



Kapsch TrafficCom.

**We make your
traffic flow.**

Kapsch TrafficCom **Service Portfolio.**



- **Toll Collection Systems:** development, implementation and operation of toll collection systems.
- **Urban Traffic Solutions:** intelligent and sustainable management of traffic flow in urban areas, for parking management, access applications or access control.
- **Operations:** commercial operations such as transaction processing, customer payments, enforcement, payment processing, customer service and developing the infrastructure, logistics and organisation.
- **ITS and Telematic Solutions:** incident detection systems, video-based traffic sensors and telematics platform.
- **Components:** design, production and installation of core components.

Kapsch TrafficCom: **234 References in 38 Countries.**



Toll Collection.

A European Perspective.



Toll Collection Systems **Needs and Requirements.**

- High detection rate for maximum revenues.
- High enforcement rate for secured revenues.
- Minimum operating costs.
- High scalability - suitable for millions of vehicles.
- Capable of handling millions of vehicles with mandatory use of on-board units (OBU).
- Flexibility - introduction of new tolling schemes (e.g. all-road tolling).
- Usage of proven concepts for the central system (systems, workflows, interfaces etc.).
- Based on proven technology

Tolling Projects in the Press

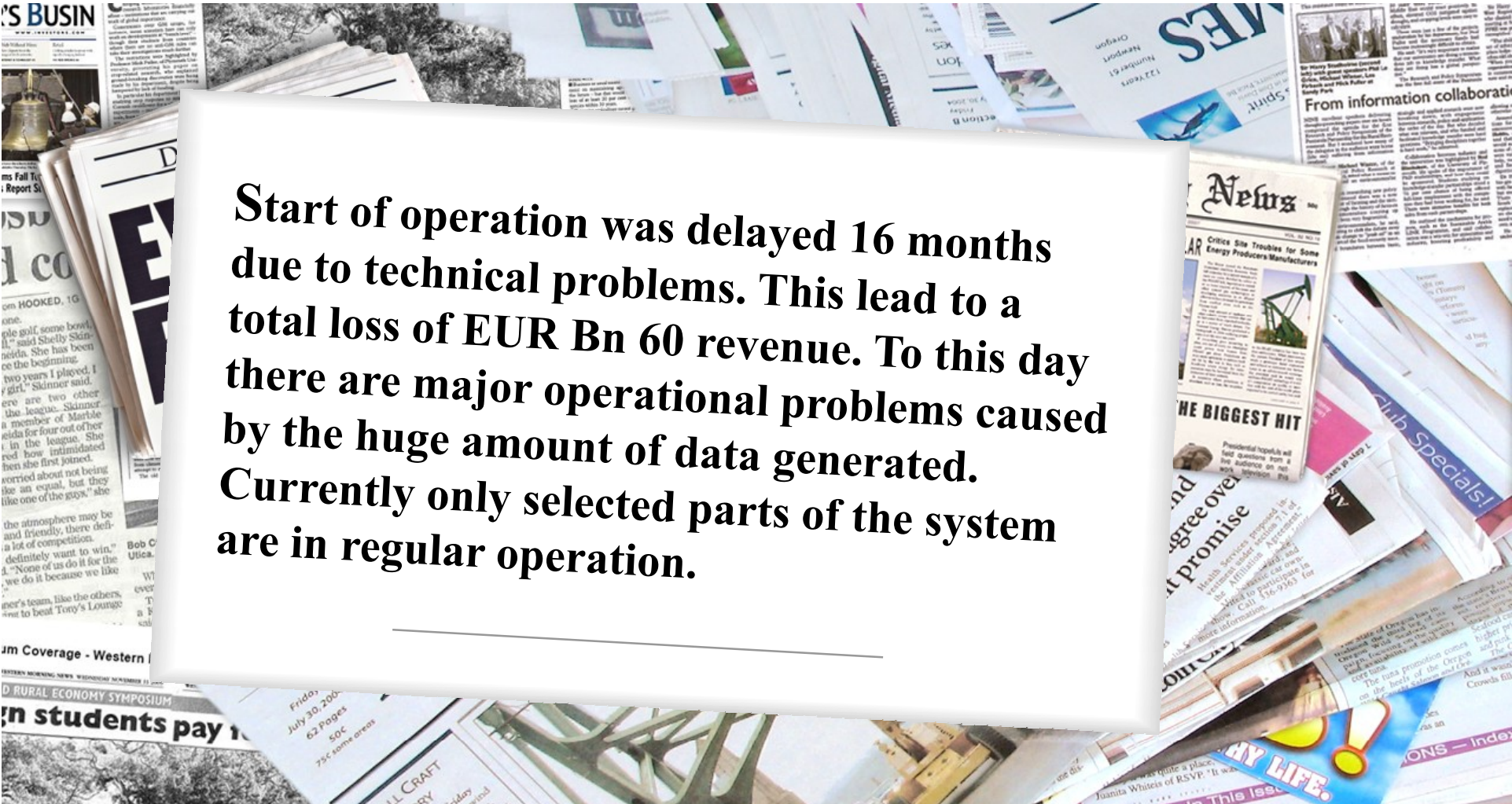


Updates on recent tolling projects. **Enjoy.**

Press Clipping Slovakia.

Tolling system not ready to go into operation. Breakdowns and failures, great nervousness and endless waiting for registration. Government lost millions of Euros due to delay of truck tolling. Finally European Commission acts. International disgrace.

Press Clipping Germany.



Start of operation was delayed 16 months due to technical problems. This led to a total loss of EUR Bn 60 revenue. To this day there are major operational problems caused by the huge amount of data generated. Currently only selected parts of the system are in regular operation.

