ZXR10 5900E Series
All Gigabit-Port Intelligent Routing Switch
Hardware Manual

Version 2.8.23.B

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Contents

About This Manual

Purpose

This manual is ZXR10 5900E (V2.8.23.B) Series All Gigabit-Port Intelligent Routing Switch Hardware Manual . This manual introduces structure and principle of 5900E, structure and principle of board, power module and installation procedure.

Intended Audience

This manual is intended for the following engineers:

- on-site maintenance engineers
- network monitor engineers
- system maintenance engineer

What Is in This Manual

ZXR10 5900E (V2.8.23.B) Series All Gigabit-Port Intelligent Routing Switch Hardware Manual contains the following chapters:

Chapter	Summary
Chapter 1 Safety Introduction	This chapter describes the safety instructions and signs.
Chapter 2 System Introduction	This chapter describes the overview and software and hardware features of ZXR10 5900E system.
Chapter 3 Structure and Principle	This chapter describes ZXR10 5900E structure and principles and each module of system in detail.
Chapter 4 Installation	This chapter describes ZXR10 5900E installation procedure.

Related Documentation

- ZXR10 5900E (V2.8.23.B) Series All Gigabit-Port Intelligent Routing Switch Hardware Manual
- ZXR10 5900E (V2.8.23.B) Series All Gigabit-Port Intelligent Routing Switch User Manual (Basic Configuration Volume)
- ZXR10 5900E (V2.8.23.B) Series All Gigabit-Port Intelligent Routing Switch User Manual (Ethernet Switching Volume)
- ZXR10 5900E (V2.8.23.B) Series All Gigabit-Port Intelligent Routing Switch User Manual (IPv4 Routing Volume)
- ZXR10 5900E (V2.8.23.B) Series All Gigabit-Port Intelligent Routing Switch User Manual (IPv6 Routing Volume)

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Chapter 1

Safety Introduction

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Safety Introduction

Only qualified professionals are allowed to perform installation, operation and maintenance due to the high temperature and high voltage of the equipment.

It is necessary to conform to local safety codes and relevant operation procedures during equipment installation, operation and maintenance to prevent personal injury or equipment damage. Safety precautions introduced in this manual are supplementary to the local safety codes.

ZTE bears no responsibility in case of universal safety operation requirements violation and safety standards violation in designing, manufacturing and equipment usage.

Safety Symbols

When configuring ZXR10 5900E, it needs to pay attention to some items. In this case, the following symbols are used:

Caution:

It indicates fault can occur if operator pays no attention to security precautions.

Note:

It indicates other noted items besides safety introduction.

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Chapter 2

System Introduction

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Product Overview

ZXR10 5900E is a type of small-sized L3 Ethernet switch conforming to ETSI. It features compact structure and eco-friendly. The switch targets at access layer of enterprise network and broadband IP MAN, provides Ethernet middle/low-density ports, and fits for being used as user-side access device of informationized intelligent residential block, office building, hotel, campus network and enterprise network or being used as convergence device of small size networks to provide user with high-speed, efficient, high price/performance ratio convergence solution.

ZXR10 5928E can provide 24 gigabit fast Ethernet electrical interfaces and ZXR10 5928E-FI can provide 24 gigabit fast Ethernet optical interfaces. Both of them support L2~L3 wire-speed switching and hardware supports IPv6 route translation and IPv4-IPv6 translation. They provide full support of Ethernet protocol suite and efficient QOS priority mechanism, show flexible management, support complete L3 routing protocols, and provide four 10Gbps–24Gbps upstream/stack interfaces.

ZXR10 5900E has the following features:

- High reliability and availability
- Full line rate forwarding and filtering capabilities
- Full support of network protocols
- Open system architecture, showing good upgrade capability

Functions

ZXR10 5900E Series includes two models: ZXR10 5928E and ZXR10 5928E-FI. Both two models use the same solution.

