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ISCOM2100G Series Product Description (Rel_01)

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Notice

Preface

Objectives

This document describes product overview, networking applications, system structure, device installation, management and maintenance, and technical specifications of the ISCOM2100G series switch.

The appendix lists terms, acronyms, and abbreviations involved in this document.

Versions

The following table lists the product versions related to this document.

Product name	Hardware version	Software version
ISCOM2110GE-MA-PWR	B or later	REAP 1.2 or later
ISCOM2118GE-MA-PWR	A or later	REAP 1.2 or later
ISCOM2126G-PWR	A or later	REAP 1.2 or later
ISCOM2128GE-MA-PWR	A or later	REAP 1.2 or later
ISCOM2128G-PWR	C or later	REAP 1.2 or later
ISCOM2128G	A or later	REAP 1.2 or later

Conventions

Symbol conventions

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

Symbol	Description
	Indicates a hazard with a medium or low level of risk which, if not avoided, could result in minor or moderate injury.

Symbol	Description
	Indicates a potentially hazardous situation that, if not avoided, could cause equipment damage, data loss, and performance degradation, or unexpected results.
	Provides additional information to emphasize or supplement important points of the main text.
	Indicates a tip that may help you solve a problem or save time.

General conventions

Convention	Description
Times New Roman	Normal paragraphs are in Times New Roman.
Arial	Paragraphs in Warning, Caution, Notes, and Tip are in Arial.
Boldface	Names of files, directories, folders, and users are in **boldface**. For example, log in as user **root**.
Italic	Book titles are in *italics*.
`Lucida Console`	Terminal display is in `Lucida Console`.

Change history

Updates between document versions are cumulative. Therefore, the latest document version contains all updates made to previous versions.

Issue 03 (2013-12-23)

Third commercial release

- Added a new model ISCOM2128G
- Upgraded system software to REAP1.2
- Optimize the whole document according to new product documentation

Issue 02 (2013-05-31)

Second commercial release

- Added new models ISCOM2110GE-MA-PWR, ISCOM2118GE-MA-PWR, ISCOM2126G-PWR, and ISCOM2128G-PWR

Issue 01 (2012-12-14)

Initial commercial release

Contents

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1 Overview

This chapter is an overview of the ISCOM2100G series switch, including the following sections:

- Introduction
- Characters
- Features
- Ordering information

1.1 Introduction

As the Wireless Fidelity (WiFi) technology keeps growing, disadvantages, such as inadequate bandwidth, inconvenient roaming, limited network management, and weak system security, are emerging with the wireless standards IEEE 802.11b (up to 11 Mbit/s) and IEEE 802.11g (up to 54 Mbit/s).

The wireless standard IEEE 802.11n supports faster transmission rate and better transmission quality, which enables wireless access to change from 54 Mbit/s to 300 Mbit/s or even 600 Mbit/s. However, the power consumption for wireless Access Point (AP) changes from traditional several or dozen watts to two dozen watts. As a result, the 100 Mbit/s Power over Ethernet (PoE) access switch fails to meet network requirements, and accordingly the 1000 Mbit/s PoE switch which supports IEEE 802.3at can meet requirements on wireless APs.

The ISCOM2100G series switch is a Layer 2 full 1000 Mbit/s PoE Ethernet access switch independently developed by Raisecom. It supports IEEE 802.11n, provides solutions to high-power and high-rate wireless APs, and fits for constructing the Wireless Local Access Network (WLAN), enterprise wireless network, safety monitoring network, etc.

1.2 Characters

The ISCOM2100G series switch supports various services types, and provides rich characters, thus guaranteeing quality and efficiency of service transmission.

1.2.1 Reliable carrier-grade design

The ISCOM2100G series switch provides the following carrier-grade design:

- Support selective QinQ, which allows the carrier to flexibly manage client VLANs.
- Support IEEE 802.3ah Operation, Administration, and Maintenance (OAM), provide link-based fault diagnosis and performance management, and facilitate the carrier to diagnose network faults and monitor network performance.
- Support IEEE 802.3ag Operation, Administration, and Maintenance (OAM), provide device-based fault diagnosis and performance management, and facilitate the carrier to diagnose network faults and monitor network performance.
- Support Service Level Agreement (SLA), provide different bandwidth for users of different Quality of Service (QoS), and enable the carrier to provide differentiated services for key customers.
- Support carrier-grade Ethernet ring network protection, with a switching time less than 50ms, which has reached the carrier-grade standard.
- Support powerful Access Control List (ACL) features, provide access control based on interface, MAC address, VLAN, IP address, Layer 4 protocol, protocol port number, customized factor, and combination of these previous factors, and provide more choices for the carrier to make ACL rules.

1.2.2 Complete PoE features

The PoE models of the ISCOM2100G series switch support the following power supply modes:

- Supply power to all interfaces with 15.4 W power for each interface.
- Supply power to half or more interfaces with 30 W power for each interface.

The ISCOM2100G series switch supports the following PoE features:

- Support IEEE 802.3af and the latest IEEE 802.3at. The maximum power supply per interface increases from 15.4 W to 30 W, which supports high-power devices, such as IEEE 802.11n wireless APs and PTZ high-end cameras.
- Provide strong compatibility to power devices (PDs). It supports IEEE standard PDs, pre-standard PDs, and Cisco private protocol PDs, so it can utilize existing PDs thoroughly.
- Support PoE intelligent management, such as configuring interface power, configuring priority for device power, enabling/disabling interface power supply, power overloading protection, and querying PoE network management information. You can flexibly manage the PoE device with these features, query device status, allocate the power required for the device, and automatically adjust the power supplied to the device.
- Support energy saving and environment protection by adjusting interface power and configuring power supply period.
- Support no cabling for power cables, which not only saves costs on constructing power supply and maintaining the device, such as power cables, sockets, and tubes, but also saves time for installing power supply system.

1.2.3 Standard QoS features

As more and more network applications emerge, users propose different QoS requirements on these applications. In this case, the network is required to allocate and schedule resources for different network applications according to user requirements.

The QoS technology can guarantee real-time performance and completeness of key services upon network overloading or congestion, thus making the entire network run efficiently.

The ISCOM2100G series switch supports the following traffic management technologies:

- Priority trust
- Traffic classification
- Traffic policy
- Priority mapping
- Queue scheduling
- Congestion avoidance
- Rate limiting

1.2.4 Powerful multicast features

The ISCOM2100G series switch supports the following multicast features:

- Support Internet Group Message Protocol (IGMP) Snooping, guaranteeing reliable aggregation of new services, such as IPTV service.
- Provide rich multicast control elements and support policy control over multicast traffic.
- Support inter-VLAN Multicast VLAN Registration (MVR), avoiding geometrical increase of uplink bandwidth due to increase of downlink users.

1.2.5 Rich security guarantee

As the Internet technologies keep growing, network applications are widely used, and more and more enterprises seek opportunities through the Internet. How to guarantee security of private data and resources on an open network has drawn people's attention. In addition, unconscious but potentially hazard access to the device will deteriorate device performance or even fail the device. For this, the ISCOM2100G series switch provides the following security guarantee features:

- Support multiple access control and user authentication technologies, such as Access Control List (ACL), Remote Authentication Dial In User Service (RADIUS), and Terminal Access Controller Access Control System (TACACS+), thus effectively enhancing security of the network and the ISCOM2100G series switch.
- Provide interface protection within a VLAN, which guarantees data security and saves VLAN resources.
- Support selective QinQ. Selective QinQ can add outer VLAN Tag to packets according to the user's requirement, or add different outer Tags for different flows. It can encapsulate packets with different outer VLAN Tags according to different users, services, and priorities, thus supporting more flexible planning and deployment of the network.
- Provide unique loopback detection function, which guarantees no loops for users' access and stable operation of the entire network.
- Support Spanning Tree Protocol (STP), Rapid Spanning Tree Protocol (RSTP), and Multi-Spanning Tree Protocol (MSTP), which improves link backup and error tolerance, and guarantees stable operation of the network.

1.2.6 Convenient management and maintenance

The ISCOM2100G series switch supports the following management and maintenance modes:

- Support Raisecom intelligent network management platform OneTouch, provide batch configuring devices, automatic discovery of devices, network topology preplanning,

statistics and analysis of online and offline user rate on the network, provide a new management mode, simplify management process, and save operation and maintenance cost.

- Support local management, maintenance, and configuration through the Console interface.
- Support software upgrade through Trivial File Transfer Protocol (TFTP), File Transfer Protocol (FTP), Telnet, and Secure Shell (SSH).
- Support IEEE 802.1ag and IEEE 802.3ah Ethernet OAM features.
- Support Dynamic Host Configuration Protocol (DHCP) Client, through which the ISCOM2100G series switch can automatically obtain the IP address.

1.2.7 Overall lightning protection

The ISCOM2100G series switch can resist directness lightning and induction lightning. Its power interfaces and service interfaces meet IEC61000-4-5 10/700μs 6 kV lightning protection capability, which can reduce damage probability from lightning and be deployed where outdoor cables are used and lightning occurs frequently.

The ISCOM2100G series switch supports YD/T 993 enhanced-level interface and power lightning protection requirements.

The power interface meets the following lightning protection requirements:

- AC power interface: 6 kV in differential mode and 6 kV in common mode
- DC power interface: 1 kV in differential mode and 2 kV in common mode

The service interface meets the following lightning protection requirements:

- PoE interface: 6 kV in common mode
- Uplink GE interface: 6 kV in common mode
- Ethernet electrical interface: 1 kV in indoor common mode

The ISCOM2100G series switch functions normally where lightning occurs frequently. Device damage rate due to lightning is low, so the ISCOM2100G series switch reduces device damage rate due to natural factors and lowers maintenance cost.

1.2.8 Green and energy-saving design

The ISCOM2100G series switch is designed and produced in compliant with RoHS standard, thus implementing energy saving by powering off idle interfaces and adjusting interface power.

The ISCOM2100G series switch can dynamically adjust its fan according to heat conditions, and lower noise and power consumption, thus meeting requirements on energy-saving, emission reduction, and environmental protection.

1.3 Features

Table 1-1 lists features of the ISCOM2100G series switch.

Table 1-1 Features

Feature	Description
Basic features	• Accessing the device (RJ45 Console/Telnet/SSHv2) • CLI • Managing files (BootROM/system files/configuration files) • Load and upgrade (TFTP auto-loading, upgrade from BootRom, and upgrade from FTP/TFTP) • Time management • Managing interfaces • Basic information (device name, language mode, saving/deleting configurations, and restarting the device) • Task scheduling
Ethernet	• MAC address (32 ×1024 addresses) • Jumbo frame • Maximum frame length of 12 kBytes • VLAN (4094 VLANs) • User VLAN • QinQ • 1:1 VLAN mapping • Loopback detection • Interface protection • Port mirroring • L2CP
IP services	• ARP • Layer 3 interface • DHCP Client • DHCP Snooping • DHCP Option 82/DHCP Option 61
QoS	• Trust priority • Traffic classification (IP priority, DSCP priority, and CoS priority) and traffic policy (rate limiting based on traffic policy, re-direction, and re-marking) • Local priority mapping and queue scheduling (SP, WRR, DRR, SP+WRR, and SP+DRR) • Interface-based and VLAN-based rate limiting (the maximum rate limit is 10 Gbit/s, and the step is 8 kbit/s) • QoS enhancement
Security	• Secure MAC • ACL (400 rules) • RADIUS authentication • TACACS+ • IEEE 802.1x • PPPoE+ • Storm control
Reliability	• Link aggregation (4 LAGs) • Interface backup • ELPS (ITU-T G.8031) • ERPS (ITU-T G.8032) • Failover

Feature	Description
OAM	• EFM (IEEE 802.3ah) • CFM (IEEE 802.1ag/ITU-Y.1731) • SLA • Y.1564 • E-LMI • Service
System management	• SNMP • KeepAlive • RMON • LLDP • DDM • System log • Alarm management • Fan monitoring • Hardware monitoring • CPU monitoring • Caching CPU packets • Dual-system • Auto-Provisioning • Loopback • Ping and Traceroute • Performance statistics

Note

For details about features, see *ISCOM2100G Series Configuration Guide*.

1.4 Ordering information

1.4.1 Naming convention

Figure 1-1 shows the naming convention for the ISCOM2100G series switch.

Figure 1-1 Naming convention

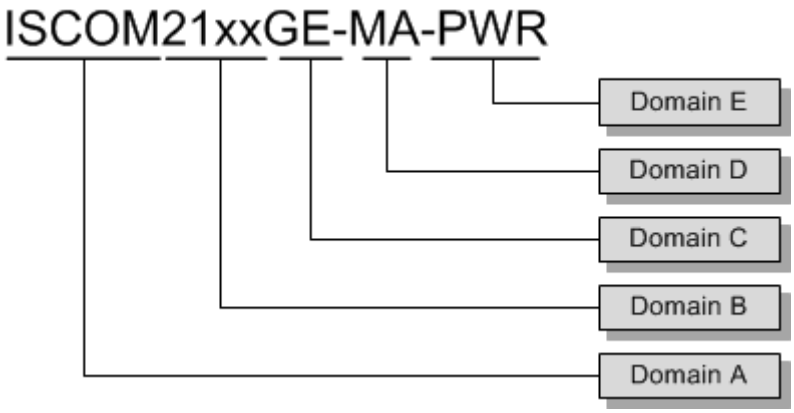


Table 1-2 describes naming convention for the ISCOM2100G series switch.

Table 1-2 Naming convention

Domain	Indication	Value	Description
A	Product ID	ISCOM	It is a Raisecom ISCOM series device.
B	Sub-type and number of interfaces	21xx	It is one of the 2100 series. For example, 2128 indicates that there are 28 interfaces.
C	Product attributes	G	It is a full 1000 Mbit/s device.
		E	It is an enhanced product.
D	MAN access	MA	MAN Ethernet access
E	Feature	PWR	It supports PoE.

1.4.2 Ordering information about device

Table 1-3 lists ordering information about the ISCOM2100G series switch.

Table 1-3 Ordering information about device

Model	Description
ISCOM2110GE-MA-PWR	220 VAC power supply • Downlink interface: eight 10/100/1000 Mbit/s Ethernet electrical interfaces. It supports IEEE 802.3af and IEEE 802.3at, non-standard PD, up to 8 interfaces with 30 W power on each interface, and up to 240 W PoE power. • Uplink interface: two 10/100/1000 Mbit/s Combo interfaces.
ISCOM2118GE-MA-PWR	220 VAC power supply • Downlink interface: sixteen 10/100/1000 Mbit/s Ethernet electrical interfaces. It supports IEEE 802.3af and IEEE 802.3at, non-standard PD, up to 16 interfaces with 15.4 W power on each interface or up to 12 interfaces with 30 W power on each interface, and up to 370 W PoE power. • Uplink interface: two 10/100/1000 Mbit/s Combo interfaces.
ISCOM2126G-PWR	220 VAC power supply • Downlink interface: twenty-four 10/100/1000 Mbit/s Ethernet electrical interfaces. It supports IEEE 802.3af and IEEE 802.3at, non-standard PD, up to 24 interfaces with 15.4 W power on each interface or up to 12 interfaces with 30 W power on each interface, and up to 370 W PoE power. • Uplink interface: two 10/100/1000 Mbit/s Combo interfaces.

