



**VCL-ETH-FE1**  
**Ethernet over E1 Converter**

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[Data Sheet & User Manual](#)

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## Product Overview

The VCL-ETH-FE1 Interface Converter (Desktop Version) provides the user with Ethernet over E1 conversion enabling the user to transport Ethernet data over an E1 link.



The equipment can be installed and used in pairs, with one terminal being installed at either end of the network. This equipment can also be used with VCL-ETH-8-ML and VCL-ETH-16-ML (8E1/16E1 point-to-point IP over TDM product) to meet various application requirements.

The VCL-ETH-FE1 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 E1 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.

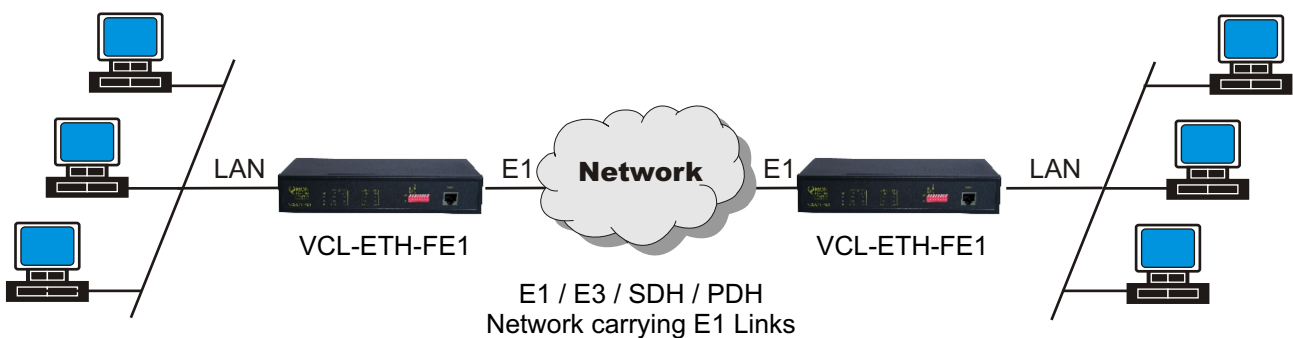
## Application

The equipment may be used for the following purposes:

