ORION TELECOM NETWORKS INC.

VCL-EC™
E1 Quad Echo Canceller
(Upto 32 Echo Cancellers per Shelf/Chassis)

E1 Quad Echo Cancellers

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.

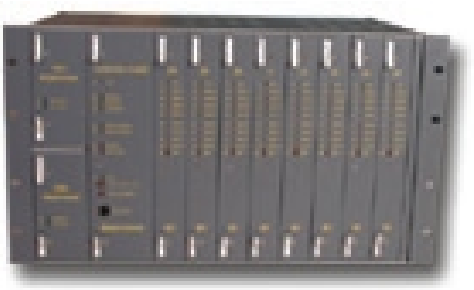
4000 Ponce de Leon Blvd. Suite 470,
Coral Gables, FL 33146 U.S.A.
Phone: 1-305-777-0419,
Fax: 1-305-777-0201
E-mail: sales@oriontelecom.com
Website: http://www.oriontelecom.com

INDEX

Product Overview

Orion Telecom Networks Inc. provides robust and cost effective E1 and T1 Quad Echo Canceller for the long distance, wireline, wireless, (GSM, CDMA), VoIP, satellite and radio communications.

The Quad VCL-EC, E1 Echo Canceller card offers 4xE1 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 E1 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 E1 Echo Canceller support the following signaling protocols:

- 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/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 E1 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 E1 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: 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/User Programmable.
- 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).

Fault Recovery

The echo canceller equipment offers fault recovery feature. It offers automatic by-pass upon power-supply failure/removal power supply. (i.e. it offers E1 circuit by-pass in the event of power supply failure).

Applications for the Quad E1 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 Base stations
- 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 E1 VCL-EC, E1 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 E1 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 E1 connections on the echo canceller card.

USER PROGRAMMABLE Signaling Option. Our echo cancellers provide user programmable E1 signaling options. The E1 signaling protocols that we support are 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.

Quad E1 VCL-EC, E1 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 E1 circuit for dedicated video you may do so, using our E1 echo cancellers. Our E1 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.

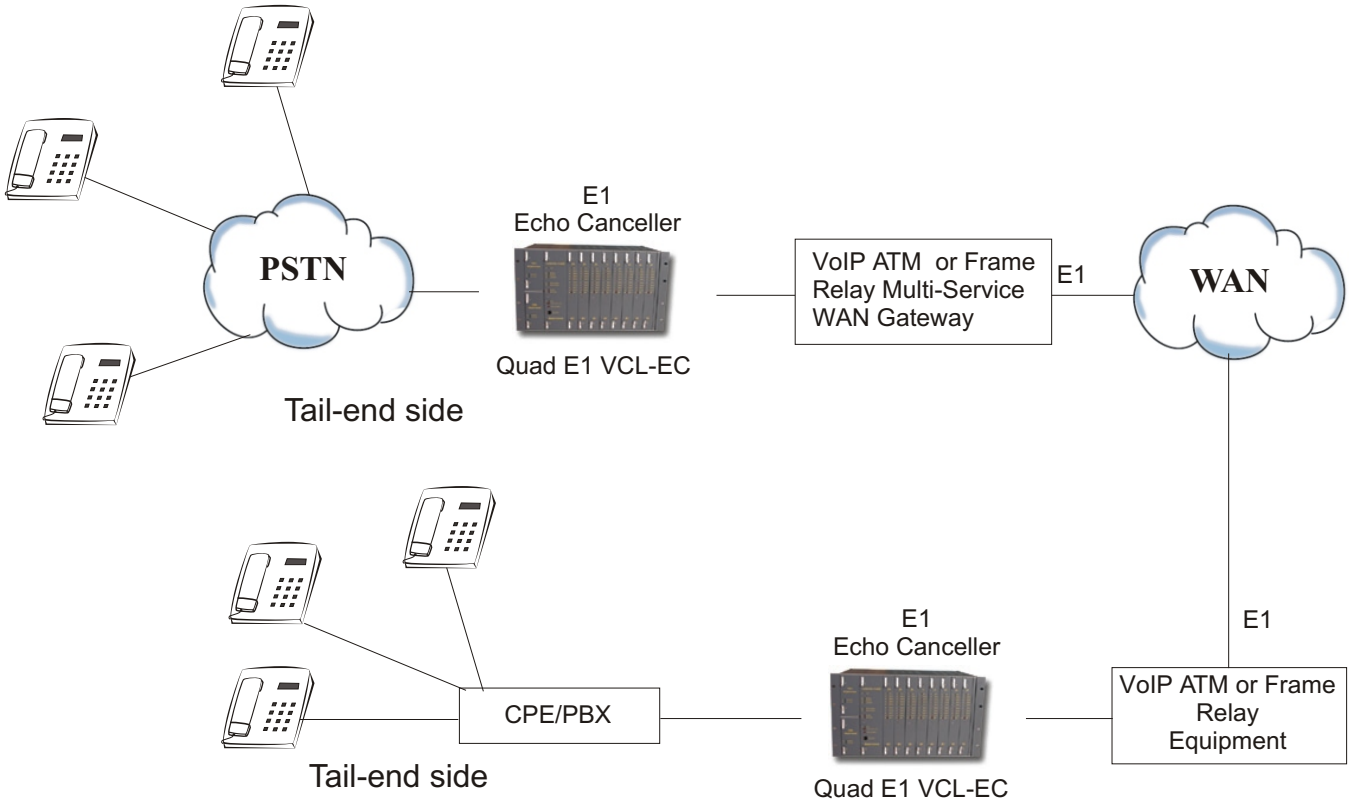
USER PROGRAMMABLE dedicated data channels. The User may specify/define the dedicated data channels so that they are always and completely by-passed from the echo cancellation circuitry - leaving those specifically assigned dedicated time-slots for digital data transmission (including video transmission).

