

# AceCom Networks

## **VCL-E3oP (E3 Version)** **E3 over IP**

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### Product Brochure & Data Sheet

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## Product Overview

AceCom 'VCL-E3oP' (E3 over IP) equipment is used to transport a single E3 interface over an IP, MPLS or Ethernet network.

The 'VCL-E3oP' (E3 over IP) equipment, is equipped with a powerful PowerPC 400 MHz Processor which provides a highly reliable clock recovery mechanism for low jitter and wander control, even under variable network conditions.



'VCL-E3oP' is equipment provides 2 x GigE electrical ports along with 2 x Gigabit optical ports which allow the Users to implement 1+1 Ethernet link redundancy (Spanning Tree Protocol) and QoS by implementing Differentiated Services (Diffserv) and packet priority classification protocols for network optimization.

### Purpose of TDM over Packet technology

Telecom companies and enterprise users can save significant network and equipment cost and generate additional revenue by offering different types of services over a single packet-switched infrastructure by the use of E3oP equipment. The E3oP equipment is also suitable for connecting to Ethernet / packet wireless equipment to achieve fast deployment of E3 services over wireless Ethernet networks. One particular application is to build E3 links with low cost Wireless LAN bridges, replacing expensive TDM / PDH microwave radios.

The 'VCL-E3oP' (E3 over IP) multiplexer may be used to provide legacy TDM services over Gigabit Ethernet optical fiber, or wireless Ethernet/IP networks.

### How the TDM over Packet (E3 Interface TDM over IP Version) equipment works

The E3 data stream received on the E3 interface is converted by the E3oP engine of the E3oP equipment to Ethernet data packets (of a fixed size) and transported over the Ethernet network with UDP / IP, MEF or MPLS headers. At the receiving end the E3oP reconstructs the original data streams by removing the IP, MEF or MPLS headers and converts the Ethernet data packets back to E3 frames using highly reliable and accurate clock recovery mechanism. The 'VCL-E3oP' (E3 over IP) equipment uses standard E3 to packet and packet to E3 conversion mechanism using the SAToP technology.

### Applications

- › Local Exchange
- › Internet Service Providers
- › Educational University
- › Multi-Site Enterprises
- › Cellular Service Providers
- › Government and Municipalities.

### Applications

- › 19-Inch rack mountable
- › 1+1 Redundant Power Supplies
- › Extended Temperature Range: (-20° C to +60° C)
- › EMI / EMC Complaint
- › Switching Capacity upto 6 Gbps, non-blocking
- › MPLS Tagging
- › PWE3 (pseudo-wire)

## Highlights

- 19-Inch rack mountable
- 1+1 Redundant Power Supplies
- Extended Temperature Range: (-200 C to +600 C)
- EMI / EMC Complaint
- Switching Capacity upto 6 Gbps, non-blocking
- MPLS Tagging
- PWE3 (pseudo-wire)
- SAToP
- Ingress Rate Limiting
- QoS
- 1+1 Ethernet Link Redundancy (Hitless) Route Protection
- Supports network latency / packet delay variation / jitter buffer of up to 60ms.
- Supports “One-Clock” and “Two-Clock” operating modes
- Adaptive, Loop-Timed, External Clock Synchronization Options with user programmable automatic fall-back priority clocking.
- External Alarm - Dry contact relay alarms are also available at rear of the system to connect the system to an external alarm.
- NMS (Network Management System) to monitor multiple units from single Central Location.

## Key Features

- Compact 19 inch rack mountable, 1U form factor (44mm)
- Support one independent E3 interface
- 802.3 compliant 2 Optical Gigabit Ethernet ports (SFP) and 2 Electrical Gigabit Ethernet port
- Supports point-to-point applications
- 1+1 Ethernet Link Redundancy (Hitless) Redundant Route Protection
- Supports both Framed and Unframed operating modes
- Supports IETF-PWE3 (pseudo-wire) and SAToP transport mechanisms
- Spanning Tree Protocol supported to provided fail safe Ethernet / IP Link
- Supports SAToP payload mechanism to transport full E3 (transparent to the structure of the TDM frame useful for transporting framed / unframed E3 channels)
- Supports network latency / packet delay variation / jitter buffer of up to 60ms.
- Supports QoS based 802.1Q based VLAN tagging
- Single / Double 802.1 VLAN tagging (Q in Q VLAN Tagging) user configurable
- Supports QoS on 802.1p based packet priority
- Single / Double 802.1 VLAN packet priority user configurable (2 levels)
- User configurable MTU packet size. May be configured from 1 to 1800 Bytes.
- Internal, External, Adaptive, Recovered clock and Asymmetrical (One-Clock and Two-Clock) options for the TDM port synchronization. Automatic clock priority selection with fall back.
- Supports IP, MPLS and MEF (Metro Ethernet) addressing.
- Switching Capacity up to 6 Gbps, Non-Blocking.
- Supports up to 9000 Bytes Jumbo frames.
- Supports Ethernet rate limiting on each port.
- Port Trunking.

