



**Tenth Meeting of the APIRG Air Traffic Services, Aeronautical
Information Services and Search and Rescue Sub-Group
[Dakar, Senegal 12 – 15 May 2009]**

Agenda Item 6: Review of the Report of the Second Meeting of the PBN Task Force

Implementation of Performance-Based Navigation in the AFI Region

(Presented by the International Air Transport Association)

Summary

This paper presents ATS/AIS/SAR/SG/10 with the checklists developed by the SAM Region for use by States implementation of Performance-Based Navigation (PBN). It also calls upon ICAO to expedite the development of additional provisions in the SARPs and guidance material necessary to provide States and other stakeholders support guidance on PBN.

References:

- ICAO SP AFI RAN 2008 Report
- APIRG/16 Report
- AFI PBN Task Force Meeting Reports

1. Introduction.

1.1. ICAO Assembly Resolution A36-23 *resolves* that:

- a) States and planning and implementation regional groups (PIRGs) complete a **PBN implementation plan by 2009** to achieve:
- 1) implementation of RNAV and RNP operations (where required) for en route and terminal areas according to established timelines and intermediate milestones; and
 - 2) implementation of approach procedures with vertical guidance (APV) (Baro-VNAV and/or augmented GNSS) for all instrument runway ends, either as the primary approach or as a back-up for precision approaches by **2016** with intermediate milestones as follows: **30 per cent by 2010, 70 per cent by 2014**; and
- b) ICAO develop a coordinated action plan to assist States in the implementation of PBN and to ensure development and/or maintenance of globally harmonized SARPs, Procedures for Air Navigation Services (PANS) and guidance material including a global harmonized safety assessment methodology to keep pace with operational demands.

1.2. As part of its mandate, the AFI PBN Task Force is to develop guidance material and facilitate training to assist States with RNAV/RNP implementation in the en-route, terminal, and approach flight phases, taking into account the PBN concept, according to the relevant ICAO Strategic Objectives and Global Plan Initiatives (GPI) on this matter.

2. Discussion

PBN Implementation Plans

2.1. After developing AFI regional PBN plan and State PBN Implementation Plan Template, the AFI PBN Task Force work now focuses on regional and national performance objectives and action plans for each phase of flight. The navigation specifications adopted by AFI/PBN/TF/2 are shown in **Appendix** to this paper.

2.2. The SAM Region has developed PBN action plans for en-route, terminal and approach operations, which are deemed mature. These plans are under further refinements by ICAO, and will be disseminated regional PBN Task Forces when finalized.

AFI Flight Procedures Office

2.3. SP AFI RAN (2008) noted ICAO was working to establish flight procedures offices (FPO) in each region to assist and accelerate the implementation of PBN (*Recommendation 6/10 — Support for establishment of an Africa ICAO flight procedures office*). The objectives of the FPO would be to foster implementation of flight procedures, developed with the appropriate quality systems, especially PBN and vertically guided instrument approach procedures.

ICAO Reference Guidance

2.4. The Global PBN Task Force (GPBNTF) has identified gaps in required ICAO SARPs and guidance material pertaining to PBN, as summarised in **Table 1** below. Accordingly, ICAO has initiated an important work to bridge the identified gaps, which needs **to be completed in a timeframe compatible with A36-23 set milestones**.

