RC702-FX
Ethernet over SDH

User Manual

Raisecom Technology Co., Ltd

1. Caution

Please carefully read the following precautions before installing and deploying RC702-FX equipment, and operate strictly according to the manual. Raisecom will not be held responsible for damages that caused by violation of the manual and security issues.

Warning: only trained and qualified technical person should be allowed to install, maintain and fix the equipment. The equipment must be safely grounded.

The equipment shall be installed in a room where the temperature and humidity can be controlled. Pay attention to the electricity guidance of the place that equipment is placed.

RC702-FX equipment is incorporated with sophisticated optical instrument. Please measure the output port optical power before connecting the optical ports. It is strictly forbidden that the receiving optical power exceeds the input port saturation.

RC702-FX equipment is incorporated with sophisticated optical instrument. Please do not disassembly or repair the equipment without Raisecom's written permission, or Raisecom will take it as abandon of the warranty.

Contents

2. Overview

RC702-FX is an Ethernet over SDH device developed by Raisecom Technology Co., Ltd. It provides a 155M SDH interface (optical or electronic) and a 100M Ethernet interface (electronic), and encapsulates Ethernet data packets to SDH/SONET payload, so remote Ethernets can be connected through SDH transmission network at a high speed.

This device is available in all the operating networks such as: China Telecom, China Unicom, China Mobile, China Netcom and China Broadcast & Television, meanwhile it accords with X.85/X.86 of ITU-T, YD/T 1179-2002 of Ministry of Information Industry and related standards of SDH/SONET. RC702-FE provides network management and it is very convenient to manage.

2.1. Main features

- Provides a 100M Ethernet electronic interface and an expansion slot in which a 155M SDH optical or electronic interface card can be inserted.
- In SDH/SONET optical interface mode, the longest transmission distance is 120km.
- Supports GFP and LAPS encapsulation at Ethernet port and 100Mbps full duplex mode only
- RC702-FX provides console interface and SNMP network management interface.
- RC702-FX provides SNMP network management function, and complies with the standard specifications of SDH/SONET network management.
- Provide local and remote alarm indicators so it can be installed and maintained conveniently.
- No limit to Ethernet maximum transmission unit (MTU). RC702-FX provides transparent transmission for Ethernet packets.
- Integrated internal power supplies provide dual PS hot redundant backup and AC220V/DC -48V options.
- Whole box power consumption: ≤15W

2.2. Part number explanation

RC702-FX box consists of mother PCB, expansion card and power supply cards. The expansion cards include optical port and electrical port options.

1. The box part number is like:

RC702-FX-**A**- **C**

RC702: Raisecom's Ethernet over SDH equipment

FX: indicates that the Ethernet port is optical

Field A: indicates the type of optical Ethernet port (M, S1, S2, S3, SS13, SS15, SS23, and SS25). Please refer to Table 2-1 for optical parameters.

Field C: AC or DC. AC for alternative 220V, and DC for direct -48V power supply.

Table 2-1 Optical port parameter

Part number	Connector type	Data speed (Mbps)	Line code	Wavelength (nm)	TX power (dBm)	Rx sensitivity (dB)	Extinction ratio (dB)	Minimum saturation (dbm)	Estimated transmission distance (km)
M	SC/ Multimode	155.52	NRZ	1310	-18 ~ -14	<-29	>8.2	>-14	0~2
S1	SC/Single mode	155.52	NRZ	1310	-15 ~ -8	<-34	>8.2	>-8	0~25
S2	SC/Single mode	155.52	NRZ	1310	-5~0	<-34	>8.2	>-8	10~60
S3	SC/Single mode	155.52	NRZ	1550/DFB	-5~0	<-36	>10	>-10	15~120
SS13	SC/Single strand/ single mode	155.52	NRZ	TX 1310 RX 1550	-12 ~ -3	<-30	>8.2	>-8	0~25
SS15	SC/single strand/ single mode	155.52	NRZ	TX 1550 RX 1310	-12 ~ -3	<-30	>8.2	>-8	0~25
SS23	SC/Single strand/ single mode	155.52	NRZ	TX 1310 RX 1550	-5 ~ 0	<-32	>8.2	>-8	10~50
SS25	SC/single strand/ single mode	155.52	NRZ	TX 1550 RX 1310	-5 ~ 0	<-32	>8.2	>-8	10~50

Note: single strand equipment must be pair used.