Quad E1 VCL-EC, E1 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 to 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 30-channels 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.
- E1 Circuit by-pass in event of power supply failure. This feature enables the by-pass of the E1 Circuit in the event of power failure. This ensures continuos signal even if the power to the echo canceller fails.
- E1 Circuit by-pass on power failure.
- E1 Circuit by-pass on echo canceller card removed. This feature allows the USER to by-pass the E1 Circuit by simply removing the echo canceller card. E1 circuit connects "through" as soon as echo canceller is removed from its slot.
- 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).
- 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 Slectable/User Configurable.
- Non-linear processor with comfort noise insertion.
- TCP/IP remote access for remote configuration and control.
- 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.
- 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.
- Ensure echo canceller maintains excellent performance at all times in presence of tones or signals including DTMF tones.
- Instability detector suppresses variable pitched ringing or oscillation.
- 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 which 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.

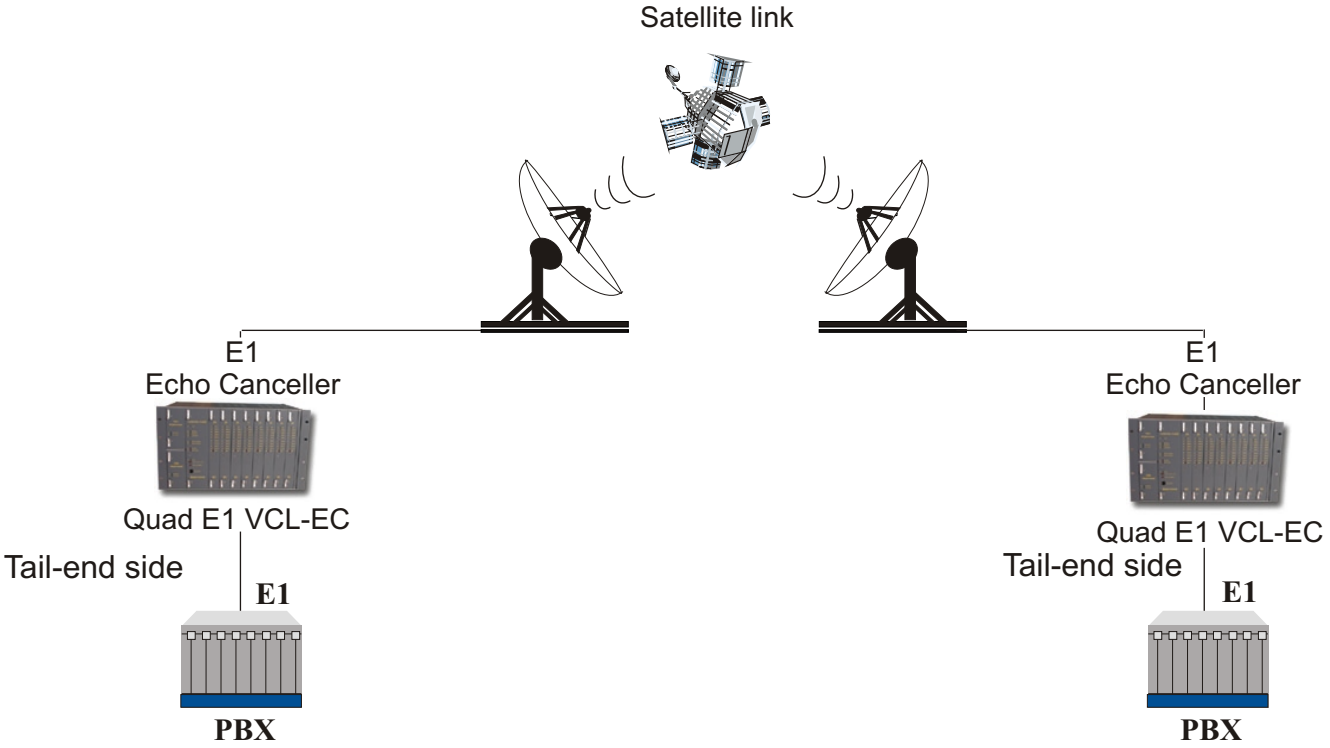
Application Diagrams

Application 1



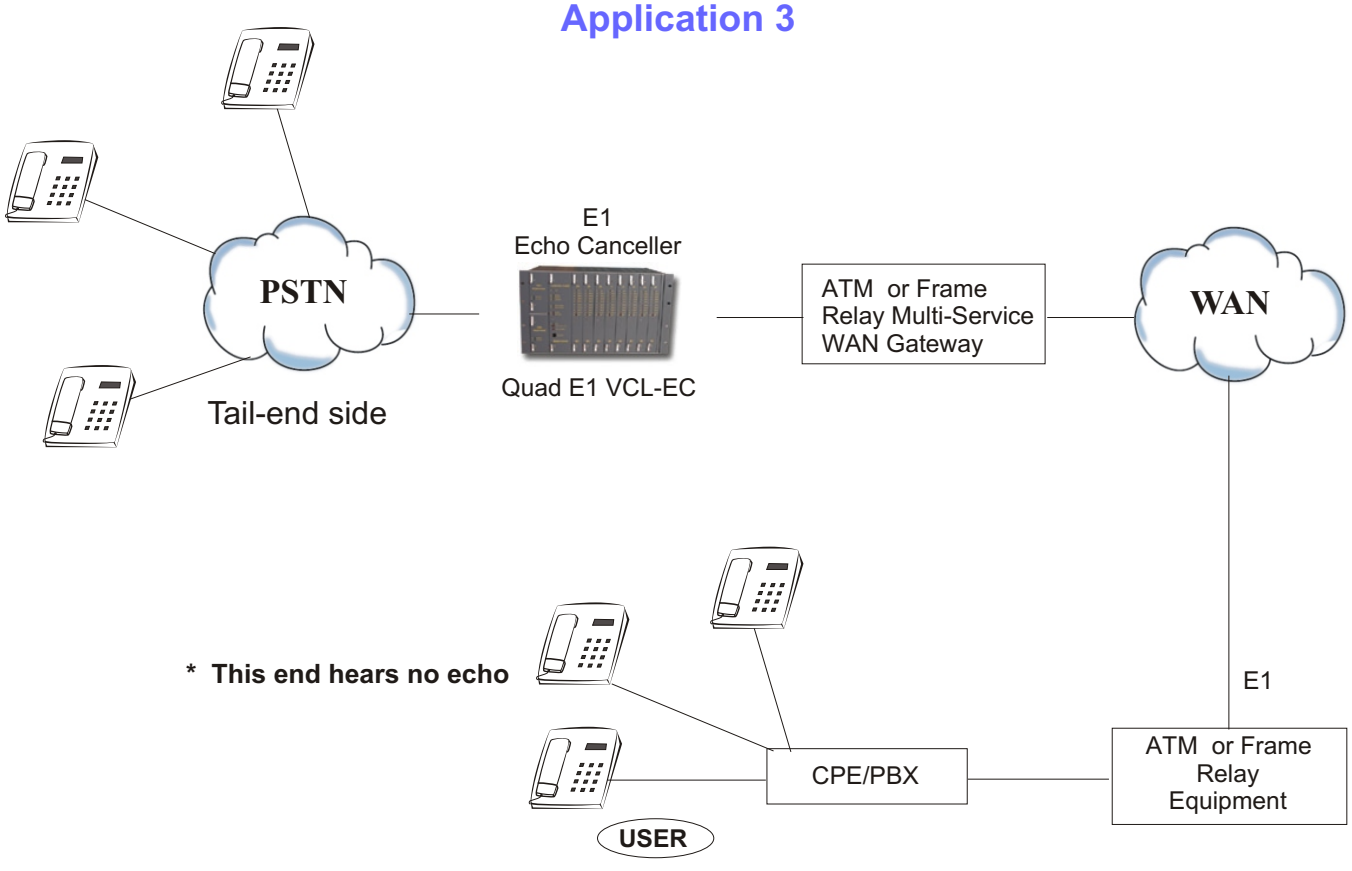
To cancel the echoes at both ends of the network with two 128ms. unidirectional echo cancellers.

