



IOAG Participation in UN International Committee on GNSS (ICG)

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Interagency Operations Advisory Group: IOAG history in brief

- In the 80's ~ 90's, cross-support (using interagency space communications assets) was dealt on bilateral level through Inter Agency Tracking Communications and Operations Panels (ITCOP) ;
- Coordination was already more global through Space Frequency Co-ordination Group (SFCG);
- Inter-Agency Consultative Group (IACG) WG-4 fostered inter-operability and cross support for space science missions amongst ESA, ISAS, NASA and RFSA.
- A plenary ITCOP was conveyed in June 1999, which attended ASI, CNES, DLR, ESA, JAXA (ISAS/NASDA), and NASA.
 - This meeting is known as the first Interagency Operations Plenary (IOP-1) which established the IOAG.
- To date 17 IOAG meetings were held (> 1/year) and 3 Interagency Operations Plenary (IOP) meetings.

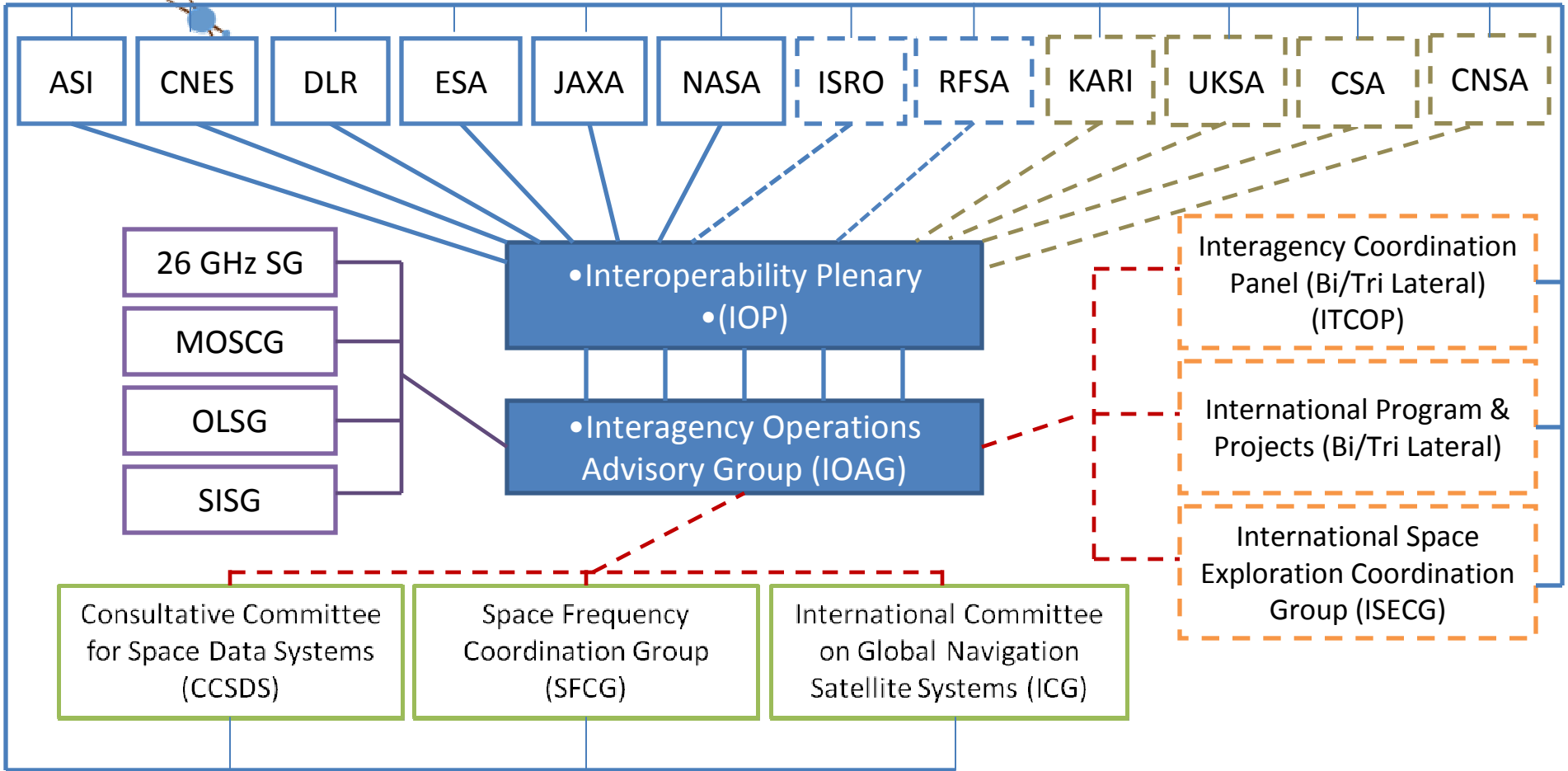


IOAG initial ToR 's

- The IOAG was chartered to be one main international body to oversee the development of collaborative, interoperable space communications and navigation services for the benefit of all members' spaceflight missions.
- Specific instructions from the first charter included:
 - Recommend specific actions needed to facilitate cross-support of one agency's spacecraft by another agency's support facilities;
 - Study interoperability issues in particular with respect to tracking, telecommand, telemetry data acquisition systems, as well as utilization of frequency bands;
 - Maintain an effective liaison to CCSDS and SFCG and make recommendations for standards development.