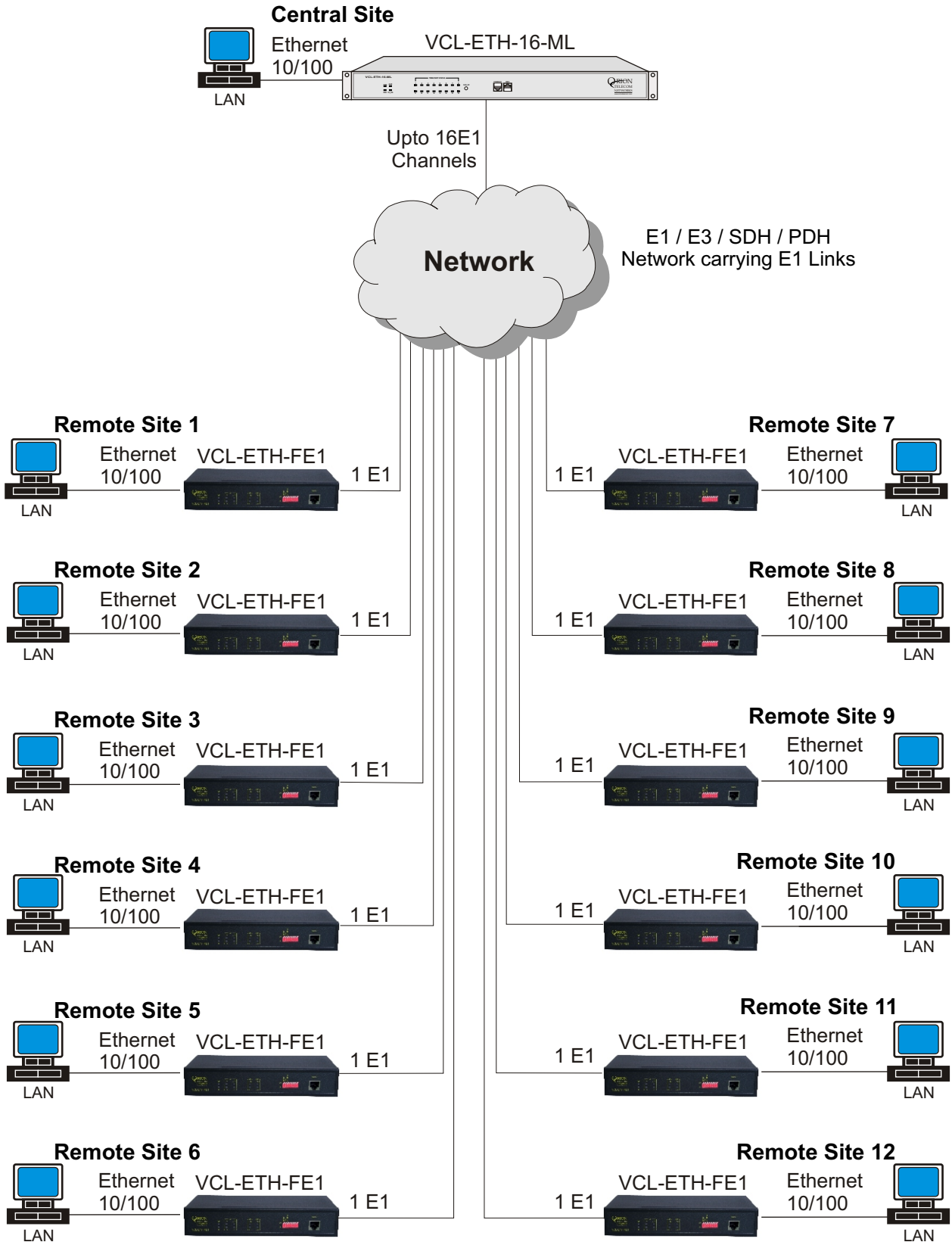
- Bridging Ethernet LANs over existing TDM (E1) telecom network.
- Extending Ethernet networks utilizing TDM (E1) landline based telecom infrastructure.
- Using telecom network of E1s/PDH/SDH microwave etc. carrying E1s to transport Ethernet data.

## Typical Applications

### Point to Point Application



Point to Multi-Point Application with VCL-ETH-8-ML or VCL-ETH-16-ML



Up to 12 Remote Sites / Directions and 16 E1 Links

## Technical Features

- 1U high compact size
- The maximum transmission rate of Ethernet data over E1 links is 2.048Mbit/s
- E1 supports three working modes unframed, framed (CCS/PCM 31) and multiple framed (CAS/PCM30)
- Allows transparent transmission of super-long frames upto 2024 bytes
- Automatic discards under size (less than 64 bytes) and oversize (more than 2024 bytes) framed
- Ethernet interface complies to IEEE 802.3
- Automatic Ethernet negotiation function. Supports 10M/100M and working modes of both full-duplex and half-duplex
- Automatic straight and cross-over cable support (Auto-MDI/X)
- Available with MAC address list filtration, learning, and updating functions
- PAUSE flow control ability in full duplex mode
- Equipment supports two working modes of internal clock and network Loop-timed clock
- With multiple loopback functions and built-in bit error testing function, it facilitates the trouble shooting
- Compatible to deluxe models (VCL-ETH-4/8/16 and VCL-ETH-8/16-ML) and can be installed with them to reduce the installation cost
- Easy to operate
- Power supply options:
  - 110V AC - 240V AC (50/60 Hz) power options available
  - -48V DC power option available
- Power consumption less than 4Watts.

## Alarms and Indicator Monitoring

- Power Indicator
- Remote Alarm Indicator
- Loss of Frame Indicator
- E1 LOS Alarm Indicator
- AIS Alarm Indicator
- Code Violation Alarm Indicator
- Ethernet Link Indicator
- Ethernet Mode (FDX) Indicator
- Loopback Indicator
- Error in Test Indicator.

