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IN ORBIT DEMONSTRATION (IOD) USING THE LEOS-50 PLATFORM

Abstract

Most opportunities for in orbit demonstration (IOD) require long and tedious process to place experiments on the satellite, BST has developed procedures and technical solutions for its LEOS-50 platform which allow to add experiments until the very last minute. In the recent Kent Ridge 1 mission (launched December 2015) some of the tested equipment requested a flight opportunity less than 3 month before launch. Within that time the test hardware was specified, built and integrated in record time literally days before shipping the satellite off to the launch pad. On KR1 the following external subsystems have been tested:

- Vanta Black Coating:

Vantablack is a new black coating made from Carbon Nanotubes. It has been applied onto the baffles of two of the four star trackers on KR1. That allowed to directly compare vantablack against BSTs standard black. From first contact to implementation it took less than 8 weeks.

- Point of Load

The point of load converter from SpaceIC is a new space grade component that was stuck in the typical cycle of has not flown will not get a mission; does not have a mission will not get flown. SpaceIC designed a standalone PCB that was then attached directly to the satellites PCU. From delivery to implementation of this device less than 4 weeks passed.

- UHF transceiver

BST uses a standard micro satellite UHF transceiver with lots of heritage as primary and secondary TMTC. However more modern CubeSat based UHF transceivers offer small packages as well as low power. BST collaborated with ECM to place a miniaturized 90x45x8mm sized transceiver as a third TMTC UHF device. The UHF transceiver also uses dStar protocol and thus Kent Ridge 1 is one of the first satellites to support this protocol.

- Precision Gyro

In the past most micro satellites used fibre optic gyros to measure precise rotation. While MEMS devices have much lower mass and power requirements they also lack the precision of their optical counterparts. The Norwegian company Sensonor has developed a family of very precise MEMS gyros that rival optical gyros. BST has integrated a Sensonor STIM202 on KR1 and has done comparative measurements to our standard Litef fors Gyros.

The paper will discuss how the IOD experiments where implemented in the mission, the lessons learned and which results have been obtained so far from the new technologies.