

HIGHWAY TOLLING READY FOR CHANGE

MARCH 2022

AUTHORS

PHILIPP GROSCHKE
Partner

UWE HÖRMANN
Senior Partner

THOMAS EBERHARDT
Senior Expert Advisor

Technology and regulation will push business model change in the toll market

Market dynamics ahead

North America and Europe represent more than two thirds of the global toll road revenues with continuous financial growth in place. Despite global growth, the tolling market is ready for a change. Especially in high-income countries, tolling network size have been stagnating for years in most countries. Toll road networks barely grow in length, be it at around 0.7% per year for US interstate roads or at 0.3% per year for French highways. Since the height of its popularity in the early millennium, not much has changed in technology and innovative scope. National toll operators have not been able to benefit use of these developments to the best possible extend. Expected economies of scale from digitization and process automation have not resulted in margin increase because administrative expenses remain high. Administrative cost ratios of Europe's large national operators have often outgrown the respective tolling volume and revenue development. Expected future growth pockets for toll networks, traffic and revenues can mainly be found in APAC and Latin America, where often double-digit growth is predicted.

These numbers give an indication of the state of the tolling market. Regulatory frameworks for national tolling operators have not fostered a strong focus on efficiency in operation. Existing business models have limited evolved from technical and business model innovation.

"5G opens new avenues for business, for disruption and market players for tolling."



UWE HÖRMANN
Senior Partner

As for current technology, on-board units (OBUs) are a proven device to handle tolling. After being installed in a vehicle, these devices communicate with roadside infrastructure or use GPS to trace the vehicle. That way, they keep track of the approximate distance travelled and can report this information to a central entity, which calculates the owed tolling fees. OBUs can only save limited vehicle data for further information and are relatively costly in production and installation. Although they are arguably the most modern devices on the market, national operators regularly apply even simpler applications such as the display of a vignette sticker in the vehicle windshield.

• Emerging disruptive trends In Europe

In recent years, two market drivers have emerged, which have the potential to disrupt the current toll collection market:

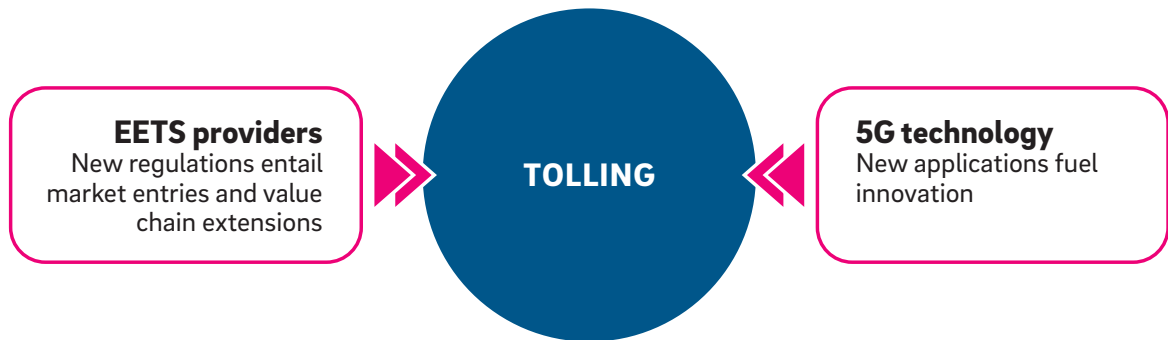
First, as part of its deregulation efforts, the European Commission¹ paved the way for a European Electronic Tolling System (EETS). This guideline aims to achieve the interoperability of electronic tolling systems within the European Union. More precisely, the goal of EETS is to allow users access to the European toll road network with only one contract. Using OBUs, EETS providers can trace the traveled distance of road users even across borders and charge them according to the rates of the respective countries. The new regulation actively lowers former high market entry barriers for private operators and allows for an international offering. The technical and legal requirements have been implemented in most European countries in recent years and EETS providers experience a growing market share.

Second, since 2019, the emergence of 5G revolutionizes the capabilities of mobile communication. Relative to the former LTE/4G technology, 5G reduces latency and increases bandwidth by far. Three use cases are especially relevant for the technology. Enhanced mobile broadband (eMBB) enables the supply of mobile devices with high data rates. Massive machine type communication (mMTC) vastly increases the number of devices with lower data rates that can communicate with one another, which is especially important for IoT devices that can also be found along roads. Finally, ultra-reliable low latency communication (uRLLC) promises communication between devices with virtually no delay. The technology is fundamental for autonomous driving.

We expect these two drivers to have substantial impact on the tolling market in coming years. The current regulatory environment could cause further new market entries from adjacent markets and gaining an even stronger market share. The new technology will fuel further innovation in the direction of business applications that have the capability of meeting existing operational requirements for toll collection and enforcement.

