# Siemens Electronic Tolling

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## Road User Charging Schemes in Europe

**Arti Gupta, Ph.d.**

# SWITZERLAND 1998-2001
## First Nationwide Toll System for Trucks (on *all* roads)

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### Distance-Based Tolling

- System start: January 1st, 2001
- For Trucks > 3.5 tons; ~ 60,000 On Board Units
- avg. price / km: 65 Eurocents or 1.6 cents/ton/km

### Commercial Issues

- CAPEX ~ € 200 million, Operation costs ~ 5%
- ~ € 750 Million revenues generated per year
- LSVA makes for 20% of the overall transport costs

### Satellite and Microwave Technologies Used

- Distance measured by odometer connection
- GPS verifies distance, recorded on a “smart-card”
- Microwave used for enforcement and at the borders

➡ **New OBU generation from Siemens for 2009**

# GERMANY 2002-2005
## First Nationwide Toll System for Trucks with GNSS/GSM

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### Distance-Based Tolling

- System start: January 1st, 2005
- For Trucks > 12 tons; ~ 550,000 On Board Units
- avg. price / km: 12.4 Eurocents or 0.3 cents/ton/km

### Satellite and GSM Technologies Used

- Tolled road network is easily expandable
- Satellite Technology has proven to be very reliable
- Dual system (manual booking) is complex & costly

