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Small Satellite Operations (3)

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A LOW COST, AGILE SPACECRAFT, FOR SPACE SITUATIONAL AWARENESS

Abstract

Knowledge of the objects in the near-earth orbital environment is critical for successful spacecraft operation in increasingly densely populated orbits. Terrestrial based methods for detecting and tracking Resident Space Objects (RSO) (orbital debris, spacecraft, etc) are limited by atmospheric conditions. A space-based platform can augment terrestrial tracking systems through the ability to be tasked on a full 24-hour basis, without lost opportunities due to weather. The Canadian Department of National Defence (DND), through Prime Contractor MDA is developing the Sapphire system to address this need. The system comprises a satellite, ground segment, launch and operations. The Sapphire spacecraft has as its foundation a low cost, highly agile, spacecraft bus which has been fully built and qualified by SSTL under a 24 month contract. It also incorporates an optical payload provided by Com Dev Ltd, Canada. The bus and payload will be integrated and operated by MDA in Canada.

The Sapphire spacecraft will reside in a Sun-synchronous, Dusk/Dawn orbit and will track space objects against a background of stars. It is capable of meeting challenging imaging and slewing requirements for over 360 space objects per day, nominally within a 20 cone off the vector normal to the orbit plane.

Sapphire will be the first 150kg class satellite mission to track RSOs using an optical telescope in space, and is planned for launch in the final quarter of 2011.

This paper focuses on the design of the Spacecraft Bus, AOCS capabilities, FDIR strategy, and how Sapphire will support and improve coordinated spacecraft operations.