

#### Product Overview

Valiant's 'VCL-E1oP' E1 over Packet (2/8E1 Port IEEE-1588v2 Version) TDM over IP equipment supports transmission of up to 2/8 x E1 links over IP / Ethernet, MEF or MPLS Packet Switched Networks (PSNs) and synchronization using IEEE-1588v2 protocol. IEEE-1588 packet synchronization mechanism provides frequency and time-of-day synchronization for all points of the network to a common, single (GPS) source.

#### Highlights

- Switching Capacity upto 9 Gbps, non-blocking
- 4 x GigE Network Ports Copper, Fiber, or Copper plus Fiber
  - Optical SFP based (1000Base-FX) and Electrical (10/100/1000Base-T) Ethernet port options
    - 4 x 10/100/1000BaseT Copper Ports
    - 4 x 1000BaseFX Optical Fiber Ports  
(*may use a combination / mix of any 4 Copper or Fiber Ports*)
- Less than 4ms latency on the E1 channels
- Synchronize ToD (Time of Day) and Frequency of all nodes to a centralized / common GPS Receiver
- IEEE-1588 packet synchronization mechanism provides frequency and time-of-day synchronization for all points of the network to a common, single source.

#### Includes the following inputs:

- 1 PPS Input from GPS Receiver (BNC Connector)
- 1 x NMEA Input from GPS Receiver (DB9 Connector)

#### Includes the following outputs:

- 1 x 1 PPS Output / 1 x IRIG-B Output (50 Ohms, BNC Connector)
- 1 x NMEA Output from GPS Receiver (DB9 Connector)
- 1 x 2.048Mbits Synchronized Clock Output (RJ45 Connector)

#### E1 Clock recovery and synchronization techniques

- Synchronize to a GPS Input
- IEEE-1588v2 Clock Recovery, IEEE-1588v2 Master / Slave, BCMA (Best Master Clock Algorithm)
- Synchronization to an External Clock (ECLK)
- Adaptive Clock Recovery (ACLK)
- Recovered Clock (RCLK) / Loop-Timed Clock
- Asymmetrical (One-Clock and Two-Clock) Clock
- Synchronization to an Internal Clock
- Automatic clock priority selection with fall back
- Plesiochronous Clocking.

#### Key Features - E1 and E1 over Packet Engine

- Supports 2/8 independent E1 interfaces
- Supports CESoPSN, SAToP, IETF-PWE3 (Pseudo-wire) transport mechanisms.
- Supports IP, MPLS and MEF8 (Metro Ethernet) tagging.
- Supports three E1 framing modes - Framed, Unframed and Multi-Framed with CAS signaling.
- Supports point-to-point, point-to-multipoint and drop and insert applications.
- Jitter and Wander exceeds G.812, G.823 / G.824 and G.8261 and TDM specifications.
- RJ45 - 120 ohms balanced E1 interfaces. Optional 75 Ohms BNC interface
- E1 Local and Remote Loop-back (RLOOP) facility for testing and diagnostics.

#### Key Features - Ethernet / IP Network Interface

- Point-to-point, point-to-multipoint applications based on IP addressing. Supports drop and insert applications.
- Port Control Ingress Rate Limiting.
- 1+1 Ethernet link redundancy
  - Rapid Spanning Tree Protocol.
  - Ethernet Port Trunking.
  - ITU-T G.8032.
- User configurable MTU (E1oP payload) packet size up to 1800 Bytes.
- Configurable payload size for each bundle.
- Switch supports jumbo frame sizes of up to 9728 Bytes.
- Supports 802.1Q based QoS, 802.1p based packet priority.
- Port Based Priority (Classifying Services).
- DSCP and 802.1Q / 802.1p based packet tagging and prioritization.
- Flow Control in an Ethernet Packet Networks (Regulating Traffic)
- Port / Customer based bandwidth allocation (Port Rate Limiting)
- Separate IP Address for TDM traffic and equipment management.
- VLAN tagging for TDM traffic and equipment access / management.
- Single / Double 802.1 VLAN tagging (Q in Q VLAN Tagging) - User configurable.
- Synchronizing traffic management
- Broadcasting Network and Broadcast equipment synchronization.

