Routledge Handbook of Space Law

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Publication details
https://www.routledgehandbooks.com/doi/10.4324/9781315750965.ch16

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Published online on: 21 Nov 2016

How to cite :- Michael Chatzipanagiotis, Konstantina Liperi. 21 Nov 2016, Regulation of navigational satellites in Europe from: Routledge Handbook of Space Law Routledge
Accessed on: 19 Jul 2023
https://www.routledgehandbooks.com/doi/10.4324/9781315750965.ch16

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Regulation of navigational satellites in Europe

Michael Chatzipanagiotis and Konstantina Liperi

In Europe, satellite navigation policy aims at providing the European Union (EU) with two satellite navigation systems: GALILEO and EGNOS. GALILEO will establish and operate the first GNSS for civilian use, primarily to contribute to EU’s strategic autonomy. EGNOS (European Geostationary Navigation Overlay Service) improves in the European region the open signals from existing GNSS and is intended to also augment GALILEO.

GALILEO

GALILEO will consist of 30 satellites, orbiting in Medium Earth Orbit. Ten satellites will occupy each of three orbital planes, with one spare satellite in each plane. A global network of ground stations will manage the system.¹

GALILEO will transmit radio navigation signals in four different operating frequencies: E1 (1559~1594 MHz), E6 (1260~1300 MHz), E5a (1164~1188 MHz) and E5b (1195~1219 MHz).² It is designed to offer five key services:³

(a) the Open Service (OS) will provide free improved global positioning, navigation and timing (PNT) services, mainly intended for high-volume satellite navigation applications;
(b) the Safety-of-Life (SoL) service, offered with a service guarantee,⁴ will improve free OS

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⁴ European Commission (EC) and European Space Agency (ESA), Galileo: Mission High Level Definition, 23 September 2002, para. 2.5.
signals for safety-critical applications and will also alert users, when the system fails to meet certain margins of accuracy (integrity monitoring);

(c) the Commercial Service (CS), also provided with a service guarantee, is intended for professional and commercial applications, and will allow access to two additional signals for a higher data rate, offering enhanced performance compared to the OS;

(d) the Public Regulated Service (PRS) will provide, free of charge for the EU Member States (MS), encrypted signals to “government-authorised users”, who require high continuity of service with controlled access;

(e) the free of charge Search and Rescue (SAR) Service, a service for locating people in distress, will contribute to the international satellite system CORSPAS–SARSAT for SAR operations.7

GALILEO has been structured according to four different phases, of which two phases have been completed: the Definition phase and the Development and Validation phase. The Deployment phase comprises the construction, establishment and protection of all space-based and ground-based infrastructure, and is scheduled to be completed by the end of 2020. The Exploitation phase includes the management, maintenance, continuous improvement, evolution and protection of system infrastructure, as well as all other activities necessary for the smooth operation of the system. This phase is scheduled to start gradually with the provision of the initial services for OS, SAR service and PRS. The target is for the system to reach Full Operational Capability (FOC) by the end of 2020.

The first four operational satellites have been constructed and launched during the In-orbit Validation phase. The rest of the satellites are scheduled to be launched during the Deployment and Exploitation phases. FOC 5 and 6 Satellites have been launched in August 2014, but were entered into a wrong orbit following an orbital injection anomaly. In total, 14 satellites are now part of the constellation. The successful launch of FOC 13 and 14 satellites in May 2016, paved the way for the provision of Galileo initial services to the users by the end of 2016.10

EGNOS

EGNOS comprises three geostationary satellites and ground stations, and has been operational since 2009. It disseminates signals on GPS L1 frequency (1575.42 MHz), providing correction and integrity monitoring of global positioning system (GPS) services. It offers an Open Service (OS), a Safety-of-Life (SoL) service and a Commercial Service (CS).11 The OS has been

5 Ibid.
8 See Regulation 1285/2013, supra note 3, art 4.
9 www.arianespace.com/press-release/soyouz-flight-vs09-independent-inquiry-board-announces-definitive-conclusions-concerning-the-fregat-upper-stage-anomaly/. Navigation signals from these satellites are to be used for test purposes. Whether these satellites will become part of the Galileo constellation is still to be decided. See more at http://spaceref.com/news/viewpr.html?pid=49264.
continuously available since 2009 and provides positioning precision by correcting errors in GPS signals.\textsuperscript{12} The SoL service mainly supports civil aviation applications and has been declared available since 2011, after the Certification of European Satellite Services Provider (ESSP) as an Air Navigation Service Provider.\textsuperscript{13} As to the CS, the EGNOS Data Access Service (EDAS) is offered, which is a terrestrial commercial service that transmits data in real time and is the single point of access for data collected and generated by the EGNOS infrastructure over Europe and North Africa.\textsuperscript{14}

EGNOS services cover mainly EU MS, although not all of them are covered yet. Its coverage could also extend to non-EU countries.\textsuperscript{15}

\section*{Administration and organization}

GALILEO was initially structured to be managed and operated as a Public-Private Partnership (PPP), to allow financing by both private and public funds.\textsuperscript{16} However, after the PPP efforts failed, it was decided in 2008 to finance the system entirely by public funds.\textsuperscript{17}

Under the new governance scheme, the EU is the owner of all tangible and intangible assets created or developed under the GALILEO and EGNOS programs.\textsuperscript{18} The European Commission (EC) acts as the program manager on behalf of the EU and possesses the overall responsibility for the programs, while political oversight rests with the Council of the EU and the European Parliament.\textsuperscript{19} Given that the development of the programs involves different stakeholders, the EC is also entrusted with ensuring a clear division of duties and responsibilities, in particular with the European Space Agency (ESA) and the European GNSS Agency (GSA).\textsuperscript{20}

