



What's new in satellite navigation for road

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European
**Global Navigation
Satellite Systems
Agency**



EGNOS

NAVIGATION SOLUTIONS
POWERED BY EUROPE

Why location (and satellite navigation) matters?



Google



BOSCH

Invented for life

DENSO

Galileo is the Satellite Navigation System made in Europe offering free global services



But what's new?



Galileo goes live

Initial Services are the first step towards full operational capability and reflects Europe's approach to satisfy evolving user needs leveraging on more performant GNSS signals

Upgrading devices

Already today, leading GNSS companies representing more than 95% of the GNSS chipset market produce Galileo-ready chips

www.useGalileo.eu

Users can keep track of Galileo-enabled devices in the different market segments, and be informed as soon as new ones become available



6 additional spacecraft deployed in 2016



What does Initial Services mean for the users?



Better availability of satellite signals:

Being compatible and interoperable with GPS, all Galileo-enabled navigation devices are capable to 'see' more satellites
→ especially important in urban environments where the presence of high buildings can prevent signal reception.



Improved Search and Rescue service:

SAR services enhanced with Galileo will improve:
→ Detection time of a person in distress (3 hours vs 10 minutes)
→ Accuracy of position of the distress beacon (10km range vs 5 km range)



Very precise timing:

Galileo timing will provide very high accuracy and resilience, e.g. in combination with GPS, needed for infrastructure synchronisation.

→ The timing of Galileo can be used with only one satellite in view



Is it possible to use Galileo in receivers?



From 3 manufacturers adopting Galileo in 2010 to 17 in 2016, representing more than the 95% of global supply

2010



2016

TIMING spectracom
Synchronizing Critical Operations

SMARTPHONES/MASS MARKET



AUTOMOTIVE



UAVs

HIGH PRECISION



How can I find Galileo ready products?



USEGALILEO.EU

Galileo Initial Services triggered many forward-looking companies to create Galileo-enabled receivers, chipsets and modules and launch them in the market.

Users can keep track of Galileo-enabled devices in the different market segments, and be informed as soon as new ones become available.



With the declaration of Initial Services expected soon, Galileo is moving from a global satellite navigation system in testing, to a live, operational service. For the first time, European satellites are providing users with global positioning, navigation and timing information. In the lead up to Galileo Initial Services, many forward-looking companies have created Galileo-enabled receivers, chipsets and modules - many of which are already available on the market.

This tool helps you keep track of Galileo-enabled devices serving a variety of needs as they become available.



New technology trends: the advantages of dual frequency!



Advantages of dual frequency

Better accuracy

- Ionosphere error correction
- Faster and more reliable carrier phase ambiguity resolution



Increased robustness

- Reduce vulnerability risks of GNSS signals to jamming and/or spoofing



Why L5/E5 is the best solution for a second frequency?

- A protected frequency
- There will be soon more L5/E5 satellites than L2C satellites
- Shared by all GNSS and all SBAS
- More widely separated from L1, thus minimising the iono-free linear combination errors



Specific key advantages of L5/E5 signal

- Better multipath mitigation and better accuracy using L5/E5 signals vs using L2C
- Higher received power for L5/E5 vs L2C

New technology trends: an authenticated signal!



Authentication

- Ability of the system to guarantee to the users that they are utilizing signals from the Galileo satellites and not from any other source



CS (SCE)
authentication:
E6C



OS (NMA)
authentication:
E1B

- Galileo will provide an efficient, resilient and low-cost solution against spoofing attacks
- Expected availability:
 - ✓ OS E1B with OSNMA starting 2018, at very low cost. (*)
 - ✓ CS E6 signals with Spreading Code Encryption/Authentication by 2020
- OSNMA receiver implementation efforts/HW are expected to be low.

(*) Source: EC. Current OSNMA proposed in "Reserved 1" field (20bps) of E1-B through TESLA protocol. Analyses and simulations incl. degraded environments show no performance degradation wrt. standard PNT.

GNSS Market Report 5 now available online!

