TR S9500 Installation Manual

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Chapter 1 Overview

1.1 Introduction to S9500

In recent years, Internet users increase explosively. Users are not satisfied with communications based on the telephone network. They wish telecom carriers to provide multimedia services like audio, data and pictures. The traditional bandwidth access mode cannot meet the increasing requirements for telecom services. The bandwidth access technology can bring great changes to people's life and work.

Compared with ADSL and HFC, the Ethernet access mode has advantages like bandwidth and low cost. IP is the main service of the bandwidth MAN, while Ethernet is the direct mode to bear the IP service. No other specific devices need be added for the network and users, which reduces the cost of protocol transform. Meanwhile, the Ethernet access mode is much suitable to relativelypopulated community users, which meets the access network optical trend. Hence, the Ethernet is widely applied to the bandwidth access field.

Facing this trend, TSR provides a business Ethernet solution, a kind of business-oriented Ethernet access solution. S9500 is a manageable bandwidth access aggregation device produced by TSR.

S9500 has the user management function and the multi-layer switching function. It provides largecapacity multilayer switching capability, the wire-speed user access management capacity and multiple charging modes. It provides carriers a mature and flexible operation mode.

S9500 can meet users' requirements to add single board and plug-ins. S9500 supports the following services:

- Internet broadband access

- Large-capacity data exchange between MAN enterprises or within one enterprise.

- Large-capacity data exchange between MAN enterprises, within one enterprise and campus networking

1.2 Attributes of S9500

- Parallel development of wire-speed L2/L3 switchover and wire-speed access

- Flexibility and high performance obtained from ASIC wire-speed processing and the network processor

- High active-passive redundancy without restarting
- Proper switchover capacity and high port density
- Coexistence of multiple access modes

- Uniform user management

- Flexible charging mechanism

- RADIUS-based user broadband management and privilege control

- Easy non-Ethernet module expansibility provided by the standard switchover frame

1.3 Appearance of S9500

S9500 has three models, S9506, S9510 and S9514. Their appearances are displayed below respectively.
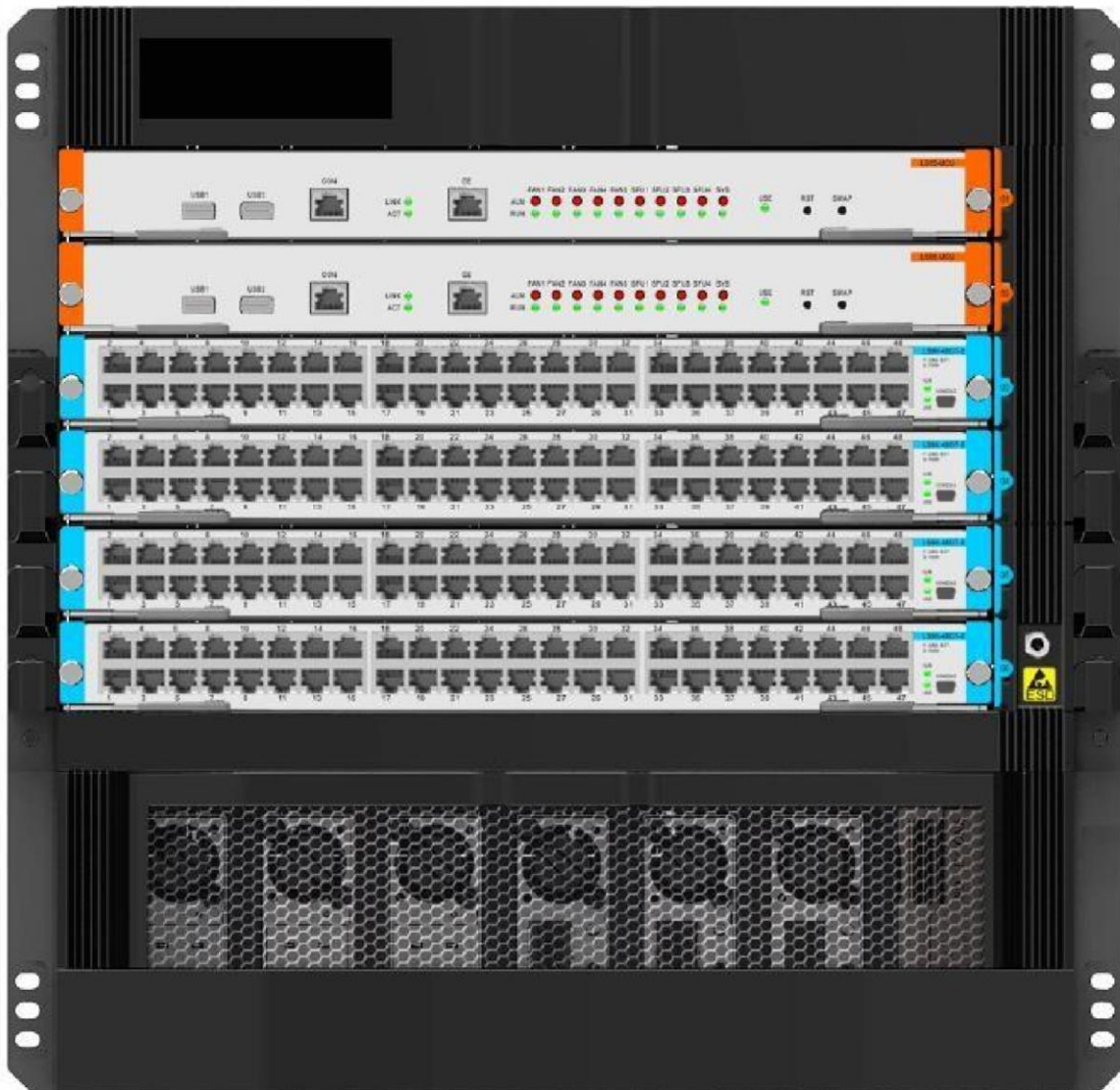
Figure 1-1 Appearance of S9506
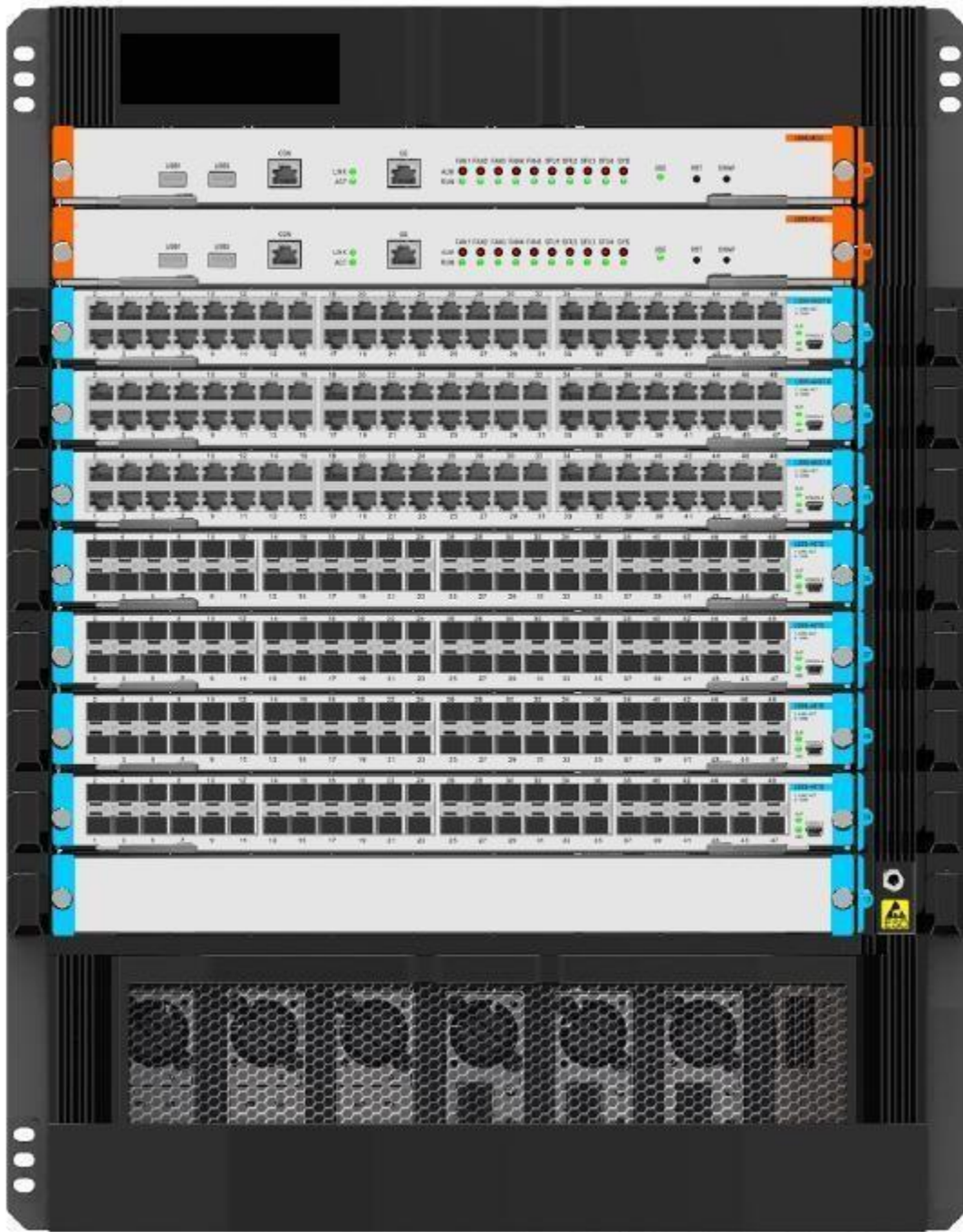
Figure 1-2 Appearance of S9510
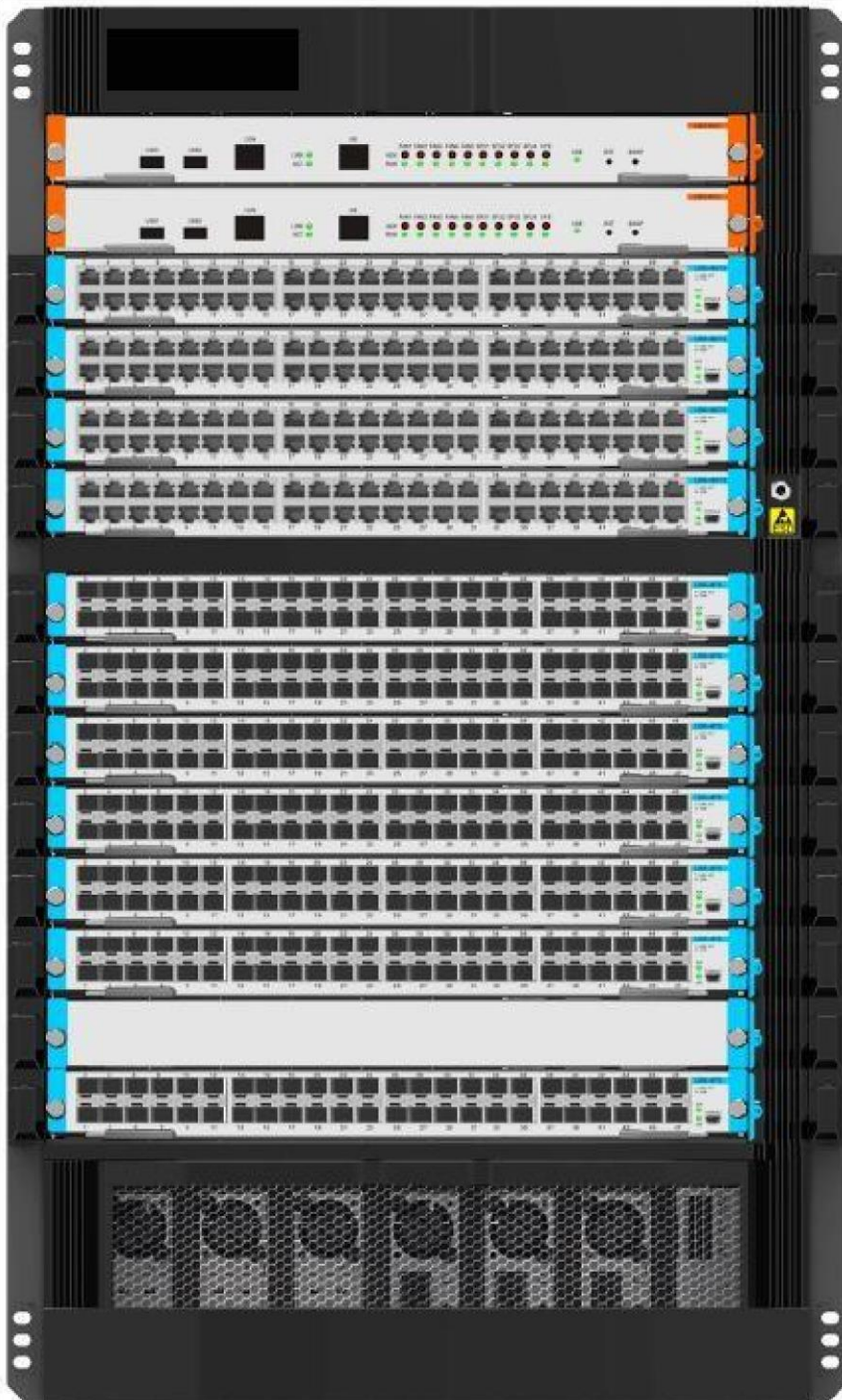
Figure 1-3 Appearance of S9514

