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Committee on the Peaceful Uses of Outer Space
Scientific and Technical Subcommittee
Fifty-fourth session
Vienna, 30 January-10 February 2017
Item 9 of the provisional agenda
Recent developments in global navigation satellite systems

International Committee on Global Navigation Satellite Systems (ICG)

Call for Participation in ICG Spectrum Protection and Interference Detection and Mitigation Activities

Request for Voluntary Reporting on National Radionavigation Satellite Service Spectrum Protection Practices and Global Navigation Satellite Systems Interference Detection and Mitigation Capabilities

Note by the Secretariat

I. Background

1. The Working Group on Systems, Signals, and Services of the International Committee on Global Navigation Satellite Systems (ICG) has been discussing spectrum protection and interference detection and mitigation (IDM) for over 10 years, and has collected a great deal of information about this subject. However, the discussions and information collected have been limited to ICG participants, especially spectrum experts and industry representatives from system providers. At the fifty-first session of the Scientific and Technical Subcommittee of the Committee on the Peaceful Uses of Outer Space on 10-21 February 2014 (see A/AC.105/1065), the subject of global navigation satellite systems (GNSS) IDM was raised, especially by the Canadian delegation, as a topic of interest, specifically with regard to the prevalence of GNSS jammer devices.

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II. Call for participation in ICG spectrum-related activities

2. The Office for Outer Space Affairs, in its capacity as the Executive Secretariat of ICG and its Providers' Forum, organizes regional workshops, training courses and technical seminars focusing on capacity-building in the use of GNSS-related technologies in various rapidly growing fields of science and industry. Those activities bring together a large number of experts every year, including experts from developing countries, to discuss and act on issues that are also of great relevance to ICG.

3. Pursuant to the ICG workplan and its recommendations, the Office for Outer Space Affairs, in partnership with other international agencies, focuses on: (a) disseminating information through a network of the information centres hosted by the regional centres for space science and technology education, affiliated to the United Nations; (b) promoting the use of GNSS as tools for scientific applications; and (c) building the capacity of developing countries in using GNSS technology for sustainable development. Consistent with (b) and (c), regional workshops on applications of GNSS were held in Zambia and China (2006), Colombia (2008), Azerbaijan (2009), Republic of Moldova (2010), the United Arab Emirates (2011), Latvia (2012), Croatia (2013), the Abdus Salam International Centre for Theoretical Physics (ICTP), Italy (2014), the Russian Federation (2015), and most recently, Nepal (December 2016, see A/AC.105/1136). In conjunction with this last workshop, a seminar was conducted on GNSS spectrum protection and IDM to highlight the importance of GNSS spectrum protection at the national level so that the benefits of GNSS reception are not jeopardized.

4. The seminar, conducted in coordination with the ICG IDM Task Force, and in cooperation with the International Telecommunication Union (ITU), introduced spectrum management for radionavigation satellite services (RNSS),[1] and the mitigation of radio frequency interference, collectively referred to here as spectrum protection. Aspects of RNSS spectrum protection addressed by experts with spectrum experience gained from the development, operation, and use of RNSS included regulatory, technical, operational, and policy. **The ICG formally invites States members of the Committee on the Peaceful Uses of Outer Space to consider identifying technical experts and spectrum managers to participate in future GNSS spectrum protection and IDM events to be held in 2017, such as a planned IDM workshop to be held in conjunction with the Baska GNSS Conference, Baska Croatia, 7-9 May 2017 and spectrum seminars to be announced.**

III. ICG recommendation and implementation

5. At the 10th Meeting of the ICG (ICG-10), held on 2-6 November 2015, Boulder, Colorado, the United States (see A/AC.105/1104), in order to expand the discussion on this topic beyond its members, associate members, and observers, the ICG endorsed a recommendation to prepare a presentation on its spectrum protection and IDM activities for the 53rd session of the Scientific and Technical Subcommittee in 2016. Although this presentation was not made at the Scientific and Technical Subcommittee in 2016, two member states, the Russian Federation and the United States, noted the recommendation in their national statements, and the Subcommittee discussed the feasibility of conducting a focused review of GNSS spectrum protection and IDM under the existing agenda item on "Recent Developments in Global Navigation Satellite Systems".

[1] Radionavigation satellite service (RNSS) is the accepted terminology used in ITU for GNSS.

