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Author: Mr. Matteo Emanuelli
GomSpace ApS, Denmark

Mr. Jens Nielsen
GomSpace ApS, Denmark
Mr. Daniel Smith
GomSpace ApS, Denmark

STARLING: A CONSTELLATION MISSION FOR CONTINUOUS EQUATORIAL SURVEILLANCE
USING NANO-SATELLITES

Abstract

Currently, the infrastructure needed to track ships and aircrafts throughout the equatorial regions is limited and countries might not be aware of the traffic crossing their borders. This lack of awareness is not only inconvenient, but it has also a monetary loss for developing countries.

GomSpace, a Danish Publicly-traded company specialised in CubeSat solutions, has been tasked by Aerial Maritime Ltd., a company funded partially by the Investment Fund for Developing Countries (IFU), to conceive such a system able to track air and maritime traffic (ADS-B and AIS signals), in the equatorial regions for a period of 5 years. An operational requirement of 5 years using CubeSats sets obviously, a high focus on the reliability of the solution itself. As a matter of fact, CubeSats are not in general designed to withstand the harsh environment of a Low-Earth orbit for such a relative long time span. Moreover, to maximise the update rate of traffic data considered in the equatorial zone at any given time of the day, a constellation of CubeSats has been developed. Therefore, the CubeSats in the constellations should be also able to perform orbital manoeuvres to acquire a distributed service throughout the orbital plane.

The solution proposed by GomSpace is the Starling constellation, a group of 3U CubeSats which can perform autonomous operations and have an anticipated design lifetime of 5 years. The Starling satellites will be launched in 2018.

In this paper, the background of the mission is detailed and the Starling constellation is presented, with its main components at system and subsystems level. The method and control system for achieving a distributed service on the orbital plane are presented as well. In addition, GomSpace is also developing mitigation methods to ensure an anticipated lifetime of 5 years. Further, such methods involving testing, hardening and failures analysis are being discussed in this paper.