ASECAP DAYS
ISTANBUL 2023

Celebrating 50 YEARS OF Successful TOLL ROAD PROJECTS

GNSS CONSULTING

SATELLITE POSITIONING INNOVATIONS IN TOLLING

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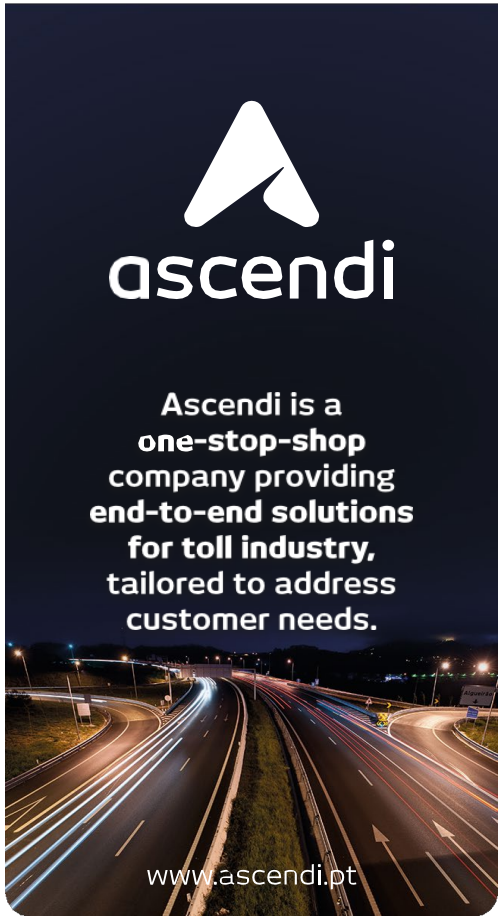
YAVUZ SULTAN SELİM BRIDGE AND NORTHERN RING MOTORWAY

Ascendi's Expertise in Tolling



OUR OPERATIONS

Ascendi is a service provider for toll collection operations with more than 20 years of experience in distinct toll collection models.

Portugal:
- 2 traditional toll operations
- 7 electronic toll operations

France:
- 1 electronic toll operation in development

WHAT WE DO

AET (MLFF)
- All Electronic Toll Collection;
- Light-duty and heavy-duty vehicles;
- **7 systems** in full operation;
- **136** collecting points;
- **150M** anual transactions.

TRADITIONAL TOLLING
- Manual and automatic lanes both in open or closed systems;
- Electronic Free Flow Single Lanes;
- **26** toll plazas.

WHAT WE OFFER

One of the largest European private operator of AET systems for multi-vehicle category, Ascendi provides end-to-end solutions, covering the complete lifecycle of design, implementation and operation of any kind of toll collection system.

Experience and Expertise is our added value in the toll collection value chain.

1. **PROJECT MANAGEMENT AND QUALITY ASSURANCE** are addressed to develop end-to-end solutions. Best quality for the minimum cost.

2. **MODULAR AND SCALABLE SYSTEM ARCHITECTURE**

ROAD SIDE EQUIPMENT (RSE) | **OPERATING BACK-OFFICE** (OBO) | **COMMERCIAL BACK-OFFICE** (CBO)

3. **OPERATIONAL ACTIVITIES**

Transaction's processing and collection | **Interfaces with External Entities** | **Customer Management and Support** | **Collection Management** | **Enforced Collection**

- End-to-End industry solution regardless of the RSE technology
- Process harmonization and business optimization
- Natural integration with external entities
- Software's stability and technical strength
- Multi-Company solution
- Scalable solution

INNOVATIVE SOLUTIONS

Some of the technological solutions that have been implemented

- Satellite Collection pilot project in Portugal with demonstrated technical feasibility
- Launch of a Mobile Application for customers (toll payments and account management and customer support)
- Implementation of Robotic Process Automation (RPA) technology supporting day-to-day client related operations

