

# 5.9 GHz Performance Based Tolling Solutions



# AGENDA

1. Security, Safety and Congestion Mitigation
2. Denver – 5.9 Pilot Project & Independent Testing
3. Active Traffic Management Systems – Overview



# Tolling solutions that enable interoperable and scalable mobility and safety solutions

## Capabilities

Multi Platform Support	DSRC Systems	Cellular	GPS
	Road Operations	Enforcement System	Back Office System
	Operations		

Components	DSRC Products	Vehicle Identification	Road Monitoring

## Applications

Tolling	Congestion Mitigation
Connectivity & Safety	Urban Solutions
Traffic Surveillance	Cashless Payments
Parking Mgmt	Access Systems

## The 5.9 GHz DSRC Solution

Road Use Pricing is the business model for DSRC based VII deployments

- 5.9 GHz DSRC is the best solution for customer discriminated pricing
  - Open, Secure and Interoperable
  - Enforceable
  - Works for HOT lanes as well as zone, free-flow approaches and intermodal exchanges
  - May be combined with GPS based approaches to avoid airtime charges and logistics challenges of cellular and reduce infrastructure density where possible
- It also meets the requirements for active vehicle safety applications
  - Fast initialization and low transaction latency
  - High reliability
  - Priority mechanisms for safety applications
  - Interoperability
  - Security
- A 5.9 GHz DSRC strategy sells itself
  - Consistent with existing toll road architectures but with the promise of interoperability and standardized financial processing
  - Readily supports the aftermarket
  - Will win DOT and auto OEM support because of safety
  - Long term auto OEM penetration makes it a clear choice (it will be on every car...)



## 5.9 GHz Performance Based Tolling Solutions

### Vision

Performance-based  
solution

5.9 Interoperability  
and Open Standard

Infrastructure  
Transformation



### Enables

Tolling/HOT lanes

Congestion  
Mitigation

Open Standards

Public-Private  
Partnerships  
(PPP)

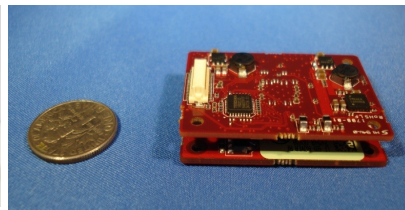
Vehicle  
Infrastructure  
Integration (VII)



# Integrated Mobility Solutions

## Kapsch 5.9 GHz DSRC Platforms

- DSRC platforms, including the Multiband Configurable Networking Unit (MCNU) are used to build IEEE 802.11 standards-compliant WiFi networks and 1609 compliant DSRC systems
- The platforms are designed to support mobility management, safety and security applications including VII; with Kapsch's platforms customers can rapidly deploy VII safety, mobility and e-commerce applications



## Application

### E-commerce

- Tolling
- Electronic payment systems
  - Hot Lanes
  - Parking
  - Gas/food payment
- Infotainment

### Safety

- Crash Avoidance
- In vehicle signing
- Emergency vehicle traffic signal pre-emption
- Commercial vehicle inspection

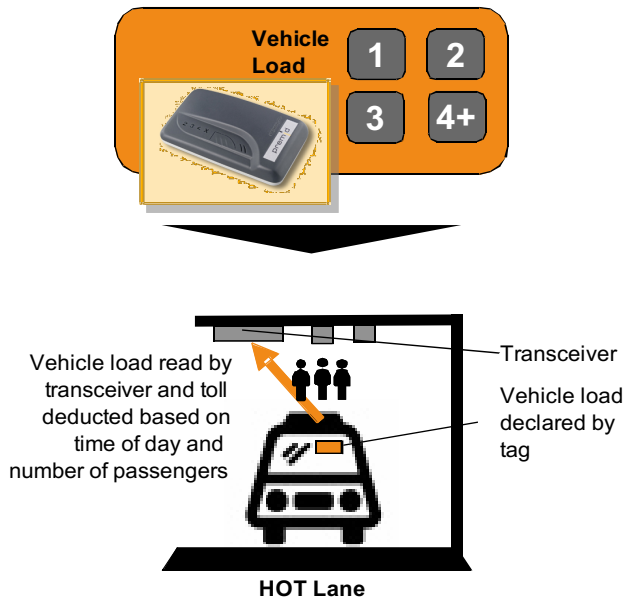
### Mobility

- Real time traffic info (probe data collection and distribution)
  - Signal timing adjustment
  - Traveler/traffic info
- Traffic signal priority for transit vehicles
- Commercial vehicle inspection/weigh in motion

