European Roundtable on Intelligent Roads (26 January 2006): Conference Report

by J. L. Francsics

CONTENTS

1 Introduction

TRL attended this conference on behalf of the Highways Agency, as part of the HA EU Watch project. The HA EU Watch Project is providing intelligence for the Highways Agency on ITS developments in Europe and is carried out by TRL on behalf of the HA. The project summarises key information for decision makers and practitioners on activities related to Intelligent Transport Systems (ITS) in Europe. The project covers specific areas of key interest to the HA. Initially these are:

- Galileo (including location-based services)
- Standards (including DATEX and location referencing)
- European ITS research projects
- European Commission activities

The European Round Table on Intelligent Roads took place on 26th January 2006 at the Residence Palace in Brussels. It is hoped that in a matter of years, the integrity, continuity, accuracy and availability provided by the Galileo satellite system will open the doors to new ways of reducing the negative impact of road transport while at the same time offering new services to a wide range of stakeholders. The conference was billed as a unique opportunity for stakeholders to understand why Galileo is set to "revolutionise transport and radically change people's daily lives" (European Commission Transport Policy 2001 White Paper) through:

- Keynote contributions from senior transport policy-makers
- An example of ongoing European research
- Examples of specific GNSS road sector applications

The event was hosted by **ADvantis** and **GIROADS**, projects supported by the Galileo Joint Undertaking with funds from the European Commission's 6th Framework Programme FP6). The conference was aimed at organisations and individuals who wish to make a contribution to long-term structural and policy choices that will shape the future of Europe's satellite programme.

This report provides a summary of the presentations of most relevance to the HA that took place at the conference, and highlights interesting areas for future monitoring of progress. The presentations were divided into five sections. The first section gives an overview of the Galileo Joint Undertaking (GJU) and how projects are being supported by it. The second section highlights of the Galileo related research projects VERT, SCORE and ARMAS. The next two sections introduce and explain the GIROADS and ADvantis projects. The last section examines the way forward for road user charging policies and systems in Europe and the future application of Galileo in this process.

2 Galileo, an enabler of European transport policy

This was the first session of the conference and started with several keynote speakers, talking about the future of Galileo.

2.1 Galileo Joint Undertaking – Hans Marchlewski

Hans Marchlewski, General Counsellor of the Galileo Joint Undertaking, presented an overview of the Galileo project, outlining its components and the services it will provide. The presentation went on to introduce the Galileo research activities in the road transport domain.

The Galileo project constellation will consist of 30 satellites in three Medium Earth Orbit (MEO) planes at an altitude of 23,616 km. One satellite per orbital plane is a spare. The inclination of orbital planes for the satellites is 56 degrees with one revolution taking 14 hours 4 minutes. Ground track will be repeated every 10 days.

This constellation of satellites will provide five services as shown in Table 1.

Table 1. Galileo – Five Services

Open Access	Free to air; Mass market; Simple Positioning
Commercial	Encrypted; High Accuracy; Guaranteed service
Safety of Life	Open Service + Integrity and Authentication of signal
Public Regulated	Encrypted, Integrity; Continuous availability
Search and Rescue	Near real-time; Precise; Return link feasibility

Galileo research activities in the road transport domain have been subject to three calls to date. The first call titled, “Introduction of Galileo services using EGNOS” had the objective of implementation of end-to-end services, to demonstrate the benefits of EGNOS and Galileo and their market potential for service providers. These were demonstrated in three projects: VeRT, ADvantis and SCORE (see Section 3).

The second call, titled “GNSS introduction in the road sector” has the following objective: to gather all the activities common to the road domain (technical issues, regulatory aspects, standardisation, receiver development, applications demonstration, etc.) in a unique framework addressing the user community needs encompassed in the project GIROADS (see Section 4.1).

The third call, titled “Tracking and tracing” and “Emergency management” was on-going at the time of the workshop.

