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

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

THAILAND PBN IMPLEMENTATION

(Presented by Thailand)

SUMMARY

This paper discusses the progress of PBN implementation within Thailand. The paper notes the completion of Thailand PBN Implementation plan, the operations of PBN procedures at terminal airspaces, and the operations of PBN routes in Thailand. The paper also summarizes the progress made for PBN implementations at other terminal areas around Thailand.

1.   Introduction

1.1   Challenges in aviation and needs for higher efficiency in aircraft fuel consumption call for new navigation technologies and operation procedures to be implemented. In respond to this call for actions, ICAO has adopted several conclusions to promote the uses of Performance-Based Navigation (PBN) and Global Navigation Satellite System (GNSS) as the navigation elements of CNS/ATM systems. These navigation technologies and specifications have promising potentials to provide accurate, reliable and seamless position determination and navigation capabilities to airspace users. Implementations of PBN and GNSS facilitate more efficient use of airspace and more flexibility for procedure design. They cooperatively result in improved safety, access, capacity, predictability, operational efficiency, fuel economy, and environmental effects.

1.2   Recognizing the benefits of PBN and GNSS, in May 2007, Thailand has established a national Working Group to foster a cooperative approach among Thai aviation stakeholders in the implementations of PBN and GNSS over Thai airspaces. Planning and implementation activities involve participations from Department of Civil Aviation of Thailand (Thai DCA), representatives from Thai airline operators, Thai Pilot's Association (THAIPA), Airports of Thailand Public Company Limited, and Aeronautical Radio of Thailand Limited (AEROTHAI).

1.3   The Working Group is responsible for developing policies, implementation plans, and implementation standards for the deployment of PBN and GNSS procedures and operations in Thai airspace. The Working Group has three areas of responsibility in regards to the implementation of PBN and GNSS in Thai airspace. The three areas of responsibility are:
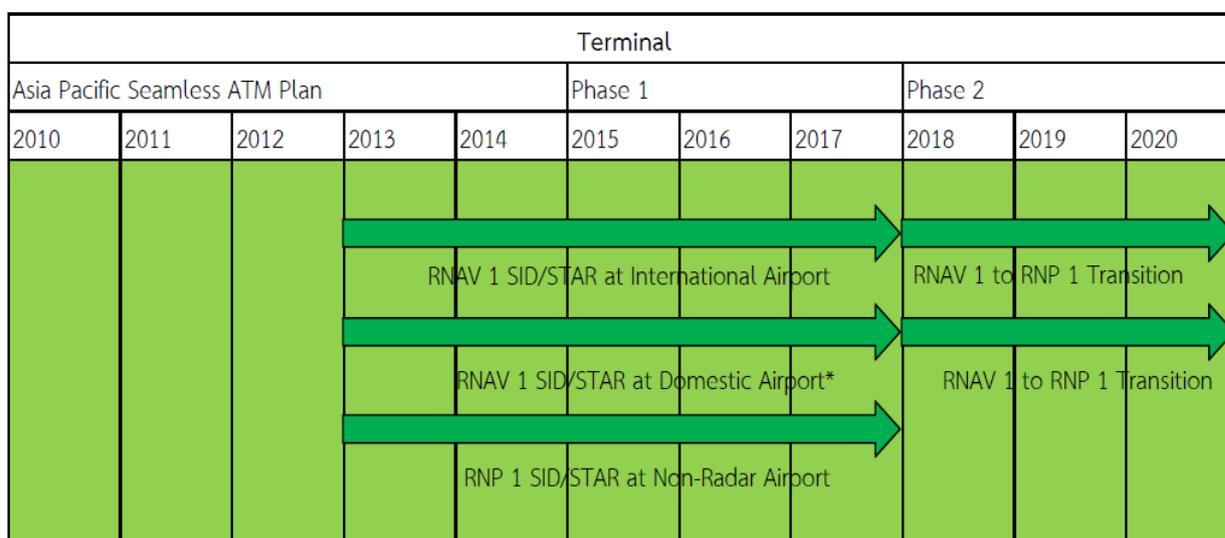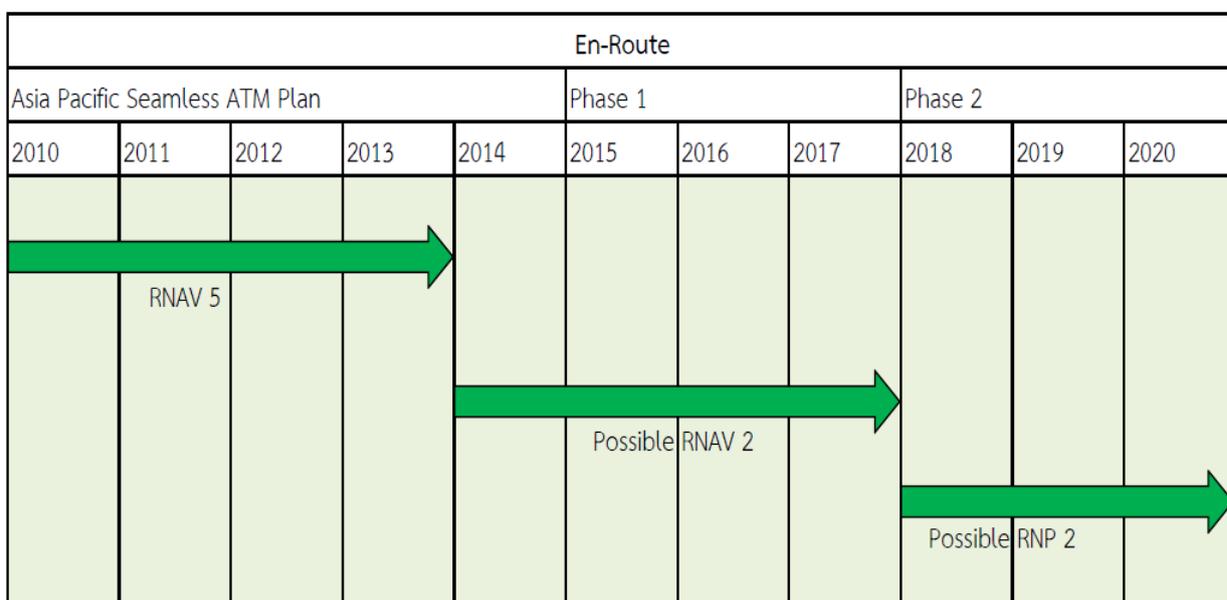
- Policy & Implementation Planning
- Establishments of Standards and Requirements in accordance to appropriate ICAO requirements
- Communication with Stakeholders

