Ticket to ride

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Abstract
The start of the European Electronic Toll Service (EETS) appears far from being thoroughly realized, because of the unclear definition of a business model especially from the point of view of the EETS Providers. Toll Chargers started to approach EETS at a greater speed, as they shall accept any possible Provider from October 2012.

The EETS Directive is one of the factors affecting the next architecture of transport ICT, as well as the Eurovignette Directive and the ITS Directive. This paper analyses how the different approaches existing in the European countries for the management of tolling schemes create a growing need to harmonize criteria that, on one hand respect the traditions of member States and, on the other, help find the key towards a European vision of mobility. The need of harmonization is also confirmed by the latest development in the new European toll motorway systems, which have to take into account not only National needs (e.g. to guarantee back compatibility with existing local systems) but also those coming from the new perspectives at European level.

Some future perspectives that could facilitate the vision of business models for the EETS Providers are analyzed, considering the roles of automotive industry, urban and maritime mobility and mobile technology.

Keywords:

The state of the art
After the publication of the 2009/750/EC Decision [1] about the EETS (October 2009) and its immediate acknowledgment into the member States legislation, the start of the European Electronic Toll Service seemed very far from being realized, in spite of what the document stated about time schedules: October 2012 entry in force for Heavy Goods Vehicles and
October 2014 for Light Vehicles. The reason of that was mainly to be searched in the difficult vision of business models especially from the point of view of those who are the main actors in the architecture: the EETS Providers.

The EETS Directive is not the only one affecting the new architecture of transport ICT. Let us imagine, at least for what concerns Road Traffic and Transport Telematics dedicated to automated debiting systems, a series of circles enlarging their boundary. Let us call the smallest one (not for importance, but only because it is the starting point) the “How Much” circle because it contains the Eurovignette Directive [2]. This Directive represents a new philosophy related to the tolling schemes in Europe. In other words, this documents gives member States the criteria to be applied in order to determine tariff schemes based upon the real cost of infrastructures and their use. Let us call the larger one the “What Way” circle, because it contains the EETS Directive [3]. This Directive represents a technical guide to be followed by the stakeholders in order to enlarge their view and “think Europe” for what concerns toll services. The main difficulties of this new role (as stated in the Decision) is both linked to an important financial guarantee that providers, willing to be part of the game, shall give to Toll Chargers (even though depending from situation to situation) and to the long path towards the status of EETS Providers, given the fact they should sign contract with every EETS Toll Charger in the Union within a very short period of time (24 months).

On the other hand, Toll Chargers in the member States started to approach the EETS world at a greater speed due to the general awareness of being ready to accept any possible EETS Provider from October 2012.

The obligation they have to choose their own technology among the ones specified in the 2009/750/EC Decision, at some extents, pushed them to imagine the next future scenario in which local toll services will be in operation together with the EETS and, in particular for those who manage a cross border situation, to speed up a bit because the nearness of possible new EETS clients coming from a different member States motorway must not find them unprepared.

The art of the (member) States

The important is to arrive. Europe is made of different cultures, different approaches, different organizations, different views related also to tolling schemes. Some Countries are familiar with tolling schemes and tolling architectures to finance the maintenance of infrastructures, other countries are more familiar with models based upon taxes, some other are familiar with only some kind of toll infrastructures but roads (like bridges, ferries, tunnels and so forth) and some other countries may not have toll infrastructures at all. Some Countries apply the Concession model, some other apply models based upon a direct involvement of Ministries as the Toll Charger. If we investigate the criteria laying behind these different interpretations the answer is probably very simple and it depends upon geographical positions and different political road maps. None of them is “the way”, but all of them represent Europe. The
challenge is to harmonize criteria trying to respect the behavior and the tradition of people. If the target is to really allow the free circulation of persons and goods within the boundaries of Europe (…and who knows, maybe of the whole world), tools must be given to travellers in order to really make feel them free. Everyone feels comfortable at home because he/she knows the internal rules and the tools he/she may use for the needs; if we try to “extend” the home boundaries (virtually speaking) creating an interoperable zone with the same behaving criteria for every single State, we are probably on the right way to design the true European mobility. If we think at the difference (in shape and tension) among the power supply plugs used in the world, we may well understand that the most suitable solution to travel without trouble is to have in the luggage a “multi-purpose” plug capable to be coupled with all the existing systems in Europe. The solution tool is represented by a sort of a universal “plug” capable to be used, without any trouble, wherever in the world. They sell it in any airport or electric supply store. In the case of EETS the “plug” may be represented by an On Board Unit capable to guarantee the freedom of circulation across Europe for those who are interested in having a European scale service.

