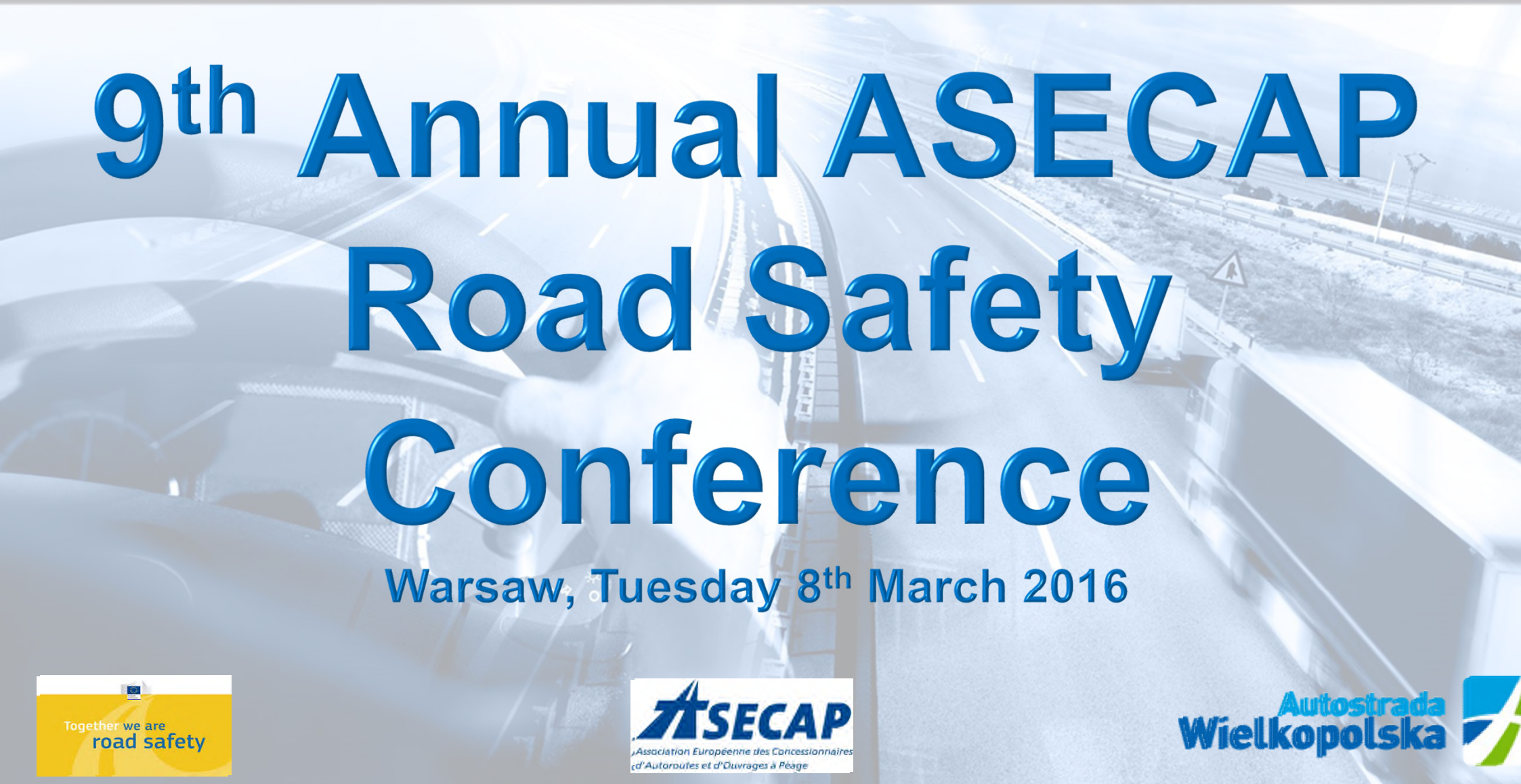
Road Safety on a Larger European Motorway Network



9th Annual ASECAP Road Safety Conference

Warsaw, Tuesday 8th March 2016

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ASECAP
Association Européenne des Concessionnaires d'Autoroutes et d'Ouvrages à Péage

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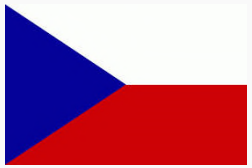
9th Annual ASECAP Road Safety Conference

The Czech ETS, its development and positive effects to road safety



Warsaw, March 8th 2016

Karel Feix, CEO Kapsch CZ

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rrent state of the toll system in CZ.

