VCL-2156, PTP IEEE-1588v2 Grandmaster with NTP SERVER
Primary Reference Clock (G.811)

Product Overview

The VCL-2156 PTP IEEE-1588v2 Grandmaster with NTP SERVER is designed to provide PTP, NTP and ITU-T G.811 Primary Reference Clock that is locked to a GPS / GNSS reference to provide time synchronization to private networks such as Railways and Metro networks, Airports and Air-Traffic Control facilities, Power Utilities, Oil and Gas Utilities, ISPs and Cable TV networks as well as to Campus networks that are required to maintain a complete isolation from public networks for security reasons.

VCL-2156 locks to a GPS / GNSS reference to provide an NTP time reference on up to 4+1, 10/100BaseT Ethernet Ports which can be segregated to serve separate classes of assets in the network.

Features and Highlights:

- IEEE 1588 v2 Precision Time Protocol Grandmaster
- Support PTP Power Profile
- Support up to 128 PTP Clients
- Gigabit Ethernet Interfaces
- 2.048MHz, 10MHz, 1PPS and TOD Output
- High bandwidth NTP performance
- Upto 7,500 NTP requests per second
  - 40,000 NTP Slaves supported
  - 250,000 SNTP Slaves supported
- Multiple NTP Ports - 4+1 x Independent 10/100 Mbit/s, RJ-45 Ethernet interfaces
- ITU-T G.811 / Stratum 1 compliant (PR) Primary Reference when locked to GPS
- ITU-T G.812 compliant holdover
- Synchronization of NTP and SNTP clients
- NTP Peering
- Leap Second Correction Support
- MD5 authentication for NTP clients
- 1 x IRIG-B Un-Modulated (BNC)
- 1 x IRIG-B Modulated (Rj45)
- Meets and comply with Power Contact and Lightening Protection as per Telcordia GR-1089-CORE and EN61000-4-5 Level 3 specifications.
- Alert notifications via SNMP Traps, SNMPv2, SNMPv3
- Concurrent IPv6 and IPv4 operation
- Networking protocols: IPv4, IPv6, SSH, TELNET, FTP, SYSLOG, SCP, TFTP, SCP, SFTP
- Supports Anti Jamming feature
- Supports Anti-Spoofing
- Secure network management: enable or disable options
- Double Oven Quartz Oscillators (OCXO) hold-over
- DC, or AC, or 1+1 Redundant AC+DC Power Supply options.

The **VCL-2156** is equipped with a highly accurate, low-noise OCXO to provide a high stability, ITU-T G.812, Type II, III compliant holdover clock with better than 12µs accuracy over a 24 hour (5 milliseconds per year) period in the event of unavailability of the GPS / GLONASS signal or antenna failure, or a temporary loss of reception in a totally isolated network without any external reference.

VCL-2156 establishes a highly accurate phase-synchronized frequency and time base by synchronizing to the GPS / GLONASS satellites' atomic clocks to distribute synchronized time over packet based networks including Ethernet, Carrier Ethernet, IP and IP/MPLS Networks.

The VCL-2156 provides a wide range of GPS / GLONASS referenced frequency and time sources that include 2.048MHz, 10MHz, 1PPS frequency as well as an NMEA and NTPv4 time reference. Features such as maintaining a distinctly separate IP address for system management and control, password based access, SSH as well as Md5 authentication ensures operational reliability and security. Additional features include remote login and remote firmware upgrade (file transfer) capabilities. VCL-2156 includes complete SNMP monitoring as well as support for enterprise directory services for user authentication, internal and external logging and monitoring of alarm and error messages through Syslog ensures a high level of system manageability. Other features include DHCP for installation convenience and support concurrent IPv4/IPv6 support for future network up gradation.

Display :

- LCD-display with back-light

The **NTP Input supports only the Sub-Master clock feature, ensuring synchronized outputs from the four NTP server RJ45 ports, when the GPS/GNSS antenna is disconnected.*

NTP Peering

NTP peering is a method to allow multiple NTP servers to share time. Having more than one reference server configured increases reliability of the NTP server.

In peering mode, in addition to its GPS reference, the VCL-2156 can be configured to receive and monitor time from an additional Stratum 1 NTP Server available on the network. This allows the unit to fall back to its peer source in the event its primary reference becomes unavailable.