1. Physical Interface

- Supporting port rate, duplex mode and adaption configurations
- Supporting port mirroring
- Supporting suppression of broadcast storm
- Supporting line diagnosis & analysis

2. VLAN
   - Supporting port-based VLAN
   - Supporting IEEE 802.1Q, allowing up to 4094 VLANs
   - Supporting PVLAN
   - Supporting VLAN double-tag
   - Supporting SuperVLAN
3. L2 Protocol
   - Supporting STP, RSTP and MSTP
   - Supporting static Trunk and LACP
   - Supporting IGMP Snooping
4. Routing Protocol
   - Supporting static route, RIP v1/v2, OSPF, IS-IS, BGP and other unicast protocols
   - Supporting IGMP v1/v2, PIM-SM, MSDP and other multicast protocols
5. ACL
   - Supporting basic ACL, extended ACL, L2 ACL and hybrid ACL
   - Supporting ACL time range limit
6. QoS
   - Supporting 802.1p
   - Supporting SP and WRR queue scheduling modes
   - Supporting traffic monitoring
   - Supporting flow-based redirection
   - Supporting flow mirroring and traffic statistics
7. Access Authentication
   - Supporting RADIUS Client
   - Supporting DHCP Relay and DHCP Server
8. Reliability
   - Supporting VRRP
   - Supporting route load balancing
9. Network Management
   - Supporting Command Line Interface (CLI) configuration mode
   - Supporting configuration through console port, Telnet and SSH

- Supporting SNMP and RMON
- Supporting ZTE NetNumen N31

10. Supporting monitoring interface
    - Supporting 3 dry node signal input
    - Supporting 5 dry node signal output

Technical Characteristics and Parameters

Technical characteristics and parameters of ZXR10 5900E are listed in Table 1.

TABLE 1 ZXR10 5900E TECHNICAL CHARACTERISTICS AND PARAMETERS

Item	Description
Dimensions	ZXR10 5928E: 43.6mm (Height)×442mm (Width)×220mm (depth) ZXR10 5928E-FI: 43.6mm (Height)×442mm (Width)×220mm (depth)
Weight	ZXR10 5928E: 4.8kg ZXR10 5928E-FI: 4.8kg
Power Supply	AC: 100V~240V, 50Hz~60Hz DC: –48V
Power Consumption	ZXR10 5928E: <55w ZXR10 5928E-FI: <65w
Reliability	MTBF: >200000 Hours MTTR: <30 Minutes
Lightning Protection	4KV
Working Temperature	Operating ambient temperature: -5℃~+45℃ Storage temperature: -40℃~+70℃
Working Humidity	Relative humidity: 10% to 90%, non-condensing
Memory Size	ZXR10 5928E: 256M ZXR10 5928E-FI: 256M
Switch Capacity	ZXR10 5928E: 128G ZXR10 5928E-FI: 128G

Item	Description
Packet Forwarding Rate	ZXR10 5928E: 13.98M ZXR10 5928E-FI: 13.98M
Number of Routing Table Entries	ZXR10 5928E: host route: IPv4 8K, IPv6 4K Network segment route: IPv4 12K, IPv6 6K Equivalence route: 8 ZXR10 5928E-FI: host route: IPv4 8K, IPv6 4K Network segment route: IPv4 12K, IPv6 6K Equivalence route: 8
Capacity of MAC Address Table	ZXR10 5928E: 32K ZXR10 5928E-FI: 32K

Chapter 3

Structure and Principle

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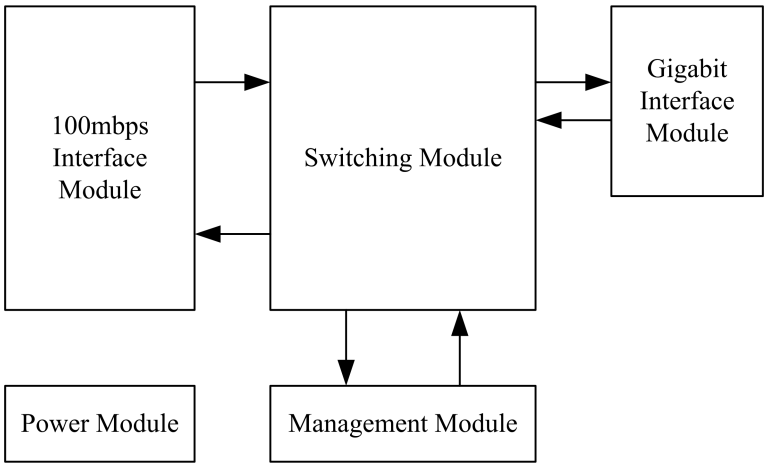
Working Principle

ZXR10 5900E series products cassette fast Ethernet switches developed by ZTE. This series switches adopt modular design and have strong capability in service control and user management so as to provide networking solutions to convergence of enterprise network, IP MAN network and residential block. ZXR10 5900E series products have powerful functions and sound performance. According to system functions, the product contains the following modules: control module, switching module, interface module, power module and monitoring module.

