

The road operator's dilemma

As Thinking Highways and ETC etc have reported many times already, the historical dependence in Europe on microwave Dedicated Short Range Communication systems (DSRC) has been disrupted by Global Navigation Satellite System (GNSS) as new Road User Charging policies (RUC) have emerged.

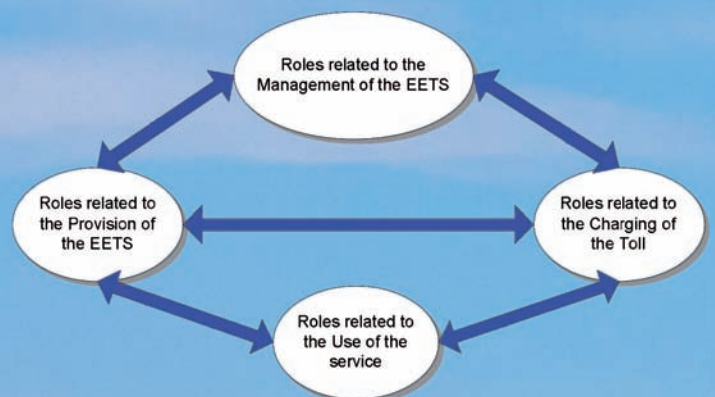
Despite the apparent competition between these technologies we are now seeing that they are in fact complementary. However, the bigger picture reveals that it is the choice of charging policies themselves and the appropriate business model that selects the underlying charging (and enforcement) technologies. So, in the expanding RUC universe the mantra remains: policy leads, technology enables.

The problem with long-term road operations planning - in some cases bound up by long-term concession agreements - is that it tends to 'lock-in' assumptions and even the underlying systems and technologies. These assumptions are bound up by the desire for vertical integration and the need to 'own' the customer, underpinned by elaborate back office systems. The business case for charging and setting toll rates also includes assumptions on traffic levels, economic growth rates, the cost of operations and maintenance, elasticities of demand at different pricing levels, the enforcement regime, the cost of borrowing and many other factors. Users themselves see little evidence of the assumptions for each road apart from the cost of tolls, charges or taxes applied at the point of use. Most roads of course are free at the point of use, funded by the general tax and fuel tax revenue.

Now, increase the density of roads subject to these tolls, charges or taxes and we see the benefits of interoperability as practiced within many of the European member states and across a handful of borders. From the perspective of road operators the view is a little different. Road networks include an increasing proportion of tolled routes managed by public and private sector operators. Congestion charges are applied on bases very different from tolls and, now we have the advent of policies to replace taxes on fuel or vehicle ownership by taxes that vary according to Time, Distance and Place (TDP) of road usage. Then increase the complexity further by adding tolls, charges or taxes that vary by type of vehicle or its carbon footprint. Finally, mix in the customer benefits of interoperability and the launch of the European Electronic Toll Service (EETS) and it's no wonder that we are now seeing market distortions that benefit some stakeholders over others.

So, let's explore this in more detail by considering how the traditional vertically integrated model is being challenged by EETS. Then we can examine the relationship between public and private sector operators in an interoperable environment. It is already a given that this is all underpinned by technology standards, evidential standards, certification regimes, robust procurement processes, an agreed apportionment of risk across the main client-supplier boundary, procurement processes that drive innovation, workable legislation and pragmatic regulations.

Fig. 2 The EETS Reference Model



Who owns the customer?

Traditionally, a concession operator or public authority road operator would build a vertically integrated system that does everything from the capture of usage data to Customer Relationship Management (CRM) and debt collection (where local laws permit). The introduction of newer forms of charging policy that do not depend on toll plazas or otherwise determine charges based on TDP principles, does not change the relationship with the road user. However, interoperability and the separation of the road-level charging process from the account management processes are highly disruptive to the old model and do change the relationship with road users.

