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ISCOM2900 Series Product Description (Rel_07)

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Notice

Preface

Objectives

This document describes product overview, networking applications, system structure, device installation, and technical specifications of the ISCOM2900 series switch.

The appendix describes cables and service interface module parameters, and 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
ISCOM2924G-4C	A or later	REAP_1.2.3617
ISCOM2948G-4C	A or later	REAP_1.2.3617
ISCOM2948GF-4C	A or later	REAP_1.2.3617
ISCOM2924GF-4GE	A or later	REAP_1.2.3617
ISCOM2924GF-4C	A or later	REAP_1.2.3617

Conventions

Symbol conventions

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

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

Symbol	Description
	Indicate a potentially hazardous situation that, if not avoided, could cause equipment damage, data loss, and performance degradation, or unexpected results.
	Provide additional information to emphasize or supplement important points of the main text.
	Indicate 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	Buttons and navigation path are in **Boldface**.
Italic	Book titles are in *italics*.
`Lucida Console`	Terminal display is in `Lucida Console`.
Book Antiqua	Heading 1, Heading 2, Heading 3, and Block are in Book Antiqua.

Change history

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

Issue 07 (2018-03-12)

Seventh commercial release

- Modified the software version to REAP_1.2.3617.

Issue 06 (2017-05-15)

Sixth commercial release

- Upgraded software version to 1.2.3324.

Issue 05 (2016-07-15)

Fifth commercial release

- Upgraded software version to 1.2.3010.

Issue 04 (2016-05-18)

Fourth commercial release

- Fixed known bugs.

Issue 03 (2014-06-15)

Third commercial release

- Upgraded software version to 1.2.500.
- Optimized other parts.

Issue 02 (2014-02-28)

Second commercial release

- Modified the CBL-RS232-DB9F/RJ45-2m cable to the CBL-RS232-DB9F/RJ45-2m/RoHS cable.
- Optimized other parts.

Issue 01 (2013-12-18)

Initial commercial release

Contents

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1 Overview

This chapter is an overview of the ISCOM2900 series switch, including the following sections:

- Introduction
- Characteristics
- Features
- Ordering information

1.1 Introduction

The enhanced aggregation Ethernet switch ISCOM2900 series (hereinafter referred to as the ISCOM2900 series switch), developed by Raisecom, is designed for the access layer of the 10GE Metropolitan Access Network (MAN) and used as an aggregation device in the solution of all optical interface switch+Ethernet Demarcation Device (EDD).

The ISCOM2900 series switch includes the following 5 models:

- ISCOM2924G-4C: provide four 10 Gbit/s SFP+ interfaces in the uplink and twenty-four 1000 Mbit/s RJ45 interfaces in the downlink.
- ISCOM2948GF-4C: provide four 10 Gbit/s SFP+ interfaces in the uplink and forty-eight 1000 Mbit/s Small Form-factor Pluggable (SFP) interfaces in the downlink.
- ISCOM2948G-4C: provide four 10 Gbit/s SFP+ interfaces in the uplink and forty-eight 1000 Mbit/s RJ45 interfaces in the downlink.
- ISCOM2924GF-4GE: provide four 1000 Mbit/s Combo interfaces in the uplink and twenty-four 1000 Mbit/s SFP interfaces in the downlink.
- ISCOM2924GF-4C: provide four 10 Gbit/s SFP+ interfaces in the uplink and twenty-four 1000 Mbit/s SFP interfaces in the downlink.

Note

The Combo interface is a pair of Ethernet interfaces (usually an optical interface and an electrical interface) on the panel of a switch, but there is only one forwarding interface inside the switch. The Combo electrical interface and the optical interface multiplex each other, so you can choose one of them according to actual networking conditions. However, they cannot work concurrently; namely, when one is enabled, the other is automatically disabled.

1.2 Characteristics

The ISCOM2900 series switch supports various services types, and provides rich characteristics, thus guaranteeing quality and efficiency of service transmission.

1.2.1 Multi-service processing capability

The ISCOM2900 series switch is deployed on the access layer of a MAN. It can aggregate services from the downstream Access Gateway (AG), Passive Optical Network (PON), and Digital Subscriber Line Access Multiplexer, and Local Access Network (LAN) switch, to an upstream device.

The ISCOM2900 series switch can aggregate the following services:

- Next Generation Network (NGN) voice service
- Internet Protocol Television (IPTV) and Video On Demand (VOD) service
- Data service

The ISCOM2900 series switch, by adopting reliability networking technologies, supports multicast, provides good Quality of Service (QoS) mechanism and multiple protection switching technologies, and implements good bandwidth guarantee and multi-service supporting capabilities.

1.2.2 Flexible networking applications

The ISCOM2900 series switch can work as an aggregation device, providing up to 10 Gbit/s rate on the uplink interface. It can also work as a high-end access device, providing 1000 Mbit/s rate to PCs.

The ISCOM2900 series switch supports RJ45 and Small Form-factor Pluggable (SFP) downlink interfaces. It supports 1000 Mbit/s or 10 Gbit/s rate on the uplink interface according to the inserted SFP module. You can choose proper length of fiber according to transmission distance.

The ISCOM2900 series switch supports tree, star, and ring Ethernet.

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 ISCOM2900 series switch supports the following traffic management technologies:

- Priority trust
- Traffic classification
- Traffic policy
- Priority mapping
- Queue scheduling, supporting SP, WRR, DRR, SP+DRR, and SP+DRR
- Congestion avoidance

- Rate limiting based on interface, Virtual Local Area Network (VLAN), and interface+VLAN.

1.2.4 Powerful multicast features

The ISCOM2900 series switch supports the following multicast features:

- Support Internet Group Message Protocol (IGMP) Snooping and IGMP Proxy, 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. How to guarantee security of private data and resources on an open network has drawn people's attention. For this, the ISCOM2900 series switch provides the following security guarantee features:

- Support multiple access control and user authentication technologies, such as Access Control List (ACL), dynamic Address Resolution Protocol (ARP) detection, Remote Authentication Dial In User Service (RADIUS), Terminal Access Controller Access Control System (TACACS+), and IP Source Guard, thus effectively enhancing security of the network and the ISCOM2900 series switch.
- Provide interface isolation 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.
- Support storm control, thus enhancing network security.
- 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 Reliable carrier-grade design

The ISCOM2900 series switch provides the following carrier-grade design:

- Support Ethernet Linear Protection Switching (ELPS), namely, G.8031, and Ethernet Ring Protection Switching (ERPS), namely, G.8032, which provides reliable carrier-grade networking.
- Support Layer 2 and Layer 3 SLA.
- Support Ethernet ring (single ring, tangent ring, and intersecting ring) network protection, with a switching time less than 50ms, which has reached the carrier-grade standard.

1.2.7 Rich management features

The ISCOM2900 series switch supports the following management and maintenance modes:

- Support Trivial File Transfer Protocol (TFTP), File Transfer Protocol (FTP), Telnet, and Secure Shell (SSH), and support complete software upgrade.
- Support IEEE 802.1ag and 802.3ah Ethernet Operation, Administration, and Maintenance (OAM) functions.
- Support DHCP Server/Client/Relay.
- Support local management and configuration through the Console interface.
- Support NView Network Node Management (NNM) through the service interface and Simple Network Management Protocol (SNMP) interface.

1.2.8 Overall lightning protection

The power modules and Ethernet interface of the ISCOM2900 series switch support lightning protection, which can adapt to various bad environment, low probability of failure in lightning, and enhance device reliability:

- 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
- Ethernet electrical interface: 1 kV in indoor common mode

1.3 Features

Table 1-1 lists features of the ISCOM2900 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, with a maximum frame length of 12 Kbytes • VLAN (4094 VLANs) • User VLAN • QinQ • 1:1 VLAN mapping • Loopback detection • Interface protection • Port mirroring • L2CP • Layer 2 protocol transparent transmission

Feature	Description
IP services	• ARP • Layer 3 interface • DHCP Client • DHCP Server • DHCP Relay • DHCP Snooping • DHCP Option 82/DHCP Option 61/IPv6 DHCP Option 18
QoS	• Trust priority • Traffic classification (IP precedence, DSCP priority, and CoS priority) and traffic policy (rate limiting based on traffic policy, redirection, and remarking) • Local priority mapping and queue scheduling • Interface-based and VLAN-based rate limiting • QoS enhancement
Multicast	• IGMP Snooping • IGMP MVR • IGMP Proxy • IGMP filtering
Security	• Secure MAC • ACL • Dynamic ARP inspection • RADIUS authentication • TACACS+ • 802.1X • PPPoE+ • Storm control • IP Source Guard
Reliability	• Link aggregation • Interface backup • ELPS (ITU-T G.8031) • ERPS (ITU-T G.8032) • Ethernet ring • Link-state tracking
OAM	• EFM (IEEE 802.3ah) • CFM (IEEE 802.1ag/ITU-Y.1731) • SLA • E-LMI • Service

Feature	Description
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

1.4 Ordering information

1.4.1 Naming convention

Figure 1-1 shows the naming convention for the ISCOM2900 series switch.

Figure 1-1 Naming convention

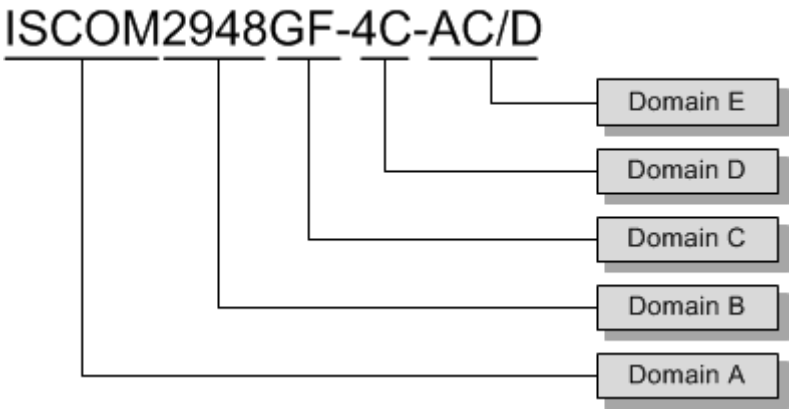


Table 1-2 describes naming convention for the ISCOM2900 series switch.

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	29	It is one of the 2900 series.
		24/48	• 24: it provides 24 downlink interfaces. • 48: it provides 48 downlink interfaces.

Domain	Indication	Value	Description
C	Product attributes	G	It is an all 1000 Mbit/s device.
		F	It can be configured with all optical interfaces.
D	Number and parameters of uplink interfaces	4	It supports 4 uplink interfaces.
		C/GE	• C: it supports the 10GE uplink interface. • GE: it supports 1000 Mbit/s Combo uplink interface.
E	Power type	AC/D	It supports dual-AC power.
		DC/D	It supports dual-DC power.
		AC_DC	It supports hybrid AC/DC power.

1.4.2 Ordering information about device

Table 1-3 lists ordering information about the ISCOM2900 series switch.

Table 1-3 Ordering information about device

Model	Description
ISCOM2924G-4C-AC/D	• Support twenty-four 10/100/1000 Mbit/s RJ45 downlink interfaces. • Support four 10 Gbit/s SFP+ uplink interfaces. • Support the SNMP interface and out-of-band network management. • Support dual 220 VAC power.
ISCOM2924G-4C-DC/D	• Support twenty-four 10/100/1000 Mbit/s RJ45 downlink interfaces. • Support four 10 Gbit/s SFP+ uplink interfaces. • Support the SNMP interface and out-of-band network management. • Support dual -48 VDC power.
ISCOM2924G-4C-AC_DC	• Support twenty-four 10/100/1000 Mbit/s RJ45 downlink interfaces. • Support four 10 Gbit/s SFP+ uplink interfaces. • Support the SNMP interface and out-of-band network management. • Support hybrid AC/DC power.
ISCOM2948G-4C-AC/D	• Support forty-eight 10/100/1000 Mbit/s RJ45 downlink interfaces. • Support four 10 Gbit/s SFP+ uplink interfaces. • Support the SNMP interface and out-of-band network management. • Support dual 220 VAC power.
ISCOM2948G-4C-DC/D	• Support forty-eight 10/100/1000 Mbit/s RJ45 downlink interfaces. • Support four 10 Gbit/s SFP+ uplink interfaces. • Support the SNMP interface and out-of-band network management. • Support dual -48 VDC power.
ISCOM2948G-4C-AC_DC	• Support forty-eight 10/100/1000 Mbit/s RJ45 downlink interfaces. • Support four 10 Gbit/s SFP+ uplink interfaces. • Support the SNMP interface and out-of-band network management. • Support hybrid AC/DC power.
ISCOM2948GF-4C-AC/D	• Support forty-eight 100/1000 Mbit/s SFP downlink interfaces. • Support four 10 Gbit/s SFP+ uplink interfaces. • Support the SNMP interface and out-of-band network management. • Support dual 220 VAC power.

