



International Committee on  
Global Navigation Satellite Systems

**ICG EXPERTS MEETING:  
GLOBAL NAVIGATION SATELLITE SYSTEMS SERVICES**

**15 - 18 December 2015  
Conference Room C2, Vienna International Centre, Vienna, Austria**

*Organized by  
International Committee on Global Navigation Satellite Systems (ICG)*

*Sponsored by  
United States of America and European Commission*

**PROGRAMME**

**Tuesday, 15 December 2015**

**08:00 – 10:00**      **Registration (*Pass Office, Gate 1, Vienna International Centre*)**

**09:00 – 09:30**      **OPENING SESSION**

**WELCOME REMARKS**

*Simonetta DI PIPPO, Director, Office for Outer Space Affairs, United Nations Office at Vienna*

*Kenneth HODGKINS, Office of Space and Advanced Technology, Bureau of Oceans and International Environmental and Scientific Affairs, Department of State*

*Pieter DE SMET, Galileo and EGNOS – Applications, Security; International Aspects. Directorate-General for Internal Market, Industry, Entrepreneurship and SMEs European Commission*

**ICG Providers' Forum Overview**

*Providers' Forum Co-Chairs, Kenneth HODGKINS, United States and Pieter DE SMET, European Commission*

**09:30–11:30**      **SESSION 1 – Precise Positioning and GNSS Reference Station Networks**

*Chairperson: Krishna BHANDARI, Nepal*  
*Rapporteur: Claudia PAPARINI, Italy*

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|---------------|--|
| 09:30         | Precise GNSS Positioning -- Not Just a Niche Technology, <i>Christos RIZOS, Australia</i>  |
| 09:45         | Capabilities and potentialities of implementation of GNSS precise point positioning (PPP) Service in Morocco, <i>Mourad BOUZIANI, Morocco</i>    |
| 10:00         | Dynamic Precision Research Using Two GNSS Receivers with RTK, <i>Ingus MITROFANOV, Latvia</i>  |
| 10:15         | GNSS services in Estonia: ESTPOS as a case study, <i>Karin KOLLO, Estonia</i>  |
| 10:30         | The Philippine Active Geodetic Network in Support of the Surveying Community, <i>Ronaldo GATCHALIAN, The Philippines</i>                         |
| 10:45         | Feasibility study and site choice for an EGNOS station in Algeria, <i>Salem KAHLOUCHE, Algeria</i>   |
| 11:00         | State GNSS base station Network development and applications, <i>Janis ZVIRGZDS, Latvia</i>  |
| 11:15 – 11:35 | Coffee Break   |
| 11:35 – 13:00 | <b>SESSION 2 –Space Weather and GNSS</b><br><br><i>Chairperson: Karin KOLLO, Estonia</i><br><i>Rapporteur: Renato ALVES BORGES, Brazil</i>       |
| 11:35         | The NeQuick ionosphere electron density model: GNSS applications, <i>Bruno NAVA, ICTP</i>  |
| 11:50         | Simultaneous Observations of EGNOS and GPS Amplitude Scintillation over Equatorial Africa, <i>Andrew AKALA, Nigeria</i>                          |
| 12:05         | Effects of Solar radio bursts on GPS derived TEC: an analysis of some recent events, <i>Jean UWAMAHORO, Rwanda</i>                               |
| 12:20         | Space Weather Effects on the Wide-Area Augmentation System (WAAS), <i>Patricia DOHERTY, United States of America</i>                             |
| 12:35         | Training on Space Weather for developing countries, <i>Christine AMORY, France</i>   |
| 12:50         | Information of Space Weather effects to GPS/GNSS for fishermen activities in Indonesia, <i>Varuliantor DEAR, Indonesia (poster presentation)</i> |
| 13:00 – 14:00 | Lunch Break  |

