STAR

Secure ATM CDMA Software-Defined Radio

Funding: European (6th RTD Framework Programme)
Duration: Jun 2006 - Feb 2010
Status: Complete with results
Total project cost: €5,204,567
EU contribution: €2,692,768

Call for proposal: FP6-2005-AERO-1
CORDIS RCN: 79953

Background & policy context:

ATM (Air Traffic Management) systems will run short of communication capacity between 2010 and 2015 depending on the considered geographical area (e.g. north-west of France which is a dense air traffic area will be among the first ATC saturated ones). Depending on the forecast scenarios, it appears that current and planned analogue and even digital VHF systems (VDL mode 2, 3 or 4) will only support capacity growth until 2015 at most in Europe, before being saturated. It is feared that ATC problems could arise earlier (from 2010 on) in high-density traffic areas creating severe traffic congestion and increasing safety risks.

At European level, ICAO in the ACP workgroup has initiated an analysis and first selection of potential radio solutions. The UMTS 3GPP Wideband CDMA standard has been identified officially as a candidate for the future ATC radio system by the Working Group C of the Aeronautical Communications Panel belonging to ICAO.

Objectives:

The STAR project's Scientific and Technological objectives can be summarised as follows:

- To develop a secure wideband ATM communications system based on UMTS protocols;
- To develop a representative trial network permitting the set-up of an air-ground link by airborne equipment in Wideband communications mode;
- To perform research on and to develop a prototype multi-mode (SDR) avionics baseband platform able to support both wideband communications and the existing VHF analog audio format;
- To estimate the capacity and QoS improvements offered by a wideband communications system with regards to the 8.33 kHz and VDL-Mode2 systems;
- To validate and verify a secure wideband communications system by 2008 in lab and flight trials;
- To carry out the preparatory standardisation & regulatory activities required for an effective wideband based ATM system deployment;
- To promote the system with dissemination towards the relevant stakeholders.

Methodology:

Work that was to be done within the project is as follows:

- The STAR project will study and validate a secure, scalable, Wideband UMTS/3GPP communication system at RF frequencies including the avionics modem and necessary ground communication infrastructure for a future air traffic communication system (part of ATM) with VHF audio capability through SDR reconfigurability.

Innovation in the STAR programme will mainly be on the following items:

1. Software Defined Radio (RF + modem). STAR is aiming at proving the advantages of a SDR concept for avionics ATM purposes regarding modulations (legacy analogue voice and digital wideband...
3GPP) and frequencies (at VHF for voice and at RF band for Wideband CDMA) showing the backward compatibility of this concept with legacy and forward compatibility with other possibly future standards.

2. Adaptation of the UMTS protocols (down to physical layer) to allow their use in the avionic ATM/ATC radio taking in account it’s specificities (Doppler, delays due to cell size)

The validation of the ATM SDR concept will be done:

1. In lab trials emulating the complete system (airborne and ground equipment), using channel simulators, traffic load generation and jamming, at VHF for legacy analogue voice and digital wideband modulation and at RF band for CDMA waveforms.
2. Through flight trials in order to confirm the lab tests results, at VHF for legacy analogue voice and at RF band for CDMA waveforms.

**Parent Programmes:**
**FP6-AEROSPACE - Aeronautics and Space - Priority Thematic Area 4 (PTA4)**

**Institute type:** Public institution
**Institute name:** European Commission
**Funding type:** Public (EU)

**Lead Organisation:**

**Thales Communications S.a.**

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160 boulevard de Valmy
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**Organisation Website:**
http://www.thales-communications.com

**EU Contribution:** €0

**Partner Organisations:**

**Agilent Technologies Belgium Sa/nv**

**Address:**
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**Organisation Website:**
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**EU Contribution:** €0

**Ericsson Telecomunicazioni**

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VIA ANAGNINA 203
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**Organisation Website:**
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**EU Contribution:** €0

**Imst Gmbh**

**Address:**
| Organisation Name                                                                 | Address                                                                 | Website                        | EU Contribution |
|----------------------------------------------------------------------------------|--------------------------------------------------------------------------|-------------------------------|----------------|----------------|
| CARL FRIEDRICH GAUSSSTRASSE 2                                                    | 47475 KAMP LINTFORT Germany                                              | http://www.imst.de             | €0             |
| Green Hills Software Bv                                                           | Argonweg 7-11, 3812 RB AMERSFOORT Netherlands                             | http://www.ghs.nl              | €0             |
| Universidad Politécnica De Madrid                                                | Avda. Ramiro de Maeztu, 3 28040 MADRID Spain                              | http://www.upm.es              | €0             |
| Ercom                                                                            | 13 avenue Morane Saulnier VÉLIZY France                                   | http://www.ercom.fr            | €0             |
| Dfs Deutsche Flugsicherung GmbH                                                  | Am DFS-Campus 10 63225 LANGEN Germany                                   | http://www.dfs.de              | €0             |
| Stichting Centrum Voor De Ontwikkeling Van Transport En Logistiek In Europa     | Van Nelleweg 1 3044 BC Rotterdam Netherlands                             |                               | €0             |
Key Results:

The STAR Project will implement concepts and technologies to:

1. Reduce uncertainty in the air traffic management system.
2. Increase system capacity to safely handle three times more air movements.
3. Improve today’s aircraft safety and security levels.
4. Set up collaborative decision making related support systems and applications with associated system performance requirements.

The STAR programme, by providing a secure, trustable and high capacity radio system, allows handling the data rates needed to provide the pilot and the controller in time with all the information they need on the surrounding traffic coming through ATM signalling.

Documents:

Star Final Report_EN19.doc (Final report)

STRIA Roadmaps:
Cooperative, connected and automated transport, Network and traffic management systems

Transport mode: Air transport
Transport sectors: Passenger transport, Freight transport
Transport policies: Safety/Security
Geo-spatial type: Infrastructure Node