# SLOVENSKI STANDARD
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**Elektronsko pobiranje pristojbin - Storitve z dodano vrednostjo, izvajane z opremo EFC na vozilu**

Electronic Fee Collection - Value added services based on EFC on-board equipment

Elektronische Gebührenerfassung - Zusätzliche Funktionen basierend auf den fahrzeugbasierenden Gebührenerfassungssystemen



Perception du télépéage - Services à valeur ajoutée sur la base de l'équipement embarqué du télépéage



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# Electronic Fee Collection - Value added services based on EFC on-board equipment

Perception du télépéage - Services à valeur ajoutée basé sur l'équipement embarqué de télépéage

Elektronische Gebührenerfassung - Zusätzliche Funktionen basierend auf den fahrzeugbasierenden Gebührenerfassungssystemen

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## Foreword

This document (CEN/TR 16219:2011) has been prepared by Technical Committee CEN/TC 278 “Road Transport and Traffic Telematics”, the secretariat of which is held by NEN.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN [and/or CENELEC] shall not be held responsible for identifying any or all such patent rights.

A CEN Technical Report is a document adopted by CEN/CENELEC containing informative material not suitable for publication as a European Standard or a Technical Specification.

This document has been prepared by CEN/TC 278 WG1 Project Team 31 on Value Added Services. The work done by the project team has been governed by the Technical Committee CEN/TC 278 “Road Transport and traffic telematics”, the secretariat of which is held by NEN and by CEN/TC 278 Working Group 1: Electronic Fee Collection.

# Introduction

This Technical Report (TR) analyses the technical feasibility of using EFC OBE for delivering additional services, commonly called value added services (VAS). These VAS may either be delivered on board to the driver of the vehicle, or off board to the road operator, to a freight company or to the general public. The report only analyses the situation where EFC is considered to be the core application, with VAS applications as add-ons, not the reverse situation, namely whether an EFC application can be added to telematics platforms with other core applications, such as EFC that might be delivered as an add-on to a navigation device.

Currently, the interaction between services based on EFC OBE without any additional equipment and comfort service platforms is not clearly visible. Therefore, the scope of this TR includes investigation of the suitability of the available sensor information, data elements, communication media and HMI features for supporting the envisaged mass services such as; fleet management, hazardous goods / livestock management and eCall. This relates to the expectations mentioned in the interoperability directive, Directive 2004/52/EC. It is expected that with the advent of the European Electronic Tolling Service EETS as mandated by Directive 2004/52/EC, VAS will benefit from widespread deployment of capable multi-technology telematics platforms. Commercial transport might achieve efficiency improvements and competitive advantages through a wider take-up of fleet management and related applications that might be offered as VAS to EFC equipment.

The TR identifies potential applications and groups them into application classes for the purpose of a more compact analysis. The application classes are



- Fleet management;
- Entertainment;
- Payment;
- Cooperative road safety;
- Driver assistance;
- Communications;
- Navigation & traffic information;
- Traffic data collection;
- Vehicle usage recording;
- Regulatory applications.



The methodology in this TR is firstly to compile the specific requirements of the applications in each class, then to establish the requirements of EFC applications, and finally to analyse potential synergies and prerequisites for joint delivery. The analysis strives to encompass two viewpoints, namely the business and the technical perspectives.

The TR also analyses how these services can be implemented without jeopardising the security requirements of the EFC Service Provider responsible for the OBE and the charging process. The possibilities and constraints, including privacy requirements as defined in Directive 2006/24/EC and Commission Decision 2008/597/EC, related to the integration of the OBE into a wider open platform for delivery of other public or private added value services form part of the investigation, as well as the required standards and anticipated road map.

The analysis results in a set of recommendations as to how the preconditions for a joint delivery of VAS with EFC might be improved. The analysis in the report shows that certain preconditions required for VAS are not available in current EFC standards and might need to be taken into account for future work.

# 1 Scope

## 1.1 Definition of VAS

Value Added Services, VAS, is a term that was coined in the telecommunications industry for services that go beyond core service, such as mobile voice communications. Such additional services are intended to add value for the consumers in order to encourage them to use the telecommunications service more often and to add an additional revenue stream for the Service Provider.

