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AISSAT-1: IN-ORBIT VERIFICATION OF THE GENERIC NANOSATELLITE BUS PLATFORM

Abstract

The Automatic Identification System Satellite 1 (AISSat-1) was launched on July 12, 2010 into a 635 km sun synchronous orbit by an Indian PSLV rocket from Satish Dhawan Space Centre in Andhra Pradesh, India. AISSat-1 is a six kilogram nanosatellite based on the Generic Nanosatellite Bus (GNB) satellite platform, and was designed, built, and commissioned in orbit by the Space Flight Laboratory (SFL) at the University of Toronto Institute for Aerospace Studies (UTIAS) in Toronto, Canada.

AISSat-1's primary mission is to enable investigation of the orbital reception of maritime Automatic Identification System message traffic and demonstration of a high duty cycle operational space-based Automatic Identification System service capability. Its primary observational area is the Norwegian territorial waters, especially in the High North, where it operates every orbit. The program is funded by the Norwegian Space Centre, and managed and operated by the Norwegian Defence Research Establishment (FFI). It is designed to operate for at least three years.

AISSat-1 is the first GNB-based satellite to be launched into orbit. The Generic Nanosatellite Bus is a flexible, high-performance nanosatellite platform designed to support multiple missions with differing mission and payload requirements with minimal modification. The platform is based around a 20 cm cube form factor, and contains a complete set of standard, configurable subsystems that can be tailored to specific mission needs. In particular, the GNB platform is capable of high performance, full three-axis attitude control on a nanosatellite scale. The platform design allows a rapid deployment of new missions using existing, flight-proven subsystems and design methodologies.

This paper will summarize the early operations and commissioning results from AISSat-1, with a focus on the in-orbit verification and performance results of the GNB platform and the enabling of the demanding AISSat-1 mission. Flight verification of the GNB platform opens the door for many innovative new mission concepts that were not previously possible. A series of GNB-based satellites performing a variety of missions are currently under construction and expected to be launched within the next 1-2 years.