**Siemens supplies > 350,000 OBUs to Toll Collect**

# GERMANY 2002-2005
# First Nationwide Toll System for Trucks with GNSS/GSM

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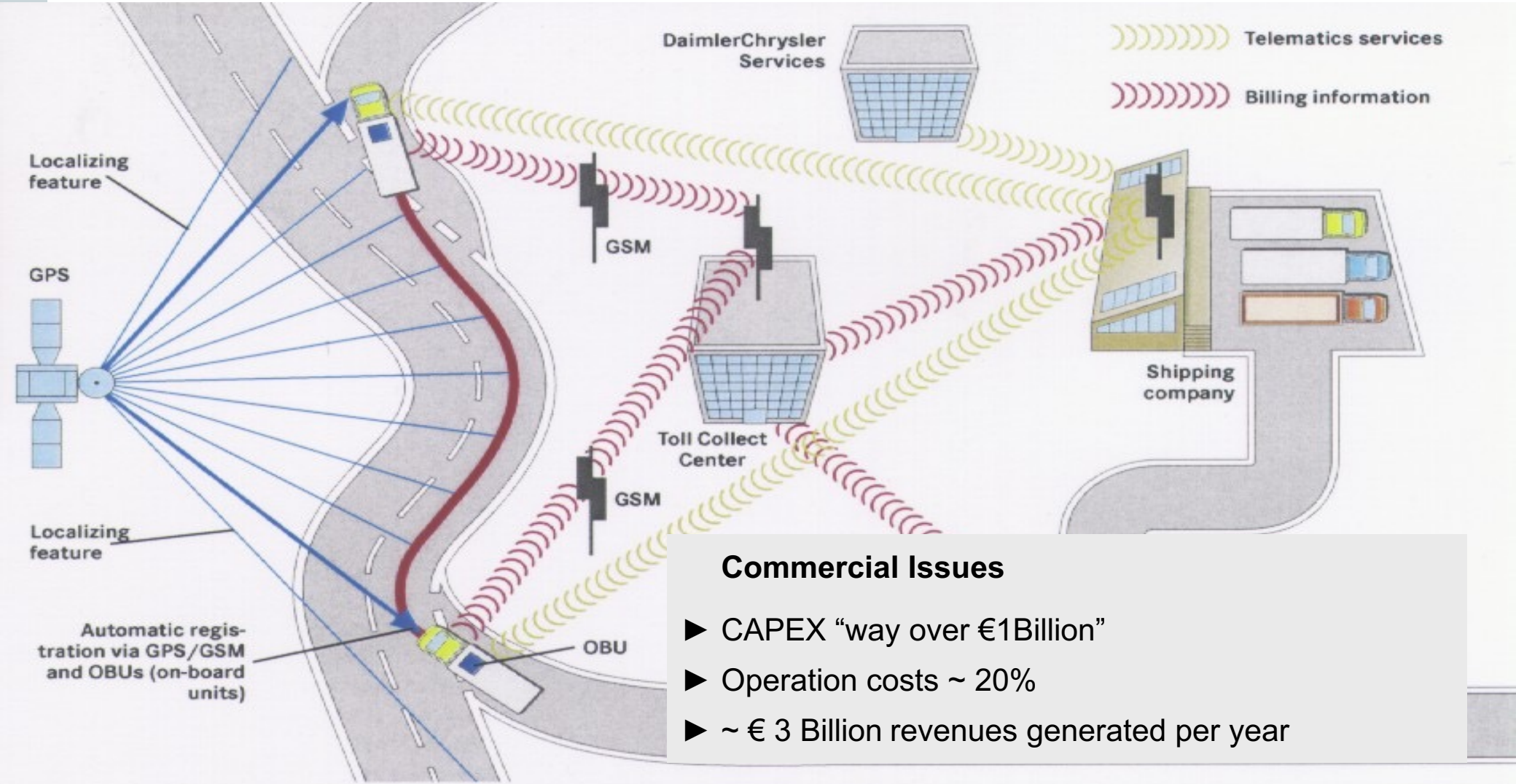
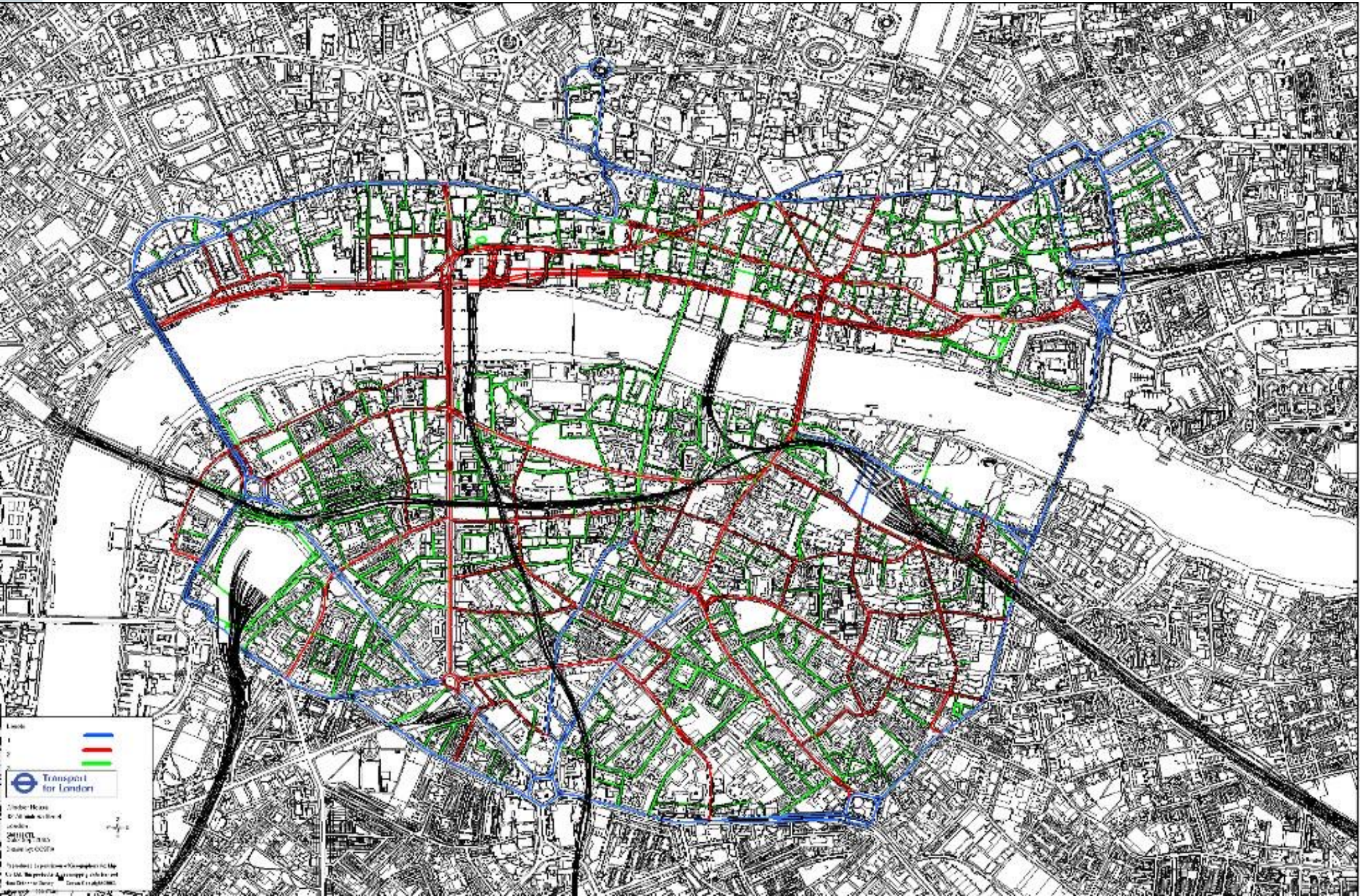