Press Clipping The Netherlands.

After Great Britain decided against the introduction of a satellite based tolling system in 2005, the Netherlands reviewed their plan to implement an all-road satellite tolling system. In both cases it turned out that the technical obstacles and the operation costs would have been too high.

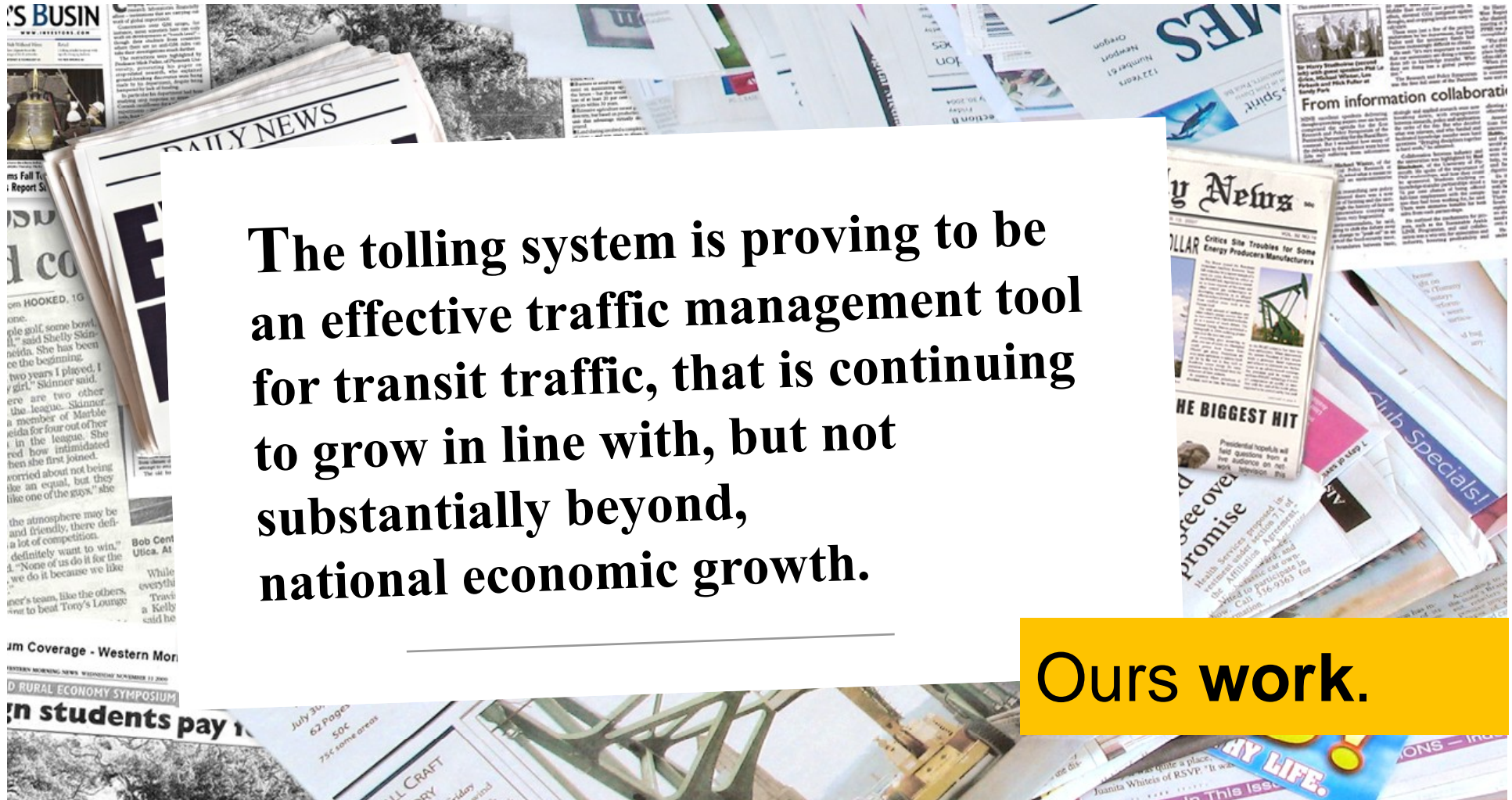


Press Clipping Austria.

**The system went into operation
on January 1st, 2004.
On time and keeping to the budget.
Since then it has been running without
interruption, with an effective toll
transaction execution-rate of 99,93%.**

Ours work.

Press Clipping Switzerland.



The tolling system is proving to be an effective traffic management tool for transit traffic, that is continuing to grow in line with, but not substantially beyond, national economic growth.

Ours work.

Press Clipping Czech Republic.

A sound investment - total toll revenue equalled total expenditure after only 6 months of operation. System implemented within nine months, which is an internationally recognized world record. Utilisation of the system for traffic telematics, which makes a significant contribution to improving traffic safety on the main motorways.

Ours work.

Truck Toll Project Czech Republic

Munich

23.09.2010



History of the Electronic toll collection in the Czech Republic.



Project history.

- **Decision of Czech Government to introduce the electronic toll collection** on defined highways and motorways **in Mai 2004.**
- **Competition of the tender** for Czech Republic Truck Tolling System **on 11th July 2005** & announcement of the winner on 21th of November 2005.
- Appeals of the unsuccessful competitors at the Czech cartel authority from December 2005 till March 2006.
- **Contract signature** with the Czech Ministry of Transport **on 31th of March 2006.**
- **Implementation** of the Czech Republic Truck Tolling System **from April to End of November 2006.**
- Start of **commercial operation on 1th of January 2007.**

A large, hollow orange arrow pointing downwards, centered below the list of events.

