



International Civil Aviation Organization

**The Fourteenth Meeting of the Regional Airspace Safety Monitoring
Advisory Group (RASMAG/14)**

Bangkok, Thailand, 21 – 25 February 2011

Agenda Item 2: Review Outcomes of Related Meetings

OUTCOME OF THE SEVENTH MEETING OF THE PBN TASK FORCE (PBN TF/7)

(Presented by the Secretariat)

SUMMARY

Early implementation of RNAV/RNP (Performance Based Navigation) was recommended by both the Eleventh Air Navigation Conference and the 36th ICAO Assembly. Regional PBN Task Force was established to facilitate early implementation of PBN in the region. This paper presents the outcomes of the Seventh Meeting of the PBN Task Force.

This paper relates to:

Strategic Objectives:

C: Environmental Protection and Sustainable Development of Air Transport – Foster harmonized and economically viable development of international civil aviation that does not unduly harm the environment

Global Plan Initiatives:

*GPI-5 RNAV and RNP (Performance-based navigation)
GPI-11 RNP and RNAV SIDs and STARs
GPI-21 Navigation systems*

1. INTRODUCTION

1.1 The 36th session of ICAO Assembly, after recognizing that the implementation of approaches with vertical guidance (APV) was not progressing at the desired level and that the Global Air Navigation Plan had identified Global Plan Initiatives (GPIs) to concentrate on the incorporation of advanced aircraft navigation capabilities into air navigation infrastructure, adopted Resolution A 36/23 to establish global goals for the implementation of Performance Based Navigation (PBN).

1.2 To meet the requirements of ICAO Assembly Resolution A 36/23, the Asia/Pacific Air Navigation Planning and Implementation Regional Group (APANPIRG) at its 18th meeting (APANPIRG/18, August 2007) adopted Conclusion 18/52 which stipulated the establishment of a regional Performance Based Navigation task force (PBN/TF), assigning the task force the responsibility of developing a PBN implementation plan for Asia/Pacific Region and addressing regional PBN implementation related issues. The terms of reference for the task force were subsequently developed and revised.

2. DISCUSSION

2.1 PBN/TF discussed issues related to the global and the regional PBN Implementation progress, technical and operational issues related to the implementation, State and industry contribution towards the implementation efforts, and the feasibility of establishing a regional RAIM prediction system. The meeting also reviewed the existing tasks list.

2.2 Full report of the seventh meeting of PBN/TF (PBN/TF/7, September 2010) is placed at the ICAO Asia and Pacific Office website and can be accessed at: http://www.icao.or.th/meetings/2010/pbn_tf7/index.html. Relevant portion of the meeting report is provided in **Attachment** to this paper.

3. ACTION BY THE MEETING

3.1 The meeting is invited to:

- a) note the outcome of PBN/TF/7;
- b) note that two of the most significant areas of challenge appeared to be conducting safety assessments and including international data in PBN fleet readiness assessments, and assist PBN/TF in considering regional solutions to provide States with the required methodologies and data; and
- c) note the need for guidance material on safety assessment was highlighted by most States. PBN/TF/7 was informed that ICAO was developing/preparing guidance material on safety assessment and a database on the capabilities/readiness of aircraft with regard to PBN.

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1.1 The Seventh Meeting of the Performance Based Navigation Task Force (PBN/TF/7) was held in Bangkok, Thailand from 1 to 3 September 2010 at ICAO Asia and Pacific Office.

Agenda Item 2: Global PBN Implementation – Update

2.1 **PBN UPDATE.** A global PBN update was presented by the PBN Programme Manager from ICAO HQs. Main highlights included the following:

- a) PBN airspace design workshops have started and appear to be very successful; and the interactive nature of the workshop ensures a very good comprehension of the tasks and principles required for implementing PBN into airspace;
- b) Operational approval appears to be one of the main elements for which guidance is still missing on a global level;
- c) The Continuous Descent Operations (CDO) manual is completed in draft and the final document can be expected in one month;
- d) A State letter was circulated, providing States guidance on an updated RNP approach navigation spec that include satellite-based augmentation system (SBAS) approach requirements; and
- e) The PBN SG is in the process of finalizing amendments to the PBN manual that will include RNP 0.3, advanced RNP, and the RF legs for RNP as well as changes to the RNP AR navigation spec to include departures.

