INTERNATIONAL CIVIL AVIATION ORGANIZATION

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

HONG KONG, CHINA
3 – 5 FEBRUARY 2010

The views expressed in this Report should be taken as those of the PBN/TF and not of the Organization.

Adopted by the PBN/TF
and published by the ICAO Asia/Pacific Office

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Attachment 1: A CD Rom which includes the following material was provided to all participants on 3 February 2010:

i) PBN/TF/6 Meeting Papers
ii) Report of the PBN/TF/1 Meeting
iii) Report of the PBN/TF/2 Meeting
iv) Report of the PBN/TF/3 Meeting
v) Report of the PBN/TF/4 Meeting
vi) Report of the PBN/TF/5 Meeting
vii) PBN Plan "Version 1" adopted by APANPIRG/20
viii) Material from the ICAO PBN Website
ix) PBN Model Action Plans
x) PBN Implementation Progress Report Template
xi) Participants List
xii) PBN Supporting Documents

Attachment 2: A CD Rom which includes the following material was provided to all participants on 5 February 2010:

i) PBN/TF/6 Meeting Draft Report
ii) Power Point Presentations
iii) Participants List

PART I - HISTORY OF THE MEETING

1. Introduction

1.1 The Sixth Meeting of the Performance Based Navigation Task Force (PBN/TF/6) was held in Hong Kong China from 3 to 5 February 2010 at the Novotel Citygate Hotel, Hong Kong China.

1.2 The PBN/TF/6 Meeting was preceded by the ICAO-CAD Asia-Pacific PBN Implementation Seminar which was hosted by the Civil Aviation Department, Hong Kong China (CAD) at Cathay Pacific City on 1 – 2 February 2010. 154 participants representing Australia, Bangladesh, Cambodia, China, Hong Kong China, Macao China, France, Fiji, India, Indonesia, Japan, Lao PDR, Malaysia, Maldives, Mongolia, Myanmar, Nepal, New Zealand, Oman, Philippines, Republic of Korea, Singapore, Sri Lanka, Thailand, United States, Viet Nam, IATA, IBAC, IFALPA, Boeing, Jeppesen and Naverus attended the Seminar.

1.2.1 The two-day event included 23 presentations from a total of 22 speakers, covering the different aspects of PBN :

- ICAO PBN Concept Facilitation
- Navigation and Surveillance System Requirements
- PBN Procedures Design and Implementation
- PBN Operational Approval - Best Practices
- Benefits of PBN Implementation
- PBN Implementation - Users' perspective
- State Presentations on Implementation Status

1.2.2 The seminar received an encouraging level of support and participation throughout with many fruitful exchanges and discussions. It was considered beneficial that the PBN Implementation Seminar be continued on an annual basis in order to promote PBN knowledge and experience sharing, and to facilitate effective PBN implementation within the Asia Pacific region.

2. Attendance

2.1 The PBN/TF/6 Meeting was attended by 101 participants from Australia, Bangladesh, Cambodia, China, Hong Kong China, Macao China, Fiji, India, Indonesia, Japan, Lao PDR, Malaysia, Maldives, Mongolia, Myanmar, Nepal, New Zealand, Oman, Pakistan, Philippines, Republic of Korea, Singapore, Sri Lanka, Thailand, United States of America, Vietnam, IATA, IBAC, ICAO, Boeing and Jeppesen. List of participants is at **Appendix A** to this Report.

3. Opening of the Meeting

3.1 On behalf of the ICAO Asia Pacific Office, the Secretary PBN Task Force, welcomed the participants to the Sixth Meeting of the Asia Pacific Performance Based Navigation Task Force. The Secretary thanked the Civil Aviation Department, Hong Kong China for hosting the PBN Task Force Meeting and appreciated the excellent arrangements made for the meeting. He also acknowledged the meticulous arrangements made for the ICAO-CAD Asia Pacific PBN Implementation Seminar.

3.1.1 Expressing his gratitude to the States/Administrations, the International Organizations and the industry for facilitating participation of their representatives in such large numbers, the Secretary briefly recounted the progress made by the PBN Task Force in a short span of two years.

3.1.2 The Secretary thanked all the participants for their continued support and contribution, and in particular acknowledged the commitment displayed by Mr. Ian Mallett, Chairman

PBN Task Force and Mr. Noppadol Pringvanich, Rappoteur Regional PBN Implementation Plan Sub-group in guiding the work of the Task Force. He also thanked the ICAO Headquarters for its support and involvement in the Task Force activities.

3.1.3 The Secretary, however, expressed concern that of the 40 States/Administrations in the Asia Pacific region only 27 States/Administrations had nominated their Focal Points despite repeated reminders. In addition, not all States had submitted their PBN Implementation Plan. Highlighting the resource limitations in some of the Asia Pacific States, the Secretary stated that these States may require considerable assistance and guidance to ensure a harmonized and coordinated transition to PBN at the regional level. The Secretary urged the Task Force to address this issue in earnest and look for workable solutions.

3.2 The Chair welcomed the delegates to PBN/TF/6 meeting and added his thanks to the Hong Kong CAD and Cathay Pacific for their organizing and hosting of the PBN seminar and the Task Force meeting.

3.2.1 The seminar has provided an excellent foundation in all aspects of PBN that will contribute significantly to the implementation efforts in the region. He then summarized the agenda and highlighted issues that would need deeper consideration during the meeting.

3.2.2 Of on-going concern was the number of States who had yet to nominate a PBN contact point and/or had yet to submit their PBN Implementation Plan. The Chair requested all States to encourage their neighbours to engage in the PBN work as PBN could not be effectively implemented in isolation.

3.2.3 The Chair appreciated the efforts of the ICAO Secretariat in setting up the meeting and providing continued support.

4. Officers and Regional Office

4.1 Mr. Ian Mallett, Head of Aerodromes and CNS/ATM Section, Civil Aviation Safety Authority of Australia, chaired the meeting.

4.2 Mr. Noppadol Pringvanich, Engineering Manager, AEROTHAI served as Rapporteur for the PBN Task Force Meeting.

4.3 Mr. Erwin Lassoij, Acting Chief CNS Section, ICAO Headquarters and Capt. Dave VanNess, Implementation and Resource Development Coordinator, ICAO PBN Programme, provided technical guidance to the meeting.

4.4 Capt. Fareed Ali Shah, Regional Officer Flight Safety, served as Secretary to the meeting.

5. Documentation and Working Language

5.1 The working language of the meeting as well as all documentation was in English.

5.2 Thirteen (13) Working Papers and Five (5) Information Papers were presented at the meeting. A list of papers is included at **Appendix B** to this Report.

PART II - REPORT ON AGENDA ITEMS

Agenda Item 1: Adoption of Agenda

1.1 The following Agenda was proposed for adoption by the meeting:

Agenda Item 1: Adoption of Agenda

Agenda Item 2: Global PBN Implementation – Update

Agenda Item 3: APAC Region PBN Implementation

- 3.1 APAC Region PBN Implementation Progress
- 3.2 Review of Outcome of APANPIRG/20 on PBN
- 3.3 RASMAG/12 Outcomes
- 3.4 PBN Implementation En-route
- 3.5 APAC Flight Procedure Programme Office – Update
- 3.6 The Role of the PBN Task Force in Managing Challenges to PBN Implementation in Asia Pacific

Agenda Item 4: PBN Implementation Issues

- 4.1 Draft ICAO PBN Operations Approval Handbook
- 4.2 PBN Operational Approval Process / Training
- 4.3 FMS Coding Issue Encountered during the Development of RNP APCH Procedures

Agenda Item 5: Review of Final Version (Version 1) of APAC Regional PBN Implementation Plan

Agenda Item 6: State / Industry Presentations

- 6.1 State PBN Plan and Status of PBN Implementation Progress
- 6.2 Industry Updates on PBN
- 6.3 Expanding the Scope of PBN Implementation Progress Reporting

Agenda Item 7: Task Lists Review

- 7.1 Task List – PBN Task Force
- 7.2 Task List – Implementation Task List

Agenda Item 8: Feasibility of Establishing a Regional RAIM Prediction System

- 8.1 APEC GNSS Implementation Team Activities and Potential Collaboration with ICAO PBN Task Force
- 8.2 Regional RAIM Prediction System

Agenda Item 9: Back up Requirements for PBN

Agenda Item 10: Flight Planning 2012 – PBN Flight Planning Issues

10.1 Review of PBN Flight Plan Requirements

Agenda Item 11: Update of Task Lists

Agenda Item 12: Extension of Task Force beyond TF/7 Meeting

Agenda Item 13: Any Other Business

13.1 Hosting of ICAO Asia Pacific PBN Implementation Seminar in 2011

Agenda Item 14: Date and Venue for Next Meeting

1.2 The Provisional Agenda was adopted. The Final Agenda is placed at **Appendix C.**

Agenda Item 2: Global PBN Implementation – Update

2.1 **Presentation of Working Paper 13 (WP13).** Mr. Erwin Lassoij, Acting Chief, CNS Section ICAO presented a Working Paper on the Global PBN Implementation.

2.1.1 Working Paper 13 provided an update on PBN initiatives being worked or coordinated by the ICAO PBN Programme Office in Montreal. This includes the Global PBN Task Force, recent outcomes of Panels, Study groups and task forces on work related to PBN and new manuals or changes that are published or about to be published.

2.1.2 A PBN Airspace design workshop is being organized by the ICAO PBN Programme Office, the first of a series of four, is to be held in Bangkok, 19-22 April, 2010. The objective of these workshops is to familiarize participants with airspace design as it relates to implementation of Performance Based navigation. The target audience will be procedure designers and ATM planners involved in the PBN implementation process.

2.1.3 In a cooperative effort with ICAO COSCAP-SEA and the Australian CASA, and with input from operational approval experts in the region and from FAA, the initial draft of a PBN Operational Approval manual has been completed. The Asia COSCAPs will organize the first course for select participants from their member States, 26-30 April 2010, in Singapore.

2.1.4 The next IFPP amendments to PANS OPS and annexes will be reviewed by the ANC on 18 February 2010. The PANS OPS amendments should be applicable in November 2010. The sixth meeting of the IFPP will be hosted by AEROTHAI, 15-26 March 2010, in Bangkok, Thailand. Interested States are invited to attend as observers, to gain insight into the work of this global panel, which is pivotal to PBN implementation.

2.1.5 **Performance Based Navigation Study Group (PBN SG).** The PBN SG met in late September 2009 and worked on the next phase of PBN. Decisions were made on the direction to take with respect to new navigation specifications. Included in those decisions were:

- Development of a navigation specification for SBAS and its inclusion in the PBN Manual as part of the RNP APCH nav spec;

- Development of an RNP 2 nav spec for en route continental application, including remote continental;

- Application of RF turns outside final approach in RNP APCH, advanced RNP and Basic-RNP 1 nav specs; and

- Development of an Advanced RNP navigation specification

An amendment to the PBN Manual is expected to be ready by the end of 2010, incorporating all or most of the work shown above.

