Content

Chapter 1 Product Introduction

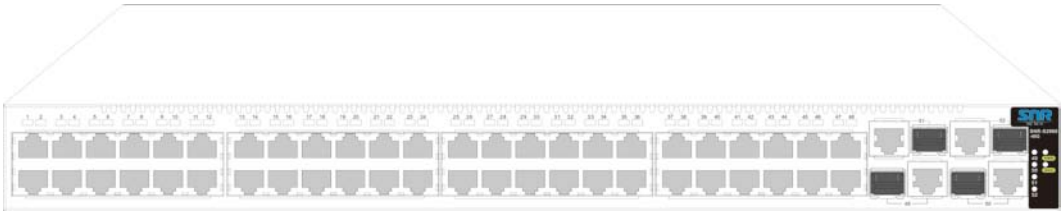

Fig 1-1 SNR-S2960-48G Switch

1.1 Overview

The SNR-S2960-48G of Intelligent Stackable Secure Ethernet Access Switch not only can be utilized in large-scale enterprise networks, campus networks and metropolitan area networks as access equipment, but also can meet the demand of medium-scale office networks. This switch has unique network access functions and flexible management of network, including MAC binding/filtering, limiting the number of Mac addresses, IEEE802.1Q VLAN, PVLAN, IEEE802.1x access authentication, QoS, ACL, bandwidth control, IEEE802.3ad TRUNK, IGMP Snooping, broadcast storm suppression, IEEE802.1d/w spanning tree, port mirroring and so on.

1.2 Product Features

✧ **MAC Address Control**

Besides the standard dynamic learning of MAC address, the SNR-S2960-48G of Intelligent Stackable Secure Ethernet Access Switch also supports several MAC managing methods based on the MAC address list. For secure access, the MAC address binding function can restrict the MAC addresses of access devices connected to a port. The MAC address filtering function can block the invalid access devices by filtering source and destination MAC addresses.

✧ **VLAN Configuration**

The SNR-S2960-48G switch supports standard IEEE802.1Q VLAN, port-protect VLAN and PVLAN. IEEE802.1 Q VLAN can divide ports into as many as 4094 VLAN groups. It can also realize multi-switch VLAN division via IEEE802.1 Q VLAN tags, and thus manage to control broadcast traffic, guarantee the security and performance of the network at the same time. PVLAN function can divide ports into isolated ports and community ports, in order to isolate or connect them as network applications demand.

✧ **QoS**

SNR-S2960-48G switch fully supports QoS policy, by providing 4 precedence queues on each port and by supporting WRR/SP scheduling. This switch also supports port security, by sorting its traffic according to port, VLAN, DSCP, IP precedence and ACL table. Besides, it can modify packets' DSCP and IP precedence and specify different bandwidths for voice/data/video to customize different service qualities.

✧ **ACL**

SNR-S2960-48G switch supports the complete ACL policy. ACL is a mechanism realized by switches to filter IP data. By allowing or denying specific data packets entering/leaving the network, a switch can control the network access and effectively guarantee the secure operation of network. SNR-S2960-48G supports IP-based, MAC-based and MAC-IP-based ingress filtering, it can also filter data based on the information of source/destination IP addresses, source/destination MAC addresses, IP protocol type, TCP/UDP port, IP precedence, time range and ToS, etc.

✧ **IEEE802.1x Access Authentication**

The SNR-S2960-48G switch supports both port-based IEEE802.1x authentication mode and MAC-based authentication mode. It can set the upper limit of authenticated access users per port, realize dynamic secure authentication mode based on MAC address, and bind the MAC address of an authenticated device to a port. By combining these IEEE802.1x authentication modes with the authentication and cost-counting products, we can supply a whole set of integrated IEEE802.1x access authentication and cost-counting resolution to satisfy the need of access, authentication and cost-counting, ensuring the network's security and maintaining its operation.

✧ **Bandwidth Control (Port Speed Limit)**

The SNR-S2960-48G switch can control the upstream/downstream bandwidth and provide different access bandwidth for users at different levels. Each port can set its own bandwidth rate according to the access networks' requirements for controlling access bandwidth.

✧ **TRUNK**

The SNR-S2960-48G supports IEEE802.3ad standard TRUNK and can realize link redundancy and traffic load balancing.

