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CUBESAT TECHNOLOGY FOR TELECOM MISSIONS

Abstract

The reliability and functionality of small satellites (CubeSats) has significantly increased over the years. In the framework of ESA's OPSSAT nanosatellite mission, which is a telecom mission using S- and X-band, key technologies have been developed which are currently tested in space. A very powerful processor including a large Field Programmable Array (FPGA) for the control of experiments, data collection, high-speed data delivery to ground and on-board autonomy is the core of the OPSSAT spacecraft. It is directly connected to a software-defined radio (SDR) front-end for communications tasks. The SDR front-end, originally foreseen for receive-only purposes, is currently developed further as a high-speed transceiver which can be used in X- or Ka-band, depending on the chosen up/downconverters. The processor and the SDR front-end were successfully radiation-tested in the ESTEC Co60 chamber for total dose and the Paul-Scherrer-Institute for single-event upsets.

In this paper the design and functionalities of the board processor with FPGA and the SDR front-end are described and first experience of the performance in space are presented. Examples of the application of both systems in data collection, experiment control and as an inter-satellite link system in a constellation of CubeSats in the context of telecom missions are described.