RAISECOM

RC959-4FE16E1-BL User Manual

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Technical Assistance Center

The Raisecom TAC is available to all customers who need technical assistance with a Raisecom product, technology, or, solution. You can communicate with us through the following methods:

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World Wide Web

You can access the most current Raisecom product information on the World Wide Web at the following URL:

http://www.raisecom.com

Feedback

Comments and questions about how the RC959-4FE16E1-BL device works are welcomed. Please review the FAQ in the related manual, and if your question is not covered, send email by using the following web page:

http://www.raisecom.com/en/xcontactus/contactus.htm.

If you have comments on the RC959-4FE16E1-BL specification, instead of the web page above, please send comments to:

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We hope to hear from you!

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Release Notes

Date of Release	Manual Version	Revisions
20080603	200803	V1.0 (first draft)

General Safety Instructions

The following instructions serve as a general guide for the safe installation and operation of telecommunications products. Additional instructions, if applicable, are included inside the manual.

Safety Symbols

⚠️ **Warning**	This symbol may appear on the equipment or in the text. It indicates potential safety hazards regarding product operation or maintenance to operator or service personnel.

⚡	Danger of electric shock! Avoid any contact with the marked surface while the product is energized or connected to outdoor telecommunication lines.

⏚	Protective earth: the marked lug or terminal should be connected to the building protective earth bus.

☀ **Warning**	Some products may be equipped with a laser diode. In such cases, a label with the laser class and other warnings as applicable will be attached near the optical transmitter. The laser warning symbol may be also attached. Please observe the following precautions: • Before turning on the chassis with optic module, make sure that the fiber optic cable is intact and is connected to the transmitter. • Do not attempt to adjust the laser drive current.

• Do not use broken or unterminated fiber-optic cables/connectors or look straight at the laser beam.

• The use of optical devices with the equipment will increase eye hazard.
• Use of controls, adjustments or performing procedures other than those specified herein, may result in hazardous radiation exposure.
ATTENTION: The laser beam may be invisible!

Always observe standard safety precautions during installation, operation and maintenance of this product. Only qualified and authorized service personnel should carry out adjustment, maintenance or repairs to this product. No installation, adjustment, maintenance or repairs should be performed by either the operator or the user.

All extension slots are not hot-swappable

Before operating modules in the electricity conditions, please be noticed that optical modules shall be connected with optical fiber wires or shield with optical module cover for fear that laser light harms to operator's eyes.

Handling Energized Products

General Safety Practices
Do not touch or tamper with the power supply when the power cord is connected. Line voltages may

be present inside certain products even when the power switch (if installed) is in the OFF position or a fuse is blown. For DC-powered products, although the voltages levels are usually not hazardous, energy hazards may still exist.

Before working on equipment connected to power lines or telecommunication lines, remove jewelry or any other metallic object that may come into contact with energized parts.

Unless otherwise specified, all products are intended to be grounded during normal use. Grounding is provided by connecting the mains plug to a wall socket with a protective earth terminal. If an earth lug is provided on the product, it should be connected to the protective earth at all times, by a wire with a diameter of 18 AWG or wider. Rack-mounted equipment should be mounted only in earthed racks and cabinets.

Always make the ground connection first and disconnect it last. Do not connect telecommunication cables to ungrounded equipment. Make sure that all other cables are disconnected before disconnecting the ground.

Connection of AC Mains

Make sure that the electrical installation complies with local codes.

Always connect the AC plug to a wall socket with a protective ground.

Always connect the power cord first to the equipment and then to the wall socket. If a power switch is provided in the equipment, set it to the OFF position. If the power cord cannot be readily disconnected in case of emergency, make sure that a readily accessible circuit breaker or emergency switch is installed in the building installation.

Connection of DC Mains

Unless otherwise specified in the manual, the DC input to the equipment is floating in reference to the ground. Any single pole can be externally grounded.

Due to the high current capability of DC mains systems, care should be taken when connecting the DC supply to avoid short-circuits and fire hazards.

DC units should be installed in a restricted access area, i.e. an area where access is authorized only to qualified service and maintenance personnel.

Make sure that the DC supply is electrically isolated from any AC source and that the installation complies with the local codes.

Before connecting the DC supply wires, ensure that power is removed from the DC circuit. Locate the circuit breaker of the panel board that services the equipment and switch it to the OFF position. When connecting the DC supply wires, first connect the ground wire to the corresponding terminal, then the positive pole and last the negative pole. Switch the circuit breaker back to the ON position.

