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NORSAT-2: ENABLING ADVANCED MARITIME COMMUNICATION WITH VDES

Abstract

Satellite AIS is well recognized as a system for vessel traffic monitoring and maritime safety. The growing demand for maritime data services has led to the development of a new VHF Data Exchange System (VDES), which will provide two-way communication at higher data rates than possible with current AIS systems. Within the VHF maritime frequency band (156.025-162.025 MHz), VDES integrates AIS with channels for Application Specific Messages (ASM), which have higher capacity and increased reliability. VDES will support the distribution of maritime data, including meteorological and hydrographic data and traffic information. Expanding VDES to a satellite platform will facilitate a global data exchange between ships and shore via satellite. NORSAT-2 is the first satellite to incorporate a VDES payload, in addition to an advanced AIS receiver, both of which are in-orbit reconfigurable software-defined radios developed by Kongsberg Seatex.

NORSAT-2 was developed and built by the Space Flight Laboratory (SFL) for Space Norway and the Norwegian Space Centre. With a mass of 16 kg, the satellite design is based on SFL's Next-generation Earth Monitoring and Observation (NEMO) bus, which has proven flight heritage to be a robust and reliable microsatellite platform. To enable directional communication over VHF for the VDES payload, SFL has developed a three-element deployable Yagi-Uda antenna. The antenna is stowed during launch and deployed on-orbit upon command receipt. In addition to NORSAT-2's S-band telemetry and command system, the satellite also has an enhanced S-band feeder uplink which is capable of achieving data rates of up to 1 Mbps.

NORSAT-2 is scheduled to launch onboard a Soyuz in Q2 2017 into a 600 km polar sun synchronous orbit. It will be the fourth Norwegian satellite on-orbit and is highly anticipated to be one of the first satellites to supply VDES services, in addition to complementing Norway's existing satellite AIS network.

This paper describes the NORSAT-2 mission, with an emphasis on the unique and innovative aspects that are the VDES payload, deployable Yagi antenna, and enhanced S-band uplink.