## E1 Interface Specifications

Line Rate	E1 (2.048 Mbps $\pm$ 50 bps)
Framing	Un-Framed /PCM 30 /PCM 31
Electrical	As per ITU-T G.703 and ITU-T G.704
Jitter	As per ITU-T G.742 and ITU-T G.823
Impedance	120 Ohm (RJ-45), 75 Ohm (BNC) Optional

### Ethernet Port Specifications

Interface Types	10/100BaseT
Standards Compliance	IEEE 802.3
Connectors	RJ-45 (10/100 BaseT Electrical)
MDI-X	Supported (auto adapts cross-straight cable)
Mode	Autonegotiation (Half/Full - 10/100M)

### Clock

Internal (Master) and network (Slave) clock.

### Encapsulation

HDLC	HDLC mode is required in installation between two VCL-ETH-FE1 (point to point protocol) if fractional E1 is used to carry payload
GFP	GFP Mode is must, to use the VCL-ETH-FE1 in point to multi-point Protocol with Deluxe models (VCL-ETH-4/8/16 and VCL-ETH-8/16-ML)

### Installation and Commissioning

#### Qualifying the Network

- Please ensure that the error code rate each of the E1 circuits connecting to the equipment 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/HUB. The length of the Ethernet cable shall not exceed 100m.

#### Grounding

- When the device is used with the AC~220V power supply, the 3-core socket must be grounded for protection.
- The other equipment connected with the converter shall also be grounded to earth for protection.

## Installation

**Step 1:** Power up the equipment. Please ensure that 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 converter have safely grounded.

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.

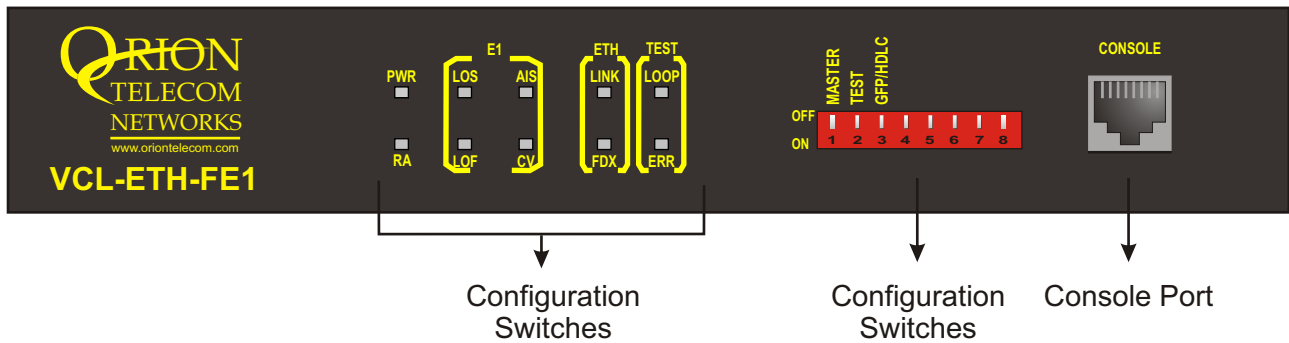
**Step 3:** Please configure the Ethernet mode of the Ethernet over E1 equipment at both sides as well as the Ethernet interfaces of the devices that are connected to the Ethernet over E1 equipment. Connect the ethernet links.

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) to verify that the Ethernet connection has been established between the two LANs.

After succeeding in "ping", the user may also check the integrity of each E1 link by connecting E1 link and then transporting Ethernet data over that E1 link. In the event that the 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.