1.4 ROHS Description

Part Number, Name and Description	Toxic or Hazardous Substances and Elements					
	Pb	Hg	Cd	Cr (VI)	PBB	PBDE
Machine Box	○	○	○	○	○	○
Cabinet	○	○	○	○	○	○
Module	○	○	○	○	○	○
Basic Board	○	○	○	○	○	○
Interface Card	○	○	○	○	○	○

O: Indicates that this toxic or hazardous substance contained in all the homogeneous materials for this part, according to EIP-A， EIP-B， EIP-C is below the limit requirement in SJ/T11363-2006.

X: Indicates that this toxic or hazardous substance contained in al the homogeneous materials for this part, according to EIP-A, EIP-B, EIP-B, EIP-C is above the limit requirement in SJ/T11363-2006.

The referenced environment-friendly use period logo is determined based on normal operating conditions (such as temperature and humidity).

Note-These statements apply only to the China RoHS regulations.

1.5 S9500 Hardware Composition

The hardware system of S9500 consists of the machine box, power supply system, heat cooling system and systematic modules.

The machine box of S9506 has a net weight of 39kg; the power module has a net weight of 1.26 kg; the SFU single-board module has a net weight of 2 kg, the service module has a net weight of 3kg, the SFU fan module has a net weight of 2.4kg, the service card fan module is 3.9kg. When all modules of S9506 are inserted, the net weight of S9506 is 81kg.

The machine box of S9510 has a net weight of 43.4kg; the power module has a net weight of 1.26 kg; the SFU single-board module has a net weight of 2.4kg; the service module has a net weight of 3kg, the SFU fan module has a net weight of 2.4kg, the service card fan module has a net weight of 3.9kg. When all modules of S9510 are inserted, the net weight of S9510 is 102 kg.

The machine box of S9514 has a net weight of 54.6 kg; the power module has a net weight of 1.26 kg; the SFU single-board module has a net weight of 2.4 kg. When all modules of S9514 are inserted, the net weight of S9514 is161kg.

1.5.1 Cabinet

S9500 should be installed on the 19-inch standard cabinet. TSR can provided the standard 19-inch cabinet, which has the following different specifications:

- 2.2m mental-plate cabinet (Height×Width×Depth =2200×600mm×600mm)

- 2.0m mental-plate cabinet (Height×Width×Depth =2000×600mm×600mm)

- 1.8m mental-plate cabinet (Height×Width×Depth =1800×600mm×600mm) ● 1.6m mental-plate cabinet (Height×Width×Depth =1600×600mm×600mm)

1.5.2 Machine Box

S9500 adopts the 19-inch standard machine box, whose specification varies with different models:

- S9506: Height×Width×Depth=486.1mm×482.6mm×563.8mm

- S9510: Height×Width×Depth=626.2mm×482.6mm×563.8mm

- S9514: Height×Width×Depth=812.8mm×482.6mm×563.8mm

The machine box of S9500 consists of the fan module layer, the functional module layer and the power supply layer.

The functional module layer is a single-board insertion box, which is the base to support each single board of S9500.

The power supply layer is at the top of the machine box, which can be inserted with 1 to 7 AC/DC power modules. The power module has its own fan and adopts the air exhaust mode. The front template of the power supply has an air inlet, while the backplane of the machine box has an air outlet.

The fan module layer lies on the right of the machine box. The fan is on the fan module layer and it takes the air exhaust mode. The fan module can be taken out from the front of the machine box for maintenance, clearance or replacement.

The air inlet is on the left of the machine box and has been installed with the dust-free net. It can be taken out from the back of the machine box for clearance or replacement.

1.5.3 Single-Board Frame

The single-board frame consists of single-board slot and backplane.

S9506 has 10 single-board slots and the space between every two slots is 40.6mm. Slot 5 and slot 6 can only be inserted with the LS95-MCU board. Slot 1 to 4 can be inserted with varied service boards simultaneously. The other four slots must be inserted with SFU switching boards.

S9510 has 14 single-board slots and the space between slots is 40.6mm. Slot 9 and slot 10 can only be inserted with the LS95-MCU board. Slot 1 to 8 can be inserted with varied service boards simultaneously. The other four slots can be inserted with SFU switching boards.

S9514 has 18 single-board slots and the space between slots is 40.6mm. Slot 13 and slot 14 can only be inserted with the LS95-MCU board. Slot 1 to 12 can be inserted with varied service boards simultaneously. The other four slots can be inserted with SFU switching boards.

The single boards of S9500 are horizontally inserted, which is 415mm in width, 370mm in depth and 40.2mm in height.

The backplane of S9500 realizes the hi-speed data link's interconnection between network board and interface card, or realizes the interconnection of the control signal. The backplane capacity of S9500 is 5.12Tbit/s.

a. Functions of the Backplane

- Interconnecting all types of signals between single boards and providing the communication channel

- The systematic backplane is a passive backplane.

- Supporting the insertion and dial-out of all types of single-boards when it is powered

- Supporting the master-slave exchange of the main control board

- Supporting automatic identification of each slot

- Realizing the distributive power supply

- The fan and the signal monitor line of the power are provided.

b. Explanation of Slot Number

As S9506 is fully configured, the single-board configuration in the single-board box is shown as follows:

- The two LS95-MCU boards are inserted into slot 5 and slot 6 respectively;

- Four single-boards are configured according to actual requirements which are inserted into slot 1 to slot 4 respectively.

The slot numbers of the single-board are listed from bottom to top as 1 to 6.

SFU is at the back. The slot number is 21 to 24 from left to right.

As S9510 is fully configured, the single-board configuration in the single-board box is shown as follows:

- Two LS95-MCU boards are backup boards of each other and they are inserted into slot 9 and slot 10 respectively.

- Eight single-boards are configured according to actual requirements which are inserted into slots 1 to 8 respectively.

- The slot number of the single-board is listed from bottom to top as 1 to 10.
- The SFU is at the back. The slot number is 21 to 24 from left to right.

- As S8510 is fully configured, the single-board configuration in the single-board box is shown as follows:

- Two LS95-MCU boards are backup boards of each other and they are inserted into slot 13 and slot 14 respectively.

- Twelve single-boards are configured according to actual requirements which are inserted into slots 1 to 12 respectively.

The slot number of the single-board is listed from bottom to top as 1 to 14. SFU is at the back. The slot number is from 21 to 24 from left to right.

