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NAVIGATION APPLICATIONS OF SPACE BASED ADS-B INFORMATION

Abstract

The Automatic Dependent Surveillance-Broadcast (ADS-B) is seen as an important technology to improve Air Traffic Surveillance (ATS) and Air Traffic Control (ATC) capabilities. Today, ADS-B is an established technology, globally and widely used in continental airspace. Since 2008 the German Aerospace Center (DLR) started to prove that 1090ES ADS-B signals broadcasted by aircraft can be received on board of low earth orbiting (LEO) satellites. This was validated in 2013 by world's first in-orbit demonstration of a space based ADS-B system, hosted on the ESA satellite PROBA-V. The introduction of space-based ADS-B opens new opportunities, e.g. by complementing and enhancing the existing terrestrial ADS-B. Today, several commercial service providers are operating LEO constellations and offering the service of their received ADS-B data. Several new constellations are planned. In this context new services to use the space based data and to fuse them with other data from ground based surveillance systems are being discussed. So space based ADS-B data can be fused with ground based ADS-B and radar surveillance data to obtain a higher level of situational awareness in the airspace. This is of increasing interest in the vicinity of airports where still some surveillance lacks might exist which can be filled-up by space data. The existing data of the PROBA-V mission have been analyzed with respect to their applicability near to airports. It could be shown, that especially in some regions of mid-size airports the surveillance information can be significantly enhanced by use of space based ADS-B data. Further, integration of the data to the information exchange concept of the System Wide Information System (SWIM) of the Single European Sky (SESAR) and the US NextGen is discussed. A SWIM interface was developed and tested. The results show, that fused ADS-B based surveillance data can be exchanged easily on a global scale via standardized SWIM services.