



Expert Review of the
EETS Legislative Acts

European Commission
DIRECTORATE-GENERAL FOR
MOBILITY AND TRANSPORT
*Directorate D – Logistics,
maritime and land transport and
passenger rights*

Analysis
September 2015

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Table of Contents

Executive Summary	3
Glossary	6
1. Introduction to the study	8
2. Evaluation of the applicable legislative acts	9
2.1. Introduction	9
2.2. Directive 2004/52/EC.....	9
2.2.1. Preamble.....	9
2.2.2. Objective and scope (Article 1).....	11
2.2.3. Technological solutions (Article 2)	12
2.2.4. Setting-up of a European electronic toll service (Article 3)	15
2.2.5. Features of the European electronic toll service (Article 4)	16
2.2.6. Committee procedure (Article 5)	17
2.2.7. Implementation (Article 6)	17
2.2.8. Entry into force (Article 7).....	17
2.2.9. Addresses (Article 8).....	17
2.2.10. Annex	17
2.3. Decision 2009/750/EC.....	23
2.3.1. Preamble.....	23
2.3.2. General provisions (Articles 1 and 2)	25
2.3.3. Requirements to be fulfilled by the EETS Providers (Article 3).....	25
2.3.4. Rights and obligations of the EETS Providers (Article 4).....	25
2.3.5. Rights and obligations of the Toll Chargers (Article 5)	27
2.3.6. Toll context data (Article 6)	28
2.3.7. Tolls (Article 7)	28
2.3.8. Accounting (Article 8).....	28
2.3.9. Rights and obligations of the EETS Users (Article 9)	29
2.3.10. Conciliation Body (Articles 10 and 11)	29
2.3.11. Technical provisions (Articles 12, 13 and 14)	29
2.3.12. Safeguard clauses (Articles 15 and 16).....	31
2.3.13. Notified bodies (Article 17 and 18).....	31
2.3.14. Registers (Article 19)	31

2.3.15.	Final provisions (Articles 20, 21 and 22).....	32
2.3.16.	Content of an EETS Domain Statement (Annex I).....	32
2.3.17.	EETS Stakeholders Roles and Interfaces (Annex II).....	33
2.3.18.	Essential requirements (Annex III).....	35
2.3.19.	Conformity to specifications and suitability for use (Annex IV)	39
2.3.20.	Minimum criteria for notifying bodies (Annex V).....	41
2.3.21.	Vehicle classification parameters (Annex VI).....	41

Executive Summary

More than 10 years ago, the European Commission has published the Directive 2004/52/EC on the Interoperability of electronic road toll systems across Europe, laying down the principles upon which a EU-wide interoperable services shall be set-up and operated.

The Directive 2004/52/EC and the following Decision 2009/750/EC have been developed and published in a context characterized by several electronic tolling systems being operated in most of the Member States in a not-harmonised way. The existing electronic toll collection services were making use of not interoperable technologies, they were mainly operated on the base of monopolistic business models and were basically offered to local and national users.

The acts published by the European Commission aim at contributing to the setting-up of a payment service allowing all road users to pay tolls within all road user charging schemes in Europe, although successive implementation phases were envisioned. The service shall be based on the “one contract and one on-board unit” principle, so allowing each user to make use of a single On-Board Unit (OBU) to access and pay tolls throughout Europe, on the base of a contract with one of the available service providers.

As recognised by all involved parties, the setting-up of such an interoperable service throughout Europe requires the implementation of a number of measures supporting the achievement of:

- technical interoperability;
- procedural interoperability;
- contractual interoperability.

Although significant efforts have been made during the last decade, interoperability has obviously not yet been achieved. The European market is still characterised by a proliferation of electronic toll systems that are characterised by (even slightly) different technical and procedural solutions.

Since the publishing of the above-mentioned Directive and Decision, the market has gone through a significant modification with a significant number of players (existing or new) that have shown an interest to play the role of the EETS Service Providers, on a national, regional and international level. The separation of the roles of the Toll Charger and of the Service Provider has been widely accepted, although certain countries are still working on a migration towards such a scenario.

Nevertheless a real interoperability across Europe is not a reality, for a number of different reasons that prevent today a road user from subscribing for a service and make use of a unique OBU to pay tolls on all the toll domains, or even on the toll domains within a specific region.

First of all, the different Member States and/or Toll Chargers, when specifying the new systems to be deployed, keep introducing new requirements (not only technical) that

prevent – without the introduction of evolutions and adaptation – the use of the OBUs that are already distributed and that are being used within neighbouring toll domains. Whereas more traditional DSRC-based systems have gone through a certain convergence, the new GNSS-based systems are still characterised by diverging solutions.

The sets of requirements that are specified for the different toll domains are such that the aspiring EETS Providers are continuously faced with the necessity of adapting their technical platform, and in particular (and this is the worse problem) their OBU. Although each Member State should be left free to implement its own policy, the appearance of new requirements and of new system architectures force to a continuous adaptation of the OBUs and therefore prevent from establishing a full interoperability. Data security and personal data protection are, amongst others, two areas where specific national requirements often appear.

The technical standards that are published so far are not sufficiently prescriptive; they are the result of a large compromise and provide for options that still contribute to a divergence between the different systems. This is in particular true with regards to the GNSS based systems, for which no harmonised technical concept exists yet (e.g. the continuous debate between Thin Client and Thick Client architectures).

It is therefore necessary to better specify one or more application profiles to be used as the base for interoperability amongst GNSS based systems, like it was done for the DSRC-based systems.

We believe that, although each Member State should be left free to design its own scheme, clear and unambiguous specifications (better if standardised) should be defined for the use of OBUs distributed by EETS Providers across Europe. Each scheme shall then support (besides the local and national profiles) one or more interoperable profiles to ensure interoperability with EETS Providers.

With regards to the operational procedures, we are not convinced that they should be all harmonized across the EU, as every Member State has its own legislation and regulations. For example it is therefore absolutely normal that certain procedures differ between a tolling system and a taxation system.

The fact that different Member States and different Toll Chargers apply different operational procedures does not prevent the establishment of interoperability across EU. Nevertheless a certain level of harmonisation should be achieved with respect to the key business processes, such as registration, billing, payment management and enforcement.

A key issue to be solved to ensure procedural interoperability is the handling of enforcement processes with international users. Today Toll Chargers have very limited possibilities to enforce the payment of tolls to international users, as they do not have access to common vehicle registration databases and do not have the rights to prosecute users once they leave the Member States. The Directive on Enforcement needs to be amended in order to integrate the toll violations.

It's also very important to clarify the non-discriminatory rules to be applied, especially with regards to systems based on the mandatory use of an OBU, in order to avoid the deployment of means that are not coherent with the actual needs. Most Toll Chargers

made their own interpretation of the Eurovignette Directive for the implementation of their GNSS toll scheme, and required the setting-up of an extensive distribution network providing service to the road users on a 24/7 basis, independently from the expected level of demand.

Finally certification procedures at EU level should be set-up and enforced within the shortest time possible. As of today a real certification process is not in place. A Toll Service Provider who wishes to provide its customers with a an electronic toll service within a specific country is today facing a specific problem and is “forced” to implement in its own system (namely OBU) the specifications of the national systems rather than implementing a solution that is in line with the characteristics of the interoperable service. Very often certification procedures in place at national level have been used (intentionally or not) as a means to limit the access of industries and/or Toll Service Providers to a specific national market.

The role of the Notified Bodies should be emphasized with regards to the conformity to standards and specifications and to the suitability for use. We believe that the EETS legislative acts should be re-worked in a way that the certification through Notified Bodies is outlined as the nominal path for the certification of equipment.

The above considerations should be taken into account in the frame of the future revision of the EETS legislative acts. Taking into account the actual demand from the market, we recommend that the focus is maintained on interoperability for heavy goods vehicles and that the aspiring EETS Providers are allowed to offer their customers with regional services rather than with a EU wide service from the beginning.

Glossary

Name	Definition
ANSSI	Agence Nationale de la Sécurité des Systèmes d'Information
BAG	Bundesamt fuer Gueterverkehr
BMVI	Bundesministerium fuer Verkehr und digitale Infrastruktur
CCC	Compliance Checking Communication
CEN	<i>Comité Européen de Normalisation</i> (European Committee for Standardisation)
CNIL	Commission Nationale de l'Informatique et des Libertés
CPU	Central Processing Unit
DSRC	Dedicated short-range communications technology
EC	European Commission
EEC	European Economic Community
EETS	European Electronic Toll Service
EMC	Electromagnetic Compatibility
EN	European Norm
ES	ETSI Standard
ETSI	European Telecommunication Standard Institute
EU	European Union
GNSS	Global Navigation Satellite Systems technology
GPRS	General Packet Radio Service
GPS	Global Positioning System
GSM	Global System for Mobile. Protocol for cellular networks
ISO	International Organisation for Standardisation
ITS	Intelligent Transportation Systems
KCSBE	Kilometre Charging System Belgium
KPI	Key Performance Indicator
LAC	Location Augmentation Communication

Name	Definition
MTBF	Mean Time Before Failure
OBE	On Board Equipment
OBU	On Board Unit
ROI	Return Of Investment
RSE	Road Side Equipment
SIM	Subscriber Identify Module
SLA	Service Level Agreement
TC	Technical Committee
TIS-PL	Télépéage Inter-Société – Poids Lourds
UNI	Ente Italiano di Normazione

1. Introduction to the study

This document represents the outcome of an ex-post evaluation of the EETS (European Electronic Toll Services) legislative acts that are currently in place and includes an independent opinion on such provisions based principally on experience with the implementation of electronic tolling systems in Europe.

