

Violation Enforcement – the Path to All-Electronic-Toll-Collection (AETC)

All-Electronic-Toll-Collection (AETC) is the dream of many toll collection agencies. It represents the end of many operational costs that have been a part of toll collection since the first pike was turned. Labor costs, buildings, utilities, right of way, signing for the various types of lanes, banking fees for counting and hauling tons of coins and other ancillary costs are a part of collecting toll revenue with a cash option. AETC promises a highway-speed, toll-paying experience using Radio Frequency Identification, (RFID) and automatic license plate recognition (ALPR) technology. Perhaps the attendant risk of losing slightly more revenue to violations is the predominant factor that has held toll agencies back from shifting to AETC. However, many are designing new toll roads as AETC because of the reduced operating costs and because the revenue stream lacks a track record upon which to be judged for increased violations and revenue loss. There are also concerns about transitioning to AETC. How can toll agencies communicate such a major shift in the way collections are made, change decades long behavioral patterns and pay for major toll plaza renovation or demolition. Transitioning an existing toll facility to AETC is an extremely difficult task fraught with risk. On what day do you tell your customer base that cash will no longer be accepted? What happens when someone stops in a high-speed lane attempting to find a booth to pay cash? Greenfield projects will be more straight forward but what about existing facilities, how can they be converted to AETC?

Some of the answers to these questions can be found in the progress of ETC. Perhaps AETC will become a reality through our continued improvements in existing processes such as violation enforcement and alternative payment methods for toll customers. It seems likely that we are already on the path to AETC, a path that is not new in concept, simply a continuation of improvements on existing ETC and violation processes.

The Progress of ETC Improvements

As improvements have been made to ETC over the last decade, the systems have become more robust and adaptive to various users. When ETC was first introduced, the options for payment were cash, ETC or violation. As ETC systems and methods improved the violations process was preceded with billing. Heretofore people not paying by cash or ETC were violators now those same people were customers who chose to pay by post billing. The billing process used the same images as the violations process. Methods of identifying the registered owner of the vehicle remained the same.

At first, the license plate recognition systems and camera equipment were quite basic. We used all sorts of lighting schemes to make up for the inability to calibrate lane camera equipment to changing lighting conditions. The ability to obtain an image of sufficient quality to process through an optical character recognition system was limited. This was somewhat improved with enhancement processes, but it required the intervention of an operator and therefore incurred additional cost and time. Telecommunications systems lacked the capacity to transmit large volumes of video images to processing centers. Common approaches included storing images on disks at the plaza and periodically physically carrying the disks to the processing center. Violation behavior varied resulting in some disks filling to capacity and dropping subsequent violations or conversely delivering disks that had few violation images at all.

As the cameras and telecommunications improved, it became apparent that some of the violations were in fact our ETC customers. With age, transponder batteries depleted and made for intermittent reads and otherwise erratic behavior. Because transponders were allowed to be used on more than one vehicle, customers sometimes forgot to put them in the car. These events led to a growing number of violations of valid ETC account holders. After all of the time consuming process it was not possible to assess a violation. Vtolling or similarly named processes were the result. Vtolling is the process of matching valid account holders license plates with the license plates of violators and if a match occurs, the toll amount is simply billed directly to the transponder account. The process had morphed into a process of charging by license plate image. Further, as the ETC customer was relieved of his or her duty of notifying the customer service center of faulty transponder reads and replacing batteries or even remembering to keep the transponder in the vehicle, the number of vtolls grew. There was also the customer who refused to place the transponder on the windshield because of aesthetics. This customer is the “transponder waver”. We were slowly moving further into the territory of video tolling or paying by plate.

Another complication with ETC that is slowly being improved is the process of determining the address of the registered owner of the vehicle. Without the correct address, billing processes are blunted in their effectiveness. The probability of determining the correct address from a motor vehicle record is 80%. Some states can return a correct or current address 70% of the time. The requirement for updating vehicle registration information varies from one political jurisdiction to another and some jurisdictions have part time residents that have frequently changing addresses. Toll operators have begun to use other commercial databases of information to determine current addresses.

Certain classes of users are particularly difficult to bill or process as a violator. Rental cars, out of state vehicles and tractor trailer combinations yield little information about the person who violated and

should be charged or represent a difficult collections dilemma. Once again, all of these issues of ETC have been improved. Private companies have developed plate matching schemes to collect tolls from rental car companies and their customers. Collection agents are beginning to be used by toll operators to collect from violators or billing customers from other jurisdictions and toll operators who have a significant percentage of truck traffic have learned that front and rear license plate images are necessary to determine the operator registration information.