2.2 **Performance-Based Navigation – The Implementation Challenge.** The essence/body of an upcoming Assembly paper on PBN was presented. An update on the achievements on PBN was included. It also indicates that the progress of PBN was slow, both due to a lack of expertise in many States as well as lack of resources in ICAO. Also highlighted the need for implementing RNP APCH LNAV approaches if approaches with vertical guidance (APV) cannot be implemented.

Agenda Item 3: APAC Region PBN Implementation

3.1 **Review Outcome of CNS/MET/SG/14.** Outcome of the Fourteenth Meeting of the CNS/MET Sub-group (CNS/MET/SG/14, July 2010) in Jakarta, Indonesia was presented by the Secretariat. The meeting was informed that the integrated Task List proposed by PBN/TF was recommended by CNS/MET/SG/14 for acceptance by APANPIRG. The meeting noted actions taken by the CNS/MET/SG on the recommendations made by PBN/TF/6.

3.1.1 In respect of Draft Conclusion 14/15, on the limitation of older generation flight management system (FMS), the meeting after discussing another relevant paper presented by Japan, revised the Draft Conclusion 14/15. The meeting also invited IATA to provide further information on the subject, from the perspective of avionics engineering.

3.1.2 CNS/MET/SG went through a brief on the report of PBN State Plan Harmonization Assessment carried out by a volunteer group of States and IATA. CNS/MET/SG was of the opinion that non-submission of plan should not be viewed as a deficiency, but efforts should be made to find out the reasons for the non-submission of plans by the States. While discussing issues related to the revision of the GNSS Manual (Doc 9849), CNS/MET/SG expressed its concern about unsatisfactory implementation of GNSS in the region. It was informed that the list of identified hurdles had already been circulated to the designated focal contact points for PBN implementation in the States for comments and it has been requested that additional impediments, if any, should be informed so that

the revision of the GNSS manual can adequately address those issues. CNS/MET/SG also noted the proposal for establishment of PBN Regional Development and Implementation (REDI) Team including its need and proposed terms of reference (ToR).

3.2 **PBN State Plan Harmonization Analysis Report.** At PBN/TF/6 (February 2010, Hong Kong, China), IATA and a group of volunteering States were tasked to conduct a review and provide a harmonization report of State PBN implementation plans.

3.2.1 Out of the 40 States within Asia and Pacific Region, 21 State plans had been submitted. Of those 21 plans, eight were rated Robust (with only minimal improvements needed), four were rated Marginal (needing significant improvement) and nine were rated Incomplete (no viable plan documented).

3.2.2 Two of the most significant areas of challenge appear to be conducting safety assessments and including international data in PBN fleet readiness assessments. These will require regional and/or global solutions to provide States with the required methodologies and data.

3.2.3 **Discussion:** In the ensuing discussion, the meeting was apprised that the criteria for review of State plans were derived from the Regional Plan. It was informed that none of the States in Asia and Pacific Region had addressed BPE 3 (Assessment of PBN Fleet Readiness), and that BPEs 9 (Safety Assessment) and 10 (Description of Tangible Benefits) were addressed by very few States. The need for guidance material on safety assessment was highlighted by most States. The meeting was informed that ICAO was developing/preparing guidance material on safety assessment and a database on the capabilities/readiness of aircraft with regard to PBN. It was generally felt that the benefits of PBN needed to be appreciated and understood at the appropriate State level so that adequate resources are made available to facilitate efficient implementation of PBN. Action Items 7/3 to 7/7 and Conclusions 7/8 were endorsed by the meeting:

3.3 **Regional Support Strategy for PBN Implementation.** IATA addressed the need for a regional support strategy to provide direct support to States in an effort to accelerate PBN implementation within Asia and Pacific Region. Hong Kong, China was of the view that creation of REDI teams would lead to replicating of tasks in the presence of PBN/TF. It suggested that some Task Force Team(s) can pick up the work of the proposed strategy with little additional resources. It was generally accepted that the proposed strategy would entail additional resources and may result in duplication of effort. New Zealand stated that there was a need to ask States as to what assistance they needed and highlighted that the States which apparently need/require assistance are not present in the meeting(s). The Chair pointed out that the PBN/TF was focusing on States' terminal areas/approaches and not enough attention is being given to en-route PBN requirements (State to State) as it cannot be undertaken by the existing PBN/TF. Similarly, GO teams are responsible for gap analysis only. It was suggested that the FPP or a similar office could/should be utilized to support States with the en-route PBN issues. IATA stressed that there was a need to have a mechanism to enable working level assistance to States who are struggling with PBN implementation. While it was generally agreed that there was a need to support such efforts but it was felt the proposed strategy needed further review/refinement to address management and resource issues.

