



Huawei CX110 Switch Module
V100R001C00

White Paper

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About This Document

Purpose

This document describes the E9000 CX110 GE switch module (CX110 for short) in terms of its functions, advantages, appearance, specifications, internal networking, standards and certifications. You can learn about the CX110 by reading this document.

The product features and commands for the ethernet switching plane of the switch modules vary according to the software version. For details, see the documents listed in the following table.

Huawei Support Website Version	Ethernet Switching Plane Software Version	Reference Document
V100R001C00 or V100R001C00SPCxxx	1.1.3.100.3	See this document.
	1.1.3.300.3	
	1.1.3.301.6	
	1.1.3.330.13	
V100R001C10 or V100R001C10SPCxxx	1.2.1.0.39	See the <i>Huawei CX110 Switch Module V100R001C10 White Paper</i> .
	x.xx, for example, 2.05	






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	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	WARNING indicates a hazard with a low level of risk which, if not avoided, could result in minor or moderate injury.
 CAUTION	CAUTION indicates a potentially hazardous situation that, if not avoided, could result in equipment damage, data loss, performance deterioration, or unanticipated results.
 TIP	TIP indicates a tip that may help you solve a problem or save time.
 NOTE	NOTE provides additional information to emphasize or supplement important points of the main text.

Change History

Issue 11 (2017-03-27)

This issue is the eleventh official release.

Mode	Change Description
Added	Added product model descriptions to 1.3 Appearance .
	Added the description about the working temperature's compliance with the ASHRAE Class A3 standard in 1.8 Technical specifications .
	Added the long-term storage temperature and humidity to 1.8 Technical specifications .
Modified	Modified the relationships between switching plane software versions and reference documents in About This Document .
	The reference to the throughput is added to 1.8 Technical specifications .

Issue 10 (2015-02-16)

This issue is the tenth official release.

Mode	Change Description
Modified	The reference to the Networking Assistant is added to 1.6 Internal Chassis Networking .

Issue 09 (2014-09-15)

This issue is the ninth official release.

Mode	Change Description
Deleted	"Tecal" is deleted from the product document.

Issue 08 (2014-07-30)

This issue is the eighth official release.

Mode	Change Description
Modified	The storage temperature and altitude are updated in 1.8 Technical specifications .

Issue 07 (2014-05-13)

This issue is the seventh official release.

Issue 06 (2014-03-07)

This issue is the sixth official release.

Issue 05 (2014-01-01)

This issue is the fifth official release.

Mode	Change Description
Modified	The content in 1.2 Advantages is optimized.

Issue 04 (2013-10-30)

This issue is the fourth official release.

Mode	Change Description
Modified	The networking figure in 1.6 Internal Chassis Networking is changed.

Issue 03 (2013-09-30)

This issue is the third official release.

Mode	Change Description
Added	The description of the MZ111 mezz module is added to 1.6 Internal Chassis Networking and 1.7 Software and Hardware Compatibility .
	The Jumbo item is added to Network switching specifications in 1.8 Technical specifications .

Issue 02 (2013-08-20)

This issue is the second official release.

Mode	Change Description
Added	The GE optical port description is added to the function description of Ethernet features in 1.1 Function .
Deleted	The function description of Monitor Link is deleted from 1.1 Function .

Issue 01 (2013-06-20)

This issue is the first official release.

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1 Introduction

About This Chapter

[1.1 Function](#)

This topic describes the functions, protocols, and ports of the CX110 GE switch module.

[1.2 Advantages](#)

The CX110 provides various ports (GE/10GE/40GE) and high specifications, and supports large data center networks, high-performance stacking, and various data center features. In addition, the CX110 switch module can be easily deployed and maintained.

[1.3 Appearance](#)

This topic describes the CX110 in terms of its appearance, panel, and installation positions in the chassis.

[1.4 Ports](#)

This topic describes the features, number rules, names, types, quantities, subcard numbers, and port numbers of the CX110 ports.

[1.5 Indicator](#)

This topic describes the indicators on the CX110.

[1.6 Internal Chassis Networking](#)

This topic describes connection relationships between the CX110 and mezz modules on compute nodes.

[1.7 Software and Hardware Compatibility](#)

This topic describes mezz modules that can work with the CX110 and pluggable modules and cables supported by ports on the CX110 panel.

[1.8 Technical specifications](#)

This topic describes the physical, environmental, power, and network switching specifications of the CX110.

1.1 Function

This topic describes the functions, protocols, and ports of the CX110 GE switch module.

The CX110 GE switch module (CX110 for short) is a switch control unit that provides data switching function for service slots in the system and centrally provides service and management ports for external devices.

The CX110 is installed in the rear slot of the E9000 chassis and connected to compute nodes, storage nodes, management modules through the E9000 midplane. The CX110 performs switching of internal data packets and control management packets to provide high-speed data transmission.

Table 1-1 describes the functions of the CX110.

