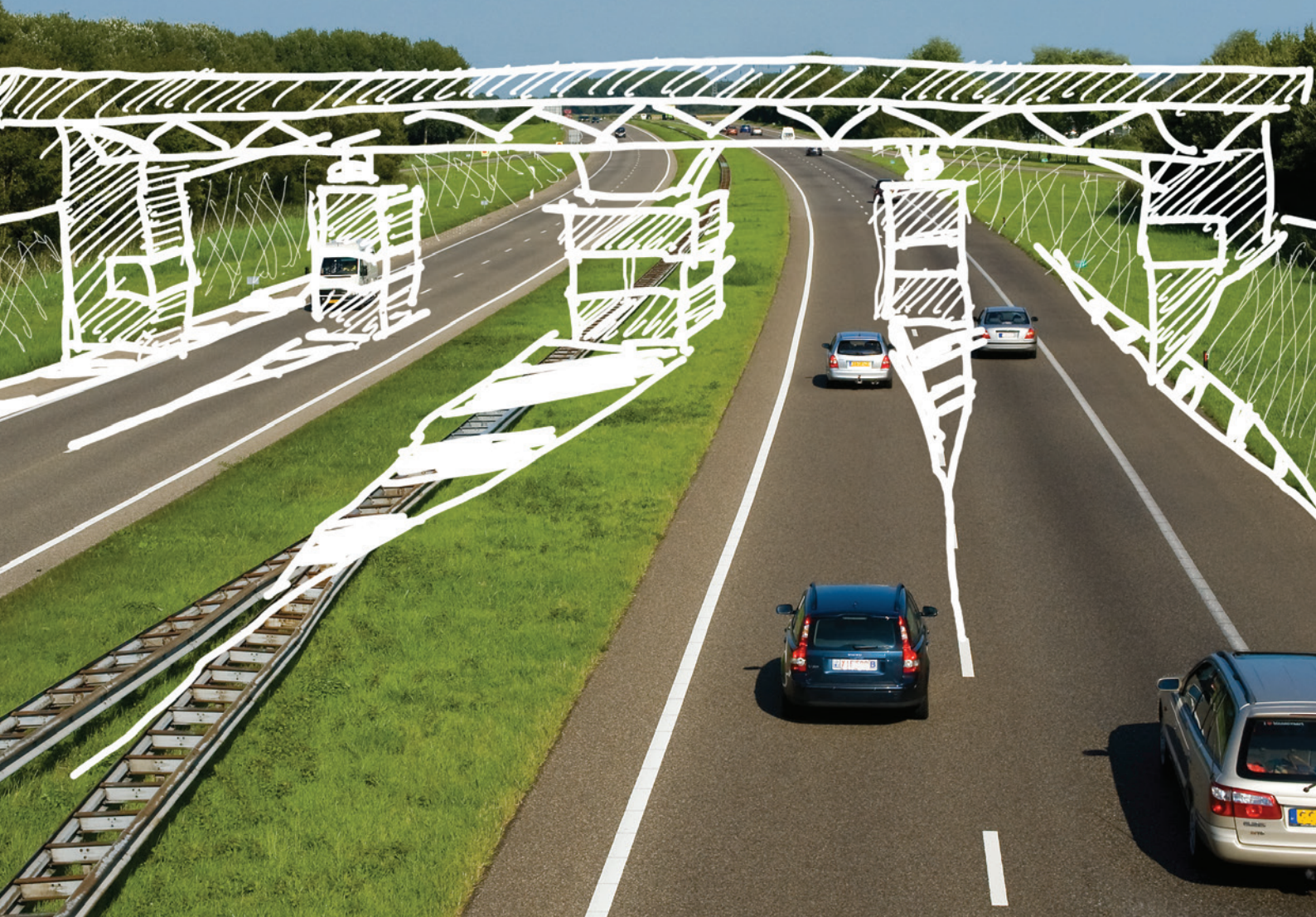


**EGNOS**

**FOR ITS AND ROAD  
TRANSPORTATION**



# HIGH FLEXIBILITY, LOW INVESTMENT



European  
Global Navigation  
Satellite Systems  
Agency

Navigation solutions  
powered by Europe







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As one of the largest and most dynamic transportation markets, the road segment represents a major business opportunity for European Global Navigation Satellite System (GNSS) technology applications.

With a projected 2018 worldwide market for road GNSS receivers and services estimated at a core revenue of EUR 36 billion, the future for EGNOS and GALILEO-related road applications looks bright.

## EUROPEAN GNSS ROAD APPLICATIONS TODAY

Significant advancements in satellite-based positioning are contributing to the development of better transport services and new applications for safe transport and smart mobility. With its flexibility, low infrastructure costs and long-term sustainable use, GNSS has proven to be an important asset in the design of new ITS infrastructures.

**Smart mobility applications** improve the efficiency, effectiveness and comfort of road transportation through:

- **Navigation**, the most widespread application, provides turn-by-turn information to drivers via portable navigation devices (PNDs) and in-vehicle systems (IVS).
- **Fleet management** on-board units (OBUs) transmit GNSS positioning information through telematics to support transport operators in monitoring the performance of logistic activities.
- **Road traffic monitoring** services collect floating car location data from vehicles through PNDs, IVS and mobile devices to be processed and distributed to users and other interested parties.

