

AN-FE1-ETH
Interface Converter

User Manual



AD-NET TECHNOLOGY CO., LTD

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1. Product description

AN-FE1-ETH Interface Converter (also as AN-FE1-ETH Ethernet 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 AN-FE1-ETH Bridge realizes interconnection of two 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 MAC address self-learning, address filtering, address table maintenance and flow control.

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 $N \times 64\text{Kbps}$ ($N=1 \sim 31$). In the un-framing mode, the E1 channel provides a rate of 2.048Mbps and accomplishes transparent transmission.

If the AN-FE1-ETH 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 AN-FE1-ETH Bridge provides plenty of self-test functions, supporting local loop and remote 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-FE1-ETH 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 100BASE-TX Ethernet interface supports 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 remote loop and local loop tests.
- Pseudo random sequence test, facilitating the test of E1 circuit.
- Perfect circuit test and alarm indication.
- Two architectures: stand alone and 19in rack mount architecture (15 interface converter modular and one NMS modules or 16 interface converter modules can be inserted in the rack mount architecture) ;
- Optional AC 220V or DC -48V input for bridge of both architectures
- Hot rear up of double power supplies is provided for

the Bridge of rack mount architecture, assuring high reliability.

- Support local Hypber Terminal management via RS232 serial port and remoter management by Telnet、Web、SNMP and CGI management software.
- Can be communicated with the bridge of other company.

3. Technical specifications

Protocol: G.703, G.704, G.736, G.823, I.431

IEEE802.3 100BASE_TX

Circuit interface (E1):

Impedance: 75ohm, physical interface: BNC

Impedance: 120ohm, 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: 100ohm, physical interface: RJ45

Interface rate: 100Mbps

Coding: Manchester

Cable: 75ohm coaxial-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:

Stand alone: 140mm (depth) x 210mm (width) x 40mm (height)

Rack mount: 19in standard 4.5U cabinet

Power supply:

stand alone: 85V~264V AC input, 5V/1A output

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

rack mount: 150V~260V AC input, 5V/16A、12V/1A output

-38V~-58V DC input, 5V/16A、12V/1A

output

Power dissipation: 3W

Operational temperature: 0°C ~50°C

Storage temperature: $-20^{\circ}\text{C} \sim 80^{\circ}\text{C}$

Humidity: 5%~90% (no condensation)

4. Installation and panel description

4.1 Unpacking (stand alone AN-FE1-ETH Bridge)

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:

- One AN-FE1-ETH Bridge
- Product eligibility card
- Operation manual
- A supply cord
- Two plugs for coaxial cable
- Box up list

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

4.2 Front and rear panel of the stand alone device

- The front panel of the AN-FE1-ETH Bridge is shown in figure 2.

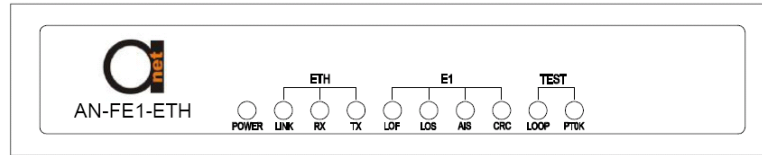


Figure 2 front panel of AN-FE1-ETH Bridge

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

POWER: Power. Always lights after starting up.

LINK: Link. Always lights if the data link is complete.

RX: Data reception. Flickers when the data interface receives data.

TX: Data transmission. Flickers when the data interface transmits 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 an alarm indication signal from the uplink.

CRC: Always lights after finding CRC check error.

LOOP: Test. Always lights in testing (transmitting local or remote E1 interface loop instructions or pseudo-random sequence test instructions).

PTOK: Circuit pseudo-random sequence test success. In the state of remote E1 interface loop, transmits pseudo-random codes to the remote equipment via local E1 interface, and checks for error codes according to the pseudo-random codes received at the local E1 interface. If there is no error code, the indicator always lights. This function can be used to check the E1 circuit.

Note: Circuit pseudo-random sequence test is valid only when the local equipment is in the framing mode and main clock is configured.

- The AC input rear panel of AN-FE1-ETH Bridge is shown in figure 3.

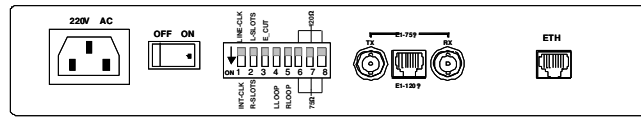


Figure 3 AC input rear panel of AN-FE1-ETH Bridge

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

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

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

ETH: RJ45 socket for 100Mbps Ethernet interface

● The DC input rear panel of AN-FE1-ETH Bridge is shown in figure 4.