Model	Description
ISCOM2948GF-4C-DC/D	• Support forty-eight 100/1000 Mbit/s SFP downlink interfaces. • Support four 10 Gbit/s SFP+ uplink interfaces. • Support the SNMP interface and out-of-band network management. • Support dual -48 VDC power.
ISCOM2948GF-4C-AC/DC	• Support forty-eight 100/1000 Mbit/s SFP downlink interfaces. • Support four 10 Gbit/s SFP+ uplink interfaces. • Support the SNMP interface and out-of-band network management. • Support hybrid AC/DC power.
ISCOM2924GF-4GE-AC/D	• Support twenty-four 100/1000 Mbit/s SFP downlink interfaces. • Support four 1000 Mbit/s Combo uplink interfaces. • Support the SNMP interface and out-of-band network management. • Support dual 220 VAC power.
ISCOM2924GF-4GE-DC/D	• Support twenty-four 100/1000 Mbit/s SFP downlink interfaces. • Support four 1000 Mbit/s Combo uplink interfaces. • Support the SNMP interface and out-of-band network management. • Support dual -48 VDC power.
ISCOM2924GF-4GE-AC_DC	• Support twenty-four 100/1000 Mbit/s SFP downlink interfaces. • Support four 1000 Mbit/s Combo uplink interfaces. • Support the SNMP interface and out-of-band network management. • Support hybrid AC/DC power.
ISCOM2924GF-4C-AC/D	• Support twenty-four 100/1000 Mbit/s SFP downlink interfaces. • Support four 10 Gbit/s SFP+ uplink interfaces. • Support the SNMP interface and out-of-band network management. • Support dual 220 VAC power.
ISCOM2924GF-4C-DC/D	• Support twenty-four 100/1000 Mbit/s SFP downlink interfaces. • Support four 10 Gbit/s SFP+ uplink interfaces. • Support the SNMP interface and out-of-band network management. • Support dual -48 VDC power.
ISCOM2924GF-4C-AC_DC	• Support twenty-four 100/1000 Mbit/s SFP downlink interfaces. • Support four 10 Gbit/s SFP+ uplink interfaces. • Support the SNMP interface and out-of-band network management. • Support hybrid AC/DC power.

1.4.3 Ordering information about auxiliary parts

The ISCOM2900 series switch can be equipped with the following auxiliary parts:

- 100 Mbit/s SFP optical module
- 100 Mbit/s SFP electrical module
- 1000 Mbit/s SFP optical module
- 1000 Mbit/s SFP electrical module
- 10 Gbit/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
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

100 Mbit/s SFP electrical module

Table 1-5 lists ordering information about the 100 Mbit/s SFP electrical module.

Table 1-5 Ordering information about 100 Mbit/s SFP electrical module

Model	Description
USFP-FE/AN-R	• Transmission rate: 125 Mbit/s • Target transmission distance: 100 m • Enabled with auto-negotiation • SerDes interface

1000 Mbit/s SFP optical module

Table 1-6 lists ordering information about the 1000 Mbit/s SFP optical module.

Table 1-6 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
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

Model	Description
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
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

1000 Mbit/s SFP electrical module

Table 1-7 lists ordering information about the 1000 Mbit/s SFP electrical module.

Table 1-7 Ordering information about 1000 Mbit/s SFP electrical module

Model	Description
USFP-GE-R	• Transmission rate: 1000 Mbit/s • Target transmission distance: 100 m • SerDes interface
USFP-GE/AN-R	• Transmission rate: 10/100/1000 Mbit/s • Target transmission distance: 100 m • SGMll interface

10 Gbit/s SFP+ optical module

Table 1-8 lists ordering information about the 10 Gbit/s SFP+ optical module.

Table 1-8 Ordering information about 10 Gbit/s SFP+ optical module

Model	Description
USFP+-192/M	• Transmission rate: 10 Gbit/s • Target transmission distance: 300 m • Tx wavelength: 850 nm • Dual-fiber multi-mode SFP+ optical module
USFP+-192/S1	• Transmission rate: 10 Gbit/s • Target transmission distance: 10 km • Tx wavelength: 1310 nm • Dual-fiber single-mode SFP+ optical module
USFP+-192/S2	• Transmission rate: 10 Gbit/s • Target transmission distance: 40 km • Tx wavelength: 1310 nm • Dual-fiber single-mode SFP+ optical module
USFP+-192/S3	• Transmission rate: 10 Gbit/s • Target transmission distance: 80 km • Tx wavelength: 1310 nm • Dual-fiber single-mode SFP+ optical module

2 Networking applications

This chapter describes typical networking applications of the ISCOM2900 series switch, including the following sections:

- MAN aggregation networking
- Small-scale network core switching networking

2.1 MAN aggregation networking

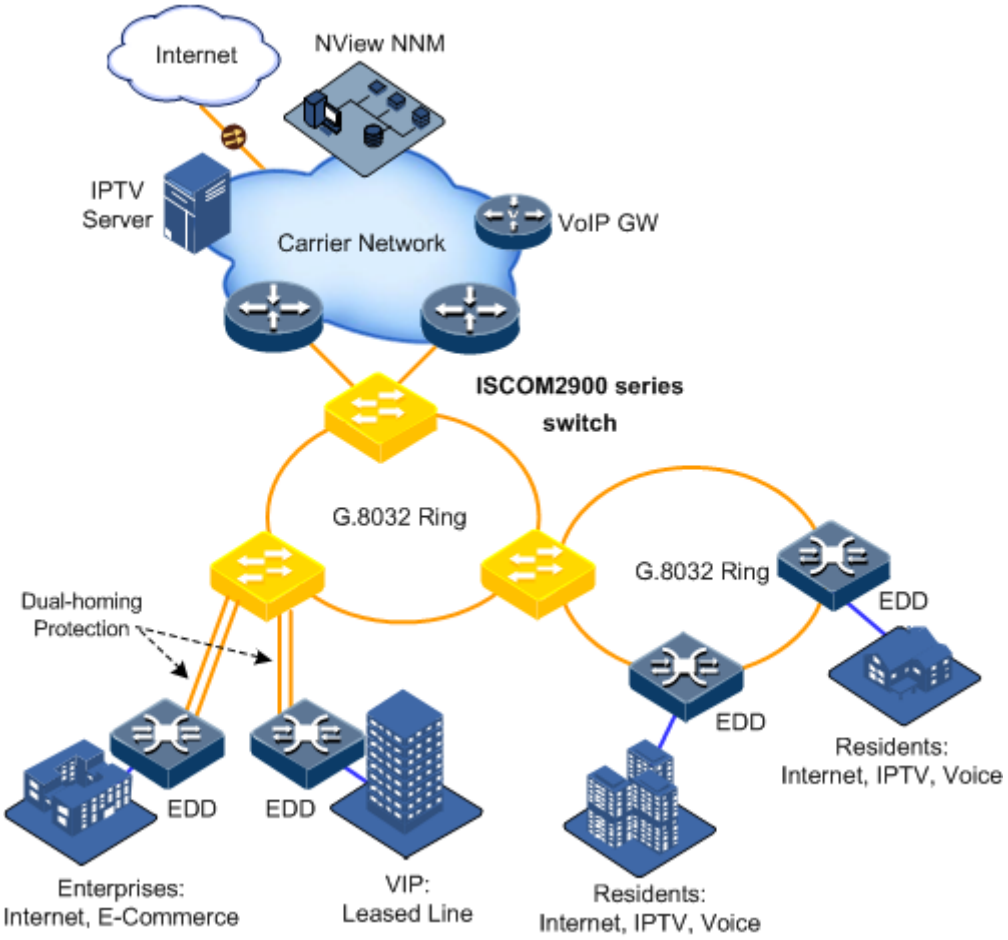
As shown in Figure 2-1, in MAN access application, the ISCOM2900 series switch and the EDD cooperate to network.

As the aggregation device, two ISCOM2900 series switches can form a G.8032 ring network, with a protection switching time less than 50ms. The ISCOM2900 series switch is connected downlink with EDDs of enterprises, campuses, and communities, thus aggregating and transmitting voice, broadband, and IPTV services.

The EDD and the ISCOM2900 series switch can form a tangent ring. The uplink interface on the EDD is connected to the ISCOM2900 series switch through fiber or the Ethernet cable, and the downlink interface is connected to users' VoIP phones, PCs, Set Top Boxes (STBs), etc. through the GE electrical interface, meeting broadband and multi-service access requirements.

In addition, two links can be configured between the ISCOM2900 series switch and the EDD of Very Importance Person (VIP) and enterprise users, thus implementing dual-homed link protection.

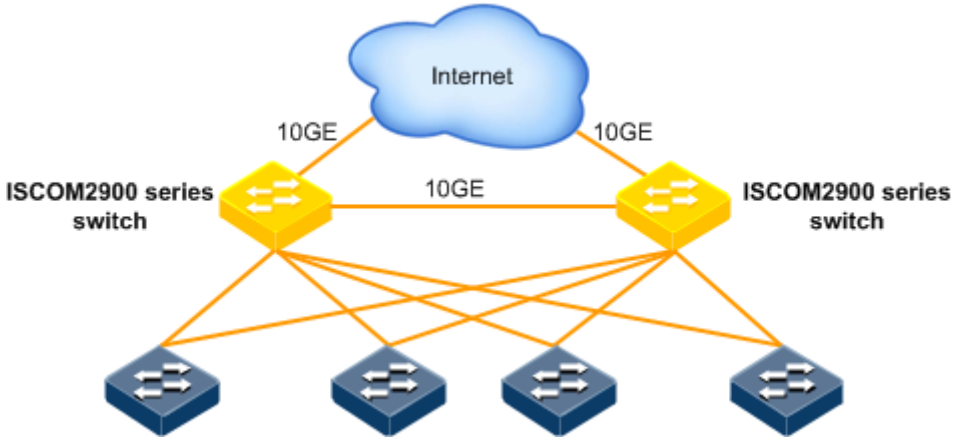
Figure 2-1 MAN aggregation networking



2.2 Small-scale network core switching networking

The ISCOM2900 series switch is a Raisecom 10 Gbit/s aggregation switch, which can be used as a core switch for the small-scale networks. As shown in Figure 2-2, the ISCOM2900 series switch is connected to the gateway through the 10GE interface and to the 1000 Mbit/s switch through the GE interface. Two ISCOM2900 series switch devices can implement Automatic Protection Switching (APS). In addition, each access switch is connected to two ISCOM2900 series switches, thus implementing dual-homed link protection.

Figure 2-2 Small-scale network core switching networking



3 System structure

This chapter describes system structure of the ISCOM2900 series switch, including the following sections:

- Panel
- Interfaces
- LEDs

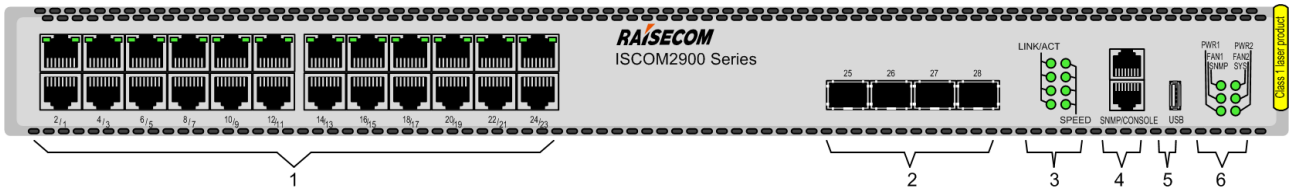
3.1 Panels

3.1.1 Front panels

ISCOM2924G-4C

Figure 3-1 shows the front panel of the ISCOM2924G-4C.

Figure 3-1 Front panel of ISCOM2924G-4C

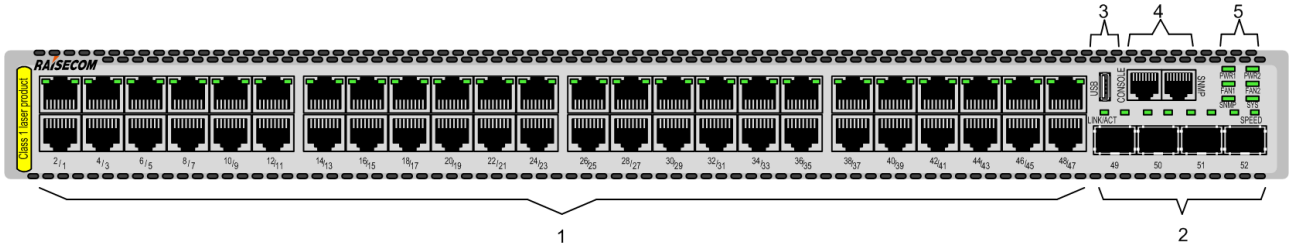


1	Service downlink interfaces (1–24) and LEDs	2	Service uplink interfaces (25–28)
3	Service uplink interfaces (25–28) and LEDs	4	SNMP interface and Console interface
5	USB interface	6	PWR, FAN, and SYS LEDs

ISCOM2948G-4C

Figure 3-2 shows the front panel of the ISCOM2948G-4C.