2.1.6 **Continuous Descent Operations (CDO) manual.** The purpose of this Manual, which is expected to be available on the ICAO-NET as an Advance Copy in a few weeks is to standardize and harmonize the development and implementation of CDO. To achieve this, airspace and instrument flight procedure design and air traffic control techniques should all be employed in a cohesive manner. This will then facilitate the ability of flight crews to use in-flight techniques to reduce the overall environmental footprint and increase the efficiency of aircraft operations.

2.2 **APAC Flight Procedure Programme (Agenda Item 3.5).** Capt. Dave VanNess provided an update on the Flight Procedure Programme.

2.2.1 In November 2009 a State Letter was sent out inviting States to participate in the FPP as either an Active Participating State (Core Group) or User State. The contribution by each Active Participating State was set at $16,000 to facilitate budgeting and approval of States' participation. Active Participating States will be members of the FPP Steering Committee. User States will have access to the "free services" of the FPP. To date, fourteen States have joined the FPP, eight as Active Participating States/Administrations, including the host State China, and six as User States. ICAO received the key State signature needed to proceed with opening of the FPP office in Beijing on 26 January 2010. As a result, it is expected that the FPP office will now be able to open in March 2010. It should be emphasized that any State in the region can still join the FPP at any time either as an Active Participating State or a User State, and all States are encouraged to do so.

2.2.2 The FPP as it has developed would not have been possible without the generous contributions of a number of States and organizations. In addition to the CAAC, which has offered to host the FPP office and provide substantial resources and personnel, the following have contributed to fill a critical need in the programme:

— FAA is funding the FPP manager position
— French DGAC/ENAC is providing their GeoTITAN procedure design software
— Airbus is providing the funding for the substantial start-up installation and middleware costs associated with introduction of the GeoTITAN software
— Hong Kong China is providing a procedure design instructor
— Jeppesen will provide aeronautical data to populate the FPP database
— Other States and organizations have offered or are considering offering additional support to the FPP in the future

2.2.3 The initial few months after the APAC FPP starts will be devoted to organizing the first Steering Committee meeting, setting up the office, developing the FPP processes, training and development of FPP staff and developing and conducting a PANS OPS initial course and PBN Procedure Design Course.

Agenda Item 3: APAC Region PBN Implementation

3.1 **Presentation of Working Paper 4 (WP4) - PBN Implementation Progress in the Asia Pacific Region.** The Secretariat presented a paper on PBN Implementation Progress in the Asia Pacific region.

3.1.1 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 meeting since January 2008. The initial Terms of Reference were subsequently revised in the PBN/TF/4 meeting. The APAC Regional PBN Implementation Plan (version1) 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. The Plan includes Short Term (2008-2012), Medium Term (2013-2016) and Long Term (2016 and beyond) Strategies for implementation of PBN in the Asia Pacific region.

3.1.2 The Paper provides a progress report on the level of PBN Implementation in the Asia Pacific region.

3.2 **Presentation of Working Paper 2 (WP2) - Review of Outcome of APANPIRG/20 on PBN.** Working Paper 2, presented by the Secretariat informed the Task Force about the outcome of APANPIRG/20 meeting held from 7 to 11 September, 2009.

3.2.1 APANPIRG urged the States to participate in the Flight Procedures Programme in order to build or improve their instrument flight procedures capabilities. APANPIRG adopted a conclusion to support the development of guidance materials on various implementation related issues and recommended circulation amongst airline operators of the information developed/researched by the Cranfield University on human factor issues related to RNAV operations. A Template developed by the PBN TF for reporting progress of implementation was adopted by APANPIRG through a Conclusion. In addition, Version 1.0 of Asia Pacific Regional PBN Implementation Plan was also adopted by APANPIRG/20 and was subsequently circulated by ICAO APAC Office through a State Letter dated 4 November 2009. APANPIRG agrees with the PBN TF recommendation that States should carry out safety and cost benefit analysis before considering adoption of RNP AR Approach Procedures and adopted a Conclusion to that effect. Progress report on PBN Implementation was presented to APANPIRG by the States and those States, which had not done so far, were reminded to develop their State PBN Implementation Plan and complete the implementation of WGS-84 and Electronic Terrain and Obstacle Data in their respective States.

Discussion

3.2.2 As required by the APANPIRG/20 Report, the PBN/TF/6 meeting reviewed paragraph 2.7 of Working Paper APANPIRG/20-WP/23 presented by IATA on Linking, PBN, CDO and ATC Infrastructure.

3.2.3 Hong Kong China notes that, CDO implementation in high density terminal airspace is a highly complex and demanding process for ATC. Phased implementation of CDO, with due consideration to acceptance of ATC controllers, is considered critical as adoption of CDO will radically change the current mode of ATC operation by minimizing radar vectoring and transition to a highly systemized and standardized mode of operations.

3.2.4 After due deliberation on the systemic implications of requiring linkages between arrival and approach, and the exclusion of ATC intervention at designated points outside the Final Approach Fix, the meeting agreed to the following course of action:

Action 6/1: that, States are encouraged to consider implementing CDO in accordance with ICAO CDO Manual Doc 9331 on as many STARs as practicable to enhance fuel efficiency, ease pilot and ATC workloads, and reduce emission and noise.

Action 6/2: that, States are encouraged to attend the ICAO PBN Airspace Planning Workshop at the ICAO APAC Office Bangkok on 19-22 April 2010 to enhance their expertise with airspace design relating to implementation of PBN.

Action 6/3: that, States are encouraged to attend the CDO workshop to be held in Bangkok in the week of March 15, 2010 in conjunction with the IFPP meeting.

3.3 **Presentation of Working Paper 3 (WP3) - RASMAG/12 Outcomes**. The Secretariat presented this Paper. The 12th Meeting of the Regional Airspace Safety Monitoring Advisory Group (RASMAG/12) was held from 14-17 December 2009.

Airspace Safety Monitoring Activities/Requirements in the Asia/Pacific Region

EMA Handbook PBN Approvals Database Record Format

3.3.1 RASMAG/12 developed a revised format that specifically includes all current PBN and data link approval types (**Appendix D**). New Zealand proposed combining the RVSM, PBN and data link approvals databases, and so, in anticipation, the proposed format also allows for RVSM approvals. The same structure could be used as the form for States to report additions and changes to their approvals.

3.3.2 APANPIRG Conclusion 20/22 requests States to provide an annual update of their RVSM approvals to their RMA in conjunction with the annual traffic sample data. New Zealand suggested that the revised format could also be converted into spreadsheet format in anticipation that a similar request will eventually be made in respect of PBN and data link approvals. RASMAG/12 endorsed the format and tasked the Secretary to amend the EMA Manual accordingly.

Unified Approvals Database

3.3.3 Both RVSM and PBN databases contain the same basic data on the aircraft, its operator and its State of registry. The PBN approvals database format suggested in the EMA Handbook is similar to that for the RVSM approvals, but also includes data link approvals. However, it is recognised that the PBN approvals field in this format is inadequate, and New Zealand proposed changes to the format.

3.3.4 Where an organization provides both RMA and EMA functions, it would be feasible to combine the RVSM, PBN and data link approvals databases. This would provide a single record for each aircraft and would avoid the duplication of the nine or more fields of common data for that aircraft, such as aircraft type, operator and state of registry. A combined RVSM, PBN and data link approvals database would allow States to provide approvals data to a single monitoring agency; the data will be distributed to other agencies through monitoring agency internal data exchange mechanism. Sending data to a single agency is considered to be a significant benefit in reducing overhead activities and minimizing the risks of errors.

PBN Approvals Information on Flight Plans

3.3.5 Singapore presented the need to include all PBN approval types into the flight plan for all flights so as to facilitate future implementation of reduced horizontal separation; this would also greatly assist in the airspace monitoring duties of the En-route Monitoring Agency. Information about the PBN readiness of airline fleets is crucial to the timely execution of the Asia and Pacific Regional PBN Implementation Plan. However, this information is not readily available in the current flight plan, and the new ICAO Flight Plan, with requirements for PBN approval data, will not be implemented until 2012.

Date and Venue of the Next RASMAG Meeting

3.3.6 With regards to the scheduling of the next meeting, it was agreed that RASMAG/13 would be held from 2-5 August 2010, at the Regional Office premises.

Discussion

3.3.7 The PBN/TF/6 meeting deferred a decision on 'flight planning issues' till the presentation of PBN/TF/6 – WP/7 on *Review of PBN Flight Plan Requirements.* The meeting reviewed the revised PBN and Data Link Approvals Database Record Form and agreed with the proposed format. The meeting further requested:

Action 6/4: IATA to provide the progress on the development of global database for PBN approval at the PBN/TF/7 Meeting

3.4 **Presentation of Working Paper 5 (WP5) - PBN Implementation En-route**. The implementation status of PBN en route in Asia and Pacific Regions was presented by the Secretariat. The meeting was requested to consider the reporting process on the implementation status of PBN en route.

Implementation Status

Oceanic and Remote Continental Airspace

3.4.1 Over the South China Sea, RNP 10 equipage had been required since 2001 when the ATS route structure was reviewed for the area where the routes were established 60 NM apart. 50 NM lateral and longitudinal separation standards have been implemented since 2008 on L642 and M771. For the other routes, the applicable separation standards remain same. Based on system performance during the first 90 days after the introduction of the 50 NM lateral separation standard between L642 and M771, and the 50 NM longitudinal separation on these routes, it was concluded that the regional lateral and longitudinal target level of safety were satisfied and the safety assessment supported the continued use of RNP 10 (50/50) horizontal separation on L642 and M771, and agreed that the application of the 50/50 horizontal separation shall continue on L642 and M771. The review of ATS routes in this area will be continued by Southeast Asia Route Review Task Force. This activity will be undertaken based on PBN concepts and in accordance with the provisions of the Regional PBN Implementation Plan.

3.4.2 Over the Bay of Bengal, EMARSSH route structure was implemented in 2002 which was designed to support RNP 10 operations. The routes have been established 50 NM apart. Under the auspices of the Bay of Bengal ATS Coordination Group (BBACG) and the Arabian Sea/Indian Ocean ATS Coordination Group (ASIOACG), the Regional Office had assisted a number of the Bay of Bengal and the Indian Ocean States to designate a number of existing routes as RNAV routes over a widespread area of the Indian Ocean. The Regional Office conducted coordination with ICAO Cairo and Nairobi Offices to ensure that complementary amendments to the respective Basic Air Navigation Plans are progressed. The Bay of Bengal Reduced Horizontal Separation Task Force is

looking into the application of the 50 NM longitudinal separation in this area. Over the Indian Ocean, Australia would extend RNP 4 operations to the Melbourne FIR to support application of 30 NM/30 NM separations in the oceanic airspace.