Table 1-1 GE switching plane function description

Function		Description
Ethernet features	Ethernet	<ul style="list-style-type: none">● Operating modes of full-duplex and auto-negotiation● Ethernet ports support the rate of GE and 10GE. NOTE <ul style="list-style-type: none">● 10GE optical ports support passive direct attached cables (DACs).● GE and 10GE optical ports support multi-mode and single-mode optical modules. <ul style="list-style-type: none">● Port traffic control● Jumbo frames● Link aggregation● Load balancing among links within a trunk● Interface isolation and forwarding restrictions● Broadcast storm suppression
	Virtual Local Area Network (VLAN)	<ul style="list-style-type: none">● Multiple interface types: Access, Trunk, Hybrid, and 802.1Q-in-802.1Q (QinQ)● Default VLAN
	Media Access Control (MAC)	<ul style="list-style-type: none">● Automatic learning and aging of MAC addresses● Static, dynamic, and blackhole MAC address entries● Packet filtering based on source MAC addresses● Interface-based MAC learning limits

Function		Description
	Link Layer Discovery Protocol (LLDP)	LLDP
-	Virtual Cable Test (VCT)	Support for VCT
Ethernet loop protection	Multiple Spanning Tree Protocol (MSTP)	<ul style="list-style-type: none"> ● Spanning Tree Protocol (STP) ● Rapid Spanning Tree Protocol (RSTP) ● MSTP ● Bridge protocol data unit (BPDU) protection, root protection, and loop protection ● Partitioned STP and BPDU tunnel
IP features	Address Resolution Protocol (ARP)	<ul style="list-style-type: none"> ● Static and dynamic ARP entries ● ARP in a VLAN ● Aging of ARP entries
	Dynamic Host Configuration Protocol (DHCP)	<ul style="list-style-type: none"> ● DHCP snooping ● DHCP relay
IPv4 forwarding	Unicast routing features	<ul style="list-style-type: none"> ● Static route ● Routing Information Protocol version 1 (RIPv1) and RIPv2 ● Open Shortest Path First (OSPF) ● Intermediate System to Intermediate System (IS-IS) ● Border Gateway Protocol version 4 (BGP4) ● Routing policies and Policy-based Routing (PBR) ● Unicast Reverse Path Forwarding (URPF) check
	Multicast routing features	<ul style="list-style-type: none"> ● Internet Group Management Protocol version 1/2/3 (IGMPv1/v2/v3) ● Protocol Independent Multicast-Sparse Mode (PIM-SM) ● Protocol Independent Multicast Source-Specific Multicast (PIM-SSM) ● Multiprotocol BGP (MBGP) ● Multicast Source Discovery Protocol (MSDP) ● Multicast routing policies ● Reverse Path Forwarding (RPF)

Function		Description
Device reliability	Bidirectional Forwarding Detection (BFD)	<ul style="list-style-type: none"> ● Basic BFD functions ● Association between BFD and OSPF ● Association between BFD and IS-IS ● Association between BFD and BGP ● Association between BFD and PIM
	Others	<ul style="list-style-type: none"> ● Virtual Router Redundancy Protocol (VRRP) ● Device Link Detection Protocol (DLDP)
Layer 2 multicast features	Layer 2 multicast features	<ul style="list-style-type: none"> ● IGMP snooping ● IGMP proxy ● Fast leave ● Multicast traffic control
Quality of Service (QoS) features	Traffic classification	<ul style="list-style-type: none"> ● Traffic classification based on combination of the L2 protocol header, IP 5-tuple, outbound interface, and 802.1p priority ● Traffic classification based on the C-VID and C-PRI of QinQ packets
	Traffic behavior	<ul style="list-style-type: none"> ● Access control after traffic classification ● Traffic policing based on traffic classifiers ● Re-marking based on the traffic classification result ● Class-based packet queuing ● Association between traffic classifiers and traffic behavior (actions)
	Queue scheduling	<ul style="list-style-type: none"> ● Priority queuing (PQ) scheduling ● Deficit round robin (DRR) scheduling ● PQ+DRR scheduling ● Weighted round robin (WRR) scheduling ● PQ+WRR scheduling
	Congestion avoidance	Weighted Random Early Detection (WRED)
	Rate limiting on outbound interfaces	Rate limiting on outbound interfaces

Function		Description
Virtualization	Many-to-one virtualization	<ul style="list-style-type: none"> ● Intelligent Stack (iStack) ● Stack split and merge ● Dual-active detection ● Version and configuration synchronization ● Network Time Protocol (NTP) clock synchronization
Data center features	Transparent Interconnection of Lots of Links (TRILL)	TRILL features
	Data Center Bridging (DCB)	<ul style="list-style-type: none"> ● Data Center Bridging Exchange Protocol (DCBX) ● Priority-based Flow Control (PFC) ● Enhanced Transmission Selection (ETS)
	Fibre Channel over Ethernet (FCoE)	FCoE Initialization Protocol Snooping Bridge (FSB)
	Virtual machine (VM) detection	<ul style="list-style-type: none"> ● Virtualization detection ● Automatic policy deployment ● Automatic policy migration
	Forwarding mode based on Virtual Ethernet Port Aggregator (VEPA)	Forwarding mode based on VEPA
Configuration and maintenance	Terminal service	<ul style="list-style-type: none"> ● Configuration using command lines ● Error messages and online help in English and Chinese ● Login through console and Telnet terminals ● Send function and data communications between terminal users
	File system	<ul style="list-style-type: none"> ● Directory and file management ● File upload and download using File Transfer Protocol (FTP), Trivial File Transfer Protocol (TFTP) and Secure File Transfer Protocol (SFTP)