Figure 3-2 Front panel of ISCOM2948G-4C

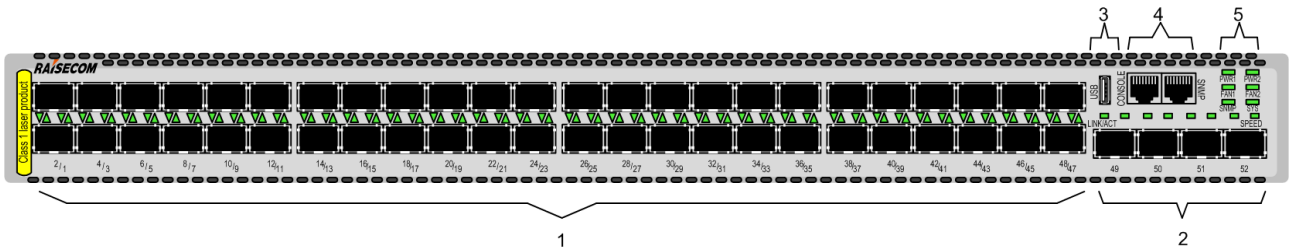


1	Service downlink interfaces (1–48) and LEDs	2	Service uplink interfaces (49–52)
3	USB interface	4	SNMP interface and Console interface
5	PWR, FAN, and SYS LEDs		

ISCOM2948GF-4C

Figure 3-3 shows the front panel of the ISCOM2948GF-4C.

Figure 3-3 Front panel of ISCOM2948GF-4C

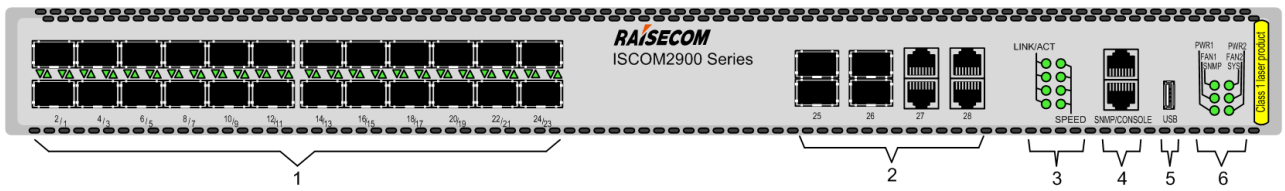


1	Service downlink interfaces (1–48) and LEDs	2	Service uplink interfaces (49–52) and LEDs
3	USB interface	4	SNMP interface and Console interface
5	PWR, FAN, and SYS LEDs		

ISCOM2924GF-4GE

Figure 3-4 shows the front panel of the ISCOM2924GF-4GE.

Figure 3-4 Front panel of ISCOM2924GF-4GE



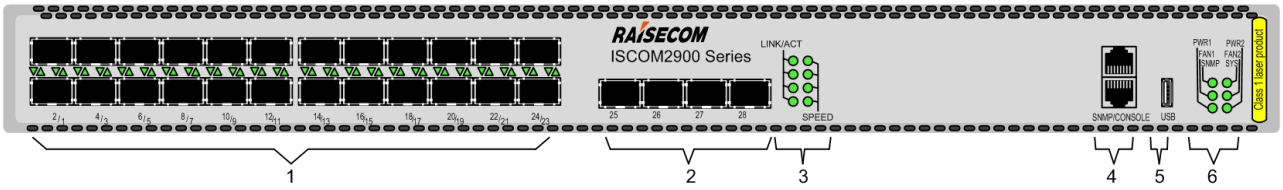
1	Service downlink interfaces (1–24) and LEDs	2	Service uplink interfaces (25–28) and LEDs

1	Service downlink interfaces (1–24) and LEDs	2	Service uplink interfaces (25–28) and LEDs
3	Service uplink interfaces and LEDs	4	SNMP interface and Console interface
5	USB interface	6	PWR, FAN, and SYS LEDs

ISCOM2924GF-4C

Figure 3-5 shows the front panel of the ISCOM2924GF-4C.

Figure 3-5 Front panel of ISCOM2924GF-4C



1	Service downlink interfaces (1–24) and LEDs	2	Service uplink interfaces (25–28) and LEDs
3	Service uplink interfaces and LEDs	4	SNMP interface and Console interface
5	USB interface	6	PWR, FAN, and SYS LEDs

3.1.2 Rear panels

Figure 3-6 shows the rear panel of the ISCOM2900 series switch that supports dual AC power.

Figure 3-6 Rear panel of dual AC power model

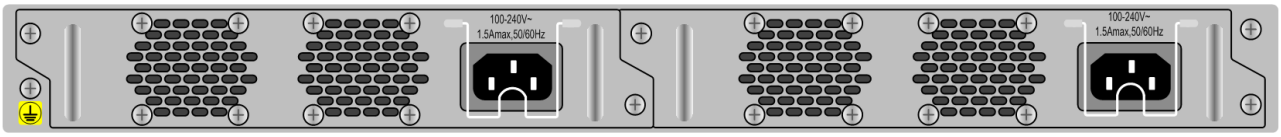


Figure 3-7 shows the rear panel of the ISCOM2900 series switch that supports dual DC power.

Figure 3-7 Rear panel of dual DC power model

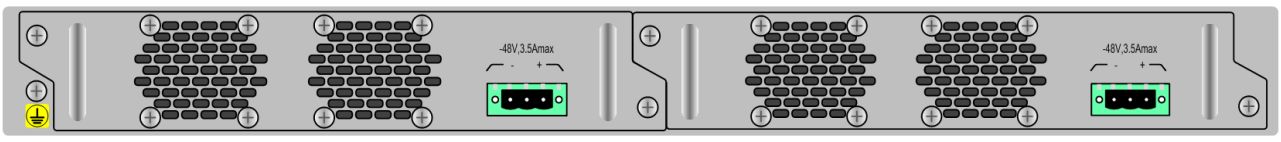
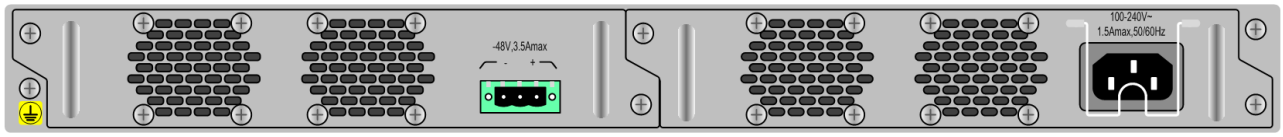


Table 3-8 shows the rear panel of the ISCOM2900 series switch that supports hybrid AC/DC power.

Figure 3-8 Rear panel of hybrid AC/DC power model



Note

- You can choose dual DC power, dual AC power, or hybrid AC/DC power for the ISCOM2900 series switch as required.
- The rear panel of the hybrid AC/DC power model supports inserting the AC or DC power module in each power slot.

3.2 Interfaces

The ISCOM2900 series switch provides external interfaces, such as service interfaces, management interfaces, and power interfaces.

3.2.1 Service interfaces

Table 3-1 lists service interfaces on the ISCOM2900 series switch.

Table 3-1 Service interfaces on the ISCOM2900 series switch

Interface		Quantity	Description
Uplink interface	• ISCOM2948GF-4C • ISCOM2948G-4C • ISCOM2924G-4C • ISCOM2924GF-4C	4	• 10 Gbit/s SFP+ optical interface: using 10GBASE-X SFP+ optical module • 1000 Mbit/s SFP optical interface: using 1000BASE-X SFP optical module • 1000 Mbit/s SFP electrical interface: using 1000BASE-T SFP electrical module
	ISCOM2924GF-4GE	4	1000 Mbit/s Combo interface The SFP interface uses the following SFP optical modules: • 1000BASE-X • 100BASE-FX The SFP interface uses the following SFP electrical modules: • 1000BASE-T

Interface		Quantity	Description
Downlink interface	ISCOM2948GF-4C	48	SFP interface The SFP interface uses the following SFP optical modules: • 1000BASE-X • 100BASE-FX The SFP interface uses the following SFP electrical modules: • 1000BASE-T • 10/100/1000BASE-T • 10/100BASE-T
	• ISCOM2924GF-4GE • ISCOM2924GF-4C	24	SFP interface The SFP interface uses the following SFP optical modules: • 1000BASE-X • 100BASE-FX The SFP interface uses the following SFP electrical modules: • 1000BASE-T • 10/100/1000BASE-T • 10/100BASE-T
	ISCOM2948G-4C	48	10/100/1000BASE-T self-adaptive electrical interface
	ISCOM2924G-4C	24	10/100/1000BASE-T self-adaptive electrical interface

10 Gbit/s SFP+ optical interface

Table 3-2 lists parameters of the 10 Gbit/s SFP+ optical interface.

Table 3-2 Parameters of 10 Gbit/s SFP+ optical interface

Parameter	Description
Connector type	LC/PC
Optical interface properties	Depend on the selected SFP optical module.
Coding type	64B/66B
Transmission rate	10 Gbit/s
Working mode	Full duplex

1000 Mbit/s SFP optical interface

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

Table 3-3 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
Supported network protocol	IP

100 Mbit/s SFP optical interface

Table 3-4 lists parameters of the 100 Mbit/s SFP optical interface.

Table 3-4 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
Supported network protocol	IP

1000 Mbit/s Ethernet electrical interface

Table 3-5 lists parameters of the 1000 Mbit/s Ethernet electrical interface.

Table 3-5 Parameters of 1000 Mbit/s Ethernet electrical interface

Parameter	Description
Connector type	RJ45
Working mode	• 10/100/1000Mbit/s auto-negotiation • Full/Half duplex auto-negotiation
Cable specifications	• When the interface rate is 10/100 Mbit/s, we recommend using the Cat 5 UTP cable. • When the interface rate is 1000 Mbit/s, we recommend using the Cat 5e UTP or STP cable.
Compliant standard	IEEE 802.3

Parameter	Description
Supported network protocol	IP

3.2.2 Management interfaces

Table 3-6 lists types and usage of management interfaces on the ISCOM2900 series switch.

Table 3-6 Management interfaces

Interface	Quantity	Description
Console (RJ45)	1	Local management and control interface. You can locally manage and configure the ISCOM2900 series switch through Hyper Terminal from this interface.
Console (USB)	1	Local management and control interface. It can be directly connected to the USB interface of a PC without the DB9 or DB25 Console cable. **Note** The USB Console interface on the ISCOM2948G-4C and ISCOM2948GF-4C is reserved.
SNMP (RJ45)	1	10/100BASE-T self-adaptive electrical interface. You can conduct out-of-band management of the ISCOM2900 series switch.

RJ45 Console interface

Table 3-7 lists parameters of the RJ45 Console interface.

Table 3-7 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

USB Console interface

Table 3-8 lists parameters of the USB Console interface.

Table 3-8 Parameters of USB Console interface

Parameter	Description
Connector type	USB
Working mode	Half duplex
Electrical feature	USB
Transmission rate	• USB1.1: 12 Mbit/s • USB2.0: 480 Mbit/s
Cable specification	4-core cable

SNMP interface

Table 3-9 lists parameters of the SNMP interface.

Table 3-9 Parameters of SNMP interface

Parameter	Description
Connector type	RJ45
Transmission rate	10/100Mbit/s auto-negotiation
Wiring	Support self-adaption to the straight-through cable and crossover cable in host mode.
Compliant standard	IEEE 802.3

3.2.3 Power interfaces

Table 3-10 lists power interfaces on the ISCOM2900 series switch.

Table 3-10 Power interfaces

Power interface	Description
AC power interface	220 VAC power
DC power interface	-48 VDC power, ranging from -36 to -72 VDC

AC power interface

Table 3-11 lists parameters of the AC power interface.

Table 3-11 Parameters of AC power interface

Parameter	Description
Connector type	3-pin plug
Rated input voltage	220 VAC
Voltage range	100–240 VAC
Frequency	50/60 Hz
Maximum input current	1.5 A

DC power interface

Table 3-12 lists parameters of the DC power interface.

Table 3-12 Parameters of DC power interface

Parameter	Description
Connector type	3-pin Phoenix connector (5.08)
Rated input voltage	-48 VDC
Voltage range	-36 to -72 VDC
Maximum input current	3.5 A

Table 3-13 describes the DC power interface.

Table 3-13 DC power interface

Power interface	Type	Print	Usage
DC power interface	3-pin Phoenix connector	–	GND power input terminal
		+	+48V power input terminal

3.3 LEDs

3.3.1 ISCOM2924G-4C

Table 3-14 lists LEDs on the ISCOM2924G-4C.

Table 3-14 LEDs on ISCOM2924G-4C

LED	Status	Description
LNK/ACT Port1–Port24	Green	1000 Mbit/s Ethernet interface working status LED • Green: the interface is working at 1000 Mbit/s. • Blinking green: the interface is receiving or sending data at 1000 Mbit/s. • Off: the interface is disconnected or improperly connected.
	Yellow	100 Mbit/s Ethernet interface working status LED • Yellow: the interface is working at 10/100 Mbit/s. • Blinking yellow: the interface is receiving or sending data at 10/100 Mbit/s. • Off: the interface is disconnected or improperly connected.
LNK/ACT Port25–Port28	Green	10 Gbit/s SFP+ interface working status LED • Green: the interface is properly connected. • Blinking green: the interface is receiving or sending data. • Off: the interface is disconnected or improperly connected.
SPEED Port25–Port28	Green	10 Gbit/s SFP+ interface working rate LED • Green: the interface is working at 10 Gbit/s. • Off: the interface is working at 1000 Mbit/s or stops working.
PWR1/2	Green	Power working status LED • Green: the power supply is normal. • Off: the power supply is off or the power module is improperly installed.
FAN1/2	Green	FAN working status LED • Green: the fan is working properly. • Blink green: the fan is working improperly. • Off: the fan is not installed.
SNMP	Green	SNMP interface working status LED • Green: the SNMP interface is properly connected. • Blinking green: the SNMP interface is receiving or sending data. • Off: the SNMP interface is disconnected or improperly connected.
SYS	Green	System working LED • Green: the system is working improperly. • No-configuration blinking green (every 10s): the system is restored to factory settings. • Slow blinking green (every 2s): the system has successfully loaded the configuration file or experienced configurations. • Fast blinking green (every 60ms): the system fails in Auto-Provisioning or is loading the configuration file. • Off: the system is working improperly.

