



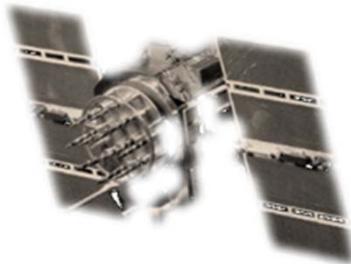
SPACE-BASED POSITIONING  
NAVIGATION & TIMING  
NATIONAL COORDINATION OFFICE

# GPS and Space Weather

**Anthony J. Russo**  
Director, National Coordination Office

**Space Weather Enterprise Forum**

**June 4th, 2012**





# U.S. Policy History

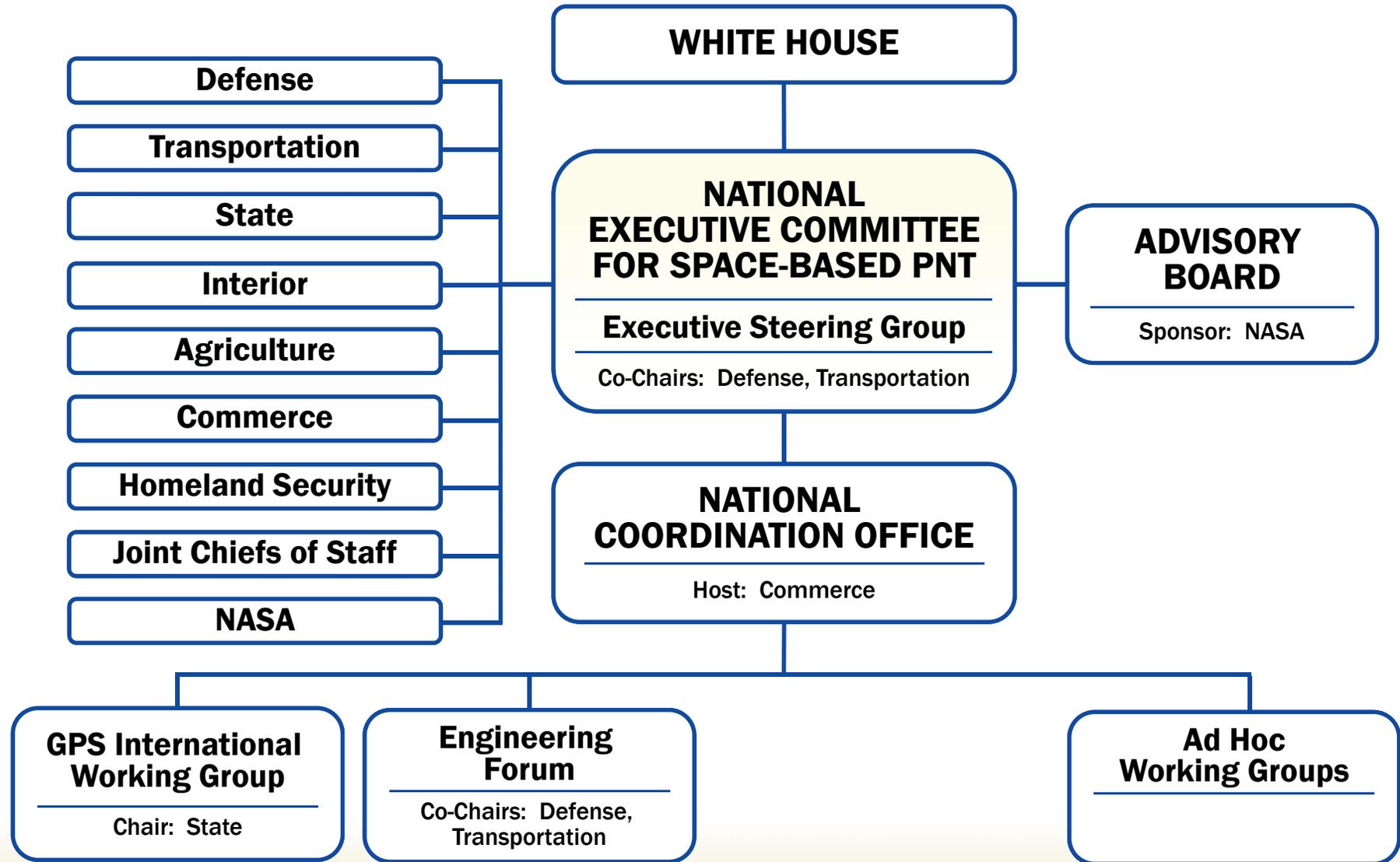


- **1983:** President announces civilian access to GPS following KAL 007
- **1991:** U.S. offers free civil GPS service to the International Community
- **1996:** First U.S. GPS Policy establishes joint civil/military management
- **1997:** U.S. law provides civil GPS access free of direct user fees
- **2000:** President ends use of *Selective Availability*
- **2004:** President issues U.S. Policy on Space-Based PNT
- **2004:** Agreement signed on GPS-Galileo Cooperation
- **2007:** President announces *Selective Availability* eliminated from future GPS III satellites
- **2010:** New National Space Policy provides high-level PNT guidance