✧ **IGMP Snooping**

The SNR-S2960-48G switch supports multicast applications based on the IGMP Snooping mechanism, and thus realizes all kinds of multicast services, decreases the network traffic and meets the requirements of multicast services like multimedia playing, remote teaching and entertainment.

✧ **Multicast VLAN**

The SNR-S2960-48G of Secure Routing Access Switch adds ports of the switch into

a multicast VLAN by configuring the multicast VLAN. With the IGMP Snooping enabled, users of different VLANs can use a same multicast VLAN, which restricts the multicast flow within only one multicast VLAN, and thus save the bandwidth effectively.

✧ **Broadcast Storm Suppression**

The SNR-S2960-48G switch supports broadcast storm suppression, and thus can effectively control broadcast storm, decrease useless occupancy of the bandwidth, and increase the overall network performance.

✧ **Spanning tree**

The SNR-S2960-48G switch supports IEEE802.1d spanning tree, IEEE802.1w rapid spanning tree and IEEE802.1s spanning tree. Spanning tree can effectively avoid loop, and at the same time, create a redundant backup for the link.

✧ **Port Mirroring**

The SNR-S2960-48G supports port mirroring, which can mirror the inbound/outbound traffic of one or more ports to another one, in order to detect related data information. This function can be used to debug network faults and monitor the network traffic.

✧ **DHCP Server, Client**

The SNR-S2960-48G switch supports DHCP server, which can dynamically allocate IP addresses for equipments, and bind MAC with IP by designating a specified IP for a specified MAC.

✧ **RADIUS**

The SNR-S2960-48G switch supports RADIUS (Remote Authentication Dial in User Service). RADIUS allows users to authenticate identity via IEEE802.1x protocol.

✧ **Complete Network Management**

The SNR-S2960-48G switch supports out-of-band and in-band management via Console, Telnet, Web and SNMP. The Console and Telnet management supports standard CLI (Command Line Interface), which makes the operation easier and faster, it also provide bilingual instructions in Chinese and English. Web management provides a remote browsing graphic management interface, making management more direct and convenient, while enabling immediate check of working state and real-time configuration management. SNMP management is in accordance with V1, V2C and V3 standard versions, supporting Ether-Like MIB, Bridge MIB and MIB II, as well as standard management information libraries, such as RMON 1/2/3/9 MIB and etc. The SNR-S2960-48G also supports SSH protocol to maximally ensure the safety of configuration management. Besides, it provides a unique function to manage and set the IP of workstations, enabling the switch to automatically filter invalid remote network management access, and thus guaranteeing the efficiency, security and consistency of remote network management access.

1.3 Physical Characteristics

- Console port

Serial Console port

- AC Power

100~240VAC, 50~60Hz

Embedded General Power

- Power Consumption

30W

- Operating Temperature

0°C~50°C

- Storage Temperature

-40°C~70°C

- Relative Humidity

10%~90%, non-condensing

- Size

Wide × High × Deep 440mm×44mm×229mm

- Weight

3.0kg

- Mean Time Between Failure

Minimal MTBF: 80,000 Hours

1.4 Product Appearance

1.4.1 Front Panel

The following figure demonstrates the front panel of the SNR-S2960-48G switch:

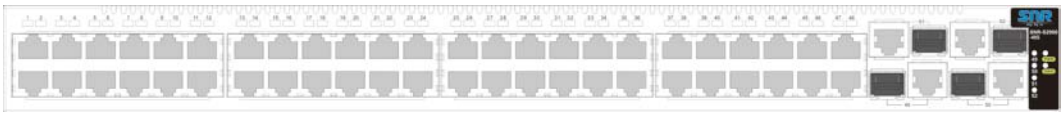

Fig 1-2 The Front Panel of the SNR-S2960-48G switch

1.4.2 Back Panel

The following figure demonstrates the back panel of the SNR-S2960-48G switch:

Fig 1-3 The Back Panel of the SNR-S2960-48G switch

1.4.3 LED Indicator Lamps

The LED indicator lamps of the SNR-S2960-48G switch include: PWR, DIAG, Link/Act.

The 100M port Link/ACT indicator lamp over its corresponding port and 1000M port Link/ACT indicator lamp on the right of its corresponding port.