Tolled Roads in the 20th Century

Image © GNSS Consulting

Tolled Roads in the 21st Century

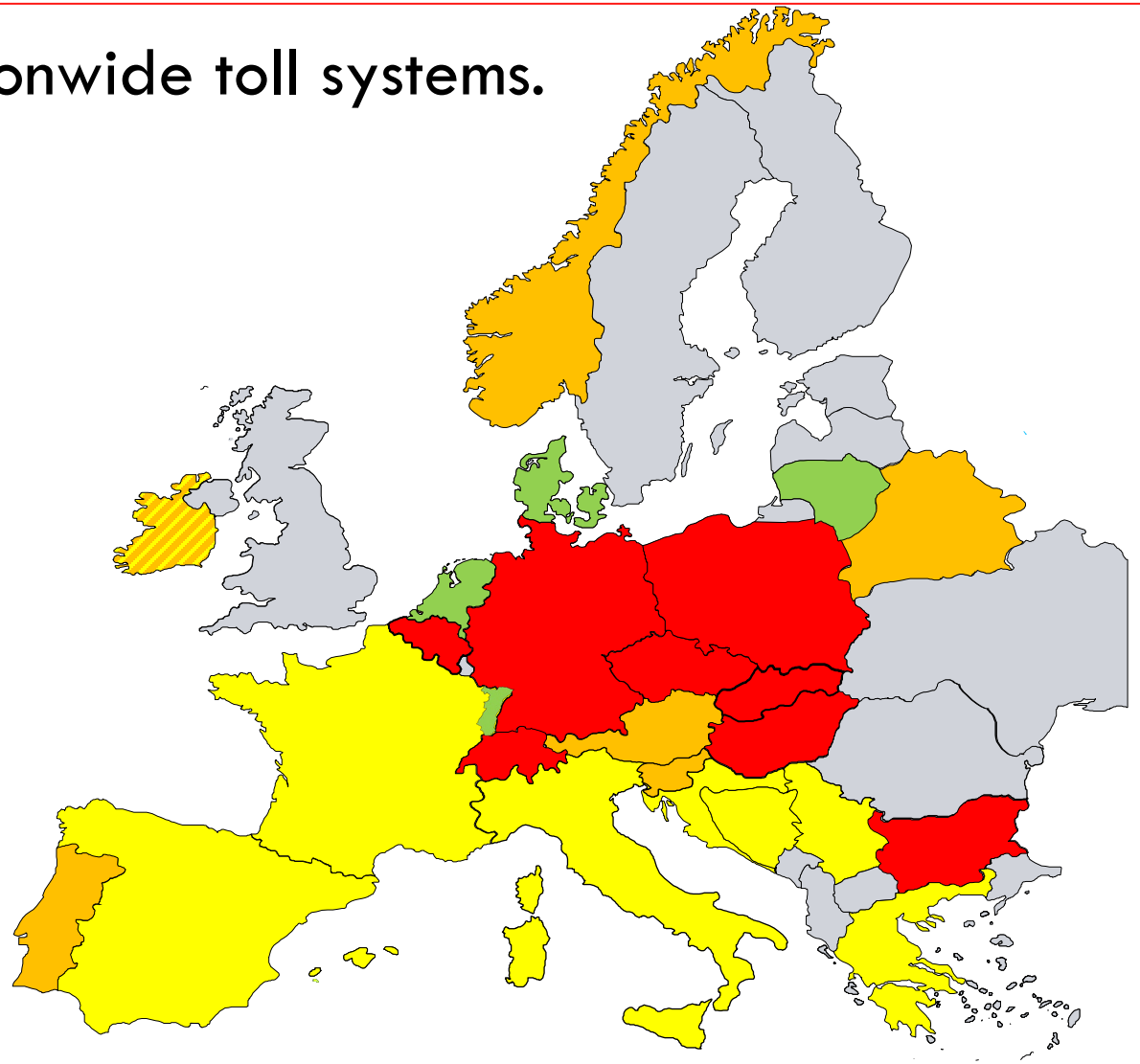
Satellite-Based Tolling in Europe

GNSS is the technology of choice for nationwide toll systems.

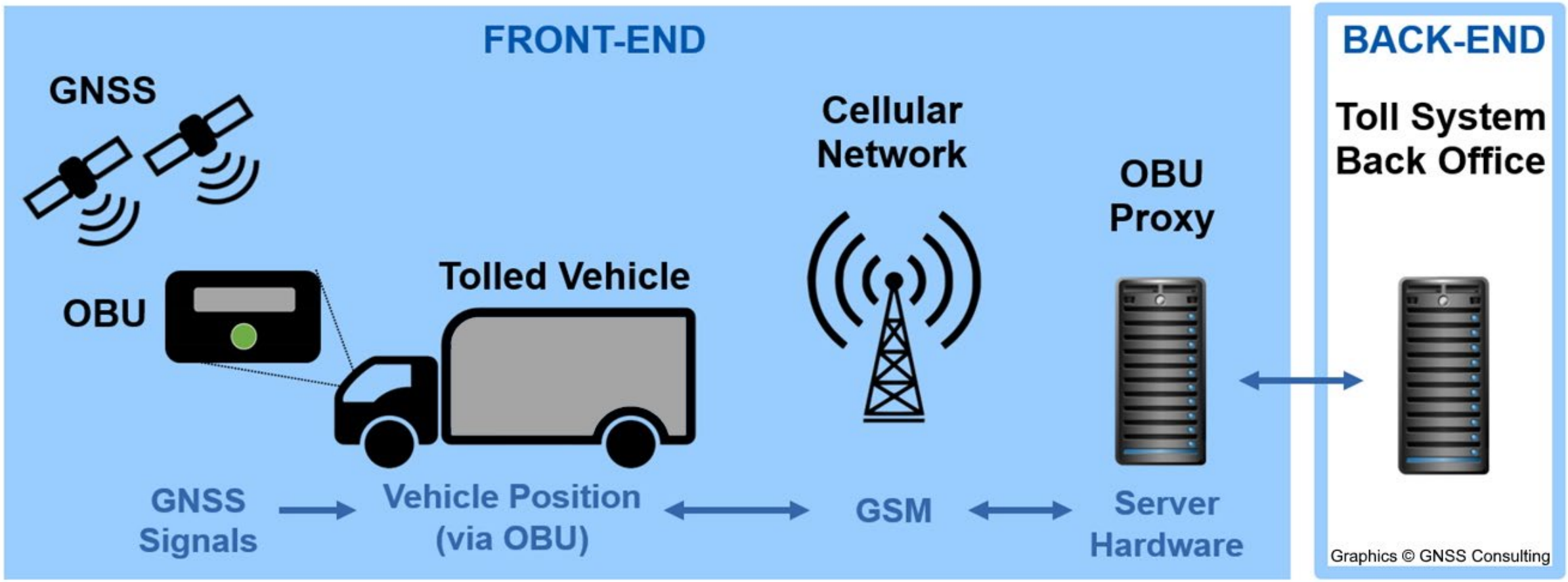
Switzerland 2001	Lithuania 2024
Germany 2005	Denmark 2025
Slovakia 2010	Alsace, France 2025
Hungary 2013	Netherlands 2026
Belgium 2016	
Bulgaria 2020	
Czech Republic 2019*	
Poland 2021*	

