U.S. GNSS International Activities Update

Civil GPS Service Interface Committee Meeting
Austin, Texas

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Overview

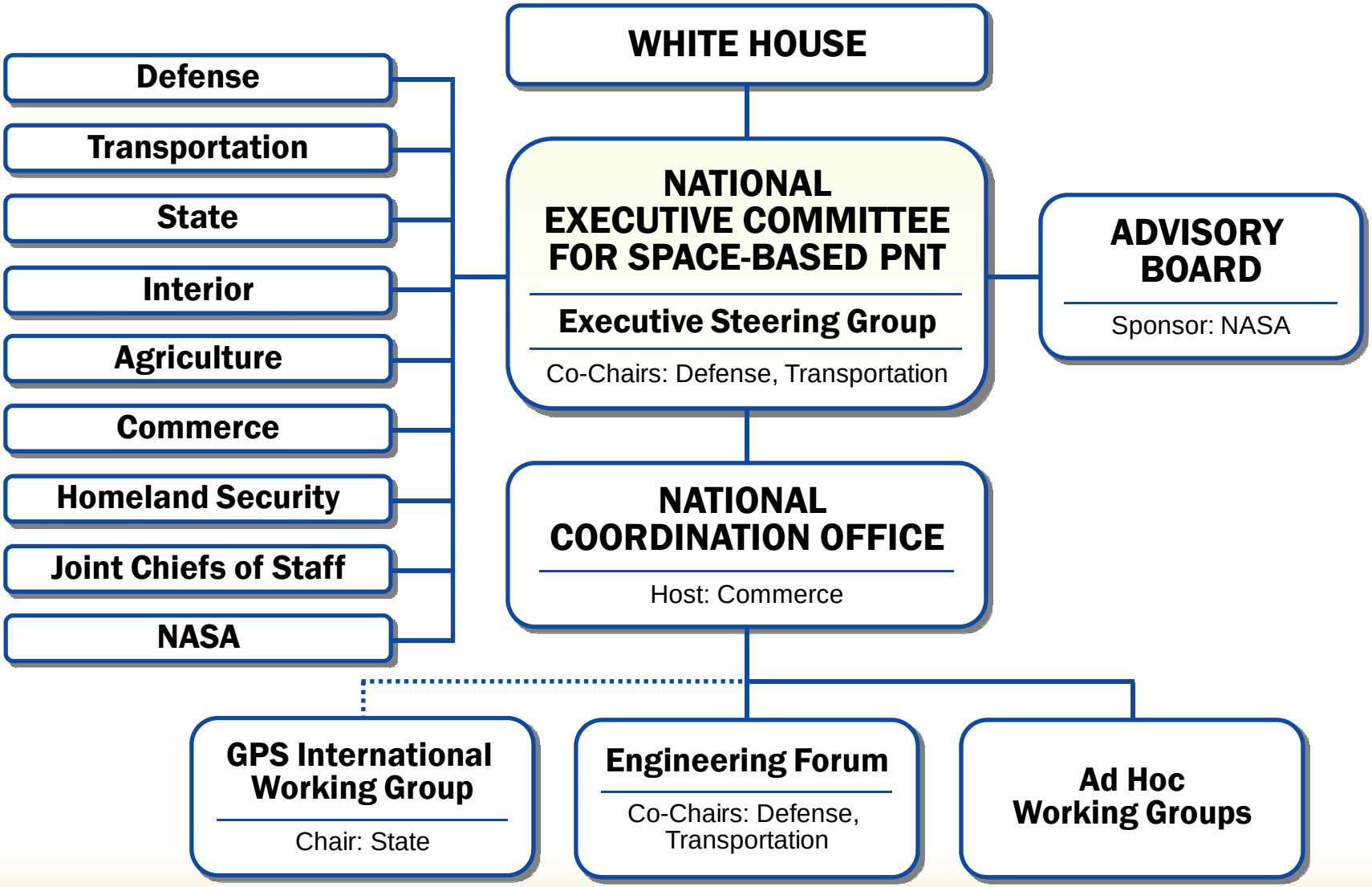
- **U.S. Space-Based PNT Policy**
- International Cooperation Activities
- Summary

U.S. National Space Policy

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

- Provide civil GPS services, free of direct user charges
  - Available on a continuous, worldwide basis
  - Maintain constellation consistent with published performance standards and interface specifications
  - Foreign PNT services may be used to complement services from GPS
- Encourage global ***compatibility*** and ***interoperability*** with GPS
- Promote transparency in civil service provision
- Enable market access to industry
- Support international activities to detect and mitigate harmful interference

U.S. Space-Based PNT Organization Structure



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Planned GNSS

- Global Constellations
  - **GPS (24+)**
  - GLONASS (30)
  - Galileo (27+3)
  - Compass (27+3 IGSO + 5 GEO)

- Regional Constellations
  - QZSS (4+3)
  - IRNSS (7)
- Satellite-Based Augmentations
  - **WAAS (3)**
  - MSAS (2)
  - EGNOS (3)
  - GAGAN (2)
  - SDCM (3)

U.S. Objectives in Working with Other GNSS Service Providers

- Ensure **compatibility** — ability of U.S. and non-U.S. space-based PNT services to be used separately or together without interfering with each individual service or signal
  - Radio frequency compatibility
  - Spectral separation between M-code and other signals
- Achieve **interoperability** – ability of civil U.S. and non-U.S. space-based PNT services to be used together to provide the user better capabilities than would be achieved by relying solely on one service or signal
- Promote fair competition in the global marketplace

Pursue through Bilateral and Multilateral Cooperation

China

- U.S. and China concluded ITU operator-to-operator coordination on GPS-COMPASS signal compatibility in September 2010
- Successful bilateral GNSS workshop organized by U.S. and Chinese engineering academies, May 2011 in Shanghai
- Bilateral meeting focused on aviation satellite navigation issues took place following the China Satellite Navigation Conference in May 2011
- On going discussions with China Satellite Navigation Office on the margins of multilateral international meetings

Europe

- GPS-Galileo Agreement signed in 2004, ratified by EU in December 2011
  - Four working groups established under the Agreement
- Working group on trade met in October 2011 to discuss commercial issues
- ITU coordination meetings held in September and December 2011
  - Focused on GPS III, WAAS, EGNOS
- Plenary meeting scheduled for June 2012 in Washington, D.C.

