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**ISCOM RAX711 (A)
Hardware Description
(Rel_03)**



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Preface

Objectives

This guide describes the structure, power supply, and cables of the ISCOM RAX711, including features, appearance, interfaces, LEDs, and specifications, as well as appearance and technical specifications of cables.

Versions





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

Product name	Hardware version	Software version
ISCOM RAX711	A or later	REAP_1.2.500 or later

Conventions

Symbol conventions

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

Symbol	Description
 Warning	Indicates a hazard with a medium or low level of risk which, if not avoided, could result in minor or moderate injury.
 Caution	Indicates a potentially hazardous situation that, if not avoided, could cause equipment damage, data loss, and performance degradation, or unexpected results.
 Note	Provides additional information to emphasize or supplement important points of the main text.
 Tip	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 .
<i>Italic</i>	Book titles are in <i>italics</i> .
Lucida Console	Terminal display is in Lucida Console.

Changehistory

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

Issue 03 (2014-04-18)

Third commercial release

- Modified address and postal code of Raisecom.
- Upgraded software version to REAP 1.2.500.

Issue 02 (2013-09-30)

Second commercial release

- Upgraded software version to REAP 1.2.

Issue 01 (2013-04-25)

Initial commercial release

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1 Overview

This chapter describes features of the ISCOM RAX711, including the following sections:

- Introduction
- Features

1.1 Introduction

The ISCOM RAX711, a GE Ethernet Demarcation Device (EDD) developed by Raisecom, is designed for remote access to the Ethernet Metropolitan Access Network (MAN). By cooperating with the ISCOM2924GF-4GE/4C at the Central Office (CO), it provides a bearer Ethernet access solution that is of easy access and easy service activation.

The ISCOM RAX711 has the following interfaces:

- Two uplink Small Factor Pluggable (SFP) optical interfaces, which support 100BASE-FX/1000BASE-X SFP and 10/100/1000BASE-T SFP.
- Four pairs of downlink service Combo interface, of which:
 - Four Combo optical interfaces support the 100BASE-FX/1000BASE-X SFP.
 - Four Combo electrical interfaces support the 10/100/1000BASE-T.

The ISCOM RAX711 can be installed in the following scenarios of a telecom equipment room:

- ETSI 300-mm-deep cabinet
- 19-inch 450-mm-deep cabinet
- 19-inch 600-mm-deep cabinet
- Open rack
- Workbench

1.2 Features

The ISCOM RAX711 has the following features:

- Provide a remote Simple Network Management Protocol (SNMP) interface, support 10/100 Mbit/s auto-negotiation, support loading and debugging programs by being connected with a Local Maintenance Terminal (LMT), and support remote management (outband network management) by being connected to the Network Management System (NMS).
- Support monitoring multiple ways of voltage on cards.
- Support monitoring temperature.
- Adopt intelligent fan design, including monitoring fan faults, automatical adjustment of rotational speed of the fan, and reading rotational speed of the fan.
- Adopt lightning protection and anti-interference design.
- Support power Dying Gasp (power failure).
- Support single AC power, single DC power, and hybrid AC and DC power, according to device models. The dual-power model supports 1+1 power protection and hybrid input of AC and DC power.
- Support EMI Class A.
- Support Anti-Static Discharge (ASD) interference.

2 Structure

This chapter describes the system structure, including the following sections:

- Appearance
- Interfaces
- LEDs
- Specifications

2.1 Appearance

Figure 2-1–Figure 2-3 show the appearance of the ISCOM RAX711.

