

11. Global navigation satellite systems (GNSS)

Like time-keeping, the ability to locate one's position or the position of various objects accurately and reliably is a growing need in our modern economies, with wide-ranging implications for traffic management, security, the environment, the management of natural resources and the provision of personal services (civil and commercial).

As of spring 2014, six regional and global constellations are under development, with the American Global Positioning System (GPS) constellation already fully functional. All these constellations are institutional programmes, with satellites and ground segment systems contracted to national or regional space industries, but under national authority. The only exception is the Galileo programme, which is managed by the European Union. Around 100 navigation satellites could be in orbit by 2020, with at least four different satellite navigation systems with global coverage (GPS, Galileo, Glonass, Beidou), transmitting signals on multiple frequencies.

Many consumer electronics companies are providing devices and services using location-based data. In terms of revenue generation, value-adders involved in satellite positioning, navigation and timing are perfect illustrations of downstream markets, only linked to the space industry by the satellite signals and data they use in their consumer products (e.g. navigation devices in cars, precision farming tools).

When examining top actors in location based services (Trimble, Mitac International, Tom Tom and Garmin), their

2013 revenues represent some USD 8 billion. These actors and others involved in Personal Navigation Device (PND) markets are looking at diversification, as smartphones and tablets are impacting the sale of proprietary PNDs. Other actors involved include manufacturers of receivers, and antennas. Some 47 manufacturers surveyed in 2013 captured more than 95% of the market, with 380 receivers available commercially (GPS World, 2013). Although estimates vary, a recent market report published by the European GNSS Agency estimates the global core revenues of the GNSS market around EUR 50 billion in 2013 (European GNSS Agency, 2013).

Methodological notes

Industry surveys are still relatively few concerning the location-based and navigation sectors, especially as technologies have rapidly evolved in the past five years. Estimates provide interesting orders of magnitude, but statistical definitions vary.

Sources

European GNSS Agency (2013), *GNSS Market Report: Issue Three*, October, Prague. www.gsa.europa.eu.

GPS World (2013), gpsworld.com.

11.1. Satellite navigation constellations

United States	Operational since April 1995, the Global Positioning Satellite (GPS) system is composed of 27 satellites, providing a horizontal accuracy of minimum 3 meters, which can be further enhanced by ground- or space-based augmentation systems. An upgrade of the constellation is currently under way with GPS-III satellites under production.
Russian Federation	Some 29 Glonass satellites in orbit, with 24 operating to provide global coverage. Accuracy is comparable to that of GPS, and commercial use of Glonass is increasing. The Russian Government approved a work programme in March 2012, allocating RUB 326.5 billion (≈ USD 11 billion) for the period 2012-20. The complete constellation would consist of 30 satellites in orbit, including six in reserve.
Europe	As of spring 2014, Galileo has four satellites, with six more satellites scheduled for launch by late 2014, at which point early services could be made available to the public. Galileo could reach full operational capability with 30 satellites around 2020. In 2008, a governance framework was established for the Galileo programme. It provides for the deployment of the full operational capability of the constellation under a public procurement scheme, entirely financed out of the European Union budget. The European Union also operates a GPS augmentation system, EGNOS, with transponders on three satellites, to improve accuracy.
China	The Chinese global positioning system, dubbed Compass/Bei Dou, is currently covering the Asia-Pacific region, with a constellation consisting of 14 operational satellites, as of May 2014. The constellation could reach global coverage by 2020, with 35 satellites.
India	The two first satellites in India's seven-satellite constellation, Indian Regional Navigation Satellite System (IRNSS), were successfully launched in July 2013 and April 2014. India has furthermore launched two out of three satellites that will contribute to the GPS augmentation system GAGAN, the last launch scheduled in 2014-15.
Japan	The Japanese Quasi-Zenith Satellite System (QZSS) is a space-based GPS augmentation system, compatible with GPS, which will consist of four satellites. The first satellite, Michibiki, was launched in 2010 with the remaining three satellites to be launched in the 2015-17 period.



From:
The Space Economy at a Glance 2014

Access the complete publication at:
<https://doi.org/10.1787/9789264217294-en>

Please cite this chapter as:

OECD (2014), "Global navigation satellite systems (GNSS)", in *The Space Economy at a Glance 2014*, OECD Publishing, Paris.

DOI: <https://doi.org/10.1787/9789264217294-15-en>

This work is published under the responsibility of the Secretary-General of the OECD. The opinions expressed and arguments employed herein do not necessarily reflect the official views of OECD member countries.

This document and any map included herein are without prejudice to the status of or sovereignty over any territory, to the delimitation of international frontiers and boundaries and to the name of any territory, city or area.

You can copy, download or print OECD content for your own use, and you can include excerpts from OECD publications, databases and multimedia products in your own documents, presentations, blogs, websites and teaching materials, provided that suitable acknowledgment of OECD as source and copyright owner is given. All requests for public or commercial use and translation rights should be submitted to rights@oecd.org. Requests for permission to photocopy portions of this material for public or commercial use shall be addressed directly to the Copyright Clearance Center (CCC) at info@copyright.com or the Centre français d'exploitation du droit de copie (CFC) at contact@cfcopies.com.