A successful state IT project = one invested crown earns four more, generating 5x more evenue than time-based highway coupons.

The toll system has already collected **2,67 bill. EUR for the state** – by the end of the irst decade of the cycle, it will add another 400 mio EUR. The state paid **3.4 billion CZK exc. VAT) = 136 mio EUR to build the toll system**.

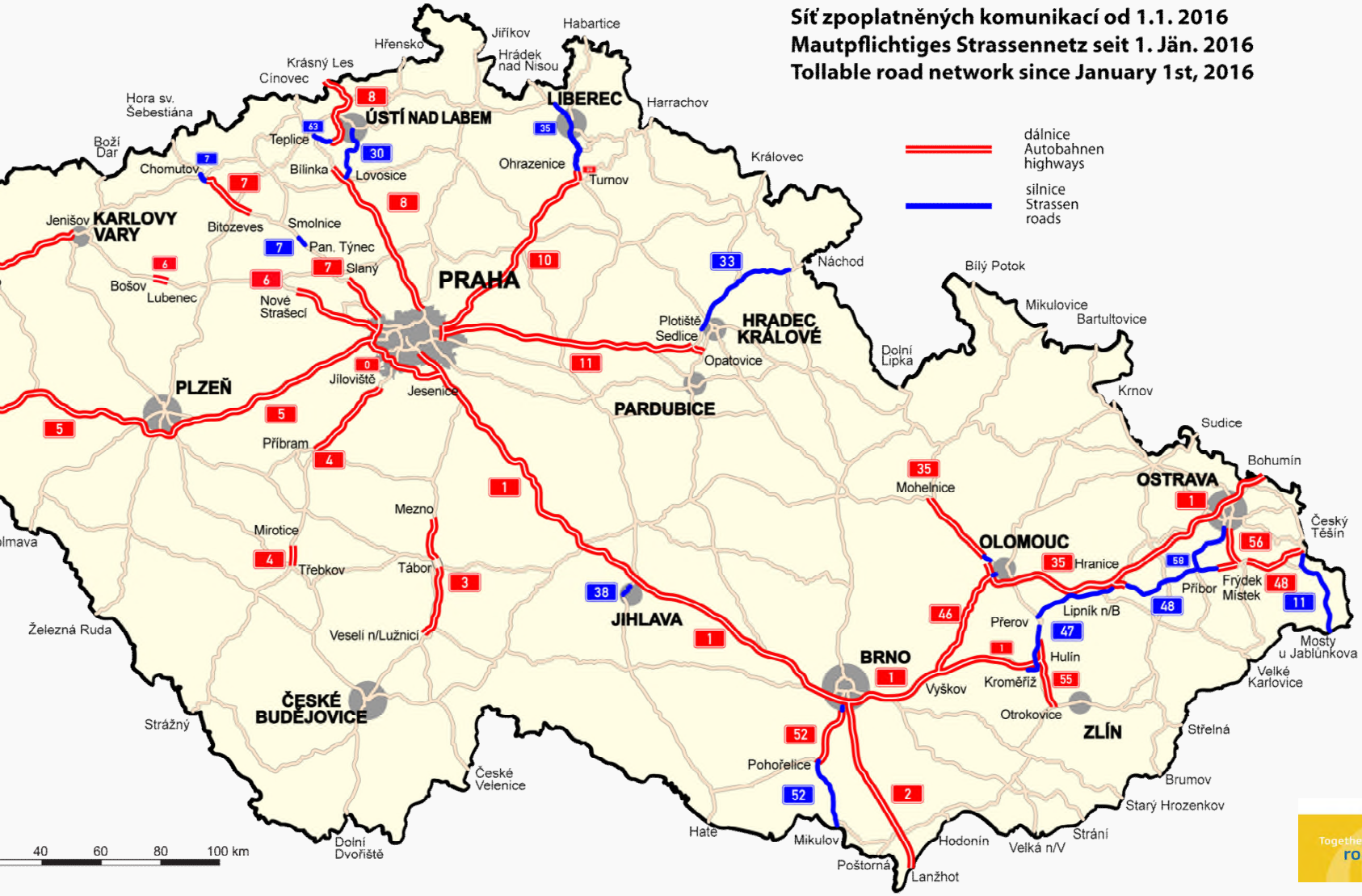
In past years, the operator **refurbished and modernized the system** so that after 2016 e will be prepared to collect in subsequent years.

