

# E1 Voice Echo Canceller

## Product Overview

**VCL-EC-E1, E1 Voice Echo Canceller** is a fully integrated 30-channel echo canceller that cancels echo of up to 64ms / 128ms. Each of the 30 channels cancels echoes up to 64ms / 128ms with disable tone detection and meets ITU-T G.165 and ITU-T G.168 requirements for echo cancellation. E1 Inputs and E1 Outputs are balanced 120 Ohms, RJ-45.



## Types of Echo Cancellers Offered

User Selectable:

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

## Highlights

- Provides voice echo cancellation of up to 64ms / 128ms, User Selectable
- Meets ITU-T G.164 and G.165 and G.168 recommendations.
- Non-Linear Processor with Comfort Noise Insertion
- Redundant Power Supply (Optional)
- E1 Circuit by-pass in the event of power supply failure.
- Fully integrated independent 30-channel voice echo canceller
- Supports Signaling: 30B+D PRI ISDN , 31B (31 voice channels) with out-of-band, R2 CAS , SS7 - User Selectable

## Applications for the VCL-EC-E1

- Wireless: Digital Cordless, PCS, and Cellular Base Stations and Access Controllers.
- Digital Circuit Multiplication Equipment (DCME) : Satellite Communications and Multiplexers.
- PCS, cellular, 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 that provide a separate channel to carry V.32/V.32bis/V.34 modem 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, and voice over Frame Relay (VoFR).

### Datacomm Applications

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

### Satellite Communications Applications

- Digital Circuit Multiplication Equipment (DCME)

### Central Office and PBX Applications

- Network Trunks
- Echo Canceller Pool
- Common Equipment
- Audio Conferencing Bridges