 - Draw on the technical work already completed by other organizations developing standards or regulations;
 - Make an analysis of the future demand for Ground Tracking and Data Acquisition Facilities and maintain related Mission Model and Tracking Facilities Inventory
 - Evolve Compatible Space Communications Architectures



IOAG Organization Chart



Legend:

- Member
- Observer
- Subcommittee
- Requirements Organizations
- Standards Organizations
- Staffing Function
- Liaison Function



ICG & IOAG Membership and Synergies

ICG

- Members: 9 nations & the European Union, including:
 - Current and future core, regional or augmentation system providers (China (BeiDou), EU (Galileo), ESA (EGNOS), Russian Federation (GLONASS/SDCM), USA* (GPS/WAAS), India (IRNSS/GAGAN), and Japan (QZSS/MSAS))
- Associate Members and Observers: 18 organizations, including:
 - Members of the UN with an active program in implementing or promoting a wide range of GNSS services and applications (Italy, Malaysia, United Arab Emirates).
 - IOAG since ICG-6

IOAG

- Members:
 - Agenzia Spaziale Italiana (ASI),
 - Centre National d'Etudes Spatiales (France),
 - Deutsches Zentrum für Luft- und Raumfahrt (Germany),
 - European Space Agency (Europe),
 - Japan Aerospace Exploration Agency (Japan),
 - National Aeronautics and Space Administration (NASA),
 - Indian Space Research Organization (ISRO),
 - Russian Federal Space Agency (Russia).
- Observers:
 - Canadian Space Agency (CSA),
 - China National Space Administration (CNSA),
 - Korea Aerospace Research Institute (KARI),
 - UK Space Agency (UKSA).



