



Satellite Navigation (GNSS) bringing innovation to Road User Charging

Alberto Fernández Wytttenbach, Market Leader Road/ITS - European GNSS Agency

[ITF Expert Workshop: International best practices to promote eco-friendly cars, 25-26 January 2021](#)

GNSS is a free-flow technology



GNSS does not need roadside infrastructure



GNSS is interoperable



This is GNSS for tolling!



FLEXIBILITY

Rapid changes can be implemented

EXTENSIBILITY

Example of a network extension in 3 months

REVENUE POTENTIAL

SP can include several VAS to their offer

ENVIRONMENT (AND COST)

Around 80% less roadside infrastructure

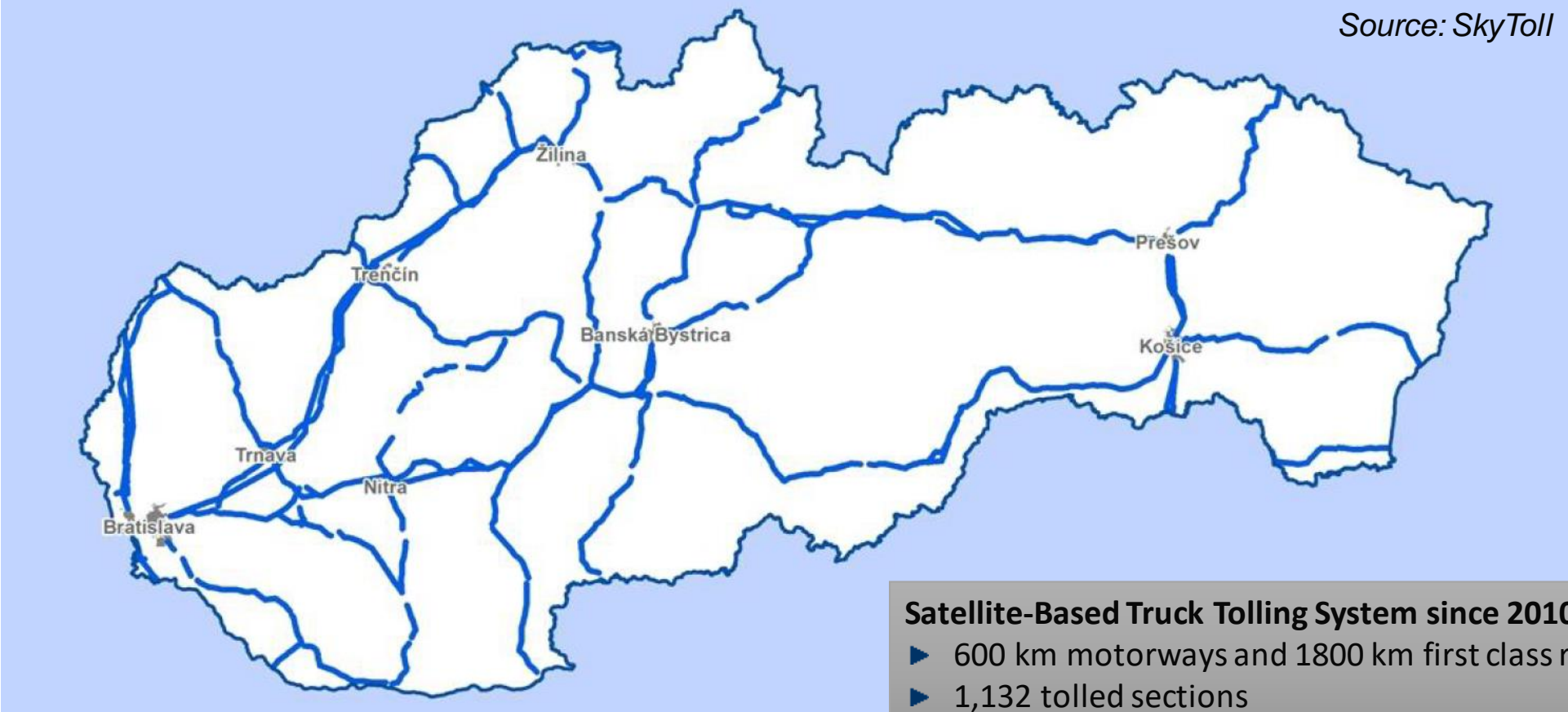
TRAFFIC MANAGEMENT

Dynamically influence traffic behavior

LOW TRANSACTION COSTS

Data traffic costs already @ approx. 2€/month