Figure 2-1 Appearance of the ISCOM RAX711-AC_DC

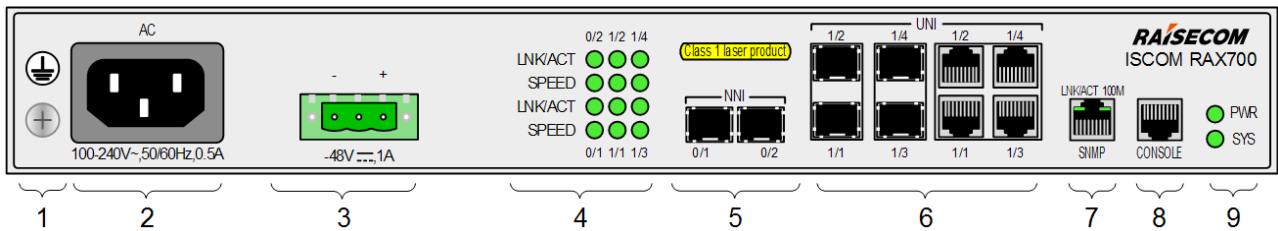


Figure 2-2 Appearance of the ISCOM RAX711-AC

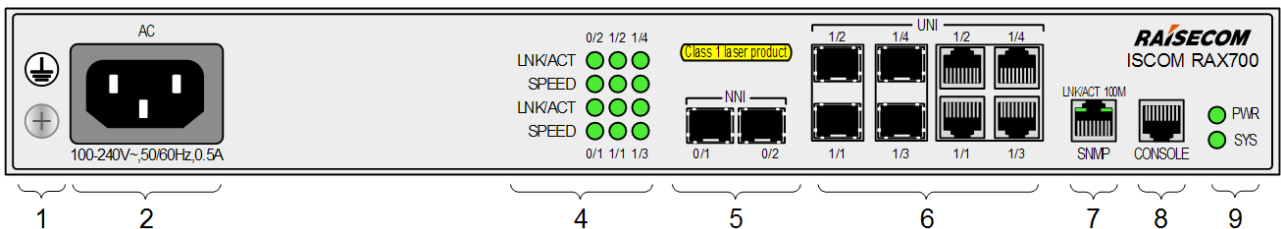


Figure 2-3 Appearance of the ISCOM RAX711-DC

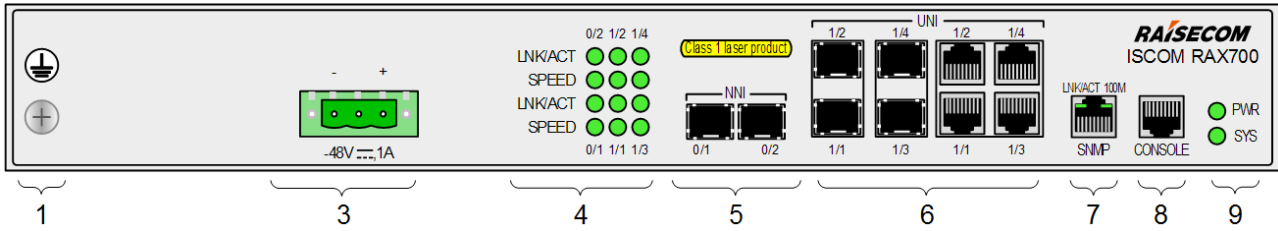


Table 2-1 lists parameters of the ISCOM RAX711.

Table 2-1 Parameters of the ISCOM RAX711

No.	Print	Description
1		Grounding terminal
2	AC 100-240~, 50/60Hz, 0.5A	AC power interface
3	-48V 1A	DC power interface
4	LNK/ACT and SPEED	Service interface LEDs
5	NNI	Uplink service interface (SFP)
6	UNI	Downlink service interface (Combo)
7	LNK/ACT and 100M	SNMP interface (RJ45)
8	CONSOLE	Console interface (RJ45)
9	PWR and SYS	PWR and SYS LEDs

2.2 Interfaces

The ISCOM RAX711 has 4 pairs of downlink service Combo interfaces and 2 uplink service SFP optical interfaces.

Table 2-2 lists interfaces on the ISCOM RAX711 panel.

Table 2-2 Interfaces on the ISCOM RAX711

Interface	Usage	Type	Description
0/1–0/2	Uplink service interface	SFP	It supports optical modules of the following types: <ul style="list-style-type: none"> • 1000BASE-X • 100BASE-FX It supports the following types of electrical module: <ul style="list-style-type: none"> • 10/100/1000BASE-T • 10/100BASE-T • 1000BASE-T
1/1–1/4	Downlink service interface	Combo optical interface (SFP)	It supports optical modules of the following types: <ul style="list-style-type: none"> • 1000BASE-X • 100BASE-FX
		Combo electrical interface (RJ45)	10/100/1000BASE-T
SNMP	Network management interface	RJ45	10/100BASE-T self-adaptive electrical interface
CONSOLE	Console interface	RJ45	It is connected to the PC with the Console cable.

2.3 LEDs

Table 2-3 lists LEDs on the ISCOM RAX711 panel.

Table 2-3 LEDs on the ISCOM RAX711 panel

LED	Status	Description
LNK/ACT 0/1–1/4	Green	Link working LED <ul style="list-style-type: none"> • Green: the link is properly connected. • Blinking green: the link is receiving or sending data. • Off: the link is disconnected or improperly connected.
SPEED 0/1–0/2	Green	Interface working rate LED <ul style="list-style-type: none"> • Green: the interface is working at 1000 Mbit/s. • Off: the interface is working at 100 Mbit/s or stops working.
SPEED 1/1–1/4	Green	Interface working rate LED <ul style="list-style-type: none"> • Green: the interface is working at 1000 Mbit/s. • Off: the interface is working at 100 Mbit/s or stops working.

LED	Status	Description
LNK/ACT (SNMP)	Green	SNMP interface working LED <ul style="list-style-type: none"> • 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.
100M (SNMP)	Green	SNMP interface rate LED <ul style="list-style-type: none"> • Green: the SNMP interface rate is 100 Mbit/s. • Off: the SNMP interface rate is 10 Mbit/s or the SNMP interface is not working.
PWR	Green	Power LED <ul style="list-style-type: none"> • Green: the power supply is normal. • Off: the power supply is off or abnormal.
SYS	Green	System working LED <ul style="list-style-type: none"> • Green: the system is working improperly. • Slow blinking green: the configuration file is successfully loaded, and the system is working properly. • Fast blinking green: the configuration file is being loaded or the management channel is established. • Off: the configuration file is not loaded, or the system is working properly.

2.4 Specifications

Table 2-4 lists specifications of the ISCOM RAX711.

Table 2-4 Specifications of the ISCOM RAX711

Parameter		Value
Dimensions		320 mm (Width) × 200 mm (Depth) × 43.6 mm (Height)
Power		≤ 20 W
Weight		≤ 2.2 kg
Operating temperature		0–50 °C
Operating humidity		10%–90% RH (indoor, non-condensing)
Input AC voltage	Rated voltage	-48 VDC
	Voltage range	-36 to -72 VDC
Input DC voltage	Rated voltage	220 VAC
	Voltage range	100–240 VAC

Parameter		Value
	Frequency	50/60 Hz
Lightning protection level	AC power	<ul style="list-style-type: none">• 6 kV in differential mode• 6 kV in common mode
	DC power	<ul style="list-style-type: none">• 1 kV in differential mode• 2 kV in common mode

3 Power supply modules

This chapter describes functions, appearance, interface, and specifications of the AC power module used by the ISCOM RAX711.