Since the early stages on the road towards interoperability, the experience gained with the design, the implementation and the operation of most of the electronic toll collection systems throughout Europe, has permitted the authorities, toll chargers, system integrators, system operators, as well as service providers and fleet managers, to be faced directly with different problems in the implementation and operation of electronic toll systems and also in the provision for suitable services to private and commercial vehicle users.

Taking into account such experiences, the study includes, first of all, a critical review of each provision by both the Directive and the Decision (including the annexes) and an evaluation on the adequacy of these elements in view of the objectives and where necessary, that they be modified or updated. The outcome of this review is detailed in Chapter 2 “Evaluation of the applicable legislative acts”.

2. Evaluation of the applicable legislative acts

2.1. Introduction

This section provides the results of a critical review of the provisions of the existing EETS legislative acts, in particular:

- the Directive 2004/52/EC of the European Parliament and of the Council of 29th of April 2004 on the interoperability of electronic road toll systems in the Community (referred below as “Directive”);
- the Decision 2009/750/EC of the Commission of European Communities of 6th of October 2009 on the definition of the European Electronic Toll Service and its technical elements (referred below as “Decision”).

The review has been undertaken in order to identify which provisions of the above mentioned legislative acts are to be considered not fully adapted to the current context and should be modified rather than updated in order to facilitate and promote the deployment of an EETS service across the member States.

2.2. Directive 2004/52/EC

2.2.1. Preamble (recitals)

The preamble section of the Directive 2004/52/EC lays down the context within which the interoperability of electronic road toll systems is planned to be achieved.

Although this section makes reference to and outlines the actual situation of the European market of electronic toll systems as well as the key strategic objectives that the Directive intends to pursue, however, there are certain considerations that we believe need to be better detailed rather than adapted to the real situation.

Below we provide some remarks on some of the clauses within the Preamble, by making reference to the precise clause:

- (2) Although a majority of the electronic toll systems in Europe are based on the 5.8 GHz DSRC technology and in particular on the technical standards developed by

the CEN TC278 committee, most systems are characterized by specificities that make difficult whereas impossible to achieve interoperability; the situation has not changed much during the last 10 years;

(3) We believe that it is necessary to be more prescriptive in terms of technology and in particular to emphasize the fact that a certain priority is to be given to the GNSS technology, going as much as possible in the direction of having one unique type of interoperable OBU across the different toll domains in Europe; we consider appropriate to prescribe that the EETS service shall be based upon one specific type of OBU integrating all three technologies (GNSS, DSRC and GSM/GPRS) and compliant to stricter and more detailed European standards (as explained below) and supporting a specific harmonized application profile (for example based on the Thin Client approach for what concerns GNSS schemes, as it seems the most flexible and effective);

(4) The technical standards have been developed by the standardization committees and have been widely referenced within any tender and other procurement activities carried out in Europe, but obviously the technical standards are not sufficiently prescriptive to ensure the technical interoperability (for example, in the field of GNSS schemes Toll Chargers are free to implement systems based either on the Thin Client or on the Thick Client architecture, that makes it nearly impossible to achieve interoperability); the standards in fact provide for a certain flexibility by both manufacturers and system integrators/operators, so that two or more “compliant” systems may be differently designed. The OBU developed by Ecomouv’ for the Taxe Poids Lourds domain would not have been able to operate within the Belgium Toll Domain due to lack of memory and CPU; it had been designed to serve for the Taxe Poids Lourds and for the TIS-PL domains only, in particular no other GNSS-based toll domain (the embedded SIM card was just active for France and within 30 kilometres outside the borders).

(8) The market is still driven mainly from public tenders, aiming at the implementation of local or nationwide electronic tolling systems and therefore focusing on this objective only without devoting much importance to cross-border interoperability. The players who are taking part in tenders as well as the Members States are not motivated to design and implement a system that fully supports the interoperability. Otherwise France, Belgium and Germany (with its renewal in 2018) would have been able to define a joint-system for the three countries. In case the Taxe Poids Lourds system would be in operation, then there could be 3 GNSS systems without any interoperability. We believe that each Toll Charger and Member State needs to be obliged to set-up proper interfaces within their system, to accept and to be able to handle one or more OBUs among those which respect harmonized rules.

(9) The legislative framework as well as applicable technical standards are not able today to enforce interoperability and, as a consequence, Toll Chargers and Member States continue to define proprietary requirements and specifications leading to the proliferation of incompatible systems. Where prescribing a specific technical solution may be too much, as a minimum the EC should define and impose on each Toll Charger one or more application profiles to be implemented (besides the local and national ones) within their systems.

(10) Same as item # 9

(11) The integration of on-board equipment within the vehicles is very difficult, as the operating lifespan of such units is completely different from the one of the vehicles themselves. Vehicle manufacturers have no incentive to promote such integration.

(12) EETS Providers have an interest in providing diversified services to their customers, by means of the same OBU or not; if a concrete business case exists, they will promote such integration.

(17) The protection of personal data is a key issue to be considered when deploying an electronic toll system, and we can confirm that – in our experience - every Toll Charger is carefully considering it. Nevertheless national regulations and/or different interpretations of the EU harmonized rules often force to consider additional functional and technical requirements that limit the possibility of achieving interoperability.

2.2.2. Objective and scope (Article 1)

This provision of the Directive specifies the objectives that the Directive wants to achieve and the context upon which the Directive is applicable.

In terms of objectives, the provision is correct and it specifies that the Directive aims at laying down the conditions necessary to ensure the interoperability among electronic toll systems within the European Union.

It correctly makes reference to the electronic collection of all types of road fees, on the entire road network of the EU, including urban and interurban, motorways, primary and secondary roads, as well as other road infrastructures whose use may involve the payment of a fee.

During the last few decades the ITS market has been characterized by other applications which are worth a mention as part of the scope of the Directive.

Due to global warming and pollution, a significant number of cities have introduced access control schemes as well as congestion charging schemes; we can anticipate that an increasing number of cities all over Europe will create in the near future a limited traffic area and we have to anticipate interoperability in order to avoid duplicating systems, to allow cities to implement solutions quickly and develop a pan-European solution for the enforcement.

In a similar way, several countries have introduced the possibility of paying for parking and other road transport related services (such as petrol) by means of on-board units that were originally distributed for electronic road toll collection. This demonstrates a certain level of integration among services around the same on-board unit and contract.

We believe that the Directive should enlarge its scope and include all kinds of applications involving the payment of a fee for the access and/or use of a road infrastructure, and in particular should expressly mention applications related to urban areas.

On the other hand we believe that it might be appropriate to better specify that this Directive does not apply to road toll systems that do not make use of On-Board Units (OBUs), such as for example video tolling schemes where the user is identified by

means of its number plate. The experience with the implementation of such provisions during the last few years has in fact shown that it is not very clear in that respect, or at the very least creates misunderstanding within the market players. We believe that it would definitely make sense to integrate a clarification in that respect.

Finally, one of the key problems that has probably been underestimated in the past and that, in some cases, has constituted an obstacle to the setting up of the EETS service throughout Europe has to do with the legacy systems, i.e. electronic toll systems that have been implemented before or even after the Directive and that have reached a size that does not easily allow a transition towards an interoperable solution.

We believe it's worth to mention already at this stage, and in any case to modify the provisions of the Directive in that sense, the fact that the Directive intends to lay down the conditions to help the Member States to plan and execute the necessary actions to develop legacy systems in a way that become integral part of the EETS service.

The EC should also define the conditions of the migration.

2.2.3. Technological solutions (Article 2)

This provision of the Directive specifies the high-level characteristics and technologies that the electronic toll systems be deployed after a certain date (originally fixed on the 1st of January 2007) should integrate.

From a technical perspective, this provision is not sufficient enough to ensure the convergence of existing and new electronic toll systems towards a common platform, providing for interoperability.

Although we understand and respect the fact that each Member State (and potentially each Toll Charger) wishes to keep a certain flexibility in the definition of their own tolling policies, taking into account their objectives and the local context, at the same time it is necessary to reinforce the obligation to comply (and or adapt) to specific technical specifications in order to provide for the necessary basis for real technical interoperability.

Surely, the achievement of real technical interoperability does not surely represent an opportunity for the industrial players, who are encouraging the diversification of technical solutions in order to sell more equipment.

Nowadays most existing electronic tolling systems respect the provisions of the Article 2 of the Directive, as they make use of one or more of the indicated technologies.

Nevertheless this has proven not to be sufficient in order to achieve interoperability between different systems. It is not only a question of technical standards to be used by industries and system integrators, every single project has been characterized by specific functional and technical requirements that obliged the suppliers to adapt their solutions and in particular the design of their equipment.

As far as DSRC-based systems are concerned, the market has reached significant maturity and the characteristics of the OBUs tend to be quite harmonized throughout the different domains. We believe that the EN 15509 represents already a good base for interoperability among schemes based on DSRC technology, and that this can be

integrated with additional elements (for example the characteristics of the OBU in terms of HMI interface) to achieve a common base.

The main remaining problem regards the interoperability with the system operated in the Toll Domain in Italy (referred to as TELEPASS), whose specification in terms of power and in particular of physical layer protocol poses severe limitations on solutions applied for the migration. Some years ago potential scenarios were identified to implement some kind of migration strategy to ensure interoperability, in particular to ensure that DSRC OBUs distributed across Europe could be handled without discrimination also in Italy; in particular the following options were outlined:

- to prescribe that all interoperable OBUs integrate the possibility to communicate with a TELEPASS roadside equipment (the specification has been published by means of the UNI 10607 norm, but it is only recently that some manufacturers decided to develop an OBU that is compatible with that norm);
- to modify all tolling facilities in Italy allowing to manage without discrimination either TELEPASS OBUs or other DSRC OBUs distributed elsewhere in accordance to the EN 15509 profile (in this case the only viable solution seems to involve a time synchronisation among all tolling equipment in the same tolling stations, thus avoiding that OBUs of the two different types could communicate with the roadside at the same time, but the applicability of such solution is less obvious now that multilane free-flow tolling equipment are being deployed along the Pedemontana Lombarda motorway in the north of Italy);
- to provide the road users who wishes to make use of their interoperable contract also in Italy with an additional OBU supporting the UNI 10607 profile.

