



VCL-MX™ Version 2-DLX (Deluxe Version) 4 x E1, 30 Channel Drop-Insert Voice and Data Multiplexer

VCL-MX, Voice and Data Multiplexer

Product Brochure & Data Sheet

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Product Overview

The VCL-MX Version 2-DLX, (Deluxe Version), 4 E1, 30 Channel Voice and Data, Drop-Insert Multiplexer provides full range of POTS (voice) and digital data services to subscribers located at different locations, requiring to interconnect and establish a voice and data network over an E1 link. The VCL-MX Version 2-DLX is a simple, yet powerful E1 Channel Bank for connecting and integrating analog communication equipment with digital E1 services.



The VCL-MX Version 2-DLX, 4 E1, Drop-Insert Multiplexer provides voice telephony and digital data services which may include:

The Multiplexer may be used in Terminal or Drop-Insert configuration to provide:

- Toll Quality Voice Services
- Interconnect LAN (Campus Network)
- Interconnect Computer Terminals
- Provide LAN-WAN Interconnectivity
- Provide Leased Lines on DSL for SOHO Applications

Voice Interface

- FXO, FXS
- E&M (2 Wire and 4 Wire)
- FXS-FXS (Hot-line)
- GEN-GEN Magneto

Data Interface

- RS232
- G.703 @ 64 Kbps, co-directional

The VCL-MX Version 2-DLX, E1 Interface operates at a primary rate of 2.048 Mbits/sec and provides a host of features including, channel drop and insert facility over a network of VCL-MX E1 Multiplexers, for voice and data applications.

The VCL-MX Version 2-DLX has an effective, CLI (text) and GUI (Graphical User Interface) based "Network Management System", which may be used for configuring the system, subsequent remote monitoring and management of the inter-connected systems in the network. Both Inband and Out-of-Band configuration and monitoring options are available. An extensive set of alarms, for easy maintenance are provided in the system.

Voice and Data Drop-Insert Multiplexer with In-band Management Interface.

Available Interface

- Voice Interfaces: FXO / FXS / E&M / Hotline
- GEN-GEN Magneto
- Data Interfaces: RS232 / G.703
- OAM Card - SNMP and NMS
- Dual feed (1+1 Redundant) -48V DC Input.

Features

- 4 E1 Control Card for Point-to-Point, Point-to- Multi point, Add-Drop (drop-insert), Tree and Star topology tree and Star topology
- 4 E1 non-blocking cross-connect at 64Kbps (DS-0) level
- Dual feed (1+1 Redundant) -48V DC Input
- SNMP V2 Monitoring with NMS for monitoring multiple nodes over an IP Network, from a central location
- Telnet management
- In-band and Out-of-band management
- GUI (Graphical User Interface)
- In-band access for configuration and monitoring
- Power supply failure monitoring
- Wide Range (-18V DC to -72V DC) for -48V DC Power Input
- Ringer card failure monitoring
- User programmable voice levels with 15dB Programmable gain settings for FXS and E&M interfaces
- Multiple clock synchronization options
- E1 Synchronization
- Voice and Low Speed Digital Data services
- Any combination ("mix-n-match") of Voice and Low Speed Digital Data services deployed from a single VCL-MX "Smart Shelf"
- Drop and Insert applications
- Wireless applications including Cellular Networks
- Digital Microwave Radio
- SCADA applications
- Frame Relay circuit termination
- Powerful Network Management System for monitoring and network control
- Compliance with all relevant ITU-T (CCITT) recommendations
- 3U high 19 inch rack mounting version

Highlights

- Field upgradable to provide voice, data or both services
- Flexibility on use of transmission medium-copper, fiber or wireless
- Choice of Interfaces for Data Applications
- RS232, PC Interface "Network Control and Management Software"
- In-band system configuration and management interface
- Out-of-band system configuration and management interface through 10BaseT Terminal (Optional)
- Channel assignment independent of slot position in the sub-rack
- Extensive set of alarms
- User selectable Internal, Loop-timed and external E1 synchronization clock options

Clock Options

- Internal clock (Stratum 3)
- Loop-timed Clock from any E1 Span
- External 120 Ohms BITS clock
- External 75 Ohms TTL clock

Transmission Mediums

The VCL-MX offers an excellent flexibility on the choice of transmission medium over which it may be deployed. The transmission medium can be either of the following:

- Copper
- Optical Fiber
- Wireless

Applications of VCL-MX Version 2-DLX

- Junction Mux - for digital interconnection of analog exchanges
- Drop & Insert applications
- Wireless network applications
- Micro-Cellular infrastructure applications for providing cell-switch connectivity
- Wide area networking
- Internet access over POTS lines - All POTS interfaces operate @ 64Kbps and support V.34 (33.6Kbps) dial-up modems

System Access, Control and Management Options:

- Telnet
- SSH
- CLI Control Interface (HyperTerminal or VT100)
- SNMP V2 Traps (MIB File provided).