Model	Description
ISCOM2128GE-MA-PWR	220 VAC power supply • Downlink interface: twenty-four 10/100/1000 Mbit/s Ethernet electrical interfaces. It supports IEEE 802.3af and IEEE 802.3at, non-standard PD, up to 24 interfaces with 15.4 W power on each interface or up to 12 interfaces with 30 W power on each interface, and up to 370 W PoE power. • Uplink interface: four 10/100/1000 Mbit/s Combo interfaces.
ISCOM2128G-PWR	220 VAC power supply • Downlink interface: twenty-four 10/100/1000 Mbit/s Ethernet electrical interfaces. It supports IEEE 802.3af and IEEE 802.3at, non-standard PD, up to 24 interfaces with 15.4 W power on each interface or up to 12 interfaces with 30 W power on each interface, and up to 370 W PoE power. • Uplink interface: four 10/100/1000 Mbit/s Combo interfaces.
ISCOM2128G-AC	220 VAC power supply • Downlink interface: twenty-four 10/100/1000 Mbit/s Ethernet electrical interfaces • Uplink interface: four 10/100/1000 Mbit/s Combo interfaces.
ISCOM2128G-DC	220 VAC power supply • Downlink interface: twenty-four 10/100/1000 Mbit/s Ethernet electrical interfaces • Uplink interface: four 10/100/1000 Mbit/s Combo interfaces.

1.4.3 Ordering inforamtion about auxiliary parts

The ISCOM2100G series switch can be equipped with the following auxiliary parts:

- 100 Mbit/s SFP optical module
- 1000 Mbit/s SFP optical module

100 Mbit/s SFP optical module

Table 1-4 lists ordering information about the 100 Mbit/s SFP optical module.

Table 1-4 Ordering information about 100 Mbit/s SFP optical module

Model	Description
USFP-03/M-D-R	• Transmission rate: 155 Mbit/s • Target transmission distance: 2 km • Tx wavelength: 1310 nm • Dual-fiber multi-mode SFP optical module
USFP-03/S1-D-R	• Transmission rate: 155 Mbit/s • Target transmission distance: 15 km • Tx wavelength: 1310 nm • Dual-fiber single-mode SFP optical module

Model	Description
USFP-03/S2-D-R	• Transmission rate: 155 Mbit/s • Target transmission distance: 40 km • Tx wavelength: 1310 nm • Dual-fiber single-mode SFP optical module
USFP-03/S3-D-R	• Transmission rate: 155 Mbit/s • Target transmission distance: 80 km • Tx wavelength: 1550 nm • Dual-fiber single-mode SFP optical module
USFP-03/SS13-D-R	• Transmission rate: 155 Mbit/s • Target transmission distance: 15 km • Tx wavelength: 1310 nm • Rx wavelength: 1550 nm • Single-fiber single-mode SFP optical module
USFP-03/SS15-D-R	• Transmission rate: 155 Mbit/s • Target transmission distance: 15 km • Tx wavelength: 1550 nm • Rx wavelength: 1310 nm • Single-fiber single-mode SFP optical module
USFP-03/SS23-D-R	• Transmission rate: 155 Mbit/s • Target transmission distance: 40 km • Tx wavelength: 1310 nm • Rx wavelength: 1550 nm • Single-fiber single-mode SFP optical module
USFP-03/SS25-D-R	• Transmission rate: 155 Mbit/s • Target transmission distance: 40 km • Tx wavelength: 1550 nm • Rx wavelength: 1310 nm • Single-fiber single-mode SFP optical module
USFP-03/SS34-D-R	• Transmission rate: 155 Mbit/s • Target transmission distance: 80 km • Tx wavelength: 1490 nm • Rx wavelength: 1550 nm • Single-fiber single-mode SFP optical module
USFP-03/SS35-D-R	• Transmission rate: 155 Mbit/s • Target transmission distance: 80 km • Tx wavelength: 1550 nm • Rx wavelength: 1490 nm • Single-fiber single-mode SFP optical module

1000 Mbit/s SFP optical module

Table 1-5 lists ordering information about the 1000 Mbit/s SFP optical module.

Table 1-5 Ordering information about 1000 Mbit/s SFP optical module

Model	Description
USFP-Gb/M-D-R	• Transmission rate: 1.25 Gbit/s • Target transmission distance: 550 m • Tx wavelength: 850 nm • Dual-fiber multi-mode SFP optical module

Model	Description
USFP-Gb/S1-D-R	• Transmission rate: 1.25 Gbit/s • Target transmission distance: 15 km • Tx wavelength: 1310 nm • Dual-fiber single-mode SFP optical module
USFP-Gb/S2-D-R	• Transmission rate: 1.25 Gbit/s • Target transmission distance: 40 km • Tx wavelength: 1550 nm • Dual-fiber single-mode SFP optical module
USFP-Gb/S3-D-R	• Transmission rate: 1.25 Gbit/s • Target transmission distance: 100 km • Tx wavelength: 1550 nm • Dual-fiber single-mode SFP optical module
USFP-Gb/LH1-D-R	• Transmission rate: 1.25 Gbit/s • Target transmission distance: 40 km • Tx wavelength: 1310 nm • Dual-fiber single-mode SFP optical module
USFP-Gb/ZX-D-R	• Transmission rate: 1.25 Gbit/s • Target transmission distance: 80 km • Tx wavelength: 1550 nm • Dual-fiber single-mode SFP optical module
USFP-Gb/EX-D-R	• Transmission rate: 1.25 Gbit/s • Target transmission distance: 120 km • Tx wavelength: 1550 nm • Dual-fiber single-mode SFP optical module
USFP-Gb/SS13-D-R	• Transmission rate: 1.25 Gbit/s • Target transmission distance: 15 km • Tx wavelength: 1310 nm • Rx wavelength: 1550 nm • Single-fiber single-mode SFP optical module
USFP-Gb/SS15-D-R	• Transmission rate: 1.25 Gbit/s • Target transmission distance: 15 km • Tx wavelength: 1550 nm • Rx wavelength: 1550 nm • Single-fiber single-mode SFP optical module
USFP-Gb/SS13-4	• Transmission rate: 1.25 Gbit/s • Target transmission distance: 15 km • Tx wavelength: 1310 nm • Rx wavelength: 1490 nm • Single-fiber single-mode SFP optical module
USFP-Gb/SS14-3	• Transmission rate: 1.25 Gbit/s • Target transmission distance: 15 km • Tx wavelength: 1490 nm • Rx wavelength: 1310 nm • Single-fiber single-mode SFP optical module
USFP-Gb/SS24-D-R	• Transmission rate: 1.25 Gbit/s • Target transmission distance: 40 km • Tx wavelength: 1490 nm • Rx wavelength: 1550 nm • Single-fiber single-mode SFP optical module

Model	Description
USFP-Gb/SS25-D-R	• Transmission rate: 1.25 Gbit/s • Target transmission distance: 40 km • Tx wavelength: 1550 nm • Rx wavelength: 1490 nm • Single-fiber single-mode SFP optical module
USFP-Gb/SS34-D-R	• Transmission rate: 1.25 Gbit/s • Target transmission distance: 80 km • Tx wavelength: 1490 nm • Rx wavelength: 1550 nm • Single-fiber single-mode SFP optical module
USFP-Gb/SS35-D-R	• Transmission rate: 1.25 Gbit/s • Target transmission distance: 80 km • Tx wavelength: 1550 nm • Rx wavelength: 1490 nm • Single-fiber single-mode SFP optical module

2 Networking applications

This chapter describes typical networking applications of the ISCOM2100G series switch, including the following sections:

- MAN access networking
- PoE networking applications

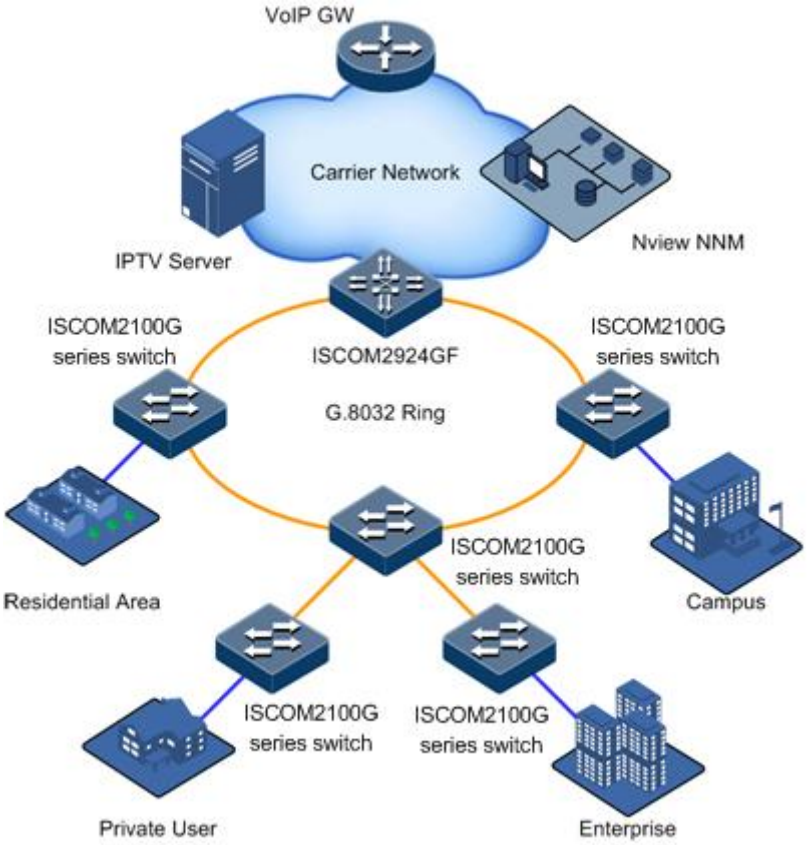
2.1 MAN access networking

As shown in Figure 2-1, the ISCOM2100G series switch provides 1000 Mbit/s uplink/downlink access service, works as a switch for building aggregation and low-density aggregation, and provides better network performance for users.

The networking application has the following advantages:

- The ISCOM2100G series switch supports loopback detection, prevents inner loops on the network, fits for campus network, enterprise network, and residential users, and provides building access to broadband residential area and small-scale network aggregation.
- The ISCOM2100G series switch and the ISCOM2924GF-4GE/4C can form a G.8032 ring network, thus guaranteeing reliable access for downlink users.
- The ISCOM2100G series switch has several models and rich interfaces, which facilitates you to choose.

Figure 2-1 MAN aggregation networking



2.2 PoE networking applications

The PoE models of the ISCOM2100G series switch supports the following networking applications:

- WLAN
- Enterprise wireless network
- Safety monitoring system

2.2.1 WLAN construction

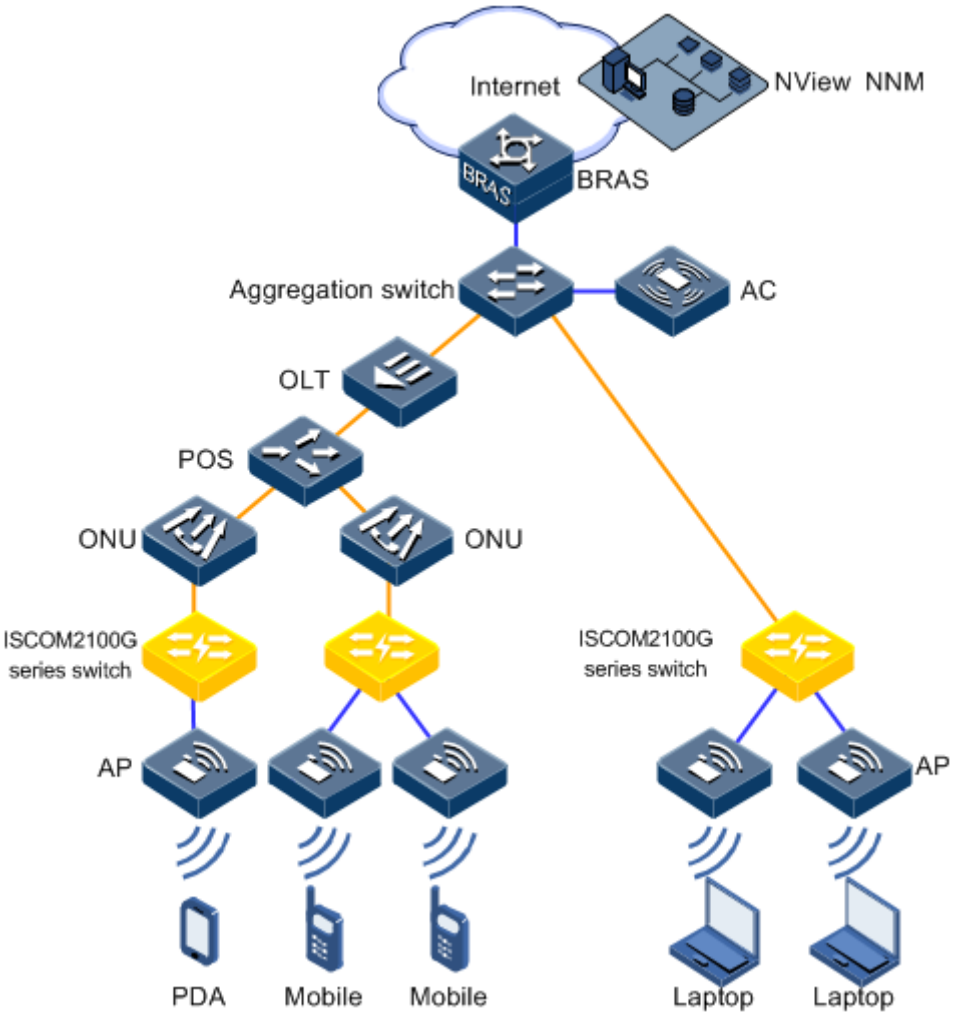
On a WLAN, wireless APs can be deployed in hot spots to implement wireless high-speed Internet access service for various users. As WLAN service grows, wireless broadband access is accelerated, load is balanced for data service on the 2G/3G network, and load for the 2G/3G access network is relieved.

The PoE models of the ISCOM2100G series switch, as a 1000 Mbit/s access switch, can supply power for wireless APs and other high-power PDs that support IEEE 802.11n, as shown in Figure 2-2.

The NView Network Node Management (NNM) system controls power supply on the interfaces on the PoE switch, controls power-off or restart of wireless APs, avoids maintenance personnel to powering off or restarting wireless APs over and over again, and

improves management efficiency. In addition, the NView NNM system can monitor and take statistics of traffic for wireless APs connected to the PoE switch.