The first option is the most integrated and effective one, as the development of a UNI 10607 compliant DSRC equipment or module can be realized at marginal cost in the frame of a development of a multi-technology and multi-profile OBU. Until a couple of years ago, no OBU manufacturers had taken into consideration this opportunity as obviously they were not convinced of the potential return from such an investment. Lately a few European manufacturers developed and started to plan the development of an OBU supporting also the UNI 10607 profile for Italy; one manufacturer has also launched the certification of such a product in Italy in accordance with the above mentioned norm. This is proof of the fact that the development of a product compliant with the TELEPASS profile is possible, and also that there is a potential market for other manufacturers in Italy.

The second option is based on the modification of the roadside infrastructure and equipment in order to allow the possibility to manage, on all tolling stations in Italy, both TELEPASS OBUs and other DSRC OBUs that are being issued elsewhere in accordance with the EN 15509 standard. This option is inspired by what has been already done in other countries in Europe (among which Portugal and Norway) as well as in the United States, where multi-protocol roadside equipment have been deployed to handle different types of circulating OBUs. In this specific case this approach is difficult as it would be very expensive for the Italian Toll Chargers, for the upgrading of all the existing roadside equipment, for a limited benefit with regards to number of potential additional users.

The third option is probably the most pragmatic in the short term, and several potential EETS providers have already followed this approach.

We believe that today the market may even be ready to accept that the specifications of the interoperable OBU require the support of a UNI 10607 profile as well as the EN 15509 profile. The option to meet such requirements by means of a separate device should be also supported.

Moving to GNSS solutions, there is a clear problem of harmonization of requirements with a strong impact on the specifications of the OBUs and of the other components of the system. A specific effort needs to be performed in that direction, in order to harmonize the specification of the OBU and the functioning mode.

Although the Decision and the following standards indicated that each EETS Providers is free to deploy its own solution (OBU in combination with a Proxy) as long as it meets the specification on the interface between its central system and the Toll Chargers, a decision needs to be taken for example on whether a Thin Client or a Thick/Intelligent Client approach must be implemented as the base for the interoperable solution.

The two approaches are so different that the characteristics of the respective OBUs can be significantly different.

A Thin Client approach (with the OBU simply collecting and transferring to a Proxy the GNSS coordinates) seems to be more flexible, as an EETS Provider may easily use the same OBU in different countries and implementing the specific business rules only within its central system. A Thick/Intelligent Client approach (with the OBU directly implementing the business rules governing each Toll Domain and therefore generating the charge data record) is more efficient in terms of operating costs, as the data transferred towards the central system is limited to the toll declarations, but it poses more constraints on the hardware capability and on the expandability of the OBU, as the road network modelling needs to be stored within the OBU.

As the performance in the toll collection are key for the Toll Chargers, the specifications need to also integrate specific performance indicator with regards to the precision of the localization (as a function of the different environment, urban or extra-urban) and to how often a position needs to be registered and transferred.

In case the enforcing of one single application profile (and specification) cannot be implemented, at least a set of potential profiles should be defined and supported by all Member States.

Today every Member State, in the absence of an harmonized set of specifications, keeps introducing specific requirements, on the base of local regulations and/or strategies. The specific requirements that each country can introduce may pose constraints on the characteristics of the OBUs.

For example:

- in France (Taxe Poids Lourds) a decree for the homologation of the data processing chains (toll collection and enforcement) had been published and imposed specific constraints in terms of data security and data protection that imposed;
- in the Netherlands the overall system architecture was foreseeing that each OBU should have been integrated with a secure module (storing and handling the keys) to be provided by a third party;
-

- finally the KPI specified by each Toll Charger often oblige the OBUs to be modified and adapted to the new requirements.

As a last resort, we believe that we could go in the same direction of what has been done for the tachograph that has been completely specified and is type approved and certified by the Commission. Ideally this OBU (or this range of OBUs) would support both the EN15509 profile and the “TELEPASS” profile for what concerns the DSRC and an harmonized profile for the GNSS world, this last to be preferably based on a Thin Client architecture.

The publishing of such kind of specification for one or more common interoperable OBUs throughout Europe (in the frame of a harmonized system architecture) would clearly solve the problem of interoperability.

Probably one of the problems is represented by the fact that the market is mainly driven by public tenders, where each country and Toll Charger specify their own requirements and strict public procurement rules prevent a Member State to plan the deployment of the new system by taking into account the surrounding context.

We believe that the only possible way to achieve in the mid-term interoperability across Europe rather than at regional level is to be more prescriptive on the characteristics of the OBU that must be offered to clients of interoperable tolling services.

If the adoption of a unique technical solution across Europe is not possible, at least the characteristics of an interoperable OBU should be specified and prescribed to be adopted by every Toll Charger throughout Europe.

The specification should not only concern the OBU but rather the entire electronic toll collection chain and the enforcement chain across the systems to be deployed by the Toll Charger and the Toll Service Providers.

As it was already indicated within this article of the Directive, a clear migration strategy should be made mandatory for all those systems (and Member States) who are not compatible with the overall strategy. Probably the European Commission should consider the possibility of making specific funds available for the implementation of such migration strategy. Member States must be “encouraged” to develop in a way to ensure the necessary level of interoperability.

This article of the Directive does also specify that Member States shall take all necessary measures to increase the use of electronic toll systems, in a way to achieve (with a pre-defined time horizon) a situation where at least 50% of the toll transactions in a specific toll station/point are collected by means of electronic systems.

We believe that this requirement does not help the setting up of interoperability by itself and in general is not always feasible; toll chargers have already an advantage (in terms of operational cost optimization) to increase electronic charging ratio, therefore this provision should be removed.

2.2.4. Setting-up of a European electronic toll service (Article 3)

This provision of the Directive specifies the principles upon which a European interoperable electronic toll service shall be established.

The specified service architecture is correct and has been immediately accepted by the market, in particular the separation of the roles of Toll Charger and of Toll Service Provider.

During the last few years the market has seen a significant development in terms of Toll Service Providers; several companies (already active as payment service providers in the field of road transport) started to extend their service package by including electronic toll services within specific countries and on a regional basis within the EU, new players have also appeared.

The clients of such providers are typically transportation companies.

The market of freight transportation across Europe is characterized by a significant level of trans-border traffic, but very few vehicles actually cross the entire EU territory.

We believe that, whereas it is evident that there is a specific demand for an interoperable toll service at international level, there is not really a demand for a EU-wide service. Most road users (this is true for heavy transport vehicles, but even more applicable for light vehicles) are interested to subscribe to interoperable toll services at regional level and therefore Toll Service Providers should be left free to develop their own commercial proposals by taking into account the real market demand.

Regional interoperability could be an option, but only at the contract level, not at the level of technologies.

As far as light vehicles are concerned, the demand for interoperability is significantly lower, as the low cost airlines have radically changed the way people are travelling, except for some specific areas.

2.2.5. Features of the European electronic toll service (Article 4)

This provision lists the key characteristics of the EETS interoperable service.

It makes references to the annex to the Directive for what concerns the technical, operational and contractual elements, and to the fact that it was foreseen that the content of the annex would be updated if need be. Specific comments, on the content of the annex are provided within the relevant section of this document.

As detailed within the section 3.2.3 of this document (with reference to the Article 2 of the Directive) the list of technological solutions to be supported remains the same but:

- one or more application profiles must be developed and agreed as a basis for interoperability between GNSS based systems;
- a solution must be found for the setting up of interoperability with Italy, either by means of a migration plan to be arranged or by the use of an OBU supporting the two 5.8 GHz communication protocols.

More prescriptive technical solutions have to be developed for both the DSRC (where the EN 15509 already support a sufficient level of technical interoperability) and for the GNSS systems; in this last case, the currently available standards are not sufficient to guarantee technical interoperability.

2.2.6. Committee procedure (Article 5)

This provision of the Directive specifies the setting-up of an Electronic Toll Committee composed by the representative of the member States and chaired by the European Commission, as stipulated by the Decision 1999/468/EC.

We do not have specific comments in that respect.

2.2.7. Implementation (Article 6)

This provision of the Directive specifies that Member States should take all necessary measures to translate the provisions of the Directive into the national legal framework.

We believe that this provision has not been properly implemented by all countries, and that this requirement should be reinforced.

2.2.8. Entry into force (Article 7)

No specific comments for this provision.

2.2.9. Addresses (Article 8)

This provision of the Directive indicates the players to which the Directive is addressed.

In order to reinforce the implementation of the provisions of the Directive, we believe important that the Directive makes explicit reference to the fact that it applies to the Member States as well as to the different Operators in the field (namely the operators of road infrastructures and to related service providers).

2.2.10. Annex

The Annex to the Directive provides for a list of all the matters that need to be specified for the definition of the deployment of the European electronic toll service from a technical, operational and contractual perspective.

Technical issues

The following issues are listed as being essential – from a technical perspective – for the definition and the deployment of the European electronic toll service:

- ✓ Operational procedures

We are not convinced that all the operational procedures should be harmonized across the EU. Every Member States has its own legislation and regulations, which may have an impact on the operational procedures to be implemented.

