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SALSAT: READY FOR LAUNCH - OVERVIEW OF THE FINAL FLIGHT CONFIGURATION, MISSION CONCEPT AND FIRST FLIGHT RESULTS

Abstract

The number of small satellite launches has increased continuously throughout the past years. The resulting intensification of radio communication and number of users inherits a continued increase in the probability of an interferences. This can compromise reliable satellite operation in the utilized frequency bands. Therefore, the nanosatellite mission SALSAT (Spectrum AnaLysis SATellite) carried out by the Technische Universität Berlin (TU Berlin) investigates the global RF spectrum use in VHF and UHF amateur radio bands and the S band. The SALSAT satellite is equipped with the spectrum analyzer payload SALSA which is based on a Software Defined Radio (SDR) and FPGA. A preparatory study using the COTS device LimeSDR has been successfully performed during the MarconISSta experiment aboard the ISS. The experiment revealed first insights into the global spectrum usage for regions overflown by the ISS. The SALSAT mission shall achieve global coverage.

The final flight configuration of SALSAT features the in-flight reconfigurable SALSA spectrum analyzer as the mission's primary payload alongside with a variety of secondary payloads. The spectrum analyzer is fully reconfigurable in-flight. Furthermore, it can record the spectrum use in the amateur radio bands within the VHF and UHF ranges as well as the S band frequencies allocated for space research and operation service. The secondary payloads complement the mission's objectives and include a fully customizable, embedded SoC Linux computer, a visual camera as well as a set of three novel, miniaturized

fluid dynamic actuators (FDA). This allows for a wide range of applications. The collected raw frequency data (I/Q samples) can either be downlinked directly during an overflight and be processed on ground or it can be preprocessed, analyzed and stored on-board. Additionally, SALSAT will be the first satellite ever to feature a complete, three-axis FDA system. The system is based on fluids can fully alter the attitude of the satellite without any moving parts or wear.

The following paper will introduce the final flight configuration of SALSAT hardware and software. It will provide insights on the qualification and acceptance testing of SALSAT and the satellites performance parameters. A detailed mission scenario and description of the mission's payloads will be provided. The launch of SALSAT is scheduled for June 15th – July 15th, 2020. First flight results will be presented as they become available.