Innovation, interoperability and EETS: In part 1 of his series of articles, ANDREW PICKFORD explores the emerging gap between current toll road operating models and a new paradigm enabled by interoperability and the new European Electronic Toll Service. This is a short story of how technology and policy innovations are enabling new lower cost, charging models and the emergence of strategic dilemmas increasingly being faced by road operators

“Interoperability can underpin separation of roles and enable market entry of new service providers”

Fig. 1 Dartford-Thurrock River Crossing

One of the benefits of interoperability is the separation of roles, increasing specialisation and reduced per-account and per-transaction costs through increasing economies of scale. Size is important here. EETS enables this specialisation and, with a level playing field, potentially promotes competition between service providers. For example, this would enable a credit card provider, parking services operator or Mobile Network Operator (MNO) to offer accounts usable anywhere by Toll Chargers that conform to the EETS principles.

It could be expected that a region that has a history of tolling would be receptive to new organisational structures but, paradoxically, having a long history of toll collection could increase the inertia that slows change. Similarly, largely green-field countries such as the UK, Germany and Denmark that do not have a history of tolling could enjoy the benefits of policy leapfrogging into new forms of charging. The Dutch attempt at replacing ownership fees and fuel duties with distance-related charges demonstrates this innovative thinking. Other architectural innovations promoted by the Dutch model includes the aim to develop an attractive market for third party account operations alongside value-added services. From the road users' perspective, paying for road use is not only being offset by reduced motoring taxes but is a part of a package of additional services.

Greece is attempting to define an information exchange model between concession operators that preserves the traditional vertically integrated structures within the Greek Interoperable Tolling Systems (GRITS) architecture where Service Providers and Toll Chargers remain within existing operating entities. It will be instructive to see how this model evolves over time to accommodate independent Account Issuers operating within Greece (or elsewhere) as defined by EETS.



Fig. 3 MLFF charging in Ireland, the M50.
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Ireland is one example of where interoperability works. Ireland's approach shows a healthy precedence in combining the relatively high level of enforcement risk afforded by Multi Lane Free Flow Tolling (MLFF) with traditional plaza-based operations. New image-based evidential standards and road users that understand how to pay a toll without a plaza have shown for the first time in Europe that it is possible to achieve what Canada, Australia, Chile, US and other countries are already enjoying. However the differing levels of VAT incurred by public and private operators in Ireland together with significant levels of public monies spent promoting the public service provider and different levels of risk, create an array of challenges for existing Account Issuers and a significant entry barrier for new service providers. The National Roads Authority of Ireland (NRA), Beteire, the Information Exchange

Agent (IEA), Easytrip, ParkMagic and road operating concessionaires are part of this interoperability regime. This largely successful ecosystem will be explored in the next article, to be published in early 2011.

Entrance exam

Through the efforts of the Norwegian Road Administration, Norway also demonstrates a highly successful national interoperability regime that has enabled around 25 operators of roads, crossings and city operators to join a ready-made scheme based on a highly developed, proven suite of specifications and business rules. The costs, risks and benefits of participation are largely predictable, thus enabling new market entrants to have full visibility of the costs and risks of entry.

France and Italy are two of the first countries in Europe in modern times to employ tolls as a fiscal instrument to fund and maintain new infrastructure. In France, Liber-t and TIS-PL co-exist but the differences between them highlight different assumptions on operating costs, scope of services and lack of access for new market entrants that do not own a road asset. While France has demonstrated innovation, the market structure has generally resulted in the concessionaires being the key beneficiaries. Italy's interoperability model has served to concentrate market power with one service provider/road operator but has the advantage that service provision nationally is generally homogeneous and predictable for road users. Hong Kong's smaller scale interoperable ETC model, run by Autotoll Limited, a private service provider for profit, has a similar structure - and offers similar benefits to road users whilst offering ETC services to tunnel operators, complete with all ETC-related CRM.

The South African National Roads Agency Limited (SANRAL) is currently procuring design and operations of a centralised account management and enforcement operations as part of a nationally interoperable programme based on DSRC.

Although all customer accounts based on Electronic Toll Collection will be centralised, existing plaza-based operators will retain an ongoing option whether or not to opt-in to the centralised violation processing and debt collection services and enforcement operations in the future. The parallel implementation of MLFF in Gauteng means that, as in Ireland, operators could face different levels of revenue risk and cost of operations.