## Commercial Issues

- CAPEX “way over €1Billion”
- Operation costs ~ 20%
- ~ € 3 Billion revenues generated per year


Transport for London

# 2005-2012 THE NETHERLANDS
## First Nationwide Scheme for all Vehicles on all Roads

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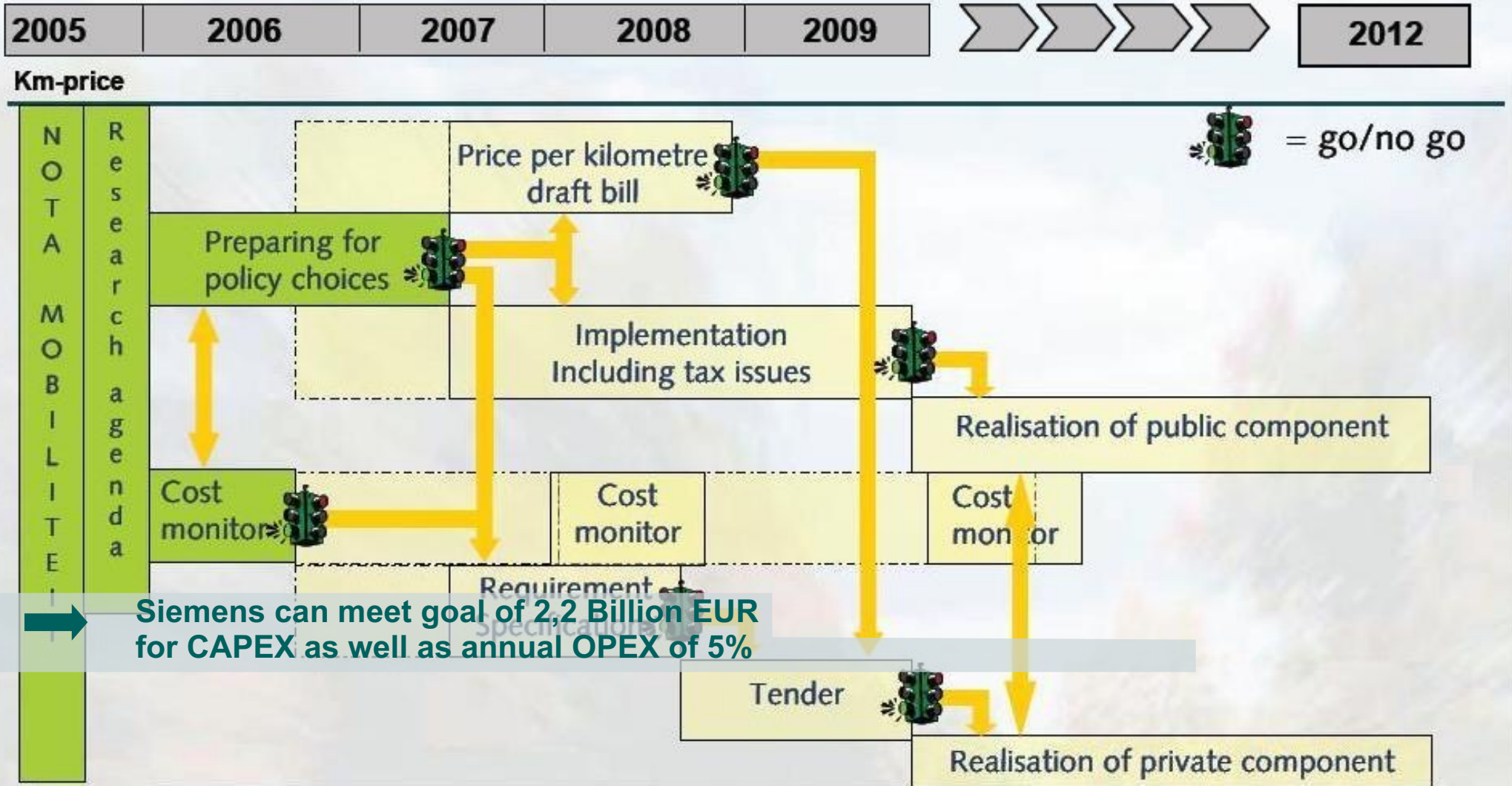
**"Anders Betalen voor Mobiliteit"**