Application 2



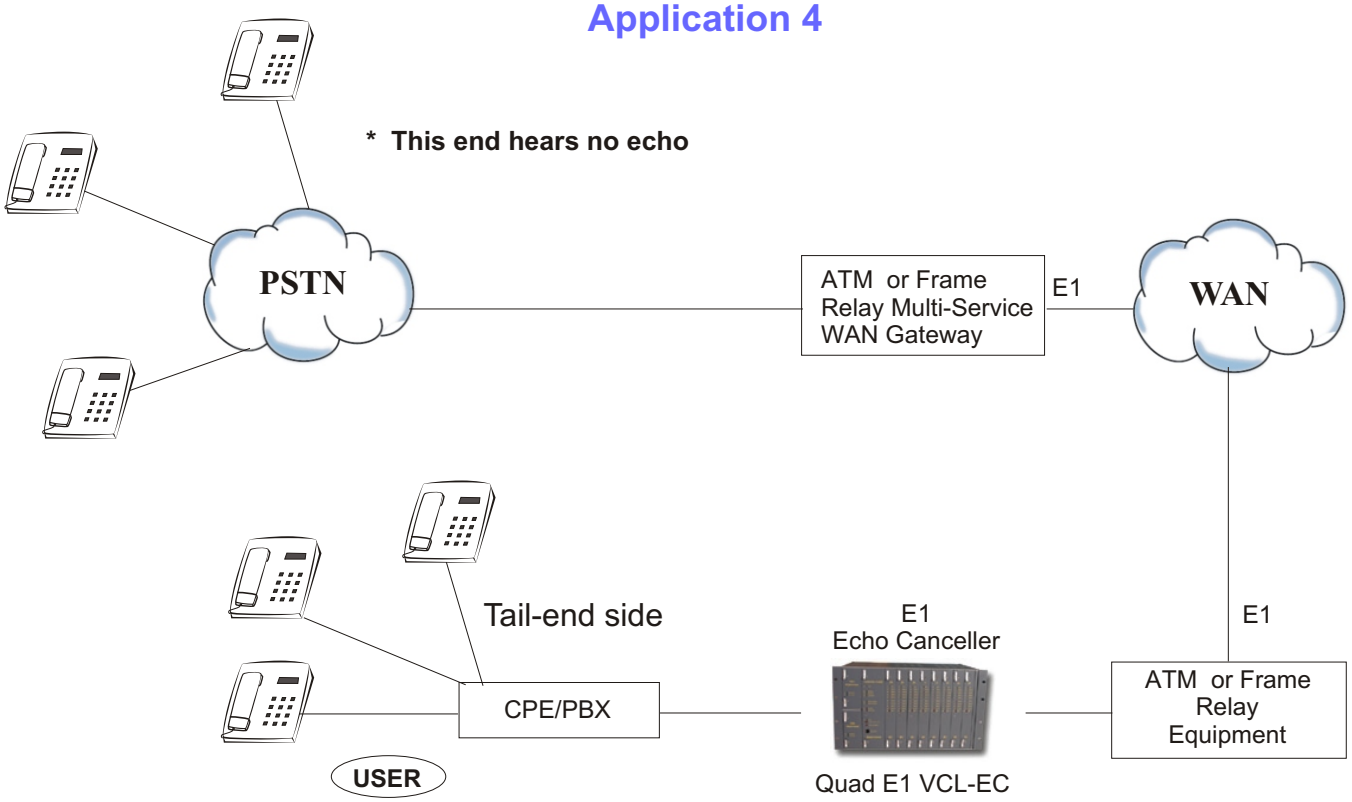
To cancel the echoes at both ends of the network with two 128ms . unidirectional echo cancellers.

