ORION TELECOM NETWORKS INC.

VCL-EC™
T1 Quad Echo Canceller
(Upto 32 Echo Cancellers per Shelf/Chassis)

Product Brochure & Data Sheet

Headquarters: Phoenix, Arizona

Orion Telecom Networks Inc.

20100, N 51st Ave, Suite B240,
Glendale AZ 85308
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.

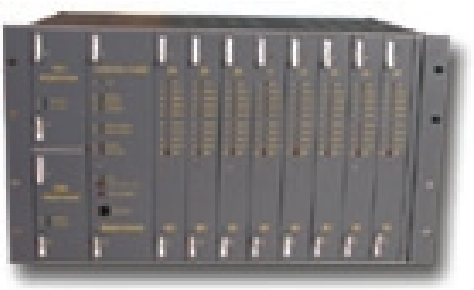
4000 Ponce de Leon Blvd. Suite 470,
Coral Gables, FL 33146 U.S.A.
Phone: 1-305-777-0419,
Fax: 1-305-777-0201
E-mail: sales@oriontelecom.com
Website: http://www.oriontelecom.com

INDEX

Product Overview

Orion Telecom Networks Inc. provides robust and cost effective T1 Quad Echo Canceller for the long distance, wireline, wireless, (GSM, CDMA), VoIP, satellite and radio communications.

The Quad VCL-EC, T1 Echo Canceller card offers 4xT1 Echo Cancellers in each card which provide cancellation of 64ms./128ms. (user selectable) echo tails. The echo canceller equipment is compliant with ITU-T G.164, G.165, G.168 (2000/2002) requirements for echo cancellation.



Quad T1 Echo Canceller

The echo canceller solution offer carrier-grade voice quality per AT&T Voice Quality Assessment Lab. It also supports fax/modem G.164 and G.165 (2100 Hz) tone disable function.

Signaling

The T1 Echo Canceller support 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)
- Robbed Bit Signaling
- All signaling options are User Selectable/User Configurable.

Redundancy

The echo canceller is equipped to offer redundant power supply (optional).

Remote Monitoring and Control

The equipment offers RS232 serial interface for configuration through a PC COM Port and an Ethernet (10BaseT) interface for remote LAN configuration and monitoring which allows the user to monitor and configure the equipment over a TCP-IP network, from anywhere in the world over a TCP/IP network.

Types of T1 Echo Canceller offered

User Selectable:

- **128ms** - Unidirectional (cancels the echo with upto 128ms. tail at the far end).
- **64ms** - Bidirectional (cancels the echo with upto 64ms. tail in both directions).

Quad T1 VCL-EC™, Voice Echo Canceller - Technical Highlights

- Provides voice echo cancellation of up to 64ms. bidirectional/128ms. unidirectional - User Selectable/User Programmable
- Meets ITU-T G.168 (2000/2002) requirements for echo cancellation
- Signaling protocols supported: 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). Robbed Bit Signaling. All signaling options are User Selectable/User Configurable
- The echo canceller supports fax/modem G.164 and G.165 (2100 Hz) tone disable
- Offers RS232 serial interface for external PC COM port and Ethernet (10Base-T) interface for remote LAN
- Non-linear processor with comfort noise Insertion
- Automatic by-pass upon power supply failure/removal of power supply
- Redundant Power Supply (optional)

Applications for the Quad T1 Echo Canceller

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

Quad T1 VCL-EC, T1 Echo Canceller Advantage

USER PROGRAMMABLE tail-side. Echo Cancellers are always required to be installed, such that, the tail-side of the echo canceller always faces towards the source of the echo. Our T1 Echo Cancellers have 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. Our echo cancellers provide user programmable T1 signaling options. The T1 signaling protocols that we support are 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). Robbed Bit Signaling. All signaling options are user selectable/user configurable.

Quad T1 VCL-EC, T1 Echo Cancellers Support 2100 Hz fax/analog data modem tone detection and echo canceller disabling on all channels. For dedicated digital data or video channels, if you wish to assign certain specific time-slots of the T1 circuit for dedicated video you may do so, using our T1 Echo Cancellers. Our T1 Echo Cancellers allow the user to program/assign dedicated time-slots for digital data or video transmission. The user may specify/define the dedicated data channels so that they are always by-passed from the echo cancellation circuitry - leaving those dedicated time-slots for digital data communication/dedicated video transmission only.