Source: SkyToll



Satellite-Based Truck Tolling System since 2010

- ▶ 600 km motorways and 1800 km first class roads
- ▶ 1,132 tolled sections
- ▶ More than 30 legislative changes in RUC in 4 years

Source: SkyToll



Thanks to GNSS, Slovakia easily extended in 2014 the tolling network in **just 3 months**:

- ▶ 15,315 Km of new tolled roads
- ▶ 3,162 new tolled sections
- ▶ Thousands of gantries would be needed with DSRC technology otherwise
- ▶ All motorways, expressways, 1st, 2nd and 3rd class roads covered



Slovakia's Satellite Tolling System was awarded as the **2015 Global Road Achievement** by the IRF - International Road Federation -

Road Tolling

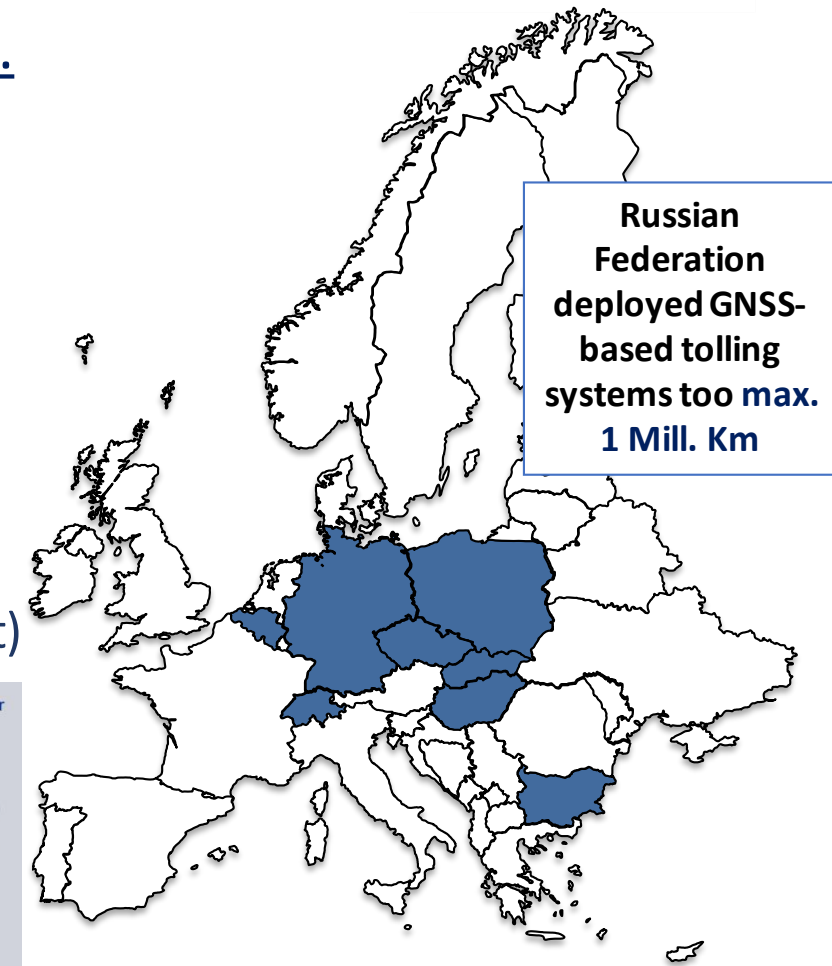
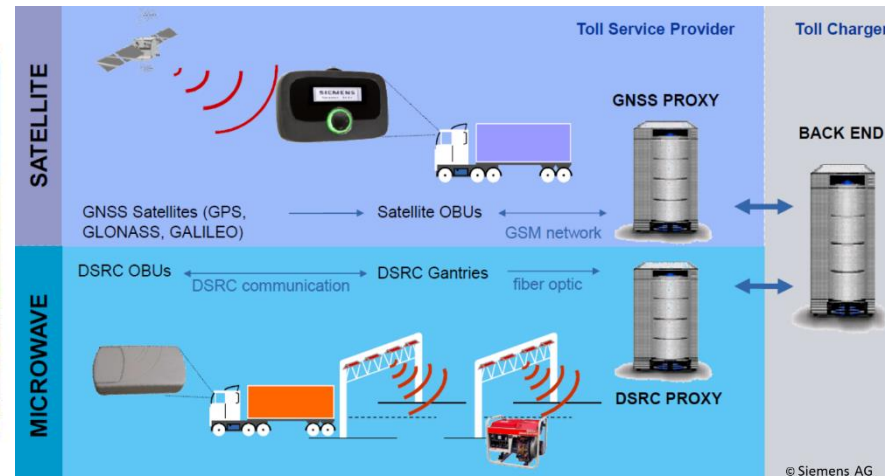
Distance-based tolling: GNSS is the preferred solution



