



INTERNATIONAL CIVIL AVIATION ORGANIZATION

**FIFTH MEETING OF THE
ASIA/PACIFIC PERFORMANCE BASED NAVIGATION TASK FORCE
(PBN TF/5)**

Bangkok, Thailand, 15 – 17 July 2009

Agenda Item 3: 3.1 State PBN Plan and Status of PBN Implementation

THAILAND PBN IMPLEMENTATION PLAN

(Presented by Thailand)

SUMMARY

In June 2009, Thailand National Working Group for PBN & GNSS has approved Thailand PBN Implementation Plan. This Plan aims to provide aviation stakeholders with appropriate implementation guidance and timelines to allow proper preparation for PBN implementations within Bangkok Flight Information Region (FIR). The Plan is aligned with the Asia/Pacific Regional PBN Implementation Plan developed by ICAO Asia/Pacific PBN Task Force and 2007 ICAO Assembly Resolutions. Details of the Thailand PBN Implementation Plan can be found attached to this paper.

1. Introduction

1.1 Challenges in aviation and needs for better efficiency in aircraft fuel consumption call for new navigation technologies and operation procedures to be implemented. In respond to this call for actions, ICAO Asia/Pacific Air Navigation Planning and Implementation Regional Group, APANPIRG, 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.

1.2 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.

1.3 The 36th Session of the ICAO Assembly held in Montreal from 18 to 28 September 2007 adopted Resolution A36-23 urging all the States to implement RNAV and RNP air traffic services (ATS) routes and procedures in accordance with ICAO PBN concept described in the *Performance Based Navigation Manual* (Doc 9613). The resolution calls on the States and Planning and Implementation Regional Groups (PIRGs) to develop PBN implementation plans by 2009 to ensure globally harmonized and coordinated implementation of PBN.

1.4 APANPIRG, through its Conclusion 18/52, established a Regional Performance Based Navigation Task Force (PBN/TF) to address PBN related regional implementation issues. In its Conclusion 18/53, APANPIRG stipulated development of State PBN Implementation Plans in harmony with the Asia/Pacific Regional PBN Implementation Plan.

1.5 During the 6th APEC Transportation Ministerial Meeting in Manila, the Philippines in April 2009, Transportation Ministries of Asia-Pacific Economic Cooperation (APEC) Economies, encourage the continued implementation of PBN aiming to result in more efficient fuel utilization for aircrafts.

2. **Thailand PBN Implementation Plan**

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

2.2 The Working Group is responsible for developing policy, implementation plans, and implementation standards for the deployment of PBN and GNSS procedures and operations in Thailand airspace. The Working Group has three areas of responsibility in regards to the implementation of PBN and GNSS in Thailand airspace. The three areas of responsibility are:

- Policy & Implementation Planning
- Establishments of Standards and Requirements in accordance to appropriate ICAO requirements
- Communication with Stakeholders

2.3 In June 2009, the Working Group has 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 implementations within Bangkok Flight Information Region (FIR). The Plan is aligned with the Asia/Pacific Regional PBN Implementation Plan developed by ICAO Asia/Pacific PBN Task Force and 2007 ICAO Assembly Resolutions. Details of the Thailand PBN Implementation Plan can be found attached to this paper.

2.4 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.

3. **Actions by the Meeting**

3.1 The Meeting is invited to note:

- a) the roles of Thailand's National Working Group on PBN & GNSS Implementation,
- b) that Thailand PBN Implementation Plan has been approved by the National Working Group,
- c) that Thailand PBN Implementation Plan is developed in consistent with the interim Asia/Pacific Regional PBN Implementation Plan.

Thailand Performance Based Navigation (PBN) Implementation Plan

Executive Summary

This Thailand PBN Implementation Plan is a cooperative work of Department of Civil Aviation of Thailand, representatives from Thai airline operators, Thai Pilot's Association, Airports of Thailand Public Company Limited, and Aeronautical Radio of Thailand Ltd. This Plan aims to provide aviation stakeholders with appropriate implementation guidance and timelines to allow proper preparation for Performance Based Navigation (PBN) implementations within Bangkok Flight Information Region (FIR). The Plan is aligned with the Asia/Pacific Regional PBN Implementation Plan developed by ICAO Asia/Pacific PBN Task Force and 2007 ICAO Assembly Resolutions.

This 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 implementation.

1. Introduction

1.1 The continuing growth of aviation places increasing demands on airspace capacity and the need for optimum utilization of available airspace. With these needs and increasing fuel costs and higher concerns on aircraft/airport noise to the environment, aviation industry calls for new navigation technologies and operation procedures to be implemented. In respond to this call for actions, ICAO Asia/Pacific Air Navigation Planning and Implementation Regional Group, APANPIRG, 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.

1.2 Introduction of PBN specifications and GNSS technology 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.

2. Benefits of PBN

2.1 PBN offers a number of benefits over the sensor-specific navigation routes and procedures. Some of the benefits are being listed below:

- Reduced need to maintain sensor-specific routes and procedures, and their associated costs
- Avoids need for development of sensor-specific operations with each new evolution of navigation system. The present requirement of developing procedures with each new introduction is often very costly.
- Allows more efficient use of airspace in true harmony with the way in which RNAV systems are used
- Facilitates the operational approval process for operators by providing a limited set of navigation specifications intended for global use.
- For the pilots, the main advantage of using this system is that the navigation function is performed by highly accurate and sophisticated on-board equipment and thus allowing reduction in cock-pit workload and also increase in safety.