2. Expansion part number explanation

SDH electrical expansion card naming rules:

RC702-SC-EP

Explanation:

RC702: Raisecom's Ethernet over SDH equipment

SC: stands for expansion card of RC702

EP: indicates that the expansion card has an electrical port

SDH optical expansion card naming rules:

RC702-SC-OP-**D**

Explanation:

RC702: Raisecom's Ethernet over SDH equipment

SC: stands for expansion card of RC702

OP: indicates that the expansion card has an optical port

Field D indicates the optical port type (M, S1, S2, S3, SS13, SS15, SS23, and SS25). Please refer to Table 2-1 for optical parameters.

3. Power supply card part number explanation

Part number	Description
RC702-PWR-AC	AC 220V power supply
RC702-PWR-DC	DC -48V power supply

2.3. Dimensions

RC702 is finished in international standard 19' metal enclosure, compact and stylish for convenient installation.

RC702-FX: 440mm (width) x 43.6mm (height) x 200mm (depth)

3. Technical Specification

3.1. RC702-FX basic configuration

- Expansion card: 155.52Mbps SDH STM-1 optical or electrical
- Ethernet port: 100Mbps optical
- Power supply card: AC 220V or DC -48V
- Management port: console/Ethernet for SNMP

3.2. Expansion card properties

- SDH optical port: 155.52Mbps, NRZ line code. Refer to Table 2-1 for optical parameters.
- Optical connector: SC/PC
- Optical port compliance: ITU-T G.957
- SDH electrical port: CMI line code. Line signal peak-peak value 0.9~1.1V, complying with ITU-T G.703.
- Electrical connector: 75 Ohm coaxial cable connector
- Electrical port compliance: ITU-T G.703

3.3. Ethernet port properties

- Port type: optical
- Data rate: only 100Mbps full duplex mode supported
- Connector: SC/PC
- Refer to Table 2-1 for optical port parameters

3.4. Console port properties

- Connector type: RJ45
- Compliance: RS232

- Data rate: 9600bps

3.5. SNMP management port properties

- Connector: RJ45
- Compliance: IEEE802.3
- 10/100M auto negotiation
- Wire order: host mode

3.6. Power supply condition

- Voltage: -48V DC, range of tolerance -36V ~ -72V
  +24V DC, range of tolerance +18V ~ +36V
  220V AC, range of tolerance 180V ~ 260V
- Power consumption: less than 15W

3.7. Ambience

- Temperature: -5℃ ~ 50℃
- Relative humidity: ≤90% (35℃)