Tolls, charges and taxes

Toll road operators only charge a toll. Or do they? A toll for paying back the cost of building and operating the infrastructure is likely to include Value Added Tax (VAT) if it is a privately operated concession but no VAT if it is publicly operated. Does this mean that publicly operated toll roads have an advantage over privately operated toll roads? Perhaps, but privately operated toll roads can co-exist within free-at-the-point of use road networks as long as these privately-operated roads can continue to offer a clear advantage to road users whilst maintaining their own economic viability in the long term. It does make the management and reconciliation of charging records marginally more difficult. Otherwise VAT differences do create some market distortions but are manageable without customer confusion.

There may be a premium (or discount) applied to a charge for road use to reflect the time of day or, in some countries, the

occupancy of the vehicle. Transport for London (TfL), as a fully integrated service provider of transport services within Europe's largest capital city, applies a charge in return for travelling in a demand-managed area, discounted for residents and exempted for vehicles satisfying low emission requirements. The advent of TDP charging in the Netherlands and its enabling legislation would have allowed for local authorities to apply local congestion charges and make use of the existing charging and CRM services provided nationally to implement a local scheme at lower cost than going alone.

Interoperability can underpin separation of roles and enable market entry of new service providers that do not own a road asset. In the worst case, a complex mix of tolls, fees and charges from co-existence of toll roads, congestion charging schemes and tax-offsetting TDP schemes could make route planning and modal selection a more complex choice.

So where is this going?

In 2010, charges no longer need to be based purely on the number of axles or other classification metrics but now on many other measures, including a vehicle's carbon footprint, time-of-day, location and distance travelled. Traditional point-based charging as typically used on open and closed toll routes still has an important role to play, particularly in emerging countries, but event-based technologies that enable such charging regimes struggle to record distance travelled and time-based charging - hence the advent of GNSS-enabled approaches, initially being introduced through truck tolling schemes of varying levels of complexity within Europe (eg. Switzerland, Germany and Slovakia).

Within this changing policy and technological landscape, the key competition considerations for a free-market between tag account issuers remain pragmatic and include the VAT

advantage enjoyed by public sector operators, maximising the benefit to transport users of economies of scale offered by specialist high volume service providers, ensuring common access to marketing channels/advertising sources and workable transaction fees charged to Toll Chargers to buy outsourced CRM operations as the EETS model enables. If these considerations are not addressed, the market distortions discussed above could serve to protect the incumbents at the cost of new market entrants. Therefore the public sector, as the end client, has a compelling need to ensure that public and private sector objectives are sufficiently aligned (and remain sufficiently aligned) through ongoing cooperation to enable (and maintain) fairer free-market conditions to existing and new service providers whilst preserving the benefits to users of the increased use of pricing on the road network.

To ensure that there is no technology lock-in, long-term concession agreements should include technology refresh points, say every five to seven years where private sector operators need to demonstrate how systems will evolve. For example, there should be a requirement to be EETS compliant if it is likely that the toll road or tolled crossing may at some point fall within the (currently broad) definition of an EETS facility (Toll Charger).

The public sector's role could also include:

- Addressing the inertia within existing stakeholders that may restrict customer choice through sound governance;
- Acting on behalf of the member state to enable cross-border interoperability;
- Raising awareness of the need for certification amongst test facilities;
- Implementing a national security regime consistent with the EETS security strategy;
- An assessment of options to harmonise vehicle classification schemes, debt collection and enforcement processes and improved accuracy of vehicle registration databases;
- Varying concession agreements where needed to ensure ongoing technological alignment and interface with charging overlays such as that enabled through TDP; and
- Initial funding as a market-making initiative to develop specifications and to raise awareness amongst existing operators (as the UK's DfT did with its innovative Interoperability Forum).

In an interoperable world, users can expect to see a common and consistently high level of service on each of the roads or crossings that form part of the interoperable road network.

Conclusion

This is the first of a series of articles that aims to reveal the practical reality of implementing interoperable pricing throughout (and beyond) the EU and show how a better alignment of technology vendors, system integrators, concession operators, Toll Service Providers (TSPs) and government, amongst others, is critical to secure public support and private sector participation in all schemes. The next article will focus on case studies to highlight what can be achieved. [TH](#)

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Fig. 4 A typical point-of sale display of ETC tags bundled with a ready-made account (Ireland)
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