Construction time of about 9 months including a period of test operation.

Strategic objectives and high level requirements

Strategic objectives from States perspective

Migration from time-based taxation system (vignette) to a distance-based concept

Increase of **investments into road infrastructure**

Improvement of **competitiveness** of other means of transport (e.g. railways)

Limiting the increasing number of trucks at the road network in Czech Republic

First steps towards **telematics applications** (traffic management)

Major tender requirements

Technology independent tender: Selection of the commercially and technically **best concept**

Maximum **comfort** and **non-discriminatory system access** for all users

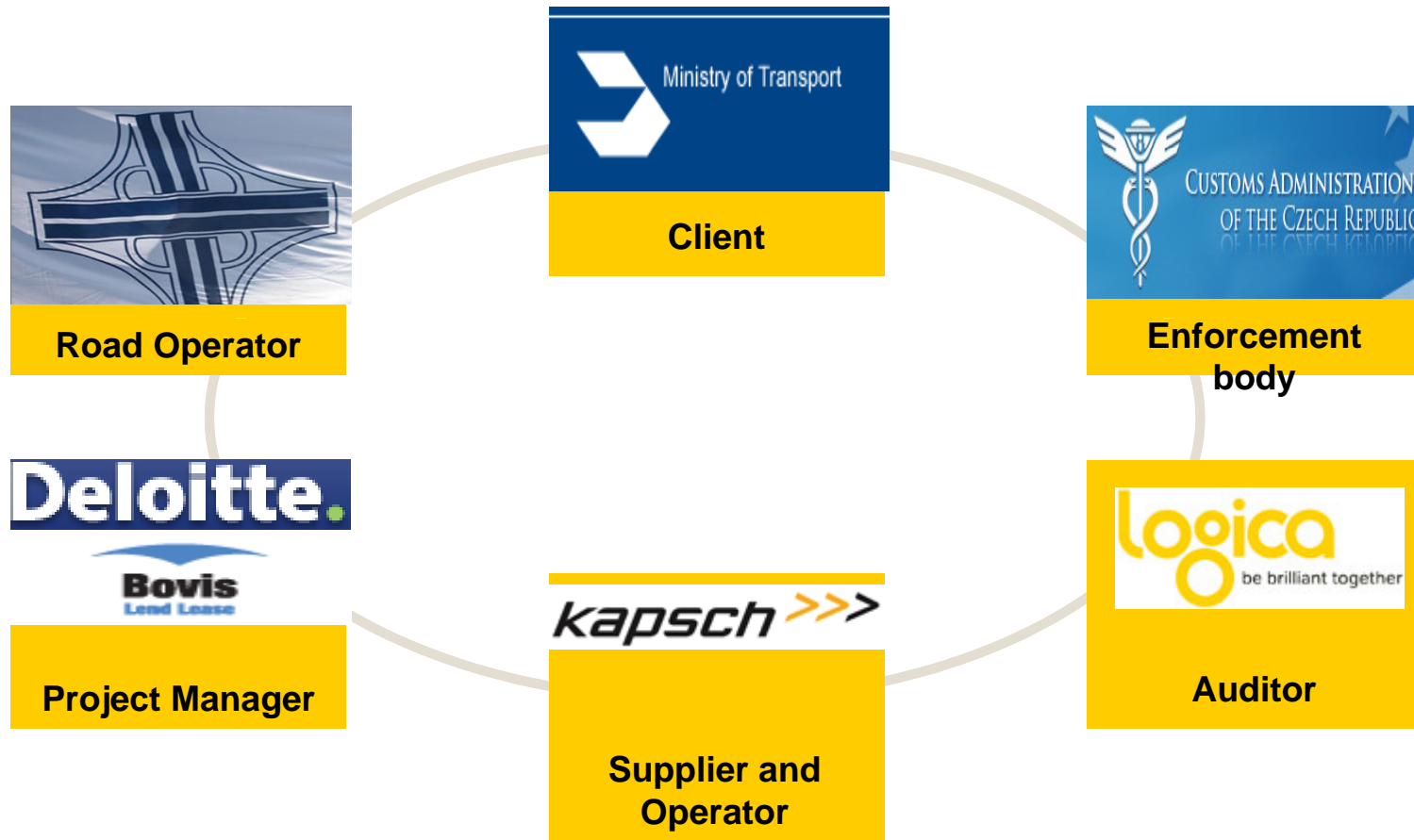
Ability to extend the toll liable road network to **all roads** in a later project phase

Risk of the uncertain **number of users** to be taken into account

Electronic toll collection in the Czech Republic.



Parties involved.

