RapidCom

4Eth-1E1

Interface Converter

User Manual

Content

1. Product description

4Eth-1E1 Interface Converter (also as 4Eth-1E1 Bridge) is an Ethernet bridge of high performance, which accomplishes the converting between the 100M Ethernet port and the E1 port. As an extended device of the Ethernet, the 4Eth-1E1 bridge realizes interconnection of four Ethernet by using the E1 channel provided by existing networks with low cost.

100BASE-TX (RJ45) interfaces are provided at the end of Ethernet LAN to accomplish various functions including double Ethernet interface broad band shared, MAC address self-learning, address filtering, address table maintenance and flow control. The device has 4 ETH port, it can work like an intelligent L2 switch. It can be reduce the net node, dispense with the device as HUB, consequently reduce the malfunction node.

The 4Eth-1E1 has the GUI NMS, it can manage the converter like an intelligent L2 switch. It can set the TAG VLAN on these 4 ETH port, can set the special tag like Q-in-Q, can configurable data rate from 32K~100M on each ETH port, can do some Qos setting.

E1 interfaces conforming to ITU-T G.703 and G.704 proposals are provided at the end of WAN, supporting RJ45 and BNC connection modes. The E1 ports support

both framing and un-framing architecture. The user can select an operating mode for the E1 interface according to the connected E1 environment. This provides flexibility of network application. In the framing mode, the E1 interface provides a rate of N*64Kbps（N=1~31）. In the un-framing mode, the E1 channel provides a rate of 2.048Mbps and accomplishes transparent transmission.

If the 4Eth-1E1 bridge is used in the framing mode, the transmission clock can be either provided internally, i.e. using the main clocking timing mode (INT), or extracted from the E1 channel, i.e. using slave clock timing mode.

The 4Eth-1E1 bridge provides plenty of self-test functions, supporting local loop. It also provides pseudo random code test function to test error codes in the circuit.

It is proposed to use the products of this series in pairs.

A typical application is shown in figure 1.

Figure1 typical application of an 4Eth-1E1 bridge

2. Main features

● In accordance with the provisions of IEEE 802.3、

   802.3u Ethernet, ITU-T G.703, G.704 and G.823 protocols.

● E1 interface framing/un-framing optional; balanced

120ohm unbalanced 75ohm optional.

● The E1 interface uses PCM31 mode, supporting CRC check.

● E1 interface main/ slave clock optional in the framing mode.

● In the E1 framing mode, the number of time slots is optional from 1 to 31.

● Supporting 2.048Mbps transparent transmission in the E1 un-framing mode.

● The two 100BASE-TX Ethernet interfaces support 100M half/ full duplex modes.

● MAC addresses self-learning and addresses filtering functions, reducing the transmission load of the E1 circuit.

● Built-in 64Mbits SDRAM Ethernet data buffer memory, improving the capability of Ethernet side anti-outburst, assuring high throughput of data transmission.

● E1 circuit local loop tests.

● Pseudo random sequence test, facilitating the test of E1 circuit.

● Perfect circuit test and alarm indication.

● Optional AC 220V or DC –48V input for bridge of both architectures

3. Technical specifications

Protocol: G.703, G.704, G.736, G.823, I.431
IEEE802.3u 100BASE_TX

Circuit interface (E1):

       Impedance: 75Ω, physical interface: BNC

       Impedance: 120Ω, physical interface: RJ45

Interface rate: framing: N*64Kbps，N=0~31;

Un-framing: 2.048Mbps。

Coding: HDB3, Jitter tolerance in accordance with G.823

Output jitter < 0.05UI

Data interface (100BASE_TX):

Impedance: 100Ω, physical interface: RJ45

Interface rate: 100Mbps

Coding: Manchester

Cable: 75Ωcoaxial-cable, UTP5 twisted pair。

Transmission range:

       Circuit interface: BNC: 600m; RJ45: 300m

       Data interface: 100m

Indicator: indicating power, connection states of data and circuit interfaces, operation state, test state and trouble alarm.