3.3.2 ISCOM2948GF-4C

Table 3-15 lists LEDs on the ISCOM2948GF-4C.

Table 3-15 LEDs on ISCOM2948GF-4C

LED	Status	Description
LNK/ACT Port1–Port48	Green	1000 Mbit/s SFP optical interface working status LED • Green: the interface is properly connected. • Blinking green: the interface is receiving or sending data. • Off: the interface is disconnected or improperly connected.
SPEED Port1–Port48	Green	1000 Mbit/s SFP optical interface working rate LED • Green: the interface is working at 1000 Mbit/s. • Off: the interface is working at 100 Mbit/s or stops working.
LNK/ACT Port49–Port52	Green	10 Gbit/s SFP+ interface working status LED • Green: the interface is properly connected. • Blinking green: the interface is receiving or sending data. • Off: the interface is disconnected or improperly connected.
SPEED Port49–Port52	Green	10 Gbit/s SFP+ interface working rate LED • Green: the interface is working at 10 Gbit/s. • Off: the interface is working at 1000 Mbit/s or stops working.
PWR1/2	Green	Power working status LED • Green: the power supply is normal. • Off: the power supply is off or the power module is improperly installed.
FAN1/2	Green	FAN working status LED • Green: the fan is working properly. • Blink green: the fan is working improperly. • Off: the fan is not installed.
SNMP	Green	SNMP interface working status LED • Green: the SNMP interface is properly connected. • Blinking green: the SNMP interface is receiving or sending data. • Off: the SNMP interface is disconnected or improperly connected.
SYS	Green	System working LED • Green: the system is working improperly. • No-configuration blinking green (every 10s): the system is restored to factory settings. • Slow blinking green (every 2s): the system has successfully loaded the configuration file or experienced configurations. • Fast blinking green (every 60ms): the system fails in Auto-Provisioning or is loading the configuration file. • Off: the system is working improperly.

3.3.3 ISCOM2948G-4C

LEDs on the ISCOM2948G-4C have the same meaning with those on the ISCOM2924G-4C. For details, see Table 3-14.

3.3.4 ISCOM2924GF-4GE

Table 3-16 lists LEDs on the ISCOM2924GF-4GE.

Table 3-16 LEDs on ISCOM2924GF-4GE

LED	Status	Description
LNK/ACT Port1–Port28	Green	Line working status LED • Green: the interface is working properly. • Blinking green: the interface is receiving or sending data. • Off: the interface is disconnected or improperly connected.
SPEED Port1–Port24 (SFP optical module interface)	Green	10 Gbit/s SFP+ interface working rate LED • Green: the interface is working at 10 Gbit/s. • Off: the interface is working at 1000 Mbit/s or stops working.
SPEED Port25–Port28 (Combo interface)		
PWR1/2	Green	Power working status LED • Green: the power supply is normal. • Off: the power supply is off or the power module is improperly installed.
FAN1/2	Green	FAN working status LED • Green: the fan is working properly. • Blink green: the fan is working improperly. • Off: the fan is not installed.
SNMP	Green	SNMP interface working status LED • Green: the SNMP interface is properly connected. • Blinking green: the SNMP interface is receiving or sending data. • Off: the SNMP interface is disconnected or improperly connected.
SYS	Green	System working LED • Green: the system is working improperly. • No-configuration blinking green (every 10s): the system is restored to factory settings. • Slow blinking green (every 2s): the system has successfully loaded the configuration file or experienced configurations. • Fast blinking green (every 60ms): the system fails in Auto-Provisioning or is loading the configuration file. • Off: the system is working improperly.

3.3.5 ISCOM2924GF-4C

Table 3-17 lists LEDs on the ISCOM2924GF-4C.

Table 3-17 LEDs on ISCOM2924GF-4C

LED	Status	Description
LNK/ACT Port1–Port28	Green	Line working status LED • Green: the interface is working properly. • Blinking green: the interface is receiving or sending data. • Off: the interface is disconnected or improperly connected.
SPEED Port1–Port24 (SFP optical module interface)	Green	Optical interface working rate LED • Green: the interface is working at 1000 Mbit/s. • Off: the interface is working at 100 Mbit/s or stops working.
SPEED Port25–Port28 (SFP+ optical module interface)	Green	Optical interface working rate LED • Green: the interface is working at 10 Gbit/s. • Off: the interface is working at 1000 Mbit/s or stops working.
PWR1/2	Green	Power working status LED • Green: the power supply is normal. • Off: the power supply is off or the power module is improperly installed.
FAN1/2	Green	FAN working status LED • Green: the fan is working properly. • Blink green: the fan is working improperly. • Off: the fan is not installed.
SNMP	Green	SNMP interface working status LED • Green: the SNMP interface is properly connected. • Blinking green: the SNMP interface is receiving or sending data. • Off: the SNMP interface is disconnected or improperly connected.
SYS	Green	System working LED • Green: the system is working improperly. • No-configuration blinking green (every 10s): the system is restored to factory settings. • Slow blinking green (every 2s): the system has successfully loaded the configuration file or experienced configurations. • Fast blinking green (every 60ms): the system fails in Auto-Provisioning or is loading the configuration file. • Off: the system is working improperly.

4 Device installation

This chapter describes how to install the ISCOM2900 series switch, including the following sections:

- Installing hardware
- Installing software

4.1 Installing hardware

The ISCOM2900 series switch adopts a cartridge structure. It can be easily installed in the following scenarios of a telecom equipment room:

- Cabinet
- Workbench

4.1.1 Preparing for installation

Environment conditions

The environment where the ISCOM2900 series switch is to be installed should meet the conditions described in Table 4-1.

Table 4-1 Requirements during operation

Parameter	Description
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 ISCOM2900 series switch.

Table 4-2 Power supply requirements for operation

Parameter	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	• ISCOM2924G-4C: 55 W • ISCOM2948GF-4C: 85 W • ISCOM2948G-4C: 80 W • ISCOM2924GF-4GE: 55 W • ISCOM2924GF-4C: 65 W

Grounding conditions

The ISCOM2900 series switch adopts common earthing mode, and the ground 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

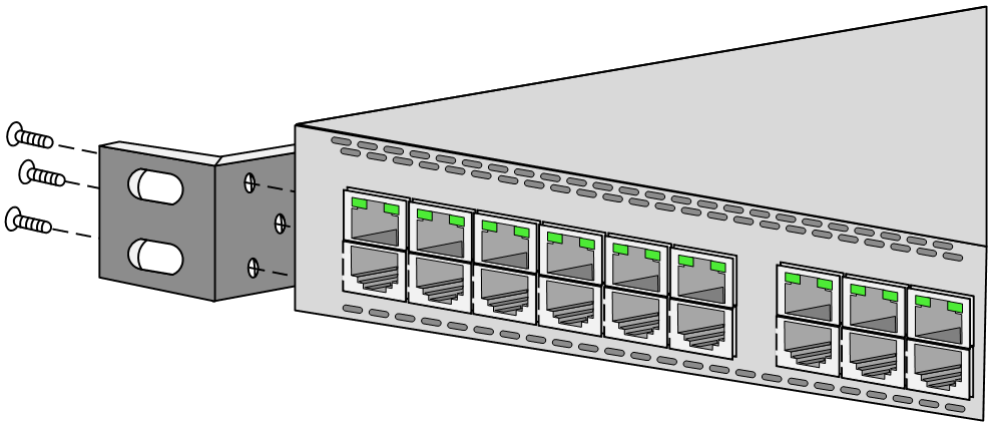
The installation mode of the ISCOM2900 series switch is identical. The following installation takes the ISCOM2924G-4C for example.

The ISCOM2924G-4C supports being installed on the rack, with steps as below:

Step 1 Ensure that the rack is stable.

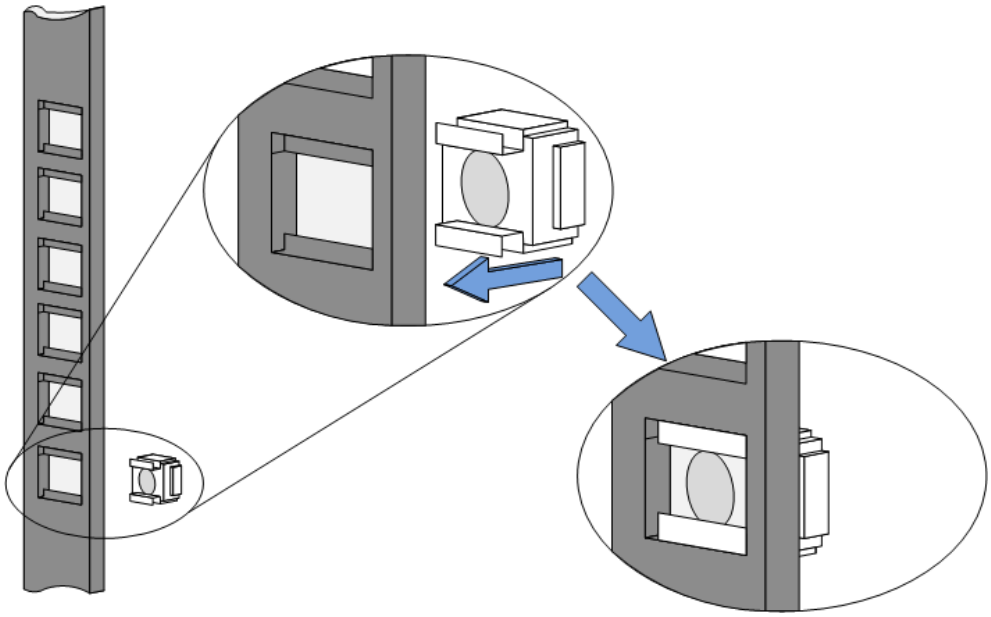
Step 2 Install two customized brackets on the two sides of the ISCOM2900 series switch respectively, and fix them with screws, as shown in Figure 4-1.

Figure 4-1 Installing brackets



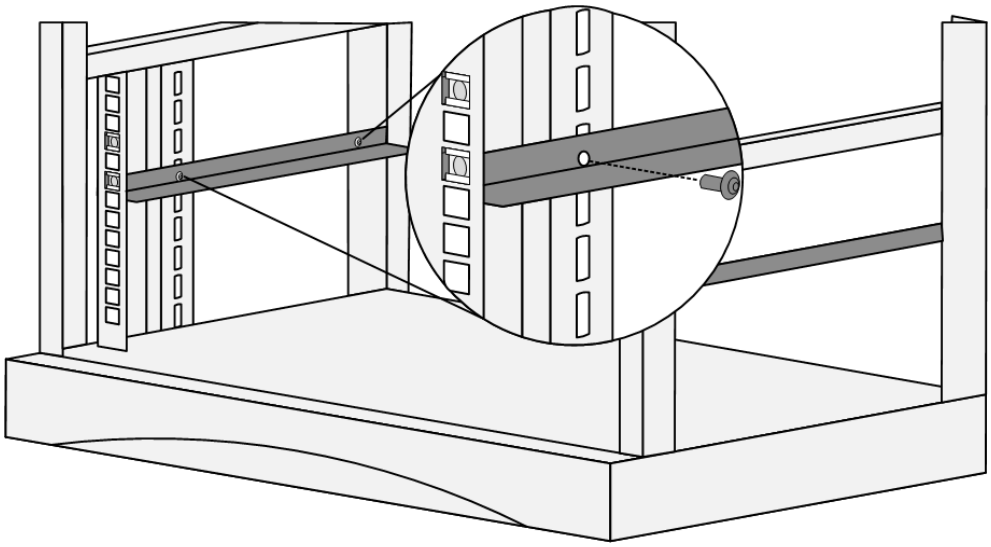
Step 3 Install floating nuts on the rack, as shown in Figure 4-2.