Performance:

VCL-2156 has 4+1, 10/100 BaseT Industrial Ethernet Ports that meet and comply with "Power Contact and Lightening Protection" as per Telcordia GR-1089-CORE and EN61000-4-5 Level 3 specifications making it suitable for the equipment to be installed in harsh industrial environments which include Electric Sub-Stations, Railway and Metro Networks.

VCL-2156 is powered by a high performance microprocessor and a highly precise GPS / GLONASS based time receiver that provides a better than 30 nanosecond accuracy to assure high bandwidth NTP Performance of better than 7,500 NTP requests per second / 128 packets per seconds (40,000 NTP Slaves supported).

Monitoring and Management:

The configuration can be managed by Graphical User Management Interface. A text based and menu driven setup utility is also available via Telnet or SSH. An optional Graphical User Network Management Interface (NMS) allows multiple systems installed on a networks to be monitored and configured from a single or multiple management locations.

MTBF:

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

Technical Specifications:

GPS/GNSS Receiver Specifications:

- 50 Channel GPS Receiver
- 72 Channel GNSS Receiver
- GPS L1 frequency, C/A Code Receiver
- Tracks up to 12 satellites in GPS only mode (GPS only version)
- Tracks up to 24 satellites in GNSS mode (GNSS version)
- Synchronizing Time:
  - Acquisition time - Hot Start: 1 sec.
  - Acquisition time - Warm Start: 28 sec.
  - Acquisition time - Cold Start: 28 sec.
- GPS/GNSS Signal
  - Tracking and Navigation: -162 dBm
  - Reacquisition -160 dBm
  - Cold Start -148 dBm
- Antenna Connector: TNC
- Accuracy Of Time-Pulse Signal referenced to GPS: ± 30ns (raw)
- Accuracy Of Time-Pulse Signal referenced to GNSS: ± 20ns (raw)
- Accuracy Of Time-Pulse Signal referenced to GPS/GNSS: ± 15ns (compensated)
  (Note: with all satellites in view at -130db)

Synchronization Inputs:

- 1 x GPS / GNSS (TNC)
- 1 x NTP Time Source

Holdover (G.812) Synchronization:

- OCXO (Double Oven-Controlled Crystal Oscillator)
- Accuracy
  - 0.5 ppb per day
  - 50 ppb per year

NTP Outputs:

- 4 x 10/100 Mbps NTP Interfaces
- 1 x 10/100Mbps user configurable NTP / SNTP interface

PTP, Frequency and Time Outputs:

- 1 x Gigabit IEEE-1588 v2 PTP Grandmaster
- 1 x 2.048 MHz, 75 Ohms, phase-locked to GPS (BNC). ITU-T G.811 compliant.
- 1 x 10 MHz, 50 Ohms, phase-locked to GPS (BNC). ITU-T G.811 compliant.
- 1 x 1 PPS, phase-locked to UTC (BNC)
- 1 x ToD (Time-Of-Day) output compliant to NMEA 0183 (Db9)
- 1 x IRIG-B Un-Modulated (BNC-50 Ohms) (B000, B002, B003, B004)
- 1 x IRIG-B Modulated (Rj45) (B120, B122, B123, B124)
- 1 x 1 PPM / 1 PPH

Network Time Protocol:

- NTP v2, (RFC 1119), NTP v3 (RFC 1305), NTP v4, (RFC 5905, RFC 4330), SNTP v3 (RFC 1769), SNTP v4 (RFP 2030), MD5 Authentication
- Upto 7,500 NTP requests per second
  - 40,000 NTP Slaves supported
  - 250,000 SNTP Slaves supported
- Internet Protocol: IPV4 - DHCP (RFC 2131), IPV6 - DHCPv6 (RFC 3315)
- NTP Version 4.2.8p7
- Time Protocol: TIME (RFC 868)
- Daytime Protocol: DAYTIME (RFC 867)
- NTP Peering

PTP IEEE 1588 v2 Grandmaster

- Communication: Unicast, Multicast, Broadcast
- Synchronization of IEC-61850 Compliant
- <100ns Accuracy when locked with GNSS (GPS/GLONASS)
- PTP Slave/Client capacity: 8, 16, 32, 64 or 128
- User Configurable
  - 1-step and 2-step Clock
  - End-to-End and Peer-to-Peer
- Layer 2 (Ethernet) or Layer 3 (UDP)
- Configuration message rate 8 pkts/sec, 16 pkts/sec, 32 pkts/sec, 64 pkts/sec, 128 pkts/sec
- Up to 128 message per second
- 1 x 10/100/1000Base-T (RJ45)

