



*International Civil Aviation Organization*

**THE THIRD MEETING OF PERFORMANCE BASED NAVIGATION  
IMPLEMENTATION COORDINATION GROUP (PBNICG/3)**

Bangkok, Thailand, 08 – 10 March 2016

---

**Agenda Item 4: Reports on relevant meetings outcomes**

**REGIONAL APANPIRG/26 AND GLOBAL NSP/2 OUTCOMES**

(Presented by the Secretariat)

**SUMMARY**

This paper presents the relevant outcomes from the Twenty Sixth Meeting of the Asia/Pacific Air Navigation Planning and Implementation Regional Group (APANPIRG/26) held in September 2015 and from the Navigation System Panel /2 held in December 2015.

**1. INTRODUCTION**

1.1 The Twenty Sixth Meeting of the Asia/Pacific Air Navigation Planning and Implementation Regional Group (APANPIRG/26) was held at ICAO APAC Office, Bangkok, Thailand from 7 to 10 September 2015 and was attended by 141 participants from 26 Member States, 2 Special Administrative Regions of China and 5 International Organizations (CANSO, IATA, IBAC, ICCAIA and IFALPA).

1.2 The Second Meeting of the Navigation Systems Panel (NSP/2) was held at ICAO, Montreal, Canada from 7 to 11 December 2015. Prior to the Panel meeting, working group meetings took place from 1 to 4 December. The meeting was attended by 77 members and observers from 15 States and 5 International Organizations (ACI, European Commission, Eurocontrol, IATA and ICCAIA).

**2. DISCUSSION**

**APANPIRG/26 outcomes**

**Performance-based Navigation (PBN) Implementation Report**

2.1 The CNS/SG/19 noted reports of the first meeting of Performance Based Navigation Implementation Co-ordination Group (PBNICG/1) and second meeting of the PBNICG as well as the PBN Seminar organized in conjunction with the second meeting. The PBNICG developed a document called the 'PBN-in-a-page' to summarise relevant PBN-related information from various ICAO documents into one page to be used as a quick reference material during PBNICG meetings as well as during PBN airspace and route design sessions.

2.2 Recognising the difficulties of safety assessment of PBN procedures which are required by various ICAO documents, the PBNICG developed a PBN Procedure Safety Assessment Checklist and Hazard Template which can be used to record and analyse the hazards identified as well as the proposed mitigation measures. APANPIRG/26 therefore adopted the following Conclusions which were endorsed by CNS SG:

***Conclusion APANPIRG/26/35 – PBN in a page***

*That, the PBN-in-a-page document provided in **Appendix IA** to the Report under Agenda Item 3.4 is adopted as a regional supporting material and published on the ICAO Regional Office's website.*

***Conclusion APANPIRG/26/36 – PBN Procedure Safety Assessment Checklist and Record of Hazard Template***

*That, the PBN Procedure pre-implementation Safety Assessment Checklist and Record of Hazard Template provided in **Appendices IB and IC** to the Report under Agenda Item 3.4 are adopted as regional supporting materials and published on the ICAO Regional Office's website.*

**Ionospheric Studies Task Force outcome**

2.3 The CNS/SG/19 noted studies done by the Ionospheric Study Task Force. In particular, the need for local threat model for GBAS for the APAC Region. APANPIRG/26 adopted the following Conclusion which was endorsed by the CNS SG:

***Conclusion APANPIRG/26/37 – Need for ionospheric models in the APAC Region***

*That, considering that extreme ionospheric gradients were observed in parts of APAC Region through data collection, the need for GBAS threat model is confirmed.*

2.4 The Task Force reported to CNS SG that the ionospheric threat models would only be available for review at the CNS SG/20 meeting in 2016. The meeting agreed with the Task Force's schedule. The meeting also agreed with the Task Force that these threat models being developed as outcomes of the Task Force should be properties of ICAO. It was agreed that these threat models should be published in both ICAO documents as well as technical journals for public use. It was indicated by the chair of the Task Force that it would develop a framework for maintenance of these models for consideration at CNS SG/20 meeting.

2.5 The CNS/SG/19 meeting was briefed about the need for guidance material for developing safety case of using SBAS services in the APAC Region, namely how to mitigate operational hazards related to the ionospheric threats. The meeting noted that the SG endorsed a Decision regarding development of SBAS ionospheric safety case model by the Task Force. In order to facilitate exchange and sharing of GNSS data in the study of ionospheric effects on navigation systems, APANPIRG/26 adopted the following Conclusion as recommended by the Task Force and endorsed by the CNS/SG.