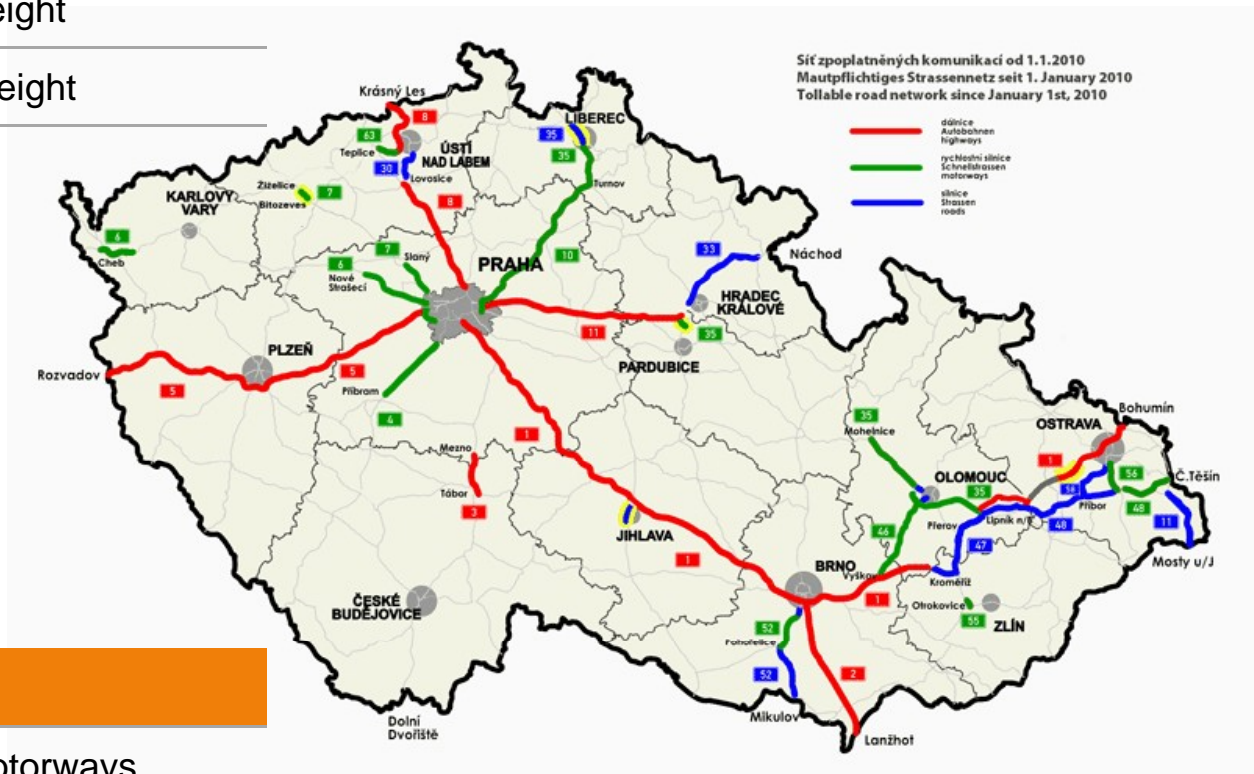


Liabe vehicles and liable toll road network

From Commercial vehicles

2007 > 12 t maximum gross weight

2010 > 3,5 t maximum gross weight



From Road network

2007 980 km highways and motorways

2008 + 180 km 1st class roads (transit routes)

Architecture, On-Board Unit OBU, Tariffs.

- Technology: Standardised 5.8 GHz DSRC
- Open system architecture & Multi Lane Free Flow
 - Free access to highway network (no toll plazas at entries/exits)
- Compulsory use of OBU
 - Easy access to registration and service at more than 250 distribution and contact points.
 - Deposit for OBU (prepay or post pay) 1550 CZK (appr. 410 DKK)
- Tariffs depend on
 - Road type (Highways and expressways; 1st class roads)
 - Emission class (Euroclasses)
 - Number of axles
 - Time of day (Higher tariffs between 3 pm and 9 pm)

User services.



Network of distribution and contact points.



Distribution points	240	Petrol stations	
Contact points	15	Customer service centres	
Call centre	24/7/265	Phone, fax, e-mail, postal	8 languages
Web portal	2010	www.premid.cz	9 languages

Customer contact point / Customer distribution point



Czech OBU - premid unit - Starter package.

- Installed and ready to use within seconds! [Show it!](#)
- Technically compliant to Austria, Easygo, Spain, ...



Toll registration.



Multi Lane Free Flow tolling station on a highway.



Tolling station on a 1st class road.



Enforcement.



Enforcement methods in operation



>>> Fixed Enforcement

- Fixed gantry or pole covering one or several lanes
- Combined DSRC/Video/Laser solution



>>> Mobile Enforcement

- Enforcement on the road executed by 35 enforcement vehicles by 24/7/365
- On-line connection to toll points and central system
- Mobile office in the vehicle
- Various payment means accepted in the car



>>> Handheld Enforcement

- Checking of OBUs while parking
- Read out of data stored in On-board units
- On-line access to central system and mobile enforcement vehicle

Multi Lane Free Flow enforcement station.



Mobile Enforcement – Mobile enforcement car.

- Enforcement/supervision on the road executed by 35 enforcement vehicles 24/7/365
- Connection to toll points and central system
- Full enforcement functionality at any time
- Mobile office in the vehicle
- Various payment means accepted in the car

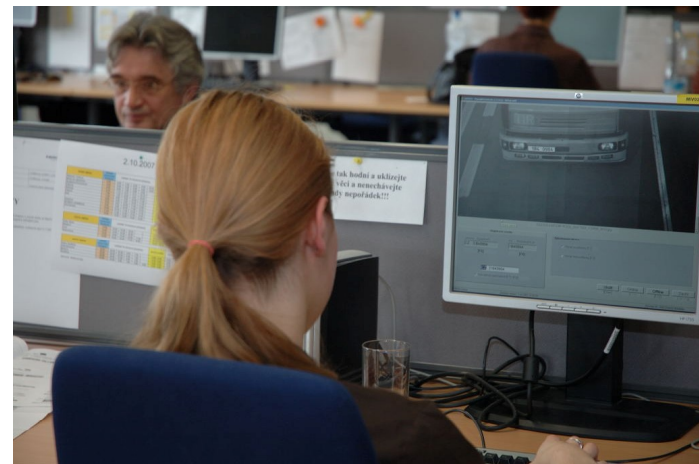


Mobile Enforcement – handheld device.