All new systems will rely heavily on the European Electronic Toll Service (EETS)

* *GNSS replaced DSRC*

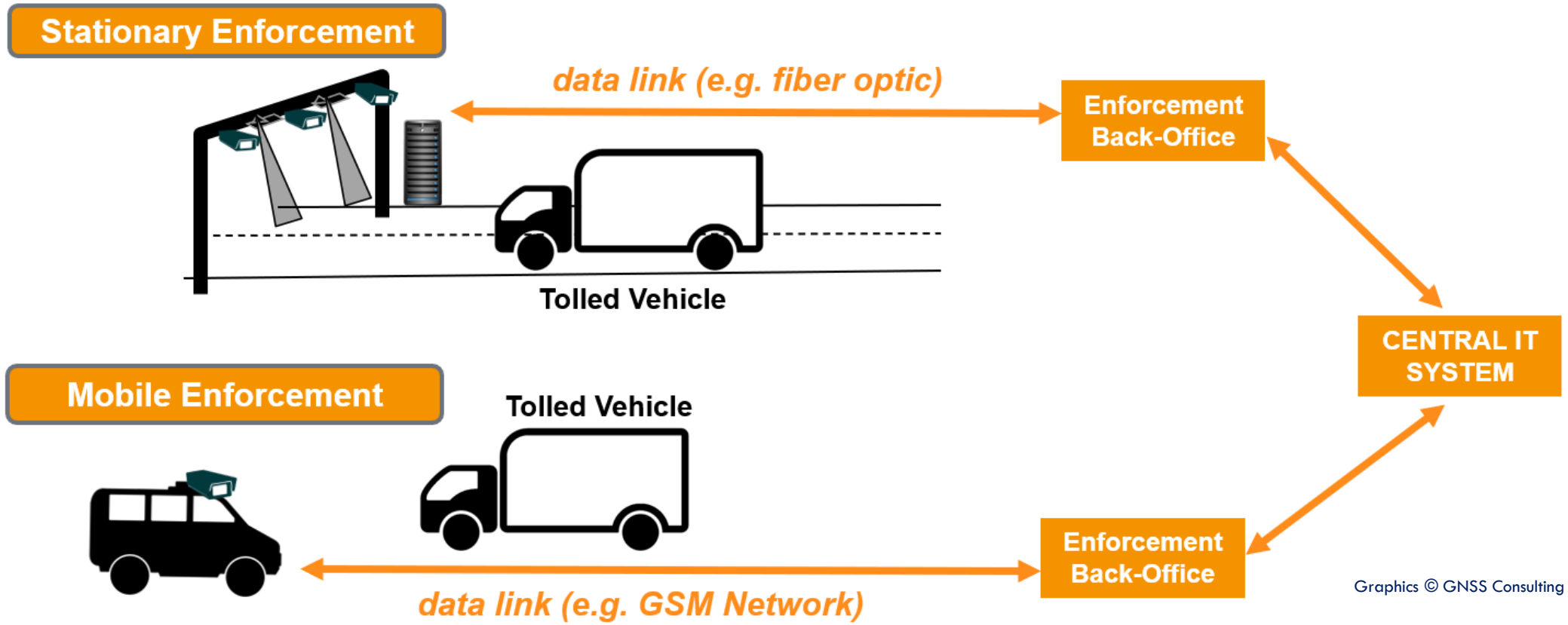


How GNSS-Based Tolling Works



How Enforcement for GNSS Works

GNSS schemes also use roadside infrastructure, but comparatively much less.



Using Multiple Satellite Systems

GNSS is much more than just GPS.

Multi-Constellation
Improved availability and position accuracy.

Multipath Resistance
Mitigation of multipath effects in urban canyons.

Signal Authentication
Galileo provides services that can detect spoofing.

