Satellite-based Tolling – Built for the Future

Ontario Transportation Futures Road Pricing Forum
Martin Rickmann
Head of Communications
Outline

1. Challenges
2. Toll system – key technology for the future
3. Results and achievements
   - Financing the infrastructure
   - Environment
   - Traffic management
4. Outlook
1. Challenges
Freight transport and logistics are critical factors for the international competitive strength of the export-oriented economy and essential components of its attractiveness as an investment location.

**Basis of economic value creation and material prosperity**

- Estimated market size of the logistics sector in Germany in 2006
  - € 170 billion in sales
  - 2.6 million employees, one of the fastest growing job markets
Challenges

Environment-friendly operation of freight transport and logistics

- Design environment-friendly freight transport and logistics for the generations of today and tomorrow

- Sustainable transport policy must ensure that
  - Economic growth and mobility are decoupled
  - Mobility is not at the expense of quality of life in the society
  - Options to reduce traffic are systematically used

Traffic policy therefore requires an integrated approach that links all modes of transport.
Challenges

**Further develop Germany as a European logistics hub**

- 12,600 km federal motorway/toll roads
- 41,000 km federal roads
- Road network is backbone of mobility

**Expert opinion by Progtrans (up to 2050)**

- Freight traffic on the road will increase from 45% today to 72%
- Most dynamic development: through traffic
- Passenger transport will increase
2. Satellite-based toll system – key technology for the future
2. Satellite-based toll system – key technology for the future

“More intelligent technology, organisation and financing of the transport infrastructure form the indispensable foundation on the path through the 21st century!”

The legislature requires a flexible toll system in Germany, which:

- Identifies an established route network and collects tolls exclusively there
- Takes emission class and number of axles into account
- Is a free flow system - enforcement gantries are not required
- Permits automatic and manual log-on
- Meets technical preconditions for interoperability with other toll systems
- Is quickly expandable
Toll system – key technology for the future

Highest data protection standards

- Storage of journey-related data
  - Toll amount, route, vehicle registration, etc.
- Use is governed by the Motorway Toll Act (Autobahnmautgesetz – ABMG)
- Data used exclusively for toll collection
- § 4 sect. 2 sentence 5 Motorway Toll Act: “Transfer, use or appropriation... According to other statutory provisions is prohibited”.
- Strict deletion deadlines at Toll Collect
- Ongoing arrangement with the Federal Commissioner for Data Protection
- Data security is certified
Public Private Partnership

Building and maintaining the motorway system

Development, building and operating the toll system

Pre-Financing the toll system

45%

10%

Deutsche Telkom

Daimler Financial Services

COFIROUTE

Financing

Remuneration

User

Financing Infrastructure

Bundesministerium für Wirtschaft und Technologie
Toll system – key technology for the future

The toll system – the innovative answer to political requirements

- The On-Board Unit is the central element of the automatic procedure
- Innovative combination of satellite navigation and mobile radio signals

- DSRC module
- Infrared/microwave
- Interoperability
- Communication with enforcement gantries
- Support for positioning

- Computing centre
- GSM/GPRS
- Data security
Toll system – key technology for the future

The toll system – the innovative answer to political requirements

- The On-Board Unit is the central element of the automatic procedure
- Innovative combination of satellite navigation and mobile radio signals

> 640,000 OBUs (Europe)

share of toll bookings: 90% ALO / 10% MLO

System is accepted by the market!
Toll system – key technology for the future

**Flexibility – Precondition for quick adaptation**

- A motorway network «lives», new sections are added or removed regularly
- Only an update of the cartography is needed and it is done «over the air» (through GSM), without any ground infrastructure

![Tolled motorways (km) and Tolled federal roads (km) chart](chart.png)
3. Results and achievements
Results and achievements

Financing of maintenance and expansion

Protecting the environment and health

Traffic management
Results and achievements

The system is stable and ensures continuous revenue

- Toll receipts since 1.1.2005: approx. € 12 billion
- Toll system can be used to finance public private partnership in road construction
  (e.g. A 8: AS Augsburg – AS Munich/Allach)
Results and achievements

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2005 € 2.866 billion

2005+2006 € 5.943 billion
Results and achievements

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Results and achievements

Financing of maintenance and expansion
Protecting the environment and health
Traffic management
Results and achievements

The toll system actively supports environmental protection

- Proportion of empty trucks on tolled motorways fell under 10%
- Number of containers carried by train rose by approx. 7%
- Share of cleaner vehicles rose substantially

![Kilometers travelled on toll motor ways by emission class](chart.png)
The federal government plans to use the toll system to help combat climate change

“The toll must be further developed to more effectively help prevent climate change.”

- Wider spread and more differentiation of toll rates based on emission categories
- Toll allowance for retrofitted particulate reduction systems
- Differentiation of toll rates to help regulate traffic congestion and combat climate change
- Stronger integration of trunk roads

*(Federal government resolution from 23/24.8.2007)*
Results and achievements

Financing of maintenance and expansion

Protecting the environment and health

Traffic management
Results and achievements

Traffic management via flexible rates...

...by location

Region A

Price A

Region B

Price B

...by time of day
4. Outlook
Outlook

Creation of uniform international standards is necessary

Interoperability – today...
Outlook

Interoperability – The vision...

...one OBU and one contract for each vehicle
Outlook

The toll system – Paving the way for telematic services (1)

- Traffic control
  - Traffic jam warnings via SMS text messaging

- Logistics services
  - Centralised scheduling based on vehicle movements
  - Route monitoring (e.g. arrival report)
  - Order management (e.g. shipment tracking)
  - Transport monitoring (e.g. hazardous materials)

- Theft and unauthorised use prevention
  - Tracking and remote-controlled shutdown of trucks
  - Remote display of actions (e.g. opening tailboard)
  - Emergency button
Outlook

The toll system – Paving the way for telematic services (2)

☐ Vehicle management
  ▸ Optimisation of vehicle data
  ▸ (e.g. usage, wear and tear)
  ▸ Remote diagnosis vehicle technology
  ▸ Wireless update of vehicle software

☐ Car-to-Car Communication (DSCR module)
  ▸ Hazard warning in the immediate area
  ▸ (e.g. weather, accident, railroad crossing)
  ▸ Low bridge warning
  ▸ Collision warnings when approaching interchanges
  ▸ Customs data transfer when approaching border crossings
Conclusion

The flexible satellite-based toll system is a tool for

- User financing of infrastructure
- Proactive environmental protection
- Intelligent traffic control

The toll system can also actively support the preservation of mobility and economic growth in Germany!