

International Cooperation in Promoting a Global Navigation Satellite System (GNSS) of Systems

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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

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
- 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

Planned GNSS

- 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 Cooperation: GNSS Providers

- European Union: GPS-Galileo Cooperation Agreement signed 2004
 - Plenary and technical working group meetings held regularly
 - 2014 compatibility coordination agreement between GPS and Galileo
- China: Joint Statement on Cooperation signed at first civil GNSS bilateral held May 2014
 - Issues include spectrum protection, civil aviation applications
- Japan: Joint Statement on cooperation signed in 1998
 - Regular plenary and technical WG meetings
 - U.S. hosts QZSS monitoring stations in Hawaii and Guam
- India: U.S.–India Joint statement on cooperation signed in 2007
 - Compatibility coordination completed between GPS and IRNSS
 - U.S.-India Civil Space Joint Working Group meets periodically

Bilateral Cooperation: UK

Joint United Kingdom–United States Statement Regarding Global Positioning System (GPS) Intellectual Property (17 January 2013)

- Common understanding of intellectual property rights related to the Global Positioning System (GPS) and agreed to work together to address broader global navigation satellite systems' intellectual property issues
 - U.S. – UK affirmed their commitment to ensuring that GPS civil signals will remain free and openly available for users worldwide;
 - The UK is dedicating all government held patents and patent applications relating to U.S. GPS civil signal designs to the public domain

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

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-9 Meeting in Prague: 9-14 November 2014

- Interference Detection and Mitigation (IDM)
 - Nations should evaluate & implement existing/emerging IDM capabilities and work with the telecom industry on standards for crowd sourcing IDM techniques
 - The ICG Secretariat and IDM taskforce will organize UN-sponsored workshops on RNSS spectrum protection and IDM for user community member nations
- International Multi-GNSS monitoring (IGMA)
 - Existing civil service centers should establish a link to a new ICG web portal allowing users to easily 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 organizational approach
- Interoperability Task Force and System Providers continue to assess industry feedback received at 4 interoperability workshops
- Providers should develop a booklet defining the characteristics of a fully interoperable space service volume
- Providers will consider further discussion on GNSS "Market Access"
- ICG Vision Statement adopted

U.S. Will Host Tenth Meeting of the ICG (ICG-10)

- Meeting will be held in Boulder, Colorado: 1-6 November 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
- Will Include Site Tours
 - National Oceanic and Atmospheric Administration (NOAA), National Space Weather Prediction Center
 - UNAVCO: University NAVSTAR Consortium, which facilitates geoscience research and education using space geodesy
 - National Institute of Standards and Technology (NIST)

UN Workshops on the Use and Applications of GNSS

- Office for Outer Space Affairs (OOSA), through its Program on GNSS Applications:
 - Organizes regional workshops, training courses and international meetings focusing on capacity-building in the use of GNSS-related technologies;
 - Has developed an in-depth GNSS education curriculum for the training programs at all UN-affiliated Regional Centres for Space Science and Technology Education, also acting as the ICG information centres.
- These activities bring together a large number of experts, including those from developing countries, to discuss and act on issues that are also of high relevance to the ICG
- International Meeting on GNSS, 14 – 18 December 2015, Vienna, Austria

Summary

- U.S. policy encourages the worldwide use of GPS/GNSS
- International cooperation to ensure compatibility, interoperability, and transparency is an important priority
- ICG and the work OOSA is doing through its Program on GNSS Applications are important vehicles for accomplishing these goals multilaterally