**Siemens can meet goal of 2,2 Billion EUR for CAPEX as well as annual OPEX of 5%**

# SLOVAKIA 2007
## Tender for Nationwide Tolling for Trucks

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### Introduction of Electronic Tolling in 2009

- Siemens is technology supplier of winning consortium (“Santoll”, led by SANEF)
- Mandatory tolling for all trucks including foreign
- Electronic tolling to start July 2009 for trucks and buses > 3.5 tons
- Tolled network to start with 2,400 km (400 km of which are Motorways)

# SLOVAKIA 2007
## Tender for Nationwide Tolling for Trucks

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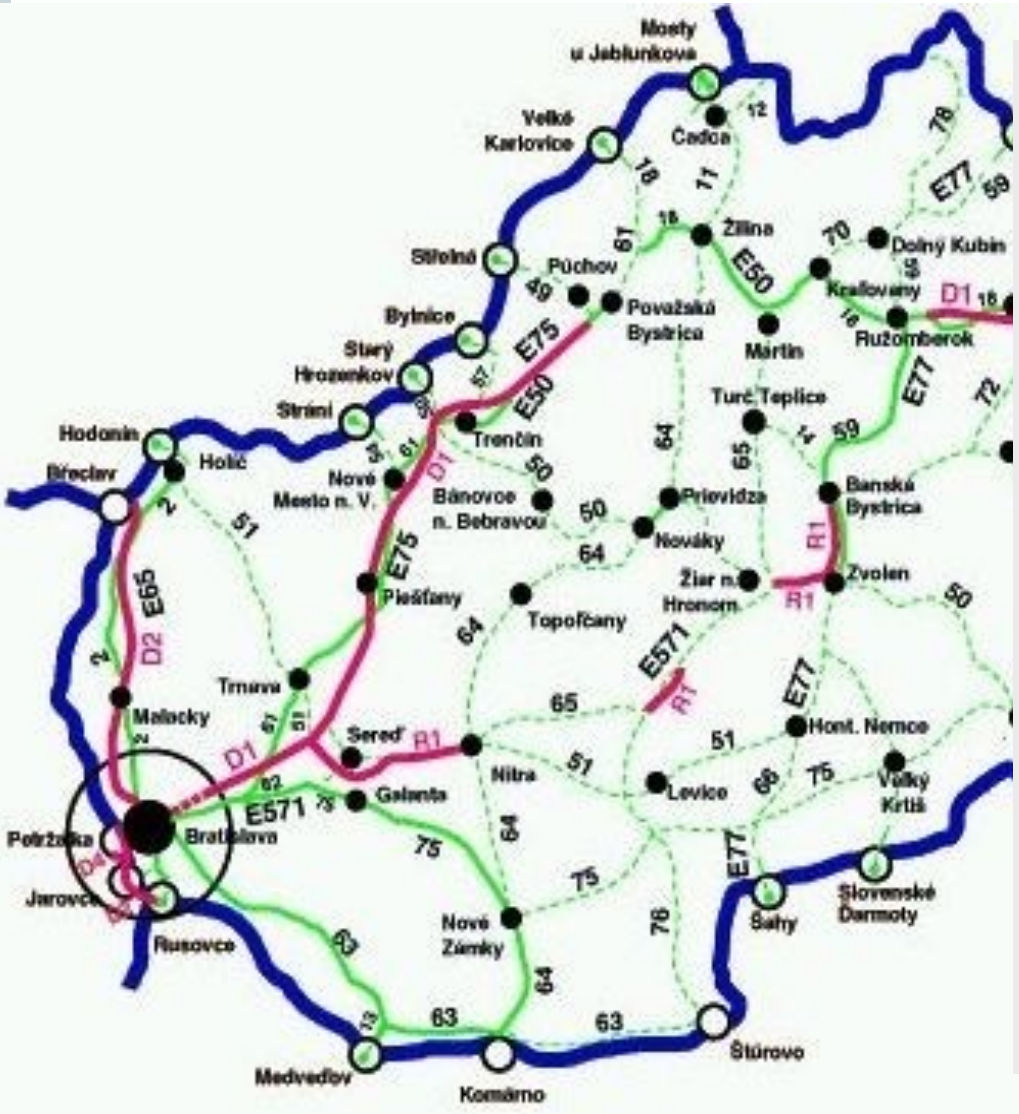