Toll tariffs were raised and new discounted Euro VI emission categories were mplemented = **the environmental effect take part.**

High toll efficiency – total performance of the Czech electronic toll collection system xceeds **99.6 %.**

The Czech government **decided to prolonge the operation of the current DSRC toll ystem** = reliability, modernity, cost-effectiveness.

# of tolled roads in the Czech Republic.



onomic characteristics the CZ ETS.

This is one of only a few successful state IT investments - of one invested crown it brings in a further five, it generates four times more money than the former motorway time coupons.

Quick return on investment – in 7 months (!) of operation total toll revenues have reached the same sums as its construction costs.

Budget neutrality – a toll project without demands on the state budget = the state asserted a contract with the contractor that it would gradually repay the costs of delivery of the toll system within 4 years as of the start of the tender (once it acquired money from the toll).

Risk-free "quasiPPP" financing – a successful project of cooperation of the private and public sector when the contractor financed, implemented and bore all the risks.

High guarantees and warranties – the contractor and operator guarantees under high sanctions full functionality and efficiency of the toll system.

uantity discounts on toll charges.

s compensation to transport operators for the double increase in toll tariffs, **tarting in 2012**the state decided to introduce **discounts for trucks** that travel a arge number of tolledkilometres and pay the relevant amount in toll charges.

his is conditional on an active application and the more detailed registration of very vehicle and operator. 2/3 of applicants for discounts are Czech entities.

ince 2013 the state has paid transport operators approx. 150 million CZK (5.6 illion EUR) in discounts every year, and over 200 million crowns (7.4 million EUR) or last year

Amount paid in toll during the year	Toll discount provided
2,800 EUR	**5 %**
4,000 EUR	**8 %**
7,000 EUR	**11 %**
11,000 EUR	**13 %**

ote: Rules valid for year 2015. Source: Ministry of Transport of the Czech Republic

TS implementation.

gulation binds states to quickly introduce EETS (European Electronic Toll Services):

TS introduces in practice interoperability regardless of the applied technology **= 1 board unit and 1 contract for the truck to travel throughout Europe = the boundary ark separating provided toll services from technical operations**

the Czech Republic EETS **is recognised by the law, but implementation is delayed** (the tes are under the sanctions and control of EU bodies)

r example in Italy, Spain, Scandinavia, Austria and Poland EETS are already being plemented

t advantage: opening of the market to EETS contractors, incl. onboard units of various contractors

d advantage: the state will increase the value of its asset

ese day the State iniciated steps toward to implementation of EETS in 2017

afety, environment & road management.

ultifunctional infrastructure – a fully invested national toll
nfrastructure allows the state to reuse the already implemented
nvestment several times to develop telematic applications (for
raffic safety, increased comfort of motorists, statistics and data):

an important **online data source** and information for the NDIC
+ serves the RMD when planning closures for the modernisation of the D1
supplemented by a telematic function it serves to **manage traffic** and increase traffic safety (traffic-information system)
informs of arrival times for selected destinations

detects **wrong-way vehicles on motorways**
the control gates can be used as **weighing points**, in the first stage mainly at **border crossings** (pilot in progress).

motivated hauliers to quicker **change of vehicle fleets for more environmental trucks** with emission class Euro V.

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ed values of the CZ toll system.

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nvironmental impact of the CZ ETS.

Since 2011 the state has used the toll system to implement both environmental and fiscal policy = reduction in harmful emissions from trucks.