1. Control module: the module contains main processor and some other external function chips and is used by system to process various applications. It provides console port for data manipulation and maintenance.
2. Switching module: the main part of switching module is packet processor, used for processing and switching of packets sent from ports;
3. Interface module: interface module is composed of interface chip and corresponding peripheral circuits, mainly used for connection to external users and packet forwarding.
4. Power module: the module adopts 220V AC and supports 1+1 backup and hot-swap to supply needed power to the other components within the system.
5. Monitoring module: Supporting 3 dry node signal input and 5 dry node signal output.

ZXR10 5900E system schematic diagram is shown in Figure 1.

FIGURE 1 ZXR10 5900E SYSTEM SCHEMATIC DIAGRAM



ZXR10 5900E system adopts standard 19-inch plug-in box, which can be installed outside separately or within the standard cabinet.

Hardware Structure

ZXR10 5928E

The height of ZXR10 5928E chassis is 1U (1U=44.45mm). It can provide 24 gigabit Ethernet electrical interfaces (RJ45) and support CAT5 or above twisted pair cable, as well as QXFB and QGLB upstream subcards.

The front view of ZXR10 5928E is as shown in Figure 2.

FIGURE 2 ZXR10 5928E FRONT VIEW

The rear view of ZXR10 5928E is as shown in Figure 3.

FIGURE 3 ZXR10 5928E REAR VIEW

ZXR10 5928E-FI

The height of ZXR10 5928E-FI chassis is 1U (1U=44.45mm). It can provide 24 gigabit Ethernet optical interfaces (SFP) and sup-

port various gigabit optical modules conforming to SFP standard. It also supports QXFB and QGLB upstream subcards.

The front view of ZXR10 5928E-FI is as shown in Figure 4.

FIGURE 4 ZXR10 5928E-FI FRONT VIEW

The rear view of ZXR10 5928E-FI is as shown in Figure 5.

FIGURE 5 ZXR10 5928E-FI REAR VIEW

MCS

MCS is the core of ZXR10 5900E and it mainly implements the functions of control module and switching module. As for ZXR10 5900E system, MCS is installed in cassette structure and doesn't have separate panel. Its interfaces and signal indicators are on system front panel.

1. Interfaces
   i. Console Port

      Management terminal perform operations and maintenance to ZXR10 5900E through Console port. Console port is RJ45 socket, connected with COM port on management terminal by serial console cable. One end of the cable is RJ45 plug, connected to ZXR10 5900E and the other end of the cable is DB9 female plug, connected to management terminal.

   ii. Management Interface

      Management terminal can perform operations and maintenance to ZXR10 5900E through management interface, which supports 10/100Base-T.

   iii. 100/1000Base-T Ethernet Interface

      ZXR10 5928E main board supports 1000 Base-TX and 100Base-TX on CAT5. The characteristics are as shown in Table 2.

TABLE 2 ZXR10 5900E MAIN BOARD 100/1000BASE-T ETHERNET INTERFACE CHARACTERISTICS

Port Type	Characteristics
100/1000Base-TX	• Conforming to the following standards: • 1000BASE-TX IEEE 802.3u • RJ45 Connector • Using CAT5 UTP, max transmission distance 100m • MDI/MDIX

2. Indicator

There are 29 indicators on front panel of ZXR10 5900E, where 24 indicators are port status indicators. There are 4 system indicators STA, SPD, DUP and SYS/ALM and 1 management interface indicator. By pressing mode button, 24 port indicators can switch their display modes: SPD mode, DUP mode or STA mode. ZXR10 5900EAC-DC power module has two indicators: RUN indicator and FAULT indicator.Table 3 shows functions of system indicator.Table 4 shows functions of port status indicator.