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| 14:00 –16:15  | <p><b>SESSION 3 – Applications of GNSS</b></p> <p><i>Chair: Bertram ARBESSER-RASTBURG, Austria</i><br/> <i>Rapporteur: Andrew AKALA, Nigeria</i></p>   |
| 14:00         | EGNSS applications and services for road and freight transport regulated applications, <i>Antonella DI FAZIO, Italy</i>  |
| 14:15         | The Use of Satellite Navigation in Aviation: Towards a Multi-Constellation and Multi-Frequency GNSS Scenario, <i>Jose Pablo HARO-RODRIGUEZ, Spain</i>  |
| 14:30         | The Use of Satellite Technology in Air Navigation Services in Peru, <i>Jorge GARCIA VILLALOBOS, Peru</i>   |
| 14:45         | Disaster monitoring and management with unmanned aerial systems utilizing GNSS, <i>Khalid ISHAQ, Pakistan</i>  |
| 15:00         | Citizen Science for GNSS Performance Monitoring and Assessment, <i>Renato FILJAR and Boris SVILICIC, Croatia</i>   |
| 15:15         | Impact of Multi-Path Error on Availability of Integrity In GBAS Applications, <i>Ahmad AL HOSBAN, Jordan</i>   |
| 15:30         | Analysis and Simulation of GNSS for Peru, <i>Fredy Marcell VILLANUEVA JIMENEZ, Peru</i>  |
| 15:45 -16:05  | Coffee Break   |
| 16:05 – 17:50 | <p><b>SESSION 4 – Regional and National Initiatives/Projects and Capacity Building</b></p> <p><i>Chairperson: Salem KAHLOUCHE, Algeria</i><br/> <i>Rapporteur: Ronaldo GATCHALIAN, The Philippines</i></p> |
| 16:05         | A joint project of the University of Brasilia and the International Centre for Theoretical Physics on GNSS applications, <i>Renato ALVES BORGES, Brazil and Claudia PAPARINI, ICTP</i>                     |
| 16:20         | The state of space techniques in French speaking African countries: Bottleneck and Future Perspective, <i>Anas EMRAN, Morocco</i>  |
| 16:35         | Capacity building for GNSS education in Nepal, <i>Krishna BHANDARI, Nepal</i>  |
| 16:50         | ICAO Global provisions and regional strategy for the introduction of GNSS services, <i>Harvey Gabriel LEKAMISY, Kenya</i>  |
| 17:05         | The Current State and Prospects of the Positioning and Timing and Navigation System in Ukraine, <i>Stanislav KHOLODNY, Ukraine</i>   |

- 17:20 GNSS application in aviation: Nepal, *Narayan DHITAL, Germany*
- 17:35 Status Report on BeiDou International Exchange and Training Center, *Tian JIN, China*
- 17:50 Summary of the United Nations/Russian Federation Workshop on the applications of GNSS, *Vasily ZVONAR, Russian Federation (to be presented by Marina MOLOKANOVA)*
- 18:05 Adjourn

### Wednesday, 16 December 2015

09:00 – 18:00 **SESSION 5 – Seminar on GNSS Spectrum Protection and Interference Detection and Mitigation**

#### I. OVERVIEW

- 09:00 Course Introduction, *Jeffrey AUERBACH, United States*
- 09:30 Participant Introductions (*Country, GNSS Use Within Country*), *Tom STANSELL, United States, Dominic HAYES, European Union, Takahiro MITOME, Japan*

10:30 – 10:50 Coffee Break

#### II. INTRODUCTION TO GNSS

- 10:50 History, *Tom STANSELL, United States*
- 11:10 How GNSS Works and Applications, *Dominic HAYES, European Union*
- 11:30 GNSS Signals, Spectra, and Receiver Fundamentals, *Tom STANSELL, United States*
- 11:50 Why GNSS is so Weak vs Terrestrial Signals - Why it is Vulnerable, *Dominic HAYES, European Union*
- 12:10 Three Ways Interference Affects GNSS, *David CHOI, United States*

12:30 – 13:45 Lunch Break

#### III. SPECTRUM MANAGEMENT

- 13:45 What is Spectrum Management and Why Do It, *Dominic HAYES, European Union*
- 14:00 Introduction to International Telecommunication Union (ITU), *Attila MATAS, ITU*

