International Civil Aviation Organization

WORKING PAPER

A37-WP/195[1]
TE/109
22/9/10
(Information paper)

ASSEMBLY — 37TH SESSION

TECHNICAL COMMISSION

Agenda Item 35: The Global Air Traffic Management (ATM) System

STATUS AND OUTLOOK FOR THE DEVELOPMENT OF THE RUSSIAN GLOBAL NAVIGATION SATELLITE SYSTEM (GLONASS)

(Presented by the Russian Federation)

EXECUTIVE SUMMARY	
This paper presents information on the status and development of the Russian global navigation satellite system (GLONASS).	
Strategic Objectives:	This working paper relates to Strategic Objective A on safety.
Financial implications:	Not applicable.
References:	Annex 10 — *Aeronautical Telecommunications*, Volume I — *Radio Navigation Aids;* Doc 9750, *Global Air Navigation Plan*; and Doc 9849, *Global Navigation Satellite System (GNSS) Manual*

[1] Russian version provided by the Russian Federation.

1. INTRODUCTION

1.1 The adoption of the communications, navigation, and surveillance/air traffic management (CNS/ATM) concept by ICAO envisages the use of a global navigation satellite system (GNSS). In accordance with ICAO Standards and Recommended Practices (SARPs), the GNSS system currently comprises two main satellite constellations, the American global positioning system (GPS) system and the Russian global navigation satellite system (GLONASS), as well as augmentations.

1.2 The use in GNSS of two, and more in future, national satellite systems increases GNSS system stability by enhancing the integrity, reliability, and accuracy of the navigation service, as well as by mitigating the potential impact of technical and political factors.

2. DEVELOPMENT OF THE GLONASS SYSTEM

2.1 The fundamental principles of the Russian State policy on satellite navigation are:

a) to provide civil GLONASS signals free-of-charge to all users with GLONASS application support in the territory of the Russian Federation and globally;

b) to establish the conditions for wide-scale use of the GLONASS system in the State and private sectors of the economy, both in Russia and abroad, in order to promote the development of a mass navigation services market; and

c) to provide open access to the documentation on the structure of the GLONASS civil signals for designers of navigation receivers and systems based on them; and

d) to develop the integration of the GLONASS system with the navigation systems of foreign States to ensure the compatibility and interoperability of GLONASS with the GPS system and the future Galileo system. The creation and further development of the Russian GLONASS system is one of the priority focuses of the economic modernization of the Russian Federation.

2.2 The GLONASS system was commissioned in 1993 and deployed up to the regular composition of twenty-four satellites in 1995. In accordance with the 26 June 1996 Agreement between the Government of the Russian Federation and ICAO, the GLONASS system is available to the international aviation community for use free-of-charge. This offer was confirmed in August 1999 by the Statement of the Government of the Russian Federation on providing the GLONASS space-based navigation system as a foundation for the creation and development of international global satellite systems.

2.3 In the second half of the 1990s, due to a number of economic and political factors, the GLONASS constellation was virtually incomplete and, in December 1998, the GLONASS constellation strength reached the minimum level, eleven satellites.

2.3.1 In 2001, to correct the situation, the Government of the Russian Federation developed and launched a federal target programme for the reconstruction, development, and extensive use of the Russian satellite navigation system, GLONASS, with implementation deadlines from 2002 to 2011. The main outcome of the programme implementation thus far is the significant reconstruction of the constellation, the composition of which reached twenty-three GLONASS-M type satellites by the middle of this year (Appendix A).

2.3.2 Information in English about the current status of the GLONASS constellation can be found at: http://www.glonass-ianc.rsa.ru/pls/htmldb/f?p=202:20:1362495372516167::NO

2.4 It is proposed to launch a further six GLONASS satellites by the end of 2010, after which the GLONASS constellation shall reach its nominal strength of twenty-four satellites, which will make it possible to ensure global, continuous navigation support to GLONASS system users and, considering the modernization of the ground control system, to achieve the users' navigational determination accuracy to 5.5 m, and to 2.8 m in 2011.

