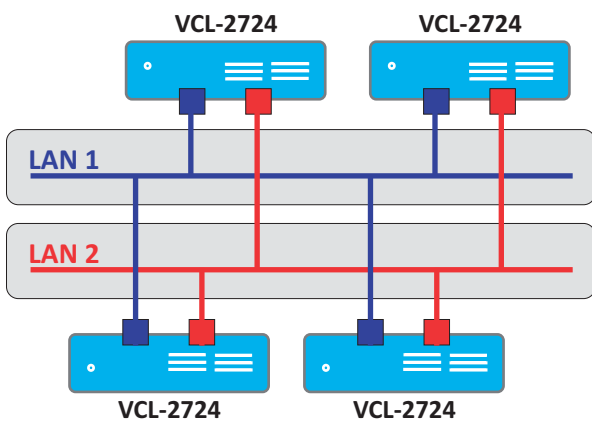## Product Overview:

VCL-2724 PRP / HSR Switch is a simple, compact, easy-to-use solution designed to be used in critical Ethernet networks that cannot afford packet loss which may otherwise occur during ring-recovery, or switchover upon failure of either one of the Ethernet LANs. The VCL-2724 is designed to carry critical Ethernet data over two parallel LANs with zero packet loss.

The VCL-2724 PRP / HSR Switch may also be used to carry Ethernet data in over an HSR ring with absolutely no packet loss. VCL-2724 PRP / HSR Switch is the only presently available in the industry which ensures that the PRP / HSR Switch never itself becomes a point of failure, even in power down condition.

- **In-built Electrical and Optical Ethernet Interface Options.** Provides both optical and electrical ethernet interface options on the "Protected side" as well as the "PRP sides".
- **Ultra-Resilient and Failsafe*** – Never itself becomes a point of failure in the electrical ethernet mode. The "protected interface" automatically reverts to and reconnects to the "primary PRP interface" even in a power down condition. It is the only such PRP solution available in the industry which ensures that the VCL-2724 PRP Switch, itself, never becomes a point of failure!!!
- **Applications include** critical Ethernet network applications such as Smart-Grid, electrical substation automation, industrial automation, aircraft controls, automotive applications and military communications.
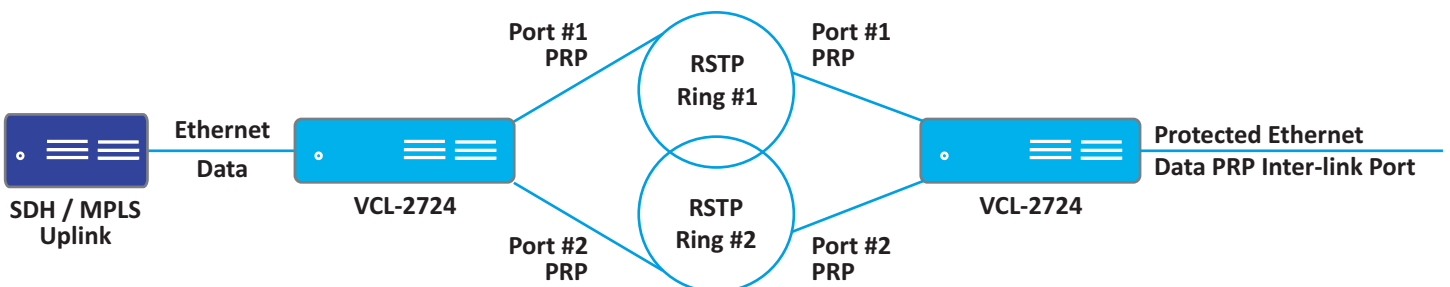
Typical PRP Application Diagram:

Failsafe* – Never itself becomes a point of failure, even in a power down condition.
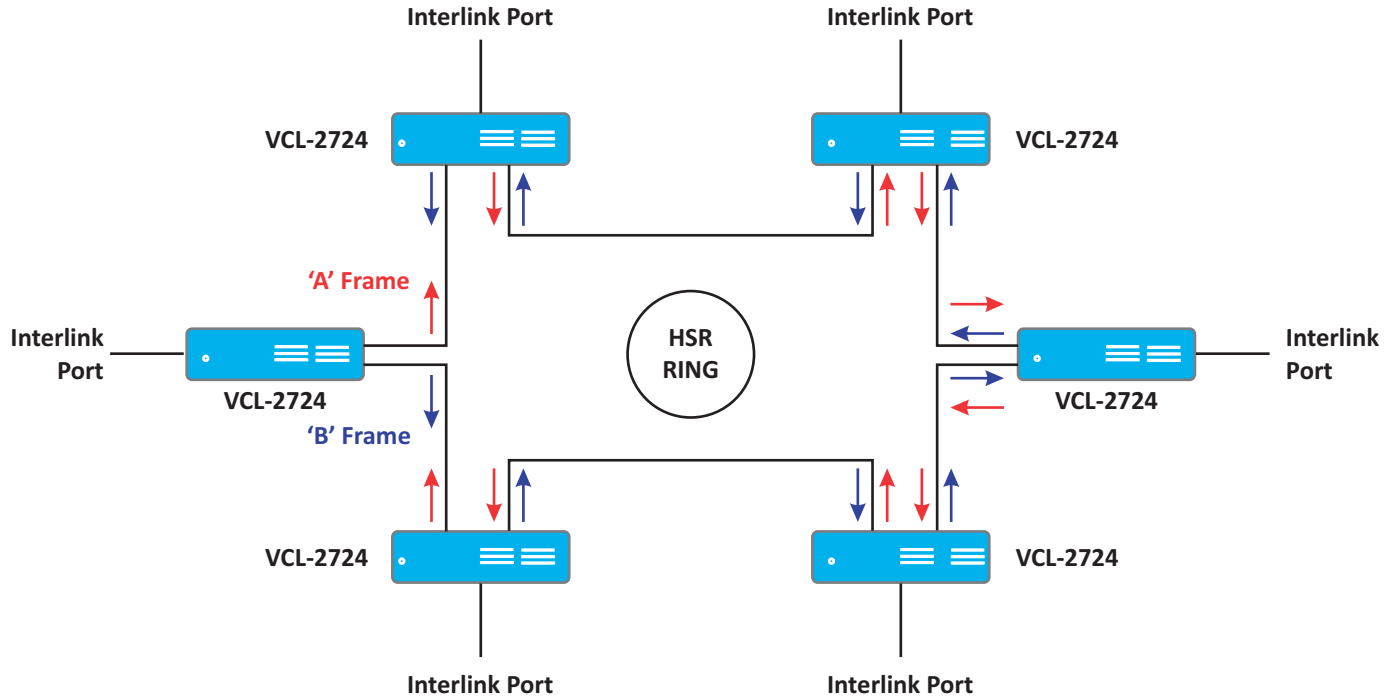

Features:

- Ruggedized construction. IEC 61850-3 Compliant. Suitable for industrial applications.
- Available in compact DIN Rail and 19-inch Rack Mount with 1+1 power supply options
- Total number of Ethernet Ports: 3
  - One Interlink Port: Input Ethernet Port (Optical / Electrical - User Selectable)
  - PRP/HSR #1: Protected Ethernet Port (Optical / Electrical - User Selectable)
  - PRP/HSR #2: Protected Ethernet Port (Optical / Electrical - User Selectable)
- Compliant with IEC 62439-3 specifications
- Zero recovery time and zero packet loss in case of the failure of either of the (parallel) transmission links. A single network fault will not result in any frame loss.
- Support IEEE-1588v2 Precision Time Protocol (PTP) transparent clock functionality.
- Network loop detection and removal
- Cut-through and store-and-forward operation.
- Quality of Services (QoS) with priority tagging packet filtering and four priority queues per port.
- Port-based VLAN, VLAN tagging - Max number VLANs is 4094
- Per port packet filtering
- Support for MAC address-based authentication methods.
- **Operating Modes**: PRP, HSR and PRP+HSR.
- **Maintenance:** The network is fully operational even during maintenance as any intermediate network device (such as an Ethernet Switch) can be disconnected and replaced without breaking the network connectivity.
- **Applications include** critical network applications, smart-grid, electrical substation automation, industrial automation, critical automotive and military communication applications.
- **Failsafe*:** In Electrical Ethernet Mode.