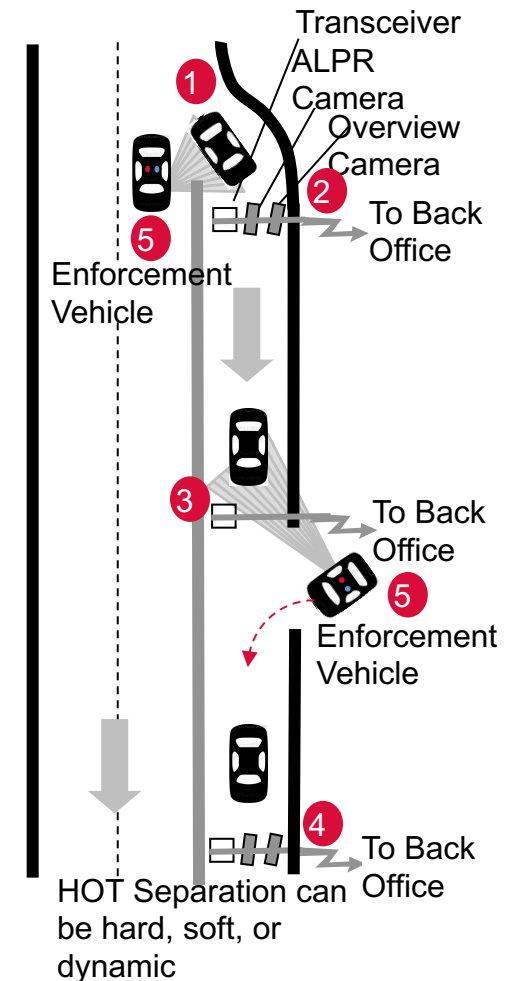
# HOT Lanes Solution

**Kapsch HOT solution is enabled by a self-declaring tag and cover collection, processing and enforcement**

**Self-declaring Tag allows Drivers to Declare Vehicle Passenger Load to HOT System with Button Press**



- 1** Vehicle occupancy self-declared on entry
- 2** Occupancy read and appropriate fee charged
- 3** Alternate gantries write location data to tag validating passage
- 4** Following gantries read occupancy data as well as prior location data to process toll for both gantries
- 5** Mobile enforcement vehicles validate self-declared occupancy against observable occupancy while driving or stationary



**Kapsch HOT Lane solutions enable operators to implement variable-pricing mechanisms and congestion management**

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# 5.9 GHz Open Road Tolling on Colorado's E-470

<b>Summary</b>	E-470 is a limited-access toll way traversing the eastern portion of the Denver - Aurora Metropolitan Area in CO
<b>Distance</b>	46 miles
<b>Timeline</b>	Phase 1 rollout in 2010, a year earlier than VII projections
<b>Agency</b>	E-470 Public Highway Authority