1.5.4 Power Supply Distribution

S9500 supports two kinds of power supply modules.

a. DC power supply

If the DC power supply is adopted, the DC power supply must be -48V. The maximum output power of a single power supply is 1200W.

b. AC power supply

If the AC power supply is adopted, the input voltage should be 220V. The voltage of the input power is 220V±20% and 50Hz±10%. The max output power of the AC power module is 1200W.

S9500 provides multiple power configuration resolutions which vary with different requirements: you can use one DC/AC power module, or two DC/AC power modules or one AC power module and one DC power module.

1.6 Ventilation and Cooling System

The working temperature of S9500 is 0℃ to 40℃. The temperature in the appearance of one device cannot be higher than the 50% to 80% of the highest temperature of the device itself. Meanwhile, the device should be reliable, secure and easy to maintain.

The device adopts the fan for air exhaust and mandatory convection, ensuring the device to run normally in the regulated conditions.

1.7 Introduction to S9500 Single Boards

S9500 has 6 types of single boards which are described as follows:
- Main control board (LS95-MCU): It is the centralized control center module of S9500, which is to conduct route management, control and management user access control and management, network operation and maintenance. It is adaptable to all models of S9500.

- Main control board (LS9506-SFU): It is the switching center module of S9500, which is mainly to conduct the switching function. It is applicable to S9506.
- Switching board (LS9514-SFU): It is the switching center module of S9500, which is mainly to conduct the switching function. It is applicable to S9514.
- 48-port gigabit BASE-T Interface Module (LS95-48GT-E): It provides with 48-port gigabit Base-T ports and supports 10/100/1000Mbps. It can realize the layer-2 switching and layer-3 routing function of the interface. It connects to the core layer or the access layer, which can realize interface or user QoS. TCAM supports up to 350MHz working frequency and its capacity of TCAM can expand to 36Mb.
- 48-port 10GE SFP+ interface module (LS95-48TE-SFP+): It provides with 48 10GE SFP+ ports. It supports SFP+ 10GE modules. It can realize the layer-2 switching and layer-3 routing function of the interface, port trunking. It can connect to the core layer or access layer, realizing port or user QoS.

1.7.1 Main Control Board (LS95-MCU)

1. Interface

The LS95-MCU board provides with three kinds of interfaces:

- The console serial interface: It is a serial interface for communication, using the RS-232 capacitance and the RJ45 connector. The console serial interface is used to connect the background terminal computer for systematic debugging, configuration, maintenance, management and software download.
- GEO port: a 1000M Ethernet port, adopting the RJ45 connector. The GEO port is used to connect the background computer for program downloading. The GEO port can also be used to connect the remote network manager workstation to realize the remote management.

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  When the remote device management is realized, you can select the standard network cable to connect to the HUB, then connect the HUB to the network management workstation on LAN; you can also connect the standard network cable to the switch and then to the network management workstation on the WAN.

- USB interface: It can be used for plugging into the USB.

2. Indicator

The LS95-MCU board provides with 23 LED indicators, the description of which is shown in the following table:

Table 1-1 Description of Indicators in LS95-MCU

Name	Description
FAN1ALM	If the red indicator is on, the alarm occurs in the first fan of the system.
	If the red indicator is off, the first fan of the system runs normally.

FAN1RUN	If the green indicator is on, the first fan of the system runs normally.
	If the green indicator is off, the alarm occurs in the first fan of the system or it does not work.
FAN2ALM	If the red indicator is on, the alarm occurs in the second fan of the system.
	If the red indicator is off, the second fan of the system runs normally.
FAN2RUN	If the green indicator is on, the second fan of the system runs normally. If the green indicator is off, the alarm occurs in the second fan of the system or it does not work.
FAN3ALM	If the red indicator is on, the alarm occurs in the third fan of the system.
	If the red indicator is off, the third fan of the system runs normally.
FAN3RUN	If the green indicator is on, the third fan of the system runs normally.
	If the green indicator is off, the alarm occurs in the second fan of the system or it does not work.
FAN4ALM	If the red indicator is on, the alarm occurs in the fourth fan of the system.
	If the red indicator is off, the fourth fan of the system runs normally.
FAN4RUN	If the green indicator is on, the fourth fan of the system runs normally.
	If the green indicator is off, the alarm occurs in the fourth fan of the system or it does not work.
FAN5ALM	If the red indicator is on, the alarm occurs in the fifth fan of the system.
	If the red indicator is off, the fifth fan of the system runs normally.
FAN5RUN	If the green indicator is on, the fifth fan of the system runs normally.
	If the green indicator is off, the alarm occurs in the fifth fan of the system or it does not work.
SFU1ALM	If the red indicator is on, the alarm occurs in the fifth fan of the system.
	If the red indicator is off, the fifth fan of the system runs normally.
SFU1RUN	If the green indicator is on, the first switching board of the system runs
	normally.
	If the green indicator is off, the alarm occurs in the first switching board of the system or it does not work.
SFU2ALM	If the red indicator is on, the alarm occurs in the second switching board of the system.
	If the red indicator is off, the second switching board of the system runs normally.
SFU2RUN	If the green indicator is on, the second switching board of the system runs normally.
	If the green indicator is off, the alarm occurs in the second switching board of the system or it does not work.
SFU3ALM	If the red indicator is on, the alarm occurs in the third switching board of the system or it does not work.
	If the red indicator is off, the third switching board of the system runs normally.

SFU3RUN	If the green indicator is on, the third switching board of the system runs normally. If the green indicator is off, the alarm occurs in the third switching board of the system or it does not work.
SFU4ALM	If the red indicator is on, the alarm occurs in the fourth switching board of the system. If the green indicator is off, the fourth switching board of the system runs normally.
SFU4RUN	If the green indicator is on, the fourth switching board of the system runs normally. If the green indicator is off, the alarm occurs in the fourth switching board of the system or it does not work.
SYSRUN	If the green indicator is on, the system runs normally. If the green indicator is off, the alarm occurs in the system.
SYSALM	If the red indicator is on, the alarm occurs in the system. If the red indicator is off, the system runs normally.
USE	If the green indicator is on, the MSU board runs normally. If the green indicator is off, you then can plug out the board.
LINK	If the green indicator is on, there is link established on the Ethernet port. If the green indicator is off, there is no link established on the Ethernet port.
ACT	If the green indicator flickers, there is data transmission on the Ethernet port.

Name	Description
RST	Reset button, Reset LS95-MCU single board
SWAP	Use for hot Swap. When use two LS95-MCU module; one operates at Maste status and the other operates at Slave status. Press the master MSU module SWAP button, the Slave MCU module turn to Master and the system will ligh the SWAP LED and turn Off the ACT LED, then the MCU module can be ho plugged out.

3. BUTTON Description

Table 1-2 Description of Buttons in the LS95-MCU Single Board
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1.7.2 9506 Switching Board (LS9506-SFU II)

The 9506 switching board (LS9506-SFU II) finishes all the data switching of the service line cards. Each switching board provides with 16 high-speed data channels and the highest rate of each data channel is up to 40Gbps.

Figure 1-4 9506 Switching Board (LS95-MCU II) a. Interface

- The interface of LS9506-SFU-II single board is not open for the client, but leave an Ethernet port and a serial port for debugging.
- It provides with one offline button for hot swap switching board.

2. Indicator

Table 1-3 Description of Indicators in the LS9506-SFU-II Single Board

Location	Name	Description
Upwards of the board	PWR	Power indicator. If the indicator is on, the board is normally powered. Otherwise, there is some fault.
	SYS	SYS operating indicator. If the indicator flickers, the system works normally. Otherwise, there is some fault.
	LNK/ACT	MG1 port indicator. If the indicator is on, the interface is linked up. If the indicator flickers, there is data transmission. If the indicator is off, the indicator is not linked.
	offline	Offline indicator. If the indicator is on, the board can be plugged out.

1.7.3 9510 Switching Board (LS9510-SFU II)

The 9510 switching board (LS9510-SFU II) finishes all the data switching of the service line cards. Each switching board provides with 32 high-speed data channels and the highest rate of each data channel is up to 40Gbps.

Figure 1-5 9510 Switching Board (LS9510-SFU II)

1，Interface
- The interface of LS9510-SFU-II single board is not open for the client, but leave an Ethernet port and a serial port for debugging.
- It provides with one offline button for hot swap switching board.

2，Indicator

Table 1-3 Description of indicators in the LS9510-SFU-II Single Board

Location	Name	Description
of the	PWR	Power indicator. If the indicator is on, the board is normally powered. Otherwise, there is some fault.
	SYS	SYS operating indicator. If the indicator flickers, the system works normally. Otherwise, there is some fault.

| Upwards board | LNK/ACT | MG1 port indicator. If the indicator is on, the interface is linked up. If the indicator flickers, there is data transmission. If the indicator is off, the indicator is not linked. |
| | Offline | Offline indicator. If the indicator is on, the board can be plugged out. |

1.7.4 9514 Switching Board (LS9514-SFU-II)

The 9514 switching board (LS9514-SFU II) finishes all the data switching of the service line cards.

Each switching board provides with 32 high-speed data channels and the highest rate of each data channel is up to 40Gbps. Of the slots, slot 5, 6, 7 and 8 have 4 high-speed channels respectively, which altogether supports 160Gbps data switching channel. Other slots including 1,2,3,4,9,10, 11 and 12 support 2 high-speed channels respectively, which altogether supports up to 80Gbps data channel.

Figure 1-6 9514 Switching Board (LS9514-SFU-II)

Location	Name	Description
Upwards of the board	PWR	Power indicator. If the indicator is on, the board is normally powered. Otherwise, there is some fault.
	SYS	SYS operating indicator. If the indicator flickers, the system works normally. Otherwise, there is some fault.
	LNK/ACT	MG1 port indicator. If the indicator is on, the interface is linked up. If the indicator flickers, there is data transmission. If the indicator is off, the indicator is not linked.
	Offline	Offline indicator. If the indicator is on, the board can be plugged out.