TABLE 3 ZXR10 5900E SYSTEM INDICATOR FUNCTION DESCRIPTION

Indicator	Off	Green	Red
SPD	/	Green indicator is on: SPD mode	/
DUP	/	Green indicator is on: DUP mode	/
STA	/	Green indicator is on: STA mode	/
SYS/ALM	Device is not powered	Green indicator flashes: Device runs normally	Red indicator is on: Fault occurs on device
Management Interface Indicator	Connection is unavailable.	Green indicator is on: link Green indicator flashes: active	/
RUN	Device is not powered or fault occurs on power source	Green indicator is on: Power source works normally	/

Indicator	Off	Green	Red
FAULT	/	/	Red indicator is on: Power temperature alarm is generated or fault occurs on power source.

TABLE 4 ZXR10 5900E PORT STATUS INDICATOR FUNCTION DESCRIPTION

Indicator	Mode	Off	Green	Yellow
24 gigabit Port Indicators	SPD mode	Connection is unavail-able.	Green indicator is on: 1000M link	Yellow indicator is on: 100M link
			Green indicator flashes: 1000M active	Yellow indicator flashes: 100M active
	DUP mode	Connection is unavail-able.	Green indicator is on: Full-duplex link	Yellow indicator is on: Half-duplex link
			Green indicator flashes: Full-duplex active	Yellow indicator flashes: Half-duplex active
	STA mode	Connection is unavail-able.	Green indicator is on: link	Yellow indicator is on: Packets fail to be forwarded since STP port is blocked.
			Green indicator flashes: active	Yellow indicator flashes: Packets are being forwarded and STP port is blocked.
			Green and yellow indicators flash: Connection error, frame	

Indicator	Mode	Off	Green	Yellow
			error CRC error and so on.	

LIC

QXFB

QXFB subcard provides 4 gigabit Ethernet upstream optical interfaces, as shown in Figure 6.

FIGURE 6 QXFB FRONT VIEW

There are four indicators on QXFB panel, corresponding to four 10 gigabit optical interfaces respectively. The description of four indicators is as shown in Table 5.

TABLE 5 QXFB INDICATOR FUNCTION DESCRIPTION

Indicator	Mode	Off	Green
QXFB Gigabit Optical Interface	SPD mode	Connection is unavailable.	Green indicator is on: 10G link
			Green indicator flashes: 10G active
	DUP mode	Connection is unavailable.	Green indicator is on: Full-duplex link
			Green indicator flashes: Full-duplex active

QGLB

QGLB subcard provides 4 gigabit Ethernet upstream optical interfaces, as shown in Figure 7.

FIGURE 7 QGLB FRONT VIEW

There are four indicators on QGLB panel, corresponding to four gigabit optical interfaces respectively. The description of four indicators is as shown in Table 6.

TABLE 6 QGLB INDICATOR FUNCTION DESCRIPTION

Indicator	Mode	Off	Green
QGLB Gigabit Optical Interface	SPD mode	Connection is unavailable.	Green indicator is on: 1G link
			Green indicator flashes: 1G active
	DUP mode	Connection is unavailable.	Green indicator is on: Full-duplex link
			Green indicator flashes: Full-duplex active

Power Module

The power panel of ZXR10 5900E is as shown in Figure 8

FIGURE 8 5900E AC POWER INTERFACE DIAGRAM

Technical parameters of AC-DC power module are as follows:

- Input voltage: single-phase 100VAC–240VAC
- Input current: Max 1.42A
- Frequency: 43–67Hz
- Max Power Consumption: 100W

- Line voltage waveform deviation factor (WDF)<5%

Monitoring Interface

ZXR10 5900E provides 2 RJ45 interfaces. ALARM IN interface provides a pair of dry node input and 3 pairs of dry node input and ALARM OUT interface provides 4 pairs of dry node output.Figure 9 shows interfaces.

