EGNOS Extension to Eastern Europe

EGNOS Extension to Eastern Europe: First Flight Trials in Romania

UN/Croatia Workshop on the Applications of GNSS

Date: 21-25 April 2013
Place: Krk Island, Croatia
What is EGNOS?

**EGNOS** – European Geostationary Navigation Overlay Service - SBAS developed by ESA in agreement with the EC and Eurocontrol.

- Ownership transferred to EC since 2009
- Operational since 2009 as an Open Service
- Certified for SoL applications – March 2011

Architecture:
- 3 Geostationary satellites
  - 4 Mission Control Centres
  - 40 Ranging and Integrity Monitoring Stations
Current EGNOS coverage status

Nominal Case – All RIMS OK

EGNOS APV-I Availability for December 1\textsuperscript{st} 2009
EEGS
EGNOS Extension to Eastern Europe
EEGS – Main Objectives

EEGS has 4 main objectives:

• To prove through demonstrations that EGNOS can be “easily” extended to cover all Eastern Europe

• To assess the level of interoperability between EGNOS and SDCM (the Russian SBAS)

• To promote EDAS on the GNSS market in Russia in order to provide a high precision positioning service (PPP)

• To study the impact of Galileo in the scenarios implying EGNOS extension to Eastern Europe and EGNOS/SDCM interoperability.
EEGS – Consortium

GMV (Spain) – Consortium Leader

RSS (Russia)

ROSA (Romania)

SRC (Poland)

AENA (Spain)

AENI (Spain)

MAO (Ukraine)
EEGS – Analysis results for nominal case

EGNOS release (V.2.3.1)  

EEGS proposed release  
(no additional RIMS)
EEGS – Analysis results for degraded case with RIMS OK

EEGS proposed release

with one additional RIMS in Eastern Ukraine

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EEGS – Analysis results for degraded case with RIMS problems

EEGS proposed release

with one additional RIMS in Eastern Ukraine
EEGS – Static demonstration

Location of the tests – ROSA premises
EEGS – Dynamic demonstration 1

Route and installation

<table>
<thead>
<tr>
<th>Time</th>
<th>Km</th>
<th>Instruction</th>
<th>Toward</th>
</tr>
</thead>
<tbody>
<tr>
<td>1h 15 min</td>
<td>150 km</td>
<td>1. Head East on A2 toward Cernavoda</td>
<td>Cernavoda</td>
</tr>
<tr>
<td>1 min</td>
<td>700 m</td>
<td>2. Turn right to exit the A2 Highway</td>
<td>Cernavoda</td>
</tr>
<tr>
<td>2 min</td>
<td>200 m</td>
<td>3. At the roundabout, take the 2nd exit onto the A2 Highway</td>
<td>Bucharest</td>
</tr>
<tr>
<td>1h 15 min</td>
<td>150 km</td>
<td>4. Continue on A2 Highway</td>
<td>Bucharest</td>
</tr>
<tr>
<td>1 min</td>
<td>400 m</td>
<td>5. Exit A2 Highway</td>
<td>Bucharest</td>
</tr>
<tr>
<td>1 min</td>
<td>170 m</td>
<td>6. At the roundabout, take the 3rd exit onto the A2 Highway</td>
<td>Cernavoda</td>
</tr>
<tr>
<td>1h 15 min</td>
<td>150 km</td>
<td>7. Head East on A2 Highway</td>
<td>Cernavoda</td>
</tr>
<tr>
<td>5 min</td>
<td>200 m</td>
<td>8. Exit the A2 Highway</td>
<td></td>
</tr>
</tbody>
</table>
EEGS – Dynamic demonstration 2

Route and installation
EEGS – Conclusions

EGNOS Services may easily be extend to fully cover Romania and Poland by algorithm modifications while fully covering Ukraine needs additional RIMS.

The demonstrations in Romania proved that an extended EGNOS service may be used for SoL applications.

All the project’s outcomes and opinions are belonging to the consortium and are not necessarily endorsed by EC.
EEGS2

EGNOS Extension to Eastern Europe: Applications
EEGS2 – Main Objectives

1. To demonstrate, through flight trials, the benefits of EGNOS in Eastern Europe where EGNOS is not yet available and prepare the civil aviation and service providers of those areas for the future usage of EGNOS.

2. To study the impact of SBAS technology in transport management in the scenarios of EGNOS service in Eastern Europe.

3. To promote EDAS, EGNOS and Galileo.
EEGS2 – Consortium

GMV (Spain) – Consortium Leader

GMV

RSS (Russia)

TUM (Moldova)

RSS

ROSA (Romania)

NDConsult (UK)

ROSA

SRC (Poland)

MAO (Ukraine)

SRC

MAO

NDConsult

KHU (Ukraine)

NDConsult

KHU
EEGS2 – Work Breakdown Structure

EEGS2: EGNOS Extension to Eastern Europe: Applications

WP 1: Project Management
- WP 1.1: SBAS Flight Trials and Procedures Studies
- WP 1.2: SBAS Road Applications Studies
- WP 1.3: Commercial & Market Studies

WP 2: Feasibility Studies
- WP 2.1: SBAS Flight Trials and Procedures Studies
- WP 2.2: SBAS Road Applications Studies
- WP 2.3: Commercial & Market Studies

WP 3: Applications in Eastern Europe and Russia
- WP 3.1: SBAS Flight Trials and Procedures
- WP 3.2: SBAS Road Applications
- WP 3.3: Market Trials Reports and Business Plans

WP 4: Conclusions and Way Forward
- WP 4.1: Project Conclusions

WP 5: Dissemination Activities
- WP 5.1: Dissemination Plan
- WP 5.2: Results Dissemination

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EEGS2 – General approach

- The general approach concentrated on 3 major steps:
  - Develop the feasibility and commercial studies
  - Prepare and conduct the flight trials
  - Drawing the conclusions based on the results
EEGS2 ROSA Activities

- ROSA conducted a commercial feasibility study and a market study on SBAS for aviation in Romania

- ROSA prepared the flight trials in Romania together with GMV

Activities to be undertaken for the Flight Trials

- Procuring the necessary infrastructure (receivers, RF modems, etc.)
- Providing the aircraft
- Develop and review the Safety case assessment
- Preparing, installing and testing the equipments
- Conducting the flight trials
- Navigation errors and performance analysis
EEGS2 – Selected aircraft

Selected aircraft:

- The aircraft selected for the trials is a Hawker Air King C90GTx
EEGS2 – Selected aircraft
EEGS2 – Selected aircraft

Selected airport:

- The airport selected for the trials is the International Airport “Delta Dunarii” in Tulcea (IATA: TCE, ICAO: LRTC)
EEGS2 – Installations Architecture
EEGS2 – Aircraft Installation
EEGS2 – Ground installations

The equipment will be installed in the vicinity of the airport, at the end of the RWY, in a small facility belonging to the airport, in order to have access to a power source and also to have a clear broadcasting area.
EEGS2 – Planning of the flights

- In order to have a general positive feedback, ROSA will try to involve the Romanian CAA and ANSP (ROMATSA) both in the flight trials as well as the safety cases.

- We had several meetings with the above mentioned organizations.

- Unfortunatelly, due to bad weather conditions in Moldova, the flight trials were delayed for several weeks, which delayed also the trials in Romania.

- Currently the planned date for the trials is 8th -10th of May.
Thank you