Function		Description
	Debugging and maintenance	<ul style="list-style-type: none"> ● Unified management of logs, alarms, and debugging information ● Electronic labels ● User operation logs ● Detailed debugging information for network fault diagnosis ● Network test tools such as tracer and ping commands ● Port mirroring and traffic mirroring
	Version upgrade	<ul style="list-style-type: none"> ● Device software loading and in-service software loading ● In-service upgrade using the basic input/output system (BIOS) menu ● In-service patching <p>NOTE To ensure secure service application, periodically upgrade the switch module software version.</p>
Security and management	System security	<ul style="list-style-type: none"> ● Hierarchical command-line protection based on user levels, preventing unauthorized users from using commands to access switch modules ● Secure Shell (SSH) ● Remote Authentication Dial In User Service (RADIUS) and Huawei Terminal Access Controller Access Control System (HWTACACS) authentication for login users ● Access control list (ACL) filtering ● Dynamic ARP inspection (DAI) ● DHCP packet filtering (appending the Option 82 field) ● Defense against control packet attacks ● Defense against attacks of source address spoofing, LAND, SYN flood (TCP SYN), smurf, ping flood (Internet Control Message Protocol Echo), teardrop, and ping of death
	Network management	<ul style="list-style-type: none"> ● Internet Control Message Protocol (ICMP)-based ping and tracer ● Simple Network Management Protocol version 1/2c/3 (SNMPv1/v2c/v3) ● Standard management information base (MIB) ● Remote network monitoring (RMON) ● Network quality analysis(NQR)

1.2 Advantages

The CX110 provides various ports (GE/10GE/40GE) and high specifications, and supports large data center networks, high-performance stacking, and various data center features. In addition, the CX110 switch module can be easily deployed and maintained.

Various Ports (GE/10GE/40GE)

Underpinned by the leading hardware platform, the CX110 provides high-density ports and a line-speed forwarding capability.

The CX110 provides four 10GE ports and 12 GE electrical ports for connecting upstream to convergence/core switches, 34 GE ports for interconnecting with high-performance compute nodes, and two 40GE ports for interconnecting with and stacking switch boards.

High Specifications and Support for Large Data Center Networks

The CX110 provides the highest specifications in the industry. It supports a maximum of 131,072 MAC addresses, a maximum of 16,384 forwarding information bases (FIBs), and a maximum of 4,096 multicast prefix tables.

High-Performance Stacking, Easy Deployment and Maintenance

The CX110 supports stacking of four devices. It has the following advantages:

- High performance: A single stacking system can provide eight 10GE and 24 GE uplink ports (two devices are stacked).
- High bandwidth: The CX110 supports 80GE stacking bandwidth. The stacking system has no bandwidth bottlenecks.
- 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, supporting plug and play and Pay As You Grow.
 - The slot ID of a device is the ID in a stacking system, facilitating device 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 upgrade workload.

Various Data Center Features

- Virtual/virtual machine (VM) access
 - Supports virtualized servers, improving data center utilization.
 - Supports virtual resource discovery. During migration of VMs, VM network policies can be automatically migrated using the virtual resource discovery function so that network resources can be allocated as required. Working with the large-scale layer 2 network, VMs can be freely migrated inside the whole data center.

- Transparent Interconnection of Lots of Links (TRILL) protocol
 - Complying 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 by paths, so that traffic can be shared between multiple paths according to service requirements.
 - The TRILL protocol supports sub-second network convergence. Any changes on the network can be quickly sensed and then fast convergence is performed.

1.3 Appearance

This topic describes the CX110 in terms of its appearance, panel, and installation positions in the chassis.

Appearance

Figure 1-1 shows the CX110.

