



WORKING PAPER

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

STATUS AND DEVELOPMENT OF GLONASS

(Presented by the Russian Federation)

EXECUTIVE SUMMARY

This working paper presents data on the status and development of the GLONASS satellite navigation system.

Action: The Conference is invited to note the information presented and propose that ICAO consider using a multi-constellation solution based on the existing GPS and GLONASS satellite navigation systems in order to meet navigation challenges.

1. INTRODUCTION

1.1 The ICAO concept of communications, navigation and surveillance/air traffic management (CNS/ATM) calls for the use of a global navigation satellite system (GNSS). In accordance with the Standards and Recommended Practices (SARPs) adopted by ICAO, the GNSS system currently consists of two main constellations of satellites from the American Global Positioning System (GPS) and the Russian Global Navigation Satellite System (GLONASS), and their functional augmentations.

1.2 Over the course of several years, work has been under way in the Russian Federation to develop and improve GLONASS. The system's standard precision signal is designed for open use by all interested users, including aviation users. All of the work has been done within the framework of the Federal Special-Purpose Programme entitled “The Global Navigation Satellite System,” which ran from 2002 through 2011.

2. BACKGROUND

2.1 At the Tenth Air Navigation Conference of ICAO in 1991, the Government of the USSR presented GLONASS to the international aviation community for use free of charge. The GLONASS system went into operation in 1993 and was deployed in its full constellation of twenty-four satellites in 1995.

2.2 In June 1996, the Government of the Russian Federation confirmed the proposal to provide a GLONASS standard precision channel to the international aviation community on a non-discriminatory basis for

a period of fifteen years. On the basis of this proposal, an agreement was concluded between the Government of the Russian Federation and ICAO on the use of GLONASS for the needs of international civil aviation, as confirmed by the letter from the President of the Council dated 29 July 1996.

2.3 In the second half of the 1990s, the GLONASS group remained incomplete for practical use due to a series of economic and political factors. In December 1998, however, the GLONASS group achieved its minimum required number of satellites: eleven. In order to correct the situation, the Government of the Russian Federation approved a Federal Special-Purpose Programme for the reconstruction, development, and broad use of GLONASS with implementation timelines from 2002 through 2011. The primary objective in implementing this programme was to bring the GLONASS orbital group to its full constellation. This aim has been achieved.

2.4 On 8 December 2011, the working constellation of the Russian Global Navigation Satellite System (GLONASS) was brought up to its full constellation of twenty-four GLONASS-M satellites after the first of three GLONASS-M satellites launched on 4 November 2011 from the Baikonur Cosmodrome was put into operation in slot No. 3 of the first orbital plane.

2.5 Starting on 23 December 2011, a stable space grouping of twenty-four GLONASS-M satellites was formed. In this grouping, the oldest are the GLONASS-M satellites located in the second plane in slots ten, fourteen and fifteen. Their actual lifespan to date is less than six years, while the guaranteed service life of these satellites is seven years. In addition, the orbital group contains back-up GLONASS-M satellites: two in the first orbital plane, and one each in the second and third orbital planes.

2.6 In addition, the Russian Federation is continuing its work to develop a new generation of GLONASS-K satellites, and tests are being conducted on the GLONASS-K experimental satellite located in slot twenty-one of the third orbital plane. Meanwhile, the creation of the Russian satellite-based augmentation system known as the System of Differential Correction and Monitoring (CDKM) continues. The ground control system is also being improved.

2.7 The Government of the Russian Federation has guaranteed the completion of all work on subsequent maintenance and development of the GLONASS system, having approved a new Federal Special-Purpose Programme entitled “The Maintenance, Development, and Use of the GLONASS System in 2012 – 2020”.

2.8 The principles of the Russian Federation’s current policy on satellite navigation are as follows:

- a) provision of GLONASS civilian signals free of charge for all users with support for GLONASS within Russia and globally;
- b) creation of conditions for the broad use of the GLONASS system in the State and private sectors of the economy, both in and outside of Russia, in order to promote the development of a mass market for navigation services;
- c) provision of open access to documentation concerning the structure of GLONASS civilian signals for developers of navigation receivers and systems based on them;
- d) development of the integration of the GLONASS system with the navigation systems of foreign States to ensure the compatibility and mutual complementarity of GLONASS with the GPS system and future Galileo system. The creation and further development of GLONASS is one of the priority areas of Russia's economic modernization.

2.9 These principles are formalized in a Russian Federation Presidential Decree dated 17 May 2007, “On the use of the GLONASS global navigation satellite system in the interest of the social and economic development of the Russian Federation”, which grants Russian and non-Russian users access to GLONASS civilian navigation signals on an unrestricted basis, free of charge. The Decree also defines the organization of the work for the maintenance and use of GLONASS and establishes the need to continue work on the development of GLONASS in the post-2011 period.

3. CONCLUSION

3.1 To date, the Russian Federation has fully completed the outfitting of the orbital group of GLONASS satellites. The process of developing the group and broadening the sphere of its use by aviation community users in the Russian Federation and worldwide continues.

3.2 The Conference is invited to:

- a) note the information presented; and
- b) agree to the following recommendation:

Recommendation 1/x – Use of a multi-constellation solution to navigation problems

That the Conference request ICAO to develop and include guidance to the documents on the aviation system block upgrades pertaining to the use of a multi-constellation solution to navigation problems that is based on a GNSS system standardized by ICAO and comprised of the existing satellite navigation systems GPS, GLONASS, and their functional augmentations, in order to improve the precision, completeness, availability, and seamlessness of service.

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