Herr Marchlewski finished by summarising that Galileo, with successful international cooperation, would provide worldwide availability. It will provide a clear contribution to European Transport Policy and is the first major European Public Private Partnership Programme. It is also the first commercial service in Satellite Navigation that is orientated towards satisfying the needs of the private user, with benefits for current and future generations.

2.2 European Parliament Support - Etelka Barsi-Pataki, MEP

Etelka Barsi-Pataki MEP, (Member of the European Parliament) gave a speech on how the European Parliament aims to support for the Galileo projects. The main points from the speech are summarised below.

The European Parliament declared its full support for the GALILEO programme in September 2005 and at the forthcoming second reading, it will continue to push the programme forward as much as parliamentary powers allow.

GALILEO is a strategic project for the European Parliament. The Parliament's responsibility within the process is twofold:

- Firstly as a legislative body and as a budgetary authority, the Parliament has to safeguard the interest of European public money. The Parliament is confident of the excellence of the private consortium and trusting towards this new public private partnership structure.
- The Parliament's other responsibility, which gives it the basis for its legislative and budgetary responsibility, is directly related to the citizens of Europe. Of all the EU bodies, the Parliament is the one that is the closest to the citizens.

The basic structure for the deployment and operational phase has already been settled. For the commercial liability and success of the programme, timing is crucial. The new generation of GPS offers strong competition for the European plans.

Etelka Barsi-Pataki, as the Parliamentary Rapporteur for Galileo, is committed to pushing the programme with the necessary speed and expects the Commission, the Council, the Galileo Joint Undertaking, the Supervisory Authority and the Concessionaire to do likewise. To achieve this goal, all the national bodies have to work together in full cooperation.

In her message to stakeholders she stressed that the Parliament is the body with the mandate to listen to the voice of the citizen and that the message of the GIROADS partnership will be taken into account when the Parliament continues the legislative process and also at other forums where the Parliament has an influence.

The development of the next generation satellites will be financed by the FP7 programme and will provide many facilities for European SMEs (Small and Medium Enterprises). Using the Galileo system, Europe can create a significant number of jobs and strengthen its competitiveness. Considering that the deployment of the system will be a task for the private consortium, they will be interested in global markets and global competition.

It was also noted that there is some risk regarding the development of technical specifications for commercial applications, consumer acceptance of services, competition with GPS and the necessary standardisation of technical parameters.

3 GALILEO Research at the Service of Road Sector Needs

3.1 The VeRT Project – Giovanna Giuarino, Alcatel Alenia Space, Italy

Giovanna Giuarino gave a presentation explaining the VeRT (Vehiclular Remote Tolling) project. VeRT is an R&D project co-funded in the 6FP by GJU within the framework of the Activity C First Call: Introduction of GALILEO services using EGNOS.

VeRT, together with ADVANTIS and SCORE, is one of the three projects used as basis for the GIROADS System (which will re-use the outputs of these projects). Vega-group.com has created a free of charge simulation facility, which can simulate the data created by GNSS satellites. It can provide raw data, or a volume performance analysis service.

In the EU there are a number of different EFC (Electronic Fee Collection) systems operating in different Member States. EGNOS/GALILEO will provide the opportunity for creating a single European EFC system, eliminating the compatibility problems due to the differences among the national systems.

VeRT is aimed at exploiting the capabilities of EGNOS/GALILEO in the road tolling application. Moreover with an EFC System based on satellite positioning,it will be possible to introduce new payment schemes, taking into account actual journey distances, time parameters, etc.

VeRT is also investigating the possibility of extending the EGNOS/GALILEO technology to serve other applications including Limited Traffic Zone (LTZ) access, Pay-per-Use Insurance and support for Emergency Services, creating a multi-functional platform (at present not existing) with a single OBU (On Board Unit) and introducing the capability for drivers to have one contract and one invoice covering all of the services which they use.