OAM: Operation and Management Ports

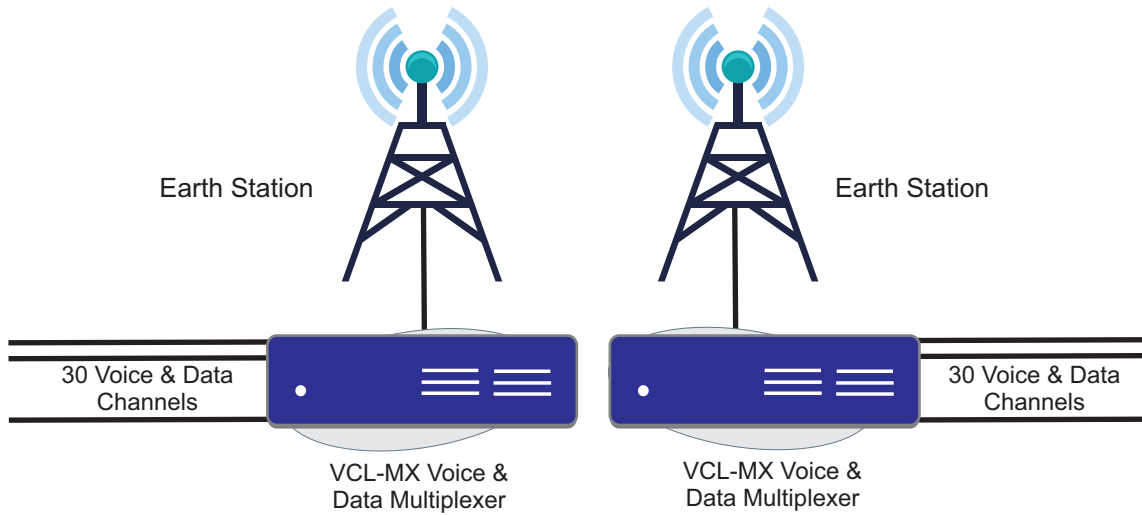
- RS232 Serial Port
- USB COM Port
- 10/100BaseT Ethernet for remote access.

OAM: Operation and Management Ports

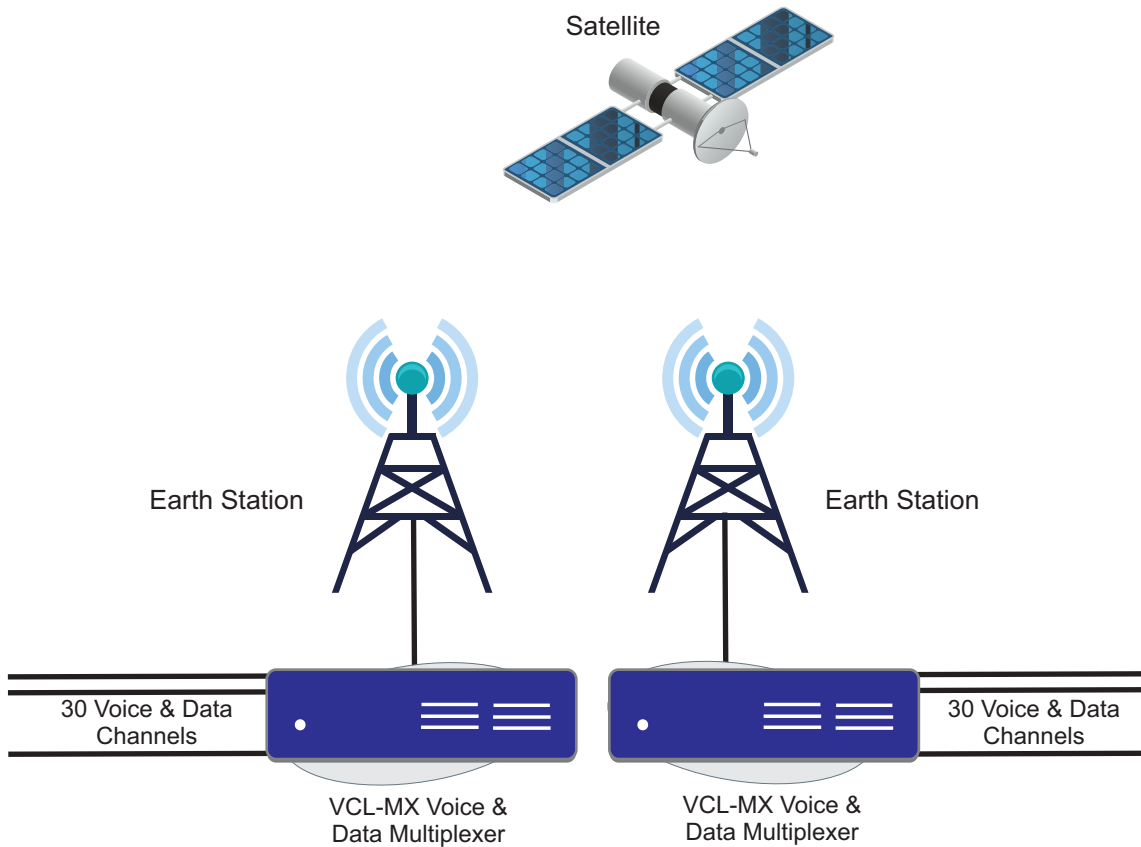
- Secured Access via SSH V2
- Password Protection: Password Protection in compliance with the mandatory clauses of the GR-815-CORE-2 specifications for secured access control.
- Logging: Maintains a log of all successful and un-successful attempts. Logged information includes the ID and the IP address of the accessing entities. Alerts the administrator if the un successful logging attempts exceed 3.
- Security Audit: All access logs for up to 30 days are maintained for security audit purposes.
- Security log entry of any request or activity including that user-ID (including IP address, if applicable), to establish user accountability
- Report Generation / Audit Trail
- Security Administration.

