



INTERNATIONAL CIVIL AVIATION ORGANIZATION

**SIXTH MEETING OF THE PERFORMANCE BASED NAVIGATION
TASK FORCE (PBN/TF/6)**

Hong Kong, China, 3 – 5 February 2010

Agenda Item 3: APAC Region PBN Implementation

**3.1 PBN IMPLEMENTATION PROGRESS IN THE ASIA
PACIFIC REGION**

(Presented by the Secretariat)

SUMMARY

The 36th Session of the Assembly of ICAO in September 2007 adopted Resolution A 36-23 thereby setting global goals for implementation of PBN. APANPIRG/18 meeting considered that implementation of PBN in the region was very important and would yield efficiency and safety benefits. As participation of all stakeholders was critical to the implementation of PBN in the region, APANPIRG/18 agreed to the establishment of a PBN Task Force. The PBN Task Force has held five meetings since January 2008. The initial Terms of Reference were subsequently revised in the PBN/TF/4 meeting. The APAC Regional PBN Implementation Plan (version 1) was adopted by APANPIRG/20 in September 2009 and all States were urged to develop their national plans based on the target dates stipulated in the APAC Regional PBN Implementation Plan.

This Paper provides a progress on the PBN Implementation in the Asia Pacific Region.

1. INTRODUCTION

1.1 APANPIRG/18 meeting (3-7 September 2007) considered that implementation of PBN in the region was very important and would yield efficiency and safety benefits. Noting that the participation of all stakeholders in the development of a PBN implementation plan was essential, the meeting agreed that the establishment of a PBN Task Force would likely be the best vehicle to achieve the objective of an accelerated PBN implementation programme regionally. Asia/Pacific PBN Task Force was established in January 2008 and since then the Task Force met five times. Asia/ Pacific Regional Performance-Based Navigation Implementation Plan (version 1) was adopted by APANPIRG/20 in September 2009 (Conclusion 20/41). APANPIRG/20 (Conclusion 20/36) urged States that had not developed their State PBN Implementation Plan to complete the development of their national PBN Implementation Plan.

2. BACKGROUND

2.1 The 36th Session of the Assembly of ICAO in September 2007 adopted Resolution A36-23 thereby setting the following global goals for implementation of PBN.

- a) States and planning and implementation regional groups (PIRGs) complete a PBN implementation plan by 2009 to achieve:

- 1) implementation of RNAV and RNP operations (where required) for en route and terminal areas according to established timelines and intermediate milestones; and
 - 2) implementation of approach procedures with vertical guidance (APV) (Baro-VNAV and/or augmented GNSS) for all instrument runway ends, either as the primary approach or as a back-up for precision approaches by 2016 with intermediate milestones as follows: 30 per cent by 2010; 70 per cent by 2014; and
- b) ICAO develop a coordinated action plan to assist States in the implementation of PBN and to ensure development and/or maintenance of globally harmonized SARPs, Procedures for Air Navigation Services (PANS) and guidance material including a global harmonized safety assessment methodology to keep pace with operational demands.
- c) States include in their PBN implementation plan provisions for implementation of approach procedures with vertical guidance (APV) to all runway ends serving aircraft with a maximum certificated take-off mass of 5700 kg or more, according to established timelines and intermediate milestones.

2.2 APANPIRG/18, in anticipation that PBN would become widely implemented, recognized that considerable effort would need to be put into planning and identifying what airspace measures could be introduced and the level of air navigation service required. Furthermore, PBN activities would require participation from the many disciplines involved, such as flight operations, air navigation service providers, safety management, industry partners both technical and operational, etc. Noting that the participation of all stakeholders in the development of a PBN implementation plan was essential, the meeting agreed that the establishment of a PBN Task Force would likely be the best vehicle to achieve the objective of an accelerated PBN implementation programme regionally. In order to ensure timely progress in PBN planning and implementation in the region, the meeting agreed to the following Conclusion.

Conclusion 18/52 –Establishment of a Regional Performance Based Navigation Task Force (PBN/TF)

That, an Asia/Pacific PBN Task Force, with terms of reference as outlined in **Appendix A** to the APANPIRG/18 Report on Agenda Item 3.5, be established to develop a PBN implementation plan for the Asia/Pacific Region and address related regional PBN implementation issues (**Attachment “A” – TORs**).

2.2.1 In addition, the meeting noted that ICAO Assembly Resolution A36-23 required that States and Planning and implementation groups complete PBN implementation plan by 2009 and was of the view that implementation of PBN would be enhanced by the development by States of a PBN implementation plan, geared towards achieving the global PBN implementation performance objectives and adopted:

Conclusion 18/53 – Development of State PBN Implementation Plans

That, the Regional Office encourages States to begin development of their State PBN implementation plans in harmony with the development of the Asia/Pacific Regional PBN implementation plan being coordinated by the Asia/Pacific PBN Task Force for submission to APANPIRG/19 (2008).

2.2.2 To encourage States' involvement/commitment, APANPIRG/18 considered that States should also nominate a focal point of contact responsible for PBN implementation. In view of this, the meeting adopted:

Conclusion 18/55 – Designation of Contact Person for PBN Implementation

That, by 31 December 2007, States designate a focal contact person responsible for performance based navigation implementation and provide details of the contact person to ICAO Asia/Pacific Regional Office accordingly.

2.3 The First Meeting of the Performance Based Navigation Task Force (PBN/TF) was held in Bangkok, Thailand from 9 to 11 January 2008. The Meeting was attended by 50 participants from 16 States/Administrations and 3 International Organizations (Australia, Bhutan, China, Hong Kong China, India, Japan, Malaysia, Maldives, New Zealand, Pakistan, Philippines, Singapore, Sri Lanka, Thailand, United States, Vietnam, IATA and IFALPA and ICAO). States were further encouraged to nominate Task Force Members and State Focal Points.

