



International Cooperation and the International Committee on GNSS

U.S. Space-based Positioning, Navigation and Timing (PNT) Advisory Board

*Office of Space and Advanced Technology
Bureau of Oceans, and International Environmental & Scientific Affairs
U.S. Department of State*

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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. Bilateral Cooperation

- Activities/accomplishments since the June 2014 PNT Advisory Board Meeting
 - GPS-GALILEO ITU compatibility coordination agreement with the EU completed in July
 - Technical meetings with Japan to discuss GPS/WAAS-QZSS ITU compatibility coordination held in September and November
 - U.S.-EU Working Group on cooperation on the next generation of civil satellite-based navigation and timing systems (WG-C) met in early December



International Committee on Global Navigation Satellite Systems (ICG)

- Emerged from UN COPUOS Action Team Co-Chaired by the U.S. and Italy (2001-2004)
- 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 UN Member States with an interest in implementing or promoting GNSS services and applications
 - Italy, Malaysia, United Arab Emirates
 - International organizations/associations
 - 21 Associate Members and Observers





ICG Mission Statement (2013)

- Promote voluntary cooperation on matters of mutual interest related to civil satellite-based positioning, navigation, timing, and value-added services
- Contribute to the sustainable development of the world
- Encourage coordination among GNSS Providers to ensure greater compatibility, interoperability, and transparency
- Promote the introduction and utilization of GNSS services in developing countries, by assisting with the integration into their infrastructure
- Assist GNSS users with their development plans and applications, by encouraging coordination and serving as a focal point for international information exchange



Meetings of the ICG

Annual Meetings Since 2006

- ICG-1: UN Office for Outer Space Affairs (Vienna - 2006)
- ICG-2: India (Bangalore - 2007)
- ICG-3: U.S. (Pasadena - 2008)
- ICG-4: Russia (St. Petersburg - 2009)
- ICG-5: EU (Turin - 2010)
- ICG-6: Japan (Tokyo - 2011)
- ICG-7: China (Beijing - 2012)
- ICG-8: United Arab Emirates (Dubai - 2013)
- ICG-9: EU/ESA (Prague - 2014)

ICG-10 will be hosted by the U.S., November 2015



ICG Providers Forum

- Established in 2007
- Terms of Reference created in 2008
- Members
 - Current and Future GNSS and Satellite Based Augmentation System (SBAS) Providers
 - China (BEIDOU), India (IRNSS/GAGAN), Japan (QZSS/MSAS), Russia (GLONASS/SDCM), U.S. (GPS/WAAS), EU (GALILEO/EGNOS)
- Purpose
 - Focused discussions on compatibility and interoperability, encouraging development of complimentary systems
 - Exchange detailed information on systems & service provision plans
 - Exchange views on ICG work plan and activities
- Next Meeting: Fourteenth Meeting, June 2015, Vienna, Austria



ICG Working Groups

Four Working Groups established under the 2006 Terms of Reference and Work Plan:

- A. Compatibility and Interoperability (Co-Chairs: U.S. & Russia)
 - Focus on compatibility, interoperability, and transparent open service provision
 - Support Providers efforts to monitor open signal/service performance, pursue RNSS spectrum protection, and interference detection and mitigation capabilities
- B. Enhancement of GNSS Services Performance (Co-Chairs: India & European Space Agency)
 - Focus on system enhancements (multipath, integrity, interference, etc.) to meet future needs
- C. Information Dissemination and Capacity Building (Chair: UN Office for Outer Space Affairs)
 - Focus on training/workshops, promoting scientific applications, space weather
- D. Reference Frames, Timing and Applications (Co-Chairs: IAG, IGS & FIG)
 - Focus on monitoring and reference station networks



Ninth Meeting of the ICG (ICG-9)

- Hosted by the EU in Prague, 9-14 November 2014
- 204 participants representing more than 30 countries/organizations
- Keynote presentation from Dr. Brad Parkinson
 - Focused on Protect, Toughen, Augment (PTA)
 - Recommendation to other Providers that they consider establishing Advisory Boards with international participation
- Total of 13 recommendations approved by the committee members
- New Vision Statement adopted



ICG-9 Important Outcomes

- U.S. presentation on fair “Market Access”
 - Expressed concern about equipage mandates being used to promote adoption of specific GNSS technologies
 - Recommended use of technology-neutral, performance-based standards
 - GNSS providers to discuss further at next ICG Providers’ Forum
- Interference Detection and Mitigation (IDM) Task Force initiated discussion
 - Viewpoints and discussion on GNSS as critical infrastructure
 - Review of GNSS provider laws regarding GNSS Jammers
- Interoperability Task Force and System Providers continue to assess industry feedback received at four interoperability workshops
- Continued discussion on the importance of an interoperable space service volume (SSV)



ICG-9 Recommendations

- Interference Detection and Mitigation (IDM)
 - Nations should evaluate & implement existing/emerging IDM capabilities
 - Work with the telecom industry on standards for crowd sourcing IDM techniques
 - The ICG Secretariat and IDM taskforce to organize UN-sponsored workshops on RNSS spectrum protection and IDM for user community UN member nations
- International Multi-GNSS monitoring (IGMA)
 - Existing civil service centers should establish a link to a new ICG portal for users to find GNSS monitoring information and products
 - IGMA Task Force should conduct a workshop in 2015 focused on the purpose of multi-GNSS open service monitoring, the parameters to be monitored, and an appropriate organizational approach



ICG-9 Recommendations (2)

- ICG Members encouraged to participate in ITU process to ensure that new International Mobile Telecommunications spectrum allocations are compatible with GNSS
- Providers should develop a booklet defining the characteristics of a fully interoperable space service volume
- Providers' Forum should consider supporting the draft resolution on Global Geodetic Reference Frame for Sustainable Development and its submission to the UN General Assembly
- GNSS Providers should consider making available specific satellite data to improve orbit dynamics modeling
 - To include geometry, power, altitude information, etc.



ICG-9 Recommendations (3)

- GNSS Providers' user service centers should develop a process for exchanging information and referring inquiries to each other
- Capacity building and GNSS outreach activities in South East Asia
 - Workshops and technical seminars to be organized in the region
- Providers should disseminate educational material to the UN-affiliated regional centers acting as ICG information centers
- Assess the performance and usability of a Nequick Ionospheric Correction algorithm as a way to enhance the ranging accuracy for single frequency GNSS



ICG-10: 01-06 November 2015

- **U.S. will host in Boulder, Colorado**
- 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
- **Tour sites being considered**
 - National Oceanic and Atmospheric Administration (NOAA) National Space Weather Prediction Center
 - UNAVCO: University-governed consortium, which facilitates geoscience research and education using geodesy



UCAR Center Green Facility