Following a dual increase in km tariffs (2011 and 2012), the lowest rates apply to vehicle emission class Euro V. Since January 2015 a special rate has applied to emission class Euro VI+EEV.

The state has always recorded immediate, rapid growth in the proportion of the most ecological vehicles to the total collected toll and associated toll reduction = **e.g. share of vehicles with Euro VI on collected toll (in last 12 months) increased from 0 to 30 %.**

Decrease in harmful emissions from trucks in CZ	Comparison of 01/2011 (start of EuroV favouritism) and 01/2015
CO - carbon monoxide	**- 21 %**
HC - hydrocarbons	**- 28 %**
NO – nitrogen oxides	**- 40 %**

Note: with the increase in toll transactions by 15%

oad management impact of the CZ ETS.

he Czech Republic is a transit country used for the traffic of overloaded trucks which has a significant impact on e destruction

the road network.

Weighing in motion (WIM) in the CZ toll system = synergy.

he MoT has decided to test the synergy with the toll

tem and incorporate WIM into it as a further functionality.

he control gates can be used as **weighing points**, in the first stage mainly at **border crossings**. Further procedures ll take place as in the toll system (manual validation, customs administration, administrative proceedings).

here is pilot operation testing at the toll station near Brno the functionality of the entire system with satisfactory ults and showing the economic benefits:

- **Direct effects** – fines for overloaded vehicles (at one measuring point 24 million crowns + a vehicle weighing charge would have been collected in 8 months) = a conservative investment return is 2-3 months.
- **Indirect effects** – hauliers will begin to observe the loading of vehicles, a smaller need to invest in the repair and reconstruction of the surface.

long-term savings of hundreds of millions of CZK

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raffic safety and telematics on the CZ ETS.

The Czech electronic tolling system delivered by Kapsch represents **an ideal infrastructure for the implementation of a broad spectrum of traffic telematic solutions** including the procurement of data about road traffic for the purpose of traffic management and planning, applications for increased safety, mobile services for increase comfort or road users, solutions for various branches such as monitoring car fleets or mileage insurance.

The tolling system for increased road traffic safety:

- Implementation of a traffic management system for the busiest Czech motorway D1 in the section from 0. to 246.8. kilometres by using the existing system.
- Connection to the NTIC (National Transport Information Centre) – data from the electronic tolling system serves as the basic source of information for the police, emergency service information system, meteorological information, traffic reports and the road infrastructure.
- The second phase of the traffic management system (information panels and travel time system) was implemented on motorways D2, D5 and D8 from the end of 2009 and during 2010.

On-line data currently used to plan closures in modernizing CZ highway D1!

