VCL-EC™
T1 Echo Canceller
1U, 19 inch Version with Telnet

T1, 1U Echo Canceller

Product Brochure & Data Sheet

Headquarters: Phoenix, Arizona
Orion Telecom Networks Inc.
Address: 20100, N 51st Ave,
Suite B240, Glendale AZ 85308 U.S.A.
Phone: +1 480-816-8672
Fax: +1 480-816-0115
E-mail: sales@oriontelecom.com
Website: http://www.oriontelecom.com

Regional Office: Miami, Florida
Orion Telecom Networks Inc.
4000 Ponce de Leon Blvd. Suite 470,
Coral Gables, FL 33146 U.S.A.
Phone: 1-305-777-0419,
Fax: 1-305-777-0201
E-mail: sales@oriontelecom.com
Website: http://www.oriontelecom.com
**Product Overview**

Orion offers a compact, robust and cost effective T1 Echo Canceller solution in 19 inch, 1U high (44mm height) chassis (accomodates 1, T1 Echo Canceller with telnet, per shelf). Echo cancellation on each channel is 64ms. bidirectional/128ms. unidirectional echo tails - user selectable. E1 Echo Canceller is also offered and available.

Orion offers echo cancellation and voice quality enhancement solutions for the following network situations:

- Wireline
- Wireless
- Satellite
- International Gateway
- IP Gateway

The T1 Echo Canceller solutions are also ideally suited for long distance telephony, GSM, CDMA, TDMA, VoIP, satellite and radio communication applications. The echo canceller equipment offers fault recovery feature. It offers automatic by-pass upon power-supply failure (i.e. it offers T1 circuit by-pass in the event of power supply failure).

**Type of T1 Echo Canceller offered**

T1 Echo Canceller solution in 19 inch, 1U high (44mm height) chassis and accomodates 1, T1 echo canceller with telnet, per shelf. Echo cancellation on each channel is 64ms. bidirectional/128ms. unidirectional echo tails - user selectable. T1 Inputs and Outputs are balanced 100 Ohms, RJ-45

**Unique T1 Echo Canceller Features**

**USER PROGRAMMABLE TAIL-SIDE**: Echo Cancellers are always required to be installed in such that, the tail-side of the echo canceller always faces towards the source of the echo. Our T1 Echo Cancellers has a User Configurable tail-side so that the user may remotely change the direction of the tail-side of the echo canceller - without having to physically change the T1 connections on the echo canceller card.

**USER PROGRAMMABLE SIGNALING OPTION**: The T1 Echo Canceller supports the following signaling protocols: 24B (24 Voice Channels) with out-of-band signaling (C7/SS7 signaling on any user selected time-slot), 23B+D, PRI ISDN (23 Voice Channels+D signaling Channel), D4 Robbed Bit. All signaling options are User Selectable / User Programmable. Allows digital data transmission on user-selected time-slots.

**USER PROGRAMMABLE DEDICATED DATA CHANNELS**: The user may specify/define the dedicated data channels so that they are always and completely by-passed from the echo cancellation circuitry - leaving those specifically assigned dedicated time-slots for digital data transmission (including video transmission).

The T1 Echo Canceller supports 2100 Hz fax/analog data modem tone detection and echo canceller disabling on all channels.

**Signaling Support**

The T1 Echo Canceller supports the following signaling protocols:

- 24B (24 Voice Channels) with out-of-band signaling
- C7/SS7 Signaling on any user selected time-slot
- 23B+D, PRI ISDN (23 Voice Channels+D Signaling Channel)
- D4 Robbed Bit
- All signaling options are User Selectable/User Programmable
- Allows digital data transmission on user-selected time-slot
Highlights

- Compact T1 Echo Canceller solution in 19 inch, 1U high (44mm height) chassis and accommodates 1, T1 Echo Canceller with telnet, per shelf
- Provides voice echo cancellation of up to 64ms. Bidirectional/128ms. unidirectional - User Selectable / User Programmable.
- The echo canceller supports fax/modem G.164 and G.165 (2100 Hz) tone disable
- Carrier-grade voice quality per AT&T Voice Quality Assessment Lab
- Remote access through telnet over LAN/TCP-IP link (10/100BaseT)
- Easy-to-use Graphical User interface (GUI) and text based CLI commands for management and configuration
- Adjustable gain/loss settings on all channels. Provides the user the flexibility to adjust and optimize the voice, transmit and receive levels
- Local access through COM port (RS232 serial port) and USB Port
- Non-linear processor with comfort noise insertion
- T1 link by-pass on power failure. This feature helps to maintain the link integrity even in the event of power failure
- Option for user to select voice echo cancellation or digital-data transmission selectively on each time-slot for selective echo cancellation. This feature allows the user to use selected time-slots for data transmission to enable digital data/CCS signaling transmission
- Transmission (data mode), while keeping the echo cancellation "ON" on the remaining time-slots (voice mode), on which echo is required to be cancelled
- Ensure echo canceller maintains excellent performance at all times in presence of tones or signals including DTMF tones
- Fully integrated independent 24-channel voice echo canceller

