



# Pakistan Space Based Augmentation System (Pak-SBAS)

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# Introduction

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- Pakistan Space Based Augmentation System (Pak-SBAS) program was initiated in 2019
- Space and Upper Atmosphere Research Commission - SUPARCO ([www.suparco.gov.pk](http://www.suparco.gov.pk)) - the National Space Agency of Pakistan is responsible for development and operation of the System
- Pakistan Civil Aviation Authority - PCAA ([www.caapakistan.com.pk](http://www.caapakistan.com.pk)) is supporting SUPARCO in the implementation of the System
- The System is envisaged to significantly promote adoption of precise positioning GNSS services in the socio-economic sectors of Pakistan



# Introduction

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- **Program objectives:**
  - To meet Safety-of-Life (SoL) positioning requirements of the transportation sector (aviation, marine, land, rail) in a phased manner (initially IOC, later FOC)
  - To meet positioning requirements of other national sectors such as surveying & mapping, precision agriculture, urban planning & infrastructure development, disaster management, etc



# Overview

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- Constellations      GPS, BeiDou
- Signals              L1, L5, B2b
- Protocols            RTCA, DFMC, PPP
- Services             Public, Authorized



# Configuration

## ■ Space Segment

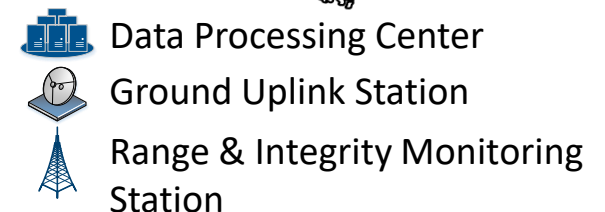
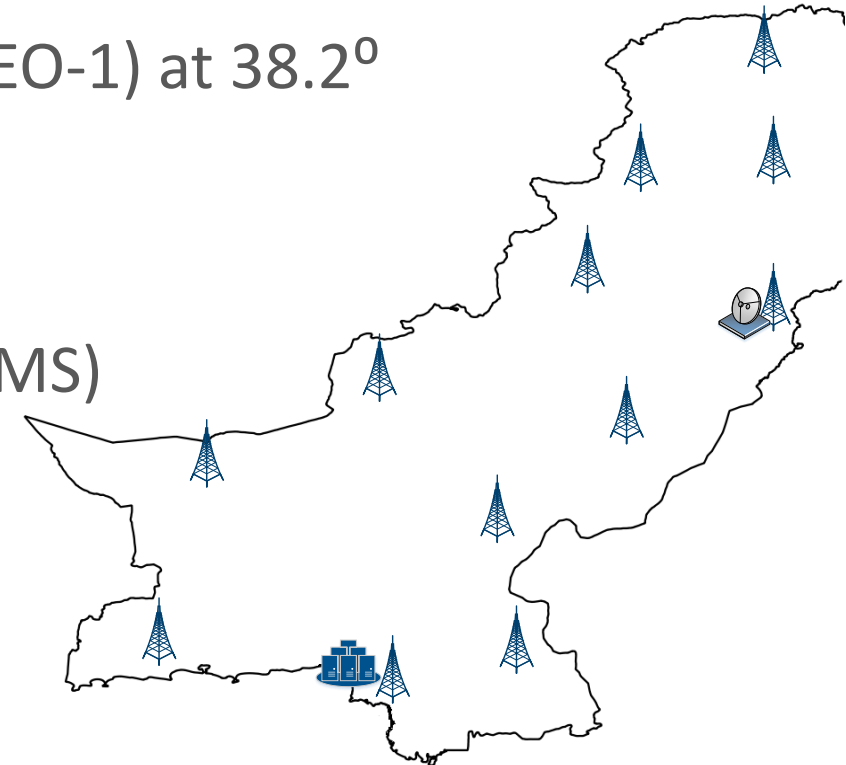
- SBAS Payload onboard PakSat MM-1 satellite (GEO-1) at  $38.2^{\circ}$

## ■ Ground Segment

- 01 x Data Processing Center (DPC)
- 12 x Range and Integrity Monitoring Stations (RIMS)
- 01 x Ground Uplink Station
- Data Communication Network
- Interface with International GNSS Service (IGS)