FIGURE 9 ZXR10 5900E MONITORING INTERFACE DIAGRAM

Chapter 4

Installation

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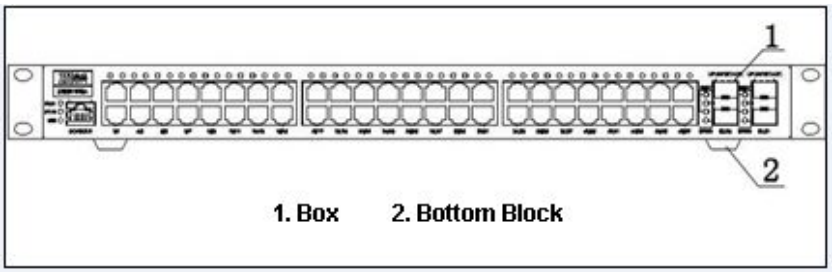
Equipment Installation

Similar to installation of ZXR10 5952A, ZXR10 5900E series switch can be installed both on desktop and in 19-inch standard cabinet. Where, 19-inch standard cabinet can be provided by the user. In case ZTE cabinet is to be used, please refer to 19-Inch Standard Cabinet Installation Manual for cabinet installation.

Desktop Installation

When installing switch on desktop, install four plastic bottom blocks (plastic bottom blocks are strews are provided together with device) on the bottom plate of switch to form an air passage, for which heat generated by power module can be dissipated efficiently. The detailed installation is shown in Figure 10 (taking ZXR10 5952A for example).

FIGURE 10 5952A DESKTOP INSTALLATION

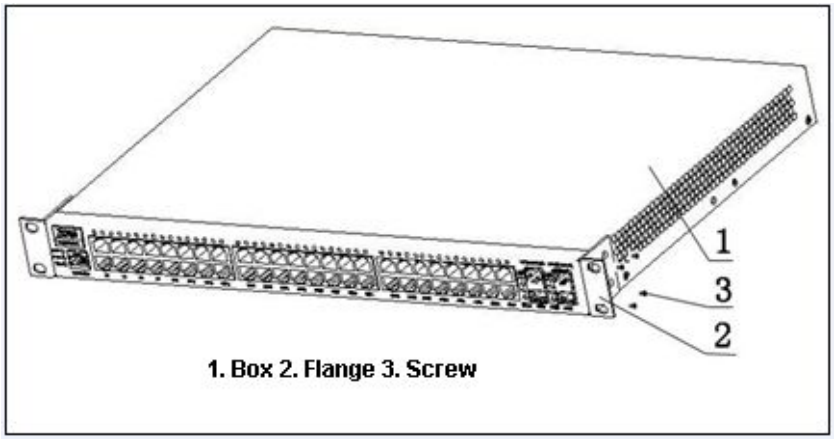


Cabinet Installation

To install ZXR10 5900E series switch onto 19-inch cabinet, fix two flanges (both flanges and screws are provided together with de-

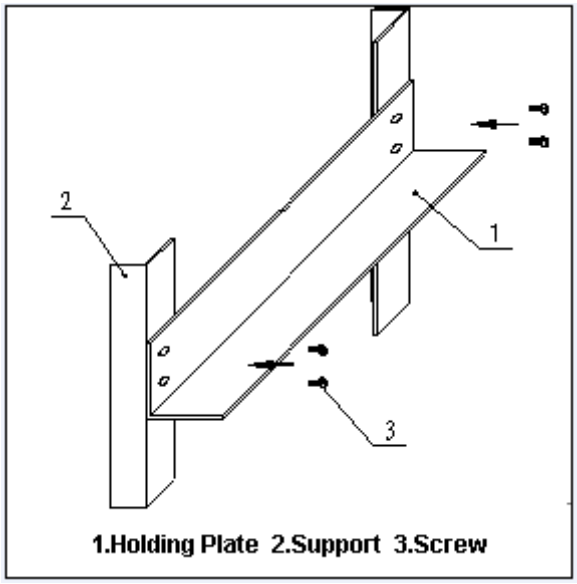
vice) on two sides of switch shell, as shown inFigure 11 (taking ZXR10 3252A for example).

