International Civil Aviation Organization

THE EIGHTH MEETING OF THE ASIA/PACIFIC GBAS/SBAS IMPLEMENTATION TASK FORCE (GBAS/SBAS ITF/8)

(Melbourne, Australia, 12-14 May 2026)

Agenda Item 4: Updates on GBAS/SBAS system and States' implementation status

PAK-SBAS IMPLEMENTATION STATUS

(Presented by Islamic Republic of Pakistan)

SUMMARY

This paper presents the latest status of Pakistan Space Based Augmentation System (Pak-SBAS) program, which is being undertaken by Pakistan Space and Upper Atmosphere Research Commission (SUPARCO) in cooperation with Pakistan Civil Aviation Authority (PCAA) and Pakistan Airports Authority (PAA).

1. INTRODUCTION

1.1 Pak-SBAS program was initiated in 2019. It is owned by the Government of Pakistan and is being implemented and operated by SUPARCO (www.suparco.gov.pk) – the National Space Agency of Pakistan.

1.2 PAA & PCAA is cooperating with SUPARCO in the implementation of Pak-SBAS and utilization of Pak-SBAS services for Performance Based Navigation (PBN) in the aviation sector in Pakistan.

2. DISCUSSION

Overview

2.1 Pak-SBAS provides both Public and Authorized services to users in the aviation, transportation, surveying & mapping, precision agriculture, urban planning & infrastructure development, disaster management and other sectors.

2.2 Pak-SBAS Public service augments GPS L1 signal and utilize GPS & BDS for L5 Dual Frequency Multi Constellation (DFMC) signal. Pak-SBAS Authorized service provides Precise Point Positioning (PPP) service using BDS B2b signal.

2.3 Pak-SBAS will comply with the SBAS requirements of International Civil Aviation Organization (ICAO) published in Annex 10 – Aeronautical Communications, Volume I, Radio Navigation Aids. Pak-SBAS L1 Signal-in-Space (SIS) complies with the corresponding requirements in the SBAS Minimum Operational Performance Standards (MOPS) (DO-229E) published by RTCA (Radio Technical Commission for Aeronautics). Pak-SBAS L5 SIS complies with the corresponding requirements outlined in the EUROCAE/ED-259. Pak-SBAS B2b SIS complies with corresponding requirements in the BeiDou Navigation Satellite System SIS Interface Control Document Precise Point Positioning Service Signal PPP-B2b (version 1.0) published by China Satellite Navigation Office (CSNO).

2.4 Pak SBAS will be certified by PCAA with support from certification experts where as PAA will provide the Air Navigation Services to corresponding users in Pakistan in phased manner.

PAK-SBAS Configuration

2.5 Current configuration of Pak-SBAS comprises PakSat-MM1 satellite at 38.2ºE (GEO-1) in the Space Segment and twelve Range and Integrity Monitoring Stations (RIMS), one Data Processing Centre (DPC), one Ground Uplink Station (GULS) in the Ground Segment which utilizes both terrestrial and satellite communication links for interconnectivity.

2.6 Pak-SBAS RIMS receive data from GPS & BDS satellites and transmit it to DPC. DPC is also linked to an International GNSS Service (IGS) Data Center (DC) to receive data online. DPC generates Pak SBAS correction messages and transmit the same to GULS which transmits Pak-SBAS correction messages to the PakSat-MM1 satellite which broadcasts L1/ L5/ B2b signals. Pak-SBAS broadcast signals are received by compatible ground terminals.