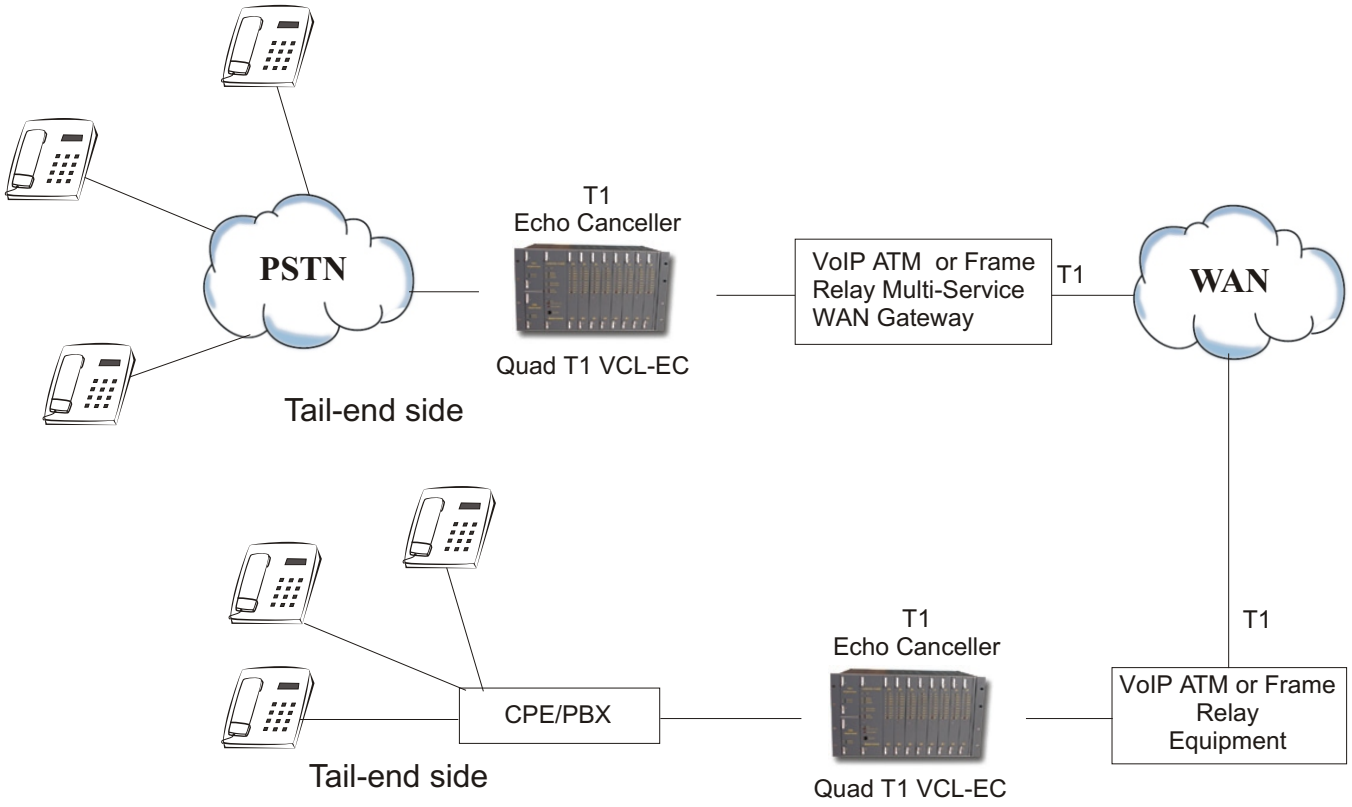
USER PROGRAMMABLE dedicated data channels. The user may specify/define the dedicated data channels so that they are always and completely by-passed from the echo cancellation circuitry - leaving those specifically assigned dedicated time-slots for digital data transmission (including video transmission).

