



MODEL7213S

E1 to Optical Ethernet Interface Converter

User Manual

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1. Introduction

MODEL7213S is E1 to Optical Ethernet Interface Converter with fiber optic interface is a multifunction and high performance L2 switch which build in three port cross engine to realize the conversion between two Ethernet interface and E1 interface. The equipment supports the function used as Ethernet transceiver or Ethernet net bridge or fiber optic modem. As the extension of Ethernet, This converter may realize Ethernet interconnection at low cost via the E1 channel provided by existing network.

The optical Ethernet Interface Converter(also as Optical Ethernet Interface bridge) is a high performance, which accomplishes the converting between the 10/100M Ethernet port,the 100M Ethernet Optic Interface and E1 interface. As an extended device of the Ethernet, the optical Ethernet Interface Converter realizes interconnection of two Ethernet by using the E1 channel provided by exiting networks with the low-cost.

10/100Base-T (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, support the protect of net storm. Ethernet electric interface (RJ45) realizes 10/100M and HDX/FDX Auto-Negotiation. It can realizes DTE/DCE auto-negotiation (support "straight"-thru and crossover two Ethernet interface)

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 $N \times 64\text{Kbps}$ ($N=1 \sim 32$). In the un-framing mode, the E1 channel provides a rate of 2.048Mbps and accomplishes transparent transmission.

If the Optical Ethernet Interface Converter 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.

2. Typical scheme

The optical Ethernet interface converter 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.

The device supports conversion between:

1. 10/100Base-TX and 100 Base-FX
2. 10/100Base-TX and G.703
3. 100base-FX and G.703

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

A typical application is shown in figure 1.



Figure1 typical application of E1 to Optical Ethernet Interface Converter

Another typical application is shown in figure 2.



Figure2 typical application of E1 to Optical Ethernet Interface Converter

3. Specifications

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

IEEE802.3 10BASE_T

Circuit interface (E1): Impedance: 75Ω, physical interface: BNC

Impedance: 120Ω, physical interface: RJ45

interface rate: framing: N×64Kbps(N=0~32); un-framing: 2.048Mbps

Coding: HDB3, Jitter tolerance in accordance with G.823 Output jitter < 0.05UI

Data interface (100BASE_T): 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

Optical line code type: CMI

Optical line code rate: 100Mbps

Wavelength: 850nm、1310nm、1550nm

Optical Connector: SC/PC

Optical type: multi mode , single mode

Transmission distance: single mode: the max distance is 120Km

Multi mode: the max distance is 2Km

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

Dimensions: stand alone: 154mm (depth) × 190mm (width) × 37mm (height)

Rack mount: 19in standard 4.5U cabinet

Power supply: stand alone: 160V~270V AC input, 5V/2A output

-40V~-60V DC input, 5V/2A 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° C~80° C

Humidity: 5%~90% (no condensation)

4. Description on Installation and Panels

4.1 Unpacking(stand lone MODEL7213S):

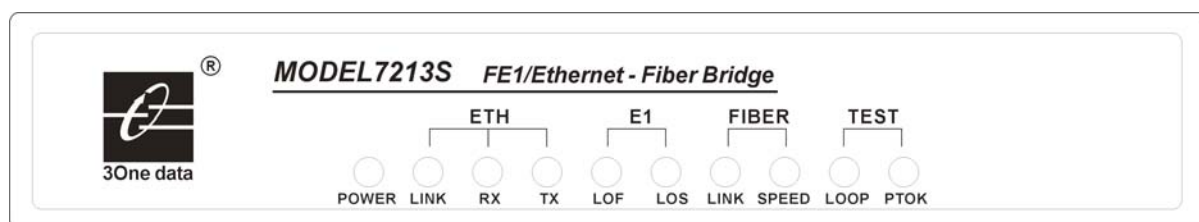
Check the accessories and spare parts when opens the package. In case of missing, immediately contact our offices or agencies. Check for the following items:

- One E1 to Optical Ethernet Interface Converter MODEL7213S
- An Operation manual
- A supply cord
- Two plugs for coaxial cable

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

4.2 Front/Rear panels of the stand alone device:

■ Front panel:



Front Panel of MODEL7213S

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

POWER: Power. Always lights after starting up.