## Pilot Outcomes

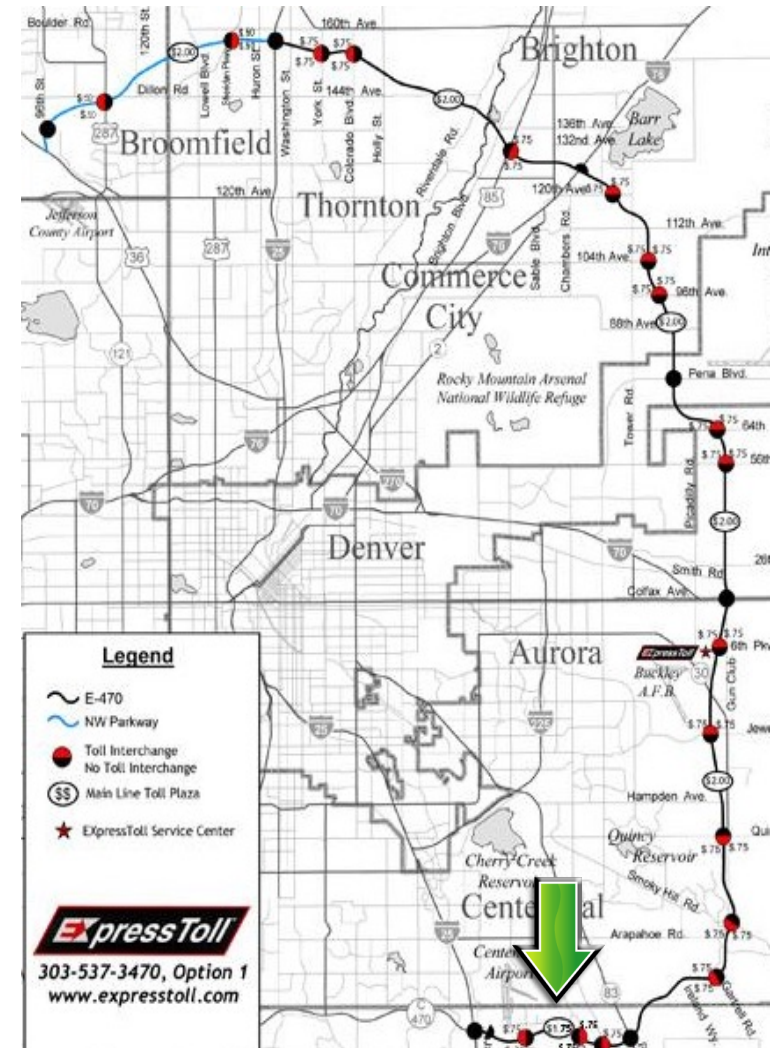
- US Regulatory Standards
- Enforcement Rates
- 5.9GHz Compliant System
- Technology effectiveness on US license plates and roadways
- Interoperability Standards

## Project Description

- Entails development and deployment of roadside equipment (service delivery nodes)
- Partner with auto companies to install OBUs in new autos sold in the Denver region