- Checking of OBUs while parking
 - Read out of data stored in On-board units
 - Reads vehicle data and last transactions
 - On-line access to central system and mobile enforcement vehicle



Manual validation centre.

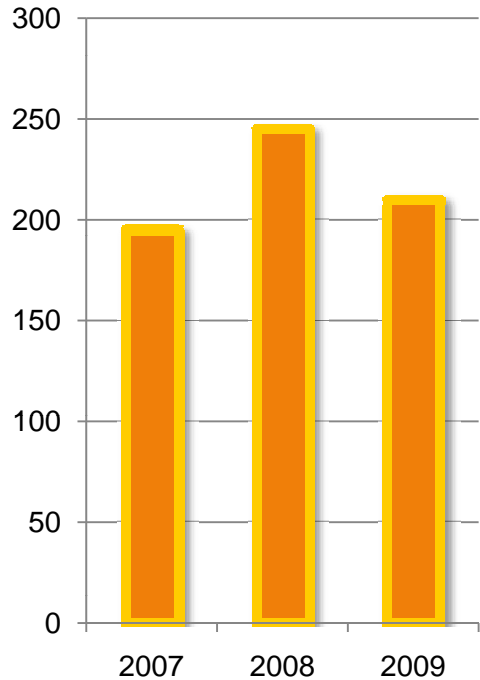


Facts and figures.



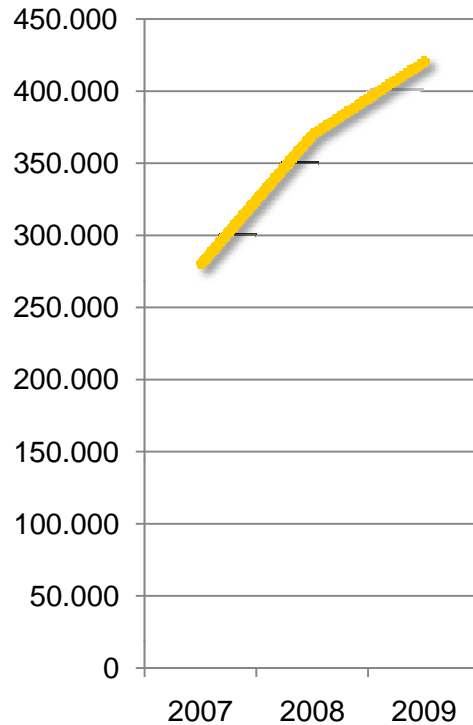
Facts & Figures.

**Toll income
EUR]**



■ Toll Income [Mio EUR]

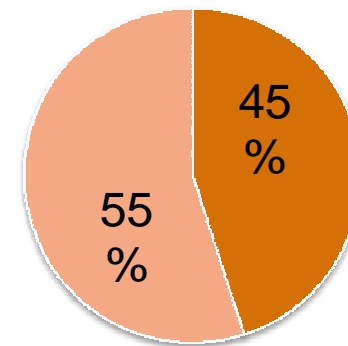
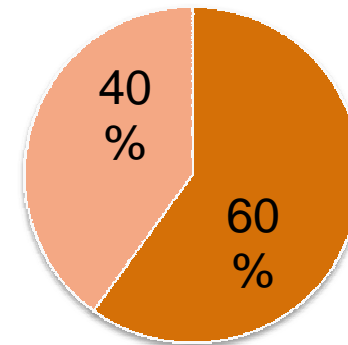
Active contracts/OBUs



— Active contracts

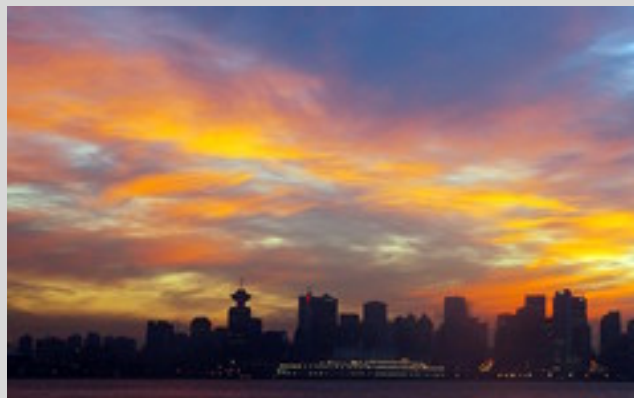
Note: Initially estimated by State: 170.000