For example the procedures to be used in the frame of a taxation system (such as the Taxe Poids Lourds system in France) might be significantly different from those to be used in a more conventional tolling system (such as the LKW-Maut system in Austria).

For example the registration of the users into the scheme in France, this being a taxation system, was characterized by many more constraints in respect to a more traditional tolling system. The users were required to provide several documents for registration and the registration could be finalized only when all the documents were provided and validated.

In cases like the LKW-Maut system in Austria or even the KCSBE system in Belgium, the registration procedures are simpler and provide the user with a fast track registration procedure (allowing him to rapidly collect its OBU) and with the possibility to finalise its registration afterwards.

The fact that different Member States and different Toll Chargers apply different operational procedures does not prevent the establishment of interoperability across EU.

Interoperability should focus on the specific elements that allow access to and make use of a system (such as the OBUs and the roadside equipment) as well as on the processes and on the interfaces allowing the EETS Providers to be integrated within the value chain and to feed the Toll Chargers with the necessary data for billing and accounting.

✓ Functional specifications of the service

The focus of standardization bodies should be on the finalization of a set of standards ensuring the technical interoperability between the constituents deployed by Toll Chargers and EETS Providers, as well as on the detailed testing procedures to be implemented by Notified Bodies for the certification of the equipment for suitability for use. Greater details are provided by following sections of the document.

✓ Technical specifications of roadside and on-board equipment

The technical specifications of the on-board equipment and of the roadside equipment (where applicable) should be left to manufacturers, in order to leverage on the continuous technological development.

Nevertheless these specifications should carefully take into account the application profiles defined (or to be defined) for the different technological options, as well as a set of functional requirements ensuring that equipment may be certified for suitability for use.

✓ Certification procedures

Certification procedures at EU level should be set-up and enforced within the shortest time possible. As of today a real certification process is not in place. A Toll Service Provider who wishes to provide its customers with a an electronic toll service within a

specific country is today facing a specific problem and is “forced” to implement in its own system (namely OBU) the specifications of the national systems rather than implementing a solution that is in line with the characteristics of the interoperable service. Very often certification procedures in place at national level have been used (intentionally or not) as a means to limit the access of industries and/or Toll Service Providers to a specific national market.

The Directive and the consequent Decision have already laid down the basis for several Notified Bodies to operate throughout Europe to certify that the different products (in particular the OBUs and the RSEs) are compliant with the relevant standards and specifications.

As detailed elsewhere within this report, the Notified Bodies are not yet active in certifying equipment with regards to the conformity to standards and specifications and to the suitability for use. The certification process is still widely managed by the Toll Chargers themselves, which leads to potential discrimination.

We believe that the EETS legislative acts should be re-worked in a way that the certification through Notified Bodies is outlined as the nominal path for the certification of equipment.

At the same time the Notified Bodies need to be put in conditions to properly do their job, in particular they must be allowed to access to test sites where – without a direct implication of the Toll Chargers (and even less of the respective manufacturers) – they can perform testing activities in real operational conditions.

✓ Standardization work

The standardization bodies need to focus their attention on:

- the development of one or more harmonized application profiles for GNSS based systems, to be used as references by the different Toll Chargers when procuring new schemes or when migrating the existing schemes;
- the further development and re-working of the standard ISO 12855 for the specification of the back-office interfaces between Toll Chargers and EETS Provider, adapting it to the real market requirements;
- the development of harmonized test procedures to be used to validate the suitability for use of the EETS constituent.

✓ Specifications for the installation of the on-board equipment

The installation of the on-board equipment within vehicles can have a significant impact on the performances of an electronic tolling system, both in terms of charging and of enforcement. This is true whatever is the technological solution, i.e. whether a DSRC technology is used rather a GNSS solution.

The correct installation of the OBU within the vehicle influences:

- the possibility for an OBU to correctly communicate with a DSRC roadside equipment (in both single lane and multilane free-flow environments) implementing a charging process;
- the possibility for an OBU to correctly communicate with a fixed, portable or mobile enforcement equipment;
- the possibility for an OBU to correctly receive the GNSS signals for the positioning of the vehicle.

The way the roadside equipment are designed and deployed (with overhead or side installations of the equipment) can even significantly influence the performance of the radio communication link between the OBU and the roadside. In some cases the OBU should preferably be installed with the antenna nearly parallel to the ground as the roadside antenna are installed in an overhead position, in some other cases it is preferable that the OBU are installed with their antenna nearly vertical as it has to communicate with equipment that is installed on the side of the road.

So far the applicable DSRC standards include some constraints on the installation of the OBUs, in particular on the orientation of the antenna towards the roadside equipment. This is not sufficient to ensure the correct handling of the communication with the OBU at all times.

It is definitely necessary to develop a harmonized specification for the installation of the OBU within the vehicle, including:

- the definition of the correct orientation of the antennas towards the roadside equipment, where applicable, with consequences on how the OBUs can be designed and installed;
- the handling of the installation of OBUs within vehicles that are characterized by metallic windscreens.

✓ Transaction models

The decision upon the exact transaction model should be left up to Toll Chargers, as it depends on the strategical objectives and on the local context.

As mentioned before, the focus should be on the contrary on the finalization of an harmonized set of specifications for the back-offices interfaces between the Toll Chargers and the EETS Providers, eventually supporting different profiles among which they are free to choose. The currently available standards are not sufficient to support the operational requirements expressed by Member States and to ensure interoperability.

✓ Arrangements for the availability of on-board equipment

The availability of OBUs to the user requiring them has been a very important issue to be dealt with during the last few decades, in particular on those systems that were deployed on the base of a mandatory use of an OBU (for truck only).

Nowadays all the Toll Chargers that plan the introduction of such kind of toll systems (based on a mandatory OBU) interpret the Eurovignette Directive in a way that every road user (either national or international) need to be able – on a 24/7 basis – to register himself into the scheme and obtain an OBU within a relatively short time and in proximity to each point of access to the road network.

We have seen then Toll Chargers requiring, for example:

- the maximum travel distance between any point on the highways in Belgium and the nearest 24/7 distribution point to the highway is 30 kilometres;
- a 24/7 distribution point must be put in place at every highway that enters and that leaves the toll domain right before the border crossing;
- 24/7 distribution points must be put in place at foreign non- highways so that the maximum extra travelling distance or travelling time to make contact with the service point before entering or leaving the toll domain is 10 km or 10 minutes;
- the maximum delay for road users on the main roadway due to large numbers of Users / Drivers who wish to obtain an OBU is 5 minutes; such a disruption per day per service point must never exceed a total of 30 minutes.

All these requirements oblige the Toll Charger (or the operator on its behalf) to set-up a very dense network of distribution points, within the toll domain and in the proximity of the national borders. For each point of access to the network, it is required that the user finds a distribution point in operation within few kilometers, independently from the level of traffic and in particular from the number of users that are expected to need an OBU around that area.

Depending on the precise requirements, we have seen a network of 230 distribution points being deployed in Austria (for the LKW-Maut system), a network of 450 distribution points being deployed in France (for the Taxe Poids Lourds system) and a network of about 130 distribution points being deployed in Belgium (for the KCSBE system).

The experience has shown that, during the operation of such systems, most of these distribution points remain completely not operational, as the demand for OBUs exists only on a limited number of points, in particular on the borders where occasional users enter the toll domain.

The costs associated with the operation and maintenance of these distribution points represent a significant portion of the overall operation and maintenance cost of an electronic tolling system.

We believe that a new interpretation should be given to such requirements, with the support of the legislative acts, in order to optimize the costs for the setting up and the operation of the distribution network.

Procedural issues

The following issues are listed as being essential – from an operational perspective – for the definition and the deployment of the European electronic toll service:

✓ Procedures for verification of the technical performance of equipment

The procedures for the verification of the technical performance of the equipment and in particular the way on-board-equipment are installed within vehicles must be dealt with by the certification for suitability for use, which is detailed elsewhere in the report.

✓ Parameters for vehicle classification

We believe that, even if each Member State needs to maintain a certain flexibility in defining the exact parameters upon which vehicles are classified, a harmonization process across the EU should be promoted in order to identify a minimum set of parameters to be used for the EETS service.

The introduction of free-flow tolling systems has already contributed to a shift in that direction, as Toll Chargers understand the technological limits related to the classification of a vehicle without constraining it to a single lane and using specific devices.

Today all free-flow systems are making use of the following parameters for classification:

- number of axles;
- maximum weight allowed;
- emission class;

and therefore there is the possibility of formalizing such list of parameters and to integrate guidelines on how to use them.

✓ Exception handling procedures

The handling of exceptions has always been one of the main focus of the Toll Chargers since tolling schemes have been introduced, not only in the case of electronic toll collection systems.

The proper handling of exceptions allows Toll Chargers to keep violations to the tolling schemes under control, and to ensure the appropriate level of service to users, without discriminating between local and international users.

In that respect a key issue to be solved to ensure procedural interoperability is the handling of enforcement processes with international users.

Today Toll Chargers have very limited possibilities to enforce the payment of tolls to international users, as they do not have access to common vehicle registration databases and do not have the rights to prosecute users once they leave the Member States.

The Directive on Enforcement needs to be amended in order to integrate the toll violations.

Legal issues

The following issues are listed as being essential – from a legal perspective – for the definition and the deployment of the European electronic toll service:

- ✓ Validation of the chosen technical solutions against legislative framework protecting the rights of individuals

First of all, the entire legislative framework protecting the freedom and the fundamental rights of individuals, including the privacy, needs to be harmonized across the EU or at least reinforced.

Our experience, for example within the framework of the Taxe Poids Lourds system in France, has shown that a Member State has the freedom to interpret and apply the existing legislative framework in a way that may significantly impact the characteristics of the system, thus preventing real interoperability.

