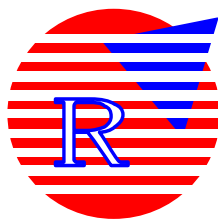


RC901-FE4E1 (version D)
Fast-Ethernet to 4 E1 links
Interface Converter

Manual



Beijing Raisecom Science & Technology Co. Ltd

Contents

Chapter 1 Overview	3
Chapter 2 Connection Features	6
Chapter 3 Guide of Installation	7
Chapter 4 Setting of switches	9
Chapter 5 Troubleshooting	13

Chapter 1 Overview

1. Description

RC901- 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.

2. Specifications:

1) E1 Interface

Type: BNC (75 Ω , unbalanced)
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:

- a: Store and Forward mode-----For normal data transmission, high resistance for bursty.
- b: Real-time Forward mode-----For higher requirement in real-time transmission ability, for example, image transmission time can be reduced. However, packet loss may occur.

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

RC901-FE4E1 supports 1~4 E1 link 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, bandwidth is 8Mbps in total. E1 link “working” means the two converters have no alarm occurs in E1 link.

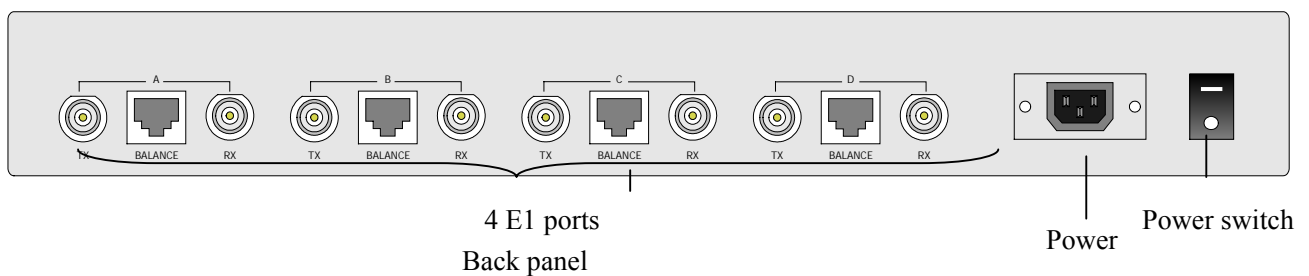
3) Fault Pass Though

RC901-FE4E1 provides Fault Pass Though (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. Panel and LED indicator



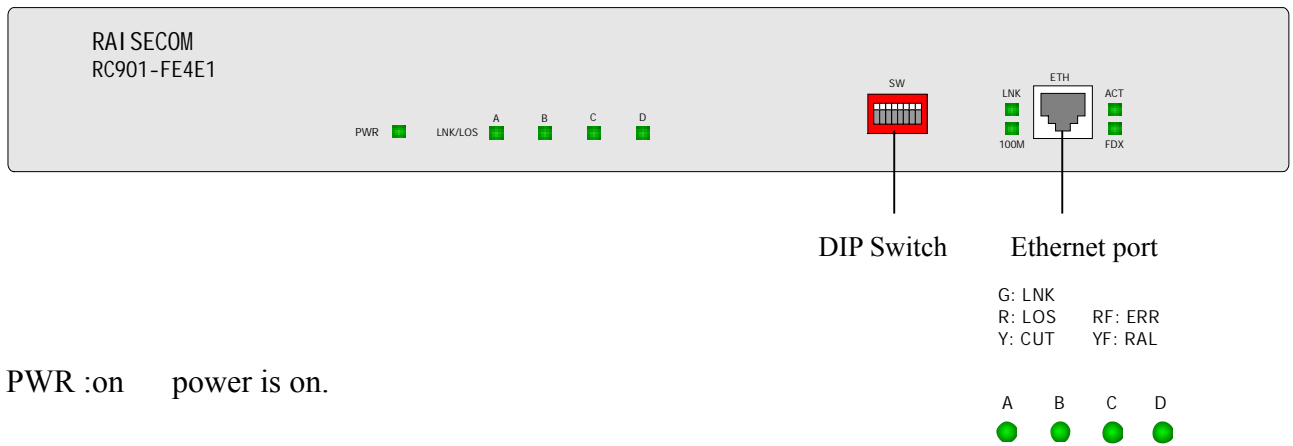
A、 B、 C、 D 4 E1 link ports :

TX : BNC , 75Ω unbalanced , output.

RX : BNC , 75Ω unbalanced , input

BALANCE : RJ-45 , 120 Ω balanced , 1、 2 pin output , 5、 6 pin input

Note: BNC unbalanced interface cannot be used concurrently with RJ-45 balanced interface. The switches in bottom panel are used for setting the type of cables. (Default is 75 Ω BNC).



PWR :on power is on.

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

It takes few seconds for detection when power is just on, or when cables are connecting or disconnecting of E1, please wait patiently.

See front panel for switching setting.

UTP Ethernet interface :

Indicators:

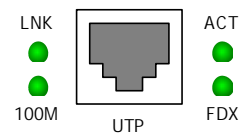
LNK : on , Normal operation ; off , no connection.