### Wireless Applications

- Digital Cordless and Cellular Basestations
- Access Controllers

### 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

### 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.

## Key Features and Benefits

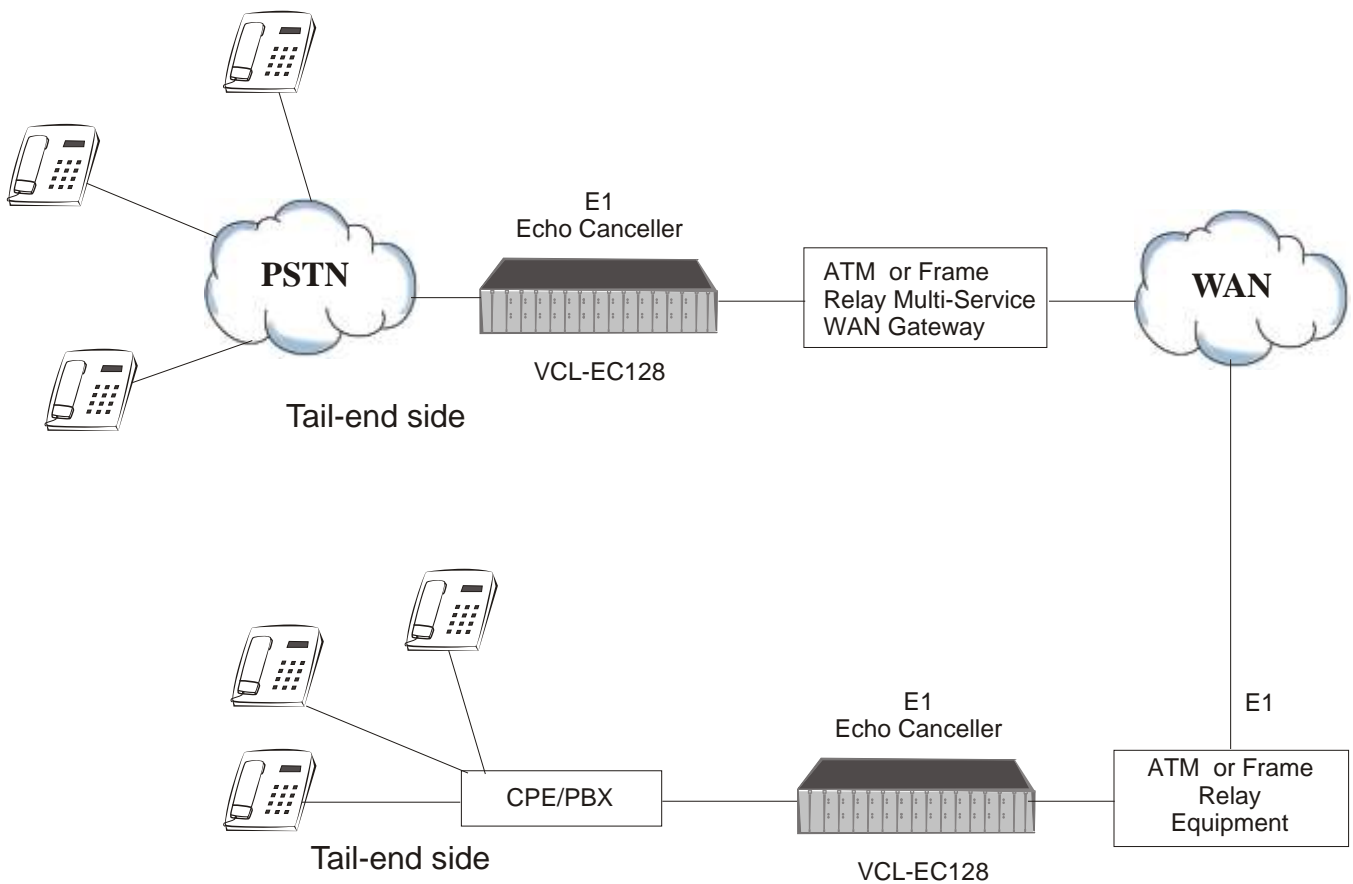
Features	Benefits
<ul style="list-style-type: none"> <li>• The echo-cancellers are "user configurable" for 64ms. Bi-directional, or 128ms. uni-directional echo cancellation. The user selection is made through a user configurable software interface command.</li> </ul>	<ul style="list-style-type: none"> <li>• Signaling Support: 30B+D PRI ISDN (Euro ISDN) signaling, 31B (31 voice channels) with out-of-band signaling, R2 CAS Signaling, SS7 signaling (on any user selected time-slot). All signaling options are USER SELECTABLE.</li> </ul>
<ul style="list-style-type: none"> <li>• 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 data / CCS signaling.</li> </ul>	<ul style="list-style-type: none"> <li>• TCP/IP remote access for remote configuration and control.</li> </ul>
<ul style="list-style-type: none"> <li>• Transmission (data mode), while keeping the echo cancellation "ON" on the remaining time-slots (voice mode), on which echo is required to be cancelled.</li> </ul>	<ul style="list-style-type: none"> <li>• Redundant Power Supply (Optional - to be ordered additionally).</li> <li>• E1 circuit by-pass in event of echo canceller card removal from chassis.</li> </ul>
<ul style="list-style-type: none"> <li>• Meets ITU-T G.164, G.165 and G.168 recommendations.</li> </ul>	<ul style="list-style-type: none"> <li>• Analog data / fax (2100 Hz) tone disable detection. Allows fax and analog modem data transmission through automatic echo- cancellation enable / disable function.</li> </ul>
<ul style="list-style-type: none"> <li>• E1 Circuit by-pass in event of power supply failure.</li> </ul>	
