

RapidCom

4Eth-4E1 Interface Converter

User manual

V1.2

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1. Introduction

1.1 Overview

4Eth-4E1 is the IP over TDM converter, which supports the conversion from MAC frames to 1 ~ 4 E1 lines. The maximum bit rate is 7.936Mbps (4E1 lines). The device shows state and alarm information of each E1 channel, and also offers a RS232 port, which is used to connect NMS server which has been installed GUI NMS software.

Compliant to international standards, the device can communicate with products from other manufacturers adopting the same standards.

1.2 Main Features

- E1 interface
 - Supports automatic removal and recovery of E1 channels that used for carrying payload. The E1 channels that have urgent alarm, such as LOS and LOF, or the Bit Error Rate (BER) exceeds $1E-6$, are removed automatically, and during this period, some Ethernet packets may be lost; It will be resumed when the fault dismisses.
 - Supports the embedded E1 BER Tester function, to detect any E1 channel of 4 channels. When the embedded E1 BER Tester is used via CLI command, the particular E1 channel on testing mode cannot convey E1 service, while the other E1 channels are not affected by the BER test.
 - The differential delay between any two of the 4 E1 can be up to 220ms; when the factual differential delay exceeds 220ms, alarm is generated and Ethernet is cut off.
 - Jitter tolerance and jitter transfer characteristic compliant to ITU-T G.823.
- Ethernet interface
 - Provides up to 4 shared Ethernet interfaces.
 - 1024 MAC address table and 5-minute aging time.
 - Accepts frames with length between 64 and 1916 bytes (otherwise filtering).
 - VLAN function based on tags compliant to IEE 802.1Q.
 - Throughout statistic of the Ethernet packets based on port, such as error packets.

- Configurable pause flow control.
- Optional optical Ethernet interface compliant to IEEE 802.3u 100BASE-FX standard (can communicate with remote optical transceiver) and electrical Ethernet interface compliant to IEEE 802.3u 100 BASE-TX standard.
- Management interface
 - GUI via serial RS232 port.
- Timing mode
 - Optional local timing mode and tracing E1 line (set by GUI).
 - The source of tracing E1 line can be switched according to the signal quality. For instance, the system is set as tracing the first E1 link, when some malfunction occurs to it (i.e., urgent alarm LOS/AIS/LOF/LOMF or the signal is looped back), the system will automatically change to tracing the second E1 link; when the fault disappear, the system will be re-tracing the first E1 link.
- Compliant to ITU-T standards
 - GFP-F encapsulation recommendation G.7041.
 - Virtual concatenation (VCAT) and Link Capacity Adjustment Scheme (LCAS) recommendation G.7042.
 - Ethernet to nxE1 mapping recommendation G.7043.
 - Ethernet to single E1 mapping recommendation G.8040.
- Bandwidth is increased without damaging the Ethernet data, and can be decreased no injury through management.
- The E1s in the local and remote sides can be arranged arbitrarily, such as, the remote E1 port 1 can communicate with local E1 port 3.
- Supports bandwidth unbalanced usage – when some E1s cannot work properly (i.e. the bandwidth of the sending and receiving can be 5E1 and 3E1 respectively).
- Provides the E1 connection-ship between local and remote system (accessed via GUI).
- E1 tributary signal loopback automatic detect and cut off; when some E1 signal is detected as looped back, it will be not employed for carrying payload temporarily,

and when the loopback is broken, this E1 will resume to be used.

- Remote/local E1 loopback function will be convenient for E1 line(transmission system included) testing .
- Complete alarm which is selectable to be shown between local and remote.
- Single-board design with small dimension, 1 U high and low power consumption.

1.3 Product Options

In order to address the varying needing and requirements of users, EOP series consist of a diverse range of products:

4Eth-4E1, Ethernet to 4E1 converter

4Eth-8E1, Ethernet to 8E1 converter

4Eth-16E1, Ethernet to 16E1 converter

2. Application Diagram

Figure 4 illustrates a typical application (point-to-point). With 4Eth-4E1 system, the Ethernet is transferred by 4E1. The 4Eth-4E1 complies with international standard so that it can communicate with similar products from other manufacturers. Note that 4Eth-4E1 can only support point-to-point application.

