



SPACE-BASED POSITIONING  
NAVIGATION & TIMING  
NATIONAL COORDINATION OFFICE

# Policy Update

**Munich Satellite Navigation Summit  
Munich, Germany**

**6 March 2018**

**Harold W. Martin III, Director National Coordination Office  
United States of America**



# U.S. National Space Policy



## *Space-Based PNT Guideline: Maintain leadership in the service, provision, and use of GNSS*

- **Provide continuous worldwide access to GPS for peaceful uses, free of direct user charges**
- **Engage with foreign GNSS providers on compatibility, interoperability, transparency, and market access**
- **Operate and maintain GPS constellation to satisfy civil and national security needs**
  - Foreign PNT may be used to strengthen resiliency
- **Invest in domestic capabilities and support international activities to detect, mitigate, and increase resiliency to harmful interference**



# GPS Overview

## Civil Cooperation

- 3+ Billion civil & commercial users worldwide
- Search and Rescue
- Civil Signals
  - L1 C/A (Original Signal)
  - L2C (2<sup>nd</sup> Civil Signal)
  - L5 (Aviation Safety of Life)
  - L1C (International)



**35 Satellites / 31 Set Healthy**  
**Baseline Constellation: 24 Satellites**

Satellite Block	Quantity	Average Age	Oldest
GPS IIR	12	15.9	20.3
GPS IIR-M	7	10.3	12.2
GPS IIF	12	3.8	7.5
Constellation	31	10.0	20.3

## Spectrum

- World Radio Conference
- International Telecommunication Union
- Bilateral Agreements
- Adjacent Band Interference



## Department of Transportation

- Federal Aviation Administration

## Department of Homeland Security

- U.S. Coast Guard

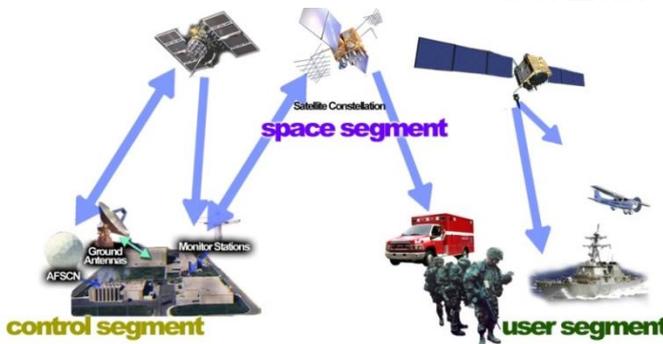
## Department of Defense

- Services (Army, Navy, AF, USMC)
- Agencies (NGA & DISA)
- US Naval Observatory
- PNT EXCOMS
- GPS Partnership Council

## Maintenance/Security

- All Level I and Level II
  - Worldwide Infrastructure
  - NATO Repair Facility
- Develop & Publish ICDs Annually
  - Public ICWG: Worldwide Involvement
  - Materials Available at: [gps.gov/technical/icwg](http://gps.gov/technical/icwg)
- Update GPS.gov Webpage
- Load Operational Software on over 970,000 SAASM Receivers
- Distribute PRNs for the World
  - 120 for US and 90 for GNSS

AS OF 22 NOV 17



## International Cooperation

- 57 Authorized Allied Users
  - 25+ Years of Cooperation
- GNSS
  - Europe - Galileo
  - China - Beidou
  - Russia - GLONASS
  - Japan - QZSS
  - India - NAVIC



# GPS SIS Performance Scoreboard



## GPS SIGNAL IN SPACE (SIS) PERFORMANCE (CM)

**BEST WEEK\***

**BEST DAY\***

**WORST DAY\***

**ENDING**

**SIS**

**ENDING**

**SIS**

**ENDING**

**SIS**

**ROLLING YEAR**

**29 NOV 16**

**44.1**

**26 JAN 17**

**35.0**

**15 JUN 17**

**69.7**



**BEST WEEK EVER**

**29 NOV 16**

**44.1**

*\*ROLLING YEAR*



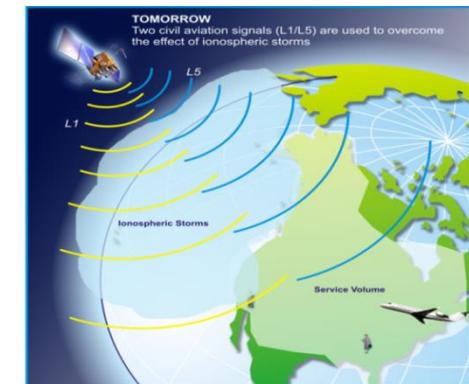
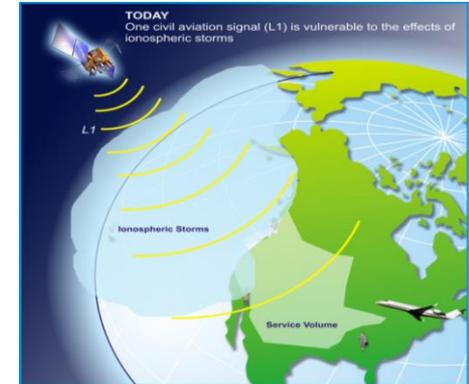
SIS values are Root Mean Square (RMS)



