Scoping Study on an Impact Assessment of the allocation of pseudolites in the GNSS Bands
25/2/2011

On the request of DG ENTR GP3 unit in January, STA/CORSA action carried out a study on the pseudolites in GNSS bands. The field of pseudolites (or pseudo-satellites) is emerging rapidly as a precise positioning technology in challenging environments. Several members states are keen to allow installation of these devices in aviation and other sectors. DG ENTR is keen to launch a detailed project in this area however, establishing priorities and precise specifications for the project are eluding this initiative. The scoping study carried out by the JRC is meant to shed light on the current status and future challenges in this field.

"Scoping Study on an Impact Assessment of the Allocation of Pseudolites in the GNSS Bands" was delivered to ENTR in a record completion time of one month.

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New colleague in CORSA action

CORSA is pleased to welcome Dr Cillian O’Driscoll who has joined the team as a post-doctoral researcher (GH-30) on 16 January 2011. He will work on the security of Global Navigation Satellite Systems (GNSS). Before joining the JRC, Cillian worked for three years as a Senior Research Engineer in the Position Location and Navigation (PLAN) Group at the University of Calgary. Prior to that he received PhD on GPS Weak Signal Acquisition and MEngSc on Cryptographic Hardware, both from the University of Cork, Ireland.

Cillian will strengthen CORSA competencies in the GNSS area led by Dr Joaquim Fortuny. Late in 2010, the team had welcomed Dr Daniele Borio, another specialist in GNSS technology. CORSA is committed to support the EU policies on Galileo and space-based navigation and communication infrastructure, an important element of the JRC’s support to EU’s Critical Infrastructure Protection (CIP).

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GNSS technologies

Reconfigurable Radio Systems (RRS)
ETSI TC RRS Report approved
2/10/2011

A technical standardization report prepared under the chairmanship of STA/CORSA has been approved by the standardization body ETSI - European Telecommunications Standards Institute.

The ETSI TR (Technical Report) 103 064 “Business and Cost considerations of Software Defined Radio / Cognitive Radio in the Public Safety domain” produced by WG4 was approved at the plenary meeting. The TR describes benefits (both technical and economical) of SDR/CR technologies in the Public Safety domain. This is the third TR produced by CORSA action and WG4 for ETSI TC RRS in the past two years. Reconfigurable radio systems technologies based on Cognitive Radio concepts promises several benefits in interoperability of telecommunications systems as well as in radio spectrum management challenges highlighted in the EU Digital Agenda.

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Announcement

ETSI World Class Standards

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11th Meeting of CEPT working group SE40
London, 12/1/2011

STA/CORSA action attended the CEPT working group SE40 meeting on pseudolites where Mr Fortuny presented a report based on the recent JRC study carried out on the subject.

Conference of European Post and Telecommunications Administrators (CEPT) advises DG INFSO on behalf of the EU Member States, on all technical and regulatory matters related to the use of radio spectrum.

The CEPT Working Group (WG) SE40, which jointly with WG FM44 is currently addressing the various compatibility issues arising from the introduction of radio navigation services based on pseudolites. Pseudolite was one of the main points on the agenda of the 11th meeting of CEPT WG SE40, in addition to other issues related to compatibility of radio navigation services with mobile satellite systems and meteo radars in adjacent bands. Currently there is no regulation in the EU on the use of pseudolites and some member states are keen to begin their deployment in aviation and other sectors.

Pseudolites are the ground based transmitters of precise geolocation and timing signals in the frequency band used by GPS and GNSS services. In a recent meeting in Brussels organized by ENTR.GP1 and ENTR.GP3, the chairman of WG SE40, Mr. Jean-Yves Guyomard (ANFR France), had invited the JRC to present the results of the pseudolites tests that were carried out at the end of 2010 on the request of ENTR. In addition to the presentation, JRC delivered a detailed technical report that was written by its scientists in late 2010. This report presents the main results of the tests and makes a number of suggestions for possible follow-on activities.

