



Brussels, 18.3.2016  
C(2016) 1580 final

ANNEX 1

**ANNEX**

**to the**

**Commission Implementing Decision**

**on the adoption of the 2016 Work programme and the financing for the implementation  
and exploitation of the European satellite navigation programmes**

## Table of Contents

1.	Introduction .....	4
1.1.	Purpose of this document .....	4
1.2.	The European satellite navigation systems .....	4
2.	Achieving the objectives of the Strategic framework .....	5
2.1.	2015 achievements .....	5
2.1.1.	Galileo service provision.....	5
2.1.2.	EGNOS service provision .....	6
2.1.3.	Market uptake.....	7
2.1.4.	Conclusions .....	7
2.2.	Key actions for 2016 .....	8
2.2.1.	Galileo service provision.....	8
2.2.2.	EGNOS service provision .....	9
2.2.3.	Market uptake.....	10
2.3.	Governance of the Galileo and EGNOS programmes .....	10
2.4.	Financial resources.....	11
2.4.1.	Budget for implementation of EU GNSS programmes.....	11
2.4.2.	Other funding related to the EU GNSS programmes.....	11
3.	2016 actions and milestones.....	12
3.1.	Objective 1: Provide Galileo services .....	12
3.1.1.	Priorities .....	12
3.1.2.	Main actions and milestones .....	14
3.2.	Objective 2: Provide EGNOS services .....	16
3.2.1.	Priorities .....	16
3.2.2.	Main actions and milestones .....	18
3.3.	Objective 3: Market uptake .....	19
3.3.1.	Priorities .....	19
3.3.2.	Main actions and milestones .....	20
3.4.	Objective 4: Evolution of the European global navigation satellite systems .....	22
3.4.1.	Priorities .....	22
3.4.2.	Main actions and milestones .....	23
3.5.	Objective 5: Programme Management.....	23
3.5.1.	Priorities .....	23
3.5.2.	Main actions and milestones .....	24
4.	Indicative breakdown of 2016 budget.....	26

Appendix I: Procurements implemented in direct management ..... 28  
Appendix II: Grants implemented in direct management ..... 32  
Appendix III: Actions implemented in indirect management ..... 36  
Appendix IV: Other actions ..... 38  
Appendix V: Acronyms ..... 39

## **1. INTRODUCTION**

### **1.1. Purpose of this document**

This annual work programme covers all activities to be launched or continued in 2016 to implement the European satellite navigation programmes – Galileo and EGNOS. Its legal basis is Regulation (EU) No 1285/2013 of the European Parliament and of the Council on the implementation and exploitation of the European satellite navigation systems (hereinafter "the GNSS Regulation").

In accordance with Article 27 of the GNSS Regulation, the annual work programme describes actions required to meet the objectives of the Galileo and EGNOS programmes and their funding. The annual work programme is adopted by the European Commission following the positive opinion of the European GNSS Programmes Committee in accordance with the examination procedure. It is also a basis for quarterly reporting on the progress of the programmes.

### **1.2. The European satellite navigation systems**

Galileo and EGNOS are two flagship projects of the Union. While the Galileo programme will establish the first global satellite navigation system under civil control, EGNOS is a regional satellite navigation system that monitors and corrects open signals from existing global satellite navigation systems.

With the European economy increasingly depending on satellite navigation services in transport, logistics, telecommunication or energy it is important that the Union can rely on an autonomous civil system. The new generations of high-performance satellite navigation services provide considerable opportunities in a wide range of activities.

The provision of satellite navigation services depends on the readiness, robustness and security of the underlying infrastructure, consisting of a fleet of satellites and a ground segment. This infrastructure needs to be deployed according to the agreed budget, timeline and performance requirements. Additionally, the system operator and other actors involved in the services provision need to be ready to ensure seamless service provision according to the agreed parameters.

## **2. ACHIEVING THE OBJECTIVES OF THE STRATEGIC FRAMEWORK**

This chapter contains a strategic assessment as to how the achievements of 2015 as well as the key actions planned for 2016 contribute to the objectives of the Galileo and EGNOS programmes, in line with the strategic framework outlined in the 2014 GNSS Work programme:

- provide Galileo services;
- provide EGNOS services;
- reinforce market uptake of Galileo and EGNOS services

### **2.1. 2015 achievements**

#### *2.1.1. Galileo service provision*

The key priority of the past years has been the preparation of the exploitation phase of the Galileo programme in the view of the provision of the full set of Galileo services in 2020.

In this context, the Commission has focussed on three areas:

- carrying out ongoing activities for the deployment of ground and space segments;
- preparing the transition from the deployment to the exploitation phase in 2016, including the initial service provision;
- consolidating the system configuration in view of the Full Operation Capability (FOC) in 2020, and the preparation of evolution of Galileo.

Regarding ongoing activities, substantial progress was made regarding both the ground and space infrastructure. In 2015, critical activities for the ground infrastructure took place, in line with the objectives for Galileo service provision:

- a major update of the ground mission segment (GMS) with improved performance, robustness and availability was deployed (release v2.1), together with a pre-operational version of the Galileo Security and Monitoring Centre which was deployed on the French site in July 2015;
- the operational ground control segment (GCS) system has successfully demonstrated its capacity to control the Galileo satellites already in orbit.

The deployment of the space infrastructure accelerated in 2015:

- with three successful launches and the deployment of six further satellites the Galileo constellation reached a total of twelve satellites in orbit;
- the production of the remaining already ordered fourteen satellites has been continuing as planned;
- the procurement of the additional satellites to complete the constellation and replenishment satellites was initiated. They are expected to start being available in 2019;
- the satellites 5 and 6 launched into an incorrect orbit were recovered and will be adequate for the provision of Galileo Search and Rescue services;
- an insurance policy was put in place for launchers and satellites.

Security is a core function for Galileo. The system operations require a security accreditation by the Security Accreditation Board. Measures were taken to increase the cyber security of

the infrastructure and the rules for access to the Public Regulated Service (Common Minimum Standards) were adopted by the Commission in September 2015.

In addition to a robust space and ground infrastructure, service provision requires the establishment of a contractual framework concerning system operations and the different sites of the programme. In 2015, the following developments can be highlighted:

- preparations for the conclusion of administrative arrangements continued with the Member States hosting parts of the ground infrastructure (including the Galileo Control Centre and the Galileo Reference Centre);
- the Galileo service operations public procurement, initiated by the GSA in December 2014, continued, ensuring that the selection of the future Galileo operator is on track;
- procurement of hosting services necessary to run the ground infrastructure was launched.

This means that the putting into place of the framework for the provision of initial services from 2016 and full services in 2020 is on track.

Additionally, the steps necessary to ensure a smooth and seamless transition between the deployment and exploitation phases of the programme were taken, both at technical and contractual level. This implied the successful prolongation of ground segment contracts under the deployment phase, anticipating the needs of the exploitation phase and ensuring the robustness of the system with regard to external threats, and the launch of negotiations both for the amendment of delegation agreements and the Galileo working arrangements.

Finally, the System Delta Critical Design Review was initiated in December 2015 and has allowed establishing a process for the consolidation of the system configuration aimed for 2020. In addition, preparatory activities related to the evolution of Galileo intensified in 2015 as the Commission services continued to explore possible evolution areas aimed at improving the existing technology and performance baseline, and that could be introduced during the replenishment phase. A delegation agreement with ESA was concluded on the upstream R&D and system engineering activities for the evolution financed under the Horizon 2020 programme. In the context of the programme Horizon 2020 seven projects dealing with mission activities and services evolution were launched by the Commission.

#### *2.1.2. EGNOS service provision*

The second priority of the 2015 work programme was the operation and maintenance of the EGNOS services, enlarging the coverage and the preparation of the new EGNOS generation.

In 2015 the EGNOS services were provided in line with applicable requirements. This means that the objectives for the continued provision of the current EGNOS services were fully met.

Additionally, a new system release took place successfully (EGNOS V2.4.1M), improving the resilience of EGNOS signals passing through the ionosphere and enabling the declaration of a new service level for airplane landing procedures (LPV-200). The EGNOS Service Evolution Plan v2.0 was developed and constitutes the baseline for the evolution of the EGNOS services.

Finally, the framework for future upgrades was put in place including:

- the conclusion of the EGNOS working arrangement between the GSA and ESA<sup>1</sup>;
- preparations for an additional system release (EGNOS V2.4.2);
- adoption of a Commission implementing decision on the technical and operational specifications of a major evolution (EGNOS V3)<sup>2</sup>, which will improve both GPS and Galileo signals.

This will allow the evolution of EGNOS in line with the programme objectives.

