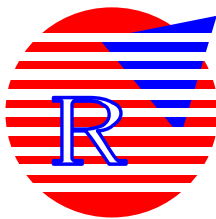


RC902-FE4E1 fast Ethernet to 4 E1converter

User guide



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Chapter 1 Overview

1. Description

RC902- FE4E1, 10/100M auto-sensing Ethernet interface converter of Ethernet to 4E1, is one product of RC series converters made by Beijing Raisecom Science & Technology Co. Ltd. It provides a simple solution to enable Ethernet access by using 4 E1 links for signal transmissions.

RC902-FE4E1 is modular device. It can provide central SNMP management solution, when it is plugged in RC002-16 that is 16 slot chassis.

It can support remote management when it works in pair with RC901-FE4E1.

2. Specification

1) E1 interface :

RJ-45 (120 Ω , balanced)

Bit rate: 2048Kbps \pm 50ppm

Line code: HDB3

Compliance: ITU-T G.703,
ITU-T G.823

Other features:

Real-time BER detecting and E1links auto protection auto-reset

Resistance for drift of 512UI, the ability of counteraction of jitter and drift

Selectable BER threshold of link auto-reset: 10^{-6} (default) or 10^{-5}

2) Fast Ethernet interface :

Interface: RJ-45, cat5/cat5e cables available, supports link distance up to 100m

Bit rate: selectable, Auto-sensing 10M/100Mbps or manual configuration

Duplex type: Full/Half duplex auto-negotiation or manual configuration

Compliance: IEEE 802.3、IEEE 802.3u

Other features:

Supports maximum frame size up to 1536 bytes

Supports IEEE 802.3d Spanning Tree, 802.1q VLAN

Supports 1K MAC address table, address filtering, improve efficiency of

E1 link

Supports Auto-MDI/MIDX auto-negotiation

Supports Link Fault Pass-through (LFP)

Provides 64Mbit SDRAM for reducing the network congestion.

3. Features

1) forward features

Maximum forward speed in each E1 link supports up to 1920Kbps

Maximum forward speed for 4 E1 link supports up to $1920 \times 4 = 7680$ Kbps when fully loaded

The forward bit rate is auto allocated, depending on the real-time status of E1 links.

2) Bandwidth auto-adjustment

RC902-FE4E1 supports 1~4 E1 links bandwidth auto-adjustment. If any of the E1 links disconnected, or when it is just back to normal from disconnecting, transmission can be automatic achieved trough connecting E1 link and bandwidth can be adjusted automatically, but at least 1 E1 link has to connect.

Every E1 link provides 2Mbps bandwidth. If 4 E1 links are working properly, 8M bandwidth can be provided in total. E1 link “working” means the two converters have no alarm occurs in E1 link.

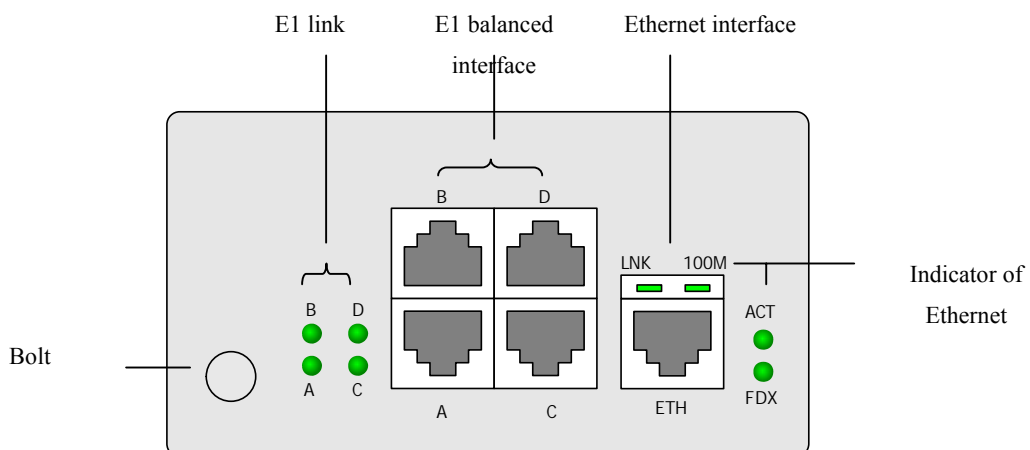
3) Fault Pass Through

RC901-FE4E1 provides Fault Pass Through (FPT) for special requirements, e.g. which need Spanning Tree, superior switch network management record. The FPT defined as:

If alarm occur on all 4 E1 links, then all the links disconnect, FPT function will suspend the UTP port and disconnect the links with Ethernet switches and NIC, until any of E1 link no alarm occurred, then system is back to default status.

