

SPACE COMMUNICATIONS AND NAVIGATION SYMPOSIUM (B2)
Space-Based Navigation Systems and Services (1)

Author: Mr. Nikolaos Batzilis
Aristotle University of Thessaloniki, Greece

Mr. Jose Vicente Perello Gisbert
European Space Agency (ESA/ESTEC), The Netherlands
Dr. Gustavo Lopez Risueno
European Space Agency (ESA/ESTEC), The Netherlands
Mrs. Julia Alegre Rubio
The Netherlands

GNSS PERFORMANCE COMPARISON USING IN-ORBIT SATELLITE MEASUREMENTS

Abstract

GNSS (Global Navigation Satellite Systems) systems are currently reinforcing their space segment by launching state of the art satellites. GPS modernization plan is already in progress with B-IIF satellites transmitting L1, L2 and L5. Compass and Glonass are also launching new satellites and modernizing their constellations. In-orbit GNSS satellite payload characterization regularly requires large antennas for smooth results, reducing the multipath effect and increasing the SNR. Despite of that fact, the measurements presented in this paper were taken using a 3m dish antenna, providing useful results at cm level. The setup was calibrated and diligent tests were done to certify measurements' reliability. The antenna is steered by a COTS pedestal-engine that is controlled by a home-made SW controller, able to track automatically complete satellite passes. The payload characterization included in this paper is done for GPS IIF-IIRM-IIR-IIA, GLONASS-M and COMPASS MEO satellites. With this 3m dish antenna measurement system, two figures of merit are in our interest: onboard Equivalent Isotropic Radiated Power (EIRP) and Code-Carrier Coherence (CCC) Differential CCC analysis. An extension in the CCC analysis is done for the last two GPS generations, intending to make a deeper analysis on the signal distortion impact in the CCC stability, using different receiver early late correlator spacing. Several GNSS receivers are connected in parallel with the antenna for performing the CCC measurements. A spectrum analyzer is also connected and programmed for automated power-EIRP measurements. The antenna setup and the methodology that were used are also presented in the paper.