### Integrated 8 Port Electrical Ethernet Switch Card and 8 Port Optical Ethernet Switch Card (Optional)

- Plug-In 8 Port Electrical Ethernet Switch Card (Optional)
  - Electrical Ethernet Card provides 8 x 10 / 100BaseT full-duplex (RJ-45) Ethernet ports.
- Plug-In 8 Port Optical Ethernet Switch Card (Optional)
  - Optical Ethernet Card provides 8 x 100Base-FX Optical (SFP) Ethernet ports.
- Fully managed Layer2 Switches which offer QoS by implementing IEEE802.1p, 802.1Q VLANs and Differentiated Services (Diffserv) and packet priority classification protocols for traffic management and optimization
- The optional Substation Hardened Managed Switch cards are designed to operate in rugged environments even in extreme temperature conditions. No external fans or forced air cooling is required.
- IEC 61850-3 and IEEE 1613 complied.

### Applications Cellular/Mobile

- Backhaul 2G and 3G/LTE services using a single Ethernet infrastructure
- Port based Priority feature allows the user to assign priority to the 2G and 3G/LTE traffic ports
- VLAN based Priority feature allows the user to assign priorities to different types of service traffic
- User can assign highest priority to TDM traffic to ensure un-interrupted transmission of E1 links even under heavy 3G traffic conditions
- User can configure a particular TDM link should be given preference over the other TDM links
- Flow Control feature allows Ethernet based flow to minimize link disruptions and lost packets due to data bursts
- Ingress Ethernet Rate Limiting allows to assign the bandwidth as per customer requirements
- Separating traffic by applications and classes by assigning 802.1Q based VLANs
- To synchronize cell sites:
  - Frequency synchronize all BTSs and BSCs with the MSC using IEEE-1588v2 phase synchronized frequency
  - Distribute Time-Of-Day across all nodes of the network with 500ns (0.5 micro-second) accuracy
  - Distribute 1 PPS across all nodes of the network
  - Distribute NMEA information across all nodes of the network.

### Applications Power and Transportation

- Backhaul legacy voice, low speed legacy data and high speed Ethernet services using a single Ethernet infrastructure
- Frequency synchronization across the entire network with IEEE-1588v2 phase synchronized frequency
- Distribute Time-Of-Day across networks with 500ns (0.5 micro-second) accuracy
- Distribute IRIG-B time across the entire network for synchronizing all RTUs, **Synchrophasors** / PMUs and Protection Relays to a common network clock
- Distribute Time-Of-Day across all nodes of the network with 500ns (0.5 micro-second) accuracy
- Applications Include
  - Smart Grid
  - Air Traffic Control
  - Railways
  - Road Traffic Management

### Hardware Highlights

- 19-Inch rack mountable
- Available in 3U form factor with various connector options
- 1+1 Redundant Power Supplies, AC and DC, or AC plus DC
- Extended Temperature Range: (-40° C to +60° C)
- EMI / EMC Compliant
- Real time battery backed clock

### System Management, Monitoring and Alarm Interfaces

- NMS (Network Management System) to monitor multiple units from single Central Location
- External Alarm - Dry contact relay alarms are also available at rear of the system to connect the system to an external alarm
- Supports system temperature monitoring with High Temperature and Low Temperature alarms and SNMP Traps
- Supports SNMP V2 Monitoring and Traps
- Self-test for checking system errors upon system boot up
- Event Logging
- Clock Performance Alarms
- Network Performance Alarms
- Network Performance Monitoring and Diagnostics
- Online / remote upgrade of firmware

### System Access, Control and Management Options

- Telnet
- CLI Control Interface (HyperTerminal or VT100)
- SNMP V2 Traps (MIB File provided)
- Windows based GUI (Graphical User Interface) for easy configuration, management and access. Ability to monitor multiple units from a single NMS
- Password Protection
- Supports SSH and Radius for secured access control

### OAM: Operation and Management Ports

- RS232 Serial Port
- USB COM Port
- 10/100/1000BaseT Ethernet Management for In-band remote access.

### Power Supply Options

- Dual Redundant Power Supplies
- 1+1 AC power (100 to 240V AC, 50/60 Hz)
- 1+1 DC (-48V) power (40 to 72V DC)
- 1+1 DC (-24V) power (18 to 40V DC)
- AC or DC
- EMI/EMC compliant.