### 2.1.3. *Market uptake*

Reinforcing market uptake of Galileo and EGNOS services was the third priority of the 2015 work programme, as the use of these services needs to be ensured. Market uptake activities focussed on the following areas:

- regulatory activities: a major milestone was completed this year with the adoption of the eCall Regulation<sup>3</sup> in April 2015, which ensures compatibility of the eCall system with Galileo and EGNOS;
- development of applications financed by the Union: the second Horizon 2020 European GNSS Applications call was evaluated. Furthermore, the first calls under the ‘Fundamental Elements’ set of activities were launched in 2015;
- development of standards progressed well, in particular in the aviation sector;
- frequency coordination: with regard to the Galileo and EGNOS frequencies, building upon successful ITU coordination with GPS, IRNSS and QZSS in 2014, the coordination with BeiDou was concluded in 2015;
- intellectual property rights related to Galileo and EGNOS: the Commission has ensured access to key IPR held by CNES and the UK government, and has published a new set of the documents (including OS ICD) required by manufacturers to produce equipment able to process Galileo open service signals;
- awareness raising: this included in particular the EGNOS Flight Event in Toulouse in May 2015.

These activities will contribute to maximising the return on Union's investment to the programmes.

### 2.1.4. *Conclusions*

With regard to the completion of actions set out in the 2015 work programme, the majority of actions critical for the preparation of the Galileo exploitation phase were completed. There are several actions that are expected to be completed in 2016 such as Ariane-5 qualification, completion of the initial services validation review and international negotiations. One fifth of the actions in the 2015 Work programme were of recurring nature, in particular in the area of

---

<sup>1</sup> The EGNOS working arrangement between GSA and ESA was signed on 6 July 2015.

<sup>2</sup> Commission Implementing Decision (EU) 2015/1183 of 17 July 2015 setting out the necessary technical and operational specifications for implementing version 3 of the EGNOS system. OJ L 192, 18.7.2015, p. 20–26.

<sup>3</sup> Regulation (EU) 2015/758 of the European Parliament and of the Council of 29 April 2015 concerning type-approval requirements for the deployment of the eCall in-vehicle system based on the 112 service and amending Directive 2007/46/EC. OJ L 123, 19.5.2015, p. 77–89

programme management and international relations. These actions have been carried out continually and will go on in 2016.

As with any large infrastructure project, and in particular in the area of space, risks can materialise at any moment. The Commission mitigated these risks through a risk management process. Examples include:

- the risk of delays with the Ariane-5 adaptation, which was mitigated through the establishment of an Independent Inquiry Board, the recommendations of which were implemented;
- the risk of future launch failures, which was mitigated through the conclusion of appropriate insurances.

As an overall assessment, it can be stated that with the actions implemented under the GNSS Work Programme 2015, Galileo and EGNOS are on track to meet the objectives of the strategic framework.

## **2.2. Key actions for 2016**

The priorities for 2016 are:

1. Achieve Galileo initial services with sufficient service level, security and continuity and prepare for the full operational capability of the services by end 2020;
2. Ensure the continuity of service for both Galileo and EGNOS services (including effective risk mitigation after the declaration of Galileo initial services);
3. Promote the market uptake of Galileo and EGNOS services by continuing the ongoing activities and by proposing a Space Strategy for Europe.

### *2.2.1. Galileo service provision*

2016 constitutes a pivotal year for the Galileo programme, notably in view of the transition from the deployment to the exploitation phase and initial services provision. At the same time, activities will be ongoing to ensure the full deployment of the system.

The transition towards the exploitation phase implies the transfer of responsibilities for the ground segment, system operations and the development of future generations towards the GSA, pursuant to the GNSS Regulation. Conversely, the production and launch of the remaining satellites will be implemented under the deployment phase. Consequently, the contractual framework for programme implementation will evolve, on the basis of the preparatory work initiated in 2015. This implies a modification of the delegation agreements concluded by the Commission with both ESA and the GSA later this year, the conclusion of a working arrangement on Galileo between the GSA and ESA, and the transfer of industrial contracts to the GSA. A roadmap for all activities and contractual arrangements until 2020 will be finalised by mid-2016.

On services provision, initial services declaration is expected to take place before the end of 2016. Initial services are due to include:

- an initial Open Service, in combination with GPS;
- an initial Search and Rescue Service, with forward link only;
- PRS early access initial service, with manual distribution of keys and test and preoperational receivers;
- continuation of the Commercial Service demonstrator activities.

To that end, it is essential to continue the deployment of the infrastructure, in particular with the launch of additional satellites and the deployment of the service facilities, notably the COSPAS-SARSAT commissioned SAR Galileo Ground Segment, to ensure that the system is sufficiently robust.

Additionally, the already available core ground facilities at the Galileo Control Centres (GCC), at the Galileo Security and Monitoring Centre (GSMC), at the Galileo remote sites and at the European GNSS Service Centre nucleus (GSC-Nucleus) will be upgraded as necessary to ensure their readiness to support the Initial Services. Finally, the performance of the initial services needs to be tested in a representative environment before going 'live', and the services need to obtain security accreditation.

Additional procurements concerning new service facilities (such as the Galileo Reference Centre and Integrated Logistic Centre) and upgrades (European GNSS Service Centre) shall be launched in 2016 to meet the programme objectives in the mid-term.

Although the provision of initial services is a crucial milestone, it is only a step towards achieving Full Operational Capability (FOC). To ensure the completion of the deployment phase by 2020 important activities need to be carried out in 2016, in particular:

- to finalise the technical perimeter of the system at FOC;
- to sign the contract(s) for the purchase of additional satellites;
- to launch the follow up contracts for system and service support and the ground segment;
- to complete the selection of the Galileo Service operator, the conclusion of administrative arrangements with Member States hosting ground infrastructure, and the procurement of hosting services, in a coherent, complementary and synchronised fashion.

Regarding security, key actions will include measures to ensure the accreditation of the system and initial services, and the development of operational concepts and procedures for the PRS.

The more distant future also needs to be prepared to ensure the continuity of services after 2020. In 2016 preparatory work will continue to identify possible evolution areas, technological capabilities, constraints, signal and frequencies trends, evolutions of the GNSS international context and lessons learnt from the operation of the current system.

### 2.2.2. *EGNOS service provision*

For EGNOS, efforts are focused on ensuring the continuity of services in the medium and long term. This requires an efficient implementation of recurring activities, and the preparation of system updates.

In the medium term, to guarantee the continuity of services beyond 2018/2019 by managing obsolescence and to ensure full coverage of all EU Member States a new release of the system (V2.4.2) with the deployment of four additional RIMS is expected to be kicked-off in 2016.

In the long term, the objective is to deploy a new version of the system (EGNOS V3) which will allow for the provision of more robust services (dual frequency, dual constellation). The procurement for this new generation of system is planned to be launched in 2016 with the qualification of a first version (V3.1) providing the current legacy services in mid-2021/2022 and the qualification of a second version (V3.2) with dual-frequency GPS and Galileo version in 2023 at the earliest.

### 2.2.3. *Market uptake*

In view of the investment, it will be crucial to demonstrate that a relevant infrastructure is put in place but also that there is a plan and a vision for the uptake of these technologies in the market. Therefore, the Commission will tackle the market uptake of Galileo and EGNOS services, in particular in the context of the Space Strategy for Europe to be submitted in 2016. It is the ideal time to do so, given the provision of initial services by Galileo from 2016 onwards.

Furthermore, a week-long event under the auspices of the Dutch Presidency of the Council, the European Space Solutions Conference 2016 'Bringing Space to Earth' will take place from 30<sup>th</sup> May to 3 June.

In the field of international cooperation, negotiations with the US and Norway for access to PRS are expected to start in the course of 2016, and negotiations with ASECNA will continue with a view to finalising them by the end of the year.

### **2.3. Governance of the Galileo and EGNOS programmes**

Under the overall responsibility of the Commission, the implementation of programmes' tasks is divided between ESA and GSA in line with the Commission Implementing Decision<sup>4</sup> amended in 2015 and with the provisions of the respective delegation agreements. Currently, these delegation agreements are in force:

- Delegation Agreement concluded with ESA on the further deployment of Galileo (signed in July 2014);
- Delegation Agreement concluded with the GSA on Galileo exploitation (signed in October 2014 and amended in December 2015);
- Delegation Agreement concluded with the GSA on EGNOS exploitation (signed in April 2014).

These agreements lay down the general conditions for the management of the tasks and the funds entrusted to these agencies and rules applicable to their implementation. The technical annex of each agreement describes in detail the tasks to be carried out under indirect management.

The Programme Management Plan<sup>5</sup>, common to the deployment and exploitation phases of the Galileo programme, describes the Galileo Programme management processes and sets out how the Commission, the GSA and ESA interface in the management and implementation of the Programme's activities.

The GSA and ESA entered into working arrangement on the future implementation of the EGNOS programme in 2015. A similar working arrangement on the implementation of the Galileo programme is expected to be concluded as part of the transfer of management responsibility for deployment of infrastructure to GSA in 2016.

