PAPER TEMPLATE

EETS – more than interoperability

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Abstract: The European Electronic Toll Service (EETS) had been introduced already ten years ago by the European Commission to harmonize the technological basis for electronic toll systems and foster the interoperability between tolling systems. The actual introduction of EETS still faces significant organisational, commercial and technical problems. This paper shows that the EETS regulation, beyond the interoperability aspect, has much more potential and provides a lot of opportunities for easier introduction or migration of tolling systems, the development of new business models and better support of hauliers and truck drivers.

Keywords: "EETS", "Business Case", "Interoperability"

EETS – what happened so far?

With the Directive 2004/52 and Decision 2009/750 the European Commission introduced conditions for tolling systems in Europe and created the framework for a European Electronic Toll Service (EETS) covering all electronic toll domains in Europe on a commercial basis. The implementation of EETS in the toll domains as well as the availability of the service to the user was foreseen for October 2012. However, not all toll domains are properly prepared for EETS and no EETS Provider is offering this commercial service to users up to now. There are various reasons that lead to this development, in particular:

- **High investment and procedural cost for Toll Chargers** – The design of the local toll system needs to be made EETS compatible. That includes not only technical implementation but also the preparation of the local legal, commercial and organisational framework. Toll Chargers have invested in their local systems and they are operating according to high quality standards. The investment into EETS may not lead directly and in the short-term to a more efficient toll collection.

- **High investment cost for EETS Provider to offer this service to users** – EETS Providers need to procure on-board units (OBU) and corresponding back office systems to offer the service in all toll domains. These systems shall cover all allowed tolling technologies to the EETS directive, i.e. satellite based tolling or microwave technology. Furthermore, concluding contracts with all Toll Chargers is cost- and time-consuming. Technical systems need to be maintained and updated according the changing requirements and conditions and the various toll domains.

- **Heterogeneous and cost-intensive registration and accreditation procedures** – Before entering into direct negotiations with Toll Chargers, EETS Providers once need to be registered by the Member State where they are established. This registration requires the demonstration of financial and technical capabilities for providing the service. After that, EETS Providers face a variety of accreditation procedures in the different toll domains, consisting of legal, commercial and technical conditions. The procedures and the conditions can differ significantly between toll domains and mutual recognition of already performed checks and tests between toll domains is limited.

- **Unclear remuneration schemes for EETS Provider services** – At the moment, remuneration of technical and payment services for EETS Provider´s services follows no common rules of European Toll Chargers. Currently, some Toll Chargers provide a remuneration scheme others not. It is unlikely that EETS can be financed by user fees only. Some Toll Chargers are bound by existing service contracts with toll operation companies and fixed remuneration schemes. Changing the business and remuneration model during the lifetime of such contracts is difficult. Therefore, EETS Providers might be reluctant to enter into a business where the earnings side is unclear.

- **Limited customer base** – A limited number of trucks is actually driving in several countries and can fully enjoy the benefits of a full European interoperable tolling solution. The total number of hauliers that would be interested in the EETS and the corresponding number of trucks will remain quite stable. For many trucks, the usage of the provided national tolling solutions may be sufficient.

The European Commission characterised the EETS implementation situation in their Communication document COM 2012(474) in August 2012. In the meantime, a European Project "REETS – Regional EETS" has been setup to work on open issues of EETS implementation and initiate pilot implementations to demonstrate the feasibility of the EETS. The main topics of the investigation of the project are contractual and risk issues, technical requirements for registration and accreditation of

EETS Providers, key performance indicators, back office interfaces between Toll Chargers and EETS Providers and security requirements. The REETS project started in September 2013. First results are expected in July 2014.

EETS – New chances

Currently, many stakeholders assess the EETS development not to be promising and even to be a burden, considering the mentioned difficulties in contrast to the limited opportunities. But the current discussion is focused on just the interoperability aspect of EETS and whether there is a real demand to be able to travel smoothly through all electronic toll domains in Europe. Some claim that it would be more beneficial to focus on local interoperability projects.
But such discussions are falling short of the fact that the EETS regulation is enabling much more potential for organizing tolling services in Europe. The EETS decision limited the number of allowed technologies to implement tolling systems. Furthermore, it introduced a business service model that enables EETS Providers to provide tolling services in all EETS toll domains when they comply with certain conditions. These provisions also support the further development of national tolling systems as well as the extension and introduction of new tolling schemes. In the following sections we will focus on certain aspects of tolling systems and how EETS regulation can support them.