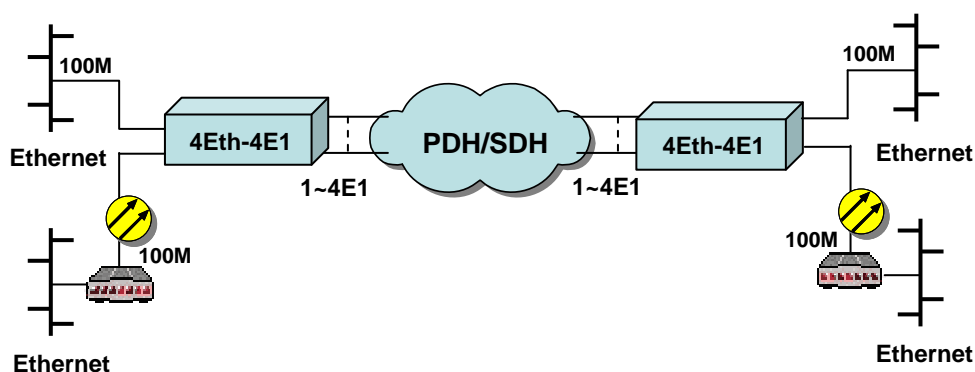


Figure 2-1 4Eth-4E1 application diagram

3. Panel Description

3.1 Front Panel

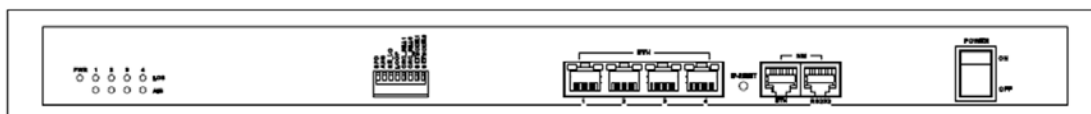


Figure 3-1-1 4Eth-4E1 Front panel diagram

The front panel 4Eth-4E1 equipment can be divided into two parts: global indicator lights and state E1 tributary state indicator. E1 branch of reuse is light.

Table3-1-1: Description of global status indicator

| Name | Indicator LEDs | Description |
|-----------|----------------|--------------------------------------|
| PWR | Green | Power is supplied |
| | OFF | Power is cut off. |
| LINK | Green | The Ethernet port connect successful |
| | OFF | No connect on Ethernet port |
| LOS1/AIS1 | Red(LOS) | Loss of E1 signal of E1 tributary |
| | Yellow(AIS) | Remote device alarm |
| LOS1/AIS2 | Red(LOS) | Loss of E1 signal of E1 tributary |
| | Yellow(AIS) | Remote device alarm |
| LOS1/AIS3 | Red(LOS) | Loss of E1 signal of E1 tributary |
| | Yellow(AIS) | Remote device alarm |
| LOS1/AIS4 | Red(LOS) | Loss of E1 signal of E1 tributary |
| | Yellow(AIS) | Remote device alarm |

Table 3-1-2: shows the front panel buttons and interface

| Serial number | Name | Explain |
|---------------|---------|-----------------------------|
| 1 | CONSOLE | interface serial (RJ45) 。 |

3.2 Device rear panels

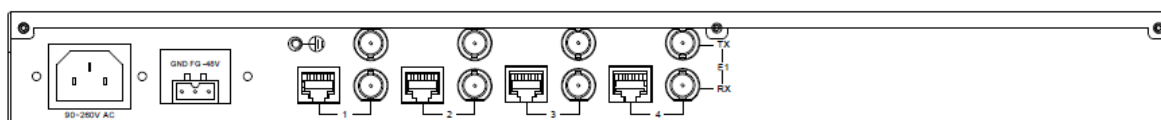


Figure 3-2-1 4Eth-4E1 device rear panel diagram

Table 3-2-1: Power connector

| Name | explain |
|------------|--|
| 90~260V AC | AC 220V power connector; Safety range: 90 ~ 264vAC |
| FG | Earthling ground (connect to chassis protect ground) |
| -48V | “-“ for DC-48V power input (-36~-72V DC) |
| GND | “+“ for DC-48V power input |