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

1. RC series interface converters are always working in pairs. They have to be deployed in pairs as the models shown below. Otherwise abnormal data transmission will occur.

Central Office	Customer
RC901/2-FE4E1	RC901-FE4E1

2. Network equipment (Ethernet port) Connection features

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

The feature of that RC901-FE4E1 connects with other network equipment shown below.

Part Number	Host-site equipment	RJ-45 connecting mode
RC901-FE4E1	Switch	MID CAT5
RC901-FE4E1	HUB	MID CAT5
RC901-FE4E1	Router	MIDX CAT5
RC901-FE4E1	Ethernet Card	MIDX CAT5

Chapter 3 Guide of Installation

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

Unbalanced: SYV 75-2-2 coax, up to 200m

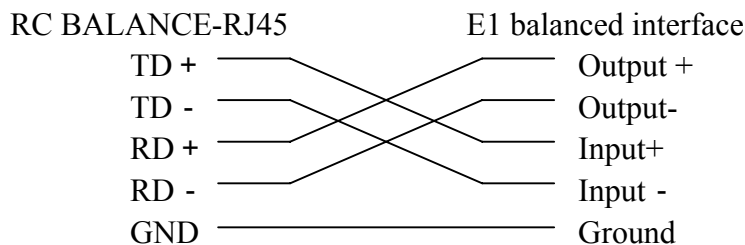
Balanced: 0.6mm(22AWG) twisted pairs, up to 1500m

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

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

DIP No.	1	2	3	4	5	6	7	8
Label	TD+	TD-	GND	GND	RD+	RD-	GND	GND
Signification	Output+	Output-	Ground	Ground	Input+	Input-	Ground	Ground

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. Operation Environment :

Temperature : 0-45

Humidity : 5%~90% non-condensing

5. Power supply requirements : AC/DC

AC : AC 220v/50Hz (range from 165V to 265V)

DC : DC - 48v (range from - 36V to - 72V)

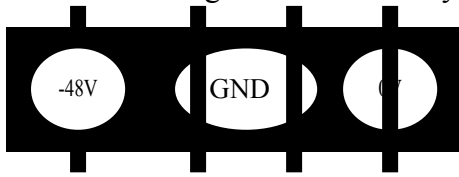
Power consumption : 5W

6. Dimensions :

440 × 43.6 × 180mm——standard 19' 1U chassis mountable

7. DC power supply installation guide.

DC power supply module provides 3 connectors: -48V, Ground, 0V, the connection of ground is necessary to the safety.



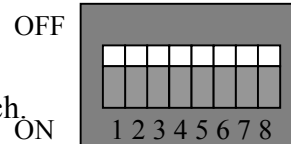
Chapter 4 Setting of switches

1. Set the DIP switches on the front panel

A set of 6 DIP-switch is located on the front panel of the unit. Refer to the table below for the proper setting of the DIP-switch.

NOTE: The switch is ON when it is in the DOWN position.

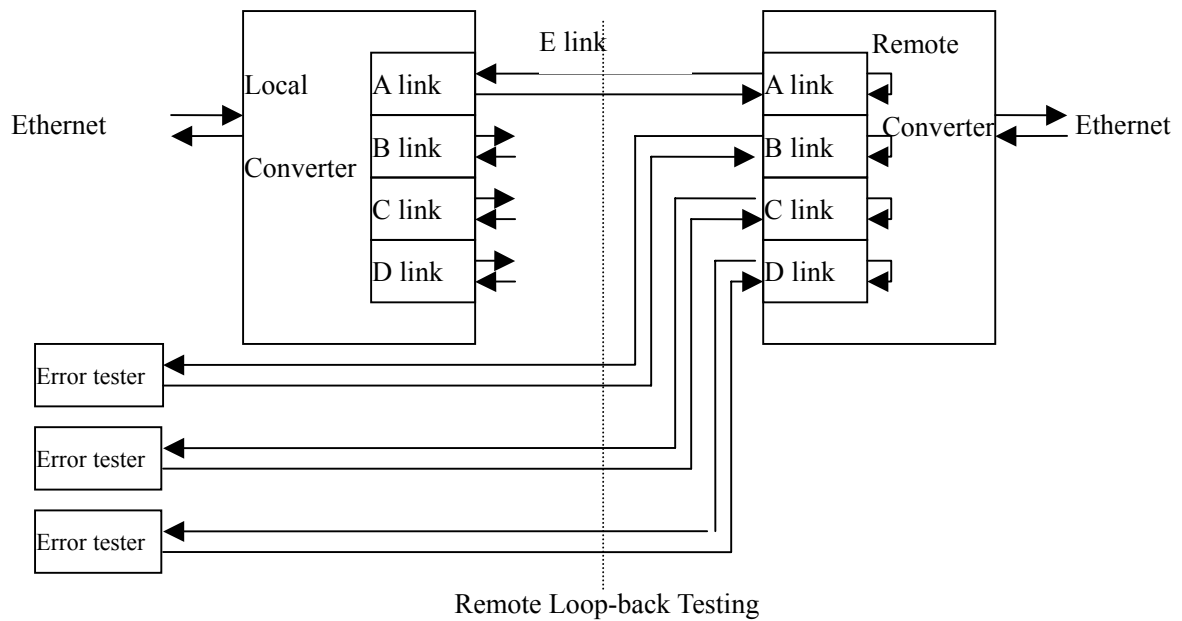
The switch is OFF when it is in the UP position.