In the context of EFC, a VAS in this strict sense is a telematics service offered to the Service User by means of an EFC OBE. This service might directly be consumed by the driver in the vehicle, or might, particularly in the case of heavy vehicles, be targeted at the freight operator and be consumed in a back office. Such services can be fleet management services like track-and-trace, payment services such as paying petrol automatically at the pump, or regulatory applications such as Electronic Licence Plate or access control. Such additional services and applications create additional value to the user, either by the value the new service creates to him, or in the case of regulatory services, by combining several functionalities in a single device, thus removing the need to install and maintain several pieces of equipment simultaneously.

In a wider sense, the operator of the EFC service can draw additional benefit from the data collected by the EFC system. Data from EFC OBE gives a good account of the traffic situation on the charged network, and may be utilised for statistical purposes, for traffic planning or even in real-time for traffic information purposes.

The scope of this TR covers both the original meaning of VAS, namely both additional services to the user of the core EFC service and additional value created for the operator of the charging system.



## 1.2 Coverage

The TR analyses all telematics applications that have the potential to be delivered as a VAS to EFC. The analysis covers the requirements of the VAS applications and the fit to the resources offered by the EFC system. It also analyses prerequisites in terms of business and technical system architecture in order to enable VAS to be delivered, including questions of control and governance, security aspects and privacy issues.



The TR does not analyse commercial viability. Cost to benefit ratio and market potential for VAS are considered to be out of scope.

The TR analyses the potential and pre-conditions for EFC equipment to serve as platforms for a diverse range of VAS. The VAS are considered to be add-ons to EFC equipment. The TR does not analyse the reverse situation, namely the situation where an EFC application is added to a telematics platform that has been deployed for another core service, such as the suitability of navigation systems to serve as platforms for EFC.

# 2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 15509, *Road transport and traffic telematics — Electronic fee collection — Interoperability application profile for DSRC*

CEN ISO/TS 12813, *Electronic fee collection — Compliance check communication for autonomous systems (ISO/TS 12813:2009)*

CEN ISO/TS 13141, *Electronic fee collection — Localisation augmentation communication for autonomous systems (ISO/TS 13141:2010)*

EN ISO 14906, *Road transport and traffic telematics — Electronic fee collection — Application interface definition for dedicated short-range communication (ISO 14906:2004)*

ISO 17573:2010, *Electronic fee collection — Systems architecture for vehicle related-tolling*

CEN ISO/TS 17575-1, *Electronic fee collection — Application interface definition for autonomous systems — Part 1: Charging (ISO/TS 17575-1:2010)*

CEN ISO/TS 17575-3, *Electronic fee collection — Application interface definition for autonomous systems — Part 3: Context data (ISO/DTS 17575-3:2010)*

ISO 14813-1, *Intelligent transport systems — Reference model architecture(s) for the ITS sector — Part 1: ITS service domains, service groups and services*

## 3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 17573:2010 and the following terms and conditions all apply.

**3.1**
**business architecture**
the structure of the relationship between the actors involved in the VAS and EFC services, including the roles of the actors, their contractual relationship, the allocation of responsibilities, and system control and governance



**3.2**
**EFC platform for VAS**
an EFC platform for telematics service delivery comprises a set of one or more in-vehicle components, commonly termed OBE, potentially roadside and central equipment, but also a set of business rules and a legal framework. Business rules include an institutional setup, with defined responsibilities, ownership, governance, certification, and contractual relationships



**3.3**
**technical architecture**
the concept of the technical delivery platform in terms of technical components, their interfaces and interactions

**3.4**
**Value Added Service**
an additional value that is created in an EFC system to Service Users or the system operator beyond the core service, payment for road use

**3.5**
**On-road Service Integrator**
the On-road Service Integrator provides to the Service User both tolling services and VAS offers and as such incorporates the role and responsibilities of the EFC Service Provider as defined in ISO 17573 plus the additional responsibilities as provider of VAS

