

Truck Tolling and Interoperability in the U.S.

Early ETC standards

Electronic Toll Collection, ETC was first introduced in 1987 in Alesund, Norway and has since been utilized on most toll facilities worldwide. From 1987 forward ETC has moved from mixed lane applications to dedicated ETC lanes and finally multi lane free flow. ETC as a technology has been an enormous success. ETC has been a foundation technology and a catalyst for the growing interest in tolling as an alternative/supplement to user fee taxation. ETC has provided the opportunity to consider large greenfield projects, congestion pricing and other alternative transportation funding techniques possible.

Initially, the industry was focused on making sure that ETC was practical and that there was limited risk to the toll revenues of the respective agency or concession. As more and more agencies and concessionaires adopted ETC, it became apparent that these systems needed to be interoperable across regional and national boundaries to provide the optimum benefit to the end user. Interoperability was not as clear of a concept as it is today. When designing ETC systems, we were generally inclined towards a concept that was predominantly made up of two axle vehicles. In recent years more attention has been given to the question of long haul freight movement.

Interoperability of Long Haul Freight Operations

Toll applications in the long haul freight environment of the European Union have highlighted the question of interoperability. Rather than addressing the collection of tolls within a metropolitan area or member state, the issue of collecting tolls is now a question for the entire EU. The question of interoperability now takes on a new meaning as the European Union expands and strives to ensure efficiency in the movement of goods. It is no longer a question of ensuring ETC interoperability within a member state but rather interoperability across the entire European Union. Suddenly, the toll industry was faced with accommodating a new ETC user base with differing economic decision processes. It is no longer a question of regional travel by two axle vehicle but international travel by long haul operators.

These toll motorway users understand the direct economic benefit of nonstop toll payment applications. Rather than being concerned with privacy related to where a vehicle has been or is at present, the truck operator is keenly interested in knowing the location of vehicles for logistic planning purposes. In fact, many larger fleet operators currently utilize on board equipment for logistical support without regard for electronic toll payment. The preeminent motivator is one of economics. Studies in the U.S. suggest that it costs in excess of \$1.00/minute for a tractor trailer combination to set in traffic. As congestion rises, these costs of delay become increasing negative impacts on the economy. Interoperability of payment mechanisms for this daily interstate or international traveler is a crucial issue.

Freight Operations and Interoperability in the U.S.

Interoperability has not been addressed in a formal manner in the U.S. as it has been in the EU. With the exception of California and their title 21 legislation, no technical standard exists and no Federal or State regulation was attempted to ensure interoperability. Interoperability in the Northeastern U.S. was accomplished with the establishment of the interagency group, IAG. This organization is a voluntary collaboration amongst the various entities that are members. Twenty two separate toll operators and/or states joined to create interoperability. Perhaps because of the close proximity of several tolling facilities these agencies were motivated to cooperate. However, once established it became a convenient vehicle for those agencies that followed with the implementation of ETC and provided significant efficiency to freight movement.

However, for optimum efficiency of the interstate movement of goods, interoperability must be established across the U.S. The magnitude of the issue increases with the increased movement of freight by truck in the U.S. Interstate freight traffic has experienced significant growth over the last fifteen years and USDOT projects that trend to continue. In 2002 the Transportation Research Board produced Special Report number 271 entitled "*Freight Capacity for the 21st Century.*" The report concluded "*in the next two decades, the nation's total output of goods and services probably will increase by 70 percent, highway travel and all domestic freight traffic will increase by about 40 percent, and international container traffic may more than double.*" These projections highlight the need for improving efficiency in freight movement. The reasons for this growth have been in place for some time and they will likely continue to create expanded use of trucks for moving freight in the future.

Deregulation of the trucking industry in the nineteen nineties resulted in a doubling of the number of freight operators in less than a decade. While freight costs reduced and the efficiency of freight movement thereby increased, more goods began to be transported by highway versus other modes.

Creating Practical Solutions Through Innovation

As this was occurring many retailers and manufacturing operations were implementing just-in-time inventory processes. Suddenly, manufacturing components had to be delivered on a precise schedule as required by the assembly process. Retailers began to move from a “push” retailing process to a “pull” process. Rather than purchasing a quantity of goods based on price points, retailers began to request shipments based on the likelihood that the goods could be sold to the end customer. Warehousing was reduced significantly.

