



# ***U.S. GPS/GNSS International Activities Update***

**Civil GPS Service Interface Committee Meeting**

Miami, Florida

*Office of Space and Advanced Technology*

*U.S. Department of State*

***September 25, 2018***



# *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 augment and strengthen the resiliency of 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



# GNSS: A *Global Navigation Satellite System of Systems*

- Global Constellations

- **GPS (24+3)**
- GLONASS (24+)
- GALILEO (24+3)
- BDS/BEIDOU (27+3 IGSO + 5 GEO)



- Regional Constellations

- QZSS (4+3)
- IRNSS/NAVIC (7)

- Satellite-Based Augmentations

- **WAAS (3)**
- MSAS (2)
- EGNOS (3)
- GAGAN (3)
- SDCM (3)
- BDSBAS (3)
- KASS (2)



## ***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***



# *Bilateral Cooperation*

## Europe

- GPS-Galileo Cooperation Agreement signed in 2004
- Working Group on Next Generation GPS/Galileo Civil Services meets twice per year – Next meeting scheduled for November 2018
- EU request to waive FCC Part 25 rules discussed by Working Group on Trade & Civil Applications
- On-going PRS access negotiations

## Japan

- Comprehensive Dialogue held in Tokyo, July 2018
- Civil Space Dialogue held in Washington, May 2017
- Technical Working Group (TWG) discusses GPS and QZSS compatibility and interoperability
  - ITU coordination is ongoing – Most recent meeting in June 2018



# *Bilateral Cooperation (continued)*

## China

- GNSS Plenary meeting held May 2018 in Harbin, China
- 3 Working Groups established – meet as needed
  - Public Joint Statement on Cooperation signed in November 2017 (available at [GPS.gov](http://GPS.gov)) – result of working level discussions on compatibility and interoperability

## India

- U.S.–India Joint statement signed in 2007
- U.S.-India Civil Space Joint Working Group (CSJWG) met October 2017 in Washington
  - Agenda included GNSS discussions



# *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
- Members include:
  - **GNSS Providers:** (U.S., EU, Russia, China, India, Japan)
  - Other Member States of the United Nations
  - International organizations/associations



<http://www.unoosa.org/oosa/en/ourwork/icg/icg.html>



# *ICG Meetings*

## **Past ICG Meetings**

- ICG-1: UN Vienna, Austria – November 2006
- ICG-2: Bangalore, India – September 2007
- [ICG-3: Pasadena, CA, USA – December 2008](#)
- ICG-4: St Petersburg, Russia – September 2009
- ICG-5: Turin, Italy – October 2010
- ICG-6: Tokyo, Japan – September 2011
- ICG-7: Beijing, China – November 2012
- ICG-8: Dubai, UAE – November 2013
- ICG-9: Prague, Czech Republic – November 2014
- [ICG-10: Boulder, CO, USA – November 2015](#)
- ICG-11: Sochi, Russia – November 2016
- ICG-12: Japan – December 2017

## **Future Meetings**

- **ICG-13: China – 2018**
- ICG-14: India – 2019
- ICG-15: UN Vienna, Austria - 2020





# 12<sup>th</sup> Meeting of the International Committee on GNSS (ICG-12)



- More than 200 participants
  - Representatives from 20 countries/organizations
  - Representation from 5 GNSS Providers
- Agenda included:
  - Meeting of the Providers' Forum
  - System Provider Updates
  - Applications and Experts Session
  - Meeting of all four Working Groups





# ***GNSS Interference and Spectrum Protection***

## Core Area of Focus of the ICG

- Primarily discussed within the Working Group on Systems, Signals and Services (WG-S)
- Subgroup on Compatibility and Spectrum Protection established in 2010
- Task Force on Interference Detection and Mitigation (IDM) established in 2013
- IDM Workshops have been held since 2012 – organized by the ICG
  - 7th IDM Workshop took place May 2018 as part of Baska GNSS Conference in Croatia
- Spectrum Protection Educational Seminars organized by ICG Experts – Focused on the importance of protecting GNSS spectrum
  - 3<sup>rd</sup> Seminar held March 2018 in Argentina



