U.S. Space-Based Positioning, Navigation and Timing (PNT) Policy and International Cooperation

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on the Applications of Global
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General Topics

- U.S. Space-Based Positioning, Navigation and Timing (PNT) Policy and Organization
- Keys to GPS Success
- U.S. Bi-lateral Satellite Navigation Cooperation
- U.S. Multi-lateral and Regional Satellite Navigation Cooperation

U.S. Space-Based PNT Policy History

- 1978: First GPS satellite launched
- 1983: U.S. President offers free civilian access to GPS
- 1996: U.S. policy establishes joint civil/military GPS management
- 1997: U.S. Congress passes law that civil GPS shall be provided free of direct user fees
- 2000: U.S. President set Selective Availability to "Zero"
- 2004: U.S. President issues U.S. Policy on Space-Based PNT
- 2007: U.S. President announces Selective Availability will no longer be built into modernized GPS III satellites

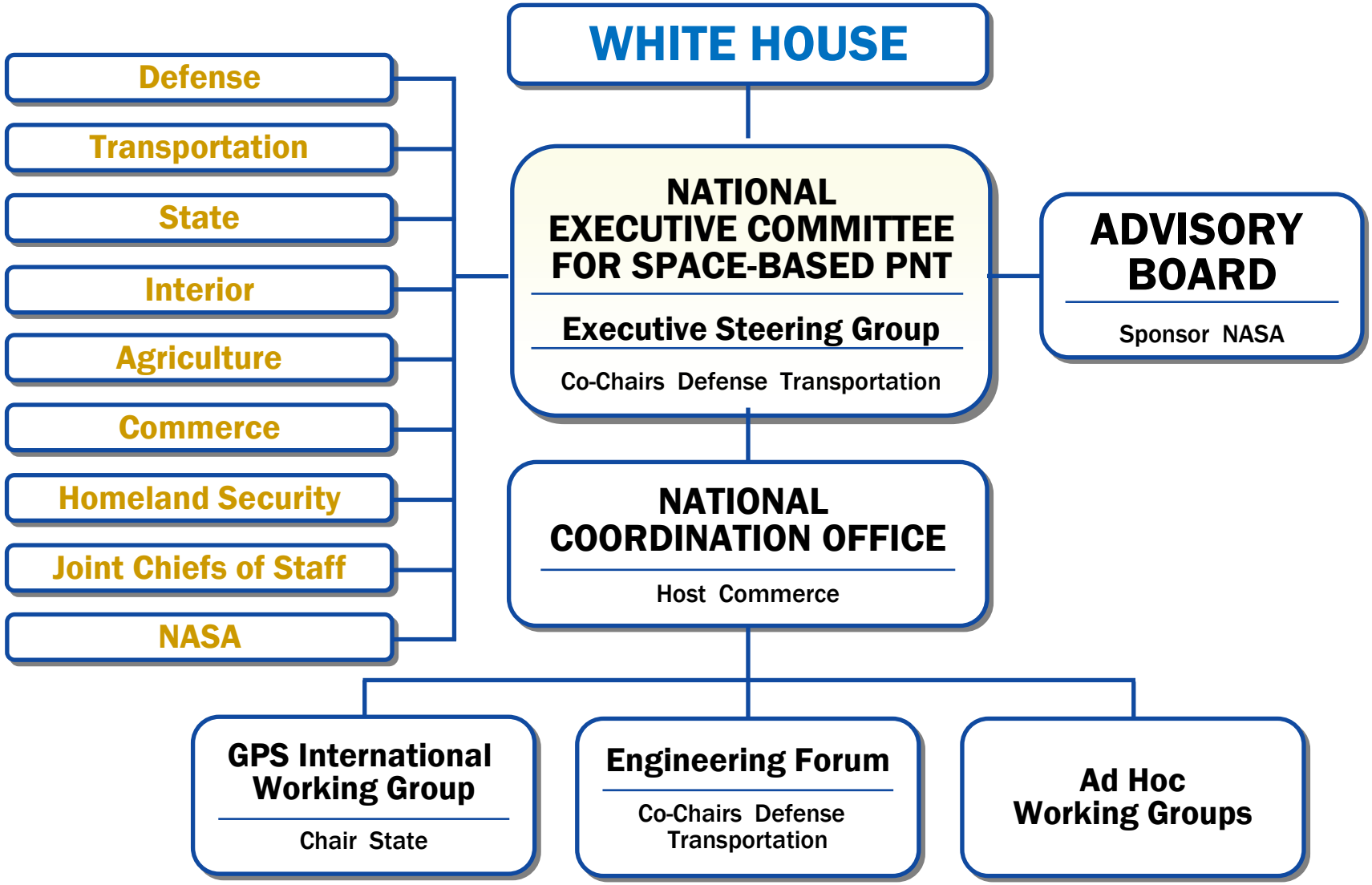
U.S. Space-Based PNT Policy

- Provide GPS and augmentations free of direct user fees on a continuous, worldwide basis
- Provide open, free access to information needed to develop equipment
- Continue to improve performance of GPS and augmentations
- Encourage international development of PNT systems based on GPS
- Seek to ensure international systems are interoperable with civil GPS and augmentations
- Address mutual security concerns with international providers to prevent hostile use

U.S. Space-Based PNT Policy: Organization

- Recognizes the changing international scene
  - Other nations are implementing space-based systems that provide PNT services