## Key Feature

- Supports Packet priority assignment (IP Diffserv / DSCP)
- Jitter and Wander conforms to G.823 / G.824 and G.8261 and TDM specifications
- Supports ITU-T, G.751 and G.832 framing modes user selectable. The G.832 framing mode may be used to transport ATM (Asynchronous Transfer Mode) data over E3 links
- Real Time battery backed clock with life in excess of 10 years
- Supports system temperature monitoring with High Temperature and Low Temperature alarms and SNMP Traps
- Supports SNMP V2 Monitoring and Traps
- Absolute and Differential times tamps
- UDP-specific "Special" Ethernet type
- In band VCCVARP
- Broadcast DA
- 75 Ohms BNC interface
- E3 Loopback facility for testing and diagnostics
- Self-test for checking system errors upon system bootup
- RS232 COM port (DB9), USB and 10/100 Base-T Ethernet Management port
- Supports TELNET and SNMP V2
- Supports CLI interface and GUI
- Complies with specifications for secured password access and control
- Access log audit
- Event Logging
- Real Time Clock
- Clock Performance Alarms
- Network Performance Alarms
- Network Performance and Diagnostics
- Online / remote upgrade of firmware
- AC and DC power supply options
- Redundant power supply inputs.

## Clock recovery and synchronization techniques

- Adaptive Clock Recovery (ACLK)
- Recovered Clock (RCLK) / Loop-Timed Clock
- Asymmetrical (One-Clock and Two-Clock) Clock
- Synchronization to an External Clock (ECLK)
- Synchronization to an Internal Clock
- Automatic clock priority selection with fall back
- Plesiochronous Clocking.

## OAM: Operation and Management Ports

- RS232 Serial Port
- USB COM Port
- 10/100BaseT Ethernet Management for In-band remote access.

## System Access, Control and Management Options

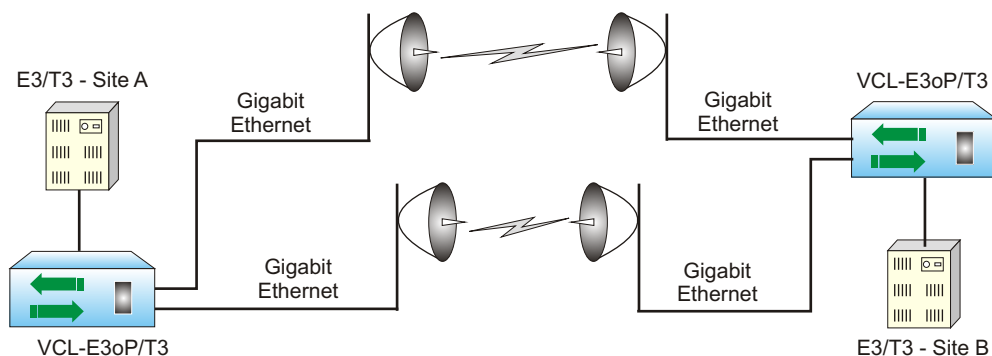
- Telnet
- CLI Control Interface (HyperTerminal or Vt100)
- SNMP V2 Traps (MIB File provided)
- Windows based GUI (Graphical User Interface) for easy configuration, management and access. Ability to monitor multiple units from a single NMS
- COM Port (RS232 Serial Port)
- USB Port
- 10/100BaseT Ethernet Port (each multiplexer may be assigned an IP address and connected to a LAN / IP network for remote access and management through the 10/100BaseT Ethernet Port for in-band configuration, management and access).

## Application Diagram

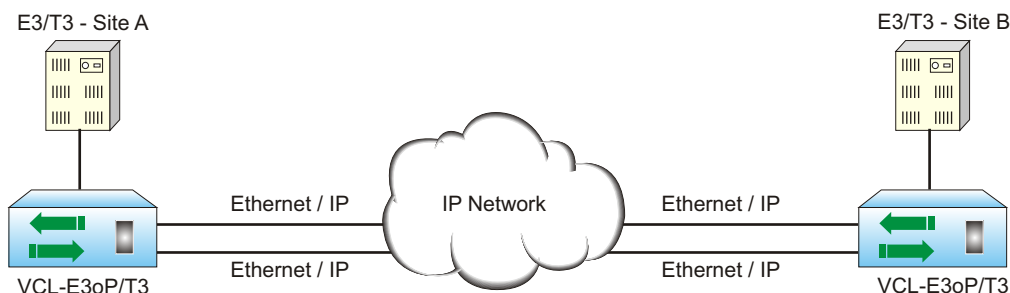
### LANs, WANs, MANs, IP Satellite and Wireless Ethernet