Dimensions: 210mm (dep) x 140mm (wid) x40mm (hei)

Power supply: 85V ~ 264V AC input, 5V/1A output

       -36V ~ -72V DC input，5V/1A output

Power dissipation：3W

Operational temperature: 0℃～50℃

Storage temperature: -20℃～80℃

Humidity: 5%～90% (no condensation)

4. Installation and panel description

4.1Unpacking

Check the accessories and spare parts when opens the package. In case of missing, immediately contact our offices or agencies. Check for the following items:
■ 4Eth-1E1 Bridge
■ Operation manual
■ A supply cord (AC)
■ Two plugs for coaxial cable

In case of any damage in transportation, contact our offices or agencies.

4.2 Front and rear panel of the device

4.2.1The front panel of the 4Eth-1E1 bridge

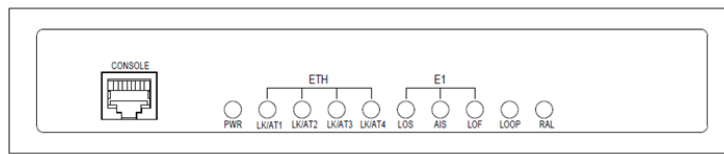The front panel of the 4Eth-1E1 Bridge is shown in figure 2.

Figure 2 front panel of 4Eth-1E1 Bridge

Explanations for the two rows of indicators at the left are as follows:

POWER: Power. Always lights after starting up.

LK/AT1: Flickers when the ETH1 has been connected and transmission data.

LK/AT2: Flickers when the ETH2 has been connected and transmission data.

LK/AT3: Flickers when the ETH3 has been connected and transmission data.

LK/AT4: Flickers when the ETH4 has been connected and transmission data.

LOF: Alarm indicator lamp for input signal out-of-frame in E1 line. Constantly lightening indicates the alarm with local device; flash indicates the alarm with opposite device. Alarm status of opposite device can be detected only at framing mode.

LOS: E1 link interruption alarm. Always lights after starting up till synchronization is established. It also lights in case of E1 link interruption or signal loss in communication.

AIS: Always lights after receiving a alarm indication signal.

LOOP: Test. Always lights in testing if transmitting local

loop, flickers if remote E1 interface loop instructions or pseudo-random sequence test instructions.

RAL : Always lights when the E1 line of remote site cut down.

4.2.2 The rear panel of the 4Eth-1E1 bridge

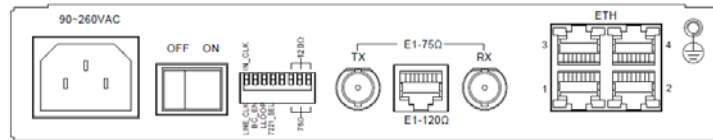●The AC input rear panel of 4Eth-1E1 Bridge is shown in figure 3.

Figure 3 AC input rear panel of 4Eth-1E1 Bridge

220V AC: AC socket with two cores

OFF ON : Power switch, When the ON button is pressed down, the power supply is turned on

8 bits coded Switch: System configure, more description in 5.2.2

E1-75Ω TX / RX: BNC transmission/reception socket for 75ohm impedance E1 interface

E1-120Ω: RJ45 socket for 120Ω impedance E1 interface

ETH: RJ45 socket for 100Mbps Ethernet interface

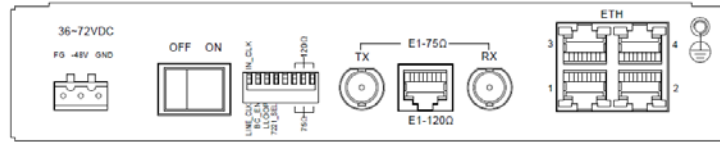●The DC input rear panel of 4Eth-1E1 Bridge is shown in figure 4.

Figure 4 DC input rear panel of 4Eth-1E1 bridge

48V DC：DC -48V power supply connector

The others are the same as in figure 3.