In addition, under the Horizon 2020 two delegation agreements related to Galileo and EGNOS programmes were concluded: one with the GSA in the area of European GNSS applications and one with ESA in the area of European GNSS infrastructure related research and development.

---

<sup>4</sup> Commission Implementing Decision of 14.2.2014 on entrusting budget implementation tasks to the European GNSS Agency and the European Space Agency linked to the deployment and exploitation of the European GNSS systems (EGNOS and Galileo). C(2014) 809 final

<sup>5</sup> Annex to the Delegation Agreements

## **2.4. Financial resources**

### *2.4.1. Budget for implementation of EU GNSS programmes*

The 2015 financial execution has reached 100%. In particular:

- the annual parts of the delegation agreements for the Galileo deployment and for the exploitation of EGNOS have been committed;
- the Delegation Agreement concluded with the GSA on Galileo exploitation was amended and increased with additional 300 million EUR;
- direct management actions were concluded in due time.

The 2016 work programme amounts to 993 823 100 EUR in commitment appropriations. More than 98% of this budget is implemented in indirect management by ESA and GSA in accordance with the provisions of the respective delegation agreements. It is recalled that ESA implements the entrusted acts in the name and on behalf of the European Union while the European GNSS Agency does so in its own name. The remaining budget is to be implemented in direct management by the European Commission through procurements and grants. The indicative breakdown of funds is detailed in chapter 4.

### *2.4.2. Other funding related to the EU GNSS programmes*

The activities of the Galileo and EGNOS programmes are supported by Horizon 2020. In the area of European GNSS applications (implementation delegated to GSA), the second Call for proposals for GNSS applications was carried out in 2015 and the projects will start in 2016. A third Call for proposals for GNSS applications is foreseen in the 2016-2017 Horizon 2020 Space Work Programme for an estimated amount of EUR 33 million. In the area of European GNSS infrastructure related research and development a delegation agreement was signed with ESA in 2015 and the Horizon 2020 space work programme 2016-2017 indicates a funding of EUR 96.5 million for this activity. The European GNSS mission and services related research and development activities are under direct management by the Commission.

### 3. 2016 ACTIONS AND MILESTONES

This chapter outlines the specific actions to be implemented in 2016 to achieve the overall objectives and milestones of the programmes as defined in the GNSS Regulation.

#### 3.1. Objective 1: Provide Galileo services

##### 3.1.1. Priorities

The shared objective of the main stakeholders of the programmes is to start delivering Galileo services as soon as possible on the basis of the infrastructure available so as to allow citizens and businesses to benefit from Galileo before the constellation is fully deployed. The feasibility of this objective has been confirmed by the joint Task Force set up to work on initial services preparation and comprising experts from the Commission, the European GNSS Agency and ESA.

The declaration of initial services will enable the use of the deployed infrastructure by receiver manufacturers, application developers and early adopters thus starting to build the user basis for Galileo. This will contribute to improving the position of Galileo in an increasingly competitive environment.

Our objective is to achieve the declaration of Galileo initial services before the end of 2016. These will consist of:

- Initial Open Service, in combination with GPS;
- Initial Search and Rescue service, with forward link only;
- PRS early access initial service, with manual distribution of keys and test and pre-operational receivers;
- Continuation of Commercial Service demonstrator activities.

The declaration and provision of Galileo initial services depends on the readiness of the space and ground infrastructure, in particular the availability of sufficient satellites (minimum 7), a stable and functional ground segment, the minimum configuration of the Galileo Security and Monitoring Centre (GSMC) as well as the Galileo Service Centre (GSC) and Key Performance Indicator (KPI) monitoring tools.

The planning calls for a Service Validation Readiness Review in January 2016 and a Service Validation Review in May 2016, leading to Service Declaration before end 2016, subject to the relevant security accreditation.

To enable the declaration of initial services, further critical activities need to be undertaken in 2016:

- to ensure the deployment of the relevant Galileo infrastructure:
  - The ground segment will continue to be upgraded and maintained by the current FOC contractors during 2016 and up to mid-2017 by providing new releases that should implement improved security features and additional service management functions.
  - The space segment will continue to be deployed; it is expected to launch four Galileo satellites in 2016, achieving a total of 16 satellites of the constellation. In parallel, the procurement for remaining constellation satellites and replenishment satellites will be concluded and contract(s) signed.
- to ensure the security of the system:

- ensure that appropriate actions are taken to maintain the security accreditation of Galileo operations granted by the SAB;
- obtain authorisation to launch satellites, to be granted by the SAB;
- obtain security accreditation for the declaration of initial services, to be granted by the SAB.
- to ensure the preparation for and provision of Galileo services:
  - public procurement for the Galileo service operator (GSOp) should be finalised by the end of 2016. To allow a smooth handover of operations to GSOp new contracts for the ground segment should be in place in early 2017 to ensure the transition to exploitation;
  - the services facilities will continue to be deployed: the GNSS Service Centre Nucleus will continue its operations until its replacement by the first version of the GNSS Service Centre; the Galileo Reference Centre (GRC) the contract for the first version of GRC (v1) will be awarded by GSA in mid-2016 and the Integrated Logistics Service (ILS) Centre will be deployed by the end of 2016.

In parallel, the other activities related to service provision will be ongoing:

- Regarding the Commercial Service and the Open Service Authentication, the actions have been divided in four streams: Definition, Implementation, Demonstration and Exploitation. The approval of the specifications of the Commercial Service will allow launching the related activities toward adapting the Galileo system as required, and preparation of the CS Provider selection process;
- Regarding the Public Regulated Service, work will focus on defining security management and operational concepts and procedures for the use of PRS;
- Regarding the Search and Rescue Service, the SAR/Galileo Service preparation phase should be completed by CNES (acting as SAR/Galileo Data Service Provider) in the first half of 2016. Search and Rescue transponders and the EU MEOLUTs should be ready for final endorsement by the Cospas-Sarsat Council in October 2016. In order to ensure the global coverage of the future MEOSAR system, the Commission plans to procure an additional MEOLUT (SAR Ground Station) to be deployed in one of the Galileo sites in south Indian Ocean. During the year significant progress on the development of the operational Return Link Service Provider (RLSP) shall also be achieved;
- The Commission will continue its collaboration with ICAO, EUROCAE and Cospas-Sarsat on the use of the return link service for the remote activation of aviation distress in view of defining future services provided by the RLS technology of Galileo.

### 3.1.2. Main actions and milestones

Objective 1.1: Deploy infrastructure				
#	Actions	Description	Target Date	Direct/indirect management (ESA/GSA)
1.1.1	Produce and accept satellites	Produce and accept satellites in accordance with the schedule		Indirect management by ESA
1.1.2	Launch satellites	4 satellites will be launched using a qualified Ariane 5 for its use for Galileo	Sep-Nov -16	Indirect management by ESA
1.1.3	Procure additional satellites to complete the constellation	Award a contract for remaining constellation satellites to allow completion of the constellation by 2020 and replenishment satellites	Sept-16	Indirect management by ESA
1.1.4	Complete the S-DCDR and establish a consolidated roadmap until 2020	<p>The completion of the System Delta CD Review will allow for consolidation of the Galileo FOC scope, definition of the Master FOC Implementation plan and verifying the consistency between FOC ESA and GSA system development, deployment and validation plans as well as assessing the critical paths, identifying and assessing risks and mitigation actions. Immediately after, the detailed tender documentations for the procurement of the ground segment follow up contracts will be launched to ensure continuity with the current deployment activities.</p> <p>Following the close-out of the S-DCDR and the launch of the procurements for the Galileo infrastructure contracts, the handover plan from ESA-GSA from deployment to exploitation phase, will be carried out together with necessary changes in the Delegation Agreements and Working Arrangement between ESA and GSA.</p> <p>The consolidated roadmap can be established based on the accomplishment of the above.</p>	<p>Mar-16</p> <p>Jun-16</p>	
1.1.5	Deploy further the ground segment	<p>The main pending ground segment deployments envisaged in 2016 to reach improved security features and additional service management functions by mid-2017:</p> <ul style="list-style-type: none"> <li>- GSMC Enhanced Minimum Configuration (April)</li> <li>- GCS v2.1.1 (June)</li> <li>- GMSv2.1.1 (April)</li> <li>- GSF P2.0.1 (September)</li> <li>- GCS v2.1.2 (December)</li> <li>- Infrastructure and Operation Hand Over (December)</li> <li>- Other activities contribution to long term planning</li> </ul>	Dec-16	Indirect management by ESA