Following the success of the previous publication, the 5th edition of the GSA's GNSS Market Report provides:

- a full description of the global GNSS market and its expected evolution up to 2025
- by market segments analyses including specific GNSS applications and trends

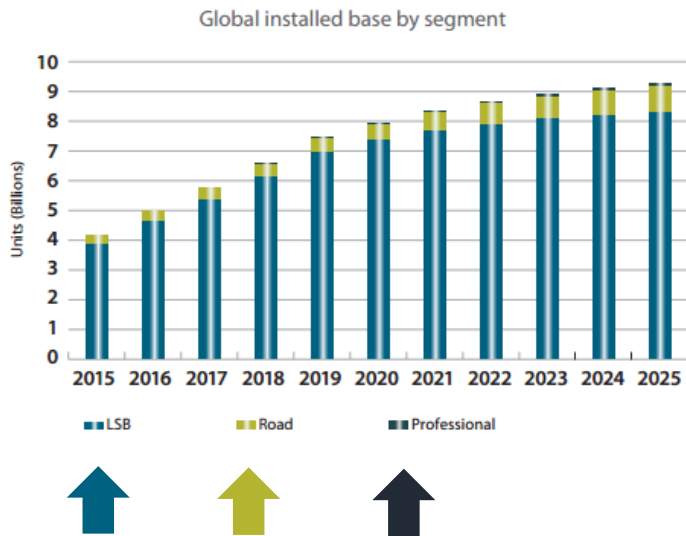


Download here: <https://www.gsa.europa.eu/market/market-report>



- ✓ An **expanded section on technological macro-trends** where GNSS has become essential
- ✓ Segment-specific **user perspectives** and their increasingly stringent demands
- ✓ Impact of **Galileo Initial Services declaration** enhancing performance of GNSS applications
- ✓ The important role that GNSS plays in the growing **market of drones**

The global GNSS installed base will reach 8bln devices in 2020, meaning more opportunities...



Smartphones account for almost 80% of the global installed base of GNSS devices, being the most popular platform to support mobile “LBS”



Tanks to In-Vehicle System and eCall markets the number of devices used for “Road” applications is set to grow substantially, with a CAGR of 11.4%



Fostered by a maturing regulatory environment, drones market is set to account for over 70% of the installed base of “Professional” segments in 2025

