**PROJECT**

**RCI**

**Road Charging Interoperability Pilot Project**

**Funding:** European (6th RTD Framework Programme)

**Duration:** Jun 2005 - Jul 2008

**Status:** Complete with results

**Total project cost:** €8,467,497

**EU contribution:** €4,239,766

**Call for proposal:** FP6-2003-TREN-2

**CORDIS RCN:** 86590

**Background & policy context:**

In Europe, different road charging systems are operated by professional companies that make use of State-of-the-Art technologies. Current road charging is successful but a public standard that is needed for interoperable road charging solutions that work seamlessly anywhere in Europe is missing.

European efforts towards such interoperability could improve several of the prerequisite conditions for a market development towards more functionality, lower risks and lower costs of road charging solutions:

- the stability and flexibility of a European standard on interoperability will allow operators and Member States to predict and control costs for maintenance and functional updates and reduce the involved risks for deployment of sophisticated new systems;
- the inclusion of standardised interfaces will allow re-usability of standard components for future road pricing schemes and potentially even for other applications;
- a widely accepted standard would increase the market size that can be addressed by specific solutions as such creating an incentive for costly investments in mass production, cost optimisations and lower prices per piece;
- the international car or truck driver will not longer be obliged to install and use several different boxes (onboard equipment, OBE) in his vehicle.

Interoperability of road charging solutions is a long-term objective of the EC. In April 2004, Directive 2004/52/EC of the European Parliament and Council on the interoperability of electronic road toll systems in the Community was adopted. The Directive places constraints on the technologies that may be used in future new road charging systems:

- satellite positioning;
- mobile communications using the GSM-GPRS standard;
- 5,8 GHz microwave technology.

The new road charging service that is interoperable throughout Europe on the basis of one or more of the mentioned technologies is called the European Electronic Tolling Service (EETS). In a summary this directive describes the following:

- operators and Member States are obliged to accept interoperable On Board Equipment (EOBE) that are compliant with the EETS;
- operators are obliged to provide this service and EOBE to end users;
- the end user can make use of this service and onboard equipment on a voluntary basis.

The EC envisaged a final definition of the EETS service by 2007 (one year delay with respect to the original Directive)

**Objectives:**

The objective of the RCI project was to develop an open, integrated framework enabling road charging interoperability at the technical (and related procedural) level based on the key existing and planned
road charging deployments in Europe (AUTOPASSEUROPPASS, LSVA, TELEPASS, TIS, TOLLCOLLECT, VIALT and VIA VERDE).

It implemented and tested this framework in field trials at five sites, namely Austria (EUROPPASS), France (TIS), Germany (TOLLCOLLECT), Italy (TELEPASS) and Switzerland (LSVA).

Methodology:

The RCI project first consolidated the EETS specifications with those of existing solutions and specified the framework for interoperability across six major European tolling sites:

- systems based on 5.8 GHz CEN norm;
- according to the CESARE/CARDME specifications;
- non-compliant but upgradeable to CESARE/CARDME specifications;
- non-compliant and non-upgradeable to the CESARE/CARDME specifications;
- Italian system 5.8 GHz DSRC Telepass;
- German system, based on three technologies (GPS/GNSS, GSM/GPRS, infrared communication used for vehicle positioning, mobile and stationary enforcement and communication between the OBE and RSE and including but not using 5.8 GHz CEN DSRC as fourth technology).

Secondly, the project implemented and tested two different types of prototypes, both interoperable across all test sites and based on specifications that:

- define interfaces that can 'open existing systems' by allowing different suppliers to manufacture equipment that can be certified against these specifications and that can operate in different contexts (CEN DSRC/CARDME, Autostrade DSRC, 'Multi technologies' as in Germany and in Switzerland);
- contribute to the convergence of future tolling systems and the evolution of existing tolling systems as such allowing for a greater re-usability of standard components across different systems;
- be open, public and available on a non-discriminatory basis to any stakeholder including all system suppliers.

A range of European suppliers were included in the project, following an open call for tender. RCIPP exploited the results of earlier European research activities in the domain (such as CARDME, CESARE and INITIATIVE) and used elements developed by concurrent initiatives working toward the same objective. It also reflected the evolution towards open platforms, allowing future road charging platforms to be used for a range of other services.

The success of the RCI standards - especially those that are crucial for interoperability - depends on the scale of acceptance and implementation by industry and operators. The project liaised with several standardisation groups, ensuring the connection with relevant standardisation activities. This liaison allowed the exchange of information about system requirements, technologies and in-vehicle architecture.