### E3 Link Redundancy - Using Port Trunking / Bonding



### E3 Link Redundancy - Using Spanning Tree Protocol



## Technical Specifications

### E3oP Specifications

Max number of logical link	One point-to-point logical link
Max E3 payload MTU size	User configurable from 1 to 1800 Bytes
Supported Transport Mechanisms	IETF-PWE3 and SAToP
Supported PSN (Packet Switched Networks) type	UDP, IP, MPLS and MEF
QoS	802.1q, 802.1p packet priority

### E3 Interface

Number of Ports	One
Framing Formats	Framed, Unframed (User selectable)
Framing	As per ITU-T, G.751 and G.832 framing modes (User selectable)
Line Coding	HDB3
Line Impedance	75 Ohms

### Gigabit Ethernet Switch Interface

Number of Ports	4 Ports: 2 Gigabit optical ports and 2 GigE (electrical) ports. Complies with IEEE802.3, 802.1Q and 802.1P
Electrical	10/100/1000 Auto-negotiation / MDI-X (Auto-sensing), Full-Half Duplex, Rj45 Electrical Connector
Optical	1000Base-FX (Gigabit Ethernet), SFP
Protection	ESD protection
Maximum Frame Size	9000 Bytes (Jumbo Frames)
Switching Capacity	Upto 6 Gbps, Non-blocking

### Gigabit Ethernet Optical Specifications

Optical Interface Type	SFP
Compliance	- Compliant with 1000Base-LX - MSA Compliant, RoHS, EMI, ESD, DDM
Safety	Class 1 Laser Safety / IEC-60825 Compliant
Bit Rate	1.25 Gbps
Wavelength	1310 / 1550 nm
Distance	550m to 80Kms, as per order
Optical Connector	LC

### AC Power Supply Specifications

Input AC Voltage	110 / 220 Volts AC
Range of input AC voltage	100 V to 240 V AC, 50Hz/60Hz.
AC Input Connector	IEC Connector

### 24V DC Power Supply Specifications

Power Supply	24V DC
Range of input	18V to 40V DC
Input voltage reversal protection	Provided
Under voltage protection	< 4.85V
Over voltage protection	> 5.15V
Efficiency at full load	> 90% @ 5V/8A (when input voltage - 24V)
Ripple at full load	< 5mVrms
Spike at full load	< 50mV

### 48V DC Power Supply Specifications

Power supply	-48V DC
Range of input	-40V DC to -72V DC
Under voltage protection	< 4.85V
Over voltage protection	> 5.15V
Efficiency at full load	> 91% @ 5V/10A (when input voltage -48V)
Ripple at full load	< 5mVrms
Spike at full load	< 50mV

### Power Consumption

Power Consumption	<30 Watts
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### Power Supply Options

- Dual Redundant (AC + DC)
- 1+1 AC power (100 to 240V AC, 50/60 Hz)
- 1+1 DC (-48V) power (40 to 72V DC)
- 1+1 DC (-24V) power (18 to 40V DC)
- AC or DC

### Command Language

- Windows based GUI (Graphical User Interface).
- Command Line Interface (English text commands)

### Regulatory Compliance

- Safety - IEC 60950 Safety - IEC 60950
- CE
- RoHS
- Complies to ANS/IEC standards
- Complies with Telecom Part 68, FCC Part 15 and CISPR 22 Class A
- EMC EN55022: 1998 + A1 and A2
- EMC En55024,
- Operation ETS 300 019 Class 3.2
- Storage ETS 300 019 Class 1.2
- Transportation ETS 300 019 Class 2.3)

## Environment

Temperature	-20°C ~ +60°C for operation
Storage	-40°C ~ +70°C for storage
Humidity	5% to 95% (35°C) Non-condensing

## NMS (with Telnet) OAM port Specifications

Network Interface	RJ-45 10/100/1000BaseT(auto sensing)
Compatibility	Ethernet Version 2.0, IEEE802.3
Protocols supported	ARP, UDP/IP, TCP/IP, Telnet, ICMP, SNMP
LEDs	10Base-T and 100Base-TX Activity, Full/half duplex
Management	SNMP, Serial login, Telnet login
EMI Compliance	-Radiated and conducted emissions complies with Class B limits of EN55022:1998 -Direct and Indirect ESD complies with En55024: 1999 -RF Electromagnetic Field Immunity complies with EN55024:1998 -Electrical Fast Transient/Burst Immunity complies with EN55024:1998 -Power Frequency Magnetic Field Immunity complies with EN55024:1998 -RF Common Mode Conducted Susceptibility complies with EN55024:1998

## External Alarms

Dry Contact Relay - 2 Form C
Rated upto 72V DC, 1 Amp.