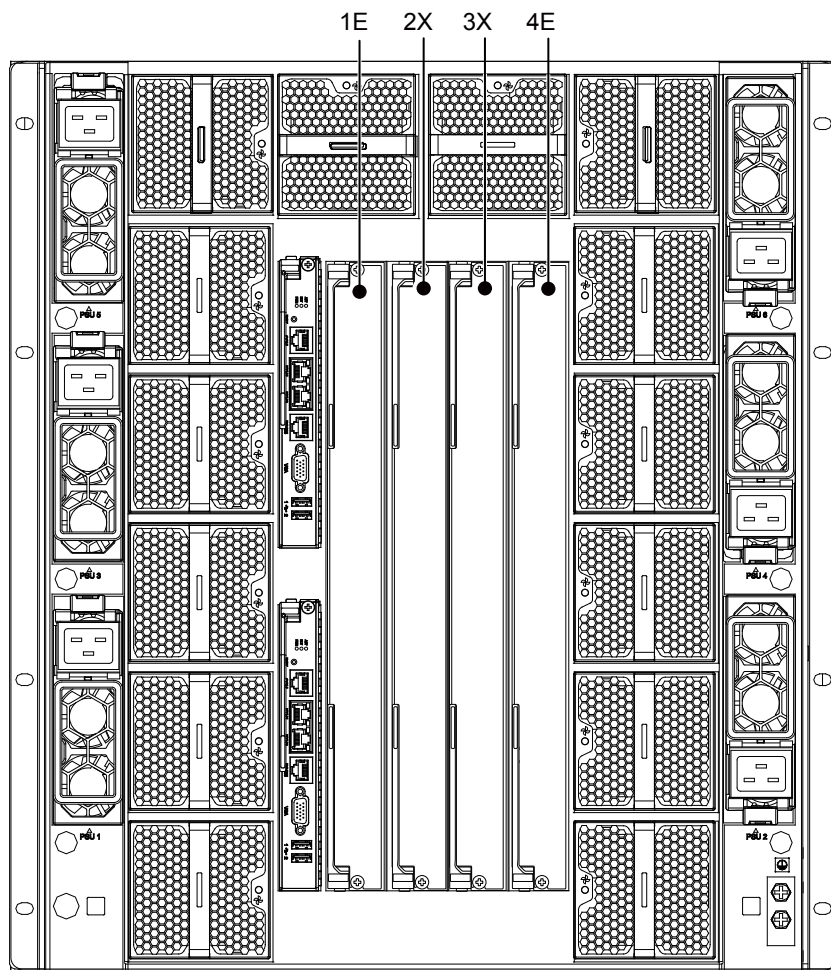
Figure 1-1 Appearance



Installation Positions

The CX110 can be installed in the four slots at the rear of the E9000 chassis. The four slots are 1E, 2X, 3X, and 4E, as shown in **Figure 1-2**.

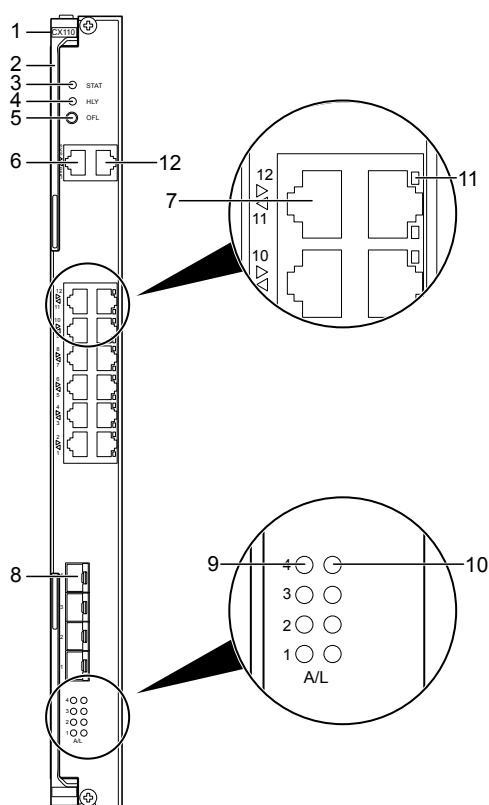
Figure 1-2 Installation positions and slot numbering



Panel

Figure 1-3 shows the CX110 panel.

Figure 1-3 Panel



1	Product model	2	Customization label (with an ESN label)
3	Stacking status indicator	4	Health status indicator
5	Offline button/indicator	6	BMC serial port
7	GE electrical port	8	10GE optical port
9	Data transmission status indicator of the 10GE optical port	10	Connection status indicator of the 10GE optical port
11	GE electrical port indicator	12	SYS serial port

NOTE

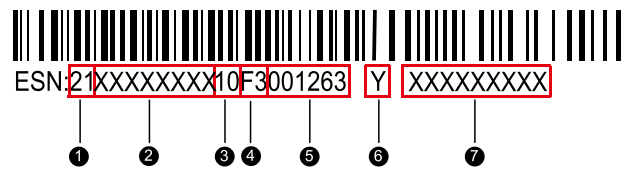
The numbers on the left side are port serial numbers. The arrow direction of a triangle indicates the direction of a port.

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, number rules, names, types, quantities, subcard numbers, and port numbers of the CX110 ports.

The CX110 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 1E, 2X, 3X, and 4E slot respectively from left to right on the panel.
- Subcard number: indicates the number of a subcard supported by service ports. The value ranges from 1 to 20. [Table 1-2](#) and [Table 1-3](#) describe subcard numbers.
- Port number: indicates the sequence number of a port on a subcard. [Table 1-2](#) and [Table 1-3](#) describe port numbers and subcards.

For example, if the CX110 is in slot 2X, the first GE port on the upper right on the panel is numbered as GE 2/17/12, as shown in [Figure 1-5](#).

