



UNITED NATIONS
Office for Outer Space Affairs



International Committee on
Global Navigation Satellite Systems

International Committee on Global Navigation Satellite Systems and its Programme on the Applications of Global Navigation Satellite Systems

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United Nations Office for Outer Space Affairs

ICG Executive Secretariat

54th Meeting of the Civil GPS Service Interface Committee

Tampa, Florida, 8 – 9 September 2014



International Committee on Global Navigation Satellite Systems (ICG)

- ◆ **2005:** Establishment of ICG (**noted by UNGA 61/111 of 14 December 2006**)
 - ◆ Promote the use of GNSS and its integration into infrastructures, particularly in developing countries
 - ◆ Encourage compatibility and interoperability among global and regional systems
- ◆ **ICG Membership:**
 - ◆ ***Members: 9 nations & the European Union***
 - ◆ Current and future core, regional or augmentation system providers (China (BeiDou), EU (Galileo/EGNOS), Russian Federation (GLONASS/SDCM), USA (GPS/WAAS), India (IRNSS/GAGAN), and Japan (QZSS/MSAS))
 - ◆ State Members of the UN with an active programme in implementing or promoting a wide range of GNSS services and applications (Italy, Malaysia, United Arab Emirates)
 - ◆ ***Associate Members and Observers: 20 organizations***
 - ◆ International and regional organizations and associations dealing with GNSS services and applications (UN system entities, IGOs, NGOs)
 - ◆ CGSIC – a founding member



ICG Annual Meetings

UNOOSA (2006), India (2007), USA (2008), Russia (2009), Italy & EU (2010), Japan (2011), China (2012), United Arab Emirates (2013)

2006: Terms of Reference and Work plan

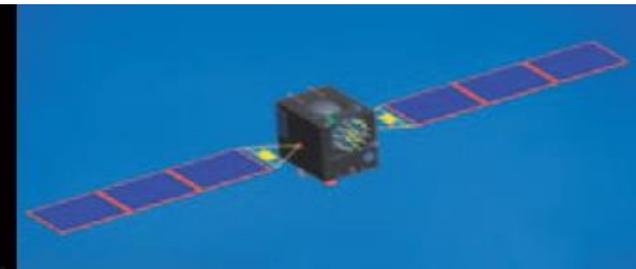
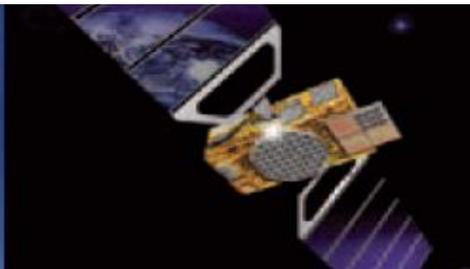
- ◆ **Compatibility and Interoperability (USA and Russian Federation)**
 - ◆ Focused discussion on compatibility and interoperability, encouraging development of complimentary systems
 - ◆ Exchange detailed information on systems and service provision plans and views on the ICG work plan and activities
- ◆ **Enhancement of GNSS Services Performance (India and ESA)**
 - ◆ Focused on system enhancements (multipath, integrity, interference, etc.) to meet future needs
- ◆ **Information Dissemination and Capacity Building (OOSA)**
 - ◆ Focused on training/workshops, promoting scientific applications, space weather
- ◆ **Reference Frames, Timing and Applications (IAG, IGS and FIG)**
 - ◆ Focused on monitoring and reference station networks



Providers' Forum

2007: Establishment

- ◆ **Members:** China (Compass/BeiDou), India (GAGAN/IRNSS), Japan (QZSS/MSAS), Russian Federation (GLONASS), USA (GPS), EU (Galileo/EGNOS)
- ◆ **2008 : Terms of Reference and Work plan**
- ◆ Agreement that all GNSS signals and services must be **compatible** and open signals and services should also be **interoperable** to the maximum extent possible in order to maximize benefit to all GNSS users
- ◆ **Principle of Transparency** – every GNSS provider should publish documentation that describes the signal and system information, the policies of provision and the minimum levels of performance offered for its open services
- ◆ **Twelfth Meeting, 10 June 2014, Vienna, Austria (in conjunction with the 57th session of the United Nations Committee on the Peaceful Uses of Outer Space (UNCOPUOS))**
 - ◆ ***Open Service Information Dissemination, Open Service Performance, Spectrum Protection (IDM)***





