



## EGNOS Grant Plan 2019

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# **1 Support to the continuous development of EGNOS and Galileo programmes in the field of Aviation**

## **1.1 Legal basis**

The legal basis for this grant is Regulation (EU) No 1285/2013 of the European Parliament and of the Council of 11 December 2013 on the implementation and exploitation of European satellite navigation systems and repealing Council Regulation (EC) No 876/2002 and Regulation (EC) No 683/2008 of the European Parliament and of the Council and Delegation Agreement between the European Union, represented by the European Commission and the European GNSS Agency on the Exploitation Phase of the EGNOS Programme signed on 16 April 2014.

## **1.2 Budget line**

The budget line is 3920.

## **1.3 Background**

Following the recommendations of the Joint EU-EUROCONTROL Task Force on GNSS of 28 June 2013, the GSA signed in Q2 2015 a Framework Partnership Agreement (FPA) with EUROCONTROL for the period 2014-2020 on the grounds of Article 190(1)(f) of the Rules of Application establishing a long-term cooperation between the GSA and EUROCONTROL.

The indicative overall budget of the grants awarded for the entire duration of the FPA is €6.000.000.

The GSA awarded EUROCONTROL:

1. A First Specific Grant of 12 months starting in April 2015. This grant is now closed.
2. A Second Specific Grant of 36 months starting in April 2016. This grant is ongoing.

The GSA intends to establish a Third Specific Grant with EUROCONTROL starting in 2019 in line with the scope of the FPA.

## **1.4 Priorities, objectives pursued and expected results**

The Third Specific Grant shall address activities within the topics below.

- a) Definition of mission level requirements for EGNOS and Galileo;

- b) Operational introduction of European GNSS services (EGNOS and Galileo) for aviation in European Civil Aviation Conference (ECAC) area;
- c) Advice on Regulatory and Standardisation aspects, including spectrum;
- d) Support to European GNSS Development and Exploitation Activities (major systems reviews and Programme level activities managed by the EU);
- e) Inclusion of EGNOS and Galileo in future GNSS user terminals for aviation;
- f) Coordination of R&D for GNSS in aviation;
- g) Support to Aviation-specific performance monitoring activities;
- h) Support on International activities on GNSS in the aviation domain including European GNSS activities outside ECAC area.

## 1.5 Description of activities to be funded under this call for proposals

The high-level activities funded within the Third Specific Grant are described below:

### **(1) Definition of aviation users' needs to support the definition of mission level requirements for EGNOS and Galileo:**

EUROCONTROL will continue supporting the discussions on the definition of mission requirements for EGNOS and Galileo systems and their evolutions (including NOTAMs) relevant to the aviation user needs, in particular to:

- a) Assess the benefits of proposed new EGNOS services (e.g. to meet performance requirements that go beyond Cat I), from an airspace user perspective. Attend four AEOLUS meetings per year and organise user consultations within the aviation community about the subject to define the technical characteristics and the concept of operation of such a service. Provide technical assistance to the GSA by reviewing deliverables of projects on this topic and attending relevant milestones.
- b) Assess the impact of EGNOS related events (e.g. GPS/Galileo Satellites set to "Do Not Use") and of EGNOS technical limitations (e.g. continuity performance) from an operational perspective for the definition of mission level requirements.
- c) Support the GSA in developing DFMC SBAS SARPs, notably
  - I. Document the needs of the aviation community for new features under study, such as a message defining the service area, assessing to which extent this message would alleviate

States' concerns about GNSS Elements approval and whether this message could be legally used to reduce liability exposure of the SBAS Service Provider.

- II. Contribute to writing relevant chapters of Guidance Material.
- III. Assess aviation operational needs and constraints when implementing an SBAS authentication mechanism also taking into account the activities done at international level (e.g. ICAO, FAA). Provide technical assistance to the SBAS authentication project (SPARC) by reviewing deliverables and attending relevant milestones.

The result of this activity will feed the definition of the authentication requirements to be injected into the EGNOS mission. EUROCONTROL should also analyse the impact on safety to confirm feasibility.