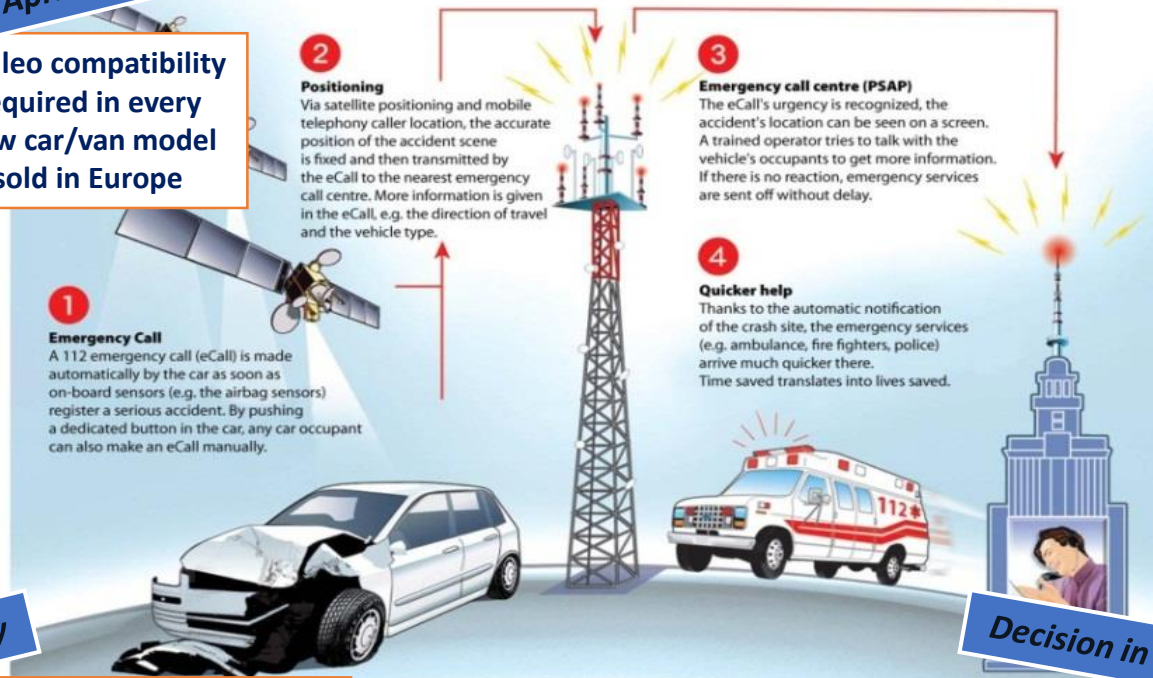


Galileo getting in all cars in Europe via eCall...



From April 2018

Galileo compatibility required in every new car/van model sold in Europe



1

Emergency Call

A 112 emergency call (eCall) is made automatically by the car as soon as on-board sensors (e.g. the airbag sensors) register a serious accident. By pushing a dedicated button in the car, any car occupant can also make an eCall manually.

2

Positioning

Via satellite positioning and mobile telephony caller location, the accurate position of the accident scene is fixed and then transmitted by the eCall to the nearest emergency call centre. More information is given in the eCall, e.g. the direction of travel and the vehicle type.

3

Emergency call centre (PSAP)

The eCall's urgency is recognized, the accident's location can be seen on a screen. A trained operator tries to talk with the vehicle's occupants to get more information. If there is no reaction, emergency services are sent off without delay.

4

Quicker help

Thanks to the automatic notification of the crash site, the emergency services (e.g. ambulance, fire fighters, police) arrive much quicker there. Time saved translates into lives saved.

Today

13 Millions of light vehicles sold every year in EU

Decision in 2017

United Nations Economic Commission for Europe (UNECE) working in a eCall harmonised regulation

...and in all trucks via the digital tachograph



From June 2019

- **Digital Tachograph (DT)** improves road safety, supporting the respect of time of drive and rest rules.
- The new amended **EU legislation** is proposing GNSS inside the new generation of Digital Tachograph requiring in particular Galileo compatibility.
- The need for **increased robustness and trustability** is opening new opportunities for Galileo OSNMA Authentication!



Interested to know more?



GNSS market trends & applications



<https://www.gsa.europa.eu/market/market-report>

GNSS receiver trends & technology



<https://www.gsa.europa.eu/european-gnss/gnss-market/2016-gnss-user-technology-report>

And what about tolling?



- ✓ GNSS is used in the majority of the new schemes for trucks...
- ✓ ... and EGNOS and Galileo are required in several tenders.
- ✓ And what about cars?

More than 43,000km of GNSS-enabled road tolling in the EU

Across **Germany, Slovakia, Hungary and Belgium** more than 43,000km of roads in the EU are currently being charged by GNSS technology for the electronic tolling scheme of heavy goods vehicles. By 2019, **Bulgaria is set to join** this group of countries potentially adding 16,000km of roads to the total of EU roads tolled through GNSS. Outside the European Union, Switzerland and the Russian Federation are also using GNSS technologies in conjunction with other technologies for their tolling scheme. Singapore recently announced that it will have the first GNSS urban congestion charging system for all vehicles by 2020. Some EU Member States are also considering road tolling for passenger and light vehicle. In the case of Belgium, GNSS is likely to be the preferred technology.

More information in the **dedicated RUC report** downloadable via our website <https://www.gsa.europa.eu/system/files/documents/ruc-brochure.pdf>



Use of GNSS for Heavy goods vehicle Road Tolling

- GNSS used (also in conjunction with other technologies)
- Use of GNSS for Road Tolling under evaluation

Linking space to user needs



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