2.3.1 PBN/TF/1 meeting developed a List of PBN Implementation Issues and Two Task Lists. These included:

- a) Establishing current levels of State operations and initial intent; Establishing list of local and general issues which should be addressed during implementation of PBN; Providing Training Framework and individual training packages for pilots, controllers, regulators etc; Establishing On-The-Job Training specifically with regard to PBN Procedure Design and *Establishing ability and intent of States to offer participation* and Provision of Model Operational and Air Worthiness Approval Documentation.
- b) Table of Contents for the Regional PBN Implementation Plan was developed and task allotted to respective TF members.

2.3.2 Subsequently, the PBN Task Force met four times as follows:

- a) Second Meeting at Bangkok: 1-3 April 2008 (57 participants/17 States and 3 International Organizations);
- b) Third Meeting at Bangkok: 14 – 17 July 2008(72 participants/18 States and 6 International Organizations and Industry/Manufacturer);
- c) Fourth Meeting at Japan: 4 – 6 March 2009 (68 participants/20 States and 2 International Organizations); and
- d) Fifth Meeting at Bangkok: 15 – 17 July 2009 (74 participants/21 States and 3 International organizations)

2.4 APANPIRG/19 meeting (1-5 September 2008) approved the Asia /Pacific Regional PBN Implementation Plan as an Interim Edition (Version V. 0) pending subsequent reviews by RASMAG, CNS/MET/SG and ATM/AIS/SAR/SG. Version V 0.2 of the Plan was finalized by PBN/TF/4 meeting and Version 0.3 by PBN/TF/5 meeting.

2.4.1 APAC States were requested to use the Interim Edition of the APAC Regional PBN Implementation Plan as guidance for development of their respective State Plans.

2.4.2 Given that the PBNTF had completed its primary task, to develop a Regional PBN Implementation Plan, it was felt that while the PBNTF should continue, the focus of the PBNTF should now shift to implementation of that regional plan. The PBNTF reviewed its Terms of

Reference (TOR) and proposed amendments to improve the viability of the TOR in terms of PBN implementation. In reviewing the TOR against the provisions of Assembly Resolution A36-23, the meeting also noted that clear references to implementation of approach procedures with vertical guidance (APV/Baro-VNAV and/or augmented GNSS) were not explicitly reflected in the TOR. Although recognizing that APV was effectively inherent in RNP approaches, the PBNTF proposed to expand the TOR to include a clarifying reference to approach procedures with vertical guidance. The meeting reviewed and agreed to the revised Terms of Reference proposed by PBNTF and adopted it (Decision 19/30). The revised TORs is attached at **Attachment "B"**.

2.4.3 APANPIRG/19 agreed to extend the term of the PBN/TF till its next meeting in September 2009 (two additional PBN TASK Force meetings were subsequently held in March and July 2009 respectively).

2.5 PBN/TF/4 meeting was preceded by the ICAO-JCAB Asia/Pacific PBN Implementation Seminar which was hosted by the Japan Civil Aviation Bureau (JCAB) on 2 – 3 March 2009. Eighty four (84) participants representing Australia, Bangladesh, Cambodia, China, Hong Kong China, Fiji, Indonesia, Japan, Lao PDR, Malaysia, Maldives, New Zealand, Philippines, Republic of Korea, Singapore, Sri Lanka, Thailand, United States, Viet Nam, IATA, IFALPA and Jepessen attended the Seminar. The purpose of the Seminar was to develop greater awareness and a better understanding of PBN and its related issues.

2.5.1 At the PBN/TF/4 meeting, twenty (20) of the APAC States provided an update on their status of implementation. Eighteen (18) Draft Conclusions/Action Items were agreed to at the Meeting.

2.5.2 An in-depth appraisal of the PBN TF Outputs against the PBN TF Terms of Reference was completed at PBN/TF/4 meeting and the following Conclusions and Actions were agreed to:

- The APAC PBN TF to continue an annual review of the Asia-Pacific Regional PBN Implementation Plan
- Develop an up-to-date archive of all relevant guidance materials for each PBN implementation step as outlined in the PBN manual
- Arrange future annual PBN implementation seminars to serve as a forum for exchanging expertise and implementation experiences and invite interested States who would like to host future seminar to make a formal proposal at the next PBN TF meeting and to invite industry representatives to attend the seminar
- The APAC PBN TF agreed to continue coordination with other regional PBN task forces and the Global PBN Task Force to ensure harmonization of PBN implementation
- States to present their PBN Implementation Plan and to provide progress reports on the development of the State Plan at the next PBN TF meeting
- Request the Task Force Chairperson and Rapporteurs to develop a common template for State PBN Implementation Progress Report to be reviewed by the next PBN TF meeting
- The APAC PBN TF agreed to develop a regional PBN progress report to be reported annually to CNS/MET and APANPIRG and to be posted on ICAO APAC and ICAO Global PBN web site

- The APAC PBN Task Force considered itself a suitable forum to facilitate and harmonize terminal and en-route PBN implementation in the Asia Pacific Region. Therefore, the Task Force requested APANPIRG to consider adding the following task into the Task Force's TOR. *“Facilitate and coordinate the harmonized implementation of PBN for terminal and en-route applications in the Asia Pacific Region”*.

2.5.3 In view of the appraisal carried out of the PBN TF Outputs against the PBN TF Terms of Reference the Meeting developed a detailed Implementation Task List of work that still needed to be carried out to ensure effective and smooth implementation of PBN in the Asia Pacific Region.