**Description of the Front Panel**

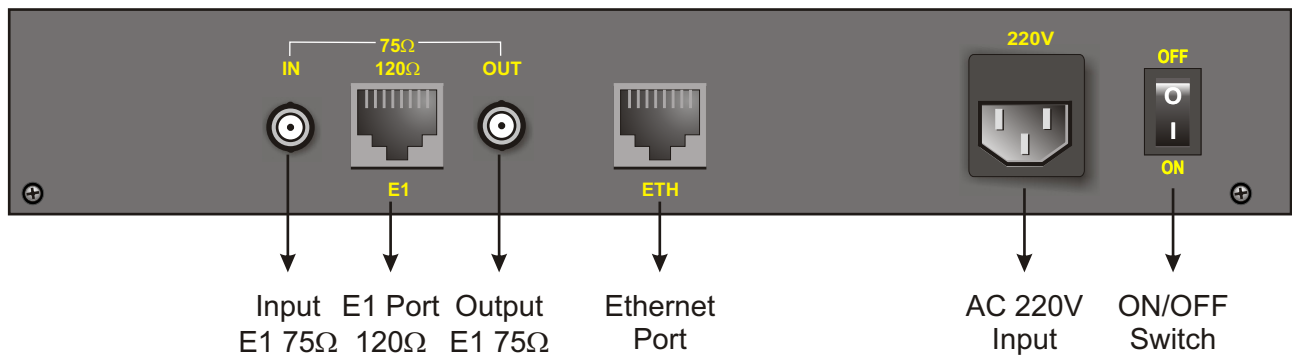


**Definition of Indicators on Front Panel**

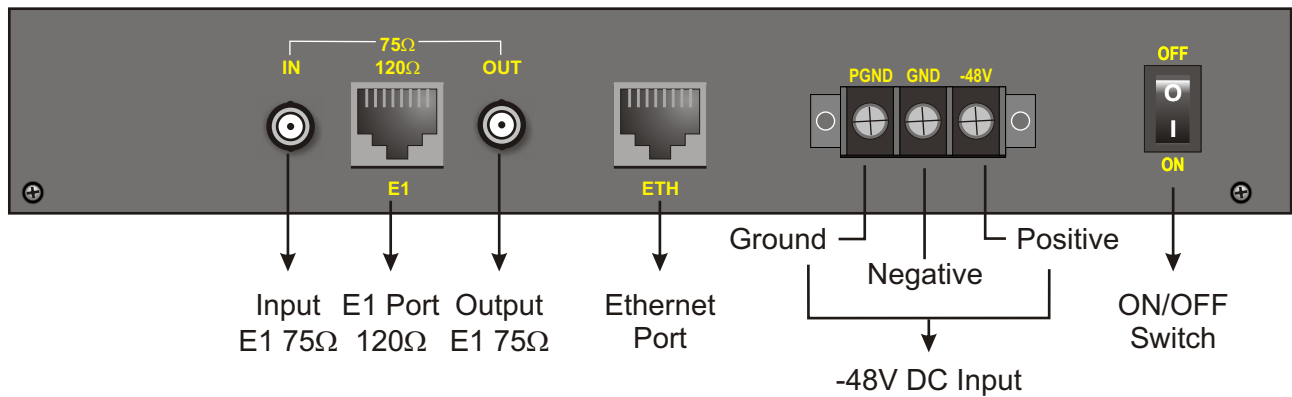
LED	Status	Description
PWR	ON	<b>Green</b> , system is powered
	OFF	System is not powered
RA	ON	<b>Red</b> , remote alarm indication
	OFF	OK
LOS	ON	<b>Red</b> , Loss of E1 alarm indication
	OFF	OK
LOF	ON	<b>Red</b> , Loss of E1 frame indication
	OFF	OK
AIS	ON	<b>Red</b> , AIS alarm indication
	OFF	OK
CV	ON	<b>Red</b> , E1 code violation alarm indication
	OFF	OK
LINK	ON	<b>Green</b> , LAN port connection Normal
	OFF	No LAN connection on Ethernet port
FDX	ON	<b>Green</b> , Ethernet port is running in full-duplex mode
	OFF	Ethernet port is running in half-duplex mode
LOOP	ON	<b>Yellow</b> , system is in test mode
	OFF	Normal operation mode
ERR	ON	<b>Red</b> , Error in BER test E1 Signal
	OFF	BER test OFF or has no errors