- For Air Traffic Controllers, the main advantage of aircraft using a RNAV system is that ATS routes can be straightened as it is not necessary for the routes to pass over locations marked by conventional navigation aids.
- RNAV based arrival and departure routes can complement and even replace radar vectoring, thereby reducing Approach and Departure Controllers' workload.

3. **Global Perspectives and Needs for Harmonization**

3.1 The 36th Session of the ICAO Assembly held in Montreal in September 2007 adopted Resolution A36-23 urging all the States to implement RNAV and RNP air traffic services (ATS) routes and procedures in accordance with ICAO PBN concept described in the *Performance Based Navigation Manual* (Doc 9613). The Assembly urged 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 5700 kg or more, according to established timelines and intermediate milestones.

3.2 At the 44th Asia-Pacific DGCA Conference held in 2007 in Xi'an, China, the Conference adopted Action Item 44/6 urging States to implement PBN as per ICAO guidance material and to support the Asia-Pacific PBN Task Force established by APANPIRG/18.

3.3 During the 44th Conference of Directors General of Civil Aviation, Asia and Pacific Region held at Xi'an, China from 22 to 26 October 2007, IATA expressed that implementation of Performance Based Navigation provides significant safety, efficiency and environmental benefits to operators and service providers.

3.4 The PBN concept specifies RNAV and RNP system performance requirements in terms of accuracy, integrity, availability, continuity and functionality needed for the proposed operations in the context of a particular Airspace Concept, when supported by the appropriate navigation infrastructure. In that context, the PBN concept represents a shift from sensor-based to performance-based navigation. Performance requirements are identified in navigation specifications which also identify the choice of navigation sensors and equipment that may be used to meet the performance requirements. These navigation specifications are defined at a sufficient level of detail to facilitate global harmonization by providing specific implementation guidance for States and operators.

3.5 Under the PBN concept, the generic navigation requirements are defined based on operational requirements. Thus, users may evaluate the available options. To ensure synchronization of investment and interoperability of the airborne and ground systems, the selection of the solution should be in consultation with aviation stakeholders, including international and domestic airline operators, air navigation service providers, and regulators. The solution selected should also be the most cost-effective one.

3.6 The development of PBN concept recognized that advanced aircraft RNAV systems are achieving an enhanced and predictable level of navigation performance accuracy which, together with an appropriate level of functionality, allows a more efficient use of available airspace to be realized. It also takes account of the fact that RNAV systems have developed over a 40-year period and as a result there were a large variety of differing implementations globally. Identifying navigation requirements rather than on the means of meeting the requirements will allow use of all RNAV systems meeting these requirements irrespective of the means by which these are met.

3.7 APANPIRG established the PBN Task Force to develop a PBN implementation plan for the Asia/Pacific Region and to address related regional PBN implementation issues. Accordingly, States are encouraged to work cooperatively bilaterally, multilaterally and with the PBN Task Force to ensure regional and sub-regional harmonization of PBN implementation.

3.8 Resulting from the work of the APAC PBN Task Force, the following Asia/Pacific Regional PBN Implementation Plan was established.

3.9 **Route Operations** - The application of RNAV 10 and RNP 4 navigation specifications is expected for Oceanic and Remote continental routes. For Continental routes, the application of RNAV 5 and RNAV 2 navigation specifications is expected.

3.10 **TMA Operations** - In selected TMAs, the application of RNAV 1 in a radar environment can be supported through the use of GNSS or ground navigation infrastructure, such as DME/DME and DME/DME/IRU. In this phase, mixed operations (equipped and non-equipped) will be permitted. In a non-radar environment and/or in an environment without adequate ground navigation infrastructure, the SID/STAR application of Basic-RNP1 is expected in selected TMAs with exclusive application of GNSS. In this phase, mixed operations (equipped and non-equipped) will be permitted.

3.11 **Instrument Approaches** - The application of RNP APCH with Baro-VNAV procedures is expected to be implemented in the maximum possible number of airports, commencing primarily with international airports. To facilitate transitional period, conventional approach procedures and conventional navigation aids should be maintained for non-equipped aircraft. The use of APV operations (Baro-VNAV or augmented GNSS) will be promoted to enhance safety and accessibility of RNP approaches. The application of RNP AR APCH procedures should be considered in selected airports, where obvious operational benefits can be obtained due to the existence of significant obstacles.

