



# ORION TELECOM NETWORKS INC.

## **E2, 2Mbps x 4 Opti-Multiplexer Integrated E2, OLTE and Multiplexer**

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### Product Brochure & Data Sheet

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## Description - E2, 2Mbps x 4 - Opti-Multiplexer (Integrated E2, OLTE & Multiplexer)

**VCL - E2, Opti-Multiplexer (4E1)** is an Integrated OLTE and multiplexer/demultiplexer unit, based on PDH (Plesiochronous Digital Hierarchy) technology. It multiplexes four 2.048 Mbps (hereafter referred to 2Mbps) E1 tributaries into a single 8 Mbps, E2 stream and then transports it as an optical signal on a Single Mode, 1300nm optical fiber cable, without the use of any signal repeaters up to a distance of over 50 KM (Optical Loss Budget  $\geq$  30dBm). The mux also does the reverse processing i.e. demultiplexing a received optical signal into four 2Mbps E1 tributaries.

Orion's Opti-Multiplexer solution multiplexes, 4 E1 stream into one 8 Mb signal and then transport it on a 1300 nm Single Mode Optical Fiber pair. On the de-multiplex side, it receives the optical signal and de-multiplexes it into 4, electrical E1 signals.

The card uses one E1 quad line unit for interfacing to E1 streams. This device provides data and extracted jitter free clock meeting the G.703 standards. The jitter attenuator meet G.735 specifications. The multiplexer device provides for in-built DPLL circuits for recovery of received E1 clocks. The device provides various alarm conditions as per draft G.775 recommendations. These include loss of signal at E1, loss of signal at E2, loss of frame sync at E2, detection of AIS at E2 and bit error exceeding 1 in 1000. The output of the mux chip is connected to E2 line interface unit which provides the HDB3 coder along with clock extraction. The control functions are carried out by a micro controller.

The power supply module accepts -48V DC input and provides 5V output required for the operation of the card.

**Front View**



**VCL - E2, Opti-Multiplexer (4E1)**

### Features and Highlights

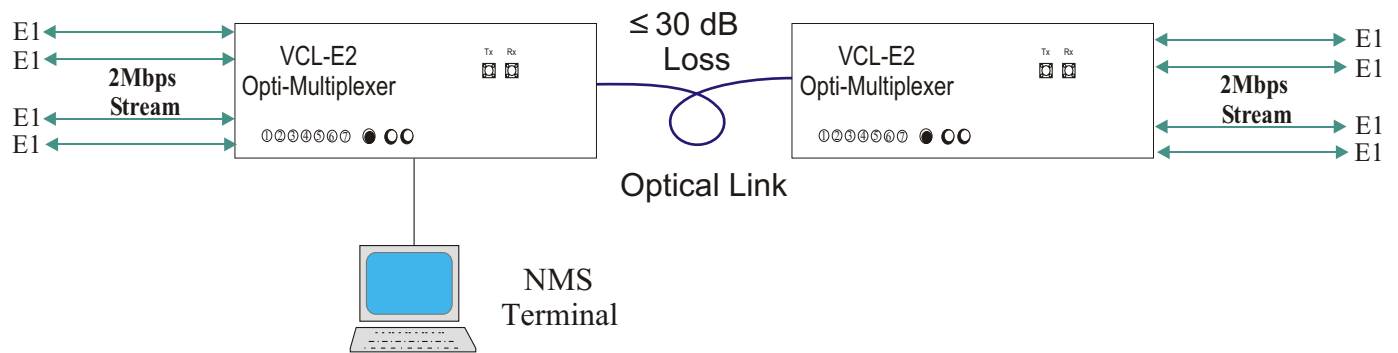
- A compact solution that performs E1 to E2 multiplexing and de-multiplexing and provides an 8Mbps optical interface (8Mbps OLTE) in a single card
- Conforms to ITU recommendations G.742
- Performs Second order Mux as per G.742
- Loss of signal and AIS detection as per G.775
- Tributary and higher order loop backs supported
- Supports tributary loopbacks for commands received from far end based on stuff bit polarity
- Single-card implementation
- Highly reliable and compact
- Standard CCITT Interfaces
- Class I Laser
- Remote and local terminal monitoring and control through a PC COM Port using VCL-Opti-Multiplexer, Network Management System
- Extensive alarms and status indication facility
- Operates on nominal - 48V DC input
- Distributed on-board power supply
- Microprocessor controlled with powerful diagnostic facilities for both remote and local systems
- Local and remote loopback facility for the 8Mbps stream for diagnostics
- Programmable auto-laser shut down feature for greater safety
- Capable of synchronizing on any of the clock sources - internal, or extracted (loop-timed)

### External Interfaces and Connectors

VCL Opti-Multiplexer unit provides the following interfaces to the external world:

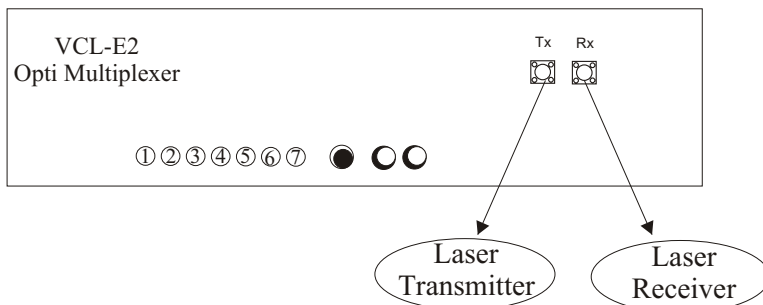
- 4, Primary rate 2Mbps and 120 Ohms balanced E1 interfaces
- 1300nm, Single Mode optical fiber interface, Tx and Rx through FC/PC Connectors
- -48V input for on-board power supply
- RS232 interface for connection to Network Management System, used for configuration and monitoring of the Opti Multiplexer system
- 2 External alarm extensions for visual and audible alarms

