



*International Civil Aviation Organization*

**THE THIRD MEETING OF THE ASIA/PACIFIC GBAS/SBAS  
IMPLEMENTATION TASK FORCE (APAC GBAS/SBAS ITF/3)**

*(Video conference, 27-28 September 2021)*

---

**Agenda Item 5:** Guidance Reference on Implementation Process for GBAS/SBAS

**Framework of Guidance Reference on Implementation Process for GBAS/SBAS**  
(Presented by Co-Chairs)

**SUMMARY**

This paper presents a high level framework of guidance reference document on implementation process for GBAS/SBAS. The framework will be taken as a reference for the Task Force Expert Group to draft the guidance document for the Region.

**1. INTRODUCTION**

- 1.1 As per CNS SG/23 meeting Decision CNS SG/23/9 regarding establishment of the APAC GBAS/SBAS Implementation Task Force, the first and second Meeting of the ICAO GBAS/SBAS Implementation Task Force (GBAS/SBAS TF/1 and GBAS/SBAS TF/2) were held through VTC on 23-24 June 2020 and 9-10 September 2020. An Action List of the Task Force was discussed and formulated.
- 1.2 In GBAS/SBAS TF/2, Co-Chairs of the Task Force volunteered to take over a task in the Action List for preparing a high level framework of guidance reference document on implementation process for GBAS/SBAS. The framework will be taken as a reference for the Task Force Expert Group to draft the guidance document for the Region. This Working Paper (WP) presents the framework proposed by the Co-Chair for the Task Force's reference.

**2. DISCUSSION**

**Objectives and Scope of the Guidance Document**

- 2.1 The objective of the guidance document is to provide reference materials for States on implementation process for GBAS/SBAS. The document will present a holistic view of implementation from the initial phase for the analysis of operational need to the phase for conducting post-implementation review.

### **Skelton and Overview of the Guidance Document**

2.2 The following structure and content list are proposed for consideration in preparing the guidance document, which would cover the initial phase for the analysis of operational need to the phase for post-implementation review:

1. *Objectives and Scope of the Guidance Document*
2. *Executive Summary*
3. *Roles and Responsibilities of Stakeholders*
4. *Performance Indicators*
5. *Implementation Process for GBAS*
  - a. *Overview*
  - b. *Framework, Phases and Elements of GBAS Implementation Process*
6. *Implementation Process for SBAS*
  - a. *Overview*
  - b. *Framework, Phases and Elements of SBAS Implementation Process*
7. *Post-implementation Activities*
  - a. *Operation and Maintenance Activities*
  - b. *Performance Indicators*
8. *Appendix*
  - Appendix 1 - Terminologies and Definition*
  - Appendix 2 – Reference*
  - Appendix 3 – Experience shared by States/Administrations*

### **Framework, Phases and Elements of Implementation Process for GBAS/SBAS**

2.3 Taking into consideration the works involved in the implementation of GBAS and SBAS and the difference in the associated process, the phases and elements of implementation process for GBAS and SBAS are listed below for reference.

2.4 Phases and elements involved in GBAS implementation are given below:

1. *Operational Need Analysis*
2. *Cost-benefit Assessment*
3. *Technical Feasibility Assessment*
  - a. *Siting Study*
  - b. *GPS Data Collection and Analysis*
  - c. *Ionospheric Impact Study*
  - d. *Site Constraint Study*
4. *Concept of Operations (CONOPS) Development*
5. *VDB Frequency Application and Assignment*
6. *GBAS Solution Selection*
7. *Site Deployment*
8. *Airport Height Restriction Plan Amendment*
9. *GLS Flight Procedure Development*
10. *Flight Check*
11. *Safety Assessment*
12. *System Certification*
13. *Development of Regulations Related to GBAS for Aviation*
14. *Training*
15. *Operation Certification*

16. *Post-implementation Review*

2.5 Phases and elements involved in SBAS implementation are given below:

1. *Operational Need Analysis*
2. *Cost-benefit Assessment*
  - a. *Full SBAS implementation (Implementation Type A)*
  - b. *Participating in existing SBAS (Implementation Type B)*
  - c. *Utilizing existing SBAS service (Implementation Type C)*
3. *Technical Feasibility Assessment*
  - a. *Full SBAS implementation (Type A)*
    - i. *Satellite (transponder) deployment*
    - ii. *SBAS PRN coordination*
    - iii. *SBAS ID coordination*
    - iv. *Coverage and service volume*
    - v. *Service level*
    - vi. *Ground monitoring station siting*
    - vii. *Uplink station siting*
    - viii. *Ionospheric impact study*
  - b. *Participating in existing SBAS (Type B)*
    - i. *Ground monitoring station siting*
    - ii. *Coordination with the SBAS provider*
    - iii. *Review of existing SBAS services*
    - iv. *Coverage and service volume*
    - v. *Service level*
    - vi. *Ionospheric impact study*
  - c. *Utilizing existing SBAS service (Type C)*
    - i. *Coverage and service volume*
    - ii. *Service level*
    - iii. *Available services*
    - iv. *Coordination with the SBAS provider*
4. *Concept of Operations (CONOPS) Development*
5. *SBAS Solution Selection*
6. *System Deployment (For Implementation Type A and B)*
7. *SBAS Flight Procedure Development*
8. *Flight Check*
9. *Safety Assessment*
10. *System Certification*
11. *Development of Regulations Related to SBAS for Aviation*
12. *Training*
13. *Operation Certification*
14. *Post-implementation Review*