Reporting Mechanism on the Implementation Status of RNP Enroute

3.4.3 In order to ensure that appropriate data was available to enable the measurement of suitable regional metrics, APANPIRG/20 agreed to Conclusion 20/4 − Asia/Pacific Performance Metrics. Among others, APAC Metrics 3 was adopted. Accordingly, APANPIRG/20 concluded that States, organizations and stakeholders collect and process data to support the regional metrics under Conclusion 20/5 − Data Collection for Regional Metrics.

3.4.4 Besides, APANPIRG/20 agreed that the common template developed by PBN TF would help in harmonizing the reporting process and adopted Conclusion 20/40 − PBN Implementation Progress Report Template. The PBN Implementation Progress Report Template, however, only requires the report of PBN in the terminal and the approach areas and does not cover the enroute applications.

Discussion

3.4.5 IATA supported the suggestions presented in Working Paper 5 and stated that it would present a Working Paper (WP11) on Expanding the Scope of PBN Implementation Progress Reporting.

3.4.6 The PBN/TF/6 noted the information on the implementation status of PBN en route.

3.5 **Presentation of Working Paper 10 (WP10) - The Role of the PBN Task Force in Managing Challenges to PBN Implementation in Asia Pacific.** IATA presented a paper proposing the PBN Task Force shift its focus to developing applications to facilitate the achievement of the gate-to-gate concept, continued education and training, and identification of implementation issues as directed by APANPIRG/20.

3.5.1 IATA asserts that the PBN Task Force is in the best position (most suited) to facilitate the necessary engagements with States, industry and ICAO to deliver PBN in the region. It was emphasized, however, that in order to maintain a relevant role in PBN implementation, the Task Force must revise its activities from planning to development.

3.5.2 The paper acknowledges that APANPIRG/20 also decided that the focus of the PBN Task Force should now shift to developing applications that facilitate:

a) Achievement of the gate-to-gate concept
b) Continue its education and training role
c) Identify issues to be considered by the PBN TF

3.5.3 IATA maintains the position that:

a) The PBN Task Force can help direct State implementation activities to focus on gate-to-gate design strategies.
b) The PBN Task Force should continue to promote the activities of the Flight Procedure Programme office and also leverage the resources of the Global PBN Task Force.
c) Specifically, the Task Force should develop a process that allows for identification, monitoring and solutions to PBN implementation challenges.

3.5.4 The paper suggests that the meeting:

a) Revise the TOR as necessary to embrace APANPIRG/20 decisions.
b) Establish a process for States to report and seek implementation assistance.
c) Consider methods to identify, direct and/or organize resources to provide implementation assistance on the regional level and direct to States.
d) Request the PBN Task Force, through a group of volunteering States, work with the Regional Office to review and harmonize State Plans.

Discussion

3.5.5 Regarding IATA's proposal for harmonization of State PBN Plans, the PBN TF agrees that this activity is very important and beneficial and is in the purview of the current PBN TF Terms of Reference. However, this activity should be conducted in conjunction with the ICAO Regional Office. IATA agrees to serve as the Coordinator of the harmonization activities. Australia, Hong Kong China, New Zealand, and Thailand also volunteered to support this activity. Other States are encouraged to support this activity and provide up-to-date State PBN Implementation Plans. It is agreed by the Meeting that IATA and the volunteering States to develop recommendation report for State Plan harmonization to be presented at the next PBN/TF meeting.

Action 6/5: States are requested to list the challenges and impediments for PBN implementations to be reported at the PBN TF/7 Meeting.

Action 6/6: A harmonization analysis report to be developed by IATA and volunteering States and reported to the PBN TF/7 Meeting.

Agenda Item 4: PBN Implementation Issues

4.1 **Presentation of Working Paper 6 (WP6) - Draft ICAO PBN Operations Approval Handbook.** Australia presented this Paper which introduces a draft ICAO PBN Operational Approval Handbook that is intended to form the basis for the training of inspectors involved in PBN operational approval. The Handbook is a first draft and it is expected that it will be further developed over the coming months as a result of experience and feedback from users. The Handbook contains a number of technical illustrations but does not include all the graphics that are intended. Task Force members are encouraged to contribute additional graphics or to suggest the need for specific illustrations.

Action 6/7: States are requested to review the draft PBN Operational Approval Handbook and provide feedback at the PBN/TF/7 meeting. States are also invited to contribute relevant material to be integrated into the Handbook.

4.2 **Presentation of Working Paper 9 (WP9) - PBN Operational Approval Process / Training.** Capt. Len Cormier, Chief Technical Adviser, COSCAP-SEA presented a Working Paper on PBN Operational Process and related Training Requirements.

4.2.1 The meeting was informed that recently some of the COSCAP States have requested COSCAP support concerning PBN Operational Approval. While the PBN Manual does contain some basic information concerning PBN Operational Approval (Volume I, Part A, 3.4), there is no detailed guidance nor is training available to assist States with the PBN operational approval process.

4.2.2 In cooperation with ICAO, the COSCAP programmes, with the support of available expertise, are actively pursuing the development of PBN Operational Approval procedures and a related training programme. CASA Australia advised ICAO that they are developing a PBN Operational Approval Manual and kindly offered to provide this material to ICAO. In addition to the FAA, CASA Australia might also be able to provide some support concerning the training programme.

4.2.3 Attention of the PBN/TF/6 meeting was drawn to the proposed PBN Operational Training Programme (Attachment 1 to WP/9) which highlights some of the issues and views from the participants of the PBN Operational Approval meeting/workshop hosted by FAA at Los Angeles in November 2009. The PBN/TF/6 meeting was requested to provide inputs on the PBN operational Approval requirements and the training programmes.

4.2.4 Capt. Cormier informed the PBN/TF/6 meeting of the outcome of a side meeting held on 03 February, 2010 concurrent with the PBN/TF/6 meeting and presented a PBN Operational Approval Requirements – Draft Implementation Template (**Appendix E**). The document describes the outputs to be developed by an ad hoc Asia Pacific Operational Approval implementation team, with members from ICAO, Asia Flight Procedures Programme (FPP), COSCAPs in Asia Pacific, Australia, China, Hong Kong China, Singapore and the United States. The outputs to be developed include, Draft ICAO PBN Operational Approval Manual, Model PBN Regulations, Model PBN Operational Approval Handbook, and PBN Operational Approval Training Course.

4.2.5 The PBN/TF/6 meeting acknowledged the excellent work being done by CASA Australia, the COSCAPs in Asia and ICAO to assist States with the PBN Operational Approval requirements and extended strong support to the much needed initiative.

> **Action 6/8:** States are encouraged to participate in the PBN Operational Approval Training to be conducted under the auspices of COSCAPs in Singapore during 26-30 April 2010. Invitation will be issued to selected States by COSCAPs.

4.3 **Presentation of Working Paper 12 (WP12) - FMS Coding Issue Encountered during the Development of RNP APCH Procedures.** Hong Kong China presented this Paper highlighting the issues encountered during the development of RNP APCH procedures.

4.3.1 ICAO Doc. 8168 stipulates that in case more than one RNP APCH procedures are designed for the same runway, *Suffixes "x", "y", or "z"* should be used to differentiate different RNP APCH procedures. Such naming convention will increase the length of the procedure identification to 7 characters for parallel runway operations.

4.3.2 The meeting was informed that most FMS on board aircraft are not able to accept inputs of procedure identification with more than 6 characters. Only very few aircraft types equipped with the latest version of FMS models can accept the procedure identification which has more than 6 alpha-numeric characters.

4.3.3 To reap most benefits of PBN procedures, it is often desirable for more than 1 RNP ACPH procedure to be developed for a runway. The limitation on the current on board FMS identified above may delay the implementation process and cause confusion to flight crews as well as ATC. Upgrading of older versions of FMS to comply with the latest naming convention will take a long time to complete, with a cost consideration on the part of airline operators.

4.3.4 Hong Kong China requests the meeting to: take note of the limitation of FMS in putting the RNP procedure identification in accordance with the ICAO procedure naming convention as stipulated in ICAO Doc 8168; advise States to take into account the FMS compatibility factor in formulating the PBN implementation strategy; and request ICAO to provide more guidance to help States and operators in resolving the FMS limitation.

Action 6/9: ICAO Regional Office is requested to inform IFPP, PBNSG and APANPIRG of the limitation of older FMS in putting procedure identification within 6-digit alpha-numeric. This limitation occurs when pilots attempt to select specific approach for an airport that has multiple runways and each of the runways has multiple approach procedures for the same type of navigation system. ICAO is requested to provide guidance and standardized solution on the issue.

Agenda Item 5: Review of Final Version (V 1) of APAC Regional PBN Implementation Plan

5.1 The meeting reviewed Version 1 of the APAC Regional PBN Implementation Plan Document as adopted by APANPIRG/20.

5.2 The Chairman requested the States to develop their State Plans in accordance with the APAC Regional PBN Implementation Plan to ensure harmonized transition and implementation at the regional level.

Agenda Item 6: State / Industry Presentations

6.1 **State PBN Plan and Status of PBN Implementation Progress.** Thirteen (13) States made presentations on the status of implementation of their respective PBN Plans while another three (3) States provided a written update on their PBN Plans.

6.1.1 Australia

6.1.1.1 Australia presented an update on its State PBN Implementation plan. Australia has developed a plan based on the concept of parallel availability of RNAV and RNP specifications in all classes of airspace thus providing operational flexibility to all aircraft types and capabilities. RNAV 10 and RNP 4 will be provided in all oceanic airspace, RNAV 5 and RNP 2 will be provided in all en route airspace and RNAV 1and RNAV 2 and Basic RNP 1 will be provided in the terminal area.

6.1.1.2 In terms of approach operations, INS only equipped aircraft will have access to RNAV STARs, SIDs and conventional instrument approaches including ILS, LLZ and VOR/DME. GNSS equipped aircraft will have access to RNP APCH (LNAV or LNAV/VNAV only) and RNP AR Terminal procedures (RNP AR APCH, RNP AR DEPT and Engine Out SID) designed to proprietary multi aircraft type criteria but publicly available to suitably equipped operators at no additional charge. APV will only be implemented through Baro-VNAV (RNP APCH or RNP AR APCH) as Australia does not have access to an SBAS to enable LPV type APV operations.

6.1.1.3 To date Australia has implemented RNP AR APCH procedures at 17 aerodromes with a further 11 aerodromes pending. Implementation of RNP APCH – LNAV/VNAV procedures has yet to commence.

6.1.1.4 In terms of regulatory development Australia has developed guidance material for each PBN specification in the current edition of the PBN manual and draft regulations for each specification have also been developed. The suite of regulations, orders and guidance material should come into effect from June 2010 with the full transition to ICAO PBN specifications due for completion in June 2013.

6.1.2 **Cambodia**

6.1.2.1 By understanding the global aviation industry requirements for safety in air transport and the benefit of satellite technology so called Performance Based Navigation in term of fuel saving, time saving and particularly environmental saving, Cambodia as an ICAO Contracting State has established the CNS/ATM Working Team to study and establish the frame work for CNS/ATM of which PBN Implementation Plan is a part. This Working Team is comprised of ANSP, Airport Operators, Airline Operators and CAA.