Figure 4-2 Installing floating nuts



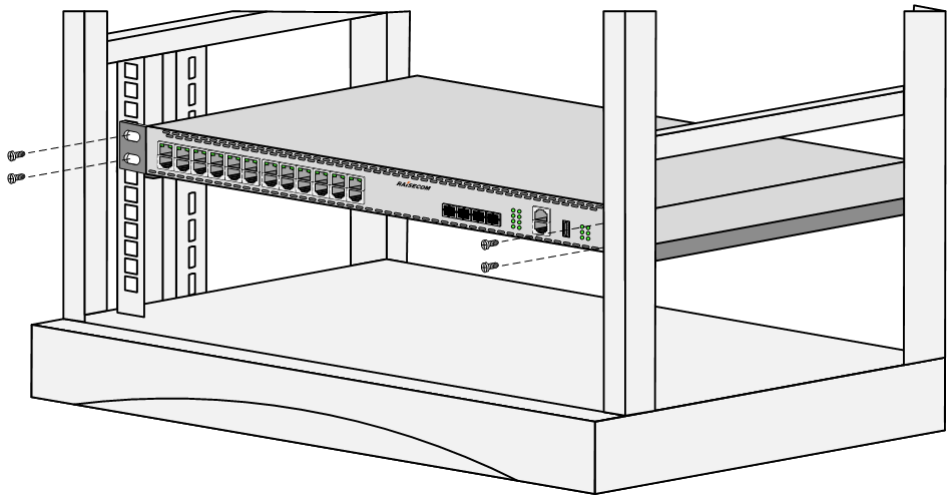
Step 4 Install guide rails on the rack, as shown in Figure 4-3.

Figure 4-3 Installing guide rails



Step 5 Use screws to fix two customized brackets to guide rail, and install the ISCOM2924G-4C horizontally on the rack, as shown in Figure 4-4.

Figure 4-4 Installing device horizontally on rack



Caution

Laying heavy objects or covering objects on the ISCOM2900 series switch is prohibited.

4.1.3 Connecting cables

Connecting fiber

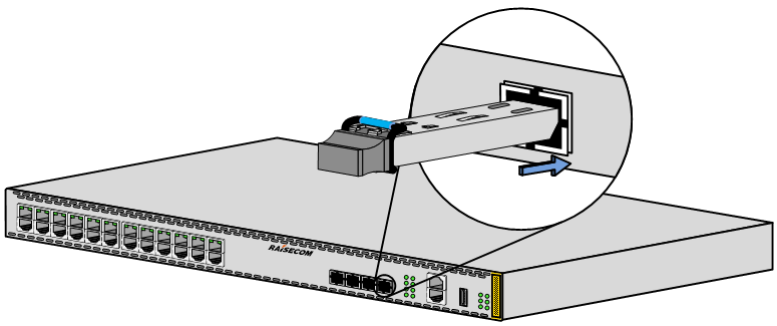
Warning

There is invisible laser inside the ISCOM2900 series switch and it harms eyes. Do not directly stare into the optical interface, fiber connector, or breakage of fiber.

Connect the fiber as below:

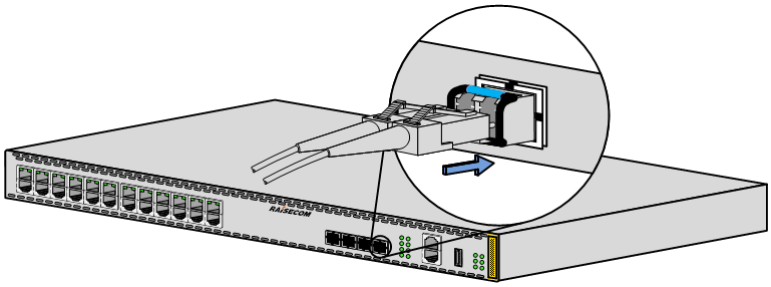
Step 1 Remove the dustproof cover from the SFP optical interface and SFP optical module, and insert the SFP optical module into the optical interface on the ISCOM2900 series switch, as shown in Figure 4-5.

Figure 4-5 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 4-6.

Figure 4-6 Connecting fiber



Note

- Figure 4-6 takes the 1000 Mbit/s SFP optical module for example. The connection of the 10 Gbit/s SFP optical module is identical.
- When the optical interface is idle, cover it with the dustproof cover to prevent dust and dirt from entering it and causing the ISCOM2900 series switch to work improperly.

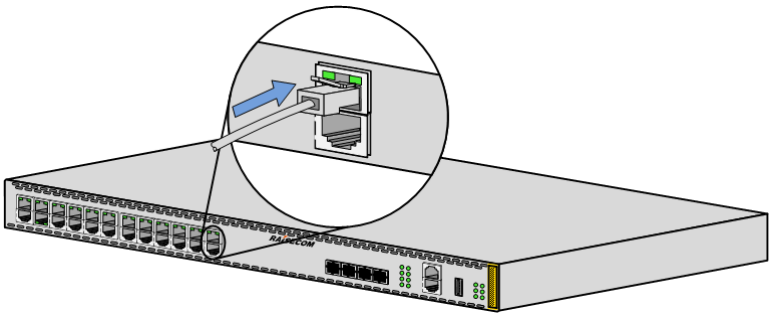
Connecting Ethernet cable

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 ISCOM2900 series switch, and insert the other RJ45 connector of the Ethernet cable into the Ethernet interface of the peer device, as shown in Figure 4-7.

Figure 4-7 Connecting Ethernet cable



Connecting ground cable

Warning

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

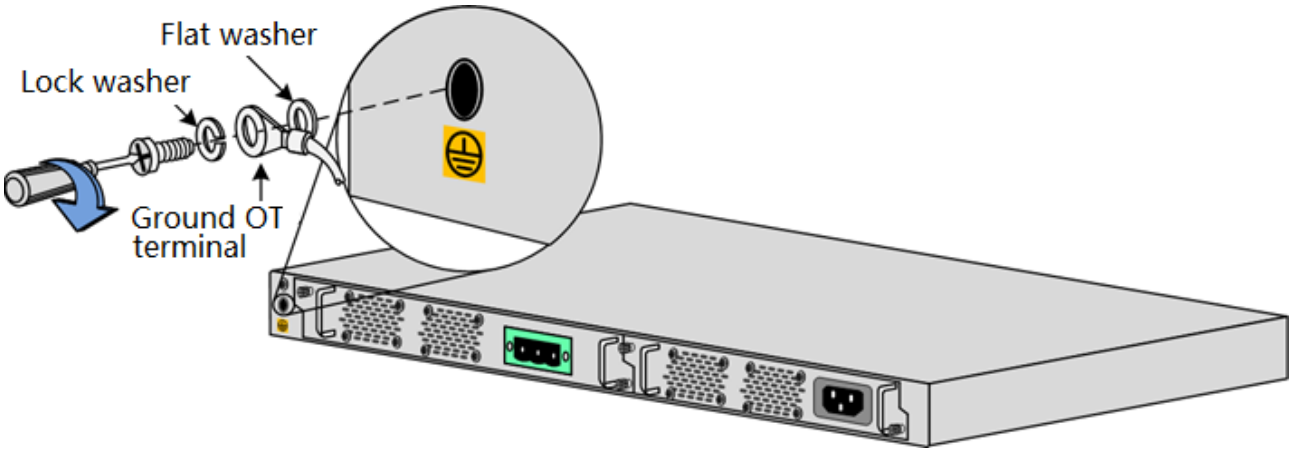
Install the ground cable as below:

Step 1 Unscrew ground terminal counterclockwise, remove the screws and washers.

Step 2 Sheathe the flat washer, ground OT terminal, and spring washer in sequence over the screw.

Step 3 Reinstall the screw to the ground terminal, and tighten the screws clockwise, as shown in Figure 4-8.

Figure 4-8 Connecting ground cable



Installing DC power cable

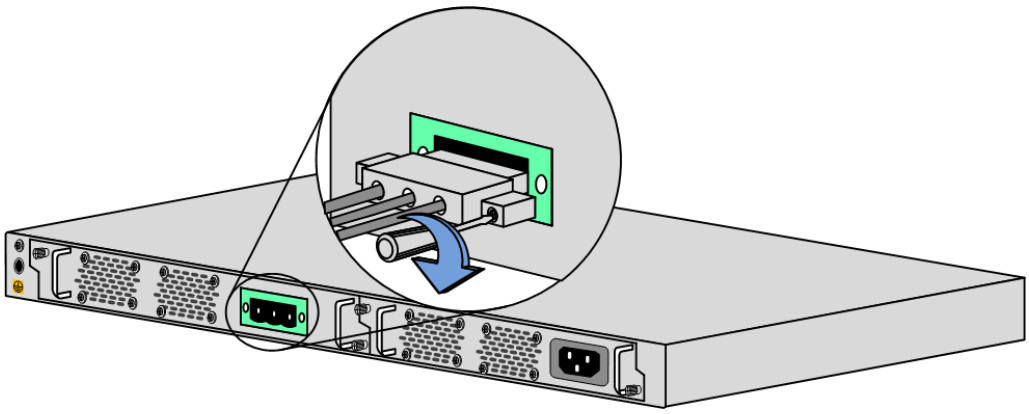
Install the DC power cable as below:

Step 1 Ensure that the ISCOM2900 series switch is well grounded.

Step 2 Insert the 3-pin Phoenix connector into the DC power interface on the front panel properly.

Step 3 Insert the stripping end of the DC power cable into the 3-pin Phoenix connector, and fasten the spring screws on two sides of the 3-pin Phoenix connector, as shown in Figure 4-9.

Figure 4-9 Connecting DC power cable



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

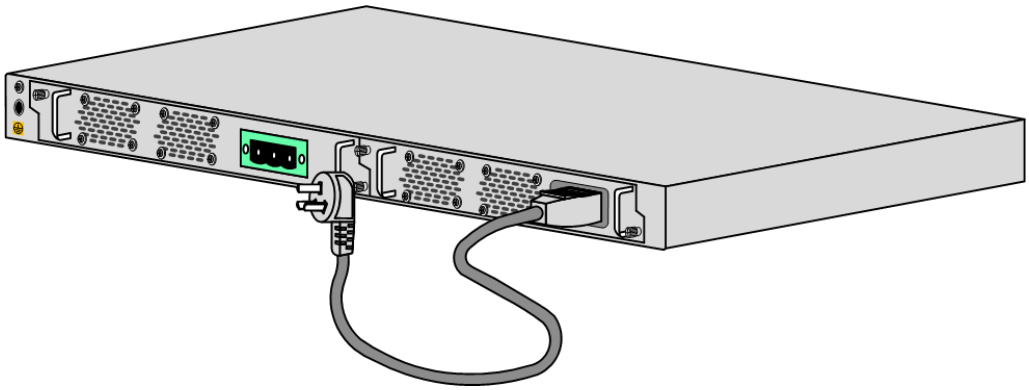
Connecting AC power cable

Install the AC power cable as below:

Step 1 Ensure that the ISCOM2900 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 4-10.

Figure 4-10 Connecting AC power cable



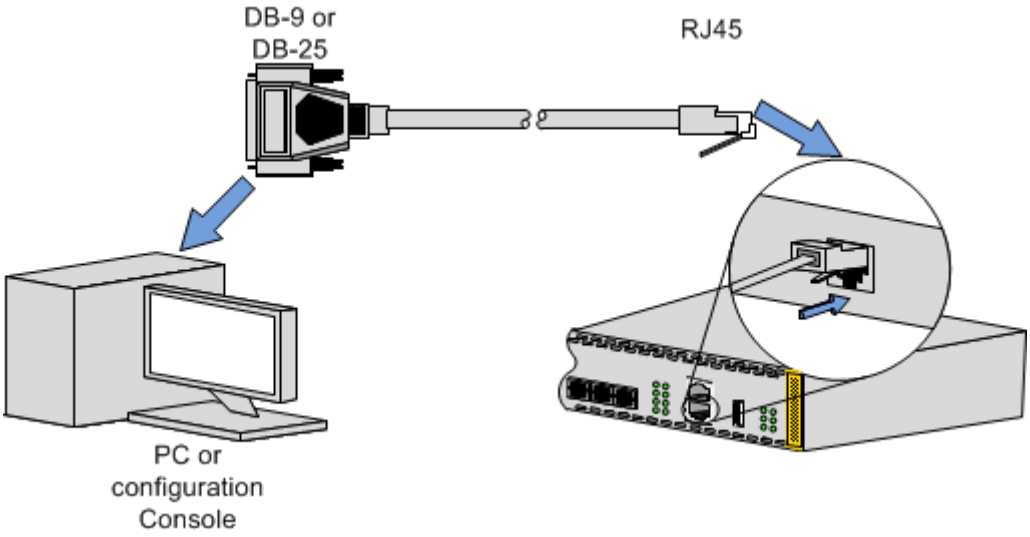
Connecting RJ45 Console cable

Install the RJ45 Console cable as below:

Step 1 Insert the RJ45 connector of the RJ45 Console cable into the Console interface on the ISCOM2900 series switch.

Step 2 Insert the other end of the RJ45 Console cable into the RS-232 serial interface on a PC (or maintenance terminal), as shown in Figure 4-11.