Chapter 2 Device Installation

2.1 Installation Notice

To ensure your security and the normal operation of SNR-S2960-48G, please carefully read the following instructions and notices while installing and using the SNR-S2960-48G of Intelligent Stackable Secure Ethernet Access Switch:

2.1.1 Installation Environment

- A clean environment is necessary for normal operation of the switch. No dust is allowed, or, the switch may be damaged by electrostatic adherence.
- The switch requires a non-condensing environment with a temperature between 0 to 50 °C and a humidity between 10% to 90%,
- The switch must be kept in a dry and cool place with sufficient space around it for air circulation.
- The switch requires a power input ranging from 100 to 240 VAC (50 ~ 60Hz).
- Make sure that the switch is safely grounded, in order to avoid electrostatic damage to the device and potential dangers to people.
- Avoid direct sunlight, and keep the switch away from heat sources and strong electromagnetic interference sources.
- The switch must be stably mounted to a standard 19” rack or placed on a desktop.

2.1.1.1 Cleanliness of the Installation Environment

Dust is harmful to the safe operation of the switch, which may lead to poor contact of metal connectors or contacts caused by electrostatic adherence, especially under low relative humidity. Such electrostatic adherence may reduce the product lifespan and increase the chance of operation failures. The recommended values of dust content and particle diameter of the switch’s working environment are listed below:

Table 2-1 Recommended Working Environment (Dust Content and Particle Diameter)

Max Diameter（μm）	0.5	1	3	5
Max Diameter （particles /m^3）	1.4×10^5	7×10^5	2.4×10^5	1.3×10^5

Other than dust, the content of salt, acid and sulfide in the air should also be

restricted to meet the requirements of switch's working environment, since such harmful gases will aggravate metal corrosion and the aging of some parts. The working environment should be free of harmful gases, like SO_2, H_2S, NO_2, NH_3 and Cl_2, and etc. The table below demonstrates the recommended threshold of those gases:

Table 2-2 Recommended Working Environment (Thresholds of Harmful Gases)

Gas	Average（mg/m^3）	Max（mg/m^3）
SO_2	0.2	1.5
H_2S	0.006	0.03
NO_2	0.04	0.15
NH_3	0.05	0.15
Cl_2	0.01	0.3

2.1.1.2 Temperature and Humidity

For a good air circulation after the switch being installed, it is recommended to keep the switch rack in a room with a stable temperature and humidity. Please use an air-conditioner to cool it up in summer and a heating system in winter. Too high a relative humidity will harm the effect of insulation material, which may result in electric leakage. Sometimes it may also change the mechanical properties of some materials and cause metal corrosion. While in too low a relative humidity, the insulation spacer may contract, resulting in loosed fastening screws. Besides, working in too dry an environment will increase the danger of static electricity, threatening the switch circuits. If the environment temperature is too high, the reliability and lifespan of the switch will be affected, and the aging of insulation material will be accelerated. The recommended working temperature and humidity are listed in the following table:

Table 2-3 Recommended Working Environment (Temperature and Humidity)

Temperature	Relative Humidity
0～50℃	10～95%

Notice!

The working environment temperature and humidity of the switch should be measured at 1.5m above the floor and 0.4m in front of the rack, without front or back protective panel on the rack.

2.1.1.3 Power

The switch uses module switching power. The parameters of AC power are as below:

Input Voltage: 100-240VAC

Frequency: 50-60Hz

Total power consumption: ≤30W

Before powering on the switch, please make sure a proper grounding of the power supply system and the stability of the input power. Use a voltage adapter device if necessary. A fuse or a circuit-breaker no greater than 240 V, 10 A is required to prevent short circuits. A UPS is recommended to provide a more reliable power supply.

Warning!

An improper grounding of power supply system, dramatic electric fluctuations or pulses can result in abnormal operation and even hardware damage!

2.1.1.4 Preventing Static Electricity

Static electric may damage the switch circuits, or the entire device, to prevent which, please ensure a good grounding, keep the environment dust-free, and maintain a proper temperature and humidity. Operators should wear antistatic uniforms, straps, or gloves.