A readily accessible disconnect device that is suitably rated and approved should be incorporated in the building installation.

Preventing Electrostatic Discharge Damage

Modules which can be plugged into chassis are sensitive to damage from static electricity. Conversely, static voltages as high as 35,000V can be generated just by handling plastic or foam packing material, or by sliding assemblies across plastic and carpets. Not exercising the proper electrostatic discharge (ESD) precautions can result in intermittent or complete component failures. To minimize the potential for ESD damage, observe the following guidelines:

• Always use an ESD-preventive antistatic wrist strap or ankle strap and ensure that it makes good skin contact.

• When removing or installing a component, make sure the equipment end of your antistatic strap leash is connected to the ESD connection sockets on the front of the chassis or to a bare metal surface on the chassis. Avoid contact between the component and your clothing. The wrist strap only protects the component from ESD voltages on the body; ESD voltages on your clothing can still cause component damage.

• Always place a card component-side-up on an antistatic surface, in an antistatic card rack, or in a static shielding bag. If you are returning the item to the factory, immediately place it in a static shielding bag.

• Handle Modules by the metal card carrier edges only; Avoid touching the board or any connector pins.

Chapter 1   Overview

RC959-4FE16E1 (-BL) is a central site interface converter with VLAN function and inverse multiplexing function. It provides 4 FE interfaces (3 electrical interfaces and 1 optical interface) and 16 E1 interfaces and is mostly used to access or transmit Ethernet services with bandwidth larger than 2Mbps and smaller than 32Mbps.

Classifying by the type of E1 interface, Raisecom provides RC959-4FE16E1(-BL) with 75Ω unbalanced E1 interfaces and RC959-4FE16E1(-BL) with 120Ω balanced E1 interfaces.

1.1 Main features

- ➢ 16 E1 interfaces
  - ● Balanced or unbalanced interface can be chosen;
  - ● Framed mode of transparent mode can be chosen; only 1 line of E1 in VCG (Virtual Cascade Group) under transparent mode;
  - ● Users configurable for CRC auto-negotiation, in support of PCM31 format of FAS+CRC4 and PCM30 format of FAS+CAS+CRC4 under framed mode;
  - ● Supports E1 loopback test;
  - ● Supports E1 error bit statistics function;
  - ● Supports LCAS (Link Capacity Adjustment Strategy);
  - ● Supports E1 link Auto-MDI/MDIX.
- ➢ VCAT function
  - ● Supports one VCG only and at most 16 E1 virtual cascade members can be allocated to the VCG;
  - ● Supports VCG LCAS;
  - ● Supports alarm and statistics information in VCG;
  - ● Supports relatively time delay of E1 member for +/-250ms.
- ➢ Ethernet encapsulation format supports GFP, LAPS, PPP and HDLC
- ➢ Ethernet interface
  - ● 4 FE interfaces (3 electrical interfaces and 1 optical interface), SFP connector for optical interface;
  - ● Supports maximal frame size of 12000 bytes;
  - ● The electrical interfaces support 10M/100M, full-duplex/half-duplex, auto-negotiation, 802.3X flow control, MDI/MDIX;
  - ● The optical interface supports 100BASE-FX, flow control, SFP ALS (automatic laser-shutdown);
  - ● Ethernet interfaces performance statistics.
- ➢ VLAN forward function of Ethernet service
  - ● The device can work in VLAN-UNAWARE mode, VLAN-AWARE mode and Double-tag (Q-in-Q) mode;
  - ● VLAN-AWARE mode and Double-tag (Q-in-Q) mode support adding and stripping tag.
  - ● Supports all 4096 VLAN ID, meanwhile 16 forward rules can be configured, one forward rule corresponding one VLAN ID.
- ➢ CONSOLE interface
- ➢ SNMP network management interface, in support of local and remote software online upgrade, easy to maintain
- ➢ Full-scale network management function can manage over both local device and remote RC959 interface converter
- ➢ Standard 19 inch, 1U chassis
- ➢ Power consumption < 10W and working stably

➢ Redundant power supply design, AC/DC selectable
➢ Working temperature: －5～50℃

1.2 Device naming rules

The device is composed of main circuit board and power supply board.

