



International Civil Aviation Organization

**FOURTEENTH MEETING OF THE
COMMUNICATIONS/NAVIGATION/SURVEILLANCE
AND METEOROLOGY SUB-GROUP OF
APANPIRG (CNS/MET SG/14)**



Jakarta, Indonesia, 19 – 22 July 2010

Agenda Item 5: Navigation

3) discuss issues related to implementation of GNSS and review developments that have taken place in the Region

IONOSPHERIC DATA COLLECTION FOR GNSS IMPLEMENTATION

(Presented by the Secretariat)

SUMMARY

In the CNS/MET SG/13 and APANPIRG/20 meetings, it was agreed to develop a cooperative effort in developing a standard ionospheric model for the region to facilitate implementation of GNSS. As a first step, it was decided that Focal Contact Points in the States should be identified, who will coordinate in the matters of ionospheric data collection. The second step is to be discussed in this meeting. This paper presents a report on the progress that has taken place in the identification of Focal Contact Points and invites the meeting to discuss the second step in the direction of developing the model.

This paper relates to:

Strategic Objective:

A. Safety D. Efficiency

Global Plan Initiative:

GPI – 5 RNAV and RNP (Performance Based Navigation)

GPI – 21 Navigation

1. Introduction

1.1 Global Navigation Satellite System (GNSS) has been recognized as the ultimate navigation system of the future. Global Air Navigation Plan (Doc 9750) envisages progressive reduction of dependence on ground based navigation and landing services and transition to GNSS in a planned and systematic manner. In addition to the core satellite based navigation systems, augmentation systems have been included to enable precision navigation with vertical guidance to support approach and landing requirements. Two types of augmentation systems, the Ground Based Augmentation System (GBAS) and Satellite Based Augmentation System (SBAS) have been included

in the ICAO SARPs. Both these systems assess errors in the positional information contributed by various factors and provide correctional data to the users.

1.2 One of the significant sources of error is the ionospheric effect on the propagation of navigational signals. It has been established that the performance of the satellite based navigation system depends significantly upon the ionospheric conditions and the effect increases during 11 year solar max period. Since ionospheric conditions vary from time to time and also depend on the geographical location, predictability of the extent of its effect has become a very complex issue.

1.3 Through Working Papers presented to the Thirteenth Meeting of CNS/MET Sub-Group (July 2009) and Twentieth Meeting of APANPIRG (September 2009), APANPIRG was urged to commission an Ionospheric Study to develop a standard Ionospheric Characterization Methodology in the region. This methodology can guide States in the region to consistently analyze the effects and impact of ionospheric anomaly and confirm the feasibility of current GBAS and SBAS in mitigating the risk.

2. Discussion

2.1 Through a Working Paper presented in the Thirteenth Meeting of CNS/MET Sub-Group of APANPIRG, Australia explained in detail the two augmentation systems, Ground Based Augmentation System (GBAS) and the Space Based Augmentation System (SBAS) and highlighted the benefits these are going to provide to the aviation community in meeting the navigational requirements of future. The paper after describing issues related to ionospheric storm, scintillation etc. and their harmful effect on GNSS performance, concludes that assessment of this effect should be carried out to enable correcting the error caused in the positional information because of this. The paper suggested establishment of a regional cooperative effort to collect GPS data for the purpose of facilitating this assessment and creation of an ionospheric characterization methodology for the region. The paper also suggested Terms of Reference for the cooperative body and called this cooperative body as Ionospheric Regional Task Force. The meeting noted that similar activities are already going on within the States in the Asia/Pacific region as well as in other regions. The value of undertaking this activity was appreciated by the meeting but the States were unwilling to commit to participate at that point of time.

2.2 In a Working Presented by Japan to the Twentieth Meeting of APANPIRG, importance of collecting data reflecting the real ionosphere and establishing a standard ionospheric model representing unique ionospheric behaviors at low and medium latitudes in the region were stressed upon. It was stressed that the collection of data should be started at the earliest in view of fast approaching solar-max period (2011/2012). Following recommendations were made in the paper:

2.3 States were encouraged to:

- a) Facilitate relevant institutions which are capable of conducting observatory works of ionosphere and to immediately start observations and data collections towards the foreseeable solar-max period (2011 – 2012) especially in the frequency band for GNSS;
- b) Keep past observatory data since 2000/2001, if available for research activities to establish a standard ionosphere model representing unique ionosphere behaviors at low and medium latitude in this region; and
- c) Cooperate with each other to collect data and characterize ionospheric model in the APAC region that will lead smooth introduction of GNSS in the region.

2.4 APANPIRG/20, after discussing issues raised in the Working Paper presented by Japan, came to a conclusion that the efforts towards collection of data to establish a standard ionospheric model should not be related to SBAS implementation only, it is an activity which supports GNSS as a whole and hence should be supported and promoted. Indonesia, India, USA, Philippines, Hong Kong China, Thailand and Singapore also supported the proposal made in the paper.

2.5 As a result of discussion on this issue, APANPIRG/20 agreed to establish Focal Contact Points for each State as the first step. It was decided that the next step will be discussed at the CNS/MET SG/14 meeting. The meeting acknowledged the efforts put in by Japan and for the offer of services of Electronic Navigation Research Institute (ENRI) to support this activity. Following Conclusion related to the subject was adopted by the meeting:

Conclusion 20/72 – Ionospheric Data Collection – Focal Point of Contact

That, the States be urged to:

- a) cooperate with each other to collect data and characterize ionosphere model in the APAC region that will lead to smooth introduction of GNSS in ASIA/PAC Region; and
- b) provide the name and contact details of the Focal Point of Contact to ICAO Regional Office for coordinating collection and exchange of ionospheric data with the ultimate objective of establishing a standard ionospheric model for the region.

2.6 To meet the requirements of APANPIRG Conclusion 20/72, State Letter T 8/5.10, T 8/5.11: AP026/10 (CNS) dated 2 February 2010 was issued inviting the States to nominate a Focal Point of Contact in their administrations to coordinate on the matters related to Ionospheric Data Collection. Response has been received from Australia, Hong Kong China, India, Japan, Lao PDR, Mongolia, New Zealand, Philippines, Republic of Korea, Thailand and USA. List containing the contact details of the Focal Contact Points nominated by the States in the region is placed at **Attachment** to this paper.

3. Action required by the Meeting

3.1 The meeting is invited to:

- a) note the developments that have taken place in identifying Focal Contact Points in the States to support ionospheric data collection in their administration; and
- b) identify and progress Second Step as is required in the APANPIRG/20 report.

**IONOSPHERIC DATA COLLECTION
FOCAL POINT OF CONTACT**

Updated as of: 5 July 2010

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