Introduction:

The VCL-2711, IEEE C37.94 over Ethernet / MPLS-TP / IP-MPLS Transmission Equipment is a ruggedized, robust and sub-station-hardened transmission equipment which converts and transmits up to four IEEE C37.94 Interfaces over an Ethernet / MPLS-TP / IP-MPLS link with "SDH / SONET like" performance. The VCL-2711 units must be always used in pairs, with one unit installed on each end of the Ethernet / MPLS-TP / IP-MPLS transmission link.

The VCL-2711, IEEE C37.94 over Ethernet / MPLS-TP / IP-MPLS equipment can be used in a point-to-point, or a point-to-multipoint topology with "zero" bit-errors and almost "zero" jitter or wander when used its integrated GPS (ITU-T G.811) compliant primary reference clock. Other clock synchronization options include an internal OCXO disciplined clock, external 1PPS clock, external 2.048MBits clock and an external 10MHz clock – any of which can be used to provide error-free C37.94 transmission over Ethernet / MPLS-TP / IP-MPLS links.
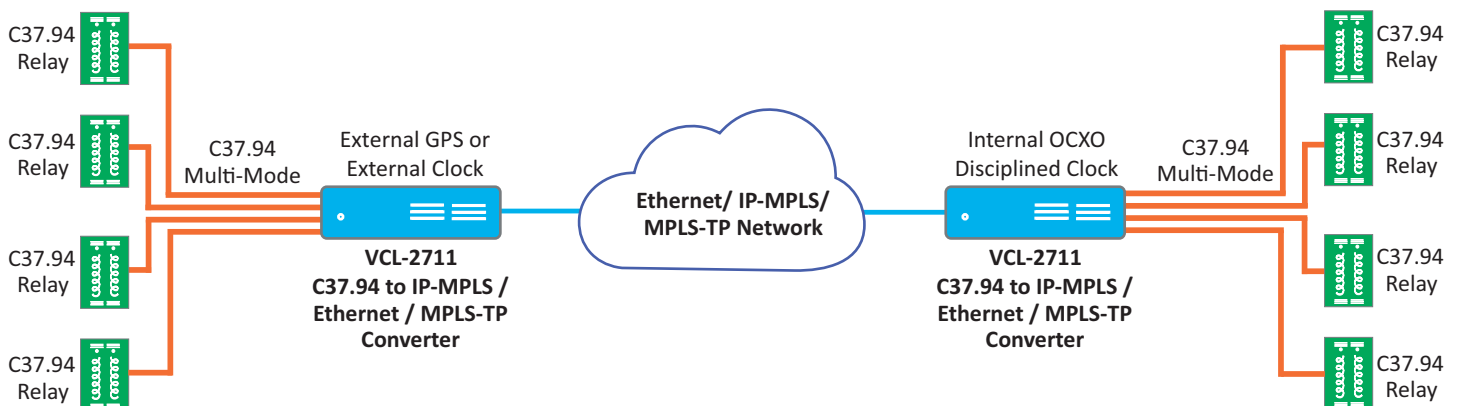
Application:

The VCL-2711, IEEE C37.94 over Ethernet / MPLS-TP / IP-MPLS Transmission Equipment is designed to enable sub-stations to seamlessly migrate from SDH / SONET transmission networks to more efficient IP / MPLS transmission networks without incurring large capex or requiring the tiresome task of having to replace and rewire the existing C37.94 Relays which need to be inter-connected to remote substations inter-connected over Ethernet / MPLS-TP / IP-MPLS transmission links.

Access and Control Interfaces:

- Ethernet – SSH and Telnet with clear-text disable option (clear-text disabled by default)
- USB

VCL-2711 with Integrated GPS ITU-T G.811 Primary Reference Clock

Features and Highlights:

- End-to-end transmission delay (latency) of less than 6ms on IEEE C37.94 transmission link
- Symmetrical latency on the transmit and the receive paths
- SDH / SONET quality "jitter" and "wander" with "zero" transmission errors
- Multiple, integrated clock synchronization options include:
  - Internal OCXO Disciplined Clock
  - GPS - Integrated GPS (ITU-T G.811) Complaint Primary Reference Clock
  - External 1PPS, 2.048MBits, 10MHz Clock

C37.94 Interface Specifications:

- Number of IEEE C37.94 Interfaces per chassis: 4
- Standard: IEEE C37.94
- Optical: 820nm / 850nm Multi-Mode
- Optical Connector, Tx/Rx: ST
- Optical Transmitter: LED

Network Port Specifications:

- Interface Type: 10/100 Base-T/Tx, Auto MDI-X
- Connector: RJ-45 (F)
- Compliance: IEEE-802.3

OAM Port Specifications:

- Interface Type: 10/100/1000 Base-T/Tx, Auto MDI-X
- Supported Protocols: SSH, Telnet, ARP, SCP, TFTP, SFTP
- Connector: RJ-45 (F)
- Compliance: IEEE-802.3

Application Diagram:

By installing the VCL-2711, the existing C37.94 Protection Relays can be migrated from an SDH / SONET transmission network to an Ethernet / MPLS-TP / IP-MPLS transmission network with no degradation or compromise in the reliability or the performance of the C37.94 interfaces.

Security:

- Secure Boot
- Encrypted Firmware Updates
- SNMPv2 and SNMPv3 trap generation, along with LED and external alarm indication
- Password protection with password strength monitor
- RADIUS Password Authentication
- SSH (Secure Access Control) with encrypted Password Protection

Power Supply Options:

- Redundant 1+1, 48V DC (Input range 18V DC to 60V DC).

Environmental (Operational):

- Operating Temperature: -20C to +60C (-4F to 140F)
- Cold Start Temperature: -10C (14F)
- Maximum Operational Humidity 95% R.H. (Non-condensing)

Chassis Type:

- 19-Inch, 1U, Corrosion Resistant Aluminium Enclosure

Physical:

- Width x Depth x Height: 437mm x 413mm x 44mm
- Weight: 3.0 Kgs

CE Compliance:

- Low Voltage Directive 2014/35/EU
- Electromagnetic Compatibility 2014/30/EU

Other Regulatory Compliances:

- RoHS
- CE Marking
- Complies with FCC Part 68 and EMC FCC Part 15
- Telcordia GR-1089 Surge and Power Contact

EMI, EMC, Surge Withstand and other Compliances:

EN 50081-2	EN 50082-2	IEC 60068-2-29
IEC 61000-4-6 (Conducted Immunity)	IEC 60068-2-6	
IEC 60068-2-78	IEC 60068-2-1	IEC 60068-2-14
CISPR 32 / EN55032 Class A (Conducted Emission and Radiated Emission)		
IS 9000 (Part II Sec. 1-4, Part III Sec. 1-5, Part IV, Part 14 Sec. 1-3)		
IEC 60870-2-1	IEC 61000-4-5	
IEC 61000-4-3 (Radiated Immunity)	IEC 61000-4-8	
IEC 61000-4-2	IEC 61000-4-4	
Telcordia GR-1089 Surge and Power Contact		

Ordering Information:

Part #	Description
VCL-2711-RU	**IEEE C37.94 over MPLS-TP / MPLS-IP / IP Transmission Equipment.** 19", Rack Mount. Supports: – **Optical Interfaces:** 4 x C37.94, Tx, Rx, 820nm, MM, ST Optical Connectors – **Network Interface:** 1 x RJ45 Network (Transmission) Interface (10/100BaseT) – **Management:** 1 x RJ45 Management Interface (10/100/1000BaseT). USB Port, Telnet (with clear text disable option), SSH, EMS, Graphical User Interface (GUI) **[# Add Power Supply]**
VCL-2711-LU	**IEEE C37.94 over MPLS-TP / MPLS-IP / IP Transmission Equipment** with Integrated GPS. 19", Rack Mount. Supports: – **Optical Interfaces:** 4 x C37.94, Tx, Rx, 820nm, MM, ST Optical Connectors – **Network Interface:** 1 x RJ45 Network (Transmission) Interface (10/100BaseT) – **Management:** 1 x RJ45 Management Interface (10/100/1000BaseT). USB Port, Telnet (with clear text disable option), SSH, EMS, Graphical User Interface (GUI) **[# Add Power Supply]**

 # Add Power Supply

AC220	1 x 110~240V AC Power Supply Input
AC220R	2 x 110~240V AC Power Supply Input [Redundant]
DC048	1 x 48V DC Power Supply Input
DC220	1 x 110~250V DC Power Supply Input
DC048R	2 x 48V DC Power Supply Input [Redundant]
DC220R	2 x 110~250V DC Power Supply Input [Redundant]