEA)
IEC 863	Reliability, maintainability and availability
IEC60297	Chassis compliance
IEC60950	Safety
IEC60825-1/2/6	Safety
IEC60215	Safety
IEC61000	EMC
Telcordia SR-332	Reliability
UL60950	Safety (North America)

Communication Protocols

Table 2-3 lists the communication protocols.

Table 2-3 Communication protocols

Protocol	Description
ARP	Address Resolution Protocol
BFD	Bidirectional Forwarding Detection
BGP	Border Gateway Protocol
DHCP	Dynamic Host Configuration Protocol
DLDP	Device Link Detection Protocol
FTP	File Transfer Protocol
GMRP	GMRP Multicast Registration Protocol
GVRP	GARP VLAN Registration Protocol
HTTP	Hypertext Transfer Protocol

Protocol	Description
ICMP	Internet Control Message Protocol
IGMP	Internet Group Management Protocol
IPMI	Intelligent Platform Management Interface
IPv4/IPv6	IPv4 or IPv6 Internet Protocol
MSTP	Multiple Spanning Tree Protocol
NTP	Network Time Protocol
OSPF	Open Shortest Path First
RADIUS	Remote Authentication Dial In User Service
RIP	Routing Information Protocol
RSTP	Rapid Spanning Tree Protocol
SNMP	Simple Network Management Protocol
SSH	Secure Shell
SSL	Secure Socket Layer
STP	Spanning Tree Protocol
TCP	Transmission Control Protocol
TELNET	Remote Terminal Protocol
TFTP	Trivial File Transfer Protocol
TRILL	Transparent Interconnection of Lots of Links
UDP	User Datagram Protocol
VRRP	Virtual Router Redundancy Protocol

2.2 Certifications

This topic describes the certifications that the E9000 has passed.

Table 2-4 lists the certifications.

Table 2-4 Certifications

Country /Region	Certification	Standard
Europe	WEEE	2002/96/EC, 2012/19/EU
Europe	RoHS	2002/95/EC, 2011/65/EU, EN 50581: 2012

Country /Region	Certification	Standard
Europe	REACH	EC NO. 1907/2006
Europe	CE	Safety: EN 60950-1: 2006+A11: 2009+A1: 2010+A12: 2011 EMC: ● EN 55022: 2010 ● CISPR 22: 2008 ● EN 55024: 2010 ● CISPR 24: 2010 ● ETSI EN 300 386 V1.6.1: 2012 ● ETSI ES 201 468 V1.3.1: 2005
China	RoHS	SJ/T-11363-20006 SJ/T-11364-20006 GB/T 26572-2011
China	China Environmental Labeling	GB/T24024: 2001 idt ISO14024: 1999 HJ 2507-2011
Australia	C-tick	AS/NZS CISPR22: 2009
America	UL	UL 60950-1
America	FCC	FCC Part 15 (Class A)
America	NTRL-UL	UL 60950-1, 2nd Edition, 2011-12-19 (Information Technology Equipment - Safety - Part 1: General Requirements) CSA C22.2 No.60950-1-07, 2nd Edition, 2011-12 (Information Technology Equipment-Safety-Part 1: General Requirements)
Canada	IC	ICES-003 Class A
Nigeria	SONCAP	IEC 60950-1: 2005 (2nd Edition) + A1: 2009 EN 60950-1: 2006+A11: 2009+A1: 2010 + A12: 2011
Kingdom of Saudi Arabia (KSA)	SASO	IEC 60950-1: 2005 (2nd Edition) + A1: 2009 EN 60950-1: 2006+A11: 2009+A1: 2010 + A12: 2011
Global	CB	IEC 60950-1
Japan	VCCI	VCCI V-4: 2012