■ CZ ■ Foreign

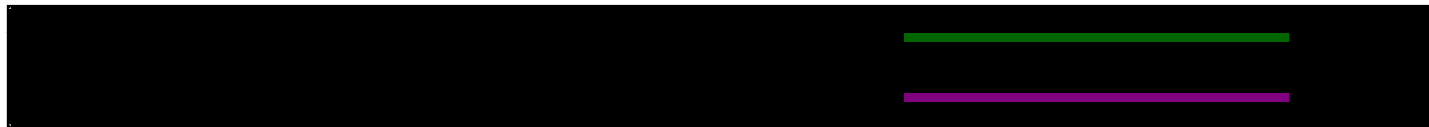
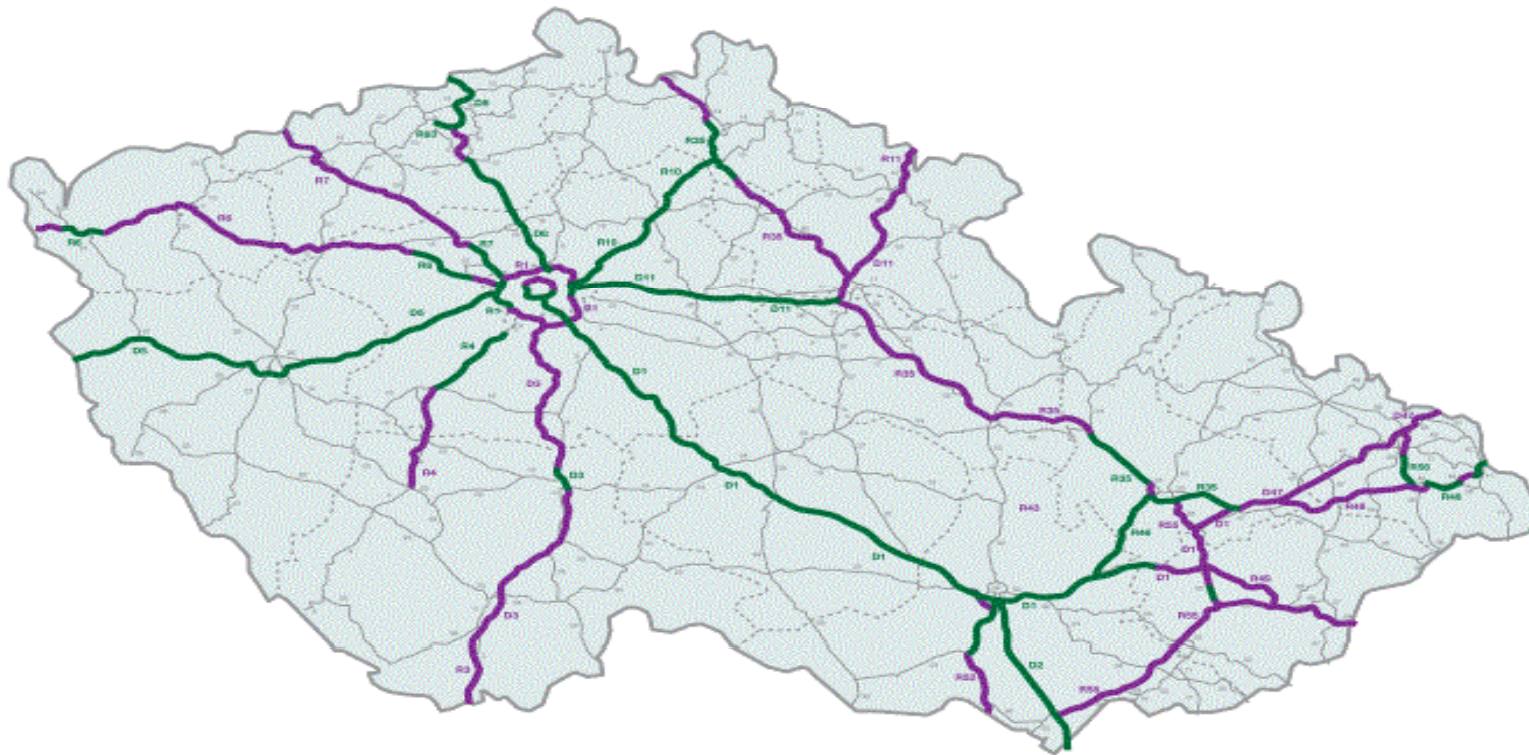


■ Pre-paid ■ Post-paid

Future extensions and flexibility.



Extension of toll highway and motorway network till 2015.



Telematics: Traffic Management System for D1 Highway.

- Implementation of the Traffic Management System for the Czech most used highway D1 over almost 250 km by means of using existing System
- Is composed of the following parts:
 - Traffic flow sensor detection system,
 - Additional system for FCD traffic flow detection system,
 - System for calculation of travel times,
 - Monitoring camera system,
 - Variable traffic signs for traffic line control,
 - Service information facilities.



Extension to 2nd and 3rd class roads: GPS-based tolling

- Adding a GPS tolling functionality to the DSRC charging system
- Provision of an open interface for connection of GPS-OBUs to the system
- Supply of 5.000 GPS OBUs from Kapsch
- Integration of 5.000 GPS OBUs from second source supplier
- Running a trial and assessing technical feasibility
- Evaluation of business case



Kapsch Truck Tolling

Turn key provider

Delivering tailored, scalable, and efficient tolling scheme

Content

- The presentation will demonstrate that:
 - 5% of the road network will generate between 80% - 96% of the potential revenue;
 - dependent on road network and tariffs, the operational cost (OpEx) will vary between 6% to 19%, and;
 - commercial and technological interoperability with existing BroBizz (used at Sund & Baelt) appears attractive.

Truck Tolling is already operational in five European countries

	Austria	2004	Kapsch	DSRC based tolling DSRC/ALPR based enforcement
	Czech Republic	2007	Kapsch	DSRC and GNSS based tolling DSRC/ALPR based enforcement
	Germany	2005	Toll Collect	GNSS and Ticket based tolling DSRC/ALPR based Enforcement
	Slovakia	2010	Skytoll	GNSS and Ticket based tolling DSRC/ALPR based enforcement
	Switzerland	2001	Fela	Tachograph and tolling (DSRC/GNSS support) DSRC/ALPR based enforcement

In progress to introduce:






- France, Poland

Considering to introduce:

- Bulgaria, Denmark, Hungary, Netherlands, Slovenia, Sweden, etc.