India

- Joint statement on GNSS cooperation signed 2007
- Third U.S.-India Joint Working Group on Civil Space Cooperation held July 2011
- Parties agreed to resume work on interoperability between GPS and India's GPS Aided Geo Augmented Navigation (GAGAN) system and Indian Regional Navigational Satellite System (IRNSS)

Japan

- Joint statement signed in 1998
- Cooperation focuses on compatibility and interoperability between GPS and Japan's Quasi-Zenith Satellite System (QZSS)
- Bilateral agreements for QZSS monitoring stations in Hawaii and Guam
- Annual plenary meeting held January 2012
  - Both sides reaffirmed close cooperation on GNSS issues, no major outstanding problems or issues
  - GPS-QZSS Technical Working Group completed, released its report

Russia

- GPS-GLONASS discussions ongoing since 1996
- Joint Statement issued December 2004
- Working Group 1 met in June 2011 to discuss Russian augmentation system (SDCM), assignment of PRN codes, and GLONASS CDMA signal plans
- Working Group 2 met October 2011 to discuss joint search and rescue capabilities
- Joint statements signed in September 2011 and June 2012 reaffirming intent to continue cooperation

International Committee on GNSS (ICG)

- Emerged from 3rd UN Conference on the Exploration and Peaceful Uses of Outer Space July 1999
  - Promote the use of GNSS and its integration into infrastructures, particularly in developing countries
  - Encourage compatibility and interoperability among global and regional systems
- Members include:
  - **GNSS Providers** (**U.S.**, EU, Russia, China, India, Japan)
  - Other Member States of the United Nations
  - International organizations/associations

http://www.icgsecretariat.org

ICG Providers Forum

- Six space segment providers listed previously are members
- Purpose:
  - Focused discussions on **compatibility and interoperability**, encouraging development of complimentary systems
  - Exchange detailed information on systems & service provision plans
  - Exchange views on ICG work plan and activities
- Providers have agreed that all GNSS signals and services must be compatible and open signals and services should also be interoperable to the maximum extent possible
  - Working definition of **compatibility** includes respect for spectral separation between each system's authorized service signals and other systems' signals
  - **Interoperability** definition addresses signal, geodetic reference frame realization, and system time steerage considerations

ICG-6 Outcomes

- 6th ICG meeting held in Tokyo, Sept 2011
- The development of **Multi-GNSS monitoring** networks was a major topic of discussion
  - The Committee endorsed the IGS Multi-GNSS Experiment
  - A Subgroup of the Working Group A has been formed to collectively investigate international GNSS monitoring and assessment
- The Compatibility sub-group of Working A will initiate discussions and **collaboration on Open Service GNSS performance parameters**, including definitions and calculation methods
- Templates describing the **geodetic and timing references for all systems** have been completed
- **Interference Detection and Mitigation (IDM) Workshop** endorsed – Workshop held 7-8 June 2012

ICG-7 will be hosted by China in November 2012

ICG Working Group on Compatibility and Interoperability (WG-A)

- Co-Chaired by the United States and the Russian Federation
- Work plan focused on assisting Providers in the pursuit of complementary systems
  - ***Compatibility and Interoperability*** - consider the perspective of various user applications and equipment manufacturers
  - ***Open Service Information Sharing*** - pursue **Principle of Transparency:** every GNSS provider should publish documentation that describes the signal and system information, the policies of provision and the minimum levels of performance offered for its open services
  - ***Service Performance Monitoring*** - potential cooperation in the development of the necessary ground infrastructure to monitor signal and service performance for open services
  - ***Spectrum Protection - Interference Detection, and Mitigation*** - develop a strategy for supporting mechanisms to detect and mitigate sources of electromagnetic interference

LightSquared (LSQ) proposed 4G Broadband Network

- U.S. Federal Communications Commission (FCC) awarded LSQ a "Conditional Waiver Order" of the Ancillary Terrestrial Component (ATC) "integrated service" rule on January 26, 2011
  - Testing by multiple government agencies and GPS receiver manufacturers conclusively showed that the LSQ's signal interfered directly with GPS receiver operation
- Feb 14, 2012 National Telecommunications and Information Administration (NTIA) Letter to FCC : "We conclude at this time that there are no mitigation strategies that both solve the interference issues and provide LightSquared with an adequate commercial network deployment."
- Feb 15, 2012 FCC Public Notice seeking comment on actions proposed by the FCC International Bureau:
  - Vacatur of the Conditional Waiver Order
  - Modification of LightSquared's satellite license to suspend indefinitely LightSquared's underlying ATC authorization, first granted in 2004, to an extent consistent with the NTIA Letter
  - Public Comment and Reply Comment period closed on March 30, 2012

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Summary

- U.S. policy encourages **worldwide use of civil GPS and augmentations**
- **International cooperation** at all levels is a priority
- **Compatibility, interoperability**, and **transparency** in open service provision are critical

http://www.gps.gov/

THANK YOU!

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