3.12 **Summary table & Implementation targets for Asia-Pacific Region**

| Short Term (2008-2012) | | |
|-------------------------------|---|---------------------------------------|
| Airspace | Preferred Nav. Specifications | Acceptable Nav. Specifications |
| Route – Oceanic | RNP 4 | RNAV 10 |
| Route – Remote continental | RNP 4 | RNAV 10 |
| Route – Continental en-route | RNAV 2, RNAV 5 | |
| TMA – Arrival | RNAV 1 in radar environment and with adequate navigation infrastructure. Basic-RNP 1 in non-radar environment | |
| TMA – Departure | RNAV 1 in radar environment and with adequate navigation infrastructure. Basic-RNP 1 in non-radar environment | |
| Approach | RNP APCH with Baro-VNAV in most possible airports RNP AR APCH in airport where there are obvious operational benefits. | |

Implementation Targets

- RNP APCH (with Baro-VNAV) in 30% of instrument runways by 2010 and 50% by 2012 and priority should be given to airports with operational benefits
- 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
- Re-defining existing RNAV/RNP routes into PBN navigation specification by 2012
- Implementation of additional RNAV/RNP routes

4. Thailand National Working Group for PBN and GNSS Implementation

4.1 Recognizing the benefits of PBN and GNSS, since May 2007, Thailand has established a national working group to foster a cooperative approach among Thailand aviation stakeholders in the implementations of PBN and GNSS over Thailand airspace. Planning and implementation activities involve participation from Department of Civil Aviation of Thailand, representatives from Thai airline operators, Thai Pilot's Association, Airports of Thailand Public Company Limited, and Aeronautical Radio of Thailand Ltd.

4.2 The Working Group is responsible for developing policy, implementation plans, and implementation standards for the deployment of PBN and GNSS procedures and operations in Thailand airspace. The Working Group has three areas of responsibility in regards to the implementation of PBN and GNSS in Thailand airspace. The three areas of responsibility are:

- Policy & Implementation Planning
- Establishments of Standards and Requirements in accordance to appropriate ICAO requirements
- Communication with Stakeholders

4.3 These three areas of responsibility define the list of work tasks responding to the needs for careful planning, well-defined implementation roadmap, well-established implementation standards, and flexible processes to address the needs of aviation stakeholders. The three areas are related, sequential, and recursive by nature.

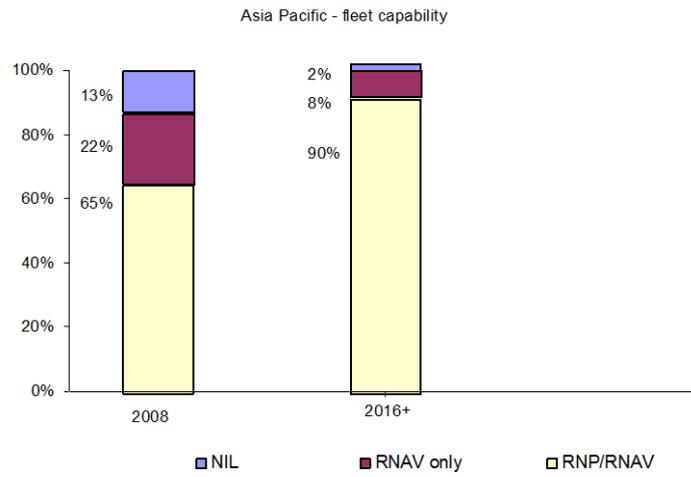
4.4 The Terms of Reference for the Working Group is shown in **Attachment 1**.

5. Fleet Readiness Status

5.1 All major commercial aircraft manufacturers since the 1980's have included RNAV capabilities. The commercial aircraft currently produced incorporate an RNP capability.

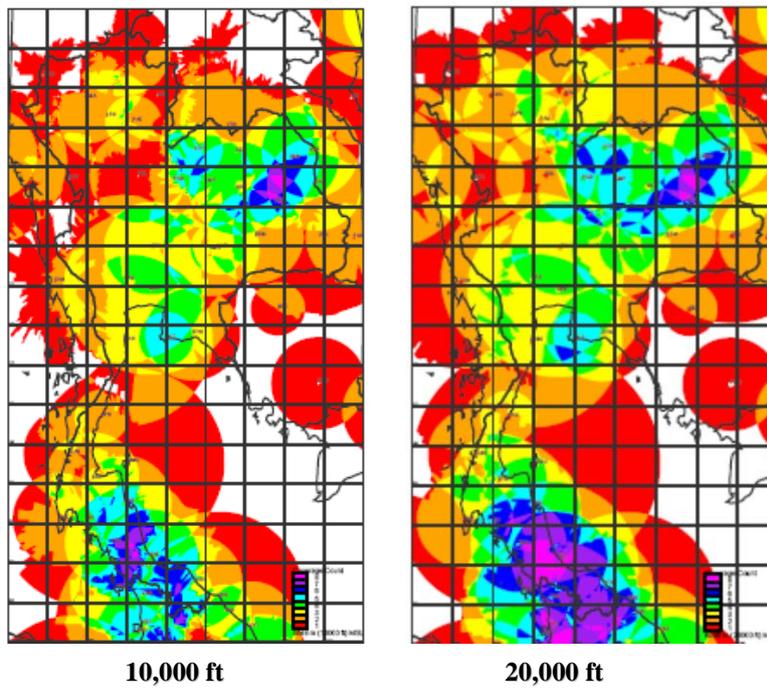
5.2 One significant issue for PBN implementation today is directly related to the multitude of FMS installations and varying degrees of capabilities associated with the current fleet of RNAV aircraft. Specifically, there are numerous FMS systems installed in today's fleets, all with varying capabilities.