6.1.2.2 The Working Team in discussion with adjacent States such as Lao PDR and Vietnam has come up with the draft PBN Implementation Plan. This plan will be finalized and harmonized with concerned States and also harmonized with the ICAO Asia Pacific PBN Implementation Plan. Cambodia will report to the next PBN Task Force 7/Meeting on the progress of this plan.

6.1.2.3 Cambodia has provided a copy of its PBN Implementation Plan which has been included in the CD provided to the participants.

6.1.3 **Hong Kong China**

6.1.3.1 The Hong Kong China PBN Implementation Plan (the Plan) was developed in line with the ICAO Regional PBN Implementation Plan. The Plan adopts a 3 phased approach; Short Term (2009-2012), Medium Term (2013-2016) and Long Term (beyond 2016). The Plan was presented to ICAO at the PBN/TF/4 meeting held in Japan in March 2009. So far, Hong Kong China has been following the Plan in moving forward the PBN project and the implementation progress is satisfactory. The PBN Planning and Implementation Team (PBN PIT) established in November 2007 also facilitates and harmonizes the requirements of various stakeholders in the course of PBN implementation in Hong Kong China.

6.1.3.2 Hong Kong China plans to implement the RNP AR APCH with Baro-VNAV procedures to the north runway in 2010. Tentatively, the effective date will be April 2010. 2 AIRAC cycles prior notification will be provided in accordance with the ICAO provisions. At the same time, CAD is finalizing the relevant RNP AR APCH operational approval procedures and requirements. Initially, consideration will be given to approved local airline operators with specific aircraft types that satisfy the ICAO RNP AR APCH requirements. With experience gained, CAD will consider extending the procedures to foreign operators for the conduct of RNP AR APCH procedures in Hong Kong China.

6.1.3.3 CAD is also concurrently developing more RNP APCH procedures with a view to improving the overall operational efficiency.

6.1.4 **India**

6.1.4.1 India initiated activities for implementation of PBN procedures in 2006-07. PBN Implementation roadmap of India has been developed in harmony with the APAC Regional PBN Implementation Plan. The Roadmap is subdivided into objectives that extend over short-term (2009-2012), medium-term (2013-2016) and long-term (beyond 2016) period. The roadmap is available on the AAI website www.aai.aero/menu_inc/PBN_Im.pdf .

6.1.4.2 Current PBN Implementation status - RNAV-1 SID/STAR have been implemented at Mumbai, Delhi, Ahmedabad in 2008 and Chennai in 2009. These implementations have provided significant benefits to airspace users. RNAV-1 SID/STAR at Hyderabad Int'l. airport is likely to be implemented in April 2010. As an on-going activity to implement PBN procedures, RNAV-1 SID/STAR development is being taken up at Kolkata, Guwahati, Bangalore and Trivndrum airport and the activity is likely to be completed by December 2010. Baro VNAV procedure development has been initiated and implementation will commence in 2010. These procedures are expected to provide

better access to airport through precision-like approach without relying on ground-based navaids. To enhance en route capacity, parallel routes with RNAV5/RNP4 specifications are being planned between major city pairs.

6.1.5 **Japan**

6.1.5.1 Japan established RNAV Roadmap version 2 in 2007 based on ICAO PBN manual. In November 2008, Japan partly amended the RNAV Roadmap version 2 and moved forward the original 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 2011.

6.1.5.2 Japan has implemented more than 100 RNAV 5 routes for en-route. In order to maximize the benefit of RNAV, Japan is planning to introduce RNAV 5 preferential operation, called "Sky Highway", which segregates operations of RNAV and non-RNAV vertically.

6.1.5.3 Japan has also implemented RNAV 1 SID/STARs and RNP APCHs. As a result of implementing RNAV1 SID/STAR, the flight distance in terminal area has been reduced by about 20%. Japan is planning to introduce RNP AR approach at Haneda airport, Tokyo in October 2010. In order to conduct Flight Operational Safety Assessment or FOSA, Japan has established a FOSA task force, which is composed of JCAB, airlines, and research institute. Japan is also planning to introduce Basic RNP 1 in non-radar airport in 2010.

6.1.6 **Maldives**

6.1.6.1 Maldives is committed to implement the ICAO resolution A36-23. and envisages enormous operational benefits by implementing PBN.

6.1.6.2 The Maldives' PBN program include implementing RNAV 10, RNP4 in the en-route sector; Basic RNP1 in the Terminal sector; and RNP APV (Baro-VNAV) in the approach phase.

6.1.6.3 RNAV10 has been implemented on selected routes effective from November2009 in accordance with the regional implementation plan.

R456	L894	Re-designated RNAV 10
	P756	
A579	L891	Re-designated RNAV 10
A214	N628	Re-designated RNAV 10
A456	L516	Re-designated RNAV 10
--	L899	RNAV 10

6.1.6.4 Further expansion of RNAV10 in Male FIR will be in accordance with regional implementation plan and in harmony with the other countries in the region. Longitudinal separation of 50 NM on these designated RNAV10 routes will come to effect once the regional planning group has agreed upon the application of the separation.

6.1.6.5 RNP 4 will be implemented in harmony with the other countries in the region.

6.1.6.6 PBN SIDs and STARs has been developed for Male International Airport. The recommended navigational specification is Basic RNP1. After the initial tests in the simulator, these procedures are now flown on trial since November 2009 by Emirates during their scheduled flight. Further flight trials are planned with assistance from other airlines including the local airline, Island Aviation. Implementation of PBN in Male TMA is planned for 2011, after overcoming the problems associated with fleet readiness, operational validation and training.

6.1.6.7 RNP APV (Baro-VNAV) approach procedures for Male International Airport have been developed and are now on trial, test flown by Emirates together with SIDs and STARs. Further flight trials will be conducted with assistance from other airlines, including the Island Aviation.

6.1.6.8 In the en-route sector any development to implement and/or expand PBN will be in accordance with regional implementation plan.

6.1.6.9 Successful implementation of the PBN approach procedures at Male International Airport will be followed by programs to implement PBN procedures at the other airports in the country.

6.1.7 **Mongolia**

6.1.7.1 Civil Aviation Authority of Mongolia (MCAA) provided a copy of its PBN Implementation Plan which has been included in the CD provided to participants. The paper provides information concerning PBN implementation plan of Mongolia. MCAA has decided to gradually change the navigation system in airspace of Mongolia to performance based navigation system. In addition, the paper presents implementation and planning progress of PBN in Mongolia.

6.1.8 **Myanmar**

6.1.8.1 In accordance with several Conclusions adopted by APANPIRG, Myanmar has set up a working team comprising relevant stakeholders for studying PBN Implementation issues. The team is responsible for developing policy, plans and standards for deploying PBN and GNSS procedures.

6.1.8.2 Myanmar has established a Roadmap which consists of Medium Term (2010-2015) and Long Term (2015-2025). As for En-route operation, Myanmar will try to develop RNAV5 PBN routes during Medium Term and RNAV/RNP2 in the Long Term. For Terminal operation, Myanmar will develop RNAV1 specification based on SID/STAR during the Medium Term. For Approach operations, Myanmar will develop Baro–VNAV Approach during the Medium Term.

6.1.8.3 Existing 8 RNAV routes will be RNAV 5 or RNP4 based PBN routes in 2012.

6.1.8.4 RNP APCH with Baro–VNAV (Approach) and RNAV1 (DME/DME/IRU) or GNSS based (SID/STAR) will be implemented for Yangon Intl Airport (VYYY), Mandalay Intl Airport (VYMD) and Naypyitaw Airport (VYNT) in 2012.

6.1.8.5 RNP APCH with Baro–VNAV (Approach) and Basic RNP1 (SID/STAR) will be implemented for Bagan Airport (VYBG) and Heho Airport (VYHH) in 2013.

6.1.8.6 Basic RNP1 SID and STAR procedures will be implemented at other domestic airports also in a phased manner.

6.1.9 **Nepal**

6.1.9.1 Civil Aviation Authority of Nepal has initiated the process to prepare the PBN Implementation Plan for Nepal following the Conclusions adopted by the APANPIRG/18 and 19 meetings.

6.1.9.2 CAAN has immediate task of implementing the GNSS/RNAV procedures already designed. While the procedures should be reviewed periodically to ensure that they have been designed in accordance with the latest international standard and that all the waypoints should be incorporated in the database, there is shortage of trained manpower in procedure design and validation.

6.1.9.3 CAAN has so far designated the PBN focal contact person and formed the PBN Implementation Task Force, which is composed of technical staffs from ATM, CNS and flight inspection, to coordinate with all stake holders to develop the PBN Implementation Plan.

6.1.9.4 CAAN will implement PBN in the Near Term (2010–2012) time frame as given below. Depending on the progress in the Near Term Plan and emerging ICAO guidelines, the Medium (2013–2016) and Long Term (2017–2025) Plans shall be formulated.

6.1.9.5 For En-route - RNAV 10 (RNP 10) for ATS Route L626 (KT-DELHI) established on 19th November 2009. Nepal intends to designate L626 as RNAV-5 after consultation with India. Existing ATS routes will be revised in accordance with PBN navigation Specifications RNAV- 5 Subject to coordination with Indian authorities.

6.1.9.6 For Departure/Arrival (Terminal) - RNAV 1 based on GNSS will be developed for SIDs, STARs and En-route within Kathmandu TMA by 2012.

6.1.9.7 For Approach - Develop and Implement RNP Approach based on GNSS at TIA. GNSS based RNAV approach supported by Baro-VNAV for APV in selected major domestic airports will be introduced.

6.1.10 **New Zealand**

6.1.10.1 New Zealand completed the state PBN Implementation Plan in December 2009 and this was lodged with ICAO. The implementation of Performance Based Navigation (PBN) in New Zealand controlled airspace will be delivered in three major phases with target implementation dates of 2012, 2017 and 2020.

6.1.10.2 The Plan was developed in conjunction with government and industry stakeholders. These included aerodrome operators, airlines, the air navigation service provider and the general aviation community. The implementation of PBN in New Zealand controlled airspace will require the allocation of significant resources by each of the key industry stakeholders and the Civil Aviation Authority (CAA).

6.1.10.3 There are several strategic objectives of the New Zealand PBN Implementation Plan based on providing a structure to PBN implementation. This will assist the industry to know what the PBN requirements are, how they meet any operational approvals and ensure the benefits of PBN achieved.

6.1.10.4 During development of the plan an issues register was developed and updated covering a range of issues to be addressed. This register is being used to identify work areas, resource requirements and organisations responsible for actions. A work plan is under development to identify working groups, including technical representatives, to address these issues to ensure the PBN Implementation Plan is progressed.

6.1.10.5 Information on PBN developments and implementation work is provided on the CAA website at http://www.caa.govt.nz/PBN/pbn.htm and this will be regularly updated.