Devices naming rule: **RC959   – A   – B   – C**

4FE16E1   BL   AC

blank   DC

Explanation:

RC959: the device is EOPDH inverse multiplexer in support of GFP encapsulation.

A: FE type and the number of E1 interface.

4FE16E1: 4 FE interfaces, 3 electrical interfaces and 1 optical interface

16 E1 interfaces

B: type of E1 interface, could be BL or blank.

BL indicates that is a 120Ω RJ45 balanced interface.

Blank indicates that is a 75Ω BNC unbalanced interface.

C: type of power supply, could be AC or DC.

AC indicates that the device adopts 220V AC power supply

DC indicates that the device adopts -48V DC power supply

Device mode that adopts 24V DC power supply can be made to order.

For detailed available product list, please refer to product ordering information.

1.3 Device exterior and dimension

RC959-4FE16E1-BL adopts international standard 19 inch 1U chassis.

Dimension: 430 mm (Width) x 44.45 mm (Height) x 266 mm (Depth)

Chapter 2 Technical Specifications

2.1 Basic configuration

- ➢ Main circuit board: 4 FE interfaces (3 electrical interfaces and 1 optical interface) and 16 E1 interfaces
- ➢ Power supply: redundant power supply, 220V/AC or -48V/DC

2.2 Ethernet interface properties

2.2.1 Electrical interface

- ➢ Interface number: 3
- ➢ Rate: 10/100M auto-negotiation
- ➢ Connector: RJ-45
- ➢ In support of IEEE802.3 recommendation
- ➢ In support of IEEE802.3x flow control
- ➢ Host pin arrangement, in support of AUTO-MDIX

2.2.2 Optical interface

- ➢ Interface number: 1
- ➢ Rate: 100M
- ➢ Connector: SFP module, LC connector

2.3 E1 interface properties

- ➢ Number of E1 interfaces: 16
- ➢ E1 Interface connector: 75Ω unbalanced BNC connector or 120Ω balanced RJ-45 connector
- ➢ Bit Rate: 2048Kbps±50ppm
- ➢ Code type: HDB3
- ➢ Input impedance: 75Ω unbalanced or 120Ω balanced
- ➢ Electrical characteristics: compliant to ITU-T G.703 recommendation
- ➢ Frame structure: compliant to ITU-T G.704 recommendation
- ➢ Jitter: compliant to ITU-T G.823 recommendation
- ➢ Ethernet data adopts GFP, LAPS, PPP, HDLC encapsulation format
- ➢ Framed or transparent mode is optional. Only 1 E1 line in VCG under transparent mode
- ➢ In framed mode:
  PCM31 format of FAS+CRC4 is supported, PCM30 format of FAS+CAS+CRC4 is supported, CRC auto-negotiation and configurable
  Maximal relative time delay of E1: +/-250ms
- ➢ One LOS indicator corresponding to every E1 line, which provides alarms for command lines and network management
  Local alarms include LOS (Loss Of Signal), AIS (Alarm Indication Signal), LOF (Loss Of Frame) and CRC (Cyclic Redundancy Check)
  Remote alarms include LOS, AIS, LOF and CRC
- ➢ In support of E1 link local and remote loopback test
- ➢ In support of E1 link error bit ratio statistics function
- ➢ In-band network management via E1 line can manage remote RC959 interface converter

2.4 Power supply

➢ Redundant power supply
➢ Voltage of power supply: DC -48V with allowance range -36V~-72V
                             AC 220V, allowance range 180V~260V
➢ Power consumption: <10W

