

Development of the European GNSS Interference Protection Network: EGIPRON

9th ICG Workshop on GNSS Spectrum Protection and Interference Detection and Mitigation



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European Union Agency for Space Programme (EUSPA)

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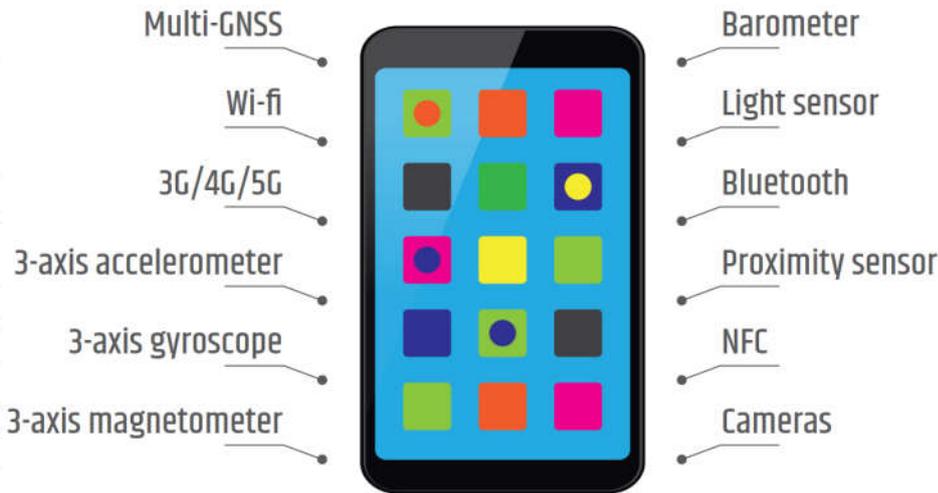
GSA GNSS User Technology Report



Sister publication to the GSA's GNSS Market Report, is published every two years and takes an in-depth look at the latest state-of-the-art GNSS receiver technology, along with providing expert analysis on the trends that will shape the global GNSS landscape in the coming years.

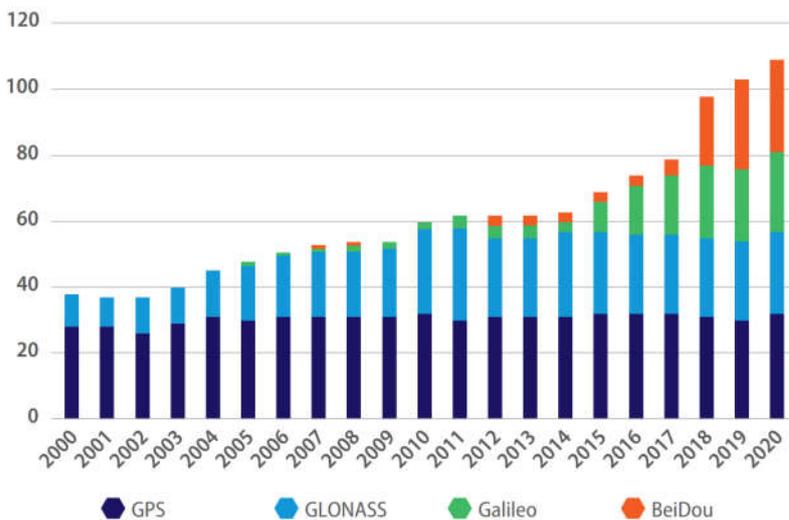
<https://www.gsa.europa.eu/european-gnss/gnss-market/gnss-user-technology-report>

Protecting against GNSS Jamming and Spoofing at all levels

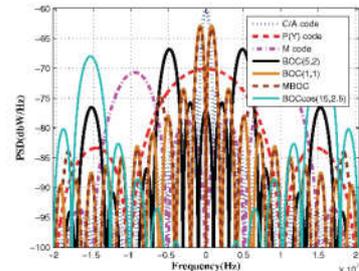


A typical smartphone embeds a wealth of sensors that can be leveraged to ensure reliable positioning.

Interoperable multi-GNSS is the reality for the foreseeable future



Operational* GNSS Satellites MEO only
 * Excluding test satellites.
 Reporting global coverage only (Medium Earth Orbit).



EGIPRON, Interference detection and robustness capabilities system



Qascom
Trust is Nice, Control is Better.