6.1.11 **Republic of Korea**

6.1.11.1 In December 2009, Office of Civil Aviation, the Republic of Korea approved the PBN Implementation Plan which was presented by PBN/TF. The plan provides aviation stakeholders with appropriate implementation guidance and timelines to allow proper preparation for PBN implementation within Incheon FIR. The PBN Implementation Plan of the Republic of Korea comprises 3 steps; Short Term (2010~2012), Medium Term (2013~2016) and Long Term (2017~).

6.1.11.2 In the Short Term, current RNAV routes and RNAV STAR/SID will be adjusted to meet ICAO's RNAV 5 and RNAV 1 specification respectively and RNAV 2 will be introduced on heavily congested routes such as B576 to establish unidirectional parallel routes. Also, continuous descent operations (CDO) will be applied to all major airports and APV-Baro VNAV will be introduced to all international airports and domestic airports with high traffic volume.

6.1.11.3 In the Medium Term, RNAV2 or RNP 2 will be applied to new RNAV routes and new transition route will be established exclusively for transition flights to diversify traffic. Also, RNAV 1 or RNP 1 specification will be applied to international airports and be expanded to major domestic airports. In addition, CDO will be expanded to all domestic airports. In terms of approaches, the application of APV-Baro will be completed at all airports in Korea and trial operation of GBAS Landing System (GLS) will begin at the selected airports.

6.1.11.4 In the Long Term, all RNAV 5 routes will be switched over to RNAV 2 or RNP 2 and approach procedures using GBAS will be expanded to other airports. VOR routes and RNAV routes will be completely separated at specific airports. In addition, ground NAVAIDs will be decommissioned gradually from 2021. As a result, conventional routes will be replaced with RNAV routes.

6.1.11.5 To implement the approved PBN Implementation Plan and recognizing the benefits of CDO, the Republic of Korea decided to expand CDO trial operation for Incheon airport from 2-direction routes (G585, G597E) to 4-direction routes (B576, G597W, G585, G597E). In addition, 5 STARs were adjusted to enable to fly directly to Initial Approach Fix (IAF) or Intermediate Fix (IF) to save the distance. Therefore, it is expected that 10 flights a day will be participated in the trial operation and around 457,000 pounds of fuel will be saved from this expansion of CDO trial operation.

6.1.11.6 At the first year of the implementation of PBN, the republic of Korea will change the current 6 RNAV routes and RNAV STAR/SID for Incheon International Airport to RNAV 5 and RNAV 1 specification respectively. APV-Baro VNAV approaches for Incheon International Airports will be introduced. In addition, the Republic of Korea will develop the safety assessment method suitable for its own environments and will publish standards and regulations for the approval of each navigation specification.

6.1.12 **Sri Lanka**

6.1.12.1 In the Colombo FIR RVSM has been introduced and the State has implemented WGS 84.

6.1.12.2 All routes are RNP 10 except for three routes. All routes are expected to be RNP 10 before end of 2010. Redefining RNP 10 to align with PBN is in progress. All routes are expected to be RNP 4 by 2012.

6.1.12.3 Surveillance and Communication – PSR and MSSR Radars and ADS C; VHF, HF and CPDLC.

6.1.12.4 Conventional SIDs will be replaced by RNAV 1 STARs which are already introduced on trial basis for both runways. R NAV 1 STARs will be operational by 2011 and R NAV STARs/SIDs by 2013.

6.1.12.5 For RM (Domestic aerodrome in Colombo) R NAV SIDs/STARs by 2014 and for Udumattala (new alternate /international airport) by 2014.

6.1.12.6 RNP APCH with Baro NAV for both runway ends as a back up for the ILS.

6.1.12.7 ADS B by 2014 and 2 Doppler VOR/DME (Udumattala and Jaffna) by 2014.

6.1.13 **Thailand**

6.1.13.1 In June 2009, the 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 the Asia/Pacific Regional PBN Implementation Plan developed by ICAO Asia/Pacific PBN Task Force and the 2007 ICAO Assembly Resolution. It also provides assessment 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 APCH with Baro-VNAV is the preferred navigation specification.

6.1.13.2 Regarding actual implementation, since February 2009, the Department of Civil Aviation has approved the full operation of RNP Approach Procedures for Phuket International Airport. These procedures enhance safety and efficiency in the approach operation and resolve the offset problems caused by the limitation of installation sites of conventional navigation aids. Furthermore, RNP APCH Procedures for Hat Yai and Samui airports have been designed and successfully flight validated by AEROTHAI. RNP APCH Procedures for Hat Yai are scheduled to fully operate in December 2009. These RNP APCH Procedures help enhance the level of safety and efficiency in approach and landing operations at Hat Yai International Airport, especially for Runway 08, for which no instrument approach procedure with conventional navigation aids was feasible.

6.1.14 **China**

6.1.14.1 Civil Aviation Administration of China (CAAC) published the PBN Roadmap in October 2009. In 2009, 4 airports (Yanji, Huangshan, Xining and Yushu) got the RNP AR procedures. RNAV-1 procedures are mandated in Guangzhou airport to expedite the transition as a study case. The first RNP APCH (with Baro-VNAV) had been designed and tested in Mianyang airport and the Operation Certification Advisory Circular will be published in March 2010. In 2009, 4 new RNP4 routes have also been implemented in the west part of China, Beijing-Shanghai and Beijing-Guangzhou, two pairs of parallel routes based on RNAV2 are under study to increase the capacity of this area airspace. A RAIM prediction system with the functions of airdromes and routes prediction has been developed and is now under trail operation for airlines.

6.1.15 **Macao China**

6.1.15.1 Based on the Asia/Pacific Regional PBN implementation Plan, for near term by 2012, Macao, China plans to develop the RNP approach with Baro-VNAV as backup for the approach procedures and develop selected STARs and SIDs with RNAV 1 specification.

6.1.15.2 In middle term by 2016, Macao, China plans to expand the adoption of RNAV 1 specification to all Macao SIDs and STARs.

6.1.15.3 As the Macao aerodrome traffic zone lies between the Guangzhou and Hong Kong FIRs, Macao, China keeps close coordination with Civil Aviation Administration of China and Hong Kong Civil Aviation Department regarding the PBN implementation.

6.1.16 **Singapore**

6.1.16.1 Singapore look forward to utilising PBN for en-route harmonisation between airspaces. Within the TMA, PBN shall be employed to improve air traffic flow to ease congestion, such as, introducing RNAV1 to support close track spacing and for segregation of traffic in the opposite directions. As a backup for RNAV1 and for areas with limited surveillance coverage, Basic-RNP1 will be a good alternative.

6.1.16.2 Singapore submitted PBN Implementation Plan in 2009. As of now, Singapore plans its PBN implementations as follows:

> Short Term (Now until end of 2012). For the En-route phase, to work towards having up to 50% of existing international routes converted to RNAV10 and RNP4 (up to 25% of international routes) for heavily utilised routes. For the TMA, to convert existing RNAV departures and arrivals into RNAV1 SIDs and STARs for Changi Airport. For Approach, RNP APCH with vertical guidance (Baro-VNAV) for Changi's second runway.
>
> Medium Term (2012 until end of 2016). For the En-route phase, to continue work to have up to 75% of international routes on RNAV10 and RNP4 (up to 50% of international routes) for heavily utilised routes. Depending on the progress, to monitor the development of RNP2 and consider it for heavier traffic routes. For the TMA, extending RNAV1 SID and STAR for Seletar Airport to enhance traffic management to the other airfields in the vicinity, and to introduce Basic-RNP 1 for Changi Departures. For Approach, consider RNP APCH with vertical guidance (Baro-VNAV) for Seletar Airport.
>
> Long Term (2016 and beyond). Likely to rely on GNSS as primary means of navigation infrastructure considering the scarcity of DMEs in the region and vastly oceanic geography. To continually improve airspace design by utilising PBN and GNSS in areas where obvious operational benefits can be reaped.

6.1.17 **Viet Nam**

6.1.17.1 Viet Nam provided a copy of a power point presentation which has been included in the CD provided to participants. The presentation provides a brief overview of the Viet Nam PBN Implementation Plan and includes a road map for implementation.

Discussion

6.1.18 Review of the Regional Plan. New Zealand raised concerns about the ICAO APV Resolutions noting that there are many airports that may only support small number of flights with limited or no APV capability. The PBN TF noted the concern and agreed to propose the revision of the APAC PBN Regional Plan as shown in **Appendix F** to be considered by ATM/AIS/SAR SG, CNS/MET SG, and APANPIRG.

> **Draft Conclusion 6/10**: that, the proposed revision to the APAC Regional PBN Implementation Plan as shown in **Appendix F** be adopted.

6.1.19 Operational Issue. Hong Kong CAD is proposing to rollout a RNP-AR procedure which requires RNP 0.30 during initial, final and the missed approach segments. Information received from Airbus indicates that EASA/Airbus will require lateral and vertical deviation displays, including cross track resolution to two decimal places before this approach type can be approved.

6.1.19.1 Also based upon the standards in ICAO Doc. 9613, Hong Kong CAD intends to follow this requirement to mandate this display capability. This requirement, if implemented, would result in a minimum number of aircraft that are equipped and would therefore be able to participate.

6.1.19.2 Whilst desirable, lateral and vertical path deviation displays on forward displays should not be required for RNP operations of 0.30 nm or higher, regardless of the complexity of the procedure. Alaska Airlines has been flying complex RNP procedures without such display capabilities successfully since mid-1994. In addition, Air New Zealand Boeing 737-300s are also flying complex RNP-AR procedures into Queenstown New Zealand without such forward display capabilities.

6.1.19.3 Alternative solutions include lateral & vertical cross track and navigation performance information on the FMC/FMGEC MCDU, Flight Director guidance commands, lateral turn prediction vector (Boeing EFIS models), Vertical Situation Displays or specific map range selections. Accompanying Flight Crew procedures, training and proficiency demonstrations are obviously required. Acceptability for initial applicants should be demonstrated to the appropriate regulatory authority for approval.

6.1.19.4 Ultimately these PBN procedures provide defined and therefore predictable lateral and vertical course guidance which enhance operational safety and efficiency as compared to the conventional procedures they are replacing. When assessing relative risk this point must be considered.

6.1.19.5 Applications for RNP operations to levels below 0.30 should be assessed on a case by case basis with appropriate credit for existing display capability, Flight Crew procedures and training along with other relevant capabilities if the applicant does not have NPS or equivalent display capabilities.

6.1.19.6 It is therefore recommended that aircraft that does not have a lateral and vertical readout on the navigation display, but does display the lateral and vertical profile on the navigation equipment could be considered as alternate means of compliance if supplemented by appropriate flight crew training for RNP value of 0.3 RNP or greater.

