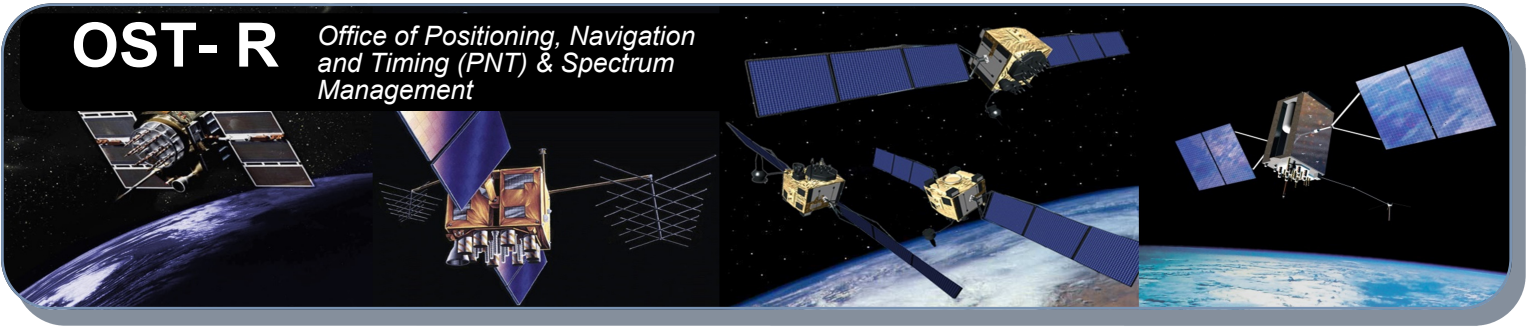


# OST- R

Office of Positioning, Navigation and Timing (PNT) & Spectrum Management



## Positioning, Navigation and Timing (PNT) Program Overview

The U.S. Government sustains support of GPS providing a global PNT service that is open, stable, accurate, and free to access. PNT systems, “have become a largely invisible utility for technology and infrastructure, including the electrical power grid, communications infrastructure and mobile devices, all modes of transportation, banking and finance, precision agriculture, weather forecasting, and emergency response.”

- White House, National Research and Development Plan for Positioning, Navigation, and Timing Resilience, August 2021

### Advancing PNT And Spectrum Policy and Research

#### FEDERAL RADIONAVIGATION PLAN



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#### Complementary PNT Action Plan DOT Actions to Drive CPNT Adoption



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September 2023



CPNT Action Plan 1

### DOT Leadership of Civil Global Positioning System (GPS)/PNT

- Coordinate the development of departmental positions on PNT and spectrum policy and protection from harmful radio frequency interference and operational degradation of services and capabilities.
- Responsible for the development of PNT requirements for civil applications from all United States Government civil departments and agencies.
- Represent the civil departments and agencies in the development, acquisition, management, and operations of GPS based PNT services.
- Provide civil PNT systems analysis and coordination, including requirements development and architectural development.
- Represent the civil departments and agencies in Radionavigation Systems Policy, Planning, and Analysis via publishing of the Federal Radionavigation Plan (FRP), the official source of positioning, navigation, and timing policy and planning for the Federal Government.
- Chair the Civil Global Positioning System Service Interface Committee (CGSIC) which is the recognized worldwide forum for effective interaction between all civil GPS users and the U.S. GPS enterprise.

### DOT PNT Research Priorities

- Implementation of Complementary PNT (CPNT) Demonstration Recommendations
  - Facilitate Adoption of CPNT Technologies
  - Establish PNT Standards, Requirements & Conduct Vulnerability Testing and Analysis at Field Test Ranges/Proving Grounds
  - Engagement with PNT Technology Vendors and Critical Infrastructure Sectors
- GNSS Interference Detection and Mitigation
- GNSS Civil Signal Performance Monitoring
- GPS Signal and Data Authentication
- EO 13905 Implementation (Strengthening National Resilience Through Responsible Use of PNT Services)