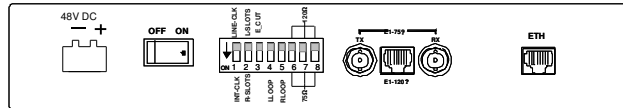


Figure 4 DC input rear panel of AN-FE1-ETH Bridge

48V DC: DC -48V power supply connector

The others are the same as in figure 3.

The code switch on rear panel is S5. which is the system configure set.

(1) When S5.6~S5.8 is all jumped to end 75, the physical match impedance of the E1 interface is 75ohm 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 120ohm balanced twisted-pair. (The E1 circuit uses RJ45 sockets.)

Note: the default factory setting is (1).

4.3 System test and configuration

S5.1: main/slave clock setting. ON for main clock (INT-CLK) and OFF for slave clock (LINE-CLK).

S5.2: Track remote time slot setting or not, on for R-SLOTS, OFF for L-SLOTS (valid only when S5.1 = OFF)

S5.3: mode select. ON for allow transmit the data from the Eth interface to the E1 interface and take back when loop test. OFF (E_CUT) for cut off the data from the Eth interface completely when loop test.

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

S5.5: RLOOP. Remote loop back setting (remote E1 interface in direct loop back), ON valid.

Remote loop loops rear the E1 port of the remote equipment by sending remote loop instructions to the remote equipment through the local equipment. Remote loop can be used to check the E1 circuit.

When you set RLOOP, you must make the local device at main clock and the framing mode.

4.4 Front and rear panel of the rack mount

- The front panel of RACK is shown in figure 5.

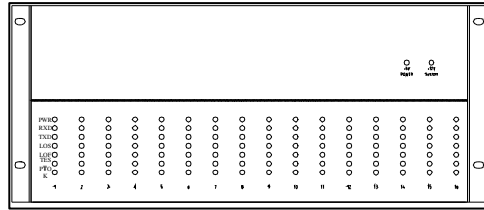


Figure 5 Front panel of RACK

+5V: 5V main power indicator

+12V: 12V fan power indicator

Underneath the panel there is an indicator matrix. See figure 2 about the description of the front panel of AN-FE1-ETH Bridge for its functionality.

- The rear panel of RACK is shown in figure 6.

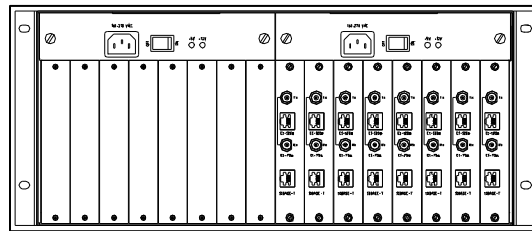


Figure 6 Rear panel of rack

The panel above consists of three different small panels:

- The small panel of AN-FE1-ETH bridge module, as shown in figure 7.

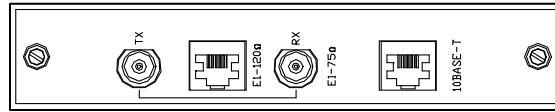


Figure 7 Panel of AN-FE1-ETH Bridge module

See figure 3 about the description of AC input rear panel of AN-FE1-ETH bridge for the functions of every component of the small panel.

- The panel of RACK/AC AC redundant power supply is shown in figure 8.

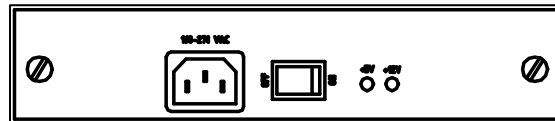


Figure 8 Panel of rack/AC AC redundant power supply

160-270VAC: AC 220V input socket

ON OFF: Power converter

+5V: 5V main power indicator

+12V: 12V fan power indicator

- The panel of RACK/DC DC redundant power supply is shown in figure 9.

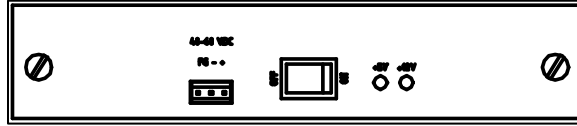


Figure 9 Panel of rack/DC DC redundant power supply

40-60VDC: DC-48V connector (FG to protective GND, “-” is the polarity of the -48V DC input)

ON OFF: Power converter

+5V: 5V main power indicator

+12V: 12V fan power indicator

5. Applications of AN-FE1-ETH Bridge

5.1 Definition of balanced twisted-pair wire sequence for RJ45 interface

5.1.1 100BASE-TX interface wire sequence

The RJ45 Unshielded twisted-pair for 100BASE-TX interface can use DCE or DTE standard stipulations, it support AUTO MDI/MDX function. Complied with EIA/TIA-568A、EIA/TIA-568B.