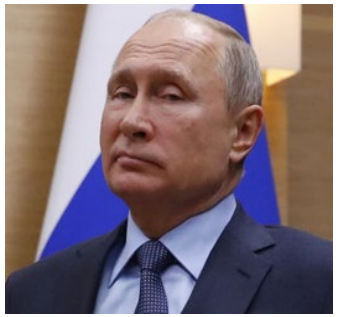
GPS (USA)
6 orbital planes
24 satellites (+1)
55° inclination
20,200 km altitude

Galileo (Europe)
3 orbital planes
27 satellites (+3)
56° inclination
23,616 km altitude

BeiDou-3 (China)
3 orbital planes
24 satellites (+6)
55° inclination
21,500 km altitude

Glonass (Russia)
3 orbital planes
21 satellites (+3)
54.8° inclination
19,100 km altitude

Galileo is the only civilian-operated GNSS: EU Agency for the Space Programme (EUSPA)



GNSS is Far More Cost Effective

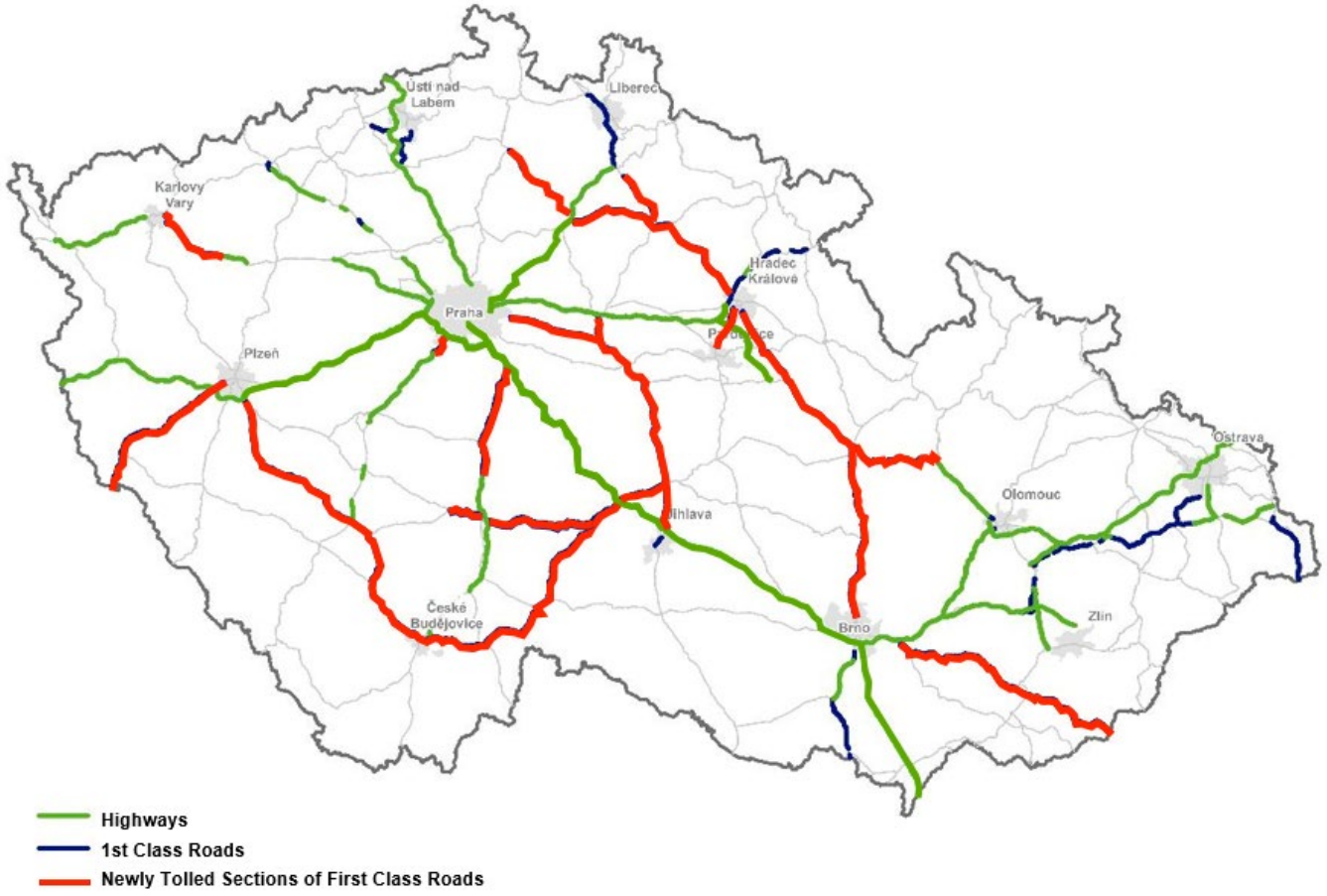
Czech Republic demonstrates how GNSS-based tolling is far more cost-effective.

Tolled Road Network was extended from 1,500 km (with DSRC) to 2,800 km (with GNSS)

Cost of replacement € 75 million with 600,000 new OBUs delivered. ***OPEX is cut by half!***

OLD DSRC OBU

NEW GNSS OBU



GNSS is Far More Flexible

Germany demonstrates how GNSS-based tolling is far more flexible.

German Truck Tolling ("LKW Maut") was launched in 2005, with a tolled road network of 12,000km (all the highways).

Initially €4b - €5b in toll revenue p.a.

In 2018, the tolled road network was extended to 52,000 km – including all the major national roads ("Bundesstrassen") – become the largest toll system in the world.

Toll evasions were avoided and toll revenue increased to €7b to €8b p.a.