Applications

- GSM, CDMA, TDMA and Cellular Base Stations
- Digital Circuit Multiplication Equipment (DCME) : Satellite Communications and Multiplexers
- PCS, mobile and digital cordless wireless systems
- PBX and central office systems
- Datacomm: Voice over Frame Relay, Voice over ATM and Voice over Internet
- Voice over ATM, Frame Relay or packet switching systems and fax transmissions
- Central Office and PBX: Network Trunks, Echo Canceller Pool, Common Equipment and Audio Conferencing Bridges
- Voice over datacomm including Voice over Internet (VoIP), Voice over ATM (VoATM) and Voice over Frame Relay (VoFR)

Fault Recovery

The Echo Canceller equipment offers fault recovery feature. It offers automatic by-pass upon power-supply failure (i.e. it offers T1 circuit by-pass in the event of power supply failure).

Clock

<table>
<thead>
<tr>
<th>Internal</th>
<th>Stratum 3 Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Loop-timed</td>
<td>T1 Line Clock</td>
</tr>
</tbody>
</table>
Datacomm Applications
- Voice over Frame Relay
- Voice over ATM
- Voice over Internet/LAN (VoIP)

Central Office and PBX Applications
- Network Trunks
- Echo Canceller Pool
- Common Equipment
- Audio Conferencing Bridges

Voice Over ATM Applications
- A multi-channel echo canceller resource or pool is shared among many channels to reduce cost
- Echo cancellation is done at a DS0 level

Satellite Communications Applications
- Digital Circuit Multiplication Equipment (DCME)

Wireless Applications
- Digital Cordless and Cellular Basestations
- GSM, CDMA
- Access Controllers

Voice over Frame Relay, ATM Applications
- Frame Relay and ATM routers and switches introduce large, variable and unpredictable delays
- Echoes from the Public Switched Telephone Network (PSTN) in combination with the delays from Frame Relay and ATM equipment yield objectionable speech quality

Regulation Compliance
- Meets CE requirements
- Complies with FCC, Part 68 and Part 15 sub part A Specifications
- Safety - UL 1459 Issue 2

Management and Control
- Remote access through telnet over LAN/TCP-IP link (10/100BaseT)
- Local access through COM Port (RS232 serial port) and USB Port

VCL-EC, T1 Echo Canceller, 1U 19 inch Version with Telnet
Shelf Description:

The VCL-EC, T1 Echo Canceller is a 1U, 19 inch shelf, fitted with a back plane. The T1 interface, power input, COM Port, USB Port and LAN Port are all accessed from the system front panel.

VCL-EC, T1, 1U Echo Canceller
Front View of the 1U Version

Orion Telecom Networks Inc., 2005-17
Technical Specifications

Network Interface

<table>
<thead>
<tr>
<th>Feature</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Interfaces</td>
<td>2, 1-Input (RJ-45), 1-Output (RJ-45)</td>
</tr>
<tr>
<td>Line Rate</td>
<td>T1 - 1.544 Mbps</td>
</tr>
<tr>
<td>Line Code</td>
<td>B8ZS, AMI (User Selectable)</td>
</tr>
<tr>
<td>Frame Structure</td>
<td>D4, ESF (User Selectable)</td>
</tr>
<tr>
<td>PCM Encoding Law</td>
<td>μ Law as per ITU-T G.711</td>
</tr>
<tr>
<td>Signaling</td>
<td>Pass-Through: Signaling protocols supported:</td>
</tr>
<tr>
<td></td>
<td>- 24B (24 Voice Channels) with out-of-band signaling</td>
</tr>
<tr>
<td></td>
<td>- C7/SS7 signaling on any user selected time-slot</td>
</tr>
<tr>
<td></td>
<td>- 23B+D, PRI ISDN (23 Voice Channels+D Signaling Channel)</td>
</tr>
<tr>
<td></td>
<td>- D4 Robbed Bit Signaling.</td>
</tr>
<tr>
<td></td>
<td>- All signaling options are UserSelectable</td>
</tr>
<tr>
<td>PCM Sampling Rate</td>
<td>8000 samples/sec</td>
</tr>
<tr>
<td>Bit Rate</td>
<td>1544 Kbps ± 50 ppm</td>
</tr>
<tr>
<td>Jitter Tolerance</td>
<td>As per ITU-T G.823</td>
</tr>
<tr>
<td>Output Jitter</td>
<td>&lt; 0.05 UI (in the frequency range of 20Hz to 100 Khz)</td>
</tr>
<tr>
<td>Nominal Line Impedance</td>
<td>100 Ohms Balanced RJ-45</td>
</tr>
<tr>
<td>Nominal Pulse Width</td>
<td>244 ns</td>
</tr>
<tr>
<td>Pulse Mask</td>
<td>As per ITU (CCITT) Rec. G.703</td>
</tr>
<tr>
<td>Loss and recovery of frame alignment</td>
<td>As per clause 3 of ITU (CCITT) G.732</td>
</tr>
<tr>
<td>Loss and recovery of multiframe alignment</td>
<td>As per clause 5.2 of ITU (CCITT) G.732</td>
</tr>
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</table>