# WAAS Overview



- **Final Investment Decision for Phase IV Segment 1 (2014-2019) Dual Frequency Operations (DFO) approved**
  - Segment 1 (2014-2019) - Develop infrastructure improvements to support L5 & Tech Refresh
  - Segment 2 (2019-2023) - Sustainment of L1 Coarse/Acquisition WAAS Service; MOPS and Standard and Recommended Practices (SARPs) Development; WAAS Service Improvements
- **Implementation of L1/L5 user capability; Transition from use of L2 P(Y) to L5 within 2 years of GPS L5-signal Full Operational Capability (FOC)**
- **GEO sustainment will occur during both segments**
- **Future considerations**
  - **Dual-Frequency Multi-constellation Capability**
    - International Focus is on taking advantage of other GPS like constellations
  - **User Equipment Standards for Dual-Frequency Operations**
    - FAA working with Interoperability Working Group (IWG) on definition document that provides the basis for interface design and MOPS development for L1/L5 and multi-constellation
  - **Advanced RAIM (ARAIM)**
    - Avionics-centric approach to dual-frequency multi-constellation

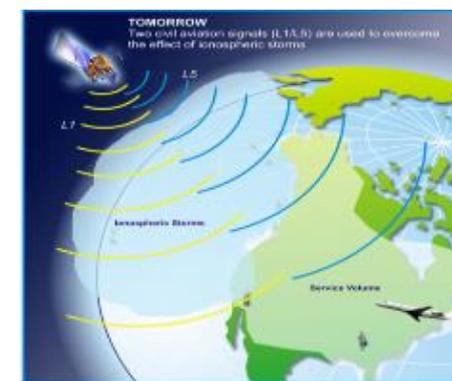
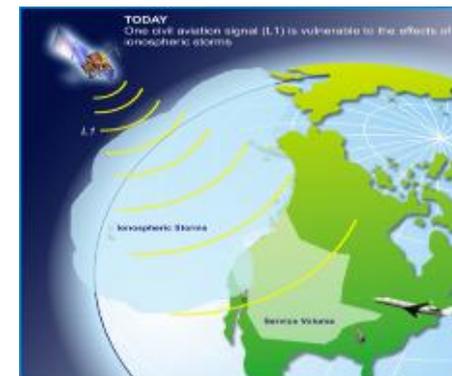




# WAAS Operations Status / Modernization



- **Phase IV Segment 1 (2014-2019)**
  - **Combination of infrastructure improvements and tech refresh in support of operational system and future incorporation of dual frequency**
  - **Focus of the Segment is on the replacement of obsolete system hardware components in addition to integration of two replacement GEO satellites**
  - **Segment 1 is planned for deployment over the course of five releases, with approximately one release per year**
  - **Each release modification is developed by the WAAS prime contractor (DFO) and delivered to NASE who then conducts a final system test before deploying the release into the operational WAAS**