2.   Thailand PBN Implementation Plan

2.1   In June 2009, the Working Group had approved Thailand PBN Implementation Plan. This Thailand PBN Implementation Plan aims to provide aviation stakeholders with appropriate implementation guidance and timelines to allow proper preparation for PBN implementation within the Bangkok Flight Information Region (FIR). The Plan is well aligned with the Asia/Pacific Regional PBN Implementation Plan developed by ICAO Asia/Pacific PBN Task Force and 2007 and 2010 ICAO Assembly Resolutions.

2.2   Thailand PBN Implementation Plan provides assessments of fleet readiness status and CNS infrastructure, which results in selection of appropriate PBN navigation specifications and implementation strategies for En-route and Terminal Area operations. It also explains some tangible operational benefits, derived from actual PBN implementations.

2.3   In 2014, the Working Group had revised the Thailand PBN Implementation Plan to be line with the Regional Asia/Pacific Seamless ATM Plan. The following diagram and table depict selected PBN navigation specifications and targeted TMA implementations as outlined in the revised Thailand PBN Implementation, respectively.

Approach										
Asia Pacific Seamless ATM Plan					Phase 1			Phase 2		
2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020

RNP APCH (with Baro VNAV) at International Airport

RNP APCH (with Baro VNAV) at Domestic Airport

RNP AR APCH at selected Airport*

GBAS at selected Airport**

3. Progress of PBN Implementation in Terminal Airspaces

3.1   The following table shows the list of PBN implementations in terminal airspaces in Thailand currently in operation as published in AIP Thailand:

Aerodrome	PBN Procedure (Runway)	Status
Phuket (VTSP)	2 RNAV (GNSS) (09/27) w BARO-VNAV	In operation
	RNAV 1 SID/STAR	In operation
Hat Yai (VTSS)	2 RNAV (GNSS) (08/26)	In operation
Samui (VTSM)	2 RNAV (GNSS) (17/35) CAT A, B	In operation
Chiang Mai (VTCC)	2 RNAV (GNSS) (18/36)	In operation
	RNAV 1 / Basic RNP 1 SID/STAR 36	In operation
Udon Thani (VTUD)	2 RNAV (GNSS) (12/30)	In operation
Lampang (VTCL)	2 RNAV (GNSS) (18/36)	In operation
	Basic RNP 1 SID	In operation
Chiang Rai (VTCT)	2 RNAV (GNSS) (03/21)	In operation
Don Muang (VTBD)	RNAV 1 SID/STAR RWY21 L,R	In operation
Surat Thani (VTSB)	2 RNAV (GNSS) (04/22)	In operation
Narathiwat (VTSC)	2 RNAV (GNSS) (02/20)	In operation
Nakhon Si Thammarat (VTSF)	2 RNAV (GNSS) (01/19) w BARO-VNAV	In operation
	Basic RNP 1 SID (01/19)	In operation
Phrae (VTCP)	RNAV (GNSS) RWY01	In operation
Khon Kaen (VTUK)	2 RNAV (GNSS) (03/21)	In operation
	RNAV 1 SID (03/21)	In operation
Ubon Ratchathani (VTUU)	2 RNAV (GNSS) (05/23) w BARO-VNAV	In operation
	RNAV1 SID (05/23)	In operation

