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Electronic Tolls to Improve Payment Efficiency

Teresa Slack

My topic today concerns electronic toll collection (ETC). I will give an overview of electronic tolling, provide some facts about automated vehicle information, and describe the benefits of ETC.

The Orlando–Orange County Expressway Authority was formed in 1963 with the primary goal of building a connection from Orlando out to Cape Canaveral. We have a five-member board, three of whom are appointed by the governor and two of whom are ex officio (including the county chairman and the DOT district secretary). We have only 38 employees but engage many contractors. This past year we did $125.38 million in revenue; about 36 percent of that came from tolls.

Broadly defined, electronic tolling is the computerization of the toll collection process. It encompasses ETC, electronic toll and traffic management, and automatic vehicle identification (AVI). Sometimes these terms are used interchangeably.

Here are some facts on the authority's use of ETC. Currently, our transponders are mounted behind the bumper of automobiles, but soon we will move to a common system with all other tolling agencies in Florida. The new statewide system, named "Sun Pass," will involve transponders that are mounted on windshields. It is an exciting program and we hope to be on line in December.

Currently the authority has about 240,000 transponders on the road; that represents about 150,000 accounts because of families with two or more transponders, utility trucks, and commercial fleets. We have 50 percent usage of the transponders (as opposed to cash transactions) during peak hours and 40 percent daily. We have lanes that are dedicated to transponder-only traffic; other lanes accept both cash and electronic transactions. An average customer pays $50 on a credit card to get going. Once the balance hits $10, we automatically replenish the account from the same credit card.

Some of the benefits of electronic tolling include improved highway operations, streamlined financial transactions, and enhanced customer relationships. We cannot speak enough about the enhanced customer relationships. We have the addresses now of all of our primary users—40 percent of our users. We send them quarterly newsletters and surveys—which people actually send back. We also offer benefits like movie tickets, and, all in all, we believe that we have a good level of communication with our customer base.

As for improved roadway operations, the dedicated AVI lanes can handle five times the traffic that a cash lane can handle. We currently handle about 2,200 vehicles per hour on the pure AVI lanes and only 400 per hour in lanes that accept cash transactions.

Improved roadway operations not only help ease congestion but also create some significant ancillary benefits. You can improve safety by reducing weaving and speed variations. Also, the reduction in congestion

dramatically reduces emissions. A study done by the University of Central Florida's Department of Engineering calculated delay times before and after implementation of our E-Pass system and showed a reduction in six different categories of emissions of about 30 percent.

ETC offers other key advantages: it greatly reduces the risk of fraud and provides a more reliable accounting of transactions. I was at a seminar on fraud awareness some time ago and heard about a case—not in Florida—where a toll collector was astute enough to line his uniform pants and drop the quarters in his pants. By the end of the day, he would walk out with lead-lined pants. They caught him after a period of time, but ETC would definitely have eliminated that risk in the first place.

On this point, consider the difference in the way we handle the two sides of our business. On the cash side, the toll collector collects the money and takes it back into the shop. There it is bagged and put into a vault. The next morning, the supervisor hands off the money to an armored car service, which takes it to the bank. Then we get a report from the contractor that handles all of our toll collections. We get the bank's deposit information, and we get reports from our operations staff. I end up with a staff of three that spends all day, every day, verifying these reports of all the handling of the money. On the electronic side, there is one accountant who works with the credit card companies charging prepaid revenue. Once the transaction reports are received, she prepares a journal entry to book the revenues.

I mentioned before that we periodically survey our customers. We have found that the electronic toll systems are extremely popular and actually reduce customer objections to the concept of charging tolls. In Orlando, there is a clear sense that the public prefers tolls over taxes, and we have found this to be true in every category of our customer base, including those who do not use the E-Pass system. The philosophy is that if you use it, you should pay for it.

One of the ways we have built customer loyalty is through discounts, such that if you do 40 transactions per month, you get a 5 percent discount. Eighty transactions per month yield a 10 percent discount. These discounts also position us for the future should we need a toll increase; for example, we are exploring the possibility of limiting any increase to cash transactions only. That kind of discount would certainly reflect the savings that we realize through the use of ETC. Not only do we avoid the capital costs we would bear if we had to expand the toll plazas, but also we save enormously on the cost of collection. The ballpark numbers we work with—and this applies pretty generally across the toll industry—show that the cost of collection is about 21 cents on the dollar for standard manual and coin systems. But with ETC, we are looking at a cost of only 6 to 7 cents on the dollar.