Figure 1-5 Port naming rules

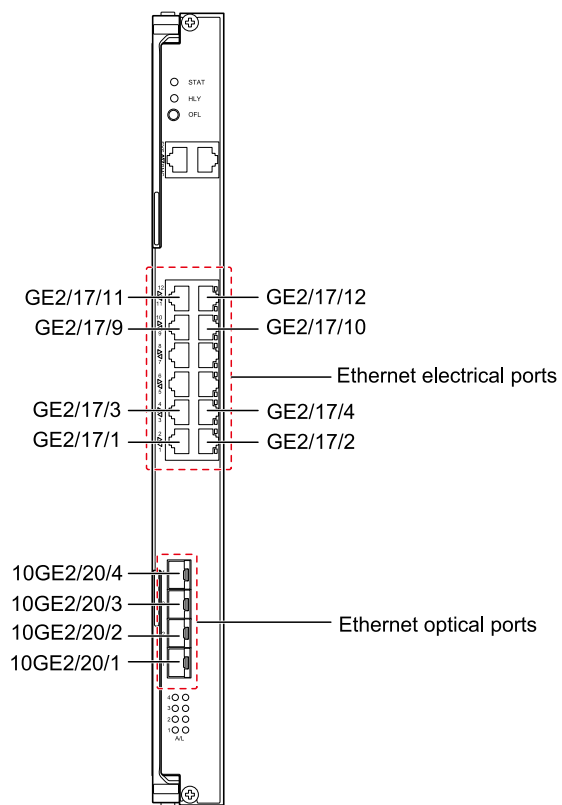


Table 1-2 describes the external ports on the CX110.

Table 1-2 External ports

Name	Type	Quantity	Subcard Number	Port Number	Description
Serial port	RJ-45	2	-	-	<p>The serial ports include the baseboard management controller (BMC) serial port and the SYS serial port. This port complies with RS232 and provides the 115,200 bit/s baud rate. This port has no indicator.</p> <ul style="list-style-type: none"> ● BMC serial port: The port is used to log in to the BMC command-line interface (CLI). ● SYS serial port: This port is used for managing, maintaining, and commissioning the onboard GE switching plane.
GE electrical port	RJ-45	12	17	The value ranges from 1 to 12. The ports are numbered in ascending order from left to right and then from bottom to top.	<p>This port is used to exchange data with an external network. Each port has one indicator. When the indicator blinks green, it indicates the GE electrical port data transmission status. When the indicator is steady green, it indicates the GE electrical port connection status.</p>

Name	Type	Quantity	Subcard Number	Port Number	Description
10GE optical port	SFP+	4	20	The value ranges from 1 to 4. The ports are numbered in ascending order from bottom to top.	This port is used to exchange data with an external network. Each port has two indicators. The orange one indicates the 10GE optical port data transmission status, and the green one indicates the 10GE optical port connection status.

Table 1-3 describes the internal ports on the CX110.

Table 1-3 Internal ports

Name	Type	Quantity	Subcard Number	Port Number	Description	Example
GE port	-	32	1 - 16	The value ranges from 1 to 2.	The ports connect to the front half-width slots 01 to 16, and map to subcard numbers from 1 to 16.	If the CX110 is in slot 2X, the ports connected to the compute node in slot 1 are numbered GE 2/1/1 and GE 2/1/2.
40GE port	-	2	18	The value ranges from 1 to 2.	The port is used to connect switch modules in the 1E and 4E slots or in the 2X and 3X slots.	If the CX110 is in slot 2X, the ports are numbered 40GE 2/18/1 and 40GE 2/18/2.

Name	Type	Quantity	Sub card Number	Port Number	Description	Example
GE port	-	2	19	The value ranges from 1 to 2.	Two GE ports connect to two MM910s respectively. They are used to communicate with the MM910. The two ports can communicate with the MM910s only when the switch module is in slot 2X or 3X.	If the CX110 is in slot 2X, the ports are numbered GE 2/19/1 and GE 2/19/2.


1.5 Indicator

This topic describes the indicators on the CX110.

You can observe the indicators to determine the current operating status of the CX110. [Table 1-4](#) describes the indicators.

Table 1-4 Indicator description

Label	Meaning	Color	Description
STAT	Stacking status indicator	Green	<ul style="list-style-type: none"> ● Off: The CX110 is not powered on. ● Blinking green for 10 times: The CX110 is being powered on. ● Blinking green: The CX110 is standby in stacking mode and is operating properly. ● Steady green: The CX110 is active in stacking mode or is not stacked, and is working properly.

Label	Meaning	Color	Description
HLY	Health status indicator	Red and green	<ul style="list-style-type: none"> ● Off: The CX110 is not powered on. ● Steady green: The CX110 is working properly. ● Blinking red (1 Hz): A major alarm is generated. ● Blinking red (4 Hz): A critical alarm is generated. ● Blinking red (5 Hz): The CX110 is not installed properly. <p>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.</p>
OFL	Offline button/indicator (reserved)	N/A	None.
	GE electrical port indicator	Green	<ul style="list-style-type: none"> ● Off: The port is not properly connected. ● Blinking green: Data is being sent or received over the port. ● Steady green: The port is properly connected.
A	Data transmission status indicator of the 10GE optical port	Orange	<ul style="list-style-type: none"> ● Off: No data is being transmitted over the port. ● Blinking orange: Data is being sent or received over the port.
L	Connection status indicator of the 10GE optical port	Green	<ul style="list-style-type: none"> ● Off: The port is not connected or not properly connected. ● Steady green: The port is properly connected.

