



**The First Meeting of ICAO Asia/Pacific Performance based Navigation
Implementation Coordination Group (PBNICG/1)**

Beijing, China, 10-12 March 2015

Agenda Item 4: Review of related global/regional plans, priorities and targets and relevant meetings outcomes

REVIEW OF RELEVANT MEETINGS OUTCOMES

(Presented by Secretariat)

SUMMARY

This paper presents the relevant outcomes of APANPIRG/25 and ISTF/5 meetings.

1. INTRODUCTION

1.1 The Twenty Fifth Meeting of the Asia/Pacific Air Navigation Planning and Implementation Regional Group (APANPIRG/25) was held at Hotel Renaissance Kuala Lumpur, Malaysia from 8 to 11 September 2014. The meeting was attended by 122 participants from 23 Member States, 2 Special Administrative Regions of China and 4 International Organizations (CANSO, IATA, IBAC and IFALPA).

1.2 The Fifth Meeting of Ionospheric Studies Task Force (ISTF/5) was held in Okinawa, Japan from 16 to 18 February 2015. ISTF/5 meeting and was attended by 21 participants from 6 States (China, India, Japan, Malaysia, Thailand, USA), 1 Regional Organization (Eurocontrol) and 5 Industry organizations (Boeing, UK NATS, Honeywell, Indra Navia, Thales).

1.3 Both meetings present outcomes of significance for PBNICG.

2. DISCUSSION

APANPIRG/25

Regional and Global Planning & Monitoring

2.1 The APANPIRG/25 reviewed the ten regional priorities, targets and indicators. The discrepancies between targets and indicators noted by the CNS SG/18 meeting for 3 specific targets were solved by an ad hoc group formed by APANPIRG/25. Consequently the meeting adopted the following Conclusion:

Conclusion APANPIRG 25/2 – APAC Regional Air Navigation Priorities and Targets

That, the Regional Priorities and Targets contained in Appendix A to this Report on Agenda Item 3.0 be endorsed by APANPIRG.

2.2 For PBNICG the related priorities are as follows:

Priority	ASBU module or Seamless Element	Targets	Target date (Seamless ATM Phase 1 Plan)	Metric
PBN	B0-APTA	<p>1. <u>Approach</u>: Where practicable, all high-density aerodromes with instrument runways serving aeroplanes should have precision approaches or APV or LNAV.</p> <p><i>Note 1: High density aerodrome is defined by Asia-Pacific Seamless ATM Plan as aerodromes with scheduled operations in excess of 100,000/year.</i></p> <p><i>Note 2: the Asia/Pacific PBN Plan Version 3 required RNP APCH with Baro-VNAV or APV in 100% of instrument runways by 2016</i></p>	12 November 2015	% of high density aerodromes with precision approaches or APV or LNAV.
Trajectory-Based Operations-Data Link En-Route	B0-TBO	10. Within Category R airspace, ADS-C surveillance and CPDLC should be enabled to support PBN-based separations.	12 November 2015	% of FIRs using data link applications to support PBN-based separations in Category R airspace

ANRF, Seamless Reporting and Monitoring of Regional Progress

2.3 The APANPIRG/25 noted that the Air Navigation Report Forms (ANRFs) had replaced the earlier Performance Framework Forms (PFF) that were maintained by the various APANPIRG sub groups. The ANRF is intended to be a tool to set milestones, targets, and metrics for each of the key planning elements. The ANRF also identifies the implementation challenges. ANRF corresponding to the 18 ASBU elements were developed at the regional level and presented to APANPIRG and its Sub-Groups as appropriate for review, with the exception of B0-OPFL and B0-WAKE that were not reviewed by any sub group and were provided for information only at this stage. Noting that the creation of Performance Based Navigation Implementation Coordination Group (PBNICG) was adopted, the meeting selected the scenario 1 of the matrix of responsibilities for the 18

Block 0 ASBU elements and 45 Seamless items, and adopted the following Draft Conclusion endorsed by the CNS SG/18 and ATM SG/2 meetings:

Conclusion APANPIRG 25/3 – Air Navigation Report Forms (ANRFs) and Responsibility Matrix

That, the ANRF regarding the Block 0 ASBUs (except B0-RSEQ, B0-OPFL, and B0-WAKE) provided in the APANPIRG/25/WP26 Appendices A to P together with the matrix of responsibilities placed at Appendices B and C to the Report on Agenda Item 3.0 be adopted for the APAC Region.