- d) Define the requirements on the information required by aviation users from the EGNOS Service Provider (about both EGNOS and Galileo), including coordinated requirements for NOTAMs defined at international level (i.e. EU, US, Russia...) for Aeronautical Information Services.
- e) Contribute to the preparation and consolidation of Document Change Notices (DCNs) to EGNOS V3 MRD in order to align the EGNOS Mission requirements with future needs of the aviation community and updates of the aviation standards. Attend four EGNOS MRD CCB meetings per year.
- f) Analyse the operational impact of EGNOS continuity performance for SBAS APV I and CAT I, defining what operational constraints non-compliance to ICAO SARPs would have for various levels of traffic at European airports until 2030.
- g) Analyse the impact of using EGNOS for ADS-B on EGNOS Service Provider (i.e. in terms of additional certification and ATM safety impact).

## **(2) Operational introduction of European GNSS services (EGNOS and Galileo) for aviation in European Civil Aviation Conference (ECAC) area:**

EUROCONTROL will continue supporting the adoption of EGNOS and Galileo-based applications, targeting specific actions areas such as incentives programmes, training initiatives and guidance material. This activity is limited to ECAC States.

- a) Support the GSA in the implementation of new procurements and grants aiming at increasing the use of EGNOS in aviation. EUROCONTROL will contribute to the preparation of calls for tender and proposal, including their evaluation. In addition, EUROCONTROL will provide technical assistance to the awarded projects, upon GSA request, by reviewing deliverables, participating to progress meetings and providing consolidated operational feedback.

- b) Support civil aviation authorities, ANSPs and aircraft operators in the EGNOS operational implementation, upon GSA request,
  - I. Cooperate with GSA in the organisation of specific User fora, gathering air traffic controllers, pilots, and flight schools among others, to define guidance material and identify further user needs for EGNSS applications and services.
  - II. Support the requirements for procedure design training courses on PANS\_OPS criteria for LPVs.
- c) Support safety assessment at user level, interfacing between GNSS system safety and the implementation of aviation applications using GNSS, providing safety information to the aviation community (e.g. assistance to safety case production) to promote adoption and to manage the outcomes of user safety assessments to improve the service.
- d) Support tracking of SBAS capabilities in ECAC aircraft, availability of avionics and traffic to ECAC destinations. EUROCONTROL will continue to deliver data/analyses on SBAS capabilities in ECAC to support prioritisation actions (e.g. where and by whom operations should be implemented).
- e) Communication and awareness initiatives:
  - I. Support the GSA communication to Airspace users' fora on SBAS implementation objectives.
  - II. Coordination and participation to aviation events.
- f) Develop a methodology to allow the quantification of the use of published EGNOS procedure (e.g. based on any ATC recording).
- g) Support the introduction of EGNOS for RPAS navigation and applications, aligned with ongoing activities in JARUS and in support to the development of European standards and regulations.
- h) Contribute to the introduction of EGNOS and Galileo in the aviation regulatory agenda, by highlighting operational and safety benefits.

### **(3) Advise on Regulatory aspects, including spectrum:**

EUROCONTROL shall provide technical notes defining the need for EGNOS and Galileo frequency management actions such as licensing rules, ban on jammers, regulation of pseudolites, protection of GNSS spectrum, compatibility between GNSS and other aviation systems (e.g. DME), etc. and an analysis of related regulation supporting the operational use. EUROCONTROL will be consequently expected to provide support for the recommended actions in the appropriate frequency management fora.

### **(4) Support to European GNSS Development and Exploitation Activities:**

EUROCONTROL will participate, upon GSA request, to major system reviews and Programme level activities managed by the GSA.

- a) Support in the EGNOS systems reviews (EGNOS V2 and EGNOS V3 reviews), including assistance to the validation of system safety requirements/assumption impacting the operational safety.
- b) Ad-hoc support during iterations with programme stakeholders.