- Functions
- Appearance and interfaces
- Specifications

3.1 Functions

Power modules of the ISCOM RAX711 have the following functions:

- Support -48 VDC power through the DC power module.
- Support 220 VAC power through the AC power module.
- The ISCOM RAX711 family has different models, supporting different power input modes:
 - ISCOM RAX711-AC_DC: be embedded with a DC power module and an AC power module. Support dual power 1+1 protection and hybrid input of AC and DC power.
 - ISCOM RAX711-AC: be embedded with an AC power module and support single AC power input.
 - ISCOM RAX711-DC: be embedded with a DC power module and support single DC power input.
- Adopt intelligent fan design, including monitoring fan faults, automatic adjustment of rotational speed of the fan, and reading rotational speed of the fan.
- Support power Dying Gasp (power failure).

3.2 Appearance and interfaces

Figure 3-1 and Figure 3-2 show the appearance of power modules.

Figure 3-1 Appearance of the AC power module

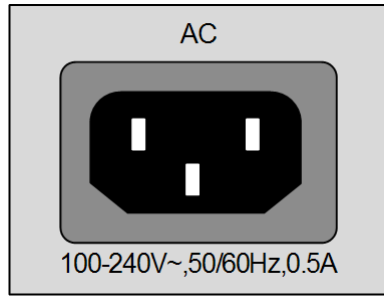
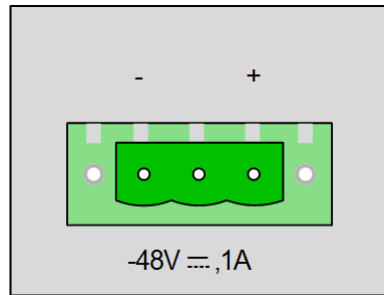


Figure 3-2 Appearance of the DC power module



The quantity and type of power interfaces are different for various models, as listed in Table 3-1.

Table 3-1 Interfaces on the power modules on the ISCOM RAX711

Power interface	Print	Description	Device model
AC power interface (100V-240V~, 50/60Hz, 0.5A)	AC	AC power input interface	<ul style="list-style-type: none"> • ISCOM RAX711-AC_DC • ISCOM RAX711-AC
DC power interface (-48V ~~, 1A)	+	GND power input terminal	<ul style="list-style-type: none"> • ISCOM RAX711-AC_DC • ISCOM RAX711-DC
	-	-48V power input terminal	

3.3 Specifications

Table 3-2 lists specifications of power modules on the ISCOM RAX711.

Table 3-2 Specifications of power modules on the ISCOM RAX711

Power module	Parameter	Value
AC	Rated input voltage	220 VAC
	Voltage range	100–240 VAC

Power module	Parameter	Value
	Frequency	50/60 Hz
	Rated input current	0.5 A
	Maximum input current	1 A
DC	Rated input voltage	-48 VDC
	Voltage range	-36 to -72 VDC
	Rated input current	1 A
	Maximum input current	3.8 A

4 Cables

This chapter describes cables used by the ISCOM RAX711, including the following sections:

- Grounding cables
- DC power cables
- AC power cables
- Console cable
- Fiber
- Ethernet cables

4.1 Grounding cables

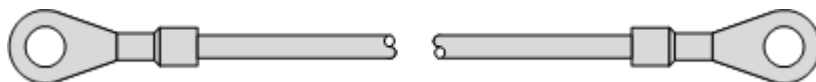
4.1.1 Introduction

The grounding cable is used to connect the ISCOM RAX711 to the ground.

4.1.2 Appearance

The grounding cable is composed of OT terminals and the coaxial cable, as shown in Figure 4-1.

Figure 4-1 Appearance of the grounding cable



4.1.3 Technical specifications

Table 4-1 lists specifications of the grounding cable for the ISCOM RAX711.

Table 4-1 Specifications of the grounding cable for the ISCOM RAX711

Item	Description
Connector	Non-insulated terminal-OT-2.5mm ² -M4-tinning-round pre-insulation terminal-16-14AWG (1.3–2.0 mm ²)

Item	Description
Model	Electron power cable-450V/750V-H07Z-K-2.5mm ² -yellow/green-Low-smoke halogen-free burn-resistant cable



Note

The ISCOM RAX711 is delivered without the grounding cable. If required, make the grounding cable on site according to technical specifications.

4.2 DC power cables

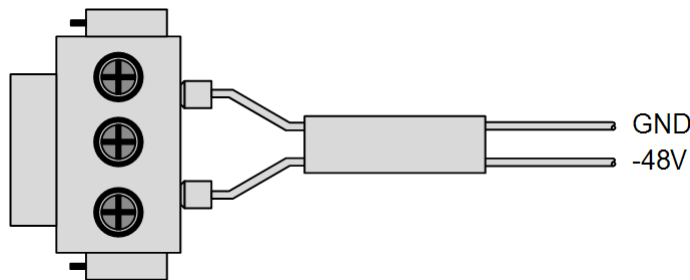
4.2.1 Introduction

The DC power cable transmits -48 VDC power to the power interface of the ISCOM RAX711, and supplies power for the whole device.

4.2.2 Appearance

The DC power cable is composed of DC connectors and conducting wire, as shown in Figure 4-2.