Objective 1.2: Provide services				
#	Actions	Description	Target Date	Direct/indirect management (ESA/GSA)
1.2.1	Prepare the contractual framework for exploitation phase	New contracts for the ground segment as well as system and service support and operations need to be concluded for the exploitation phase up to 2020.	Dec-16	Indirect management GSA
1.2.2	Complete the initial services validation review	This review will comprise the verification of: - Readiness status of the Galileo infrastructure to support the provision of initial services; - Readiness status of the Galileo operations to support the provision of initial services; - Feasibility and adequacy of initial service provision management processes (in terms of continuity and quality).  -Availability of all tools and processes required to assess and report on Key Performance Indicators	Jul-16	Indirect management by GSA
1.2.3	Manage service centres	This action will focus on:		
		i) Achieve operational readiness of an integrated and qualified full EGNSS Service Centre (GSC) (v1) while continuing Galileo Service Centre Nucleus operations.	Dec-16	Indirect management by GSA
		ii) Prepare new versions of the European GNSS service centre.	Dec-16	Indirect management by GSA
		iii) For the Galileo Reference Centre (GRC): conclude a contract for equipment development and early operations, as well as for the provision of Hosting Services.	Jul-16	Indirect management by GSA
		iv) Secure support of Member States to GRC operations by means of a grant scheme.	Sept-16	Indirect management by GSA
		v) Procure an additional Timing & Geodesy Validation Facility (TGVF) to support early performance monitoring before the GRC equipment is developed.	Jul-16	Indirect management by GSA
		vi) deploy the Integrated Logistics Center and handover to the GSOp contractor	Dec-16	
1.2.4	Prepare the provision of the Commercial Service	This action will focus on:		
		i) Establish technical and operational requirements for the CS	Jan-16	EC
		ii) Procure Galileo OS Navigation Message Authentication Module	Mar-16	Indirect management by GSA
		iii) Finish demonstrations with CS Demo platform for OS Authentication and CS.	Sep-16	Indirect management by GSA
1.2.5	Prepare Return Link Service function	Develop the operational Return Link Service Provider (factory acceptance) so that the RLSP is ready to be deployed on the SAR/Galileo Service Centre by 2016.	Dec-16	Direct management by EC

	1.2.6	<b>Launch PRS User Segment Support</b>	The PRS User Segment Support Activities will be developed to support Member States		Indirect management by GSA (in coordination with EC and ESA)
--	-------	--	--	---	---

<b>Objective 1.3: Ensure the security of the Galileo programme</b>					
#	Actions	Description	Target Date	Direct/indirect management (ESA/GSA)	
1.3.1	<b>Improve cyber security of Galileo</b>	Implement corrective and preventative measures concerning cyber security.		Indirect management by ESA	
1.3.2	<b>Prepare PRS</b>	This action will focus on:			
		i) Elaborate PRS operational procedures and user-group organisation	Dec-16	EC	
		ii) Update PRS implementation plan to allow PRS participants to align their schedule and to plan the ramp-up of their activities in accordance with the Programme milestones.	Mar-16	Indirect management by GSA (in coordination with both EC and ESA)	
1.3.3	<b>Coordinate the preparation of crisis management procedures</b>	Coordinate with the EEAS the establishment and implementation of complete operational procedures.	Jun-16	Direct management by EC	
1.3.4	<b>Establish specific arrangement on PRS with ESA</b>	Access to PRS technology and the ownership or use of PRS receivers shall be authorised, subject to compliance with the principles laid down in Article 8 and the Annex of Decision 1104, as regards the European Space Agency, strictly for the purposes of research, development and infrastructure roll-out, as laid down in a specific arrangement with the Commission.	Oct-16	Direct management by EC	
1.3.5	<b>Administrative Arrangement on the hosting and operation of PRS stations in Norway</b>	Decision 1104/2011/EU foresees the possibility of establishing an administrative arrangement with third countries on the hosting and operation of PRS stations.	Mar-16	Direct management by EC	
1.3.6	<b>Obtain and maintain security accreditation</b>	Obtain and maintain security accreditation for operations and for site infrastructure.		Direct management by EC (in coordination with both GSA and ESA)	

### 3.2. Objective 2: Provide EGNOS services

#### 3.2.1. Priorities

EGNOS is the EU Satellite Based Augmentation System (SBAS) providing three services to end users: the Open Service (OS) since 2009, the Safety-of-Life service (SoL) since 2011 and the EGNOS Data Access Service (EDAS) since 2012. The associated performances can be found in the related Service Definition Documents (SDDs).

For 2016, the main objectives in the EGNOS services provision are to:

- ensure the continuity of the services by operating, maintaining and ensuring services quality of the latest deployed EGNOS system release;
- continue with the improvement of the services by deploying major evolutions such as EGNOS V2.4.1N<sup>6</sup>, by finalising the study phase of the next major EGNOS evolution (EGNOS V2.4.2 phase B) and launching its development and qualification (EGNOS V2.4.2 phase CD) and by developing also minor evolutions – managed by ESSP – such as the Yearly System Release 2 (YSR2<sup>7</sup>);
- launch the procurement of the future generation of the system (EGNOS V3<sup>8</sup>) and the services of a new geostationary transponder (GEO3).

With respect to EGNOS coverage and in line with the GNSS Regulation objective to cover all Member States' European territories as soon as possible, in 2015 the EGNOS Service Evolution Plan v2.0 was established. During 2016, the advancement of such a plan will be reported and an updated version will be available by end of the year with the necessary changes to reflect the most up-to-date information.

As for EGNOS coverage extension to non-Member States territories, notably the EGNOS extension to European Neighbourhood Policy (ENP) south countries and Ukraine, infrastructure should continue to be deployed to complete the work achieved under the Euromed GNSS I & II programmes and ensure Safety of Life (SoL) coverage to these areas.

In line with the mandate received from the Council of the EU to negotiate with ASECNA, the work towards the provision of Satellite Based Augmentation System (SBAS) services based on EGNOS over the African region will continue. Extension coverage of EGNOS to third countries is subject to the conclusion of international agreements.

With respect to EGNOS security, the main priorities will be to:

- Prepare a security accreditation strategy;
- Ensure compliance with security rules and proper integration of the risks relating to the High Level Security Statement in EGNOS V3;
- Ensure the correction of the findings stemming from EDAS penetration test;
- Establish an EDAS access policy.

EGNOS evolution activities will focus on enhancing EGNOS services. The development and qualification phase (phase C/D) of EGNOS V3 will be procured in 2016. Also, the procurement for the geostationary satellite serving EGNOS V3 (satellite GEO 3) will be initiated.

---

<sup>6</sup> EGNOS V2.4.1N integrates ASTRA 5B into operations.

<sup>7</sup> EGNOS YSR2 will extend EGNOS coverage from 70N to 72N.

<sup>8</sup> EGNOS V3 will provide dual-frequency multi-constellation services.

### 3.2.2. Main actions and milestones

Objective 2.1: Provide and enhance EGNOS services					
#	Actions	Description	Target Date	Direct/indirect management (ESA/GSA)	
2. Provide EGNOS services	2.1.1	<b>Operate, maintain and ensure coherence and quality of EGNOS services</b>	Operate and maintain EGNOS services based on the latest EGNOS release and ensure the continuity and quality of services in terms of safety, certification, interoperability, performance monitoring, and engineering. This task will be performed by the EGNOS service provider.		Indirect management by GSA
	2.1.2	<b>Publish updated EGNOS services performances</b>	Publish updated Service Definition Documents (SDD) with the latest EGNOS System Releases deployed and in operation.		
			i) Publish OS SDD based on ESR V2.4.1M	Jul-16	Indirect management by GSA
			ii) Publish SoL SDD based on ESR V2.4.1M	Jul-16	Indirect management by GSA
	2.1.3	<b>Upgrade and deploy EGNOS System</b>	Procure, develop, qualify and deploy new EGNOS System Releases (ESR) to improve performance, increase robustness and solve obsolescence. This action will focus on the following main activities:		
			i) Complete the acceptance of the last two RIMS A/B which can still be procured with current technology	Mar-16	Indirect management by GSA
			ii) Complete the Preliminary Design Review (PDR) for ESR V2.4.2 Phase B	Feb-16	Indirect management by GSA
			iii) Qualify ESR V2.4.1N	May-16	Indirect management by GSA
			iv) Start the EGNOS V2.4.2 phase CD	Oct-16	Indirect management by GSA
	2.1.4	<b>Extend EGNOS coverage within EU-28 territories</b>	Determine the location of the ground-based infrastructure of the systems.	Jun-16	Direct management by EC
	2.1.5	<b>Enhance EGNOS services</b>	Enable enhanced EGNOS services by:		
			i) Elaborating a plan for the evolution of the EDAS services	Sep-16	Indirect management by GSA
			ii) Proposing SBAS service requirements for rail	Sep-16	Indirect management by GSA
	2.1.6	<b>Prepare the new EGNOS generation (EGNOS V3)</b>	Procure and develop a new generation of the System and associated GEOs		
			i) Launch EGNOS V3 phase CD tender	May-16	Indirect management by GSA
ii) Kick-off the GEO3 activities			Dec-16	Indirect management by GSA	

