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Author: Mr. Alexander Beattie
Space Flight Laboratory, University of Toronto, Canada

Mr. Øystein Helleren
Norwegian Defence Research Institute (FFI), Norway
Dr. Robert E. Zee
University of Toronto, Canada

IN-FLIGHT OPERATIONS OF A HIGH-AVAILABILITY NANOSATELLITE CONSTELLATION FOR
MARITIME OBSERVATION

Abstract

The Space Flight Laboratory (SFL) at the University of Toronto Institute for Aerospace Studies (UTIAS) in Toronto, Canada has been a pioneer in nano- and microsatellite technologies since the launch of its first satellites in 2003. Since then, UTIAS/SFL has launched five more nanosatellites, ranging in size from 3 to 7 kg and spanning several different generations of technology and mission profiles. This makes UTIAS/SFL one of the largest and most experienced nanosatellite builders and operators in the world.

The Automatic Identification System Satellite no. 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 UTIAS/SFL. The second satellite in this series, AISSat-2, will be launched in 2013.

The primary mission of the AISSat-12 satellites is to receive maritime Automatic Identification System (AIS) message traffic within the primary observational area over Norwegian territorial waters, especially in the High North. Each satellite operates at a high duty cycle, with most of the coverage area revisited every orbit. Data is received, decoded, downloaded, and distributed into the Norwegian Coastal Authority's live ground network to end users in real time. The program is funded by the Norwegian Space Centre, and managed and operated by the Norwegian Defence Research Establishment (FFI).

The AISSat-1 and -2 constellation provides a high degree of observational and monitoring capability assurance to the Norwegian maritime authority. Using a highly capable nanosatellite platform, this has been achieved at very low cost relative to other approaches to such a capability. This paper will discuss the in-flight operational experience and performance of the AISSat-12 satellites and the combined constellation. In particular, the observational availability of the system based on in-flight experience will be highlighted.