***Conclusion APANPIRG/26/38 – Standard for exchange and sharing of GNSS data in the APAC Region***

*That, considering the need for sharing GNSS data to study the ionospheric effects on navigation systems, the SCINTEX and GTEX Formats are adopted as ICAO APAC standard for exchange of GNSS data and these formats be posted on the ICAO APAC Regional Website.*

2.6 APANPIRG/26 reviewed and updated the navigation strategy and adopted the following Conclusion:

***Conclusion APANPIRG/26/39 – Revised Navigation Strategy for the Asia/Pacific Region***

*That, the revised Navigation Strategy for APAC Region provided in Appendix G to WP/9 is adopted.*

**CANSO PBN Best Practice Guide to ANSPs (WP/18)**

2.7 CANSO introduced its PBN Best Practice Guide to ANSPs which provides practical guidance to ANSPs that are embarking on the implementation of PBN. The Guide draws on the lessons learned from those with previous PBN implementation experience and provides PBN guidance that specifically addresses the five key issues that have been highlighted by CANSO Members i.e. knowledge, regulations, avionics equipage, resources and training. The Performance Based Navigation Best Practice Guide for ANSPs can be downloaded from the website at [www.canso.org](http://www.canso.org). States/Administrations and ANSPs were encouraged to avail themselves of the CANSO PBN Best Practice Guide for ANSPs.

**NSP/2 outcomes**

**SARPs for GNSS Elements and Signals (ABAS, SBAS and Core Constellations)**

2.8 The meeting reviewed current operational status of GNSS elements. 30 GPS satellites were maintaining healthy status and one additional satellite would be declared as operational soon. For GLONASS, 24 satellites were operational as of September 2015 and meeting or exceeding the performance requirements in the SARPs. Chinese BeiDou System (BDS) had been delivering a stable regional service since December 2012 but no aviation standards had been developed. Regarding BDS geodetic reference framework, no need to apply a conversion was required to use BDS positions in WGS 84 geographical data. For Galileo program, the European Commission was intended to declare initial services on the basis of a limited satellite configuration in order to enable early benefits from the combined use of Galileo with core constellations. The full operational capability was planned for 2020.

2.9 The meeting also reviewed the development of SBAS such as US Wide-Area Augmentation System (WAAS), MTSAT Satellite-based Augmentation System (MSAS) and EGNOS. The SBAS Interoperability Working Group (IWG) of the Panel provided an update on the development of dual-frequency, multi-constellation (DFMC) SBAS standards including the completion of an initial version of the DFMC SBAS Definition Document and DFMC SBAS Interface Control Document (ICG) which contained the DFMC SBAS concept definition and a basis for standards development.

2.10 Recognizing ongoing activities related to this issue such as the development of SARPS for Galileo, ICD and SARPs for DFMC SBAS, and Minimum Operational Performance Standards (MOPS) for a multi-constellation GPS/Galileo/DFMC SBAS/H-ARAIM aviation receiver in Europe and US, the meeting adopted the following action item. An initial DFMC SBAS MOPS is expected in 2019-2020 and the final is targeted for 2021-2022.

*Action: NSP Chair, GSWG Chair, RTCA SC-159 Co-chair, WG-62 Chair, and IWG Co-chair to prepare a high level roadmap for the development of DFMC standards to ensure consistency between the various organisations involved in DFMC standardization.*

2.11 Regarding GBAS, the meeting reviewed the development status and test results of GBAS activities from other States such as US, Japan, Australia, China, etc. Among them, US FAA reported the completion of the planned GBAS Approach Service Type D (GAST-D) SARPs validation work program with the successful development and testing of commercial ground station and avionics focusing on support of Honeywell's GAST-D System Design Approval (SDA) for an approved GAST-D capable GBAS ground station by mid-2019. In addition, Japan reported the operational validation program performed in support of the GAST-D validation would be expected to reach completion at the end of 2016 and a new research project focused on multi-constellation, multi-frequency (MCMF) GBAS had been started. Also there was a discussion to integrate the use of the GBAS positioning service into the navigation specifications of the ICAO PBN manual.

#### **Guidance on Operational Implementation Issues**

2.12 The meeting was informed about the document regarding Concept of Operations (CONOPS) for multi-constellation GNSS and noted the good progress made by the drafting ad hoc group. The meeting agreed to emphasize the expected benefits of multi-constellation GNSS and elaborate on the functional requirement on how to comply with States approval to cope with the fact that GNSS elements (e.g. constellations, signals and SBAS) could have a different approval status in different States.

2.13 The meeting discussed on the proposed amendments to Annex 10 and to the GNSS Manual in order to further develop the notion of GNSS monitoring which included GNSS performance assessment, GNSS operational status monitoring, GNSS interference monitoring, and GNSS data recording. There was considerable debate on the appropriate balance between the degree of monitoring versus value and cost. It was noted that that the monitoring provisions are guidance for those States which wish to implement a higher level of monitoring than is required by the SARPs and States may make use of the performance reports supplied by constellation providers.

2.14 The meeting was provided an update on European Union/United States development of the advanced receiver autonomous integrity monitoring (ARAIM) concept that focussed on regulatory, standards and institutional issues which require ICAO consideration and potential action to resolve. The objective of ARAIM is to ensure the integrity of navigation solutions derived from multiple constellations. It was recognized that this issues should be addressed in the multi constellation CONOPS document and that future SARPs would be developed to cover some points. Also the meeting was informed that, while use of ARAIM in support of horizontal guidance could be introduced relatively early due to the maturity of the concept, the timeline for ARAIM in support of vertical guidance (LPV200 being the goal) would be far longer, as the service provision issues are more significant.

**3. ACTION REQUIRED BY THE MEETING**

3.1 The meeting is invited to:

- a) note the information contained in this paper; and
- b) discuss any relevant matters as appropriate.

-----