### Introduction of Electronic Tolling in 2009

- Operation period planned for 13 years
- Total system costs ~ € 800 Million
- Annual income projected at ~ € 300 Million
- Anticipated fees 10 Eurocents for trucks > 3.5 tons and 23 Eurocents for trucks > 12 tons
- Satellite-based technology will be deployed, since tolled network consists primarily of first-class roads and should be expandable

# *Puget Sound Traffic Choices Study*

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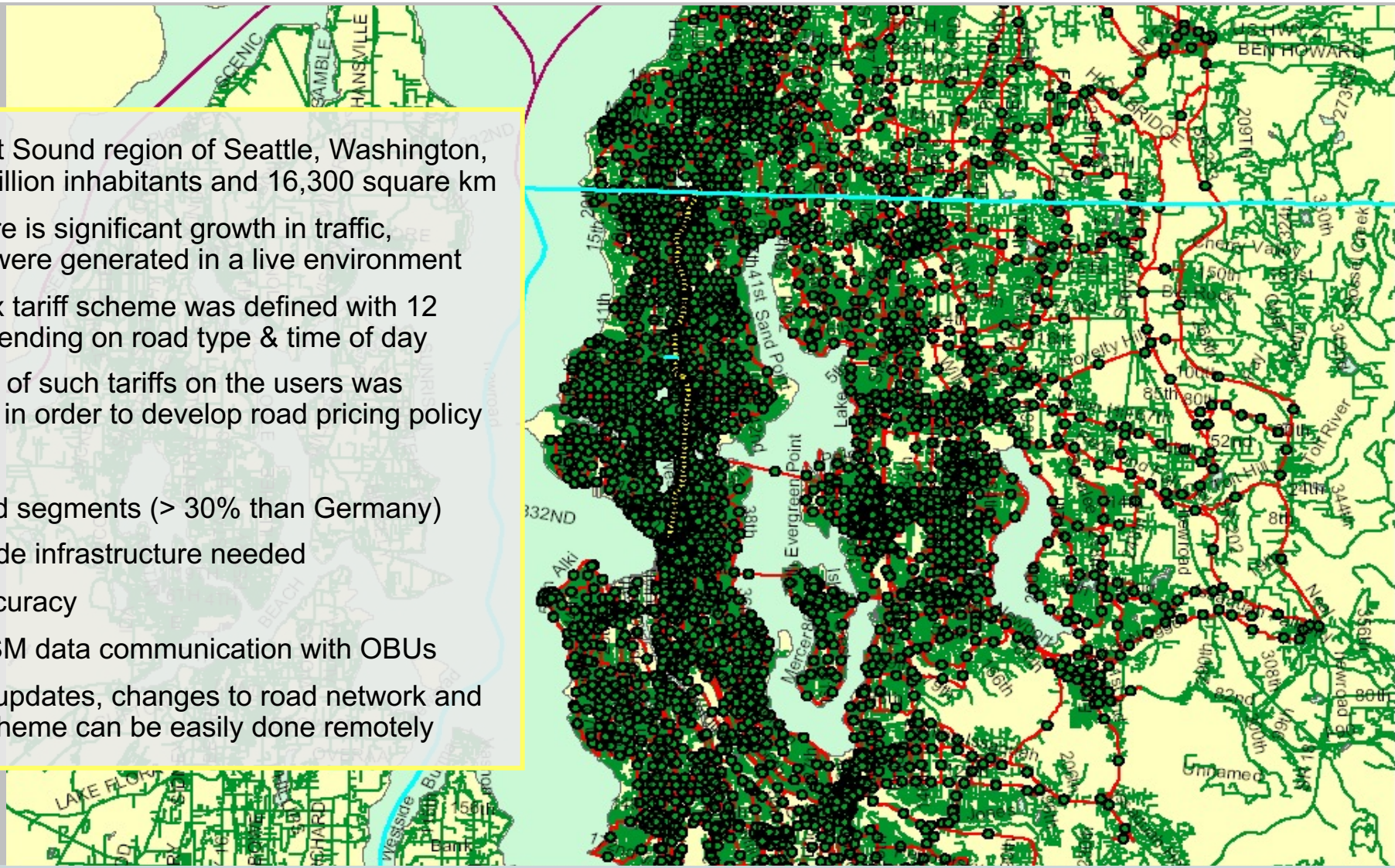
- The Puget Sound region of Seattle, Washington, has 3,2 Million inhabitants and 16,300 square km
- Since there is significant growth in traffic, statistics were generated in a live environment
- A complex tariff scheme was defined with 12 tariffs depending on road type & time of day
- The affect of such tariffs on the users was evaluated in order to develop road pricing policy

