INTERNATIONAL CIVIL AVIATION ORGANIZATION

Third Meeting of the APIRG Communications, Navigation and Surveillance Sub-Group (Nairobi, 26-30 April 2010)

Agenda Item 6: Implementation of performance Based Navigations System (PBN) in AFI

(Presented by the Secretariat)

SUMMARY
This working paper highlights s the implementation of PBN in AFI and the required CNS infrastructure to support PBN. Action by the meeting is at **paragraph 4.**
REFERENCE: PBN Hand book ICAO Doc 9613 Doc 003

1. INTRODUCTION

1.1 The Eleventh Air Navigation Conference, (September – October 2003 Montreal) recommended that ICAO, as a matter of urgency, address and progress the issues associated with the introduction of RNP and Area Navigation (RNAV). Discussions during the Worldwide Symposium on Performance of the Air Navigation System also identified a need to accelerate the implementation of PBN. The Thirty-sixth Session of the ICAO Assembly held in Montreal in September 2007 also adopted a Resolution that States and PIRGs complete a regional PBN implementation plan by 2009.

2 DISCUSSION

2.1 The PBN concept represents a shift from sensor-based to performance-based navigation. Performance requirements are identified in navigation specifications which also identifies the choice of navigation sensors and equipment that may be used to meet the performance requirements. These navigation specifications are defined at a high level with details to facilitate global harmonization by providing specific implementation guidance for States and Operators. 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 one that is the most cost-effective.

2.2 The development of the 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 into 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 the use of all RNAV systems to meet these requirements irrespective of the means by which they are met.

3, OPERATIONAL REQUIREMENTS

En route

3.1 En-route operations can be classified as Oceanic, Remote continental and Continental. ATM operational requirements for en-route operations are RNAV-10; RNP-4; RNAV-5 and RNAV-1.

TMA Operations

3.2 TMA operations have their own characteristics, taking into account the applicable separation minima between aircraft and between aircraft and obstacles. TMA operations also involve the diversity of aircraft, including low-performance aircraft flying in the lower airspace and conducting arrival and departure procedures on the same path or close to the paths of high-performance aircraft. TMA operational requirements are RNAV-1 in surveillance environment and basic RNP-1 in non surveillance environment.

Approach

3.3 Operational requirements are Vertical Guidance to enhance safety. Conventional approach procedures and conventional navigation aids should be maintained to support non-equipped aircraft during the transitional period.

Navigation infrastructure

3.4 GNSS augmentations include Aircraft-Based Augmentation System (ABAS), Satellite-Based Augmentation System (SBAS), Ground-Based Augmentation System (GBAS), and Ground-based Regional Augmentation System (GRAS). Other navigation infrastructures includes INS, VOR/DME, DME/DME and DME/DME/IRU. These navigation infrastructures may satisfy the requirements of RNAV navigation specifications, but RNP INS may be used to support PBN en-route operations with RNAV 10 and RNAV 5 navigation specifications.

3.5 VOR/DME may be used to support PBN en-route and STAR operations based on the RNAV 5 navigation specification

3.6 Uses of DME/DME and DME/DME/IRU may support PBN en-route and terminal area operations based on RNAV 5, RNAV 2 or RNAV 1 navigation specifications.

Validation of DME/DME coverage area and appropriate DME/DME geometry should be conducted to identify possible DME/DME gaps, including identification of critical DMEs and to ensure proper DME/DME service coverage.

3.7 For RNAV operations, States should ensure that sufficient surveillance coverage is provided to assure the safety of the operations. For RNP operations, surveillance coverage may not be required. Details on the surveillance requirements for PBN implementation can be found in the ICAO PBN Manual and ICAO PANS-ATM (Doc 4444).

3.8 Implementation of RNAV/RNP routes includes communication requirements. Details on the communication requirements for PBN implementation can be found in ICAO PANS-ATM (Doc 4444), ICAO RCP Manual (Doc 9869), and ICAO Annex 10. Information on the current existing communication infrastructure in AFI can also be found in ICAO FASID Doc. 7474.

3.9 PBN Task Force is developing AFI PBN Implementation Plan to be presented to APIRG/17 for adoption and to be used by AFI States.

3.10 From the above implementation of GNSS in AFI Region, it is crucial in the implementation of PBN since most States in AFI Region cannot use DME/DME as ,there are no enough DMEs on the Air Routes.

3.10 At SP AFI RAN Recommendation 6/14:- *ICAO assistance with legal and regulatory issues associated with implementation of GNSS approach procedures*, not much progress has taken place due to no responds from States on their status of GNSS implementation.

4. ACTION TO BE TAKEN BY THE MEETING

4.1 The meeting is invited:

a) to take note of the above information;

b) States to inform the regional office on the status of the GNSS implementation in their States; and

c) States to participate in PBN task force meetings