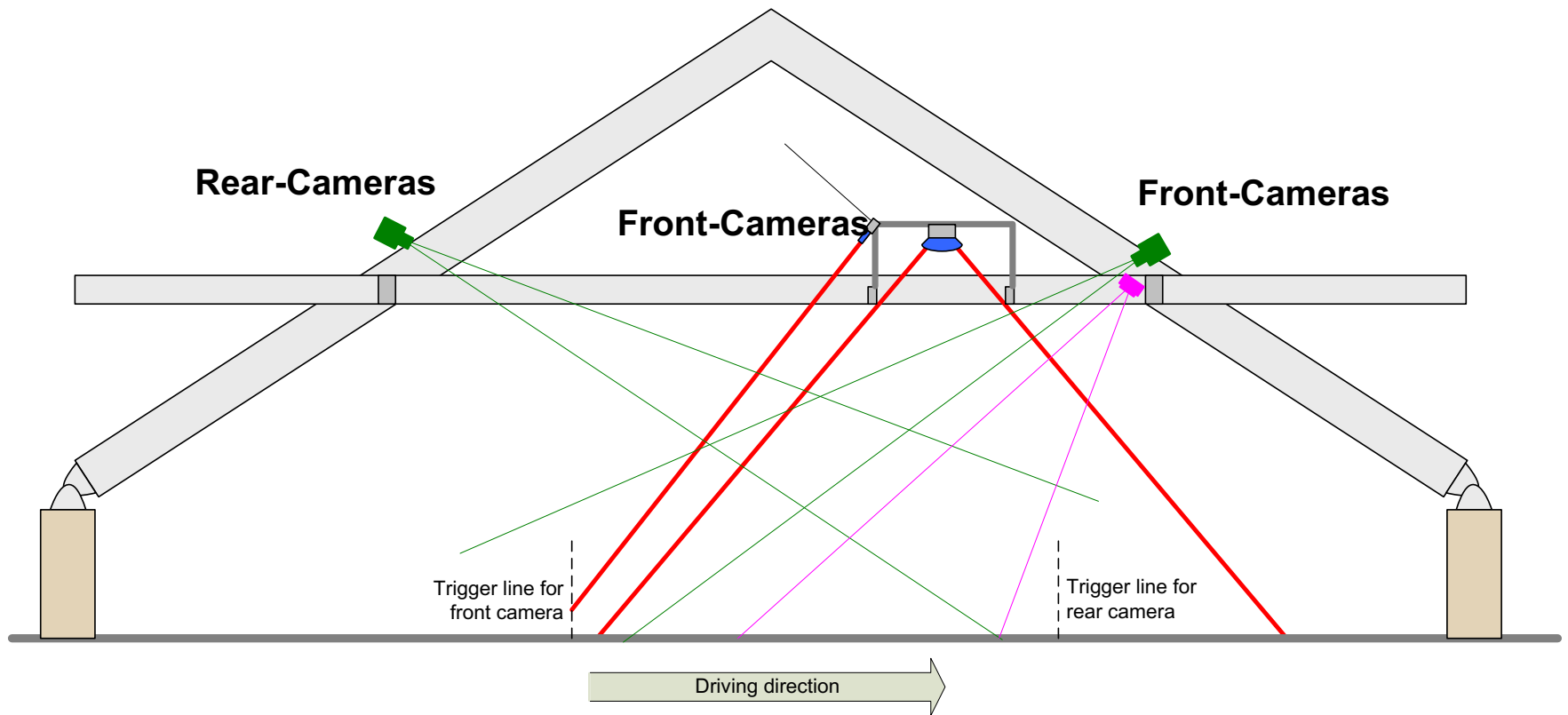
## Background

- E-470 is recognized as an innovator among toll roads. Authorities are reputed for being early adopters of technology (e.g. IDRIS loops)
- Toll way was among the first in the nation to offer non-stop, open-road toll payment via Electronic Toll Collection (ETC) transponders
- Open platform (Title 21) allows interoperability with other systems
- Proposed phased approach to VII implementation starting in 2010



Source: Booz Allen Analysis, "Vehicle-Infrastructure Integration (VII) Initiative - Benefit-Cost Analysis: Pre-Testing Estimates" by USDOT