Application 3



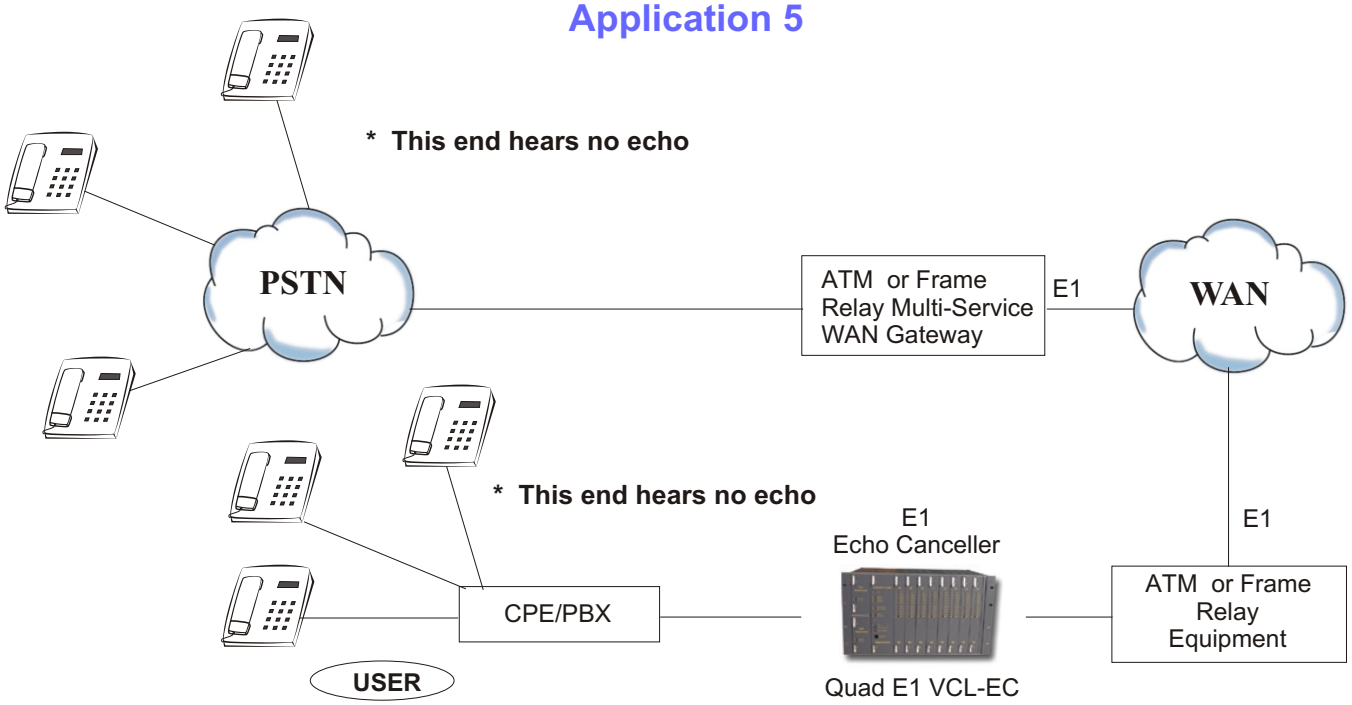
To cancel the echo at near end of the network with one 128ms. unidirectional echo canceller.

