International Civil Aviation Organization

The Twelfth Meeting of the South East Asia ATS Coordination Group (SEACG/12)

Bangkok, Thailand, 3 – 6 May 2005

Agenda Item 5: Implementation of the New CNS/ATM Systems in the Region

GUIDELINES FOR THE IMPLEMENTATION OF RNP OPERATIONS

(Presented by the Secretariat)

SUMMARY

The ICAO Secretariat, assisted by the ICAO RNP Special Operational Requirements Study Group (RNPSORSG) has commenced work in regard to harmonizing the differing concepts, terminology and definitions utilized in RNP applications globally. This paper introduces draft guidelines that will form the basis for amendments to ICAO provisions for applicability in November 2006 in regard to RNP naming conventions and associated concepts.

1 INTRODUCTION

1.1 In a global sense, within the international civil aviation community and among individual States there exists a number of different perspectives in relation to several aspects of required navigation performance (RNP). In particular, the naming conventions associated with RNP have led to some confusion regarding concepts, terminology and definitions. Consequently, divergences in regional implementations had resulted in a lack of harmonization between RNP applications in different areas of the world.

2 DISCUSSION

2.1 In order to address the lack of global harmonization resulting from the differing RNP naming conventions the ICAO Secretariat, with the assistance of the ICAO RNP and Special Operational Requirements Study Group (RNPSORSG), commenced work on developing guidelines aimed at ensuring a common global understanding of RNP and the relationship between RNP and area navigation (RNAV) system functionality. The draft guidelines introduce the terminologies and associated concepts of Basic RNAV (BRNAV), Continental RNAV (CRNAV) and Terminal RNAV (TRNAV), which incorporate existing situations in regard to RNP5, USRNAV type A, USRNAV type B and P-RNAV nomenclature.

2.2 At the current stage of development, the guidelines focus primarily on the enroute phase of flight and need further development in regard to the approach phase of flight. The draft guidelines are reproduced as an **Attachment** to this working paper for consideration by the meeting.

2.3 The development of amendment proposals to relevant ICAO provisions will be accomplished later this year with an applicability date of November 2006. The *Manual on Required Navigation Performance* (Doc 9613) is also being updated by the Secretariat with the assistance of the study group. In the meantime, the attached guidelines are intended to be used with States and within

the planning and implementation regional groups (PIRGs) in anticipation of expected approval, so as to avoid further proliferation of non-harmonized RNP implementation.

3 ACTION BY THE MEETING

3.1 The meeting is invited to:

a) note the ICAO initiatives in relation to the alignment of RNP naming conventions in order to assist the global harmonization of RNP operations;

b) review the draft guidance material in the attachment to this paper;

c) adopt the intent of the guidance material, in anticipation of amendments to ICAO provisions in this regard, in future airspace planning and implementation; and

d) identify regional issues arising from the pending introduction of amended ICAO provisions in relation to RNP naming conventions, concepts and definitions.

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ATTACHMENT

Guidelines for uniform implementation of RNP operations

1. Introduction

Many different perspectives within the international civil aviation community and among individual States on several aspects of required navigation performance (RNP) and, in particular, the naming convention associated with it, have led to some confusion regarding concepts, terminology and definitions. Consequently, a divergence of implementation resulted in a lack of harmonization between RNP applications. Without immediate action, the danger exists that increasing disparity with implementation will continue.

Therefore, the Secretariat, with the assistance of a study group, developed these guidelines in order to ensure a common understanding of RNP and the relationship between RNP and area navigation (RNAV) system functionality, thereby facilitating global harmonization of existing implementations and creating a basis for harmonization of future operations. The guidelines still need to be further developed for the approach phase of flight.

Development of amendment proposals to relevant ICAO provisions will be accomplished later in the year with an applicability date of November 2006. The RNP Manual (Doc 9613) is also being updated by the Secretariat with the assistance of the study group. In the meantime, these guidelines may be used with States and within the planning and implementation regional groups (PIRGs) in anticipation of expected approval so as to avoid further proliferation of RNP implementation.

2. Description

At its highest level, RNP refers to the definition of navigation performance and functional requirements for an operation and thus applies to and affects both the airspace and the aircraft**.** This concept is realized and used in clearly defined navigation applications. A navigation application consists of a navigation standard and an associated operating environment.

While the differences between the existing RNP Concept and its present implementation in demanding operating environments are significant, these differences are not as apparent in less demanding operating environments. Mindful that most existing continental area navigation applications are currently used in demanding operating environments and that it is reasonable to assume that such environments will need to be addressed in many of the expected future en-route and terminal airspace applications, the existing RNP Concept has been elaborated upon with a view to ensuring the maximum coherence between existing navigation standards and future navigation applications.

As such, the revised RNP Concept distinguishes between navigation standards that **do not** require containment integrity and continuity, which are to be designated as "X-RNAV" where "X" is a letter of the Roman alphabet, and those navigation standards requiring containment integrity and continuity, which are to be designated as "RNP-x", where "x" corresponds to the navigation accuracy.

There will be an increasing demand for navigation applications that take advantage of the higher performance capabilities of aircraft (including containment continuity and integrity requirements), and that will allow for future developments, including the ability to rely upon such navigation capability for critical applications such as reduced separation minima in high-density airspace and for approach procedures.