Two VCL-2724 units interconnected by two parallel RSTP Rings ensure zero packet loss, failsafe transmission
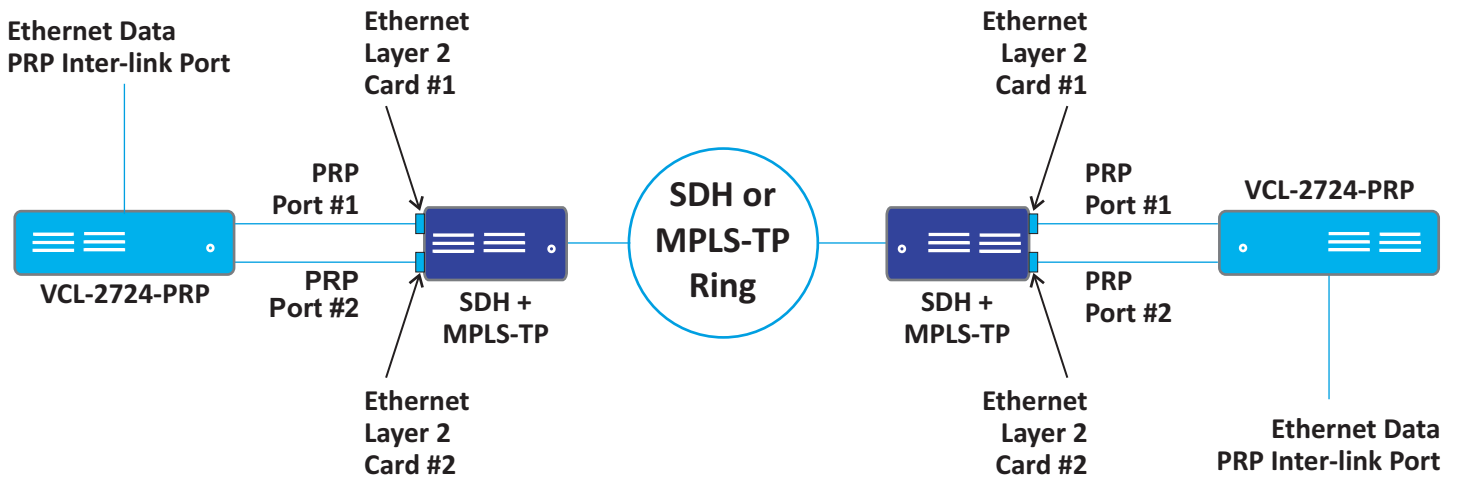

Two PRP/HSR units interconnected by two parallel RSTP rings ensure that data is transferred seamlessly with zero packet loss, even if one of the RSTP link in the LAN breaks / fails.

Typical HSR Application Diagram

Interlink Port   Interlink Port

VCL-2724   VCL-2724

'A' Frame

Interlink Port   VCL-2724   HSR RING   VCL-2724   Interlink Port

'B' Frame

VCL-2724   VCL-2724

Interlink Port   Interlink Port

Redundant Ethernet transmission over SDH links with zero packet loss.

Ethernet Data PRP Inter-link Port

Ethernet Layer 2 Card #1   Ethernet Layer 2 Card #1

PRP Port #1   PRP Port #1

VCL-2724-PRP   SDH + MPLS-TP   SDH or MPLS-TP Ring   SDH + MPLS-TP   VCL-2724-PRP

PRP Port #2   PRP Port #2

VCL-2724-PRP

Ethernet Layer 2 Card #2   Ethernet Layer 2 Card #2   Ethernet Data PRP Inter-link Port

PRP/HSR units installed on either side of an SDH transmission equipment ensures that even in the event of the failure of any one of the Ethernet card / Ethernet port on either side of the transmission link, the Ethernet data shall continue to be transmitted seamlessly with zero packet loss between the two locations.