6. This approach is an alternative to the ICG original goal of establishing a dedicated multi-year agenda item focused specifically on GNSS spectrum protection and IDM. Nevertheless, the desire is for Member States to voluntarily report on:

(a) National RNSS Spectrum Allocations and consistency with ITU allocations;

(b) Regulations regarding Non-licensed emissions limits from radio-frequency (RF) emitters and non-emitters;

(c) Planned or existing Laws and Regulations related to the manufacture, sale, export, import, purchase, ownership, and use of GNSS jammers;

(d) Domestic efforts to detect and mitigate GNSS interference.

IV. Request for voluntary reporting under the agenda item "Recent developments in global navigation satellite systems" of Scientific and Technical Subcommittee of the Committee on the Peaceful Uses of Outer Space

7. At the 59th Session of the Committee on the Peaceful Uses of Outer Space (see A/71/20), the Scientific and Technical Subcommittee report on its fifty-third session noted the proposal that the Subcommittee explore, at its next session in 2017, the feasibility of a focused review, within its current agenda item on recent developments in global navigation satellite systems, of issues related to GNSS spectrum protection and IDM. Subsequently, it has been confirmed that the United States, Russian Federation, Peoples Republic of China, and the European Union intend to make reports at the 54th session of the Scientific and Technical Subcommittee on 30 January-10 February 2017. We believe that these presentations by system providers should be complemented by reports from member states, who widely utilize GNSS services across their economies and public infrastructures**. Specifically, we would like to know if representatives of Spectrum Administration, National Space Agency, and delegates to the ICG can work with delegation at the Scientific and Technical Subcommittee of the Committee on the Peaceful Uses of Outer Space to make a presentation at the 54th session or future Scientific and Technical Subcommittee session under the existing GNSS agenda item that includes information on the four items mentioned above.**

Attachments:

1. ICG Background Paper on GNSS Spectrum Protection
2. Summary of ICG Interference Detection and Mitigation Workshops through 2016.

Attachment 1

ICG Background Paper on GNSS Spectrum Protection

I. Why protect spectrum?

1. The utility and value of GNSS knows almost no bounds; everyday new uses are found, which drives global and national economies. However, access to interference-free radio spectrum (frequencies) is crucial for reliable GNSS performance; therefore care must be taken to ensure GNSS spectrum protection.

2. The satellite signals received by GNSS receivers are very weak compared to typical radio signals used by ground based systems such as television (TV) stations or mobile phone networks and consequently it is essential to keep the frequencies used by ground based systems well separated from those of GNSS. If this is not done, GNSS signals will be swamped by these other radio signals and GNSS reception will not be possible — your GNSS device will not work.

II. How to protect spectrum?

3. Protection requires prudent spectrum management, which has three key aspects, sensible spectrum regulations, vigilant spectrum monitoring and strict spectrum regulation enforcement.

III. Spectrum regulations

4. ITU publishes the international Radio Regulations. This United Nations treaty level text is written to minimize the likelihood that different radio systems will interfere with each other by specifying what radio systems can use, which radio frequencies, where and how. The fundamental concept is to divide radio frequency spectrum into blocks known as “allocations”. Allocations group together similar radio services that have been determined to be compatible with each other, also taking into account how the allocations fit next to each other so that they can be good frequency neighbours. The Radio Regulations are the result of many years of detailed compatibility studies by thousands of engineers from across the globe and they are constantly revised to take account of new radio technologies. National regulators typically use the Radio Regulations as the basis for their own national regulations, adapting to local requirements for terrestrial radio systems where needed. However, when it comes to GNSS spectrum allocations and adjacent frequencies, it is essential not to deviate from the Radio Regulations when setting **national regulations** in order to avoid polluting GNSS spectrum. Applying the Radio Regulations gives GNSS the best opportunity to work effectively.

IV. Spectrum monitoring

5. Applying the Radio Regulations is the best start to protecting GNSS spectrum, but that spectrum should be monitored to ensure that the regulations are being respected. Most spectrum regulators have the capacity to identify and locate rogue radio signals, but finding the low power signals that can disrupt GNSS signal reception presents a unique challenge. In-car GNSS jammers, or so-called “personal privacy devices” (not so private, as their unique individual radio signatures can be tracked!), are illegal devices that transmit low power signals that disrupt GNSS

reception. To detect and locate these low power signals requires special techniques such as geolocation, crowd sourcing of GNSS receivers, or dense detector networks — some of these techniques have been discussed at the ICG's IDM workshops. Other types of interfering radio emissions could include malfunctioning radio equipment, GNSS repeaters, and unauthorized or erroneous radio assignments. To detect any interfering radio emission requires diligent organization and suitably trained and equipped personal to act.