Table 1 - Gaps in Required SARPs and Guidance Material for PBN

OPS	ATM	CNS	PANS-OPS	PANS-OPS QA	MAP	AIS
-Annex 6 terminology -PBN manual -Operational Approval -Pilot guidance on PBN IFPs -APV-OPS / RWYs -New Nav Specs and Additions to current Nav Specs	-Annex 11 and PANS-ATM terminology -Route spacing requirements ² -Phraseology -Controller guidance	-Annex 10 terminology -Flight inspection	-Annex for IFP -PANS-OPS Flight procedure design criteria -RNP AR approach design criteria -RNP AR departure design criteria -Update to PANS-OPS to reflect new Nav Specs	-FOSA for PBN IFPs -IFP QA for regulators (Doc 9906) -QA for procedure design (Doc 9906) -Ground and flight validation (Doc 9906) -Competency Framework for flight validation pilots -Approval of 3rd party designers (Doc 9906) -QA Manual V. 1, 2 & 3 -QA Manual V.4	-Annex 4 terminology -Charting requirements for PBN approaches -Charting requirements for PBN en-route/terminal -Update to charting manual	-Annex 15 terminology -Aeronautical database harmonization -Data chain quality

2.5. The language issue also needs to be addressed to facilitate stakeholders' access to available guidance material³.

2.6. From a PBN perspective, it is likely that navigation applications will progress from 2D to 3D/4D. Concerning approach performance, at the moment **PBN is focussed on linear performance criteria** (supporting rectangular obstacle clearance areas) (See **Table 2**), while discussions are ongoing on whether and how angular performance criteria (supporting trapezoidal obstacle clearance areas, such as with GBAS and SBAS) should be included in the PBN concept.

Table 2 – Approach classification overview

	Approach classification	Approach designation	Minima line	Navigation specification
Performance – Based Navigation (PBN)	Non-precision approach (NPA)	RNAV (GNSS) RWY XX	LNAV	RNP APCH
	Approach with vertical guidance (APV)	RNAV (GNSS) RWY XX	LNAV/VNAV	RNP APCH with VNAV
		RNAV (RNP) RWY XX	LNAV/VNAV	RNP AR APCH
Angular System Specific	Approach with vertical guidance (APV)	RNAV (GNSS) RWY XX	LPV	SBAS
	Precision approach (PA)	ILS, MLS, GLS RWY XX	CAT I / II / III	ILS, MLS, GBAS

¹ Issue completed.

² Communications (COM), navigation (NAV) and surveillance (SUR) requirements are also needed for new navigation specifications.

³ Existing PBN reference guidance material are in English language only.

3. Conclusion

3.1. The Sub-group is invited to:

- 1) Agree to draw an initial list of national PBN managers based on ATS/AIS/SAR/SG/10 attendance;
- 2) Encourage AFI States and stakeholders to anticipate PBN implementation activities, in accordance with APIRG *Conclusion 16/3 – Development of States PBN implementation Plans*, using available guidance material. In so doing, partnership with relevant Organisations should be considered as required; and
- 3) Request ICAO to:
 - a) Expedite the establishment of an AFI *Flight Procedures Office*; and
 - b) Expedite its work on additional guidance material on PBN in a timeframe compatible with the milestones established under Assembly Resolution A36-23, and ensure that is made available in other ICAO working languages.

-END-

Appendix

Short – Term and Mid – Term Navigation Specifications

Short – Term (2008-2012) Navigation Specifications		
Airspace	Nav. Specifications	Nav. Specifications where Operationally Required
En-Route Oceanic	RNAV-10	RNP-4
En-Route Remote Continental	RNAV-10	RNP-4
En-Route Continental	RNAV-5	RNAV-1
TMA Arrival/Departure	RNAV-1 in a surveillance environment	
	Basic RNP-1 in non-surveillance environment	
Approach	RNP APCH with Baro-VNAV or RNP AR APCH if required	

Mid – Term (2013-2016) Navigation Specifications		
Airspace	Nav. Specifications	Nav. Specifications where Operationally Required
En-Route Oceanic	RNAV-10,	RNP-4
En-Route Remote Continental	RNAV-10,	RNP-4
En-Route Continental	RNAV-2, RNAV-5	RNAV-1
TMA Arrival/Departure	Expand RNAV-1, or RNP-1 application Mandate RNAV-1, or RNP-1 in high density TMAs	
Approach	Expand RNP APCH with (Baro-VNAV) and APV Expand RNP AR APCH where there are operational benefits	