Application Diagram

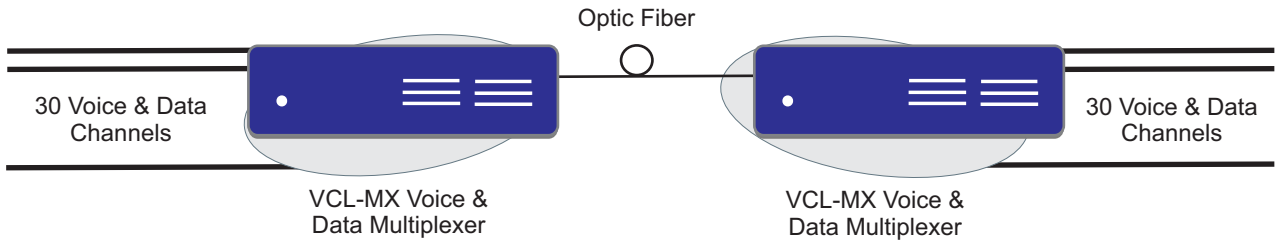
Application # 1: Connecting over Digital Microwave Radio Links



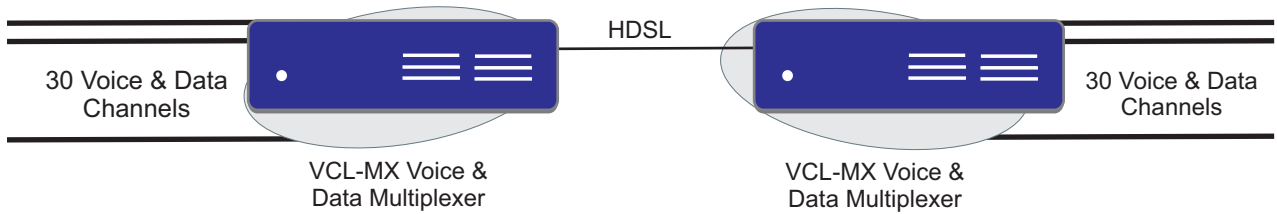
Application # 2: Connecting over Digital Satellite Circuits



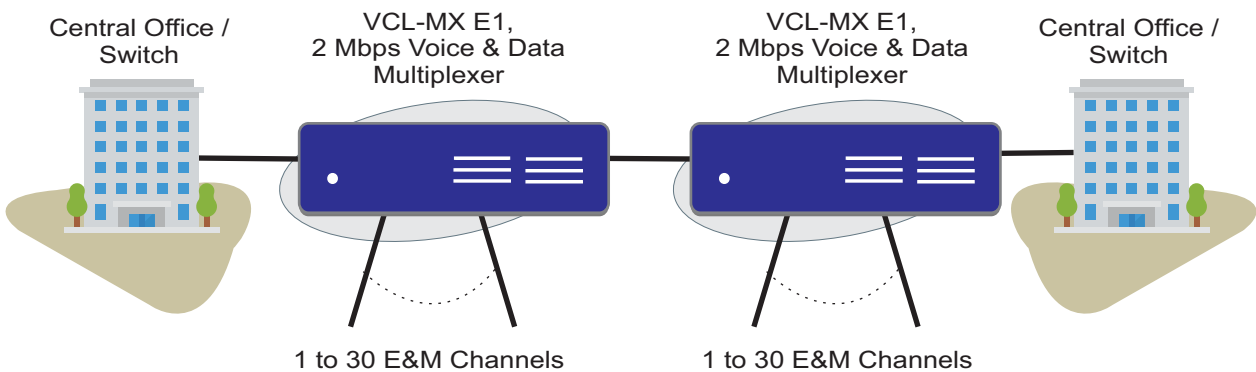
Application # 3: Connecting over Optical Fiber Links



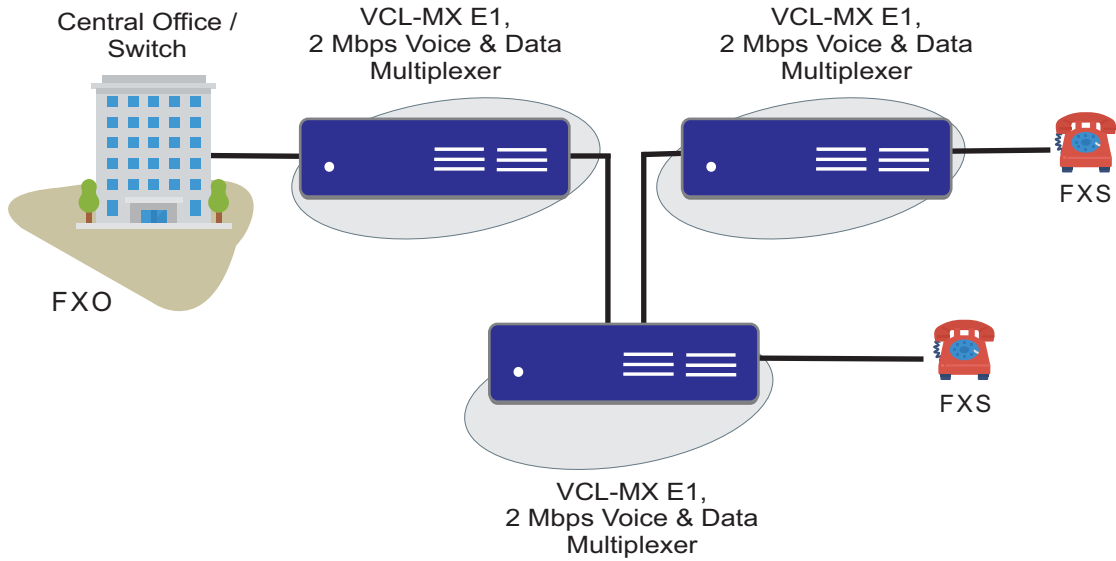
Application # 4: Connecting over HDSL Links



