



International Civil Aviation Organization

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

Beijing, China, 10-12 March 2015

PBNICG/1-WP/09  
10/03/2015 - 12/03/2015

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**Agenda Item 3: Global and Regional PBN Updates and States' PBN Implementation Progress**

**REVIEW AND UPDATE STATE'S PBN IMPLEMENTATION STATUS**

(Presented by Secretariat)

**SUMMARY**

This working paper requests PBNICG to review the status of State's PBN Implementation and advise PBNICG Secretariat of any discrepancy found in the current database. The paper also requested PBNICG to review and enhance the PBN Implementation Progress Report.

**1. INTRODUCTION**

1.1 In the Resolution A37-11 of the 37<sup>th</sup> Session of the ICAO General Assembly which superseded Resolution A36-23, the Assembly urged all States to implement RNAV and RNP air traffic services (ATS) routes and approach procedures in accordance with the ICAO PBN Manual (Doc 9613). Also the Assembly resolved that States complete a PBN implementation plan to achieve the implementation of RNAV and RNP operations for en-route and terminal areas according to established timelines and intermediate milestones. Especially for the implementation of approach procedures with vertical guidance (APV) including LNAV-only minima, the Assembly proposed to complete the implementation for all instrument runways by 2016 with intermediate milestones, i.e. 30% by 2010 and 70% by 2014 (see **Appendix A**).

1.2 Following the ICAO Assembly Resolution A37-11, ICAO is monitoring State's PBN implementation status. More detailed information will be provided through PBN application in the *integrated* Safety Trend Analysis and Reporting System (*i*STARS) 2.0 SPACE, which requires registration (see <http://www.icao.int/safety/istars/pages/intro.aspx>).

1.3 The APANPIRG/25 reviewed the ten regional priorities, targets and indicators. 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.*

1.4 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, <b>all high-density aerodromes</b> 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 <b>high density aerodromes</b> 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

## 2. DISCUSSION

### Updating of PBN Implementation Status

2.1 As the source information for the iSTARS comes from published procedures in Jeppesen, aeronautical information services provider, monitoring ICAO PBN implementation status information and feedback of this will increase correctness and reliability of the information. If there is a gap between ICAO’s data and State’s published procedures, a State may compare its published procedures in Aeronautical Information Publication (AIP) with Jeppesen’s.

2.2 Besides ICAO’s status data and following the Terms of Reference (TOR) of PBNICG, the PBNICG needs to gather its own PBN implementation data in the region to provide regular PBN implementation updated information to ICAO for inclusion in the air navigation reports and regional performance dashboard. Previously, APAC PBN/TF gathered State’s PBN implementation information using PBN Implementation progress Report (see **Appendix B**). But the information in the report may not be sufficient as an input to the iSTARS (see example in **Appendix C**) and to the reporting requirements for APAC Regional Priorities and Targets. Therefore, the

PBNICG is invited to review and enhance the PBN Implementation Progress Report form, such that it can fulfill all PBN reporting requirements.

**3. ACTION BY THE MEETING**

3.1 The meeting is invited to:

- a) note the information contained in this paper;
- b) urge APAC States to review their PBN implementation status as posted on ICAO iStar and advise any discrepancy to PBNICG secretariat; and
- c) form a small group to review and enhance the PBN Implementation Progress Report; and
- d) consider the interval for which APAC States will be requested to submit PBN Implementation Progress Report to PBNICG secretariat.

