

Electronic Road User Charges: A New Zealand Perspective

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Abstract

The use of Road User Charges (RUC) in New Zealand generates hundreds of millions of dollars of revenue, but the present paper-based system is costly to administer, enforce and for vehicles to comply with.

An electronic RUC system presents an opportunity for massive cost savings, as well as new revenue streams from providing the fleet operators business information and exporting the e-RUC system to other countries.

For e-RUC to be a success, it needs a driving organisation with a holistic view to the issue, such as NZ Post, and a commitment to open standards to avoid the system being tied to any single technology or vendor.

The Road Well Travelled

Road User Charges (RUC) is a government initiative to provide a fund for the construction, operation, maintenance and repair of roads throughout New Zealand. This is levied by charging heavier vehicles and those that do not use petrol as a fuel, in order to bill those vehicles that do the most damage to the roads.

With this goal in mind, the charges are structured by vehicle weight and type, and licences are purchased in units of 1000km or multiples thereof. Supplementary licences for shorter distances are also available for factors such as a temporary weight increase, for example.

The use of RUC across New Zealand presently brings in up to \$700million per year in revenues to the government¹.

Counting the Full Cost

The cost of RUC lands primarily on the road transport industry, particularly operators of heavy trucking fleets. But the cost extends beyond the simple cost of the charges themselves.

The current system of charging was introduced in 1977 and remains a paper-based approach. Relying on odometers and hubometers to measure distance and average (rather than

actual) vehicle weights to charge against the average cost of the road system.

The result is an inefficient system that requires high infrastructure costs for enforcement and issuing agencies. The difficulty in enforcement means that non-compliance is currently estimated to cost the country around \$28million annually¹. The sheer administration cost of the scheme was approximately \$11.5million in the year 2000/2001².

The cost is also heavy for the transport companies to comply with the RUC scheme. An in-depth 2003 survey by the Waikato University Management Research Centre for the Road Transport Forum indicated that 9% of all fleet operator costs are attributable to RUC. This is comparative to the amount spent on vehicle maintenance or on fuel³.

The future only looks to exacerbate the situation. The number of vehicles on New Zealand roads has been progressively increasing. A greater population and more cars per household have been one contributing factor, but more importantly, the number of heavy vehicles has also been growing larger.

One crucial area of fleet expansion is the forestry industry. A large amount of forest reserves are reaching maturity during the next few years in New Zealand, leading to a vast increase in logging activity, including transportation. Often termed the "wall of wood", this increase is expected to see roundwood removals from New Zealand's planted forests increase from 18,489,000m³ in September 2000 to an estimated 31,000,000m³ by 2010⁴.

This 67% increase would see a dramatic rise in the number of heavy logging vehicles on our roads, and the resultant increase in administration requirements for RUC would massively impact the present system. In addition, the current road and rail infrastructure would require significant capital investment to upgrade.

e-RUC, The Magic Bullet?

The scale of the problem has not gone unnoticed. Alternative, electronic-based systems for managing the charges have been proposed in

the past. However, without legislative backing, such schemes have failed to reach the implementation stage.

More recently, steps have progressed within the NZ government to implement some form of electronic RUC, or e-RUC. Such a system would be aimed at providing lower administration costs, more accurate charging, reduced compliance costs on fleet companies and better targeted enforcement. An e-RUC system would also provide information on the actual driving patterns, so that driver behaviour could be influenced to better manage road usage.

Administration costs would be lowered by the fact that charges would be accumulated and billed automatically as the vehicles travel, rather than requiring the repeated filing of licensing paperwork.

The current RUC system provides only an estimate of responsibility. The charges do not differentiate between different types of road, location, or time of travel. An electronic system would be responsive to both the time and location the given vehicle is travelling.

Enforcement costs would also be driven down. Less need for stringent and time-consuming vehicle checking would reduce police resource costs.

Anatomy of an e-RUC System

An e-RUC system involves the use of various wireless technologies to obtain information both from and about a vehicle and transmit this to a central host system for processing into an accurate charge.

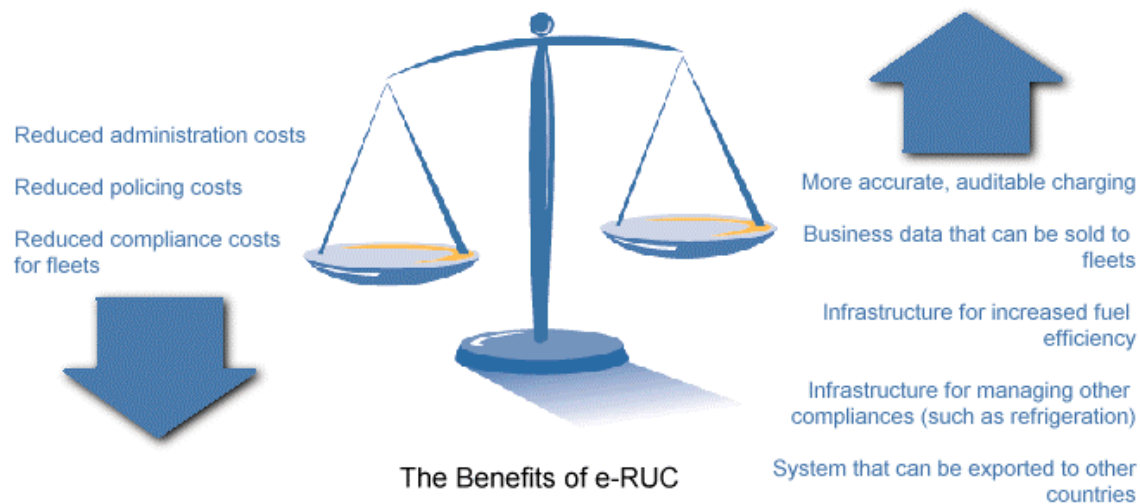
Heavy fleet vehicles already use a range of in-board electronic and computer systems that collect data on the vehicle ranging from current weight, to fuel consumption, to speed. Combined with the use of a Global Positioning System (GPS) to accurately identify the present location of the vehicle, all of the information required for accurate and efficient charging is already available.