4.2.3 System test and configuration

(1) When S5.6~S5.8 is all jumped to end 75, the physical match impedance of the E1 interface is 75Ω non-balanced coaxial cable. (The E1 circuit uses BNC coaxial-cable sockets.)

(2) When S5.6~S5.8 is all jumped to end 120, the physical match impedance of the E1 interface is 120Ω balanced twisted-pair. (The E1 circuit uses RJ45 sockets.)

Note: the default factory setting is (1).

(3)S5.1: main/slave clock setting, valid only in the framing mode. ON for main clock (INT-CLK) and OFF for slave clock (LINE-CLK).

(4)S5.2: Bandwidth Coupling, ON for follow the bandwidth (time slot) of remote converter. OFF for use the local setting of bandwidth (time slot)

(5)S5.3: LLOOP. Local loop back setting (E1 interface in direct loop back), ON valid. (6)S5.4: LLOOP. Local loop back setting (E1 interface in direct loop back), ON valid.

(6)S5.4: 7221_SEL, ON for working with the old version device. In the normal the setting should be OFF

(7)S5.5: NULL

5. Applications of 4Eth-1E1 Bridge

5.1 Definition of balanced twisted-pair wire sequence

5.1.1 100BASE-TX interface wire sequence

The RJ45 Unshielded twisted-pair for 4Eth-1E1 interface can use DCE or DTE standard stipulations, it support AUTO MDI/MDX function.

5.1.2 E1 interface wire sequence

1 and 2 are transmitting lines, 4 and 5 are receiving lines, as shown in figure 5.

1. TX+ Positive end of data transmission
2. TX- Negative end of data transmission
3. Idel
4. RX+ Positive end of data reception
5. RX- Negative end of data reception
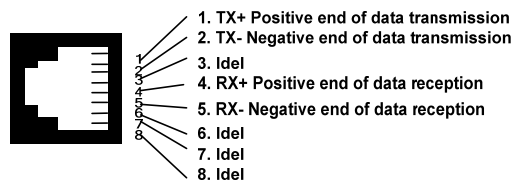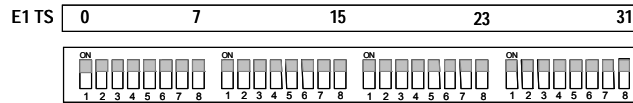6. Idel
7. Idel
8. Idel

Figure 5 RJ45 balanced twisted-pair wire sequence for E1 interface

5.2 Setting of DIP switch and jumper

5.2.1 Setting of E1 interface impedance

Bottom coded switch, as shown in Figure 18 ：

Figure 6 E1 Time Slot Setting

After time slot 0 is valid, other coded switches in whatever positions are all valid. Select the number of time slots according to the expected rate. Normally for an independent type, a time slot setting of automatic tracking Central Site module is selected. Coded switches of plate-clip time slot correspond to S1, S2, S3 and S4.

SW	Status	Function	Status	Function	Default
0	ON	Unframed 2048KBps	/	/	OFF
	OFF	CCS (PCM31)	OFF	CAS (PCM30)	OFF
16	ON		OFF		OFF

●1st switch (S1.1) is used for controlling E1 framing/non-framing. "ON" refers to non-framing mode (2.048Mbps).

●31 switches, from 2nd—32nd (S1.2~S1.8, S2, S3, S4), are respectively used for controlling the selection of 1st –31st time slots. Set at "ON", the corresponding time slot

is selected; set at "OFF", the corresponding time slot is not selected. The rate of E1 interface is completely dependent on the number of the selected time slots.

For example: the setting of 3rd switch to "ON" and all other switches to "OFF" indicates that 2nd time slot is selected, at this moment the rate is 64K; the setting of 7th and 8th switches to "ON" and all other switches to "OFF" indicates that 6th and 7th time slots are selected, with a rate of 2*64K=128K. TS0 setting is used for specifying E1 frame to be transparent or framing: '0'--framing, "1"--non-framing. But the bit has to be specified in combination with other time slots. TS16 setting is used for controlling E1 frame

structure to be PCM30（CAS）or PCM31（CCS）:

'0'—PCM30, at this moment 16th time slot must not be used for transmission service; '1'—PCM31, 16th time slot can be used for transmission service. Besides, TS1—TS31 are respectively used for controlling the selection of 1st—31st time slots: '1'—the corresponding time slot is selected; '0'—the corresponding time slot is not selected.

