NextGen Network Sync Solutions Overview

Trimble offers cost effective and best in class timing product portfolio in the industry. Our portfolio includes a wide selection of Embedded GNSS Timing Modules, Custom GNSS Timing Receiver, GNSS Disciplined Oscillator, Grandmaster and Boundary Clocks, NTP Time Servers, Smart Antenna and standard Antenna products. Trimble is a trusted name for thousands of customers across the globe.

**FEATURES**
- Cost effective best in class timing product
- Industry’s broadest portfolio
- Proven expertise in PNT industry
- Advanced timing technology

**BENEFITS**
- Off the shelf and Custom design
- Global Reach
- Complimentary clock tree design and review services
- Expert engineering support

**APPLICATIONS**
- 4G/5G infrastructure
- Enterprise & Industrial Networks
- Datacenters, cloud & MSO infrastructure
- Financial Infrastructure
- Automotive, Calibration and SATCOM
Best in Class GNSS Module

Meeting Industry Standards

Trimble offers an existing line up of GNSS timing modules that provides GNSS receiver and PRTC function to be integrated with network equipment. Trimble’s newly added RES720 and ICM720 GNSS receivers provide a dual band multi-constellation secured resilient timing and act as primary reference time clock (PRTC) for precision time distribution in a network. It is the key component to receive and convert the UTC time from GNSS signals. The RES720 GNSS receiver combines PRTC and LNA (low noise amplifier) circuits as an external standalone device or as an internal board or module, and the ICM 720 also offers a programmable 10 MHz frequency output.

Applications

- Cell Site Router/DCSG
- eNB/gNB
- Radio Unit/O-RU/DU
- Passive Radar
- SATCOM Devices

<table>
<thead>
<tr>
<th>Model Name</th>
<th>Multi-Constellation</th>
<th>Dual Band (L1 &amp; L5)</th>
<th>Accuracy</th>
<th>Frequency Output</th>
<th>Extended Temp (-40 °C to 85 °C)</th>
</tr>
</thead>
<tbody>
<tr>
<td>RES 720</td>
<td>GNSS</td>
<td>Yes</td>
<td>5 ns (1 Sigma)</td>
<td>IPPS/PP2S</td>
<td>Yes</td>
</tr>
<tr>
<td>RES SMT 360</td>
<td>GNSS</td>
<td>No</td>
<td>15 ns (1 Sigma)</td>
<td>IPPS/PP2S</td>
<td>Yes</td>
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<tr>
<td>ICM SMT 360</td>
<td>GNSS</td>
<td>No</td>
<td>15 ns (1 Sigma)</td>
<td>IPPS/PP2S &amp; 10MHz</td>
<td>Yes</td>
</tr>
</tbody>
</table>
Packet Timing

Meeting NextGen Network Synchronization

Trimble offers both NTP and PTP time servers for packet timing solutions. Precision Time Protocol (PTP) is the standard that guarantees both phase and frequency alignment across the entire packet network. Packet network infrastructure relies on PTP to synchronize timing devices across the network.

Essential components of the synchronization architecture are the grandmaster, slave and boundary clocks. Trimble’s Thunderbolt™ GM200 is industry’s most cost effective best in class two-in-one that provides both Grandmaster and boundary clock in in half rack size box with unparalleled accuracy with background for NTP based networks.

Applications

- Telecom Networks: 4G/5G xHaul/OpenRAN/O-RAN
- Industrial Networks/ Industrial Automation System
- Autonomous Vehicle/ LiDAR System/Machine Vision
- SmartGrid & SATCOM Infrastructure
- Data Center/ Financial Networks
- MSO/CATV Infrastructure

<table>
<thead>
<tr>
<th>Model Name</th>
<th>Multi-Constellation</th>
<th>Protocol Support</th>
<th>Accuracy</th>
<th>Holdover</th>
<th>Frequency Output</th>
<th>Extended Temp (-40 ° to 85 ° C)</th>
</tr>
</thead>
<tbody>
<tr>
<td>GM200</td>
<td>GNSS</td>
<td>PTP with NTP</td>
<td>15 ns (1 Sigma)</td>
<td>1.5μs over 12 hours</td>
<td>SyncE/1PPS/10MHz</td>
<td>Yes</td>
</tr>
<tr>
<td>TS200</td>
<td>GNSS</td>
<td>NTP</td>
<td>15 ns (1 Sigma)</td>
<td>1.5μs over 12 hours</td>
<td>1PPS/10MHz</td>
<td>Yes</td>
</tr>
</tbody>
</table>
Disciplined Clock

**Best in class primary clock reference GNSSDO**

Disciplined Clocks or GNSS Disciplined Oscillators (GNSSDO) are a trusted and accurate source of timing. Even when GNSS signals are unavailable, they continue to output precise time. These powerful devices consist of GNSS receivers that discipline high quality oscillators to provide a highly accurate time source, comparable to expensive atomic frequency standards. Trimble’s disciplined clock product lines offer a range of performance choices - holdover, phase noise, size and cost, ideally suitable for your application. Thunderbolt E GPS and Mini-T GG are two distinct lines of products offering GNSSDO based primary reference clock traceable to UTC.