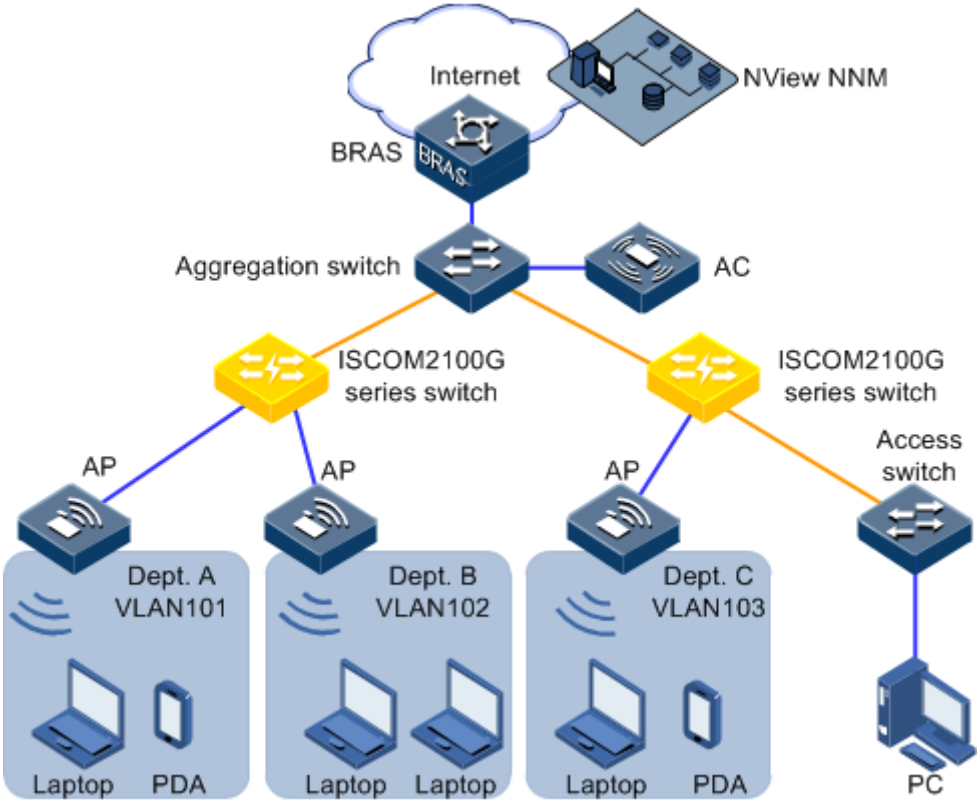
Figure 2-2 WLAN construction networking



2.2.2 Enterprise wireless network

The PoE model of the ISCOM2100G series switch is applicable for the enterprise wireless network, as shown in Figure 2-3. Each ISCOM2100G series switch is connected downlink to a department (an AP for each department). These departments are separated by VLANs. If they have to access each other, they use ISCOM2100G series switches for inter-VLAN routing, and thus implementing forwarding data between different VLANs.

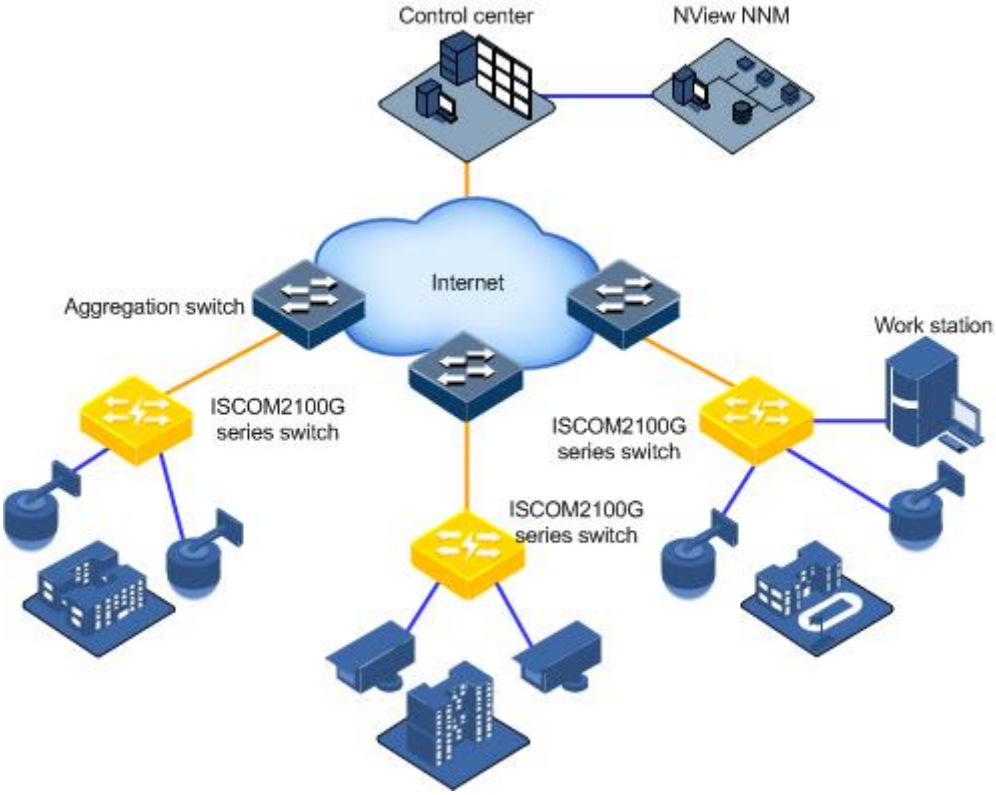
Figure 2-3 Enterprise wireless network networking



2.2.3 Safety monitoring system

As the economy keeps growing, safety monitoring technology plays a vital role in maintaining social safety and protecting personnel and property safety. More and more monitoring devices are deployed in public occasions such as residential areas, schools, and enterprises. However, cameras are usually installed where the power cable is difficult to install, such as corners, wayside, and doorway. Thus supplying power over Ethernet for monitoring devices not only saves cabling and maintenance cost, but also reduces workload.

Figure 2-4 Safety monitoring system



The PoE models of the ISCOM2100G series switch supports the following features:

- High power: the PoE models support IEEE 802.3at and IEEE 802.3af. Each interface supports up to 30 W output power, thus supporting high-power APs.
- High bandwidth: the PoE models provide 1000 Mbit/s Ethernet electrical interfaces, which meets broadband requirements of IEEE 802.11n.
- Manageable feature: APs can be freely powered on where the Ethernet cable is reachable. The network administrator can manage and control power supply for APs through the PoE switch.
- Low cost: powering on APs over the Ethernet cable can enable APs to work without power cables, thus effectively accelerating deployment of WLANs, avoiding complex cabling with power cables, and lowering cost on deployments the network.

3 System structure

This chapter describes system structure of the ISCOM2100G series switch, including the following sections:

- Panels
- Interfaces
- Power module
- LEDs

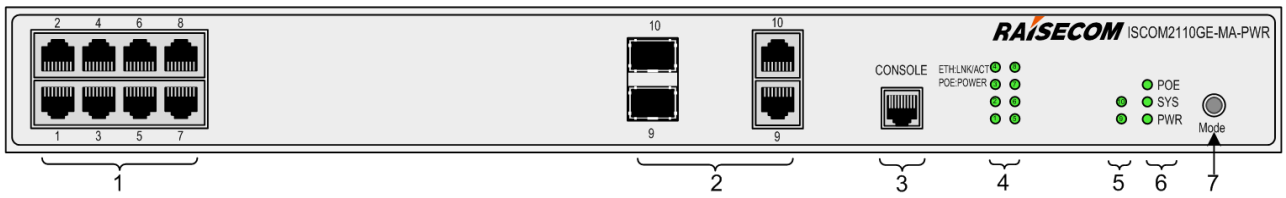
3.1 Panels

3.1.1 ISCOM2110GE-MA-PWR

Front panel

Figure 3-1 shows the front panel of the ISCOM2110GE-MA-PWR.

Figure 3-1 Front panel of ISCOM2110GE-MA-PWR

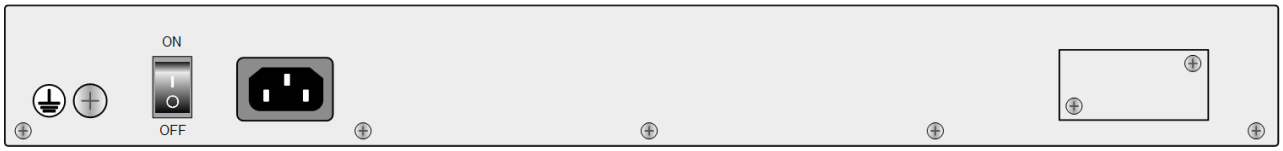


1	Service downlink interfaces 1–8 (PoE+ interface)	2	Service uplink interfaces 9–10 (Combo)
3	Console interface (RJ45)	4	Downlink interface LNK/ACT and PoE LED
5	Uplink Combo interface LED	6	PoE, SYS, and PWR LEDs
7	Mode switching button		

Rear panel

Figure 3-2 shows the rear panel of the ISCOM2110GE-MA-PWR.

Figure 3-2 Rear panel of ISCOM2110GE-MA-PWR



Interfaces

Table 3-1 lists interfaces on the ISCOM2110GE-MA-PWR.

Table 3-1 Interfaces on ISCOM2110GE-MA-PWR

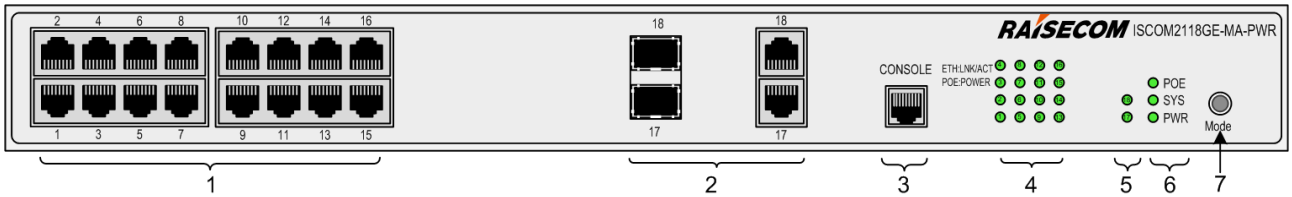
Interface	Usage	Type	Description
1–8	Service downlink interface (PoE+ interface)	RJ45	10/100/1000BASE-T
9–10	Service uplink interface	Combo optical interface (SFP)	It supports the following optical modules: • 1000BASE-X • 100BASE-FX
		Combo electrical interface (RJ45)	10/100/1000BASE-T
CONSOLE	Console interface	RJ45	You can locally manage and configure the ISCOM2110GE-MA-PWR through the Console interface.

3.1.2 ISCOM2118GE-MA-PWR

Front panel

Figure 3-3 shows the front panel of the ISCOM2118GE-MA-PWR.

Figure 3-3 Front panel of ISCOM2118GE-MA-PWR



1	Service downlink interfaces 1–16 (PoE+ interface)	2	Service uplink interfaces 17–18 (Combo)
3	Console interface (RJ45)	4	Downlink interface LNK/ACT and PoE LED
5	Uplink Combo interface LED	6	PoE, SYS, and PWR LEDs
7	Mode switching button		

Rear panel

Figure 3-4 shows the front panel of the ISCOM2118GE-MA-PWR.

Figure 3-4 Rear panel of ISCOM2118GE-MA-PWR

Interfaces

Table 3-2 lists interfaces on the ISCOM2118GE-MA-PWR.

Table 3-2 Interfaces on ISCOM2118GE-MA-PWR

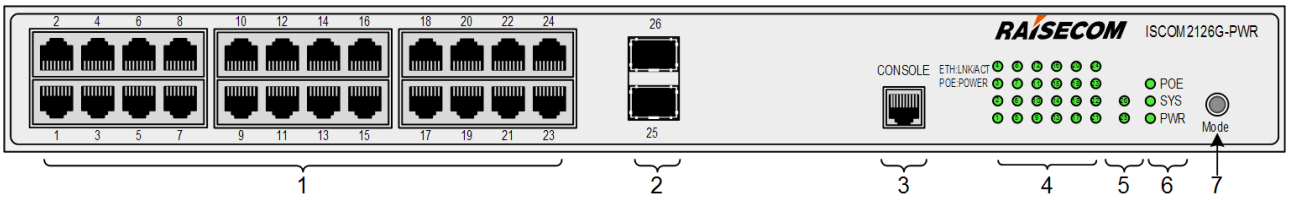
Interface	Usage	Type	Description
1–16	Service downlink interface (PoE+ interface)	RJ45	10/100/1000BASE-T
17–18	Service uplink interface	Combo optical interface (SFP)	It supports the following optical modules: • 1000BASE-X • 100BASE-FX
		Combo electrical interface (RJ45)	10/100/1000BASE-T
CONSOLE	Console interface	RJ45	You can locally manage and configure the ISCOM2118GE-MA-PWR through the Console interface.

3.1.3 ISCOM2126G-PWR

Front panel

Figure 3-5 shows the front panel of the ISCOM2126G-PWR.

Figure 3-5 Front panel of ISCOM2126G-PWR

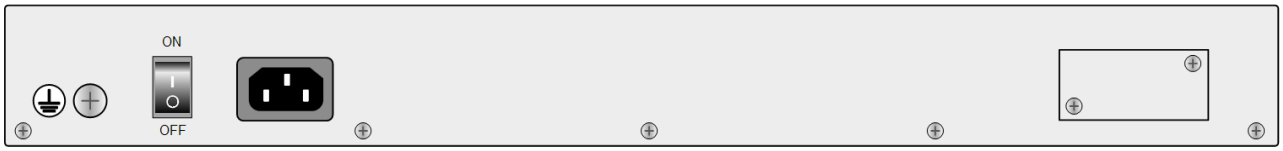


1	Service downlink interfaces 1–24 (PoE+ interface)	2	Service uplink interfaces 25–26 (Combo)
3	Console interface (RJ45)	4	Downlink interface LNK/ACT and PoE LED
5	Uplink SFP optical interface LED	6	PoE, SYS, and PWR LEDs
7	Mode switching button		

Rear panel

Figure 3-6 shows the rear panel of the ISCOM2126G-PWR.

Figure 3-6 Rear panel of ISCOM2126G-PWR



Interfaces

Table 3-3 lists interfaces on the ISCOM2126G-PWR.

Table 3-3 Interfaces on ISCOM2126G-PWR

Interface	Usage	Type	Description
1–24	Service downlink interface (PoE+ interface)	RJ45	10/100/1000BASE-T

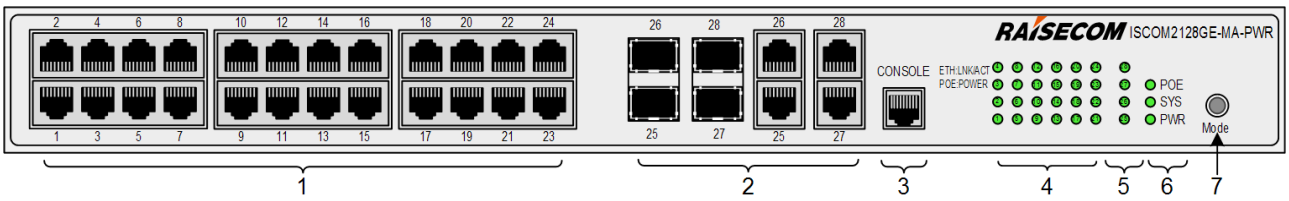
Interface	Usage	Type	Description
25–26	Service uplink interface	SFP	It supports the following optical modules: • 1000BASE-X • 100BASE-FX
CONSOLE	Console interface	RJ45	You can locally manage and configure the ISCOM2126G-PWR through the Console interface.

3.1.4 ISCOM2128GE-MA-PWR

Front panel

Figure 3-7 shows the front panel of the ISCOM2128GE-MA-PWR.

Figure 3-7 Front panel of ISCOM2128GE-MA-PWR

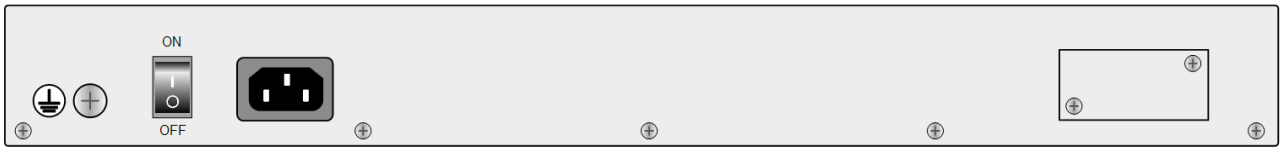


1	Service downlink interfaces 1–24 (PoE+ interface)	2	Service uplink interfaces 25–28 (Combo)
3	Console interface (RJ45)	4	Downlink interface LNK/ACT and PoE LED
5	Uplink Combo interface LED	6	PoE, SYS, and PWR LEDs
7	Mode switching button		

Rear panel

Figure 3-8 shows the front panel of the ISCOM2128GE-MA-PWR.