Quad T1 VCL-EC, T1 Voice Echo Canceller Features and Highlights

- User Selectable - 128ms. - unidirectional or 64ms. - bidirectional. The user selection is made through a user configurable software interface command
- Compliant with ITU-T G.164, G.165, G.168 2000, G.168 2002) requirements
- Carrier-grade voice quality per AT&T Voice Quality Assessment Lab
- Fax/Modem G.164, G.165 - 2100 Hz tone disable as per ITU-T G.164/G.165 Recommendations. Allows fax and analog modem data transmission through automatic echo- cancellation enable/disable function
- Disable tone detection supported on all audio paths
- Fully integrated independent 24-channel voice echo canceller
- Option for user to select data or voice channels 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
- Non-linear processor with adaptive suppression threshold and comfort noise insertion.
- Programmable double-talk detection threshold.
- Narrow-band signal detection.
- Adjustable gain/loss settings on all channels. Provides the user the flexibility to adjust and optimize the voice and transmit receive levels.
- Redundant Power Supply (optional).
- Non-linear processor with comfort noise insertion.
- TCP/IP remote access for remote configuration and control.
- Instability detector suppresses variable pitched ringing or oscillation.
- Signaling Support:
  - 24B (24 Voice Channels) with out-of-band signaling
  - C7, SS7 Signaling
  - 23B+D, PRI ISDN (23 Voice Channels+D Signaling Channel)
  - Robbed Bit Signaling (on any user selected time-slot).
  - All signaling options are User Selectable/ User Configurable.
- Assures operability with V.32 / V.32bis / V.34 modem and fax transmissions. Conforms to standards assuring proper public network operation and facilitating system integration.
- Removes residual echo and minimizes switching effects thereby providing high perceived speech quality. Its unique design provides the industry's best sounding single chip echo canceller.
- Ensures echo canceller maintains excellent performance at all times in the presence of non-echo voice signals. Useful for trunks that have very low echo-returns loss.
- Ensures echo canceller maintains excellent performance at all times in presence of tones or signals including DTMF tones.
- Path change detect permits fast re-convergence when a major change occurs in the echo channel.
- User selectable tail-end side. This feature allows the user to select the "Tail-end" side of the Echo canceller. The "Tail-end" side of the echo canceller is that part of the network which generates/causes to generate the Echo. Unidirectional echo cancellers must always be installed on far-end of any network from the point at which an echo is being heard. The "Tail-End" side must always face the "Source Side" of the network that is generating the echo. Ideally suited to handle most echo situations.
- Usable in telecommunications systems worldwide. Able to interface in most systems where linear samples are available.