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International Technical Meeting (ITM)
of the Institute of Navigation (ION)
San Diego USA, 22/1/2011

ITM is a conference with a select group of attendees (approximately 200), which focuses on navigation technologies. Some of the most prominent GNSS groups including Stanford University, University of Calgary, Ohio University, US Navy, Air Force Research Lab, DLR, CNES, ENAC, FAF Munich, ISMB Torino, and others.

The symposium started with a half a day plenary session with three keynote speeches on Robotics Navigation: one from Air Force Research Lab (ARFL), and another two from two SMEs located in the San Francisco Bay Area. Robotics combined with inertial navigation systems and GNSS is a very hot topic of research. The presenters introduced the concept of “personal robotics”, which they expect will revolutionise our lives very soon. ARFL expects that the use of robotics (i.e., UAV or micro-UAVs) in military missions will grow very significantly in the coming years. The two SMEs presented an example application of robotics to help elderly people in hospitals. One of these companies (The Willow Garage) has developed a robot following the principle of Linux with an open source software. Some of the demos shown during the presentation were just amazing.

STA/CORSA action presented a paper on impact assessment of the DVB-T interference on GPS L1 and Galileo E1 receivers. Matthias and Daniele are the main contributors of this work. This conference paper was one of the deliverables in the context of the AA with DG HOME.

The main result of the mission was that it gave us the opportunity to understand what are the current topics of research in the various GNSS groups around the world. One of the most interesting contacts we made was a group of two professors, respectively, from Miami University (Prof. Jade Morton) and Ohio University (Prof. Wouter Pelgrum) who are setting up a project very much similar to our exploratory research proposal on space weather. They plan to design a software receiver (based on the USRP2 platform) that want to use in combination with an scintillation monitoring station. They are also planning to get the Septentrio Scintillation receiver in order to monitor scintillation events in various GNSS bands simultaneously. In one of the presentations, they showed some examples of observations made in Alaska, where the US Air Force has a radar array facility (HAARC) that can trigger artificially ionospheric scintillations. They showed a comparison of artificially triggered and natural scintillations observed in that site. They have plans to deploy their receivers at the Jicamarca Radio Observatory located near Lima, exactly as we were also planning. This group is very open and they are ready to share the collected data with us. We were positively surprised with this as it proves that the exploratory research proposal is rightly focused and in line with those of other research groups with many years of experience on the subject.

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STA/CORSA action attend the 2nd meeting of the GNSS Impact Assessment Steering Group, which was established at the beginning of January by the Unit ENTR.GP2 (Legal, Financial and Institutional Aspects) and all DGs have been invited to appoint a representative. The function of this steering group is to assess the impact of the different policy options related to the further implementation of the European satellite navigation programmes (i.e., Galileo and EGNOS) after 2013, more specifically with regard to possible governance schemes and related budgetary contribution mechanisms that shall cater for the needs of these two programmes. ENTR has also launched in parallel a second impact assessment on the GNSS applications market.

Representatives from RTD, MOVE, HR, INFSO and ENTR attended the meeting. The Steering Group reviewed the latest version of the impact assessment report that shall be the main accompanying document to the proposal for a Regulation of the European Parliament and the Council on further implementation of the European satellite navigation programmes (2014-2020). This proposal for a Regulation has to be completed by June - July 2011. The impact assessment itself has to be completed by the end of April 2011.

In the current version of the impact assessment there is a section on the EU policies related to GNSS. CORSA suggested adding a reference to the CIP Directive and this was well received. At the moment the main policies cross-referenced are related exclusively to transport.

ENTR.GP1 was also interested in mentioning the fact that multiple CIs rely on GNSS for precise timing synchronization. They asked to send copies of the reports that the CORSA team has produced for DG HOME on the vulnerability of GNSS-based services. They will include these reports in the list of reference documents of the impact assessment.