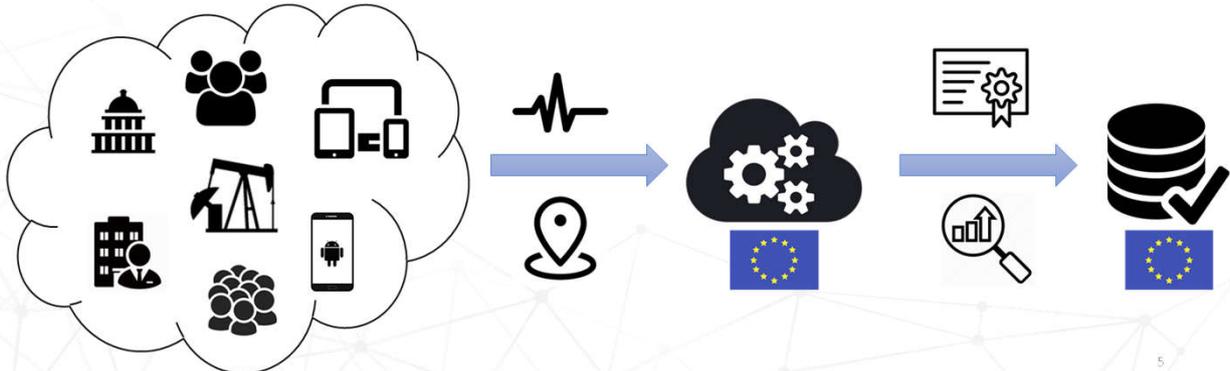
LEONARDO

RHEA
GROUP

BHO
LEGAL



EGIPRON
EUROPEAN GLOBAL INTERFERENCE
PROTECTION NETWORK

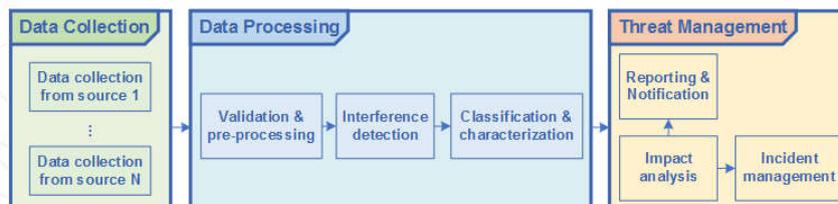


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EGIPRON Mission and objectives



- Analysis of the national interference reporting regulatory environment
- Design and implement a platform to collect heterogeneous interference-related data from contributors and share events to relevant end users
- Promptly notify to competent authorities of the EU Member States GNSS interference events.
- Ensure the protection of sensitive information.



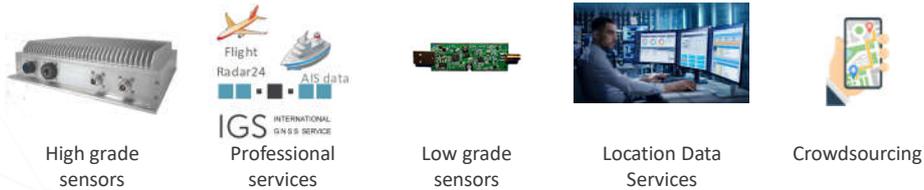
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EGIPRON User types