GNSS being deployed in Urban Areas

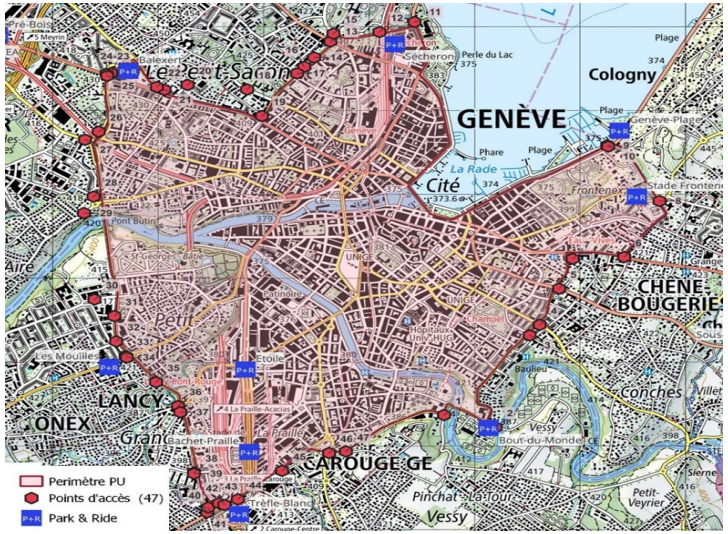
Singapore ERP-II

Removal of 78 microwave gantries (from 1998). GNSS-based Electronic Road Pricing should go live in 2023, making it the first satellite-based congestion scheme in the world.

"Immense" Project

A Pilot Project in Munich and Barcelona uses smartphones to explore the use of GNSS for demand-driven road pricing and mobility management.

Geneva Congestion Pilot

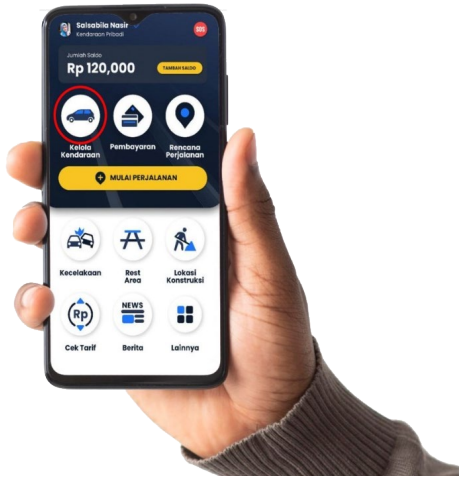


Geneva is planning a congestion pilot to limit the traffic entering the city, starting in 2024/2025 for a 4-year trial. Initial studies recommend GNSS and ANPR.

GNSS is Replacing Toll Plazas

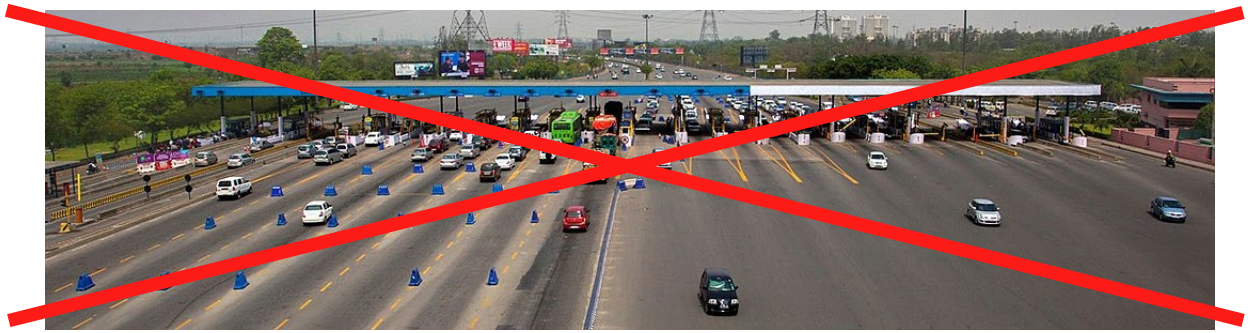
Indonesia is rolling out GNSS

Indonesia is now replacing all toll plazas with a GNSS-based solution. 50 million users will be using the new system, and can choose between a GNSS OBU or a smartphone app.



