SPACE COMMUNICATIONS AND NAVIGATION SYMPOSIUM (B2)
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Author: Mr. Rakshith Ramesh
Team Indus, Axiom Research Labs Pvt. Ltd., India, rkshthrmsh@gmail.com

Mr. Adheesh Boratkar
Team Indus, Axiom Research Labs Pvt. Ltd., India, adheesh.boratkar@teamindus.in

FPGA ARCHITECTURE FOR A STANDALONE, MODULAR TELE-COMMAND AND TELEMETRY CARD BASED ON CCSDS COMMUNICATION FRAMEWORK

Abstract

Every spacecraft needs to have the ability to be commanded by a ground station, and to transmit health-keeping and payload information, such as images, experimental data, etc., to the ground station. The Tele-command and Telemetry Card (TMTC) in the spacecraft is responsible for these functionalities.

Herein, an FPGA based architecture is proposed for the TMTC which implements the framework for communication proposed by CCSDS. This renders the architecture capable of accommodating up to two receivers and transmitters, and interfacing with up to 64 sub-systems on the spacecraft for reception, distribution and transmission of both tele-commands and telemetry. The standalone nature combined with the flexibility of adding or removing communication, and sub-system, interfaces make this architecture reusable and hence, desirable.

Further, novel algorithms are implemented to ensure that the TMTC maintains synchronization with the ground station beven in the absence of telemetry from the spacecraft to populate the transmission channel.