<ul style="list-style-type: none"> <li>• E1 Circuit by-pass on power failure</li> </ul>	<ul style="list-style-type: none"> <li>• This feature enables the by-pass of the E1 Circuit in the event of power failure. This ensure continues signal even if the power to the echo-canceller fails.</li> </ul>
<ul style="list-style-type: none"> <li>• E1 Circuit by-pass on Echo Canceller card removed</li> </ul>	<ul style="list-style-type: none"> <li>• This feature allows the USER to by-pass the E1 Circuit by simply removing the echo-canceller card E1 circuit connects thru as soon as echo-canceller is \ removed from its slot.</li> </ul>
<ul style="list-style-type: none"> <li>• User selectable tail-end side</li> </ul>	<ul style="list-style-type: none"> <li>• This feature allows the USER to select the "Tail-End" side of the Echo-Canceller. The "Tail-End" side of Echo-Canceller is that part of the network which generates / causes to generate the Echo. Uni-directional 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 which is generating the echo.</li> </ul>
<ul style="list-style-type: none"> <li>• ITU-T G.164/G.165 Disable Tone detection supported on all audio paths</li> </ul>	<ul style="list-style-type: none"> <li>• Ideally suited to handle most echo situations.</li> </ul>
<ul style="list-style-type: none"> <li>• Non-Linear Processor with adaptive suppression threshold and comfort noise insertion</li> </ul>	<ul style="list-style-type: none"> <li>• 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</li> </ul>
<ul style="list-style-type: none"> <li>• Programmable Double-Talk detection threshold</li> </ul>	<ul style="list-style-type: none"> <li>• Removes residual echo and minimizes switching effects thereby providing high perceived speech quality. Unique design provides the industry's best sounding single chip echo canceller.</li> </ul>
<ul style="list-style-type: none"> <li>• Narrow-Band signal detection</li> </ul>	<ul style="list-style-type: none"> <li>• Ensure 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.</li> </ul>

