International Civil Aviation Organization

WORKING PAPER

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ASSEMBLY — 37TH SESSION

TECHNICAL COMMISSION

Agenda Item 36: NextGen and SESAR as part of the Global ATM system

INTRODUCTION OF BEIDOU (COMPASS) NAVIGATION SATELLITE SYSTEM

(Presented by China)

EXECUTIVE SUMMARY

As one of four major global navigation satellite systems in the world, the BeiDou (COMPASS) navigation satellite system is now capable of providing positioning, navigation and timing services to civil aviation users to meet their respective requirements.

This paper describes the relevant considerations associated with this system in terms of its planning, development and services.

Action: The Assembly is invited to:
a) request ICAO to pay due attention to this system; and
b) initiate, as soon as possible, its work on development, in accordance with ICAO's relevant technical standards, a series of guidance and recommended practices with respect to COMPASS's application in civil aviation.

Strategic Objectives:	This working paper relates to Strategic Objectives A, D and E on safety, efficiency and continuity.
Financial implications:	Not applicable.
References:	Nil

* Chinese version provided by China.

1. INTRODUCTION

1.1 The BeiDou (COMPASS) navigation satellite system has so far launched five BeiDou navigation satellites. There is a need to bring China's fast growing satellite navigation system, a core constellation of global satellite systems, in line with the concepts and planning of the global navigation satellite system (GNSS) of ICAO, so that the system's application in the civil aviation would be most effective.

1.2 The objective of navigation services is to comply with ICAO Standards and Recommended Practices (SARPs) on civil aviation, there is no exception in the case of COMPASS, which can provide more civil frequencies and orbital satellites in the interest of civil aviation. In the meantime, augmentation technology will also be developed in parallel with the core constellations, which, as a component of the ICAO GNSS master plan, should be complemented and improved.

2. OVERVIEW

2.1 The BeiDou (COMPASS) navigation satellite system, currently under implementation in China, is a global navigation satellite system developed and operated by China exclusively. The objective of the system is to build an independent BeiDou navigation satellite system that is open and compatible, technologically sophisticated, stable and reliable, and with global coverage; to promote the formation of a satellite navigation industry chain, and to establish a complete national system with respect to satellite navigation application, development, promotion and support; and to promote widespread applications of satellite navigation across all economic and social sectors in China.

2.2 COMPASS consists of three components, namely: the space segment, the ground control segment and the user equipment segment. The space segment consists of five geostationary orbital satellites and thirty non-geostationary orbital satellites; the ground segment consists of a master control station, input stations and monitoring stations; and the user equipment segment consists of COMPASS' user terminals and interfaces which are compatible with other navigation satellite systems.

3. DEVEOPMENT HISTORY

3.1 Satellite navigation system is an important spatial information infrastructure. China has attached great importance to the construction of satellite navigation systems, and has made efforts to explore and develop a satellite navigation system with exclusively independent intellectual property rights. In 2000, China successfully built an experimental BeiDou navigation system, making it the third State to have its own navigation satellite system after the United States and Russia. The system has been successfully used in mapping, telecommunications, water conservancy, fishery, transport, forest fire prevention, disaster relief and public safety and other areas, yielding remarkable economic and social benefits. It is worthy to mention that the system played a very important role in supporting 2008 Beijing Olympic Games and the Wenchuan earthquake disaster relief work. China has embarked on the implementation of the construction of COMPASS with a view to better serving the nation's construction and development demands and meeting global application needs.

4. PRINCIPLES OF CONSTRUCTION

4.1 The construction and development of COMPASS take application promotion and industry development as its fundamental objectives. It will set up and more importantly make the best use of the system with emphasis placed on the system's quality, safety, application and efficiency. The following principles will be adhered to in its construction process.

4.2 **Openness:** COMPASS will make its construction, development and application accessible to the whole world. It will provide its users in the world with high quality services free of charge, actively engage in extensive and in-depth exchanges and cooperation with States in the world, facilitate compatibility and interoperability between each satellite navigation system, and promote the advance of satellite navigation technology and associated industry.

4.3 **Ownership:** COMPASS will be built and operated by China alone, and will be capable of providing services to global users independently.

4.4 **Compatibility:** COMPASS aims to achieve compatibility and interoperability with other satellite navigation systems in the world under the frameworks of International Committee on Global Navigation Satellite Systems (ICG) and International Telecommunication Union (ITU), so that all users will be able to benefit from the development of satellite navigation.

4.5 **Gradual progress:** China will push forward the construction and development of COMPASS in a progressive and steady manner. It will constantly improve the quality of the system's services, and achieve the seamless integration of all construction phases.

5. DEVELOPMENT PLAN

5.1 Currently, China is implementing the construction of COMPASS. China has successfully launched five BeiDou navigation satellites. According to the construction master plan, the system will have the capability of providing positioning, navigation and timing services as well as text communication services covering the whole Asia-Pacific Region by 2012. Once completed in 2020, the COMPASS will have the capability of providing world coverage.

6. SERVICES

6.1 COMPASS is committed to providing users in the world with high quality positioning, navigation and timing services, which include both open and authorized services. Open services are positioning, velocity and timing services provided free of charge to the world, with positioning accuracy at 10 meters, velocity accuracy at 0.2 meters per second, and timing accuracy at 10 nanoseconds. Authorized services are provided to users who have more stringent accuracy and reliability requirements of satellite navigations. These include positioning, velocity, timing and communication services and information about system integrity.

6.2 In order to make COMPASS better serve the whole world, improve its compatibility and interoperability with other satellite navigation systems, and promote the widespread application of satellite positioning, navigation and timing services, China is willing to cooperate with other States in the furtherance of the satellite navigation services.

7. CONCLUSION

7.1 ICAO is invited to pay attention to the rapid development of China's Compass system, which is one of the core constellations under the concept of GNSS, and consider incorporation of COMPASS into its GNSS framework as soon as possible, so as to initiate its work aimed at developing guidance and recommended practices which will help introduce COMPASS's harmonized and standardized application in the civil aviation.

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