1，Interface

- The interface of LS9514-SFU-II single board is not open for the client, but leave an Ethernet port and a serial port for debugging.
- It provides with one offline button for hot swap switching board.

2，Indicator

Table 1-4 Description of Indicators in the LS9514-SFU-II Single Board

Location	Name	Description

Upwards of the board	PWR	Power indicator. If the indicator is on, the board is normally powered. Otherwise, there is some fault.
	SYS	SYS operating indicator. If the indicator flickers, the system works normally. Otherwise, there is some fault.
	LNK/ACT	MG1 port indicator. If the indicator is on, the interface is linked up. If the indicator flickers, there is data transmission. If the indicator is off, the indicator is not linked.
	Offline	Offline indicator. If the indicator is on, the board can be plugged out.

1.7.5 48-port Gigabit Base-T Interface Module (LS95-48GT-E)

The board performs Layer 2 & Layer 3 wire-speed switching, ports trunking, connecting core layer and access layer, enables port and user QoS.
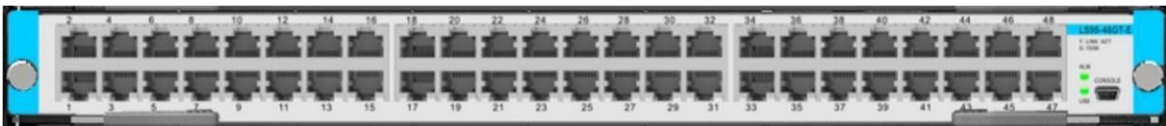
1. Interface
   - LS95-48GT-E single board provides with 48 gigabit Ethernet Base-T interfaces. The gigabit Base-T (10/100/100M) interface supports the RJ45 interface mode.
   - The interface of LS9506-SFU-II single board is not open for the client, but leave an Ethernet port and a serial port for debugging.

2. Indicator

Table 1-5 Description of Indicators in the LS95-48GT-E Single Board

Location	Name	Description
Upwards of RJ45 port	LINK／ACT	If the green indicator is on, the port has been appropriately connected with the device in the opposite terminal. The port is in "UP" state. If the green indicator is off, the port is in "DOWN" (non-working) state. If the green indicator flickers, there is data transmission in the port.

Location	Name	Description
Right Side of the board	ALM	If the indicator is on, the alarm occurs in the single board.

If the indicator is off, the board runs normally. |
| | USE | If the green indicator is on, the module runs normally.

If the green indicator is off, the module does not work. |

1.7.6 48-port 10GE SFP+ Interface Module (LS95-48TE-SFP+)

The board performs Layer 2 & Layer 3 wire-speed switching, ports trunking, connecting core layer and access layer, enables port and user QoS. It supports the bandwidth of 480Gbps.

3. Interface
- LS95-48TS single board provides with 48 10GE SFP+ interfaces and supports 10GE SFP+ modules.
- The interface of LS95-48TS single board is not open for the client, but leave an Ethernet port and a serial port for debugging.

4. Indicator

Table 1-6 Description of Indicators in the LS95-48TS Single Board

Location	Name	Description
Upwards SFP+ of interface	LINK／ACT	If the green indicator is on, the port has been appropriately connected with the device in the opposite terminal. The port is in "UP" state.

If the green indicator is off, the port is in "DOWN" (non-working) state.

If the green indicator flickers, there is data transmission in the port. |
| Right Side of the board | ALM | If the indicator is on, the alarm occurs in the single board.

If the indicator is off, the board runs normally. |

| | USE | If the green indicator is on, the module runs normally. |
| | | If the green indicator is off, the module does not work. |

Chapter 2Installation Preparation

2.1Safety Advice

To prevent personnel and devices from harms, read safety advices in the manual before you install the TR S9500switch.

The following safety advices do not cover all potential dangers.

2.1.1 Safety Advices for System Installation

- Keep the hull clean and dustless.

- Do not put the device at the walking area.

- Do not wear loose clothes or other things that may be tumbled by the machine box during installation and maintenance.

- Before dismantling the hull, please shut down all powers and plug out all power supplys and cables.

2.1.2 Safety Advices for Removal

Because S9500 has a large volume and weighs heavy, please follow the following requirements during carrying S9500:

- Do not remove S9500 frequently, as the whole device of S9500 weighs about 80 to 160kg.

- At least two persons are needed if S9500 requires to be moved.

- When you move the device, watch your feet or your waist.

- Before moving the device, cut off all power supplies and plug out all cables.
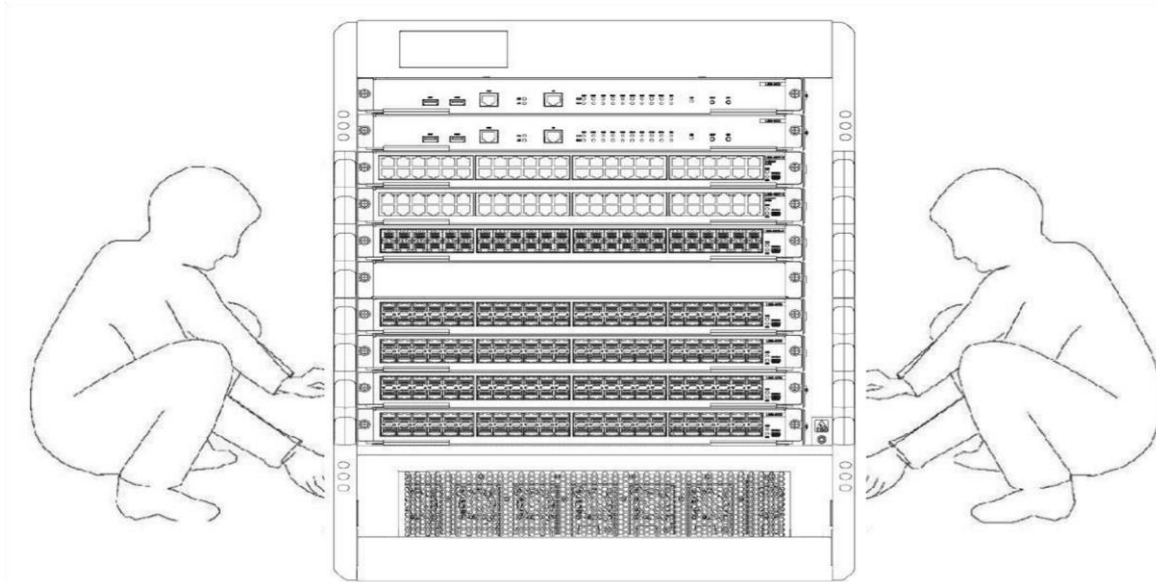
Figure 2-1 Moving S9500 Correctly

⚠️ **When moving the device, do not hold the board, power handle or ventilation hole.**

2.1.3 Electricity Security

- Check potential dangers in the working area, such as ungrounded power supply, unreliable power grounding and wet ground.

- Before installation, know the location of the emergency power switch indoors. If trouble occurs, cut off the power.

- Try to avoid to maintain the devices alone.

- When the power is cut off, check the devices carefully.

- Do not put the device in moist environment or let liquid substance into the hull.

- Follow instructions to connect the positive/negative line before the DC power is used.

2.1.4 Static Discharge Prevention

Although many measures are taken on S9500 for preventing the static, the static still has bad effect on the circuits and devices when the static reaches a certain volume.

The following are the main resources of the static when S9500 connects the communication network:

- Outside electric fields like outdoor hi-voltage wire and thunder

- Inside systems such as the floor materials and the architecture of machines

📝 **To prevent the static's damage, do as follows:**

- The device and the floor is well grounded.

- Prevent the dust indoors.

- Keep proper humidity.

- Wear the static-free armguard before you touches the circuit board.

Do as follows when the board is replaced or installed:

- Before installing all kinds of parts, especially the circuit board, wear the static-free armguard.

- When you have to hold the circuit board, hold its edges. Forbid to touch the elements and the printing circuit.

- Prevent clothes from touching the circuit board. The static-free armguard can only prevent the static in the body from damaging the   circuit board, while   it   cannot prevent the   static in   the clothes.

2.1.5 Laser Security

- When the optical-fiber transceiver works, you should make sure that the port connects the optical-fiber cable and that the port is stuffed by the anti-dust lid.

- Do not look the laser interface in the eye.

2.2Requirements for Location Place

TR S9500switch must be installed indoors. To secure its normal running and expand its lifespan, the following requirements for the installation place must be satisfied:

2.2.1 Requirements for Stand Installation

To install S9500 in a stand, make sure that the machine box meets the following requirements:

- Try to install it in an open stand. If it is installed in a closed stand, make sure that the ventilation of the stand is good.

- Make sure that the stand is strong enough to support S9500 and its accessories.

- Make sure that the size of the machine box is proper so that there is certain space for heat cooling after S9500 is installed.

- The machine box is well grounded.

2.2.2 Ventilation Requirements

The ventilation of the device must guarantee space reservation at the ventilation hole, as shown in figure 2-2, enabling the cooling system to works normally. After all types of cables are connected, you should bind them together to prevent them from stuffing the ventilation hole.