PTP Profiles:

- Default Profile
- Power Profile - C37.238-2011
- Power Profile - C37.238-2017
- Power Profile - IEC/IEEE 61850-9-3
- Power Profile - IEC 61850-9-3
- Ethernet Default Profile (Layer 2 multicast)
- Communication: Unicast, Multicast, Mixed
- Best Master Clock Algorithm (BMCA)

Security and Protection:

- Password Protection with password strength monitor
- SSH

Local / Remote Management:

- RS-232C, USB
- 10/100BaseT Ethernet RJ45
- 2 x External Alarm Relay Contacts
- Telnet / SSH v2 (option to disable clear text communication to comply with NERC security requirements)
- CLI Control Interface (HyperTerminal or Vt100)
- SNMPv2, SNMPv3 Traps (MIB provided)
- Syslog, HTTP/HTTPS
- TCP, UDP, FTP, SCP, SFTP.

Configuration and Monitoring Software:

- Telnet,
- SSH, CLI
- NMS - GUI (Graphical User Interface) - Runs on any PC operating on Windows 7, Windows 8 or Windows 10 OS.

Standards & Compliance:

- IEC - EMC – Certified to EN 55022: 2005 / CISPR 32A / EN55022, EN 55024:2005, IEC 61000-4-2, IEC 60255 / 61000-4-6, 8, 9, IEC 60255-22-6, IEC 60255-5:2000, IEC 61000-4-8, IEC 61000-4-9, IEC 61000-4-3, IEC 61000-4-4, IEC 61000-4-18, IEC 60068-2-6, IEC 60068-2-1Ad, IEC 60068-2-14Ad, IEC 60068-2-2Bd, IEC 60068-2-30, IEC 61850-3, IEEE 1613
- RoHS, CE – 2001/95/EC, 2006/95/EC, EN60950-1, EN61000-6-2, EN61000-6-4
- FCC – FCC Part 15 B Class A: Conducted Emission test on Power Line
- FCC Part 15 B Class A: Radiated Emission >1 GHz FCC, 6 GHz, on Power Line

Mechanical Specifications:

- H x W x D : 44 mm x 480 mm x 225 mm
- Weight: 2.3 Kg
- 19", 21", 23" Rack mounting options
- IP Rating : Ip20

Environmental (Equipment):

Operational	-20C to +65C (Typical: +25C)
Cold start	-10C
Storage	-40C to +85C
Humidity	95% non-condensing
Cooling	Convention Cooled. No cooling fans are required.

Power Supply:

- Dual Redundant
- 1+1 AC power (100 to 240V AC, 50/60 Hz, IEC C14 Inlet Connector)
- 1+1 DC 24V, 1+1 DC 48V
- 1+1 DC 110~220V
- AC or DC
- Reverse Polarity Protection

Power Consumption:

- < 15W at ambient (steady state 24°C)

Antenna Specifications:

- Antenna Type: Active, Wall Mounting
- Antenna Connector: TNC
- Polarization: Right hand circular
- Frequency Band: 1575.42 MHz ± 10 MHz
- Amplifier Gain: 40dB ± 4dB
- VSWR: <2.0 Max, 1.0 Typical
- Operating temperature: -40C to +85C
- Out of Band Rejection: ≥ -60dB @ ± 50MHz off center (1575.42 MHz) frequency
- Lightening Protection: According to EN61000-4-5 Level 3.
- LMR400 (or equivalent) Cable Length - 30, 50, 60, 90 and 100 meters

Expansion Chassis

- Up to 6 User selectable output modules (Add any 4 output cards, in any combination Please specify in order)
- Up to 16 x IRIG-B Un-Modulated outputs (RS422, RS485, RS232)
- Up to 16 x IRIG-B Un-Modulated outputs (BNC)
- Up to 8 x NMEA-0183 outputs (Rj45)
- Up to 16 x 1 PPS outputs (BNC)
- Up to 4 x 1 PPS outputs (ST)

Ordering Information:

Part Number	Description
VCL-2156-NTP-yy	NTP Server
	yy: AC or ACR or DC or DCR or ACDC (1+0, 1+1, AC+DC)
VCL-2156-NTP-PTP-yy	NTP Server and IEEE-1588v2 PTP Grandmaster
	yy: AC or ACR or DC or DCR or ACDC (1+0, 1+1, AC+DC)

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Revision 6.3 – February 20, 2026

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