

# VALIANT COMMUNICATIONS LIMITED



**VCL-EC™**

**T1 Quad Echo Canceller**

**(Upto 32 Echo Cancellers per Shelf/Chassis)**

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**T1 Quad Echo Canceller**

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**Product Brochure & Data Sheet**

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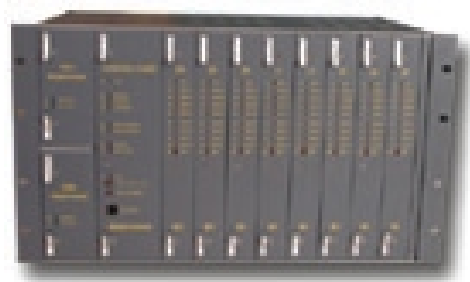
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## Product Overview

Valiant Communications provides robust and cost effective T1 Quad Echo Cancellor for the long distance, wireline, wireless, (GSM, CDMA), VoIP, satellite and radio communications.

The Quad VCL-EC, T1 Echo Cancellor 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 Cancellor

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 Cancellor 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 Cancellor 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 Cancellor - 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 Cancellor

### Datacomm Applications

- Voice over Frame Relay
- Voice over ATM
- Voice over Internet/LAN (VoIP)

### Central Office and PBX Applications

- Network Trunks
- Echo Cancellor 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 Cancellor 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.

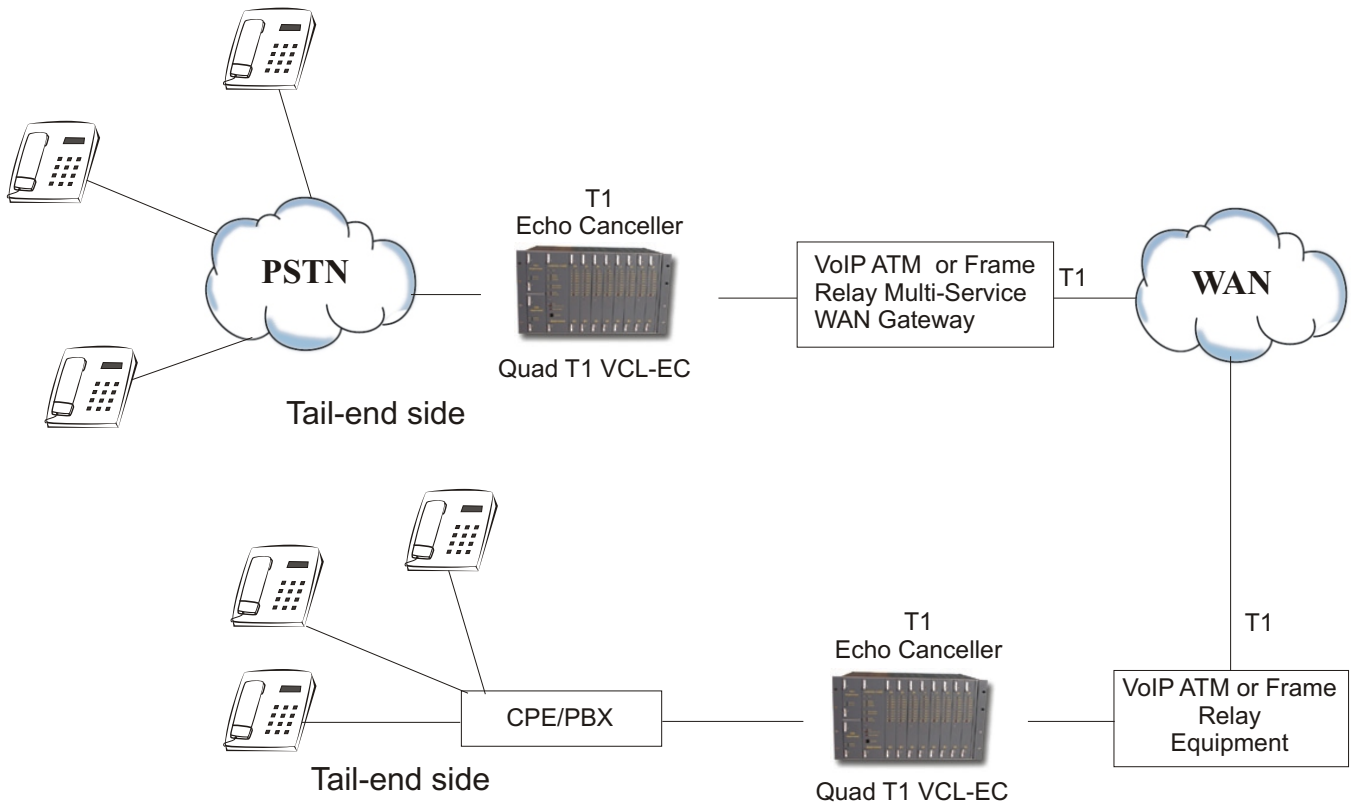
**USER PROGRAMMABLE dedicated data channels.** The user may specify/define the dedicated data channels so that they are always and completely by-passed from the echo cancellation circuitry - leaving those specifically assigned dedicated time-slots for digital data transmission (including video transmission).