Once such a harmonization process is finalized, we believe that a cross-border entity should be involved for the validation of whether a Member States is correctly interpreting and implementing the harmonized legislative framework.

- ✓ Setting non-discriminatory rules and requirements to be applied

It's important to clarify the non-discriminatory rules to be applied, in order to avoid the deployment of means that are not coherent with the actual needs. Most Toll Chargers (in France and Belgium for example) made their own interpretation of the Eurovignette Directive for the implementation of their GNSS toll scheme, and required the setting-up of an extensive distribution network providing service to the road users on a 24/7 basis, independently from the expected level of demand. In France a Service Point network of 420 sites (of which 60 % where opened 24/7/365 with personnel) was set-up, implying a significant operation and maintenance cost for a limited number of transactions. In a similar way in Belgium several Service Points are being set-up in the region of the Ardennes, where the traffic crossing the border is very limited.

- ✓ Assessment of possibility of harmonizing the rules of enforcement

As previously detailed, a key success factor to ensure interoperability across EU for electronic toll collection schemes is the modification of the “Cross Border” Directive of 25th of October 2011 among those traffic offenses for which a cross-border exchange of information is foreseen; this Directive should include the toll violations within the list of violations for which a cross border data exchange is possible.

2.3. Decision 2009/750/EC

2.3.1. Preamble (Recitals)

The preamble section of the Commission Decision 2009/750/EC lays down the context within which the decision is based.

Here below we do provide some remarks on some of the clauses within the Recitals, by making reference to the precise clause:

(2) A single contract with one EETS provider and one OBE to be used on all EETS domains is the final objective. Nevertheless, the business reality and the existence of different tolling schemes and technologies will make it really difficult to achieve by the coming decade. Our suggestion is: one single contract with one EETS provider who has potentially agreements with local ETS Provider to propose a European coverage and the minimized number of OBE to be used on the all the EETS toll domains.

(5) For each new toll scheme or contract change, the toll charger has to open its value chain to EETS the day it starts operations. Due to the fierce competition and the cost to churn for a transport company, changing of EETS provider is not a complex operation and not priority for a fleet.

(6) The information should be available for all stakeholders (toll operator and EETS provider) at the same time

(8) To our knowledge, no National Conciliation Body has been set up up-to-now (except in Italy). The French State was directly talking to the EETS and Viapass is directly trying to solve its problems with ETS Provider. The National Conciliation Body should be set up at the European level.

(12) Facilitating EETS users to contract with EETS Provider would be positive. It brings more guarantee of payment for the Toll Charger. It limits pollution (in case of toll gate – trucks do not have to stop any more). It's cost-effective for a toll charger and it limits violations. Like in France, the rules could be a discount on toll fee for the ones who have contracted with an EETS provider. Such a solution means that each Member State would have to develop a solution of guarantee for the transport companies that can't afford the guarantee requested by the EETS Provider

(14) We suggest to add dynamic traffic management by increasing the toll during peak hours and during a high pollution peak. The transport companies have equipped their fleet with navigation system and are able to adapt their routing. Tolling must be clearly linked to environment protection

(15) A way to limit the dumping and to make all the European transport companies more respectful of the current rules is to define the price of a kilometer driven in any road of Europe (build and maintenance). Then a solution could be that any invoice sent by a transport company to a haulier integrates two mandatory lines:

- a. Price of the infrastructure (including tolling)
- b. Service of transport value added

(16) This is one of our main proposals in our report on the State of the Art of Electronic Tolling: define the handbook of the requirements (general, detailed, KPI and services) of a GNSS based tolling solution taking into account all the Member States specific ones.

(17) Any new EETS (or new contract including major changes) must be interoperable with the existing ones. An OBU developed for Belgium could be used in next generation in Germany.

2.3.2. General provisions (Articles 1 and 2)

We suggest no changes for those two articles.

2.3.3. Requirements to be fulfilled by the EETS Providers (Article 3)

There are 6 requirements to be fulfilled by the EETS Providers.

Over the last few years, we met several ETS Providers that have never complained about the difficulties to fulfill these requirements.

For example, 6 requirements are requested by ASFA for an ETS Provider applying to become a TIS-PL issuer. The documentation is really exhaustive but can't be a barrier to enter the certification process. An important point is that ASFA - on behalf of the 19 toll chargers in France - will go on requesting the initial documentation in French even if they are supposed to accept any EETS Provider granted in its own country.

Regarding AGES EETS GmbH in Germany, the initial issue was the fact the European Directive was not translated in German law.

Most of the company applying (or planning to apply) as EETS Providers are major players on the market:

- EN ISO 9001 Certification is a minimum to operate any business in any type of international business
- In terms of technical equipment, any actor that applies to become an EETS Provider must know the business or is able to invoice a large number of customers. Nevertheless, who is the organization at the Member State level that will evaluate the technical equipment?
- Same question for the competence in provision of electronic tolling services or relevant domains;
- The question of the financial issue can be an issue and must be homogeneous. Making a reference to a rating can be an handicap due to the fact that most of the potential EETS provider are belonging to major pan European group;
- The global risk management plan is audited by who and when? A National body? Who will finance the audit? It would be important to precise this point.
- "be of good repute" : no Member State will refuse to any actor to be granted due to his reputation. This point can be left as it is.

2.3.4. Rights and obligations of the EETS Providers (Article 4)

This provision of the Decision specifies the rights and the obligations that apply to the EETS Providers in the frame of the EETS service provision.

The obligations requested to the EETS Providers was a real breakdown to the market development:

- EETS Providers shall conclude EETS Domain within 24 months following their registration (1)

- EETS Provider shall maintain a full coverage of all the EETS domains. If any change, it shall re-establish full coverage within 6 months (1)
- The audit of operational processes and performance
- EETS Providers shall provide appropriate service and technical support in order to ensure the correct personalisation of the OBE
- EETS Providers shall collaborate with Toll Chargers in their enforcement efforts
- The EETS Provider market presents the following features:
 - A fierce competition
 - ETS Provider are mainly local companies with a strong national position and limited market share abroad
 - Three main type of actors:
 - Pure players like Airplus, Axxès, DVB, Eurotoll, Eurowag, Telepass, ...; all of them have strong national positions;
 - Petroleum card issuer; those actors are not investing in technology, some of them are outsourcing their operations like Shell, BP, etc; they often operate through partnerships;
 - Players that plan to become a technical interface between ETS Provider and Toll domains by providing a pan-European OBU and Proxy.

It means that the players have not got the same ambition and strategy. None of them plans to offer services and EETS for each EETS toll domain directly due to negative ROI. Nevertheless, all of them are negotiating agreements with their peers to propose EETS in different countries

- The average price to be interoperable with a toll domain is around 100 KEUR
 - Confirmed by the Liefkenshoek
 - Becoming a TIS-PL issuer in France estimated cost around 1.8 million EUR (18 toll domains) on a 22 months period. It can split as follow:
 - 350 KEUR paid the toll charger
 - 250 KEUR of IT development
 - 300 KEUR of legal
 - 200 KEUR (OBU + equipment)
 - 700 KEUR of technical test with the 18 toll domains

It doesn't include the marketing/sales effort for the acquisition of new customer that can be a few million EUR: communication, sales force, rebate to support the customer churn, etc;

- It means that being interoperable with 142 toll domains (if all of them were interoperable) means a CAPEX of 14.2 MEUR just for the technical interoperability then the ETS provider will have to develop its business in each country;
- If you monitor the market share on the TIS-PL market in France, observers can notice that the main actors have stable market share. The Ecotaxe introduction enhance the competition, make the fee percentage decrease but the market share remains the same. Thus, Telepass, which became TIS-PL issuer in

February 2013 remains at 5% market share after 2.5 years with mainly Italian customer base. Gaining clients from its competitors was too difficult because the service fee applied to the customer are nearly the same. Moreover churning of a transport company means a significant investment (changing the OBU of each truck means a complex logistics for a limited benefit, transferring the bank guarantee, etc);

- The final users are mainly transport companies that are in a competitive market and 50% of them are in financial difficulties. It means that the ETS provider activity is risky.

We recommend:

- To introduce EETS Provider (for all the toll domains which are interoperable) and Regional EETS (at least 5 toll domains)
- An EETS Provider can be accepted on EETS domain even if they are not operating directly but through partners
- Suppress the constraint of 24 months to conclude the EETS contracts – which is impossible to respect and which is not relevant in term of business
- Maintaining the full cover and re-establish within six months must be suppressed too

On the technical point of view:

- EETS Providers shall provide appropriate service and technical support in order to ensure the correct personalisation of the OBE. These requirements must be highlighted as this point because it's not always fulfilled. Ecomouv' was making the OBU personalization of the different toll domains on behalf of an ETS Provider option 1. It was an issue for the ETS Provider due to the fact that they had to respect the constraints of the toll operator and lost flexibility

As far as enforcement is concerned:

- EETS Providers shall collaborate with Toll Chargers in their enforcement efforts. We consider that this point must be enhanced because some ETS Providers are still reluctant to help the toll charger against their clients.

2.3.5. Rights and obligations of the Toll Chargers (Article 5)

This provision of the Decision specifies the rights and the obligations that apply to the Toll Chargers in the frame of the EETS service provision.

The first point of the article clearly point out the question of the adaptation of the existing toll domains that are not respecting EETS interoperability conditions. A key question is how are the changes financed?