2.1.1.5 Anti-interference

All kinds of interference, no matter from the switch itself, or other devices, from the outside or the inside, will affect its operation in some forms, such as capacitive coupling, inductive coupling, electromagnetic radiation, common impedance (including the grounding system) and the conduction methods of cables/lines (power cables, signal lines, and output lines). To avoid them, please follow the instructions below:

- Measures to prevent power source interference are required for the power system.
- Provide an exclusive grounding system for the switch rather than sharing one with electronic equipment or lightning protection devices, and keep them as far away from each other as possible.
- Keep the switch away from high power radio transmitters, radar transmitters, and high frequency strong circuit devices.
- Use electromagnetic shielding if necessary.

2.1.1.6 Rack Configuration

The switch size fits the standard 19” rack. Pay attention to the following instructions to ensure a good ventilation and air circulation:

- All devices on the rack will generate heat during their operation, therefore vents and fans are required for an enclosed rack. Keep devices at a certain distance from each other to ensure a good ventilation and air circulation.
- For an open rack, make sure not to block the vents on both sides of the switch by

carefully checking the switch status after its installation.

Notice!

Put the switch on a stable and clean desktop as a substitute of a standard 19'' rack, leaving a space of 100mm around the switch for ventilation. And don't place anything on top of it.

2.1.2 Installation Instructions

- Read related chapters in this manual carefully or participate in concerning technology training before the installation. Make sure all materials, tools and other items required by the installation are prepared, as well as a proper site for installation and debugging.
- During the installation, it is required to use the brackets and screws provided in the accessory kit, and proper tools to ensure stability and reliability. Users should always wear antistatic uniforms and ESD wrist straps to prevent damaging the switch, and should only use and make standard cables and connecters. Be cautious to potential dangers during the installation, and make protective preparations to avoid accidents.
- Clean the site after the installation. Please ensure the switch is well grounded before powering it on. Users should also maintain the switch regularly to extend its lifespan.

2.1.3 Security Warnings

- Do not stare directly at the fiber port during operation to prevent eye damage caused by the laser transceiver in the SFP optical module of the switch,
- Do not attempt to conduct any operation which may cause physical injuries, accidents or damage the switch.
- Do not install, move or disclose the switch or its modules with power on, to prevent physical injuries and device damages.
- Do not open the switch without permission. Please resort to the manufacturer for help if any problem happens, to prevent physical injuries and device damages.
- No contact between metals and the working power is allowed, and do not drop metals into the switch, to prevent short-circuit and device damages.
- Do not touch the power plug and power socket, to prevent electric shock.
- Do not place the tinder near the switch, to prevent fire.
- Do not configure the switch alone in a dangerous situation, to prevent accidents.
- Use standard power sockets which have overload and leakage protection, to prevent

accidents.

- Check the circuits, installation and the working environment for potential dangers, and maintain them regularly, for the sake of security.
- Place the emergency power switch in the working site, so that the power can be cut off immediately if any accident happens.

Notice!

The potential dangers include: electric leakage in the power, the ignition of the power, broken electric cables or lines, bad grounding, electric overload, short-circuit and etc. In cases of accidents like electric shock, fire or short-circuit, please cut off the power immediately and call the police. Please help the victims after confirming the security of one's own and provide first aid according to their situations. Make sure to call professional medical organizations for help in time.

2.2 Preparations for Installation

Required Tools and Utilities:

- Cross screwdrivers
- Flat-blade screwdriver
- ESD wrist strap
- Antistatic uniform

Notice!

The tools above are not provided along with the switch.

2.3 Device Installation

2.3.1 Mount Switches onto a Rack

SNR-S2960-48G of Intelligent Stackable Secure Ethernet Access Switch can be mounted onto a standard 19'' rack. Please follow the steps below to install it:

Fig 2-1 SNR-S2960-48G Rack-mounting

1. Attach the brackets on both sides of the SNR-S2960-48G with screws provided in the accessory kit.
2. Put the bracket-mounted switch onto a standard 19” rack. Fasten it at a proper location with the screws provided, leaving enough space around the switch for good air circulation.

Notice!

The brackets are used to fix the switch on the rack rather than bearing its weight, so it is recommended to place a rack shelf under the switch. Do not place anything on top of the switch or block the vents, to prevent device damages and abnormal operation.