Figure 4-2 DC power cable



4.2.3 Technical specifications

Table 4-2 lists technical specifications of the DC power cable.

Table 4-2 Technical specifications of the DC power cable

Item	Description
Name	POL-DC-unstrapped/stripped cover-1.5m
Connector	DC connector-3-pin-head/UL/RoHS
Model	Copper core multi-strand power cable 16AWG (1.3mm ²)
Length	1.5 m

4.3 AC power cables

4.3.1 Introduction

The AC power cable transmits 220 VAC power to the power interface of the ISCOM RAX711, and supplies power for the whole device.

The ISCOM RAX711 uses different AC power cables in different countries or regions, as lists in Table 4-3.

Table 4-3 AC power cables

Regional standard	Cable
Europe	European standard French mode 3-pin-10A/250V-1.5m/RoHS
America	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.

4.3.2 Appearance

Figure 4-3 shows the European standard AC power cable.

Figure 4-3 European standard AC power cable

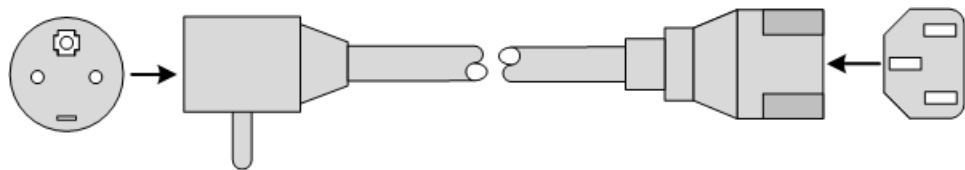
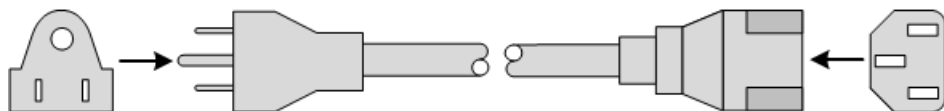


Figure 4-4 shows the American standard AC power cable.

Figure 4-4 American standard AC power cable



4.3.3 Technical specifications

Table 4-4 lists specifications of the European standard AC power cable.

Table 4-4 Specifications of the European standard AC power cable

Parameter	Description
Name	European standard French mode receptacle-10A/250V-1.5m/RoHS
Connector	<ul style="list-style-type: none"> • French mode 3-pin plug • IEC60320-C13 receptacle
Type	Copper core multi-strand power cable 18AWG (0.8 mm ²)
Length	1.5 m

Table 4-5 lists specifications of the American standard AC power cable.

Table 4-5 Specifications of the American standard AC power cable

Parameter	Description
Name	American standard 3-pin-plug-10A/250V-1.5m/RoHS
Connector	<ul style="list-style-type: none"> • American standard 3-pin plug NEMA5-15 • IEC60320-C13 receptacle
Type	Copper core multi-strand power cable 18AWG (0.8 mm ²)
Length	1.5 m

4.4 Console cable

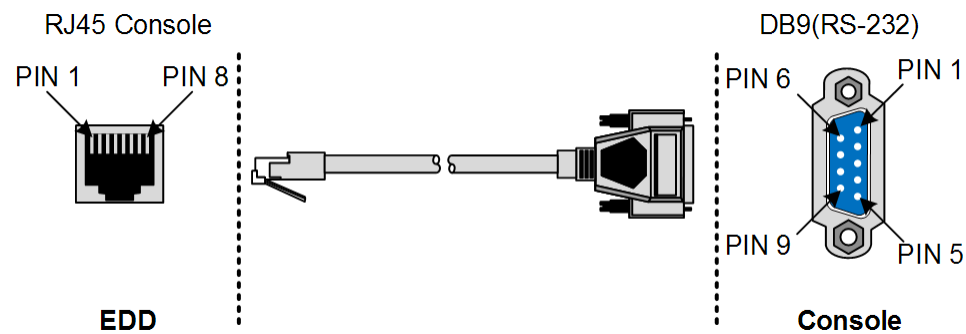
4.4.1 Introduction

You can log in to the ISCOM RAX711 through the Console interface.

4.4.2 Appearance

Figure 4-5 shows the RJ45 Console cable.

Figure 4-5 RJ45 Console cable



4.4.3 Technical specifications

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

Table 4-6 Technical specifications of the Console cable

Item	Description
Name	CBL-RS232-DB9F/RJ45-B-2m/RoHS
Connector	<ul style="list-style-type: none"> • RJ45 connector • DB9 female connector
Model	Unshielded Cat 5 flat cable
Length	2 m

Table 4-7 lists wiring on the Console interface on the ISCOM RAX711.

Table 4-7 Wiring on the Console interface on the ISCOM RAX711

PIN	Function	PIN	Function
PIN 1	NC	PIN 5	GND
PIN 2	NC	PIN 6	RxD
PIN 3	TxD	PIN 7	NC
PIN 4	GND	PIN 8	NC

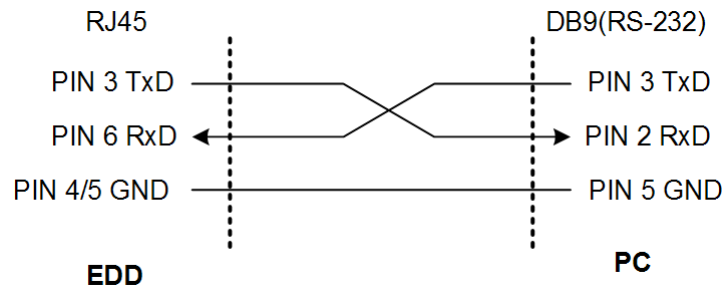
Table 4-8 lists wiring of the serial interface on the PC.