2.5 Working environment
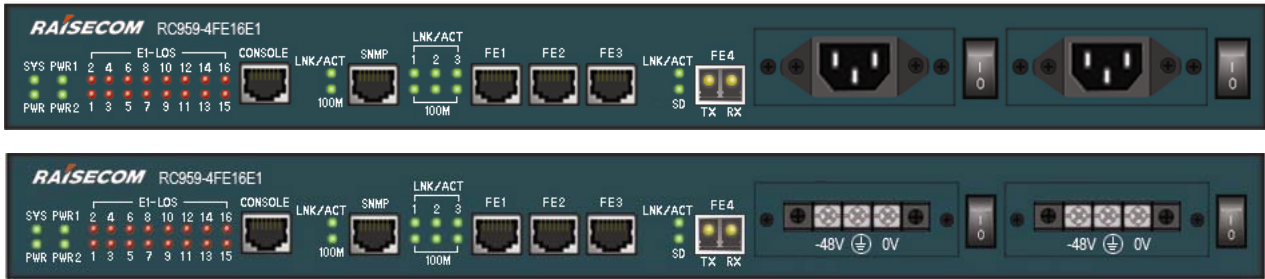
➢ Temperature: -5℃～50℃
➢ Relative humidity: ≤90% (35℃)

Chapter 3 Device Structure and Indicator Definition

All RC959 series devices have the same size, but their panel appearance varies with different E1 balanced/unbalanced interface and AC/DC power supply.
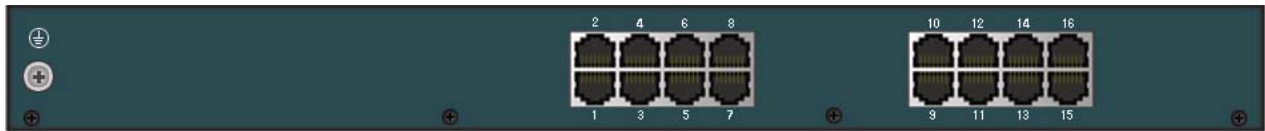
3.1 Panel direction description

The figure 3-1 and figure 3-2 shows front panel of RC959-4FE16E1-BL with AC/DC, balanced/unbalanced interface.

Front panel figures with AC/DC power supply:

Rear panel figure with balanced interface:

Explanation of indicators on RC959-4FE16E1 as table 3-1 show:

Table 3-1 RC959-4FE16E1 front panel indicators explanation

Serial number	Title	Color	Description
1	LOGO and device model	-	For device with balanced E1 interfaces and device with unbalanced E1 interfaces, the device model typed on the device panel are the same: RC959-4FE16E1.
2	SYS	Green	Upper: Flickering (ON 0.5s and OFF 0.5s alternately): the device is operating normally.
	PWR	Green	DOWN: the power supply of the device is working in order.
3	PWR1	Green	PWR1 is the indicator for power supply 1. ON indicates

			that power supply is working normally.
			PWR2 is the indicator for power supply 2. ON indicates that power supply is working normally.
	PWR2	Green	The meanings of the combination of PWR, PWR1 and PWR2: PWR PWR1 PWR2 Meanings ON ON ON The two power supplies are both working in order and the device power supply is working normally. ON ON OFF Power supply 1 is working in order; voltage of power supply 2 is too low, and power of the device is supplied by power supply 1 and working normally. ON OFF ON The voltage of power supply 1 is too low, the power supply 2 is working in order, and power of the device is supplied by power supply 2 and working normally. OFF ON ON The two power supplies are both working normally, but the power supply of the device is not working in order. OFF ON OFF The power supply 1 is working normally, voltage of the power supply 2 is too low, and the power supply of the device is not working in order. OFF OFF ON The voltage of power supply 1 is too low, the power supply 2 is working in order, and the device's power supply is not working normally. OFF OFF OFF The device is powered on or neither of the two power supplies is working in order. ON OFF OFF Some abnormity occurs.
4	E1 LOS	Red	LOS: Loss of signal. One LOS indicator for one E1 line. ON: loss of local E1 receiving signal. OFF: receiving signal has been detected.
5	CONSOLE interface	-	Local CONSOLE, connected to the serial port of PC.
6	SNMP interface and indicator	-	SNMP interface with 2 indicators: LNK/ACT and 100M. LNK/ACT: ON indicates that the link is connected. Flicking indicates that there is data being transmitted or received.

			100M: Indicates working rate is 100M. OFF: Indicates working rate is 10M.
7	FE1~FE3 interface	Green	Three Ethernet electrical interfaces, 2 indicators for each. LNK/ACT: ON indicates that the link has been set up. Flickering: indicates receiving or sending date. OFF indicates that the link has not been set up. 100M: ON indicates that the interface is working at the rate of 100M. OFF indicates that the interface is working at the rate of 10M.
8	FE4 interface	-Green	Ethernet optical interface, SFP interface, 2 indicators. LNK/ACT: ON indicates that the link has been set up. Flickering indicates that there is data transmitting or receiving. OFF indicates that the link has not been set up. SD: ON indicates that optical signal has been detected. OFF indicates that no optical signal has been detected.
9	Power supply socket	-	2 power supply sockets. 3-pole socket for AC power supply chassis. Socket with 3 terminals for DC power supply chassis: -48V: left terminal, connect with the negative polarity of the power supply. PGND: middle terminal, the inside part of the terminal connect to the device shell. BGND: right terminal, power supply earth.
10	Power supply switch	-	One switch for one power supply. ON: upper, the power is on. OFF: down, the power is off.
11	Grounding terminal	-	The shell joint with grounding bolt.
12	16 E1 interfaces	-	For RC959-4FE16E1, there is a transmitting BNC female connector (TX) and a receiving BNC female connector (RX) for every E1 line. For RC959-4FE16E1-BL, there is one RJ-45 interface for every E1 line. There are 2 groups of 2x4 RJ-45 jacks on the device. For the pin arrangement of the RJ-45 jack, please refer to the appendix of this document.