ESA joined forces with EU for the development of a coherent and progressive overall European Space Policy under a Framework Agreement signed in 2004.\textsuperscript{21} Satellite navigation is one of the fields of cooperation. The initial Definition, Development and Validation phases of the GALILEO program were carried out by ESA on a co-funded basis with the EC. The deployment phase is being managed and funded by the EC, while ESA acts as design and procurement agent.\textsuperscript{22} By virtue of delegation agreements signed with the EC, the GSA is

\footnotesize
\begin{itemize}
\item \textsuperscript{12} www.navipedia.net/index.php/EGNOS_Open_Service.
\item \textsuperscript{13} www.navipedia.net/index.php/EGNOS_Safety_of_Life_Service.
\item \textsuperscript{14} See www.egnos-portal.eu/discover-egnos/services/edas.
\item \textsuperscript{15} See Regulation 1285/2013, \textit{supra} note 3, recital 12, art 2(5).
\item \textsuperscript{18} Regulation 1285/2013, \textit{supra} note 3, art 6.
\item \textsuperscript{19} Ibid., art 12.
\item \textsuperscript{20} Ibid.
\item \textsuperscript{22} \textit{Delegation Agreement between the EU, represented by the European Commission and the European Space Agency on the Deployment Phase of the European Satellite Radiolocation Programme Galileo}, 16 July 2014.
\end{itemize}
currently responsible for, *inter alia*, the commercialization and exploitation of the systems, their security accreditation, the promotion of satellite navigation applications and services, as well as the implementation in the space sector of the research program Horizon 2020.23

EGNOS services are currently delivered by the European Satellite Services Provider (ESSP SAS), which was founded by seven air navigation service providers.24 The GSA has been the EGNOS program manager since 2014,25 while ESA is the design and procurement agent working on behalf of the EC.26

**Liability**

Attributing liability for GNSS failures is complex owing to the EU’s distinctive governance structure. The EU owns the GALILEO and EGNOS systems.27 According to Article 189 of the Treaty on the Functioning of the EU (TFEU),28 the EU enjoys a shared competence on space matters with its Member States (MS). Art. 47 of the Treaty on European Union (TEU)29 provides that the EU has a legal personality separate from that of its MS, and a separate legal system and jurisdiction over issues of substantive European law.30

It is suggested that at least in the event of contractual provision of PNT services, the EU might be liable for failure to provide appropriate services or to oversee such provision.31 The EU’s contractual liability is governed by the law designated in the contract, as Article 340(1) TFEU clarifies. Eventual extra-contractual liability will be governed by Article 340(2) TFEU,32 such claims being subject to the exclusive jurisdiction of the Court of Justice of the EU.33 The EU, as a supranational organization with distinct legal personality, enjoys sovereign immunity; however, its exact legal basis and extent are disputed.34

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23 Delegation Agreement between the EU, represented by the European Commission and the European GNSS Agency on the exploitation of the Galileo programme, 2 October 2014; Delegation Agreement between the EU, represented by the European Commission and the European GNSS Agency on the implementation of Horizon 2020, April 2014.
24 See details at www.essp-sas.eu.
25 Delegation Agreement between the EU, represented by the European Commission and the European GNSS Agency on the exploitation of the ENGOS Programme, 16 April 2014.
26 See ec.europa.eu/growth/sectors/space/egnos/.
27 Regulation 1285/2013, supra note 3, arts 12, 13.
31 See in this regard Regulation 1285/2013, supra note 3, recital 22, which recognizes explicitly the possibility of EU liability arising out of the ownership of the systems.
32 Art 340(2) provides:

> In the case of non-contractual liability, the Union shall, in accordance with the general principles common to the laws of the Member States, make good any damage caused by its institutions or by its servants in the performance of their duties.

33 Art 268 TFEU.
International agreements

The EC is responsible for managing, on behalf of the EU, relationships with third countries and international organizations. In 2004, an agreement was signed with the United States on interoperability and compatibility between GPS and GALILEO. Moreover, the EU has signed several cooperation agreements with various countries, e.g. China, Israel, India, Ukraine, Morocco, Korea, Norway, and Switzerland.

Spectrum protection

Each EU MS is responsible for its radio spectrum management. However, national policies reflect decisions and practices proposed by European and international bodies. The Electronic Communications Committee (ECC) of the European Conference of Postal and Telecommunications Administrations (CEPT) proposes practices that contribute to spectrum harmonization, standardization and cooperation, reflecting the work done by the ITU. Within the EU, the EU Radio Spectrum Committee and the EU Radio Spectrum Policy Group put forward binding decisions on harmonization and technical issues. Moreover, the European Telecommunications Standards Institute (ETSI), a non-profit organization led by industry, plays a critical role in developing standards in information and communications technologies.

Concerning GALILEO and EGNOS, the EU has been entrusted with the power to negotiate frequency issues, as well as to negotiate and conclude international compatibility and interoperability agreements. By virtue of their competence in spectrum, the EU MS support the EU in its activities on GNSS spectrum availability and protection.

Privacy protection

The EU has entrusted the EC with the protection of personal data and privacy during the design, implementation and exploitation of the European GNSS systems. Moreover, all EU legislation on personal data protection is applicable to data collected during the implementation and exploitation of the systems.

35 See Regulation 1285/2013, supra note 3, arts 12(2)(c), 29.
36 Agreement on The Promotion, Provision and Use of Galileo and GPS Satellite-Based Navigation Systems And Related Applications, signed at Dublin, on 26 June 2004.
38 See www.cept.org/ecc/.
40 See www.etsi.org/about.
41 See UNOOSA, supra note 2 at 33.
43 Regulation 1285/2013, supra note 3, art 31(1).