Echo Canceller

<table>
<thead>
<tr>
<th>Feature</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Echo Tail Cancellation</td>
<td>Up to 64ms. Bidirectional/128ms. Unidirectional - User Selectable</td>
</tr>
<tr>
<td>Tone Disabler</td>
<td>As per ITU-T G.164, G.165</td>
</tr>
<tr>
<td>ERLE (Echo Return Loss Enhancement)</td>
<td>&gt;35dB (with 6dB ERL) at -10dBm0</td>
</tr>
<tr>
<td></td>
<td>&gt;65dB with NLP enabled</td>
</tr>
<tr>
<td>ERL (Echo Return Loss)</td>
<td>Selectable Threshold Levels Options: 0, 3, 6 dB</td>
</tr>
<tr>
<td>Transmit/Receive Levels (Programmable)</td>
<td>Selectable Levels Options: -12, -9, -6, -3, 0, +3, +6, +9</td>
</tr>
<tr>
<td>Comfort Noise Insertion</td>
<td>User Selectable - Enable/Disable</td>
</tr>
<tr>
<td>Local Monitoring</td>
<td>RS232 serial interface and USB Port</td>
</tr>
<tr>
<td>Remote Monitoring</td>
<td>10/100BaseT Ethernet Port</td>
</tr>
<tr>
<td>Local and Remote Provisioning</td>
<td>CLI (text commands) and GUI</td>
</tr>
<tr>
<td>Front Panel Indicators</td>
<td>-In SYNC/Failure</td>
</tr>
<tr>
<td></td>
<td>-LEDs for power on/off</td>
</tr>
<tr>
<td>Environmental-Operational</td>
<td>0°C to 50°C</td>
</tr>
<tr>
<td>Humidity</td>
<td>5% to 95%, non-condensing</td>
</tr>
</tbody>
</table>
Power Consumption - T1 Echo Canceller, 1U 19 inch Version

<table>
<thead>
<tr>
<th>Input Voltage Option</th>
<th>Current (in Amps.)</th>
<th>Power Consumption (in Watts)</th>
</tr>
</thead>
<tbody>
<tr>
<td>- 48V DC</td>
<td>0.15</td>
<td>6.0</td>
</tr>
<tr>
<td>220V AC</td>
<td>0.03</td>
<td>6.0</td>
</tr>
</tbody>
</table>

DC Power Supply Specifications

- Input DC Voltage: -48V DC (nominal)
- Range of Input: -40V to -60V DC
- Input Voltage Reversal Protection: Provided

AC Power Supply Specifications

- Range of input AC voltage: 100 V to 240 V AC, 50Hz / 60Hz.
- Connector Type: 3 PIN AC Socket (IEC 60320 C14)
- Efficiency at full load: > 86%

Mechanical Specifications

- Height: 44 mm.
- Depth: 260 mm.
- Width: 480 mm.
- Weight: 4 kgs.
### Ordering Information

<table>
<thead>
<tr>
<th>Part #</th>
<th>Specifications</th>
</tr>
</thead>
</table>
| VCL-EC-1U-T1-AC | T1, Echo Canceller 1U (44mm high) 64ms. Bidirectional/128ms. unidirectional - User Selectable  
|                 | - Available in 1U Rack-Mount version  
|                 | - OAM : 10/100BaseT Ethernet RJ45 (Telnet) and Serial Port (USB and DB-9 COM Port)  
|                 | - AC input, 100V AC to 240V AC, 50Hz / 60Hz.                                                                                              |
| VCL-EC-1U-T1-DC | T1, Echo Canceller 1U (44mm high) 64ms. Bidirectional/128ms. unidirectional - User Selectable  
|                 | - Available in 1U Rack-Mount version  
|                 | - OAM : 10/100BaseT Ethernet RJ45 (Telnet) and Serial Port (USB and DB-9 COM Port)  
|                 | - -48V DC (-40V DC to -60V DC).                                                                                                          |

Technical specifications are subject to changes without notice.
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Revision 06 - June 16, 2017