2.4.1 Moreover, an orbital satellite redundancy will be created, making it possible to guarantee the reliability of the navigation support to users.

2.5 It is proposed that flight tests will begin at the end of 2010 on the next generation GLONASS-K satellite with a service life of ten years, which has improved accuracy and an operational performance comparable with the world's best counterparts. The launch of the GLONASS-K, which emits a new standard accuracy code division signal in the L3 band, is slated for December 2010.

2.6 A significant impetus to develop the GLONASS system was given by the Decree of the President of the Russian Federation, issued in 2007, which defined the sequence for providing the signal to users, organizing the work to maintain and use the GLONASS system, as well as the outlook for its development to the year 2020.

2.6.1 To execute the Decree of the President of the Russian Federation, work is being done by the Russian Space Agency, along with other federal bodies of executive authority, to establish a federal target programme on the maintenance, development, and use of the GLONASS system for 2012–2020.

2.6.2 The implementation of the measures in the programme being developed will make it possible in the GLONASS system to fulfil the growing demands of a wide range of users, firstly from the State regulated sector; it will promote the accomplishment of the mission of modernizing the State economy, support national security, and meet the challenges of supporting aircraft navigation and ensuring flight safety.

2.6.3 Within the framework of executing this programme, the plan is gradually to introduce navigation code division signals, including in the L1 and L2 bands, while retaining the existing signals. Agreement of the development concept of GLONASS system navigation signals, which will define specific target dates for the introduction of the new navigation signals, is nearing completion.

2.7 Work on creating a GLONASS space-based augmentation system, the system of differential correction and monitoring (SDCM), is underway in the Russian Federation.

2.7.1 The SDCM is an augmentation to the GLONASS and GPS satellite navigation systems and provides a performance enhancement of these systems to meet the high accuracy and reliability required.

2.7.2 It provides users with integrity information, refined ephemeris-time information, information corrected to measurements, and information on the health of the GLONASS and GPS, and Galileo in future, satellite navigation systems.

2.7.3 A network of navigation area monitoring stations is now deployed, comprising thirteen stations, including one station deployed in Antarctica as from 2010. It is proposed to increase the station network by approximately 14–15 units, including ones deployed outside the Russian Federation.

2.7.4 As of 2011, it is planned to deploy the SDCM constellation to transmit integrity information and corrected information based on geostationary satellites. The launch of three geostationary satellites that provide coverage not only for the territory of the Russian Federation, but also of a significant portion of foreign territories is planned.

2.7.5 The proposed SDCM service area is shown in Appendix B.

3. CONCLUSION

3.1 The extensive commissioning of the GLONASS system on the national, regional and global bases, with the advantages to be enjoyed by using it in its original implementation and in combination with other existing satellite navigation systems and those being developed, meets the demands for a significant improvement in the safety, regularity and economic efficiency of aircraft operations in international civil aviation.

3.2 The Russian Federation is prepared to pursue its active cooperation with ICAO, particularly in the improvement of GNSS SARPs, so as to ensure the use of navigation technologies in worldwide civil aviation, including that based on the GLONASS system.