Switch	Status	Description
MASTER	ON	Local timing
	OFF	Tracing E1 line
TEST	ON	Line error testing, Led "ERR" show the testing result
	OFF	Turn off line error test function
GFP/HDLC	ON	HDLC framing
	OFF	GFP framing
Other	Unused	Factory use only / Unused for the users

**Back View with 220V AC Power Input**



**Back View with 48V DC Power Input**



Tag	Description
IN 75Ω	Represents the unbalanced E1 75Ω input (BNC)
OUT 75Ω	Represents the unbalanced E1 75Ω output (BNC)
120Ω	Represents the balanced E1 120Ω input/output (RJ-45)
ETH	Fast Ethernet interface (RJ-45)
220V	Represents AC 220V input
-48V	Represents DC 48V input

### E1 Bandwidth Selection

Fractional E1 bandwidth selection is effective only if the encapsulation mode is set to 'HDLC' (i.e. GFP / HDLC switch is set to 'ON').

The DIP switches for the bandwidth selection are given in the right side-bar of the equipment and the setting are as follows:



Working Mode	Switch Setting		
	TS0	TS1-15, 17-31	TS16
Unframed / PCM 31	ON	ON	ON
Framed (CCS) / PSM 31	OFF	Occupied timeslot ON	
Multi Framed (CAS) / PCM 30	OFF	Occupied timeslot ON	OFF

**Note:** Fraction E1 bandwidth is effective only if the encapsulation mode is set to 'HDLC'. GFP/HDLC switch is set to 'ON'

**Example 1:** If you wish to use only first five time slots then you need to set the TS0 time slots to OFF and switch TS1 to TS5 to ON and time slot TS16 will be set to ON.

**Example 2:** If you wish to carry first eight time slots on 512Kbps, then you need to set the TS0 time slot OFF and switch TS1 to TS8 to ON (i.e. since each time slot consumes 64Kbps, so 8 time slots will consume 8 x 64Kbps = 512Kbps) and time slot S16 will be set to ON.

**Example 3:** If you wish to carry twenty time slots on 1.28Mbps (64Kbps x 20) then you need to set time slot TS0 OFF and TS1 to TS21 time slots to ON. Please remember that the time slot TS16 will be used as signaling time slot.

## Pinout Details

### Console (RJ-45) Pinout Details

PIN No.	Definition of function	Signal Direction
6	GND	Signal Ground
7	RX (received data)	RS232 Signal Input
8	TX (transmitted data)	RS232 Signal Output
Others	NC	

### Hyper Terminal settings

PIN No.	Definition of function	Signal Direction
1	Bits per second	19200
2	Data bits	8
3	Parity	None
4	Stop bits	1
5	Flow control	None

### E1 120Ω (RJ-45) Pinout Details

PIN No.	Definition of function	Signal Direction
1	TX+ (transmitted data +)	E1 Data Output
2	TX- (transmitted data -)	E1 Data Output
4	RX+ (received data +)	E1 Data Input
5	RX- (received data -)	E1 Data Input
Others	NC	

### Ethernet (RJ-45) Pinouts

PIN No.	Definition of function	Signal Direction
1	TX+ (transmitted data +)	Data Output
2	TX- (transmitted data -)	Data Output
3	RX+ (received data +)	Data Input
6	RX- (received data -)	Data Input
Others	NC	

## CLI Command Help

After entering into the application program for CLI command, please key "?" in the command line to get the list of the commands.

VCL>?

Command	Description
?/help	To get a list of the commands for the system.
showversion	View software and hardware version.
showe1alarm	View E1 alarm.
seteth	Configure the Ethernet port Speed, Mode, Auto Negotiation.
showeth	View Ethernet port status.
showframe	View framing status.
showclock	View E1 clock mode.
showencapmode	View encapsulation mode.
setgfp	Configure PFI, EXI, PSCRD and HSCRD of GFP.
showgfp	View PFI, EXI, PSCRD and HSCRD of GFP.

## More help for a particular CLI command

For detailed command format, please key "? cmdname" or "help cmdname".