Implementation Task List

- **General**
 - Fleet readiness statistics for different navigation specification
 - General guidance on aircraft types and their configurations that have capability for different PBN navigation specifications
 - Prepare performance measuring methodology to assess success of PBN implementation
- **En-route**
 - Identify appropriate navigation specification for existing pre-PBN RNAV routes.
 - Identify and prioritize suitable city-pairs which can benefit from PBN implementation
 - Develop a status report on areas of en-route harmonization gaps.
 - Identify regional route structures for application of RNAV 10 and RNP 4 separation standards.
- **Terminal Area & Approach**
 - Create a status report of WGS-84 implementation within the APAC
 - Create a status report of compliance with the Annex 15 Electronic Terrain and Obstacle Data (ETOD) requirements
 - Identify proper strategies for PBN applications for helicopter in the Asia-Pacific
 - Identify and prioritize suitable airports and terminal areas which can benefit from PBN implementation

2.6 PBN/TF 5 meeting was held in Bangkok, Thailand from 15 – 17 July 2009. It was attended by 74 participants from 22 States and 4 international organizations. The TF meeting adopted 17 Draft Conclusions which were based on the review of various working papers presented during the TF meeting and subsequent discussion on issues raised. The following Draft Conclusions were adopted by the TF meeting :

Review of ICAO Directives /Guidelines on APVs

- Draft Conclusion 5/01** Confirmed the likely inability of many APAC states to meet the APV implementation goals of Assembly Resolution A 36-23 within the required timeframe. The PBN/TF/5 meeting requested that, APANPIRG while taking note of the limitation of many of the

APAC States, consider conveying the same to ICAO with the recommendation that the Resolution be reviewed.

- Draft Conclusion 5/02** As the authorized GNSS Service Areas, in which SBAS based APVs may be implemented are very limited in coverage, the PBN/TF/5 meeting requests that APANPIRG consider the feasibility of establishing a regional SBAS capability to support all aircraft types.

Review of PBN Manual RAIM Prediction Requirements

- Draft Conclusion 5/03** That, the concern raised by the US GAO report was noted; and this concern be forwarded to APANPIRG and ICAO HQs.

- Draft Conclusion 5/04** The PBN/TF/5 meeting recommends that the PBN Study Group review the current PBN GNSS reporting and prediction requirements with a view to establishing common implementation rules and technical standards for such requirements.

- Draft Conclusion 5/05** That, APANPIRG consider tasking the PBN TF with examining the feasibility of establishing a regional RAIM prediction system.

Translating GPS IFR Approvals to PBN Capability

- Draft Conclusion 5/06** That, the PBNSG consider the proposal to develop Guidance Material that provides a means to assign PBN capability to GPS IFR aircraft in the first instance without the need for recertification.

RNAV Human Factors and Systems Safety

- Draft Conclusion 5/07** That, States distribute the RNAV safety message and emphasize on all operators involved in RNAV to apply the lessons learnt on Human Factor issues, as discussed in the paper presented by New Zealand on RNAV Human Factors and System Safety.

PBN Implementation Progress Report Template

- Draft Conclusion 5/08** That, States / Administrations be requested to use the PBN Implementation Progress Report Template for all future reporting on their status of PBN implementation. The Report should be submitted at each of the future PBN Task Force Meeting.

- Draft Conclusion 5/09** That, States / Administrations be requested to submit their PBN Implementation Progress Report by 15 August 2009 for onward submission to APANPIRG/20 Meeting scheduled to be held from 7 – 11 September 2009.

RASMAG/11 and ATM/AIS/SAR/SG/19 Outcomes

Draft Conclusion 5/10 That, the APAC Regional PBN Implementation Plan (Interim Edition Version 0.3) be presented at the APANPIRG/20 for approval.

Implementation of Region Wide Performance Based Navigation

Draft Conclusion 5/11 That, APANPIRG consider in conjunction with the proposal to establish a SEA RR/TF, acquiring the necessary resources to establish a Regional PBN Office or a dedicated Project to design PBN based regional air routes and facilitate their adoption by the States in the APAC region.

Draft Conclusion 5/12 That, the PBNSG be requested to provide guidance on any PBN-specific aspects of en route safety assessment.

RNP AR Flight Operation Safety Assessment (FOSA)

Draft Conclusion 5/13 That, presentation(s) on Safety Assessment be included in the Agenda for the PBN Implementation Seminar to be held in Hong Kong in February 2010.

Draft Conclusion 5/14 That, ICAO kindly assist with addressing the PBN safety assessment training needs in the region.

Draft Conclusion 5/15 Urged States to give detailed considerations to the operational need, safety and cost benefits prior to deciding on RNP AR Approach implementation.

Restructuring of APAC PBN Task Force

Draft Conclusion 5/16 That, APANPIRG agree to the PBN Task Force activities continuing for two additional meetings in the first half of 2010 using the Task Force's current TORs.

Draft Conclusion 5/17 That, ICAO be requested to consider providing an annual summary of panel and working group activities to allow proper coordination amongst different groups

2.7 APANPIRG/20 meeting reviewed the outcomes of the work accomplished by the PBN TF over the course of two meetings. The work of the Task Force (TF) that was accomplished prior to the meetings of RASMAG/11 and ATM/AIS/SAR/SG/19 was coordinated with those bodies and their input was taken into consideration for the work programme of PBN TF. The Fourth meeting of the PBN TF was held in Osaka, Japan from 4-6 March 2009 and the Fifth meeting was held in Bangkok, Thailand from 15 to 17 July 2009 at the ICAO Asia/Pacific Office.

2.7.1 Conclusions adopted by APANPIRG/20 on PBN include:

Conclusion 20/35 – Asia-Pacific Flight Procedure Programme

That, States be encouraged to participate in the Asia-Pacific Flight Procedure Programme in order to build or improve their instrument flight procedure capabilities, meet the PBN implementation goals of Assembly Resolution A36-23 and enhance flight safety, efficiency and environmental protection.

