Electronic toll collection in the Czech Republic.

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In the last 15 years the road user charging schemes were mainly focused on charging on either highway segments or particular road infrastructure objects (like bridges or tunnels).

During the last decade more and more member states of the European Union (EU) opted for electronic fee collection systems to finance the construction of new infrastructure.

In Europe the vast majority of member states such as Austria, Czech Republic, France, Spain, United Kingdom, Netherlands, Denmark, Sweden, Norway, Finland, Italy, Slovenia, Croatia, Greece, Turkey, and Portugal apply electronic tolling systems which are based on microwave technology (Dedicated Short Range Communication, DSRC)

Except for Germany where a electronic fee collection system based on satellite GNSS/GPS technology is in place.

In Switzerland – the combination of microwave, satellite and tachograph is used.
Overview on European Electronic Toll Services.

• The European Commission (EC) therefore initiated the interoperability directive on electronic road toll systems to support functionalities for the common European market and enhance cross-border transport in Europe.

• For EU countries, there is the interoperability directive on electronic road toll systems (2004/52/EC). The directive regulates technical solutions of new electronic toll systems deployed after the January 1st 2007 to use one of the following three technologies or a combination of them:
  • 5,8 GHz microwave technology
  • Satellite positioning
  • Mobile communications using GSM/GPRS standards

• In addition it was decided to create a European Electronic Toll Service (EETS). This service is to be based on the idea “One contract – one On-Board-Unit – multiple tolling systems”, allowing users to enter into a contract with one provider who offers an EETS On-Board-Unit (OBU). This interoperable OBU enables travelling on all electronic toll domains of the European road network. The establishment of EETS aims to provide interoperability at technical, contractual and procedural level.
Current electronic toll collection in Europe.
Complete implementation of the toll system only within nine (9) months

= internationally recognized world record!

Only after seven (7) months of operation, the total amount of the toll income reached the total capital expenditure (EUR 112 mio.)

= excellent cost-effective indicator!

For rural roads charging the existing microwave open toll system on highways was developed to hybrid solution by the implementation of the satellite submodel

= new and tried-and-tested way for Europe and world!

…now in detail…
Reasons for the introduction of Electronic toll collection.

- Czech Government discussed the introduction of the road toll shortly after the country joined EU in 2004. The primary reasons for that were:
  - to change the time-based taxation to a more just performance-based one where a user pays for the number of kilometers actually taken;
  - to increase the volume of funds flowing into road management;
  - to introduce the introduction of telematic services (safety and free flow).
First steps of the Czech ETC introduction.


- Consortium Kapsch won the tender (2005) with microwave (DSRC) technology, with open system architecture within and Multi Lane Free Flow System, with mandatory OBU.

- Signature of the contracts with Czech Ministry of Transport on March 31st 2006, due to legal obstructions of unsuccessful competitors.

- System implemented only within nine (9) months which is international recognized world record! Operation started on January 1, 2007 for heavy vehicles with a maximum permissible lade weight of 12 tons and above.

- By the January 1, 2008 the length of the Czech tolled motorway network reached approximately 1.160 km (highways, motorways and selected 1st class roads mainly used by international transit traffic).
Intensity of transport in the Czech Republic.
The Czech ETC in detail.

- Toll for vehicles over 12 tons maximum gross weight
  - vehicle categories (axles and emission class).
- Toll for vehicles over 3.5 tons maximum gross weight from 2009.
- Operation of about 970 km highways and motorways (1st Phase) from 1st January 2007. Operation of about 180 km 1st class roads (2nd Phase) from 1st January 2008 (+ newly completed highways and motorways).
- Open system architecture & Multi Lane Free Flow with compulsory OBU (On-Board-Unit).
- Deposit for OBU (prepay or post pay) about 62 EUR (1,550,- CZK)
- Average toll 0.16 EUR/km for H+M and 0.08 EUR/km for 1st class roads.
- The total performance of the Czech tolling system is about 98 % (independent auditor). The transaction performance reaches over 99.7 %.
Tollable road network by January 1th, 2008.
Structure of the parties involved.