Figure 4-11 Connecting RJ45 Console cable



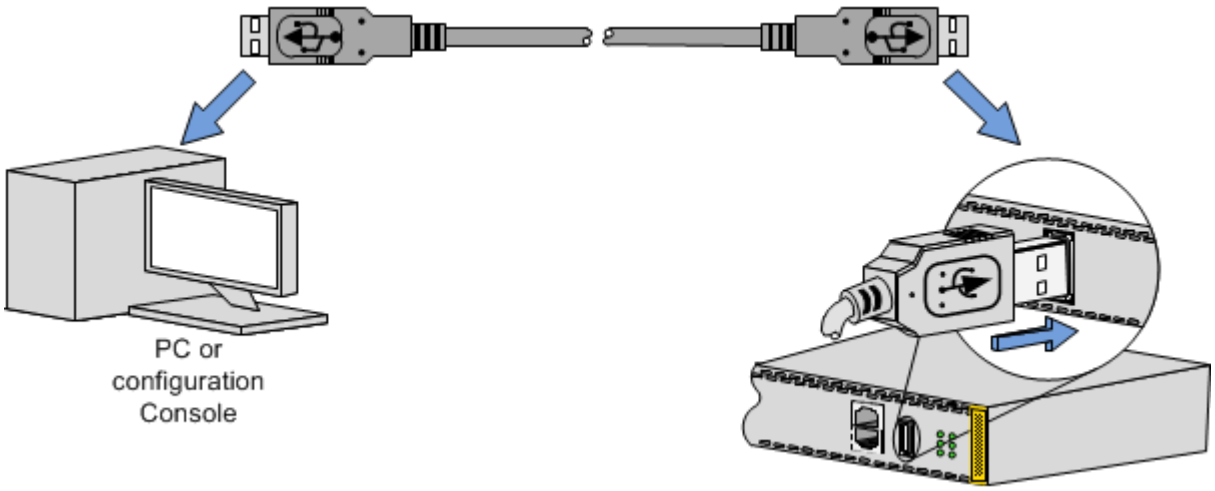
Connecting USB Console cable

Install the USB Console cable as below:

Step 1 Insert one end of the USB Console cable into the USB interface on the ISCOM2900 series switch.

Step 2 Insert the other end of the USB Console cable into the USB interface on a PC (or maintenance terminal), as shown in Figure 4-12.

Figure 4-12 Connecting USB Console cable



4.2 Installing software

The ISCOM2900 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 ISCOM2900 series switch. For details, see *ISCOM2900 Series Configuration Guide*.

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

5 Technical specifications

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

- Overall parameters
- Laser safety class
- Reliability specifications
- EMC indexes
- Security standards
- Environmental requirements
- Compliant standards and protocols

5.1 Overall parameters

Table 5-1 lists overall parameters of the ISCOM2900 series switch.

Table 5-1 Overall parameters

Parameter		Description
Dimensions		440 mm (Width) × 360 mm (Depth) × 44 mm (Height)
Overall power consumption		• ISCOM2948GF-4C: 85 W • ISCOM2948G-4C: 80 W • ISCOM2924G-4C: 55 W • ISCOM2924GF-4GE: 55 W • ISCOM2924GF-4C: 65 W
Weight		• ISCOM2948GF-4C and ISCOM2948G-4C: 8 kg • ISCOM2924G-4C, ISCOM2924GF-4GE, and ISCOM2924GF-4C: 6 kg
Operating temperature		0–50 ℃
Operating humidity		10%–90% RH (indoor, non-condensing)
DC power	Rated voltage	-48 VDC

Parameter		Description
	Voltage range	-36 to -72 VDC
AC power	Rated voltage	220 VAC
	Voltage range	100–240 VAC
	Frequency	50/60 Hz
Lightning protection level	AC power	• 6 kV in differential mode • 6 kV in common mode
	DC power	• 1 kV in differential mode • 2 kV in common mode
	Ethernet electrical interface	1 kV in indoor common mode

5.2 Laser safety class

According to the Tx power of Laser, the ISCOM2900 series switch laser belongs to Class 1 in safety class.

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

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

5.3 Reliability specifications

Table 5-2 lists reliability specifications of the ISCOM2900 series switch.

Table 5-2 Reliability specifications

Parameter	Description
System availability	99.999%. The annual failure time for the ISCOM2900 series switch should be no longer than 5 minutes.
Annually system mean repair rate	< 1.5%
MTTR	< 2 hours
MTBF	100000 hours

5.4 EMC indexes

The ISCOM2900 series switch, designed according to ETS 300 386 series and ETS 300 127 series of European Telecommunication Standards Institute (ETSI), has passed Electromagnetic Compatibility (EMC) tests.

5.5 Security standards

The ISCOM2900 series switch complies with the following security standards:

- EN 60950
- UL 60950

5.6 Environmental requirements

The ISCOM2900 series switch complies with the following environmental requirements:

- NEBS GR-63-CORE: Network Equipment-Building System (NEBS) Requirements: Physical Protection
- European Telecommunication Standards Institute (ETSI) EN 300 019

5.6.1 Storage environment

Atmosphere environment

Table 5-3 lists atmosphere requirements for the ISCOM2900 series switch during storage.

Table 5-3 Atmosphere requirements during storage

Parameter	Description
Air pressure (kPa)	86–106
Temperature (°C)	-25 to +60
Relative humidity	10%–90%
Solar radiation (W/s ^{2})	≤ 1120
Heat radiation (W/s ^{2})	≤ 600
Wind speed (m/s)	≤ 20

Waterproof environment

Keeping the ISCOM2900 series switch indoor is recommended with the following requirements:

- No ponding in the room

- No water dropping above
- Away from any water leakage area, such as the automatical fire facility or central heating facility

If the ISCOM2900 series switch is kept outdoor, ensure the following four prerequisites:

- The package box is intact.
- Rainproof measures are taken that rain will not leak into the package box.
- No hydrops is round the package box.
- The package box is not directly exposed in the sun.

Biotic environment

Keep the ISCOM2900 series switch away from:

- Reproduction of fungus and mould
- Existence of rodent animals, such as rats

Air cleanliness

No explosive, conductive, magnetic, and corrosive dust is around the ISCOM2900 series switch during storage.

Table 5-4 lists mechanical active substance requirements for the ISCOM2900 series switch during storage.

Table 5-4 Mechanical active substance requirements during storage

Mechanical active substance	Description
Floating dust (mg/m ^{3})	≤ 5.00
Droppable dust (mg/m ^{2}h)	≤ 20.0
Grit (mg/m ^{3})	≤ 300

Table 5-5 lists chemical active substance requirements for the ISCOM2900 series switch during storage.

Table 5-5 Chemical active substance requirements during storage

Chemical active substance	Description
Sulfur dioxide SO_2 (mg/m ^{3})	≤ 0.30
Hydrogen sulfide H_2S (mg/m ^{3})	≤ 0.10
Nitrogen dioxide NO_2 (mg/m ^{3})	≤ 0.50
Ammonia NH_3 (mg/m ^{3})	≤ 1.00
Chlorine Cl_2 (mg/m ^{3})	≤ 0.10
Chlorhydric acid HCl (mg/m ^{3})	≤ 0.10

Chemical active substance	Description
Hydrofluoric acid HF (mg/m ^{3})	≤ 0.01
Ozone O_3 (mg/m ^{3})	≤ 0.05

5.6.2 Transport environment

Atmosphere environment

Table 5-6 lists atmosphere requirements for the ISCOM2900 series switch during transport.

Table 5-6 Atmosphere requirements during transport

Parameter	Description
Air pressure (kPa)	86–106
Temperature (°C)	-25 to +60
Temperature change rate (℃/min)	≤ 1
Operating humidity	10%–90%
Solar radiation (W/s ^{3})	≤ 1120
Heat radiation (W/s ^{3})	≤ 600
Wind speed (m/s)	≤ 20

Waterproof environment

When transporting the ISCOM2900 series switch, ensure the following prerequisites:

- The package box is intact.
- Rainproof measures are taken that rain will not leak into the package box.
- No ponding is inside the transport vehicle.

Biotic environment

Keep the ISCOM2900 series switch away from:

- Reproduction of fungus and mould
- Existence of rodent animals, such as rats

Air cleanliness

No explosive, conductive, magnetic, and corrosive dust is around the ISCOM2900 series switch during transportation.

Table 5-7 lists mechanical active substance requirements for the ISCOM2900 series switch during transportation.

Table 5-7 Mechanical active substance requirements during transportation.

Mechanical active substance	Parameter
Floating dust (mg/m ^{3})	Unlimited
Droppable dust (mg/m ^{2}h)	≤ 3.0
Grit (mg/m ^{3})	≤ 100

Table 5-8 lists chemical active substance requirements for the ISCOM2900 series switch during transport.

Table 5-8 Chemical active substance requirements during transport

Chemical active substance	Parameter
Sulfur dioxide SO_2 (mg/m ^{3})	≤ 0.30
Hydrogen sulfide H_2S (mg/m ^{3})	≤ 0.10
Nitrogen dioxide NO_2 (mg/m ^{3})	≤ 0.50
Ammonia NH_3 (mg/m ^{3})	≤ 1.00
Chlorine Cl_2 (mg/m ^{3})	≤ 0.10
Chlorhydric acid HCl (mg/m ^{3})	≤ 0.10
Hydrofluoric acid HF (mg/m ^{3})	≤ 0.01
Ozone O_3 (mg/m ^{3})	≤ 0.05

5.6.3 Operation environment

Atmosphere environment

Table 5-9 lists atmosphere requirements for the ISCOM2900 series switch during operation.

Note

The temperate and humidity referred to are measured 1.5 m above or 0.4 m in front of the ISCOM2900 series switch.

Table 5-9 Atmosphere requirements during operation

Parameter	Description
Air pressure (kPa)	86–106
Temperature (℃)	0–50
Relative humidity	10%–90% (non-condensing)
Temperature change rate (℃/min)	≤ 0.5

Parameter	Description
Solar radiation (W/s ²)	≤ 700
Heat radiation (W/s ²)	≤ 600
Wind speed (m/s)	≤ 5

Biotic environment

Keep the ISCOM2900 series switch away from:

- Reproduction of fungus and mould
- Existence of rodent animals, such as rats

Air cleanliness

No explosive, conductive, magnetic, and corrosive dust is around the ISCOM2900 series switch during transportation.

Table 5-10 lists mechanical active substance requirements for the ISCOM2900 series switch during operation.

Table 5-10 Mechanical active substance requirements during operation

Mechanical active substance	Description
Number of dust grains (/m ³)	≤ 3×10^5
Floating dust (mg/m ³)	≤ 0.2
Droppable dust (mg/m ²h)	≤ 15
Grit (mg/m ³)	≤ 100

Table 5-11 lists chemical active substance requirements for the ISCOM2900 series switch during operation.

Table 5-11 Chemical active substance requirements during operation

Chemical active substance	Description
Sulfur dioxide SO_2 (mg/m ³)	≤ 0.30
Hydrogen sulfide H_2S (mg/m ³)	≤ 0.10
Ammonia NH_3 (mg/m ³)	≤ 3.00
Chlorine Cl_2 (mg/m ³)	≤ 0.10
Chlorhydric acid HCl (mg/m ³)	≤ 0.10
Hydrofluoric acid HF (mg/m ³)	≤ 0.01

Chemical active substance	Description
Ozone O_3 (mg/m^3)	≤ 0.05

5.7 Compliant standards and protocols

The ISCOM2900 series switch complies with the following standards and protocols:

- MEF Technical Specification MEF 6.1 Ethernet Services Definitions - Phase 2
- MEF Implementation Agreement, MEF 8 Implementation Agreement for the Emulation of PDH Circuits over Metro Ethernet networks
- MEF Technical Specification, MEF 10.1 Ethernet Services Attributes - Phase 2
- MEF Technical Specification, MEF 11 User Network Interface (UNI) Requirements and Framework
- MEF Technical Specification, MEF 13 User Network Interface (UNI) Type 1 Implementation Agreement
- MEF Technical Specification, MEF 17 Service OAM Requirements & Framework
- MEF Technical Specification, MEF 20 User Network Interface (UNI) Type 2 Implementation Agreement
- IEEE 802.1D-2004 Part 3: Media Access Control (MAC) Bridges
- IEEE 802.1Q-2005 - Standard for Local and Metropolitan Area Networks - Virtual Bridged Local Area Networks
- IEEE 802.1s-2002 - Amendment to 802.1Q Virtual Bridged Local Area Networks: Multiple Spanning Trees
- IEEE 802.3-2005 Part 3: Carrier sense multiple access with collision detection (CSMA/CD) access method and physical layer specifications
- IEEE 802.1ag: Virtual Bridged Local Area Networks Amendment 5: Connectivity Fault Management
- IEEE 1588-2008 Standard for a Precision Clock Synchronization Protocol for Network Measurement and Control Systems
- ITU-T Y.1541 Network Performance Objectives For IP-Based Services
- ITU-T Y.1731 OAM Functions and Mechanisms for Ethernet based networks
- ITU-T G.8031 Ethernet linear protection switching
- ITU-T G.8032 Ethernet ring protection switching
- ITU-T G.8261 Timing and Synchronization Aspects in Packet Networks
- ITU-T G.8262 Timing Characteristics of Synchronous Ethernet Equipment Slave Clock (EEC)
- ITU-T G.823 The control of jitter and wander within digital networks which are based on the 2048 kbit/s hierarchy
- ITU-T G.824 The control of jitter and wander within digital networks which are based on the 1544 kbit/s hierarchy
- ITU-T G.825 The control of jitter and wander within digital networks which are based on synchronous digital hierarchy (SDH)
- RFC1349 Type of Service in the Internet Protocol Suite

- RFC2474 Definition of the Differentiated Services Field (DS Field) in the IPv4 and IPv6 Headers
- RFC2475 An Architecture for Differentiated Services
- RFC2597 Assured Forwarding PHB Group
- RFC2598 An Expedited Forwarding PHB
- RFC2698 A Two Rate Three Color Marker
- RFC3086 Definition of Differentiated Services Per Domain Behaviors and Rules for their Specification
- RFC3140 Per Hop Behavior Identification Codes
- RFC3246 An Expedited Forwarding PHB (Per-Hop Behavior)
- RFC3247 Supplemental Information for the New Definition of the EF PHB (Expedited Forwarding Per-Hop Behavior)
- RFC3248 A Delay Bound alternative revision of RFC 2598
- RFC3260 New Terminology and Clarifications for DiffServ
- RFC3289 Management Information Base for the Differentiated Services Architecture
- RFC3290 An Informal Management Model for DiffServ Routers
- RFC3317 Differentiated Services Quality of Service Policy Information Base

6 Appendix

The appendix includes the following sections:

- Cables
- SFP modules
- Terms
- Acronyms and abbreviations

6.1 Cables

6.1.1 Fiber

Introduction

The ISCOM2900 series switch supports Single-mode Fiber (SMF) and Multi-mode Fiber (MMF).