**Regulatory Compliance**

- Safety - IEC60950
- CERoHS
- Complies to ANS/IEC standards
- Complies with Telecom Part 68, FCC Part 15 and CISPR 22 Class A
- EMC EN55022: 1998 + A1 and A2
- EMC EN55024,
- Operation ETS 300 019 Class 3.2
- Storage ETS 300 019 Class 1.2
- Transportation ETS 300 019 Class 2.3

**NMS (with SSH/Telnet) OAM port Specifications**

Network Interface	RJ-45 10/100/1000BaseT (Auto sensing)
Compatibility	Ethernet Version 2.0 IEEE 802.3
Protocols supported	ARP, UDP/IP, TCP/IP, Telnet, SNMP
Management	SNMP, Serial login, Telnet login

**External Alarms**

- Dry Contact Relay - 2 Form C
- Rated upto 72V DC, 1Amp.

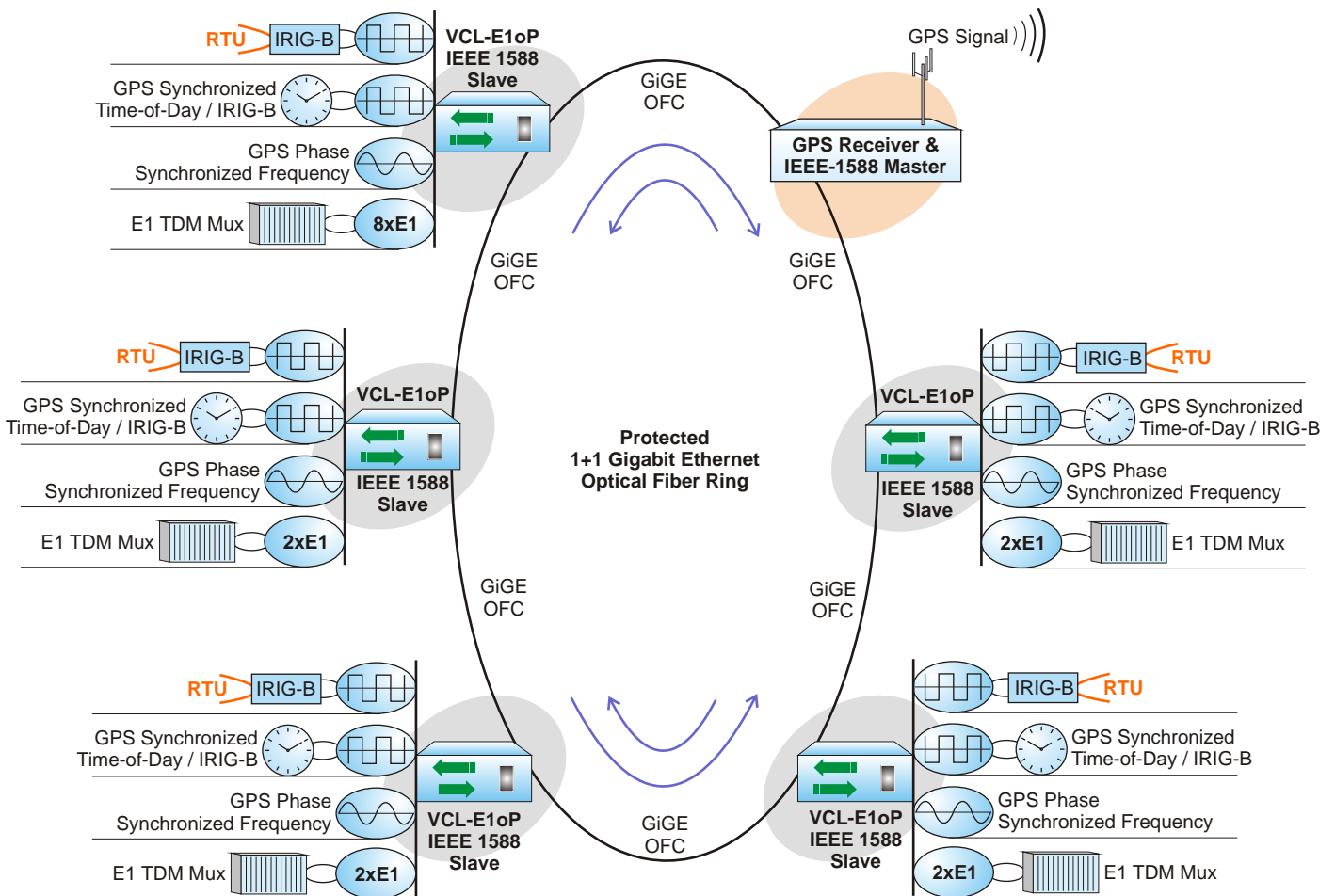
**Chassis**

- 3U High
- 19-inch rack-mounting

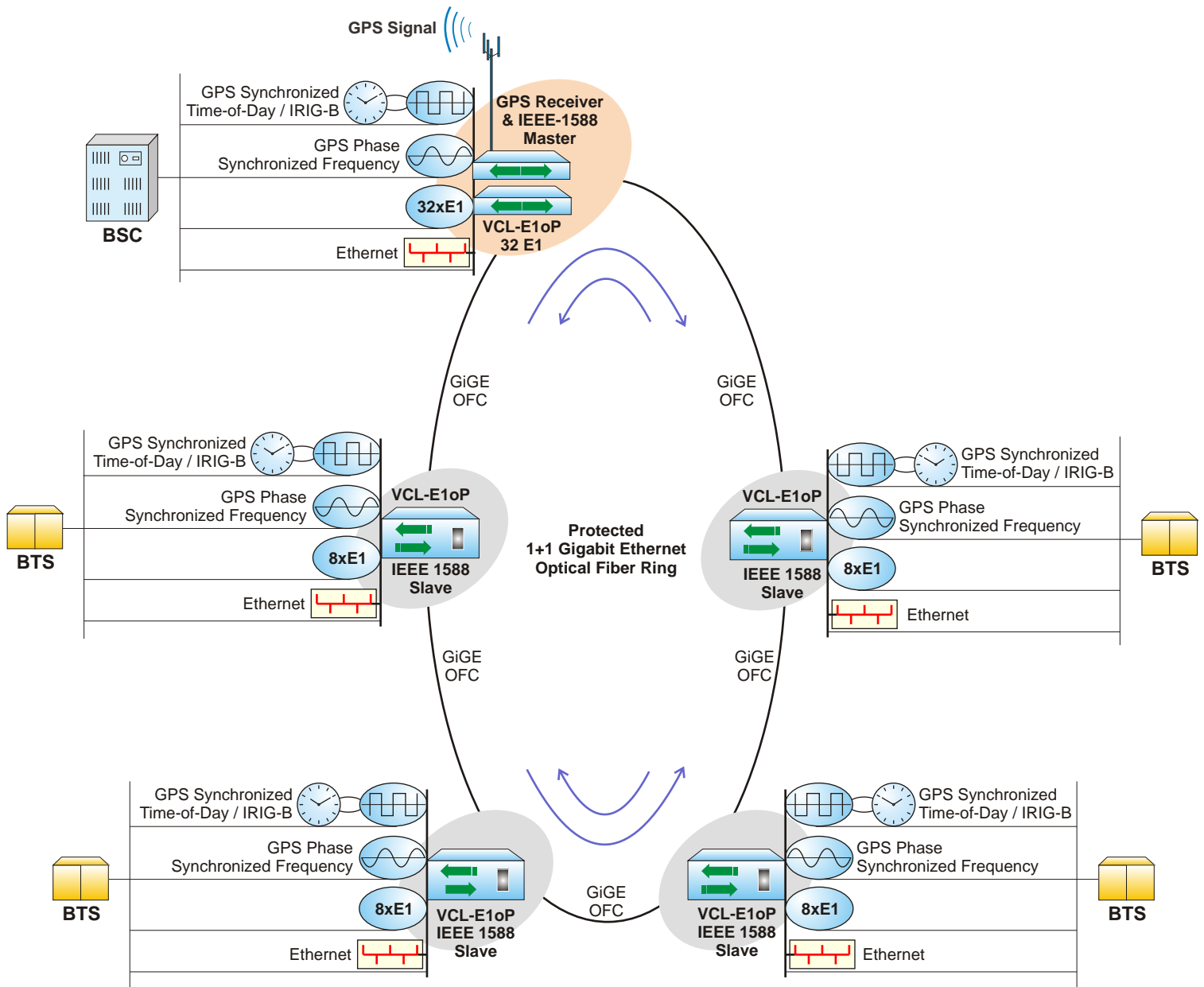
**Mechanical Specification**

Height	142 mm (3U)
Depth	260 mm
Width	480 mm (19 inch rack mountable)
Weight	5 Kgs.

**Application Diagram for Power Utilities**



## Application Diagram for Cellular Networks



Technical specifications are subject to changes without notice.  
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