GNSS INTRODUCTION IN THE AVIATION SECTOR (GIANT)

GIANT aims to support the introduction of EGNOS and Galileo services in the aviation market, while demonstrating that the required safety levels are maintained for the responsible authorities and show economic and operational benefits to end-users.

BACKGROUND

For some time, ICAO has stated the recommendation to make the most extensive use of the available satellite technology for navigation and communications. The CNS/ATM concept was understood as technical (CNS) and operational (ATM) components of the global system. It envisages the Global Navigation Satellite System (GNSS) as the main navigation system including satellite constellations, aircraft receivers and system integrity monitoring, augmented as necessary to support the required navigation performance (RNP) for specific phases of flight. However, it is also recognised that GNSS have inherent vulnerabilities that have to be investigated, mitigated and solved.

Following the ICAO’s recommendation and the Council Conclusions regarding the use of EGNOS in the aviation domain, EUROCONTROL has included the introduction of APV operations based on EGNOS as one of its implementation objectives (ECIP). Thus, the GIANT project will continue some of the many activities that were begun for Galileo in earlier phases (e.g. GALILEI, GALA, SAGA, GILT and GEM).

OBJECTIVES

The aim of GIANT is to support the introduction of EGNOS and Galileo services in the aviation market, maintaining the required safety level imposed by the responsible authorities. Therefore its goal is the implementation of a strategic plan for the progressive introduction of GNSS services in aviation which complement the tasks being developed by EUROCONTROL. The main objectives and challenges of the project have been to provide a wide range of civil aviation users (airlines, regional/general aviation, helicopters) with first-hand experience on the benefits of GNSS for air navigation from the point of view of: Safety:

- vertical guidance (LPV) available on all runways (CFIT reduction);
- low height routes (helicopters, obstacles);
- low cost, high performance avionics for all users; - potential to rationalise conventional navigation aid infrastructure. Efficiency and operational benefits:
• LPV - Back-up to ILS approaches;
• Lower operational minima on non-ILS runways;
• Advanced procedures (e.g. curved approaches); - Approach operations;
• Lower noise impact; - More efficient routes and fuel savings;
• Operations in areas with poor navigation infrastructure; Integrated avionics:
• Definition of different ways of integration of GNSS receivers in the airborne architectures; - Integration of EGNOS application on a CRJ-system architecture.

DESCRIPTION
The GIANT objectives require much work in different fields - air navigation technical aspects, economy and business aspects, safety, regulation, etc. The activities to be performed have been broken up into the following sub Work Packages:

• Action and transition plans;
• Development of innovative applications;
• Demonstration of the operational benefits of GNSS to airspace users;
• Business, market, economical and safety studies;
• User terminal;
• Local elements;

Assessment of legal and regulatory GNSS enablers.

GIANT is a user-driven project. This means that this project deals with the development of a solution proposed by the industry, promoted by the service provider (ATSP) and accepted by the user (airlines). The activities performed within GIANT address, among others, the safety aspects for the implementation of GNSS, the demonstration of the operational benefits to airspace users through flight trials and the cost effectiveness of GNSS. In addition, GIANT promotes GNSS in aviation through the development of innovative applications, analysis of required technological developments (user terminal and local elements) and covers any legal and regulatory aspects necessary for its successful implementation. Special effort within the project is devoted to the flight demonstrations.
RESULTS

The main results will be proposals and solutions for GNSS operational implementation, legal aspects and onboard and ground elements of GNSS, especially issues regarding:

1. Definition and validation of new GNSS approach and landing procedures, LPV approach procedures for Valencia, San Sebastian and Bologna airports (for aircraft) and Lausanne and North Sea oilrigs helipads (for helicopters).

2. Enabler and action plan for the GNSS operational implementation, addressing the open points and the risk mitigation for the short term and medium to long term.

3. Development of innovative applications that could be supported by GNSS.

4. Required technological developments (user terminal and local elements) which allow flying these new GNSS procedures.

5. Assessment of the new GNSS approach procedures and its technical suitable implementation in terms of operational, safety, environmental and economic benefits.

6. Demonstration of the feasibility and “flyability” of the studied GNSS approach procedures through flight trials, flight demonstrations and simulation campaigns.

7. Study of the impact of these new GNSS techniques in the current legal frame and recommendations for regulatory procedures. In particular, the technologies and concepts involved in the GIANT project would allow aviation operations in areas with poor navigation infrastructures, while the technologies and concepts involved in the GIANT project will also derive in an enhancement of the approach operations, in terms of:

   • Lower noise impact;
   • More efficient routes and fuel and emissions savings.

PROJECT DETAILS

Acronym: GIANT

Name of Proposal: GNSS introduction in the aviation sector

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Project Type: APPLICATION

Project Links: Website

Coordinator: Luis Chocano, INECO, Avda. del Partenón, 4-4 (Campo de las Naciones), 28042 Madrid ES

Email: luis.chocano@ineco.es

Tel: +34 (0)91 452 57 66

Fax: -

Scientific Officer: Eric Chatre