



GPS/Civil PNT Update

Space-Based PNT Advisory Board Meeting

June 11, 2015

Overview

- 2014 Federal Radionavigation Plan
- Complementary PNT
- Nationwide Differential GPS (NDGPS)
- GPS Adjacent Band Compatibility Assessment



2014 Federal Radionavigation Plan (FRP)

2014 FRP most recent version:

- Emphasis on future planning
- Includes civil PNT requirements (accuracy, availability, coverage, integrity)
- Incorporates National PNT Architecture concepts
- PNT Architecture Assessment and Evolution:
 - FAA Alternative PNT
 - Autonomous Navigation based on a Diverse Set of PNT Sources
 - Enablers for Interoperable/ Interchangeable PNT



Updated Language on Discontinuation of Codeless and Semi-Codeless GPS Access

Section 3.2.8

The USG commits to maintaining the existing GPS L1 C/A, L1 P(Y), L2C, and L2 P(Y) signal characteristics that enable codeless and semi-codeless GPS access **until at least two years after there are 24 operational satellites broadcasting L5.**

Barring a national security requirement, the USG does not intend to change these signal characteristics before then. Twenty-four satellites broadcasting the L5 signal is estimated to occur in 2024.

This paragraph supersedes the previously announced commitment in FRN Vol. 73 No. 185 to maintain such signal characteristics through December 31, 2020.



Complementary PNT (CPNT)

- DOT issued a *Federal Register* Notice in conjunction with Complementary PNT (CPNT) Team
- Widely circulated to stakeholder communities
- Approximately 200 comments received
 - CPNT Team evaluating input
- Comments posted on www.regulations.gov
 - Enter DOT-OST-2015-0053 into Search Box to view comments



2014 FRP Language on NDGPS

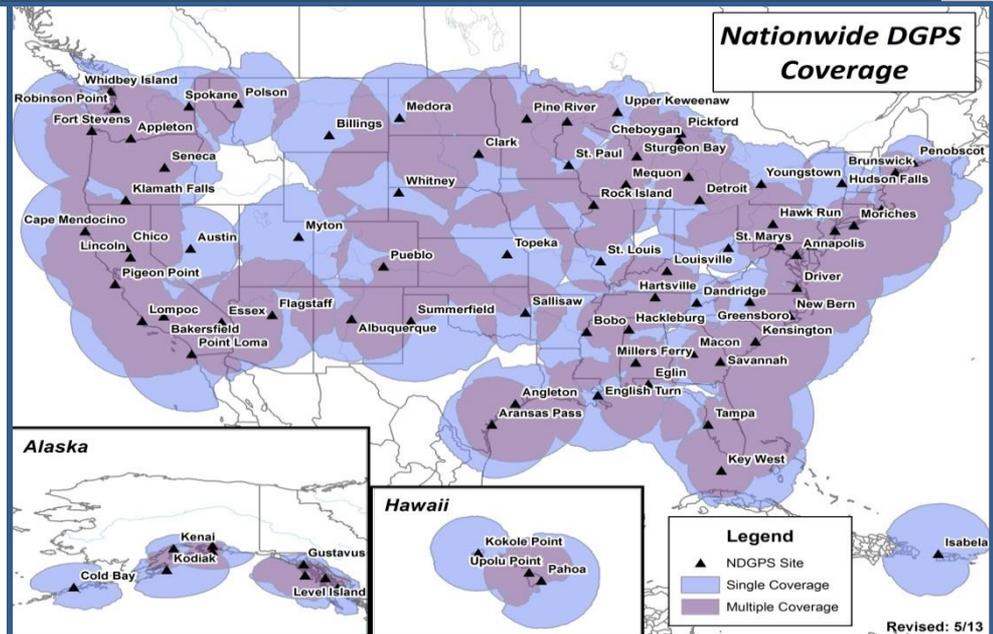
- The Department of Homeland Security, in coordination with the Department of Transportation, is analyzing the future requirements for the NDGPS to support investment decisions beyond Fiscal Year 2016
- Future investment decisions might include:
 - Maintaining NDGPS as currently configured
 - Decommissioning NDGPS
 - Developing alternate uses for the NDGPS infrastructure



Overview of NDGPS

System Description

- 84 Nationwide Remote Broadcast Sites throughout the United States and territories
 - 92% nationwide signal coverage
 - Better than 10 meter accuracy
 - 10 second integrity alarm to the user
 - Satisfies Harbor/Harbor Approach requirements
 - 99.7% availability requirement
 - Sites equipped with out-of-tolerance user alerting



