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All Electronic Tolling Speeds to the Forefront New Efficiencies and Cost Savings Leave Cash Tolling in the Dust

Once upon a time, cash was king. Now, debit cards and electronic payments are the order of the day. All Electronic Tolling (AET) delivers the efficiencies of electronic payment where the rubber meets the road. With benefits ranging from reduced operating costs and uninterrupted traffic flow to a cleaner environment, it's easy to see why AET is gaining momentum so quickly – and why agencies nationwide are so revved up about the possibilities.

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The Technology That's Driving Change

First, let's take a look at how the concept evolved.

The foundation of AET is Electronic Toll Collection, which replaces the manned tollbooth with an automated system that reads small radio frequency identification tags (RFID) on vehicles traveling at highway speeds. RFIDs, also called transponders, are actually intelligent radio transmitters that can communicate with a networked system.

Each driver opens an account with the toll operator – typically secured with a credit card, check or cash deposit – and receives an RFID, about the size of a credit card, to put on the windshield of his or her motor vehicle. Instead of tollbooths, electronic scanners mounted on overhead gantries read these RFIDs as vehicles pass by at normal rates of speed. The appropriate fees are automatically deducted from the driver's account, without the need to slow down, wait in line, pay, and then, eventually, resume the trip.

All Electronic Tolling uses the RFID system in conjunction with video tolling technology, which uses License Plate Recognition (LPR) software to read license plates as vehicles pass by. These images can be matched to state vehicle registration databases for billing, giving new residents, tourists and late-adopters the opportunity to use the toll road as needed – even without a transponder. In a way, AET brings the same type of efficiency to toll collection as the bar code scanner did to the checkout line – but with no human intervention required.

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The most amazing part of the equation is the accuracy the right system delivers. In just the past few years, AET technology has advanced significantly, to the point that the RFID device can be read at 99.9 percent accuracy, and the license plates themselves can be read with average accuracy rates of 99 percent. So, not only does All Electronic Tolling deliver an improved driving experience for residents, it ensures that cash-strapped agencies get all the toll revenue they're due – all in a solution that's working around-the-clock, never requires sick days, takes vacation or needs training.

To understand how dramatically AET technology has improved, think about the quality of a digital photo taken five years ago versus today. The resolution and clarity have improved, while the price has gone down. Now, consider the difference in clarity and quality of a television purchased five years ago versus today's high-definition models. Today, the standard HDTV enables people to watch fast-moving sporting events and races without blur and see details so great that the news anchors have every wrinkle, line and blemish exposed. A version of this same type of crystal-clear technology can now be applied to AET.

A Look Under the Hood

An effective All Electronic Tolling solution not only makes things more convenient for drivers on the road but makes it easy for them to participate in the program. It's important for agencies to work with a provider that has the capacity to handle the entire solution, including the all-important billing, accounts receivable and customer care.

The real key is giving motorists choices – enabling them to re-up their toll deposits by automatic credit card charge, using payment kiosks, adding funds online, as well as in-person options. In some cases, users are billed – or sent text or e-mail messages – when their accounts are running low. In other programs, the tags themselves can send a signal that lets the drivers know that their accounts are approaching the minimum level.

The real key is giving motorists choices.

Although the credit card option is convenient for most, a viable solution must include payment options for those drivers who don't have a bank account or credit card or, for whatever other reason, prefer to pay their bills with cash. Not only does this speed adoption, but it ensures that every citizen who so desires can participate in the program.

Benefits for the Driver, the Agency and the Environment

Even the most ardent skeptic would find it hard to argue against All Electronic Tolling, because it's one of those rare innovations that truly benefits everyone involved.

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With ever-decreasing budgets, state agencies are forced to do more with less. All Electronic Tolling increases efficiency while significantly lowering operating expense. Although every state is different, industry averages show that the typical cost to collect a cash toll is about three times that of electronic collection options. And, because AET removes the currency, it also reduces the shrinkage. So, agencies can keep the full amount of tolls they collect.

At the same time, this innovation improves the driver experience. Because transponders and license plates are read at highway speeds, vehicles can continue on their ways without slowing for toll collection. By eliminating the booths and the traffic backups, agencies also reduce the incidence of rear-end collisions that are all too common at tollbooth locations.

This rapid throughput and decreased congestion also reduce the emission of pollutants and the proliferation of greenhouse gases. By reducing the number of stops along toll roads, agencies also reduce the environmental impact – at average estimations of more than 30 percent. So, All Electronic Tolling is green – both environmentally and in the monies it saves.

Results in the Fast Lane

The benefits of AET have been realized worldwide, with Canada, Australia and Israel all using this type of solution to reduce both costs and congestion. In the U.S., progressive states are rapidly realizing the benefits of this technology.