Conclusion 20/36 – Preparation for PBN Implementation

That, States that have not done so, are urged to develop their State PBN Implementation Plans, and take action in accordance with those plans to implement WGS-84 and Electronic Terrain and Obstacle Data in their States.

Conclusion 20/37 - Guidance material for PBN Implementation

That, ICAO be invited to develop guidance materials on:

- a) establishing common implementation rules and technical standards for GNSS reporting and prediction requirements;
- b) assigning PBN capability to GPS IFR aircraft in the first instance without the need for recertification; and
- c) PBN-specific aspects of en-route safety assessment.

Decision 20/38 - Regional RAIM prediction System

That, PBNTF be tasked to examine the feasibility of establishing a regional RAIM prediction system.

Conclusion 20/39 - RNAV Human Factors

That, RNAV safety message provided in **Appendix J** to the Report on Agenda Item 3.4 be distributed to the States for further distribution to all operators involved in RNAV operations in order to apply the lessons learnt.

Conclusion 20/40 - PBN Implementation Progress Report Template

That, States be urged to use the PBN Implementation Progress Report Template provided in **Appendix K** to the Report on Agenda Item 3.4 for all future reporting of their status of PBN implementation. The Report should be submitted at each of the future PBN Task Force Meeting.

Conclusion 20/41 - Asia/Pacific Regional PBN Implementation Plan

That, the Asia/Pacific Regional PBN Implementation Plan provided in **Appendix L** to the Report on Agenda Item 3.4 be adopted as Version 1.0

Conclusion 20/42 - PBN Safety Assessment Training

That, ICAO be requested to assist in addressing the PBN safety assessment training needs in the region.

Conclusion 20/43 - RNP AR Approach Implementation

That, States be urged to give detailed considerations to the operational need, safety and cost benefits prior to deciding on RNP AR Approach implementation.

Decision 20/44 - PBN Task Force Activities

That, the PBN Task Force continues with the current TORs for two additional meetings in 2010.

Conclusion 20/45 - Sharing Information on ICAO Panels/SGs

That, ICAO be requested to consider sharing information on ICAO Panels and Study Groups activities/outcome regularly with regional planning/implementation groups.

2.8 Asia Pacific Flight Procedure Programme

2.8.1 As directed by the APANPIRG/19 meeting, plans for the establishment of a Flight Procedure Programme office in the Asia-Pacific region were developed. At PBN/TF/4 the decision was announced that the FPP for Asia/Pacific Region would be located in Beijing, China. On March 26, 2009 ICAO signed a letter of intent with the CAAC regarding establishment of the FPP Office in Beijing. ICAO State Letter T 6/13.11.2 - AP089/09 (FS), dated 26 June 2009, invited the States in the region to indicate their intent to participate in the Flight Procedure Programme. Initial FPP activities will include a PANS OPS initial course and a PBN Procedure Design Course to be held soon after establishment of the FPP. Both these courses would be held at the Civil Aviation Flight University of China (CAFUC), Chengdu, China.

2.8.2 The FPP is an outstanding opportunity for the States in the region. There are substantial contributions, in cash and in-kind, from China, the host country, the U.S.A. and Hong Kong, China and other organizations over the initial 3-year life of the FPP. APANPIRG/20 adopted Conclusion 20/35 to encourage States to take full advantage of the resources that are being provided, to build or improve their own instrument flight procedure capability and meet the goals of Assembly Resolution A36-23. ICAO Secretariat urged States to take the prerequisite actions now that would prepare and enable them to make maximum use of the services of the FPP.

2.8.3 The finalized Project Document for the FPP was forwarded to States/Administrations on 11 November 2009 inviting States to indicate if they wished to join the FPP either as an Active Participating State (member of the Steering Committee and part of the Core Group funding the FPP budget) or as a User State only. A participation in the FPP as an Active Participating State requires a contribution of US \$ 16,000 for the first year of the Programme. Besides the Host State, till date 7 States have indicated their intent to participate as Active Participating State while 5 States have indicated that they would participate as User only. 2 States has indicated that it did not wish to join.

3. DISCUSSION

3.1 Follow-up on APANPIRG Conclusions – ICAO action

3.1.1 APANPIRG/20 Conclusions on PBN requiring action by ICAO have been forwarded to Headquarters through Issue Forms.

3.2 State action

3.2.1 In conformance with the decision arrived at the PBN/TF/5 meeting and adoption of the relevant Conclusion by APANPIRG/20, sixteen (16) States have submitted their PBN

Implementation Progress Report on the PBN Template Form. A Summary of the information provided by the States is tabulated in **Attachment “C”**. In addition, four (4) States have also submitted their PBN Implementation Plan. The State Plans and the Progress Reports will be included in the CD being provided to the Task Force Members /Focal Points at the PBN/TF/6 meeting .

4. SUMMARY OF ACHIEVEMENT

4.1 APAC Regional PBN Implementation Plan (V 1.0) was adopted by APANPIRG/20. The Plan includes Short term, Medium term, and Long term strategies for PBN implementation including target dates. Summary attached at **Attachment “D”**

4.2 Twenty-eight (28) States and three (3) International Organizations have nominated their PBN Focal Points.

4.3 The PBN Task Force includes fifty-three (53) Members representing twenty-eight (28) States and three (3) International Organizations.

4.4 PBN Seminar held in Japan in March 2009. CAD Hong Kong is hosting the next PBN Seminar in February 2010.

4.5 Asia Pacific Flight Procedure Programme Office is being established in Beijing, China (expected to be operational in early 2010)

4.6 Model Operational and Airworthiness Approval Documentation have been provided to States.

5. ACTION BY THE MEETING:

5.1 The Meeting is invited to:

- a) note the progress update provided in this Paper;
- b) review the Progress Report submitted by the States (Attachment ‘C’);
- c) review the State Implementation Plans (Attachments “C” & “D”); and
- d) accordingly determine the future work plans for the PBN/TF based on 1, 2 and 3 above.

