

## 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 (ticketing and platform) networks, Airports and Air-Traffic Control facilities, Electric Sub-Stations, Power Distribution and Transmission companies, 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. It may be also used by 2G, 3G and LTE service providers which provide a time of day reference to their customers over their wireless networks.

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.



Front View



Back View

### Features and Highlights:

- IEEE 1588V2-2008 Precision Time Protocol Grandmaster
- PTP Profiles supported: Telecom profile, Power profile
- Support up to 128 PTP Clients
- Gigabit Ethernet Interfaces
- 2048MHz, 10MHz, PPS and TOD Output
- High bandwidth NTP performance
- Upto 5000 NTP requests per second
- 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
- <100ns Accuracy when locked with GNSS (GPS/GLONASS)
- 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 Lightning Protection as per Telcordia GR-1089-CORE and EN61000-4-5 Level 3 specifications.
- Alert notifications via SNMP Traps
- Concurrent IPv6 and IPv4 operation
- Supported networking protocols: IPv4, IPv6, SSH, TELNET, FTP, SYSLOG and SNMPv2
- 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.

### Performance:

VCL-2156 is designed to be deployed in concurrent IPv4 networks to provide PTP and NTP time and frequency synchronization.

The VCL-2156 has 4+1, 10/100 BaseT Industrial Ethernet Ports that meet and comply with "Power Contact and Lightning Protection" as per Telcordia GR-1089-CORE and EN61000-4-5 Level 4 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 5000 NTP requests per second / 128 packets per seconds.

### Monitoring and Management:

The configuration of the system can be managed by Graphical User Management Interface. Alternatively, a text based and menu driven setup utility can be started from the shell prompt after logging into the unit 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.

### Standards & Compliance:

- IEC - EMC – Certified to EN 55022: 2005 / CISPR 22, EN 55024:2005, IEC 61000-4-2
- 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

**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 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)

**Holdover (G.812) Synchronization:**

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

**Synchronization Inputs:**

- 1 x GPS (TNC)

**NTP Outputs:**

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

**PTP, Frequency and Time Outputs:**

- 1 x IEEE-1588v2 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)
- 1 x IRIG-B Modulated (RJ45)
- 1 x 1 PPM

**Ordering Information:**

Part Number	Description	Power
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)

**Network Time Protocol:**

- NTP v2, (RFC 1119), NTP v3 (RFC 1305), NTP v4, (RFC 5905), SNTP v3 (RFC 1769), SNTP v4 (RFP 2030), Md5 Authentication
- Internet Protocol: IP v4
- Time Protocol: TIME (RFC 868)
- Daytime Protocol: DAYTIME (RFC 867)

**PTP IEEE 1588-2008 V2 Grandmaster:**

- <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
- 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) Electrical Ports

**PTP Profiles:**

- ITU-T G.8265.1 (Layer 3 unicast, IPv4)
- Telecom-2008 Profile (Layer 3 unicast, pre-standard ITU-T G.8265.1, IPv4)
- Power Profile: IEEE C37.238-2011
- Ethernet Default Profile (Layer 2 multicast)
- Communication: Unicast, Multicast or Mixed
- Best Master Clock Algorithm (BMCA)

**Display :**

- LCD-display with back-light

**Local / Remote Management and Monitoring Ports:**

- RS-232C, USB
- 10/100BaseT Ethernet RJ45
- 2 x External Alarm Relay Contacts.

**Local / Remote Communication Options:**

- Telnet / SSH  
(option to disable clear text communication to comply with NERC security requirements)
- CLI Control Interface (HyperTerminal or VT100)
- SNMP V2 Traps (MIB File provided).

**Security and Protection:**

- Password Protection with password strength monitor
- SSH

**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.

**Environmental (Equipment):**

Operational:	-10C to +65C (Typical: +25C)
Cold start	-0C to +50C
Storage	-20C to +70C
Humidity	95% non-condensing
Cooling	Convention Cooled. No cooling fans are required.

**Mechanical Specifications:**

Height	44 mm
Width	480 mm (DIN 19-inch)
Depth	225 mm
Weight	3.5 Kg
Rack Mount Options	19", 21", 23" Rack mounting options

**Power Supply Options:**

- Dual Redundant
- 1+1 AC power (100 to 240V AC, 50/60 Hz)
- 1+1 DC 24V
- 1+1 DC -48V
- 1+1 DC 110~220V
- AC or DC

**Power Consumption:**

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

**Antenna Specifications:**

- Antenna Type: Active
- Polarization: Right hand circular
- Frequency Band: 1575.42 MHz  $\pm$  10 MHz
- Amplifier Gain: 40dB  $\pm$  4dB
- VSWR: <2.0 Max, 1.0 Typical
- Operating temperature: -40C to +85C
- Reverse Polarity Protection
- Out of Band Rejection:  $\geq$  -60dB @  $\pm$ 50MHz off center (1575.42 MHz) frequency
- Lightning Protection: According to EN61000-4-5 Level 4.
- LMR400 (or equivalent) Cable Length - 30, 50, 60 and 90 meters

**MTBF:**

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

Technical specifications are subjects to changes without notice.

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