5.3 The diagram below displays a high level analysis based on fleet numbers from Ascend Online Fleets database March 2008 and RNAV/RNP classification by IATA.

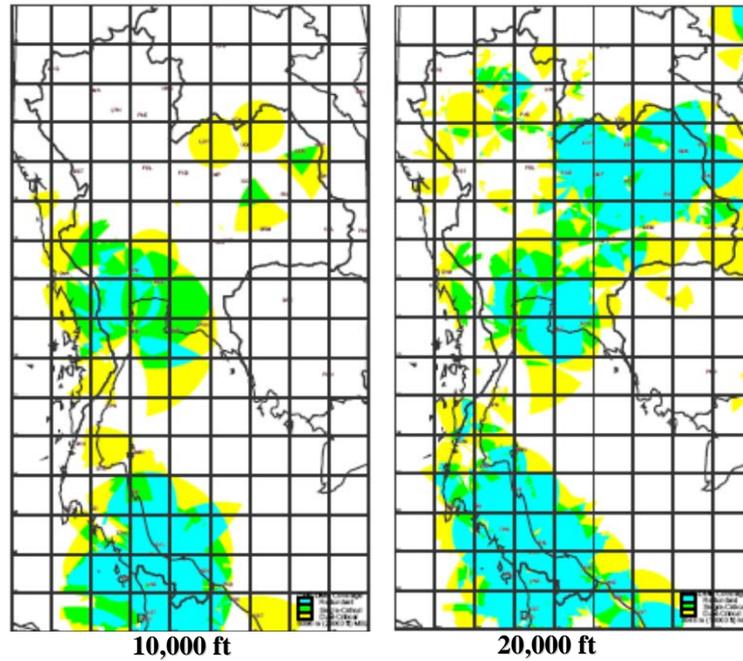


6. Assessment of CNS Infrastructure

6.1 VOR/DME coverage within the Bangkok FIR is as following:

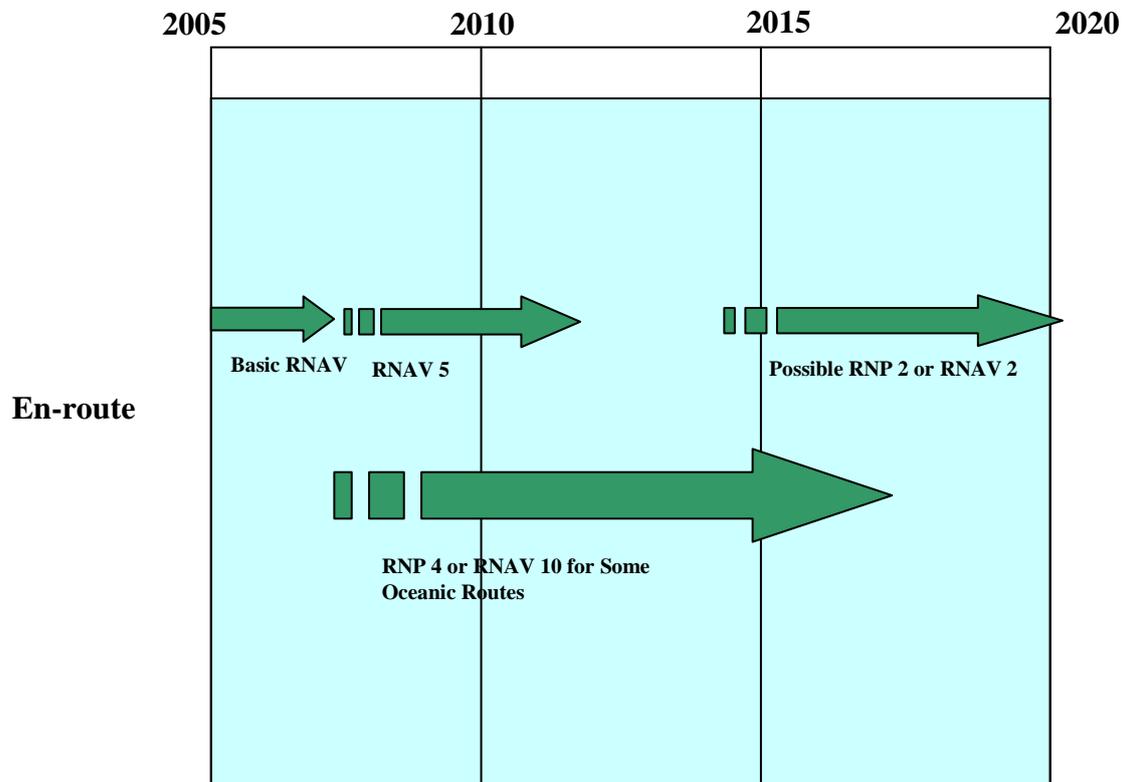


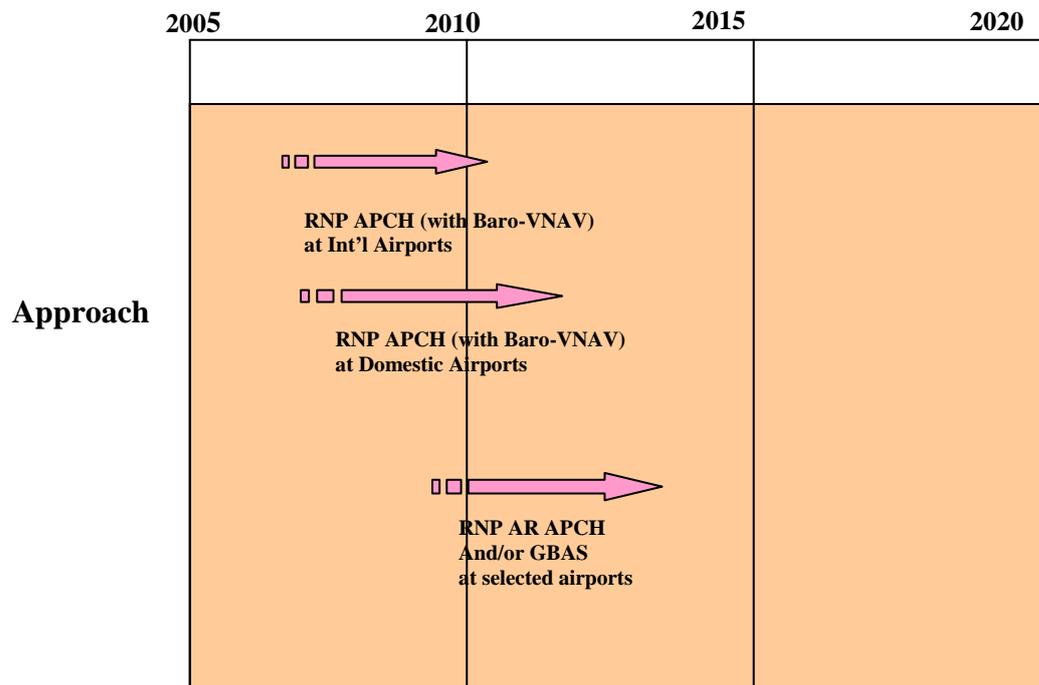
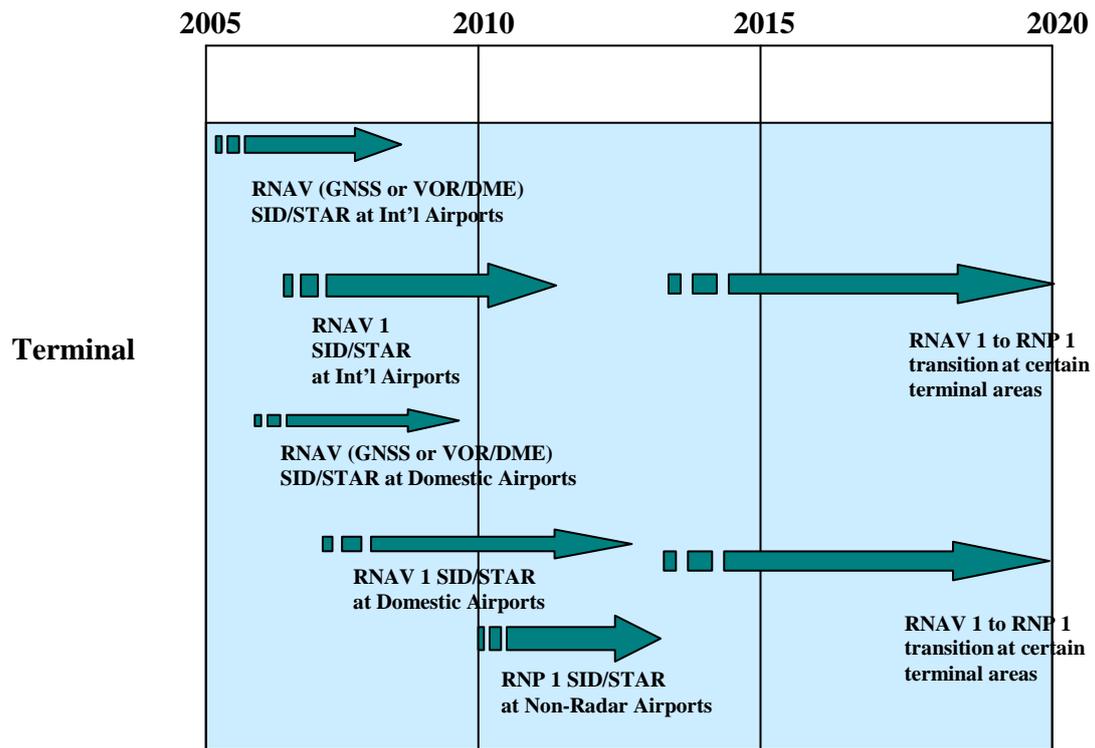
6.2 DME/DME coverage within the Bangkok FIR is as following:



7. Thailand PBN & GNSS Navigation Specification Roadmap

7.1 To assist planning and to assure proper equipages by aircraft operators, the National Working Group has established a Navigation Specification Roadmap for PBN & GNSS Implementation over Bangkok FIR. The Roadmap is consistent with the interim Asia/Pacific Regional PBN Implementation Plan adopted by ICAO APANPIRG/19.





