WORKING PAPER

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Agenda Item 28: Regulation and organization of airports and air navigation services

THE IMPORTANCE OF GNSS COST ALLOCATION

(Presented by the Netherlands on behalf of the European Community and its Member States[2])

SUMMARY

The working paper describes the status of the GALILEO programme and analyses the impact of the cost allocation question on the system. It recognises that cost allocation of global navigation satellite systems is closely related to legal and technical questions and has to consider the multi-modal character of such systems.

The paper appreciates the work already performed by the ICAO panels and working groups concerned. It urges ICAO to further analyse the issue thoroughly and to complete the work.

Action by the Assembly is in paragraph 5.

1. INTRODUCTION

1.1 Recognising the strategic importance of satellite navigation, its potential applications and the current GNSS systems' shortcomings, it has been decided by the European Community to develop its own GNSS capability in a two-step approach:

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[1] English, French and Spanish versions provided by the Netherlands.

[2] The European Community comprises the following states: Austria, Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Poland, Portugal, Spain, Slovak Republic, Slovenia, Sweden and the United Kingdom.

a) The EGNOS (European Geostationary Navigation Overlay Service) programme is the first European step in satellite navigation and will be operational by 2004. Europe is building the EGNOS system as an enhancement over GPS and GLONASS to provide, through a civil service, improved accuracy and integrity data. Similar initiatives are being developed in the US (WAAS system) and Japan (MSAS system). The ICAO international SBAS (Satellite-Based Augmentation System) standards guarantee the interoperability of all these systems at user level.

b) The Galileo programme is the second step. The EGNOS system provides the Member States of the European Community with early benefits but does not provide a sufficient level of control over GNSS. The Galileo programme represents the objective of the European Community of autonomy for this crucial technology. Alongside an open service similar to the GPS civilian service, the Galileo system will provide new features to improve and guarantee services, thereby creating the conditions for responding to obligations imposed by critical, safety of life, or commercial applications. Services based on the Galileo system are required to be fully compatible and interoperable at user level with other GNSS services, with no common failure mode between systems. This combined use of the Galileo system and other GNSS will offer better performances for all kinds of user communities all over the world.

1.2 This strategy is reflected in the communications of the of the European Commission on the Galileo programme,[3] [4] and in the Galileo resolution of the Council of the European Union[5].

2. GALILEO PROGRAMME

2.1 Galileo mission

2.1.1 The definition of Galileo-based services is supported by a comprehensive review of user needs and market analysis. The Galileo-based services will be provided worldwide and independently from other systems. There are a wide range of possible applications with different operational requirements that have been grouped around the following services:

- Open Service (OS)
- Safety of Life (SoL)
- Commercial Service (CS)
- Public Regulated Service (PRS)
- Search and Rescue

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[3] Commission Communication, "Galileo, Involving Europe in a New Generation of Satellite Navigation Services", COM (1999) 54 final, 10.02.1999.

[4] Commission Communication on "Galileo", COM (2000) 750 final, 22.11.2000.

[5] Council Resolution on Galileo, 7918/01, 5.04.2001.

2.1.2 For the navigation in the aviation domain the Open Service and the Safety of Life Service should be of special interest.

Open service

2.1.3 The Open Service provides basic positioning, velocity and timing information that can be accessed free of direct charge. This service is suitable for mass-market applications, such as in-car navigation and hybridisation with mobile telephones.

Safety of life service

2.1.4 The target markets of the Safety of Life service are safety-critical users, for example, maritime, aviation and trains, whose applications or operations require stringent performance levels. This service will provide high-level performance globally to satisfy the user community needs and to increase safety especially in areas where services provided by traditional ground infrastructure are not available. The provision of integrity information at global level is the main characteristic of this service.

2.1.5 This service will be available on a non-discriminatory basis and the system will have the technical capability to encrypt or authenticate the signal (e.g. by a digital signature) to assure users that the received signal is safely provided by Galileo.

2.2 Galileo programme status

2.2.1 The GALILEO programme is structured in three phases:

- *Development and validation phase (2002-2005)*

  It includes the Consolidation of Mission Requirements, the development of satellites and ground-based components and the in-orbit validation of the system.

- *Deployment phase (2006-2007)*

- *Operational phase (from 2008)*

2.2.2 The Galileo preliminary system design phase is now finalised and ESA has recently launched the full development contracts for the Galileo system. Financing of this phase is provided jointly by the European Community and the European Space Agency.