1.6 Internal Chassis Networking

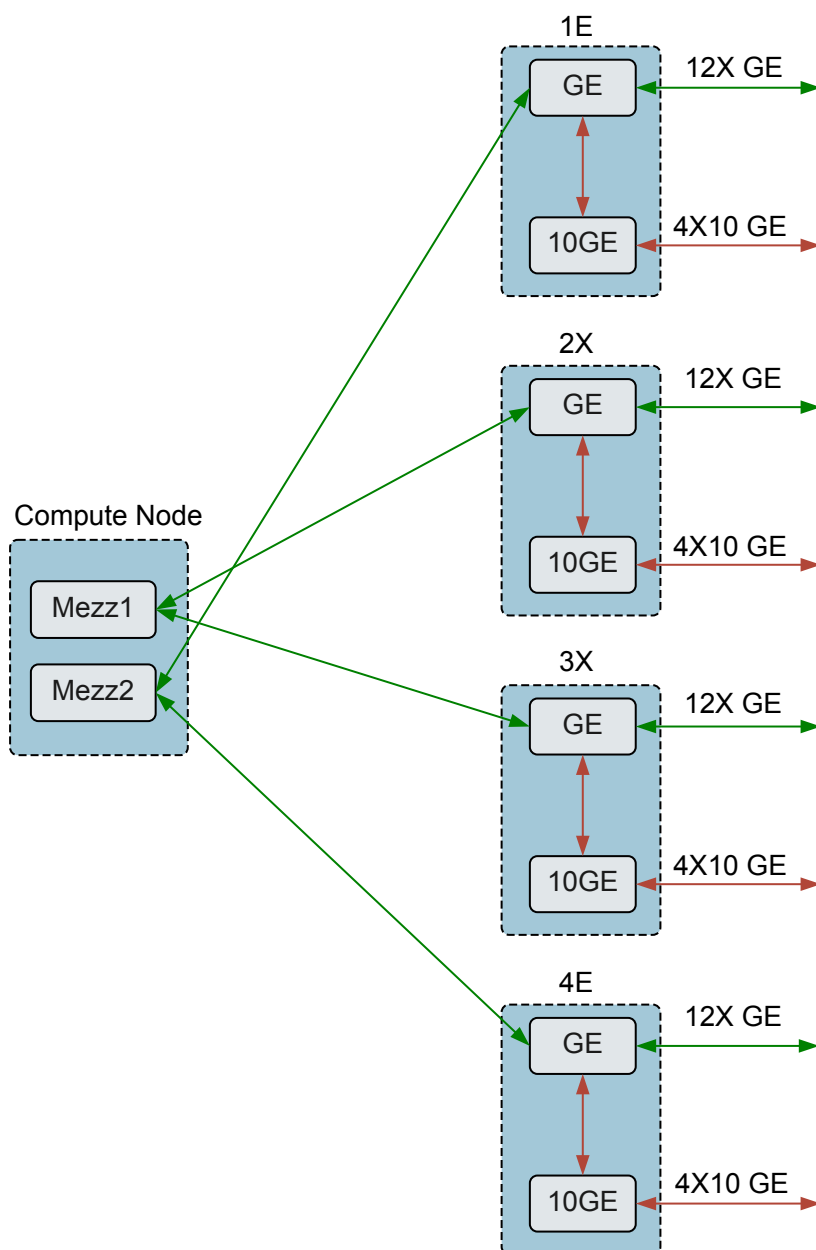
This topic describes connection relationships between the CX110 and mezz modules on compute nodes.

For details about the networking of the CX110 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 for the CX110 and compute nodes. Ports on compute nodes for connecting to the CX110 are provided by two mezz modules as follows:

- Mezz 1 connects to GE switching planes of the CX110s in slots **2X** and **3X**.
- Mezz 2 connects to GE switching planes of the CX110s in slots **1E** and **4E**.

Figure 1-6 Mapping between the CX110 and mezz modules on compute nodes



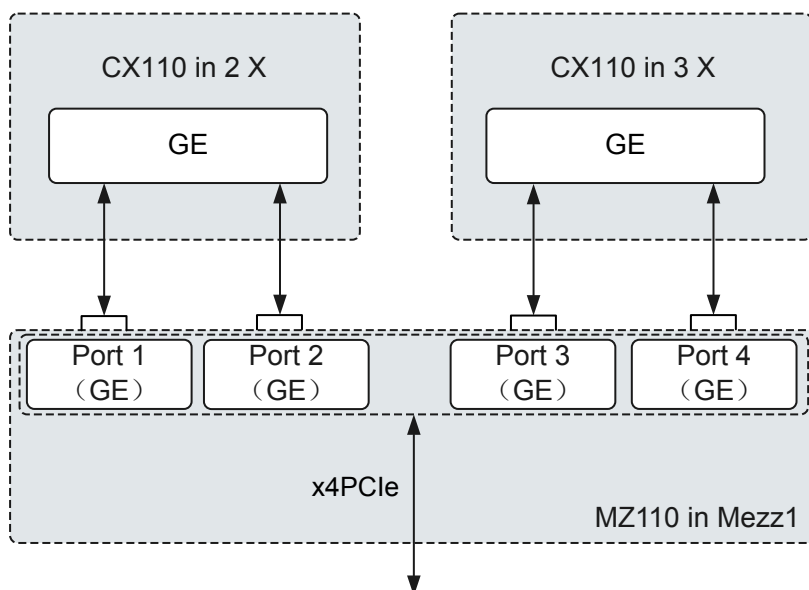
The following describes the mapping between the CX110s and mezz modules. For example, the CX110s are installed in slots 2X and 3X and connect to Mezz 1.