4icom got into the discussion with BVMI/BAG last June. The German State announced that it would open its value chain to the EETS provider in 2018. The procedures have been defined for the next contract that will be in operation on the 1st of September 2015. BVMI/BAG is financing all the changes to the existing value chain but it can't anticipate the introduction of the EETS provider in the coming months. The reason is that BVMI/BAG have a contract with Toll Collect and that the introduction of EETS provider will modify the scope of work of Toll Collect and its revenues. Nothing was

anticipated into the existing contract to overcome such a situation. Then BVMI/BAG cannot figure out what will be the value of the EETS provider taking into account the good functioning of the current solution.

The EC should clarify this point or suppress the first point.

The fifth point points out the question of the OBE certification. The issue is that no Member State will keep a certification process alive just in case there are some demands of certification.

As of today:

- to our knowledge the only solution that works is the one developed by ASFA in France, acting on behalf of 18 Toll Chargers;
- no other toll chargers or toll operators have the resources to lead such a process;
- every time a major change is introduced within the OBE, this must be submitted again to all the certification bodies in every country/domain; this is an expensive and time consuming process.

We suggest developing a European Body that may act on behalf of all the Member States.

2.3.6. Toll context data (Article 6)

No specific comments on this particular provision, as it is still relevant and does not need to be updated.

2.3.7. Tolls (Article 7)

This provision of the Decision specifies how tolls shall be calculated and how Toll Chargers and EETS Providers should cover the liability for tolls that cannot be collected.

Specific SLA should be defined and implemented as part of the agreement between a Toll Charger and an EETS Provider, in order to unambiguously specify the boundaries of responsibility of the two. Such SLA might be inspired by similar SLA which are today in place for the acceptance of credit and fuel cards as payment means for toll collection, suitably adapted to take into account the specific technical solutions.

We believe that the last sentence of the provision should be removed from this provision, although relevant, or integrated with similar provisions for GNSS based systems.

2.3.8. Accounting (Article 8)

This provision of the Decision specifies the principles upon which the accounting principles of Toll Chargers and EETS Providers need to be set-up and operated.

We believe that such principles are absolutely relevant and should be possibly further reinforced. Taking into account the history of some tolling systems in Europe, some of

the aspiring EETS Providers have been set-up as a spin off of Toll Chargers; therefore a risk exists that the two activities are partly overlapped.

In particular there are, with respect to specific Toll Domains, Toll Chargers and aspiring EETS Providers who still share parts of the technical platform required to operate their respective services. Where it applies, it is necessary to ensure the proper allocation of investments and costs in order to ensure a non discriminatory access to the market.

2.3.9. Rights and obligations of the EETS Users (Article 9)

This provision of the Decision specifies the rights and the obligations that apply to the EETS users along with the use of the EETS service.

We believe that this provision is still relevant.

2.3.10. Conciliation Body (Articles 10 and 11)

This provision of the Decision specifies the establishment of the foreseen Conciliation Body as well as the applicable procedures to be implemented for the handling of mediations.

We consider that the issues between toll chargers and EETS providers are mostly concentrated before the start of operations. For example, in Belgium, the EETS provider are directly discussing with Viapass and we can't imagine that there could be a Belgian third party which has an up-to-date level of tolling knowledge to be efficient and which is playing a role of facilitator.

Then if such a Conciliation body exists, then there are questions like its permanent availability to be able to intervene within a period of 1 month, its daily cost, ... then the delay of 6 months maximum to formulate an opinion is too long if moreover we are approaching the start of operations

Our vision is that the Member States have not always the expertise and the resources to organize a Conciliation body and our recommendation is to establish one at the European level. It will facilitate the interoperability because the stakeholders will speak the same language.

2.3.11. Technical provisions (Articles 12, 13 and 14)

This provision of the Decision specifies some technical and operational requirements that shall be considered in the design and provision of the OBU to the EETS users.

As far as tolling is concerned, the provision is relevant and should not be modified. The specific requirement concerning the human interaction (that needs to be taken into account when designing the HMI interface of an OBU) should be taken into account when specifying the minimum harmonised characteristics of the interoperable OBU. Member States, and respective Toll Chargers, shall accept and manage the EETS OBUs respecting these minimum requirements, independently from the specific local and national provisions.

We understand that every Member State should be allowed to specify an OBU with a HMI interface respecting national requirements and to deploy specifically designed OBUs for national toll collection services; nevertheless the legal framework for the provision of the EETS service should ensure that, independently from the national specific requirements, each Toll Charger shall accept the EETS OBUs even if they do not respect national requirements.

This is the reason why 4icom recommends to proceed with Member States (or/and Toll Chargers) towards the development of a harmonised set of specifications for a European GNSS OBU/Proxy (including functionalities, performances and services), to be used as the reference on which any new tolling schemes would be based.

Then, it would be important to take into account the EETS provider's point of view and the conclusion of the Regional EETS project and then finance a demonstration project of an OBU/Proxy (3 models minimum), that will be certified for the different toll domains and allow the EETS Provider to get accreditation for those new OBUs.

The same concept applies also to the information that each OBU needs to make available for compliance check control. The experience with the implementation of existing systems has shown that, independently from what is specified by the European standards, Member States tend to integrate specific requirements on the information that each OBU shall make available to enforcement agents for control purposes. Such local requirements often pose constraints on the characteristics of the OBUs and of their working modes, so limiting interoperability with OBUs that have been distributed within other Toll Domains.

For example:

- the functional requirements specified for the Taxe Poids Lourds system in France included for all OBUs (therefore including the OBUs potentially distributed by EETS Providers) the need to make available (via the DSRC interface) a set of attributes that goes beyond the list specified by the ISO 12813 (CCC) norm;
- the functional requirements specified for the Viapass system in Belgium includes the obligation for all circulating OBUs to make available at all times certain information concerning the registered toll declarations, that poses constraints on the adoption of a Thin Client approach.

Besides the tolling application, this provision outlines the need for the EETS OBU to enable the implementation of future other location-based services. This is a very reasonable requirement, but it needs to be better developed and to be taken into account by the minimum specification to be met by the EETS OBUs.

Again, also in that respect, specific national requirements (as it was the case in France with regards to the need to comply to the data protection regulation) can impose additional burden onto the OBU (and in general on the technical platform developed and operated by an EETS Provider) that may put interoperability in doubt. It is therefore necessary to harmonise such provisions at European level.

We believe that a detailed set of specifications should be developed with respect to the EETS OBU, and that these specifications should be used to certify the conformity to specifications and suitability for use.

The rules concerning the verification of the suitability for use should be also harmonised at European level and taken into account within the specification of the OBUs and of the others elements of the systems (for example the tolling and enforcement related roadside equipment).

2.3.12. Safeguard clauses (Articles 15 and 16)

This provision of the Decision specifies a set of safeguard clauses with respect to the handling of interoperability constituents bearing the CE marking.

This provision is still relevant to our point of view.

2.3.13. Notified bodies (Article 17 and 18)

This provision of the Decision specifies the administrative arrangements related to the bodies entitled to carry out or supervise the procedure for the assessment of conformity to specifications or suitability for use (referred to as notified bodies).

Certification of conformity and suitability for use represents a key success factor for the deployment of an interoperable EETS service and therefore the certification chain should be properly developed and reinforced.

We believe necessary that an harmonised procedure for the assessment of the conformity and in particular of the suitability for use should be put in place as soon as possible; at the same time it is necessary that the market is characterised by as many notified bodies as possible, and that the declaration of conformity issued by them are really recognised by Toll Chargers across Europe.

This objective may be achieved only by finalising a set of specification for the interoperable OBUs that takes into account:

- the conformity to the different applicable standards;
- the capacity of these OBUs to properly (and with sufficient level of performance) operate in all the different toll domains.

We believe that the suitability for use has not been yet sufficiently explored and the harmonisation of such requirements is necessary. To show how much such harmonisation is important we would like to outline the fact that very often different requirements in terms of OBU installation that apply for the different domains, even within the same country.

This is the reason why we recommend to define and operate one Pan European notify body. The Notified Body will also supervise the European certification body.

Its status and governance will have to be defined with the Member States.

2.3.14. Registers (Article 19)

No specific comments with regards to these provisions.

2.3.15. Final provisions (Articles 20, 21 and 22)

No specific comments with regards to these provisions.

2.3.16. Content of an EETS Domain Statement (Annex I)

The Annex I to the Decision specifies the content of the EETS Domain Statement that each Toll Charger should develop and publish in regards to its own toll domain.

The Decision currently specifies that the EETS Domain Statement shall contain:

- a section on the financial requirements towards the EETS Providers;
- a section on the procedural conditions to be fulfilled by the EETS Providers along with the provision of the EETS service.

This list cannot be considered exhaustive, as a EETS Domain Statement should include many more provisions.

We believe that the Decision should be much more prescriptive with regards to the structure and to the content of the EETS Domain Statement.

A Domain Statement should in fact include:

- a section with the description of the concerned road network or infrastructure, including all the contextual data (network extension and topology, characteristics of the vehicles that are subject to the payment of the fee as well as those exempted, parameters and rules for the calculation of the fee);
- a section with the functional and technical requirements to be fulfilled by the EETS Provider (in particular with regards to the OBU) as well as detailed interface specifications;
- a section with the key performance indicators to be fulfilled by the EETS Provider during the provision of the EETS Service, as well as the
- a section with the procedures to be implemented by the EETS Provider along with the provision of the EETS Service;
- a section with the contractual terms supporting the relations between the Toll Charger and the EETS Provider ("General Terms and Conditions");
- a section with the economical elements, i.e. with the rules along which the EETS Provider will be compensated by the Toll Charger for the provision of the service as well as any bank guarantee (or equivalent) that the EETS Provider needs to put in place.

The structure and the content of the EETS Domain Statement need to be more harmonised, and this needs to be laid down within the Decision.