¹ Directive (EU)2019/520 of the European Parliament and the Council from the 19th March 2019.

Two drivers will have substantial impact on the European tolling market in the coming years



Source Roland Berger



- **New market entries fueled by regulatory change**

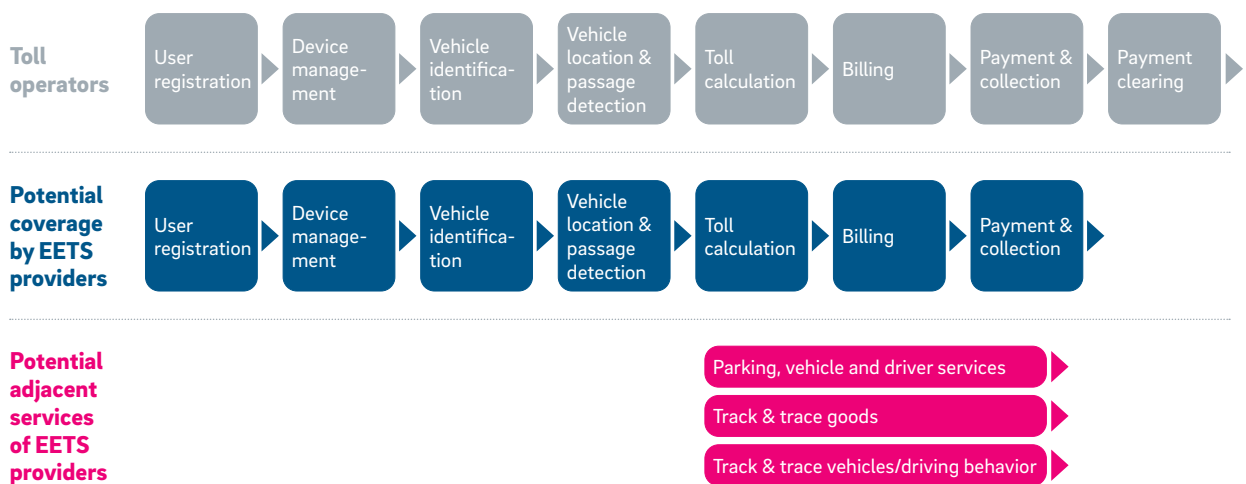
The traditional business model of toll operators such as the German Toll Collect GmbH included the entire toll value chain end-to-end: from user registration, device management, passage detection, toll calculation and billing to payment collection and clearing. Today, newly emerged economic conditions enabled EETS providers to specialize on specific elements of the tolling value chain. These usually include all steps from user registration through billing. Because EETS providers can focus on single steps of the value chain in multiple countries, they can improve market dynamics in two dimensions.

On the one hand, unlike regional toll operators, EETS providers offer toll services in multiple European countries from one single source to their internationally operating clients. In return they receive a fixed margin of their charged toll volume from local toll operators, e.g. 2.9% in Germany. That way, the EETS providers play an intermediary role between vehicle users and toll operators. The limited achievable margins force EETS providers to work with a highly efficient, automated process and focus on internationally scalable services. Through their internationality and ability to focus on parts of the value chain, EETS providers push towards making tolling more efficient.

On the other hand, EETS providers, often coming from adjacent markets themselves, could broaden the value chain by offering adjacent services. To win market share in such a competitive environment, they are increasingly exploiting the available resources to expand their offering – similar to the DKV Card model, which started out as a fuel card and now additionally offers toll billing, vehicle and driver services. In today's technology

setup, EETS providers can exploit the OBU interface as a certified vehicle-side geodata-providing infrastructure. Such trusted data gateways open the way for further products, like parking services, improved navigation, exact tracking of goods, or driving behavior documentation. Here, the OBU interface is used beyond tolling, enabling the customer to flexibly add other mobility services to the EETS. This consistently continues the trend of product innovations beyond the current, stand-alone toll service. Technically, national toll operators could do the same, but they are subject to tighter regulations concerning market access and competition restrictions.

Value chain coverage of tolling operator and EETS providers as well as adjacent services opportunities



Source Roland Berger



From the point of view of the road-using end customer, bundling services on a single platform and linking applications is desirable if this reduces the complexity of operation and increases the functional added value. Consistent toll services from a single source and additional infrastructure applications increase user comfort, confidence, and capabilities. Furthermore, the bundling of toll collection and payment transactions creates sales volumes which allow for bonus refunds when service volumes are reached.

• Further technological development in a 5G environment

Before the emergence of 5G, tolling was – and still is – mostly based on GPS and DSRC technology. There, the main challenges are reliable and accurate position and vehicle detection, as well as corresponding sufficient control to ensure toll compliance. For this purpose, OBU systems are equipped with a great deal of system intelligence and supplemented with automated enforcement equipment/sensors (road-side infrastructure).