Notes:

No plugging the module slot must be fitted with fake handle bar, to ensure that the equipment cooling air duct smooth.

air-out
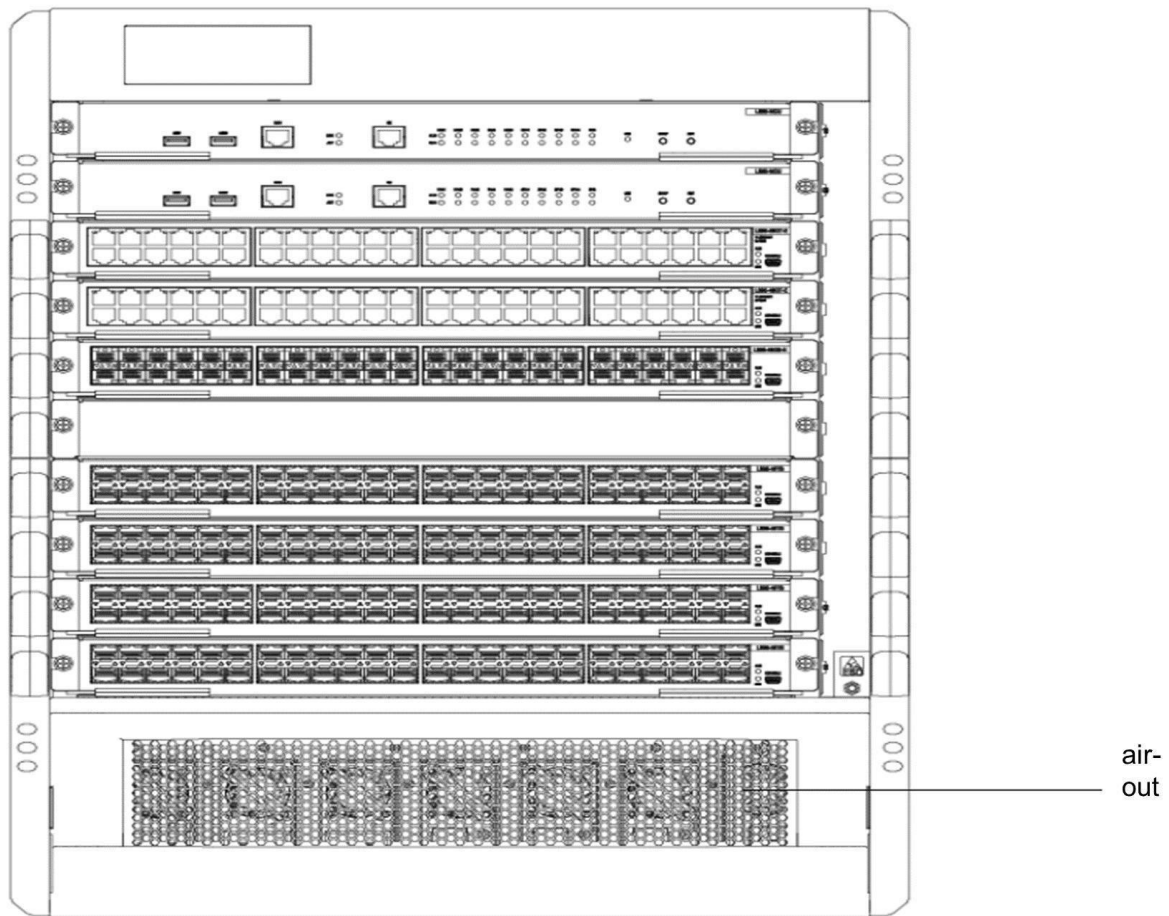
2.2.3 Temperature and Humidity

air-in

air-out

air-in
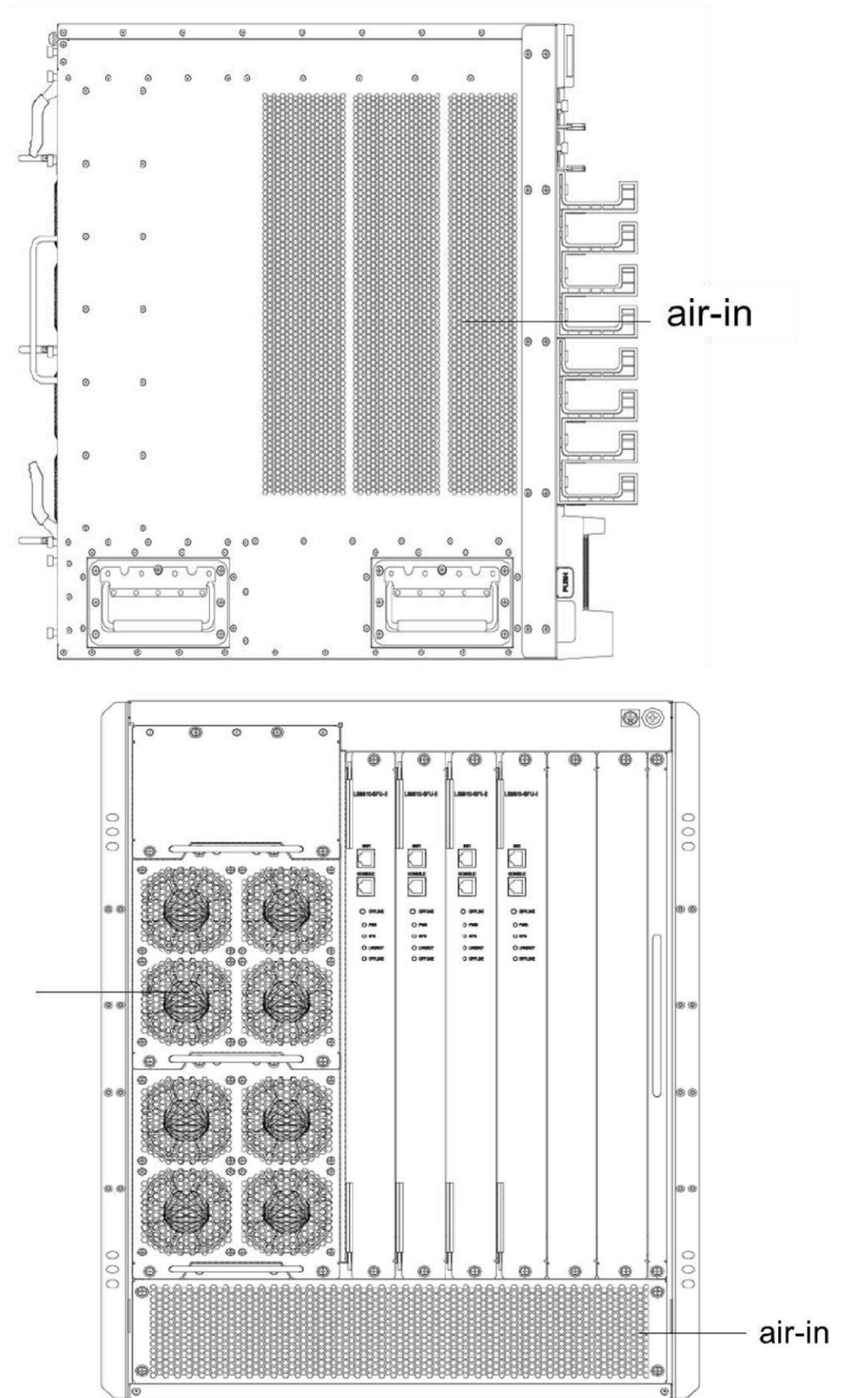
Figure 2-2   Ventilation mode of S9500

To guarantee the normal function and lifespan of TR S9500switch, you should maintain a certain temperature and humidity in the machine room.

If the temperature and humidity in the machine room is unsuitable for a long time, the device may get damaged.

- In a relatively high humid environment, the insulation material may not insulate well, or even have current leakage. In some cases, the mechanic performance of the material and mental parts' erosion may occur.

- In a relatively low humid environment, the insulation slice may be dried, shrink and easily generate static; hence, the circuits on the device may get damaged.

- The higher the temperature, the greater the danger is. The reliability of the switch, hence, will greatly affected and the aging process of the switch will be greatly accelerated.

The switch's requirements for temperature and humidity are shown in table 2-1:

Table 2-1 TR S9500switch's requirements for temperature and humidity

Temperature		Relative Humidity	
Long-term working condition	Short-term working condition	Long-term working condition	Short-term working condition
15ºC-30ºC	0ºC-40ºC	40%-65%	10%-90%

Notes

- The measurement should be taken at 1.5m high and 0.4m ahead of the front template when the bracket has no shield panes.

- The short-term function means that the switch cannot continuously run over 48 hours or 15 days discontinuously each year.

- The extremely bad working environment means the temperature and humidity when trouble occurs in the air-conditioning system. The switch may restore to its working condition if it exposed in the extreme environment is no more than 5 hours.

2.2.4 Cleanness Requirements

Dust is a danger for device's function. If there are lots of dusts in the switch's hull, the static may be absorbed and therefore the metal pointer may not be well touched, especially when the indoor humidity is relatively high. The dust volume and particle diameter in the machine room are shown in table 2-2.

Table 2-2 Dust volume and particle diameter in the machine room

Maximum diameter (μm)	0.5	1	3	5
Maximum thickness (particle/m3)	1.4 x 10	7 x 10	2.4 x 10	1.3 x 10

Besides the dust, the device has severe demands for the salt/acid/sulfide percentage in the air. These vicious substances will accelerate metal's erosion and the aging process of some parts. Hence, vicious gases (SO_2, H_2S, NO_2, and CL_2) must be prevented from entering the computer room. The details about the maximum vicious gas percentage in the air are shown in table 2-3.

Table 2-3 Average/maximum vicious gas ratio in the air

Gas	Average ratio (mg/m)	Average ratio (mg/m)
SO2	0.2	1.5
H2s	0.006	0.03
NO2	0.04	0.15
NH3	0.05	0.15
CL2	0.01	0.3

2.2.5 Power Requirements

- When S9500 adopts the AC power, the following conditions must be met: Input AC voltage: 220V±20%,50Hz±10%

- When S9500 adopts the DC power, the following conditions must be met: Voltage for input DC current: DC-48 V

The device provides the function of power supply backup. You are suggested to adopt the multi-path power supply so as to guarantee the continuous running of the device, preventing sudden power shutdown.

2.3 Grounding Requirements for the System

The nice grounding system is a solid base for TR S9500switch to function reliably, and a prima premise for thunder attack prevention and anti-jamming. Please carefully check the grounding conditions of the installation site according to the requirements of grounding regulations, and get the grounding well done according to actual situation.

2.3.1 Safe Grounding

The AC-adopted device must be grounded through the yellow-green grounding line, or the electric shock may occur when the insulation resistance between power supply and hull gets small.

2.3.2 Thunder Grounding

The anti-thunder system is an independent system among facilities, consisting of the lightning rod, the underground conductor and the connector for the grounding system. The grounding system is used together with the grounding device for the yellow-green safety grounding line. The lightning discharge grounding is just for facilities, not for devices.

