

Abstract

Mohamed E.Tamazin

Investigation of the effects of White Gaussian Noise jamming on commercial GNSS receivers

Satellite-based navigation and location technology has become an important tool for many positioning, navigation, and timing services. However, with increased use of Global Navigation Satellite Systems (GNSS) comes a major challenge - GNSS signal jamming, which is an intentional form of interference. Nearly all electronic equipment using services generated by GNSS receivers is susceptible to jamming, and its effects include degradation in received signal power and receiver clock drift. Jamming signals are categorized as narrowband and wideband signals according to the bandwidth of the target signal. One common type that has recently been researched is White Gaussian Noise (WGN) jamming. Several studies investigated the impact of such signal jamming on the performance of GNSS receivers under a variety of jamming conditions. This paper, on the contrary, investigates the effects of White Gaussian Noise jamming on the performance of both high-sensitivity and standard GNSS commercial receivers. Additionally, the performance of GPS-only receivers versus combined GPS/GLONASS receivers under jamming scenarios is explored. This study used receivers by NovAtel and UBlox, with simulation scenarios created using Spirent SimGEN™ with the GSS6700 Multi-GNSS Simulator. The jamming signals were generated using an Agilent interference signal generator (ISG) unit. The results show that the receivers responded differently to the jamming signals. Dilution of Precision (DOP) and the Carrier-to-Noise (C/N₀) were the main measures used for the evaluation process. The results show that multi-constellation receivers attained higher resistance for signal jamming effects than GPS only receivers.