

Dual-Frequency GNSS Receivers for Space Applications

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The ACES (Atomic Clock Ensemble in Space) experiment aims at the validation of new generations of atomic clocks onboard the International Space Station. To facilitate time determination and time transfer, it has recently been proposed to connect the ACES clocks with a GNSS receiver. With this background, the talk provides an overview of existing spaceborne GPS receivers and summarizes their performance and environmental characteristics. Besides dedicated space qualified receivers the possible use of commercial off the shelf (COTS) dual-frequency receivers is discussed. As an example, the tracking and navigation performance of the flight proven BlackJack/IGOR receiver is compared with a NovAtel OEM4-G2 and a Septentrio PolaRx2 for a representative low Earth orbit scenario. In addition, the results of preliminary thermal vacuum and radiation tests are presented. Given the fairly benign conditions inside the Columbus module, the use of a COTS GNSS receiver can provide a cost effective and well justified alternative to a fully space qualified device. It would also help to ensure access to the latest receiver technology for new GNSS signals such as Galileo or GPS L2C.