2. Provide EGNOS services	Objective 2.2: Enlarge EGNOS coverage				
	#	Actions	Description	Target Date	Direct/indirect management (ESA/GSA)
	2.2.1	Coordinate activities to ensure EGNOS extension beyond EU-28	Coordinate relevant activities to examine the EGNOS extension beyond EU-28 territories		Direct management by EC
2.2.2	Coordinate technical activities to enable EGNOS adoption beyond EU-28 territories	Launch of the technical activities for the development of a system for SBAS provision in Africa based on EGNOS.		Indirect management by GSA	
2. Provide EGNOS services	Objective 2.3: Ensure the security of the EGNOS programme				
	#	Actions	Description	Target Date	Direct/indirect management (ESA/GSA)
	2.3.1	Ensure EDAS (EGNOS Data Access Service) security	Implement the activities recommended following the EDAS penetration test in accordance with the detailed action plan to be proposed by the GSA, including the EDAS access policy, as well as specific security analysis as necessary.		Indirect management by the GSA
2.3.2	Accredit EGNOS	Prepare EGNOS accreditation activities together with Member States through the appropriate fora.		Direct management by EC (in coordination with both GSA and ESA)	

### 3.3. Objective 3: Market uptake

#### 3.3.1. Priorities

The socio-economic benefits of the use of the systems established under the Galileo and EGNOS programmes shall be maximised through the wide adoption of the services offered by them. This will be further detailed in the "Space Strategy for Europe" and will include market specific as well as horizontal activities. Further details can be found here: [http://ec.europa.eu/smart-regulation/roadmaps/index\\_en.htm](http://ec.europa.eu/smart-regulation/roadmaps/index_en.htm)

Actions focusing on raising awareness and building confidence in the systems, with the support of other relevant services of the Commission, will focus on presenting the Galileo and EGNOS programmes in a number of international events and conferences on satellite navigation. The GSA will present the programmes at sector-related conferences. Furthermore, a week-long event under the auspices of the Dutch Presidency of the Council, the European Space Solutions Conference 2016 'Bringing Space to Earth' will take place from 30<sup>th</sup> May to 3<sup>rd</sup> June.

With regard to the standards' development activities, actions launched in the past for the development of sectorial standards for EGNOS and Galileo will continue to be pursued in 2016 with these objectives:

- facilitating the use of GNSS technology in a broad set of multi-modal transport applications recommended by multi-modal transport EU policies, including rail;
- preparing for the initial provision of the Galileo Commercial Service;

- covering potential new authentication services to be introduced on Galileo. In the aviation sector, the main focus will be the development of standards for Galileo and for the next generation of SBAS augmenting two frequencies and multiple constellations. The work will be mostly conducted in the context of ICAO and aviation receiver standardisation bodies such as EUROCAE and RTCA;
- in the maritime sector, the recognition of Galileo as part of the Worldwide Radio Navigation Service will be sought from IMO. In parallel, work will be on-going in RTCM to update EGNSS standards in order to include Galileo and actions will be taken to prepare for a potential future use of EGNOS V3 by the maritime sector;
- work will also continue to maintain and update standards in the area of Location Based Service (LBS), namely focusing on 3GPP and OMA standardization groups, and multi-modal transportation.

To ensure compatibility with relevant systems, and in particular to harmonize the provision of services with future generations of Galileo and EGNOS with GPS and WAAS, the cooperative work with the US counterparts will continue during 2016 under the frame of the Working Group C (created following the EU-US cooperation agreement on satellite navigation). The subgroup on Advanced Receiver Integrity Monitoring (ARAIM) will also continue carrying out its tasks, which for beginning of 2016 previews the publication of the third report on the topic (the “Milestone 3 Report”).

To protect frequencies, the focus for 2016 will be on:

- reaching a workable solution with radio amateurs will be important to minimise potential impacts to E6 services;
- consolidating ideas for the evolved Galileo signals;
- identifying potential threats to European GNSS spectrum from conclusions of the World Radiocommunication Conference (WRC) 2015 and preparation for the next one in 2019.

### 3.3.2. Main actions and milestones

3. Secure return on investment	Objective 3.1: Raise awareness				
	#	Actions	Description	Target Date	Direct/indirect management (ESA/GSA)
	3.1.1	Organise a Space Solutions/ Applications event	Organise a Space Solutions/ Applications event together with the GSA, which will create synergies between Galileo, Copernicus, and space research.	Jun-16	Indirect management by GSA
3.1.2	Ensure the promotion of the EU GNSS programmes	To support the presentation of the Galileo and EGNOS programmes by producing audio-visual materials, publications as well as attending and organising dedicated events.	Dec-16	Direct management by EC	

Objective 3.2: Reinforce market uptake, and standards				
#	Actions	Description	Target Date	Direct/indirect management (ESA/GSA)
3.2.1	Maximising the socio-economic benefits of Galileo and EGNOS	This will be further detailed in the "Space Strategy for Europe	Oct-16	Direct management by EC
3.2.2	Ensure large adoption of EGNOS and Galileo in aeronautical domain	As defined by the policy paper for the adoption of EGNOS and Galileo above (3.2.1), aviation-specific activities will be carried out, to achieve positive discrimination, avoid unnecessary certification, prevent impact of foreign regulation, promote SAR service and perform supporting standardisation.		Direct management by EC indirect management by GSA
3.2.3	Manage and monitor EU H2020 research projects aiming to develop applications based on EU GNSS	Under H2020, the Commission has delegated the implementation of GNSS applications related research to the GSA. The planning for activities will duly take into account the announced Space Strategy for Europe.		Indirect management by GSA
3.2.4	Coordinate implementation of the 'Fundamental Elements' activities	The Commission services, in close collaboration with the GSA, will steer and monitor the implementation of the 'Fundamental Elements' set of activities. It will duly take into account the announced Space Strategy for Europe.		Direct management by EC
3.2.5	Prepare access to PRS by third countries	Following the adoption of the CMS, discussions on the access to PRS of Norway and US could start, subject to the adoption of the necessary negotiation mandates.		
		i) Start negotiations with Norway on PRS access	Jul-16	Direct management by EC
		ii) Start negotiations with US on PRS access	Jul-16	Direct management by EC
3.2.6	Obtain an FCC waiver	Within the U.S., the Federal Communications Commission (FCC) rules require the delivery of a licence to operate commercial equipment that receives non-U.S. satellite signals.  In December 2014, the Commission services applied for a FCC waiver, which will enable Galileo operations in the US. Since then, the FCC has been instructing the file without putting it yet for public consultation. The Commission services are in contact with the US Department of State in order to closely monitor the file.	Jun-16	Direct management by EC
3.2.7	Pursue standards' development efforts	Standards' development efforts should continue, focusing on aviation, maritime, LBS and multi-modal transport.		Direct management by EC
3.2.8	Recognition of Galileo as a component of the IMO World-	Achieve recognition of Galileo as a valid component of the IMO WWRNS by submitting and discussing a preliminary version of the Galileo Open Definition	Jun-16	Direct management by EC

3. Secure return on investment

		<b>Wide Radionavigation Services (WWRNS)</b>	Document (OS SDD) to the IMO Member States.		
	3.2.9	<b>Support the use of Galileo and EGNOS services in future radio navigation systems</b>	In 2016, an updated detailed inventory of the radio navigation services and applications will be provided. This will help prepare a European Radio-Navigation Plan. The cost-benefit analysis of different service options will start off.	Dec-16	Direct management by EC

<b>Objective 3.3: Protect Frequencies and ensure compatibility/interoperability with other GNSS</b>					
	#	Actions	Description	Target Date	Direct/indirect management (ESA/GSA)
<b>3. Secure return on investment</b>	3.3.1	<b>Prepare Advanced-RAIM concept</b>	Issue the Milestone 3 Report on Advanced-RAIM with US counterparts	Jan-16	Direct management by EC
	3.3.2	<b>Coordinate international activities to protect frequencies</b>	Conclude coordination for S-band and C-band frequencies with China	Jul-16	Direct management by EC
			Promote receiver level interoperability in the framework of the International Committee on GNSS	Oct-16	Direct management by EC
			Resume ITU coordination discussions on E5 and future options for evolved signals	Apr-16	Direct management by EC
			Reduce the S-band Telemetry Tracking and Control (TTC) frequency coordination backlog	Dec-16	Direct management by EC
			Sharing frequencies with Radio amateurs by determining a strategy and reach agreement with E6 Radio Amateurs to prevent potential impacts to E6 receivers	Nov-16	Direct management by EC

### 3.4. Objective 4: Evolution of the European global navigation satellite systems

#### 3.4.1. Priorities

In 2016, the main objective will be to make progress in view of high level definition of the main features of possible evolutions (with options) of European GNSS including mission, system and security aspects. To that end, several activities will be carried out in 2016:

- continue the consultation process with a focus on clarification of Member States' policies and strategies, in particular with respect to PRS and Security evolutions and on the further analysis of the evolution of the GNSS environment, usage and competing technologies;
- consolidate the work on the evolution of the mission and of the system with the development of a draft High Level requirement Document (HLD). An accompanying justification file will include inter alia a cost/benefit analysis for the identified mission and system evolution scenarios;
- implement R&D activities as defined in the Work Plan under H2020, including in the Work plan elaborated in the context of the Delegation Agreement.