Port Mapping Between a Switch Module and a Mezz Module

Mapping between the CX110 and ports on the MZ110

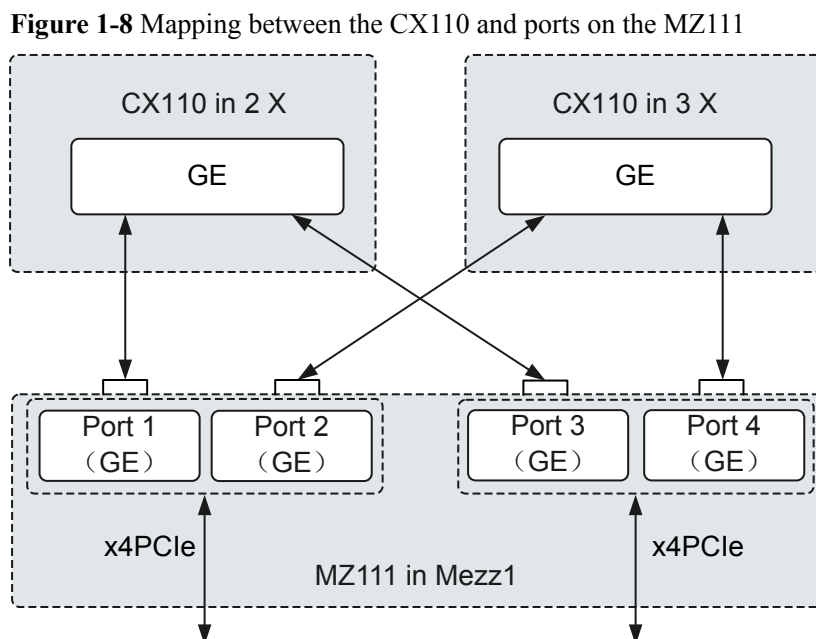
The MZ110 provides four GE ports, including ports 1, 2, 3, and 4. Ports 1 and 2 map to the GE switching plane of the CX110 in slot 2X, and ports 3 and 4 map to the GE switching plane of the CX110 in slot 3X, as shown in [Figure 1-7](#).

Figure 1-7 Mapping between the CX110 and ports on the MZ110



Mapping between the CX110 and ports on the MZ111

The MZ111 provides four GE ports, including ports 1, 2, 3, and 4. Ports 1 and 3 map to the GE switching plane of the CX110 in slot 2X, and ports 2 and 4 map to the GE switching plane of the CX110 in slot 3X, as shown in [Figure 1-8](#).



1.7 Software and Hardware Compatibility

This topic describes mezz modules that can work with the CX110 and pluggable modules and cables supported by ports on the CX110 panel.

For details about the software and hardware that are compatible with the CX110, see [Huawei Server Compatibility Checker](#).

Supported Mezz Modules

The CX110 connects to mezz modules of compute nodes. [Table 1-5](#) describes models and specifications of the supported mezz modules.

Table 1-5 Supported mezz modules

Model	Specifications
MZ110	4-port GE NIC (Network Interface Card) mezzanine card
MZ111	4-port GE dual-chip NIC (Network Interface Card) mezzanine card

Supported Pluggable Modules and Cables

Table 1-6 Supported pluggable modules and cables

Module/Cable	Description
SFP+ multi-mode optical module (10GE)	Supports 10GBASE-SR.
SFP+ single-mode optical module (10GE)	Supports 10GBASE-LR.
SFP+ cable (10GE)	Supports 10GBASE-CR. The 7 m and 10 m active high-speed cables or 1 m, 3 m, and 5 m passive high-speed cables can be used.
SFP multi-mode optical module (GE)	Supports 1000BASE-SX.
SFP single-mode optical module (GE)	Supports 1000BASE-LX.
Multi-mode fiber (MMF)	Supports the MMF of 850 nm OM1/OM2/OM3.
Single-mode fiber (SMF)	Supports the 1310 SMF.
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.

CX110 supports multiple pluggable optical modules, fibers, and network cables. You can choose the modules and cables based on site requirements.

- The CX110 provides the following functions for uplink GE applications:
 - Provides SFP+ optical ports and supports single-mode and multi-mode SFP optical modules.
 - Provides RJ45 ports, supports 10/100/1000 Mbit/s autonegotiation, and uses twisted pair cables for connection.
- The CX110 provides the following functions for uplink 10GE applications:
 - Provides SFP+ optical ports and supports single-mode and multi-mode SFP+ optical modules.
 - Supports SFP+ 10GE cables, which can be 7 m or 10 m active high-speed cables or 1 m, 3 m, or 5 m passive high-speed cables.

1.8 Technical specifications

This topic describes the physical, environmental, power, and network switching specifications of the CX110.

