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# NSSTC

المركز الوطني لعلوم وتكنولوجيا الفضاء  
National Space Science & Technology Center



## LEO PNT: Solution for Future Transportation

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# Introduction



**Definition:** LEO PNT, or Low Earth Orbit Positioning, Navigation, and Timing, refers to the use of satellites in low earth orbit to provide accurate positioning, navigation, and timing information.



**Challenges Addressed:** LEO PNT addresses the vulnerabilities of existing Global Navigation Satellite Systems (GNSS) in medium earth orbit, such as signal impairments and interferences.



**NSSTC Role:** The National Space Science & Technology Center (NSSTC) is at the forefront of developing LEO PNT solutions to enhance the robustness and accuracy of satellite navigation.

# Introduction

## Global Players



# GNSS & Transportation Global Market

## GNSS Market:

- The global GNSS market was estimated to be around \$22-24 billion in 2023.
- Projected growth rates remained consistent, with a forecasted CAGR of approximately 7-9% through 2026.
- Key factors driving the growth of the GNSS market include increasing demand for precise positioning and navigation in various industries such as transportation, agriculture, and construction.

## Transportation Market:

- The global transportation market was estimated to be approximately \$8.8-9.2 trillion in 2023.
- Growth rates varied by sector, with road transportation being the largest segment, followed by air and maritime transportation.
- Key factors driving the growth of the transportation market include urbanization, population growth, increasing trade activities, and technological advancements in transportation infrastructure and vehicles.

## Autonomous Vehicles Market:

- The global autonomous vehicles market likely reached around \$60-65 billion in 2023.
- The growth rate remained robust, with a projected CAGR of about 35-40% through 2026.
- Factors driving the growth of the autonomous vehicles market include advancements in sensor technologies, supportive government regulations, and increasing investments by automotive manufacturers and technology companies.

# Importance of LEO PNT

Resilience: LEO PNT offers resilience against natural phenomena impairments and interferences, ensuring continuous and reliable positioning and timing information.

Applications: The applications of LEO PNT extend to various sectors including transportation, telecoms, and emergency services, contributing to the overall safety and efficiency of operations.

Future Prospects: Anticipating the future of satellite navigation, LEO PNT is poised to revolutionize the way we navigate and interact with the world around us



## NSSTC LEO PNT Mission



Tech-Demo  
CubeSat



Mini-  
Constellation (6-  
10 Sats)



Prototype  
Satellite  
(MicroSat)



Deployment of  
the Full Solution





# GNSS From LEO

What is the added value?

## Resilient Signals

LEO PNT assures robust signals, mitigating the vulnerabilities of existing GNSS and enhancing safety measures for air, land, and maritime transportation.

## Real-time Accuracy

The real-time accuracy of LEO PNT facilitates precise navigation and timing, contributing to safer and more efficient transportation operations.

## Impact on Society

The societal impact of resilient transportation networks underscores the critical role of LEO PNT in ensuring the safety and well-being of communities.

## Dynamic Environments

LEO PNT is designed to operate effectively in dynamic environments, providing uninterrupted navigation support for transportation systems across diverse terrains.

## Adaptive Solutions

The adaptive nature of LEO PNT enables transportation networks to overcome challenges posed by natural phenomena and interferences, ensuring continuous connectivity.

## Future-proofing

Transportation By future-proofing transportation navigation systems, LEO PNT lays the foundation for sustainable and resilient mobility solutions.

# Future Perspectives and Innovations

## Industry Collaboration

Engaging in collaborative initiatives with industry partners fosters innovation and accelerates the development of LEO PNT-enabled transportation solutions.

## International Cooperation

International cooperation and partnerships in LEO PNT for transportation promote knowledge exchange, interoperability, and global harmonization of navigation standards.

## Public Awareness

Educating the public about the benefits and implications of LEO PNT in transportation fosters acceptance and understanding, paving the way for widespread adoption.

## Policy and Regulation

Addressing policy and regulatory frameworks for LEO PNT in transportation is crucial to ensure standardization, safety, and ethical use of advanced navigation technologies.





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# Thank You!

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