Some ITS applications for road users require guaranteed navigation services, often requiring high accuracy positioning. These include: road charging, access to limited traffic zone, pay-per-use Insurance and parking.

The stringent navigation requirements are not currently met by the existing navigation systems (GPS, GLONASS). EGNOS and GALILEO will provide better accuracy of GPS and, most importantly, will make available the data integrity information that is the basis for certifying and guaranteeing the service.

Research has highlighted the necessity of providing users with a bundle of services (some of which don't make obvious use of the advantages offered by the introduction of EGNOS/Galileo) for penetrating the mass market. The services to be offered can be divided into the following categories:

- Liability/Safety Critical Services
- Road Charging
- Parking
- LTZ Access
- Pay per Use Insurance
- Emergency Services
- Fleet Management (Hazardous materials, HGV)

But not:

- General telematics services such as route guidance and location based services which are already served by GPS.

3.2 The SCORE Project - Simon Accarier, Alcatel Alenia Space, France

Simon Accarier's presentation covered the SCORE (Service of Coordinated Operational & emergency and Rescue using EGNOS) project, and provided an overview and some interim results. SCORE is the first operational 112 emergency assistance service using GNSS (Global Navigation Satellite System) technology.

Effectively SCORE offers a twofold service:

- Emergency Call Assistance (E112)
- Coordination of Emergency & Rescue operation for medical teams, police, fire brigades etc., taking advantage of Location Based Services.

SCORE has a 24 month schedule:

- Phase A: Definition of a final service [Feb2004 -Sept2004]
- Phase B: Service prototype development and field trials [Sept2004 -Feb2006]

There are a number of problems associated with implementing a universal 112 system such as:

- Common European legal standards are rendered necessary
- Position of the caller is crucial for an efficient intervention
- Cell-ID is not an efficient solution for time-critical emergencies in rural areas, if the caller cannot describe their position exactly
- Time limits for emergency services to reach the person(s) in distress are not appropriate
- Multilingual PSAP (Public Safety Answering Point) become more and more important
- Appropriate budgets to enhance technical infrastructure have to be taken into account. Otherwise processes and efficiency will not improve in the future.

Table 2 shows the SCORE applications and the benefits to the associated emergency services.

Table 2. SCORE applications

Application	Fire Brigade	Police	Ambulance
Tracking (indoor) of persons who enter a big building under difficult conditions	✓	✓	
Position based dispatching	✓	✓	✓
Intervention command	✓		
Flight Support	✓		
Boat on a river or big lake	✓		
Routing of vehicles	✓	✓	✓
Major incident management		✓	
Collective chasing of suspects		✓	
Tracking of pedestrians (outdoor)	✓	✓	
Tracking of devices			✓
Tracking of first responders			✓

Interim results of the SCORE project indicate the following:

- The Universal Service Directive 2002/22/EC, requires that public telephone network operators must make location information available to emergency authorities on the caller's position for all 112 calls, to the extent that this is technically feasible.
- The ability to overrule privacy (Protection of Privacy Directive) 2002/58/EC is required, making it possible to make emergency calls.
- Concerning the "E112" Recommendation 2003/558/EC to make a recall of the Directives and add recommendations on location push and pull, common interface/datagrams (ETSI, open interface) adaptable to future needs and encouraging high precision techniques such as GNSS, are required. Member States reported on the situation at the end of 2004 and the process is being slowed down by some countries that consider that emergency handling is not in the EC prerogatives and should be organised at a national level.

In summary, the SCORE project follows and contributes to the E112 standardisation process defining a generic architecture for E112 and rescue team coordination. The user requirements for positioning performances are very high, particularly indoors. This can be reached by using a hybridised solution with satellite techniques and EGNOS/GALILEO features. The SCORE service prototype demonstrates the added value of such solutions (with the ALCATEL EA-GPS, hybridised solution). The SCORE project has listed the development enablers of the SCORE final service. These include the political will to develop the service and to equip the PSAP (Public Safety Answering Point) and emergency centres accordingly. To achieve this, SCORE proposes a local approach which is interoperable within a bigger structure (national, European, etc.).