**3.6**
**vehicle-related data**
any kind of data related to the vehicle's characteristics (including any trailer), its movements, the vehicle driver or the vehicle's cargo

## 4 Abbreviations

For the purposes of this document, the following abbreviations apply throughout the document unless otherwise specified.

| | |
|---|---|
| AEI | Automatic Equipment Identification |
| AVI | Automatic Vehicle Identification |
| CALM | Communications Access for Land Mobiles (a set of ISO communications standards) |
| CESARE | Common Electronic Fee Collection System for a Road Tolling European Service (acronym of a European research project) |
| CN | Cellular Network communications |
| COOPERS | COperative SystEms for Intelligent Road Safety (acronym of a European research project) |
| CVIS | Cooperative Vehicle Infrastructure Systems (acronym of a European research project) |
| DSRC | Dedicated Short Range Communications |
| EC | European Commission |
| EFC | Electronic Fee Collection |
| EETS | European Electronic Toll Service |
| ETSI | European Telecommunications Standards Institute |
| EURIDICE | EURopean Inter-Disciplinary research on Intelligent Cargo for Efficient, safe and environment-friendly logistics (acronym of a European research project) |
| FCD | Floating Card Data |
| GALILEO | Name of the European satellite localisation system |
| GNSS | Global Navigation Satellite Systems (a generic term used for satellite localisation system such as GPS and GALILEO) |
| GPS | Global Position System (acronym for the satellite localisation system operated by the United States of America) |
| GST | Global System for Telematics (acronym of a European research project) |
| GSC | GNSS enabled Services Convergence (acronym of a European research project) |
| HMI | Human to Machine Interface |
| IAP | Intelligent Access Programme |
| ICT | Information and Communication Technologies |
| ISO | International Standards Organisation |
| ITS | Intelligent Transport Systems |

| | |
|---|---|
| NCR | Non-Compliance Report |
| OBE | On-Board Equipment |
| ORSI | On-road Service Integrator |
| PDA | Personal Digital Assistant |
| PSAP | Public Safety Answering Point |
| RCI | Road Charging Interoperability (acronym of a European research project) |
| SMS | Short Message Service |
| SP | Service Provider |
| TC | Toll Charger |
| TCA | Transport Certification Australia |
| UOBU | Universal On-Board Unit (acronym of a European research project) |
| VAS | Value Added Service |
| V2I | Vehicle to Infrastructure (communication) |
| V2V | Vehicle to Vehicle (communication) |
| WG | Working Group (of a CEN or ISO Technical Committee) |
| WI | Work Item |



# 5 Background and Context

## 5.1 Starting Point and Aims

### 5.1.1 Motivation for VAS

Tolling systems are becoming increasingly automated and EFC is becoming a pervasive service. EFC is the ITS application with the widest deployment. Since payment for road use is mandatory and imposed upon the user, EFC is not perceived by the user as a service.

EFC equipment is also becoming more capable. Since modern approaches to road financing and demand management require more accurate assessment of individual road use, involving more differentiation according to vehicle characteristics, road type and time of day, EFC systems have developed from single purpose object tolling into sophisticated charging systems employing a wide range of technologies, including on-board processing, satellite-based localisation, mobile communications, DSRC, digital maps and cryptographic security services. This technical report focuses mainly on interoperable EFC OBE, which support both DSRC and autonomous tolling, and could therefore, in principle, deliver a wide range of ITS applications. However, more dedicated CEN DSRC OBEs may also provide platforms for delivering selected VAS applications.

These core facts, namely wide deployment, unfavourable user perception and availability of capable ITS platforms, have motivated the services industry to investigate the potential for delivering additional value through EFC equipment.
Motivation for developing a VAS offer can stem from several areas:

— For toll chargers, based on the desire to increase take up of EFC equipment: Toll chargers have an interest in automating processes and increasing the number of equipped users. The availability of VAS might be an additional motivation for users to equip themselves.

— For toll chargers to create value out of the available user movement data: EFC systems collect information about vehicle movements that can be made anonymous and then become a valuable resource beyond the mere tolling purposes. Movement data is especially valuable for planning purposes, for traffic management and even for providing real time traffic information.