### 3.4.2. Main actions and milestones

4. Evolution of the European global navigation satellite system	Objective 4.1: Ensure Galileo evolution				
	#	Actions	Description	Target Date	Direct/indirect management (ESA/GSA)
	4.1.1	<b>Prepare for the Galileo evolution</b>	Continuation of consultation phase with the main actors (GSA, ESA, MS, JRC)  Identification of possible areas of evolution and development of scenario's for replenishment  Analysis of trade-offs space for these scenarios (costs, benefits, risks, launch strategy)	Dec-16	Direct management by EC
	4.1.2	<b>Consolidate Mission &amp; System Evolution Roadmaps</b>	Preparation of a programme documentation set presenting the outcomes of the consultation and analysis phase in the form of roadmaps.	Dec-16	Direct management by EC indirect management by ESA indirect management by GSA
4.1.3	<b>Manage and monitor EU H2020 research projects in technology development and mission and new services concepts</b>	Galileo and EGNOS R&D needs analysis, including coordination with ESA and GSA on delegated activities EC also has to manage and monitor research projects financed under the Horizon 2020 budget.		<i>Direct management by EC</i> <i>indirect management by ESA &amp; GSA (H2020)</i> <b>Note: implementation of R&amp;D action takes place under Horizon 2020</b>	

## 3.5. Objective 5: Programme Management

### 3.5.1. Priorities

In 2016 the Commission will:

- continuously supervise the implementation of the delegation agreements concluded with ESA and GSA and delegation agreements for specific research activities related to the programmes financed under Horizon 2020 budget with a view to ensuring that the programme is implemented according to the agreed schedule, cost and performance indicators;
- continuously scrutinise the conclusion of and implementation of the Galileo working arrangements between GSA and ESA;
- carry out a comprehensive review of the functioning of the delegation agreements concluded with ESA and GSA in 2014;
- evaluate the GSA concerning its effectiveness, working methods and the use of resources entrusted to it;
- prepare a mid-term evaluation report of the programmes to be presented in June 2017;
- continue developing and implementing policies and necessary legal instruments to ensure the implementation of the programmes, in particular with regard to IPR.

As part of this supervision task, the Commission will continue to report on the progress made in the implementation of the programmes. It will ensure that this reporting is in line with the requirements set in the GNSS Regulation, in particular towards the European GNSS Programmes Committee, the European Parliament and the Council of EU. It will also ensure the smooth implementation of the programmes with the organisation of European GNSS Committee meetings to support the decision-making process.

Furthermore, the Commission will be responsible for the management of all the other activities required to ensure the smooth running of the programmes, in particular it will ensure efficient and effective financial control of the programmes, ensure efficient contract management and management of the procurement strategy for the further implementation of the programmes.

### 3.5.2. Main actions and milestones

<b>Objective 5.1: Manage legal activities</b>				
#	Actions	Description	Target Date	Direct/indirect management (ESA/GSA)
5.1.1	Ensure appropriate legal framework for the implementation of the programmes	This action will focus on the amendments to delegation agreements, including the necessary reviews, and other actions necessary to ensure a smooth transition to the exploitation phase.		Direct management by EC
5.1.2	Manage the IPR related to the GNSS programmes	In accordance with Article 6 of Regulation 1285/2013, the Commission will acquire the ownership of IPR created or developed under the European GNSS programmes and make an optimal use of those assets in order to facilitate the market uptake.		Direct management by EC

<b>Objective 5.2: Prepare and evaluate programmes' implementation</b>				
#	Actions	Description	Target Date	Direct/indirect management (ESA/GSA)
5.2.1	Report on the progress of the programmes	The Commission will organise regular meetings of the European GNSS Programmes Committee.  The Commission will report on programmes' progress at each meeting of the Committee. In addition, the Commission will deliver each quarter a report on the status and developments of the programmes, in particular in terms of risk management, cost, schedule and performance.		Direct management by EC
5.2.2	Prepare the annual evaluation of the programmes	The Commission shall present a report summarising the actions taken and results achieved in the past year.	May-16	Direct management by EC
5.2.3	Evaluate the GSA	By 31 December 2016 the Commission will evaluate the Agency concerning its impact, effectiveness, smooth running, working methods, requirements and the use of	Dec-16	Direct management by EC

			resources entrusted to it. The Commission will submit the report on evaluation and its conclusions the the European Parliament, the Council, the Administrative Board of tand the Security Accreditaion Board of the Agency.		
5. Programme management	<b>Objective 5.3: Ensure financial control of the programmes</b>				
	<b>#</b>	<b>Actions</b>	<b>Description</b>	<b>Target Date</b>	<b>Direct/indirect management (ESA/GSA)</b>
	5.3.1	<b>Ensure efficient and effective financial control of the programmes</b>	To ensure a strong cost control of the programmes, an efficient and effective financial control is established for: 1) monitoring the cost to completion; 2) operational implementation of the programmes' budget (annual budget cycle).		Direct management by EC
	5.3.2	<b>Ensure efficient contract management</b>	The Commission launches various procurements to ensure the implementation of its tasks. The preparation, establishment and follow-up of the necessary contracts will be managed by the Commission with the aim to select the most appropriate procedure and to ensure that the results are in line with the requirements.		Direct management by EC
5.3.3	<b>Manage the assets developed under the programmes</b>	The GNSS Regulation provides that the Union is the owner of all tangible and intangible assets developed under the programmes. These assets need to be identified, checked and incorporated in the balance sheet of the Commission.		Direct management by EC	
5. Programme management	<b>Objective 5.4: Supervise delegated tasks</b>				
	<b>#</b>	<b>Actions</b>	<b>Description</b>	<b>Target Date</b>	<b>Direct/indirect management (ESA/GSA)</b>
	5.4.1	<b>Supervise the implementation of delegated activities for the deployment and exploitation phases of the programmes</b>	The Commission has the overall responsibility for the programmes and supervises the programmes' implementation and ensures that relevant information is available to perform the reporting on the programmes.		Direct management by EC
	5.4.2	<b>Coordinate activities relating to R&amp;D delegated to GSA and ESA</b>	The Commission needs to coordinate the activities which are delegated to ESA and GSA and financed under the Horizon 2020 budget.		Direct management by EC
5.4.3	<b>Manage a procurement strategy for the further implementation of the programmes</b>	In 2016 several contracts will need to be amended or renewed. The Commission establishes the procurement strategy laying down the list of contracts, their scope, planning and estimated price to ensure the continuity of the programmes.  A key focus for 2016 should be to ensure the continuity of industrial contracts during the transition between the deployment and exploitation phase.		Direct management by EC	

#### 4. INDICATIVE BREAKDOWN OF 2016 BUDGET

The budget established under the GNSS Regulation is EUR 7,072 million for the period 2014-2020. This amount covers activities related to:

- completion of the deployment phase of the Galileo programme;
- exploitation phase of the Galileo programme;
- exploitation phase of the EGNOS programme;
- management and monitoring of the programmes.

It also includes a maximum budget of EUR 113 million at current prices (not included in the Figure 1 below) to finance management expenditure of the European GNSS Agency for activities relating to the exploitation phase of the Galileo and EGNOS programmes and which should be transferred to the budget of the European GNSS Agency.

The budget available under the EU's multiannual programming is increased by a financial contribution from Norway and Switzerland to the GNSS programmes. Finally, a pilot project related to E112 in the frame of GNSS proposed by the European Parliament and awarded in 2015 is added to the summary table below for information purposes. The objective of the pilot project is to examine the possibility for an introduction of an effective emergency caller location from a GNSS enabled phone to the 112 number building on the GNSS advantages and more specifically on EGNOS and Galileo for improved accuracy and robustness.

In accordance with Article 9(5) of the GNSS Regulation, the budgetary commitments shall be broken down into annual instalments. The following table gives an indicative schedule of the annual commitment appropriations of the GNSS budgetary lines:

Figure 1: Indicative schedule of the annual commitment appropriations

	2014	2015	2016	2017	2018	2019	2020	Total
<b>Commitment appropriations (in million Euros)</b>	1.326	1,061	852	899	812	756	1.253	<b>6.959</b>
<b>Indicative contribution of Norway (in million Euros)<sup>9</sup></b>	39	30	22	24	21	20	33	<b>189</b>
<b>Indicative contribution of Switzerland (in million Euros)<sup>10</sup></b>		81	120	34	31	29	48	<b>343</b>
<b>Pilot Project<sup>11</sup></b>		1						<b>1</b>
<b>Grand total (in million Euros)</b>	<b>1.365</b>	<b>1.173</b>	<b>994</b>	<b>957</b>	<b>864</b>	<b>805</b>	<b>1.334</b>	<b>7.492</b>

<sup>9</sup> Estimated at current rate of 2.64% contribution for 2016.

<sup>10</sup> Estimated at current rate of 3.83% contribution for 2016. Includes €80M from 2008-2013.

<sup>11</sup> The pilot project is added for information purposes.

The total amount covered by this work programme amounts to EUR 993.823.100. On the basis of the objectives given in the GNSS Regulation, this work programme contains the actions to be financed and the budget breakdown for year 2016 as follows:

- for procurements implemented in direct management: EUR 12.519.204
- for grants implemented in direct management: EUR 4.900.000
- for actions implemented in indirect management: EUR 976.303.896
- for a contribution fee to United Nations International Committee on GNSS: EUR 100.000.

These actions are detailed in Appendixes I, II, III and IV to this work programme.

## APPENDIX I: PROCUREMENTS IMPLEMENTED IN DIRECT MANAGEMENT

The overall budgetary allocation reserved for contracts in 2016 amounts to EUR 17.719.204 out of which EUR 12.519.204 are financed by this Work Programme. The balance of 5,2 million EUR is financed by budget lines 02.040201 (Horizon 2020) and 02.0302 (Standardisation) which are included in Appendix I only for information purposes.

### 1. Ensure Galileo service provision

Legal basis

GNSS Regulation

Budget line

This section relates to actions for a total of EUR 5.100.000 of the proposed expenses for 2016 financed under budget line 02.0501 and 02.010403 (included in this Work Programme).

Summary table including type of contract / indicative number of contracts envisaged / subject matter / indicative timeframe for launching the procurement procedure

Type of contract and procedure	Number of contracts	Subject matter	Indicative timeframe for launching the procedure
Specific service contracts implementing existing framework contracts (FWC)	2	Technical support to the PRS Pilot Projects activities - P3RS1	Q1,Q2
	1	PSI online database	Q1
New procurement procedures (FWCs and specific contracts, service contracts)	1	Security & GNSS Monitoring	Q1
	1	SAR activities (Galileo)	Q2
	10	Network security tests	Q2

Implementation

These procurements will be implemented directly by the Commission.

## 2. Market uptake

### Legal basis

GNSS Regulation

### Budget line

This section relates to actions for a total of EUR 2.490.000 of the proposed expenses for 2016, out of which EUR 1.690.000 are financed under budget line 02.0501 and 02.010403 included in the scope of this Work Programme and EUR 800.000 under budget line 02.0302 not in the scope of this Work Programme.

Summary table including type of contract / indicative number of contracts envisaged / subject matter / indicative timeframe for launching the procurement procedure

Type of contract and procedure	Number of contracts	Subject matter	Indicative timeframe for launching the procedure
Specific service contracts implementing existing framework contracts (FWC)	4	Information and communication	Q2,Q3
	1	Cost-benefit studies of selected Galileo application markets	Q2
New procurement procedures (FWCs and specific contracts, service contracts)	2	Technical and regulatory support for World Radio communication Conference	Q2
	1	Standards for multi-modal transport and location based services	Q2
	2	ITU Satellite filing	Q1

### Implementation

These procurements will be implemented directly by the Commission.

### 3. Implementing European GNSS evolutions

#### Legal basis

Horizon 2020

#### Budget line

This section relate to actions for a total of EUR 4.400.000 of the proposed expenses for 2016, financed under budget line 02.040201 (not in the scope of this Work Programme).

Summary table including type of contract / indicative number of contracts envisaged / subject matter / indicative timeframe for launching the procurement procedure

Type of contract and procedure	Number of contracts	Subject matter	Indicative timeframe for launching the procedure
New Service contracts	6	R&D Galileo: Evolution, mission and service	Q2,Q3
	2	R&D EGNOS: mission and service	Q2,Q3
	3	R&D EGNOS: Experts and Evaluators	Q3

#### Implementation

These procurements will be implemented directly by the Commission.

#### 4. Programme management

##### Legal basis

GNSS Regulation
-----------------

##### Budget line

This section relate to actions for a total of EUR 5.729.204 of the proposed expenses for 2016, financed by budget line 02.0501 and 02.010403 included in this Work Programme.
---

Summary table including type of contract / indicative number of contracts envisaged / subject matter indicative timeframe for launching the procurement procedure

Type of contract and procedure	Number of contracts	Subject matter	Indicative timeframe for launching the procedure
Specific service contracts implementing existing framework contracts (FWC)	2	Technical support for risk management	Q2,Q3
	2	IT and document management activities	Q2
	3	Management support	Q2,Q3
	1	Technical support for activities relating to service provision	Q2
New tender procedure (service contract and FWC + Specific Contract)	1	Potential remedying action against legal risks <sup>12</sup>	Q2
Admin. arrangement	2	Technical support under administrative arrangement	Q1, Q3

##### Implementation

These procurements will be implemented directly by the Commission and through administrative arrangements with the Joint Research Centre of the European Commission.
--

<sup>12</sup> The Commission has identified a certain number of legal risks related to the implementation of the Galileo Programme which may require contractual agreements with third parties.

## APPENDIX II: GRANTS IMPLEMENTED IN DIRECT MANAGEMENT

### 1. Grant to the consortium resulting from the implementation of the space surveillance and tracking support framework established by Decision no 541/2014/EU

Legal basis

Regulation 1285/2013

Budget line

020501 – EU Satellite Navigation programmes (EGNOS and Galileo)

Priorities of the year, objectives pursued and expected results

In line with the Decision No 541/2014/EU of the European Parliament and of the Council of 16 April 2014 establishing a Framework for Space Surveillance and Tracking Support (OJ L 158 of 27 May 2014, p. 227–234, at recital 24) the European GNSS Programmes will contribute to the funding of the SST support framework, since the objectives of Decision No 541/2014/EU are relevant to the Programme's activities. A first action was launched under the 2015 GNSS Work programme for an amount of € 4.6 million.

For 2016-2020 a new multi-annual grant agreement will be concluded between the Commission and the consortium established under Decision No 541/2014/EU and the EU SATCEN with a maximum Union contribution of € 43.2 million. This amount will comprise financial resources from the European GNSS Programmes and the Copernicus Programme up to € 21.6 million from each programme.

On the basis of Article 9(5) of Regulation No 1285/2013, the EGNSS contribution of € 21.6 will be broken down into annual instalments as follows:

Year	2016	2017	2018	2019	2020
Millions €	3.4	4.1	4.4	4.8	4.9

This action specifically aims at:

- (1) supporting the pooling of national resources on the SST objectives outlined in Decision No 541/2014/EU and coinciding with objectives and challenges of the European GNSS programmes related to protecting Europe's investment made in space infrastructure, and
- (2) achieving significant economies of scales by adding related European GNSS programmes' resources to this joint effort.

Description of the activities to be funded by the grant awarded without a call for proposals on the basis of articles 190(1)(d) and 190 (1)(f) RAP.

This action shall support:

- (a) The operation of a sensor function consisting of a network of ground-based or space-based existing national sensors to survey and track space objects;
- (b) The operation of a processing function to process and analyse the SST data captured by the

sensors;

(c) The operation of a service function to provide SST services to spacecraft operators and public authorities.

In line with Article 7 of Decision No 541/2014/EU, this Action shall facilitate the broadest participation of Member States, whenever appropriate.

#### Selection and award criteria

##### Selection criteria:

- financial capacity of the applicant(s) to maintain the activity throughout the period during which the action is being carried out
- operational capacity, to carry out the proposed work, based on the competence and experience of the beneficiaries.

##### Award criteria:

The essential award criteria relate to the relevance, impact, quality, visibility, budget and cost-effectiveness of the proposed action.

#### Implementation

Direct management.

Indicative timetable and indicative amount of the grant awarded without a call for proposals

<b>Reference</b>	<b>Date</b>	<b>Amount</b>
Space surveillance and tracking (SST)	Q4 2016	Annual instalment for 2016 EUR 3.400.000

Maximum possible rate of co-financing of the eligible costs

Up to 100% of the total eligible costs.