# U.S. Space-Based PNT Organizational Structure





# U.S. Space-Based PNT Policy



**GOAL: Ensure the U.S. maintains space-based PNT services, augmentation, back-up, and service denial capabilities that...**

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## **ASSURE SERVICE**

**Provide uninterrupted availability of PNT services**

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## **MEET DEMANDS**

Meet growing national, homeland, economic security, and civil requirements, and scientific and commercial demands

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## **LEAD MILITARILY**

Remain the pre-eminent military space-based PNT service

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## **STAY COMPETITIVE**

Continue to provide civil services that exceed or are competitive with foreign civil space-based PNT services and augmentation systems

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## **INTEGRATE GLOBALLY**

Remain essential components of internationally accepted PNT services

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## **LEAD TECHNICALLY**

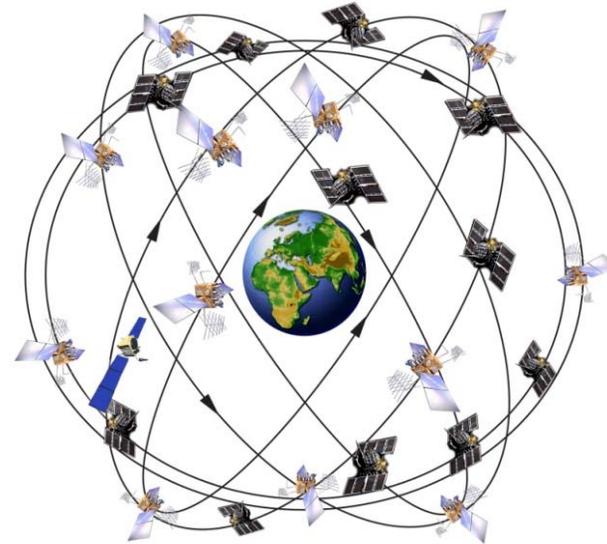
Promote U.S. technological leadership in applications involving space-based PNT services