**Safety-critical applications** leverage precise and secure positioning in situations posing potential harm to humans or damage to a system/environment:

- In **connected vehicles**, GNSS positioning will be a key element for providing situational awareness through vehicle-to-vehicle and vehicle-to-infrastructure communications, enhancing the safety and comfort of the driver.

- **Dangerous goods tracking** can be done by transmitting GNSS-based positioning data on the vehicles carrying them, along with other information about the status of the cargo.

**Liability and payment applications** can have significant legal or economic consequences depending on positioning data:

- In **Road User Charging (RUC)**, GNSS-based solutions are designed to charge motorists for the actual distance travelled, without barriers or gantries, and provide interoperability between national cross-border schemes.
- **Insurance telematics** rely on GNSS data to increase the fairness of motor insurance for both insurers and subscribers.

**Regulated applications** apply the transport policies introduced by national and international legislation:

- GNSS-enabled IVS are used in the pan-European **eCall**, which accelerates emergency assistance by sending an emergency call to 112 in the case of an accident.
- **Smart digital tachographs** leverage GNSS positioning to support road enforcers, recording the position of a given vehicle at different points during the working day.







## European GNSS Supporting Autonomous Driving

Autonomous vehicles can take over activities traditionally performed by the driver, thanks to their ability to sense the environment, navigate and communicate with other vehicles and road infrastructure when combined with connected vehicle solutions. Widespread adoption of autonomous driving can reduce traffic accidents and improve traffic flow, as well as improve driver comfort.

Autonomous vehicles are enabled by the combination of different technologies and sensors, allowing the IVS to identify the optimal path of action. European GNSS plays a key role by providing relevant inputs for integrated navigation, such as precise vehicle location and speed.

## THE PREFERRED SOLUTION FOR ELECTRONIC TOLL COLLECTION

Satellite-based technologies such as EGNOS and Galileo enable quick implementation of tolling schemes for large road networks without the need for costly roadside infrastructure, together with a broad range of new applications.

Thanks to its flexibility, GNSS-based tolling is being increasingly adopted in nationwide schemes. Users can be charged based on different criteria (type of road, time, distance, vehicle type, level of emissions), all of which are easily modifiable over space and time. Other benefits of GNSS in complex new networks include low transaction costs, minimal environmental impact and additional revenues from value added services.

## EUROPEAN SATELLITE NAVIGATION SUCCESS STORIES DRIVEN BY R&D

### **GAIN paves the way to environmentally friendly road mobility**

Innovative solutions such as GNSS can mitigate the negative economic, social and environmental impact of increasing road traffic.

The FP7-supported GAIN project implemented an Enhanced Active Green Driving (EAGD) system where Vehicle-to-Vehicle communication is integrated with positioning algorithms based on EGNOS, detecting and mitigating multipath in urban areas. The GAIN dynamic information system allows more accurate real-time speed optimisation and reduced fuel consumption. In 2014, the solution was successfully tested in real scenarios, including roundabouts and crosswalk approaches.

### **FOSTER ITS ensures more secure positioning and timing**

The growth of liability-critical applications such as RUC, insurance telematics and digital tachographs will require increasingly secure positioning with respect to interferences like jamming and spoofing.

The Horizon 2020-supported FOSTER ITS project deals specifically with this need for robust positioning. Building on the outputs of the FP7-supported TACOT project, FOSTER ITS will address solutions for attack detection and confidence in Position Velocity and Time (PVT) data by developing a secured multi-constellation GNSS module. Planned outcomes of the project include the rapid marketing of a multi-constellation module with different possible features in 2016, along with a development kit for system integrators to assess its performance.







## EGNOS Ground Segment

- Mission Control Center
- Navigation Land Earth Station
- Support Facilities
- Ranging and Integrity Monitoring Station (Deployed)
- Ranging and Integrity Monitoring Station (Under deployment)
- Ranging and Integrity Monitoring Station (On Test)

## THE BENEFITS OF EGNOS AND GALILEO

### EGNOS: augmenting capability, enhancing position performance without cost

EGNOS is the European satellite-based augmentation system that enhances the accuracy of GPS (by delivering corrections of ionosphere and system errors) and provides information on its reliability. EGNOS is already fully operational and can enhance GNSS-based road applications by offering:

- Increased accuracy: EGNOS provides a better positioning precision accuracy, reducing the errors of GPS and thus being able to distinguish, for example, between two parallel roads.
- High signal availability: the service availability reaches 99% for EU coverage.
- Increased reliability: EGNOS' signal integrity guarantees that positions errors are bounded by a very high probability.
- EGNOS is fully available at **no additional costs**.
- Already there: EGNOS is embedded in most last generation GNSS devices and can be easily activated.

### Galileo: a new global navigation system

In the near future, multi-constellation receivers will be the "standard". Galileo, together with other GNSS programmes, will provide enhanced robustness at no additional cost, delivering added value as:

- Increased accuracy: Galileo, in combination with GPS, guarantees high precision performance.
- Reduced Time to First Fix: it will be possible to spot the location of a vehicle just starting a trip faster than by using GPS-only solutions.
- A wider and stronger signal compared to GPS: capable of more easily passing through a tree canopy – especially important in rural areas.
- Authentication: Galileo will deliver a signal authentication capable of improving the robustness of the positioning against interferences and spoofing attempts.

For more information, please visit:

[www.gsa.europa.eu](http://www.gsa.europa.eu)