Contributor/Producer

Upload data
Using M2M interfaces or manual upload



End User/Consumer

Download statistics
Public authority, equipment manufacturer

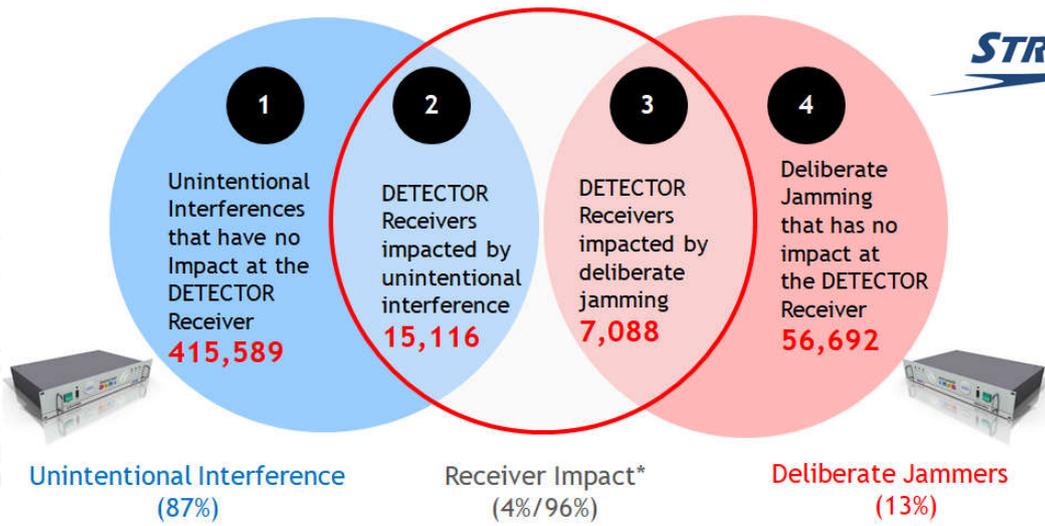
Administrator

Mange service and check uploaded data

- Flexibility is paramount
- Holistic data collection



STRIKE3 Knowledge Database



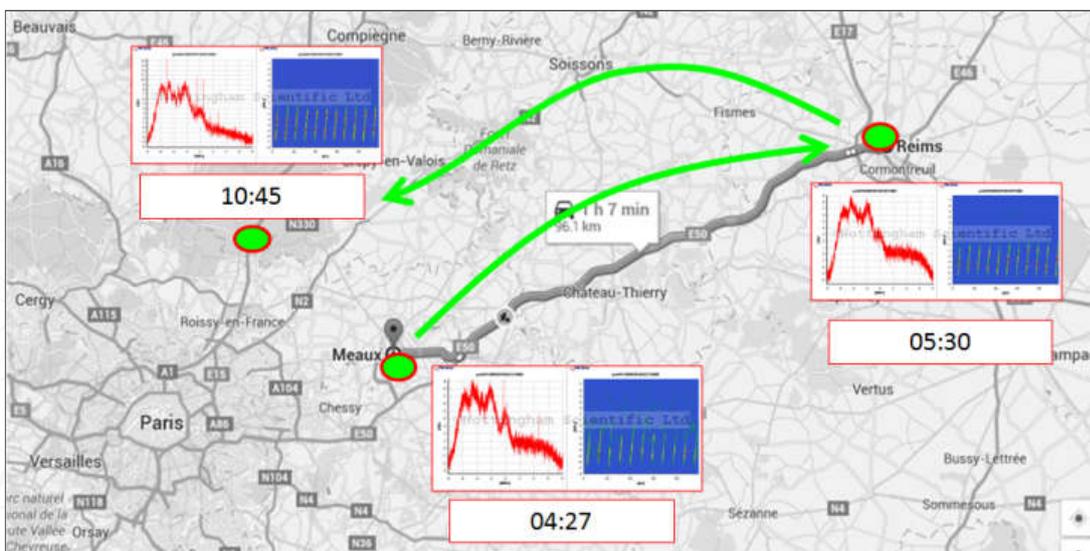
STRIKE3 Project Rationale



Provided a response at an international level to ensure that there is:

- i. A standard for GNSS threat reporting and analysis
- ii. A standard for assessing the performance of GNSS receivers and applications under threat

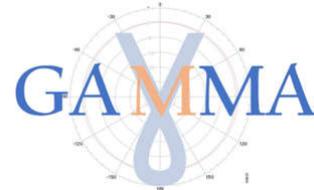
The value of characterization



Antennas and Receivers are essential to GNSS performance



Fundamental Elements

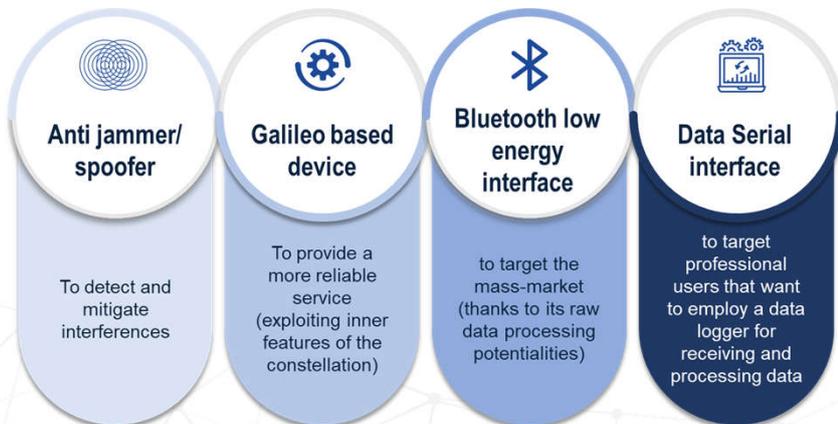
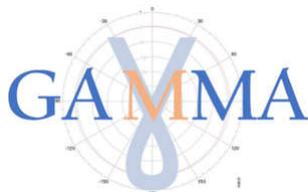