Accessing the data is possible through modern wide-area communications for the GPS coordinates, combined with short-range radio frequency (RF) systems to wirelessly and automatically extract the vehicle data. This system need not be limited to solely information for RUC. A central host could also provide select data online in a secure manner to deliver business information to the fleets as to the performance and condition of their vehicles. This is facilitated by existing vehicle computers, potentially supplemented by the use of driver contactless smartcards, which can be used for auditing the charges.

From Theory to Practice

There have been previous attempts to implement an e-RUC system in New Zealand but to date all have failed. Such systems have suffered from two fundamental flaws: being proprietary and being technology-driven.

A successful implementation would require being driven from a licensing authority or agent, rather than from a technology supplier. The RUC problem has now escalated to the point that such an initiative is not only feasible, but



also necessary.

The agent would be one capable of providing the infrastructure and more importantly, is able to administer the scheme. The Land Transport Safety Authority (LTSA) is focussed exclusively on the actual charging and so is unsuitable for such a role. The potential benefits from an e-RUC system are wide-ranging and include opportunities for business-to-business information distribution and technology export revenue.

Any e-RUC initiative needs to address the needs of all of the stakeholders involved in order to get complete buy-in to the project. These include LTSA, Transfund New Zealand, Transit New Zealand, the Police, Treasury, State Services Commission, the Ministry of Economic Development, the Ministry for the Environment, Road Transport Forum, Automobile Association and the Bus and Coach Association.

Of the other licensing agents for RUC, which include the AA, BP, On Road New Zealand, Vehicle Testing New Zealand and Vehicle Inspection New Zealand, only NZ Post have the experience, influence and ability to drive and manage such a system.

Open System, Level Playing Field

A danger with any deployment of a large system is a proprietary approach. This involves a single vendor providing all of the technology, leading to a monopolistic environment where maintenance and customisation costs can become exorbitant and flexibility is lost.

The solution is to establish open standards for the interfaces between the various components. This allows different New Zealand companies to provide their niche expertise, rather than driving a single vendor overseas to seek suitable product. An open standards approach means that any company can develop an individual component, and the deployment need not be national to remain fully compliant with the e-RUC system. Each fleet operator can utilise their own equipment, to look to leverage existing investment as well as to obtain information specific to their business.

Similarly, fleet operators need only use components that suit the size of their operation. A large trucking fleet may include a range of operational and administration data, while a single driver owner/operator would only require the smaller investment in components providing

the minimum to comply with the e-RUC requirements.

The use of open, published standards also provides extensibility and flexibility for the system. Should new developments provide a more effective or efficient means of delivering the requisite data, the specific component(s) can be replaced, without the need to impact any other aspect of the e-RUC system. This is a form of 'future-proofing'.

The Future, Now

Implementing an e-RUC system requires a number of key factors. The first is a driving organisation, such as NZ Post, who is willing to take ownership of the resulting system.

The primary stage is a detailed design and feasibility study to ascertain the best approach forward. This is to include a migration strategy from the present system. It is the recommendation of the Road Transport Forum that any switch to e-RUC is handled on an optional basis for users to begin with. This provides a manageable deployment path, as well as allowing for ownership in the scheme by users, likely spurred on by incentives for early adopters.

The subsequent stages would involve developing the interface standards. These would have to be an open, published set of guidelines that a technology vendor would have to comply with in order for their product to be legally capable of being deployed for e-RUC purposes.

R&D Technology Solutionz is a New Zealand company ideally placed to fulfil these initial project stages. The company has experience in a number of closely related fields, including automatic payment, contactless smartcards, heavy vehicle computers, wireless communications and in carrying out independent technical audits on products and system concepts for investors. R&D Technology Solutionz also holds the current contract to maintain RUC for BP and has worked extensively in providing technology to the oil industry worldwide.

Once the standards have been established, the infrastructure can be deployed by any of a number of local vendors. A roadmap would need to be developed, determining how best to manage this deployment and what technologies are to be used in an initial implementation.

Ultimately, an e-RUC system for New Zealand would save millions of dollars for the administrators, enforcers and users. It may also

provide other revenue streams such as selling business data to fleet operators or even exporting the system to other countries pursuing similar initiatives.

R&D Technology Solutionz

R&D Technology Solutionz (RDTS) are a New Zealand company based in Palmerston North working on innovative new technologies, including RFID systems for the retail oil industry. RDTS are involved in the integration, development and deployment of systems in a number of countries across the globe.

RDTS specialise in consultancy and development for technological systems, including all stages from initial requirements and architectural design through to wide-scale deployment and maintenance.

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