Nowadays each Toll Charger is developing the Toll Domain Statement along with a specific structure and, besides the technical specifications (of which we have talked in several other sections), tends to implement specific procedural and contractual rules.

Whereas we cannot expect that the procedures and the contractual terms will be completely harmonised, as each domain may have specific constraints, it is necessary

that a minimum set of information should be harmonised across the different Toll Domains.

2.3.17. EETS Stakeholders Roles and Interfaces (Annex II)

The Annex II to the Decision lists the different interfaces that need to be established between the system components operated by the Toll Charger (roadside equipment and back-office) and by the EETS Provider (OBU and back-office).

The interfaces listed by this Annex II are correct and exhaustive. Nevertheless the experience made with the implementation of such provision within the Taxe Poids Lourds system in France has outlined two specific problems that need to be solved.

The first problem regards the section 3 of the Annex II, which lists the interfaces that each OBU distributed by the EETS Providers; it specifies that each OBU distributed by the EETS Providers will support the three following interfaces:

- the DSRC charging transaction, for communication between the OBU and the roadside equipment in the frame of DSRC-based tolling systems;
- the real-time compliance checking transactions, for communication between the OBU and the fixed and mobile enforcement equipment;
- the localisation augmentation (where applicable), for communication between the OBU and the augmentation beacons (LAC) within the GNSS based systems.

It is necessary that a clear reference to the technical standards be made within this annex; in particular, for sake of clarity, we believe that this section should be amended as follows:

3. As a minimum, standardized roadside interfaces between OBE and Toll Chargers' fixed or mobile equipment shall enable:

- a) DSRC (Dedicated Short-Range Communication) charging transactions, along with the EN 15509 standard;
- b) Real-time compliance checking transactions, along with the ISO 12813 standard;
- c) Localisation augmentation (where applicable), along with the ISO 13141 standard.

EETS Providers must implement all of these three interfaces in their OBE. Toll Chargers may implement any or all of these interfaces in their fixed or mobile equipment according to their requirements

Besides the reference to the applicable standards, the detailed specification of the above mentioned interfaces is often not harmonized across the different domains, as the standards allow for the integration of private attributes within the transactions.

This issue is particularly sensible in the frame of the real-time compliance check (CCC) transactions. The standard ISO 12813 (“Compliance check communication for autonomous systems”) is formally supporting the read out from the OBU of private attributes, in addition to the harmonized attributes that are specified by the standard itself.

By leveraging this option of the standard, each Toll Charger tends to specify additional private attributes to be retrieved from the OBUs. It has been the case in the Taxe Poids Lourds system in France, and it is anticipated for the Toll Domain in Germany.

As a result of that, the EETS Providers need to continuously upgrade their OBUs in order to take into account to new requirements, with negative impacts on the technical interoperability.

The second problem regards the interface between the back-offices of the Toll Charger and of the EETS Provider (as referred to by the section 4 of the Annex).

The Decision requires that the following sub-interfaces are supported, with reference to the high level architecture:

- Exchange of toll declaration data, i.e the interface for the exchange between the Toll Charger and the EETS Providers of the charge data on the use of the tolled infrastructure (sub-interface 3.1);
- Invoicing/settlement, i.e. the interface for the sending and the settling of invoices between Toll Chargers and EETS Providers (sub-interface 3.2);
- Exception handling (enforcement support), i.e. the interface by which Toll Chargers may request EETS Providers to supply specific information about their customers in the frame of an enforcement procedure (sub-interface 3.3);
- Exchange of EETS blacklists, i.e. the interface by means of which the EETS Providers may distribute to a blacklist of OBE/Account to Toll Chargers (sub-interface 3.4);
- Exchange of trust objects (security keys, certificates), i.e. the interface by which Toll Chargers and EETS Providers may exchange security related elements (sub-interface 3.5);
- Sending of Toll Context Data, i.e. the interface by which a Toll Charger will provide the EETS Providers with the elements necessary to detect the passage of a vehicle through a charging point and to calculate the toll (sub-interface 3.6);

Under the assumption that the exact implementation of these interfaces will depend on whether a DSRC- or a GNSS-based system is implemented.

The ISO 12855 (“Electronic Fee Collection – Information exchange between service provision and toll charging”) was expected to specify in detail these interfaces.

The experience made with the implementation of the Taxe Poids Lourds system in France has outlined several problems in the use of the standard ISO 12855 for this purpose. In fact this standard was not able to support all the data exchanges as specified by the functional requirements in that project.

We believe that the ISO 12855 has been developed at first without taking into account real requirements, in particular concerning GNSS systems (as no real implementations

existed at the time, at least implementations coherent with the Decision). It results in that standard not always being applicable.

One of the key issues influencing this is the decision of Toll Chargers who have to calculate the tariff associated to the passage of a vehicle through a charging point. Whereas this is quite clear in the frame of DSRC based systems, there are different interpretations concerning GNSS based systems.

In the Taxe Poids Lourds system in France, the Toll Charger required each Service Provider to transfer the raw data (GPS coordinates) associated to the passage of a vehicle across a charging point, with the Toll Charger itself being in charge for the detection of the passage and for the calculation of the associated fee.

In the KCSBE system in Belgium, the Toll Charger requires the detection of the passage through the charging points and the calculation of the fee to be performed by the EETS Providers.

These two cases have clearly an impact on the data exchange between the EETS Providers and the Toll Chargers; in the first case a set of GPS coordinates has to be transferred, in the second case a toll transaction has to be produced and transferred.

The standard was not able to support the implementation in France and the ISO 1285 was only partly used for the data exchanges between the Toll Charger and the EETS Providers.

On one side the ISO 12855 has been developed without taking into account the actual implementation requirements, and it should be therefore further developed in order to take into account the requirements coming from Toll Chargers. The standard should also account for different type of implementation, considering the difference between DSRC and GNSS based systems.

On the other side the ISO 12855 standard is actually not mandatory, and Toll Chargers (and EETS Providers) are left free to decide whether using it for the data exchanges or not; this results in different requirements from Toll Chargers and therefore in interfaces that are not harmonised.

We believe that, for both DSRC and GNSS based systems, the ISO 12855 should specify one or more profiles (in case one only is considered too prescriptive) and Toll Chargers should mandatorily make use of one of them for their exchanges with EETS Providers.

2.3.18. Essential requirements (Annex III)

The Annex III of the Decision lists a set of requirements (general and specific) that should be taken into account in the design and the implementation of electronic toll systems supporting the EETS service.

Specific comments are provided here below to each of the listed requirements, following the sequence by which the requirements have been listed by the Annex III.

Safety/Health

This provision requires that the OBUs (or better any devices intended to be handled by the users) are to be designed as not to impair the safe operation of the device and the health and safety of the users.

Although the requirement is clear, it is advisable to make express reference to existing regulations, such as – for example – the Directive 2004/108/EC (“EMC”), the Directive 77/649/EEC (“Field of Vision of Motor Vehicle Drivers”) and the Directive 2002/95/EC (“Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment”).

Reliability and availability

This provision specifies high-level requirements to be fulfilled by all players involved to ensure that the system components involved into the provision of the EETS service are reliable and available.

As terms like reliability and availability can be interpreted differently, we believe that is necessary to precisely define service level to be matched by the different components.

A service level should be defined for:

- the OBUs, by means of a Mean Time Before Failure (MTBF) and a maximum Defect Rate on a yearly basis;
- the roadside equipment, by means of an availability rate in %;
- the back-office interfaces, by means of an availability rate in %.

The Toll Chargers and the EETS Providers shall then develop and make available a disaster recovery and a business continuity concept for their own components.

Environmental protection

This provision requires that both the OBUs and the roadside equipment must be designed and manufactured in such a way that they are electromagnetically compatible.

In order to introduce each of these equipment on the market (and therefore on the field) the respective manufacturers need to obtain the CE marking. The CE marking of an equipment (whether it is a radio equipment or not) requires performing specific tests in accordance to the Directives 2004/108/EC.

Technical compatibility

This provision requires that the components of the system under the control of the Toll Chargers and of the EETS Providers respectively shall be compatible.

This means that they should be developed on the base of the same interface specifications.

In order to achieve that, we believe that it is important to develop and impose more prescriptive technical specifications and standards, so that all involved players will have to refer to the same technical documentation.

Security/Privacy

These provisions specify that the components of the EETS shall integrate suitable mechanisms ensuring the security against fraud and privacy for the user data.

These provisions are pertinent but they need to be further developed and harmonized throughout the EU, as they can have a significant impact on the characteristics of the components of the systems to be deployed by both the Toll Chargers and the EETS Providers.

Nowadays, in absence of harmonized requirements and specifications in that respect (beyond what is defined within the applicable norms), each Toll Charger refers to specific requirements in terms of:

- data security;
- data privacy.

As an example of that, we would like to put forward the experience we had during the implementation of the Taxe Poids Lourds in France.

As far as data security is concerned, amongst others, the type approval decree that was published in France and that had to be fulfilled by the technical components of the key data handling chains (tolling and enforcement related) made reference to the fact that data security should conform to the requirements and constraints on the selection and the dimensioning of the cryptographic mechanisms recommended by ANSSI (“Agence Nationale de la Sécurité des Systèmes d'Information”), the national body for the security of information systems.

These recommendations included a list of security mechanisms that could be considered acceptable to ensure the necessary level of security (e.g. the use of security keys of at least x bytes when using authentication mechanisms based on public/private keys).

In a similar way, the requirements laid down by the Toll Charger specified that the system should have been approved by the CNIL (“Commission National de l'Informatique et des Libertés”) with respect to data privacy.