4. Construction and Indicator

4.1. Front view

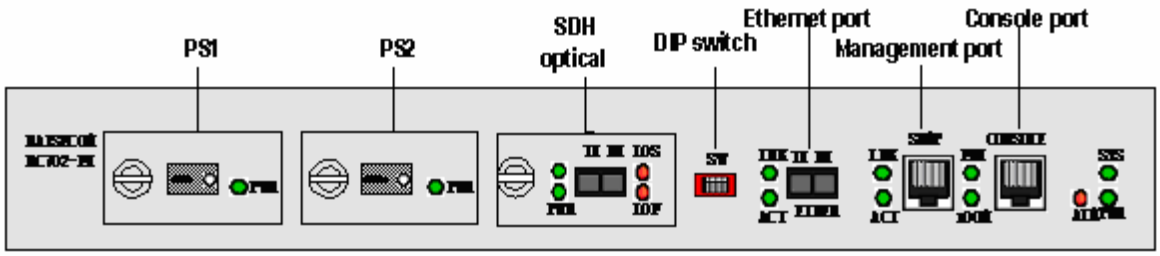

Figure 4-1 RC702-FX with SDH optical port

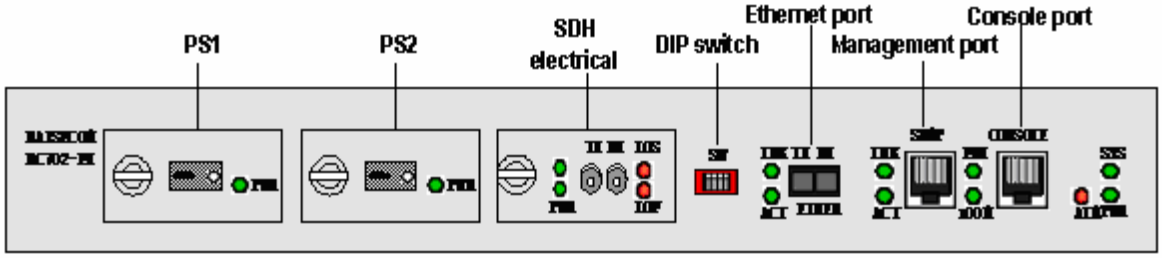

Figure 4-2 RC702-FX with SDH electrical port

4.2. Back panel view

When using AC power supply, 220V standard three-phase power socket is provided.

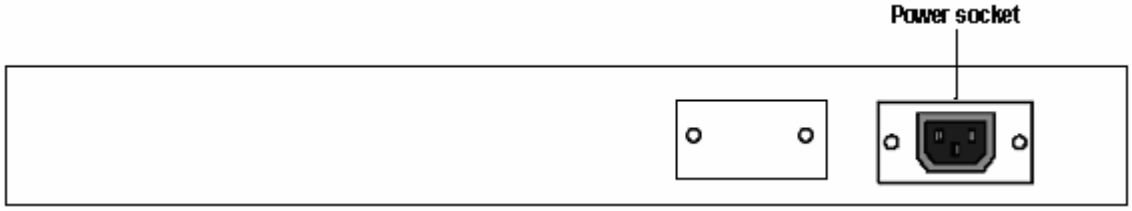

Figure 4-3 RC702-FX with AC power supply

When using DC power supply, -48V connector pins are provided.

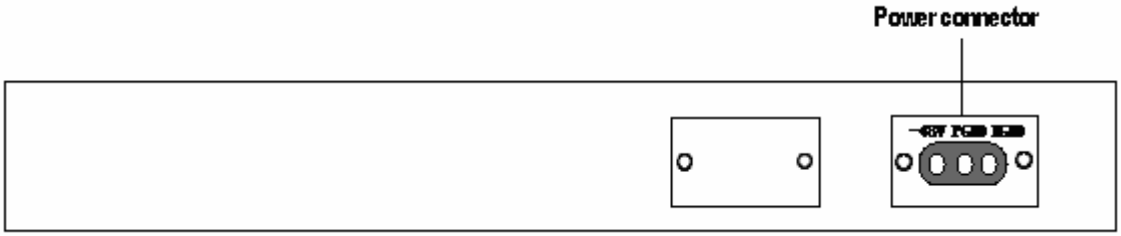

Figure 4-4 RC702-FX with DC power supply

DC power supply provides 3 connector pins, -48V, PGND, and BGND, which shall be connected to -48V, protecting ground and 0V power ground respectively. Note that it is critical to connect the protecting ground to ensure the equipment safety.

