International Civil Aviation Organization

WORKING PAPER

A36-WP250/[1]
TE/82
19/09/07
English and Russian only

ASSEMBLY — 36TH SESSION

TECHNICAL COMMISSION

Agenda Item 37: Other air navigation matters

STATUS OF THE GLONASS SYSTEM AND ITS USE WITHIN GNSS

(Presented by the Russian Federation)

EXECUTIVE SUMMARY	
The document covers general issues of status and development of the GLONASS system in the context of its use as an element of GNSS for the benefit of both national and international civil aviation. **Action:** The Assembly is invited to note the benefits of the combined use of GNSS signals.	
Strategic Objectives:	This working paper relates to Strategic Objectives A and D.
Financial implications:	Not applicable
References:	Doc 9828, *Report of the Eleventh Air Navigation Conference (2003)* Recommendation 6/12

[1] English and Russian versions provided by the Russian Federation.

1. INTRODUCTION

1.1 The CNS/ATM conception adopted by ICAO stipulates the use of the internationally standardized global satellite navigation system (GNSS). At present time GNSS includes two core constellations GPS (USA) and GLONASS (Russia), as well as a few augmentations. Navigation System Panel (NSP) as established within ICAO continues to improve existing Standards and Recommended Practice for GNSS (SARPs) and develop brand new SARPs for emerging core elements and signals.

1.2 Combined use of two or more GNSS constellations increases robustness, integrity and accuracy of air navigation and decreases risks of possible negative impact of technical and political factors. Advantages of the combined GNSS constellation use were recognized by the Eleventh Air Navigation Conference (Montreal 2003) in its Recommendation 6/12.

2. DISCUSSION

2.1 GLONASS was put into operation in 1993. By the end of 1995 the GLONASS constellation of 24 satellites was completely deployed. In accordance with Agreement of 26 June 1996 between ICAO and the Russian Federation, GLONASS was offered to international civil aviation community for the use on a free-of-charge basis. Such an offer was repeatedly confirmed by the Russian Federation at the World-wide CNS/ATM Systems Implementation Conference (Rio de Janeiro, 1998).

2.2 In the second half of 90's, due to a number of economical and political reasons replenishment of the GLONASS constellation was significantly reduced. But in 2001 the Government of the Russian Federation adopted a Federal Task-oriented Program on the GLONASS recovery and further development until 2011 (the Program).

2.3 Basic objectives of the Program are further development and efficient implementation of GLONASS for the benefit of national economy and security, and maintenance of sustainable progress of national satellite navigation technology by offering of guaranteed free-of-charge navigation signals to the users worldwide.

2.4 These objectives shall be achieved by:

- development and maintenance of GLONASS performance on the level of world requirements, as well as timely replenishment of the constellation;
- modernization of GLONASS orbital and terrestrial segments;
- arrangement of favorable conditions for wider implementation of satellite navigation technology in economics, as well as mass manufacture of better and cheaper GLONASS equipment for users.

2.5 In May of 2007 President of the Russian Federation signed a Decree on the use of GLONASS for the benefit of social and economical progress of the Russian Federation. This Decree defines a basic principle of the Russian Government's policy in the field of satellite navigation – free-of-charge and unlimited access to GLONASS civil navigation signals for users worldwide. The Decree also outlines the matters of GLONASS application in national economy and relevant international cooperation.

2.6. In the framework of the Program GLONASS gains benefits for accelerated development. Current GLONASS constellation consists of 13 satellites, and 11 of them are fully operable ones. Other 2 satellites are about to be entered into operation. By the end of 2007 other 6 GLONASS-M satellites will be launched; these satellites will have better characteristics and longer lifetime up to 7 years. It is planned to have GLONASS constellation of 18 operable satellites in orbit in 2008. Complete GLONASS constellation deployment of 24 satellites is planned to be achieved as early as in 2009.

2.7 Next generation of GLONASS satellites – GLONASS-K – is under development. GLONASS-K will be transmitting an additional navigation signal in L3 band (1164-1215 MHz) for civil users and providing better accuracy and integrity of navigation.

2.8 There is certain progress in development of augmentations. Implementation of GBAS facilities based on the combined GLONASS/GPS use has begun. Russian GBAS station is designed in full compliance with ICAO SARPs.

2.9 There are plans regarding development of Russian SBAS. This System for Differential Correction and Monitoring (SDKM) will operate with GLONASS and GPS signals and provide coverage of entire territory of the Russian Federation. SDKM also stipulates interoperability with existing and future space-based augmentations.

2.10 Combined use of GLONASS, GPS and emerging satellite navigation systems would ensure better performance of GNSS due to improved integrity, robustness and accuracy characteristics, as well as reduced impact of possible technical and political difficulties. GLONASS is less vulnerable to interference due to FDMA technology, and its orbital parameters enable better navigation in regions closer to northern latitudes. This causes additional advantages that should be combined with advantages of other systems.

2.11. With the aims of more interoperability with other core GNSS elements, GLONASS administration is considering pros and contras of future implementation of common civil CDMA navigation signal in GLONASS. This signal would be similar to those planned for implementation in GPS and Galileo.

2.12. Government of the Russian Federation actively supports development and manufacture of combined GLONASS/GPS receivers and promotes mandatory equipping governmental users with combined GLONASS/GPS receivers. More than 10 types of onboard GLONASS/GPS receivers are developed in Russia for civil aviation. Civil aviation authorities in Russia have initiated mounting these receivers on board of new and operating aircraft.

3. CONCLUSION

3.1. Implementation of GLONASS, on national, regional and global bases, would promote significant increase in safety, regularity and efficiency of international civil aviation flights. Combination of GLONASS with other GNSS elements enables additional advantages for air navigation.

3.2. Aviation authorities of the Russian Federation, following ICAO recommendations, are not in a position to restrict or discriminate anyhow the use of various GNSS constellations for the benefit of air navigation and pursue a policy towards implementation of combined and non-discriminated approach with regard to the use of GNSS constellations.

— END —