> **Draft Conclusion 6/11**: that, ICAO provides guidance on aircraft that do not have a lateral and vertical readout on the navigation display, but do display the lateral and vertical profile on the navigation equipment, could be considered as alternate means of compliance if supplemented by appropriate flight crew training for RNP value of 0.3 RNP or greater.

6.2 **Industry Updates on PBN**

6.2.1 No update / presentation was provided.

6.3 **Presentation of Working Paper 11 (WP11). - Expanding the Scope of PBN Implementation Progress Reporting.** IATA presented a paper proposing to revise the PBN Progress Reporting Template to enable States to better measure and report progress in PBN implementation in accordance with ICAO performance framework requirements.

6.3.1 The paper states that one of the key aspects of the performance based approach is the development of regional performance objectives with measurable outcomes and metrics. It emphasizes that in order to accurately assess the benefit and return on investment of PBN implementation, it is important to measure progress in terms of PBN's ability to fulfill local and regional strategic objectives. It is asserted that expanding the PBN Progress Report Template to include the impact on safety, gains in efficiency, environmental savings and infrastructure cost reduction will allow for measureable determination of the regional impact and benefits gained as a result of PBN implementation.

6.3.2 The paper highlights the key benefits of expanding the State reporting of PBN:

a) Allows stakeholders to better assess their return on investment in PBN.
b) Provides justification to stakeholders for further investment in PBN.
c) Communicates the region's commitment to reducing aviation's environmental impact.
d) Establishes a platform for State recognition of progress and success in PBN implementation.

6.3.3 IATA suggests that the PBN Task Force revise and expand the scope of the PBN Progress Template to allow for measurable determination of the benefits of PBN implementation.

6.3.4 IATA also recommends that the Task Force develop or adopt established principles and a mathematical model to ensure environmental benefit calculations are standardized.

Discussion

6.3.5 After due deliberations the meeting agreed that there is a need for regional performance measurement of the operational benefits PBN delivers beyond the percent of APVs and PBN routes implemented. The PBN/TF/6 meetings agreed to the following Draft Conclusions:

Draft Conclusion 6/12: Request CNS/MET SG, ATM/AIS/SAR SG, and APANPIRG to review and consider amending the APAC Performance Monitoring and Measurement Metrics 2 and 3 for PBN to include specific measurements that capture operational benefits in terms of PBN's ability to help fulfill strategic objectives (safety, efficiency, capacity, access, and the environment).

Action 6/13: ICAO Secretariat to identify the appropriate office or forum that would be best suited to develop a standardized calculation and reporting method for States. This would include a mathematical model to ensure environmental benefit calculations are standardized.

Agenda Item 7: Task Lists Review

7.1 PBN/TF/6 meeting reviewed the two Task Lists: PBN Task Force Task List and the Implementation Task List.

7.2 The PBN TF agrees to integrate its Implementation Task List into the PBN Task Force Task List and updates the PBN Task Force Task List as shown in **Appendix G**.

Decision 6/14: The PBN TF agrees to integrate its Implementation Task List into the PBN Task Force Task List and updates the PBN Task Force Task List as shown in **Appendix G** to the Meeting Report.

Action 6/15: ICAO Secretariat is requested to provide an update report on PBN TF activities to ICAO Route Review Task Force. The PBN TF also requested that activities of the RR TF to be reported to the PBN TF.

Action 6/16: States / Administrations are requested to submit their PBN Implementation Progress Report by 20 February 2010 for onward submission to APANPIRG/21 Meeting.

Agenda Item 8: Feasibility of Establishing a Regional RAIM Prediction System

8.1 **APEC GNSS Implementation Team Activities and Potential Collaboration with ICAO PBN Task Force.** Thailand informed the PBN/TF/6 meeting on the outcome of the APEC GNSS Implementation Team Activities and potential collaboration with the ICAO PBN Task Force.

8.2 **Presentation of Working Paper 8 (WP8) - Regional RAIM Prediction System**. Thailand presented the Paper on Regional RAIM Prediction System.

8.2.1 GNSS is considered a main navigation infrastructure supporting PBN operations. It is now also becoming a critical component of surveillance system, such as ADS-B. Unpredicted outage of GNSS services can cause undesired interruptions on aircraft operations. ICAO Annex 10 and ICAO PBN manual require States and ANSPs to provide timely warnings of GNSS RAIM outages. RAIM prediction results are needed daily by pilots, flight dispatchers, air traffic controllers and airspace planners.

8.2.2 The Thailand paper discusses a proposal to establish a 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.

Discussion

8.2.3 The PBN TF noted that the proposal is also in line with ICAO APANPIRG Decisions 20/38 and 20/39 which tasks the ICAO PBN Task Force to examine the feasibility of establishing a regional RAIM prediction system and invite ICAO to develop guidance material on establishing common implementation rules and technical standards for GNSS reporting and prediction requirements. The PBNTF also noted that the 46th DGCA Conference encourages States to support and place priority on the ICAO Task Forces and work programmes for the Asia-Pacific. Proposals on specific mechanisms, such as a regional RAIM prediction service, could also be looked into.

8.2.4 The PBN TF was informed that The APEC GNSS Implementation Team (GIT), a team established under the Asia-Pacific Economic Cooperation (APEC) Transportation Working Group, during its thirteenth meeting in 2009, has expressed its willingness to work cooperatively with ICAO PBN Task Force to support the establishment of a regional RAIM prediction service. The PBNTF also noted with appreciation that Thailand through AEROTHAI is willing to serve as a project coordinator for this important regional activity.

8.2.5 The PBNTF agrees in principle to the establishment of a regional RAIM prediction system and cooperation between the ICAO PBN TF and the APEC GIT. The PBN TF requests AEROTHAI to develop more detailed technical architecture, operational concepts, and administrative arrangements to be reviewed by the Task Force at the next PBN TF meeting. Australia, India, Japan and USA also agreed to be part of the project team. Several States also expressed their interests as potential users for the regional RAIM prediction system.

> **Decision 6/17:** The PBNTF agrees in principle to the establishment of a regional RAIM prediction system and cooperation between the ICAO PBN TF and the APEC GIT. Australia, India, Japan and USA also agreed to be part of the project team.

Action 6/18: The PBN TF requests AEROTHAI in conjunction with the project team to develop more detailed technical architecture, operational concepts, and administrative arrangements to be reviewed by the Task Force at the PBN TF/7.

Agenda Item 9: Back up Requirements for PBN

9.1 Australia presented the Working Paper.The Chair opened the discussion with a review of the various PBN back up proposals across the world. In high aviation activity areas such as Europe and North America PBN was being implemented over an all ready established navigation and surveillance network of aids such as DME and SSR. Such a capacity does not exist in APAC. This raises the question of what is a common back up that is suitable in the region.

9.2 The Chair suggested that in the review of the State PBN plans being conducted, consideration be given to see if a common back up proposal was available or warranted as in the medium term, new Core Element GNSS systems combined with hybrid receivers would, in themselves, provide a back up capability.

Action 6/19: States are requested to develop Working Papers on back up requirements to be discussed at the PBN TF/7 Meeting.

Agenda Item 10: Flight Planning 2012 – PBN Flight Planning Issues

10.1 **Presentation of Working Paper 7 (WP7) - Review of PBN Flight Plan Requirements.**
Australia presented Working Paper 7 that discusses some issues that had arisen in considering the implementation of PBN with the flight plan requirements that become effective in November 2012 and noted that the APAC Task Force would be considering the transition to the new format.

10.2 Issues noted were the lack of APV reporting capacity beyond that of SBAS, Field 18 requirements to report PBN capability, the definition of G for GNSS and the removal of ADF for the "S" reporting for standard aids. Also noted was the capacity of many new aircraft to fly procedures (such as an NDB approach) without technically having the aid on the aircraft and questioned the status of reporting this capability.

10.3 The need for significant AIP amendments and training of pilots, ATC and dispatch staff on the changes was also highlighted.

Discussion

10.4 The meeting discussed the issues at length and also reviewed the guidance provided in ICAO State Letter AN 13/2.1-09/9 dated 6 February 2009 for implementation of flight plan information to support Amendment 1 of the Procedures for Air Navigation Services – Air Traffic Management, Fifteenth Edition (PANS-ATM.DOC 4444). The meeting agreed that:

Action 6/20: Working Paper PBN/TF/6 – W/7 be forwarded to the Flight Plan and ATS Messages Implementation Task Force (meeting now to be held in July 2010).

Action 6/21: States be requested to review the requirements of the State Letter on the implementation of the interim 2012 flight plan format in the context of PBN implementation and report to the PBN TF 7 meeting issues noted.

Agenda Item 11: Update of Task Lists

11.1 The PBN TF agrees to integrate its Implementation Task List into the PBN Task Force Task List and updates the PBN Task Force Task List as shown in **Appendix G**.

Agenda Item 12: Extension of Task Force beyond TF/7 Meeting

12.1 APANPIRG had given the Task Force a mandate to continue its activities up to the TF/7 meeting mid 2010. The Chair raised the need for the meeting to consider the Task Force's future activities, if warranted. This generated considerable discussion with the final consensus that the TF should generate a proposal for consideration by APANPIRG for the continuation of the TF's work beyond mid 2010. This proposal should include a review of the TORs with emphasis on performance based outcomes rather than purely set meeting numbers and periods of activity. The continuity of the TF be further discussed at the PBN/TF/7 meeting and the proposal be mooted accordingly.

Agenda Item 13: Any Other Business

13.1 **Hosting of ICAO Asia Pacific PBN Implementation Seminar in 2011**

13.1.1 The chair noted that the region was committed to host another PBN Implementation Seminar in 2011 and requested States to confirm their willingness to host this at the PBN/TF/7 meeting in June 2010.

Agenda Item 14: Date and Venue for Next Meeting

14.1 PBN/TF/7 meeting will be held during the week of 1- 4 June 2010 at the ICAO Asia Pacific Office Bangkok, Thailand.

15. Closing of the Meeting

15.1 Review of Draft Report. The meeting reviewed the Draft Report and gave it concurrence after incorporating changes.

15.2 Closing Remarks

15.2.1 The Chair noted the high and increasing regional activity in PBN as indicated by the number of attendees at the PBN Seminar and the T/F 6 meeting and the range of material presented including various State Plans and PBN roadmaps. While a wide range of PBN material is now available, the issues noted at the TF meeting highlighted the need for a dedicated PBN Task Force in the region, the ongoing work of the PBN Study Group and continuation of the various education, training and approval programs.

15.2.2 The Chair recognized the success of the PBN Seminar thanks to the excellent support provided by the hosts in Hong Kong (CAD and Cathay Pacific) and the quality of the presentations.

15.2.3 The meeting was reminded of the extent of the PBN material contained in both the Seminar and the PBN TF CDs and suggested these be widely distributed on their return home.

15.2.4 The Chair thanked the ICAO Secretariat for once again their excellent support to the Task Force and wished the Task Force meeting participants a safe trip home.

15.3 The Secretary, PBN Task Force thanked the Chairman and all participants for the support and cooperation extended throughout the meeting.