Table 3-2-2: Description of “CONFIG” switch

| Number | Name | State | Description |
|--------|----------|--------|---|
| 1 | SPD | ON | Ethernet 10M rate setting enable |
| | | OFF | Ethernet 100M rate setting enable |
| 2 | ANG | ON | Ethernet Auto-negotiation disable |
| | | OFF | Ethernet Auto-negotiation able |
| 3 | RE_LO | ON | Choose the loop-back mode is local loop-back |
| | | OFF | Choose the loop-back mode is remote loop-back |
| 4 | LOOP | ON | Local E1 line loop-back disable. |
| | | OFF | Local E1 line loop-back enable. |
| 5 | CRC_SEL1 | ON(0) | CRC_SEL [1:0] decide the error code threshold of converter: "00" --- don't set it. |
| | | OFF(1) | |
| 6 | CRC_SEL0 | ON(0) | "01" --- set the line bit error rate is over 10^{-4} . |
| | | OFF(1) | "10" --- set the line bit error rate is over 10^{-5} . "11"--- set the line bit error rate is over 10^{-6} . |
| 7 | SETMODE1 | ON(0) | SETMODE [1:0] decide the operating mode of converter: "00" --- use the chip pin to set converter. |
| | | OFF(1) | |
| 8 | SETMODE0 | ON(0) | "01" --- use local CPU to set converter. |
| | | OFF(1) | "11"--- use remote CPU to set converter. |

4 Network management

4Eth-4E1 support GUI network management software of based on serial RS232 can configure device parameters. The address of local network element should be set manually and should not be identical with Remote NE, Refer to Table 7. The GUI network management software shows how to configure **4Eth-4E1**, to monitor **4Eth-4E1**, and to shoot the trouble by loopback and BERT testing and so on.

5 Device Installation

- I Open the package, check out the package contents such as equipment and parts according to the packing list; for any damage, contact with the supplier instantly;
- II Mount the unit in a 19-inch rack with screwdriver;
- III Connect the interfaces
 - ✓ Connect the E1 lines with appropriate adapter to the DB37 connector or RJ45 connector on the rear panel designated to E1
 - ✓ Connect the user LAN to the RJ-45 connectors designated 10/100 Base-T Ethernet
 - ✓ Connect the control terminal to the front panel RS232 connector
- IV connect the power
 - ✓ Always set the power switch at OFF position first and then connect the power.
 - ✓ The AC voltage is in the range of 165V ~ 265V ;The DC voltage is in the range of -36V to -72V. We strongly recommend you to make sure to connect the PGND connector on the back panel to the earth of the telecommunication house in a reliable way. Also be careful of the connector's polarity, reverse connection is forbidden.

Note: If the device does not work, please check the fuse of the power module. If the fuse is melted, please replace it by a new one.

6. Technical Parameters

Table6-1: Ethernet Interface

| Subject | Description |
|---|---|
| Connector | RJ-45 |
| Working mode | Auto - negotiation is the default setting |
| Complies with IEEE 802.3 and 10/100 Base-Tx Ethernet Protocol | |

Table6-2: E1 interface

| Subject | Description |
|---|-----------------------------|
| Bit rate | 2.048Mb/s±50ppm |
| Code format | HDB3 |
| Impedance | 75 Ohm BNC and 120 Ohm RJ45 |
| Jitter transfer, Jitter tolerance comply with ITU-T G.703、G.704、G.823 recommendations | |

Table6-3: Ethernet parameters

| Subject | Description | Remark |
|----------------------------|---|--------------------|
| MAC address table capacity | 1K | |
| MAC aging time | five minutes | |
| Minimum frame-length | 64 bytes | |
| Maximum frame-length | 1916 bytes | |
| Working mode | Support auto-negotiation compliant to IEEE802.3u. Enabled as default | Configured via GUI |

RapidCom-4Eth-4E1

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|---------------|---|-----------------------------|
| VLAN function | Disabled as default | network management software |
| Flow control | Enabled as default | |
| Bandwidth | $\approx n \times E1$ ($n=0 \sim 8$) Default is $8 \times E1 \approx 15.84\text{Mbps}$ | |

Table6-4: Dimension, weight and power consumption

| Subject | Description |
|-------------------|---|
| Dimension | 434mm×44mm×140mm (width× height× depth) |
| Weight | 3.5 kg |
| Power consumption | 5W±10% |

Table6-5: Environmental requirements

| Subject | Description |
|-----------------------|-----------------------------|
| Operating temperature | -5℃ ~ 45℃ |
| Storage temperature | -40℃ ~ 70℃ |
| Humidity | ≤95% , free from condensing |