4.3. Indicators on front panel

Indicator	Description
Expansion card (SDH optical and electrical)	
PWR	Power ON indicates the PS card is working; OFF indicates power failed
LOF	SDH optical synchronization signal. ON indicates the signal is lost of synchronization.
LOS	SDH optical signal loss. ON indicates the optical signal is lost.
DIP switch is configured to ALL OFF by default 	
1st bit	RESERVED
2nd bit	RESERVED
3rd bit	OFF, SDH card uses local clock as transmit clock ON, SDH card uses recovered clock from line as transmit clock
4th bit	RESERVED
Ethernet port	
ACT	TX/RX indicator. ON indicates data is being transmitted; OFF indicates port is idling.
LNK	Ethernet connection indicator. ON indicates Ethernet is connected; OFF indicates Ethernet

	is not connected.
SNMP network management port	
ACT	TX/RX indicator. ON indicates data is being transmitted; OFF indicates port is idling.
LNK	Ethernet connection indicator. ON indicates Ethernet is connected; OFF indicates Ethernet is not connected.
100M	Ethernet port speed indicator. ON indicates 100M; OFF indicates 10M.
FDX	Full duplex indicator. ON indicates full duplex mode; OFF indicates half duplex mode; FLASHING indicates collision is detected.
ALM	General alarm indicator. ON indicates alarms generated besides LOS and LOF.
PWR	Power supply indicator. ON indicates power normal; OFF indicates power failed.
SYS	System indicator. FLASHING indicates CPU working normally.
PS1 & PS2	
PWR	Power supply indicator. ON indicates power normal; OFF indicates power failed.

5. Application

RC702/701-FE use SDH transmission network for long distance transmission of Ethernet data. And there must be a VC4 channel in SDH/SONET before using this device. Both of ends of this channel have a RC701/702-FE device to connect Ethernet and SDH. Typical topology is as follows:

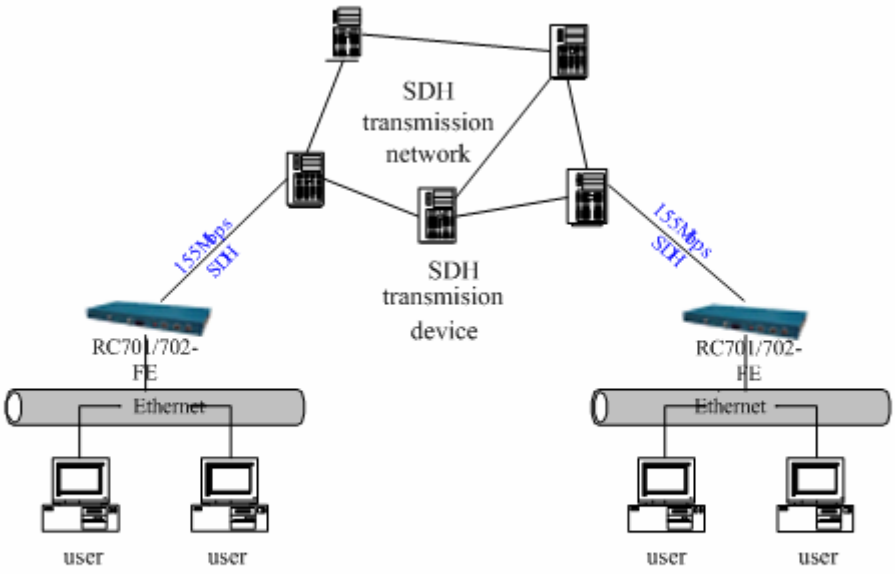

Figure 5-1 typical topology

6. Installation

6.1. Preparation

First check the type and amount of the device with packing list, and the appearance. There must be drying process if the device is affected with damp.

To make sure the device will work normally, pleas follow the steps:

- Read this guide carefully
- Prepare optical fiber or 75Ω coaxial cable
- Fix and install access device.
- Connect fiber or cable.
- Configure EOS device（RC702-FE only, more information is available in configuration guide.
- Work normally.