3.3 The ARMAS Project - Paulo Gomes, Skysoft, Portugal

Paolo Gomes introduced the ARMAS (Active Road Management Assisted by Satellite) project which is being performed under a European Space Agency (ESA) contract. Following the conclusion of the ARMAS Phase I project, ARMAS Phase II is developing on the earlier

project with the main objective being to demonstrate the feasibility of an overall solution for virtual tolling on highways and in urban areas.

The objectives of the ARMAS Phase I project were to assess the feasibility of an intelligent car navigation system, based on GNSS technologies, in order to improve the safety of car navigation by an order of magnitude, make dynamic traffic management an attractive and realistic proposition and provide a competitive solution for tolling. ARMAS Phase I carried out the early definition work and initial feasibility assessment, including institutional aspects.

The main goals for ARMAS Phase II are:

- Implement an ARMAS test-bed for advanced ITS applications;
- To investigate the critical issues related to a successful introduction of virtual tolling using the ARMAS test-bed, focusing on topics like reliability, integrity and fraud robustness.

The primary focus of this project phase will be to demonstrate the applicability of GNSS (especially EGNOS), Cellular Network and DSRC technologies to zone/road tolling (virtual tolling). The main functionalities to be demonstrated in this project phase are:

- EFC based on Satellite Positioning
    - Corridor Pricing/Passage Tolling;
    - Congestion Zones/Cordon Pricing;
    - Distance Based Pricing;
    - Combination;
- Warnings Provision – drivers receive information about hazards on the road ahead.
- SOS Request either manually by the driver or automatically by the vehicle sensors.

A demonstration has been carried out in the Lisbon area. The conclusions from the preliminary analysis of this demonstration show as expected, the “GPS+EGNOS+INS” (Internal Navigation System)positioning solution is good enough for the tolling situations tested. Accurate charging was produced, although an extensive trial with a large number of vehicles is necessary for statistical validity. The only environment where the results are not optimal is in dense urban areas where, as expected, the performance of the system becomes heavily dependant on the performance of the INS, Map-Matching Algorithms and if applicable, tolling scenario (e.g. the definition of the “Charging Zone” boundaries).

The other two applications, “SOS Request” and “Warnings Provision”, were easily implemented using the base tolling platform which proves that the approach followed is valid for providing more services and business oriented functionalities to end users.

Besides being the basis of the “integrity concept” of the system, EGNOS also improved the accuracy of positioning.

GPRS proved to be sufficient for uploading the charge-related data gathered in the OBU. However, for the dissemination of EGNOS based on SISNeT, the GPRS communication channel, showed some problems:

- High latency;
- Low bandwidth;
- Coverage problems.

It was concluded that in order to be able to have a reliable and complete EGNOS feed, the ideal solution would be transmission based on radio broadcast such as RDS or DAB, although UMTS should already bring a very noticeable improvement.

4 Tomorrow's solutions for today's transport needs: the GIROADS initiative

4.1 GIROADS, GNSS Introduction in the roads network sector – José Papí, ERF Secretary General

José Papi made a presentation on GIROADS (GNSS Introduction in the ROAD Sector) which is a 24-month project commissioned by the Galileo Joint Undertaking (GJU). This project will aggregate the road community's proposals to facilitate the technical and commercial introduction of Europe's satellite navigation programme to the road transport sector.

The underlying philosophy behind the GIROADS project is that a number of key applications have the potential to become enablers of transport policy as a whole, while giving rise to commercially viable service provision schemes of interest to a wide range of stakeholders. These applications will be individually analysed to understand user requirements, assess the existing regulatory framework and build a realistic market study that can serve as a reference to the sector.