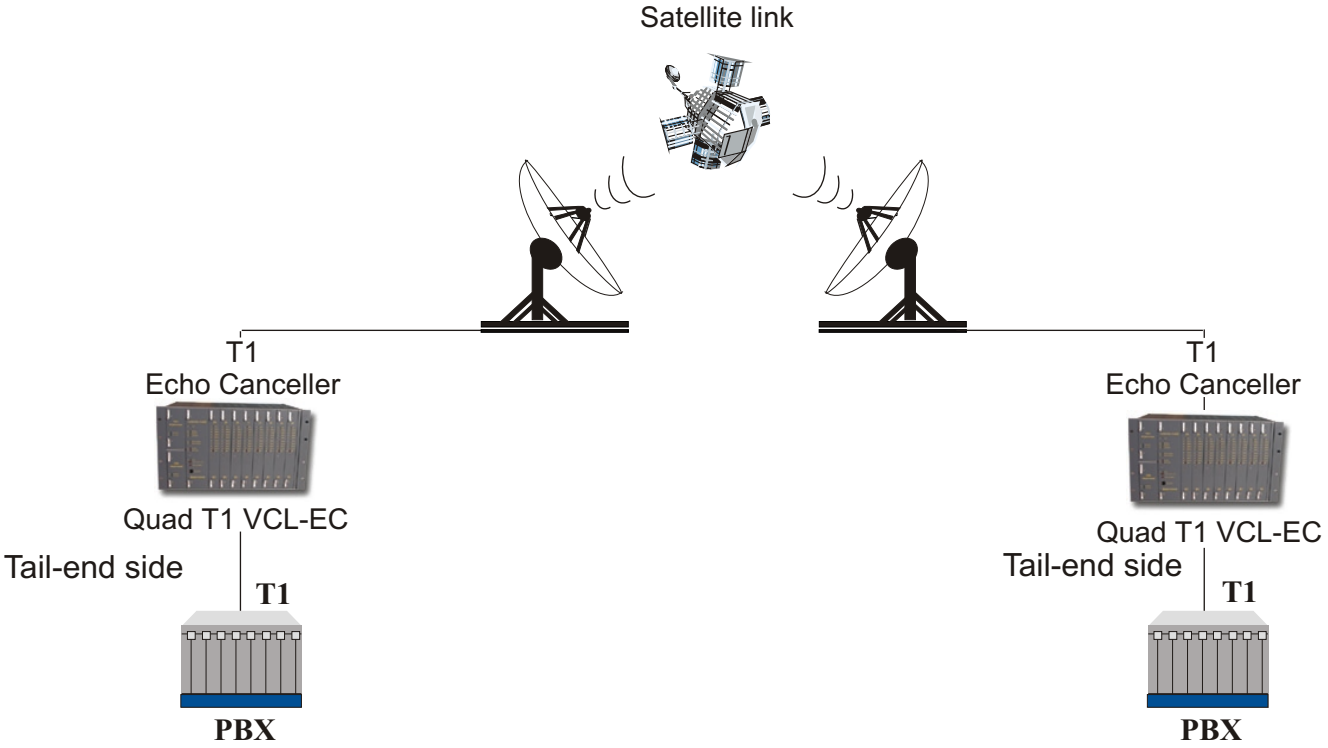
Application Diagrams

Application 1



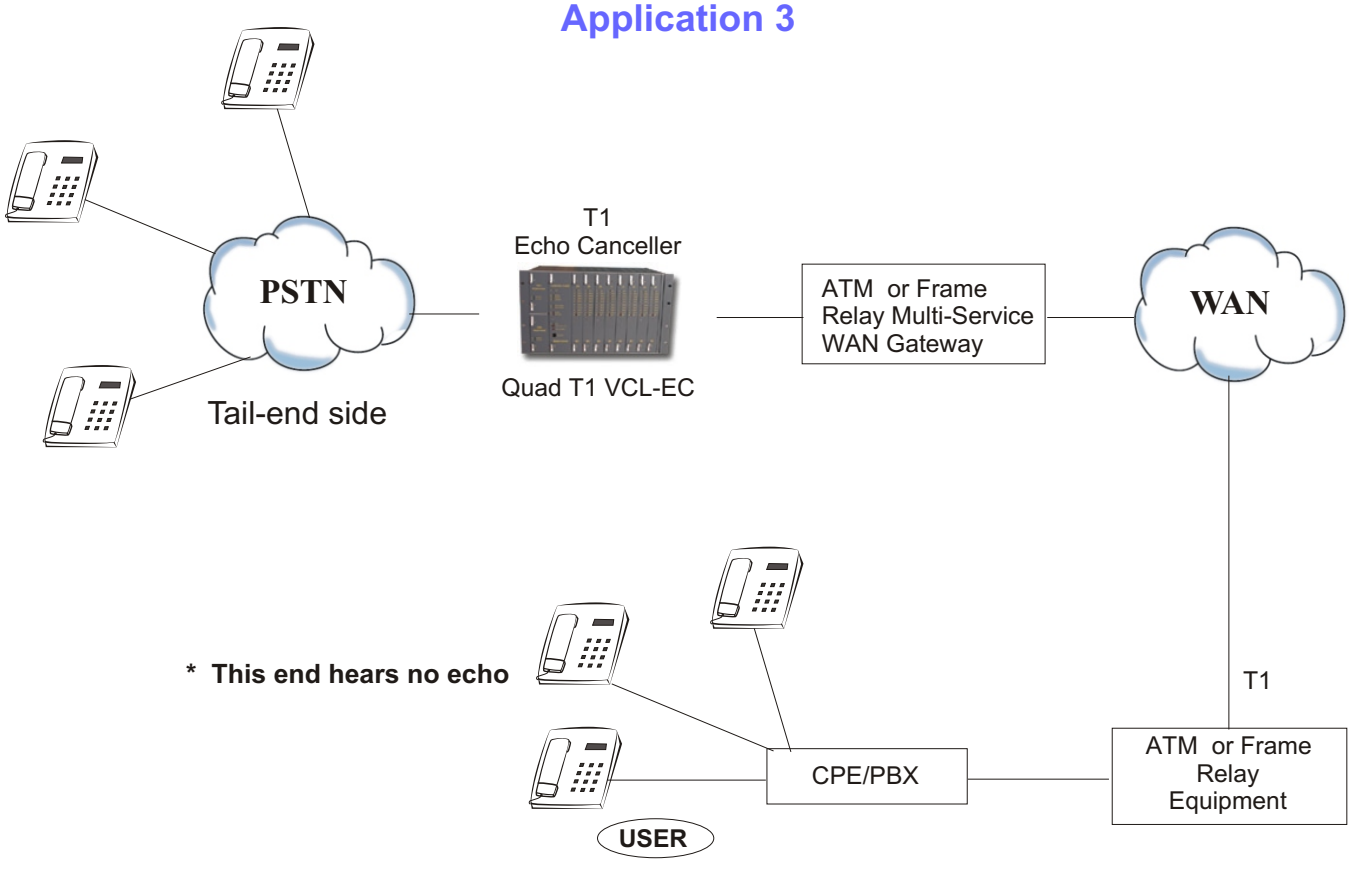
To cancel the echoes at both ends of the network with two 128ms. unidirectional echo cancellers.