#### **(5) Coordination of Research and Development (R&D) for GNSS in aviation:**

EUROCONTROL will contribute to ensure that there are neither gaps nor overlaps between R&D activities on GNSS funded by different (European and National) public programmes, with the objective to develop a consistent R&D roadmap for GNSS in aviation.

- a) Support the coordination of the R&D activities on GNSS in aviation carried out either within or outside of the framework of the SESAR JU, ensuring coherence with the SESAR Concept of Operations.
- b) Support the development and implementation of a R&D roadmap for GNSS in aviation in coherence with the activities conducted on ATM modernisation in the context of the SESAR JU, specifically addressing EGNOS and Galileo.

#### **(6) Inclusion of EGNOS and Galileo in future GNSS user terminals for aviation:**

EUROCONTROL will support the planning of activities for the development of GNSS user terminal capabilities for the coming 10, 15 and 20 years. EUROCONTROL will support the follow-up of the DFMC SBAS Receiver prototyping activities, on behalf of the GSA, contributing to the technical management of the tasks by reviewing the project documentation and by providing recommendations and way forward on specific issues.

- a) Support EGNOS and Galileo standardisation activities in EUROCAE and RTCA:
  - I. Prepare and coordinate support of an input document to WG-62 describing concrete steps to validate the DFMC SBAS MOPS.
  - II. Support the development of DFMC SBAS MOPS in EUROCAE and RTCA
  - III. Contribute to the standardisation of ARAIM.
  - IV. Ensure coherence with GNSS equipment mandates prepared by the EC.
- b) Support the DFMC SBAS Aviation Receiver prototype activities.
  - I. Support the review of the documentation of the GSA relevant projects.
  - II. Provide recommendations and way-forward in case of critical issues.
- c) Support information exchange between the GSA receiver prototyping activity, relevant projects within SESAR 2020 activities and relevant R&D programmes outside Europe (e.g. NEXTGEN).

### **(7) Aviation-specific GNSS performance monitoring.**

EUROCONTROL will contribute to clarify aviation needs for specific data and parameters related to multi-frequency multi-constellation SBAS and GNSS performance.

### **(8) Support international activities on GNSS in the aviation domain**

- a) Support in preparing the EGNOS extension beyond ECAC (institutional and regulatory aspects):
  - I. Assessment of local legal and institutional frameworks for the development and operational exploitation of GNSS in the States concerned.
  - II. Definition of a comprehensive set of institutional instruments necessary to achieve a common interface of regulations based on practices and lessons learnt from implementation in Europe.
  - III. Assess ICAO safety oversight for non-SES states in order to determine an equivalent requirement to SES oversight in regions where the SES regulations are not applicable. EUROCONTROL should assess the introduction of MT28 (instead of MT27) in terms of states acceptance of EGNOS services.
- b) Support the EGNOS extension beyond ECAC (operational introduction):
  - I. Analyse the operational aspects (e.g. evolution of SBAS aircraft capability in the future) related to EGNOS extension beyond ECAC.

Contribute to define EGNOS/LPV elements of national/regional PBN roadmaps;

- II. Support to stakeholders (ANSPs, Airspace Users ...) in developing enablers based on the experience of European work (e.g. RAISG group of EUROCONTROL).
- III. Organise workshops and trainings at international level.
- c) Report on GNSS activities in GNSS-related international bodies (e.g. SWIM-NEXTGEN coordination activities).

The following deliverables are expected to be submitted by EUROCONTROL during the implementation of the third specific grant:

- a) Annual progress reports summarising the work implemented during the year and containing as a minimum the main results and achievements in the different areas, a risks/mitigations register and recommendations for tasks to be implemented during the following years.
- b) Preparation of Document Change Notices (DCNs) to EGNOS V3 mission requirements. The DCNs shall also document the expected benefits of the change.