The latest development in the European newly born toll motorway systems is confirming, on one hand, the growing need of a homogeneous technical architecture and business model and on the other hand the nearer and nearer start of a common layer allowing the free circulation of vehicles also on toll infrastructures. New European tolling schemes bids for tenders have their framework built upon the previously described Directives and Regional approaches to large scale systems is easily recognizable. As a further important signal, a Regional approach for EETS is what the European Commission seems to accept as a good start towards large scale European interoperability. In other words, EETS will start in a slightly different way from what it was conceived at the beginning: in order to create a sustainable business model the idea is to make the model evolve starting from bilateral agreements among the parties. Therefore, at the beginning, we may talk more about E-RETS (European-Regional European Toll Service) that a true EETS. But it is not difficult to imagine this is a very smart way to attract other realities to this service, even they are not directly linked to the motorway sector (e.g. the management of urban-suburban traffic and logistics by local administrations).

As stated in an official document published by the European Commission some month ago, a considerable number of achievements has been reached towards the EETS start up, though there is a range of different opinions relative to the progress made, reflecting the variety of member States' and professional stakeholders' perceptions. Among these, the most relevant are related to:

- the start of work for the Coordination Group of EETS Notified Bodies: this Group has the aim of creating a common playground for those entities who have their core business in evaluating and certifying the equipment that guarantee interoperability: the On Board Equipment and the Road Side Equipment. This playground will have to be built in such a way to allow any member State Notified Body to certificate any equipment coming from
any member State technology provider. The experience of every member State in this sector is put and discussed in this table;

• *for the majority of member States, the availability of national electronic EETS Registers*: as a direct consequence of the previous bullet, member States will have to set up register in order to publish the information related to the Notified Bodies available and recognized by the National and European legislation;

• *for every member State, the public availability of EETS Toll Domain Statements*: containing the criteria which are the basis of the tolling schemes applied in every member State in order to allow the user to know and understand what tolled infrastructure he uses and how much he has to pay for the levied toll. Several member States published official documents (as requested by the schedule of the European Commission) describing in details which are (for instance) the Toll Chargers registered in that member State with their toll domains subject to the EETS together with the toll domain statements. In Italy, for instance, a section of the *Ministero delle Infrastrutture e Trasporti* web site [4] is dedicated to the Register of Toll Chargers (with their related Toll Domains and Toll Domain Statement) and, in a separate section, the Register of EETS Providers. In each section a download is allowed to get public documents;

• *the start up of work related to Conciliation Bodies*: which will help solving oncoming disputes between Toll Chargers and Service Providers, before they eventually decide to go in court. The perception is that many of the dispute can be solved by mean of agreements between the parts and this is what the Conciliation Body will have to try to achieve;

• *the general adoption of system based upon the requested technical standards*: this is not only a mere technical question, but also a commercial question and a balance with existing systems. New European scale systems are based upon technical standards already available (as stated in the Decision 2009/750/EC) and the new systems will have to take into account these new technologies indeed; but member States cannot forget the existing systems and commercial formulas dedicated to domestic users, as many Toll Chargers have made huge investments for. Heavy Goods Vehicles traffic has a different approach from the Light Vehicles one, due to a different business model offered to users by Providers. What appears acceptable is consequently an initial phase of parallel life between European scale services and local ones, until a break even limit will be able to offer, at reasonable costs for the users, large scale services compared to local ones.
As a consequence, a list of actions has been defined by member States, in force of their obligations and in order to prevent possible infringement procedures where necessary. The road map is slowly coming out to make proposals to converge the format. Besides, common contractual clauses between Toll Chargers and EETS Providers are expected. Service Providers are consequently changing their position from watchers to active stakeholders in order to create interesting business models in an ITS world which is rapidly changing.