IOAG Progression to ICG Observer Status

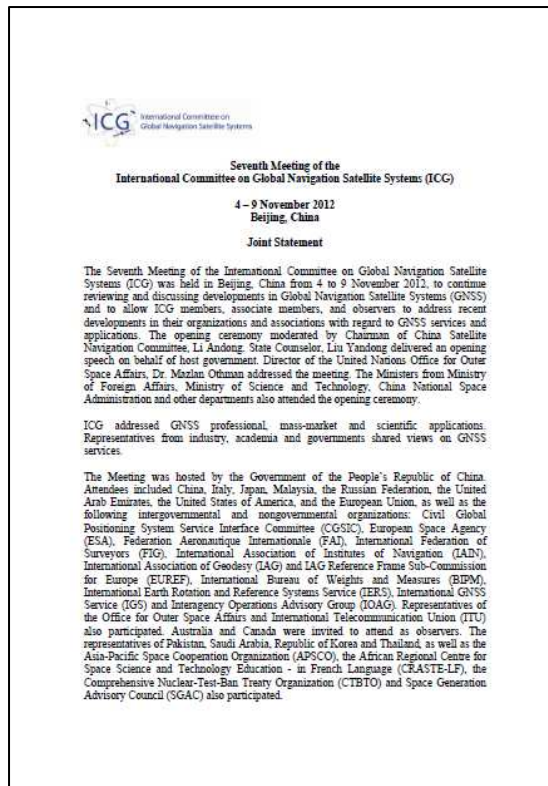
- ICG-4 Meeting in St. Petersburg, Russia, Sep. 2009:
 - Adoption of a new principle on transparency for GNSS open services for continued standardization and interoperability of GNSS constellations.
 - Also, in support of ICG principles and to enhance the strategic space operational environment for all users, NASA introduced the GNSS Space Service Volume (SSV) concept providing positioning, navigation, and timing services to space users up to geosynchronous altitude. Also recommended a guaranteed SSV minimum levels of service for Galileo, GLONASS, and COMPASS for space users to gain optimal coverage from other emerging PNT constellations.
- ICG-5 Meeting in Turin, Italy, Oct. 2010:
 - JJ Miller, on behalf of J-M Soula and B. Adde, introduced the IOAG to the ICG, and recommended establishing a liaison/coordination relationship between the two international organizations.
- ICG-6 Meeting in Tokyo, Japan, Sep. 2011:
 - JJ Miller reaffirms interest of IOAG at ICG Provider’s Forum and requests formal response. The Provider’s Forum and all member affiliates support establishing formal coordination between the two groups, and designates the IOAG as a formal “Observer” organization, with all rights to its own respective delegation and “seat-at-the-table”.
 - ICG Joint Statement included language on Space Applications under the Working Group B report.
- ICG-7 Meeting in Beijing, China, Dec. 2012:
 - J.J. Miller represented the IOAG Delegation as well as NASA on the U.S. Delegation, to build on the synergies identified thus far.
 - ICG Joint Statement included language on the GNSS SSV under Working Group B



ICG-7 Joint Statement

- ICG-7 Meeting Nov. 4-9, 2012, Beijing, China
- Joint Statement included language on the GNSS SSV under Working Group B
- Available from:

http://www.oosa.unvienna.org/pdf/icg/2012/icg-7/icg7-pf_jointstatement.pdf



“... The Working Group B on the enhancement of GNSS service performance followed up its workplan and its recommendations of ICG-6. The group discussed the benefits of an interoperable GNSS Space Service Volume. All WG-B participants believe that a fully interoperable GNSS Space Service Volume will result in significant benefits for future space users as it will allow for performance no single system can provide on its own. WG-B will continue to work towards an interoperable GNSS SSV....”



Benefits of Coordination between IOAG and ICG

- Many of the same principles on standards, compatibility, and interoperability are championed by both IOAG and ICG members, and in fact, participation in these same bodies includes representatives from the very same space agency organizations
- Formal synergies between IOAG and ICG will strengthen programmatic leverage, advocacy, and technical understanding amongst participants and policy makers as both international organizations engage to achieve mutual objectives
- IOAG space agencies are positioned to help GNSS service providers plan for provision of PNT signals to support space users out to GEO altitudes
- Success of many international space missions is dependent on GNSS capabilities and there are benefits to the IOAG observer member status to the ICG.



Interoperability Plenary-3 (IOP-3) ICG Resolutions (26 June 2013, Toulouse, France)

IOP Composition:

Representatives at the level of Directors from 9 space agencies

- The IOP recognizes that the success of many international space missions is dependent on GNSS capabilities and there are benefits to the IOAG observer member status to the ICG.
- The IOP recommends that IOAG member space agencies define and share their space user performance needs for their respective GNSS constellations.
- The IOP encourages IOAG members to strengthen collaboration with other national representatives to international bodies such as ICG to ensure implementation of such capabilities.
- The IOP recommends the IOAG continue the liaison with the ICG. Next step is IOAG participation at ICG-8 in November 2013 in Dubai.



IOAG-ICG Strategic Cooperation

- Mission Statements
 - IOAG: “...a forum for identifying common needs across multiple international agencies for coordinating space communications policy, high-level procedures, technical interfaces, and other matters related to **interoperability**...”
 - ICG: “...an informal body for the purpose of promoting cooperation, as appropriate, on matters of mutual interest related to civil satellite-based positioning, navigation, timing, and value-added services, as well as compatibility and **interoperability** among the GNSS systems...”
- Communications includes tracking of spacecraft for the purpose of orbit determination
- GNSS-based PNT enhances on-board autonomy of spacecraft
- **Interoperability** is the key common denominator between the IOAG and the ICG for ensuring successful PNT applications for space missions.