In the last part of the meeting members were briefed on the various options right now under evaluation regarding the final configuration of the space and ground segments of Galileo (baseline scenario with 30 satellites, reduced baseline with full constellation and fewer ground stations, reduced services scenario with 24 satellites, and degraded services scenario with 18 satellites), and also on the governance options (EU-Joint Undertaking, Intergovernmental Organisation, National Space Agency, a Private Company).

Space Weather Report provided to DG ECHO Monitoring and Information Centre (MIC)

Since 13 February, three energetic solar flares have erupted on the Sun and spewed clouds of charged plasma called coronal mass ejections (CMEs) out towards the Earth. The US National Oceanic and Atmospheric Administration (NOAA) issued a moderate alert and some media reported few events that could be connected with these eruptions.

On the request of MIC in DG ECHO, IPSC actions CRITECH and CORSA jointly prepared a situation report on the current solar storm and its impact on the Earth. This report describes the background and indicates why these events will become more and more frequent in the next year.

Currently, solar weather events are receiving high attention due to the anticipated increase in sun-spot activities as we approach the maxima in the 11-year solar cycle.

These periodic events can lead to severe geomagnetic storms enveloping the Earth with high risk of damage to technological systems such as satellite communications, GPS, high-voltage power lines and all the other modern civil infrastructures that depend on these critical services.

In 2011 CORSA has started an Exploratory Research project on the monitoring of the effect of ionospheric scintillations on the global navigation satellite systems (GNSS) signals. The ionosphere, like the magnetosphere around the earth in its upper atmosphere, is highly sensitive to the solar weather, and scintillation monitoring is essential to determine the accuracy of GNSS signals. JRC recently concluded an agreement with the US agency NOAA, to start trans-Atlantic collaboration in the area of solar weather and crisis management.

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The aim of the meeting was to bring together the MOSARIM partners in order to discuss the state of the project. The project’s objectives are:

- Assessment on actual radar interference potential with of the shelf radar sensors;
- Generation of a starting platform based on common understandings and state-of-the-art;
- Elaborate comprehensive and realistic simulation models regarding radar interference;
- Specification and implementation of a norm radar interferer for automotive radar interference tests;
- Find common applicable interference countermeasures to reduce mutual radar disturbance;
- Generation of recommendations and guidelines for vehicular mutual radar interference mitigation.

On the first day of the meeting, particular attention was given to providing an overview the state of the art of the project and understanding the available strategies for minimizing the mutual interference of the radars in crowded scenarios.

The JRC suggested the well-received idea to reserve a negligible part of the extremely wide band for establishing a cooperative communication channel between the automotive radars, with the ultimate purpose of making each device aware of the presence of the others without using the radar. As pointed out, the effectiveness of this system can be increased by exchanging the GPS information to provide the position, the speed and the acceleration of the other cars to the receiving device. In turn, this provides the automotive radar with a-priori information which can be exploited to increase the awareness of the outside world and, if needed, to focus most of the resources to controlling non-cooperative targets such as pedestrians, obstacles, cars without the automotive radar installed or working, etc, whose behaviour may be less predictable.

Additional topics treated in the first day concerned the importance of minimizing the multipath self-interference and a way for simulating some specific automotive scenarios with particular mention to the limits of using this tool.

Two experiments using commercial cars equipped with automotive radars/prototypes took place respectively at the end of the first day and in the middle of the morning of the second day in order to show the developments so far achieved in this technology. In addition, the second day of the meeting was also reserved to discussing some aspects of the organization of the following plenary meeting (which will be hosted by the JRC in Ispra) and other aspects related to the deliverables of this project.

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MOSARIM Workshop: “Automotive Radar Interference Mitigation and Countermeasures”
Ispra (Italy), 26/5/2011

The workshop “Automotive Radar Interference Mitigation and Countermeasures” will take place in Ispra, Italy on 26 May 2011. The letter of Invitation is available at http://www.mosarim.eu.

If you’re interested in attending the MOSARIM workshop, please contact:

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