



**The First Meeting of ICAO Asia/Pacific Performance based Navigation
Implementation Coordination Group (PBNICG/1)**

Beijing, China, 10-12 March 2015

Agenda Item 8: Issues and challenges regarding PBN implementations

LATERAL SEPARATION CRITERIA IN PANS-ATM

(Presented by Secretariat)

SUMMARY

This information paper presents lateral separation criteria which are related in PBN SID/STAR and parallel PBNATS routes as published in ICAO PANS-ATM (Doc 4444).

1. INTRODUCTION

1.1 When discussing parallel PBN ATS route spacing and designing PBN SID/STAR, relevant lateral separation criteria within ICAO PANS-ATM (Doc 4444) can be applied.

2. DISCUSSION

2.1 **Appendix A** summarizes lateral separation criteria which are shown in paragraph 5.4.1 and 5.11 of PANS-ATM (Doc 4444). This information can be used for States and ANSPs when design PBN routes and procedures and should be considered from the conceptual design step of any airspace/route design activities.

3. ACTION BY THE MEETING

3.1 The meeting is invited to:

- a) note the information contained in Appendix of this paper; and
- b) discuss any relevant matters as appropriate.

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Appendix A. Lateral Separation Criteria in PANS-ATM

Chapter 5. SEPARATION METHODS AND MINIMA

5.4 HORIZONTAL SEPARATION

5.4.1 Lateral separation

5.4.1.2 LATERAL SEPARATION CRITERIA AND MINIMA

5.4.1.2.1.4 *Lateral separation of aircraft on published instrument flight procedures for arrivals and departures.*

5.4.1.2.1.4.1 Lateral separation of departing and/or arriving aircraft, using instrument flight procedures, will exist:

- a) where the distance between any combination of RNAV 1 with RNAV 1, or RNP 1, RNP APCH or RNP AR APCH tracks is not less than 13 km (7 NM); or
- b) where the distance between any combination of RNP 1, RNP APCH or RNP AR APCH tracks is not less than 9.3 km (5 NM); or
- c) where the protected areas of tracks designed using obstacle clearance criteria do not overlap and provided operational error is considered.

Note 1.— Distance values contained in a) and b) above were determined by collision risk analysis using multiple navigation specifications. Information on this analysis is contained in Circular 324, Guidelines for Lateral Separation of Arriving and Departing Aircraft on Published Adjacent Instrument Flight Procedures.

Note 2.— Circular 324 also contains information on separation of arrival and departure tracks using non-overlapping protected areas based on obstacle clearance criteria, as provided for in the Procedures for Air Navigation Services — Aircraft Operations, Volume II — Construction of Visual and Instrument Flight Procedures (PANS-OPS, Doc 8168).

Note 3.— Provisions concerning reductions in separation minima are contained in Chapter 2, ATS Safety Management, and Chapter 5, Separation Methods and Minima, Section 5.11.

Note 4.— Guidance concerning the navigation specifications is contained in the Performance-based Navigation (PBN) Manual (Doc 9613).

5.4.1.2.1.5 *RNAV operations where RNP is specified on parallel tracks or ATS routes.* Within designated airspace or on designated routes, where RNP is specified, lateral separation between RNAV-equipped aircraft may be obtained by requiring aircraft to be established on the centre lines of parallel tracks or ATS routes spaced at a distance which ensures that the protected airspace of the tracks or ATS routes does not overlap.

Note.— The spacing between parallel tracks or between parallel ATS route centre lines for which an RNP type is required will be dependent upon the relevant RNP type specified. Guidance material related to the spacing between tracks or ATS routes based on RNP type is contained in Annex 11, Attachment B.

