



*International Civil Aviation Organization*

**The Second Meeting of ICAO Asia/Pacific Performance Based Navigation Implementation Coordination Group (PBNICG/2)**

Bangkok, Thailand, 11-12 June 2015

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- Agenda Item 7: Implementation of PBN in Terminal Area  
Agenda Item 8: Implementation of PBN in Domestic En-route Airspace  
Agenda Item 9: Regional and Sub-regional Implementation of PBN in En-route Airspace  
**Agenda item 10: Issues and Challenges regarding PBN Implementation**

**PBN IN A PAGE**

(Presented by Secretariat)

**SUMMARY**

This paper presents an enhanced “PBN-in a-page” table and asks the meeting to review and adopt it as a regional material when implementing PBN. Action by the meeting is in paragraph 3.1.

**1. INTRODUCTION**

1.1 During the First Meeting of ICAO Asia and Pacific PBN Implementation Coordination Group (PBNICG/1) which was held in Beijing China from 10 to 12 March 2015, the secretariat presented a draft, “PBN-in-a-page” for the use as a quick reference material during PBNICG meeting and during PBN airspace and route design session.

1.2 The meeting reviewed the draft and asked the Secretariat to improve it reflecting inputs from the meeting such as the inclusion of database requirement for each navigation specifications and separation of COM/SUR/NAV requirement (see Action 1/17 of PBNICG/1).

**2. DISCUSSION**

2.1 With the inputs from the meeting and TMA Rapporteur, APAC RSO improved the draft reflecting the discussion of the previous meeting and including additional functionalities required for each navigation specifications (see **Appendix A**).

**3. ACTION BY THE MEETING**

3.1 The meeting is invited to:

- a) review the proposed “PBN-in a page” table in Appendix A;
- b) discuss further development of the table; and
- c) adopt it as a regional guidance material which is used to support future PBN implementation and related meetings.



## Appendix A. PBN Navigation Specification and Route Spacing Table

PBN NavSpecs and Route Spacing (PBN Manual Doc 9613 Volume II, Attachment B & PANS-OPS Doc 8168 Volume II, Part III)