- National Executive Committee for Space-Based PNT
  - Chaired by Deputy Secretaries of Defense and Transportation
  - Membership includes: State, Interior, Agriculture, Commerce, Homeland Security, Joint Chiefs of Staff and NASA
- Established National Coordination Office (NCO) with staff from each member agency

U.S. National Space-Based PNT Organization Structure



Keys to the Global Success of GPS

- Program Stability and Performance
- Policy Stability and Transparency
- Private Sector Entrepreneurship and Investment

U.S. Policy Promotes Global Use of GPS/GNSS Technology

- No direct user fees for civil GPS services
  - Provided on a continuous, worldwide basis
- Open, public signal structures for all civil services
  - Promotes equal access for user equipment manufacturing, applications development, and value-added services
- Encourages open, market-driven competition
- Service improvements for civil, commercial, and scientific users worldwide
- Global compatibility and interoperability with GPS

Private Sector Competition

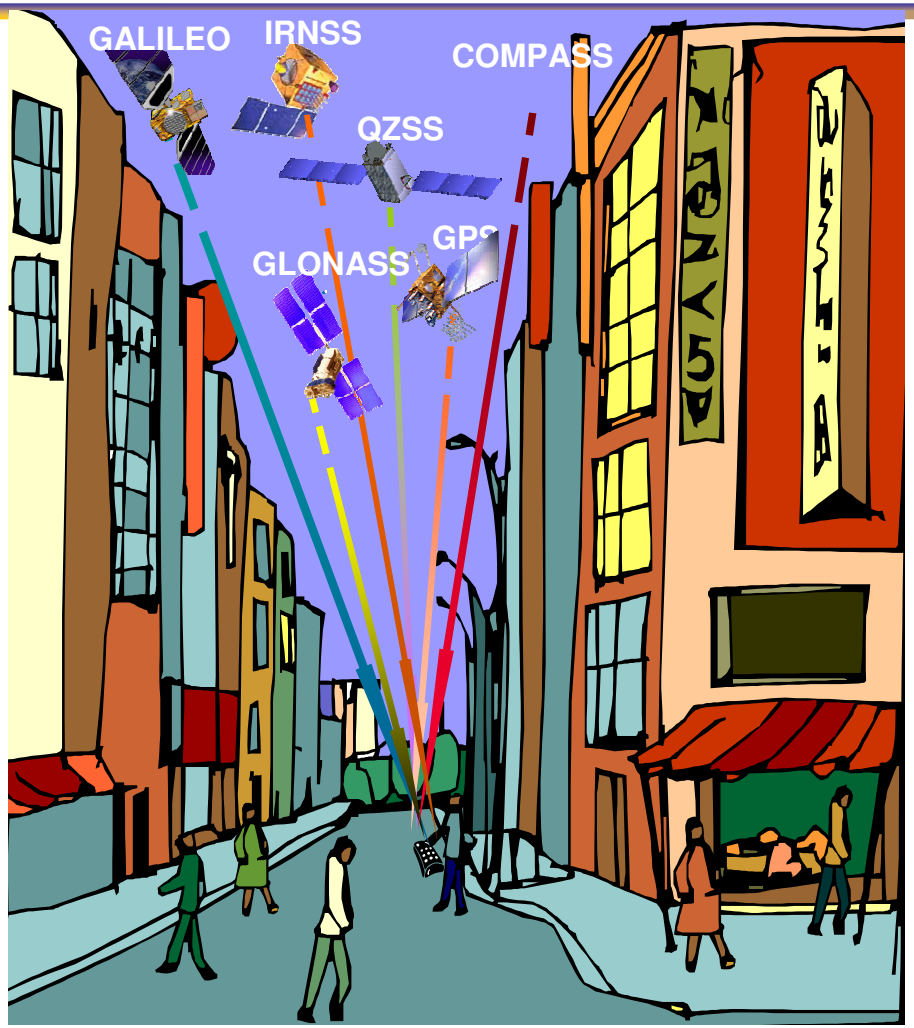
- Encourage fair competition in the private sector in GNSS receiver and application markets
  - Leads to greater innovation, lower costs
- Fair competition means no preferential treatment for any particular company (s)
  - Equal (if not open) access to information and markets
- Freedom of choice desired for end users
  - Standards and other governmental measures should not effectively mandate use of one GNSS over another
- U.S. consultations with other GNSS providers consider non-discriminatory approaches to trade in civil applications markets