- Usable in telecommunications systems worldwide. Able to interface in most systems where linear samples are available
- Ensure echo canceller maintains excellent performance at all times in presence of tones or signals including DTMF tones.

## Application Diagrams

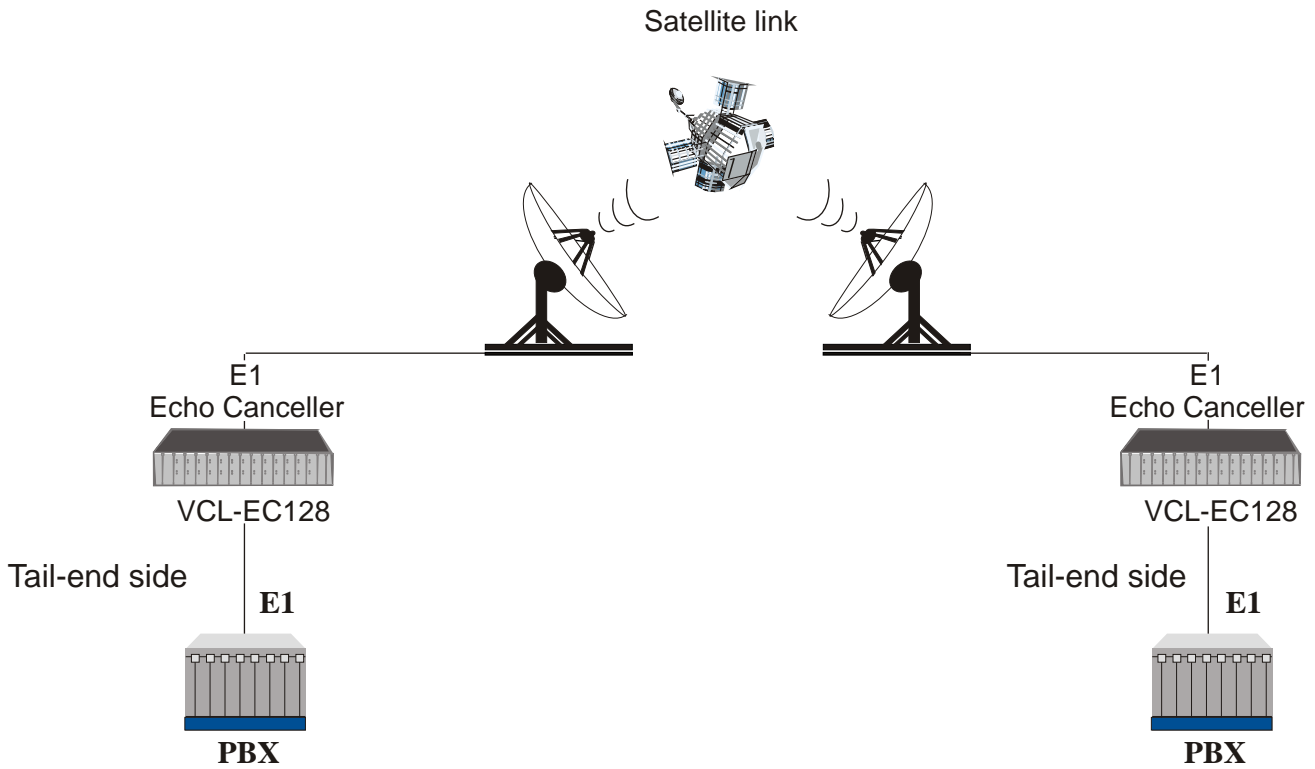
### VCL - EC - E1 Echo Cancellers

#### Application # 1



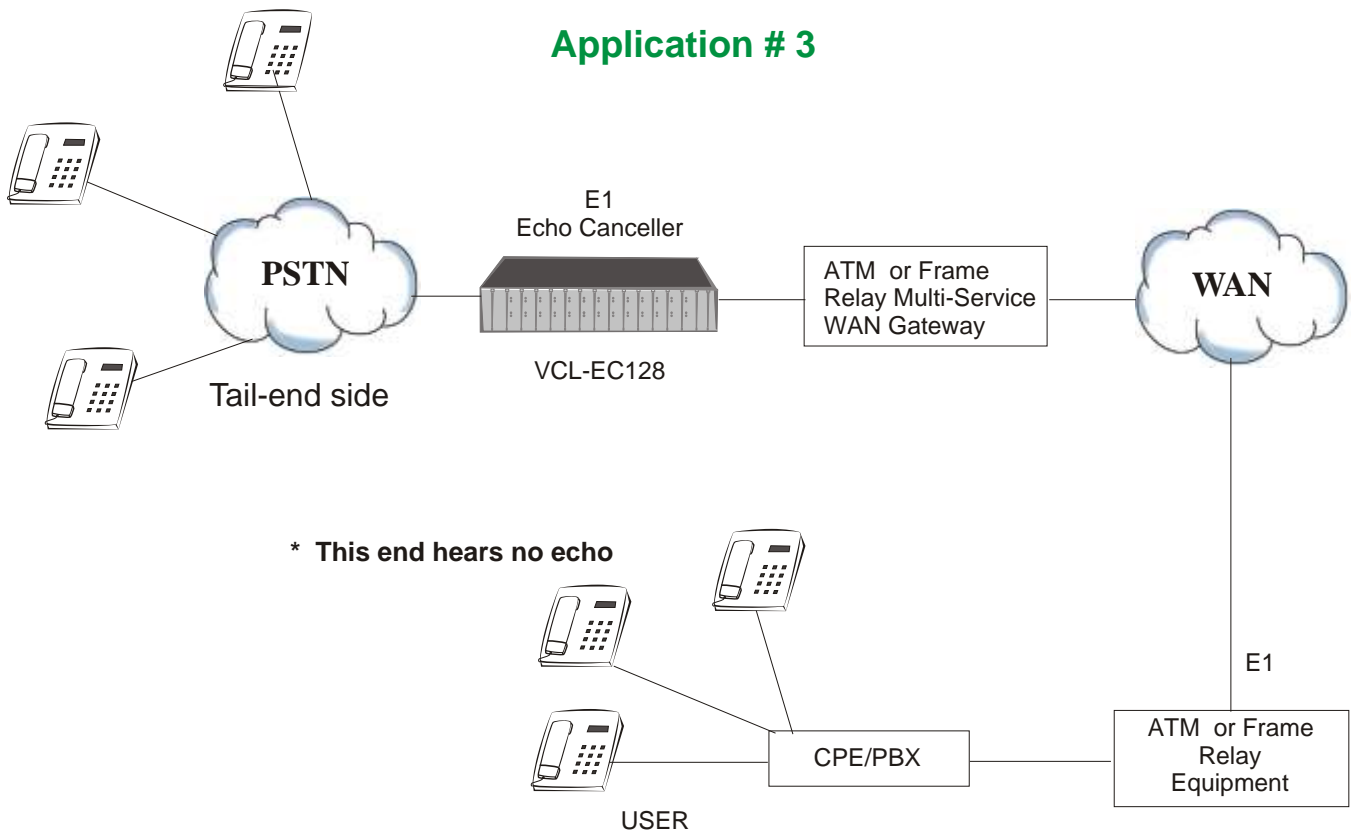
**To Cancel the echoes at both ends of the Network with two 128ms Uni-Directional Echo-Cancellers.**