FIGURE 11 INSTALLATION OF FLANGES



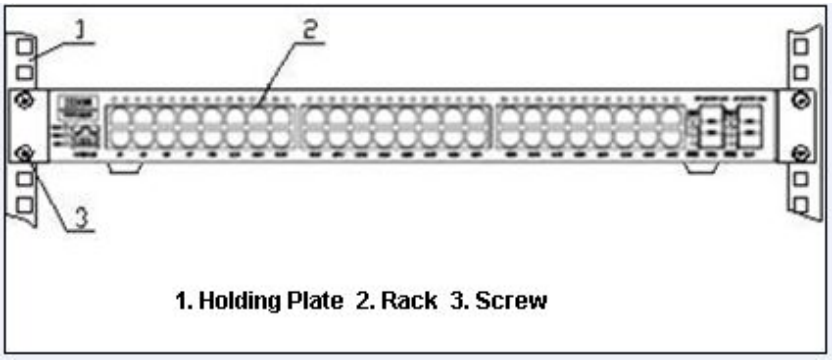
Install a pair of symmetric holding plates on inner sides of 19-inch cabinet to support switch, as shown in Figure 12.

FIGURE 12 INSTALLATION OF HOLDING PLATES



After fixing holding plates, push in switch along the holding plates and fix flanges onto the cabinet, as shown in Figure 13 (taking ZXR10 3252A for example).

FIGURE 13 FIXING DEVICE



Cable Laying

ZXR10 5900E cables consist of power cable, serial console cable, network cable and fiber.

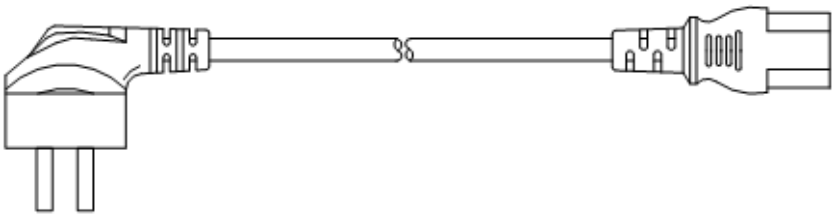
Power Cable Connection

Power cable can be divided into two types according to different power modules: AC power cable and DC power cable.

1. Connection of AC Power Cable

   As shown in Figure 14, standard print power cable is used as the AC power cable.

   FIGURE 14 AC POWER CABLE

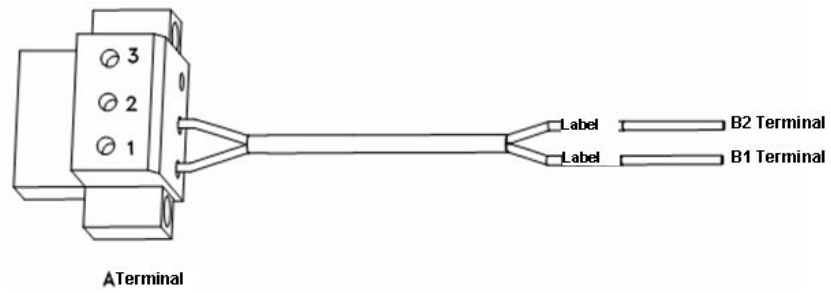
   

   Connect one end of AC cable to the AC socket of ZXR10 5900E AC power module, and connect the other end to 220V AC socket.

2. Connection of DC Power Cable

   i. DC -48V power cable C-PWR-084 is shown in Figure 15.

FIGURE 15 DC POWER CABLE C-PWR-084 DIAGRAM



Corresponding relationship between two ends of DC power cable is as shown in Table 7.

TABLE 7 CORRESPONDING RELATIONSHIP BETWEEN TWO ENDS OF DC POWER CABLE

End A	End B	Power Signal
1	End B1	-48V GND
2	End B2	-48V

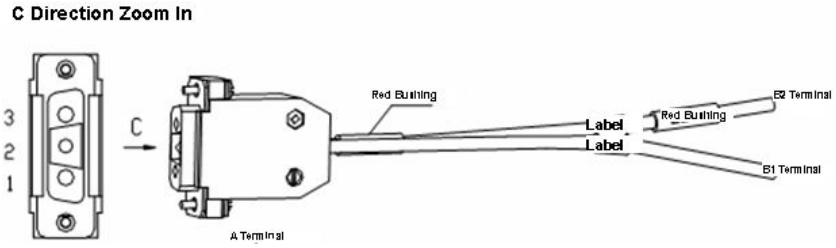
End A is connected to -48V input socket of device, and two terminals on end B shall be connected according to labels pasted on each conductor, where B1 is connected to DC power supply -48VGND and B2 is connected to DC power supply -48V. The details on B1 and B2 labels are shown in Table 8.