Application # 5: Connecting at the Central Office/Switch - E & M Interfaces



Application # 6: Using in a Subscriber Loop Point to Point or Drop/Insert Application

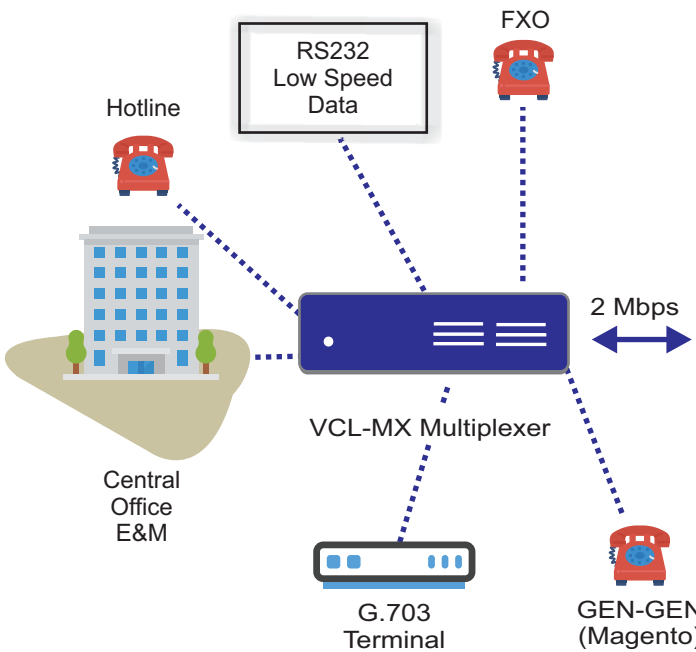


FXO/JNC 2 wire exchange loop interface card

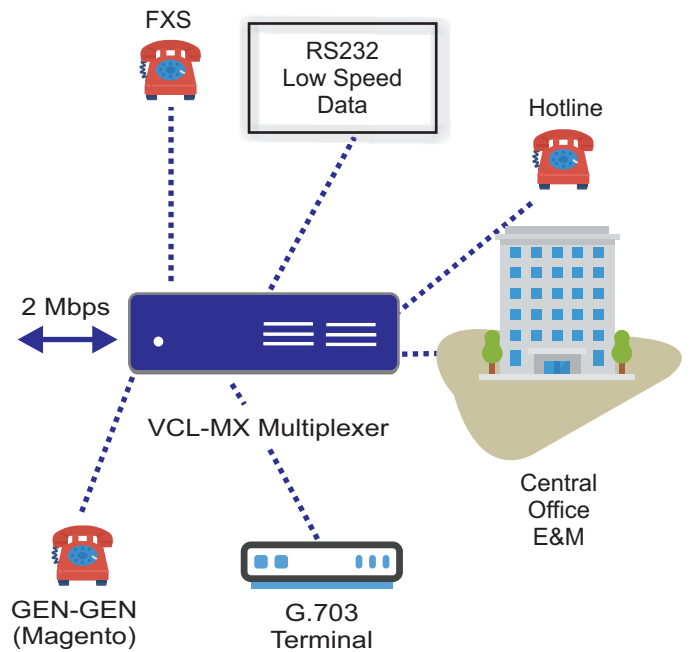
FXS/SLC wire subscriber loop interface card

Application # 7

VCL-MX, E1 Multiplexer Interfaces Cards - Voice and Data applications



VCL-MX, E1 Multiplexer Interfaces Cards - Voice and Data applications



User Configurable Interface Card

Voice Interface

- POTS service from a Central Office Switch (FXO & FXS)
- Hot Line (FXS-FXS)
- 2 Wire and 4 Wire, E&M applications
- 15W, sine-wave, 75VRMS / 86VRMS 20Hz/ 25 Hz Ringer for FXS and Hot -line (FXS-FXS) interfaces
- GEN-GEN Magneto

Data Interfaces

- RS232
- G.703 @ 64 Kbps, co-directional

System Management

- OAM / Telnet / SNMP
- NMS (Network Management System)

Technical Specifications

E1 Interface (Main Link) (VCL-MX-015-V2-DLX)

Number of Interfaces	4
Conformity (Electrical)	G.703
Frame Structure	As per ITU (CCITT) G.704
Signaling	Channel Associated Signaling
PCM Sampling Rate	8000 Samples/sec
Encoding Law	A Law as per ITU (CCITT)
Bit Rate	2048 Kbps \pm 50 ppm
Code	HDB3
Nominal Impedance	120 Ω balanced / 75 Ω unbalanced (75 Ω option)
Peak Voltage of a mark For 120 Ω Balanced interface 75 Ω Unbalanced interface	3.0 V \pm 0.3 V 2.37 V \pm 0.237 V
Peak Voltage of a space for 120 Ω Balanced interface 75 Ω Unbalanced interface	0 V \pm 0.3 V 0V \pm 0.237 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 102.4 KHz to 2048KHz 2048KHz to 3072 KHz	> 12dB > 18dB > 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