5.1.2 E1 interface wire sequence

1 and 2 are transmitting lines, 4 and 5 are receiving lines, as shown in figure 10.

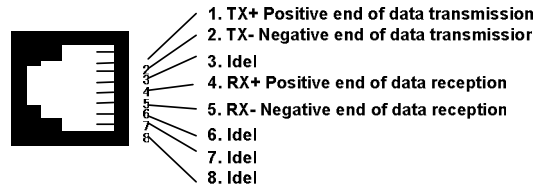


Figure 10 RJ45 balanced twisted-pair wire sequence for E1 interface

5.2 Setting of DIP switch and jumper

For a rack mount unit, the module can be easily drawn out from the guide channel just by unscrewing the screws on the module panel.

5.2.1 Setting of E1 interface impedance

Bottom coded switch, as shown in Figure 11 :

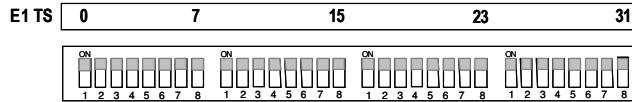


Figure 11 E1 Time Slot Setting

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	
16	ON			OFF	(PCM30)

- 1st switch (S1.1) is used for controlling E1 framing/un-framing. "ON" refers to un-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"--un-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.

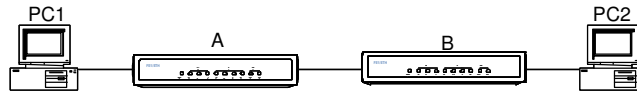
5.3 Configuration of Ethernet connecting devices

The equipment uses 100BASE-TX Ethernet interfaces and supports adaptive 100M half/full duplex mode. Ethernet devices connected to AN-FE1-ETH 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 & E1 circuits

Test 1: test of back-to-back connection

Connect two AN-FE1-ETH bridge devices back to back, ping the other's IP address on the two computers to test the



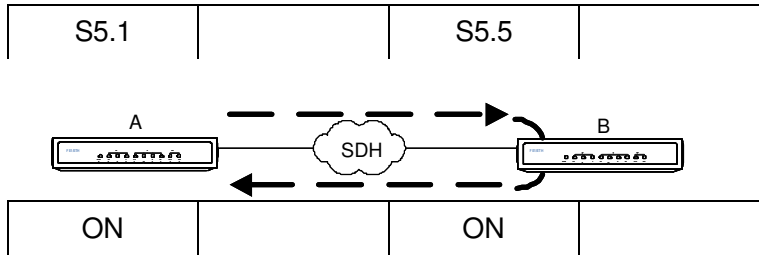
two devices.

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.

If the exchange end and the user end is very far away, the E1 circuits of the two AN-FE1-ETH bridge must be correctly connected first. Otherwise, indicator LOS will always light. Set the device at the exchange end to framing and main clock mode, set S5.5 (RLOOP) to ON, pseudo random sequence test will be executed. At the exchange end if indicator LOOP flickers and indicator PTOK always light, it means successful loop and pseudo random code test and the E1 circuit has no error code.



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

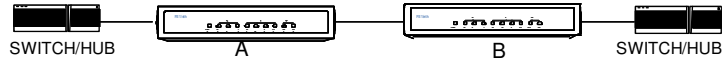
realized by the AN-FE1-ETH Bridge.



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 75ohm coaxial cable, the E1 ports of AN-FE1-ETH Bridge support a transmission range of 300m or 600m. Two Ethernet networks at different locations can be bridged by two AN-FE1-ETH 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.	<ol style="list-style-type: none"> 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 LINK does not light when the Ethernet network is connected.	Integrity test of link has not passed.	<ol style="list-style-type: none"> 1. The type of the cable does not meet the DTE/DCE modes of the Ethernet ports 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.	<ol style="list-style-type: none"> 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 75ohmBNC interface. S5.6~S5.8 should be reconfigured if a

			<p>120ohmRJ45 interface is used. See 5.2.1 for reference.</p> <p>3. The internal circuit of the equipment is damaged. Send it to factory for repair.</p>
4	Indicators are normal, but communication can not be done.	Make the different mode by the switch end and the users end,	<p>1. The setting of framing or un-framing selected are different. Make sure the double devices the code setting of S1.1 are the same.</p> <p>2. 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.</p>