Application 4



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

Application 5

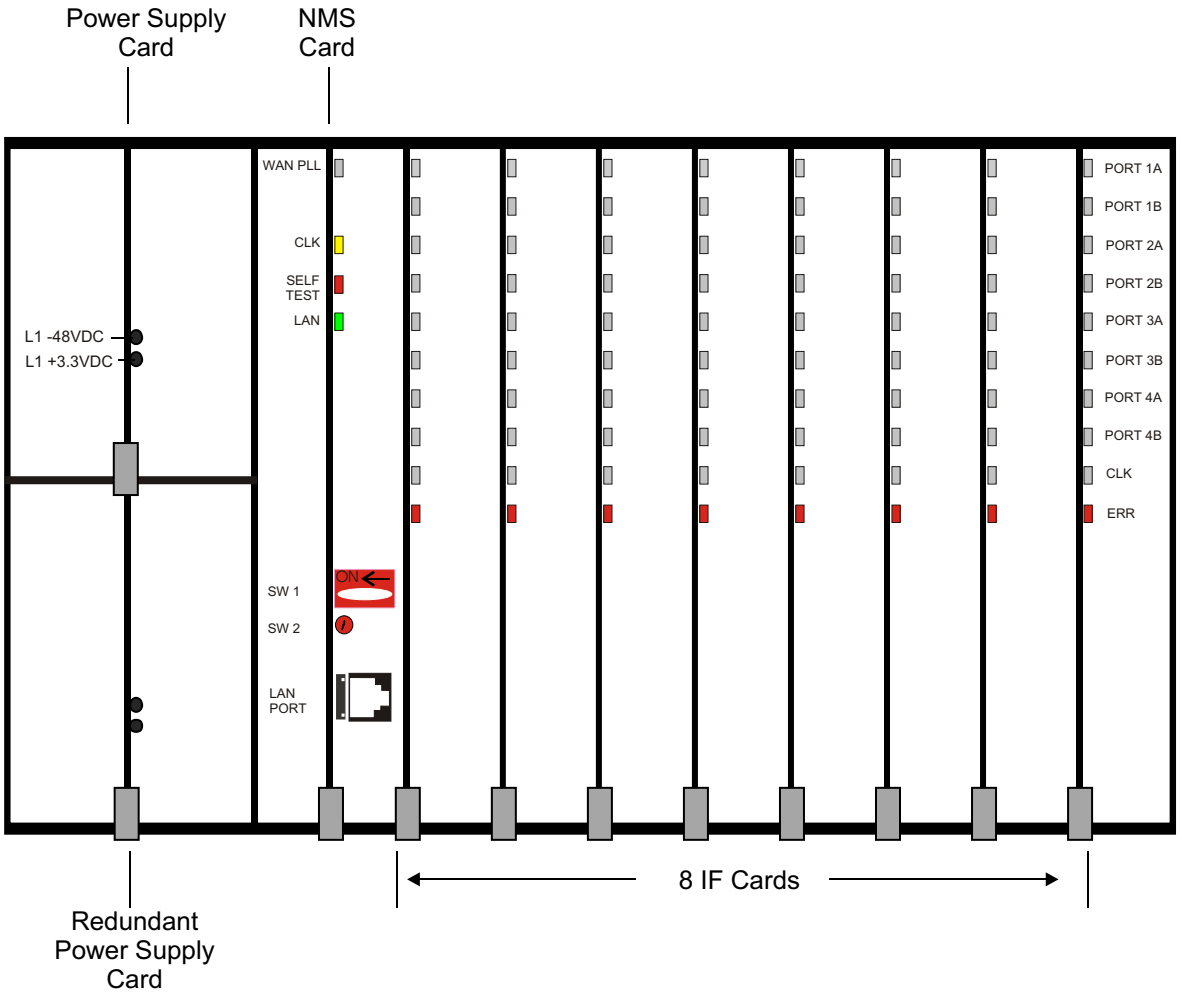


To cancel echoes at both ends of the network with one 64ms bidirectional echo canceller.

Quad E1 VCL-EC, E1 Voice Echo Canceller Shelf Description

The Quad E1 VCL-EC, E1 Voice Echo Canceller, 32 per Shelf/Chassis is fitted with a back plane that provides rear access of all external interfaces. The E1 interface, power input and alarm extension are all accessed from the system backplane.

Quad E1 VCL-EC, E1 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	NMS Card	VCL-EC-1251-NMS-4-E1
Slot 4 to Slot 11	EC, Echo Canceller Card (4 E1 Echo Canceller per Card)	VCL-EC-1252-Quad-E1

Technical Specifications
Network Interface

Number of Echo Cancellers	32 E1 Echo Cancellers (4 E1 Echo Cancellers per EC card)
per shelf	32 E1 Inputs (RJ-45) 32 E1 Outputs (RJ-45)
Line Rate	E1 - 2.048 Mbps
Line Code	HDB3 as per ITU-T G.703, G.704
Frame Structure	As per ITU-T G.704
PCM Encoding Law	A-Law as per ITU-T G.711
Signaling	Pass-Through Signaling protocols supported: - 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
PCM Sampling Rate	8000 samples/sec
Bit Rate	2048 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	120 Ohms Balanced RJ45
Peak Voltage of a mark For 120 Ohms Balanced interface	 3.0 V ± 0.3 V
Peak Voltage of a space for 120 Ohms Balanced interface	 0 V ± 0.3 V
Nominal Pulse Width	244 ns
Pulse Mask	as per ITU (CCITT) Rec. G.703
Permissible Attenuation	6 dB at 1 MHz