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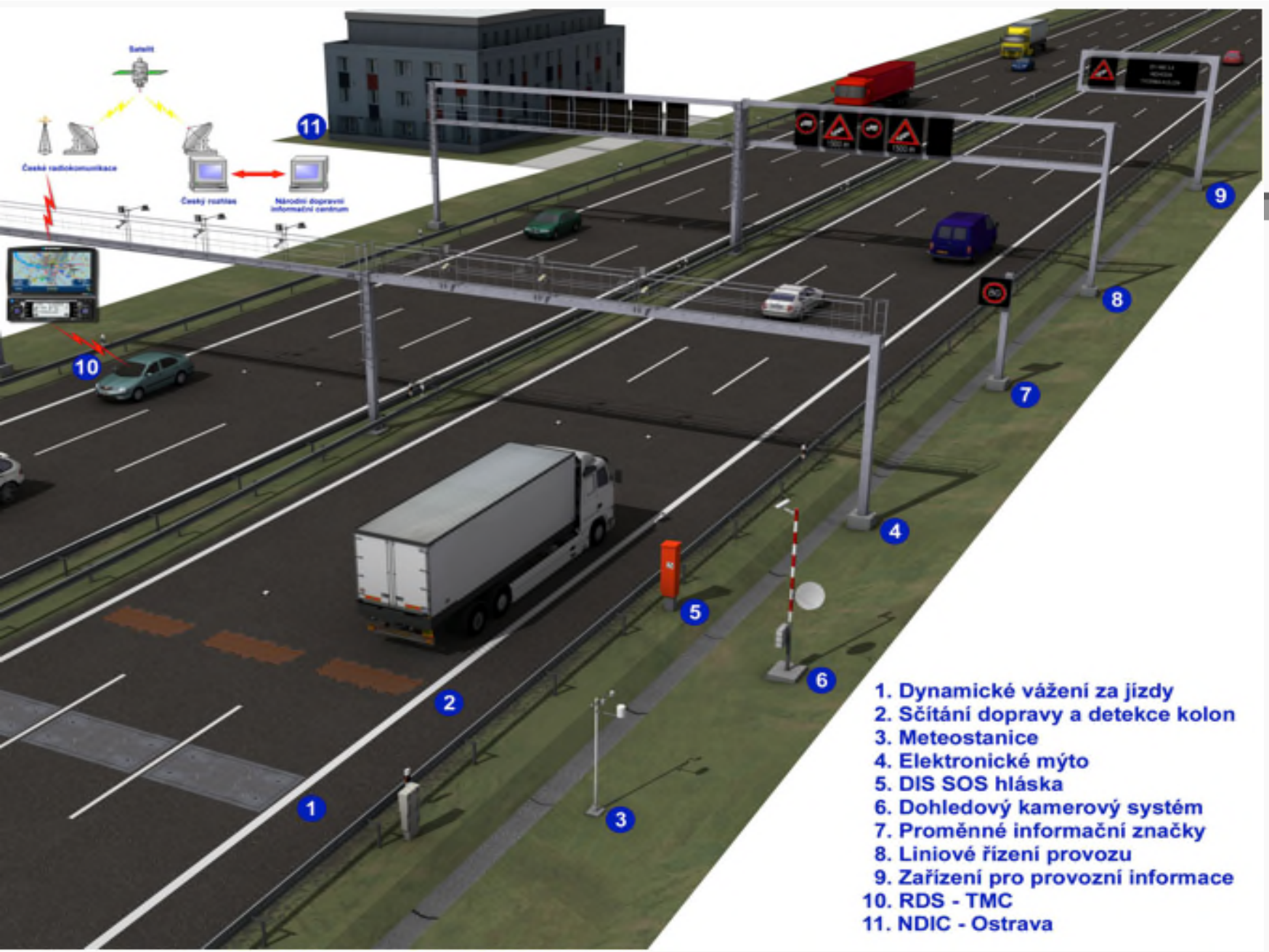

1. Dynamické vážení za jízdy
2. Sčítání dopravy a detekce kolon
3. Meteostanice
4. Elektronické mýto
5. DIS SOS hláska
6. Dohledový kamerový systém
7. Proměnné informační značky
8. Liniové řízení provozu
9. Zařízení pro provozní informace
10. RDS - TMC
11. NDIC - Ostrava

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rong Way Detection System.

The new aspect of the toll infrastructure in the Czech Republic is that it serves **to promptly detect hicles travelling the wrong way** on highways and motorways, **starting January 2012**.

So far the Czech toll system has been equipped **on highways D1, D5 and D2 with IDS technology** which using sensors immediately detects dangerous vehicles travelling the wrong way.