2.2.3 The deployment and operational phases will be conducted in the frame of a public-private partnership. The selection process for the Galileo concessionaire is currently ongoing.

3. ISSUE RELEVANT FOR ICAO

3.1 Cost allocation and recovery mechanisms

3.1.1 ANSEP has been tasked to assist the ICAO Secretariat in undertaking a study on the allocation of GNSS costs among different user groups. The study is ongoing but ANSEP, also under

consideration of a Eurocontrol study[6] on this issue, has already endorsed a set of principles and assumptions related to this cost allocation mechanism (ref. AN-Conf/11-IP/37 by ICAO Secretariat). In summary:

a) Basic GNSS services will be provided free of charge. However, discussion indicates that this does not preclude the levy of a licence fee or a small equipment-related fee at purchase.

b) Recovery of costs for more advanced GNSS services should take place at regional level. Users of these services will in most cases have to contribute to GNSS components located in their own regions. Civil aviation users will, in addition, contribute to costs in those regions where they operate through air navigation services charges.

c) Cost allocation between civil aviation and other users should be discussed and agreed upon (at regional level), in consultation with the civil aviation users, before any costs are recovered from civil aviation.

d) Cost allocation should be based on users' requirements on the systems.

3.1.2 The instances developing the Galileo system are in full agreement with this basic set of principles. It is therefore recommended that the ongoing work is completed on the basis of these principles and that guidance is rapidly issued on the proposed allocation scheme so that the relevant mechanisms can be implemented in good time.

3.2 Development of a legal framework for satellite navigation

3.2.1 The development of cost allocation schemes and cost recovery mechanisms for GNSS is strongly related to the legal framework provided. The provision of commercial GNSS services for safety of life applications will include a certain type of liability. The risk connected with this liability has to be calculable for the parties involved.

3.2.2 Substantial work has been performed by Eurocontrol in the frame of the ICAO secretariat study group, and a proposal for a legal framework, based on a contractual approach, has been developed. The European Commission firmly supports the adoption of such a legal framework and is dedicated to developing and structuring the service provision of Galileo in such a way that the contractual framework binding the different stakeholders involved in the provision of aeronautical services based on GNSS can be established.

3.2.3 The EC regulation setting up the Supervisory Authority and the joint action on security both adopted by the EU council on 11 June 2004 provides the base for GALILEO to be included in such a framework.

3.3 Development of technical standards for encrypted services

3.3.1 GNSS are multi-modal systems and the signals and services are used by very different user communities. Signal encryption is one possible option for cost recovery in some user communities. Even if such a scheme is not adopted for aviation, the use of encrypted signals should be possible so that the benefits of these signals are available to aviation without denying cost recovery from other types of users.

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[6] "The allocation of GNSS (Global Navigation Satellite Systems) Costs", Eurocontrol, June 2000.

3.3.2 Furthermore, with the increasing reliance on GNSS for multiple civil applications, the risk could significantly increase of tentative intrusion or spoofing of the GNSS signals by malevolent actors. This may force service providers to protect against such risks through signal encryption or authentication.

3.3.3 ICAO NSP should therefore continue its standardisation work to consider the use of such signals.

4. CONCLUSIONS

4.1 European Satellite Navigation Programmes EGNOS and GALILEO are moving forward and have been designed to support civil aviation operations.

4.2 The GALILEO programme will deploy a full satellite constellation, under civil control, which will strengthen the robustness of satellite navigation and alleviate a number of institutional concerns. It should further facilitate a full transition to satellite navigation in the civil aviation domain, as decided by ICAO on the 11th Air Navigation Conference. The use of the services offered by the GALILEO system will rely on the availability of ICAO standards and recommended practices covering the system.

4.3 The EGNOS programme is now nearing completion and the operational phase is under preparation with the involvement of a number of European air traffic service providers.

4.4 However, the full use of these systems for civil aviation is currently hampered by the lack of a decision on the aeronautical cost recovery mechanisms relating to these systems as well as the lack of a solid legal framework clarifying the liability chain for GNSS systems.

5. ACTION BY THE ASSEMBLY

5.1 The Assembly is invited to:

a) recognise the contribution of the European Community and its Member States to global satellite navigation and their commitment to deploying systems aiming at addressing the technical and legal issues identified by the civil aviation community;

b) continue the work carried out by the ANSEP Panel on the implementation of cost recovery mechanisms for future satellite-based services;

c) encourage the development of SARPs enabling the use of Galileo-based Open and Safety of Life services for aeronautical navigation.

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