Figure 3-8 Rear panel of ISCOM2128GE-MA-PWR



Interfaces

Table 3-4 lists interfaces on the ISCOM2128GE-MA-PWR.

Table 3-4 Interfaces on ISCOM2128GE-MA-PWR

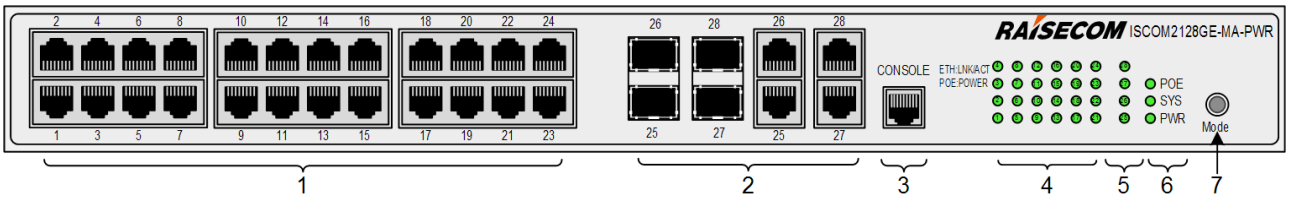
Interface	Usage	Type	Description
1–24	Service downlink interface (PoE+ interface)	RJ45	10/100/1000BASE-T
25–28	Service uplink interface	SFP	It supports the following optical modules: • 1000BASE-X • 100BASE-FX
		Combo electrical interface (RJ45)	10/100/1000BASE-T
CONSOLE	Console interface	RJ45	You can locally manage and configure the ISCOM2128GE-MA-PWR through the Console interface.

3.1.5 ISCOM2128G-PWR

Front panel

Figure 3-9 shows the front panel of the ISCOM2128G-PWR.

Figure 3-9 Front panel of ISCOM2128G-PWR

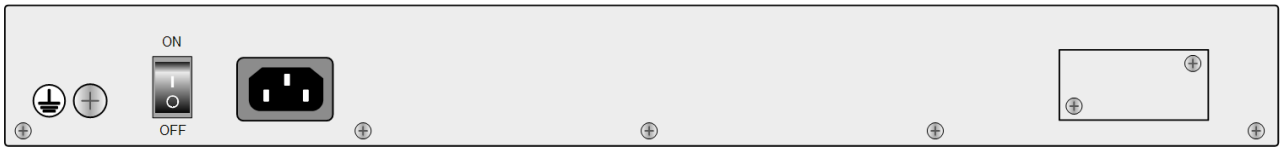


1	Service downlink interfaces 1–24 (PoE+ interface)	2	Service uplink interfaces 25–28 (Combo)
3	Console interface (RJ45)	4	Downlink interface LNK/ACT and PoE LED
5	Uplink Combo interface LED	6	PoE, SYS, and PWR LEDs
7	Mode switching button		

Rear panel

Figure 3-10 shows the rear panel of the ISCOM2128G-PWR.

Figure 3-10 Rear panel of ISCOM2128G-PWR



Interfaces

Table 3-5 lists interfaces on the ISCOM2128G-PWR.

Table 3-5 Interfaces on ISCOM2128G-PWR

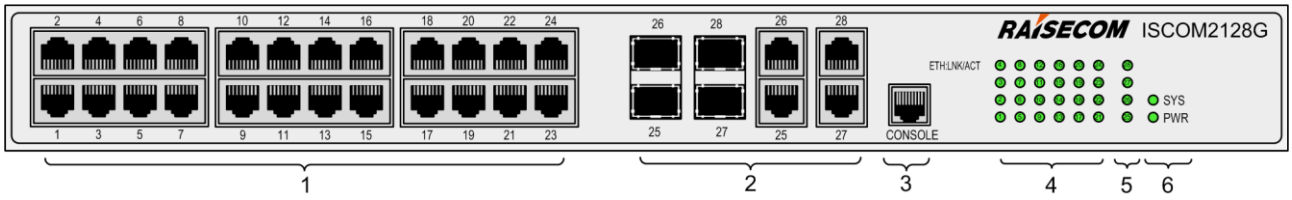
Interface	Usage	Type	Description
1–24	Service downlink interface (PoE+ interface)	RJ45	10/100/1000BASE-T
25–28	Service uplink interface	Combo optical interface (SFP)	It supports the following optical modules: • 1000BASE-X • 100BASE-FX
		Combo electrical interface (RJ45)	10/100/1000BASE-T
CONSOLE	Console interface	RJ45	You can locally manage and configure the ISCOM2128G-PWR through the Console interface.

3.1.6 ISCOM2128G

Front panel

Figure 3-11 shows the front panel of the ISCOM2128G.

Figure 3-11 Front panel of ISCOM2128G



1	Service downlink interfaces 1–24	2	Service uplink interfaces 25–28 (Combo)
3	Console interface (RJ45)	4	Downlink interface LNK/ACT

5	Uplink Combo interface LED	6	PoE, SYS, and PWR LEDs

Rear panel

Figure 3-12 shows the rear panel of the ISCOM2128G-AC.

Figure 3-12 Rear panel of ISCOM2128G-AC

Figure 3-13 shows the rear panel of the ISCOM2128G-DC.

Figure 3-13 Rear panel of ISCOM2128G-DC

Interfaces

Table 3-6 lists interfaces on the ISCOM2128G.

Table 3-6 Interfaces on ISCOM2128G

Interface	Usage	Type	Description
1–24	Service downlink interface	RJ45	10/100/1000BASE-T
25–28	Service uplink interface	Combo optical interface (SFP)	It supports the following optical modules: • 1000BASE-X • 100BASE-FX
		Combo electrical interface (RJ45)	10/100/1000BASE-T
CONSOLE	Console interface	RJ45	You can locally manage and configure the ISCOM2128G through the Console interface.

3.2 Interfaces

3.2.1 1000 Mbit/s SFP optical interface

Table 3-7 lists parameters of the 1000 Mbit/s SFP optical interface.

Table 3-7 Parameters of 1000 Mbit/s SFP optical interface

Parameter	Description
Connector type	LC/PC
Optical interface properties	Depend on the selected SFP optical module.
Coding type	8B/10B
Working mode	Full duplex
Compliant standard	IEEE 802.3

3.2.2 100 Mbit/s SFP optical interface

Table 3-8 lists parameters of the 100 Mbit/s SFP optical interface.

Table 3-8 Parameters of 100 Mbit/s SFP optical interface

Parameter	Description
Connector type	LC/PC
Optical interface properties	Depend on the selected SFP optical module.
Coding type	4B/5B
Working mode	Full duplex
Compliant standard	IEEE 802.3

3.2.3 1000 Mbit/s Ethernet electrical interface

Table 3-9 lists parameters of the 1000 Mbit/s Ethernet electrical interface.

Table 3-9 Parameters of 1000 Mbit/s Ethernet electrical interface

Parameter	Description
Connector type	RJ45
Working mode	• 10/100/1000Mbit/s self-adaption • Full/Half duplex auto-negotiation

Parameter	Description
Cable specifications	• When the interface rate is 10/100 Mbit/s, we recommend using Cat 5 UTP cable. • When the interface rate is 1000 Mbit/s, we recommend using Cat 5e UTP or STP cable.
Compliant standard	IEEE 802.3

3.2.4 Console interface

Table 3-10 lists parameters of the RJ45 Console interface.

Table 3-10 Parameters of RJ45 Console interface

Parameter	Description
Connector type	RJ45
Working mode	Duplex UART
Electrical feature	RS-232
Baud rate	9600 Baud
Cable specification	8-core shielded cable

3.3 Power modules

3.3.1 AC power

Introduction

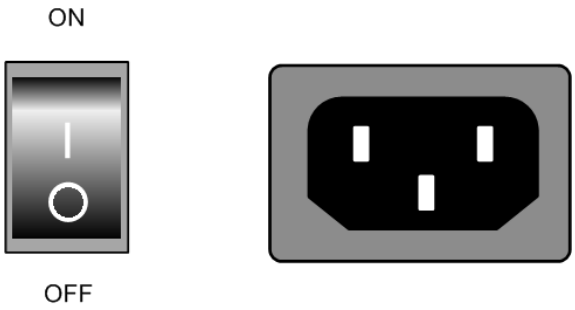
The AC power module has the following functions:

- Provide 220 VAC power input, support power out-of-position alarm.
- Support monitoring voltage, over temperature alarm, over temperature protection, and Dying Gasp.
- Support 6 kV lightning protection in common mode and differential mode.

Interfaces

There is an AC power interface and a power switch button, as shown in Figure 3-14.

Figure 3-14 AC power module



Specifications

Table 3-11 lists specifications of the AC power module.

Table 3-11 Specifications of AC power module

Parameter	Value
Rated voltage	220 VAC
Voltage range	100–240 VAC
Frequency	50/60 Hz

3.3.2 DC power

Introduction

The DC power module has the following functions:

- Provide -48 VDC power.
- Adopt low-noise design without fans, cooling internal circuit through heat dissipation hole at two sides.

Interfaces

There are a DC power interface and a power switch button, as shown in Figure 3-15.

Figure 3-15 DC power module

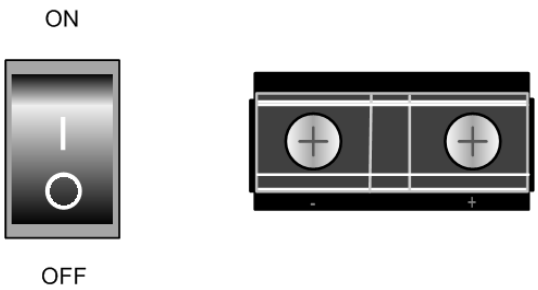


Table 3-12 describes the DC power module.

Table 3-12 DC power module

Power interface	Interface	Print	Usage
DC power interface	Fence terminal	-	-48 V power input terminal
		+	GND power input terminal

Specifications

Table 3-13 lists specifications of the DC power module.

Table 3-13 Specifications of DC power module

Parameter	Value
Rated input voltage	-48 VDC
Voltage range	-36 to -72 VDC

3.3.3 RPS power

Introduction

The Redundant Power System (RPS) is a backup power. When the primary power fails, the RPS provides +12 VDC power to ensure normal operation of the ISCOM2100G series switch.

Interfaces

There is a DC power interface on the panel of the RPS power module, as shown in Figure 3-16.

Figure 3-16 RPS power module

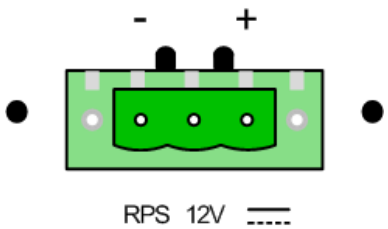


Table 3-14 describes the RPS power interface.

Table 3-14 RPS power interface

Power interface	Interface	Print	Usage
RPS power interface	3-pin Phoenix terminal	-	GND power terminal
		+	+12 V power terminal

Specifications

Table 3-15 lists specifications of the RPS power module.

Table 3-15 Specifications of the RPS power module.

Parameter	Value
Rated input voltage	+12 VDC
Voltage range	+11.64 to +12.36 VDC

3.4 LEDs

Table 3-16 lists LEDs on the ISCOM2100G series switch.

Table 3-16 LEDs

LED	Status	Description
ETH: LNK/ACT POE: POWER	Green	Link working and interface power supply LED You can switch its function by pressing the **Mode** button. ETH: LNK/ACT • Green: the link is properly connected. • Blinking green: the link is receiving or sending data. • Off: the link is disconnected or improperly connected. POE: POWER • Green: the interface is supplying power to a remote PD. • Off: the interface stops supplying power to a remote PD. **Note** Only the PoE models of the ISCOM2100G series switch has the PoE LED.
SYS	Green	System working LED • Blinking green: the system is working properly. • Green/Off: the system is working improperly.
PWR	Green	Power LED • Green: the power supply is normal. • Off: the power supply is abnormal or off.

4 Device installation

This chapter describes how to install the ISCOM2100G series switch, including the following sections:

- Installing hardware
- Installing software

4.1 Installing hardware

4.1.1 Preparing for installation

Environment conditions

The environment where the ISCOM2100G series switch is to be installed should meet the conditions described in Table 4-1.

Table 4-1 Requirements during operation

Item	Value
Operating temperature (℃)	0–50
Operating humidity	10%–90% RH (non-condensing)
Storage temperature (℃)	-25 to 60
Air pressure (kPa)	86–106

Power supply conditions

Table 4-2 lists power supply requirements for operation of the ISCOM2100G series switch.

Table 4-2 Power supply requirements for operation

Item	Description
Power supply	• AC power: the rated voltage is 220 VAC, and the voltage range is 100–240 VAC. • DC power: the rated voltage is -48 VDC, and the voltage range is -36 to -72 VDC.
Maximum power consumption	• ISCOM2110GE-MA-PWR: 240 W • ISCOM2118GE-MA-PWR: 370 W • ISCOM2126G-PWR: 370 W • ISCOM2128G-PWR: 370 W • ISCOM2128GE-MA-PWR: 370 W • ISCOM2128G: 35 W

Grounding conditions

The ISCOM2100G series switch should adopt joint grounding mode, and the grounding resistance should be no smaller than 1 Ω. Well grounding is the first guarantee to lightning protection and anti-interference.

4.1.2 Installing device

Note

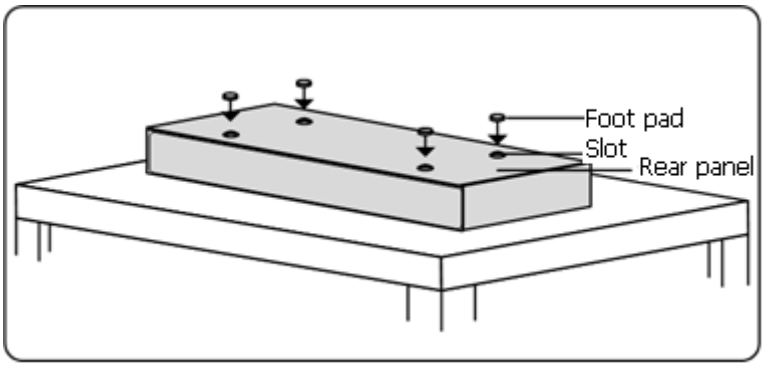
The installation mode of the ISCOM2100G series switch is identical. The following installation takes the ISCOM2128G-PWR for example.

Installing device on workbench

The ISCOM2128G-PWR supports being installed on a workbench, with steps as below:

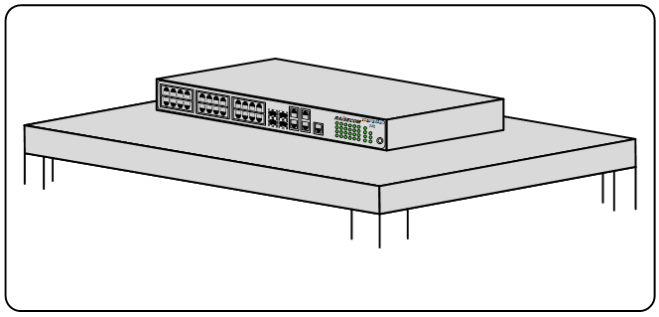
Step 1 Paste four foot pads onto the bottom of the ISCOM2100G series switch, as shown in Figure 4-1.

