



THIRTEENTH AIR NAVIGATION CONFERENCE

Montréal, Canada, 9 to 19 October 2018

COMMITTEE A

Agenda Item 2: Enabling the global air navigation system

2.2: Integrated CNS and spectrum strategy

CURRENT STATUS AND FURTHER DEVELOPMENT OF THE GROUND-BASED AUGMENTATION SYSTEM OF GLONASS AND GPS SATELLITE CONSTELLATIONS

(Presented by the Interstate Aviation Committee (IAC))

EXECUTIVE SUMMARY

This paper presents information on the current status of the ground-based augmentation system of the Global Navigation Satellite System (GLONASS) satellite constellation in the Member States of the Interstate Aviation Committee, as well as on the requirement of the integration of global navigation satellite system (GNSS) signal monitoring systems in States with neighboring airspaces in order to enable 'seamless' GNSS operations with GNSS as a primary means of navigation at all flight phases in compliance with the current and perspective performance-based navigation (PBN) specifications, and at the precision landing approach.

It is expected in the long term that the onboard radio electronic equipment standards will enable the use of all the elements and signals of GNSS constellations with ground-based, satellite and onboard multi-frequency augmentation.

Action: The Conference is invited to:

- a) take note of the information given in the paper; and
- b) support Recommendation 2.2/x of working paper AN-Conf/13-WP/15, Global Navigation Satellite System (GNSS) Evolution;
- c) invite the ICAO Council to continue its consideration of the international regulatory issues of the use of GNSS and include in the ICAO work programme the development of SARPs for new elements and new constellations in order to enhance international aviation safety and efficiency, and to amend *Procedures for Air Navigation Services — Aircraft Operations* (PANS-OPS, Doc 8168), *Performance-based Navigation (PBN) Manual* (Doc 9613), the *Global Air Navigation Plan* (GANP, Doc 9750) in accordance with ICAO SARPs in Annex 10, Vol 1, 3.7.3.5.1 and Attachment D, 7.1.2 (PBN GBAS), and ICAO Assembly Resolution A37-11.

¹ English and Russian versions provided by the IAC.

1. INTRODUCTION

1.1 ICAO Standards and Recommended Practices (SARPs) in Annex 10 — *Aeronautical Telecommunications*, Volume I — *Radio Navigation Aids* provide for the use of global navigation satellite system (GNSS) under the condition of the GNSS signal monitoring, as well as the use of ground-based augmentation systems (GBAS) of GNSS in en-route, terminal, landing procedures and GBAS positioning service when performing GNSS operations with GNSS being a primary means of navigation and landing.

1.2 This working paper addresses the need of amendments development in order to enable a valuable use of GBAS in accordance with Annex 10, Vol 1 of ICAO SARPs.

2. CURRENT STATUS OF GROUND-BASED AUGMENTATION SYSTEMS IN THE MEMBER STATES OF THE INTERSTATE AVIATION COMMITTEE (IAC)

2.1 Ground-based GNSS augmentation systems (GBAS) are installed in the Russian Federation (120 stations), Republic of Kazakhstan (Krayniy Aerodrome), Republic of Belarus, Republic of Armenia.

2.2 Main and Regional GNSS Signal Monitoring Centres have been put into operation in the Russian Federation.

2.3 In order to provide a ‘seamless’ airspace during GNSS operations with GNSS as a primary means of navigation the coordination of regional GNSS signal monitoring centres is required (especially in the border areas of states’ airspaces).

2.4 The abovementioned coordination would contribute to the improvement of flight safety and resource savings of individual states. The Interstate Aviation Committee (IAC) has decided to join the efforts of its Member States to coordinate GNSS monitoring systems in individual States.

2.5 The ground-based augmentation systems installed in the Member States have GAST A, GAST B, GAST C and PS (positioning service) options.

3. THE WAYS OF IMPLEMENTING THE TASKS OF INTRODUCING ALL GNSS ELEMENTS IN THE LONG TERM

3.1 ICAO should intensify its work on raising awareness of all neighbouring states of the status of GNSS signal, in order to enable various types of aircraft operations, as well as of the implementation of the current and perspective specifications of the PBN concept.

4. CONCLUSION

4.1 In general, the Air Navigation Conference is invited to support recommendation 2.2/x, stated in Working Paper AN-Conf/13-WP/15 “Global Navigation Satellite System (GNSS) Evolution”.

4.2 It is proposed to amend the ICAO Procedures for Air Navigation Services — Aircraft Operations (PANS-OPS, Doc 8168), Performance-based Navigation (PBN) Manual (Doc 9613), the Global Air Navigation Plan (GANP, Doc 9750) with regard to the implementation of all PBN specifications with the use of ground-based augmentation systems (GBAS) in accordance with Annex 10, Vol 1 of ICAO SARPs.

4.3 The use of GBAS in terminal procedures (for example APV-I) should be added to the provisions of the ICAO Concept of Operations (CONOPS) for dual-frequency, multi-constellation (DFMC) GNSS.

4.4 The Conference is invited to recommend the integration of GNSS signal monitoring systems of neighbouring States, in order to enable airlines and ATM bodies to be informed about the status of the GNSS signal and to record satellite signals for the purposes of air accident investigation.

— END —