8. Route Implementation

8.1 During 2009-2012, Thailand will consider the use of RNAV 10, RNAV 5, and RNP 4 navigation specifications for PBN route implementations. Some existing domestic conventional ATS routes will be modified towards PBN routes, while additional domestic and international RNAV and RNP routes may be introduced. Designation of upper and lower airspace will also be considered to assist PBN en-route implementation during the transitional period.

8.2 The following high-traffic city-pairs are being considered for initial PBN

route implementations:

- Bangkok-Phuket
- Bangkok-Samui-Hat Yai
- Samui-Phuket
- Bangkok-Chiang Mai
- Bangkok-Udonrathani
- Bangkok-Ubonratchathani

9. Terminal Area and Approach Implementation

9.1 With consultations from aviation stakeholders and airline operators, the National Working Group establishes the following PBN implementation schedule to increase safety and efficiency of terminal area and approach operations.

| Implementation Activities Starts | Terminal Areas | Target Nav. Specifications | | Expected Operation Date |
|----------------------------------|---------------------|----------------------------|-------------------------|----------------------------|
| 2008 | VTSP (Phuket) | Approach | RNP APCH (w/ Baro-VNAV) | RNP APCH since 12 Feb 2009 |
| | | SID | RNAV 1 (D/D/I or GNSS) | Sep 2009 |
| | | STAR | RNAV 1 (D/D/I or GNSS) | Sep 2009 |
| 2008 | VTSM (Samui) | Approach | RNP APCH (w/ Baro-VNAV) | Sep 2009 |
| | | SID | RNAV 1 (D/D/I or GNSS) | Sep 2009 |
| | | STAR | RNAV 1 (D/D/I or GNSS) | Sep 2009 |
| 2008 | VTSS (Hat Yai) | Approach | RNP APCH (w/ Baro-VNAV) | Sep 2009 |
| | | SID | RNAV 1 (D/D/I or GNSS) | Sep 2009 |
| | | STAR | RNAV 1 (D/D/I or GNSS) | Sep 2009 |
| 2008 | VTBS (Suvarnabhumi) | Approach | RNP APCH (w/ Baro-VNAV) | June 2010 |
| | | SID | RNAV 1 (D/D/I or GNSS) | June 2010 |
| | | STAR | RNAV 1 (D/D/I or GNSS) | June 2010 |
| 2008 | VTBD (Don Mueang) | Approach | RNP APCH (w/ Baro-VNAV) | June 2010 |
| | | SID | RNAV 1 (D/D/I or GNSS) | June 2010 |
| | | STAR | RNAV 1 (D/D/I or GNSS) | June 2010 |
| 2009 | VTBU (U-Tapao) | Approach | RNP APCH (w/ Baro-VNAV) | Dec 2010 |
| | | SID | RNAV 1 (D/D/I or GNSS) | Dec 2010 |
| | | STAR | RNAV 1 (D/D/I or GNSS) | Dec 2010 |

| | | | | |
|------|----------------------------|----------|----------------------------|----------|
| 2009 | VTCC (Chiang Mai) | Approach | RNP APCH (w/ Baro-VNAV) | Dec 2009 |
| | | SID | RNAV 1 (D/D/I or GNSS) | Dec 2009 |
| | | STAR | RNAV 1 (D/D/I or GNSS) | Dec 2009 |
| 2009 | VTSG (Krabi) | Approach | RNP APCH (w/ Baro-VNAV) | Jun 2010 |
| | | SID | RNAV 1 (D/D/I or GNSS) | Jun 2010 |
| | | STAR | RNAV 1 (D/D/I or GNSS) | Jun 2010 |
| 2009 | VTUK (Khon Kaen) | Approach | RNP APCH (w/ Baro-VNAV) | Dec 2010 |
| | | SID | RNAV 1 (D/D/I or GNSS) | Dec 2010 |
| | | STAR | RNAV 1 (D/D/I or GNSS) | Dec 2010 |
| 2009 | VTCH (Mae Hong Sorn) | Approach | RNP APCH (w/ Baro-VNAV) | Dec 2010 |
| | | SID | RNAV 1 (D/D/I or GNSS) | Dec 2010 |
| | | STAR | RNAV 1 (D/D/I or GNSS) | Dec 2010 |
| 2009 | VTCT (Chiang Rai) | Approach | RNP APCH (w/ Baro-VNAV) | Dec 2010 |
| | | SID | RNAV 1 (D/D/I or GNSS) | Dec 2010 |
| | | STAR | RNAV 1 (D/D/I or GNSS) | Dec 2010 |

9.2 Tangible Benefits of PBN

9.2.1 Phuket International Airport (VTSP) The following table summarizes benefits of PBN implementation at Phuket International Airport.

| | Conventional | PBN |
|-----------|-----------------------|-------------------------|
| Runway 27 | 1.4-degree ILS offset | Runway aligned approach |
| Runway 09 | 6-degree VOR offset | Runway aligned approach |
| | No vertical guidance | Vertical guidance |
| | OCA at 850 feet | OCA at 750 feet |