GIROADS will base its technical programme on an architecture which associates existing components within an open, robust and scalable system which can support application-specific service centres through a common technical structure. The road and GNSS communities will be associated with the project results by means of the GIROADS Club, a discussion platform open to all stakeholders with an interest in GNSS applications in the road sector.

4.2 GNSS applications in the road sector - Elena de la Peña, Spanish Road Association

Elena de la Peña looked at the GNSS applications in the road sector. The initial objective was to find criteria for grouping applications with common characteristics before analysing each individual application.

Characteristics analysed were: the existing provision of services for each application and sub-applications, stakeholders, legal, commercial and safety implications, critical issues: technological, commercial, financial, institutional-political, socio-cultural, legal, GNSS technological requirements and communication requirements. The analysis led to the following grouping of applications:

- Safety-of-Life.
- Any safety implication.
- Liability-Critical.
- Any legal or commercial (pay per use) implication.
- Non-safety-of-life & non-liability-critical.
- Non safety, legal or commercial implication.

Elena de la Peña concluded that improving existing applications and establishing new applications is in many cases not possible with the existing technologies. Enablers are more stringent for the two application groups: safety of life and liability critical. Similarities in recommendations and action plans exist and the importance of considering users' demands (users packages) for market analysis was stressed.

4.3 The Regulatory Environment – Ian Catling, Ian Catling Consultancy

Ian Catling considered the regulatory environment surrounding the road sector projects connected with the Galileo. Analysis of regulations had been undertaken by TTS Italia. The GIROADS Deliverable 5220a has been submitted, entitled: Preliminary Analysis of Regulatory & Legal Framework in the Road Sector.

Applications subject to European regulation include:

- Emergency services (Recommendation 2003/558/EC)
- Road user charging (Directives 1992/62/EC and 2004/52/EC)
- Livestock transport management (Regulation 1/2005)
- Traffic information (Recommendation 2001/551/CE)

The EFC Interoperability Directive 2004/52/EC requires the following activities to progress:

- Establishment of European Electronic Toll Service (EETS)
- New EFC systems based on three technologies: DSRC, GSM/GPRS and GNSS
- EETS currently being defined –will support all three technologies
- Lead by DG TREN, with Regulatory Committee, Expert Group, Road Platform, Expert working groups, projects such as MISTER (Minimum Interoperability Specification for Tolling on European Roads) and RCI.

A preliminary anlysis of standards by Ian Catling Consultants found that GIROADS deliverable 5320a had recently submitted an 'Initial review of relevant standards'. Many standards and draft standards existed with most being produced by CEN TC 278/ISO TC 204. These ITS standards are essential for interoperability and increased market sizes.

5 ADvantis - The value of integrity for liability critical application

5.1 The ADvantis project, Joaquín Cosmen, GMV

Joaquin Cosmen made a presentation on the ADvantis project which is aimed at confirming how EGNOS and Galileo will improve different commercial applications, answering the question of how to guarantee the integrity of the mobile unit position. The project focused on the possibility of establishing an “integrity service provider” in order to demonstrate the feasibility of key GNSS-based liability critical applications. Liability critical applications are defined in the ADvantis context as those applications in which the use of GNSS has associated liabilities either in terms of economic, administrative or legal consequences, in such a way that “large non-reported errors” may affect their operational results or even the application’s feasibility.

The final objective of the ADvantis Project was to define a centralised system and mobile units, and the associated business model, that will supply service providers with GNSS-based position information having guaranteed integrity, from mobile units subscribing to the service. The ADvantis system is valid for multiple liability-critical services and mobile units with a single item of on-board equipment. The concept was implemented within a prototype system and applied to road user charging. The trials carried out by the project have confirmed that this technology fully satisfies the road charging requirements, while providing maximum flexibility and cost efficiency.