Perspectives for the EETS Service Providers

An initial unclear definition of an appealing EETS business model, from the point of view of Service Providers, was due to some factors:

1. first, the unclear role of the automotive industry. It appears evident that if, technically speaking, EETS OBU’s will be born together with vehicles (it is a mere question of costs) the industry itself will have a big chance to put constraints in the architecture and consequently create sources of income.

2. the possible introduction of new added value services linked to EETS, not yet mature for a real market. The growing request of urban mobility in many European cities could suggest Providers to intertwine services linked to the motorway environment with those arising from local needs. So, for instance, city administrations could decide to rely on EETS-like models to better manage limited traffic areas accesses and create packages in which (for instance) parking and hotels are part of, taking advantage of the fact that interested international EETS users may have already installed the OBU (and consequently its setting). To fulfill local administration particular offers seems only a question of service subscription and software adaptations. More, maritime mobility represents another appealing factor for the growth of EETS, because many current long procedures for the management of vehicles to be transported by ferries could be easily solved by equipping specific areas with the suitable technological
devices capable to dialogue with EETS OBUs and therefore allowing very simplified web based procedures with conspicuous time savings. Last but not least, the continuous evolution in mobile technology architectures (CALM) is slowly changing the way vehicles communicate with control centers and with other vehicles and this will surely have a big impact to newly born added value services that we may not even imagine now.

One of the most important sign for a change in motorway mobility is the presence of new toll systems in Europe to manage not only expressways, but also state and normal roads. This is the case, for instance, of the French government that has awarded a bid for tender for the management of 13.000 km of roads. This system requires, obviously, also compliance with the specifications of the 2004/52/EC EETS Directive, in line with those interoperability concepts that the European Commission has been seeking for so many years. And the technical compliance is not only referred to hardware but also to back office procedure which are required, for instance, to be adherent to the EN ISO 12855 norm, describing the data exchange between Toll Chargers and Service Providers, conceived in the widest possible way. So, it is not a mere fantasy to imagine integrated platforms of multimodal applications in which Service Providers and Toll Chargers are not only referred to the motorway environment, but are also actors of regional and local needs once the web services give the opportunity to exchange data and provide them, for instance, to every possible new app for smartphone or tablet.

What about the future? Let us imagine…

The huge improvement of technical capabilities in the mobility sector, makes us imagine an incredible increase also in applications (and consequently in the provisions of applications) linked to many frameworks. So: which can be the future and the perspectives for mobility applications, given the fact that vehicles can communicate each other as well as with control centers, whenever gathered in new applications? Something is already happening with the new smartphones and tablets with apps downloadable by the user and it is not difficult to imagine that we are only at the beginning.

The new Internet Protocol version 6 (IPv6) is a version of the Internet Protocol (IP) intended to succeed Internet Protocol version 4 (IPv4), which currently directs almost all Internet traffic, but is running out of addresses. IPv6 allows up to $2^{128}$ addresses, a massive increase from the $2^{32}$ (about 4.3 billion) addresses possible with IPv4, and includes several other improvements. This allows us to think of thousands of new applications linked to mobility with the creation of new added value services. The market will likely be apportioned by those Providers with a smart approach towards it and a great fantasy in creating new services.

Conclusions

All what has been described before puts the stakeholders in a challenging positions which
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gives space to the most innovative ideas related to ITS. The upcoming freedom of communications and the wide market are the ingredients to develop ideas which help the growth of this sector towards a scenario that only 10 years ago was very difficult to imagine. DBA LAB is in the good position to play a leading role in the ITS and in particular in the whole EETS process, which is a relevant part of it. The software platforms (like ASSET® and LISY®) that DBA LAB is going to complete developing (based to the results deriving also from the work in standardization bodies) are a key factor in the acknowledgment of DBA LAB in the ITS industry. The acquisition of these platforms by major actors especially in some critical scenarios (like the Italian one) gives the Company the opportunity to have an important credential and reliability also at international level. ASSET® is a software compliant with EN ISO 12855 for the data exchange between Service Provider and Toll Charger in the EETS scenario and LISY is a platform devoted to the management of logistics. The two platforms (so distant from the point of view of the architectural design), in the next future, could operate within the same environment and this is something unimaginable up to a few years ago.

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