— For Service Providers to create an additional revenue stream: Especially in the discussions around the development of the EETS legal background (Directive 2004/52/EC and Commission Decision 2009/750/EC) it has been found that the business case for Service Providers to deliver interoperable EFC services is marginal at best and additional revenue streams will probably be necessary to justify the required investments.

— For the Service Users from the request to have all services delivered through a single channel: Especially for heavy vehicles, the numbers of different EFC OBE, equipment for regulated applications such as Tachograph, eCall and hazardous goods tracking, plus commercial ITS devices for fleet management and navigation are becoming a nuisance. All devices and applications require attention and maintenance, require different hardware, installation, contracts and operation. Owing to the pervasiveness and capability of EFC OBE, these might become the ideal platform for delivering many telematics services through a single channel.

— For policy makers to develop the telematics market in general: For several years it has been the policy of the European Commission and of the Member States to modernise road transport and manage traffic efficiently through the widespread deployment of telematics or ITS technologies. This has recently been underlined in the ITS Action Plan of the Commission which promotes deployment of a universal ITS platform in the vehicle (see ITS Action Plan in the Bibliography). EFC OBE may provide an ideal platform for delivering multiple telematics services through a single channel, based on their increasing capability and growing prevalence across Europe.



### 5.1.2 Experiences with VAS

For a long time toll chargers have been making use of the rich data provided by EFC systems. For examples see the descriptions provided in Annex A involving national VAS implementation. In EFC systems, road usage data is essentially free for additional use and requires only minimal investment in processing and analysis to create large incremental value. Early uses of this data have been for statistical purposes, e.g. for predicting the revenue flow and for planning investments into road infrastructure renewal. More sophisticated systems can produce very detailed data, including origin-destination information, which is very difficult and costly to produce by other means. EFC OBE equipped vehicles can be considered probe vehicles for the traffic stream. This fact is put to use in Floating Car Data (FCD) applications that use information provided by probe vehicles to produce a picture of the traffic situation. Ideally, this information can be processed and distributed in real time to give road users information on bottlenecks, congestion and expected travel time.

While this field of additional exploitation of EFC equipment has been thriving, VAS in their original sense, namely additional services delivered to the Service User, have seen only limited uptake and deployment. Annex A again gives some examples. Several reasons have been identified as to why the market for VAS to the Service User has not developed as anticipated by many:

— Only comparatively recently have truly capable EFC platforms been deployed.

— EFC is a sensitive application in the sense that toll chargers are not prepared to take any risk in losing revenue due to complications arising from VAS competing for on-board resources.

— EFC systems are often controlled by an operator in a monopoly situation. Delivery of VAS in such an environment will normally put the operator at an advantage that is not allowed by European anti-competition legislation.

— Providers of telematics services have chosen to develop their own dedicated equipment in order to free themselves from the constraints imposed by the toll chargers and in order to be able to serve all types of customers, including those without EFC equipment.

— The market for ITS applications for commercial vehicles is extremely fragmented. No single application has been found that would create significant benefits for a large segment of the market. Especially in the freight sector, the needs of different vehicle operators differ widely, depending on the nature of the transport task speciality they offer.

### 5.1.3 Objectives

The TR strives to establish the preconditions for delivering VAS on EFC platforms, firstly by identifying which requirements of different VAS are also met by EFC OBE, and which adaptations might be required to make certain VAS possible. The reverse is then also considered, namely the influence of VAS on the core EFC service, mainly with regard to minimisation of the risk of compromising the revenue collection process in any way, and in particular, with respect to security and privacy.

An EFC platform for telematics service delivery comprises a set of one or more in-vehicle components, commonly termed OBE, potential roadside and central equipment, as well as a set of business rules and a legal framework. Business rules include an institutional setup with defined responsibilities, ownership, governance, certification, and contractual relationships.

The objective is to analyse the required preconditions for joint delivery of EFC and VAS on a common platform both from a technical perspective and from the perspective of governance and control over the applications. The analysis of the preconditions leads to a set of recommendations for measures that might improve the environment within which VAS may be exploited via EFC systems.