V. Spectrum enforcement

6. Devices such as GNSS jammers should be made illegal and prohibited from manufacture, import, sale and use; it is the role of national market surveillance authorities to ensure such devices are not available on the market and strict measures such as fines or other punishments should be applied where appropriate. When interfering emissions occur in GNSS allocations, they should be found quickly, stopped and prevented from occurring again.

VI. Summary

7. The Radio Regulations are a sound base for any national regulations for frequency use; not just for GNSS, but especially for GNSS. It is far better and easier to put in place effective spectrum management than to deal with the effects of bad management.

8. National regulators should aim to have the required resources needed to keep GNSS spectrum clean so that they can enforce the spectrum regulations, both though spectrum monitoring and market surveillance. Only by ensuring that GNSS spectrum is kept clean and interference-free will allow the maximum benefit to be gained from the many uses of GNSS in your countries.

Attachment 2

Summary of ICG Interference Detection and Mitigation Workshops through 2016

ICG Interference Detection and Mitigation Workshops Progress

The utility and annual meetings of the ICG have recorded consensus by all Providers of GNSS signals that they share the same apprehension for IDM and for open, global use of their GNSS signals. To address this concern, the sixth meeting of the ICG (ICG-6) endorsed a joint United States/Japan proposal to conduct a workshop focused on radio frequency IDM. This workshop brought together representatives from each Provider's Position Navigation and Timing (PNT) government, scientific, and law enforcement communities. The first of these IDM workshops was conducted at the Vienna International Center, the United Nations Office at Vienna (UNOV) in 2012 in Vienna. This first workshop was so successful that subsequent workshops were conducted every year since. Recommendations made to the ICG, to date, include the following:

ICG Workshop on GNSS Spectrum Protection and Interference Detection and Mitigation

Vienna International Centre, Vienna, Austria, 7-8 June 2012

WORKSHOP CONCLUSIONS:

Sources of interference

1. The ICG should develop educational material such as downloadable pamphlets or other web content on sources of interference to GNSS. The material should include an explanation of why RNSS are different than radio communications services and more vulnerable to interference.

RNSS Spectrum Protection

2. The ICG should recommend that its member state participants identify a suitable GNSS monitoring site or operations center to be recognized by the ITU as an official part of its International interference monitoring network.

Current and future information-sharing, dissemination, collaboration and standardization

3. The ICG should compare the existing ITU interference report to the reporting form currently being used by the United States and other forms under development in order to develop a guideline or best practice for GNSS interference reporting.

4. ICG system providers should be reminded to adhere to the existing template for sharing information between service providers and should exchange information related to domestic spectrum management activities applicable to GNSS.

Concepts and Techniques for Interference Detection

5. The ICG should consider initiating a process to develop guidelines for mobile GNSS device manufacturers that are interested in contributing interference detection information to national reporting authorities or automated detection networks.

ICG Workshop on GNSS Spectrum Protection and Interference Detection and Mitigation

Marriot Waikiki, Honolulu, Hawai'i, 21-22 April 2013

WORKSHOP CONCLUSIONS:

Should GNSS be Considered Critical Infrastructure?

1. Each Provider should consider whether GNSS should be part of its critical infrastructure. In its evaluation, the following two questions may be considered:

- Is GNSS itself considered critical infrastructure or does it provide services that enable other sectors of critical infrastructure?
- Is there such a thing as international critical infrastructure?

Service Center Cooperation and Information-Sharing

2. Providers' should identify a point of contact for further discussion about the exchange of data by national centers, and ways to link the centers globally.

Interference Educational Material

3. The workshop reaffirmed recommendation 7A.3.1 made at the seventh meeting of the ICG (ICG-7) (see A/AC.105/1035) — *ICG should 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:*

- The ITU Radiocommunication Bureau (ITU-BR) agreed to participate in the development of the recommended education material and discuss this effort with other sectors of the ITU, such as the ITU Telecommunication Development Sector (ITU-D).

