

The road operator's

Andrew Pickford focuses on the dynamics of tolling operations and the regulatory and technology ecosystem in which it operates – and how it could be better stimulated to benefit road users and enhance acceptability

The history of electronic tolling has shown that the most vociferous proponents are primarily governments and technology vendors. Typically, systems integrators and road users themselves exert little influence in how this technology works, how to engage with it and how it should develop. Tags based on Dedicated Short Range Communication (DSRC) fitted to windscreens and used to identify users' accounts to roadside readers have not exactly become lifestyle products although the technology has become mature enough to be used routinely on large-scale projects worldwide.

The advent of GNSS on-board units with integrated DSRC provides an opportunity for a range of location-enhanced Value Added Services (VAS) to improve safety, create more informed travellers and generally increase the productivity of all road users.

This vision has been stated with increasing levels of certainty in technology and operations capability for years although reality lags far behind what is possible. So why is this? Under what conditions would road user charging (RUC) schemes become embedded in our daily routine? What are the barriers to innovation in RUC and how can they be

lowered to enable a closer integration with travel-related services for individuals and business? What steps can be taken to ensure an early alignment of an operator's business operations to ensure that it is best placed to exploit the benefits of interoperability in the future?

As the second in this series, this article explores the current state of policy development in tolling, the factors that can slow down the alignment of charging scheme operations towards an idealised interoperable future, and the business case for interoperability within the framework established by the European Electronic Toll Service (EETS). Ireland is one example of



dilemma – Part 2

where interoperability works to the benefit of the consumer whilst combining the relatively high level of enforcement risk afforded by Multi Lane Free Flow Tolling (MLFF) with traditional (low enforcement risk) plaza-based operations. There are many other regions with this same blend of risks, including Australia, Chile, France, Norway, Portugal, South Africa and the US.

IRELAND: THE RUC VALUE CHAIN

The National Roads Authority (NRA) created a comprehensive programme for developing the Irish road network by involving the private sector in funding, constructing and operating new motorways in 2000. When launching its PPP program, the NRA decided to stimulate the rapid development of modern toll collection methods through the universal application of standards – and the introduction of a roaming fee with concessionaires appropriate to the range of toll fees collected and with the assumption that the larger part of this fee would be recovered directly from the road users.

In an effort to further stimulate the adoption of ETC, in 2003 the NRA introduced the Information Exchange Agent (IEA) that allowed concessionaires to exchange data, including tag usage, whitelists and hotlists. A commercial and legal framework for the use of tags on all motorways in Ireland obliged each concessionaire to collect and transfer collected tolls for the cost of the roaming fee. The IEA also enabled the entry of a new category of service providers: the Independent Service Provider (ISP). Interoperability in Ireland therefore depended on not only the technical framework but the economic case, given the various cost structures of each concessionaire and the introduction of roaming fees at the onset of the PPP programme.

The decision by the Irish Government to acquire the West Link project from

NTR and convert the conventional tolling plaza (already including ETC lanes) into a MLFF facility as part of the upgraded M50 around Dublin, also had the effect of changing the economic environment in which the ISPs operated.

MARKET CONDITIONS

The NRA outsourced the development and operation of the M50 MLFF operations to *bet'aire Flow*, a company wholly owned by Sanef of France. The business case depended on frequent users subscribing with one of the several tag providers and occasional users paying a premium by using the “video tolling” charging option. For those without an account or had not registered their number plates, the NRA opted to pursue non-payments by using its own enforcement regime.

Given the relatively high costs of video tolling, the promotion of tag use was essential in order to make the newly introduced free-flow tolling system acceptable to users. This led the NRA to introduce its own marketing campaign to promote the ‘e-Flow’ brand name, alongside existing concessionaires and ISPs such as *EazyPass*, *Easytrip* and *ParkMagic* who had already established a value proposition for tag-based accounts. It is not clear if the new brand name for tag-based accounts in Ireland will be effective without clear service differentiation. The impact of new players on interoperability eco systems, such as those in Ireland – the NRA, the IEA, *Easytrip*, the M50 and road operating concessionaires – will be explored further in the next article.

In addition to new ISP market entrants, the following elements are also to be considered when evaluating the scope for market entry and market stability:

- VAT differentials: VAT is chargeable by private operators and increases road user charges payable at the point of road usage. Although Ireland is one of many examples



of this in Europe, upto June 2010 e-Flow transactions did not attract VAT.

