*International Civil Aviation Organization*

**THE TENTH MEETING OF PERFORMANCE BASED NAVIGATION IMPLEMENTATION COORDINATION GROUP (PBNICG/10)**

Bangkok, 19 - 21 April 2023

Agenda Item 2: Global and Regional PBN Updates

# REVISED NAVIGATION STRATEGY FOR ASIA PACIFIC REGION

(Presented by Secretariat)

**SUMMARY**

This paper presents Navigation Strategy for Asia/Pacific Region, which was revised in 2016 by the Twentieth Meeting of Communications, Navigation and Surveillance Sub-group of APANPIRG (CNS SG/20) and adopted via Conclusion APANPIRG/27/37: Revised Navigation Strategy for the Asia/Pacific Region for review by the meeting in view of latest developments in GNSS navigation.

## 1. INTRODUCTION

1.1 ICAO APAC Regional Office sent a State letter in January 2023 to review Navigation Strategy for Asia/Pacific Region, which was revised in 2016 by the Twentieth Meeting of Communications, Navigation and Surveillance Sub-group of APANPIRG (CNS SG/20) and adopted via Conclusion APANPIRG/27/37: Revised Navigation Strategy for the Asia/Pacific Region. In view of the latest developments in the field of navigation especially GNSS navigation, a revisit of the strategy is needed.

## 2. DISCUSSION

2.1 Navigation Strategy for Asia/Pacific Region was revised in 2016 by the Twentieth Meeting of Communications, Navigation and Surveillance Sub-group of APANPIRG (CNS SG/20) and adopted via Conclusion APANPIRG/27/37: Revised Navigation Strategy for the Asia/Pacific Region. Since this was revised in 2016, there has been lot of developments in the field of navigation, particularly GNSS navigation. Therefore there is a need to review the navigation strategy for the region.

2.2 Accordingly, ICAO APAC Regional Office sent a State letter no. T8/5-AP021/23(CNS) on 27 January 2023 to suitably review the Strategy for currency and applicability to the latest Navigation requirements in the Region. The copy of the State letter is placed as Attachment-1. The last date for the feedback from States was 7 April 2023. Three States have responded so far. Based on the feedback from the States, the Navigation strategy has been amended and it is placed as attachment-II. Navigation strategy proposed by secretariat for discussion by the meeting is placed as attachment III.

2.3 The meeting is invited to discuss and workout a draft version of the navigation strategy in view of latest development in GNSS navigation including GBAS and SBAS. The draft version of the navigation strategy will further be reviewed by GBAS-SBAS ITF and then it will be

placed in CNS-SG/27 for consideration and further recommendation to APANPIRG for adoption. It may also be noted that navigation strategy will form the basis for amendment of APAC Seamless ANS plan.

## 3. ACTION REQUIRED BY THE MEETING

3.1 The meeting is invited to:

a) note the information contained in this papers; and
b) discuss any relevant matters as appropriate and finalize a draft version of APAC Navigation Strategy.

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Attachment -I

International Civil Aviation Organization | Organisation de l'aviation civile internationale | Organización de Aviación Civil Internacional | Международная организация гражданской авиации | منظمة الطيران المدني الدولي | 国际民用航空组织

**Ref.:** T 8/5.1 – AP021/23 (CNS) 27 January 2023

**Subject**: Review Navigation Strategy for the Asia/Pacific Region

**Action Required:** To review and return suggestions **by 7 April 2023**

Dear Sir/Madam,

I have the honour to invite your Administration to review the Navigation Strategy for Asia/Pacific Region, which was revised in 2016 by the Twentieth Meeting of Communications, Navigation and Surveillance Sub-group of APANPIRG (CNS SG/20) and adopted via **Conclusion APANPIRG/27/37: Revised Navigation Strategy for the Asia/Pacific Region.**

To suitably review the Strategy for currency and applicability to the latest Navigation requirements in the Region, your Administration is invited to review and provide comments on the Strategy in **Attachment 1**. Suggestions collected shall be discussed in suitable forums, and subsequently, be proposed to CNS SG/27 for deliberation and thus APANPIRG/34 for adoption. Any feedback should be submitted to ICAO APAC Regional Office at apac@icao.int with copy to Mr. LUO Yi, Regional Officer CNS, at yluo@icao.int.