Interference Reporting

4. The United States volunteered to compare the web-based United States Coast Guard Navigation Center (NAVCEN) form for reporting interference, and compare it to the ITU (Appendix 10) form, and Providers' agreed to seek information on interference reporting forms used in their administrations.

5. Protecting RNSS users against interference as a regulatory matter is ultimately a national responsibility that is carried out in conformity with ITU rules:

- Does not preclude solutions that involve the private sector and cooperation among providers.

GNSS Spectrum Interference Source elimination

6. It was suggested that the ICG WG A consider drafting an ICG recommendation that system provider administrations lead by example and eliminate all non-RNSS primary or secondary frequency allocations in ITU-allocated RNSS spectrum bands.

ICG Workshop on GNSS Spectrum Protection and Interference Detection and Mitigation

Internation Telecommunication Union Headquarters, Geneva, Switzerland, 14-15 July 2014

WORKSHOP CONCLUSIONS:

IDM Questionnaire

1. Recommendation: Invite each ICG Member to prepare a presentation for the Ninth meeting of the ICG (ICG-9) of WG-A addressing the following questions:

- Do you consider Global Navigation Satellite Systems or their services to be National Critical Infrastructure?
- How does your response impact the protection of your GNSS components and its services in your nation?
- What do you consider to be the definition of “International Critical Infrastructure”?

Spectrum Protection

2. In the interest of increasing GNSS spectrum protection, the ICG WG-A Compatibility Subgroup should study the potential to designate RNSS allocations in each currently used band as “safety of life service.”

3. Potentially, national telecommunication administrations could be asked to initiate studies in the ITU Radiocommunication Sector (ITU-R) related to potential regulatory changes regarding the RNSS safety of life allocations/service.

4. ICG Member countries should provide information at ICG-9 as to whether it is legal within their country to manufacture, sell domestically, export, purchase, own, or use GNSS jammers.

5. The Workshop participants encouraged system providers and user community members to evaluate interference detection and characterization capabilities of the European Union-funded DETECTOR project and consider testing similar capabilities in other regions.

6. System providers and user community member states are encouraged to work with industry groups to determine if standards for crowd sourcing interference detection techniques should be developed and cost-effectively implemented by mobile TELCOM service providers.

7. Encourage ICG members to investigate the feasibility of grid network technologies for GNSS interference detection and localization, together with relevant business models.

Adjacent Band Compatibility

8. Encourage all ICG members to perform and share Adjacent Band Compatibility Studies in all RNSS bands (L, S, and C) with other ICG participants.

9. ICG participants should consider a review of whether existing limits on spurious emissions in the RNSS bands are sufficient to protect GNSS reception and offer conclusions of the reviews to WG-A at ICG-9

IDM Awareness and Education in the United Nations Member Nations

10. The ICG Executive Secretariat, in coordination with the IDM taskforce, should organize United Nations workshops on IDM for governments of user community member nations to protect the worldwide utility and benefits of GNSS.

ICG Workshop on GNSS Spectrum Protection and Interference Detection and Mitigation

Vienna International Centre, Vienna, Austria, 10-11 June 2015

WORKSHOP CONCLUSIONS:

IDM Techniques

1. (Continued discussions) The ICG recommends that GNSS providers and GNSS user community member states evaluate existing and emerging interference detection, localization, and characterization capabilities and consider developing, testing and implementing these or similar capabilities in their nations or regions of the world.

2. (Continued discussions) System providers and user community member states are encouraged to work with industry groups to determine if standards for crowd sourcing interference detection and localization techniques should be developed and cost-effectively implemented by mobile telecom service providers.

- Discussion suggested that it might be better for detection networks to begin with cell-towers instead of mobile phones;
- Volume of data from nation-wide system may not be practical; regional monitoring centres might be more realistic;
- Consensus that efforts aimed at initiating crowd-sourcing should begin with discussions between Task Force and individual companies before approaching user industry organizations such as 3GPP;
- Industry may be reluctant to act without market demand or government intervention through laws or regulations.

3. Way Forward: WG-A requested Task Force to invite industry representatives to WG-A Meeting at ICG-10 to show how crowd-sourcing would work and discuss the feasibility.

IDM Awareness and Education in the United Nations Member Nations

4. The ICG Executive Secretariat, in coordination with the IDM taskforce, should organize United Nations workshops on RNSS spectrum protection and IDM for governments of user community member nations in order to protect the worldwide utility and benefits of GNSS.