- 8,000 road segments (> 30% than Germany)
- No roadside infrastructure needed
- > 98% accuracy
- GPRS/GSM data communication with OBUs
- Software updates, changes to road network and to tariff scheme can be easily done remotely



# *Puget Sound Traffic Choices Study*

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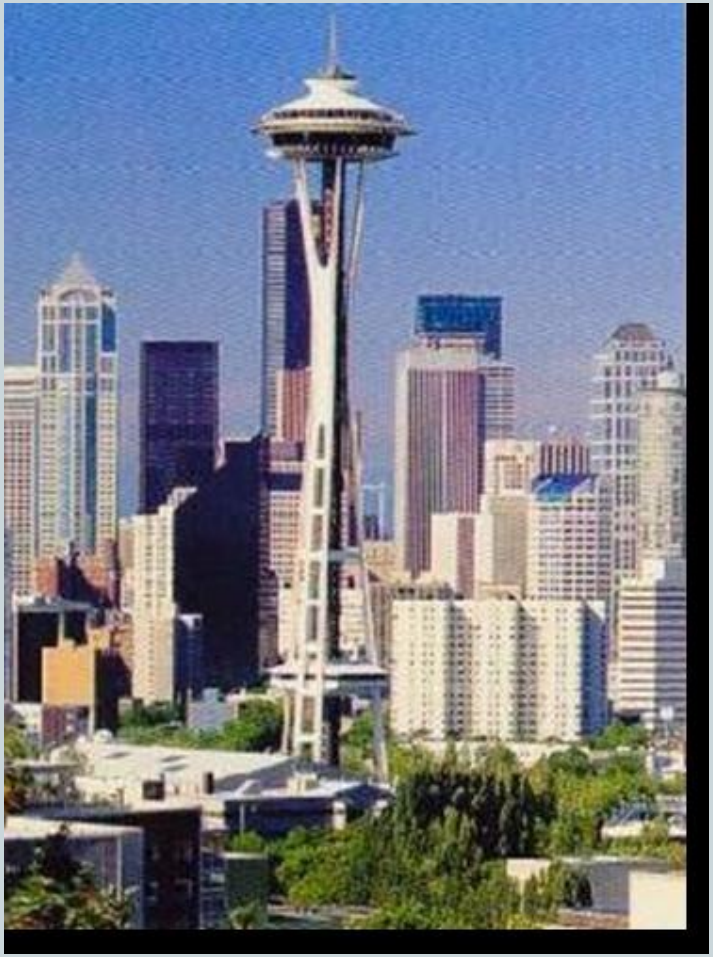
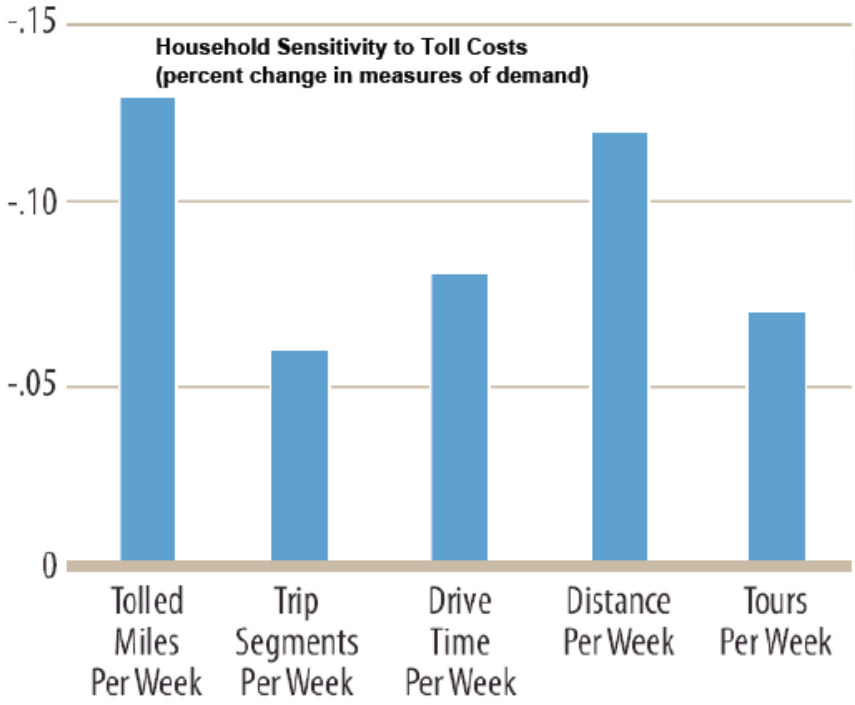