3.2 Alarm and performance data

Table 3-2 Alarm list

Alarm name	Alarm reasons	Alarm level	Indicator name	Indicator status
Electrical interface LINKDOWN	Link down		LNK/ACT	OFF
SFP not in place	SFP not in place		-	-
SFP RXLOS alarm	SFP receives LOS alarm		-	-
SFP TXFAULT	Laser fail to transmit		-	-
E1-LOS	E1 interface loss of receiving signal		E1-LOS	ON
E1-AIS	E1 interface receives AIS alarm		-	-
E1-LOF	Framed E1 interface loss of frame: indicates loss of synchronized frame signal; unframed E1 interface doesn't have this alarm.		-	-
E1-LOMF	Framed E1 interface loss of multi-frame: indicates loss of synchronous signal in multi-frame composed by 16 E1 basic frames.		-	-
E1-CRC-ERR	Framed E1 interface receives CRC error alarm: indicates CRC-4bit in 16E1 multi-frame checkout error.		-	-
E1－RAI	Remote alarm indicates loss of remote frame.		-	-
VCAT-LOM	MFI fault number in VLI exceeds setting number		-	-
VCAT-CRC	CRC in VLI checks error when LCAS enable		-	-
VCAT-SQM	Fault SQ number in VCAT: indicates receive SQ number differs from setting SQ number; especially when LCAS disabled		-	-
VCAT-MND	Indicates LCAS member can not de-excursion: indicates LCAS，corresponding member in VCG is unavailable.		-	-
VCAT-LCASSO	LCAS, sink discovers source member.		-	-

Alarm name	Alarm reasons	Alarm level	Indicator name	Indicator status
LOA	Loss of virtual cascade orientation: indicates check delay among VCG interior members is too big, especially when LCAS disable.			
PLCR	Loss part of receiving ability when LCAS enable		-	-
TLCR	Loss all receiving ability when LCAS enable		-	-
PLCT	Loss part of transmitting ability when LCAS enable		-	-
TLCT	Loss all transmitting ability when LCAS enable		-	-
LFD	GFP frame demarcation loss of frame		-	-
CSF	Client signal invalid when GFP encapsulate: indicates VCG receives loss of remote Ethernet signal.		-	-

Table 3-3 Performance data statistics

Performance data name	Description
Ethernet receives bytes	Ethernet receives total bytes
Ethernet receives unicast packets	Ethernet receives total unicast messages
Ethernet receives multicast packets	Ethernet receives total multicast messages
Ethernet receives broadcast packets	Ethernet receives total broadcast messages
Ethernet receives discarded packets (the packets are not error ones)	Ethernet receives total discarded messages (the messages are not error ones)
Ethernet receives error packets	Ethernet receives total error messages
Ethernet sends bytes	Ethernet sends total bytes
Ethernet sends unicast packets	Ethernet sends total unicast messages
Ethernet sends multicast packets	Ethernet sends total multicast messages
Ethernet sends broadcast packets	Ethernet sends total broadcast messages
Ethernet sends discarded packets (the packets are not error ones)	Ethernet sends discarded messages (the messages are not error ones)
Packets disable to send for error	Ethernet sends total error messages