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## **Appendix A. Assembly Resolution A37-11: Performance-based navigation global goals**

*Whereas* a primary objective of ICAO is that of ensuring the safe and efficient performance of the global Air Navigation System;

*Whereas* the improvement of the performance of the air navigation system on a harmonized, worldwide basis requires the active collaboration of all stakeholders;

*Whereas* the Eleventh Air Navigation Conference recommended that ICAO, as a matter of urgency, address and progress the issues associated with the introduction of area navigation (RNAV) and required navigation performance (RNP);

*Whereas* the Eleventh Air Navigation Conference recommended that ICAO develop RNAV procedures supported by global navigation satellite system (GNSS) for fixed-wing aircraft, providing high track and velocity-keeping accuracy to maintain separation through curves and enable flexible approach line-ups;

*Whereas* the Eleventh Air Navigation Conference recommended that ICAO develop RNAV procedures supported by GNSS for both fixed- and rotary-wing aircraft, enabling lower operating minima in obstacle-rich or otherwise constrained environments;

*Whereas* Resolution A33-16 requested the Council to develop a programme to encourage States to implement approach procedures with vertical guidance (APV) utilizing such inputs as GNSS or distance-measuring equipment (DME)/DME, in accordance with ICAO provisions;

*Recognizing* that not all airports have the infrastructure to support APV operations and not all aircraft are currently capable of APV; *Recognizing* that many States already have the requisite infrastructure and aircraft capable of performing straight-in approaches with lateral guidance (LNAV approaches) based on the RNP specifications and that straight-in approaches provide demonstrated and significant safety enhancements over circling approaches;

*Recognizing* that the Global Aviation Safety Plan has identified Global Safety Initiatives (GSIs) to concentrate on developing a safety strategy for the future that includes the effective use of technology to enhance safety, consistent adoption of industry best practices, alignment of global industry safety strategies and consistent regulatory oversight;

*Recognizing* that the Global Air Navigation Plan has identified Global Plan Initiatives (GPIs) to concentrate on the incorporation of advanced aircraft navigation capabilities into the air navigation system infrastructure, the optimization of the terminal control area through improved design and management techniques, the optimization of the terminal control area through implementation of RNP and RNAV SIDs and STARs and the optimization of terminal control area to provide for more fuel efficient aircraft operations through FMS-based arrival procedures; and

*Recognizing* that the continuing development of diverging navigation specifications would result in safety and efficiency impacts and penalties to States and industry;

*Noting* with satisfaction that planning and implementation regional groups (PIRGs) have completed regional PBN implementation plans; and

*Recognizing* that not all States have developed a PBN implementation plan by the target date of 2009;

*The Assembly:*

1. *Urges* all States to implement RNAV and RNP air traffic services (ATS) routes and approach procedures in accordance with the ICAO PBN concept laid down in the *Performance-based Navigation (PBN) Manual* (Doc 9613);
2. *Resolves* that:
  - a) States complete a PBN implementation plan as a matter of urgency to achieve:
    - 1) implementation of RNAV and RNP operations (where required) for en route and terminal areas according to established timelines and intermediate milestones;
    - 2) implementation of approach procedures with vertical guidance (APV) (Baro-VNAV and/or augmented GNSS), including LNAV-only minima, for all instrument runway ends, either as the primary approach or as a back-up for precision approaches by 2016 with intermediate milestones as follows: 30 per cent by 2010, 70 per cent by 2014; and
    - 3) implementation of straight-in LNAV-only procedures, as an exception to 2) above, for instrument runways at aerodromes where there is no local altimeter setting available and where there are no aircraft suitably equipped for APV operations with a maximum certificated take-off mass of 5 700 kg or more;
  - b) ICAO develop a coordinated action plan to assist States in the implementation of PBN and to ensure development and/or maintenance of globally harmonized SARPs, Procedures for Air Navigation Services (PANS) and guidance material including a global harmonized safety assessment methodology to keep pace with operational demands
3. *Urges* that States include in their PBN implementation plan provisions for implementation of approach procedures with vertical guidance (APV) to all runway ends serving aircraft with a maximum certificated take-off mass of 5 700 kg or more, according to established timelines and intermediate milestones;
4. *Instructs* the Council to provide a progress report on PBN implementation to the next ordinary session of the Assembly, as necessary;
5. *Requests* the Planning and Implementation Regional Groups (PIRGs) to include in their work programme the review of status of implementation of PBN by States according to the defined implementation plans and report annually to ICAO any deficiencies that may occur; and
6. *Declares* that this resolution supersedes Resolution A36-23.