Please accept, Excellency, the assurances of my highest consideration.

Yours sincerely,

*for* Tao Ma
Regional Director

**Enclosures:**
Attachment 1 - Revised Navigation Strategy adopted by APANPIRG/27

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**Attachment 1**

# REVISED NAVIGATION STRATEGY FOR THE ASIA/PACIFIC REGION

(Adopted by APANPIRG/27)

**Considering:**

a) the material contained in the Performance Based Navigation Manual (Doc 9613) for enroute, approach, landing and departures operations;

b) operators are qualified for PBN operations;

c) GNSS is the primary navigation system for RNP;

d) APV operations may be conducted with either BARO-VNAV or augmented GNSS;

e) Augmented GNSS is available to support Category I, and will be able to support Category II and III operations by 2018;

f) ILS is capable of meeting the majority of requirements for precision approach and landing in the Asia-Pacific Region;

g) ILS CAT III is operational;

h)the need to maintain aircraft and ground interoperability both within the Region and between the Asia/Pacific Region and other ICAO regions and to provide flexibility for future aircraft equipage;

i) single-frequency GNSS may be susceptible to radio frequency interference and ionospheric disturbances and use of multi-frequency, multi-constellation GNSS may mitigate risks caused by narrow band frequency interference and ionospheric disturbances.

j) The region has developed an ionospheric threat model for GBAS

**Strategy**

i) Convert from traditional terrestrial-based instrument flight procedures to PBN operations in accordance with the Asia/Pacific Seamless ATM Plan;

ii) retain ILS as an ICAO standard system for as long as it is operationally acceptable and economically beneficial;

iii) implement GNSS with augmentation as required for APV and precision approach or RNP operations

where it is operationally and economically beneficial;

iv) Implement the regional ionospheric threat model for GBAS as appropriate

v) implement the use of APV operation in accordance with the Asia/Pacific Seamless ATM Plan;

vi) rationalize terrestrial navigation aids, retaining a minimum network of terrestrial aids necessary to maintain safety of aircraft operations;

vii) protect all the Aeronautical Radio Navigation Service (ARNS) frequencies through education, appropriate regulation and the active detection and elimination of intentional and unintentional interference sources.;

viii) ensure civil-military interoperability; and

ix) continue monitoring the development of GNSS elements and alternative position, navigation and timing.

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**REVISED NAVIGATION STRATEGY FOR THE ASIA/PACIFIC REGION**

(Adopted by APANPIRG/27)

**Considering:**

a) the material contained in the Performance Based Navigation Manual (Doc 9613) for enroute, approach, landing and departures operations;

b) operators are qualified for PBN operations;

c) GNSS is the primary navigation system for RNP;

d) APV operations may be conducted with either BARO-VNAV or augmented GNSS;

e) Augmented GNSS is available to support Category I, and will be able to support Category II and III operations by 2030 ~~2018~~;

f) ILS is capable of meeting the majority of requirements for precision approach and landing in the Asia-Pacific Region;

g) ILS CAT III is operational;

h) the need to maintain aircraft and ground interoperability both within the Region and between the Asia/Pacific Region and other ICAO regions and to provide flexibility for future aircraft equipage;

i) single-frequency GNSS may be susceptible to radio frequency interference and ionospheric disturbances and use of multi-frequency, multi-constellation GNSS may mitigate risks caused by narrow band frequency interference and ionospheric disturbances~~.~~;

j) The region has developed an ionospheric threat model for GBAS

**Strategy**

i) Convert from traditional terrestrial-based instrument flight procedures to PBN operations in accordance with the Asia/Pacific Seamless ~~ATM~~ ANS Plan;