- A proposal focused on educating United Nations member state administrations regarding RNSS spectrum management approaches and IDM capabilities will be developed for consideration by the ICG;
- Participating member state administration representatives will be encouraged to provide information as to whether it is legal within their country to: manufacture, sell domestically, export, import, purchase, own, or use GNSS jammers.

IDM Seminar at the United Nations Experts Workshop

5. Workshop attendees planned an IDM seminar to take place at the United Nations Experts Workshop, 14-18 December 2015 in Vienna, Austria:

- Will include session (1-2 days) devoted to Spectrum Protection and IDM;
- ICG IDM Task Force will assist in developing agenda and encourage appropriate experts to participate. Will include presentations from WG-A participants focused on the IDM work taking place in the ICG;
- Provisional on the success of the Spectrum/IDM session in December, WG-A and the ICG Executive Secretariat will pursue additional sessions at upcoming United Nations Space Applications Program GNSS Workshops and/or events held by the United Nations-affiliated Regional Centers for Solace Space and Technology Education.

Agenda Item on Spectrum Protection and IDM

6. Based on a presentation to the Scientific and Technical Subcommittee, the Committee on the Peaceful Uses of Outer Space (COPUOS), should establish a multi-year agenda item under the Scientific and Technical Subcommittee focused on national efforts to protect RNSS Spectrum and pursuit of GNSS IDM in member states. Under this agenda item, Member States will be asked to report on:

- National RNSS Spectrum Allocations;
- Planned or existing laws and regulations related to the manufacture, sale, export, import, purchase, ownership, and use of GNSS jammers;
- Domestic efforts to detect and mitigation GNSS interference.

ICG Seminar on GNSS Spectrum Protection and Interference Detection and Mitigation

Experts Meeting: Global Navigation Satellite Systems Services

Vienna International Centre, Vienna, Austria, 14-18 December 2015

SEMINAR CONCLUSIONS:

An ICG Experts Meeting on GNSS Services was held in December 2015 to increase knowledge and expertise relating to GNSS capabilities and to emphasize the benefits of GNSS to the world user community. As part of this meeting, a seminar was conducted to describe the importance of GNSS spectrum protection at the National level and what states can do to reap the benefits of GNSS. Specifically, the seminar included an introduction to GNSS, presentations on spectrum management and protection, and discussion on international efforts in interference detection and mitigation.

1. Goals of this two-day seminar were to provide:

- Introduction to the regulatory aspects of spectrum management[
- Discussion of technical aspects such as detection technologies and mitigation techniques of radio frequency interference;

2. The ICG Experts Meeting had participants from more than 30 countries representing governments, colleges, research labs and space agencies etc. and the IDM

seminar was conducted by experts from Australia, Japan, United States and the European Union, as well as ITU.

- An interactive session at the beginning of the seminar was designed to make all participants recognize the benefits and importance of GNSS in their countries.

Fundamentals of GNSS

3. A brief history of GNSS was provided:

- GNSS navigation principles, its application, each GNSS system signals and receiver fundamentals were introduced;

- Throughout an interactive interview, all participants agreed on the importance of assured access to GNSS and its associated economic benefits;

- A key take away from this section is that GNSS signals are very weak when compared to terrestrial systems, on the order of -158dBW, by the time they arrive on Earth. Thus, GNSS signals are very susceptible to interference, whether intentional or not, and it is necessary that states manage and protect spectrum allocated for GNSS. Proper spectrum management is key to ensuring economic benefits from having access to interference-free GNSS.

Minimize Interference, Maximize Benefits

4. Discussion explained that in addition to the interference from co-primary radio services, other types of interference such as out-of-band emissions, spurious emissions and adjacent band interference should also be taken into account. Other possible non-GNSS emissions present in the GNSS frequency bands include radio service emissions, industrial, science, and medical (ISM) emissions, and short range radio device emissions.