Figure 4-1 Pasting foot pads



Step 2 Lay the device stably on the workbench, as shown in Figure 4-2.

Figure 4-2 Installing device on workbench



Caution

Laying heavy objects or covering objects on the ISCOM2100G series switch is prohibited.

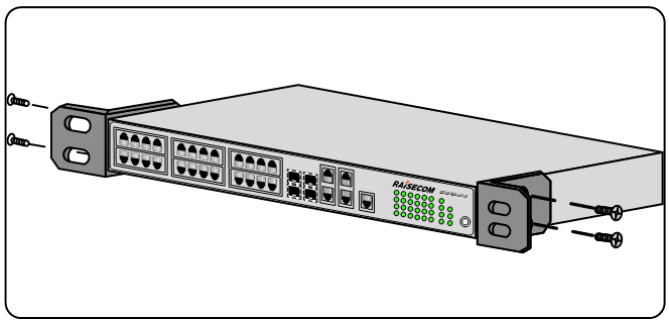
Installing device on rack

The ISCOM2100G series switch supports being installed on the rack, with steps as below:

Step 1 Ensure that the rack is stable.

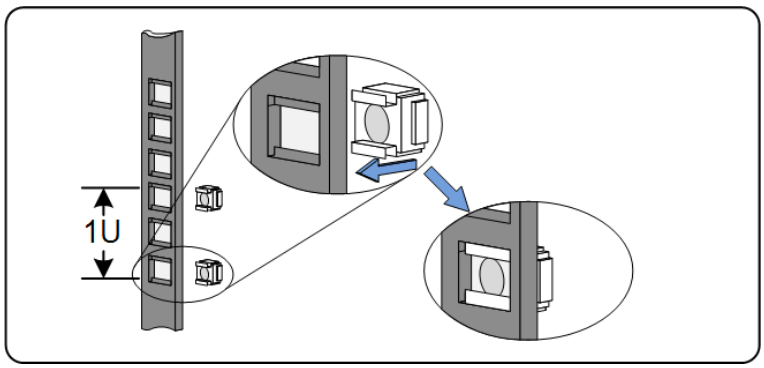
Step 2 Install two customized brackets on the two sides of the ISCOM2100G series switch respectively, and fix them with screws, as shown in Figure 4-3.

Figure 4-3 Installing brackets



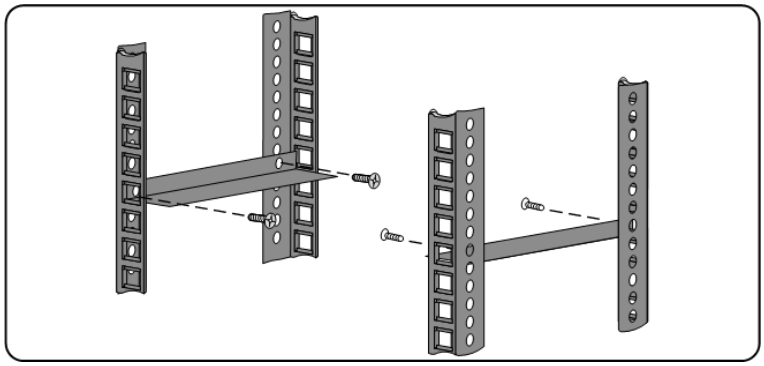
Step 3 Install floating nuts on the rack, as shown in Figure 4-4.

Figure 4-4 Installing floating nuts



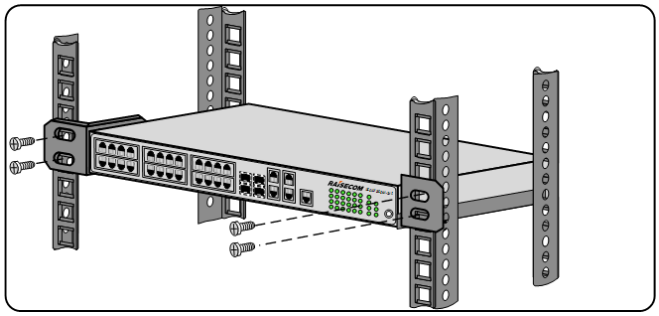
Step 4 Install guide rails on the rack, as shown in Figure 4-5.

Figure 4-5 Installing guide rails



Step 5 Use screws to fix two customized brackets to guide rail, and install the ISCOM2100G series switch horizontally on the rack, as shown in Figure 4-6.

Figure 4-6 Installing device horizontally on rack



Caution

Laying heavy objects or covering objects on the ISCOM2100G series switch is prohibited.

4.1.3 Connecting cables

Connecting fiber

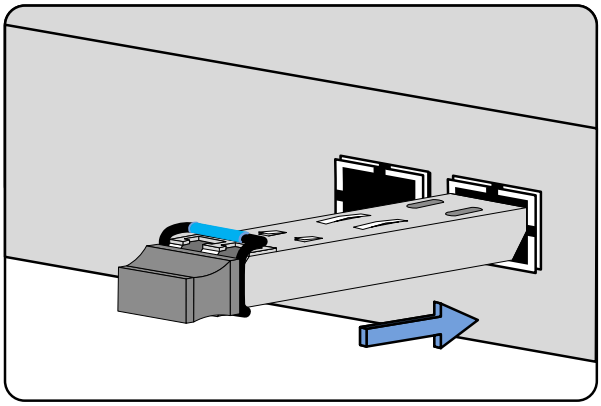
Warning

There is invisible laser inside the ISCOM2100G series switch and it harms eyes. Do not directly stare into the optical interface, fiber connector, or breakage of fiber.

Connect fiber as below:

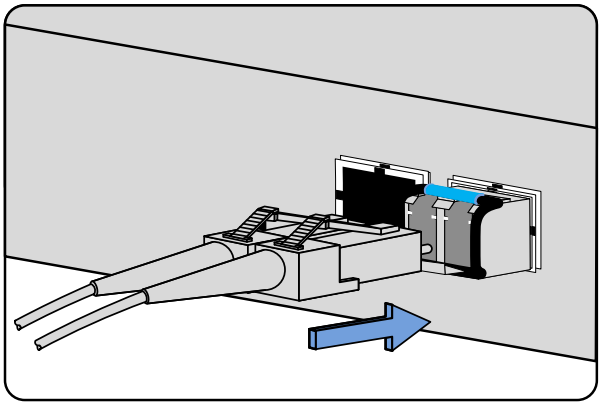
Step 1 Remove the dustproof cover from the SFP optical interface and SFP optical module, and insert the SFP optical module into the optical interface on the ISCOM2100G series switch, as shown in Figure 4-7.

Figure 4-7 Inserting SFP optical module



Step 2 Remove the dustproof cover from the LC/PC fiber, align the fiber with the SFP optical interface, and insert the fiber slightly into the SFP optical interface, as shown in Figure 4-8.

Figure 4-8 Connecting fiber



Note

When the optical interface is idle, cover it with the dustproof cover to prevent dust and dirt from entering it and causing the ISCOM2100G series switch to work improperly.

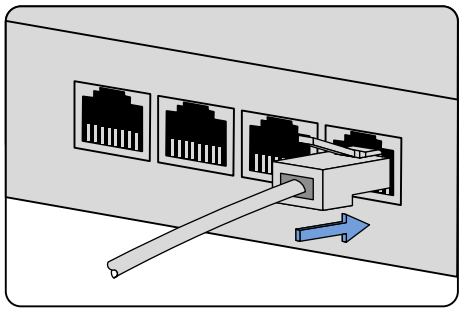
Connecting Ethernet cable

Connect the Ethernet cable as below:

Step 1 Choose a proper length for the Ethernet cable according to cabling path, and make an Ethernet cable accordingly.

Step 2 Insert the RJ45 connector of the Ethernet cable into the Ethernet interface of the ISCOM2100G series switch, and insert the other RJ45 connector of the Ethernet cable into the Ethernet interface of the peer device, as shown in Figure 4-9.

Figure 4-9 Connecting Ethernet cable



Connecting grounding cable

Warning

Connecting the grounding cable properly is an important guarantee to lightning protection, shock proof, and anti-interference. When installing and using the device, ensure that the grounding cable is properly connected; otherwise, personnel injury or equipment damage may be caused.

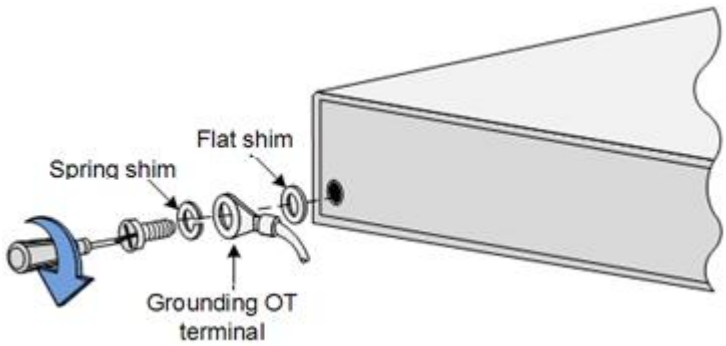
Install the grounding cable as below:

Step 1 Unscrew grounding terminal counterclockwise, remove the screws and shims.

Step 2 Sheathe the flat shim, grounding OT terminal, and spring shim in sequence over the screw.

Step 3 Reinstall the screw to the grounding terminal, and tighten the screws clockwise, as shown in Figure 4-10.

Figure 4-10 Connecting the grounding cable



Installing DC power cable

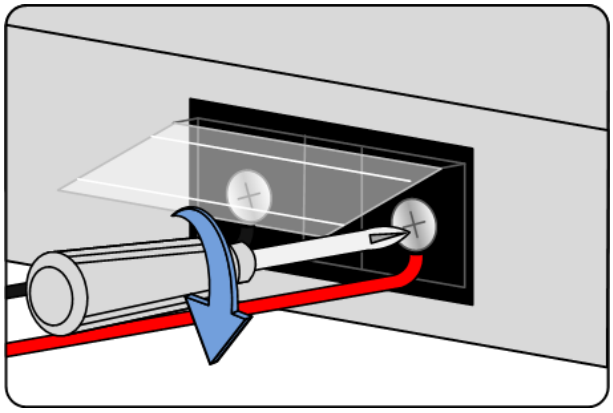
Install the DC power cable as below:

Step 1 Ensure that the ISCOM2100G series switch is well grounded.

Step 2 Remove the cover over of the fence terminal, and unfasten screws anti-clockwise.

Step 3 Put the U-shape terminal of the DC power cable under the screw (the red cable under the + screw and the black cable under the – screw), and fasten screws clockwise, as shown in Figure 4-11.

Figure 4-11 Connecting DC power cable



Step 4 Connect the power plug of the DC power cable to the power souring device in the equipment room.

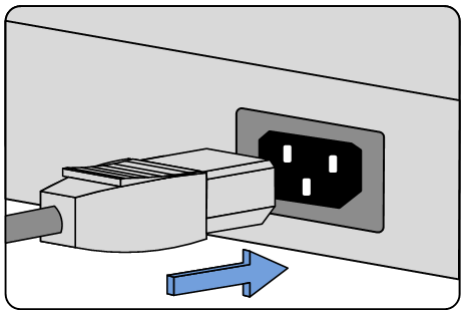
Connecting AC power cable

Install the AC power cable as below:

Step 1 Ensure that the ISCOM2100G series switch is well grounded.

Step 2 Insert the receptacle connector of the AC power cable into the AC power interface on the rear panel tightly. Insert the power plug of the AC power cable into the AC power socket of the power sourcing equipment, as shown in Figure 4-12.

Figure 4-12 Connecting AC power cable



Step 3 Insert the power plug of the AC power cable to the power souring device in the equipment room.

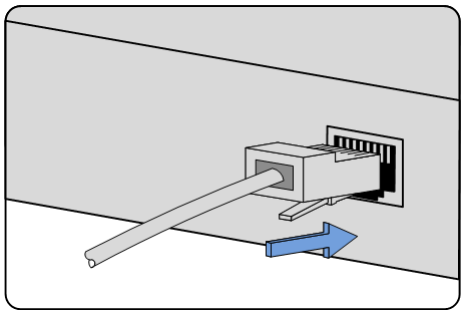
Connecting Console cable

Install the Console cable as below:

Step 1 Insert the connector of the Console cable into the Console interface on the ISCOM2100G series switch.

Step 2 Insert the other end of the Console cable into the RS-232 serial interface on a PC (or maintenance terminal), as shown in Figure 4-13.

Figure 4-13 Connecting Console cable



4.2 Installing software

The ISCOM2100G series switch is installed with all necessary software before delivery so that it can be powered on immediately for use after hardware installation is complete.

You can upgrade software of the ISCOM2100G series switch. For details, see *ISCOM2100G Series Configuration Guide*.

For details about installation and operations about the NView NNM network management software, see NView NNM related manual.

5 Management and maintenance

This chapter describes management and maintenance modes of the ISCOM2100G series switch, including the following sections:

- Management modes
- Maintenance modes

5.1 Management modes

The ISCOM2100G series switch is designed in consideration of hardware and functions based on users' requirements on operation and maintenance, so it has powerful maintenance capability.

You can manage, configure, and maintain the ISCOM2100G series switch by logging in to the ISCOM2100G series switch through the Console interface, Telnet, or SSHv2, or through the NView NNM system.

5.1.1 Console interface management

Console interface management refers to configure and manage the ISCOM2100G series switch through a terminal or a PC that runs the terminal emulation program. This is out-of-band management mode and does not rely on the service network. Though the service network is operating improperly, you can configure and manage the ISCOM2100G series switch through the Console interface.

5.1.2 Telnet management

The Telnet protocol, one of the TCP/IP protocol suites, is a standard protocol for remote login via the Internet. Applied with the Telnet protocol, a local PC can be a terminal for the remote host system. You can log in to the ISCOM2100G series switch through the PC which runs the Telnet program. You can type commands through Telnet, and these commands will be executed on the ISCOM2100G series switch as you directly execute commands on the ISCOM2100G series switch.

Telnet provides three basic services:

- Telnet defines that a network virtual terminal provides a standard interface for a remote system. The client does not need to know about the remote system in details, but needs to provide a standard interface program only.

- Telnet provides a mechanism that allows the client and server to negotiate, and also provides a group of standard options.
- Telnet symmetrically processes the connected two ends; namely, you do not have to type through the keyboard from the client nor have to make the client to display.

5.1.3 SSHv2 management

SSHv2 is a protocol that provides secure remote login and other secure network services on unsecure networks. When you remotely log in to the ISCOM2100G series switch on an unsecure network, SSHv2 automatically encrypts data every time you send. When data reach the destination, SSHv2 automatically decrypts data. In this way, SSHv2 protects the ISCOM2100G series switch from attacks such as plain text interception.

The SSHv2 protocol, between TCP/IP and application layer protocols, provides secure measures for data communication. SSHv2 provides the following services:

- Authenticate users and servers so that data are sent to the correct clients and servers.
- Encrypt data to avoid interception.
- Maintain data integration so that data keep intact during transmission.

SSHv2 can replace Telnet to manage remote devices or provide secure channel for applications such as FTP.

5.1.4 NView NNM

"Comprehensive Access, Overall Network Management" is a vision that Raisecom has been in pursuit of. The NView NNM system is developed to meet overall and efficient OAM requirements. It is of complete functions, friendly User Interface (UI), and easy operations, and can meet requirements by service activation and daily maintenance.