Table 4-8 Wiring on the serial interface on the PC

PIN	Function	PIN	Function
PIN 1	DCD	PIN 6	DSR
PIN 2	RxD	PIN 7	RTS
PIN 3	TxD	PIN 8	CTS
PIN 4	DTR	PIN 9	RI
PIN 5	GND	–	–

Figure 4-6 shows wiring between PINs on the ISCOM RAX711 and PINs on the PC.

Figure 4-6 Wiring between PINs on the ISCOM RAX711 and PINs on the PC



4.5 Fiber

4.5.1 Introduction

Table 4-9 lists fiber connectors.

Table 4-9 Fiber connectors

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



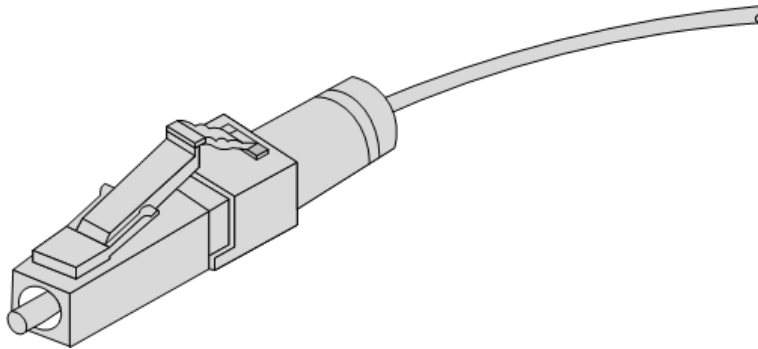
Note

Choose the fiber connector properly as required on site.

4.5.2 Appearance

Figure 4-7 shows the LC/PC fiber connector.

Figure 4-7 LC/PC fiber connector

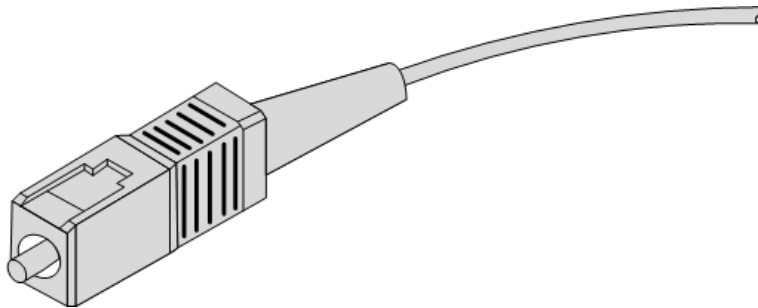


When connecting or removing the LC/PC optical connector, align the connector with the optical interface, and do not rotate the fiber. Operate the fiber as below:

- 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, and pull the fiber out.

Figure 4-8 shows the SC/PC fiber connector.

Figure 4-8 SC/PC fiber connector

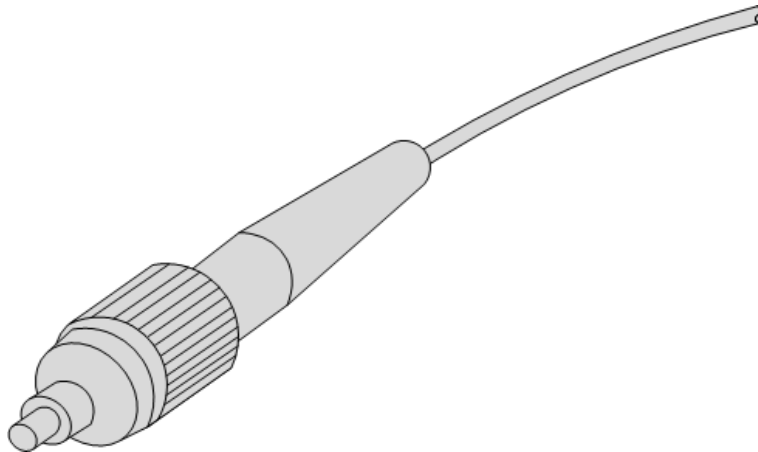


When connecting or removing the SC/PC optical connector, align the connector with the optical interface, and do not rotate the fiber. Operate the fiber as below:

- 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 fiber head inwards, and then pull the fiber out.

Figure 4-9 shows the FC/PC fiber connector.

Figure 4-9 FC/PC fiber connector



When connecting or removing the FC/PC optical connector, operate the fiber as below:

- Align the head of the fiber jumper with the optical interface to avoid damaging the ceramic inner tube, and insert the optical fiber into the interface gently to the bottom. Then, rotate the screw set clockwise tightly.
- To remove the fiber, rotate the screw set anticlockwise. When the screw set is loose, pull the fiber out.

4.6 Ethernet cables

4.6.1 Introduction

For the ISCOM RAX711, the Ethernet cable connects:

- The Ethernet electrical interface and other devices
- The SNMP interface and the NMS

The Ethernet interface on the ISCOM RAX711 is self-adaptive to straight-through cable mode and crossover cable mode.



