



ORION TELECOM NETWORKS INC.

VCL-Ethernet over 4 E1 4E1/10(100) Base-T Interface Converter

User Manual

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Warranty

This Orion product is warranted against defects in material and workmanship for a period of one year from the date of shipment. During the warranty period, Orion will, at its discretion, either repair or replace products, which prove to be defective. For warranty service or repair, this product must be returned to a service facility designated by Orion. The buyer shall prepay shipping charges to Orion and the company shall pay shipping charges to return the product to the buyer. However, the buyer shall pay all the shipping charges, duties and taxes for products returned to Orion from another country.

Limitation of Warranty

The foregoing warranty shall not apply to defects resulting from improper or inadequate maintenance by the buyer, the buyer-supplied firmware or interfacing, unauthorized modification or misuse, operation outside of the environmental specifications for the product or improper site preparation or maintenance.

Exclusive Remedies

The remedies provided herein are the buyer's sole and exclusive remedies. Orion shall not be liable for any direct, indirect, special, incidental or consequential damages, whether based on contract or any legal theory.

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Safety Warnings



The exclamation point within a triangle is intended to warn the operator or service personnel of operation and maintenance factors relating to the product and its operating environment, which could pose a safety hazard.

Always observe standard safety precautions during installation, operation and maintenance of this product. Only qualified and authorized service personnel should carry out adjustment, maintenance or repairs to this instrument. No adjustment, maintenance or repairs should be performed by either the operator or the user.



QUALITY ASSURANCE PROGRAM

Orion's products are designed and manufactured under a strict Quality Assurance Program based on the ISO 9000 philosophy and principles. Orion pays very special attention to its vendor development program which ensures an "end-product" of the highest quality at the most cost effective prices.

VCL-Ethernet over 4 E1 4E1/10(100) Base-T Interface Converter

Description

Description:

The VCL-Ethernet over 4 E1 - 4E1/10(100) Base-T Interface Converter provides the user with Ethernet over E1 conversion enabling the user to transport Ethernet data over up to 4 E1 links.

The equipment be always installed and used in pairs, with one terminal being installed at either end of the network.

The VCL-Ethernet over 4 E1 - 4E1/10(100) Base-T Interface Converter is an Ethernet extension device utilizing TDM telecom infrastructure (the telecom network of E1s, or of PDH, SDH and E1/E3/SDH microwave etc. carrying E1s). It converts the Ethernet data into E1 frame format for transmission over the existing TDM (E1) links and then re-converts the E1s back into Ethernet data the far-end terminal, to BRIDGE two Ethernet LANs over the existing E1-based telecom network. The device can effectively utilize the redundant bandwidth of telecom operators' existing TDM network to transport Ethernet data with low investment.

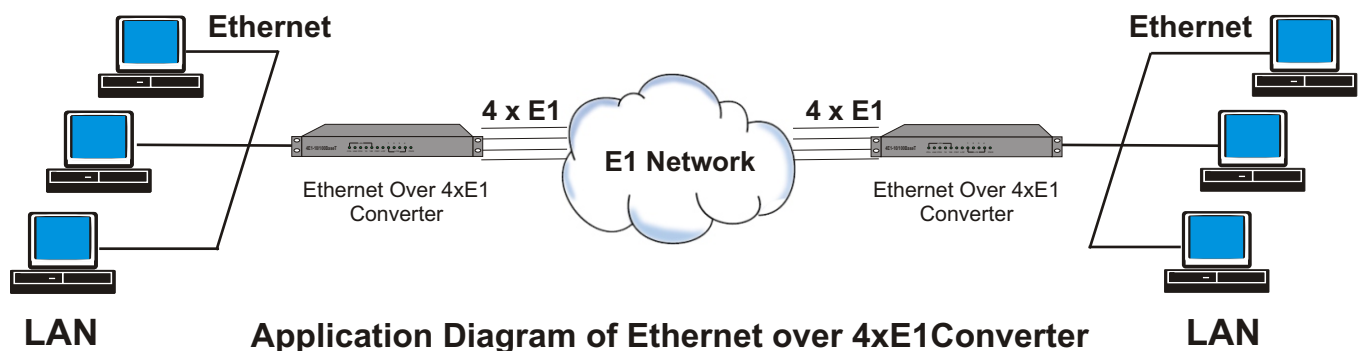
Applications

The equipment may be used for the following purposes:

1. Bridging Ethernet LANs over existing TDM (E1) telecom network.
2. Extending Ethernet networks utilizing TDM (E1) landline based telecom infrastructure.
3. Using telecom network of E1s / PDH / SDH microwave etc. carrying E1s to transport Ethernet Data.

In all cases the equipment be always installed and used in pairs, with one terminal being installed at either end of the network.

Typical Application



Technical Features

1. The maximum transmission rate of Ethernet data over 4 E1 links is 7.68Mbit/s with four routes E1 completely utilized.
2. When one or more E1 lines are utilized, the maximum time delay difference between various E1 links, which is permitted, is 8ms. This would be the permissible time delay difference when using E1s that are being transmitted two different routes (e.g. fiber and microwave).
3. Tolerant for drift of E1 signal of up to 512UI.
4. Error code correction and automatic protection and recovery of E1 channel.

Due to the ethernet frame lacking of error-correcting mechanism, the error code of one bit will cause the error of the whole data frame, or the deterioration of one E1 link shall cause the deterioration of, or even cut-off of that whole E1 link. In the event that the transmission performance of any of the four E1 links being adversely affected, the bad E1 is automatically removed from active transmission of data and the remaining E1 links shall maintain normal data transmission. When the affected E1 link recovers its performance, it is automatically added back into service. The error code rate threshold value for E1 line's cut-off / recovery 10^{-5} or 10^{-6} .

This feature also allows the equipment to be used flexibly when the customer desires to use the equipment to transport ethernet data over a fewer number of E1 links (i.e. one, two or three E1 transmission links).

5. Network management function. The main function of network management system is to fulfill the inquiry for local and remote devices and configuration management including inquiry of alarm status on E1 line, Ethernet working status, and loopback control etc. This feature is optional and available only in 19-inch rack-mount installations.
6. Automatic ethernet negotiation function. Supports 10M/100M and working modes of both full-duplex and semi-duplex.
7. Transparently transmits ultra-long frames stipulated in IEEE 802.1Q, and supports Ethernet switches with VLAN function.
8. Imbedded, dynamic Ethernet MAC address list (1024 addresses), and filter function for local data frames.

E1 Interface Specifications

Number of E1 Ports	Four
Line Rate E1	E1 (2.048 Mbps \pm 50 bps)
Framing	Un-Framed
Electrical	As per ITU-T G.703
Jitter	As per ITU-T G.823
Impedance	120 Ohm (RJ-45)

Ethernet Interface Specifications

Number of Ports	One
Interface Types	10/100BaseT
Standards Compliance	IEEE 802.3
Interface Rate	10/100BaseT limited to Max 7.68Mbps
Connectors	RJ-45 (10/100 BaseT Electrical)

Clock: Internal, with clock-drift, and bit error/slip correction

Installation and Commissioning**1. Qualifying the network**

- Please ensure that the error code rate each of the E1 circuits is lower than 10^{-7} .
- The transmission time delay difference between the various E1 circuits shall not exceed 8ms
- The Ethernet wire type shall be; crossover when connecting with PC, and straight through when connecting to an Ethernet switch. The length of the ethernet cable shall not exceed 100m

2. Grounding

When the device is used with the DC -48V power supply, the PGND blinding post shall be connected to the earth for protection.

The other equipment (e.g. optical terminal) connected with the converter shall also be grounded to earth for protection.

3. Installation

Step 1: Power up the Ethernet Over E1 (IPoTDM) equipment. Please ensure that Ethernet Over E1 (IPoTDM) equipment is powered-up prior to connecting the ethernet and the E1 links.