### Application # 2



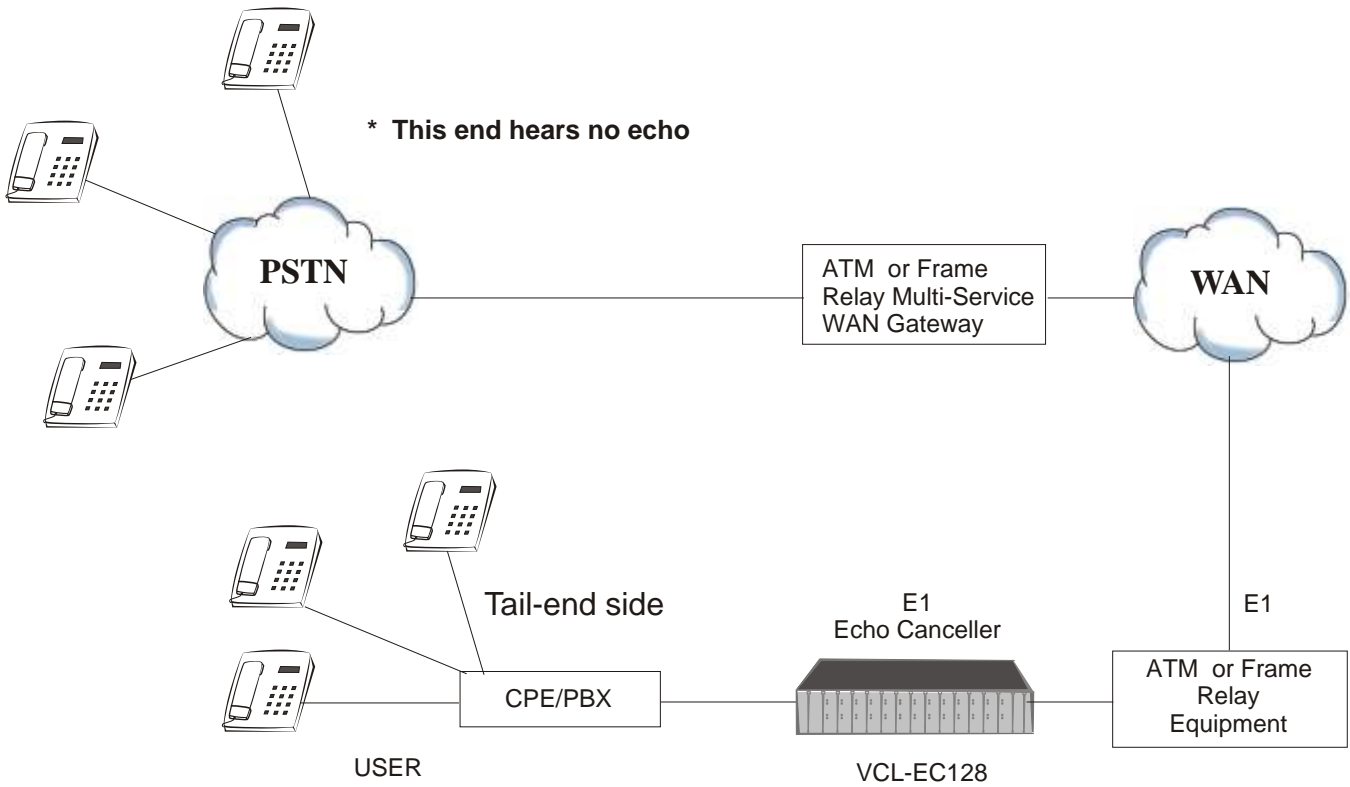
To Cancel the echoes at both ends of the Network with two 128ms Uni-Directional Echo-Cancellers.