3.4 **Report on ATM/AIS/SAR/20.** An overview of the outcome of the twentieth meeting of the Air Traffic Management/Aeronautical Information Service/Search and Rescue Sub-group of APANPIRG (ATM/AIS/SAR/SG/20, July 2010) held at Singapore was presented. Some of the important issues relating to PBN were highlighted.

3.4.1 A specific area of the Regional Plan that needed attention was implementation in the en-route phase with regards to airspace design and harmonization across FIR boundaries. IATA reinforced the need for increased support and proposed items that should be included within the Regional Support Strategy.

Agenda Item 4: PBN Implementation Issues

4.1 **FMS Coding Issue Encountered during the Development of RNP Approach Procedures.** Japan, in response to WP/12 at PBN/TF/6 (February 2010, Hong Kong, China), explained the contents of ARINC424 specification, design of existing flight management system (FMS), and related PANS-OPS statements. It was emphasized that the issue existed, not in the length of the procedure identification, but in the fact that some older FMS can accommodate only one approach procedure per type of navigation system per runway. Possible solutions minimizing the existing problem were proposed, in accordance with existing PANS-OPS statement.

4.1.1 **Discussion:** Hong Kong, China informed the meeting that it submitted the referred WP/12 at PBN/TF/6 and the problem as they saw still existed. It was generally felt that this was a supply and design issue, and the manufacturers are generally aware of the problem. There was a need for creating better awareness through education. Japan stated that the matter had been discussed at an IFP Panel meeting and felt that there was no solution. Japan suggested that Conclusion 14/15 be modified. The meeting recognized the issue raised by Japan and the only plausible solution seemed was that aircraft are upgraded with new FMS.

4.2 **Proposals to Facilitate PBN Implementation.** Republic of Korea presented information on the PBN implementation status and difficulties encountered while proceeding with PBN Implementation Project, especially PBN safety assessment issues, in the Republic of Korea. In line with PBN safety assessment, developing PBN safety assessment validation procedure was suggested, providing States in the region with PBN safety assessment assistance including experts and providing contracting States with PBN safety assessment guidance material.

4.2.1 **Discussion:** The meeting was informed that the matter of safety assessment had been taken up with ICAO HQs under two APANPIRG Conclusions 20/37 and 20/42. The Air Navigation Commission (ANC) had noted the request and directed that the matter related to PBN issues be addressed through the appropriate ANC Panels and Study Groups.

4.3 **PBN Operational Approval Handbook.** The PBN Operational Approval Handbook had been developed by Australia in coordination with ICAO and the COSCAP programmes of Asia and Pacific. The handbook had been developed in conformance with the ICAO PBN Manual (Doc 9613) and provides additional guidance on PBN Operational Approval requirements.

4.3.1 The purpose of the handbook is to provide guidance to personnel responsible for the assessment of applications for operational approval to conduct PBN operations. Over the years, a number of regions have established local RNAV and RNP standards which led to complexity in international operations and operational approvals. ICAO has developed the concept of PBN, and harmonized the concepts and requirements which are now contained in the ICAO PBN Manual. The handbook supplements the information contained in the PBN Manual related to operational approval of PBN. The meeting was informed that ICAO was in the process of developing further guidance material and training.

Agenda Item 5: State/Industry Presentations**State Presentations**

5.1 **State PBN Plan and Status of PBN Implementation Progress.** Six States made presentations on the status of implementation of their respective PBN Plans.

5.2 **Hong Kong, China:** Hong Kong, China reported the progress of PBN implementation in Hong Kong. Hong Kong, China has implemented RNP AR Approach procedure to two runway ends on 3 June 2010. After the implementation of the RNP AR Approach, Hong Kong, China has achieved 50% implementation of short term target for Approach Airspace as stated in the

PBN Implementation Plan. As the procedure requires RNP 0.3 performance in the intermediate and missed approach segments, RNP AR Approach is the only choice at the moment. Hopefully, when new navigation specification such as Advance RNP Approach is available, Hong Kong, China would be able to convert the RNP AR Approach to the Advance RNP Approach to avoid the requirements of special approval for operators.