EXTRACTED FROM REPORT OF APANPIRG/18 (3-7 SEPTEMBER 2007)
Appendix A to the Report on Agenda Item 3.5

**Asia Pacific Air Navigation Planning and Implementation Regional Group
Performance Based Navigation (PBN) Task Force**

Terms of Reference

1) Develop an Asia Pacific Regional PBN implementation plan, based on a gap analysis, and in line with the ICAO PBN goals and milestones. This PBN implementation plan must be based on the following strategic objectives and guiding principles.

Strategic objectives:

- a) a) To ensure that the implementation of the navigation item of the CNS/ATM system is based on clearly established operational requirements.
- b) b) To avoid undue equipage of multiple on board equipment and/or ground-based systems.
- c) c) To avoid the need for multiple airworthiness and operational approvals for intra- and inter-regional operations.
- d) d) To explain in detail the contents of the Regional Air Navigation Plan and of the Regional CNS/ATM Plan, describing potential navigation applications.

Guiding principles:

- a) Pre- and post-implementation safety assessments will be conducted to ensure the application and maintenance of the established target levels of safety.
- b) Continued application of conventional air navigation procedures during the transition period, to guarantee the operations by users that are not RNAV- and/or RNP-equipped.
- c) The first regional PBN implementation plan should address the short term (2008-2012) and medium term (2013-2016).
- d) Target date for completion of the first regional PBN implementation plan is APANPIRG/19.

2) Carry out specific studies, develop guidance material and facilitate training to assist States with RNAV/RNP implementation in the en-route, terminal, and approach flight phases, taking into account the performance based navigation (PBN) concept, according to the ICAO Strategic Objectives and Global Plan Initiatives (GPI) on this matter (GPI 5, 7, 10, 11, 12, 20, 21)

3) Identify other issues/action items arising from the work of ICAO or for consideration by ICAO in order to facilitate regional and global harmonization of existing applications as well as future implementation of Performance Based Navigation operations;

4) Review the States' PBN implementation documentation to ensure regional harmonization and for possible inclusion in ICAO-developed model documentation.

5) Address other regional PBN implementation issues as needed.

6) The Task Force should report to the APANPIRG, through the CNS/MET Sub-group in coordination with the ATM/AIS/SAR Sub-group and RASMAG.

Membership

Proposed membership of the Task Force should include, but is not limited to, the following:

Australia, China, Hong Kong-China, India, Japan, New Zealand, Singapore, Thailand, United States and IATA and IFALPA.

Rapporteur

At the first meeting the Task Force will elect a Rapporteur from among its members to Chair its meetings.

EXTRACTED FROM REPORT OF PBN/TF/1 (9-11 JANUARY 2008)
Appendix D to the Report

**Asia Pacific Air Navigation Planning and Implementation Regional Group
Performance Based Navigation (PBN) Task Force**

**Proposed Amendment by PBN/TF to the
Terms of Reference**

1) Develop an Asia Pacific Regional PBN implementation plan, based on a gap analysis, and in line with the ICAO PBN goals and milestones. This PBN implementation plan must be based on the following strategic objectives and guiding principles.

Strategic objectives:

- e) To ensure that the implementation of the navigation item of the CNS/ATM system is based on clearly established operational requirements.
- f) To avoid undue equipage of multiple on board equipment and/or ground-based systems.
- g) To avoid the need for multiple airworthiness and operational approvals for intra- and inter-regional operations.
- h) To explain in detail the contents of the Regional Air Navigation Plan and of the Regional CNS/ATM Plan, describing potential navigation applications.

Guiding principles:

- a) Pre- and post-implementation safety assessments will be conducted to ensure the application and maintenance of the established target levels of safety.
 - b) Continued application of conventional air navigation procedures during the transition period, to guarantee the operations by users that are not RNAV- and/or RNP-equipped.
 - c) The first regional PBN implementation plan should address the short term (2008-2012), ~~and~~ medium term (2013-2016) **and take into account long term global planning issues.**
 - d) Target date for completion of the first regional PBN implementation plan is APANPIRG/19.
- 2) Carry out specific studies, develop guidance material and facilitate training to assist States with RNAV/RNP implementation in the en-route, terminal, and approach flight phases **including Approach Procedure with Vertical Guidance (APV)**, taking into account the performance based navigation (PBN) concept, according to the ICAO Strategic Objectives and Global Plan Initiatives (GPI) on this matter (GPI 5, 7, 10, 11, 12, 20, 21)
- 3) Identify other issues/action items arising from the work of ICAO or for consideration by ICAO in order to facilitate regional and global harmonization of existing applications as well as future implementation of Performance Based Navigation operations;
- 4) Review the States' PBN implementation documentation to ensure regional harmonization and for possible inclusion in ICAO-developed model documentation.
- 5) Address other regional PBN implementation issues as needed.

6) The Task Force should report to the APANPIRG, through the CNS/MET Sub-group in coordination with the ATM/AIS/SAR Sub-group and RASMAG.

Membership

Proposed membership of the Task Force should include, but is not limited to, the following:

Australia, China, Hong Kong-China, India, Japan, New Zealand, Singapore, Thailand, United States and IATA and IFALPA.

Rapporteur

At the first meeting the Task Force will elect a Rapporteur from among its members to Chair its meetings.