2 Wire - Voice Frequency Interface(s) - FXS (VCL-CB-025)

Number of Channels per Card	2
Interface Type	FXS
Maximum Number of Channels	30
Transmission performance	Fully Compliant to ITU (CCITT) G.712 (G.713, G.714) Specification
Line Impedance	600 Ω (900 Ω optional)
Voice Channel Frequency	300Hz-3400Hz
Insertion Loss	-2.0dB Nominal (User adjustable)
Idle Channel Noise	\leq -65dB
Return Loss	300Hz - 600Hz - \geq 12dB 600Hz - 3400Hz - \geq 15dB
Longitudinal Balance	\geq 46dB between 300Hz to 3400Hz
Ring Frequency	25 Hz (20Hz, Optional)
Ring Voltage	\geq 75 volts RMS into a load of 5 R.E.N. With a 0.30 Erlang traffic pattern
Subscriber Loop Current	\geq 23mA into a subscriber loop of 1000 Ohms
Overload Level	+3.14dBm \pm 0.5dBm
Battery Reversal	All channels
Dial Pulse Speed	8-12 pps - Pulse Dialing / DTMF Dialing

2 Wire - Voice Frequency Interface(s) - FXO (VCL-CB-030)

Number of Channels per Card	2
Interface Type	FXO
Maximum Number of Channels	30
Transmission performance	Fully Compliant to ITU (CCITT) G.712 (G.713, G.714) Specification
Line Impedance	600 Ω (900 Ω optional)
Voice Channel Frequency	300Hz-3400Hz
Insertion Loss (nominal)	-2.0dB Nominal (user adjustable)
Idle Channel Noise	\leq -65dB
Return Loss - 2 wire	300Hz - 600Hz - \geq 12dB 600Hz - 3400Hz - \geq 15dB
Longitudinal Balance	\geq 46dB between 300Hz to 3400Hz
Ring Frequency	25 Hz (20Hz, Optional)
Ring Voltage	\geq 75 volts RMS into a load of 5 R.E.N. with a 0.30 Erlang traffic pattern
Subscriber Loop Current	\geq 23mA into a subscriber loop of 1000 ohms
Overload Level	+3.14dBm \pm 0.5dBm
Battery Reversal	All channels
Dial Pulse Speed	8 -12 pps - Pulse Dialing/DTMF Dialing

E&M 2 Wire / 4 Wire Voice Frequency Interface (VCL-CB-035)

Number of Channels per Card	2
Interface Type	2W / 4W E&M, Type V
Maximum Number of Channels	30
Transmission performance	Fully Compliant to ITU (CCITT) G.712 Specification
Line Impedance	600 Ohms
Voice Channel Frequency	300Hz-3400Hz
Insertion Loss (nominal)	-2.0dB Nominal (user adjustable between 0dB and 16dB)
Idle Channel Noise	\leq -65dB
Return Loss	300Hz - 600Hz - \geq 12dB 600Hz - 3400Hz - \geq 15dB
Longitudinal Balance	\geq 46dB between 300Hz to 3400Hz
Overload Level	+3.14dBm \pm 0.5dBm
E&M Signalingn Rate	10 pps

2 Wire / 4 Wire - Voice Frequency Interface(s) - E&M (VCL-MX-035-EXT)

Number of Channels per Card	2
Interface Type	2W / 4W E&M - Ext, Type V
Maximum Number of Channels	30
Transmission performance	Fully Compliant to ITU (CCITT) G.712 (G.713, G.714) Specification
Line Impedance	600 Ω (900 Ω optional)
Voice Channel Frequency	300Hz-3400Hz
Insertion Loss (nominal)	-2dB (user adjustable range of -2dB to -8dB)
User selectable range for insertion Loss	1dB to 7dB
Input level minimum	-11dB
Input level maximum	3.2dB
Transmit Gain	0 to 16dB (user configurable)
Receive Attenuation	0 to 16dB (user configurable)
Idle Channel Noise	\leq -65dB
Return Loss - 2 wire	300Hz - 600Hz - \geq 12dB 600Hz - 3400Hz - \geq 15dB
Return Loss - 4 wire	300Hz - 3400Hz - \geq 20dB
Longitudinal Balance	\geq 46dB between 300Hz to 3400Hz
Overload Level	+3.14dBm \pm 0.5dBm
Dial Pulse Speed	Pulse / MFC Dialing / DTMF Dialing

Hot-Line Interface Card (VCL-CB-027)

Number of Channels per Card	2
Interface Type	Hot-Line
Maximum Number of Channels	30
Transmission performance	Fully Compliant to ITU (CCITT) G.712 (G.713, G.714) Specification
Line Impedance	600 Ohms
Voice Channel Frequency	300Hz-3400Hz
Insertion Loss (nominal)	-2dB (nominal)
Idle Channel Noise	\geq -65dB
Return Loss	300Hz - 600Hz - \geq 12dB 600Hz - 3400Hz - \geq 15dB
Longitudinal Balance	\geq 46dB between 300Hz to 3400Hz
Ring Frequency	20 Hz (25Hz, optional)
Ring Voltage	\geq 75 volts RMS into a load of 5 R.E.N. with a 0.30 Erlang traffic pattern
Subscriber Loop Current	\geq 23mA into a subscriber loop of 1000 Ohms
Overload Level	+3.14dBm \pm 0.5dBm
Battery Reversal	All channels
Dial Pulse Speed	10 pps - Pulse Dialing / DTMF Dialing

