Protecting GNSS services in the EU and beyond

Mark Dumville / William Roberts
Nottingham Scientific Limited [NSL]
NSL Company Overview

- NSL is a UK based high-tech small-to-medium sized enterprise.

- NSL specialize in the use of satellite navigation through shaping the use of Global Navigation Satellite Systems (GNSS) within critical applications such as those that:
  - directly affect the safety of citizens
  - are key in terms of national security
  - affect the way business is conducted.

- NSL develop and deliver GNSS-based services, systems, solutions, and intellectual property ensuring positioning and navigation is accurate and reliable, safe and secure, resilient and robust.
EU governments use GNSS to deliver policy...

Slovakia has experienced the largest extension of road tolling networks worldwide so far.

In addition to Slovakia, Germany, Switzerland and Hungary have successfully implemented GNSS-based tolling. Other countries are also leveraging the benefits:
- Belgium and Russia have launched similar projects implementing GNSS-based schemes.
- France, Finland, Bulgaria, Denmark, The Netherlands and Lithuania have all declared their interest in GNSS-based schemes.

GNSS based Truck tolling

GNSS based road user charging

Remotely Piloted Aircraft Systems

Offender monitoring

Fisheries Policy
Governments trust GNSS to deliver, however...

1. GNSS system issues
2. Solar Flare
3. Masking, obscurations and blockages
4. High ionospheric activity
Governments must defend against threats...

Fines up to 50,000 euros for truckers with GPS jammer to avoid toll

Truckers who use a GPS jammer to avoid the toll, risking fines up to 50,000 euros. That is informed today at Viapass, the government agency that coordinates the kilometer charge. Moreover, there are three ways in which the fraud is detected: via fixed porches above the road, and flexible control over the mobile control units. In addition, irregularities can be noted in the billing says Edward Claessens of Viapass.
(1) NSL ensures GNSS is safe...

- Use of CORS GNSS data
- Assessing performance of GNSS for airspace
- Meeting International Standards (e.g., ICAO)
- Accuracy, Integrity, Availability and continuity
(2) NSL ensures GNSS is available...

Interference monitoring

- Detect, characterise, locate GNSS jammers
- Identify the impact of interferences on GNSS
- Critical National Infrastructure and sites
(3) NSL protects GNSS spectrum…

- spectrum compliance monitoring
- geolocalisation of RF interferences and jammers
- major transport networks and infrastructures

Not permitted in some countries
(4) NSL ensures GNSS can charge users...

- Integration of GNSS, mapping and charging zones
- Improving GNSS performance
- Identifying problems in map databases
- pay as you drive insurances, telematics

Providing assurance
(6) NSL ensures GNSS receivers are fit for use...

Compliance Testing

- Qualification testing of GNSS receivers for governments
  - Fisheries, justice, avionics, road transport

- Support development of test specifications and standards
(5) NSL monitors critical infrastructure...

- Cost effective RTK for mass deployment
- Stability monitoring and movement detection
- 3D movements, combined GNSS and IMU
- Geotechnical earthworks and structures
(6) NSL provide fit-for-purpose affordable GNSS...

- multi-GNSS, multi-Frequency stations
- rapid deployment of GNSS infrastructure
- tests and pilots (e.g., EGNOS in Africa)
Thank you for your attention

mark.dumville@nsl.eu.com
william.roberts@nsl.eu.com

Nottingham Scientific Limited [NSL]