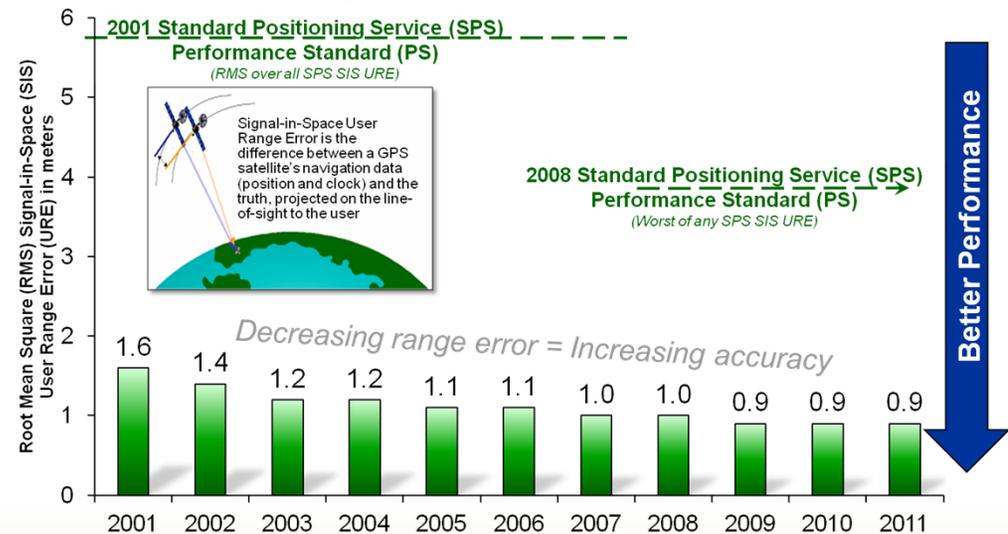
# GPS Constellation



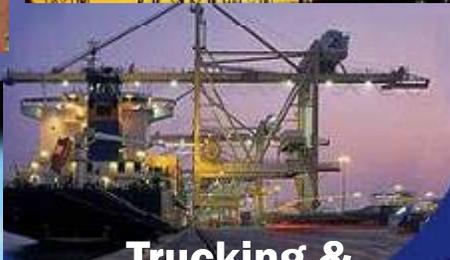
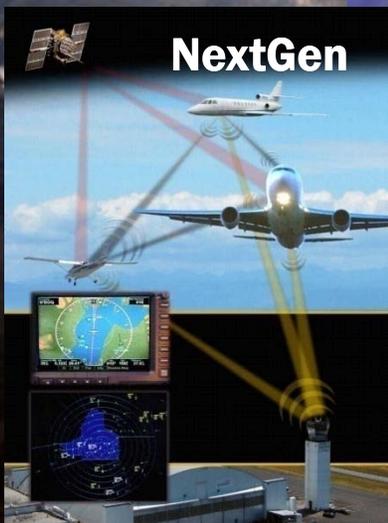
- **Very robust constellation**
  - **31 space vehicles (SVs) currently in operation**
    - 10 GPS IIA
    - 12 GPS IIR
    - 7 GPS IIR-M
    - 2 GPS IIF
  - **3 additional satellites in residual status**



## Civil Signal in Space Performance

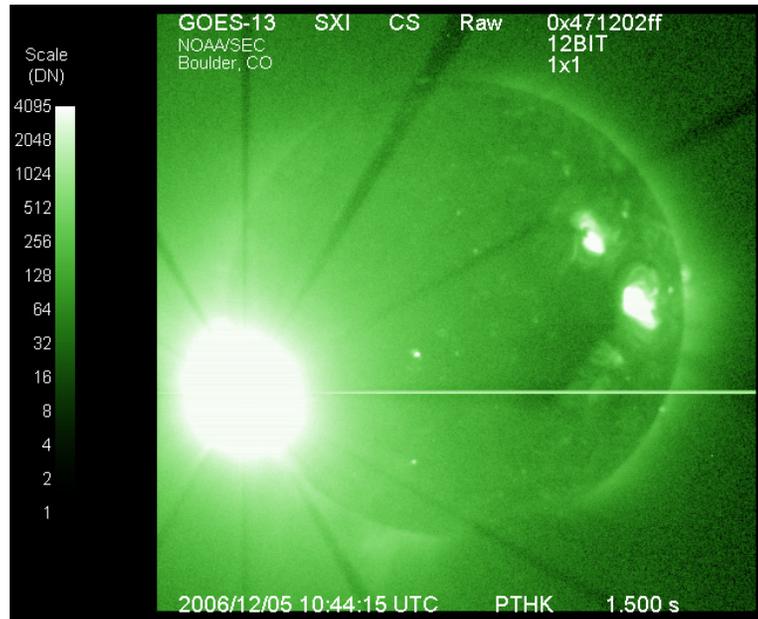


# GPS is Essential to Our Economy and National Critical Infrastructures





# Space Weather Impacts to GPS



Source: NOAA

- Propagation delays = increased range errors
- Increased signal noise = degraded performance, loss of track
- Rapid signal phase changes = loss of track