As detailed below in the discussion of the EFC context, the objective of improving the preconditions for VAS on EFC OBE has to be seen against the background of the development of EETS, which creates new opportunities and challenges both technically and commercially for widespread deployment of VAS.



## 5.2 EFC Context

### 5.2.1 Role model for interoperability

For several decades, toll collection was a bilateral relationship between a toll charger and the user. This remained essentially the same with the advent of EFC. Only with efforts to establish interoperability among toll systems did it become obvious that a new relationship model needs to be found. As a result of the series of CESARE projects in particular, a new paradigm of business model was developed that shall form the basis of interoperability in a European context.

This model foresees a new explicit role, Service Provision, and an associated actor, the Service Provider which is the main contact for the user, as shown in Figure 1. A Service User has a contract with a Service Provider and receives all necessary equipment, payment means and information enabling the user to freely roam through the toll domains of all Toll Chargers participating in the interoperability arrangement. Service Users are free to make contact with the Service Provider of their choice. The traditional bilateral relationship between user and charger has been replaced by a multilateral, open, and market based arrangement.

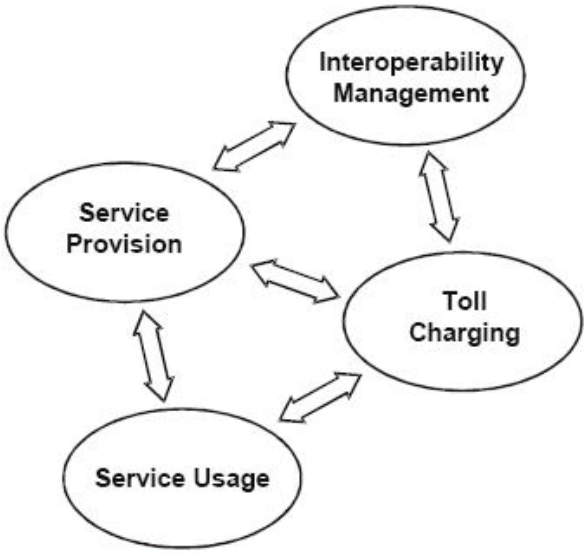


**Figure 1 — Role model developed in CESARE, prescribed in Decision 2009/750/EC and standardised in ISO 17573**



This business model is underlying the European Electronic Toll Service EETS as mandated by Directive 2004/52/EC and detailed in Decision 2009/750/EC (see EETS Directive and EETS Decision in the Bibliography). The Directive also prescribes a minimum set of technologies that needs to be supported, namely DSRC, GNSS and CN.



The EETS shall be introduced by October 2012 for heavy vehicles and by October 2014 for light vehicles. Its deployment is mandatory for all Member States of the European Community that have EFC systems of sufficient size to fall under the EETS Directive. It is expected that the development and deployment of the EETS will lead to increased availability of telematics platforms with VAS delivery potential. OBE capable of EETS will offer unrivalled capabilities and the potential for a wide range of applications, given that some barriers to deployment are removed. Such barriers might especially stem from issues of governance, control and security.

The EETS requires very capable technical platforms in the vehicle since all European electronic tolling systems need to be served. The suitability of such OBE platforms is established in a certification process that consists of two separate steps:

— In a first step, equipment suppliers will have to prove conformity to standards in a CE marking process.

— In a second step, Service Providers have to prove suitability of their OBE and their back end processes for toll collection in all systems. In principle, such a suitability process has to be performed for every individual toll system separately.

It is unclear how the provision of VAS is influenced by this certification process. It is a prerequisite of VAS delivery that OBE does not lose EETS certification as soon as certain VAS are enabled.

Another peculiarity of the EETS business model that will influence VAS deployment is the fact that the Service Providers have an unconditional payment obligation against the Toll Chargers for all tolls incurred by their Service Users. Hence the core of the EETS is a far reaching payment service arrangement that might well lead to VAS in other payment related domains.

The potential of the EETS to form the basis of a widespread uptake of telematics services through VAS on EETS OBE has not gone unnoticed. Article 13 (2) of Commission Decision 2009/750/EC reads: