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
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
  o U.S. – UK affirmed their commitment to ensuring that GPS civil signals will remain free and openly available for users worldwide;
  o 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