In concert with these developments the North American Free Trade Agreement, NAFTA was consummated. The establishment of NAFTA opened the Canadian and Mexican borders to enormous increases in freight movement. The U.S. always enjoyed significant trade with these two partners. Canada and the U.S. represent one of the largest trading relationships in the world. However, NAFTA induced even more trade between the three countries.

The Transportation Funding Gap and Freight

As events were unfolding that affected freight movement, there was a growing awareness in the U.S. that there are insufficient resources to provide for the maintenance and expansion of highways. To provide expanded highway capacity tolling will certainly play a major role. Considerable information is available documenting the enormous shortfall in highway capacity funding and tolling will clearly be one method of filling the gap. Special truck routes have been proposed by several transportation advocates and the efficiency of existing toll capacity must be compatible to keep the freight traffic moving, especially in urban areas.

Unlike the automobile, freight operators are keenly interested in the location of their vehicles at all times. Logistics efficiency is very dependent upon location information. Consequently, many freight operators have turned to global positioning satellite, GPS equipment to manage fleet operations. Having up to date location information improves the ability to anticipate arrival times and coordinate with shipping and driver schedules. GPS also provides some measure of security against theft.

Options for U.S. Interoperability

If tolling is likely to be a part of funding U.S. transportation in the future, we should distinguish between local applications and national ones for the purpose of establishing interoperability. While RFID

electronic tolling applications have provided significant improvements over manual collections, in the absence of national regulation of standards it is unlikely that RFID will be sufficient to the task.

The Vehicle Infrastructure Integration, VII project is an RFID technology and offers some potential for a national interoperable electronic toll collection system. To date however that focus has been on safety and the two axle vehicle. Automobile manufacturers have been committed to the VII project but they have an interest in establishing clearinghouse capabilities which may provide recurring revenue streams. Truck manufacturers have been less involved.

One additional possibility is the establishment of national standards for 915 MHz RFID interoperability. This seems even less likely. There has been ample opportunity to create an RFID standard for 915 MHz over the last fifteen years and no movement has occurred towards doing so. Further, the proprietary aspect of existing systems is a significant legal challenge to such an approach.

The one option that remains is the use of GPS for tolling long haul commercial freight operations. It is no longer a question of being technologically possible. ***In January of 2005 a joint venture opened the Toll Collect GPS application in Germany which levies a toll for trucks over twelve tons. This technology has facets of RFID as well as GPS. Systems based on RFID technology for trucks have been implemented in Austria, the Czech Republic and are being considered by a number of countries for truck tolling.***

While much has been accomplished technologically, perhaps the most significant challenge to this option is not technological but procedural. From the European experience it is clear that setting standards is only the first step in establishing interoperability. CEN 278 has been the RFID standard in Europe since the infancy of ETC. The frequency and protocol was effectively settled with the adoption of the CEN standard. However, interoperability in the EU remains unaccomplished and a high priority for resolution, evidence that contractual and financial issues are crucial to national interoperability.

If a technical standard for interoperability were to be established in the U.S. there would still be a need for national standards on contractual and financial procedures. The IAG has accomplished this need through collaboration and compromise. With so many toll operations in close proximity to one another in the Northeast it would have been unacceptable not to establish interoperability especially in urban areas on state boundaries. This is not the case for the South and Southwest. There is little urgency for Oklahoma and Florida to be interoperable except for long haul freight operations. To bring the nation together under one long haul interoperability process will require an agreed upon national technical standard and a national clearinghouse operation for long haul vehicles.

Once established this technology could be extended to any vehicles that travel frequently outside of existing regional RFID systems. However, the cost of more sophisticated on board units will be considerably more. It seems likely that most regional travel vehicles will continue to use current RFID methods for paying tolls.

If GPS is provided as an option for long haul travel rather than a mandate, there is a greater likelihood of adoption. It allows those customers who are satisfied with regional systems to continue to pay tolls in the manner they do today. However, GPS and a national clearinghouse offers the long haul freight operator a solution for their unique needs while improving the efficiency of freight movement throughout the U.S. Potentially, a GPS solution could ultimately be applied beyond national borders and improve efficiency and security in the international movement of goods.