India is planning GNSS

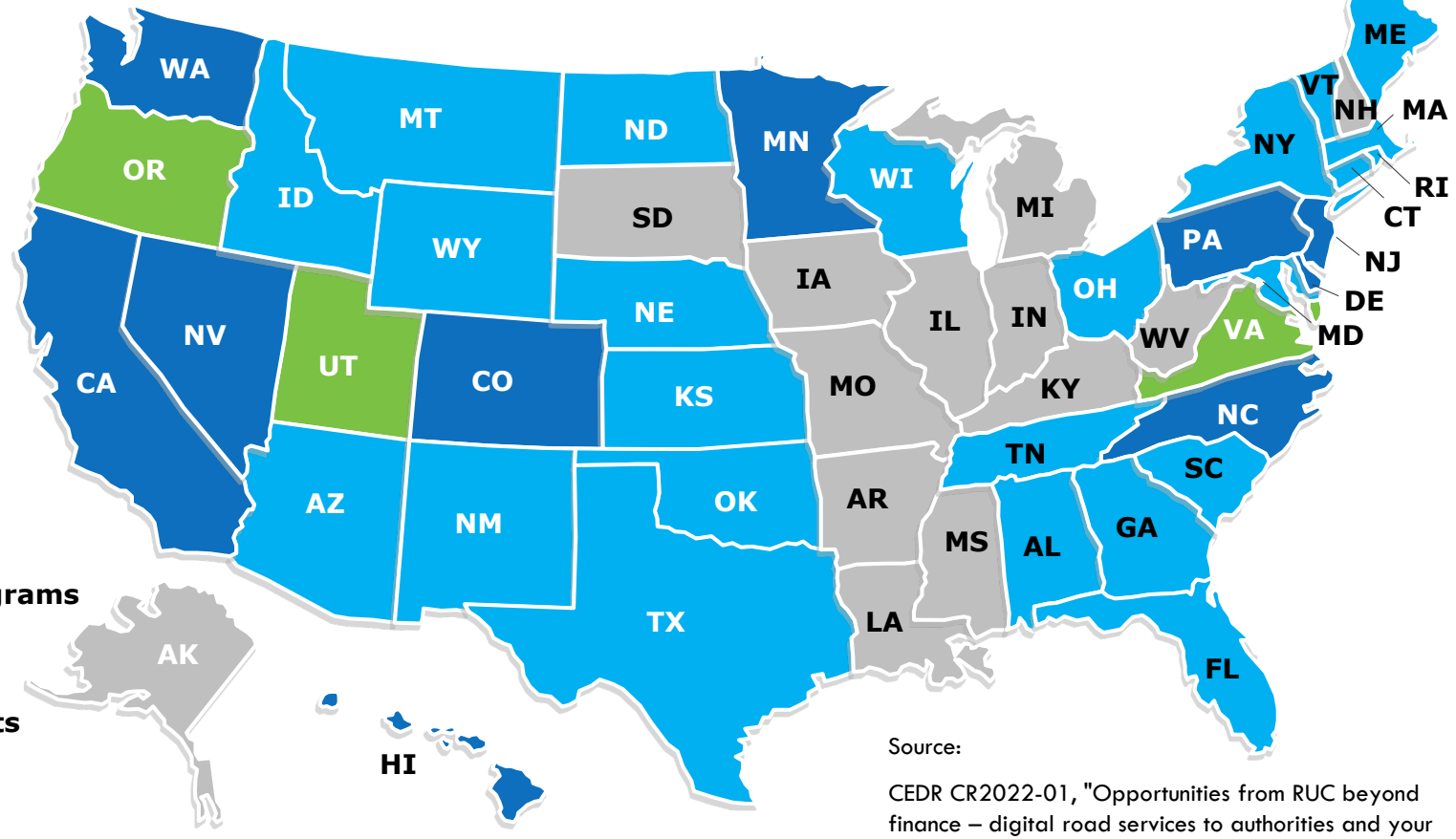
India National Highways will replace hundreds of toll plazas on more than 100,000 km of highways with a GNSS solution



www.gnss-consulting.com/india-prepares-gnss-tolling

The USA has 3 RUC systems in operation, many pilots and research projects.

Many US States looking to use GNSS-based RUC to compensate the drop in fuel tax revenues.



3 **Operational Programs**

10 **Public pilots**

14 **Research projects**

Source:

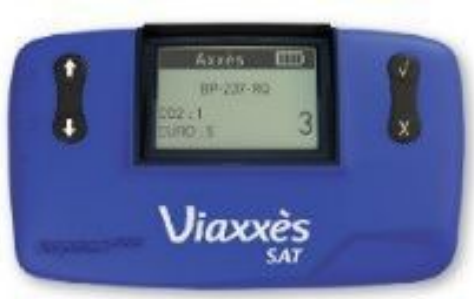
CEDR CR2022-01, "Opportunities from RUC beyond finance – digital road services to authorities and your customers." ISBN: 9791093321608, Brussels, March 2022.

GNSS is the driving force behind EETS

Travel throughout Europe with one OBU, one contract, and one invoice.

Plug & Play windshield-mounted Hybrid OBUs

Some common EETS On Board Units:



Kapsch (Austria)