LINK(ETH): Link. Link indicator of Ethernet interface. Always lights if the Ethernet link correctly. Flickers when data transferring.

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.

LINK(FIBER): Link. Always lights if the fiber link is connected. Flickers when data transfer

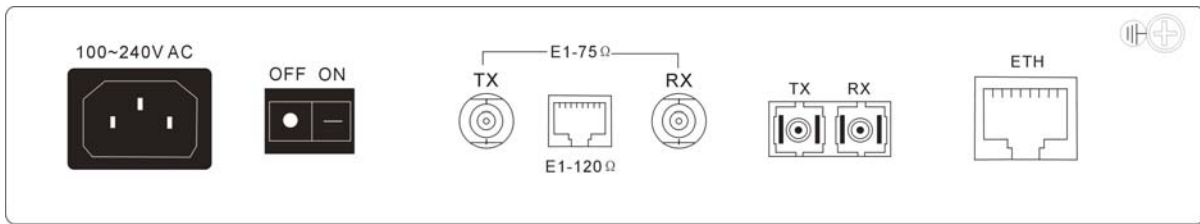
SPEED: Indicator fiber interface's work rate is 100M(The fiber interface's work rate of this kind only 100M)

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 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.

■ **Rear panel:**



Rear Panel of MODEL7213S/AC

220V AC: AC socket with two cores

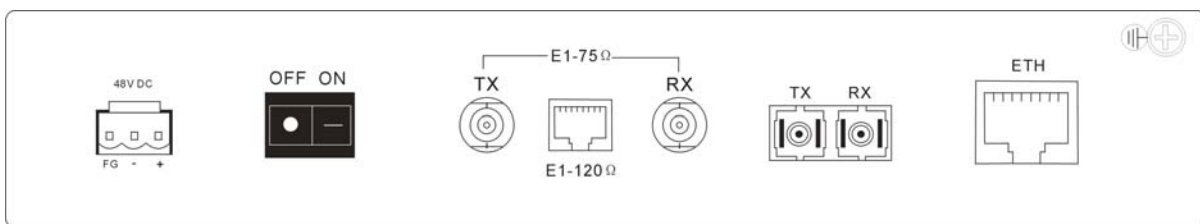
OFF/ON: Power switch. When the ON button is pressed down, the power supply is turned on
8 bits coded

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

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

TX RX: socket for E1 transfer, TX indicator of E1 data transmission, RX indicator of E1 data receives.

ETH: RJ45 socket for 100Mbps Ethernet interface



Rear Panel of MODEL7213S/DC

48V DC: DC -48V power supply connector

The others are the same as AC Rear Panel

4.3 Front/Rear panels of Rack-mountable casing:

● **RACK front panel:**



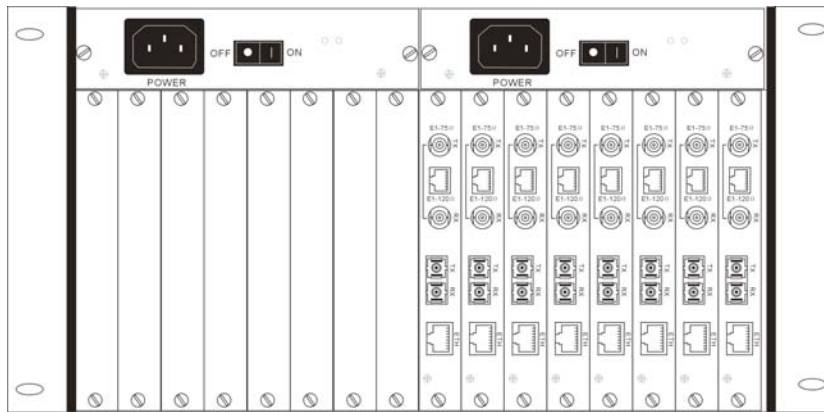
Front Panel of RACK

+5V: 5V main power supply indicator lamp

+12V: 12V fan power supply indicator lamp

Underneath the panel there are a indicator matrix. See the panel of RACK/AC about the description of the front panel of optical Ethernet Interface Converter for its functionality.