Interoperability and Compatibility



The **Providers' Forum** continues to investigate the benefits of carrier frequency commonality and diversity, as well as of compatibility and interoperability, as these latter terms are defined below:

Interoperability refers to the ability of global and regional navigation satellite systems and augmentations and the services they provide to be used together to provide better capabilities at the user level than would be achieved by relying solely on the open signals of one system;

Compatibility refers to the ability of global and regional navigation satellite systems and augmentations to be used separately or together without causing unacceptable interference and/or other harm to an individual system and/or service



Ninth Meeting of the ICG

2014: Ninth Meeting of the ICG, European Union, 10 – 14 November

- ◆ **ICG-9 Local Host: European GNSS Agency (GSA), Prague, Czech Republic**
- ◆ **Agenda:**
 - ◆ **Plenary Sessions: *Providers/Regional System and Service Updates***
 - ◆ **13th Meeting of the Providers' Forum**
 - ◆ **Joint Meeting: *Providers & Members/Associate Members/Observers***
 - ◆ **Expert Seminar: *GNSS Science and Technology applications***
 - ◆ *Road/Intelligent Transport Systems (ITS), Rail, Location-Based Services (LBS), Aviation, Maritime, Emergency Response*
 - ◆ **Working Group Meetings: *Progress on implementing ICG Work Plan within established working groups***
 - ◆ **Exhibits: *Industries***



Agenda



	Sunday 9 November	Monday 10 November	Tuesday 11 November	Wednesday 12 November	Thursday 13 November	Friday 14 November
		Registration 08:00 - 14:00	Registration 08:00 - 14:00	Registration 08:00 - 14:00		
9:00		Opening Ceremony + Welcome/ Opening Remarks Adoption of Agenda	2nd Providers' Forum	Meeting of Members, Associate Members and Observers		
AM sessions					WG meetings (preparation of the recommendations)	
		First Plenary Session	Working Group A	Working Group D	Working Group B	Working Group C
					2nd Plenary Session Presentation by W.G.	Adjourn
Lunch						
PM Sessions		Applications and/or Experts Seminar	Working Group A	Working Group D	Working Group B	Working Group C
					2nd Plenary Session Presentation by W.G.	
	Registration 16:00 - 18:00				3rd Providers' Forum/ Meeting of Members, Associate Members and Observers	
	Meeting with W.G. Chairs					Adjourn
18:00	1st Providers' Forum Meeting	Adjourn	Adjourn	Adjourn		
		Welcome Dinner		CityTour		





ICG Working Groups

Working Group A “Compatibility and Interoperability” Recommendations

- **IMT-GNSS Compatibility (Revision to 7A.2.1):**
 - *To actively participate in the ITU-R and regional WRC-15 preparatory work on new IMT spectrum allocations in order to ensure that proposals do not impact existing and future GNSS operations. Members may also consider forming links with other satellite groups already defending satellite spectrum.*

- **Providers Update to Current and Future System:**
 - *To provide updated information regarding global and regional navigation satellite systems and augmentations in time for the publication of a new edition of the Providers Forum’s Current and Planned Global and Regional Navigation Satellite Systems and Satellite-Based Augmentation Systems before ICG-10. The updated information should include observed or expected open service performance.*



Working Group A “Compatibility and Interoperability” Recommendations (continued)

- **Education & Outreach Regarding Sources of GNSS Interference (Revision to 7A.3.1)**
 - *To develop educational material such as a downloadable pamphlet or other web content on sources of interference to GNSS. The material should include an explanation why radio navigation satellite services (RNSS) are different than radio communications services and more vulnerable to interference, and will emphasize the importance of GNSS services to critical public and private sector functions, infrastructure, and economic activity*
- **GNSS Interference Detection Reporting Procedures**
 - **Initially, the task force will focus on developing a common set of information to be reported to GNSS civil service centers;**
 - **Next, the task force will focus on establishing routine communications among the centers;**
 - **Finally the task force will develop guidelines for common capabilities to be considered in the development of future national IDM networks.**