### Application # 3



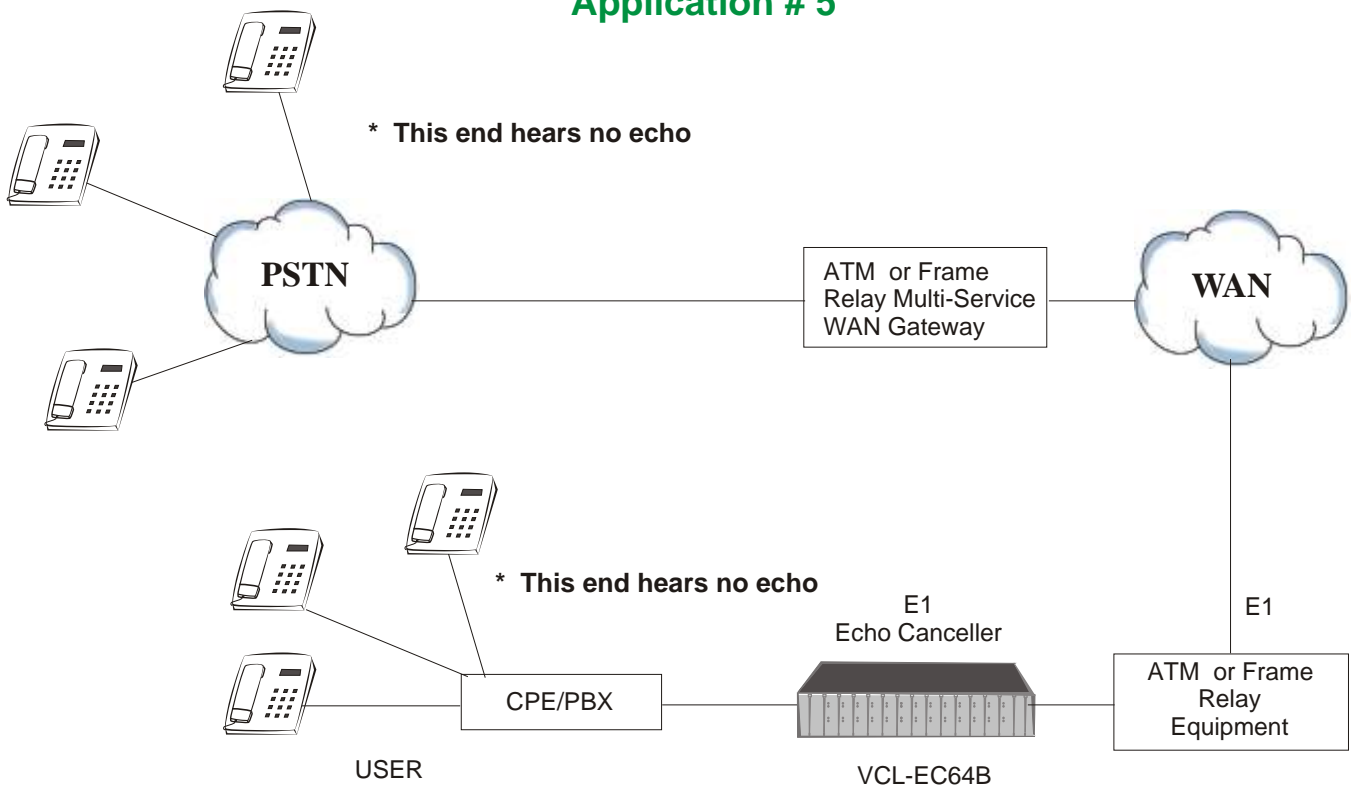
To Cancel the echo at near end of the Network with one 128ms Uni-Directional Echo-Canceller.

### Application # 4



To Cancel the echo at far end of the Network with one 128ms Uni-Directional Echo-Canceller.