- **Buyer:** Czech Ministry of Transport (MD ČR)
- **Operator:** Czech Road and Motorway Directorate (ŘSD ČR)
- **Mobile Enforcement:** Czech Customs Administration (GŘC)
- **Project Manager:** Consortium of Deloitte and Bovis
- **General Contractor and operator of services of ETC:** Consortium of Kapsch
- **Independent Auditor:** LogicaCMG
Facts & Figures from the first year of the system operation.
Only after seven (7) month of operation, the total amount of the collected toll reached the total capital expenditure! This excellent indicator is in addition amplified by the fact that the system was built using the contractor method, which means that the general contractor bears the initial costs related with the construction – of sorts of PPP project!

The state will reimburse the general contractor for such costs gradually within a horizon of 30 months after the launch of the system. Thus, in the first year of the system functioning, the state has only paid 25 % of the total acquisition price of the work!

The revenue estimation of ten years toll collect operation in highways and motorways is about EUR 4,6 billion (without toll rates increase). The calculation includes extension of toll collect obligation to vehicles 3,5 tons weight and increasing number of toll collected highways and motorways.
In the past eight months 2008, Czech toll has earned **EUR 160 mil.** (EUR 20 million more than last year).

Achieved revenue for the first year was higher than expected = EUR 222 million in 2007!

**After 20 months of operation the collected toll footed up to EUR 400 million in total.**

By the August of 2008 almost 330,000 active OBUs registered in the system, which exceeds even 3 times more the highest expectations!

Actual daily incomes (working day) reach to EUR 1 million.

Toll statistics have shown that the highest toll incomes are in the third decade of every month, between the 20th and 30th day of every month, which is most likely related to economic production cycles.

The strongest day in 2007/8 is Wednesday 28<sup>th</sup> May 2008.
Facts & Figures III.

- The good performance is demonstrated also by the number of OBU units – at the end of August 2008, more than 330,000 active OBUs is registered in the system, which exceeds even the highest expectations before the launch of toll!
  - pre-pay = 67 %
  - post-pay = 30 %
  - exempt = 3 %

- For 12 months of the functioning of the Czech toll system, the Customs officers’ mobile enforcement has
  - processed more than 45,000 violations of the legal regulations.
  - another approximately 2,400 cases were assigned for administrative action to the relevant local departments.
  - In fines has the General Customs Authority collected a total of EUR 1.8 million.

- Information from the Customs officers indicates that the most frequent reason for the inspection of the drivers right on the road is a missing OBU or a OBU with the incorrectly set amount of axles.
Summary of users nationality, according to participation on share in toll profit in Czech republic:

- Czech users makes more that 60 % of toll transactions (1st place).
- Second place have Slovak drivers with 15 % share, following by Polish, Hungarian and German vehicles. The chart is finished by users from Azerbaijan, Libya and Armenia.
- The position is influenced mainly by distance, which the foreign drivers must take in Czech network of roads. Drivers from Slovakia and Hungary drive through the Czech republic in the longest way (highways D2-D1-D5/D8).
- The most used toll collected road is highway D1, where take place about 39 % of all settle accounts transactions (all highways 75 % in total). Next rank is highway D5, D8, D2 and D11, in motorways R35 and 46.
Scope and architecture of the Czech DSRC ETC system.
Free-flow Architecture.

- access to highway network, area/city or road/tunnel/bridge → open → free-flow!
- one charge point (I) covers a certain section or an entry point for an area/city or a road/city/tunnel
- no barriers on exit and entry ramps!

Vehicle enters the network

Section „A“ 7,9 km

Vehicle enters the network

Section „B“ 4,3 km

Vehicle exits the network

Section „C“ 8,5 km

Vehicle total trip: 20,7 km
Tolling Station in CZ.
Enforcement Sequence.

Detection  Image generation  DSRC communication  Classification

Enforcement decision and transfer to Central System
Tolling station installation in CZ.
Manual Validation Centre.

Toll Violator at ES

Enforcement Records

Manual Incident Verification

Toll Violator stopped by customs

Incident- and Dispatching List
Czech OBU – premid unit.

- Interoperable systems are already existing
- Czech OBU based on DSRC
- Multi Lane Free Flow (MLFF)
- Standards from CEN TC278
- OBU inexpensive
  - Many users
  - High system performance
  - Efficient enforcement
  - Easy to install and operate

Installation and ready to use within seconds!
OBU for the vehicles exempt from tolling.

- Is used for vehicles exempt from tolling.
- Available at all Contact Points in Czech Republic.
- Can be used as electronic toll sticker (cost effective for the consumer's market)
- The smallest CEN TC278 compliant OBU on the market today, we believe
- Created by Kapsch!
- Perfect for city charging.
Enforcement Vehicle in CZ.
Extension of the Czech ETC.
Czech Republic ETC system is open.
Next steps in the years 2008 - 2009.