GEN-GEN / Magneto Interface Card (VCL-MX-1478-GEN)

Number of Channels per Card	2
Interface Type	Magneto, 2-Wire (GEN-GEN)
Maximum number of channels	30
Transmission performance	Fully Compliant to ITU (CCITT) G.712 Specification
Line Impedance	600 Ohms
Voice Channel Frequency	300Hz-3400Hz
Ring Frequency	25 Hz
Ring Voltage	75 volts RMS
Insertion Loss	-2.0dB Nominal
Idle Channel Noise	-65dB
Return Loss	300Hz - 600Hz - \geq 12dB 600Hz - 3400Hz - \geq 15dB
Longitudinal Balance	\geq 46dB between 300Hz to 3400Hz
Overload Level	+3.14dBm \pm 0.5dBm

Low Speed Data Interface RS232 (VCL-CB-045)

Interface	RS232
Number of Interfaces per Card	2
Maximum Number	30
Conformity	RS232
Mode	Asynchronous
Bit Rate	50 Kbps to 19.2 Kbps
User Interface	DCE
Character Length	5 / 6 / 7 / 8 (Auto-Select)
Stop Bits	1 / 1.5 / 2 (Auto-Select)
Parity	Even / Odd / 0's / 1's / none (Auto-Select)

G.703 @ 64kbps, Synchronous Data Interface (VCL-CB-060)

Interface	G.703 @ 64 Kbps
Number of Interfaces per Card	2
Maximum Number	30
	G.703, 64Kbits / sec. Interface
Conformity	To (CCITT) Rec. G.703
Mode	Synchronous, Co-directional
Bit Rate	64Kbps

Ring Generator Card (VCL-CB-040)

Rated Power	30W
Ring Voltage	75Vrms / 86Vrms
Frequency	17Hz / 20Hz / 25Hz / 50Hz

Protection

Central Office Terminal and Remote Terminal are protected against power surges and transients occurring from lightning and electric induction as per CCITT Rec. Table I/K-20 towards line side

E1 Synchronization Clock

Clock options:

- Internal clock (Stratum 3)
- Loop-timed Clock from any E1 Span
- External 120 Ohms BITS clock
- External 75 Ohms TTL clock

Power Supply (VCL-MX-010-DLX) (Dual Feed Power Input)

Input DC Voltage	-48V DC (nominal)
Range of Input	-18V DC to -72V DC
Output Voltages	5V, -5V, filtered -48V (for term. Cards)
Maximum Load Output Current	8A at 5V, 0.5A at -5V
Input Voltage Reversal Protection	Provided in the Card
Over Current Protection	10A for 5V, 1.0A for -5V
Short Circuit Protection	Current limit - 6A. Recovers on removal of short
Efficiency at Full Load	>93%
Ripple at Full Load	<5mVrms
Spike at Full Load	<50mV

Power Consumption

Power Consumption	25 watts (with all 30 Voice Circuits)
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Environmental

Temperature and Humidity	0°C to + 50°C, 90% R.H. (Non-condensing)
Altitude	upto 9,000 feet

Management and Control Interfaces

- Serial Management Port - RS232 Interface
- USB Serial Port
- 10/100 BaseT Telnet over a TCP/IP Network

System Access and Management

- Windows XP and Windows 7 compatible GUI
- Telnet - CLI (Command Line Interface)
- SNMP V2 (MIB File provided with the equipment)
- Inband Management of Remote Units over the E1 links
- NMS - Network Management System

Command Language

- Command Line Interface (English text commands)