In order to ensure the widest possible consensus on the proposed solutions, the project created

Parent Programmes:
FP6-SUSTDEV-2 - Sustainable Surface Transport

Institute type: Public institution
Institute name: European Commission
Funding type: Public (EU)

Lead Organisation:

Association Of European Railway Industries

Address:
avenue Louise 221/11
1050 BRUSSELS
Belgium

Organisation Website: http://suzanne.lami@unife.org
EU Contribution: €0
### Partner Organisations:

**Hz Infrastruktura D.o.o.**
- **Address:** Ulica Antuna Mihanovica 10000 Zagreb Croatia
- **Organisation Website:** [http://www.hznet.hr](http://www.hznet.hr)
- **EU Contribution:** €0

**Associazione Italiana Società Concessionarie Autostrade E Trafori**
- **Address:** via Sardegna Nr 40 ROMA Italy
- **EU Contribution:** €0

**Association Des Societes Francaises D'authoroutes Et D'ouvrages A Peage**
- **Address:** 3, rue Edmond Valentin 75007 PARIS France
- **EU Contribution:** €0

**Association Des Societes Francaises D'authoroutes Et D'ouvrages A Peage**
- **Address:** 3, rue Edmond Valentin 75007 PARIS France
- **EU Contribution:** €0

**Autobahnen- Und Schnellstrassen- Finanzierungs-Aktiengesellschaft**
- **Address:** Rotenturmstr. 5-9 1011 WIEN Austria
- **EU Contribution:** €0

**Autostrade Per l'italia S.p.a.**
- **Address:** via Alberto Bergamini 50 00159 ROME Italy
- **Organisation Website:** [http://www.autostrade.it](http://www.autostrade.it)
- **EU Contribution:** €0
<table>
<thead>
<tr>
<th>Company Name</th>
<th>Address</th>
<th>EU Contribution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compagnie Financiere Et Industrielle Des Autoroutes</td>
<td>RUE TROYON 10, 92310 SEVRES, France</td>
<td>€0</td>
</tr>
<tr>
<td>Logicacmg Nederland Bv</td>
<td>Lange Voorhout 3, DEN HAAG, Netherlands</td>
<td>€0</td>
</tr>
<tr>
<td>Isis - Ingenerie Du Trafic Et Des Systemes D'exploitation</td>
<td>4 RUE DE CUIRASSIERS, LYON, France</td>
<td>€0</td>
</tr>
<tr>
<td>Rapp Trans Ag</td>
<td>Hochstrasse 100, BASEL, Switzerland</td>
<td>€0</td>
</tr>
<tr>
<td>Abertis Autopistas Espana Sa</td>
<td>AVENIDA PARC LOGISTIC 12-20, 08040 BARCELONA, Spain</td>
<td><a href="http://www.abertisautopistas.com">http://www.abertisautopistas.com</a></td>
</tr>
<tr>
<td>T-Systems Enterprise Services GmbH</td>
<td>MAINZER LANDSTRASSE 50, 60325 FRANKFURT AM MAIN, Germany</td>
<td>€0</td>
</tr>
<tr>
<td>Tuev Intertraffic Gmbh</td>
<td>Am Grauen Stein/Konstantin-Wille-Strasse 1</td>
<td></td>
</tr>
<tr>
<td>Organisation</td>
<td>Address</td>
<td>EU Contribution</td>
</tr>
<tr>
<td>---------------------------------------------------</td>
<td>----------------------------------------------</td>
<td>-----------------</td>
</tr>
<tr>
<td>51105 KOELN Germany</td>
<td></td>
<td>€0</td>
</tr>
<tr>
<td><strong>Organization Website:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><a href="http://www.tuv.intertraffic.de">http://www.tuv.intertraffic.de</a></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>EU Contribution:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Volvo Bus Corporation</td>
<td>Fästningsvägen 1 40508 Gothenburg Sweden</td>
<td>€0</td>
</tr>
<tr>
<td><strong>Organization Website:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>EU Contribution:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Swiss Customs Authority, Dep. Lsva</td>
<td>Gutenbergstrasse 50 BERN Switzerland</td>
<td>€0</td>
</tr>
<tr>
<td><strong>Organization Website:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>EU Contribution:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Asociacion De Socieddes Espnolas Concesionrias De Autopistas, Tuneles, Puentes Y Vias De Peaje</td>
<td>C/ ESTEBANEZ CALDERON, -3º MADRID Spain</td>
<td>€0</td>
</tr>
<tr>
<td><strong>Organization Website:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>EU Contribution:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sinelec</td>
<td>Strada Provinciale 211 km 11 3/13 TORTONA SAN GUGLIELMO Italy</td>
<td>€0</td>
</tr>
<tr>
<td><strong>Organization Website:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>EU Contribution:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ages International</td>
<td>Merowingerplatz 1 DUSSELDORF Germany</td>
<td>€0</td>
</tr>
<tr>
<td><strong>Organization Website:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>EU Contribution:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Elem</td>
<td>Via Aosta 20-22-24 TORINO Italy</td>
<td>€0</td>
</tr>
<tr>
<td><strong>Organization Website:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>EU Contribution:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Organisation Name</td>
<td>Address</td>
<td>Organisation Website</td>
</tr>
<tr>
<td>-----------------------------------</td>
<td>--------------------------------------------</td>
<td>-------------------------------------------</td>
</tr>
<tr>
<td>Fela Management Ag</td>
<td>Basadingerstrasse 18, DIESSENHOFEN, Switzerland</td>
<td></td>
</tr>
<tr>
<td>Kapsch Trafficcom Ag</td>
<td>Wagenseilgasse 11, A-1120 Wien, Austria</td>
<td><a href="http://www.kapsch.net">http://www.kapsch.net</a></td>
</tr>
<tr>
<td>Q-Free Asa</td>
<td>THONNING OWESENSG 35 C, 7044 TRONDHEIM, Norway</td>
<td></td>
</tr>
<tr>
<td>Sociedad Iberica De Construcciones Electricas Sa</td>
<td>Calle Sepulveda, 28108 Alcobendas (Madrid), Spain</td>
<td><a href="http://www.sice.com">http://www.sice.com</a></td>
</tr>
<tr>
<td>Technolution</td>
<td>Zuidelijk Halfrond 1, 2801 DD GOUDA, Netherlands</td>
<td><a href="http://www.technolution.nl">http://www.technolution.nl</a></td>
</tr>
<tr>
<td>Thales Transportation Systems S.a.</td>
<td>Chemin des Bordes, LES PLESSIS PATE, France</td>
<td></td>
</tr>
</tbody>
</table>
**Key Results:**