# System Architecture



## Installation at E-470



## Independent Testing

Target Performance Specifications and  
Test Execution



Test results and live demonstration at  
ITS World Congress 2008 in November



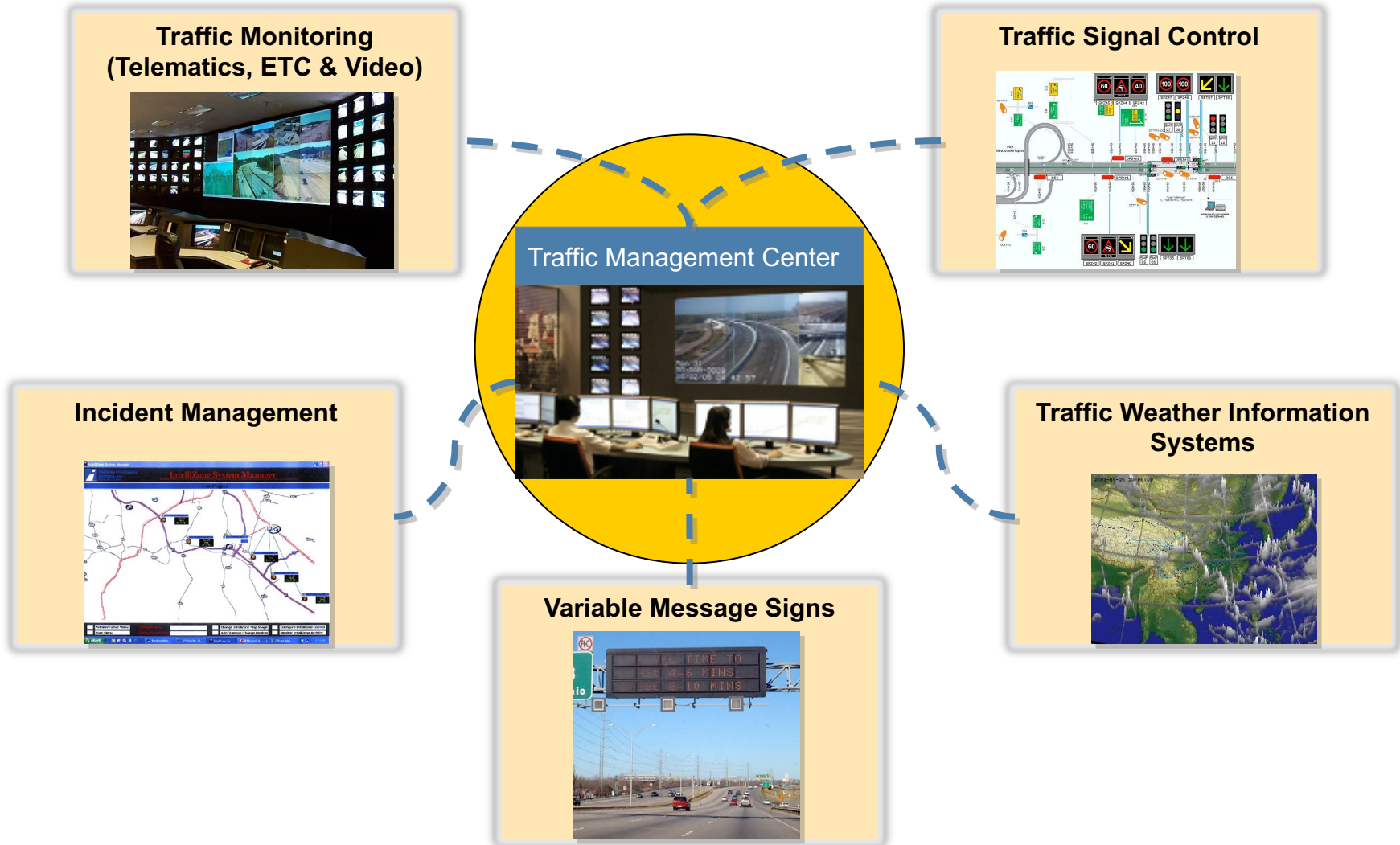
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# Active Traffic Management Systems using 5.9 GHz DSRC and VII