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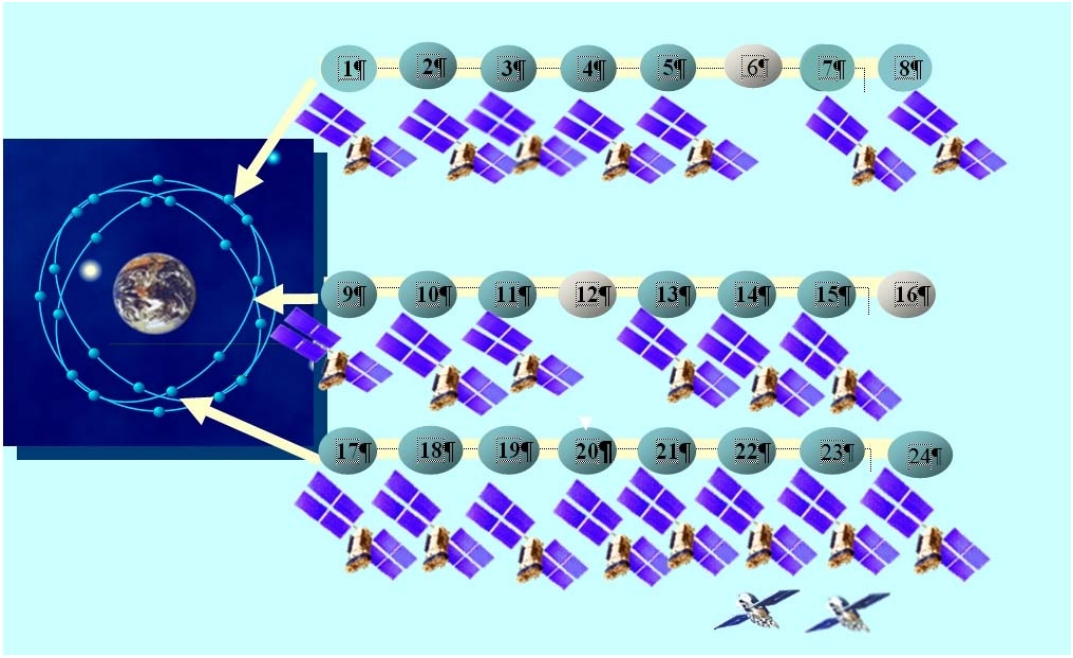
APPENDIX A

GLONASS CONSTELLATION – STATUS ON 15 AUGUST 2010



Note.—The constellation, according to the status on 15 August 2010, comprises twenty-one GLONASS-M satellites used for the designated purpose and two redundant GLONASS-M satellites.

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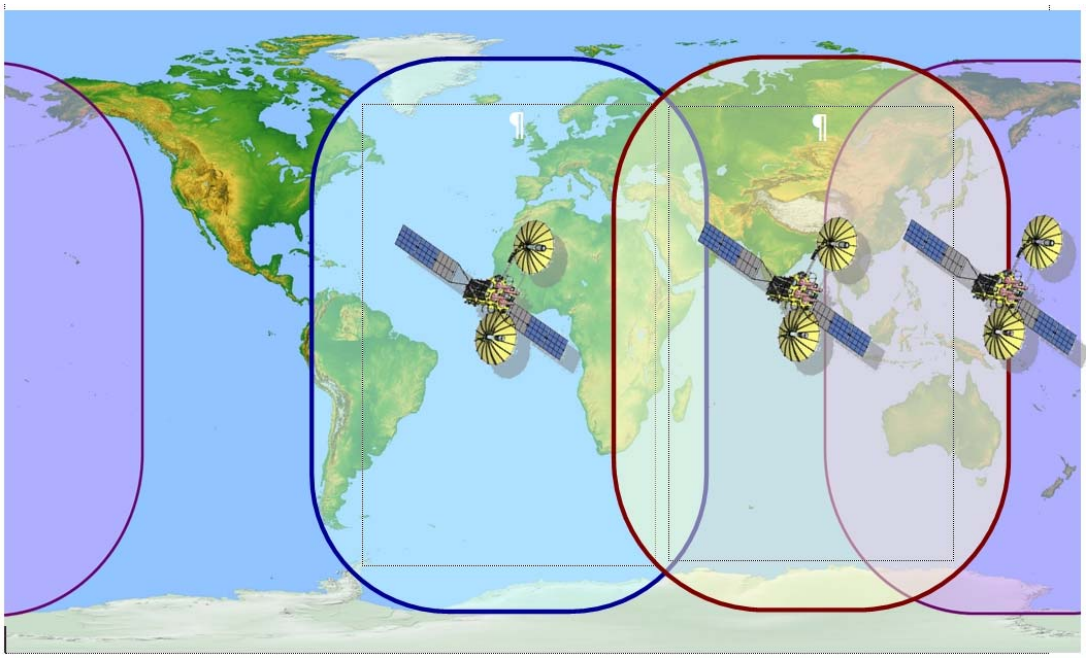
APPENDIX B

PROPOSED SYSTEM OF DIFFERENTIAL CORRECTION AND MONITORING (SDCM) SERVICE AREA



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