2.3.3 Electromagnetic-Compatible Grounding

The groundings which are oriented for electromagnetic compatibility include the shielded grounding, filter grounding, noise/interruption limitation and level reference. The grounding resistance must be less than 1Ω.

The hull of TR S9500switch has one grounding columns reserved. See figure 2-3.
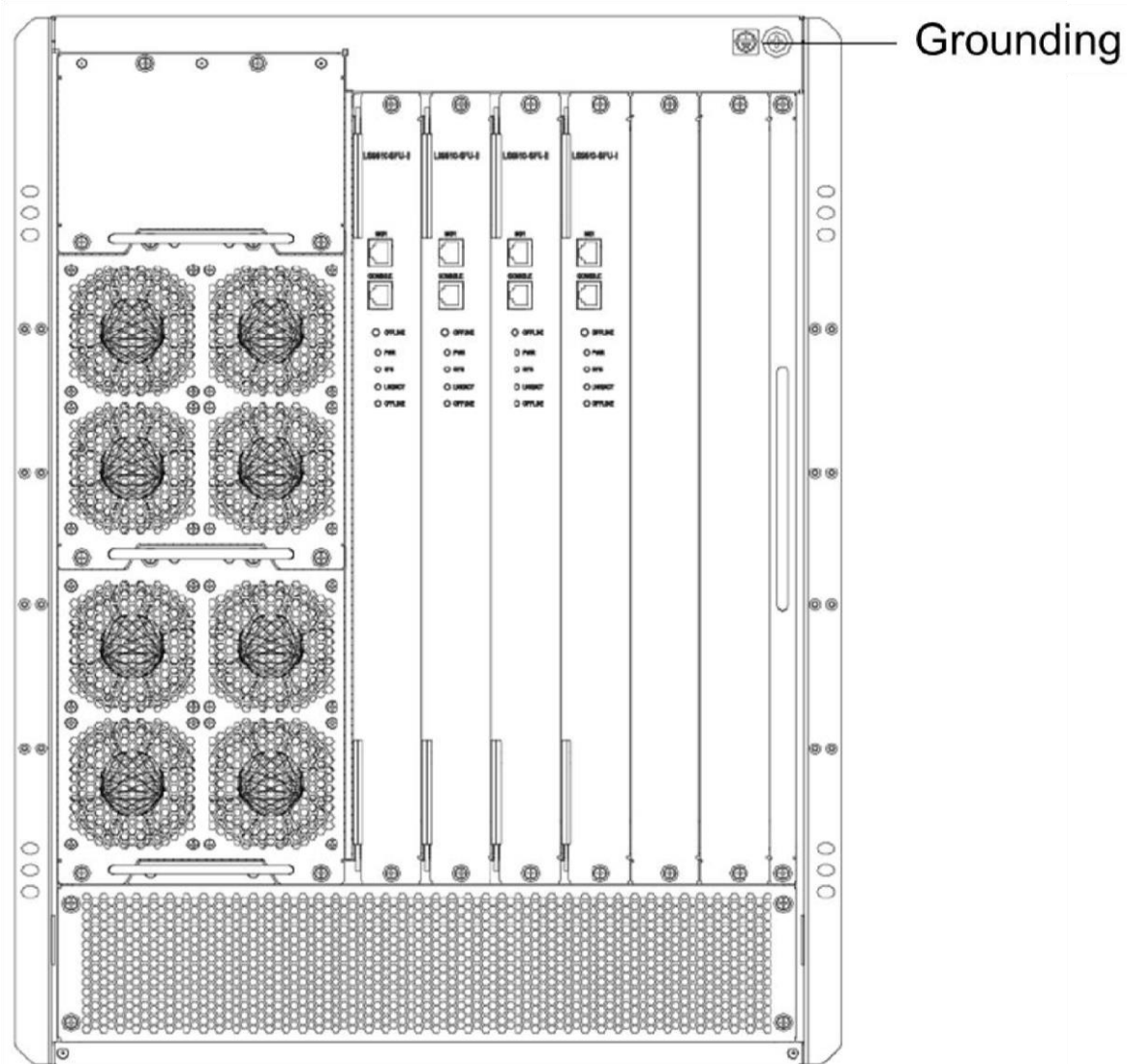
Figure 2-3 Grounding column of S9500

The system connection is to guarantee the normal running of all devices. Please read the following before you connect all devices in the system.

2.3.4 EMI Precautions

All kinds of interference sources, no matter they are from the devices, the outside of the application system or the inner system, have effect on the devices through different conduction modes such as capacitance coupling, inductance coupling and electromagnetic wave radiation.

The electromagnetic interference is classified into two types: radiation interference and conduction interference, which is decided by the type of the diffuseness path.

The process that an energy ejected by a device (it is always the radio energy) reaches a sensor through space is called the radiation interference. The interference source can be a part of the disturbed system, or be a unit which is wholly isolated from electrical devices. The reason why the conduction interference generates is that the interference source connects the sensor through the electromagnetic line or the signal cable and the interference is conducted from one unit to another. The conduction interference always affects the power system of the device. Thus, the wave filter is required to stop the conduction interference from affecting the power system. The radiation interference can affect any signal path in the device, while the way to shield the radiation interference is difficult.

- **Effective measures must be taken to prevent the grid from disturbing the power supply system.**
- **You'd better not put the grounding device of electrical equipment and the anti-thunder device on the ground where the switch lies. Try to keep a long distance between grounding/anti-thunder device and switch.**
- **Keep far away from the powerful wireless emission station, radar emission station or hi-frequency electric device.**
- **The static-shielding method must be taken.**

2.3.5 Precautions for Optical Fiber Connection

Before connecting the optical fiber, make clear that the type of the optical connector and the type of the optical fiber comply with the adopted optical interface's type.

2.4 Installation Tools

Table 2-4 Tools and Apparatus

Regular tools	Crossing screwdriver, screwdriver, spanner (10~12), relate cable and optical cable, bolts, welder, pincer, enlacement strip
Specific tools	Static-proof tools

d

Apparatus	multimeter

 S9500 has no accessory toolkit and users need prepare for these tools.

2.5 Requirements for Unpacking & Goods Examination

The switches are delivered according to the order contract, so the buyer has to unpack and check the switches according to the order contract.

2.4.1 Goods Custom Clearance

a. Package box for device and machine box

- Check whether all kinds of templates of the device are installed and debugged or not.
- Check whether the power supply module of the device is the required AC/DC module.
- Check the power line and the grounding line of the device.
- Configure the cable and optical cable.
- Check the random documents.

● Check the packing list.

b. Package box for the panel

It contains the backup panel of S9500.

Notes **The example above is a normal case for goods clearance. The actual goods clearance may differ. In this case, follow the requirements of the contract. Please check your goods according to the packing list and the order contract. If having problem, please contact the dealer.**

c. Checking the shipping container

The package method of the shipping container is shown in Figure 2-4. After the shipping container is opened, check as follows:

● Check whether the shipping container has the required shock-free foam.

● Check whether the paper box in the shipping container is fine and whether the sealing is good.
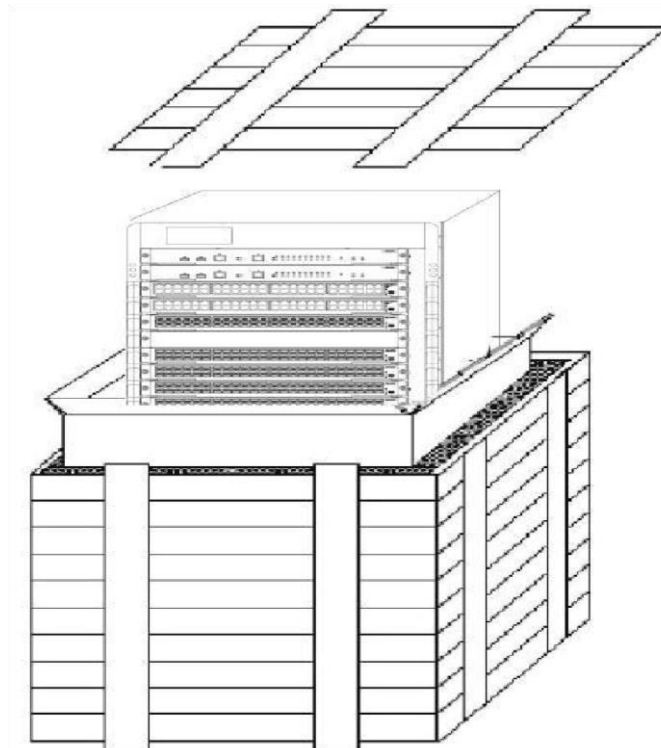
Figure 2-4   Package method for the shipping container

2.4.2 Recording the On-Site Log

After all containers are checked, put labels on the shipping containers and make corresponding records.

Each device must be prepared with an on-site log that should contain the following information: production date, debugging record, software/hardware version number, production line number.

Note:

1) When you plug or plug out the power line, keep the power line horizontal with the power socket.

2) When the lifetime of our products ends, handle them according to national laws and regulations, or send these products to our company for collective processing.