- Fundamental spectrum protection is about keeping GNSS spectrum “clean” by ensuring the frequencies near GNSS are free from licensed, unlicensed, and illegal transmissions that interfere with GNSS receptions. Doing so minimizes signal errors and maximizes the performance of GNSS receivers to include more reliable positioning and timing;

- To avoid interference, the ITU Radio Regulations allocate the spectrum appropriately (e.g., frequency separation, power constraints etc.);

- Experts explained how keeping spectrum clean requires the technical means to detect interference when it occurs and national regulators who have the capacity to detect and deter strong interference generators;

- ITU provisions for dealing with harmful interference related to radio services were presented. The ITU seeks to prevent interference through the proper allocations of spectrum use, defining power limits, establishing regulatory protection, and ensuring coordination between Spectrum management administrations;

- The Seminar emphasized that only continuous synergistic interactions by all sectors of the terrestrial and satellite communities can ensure interference to GNSS is limited.

Spectrum Management at National Level

5. National Spectrum Agencies’ activities were introduced outlining their role to maintain/improve the safety and reliability of radio use.

- National implementations usually align with the ITU Radio Regulations but experts provided examples on how National Spectrum Agencies in Japan, the United States and the European Union manage spectrum at the national level based on the provisions of the ITU;
- It was explained that different regulations/guidelines for allowable emission levels for non-radio service emissions such as escalators and Short Range Device (e.g., Ultra-Wide Band (UWB)) emissions exist among different National Spectrum Agencies;
- In general, national frequency allocations and protections are aligned with the ITU table of frequency allocations, however, they are not necessarily identical as each nation has sovereign rights to manage its own spectrum as long as it does not violate the ITU treaty;
- It was recommended that national regulators should not authorize other radio services in GNSS bands and consider the impact of a radio service's use of adjacent bands before authorizing its use.

Spectrum Protection Activities in ICG

6. The role of the ICG as a forum that can facilitate and encourage the protection of GNSS spectrum was discussed. Seminar experts highlighted topics discussed at ICG:

- Electromagnetic Emissions;
- Interference Detection and Geo-Location Capabilities;
- The challenge of detecting weak interferers, such as GNSS jammers, because those interfering levels are weak but still stronger to impact on GNSS reception;
- Critical Infrastructure.

GNSS Jammers

7. The seminar concluded with discussion on interference detection and mitigation.

- This discussion began with a presentation on GNSS jammers, how they work, and examples of when they were used and the issues they caused;
- Expert discussed regulations within the United States to deter the use of jammers and summarized the legality of exporting, importing, selling, using, and purchasing jammers within several nations. An overview highlighted regulations within Canada and Australia to deter the use of jammers;
- While jammer geo-location systems are being developed, experts emphasized the seriousness of the jammer threat and its continued proliferation. Examples of the criminal use of jammers and the economic impact of such use were discussed;
- It was recommended that increased education and strict penalties for use of jammers be instituted by Nations.

Overall Results

8. Interactive feedback at the end of the seminar confirmed that it had achieved the objective to inform participants about GNSS spectrum protection and the importance of good national spectrum management. Throughout the *Seminar on GNSS Spectrum Protection and Interference Detection Mitigation,* experts engaged participants in several interactive question and answer sessions. The IDM seminar fulfilled its purpose of educating participants on the importance of GNSS spectrum protection and

challenged them to engage with their respective National spectrum management agencies to ensure continued access to the benefits that GNSS provides.

ICG Workshop on GNSS Spectrum Protection and Interference Detection and Mitigation

Saint Tropez Hotel, Changsha, China 17-18 May, 2016

WORKSHOP CONCLUSIONS:

Strengthen the study of GNSS interference effects to typical infrastructure

1. It was recommended that ICG member states strengthen the study of GNSS interference effects to typical infrastructure that uses GNSS. GNSS is widely used in infrastructure such as transportation, electric power, communication etc. Interference to GNSS applications in infrastructure produces a high possibility of serious consequences such as economic loss, degradation of user's confidence to GNSS and effects on key government programs. GNSS interference affects various infrastructure in specifically different ways and it is recommended that these differences be well documented.

Strengthen public education of GNSS interference effects to infrastructure

2. At present the public's attention to and knowledge of specific GNSS effects and harmful consequences adequate. Since the public knows little about GNSS interference, ICG member nations should enhance public education with a focus on the study of specific influences and extent of harm that GNSS interference will have on the typical infrastructure.

3. Recommendation: It is recommended that ICG member states educate the public in their countries with regard to the harm of GNSS interference to typical infrastructure.

Next IDM Workshop scheduled to be held as part of the Royal Institute of Navigation's Baška GNSS Conference in Baška, Croatia, 07-09 May 2017