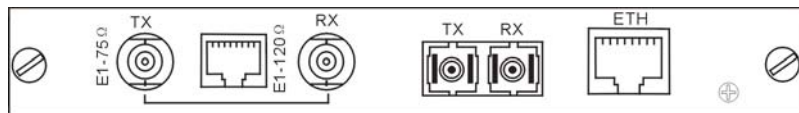
● **RACK/AC rear panel:**



panel of rack/AC

The panel above consists of three different small panels: as described below:

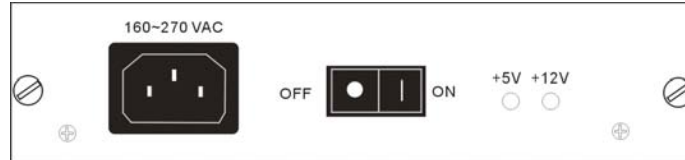
➤ **The small panel of optical Ethernet Interface Converter module:**



Panel of optical Ethernet Interface Converter module

See Rear Panel of MODEL7213S/AC about the description of AC input rear panel of MODEL7213S Interface.

➤ **RACK/AC AC redundancy power supply panel:**



RACK/AC AC Redundancy Power Supply Panel

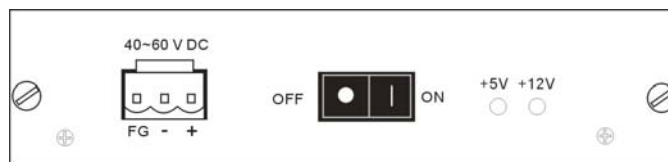
160~270 VAC: AC 220V input jack

ON OFF: power switch

+5V: 5V main power supply indicator lamp

+12V: 12V fan power supply indicator lamp

➤ **RACK/DC DC redundancy power supply panel:**



RACK/DC DC Redundancy Power Supply Panel

40~60 VDC: DC-48V input connector (FG grounded, with“- +” terminals connected with 48V input)

ON OFF: power switch

+5V: 5V main power supply indicator lamp

+12V: 12V fan power supply indicator lamp

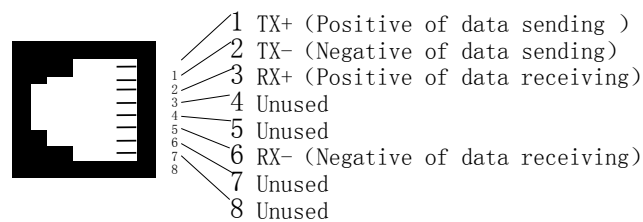
5. MODEL7213S Application

5.1 Definition of balanced Twisted Pair(120 ohm) wire sequence for RJ45 interface

5.1.1 10/100BASE-T interface wire sequence

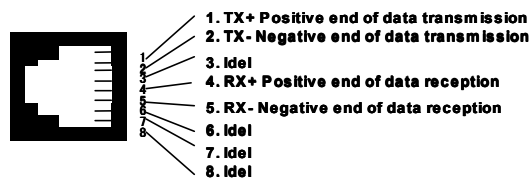
The RJ45 Unshielded twisted-pair for 10/100BASE-T interface can use DCE or DTE standard stipulations, it support AUTO MDI/MDX function.

As shown, wire 1 and wire 2 are sending wire, and wire 3 and wire 6 are receiving wire.



RJ45 Twisted-Pair Wire Sequence for Ethernet Interface

5.1.2 E1 interface wire sequence



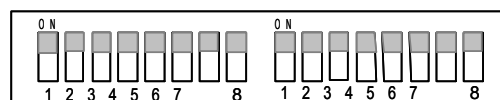
Line Sequence of Balanced Twisted-Pair at E1 Interface RJ45

Attention: In E1 twisted-pair standard, 1 and 2 are defined as sending lines, 4 and 5 as receiving lines.

5.2 Settings 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



DIP switch of bottom S1,S2

S1.1: Track remote time slot setting or not, on for R-SLOTS, OFF for L-SLOTS.(valid only when S2.1=OFF)

S1.2: used for controlling E1 framing/un-framing. “ON” refers to un-framing mode (2.048Mbps).