5.3 Configuration of Ethernet connecting devices

The equipment uses 100BASE-TX Ethernet interfaces and supports adaptive 100M half/full duplex mode. Ethernet devices connected to 4Eth-1E1 bridge (such as SWITCH, HUB, Ethernet adapter card (NIC), etc.) can be

set to 100M full duplex, 100M half duplex, adaptive 100M half/full duplex and adaptive 10/100M.

5.4 Simple self-test methods for devices and E1 circuits

Test 1: test of back-to-back connection

Connect two 4Eth-1E1 bridge devices back to back, ping the other's IP address on the two computers to test the two devices.
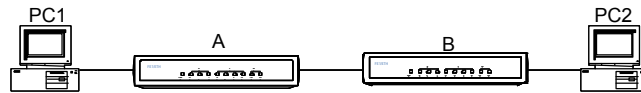
Test 2: test of E1 circuit transmission error codes.

Connect the device in the real operational environment, check the E1 circuit with the loop and pseudo-random sequence test function provided by the device.

5.5 Typical applications

Mode 1: connect Ethernet with E1 networks.

SDH, PDH and DDN networks have already been widely adopted. With E1 channels provide by such networks, bridging connection and interconnection of two Ethernet networks at different locations can be easily realized by 4Eth-1E1 bridge.

Connecting two Ethernet networks with an E1 network

Mode 2: Extend an Ethernet network with existing twisted pair or coaxial cable.

Connected with twisted pair or 75Ω coaxial cable, the E1 ports of 4Eth-1E1 Bridge support a transmission range of 300m or 600m. Two Ethernet networks at different locations can be bridged by two 4Eth-1E1 bridge with existing twisted pair or coaxial cable.
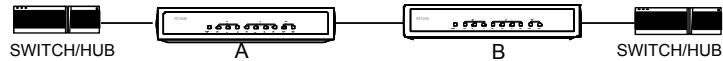
Extending Ethernet with existing twisted pair and coaxial cable

5.6 Common questions and their maintenance

(For independent interface converter, reference for frame bridge)

No.	Symptoms	Causes	Remedies
1	The power indicator does not light after starting up.。	The power circuit has a failure.	1. The power is not connected. Check the contact of the power lines and the converters. 2. The internal power module has a failure. Send it rear to factory for repair.
2	Indicator LNK does not light when the	Integrity test of link has	1. The type of the cable does not meet the DTE/DCE modes of the Ethernet ports

	Ethernet network is connected.	not passed.	of the equipment. 2. The crystal head of the cable is not well molded. Check the quality of the UTP cable. 3. The rate setting of the converter or the network card is wrong. See 5.3. 4. The internal circuit of the equipment is damaged. Send it to factory for repair.
3	Indicator LOS always lights when the cable at the E1 port is connected.	The circuit signals are lost.	1. Check the coaxial cable or the UTP5 twisted pair for open circuit and short circuit. Check whether the plugs are positioned. 2. The factory default of the equipment is 75ΩBNC interface. S5.6~S5.8 should be reconfigured if a 120ΩRJ45 interface is used. See 5.2.1 for reference. 3. The internal circuit of the equipment is damaged. Send it to factory for repair.

| 4 | Indicators are normal, but communication can not be done. | Make the different mode by the switch end and the users end, | The setting of framing or un-framing selected are different. Make sure the double devices the code setting of S1.1 are the same.
The setting of the time slots are different. Make sure the double devices selected the same time slots via the dip switch S1.2~S1.8, S2.1~S2.8, S3.1~S3.8, S4.1~S4.8.. |