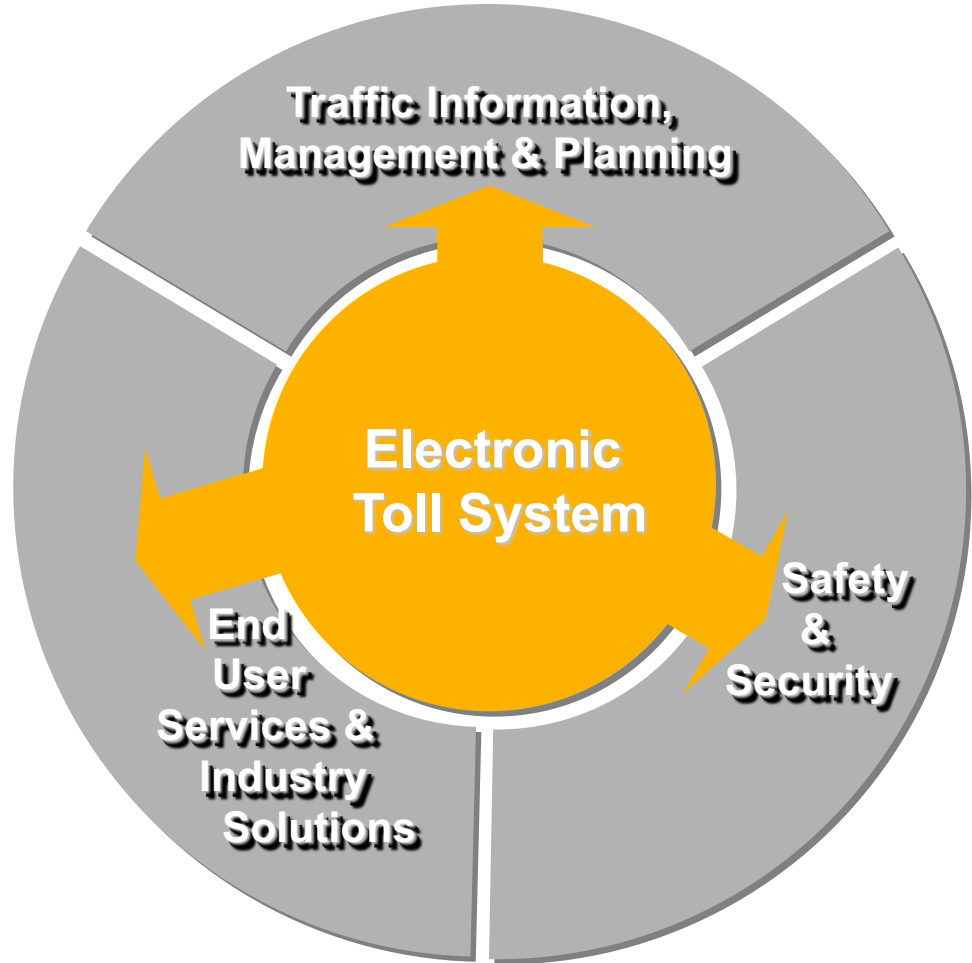
## ETC - based Traffic Management and Planning Solutions

### Concept

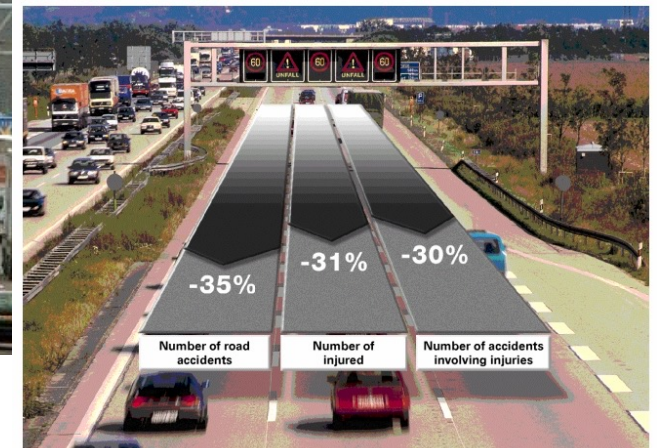
- Utilizing electronic toll systems as the “backbone” for secondary traffic & telematics solutions

### Benefits

- Cost reduction and better data for traffic management, information and planning
- Improved safety and security through better traffic enforcement and observation
- Better service for the driver through end-user services (> increasing acceptance for toll)
- Additional revenues through utilizing the ETC infrastructure for various industry solutions



# Traffic Management and Solutions



## Data Sources in ETC Environments



### DSRC

- Traffic data per stations and sections (current traffic situation, traffic statistics, route analysis) on tolled roads
- Vehicle tracks (station passages) on tolled roads



### GPS

- Traffic probe data (current traffic situation, traffic statistics, route analysis) country wide
- Vehicle trip path



### Video

- Traffic data per station (current traffic situation, traffic statistics, route analysis) on tolled roads/in zones
- License plate data (e.g. vehicle checks)