5.4.1.2.1.6 **Lateral separation of aircraft on parallel or non-intersecting tracks or ATS routes.** Within designated airspace or on designated routes, lateral separation between aircraft operating on parallel or non-intersecting tracks or ATS routes shall be established in accordance with the following:

- a) for a minimum spacing between tracks of 93 km (50 NM) a navigational performance of RNAV 10 (RNP 10), RNP 4 or RNP 2 shall be prescribed;
- b) for a minimum spacing between tracks of 55.5 km (30 NM) a navigational performance of RNP 4 or RNP 2 shall be prescribed;
- c) for a minimum spacing between tracks of 27.8 km (15 NM) a navigational performance of RNP 2 or a GNSS equipage shall be prescribed. Direct controller-pilot VHF voice communication shall be maintained while such separation is applied;
- d) for a minimum spacing between tracks of 13 km (7 NM), applied while one aircraft climbs/descends through the level of another aircraft, a navigational performance of RNP 2 or a GNSS equipage shall be prescribed. Direct controller-pilot VHF voice communication shall be maintained while such separation is applied; and
- e) for a minimum spacing between tracks of 37 km (20 NM), applied while one aircraft climbs/descends through the level of another aircraft whilst using other types of communication than specified in d) above, a navigational performance of RNP 2 or a GNSS equipage shall be prescribed.

Note 1.— Guidance material for the implementation of the navigation capability supporting 93 km (50 NM), 55.5 km (30 NM), 37 km (20 NM), 27.8 km (15 NM) and 13 km (7 NM) lateral separation is contained in the Performance-based Navigation (PBN) Manual (Doc 9613) and Circular 334, Guidelines for the Implementation of Lateral Separation Minima.

Note 2.— Guidance material for implementation of communication capability supporting 93 km (50 NM) and 55.5 km (30 NM) lateral separation is contained in the Manual on Required Communication Performance (RCP) (Doc 9869). Information regarding RCP allocations for these capabilities is contained in RTCA DO-306/EUROCAE ED-122 Safety and Performance Standard for Air Traffic Data Link Services in Oceanic and Remote Airspace (Oceanic SPR Standard).

Note 3.— Existing implementations of the 55.5 km (30 NM) lateral separation minimum require a communication capability of direct controller-pilot voice communications or CPDLC and a surveillance capability by an ADS-C system in which a periodic contract and waypoint change and lateral deviation event contracts are applied.

Note 4.— See Appendix 2, ITEM 10: EQUIPMENT AND CAPABILITIES, in relation to the GNSS prescribed in c), d) and e) above.

5.11 REDUCTION IN SEPARATION MINIMA

Note.— See also Chapter 2, ATS Safety Management.

5.11.1 Provided an appropriate safety assessment has shown that an acceptable level of safety will be maintained, and after prior consultation with users, the separation minima detailed in 5.4.1 and 5.4.2 may be reduced in the following circumstances:

5.11.1.1 As determined by the appropriate ATS authority as appropriate:

- a) when special electronic or other aids enable the pilot-in-command of an aircraft to determine accurately the aircraft's position and when adequate communication facilities exist for that position to be transmitted without delay to the appropriate air traffic control unit; or
- b) when, in association with rapid and reliable communication facilities, information of an aircraft's position, derived from an ATS surveillance system, is available to the appropriate air traffic control unit; or
- c) when special electronic or other aids enable the air traffic controller to predict rapidly and accurately the flight paths of aircraft, and adequate facilities exist to verify frequently the actual aircraft positions with the predicted positions; or
- d) when RNAV-equipped aircraft operate within the coverage of electronic aids that provide the necessary updates to maintain navigation accuracy.

5.11.1.2 In accordance with regional air navigation agreements when:

- a) special electronic, area navigation or other aids enable the aircraft to closely adhere to their current flight plans; and
- b) the air traffic situation is such that the conditions in 5.11.1.1 a) regarding communications between pilots and the appropriate ATC unit or units need not necessarily be met to the degree specified therein.

Note.— Attention is drawn to the guidance material contained in the Air Traffic Services Planning Manual (Doc 9426) regarding conditions governing the reduction of separation minima and to the Manual on Airspace Planning Methodology for the Determination of Separation Minima (Doc 9689).