5.2 ADvantis Road Charging Applications, Audrey Mark, GMV

Audrey Mark concentrated her presentation on the liability critical aspects of applications. She highlighted that liability critical applications are affected by events which, although improbable, might have a major effect on the application should they occur. Examples of this include legal proof (e.g. speed limit enforcement) and charging (e.g. road user charging) where applications must ensure that the probability of these events is well below a certain value.

The objectives for the trials carried out by GMV for ADvantis were to analyse integrity performance of receivers in different environments and also to evaluate charging performances in different environments. These were road and urban charging applications that were both static and dynamic.

Conclusions from the trials found that position integrity is central to road charging and that position integrity is more than just signal integrity. ADvantis managed to achieve position integrity in all trial scenarios with a prototype system. There is a need to extend and amplify the trials to confirm the findings.

ADvantis is fully capable of performing true GNSS-only road user charging in both urban congestion charging and road tolling. Performances of the system meet charging requirements with no incorrect charging during trials and 100% availability for reasonably sized charging zones. Full flexibility and scalability exist and EGNOS supports this technology right now.

6 Road User Charging: new Policies and new Systems

6.1 The policy framework, Philippe Hamet, European Commission, DG TREN

Philippe Hamet gave a much repeated but constantly updated presentation on the European Commission EFC directive.

Directive 2004/52/CE has been in force since the end of May 2004 and will have technical definitions completed by September 2006. Contractual definitions associated with the Directive are expected to be finalised in the first half of 2007.

The objective is for a regulatory frame for the deployment of a unique European EFC service in two stages. The first stage is for HGVs and long distance coaches by mid 2009 and a second stage for all vehicles by mid 2011. The Directive will not interfere with the pricing policies of the Member States, but the systems implemented should be capable of handling any charging policy decided at a national level.

The principles of the service are for one single contract with one single on-board unit per vehicle. Later on the aim is for one single invoice available on the whole tolled network used, covering whatever toll or fee or tax is charged. There should be the same quality of service in any country, not depending on the country where the contract is signed, or the nationality of the vehicle or the driver.

The two basic technologies exist, but the European Commission strongly recommends GNSS / GPRS as a future objective for all systems. Microwave 5.8 GHz (DSRC) can and should be used where appropriate plus a link to the digital tachograph and other technologies allowed as far as they do not discriminate against non-equipped users.

The European Commission favours satellite based tolling systems as the only solution to cope with the political requirements of the European Commission and of the Member States for new charging schemes. They also cope with wider applications than motorway tolling, area tolling, area pricing or national charge scheme pricing. When microwave technologies become obsolete, a common technology needs to be selected to ensure interoperability with the advantages of:

- no need for large infrastructures (toll plazas)
- no need for expensive roadside equipment
- fits to all kind of zone: urban, motorway, countryside

6.2 Truck tolling in Germany one year on, Wolfgang Beier, Toll Collect

Wolfgang Beier presented an update on the German Toll Collect scheme a year after its introduction and considered the equipment, transactions and enforcement required.

The Toll Collect scheme started with 335,000 OBUs on 1 January 2005. After 100 days there were 424,000 units installed and in operation. As of January 2006 just below 500,000 OBUs were operating. This compares with about 650,000 registered trucks operated in Germany by 100,000 customers, with 33% from outside Germany.

The ranking of the proportion of nationalities operating trucks in Germany is:

1) Germany
2) The Netherlands
3) Poland
4) Austria
5) Czech Republic

In the first year of operation about 250 million transactions were registered in the automatic mode (one transaction is one uninterrupted trip on a highway with no change of tariff-related parameters). About 25 million transactions were accomplished in the manual mode, with about 20 million at terminals and about 5 million using the internet. Therefore it follows that 90% of all transactions are performed in the automatic mode by 65% of the registered trucks. €2.85 billion have been collected in the first year. A minimal number of transactions are claimed to be wrong by operators (< 0.1%).