Key facts

		Type of roads	Lengths	Vehicles included	Price per km	Revenue Mio Eur
	Austria	Higways and Expressways	2.135 km	Trucks, busses >3,5t	0,14 ... 0,37 EUR/km	1 062
	Czech Republic	Highways and Expressways	1.265 km	Trucks, busses >3,5t	0,03 ... 0,32 EUR/km	223
	Germany	Higways and some Federal Roads	13.043 km	Truck =12t	0,14 ... 0,28 EUR/km	4 410
	Slovakia	Highways and 1st class roads	2.009 km	Trucks, (busses) > 3,5t	0,02 ... 0,21 EUR/km	NA
	Switzerland	All roads	71.380 km	Trucks > 3,5t	1,73... 2,36 EURCent/t x km	1 080



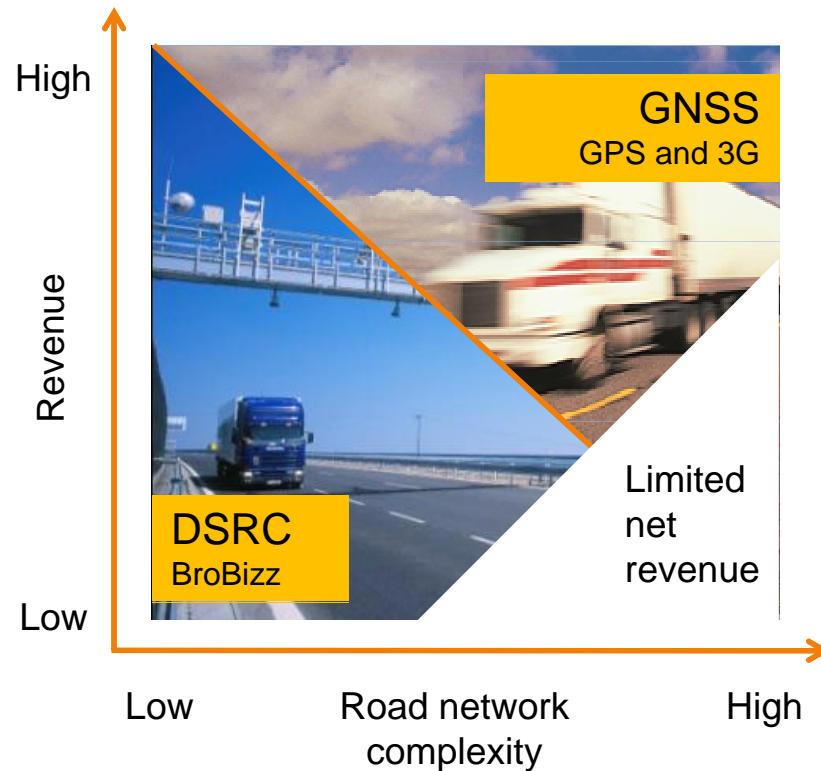
Potential revenue for Denmark

	Highways/Expressways 1 400 km (2%)	Other national Roads 2 388 km (3%)	Other roads 69 900 km (95%)
Trucks registered in DK and from abroad	Mio Eur 297 / DKK 2 213 (79%)	Mio Eur 62 / DKK 462 (17%)	Mio Eur 15 / DKK 112 (4%)
Passenger cars registered in DK and from abroad	Mio Eur 772 / DKK 5 752 (65%)	Mio Eur 167 / DKK 1 244 (14%)	Mio Eur 253 / DKK 1 885 (21%)
Grand total	EUR 1 069 million (68%)	EUR 229 million (15%)	EUR 268 million (17%)

Figure: Summary of potential revenue (values in million euro's), supporting data are attached to the presentation

- 96% of the revenue from trucks will come from 5% of the road network
- The majority of the EUR 62 million will be collected on a small part of the national road network and thus a limitation in this road network would improve system efficiency
- Expanding the tolling scheme to all vehicle on highways would increase the revenue by 300%

System efficiency will be dependent on road network and technology



>>> Revenue, dependent on e.g.:

- Number of users, traffic volume
- Type of road
- Environmental class, axels and weight

>>> Road network complexity

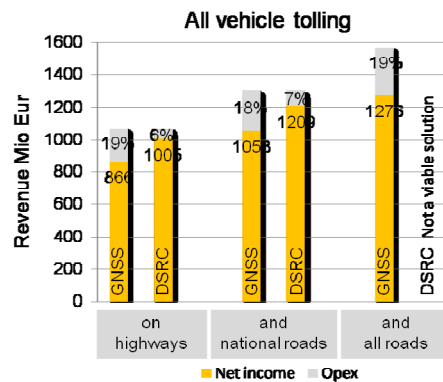
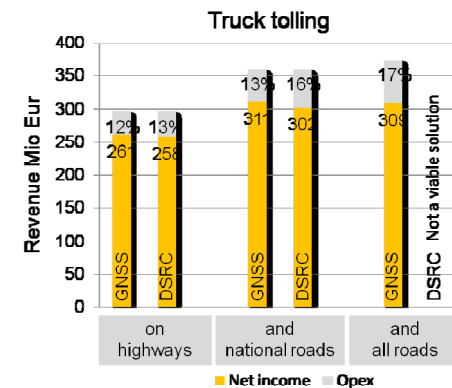
- Length of highways and rural roads
- Number of junctions

>>> Conclusions

- Transaction cost for DSRC is lower than for GNSS
- Road network expansion is easier/less expensive for GNSS
- No viable business case to date supporting tolling on all roads (nation wide) for vehicle below 3,5 ton

Predicted net revenue and operational cost (OpEx)

- 95% of the road network will have limited contribution to the net revenue
- True Life Cycle Cost (investment and OpEx) for truck tolling is estimated to be between 10%-15%
- The best choice of technology for truck tolling will be dependent on final requirements and optimization