# National Space Council

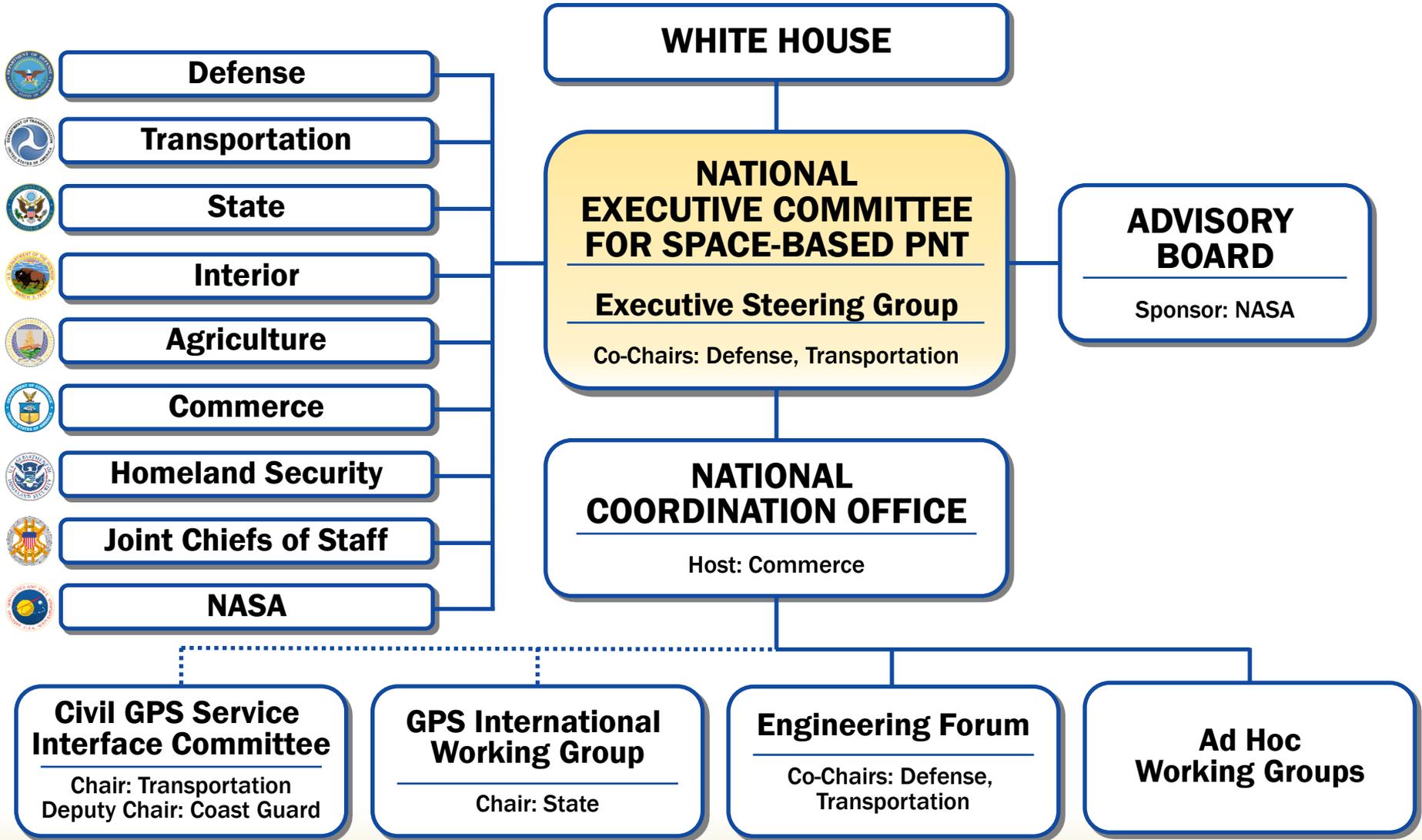


- On June 30, 2017, President signed an executive order which revived the National Space Council (NSpC)
  - Advise and assist on National Space Policy and Strategy
  - Chaired by Vice President
  - October 5, 2017, first NSPC Meeting
- February 21, 2018, second NSpC meeting
  - Testimony from:
    - Civil Space
    - Commercial Space
    - National Security space Industry





# National Space-Based PNT Organization





# EXCOM Strategic Focus Areas



- **GPS Sustainment and Modernization**
- **International Cooperation**
- **Spectrum Management**
- **Critical Infrastructure**
- **PNT Resilience**
- **Outreach**



# The Airwaves Are Not Safe



- **Computers and the Internet: Once Upon a Time...**
  - **A GPS receiver is more computer than radio...**
- **GPS relies on spectrum – no longer a safe haven**
- **GPS receivers lack cyber resilience**
- **Policy directs PNT resiliency (NSPD-39, PPD-4, PPD-21)**
- **Jan 6, 2017 - DHS released Best Practices document now available on GPS.gov:**

***"Improving the Operation and Development of Global Positioning System (GPS) Equipment Used by Critical Infrastructure"***

***Protect GPS and Critical Infrastructure that Relies on GPS***



GPS: The Global Positioning System

www.gps.gov

- How accurate is GPS?
- How vulnerable is GPS to malicious jamming?

[VIEW MORE](#)

### Featured Content

What is GPS?

How GPS Works

Truckers: Don't Use Consumer GPS Devices!

GPS Jamming is Illegal

### Radionavigation-Satellite Service

- Jan 6: Best Practices for Improving the Operation and Development of GPS Equipment Used by Critical Infrastructure

[VIEW MORE](#)

### Guidance for Critical Infrastructures

- Best Practices for Improving the Operation and Development of GPS Equipment Used by Critical Infrastructure (PDF)
- Best Practices for Improved Robustness of Time and Frequency Sources in Fixed Locations (PDF)
- Best Practices for Leap Second Event Occurring on 31 December 2016 (us-cert.gov)

### User Content

- Service Outages & Status Reports
- Civil GPS Performance Data
- UPDATED** Interface Specifications
- Other Technical Documentation
- Public Presentations
- Congressional Legislation & Funding



# Thank You



The screenshot shows the GPS.gov website interface. At the top, there is a navigation bar with links for Home, What's New, Systems, Applications, Governance, Multimedia, and Support. Below the navigation bar, the main heading reads "GPS: The Global Positioning System" with the subtitle "A global public service brought to you by the U.S. government". The page is divided into two main sections: "INFORMATION FOR THE GENERAL PUBLIC" and "FOR GPS PROFESSIONALS". The "GENERAL PUBLIC" section features an article titled "How to Correct Your Address in GPS Devices, Apps, & Online Maps" with a map image and a "Report your issue to the map providers" button. The "PROFESSIONALS" section includes a "What's HOT for Pros" list with items like "Technical documentation", "Recent presentations", and "Funding & legislation".

www.GPS.gov provides detailed information on legislation pertinent to GPS, such as:

- Program Funding, specifically information on Defense and Transportation appropriations, as well as Defense Authorization (NDAA). The website has archival information going back to Fiscal Year 2009.
- You may also find information on legislation related to Geolocation Privacy, and previous Enacted Laws.
- Subscribe to the GPS Bulletin

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