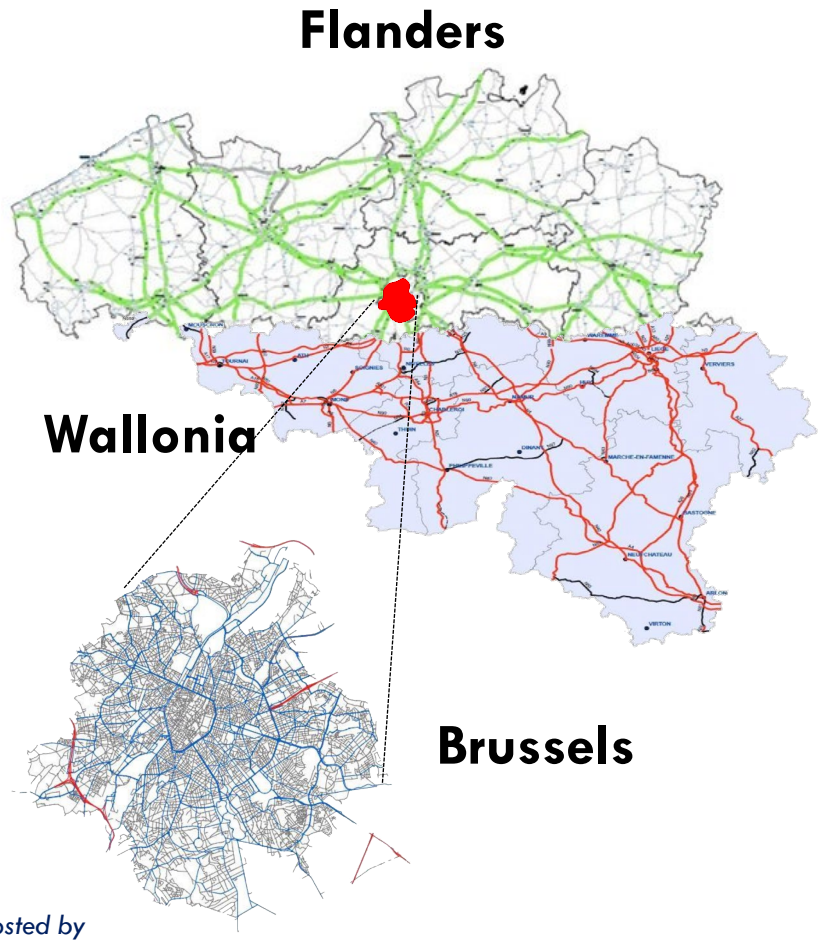
Yunex (Austria)

Continental (Germany)

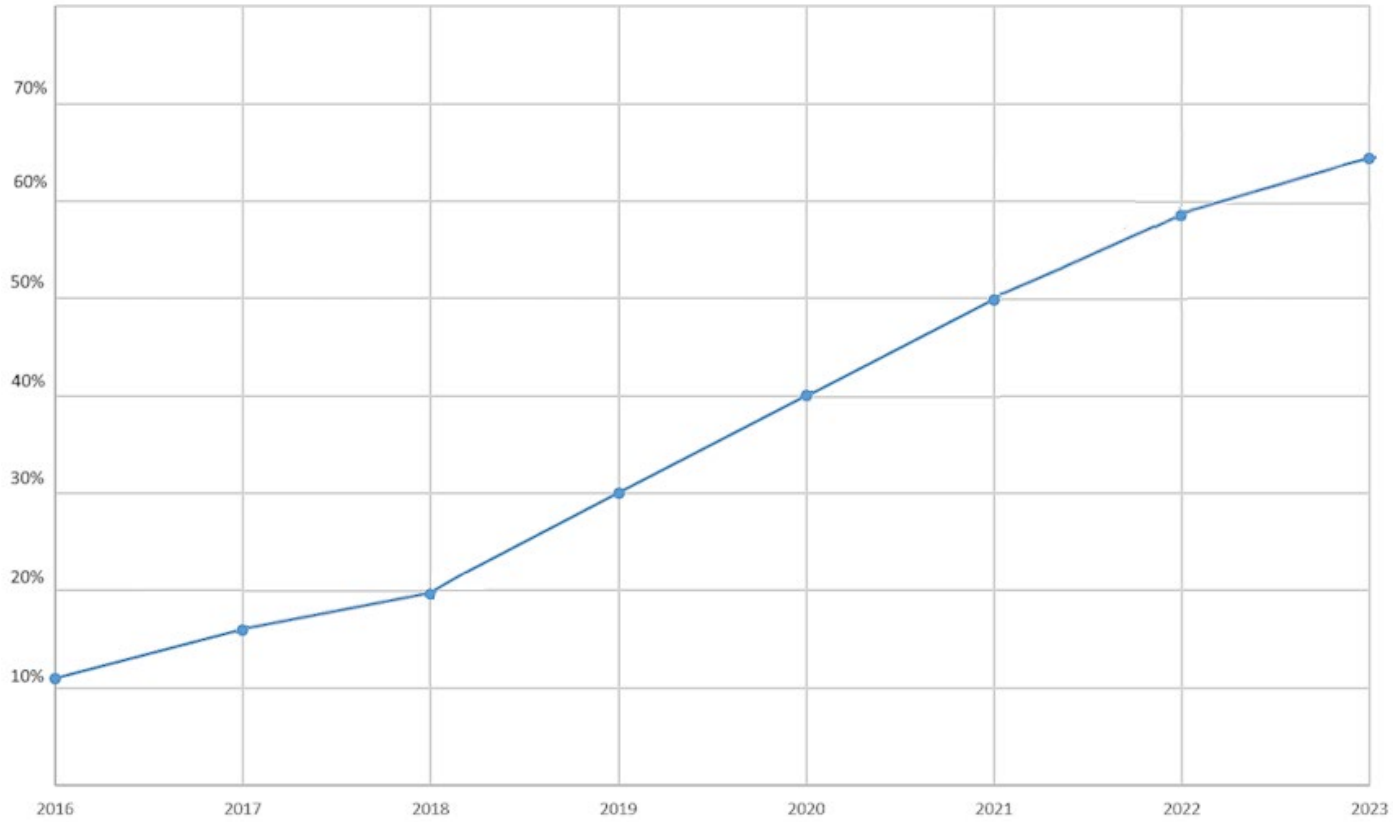
Telepass (Italy)

The Growth of EETS using GNSS

"Viapass" in Belgium introduced EETS with GNSS-based Truck Tolling in 2016.