The NView NNM system, based on SNMP, can perform centralized configurations and fault detection over all manageable devices of Raisecom. It has the following functions:

- Topology management: displays network topology graphically, organizes and manages nodes of various types and links between these nodes, and supports automatical or manual planning of network functions.
- Alarm management: collects, classifies and displays, and manages all alarms reported by managed devices. It supports query, sorting, filtering, statistics, forwarding, and voice prompt.
- Performance management: enables you to view realtime or historical performance metrics, such as interfaces, traffic, and bandwidth utilization.
- Inventory management: manages physical inventory, such as devices, chassis, and interfaces.
- User management: manages information about all connected users, and allows building relation between the customer and the device as well as the interface. This function helps quickly locate affected customers.
- Security management: supports user account and password rules according to security management features in network management; controls authorized access from a client according to the *Client Access Control List*; provides the Invalid Login Verification function, which will lock a user if the times of typing incorrect user name and password exceeds the configured number; provides security control policies based on level, authority, and domain; provides detailed system/device operation logs to facilitate you to control operation authorities.

- Service management: manages predefined system services through the application service management framework, such as Trap receiving service, alarm storm prevention service, and alarm forwarding service.
- Data center: enables you to manage devices, such as backing up, restoring, rolling back, and activating; also enables you to manage upgradable files, backup files, operations, and logs for backup. The backup operation is easy, simple and with high security.
- Data downloading: downloads logs, historical alarms, and performance data from database as viewable files and then deletes these data from database. This ensures efficient operation of database in the NView NNM system.

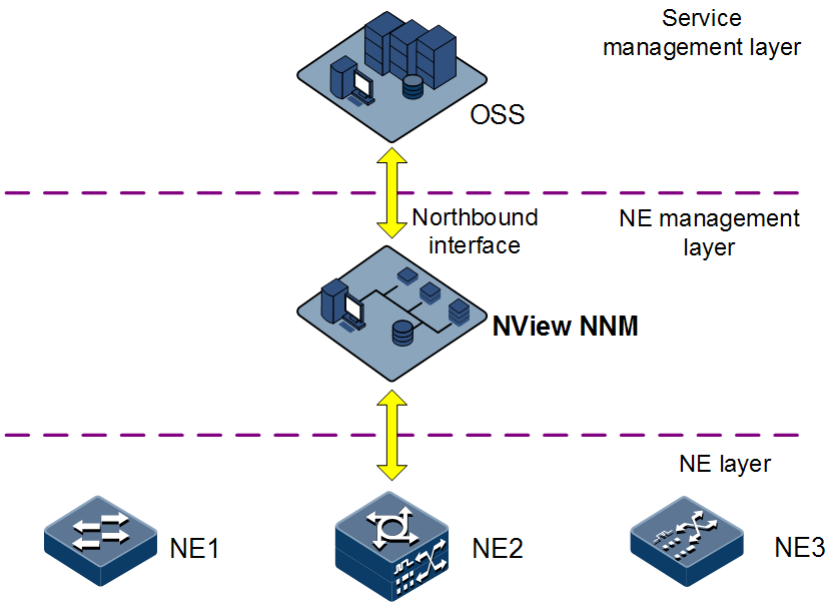
The NView NNM system has the following features:

- Work as the uniform platform for all manageable devices of Raisecom.
- Uniformly manage data network and transport network.
- Provide strong NE-level management and subnet-level management.
- Provide northbound interfaces for integration with the OAM system, such as COBRA, SNMP, JDBC, and SOCKET interfaces.
- Communicate with NE-level devices through SNMP in southbound. With a modular design, it supports flexible deployment according to actual situation.

The NView NNM system can be interconnected to the Operation Support System (OOS). It implements OAM functions between the OSS and NEs through the northbound interface, such as service activation, alarm reporting, alarm synchronization, fault diagnosis, and periodical inspection.

Figure 5-1 shows the orientation of the NView NNM system.

Figure 5-1 Orientation of the NView NNM system



5.2 Maintenance modes

The ISCOM2100G series switch supports diagnoses and debugging of software and hardware faults.

5.2.1 Ping

Packet Internet Grope (Ping) is the most widely used command for fault diagnosis and removal. It is usually used to detect whether two hosts are connected or not. Ping is achieved with ICMP echo packets. If an Echo Reply packet is sent back to the source address during a valid period after the Echo Request packet is sent to the destination address, it indicates the route between source and destination address is reachable.

5.2.2 Traceroute

Traceroute is used to discover the real route taking by the packet to transmit to the destination. Although the Ping feature can test the connectivity, it cannot record all network devices on the route limited by the IP head. Traceroute can be used to test routing information from the source host to the destination host.

5.2.3 Environment monitoring

By monitoring key environment parameters of the ISCOM2100G series switch, such as temperature and voltage, you can take measures accordingly to avoid faults.

5.2.4 RMON management

Remote Network Monitoring (RMON) is a standard developed by the Internet Engineering Task Force (IETF). RMON is used to monitor network data through different agents and NMS. RMON is an extension of SNMP, but ROMN is more active and efficient for monitoring remote devices. The administrator can quickly trace faults generated on the network, network segments or devices.

At present, RMON implements four function groups:

- Statistic group: collect statistic information on each interface, including receiving packets accounts and size distribution statistics.
- History group: similar with statistic group, it only collects statistic information in an assigned detection period.
- Alarm group: monitor an assigned MIB object and set upper threshold and lower threshold in assigned time interval, trigger an event if the monitor object receives threshold value.
- Event group: cooperating with alarm group, when an alarm triggers an event, it records the event, such as sending Trap, write into log, etc.

The differences between the RMON and SNMP are as below:

- Based on SNMP, RMON uses the function of sending SNMP Traps to inform the management device of abnormality of alarm variable; however, the targets monitored by SNMP, triggering condition, and reported information are different from those of RMON.
- As defined by RMON, when a managed device reaches the alarm limit, it actively sends Trap messages to the NMS without querying by the NMS. In this way, the communication traffic between the NMS server and the managed device is reduced.

You can configure RMON event group, RMON alarm group, RMON statistic group, and RMON historical group in the RMON management module.

5.2.5 Optical module monitoring

The SFP optical module is an optical transceiver. SFP provides a performance monitoring method for the ISCOM2100G series switch. By analyzing monitoring data provided by SFP, the network administrator can predict the life of the SFP module, isolate system fault, and verify module compatibility during on-site installation.

Each SFP provides five performance parameters:

- Transceiver temperature
- Internal voltage
- Tx bias current
- Tx optical power
- Rx optical power

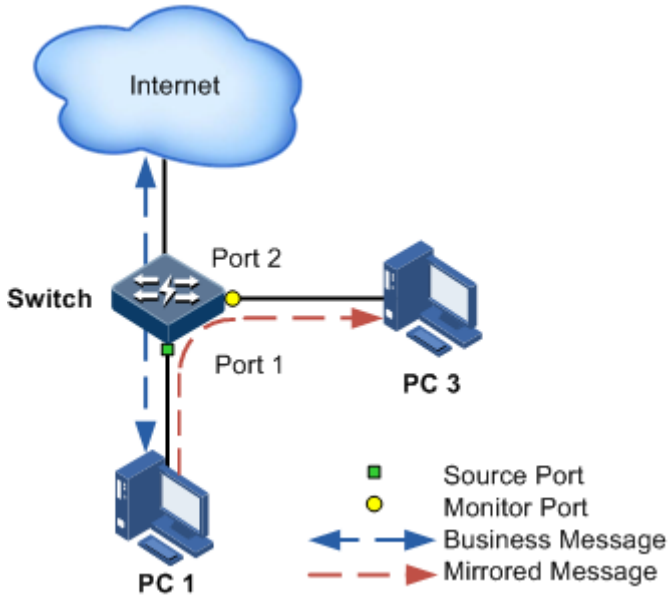
With this function, you can globally configure optical modules on the ISCOM2100G series switch, view and export the following tables:

- Optical module information table
- Optical module detection table
- Optical module current period detection table
- Optical module period detection table.

5.2.6 Port mirroring

Port mirroring refers to mirroring packets of the source port to the monitor port without affecting packets forwarding. You can use this function to monitor the receiving and sending status of one or more port and analyze the network situation.

Figure 5-2 Principle of port mirroring



Basic principles of port mirroring are displayed in Figure 5-2. PC 1 accesses the network through Port 1 on the ISCOM2100G series switch. PC 3 is the monitor PC and is connected to Port 2 on the ISCOM2100G series switch.

To monitor packets sent by PC 1, you need to configure Port 1 as the mirroring port and enable port mirroring for packets on the ingress port. Configure Port 2 as the monitor port, that is, the mirroring destination port.

When forwarding a packet sent by PC 1, the ISCOM2100G series switch forwards the packet and mirrors a copy to Port 2. The monitor device connected to Port 2 receives and analyzes this mirrored packet.

The ISCOM2100G series switch supports port mirroring based on ingress and egress ports. When port mirroring is enabled, packets on ingress/egress mirroring port will be mirrored to the monitor port. The monitor port and mirroring port cannot be the same one.

5.2.7 Ethernet OAM

EFM

EFM, complying with IEEE 802.3ah, is a link-level Ethernet OAM technology. For the link between two straightly-connected devices, EFM detects link connectivity, monitors link faults, and notifies remote faults.

The first mile referred to in EFM is the link between the Central Office (CO) device and the user end. EFM aims to apply the widely used Ethernet technology to the access network. In this way, network performance will be increased and the cost on devices and operation will be reduced. EFM is usually used in the Ethernet link at edge of the access network.

The ISCOM2100G series switch supports IEEE 802.3ah EFM functions.

CFM

CFM is a network-level Ethernet OAM technology, providing end-to-end connectivity fault detection, fault notification, judgement and location functions. It is used to diagnose fault actively for Ethernet Virtual Connection (EVC), provide cost-effective network maintenance solution and improve network maintenance via the fault management function.

The ISCOM2100G series switch provides CFM function that supports both ITU-Y.1731 and IEEE802.1ag standards.

SLA

SLA is an agreement between users and a service provider about the Quality of Service (QoS), priority and responsibility. It is a telecommunication service evaluating standard negotiated by the service provider and users.

In terms of technology, SLA is a real-time network performance detection and statistic technology, which can collect statistics on responding time, network jitter, delay, packet loss rate, etc. SLA can be used to monitor related metrics by selecting different tasks for different applications.

6 Technical specifications

This chapter describes overall parameters, system parameters, card parameters, and technical specifications, including the following sections:

- Overall parameters
- SFP optical modules
- Cables

6.1 Overall parameters

Table 6-1 lists overall parameters of the ISCOM2100G series switch.

Table 6-1 Overall parameters of the ISCOM2100G series switch

Parameter		Value
Dimensions		440 mm (Width) × 300 mm (Depth) × 43.6 mm (Height)
Overall power consumption		• ISCOM2110GE-MA-PWR: 240 W • ISCOM2118GE-MA-PWR: 370 W • ISCOM2126G-PWR: 370 W • ISCOM2128G-PWR: 370 W • ISCOM2128GE-MA-PWR: 370 W • ISCOM2128G: 35 W
Weight		< 5.0 kg
Storage temperature		-25 to 60 ℃
Operating temperature		0–50 ℃
Operating humidity		10%–90% RH (indoor, non-condensing)
DC power	Rated voltage	-48 VDC
	Voltage range	-36 to -72 VDC
AC power	Rated voltage	220 VAC
	Voltage range	100–240 VAC

Parameter		Value
	Frequency	50/60 Hz
RPS power	Rated voltage	-48 VDC
	Voltage range	-36 to -72 VDC
Lightning protection level	AC power	• 6 kV in differential mode • 6 kV in common mode
	DC power	• 2 kV in differential mode • 4 kV in common mode
	Service interface	6 kV in common mode

6.2 SFP optical modules

The ISCOM2100G series switch supports the following SFP modules:

- 100 Mbit/s SFP optical module
- 1000 Mbit/s SFP optical module

6.2.1 1000BASE-X SFP optical module

Table 6-2 lists parameters of the 1000BASE-X SFP optical module.

Table 6-2 Parameters of 1000BASE-X SFP optical module

Model	Wavelength (nm) (laser type)	Rx type	Tx optical power (dBm)	Minimum overload point (dBm)	Extinction ratio (dB)	Rx sensitivity (dBm)	Transmission distance (km)
USFP-Gb/M-D-R	850 (VCSEL)	PIN	-9.5 to -3	0	9	-17	0.55
USFP-Gb/S1-D-R	1310 (FP)	PIN	-10 to -3	-3	9	-21	15
USFP-Gb/S2-D-R	1550 (DFB)	PIN	-4 to 0	-3	9	-21	40
USFP-Gb/S3-D-R	1550 (DFB)	APD	-3 to 2	-3	9	-21	40
USFP-Gb/LH1-D-R	1310 (DFB)	PIN	-2 to 3	-3	9	-22	80

Model	Wavelength (nm) (laser type)	Rx type	Tx optical power (dBm)	Minimum overload point (dBm)	Extinction ratio (dB)	Rx sensitivity (dBm)	Transmission distance (km)
USFP-Gb/ZX-D-R	1550 (DFB)	PIN	-3 to 2	-9	9	-30	80
USFP-Gb/EX-D-R	1550 (DFB)	APD	0–5	-9	9	-30	120
USFP-Gb/SS13-D-R	TX1310/RX1550 (FP/DFB)	PIN	-10 to -3	-3	9	-21	15
USFP-Gb/SS15-D-R	TX1550/RX1310 (FP/DFB)	PIN	-10 to -3	-3	9	-21	15
USFP-Gb/SS13-4	TX1310/RX1490 (DFB)	PIN	-10 to -3	-3	9	-21	15
USFP-Gb/SS14-3	TX1490/RX1310 (DFB)	PIN	-10 to -3	-3	9	-21	15
USFP-Gb/SS24-D-R	TX1490/RX1550 (DFB)	PIN	-3 to 2	-3	9	-21	40
USFP-Gb/SS25-D-R	TX1550/RX1490 (DFB)	PIN	-3 to 2	-3	9	-21	40
USFP-Gb/SS34-D-R	TX1490/RX1550 (DFB)	PIN	-2 to 3	-9	9	-30	80
USFP-Gb/SS35-D-R	TX1550/RX1490 (DFB)	PIN	-2 to 3	-9	9	-30	80

6.2.2 100BASE-FX SFP optical module

Table 6-3 lists parameters of the 100BASE-FX SFP optical module.

Table 6-3 Parameters of 100BASE-FX SFP optical module

Model	Wavelength (nm) (Laser type)	Rx type	Tx optical power (dBm)	Minimum overload point (dBm)	Extinction ratio (dB)	Rx sensitivity (dBm)	Transmission distance (km)
USFP-03/M-D-R	1310 (LED/FP)	PIN	-20 to -10	-10	10	-29	2
USFP-03/S1-D-R	1310 (FP)	PIN	-15 to -8	-8	10	-34	15
USFP-03/S2-D-R	1310 (FP/DFB)	PIN	-5 to 0	-8	8.2	-34	40
USFP-03/S3-D-R	1550 (DFB)	PIN	-5 to 0	-10	10	-34	80
USFP-03/SS13-D-R	TX1310/RX1550 (FP)	PIN	-15 to -8	-8	8.2	-28	15
USFP-03/SS15-D-R	TX1550/RX1310 (FP/DFB)	PIN	-15 to -8	-8	8.2	-28	15
USFP-03/SS23-D-R	TX1310/RX1550 (FP/DFB)	PIN	-5 to 0	-8	8.2	-32	40
USFP-03/SS25-D-R	TX1550/RX1310 (DFB)	PIN	-5 to 0	-8	8.2	-32	40
USFP-03/SS34-D-R	TX1490/RX1550 (DFB)	PIN	-3 to 2	-8	8.2	-32	80
USFP-03/SS35-D-R	TX1550/RX1490 (DFB)	PIN	-3 to 2	-8	8.2	-32	80

6.3 Cables

6.3.1 Fiber

Introduction

The ISCOM2100G series switch supports single-mode and multi-mode fiber.

