U.S. GPS Policy and U.S. International Cooperation Activities

Civil GPS Service Interface Committee
U.S. States and Local Government Subcommittee
Groton, Connecticut
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Maureen Walker
U.S. Department of State
National Space Based PNT Coordination Office
Overview

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

WHITE HOUSE

NATIONAL EXECUTIVE COMMITTEE FOR SPACE-BASED PNT

Executive Steering Group
Co-Chairs: Defense, Transportation

NATIONAL COORDINATION OFFICE
Host: Commerce

ADVISORY BOARD
Sponsor: NASA

Defence
Transportation
State
Interior
Agriculture
Commerce
Homeland Security
Joint Chiefs of Staff
NASA

GPS International Working Group
Chair: State

Engineering Forum
Co-Chairs: Defense, Transportation

Ad Hoc Working Groups
U.S. Policy Promotes Global Use of GPS 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

• Global compatibility and interoperability with GPS

• Service improvements for civil, commercial, and scientific users worldwide

• Protection of radionavigation spectrum from disruption and interference
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

**Pursue through Bilateral and Multi-lateral Cooperation**
### GPS Modernization Program

#### Blocks Overview

<table>
<thead>
<tr>
<th>Block</th>
<th>Year</th>
<th>Satellites</th>
<th>Capabilities</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>1978-1985</td>
<td>11 (10)</td>
<td>Demonstration system</td>
</tr>
<tr>
<td>EII</td>
<td>1989-1997</td>
<td>28</td>
<td>Basic GPS Provides Initial Navigation Capabilities</td>
</tr>
<tr>
<td>IIR</td>
<td>1997-2004</td>
<td>13 (12)</td>
<td>IIA/IIR Capabilities “Plus”</td>
</tr>
<tr>
<td>IIR-M</td>
<td>2005-2009</td>
<td>8</td>
<td>IIR -M Capabilities “Plus”</td>
</tr>
<tr>
<td>IIF</td>
<td>2010-2014</td>
<td>12</td>
<td>IIF Capabilities “Plus”</td>
</tr>
<tr>
<td>III</td>
<td>2014-2024</td>
<td>32</td>
<td></td>
</tr>
</tbody>
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#### Key Features

- **Block I**
  - L1 (CA) Navigation signal
  - L1 & L2 (P Code) Navigation signal
  - 5 Year Design Life

- **Block II/IIA**
  - Standard Service
  - Single Frequency (L1)
  - C/A code navigation
  - Precise Service
  - Two frequencies (L1 & L2)
  - P (Y) -Code navigation
  - 7.5 Year Design Life

- **Block IIR**
  - 2nd Civil Signal L2 (L2C)
  - Earth Coverage M-Code on L1/L2
  - L5 Demo
  - Anti-Jam Flex Power
  - 7.5 Year Design Life

- **Block IIR-M**
  - 3rd Civil Signal L5
  - Reprogrammable Nav Processor
  - Increased Accuracy requirement
  - 12 Year Design Life

- **Block IIF**
  - 4th Civil Signal (L1C)
  - Real-time Communications

- **Block III**
  - Increased accuracy
  - Increased Earth Coverage power
  - 15 Year Design Life
  - 4th Civil Signal (L1C)
  - Real-time Communications

### Increasing Space System Capabilities – Increasing Military/Civil User Benefits

- 1978-1985: 11 (10) Satellites
- 1989-1997: 28 Satellites
- 1997-2004: 13 (12) Satellites
- 2005-2009: 8 Satellites
- 2010-2014: 12 Satellites
- 2014-2024: 32 Satellites
Overview

• U.S. Space-Based PNT Policy
• International Cooperation Activities
Planned GNSS

• Global Constellations
  – **GPS (24+)**
  – GLONASS (30)
  – Galileo (27+3)
  – Compass (30 global and 5 regional satellites)
  – GINS - Global Indian Navigation System (24)

• Satellite-Based Augmentations
  – **WAAS (2+1)**
  – MSAS (2)
  – EGNOS (3)
  – GAGAN (2)
  – SDCM (2)

• Regional Constellations
  – QZSS (3)
  – IRNSS (7)
Bilateral Cooperation

- **U.S.-EU** GPS-Galileo Cooperation Agreement signed in June 2004
  - Four working groups set up under the Agreement
- **U.S.-Japan** Joint Statement on GPS Cooperation 1998
  - Quasi Zenith Satellite System (QZSS) designed to be fully compatible and highly interoperable with GPS
  - Bilateral agreements to set up QZSS monitoring stations in Hawaii and Guam
- **U.S.-Russia** Joint Statement issued December 2004
  - Working Groups: compatibility/interoperability, search/rescue
Bilateral Cooperation (continued)

- **U.S.-China** operator-to-operator coordination under ITU auspices is complete

- **U.S.-India** Joint Statement on GNSS Cooperation 2007
  - Technical Meetings focused on GPS-India Regional Navigation Satellite System (IRNSS) compatibility and interoperability held in 2008 and 2009
  - Continuation of ITU compatibility coordination is pending

- **U.S.-Australia** Joint Delegation Statement on Cooperation in the Civil Use of GPS in 2007
  - GNSS and applications to be included in expanded space cooperation, as discussed in an October 27 Joint Announcement
International Committee on Global Navigation Satellite Systems (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
  – Met annually since 2006

• Members include:
  – **GNSS Providers** — China, EU, India, *Japan*, Russia, **United States**
  – Other interested Member States of the United Nations
  – International organizations/associations
APEC GNSS Implementation Team (GIT)

- Established in 2002

- Promote implementation of regional GNSS augmentation systems to enhance inter-modal transportation and recommend actions to be considered in the Asia Pacific Region

- Reports to Transportation Working Group (TPT-WG) through the Inter-modal Experts Group (IEG)

- Adopted a GNSS Strategy designed to promote adoption of GNSS technologies throughout the Asia Pacific region, especially with regard to transportation
Summary

• GPS performance is better than ever and will continue to improve
  – Augmentations enable even higher performance
  – New civil GPS signal available now
  – Many additional upgrades scheduled

• U.S. policy encourages worldwide use of civil GPS and augmentations

• International cooperation is a priority
  – Compatibility and interoperability very important
Contact Information

Maureen Walker
State Department Representative to the National PNT Coordination Office
www.pnt.gov
(202) 482-5809