- Maximum usage of existing Czech electronic toll system for next purposes like traffic management, road safety & other telematic applications in accordance with the transport policy for 2005 - 2013.
  - Kapsch will supply the interface for telematic applications and the implementation of the Traffic Management System for the D1 motorway route to improve the road safety and to optimize the traffic flow.

- The pilot project of hybrid toll system for the electronic toll collection on 1st class, 2nd class and 3rd class roads.
  - Kapsch will implement the interface for a future satellite-based toll collection system to achieve the hybrid toll system, which will combine existing Czech electronic toll system with satellite technology.
  - Pilot project of the Hybrid system will be part of the delivery, which will work as a full area system with the possibility to provide the tolling of even lower class roads, anywhere in the Czech republic.
Benefits of Kapsch Area Hybrid OnBoard Unit.

- Sophisticated device designed for both microwave as well as satellite-based charging.
- Designed for windscreen mounting and self-installable within a few minutes.
- Very easy to use.
- Due to their simplicity the OBUs can be distributed via a broad spectrum of point-of-sales like gas stations, kiosks etc. or send by mail after a user has registered over the web or by phone.
- Basis for additional telematic applications.
Next steps in the years 2008 - 2017.

- Because of undeniable benefits of microwave technology Kapsch would complete the electronic toll collection system on future highway and motorway network in DSRC microwave technology.
  - Kapsch will extend the existing DSRC microwave electronic toll system to cover another approximately 1,000 km of new highways and motorways, the construction of which is scheduled to begin till the end of 2017. More than 2,000 km of highways and motorways in Czech Republic will be in future tolled with DSRC microwave technology.

- The Czech MoT is thinking about replacement of existing „paper“ vignette by anonymous electronic one to maximal usage of existing toll system. In Czech republic, time fee for highways usage is paid by personal cars.
  - The electronic vignette will communicate with the existing tolling infrastructure (e.g. information about traffic flow density to prevent accidents and congestions, electronic enforcement of non-payers).
  - Only DSRC technology enable to charge personal cars on highways (low operation costs, OBU purchase price).
Tollable highway and motorway network by 2015.

- Tolled highways and motorways since 1.1.2007
- Tollable highways and motorways by 2013–2015
Main trend of the present: Back to the cities.

- Due the fact, the majority of the CEE capitals or bigger cities has been built-up with limited traffic capacities, the city tolling seems to be the only reasonable solution.
- In most of the cases the combination with parking solutions is required.
- Resolution of the parking problems, limitation of number of vehicles in the Old Towns, reduction of traffic congestion and/or air pollution temporarily and higher income for new investments into the public traffic and public transport.

- We see such enormous interest in the cities in: Czech Republic - Prague; Bulgaria - Sofia; Ukraine - Kiev; Poland - Warsaw; Hungary - Budapest.
The City of Prague considers to introduce the pilot project of city tolling by January 1, 2010.

City tolling should be introduced in phases:

- In 1st Phase, about 8.5 square kilometres of the Old Town should be tolled.
- Sequentially the city tolling should be extended stepwise and by 2012, the area of 50 square kilometres of Prague should be tolled.
- The control of the pollution in Old Town will be expected together with regulation of the traffic volume.
- At the same time, the city tolling should include a proper parking solution.
Main trend of the present: Back to the cities.
1-2-3 -> premid

1. Where you can get a premid onboard unit, the possibility of preliminary registration, and registration

2. Where and how it should be installed in a vehicle

3. Setting premid prior to each journey
Operation of Czech Republic Truck Tolling System.

- Toll Collection,
- Payment transactions,
- System Optimization (Monitoring & Tuning),
- Enforcement Centre,
- System Operation,
- Public Relations,
- Complaint Management,
- Sales & Distribution,
- Road User support,
- Telematic services…….
Kapsch Telematic Services Czech Republic.

- Czech Republic Truck Tolling System and traffic telematics operator
  - in coordination with Kapsch TrafficCom AG,
  - with support of our partner BRISA,
  - in cooperation with infrastructure operators.

- System Integrator of the Czech Republic Truck Tolling System.

- Established in 2006, headquarter in Prague.

- About 140 employees today.

- Kapsch Telematic Services was listed among the „Czech Top 100 Best“ companies for 2006 and 2007
Thank You!

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