9.2.2 Samui International Airport (VTSM) The following table summarizes benefits of PBN implementation at Samui International Airport.

| | Conventional | PBN |
|-----------|---|---|
| Runway 17 | Straight-in, yet pass through unstable weather area | Runway aligned approach, using side-step to avoid the unstable weather area |

9.2.3 Hat Yai International Airport (VTSS) The following table summarizes benefits of PBN implementation at Hat Yai International Airport.

| | Conventional | PBN |
|-----------|--|-------------------------|
| Runway 08 | Unavailable due to mountainous terrain | Runway aligned approach |

ATTACHMENT 1:

**TERMS OF REFERENCE FOR THE THAILAND JOINT WORKING GROUP ON
PBN AND GNSS IMPLEMENTATIONS IN THAILAND AIRSPACES**

Introduction

Recognizing the benefits of PBN and GNSS implementations and the need to establish a collaborative working relationship addressing the matters, Thai aviation stakeholders, including regulators, air navigation services provider, airlines, and other airspace users, agree to establish a joint working group to conduct planning and to develop implementation roadmap and standards for PBN and GNSS implementations within Thailand airspace. This document defines the Terms of Reference for the Joint Working Group on Performance Based Navigation (PBN) and Global Navigation Satellite System (GNSS) Implementations in Thailand Airspaces.

Goal

The goal of the joint working group is to foster a cooperative approach among Thailand aviation stakeholders in the implementations of PBN and GNSS procedures and operations over Thailand airspaces.

Participating Organizations

Planning and implementation activities will involve participation from Department of Civil Aviation of Thailand, representatives from Thai airline operators, Thai Pilot's Association, Airports of Thailand Public Company Limited, and Aeronautical Radio of Thailand Ltd.

Scope of Works

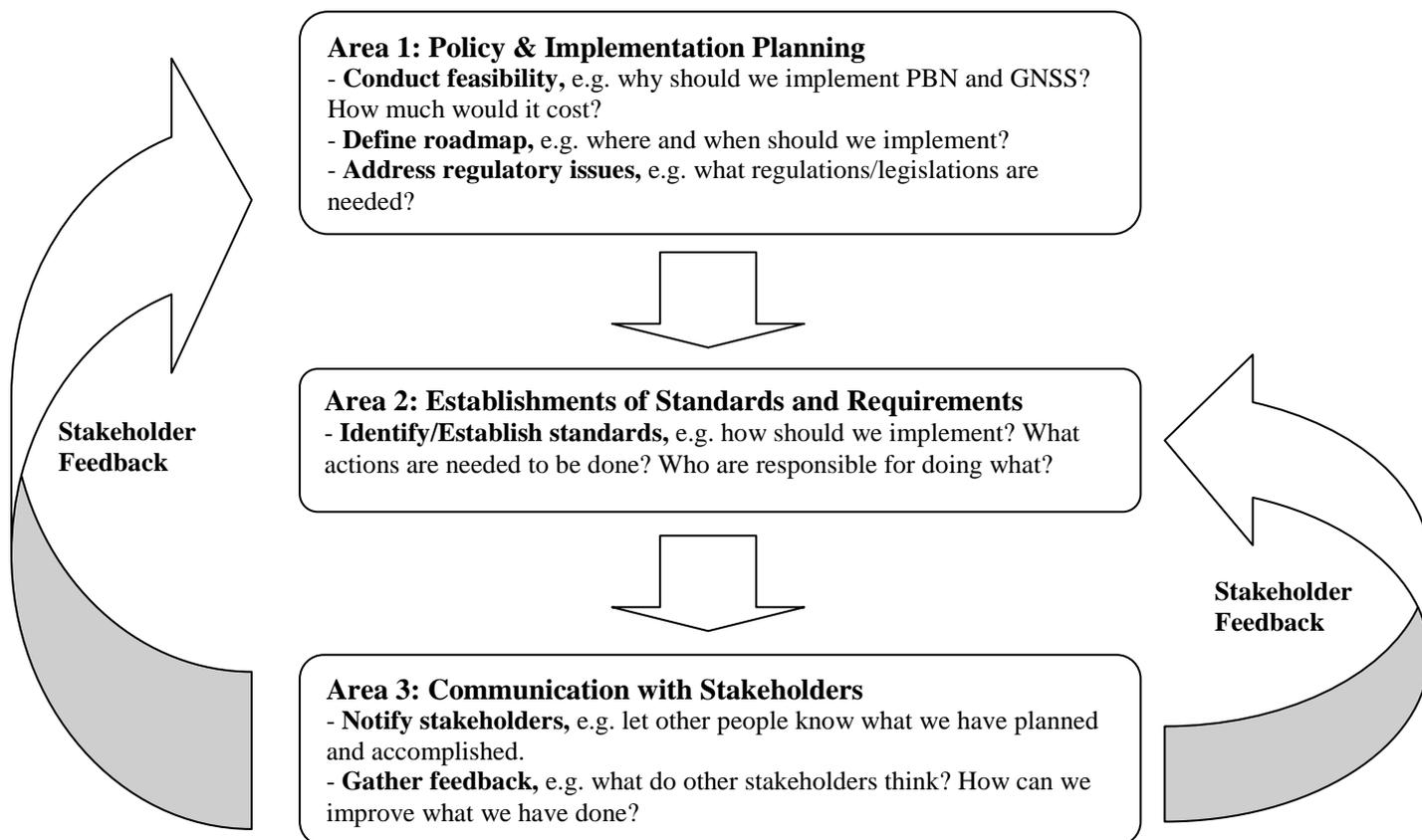
The joint working group is responsible for developing policy, implementation plans, and implementation standards for the deployment of PBN and GNSS procedures and operations in Thailand airspace.