Application 2



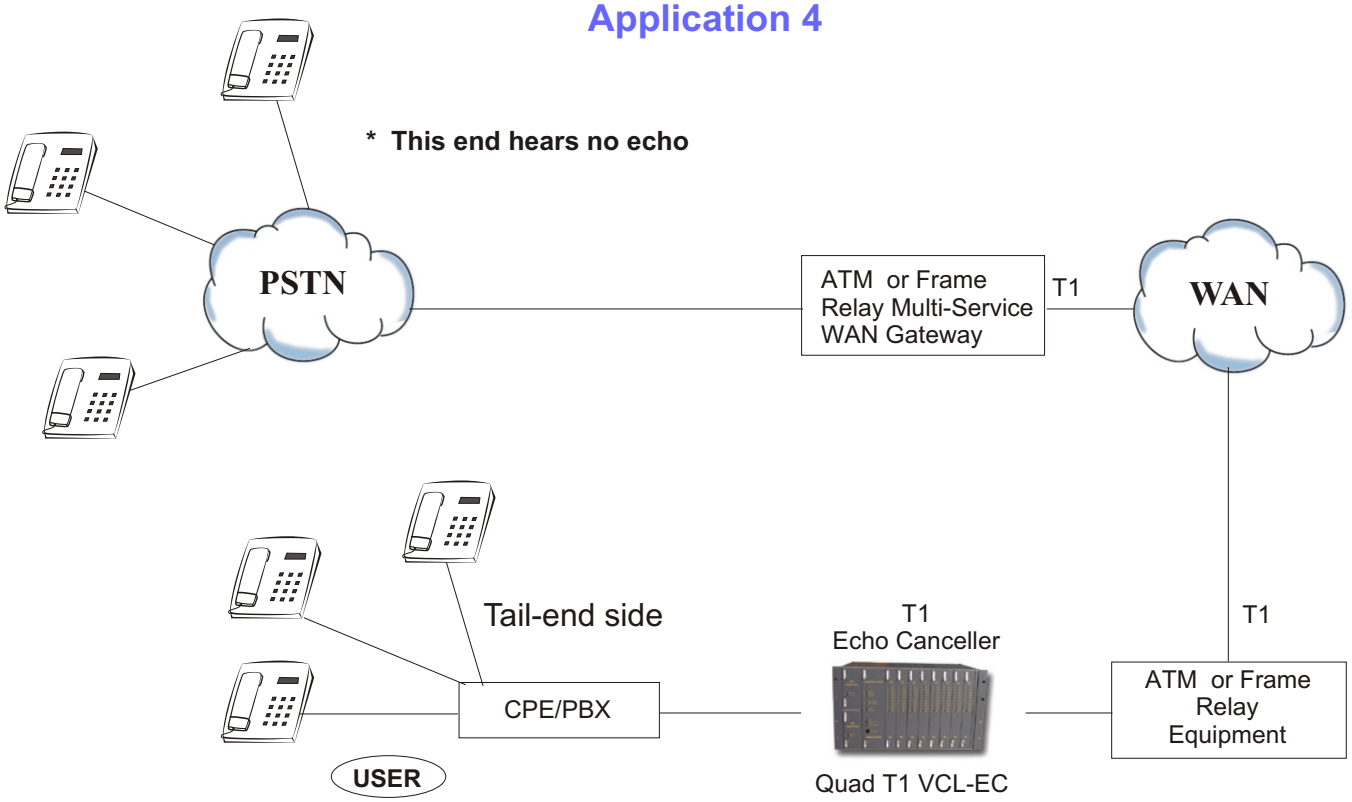
To cancel the echoes at both ends of the network with two 128ms. unidirectional echo cancellers.