2.4 The related ANRF are placed at **attachment A** for ease of reference.

2.5 The meeting reviewed the Seamless ATM Implementation Guidance v4.3 and the adopted the draft Conclusion endorsed by CNS/SG 18 and ATM SG/2 meetings:

Conclusion APANPIRG 25/4 – Seamless ATM Implementation Guidance

That, the Seamless ATM implementation guidance version 4.3,

<http://www.icao.int/APAC/Documents/edocs/Seamless%20ATM%20Implementation%20Guidance%20v4-3.pdf>), May 2014 be adopted by APAC States/Administrations and maintained by the ICAO Regional Office.

2.6 The meeting adopted the following Draft Conclusion developed by the CNS SG/18 and ATM SG/2 meetings:

Conclusion APANPIRG 25/5 – Web-based Seamless ATM Implementation Progress Reporting Process

That, States/Administrations be urged to report on their Seamless ATM implementation progress at least once a year through the ICAO online reporting process from November 2014 onwards.

2.7 The secured webpage is available here: https://portal.icao.int/RO_APAC/Reporting/Pages/default.aspx. The points of contact are responsible for updating their respective State's progress of implementing the Seamless ATM Plan.

2.8 As of 05 March 2015:

- 9 States/Administrations (Australia, French Polynesia France, Hong Kong China, India, Japan, Macao China, Singapore, Thailand, and United States) have submitted their report through the *Seamless ATM Implementation Progress Reporting Process*.
- 8 other States (Bangladesh, China, Malaysia, New Zealand, Philippines, Republic of Korea, Singapore, and Sri Lanka) have a form in preparation that should be submitted at the earliest.

- All other States should submit their first report as soon as possible
- 15 States/Administrations had nominated their Points of Contact to the ICAO Regional Office. The rest of States/Administrations are urged through ICAO State letters to do so at the earliest

Performance-based Airspace

2.9 The meeting was informed of Proposals for Amendment (PFA) to ICAO Doc. 7030 Regional Supplementary Procedures to support State mandates for performance-based airspace including PBN airspace and Controller Pilot Data Link Communications (CPDLC), Mode S Secondary Surveillance Radar (SSR) transponder, Airborne Collision Avoidance System (ACAS) II, Automatic Dependent Surveillance-Broadcast (ADS-B), and Automatic Dependent Surveillance-Contract (ADS-C) equipage for aircraft operating outside territorial airspace, within the area of responsibility of the State. The ATM/SG/2 had noted that APANPIRG had adopted a number of Conclusions supporting mandates for the carriage and use of ADS-B, ADS-C and CPDLC equipment within portions of airspace within their area of responsibility, and priority for access to such airspace.

2.10 The following PfAs had been drafted by the ICAO Asia/Pacific Regional Office:

- APAC-S 14/07 – MID/ASIA/PAC, supporting State mandates for carriage and operation of serviceable CPDLC equipment;
- APAC-S 14/08 – MID/ASIA/PAC, removing reference to the redundant standard RNP 12.6, and supporting State PBN airspace mandates; and
- APAC-S 14/09 – MID/ASIA/PAC, supporting State mandates for carriage and operation of SSR Mode S transponders, ACAS II, ADS-C and ADS-B equipment.

2.11 The PfAs would provide a framework for Asia/Pacific States to establish performance-based airspace by enabling States to promulgate PBN airspace and equipage mandates in airspace over the High Seas, but did not compel States to implement performance-based airspace. It was recognized that unlike some regions, it was not practical for the Asia/Pacific Region to establish region-wide simultaneous mandates, but the PfAs would set a strict expectation of the process to be followed by each administration. While reserving its position on the substance of the draft PfAs IBAC complimented the ICAO Regional Office, noting that development of the PfAs was in the right direction.

