

SPACE COMMUNICATIONS AND NAVIGATION SYMPOSIUM (B2)
Space Communications and Navigation Young Professionals Virtual Forum (8-YPVF.3)

Author: Mr. Roger Birkeland
Norwegian University of Science and Technology, Norway, roger.birkeland@iet.ntnu.no

PROPOSAL FOR A SATELLITE COMMUNICATION PAYLOAD FOR SENSOR NETWORKS IN
THE ARCTIC AREA

Abstract

For users and systems located in the high north, communication is a difficult task. This is due to a challenging climate, missing land-based infrastructure and also a lack of suitable satellite systems. For example, operation of remote sensors and sensor networks in this area is more challenging compared to operation in areas with better infrastructure. A growing interest in the Arctic area for economic reasons and the recent developing changes in climate causes many parties to see a greater use of the Arctic area in the future and an increasing need for infrastructure.

For many systems and services a high bandwidth system will be needed, or is at least preferable. For other systems and networks, a narrow band system can be sufficient. In the CAMOS (Coastal and Marine Operations and Surveillance) project at NTNU (Norwegian University of Science and Technology), we are studying sensor networks with relatively low bandwidth requirements. We will investigate technologies for sensor networks including acoustic underwater networks, terrestrial or airborne sensors and communication nodes as well as satellite communication payloads. Through the project we aim to offer narrow band communication between remote sensors and the operating center using a versatile satellite payload that can be useful for several applications. Light-weight, but still rugged ground terminals will also be needed. We aim to propose a satellite system employing small satellites that can be used as a network node in a sensor network operating in areas outside coverage area for traditional communication systems.

In this paper, we will discuss needs and system specifications for relaying data from sensor networks and solutions and proposals for a satellite payload that can be used as a technology demonstrator. The proposed payload could be flown as its own mission or as part of a larger mission. By the use of small satellites, we are able to carry out the payload development over several generations and such gracefully build up infrastructure.

In 2010 the Norwegian AISSat-1 was launched, and there are plans to launch several Norwegian small satellites to follow up this mission in the future. Their main purpose is to provide the AIS service. In addition there could be available room for other experimental payloads on a shared mission. Such a shared mission flying on a well-known satellite bus, such as the UTIAS satellite bus, can be flying within an acceptable time frame and on a fairly low budget pr. payload.