3.2   AEROTHAI, in cooperation with THAIPA and airlines, are now in process of designing additional RNP APCH procedures for Sakon Nakhon, Nakhon Phanom, Trang, Krabi, Ranong, Mae Sot, Trat, Hua Hin, Mae Hong Son, Phitsanulok and Sukhothai Airports and the additions of BARO-VNAV for Samui, The design process for these procedures is expected to be completed in 2015. Following the completion of the design, the procedures will be submitted to the Thai DCA for its consideration, prior to the final flight validation by AEROTHAI.   The following table shows the list of additional PBN implementations in terminal airspaces in Thailand expected to be in operation by the end of 2015:

Airport	RNP APCH	STAR PBN	SID PBN
Sakon Nakhon (VTUI)	RNAV (GNSS) RWY05 RNAV (GNSS) RWY23 BARO-VNAV	-	-
Nakhon Phanom (VTUW)	RNAV (GNSS) RWY15 RNAV (GNSS) RWY33 BARO-VNAV	-	-
Trang (VTST)	RNAV (GNSS) RWY08 RNAV (GNSS) RWY26 (BARO-VNAV)	-	SID RNAV RWY08 SID RNAV RWY26 (RNAV 1/ Basic RNP 1)
Krabi (VTSG)	RNAV (GNSS) RWY32 (LNAV)	STAR RNAV RWY32 (RNAV 1)	SID RNAV RWY14 SID RNAV RWY32 (RNAV 1)
Ranong (VTSR)	RNAV (GNSS) RWY02 RNAV (GNSS) RWY20 (BARO-VNAV)	-	SID RNAV RWY02 SID RNAV RWY20
Trat (VTBO)	RNAV (GNSS) RWY23 (LNAV)	-	-
Hua Hin (VTPH)	RNAV (GNSS) RWY16 (BARO-VNAV)	-	-
Mae Sot (VTPM)	RNAV (GNSS) RWY27 (BARO-VNAV)	-	-
Chiang Mai (VTCC)	-	STAR RNAV RWY18 (RNAV 1)	SID RNAV RWY18 (RNAV 1)
Hat Yai (VTSS)	-	-	SID RNAV RWY08 SID RNAV RWY26 (RNAV 1)
Samui (VTSM)	RNAV (GNSS) RWY17 RNAV (GNSS) RWY35 (BARO-VNAV)	-	SID RNAV RWY17 SID RNAV RWY35 (RNAV 1/ Basic RNP 1)
Chiang Rai (VTCT)	RNAV (GNSS) RWY03 (LNAV)	STAR RNAV RWY03 (Basic RNP 1)	-
Mae Hong Son (VTCH)	RNAV (GNSS) RWY11 (BARO-VNAV)	-	SID RNAV RWY29 (RNAV 1/Basic RNP 1)

Airport	RNP APCH	STAR PBN	SID PBN
Sukhothai (VTPO)	RNAV (GNSS) RWY18 RNAV (GNSS) RWY36 (BARO-VNAV)	-	SID RNAV RWY18 SID RNAV RWY36 (RNAV 1/Basic RNP 1)
Phitsanulok (VTPP)	RNAV (GNSS) RWY14 RNAV (GNSS) RWY32 (BARO-VNAV)	-	SID RNAV RWY14 SID RNAV RWY32 (RNAV 1)
Don Muang (VTBS)	-	STAR RNAV RWY03 STAR RNAV RWY21 (RNAV 1)	SID RNAV RWY03 SID RNAV RWY21 (RNAV 1)
Suvarnabhumi (VTBS)	-	STAR RNAV RWY01 STAR RNAV RWY19 (RNAV 1)	SID RNAV RWY01 SID RNAV RWY19 (RNAV 1)

4.   Progress of PBN Implementation in En-route Airspace

4.1   For en-route airspace, in 2013 Thailand has established unidirectional RNAV-5 routes connecting from Phuket to Bangkok (Y5 Route) and between Bangkok and Chiang Mai (Y6 and Y7 Routes). The unidirectional routes are designed to increase airspace efficiency based on the PBN concept and the flexible use of airspace (FUA) concept. Moreover these routes are created to reduce aircraft fuel consumption and green gas emission and to enhance safety and improve flow capacity of air traffic operations.

