Toll system interoperability: focus on the European experience

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Egis, a global approach to infrastructure development

- **Engineering**
  - Project Management
  - Engineering Procurement
  - Construction Project Management
  - Works Supervision

- **Consulting & Design**
  - Assistance to Owner
  - Project Management Consulting, Programming
  - Architecture, Urban Planning & Landscaping
  - Expertise, Audits, Certifications

- **Project Development & Turnkey Solutions**
  - PPP project structuring & investment
  - Turnkey delivery of ITS/Tolling systems

- **Operation & Road Mobility Services**
  - Road operation & maintenance
  - Airport Operation
  - Electronic road charging solutions
  - Road mobility services
Toll system interoperability: different approaches

- Germany: A8 (first A-Model)
- Austria: A5 (first PPP road)
- Hungary: M6 motorway
- Turkey: Istanbul Eurasia tunnel
- Croatia: Zagreb-Macelj motorway
- Cyprus airports
- Greece: Athens Ring Road
- Portugal: A24 Interior Norte
- Ireland: IEA, Easytrip Services, Dublin Tunnel, Northlink, Midlink & Southlink, ITS Road Services
- UK: M25 London orbital
- Transpass
- France: A63, A28 & A88 toll roads
- Poland: A2 & A4 toll roads
- India: Delhi-Gurgaon, Lucknow-Sitapur
- Korea: Daejeon Riverside Expressway
- Philippines: Easytrip Services, North Luzon Expressway, Subic-Clark-Tarlac
- Australia: Melbourne City Link ORT road
- Australia: M2 Sydney
- Canada: Golden Ears Bridge ORT, Port Mann Bridge Free-Flow Tolling
- Greece: Athens Ring Road

Egis operating companies

Egis Projects local offices
The European context

• EC Directive 2004/52/EC on interoperable road toll systems across Europe including the EETS (European Electronic Toll Service)

• 2009: EETS decision: all member states to offer interoperability
  – For HGVs: by October 2012
  – For light vehicles: 2014

• 2013: Mostly intra-national interoperability
The “One approach”

• “One account – One bill – One OBU”

• Prerequisites
  – Technical interoperability (systems)
  – Functional interoperability (procedures)
  – Commercial interoperability (contracts between players)
Technical features

- **Varied technologies**
  - Varied protocols
  - Hybrid OBUs (satellite & mobile, DSCR & satellite)
- **Communications & interfaces**
  - DSRC OBU ↔ Roadside equipment
  - Satellite-based OBU ↔ Computing center

### Protocols adopted in ETC schemes in Europe

<table>
<thead>
<tr>
<th>Protocol</th>
<th>Light vehicles</th>
<th>Trucks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Satellite positioning</td>
<td>Not used</td>
<td>X</td>
</tr>
<tr>
<td>5,8 GHz microwave (DSRC tags)</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Mobile communications GSM/GPRS</td>
<td>Not used</td>
<td>X</td>
</tr>
<tr>
<td>Video tolling</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td>NFC / RFID</td>
<td>n/a</td>
<td>n/a</td>
</tr>
</tbody>
</table>
Procedures

• Considering varied operational contexts
  – ETC lanes / Non stop lanes / Multilane free-flow
  – Vehicle classification, Euro-class
  – Control and enforcement methods
  – Prepaid / postpaid commercial schemes

• Organization of data exchanges
  – Between toll operators
  – Between toll chargers and ETC tag issuers
Different approaches for data exchanges

Hub Network
(Centrally managed solutions)

Peer-to-Peer Network
Commercial agreements

• **Set of business rules to be established**
  – By a central regulating authority (eg. Ireland)
  – Or as agreement between toll players (eg. toll chargers in France & Greece)

• **Commercial agreements include**
  – Performance levels to be achieved
  – Level of fees (eg. percentage on gross revenue)
  – Liabilities in respect of toll amounts payments
Case studies

• Hub Network
  – Ireland: central clearing-house (Information Exchange Agent IEA)
  – Greece: distributed interoperability (GRITS)

• Peer-to-Peer Network
  – France (meshed concession companies network): TIS
Ireland (IEA)

- Centralized clearing-house system
- Provided by the National Road Authority to toll road operators
- Multiple parties agreement
  - National Road Authority, IEA, all Irish Compatible Operators, independent tag service providers
- Contractual obligations set in concession contracts
Ireland (IEA)

• Centralized clearing-house system
• IEA Service Agreement (outsourced System Supply and Operations through a single Service Contract)
  – Exchange & processing of interoperable data (ETC tag and charging information) as a unique agent
  – Revenue settlement statements between operators
  – Provision of a one-stop helpdesk to operators
Irish IEA - Functional aspects

From COs to IEA
- Black / Grey / White Lists
- Charging and Enforcement Information

Information Exchange Agent

From IEA to COs
- Consolidated Black / Grey / White Lists
- Consolidated and individual Charging and Enforcement Information
- Monthly Settlement Statements

Compatible Operator 1

Compatible Operator 2

Compatible Operator 3

Settlement Statements

€

€
Greece (GRITS)

- Private initiative (5 concession companies)
- Light vehicles
- Takes into account the prepaid Greek scheme
  - 99% of accounts are prepaid
  - Require real time information exchanges
- Based on a middle-tier
  - A generic data exchange tier, capable of interfacing modern applications with real time back office systems
Greece (GRITS)

- **Centrally managed interoperability & Clearing**
  - Manages interoperable data exchange between operators
  - Integration of agencies part of the scheme
  - Reports and statements for revenue settlement between agencies
  - Provision of helpdesk to agencies

- **The middle-tier**
  - Open Architecture with distributed database (every participant creates its own interface)
  - Data transfer in near real time
France (TIS)

- 7 000 km interoperable
- 18 players (toll chargers)
- Light vehicles & HGVs
- Interoperability standards (CIP)
  - designed & maintained by concessionaires
  - in an associative manner
France (TIS)

- **One-to-one approach**
  - Each Operator is responsible for system interfaces setup and data exchange with all other operators
  - Reports and statements for revenue settlement by each operator
  - Helpdesk to all other operators

- **All systems are interconnected**
  - $\frac{N!}{2(N-2)!}$ Physical links between operators
  - For 10 operators, 45 links to be set up
Conclusions

• Technologies should not act as a brake
• Centralized clearing house model has proven effectiveness
• Key success factors
  – Interoperability platform shall enable the timely exchange of information
  – Simple architectures → cost-efficient operations & seamless integration of new players
Thank you for your attention

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