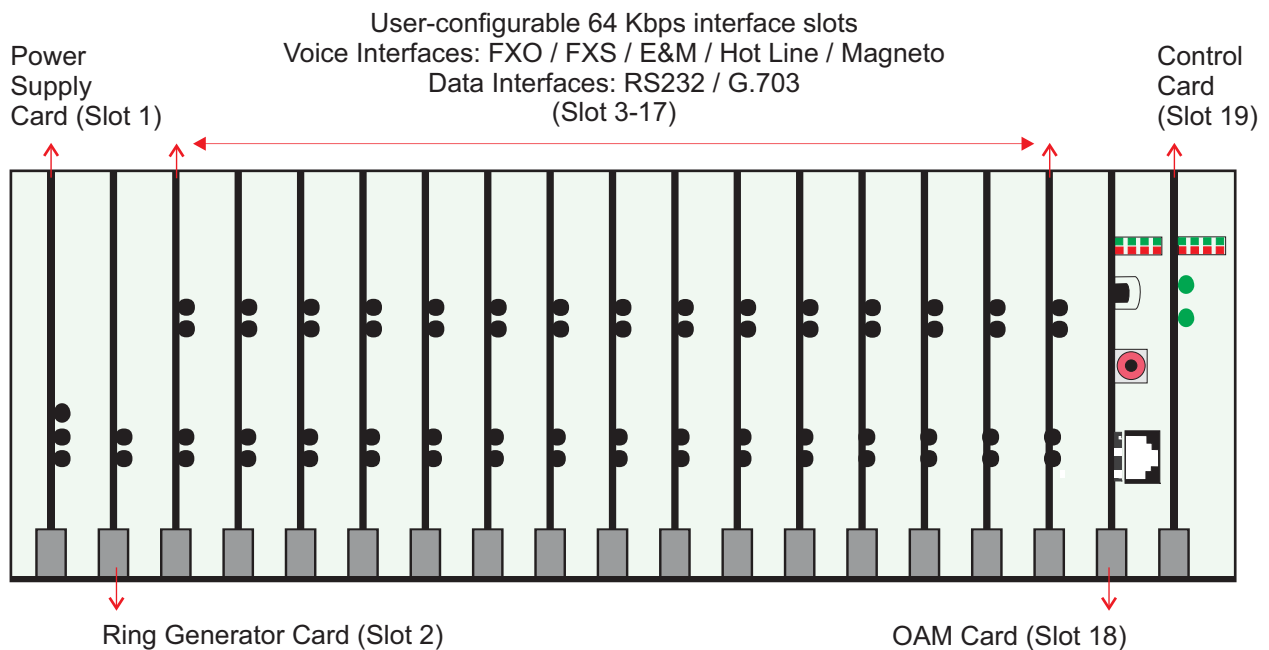
Security and Protection

- Secured Access via SSH V2
- Password Protection: Password Protection in compliance with the mandatory clauses of the GR-815-CORE-2 specifications for secured access control.
- Logging: Maintains a log of all successful and un-successful attempts. Logged information includes the ID and the IP address of the accessing entities. Alerts the administrator if the un successful logging attempts exceed 3.
- Security Audit: All access logs for up to 30 days are maintained for security audit purposes.
- Security log entry of any request or activity including that user-ID (including IP address, if applicable), to establish user accountability
- Report Generation / Audit Trail
- Security Administration.

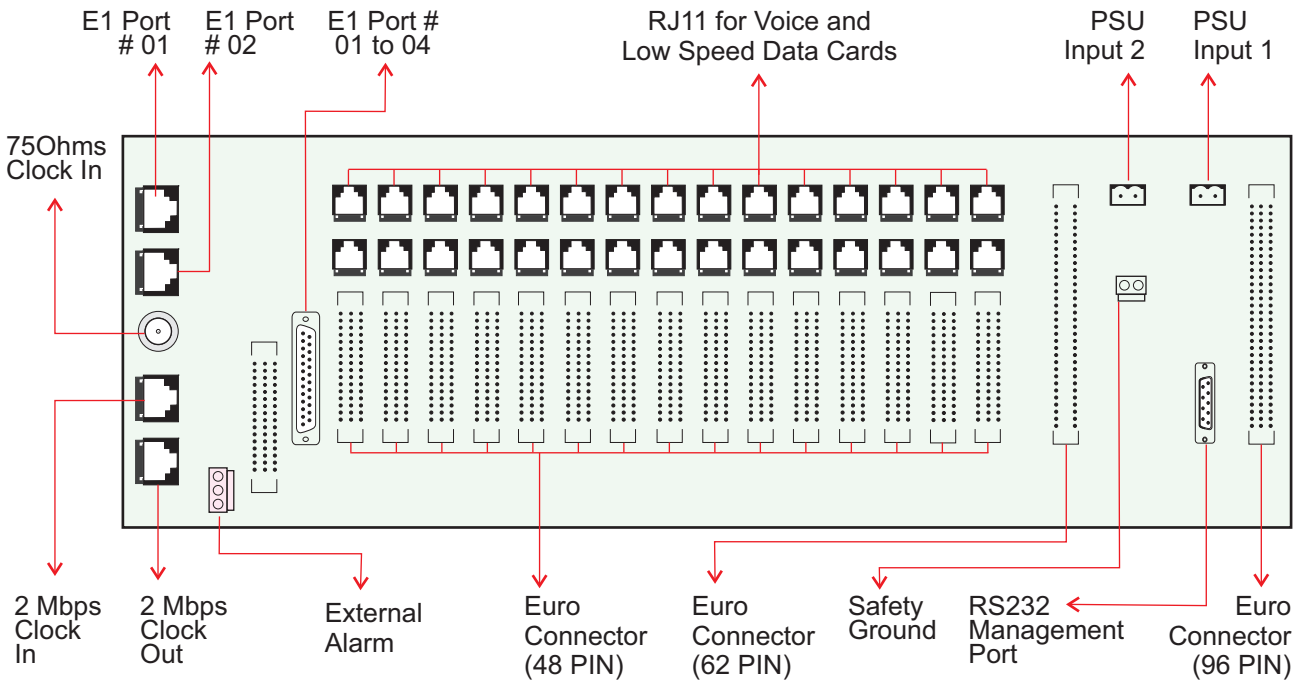
Mechanical Specification

Rack Mounting	Standard 19 inch DIN rack
Height	3U (133.33 mm)
Depth	292 mm
Width	483 mm
Weight	7.00 Kgs.