VCL>? [cmdname] {enter}  
 OR  
 VCL>help [cmdname] {enter}

### Exercise:

VCL>? showe1alarm

**Command:** showe1alarm  
**Description:** View E1 alarm.  
**Values:** none

## Detailed CLI Commands

### To view system software and hardware version

**Command:** showversion  
**Description:** View software and hardware version.  
**Values:** none

### Exercise:

VCL>showversion

IC version:V1.000  
 Hardware version:V1.12  
 Software version:V1.00A1

## To View E1 alarm

**Command:** showe1alarm

**Description:** View E1 alarm.

**Values:** none

**Exercise:**

VCL>showe1alarm

```
ALARM  LOS  LOF  AIS  CRC
Status   0   0   0   0
```

Description 1: Alarm, 0: No alarm

## To Configure Ethernet Port

**Command:** seteth <AN> <speed> <duplex> <flow>

**Description:** Configure the Ethernet port Speed, Mode, Auto Negotiation.

**Values:**

AN:<0/1>,Autotiation(0:AN not done; 1:AN done)

speed:<0/1>,(0:10Mbit/s; 1:100Mbit/s)

duplex:<0/1>,(0:half-duplex; 1:full-duplex)

flow:<0/1>,flow-control capability(0:disable; 1:enable)

**Exercise:**

VCL>seteth 1 1 1 1

```
AN      Speed Duplex Flow
Auto    100M  Full  Enable
```

## To View Ethernet Port Status

**Command:** showeth

**Description:** View Ethernet port status.

**Values:** none

**Exercise:**

VCL>showeth

```
AN      Speed Duplex Flow  Status
Not Auto 10M  Half  Disable Connected
```

## To View Framing Status

**Command:** showframe

**Description:** View framing status.

**Values:** none

**Exercise:**

VCL>**showframe**

Frame status:Frame.  
PCM30/31 status:PCM31

**To View Synchronization Clock**

**Command:** showclock

**Description:** View E1 clock mode.

**Values:** none

**Exercise:**

VCL>**showclock**

E1 Clock: Master

**To View Encapsulation Mode**

**Command:** showencapmode

**Description:** View encapsulation mode.

**Values:** none

**Exercise:**

VCL>**showencapmode**

The encapsulation mode is:HDLC

**To Configure GFP**

**Command:** setgfp <PFI> <EXI> <PSCRD> <HSCRD>

**Description:** Configure PFI, EXI, PSCRD and HSCRD of GFP.

**Values:**

PFI: 0-1

EXI: 0-15

PSCRD: 1:enable ; 0:disable

HSCRD: 1:enable ; 0:disable

**Exercise:**

VCL>**setgfp 0 0 1 1**

PFI:0

EXI:0

PSCRD:Enable

HSCRD:Enable

## To View GFP Configurations

**Command:** showgfp

**Description:** View the PFI, EXI, PSCRD and HSCRD of GFP.

**Values:** none

**Exercise:**

VCL>showgfp

PFI:0  
EXI:0  
PSCRD: Enable  
HSCRD: Enable  
GFP SYNC: Alarm

## General Parameters

### Power Supply

AC Mains Input	220V AC <b>Optional</b>
DC Mains Input	-48V
Power Consumption	<4 Watts

### Service Conditions

Ambient temperature	0°C ~ 50°C
Relative humidity	90% (at 35°C)

### Dimensions

238mm x 125mm x 44mm

### Weight

< 1 Kg.

## Ordering Information

S.No.	Part No.	Product Description	Qty.
1.	VCL-ETH-FE1-DC	10/100 Base-T (Ethernet, 1 electrical) to 1E1/FE1 (120 Ohms, 75 Ohms) Interface Converter (with -48V DC power input)	1
2.	VCL-ETH-FE1-AC	10/100 Base-T (Ethernet, 1 electrical) to 1E1/FE1 (120 Ohms, 75 Ohms) Interface Converter (with 220V AC power input)	1

**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 [helpdesk@oriontelecom.info](mailto:helpdesk@oriontelecom.info)

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