

SPACE COMMUNICATIONS AND NAVIGATION SYMPOSIUM (B2)
Mobile Satellite Communications and Navigation Technology (5)

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MONITORING ADS-B SIGNALS FROM SPACE

Abstract

ADS-B stands for Automatic Dependent Surveillance-Broadcast. It is a cooperative surveillance technique for Air Traffic Management (ATM). An aircraft equipped with an ADS-B transmitter periodically broadcasts its position determined by a GNSS receiver (or inertial navigation platform) together with other relevant information (such as speed, heading, altitude, flight number) to ground stations and other aircraft equipped with ADS-B.

The ADS-B system was developed as a terrestrial system for monitoring movement of aircrafts in an area of about 200 nm radius from a ground station. The aircraft transmits its navigational data in a random TDM mode at 1090 MHz. The ADS-B system has been designed for air-to-air and air-to ground applications. Wherever ground stations are available, all relevant aircraft navigation data can be derived. There are, however, vast areas, where this coverage can not be provided (oceans, areas with limited ground infrastructure). Detecting the ADS-B signal from space would allow to monitor arbitrarily large areas on a real global basis.

Demonstrations of ADS-B reception by satellite is being planned by TU Graz by flying an ADS-B receiver on a Cube-Sat. A similar scenario as in Satellite AIS is expected: The satellite receiver will see a large number of aircrafts transmitting their ADS-B telegrams. Signal collisions are expected. A formation flying constellation of at least three satellites would allow resolving individual aircrafts by ground processing of the received signals using digital beam forming techniques. This will allow to minimize collisions. The satellite mission will be described in this paper and due to the similarity with the Satellite AIS mission, an integrated Satellite AIS and ADS-B mission is being proposed.