In Germany there are 300 fixed enforcement gantries in operation with 150 being located in front of parking areas. Enforcement gantries may be activated or deactivated as required (currently about 10% are activated). There are about 276 mobile enforcement vehicles passing trucks while moving or waiting for violators at parking areas. Toll Collect started with about 10% violators. After short time this figure was down to about 3%, and it is now below 2%.

6.3 Road user charging: vision & challenges, Pawel Stelmaszczyk, Director of Policy, European Union Road Federation

Pawel Stelmaszczyk gave a presentation which considered the future policy direction of the ERF on funding road provision in Member States.

The vision of the ERF is a new approach to road financing. Constructive road financing proposals must respect some basic rules:

- They are efficient
- They are relevant to transport policy objectives
- They do not lead to a fall in public revenues
- They ensure fairness
- They ensure an optimal use of resources
- They are durable over time
- They do not distort competition
- They are compatible with European policy
- They accommodate the legacy of the past

Today the situation is: "free" infrastructure (paid for by the taxpayers) vs. tolled infrastructure (paid for by the users). Tomorrow there should be "free" services and "tolled" services. The road infrastructure itself becomes a neutral element which takes on a different value according to its use. Roads provide two different services; a “private" service and a ”public" service, covering road uses directly related to elementary needs, territorial considerations, and certain basic individual mobility rights.

This situation would lead to most of the local and regional road network being funded from the public purse while the national network and motorways, considered as private usage, would be paid for on a pay-per-use basis beyond an annual mileage allowance as proposed in Table 3.

Table 3 Funding source according to road type

Road Type	Source of Funding
Local/Urban	Annual circulation tax
Regional	Partly fuel duties/Partly road user charges
Interurban/Motorways	Road user charges

Two accompanying measures: individual mobility vouchers and reduction in level of fuel duties, are forecast to compliment the proposals.

In summary the proposal demonstrates that:

- It is possible to stabilise and redistribute road investment in a fairer manner,
- It is possible to reduce fuel duties and still increase the level of investment in roads and the quality of service offered to motorists,
- The loss in income on tolled roads through the annual voucher is more than compensated by the new income on non-tolled roads,
- The scheme will encourage private investment in road infrastructure by decreasing uncertainty concerning traffic levels,
- The system is compatible with different political options and makes the best use of the GALILEO satellite programme.
- The proposal is one of several pricing alternatives, but should provide food for thought to the European Commission if it chooses a fresh start to the question of road funding.

Glossary

ARMAS	Active Road Management Assisted by Satellite
CEN TC 278	Comite Europeen de Normalisation Technical Committee 278
DAB	Digital Audio Broadcast
DSRC	Dedicated Short Range Communications
EETS	European Electronic Tolling Service
EFC	Electronic Fee Collection
EGNOS	European Geostationary Navigation Overlay Service
ESA	European Space Agency
EU	European Union
FP6	6th Framework R & D Programme funded by the European Commission
FP7	7th Framework R & D Programme funded by the European Commission
GIROADS	GNSS Introduction in the ROADs Sector project
GJU	Galileo Joint Undertaking
GLONASS	Global Navigation Satellite System
GPRS	Global Packet Radio Service
GPS	Global Positioning System used in ITS services such as traffic information, emergency call and fleet management
GNSS	Global Navigation Satellite System
INS	Internal Navigation System
ISO TC 204	International Standards Organisation Technical Committee 204
LTZ	Limited Traffic Zone
MEO	Medium Earth Orbit
MEP	Member of European Parliament
MISTER	Project to develop standardisation of applications using GNSS and GPRS technologies
OBU	On Board Unit
PSAP	Public Safety Answering Point
RCI	Road Charging Interoperability project
RDS	Radio Data Service
SCORE	Service of Co-ordinated Operational & emergency and Rescuing using EGNOS project
SISNeT	GPRS communications channel
SME	Small or Medium sized Enterprise
UMTS	Universal Mobile Telephone Service
VeRT	Vehicular Remote Tolling project