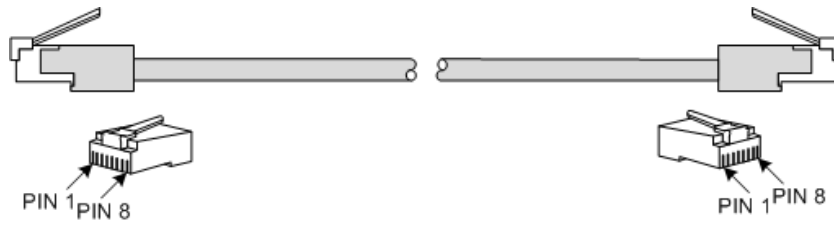
Note

Make Ethernet cables as required on site.

4.6.2 Appearance

Figure 4-10 shows the Ethernet cable.

Figure 4-10 Ethernet cable



4.6.3 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 4-10 lists the wiring of EIA/TIA 568A and EIA/TIA 568B standards.

Table 4-10 Wiring of EIA/TIA 568A and EIA/TIA 568B standards

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

Raisecom provides straight-through cables and 100 Mbit/s crossover cables. Table 4-11 lists technical specifications of the Ethernet cable.

Table 4-11 Technical specifications of the Ethernet cable

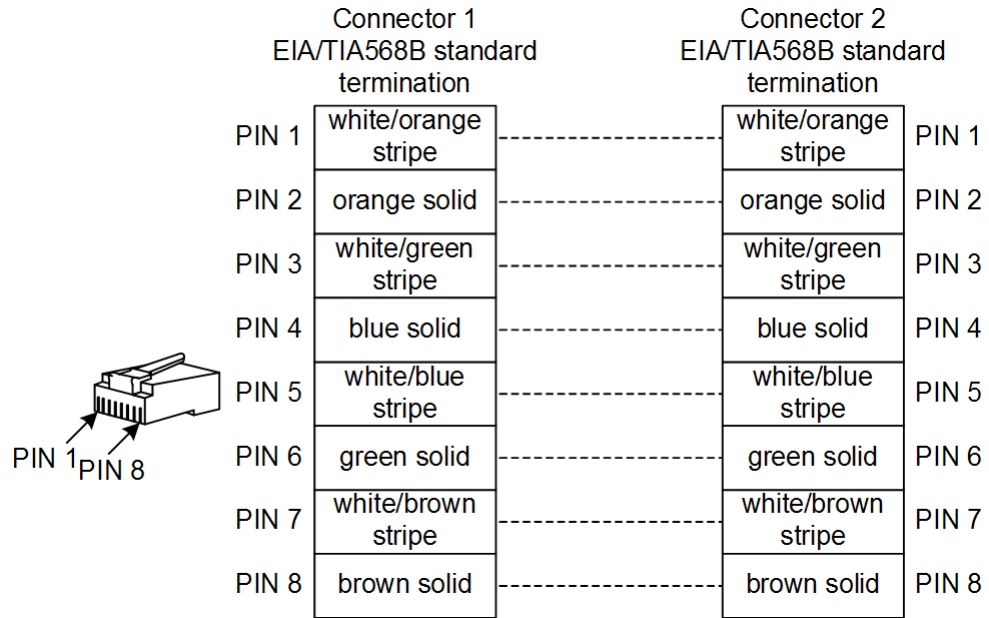
Item	Description
Name	CBL-ETH-RJ45/RJ45-D
Connector	RJ45 crystal head
Model	Symmetric twisted pair-100ohm- enhanced CAT5-0.52mm-24AWG-8 pins
Length	The letter D is the length, indicating that the cable is customized. For example, if the customer requires 2-meter cables, they are named CBL-ETH-RJ45/RJ45-2m.

Straight-through cables

Both two RJ45 connectors of the straight-through cable follow EIA/TIA 568B standard wiring.

Figure 4-11 shows the wiring of the straight-through cable.

Figure 4-11 Wiring of the straight-through cable



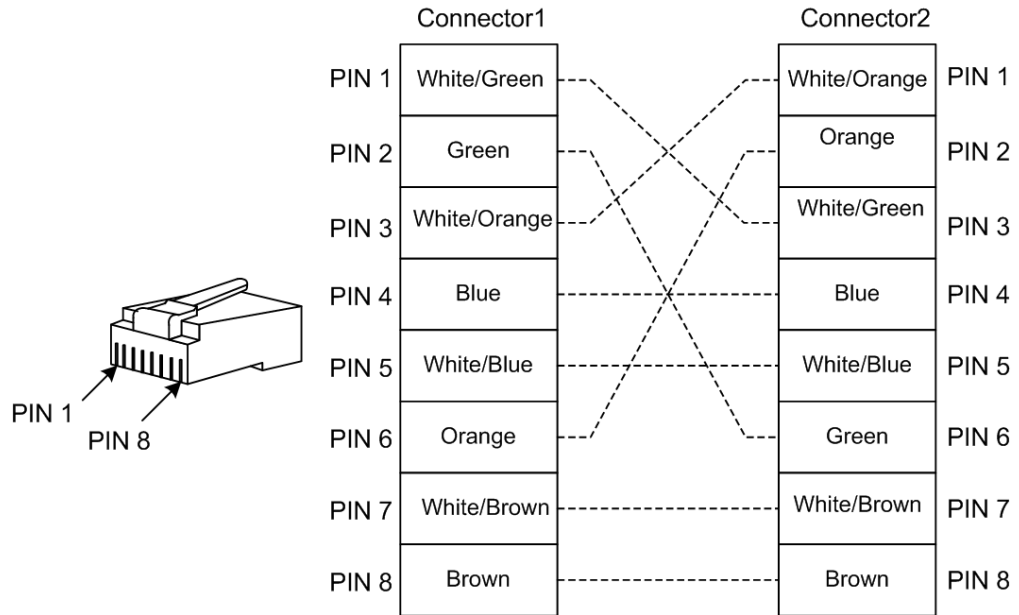
Crossover cable

The wiring of the 100 Mbit/s crossover cable is different from that of the 1000 Mbit/s crossover cable.

