



*International Civil Aviation Organization*

**THE THIRD MEETING OF PERFORMANCE BASED NAVIGATION  
IMPLEMENTATION COORDINATION GROUP (PBNICG/3)**

Bangkok, Thailand, 08 – 10 March 2016

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**Agenda Item 5: PBN implementation plans: updates by States/Administrations**

**b) Review and adoption of PBN Implementation Progress Report results**

**PBN IMPLEMENTATION IN SINGAPORE**

(Presented by Singapore)

**SUMMARY**

This paper provides information on the latest progress of PBN implementation in Singapore.

**1. INTRODUCTION**

1.1 At the 37th session of the ICAO Assembly in its Resolution A37-11, States and Planning and Implementation Regional Groups (PIRGs) were requested to develop PBN implementation plans and implement PBN in accordance with the timelines established in those plans.

1.2 Singapore has adopted a phased approach for the implementation of PBN in line with the ICAO Asia-Pacific Regional PBN Implementation Plan. The phased approach allows both ANSPs and aircraft operators to progress in tandem taking into consideration the avionics capabilities and air navigation infrastructures in the Singapore Flight Information Region (FIR).

**2. DISCUSSION**

2.1 Recognising the potential benefits that PBN implementation can bring about and to harmonise with the Asia Pacific Regional PBN Implementation Plan, new ATS routes and procedures were developed in close collaboration with neighbouring States. The areas of collaboration focus on the harmonisation of PBN implementation based on communication, surveillance and navigation capabilities in those areas. Furthermore, prioritisation on areas where high demand of air traffic would bring about the necessary capacity enhancement contributing to optimised flight operations on those areas.

**Collaboration to Progress PBN Implementation**

2.3 Singapore's initial PBN Plan had considered four international runway ends at Singapore Changi Airport (WSSS) for implementation. However, as ICAO measures the performance of States' PBN implementation against the Regional Air Navigation Plan, one of Singapore's mixed-used

aerodrome, Paya Lebar Airport (WSAP), was included into the revised PBN plan. This brings a total of six runway ends for implementation.

2.4 To date, Singapore has implemented PBN approaches on four of the six international runway ends achieving 66.7% of the PBN implementation target..

2.5 WSAP as a mixed used civil-military aerodrome, provides an opportunity for close civil-military coordination to be effected in planning for the implementation of PBN approach procedures for WSAP.

2.5 The Civil Aviation Authority of Singapore (CAAS) and the Republic of Singapore Air Force (RSAF) have established a working group to develop the RNP APCH (GNSS) Baro-VNAV. The procedure is targeted to be implemented by 2016, achieving 100% for all international instrument runways.

**Refining PBN Implementation for Enroute**

2.6 The introduction of ADS-B over some portion of Singapore FIR has reduced the need to have RNP4 routes in high volume routes that are covered by surveillance. However, some areas where surveillance gap exists, RNP4 could be implemented. This approach drives Singapore to refine the PBN implementation plan to separate the enroute procedures into two categories, namely ‘Surveillance’ and ‘Procedural’. This allows the use of more appropriate PBN specifications to suit the surveillance and communication capabilities for a given airspace.

	Near Term (2008 – 2012)		Medium Term (2013 – 2017)		Long Term (2018 onwards)
	Planned	Status	Planned	Status	Planned
<b>Enroute Surveillance</b>	-	-	RNAV5 (up to 50%)	10%	RNAV5 (up to 75%) RNAV2
<b>Enroute Procedural</b>	RNAV10 (up to 50%)	32%	RNAV10 (up to 75%)	87.5%	RNAV10 RNP4 RNP2
	RNP4 (up to 25%)	0%	RNP4 (For L625, M767, M768, M772, N884)	0%	

2.7 In line with the ICAO Asia Pacific Seamless ATM Plan, the time frame for long term implementation is 2018 and beyond. In this phase, GNSS is expected to be a primary navigation infrastructure for PBN implementation. States should work co-operatively on a multinational basis to implement GNSS in order to facilitate seamless and inter-operable systems.

**3. ACTION REQUIRED BY THE MEETING**

3.1 The meeting is invited to:

- a) note the current status of PBN Implementation in Singapore; and
- b) note the collaborative efforts between civil-military for PBN implementation; and
- c) encourage States to continue in their efforts in PBN implementation to achieve seamless ATM within Asia Pacific Region.

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