Table 6-1 lists fiber connectors available for the ISCOM2900 series switch.

Table 6-1 Fiber connectors

Local connector	Remote connector	Fiber
LC/PC	LC/PC	2 mm SMF
		2 mm MMF
	FC/PC	2 mm SMF
		2 mm MMF
	SC/PC	2 mm SMF
		2 mm MMF

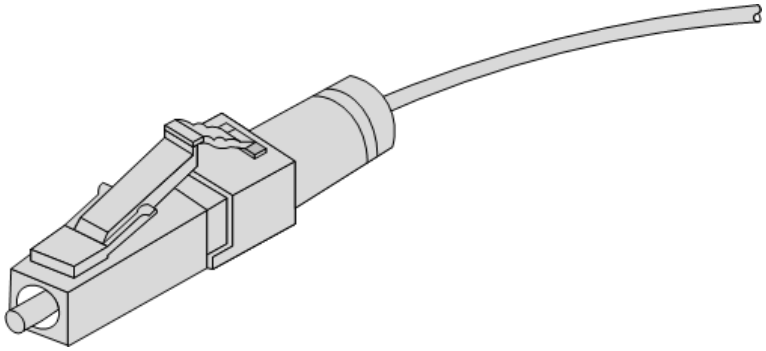
Note

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. Operate the fiber as below:

- 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 6-2 lists wiring of the fiber.

Table 6-2 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

6.1.2 Ethernet cable

Introduction

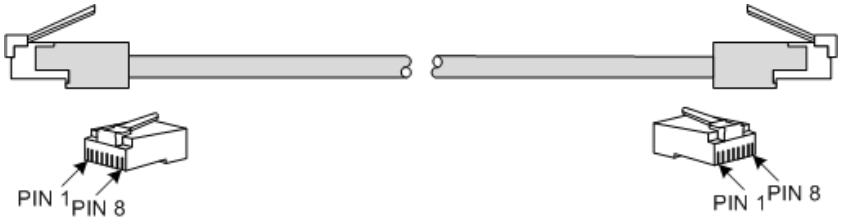
The Ethernet cable connects the Ethernet electrical interface and SFP electrical interface on the ISCOM2900 series switch.

The Ethernet interface on the ISCOM2900 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 between a PC and a switch, between a switch and a router
- Crossover cable: used to connect devices of the same type, such as between PCs, between switches, between routers, between a PC and a router (they are of the same type)

Table 6-3 lists EIA/TIA 568A and EIA/TIA 568B wiring.

Table 6-3 EIA/TIA 568A and EIA/TIA 568B wiring

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

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

Figure 6-3 Wiring of straight-through cable

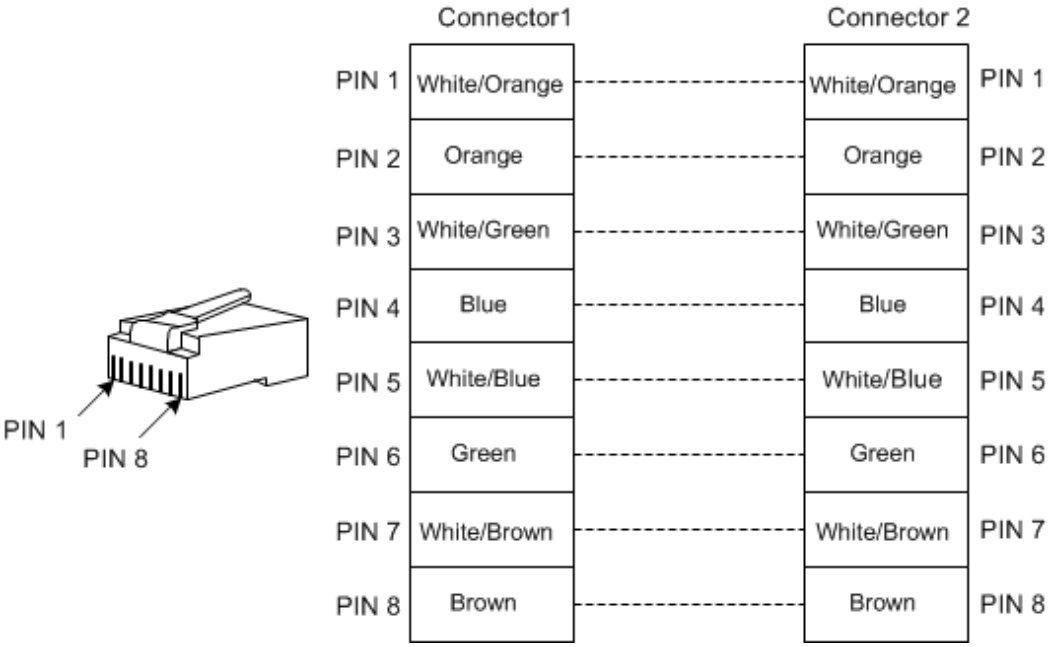


Figure 6-4 shows wiring of the 100 Mbit/s crossover cable.

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

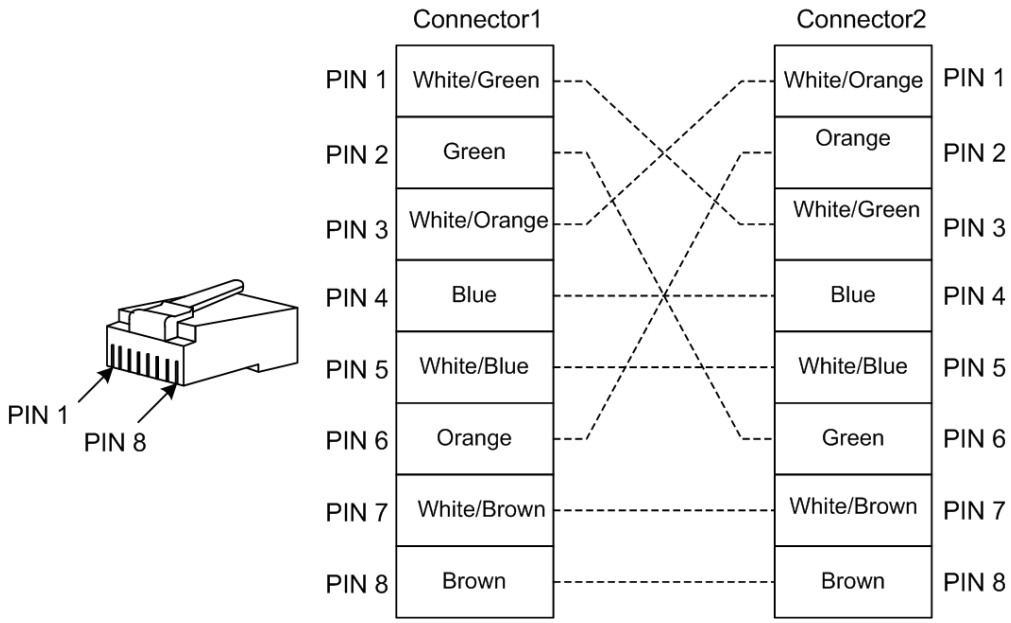
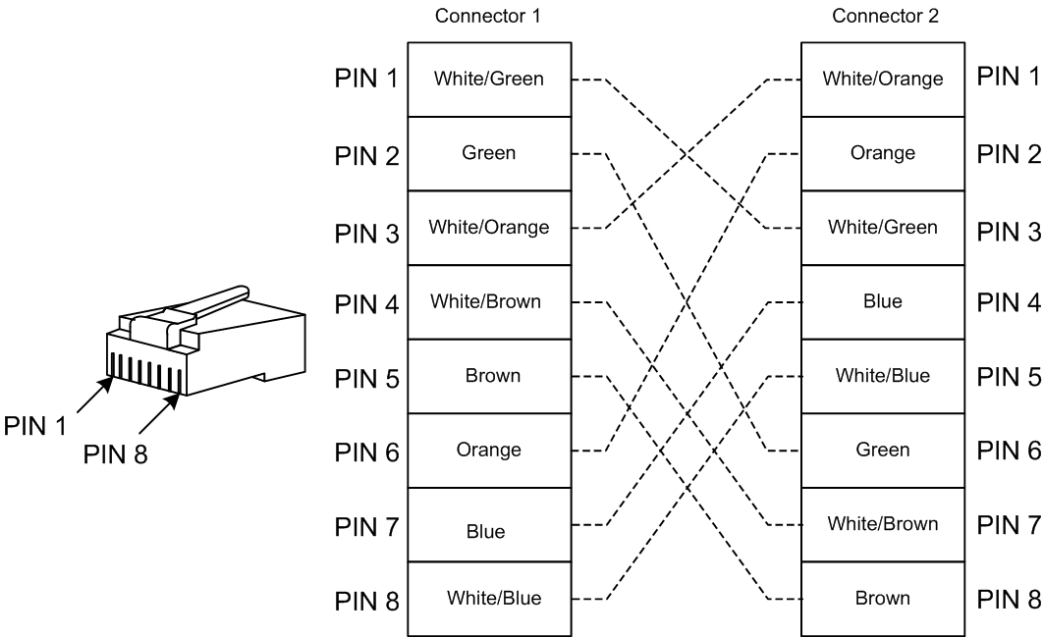


Figure 6-5 shows wiring of 1000 Mbit/s crossover cable.

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



Technical specifications

Table 6-4 lists technical specifications of the Ethernet cable.

Table 6-4 Technical specifications of Ethernet cable

Parameter	Description
Name	CBL-ETH-RJ45/RJ45-D
Connector	RJ45 crystal head
Model	Cat 5 or better UTP (UTP-5 or UTP-5e) or Cat 5e STP cable
Number of cores	8
Length	The letter D is the length, which can be customized. For example, if the customer requires a 2-meter cable, you can name it CBL-ETH-RJ45/RJ45-2m.

6.1.3 Ground cable

Introduction

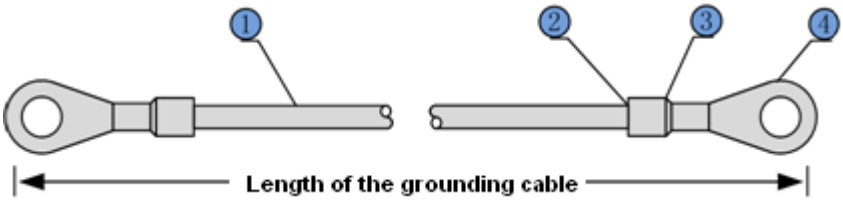
The ground cable is used to connect the ISCOM2900 series switch to the ground.

Appearance

The ground cable is composed of ground terminals and the coaxial cable. The ground terminal is usually an OT non-insulated terminal. The coaxial cable is a yellow/green copper soft

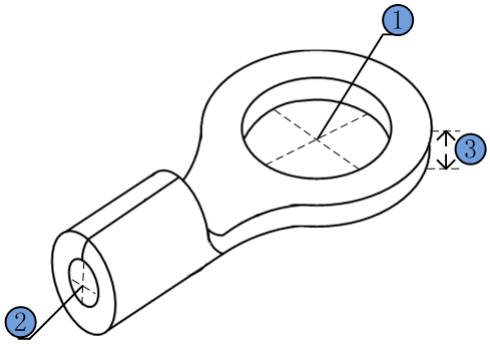
flame-retardant conducting wire. Figure 6-6 and Figure 6-7 show the ground cable and OT terminal.

Figure 6-6 Grounding cable



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

Figure 6-7 OT terminal



1	Inner diameter of soldering lug	2	Inner diameter of sheath	3	Thickness of soldering terminal

Technical specifications

Table 6-5 lists technical specifications of the ground cable.