Application 3



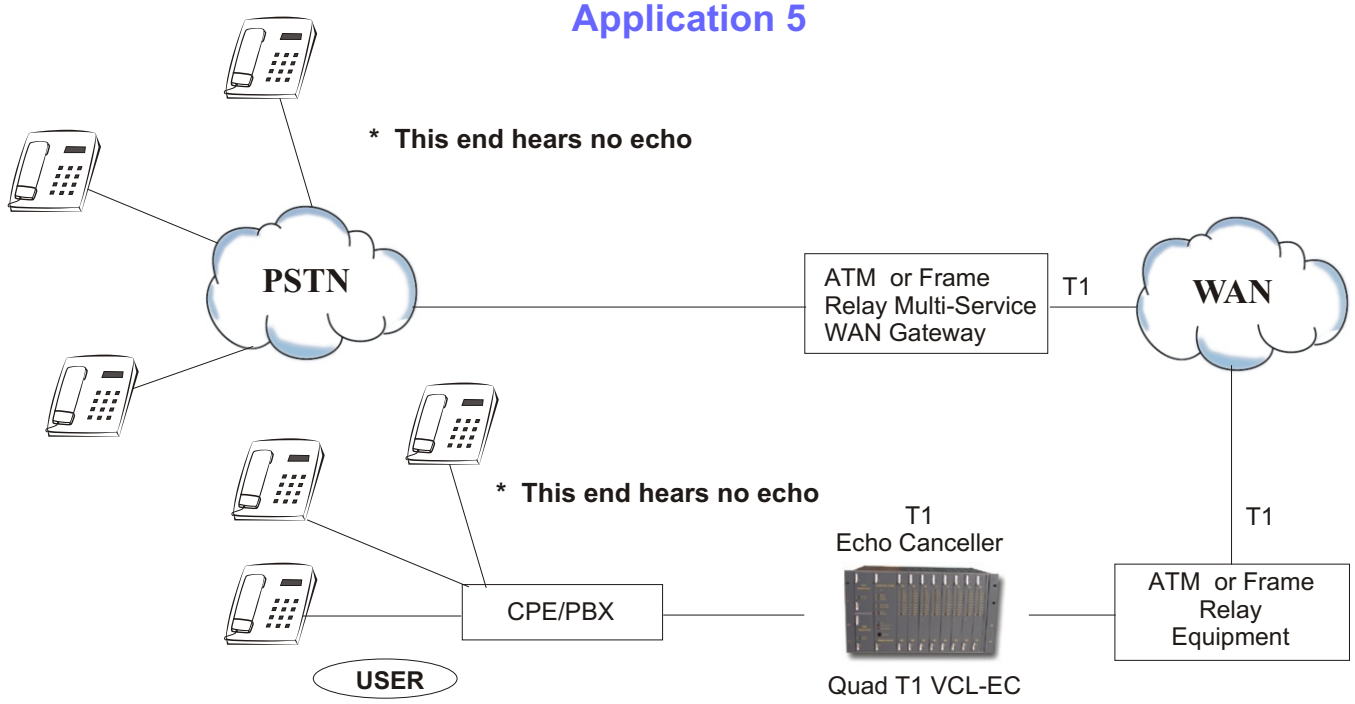
To cancel the echo at near end of the network with one 128ms. unidirectional echo canceller.

Application 4



To cancel the echo at far end of the network with one 128ms. unidirectional echo canceller.