Working Group A “Compatibility and Interoperability” Recommendations (continued)

- **Update Recommendation on IGMA ICG-7A4.1 for its Further Development:**
 - *Redefine the current IGMA joint sub-group of WG-A, B & D as an ICG Task Force. Their task will be to:*
 - *Determine Service Parameters to Monitor - definition and methodology to be coordinated with WG-A Compatibility sub group study;*
 - *Determine what gaps exist in current and planned monitoring and assessment;*
 - *Consider organizing a workshop on IGMA parameters, services and methodologies*

- **Interoperability Task Force:**
 - *To form a task force to complete efforts to collect and analyze user community and industry views on interoperability:*
 - *The task force will analyze the results of the April 2013 interoperability workshop and adjust the questions for industry accordingly, in preparation for additional workshops to be hosted by each system provider;*
 - *The results of each workshop will be consolidated and analyzed by the Task Force in preparation for the 2014 intersessional meeting of Working Group A and ICG-9*



Working Group B “Enhancement of GNSS Services Performance”

Recommendations

- **Specifying and Characterizing an Interoperable GNSS Space Service Volume:**
 - ◆ *SSV Template Completion;*
 - ◆ *Maturity of Definition;*
 - ◆ *Spaceborne GNSS receivers;*
 - ◆ *Antenna/Electronics Characterization*

- **Harmonization of TTFM Methodology:**
 - ◆ *encourages the service providers and relevant experts to review the proposed TTFM methodology and provide recommendations for its complementation. When consensus on the TTFM definition and the relevant starting conditions has been achieved, the result shall be introduced into the ICG Glossary of Terms*



Working Group C “Information Dissemination and Capacity Building” Recommendations

- **ICG Website Design and Content:**
 - ◆ *Changes to be made to the website content structure along already accepted the website standards of the Office for Outer Space Affairs*
- **Collaborative Portal for Working Groups:**
 - ◆ *To find a solution for collaborative online workspace that will allow to facilitate documents distribution and files sharing. It was highlighted that if such a website was set up, the link will be included in the ICG website*
- **Information Dissemination between GNSS Users and Providers:**
 - ◆ *The Civil Global Positioning Systems Service Interface Committee to be used as a successful example for dissemination of information between GNSS users and providers*



Working Group D “Reference Frames, Timing and Applications” Recommendations

- **Information on the works related to the proposed redefinition of UTC (revision of Recommendation 16 (2012)):**
 - ◆ *ICG monitors the ongoing development of the proposed redefinition of UTC and that reports be presented until a decision is made at WRC-15*
- **Assessment of the alignments of GNSS associated reference frames to the ITRF:**
 - ◆ *Interested groups to determine multiple sets of coordinates for MGEX or/and other stations where multi-GNSS receivers are operated, using individual sets of GNSS broadcast ephemeris, evaluate their consistency and provide feedback to the IGS multi-GNSS experiment*
- **Official provision of a rapid UTC (UTC_r) by the BIPM**
 - ◆ *Providers consider: (a) the use of UTC_r for getting a better synchronization of GNSS times to UTC, (b) improving the quality of the predictions of UTC(k) broadcast by GNSS, and (c) further recommends studying the possibility of using UTC_r as a common time reference for interrelationship between GNSS times*

