Scintillation-Hardened GPS Receiver

Improves system reliability and flexibility

CommLargo, Inc., has developed a scintillation-hardened Global Positioning System (GPS) receiver that improves reliability for low-orbit missions and complies with NASA’s Space Telecommunications Radio System (STRS) architecture standards. A software-defined radio (SDR) implementation allows a single hardware element to function as either a conventional radio or as a GPS receiver, providing backup and redundancy for platforms such as the International Space Station (ISS) and high-value remote sensing platforms.

The innovation’s flexible SDR implementation reduces cost, weight, and power requirements. Scintillation hardening improves mission reliability and variability. In Phase I, CommLargo refactored an open-source GPS software package with Kalman filter–based tracking loops to improve performance during scintillation and also demonstrated improved navigation during a geomagnetic storm. In Phase II, the company generated a new field-programmable gate array (FPGA)-based GPS waveform to demonstrate on NASA’s Space Communication and Navigation (SCaN) testbed.

Applications

<table>
<thead>
<tr>
<th>NASA</th>
<th>Commercial</th>
</tr>
</thead>
<tbody>
<tr>
<td>ISS</td>
<td>Satellites</td>
</tr>
<tr>
<td>Television Infrared Observation Satellite (TIROS) Program</td>
<td>CubeSats</td>
</tr>
<tr>
<td>Mini-satellites</td>
<td>Software services</td>
</tr>
<tr>
<td>Cube-shaped satellites (CubeSats)</td>
<td></td>
</tr>
<tr>
<td>Nanosatellites</td>
<td></td>
</tr>
</tbody>
</table>

Benefits

- Delivers a government unlimited rights waveform for the STRS waveform repository
- Allows a single hardware element to function as a conventional radio or as a GPS receiver
- Provides backup and redundancy for high-value remote-sensing platforms

Phase II Objectives

- Develop an open-source GPS software package with scintillation-hardening
- Refactor the software package into an STRS-compliant waveform compatible with the SCaN SDR testbed on the ISS
- Perform software development, testing, and verification
- Complete an STRS toolkit to provide a radio-based implementation that is compliant yet affordable

Firm Contact

CommLargo, Inc.
Donald R. Stephens
don@commlargo.com
8316 36th Avenue North
St. Petersburg, FL 33710–1018
Phone: 727–345–9668

Proposal Number: 11-2 O1.06-9056