VCG receives client frame byte	VCG receives total client frame bytes
VCG receives client frame	VCG receives total client frames
VCG receives management frame	VCG receives total management frames
VCG sends client frame byte	VCG sends total client frame bytes
VCG sends client frame	VCG sends total client frames
VCG sends management frame	VCG sends total management frames
Discarded frames for core head verifies error in VCG	Discarded frames for GFP core head verifies error in VCG
Discarded frames for net load head verifies error in VCG	Discarded frames for GFP net load head verifies error in VCG
Discarded frames for FCS verifies error in VCG	Discarded frames for GFP FCS verifies error in VCG
Discarded frames for frame head unconformity in VCG	Discarded frames for GFP frame head unconformity in VCG
Discarded frames for over maximal frame size in VCG	Discarded frames for over maximal frame size of GFP in VCG
E1 interface current 15 minutes ES (Error Seconds) counting	E1 interface current 15 minutes error seconds counting
E1 interface current 15 minutes SES (Severe Error Seconds) counting	E1 interface current 15 minutes severe error seconds counting
E1 interface current 15 minutes UAS (unavailable seconds) counting	E1 interface current 15 minutes UAS counting
E1 interface ES history statistic information	15 minutes interval, 24 hours statistic information
E1 SES history statistic information	15 minutes interval, 24 hours statistic information
E1 interface UAS history statistic information	15 minutes interval, 24 hours statistic information

Chapter 4 Installation and Testing

4.1 Cautions

Firstly, please check the model and the number of the device and spare parts according to the packing list. Please be sure that the appearance of the device is intact. If there is any evidence that the device has been affected by damp, please dry it before installation.

To insure that the device can operate properly, please install and setup the device follow the steps listed below:

 ➢ Read this manual with caution
 ➢ Fix and install the device
 ➢ Connect Ethernet cable, fiber and E1 cable
 ➢ Electrify and configure the device. Please refer to network management user manual for configuration steps
 ➢ Operate properly

4.2 Installation process

4.2.1 Connect the SNMP network management interface

Connect the SNMP interface and the relevant PC (or other device) using Ethernet cable. The indicator LNK/ACT for the Ethernet interface should turn ON.

4.2.2 Connect the CONSOLE interface

 ➢ Fit the RJ-45 connector of the CONSOLE cable to the CONSOLE interface on the device front panel.
 ➢ Start up the hyper terminal application of the PC and set the port properties as below:

4.2.3 Connect the Ethernet interface

When using the Ethernet electrical interface, please connect one end of the Ethernet cable to the Ethernet interface of this device and connect the other end of the Ethernet cable to a router or an Ethernet switch.

When using the Ethernet optical interface, please connect one end of the fiber to the Ethernet optical interface of this device and connect the other end of the fiber to a router or an Ethernet switch.

4.2.4 Connect E1 cable

For device with unbalanced E1 interface, please connect one end of the 75Ω unbalanced BNC cable to the E1 interface of this device, and connect the other end to a transmission device or another device of the same type.

For device with balanced E1 interface, please connect one end of the 120Ω balanced RJ-45 cable to the E1 interface of this device, and connect the other end to a transmission device or another device of the same type.

4.2.5 Electrify

If the power supply is -48V DC power supply, please connect the "PGND" terminal with protection earth of the device first, and connect the "-48V" terminal to the cable with lower electric potential and connect the "BGND" terminal to the cable with higher electric potential before electrifying the power supply wire. Please fit the cable and the terminal firmly and ensure that no short circuit exists. Then please turn on the power supply.

If the power supply is 220V AC power supply, please connect the power supply socket with the

power supply wire provided with the device directly.

After turning on the power supply, the PWR indicator should be ON. The indicator SYS on the front panel of the device will begin flickering, which indicates that the device finishes initialization. At the same time, please check the Ethernet interface indicator and E1 interface indicator, they should be working in order. (For the meanings of the indicators, please refer to the indicator description)

4.2.6 Configure services

The upgrade, configuration and management of the device can be realized via CONSOLE interface and SNMP interface. For details, please refer to the corresponding commands notebook and network management user manual.

If the peer E1 line (device that terminates E1 service) of RC959-4FE16E1 is remote device from Raisecom, then the remote site device and the remote device of the remote site device can be managed and configured through the local device.

4.3 Cable preparation

Table 4-1 Connecting cable specification for RC959-4FE16E1 device interface

Interface	Cable specification
10/100Mbps Ethernet electrical interface	Some 100Base-T CAT-5 UTP For the connection of SNMP interface and Ethernet electrical interface. (User self-prepare)
Fiber with LC connector	One pair Single/Multi-mode, decided by SFP model For Ethernet optical interface. (User self-prepare)
75Ω unbalanced BNC Cable	Some Only for device with unbalanced E1 interfaces (User self-prepare)
120Ω balanced RJ45 Cable	Some Only for device with balanced E1 interfaces (User self-prepare)
Power supply interface	AC 220V/10A power supply cable, two as accessory of the device. DC -48V/10A power supply cable, two as accessory of the device.

