E-HIMALAYA
extended-High performance MAss market GNSS receiver multi stAndard readY for mArket

Funding: European (7th RTD Framework Programme)
Duration: May 2012 - Nov 2014
Status: Complete with results
Total project cost: €1,976,490
EU contribution: €999,469

Call for proposal: FP7-GALILEO-2011-ENTR-1
CORDIS RCN: 103687

Objectives:
The e-HIMALAYA project aims at prototyping innovative GNSS-based core technologies and concepts, with the objective to build key Galileo differentiators in a multi-GNSS hybridised receiver. Several markets are addressed with the main weight put on Mass-Market and transport, which represents the main Galileo receiver market.

The project will have several impacts:

1. The first one is to build a ready to market localisation solution based on an efficient use of Galileo.

2. The second is to control key market levers technologies, and therefore propose a feedback both on standardisation bodies, or future Galileo signal definition, and on the products roadmaps (GNSS ASIC).

3. Finally, the project will develop an indoor technology that is today seen as a very promising one, blending GNSS measurements and LTE ones.

Methodology:
The project will develop a list of key features to enable a higher penetration of Galileo compatible receivers on the market, and especially the ASIC developed under Himalaya project. First of all it will develop a high accuracy technology made available even in bad reception conditions, thanks to a robust aided PLL processing tuned for the Galileo pilot channels. It will also address a smart integrity function taking into account the local effects, through an ultra-tight coupling with inertial sensors approach. It also addresses improved performances thanks to an extensive improvement of telecommunication assistance dissemination. In particular, a robust anti spoofing function is also developed, prototyped and demonstrated.

Parent Programmes:
FP7-TRANSPORT - Transport (Including Aeronautics) - Horizontal activities for implementation of the transport programme (TPT)

Institute type: Public institution
Institute name: The European Commission
Funding type: Public (EU)

Lead Organisation:
Thales Alenia Space France
Address:
26, AVENUE JF CHAMPOLLION
<table>
<thead>
<tr>
<th>Location</th>
<th>Organisation Website</th>
<th>EU Contribution</th>
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<tbody>
<tr>
<td>Toulouse, France</td>
<td><a href="http://www.thalesaleniiaspace.com">http://www.thalesaleniiaspace.com</a></td>
<td>€357,291</td>
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**Partner Organisations:**

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<tr>
<td>Eclexys Sagl</td>
<td>Via Dell'inglese 6, 6826 Riva San Vitale, Switzerland</td>
<td>€151,200</td>
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<tr>
<td>Deutsches Zentrum Fr Luft Und Raumfahrt E.v</td>
<td>Linder Hhe, 12489 KLN, Germany</td>
<td>€131,640</td>
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<td>Proton World International Nv</td>
<td>Excelsiorlaan 44-46, 1930 Zaventem, Belgium</td>
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<td>St-Ericsson Belgium N.v.</td>
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<td>Ecole Nationale De L Aviation Civile</td>
<td>Avenue Edouard Belin 7, 31055 31055, France</td>
<td>€101,703</td>
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<td>Stmicroelectronics Srl</td>
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From Galileo to multi-system positioning

Evolution of the Global Navigation Satellite System (GNSS) into a system of systems opens up a new world of satellite-based applications. EU-funded scientists have developed a multi-satellite receiver that will improve the integrity, precision and accuracy of positioning.

The European Galileo has already established ramp-up plans, the United States' Global Positioning System (GPS) is under modernisation, and the Russian Global Navigation Satellite System (GLONASS) is being restored. In addition, there are the European Geostationary Navigation Overlay Service (EGNOS) and the Wide Area Augmentation System (WAAS).

All these together set challenges to the design of positioning receivers that have to cope with multiple frequencies, message protocols and system parameters. In this context of demanding technological innovations, the 'Extended-high performance mass market GNSS receiver multi standard ready for market' (http://fp7-e-himalaya.com/(E-HIMALAYA)) project was initiated.

An initial research and development phase permitted exploring different directions of improvement of GNSS receiver performance. The receiver is assisted by a communications link to speed up the acquisition and find weak Galileo signals in dense urban areas or indoors. Special emphasis was placed on delivering data from at least two constellations, Galileo and GPS.

The E-HIMALAYA partners' assisted-GNSS server was upgraded to support the Secure User Plane Location (SUPL) v2.0 protocol. This is the emerging standard for exchanging information between positioning servers and mobile devices. Its numerous capabilities make it ideal for the next generation of location-enabled services.

Extensive testing proved that one of the first assisted-Galileo solutions to be developed based on 3rdGeneration Partnership Project (3GPP) assistance standards allows lessening the wait to calculate the user's position, the so-called time-to-first-fix. The test results will be shared with 3GPP to contribute to future improvements in its standards.

Next, E-HIMALAYA focused on hybridisation of the assisted-GNSS receiver with other technologies. The ready-to-market prototype includes high-performance microelectromechanical system sensors, including an accelerometer and gyroscopes. In addition, a spoofing detector allows further enhancing the precision and accuracy of positioning.

The performance of hybridisation and spoofing detection algorithms will be assessed using real signals in harsh environments, such as urban canyons. The assisted-GNSS receiver could be integrated into platforms for mobile and personal devices. Its application will demonstrate the added value of Galileo in real mass-market environments.

Documents:
Pericodic Report Summary 1 - E-HIMALAYA (extended-HIgh performance MAss market GNSS receiver muLti stAndard readY for mArket)

STRIA Roadmaps: Network and traffic management systems
Transport mode: Multimodal transport
Transport sectors: Passenger transport, Freight transport
Transport policies: Deployment planning/Financing/Market roll-out, Digitalisation
Geo-spatial type: Other