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EXTRACTED FROM REPORT OF APANPIRG/19 (1–5 SEPTEMBER 2008)
Appendix I to the Report on Agenda Item 3.4

**AIR PACIFIC AIR NAVIGATION PLANNING AND IMPLEMENTATION REGIONAL
GROUP PERFORMANCE BASED NAVIGATION (PBN) TASK FORCE**

REVISED TERMS OF REFERENCE

- 1) Continue the refinement and ongoing review of the Asia Pacific Regional PBN implementation plan and monitor and report on its application in the region.
- 2) Carry out specific studies, develop guidance material and facilities training to assist States with RNAV/RNP implementation in the en-route, terminal, and approach flight phases, taking into account the performance based navigation (PBN) concept, according to the ICAO Strategic Objectives and Global Plan Initiatives (GPI) on this matter (GPI 5, 7, 10, 11, 12, 20, 21)
- 3) Identify other issues/action items arising from the work of ICAO or for consideration by ICAO in order to facilitate regional and global harmonization of existing applications as well as future, and where appropriate, provide responses and support to the ICAO RNPSORSG.
- 4) Assist States in the preparation and review of their PBN implementation documentation to ensure regional harmonization and for possible inclusion in ICAO-developed model documentation.
- 5) Develop and review material needed to meet the ICAO initiative on the introduction of APV approaches including Baro-VNAV and RNP-AR as part of the PBN initiative.
- 6) Address other regional PBN implementation issues, including the development of staff resources and skills, as needed by safety management.
- 7) Develop, in coordination with RASMAG, the necessary airspace safety and monitoring requirements for the introduction and continued application of PBN based procedures.
- 8) Continue the review of the PBN Manual and its practical application in the implementation of PBN in the region.
- 9) Review activities of PBN Task Force from other regions including their action plans for PBN implementation to ensure harmonization and avoid duplication of work.
- 10) The Task Force should report to the APANPIRG, through the CNS/MET Sub-group in coordination with the ATM/AIS/SAR Sub-group and RASMAG.

Membership

Proposed membership of the Task Force should include, but is not limited to, the following:
Australia, China, Hong Kong-China, India, Japan, New Zealand, Singapore, Thailand, United States and IATA and IFALPA.

PBN IMPLEMENTATION PROGRESS REPORT
(DATA AS SUBMITTED BY STATES)
ICAO APAC REGION
Revision 21 January 2010

ID	Status Date	Administration	Focal Point	State PBN Implementation Plan	Note(s)	Approach Operations								Arrival & Departure Operations								Secretariat Remarks			
						Implementation Targets (# of RWY Ends)			Completed (# of RWY Ends)		On Progress (# of RWY Ends)			Note(s)	Implementation Targets (# of Int'l Airports)			Completed (# of Int'l Airport)		On Progress (# of Int'l Airports)			Note(s)		
						Y2010	Y2014	Y2016	LNAV	LNAV/ VNAV	LNAV	LNAV/ VNAV	Y2010		Y2014	Y2016	Arrival	Departure	Arrival	Departure					
1		Afghanistan																							
2	2.9.09 15.1.10	Australia	Dirk Noordewier, Air Transport Inspector, CASA, Level 4, 16 Furzer St., Phillip, ACT, 2602, Australia Email: dirk.noordewier@casa.au	Adopted by CASA and to be reviewed by ICAO APAC PBN TF		30 LNAV	30 LNAV	30 LNAV	444	36	30	36	Caveats: 1. Prerequisite Baro-VNAV training is being provided. 2. Design certification not yet completed, and as a consequence, full commencement of Baro-RNAV implementation is postponed. 3. Industry consultation on Baro-VNAV deployment program not yet completed.	6	8	8	8	6	0	2	Caveats: 1. Moderation of CASA MOS Part173 (anticipated) will provide certainty to the Arrival/Departure data above.	× Plan will be submitted shortly. ✓ Australia made a ppt. presentation of its Draft PBN Implementation Plan at PBN/TF/5 and APANPIRG/20.			
3	4.8.09	Bangladesh	Mr. Ratan Kumar Saha Deputy Director (Aerodromes) Civil Aviation Authority of Bangladesh Headquarters, Kurmitola Dhaka-1229 Tel/Fax: +88-02-8919002 aiscaab@bracnet.net	Adopted by Civil Aviation Authority, Bangladesh and to be reviewed by ICAO APAC PBNTF		Nil	70%	100%	Nil	Nil	Nil	Nil	Nil	Nil	70%	100%	Nil	Nil	Nil	Nil	Nil	Nil	Nil	Nil	× Plan not developed.
4		Bhutan	Mr. Karma Wangchuk Communication & Navigation Engineer Communication & Navigation Section Department of Civil Aviation Paro International Airport Paro, Bhutan Tel: +975-8-272-511 Fax +975-8-271-407 H/P: +975-17-686-446 Email: karmawangchu@druknet.bt																						
5		Brunei Darussalam																							
6	20.8.09	Cambodia	Mr. Chhun Sivorn Deputy Director Operation and Air Safety of SSSCA	The PBN Implementation progress report is part of the CNS-ATM Master plan. This master plan is still in the progress of studying under assistance of Japan International Cooperation Agency (JICA) project. Will report to the next PBN meeting for the progress of this plan.																					× Plan not developed.