Table 6-4 lists fiber connectors available for the ISCOM2100G series switch.

Table 6-4 Fiber connectors

Local connector	Remote connector	Fiber
LC/PC	LC/PC	2 mm single-mode fiber
		2 mm multi-mode fiber
	FC/PC	2 mm single-mode fiber
		2 mm multi-mode fiber
	SC/PC	2 mm single-mode fiber
		2 mm multi-mode fiber

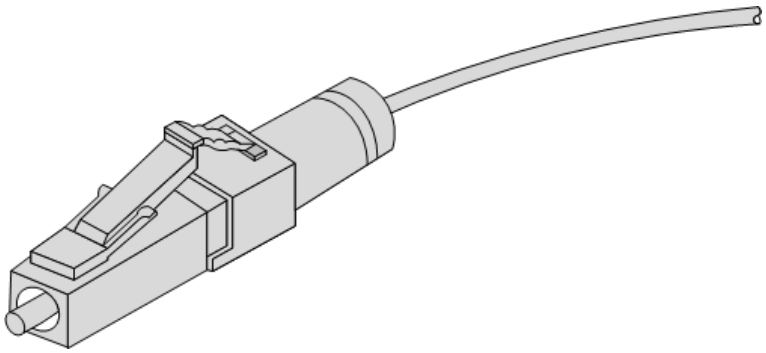
Note

Choose the fiber connector properly as required on site. Otherwise, more loss will be caused to the fiber, service transmission will be deteriorated, and even the fiber connector and interface may be damaged.

Appearance

Figure 6-1 shows the LC/PC fiber connector.

Figure 6-1 LC/PC fiber connector



When connecting or removing the LC/PC optical connector, align the connector with the optical interface, and do not rotate the fiber. Note the following points:

- Align the head of the fiber jumper with the optical interface and insert the optical fiber into the interface gently.
- To remove the fiber, press the latch on the connector, press the fiber head inwards slightly, and pull the fiber out.

Wiring

Table 6-5 lists wiring of the fiber.

Table 6-5 Wiring of fiber

Wiring	Optical interface on local device	Direction of optical signals	Optical interface on peer device
Single-fiber wiring	Optical interface	<->	Optical interface
Dual-fiber wiring	Tx optical interface	->	Rx optical interface
	Rx optical interface	<-	Tx optical interface

6.3.2 Ethernet cable

Introduction

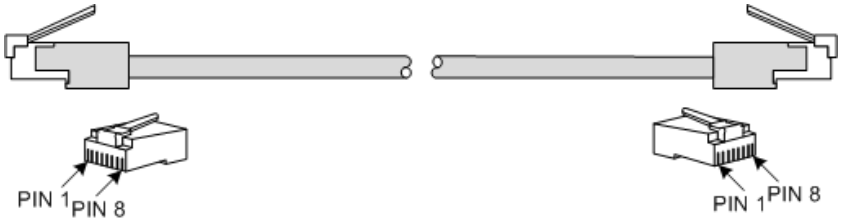
The Ethernet cable connects the Ethernet electrical interface and SFP electrical interface on the ISCOM2100G series switch.

The Ethernet interface on the ISCOM2100G series switch is self-adaptive to straight-through cable mode and crossover cable mode.

Appearance

Figure 6-2 shows the Ethernet cable.

Figure 6-2 Ethernet cable



Technical specifications

The Ethernet cables have two types:

- Straight-through cable: used to connect devices of different type, such as PC and switch, switch and router
- Crossover cable: used to connect devices of the same type, such as between a PC and another PC, between a switch and another switch, between a router and another router, between a PC and a router (they are divided into the same group)

Table 6-6 lists EIA/TIA 568A and EIA/TIA 568B wiring.

Table 6-6 EIA/TIA 568A and EIA/TIA 568B wiring

Connector (RJ45)	EIA/TIA 568A	EIA/TIA 568B
PIN 1	White/Green	White/Orange

Connector (RJ45)	EIA/TIA 568A	EIA/TIA 568B
PIN 2	Green	Orange
PIN 3	White/Orange	White/Green
PIN 4	Blue	Blue
PIN 5	White/Blue	White/Blue
PIN 6	Orange	Green
PIN 7	White/Brown	White/Brown
PIN 8	Brown	Brown

Both two RJ45 connectors of the straight-through cable follow EIA/TIA568B wiring.

Figure 6-3 shows wiring of the straight-through cable.

Figure 6-3 Wiring of straight-through cable

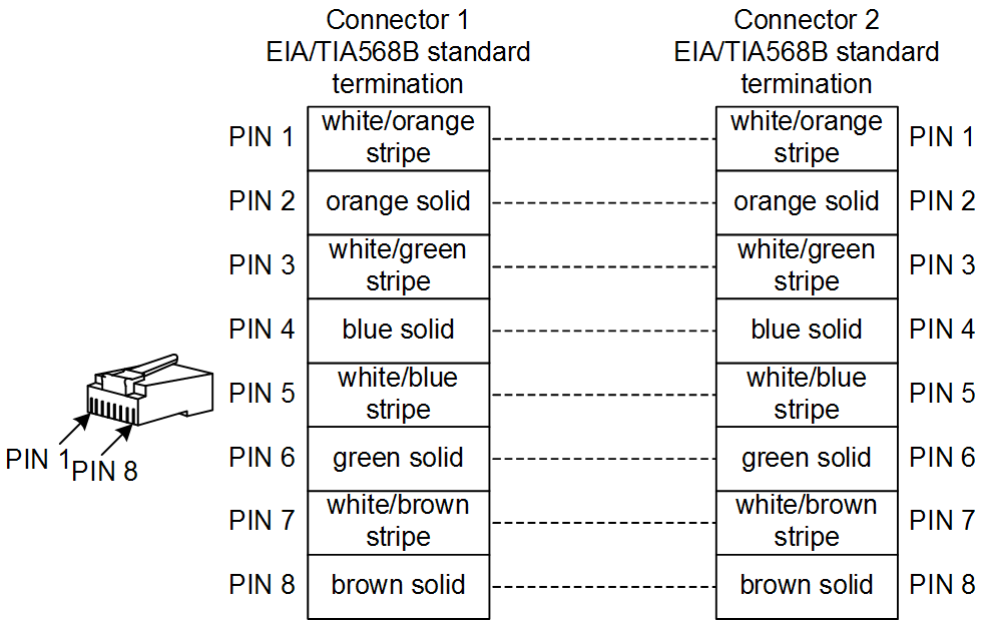


Figure 6-4 shows wiring of the 100 Mbit/s crossover cable.

Figure 6-4 Wiring of 100 Mbit/s crossover cable

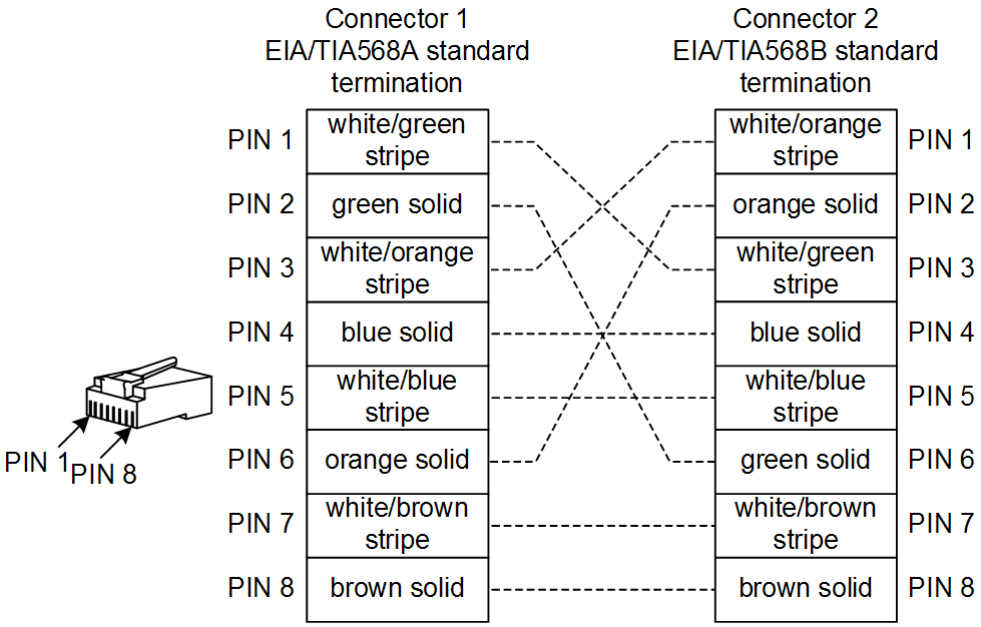
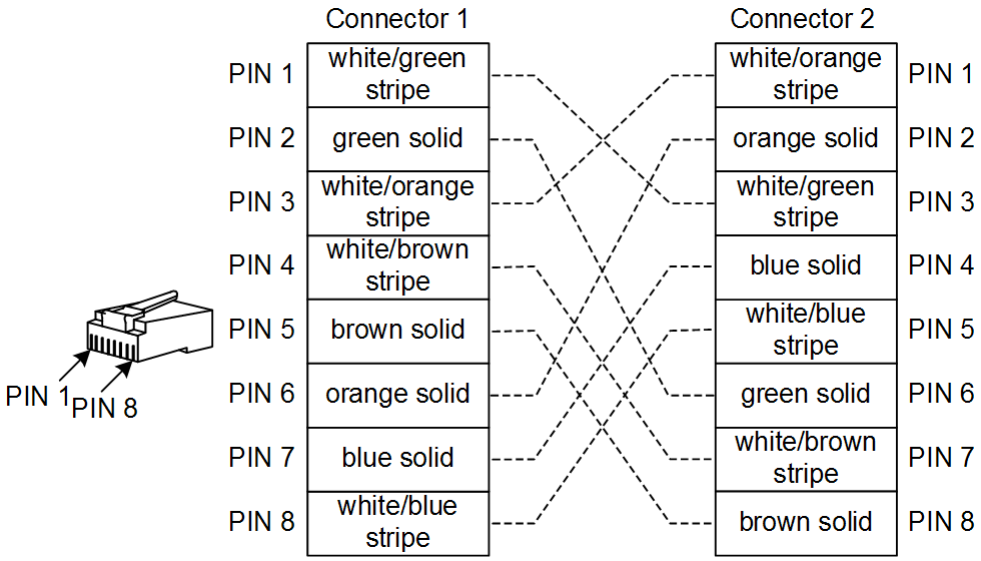


Figure 6-5 shows wiring of 1000 Mbit/s crossover cable.

Figure 6-5 Wiring of 1000 Mbit/s crossover cable



Technical specifications

Table 6-7 lists technical specifications of the Ethernet cable.

Table 6-7 Technical specifications of Ethernet cable

Item	Description
Name	• Straight-through cable: CBL-ETH-RJ45/RJ45-D • Crossover cable: CBL-ETH-RJ45/RJ45-X-D
Connector	RJ45 crystal head

Item	Description
Model	Cat 5 or better UTP (UTP-5 or UTP-5e) or STP cable
Number of cores	8
Length	The letter D indicates the length, which is customized. For example, if the customer requires 2-meter cables, they are named CBL-ETH-RJ45/RJ45-2m.

6.3.3 Grounding cable

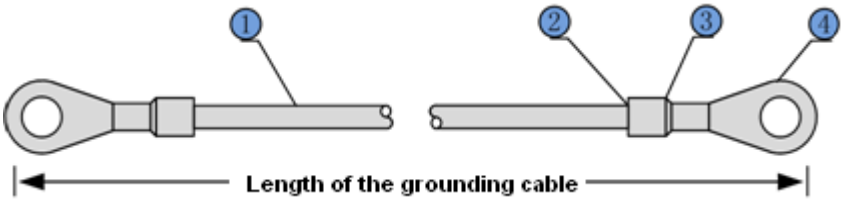
Introduction

The grounding cable is used to connect the ISCOM2100G series switch to the ground.

Appearance

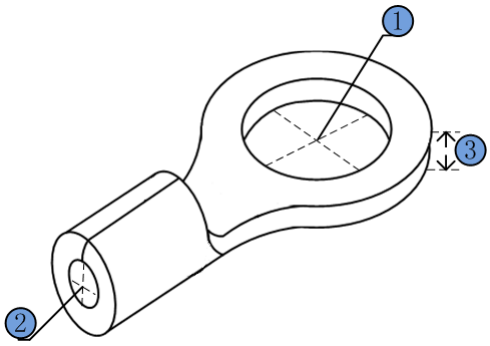
The grounding cable for the ISCOM2100G series switch is composed of wiring terminals and the coaxial cable. The wiring terminal is usually an OT bare-pressed terminal. The coaxial cable is a yellow/green copper soft flame-retardant conducting wire. Figure 6-6 and Figure 6-7 show the grounding cable and OT terminal.

Figure 6-6 Grounding cable



1	Conductive wire	2	Stripped end (connected to the OT terminal)
3	Insulating sheath	4	OT terminal

Figure 6-7 OT terminal



1	Terminal inner radius	2	Sheath inner radius	3	Thickness of soldering terminal

Technical specifications

Table 6-8 lists technical specifications of the grounding cable.

Table 6-8 Technical specifications of the grounding cable

Parameter	Description
Model (recommended)	PIL-grounding cable-Φ4-D.
Conducting wire	Yellow/Green multi-strand copper-core conducting wire (1.25 mm^2)
Model	Protective grounding round pressed terminal (M4)
Intersecting area of the wire for the OT terminal	16–15AWG (1.2–1.5 mm^2)
Length	1 m

Note

The grounding cable cannot be longer than 30 m and should be as short as possible; otherwise, a grounding bar should be used.

6.3.4 DC power cable

Introduction

The DC power cable transmits -48 VDC power to the power interface on the ISCOM2100G series switch, and supplies power for the whole device.

Appearance

A DC power cable is composed of DC connectors and power cable, as shown in Figure 6-8.

Figure 6-8 DC power cable

Technical specifications

Table 6-9 lists technical specifications of the DC power cable.

Table 6-9 Technical specifications of the DC power cable

Item	Description
Name	POL-DC-U-shaped terminal/stripped-0.75mm^2-1.5m
Color	Red (+VIN) and black (-VIN)
Stripped	Stripped end 10mm tinning
U-shape terminal	22-16KT soldering lug
Inner conductor wire gauge	18 AWG
Inner conductor sectional area	2×0.75 mm^2
Length	1.5 m

6.3.5 AC power cables

Introduction

The AC power cable transmits 220 VAC power to the power interface on the ISCOM2100G series switch, and supplies power for the whole device.

The ISCOM2100G series switch uses different AC power cables in different countries or regions, as lists in Table 6-10.

Table 6-10 AC power supply cable options

Regional standard	Cable
European	European standard-French mode head/receptacle-10A/250V-1.5m/RoHS
American	American standard-3-pin-10A/250V-1.5m/RoHS

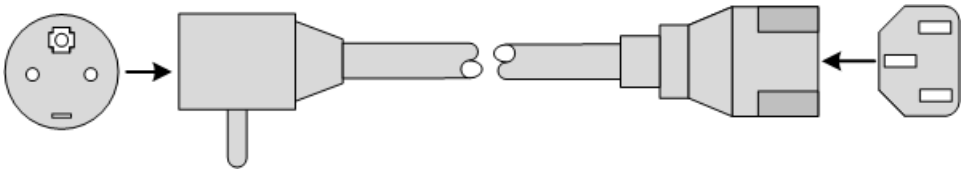
Note

Raisecom can provide cables used in some other countries, such as Brazil. You can contact Raisecom technical support engineers if needed.