- c) Report on the information required by aviation users from EGNOS and Galileo Service Provider also including NOTAM requirements.
- d) Report on the needs of the aviation community for the implementation of an SBAS authentication mechanism, including a safety analysis to confirm feasibility.
- e) Traffic and Aircraft Data analyses on current SBAS capabilities in ECAC to support EGNOS adoption in aviation. Traffic and Aircraft Data analyses on current SBAS capabilities and assessment of expected evolution of SBAS aircraft capability to support EGNOS adoption in aviation outside ECAC.
- f) Safety case guidance material for aviation applications (e.g. use of EGNOS in RNP approach to non-instrumented runways, helicopter Low Level Routes operations)
- g) Analysis of the operational effect of EGNOS continuity performance for SBAS APV I and CAT I.
- h) Annual report on the use of multi-constellation in aviation to advise on Regulatory aspects, including spectrum) with recommendations on standardisation actions and regulatory actions;
- i) Annual Report on the EGNOS and Galileo frequency management aspects such as: licensing rules, ban on jammers, regulation of pseudolites, protection of GNSS spectrum, compatibility between GNSS and other aviation systems, etc. and related regulation supporting the operational use.
- j) Contribution to GSA programme or project reviews: EUROCONTROL contribution to reviews that could include participation to meetings, preparation of RIDs and timely contribution to review reports.
- k) Report twice per year on the activities of SESAR for GNSS in aviation to identify gaps or overlaps between R&D activities on GNSS funded by H2020 and SESAR2020 programmes. A similar report shall be provided on the activities of relevant R&D programmes outside Europe (e.g. NEXTGEN) with recommendations on activities applicable to EGNOS and Galileo.
- l) Information on the software and/or hardware developed or acquired for the execution of the grant.

## **1.6 Award criteria for the specific grant**

### **1.6.1 Award criteria**

- 1) Understanding of the tasks, completeness and credibility of the proposed approach. The proposal shall explain how the objectives of the Third Specific Grant will be addressed in the grant and how the proposed work plan is adequate to reach the grant objectives.

- 2) Background and experience of the team proposed: the proposal shall clarify the coherence and appropriateness of the proposed team and demonstrate that the allocation of the proposed personnel is suitable to execute the assigned tasks.
- 3) Cost-effectiveness: the proposal shall define a clear and detailed budget and demonstrate a cost-efficient implementation of the foreseen activities.

## 1.7 Indicative timetable of the call for proposals and indicative amount of the specific grant

Indicative amount: 3,053,980 EUR

Indicative duration: 32 months or 31 December 2021. Activities shall be completed by 31 December 2021 the latest.

	Stages	Indicative timing
a)	Agency invitation for submissions	December 2018
b)	Deadline for submissions	January 2019
c)	Evaluation period	January-February 2019
d)	Signature of Specific Grant Agreement	April 2019

<b>Maximum possible rate of co-financing of the eligible costs: 100%</b>
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## 2 Shipborne double frequency multi-constellation receiver (E1/E5)

### 2.1 Legal basis

Regulation (EU) No 1285/2013 of the European Parliament and of the Council of 11 December 2013 on the implementation and exploitation of European satellite navigation systems and repealing Council Regulation (EC) No 876/2002 and Regulation (EC) No 683/2008 of the European Parliament and of the Council and Delegation Agreement between the European Union, represented by the European Commission and the European GNSS Agency on the Exploitation Phase of the EGNOS Programme.

### 2.2 Budget lines

The budget line is 3920.

NB: 500,000€ are funded through ref. EEX.0056 included in the EGNOS 2019 grant plan (GSA-EGN-PM-PL-244825\_1.0\_Grant Plan 2019) while 2,000,000€ are funded through ref. GEX.0331 included in the GAL 2019

grant plan: the activity is the same and it is reported in both grant plans for the sake of transparency and traceability. It is to be launched as a single common grant split exclusively in terms of budget funding.

## 2.3 Background

This activity is reported in both grant EGNOS and GALILEO plans for the sake of transparency and traceability, however it is to be launched as a single common grant split exclusively in terms of budget funding.