5.3 **Lao PDR:** To recognize the benefits of PBN and GNSS implementation prescribed in Asia and Pacific PBN Implementation Plan, the Department of Civil Aviation of Lao PDR has set up a working team to support the project of New CNS/ATM Development Plan, which includes PBN implementation. The Working Team is responsible for coordination, cooperation and assistance to Japan International Cooperation Agency (JICA) experts for the Master Plan Study and the development of the New CNS/ATM Systems. The Draft CNS/ATM master Plan has been finalized and will be adopted by the Department of Civil Aviation soon. Lao PDR has developed a PBN Roadmap with timelines for PBN application between year 2010 and 2015.

5.4 **Singapore:** Singapore, in collaboration with Indonesia, implemented a new RNAV route M774 in April 2010 in the Singapore FIR. This new route M774 (RNP 10) runs above an existing conventional route A464 where the vertical limit of A464 was lowered to FL 250. Using the same principle as M774, another new RNAV route M635 will be implemented above an existing conventional route A576 later this year.

5.4.1 Singapore conducted three Optimised Profile Descent (OPD) trials with Singapore Airlines from September 2009 to June 2010. The data collected from the trial showed positive results with fuel savings, reduction in CO₂ emissions and time savings for the flights that participated in the trial. The operating procedures used for the trial will be fine-tuned in accordance with the recommendation of ICAO CDO Manual (Doc 9931). Singapore intends to implement CDO in the Singapore FIR within the next six months.

5.5 **Thailand:** In June 2009, Thailand National Working Group for PBN & GNSS approved the Thailand PBN Implementation Plan. This plan aims to provide aviation stakeholders with appropriate guidance and timelines to allow proper preparation and equipage for PBN implementations within Bangkok Flight Information Region (FIR). The Plan is aligned with Asia/Pacific Regional PBN Implementation Plan developed by PBN/TF and the 2007 ICAO Assembly Resolutions. It also provides assessments of fleet readiness status and CNS infrastructure, which results in selection of appropriate PBN navigation specifications and implementation strategies for en-route and terminal area operations. For short-term implementation, RNAV 10, RNAV 5 and RNP 4 are being considered as appropriate navigation specifications for en-route applications. Moreover, RNAV 1 is considered the appropriate navigation specification for terminal area procedures, such as SIDs and STARs. For approach operations, RNP approach with Baro-VNAV is the preferred navigation specification.

Industry Presentations

5.6 **Thailand PBN GO Team Visit:** From 25 to 27 August 2010, the first visit by ICAO/IATA PBN Go-Team was successfully conducted in Thailand. Seven members of ICAO/IATA PBN Go-Team, including representatives from ICAO, IATA, IFALPA and the industry, had conducted three-day seminar/workshop on four work areas. Approximately 20 participants participated in the active discussions. Participants ranged from active pilots, air traffic controllers, regulators, engineers to airspace/procedure design specialists. The meeting participants were in view that the Go-Team Visit was an excellent opportunity for exchanging ideas and knowledge with ICAO, IATA and experts from the industry. The meeting also addressed specific concerns related to PBN implementation in Thailand. An ICAO visit report along with implementation recommendations are planned to be submitted to the Thai Government by the end of September 2010. Follow-up activities will be followed.

Agenda Item 7: Feasibility of Establishing a regional RAIM Prediction System

7.1 **Technical and Operational Requirements for APAC Regional RAIM Prediction System.** Thailand presented on Regional RAIM Prediction System.

7.1.1 Thailand proposed to establish regional RAIM Prediction System. A common, regional RAIM prediction services can prove to be an effective solution that will enhance seamless air traffic operation, while providing cost-effective investment solution. By harmonizing RAIM prediction information among States, the regional RAIM prediction service will enhance seamless air traffic operation, while providing a cost-effective investment solution. A regional RAIM project will also provide a forum for States to share their knowledge and experiences.

7.1.2 The PBN/TF agreed in principle the establishment of a regional RAIM prediction system, and cooperation between the ICAO PBN/TF and the Asia-Pacific Economic Cooperation (APEC) GNSS Implementation Team (GIT). The PBN/TF also endorsed the **Minimal Technical and Operational Requirements for a Regional RAIM Prediction System**. To encourage States' participation on the regional RAIM prediction service, and to harmonize the operational and technical requirements, the PBN/TF proposed Draft Conclusions 7/11 and 7/12 to be considered by APANPIRG.

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