GPS Program Update

ICG-12

Kyoto, Japan

3 December 2017

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 (2nd Civil Signal)
  - L5 (Aviation Safety of Life)
  - L1C (International)

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

International Cooperation
- 57 Authorized Allied Users
- 25+ Years of Cooperation

GNSS
- Europe - Galileo
- China - Beidou
- Russia - GLONASS
- Japan - QZSS
- India - NAVIC

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

35 Satellites / 31 Set Healthy
Baseline Constellation: 24 Satellites

Department of Transportation
- Federal Aviation Administration

Department of Homeland Security
- U.S. Coast Guard

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
- 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

<table>
<thead>
<tr>
<th>Satellite Block</th>
<th>Quantity</th>
<th>Average Age</th>
<th>Oldest</th>
</tr>
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<tbody>
<tr>
<td>GPS IIR</td>
<td>12</td>
<td>15.9</td>
<td>20.3</td>
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<tr>
<td>GPS IIR-M</td>
<td>7</td>
<td>10.3</td>
<td>12.2</td>
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<tr>
<td>GPS IIF</td>
<td>12</td>
<td>3.8</td>
<td>7.5</td>
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<tr>
<td>Constellation</td>
<td>31</td>
<td>10.0</td>
<td>20.3</td>
</tr>
</tbody>
</table>

As of 22 Nov 17
GPS SIGNAL IN SPACE (SIS) PERFORMANCE (CM)

ROLLING YEAR | BEST WEEK | BEST DAY | WORST DAY
--------------|-----------|----------|-----------
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*
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

- Testimony from:
  - Civil Space
  - Commercial Space
  - National Security space Industry
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
Bilateral Cooperation

- **Japan** – GNSS Technical Working Group (TWG) and Plenary-level meetings held in May 2017 in Washington, D.C.
  - Discussed GPS and QZSS Compatibility and Interoperability

- **China** - Most recent civil GNSS Plenary meeting held June 2015 in Washington, D.C.
  - Sub-group on Compatibility and Interoperability met in June and September 2017 – resulting in Joint Statement on L1-B1 Signal Compatibility and Interoperability, signed November 29 in Beijing

- **India** - U.S.-India Civil Space Joint Working Group (CSJWG) met October 2017 in Washington - Agenda included GNSS discussions

- **Europe** – 4 working groups under GPS-Galileo Cooperation Agreement signed in 2004
  - Working Group on Next Generation GPS/Galileo Civil Services meets twice per year – most recent meeting September 2017 in Los Angeles
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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