



"Overcoming Obstacles in Creating a Harmonious Multi-GNSS World"



**Space-Based Positioning Navigation and Timing
National Advisory Board Meeting**

***David A. Turner – Deputy Director
Office of Space and Advanced Technology
U.S. Department of State***

October 31, 2015



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U.S. GNSS International Cooperation and State Department Views on Challenges and Opportunities



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Overview

➤ **National Policy**

- Bilateral and Multilateral Cooperation
- Challenges and Opportunities



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***



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 (non-interference)
 - 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



Overview

- National Policy
- **Bilateral and Multilateral Cooperation**
- Challenges and Opportunities



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 (7)

- Satellite-Based Augmentations

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





Bilateral GNSS Cooperation

- *Europe:* GPS-Galileo Cooperation Agreement signed 2004
 - ITU coordination agreement between GPS and Galileo: 2014
 - Current issues include pseudolite interference, spectrum
- *China:* Most recent civil GNSS bilateral held in June 2015
 - Sub-groups under a civil GNSS cooperation working group will address: compatibility and interoperability; augmentations and aviation applications; and civil service provision
- *Japan:* Regular plenary and technical WG meetings
 - U.S. hosts QZSS monitoring stations in Hawaii and Guam
- *India:* Discussion on emerging IRNSS and spectrum use
 - ITU compatibility coordination completed
- *Russia:* No current bilateral GNSS related discussions
 - Engagement in multilateral fora such as ICG continues



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





ICG Provider Forum

- Members include the U.S., EU, Russia, China, India, and Japan
 - Focused discussions on **compatibility and interoperability**, encouraging development of complimentary systems
 - Exchange detailed information on systems and service provision plans
- Consensus reached on Principles of **compatibility, interoperability and transparency** in civil service provision
 - Compatibility definition includes spectral separation between each system's authorized service signals (e.g. U.S. M-code) and other systems' signals
- Providers are leading efforts to promote GNSS *radio-frequency interference detection and mitigation*

Providers participate in, and are supported by, the ICG Working Group on Compatibility and Interoperability



ICG-10 - November 1-6, 2015

- Meeting Venue: University Corporation for Atmospheric Research (UCAR)
 - Consortium of more than 100 member colleges and universities focused on atmospheric research and Earth system sciences
 - UCAR manages the National Center for Atmospheric Research (NCAR) on behalf of the National Science Foundation
- 267 registered attendees as of October 27



You are here



Will you be here Monday?



Overview

- National Policy
- Bilateral and Multilateral Cooperation
- **Challenges and Opportunities**



U.S. Federal Communications Commission (FCC) Part 25 Rule

- FCC Part 25 rules require licensing of non-Federal* receive-only Earth stations (receivers) operating with Non-U.S. Licensed Space Stations (satellites) [[47 CFR § 25,131\(j\)\(1\), 25.137](#)]
- These rules were established in 1997, when the FCC's regulatory policies were amended by a Report and Order to allow non-U.S. licensed satellites to provide service in the United States [[IB Docket No. 96-11, 12 FCC Rcd 24094 \(1997\) \(DISCO II Order\)](#)]
- By letter of March 2, 2011, to the FCC, the National Telecommunications and Information Administration (NTIA), on behalf of the Executive Branch, outlined the criteria it will apply in considering whether to recommend waiver of the FCC rules.

To date the FCC has not approved licensing or waiver of its Part 25 rule to allow use of multi-GNSS receivers in the U.S.

* *The FCC Part 25 rule does not apply to Federal Government Use of Multi-GNSS receivers*



Executive Branch Position on FCC Part 25 Rule

- The process for considering a waiver request from a foreign government will be initiated through a consultation with the U.S. Department of State
- Considerations (criteria):
 1. Grant of a waiver is in the public interest
 2. System complies with United Nations Space Debris Mitigation guidelines
 3. Grant of a waiver is consistent with U.S. international trade and other treaty obligations
 4. Waiver request is limited to receive-only RNSS (which includes positioning) and standard time and frequency satellite services
 5. Operation of the RNSS signals offered by the foreign RNSS system has been found compatible with U.S. government systems operating in the specified RNSS frequency bands
- The FCC will issue a public notice providing an opportunity for comment prior to taking action on a request
- The FCC will review the NTIA request for **compatibility** with non-Federal U.S.-licensed systems



Global RNSS Spectrum Protection

ICG-9 Recommendation 9A.2.1

- ICG members are encouraged to actively participate in the ITU-R and regional WRC-15 preparatory work on new IMT* spectrum allocations to ensure that proposals do not impact existing and future GNSS operations
- The ICG members are recommended, when considering candidate bands for IMT below 3 GHz, to encourage their administrations to ensure the protection of RDSS/RNSS from the unwanted emissions from those candidate bands, including adjacent band interference, spurious interference and harmonic interference, as a result may require the implementation of more stringent limits for IMT unwanted emissions levels in RDSS/RNSS bands
- Members may also consider forming links with other satellite groups already defending satellite spectrum

* "IMT" stands for International Mobile Telecommunications



GNSS Interference Detection & Mitigation

- **ICG-9 Recommendation 9A.3.1** - The ICG recommends that GNSS providers and GNSS user community member states evaluate existing and emerging interference detection, localization, and characterization capabilities and consider developing, testing and implementing these or similar capabilities in their nations or regions of the world
- **ICG-9 Recommendation 9A.3.2** - System providers and user community member states are encouraged to work with industry groups to determine if standards for crowd sourcing interference detection and localization techniques should be developed and cost-effectively implemented by mobile telecom service providers

GNSS Jammers – National Legal Status (As Reported at ICG-9)

Jammers	US	RU	China	EU
manufacture	illegal	illegal	illegal	Nation-by-nation
sell	illegal	illegal	illegal	illegal
export	illegal	illegal	illegal	Nation-by-nation
purchase	Undefined (consumer import illegal)	illegal	illegal	illegal
own	legal	Undefined	Undefined	legal
use	illegal	illegal	illegal	illegal



Draft Recommendation 10A.3 for ICG-10

UN COPUOS Agenda Item on Spectrum Protection and IDM

- UN COPUOS, based on a presentation to the Science & Technology Subcommittee (STSC), should establish a multi-year agenda item focused on National Efforts to protect RNSS Spectrum, and pursue GNSS Interference Detection and Mitigation in member states
- Under this agenda item, member states will be asked to report:
 - National RNSS Spectrum Allocations and consistency with ITU Allocations
 - Regulations regarding Non-licensed emissions limits from RF emitters and non-emitters
 - Planned or existing Laws and Regulations related to the manufacture, sale, export, import, purchase, ownership, and use of GNSS jammers
 - Domestic efforts to detect and mitigate GNSS interference

WG-A should prepare a presentation on its spectrum protection and IDM activities for the February 2016 session of the UN COPUOS STSC



Open Service Information

- From the current work plan of the ICG Working Group on Compatibility and Interoperability:
 - Consistent with the **principle of transparency** in the provision of open services, **each individual Provider will** strive to publish and disseminate all signal and system information necessary to allow manufacturers to design and develop GNSS receivers on a non-discriminatory basis
 - The Working Group will develop a template:
 - To promote common terminology and definitions in individual GNSS Open Service Signal Specifications
 - That each individual GNSS provider may consider using in their publication of signal and system information, the policies of provision, and the minimum levels of performance offered for open services



Status of GNSS ICDs and Open Service Performance Standards

	GPS	GLONASS	BDS	Galileo	IRNSS	QZSS
Interface Control Documents/ Specifications	✓	✓	✓	✓	✓	✓
	IS GPS 200-H, 705D, 800D	ICD 5.1 for L1 & L5	ICD 2.0	ICD 1.2	ICD 1.0	ICD 1.6
Open Service Performance Standards	✓	Draft under review	✓	X	X	X
	SPS PS 4 th edition (L1-only)	Provided to WG-A	OS PS 1.0			
Web Access	GPS.gov		en.beidou.gov.cn/	ec.europa.eu/grrowth/sectors/space/galileo/os-sis-icd/index_en.htm	irnss.isro.gov.in/	qz-vision.jaxa.jp/USE/is-qzss/index_e.html

Each System Provider has identified a POC for the ICG Subgroup on Compatibility and Performance Standards



Progress at ICG in GNSS Civil Service Provision

✓ Providers Forum

✓ Providers Forum System Report

✓ Principles of Compatibility, Interoperability, and Transparency

➤ Template for Performance Standards (and ICDs)

➤ *Postulated Performance Standards for future services*

- Service Assurances or
Commitments

- *Monitoring of service
performance*

- *Interference monitoring*



Summary

- U.S. policy encourages worldwide civil GPS/GNSS use
- International cooperation to ensure **compatibility, interoperability, and transparency** is a priority
- The ICG, with strong U.S. participation, is pursuing a **Global Navigation Satellite System-of-Systems** to provide civil GNSS services that benefit users worldwide
- **Challenges** to realizing the full benefits of multi-GNSS service exist, but so do **opportunities** that align well U.S. goals and objectives



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International Committee on Global Navigation Satellite Systems

U.S. Attends ICG-9 in Prague, November 9-14

Photo: Martin Hlauka (Pescan)

The United States participated in the 9th meeting of the International Committee on GNSS (ICG), which convened in Prague, Czech Republic.

[VIEW JOINT STATEMENT](#)

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To improve global understanding about GPS, we are pleased to offer key portions of this website in multiple languages. Please note that some pages link back to English content.

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