TABLE 8 LABEL DETAILS

End B1	End B2
-48V GND	-48V

ii. DC backup power cable C-PWR-072 is shown in Figure 16.

FIGURE 16 DC BACKUP POWER CABLE C-PWR-072 DIAGRAM



Corresponding relationship between two ends of DC power cable is as shown in Table 9.

TABLE 9 CORRESPONDING RELATIONSHIP BETWEEN TWO ENDS OF DC POWER CABLE

End A	Conductor Colour	End B	Power Signal
1	Black	B1	12V (-)
2	Black (Red Sleeve)	B2	12V (+)

Determine whether to connect this backup DC power cable according to configuration requirements. In installation, connect end A to the backup DC input socket of device, connect end B1 to cathode of external 12V power source, and connect end B2 with red sleeve to anode of external 12V power source.

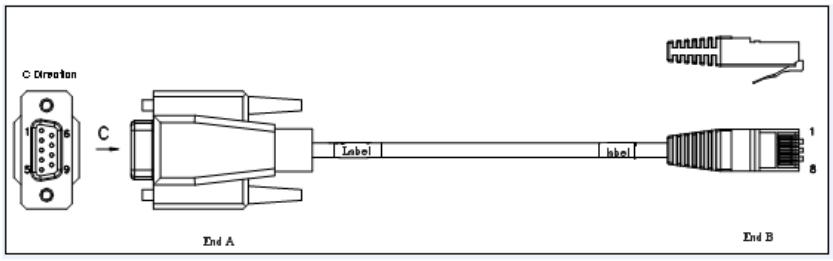
Connection of Serial Console Cable

Serial console cable is the basic cable used in configuring and maintaining ZXR10 5900E.

Serial configuration line is provided together with ZXR10 5900E one end to be DB9 console port (connected to serial port of PC) and the other end to be RJ45 port (connected to Console port on main Board of ZXR10 5900E).

The serial console cable is shown in Figure 17.

FIGURE 17 ZXR10 5900E SERIAL CONSOLE CABLE DIAGRAM



Line order of serial console cable is shown in Table 10.

TABLE 10 SERIAL CONSOLE CABLE LINE ORDER TABLE

End A	Cable Chroma-togram	End B
2	White	3
3	Blue	6
5	White	4
	Orange	5

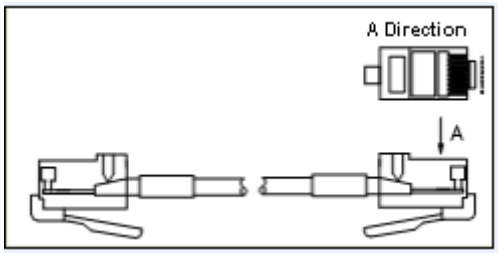
End A	Cable Chroma-togram	End B
4	White	7
6	Green	2
7	White	8
8	Brown	1

Connection of Network Cable

RJ45 plugs are crimped on both ends of the cable with the structure as shown in Figure 18.

- Cable plug name: 8P8C straight cable solder plug
- Specification: E5088-001023
- technical parameters: rated current: 1.5, rated voltage: 125V, crimped with AWG24-28# wire gauge round cable.

FIGURE 18 NETWORK CABLE STRUCTURE DIAGRAM



Cables can be classified into the following two types according to different cable crimping order in the plug:

- Straight-through network cable RJ45: the cable connection relationship is in the one-to-one correspondence at both ends. The specific connection relationship is shown in Table 11.