## 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.

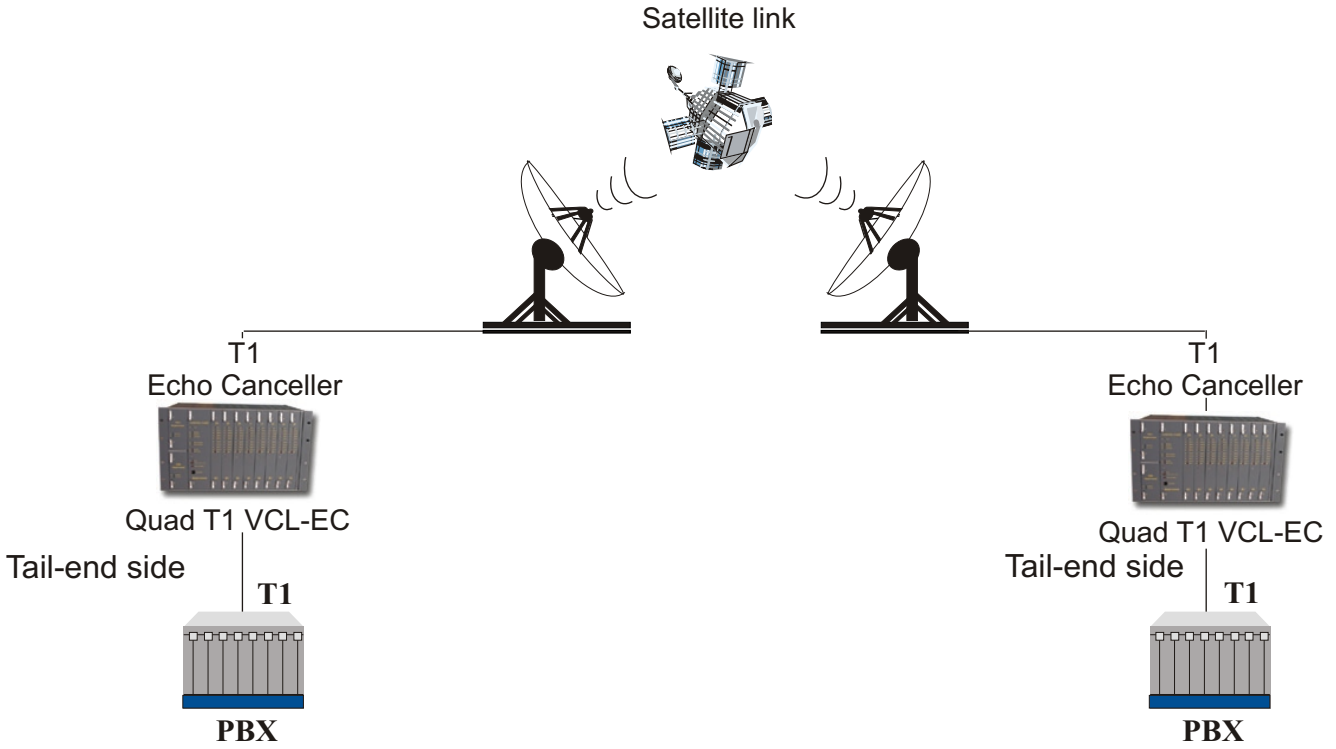
## Application Diagrams

### Application 