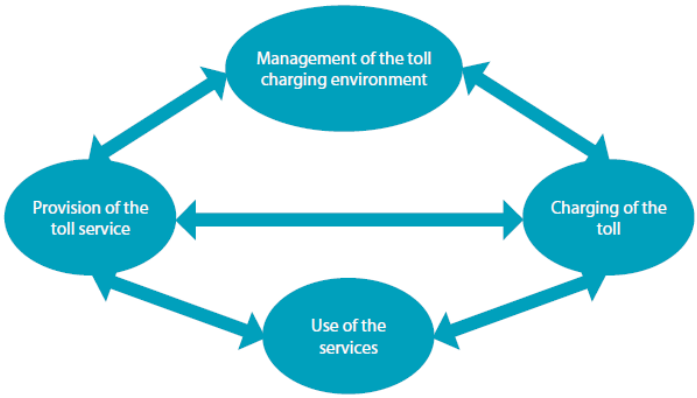

Figure 2: Main roles in EETS

Figure 1 – EETS business role model from [4]

Competition for providing tolling services

So far, most of the nation-wide tolling systems were procured as a complete system in a public tender procedure, assigning a service contract to a single consortium for a long time (usually between 8 and 12 years). That means that this consortium would implement and operate the tolling system and providing all toll liable vehicles with the proper on-board equipment. The EETS regulation broke up

this monopoly situation and defined the conditions under which EETS Providers could also offer their tolling service in these toll domains. Although the actual implementation of EETS is behind the schedule prescribed by the EETS decision, the legal framework and obligations have been defined.
Therefore, the introduction of EETS has and will contribute significantly to further develop a market for tolling services. More competition and a market for EETS Providers will eventually lead to high quality and advanced services for the customers of these providers. Toll Chargers would have the chance to reduce their dependency from a single national provider and seek for new and more market-orientated models of tolling.

Ease introduction of new tolling schemes and migration of existing systems

Current projects for the introduction of new tolling schemes or the migration from existing systems to a new system or a new provider (from tender to implementation and pilot operation) require a huge effort and likely can take several years. The existence of EETS Providers, having hauliers under contract already, can lead to a significant decrease of cost for implementation and ramp-up toll systems. The technical systems of EETS Providers are capable of supporting DSRC as well as satellite-based domains and apply all requirements that are foreseen by EETS legislation and the corresponding technical standards. That includes, amongst others the toll domain layout (sections or areas), complex tariff models and vehicle classification characteristics. Therefore, for new toll domains, service contracts could be tendered rather than aiming for buying the toll system.
At the moment, the initial registration of users and trucks and the provision with on-board units (OBU) is one of the most critical factors when introducing new tolling schemes. If a major part of trucks would have been registered already with EETS Providers, the registration process was much easier and the provision of OBUs could be limited to the remaining users. This will not only safe cost for procuring OBUs but would also reduce time before the toll system can be started because much less trucks need to be registered and equipped. For new toll schemes, Toll Chargers could assume that most of the toll liable users and their trucks would have been registered with one of the existing EETS Providers already which need to be accredited for this new EETS domain. For the remaining users, no new tolling system would need to be procured. They would be covered by an additional local service provider that operates under slightly different conditions than the EETS Providers, e.g. this provider would have the obligation to accept users unconditionally. In that case, the Toll Charger would only be responsible for operating the necessary enforcement processes and equipment and monitoring the quality of the providers.

The same benefits can be applied to situations where existing tolling systems need to be replaced, e.g. because of the end of the service contract with the current toll system operator. A number of countries, like Germany, Austria, Poland or Czech Republic, are facing this situation in the mid-term. Extension of existing tolling schemes may benefit from EETS as well. As EETS is capable of supporting various

toll and tariff schemes, extending existing schemes is easier than implementing and testing new features of isolated toll systems.

The EETS directive recommends the use of satellite technology for new toll systems because of their greater flexibility. A study [5] has been published in 2010 that analysed the possibilities of migrating from DSRC to satellite based systems (Global Navigation Satellite Systems – GNSS). It described the advantages but also discovered a number of obstacles for such a migration, among others the complexity of these systems, cost of migration and operational cost or lack of accuracy of toll event detection. Anticipating the existence of EETS Providers that, by definition, are also able to cover satellite based toll domains, a number of former identified obstacles can be removed. A previous DSRC system may remain in operation and a parallel GNSS-based scheme could be established in a pilot phase to gain necessary experience and extend the tolling scheme incrementally.

Ease toll payment, OBU management and driver training for hauliers

EETS not only provides opportunities for Toll Chargers and EETS Providers. Also the users of the toll road network will benefit from this service – on top of the interoperability aspect.
Hauliers could equip their fleet of trucks with a single tolling solution that covers all potential toll systems in Europe. Even if not all trucks regularly travel through different countries, the availability of a single solution has several benefits:

- **Only one registration** – Currently hauliers need to register their company and every single truck individually in most toll systems. In the context of this registration, the company details and the vehicle parameters need to be provided. Depending on the Toll Charger, also evidence for this information needs to be provided, e.g. vehicle registration papers. Repeating this for many toll domains can require a significant effort. With EETS, this registration needs to be performed only once. The EETS Provider is responsible for proper configuration of the OBU and communication of relevant information to the Toll Chargers according to their requirements.

