CONTRIBUTING STAKEHOLDERS

Satellite Communications and UAS

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Synchronising The Activities of the EDA & ESA

Background

The ESA Directorate of Telecommunications and Integrated Applications and EDA have recently started coordinating their activities in the area of Unmanned Aerial Systems. The particular interest of ESA to be involved in this domain is to support the challenge of Air Traffic Integration of UAS, which will trigger new markets for satellite communications in areas such as Command & Control, ATC Relay as well as Sense & Avoid. In addition, it is expected that the routine use of UAS will also increase the demand for high data rate links via satellite from mission payloads and stimulate technology developments in various areas of satellite communications. The newly created ESA Integrated Applications Programme more specifically aims at fostering the integrated use of space assets (Satcom, Earth observation and navigation) in direct response to identified user needs, including in the field of security. Against this background, initial discussions with EDA have focussed on the value added of space-based services for the operation of UAS and their integration into non-segregated airspace.

Wider UAS-related Activities in ESA

The issue of UAS-Satellite interfaces and associated technical and standardisation challenges has been included in a variety of ESA activities in recent years:

- As part of its General Studies Programme, ESA has already initiated some activities that assess the state-of-the art for cooperative satellite-UAS missions, and analyse future missions that can be supported by improved BLOS (Beyond Line of Sight) communications. In view of future frequency allocations for the safe integration of UAS in controlled airspace (as discussed in ITU WP 5B) the studies propose various system architectures which could support future UAS operations.
- For many years ESA has equally been supporting satellite communications through its ARTES (Advanced Research on Telecommunication Satellites) programme, by providing support to essential elements such as new antenna development, advanced payloads, secure telecommand and telemetry subsystems and small ground stations. Standardisation is also considered as an important area: ESA projects have made major contributions to the DVB-RCS (Digital Video Broadcasting – Return Channel via Satellite) standard. In addition, a number of ESA projects have supported the DVB-RCS Mobile extension of this standard which have made possible standardised satellite communication with mobile platforms, providing features for hand-over and stable transmission: UAS BLOS communication payloads could be users of this standard. Currently ESA is developing test beds to test and demonstrate the evolution of this standard, also for what concerns security.
- Finally, following approval by ESA's Ministerial Conference in November 2008, the Directorate of Telecommunications and Integrated Applications has started to implement the future EDRS (European Data Relay Satellite System). This system shall in a first approach serve a number of ESA requirements, providing data relay capabilities for its future GMES Sentinel satellites and the International Space Station. Current reflections are on-going to make such system available to also support the data relay or backhauling needs from UAS. ESA has proposed a partnership with an operator to implement such a system and related services.

Figure 1

Towards Synchronised ESA/EDA Activities

The EDA Air4All study and its follow up activities (as described in the Air4All article of this yearbook) have identified a number of barriers and technological challenges for the integration of UAS in General Air Traffic, notably with regard to collision avoidance, secure and sustainable communications for command and control, radio bandwidth allocation and ATC interfacing. ESA considers that satellite communication and navigation could be helpful to solve some of the issues identified, and has embarked on initiating complementary activities, aiming at a synchronised approach between ESA and EDA.

Both Agencies have therefore agreed to organise a joint workshop on the topic of UAS integration in non-segregated airspace in May 2009, specifically addressing how satellite communications could support related UAS Command and Control.

Following this workshop, EDA and ESA will initiate coordinated feasibility studies, in preparation of a subsequent demonstration activity. The feasibility phase will thereby rely on available results from previous ESA studies as well as upon EDA activities performed in the framework of Air4All, SIGAT and the Sense&Avoid Demonstration Project MIDCAS. It is the mutual understanding of EDA and ESA to further sponsor a demonstration mission in 2010/11 which shall demonstrate how a number of challenges, mainly with a focus towards Command & Control as well as ATC link, could be addressed by using various space assets.