- DSRC is optimized for an all vehicle tolling scheme on highways and national roads and as a result outperforms GNSS in that scenario
- DSRC and/or Automatic License Plate Recognition (ALPR) is the only proven solution for congestion charging

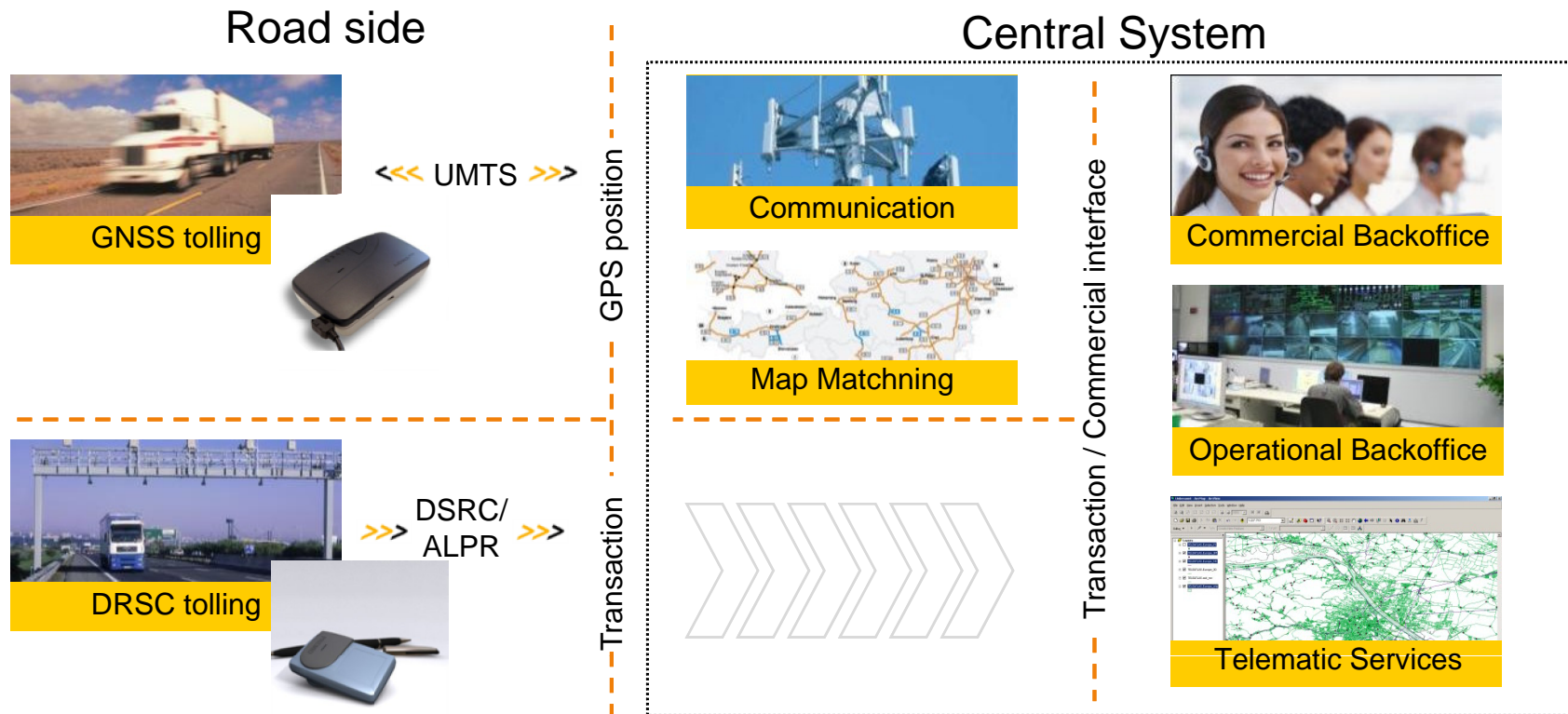
Allowing interoperability and future migration into an all vehicle and congestion charging scheme appears attractive

- Commercial and technological interoperability with existing tolling schemes BroBizz appears attractive
- Approximately 1 000 000 commuters and hollies in Copenhagen/Malmö region already has a BroBizz tolling account (used at Sund & Baelt)
- BroBizz and a BroBizz compatible OBU could be reused if going forward and introducing all vehicle tolling and/or congestion charging in the future

		GNSS			DSRC/BroBizz		
		Highways	National roads	Total	Highways	National roads	Total
Revenue		297	62	359	772	167	1 298
Opex (%)		12%	20%	13%	5%	10%	8%
Technology	HGV's Cars	GNSS	GNSS		GNSS DSRC	GNSS DSRC	

Figure: Summary of potential revenue (values in million euro's), supporting data are attached to the presentation

Kapsch provides tailored system optimizing true life cycle cost



<p>Inhouse competences</p>	<p>True E2E All core technologies</p>	<p>Technical operation Commercial operation Life Cycle management</p>	<p>Development Integration Commissioning</p>
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Summary and lessons learned

- 80% of the potential revenue from trucks will come from the highways (3% of the road network)
- Most of the national and low level roads has almost no impact on the total net revenue
- Commercial and system interoperability between nation systems appears attractive, e.g. utilizing Brobizz



- Possession of data, i.e. central system located in country, has shown to be compulsory for all Authority systems
- Operation cost (OpEx) has shown to be imperative for public acceptance
- DSRC transaction for cars and GNSS tracking of trucks appears to be acceptable from a privacy aspect
- Evaluation criterias will define the final solution and thus should consider mid and/or long term objectives