## Chassis

1U High (44mm)
19-inch rack-mounting shelf
Also available in Desktop / Table Top Version.

## Mechanical Specification

Height	44 mm (1U)
Depth	260 mm
Width	480 mm (19 inch rack mountable)
Weight	4 Kgs



## Ordering Information

S. No.	Part #	Product Descriptions	Remarks
1	VCL-E3oP-GE-2OE-XXXX	<p>VCL-E3oP E3 over Ethernet Multiplexer (E3oP / TDM over IP) 19-inch 1U High Rack Mount version</p> <p>Supports:</p> <ul style="list-style-type: none"> <li>1 x E3 [75 Ohms 2xBNC (F) (Unbalanced)]</li> <li>4 x Ethernet Ports (1000Mbps, Gigabit)                             <ul style="list-style-type: none"> <li>2 x Electrical Ethernet Ports [RJ45 (F)]</li> <li>2 x Optical Ethernet Ports [1.25Gbps SFP based / without SFPs]</li> </ul> </li> <li>OAM [10/100/1000BaseT Ethernet - RJ45 (SNMP, Telnet) and Serial Port (USB and DB-9 COM Port)]</li> </ul> <p>Supports:</p> <ul style="list-style-type: none"> <li>MPLS, MEF (Metro Ethernet)</li> <li>PWE3 (pseudo-wire), SAToP</li> <li>Point-to-point applications</li> <li>Alternate Route Protection (for 1+1 Ethernet link redundancy on WAN side)</li> <li>Clocking options: Adaptive / Loop-timed / External / Internal / Asymmetrical (One-Clock and Two Clock)</li> </ul>	CORE UNIT without PSUs.

## Power Supply Options

1	AC220	1 x 100-240V AC Power Supply Input	Any One Option.
2	DC048	1 x (-) 48V DC Power Supply Input	
3	ACDC	1 x 100-240V AC Power Supply Input 1 x (-) 48V DC Power Supply Input	
4	AC220R	2 x 100-240V AC Power Supply Input [Redundant]	
5	DC048R	2 x (-) 48V DC Power Supply Input [Redundant]	

## Gigabit Ethernet SFP Options

1	VCL-EMOD 0206	1.25Gbps SFP Transceiver Duplex LC, 850nm, 550m, MMF	Maximum 2 SFPs per CORE UNIT.
2	VCL-EMOD 0205	1.25Gbps SFP Transceiver Duplex LC, 1310nm, 10Km, SMF	
3	VCL-EMOD 0231	1.25Gbps SFP Transceiver Duplex LC, 1310nm, 20Km, SMF	
4	VCL-EMOD 0255	1.25Gbps SFP Transceiver Duplex LC, 1310nm, 40Km, SMF	
5	VCL-EMOD 0155	1.25Gbps SFP Transceiver Duplex LC, 1550nm, 40Km, SMF	
6	VCL-EMOD 0256	1.25Gbps SFP Transceiver Duplex LC, 1550nm, 80Km, SMF	

## Cables and Accessories Options

1	VCL-HRNS 1247	75 Ohms Connectorized Cable [BNCM-BNCM, 3m]	As per Site Requirement
2	VCL-HRNS 1229	Optical Patch Cord Connectorized Cable [2LC-2LC, 3m, SM]	
3	VCL-HRNS 1238	Optical Patch Cord Connectorized Cable [2LC-2LC, 10m, SM]	
4	VCL-HRNS 1242	Optical Patch Cord Connectorized Cable [LC-FC, 10m, SM]	
5	VCL-HRNS 1243	Optical Patch Cord Connectorized Cable [2LC-2FC, 10m, SM]	
6	VCL-HRNS 1239	Optical Patch Cord Connectorized Cable [LC-SC, 10m, SM]	
7	VCL-HRNS 1258	Optical Patch Cord Connectorized Cable [2LC-2SC, 10m, SM]	
8	VCL-ECON 1172	Connector (Attenuator LC-LC (10 db.))	
9	VCL-ECON 1173	Connector (Attenuator LC-LC (20 db.))	
10	VCL-ECON 1186	Connector (Attenuator FC-FC (10 db.))	
11	VCL-ECON 1187	Connector (Attenuator FC-FC (20 db.))	
12	VCL-ECON 1197	Connector (Attenuator SC-SC (10 db.))	
13	VCL-ECON 1198	Connector (Attenuator SC-SC (20 db.))	
14	UMIKitE3oPDLX	System Core Cables, Installation Accessories, Documentation, System User Manual / Disk (Set)	

**Note:** 1. SFPs to be added if 1000BaseSX/LX (Optical) Ethernet Ports are required.  
2. Redundant power supply to be added, if required.

Note: \_\_\_\_\_

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Technical specifications are subject to changes without notice.  
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