Return Loss at: 51.2 KHz to 102.4 Khz 102.4 KHz to 2048KHz 2048KHz to 3072 Khz	 > 12dB > 18dB > 14dB
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 Voltage	+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

Power Consumption of Quad E1 Echo Cancellers

Card in Use	Current (in Amps.)	Power Consumption (in Watts)
Input Voltage = - 48 Volt DC 1 EC Card + PSU Card + NMS Card	0.22	11.0
8 EC Cards (32 E1 Echo Cancellers) + PSU Card + NMS Card	1.56	75.0

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 Desabler (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 Back panel (3 Pin Connector)

Clock

Internal	(Straum 3 level)
Loop-timed	Port A / Port B (User Selectable)

Management Port Specifications RS232 COM Port

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

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	GUI Access Card for shelf configuration - allows the user to access cofigure and control upto 32 E1 echo cancellers - includes configuration and Management software for Windows 98, Windows 2000 and Windows XP	VCL-EC-1251-NMS-4-E1
Slot 4 to Slot 11	EC Echo Canceller Card (4E1 Echo Cancellers per card)	VCL-EC-1252-Quad-E1
Chassis	19 inch shelf - 6U High (sub-rack) and connectorized backplane, (one, 19-inch shelf can accommodates upto 32 E1 echo cancellers)	VCL-EC-1253-E1

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

• EMC FCC Part 15 Class 2
• 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.
All brand name and trademarks are the property of their respective owners.
Revision 07 - November 20, 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