15.4 The meeting was closed with thanks to all involved in the PBN Task Force 6 meeting.

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The Sixth Meeting of the ICAO Performance Based Navigation Task Force (PBN/TF/6)
(Hong Kong, China, 3-5 February 2010)

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LIST OF WORKING PAPERS (WPs) AND INFORMATION PAPERS (IPs)

WORKING PAPERS

Number	Agenda	Title	Presented by
WP/1	1	Adoption of Agenda	Secretariat
WP/2	3	Review of Outcome of APANPIRG/20 on PBN	Secretariat
WP/3	3	RASMAG/12 Outcomes	Secretariat
WP/4	3	PBN Implementation Progress in the Asia Pacific Region	Secretariat
WP/5	3	PBN Implementation Enroute	Secretariat
WP/6	4	Draft ICAO PBN Operations Approval Handbook	Australia
WP/7	10	Review of PBN Flight Plan Requirements	Australia
WP/8	8	Regional RAIM Prediction System	Thailand
WP/9	4	Performance Based Navigation (PBN) Operational Approval	COSCAP-SEA
WP/10	3	The Role of the PBN Task Force in Managing Challenges to PBN Implementation in Asia/Pacific	IATA
WP/11	6	Expanding the Scope of PBN Implementation Progress Reporting	IATA
WP/12	4	FMS Coding Issue Encountered during the Development of RNP APCH procedures	Hong Kong, China
WP/13	2	PBN Update	Secretariat

INFORMATION PAPERS

Number	Agenda	Title	Presented by
IP/1	-	List of Working Papers (WPs) and Information Papers (IPs)	Secretariat
IP/2	6	Thailand PBN Implementation in 2009	Thailand
IP/3	6	Myanmar PBN Implementation Plan	Myanmar
IP/4	6	Update on PBN Implementation Progress – Hong Kong, China	Hong Kong, China
IP/5	6	Republic of Korea PBN Implementation Plan	Republic of Korea

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AGENDA

Agenda Item 1: Adoption of Agenda

Agenda Item 2: Global PBN Implementation – Update

Agenda Item 3: APAC Region PBN Implementation

- 3.1 APAC Region PBN Implementation Progress
- 3.2 Review of Outcome of APANPIRG/20 on PBN
- 3.3 RASMAG/12 Outcomes
- 3.4 PBN Implementation Enroute
- 3.5 APAC Flight Procedure Programme Office – Update
- 3.6 The Role of the PBN Task Force in Managing Challenges to PBN Implementation In Asia Pacific

Agenda Item 4: PBN Implementation Issues

- 4.1 Draft ICAO PBN Operations Approval Handbook
- 4.2 PBN Operational Approval Process / Training
- 4.3 FMS Coding Issue Encountered during the Development of RNP APCH Procedures

Agenda Item 5: Review of Final Version (Version 1) of APAC Regional PBN Implementation Plan

Agenda Item 6: State / Industry Presentations

- 6.1 State PBN Plan and Status of PBN Implementation Progress
- 6.2 Industry Updates on PBN
- 6.3 Expanding the Scope of PBN Implementation Progress Reporting

Agenda Item 7: Task Lists Review

- 7.1 Task List – PBN Task Force
- 7.2 Task List – Implementation Task List

Agenda Item 8: Feasibility of Establishing a Regional RAIM Prediction System

- 8.1 APEC GNSS Implementation Team Activities and Potential Collaboration with ICAO PBN Task Force
- 8.2 Regional RAIM Prediction System

Agenda Item 9: Back up Requirements for PBN

Agenda Item 10: Flight Planning 2012 – PBN Flight Planning Issues

- 10.1 Review of PBN Flight Plan Requirements

Agenda Item 11: Update of Task Lists

Agenda Item 12: Extension of Task Force beyond TF/7 Meeting

Agenda Item 13: Any Other Business

- 13.1 Hosting of ICAO Asia Pacific PBN Implementation Seminar in 2011

Agenda Item 14: Date and Venue for Next Meeting

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PROPOSED APPROVALS DATABASE RECORD FORMAT

Aircraft & Operator Details	
Registration No	
State of Registry	
Registration Date	
Name of Operator	
State of Operator	
Operator Identifier	
Operator Type	*[CIV/MIL]*
Aircraft Type	
Aircraft Series	
Manufacturers Serial No	
Mode S Address Code	

Approval	*Airworthiness Approval* (State)	*Primary Sensor Type* (DME-DME/ INS/IRS/GNSS)	*Time Limit* (hrs)	*Vertical Guidance* (APV/LPV)	*RF Leg Capable* (Yes/No)	*Limitations* (text)	*Date*	*Operational Approval* (State)	*Date*	*Expiry date*	*Approval withdrawn* (date)	*Information provided by State authority*	*Regional approval*
RNAV10													
RNAV5													
RNAV2													
RNAV1													
RNP4													
RNP2													
Basic RNP1													
Advanced RNP1													
RNP APCH													
RNP AR APCH													
RVSM													
VDL													
Mode S													
SATCOM													
HF													
Remarks													

PBN Operation Approval Requirements

Draft Implementation Template

1. Purpose

1.1 This document provides a brief explanation on the outputs to be developed to enable States to conduct PBN Operational Approval in accordance with ICAO requirements. The outputs would also assist States' efforts to comply with the best practices of the Global Safety Initiative (GSI) 12 - Gaps in use of Technology; GSI 1 – Inconsistent Implementation of ICAO SARPs, and GSI 2 – Inconsistent Regulatory Oversight as contained in the ICAO Global Aviation Safety Plan and ISSG Roadmap.

2. Background

2.1 ICAO Assembly Resolution A36-23 urged all States to implement RNAV and RNP routes and approach procedures as laid down in the PBN Manual (DOC 9613). Furthermore it was resolved that States develop implementation plans in accordance with milestones outlined in the resolution.

2.2 While the ICAO PBN Manual (DOC 9613) does contain some basic information concerning PBN Operational Approval (Volume I, Part A, 3.4), there is no detailed guidance or is training readily available to assist States with implementation of the PBN operational approval process.

2.3 This document describes the outputs to be developed by an ad hoc Asia Pacific Operational Approval implementation team, with members from ICAO, Asia Flight Procedures Programme (FPP), COSCAP programmes Asia Pacific, Australia, China, Hong Kong China, Singapore and United States. The outputs to be developed include, Draft ICAO PBN Operational Approval Manual (DOCXXXX), Model PBN Regulations, Model PBN Operational Approval Handbook, and PBN Operational Approval Course.

3. ICAO PBN Operational Approval Manual (DOCXXXX)

3.1 The Draft ICAO PBN Operational Approval Manual (DOCXXXX) will be an ICAO document that will provide guidance to States on the operational approval process. The team would develop a draft document that ICAO would finalize in accordance with ICAO modalities.

4. PBN Model Regulations

4.1 The PBN Model Regulations would be a model regulation that would provide the regulatory basis for approval of PBN operations. States could adapt the model regulations to provide the regulatory basis for PBN approvals.

4.2 States who presently have regulations in place could utilize the model regulations as a document to confirm that present regulations can support PBN operational approval.

5. Model PBN Operational Approval Handbook

5.1 The Model PBN Operational Approval Handbook is an inspector handbook that could be readily adapted and approved by a CAA to provide guidance to CAA staff, service providers and air operators on the process for PBN Operational Approval. The Handbook would be based on the ICAO PBN Operational Approval Manual, but would be developed as a State document that would provide all procedures and job aids to ensure certification and oversight of PBN operational implementation.

6. PBN Operational Approval Course - Basic and Advanced

6.1 The Basic PBN Operational Approval Course would provide training to Flight Operations Inspectors and air operators to ensure their understanding of PBN and the approval processes. The Advanced PBN Operational Approval Course, to be developed after the Basic Course, would provide training to Flight Operations Inspectors and industry to ensure their understanding on RNP AR and these more extensive approval requirements. Completion of the Basic Course is a requirement before undertaking the Advanced Course.

Draft Work Programme

1. **ICAO PBN Operational Approval Manual (DOCXXXX)**

1.1 Comments to be provided as soon as possible to CASA Bob Kennedy on the CASA draft Manual that has recently been circulated.

1.2 Hong Kong China and Singapore agreed to adapt the South American job aids and to provide these to Bob Kennedy by 15 March 2010. Job aids to be circulated to team members for comment.

1.3 COSCAP programme to develop draft model regulations and provide to CASA Bob Kennedy by 15 March 2010 and circulated to team members for comment.

2. **Model PBN Operational Approval Regulations**

2.1 COSCAP programme to develop draft model regulations and provide to CASA Bob Kennedy by 15 March 2010.

2.2 COSCAP to amend the model regulations and ensure final version is provided to members and is available for COSCAP States by 30 June 2010.

3. **Model State PBN Operational Approval Handbook**

3.1 COSCAP to develop/derive the Handbook from the ICAO PBN Operational Approval Manual. To be provided to team members for comments by 5 May 2010 and final draft issued by 30 June 2010 .

4. **PBN Operational Approval Training Course**

4.1 CASA Bob Kennedy to develop course syllabus and circulate to team members for review by 15 March 2010.

4.2 CASA Bob Kennedy to develop course training material.

4.3 COSCAP Len Cormier to develop PBN Operational Approval Course Information and Outline and provide to team members for review by 15 February 2010.

4.4 COSCAP Len Cormier to develop letter of invitation for participates to the PBN Operational Approval Course and invite participates. For the initial course, invitations to be extended to administrations that are very active with respect PBN implementation or States who have significant needs related to PBN implementation. Maximum 20 participants.

4.5 CASA and FAA invited to each send two participants in support of the course (not included in the 20 participants above).

4.6 The first course to be conducted during the 5 day period of 26 – 30 April 2010. CAA Singapore to provide the venue for the programme and to provide venue details and recommendations concerning accommodation to COSCAP Len Cormier by 15 February 2010 for inclusion in the letter of invitation.

4.7 After the April 2010 PBN Operational Approval course, team member to consider the provision of additional training courses in the Asia Pacific region and develop a core to instructors to ensure sustainability of the training programme. In addition, consideration be given to identifying modalities to export the programme on a global basis.

4.8 After the April 2010 PBN Operational Approval course, team members to consider the needs and requirements for training related to RNP AR operational approval.

4.9 After the April 2010 PBN Operational Approval course, team members to consider the requirements and possible for On-Job-Training to assist States

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Proposed Revision to Summary Table & Implementation Targets

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	
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 • 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.

Proposed Revision Note 3

*** **Note 3:** When establishing the implementation targets in accordance with Assembly Resolution A36/23, the States should first conduct an analysis of the instrument RWY eligibility for APV approach. This analysis should include the feasibility of the APV at a particular location, the presence of regular commercial operations and the current or projected user fleet capability for APV. Locations where APV approach is either not feasible or where the regular operators cannot realize the benefit of APV within the set implementation timeline, need not be included. Where APV is not implemented, States should consider implementation of RNP APCH with LNAV minima instead of APV to provide the safety benefits of straight-in approach procedures.