### E2 Opti-Multiplexer - Basic Application



### E2 Integrated 8Mbps OLTE and Multiplexer

#### Front View of Shelf

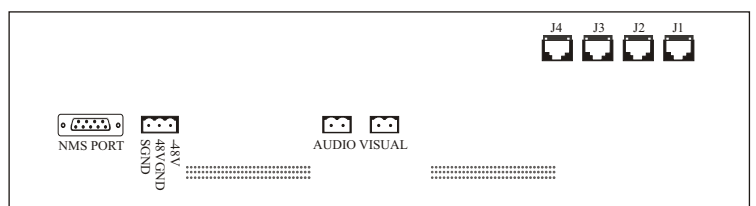


- 1 +5 V DC present
  - 2 -48 V DC present
  - 3 Loss of signal at 2Mbps - channel 4
  - 4 Loss of signal at 2Mbps - channel 3
  - 5 Loss of signal at 2Mbps - channel 2
  - 6 Loss of signal at 2Mbps - channel 1
  - 7 AIS at 8Mbps
  - 8 Optical signal - Sync
- Green = Sync. Optical signal present  
Red = Loss of Sync. Optical signal absent.

#### Mechanical Specification

Width	480 mm
Depth	280 mm
Height	90 mm
Weight	4.20 kg

#### Rear View of Shelf



## Alarms

<p>The equipment provides the following alarms through visual indications:</p> <ul style="list-style-type: none"> <li>• Power supply failure alarm</li> <li>• Higher order loss of signal alarm</li> <li>• Higher order AIS indication alarm</li> <li>• Loss of frame sync alarm</li> <li>• Bit error rate alarm</li> <li>• Loss of signal alarm for each tributary</li> <li>• Remote alarm</li> </ul>	<p>The equipment provides the following alarms and monitoring facilities through visual indications and Windows based GUI.</p> <ul style="list-style-type: none"> <li>• Loss of Digital Signal (TLOS)</li> <li>• Optical signal detection (SIG-DET)</li> <li>• BER3</li> <li>• BER6</li> <li>• Laser Bias Current (LBIASC)</li> <li>• Optical Loss of frame (OPLOF)</li> <li>• End of Life Detect (Optical module)</li> <li>• Optical Transmit disable (OPTITXDIS)</li> <li>• Auto-Laser Off</li> <li>• Prompt Alarm</li> <li>• Loop Back detection</li> <li>• The equipment provides for loop backs for diagnostic purposes</li> </ul>
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These alarm conditions except PSU failure, are extended to the bay top by two potential free make contacts. These alarms, optionally, are also transmitted over the RS232 serial link.

## Loopbacks

The card provides option to exercise the following:

- Remote alarm send
- Individual tributary remote loopbacks
- Higher order local loopback
- Higher order remote loopbacks

These options can be exercised through RS232 interface and in addition through this port. It is possible to inject PRBS pattern on any of the tributaries and also to check the received PRBS pattern on any tributary.

## System Specifications

### Technical Specifications

#### 2Mbps, E1 Electrical Interface

Number	4
Nominal bit rate	2048kbps
Bit rate tolerance	$\pm 50$ ppm
Termination Impedance	120 Ohms
Line code	HDB3
Frame structure	As per G.704
Electrical Interface	As per G.703

<b>Maximum Output Jitter</b>	$\leq 0.05$ UI
<b>Maximum Input Jitter</b>	
20Hz to 93Hz	1.5UI
700Hz to 100Hz	0.2UI
Connectivity	RJ-45 Connectors (120 Ohms, balanced) and BNC (75 Ohms, unbalanced)
Permissible Attenuation	6 dB (max) @1024 KHz

#### Return Loss at input port

51.2 KHz to 102.4 KHz	>12dB
102.4 KHz to 2048 KHz	>18dB
2048 KHz to 3072 KHz	>14dB

#### 8 Mbps, E2 Optical Interface

##### Transmitter

Type of Transmitter	Class I Laser
Number	1
Nominal bit rate	8.448 Mbps, +/-30PPM Kbps
Transmit wavelength	1310nm
Transmit output	0dBm to -3dBm (average)
Extinction ratio	>1:10
Transmit Spectral Width	<4nm

##### Receiver

Number	1
Receiver sensitivity	-37dBm (typical) -36dBm (min)
Receive wavelength	1310nm
Operating wavelength range	1280-1335nm
Receiver dynamic range	$\leq 20$ dBm
Optical Connectors	FC-PC connector

## Safety

• Class I Laser
• Meets the optical safety requirements: G.958, IEC-825-1
• Auto Laser Shut Down in case of fiber break.

## Power Supply

-48V DC (-40 to -60V DC) Input
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## Alarms

External Alarms	Audio and Visual
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## Connectors

2Mbps Ports RJ-45 Female, Balanced Pair -120 Ohms
8Mbps optical FC/PC

## Power Consumption

Power Consumption	7.2 watts
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## Ordering Information

Sr. No.	Product Description	Part No.
1.	E2 Opti-Multiplexer: 8Mbps Optical Line Terminal and 2/8 Mbps Digital Multiplexer - Stand Alone 19-inch, Integrated, Rack Mount Version - RJ-45 Connectors (120 Ohms, balanced) and - BNC (75 Ohms, unbalanced)	208100-RK

Technical specifications are subject to changes without notice.  
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 VCL - E2, Opti-Multiplexer Brochure. Revision 04 - November 05th, 2006

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