**Applications**

- Telecom Networks infrastructure
- Industrial Networks/ Industrial Automation System
- SmartGrid and other utility networks
- SATCOM Infrastructure
- Financial Networks & Passive Perimeter Defense
- Calibration Services & Scientific Labs

<table>
<thead>
<tr>
<th>Model Name</th>
<th>Constellation</th>
<th>Type</th>
<th>Accuracy</th>
<th>Frequency Output</th>
<th>Extended Temp (-40 °C to 85 °C)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thunderbolt E GPS</td>
<td>GPS</td>
<td>External Standalone</td>
<td>&lt; 8 μs over 24 hours</td>
<td>IPPS and 10MHz outputs</td>
<td>Yes</td>
</tr>
<tr>
<td>Thunderbolt E GPS</td>
<td>GPS</td>
<td>Module</td>
<td>&lt; 8 μs over 24 hours</td>
<td>IPPS and 10MHz outputs</td>
<td>Yes</td>
</tr>
<tr>
<td>Mini-T GG</td>
<td>GNSS</td>
<td>Module</td>
<td>±5 μs over 24 hours @ room temperature</td>
<td>IPPS and 10MHz outputs</td>
<td>Yes</td>
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</table>
Smart GNSS Antenna

The Trimble® Acutime™ 360 Multi-GNSS smart antenna is the latest generation Acutime product of integrated GNSS technology in a rugged and weatherproof self-contained unit. The Acutime 360 is an integrated pipe thread-mounted multi-GNSS receiver, antenna and power supply solution in a single environmentally sealed easy to install enclosure.

The Acutime 360 multi-constellation smart antenna design continues Trimble’s line of GPS smart antennas, which have been in production since 1991.

This antenna is the perfect solution for precise timing and network synchronization needs, including broadband wireless applications. It provides an extremely cost-effective and independent (within the firewall) timing source for any application, such as fault detection systems and synchronization of wireless networks.
A GNSS Antenna is the main interface through which GNSS receivers take external UTC input and provide UTC traceability information through its output signals in the form of 1PPS, 10MHz and TOD. Trimble provides a wide selection of GNSS antennas, including high gains for timing applications. Trimble’s Bullet and Bullet 360 series of antennas are hardened with advanced technology filtering capabilities to provide reliable performance in hostile RF jamming environments. The Bullet series of antennas offer customers the flexibility and choices of constellations and configurations, and unmatched reliability.

<table>
<thead>
<tr>
<th>Model Name</th>
<th>Constellation</th>
<th>Type</th>
<th>Gain</th>
<th>Frequency</th>
<th>Extended Temp (-40° to 90°C)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bullet™ GPS</td>
<td>GPS</td>
<td>Radome weather</td>
<td>28dB ± 3dB to 30dB ± 3dB</td>
<td>GPS L1 1575.42 ± 1.024MHz</td>
<td>Yes</td>
</tr>
<tr>
<td>Bullet™ GG Antenna</td>
<td>GPS &amp; GLONASS</td>
<td>Yes</td>
<td>30dB to 32dB ± 3dB</td>
<td>L1 1575.42 ± 3MHz</td>
<td>Yes</td>
</tr>
<tr>
<td>Bullet™ L1 L2 Antenna</td>
<td>GPS Dual</td>
<td>Yes</td>
<td>32dB to 36dB ± 3dB</td>
<td>L1 1575.42 ± 3MHz</td>
<td>Yes</td>
</tr>
<tr>
<td>Bullet™ 360 Antenna</td>
<td>GPS, Galileo, Beidou &amp; GLONASS</td>
<td>Yes</td>
<td>26dB to 28dB ± 3dB (GPS)</td>
<td>GPS L1 1575.42 ± 3MHz, BDS B1 1561 ± 3MHz, GLONASS G1 1602 ± 3MHz</td>
<td>Yes</td>
</tr>
<tr>
<td>Bullet™ 40dB Antenna</td>
<td>GPS</td>
<td>Yes</td>
<td>38dB to 40dB ± 3dB</td>
<td>GPS L1 1575.42 ± 3MHz</td>
<td>Yes</td>
</tr>
<tr>
<td>Bullet™ GB Antenna</td>
<td>GPS and Beidou</td>
<td>Yes</td>
<td>26dB to 28dB ± 3dB</td>
<td>GPS L1 1575.42 ± 1.024MHz, BDS B1 1561 ± 2.046MHz</td>
<td>Yes</td>
</tr>
</tbody>
</table>
Starter Kits

Kick start your targeted development with a superior out of box experience.

- It helps you easily evaluate performance with our PC tool.
- Allows you to evaluate antenna to optimize the overall solution.
- Verify PRTC input performance for timing module to isolate integration issues

Custom Timing Solutions

Trimble designs custom synchronization solutions for companies around the world. Allow us to introduce you to our highly efficient and competitive timing technologies that can be created in a custom product that will meet your specific time and frequency requirement. Trimble’s unsurpassed record of reliability positions us as value leaders in the industry.

Our timing experts can provide a custom solution—based on our proven frequency output (FreqOut™) architecture—to meet your price-point needs for virtually any stability, frequency or PPS output requirement, in a variety of form factors. Whatever form your solution takes, you can be sure it will feature Trimble’s traditional superior performance, innovation, proven quality, and reliability.

We would love to chat with you to understand what you’re looking for and how we can help. Let’s talk!

Learn more, visit https://timing.trimble.com