Nav Specs	Flight Phase								Supporting Nav. Infrastructure	Route Spacing (NM)	Additional Functionality (Required or Optional)					Operational Requirements					
	En-route Remote	En-route Continental	Arrival	Approach				Departure			RF	FRT	TOAC <sup>2)</sup>	Baro VNAV	Nav DB	Communication	Navigation	Surveillance	Others		
				Initial	Intermediate	Final	Missed <sup>3)</sup>														
RNAV 10	10								Not require ground-based Naviad Dual LRNS (INS, IRS FMS, GNSS)	50			TBD <sup>2)</sup>		O	Voice com through 3rd party, DCPC in some areas	RNAV 10 (RNP 10) Approval, lateral deviation less than 7NM (same direction)/6NM (opposite direction)	Procedural pilot position reports	System safety must be monitored, TLS 5X10 <sup>-9</sup> accident per flight hour		
RNAV 5		5	5 <sup>3)</sup>						VOR/DME DME/DME INS or IRS GNSS	16.5 - straight unidirectional racks (same direction route-ECAC) 18 - straight bidirectional tracks (opposite direction route- ECAC) 10 - ATC intervention capability (ECAC) 30 - No ATS Surveillance in high traffic density (ECAC)			TBD		O	DCPC- VHF	RNAV 5/RNP 5 OPS Approval (BRNAV)	Procedural pilot position report (RNP 5) Radar surveillance (RNAV 5)			
RNAV 2		2	2					2	GNSS DME/DME DME/DME/IRU	8 to 9 - straight tracks in high traffic density (en-route) (FAA)			TBD		R	DCPC- VHF	RNAV 2 OPS Approval (PRNAV, US RNAV AC 90-100)	Radar surveillance			
RNAV 1		1	1	1	1			1	GNSS DME/DME DME/DME/IRU	8 - straight tracks in high density (terminal, Eurocontrol) 7 for SIDs/STARs (PANS-ATM)			TBD		R	DCPC- VHF	RNAV 1 OPS Approval (PRNAV, US RNAV AC 90-100)	Radar surveillance			
RNP 4	4								Not require ground-based Naviad GNSS	30 (part of the Pacific airspace) 50 or 30' (PANS-ATM) *23NM proposed by SASP (applicable date : 10 November 2016)			o	TBD		R	DCPC or CPDLC	RNP 4 OPS Approval	ADS with a lateral deviation contract having 5NM	System verification assuring lateral deviation less than 15NM	
RNP 2	2	2							GNSS	50, 30 or 15 (PANS-ATM) 7 for climb/descend through other aircraft with VHF DCPC 20 for climb/descend through other aircraft with other type of com.			o	TBD		R	Depend on operational considerations (route spacing, traffic density, complexity, contingency procedures)	RNP 2 OPS Approval (Oceanic/Remote/co ntinental)	Not required except reduced route spacing		
RNP 1			1	1	1			1	GNSS	5 for SIDs/STARs (PANS-ATM)			O	TBD	O	R	DCPC (RNP 1 SIDs/STARs)	RNP 1 OPS Approval	Not required except reduced route spacing		
A RNP <sup>4)</sup>	2	2 or 1	1 - 0.3	1 - 0.3	1 - 0.3	0.3	1 - 0.3	1 - 0.3	GNSS Multi-DME may be provided	7 - straight and turning tracks (<90°) in high traffic density (en-route, Terminal, Eurocontrol) 6 to 7 NM with an RNP 0.5 (terminal, Eurocontrol)			R	o	TBD	O	R	DCPC- VHF	A-RNP OPS Approval (Navigation accuracy at least ±1NM, 95% of the flight time)	Radar surveillance (may not be required to certain navigation application)	
RNP APCH (Part A) <sup>5)</sup>				1	1	0.3	1		GNSS (Missed App - RNAV or Conv.)	5 for SIDs/STARs (PANS-ATM)			O	TBD	O	R	Not required	RNP APCH OPS Approval	Not required		
RNP APCH (Part B) <sup>5)</sup>				1	1	Angular	1 or 0.3 (Initial Straight MISAP)		GNSS	5 for SIDs/STARs (PANS-ATM)			O	TBD		R	Not required	RNP APCH OPS Approval	Not required		
RNP AR APCH				1 - 0.1	1 - 0.1	0.3 - 0.1	1 - 0.1		GNSS (DME/DME may be authorized)	5 for SIDs/STARs (PANS-ATM)			R <sup>6)</sup>	TBD	R <sup>6)</sup>	R	Not required	RNP AR APCH OPS Approval	Not required		
RNP 0.3		0.3	0.3	0.3	0.3		0.3	0.3	GNSS				O	TBD	O	R	Not required	RNP 0.3 OPS Approval	Not required		

1) RNP requirements do not apply to initial and intermediate missed approach segments.

2) TOAC (Time of Arrival Control), TBD (To Be Determined)

3) RNAV 5 may be used for initial parts of STARs outside 30 NM from the ARP.

4) Advanced RNP core requirements are limited to RNP 1 in all flight phases except final approach (RNP 0.3) and RNP 2 in oceanic/remote and en-route continental. A scalability option will allow accuracy values between 0.3 and 1.0, in 0.1 NM increments, in all flight phases except oceanic/remote/en-route continental (RNP 1 and RNP 2) and final approach (RNP 0.3).

5) Part A and B refer to the Performance-based Navigation (PBN) Manual (Doc 9613), Volume II, Part C, Chapter 5, Part A — RNP APCH operations down to LNAV and LNAV/VNAV minima and Part B — RNP APCH operations down to LP and LPV minima, respectively.

6) Specific requirement for RF and VNAV