4.2   For en-route airspace, in June 2014, Thailand has established five additional unidirectional RNAV-5 routes connecting Bangkok with southern destinations, as depicted in the following figure and table:
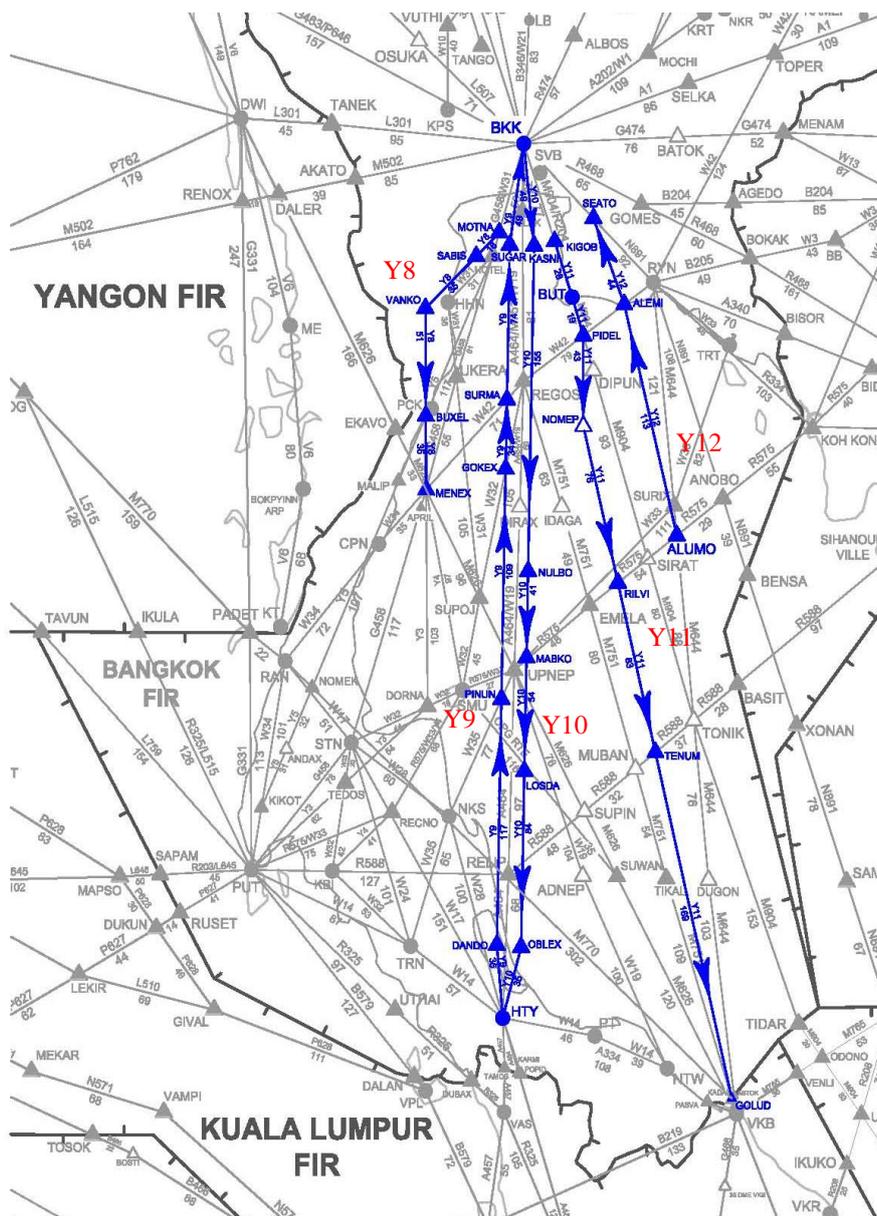
Route Designator	Direction	Main Citypairs Served
Y8	Southbound	Bangkok to Phuket/Surat Thani/Krabi/Trang
Y9	Northbound	Hat Yai/Samui/Kuala Lumpur/Penang to Bangkok
Y10	Southbound	Bangkok to Hat Yai/Samui/Kuala Lumpur/Penang
Y11	Southbound	Bangkok to Singapore/Jakarta
Y12	Northbound	Singapore/Jakarta to Bangkok

These routes are designed based on the PBN concept and the flexible use of airspace (FUA) concept to enhance safety and improve flow capacity of air traffic operations between Bangkok and major cities in the southern part of Thailand, as well as other international destinations south of Thailand.

4.3   In 2015, the Y9 and Y10 routes will be upgraded from domestic to international routes (M769 and M75) between Bangkok FIR and Kuala Lumpur FIR is to be implemented by mid-2015.   The upgrade will improve flow capacity between Bangkok and Malaysia.   Similar new   RNAV5 unidirectional routes between Bangkok FIR/Yangon FIR and Bangkok FIR/Phnom Penh FIR are being coordinated and expected to be implemented by the end of 2015, hopefully.

5.   Action by the Meeting

5.1   The meeting is invited to:

      a)   note the progress of PBN implementation in Thailand

      b)   discuss any relevant matters as appropriate.

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