Best case estimated time for network recovery

STP (Spanning Tree Protocol)	30 sec
RSTP (Rapid Spanning Tree Protocol)	4 sec. min.
PRP (Parallel Redundancy Protocol)	0ms
HSR (High-availability Seamless Redundancy)	0ms

CE Compliance:

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

Power Consumption:

- < 10 Watts

Mechanical Specifications:

- H x W x D: 72.0mm x 190.0mm x 176.5mm
- Weight: 1.5 KG
- DIN Rail Mount

MTBF:

- Per MIL-HDBK-217F: ≥ 37 years @ 24C
- Per Telcordia SSR 332, Issue 1: ≥ 42 years @ 24C

Technical Specifications

Environmental

Operating Temperature	-20^{0}C to +60^{0}C
Maximum Operating Humidity	95% R.H., Non-Condensing
Maximum Operating Altitude	Up to 3,000 meters above sea Level
Operation	Complies with ETS 300 019 Class 3.2
Storage Temperature	-40C to +70C
Storage	Complies with ETS 300 019 Class 1.2
Maximum Storage Humidity	98% R.H., Non-Condensing
Maximum Storage Altitude	Up to 3,000 meters above sea level
Transportation	Complies with ETS 300 019 Class 2.3

EMI, EMC, Surge Withstand and other Compliances:

EN 50081-2	EN 50082-2	IEC 60068-2-29
IEC 61000-4-6 (Conducted Immunity)		IEC 60068-2-2
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 61000-4-3	IEC 61000-4-2
IEC 61000-4-3 (Radiated Immunity)		IEC 61000-4-8
IEC 61000-4-4		

Electromagnetic Standards Compliance:

- EN 50081-2, EN 50082-2
- IEC 61000-6-2 (Immunity)
- IEC 610000-6-4 (Emission)
- Complies to IEEE and IEC standards

SFP Specifications

Compliance	- Compliant with IEEE 802.3z Fast Ethernet 1000BASE-LX - MSA Compliant - RoHS, EMI, ESD, DDM
Safety	Class 1 Laser Safety / IEC-60825 Compliant
Bit Rate	1.25 Gbps / 125 Mbps
Wavelength	1310 / 1550 nm
Distance	550m to 80Kms, as per order
Optical Connector	LC

Management Ports:

- USB Serial Port
- Ethernet 10/100BaseT, RJ45

Management option

- CLI English Text Command
  - Over TCP/IP Telnet
  - and Serial Communication
- Easy to use GUI
  - Over TCP/IP Telnet
  - and Serial Communication

Electrical Ethernet (OAM):

- 1 x 10/100Base-T / Tx auto negotiation
- Compliant with IEEE 802.3

Electrical Ethernet (Interlink and HSR/PRP Ports)**:

- 3 x Gigabit Ethernet Ports:
  - 1 x Input
  - 2 x PRP / HSR
- 10/100/1000M auto negotiation
- Compliant with IEEE 802.3, IEEE 802.3/u specifications

Optical Ethernet (Interlink and HSR/PRP Ports)**:

- Multirate
- 3 x 100Base-FX; or 1000Base-FX
- 3 x Optical Ethernet Ports:
  - 1 x Input
  - 2 x PRP / HSR
- Compliant with 100Base-FX/1000Base-FX Standards
- User selectable between 100Base-FX (Fast Ethernet) and 1000Base-FX (Gigabit Ethernet) modes
- Suitable for Single mode / Multi-mode fiber
- LED status for activity, link and power.

**Electrical/Optical user selectable Ethernet combo ports either Electrical Ethernet or Optical Ethernet will work.*

Regulatory Compliance:

- RoHS,
- CE Marking
- Complies with FCC Part 68 and EMC FCC Part 15

Ordering Information:

Part No.	Description:
VCL-2724-DIN-DC015060	VCL-2724, PRP / HSR Switch DIN Rail Mount Version 1 x 15~60V DC (48V DC nominal) Power Supply Input 48V DC

 # Add Power Supply Option below:
(*if AC or 125/250V DC operating voltage is required*)

VCL-EMOD 0444-AC220	External Power Supply - DIN Rail Mount Power Supply (External) AC to DC Converter, DRL30-24-1, DIN Rail Mount : - Input : 1 x AC Input [90~240V AC, 50-60Hz] - Output 1 x DC Output [24VDC~1.25A, 30W]
VCL-EMOD 0444-DC220	External Power Supply - DIN Rail Mount Power Supply (External) DC to DC Converter, DRL30-24-1, DIN Rail Mount : - Input: 1 x DC Input [110~250V DC] - Output: 1 x DC Output [24VDC~1.25A, 30W]