Status Date	Administration	Focal Point	State PBN Implementation Plan	Note(s)	Approach Operations								Arrival & Departure Operations								Secretariat Remarks		
					Implementation Targets (# of RWY Ends)			Completed (# of RWY Ends)		On Progress (# of RWY Ends)			Note(s)	Implementation Targets (# of Int'l Airports)			Completed (# of Int'l Airport)		On Progress (# of Int'l Airports)			Note(s)	
					Y2010	Y2014	Y2016	LNAV	LNAV/ VNAV	LNAV	LNAV/ VNAV	Y2010		Y2014	Y2016	Arrival	Departure	Arrival	Departure	Arrival			Departure
14	11.8.09	Indonesia	Mr. Novie Riyanto R. Deputy Director of Air Navigation Standardization and Certification Ministry of Transportation DGCA Karya Building 23fl Jl. Medan Merdeka Barat No. 8, Jakarta Pusat, Indonesia 10110 Tel: +62-21-350-6451 Fax: +62-21-350-7569 novierianto@yahoo.com Mr. Yudhi Sari S. Deputy Director of Air Navigation Aids and Surveillance Facilities yudhi@atzglobal.net	To be adopted by DGCA Indonesia and to be reviewed by ICAO APAC PBN TF.		7	25	40	-	-	-	-	Nil	5	15	23	-	-	-	-		× Plan not developed.	
15	14.8.09	Japan	Mr. Makoto Eguchi Assistant to the Director, ATS System Planning Division, Civil Aviation Bureau, Ministry of Land, Infrastructure, Transport and Tourism 2-1-3 Kasumigaseki, Chiyoda-ku, Tokyo, Japan Tel: +81-3-5253-8739 Fax: +81-3-5253-1663 eguchi-m28x@mlit.go.jp	Adopted by Civil Aviation Bureau (JCAB) and reviewed by ICAO APAC PBN TF	Japan established RNAV roadmap version 2 based on ICAO PBN manual in 2007. In November 2008, Japan partly amended the RNAV roadmap version 2 and moved forward the original implementation schedule by one year in order to facilitate the RNAV implementation in Japan. According to the RNAV roadmap, Japan will complete the RNAV implementation for almost all domestic city pairs by FY2011.	42	155	162	10	8	1	2	Japan is upgrading the MSAS, which is the Japanese SBAS system, and is planning to introduce the APV-I in FY2013 and LPV 200 in FY2014.	13	14	14	9	6	3	4		√ Roadmap √ Runway End Data Chart × Plan not submitted.	
16		Kiribati																					
17		Lao PDR	Mr. Bounteng Szymoon Chief, Area Control Center Lao Airport Authority Tel/Fax+856-21-512-091 +856-21-512-216 Email: bounteng@yahoo.com Mr. Khine Simvongsa Chief, Aeronautical Information Service Air Navigation Division Department of Civil Aviation Lao PDR Tel/Fax+856-21-512-164 +856-21-520-237 Email: ksimvongsa@yahoo.com																			√ Runway End Data Chart	
18	14.8.09 15.1.10	Malaysia	Mr. Nordin Ibrahim Assistant Director Air Traffic Management Sector Department Civil Aviation Malaysia No. 27, Persiaran Perdana Level 4, Block Podium B, precinct 4 62618 Putrajaya, Malaysia Tel: +603 8871 4230 Fax: +603 8881 0530 nordin@dca.gov.my	To be adopted by Department Civil Aviation Malaysia and to be reviewed by ICAO APAC PBN TF		4	16	24	-	-	-	-	Currently published RNAV Non-Precision Approaches are pre-PBN approach procedures.	2	4	4	-	-	-	-	Currently published RNAV arrival (STAR) are pre-PBN procedures.	√ Runway End Data Chart × Plan not submitted.	
19	3.9.09	Maldives	Ms. Fathimath Ramiza Director Air Navigation and Aerodromes Civil Aviation Department Ministry of Civil Aviation and Communication PA Complex, Male' 20307, Maldives email: ramiza@aviainfo.gov.mv Tel: +960-334-2984 Fax: +960-332-3039	Adopted by Civil Aviation Department, Maldives and reviewed by ICAO APAC PBN TF.	Nil.	4 RWY Ends	-	-	4 RWY Ends	4 RWY Ends	-	-	Nil.	1 Int'l Airport	-	-	-	-	1 Int'l Airport	1 Int'l Airport	Nil.	√ Runway End Data Chart × Plan not submitted.	

Status Date	Administration	Focal Point	State PBN Implementation Plan	Note(s)	Approach Operations								Arrival & Departure Operations								Secretariat Remarks		
					Implementation Targets (# of RWY Ends)			Completed (# of RWY Ends)		On Progress (# of RWY Ends)			Note(s)	Implementation Targets (# of Int'l Airports)			Completed (# of Int'l Airport)		On Progress (# of Int'l Airports)			Note(s)	
					Y2010	Y2014	Y2016	LNAV	LNAV/ VNAV	LNAV	LNAV/ VNAV	Y2010		Y2014	Y2016	Arrival	Departure	Arrival	Departure				
20	Marshall Islands																						
21	Micronesia																						
22	Mongolia	Mr. Bayarsaikhan.J CAA of Mongolia Chinggis Khaan International Airport CAA building Tel: +976 11 282040 Fax: +976 11 282108, 379615 H/P: 976 91916249 Email: bayarsaikhan.j@mcaa.gov.mn																					
23	Myanmar	Mr. Tike Aung Deputy-Director (Air Traffic Services), Department of Civil Aviation Yangon International Airport Mingaladon, Yangon 11021 Phone: 951-533008 Fax: 951-533016 Email: ats@dca.gov.mm																					
24	Nauru																						
25	4.9.09	Nepal	Mr. Mahesh Kumar Basnet Deputy Director, ATM Department Civil Aviation Authority of Nepal Babar Mahal, Kathmandu Tel: +977-1-426-2923 Fax: +977-1-426-2516 Email: atsdr@caanepal.org.np Email: cnsatm@mos.com.np	CAAN presented Information Paper on the status of PBN implementation in Nepal on PBN TF/5 meeting that took place in Bangkok from 15-17 July 2009.	A draft PBN implementation plan has been prepared / to be adopted by Civil Aviation Authority of Nepal and to be presented to ICAO APANPIRG/20 meeting. PBN Implementation Task force has been formed.	RNP approach at TIA	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Nil.	x Plan not developed	
26	11.8.09	New Zealand	Mr. Ron Doggett Airworthiness Engineer - Avionics PO Box 31 441, Lower Hutt 5040, New Zealand Tel: +64-4-560-9468 Fax: +64-4-560-9452 doggettr@caa.govt.nz	To be adopted by CAA of New Zealand and to be reviewed by ICAO APAC PBN TF	New Zealand's State PBN Implementation Plan has yet to be formalized, and this will be a function of a soon-to-be-formed Airspace and Environmental Policy Unit within CAANZ.		18	42	60	32	16	-	-	Nil	3	5	6	3	1	-	2	Nil	v Plan
27	13.8.09	Pakistan	Mr. Syed Yousuf Abbas Director Operations Headquarters Civil Aviation Authority Terminal-1 JIAP Karachi, Pakistan Tel: +92-21-9924-2742 Cell: +92-301-825-8525 Fax: +92-21-3460-4323 Email: dops@caapakistan.com.pk	Adopted by Pakistan Civil Aviation Authority (Implementation plan submitted to APAC Regional office in May, 2009) and to be reviewed by ICAO APAC PBN TF.			8	13	8	-	-	1	1	--	14	24	8	-	-	-	-	Nil.	v Plan submitted but not in accordance with Regional Plan format v Runway End Data Chart
28		Palau																					
29		Papua New Guinea																					
30	13.8.09	Philippines	Mr. Zerubbabel N. Cadiz Technical Personnel, ATMD, ATS Civil Aviation Authority of the Philippines MIA Rd., Pasay City, Philippines Tel/Fax: +63-2-8799-260 z_cadiz@yahoo.com	To be adopted by Civil Aviation Authority of the Philippines (CAAP) and to be reviewed by ICAO APAC PBN TF			12	45	51	8	0	4	0		10	18	18	2	2	0	0		v Roadmap v Runway End Data Chart x Plan not submitted.

