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## TRANSFORMATION OF LITHUANIAN ROAD CHARGING

Darius RAŽINSKAS, Aidas SALADŽIUS

<sup>2</sup> *Intelligent Transport Systems and Road Charging Department, Vilnius, Lithuania*

*Corresponding author: Darius Ražinskas, darius.razinskas@lakd.lt*

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**Abstract.** The current road user charge in Lithuania is based on a temporary system and is not connected to the actually covered mileage. The time-based charge is not considered to be socially fair; therefore, the principles 'user pays' and 'polluter pays' shall be employed. The charge to be introduced will take into account the interests of local road infrastructure users who are currently paying unreasonably high charge for a short distance covered.

If the current system is retained and e-tolling system is not established, heavy vehicle drivers would continue paying a road user charge by purchasing e-vignette. It would mean that road user charges paid by vehicle owners/ holders would not cover the damages directly made by the user and the current road charging system would not guarantee sufficient financing for the maintenance and development of the road infrastructure.

Legal decisions on electronic road charging system have not been taken yet; however, the project implementation preparation is underway. The latest Parliamentary approvals were received in September 2020, and it is believed that all necessary legal acts will be amended by the end of 2020.

The road charging technology has not been selected yet. However, the conducted project's implementation analysis, the assessment of necessary investments and road charging system maintenance costs revealed that a GPS-based technology would be the most economical one.

It is planned to implement the electronic road charging system by the beginning of 2023. Upon the project's implementation, additional financing to ensure high quality and safe main roads should be allocated.

### The Current Situation

Currently, road users shall carry a valid e-vignette for the use of toll main road A1–A18 sections (a full list is available at: <https://lakd.lrv.lt/lt/keliu-mokesčiai-ir-rinkliavos/naudotojo-mokestis>, Chapter *Apmokestinti keliai* (Toll Roads)) by buses (vehicle category M2–M3), heavy goods vehicles (vehicle categories N1–N3) and their combinations and special purpose road vehicles. Since 21 August 2018, only e-vignettes are sold.

E-vignette is an electronic record in the Road User Charge Payment Register Modulus of the State Significance Road Traffic Information System, confirming the payment fact and entitling to use toll main roads for the set period.

E-vignettes are distributed at [www.keliumokestis.lt](http://www.keliumokestis.lt) and selling points.

The Lithuanian Transport Safety Administration, the Customs of the Republic of Lithuania, territorial and specialized Police institutions check if vehicle owners/ holders carry necessary documents confirming the payment of the user charge of the vehicles registered in the Republic of Lithuania, foreign countries, including EU member countries, on the road or at the border crossing points. In case a vignette is invalid and the user charge is not considered to be paid on time or improperly paid, sanctions laid out in the Code of Administrative Offences of the Republic of Lithuania are applied. Vehicle owners/ holders are imposed a fine, which shall be paid into the State Tax Inspectorate account, and the collected funds are transferred to the state budget.

The generated income (revenues from e-vignette selling and paid fines), as defined in the Law on the Financing of the Road Maintenance and Development Programme (later – RMDP), are collected by the Ministry of Finance in the state budget and are used according to the annual estimate of RMDP fund allocation approved by the Government of the Republic of Lithuania, which is implemented by SE Lithuanian Road Administration.

### Target and Technologies

The new e-tolling system to be implemented that is used to collect the charge for the use of toll main roads and to finance the costs of relevant road network infrastructure should, first of all, meet the following key requirements:

- the information about the road users (owners and holders of heavy goods vehicles) shall be identifiable and protected from possible forgery;
- the system shall be based on modern technologies, yet shall be road user-friendly;



- the equipment used shall be easily accessible, installable and replaceable;
- confidentiality of legal and physical entities shall be ensured;
- road charging shall be non-discriminative, and its collection shall not cause any additional obstacles at the state border crossing points;
- the system's infrastructure on the roads shall be sufficient in order to ensure effective toll collection.

As specified in the Directive (EU) 2019/520 of the European Parliament and of the Council of 19 March 2019 on the interoperability of electronic road toll systems and facilitating cross-border exchange of information on the failure to pay road fees in the Union, all new electronic road toll systems shall use one or more of the following technologies:

- (a) satellite positioning;
- (b) mobile communications;
- (c) 5.8 GHz microwave technology.