Front View



Back View



Core System Composition	Description	Part No.
19-Inch Shelf 3U high	19 Inch 120 Ohms Impedance Shelf & Backplane	VCL-MX-002-DLX
Slot 1	Power Supply Card	VCL-MX-010
Slot 2	Ringer Card	VCL-MX-040
Slot 3 to 17	15 User Configurable voice & data interface(s)	As per user Requirement
Slot 18	OAM / NMS	VCL-OAM-2104-5.0-V2
Slot 19	4 E1 Control Card with In-Band Management Interface	VCL-MX-015-V2-DLX

Ordering Information**VCL-MX E1 Core System (Common Equipment)**

S. No.	Part #	Product Description
1	VCL-MX-015-2-DLX	4 x E1 Control Card. (4 x E1 non-blocking cross-connect at 64Kbps (DS-0 level). Supports point-to-point, point-to-multi-point, add-drop, tree, star applications (MX Version 2 - Deluxe)
2	VCL-MX-002-1484-DLX	19" Shelf 3U High (Sub-rack) fitted with Connectorized Backplane to accommodate Voice and 64Kbps Data Channels [E1 75ohms / 120ohms DB25F] (MX Version 2 - Deluxe) [15 Slots for User Configurable Interface Cards]
3	VCL-MX-010-1497-MON	(-) 48V DC Input Power Supply Card, [Output: +5V DC, -5V DC, filtered -48V DC (for terminal cards)]
4	VCL-OAM-2104-5.0-V2	Management Card [RJ45, DB9F COM, USB] OAM - Operations and Management Card for connecting the multiplexer to be managed in a LAN - allows the USER to assign a unique IP address to each multiplexer connected in a LAN to be managed from a single point. Telnet, SNMP (V2)

VCL-MX, User Configurable Interfaces

S. No.	Part #	Product Description
1	VCL-CB-025	2 Port VF, RT (FXS) @ Central Office Remote Terminal Line Interface Card 15 (max) per system
2	VCL-CB-027	2 Port VF, Hot-Line (FXS - Ring-Down) @ 64Kbps Line Interface Card 15 (max) per system
3	VCL-CB-030	2 Port VF, CO (FXO) @ 64Kbps Central Office Line Interface Card 15 (max) per system
4	VCL-CB-035-EXT	2 Port VF, E&M, 2 Wire / 4 Wire Trunk Line Interface Card (Programmable Tx and Rx settings / VF range 0 to -15dB gain), 15 (max) per System
5	VCL-MX-040-1498-MON	Ring Generator Card, Central Office Ring Generator 1 per system/Chassis with FXS Interfaces
6	VCL-CB-045	2 Port, RS232, 50 Kbps to 19.2 Kbps DCE Asynchronous Data Interface Card, 15 (max) per System
7	VCL-CB-060	2 Port, G.703 @ 64kbps, Synchronous Co-directional Data Interface 15 (max) per system

Cables & Accessories

S. No.	Part #	Product Description
1	VCL-HRNS 1022	FXS/FXO 2 Port Connectorized Cable [2RJ11M-Open] [1 cable each FXO/FXS card]
2	VCL-HRNS 1068	E&M 1 Port Connectorized Cable [RJ11M6P6C-Open] [2 cables each E&M card]
3	VCL-HRNS 1018	RS232 1 Port Connectorized Cable [RJ11M6P6C-DB9F] [2 cables each RS232 card] OR
4	VCL-HRNS 1074	RS232 1 Port Connectorized Cable [RJ11M6P6C-DB9M] [2 cables each RS232 card]
5	VCL-HRNS 1020	G.703 1 Port Cross Connectorized Cable [RJ11M-RJ45M] [2 cables each G.703 card]
6	VCL-HRNS 1076	G.703 1 Port Parallel Connectorized Cable [RJ11M-RJ45M] [2 cables each G.703 card]
7	VCL-HRNS 1225-4E1O	E1 4 Port Connectorized Cable [DB25M-Open] [1 cable each Chassis card] OR
8	VCL-HRNS 1225-4E1RJ45M	E1 4 Port Connectorized Cable [DB25M-4xRJ45M] [1 cable each Chassis card]
9	UMIKitMXV2DLX	System CORE Cables, Installation Accessories, Documentation, System User Manual, System User Manual Disk etc.

Power Supply (External) AC to DC Converter

S. No.	Part #	Product Description
1	VCL-EPSC 0002	Power Supply (External) AC to DC Converter, Portable Adapter Version, PW-065A-1Y48F1, Universal AC Input [100-240VAC~2A, 50-60Hz] to DC Output [(-) 48VDC~1.35A 65W] [1 output]
2	VCL-ACDC-48-150W-3.2A-RK	Power Supply (External) AC to DC Converter 19"2U Rack Mount Version, Universal AC Input [93VAC-276VAC, 47Hz-63Hz] to DC Output [(-) 48VDC~3.20A 150W] [4 Fused outputs]

E1, 120 Ohm (RJ45F) to 75 Ohm (BNCF) Converter

S. No.	Part #	Product Description
1	VCL-EMOD 0192 G.703 Balun	G.703 Balun 1xE1 [120Ohms RJ45F] to 1xE1 [75Ohms 2xBNCF] Converter, 1xE1 Module (Tx/Rx)
2	VCL-EMOD 0133 G.703 Balun	G.703 Balun 1xE1 [120Ohms RJ45F] to 1xE1 [75Ohms 2xBNCF] Converter, 1xE1 Module (Tx / Rx)
3	VCL-1477-CON-120-RJ45F-75-BNCF-16	16xE1, 120Ohms [16xRJ45F] to 75Ohms [32xBNCF] Converter Panel 19" Metal case 2U High Rack Mount Version [RJ45 /BNC cables not included]
4	VCL-HRNS 1247	75 Ohm Connectorized Cable [BNCF-BNCF, 3m]

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