1



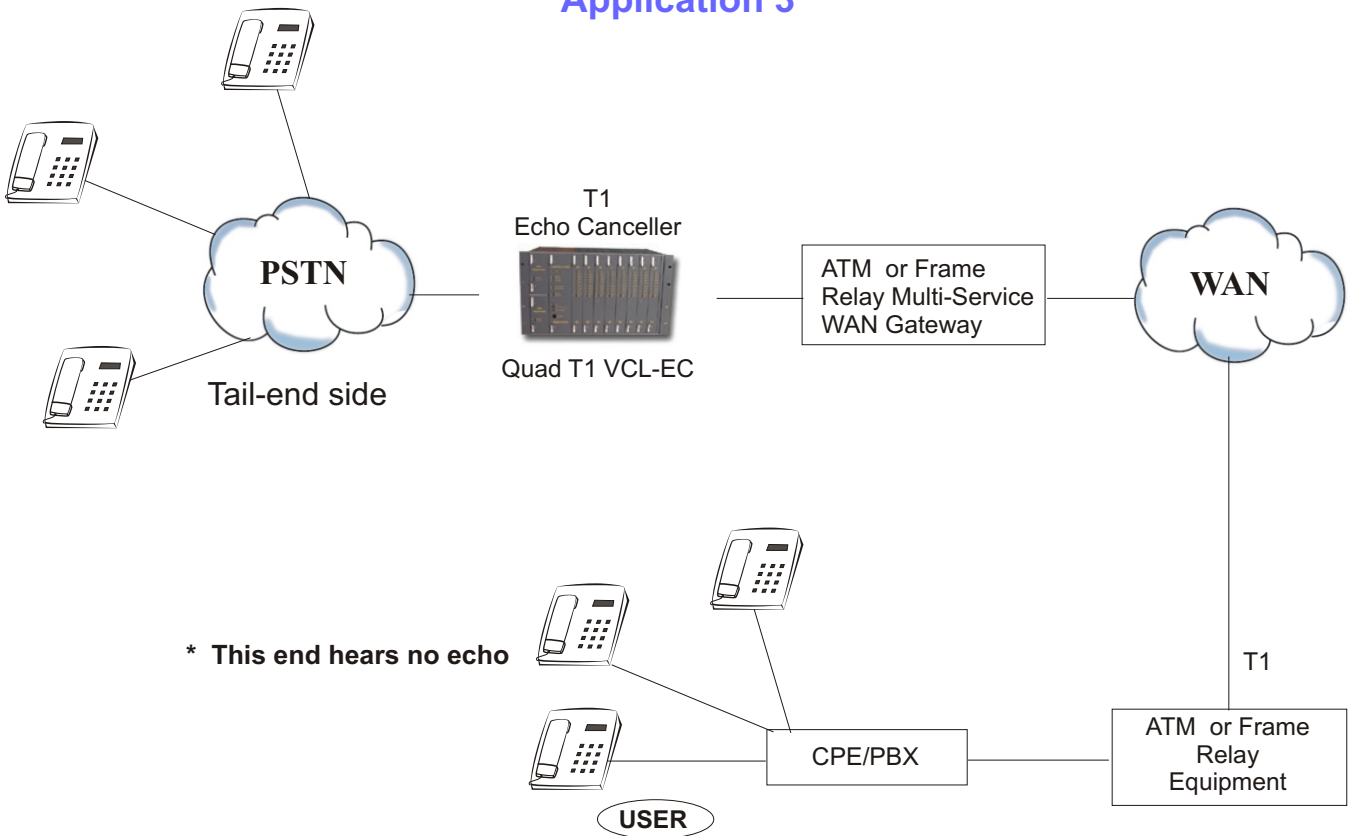
To cancel the echoes at both ends of the network with two 128ms. unidirectional echo cancellers.