EETS market share growth in Belgium 2016 to 2023 (10% to 65%)

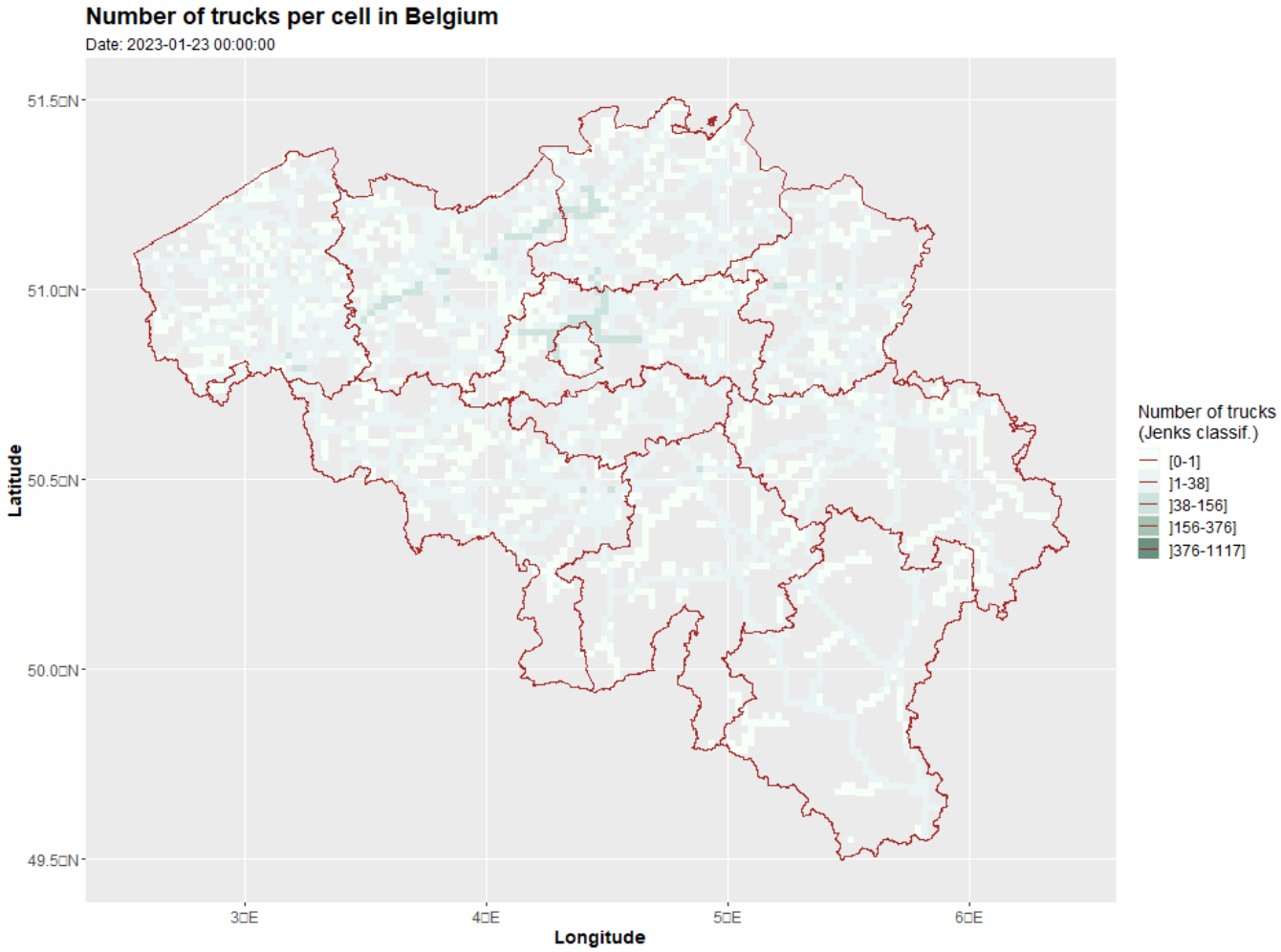


GNSS Systems Provide Added Value

Toll Chargers (State Administrations) have access to a wealth of data for:

- Traffic monitoring
- Origin / Destination analysis
- Wider tariff differentiation

GNSS-based tolling data helps policy makers to take a more informed decision.



New GNSS Systems Rely on EETS

Most new GNSS Systems procured in Europe will use EETS by default.

Advantages:

- No need for a national service provider or OBU distribution
- Most trucks already equipped with OBU, registration done through EETS providers
- Value-Added Services easily possible

Challenges:

- Using similar specifications for the exchange of information (toll declarations, white-lists, black-lists, etc.)
- Sharing the same IT platform, such as the *Viapass Hub* and *EUCARIS*
- Simplifying the accreditation processes

GNSS-based tolling systems will increasingly rely on the use of EETS.

The key success factors of such systems:

- Well structured integration between all stakeholders and actors.
- Project management structure to support multiple EETS providers.
- Getting multiple EETS providers on board from the very beginning.
- Strong public relations campaign to motivate users to sign up to EETS.
- A robust alternative for vehicles not registered with an EETS provider.

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