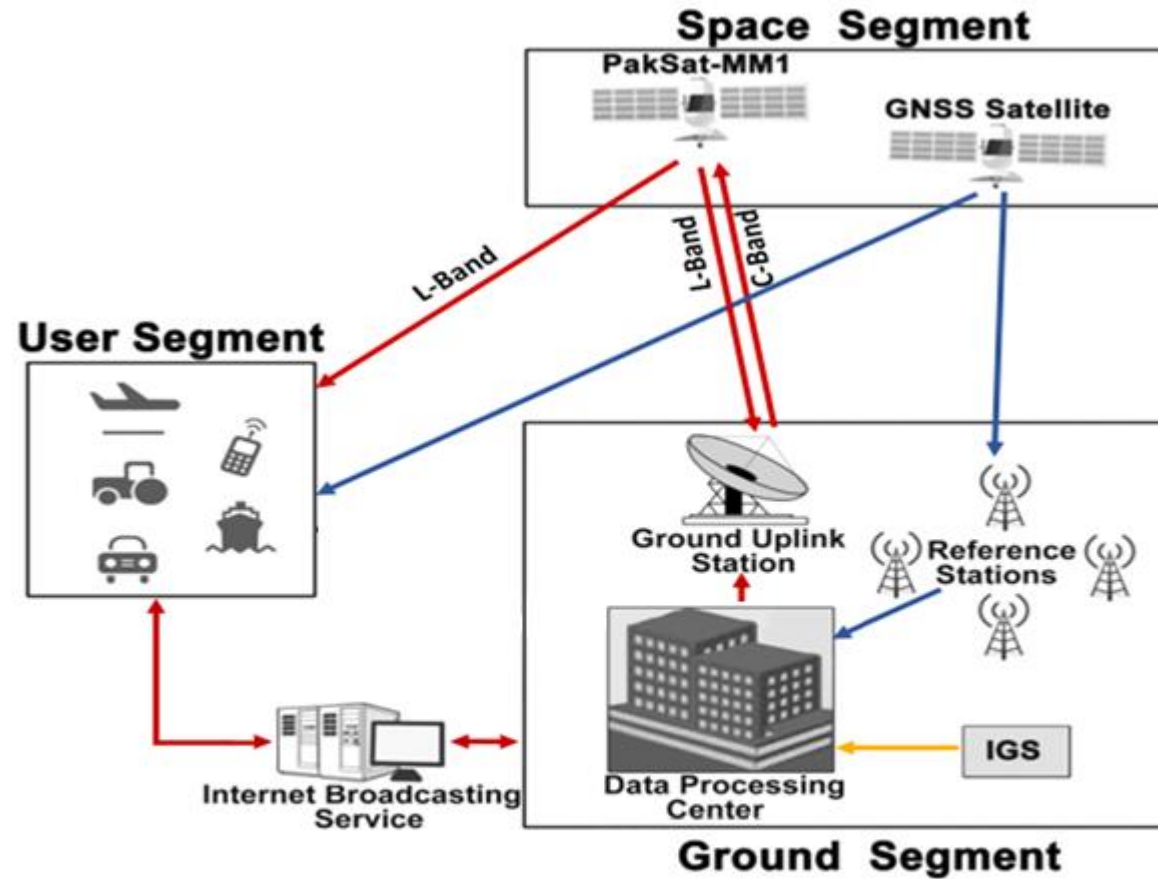
## ■ User Segment

- Pak-SBAS receivers for aviation, marine, land users





# Configuration



- Navigation Message
- Augmentation Message
- IGS Data & Products



# Implementation Status

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- Contract Nov 2020
- Kick-off Aug 2021
- PDR Dec 2021
- CDR Aug 2022
- IOC (GEO-1) Mid 2024





## Implementation Status

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- The Pak-SBAS service is planned to be tested and commissioned by end-year 2024
- The launch of the second satellite (GEO-2) in the Pak-SBAS Space Segment and augmentation of the Ground Segment is being considered in the year 2026
- The Ground Segment will also be augmented with the launch of GEO-2
- Certification of the System for Performance Based Navigation (PBN) services will be planned subsequently



## Conclusion

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- Pakistan is well poised for implementation of Pak-SBAS
- Looks forward to constructive engagement with GNSS and RNSS operators to ensure compatibility, interoperability and transparency of Systems
- Seeks cooperation of the GNSS Community and Industry to adopt advanced GNSS technology services and applications in the country
- Participation in CGSIC forum will provide Pakistan an opportunity for effective interaction with all GPS civil users and the US GPS Authorities for incorporation of resultant benefits in its Satellite Navigation Program



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# Thank You