### Application # 5

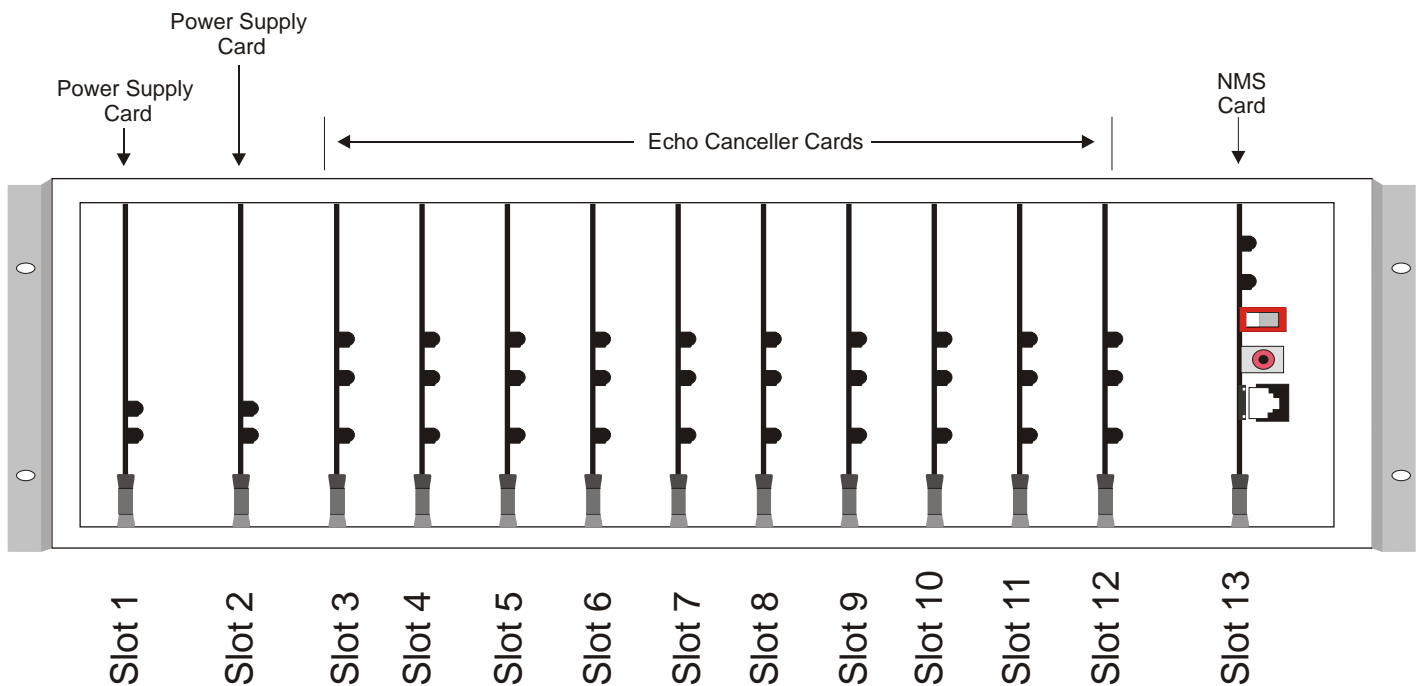


To Cancel echoes at both ends of the Network with one 64ms Uni-Directional Echo-Canceller.

## VCL-EC-E1, E1 Voice Echo Canceller SHELF DESCRIPTION:

The VCL-EC-E1, E1 Voice Echo Canceller is a 3U, 19 Inch Shelf, fitted with a backplane that provides rear access of all external interfaces. The E1 interface, power input, alarm extension are all accessed from the system backplane.