Step 2: Connect E1 line on the premise that transmission device, interface converter and Ethernet switcher have safely grounded. Note while connecting: to carry out "ping" operation for each E1 line one by one and not to connect all E1 lines at one time, so as to ensure every E1 is working.

BER test may be conducted on each E1 link using a BERT tester to ensure that the E1 errors are within the permitted limits / threshold.

Step 3: Please configure the ethernet mode of the Ethernet Over E1 (IPoTDM) equipment at both sides as well as the ethernet interfaces of the devices that are connected to the Ethernet Over E1 (IPoTDM) equipment. Connect the ethernet links.

The equipment is used to bridge two LANs. Please ensure that the LANs on both sides of the link are operating in the same IP domain.

Step 4: Ping over the ethernet connection from one side to the other (near-end to the far-end).

After succeeding in "ping", the user may also check the integrity of each E1 link by connecting only one E1 link at-a-time and then transporting ethernet data over that single E1 link. All E1 links may be tested one-by-one in this manner. Note: the sequence of E1 number connected on both two sides and the they present no error.

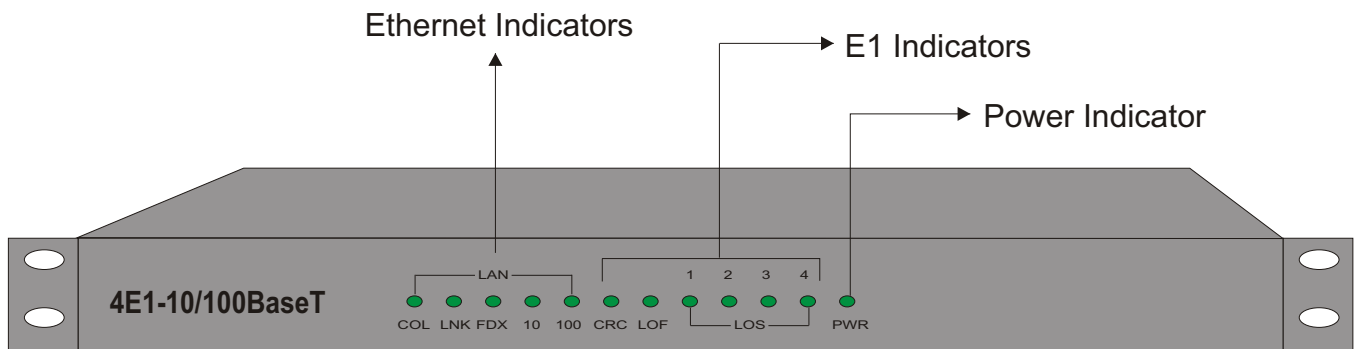
In the event that the Ethernet Over E1 (IPoTDM) equipment resets repeatedly or lots of frame errors are noticed, recheck the connection between E1 cable and interface converter, or E1 cable and transmission device.

Important Recommendation: Please power-up the equipment prior to connecting the ethernet and the E1 links.

Description of the Front Panel

1. Indicators of Front Panel

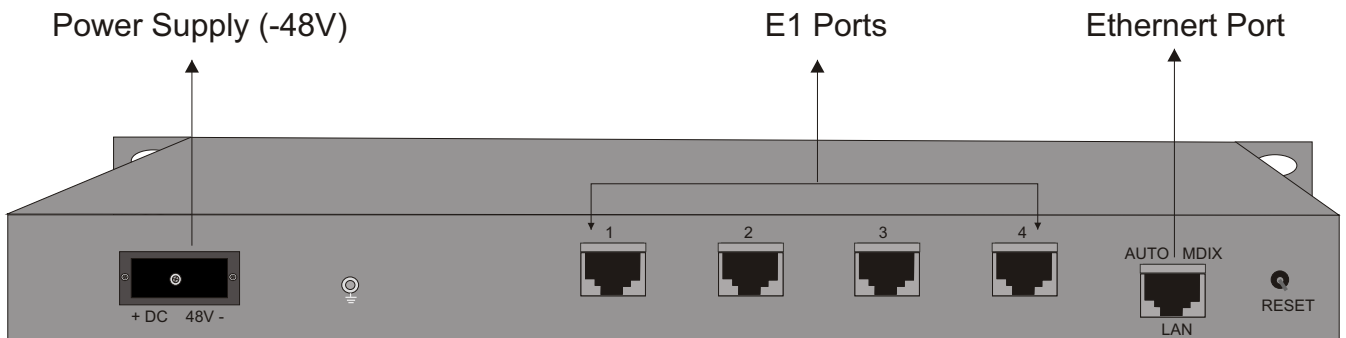
Outline of the front panel of 4E1/10(100) Base-T interface converter is as follows.



