

# Pak SBAS Update 2022



**SUPARCO**

Pakistan Space & Upper Atmosphere  
Research Commission

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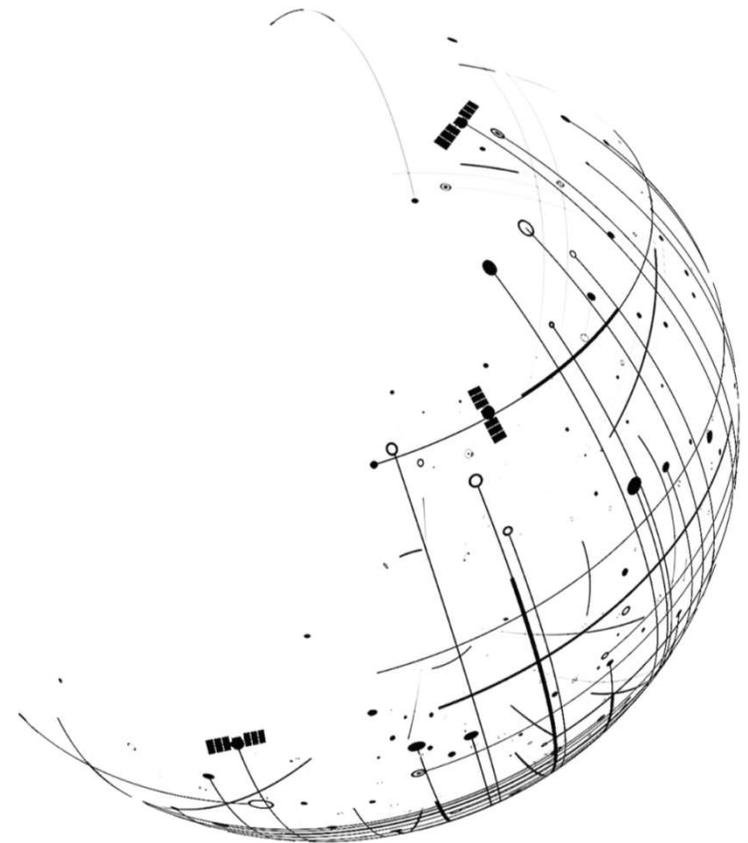




# Introduction

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- Satellite Navigation is an important component of Pakistan's Space Program
- Overview of the GNSS landscape in Pakistan and planned Satellite Navigation Systems were presented in ICG-15 at Vienna, Austria
- This presentation provides a status update on Pak SBAS currently under development





# Vision



# Statement



To develop GNSS Systems, Services and Applications for socio-economic uplift, safety of life and achievement of Sustainable Development Goals through research & development and international cooperation



# GNSS Systems



Infrastructure



- Infrastructure planned for realization of GNSS Vision:
  - Space Based Augmentation System (SBAS)
  - Ground Based Augmentation System (GBAS)
  - Regional Navigation Satellite System (RNSS)
  - National Geodetic Datum



# GNSS Systems



- System Status:
  - User survey in potential application domains completed and deliberations with key stake holders in progress
  - GEO-1 (Paksat-MM1) CDR completed in Jul 2022
- Targeted benefits:
  - Meet safety of life positioning requirements of transportation (land, marine, aviation) users in a phased manner (initially IOC, later FOC)
  - Meet positioning requirements of GIS & mapping, precision agriculture & mining, etc