### Front View of the Shelf



Front View (Left to Right)	Card Details	Part No.
Slot 1:	PS, Power Supply Card	VCL-LD-110
Slot 2:	PS, Power Supply Card	VCL-LD-110-2
Slot 3 to Slot 12:	EC, Echo Canceller Card (64ms / 128ms Echo Cancellation)	VCL-EC64B/128U
Slot 13:	NMS Card	VCL-EC128-NMS

### Mechanical Specifications

Rack Mounting	Standard 19 Inch. DIN Rack
Height	133.33mm.
Depth	292mm.
Width	482mm.
Weight	7.50 Kg. (10, Echo Cancellers)

# TECHNICAL SPECIFICATIONS

## Echo Canceller Technical Specification

- Provides voice echo cancellation of up to 64ms / 128ms (both options available)
- Meets ITU-T G.164 and G.165 and G.168 recommendations.
- Non-Linear Processor with Comfort Noise Insertion
- Redundant Power Supply (Optional)
- E1 Circuit by-pass in the even of power supply failure.
- Fully integrated independent 30-channel voice echo canceller
- Supports Signaling: 30B+D PRI ISDN, 31B (31 voice channels) with out-of-band, R2 CAS, SS7 - User Selectable

## E1 Interface at 2048 Kbps

Number of Interfaces	2, 1 - Input (RJ-45) 1 - Output (RJ-45)
Conformity	G.703
Frame Structure	As per ITU (CCITT) G.704
Signaling	Pass-Through
PCM Sampling Rate	8000 Samples / sec
Encoding Law	A Law as per ITU (CCITT) G.711
Bit Rate	2048 Kbps $\pm$ 50 ppm
Code	HDB3
Nominal Impedance	120 $\Omega$ balanced
Peak Voltage of a mark For 120 $\Omega$ Balanced interface	3.0 V $\pm$ 0.3 V
Peak Voltage of a space for 120 $\Omega$ Balanced interface	0 V $\pm$ 0.3 V
Nominal Pulse Width	244 ns
Pulse Mask	as per ITU (CCITT) Rec. G.703
Output Jitter	< 0.05 UI (in the frequency range of 20Hz to 100 KHz)
Permissible Attenuation	6 dB at 1 MHz
Return Loss at:	
51.2 KHz to 102.4 KHz	> 12dB
102.4 KHz to 2048KHz	> 18dB
2048KHz to 3072 KHz	> 14dB
Jitter Tolerance	As per ITU (CCITT) G.823
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	+5V
Full Load Output Current	4A at +5V, (10, Echo Cancellers)
Input Voltage Reversal Protection	Provided in the Card
Over Current Protection	10A for +5V
Short Circuit Protection	Current limit - 10A. Recovers on removal of short
Under Voltage	< 4.5V
Over Voltage	5.4V to 5.6V
Efficiency at full load	>70%
Ripple at full load	<5mVrms
Spike at full load	<50mV

## Power Consumption of E1 Echo Cancellers

Card in Use	Current (amp.)	Power Consumption (Watt)
Input Voltage = - 48 Volt		
1 EC Card + PSU Card + NMS Card	0.17	8.1
10 EC Cards + PSU Card + NMS Card	0.89	42.7

## NMS (with Telnet) xPort Specifications

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	Internal web server, SNMP (read only), Serial login, Telnet login
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 EN55024:1998 RF Common Mode Conducted Susceptibility - complies with EN55024:1998

## Ordering Information

Sr. #	Product Description	Part #
1.	19 inch shelf - 3U High (sub-rack) and Connectorized Backplane, 3U High (One 3U high, 19-inch shelf can accomodate upto 10, echo cancellers)	E1, VCL-EC128-000 / 105
2.	- 48 VDC Power Supply Card, Shelf Power Supply Card (supports upto 10, echo cancellers)	VCL-LD-110
3.	GUI Access Card for shelf Configuration - allows the user to access, configure and control upto 10, echo-canceller cards - includes configuration and management software for Windows 98, Windows 2000 and Windows XP	VCL-EC128-NMS
4.	Power Supply (External) AC to DC Converter - External Converter Universal AC Input [93VAC-276VAC, 47Hz - 63Hz] to DC Output (-)48 VDC	VCL-30-01048-RK-150W
5.	User & Installation Manual	User Manual
6.	E1 Echo Canceller Card, provides 64ms / 128ms Echo Cancellation	VCL-EC64B/128U

Technical specifications are subject to change without notice.  
All brand names and trademarks are the property of their respective owners.