Status Date	Administration	Focal Point	State PBN Implementation Plan	Note(s)	Approach Operations								Arrival & Departure Operations								Secretariat Remarks		
					Implementation Targets (# of RWY Ends)			Completed (# of RWY Ends)		On Progress (# of RWY Ends)			Note(s)	Implementation Targets (# of Int'l Airports)			Completed (# of Int'l Airport)		On Progress (# of Int'l Airports)			Note(s)	
					Y2010	Y2014	Y2016	LNAV	LNAV/ VNAV	LNAV	LNAV/ VNAV	Y2010		Y2014	Y2016	Arrival	Departure	Arrival	Departure				
42	New Caledonia																						

Summary of PBN Implementation Plan

Short Term (2008-2012)*		
Airspace	Preferred Nav. Specifications	Acceptable Nav. Specifications
Route – Oceanic	RNP 4	RNAV 10
Route – Remote continental	RNP 4	RNAV 10
Route – Continental en-route	RNAV 2, RNAV 5	
TMA – Arrival	RNAV 1 in radar environment and with adequate navigation infrastructure. Basic-RNP 1 in non-radar environment	
TMA – Departure	RNAV 1 in radar environment and with adequate navigation infrastructure. Basic-RNP 1 in non-radar environment	
Approach	RNP APCH with Baro-VNAV in most possible airports RNP AR APCH in airport where there are obvious operational benefits.	
Implementation Targets <ul style="list-style-type: none"> • RNP APCH (with Baro-VNAV) in 30% of instrument runways by 2010 and 50% by 2012 and priority should be given to airports with operational benefits • RNAV 1 SID/STAR for 50% of international airports by 2010 and 75% by 2012 and priority should be given to airports with RNP Approach • Re-defining existing RNAV/RNP routes into PBN navigation specification by 2012 • Implementation of additional RNAV/RNP routes 		

* **Note:** Early completion of an implementation is encouraged within the timeframe on the basis of coordination between affected States and airspace users.

Medium Term (2013-2016)*		
Airspace	Preferred Nav. Specification	Acceptable Nav. Specification
Route – Oceanic	RNP 2**, RNP 4	RNAV 10
Route – Remote continental	RNP 2	RNAV 2, RNP 4, RNAV 10
Route – Continental en-route	RNAV 1, RNP 2	RNAV 2, RNAV 5
TMA – Arrival	Expand RNAV 1 or RNP 1 application Mandate RNAV 1 or RNP 1 approval for aircraft operating in higher air traffic density TMAs	

Medium Term (2013-2016)*		
Airspace	Preferred Nav. Specification	Acceptable Nav. Specification
TMA – Departure	Expand RNAV 1 or RNP 1 application Mandate RNAV 1 or RNP 1 approval for aircraft operating in higher air traffic density TMAs	
Approach	Expansion of RNP APCH (with Baro-VNAV) and APV Expansion of RNP AR APCH where there are operational benefits Introduction of landing capability using GNSS and its augmentations	
Implementation Targets <ul style="list-style-type: none"> • RNP APCH with Baro-VNAV or APV in 100% of instrument runways by 2016 • RNAV 1 or RNP 1 SID/STAR for 100% of international airports by 2016 • RNAV 1 or RNP 1 SID/STAR for 70% of busy domestic airports where there are operational benefits • Implementation of additional RNAV/RNP routes 		

* **Note 1:** In circumstances where affected States are agreeable to completing an implementation in advance of the timeline, early implementation is encouraged on the basis of coordination between affected States and airspace users.

** **Note 2:** Related CNS requirements and operational procedures for RNP 2 application in Oceanic Airspace are yet to be determined.

Long Term Implementation Strategies (2016 and beyond)

In this phase, GNSS is expected to be a primary navigation infrastructure for PBN implementation. States should work co-operatively on a multinational basis to implement GNSS in order to facilitate seamless and inter-operable systems and undertake coordinated research and development programmes on GNSS implementation and operation.

— END —