SPACE COMMUNICATIONS AND NAVIGATION SYMPOSIUM (B2)
Mobile Satellite Communications and Navigation Technology (4)

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ESA IRIS PROGRAMME: DESIGN OF A NEW SATELLITE COMMUNICATIONS SYSTEM FOR AIR TRAFFIC MANAGEMENT

Abstract

The Single European Sky ATM Research (SESAR) Programme is modernising air traffic management in Europe, and is developing new means of communications between aircraft cockpits and ground controllers. Iris is the ESA programme of satellite communications for Air Traffic Management, which is currently designing a satellite solution for SESAR.

Iris started in 2007 and has since been progressing steadily with system design studies, covering the design of a new Communication Standard, the design of the Satellite Communication System, and the design of User Terminals to be installed on-board aircraft. ESA's current activities of the Programme include two alternative technical approaches: the adaptation of Inmarsat SwiftBroadband system, or the development of a purpose-built system specifically designed around requirements defined by SESAR Joint Undertaking.

One of the main drivers behind SESAR is to reduce the costs of provision of ATM service provision to airlines. Iris therefore requires a cost-effective design, and needs to consolidate requirements in an iterative process with SESAR Joint Undertaking in such a way that system costs are reduced while performances are guaranteed. Technical requirements have been consolidated with SESAR Joint Undertaking during 2010 and 2011, and a clear understanding of their impact on the system complexity and cost has been reached. Some key requirements at system level are still being consolidated during 2011; this notably applies to the telecommunication capacity required, the software assurance level of user terminals, and the apportionment of availability requirements between system elements. They will require further progress in the definition of SESAR operational concept before a design baseline can be consolidated.

On the other side, technical performance criteria for the communication protocols have been consolidated, and design activities have progressed significantly. The design study of the purpose-built system, called ANTARES, has been carrying out very extensive technical trade-off analyses to obtain the best performance for each element of the telecommunication protocols. The very specific constraints of the aeronautical environment, coupled with the need to close the link budget in demanding conditions (e.g. aircraft banking, low elevation of the satellite, multipath effects when flying in oceanic airspace) have led to choose specific techniques, and preliminary specifications will be produced during 2011.

The present Paper provides the latest status of these specifications, focusing on the design of the satellite communication protocols and the air interface.