Application 5

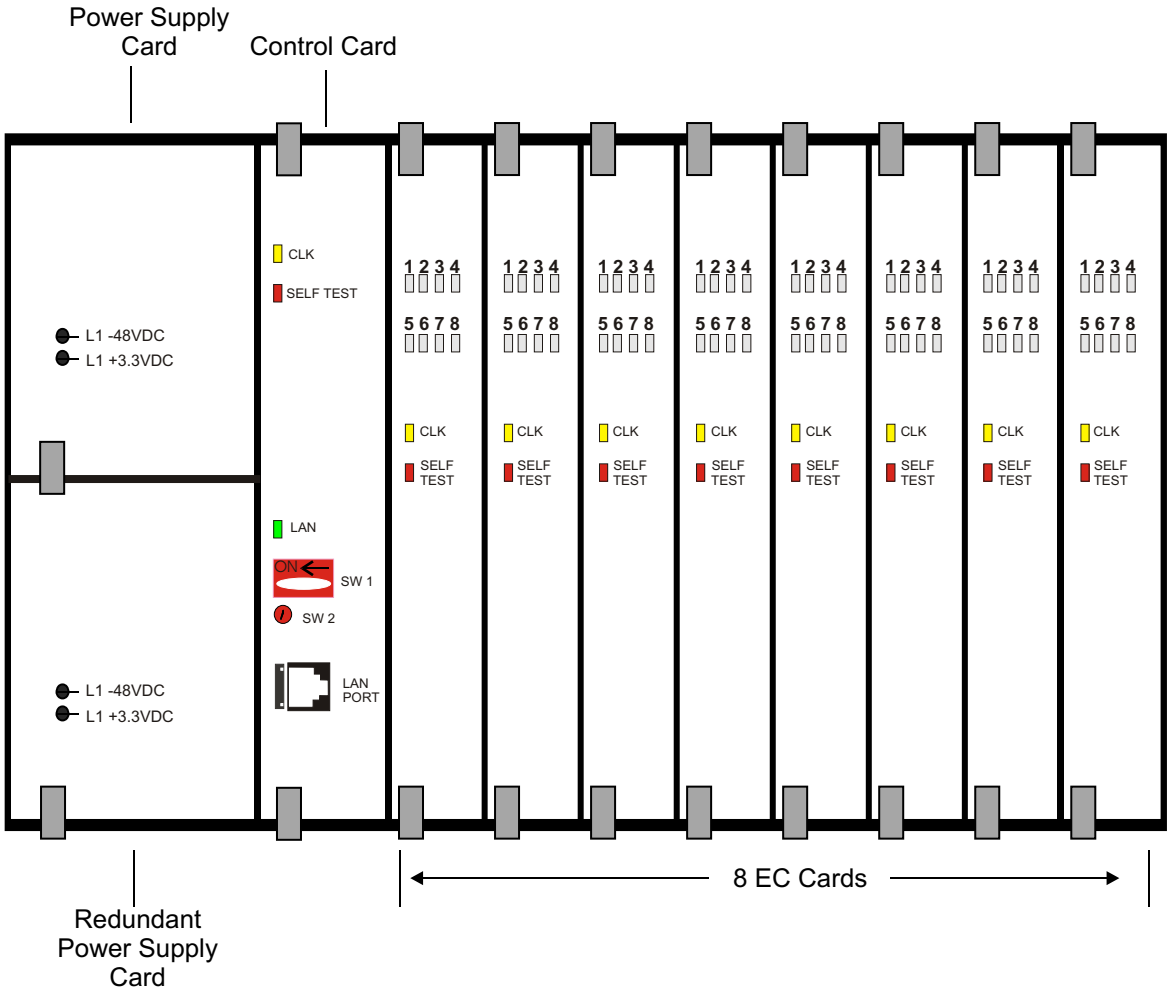


To cancel echoes at both ends of the network with one 64ms. bidirectional echo canceller

Quad T1 VCL-EC, T1 Voice Echo Canceller Shelf Description

The Quad T1 VCL-EC, T1 Voice Echo Canceller, 32 per Shelf/Chassis is fitted with a back plane that provides rear access of all external interfaces. The T1 interface, power input and alarm extension are all accessed from the system back plane.

Quad T1 VCL-EC, T1 Voice Echo Canceller Front View of the Shelf



Front View (Left to Right)	Card Details	Part No.
Slot 1	PS, Power Supply Card	VCL-EC-1295
Slot 2	PS, Power Supply Card (for redundancy)	VCL-EC-1295
Slot 3	Control Card	VCL-EC-1251-CC-4-T1
Slot 4 to Slot 11	EC, Echo Canceller Card (4 T1 Echo Canceller per Card)	VCL-EC-1252-Quad-T1

Technical Specifications

Network Interface

Number of Echo Cancellers per shelf	32 T1 Echo Cancellers (4 T1 Echo Cancellers per EC card) 32 T1 Inputs (RJ-45) 32 T1 Outputs (RJ-45)
Line Rate	T1 - 1.544 Mbps
Line Code	B8ZS, AMI (User Selectable)
Frame Structure	D4, ESF (User Selectable)
PCM Encoding Law	Mu Law as per ITU-T G.711
Signaling	Pass-Through Signaling protocols supported: - 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) - Robbed Bit Signaling - All signaling options are User Selectable
PCM Sampling Rate	8000 samples/sec
Bit Rate	1544 Kbps ± 50 ppm
Jitter Tolerance	As per ITU-T G.823
Output Jitter	< 0.05 UI (in the frequency range of 20Hz to 100 Khz)
Nominal Line Impedance	100 Ohms Balanced RJ 45
Nominal Pulse Width	244 ns
Pulse Mask	as per ITU (CCITT) Rec. G.703
Loss and recovery of frame alignment	As per clause 3 of ITU (CCITT) G.732
Loss and recovery of multiframe Alignment	As per clause 5.2 of ITU (CCITT) G.732

Power Supply Specifications

Input DC Voltage	-48V DC (nominal)
Range of input	-40V to -60V DC
Output Voltages	+3.3V
Full Load Output Current	20A at +3.3V, (Full system)
Input Voltage Reversal Protection	Provided in the Card
Over Current Protection	20.5A for +3.3V
Short Circuit Protection	Current limit - 20.5A. Recovers on removal of short
Under Voltage	< 3.17V
Over Voltage	3.5V
Efficiency at Full Load	>90%
Ripple at Full Load	<5mVrms
Spike at Full Load	<50mV

Management Port Specifications

Serial Port: 9.6Kbps (Async). ASCII / VT100 / HyperTerminal. (RS232 - COM Port)
10BaseT Ethernet: Telnet

Power Consumption of Quad T1 Echo Cancellers

Card in Use	Current (in Amps.)	Power Consumption (in Watts)
Input Voltage = - 48 Volt DC		
1 EC Card + PSU Card + Control Card	0.20	10.0
8 EC Cards (32 T1 Echo Cancellers) + PSU Card + Control Card	0.93	45.0

