RapidCom

4Eth-16E1
Interface Converter

User manual

V1.0

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1. Introduction

1.1 Overview

4Eth-16E1 is the IP over TDM converter, which supports the conversion from MAC frames to 16 E1 lines. The maximum bit rate is 31.68Mbps (16E1 lines). With different LAN card, E1 card and power card, it can meet various requirements. It not only provides alarms and status of the E1 line and Ethernet interface together with advanced management functions, such as, throughput statistic of the Ethernet, but also supports the Unification Network Management via SNMP and GUI.

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 16 channels. When the embedded E1 BER Tester is used via CLI command, the particular E1 channel on testing mode can not convey E1 service, while the other E1 channels are not affected by the BER test.
  - The differential delay between any two of the 16 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 and telnet.
  - EOP network management platform based on SNMP.
- 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.

2. Application Diagram

Figure2-1 illustrates a typical application (point-to-point). With 4Eth-16E1 system, the Ethernet is transferred by 16E1. The 4Eth-16E1 complies with international standard so that it can communicate with similar products from other manufacturers. Note that EOP can only support point-to-point application.

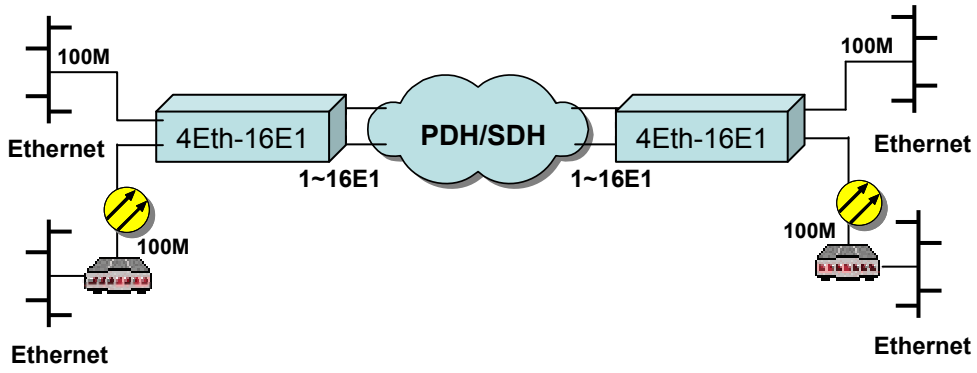


Figure2-1 4Eth-16E1 **application diagram**

3. Panel Description

3.1 Front Panel

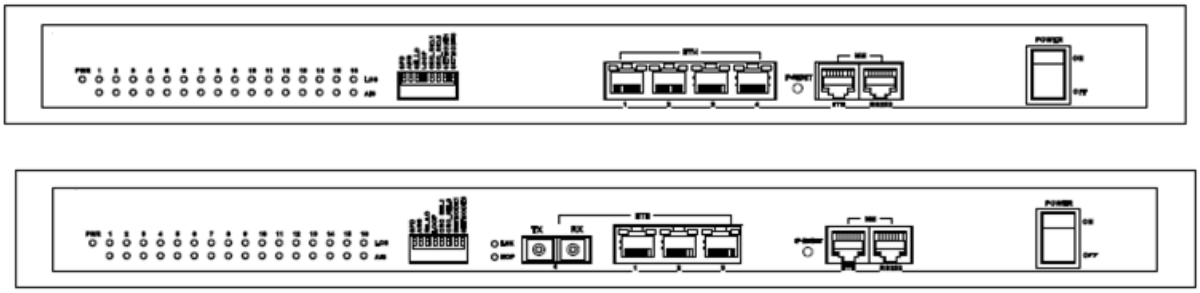


Figure3-1 4Eth-16E1 device Front panel diagram

The front panel EOP 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 Front panel lights

Name	Function description
POWER	Power LED.
E1	
LOS1~LOS16	Local /Remote LOSS or LOF alarm signal, low level alarm.
AIS1~AIS16	Local /Remote AIS alarm signal, low level alarm.
Ethernet	
LINK1~LINK4	Ethernet link light, bright or flashing means properly connected.
SPD1~SPD4	Ethernet speed light, light for 100M，off for 10M.
Ethernet optical port	
NOP	Ethernet optical no optical signal warning light, bright means no optical signal be received
LNK	Ethernet optical link light, flashing means properly connected.
NM-ETH(Management)	
LINK	Ethernet link light, bright or flashing means properly connected.
SPD	Ethernet speed light, light for 100M，off for 10M.

Table3-1-2 DIP 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. "01" --- set the line bit error rate is over 10^{-4}. "10" --- set the line bit error rate is over 10^{-5}. "11"--- set the line bit error rate is over 10^{-6}.
		OFF(1)	
6	CRC_SEL0	ON(0)	
		OFF(1)	
7	SETMODE1	ON(0)	SETMODE [1:0] decide the operating mode of converter: "00" --- use the chip pin to set converter. "01" --- use local CPU to set converter. "11"--- use remote CPU to set converter.
		OFF(1)	
8	SETMODE0	ON(0)	
		OFF(1)	

Table3-1-3 the front panel buttons and interface

Name	Description
Ethernet 1~4	4 Ethernet ports: 10/100BASE-TX AUTO-MDI/X
NM-ETH	WEB network management interfaces：10/100BASE-TX AUTO-MDI/X
NM-RS232	RS232 serial management interface（RJ45）。
TX RX	Optical Module transceiver Interface
IP-Reset	Click this button to make the configuration of NMS to back the default mode.