Chapter 3Installation of S9500

● **Before installing S9500, read this chapter and Chapter 2 first.**

● **Requirements described in Chapter 2 have been met.**

3.1Installation Procedures

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          ┌─────────────────────────────────┐
          │   Preparation before Installation │
          └─────────────────────────────────┘
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          ┌─────────────────────────────────┐
          │  Installing the Switch's Machine Box │
          └─────────────────────────────────┘
                          │
                          ▼
          ┌─────────────────────────────────┐
          │    Installing S9500 on the Cabinet  │
          └─────────────────────────────────┘
                          │
                          ▼
          ┌─────────────────────────────────┐
          │ Connecting the System and the Ground │
          └─────────────────────────────────┘
                          │
                          ▼
                    ◇ Connecting the AC/DC
                      Power Supply ◇
            ┌───────────────────┴───────────────────┐
   ┌──────────────────────────┐          ┌──────────────────────────┐
   │ Connecting the AC Power Supply │     │ Connecting the DC Power Supply │
   └──────────────────────────┘          └──────────────────────────┘
                          │
                          ▼
          ┌─────────────────────────────────┐
          │  Plugging into the Main Control Board │
          └─────────────────────────────────┘
                          │
                          ▼
          ┌─────────────────────────────────┐
          │   Plugging into the Switching Board │
          └─────────────────────────────────┘
                          │
                          ▼
          ┌─────────────────────────────────┐
          │    Plugging Into The Service Board  │
          └─────────────────────────────────┘
                          │
                          ▼
          ┌─────────────────────────────────┐
          │      Connecting the Cables of the   │
          │         Outside Interface           │
          └─────────────────────────────────┘
                          │
                          ▼
          ┌─────────────────────────────────┐
          │          Packing the Cable          │
          └─────────────────────────────────┘
                          │
                          ▼
          ┌─────────────────────────────────┐
          │      Checking After Installation    │
          └─────────────────────────────────┘
                          │
                          ▼
          ┌─────────────────────────────────┐
          │        Finish the  Installation     │
          └─────────────────────────────────┘
```

3.2Preparation before Installation

Before installing TSR S9500, you must have ideas in mind, ideas about the location site, networking mode, power supply and lining.

Do as follows before installing S9500:

● Make a reserved place for ventilation.

- Check whether the power supply and the air flow at the installation site are prepared according to corresponding requirements.

- Check whether the cables are prepared well for the power supply and relative network.

- Decide whether to select the AC power or the DC power and check whether the rated power can be obtained.

3.3 Installing the Switch's Machine box

3.3.1 Precautions

Note the following things when you install the cabinet:

- All bolts to fix the cabinet to the ground is well installed. You need wrench the bolt according to the order from bottom to top: flat pad, spring pad and nut.

- The cabinet is stable after installed.

- The cabinet should be vertical with the ground after installed.

- The cabinets installed in the machine room should be on a line. The error should be less than 5mm.

- The front door and the rear door of the cabinet should be convenient for opening or closing. The lock is fine and the keys are prepared.

- There are no redundant and abnormal labels in the cabinet or on each board.

- The fake handle should be installed well.

- The screws for fixing each device in the cabinet should be firm, complete and matched with the type of the bolt.

- Each board should be firmly installed and the screws to fix the templates are firmly wrenched.

- All cord outlets at the bottom or top of the cabinet need be installed with the rat prevention net. The diameter of the left leak cannot be more than 1.5cm, preventing rats or other little animals to enter the cabinet.

- The static-free armguard must be installed in the cabinet.

3.3.2 Installation Procedures

1) Make a layout for space before installing the cabinet. Reserve much room for the front and rear doors of the cabinets for maintenance and operation.
2) Install the 19-inch machine box on the designated location according to the layout and then fix it well.

3) Install corresponding cable troughs and connection lines.

4) Install corresponding salvers and the wire-start layer.

3.4 Installing S9500 on the Cabinet

3.4.1 Precautions

Before installing S9500 on the cabinet, check whether the front and rear fixing brackets of the cabinet is properly located. If the fixing brackets are not in a proper location, the front template of the device may be too close to the front door. The front door of the cabinet may not be closed after the network cable is plugged. Make sure of a distance of 10mm between the front door and the front template after S9500 is installed.

Additionally, the following things need be checked before installation:

The cabinet is well fixed and each module in the machine box has been installed. There is no barrier in the machine box or beside the machine box affecting the installation. The to-be-installed device is prepared well and moved to a place near the cabinet for easy removal.

3.4.2 Installation Procedures

1) Two people horizontally hold the edges of S9500 and slowly carry it before the machine box.

2) Two people move S9500 horizontally to a position slightly higher than the tray of the cabinet or the slide way and then insert it to the cabinet.

3) Install the fixed bolts to fix S9500 to the inside of the cabinet.

3.5 Connecting the System and the Ground

There is Protection Ground (PGND) on the back of S9500. First, you connect PGND and the grounding column of the cabinet and then connect the grounding column and the grounding bar of the machine room.

3.5.1 Precautions

- The side size of the grounding line can be calculated through the passed maximum current load. The fine conductor and conduction line should be used.

- The unshielded conduction lines are forbidden to use.
- The grounding resistance value should be less than 1Ω.

3.5.2 Grounding Procedures

1) Loose the six-angle screw on the rear grounding column.

2) Lock the terminal of the grounding line to the grounding column.

3) Wrench the six-angle screw with the spanner.

4) Connect the corresponding terminals through the previous steps according to the connection map.

3.5.3 Connecting the DC Power Supply to the Power Supply Module

According to identifiers and location requirements on the template of the power supply module, connect the corresponding DC power line. For details, see figure 3-2.

3.5.4 Precautions

- Before connecting the power supply, check whether the provided outside power supply matches up with the power supply module installed in S9500.
- Check whether the switch of the power supply module is in shutdown state or not before connecting the power line.
- Connect the power line and the wire post according to the same color.
- Make sure that the connected power line is well conducted.

3.5.5 Connection Procedures

1) Lock the power line to the corresponding post according to identifiers and then wrench the bolt.

2) Connect the other end of the power line to the corresponding socket or connector.

3.6 Connecting the AC Power Supply to the Power Supply Module

3.6.1 Precautions

- Before connecting the power supply, check whether the provided outside power supply matches up with the power supply module installed in S9500.
- Check whether the switch of the power supply module is in shutdown state or not before connecting the power line.
- Connect the power line and the wire post according to the same color.
- Make sure that the connected power line is well conducted.

3.6.2 Connection Procedures

1) Directly insert the plug of the power line into the power supply module.
2) Connect the other end of the power line to the corresponding socket or connector.

3.7 Connecting the Cable of the Main Control Board

3.7.1 Connection Procedures

1) Connect the RJ45 end of the Ethernet cable to the Ethernet interface of the LS95MCU board and then connect the other end of the Ethernet cable to the network manager device or the terminal control device.

2) Connect the RJ45 end of the RS-232 serial cable to the RS-232 serial interface of the LS95-MCU board and then connect the other end of the Ethernet cable to the network management device or the terminal control device.

3.8 Removing the Single Board Away from S9500

3.8.1 Procedures for Removing the Single Board

1) Plug out all optical fibers and cables from the template.

2) Loose the two bolts on the template.

3) Plug out the insertion board. See figure 3-1.
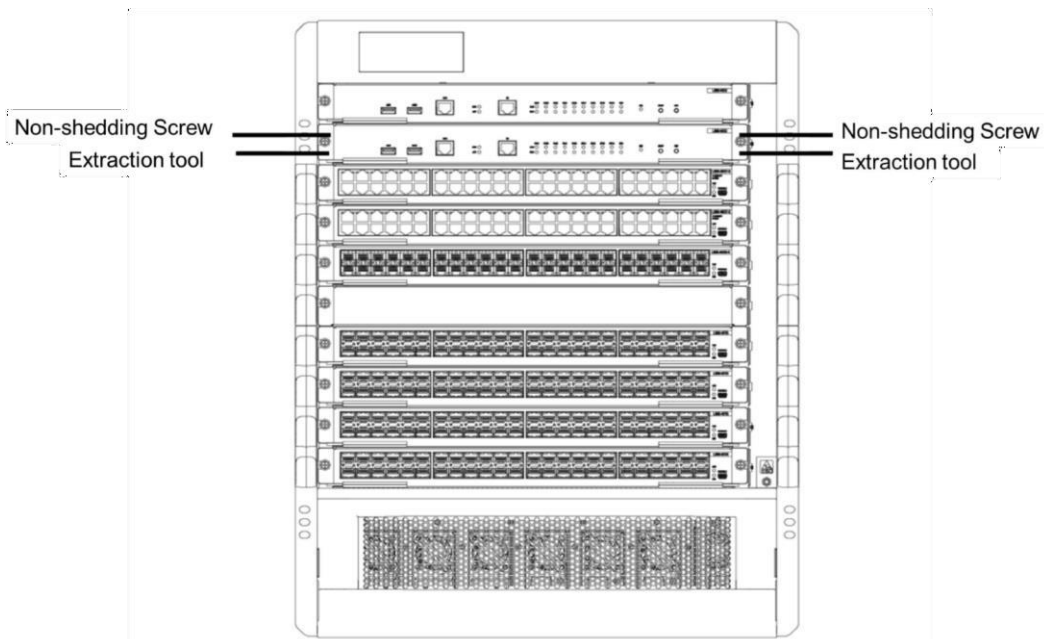
Figure 3-1 Components at the edge of the board

Notes

- **When you conduct the previous procedures, please wear the static-free armguard and shut down the corresponding power first.**
- **Do not hold the edges of PCB or collide components of PCB.**

3.9 Reinstalling a Board on S9500

3.9.1 Procedures for Reinstalling a Board

1) Remove the card of the corresponding part according to actual requirements.

2) Replace with the corresponding card and put it into the right slide way.

3) Wrench the corresponding two screws after the card is pushed to the right position.

Notes

- **Do not hold the edges of PCB or collide components of PCB.**
- **Use the corresponding tools when inserting or dialing out the PCB module. Here the harsh operation is forbidden.**

3.10 Connecting the Cables of the Outside Interface

3.10.1 Precautions

- Tell the single-mode or multi-mode optical fiber from the interface.
- Prevent the connector from being abruptly curved.

3.10.2 Connection Procedures

Connect the RJ45 end of the Ethernet cable to the Ethernet interface of the device board and then connect the other end of the Ethernet cable to the network manager device or the terminal control device.

Connect the RJ45 end of the serial cable to the serial interface of the device board and then connect the other end of the Ethernet cable to the network manager device or the terminal control device.

According to the identifiers on the template, insert the single-mode or multi-mode optical fiber into the corresponding interface.

3.11 Packing the Cable

3.11.1 Precautions

- The power lines and the cables should be bound orderly and tidily.
- When packing the optical fiber, prevent the connector of the optical fiber from being curved.
- Do not pack optical fibers and cables too tightly to shorten their lifespan or weaken the transmission ability.

3.11.2 Packing Procedures

1) Pack the drooped parts of optical fibers and cables and lead them to the two sides of the machine box conveniently.

2) On the two sides of the machine box, fix optical fibers and cables to the wire slots.

3) When packing the power lines, pack them tightly to the bottom of the machine box and keep them in a line.

3.12 Checking After Installation

3.12.1 Checking the Cabinet

- Check whether outside power supply matches up with the switchboard of the cabinet.

- After the switch is installed, check whether the front/reel cabinet doors can be closed.

  - Make sure that the cabinet is so fixed that it cannot be removed or fall down.

- Make sure that the switch has been installed and fixed well in the cabinet and that all cables are also fixed on the cabinet.

3.12.2 Checking Cable Connection

- Make sure that the optical-fiber cable and the cable match the ports.

- Check whether the cables are bound correctly.

3.12.3 Checking the Power Supply

- Check whether the power line is well touched and complies with the security requirements.

- Make sure that the power supply module is wrenched tightly through two bolt

- Open the switch of the power supply and check whether the power module works normally.

Chapter 4 Common Installation Trouble Shooting

4.1 General Procedures for Trouble Shooting during Installation

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┌─────────────────────────────────────────────────┐
│  The switch cannot work normally after          │
│  installation.                                   │
└─────────────────────────────────────────────────┘
                         │
                         ▼
┌─────────────────────────────────────────────────┐
│ Check whether installation of the machine box is right │
│ or not.                                          │
└─────────────────────────────────────────────────┘
                         │
                         ▼
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│ Check whether the parts is installed on the machine │
│ box.                                             │
└─────────────────────────────────────────────────┘
                         │
                         ▼
┌─────────────────────────────────────────────────┐
│ Check whether the power connection is right or not. │
└─────────────────────────────────────────────────┘
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                         ▼
┌─────────────────────────────────────────────────┐
│ Check whether the power module installation is right │
│ or not.                                          │
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                         │
                         ▼
┌─────────────────────────────────────────────────┐
│ Check whether the single board and backplane plug │
│ is loose or not.                                 │
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                         ▼
┌─────────────────────────────────────────────────┐
│ Check whether the single board is installed well or │
│ fixed tightly.                                   │
└─────────────────────────────────────────────────┘
                         │
                         ▼
┌─────────────────────────────────────────────────┐
│ Check whether the indicator of the main control  │
│ board works well.                                │
└─────────────────────────────────────────────────┘
                         │
                         ▼
┌─────────────────────────────────────────────────┐
│ Check whether the connection of the serial port line │
│ is correct.                                      │
└─────────────────────────────────────────────────┘
                         │
                         ▼
┌─────────────────────────────────────────────────┐
│ Check whether the parameters of the serial port  │
│ terminal is correct.                             │
└─────────────────────────────────────────────────┘
                         │
                         ▼
┌─────────────────────────────────────────────────┐
│ Check whether the version of the hardware and    │
│ software is correct.                             │
└─────────────────────────────────────────────────┘
                         │
                         ▼
        ╭─────────────────────────────────────────╮
        │ Connect with BDCOM to make sure whether there is │
        │ hardware failure.                        │
        ╰─────────────────────────────────────────╯
```

4.2 Trouble Shooting in Hardware Installation

4.2.1 Trouble Shooting in the Power Supply Module

Trouble 1: The AC power module cannot be powered.

【Trouble Description】
The PWR indicator of each board is not on. The green indicator of the power module is off. The fan cannot run.

【Trouble Shooting Method】

First, push all switches of the power supply module to the OFF state. Second, check whether the lines in the cabinet are correctly connected. Then check whether the lines in the cabinet are correctly connected. If necessary, plug out the power supply module to check whether the plugins of the power system are loosen.

Trouble 2: The DC power module cannot be powered.

【Trouble Description】

The PWR indicator of each board is not on. The green indicator of the power module is off. The fan cannot run.

【Trouble Shooting Method】

First, push all switches of the power supply module to the OFF state. Second, check whether the lines in the cabinet are correctly connected. Then, check whether the lines in the cabinet are correctly connected. If necessary, plug out the power supply module to check whether the plugins of the power system are loosen.

4.2.2 Board Installation Troubles

Trouble 1: The indicator is abnormal after the board is powered.

【Trouble Description】

The SYS indicator is always off, while the SWAP indicator is always on. The LINK indicator of the board is always on though the network cables or the optical fibers are not inserted into it.

【Trouble Shooting Method】

Check whether the board is inserted tightly. If the board is not inserted tightly, reinstall the board, insert it tightly and then wrench fixed screws tightly. If the board cannot run after it is inserted tightly, check whether the plug-in on the slot-corresponding backplane is loosen. If the plug-in is loosen, you can put the board on other slots for re-test. If the trouble is not related with the slot and the installation itself, return the board to its manufacturer for repair.

Trouble 2: The indicator is abnormal after the board runs a certain period of time. 【Trouble Description】

The SYS indicator is always off, while the SWAP indicator is always on. The LINK indicator of the board is always on though the network cables or the optical fibers are not inserted into it. The trouble still exists after rebooting.

【Trouble Shooting Method】

Check whether the board is loosen. If the board is not inserted tightly, reinstall the board, insert it tightly and then wrench fixed screws tightly. If the board cannot run after it is inserted tightly, check whether the plug-in on the slot-corresponding backplane is loosen and whether the slide track of this slot is deformed. If the plug-in is loosen, you can put the board on other slots for re-test. If the trouble is not related with the slot and the installation itself, return the board to its manufacturer for repair.

Chapter 5 Appendix

5.1 Identifier, Package, Transmission and Storage of S9500

5.1.1 Identifier of S9500

- Product identifier: S9500

5.1.2 Identifiers on the Outside Package

- Product identifier: S9500

- Name of manufacturer: Shanghai TSR

- Production origin: Made in China

- Package identifier: comply with GB191-1990 *Icons and Identifiers of Package & Storage*.

- Delivery No.

5.1.3 Production Origin

Shanghai, China

5.1.4 Product Type Network

products

5.1.5 Package

Note: The glossaries must comply with related regulations in *Electronic Product Protection, Package and Package Level* (SJ/Z3216-1989).

5.1.6 Basic Package Requirements

The package must comply with the regulations described in GB3873-1983 *General Technical Conditions for Communications Product Package*.

5.1.7 Package Materials

The inner package material of the device is plastic bag. At the two sides of the package box are EPE cascading foam plastics. The outside package material is corrugated paper box. Outside of the paper box, the wood box is used to strengthen the package. The EPE cascading foam plastics is used between the wood box and the paper box to prevent shocks. See figure 5-1.
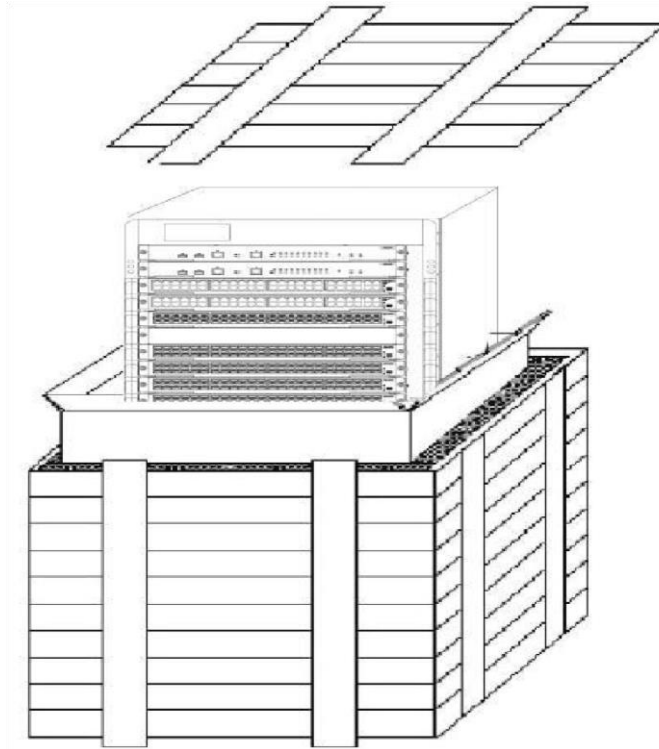
Figure 5-1 Device packaging

5.1.8 Shipping

- The products can be shipped by transportation tools such as the ship, the plane or the automobile.

- The canopy is used to prevent rains during transportation.

- Load or unload the products gently.

5.1.9 Storage

- Storage field: Warehouse

- Storage conditions

Temperature: -25℃~55℃ Humidity: 40%~90%

The air in the warehouse cannot contain caustic gases.

● Storage requirements

The outside package boxes can be piled with three layers.

● Storage period

The products can be stored for three years, while the stored products need be checked every two quarters.

5.2 Tools for Opening and Closing the Package Box

● Tools for opening the package box

Pries and knife

● Tools for loading the package box

Knife, transparent glue, nail, hammer, packing strap, packer

5.3 Others

5.3.1 Accessory Files

Table 5-1 Accessory files

File Name	Content of the File
Product for users documents	*S9500 Command Manual*, *S9500 Configuration Manual* and *S9500 Installation Manual*.
Certificates	The delivery date, the signature or seal of the checker (it can be presented by the number ID of the checker)

| Maintenance card | The product's maintenance card includes the following content:

1. Maintenance conditions and maintenance period for free maintenance

2. Maintenance period (It is calculated by month or by year according to the conditions of the product. It also synchronizes with the maintenance period of the maintenance office)
3. Maintenance regulations for those products that cannot be taken to the maintenance office
4. Charge maintenance regulations for those |

| | products that exceed the maintenance conditions and the

maintenance period

5. A list of product service centers and

maintenance offices

6. Maintenance record (maintenance date, maintenance content and maintenance result)
7. No. of the maintenance card and information registration |

5.3.2 Accessory Cables

Control cables and power lines are packaged with the plastics bag.

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