FPT set “close” as default status, it is convenient for those customers who have no special requirements. Please see the manual about the switch setting of the panel if need it.

4. Front panel and LED indicator



A、B、C、D 4 E1 links indicator color definitions:

Green (G): Normal Status (LNK)

Red (R): The lost of signal (LOS)

Red flash(RF) : Port is receiving alarm indication signal (AIS) and ERR from the sending device.

Yellow (Y) : Link is disconnected due to the receiving of the error bits. (CUT)

Yellow flash (YF) : alarm due to remote device (RAL) but local port.

Off : Link is not in use

Note: If A,B,C and D all don't be connected, four links are all red. If A link has been connected, A link is green. Other link indicators are off. Then B link is connected, B link is green automatically. Green means that normal status. And so on.

- A、 B、 C、 D four E1 links are all balanced interface :
RJ-45(120ohm balanced , 1、 2 pin output , 5、 6 pin input)。

UTP Ethernet interface :

Indicators:

LNK : on , Normal operation ; off , no connection。

100M : on , 100Mbps ; off , 10Mbps。

ACT : flash , receiving or sending ; off , no action。

FDX : on Full duplex ; off , Half duplex

UTP: interface definition and connection see following text.

Chapter 2 Connection features

1. Equipment interconnection

2. We don't suggest RC902-FE4E1 is connected with other brand products

3. Connection features on Ethernet port

RC902-FE4E1 supports auto MDI/MDIX crossover, when UTP port is set to auto-negotiation. Switch and NIC can be connected by both straight line and cross line. If UTP port is set to define fixed speed or Full-duplex mode, RC901-FE4E1 will lose this function.

The feature of that RC902-FE4E1 connects with other network equipment shown below.

Part Number	Host-site equipment	RJ-45 connecting mode
RC902-FE4E1	Switch	Straight line CAT5
RC902-FE4E1	HUB	Straight line CAT5
RC902-FE4E1	Router	Cross line CAT5
RC902-FE4E1	Ethernet Card	Cross line CAT5

Chapter 3 Installation and test

1. Make sure the E1-link cables are compatible with the RC901-FE4E1

If the E1 links with which you want to connect RC901-FE4E1 are combined with PDH or SDH equipments, please check the interface type of E1, definition and impedance of interface in relevant manuals.

2. Choose proper E1 link cables

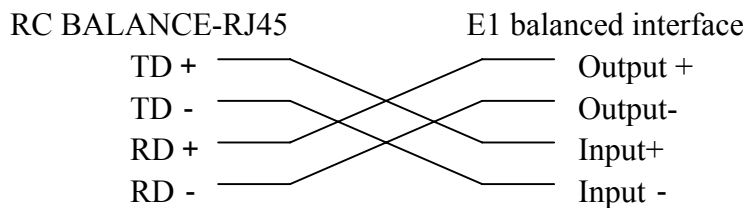
Balanced: 0.6mm(22AWG) twisted pairs, up to 1500m

3. BALANCE-RJ45 UTP E1 pin defined as shown below

Refer to the table and figure below when use the balanced interface (120 Ω)

PIN No.	1	2	3	4	5	6	7	8
Label	TD+	TD-	Not used	Not used	RD+	RD-	Not used	Not used
Signification	Output+	Output-			Input+	Input-		

120Ω balanced interface connect with other equipment, need specify the pin of the equipment. The connection of UTP pin is shown below.