- GNSS tolling in the EU: Germany, Slovakia, Belgium, Hungary,...
(in 2020) Czechia, Poland and Bulgaria
- 74% from EU tolled roads (+85,000 Km) correspond to GNSS scheme*

Directive 2019/520/EU on the European Electronic Toll Service

1. **ANPR- Automatic Number Plate Recognition**
(best choice in tunnels, bridges and fixed tariff roads)
2. **DSRC- Microwave units + many gantries**
3. **GNSS- SatNav + mobile communication: (+10% gantries for enforcement)**



**excluding e-Vignette and analysing only EETS-compliant EU28 countries*



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 - Mandatory from 2029
 - Flexible GNSS equipment options
 - ✓ *On-board units* (100-150 EUR)
 - ✓ *Smartphones/tablets*
 - ✓ *In-vehicle navigation* included in ALL new vehicles:
 - eCall emergency system (cars) - **32 car brands**, +100 models
 - Smart Tachograph (trucks)



Congestion

Time-based tolling: Eurovignette extension



1 month ago!

- Extension to passenger cars **unblocked by the EU Council**
- Make it compliant with the **EU Green Deal**:
 - ✓ 90% reduction of emissions in transport by 2050
 - ✓ **Charges linked to environm. impact: CO2 emissions**
 - ✓ Incentivize purchase of **zero-emission** vehicles
- Time-based charges **are not effective reducing congestion**
- Maintain time-based charges in order to ***“secure user acceptance of future road charging schemes”***



- **Fast but low revenues with respect to distance based-tolling**
- **Low social acceptance:** no value added technology & high fraud risk
- **GNSS-based distance tolling can discriminate on CO2 emissions too**



Congestion

The future started in Asia: GNSS for traffic management, monitoring congestion, eParking...



Singapore's next generation Electronic Road Pricing system for passengers cars



Photo: S

- Motorists will be charged proportionate to the distance travelled along certain **congested roads**
- **Additional services in the OBU:** real-time traffic information and electronic parking fees
- The 18-month system **evaluation test demonstrated feasibility** to develop a GNSS-based road-pricing system
- Contract awarded to Mitsubishi Heavy Goods. **System to be implemented in 2020-2021**

Congestion

GNSS-tolling for passenger cars: the perfect storm!



LEGAL

New Directive 2019/520
Measures for the technological
harmonization and
interoperability

+

TECHNOLOGY

**New GNSS devices enable
Galileo**
Dual frequency since 2018
(0.5 – 2 m accuracy)

+

BENCHMARK

Singapore is the first country
to implement a GNSS
congestion system for
passenger cars (2021)



<https://www.gsa.europa.eu/system/files/documents/ruc-brochure.pdf>



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