

ELEVENTH AIR NAVIGATION CONFERENCE

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Agenda Item 6: Aeronautical navigation issues

6.1: Global navigation satellite system (GNSS) development status based on reports from States, service providers and industry organizations

EUROPEAN COMMON AVIATION POSITION ON SATELLITE NAVIGATION — CURRENT POSITION AND FUTURE PERSPECTIVES

(Presented by European Organisation for the Safety of Air Navigation
(EUROCONTROL), on behalf of its Member States and those of ECAC²)

SUMMARY

This paper describes the background, which led to the development of the European Common Aviation Position regarding the future use of satellite navigation systems. It advocates a global approach to this matter, and outlines the various elements to be taken into account when framing a global satellite navigation strategy.

REFERENCES

Navigation Strategy for ECAC, 1999 edition:
<http://www.ecacnav.com/navstrat.htm>

¹ English, French, Russian and Spanish versions provided by EUROCONTROL.

² The ECAC Member States are: **Albania**, Armenia, **Austria**, Azerbaijan, **Belgium**, Bosnia and Herzegovina, **Bulgaria**, **Croatia**, **Cyprus**, **the Czech Republic**, **Denmark**, Estonia, **Finland**, **France**, **Germany**, **Greece**, **Hungary**, Iceland, **Ireland**, **Italy**, Latvia, Lithuania, **Luxembourg**, **Malta**, **Moldova**, **Monaco**, **the Netherlands**, **Norway**, Poland, **Portugal**, **Romania**, Serbia and Montenegro, **the Slovak Republic**, **Slovenia**, **Spain**, **Sweden**, **Switzerland**, **The former Yugoslav Republic of Macedonia**, **Turkey**, **Ukraine** and **the United Kingdom**).

The 31 Member States of EUROCONTROL appear in **bold**.

1. BACKGROUND

1.1 The operations of many airspace users are, by their nature, global. The aviation community requires worldwide systems that provide safe and efficient services, are compatible and interoperable and do not require different avionics. All States should join their efforts to achieve this. The aviation community will only accept “benefit driven” solutions and will strongly resist all those that are “technology driven”, i.e. not supported by a clear business case. However, it is recognized that the transition to global navigation satellite system (GNSS) requires a long-term strategic decision. A key element in stimulating investment in new systems is the early demonstration of benefits offered to the aircraft operators.

1.2 Therefore, in order to attract the attention of the aviation community and maximize the chance of obtaining the commitment for equipage, utilization and payment for a GNSS-based navigation infrastructure and service, candidate GNSS suppliers should consider their plans in the context of the views of the aviation community as expressed in this document.

1.3 As stressed in the European Commission White Paper “European transport policy for 2010: time to decide”, the European Union needs an independent satellite navigation system. There are at present two radio-navigation satellite networks in the world, the United States’ Global Positioning System (GPS), and Russian Federation’s GLObal NAVigation Satellite System (GLONASS). Both were designed as military systems. Galileo is Europe’s contribution to the GNSS infrastructure. The plan is to develop, fund and operate, as from 2008, a constellation of navigation satellites, independent from, but fully interoperable with GPS. The European Commission and the European Space Agency (ESA) attach, indeed, great importance to the complementary and interoperable relationship between Galileo and GPS in order to provide improved and safer services to the users worldwide.

1.4 The United States has indicated that the GPS service will be improved by the addition of a second civil frequency (L5), and the first GPS Block IIF satellites should be launched from 2005 onwards.

2. THE INTERNATIONAL CONTEXT

2.1 ICAO

2.1.1 The general objective of the global ICAO communication, navigation, surveillance/air traffic management (CNS/ATM) concept is to give to aircraft operators the freedom to dynamically follow preferred flight profiles with a minimum of constraints, while also maintaining or increasing the actual level of safety. Such a system, if successfully completed and implemented, will give a new perspective to the airborne and ground components of the CNS/ATM systems. Although the achievement of such flexible ATM operations is largely an ATM issue, a GNSS, providing a robust global area navigation capability, will be an important enabler of the global ICAO CNS/ATM concept. To date, ICAO has already approved Standards and Recommended Practices (SARPs) for some GNSS elements such as ground-based augmentation system (GBAS), satellite-based augmentation system (SBAS), GPS and GLONASS.

2.2 EUROCONTROL

2.2.1 The European Organisation for the Safety of Air Navigation (EUROCONTROL) Air Traffic Management Strategy for 2000+ identifies CNS as a global business, based on cohesive benefit-driven technical choices backed by realistic investment plans and political commitment. The EUROCONTROL Navigation Strategy provides a harmonized, cost-effective and customer-oriented evolution of the Air Navigation System in European Civil Aviation Conference (ECAC) Member States until 2015, and supports a judicious deployment of GNSS and a rationalization of the ground infrastructure. In addition, the EUROCONTROL Satellite Navigation Strategy states that GNSS should:

- a) be global for aviation, through cooperation with ICAO and the Federal Aviation Administration (FAA) of the United States;
- b) enable early benefits to be realized from existing systems;
- c) be multi-modal for Europe, through cooperation with the European Commission and ESA; and
- d) provide ultimately sole-means navigation for all phases of flight.

3. THE GNSS AVIATION COMMUNITY VIEWS

3.1 The aviation views expressed in this paper reflect the global nature of aircraft operations. The concept of required navigation performance (RNP) developed by ICAO defines the capabilities required for an aircraft to navigate in a particular airspace segment and allows the aircraft operator the choice of equipment to achieve that capability. The required capability could be provided by GNSS, the current ground-based navigation infrastructure, airborne systems or a combination of those. The choice of the technology will be, in all cases, benefit-driven. It is recognized that, at least for the foreseeable future, a rationalized terrestrial infrastructure must be retained until sufficient experience and confidence has been gained to validate GNSS operations.

4. THE FINAL GOAL: NEED FOR A GLOBAL STRATEGY

4.1 If world-wide GNSS is the most cost-beneficial solution, and is supported by a successful safety analysis, it should become the “sole service” navigation system, for provision of positioning and timing data, for all phases of flight.

4.1.1 The term “sole service”³ is used here to mean the only radio-navigation service provided external to the aircraft. It avoids certain confusions associated with the term “sole-means”.

4.2 In order to achieve this goal, there is a clear need for a worldwide navigation strategy, not only a European navigation strategy. All strategies should be developed under the auspices of ICAO and be supported by all the key partners. Such a world-wide strategy should address:

³ From a safety and security perspective there is a particular concern that GNSS is vulnerable to interference. Until safety and security assessments have clearly shown that such vulnerability issues have been solved, mitigation measures such as described in the appendix, including the retention of a rationalised terrestrial navigation infrastructure, will be required.

- 4.2.1 Sole service concept feasibility regarding safety requirements.
- 4.2.2 Technical, operational and safety requirements, calling for the development of a world-wide navigation satellite system that can be used, as the sole-service for provision of positioning and timing data, for all phases of flight down to CAT II/III operations, calling for due consideration of regional and sub-regional specific requirements; and calling for global interoperability and complementary ability.
- 4.2.3 Institutional requirements calling for world-wide resolution of institutional issues and guarantees from the GNSS service providers.
- 4.2.4 Cost allocation and charging requirements, calling for fair and equitable charging and cost-allocation between civil aviation and other user categories, between States and between phases of flight (en-route vs. approach/aerodrome).
- 4.2.5 Transition planning, calling for commitment for decommissioning of ground-based navigation aids, giving due consideration to global equipage implications and calling for commitment from users to equip with appropriate GNSS avionics and calling for the establishment of an implementation plan.
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