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ON THE DESIGN OF A MODULAR PLUG-AND-PLAY SATELLITE COMMUNICATION SYSTEM

Abstract

The growing demand of innovative modular communication systems is a driving factor towards designing a communication system that is easily developed, configured, modified and expanded. To begin with, a communication system shall be able to establish a link between the satellite and ground station(s). From the space segment, the communication system shall be able to interface with the ground station(s) to be able to download telemetries as well as payload data no matter the number of payloads. Nevertheless, the communication system shall be able to receive uplink telecommands from any applicable authorized ground station(s). The main pillars of a modular communication system are: data rate, modulation scheme, RF output power, and data interface. MSAT-TS attains the pillars by having the capability of configuring the data rate, modulation scheme, RF output power, and data interface. The design is fully implemented using COTS components and compartmentalized on different boards to enable plug-and-play as well as ease of expansion. The data rate and modulation scheme is configured through software while the RF output power can be course tuned and fine tuned using a DAC controlled by command in-flight. The data interface is customized according to user preference. This paper details the design and results of MSAT-TS modular satellite communication system. The paper begins with the methodology behind MSAT-TS design, followed by some analysis, specifications, test setup, test results, and finally future work.