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A COLLISION FREE SATELLITE AIS MISSION

Abstract

The AIS system was developed as a terrestrial system for monitoring movement of vessels in an area of about 60 nm radius. It is a self-organizing TDMA system for collecting navigational data of all vessels for monitoring by a land based type of 'traffic control' authority. It was realized that low flying satellites (LEO's in about 600 km orbits) are capable to receive the terrestrial AIS signals as well. Several mini-and nano-satellite missions were conceived and some experience is already available from realized missions. The generic problem for satellite AIS receivers is that each satellite will see a multitude of terrestrial AIS cells resulting in signal collisions. The state-of-the-art technology is to perform heavy number crunching on-ground of the received satellite signals to extract the relevant vessel parameters. In this paper we will start with an analysis of the collision scenario of the satellite AIS scenario. It is found that the probability of signal collision is very high in high traffic areas. Means to mitigate the interference issue are discussed and a satellite AIS mission of at least three nano-satellites with ground-processing of the received signals will be outlined in the main part of this paper.