**Appendix B. PBN Implementation Progress Report of APAC PBN TF**

**PBN IMPLEMENTATION PROGRESS REPORT**

**State:** (Name of State)

**Date:** (DD/MM/YY)

**Designation of PBN Focal Point**

*Reference:* APANPIRG Conclusion 18/55 –Designation of Contact Person for PBN Implementation  
 “That, by 31 December 2007, States designate a focal contact person responsible for performance based navigation implementation and provide details of the contact person to ICAO Asia/Pacific Regional Office accordingly.”

*Status:* (Nominated/ To be Nominated)

*Focal Point:* (Name, Designation, Mailing Address, Email, Phone, Fax)

**State PBN Implementation Plan**

*Reference:* APANPIRG Conclusion 21/32 – Development of State PBN Implementation Plan  
 “That, the States, which have not developed their State PBN Implementation Plans so far, be urged to develop the plan in accordance with the Asia/Pacific Regional PBN Implementation Plan at the earliest and advise the Regional Office of the impediments they are facing in the implementation of PBN.”

*Status:* (Adopted / To be adopted) by (name of a national body) and (Reviewed / To be reviewed) by ICAO APAC PBN TF

*Note(s):* (States may include information on publication date and location for State PBN Implementation Plan and other relevant information.)

**Approach Operations**

*Reference:* ICAO 37<sup>th</sup> General Assembly Resolution A37/11 which supersedes Resolution A36-23

“...a) States complete a PBN implementation plan as a matter of urgency to achieve:...

2) implementation of approach procedures with vertical guidance (APV) (Baro-VNAV and/or augmented GNSS), including LNAV only minima, for all instrument runway ends, either as the primary approach or as a back-up for precision approaches by 2016 with intermediate milestones as follows: 30 per cent by 2010, 70 per cent by 2014; and

3) implementation of straight-in LNAV only procedures, as an exception to 2) above, for instrument runways at aerodromes where there is no local altimeter setting available and where there are no aircraft suitably equipped for APV operations with a maximum certificated take-off mass of 5 700 kg or more;”

*Status:*

Implementation Targets (# of RWY Ends)			Completed (# of RWY Ends)		In Progress (# of RWY Ends)	
Y2010	Y2014	Y2016	LNAV	LNAV/VNAV	LNAV	LNAV/VNAV

*Note(s):* (States may include information on recent publications of new PBN approach procedures.)

**Arrival and Departure Operations**

*Reference:* 1) ICAO 37<sup>th</sup> General Assembly Resolution A37/11 which supersedes Resolution A36-23

“...a) States complete a PBN implementation plan as a matter of urgency to achieve: ...

1) implementation of RNAV and RNP operations (where required) for en route and terminal areas according to established timelines and intermediate milestones;” and

2) Asia/Pacific PBN Regional Implementation Plan v 2.0

“Short-term Implementation Targets: RNAV 1 SID/STAR for 50% of international airports by 2010 and 75% by 2012 and priority should be given to airports with RNP Approach.”

“Medium-term Implementation Targets: 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 Targets (# of Int'l Airports)			Completed (# of Int'l Airports)		In Progress (# of Int'l Airports)	
Y2010	Y2014	Y2016	Arrival	Departure	Arrival	Departure

*Note(s):* (States may include information on recent publications with new PBN arrival/departure procedures.)

**En-route Operations**

*Reference:* Asia/Pacific PBN Regional Implementation Plan v 2.0

“Short-term Implementation Targets: Re-defining existing RNAV/RNP routes into PBN navigation specification by 2012, Implementation of additional RNAV/RNP routes.”