2.3.2 Console Cable Connection

SNR-S2960-48G of Intelligent Stackable Secure Ethernet Access Switch provides a DB9 asynchronous interface serial console port. The connection procedure is listed below:

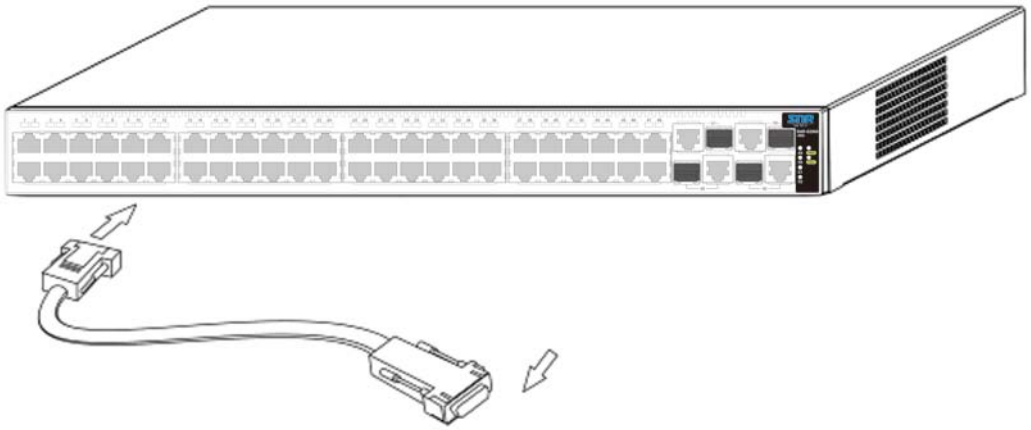

Fig 2-2 Connecting Console to SNR-S2960-48G

1. Attach the console cable provided in the accessory kit to console port of the switch.
2. Connect the other side of the console cable to a character terminal (PC).
3. After powering on the switch and the character terminal, configure the switch through the character terminal.

Notice!

Please use the console cable and the console commutator of the switch. Don't insert it to other ports or insert other cables in the Console port, to prevent damaging the cable and the port.

2.3.3 Power Cable Connection

The power of SNR-S2960-48G Switch is 100~240VAC, 50~60Hz, allowing a certain extent of voltage fluctuation. Please connect the power cable following the steps below:

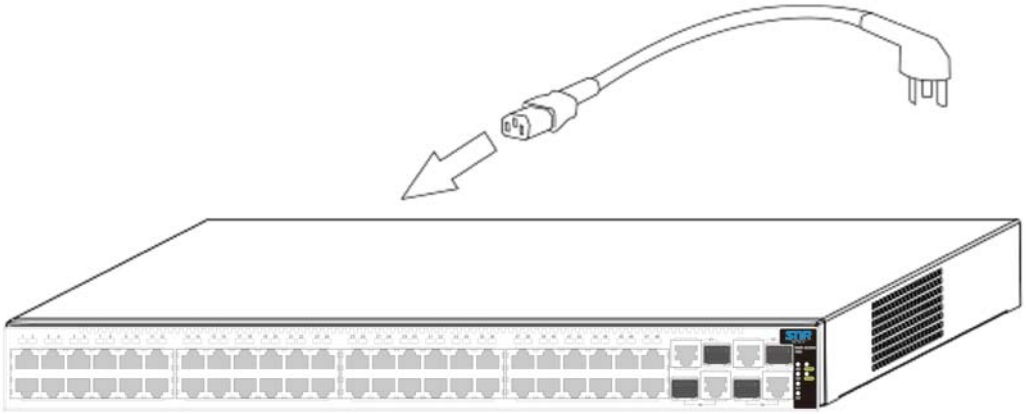

Fig 2-3 Attaching power cable to SNR-S2960-48G

1. Insert one end of the power cable provided in the accessory kit into the power socket in the back panel of the switch, and the other end to the power source socket with overload and leakage protection.
2. Check if the Power indicator lamp in the front panel of the switch is on. SNR-S2960-48G is self-adjustable according to the input voltage. As long as the input voltage is in the range printed on the switch back panel, the switch can operate normally without extra adjustment.
3. The switch will implement self-testing when powered on.

Notice!

The input voltage must be within the required range, otherwise the switch could be damaged or operate abnormally. If after being powered on, the Power indicator lamp is still off or the self-testing is incorrect, please contact your provider or the client-service center. Do not open the switch without permission, to prevent accidental loss or physical injury.