### Application 2



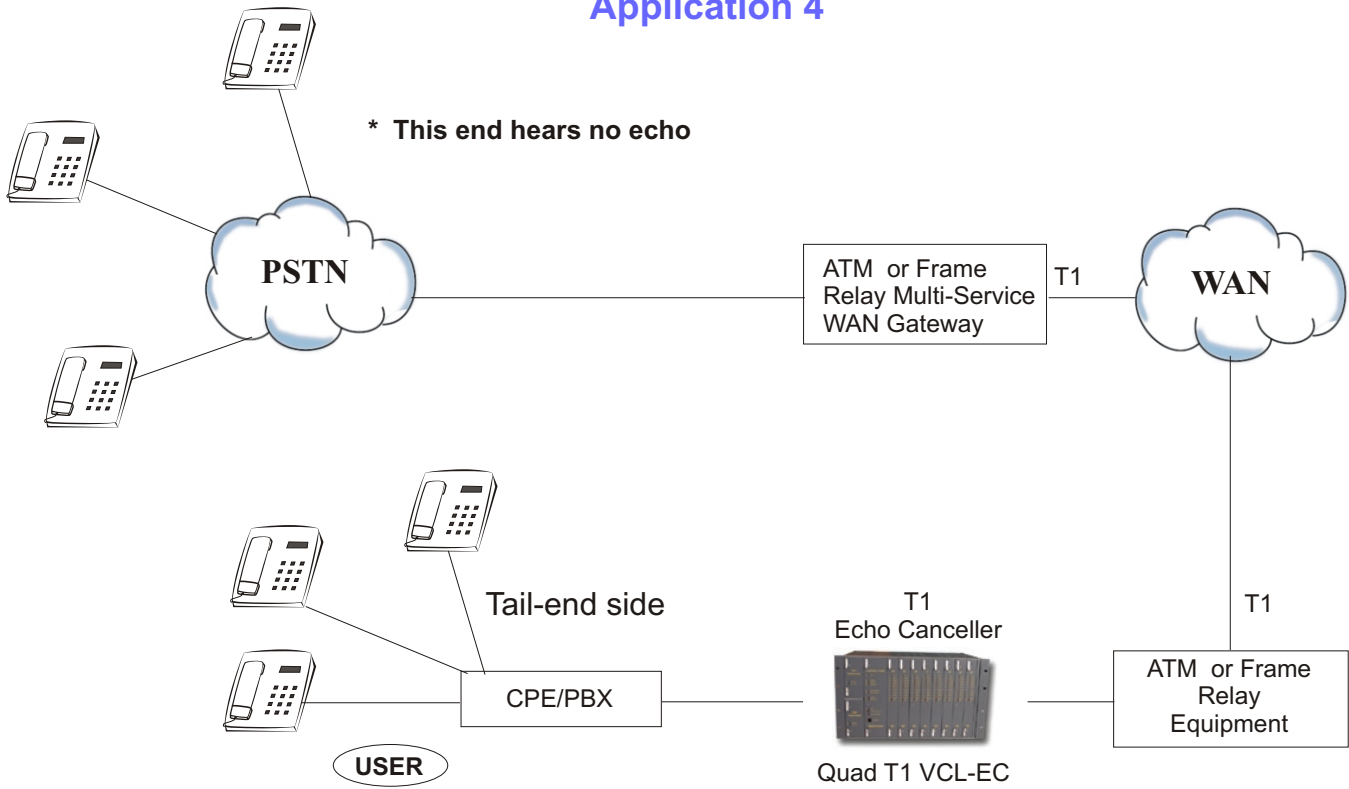
To cancel the echoes at both ends of the network with two 128ms. unidirectional echo cancellers.