# *Recommendations Related to Interference and Spectrum Protection*

<b>Recent Recommendations Adopted by the ICG</b>	
2014	ICG Members to join efforts in ITU-R and WRC-2015 for GNSS spectrum protection from IMT
2014	Evaluate existing and emerging IDM capabilities and consider developing, testing and implementing these or similar capabilities
2014/2017	Crowdsourcing capabilities analysis for IDM
2015/2016/ 2017	UN regional workshops on GNSS spectrum protection and IDM
2015/2016	Campaign of Protection of RNSS operations – GNSS providers and GNSS user community member states promote spectrum protection
2015/2016	UN COPUOS multi-year agenda item focused on National Efforts to protect RNSS Spectrum, and develop IDM capability
2017	Encourage national regulators to use the protection criteria in relevant ITU-R Recommendations



# *Interoperability and the ICG*

## Timing Workshop held in June 2018 – Focus on GNSS time offsets

- ICG is considering several technical proposals and discussing ways to test multi-GNSS time interoperability
- ICG is looking at ways to improve GNSS time synchronization with UTC

## Performance Standard Template

- Workshop held in May 2018 hosted by Galileo Reference Center in Noordwijk, Netherlands
- “Guidelines” document being developed as a template for all providers to consider when developing their performance standard

## International GNSS Monitoring and Assessment (IGMA)

- IGMA Workshop held in May 2018 in Noordwijk, Netherlands
- Discussions focused on the multi-GNSS monitoring trial project established in 2016 between the ICG and IGS



# *Recommendations Related to Interoperability*

<b>Recent Recommendations Adopted by the ICG</b>	
2011/2012	Open Service GNSS performance parameters, including Definitions and Calculation Methods
2012/2013	Interoperability Workshops with industry
2014/2015	National service monitoring center websites to connect to ICG internet portal
2014/2016	Performance Monitoring Workshop
2015	Joint trial project with IGS to demonstrate a global GNSS Monitoring and Assessment capability
2016	Protection from Provider Signal Patents Workshop to discuss system time and offsets
2016/2017	Workshop to discuss system time and offsets
2017	Develop guidelines on how to select and prioritize GNSS satellite laser tracking



# *Other Important ICG Activities*

## Space Service Volume

- Completion of booklet on space service volume by GNSS Providers – published in early 2018
- Continued outreach effort on benefits of an interoperable space service volume

## Orbital Debris and Orbital De-confliction

- Discussion and exchange of information on debris mitigation plans by GNSS providers

## Geodetic References

- Discussion about interoperability of geodetic reference for GNSS

## Precise Point Positioning (PPP)

- Working Group meeting scheduled for October 2018 to discuss multi-GNSS PPP in more detail



Xi'an, China  
November 4<sup>th</sup> - 9<sup>th</sup>, 2018

# Thirteenth Meeting of the International Committee On Global Navigation Satellite Systems

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## *Other International Activities/Events*

The U.S. participated in the following GNSS Related events in 2018:

- IGNSS Conference in Sydney, Australia – February 2018
- Munich Satellite Summit – March 2018
- United Nations/Argentina Workshop on the Applications of GNSS – March 2018
- Baska GNSS Conference in Baska, Croatia – May 2018
- China Satellite Navigation Conference in Harbin, China – May 2018
- International Committee on GNSS (ICG) Providers' Forum Meeting and ICG WG-S and WG-B Meetings, Vienna, Austria – June 2018





# *Summary*

- U.S. policy encourages the worldwide use of civil GPS services and cooperation with other GNSS providers
  - **Compatibility, interoperability, and transparency in civil service provision** are priorities
  - Pursued through bilateral and multilateral dialogues
- The ICG, with strong U.S. participation, continues to pursue a **Global Navigation Satellite System-of-Systems** to provide civil GNSS services that benefit users worldwide
  - Priorities for the U.S. at ICG-13 will include continued focus on Civil Service Protection, Definition, and Information Dissemination