When we look at transaction growth over the past 12 years, we see a nice surge in 1994, when we instituted the E-Pass system. Back in 1990, our revenues were about $50 million. Now, they are up to $126 million, and our projections for next year reach $136 million. We are getting nice growth out of the system, much of which we believe is attributable to the efficiencies inherent in ETC.

Intelligent Transportation Systems and Archived Data: Market Opportunities

Joel Markowitz

The bad news today is that I am by no means an expert in ITS archived data. But the good news is that nobody else is, either. This is new territory and far more a matter of what may be than what is.

For starters, let me offer a four-point definition of ITS archived data. First, ITS generates real-time operational data. Second, that information can be saved to a data archive. Third, the archived information can be retrieved to support historical analysis and research, for secondary uses, and for non-real-time uses. Fourth, the data can be used by multiple stakeholders, including the public and private sectors.

What systems produce data that might be useful to somebody else? A partial list might include traffic surveillance systems. Both public and private entities have interest in knowing the level of traffic flow, where it occurs, average speeds, volumes, and point-to-point travel times. This information can help support better truck monitoring, fleet monitoring, and management of accidents—all of which represent real-time applications.

A number of applications have more of a historical than a real-time bent. In particular, ITS archived data can be key to the modeling efforts that support transportation system planning. These modeling efforts are very data intensive and often rest on weak information. Part of the reason is that data collection is so expensive under traditional methods, meaning that states and local agencies cannot afford to gather data as frequently as they wish. For example, my organization can only afford to do a major regional travel survey once a decade, and that is pretty typical. So the prospect of having access to data that are generated not only frequently but also for the entire system, rather than from an occasional sampling from which you have to extrapolate on the basis of a dozen assumptions, is very enticing to the planning community.

On down the line, from planning to operations and onwards, many members of the transportation community are more than ready for this kind of information. As you start to look at private-sector interest, one key opportunity lies in truck monitoring and vehicle location for private firms. Another opportunity centers on customized delivery of traffic condition information and route guidance. And m-commerce (the new buzzword for mobile e-commerce) requires the delivery of customized information to the vehicle or your cellular phone—or in the jargon of the day, your mobile computing platform.

That is the sort of thing that sets entrepreneurial hearts aflutter, largely because the possibility for advertising revenues is right there. Nothing has happened on this front yet, but many are now looking at the possibilities: analyses of trip destinations, routing, seasonal behavior, and daily diurnal behavior, all of which provide opportunities for targeted marketing of goods and services.

In building a market for ITS archived data, we probably have enough willing buyers and sellers. The problem is in the middle—we do not yet have a good, reliable working model of how to price these data. The pricing issue is a big one—what does the information cost, and can you sell it?

The idea of an archive implies a real or virtual repository where the information goes and from which it can then be accessed. There probably would have to be some intermediary organization that would know how to use the information, be able to repackage it, aggregate it, combine it with other related data to add value, and then turn the finished product over to the user.

What are the public and private roles in this effort? You can imagine a public entity doing the whole thing: they would be their own marketer, sell their own data, maintain their own archive, and possibly even aggregate the information across public agencies in some consortium and sell directly to a private user. Alternatively, it could be entirely private. Cellular phones can be tracked, in part thanks to the E911 requirements from the Federal Communications Commission (FCC). So it is possible that a private entity could track—anonymously, we hope—the cell phone locations, speed, point-to-point travel, and be able to sell that rather valuable hunk of demographic information to whatever entities want it, be they public or private.

There are at least three things that you have to ask about how real these opportunities are. First is how good the data are. If the information is not good enough, who wants it anyway? The second is how well the possible business partners' needs are defined. You cannot really have a market opportunity unless you know exactly what the buyer wants and whether he will be there next year. You must have some basis to stand on. The third centers on institutional issues that have not yet been addressed.

As for the quality of the data, that is a moving target. ITS America sponsored a workshop in February 2000 to develop guidelines concerning gaps in the data. These data gap guidelines are in final draft now and should be coming out shortly via the ITS America website. Across the country the quality of data varies dramatically, and for a national or international purveyor of goods and services, that doesn't cut it. The data gap guidelines try to deal with issues of coverage, uniformity of information in terms of depth and detail, accuracy, the time limitations, consistency across organizations, and how well personalized the data can be.

How much information is enough to create a market? The Phoenix area has a fantastic system based on the AZTech system, a management system that Arizona DOT uses and has augmented for use by a number of jurisdictions. The system includes a real core data set, which they are using with their private-sector partners all over the place. But are one region's data enough to generate a market? Probably the data need to be available statewide, or even nationwide, to be worth selling.