- Cost advantages: Invariably governments define the cost structure of tolling operations, including the level of risk and, for MLFF schemes, the apportionment of non-payment risk. In this case study, the challenge would have been to ensure that the cost structures and cost constraints of new projects, introduced by government properly reflect the degree of risk transferred to concessionaires without inadvertently creating market advantages for existing or new players.
- Marketing: The challenge of new schemes is to promote benefits underpinned by interoperability, including any scheme-specific benefits whilst preserving freedom of choice of ISP. During the pre-opening of the M50 free-flow project, a mail campaign was initiated by the NRA to promote e-Flow and free-flow concept to the homes of all Irish citizens, backed up by radio and TV broadcasts. As part of this, the NRA directed customers to www.tagcompare.ie a website that provides details of all tag offerings currently available on the Irish market. In parallel though, route-specific marketing was increased by the NRA, including two large variable message signs.
- Interoperability benefits existing account holders users whilst encouraging new account registrations. When the MLFF scheme on the M50 opened for business, about 50 per cent of the tag-based transactions arose from the existing population of tag-based account holders – benefitting road users, the NRA and the operator - and helped to mitigate the ‘bow wave’ of initial demand on all customer-facing processes.

As the policy landscape for RUC evolves then new market entrants, including ISPs, may face a more (or less) >>>

With many charging methods under consideration, RUC remains a dilemma for policy makers and ISPs

attractive market. The challenge is to preserve this principle with the introduction of new segment-based charging methods such as MLFF (e.g. the M50) and distance-based charging such as that enabled by GNSS. Dilemmas exist for operators and governments here, particularly when charging policies evolve.

POLICY INNOVATION – THEORY

The opportunities created by interoperability can help level the playing field without stifling innovation although, as the Ireland case study highlights, market distortions may be created as new charging models are introduced. One of the most prominent successes of European efforts in standardization was the development of the GSM standards. The success of GSM worldwide highlights that interoperability does not only enable service delivery across borders amongst mobile phone operators and wireless network technology vendors but, in addition, can increase the economies of scale of deployment across regions – and ensure high levels of redundancy on choice of suppliers of handsets. In other words this means lower costs and lower procurement risk. That's where the similarity between GSM and the tolling 'value chain' ends though.

As we move progressively higher in this value chain, local differences emerge. System integrators deliver customized solutions to meet the needs of the road operator facing local demographic, geographic and regulatory requirements. And, as we migrate further into the world of enforcement, the impact of historical preferences, the regulatory environment and adversity to revenue risk become more visible; investors and operators may be able to choose from traditional barriers, advanced image-based evidence capture systems and Electronic Registration Identification (ERI) but globally, barrier-based schemes are being employed at a faster rate than ever before, followed



closely behind by image-based enforcement used on Multi Lane Free Flow (MLFF) and GNSS/DSRC-hybrid truck tolling schemes.

The choice of enforcement options available to project financiers and scheme builders also helps decide whether users pay at traditional toll plazas or pay through other channels so that they can enjoy the many benefits of MLFF tolling although with lower levels of compliance than barrier-based schemes. Nevertheless, the adoption rate of MLFF for tolling all vehicles throughout Europe has been low; Europe's first being Ireland's M50 which opened in August 2008 (Figure1) with few new examples since then.

Overall, further adoption of segment-based charging in Europe on interurban highways will depend entirely on overcoming local hurdles, including political acceptability – charging and enforcement technology readiness is unquestioned however.

POLICY INNOVATION – PRACTICE

Since the world's first electronic tolling scheme in Ålesund, Norway commenced operation in October 1987, the rapid development of charging technologies based on DSRC and the emergence of GNSS-based solutions (mostly in Europe) has been matched by innovations in charging policies themselves. From electronic tolling we now have examples of congestion charging, emissions-related charging, green zones (mostly in Europe), High Occupancy & Toll (HOT, mostly in the US) and truck tolling scheme.

The innovative (now aborted) Dutch ABvM scheme aimed to offset periodic ownership-related taxes against distance travelled, complemented by a broad

spectrum of VAS. Earlier this year, the Oregon Department of Transport (ODOT) announced the start of the Vehicle Road User Charge that would be levied on registered owners of electric vehicles and plug-in hybrids from 2014 model year onwards. The calculated charge, based on declared odometer readings, will enable registered owners to apply for a refund of their motor vehicle fuel tax. At about the same time as the decision to reduce the geographic area of the London congestion charging scheme, Gothenburg announced its plans to introduce congestion pricing from 1 January 2013. In the meantime, Norway continues to routinely roll out tolling schemes based on a highly standardized and regulated approach that incentivizes applications by local authorities to raise revenue through tolls to fund local traffic improvement projects.

Distance-based charging for trucks, enabled through hybrid GNSS/DSRC system, continues its march through Europe, most recently the Czech Republic and Poland with several more national procurements under way. Some members of the South African Development Community (SADC) are not too far behind in this area. In the turbulent domain of congestion charging, this policy is on the agenda in Delhi, Helsinki, Budapest – and two Bay Area bridges in San Francisco – amongst other cities worldwide.

So, we can safely say that globally there is no shortage of policy innovation.