"Satellite-based tolling has become a commodity, now it is time to upscale the business models."



PHILIPP GROSCHÉ
Partner

We expect cellular vehicle-to-everything (C-V2X) technology in conjunction with close-meshed 5G mMTC and uRLLC infrastructure to be increasingly rolled out globally. Using this network for road applications (e.g. autonomous driving, track&trace) will become very attractive and also reflect on the tolling market. Toll collection and monitoring will gradually take place within an existing 5G infrastructure. This is equally true for the above-mentioned adjacent services like vehicle tracking. It will even extend the current offering to additional potential services. Depending on the development of the regulatory framework, 5G-enabled vehicles could soon provide data that far exceeds mere location and move to exact, real-time vehicle data. New use cases can arise in the field of tolling based on billing-relevant vehicle data, like actual emissions, exact weight, or traffic situation. However, 5G and effective vehicle communication will change traffic and infrastructure on an even bigger scale. EETS providers could integrate real-time information to predict accidents and traffic jams, plan travel times to optimize processes and offer advice for parking, fueling or even lunch breaks to drivers.

However, it is probable that traditional road-based service providers will not be the only ones competing for such additional value. Autonomous driving platforms and pure 5G/C-V2X-based business models will likely join the market and move into parts of the tolling value chain. The currently still complex process of OBU device management, OBU handling & logistics, passage detection and control will be replaced by 5G infrastructure services in the future. The need for a dedicated OBU-based collection infrastructure and a separate control infrastructure will diminish. Tolling itself can become a by-product because location, route, vehicle information, etc. can be reliably delivered via intelligent vehicle interfaces.

For single-product, national toll operators, only toll billing would then remain as a core task. The fixed costs of the existing centralized and decentralized infrastructure elements will face a sudden and rapid decline in user numbers. Unless drastic business countermeasures are taken, falling revenues will make these parts of the value chain economically unfavorable. Under the described conditions, the market share of national toll operators would be significantly reduced, likely being focused to less lucrative client segments with low mileage/low tolling revenue.

• Outlook

Technological developments can be expected to increase the intensity of competition for toll customers. In a country like Belgium, with a high proportion of international transit traffic, more than half of the toll kilometers driven are already billed by EETS providers.

We expect that dedicated OBUs in vehicles will be developed for one more product cycle only. Starting 2025, the OBU functions will be absorbed into telematics platforms of EETS providers and other suppliers. Such platforms will be comprehensive interfaces linking vehicles and the 5G network infrastructure, and integrating vehicle data, position, and billing parameters. Then, OBU hardware and associated costs will become obsolete. This will make tolling services even more attractive to commercially viable extensions. As 5G infrastructure starts to significantly outperform OBUs, OBU technology will also dissolve as a market entry barrier. In terms of position and

movement accuracy as well as data transmission security, autonomous driving applications will have significantly higher requirements than an OBU could deliver. Technical requirements of toll detection, collection, control, and billing can be integrated into new 5G applications as by-products. This in turn opens the possibility for new market participants to enter the toll market. Potential market entries could come from payment service providers as well as data and telecom providers. If, from 2025, the smartphone interfaces of strong B2C providers gain access to position and vehicle data and these are recognized for billing, such players could quickly enter the market segment. Apple CarPlay and Google Android Auto are two such players with deep market penetration. National toll operators will then largely lose their current importance and market share.

What this means for commercial conditions and how much this depends on the actions of regulators becomes clear when looking at payment transaction regulation. The EU limits handling fees of the highest-scaled credit card service providers, such as Visa, to 1%. Therefore, the current nominal tolling service handling fee in Germany may be reduced by the regulators over time in the future.

The breakthrough into the consumer-oriented mass market will occur at the latest when a digitally distance-based passenger car toll is introduced in a major European market in the period 2025-2028. We then expect market dynamics as well as attractiveness to increase strongly.

Further reading

THINK:ACT MAGAZINE "OWN THE FUTURE"

→ rb.digital/Your_path_to_tomorrow_today

THINK:ACT MAGAZINE "EMBRACING THE UNKNOWN"

→ rb.digital/Embracing_the_unknown

THINK:ACT MAGAZINE "VIGILANT"

→ rb.digital/Vigilant

CONTACT:

PHILIPP GROSCHE

Partner

+49 89 9230-8119

philipp.grosche@rolandberger.com

UWE HÖRMANN

Senior Partner

+49 30 39927-3519

uwe.hoermann@rolandberger.com

This publication has been prepared for general guidance only. The reader should not act according to any information provided in this publication without receiving specific professional advice. Roland Berger GmbH shall not be liable for any damages resulting from any use of the information contained in the publication.