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| 14:15         | RNSS Aspects of ITU Plus Relevant Results of WRC-15, <i>Attila MATAS, ITU</i>   |
| 14:35         | Introduction to National Spectrum Agencies and National Applications, <i>Dominic HAYES, European Union, David CHOI, United States, Takahiro MITOME, Japan</i> |
| 15:05         | Possible Emissions in GNSS Frequency Bands Other than GNSS Signals, <i>Takahiro MITOME, Japan</i>   |
| 15:25         | Proliferation of GNSS Jammer Devices, <i>Tom STANSELL, United States</i>  |
| 15:40         | Adjacent Band Interference Concerns, <i>Dominic HAYES, European Union</i>   |
| 16:00 – 16:20 | Coffee Break  |
| 16:20         | Q&A Session, <i>Rick HAMILTON, United States, Jeffrey AUERBACH, United States</i>   |
| 17:20         | Conclusion: Summary and Take-Away, <i>David CHOI, United States</i>   |
| 17:50         | Adjourn   |

#### Thursday, 17 December 2015

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| 09:00 – 13:00 | <b>SESSION 5 – Seminar on GNSS Spectrum Protection and Interference Detection and Mitigation (continues)</b>                         |
| 09:00         | Introduction, <i>Jeffrey AUERBACH, United States</i>   |
| 09:10         | Interactive Discussion: What Was Learned; What Is Needed, <i>David CHOI, United States</i>   |
|               | <b>IV. SPECTRUM PROTECTION</b>   |
| 09:40         | What is Meant by Spectrum "Protection", <i>Dominic HAYES, European Union</i>   |
| 10:00         | ITU Role in Interference Enforcement, <i>Attila MATAS, ITU</i>   |
| 10:15         | ICG Activities and its Role in Spectrum Protection and Interference Detection and Mitigation, <i>Jeffrey AUERBACH, United States</i> |
| 10:30         | The Ultra-Wide Band Example and a Place to Start, <i>Tom STANSELL, United States</i>   |
| 11:00 – 11:20 | Coffee Break   |
|               | <b>V. INTERFERENCE DETECTION AND MITIGATION</b>  |
| 11:20         | Interference Detection Concepts, <i>Tom STANSELL, United States</i>  |

11:40 Interference Detection and Mitigation and GNSS Jammers, *Rick HAMILTON, United States*

12:10 Canadian and Australian Legal Sanctions, *Christos RIZOS, Australia*

## **VI. SUMMARY/INTERACTIVE DISCUSSION**

12:25 Summary and Q&A Session (*Meeting Participants*)

13:00 – 14:00 Lunch Break

### **SESSION 4 – Regional and National Initiatives/Projects and Capacity Building (continues)**

*Chairperson: Bruno NAVA, Italy*

*Rapporteur: Christine AMORY, France*

14:00 Methods and Techniques for improvement of GNSS resilience against Jamming-spoofing-meaconing attacks at the open sea, *Serdjo KOS, Croatia*

14:15 Multi-GNSS and deeply-coupled integration of sensors for interference mitigation, *Laura Maria RUOTSALAINEN, Finland*

14:30 On development of recommendations applicable to radio monitoring for the purposes of interference environment estimation in the radio frequency bands of GNSS, *Stanislav KIZIMA, Russian Federation*

14:45 Classification of GNSS interference, *Yi ZHOU, China*

15:00 **DISCUSSION SESSION**

16:00 – 16:20 Coffee Break

16:20 – 18:00 **DISCUSSION SESSION (continues)**

18:00 Adjourn

## **Friday, 18 December 2015**

09:00 -13:00 **CONCLUDING SESSION**

*Round table to finalize the recommendations/observations/proposals*

- Summary report of discussion sessions: presentation of proposals and recommendations consolidated at the discussion sessions

11:00 – 11:20 Coffee Break

### **Concluding Remarks**

- *Office for Outer Space Affairs*

- *United States and European Commission*

13:00

Adjourn