Although these issues are analyzed always keeping in mind whether the access made to specific user-related data is justified by the reason why they are accessed, the interpretation of what can be justified or not may differ from Member State to member State, also depending on specific local regulations.

In this specific case, for example, the fact that the system set-up by the operator (“Ecomouv”) acting on behalf of the Toll Charger as well as other systems to be operated by the Custom Authority had to be approved by the CNIL had the consequence that both Ecomouv’ and the ETS Providers were obliged to implement a technical solution along which the GPS coordinates to be used for the tolling system had to be clearly separated (at the source) from the other data that the OBU collected

to support other services to be offered by the ETS Providers (for example fleet management).

As long as each Toll Charger specifies its own set of rules, the characteristics of the equipment (in particular the OBUs) risk diverging.

General infrastructure requirements

This set of provisions specifies some requirements to be met by the roadside infrastructures to be deployed by the Toll Charger for the handling of electronic toll collection systems.

The following comments are worth mentioning, with regards to some of the provisions:

- the provision specified by the section 2.1.1.2 is not really clear; whereas the accuracy of the toll declaration must be clearly ensured, this provision should be better developed in order not to leave place for interpretation;
- the provision specified by the section 2.1.1.4 is not really clear; this provision should be better developed in order to clarify whether reference is made to the implementation of appropriate security mechanisms (e.g. authentication of OBUs in front of the roadside infrastructure) or other;
- the provision specified by the section 2.1.1.5 should be reinforced; the Decision should impose that OBUs integrate suitable diagnostic tools to detect any functional and technical problem preventing the OBU to properly work and register the road usage, and that in this case the OBUs should inform the user.

The other provisions are considered still relevant.

Microwave technologies based toll systems

This provision specifies the minimum characteristics that must be met by the OBU and by the roadside equipment respectively in order to ensure interoperability.

With regards to the OBU to be distributed by the EETS Providers, it is required that they support a DSRC communication along the standard EN 15509 (harmonized application profile for electronic toll collection systems) as well as the ETSI ES 200674-1 (Technical Characteristics & Test Methods for High Data Rate Data Transmit, i.e. the profile used within the Toll Domain in Italy).

This provision, as it reads, requires that all the OBUs distributed in the frame of the EETS service support both protocols, the harmonized application profile for the DSRC based electronic toll collection systems across EU and the one used in Italy.

From a technical perspective, this provision can be considered as applicable; nevertheless not everyone shares this interpretation of the provision, and several EETS Providers prefer to offer two different OBUs rather than procuring or developing an OBU supporting both protocols.

As detailed elsewhere within this report, the following two options are envisageable for the sake of clarification:

- either this provision is reinforced to expressly require that all the EETS OBUs support both communication protocols;
- or the provision is modified in a way to let the EETS Providers to decide whether supporting as well the communication protocol used in Italy within a same OBU or by distributing a separate OBU.

With regards to the roadside equipment, this provision requires that the fixed and mobile roadside equipment support either the EN 15509 profile (for all EU installations except for Italy) or the ES 200674-1 profile (in Italy).

We believe that the provision can be left as it is.

For both the OBUs and the roadside equipment, we believe necessary to also specify the support of the ISO 12813 standard for the enforcement applications.

Global Navigation Satellite System (GNSS) based toll systems

This provision specifies the obligations that the EETS Providers shall comply with regards to GNSS based tolling systems.

We believe that this provision needs to be further developed and made coherent with the equivalent provisions made for the DSRC based systems (section 2.1.2 of the same Annex), along with the development (as mentioned elsewhere) of one or more harmonized application profiles to be supported by GNSS based systems.

This section should expressly make reference to the need for all GNSS-based OBUs to support one or more of the specified application profiles.

Operation and Maintenance requirements

No specific comments with regards to these provisions, except a reminder of fact that every country tends to have local data protection regulations that often prevail on the EU-wide regulations and Directives.

2.3.19. Conformity to specifications and suitability for use (Annex IV)

The Annex IV of the Decision describes the different procedures that can be implemented to obtain the certificates respectively for the:

- Conformity to Specifications
- Suitability for Use

In the first case, the certificate of conformity to specifications can be issued either via a self-declaration of the manufacturer (or his authorized representative) or via a Notified Body.

The certificate is released on the basis of the conformity of the equipment with the applicable standards, as referred by Decision.

At the moment this provision is not really exhaustive to GNSS based systems, as the standardization process is not complete for this kind of systems and moreover no harmonized application profiles have been defined.

A certificate of conformity to specifications released today for a GNSS OBU, for example, simply establishes that the OBU is conform to the DSRC-based standards (still applicable as the OBU integrates a DSRC interface) but nothing can be certified with regards to the GNSS based functioning.

In the second case, the certificate of suitability for use can be issued either by each Toll Charger (for the relevant Toll Domain) or again by a Notified Body.

The issue of such certificates has the objective to ensure the Toll Chargers and the EETS Providers about the correct functioning of the relevant system constituents (among which the OBUs and the roadside equipment) in a productive environment.

Today a similar process exists (more or less formalized) in countries such as – amongst others - France, Austria and Spain; the process is directly managed by the Toll Chargers or by their authorized representative.

In the specific case of the OBUs (either DSRC or GNSS based), an ETS Provider (and in the future an EETS Provider) is obliged to undertake a different certification and/or a type approval process in each different toll domain.

The following three steps are typically part of the activity aiming at the issue of such certificates:

- laboratory tests;
- field tests in a controlled environment (e.g. test site);
- operational tests with a limited number of user.

Very often the Toll Chargers are obliged to involve the manufacturers that supplied them the roadside equipment and the OBU distributed for the local users; this involvement sometimes brings forward problems related to competition among industries and may cause discrimination.

The second option offered by the Decision to obtain the certificate for Suitability for Use, the one with the involvement of the Notified Bodies, has not been yet used by any manufacturer, mainly for the lack of Notified Bodies and for their incapacity to perform all necessary tests.

We believe that, independently from whether this process is implemented by Toll Chargers or by Notified Bodies, it is advisable to develop a technical standard detailing and harmonising the tests to be performed across EU, in order to avoid discrimination.

In any case, we would like to stress the fact that a more significant implication of Notified Bodies would help to speed up the process and to make it even more cost effective for the EETS Providers.

The Notified Bodies (as detailed by the following chapter) needs though to be put in the conditions to perform the necessary tests and their certificates need to be accepted by the Toll Chargers.

2.3.20. Minimum criteria for notifying bodies (Annex V)

The Annex V to the Decision lists the minimum criteria upon which the Member States would notify bodies as Notified Bodies in the frame of the Decision.

The list of minimum criteria is derived from well-established EU regulations therefore can be considered as relevant and applicable.

Nevertheless, we believe that, in order for the Notified Bodies to be able to properly perform the work they need to do, they must be able:

- to access an exhaustive set of functional and technical specifications;
- to perform laboratory tests with the different equipment;
- to perform tests in controlled environment simulating the real operational setting where the equipment will be used;
- to perform, with the cooperation of Toll Chargers, operational tests with the use of a set of real users over a significant amount of time (let's say 3 months).

Besides the problem of the specifications, which mainly affects the GNNS based systems, we believe that a Notified Body will find significant problems to perform tests in an operational environment (real and controlled), as only Toll Chargers (and manufacturers) can have access to test sites and the required investment is not affordable for a Notified Body.

As a potential solution, we may envisage that the EC finance the setting up of one or more testing centers where the different test environment may be set-up to be representative of all the operating environment within which the OBUs and the other equipment must be used; Toll Chargers and EETS Providers may have a specific interest to contribute to that.

2.3.21. Vehicle classification parameters (Annex VI)

The Annex VI of the Decision contains a set of provisions with regards to the vehicle classification parameters to be used, in the frame of the EETS service, to classify the vehicles and to calculate the corresponding fees.

Nowadays the existing tolling systems make use of set of classification parameters that are slightly different among Member States; most countries make use of the same parameters, such as the number of axles, the height of the vehicle on the first axle, the maximum allowable weight and the emission class, but then several Member States have introduced specific parameters that make a EU wide harmonization impossible.

The parameters upon which vehicles are classified have gone through a certain evolution, typically along with the technological evolution and with the introduction of free-flow charging mechanisms.

When an OBU is present in the vehicle, the OBU is storing all the different classification parameters so that they may be used either by the roadside equipment or by the OBU itself (in connection with its Proxy) to calculate the fee. In most systems (either in single lane or free-flow configuration) the tariff is calculated on the base of the information retrieved from the OBU.

In the case of free-flow systems, there is a certain harmonization of the classification parameters; all systems make use of the following parameters:

- number of axles;
- emission class;
- maximum allowed weight.

The harmonization cannot be extended to all tolling systems, as the more traditional single lane systems make use of legacy parameters that are retrieved by measuring the vehicles upon its passage by means of roadside devices.

Nevertheless, we believe that, to support interoperability in the near future, an harmonization of the classification parameters for free-flow applications should be implemented.

It is also worth a mention that there is a specific problem in the operation of tolling systems where the tariff is based also on the emission class. In fact, although the structure of the vehicle registration papers have been harmonized across the EU, it is very difficult for a user to understand – by reading through the registration papers of the vehicle – what is the emission class. The same problem applies where a vehicle's registration papers were issued before a certain date, the registration papers follow a non-harmonized structure.

Sometimes this causes the user to declare a wrong emission class and therefore brings about cases where the user is paying a higher tariff. We believe that a further harmonization should be achieved in that respects, to ease up the interaction of the road users with the tolling systems, either by changing again (not really feasible) the format of the vehicle's registration papers, or by pushing towards the use of electronic vehicle's registration documents (based on chip cards), or finally by allowing users to easily understand the characteristics of their vehicles by accessing to a database.

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