6.2. Installation

6.2.1. Prepare cables

The required cables are in table 6-1:

Table 6-1 interface cable specifications of RC701/702-FE EOS

Interface	Specification
100Mbps Ethernet interface and SNMP network management interface	UTP of 100Base-T, the longest distance is 100m,
CONSOLE cable	Available in appendix
155Mbps SDH optical interface	Single mode or multi mode optical fiber of SC depends on users.
155Mbps SDH electronic interface	75Ω coaxial cable, for short distance connection. Use SYV-75-2-2 communication cable.
Power supply interface	AC mode, 220V/10A power supply cable DC mode, -48V/10A power supply cable

6.2.2. Install extension card

Extension cards of same type devices can be exchanged, for example: extend

cards of two RC701-EF can be changed. You must use jumper to exchange extended cards of different type devices.

Crossover cable differences of extension cards between RC701-FE and RC702-FE, table 6-2 and 6-3

Table 6-2 Jumper settings of electronic extended card of RC701/702-FE

Type / jumper	RC701-FE	RC702-FE
JP1	Connect with a short	N/A
JP2	N/A	Connect with a short
JP3	N/A	Connect pin 2 and 3 with a short

Table 6-3 Jumper settings of optical extension card of RC701/702-FE

type / jumper	RC701-FE	RC702-FE
JP1	Connect with a short	N/A
JP2	Connect pin 1 and 2 with a short	Connect pin 2 and 3 with a short
JP3	N/A	Connect pin 2 and 3 with a short

Note: this is the default settings.

6.2.3. Connect 100M Ethernet interface

One end of Ethernet cable connects to router or switch, and the other end connects to Ethernet interface of EOS device. Usually, Ethernet interface is in 100M full-duplex mode.

6.2.4. Connect 155M SDH interface

- Connect one end of SDH optical fiber to the SDH interface on EOS device.
- Connect the other end of SDH optical fiber to STM-1 interface of SDH device.
- Under normal condition, indicator lights of LOS and LOF are off.

6.2.5. Connect CONSOLE interface (RC702-FE only）

- Connect the RJ45 connector of CONSOLE cable to CONSOLE interface on front panel of EOS device.
- Connect the DB9 connector to PC serial interface.
- Run Hyper terminal program, and configure the baud rate as 9600.
- Configure RC702-FE, more information is available in configuration guide.

6.2.6. Connect network management interface（RC702-FE only）

Connect SNMP network management interface to related network.

6.2.7. Power on

When connect power supply cable, first connect the cable to POWER plug on rear panel of EOS device, and than connect to power supply.

If you use the -48 DC power supply, first connect protection ground, then -48V connection to low electron cable and finally 0V to high electron. Make sure of firm installation and no short-cut, turn on power supply.

If you use 220V AC power supply, the cable described in appendix is available.

After being powered on, the power supply indicator lights of power supply card, device and extended card work normally.

7. Q&A

If you have problems during the installation or application, please try to solve them through the following suggestions. And if it does not work, please contact the sellers to get technical supports.

- PWR light of power supply card off
  Check the power supply cable first, if power supplied normally there must be error of power supply card.
- There is LOS or LOF alarm of SDH optical interface or electronic interface.
  That is to say, there is receiving signal loss or frames receiving not synchronously of SDH optical or electronic interface. First, check whether the fiber or cable is connected correctly; secondly, self-loop the fiber (perhaps optical loss is needed) or cable, if there are still alarms, then there is something wrong with device.
- Indicator light of Ethernet interface or SNMP network management interface is off.
  First, check whether the cable works normal or not; then, check whether the devices connect to Ethernet interface or SNMP network management interface works normal or not. It is recommended that use rollover cables to connect switch or hub and use crossover cables t o connect router or NIC.
- Line is disconnecting.
  Check whether Ethernet interface is in 100M full-duplex, and it must be in that mode, otherwise it will not work.

8. Appendix How to make CONSOLE cable

8.1. Appendix 1 cable of CONSOLE interface

Signaling and Pinouts of CONSOLE of RJ45 plug:

Pin number of RJ45	Signal	Correspond PC serial port pin number
1	NC	-
2	DSR#	6
3	RxD	3
4	GND	5
5	GND	5
6	TxD	2
7	DTR#	4
8	NC	-

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