ii) retain ILS as an ICAO standard system for as long as it is operationally acceptable and economically beneficial; *and/or implement GBAS landing system (GLS) as an alternative to ILS and in the absence of which, to assess the feasibility of implementing other types of approaches.(Singapore)*

iii) implement GNSS with augmentation as required for APV and precision approach or RNP operations where it is operationally and economically beneficial;

iv) Implement the regional ionospheric threat model for GBAS as appropriate

v) implement the use of APV operation in accordance with the Asia/Pacific Seamless ~~ATM~~ ANS Plan;

vi) rationalize terrestrial navigation aids, retaining a minimum network of terrestrial aids necessary to maintain safety of aircraft operations;

vii) protect all the Aeronautical Radio Navigation Service (ARNS) frequencies through education, appropriate regulation and the active detection and elimination of intentional and unintentional interference sources~~.~~;

viii) strengthen protection on the ILS Critical and Sensitive Areas in three-dimensional volumes in accordance with ICAO Annex 10;(Hong Kong China)

ix) ensure civil-military interoperability; and

x) continue monitoring the development of GNSS elements and alternative position, navigation and timing.

**REVISED NAVIGATION STRATEGY FOR THE ASIA/PACIFIC REGION**

**Considering:**

a) Performance Based Navigation (PBN) as one of the Global priority of ICAO;
b) PBN implementation in Approach and Terminal area as one of the key ASBU elements to achieve capacity and efficiency;
c) ICAO Assembly resolution A37-11 on Global PBN Goals to implement PBN in all phases of flight;
d) the ~~material~~ guidance/provisions contained in the Performance Based Navigation Manual (Doc 9613) for enroute approach, landing and departures operations;

e) operators are qualified for PBN operations;

f) GNSS is the primary navigation system for RNP;

g) APV operations may be conducted with either BARO-VNAV and ABAS or ~~augmented GNSS~~ SBAS;

h) GBAS and SBAS is ~~available~~ able to support Category I operation, and GBAS ~~will be~~ is able to support upto Category II and III operations. ~~by~~ ~~2018~~;

i) ILS is capable of meeting the majority of requirements for precision approach and landing including Cat II/III operations ~~in the Asia-Pacific Region~~;

~~g) ILS CAT III is operational;~~

j)the need to maintain aircraft and ground interoperability both within the Region and between the Asia/Pacific Region and other ICAO regions and to provide flexibility for future aircraft equipage;

k) single-frequency GNSS may be susceptible to radio frequency interference and ionospheric disturbances and use of multi-frequency, multi-constellation GNSS may mitigate risks caused by narrow band frequency interference and ionospheric disturbances.

j)

**Strategy**

i) ~~Convert~~ Transition from traditional terrestrial-based instrument flight procedures to PBN operations in En-route, Terminal and Approach in accordance ICAO Assembly Resolution A37-11 and ASBU element on capacity and efficiency ;

ii) implement GNSS with augmentation(SBAS) ~~as required~~ for APV and SBAS/GBAS for precision

approach cat I and GBAS for Cat II/III ~~or RNP operations~~ where it is operationally and economically beneficial;
iii) Implement the use of APV operation (Baro-VNAV or LPV) in ICAO Assembly resolution A37-11.

iv) retain ILS ~~as an ICAO standard system~~ for precision approach especially for Cat II/III operations as long as it is operationally acceptable and economically beneficial;

v) rationalize terrestrial navigation aids, retaining a minimum network of terrestrial aids necessary to maintain safety of aircraft operations;

vi) protect all the Aeronautical Radio Navigation Service (ARNS) frequencies through education, appropriate regulation and the active detection and elimination of intentional and unintentional interference sources.;

vii) ensure civil-military interoperability so as to ensure military aircraft is also capable of operation in PBN environment; and

viii) continue monitoring the development of GNSS elements and alternative position, navigation and timing, such as GNSS constellation and DFMC technology.

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