## **Pakistan Space Based Augmentation System**

## **Key Features**

- Meter to sub meter accuracy
- Cis & Trans-frontier
  Coverage
- Cost effective, convenient and easy to use
- Compatible & interoperable

















#### Introduction

Pakistan has developed **Pakistan Space Based Augmentation System** (**Pak-SBAS**) for improving the accuracy, integrity and reliability of existing Positioning, Navigation, and Timing (PNT) service. Pak-SBAS will enable meter to sub-meter positioning which will fulfill the precise positioning requirements of civil/public users cis & trans frontier.

## **Specification**

Parameters	Technical Specification		
Service Accuracy	Public Service	Accuracy	H ≤ 1.5m, V ≤ 2.5m
		Signals	SFSC (GPS: L1) DFMC (GPS: L1 & L5)
		Constellation Supported	SFSC (GPS) DFMC (GPS & BDS)
		Convergence Time	Real-time
		Encryption	No
		Applications	IOC: Non-Safety-of-Life (Non-SoL) FOC: Safety-of-Life (SoL)
	Authorized Service	Accuracy	H ≤ 0.15m, V ≤ 0.25m
		Signals	PPP (B2b)
		Constellation Supported	PPP (GPS & BDS)
		Convergence Time	30 min
		Encryption	Yes
		Applications	Non-SoL
Timing Accuracy	≤ 20 ns		
Coverage	Pakistan & surrounding region		



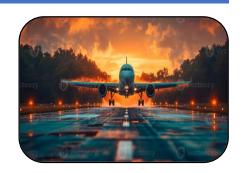
## Safety-of-Life (SoL) Applications

#### **Application**

#### **Description**

#### Aviation

Pak-SBAS will enable Performance Based Navigation (PBN) to significantly enhance safety and efficiency by providing precise navigation en-route through to precision approach for safety, efficiency & capacity benefits.



#### Marine

Pak-SBAS will enable integrity based positioning for Safety-of-Life at Sea (SoLAS) to improve accuracy and integrity for specific service areas (such as navigation in harbour entrances, harbour approaches and coastal waters).



#### Railway

Pak-SBAS will enable integrity based positioning to improve safety and reliability in railway operations that includes monitoring track deformation at network scale and assessing natural hazard risks) while allowing reduced costs for on-site inspections. Further, continuous satellite-based monitoring network scale enables a paradigm shift to predictive maintenance.



#### Intelligent Transportation

Pak-SBAS will enable integrity based positioning for smart vehicles (V2V, V2X), smart toll collection system, HAZMAT asset tracking, monitoring traffic flow & rapid incident response.



## **Non-SoL Applications**

## Application

#### **Description**

# Precise GIS & mapping

Pak-SBAS services will enhance the reliability & efficiency of precise GIS & mapping operations thru provision of high-precision ubiquitous geospatial data for precise asset management.



#### Precision Agriculture

Pak-SBAS services will aid precision farming practices by enabling precise machine guidance, accurate geolocation of crops, resources optimization and monitoring field conditions.



#### **Precision Mining**

Pak-SBAS services will provide precise positioning information for exploring & identifying sites, extraction, machine guidance, grading, drilling, collision avoidance, mine-construction and hauling processes.



#### Deep Sea Exploration

Pak-SBAS services will provide precise positioning information for offshore exploration and drilling for brining crude oil & natural gas to the surface.





## **Non-SoL Applications**

# **Application Description**

Smart City, Urban Planning & Infrastructure Development Pak-SBAS services will enable the precise positioning solutions for smart city through assistance in the development of precise digitized emaps for efficient urban planning & land demarcation.



Disaster Management Pak-SBAS services will help in response for Search & Rescue operations and will aid disaster relief teams and public safety personnel.



Deformation Monitoring Pak-SBAS service will enable precise deformation monitoring of high-rise buildings, bridges, dams and glaciers.



Precise UAV/UGVs navigation

Pak-SBAS service will enable precise navigation of UAVs/UGVs to enable smart mobility solutions.