Chapter 5 FAQ

For some problems you may meet during installation and operation, please try to solve them following the suggestions below. For the problems can not be solved by using the following suggestions, please contact with distributors for technical support.

> **PWR, PWR1 and PWR2 indicators wouldn't turn ON all after power supply has been connected.**
> Firstly, please check whether the device has been plugged in properly.
> Then, please make sure that power supply of the chassis is working properly.
> The meanings of the combination of the three power supply indicators PWR, PWR1 and PWR2 are shown in the table below:

PWR	PWR1	PWR2	Meanings
ON	ON	ON	The two power supplies are both working in order and the device power supply is working normally.
ON	ON	OFF	Power supply 1 is working in order; voltage of power supply 2 is too low, and power of the device is supplied by power supply 1 and working normally.
ON	OFF	ON	The voltage of power supply 1 is too low, the power supply 2 is working in order, and power of the device is supplied by power supply 2 and working normally.
OFF	ON	ON	The two power supplies are both working normally, but the power supply of the device is not working in order.
OFF	ON	OFF	The power supply 1 is working normally, voltage of the power supply 2 is too low, and the power supply of the device is not working in order.
OFF	OFF	ON	The voltage of power supply 1 is too low, the power supply 2 is working in order, and the device's power supply is not working normally.
OFF	OFF	OFF	The device is powered on or neither of the two power supplies is working in order.
ON	OFF	OFF	Some abnormity occurs.

> **LOS alarm occurs at E1 interface**
> LOS alarm indicates lost of receiving signal
> Firstly, please check whether the E1 cable has been connected properly.
> If alarm occurs when the E1 cable has been connected correctly, please replace the cable and check again, if LOS alarm still occurs, please check whether the device is broken down.

> **Ethernet interface indicator LINK wouldn't turn ON**
> Firstly, please check whether the cable is broken down.

Secondly, please check whether the network device connected to the Ethernet interface is working properly.

Please make sure that the cable is correctly made.

> **The service communication is not stable.**
> Firstly, please check the connection of the Ethernet cables and E1 cables.
> Secondly, please check whether there is Ethernet loop formed. For example: The Ethernet interfaces (no Trunk) can not be connected to one switch through Ethernet cable at the same time. Please map several E1 channels to one FE interface and isolate services using VLAN Tag.

Appendix A The Pin Arrangement of 120Ω Balanced Connector

RJ-45 Pin	Signal	Description
1	TX+	Transmitting +
2	TX-	Transmitting -
3	NC	No connection
4	RX+	Receiving +
5	RX-	Receiving -
6	NC	No connection
7	NC	No connection
8	NC	No connection

Appendix B CONSOLE Cable Making

One end of the cable for CONSOLE interface is a RJ-45 connector, which is used to connect to RC959-4FE16E1-BL. The other end is a DB-9 connector, which is used to connect to the host. The pin arrangement is shown in the table below:

RJ-45 Pin Number	Function	DB-9 Pin Number
1	NC	-
2	DSR#	6
3	RxD	3
4	GND	5
5	GND	5
6	TxD	2
7	DTR#	4
8	NC	-

"-" indicates that the corresponding RJ-45 pin has no connection.

The pins of DB-9 that are not listed in the table have no connection.

Appendix C Specialized Terms and Acronyms

EoPDH	Ethernet over PDH：Bear Ethernet data services over PDH. Mainly indicates bearing Ethernet service over E1 in this document.
PDH	Pseudo-synchronous Digital Hierarchy
FAS	Frame Alignment Signaling
LOS	Loss of Signal
LOF	Loss of Frame
AIS	Alarm Indication Signal
CRC	Cyclic Redundancy Check
LER	Local Error Alarm: The E1 link received reversed alarms other than LOS alarm, that is, AIS, LOF and CRC alarms.
RAL	Remote Alarm: Mainly indicates LOS, AIS, LOF, and CRC alarms from remote devices in this manual.
PAT	Pattern: Whether the E1 line BER testing function is enabled.
SD	Signal Detect: Indicates whether light has been detected by the receiving part of optical module or not in this manual.
GID	Group Identification: E1 belonged to one inverse multiplexer group should share one ID. Different group uses different ID.

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