

Positioning

A step forward for G3 technology

GALILEO, a four billion dollar satellite radio navigation system based on a constellation of 30 satellites and ground stations, was developed by the European Union and the European Space Agency. GALILEO is expected to ensure complementarity with GPS. The system utilizes satellite signals emitted at precise time intervals to determine users' positions or the locations of any moving or stationary object (e.g., a vehicle, a ship, or a herd of cattle, etc.) to within one meter.

GPS A major policy review of how this system is funded and managed is expected to be published in the U.S. this year. Among the issues that this review is likely to address are export controls, financial investment, modernization, and dual use by civilians and allied military. The review may include a restatement of the issues of free and open use of the civil signals, and some effort may be made to identify GPS as a "critical infrastructure," which has specific significance for receiving attention under U.S. laws. A clear statement on cooperation/interoperability with Galileo is also expected.

GLONASS (Global Navigation Satellite System) is a constellation of 24 active satellites which continuously transmit coded signals in two frequency bands, which can be received by users anywhere on the Earth's surface to identify their position and velocity in real time based on ranging measurements. The system is a counterpart to the U.S. Global Positioning System (GPS), and both systems share the same principles in data transmission and positioning methods. GLONASS is managed for the Russian Federation Government by the Russian Space Forces, and the system is operated by the Coordination Scientific Information Center (KNITs) of the Ministry of Defense of the Russian Federation.



Revolutionary technology developed by Topcon Positioning Systems came closer to being used on job sites worldwide when the first satellite in the European Union's (EU) Galileo navigation program was launched last December.

This launch—and the launch of three additional GLONASS satellites on Christmas Day—puts the spotlight on Topcon's Paradigm G3 chip, new receiver technology for satellite positioning systems with Universal Signal Tracking. The G3 is capable of tracking all signals from GPS, GLONASS, and Galileo.

The Galileo satellite was launched from the Baikonur Cosmodrome in Kazakhstan aboard a Soyuz rocket. A second satellite is scheduled to be placed in orbit in the spring; two more satellites will follow to complete the testing phase of the EU program.

Topcon developed G3 to provide access to Galileo satellites being launched by the European Space Agency, and new signals that will result from the modernization of the GPS constellation. Topcon products currently offer GPS+ technology, which enables access to both U.S. GPS and Russian GLONASS satellite systems.

The EU and United States agreed in 2005 to make Galileo compatible with the U.S. GPS system, thus enabling maximum use and efficiencies from precise positioning information from these constellations.

"When these three satellite systems are fully operational, users of G3 products will have access to more than 80 positioning satellites," said Eduardo Falcon, Topcon senior vice president of product development.

The Paradigm G3 chip was engineered by Topcon at its Moscow Technology Center, and it features 72 tracking channels. The chip is capable of receiving GPS L1, L2 and L5 carrier frequencies; C/A and L2C civilian codes; and P-code on both L1 and L2 frequencies. It also receives GLONASS signals of L1 and L2 carrier frequencies and L1 / L2 C/A and P-codes. The entire Galileo signal structure is supported (L1, E1, E2, E5, and E6 signals).

Paradigm G3 will be the basis for a new generation of Topcon GPS+ products and will first appear in the new Net-G3 reference receiver, providing network hardware ready to support all satellite signals for the highest possible service to all networks users into the future.

Galileo, which was specifically designed to improve coverage in high-altitude areas, will more than double current GPS coverage, providing worldwide satellite navigation for construction and optical surveying projects and for other uses, such as by motorists, sailors, and mapmakers.

Six non-EU nations—China, India, Israel, Morocco, Saudi Arabia and Ukraine—have joined the program set up by the European Commission and European Space Agency, and discussions are underway with other countries to take part. The EU will allocate an initial \$1.2 billion over the next several years to fund Galileo deployment and its commercial operations. ■