Currently, the European countries that have implemented e-tolling systems and are introducing the directives mentioned above, apply the following three technological schemes:

- GNSS-based (Global Navigation Satellite System) based system;
- DSRC-based (Dedicated Short-Range Communication) system;
- ANPR-based (Automatic Number Plate Recognition) system.

Based on the best practices of foreign countries and technological systems used in the country, Lithuania could also employ GNSS, DSRC and ANPR technologies or their combinations when charging heavy goods vehicles. In most European countries that employ GNSS-based technology, the combination of GNSS and DSRC technological systems is used. In that case Global Positioning System (GPS) and mobile communication are used as the base of the system that is controlled via DSRC-based technology.

### Comparison of E-vignette and E-tolling

| Time-based vignette  | Distance-based e-tolling  |
|--|---|
| <ul style="list-style-type: none"> <li>– socially unfair and disproportional charge since it does not ensure the principles 'user pays' and 'polluter pays';</li> <li>– does not enable to compensate for the real damage made to roads TP (&gt; 3.5 t);</li> <li>– does not enable to collect the funds for the maintenance of proper road condition. Funds collected from vignettes are considerably lower than the damage made by vehicles (&gt; 3.5 t) to the road infrastructure;</li> <li>– discriminates road users, when unreasonably high charge is paid for a short distance covered;</li> <li>– distorts competition and creates better conditions for carriers whose vehicles cover longer distances on the Lithuanian roads (&gt; 200 km per day).</li> </ul> | <ul style="list-style-type: none"> <li>– socially fair and proportional charge for the use of the road infrastructure;</li> <li>– promotes the use of environmentally-friendly vehicles, which reduces the impact on climate change and the environment;</li> <li>– ensures fair distribution of funds for road infrastructure development and maintenance;</li> <li>– enables to collect funds for the maintenance and development of infrastructure;</li> <li>– creates conditions to harmonize technical and legal conditions applied in EU member countries by developing a uniform system and fair competition.</li> </ul> |

### Comparision of Technological Systems

| Technology   | Advantages  | Disadvantages   | Accuracy, in % | General Capex and Opex in 15 years, excluding VAT |
|--|---|---|----------------|---|
| GNSS (satellite positioning)   | Flexible amendment of toll road sections;<br>Investments required only for the enforcement of road infrastructure;<br>Easily applicable on other roads.                             | High initial costs (OBU <sup>1</sup> ) compared to other technologies.  | 99             | 147.038.286.76                                    |
| DSRC (Dedicated Short Range Communication (5.8 GHz microwave technology) | High dependability, low signal interference;<br>Inexpensive OBU (compared to GNSS);<br>Gradually integrated system.   | High initial investments required when installing necessary road infrastructure;<br>Expensive and complicated application on other roads;<br>Costly on the roads with numerous intersections. | 99.5-99.9      | 239.762.486.94                                    |
| ANPR (Automatic Number Plate Recognition)                                | Does not require OBU device;<br>Does not require enforcement infrastructure;<br>Gradually integrated system.  | High quality vehicle number plates required;<br>Quality depends on lighting and weather conditions;<br>Manual control may increase operational costs;<br>Non-standardized EETS.               | 90-98          | 237.135.215.12                                    |
| SmartPhone technology  | Flexible amendment of toll road sections;<br>Investments required only for the road enforcement infrastructure;<br>Easily applicable on other roads.<br>Does not require OBU device | Data protection shall be guaranteed when collecting data;<br>Non-standardized EETS.   | 99             | 117.734.567.36                                    |

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<sup>1</sup> On-board unit

## Conclusions

The key factor in selecting the best technology has been its compliance with the aims and tasks of the investment project. Having evaluated the needs and emerging problems of the project, the focus was laid on the activities related to the road infrastructure. Technological progress was another important factor in the selection process. Having investigated technical, socioeconomic and financial advantages and disadvantages of the alternatives, SmartPhone Technology was selected as the most advantageous and beneficial one.

Lithuania would be the first country in the European Union to employ SmartPhone technology in implementing distance-based e-tolling, yet not the first one in the world. SmartPhone mobile applications have been employed in Australia and the United States. To our mind, taking into account the progress of technologies and mobile devices, SmartPhone mobile application is a future technology in e-tolling.