2.12 States were required to notify the ICAO Regional Office of any request for ATS Route designators. The process was laborious and time-consuming for States and the Regional Office, and potentially induced handling errors. The ATS Route Designators allocation function of the ICARD application was not available to the Asia/Pacific Region. Given the expected increase in requests for new ATS route designators to facilitate airspace capacity and efficiency outcomes and PBN implementation a more appropriate and up-to-date method was needed.

2.13 APANPIRG/25 agreed to the following Conclusion:

Conclusion APANPIRG/25-17: ICARD ATS Route Designators Function Access

That, taking into consideration the rising demand for ATS route designators, resulting from airspace capacity and efficiency changes and implementation of PBN routes and airspace, ICAO be requested to take steps to develop the ATS Route

Designators function in the ICARD application and provide Asia/Pacific ICARD 5LNC MANAGERS and ICARD 5LNC PLANNERS with access to it.

2.14 It was noted that the ICAO Regional Performance Dashboards (<http://www.icao.int/safety/Pages/Regional-Targets.aspx>) presented up-to-date regional implementation results, highlighting what States and groups of States were achieving in collaboration with their respective Planning and Implementation Regional Groups (PIRGs) and Regional Aviation Safety Groups (RASGs). Their ultimate intention, besides ICAO's basic measurement, accountability and transparency goals, was to help motivate aviation groups and stakeholders to continue to participate in and improve upon the applicable cooperative programmes being implemented at the regional level.

2.15 The CNS SG/18 meeting performed a review of the Navigation Strategy for the Asia/Pacific Region and endorsed the draft conclusion 18/15, which was adopted by the meeting:

Conclusion APANPIRG 25/39 – Navigation Strategy for the Asia/Pacific Region

That, the revised navigation strategy provided in APANPIRG/25/WP09, Appendix Q be adopted for the Asia/Pacific Region.

2.16 The revised navigation strategy is placed at **attachment B** for ease of reference.

2.17 To further support the implementation of PBN, the establishment of an APANPIRG PBNICG was discussed by the meeting with the primary aim to support, harmonize and prioritize implementation of PBN. The PBNICG would comprise multi-disciplinary experts with knowledge and/or responsibility for PBN implementation. In cooperation with the RSO, it would serve as a regional forum to identify issues/action items and communicate with relevant ICAO panels or working/study groups.

2.18 In view of the above the meeting adopted the following decision:

Decision APANPIRG 25/44 – APANPIRG Performance-based Navigation Implementation Coordination Group (PBNICG)

That, the APANPIRG Performance-based Navigation Implementation Coordination Group (PBNICG) be established and its Terms of Reference provided in Appendix A be adopted.

2.19 The APANPIRG/25 meeting was updated on GAGAN in India and a Regional RAIM (Receiver Autonomous Integrity Monitoring) System in Thailand. GAGAN system had successfully passed through phase I certification for RNP0.1 en- route services on 30th December 2013 and was working towards achieving Approach with Vertical Guidance (APV1.0) terminal capability by February 2015. AEROTHAI had procured and successfully implemented the initial establishment of the RAIM Prediction System in April 2013.

ISTF/5

2.20 All papers and the meeting report are available here: <http://www.icao.int/APAC/Meetings/Pages/2015-ISTF5.aspx>

Review of status of States' activities

2.21 GAGAN was certified for RNP0.1 service in December 2013 and consequently declared commissioned for RNP0.1 to support for en route operations on 14th February 2014. India

informed the meeting that the work on certification for APV1 service is being carried out and is likely to be completed by second quarter of 2015. OT&E is an essential component of the approval process.

2.22 China informed the meeting that GRIMS (Ground Regional Integrity Monitoring System) has been established since 2004 to promote GNSS's integrity. Ionosphere studies from GRIMS raw data is one of important aspects of system evaluation. Besides GRIMS raw data, data from seven IGS sites in China and simulated data have been utilized to analyze the performance of various augmentation systems proposed by industry. The seven stations are currently deployed and cover most part of China. A ground based augmentation system (GBAS) has been installed in Shanghai Pudong Airport. Performance evaluation and flight inspection will be planned.