Switch No.	Function	OFF (default)	ON
1	Remote loop-back	Disabled	Enabled
2	Local loop-back	Disabled	Enabled
3	Bit error ratio threshold	10^{-6}	10^{-5}
4	Version Selection	REVD	REV.A、 REV.B
5	Preserving	Normal	Preserving
6	Ethernet operation mode	100Mbps (when switch 5=ON)	
7		10Mbps (when switch 5=ON)	
8	Fault Pass Though	Disable	Enable

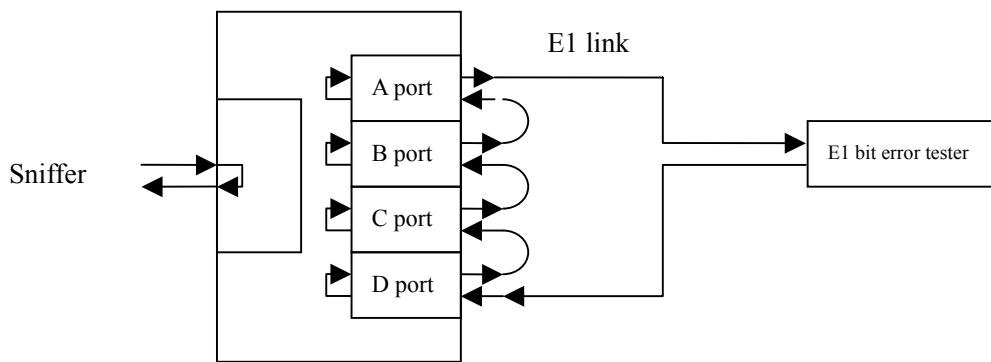
Remote loop-back:

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 BERT 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 the BER exceed the threshold, the yellow LED indicator is on, and auto terminate transmission, then Ethernet packets will not be transmitted in this E1 link. Until this link reconnecting, the green indicator is on, the transmission resumes. Two thresholds are provided in RC901-FE4E1, 10^{-6} (as default) and 10^{-5} .

Compatibility Selection:

In order to be compatible with previous version REV.A and REV.B, there is a version switch in version d. When the version d interconnect with version A and B, the version switch need to set to on, however, the new functions of c version are disabled,

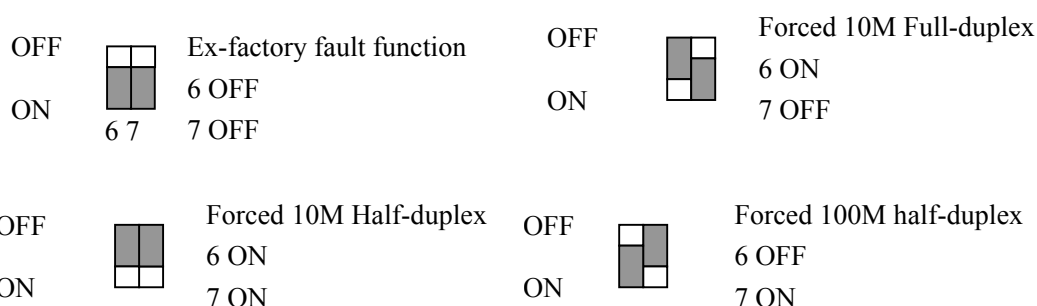
such as remote loop-back etc.

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.

See figures below for setting:



- Fault pass though

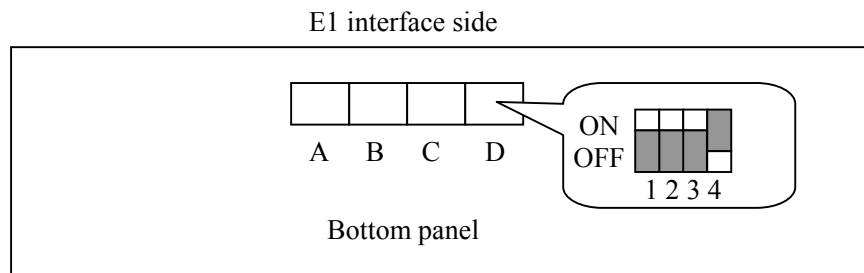
RC901-FE4E1 provides Fault Pass Though (FPT) function for special requirements.

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.

2. Set the bottom panel switches

Four sets of DIP-switch located in the bottom panel are use to configure the impedance and the type of the E1 connector.



ON OFF E1 link connector: 75 ohm, unbalanced, BNC
1 2 3 4

ON OFF E1 link connector: 120 ohm, balanced, RJ-45
1 2 3 4

Impedance and connector type in each E1 link can be set as the networks' requirements. Flexible configurations in 4 Ethernet ports enable the interface converter to meet various requirements in today dynamic networks.

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 are 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.