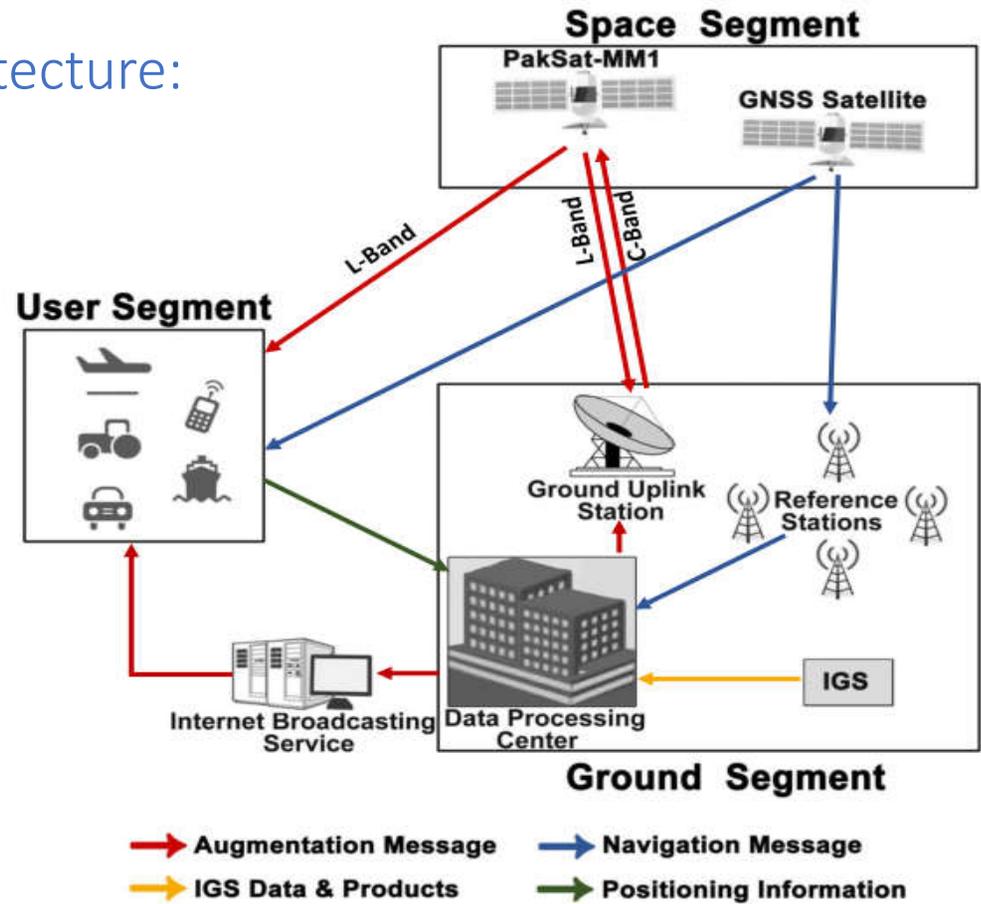
# GNSS Systems

- Planned System Configuration:
  - Space Segment
    - GEO-1: Paksat-MM1 @ 38.2°E (Launch 2024)
    - GEO-2: Paksat-2R @ 38.0°E (Launch 2026)
  - Ground Segment
    - 12 Ground Reference Stations (GRSs)
    - 01 Data Processing Centre (DPC)
    - 01 Ground Up-Link Station (GULS)
  - Constellations
    - GPS, BeiDou (planned)
    - Galileo, Glonass (to be planned in future)
  - Services
    - Public
    - Authorized



# GNSS Systems

- System Architecture:





# GNSS Systems

## Planned System Specifications:

	Public Service	Authorized Service
Parameter	Specifications	
Signal	L1: CDMA, 1.023 Mbps L5: CDMA, 10.23 Mbps	B2b: CDMA, 10.23 Mbps
Protocol	RTCA DFMC	PPP
Positioning Accuracy	Meter level	Decimeter level
Convergence time	Real-time	30 min (IOC) 01 min (FOC)

\* using around 80 IGS Stations



# GNSS Systems

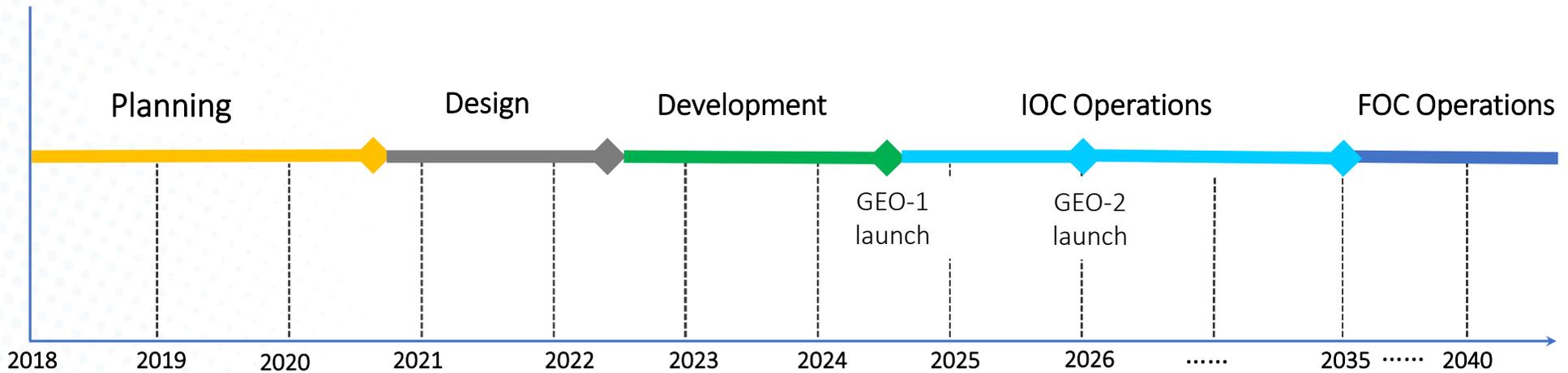
- Frequency coordination:
  - C-Notice submitted in 2019
  - 23 affected administrations; coordination in progress
- Resolution 609:
  - Data submitted to ITU in 2021
  - Successfully included in the List of RNSS Networks
- PRN codes:
  - Application submission being planned



# GNSS Systems

Pak SBAS

## ■ Implementation Plan:





## Conclusion

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- Pakistan is well poised for implementation of Pak SBAS and looks forwards to:
  - Constructive engagement with ICG for ensuring the compatibility, interoperability and transparency of its Satellite Navigation Systems
  - Seeking cooperation of the ICG members for adopting utilization of GNSS technology services and applications in the country



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# Thank You