This project demonstrated that road charging interoperability is technically achievable on the basis of the RCI prototypes and the RCI open architecture that:

- provides the user with a solution that can be used seamlessly anywhere in Europe, thanks to a single box, a single contract and a minimum number of invoices;
- can help to realise economies of scale;
- can help to establish an open and competitive market to provide interoperability services.

In more detail, the main achievements of the project are:

1. The development of RCI High-level Architecture, which defines the technical detail of the interfaces (what information is being exchanged, between who and in which format) for interoperable road charging systems. This architecture represents a first European technical reference for DSRC (Dedicated Short Range and Communication Service)-enabled and GNSS (Global Navigation Satellite System)-enabled road charging solutions accepted by the principal stakeholders (suppliers, toll operators and Toll Service Providers).

2. The successful implementation and operational testing of two RCI interoperable OBEs (on-board equipment). Two trucks run about 5,000 km, each equipped with one of the two interoperable OBE that is able to autonomously (without the user's intervention) adapt its functional behaviour when crossing borders, according to the rules that apply for the German (Toll Collect), Swiss (LSVA), French (TIS-PL), Spanish (VIA-T), Italian (TELEPASS) and Austrian (ASFINAG) tolling schemes.

**Technical Implications**

The main recommendations of the project are:

- To continue and finalise the standardisation of the interfaces and the work on the contractual aspects, taking into consideration the open issues identified by the project.
- To define the technical EETS architecture and the interfaces, which are necessary for interoperability as elements in the EETS definition.
- The responsibility of the EETS Provider for the EET Front-End (including the OBE) must be stated very clearly in the EETS architecture.
- To initialise/coordinate activity envisaging the tools needed for performance monitoring that can help to establish trust, beyond CE marking.
- To prepare for the EETS (industrial development, pilots, improvements).
- To work with all stakeholders on a clear European roadmap of how progress will be made in the three years after the decision is finalised. This roadmap should make clear how the private sector can take its responsibility in the context of Member State action, European coordination and EC involvement.

**Policy implications**

Discussions regarding the Certification of Conformity and Interoperability of ETC systems have pointed out that fundamental certification issues need to be clarified. It has not yet been recognised that the EETS is primarily a service and not a piece of equipment. Therefore, it was necessary to focus on how the service can be certified. Therefore:

The RCI partners recommend that relevant stakeholders (Member States, EC, EETS Providers), establish, at European level, the appropriate conditions for taking action towards harmonised Key Performance Indicators, tools and measurement methods that are a prerequisite for offering the EETS service. More specifically, European coordination is needed to:

- develop criteria and procedures for conformity assessment of Toll Charger's Toll Context definition;
- develop criteria and procedures for assessing Toll Charger's Road Side Equipment;
• develop criteria and procedures for verifying conformity of the EETS Provider’s Toll Context implementation with the Toll Charger’s Toll Context definition;
• define a set of Key Performance Indicators (KPI) including measuring methods and monitoring procedures to be established and harmonised by the ETS Providers and Toll Chargers.
• elaborate inspection criteria and procedures for those services deemed as crucial for interoperability.
• review the applicability of Decision 768/2008/EC (referred to in the Draft Decision to EU Directive 2004/52/EC) with regard to services certification and propose possible adaptations.

Documents:
- Final Brochure (Final report)

**STRIA Roadmaps:** Other specified

**Transport mode:** Road transport

**Transport sectors:** Passenger transport, Freight transport

**Transport policies:** Societal/Economic issues

**Geo-spatial type:** Other