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ADVANCED IN-FLIGHT RESULTS FROM THE GPS RECEIVER ON SMALLGEO

Abstract

The first SmallGEO platform used as satellite bus for the Hispasat 36W-1 mission has been launched on 27 January 2017. As an experimental payload, it carries a GPS receiver which aims at proving feasibility of GPS usage in a geostationary orbit (GEO). The data gathered by the GPS receiver enables a detailed assessment of the achievable tracking and navigation performance of a GPS receiver in GEO. This paper follows up on the results presented in 2017 showing successful in-orbit operation by providing further insight into tracking behavior and performance on station in GEO. A second emphasis will be placed on the characterization of the transmit antenna patterns from the GPS constellation satellites.

The GPS receiver is since the completion of the in-orbit tests of the Hispasat 36W-1 satellite operational in its target slot. The receiver is providing continuous navigation and tracking information during the station keeping cycles performed with electrical propulsion. A first set of tracking and navigation data has been evaluated during in-orbit testing and will now be confirmed for the nominal on-station phase.

ESA has established in the past together with industrial partners a tool allowing to reconstruct the GPS constellation satellite transmit antenna patterns based on the receiver and receive antenna characteristics as well as satellite orbital, attitude and geometry information. This tool will be adapted for use of the SmallGEO data and allow to gather further results on the actual antenna patterns. The results will be presented in this paper.

Finally, an outlook is given on the future use case of the GNSS receiver on full electric platforms.