TABLE 11 STRAIGHT-THROUGH NETWORK CABLE RJ45 LINE ORDER TABLE

End A	Cable Chroma-togram	End B
1	White-Orange	1
2	Orange	2
3	White-Green	3
6	Green	6
4	Blue	4
5	White-Blue	5

End A	Cable Chroma-togram	End B
7	White-Brown	7
8	Brown	8

- Crossover network cable RJ45J: cable connection relationship is cross correspondence between two twisted pairs at both ends. The specific connection relationship is shown in Table 12.

TABLE 12 CROSSOVER NETWORK CABLE RJ45J LINE ORDER TABLE

End A	Cable Chroma-togram	End B
1	White-Orange	3
2	Orange	6
3	White-Green	1
6	Green	2
4	Blue	4
5	White-Blue	5
7	White-Brown	7
8	Brown	8

Connection of Fiber

There are two fibers for each ZXR10 5900E optical interface. One is used for receiving packets and the other is used for sending packets. Pay attention to TX and RX marks on the panel and never insert wrong ends. Two types of fibers are available: single-mode fiber and multi-mode fiber. User can configure the fiber according to the actual application.Table 13 shows 6 types of fiber.

TABLE 13 FIBER TYPE TABLE

Mode	Switch End Connector Type	Opposite End Connector Type
Single-mode fiber	SC-PC Connector (Square Panhead)	FC/PC Connector
		SC/PC Connector
		ST/PC Connector
Multi-Mode Fiber	SC-PC Connector (Square Panhead)	FC/PC Connector
		SC/PC Connector

Mode	Switch End Connector Type	Opposite End Connector Type
		ST/PC Connector

As for fiber out of the cabinet, make sure to protect the fiber against any damages with plastic corrugated sleeve. The fiber within the protect sleeve must not be wound up and the corners must be radian. The labels at two ends of the fiber must be clear. The meaning of the label must correctly reflect corresponding serial numbers and relationship between cabinets and between rows.

Power-on Procedures

Check environment in lab and hardware installation before power-on ZXR10 5900E.

1. Check whether lab temperature, humidity and voltage meet the installation requirements, as shown in Table 14.

TABLE 14 TEMPERATURE AND HUMIDITY

Item	Temperature (℃)		Relative Humidity (%)	
	Long-Term Working Condition (Note 1)	Short-Term Working Condition (Note 2)	Long-Term Working Condition	Short-Term Working Condition
Scope	15℃~30℃	-5℃~45℃	30%~70%	20%~90%

1. When ZXR10 5900E works in normal environment, temperature and humidity measurement points refer to values measured at points 2m above the floor and 0.4m in front of equipment (they must be measured when there is no protection plate in front and back of cabinet).
2. Short-term working conditions refer to less than 48 continuous hours and less than 15 accumulated days per year.

2. Check if power cable and other cables are connected correctly and reliably.
3. Check other hardware.
   i. Check if devices are labeled completely, correctly and clearly.
   ii. Check if switch is firmly installed in 19-inch standard rack or if it is stably installed on desktop.
   iii. Check if power switch of switch is at off position.
   iv. Check if rack has a good contact and if earthing resistance meets technical requirements.
4. Power on ZXR10 5900E in the following steps:
   i. Connect switch AC power cable.

ii. Turn on external power supply.

5. Power off ZXR10 5900E in the following steps:
   i. Turn off external power supply.
   ii. Disconnect switch AC power cable.

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Figures

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Tables

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Glossary

BGP
- Border Gateway Protocol

IGMP
- Internet Group Management Protocol

IS-IS
- Intermediate System-to-Intermediate System

LACP
- Link Aggregation Control Protocol

MSDP
- Multicast Source Discovery Protocol

MSTP
- Multiple Spanning Tree Protocol

OSPF
- Open Shortest Path First

PIM-SM
- Protocol Independent Multicast - Sparse Mode

PVLAN
- Private Virtual Local Area Network

QoS
- Quality of Service

RADIUS
- Remote Authentication Dial In User Service

RIP
- Routing Information Protocol

RMON
- Remote Monitoring

RSTP
- Rapid Spanning Tree Protocol

SNMP
- Simple Network Management Protocol

SP
- Strict Priority

SSH
- Secure Shell

STP
- Spanning Tree Protocol

VLAN
- Virtual Local Area Network

VRRP
- Virtual Router Redundancy Protocol

WRR
- Weighted Round Robin