### Application 3



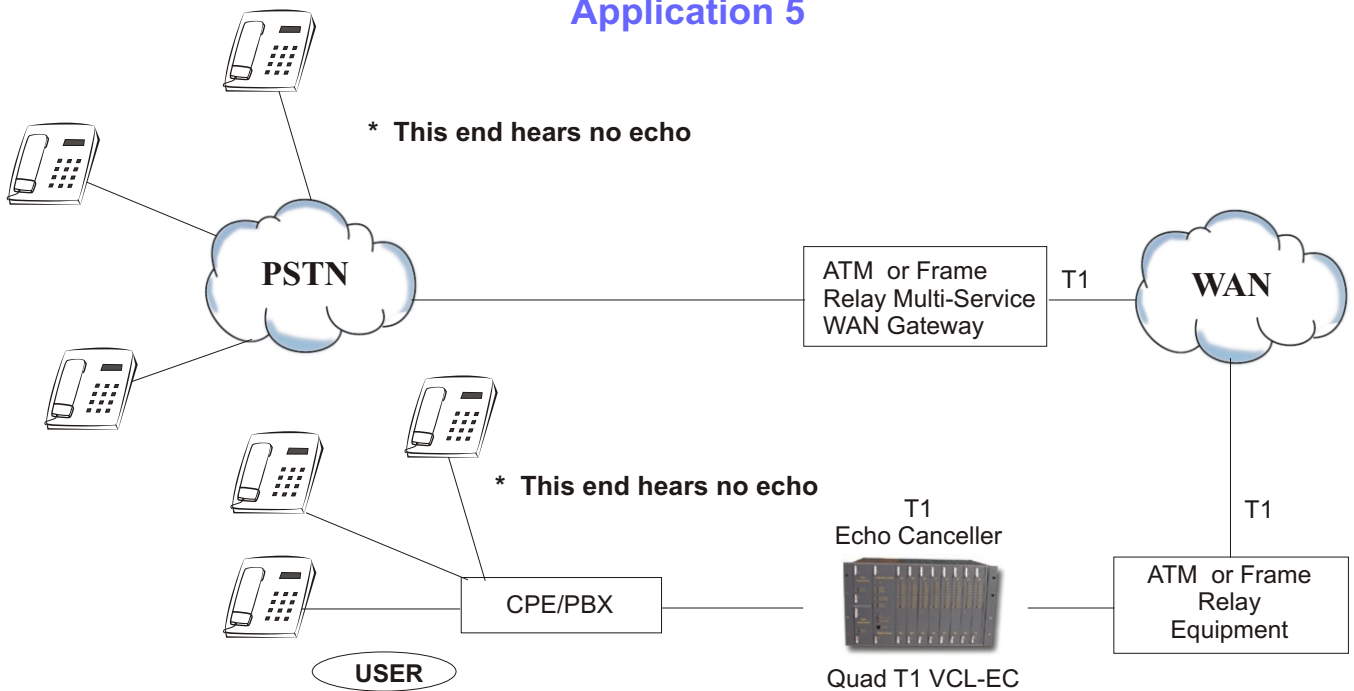
To cancel the echo at near end of the network with one 128ms. unidirectional echo canceller.