Table 6-5 Technical specifications of ground cable

Parameter	Description
Model (recommended)	PIL-ground cable-Φ4-D.
Conducting wire	Yellow/Green multi-strand copper-core conducting wire (1.25 mm^2)
Model	Ground round-pressed terminal (M4)
Cross-sectional area of the conducting wire	16–15AWG (1.2–1.5 mm^2)

Parameter	Description
Length	1 m

Note

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

6.1.4 DC power cable

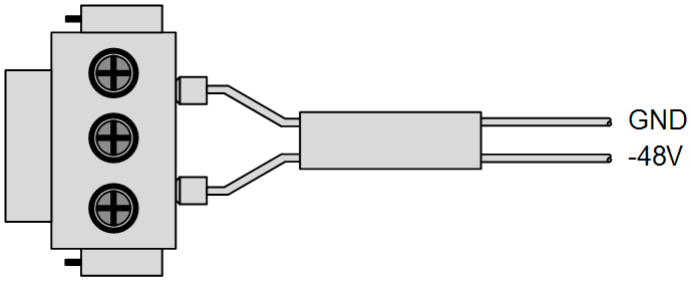
Introduction

The DC power cable transmits -48 VDC power to the power interface on the ISCOM2900 series switch, and supplies power for the whole device.

Appearance

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

Figure 6-8 DC power cable



Technical specifications

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

Table 6-6 Technical specifications of DC power cable

Parameter		Description
Name		POL-DC-unstripped/stripped-1.5m
Color	Outer	Black (injection molding insulating sheath)
	Inner	Red (+VIN), black (-VIN), and yellow/green strip (G)
Stripped		Stripped, and tinned at 10 mm
Unstripped		Sheared
Inner conductor wire gauge		16 AWG

Parameter	Description
Inner conductor sectional area	3×1 mm^2
Length	1.5 m

6.1.5 AC power cables

Introduction

The AC power cable transmits 220 VAC power to the power interface on the ISCOM2900 series switch, and supplies power for the whole device.

The ISCOM2900 series switch uses different AC power cables in different countries or regions, as lists in Table 6-7.

Table 6-7 AC power supply cable options

Regional standard	Cable
European	European standard French mode head/C13 connector-10A/250V-1.5m/RoHS
American	American standard-3-pin-10A/250V-1.5m/RoHS

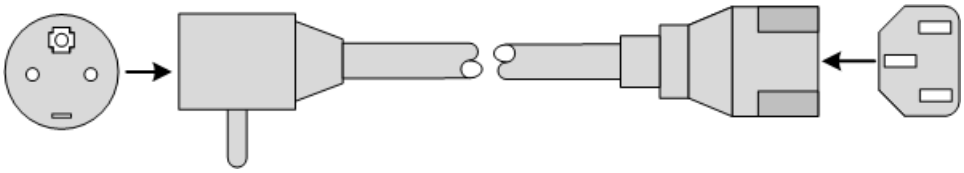
Note

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

Appearance

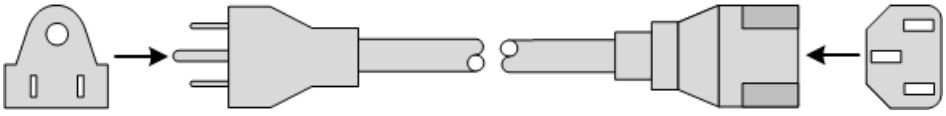
The AC power cable which meets European standard is composed of the European standard French mode 3-pin plug and C13 connector, as shown in Figure 6-9.

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 C13 connector, as shown in Figure 6-10.

Figure 6-10 American AC power cable



Technical specifications

Table 6-8 lists specifications of the European AC power cable.

Table 6-8 Specifications of European AC power cable

Parameter	Description
Name	European standard French mode head/C13 connector-10A/250V-1.5m/RoHS
Color	• External: black (PVC insulation layer) • Internal: blue (N) and brown (L)
Connector 1	C13 connector
Connector 2	European French mode 3-pin plug
Cross-sectional area of the inner conductor	3×0.75 mm^2
Length	1.5 m

Table 6-9 lists specifications of the American AC power cable.

Table 6-9 Specifications of American 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	C13 connector
Connector 2	American 3-pin plug NEMA5-15
Inner conductor wire gauge	18 AWG
Cross-sectional area of the inner conductor	3×0.75 mm^2
Length	1.5 m

6.1.6 RJ45 Console cable

Introduction

With the Console cable, you can log in to the ISCOM2900 series switch through the Console interface, and then debug and maintain it from a PC.

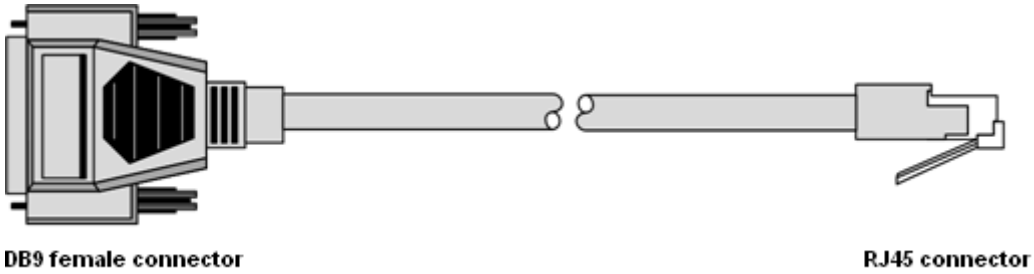
The RJ45 Console cable is an 8-core unshielded cable, with connectors as below:

- RJ45 connector: connected to the Console interface on the ISCOM2900 series switch
- DB9 female connector: connected to the Console interface on the PC

Appearance

Figure 6-11 shows the RJ45 Console cable.

Figure 6-11 RJ45 Console cable



Wiring

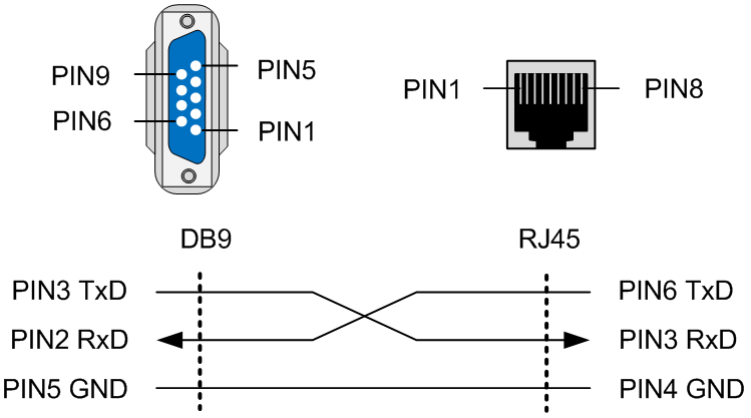
Table 6-10 lists wiring of the RJ45 Console interface.

Table 6-10 Wiring of RJ45 Console interface

PIN	PIN definition	
	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 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 ISCOM2900 series switch.

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



Technical specifications

Table 6-11 lists technical specifications of the RJ45 Console cable.

Table 6-11 Technical specifications of RJ45 Console cable

Parameter	Description
Name	CBL-RS232-DB9F/RJ45-2m
Color	White
Model	Cat 3 UTP cable
Connector	• RJ45 connector • DB9 female connector
Number of cores	8
Length	2 m

6.1.7 USB Console cable

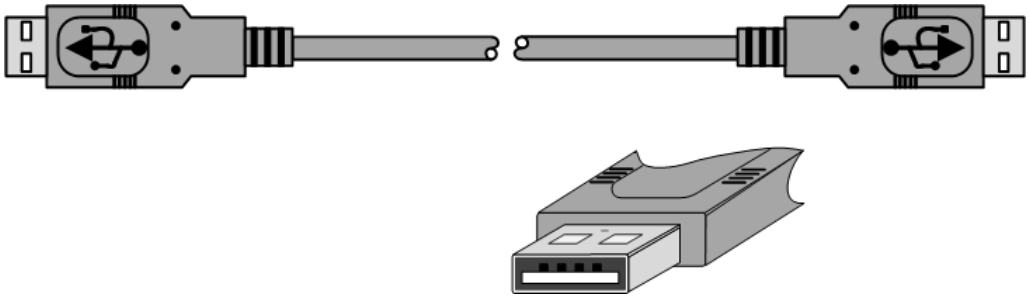
Introduction

With the USB Console cable, you can connect the USB interface on the ISCOM2900 series switch to the USB interface on a PC, and then debug and maintain it from the PC.

Appearance

Figure 6-13 shows the USB Console cable.

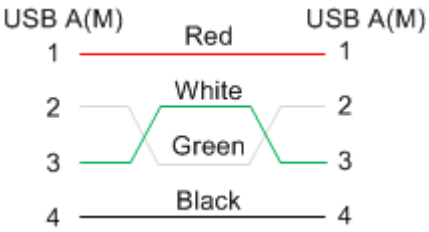
Figure 6-13 USB Console cable



Wiring

Table 6-12 lists wiring of the RJ45 Console interface.

Table 6-12 Wiring of RJ45 Console interface



Technical specifications

Table 6-13 lists technical specifications of the USB Console cable.

Table 6-13 Technical specifications of USB Console cable

Parameter	Description
Name	CBL-USB-A(M)/A(M)-1.5m/direct-connection
Connector 1	USB A-type male connector
Connector 2	USB A-type male connector
Number of cores	8
Length	1.5 m

6.2 SFP modules

The ISCOM2900 series switch supports the following SFP modules:

- 100 Mbit/s SFP optical module
- 100 Mbit/s SFP electrical module
- 1000 Mbit/s SFP optical module
- 1000 Mbit/s SFP electrical module
- 10 Gbit/s SFP+ optical module

6.2.1 100 Mbit/s SFP optical module

Table 6-14 lists parameters of the 100 Mbit/s SFP optical module.

Table 6-14 Parameters of 100 Mbit/s 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

6.2.2 100 Mbit/s SFP electrical module

Table 6-15 lists parameters of the 100 Mbit/s SFP electrical module.

Table 6-15 Parameters of 100 Mbit/s SFP electrical module

Model	Application code	Auto-negotiation	Data interface	LOS alarm	Transmission distance (m)
USFP-FE/AN-R	10/100BASE-TX	Supported	SerDes	Supported	100

6.2.3 1000 Mbit/s SFP optical module

Table 6-16 lists parameters of the 1000 Mbit/s SFP optical module.

Table 6-16 Parameters of 1000 Mbit/s 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
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

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/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

6.2.4 1000 Mbit/s SFP electrical module

Table 6-17 lists parameters of the 1000 Mbit/s SFP electrical module.

Table 6-17 Parameters of 1000 Mbit/s SFP electrical module

Model	Application code	Auto-negotiation	Data interface	LOS alarm	Transmission distance (m)
USFP-GE-R	1000BASE-T	Not supported	SerDes	Supported	100
USFP-GE/AN-R	10/100/1000BASE-T	Supported	SGMll	Supported	100

6.2.5 10 Gbit/s SFP+ optical module

Table 6-18 lists parameters of the 10 Gbit/s SFP+ optical module.

Table 6-18 Parameters of 10 Gbit/s SFP+ optical module

Model	Wavelength (nm)	Rx type	Tx optical power (dBm)	Maximum optical power	Extinction ratio (dB)	Rx sensitivity	Maximum transmission distance
USFP+-192/M	850	PIN	-7.3 to -1.0	-1.0	3.0	-11.1	0.3

Model	Wavelength (nm)	Rx type	Tx optical power (dBm)	Maximum optical power	Extinction ratio (dB)	Rx sensitivity	Maximum transmission distance
USFP+-192/S1	1310	PIN	-8.2 to 0.5	0.5	3.5	-12.6	10
USFP+-192/S2	1550	PIN	-3 to 4	4	6	-16	40
USFP+-192/S3	1550	APD	0–4	4	9	-23	80

6.3 Terms

C

Connectivity Fault Management (CFM)	CFM, defined by ITU-Y.1731 and IEEE802.1ag, is an end-to-end service-level Ethernet OAM technology. This function is used to actively diagnose faults for Ethernet Virtual Connection (EVC), provide cost-effective network maintenance solutions, and improve network maintenance.

E

Ethernet Linear Protection Switching (ELPS)	It is an APS protocol, based on ITU-T G.8031 standard, used to protect the Ethernet link. It is an end-to-end protection technology, including two line protection modes: linear 1:1 protection switching and linear 1+1 protection switching.

L

Link Aggregation	With link aggregation, multiple physical Ethernet interfaces 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 member interfaces in an aggregation group. In addition to effectively improving the reliability on links between devices, link aggregation can help gain greater bandwidth without upgrading hardware.

Q

QinQ	802.1Q in 802.1Q (QinQ), also called Stacked VLAN or Double VLAN, is extended from 802.1Q and defined by IEEE 802.1ad recommendation. This VLAN feature allows the equipment to add a VLAN tag to a tagged packet. The implementation of QinQ is to add a public VLAN tag to a packet with a private VLAN tag, making the packet encapsulated with two layers of VLAN tags. The packet is forwarded over the ISP's backbone network based on the public VLAN tag and the private VLAN tag is transmitted as the data part of the packet. In this way, the QinQ feature enables the transmission of the private VLANs to the peer end transparently. There are two QinQ types: basic QinQ and selective QinQ.

6.4 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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