## Drivers Responded to Tolling by Altering Their Driving Behavior




*Motorists made small-scale adjustments in travel that, in aggregate, could have a major effect on transportation system performance.*

Elasticities measure percent change in driving behavior in response to 100% increase in trip costs

## Focus Group Results

- Overall, participants reported they changed travel behavior over the course of the study.
- Changes in behavior were largely driven by costs, but some found additional benefits:
  - Savings in time
  - More comfortable or interesting drive
  - Time to read on the bus
- The availability of real-time tolls on the traffic meter heightened participants' awareness of the cost of travel.
- Participants think that revenues should be dedicated to maintaining and improving transportation systems.
- Privacy of travel data is a concern, but not to the extent that it would derail the use of this technology.

# GPS based Tolling is the Future.....

## Viability

- Allows tolling on a wide area
- No roadside infrastructure needed
- Easy to use and maintain

## Flexibility

- Coverage
- Tariff

## Success

- Motorway (Freeway)
- Roadway (Arterials)
- Urban Environment

# Satellite-Based Systems Support a Variety of Advanced Telematics Services

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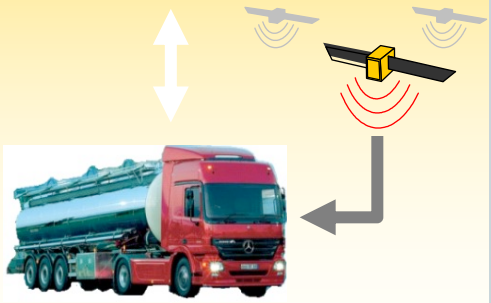
## Value Added Services for Freight Forwarder

- Pre-Trip:
  Toll collection and booking
- On-Trip:
  Information and Fleet Tracking
- Post Trip:
  Fleet Statistics

Additional revenue possible for operator

## Toll Centre

Dedicated GSM Link



## Value Added Services for Road Owner

- Road Status
- Road Usage
- Road Statistics
- Fuel Tax
- Travel Information
- Journey Time Data

## Vehicle Centric Services

- Navigation
- E- / B-Call*
- Traffic Information
- Fleet Application
- Floating Car Data

## End-User Centric Services

- Voice, Email, SMS, MMS, Internet / Wap Services
- Location Based Services
- Infotainment (News, etc)
- Entertainment (Games, etc)

## Brand Specific Services

- Remote Diagnostics
- Remote Maintenance
- Remote Vehicle Control
- Software Download
- Roadside Assistance

*__E-/B-Call__: Emergency/Breakdown Call