INSTITUTIONAL BARRIERS

Institutional barriers still represent the most significant source of suppression of operations innovation worldwide. These have resulted in reduced public benefits and increased operations through >>>



Multi-lane free flow charge point on the M50

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the reluctance of operators to outsource back-office services, including Customer Relationship Management (CRM) services by existing scheme operators. Other sources include investment appraisals that result in higher costs of evolution to a specific goal for existing schemes than a new scheme would face getting to the same end point.

The cost of swapping out a workable tolling technology solution to a more advanced solution can create technology ‘lock-in’, often an unintended consequence of allowing freedom of local decision-making. E-ZPass in the North East of the US is one example although this has not prevented road users from benefiting from the world’s largest multi-agency scheme. Other regional-centric schemes grew up in the US, notably in Florida, Texas and California. In response, the US-based Alliance for Toll Interoperability (ATI) recently declared: “current RFID programs do not allow for full national interoperability” – a reflection of the view from regional authorities that have historically implemented regionally *de facto* standard solutions.

However harmonising business rules amongst ATI members is regarded as a key enabler of interoperability and technology choice is stated as being of lesser initial importance. The US-based ATI also shares a similar opinion on enforcement as many operators in Europe – the ability to enforce across state lines in the US is critical to the success of efforts towards national interoperability.

At least for truck tolling solutions in Europe, we seem to be moving towards standardised approaches that make cross-border alignment easier. Although the German LKW-Maut (Lastkraftwagen-Maut, literally ‘truck-toll’) can now be regarded as operationally successful it is also a very German-specific solution although this was developed during the drafting of the principles that finally underpinned EETS. Later on, the

development of the charging regimes in the Czech Republic and Slovakia progressively demonstrated increasing maturity in the use of GNSS for distance-based charging with a closer alignment to EETS principles. The most recent and largest procurement in Europe (currently suspended, see *Thinking Highways Europe/Rest of the World*, March/April 2011, p76-78) is France’s eco-tax/eco-charge project applicable to the 12,000 km of the State Road Network (SRN) and provisionally 2000 km of local road network. This is aimed at full EETS compliance and will help pave the way for a competitive market in EETS providers throughout Europe and confirms that we are now in an era where organizations that do not own a road asset can provide a range of services – in this case within the role defined by the term ‘EETS provider’.

THE BUSINESS CASE FOR INTEROPERABILITY

The EETS Directive is disruptive to the status quo since it introduces clear role definitions as highlighted in Part 1 of this article (which ran in the online version of *Thinking Highways* Sep/Oct 2010). The business case for interoperability throughout the value chain has never been more important.

However, establishing a regulatory mechanism for the mutual recognition of traffic offences, including unpaid tolls, is making slow progress throughout Europe, despite the efforts of EU-wide advisory groups such as the UK-based SPARKS Network. Without effective cross-border enforcement, the business case for cross-border charging defined by EETS is therefore weakened.

Part 1 of this article considered the

increasing specialization that EETS enables although the existence of a competitive network of EETS providers will depend on the attractiveness of commercial opportunities within Europe and the willingness of existing operators (‘Toll Chargers’) to consider reducing the scope of their operations in favour of outsourcing the customer interface.

The alternative would be for some operators to partition all back-office services to create their own in-house EETS Provider that could potentially offer services to other scheme operators. As an example of this, although not subject to EETS, the initiative taken by the South African National Roads Agency (SANRAL) in its national ETC interoperability programme includes providing CRM services that will in some cases, replace the services already provided by existing operators.

Specialisation around a standardized process such as payment services and billing should permit a lower per-transaction cost to be achieved than non-specialisation at lower volumes. Therefore EETS Providers could, in principle, offer a ‘menu’ of services to existing scheme operators whether or not the operator is bound by the EETS Directive and (potentially) these services could also be offered to future urban congestion charging or emissions-related scheme operators. operators thereby lowering their startup and operating costs. Regardless, the development of a competitive network of EETS Providers will need certainty of opportunities, enough projects to warrant the cost of development and a proven business case.

To enhance the business case for interoperability it may require government

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leadership to offset the initial costs of providing sound governance. Norway, Denmark and Sweden have shown how government leadership can reduce the perceived risk and cost of implementing interoperable tolling schemes, in this case the NORITS project.

However, there are far more governments where this leadership has not been demonstrated in favour of allowing local decision-making that potentially results in a patchwork of solutions that would increase the cost to exploit the potential cost savings through interoperability.

CONCLUSION

This is the second in the series of articles that attempts to reveal the inner workings of the RUC eco-system to highlight that alignment of objectives between technology vendors, system integrators, concession operators, government and users can create the appropriate conditions for the broad acceptance of RUC.

The next article will focus on the barriers that slow down the development of seamless service provision for users travelling throughout the EU – and the fragmented progress in achieving cross-border interoperability. 🗺

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