Areas of Responsibility

The joint working group has three areas of responsibility in regards to the implementation of PBN and GNSS in Thailand airspace. The three areas of responsibility are:

- Policy & Implementation Planning
- Establishments of Standards and Requirements in accordance to appropriate ICAO requirements
- Communication with Stakeholders

These three areas of responsibility define the list of work tasks responding to the needs for careful planning, well-defined implementation roadmap, well-established implementation standards, and flexible processes to address the needs of aviation stakeholders. The three areas are related, sequential, and recursive by nature. The following diagram depicts the roles and relationships of each area of responsibility:



Work Tasks

Area 1: Policy & Implementation Planning

In this area of responsibility, the joint working group is responsible for developing implementation plans and recommending any revision on aviation policy with related to PBN and GNSS implementation. In the development of the implementation plan, the joint working group should consider safety, efficiency, and economic benefits for all stakeholders within Thai aviation community. The joint working group should also take into account the implementation strategies agreed by the ICAO APANPIRG. The work tasks under this area of responsibility are:

- Conduct feasibility study and develop a national implementation plan defining Thailand's operational requirements for PBN and GNSS procedures and operations in Thailand airspace;
- Establish target dates and deployment roadmap for PBN and GNSS procedures;
- Identify navigation infrastructures that meets the operational requirements;
- Identify required regulatory changes to support authorization of PBN and GNSS procedures and operations in Thailand airspace;
- Identify business case elements to support expenditures on development of procedures, related elements and augmentation systems;
- Facilitate with appropriate government authorities to protect and manage GNSS frequencies;
- Facilitate with appropriate agencies on issues regarding noise and environmental impacts;
- Develop transitional plans for decommissioning some terrestrial navigation aids as appropriate;

- Develop implementation strategy for all aviation users, including general aviation, for issues related to PBN and GNSS;
- Provide guidance to Thai representatives on international forums relating to PBN and GNSS.

Area 2: Standards and Requirements in accordance to appropriate ICAO requirements

In this area of responsibility, the joint working group is responsible for identifying and/or establishing standards and procedures for PBN and GNSS implementation activities. These standards and procedures should be in compliance with or based on ICAO SARPs, manuals, and documents and address all types of airspace users, including general aviation. The standards and procedures should also assist the harmonization of global and regional standards and practices. The work tasks under this area of responsibility are:

- Identify/Establish standard on WGS-84 standard for surveys, publications and databases;
- Identify/Establish technical evaluation procedures regarding signal-in-space requirements and engineering assessment of navigation infrastructures;
- Identify/Establish process on the development of PBN and GNSS flight procedures, using ICAO approved design criteria and accounting for aerodrome standards;
- Identify/Establish flight inspection requirements and procedures;
- Identify/Establish requirements for Aeronautical Information Services elements related to PBN and GNSS implementation;
- Identify/Establish requirements for GNSS status monitoring and associated NOTAMs;
- Identify/Establish an operational use policy, necessary separation standards, and ATC procedures for PBN and GNSS operations;
- Identify/Establish standards and guidance material for airworthiness requirements governing the installation of approved PBN and GNSS equipment on-board aircrafts;
- Identify/Establish standards and guidance material for certifications governing the installation of approved PBN and GNSS ground equipments;
- Identify/Establish related training requirements.

Area 3: Communication with Stakeholders

Active participation from aviation stakeholders is essentially for successful implementation of PBN and GNSS. In this area of responsibility, the joint working group is responsible for the following work tasks:

- Gather stakeholders inputs regarding PBN and GNSS implementation plans;
- Promote the use of PBN and GNSS and assist aircraft operators to make decisions on installation and certification of required avionics equipments;
- Inform aircraft operators of the terms and conditions for the use of PBN and GNSS procedures;
- Develop guidance material associated to the approval to use PBN and GNSS procedures;
- Develop a system of post-implementation reviews to ensure the effective and safe introduction of PBN and GNSS operations.

Special Tasking

The joint working group may identify the need for task forces to address a particular technical or operational issues related to PBN and GNSS implementations within Thailand airspace. The joint working group shall develop terms of reference for the work to be done, identify required resources, obtain management approval from participating organizations, and assign the work to a task force for completion. Results provided by the task force will then be

reviewed by the joint working group, who will then submit a consensus report with recommendations to management approval.

Work Arrangements

Meetings

The joint working group meeting should be held monthly or as decided by the joint working group.

Reporting

The joint working group secretariat will issue the report following each joint working group meeting, summarizing the outcomes of the meeting. Joint working group's recommendations will be submitted to the management of each participating organizations for acknowledgements and/or approvals.