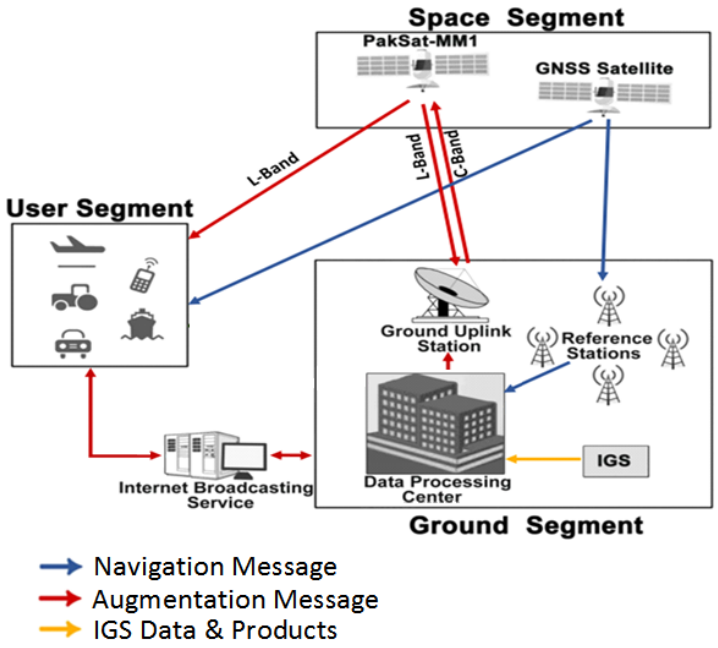

Figure 1: Pak-SBAS System Architecture

Pak-SBAS Status Update

2.7 SBAS Payload filing of PakSat-MM1 satellite was submitted in May 2019 by SUPARCO through Frequency Allocation Board (FAB) to ITU. CR/C Notice was published on 12 Nov 2019 in ITU's periodic circular (IFIC No. 2908) and requirement related to participation in Resolution 609 Consultation Meeting was completed for 18th RES-609 CM held from 9-11 Nov 2021. Notification filing (N-Notice) of PakSat-MM1 was published on 13 May 2025 in ITU periodic circular No. 3046.

2.8 Pak-SBAS development contract was awarded in Nov 2020 and kick-off meeting was held in Aug 2021.

2.9 Pak-SBAS Preliminary Design Review (PDR) was completed in Dec 2021 and Critical Design Review (CDR) was completed in Aug 2022.

2.10 SUPARCO applied for membership of the International Committee on GNSS (ICG) on behalf of the Islamic Republic of Pakistan to meet the objectives of transparency, compatibility and interoperability of Pak-SBAS. SUPARCO presented the membership case in ICG-15 and provide update on Pak-SBAS at ICG-16, ICG-17, ICG-18 & ICG-19.

2.11 SUPARCO has acquired GPS PRN Codes for Pak-SBAS Public Service with the cooperation of PCAA.

2.12 Pak-SBAS payload was launched onboard PakSat-MM1 satellite in May 2024. Pak SBAS service has been tested and commissioned in Sep 2024, and the SIS is now available for testing purposes.

2.13 Pak-SBAS Service Provider ID '10' has officially been included in the ICAO Annex 10 to the Convention on International Civil Aviation - Aeronautical Telecommunications, Volume I, Radio Navigation Aids, Eighth Edition, July 2023, Amendment 94 applicable from 27 Nov 2025.

2.14 A Joint Working Group (JWG) of SUPARCO, PCAA and PAA has been formed for the implementation of Pak-SBAS in aviation sector in Pakistan.

2.15 SUPARCO, PCAA and PAA are also in process to establish a coordinated national framework for implementation of Pak-SBAS in aviation sector.

2.16 The JWG has started to prepare the draft Concept of Operations (CONOPS) in accordance with the ICAO Standards and Recommended Practices (SARPs) as mentioned in the ICAO Doc 9849 – Global Navigation Satellite System (GNSS) Manual, Fourth Edition, 2023 and ICAO Guidance Document for Implementation of SBAS in the Asia/ Pacific Region, 2024. Further, ICAO Annex 10 to the Convention on International Civil Aviation - Aeronautical Telecommunications, Volume I, Radio Navigation Aids, Eighth Edition, July 2023 have also been considered during the preparation of the document.

Future Plans of PAK-SBAS Program

2.17 The roadmap for the implementation of Pak-SBAS in the aviation sector is being considered.

2.18 The feasibility for the launch of the second satellite (GEO-2) in the Pak-SBAS Space Segment and augmentation of the Ground Segment is being planned.

3. ACTION REQUIRED BY THE MEETING

3.1 The meeting is invited to note the information contained in this paper

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