



International Civil Aviation Organization

**THE SEVENTH MEETING OF THE ASIA/PACIFIC GBAS/SBAS
IMPLEMENTATION TASK FORCE (GBAS/SBAS ITF/7)**

(Bangkok, Thailand, 14-16 May 2025)

Agenda Item 2: Reports of relevant meetings

**REVIEW OF THE EXPECTED IMPLEMENTATION PRIORITY FOR ASBU NAVS
BLOCK 0 ELEMENTS WITHIN THE ASIA/PACIFIC REGION**

(Presented by the Secretariat)

SUMMARY

This paper presents the expected implementation priority of the Aviation System Block Upgrade (ASBU) Navigation Systems (NAVS) module Block 0 elements in the *Asia/Pacific Seamless Air Navigation Service (ANS) Plan Version 4.0* for review by the meeting.

1. INTRODUCTION

1.1. The Thirty-Fifth Meeting of the Asia/Pacific Air Navigation Planning and Implementation Regional Group (APANPIRG/35) was held in Bangkok, Thailand, from 25 to 27 November 2024.

1.2. The APANPIRG/35 adopted the following Conclusion:

Conclusion APANPIRG/35-1: Asia/Pacific Seamless ANS Plan

That, given the urgency and priority of Air Navigation Service (ANS) planning and modernization, and the lack of progress in implementing the Aviation System Block Upgrade (ASBU) elements, Version 4.0 of the Asia/Pacific Seamless ANS Plan appended as Appendix A to the Report on Agenda Item 3.0 be adopted; and uploaded to the Asia/Pacific Regional Office eDocument webpage.

1.3. The *Asia/Pacific Seamless ANS Plan Version 4.0* can be found at the Asia/Pacific Regional Office eDocuments webpage (<https://www.icao.int/APAC/Pages/eDocs.aspx>).

2. DISCUSSION

Asia/Pacific ASBU Implementation

2.1. The *Asia/Pacific Seamless ANS Plan* provides the expected priority for implementation of ASBU Block 0, Block 1 and Block 2 elements, within the Asia/Pacific Region. The allocation of priority was based on factors including its importance in promoting Seamless ANS:

- **Priority 1** – critical upgrade assignment based on whether the implementation of an element could bring most benefit to the region or regional upgrade by States and is essential to achieve the service level required globally;
- **Priority 2** – recommended upgrade for those elements which would bring benefits to the region and generally to be implemented from 2022, but States are encouraged to implement earlier if beneficial; and
- **Priority 3** – assigned to those elements which may not be universally implemented in the Asia/Pacific Region.

Development of Asia/Pacific Seamless ANS Plan Version 4.0

2.2. The ICAO Asia/Pacific Regional Office initiated the review and drafted the *Asia/Pacific Seamless ANS Plan Version 4.0* in 2023. The draft was subsequently presented at the following APANPIRG Sub-Group meetings:

- a) Seventh Meeting of the Aerodromes Operations and Planning Sub-Group (AOP/SG/7, Bangkok, Thailand, 03 to 06 July 2023);
- b) Twenty-Seventh Meeting of the Communications, Navigation and Surveillance Sub-Group (CNS SG/27, Bangkok, Thailand, 28 August to 01 September 2023);
- c) Twenty-Seventh Meeting of the Meteorology Sub-Group (MET SG/27, Bangkok, Thailand, 04 to 08 September 2023); and
- d) Eleventh Meeting of the ATM Sub-Group (ATM/SG/11, Singapore, 02 to 06 October 2023).

2.3. CNS SG/27 formed a *CNS-related ASBUs Review Ad-hoc Group for the Next Edition of the Seamless ANS Plan*, which would review the proposed ASBUs, prepare a list of CNS-related ASBUs for inclusion in the *Asia/Pacific Seamless ANS Plan Version 4.0*, and seek consent from CNS SG/28 in 2024.

2.4. It was observed that the priorities of certain CNS-related ASBUs, as finalized by the *CNS-related ASBUs Review Ad-hoc Group for the Next Edition of the Seamless ANS Plan*, were not accurately reflected in the published *Asia/Pacific Seamless ANS Plan Version 4.0*. This discrepancy might result from editorial errors during the gathering of voluminous feedback from all sources.

2.5. **Figure 1** provides a comparison of the priorities adopted by CNS SG/28 based on proposal from *CNS-related ASBUs Review Ad-hoc Group for the Next Edition of the Seamless ANS Plan* and the priorities published in the *Asia/Pacific Seamless ANS Plan Version 4.0*.

ASBU Element	Approved Priority by CNS SG/28	Priority Published in <i>Asia/Pacific Seamless ANS Plan Version 4.0</i>
NAVS-B0/1 to B0/4 SBAS, GBAS, ABAS, MON	Priority 1	Priority 2

Figure 1: Proposed Priorities vs. Published Priorities

Review of ASBU NAVS Module Block 0 Elements

2.6. Development of Ground Based Augmentation Systems (GBAS) and Satellite Based Augmentation Systems (SBAS) systems in the Asia/Pacific Region are progressing well but may not constitute Priority 1 as some States do not have access to such systems, therefore we propose to keep Priority 2 for NAVS-B0/1 GBAS and NAVS-B0/2 SBAS.

