

**Product Overview**

The above dictum can be applied absolutely literally to electronic trading platforms – since significant quantities of stocks and currencies are bought and sold microseconds apart at differing rates.

Financial Regulators all over the world, realizing this need, are now requiring all share trading platforms to use IEEE-1588v2 technology to synchronize to a GPS / GNSS based time-source with micro-second accuracy so that buy and sell orders can be executed with precision according to their time-stamp.

Accurate and precise time stamping is required for compliance with financial regulatory mandates such as the Sarbanes-Oxley Act of 2002 (SOX), the FTC's Gramm-Leach-Bliley Act (GLBA), FINRA's Order Audit Trail System (OATS) and the Payment Card Industry Data Security Standard (PCI-DSS).



The 2015 European Securities and Markets Authority MiFID II regulation requires clock accuracy and granularity in stock trading to have a time-stamp accuracy of better than 100 microseconds to UTC with a granularity of 1 microsecond.

To fulfil this requirement and fulfill the regulatory obligations and stipulations, all electronic share trading platforms must:

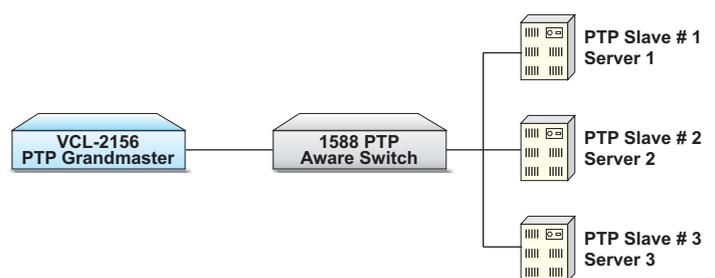
- Install GPS / GNSS based IEEE-1588v2 Grandmaster Clocks that use BCMA (Best Master Clock Algorithm) for automatic Fail-Over / Redundancy.
- Install IEEE-1588v2 Slave Clocks in Servers that can synchronize to the GPS / GNSS based IEEE-1588v2 Grandmaster Clocks and provide better than 100 microsecond time synchronization accuracy with 1 microsecond granularity.
- Submit to periodic (quarterly / bi-annual) Synchronization Audits (and obtain documented audit reports) so ensure that the GPS / GNSS based IEEE-1588v2 Grandmaster Clocks and the IEEE-1588v2 Slave Clocks installed in the Servers are complying with / maintaining the synchronization accuracy.



Valiant Communications is a one-stop manufacturer and provider of the complete IEEE-1588v2 and NTP “Turnkey Synchronization Solutions” for financial platforms that include:

- IEEE-1588v2 Grandmaster Clocks that use BCMA (Best Master Clock Algorithm) for automatic Fail-Over/Redundancy.
- PCIe based IEEE-1588v2 Slave Sever Clocks that would synchronize the Server (Share Trading Platform) to the IEEE-1588v2 Grandmaster.
- Highly secure and accurate NTP synchronization solutions with automatic Fail-Over and 1+n redundancy.
- Installation and Configuration Package – that includes Calibration and Post-Installation Synchronization Audit.
- Quarterly, Bi-Annual and Annual Synchronization Audit Services (as required by the regulator) using Calibration Equipment that is traceable to NIST (National Institute of Standards and Technology (NIST), in the United States.

**Application Diagram**



## Technical Specification

### GPS and GNSS Receiver:

- 50 Channel GPS Receiver / 72 Channel GNSS C/A Code Receiver
- Tracks up to 12 satellites simultaneously
- Accuracy Of Time-Pulse Signal referenced to GPS: +/-30ns
- Accuracy Of Time-Pulse Signal referenced to GNSS: +/-20ns
- Accuracy Of Time-Pulse Signal referenced to GPS: +/-15ns (compensated)  
(Note: with all satellites in view at -130db)
- Jamming Resistant with Signal Jamming Alert for High Reliability Applications dresses for NTP and Management Interfaces.

### Holdover Synchronization (in the event of loss of GPS / GNSS Signal):

#### Ultra-Low Noise High Stability OCXO

- Frequency Stability: 0.5 ppb / day (@ +25°C)
- Aging per day: 0.5 ppb / day
- Aging per year: 50 ppb / year
- PPS accuracy: < 12µs after 24 hours, at constant temperature
- PPS accuracy: < 12µs after 8 hours, at variable temperature.

### NTP Server:

- NTP Protocols: NTP v2 (RFC 1119), NTP v3 (RFC 1305), NTP v4
- IP Protocols: IPV4, IPV6
- Time Protocol: (RFC 868)
- Daytime Protocol: (RFC 867)
- Capable of processing up to 3000 requests per second.
- Stratum 1 Clock when synchronized to GPS (GNSS) with clock quality broadcast
- Stratum 2 Clock in Holdover Mode with clock quality broadcast
- Synchronization Accuracy: Better than 1 millisecond referenced to GPS (GNSS).

### IEEE-1588v2 Grandmaster:

- Compliant with IEEE-1588 v2 (2008) specifications
- Hardware Time-Stamp Synchronization Engine
- 1-Step Clock and 2-Step Clock Modes
- Maximum Number of Addressable PTP Clients
  - 32 Clients @ 1 Synchronization Message / Sec – Multicast Mode
  - 128 Clients @ 128 Synchronization Messages / Sec – Unicast Mode
- Synchronization Accuracy: Better than 0.1microseconds referenced to GPS / GNSS.
- BCMA – Supports Best Master Clock Algorithm for Automatic Fail-Over / Redundancy
- Synchronization Audit Port for Calibration and Certification

### IEEE-1588v2 Slave:

- Compliant with IEEE-1588 v2 (2008) specifications
- PCIe Plug-In Card – Plugs in any standard PCIe Server Slot
- Hardware Time-Stamp Synchronization Engine
- Synchronization Accuracy: Better than 0.25microseconds w.r.t. PTP Grandmaster
- BCMA – Supports Best Master Clock Algorithm for Automatic Fail-Over / Redundancy
- Synchronization Audit Port for Calibration and Certification

### Environmental Characteristics: Equipment

Operationa	-10°C to +60°C (Typical: +24°C)
Cold start	-0°C to +50°C
Storage	-20°C to +70°C
Humidity	95% non-condensing
Cooling	Convention Cooled. No cooling fans are required.

### Environmental Characteristics: Antenna

Antenna Type	Active
Amplifier Gain	Typically 27dB to 40dB
Lightening Protection	According to EN61000-4-5 Level 4.
Operating temperature	-40°C to +85°C
Reverse Polarity Protection	

### Antenna Cable Options:

(Note: cables and connectors are not included and must be ordered separately as optional extras).

- Cable Type: LMR 400 or equivalent with N connector
- Total Cable Length:
  - 30, 50, 100 meters LMR 400
  - 101 to 200 meters (LMR400 – with one active in-line amplifier).

### Power Supply Options:

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

### MTBF:

Per MIL-HDBK-217F	≥ 37 years @ 240C
Per Telcordia SSR 332, Issue 1	≥ 42 years @ 240C
Increase in Equipment Reliability with 1:1 Protection	10 <sup>15</sup> times

### Security and Protection:

- Password Protection with "Audit Trail" for log-in history
- SSH
- RADIUS

### Environmental Characteristics: Equipment

Height	45 mm (1U)
Width	480 mm (DIN 19-inch)
Depth	280 mm
Rack Mount Options	19", 21", 23" Rack mounting options

### Standards & Compliance:

- IEC – EMC – Complies 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
- FCC Part 15 B Class A: Radiated Emission

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