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For example, after a successful open tolling project on nine of its major plazas, the New Jersey Turnpike Authority is working on a pilot project with ACS to bring All Electronic Tolling to the Garden State Parkway. This program will convert both open road tolling (ORT) lanes, as well as conventional toll lanes, on the Garden State Parkway to video tolling. As part of the pilot, ACS installed newer, high-resolution camera technology at the Cape May Plaza, making these modifications in parallel to the plaza's existing system for a smooth transition. After a successful proof-of-concept, the program is expected to be fully implemented for the full length of the 173-mile roadway.

Maryland's new Intercounty Connector Tollway, better known as the ICC, cuts a parallel path to the oft-congested Maryland-D.C. Beltway, a road known for hours-long delays. The state needed toll revenue to pay for this huge undertaking but knew that if those tolls were collected through manned tollbooths, they'd eliminate the improvements in traffic flow this roadway was built to achieve.

ACS worked with the Maryland Transportation Authority to create a viable toll collection solution, with various toll segments that can be billed like a closed-loop system. In other words, a driver receives a single bill for the various toll "segments" he or she goes through on a single trip. ACS was one of the only providers with the size and scope to deliver this type of solution, which has the distinction of being one of the very few, new controlled access highways in the United States. The project savings – and customer convenience – are significant. The ICC is projected to save travelers a collective 3,000 hours each week and facilitate the efficient passage of 85,000 more vehicles than if this project – with AET – had not been built.

Other Applications on the Move

Taking this to the next level, agencies can actually change the price of tolls collected on specific roads, based on time of day or even actual traffic conditions. They can also create high occupancy toll – HOT – lanes or express toll lanes, which enable drivers to achieve a predictable, congestion-free trip by paying a fee for using dedicated lanes during busy times.

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By charging fees to use roadway facilities and increasing the cost during peak periods, these agencies can accomplish two things: change drivers' behavior by encouraging travel during off-peak times or the use of public transportation, which eases congestion and reduces pollution; and increase revenue from those drivers who continue to use the facility – revenue that can be used to fund other transportation improvement projects. This concept has been used worldwide, with great success. After initiating a fully automated, electronic, variable-charge system, Singapore, for example, reduced its traffic by 13 percent, while vehicle speed increased by 22 percent.

This same AET technology, used in tandem with GPS, also provides government agencies the option of collecting driver fees based on the number of miles driven, instead of relying on the gas tax for future funding needs.

Interoperability Gets the Green Light

Particularly in the northeastern part of the United States, individuals can live in one state and make a daily commute to work in another. At the same time, commercial vehicles – from moving vans to long-haul trucks – move across state lines daily.

It's important that AET systems are designed to be interoperable, so they can readily exchange information. This shared reciprocity enables motorists from Maryland, for example, to use the same transponder on trips into New York. When all is reconciled, Maryland pays New York the appropriate number of tolls collected. The driver, however, would just have to keep up with one RFID account – from his or her home state.

Commercial vehicles could use a version of this technology to pass through state lines, be electronically screened for safety records and tax payments – then be allowed to pass through based on these approvals. ACS' PrePass solution, for example, enables trucks to bypass weigh stations and pays tolls with one convenient transponder. This same technology has applications at border patrols and for any movement of vehicles across state lines.

All Roads Lead to All Electronic Tolling

The concept of AET has gained so much momentum that it has reached its proverbial tipping point. It's moved from a trend to the standard of the not-too-distant future.

In the near future, new automobiles will be created with onboard units (OBU) for the federally allocated 5.9GH bandwidth – so one day, every vehicle will have its transponder built in. Not only will these pieces of technology be used for toll collection, but they will be used to improve traffic safety and become information central for traffic information and other pertinent announcements.

Clearly, All Electronic Tolling is the future, leaving tollbooths, traffic tie-ups and manual fee collection in the dust. Staying with manual toll collection is like sticking with your dial-up service in a world of broadband. To do so would be to choose to remain a step behind.

ACS is one of the few companies with the breadth, scope and proven experience to provide the full range of AET needs – from system installation to back-office processing, billing and customer care. Our solutions utilize the systems state agencies already have in place for toll collection and enable these to work in a new, automated environment.

We live in a mobile society where people move freely on the open road – from home to work to school and social activities, and everywhere in between. Through a comprehensive, All Electronic Tolling solution, state agencies can keep their constituents moving – all while reducing operating expenses, eliminating inefficiencies and saving the environment in the process.

It's a value proposition where everybody wins by keeping things moving in the right direction.

About the Author

Mark Cantelli is a 25 year industrial electronics and computing veteran with 20 years of experience in the transportation industry. Mark was one of the first integrators to implement RFID technology for electronic payment systems for Lockheed Martin (formerly Gulf Systems). With a focus on improving reliability and maintainability, Mark rose through the ranks starting as a maintenance engineer and quickly became the Sr. Director of Engineering for ACS Transportation Systems and Services (TSS) and Public Safety Solutions (PSS) lines of business. In his present role as, Chief Technology Officer (CTO) for Transportation Systems and Services (TSS), Mark is integral in the growth and success of TSS.