Note: TD + and TD - are always in one twisted pairs
RD + and RD - are always in one twisted pairs

4. Environment

Temp: 0-45

Humidity: 5%~90% no condensing

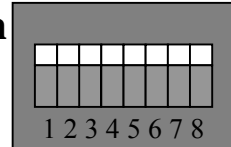
5. Power supply

AC: 220v/50Hz Voltage 165~265V

DC: - 48v Voltage - 36~ - 72V

Power consumption 3W

Chapter 4 Introduction of DIP-Switch



1. Setting of DIP-Switch

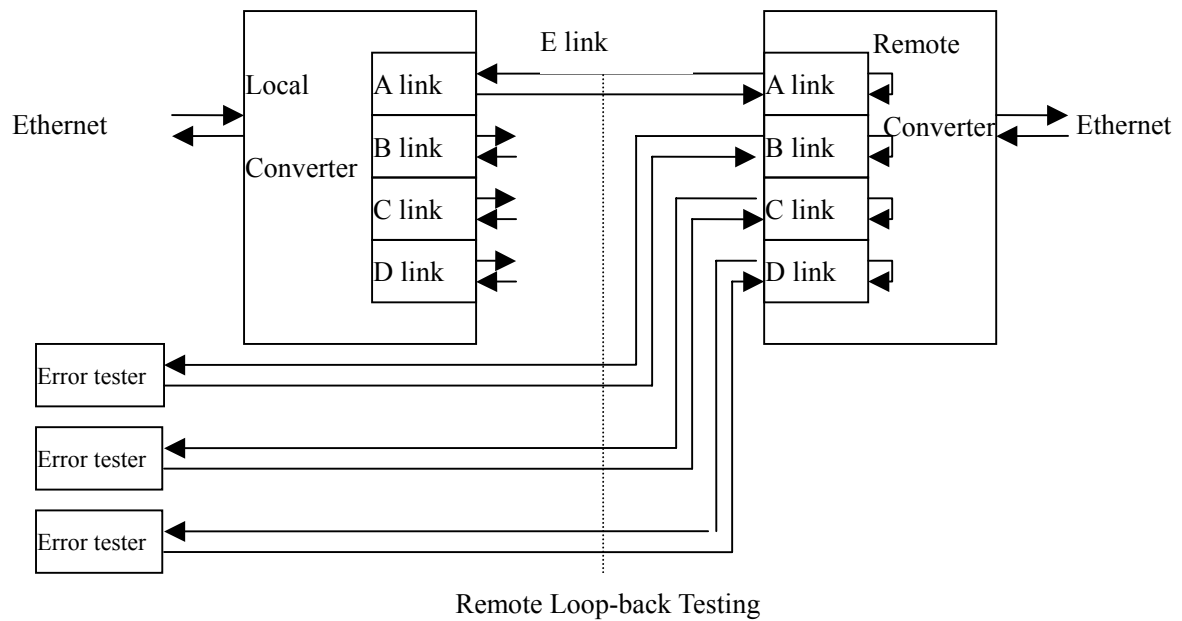
ON

There is a set of 8 bit DIP-Switch on PCB card. If you want to manage by software, the DIP-Switch must be default setting.

Definition	OFF (default setting)	ON
1 bit: remote loop-back	Disable	Enable
2 bit: local loop-back	Disable	Enable
3bit: Bit error ratio threshold	Don't shut down	Auto shut down when error bit is more than 10^{-6} .
4bit: choice of compatibility		
5bit: reserved		
6bit: configuration of Eth	Shown as table and figure below	
7bit: configuration of Eth		
8bit: fault pass	Disable	Enable

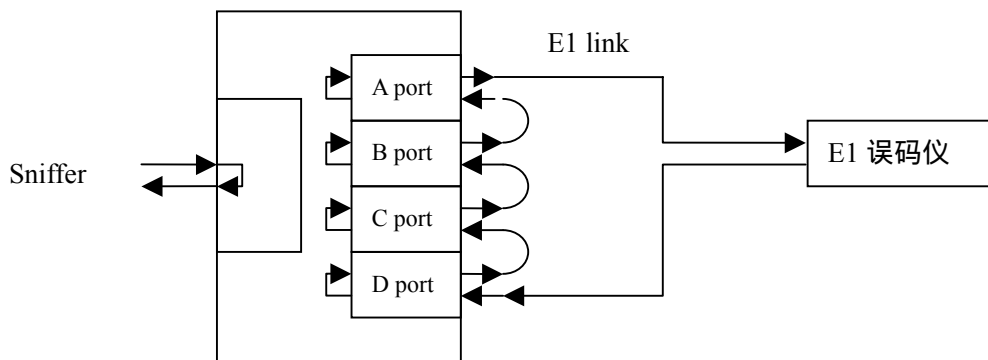
Remote loopback:

If any of E1 is linking with remote equipment (the indicator is green), network administrator can run the remote loop-back testing function (turn on the switch no.1), enabling network operators to diagnose the E1 links though a Bit Error Tester at a central location without sending a technician to the remote site. Ethernet packets of both Local and remote site are isolated, can't be forward to E1 interface.