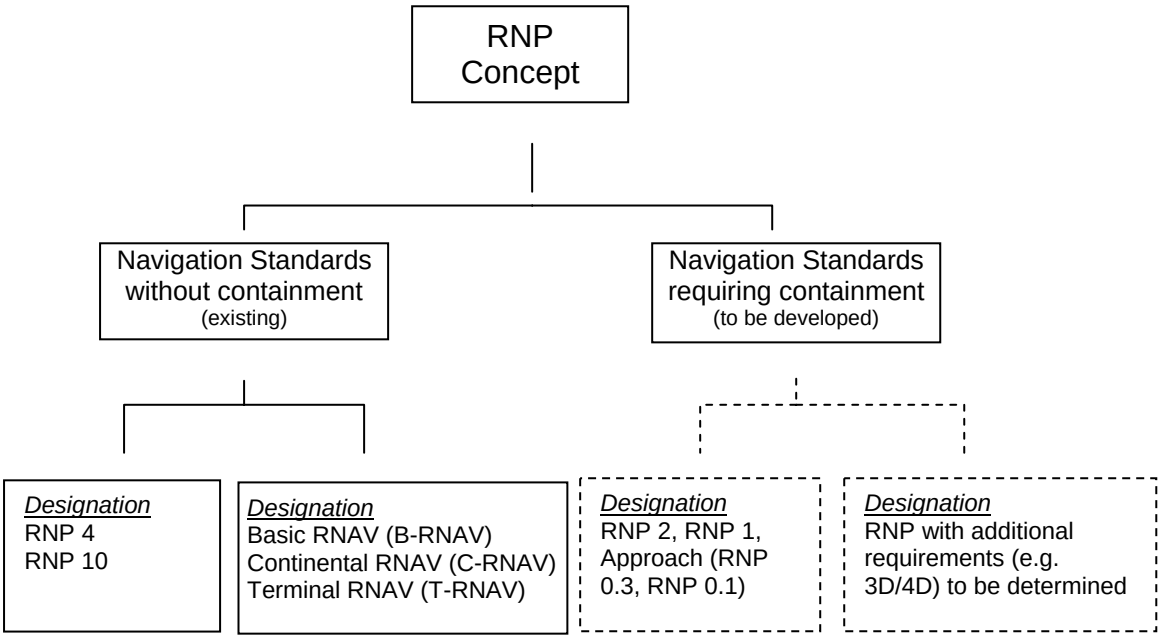

Figure 1. Overview of revised ICAO RNP Concept

3. Areas of Application of the revised approach to RNP

En route-oceanic or En Route-Remote Continental. For these areas of application, existing RNP-10 and RNP-4 navigation standards, requiring long-range navigation functionalities, fulfill operational requirements. Currently, it is not anticipated that new navigation standards for this area of application will be required.

En Route-Continental. Currently, two regional navigation applications without containment requirements have been established, one in Europe, called Basic-RNAV and one in the Middle East, called RNP-5. As RNP-5 is fully based on Basic-RNAV, and taking into consideration the agreement by the group that operations without containment should not be designated RNP, continental navigation applications requiring 5 NM accuracy should be designated Basic-RNAV. The navigation application in the Middle East will therefore be revised. It is envisaged that this will have little impact on operations.

Terminal - Arrivals and departures. To satisfy terminal airspace requirements, several regional implementations of navigation standards are currently in existence or under development (USRNAV type B and European P-RNAV). In order to ensure global interoperability, the study group agreed to harmonize these regional navigation standards under one global standard to be called Terminal-RNAV (T-RNAV). Aircraft certified to this T-RNAV navigation standard will be able to operate in airspace currently requiring either P-RNAV or US RNAV Type B. Similarly, a new navigation standard to be known as Continental RNAV (C-RNAV) is being developed for applications requiring 2 NM accuracy, that may be applied in continental en-route as well as in terminal airspace. It is expected that this navigation standard will be based on US RNAV type A.

Table 1. Operations under current situation and under new RNP concept

Area of Application	**RNP value**	**Designation of navigation standard: Current situation**	**Designation of navigation standard: new RNP concept**
Oceanic/Remote	10	RNP 10	RNP 10
	4	RNP 4	RNP 4
En Route-Continental	5	RNP 5 Basic RNAV	Basic RNAV
En Route - Continental and Terminal	2	USRNAV type A	Continental RNAV
Terminal	1	USRNAV type B P-RNAV	Terminal RNAV

The United States and Eurocontrol have agreed to identify ways by which it will be possible to migrate over time towards the T-RNAV standard. With immediate effect, however, any State excluding the United States or one of the ECAC member states that seeks to implement operations in their airspace using the equivalent of either the United States or European Terminal navigation standard as described in Table 1 should use the T-RNAV navigation standard which will be published in the revised RNP manual (Doc 9613). The United States and Eurocontrol have agreed that aircraft and operators approved for T-RNAV operations by their State of registry will also meet the requirements for operation in the United States USRNAV type B and European P-RNAV airspace.

Terminal - Approach operations. To date, approach navigation applications are sensor specific, requiring separate design for an increasing number of RNAV applications (VOR/DME, DME/DME, Basic Global Navigation Satellite System (GNSS), Satellite-Based Augmentation System (SBAS), Ground-Based Augmentation System (GBAS), etc.). This is not desirable, as it requires extensive commitment of resources for procedure development and publication, and results in operational inflexibility. Therefore, it will be required to apply the RNP concept to the approach phase of flight. Considering the criticality of this phase of flight these types of navigation applications will all require containment if operational benefits are to be achieved. The RNPSORSG is in the process of developing relevant operational requirements.