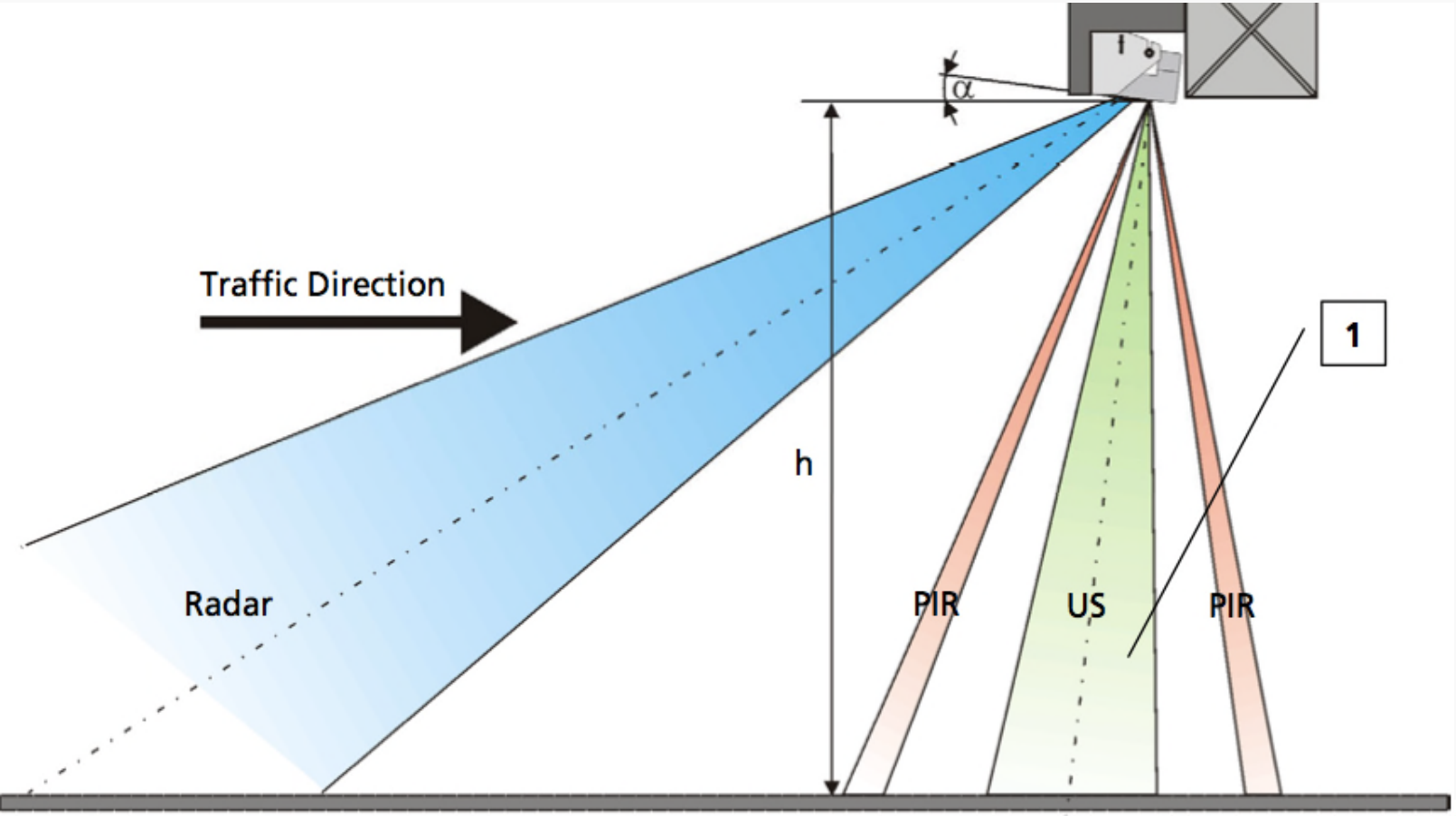
Warning reports are send to **the National Traffic Information Centre** from where they are displayed on **ghways information signs**, on **the radio** and smart **navigation systems**, and the Integrated Rescue stem and police is also informed.

Each month is in a single highway detected about **six vehicles driving in the opposite direction**.

Economical consequences: beyond the protection of human life system brings savings to state and ciety from the reduction of traffic accidents - both involved in service and road infrastructure, timated savings may reach on one highway in direct damage up to 2 mio EUR/per year.

rong Way Detection System.

hepicture describes the activity of wrong way vehicle detection on toll gantry:



rking optimization through the CZ ETS.

ack of or poor use of parking capacity (mandatory breaks, holiday driving ban, weather conditions) uses in Czech republic road-safety problems = **dangerously parked vehicles.**

se of the toll system **to optimize the use of parking areas** for trucks near highways and pressways.

n addition to unique online data from the toll system, data will be provided by counters of the ad and Motorway Directorate.

he system informs drivers about the capacity of highway parking areas ahead and later allow rking space reservation.

n 2012, data were analyzed and a prediction model were designed.

fter the successful testing, these steps will follow:

- **Recommendations to the government** as to where and how parking capacity should be increased.
- A tested prediction model will be presented and put into operation.