multi frequency automotive GNSS
integrated cost effective antenna

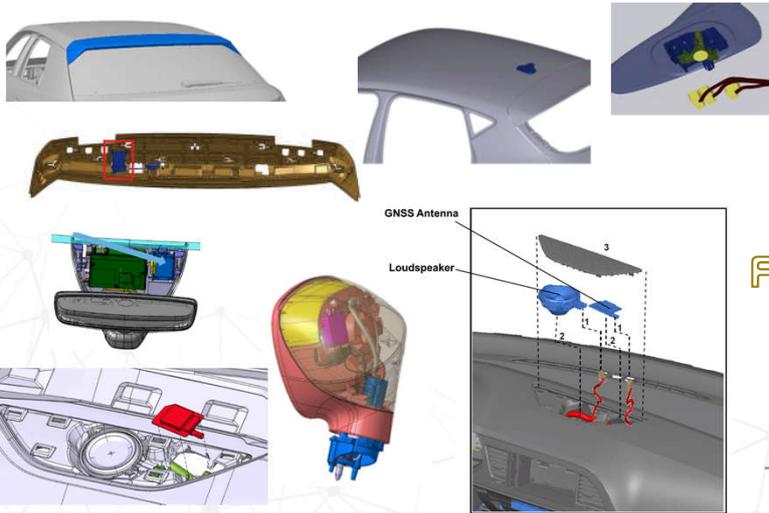


FIELD AWARE NAVIGATION AND TIMING AUTHENTICATION SENSOR
FOR TIMING INFRASTRUCTURE AND CENTIMETER LEVEL POSITIONING

GAMMA, GALileo-based Multifrequency Multipurpose Antenna



MAGICA, Multi-frequency Automotive GNSS Integrated Antenna



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FANTASTIC, GNSS applications to the next level



THE MULTI-FREQUENCY RECEIVER

The FANTASTIC receiver is:

- dual antenna,
- multi constellation,
- multi carrier.

The innovative technology implemented in the multi-frequency FANTASTIC receiver enables phase continuity in heavily interfered environments.



THE FIELD-AWARE ANTENNA

The FANTASTIC antenna is an active high-precision geodetic antenna supporting all GNSS signals in L-band and able to discriminate between right and left hand circularly polarized signals (both provided at two different outputs).

The radiation pattern is nearly optimal and the zenith cross-polarization discrimination is better than 15 dB.

It is characterized by very low phase centre variations (-3 mm to +5 mm across its frequency range).

It hosts an IMU just beneath the antenna phase center: this simplifies its setup (without the need to configure the lever arm).



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Enabling the digitisation of government controls through EGNSS



EGNSS4CAP

Enabling the digitalisation of agri-government controls through Galileo & EGNOS



Open Source Android and **iOS application** using GNSS raw measurements and **EGNSS differentiators (Galileo dual-frequency and Galileo authentication service OS-NMA)**, if the terminal allows it (up to the best possible level)

- Increasing accuracy
- Increasing robustness against data manipulation (position and time)
- Can be integrated and customised for end-user solutions
- Generating input for the Integrated Administrative Control System (IACS) of the Common Agricultural Policy (CAP)

www.EGNSS4CAP.eu

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The NAVISP Programme

A key enabler for innovation and competitiveness.



This programmatic action will not establish or duplicate the strategy or plan for the evolution of Galileo or EGNOS.

<https://navisp.esa.int/>

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GIDAS, GNSS Interference Detection & Analysis System



- Enables a continuous 24/7 monitoring of the GNSS frequency bands.
- Classify and localize intentional interference by means of jamming and spoofing.
- GIDAS targets safety critical applications with either high-demands regarding interference monitoring



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COLOSSUS



- Cloud-based GNSS data processing platform.
- Autonomous and continuous ingestion and processing of vast amounts of crowd-sourced RINEX data collected from continuously operating GNSS receiver (CORS) networks.
- Able to identify common mode GNSS failures, constellation failures and single satellite failures.



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ANTI-JAMMER SOC



- Single chip, which integrates in a single die the major building blocks of a complex system such as RF, analog digital processing data path, SRAM and a CPU.
- Application very compact, low cost and low power consumption.
- Allow un-degraded Acquisition and Tracking performance in Interference harsh scenarios.



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GNSS Vulnerability & Mitigation



- To support Czech Republic's activities related to the GNSS/PNT vulnerability.
- To create a complex overview of (critical) infrastructure dependency on GNSS/PNT.
- To prepare recommendations of mitigation measures against GNSS/PNT to particular stakeholders and governmental institutions.



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GIMAD, GNSS Interference Monitoring And Detection System



- Portable station designed to efficiently detect and support the location of threats that can endanger satellite-navigation based critical activities.
- To monitor permanently the GNSS environment in the geographical areas where these critical activities take place.
- Inform the users about the nature of the threat, allowing to initiate the necessary remedial actions.



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Linking space to user needs

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