



C37.94



For differential and distance protection applications

VCL-2711, IEEE C37.94 over Ethernet / IP/MPLS / MPLS-TP Equipment

The VCL-2711, IEEE C37.94 over Ethernet / IP/MPLS / MPLS-TP 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 / IP/MPLS / MPLS-TP link with "SDH / SONET like" performance. The far-end VCL-2711 unit receives the Ethernet data stream and re-converts it back to the IEEE C37.94 Interfaces. The VCL-2711 units must be always used in pairs, with one unit installed on each end of the Ethernet / IP/MPLS / MPLS-TP link.

The VCL-2711, IEEE C37.94 over Ethernet / IP/MPLS / MPLS-TP equipment can be used in a point-to-point, or a point-to-multipoint topology with "zero" bit errors and SDH / SONET quality jitter and wander. This equipment is designed to enable sub-stations to seamlessly migrate from SDH / SONET transmission networks to more efficient IP/MPLS / MPLS-TP transmission networks without incurring a large capex or the tiresome task of having to replace and rewire the existing C37.94 Protection Relays which need to be interconnected to the far-end substations over Ethernet / IP/MPLS / MPLS-TP transmission links.

Features and Highlights:

- End-to-end transmission delay (latency) of less than 6ms between the IEEE C37.94 interfaces
- Symmetrical transmission latency
- Zero transmission errors
- SDH / SONET quality "Jitter" and "Wander" control
- Multiple, integrated clock synchronization options include:
 - Internal, very high stability OCXO
 - External 2.048Mbits Reference Clock
 - External 10MHz Reference Clock
 - External 1PPS Reference Clock
 - GPS - Integrated GPS (ITU-T G.811) complaint Primary Reference Clock



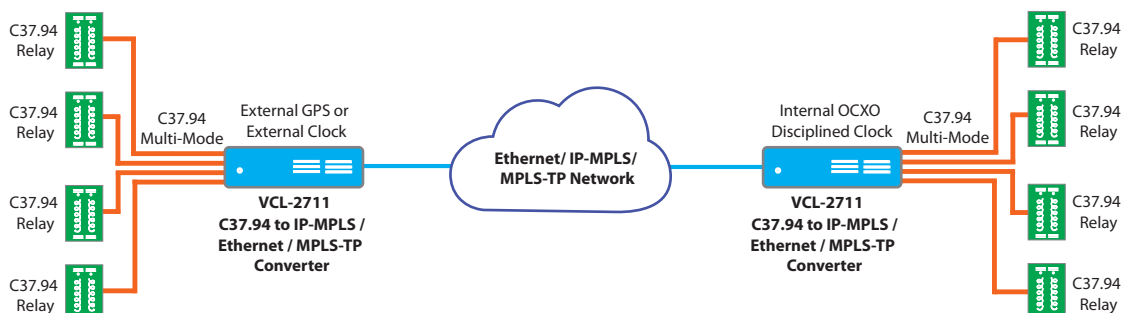
C37.94 Interface Specifications:

- 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 (Transmission) Interface:

- 1 x RJ-45 (10/100BaseT)

Application Diagram:





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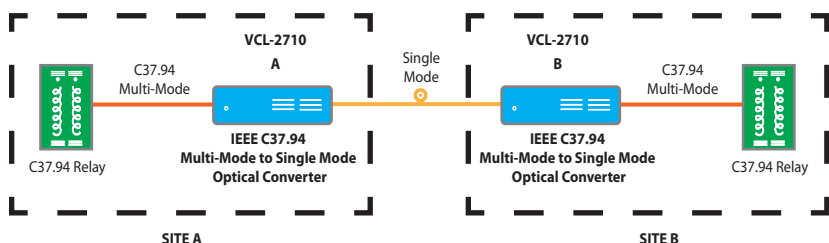
VCL-2710, IEEE C37.94 Multi-Mode to Single Mode Optical Converter

VCL-2710, IEEE C37.94 Multi-Mode to Single Mode Optical Converter is a ruggedized, sub-station-hardened converter that converts an IEEE C37.94 Multi-Mode to Single-Mode Optical signal. The equipment is designed to convert and propagate IEEE C37.94 multi-mode signals over extended 1310nm / 1550nm single-mode optical fiber spans. The VCL-2710, IEEE C37.94 Multi-Mode to Single Mode Optical Converter includes the clock synchronization and clock re-generation functions which allows it to transmit the IEEE C37.94 multi-mode signal over extended single-mode optical fiber links of up to 50dB optical link loss budget (i.e., a typical reach of approximately 160 KM or 100 miles).

VCL-2710 is designed for use in point-to-point applications. The VCL-2710 meets and complies with sub-station hardened EMI, EMC, Surge and Temperature specifications making it suitable for sub-station installations to provide uninterrupted service even in the most demanding and harsh environments.

The most common application of the VCL-2710 is to allow the user to transmit the existing IEEE C37.94 multi-mode interface over a single-mode optical fiber link without the need to install any additional multiplexers or transmission equipment, which would otherwise be required to inter-connect the IEEE C37.94 Relays between near-end and the far-end substations.

Application Diagram:



VCL-2709, C37.94 to E1 Converter

VCL-2709, IEEE C37.94 to E1 Converter is a ruggedized and robust, sub-station-hardened protocol converter that converts the IEEE C37.94 Interface to 2.048Mbps E1 Interface and vice-versa.



The VCL-2709 supports point-to-point applications.

VCL-2709, IEEE C37.94 to E1 equipment includes precise clock recovery and clock re-generation functions which allows the transmission of IEEE C37.94 channels over an E1/SDH network for error free transmission.

The most common application for the VCL-2709 converter is for inter-connecting IEEE C37.94 Protection Relays over an E1 network between two sub-stations. By installing a VCL-2709 converter, the existing IEEE C37.94 interfaces from protection relays can be converted to and inter-connected over an E1 / SDH network without incurring large capex, or without the tiresome task of having to replace or rewire the IEEE C37.94 Relays which need to be interconnected to the far end substations over E1 (SDH) transmission links.

- Number of IEEE C37.94 interfaces per card: 1
- Number of interfaces: 1, E1 (2.048 Mbit/s) Interface (Electrical G.703)

Application Diagram:





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VCL-6045, Quad C37.94 to Quad E1 Converter

VCL-6045, IEEE C37.94 to E1 Converter is a ruggedized and robust, sub-station-hardened protocol converter that converts up to 4 x IEEE C37.94 Interfaces to 4 x 2.048Mbps E1 and vice-versa. The VCL-6045, IEEE C37.94 to E1 Converter supports point-to-point as well as point-to-multipoint applications.



VCL-6045, IEEE C37.94 to E1 equipment includes precise clock recovery and clock re-generation functions which allows the transmission of IEEE C37.94 channels over an E1/SDH network for error free transmission.

The most common application for the VCL-6045, IEEE C37.94 to E1 Converter is for inter-connecting IEEE C37.94 Protection Relays over an E1 network. By installing the VCL-6045, IEEE C37.94 to E1 Converter, the existing IEEE C37.94 interfaces from protection relays can be transmitted over the E1 network without incurring large capex, or without the tiresome task of having to replace or rewire the IEEE C37.94 Relays which need to be inter-connected to the far end substations over E1 (SDH) transmission links.

- Number of IEEE C37.94 interfaces per card: 4
- Number of interfaces: 4, E1 (2.048 Mbit/s) Interface (Electrical G.703)

Revision 2.4 November 19, 2021

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