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
  - Primary focus on the common L1C and L5 signals
- Ensure a level playing field in the global marketplace

Pursue through Bi-lateral and Multi-lateral Cooperation

The Goal of RNSS Civil Interoperability



- Ideal interoperability allows navigation with one signal each from four or more systems with no additional receiver cost or complexity

Interoperable = Better Together than Separate

U.S. Bilateral Cooperation

- U.S.-Japan Joint Statement on GPS Cooperation in 1998
  - Japan is a global leader in applications and commercial GNSS markets
  - Japan's Quasi Zenith Satellite System (QZSS) designed to be fully compatible and highly interoperable with GPS
  - U.S. working with Japan to set up QZSS monitoring stations in Hawaii and Guam in exchange for data access
- U.S.-Russia Joint Statement issued in December 2004
  - Negotiations for a U.S.-Russia Agreement on satellite navigation cooperation underway since late 2005
  - Working Groups on compatibility/interoperability, search and rescue
- U.S.- India Joint Statement on GNSS Cooperation in 2007
  - Important topic is ionospheric distortion/solutions to this phenomena
  - Technical Meetings focused on GPS-India Regional Navigation Satellite System (IRNSS) compatibility and interoperability held in January and July 2008

U.S. - Europe Cooperation

- 2004 U.S.-EU agreement provides foundation for cooperation
- Four working groups were set up under the agreement:
  - Technical, trade, future system, and security issues
- Improved new civil signal (MBOC) adopted in July 2007
- First Plenary Meeting successfully held in October 2008

Oct. 22, 2008 , EU-U.S. Plenary delegations meeting under the auspices of the GPS-Galileo Cooperation Agreement

Signing ceremony for GPS-Galileo Cooperation Joint Statement, Oct. 23, 2008
(Michel Bosco, European Commission;
Kenneth Hodgkins, U.S. Department of State)

International Committee on Global Navigation Satellite Systems (ICG)

- ICG-3 held in December 2008 in Pasadena, California
- Began implementation of the ICG Work Plan within established working groups:
  - A. Interoperability and compatibility
  - B. Enhancement of performance of GNSS services
  - C. Information dissemination and capacity building
  - D. Interaction with international organizations, national, and regional authorities e.g. Geodetic Reference Frames including EUPOS, EUREF, APRSAF, AFREF, SIRGAS,
- Providers Forum: includes U.S., Russia, EU, China, India, Japan
  - Updated definitions of interoperability and compatibility
- Russia will host the 4th ICG and Providers Forum in St. Petersburg in September 2009

Summary

- **International cooperation** in the context of U.S. Space-Based PNT Policy principles is a **top priority** for the U.S. Government
- Keys to GPS success include program stability and performance; policy stability and transparency; and private sector initiative and investment
- The U.S. is actively engaged in bi-lateral, multi-lateral and regional cooperation on satellite navigation issues
- Compatibility and civil interoperability are the keys to "success for all"