1. IMO resolution MSC.401(95) and MSC.432 adopted performance standards for multi-system shipborne radio navigation receivers. The resolution states that the equipment should use at least two independent GNSS recognised by IMO as part of the World Wide Radio navigation System (WWRNS) and should have the facilities to process augmentation data.
2. Galileo is recognised by IMO.
3. Galileo Open Service (OS) will be augmented via SBAS L5/E5.
4. The current shipborne receivers for SOLAS vessels are single frequency L1/E1.
5. The development of a dual frequency L1/E1 – L5/E5 maritime receiver is a pre-requisite to enable the augmentation of Galileo OS data.
6. There is a need to adapt aviation standards for SBAS L1/L5 for maritime use.
7. There is a need to explore the operational benefits of using authenticated positioning via the Open Service Navigation Message Authentication (OS-NMA) to provide an additional mechanism to detect a potential spoofing attack.

## 2.4 Priorities, objectives pursued and expected results

Development of a double-frequency shipborne multi-constellation open service receiver including Galileo OS E1/E5 and preparation of guidelines for the implementation of SBAS L1/L5.

## 2.5 Description of activities to be funded under this call for proposals

The call for proposals is intended to fund up to two (2) projects with the following activities:

### 1. Galileo (funded by Galileo Budget – please refer to the Galileo 2019 Grant plan):

- a) Develop and test of a dual frequency E1/E5 shipborne multi-constellation receiver based on Galileo, compliant with IMO resolutions MSC.401, MSC.432 and taking into account for Galileo multi-frequency receiver the IMO resolution MSC.233 and the IEC standard 61108-3.
- b) Get type approval for Galileo receiver following IEC standard 61108-3.
- c) Implement the algorithms to use the OS NMA to support Resilient PNT in maritime navigation (optional)

## 2. SBAS/EGNOS:

- a) Prepare guidelines for shipborne manufacturers for the implementation of SBAS L1/L5 open service.
- b) Develop firmware to process Galileo augmentation messages provided by SBAS L5.

## 2.6 Award criteria for the specific grant

### 2.6.1 Eligibility

The proposal may be submitted by entities fulfilling all the criteria below:

1. Legal persons established<sup>1</sup> in and/or natural person(s) who is national of one of the following countries, are eligible:

- EU Member States;
- Switzerland, Norway.

2. Applicants must correspond to the definition of the following target organisations: active in the development, integration and/or manufacturing of GNSS antennas, components, receivers and/or expert in the field of GNSS Research and development (R&D).

### 2.6.2 Non-exclusion criteria

Article 135 and Article 136 of Financial Regulations shall apply.

### 2.6.3 Selection criteria

The applicants must fulfil the following selection criteria:

1. The financial capacity of the applicant to perform the proposed activities
2. The technical capacity of the applicant to perform the proposed activities

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<sup>1</sup> Established should be understood as having a registered office, central administration or principal place of business in one of these countries.

## 2.6.4 Award criteria

1. Relevance of the proposal to achieve the objectives of the call, credibility of the proposed approach, and innovation of the solutions proposed;
2. Impact in terms of economic and public benefits derived from the proposal including but not limited to a coherent business plan for the exploitation of the results of the grant;
3. Credible and effective dissemination plan for the results in the best interest of the European Union;
4. Quality of the implementation: coherence and effectiveness of the work plan, including appropriateness of the allocation of tasks and resources.

## 2.7 Indicative timetable of the call for proposals and indicative amount of the specific grant

Indicative amount: 2,500,000 EUR (up to 2 (two) projects to be granted depending on the quality of the proposals received (indicative)) to be funded as follows: 500,000€ are funded through ref. EEX.0056 included in the present EGNOS 2019 grant plan while 2,000,000€ are funded through ref. GEX.0331 included in the GAL 2019 grant plan.

Indicative duration: Due to the budget availability, EGNOS budget shall cover the activities undertaken before 31 December 2021.

	<b>Stages</b>	<b>Indicative timing</b>
a)	Publication of the call	Q2 2019
b)	Deadline for submitting applications	Q3 2019
c)	Evaluation period	Q4 2019
d)	Information to applicants on the outcome of the evaluation	Q1 2020
e)	Signature of the Grant Agreements	Q2 2020

<b>Maximum possible rate of co-financing of the eligible costs: 70%</b>
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