PWR	Power indication
LOS(1-4)	Signal loss of 1~4 E1 lines
LOF	Out-of-step alarm indication for E1 signal frame
CRC	CRC error indication for E1 signal
FDX	Light on, LAN interface working on full-duplex mode; Light off, semi-duplex mode.
100	Light on, LAN interface working on 100M mode; Light flashing, indicating the data is transmitting or receiving
10	Light on, LAN interface working on 10m mode; Light flashing, indicating the data is transmitting or receiving.
LINK	Normal connection of LAN interface
COL	Indication of conflicting signals at LAN interface

2. Indicators of Back Panel

The back panel of the 4E1 x 10(100) Base-T Ethernet Over E1 (IPoTDM) equipment is as follows.



Pin No.	Definition of Function	Ethernet Cross Pin Out Details
1	TD+	Data Out Details
2	TD-	Da In Details
3	RD+	Data In
4	N/C	N/C
5	N/C	N/C
6	RD-	Data In
7	N/C	N/C
8	N/C	N/C

3. Bottom Panel

The bottom panel of the 4E1 x 10(100) Base-T Ethernet Over E1 (IPoTDM) equipment is as follows



Dip Switch Settings on bottom are as follows:

- The bits 1~3 of SW1 are used to set the working mode of the LAN interface on the device

1	2	3	Working mode of LAN interface
OFF	OFF	OFF	10/100, auto-negotiating full-/semi-duplex
ON	OFF	OFF	100M full-duplex
ON	ON	OFF	100M semi-duplex
ON	OFF	ON	10M full-duplex
ON	ON	ON	10M full-duplex

Note: The default configuration for the bits 1~3 of SW1 shall be “OFF”.

- The bits 4~8 of SW1 are used to set the working mode of the device:

No of Switch	ON	OFF
4.	Working on Full-duplx mode	Working of on semi-duplex mode
5	E1 loop-back disabled	E1 loop-back enabled (remote loop)
6	Note used, set at OFF	
7	Self reset function enabled	Self reset function disabled
8	Not used, set at OFF	

Note:

- The State of the bits 1~4 of SW1 must be consistent with the state of FDX indicators.
- The default configuration of the bits 4~8 of SW1 shall be: On for the bits 4 and 5, OFF for the bits 6, 7 and 8.

120Ω RJ-45 Pin-out		
PIN No.	Definition of function	Signal Direction
1	NC	
2	NC	
3	TX- (transmitted data -)	E1 Data Output
4	RX- (received data -)	E1 Data Input
5	RX+ (received data +)	E1 Data Input
6	TX+ (transmitted data +)	E1 Data Output
7	NC	
8	NC	

General

1. Power Supply

DC Input: -48V

Power Consumption: ≤ 5W

2. Service Conditions

Ambient temperature: 0°C ~ 50°C

Relative humidity: ≤ 90% (at 35°C)

3. Dimensions : 480mm x 43mm x 16mm

4 Weight : 2 Kgs.

Note: Operation and maintenance of network equipment require professional knowledge and experience. We recommend the equipment to be managed only by qualified technicians. Should you require technical assistance please consult the provider, or contact our SUPPORT DESK at support@oriontelecom.com