2.6 Materials from ICAO/ international organisations / States / Administrations listed below are relevant for implementation of GBAS/SBAS:

1. *Relevant ICAO documents covering different aspects in GBAS implementation:*
  - a. *Global Strategy – Global Air Navigation Plan (Dec 9750)*

- b. *Regional Strategy – Asia/Pacific Seamless ATM Plan*
  - c. *General Concept - Global Navigation Satellite System (GNSS) Manual (Doc 9849)*
  - d. *System Requirements and Testing*
    - i. *Annex 10 Vol I – Radio Navigation Aids*
    - ii. *Doc 8071 Vol II – Testing of Satellite-based Radio Navigation Systems*
  - e. *Procedure Design and Validation*
    - i. *Doc 8168 Vol II – Construction of Visual and Instrument Flight Procedures*
    - ii. *Doc 9906 Vol V – Validation of Instrument Flight Procedures*
  - f. *Operation*
    - i. *Doc 8168 Vol I – Flight Procedures*
    - ii. *Doc 9613 – PBN Manual*
    - iii. *Doc 9849 – GNSS Manual*
    - iv. *Doc 4444 – Air Traffic Management*
    - v. *Doc 9734 – Safety Oversight Manual*
    - vi. *Doc 9859 – Safety Management Manual*
  - g. *Ionosphere*
    - i. *GBAS Ionospheric Threat Model for APAC Region (APAC)*
    - ii. *GBAS Safety Assessment Guidance Related to Anomalous Ionospheric Conditions (APAC)*
    - iii. *Ionospheric Effects on GNSS Aviation Operations (ICAO NSP)*
2. *Relevant documents published by international organisations / States / Administrations relevant to GBAS implementation:*
- a. *RTCA DO-246E Change 1 - GNSS-Based Precision Approach Local Area Augmentation System (LAAS) Signal-in-Space Interface Control Document (ICD)*
  - b. *RTCA DO-253D Change 1 - Minimum Operational Performance Standards (MOPS) for GPS Local Area Augmentation System (LAAS) Airborne Equipment*
  - c. *EUROCAE ED-114 - Minimum Operational Performance Standards (MOPS) for GBAS Ground Facility*
  - d. *FAA Order 6884.1 - GBAS Ground Facility Siting Criteria*
  - e. *FAA-E-3017 - Non-Fed LAAS Specification*
3. *Relevant ICAO documents covering different aspects in SBAS implementation:*
- a. *Global Strategy – Global Air Navigation Plan (Doc 9750)*
  - b. *Regional Strategy – Asia/Pacific Seamless ATM Plan*
  - c. *General Concept - Global Navigation Satellite System (GNSS) Manual (Doc 9849)*
  - d. *System Requirements and Testing*
    - i. *Annex 10 Vol I – Radio Navigation Aids*
    - ii. *Doc 8071 Vol II – Testing of Satellite-based Radio Navigation Systems*
  - e. *Procedure Design and Validation*
    - i. *Doc 8168 Vol II – Construction of Visual and Instrument Flight Procedures*
    - ii. *Doc 9906 Vol V – Validation of Instrument Flight Procedures*

- f. *Operation*
    - i. *Doc 8168 Vol I – Flight Procedures*
    - ii. *Doc 9613 – PBN Manual*
    - iii. *Doc 9849 – GNSS Manual*
    - iv. *Dec 4444 – Air Traffic Management*
    - v. *Doc 9734 – Safety Oversight Manual*
    - vi. *Doc 9859 – Safety Management Manual*
  - g. *Ionosphere*
    - i. *SBAS Safety Assessment Guidance Related to Anomalous Ionospheric Conditions (APAC)*
    - ii. *Ionospheric Effects on GNSS Aviation Operations (ICAO NSP)*
4. *Relevant documents published by international organisations / States / Administrations relevant to SBAS implementation:*
- a. *RTCA DO-229F - Minimum Operational Performance Standards for Global Positioning System/Wide Area Augmentation System Airborne Equipment*

### **3. ACTION REQUIRED BY THE MEETING**

3.1 The meeting is invited to:

- a) Review the materials presented in the WP;
- b) Establish an expert group to prepare the draft of guidance document;
- c) Set up a timeline for the preparation work; and
- d) Urge States/Administrations to nominate subject matter expert(s) for the expert group.

-----