S1.3: 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

S1.4 ~ S1.8: E1 time slot setting, valid only in the framing mode. See table 1 for reference in setting.

Setting table of tumbler converter (0=ON, 1=OFF)

Sw1.8	Sw1.7	Sw1.6	Sw1.5	Sw1.4	Number of time slots
0	0	0	0	1	1*64Kbps
0	0	0	1	0	2*64Kbps
0	0	0	1	1	3*64Kbps
0	0	1	0	0	4*64Kbps
0	0	1	0	1	5*64Kbps
0	0	1	1	0	6*64Kbps
0	0	1	1	1	7*64Kbps
0	1	0	0	0	8*64Kbps
0	1	0	0	1	9*64Kbps
0	1	0	1	0	10*64Kbps
0	1	0	1	1	11*64Kbps
0	1	1	0	0	12*64Kbps
0	1	1	0	1	13*64Kbps
0	1	1	1	0	14*64Kbps
0	1	1	1	1	15*64Kbps
1	0	0	0	0	16*64Kbps
1	0	0	0	1	17*64Kbps
1	0	0	1	0	18*64Kbps
1	0	0	1	1	19*64Kbps
1	0	1	0	0	20*64Kbps
1	0	1	0	1	21*64Kbps
1	0	1	1	0	22*64Kbps
1	0	1	1	1	23*64Kbps
1	1	0	0	0	24*64Kbps
1	1	0	0	1	25*64Kbps
1	1	0	1	0	26*64Kbps
1	1	0	1	1	27*64Kbps
1	1	1	0	0	28*64Kbps
1	1	1	0	1	29*64Kbps
1	1	1	1	0	30*64Kbps
1	1	1	1	1	31*64Kbps

S2.1: main/slave clock setting, valid only in the framing mode. ON for main clock (INT-CLK) and OFF for slave clock (LINE-CLK).

S2.2: Reserved.

S2.3: Network storm of ETH port .ON--- allowed; OFF---not allowed.

S2.4: LLOOP. Local loop back setting (E1 interface in direct loop back), ON valid.

S2.5: RLOOP. Remote loop back setting (remote E1 interface in direct loop back), ON valid.

S2.6:Compatible with our old edition device. Default—OFF, ON—compatible with old edition.

S2.7:VLAN function。 ON---use VLAN function to separate ETH electrical port and optical port.

S2.8: Reserved.

5.3 Configuration of Ethernet connecting devices

The equipment uses 10/100BASE-T Ethernet interfaces and supports adaptive 10/100M half/full duplex mode. Ethernet devices connected to FE1&10/100BASE-T bridge (such as SWITCH, HUB, Ethernet adapter card (NIC), etc.) can be set to 10M full duplex, 10M half duplex, adaptive 10M half/full duplex and adaptive 10/100M.

Note: Ethernet devices connected to FE1&10/100BASE-T Bridge can not be set to the enforced operating rate of 100M.

5.4 Simple self-test methods for devices and E1 circuits

Test 1: test of back-to-back connection

Connect two MODEL7213S 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 MODEL7213S 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 S5.1 (RLOOP) to ON, pseudo random sequence test will be executed. If indicator TEST and indicator PTOK at the exchange end always light, it indicates successful loop and pseudo random code test and the E1 circuit has no error code.

S5.1		S5.5	
ON		ON	



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 FE1&10/100BASE-T 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 FE1&10/100BASE-T Bridge support a transmission range of 300m or 600m. Two Ethernet networks at different locations can be bridged by two FE1&10/100BASE-T bridge with existing twisted pair or coaxial cable.

**Extending Ethernet with existing twisted pair and coaxial cable****5.6 Common Problems**

(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 fuse of the equipment is broken. Replace the fuse. 3. 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 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.	The opposite devices are in the state of local loop test and the Ethernet link of the opposite devices has no communication.	<p>The setting of LLOOP of tumbler converter S5 is wrong. The converter for local loop test should be set to OFF(turn up) to make it invalid.</p> <p>The Ethernet link of the opposite interface converter has a failure. Check the opposite devices according to item No. 2 in the table.</p>