Operations

- Redundant equipment at sites
- Redundant controls stations at NAVCEN

Stakeholders

- Department of Transportation (DOT)
- U. S. Coast Guard
- National Oceanic & Atmospheric Administration:



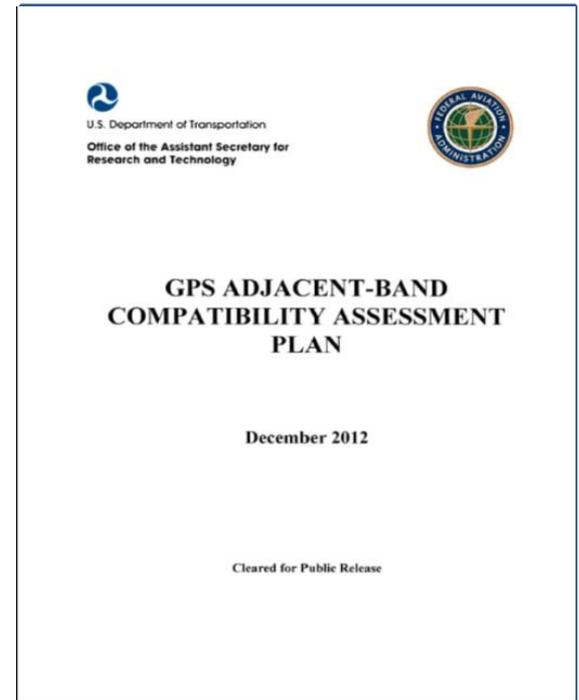
Future of NDGPS Assessment

- Contributing Factors:
 - Discontinuation of Selective Availability
 - Lack of USCG requirements
 - No international or domestic carriage requirement
 - GPS authorized for positioning Aids to Navigation (ATON)
 - Navigation Standards Manual allows use of WAAS
 - Continued GPS modernization
 - Reduced availability of consumer grade DGPS receivers
 - FRA has no NDGPS requirement for Positive Train Control
 - Agriculture sector uses commercial DGPS services



GPS Adjacent Band Compatibility Assessment

- DOT Study to Evaluate:
 - Adjacent-band power levels, as a function of offset frequency, necessary to ensure continued operation of all applications of GPS services
 - Adjacent-band power levels to ensure continued operation of all applications of GPS services by future GPS receivers utilizing modernized GPS and interoperable Global Navigation Satellite System (GNSS) signals



Approach to DOT GPS Adjacent Band Compatibility Assessment

- Certified Aviation Portion of Effort Led by FAA
- Non Aviation Certified effort (all other applications) led by DOT/OST-R Volpe Center
- DOT Extended Pos/Nav Working Group (Civil Departments and Agencies)
 - GPS Directorate, Aerospace, Mitre, Stansell Consulting, and Zeta Associates
- Conduct public outreach to ensure the plan, on going work, and assumptions are vetted and an opportunity to gain feedback
 - Hold Public Workshops
 - One-on-One Discussions with Industry
 - Open and Transparent Approach



Overview of GPS Adjacent Band Workshops

- ❑ Initial Workshop-I held on September 18, 2014
 - Overview of DOT GPS Adjacent Band Compatibility Assessment Plan and plans/timeline for implementation
 - GPS use cases and list of representative GPS receivers from government stakeholders
 - Description of GPS receiver and antenna information needed from manufacturers

- ❑ Workshop-II held on December 4, 2014
 - Industry feedback on the Adjacent Band program implementation plan
 - GPS receiver Use Case information from industry
 - Discussion of test options and associated challenges

- ❑ Workshop-III held on March 12, 2015
 - GPS/GNSS receiver test criteria
 - GPS Receiver Selection Criteria for testing



Issues to Address

- Interference Protection Criteria for GPS/GNSS Receivers
- Achieving Balance between Open/Transparent Process and Need to Protect GPS/GNSS Receiver Proprietary Design Information
- Technical and Deployment Assumptions for Potential Adjacent Band Service(s)
 - Currently Assuming LTE (Base Stations/Handsets)
- Handling an aggregation of interferers at different frequencies
- Propagation Models to Use
- Spectrum Protection for GPS/GNSS Augmentation Services in MSS Band (StarFire, OmniStar, etc.)
- Spectrum Protection for Multi-GNSS Receivers
 - Other Systems Operate Closer to Adjacent Band than GPS L1
- Sufficient Resources for Receiver Testing



Questions?