2.23 JCAB is currently performing analysis of data. MSAS is certified for NPA, and Japan has currently no plans for further certification.

2.24 AEROTHAI plans GBAS implementation for 2017 or 2018, depending also on the results of this task force. AERITHAI plans to procure 2 scintillation receivers at Suvarnabhumi airport.

2.25 United States informed the meeting that the focus was on the validation of GAST-D requirements and work with the LTIAM tool.

Progress report on Task 2 - Iono Analysis

2.26 Considering the outcomes of data collection across the APAC region done by ISTF since its inception, the meeting established the following draft decision:

Draft Decision 5/1 Need for ionospheric threat models in the APAC region

Considering that extreme ionospheric gradients were observed in the APAC region through data collection, and in Brazil likewise, the need for GBAS threat model is confirmed. Considering the various factors such as variable ground stations network layouts and service levels, guidance for establishing a SBAS iono safety case model is needed.

Progress report on Task 5 – Iono Models

2.27 Concerning SBAS models, the ISTF/5 meeting identified therefore 6 steps to complete the Task 5 for SBAS:

1. Identify the operational hazards related to the ionospheric threats for SBAS
2. Identify factors influencing the mitigation strategy (ground stations distribution, iono model used, etc)
3. Identify common threats (independent of any particular iono model) such as temporal and spatial threats
4. Identify requirements for the threat model (such as: level of overbounding of ionospheric errors)
5. Develop a methodology to generate threat mitigation models
6. Optionally, develop a tool for generating the threat model

2.28 Concerning GBAS models, the ISTF/5 meeting identified 5 steps to complete the Task 5 for GBAS:

Using the draft GAST D SARPS guidance as a reference,

1. Identify the operational hazards related to the ionospheric threats for GBAS
2. Identify factors influencing the mitigation strategy for GBAS in addition to parameters referenced in the GBAS related SARPS guidance material (such as occurrence probability, number of simultaneously influenced satellites, etc)
3. Summarizing the iono characteristics of the APAC region (SED, plasma bubbles, optionally nominal ionosphere) for 2 sets of parameters in the APAC region
4. Recommend/develop tool(s) for generating the threat model
5. Develop a methodology to generate the threat model.

3. ACTION BY THE MEETING

3.1 The meeting is invited to:

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

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APANPIRG/25 - WP/26
APPENDIX A

1. AIR NAVIGATION REPORT FORM (ANRF)

APAC Regional Planning for ASBU Modules

2. REGIONAL/NATIONAL PERFORMANCE OBJECTIVE – Module PBN Terminal					
Performance Improvement Area 4: Efficient Flight Path – Through Trajectory-based Operations					
3. ASBU B0-TBO: Impact on Main Key Performance Areas (KPA)					
	Access & Equity	Capacity	Efficiency	Environment	Safety
Applicable	N	N	Y	Y	Y

4. PBN Terminal: Planning Targets and Implementation Progress	
5. Elements	6. Targets and implementation progress (Ground and Air)
CCO implementation ¹	November 2015 (Phase I): all high density international aerodromes implement CCO and CDO operations where States have assessed it applicable ²
CDO implementation	
PBN SIDs implementation	November 2015 (Phase I): all international high density aerodromes should have RNAV 1 (ATS surveillance environment) or RNP 1 (ATS surveillance and non-ATS surveillance environments) SID/STAR
PBN STARs	

7. PBN Terminal: Implementation Challenges				
Elements	Implementation Area			
	Ground System Implementation	Avionics Implementation	Procedures Availability	Operational Approvals
CCO implementation	NIL	NIL	Airspace and procedure design enable optimized climb profile until cruising level	NIL
CDO implementation	NIL	NIL	Airspace and procedure design enable optimized profile descents (avoid stepped arrivals)	NIL

¹ CCO and CDO are flight operations procedures and only indirectly related to PBN procedures - SID/STAR, and APV. Whether this stays in this ANRF or not will depend entirely on finding a performance measurement that has some meaning. If we do not, then these items should be removed.