Technologically and methodologically ETC and in particular Violation Enforcement Systems (VES) have continually improved. The ability to properly charge a customer either through ETC or through a subsequent billing process has steadily improved. But there are other factors driving the industry to video tolling as a complement to ETC.

Toll Users and Toll Transactions

There is some confusion in the industry as to the difference between unique users of a toll highway and revenue transactions. As ETC has matured we have seen the percentage of revenue generated by ETC increase. Typically, the percentage grows quickly to 30% and then over a period of several years it approaches 50 or 60 percent and levels out. Many in the industry believe that percentages of 75 or even 85 percent or even higher are possible and that all one need do is make it more convenient to obtain a transponder. However, recent studies at toll roads and turnpikes in the U.S. have demonstrated that ETC has a practical limit. As a consultant I have had the opportunity to serve on two separate studies that incorporated a statistically accurate assessment of the frequency of use of the tollway by individual users. In excess of 40,000 surveys were distributed and responses were in the 20% range. The findings indicated that 2% of the unique users of the system generate 30% of the total revenue on the toll road and 11% of the individual users generated 60% of the revenue. Of the estimated 3,500,000 users of one toll system, approximately 385,000 generated 60% of the total annual revenue. Further, the data indicated that to increase from 60% to 70% would require an estimated additional 962,500 ETC users, 2 ½ times as many as were already generating 60% of the revenue via ETC. Further, as more infrequent users are added to the ETC database, it becomes much more expensive per transaction for the user and the agency to maintain accounts. Clearly, ETC has a practical limit as a revenue generating tool. Alternatives to ETC have to be found to make it convenient and cost effective for infrequent users to electronically pay for the use of the tollway. Various forms of video processing are emerging as those alternatives and the ultimate path to AETC.

Toll Payment Options

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Some toll agencies are experimenting with the concept of registered video toll accounts. Unlike ETC accounts, no transponder is required. The infrequent user contacts the toll operator and registers with the agency using a credit card or other payment mechanism. The license plate number of the vehicle to be used, the name of the individual, the payment information and a termination date for the account are all that is required. This minimal information is transmitted via telephone, the Internet or other convenient means. The toll transaction is slightly more costly since the process of collection using the plate image is more costly and it discourages those who should be ETC users because of their frequency of use from migrating to the registered accounts.

Some toll operators have taken this concept to yet another level conceptually and are asking if it is possible to establish a class of ETC user that requires minimal information like a registered video user, a kind of “ETC Light”. The complete responsibility for ensuring that the ETC transaction is correct would rest with the user. The user rather than the agency would be responsible for ensuring that credit card information is up to date and that the transponder is operating properly. When all options are considered, more tools are available to attract the infrequent user to an electronic means of paying tolls. A range of ETC and video payment processes could be considered that represent different levels of service and differing cost to the toll user. The options and the relative costs might be similar to that shown in the table below.

This range of options begins to provide a path towards the ultimate elimination of cash. The process of transitioning an existing facility to AETC is complex and case specific. Depending upon the nature of the facility, the make up of the user base, the political and economic environment and whether the toll facility is a concession or a public agency can all affect the specific plan for transitioning to AETC.

Service level	Toll rate	User frequency
ETC	\$1.00	Very frequent
ETC through Vtolling	\$1.25	Very frequent
ETC Light	\$1.00	Frequent
ETC Light through Vtolling	\$1.25	Frequent
Pre-registered Video	\$1.50	Infrequent
Post Billing (within X days)	\$3.50	Infrequent

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Violation via collection agency	\$10.00	
Legal process through court system	\$50.00	

Conclusion

It seems likely that as ETC and VES improvements occur we are moving towards AETC. The limitations to AETC are perhaps less due to the technical ability to do so and more to a reluctance to augment the extremely successful tool of ETC with video toll payment services and rethinking the basic model of ETC. As toll agencies strive to increase ETC market penetration with marketing campaigns, new transponder designs and improved customer service, it is important to keep in mind that indeed “one size does not fit all”. Infrequent users have a differing set of motivations and willingness to pay than do frequent customers. If we make use of the tools available and structure business models that are appropriate to our user community, AETC may be closer than we think. We may already possess the means to accomplish this industry changing event and it has been disguised as the well known processes of ETC, VES and video imagery.