- **Single Point of Contact** – With different OBUs and different contracts or registrations in the toll domains a haulier also has various contact points in case of any problems, e.g. in case of technical problems with the OBU or unjustified toll claims. EETS Providers are the first level contact for any problem. Even in case of an enforcement dispute where Toll Chargers directly interact with users, they can mediate and provide supporting information to solve the issue, if necessary.

- **Unified OBU user interface** – At the moment, drivers need to be familiar with the handling of different OBUs which also leads to higher driver training efforts by hauliers. In particular,

drivers are responsible for the declaration of variable parameters at the beginning of a trip and the monitoring of the operational status of the OBU while driving. These two activities are considered obligations to cooperate and will be checked during enforcement activities of the Toll Charger. The EETS decision requires that the OBU user interface shall stay the same for all EETS domains and no manual declaration needs to be done during a journey (unless the current vehicle parameters change). Consequently, there is only one well defined signal to the driver if the OBU turns into a failure state that is the same for all EETS domains. Having only one OBU with one user interface will reduce the risk of incorrect handling and the number of enforcement incidents.

Cost efficiency

Last not least, the total cost for toll systems can be reduced if cost for equipment like OBUs but also procedural cost could be shared between Toll Chargers. Currently, trucks that are driving internationally often have three or even more OBUs installed. Aside from some bilateral interoperability initiatives, each OBU is only operating for one EETS domain. With the assumed increase of GNSS based toll systems, the comparatively high price of these OBUs cannot be justified if installed several times just to serve one EETS domain. If an OBU is not only used for one but for many toll domains, the cost for an individual toll domain decreases.
Applying technical and procedural standards for the accreditation of EETS Providers and their monitoring avoids repeating the same tests again and increases the efficiency of managing the tolling service. In particular, the introduction of technical standards for interfaces between Toll Chargers and EETS Providers equipment will lead to less implementation cost.

EETS – What needs to be done?

To finally unfold the discussed potential of EETS, a number of actions should be initiated:

1. Accepting the EETS business model - The EETS business model, as shown in Figure 1, has introduced the split between service provisioning and toll charging functions. Applying this model is a key prerequisite to enable the potential of EETS as described above. In particular for new toll systems or for toll systems which need to be migrated, the incorporation of this model is essential. Toll Chargers should, regardless whether they go for a DSRC or GNSS based system, check whether procuring toll charging functions as a service from existing providers would have advantages over procuring a complete new technical system and organisation responsible for its operation.

2. Commitment to appropriate remuneration schemes for EETS services – As mentioned above,

no common rules or commitment on how to remunerate for the services of EETS Providers exist. Toll Chargers should, when making their toll systems EETS compliant, also think about appropriate remuneration schemes. Of course, these schemes must reflect the current situation of the Toll Charger, in particular when bound by a contract with an existing local toll system operator. Some Toll Chargers might not be able to define such remuneration without paying more for toll service provisioning than before the introduction of the EETS model. In these cases, the consequent planning based on the EETS service model and indication of potential future remuneration schemes could support a positive outlook.

3. Further harmonisation of registration and accreditation procedures – The harmonization of these procedures would significantly reduce effort on EETS Providers side in order to be accepted for providing toll services in the EETS domains. Aligning of accreditation procedures or even the mutual recognition of tests already performed in another EETS domain would lead to a significant decrease in cost for these procedures, for EETS Providers but for Toll Chargers as well. Additional supporting measures could be the setup of common test sites that cover more than EETS domain or the use of test frameworks where EETS Providers or manufacturers can test their equipment´s compliance before entering into cost-intensive end-to-end tests.

4. Foster technical standardisation – Further development of technical standards and their implementation for the technical interfaces between Toll Chargers and EETS Providers will lower the efforts and speed up implementations. As an example, the technical specification EN ISO 12855 provides a broad range of messages and data elements that can be used. A project is ongoing to develop an interoperable application profile (IAP) based on this standard to reduce the number of options and just provide the necessary functionality for the respective EETS domains. Such an approach would support EETS Providers, as they would only have to implement the profile and would be sure that they meet all requirements of the respective Toll Chargers. Also Toll Chargers can benefit, as they are provided with a technical specification that supports the functionality and necessary data elements. There would be no need for the development of individual interface specifications that need to be implemented one by one by the EETS Providers.

The REETS project is investigating a number of the mentioned issues and will provide recommendations how to improve the current situation. Toll Chargers and EETS Providers should incorporate the suggestions from this project in their EETS development plans.

We have shown that EETS can provide substantial benefits to all stakeholders – Toll Chargers, Users and EETS Providers – beyond the pure aspect of interoperability of tolling schemes itself. All stakeholders should work together to bring EETS to success and take advantage of this service for their respective needs.

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