Aircraft Identification Tag Concept Feasibility Analysis and Transfer to Industry

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Abstract—EUROCONTROL Experimental Center (EEC), Innovative Research Section developed a new concept called Aircraft Identification Tag (AIT). It aims at reducing voice communication errors by allowing the controller to identify the pilot/aircraft on the frequency with a visual signal on the aircraft label. The aircraft identification can be achieved with speech watermarking over the existing VHF radio communication link. The digital aircraft identification information is embedded into the existing analogue voice transmission between pilot and air traffic controller.

The project is transferred in 2005 to the EUROCONTROL ATM Strategies Directorate for a feasibility analysis to prepare a possible implementation of this concept and its transfer to industry.

The paper introduces what is intended to be done in this feasibility analysis.

I. INTRODUCTION

Callsign confusion is an important problem as far as the ATC safety is concerned. A recent study [1] showed that it is contributing in the order of 5% to the overall ATC induced incidents. Among those, the percentage of severe incidents is also above the average value. As a consequence, the call sign confusion reduction is identified as a priority action for safety improvements in Europe by the EUROCONTROL Safety Improvement Sub-Group.

EUROCONTROL Experimental Center (EEC), Innovative Research Section developed the Aircraft Identification Tag (AIT) concept initially aiming to reduce call sign confusions [2][3][4]. Considering the interesting results obtained in the R&D work, EUROCONTROL decided to launch recently a feasibility analysis to refine the concept and to prepare its possible implementation and transfer to industry.

The aim of this short paper is to explain briefly what we intend to do in this feasibility analysis.

II. FEASIBILITY ANALYSIS

The feasibility analysis is divided into two phases. In the first phase, the concept will be further refined and an initial Cost Benefit Analysis will be done by comparing the AIT concept to the possible alternative solutions. At the end of this phase, stakeholder feedback will be obtained through a workshop. In the second phase a full feasibility study will be launched aiming to prepare an implementation program and to transfer the AIT concept to industry.

A. FEASIBILITY ANALYSIS – PHASE 1

As indicated in [5] [6], several information can be send on the VHF channel in addition to the digital signature (e.g. position data, etc) modifying the AIT concept definition, benefits and constraints.

In the first phase, the AIT concept will be refined to focus on most beneficial use that can be made from it. For each of the AIT concept elements, the expected benefits will be identified.

The initial analysis identified a core AIT concept that needs to be further refined. It includes
- the transmission of digital signature from the aircraft to the ground;
- the transmission of ATC id from the ground to the aircraft;
- the application of channel equalisation techniques to improve signal quality [6];
- the use of encryption techniques for the transmission of aircraft id and center id to improve security;

During this refinement phase, the possible alternative solutions to AIT will also be analysed in respect to their cost and benefits. Among these concepts, we have identified three important ones:

1. AIT over the digital radio communication link: although it is not clear whether the digital radio communications will replace VHF one day, it is essential to compare its cost and benefits with the AIT over VHF;
2. **Use of direction finders to identify the communicating aircraft:** the direction finders is an old concept used to find the direction of the communicating aircraft on the frequency (e.g. position finding, IFR pick ups). It is also used for the call sign confusion reduction in The Netherlands. It has the advantage of a low cost solution requiring only the improvement of the ground infrastructure. However, it is a partial solution as it cannot solve the cases where the aircrafts are at the same geographical position but different levels (e.g. holding stacks).

3. **Reduction of similar call signs by better code allocation:** this is a new study aiming to develop an algorithm to eliminate (if not to reduce) similar call signs at pre-tactical/tactical phase by CFMU.

The following deliverables will be produced in this phase:
- AIT Operational Concept Document
- AIT Functional & Technical Specifications Document
- AIT Initial Cost benefits Analysis
- PMP for the Full Feasibility Study (second phase)
A workshop will then be organised to gather stakeholder feedback by mid of 2006. Finally, a decision will be taken to launch or not the second phase.

**B. FEASIBILITY ANALYSIS – PHASE 2**

The second phase will aim to further refine the concept and the functional and technical specification using the feedback obtained from the stakeholders at the first phase. The initial CBA will also be refined and extended in this phase. A safety case will be developed. The validation will be done through the development of prototypes and trials. Finally, an implementation programme will be developed together with the stakeholders. The transfer of the concept to the industry will also be realised during this phase.

**REFERENCES**