POWER	Power switch. in "on", said on the power supply any ; in "off", means the closure。

3.2 Device rear panels

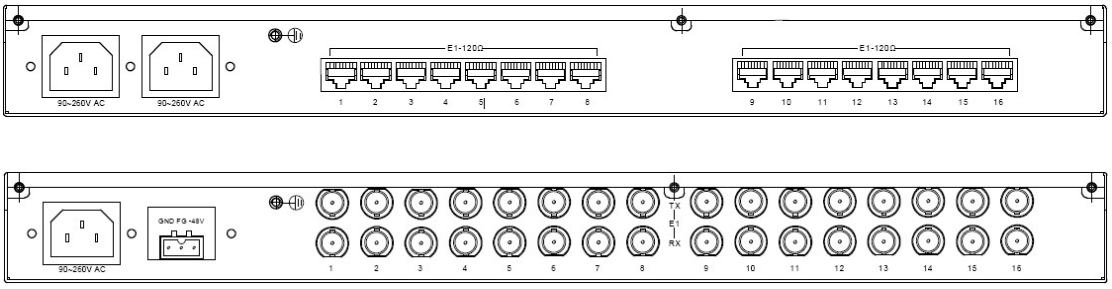


Figure 3-2 4Eth-16E1 device rear panel diagram

Table3-2-1 Rear panel interface description

Serial number	Name	Explain
1	1 ~ 16 E1	E1 interfaces optional 120 Ohm / 75 Ohm.
2	⏚	To ether ground

Table3-2-2 Power connector

Name	explain
90~260V	AC 220V power connector: Safety range: 90~260VAC
FG	ether ground connector
-48V	DC-48V power input (-36~-72V DC)
GND	Working ground connector

Note: AC 220V and DC-48V may access simultaneously, but it is not recommend.

4 Network management

4Eth-16E1 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-16E1, to monitor 4Eth-16E1, and to

shoot the trouble by loopback and BERT testing and so on.

5. Technical Parameters

Table5-1 Optical Ethernet interface （Dual-fiber）

Subject	Description
Wavelength	1310nm/1550nm
Bit rate	125Mb/s
Optical power	-4 ~ -12dBm
Receiving sensitivity	Prior to -36dBm
Dynamic range	32dB
Connector	FC/SC
Transmission Distance	40Km is the default configuration
Compliant to IEEE 100Base-Fx Standard	

Table5-2 Optical Ethernet interface (single-fiber)

Subject	Description
Wavelength	1310nm/1550nm
Bit rate	125Mb/s
Optical power	-4 ~ -12dBm
Receiving sensitivity	Prior to -36dBm
Dynamic range	32dB
Connector	FC/SC
Transmission Distance	25Km is the default configuration;
Compliant to IEEE 100Base-Fx Standard	

Table5-3 Electrical 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	

Table5-4 E1 interface

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

Table5-5 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 network management software
VLAN function	Disabled as default	
Flow control	Enabled as default	

Bandwidth	≈n×E1（n=0～16）Default is 16×E1 ≈31.68Mbps	

Table5-6 Dimension, weight and power consumption

Subject	Description
Dimension	434mm×44mm×155mm（width× height× depth）
Weight	3.5 kg
Power consumption	8W±10%

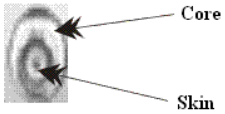
Table5-7 Environmental requirements

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

6. Line Making Method

Making method of 75Ω line:

Core connected with core, and skin connected with skin. Being disconnected between core and skin



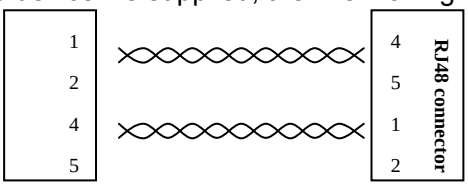
Making method of 120Ω line:

Physical interface: RJ48-C (marked “RJ48-C” on the rear panel)

1、2、3、4、5、6、7、8

The pins 4 and 5 are output, and 1 and 2 are input

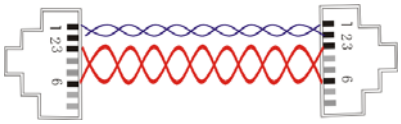
If the input and output of 120Ω interface at the remote device are consistent with those of the device we supplied, the line making method is as follows:



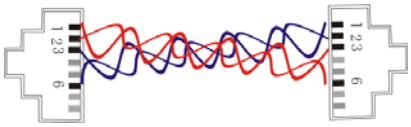
Making method for Ethernet cable

In order to ensure the transmission distance and reduce interference, the two input lines and the two output lines shall be made into a twisted pair respectively.

Making method of straight-through network cable:



Making method of crossover network cable:



7. Installation Procedure

carefully read the instructions in the manual before use. Pay particular attention to the notes.

The icons marked with “Note” and “Alarm” in the user manual refer to the identification of safe and correct operation, which shall be abided by strictly.

Package and Appearance Check

1) upon the arrival of device, check the package for any damage. If any severe damage, contact with the after-sales service.

2) Carry out open package inspection according to the packing list. If any damage is found on the rack external enclosure, contact with the installation personnel or directly the after-sales service.

Device Installation

1) Fix the device into the rack (mounted type).
2) Connect the power supply. In the case of DC input, measure the voltage and polarity with a multi-meter above all. Carry out self inspection of the device after electrified, and check the indicators for normal working during the device self inspection.

3) The E1 interfaces of the device shall be connected with the receiving and transmitting cables corresponding to one by one.

4) The simple installation is completed if the device can work normally.

Requirement for apparatus room and grounding

1) It should be placed in a stable place where is convenient for personnel to test and set.

2) Ambient environment should be dry, tidy and draughty.

3) During the installation and maintenance of the equipment, necessary anti-static measures should be taken, so the rack should be grounded to strengthen anti-jamming ability and prevent lighting strike. Working and protection ground of independent erection should be available and ensures to grounded well for equipment operation. Connecting method is shown as follows: