



Department of Transportation

Office of the Secretary

Office of the Assistant Secretary for Research and Technology (OST-R)



**62<sup>nd</sup> Civil GPS Service Interface Committee (CGSIC)**

**U.S. Department of Transportation Update**

**September 20, 2022**

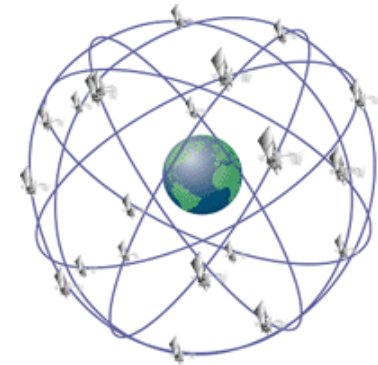
# Space Policy Directive (SPD)-7

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## Key DOT Responsibilities

To implement SPD-7, DOT responsibilities are grouped under the following categories:

- Space-Based PNT Requirements for Civil Applications
- Space-Based PNT Management and Modernization for Civil Applications
- Performance Monitoring and Interference Detection for Civil Space-Based PNT Services
- PNT Resiliency
- Space-Based PNT Data and Signal Authentication
- International Engagement



Space-Based PNT Summit Held between DOT and U.S. Space Force May 2022



# Assured PNT: Embrace PTA Principle

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- **Protect**

- Ensure performance monitoring of space-based civil PNT services
- Implement interference monitoring capabilities to identify, locate, and attribute PNT threats
- Prevention of harmful interference
- Facilitate international coordination for development of monitoring standards

- **Toughen**

- Authenticate signals and harden user equipment (receiver/antenna/algorithms)

- **Augment / Adopt**

- Implement and utilize GPS augmentations and Complementary PNT services
- Facilitate adoption of Complementary PNT into end-user applications



# DOT PNT Research Priorities - FY2022 Enacted Budget

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- GNSS Civil Signal Performance Monitoring
- GNSS Interference Detection, Monitoring, Location, and Attribution
- GPS Signal and Data Authentication
- Implementation of Complementary PNT Demonstration Recommendations
  - Facilitate adoption of Complementary PNT technologies to increase PNT resiliency for safety-critical transportation applications
  - PNT standards, safety critical requirements, and testing/monitoring development
- EO 13905 Implementation



# GPS Modernization GPS Performance Monitoring

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## Scope for Civil GPS Signal Monitoring

- Full Civil Monitoring Performance Specification on Civil GPS Signals (L1C, L2C, L5, and L1 C/A) to ensure U.S. government commitments are met
- GPS Integrity Support Message (ISM) Monitoring for Advanced Receiver Autonomous Integrity Monitoring (ARAIM)
- Monitoring and Assessment of GNSS L-band broadcasts to support SPD-7 responsibility

## Implement in Partnership with National Geospatial-Intelligence Agency (NGA)

- Deploy and maintain High-Rate Tracking Receiver (HRTR) in NGA Monitor Station Network (MSN)
- Implement Civil Signal Monitoring System at NGA MSN Control Center (MSNCC)

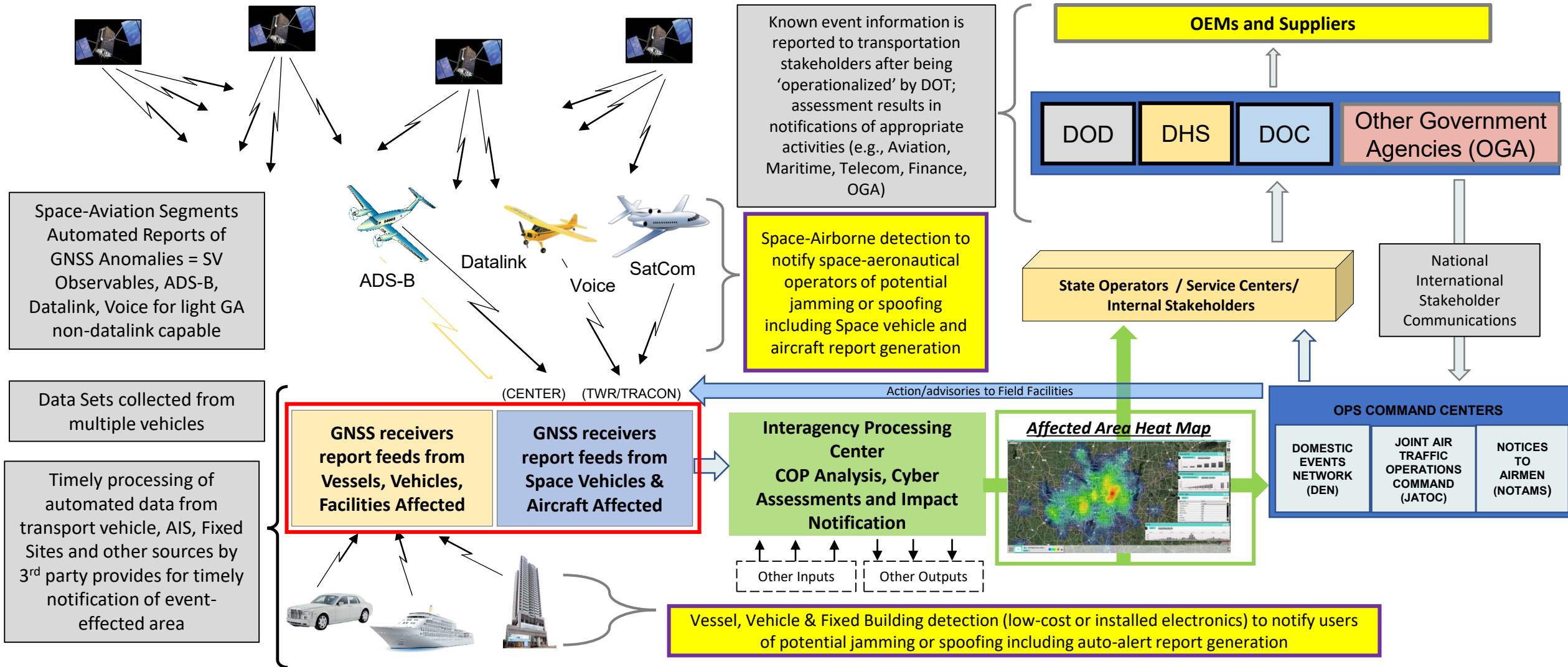


# SPD-7 High-Level GPS IDM Strategy-Partnerships

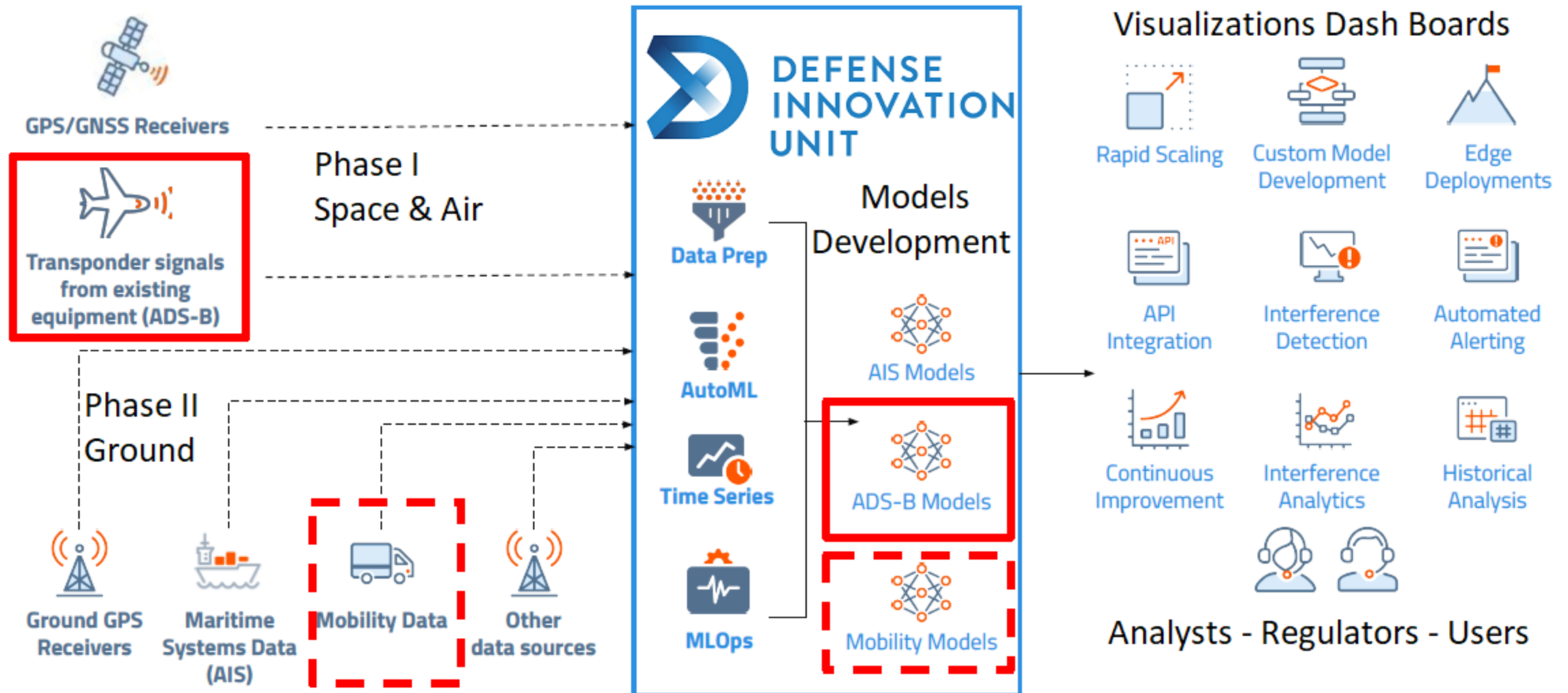
- Actively Detect and Identify L-Band Interference Emissions
  - Focus on In-Band and Adjacent Band Interference
  - In partnership with other Federal Departments/Agencies
- Leverage Space & Ground, Fixed, Transportable, and Mobile
  - Sensor Equipment Already in Operational Use
  - Adaptation to cover GNSS Interference
- Joint Federal, State and Local – Civil, Military
  - Multi-Federal-State MOA & CONOPS
- State and Local Law Enforcement Involvement
  - Focused for Critical Ports and Infrastructure Protection



# GPS Anomaly IDM Joint Concept of Operations



# DOT/OST-R Partnership with DIU Harmonious Rook Initiative





# Complementary PNT Demonstration Recommendations

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1. Safety-critical PNT requirements and standards development
2. PNT vulnerability and performance testing framework for demonstrated and suitable complementary technologies
  - Procedures, facilities, and platforms for testing PNT performance and resilience to threats
  - Certification protocols for safety-critical PNT functions
3. PNT performance monitoring capabilities to ensure operational PNT services provide resilience and achieve safety-critical standards for transportation and critical infrastructure applications

**Focus on widespread adoption of Complementary PNT capabilities**



# DOT Complementary PNT Industry Roundtable – Aug. 4, 2022

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## Key Takeaways:

- **Complementary PNT vendors voiced their vision for paths forward to resilience:**
  - GPS has had excellent reliability and is a market anomaly created by the impression that it is a free service/utility; cost is a concern for adoption of other PNT technologies
  - CPNT technologies must provide increased capability, not viewed only a backup to GPS
  - “Sandbox” facilities, test ranges, and pilot programs for soft entry to mature operations
  - CPNT technologies need to have a mature threat posture against capable actors
  - CPNT must be viewed as a system-of-systems approach with layered/overlapping service
  - Need Federal PNT contract language and for the USG to lead as an investor/subscriber of services
  - Standards and requirements serve a role to promote innovation and adoption
- **Critical infrastructure owners and operators reflected views:**
  - USG must demonstrate commitment to resilience through procurement of these services
  - Cost and technology risk are decision factors for CPNT vs. GPS in fixed infrastructure



# PNT Industry Roundtable – Bottom Line and Next Steps

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## Bottom Line:

- It will take a combination of the awareness of PNT vulnerabilities, use of Pilot Programs, Grants (Critical Infrastructure Sector Users), and other programs put in place to ensure the transition from experimentation to actual adoption of Complementary PNT services and products

## Next Steps:

- DOT is developing an action plan of concrete recommendations from the roundtable that lead to demonstratable progress on the adoption of CPNT capabilities

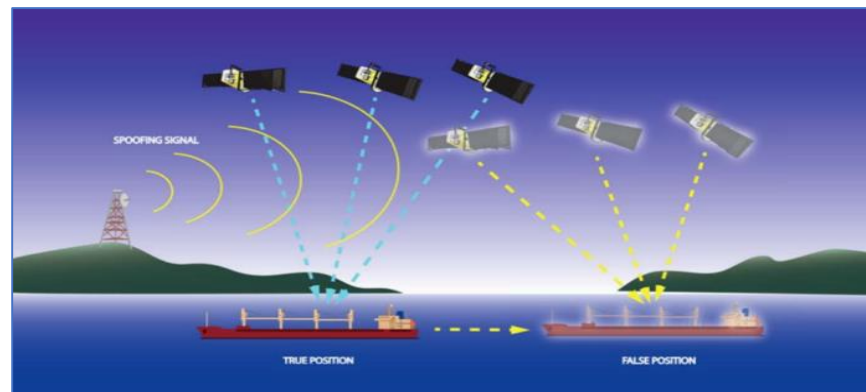
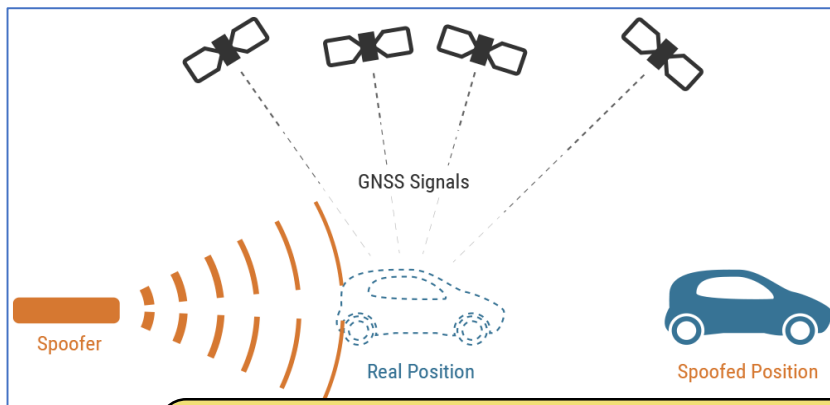
<https://www.transportation.gov/pntindustryround>



# Executive Order 13905

## Key Actions for DOT:

- Vulnerability Assessment / Testing
- Maritime Pilot Program
- PNT Profile Adoption and Adaptation
  - Focus on Automated Vehicles, Aviation, and Maritime
- National R&D Plan on PNT Resilience
- Work with DHS on PNT Resilience Contract Language



**“Responsible use of PNT services” means the deliberate, risk-informed use of PNT services**

# Federal Radionavigation Plan

- The Federal Government's reflects U.S. official PNT policy and plan, as required by the National Defense Authorization Act for FY1998
- Joint product of the Departments of Defense, Transportation, and Homeland Security with the assistance of other government agencies
- 2021 version of the FRP
  - Updates to U.S. PNT Policy
  - Complementary PNT Demonstration
  - Implementation of EO 13905