² The Seamless ATM Plan does not state that CCO/CDO is expected to be implemented in all high density aerodromes. It says that States should consider implementation. The target is to implement 100% of procedures that have been assessed as beneficial (i.e.: according to the States plan)



APANPIRG/25 - WP/26
APPENDIX A

7. PBN Terminal: Implementation Challenges				
Elements	Implementation Area			
	Ground System Implementation	Avionics Implementation	Procedures Availability	Operational Approvals
PBN SIDs implementation	ATM systems enable PBN spec. and ATC separation standards (as per Seamless item 250)	NIL	NIL	NIL
PBN STARs	ATM systems enable PBN spec. and ATC separation standards (as per Seamless item 250)	NIL	NIL	NIL

8. PBN Terminal: Performance Monitoring and Measurement	
8A. PBN Terminal: Implementation Monitoring	
Elements	Performance Indicators/Supporting Metrics
CCO implementation	Indicators: Percentage of high density international aerodromes implementing CCO and CDO operations Supporting metric: Number of high density international aerodromes implementing CCO and CDO operations
CDO implementation	
PBN SIDs implementation	Indicators: percentage of international high density aerodromes implementing Standard Instrument Departures/Standard Terminal Arrivals (SID/STAR) Supporting metric: Number of international high density aerodromes implementing Standard Instrument Departures/Standard Terminal Arrivals (SID/STAR)
PBN STARs	
	Indicators: percentage of high density international aerodromes implementing ATM systems enabling optimal PBN operations Supporting metric: Number of high density international aerodromes implementing ATM systems enabling optimal PBN operations

8. PBN Terminal: Performance Monitoring and Measurement	
8 B. PBN Terminal: Performance Monitoring	
Key Performance Areas	Metrics (if not indicate qualitative Benefits)
Access & Equity	NA
Capacity	NA
Efficiency	Benefit: Cost savings for aircraft operators through reduced fuel burn and efficient aircraft operating profiles.
Environment	Benefit: Environmental benefits through reduced emissions and noise reduction Authorization of operations where noise limitations would otherwise result in operations being curtailed or restricted.
Safety	Benefit: More consistent flight paths. Lower pilot and air traffic control workload

REVISED NAVIGATION STRATEGY FOR THE ASIA/PACIFIC REGION

Considering:

- a) the material contained in the Performance Based Navigation Manual (Doc 9613) for enroute, approach, landing and departures operations;
- b) operators are approved to conduct PBN operations;
- c) GNSS is the primary navigation system for RNP;
- d) APV operations may be conducted with either BARO-VNAV or augmented GNSS;
- e) Augmented GNSS is available to support Category I, and will be able to support Category II and III operations by 2016;
- f) ILS is capable of meeting the majority of requirements for precision approach and landing in the Asia-Pacific Region;
- g) MLS CAT III is operational;
- h) the need to maintain aircraft and ground interoperability both within the Region and between the Asia/Pacific Region and other ICAO regions and to provide flexibility for future aircraft equipage;
- i) single-frequency GNSS may be susceptible to radio frequency interference and ionospheric disturbances:

Strategy

- i) Convert from terrestrial-based instrument flight procedures to PBN operations in accordance with the Asia/Pacific Seamless ATM Plan;
- ii) retain ILS as an ICAO standard system for as long as it is operationally acceptable and economically beneficial;
- iii) implement GNSS with augmentation as required for APV and precision approach or RNP operations where it is operationally and economically beneficial;
- iv) implement the use of APV operation in accordance with the Asia/Pacific Seamless ATM Plan;
- v) rationalize terrestrial navigation aids, retaining a minimum network of terrestrial aids necessary to maintain safety of aircraft operations;
- vi) protect all the Aeronautical Radio Navigation Service (ARNS) frequencies;
- vii) ensure civil-military interoperability; and
- viii) continue monitoring the development of alternative position, navigation and timing