“Medium-term Implementation Targets: Implementation of additional RNAV/RNP routes”

Navigation Specification	Completed (# of routes)	In Progress (# of routes)
RNAV 10		
RNAV 5		
RNAV 2		
RNP 4		
RNP 2		

*Note(s):* (States may include information on recent publications with new PBN routes.)

**Continuous Descent Operations**

*Reference:* APAC PBN Task Force Action Item 6/1

“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.”

*Note(s):* (States may include information on recent publications with new STARs with CDO.)

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## Appendix C. Example of State’s PBN Implementation Progress Status in iSTAR 2.0 SPACE

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# Republic of Korea

**77.3% PBN Runways (17/22)**

View airports: All (8) [Cheongju Intl](#) [Daegu Intl](#) [Gimhae Intl](#) [Gimpo Intl](#) [Incheon Intl](#) [Jeju Intl](#) [Muan Intl](#) [Yangyang Intl](#)

### PBN Trends

% of PBN Runways by type for Republic of Korea

### SID/STAR Trends

% of SID/STAR Runways for Republic of Korea

### Cheongju Intl (RKTU)

**100% PBN Runways (2/2)**

	PBN	LNAV	LNAV/VNAV	LPV	RNP AR	Unknown PBN	SID	STAR
RWY 06R <sup>ⓘ</sup>								
RWY 24L <sup>ⓘ</sup>								
RWY 06L	✓	✓					✓	
RWY 24R	✓	✓					✓	

### Yangyang Intl (RKNY)

**100% PBN Runways (1/1)**

	PBN	LNAV	LNAV/VNAV	LPV	RNP AR	Unknown PBN	SID	STAR
RWY 15 <sup>ⓘ</sup>							✓	
RWY 33	✓	✓	✓				✓	✓

**Daegu Intl (RKTN)****0% PBN Runways (0/3)**

	PBN	LNAV	LNAV/VNAV	LPV	RNP AR	Unknown PBN	SID	STAR
RWY 13L <sup>②</sup>								
RWY 31R								
RWY 31L								
RWY 13R								

**Gimhae Intl (RKPK)****0% PBN Runways (0/2)**

	PBN	LNAV	LNAV/VNAV	LPV	RNP AR	Unknown PBN	SID	STAR
RWY 18L <sup>②</sup>								
RWY 36R								
RWY 18R <sup>②</sup>								
RWY 36L								

**Gimpo Intl (RKSS)****100% PBN Runways (4/4)**

	PBN	LNAV	LNAV/VNAV	LPV	RNP AR	Unknown PBN	SID	STAR
RWY 14L	✓	✓	✓				✓	✓
RWY 32R	✓	✓	✓				✓	✓
RWY 14R	✓	✓	✓				✓	✓
RWY 32L	✓	✓	✓				✓	✓

### Incheon Intl (RKSI)

100% PBN Runways (6/6)

	PBN	LNAV	LNAV/VNAV	LPV	RNP AR	Unknown PBN	SID	STAR
RWY 16	✓	✓	✓				✓	✓
RWY 34	✓	✓	✓				✓	✓
RWY 15L	✓	✓	✓				✓	✓
RWY 33R	✓	✓	✓				✓	✓
RWY 15R	✓	✓	✓				✓	✓
RWY 33L	✓	✓	✓				✓	✓

### Jeju Intl (RKPC)

100% PBN Runways (2/2)

	PBN	LNAV	LNAV/VNAV	LPV	RNP AR	Unknown PBN	SID	STAR
RWY 13 								
RWY 7	✓	✓	✓				✓	✓
RWY 25	✓	✓	✓				✓	✓
RWY 31 							✓	

### Muan Intl (RKJB)

100% PBN Runways (2/2)

	PBN	LNAV	LNAV/VNAV	LPV	RNP AR	Unknown PBN	SID	STAR
RWY 1	✓	✓	✓				✓	✓
RWY 19	✓	✓	✓				✓	✓