



TWELFTH AIR NAVIGATION CONFERENCE

Montréal, 19 to 30 November 2012

Agenda Item 1: Strategic issues that address the challenge of integration, interoperability and harmonization of systems in support of the concept of “One Sky” for international civil aviation

1.1: Global Air Navigation Plan (GANP) – framework for global planning

DEPENDENCY ON GNSS OF FUTURE AIR NAVIGATION SYSTEMS AND MEASURES FOR ITS VULNERABILITY

(Presented by the Republic of Korea)

EXECUTIVE SUMMARY

The Global Navigation Satellite System (GNSS) is the key element in developing and implementing future air navigation plans, and operational dependency on the GNSS technology increases at the same time. However, recently GNSS signals have proved to be vulnerable to intentional interference, including jamming, blocking and spoofing, and the concerns on the threats from such interference calls for high attention from each Contracting State.

This paper highlights the need for ICAO to develop short- and long-term measures to address such “acts of unlawful interference”.

Action: The Conference is invited to agree to the recommendation in paragraph 3.

1. INTRODUCTION

1.1 ICAO assumes that approximately 120 billion dollars will be spent worldwide to form the air navigation systems of the future as envisioned in the Global Air Navigation Plan (GANP) by 2025. Through this transition, it is expected to deliver improved safety and efficiency of aircraft operation as well as reduction of CO₂ emissions.

1.2 The Global Navigation Satellite System (GNSS) is the key element in developing and implementing future air navigation plans, and operational dependency on the GNSS technology increases at the same time. As dependency on GNSS grows consistently, it is predicted that the GNSS-based air route will be able to accommodate increased traffic volume two to three times the current maximum traffic volume.

1.3 ICAO is in the process of revising the GANP including the aviation system block upgrades (ASBU). The ASBU methodology emphasizes the dependency and importance of GNSS and recognizes the system as a key element to develop and implement the global air navigation plan on a national, regional and global basis.

1.4 However, if any problems arise on GNSS or related systems by intentional interference acts, it will cause a significant threat to flight safety, and notwithstanding the concerns on the growing risk of interference to GNSS are increasing, an appropriate action plan that includes risk assessment and analysis on such interferences or short- and long-term measures to protect GNSS against such acts has not been developed at a global level.

2. DISCUSSION

2.1 As explained in the introduction, in spite of high operational dependency on GNSS, which plays an important role in the transition to ICAO's next generation air navigation system, GNSS signals are innately vulnerable to interference or spoofing, etc. Therefore, the intentional interference acts can be extremely dangerous to the aircraft in operation. The recent interferences which occurred in the Incheon FIR are empirical examples of such cases.

2.2 One hundred and six aircraft of eighteen airlines from six States (from 4 March to 13 March 2011) and 1 016 aircraft including eighty-eight aircraft of thirty-three airlines from sixteen States (from 28 April to 13 May 2012) were subject to GPS interference in the Incheon FIR. Among them, four aircraft confronted dangerous situations such as failing to perform approach procedures causing activation of the ground proximity warning system (GPWS). And the testimonies given by pilots and controllers who have experienced the situation show the gravity and urgency of the situation.

2.3 With a quick response by the Republic of Korea, this issue was seriously discussed at the meeting of the 196th Session of the ICAO Council and subsequent decisions were adopted to note the GPS interference incidents with grave concern, urge the Contracting State with the source of such GPS interference signals to ensure that any similar incidents do not take place again, and call upon collaboration between the ICAO Secretariat and the International Telecommunication Union (ITU). The ICAO High-level Conference on Aviation Security (HLCAS) held last September also recognized its significance, and recommended that ICAO intensify efforts to develop guidelines on the prevention and appropriate response to emerging aviation security threats such as GNSS jamming, blocking and spoofing.

2.4 As such, it is inevitable that as the air navigation system technology using GNSS advances, the dependency on the system will increase and moreover, new types of intentional interference acts skilfully developed to induce GNSS's vulnerability will also be increasingly developed. Therefore, it is necessary for ICAO to establish short- and long-term measures to prevent unlawful acts that cause interference on GNSS along with the mid- to long-term air navigation plan which addresses the benefits of using GNSS to smoothen the implementation of the global air navigation plan.

3. CONCLUSION

3.1 The Conference is invited to agree to the following recommendation:

Recommendation 1/x – Dependency on the Global Navigation Satellite System (GNSS) of future air navigation systems and measure for its vulnerability

That the Conference:

- a) urge Contracting States to note that even though the Global Navigation Satellite System (GNSS) is becoming the key element of future air navigation systems, it is still vulnerable to intentional interference acts and always carries inherent potential risks;
- b) request ICAO, in the short-term, to acknowledge the necessity of developing a guideline, including a cooperative mechanism and process to share information among Contracting States and relevant international organizations, against the system failure or inconvenience caused by intentional GNSS signal interference;
- c) request ICAO, in the long-term, to review the necessity of a study on the risk assessment of GNSS and development of measures for each possible situation to be included in the aviation system block upgrades (ASBU); and
- d) request ICAO to revise related Annexes and provide concrete measures, in order to consider the intentional interference acts against GNSS operations as unlawful acts.

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