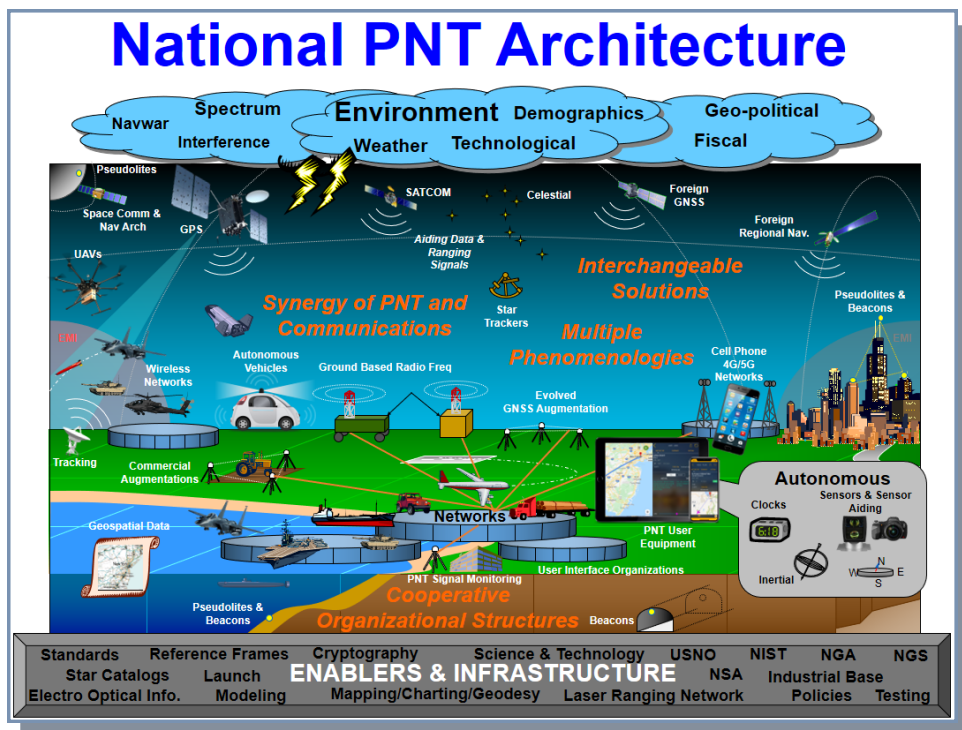
**For more information, please visit us at**  
**<https://www.transportation.gov/pnt>**



**U.S. Department of  
Transportation,  
Office of the Secretary**

## National PNT Architecture & PNT Resiliency

The National PNT Architecture identifies recommendations to be implemented to overcome PNT capability gaps, predominantly resulting from the limitations of GPS. There are increasing occurrences of unintentional and intentional interference to GPS, including spoofing of the signal. DOT works closely with the Departments of Homeland Security and Defense to increase awareness of vulnerabilities of GPS, evaluate the impact, and to research complementary sources of PNT to increase resiliency for safety-critical transportation applications. DOT also coordinates research on new technologies to address emerging PNT needs for applications, such as automated vehicles, across all modes of transportation, including with the university transportation centers



### Center for Automated Vehicles Research with Multimodal AssurEd Navigation (CARMEN) University Transportation Center (CARMEN+ UTC)

The CARMEN+ University Transportation Center leads research efforts including, but not limited to, generating and analyzing realistic PNT threat scenarios, developing risk mitigation strategies for Highly Automated Transportation Systems (HATS), crafting standards and guidelines for cyber resilient PNT systems, and validating real-world jamming and spoofing environments. The CARMEN+ UTC is led by The Ohio State University with consortium members from University of California Irvine, University of Texas Austin, and North Carolina Agricultural and Technical State University.

### Center for Assured & Resilient Navigation in Advanced Transportation Systems (CARNATIONS UTC)

The CARNATIONS University Transportation Center is focused on resilient PNT (R-PNT) and resilient PNT-related communications in multimodal transportation. CARNATIONS brings together a consortium of partner institutions including Illinois Tech, Chicago State University, Stanford University, the University of California-Riverside, and Virginia Tech to form a research team working at the forefront of R-PNT in multi-modal transportation.

## PNT Capability Gaps



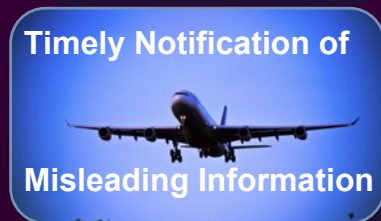
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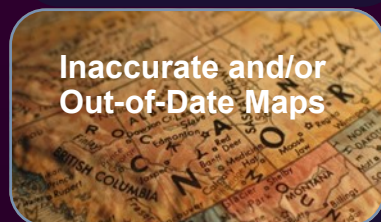
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