The viability of the market depends not only on the data but also on a threshold number of buyers and sellers. There are only a certain number of transportation organizations in the country and in the realm of marketing, and not very many. On the private-sector side, every business that wants to market to people who travel, which is almost every business, can see an opportunity there.

Nonetheless, there is some potential for the public sector to serve as a customer. This potential resides most notably at the local level. Local agencies like MPOs have to report to FHWA, and it would be dandy if they could press a button and generate data without going through the hoops they currently face. Use of ITS archived data for this purpose would also allow local agencies to transfer data across systems within a metropolitan region and to the state.

Attempts to define public and private roles cause many institutional issues to crop up. The development, operation, and maintenance costs of an archiving system are unknown, but you can bet that they are nonzero. When you are talking about ITS data, you are way beyond gigabytes. That is not just to store the data, which is the easy part, but also to manage the data and retrieve what you want. These capabilities demand sophisticated technology. So there is a question as to who will provide the infrastructure.

Ownership of the data is a question as well. Some private-sector firms complain that public-sector organizations do not make their data readily available to the private sector. The same thing will happen in reverse, of

course, when the private sector develops its independent data sources. Also, it is not clear who controls the quality of the data once they are released for secondary and tertiary uses. Liability for the use of the data is something else that every agency's legal department will have to scratch their collective heads about.

Privacy and confidentiality issues hit the pages every day because of the Internet, and this is just one more version of that. In many cases, local institutional history and legal mechanisms specific to the state or jurisdiction will constrain what can be done.

In conclusion, yes, there are likely near-term opportunities for public use of archived data to streamline and improve operations and planning activities. There are also interesting, though mostly untried, opportunities for either selling public data for private-sector use or buying private data for public-sector use. But we need to get a handle on the potential revenue streams and identify the basic parameters of the would-be market.

Automated Traffic Enforcement: New Financing Approaches

Frederick (Bud) Wright

How many of you have ever exceeded the posted speed limit in your life? And how many of you have every actually received a speeding ticket? Has anyone ever run through a red traffic light? All rhetorical questions, of course.

Today I will speak about two areas—speeding and red-light running—that are at the forefront of advanced technology in terms of traffic enforcement. Let me first set the stage with some statistics. It is appalling that we as a society accept that more than 41,000 people die each year in highway crashes in the United States just as a cost of doing business. That is almost half a million fatalities over the last decade. Highways account for 99 percent of the transportation injuries and 95 percent of the transportation fatalities in this country. More than 3 million people are injured each year in highway crashes. These are events that change people's lives forever.

The annual cost of highway crashes is calculated as $160 billion. Even when we think about the value of the multiyear authorization bills for the nation's federal highway and transit programs, those numbers simply pale in comparison with the cost exacted by highway crashes.

To break down these figures, 37 percent of the 41,000 fatalities are associated with single, run-off-the-road crashes. That is not something, unfortunately, that automated enforcement technologies can do much about. More than 5,000 pedestrians and bicyclists, representing 14 percent of the total, are killed in highway crashes each year. A tremendous amount of attention is paid to large truck safety, but in fact the number of pedestrians and bicyclists killed each year is almost identical to the number of deaths associated with large truck crashes. Yet it is almost a forgotten statistic.

Of the 41,000 fatalities, 32 percent stem from speed-related crashes. Interestingly enough, typically these are not crashes on the Interstate or on the highest-speed system. Most of these speed-related crashes occur on local roads or minor collectors. And finally, in an area that is increasingly problematic, 23 percent of fatalities now are associated with crashes at intersections. This particularly relates to one of the subjects I will talk about: red-light running.

Automated technologies are taking hold on a number of fronts. Technology is targeting speed enforcement, red-light running, HOV lane compliance, and railroad grade crossing enforcement. On this last point I will note that almost all of the crashes at railroad grade crossings happen because people actually go around gates that are down, and where markings are actually in place. These are considered reasonable transportation engineering improvements, but we still have a huge number of railroad grade crossing crashes.

Identification of aggressive drivers is another emergent area. Maryland is using cameras on the Capital Beltway not to ticket, but rather to identify aggressive drivers and to use that as an advance warning system, if you will.

What are the advantages of automated enforcement? Well, obviously, given the number of enforcement personnel in the United States, you will not catch every person who speeds or runs a red light. Yet obviously, from these statistics that I mentioned earlier, at intersections alone there is a tremendous problem that has to be dealt with. Automated technologies allow for much more comprehensive and widespread traffic enforcement. They have most definitely been shown to increase transportation safety.