Echo Cancellation

Echo Tail Cancellation	Up to 64ms. bidirectional/128ms. unidirectional User Selectable
Tone Disabler	As per ITU-T G.164, G.165
ERLE (Echo Return Loss Enhancement)	> -35dB (with -6dB ERL) at -10dBm0 input > -65dB with NLP enabled
ERL (Echo Return Loss)	Selectable Levels Options: 0, -3, -6 dB
Convergence time for 90% ERLE	< 50ms for combined ERL & ERLE of 30dB
Tone Disabler (for Data Transmission)	As per ITU-T rec. G.164 and G.165
Detection Threshold	-33dBm0 +/- 2dB at 2100Hz
Disable Operate Time	350 +/- 50ms
Disable Release Time	300 +/- 100ms
Idle Channel Code Detection	As per ITU-T Q503 - Automatic re-convergence upon commencement of each call. **Note:** Idle channel code detection is automatic and each echo canceller channel re-converges when Idle Channel Code is detected as per ITU-T Q503 upon initiation of each new call.
Transmit/Receive Levels (Programmable)	Selectable Levels Options: -12, -9, -6, -3, ,0 +3, +6, +9
Comfort Noise Insertion	User Selectable - ON/OFF
NLP	User Selectable - ON/OFF
Signal Processing Delay : 1) Transmit Channel 1) Receive Channel	 < 0.250ms < 60 micro seconds
Local Monitoring and Control	RS232 serial interface for Management through a PC COM Port
Remote Monitoring and Control	Ethernet (10BaseT) interface for remote LAN Management and Control
Local and Remote Provisioning	CLI (text commands) and GUI
Front Panel Indicators	- In SYNC/Failure - Equipment alarm - LEDs for power ON/OFF
Power Supply Redundancy	Optional: -48VDC Power Supply (1+1)
Environmental - Operational	0^0 C to 50^0 C
Humidity	5% to 95%, non-condensing
Alarm Extension	Normally Open (NO) & Normally Closed (NC) Through Backpanel (3 Pin Connector)

Clock

Internal	(Stratum 3 level)
Loop-timed	Port A/Port B (User Selectable)
External	2 MHz. (BNC Connector)

Management Port Specifications 10BaseT LAN Management Port (with Telnet)

Network Interface	RJ-45 Ethernet 10BaseT or 100BaseT-TX (auto sensing)
Compatibility	Ethernet Version 2.0 IEEE802.3
Protocols Supported	ARP, UDP/IP, TCP/IP, Telnet, ICMP, SNMP, DHCP, BOOTP, TFTP, Auto IP, SMTP and HTTP
LEDs	10Base-T & 100Base-TX Activity, Full/half duplex.
Management	Serial login, Telnet login, GUI (Graphical User Interface)
EMI Compliance	Radiated & conducted emissions - complies with Class B limits of EN 55022:1998 Direct & Indirect ESD - complies with EN55024:1998 RF Electromagnetic Field Immunity - complies with EN55024:1998 Electrical Fast Transient/Burst Immunity - complies with EN55024:1998 Power Frequency Magnetic Field Immunity complies with N55024:1998 RF Common Mode Conducted Susceptibility complies with EN55024:1998

Shelf Description

Slot/Chassis	Description	Part Number
Slot 1	-48 VDC Shelf Power Supply Card (supports upto 32 echo cancellers)	VCL-EC-1295
Slot 2	-48 VDC Shelf Power Supply Card (supports upto 32 echo cancellers) - (for redundancy)	VCL-EC-1295
Slot 3	Control Card for shelf configuration - allows the user to access cofigure and control upto 32 T1 echo cancellers	VCL-EC-1251-CC-4-T1
Slot 4 to Slot 11	EC Echo Canceller Card (4T1 Echo Cancellers per card)	VCL-EC-1252-Quad-T1
Chassis	19 inch shelf - 6U High (sub-rack) and connectorized backplane, (one, 19-inch shelf can accommodates upto 32 T1 echo cancellers)	VCL-EC-1253-T1

Mechanical Specifications

Rack Mounting	Standard 19 Inch. DIN Rack
Height	266.66mm.
Depth	292mm.
Width	482mm.
Weight	10.00 kg. (32, Echo Cancellers)

Compliance/Regulatory

• FCC Part A
• Operation ETS 300 019 Class 3.2
• Storage ETS 300 019 Class 1.2
• Transportation ETS 300 019 Class 2.3
• CE

Note:

Technical specifications are subject to changes without notice.

Revision 08 - December 30, 2006

Headquarters: Phoenix, Arizona

Orion Telecom Networks Inc.

20100, N 51st Ave, Suite B240,
Glendale AZ 85308
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