One RJ45 connector of the crossover cable follows EIA/TIA 568A standard wiring; the other RJ45 connector follows EIA/TIA 568B standard wiring.

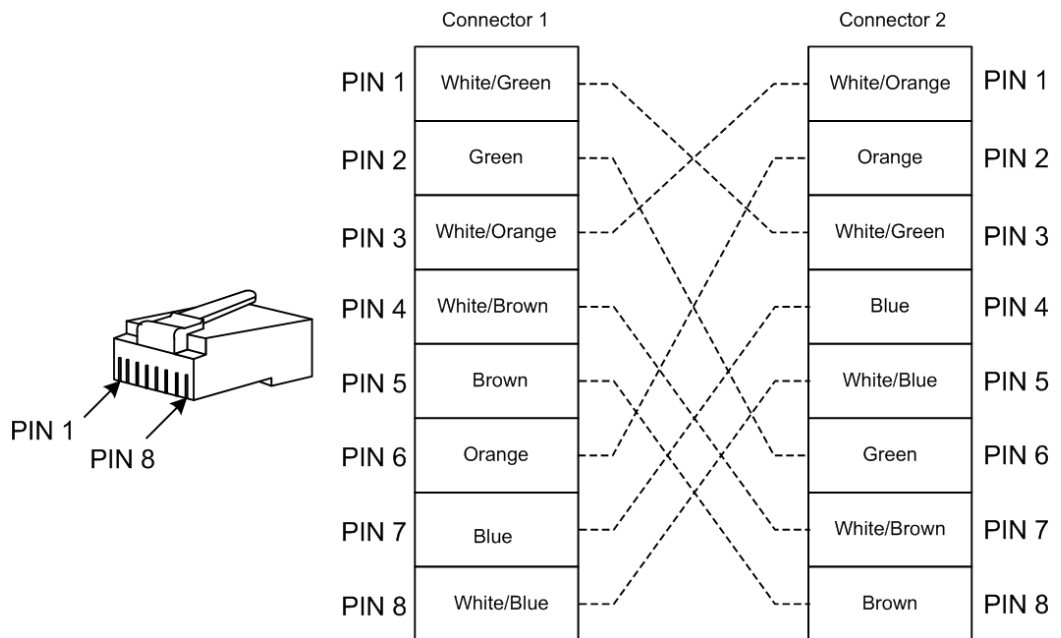
Figure 4-12 shows the wiring of the 100 Mbit/s crossover cable.

Figure 4-12 Wiring of the 100 Mbit/s crossover cable



The 1000 Mbit/s crossover cable uses all 8 pins. The crossover is PIN1 to PIN3, PIN2 to PIN6, PIN4 to PIN7, and PIN5 to PIN8, as shown in Figure 4-13.

Figure 4-13 Wiring of the 1000 Mbit/s crossover cable



5 Lookup table for interface and module parameters

This chapter describes interface and module parameters, including the following sections:

- Lookup table for interface parameters
- Lookup table for service interface module parameters

5.1 Lookup table for interface parameters

5.1.1 100BASE-FX/1000BASE-X SFP optical interface parameters

Table 5-1 lists 100BASE-FX/1000BASE-X SFP optical interface parameters.

Table 5-1 100BASE-FX/1000BASE-X SFP optical interface parameters

Item	Description
Connector type	LC/PC
Optical interface parameters	Depending on the selected SFP
Coding type	<ul style="list-style-type: none">• 8B/10B (1000BASE-X)• 4B/5B (100BASE-FX)
Transmission rate	100/1000 Mbit/s, depending on the selected SFP
Duplex mode	Full duplex

5.1.2 1000BASE-T Combo electrical interface parameters

Table 5-2 lists 1000BASE-T Combo electrical interface parameters.

Table 5-2 1000BASE-T Combo electrical interface parameters

Item	Description
Connector type	RJ45
Transmission rate	10/100/1000 Mbit/s auto-negotiation
Duplex mode	Full/Half duplex auto-negotiation
Cable specifications	<ul style="list-style-type: none"> • Using Cat 5 or better UTP is recommended in 10/100 Mbit/s duplex mode. • Using Cat 6 or better UTP is recommended in 1000 Mbit/s duplex mode.

5.1.3 Console interface parameters

Table 5-3 lists Console interface parameters.

Table 5-3 Console interface parameters

Item	Description
Connector type	RJ45
Duplex mode	Duplex UART
Electrical features	RS-232
Baud rate	9600 Baud
Cable specifications	8-pin cable

5.1.4 SNMP interface parameters

Table 5-4 lists SNMP interface parameters.

Table 5-4 SNMP interface parameters

Item	Description
Connector type	RJ45
Interface rate	10/100 Mbit/s auto-negotiation
Wiring	Host mode, self-adaptive to the straight-through cable and crossover cable

5.2 Lookup table for service interface module parameters

5.2.1 1000BASE-X SFP optical module parameters

Table 5-5 lists 1000BASE-X SFP optical module parameters.