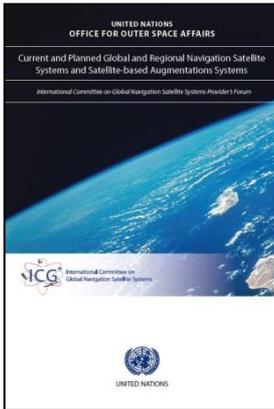


Information Dissemination

The way forward to provide positioning, navigation and timing globally



2007



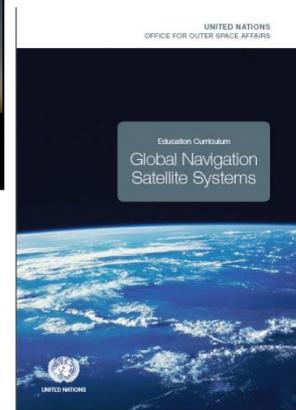
2010

Report on planned or existing global navigation satellite systems and on relevant policies and procedures



2011

Achievements of providers and users of positioning, navigation, and timing services, under the umbrella of the United Nations, in promoting GNSS over the past 10 years



2012

Education Curriculum and Glossary of GNSS Terms (English, French, Spanish, Arabic)



Programme on GNSS Applications

Regional Workshops on the Applications of GNSS:

- ◆ ***Zambia and China (2006), Colombia (2008), Azerbaijan (2009), Moldova (2010), UAE (2011), Latvia (2012), Croatia (2013)***
 - ◆ ***increase awareness among decision and policy makers of the benefits of GNSS and develop regional and national pilot projects on GNSS applications, and strengthen the networking of GNSS related institutions in the regions***
- ◆ **2014: United Nations/International Centre for Theoretical Physics Workshop on the use of GNSS for scientific applications, 1 – 5 December, Trieste, Italy**

<http://www.unoosa.org/oosa/en/SAP/act2014/trieste-gnss/index.html>



Programme on GNSS Applications (continued)

Promoting the use of GNSS technologies as tools for scientific applications, including space weather effects on GNSS:

- ◆ ***Reference Frames and Timing:***
 - ◆ ***The objective and goals: to provide technical knowledge on the operational and practical aspects and issues relating to references frames, more specifically,***
 - ◆ ***facilitate a regional forum for geodetic agencies, improve data sharing (GNSS, levelling, tide gauge, gravity) and dense regional reference frame***
 - ◆ ***FIG Technical Seminar Reference Frame in Practice, June 2014, Malaysia***
- ◆ ***Space Weather Effects on GNSS***
 - ◆ ***Ionospheric modelling is an effective approach for correcting the ionospheric range error and improving the GNSS positioning accuracy***
 - ◆ ***The abundance of GPS measurements from worldwide distributed GPS reference networks, which provide 24-hour uninterrupted operational services to record dual-frequency GPS measurements provides an ideal data source for ionospheric modelling research***
 - ◆ ***ICTP and Boston College: Workshop on GNSS data application to low latitude ionospheric research, July 2014, Rwanda***



Regional Centres for Space Science and Technology Education, affiliated to the United Nations, as Information Centres for ICG

- ◆ ***Africa: Morocco and Nigeria***
- ◆ ***Latin America and the Caribbean: Brazil and Mexico***
- ◆ ***Asia and the Pacific: India***
- ◆ ***Western Asia: Jordan***
- ◆ ***Remote Sensing & GIS, Satellite Meteorology & Global Climate, Satellite Communications, Space & Atmospheric Science and [Global Navigation Satellite Systems \(2013\)](#)***





International Committee on Global Navigation Satellite Systems

- **As new space-based GNSS are emerging globally, interoperability is the key to “success for all”**
- **ICG is a forum to discuss GNSS to benefit people around the world**
- **Mission Statement:** The International Committee on Global Navigation Satellite Systems (ICG), established in 2005 under the umbrella of the United Nations, promotes voluntary cooperation on matters of mutual interest related to civil satellite-based positioning, navigation, timing, and value-added services. The ICG contributes to the sustainable development of the world. Among the core missions of the ICG are to encourage coordination among providers of global navigation satellite systems (GNSS), regional systems, and augmentations in order to ensure greater compatibility, interoperability, and transparency, and to promote the introduction and utilization of these services and their future enhancements, including in developing countries, through assistance, if necessary, with the integration into their infrastructures. The ICG also serves to assist GNSS users with their development plans and applications, by encouraging coordination and serving as a focal point for information exchange.





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