Table 1-7 describes the technical specifications of the CX110, and **Table 1-8** describes the network switching specifications of the CX110.

Table 1-7 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	2 kg
Environmental specifications	Temperature	<ul style="list-style-type: none"> ● 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	<ul style="list-style-type: none"> ● 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	<p>At an altitude of 900 m (2952.72 ft), the highest operating temperature is 40°C (104°F).</p> <p>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).</p>
Input power supply	Rated input voltage	12 V DC
Power consumption	Maximum power consumption	96 W

Table 1-8 Network switching specifications

Attribute	Service Feature	Specifications
Device performance	Number of ports on the panel	<ul style="list-style-type: none"> ● One BMC serial port and one SYS serial port ● Four 10GE optical ports ● 12 GE electrical ports
	Port rate	10GE ports are support 10GE optical ports and GE optical ports.
	Service port stacking	Two 10GE ports on the panel or two 40GE ports on two switch modules can be stacked (10GE ports and 40GE ports cannot be stacked into one logical interface.)
	Switching capability (throughput)	336 Gbit/s
	Packet forwarding rate	252 Mpps
Ethernet service	Number of Media Access Control (MAC) addresses	<ul style="list-style-type: none"> ● Default value: 32,768 ● Large MAC mode: 131,072
	Number of VLANs	4063 NOTE A switch module reserves 31 internal virtual local area networks (VLANs). The default value ranges from 4064 to 4094. The range of consecutive VLANs must be reserved for configuration.
	Number of Eth-Trunk interfaces	128 Eth-Trunk interfaces, with each Eth-Trunk interface supports a maximum of 16 member interfaces
	Number of Address Resolution Protocols (ARPs) for the device	16384
	Jumbo frame length (in byte)	9216 byte
	Quality of service (QoS)	Number of queues for a port
Number of CARs		<ul style="list-style-type: none"> ● Ingress: 4096 ● Egress: 1024

Attribute	Service Feature	Specifications
	Packet cache	4 MB
ACL	ACLv4	<ul style="list-style-type: none"> ● Pre-Ingress: 1500 ● Ingress: 3000 ● Egress: 1000
L3VPN	VRF	128 (MPLS is not supported) MPLS is short for Multiprotocol Label Switching.
	Number of virtual private network (VPN) routes	12288
IP address unicast	Number of route entries	12288
	Number of IPV4 forwarding information bases (FIBs)	12288
Multicast	Number of layer 2 multicast forwarding entries	2000
	Number of layer 3 multicast forwarding entries	2000
Reliability service	Bidirectional Forwarding Detection (BFD)	<ul style="list-style-type: none"> ● Number of BFD sessions: 128 ● Minimum interval for transmitting and receiving packets: 50 ms
	Virtual Router Redundancy Protocol (VRRP)	<ul style="list-style-type: none"> ● 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: 48

Attribute	Service Feature	Specifications
Enhanced Ethernet	Transparent Interconnection of Lots of Links (TRILL)	<ul style="list-style-type: none">● 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 industrial standards and communication protocols that the CX110 complies with.

[2.2 Certifications](#)

This topic describes the certifications that the E9000 has passed.

2.1 Standards Compliance

This topic describes the international and industrial standards and communication protocols that the CX110 complies with.

International Standards

Table 2-1 lists the international standards.

Table 2-1 Standards and protocol compliance

Standard	Protocol
IEEE 802.3x	Flow control and Back pressure
IEEE 802.3z	1000BASE-X Gbit/s Ethernet over Fiber-Optic at 1 Gbit/s
IEEE 802.3aq	10GBASE-LRM 10 Gbit/s Ethernet over multimode fiber
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)
IEEE 1149.1-2001	IEEE Standard Test Access Port and Boundary-Scan Architecture
SFF-8431	Enhanced Small Form Factor Pluggable Module SFP+
SFF-8472	Diagnostic Monitoring Interface for Optical Transceivers

Industrial Standards

Table 2-2 lists the industrial standards.

Table 2-2 Industrial standards

Organization	Standard
EN60950	Safety (Europe)
ECMA TR/70	Environment protection
GR-929	Reliability

Organization	Standard
IEC 812	Failure Mode and Effects Analysis (FMEA)
IEC 863	Reliability, maintainability, and availability compliance standard
IEC60297	Chassis compliance
IEC60950	Safety
IEC60825-1/2/6	Safety
IEC60215	Safety
IEC61000	EMC standard
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	GARP Multicast Registration Protocol
GVRP	GARP VLAN Registration Protocol
HTTP	Hypertext Transfer Protocol
ICMP	Internet Control Message Protocol
IGMP	Internet Group Management Protocol
IPMI	Intelligent Platform Management Interface
IPv4/IPv6	IPv4/IPv6 Internet Protocol
MSTP	Multiple Spanning Tree Protocol
NTP	Network Time Protocol

Protocol	Description
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
Europe	REACH	EC NO. 1907/2006

Country /Region	Certification	Standard
Europe	CE	Safety: EN 60950-1: 2006+A11: 2009+A1: 2010+A12: 2011 EMC: <ul style="list-style-type: none"> ● 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