Seventh Framework Programme of the European Community for Research, Technological Development and Demonstration Activities (2007 to 2013)

'Cooperation' Specific Programme

Theme: Transport (including Aeronautics)

Sub-theme: Support to the European Global Navigation Satellite System (Galileo) and EGNOS

Area: 7.4.3.1 - Receivers

Funding Scheme: Collaborative Project

DESCRIPTION OF TOPIC Galileo.2011.3.1-1

'Innovative receivers for the mass market or for professional use'

I. INTRODUCTION

I.1. Context

GNSS receivers are a key part of the navigation chain, as they are the link between satellite signals and PNT services. Past activities in FP6 and FP7 in this area have focused on the development of GPS/Galileo receivers for the mass market, professional and safety-of-life users, as well as hybridisation with other technologies.

This topic provides funding opportunities to research and develop innovative solutions in the user receiver domain including multi-GNSS, multi-signal and multi-sensor approaches, innovative techniques to enhance availability, reliability and high accuracy in most user environments, and novel GNSS signal acquisition/tracking techniques to lower power consumption, among others. It is therefore an open topic not targeting any user community in particular but rather covering a broad set of technologies that can be applied to different communities.

I.2. Special conditions

None

I.3. List of Acronyms

AltBOC	Alternative Binary Offset Carrier
ASIC	Application-Specific Integrated Circuit
BOC	Binary Offset Carrier
EC	European Commission
EU	European Union
FOC	Full Operational Capability
FP6	Sixth Framework Programme
FP7	Seventh Framework Programme
GLONASS	Global'naya Navigatsionnaya Sputnikovaya Sistema
GNSS	Global Navigation Satellite System
GPS	Global Positioning System
ICD	Interface Control Document
INS	Inertial Navigation System
IOV	In-Orbit Validation
MEMS	Micro Electro Mechanical Systems
PNT	Position, Navigation and Timing
PPP	Precise Point Positioning
QZSS	Quasi-Zenith Satellite System
R&D	Research and Development
RTK	Real Time Kinematics

II. TOPIC DESCRIPTION

II.1. Objectives and Scope

The objective of this topic is to provide research funding opportunities to participants in the area of receiver PNT technologies and support prototyping and implementation activities of innovative solutions to aid development of final products.

Based on the experience from previous calls, two different approaches are proposed:

- Receiver Prototype Development: Following this approach, participants will be able to perform prototyping and implementation activities to aid development of a receiver. An indicative budget of €1M (EC contribution) per project and a maximum duration of 24 months are proposed.

- Advanced Receiver Technologies: Following this approach, participants can focus on research activities in promising fields in the user technology domain oriented to solve an existing problem or satisfy an existing need of positioning users, without necessarily implementing a prototype. An indicative budget of €0,5M (EC contribution) per project and a maximum duration of 18 months are proposed.

In either case, the proposals shall clearly present areas for innovation, a sound project implementation and the expected impact in the GNSS community. A total budget of €3M is foreseen for this topic.

The evaluation will be driven by the potential of innovation and impact of the proposed activities. Compared to previous calls, this topic allows more flexibility in the project plan and participants can tailor the project activities according to their needs.

II.2. Research and Technological Development

Whatever the approach selected, at least one of the R&D areas described below must be addressed. Although there may be some overlap between areas, participants are encouraged to streamline their activities in one or two areas (three at most) in order to achieve relevant results beyond the state of the art, instead of covering horizontally many topics at the same time:

- Hybridisation of GNSS with dead-reckoning sensors as INS/MEMS. GNSS/INS hybridisation is already in the state of the art for several years, but there is still scope for innovation, through tighter integration, at algorithm and implementation level, higher performances and lower terminal costs. Innovative hybridisation schemes with other information sources as e.g. mapping, laser, vision sensors or digital photography can be incorporated as well.

- Hybridisation of navigation and communication signals, including the use of opportunity signals, and combined positioning solutions using ranging signals from GNSS and other sources.

- High accuracy and fast initialisation through RTK/PPP techniques adapted to all environments and user dynamics including the optimal combination of measurements from different frequencies. Aiding through relative or cooperative positioning can be also included in this category.

- Multi-GNSS and multi-frequency receivers, aiming at the maximisation of interoperability at receiver level in the use of systems from other regions (QZSS, GLONASS, etc) in addition to

GPS/Galileo. Activities shall be based on existing public ICDs published by the relevant authorities.

- Multipath modelling, detection and mitigation in environments with high multipath or even indoor, and advanced signal processing schemes extracting the full advantage of BOC modulations such as AltBOC/CBOC or novel tracking architectures yielding better performances.

- Low power signal processing, including novel techniques different from the classical acquisition and continuous tracking implementation, such as snapshot positioning, adapted to the low consumption requirements of handheld users.

- Multi-antenna techniques, for example beam-forming and interferometry, and other innovative techniques against GNSS vulnerabilities and interference mitigation.

II.3. Deliverables

The project should provide at least the following outputs during its lifetime:

- Project Plan
- Quarterly reports
- Minutes of review meetings
- Final Report

The Final Report must be public, or at least a part of it including the main project results. In addition, other deliverables considered by the participants as relevant for the completion of the project can be proposed.

II.4. Schedule and milestones

The project shall be split in the required phases and milestones according to the nature of the activities. As a minimum, the following milestones shall be foreseen:

- Kick-off Meeting
- Mid-Term Review
- Final review

II.5. Interaction with EC

The consortium shall appoint one person to be the single point of contact towards the EC[1], and they will be responsible for organising meetings and reporting to EC whenever requested. Any deviations from the agreed work-plan should be communicated to EC as soon as possible.

[1] EC may be represented by external experts.

III. RECOMMENDATIONS

- Proposals should follow the Guide for Applicants for this topic.

- Participants are recommended to write their proposals in a concise and factual style. Ambiguous or contradictory descriptions of the project activities should be avoided. The recommended maximum length of the part B of the proposal is 70 pages, excluding annexes.

- Participants are free to propose the most adequate plan for the nature of the activities proposed.

- Proposals must be oriented towards technological innovation and therefore Section 1 will be critical for the evaluation, but they will be evaluated on the basis of sections 2 and 3 as well, so implementation and expected impact of the project must be provided.

- Bidders are invited to exploit the advantages of the FP7 Collaborative Projects approach through balanced consortia in which each participant adds value to the project, for example by:

    - Involving organisations with technical expertise in GNSS and non-GNSS positioning areas, if the project is focusing on hybridisation of several technologies.

    - Promoting international cooperation through the involvement of non-EU organisations[2] with expertise in technology development for other GNSS and/or access to other markets, if a multi-GNSS approach is selected.

    - Involving R&D-driven organisations and end users or firms with access to the positioning device markets (chipset manufacturers, integrators, etc), especially if prototype implementation activities are selected.

- Participants are encouraged to streamline their activities and focus on specific areas rather than trying to cover many research areas superficially.

- Given that this topic is part of a Galileo call, it is recommended to use the available European GNSS infrastructure throughout the project, particularly the signals from Galileo IOV/FOC satellites.

- Activities can be integrated in participants' own R&D or product development processes (e.g. breadboard or contribution to phases/blocks of a receiver ASIC or chipset) as long as they are in line with the innovative nature of the topic and the proposal clearly states the division between project and external activities.

[2] ftp://ftp.cordis.europa.eu/pub/fp7/docs/guideline-third-country-participants_en.pdf