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TASK LIST – PBN Task Force

No.	Tasks/Strategy	Category	Status
C4/1	The APAC PBN TF encourages States to consider the GO Team visit.	Implementation	**On-going.** States are encouraged to consider the GO Team visit as required.
C4/2	The APAC PBN TF requests the Global PBN Task Force to consider providing assistance to States which currently are at the early stage of PBN implementation.	-	**Closed.**
C4/3	The APAC PBN TF agrees to provide progress report of PBN implementation in the Asia-Pacific to the Global PBN Task Force	-	**Closed.** The PBN TF has provided progress report to the Global PBN Task Force.
C4/4	The APAC PBN Task Force requested that the Interim Edition (V '0.2') of the Regional PBN Implementation Plan be presented at theATM/AIS/SAR/SG/19 Meeting (June 22-26, 2009) for review as required by APANPIRG/19.	-	**Closed.**
C4/5	The APAC PBN TF agrees to continue an annual review of the Asia-Pacific Regional PBN Implementation Plan	Reporting	**Routine**
A4/6	Develop an up-to-date archive of all relevant guidance materials for each PBN implementation step as outlined in the PBN manual	-	**Closed.** Information on relevant guidance materials is currently available and can be downloaded from ICAO PBN web site. (http://www.icao.int/pbn) The Secretariat also provides a comprehensive CD containing important PBN guidance and resource materials.

No.	Tasks/Strategy	Category	Status
A4/7	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	Education	**On-going.** The PBN TF/5 accepted Hong Kong's offer to host the second PBN Seminar, planned for Feb 2010, subjected to APANPIRG approval. Vietnam and Thailand also offer to host future PBN seminars.
C4/8	In respect to the request by COSCAPs regarding the development of guidance material for APV, the APAC PBN TF recognized the work currently being conducted by the Global PBN TF to develop and review materials on the issues of APV and Non-Precision Approach as related to PBN	-	**Closed.**
C4/9	The ICAO APAC PBN TF recommends that the PBNSG continue to review and revise the PBN Manual to achieve a more hierarchical and easily used structure to minimize the number and complexity of the airworthiness approvals required for PBN operations. The GPBNTF is considered to be an organization well placed to advise ICAO Regions on harmonization and the development of common standards	-	**Closed.** PBNSG noted the request from the APAC PBN TF. Materials and suggestions on structure of the PBN manual have been forwarded to PBN SG. Updated version of the PBN manual would be available in the second quarter of 2010.
C4/10	The APAC PBN TF agrees to continue coordination with other regional PBN task forces and the Global PBN Task Force to ensure harmonization of PBN implementation	Planning	**On-going.** Report on Global PBN Task Force activities are presented and noted by PBN TF/5.
A4/11	States are requested to provide progress report regarding PBN implementation at each Task Force meeting	-	**Closed.** Transferred to Action Item 5/08

No.	Tasks/Strategy	Category	Status
A4/12	Mandate 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	Planning	**Routine.** States are requested to provide report on the developments of State PBN Implementation Plans.
A4/13	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	-	**Closed**. The TF/5 agreed on the report template.
C4/14	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	Reporting	**Routine.**
A4/15	Request ICAO Headquarter to provide a presentation on the requirement for safety assessment for PBN implementation and overview of how to conduct proper safety assessment at future PBN TF meetings	Education	**On-going**. The TF referred to the PBN SG for the development of safety assessment criteria.
C4/16	The APAC PBN Task Force considers itself a suitable forum to facilitate and harmonize terminal and en-route PBN implementation in the Asia Pacific Region. Therefore, the Task Force requests 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*"	-	**Closed.** APANPIRG/20 has a decision to establish a Route Review Task Force.
A4/17	Recognizing that the PBN planning activities for the Asia-Pacific are nearing completion and acknowledging the Task Force's willingness to support actual PBN implementation, the APAC PBN Task Force request working papers regarding revision of the Task Force's work structure to be submitted for consideration at PBN TF/5. Members of the PBN TF are encouraged to coordinate intersessionally to prepare the working papers.	Implementation	**On-going.**
A4/18	Request ICAO to provide status report of the work by PBNSG, SASP and IFPP	-	**Closed.**
C5/01	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.	Planning	**On-going.**

No.	Tasks/Strategy	Category	Status
C5/02	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.	-	**Closed.** CNS/MET will consider the feasibility of establishing a regional SBAS capability.
C5/03	That, the concern raised by the US GAO report was noted; and this concern be forwarded to APANPIRG and ICAO HQs.	-	**Closed**. US Government has guaranteed availability of minimum GPS constellation in writing to ICAO HQ.
C5/04	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.	Implementation	**On-going.** APANPIRG Conclusion 20/37invites ICAO to develop the guidance materials.
C5/05	That, APANPIRG consider tasking the PBN TF with examining the feasibility of establishing a regional RAIM prediction system.	-	**Closed.** APANPIRG Conclusion 20/38 tasks the PBN TF with examining the feasibility of establishing a regional RAIM prediction system.
C5/06	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.	Education	**On-going.** APANPIRG Conclusion 20/37invites ICAO to develop the guidance materials.
C5/07	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.	-	**Closed.** APANPIRD Conclusion20/39 distributes the Report to the States for further distribution to all operators.
C5/08	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.	Reporting	**Routine.**

No.	Tasks/Strategy	Category	Status
C5/09	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.	-	**Closed.**
C5/10	That, the APAC Regional PBN Implementation Plan (Interim Edition Version 0.3) be presented at the APANPIRG/20 for approval.	-	**Closed.** APANPIRG Conclusion 20/41 adopted the APAC Regional PBN Implementation Plan (Interim Edition Version 0.3) as Version 1.0
C5/11	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.	-	**Closed.**
C5/12	That, the PBNSG be requested to provide guidance on any PBN-specific aspects of en route safety assessment.	Education	**On-going.**
C5/13	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.	-	**Closed.**
C5/14	That, ICAO kindly assist with addressing the PBN safety assessment training needs in the region.	Education	**On-going**
C5/15	Urged States to give detailed considerations to the operational need, safety and cost benefits prior to deciding on RNP AR Approach implementation.	-	**Closed.**
C5/16	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.	-	**Closed.**
C5/17	That, ICAO be requested to consider providing an annual summary of panel and working group activities to allow proper coordination amongst different groups (PBN/TF/4 Action Item 4/18)	Reporting	**Routine.**

No.	Tasks/Strategy	Category	Status
A6/1	States are encouraged to consider implementing CDO in accordance with ICAO CDO Manual Doc 9331 on as many STARs as practicable to enhance fuel efficiency, ease pilot and ATC workloads, and reduce emission and noise.	Implementation	
A6/2	States are encouraged to attend to ICAO PBN Airspace Design Workshop in 19-22 April 2010 to enhance their expertise with airspace design relating to implementation of PBN	Education	
A6/3	States are encouraged to attend CDO workshop to be hold in Bangkok on the week of March 15 in conjunction with IFPP meeting.	Education	
A6/4	IATA is requested to provide the progress on the development of global database for PBN approval at the PBN TF/7 Meeting.	Implementation	
A6/5	States are requested to list the challenges and impediments for PBN implementations to be reported at the PBN TF/7 Meeting.	Implementation	**Routine**
A6/6	A harmonization analysis report on State PBN Implementation Plans to be developed by IATA and volunteering States (Australia, Hong Kong, New Zealand and Thailand) and reported to the PBN TF/7 Meeting.	Planning	
A6/7	States are requested to review the draft PBN Operational Approval Handbook and provide feedback at future PBN TF meetings. States are also invited to contribute relevant material to be integrated into the Handbook.	Implementation	
A6/8	States are encouraged to participate in the PBN Operational Approval Training to be conducted under the auspices of COSCAPs in Singapore on during 26-30 April 2010. Invitation will be issued to selected States by COSCAPs.	Education	

No.	Tasks/Strategy	Category	Status
A6/9	ICAO Regional Office to inform IFPP, PBNSG and APANPIRG limitation of older FMS in inputting procedure identification within 6-digit alphanumeric. This limitation occurs when pilots attempt to select specific approach for an airport that has multiple runways and each of runways has multiple approach procedures of the same type of navigation system. ICAO is requested to provide guidance and standardized solution to the issue.	Implementation	
DC6/10	The proposed revision to the APAC Regional PBN Implementation Plan as shown in Appendix 'F' of the PBN TF/6 Meeting report be adopted.	Planning	
DC6/11	ICAO provides guidance on aircraft that do not have a lateral and vertical readout on the navigation display, but do display the lateral and vertical profile on the navigation equipment, could be considered as alternate means of compliance if supplemented by appropriate flight crew training for RNP value of 0.3 RNP or greater.	Implementation	
DC6/12	Request CNS/MET SG, ATM/AIS/SAR SG, and APANPIRG to review and consider amending the APAC Performance Monitoring and Measurement Metrics 2 and 3 for PBN to include specific measurements that capture operational benefits in terms of PBN's ability to help fulfill strategic objectives (safety, efficiency, capacity, access, and the environment).	Planning	
A6/13	ICAO Secretariat to identify the appropriate office or forum that would be best suited to develop a standardized calculation and reporting method for States. This would include a mathematical model to ensure environmental benefit calculations are standardized.	Reporting	

No.	Tasks/Strategy	Category	Status
D6/14	The PBN TF agrees to integrate its Implementation Task List into the PBN Task Force Task List and updates the PBN Task Force Task List as shown in an Appendix of the Meeting Report.	-	**Closed.**
A6/15	ICAO Secretariat to provide an update report on PBN TF activities to ICAO Route Review TF. The PBN TF also requested that activities of the RR TF to be reported to the PBN TF.	Coordination	
A6/16	States / Administrations to submit their PBN Implementation Progress Report by 20 February 2010 for onward submission to APANPIRG/21 Meeting.	Reporting	
D6/17	The PBNTF agrees in principle to the establishment of a regional RAIM prediction system and cooperation between the ICAO PBN TF and the APEC GIT. Australia, India, Japan and USA also agreed to be part of the project team.	Implementation	
A6/18	The PBN TF requests AEROTHAI in conjunction with the project team to develop more detailed technical architecture, operational concepts, and administrative arrangements to be reviewed by the Task Force at the PBN TF/7.	Implementation	
A6/19	States are requested to develop Working Papers on back up requirements for PBN to be discussed at the PBN TF/7 Meeting.	Planning	
A6/20	Working Paper PBN/TF/6 – W/7 be forwarded to the Flight Plan and ATS Messages Implementation Task Force (meeting now to be held in July 2010).	Coordination	

No.	Tasks/Strategy	Category	Status
A6/21	States be requested to review the requirements of the State Letter on the implementation of the interim 2012 flight plan format in the context of PBN implementation and report to the PBN TF 7 meeting issues noted.	Implementation	

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