



GNSS Data Pool for Performances Prediction and Simulation of New Applications for Developers

Rationale

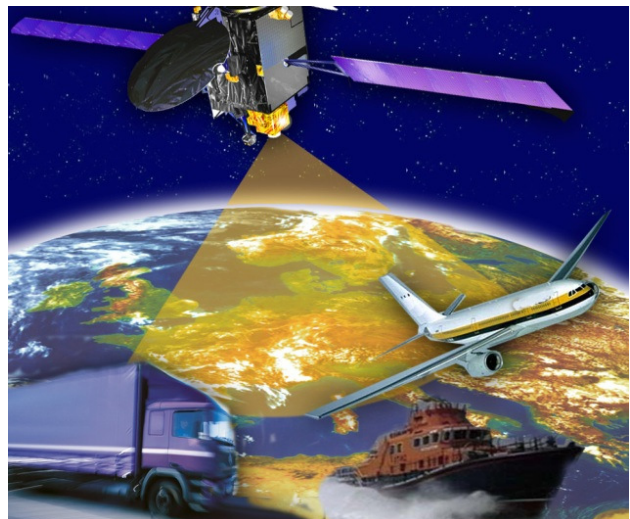
The overall worldwide GNSS (Global Navigation Satellite System) revenues for civil applications are expected to grow on average by 11% per year reaching €165 billion in 2020.

The community trust on GNSS system is so high that more and more applications based on GNSS are now **safety critical**. In that context, Europe recently certified a new system, the European Geostationary Navigation Overlay Service (EGNOS) that supplements the GPS systems by reporting on the **reliability and accuracy** of the signals. Furthermore, in the near future, the new European GALILEO satellites constellation should also contribute to enhance performances of GNSS based solutions.

With the increase of criticality level of the GNSS applications, products manufacturers and developers are now requesting a relevant mean to **predict performances and reliability** of their future applications in different environments. For example, one will be interested to know the GNSS performances in the city of Berlin for its critical application for guiding blind people while another one would like to predict the accuracy of its road toll collection system over all the country of Italy. Often SMEs have ideas that sometimes cannot be implemented because they depend on the availability of data resources or specialised tools that are too expensive to obtain and maintain.

During the positioning applications development lifecycle and particularly before the commercialisation and deployment phase, companies are obliged to perform **long and expensive field trials in several targeted operational environments** in order to assess and certify the behaviour of their future products/applications.

Although the big manufacturers have the resources and the financial capability to support such activities with long test campaigns in all possible operational environments, **for the SMEs this is not true since their limited budget** prohibits them from executing the required test campaigns, which include major personnel, travel and subsistence costs, as well as expensive and dedicated tools and equipments for performance evaluation. Such costs constitute a barrier for SMEs that would like to propose innovative GNSS services by exploiting the full potential of advance GNSS technologies such as EGNOS/GALILEO.



Main Objective

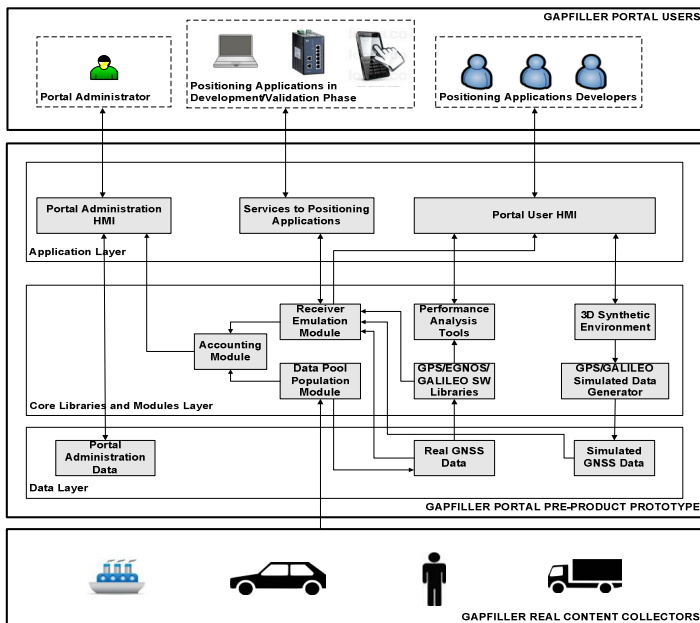
The GAPFILLER project aims at filling the gap between big manufacturers and SMEs by providing the researchers and developers' community with a **unique, sustainable and extensible GNSS data pool** enabling performances prediction and simulation of new GNSS based applications and algorithms. The GAPFILLER's consortium aim is to create quality content and innovative services and to allow users to access and use online content and services across GNSS technologies barriers; it also aims at ensuring reliability of retrieval and use of digital resources across applications and platforms and at scaling up GNSS data analysis to keep pace with extremely large data volumes of tests campaigns.

Using GAPFILLER data pool combined with interfaces to the positioning applications and analysis/simulation tools will **substitute long and expensive test campaigns**. Such simulations can be done along with all the development cycle and allow early tracking of bugs and thus reduce the time to market.



GAPFILLER high-level architecture & features

The GAPFILLER high-level architecture is depicted in the following figure:



Benefits

The project will result in benefits that include but are not limited to:

- The development of an innovative use of a common GNSS database for performances assessment that will drastically reduce the cost of tests campaigns and certification process.
- The adaptation of the EGNOS aeronautical integrity concept to new application domains that will allow SMEs to gain the know-how for exploiting it and getting competitive advantage.
- The knowledge transfer between technology providers/data brokers and content providers (especially SMEs) boosting development speed of EGNOS and GALILEO services.

The GAPFILLER project is co-funded by the European Union's Seventh Framework Programme under grant agreement no 296379.



The **main features** include:

- A receiver emulation module, which by using the GNSS data provided by the data pool and exposing a standard API, allows easy interfacing with different positioning applications (embedded systems, PC-based, smartphone-based) and emulation of the behaviour of the application using different trajectories (PVT) as well as integrity information.
- A framework of performance analysis tools allowing comparison of GNSS performances (accuracy, integrity, availability) provided by several types of receivers (GPS, EGNOS or GALILEO) depending on key configuration parameters and targeted environments in different cities in Europe.
- A 3D synthetic data generator enabling to compute the propagation and the reception of radionavigation signals in a 3D virtual environment taking into account shadowing effects, generated by buildings or obstacles as well as multipaths (reflexions, diffractions and transmission) combinations leading to performance problems and fading effects.
- Trajectories display of the GAPFILLER GNSS data using third party maps services (Google Maps, other).
- Community features including Forum support, WIKI etc.

Competitive advantages

The GAPFILLER competitive advantages, which are not currently offered by any of the existing data pools include:

- The GAPFILLER data pool will include trajectories (PVT) and associated GNSS data not only from highways, roads and streets but also from other areas as well including canyons, ports, rivers etc.
- The GAPFILLER trajectories will be available through a dedicated application and using an open API (NMEA standard), so as to be able to be used directly in positioning applications evaluation by the developers.
- The GAPFILLER portal will provide performance analysis tools, allowing for rapid validation of the functional behavior of positioning applications in different operational environments, using EGNOS or GALILEO.
- The GAPFILLER portal will provide simulation tools for predicting the strength of the GNSS signals in high demanding operational environments (high density urban canyons etc.).

CONTACT

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