Abstract

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Experimental Evaluation of the Impact of Different Types of Jamming Signals on Commercial GNSS Receivers

The received global navigation satellite system (GNSS) signal has a very low power due to traveling a very long distance and to the nature of the signal's propagation medium. Thus, GNSS signals are easily susceptible to signal interference. Signal interference can cause severe degradation interruption in GNSS position, navigation, and timing (PNT) services which could be very critical, especially in safety-critical applications. The objective of this paper is to evaluate the impact of the presence of jamming signals on a high-end GNSS receiver and investigate the benefits of using a multi-constellation system under such circumstances. Several jamming signals are considered in this research, including narrowband and wideband signals that are located on GPS L1 GLONASS L1 frequency bands. Quasi-real dynamic trajectories are generated using the Spirent™ GSS6700 GNSS signal simulator combined with an interference signal generator through a Spirent™ GSS8366 unit. The performance evaluation was carried out using several evaluation metrics, including signal power degradation, navigation solution availability, dilution of precision (DOP), and positioning accuracy. The multi-constellation system presented better performance over the global positioning system (GPS)-only constellation in most cases. Moreover, jamming the GPS band caused more critical effects than jamming the GLONASS band.