2.7. The Seventh Edition of the *Global Air Navigation Plan* (GANP) defines NAVS-B0/3 Aircraft Based Augmentation Systems (ABAS) (see **Figure 2**) and NAVS-B0/4 Navigation Minimal Operating Networks (Nav. MON) (see **Figure 3**), as follows:

NAVS-B0/3	Aircraft Based Augmentation Systems (ABAS)	Technology
☐ Sixth edition of the GANP		
Main Purpose	Support non-precision (LNAV) and vertically guided (LNAV/VNAV) approaches with BaroVNAV and other terminal and enroute navigations.	
New Capabilities	ABAS supports all PBN navigation specifications with the exception of RNP APCH down to LPV/LP minima. Specific ABAS configurations are required to support RNP AR APCH.	
Description	This element supports non-precision and vertically guided approaches using GNSS lateral navigation and barometric vertical guidance.	
Maturity Level	Ready for implementation	

Figure 2: NAVS-B0/3 ABAS

NAVS-B0/4	Navigation Minimal Operating Networks (Nav. MON)	Technology
☐ Sixth edition of the GANP		
Main Purpose	• To adjust conventional navaids networks through the increased deployment of satellite based navigation systems and procedures to ensure the necessary levels of resilience for navigation. • To provide a minimum level of capabilities to accommodate State aircraft operations where there is a mismatch in terms of aircraft equipage. • To make a more efficient use of the frequency spectrum	
New Capabilities	Provision of a navigation backup.	
Description	This element allows the rationalization of the ground based conventional infrastructure through the definition of minimal networks of ground navaids. Consultations and agreements from airspace users and aircraft operators are required to define this element. The MON should be revisited with the introduction of new navigation capabilities.	
Maturity Level	Ready for implementation	

Figure 3: NAVS-B0/4 Nav. MON

2.8. In addition, the Fourteenth Air Navigation Conference (AN-Conf/14) held in Montréal, 26 August to 6 September 2024, adopted **Recommendation 2.2/2 – Addressing GNSS interference and contingency planning**, as follows:

Recommendation 2.2/2: Addressing global navigation satellite system interference and contingency planning

That States:

- a) *ensure that effective GNSS RFI mitigation measures are implemented, based on measures developed by ICAO and industry, including the need to maintain a sufficient network of conventional navigation aids to ensure operational safety as well as sufficient airspace capacity during times of GNSS interference;*
- b) *through the mechanism of the planning and implementation regional groups, develop regional or global navigation satellite system reporting mechanisms, as described in the Global Navigation Satellite System (GNSS) Manual (Doc 9849); and*
- c) *work with industry to provide guidance on detecting global navigation satellite system jamming or spoofing and maintaining safe and efficient aircraft operation in case of GNSS anomalies;*

that ICAO:

- d) *develop a standardized implementation package to assist and guide States in implementing effective GNSS RFI mitigation measures, including optimization and rationalization of conventional navigation aids, commensurate with their local conditions, to ensure continuity in the provision of ANS;*
- e) *develop guidance on civil-military coordination in relation to harmful interference to GNSS(s) originated or detected by military authorities; and*
- f) *review aircraft minimum equipage lists to ensure compatibility with States' implemented minimum operational networks.*

2.9. Also, the DGCA/59 Conference held in Cebu, Philippines, 14 to 18 October 2024, formulated Action Item 59/15:

Acknowledging that GNSS RFI events such as jamming and spoofing jeopardize the safety and resiliency of airspace operations, consistent with the recommendations of the Fourteenth Air Navigation Conference, the Conference urged:

1. States/Administrations to:

- a) *take appropriate actions to detect and mitigate GNSS RFI sources;*
- b) *monitor, report, and share GNSS RFI events such as jamming and spoofing events and best practices of mitigation measures through APANPIRG;*
- c) *maintain adequate conventional Ground Based Navigation Aids (GBNA)/minimal operational networks (MONs) to support aircraft navigation;*
- d) *foster enhanced cooperation and collaboration regarding GNSS RFI events with military;*
- e) *bring proposals for improvement in RT phraseology regarding reporting of GNSS RFI events to relevant ICAO forum; and*

2. ICAO to organize a workshop for sharing best practices and lessons learned for managing and mitigating GNSS RFI events.

2.10. Therefore, it is proposed to change the priorities of NAVS-B0/3 ABAS and NAVS-B0/4 Nav. MON to Priority 1. The GBAS/SBAS ITF is invited to take into account the Global Navigation Satellite System (GNSS) radio frequency interference (RFI) events as reported at the AN-Conf/14 and DGCA/59, which are increasing in some parts of the world and could become a serious threat in this Region.

2.11. Recognizing the fact that not all ASBU NAVS module Block 0 elements may be implemented as Priority 1 in the Asia/Pacific Region, the ICAO Secretariat proposed considering the splitting of the elements from a 'Thread' (see **Figure 4**) into individual elements (see **Figure 5**) to ensure that appropriate Priority is assigned to each element.

Functional Category	Element	Description	Priority	Responsibility for Review
Technology	NAVS-B0/1 to B0/4	SBAS, GBAS, ABAS, MON (PARS 7.5, 7.7)	2	CNS SG

Figure 4: Priority Published in *Asia/Pacific Seamless ANS Plan Version 4.0*

Functional Category	Element	Description	Priority	Responsibility for Review
Technology	NAVS-B0/1	GBAS	2	CNS SG
	NAVS-B0/2	SBAS	2	
	NAVS-B0/3	ABAS	1	
	NAVS- B0/4	Nav. MON	1	

Figure 5: Proposed New Priority

2.12. The outcomes of the discussion will be shared with the CNS SG/29 meeting planned to be held from 16 to 20 June 2025.

3. ACTION REQUIRED BY THE MEETING

3.1. The meeting is invited to:

- note the information contained in this paper;
- discuss whether NAVS-B0/1 GBAS and NAVS-B0/2 SBAS should be retained as Priority 1 as agreed by CNS SG/28 or changed to Priority 2 as proposed in Figure 5;
- discuss whether NAVS-B0/3 ABAS and NAVS-B0/4 Nav. MON should be retained as Priority 1 as agreed by CNS SG/28; and
- discuss any relevant matters as appropriate.