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lematic surveillance system & V2X.

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ematic surveillance system (TSS) for Prague.

ct of the capital Prague to complement the collection of traffic information for traffic management. Project management
ided by Technická správa komunikací Praha (Technical Management of Roads in Prague). Supplier of the project is Kapsch with
, Vars Brno and Eltodo.

sion of HDŘÚ (Main Transport Control Switchboard):

specialized computer software to provide a sophisticated, the most accurate and reliable calculation of the levels of operati
ased on modern computational methods,

a data analyzer for performing classification of the validity of the measured data based on the status information from t
easuring device, historical measured values and logical rules,

application for user configuration of scenarios and trigger conditions, which allows the user (administrator) to create and ed
cenarios for traffic control and trigger conditions

ic-telematics camera surveillance system provides :

- Operator supervision of all locations
- Detection of events - incidents (detection of traffic jam, detection of stationary vehicle, detection of roadblocks of crossroads)
- vehicles count
- vehicle classification into 3 classes (cars, trucks, NA)
- speed traffic flow
- traffic line calculation of travel time.

as integrated to HDŘÚ Prague.

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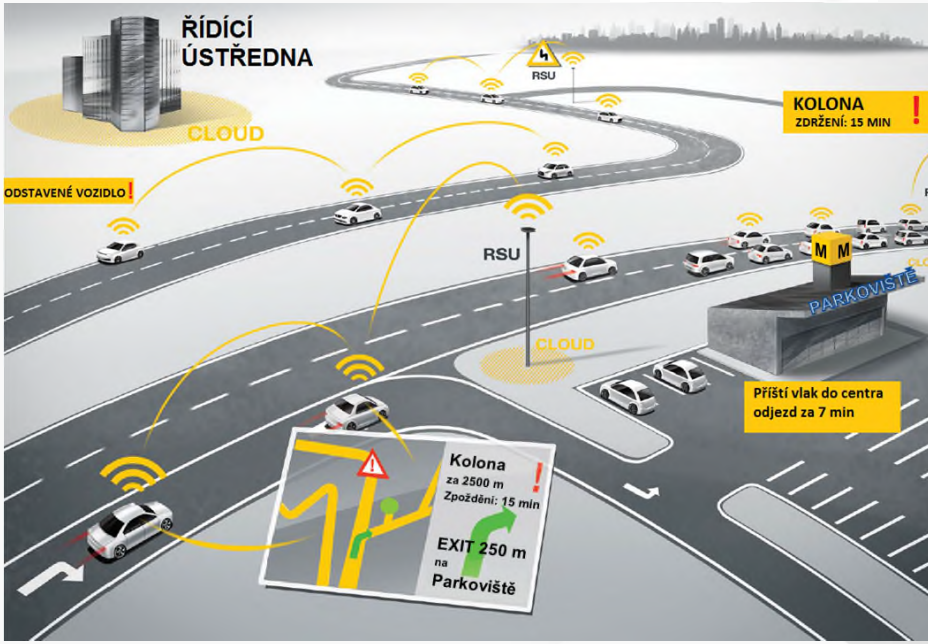
S co-operative system – V2X in Prague.

sch delivered the subsystem to HDŘÚ for cooperative communication system of vehicles to es and to infrastructure.

an additional source of traffic data received directly from the operation and their distribution o drivers according to their position. Traffic data are processed in the main control panel and o the RSU (Road Side Units) according to their position.

obtained from the vehicles unit sends to HDŘÚ for processing:

ata from vehicles = eg. their position, acceleration /deceleration, peed, direction of travel, type of vehicle ...



fic data from HDŘÚ are transmitted to sing vehicles equipped by V2X unit:

affi data from HDŘÚ eg. information on accidents,
affi jams, roads repairs and other traffic restrictions, driving
m between RSU, information on ZPI, meteorological situation,
iversionar routes ...
affidata are filtered according to the geographic position of RSU units.
affidata from HDŘÚ are selected for RSU
ccordingto their locations.

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Thank you for your attention.

Kapsch

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