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RAAF – M1: UNSW CANBERRA – ROYAL AUSTRALIAN AIR FORCE SPACE SITUATIONAL AWARENESS AND ISR PATHFINDER MISSION

Abstract

UNSW Canberra Space has undertaken a three-year research and development programme with the Australian Defence Force (ADF) to implement and operate two nano-satellite (cubesat) missions. The programme aims to support and enhance ADF capabilities and activities in Space Situational Awareness (SSA), and to support the ADF's ability to develop and operate affordable miniature-satellite-based ISR capabilities that can provide a level of space self-reliance and resilience to support ADF operations. Additionally it will underpin UNSW's fundamental SSA research and provide education and training opportunities for ADF, and in particular the Royal Australian Air Force (RAAF) in relation to the development and operation of a nanosatellite.

The programme consists of two missions, launched approximately 1 year apart. The first mission, RAAF M1, is scheduled to launch in late 2017/early 2018, less than a year after the programme Kick Off. M1 will be a flight demonstration of several key technologies and operations for the main mission. M1 aims to:

- Deliver to the RAAF AIS / ADS-B capability across the globe using COTS AIS and ADS-B systems.
- Test, validate and further develop Australian SSA capabilities by providing engineering design and performance data for the design of future passive radar systems to track LEO spacecraft.
- Develop and demonstrate software defined radio capability, which is used to support AIS and ADS-B monitoring and recording and GNSS SDR receive capability for passive LEO tacking.
- Develop and demonstrate building-block technologies and CONOPS for future ADF space capabilities.
- Build ADF expertise in specifying, developing/procuring and operating sovereign space assets.

The RAAF M1 spacecraft will be a 3U Cubesat form factor with a nadir facing deployable payload module and two deployable solar arrays. As well as monitoring and recording AIS and ADS-B signals from maritime traffic and aircraft, the mission will demonstrate a number of new developments; bespoke mechanical design supporting a large deployable model, a custom UNSW Canberra flight computer, custom deployable antennae and custom software defined radio receivers. The programme demonstrates that a system such as this can be developed under a rapid design and development programme.

The paper will provide an overview of the overall programme context, the objectives and the concept of operations of M1 and a status of progress to date of the spacecraft design, manufacture and verification against the rapid timeline.