Local loop-back:

Local loop-back testing makes both local E1 and Ethernet signal loop-back outward, this function is designed for testing equipment interface. Connecting E1 误码仪 is for testing E1 interface; Sniffer is for diagnosing Ethernet interface. Note, Ethernet data also loop-back during local loop-back, it easy to make broadcast storm which occurred in Ethernet switches connected with local equipment. In case to avoid broadcast storm, disconnect with switch before loop-back.



Local Loop-back Testing

● **Bit error ratio threshold**









When it enable and error bit ratio exceeded more than 10^{-6} , indicator is yellow and shut down the service. Traffic is provided by other E1 channels, until that E1 channel is available.

Ethernet operation mode

The Ethernet port is default as auto-sensing and provides auto MDI/MDIX crossover function. If need change the status of port, please refer to the table shown below for setting.

Connecting equipment (NIC, switch etc.)	Setting of Ethernet port of converter
10/100M Auto-sensing port	a. Enable auto-sensing (default) function, 100M full duplex (common mode) will be obtained. b. Disable auto-sensing function, force port to 10M half duplex mode. 10M half-duplex will be obtained. c. Disable auto-sensing function, force port to 10M full duplex mode. 10M full-duplex will be obtained. d. Disable auto-sensing, force port to 100M half duplex mode. 100M half-duplex will be obtained .
10M Half duplex port	a. Disable auto-sensing function, force port to 10M half duplex. 10M half duplex will be obtained.
10M Full duplex port	Disable auto-sensing function, force port to 10M full duplex. 10M full duplex will be obtained.
10M Auto-sensing port	a. Enable auto-sensing (default) function, 100M full duplex will be obtained.
100M Half duplex port	a. Disable auto-sensing function, force port to 100M half duplex mode. 100M half-duplex will be obtained.
100M Full duplex port	a. ex-factory default function, 100M full duplex will be obtained.
100M Auto-sensing port	a. Enable auto-sensing function (default), 100M half-duplex will be obtained. b. Disable auto-sensing function, force port to 100M half duplex mode. 100M half-duplex will be obtained.

Setting as shown:

OFF		Ex-factory default setting 6 th 、7 th are OFF	OFF		10M full duplex
ON			ON		6 th : ON 7 th : OFF
OFF		10M half duplex			
ON		6 th : ON 7 th : ON			
OFF		100M half duplex			
ON		6 th : OFF 7 th : ON			

Fault pass though

RC901-FE4E1 provides Fault Pass Though (FPT) function for special requirements.

In case of any E1 link was out of work, RC901-FE4E1 could transmit the Ethernet packets in the other available E1 links automatically, until all E1 links were not available.

And RC901-FE4E1 supports IEEE 802.3d Spanning Tree.

Chapter 5 Troubleshooting

If you meet some problem during installing and employing, please deal with them by the following proposals. If there is no answering for the question, please contact with distributors for technical support.

1 . PWR indicator is down

Answering: PWR line is not connected or there is any error in the PS system.

2 . UTP LNK indicator is down

Answering: Please check the twisted pairs is good or damaged and the network device that is connected to the interface converter is running well or not.

Please check connection type is matching or not: if you close auto-sensing and auto-identifying function of twisted pairs cable MDI/MDIX, then please use MDI type when connected to HUB or switch; please use MDIX type when connected to router or networking card.

Please check the fault-pass function is Enable or Disable. If it is Enable, it can make Ethernet port to close.

3 . E1 line indicator alarm

If there is E1 line alarm, please find the fault reason according to explaining of front panel indicator.

4 . Test way of E1 line bit error

Configure remote loop-back and local loop-back through switch of front panel. Please use loop-back function carefully. And avoid to bringing Ethernet broadcast storm.

5 . No alarm show, LNK is light, ACT indicator keep winking. But the connection is not working.

Please check work status of Ethernet port and networking device matching or not, according to switch of front panel.

6 . Networking frame loss rate is very high

possible reasons :

The duplex mode is not matching of converter and Ethernet TX ports;

Cabling connection false;

E1 interface impedance type is not matching;

There is some frame loss, because the rate of Ping is beyond transmission rate of E1. You can increase parameter of timeout.