### Application 4



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

### Application 5

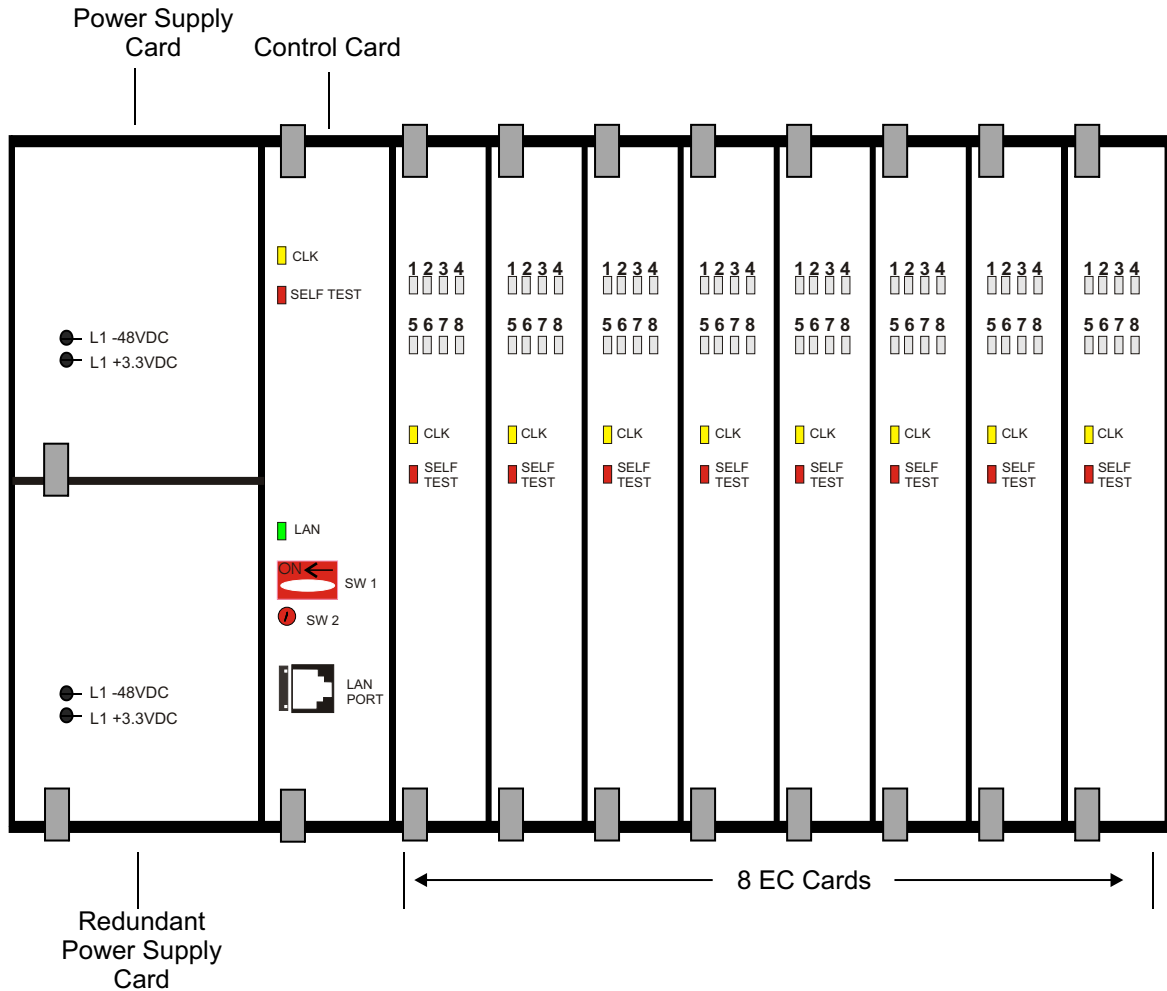


To cancel echoes at both ends of the network with one 64ms. bidirectional echo canceller

## 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 $\pm$ 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. <b>Note:</b> 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	< 0.250ms
1) Receive Channel	< 60 micro seconds
Local Monitoring and Control	RS232 serial interface for Management through a PC COM Port
<b>Remote Monitoring and Control</b>	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: -48V DC Power Supply (1+1)
Environmental - Operational	0° C to 50° 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 and conducted emissions - complies with Class B limits of EN 55022:1998 Direct and 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 V DC Shelf Power Supply Card (supports upto 32 echo cancellers)	VCL-EC-1295
Slot 2	-48 V DC 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 accomodates 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)