Appearance

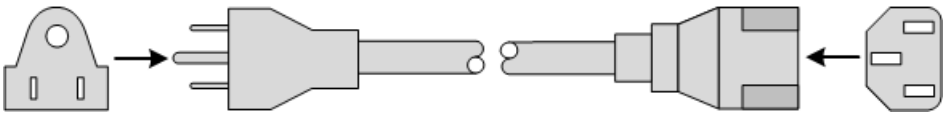
The AC power cable which meets European standard is composed of the European standard French mode 3-pin plug and receptacle connector, as shown in Figure 6-9.

Figure 6-9 European AC power cable



The AC power cable which meets American standard is composed of the American standard 3-pin plug and receptacle connector, as shown in Figure 6-10.

Figure 6-10 American AC power cable



Technical specifications

Table 6-11 lists specifications of the European standard AC power cable.

Table 6-11 Specifications of European standard AC power cable

Parameter	Description
Name	European standard French mode head/receptacle-10A/250V-1.5m/RoHS
Color	• External: black (PVC insulation layer) • Internal: blue (N) and brown (L)
Connector 1	Receptacle connector
Connector 2	European standard French mode 3-pin plug
Inner conductor wire gauge	18 AWG
Inner conductor sectional area	3×0.75 mm^2
Length	1.5 m

Table 6-12 lists specifications of the American standard AC power cable.

Table 6-12 Specifications of American standard AC power cable

Parameter	Description
Name	American standard 3-pin-10A/250V-1.5m/RoHS
Color	• External: black (PVC insulation layer) • Internal: blue (N) and brown (L)
Connector 1	Receptacle connector
Connector 2	American standard 3-pin plug NEMA5-15
Inner conductor wire gauge	18 AWG

Parameter	Description
Inner conductor sectional area	3×0.75 mm^2
Length	1.5 m

6.3.6 Console cable

Introduction

With the Console cable, you can log in to the ISCOM2100G series switch through the Console interface, and then debug and maintain it from a PC.

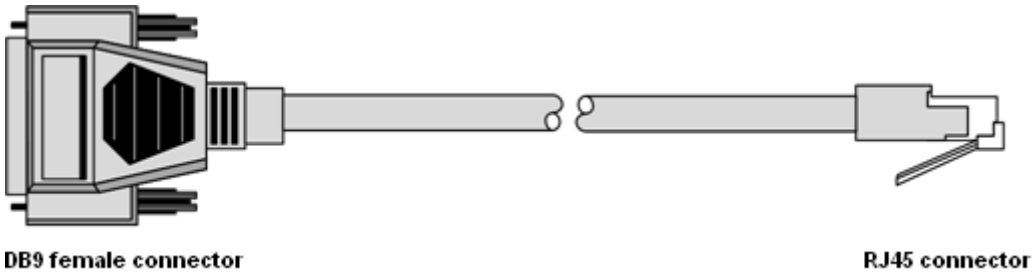
The Console cable is an 8-core unshielded cable, with connectors as below:

- RJ45 connector: connected to the Console interface on the ISCOM2100G series switch
- DB9 female connector: connected to the Console interface on the PC

Appearance

Figure 6-11 shows the Console cable.

Figure 6-11 Console cable



Wiring

Table 6-13 lists wiring of the RJ45 Console interface.

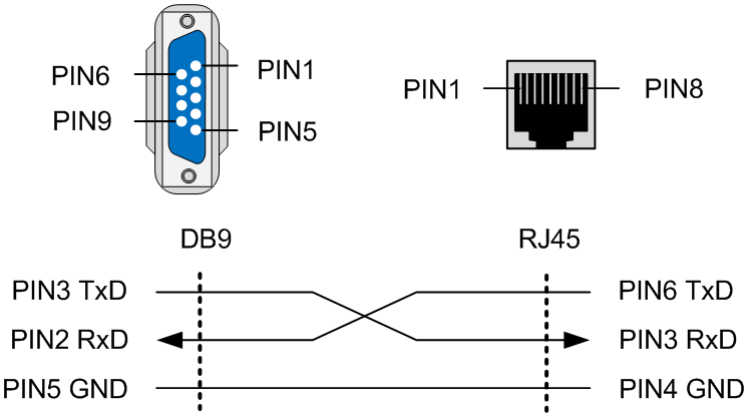
Table 6-13 Wiring of RJ45 Console interface

PIN	PIN functions	
	Switch (RJ45)	Console (DB9)
PIN 1	NC	DCD
PIN 2	NC	RxD
PIN 3	RxD	TxD
PIN 4	GND	DTR
PIN 5	GND	GND

PIN	PIN functions	
	Switch (RJ45)	Console (DB9)
PIN 6	TxD	DSR
PIN 7	NC	RTS
PIN 8	NC	CTS
PIN 9	–	RI

Figure 6-12 shows wiring between the DB9 female connector and the RJ45 Console interface on the ISCOM2100G series switch.

Figure 6-12 Wiring between DB9 female connector and RJ45 Console interface



Technical specifications

Table 6-14 lists technical specifications of the RJ45 Console cable.

Table 6-14 Technical specifications of RJ45 Console cable

Item	Description
Name	CBL-RS232-DB9F/RJ45-2m
Color	White
Model	Unshielded Cat 5 flat cable
Connector	RJ45 connector and DB9 female connector
Number of cores	8
Length	2 m

7 Compliant standards and protocols

This chapter describes compliant standards and protocols for the ISCOM2100G series switch, including the following sections:

- International standards and protocols
- Safety and environment standards
- Laser security class
- Reliability specifications

7.1 International standards and protocols

The ISCOM2100G series switch complies with international standards and protocols, as listed in Table 7-1.

Table 7-1 International standards and protocols

Standard	Description
IEEE	
IEEE 802.2	IEEE standard for local and metropolitan area networks: Specific requirements Part 2: Logical Link Control
IEEE 802.3	IEEE standard for local and metropolitan area networks: Specific requirements Part 3: Carrier Sense Multiple Access with Collision Detection (CSMA/CD) Access Method and Physical Layer Specifications (includes 802.3ab, 802.3ac and 802.3ad)
IEEE 802.3u	Definition of Fast Ethernet (100BTX, 100BT4, 100BFX)
IEEE 802.3x	Definition of Full Duplex operation in a switched LAN
IEEE 802.3z	Definition of Gigabit Ethernet (over Fiber)
IEEE 802.3ad	Definition of Ethernet VLAN Trunking
IEEE 802.3af	Power over Ethernet (15.4W)
IEEE 802.3at	Power over Ethernet (30W)

Standard	Description
IEEE 802.1D	MAC bridges
IEEE 802.1p	Traffic Class Expediting and Dynamic Multicast Filtering
IEEE 802.1q	IEEE standard for local and metropolitan area networks: Virtual Bridged Local Area Networks
IEEE 802.1w	Rapid Reconfiguration of Spanning Tree
IEEE 802.1x	Port Based Network Access Control
ITU-T	
ITU-T G.983.3	A broadband optical access system with increased service capability by wavelength allocation
ITU-T G.983.3 Amendment 1	A broadband optical access system with increased service capability by wavelength allocation Amendment 1
ITU-T G.983.4	A broadband optical access system with increased service capability using dynamic bandwidth assignment
ITU-T G.983.5	A broadband optical access system with enhanced survivability
ITU-T G.984.1	Gigabit-capable Passive Optical Networks (GPON): General Characteristics
ITU-T G.984.2	Gigabit-capable Passive Optical Networks (GPON): Physical Media Dependent (PMD) Layer Specification
ITU-T G.984.3	Gigabit-capable Passive Optical Networks (GPON):Transmission Convergence Layer Specification
ITU-T G.984.4	Gigabit-capable Passive Optical Networks(GPON):ONU Management and Control Interface Specification
ITU-T G.652	Characteristics of a single-mode optical fibre and cable
ITU-T G.692	Optical interfaces for multi-channel systems with optical amplifiers
ITU-T G.872	Architecture of optical transport network
ITU-T G.873	Optical transport networks requirements
ITU-T G.911	Parameters and calculation methodologies for reliability and availability of fiber optic systems
Draft prETS 300 672	TM 1 Relevant generic characteristics of optical amplifier devices and sub-systems
ITU-T M.3010	Principles for a Telecommunications management network
ITU-T -G.704	Synchronous Frame Structures Used at Primary Hierarchical Levels, July 1995.
ITU-T G.703	Physical/electrical characteristics of hierarchical digital interfaces
ITU-T G.823	The control of jitter and wander within digital networks which are based on the 2048 kbit/s hierarchy

Standard	Description
ITU-T G.957	Optical interfaces for equipments and systems relating to the synchronous digital hierarchy
ITU-T G.825	The control of jitter and wander within digital networks which are based on the synchronous digital hierarchy (SDH)
RFC	
RFC0768	UDP
RFC0783	The TFTP Protocol (Revision 2)
RFC0791	IP
RFC0792	ICMP
RFC0793	TCP
RFC0826	ARP
RFC0854	Telnet
RFC0894	Standard for transmitting IP packet on Ethernet
RFC2236	IGMP v2
RFC1155	Structure and identifier of the Internet management information based on TCP/IP
RFC1157	Simple Network Management Protocol (SNMP)
RFC1213	Internet Network Management Information Base based on TCP/IP: MIB-II
RFC1493	Bridge MIB
RFC1643	Definitions of Managed Objects for the Ethernet-like Interface Types
RFC1757	Remote Network Monitoring Management Information Base
RFC1907	Management Information Base for Version 2 of the Simple Network Management Protocol (SNMPv2)
RFC2131	DHCP Relay
RFC2236	Internet Group Management Protocol, Version 2 Internet
RFC2613	Remote Network Monitoring MIB Extensions for Switched Networks
RFC2652	Ethernet Interface MIB
RFC2819	Remote Network Monitoring
RFC1027	Using ARP to implement transparent subnet gateways (ARP Proxy)
Internet-Draft	Virtual Broadband Access Server Protocol for communicating between BAS and IP-DSLAM (draft-abel-vbas-01.txt)

7.2 Safety and environment standards

The ISCOM2100G series switch complies with the following safety and environment standards, as listed in Table 7-2.

Table 7-2 Safety and environment standards

Item	Requirements
Safety standards	• EN 60950 • IEC 60825 • IEC 60950-1999 • UL 1950 • UL60950
EMC	• ETSI EN 300 386 V1.2.1 • EN55022 • EN55024
Protection	• GR-1089-CORE • ITU-T K.20 • IP20

7.3 Laser security class

According to the Tx power of Laser, the ISCOM2100G series switch laser belongs to Class 1 in security class.

In Class 1, the maximum Tx power on the optical interface is smaller than 10 dBm (10 mW).

Warning

The laser inside fiber may hurt your eyes. Do not stare into the optical interface directly during installation and maintenance.

7.4 Reliability specifications

Table 7-3 lists reliability specifications of the ISCOM2100G series switch.

Table 7-3 Reliability specifications of the ISCOM2100G series switch

Specifications	Requirements
System availability	99.999%. The annual failure time for the ISCOM2100G series switch should be no longer than 5 minutes.
Annually system mean repair rate	< 0.2%
MTTR	< 2 hours
MTBF	100000 hours

8 Appendix

The appendix includes the following sections:

- Terms
- Acronyms and abbreviations

8.1 Terms

C

Connectivity Fault Management (CFM)	A standard defined by IEEE, used to diagnose fault for Ethernet Virtual Connection (EVC). Cost-effective by fault management function and improve Ethernet maintenance.

E

Ethernet Linear Protection Switching (ELPS)	It is an APS protocol based on ITU-T G.8031 standard. It, an end-to-end protection technology, protects an Ethernet link. It has two linear protection methods: linear 1:1 APS and linear 1+1 APS.

L

Link Aggregation	With link aggregation, multiple physical Ethernet ports are combined to form a logical aggregation group. Multiple physical links in one aggregation group are taken as a logical link. Link aggregation helps share traffic among members in an aggregation group. In addition to effectively improve the reliability on links between devices, link aggregation can help gain higher bandwidth without upgrading hardware.

Q

QinQ	QinQ (also called Stacked VLAN or Double VLAN) technology is an extension of 802.1Q, which is defined in the 802.1ad standard defined by the IEEE. Basic QinQ is a simple Layer 2 VPN tunnel technology. At the ISP's access end, QinQ encapsulates an outer VLAN Tag for a private packet, so that the packet traverses the backbone network of the Internet Service Provider (ISP) carrying double VLAN tags. In the Internet, the packet is transmitted according to the outer VLAN Tag (public VLAN Tag). And the private VLAN Tag is transmitted as the data in the packet.

8.2 Acronyms and abbreviations

A	
ACL	Access Control List
APS	Automatic Protection Switching
C	
CCM	Continuity Check Message
CFM	Connectivity Fault Management
CoS	Class of Service
D	
DoS	Deny of Service
DRR	Deficit Round Robin
DSCP	Differentiated Services Code Point
E	
EFM	Ethernet in the First Mile
E-LMI	Ethernet Local Management Interface
ELPS	Ethernet Linear Protection Switching
ERPS	Ethernet Ring Protection Switching
EVC	Ethernet Virtual Connection
F	
FTP	File Transfer Protocol

G

GARP	Generic Attribute Registration Protocol
GPS	Global Positioning System
GSM	Global System for Mobile Communications
GVRP	GARP VLAN Registration Protocol

I

IEEE	Institute of Electrical and Electronics Engineers
IETF	Internet Engineering Task Force
IP	Internet Protocol
ITU-T	International Telecommunications Union - Telecommunication Standardization Sector

L

LACP	Link Aggregation Control Protocol
LBM	LoopBack Message
LBR	LoopBack Reply
LLDP	Link Layer Discovery Protocol
LLDPDU	Link Layer Discovery Protocol Data Unit
LTM	LinkTrace Message
LTR	LinkTrace Reply

M

MA	Maintenance Association
MAC	Medium Access Control
MD	Maintenance Domain
MEG	Maintenance Entity Group
MEP	Maintenance associations End Point
MIB	Management Information Base
MIP	Maintenance association Intermediate Point
MSTI	Multiple Spanning Tree Instance
MSTP	Multiple Spanning Tree Protocol
MTBF	Mean Time Between Failure

MTTR	Mean Time To Restoration
N	
NNM	Network Node Management
O	
OAM	Operation, Administration, and Maintenance
P	
PC	Personal Computer
Q	
QoS	Quality of Service
R	
RADIUS	Remote Authentication Dial In User Service
RMON	Remote Network Monitoring
RMEP	Remote Maintenance association End Point
RNC	Radio Network Controller
RSTP	Rapid Spanning Tree Protocol
S	
SFP	Small Form-factor Pluggables
SLA	Service Level Agreement
SNMP	Simple Network Management Protocol
SNTP	Simple Network Time Protocol
SP	Strict-Priority
SSHv2	Secure Shell v2
STP	Spanning Tree Protocol
T	
TACACS+	Terminal Access Controller Access Control System
TCP	Transmission Control Protocol

TFTP	Trivial File Transfer Protocol
TLV	Type, Length, Value
ToS	Type of Service

U

UART	Universal Asynchronous Receiver/Transmitter

V

VLAN	Virtual Local Area Network

W

WRR	Weight Round Robin

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