## Summary



- **GPS is an essential part of critical infrastructures**
- **GPS has a robust constellation that has continuously exceeded performance commitments**
- **New services and better performance coming on line—will evolve from one civil signal to four**
- **Space weather can impact GPS applications**
- **GPS can help contribute to our understanding of space weather**



# For Additional Information...



Global Positioning System - Windows Internet Explorer  
http://www.gps.gov/spanish.html

English | Español | Français | 普通话 | عربي

## SISTEMA DE POSICIONAMIENTO GLOBAL

*Al Servicio del Mundo*

**E**l Sistema de Posicionamiento Global (SPG) es un sistema de radionavegación de los Estados Unidos de América, basado en el espacio, que proporciona servicios fiables de posicionamiento, navegación, y cronometría gratuita e ininterrumpidamente a usuarios civiles en todo el mundo. A todo el que cuente con un receptor del SPG, el sistema le proporcionará su localización y la hora exacta en cualesquiera condiciones atmosféricas, de día o de noche, en cualquier lugar del mundo y sin límite al número de usuarios simultáneos.

El SPG se compone de tres elementos: los satélites en órbita alrededor de la Tierra, las estaciones terrestres de seguimiento y control, y los receptores del SPG propiedad de los usuarios. Desde el espacio, los satélites del SPG transmiten señales que reciben e identifican los receptores del SPG; ellos, a su vez, proporcionan por separado sus coordenadas tridimensionales de latitud, longitud y altitud, así como la hora local precisa.

Hoy están al alcance de todos en el mercado los pequeños receptores del SPG portátiles. Con esos receptores, el usuario puede determinar con exactitud su ubicación y desplazarse fácilmente al lugar a donde desea trasladarse, ya sea andando, conduciendo, volando o navegando. El SPG es

**INFORMACIÓN SOBRE EL SISTEMA**

- El Sistema de Posicionamiento Global
- Ampliaciones al SPG

**APLICACIONES**

- Cronometría
- Carreteras y Autopistas
- Espacio
- Aviación
- Agricultura
- Navegación Marítima
- Vías Férreas

[GPS.gov](http://GPS.gov)

National Executive Committee for Space-Based Positioning, Navigation, and Timing - Windows Internet Explorer  
http://mendiculus.nos.noaa.gov/

## SPACE-BASED POSITIONING NAVIGATION & TIMING

NATIONAL EXECUTIVE COMMITTEE

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The National Executive Committee for Space-Based Positioning, Navigation, and Timing (PNT) is a U.S. Government organization established by **Presidential directive** to advise and coordinate federal departments and agencies on matters concerning the Global Positioning System (GPS) and related systems.

Get GPS status info and other user support at the **Navigation Center**

Learn more about the uses of space-based PNT at [www.GPS.gov](http://www.GPS.gov)

The National Executive Committee is chaired jointly by the Deputy Secretaries of Defense and Transportation. Its membership includes equivalent-level officials from the Departments of State, the Interior, Agriculture, Commerce, and Homeland Security, as well as the Joint Chiefs of Staff and NASA. Components of the Executive Office of the President participate as observers to the National Executive Committee, and the FCC Chairman participates as a liaison.

**What's New at PNT.gov**

- Presentations from APFG meetings
- Presentation from GPS Partnership Council
- Request for Public Comments on Semi-Codetless GPS
- Presentations from ENC-GNSS 2008
- Presentations from CGSIC Toulouse

More Releases...

An Advisory Board provides independent advice to the National Executive Committee through its sponsor agency, NASA.

Several working groups support the National Executive Committee through staff-level, interagency

[PNT.gov](http://PNT.gov)



# Contact Information



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