Table 5-5 1000BASE-X SFP optical module parameters.

Model	Wavelength (nm) (Laser type)	RX type	TX optical power (dBm)	Min. overload point (dBm)	Extinction ratio (dB)	RX sensitivity (dBm)	Transmission distance(km)
USFP-Gb/M-D-R	850(VCSEL)	PIN	-10 to -3	-3	9	< -15	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	-3 to 2	-3	9	< -21	40
USFP-Gb/S3-D-R	1550(DFB)	APD	-3 to 2	-9	9	< -30	80
USFP-Gb/LH1-D-R	1310(DFB)	PIN	-4 to -0	-3	9	< -21	40
USFP-Gb/ZX-D-R	1550(DFB)	PIN	-2 to 3	-3	9	< -22	80
USFP-Gb/EX-D-R	1550(DFB)	APD	0 to 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/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	-3 to 2	-3	9	< -29	100

Model	Wavelength (nm) (Laser type)	RX type	TX optical power (dBm)	Min. overload point (dBm)	Extinction ratio (dB)	RX sensitivity (dBm)	Transmission distance(km)
USFP-Gb/SS35-D-R	TX1550/RX1490(DFB)	PIN	-3 to 2	-3	9	< -29	100

5.2.2 100BASE-FX SFP optical module parameters

Table 5-6 lists 100BASE-FX SFP optical module parameters.

Table 5-6 100BASE-FX SFP optical module parameters

Model	Wavelength (nm) (Laser type)	RX type	TX optical power (dBm)	Min. overload point (dBm)	Extinction ratio (dB)	RX sensitivity (dBm)	Transmission distance(km)
USFP-03/M-D-R	1310(LED)	PIN	-20 to -10	-14	9	< -29	2
USFP-03/S1-D-R	1310(FP)	PIN	-15 to -8	-8	9	< -34	15
USFP-03/S2-D-R	1310(DFB)	PIN	-5 to 0	-8	9	< -34	40
USFP-03/S3-D-R	1550(DFB)	PIN	-5 to 0	-10	9	< -34	80
USFP-03/SS13-D-R	TX1310/RX1550(FP/DFB)	PIN	-15 to -8	-8	9	< -28	15
USFP-03/SS15-D-R	TX1550/RX1310(FP/DFB)	PIN	-15 to -8	-8	9	< -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(FP/DFB)	PIN	-5 to 0	-8	8.2	< -32	40
USFP-03/SS34-D-R	TX1490/RX1550(FP/DFB)	PIN	-3 to 2	-8	8.2	< -32	80
USFP-03/SS35-D-R	TX1550/RX1490(FP/DFB)	PIN	-3 to 2	-8	8.2	< -32	80

5.2.3 SFP electrical module parameters

Table 5-7 lists SFP electrical module parameters.

Table 5-7 SFP electrical module parameters

Model	Application code	Auto-negotiation	Data interface	LOS alarm	Transmission distance (m)
USFP-GE-R	1000BASE-T	–	SerDes	Supported	100
USFP-GE/AN-R	10/100/1000BASE-T	Supported	SGMII	Supported	100
USFP-FE/AN-R	10/100BASE-TX	Supported	SerDes	Supported	100

6 Appendix

This chapter describes terms, acronyms, and abbreviations involved in this document, including the following sections:

- Terms
- Acronyms and abbreviations

6.1 Terms

E

ETSI 600 standard cabinet	600-mm-wide and 600-mm-deep cabinet, complying with ETSI standards
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F

Full duplex	In a communication link, both parties can receive and send data concurrently.
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G

Grounding cable	Connecting the device to the ground, usually a yellow/green coaxial cable
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I

IEEE	American Institution of Electrical and Electronic Engineers
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ITU-T	International Telecommunication Union-Telecommunication Standardization Sector
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L

Laser safety level Laser products are divided into 4 levels by safety level to the user. Level 1 laser is the safest and its power is within 1 mW; under normal conditions, it does not result in harmful radiation or fire.

M

Mounting ear A part used at the side of a chassis to fix the chassis to a cabinet

Multi-mode fiber In this fiber, multi-mode optical signals are transmitted.

R

RS232 In synchronization transfer mode, no handshaking signals, able to communicate with RS232 or RS422 devices point to point, in transparent transmission, with a maximum rate of 19.2 Kbit/s

S

Single-mode fiber In this fiber, single-mode optical signals are transmitted.

Self-adaption The Ethernet interface automatically chooses the supported highest rate and duplex mode according to auto-negotiation result.

U

U Unit of dimension, short for unit. It takes 44.45 mm as basic unit; namely 1 U = 44.45 mm

6.2 Acronyms and abbreviations

A

ACL Access Control List

AWG American wire gauge

B

BPDU Bridge Protocol Data Unit

C

CFM Connectivity Fault Management

E

ESD	Electro Static Discharge
EDD	Ethernet Demarcation Device
ETSI	European Telecommunications Standards Institute

L

LLDP	Link Layer Discovery Protocol
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M

MPLS	Multi-protocol label switching
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O

ODF	Optical Distribution Frame
OAM	Operation, Administration, and Maintenance

P

PTN	Packet Transport Network
PTP	Precision Time Protocol

Q

QoS	Quality of Service
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R

RH	Relative Humidity
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S

SLA	Service-Level Agreement
SFP	Small Form-factor Pluggable

U

UPS	Uninterruptible Power Supply
UART	Universal Asynchronous Receiver/Transmitter