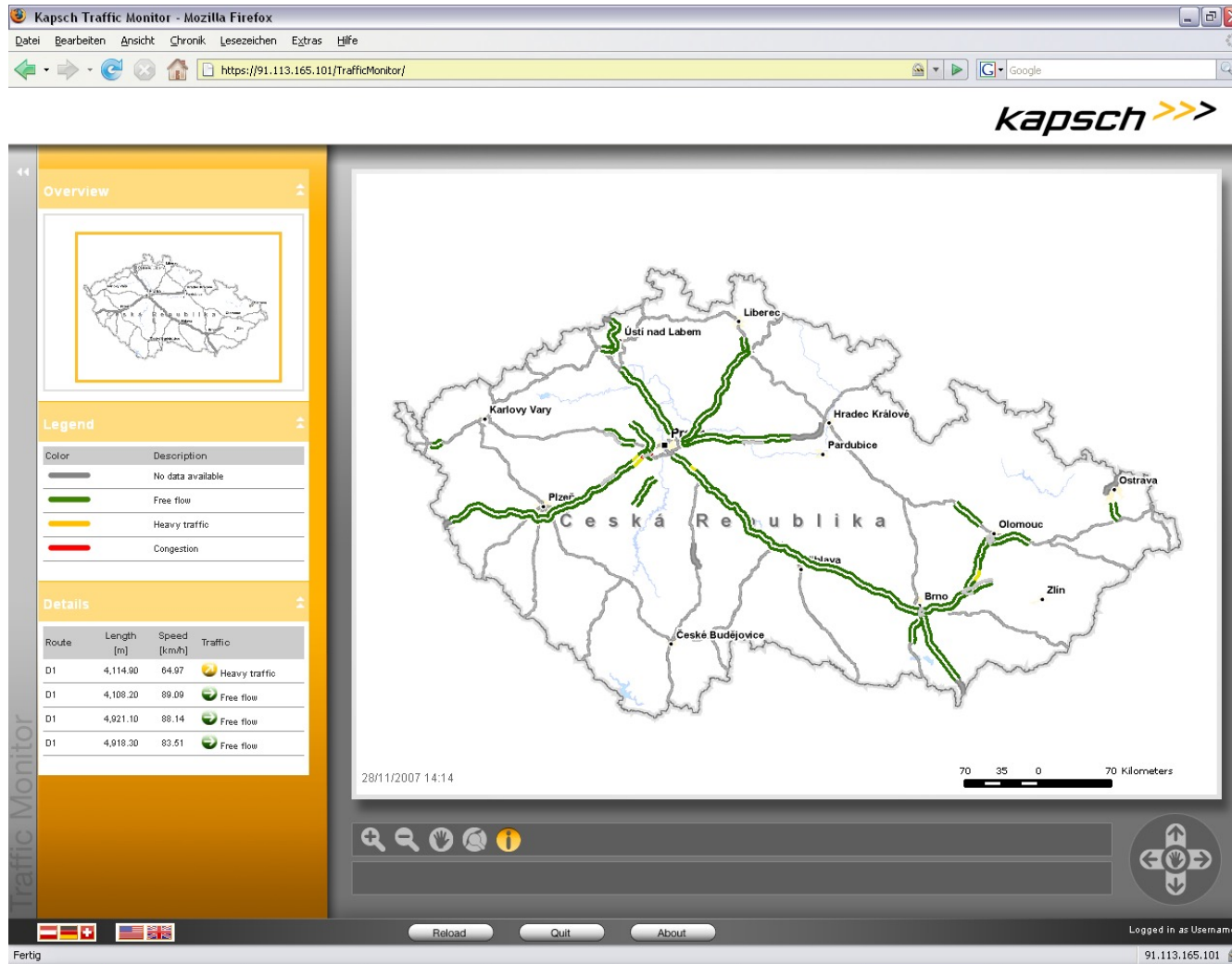


### Sensors

- Traffic data (current traffic situation, traffic statistics)



# Traffic Monitor – User Interface



Mobile Solutions





*Always One Step Ahead*

Justin McNew

Chief Technology Officer

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