## 2. Galileo-EGNOS award scheme for innovative ideas and support for incubation

### Legal basis

Regulation 1285/2013

### Budget line

020501 – EU Satellite Navigation programmes (EGNOS and Galileo)

### Priorities of the year, objectives pursued and expected results

- a) support the establishment of an award scheme for EGNOS and GALILEO applications involving regional organizations that promote innovation and the uptake of high-technologies in Europe.
- b) reward the work done by innovative companies and/or entrepreneurs applying Galileo or EGNOS in concrete prototype products and services, proving GALILEO and EGNOS added-value and/or promoting services
- c) increase the visibility of the European GNSS programmes
- d) generate a flow of viable projects to be further incubated in order to launch actual commercial exploitation.
- e) encourage SMEs and innovative companies to invest more in Galileo and EGNOS applications and thus support the European industry

### Description of the activities to be funded under the call for proposals .

- 1) Organization and management of a yearly GALILEO prize-awarding competition covering all necessary tasks such as elaboration of a well-defined, fair and transparent prize awarding scheme, publication of calls for idea, evaluation by experts of submitted ideas, prize awarding event, dissemination 'inbound'( i.e. to increase the number and the quality of innovative ideas submitted to the GALILEO prize-awarding competition), dissemination 'outbound' (i.e. obtain adequate visibility within the Europe and worldwide GNSS industry - including academic and research - to promote the competition, its sponsors, participants and prize winners).
- 2) Prizes: coordination with existing award schemes and financing facilities.
- 3) Incubation: coaching of prize winners in view of the market access.

### Selection and award criteria

#### Selection criteria:

- financial capacity of the applicant(s) to maintain the activity throughout the period during which the action is being carried out
- operational capacity, to organise and carry out prize award mechanism,

#### Award criteria:

- quality of the proposal
- visibility of the organisation of the prize mechanisms (publications, website, organization of events, press conferences etc.)

- presentation of the proposal ( detailed work plan, timetable)

### Implementation

Direct management.

### Indicative timetable and indicative amount of the grant

<b>Reference</b>	<b>Date</b>	<b>Amount</b>
Galileo-EGNOS Master prize scheme	Q1 2016	EUR 1.500.000

### Maximum possible rate of co-financing of the eligible costs

70 % of management costs (activity 1) with an annual ceiling of 80000€.

60% of prize costs (activity 2)

70% of incubation costs (activity 3)

### APPENDIX III: ACTIONS IMPLEMENTED IN INDIRECT MANAGEMENT

#### 1. Actions implemented in indirect management (ESA)

Legal basis

GNSS Regulation 1285/2013

Budget line

Actions concerned will be financed under budget lines 02.0501

Amount

The global budgetary envelope reserved in 2016 for actions implemented in indirect management with ESA amounts to EUR 381.931.896

Implementing entity

The choice for this management mode and the implementing entity is governed by Article 15 of the GNSS Regulation.

Overall objective and purpose of the action

The Delegation Agreement defines the remaining Galileo deployment tasks delegated to ESA and comprises, in particular, the procurement activities to be launched by ESA and the costs related to the Project Management and System Prime Activities. It is expected to increase the current Galileo Delegation Agreement with an indicative additional [EUR 715 million]<sup>13</sup> during 2016.

#### 2. Actions implemented in indirect management (GSA)

Legal basis

GNSS Regulation

Budget line

Actions concerned will be financed under budget lines 02.0501 and 02.0502.

Amount

The global budgetary envelope reserved in 2016 for actions implemented in indirect management with the GSA amounts to EUR 594.372.000

Implementing entity

<sup>13</sup> The final amount will be provided in the amendment of the implementation decision C (2014) 809

The choice for this management mode and the implementing entity is governed by Article 14 of the GNSS Regulation

#### Overall objective and purpose of the action

The Delegation Agreements defines the tasks delegated to GSA related EGNOS operations and Galileo initial services activities. It is expected to increase the current EGNOS Operations Delegation Agreement with an indicative additional [EUR 100 million]<sup>14</sup> and the current Galileo Exploitation Delegation Agreement with an indicative additional amount of [EUR 1 610 million<sup>15</sup>] during 2016.

---

<sup>14</sup> The final amount will be provided in the amendment of the implementation decision C (2014) 809

<sup>15</sup> The final amount will be provided in the amendment of the implementation decision C (2014) 809

**APPENDIX IV: OTHER ACTIONS**

**3. Contribution fee to United Nations International Committee on GNSS**

Legal basis

GNSS Regulation 1285/2013

Budget line

02 01 04 03 European satellite navigation programmes – expenditure on administrative management

Amount

EUR 100 000

## APPENDIX V: ACRONYMS

	Symbol for a recurrent action
3GPP	3rd Generation Partnership Project
ARAIM	Advanced Receiver Autonomous Integrity Monitoring
ASECNA	Agency for Aerial Navigation Safety in Africa and Madagascar
CDR	Critical Design Review
CFI	Customer Furnished Items
CMS	Common Minimum Standards
CNES	Centre National d'Etudes Spatiales (French National Centre for Space Studies)
Commission	European Commission
CS	Commercial Service
CSI-WG	Compatibility, Signals and Interoperability Working Group
CS-WG	Commercial Service Working Group
EASA	European Aviation Safety Agency
EC	European Commission
EDAS	EGNOS Data Access Service
EEAS	European External Action Service
EEV	End-to-End Validation
EE-WG	European GNSS Evolutions Working Group
EGEP	European GNSS Evolution Programme
EGMER	European GNSS Mission Evolution Roadmap
EGMER-x	European GNSS Mission Evolution Roadmap – Security
EGNOS	European Geostationary Navigation Overlay Service
EGNSS	European Global Navigation Satellite System
EGSER	European GNSS Mission System Evolution Roadmap
EGSER-x	European GNSS Mission System Evolution Roadmap – Security
ENP	European Neighbourhood Policy
ESA	European Space Agency
ESR	EGNOS System Release
ESSP	European Satellite Services Provider
ETSI	European Telecommunications Standards Institute
EU	European Union
EUR	Euro
EUROCAE	European Organisation for Civil Aviation Equipment
FCC	Federal Communications Commission (US)
FOC	Full Operation Capability
G2G	Galileo Second Generation
GCC	Galileo Control Centre
GCS	Galileo Control Segment
GIP	Galileo Interinstitutional Panel
GMS	Ground Mission Segment
GNSS	Global Navigation Satellite System
GNSS Committee	European GNSS Programmes Committee established by the GNSS Regulation
GNSS Regulation	Regulation (EU) No 1285/2013 of the European Parliament and of the Council on the implementation and exploitation of the European satellite navigation systems
GPS	Global Positioning System
GRC	Galileo Reference Centre
GRC-WG	Galileo Reference Centre Working Group
GSA	European GNSS Agency
GSAP	Galileo Security Accreditation Panel
GSC	European GNSS Service Centre
GSF	Galileo Security Facility
GSMC	Galileo Security Monitoring Centre
GSOp	Galileo Service Operator
HRAIM	Horizontal Receiver Autonomous Integrity Monitoring
ICAO	International Civil Aviation Organisation

ICG	International Committee on GNSS
ILS	Integrated Logistics Service
IMO	International Maritime Organisation
IOT	In Orbit Test
IPR	Intellectual Property Right
ITS	Intelligent Transport Systems
ITU	International Telecommunication Union
KPI	Key Performance Indicator
LBS	Location Based Service
LPV	Localiser Performance with Vertical Guidance
MEOLUT	Medium Earth Orbit Local User Terminal
MEOSAR	Medium Earth Orbit Search And Rescue
MOPS	Minimum Operational Performance Specification
OMA	Open Mobile Alliance
OS	Open Service
PDR	Preliminary Design Review
PRS	Public Regulated Service
R&D	Research and Development
RIMS	Ranging and Integrity Monitoring Stations
RLS	Return Link Service
RLSP	Return Link Service Provider
RTCA	Radio Technical Commission for Aeronautics
RTCM	Radio Technical Commission for Maritime Services
SAB	Security Accreditation Board
SACP	Security Accreditation and Certification Plan
SAR	Search And Rescue
SBAS	Satellite Based Augmentation System
SDD	Service Definition Document
SIS	Signal in Space
SMS	Safety Management System
SoL	Safety of Life
TGVF	Time and Geodesy Validation Facility
TTC	Telemetry, tracking and command
WAAS	Wide Area Augmentation System
WG	Working Group
WG-CDA	Working Group Crypto Distribution Authority
WG-IRC	Working Group Incident Response Coordination
WG-NET	Working Group National Expert Team
WG-PCI	Working Group Protection of Classified Information
WG-PRS	Working Group Public Regulated Service
WG-PUSS	Working Group PRS User Segment Standards
WP	Work Package
WRC	World Radiocommunication Conference
WWRNS	World-wide Radio Navigation System