Obviously there has been a tremendous amount of opposition around the country to automated enforcement. The typical concerns have to do with a violation of personal privacy and often a basic distrust of technology and "the system." People are also concerned that they do not have an opportunity to make their case to an officer, especially in cases of speeding incidents, as to mitigating circumstances. Because of the tremendous opposition, there are not that many localities around the country using automated enforcement. It so happens that Scottsdale, Arizona, is one area that has been using automated enforcement both for red-light running and for speeding for some time. So be careful at this conference because you may encounter an automated enforcement intersection.

One issue that has become significant in law enforcement of late is racial profiling. Many law enforcement agencies around the country are accused of pulling over drivers who fit particular racial profiles. Well, automated enforcement is, of course, about as nondiscriminating as any enforcement can be. The camera takes a picture of a car, has no idea who is behind the wheel, and the ticket is issued to the person to whom the car is registered—not necessarily the driver.

The technology that enables ticketing of red-light runners is actually pretty straightforward. It is a camera and some simple loop detectors—the same kinds that have been at intersections for decades to trip traffic signals. There is also a feedback loop to the red-light camera. A car approaches the intersection and triggers the loop detectors, which in turn trigger the camera. The camera takes two photos: one of the car approaching the red light, and a second picture, say 1.3 seconds later, that shows whether the driver has proceeded through the intersection while the light is still red. The camera has the ability to focus in on the license plate, which allows law enforcement to issue a ticket to the registered owner.

Speed enforcement relies on essentially the same kind of technique, although the camera need not be permanently mounted. It relies on radar technology and shoots a beam to determine the speed of the car traveling through the beam, then takes a picture of the license plate.

As I said earlier, very few jurisdictions are actually using automated speed enforcement at this point. But some of those take photos that can compare what the driver looks like with the person to whom the car is registered. If, on the basis of the picture that is on file with the Department of Motor Vehicles, it does not appear to be the person to whom the car is registered, a ticket is not issued.

Turning to the financial side of automated traffic enforcement, I want to stress that this is an area where the private sector is very much engaged. Lockheed Martin, for example, has a contract with the District of Columbia for both red-light running systems and a pilot speed system. Lockheed Martin receives $29 for every ticket that is issued using either of these two systems.

There are a couple approaches to financing automated enforcement. One is the traditional government approach, in which the jurisdiction would fund the cost of cameras, the maintenance of cameras, the development of film, the issuance of citations, and the like from government sources. But of the jurisdictions using automated enforcement, none is doing this. Instead, every jurisdiction has elected to enter into a partnership with the private sector. Most often the private vendor front-ends the cost of the purchase and installation of the cameras associated with both red-light and speed-monitoring equipment. The vendor maintains the equipment and in many cases develops the film and presents it to a local law enforcement jurisdiction. At that point a decision is made as to whether there is sufficient evidence to issue a citation.

In a more controversial approach, a couple of jurisdictions allow the vendor to manage the entire program, including assessing whether or not there was a violation, sending a ticket to a citizen, collecting the fine, and paying the jurisdiction a portion of the fine collected. This gets into the arena of whether these are just cash cows as opposed to law enforcement techniques.

So what do these systems yield, in terms of revenue? Howard County, Maryland, generated revenues in excess of the costs of installation, maintenance, and the like, receiving about $1.4 million in a 15-month period from 1998 to 1999. Baltimore, Maryland, has generated $700,000; New York City, $1.5 million; the District of Columbia, $7 million in excess of the cost of the system in a single year. These are all relatively small-scale operations, I might add. New York City has only 100 cameras mounted for the entire city. Washington, D.C., has 50 cameras mounted. Howard County has only 15 cameras, yet they are still generating this kind of revenue.

Again, this issue of revenue generation can be a bit controversial, and the controversy leads to several approaches to the use of revenue. Some jurisdictions use the revenue to offset the cost of automated enforcement and to purchase additional cameras and additional installations of the technology. In contrast, the District of Columbia's revenue from fines actually goes into the general fund after costs have been covered and Lockheed Martin has made its share of profit. In what many consider to be a strategic mistake last year, the District's budget revealed that income from automated enforcement was projected to grow. Some took this to mean that automated enforcement had no deterrent effect, but instead was just a revenue-generating machine.

We believe, and the statistics bear out, that these monitoring efforts do, in fact, have a deterrent effect on traffic violations. We also believe that the most sensible strategy is for fine revenue to offset the costs of the automated enforcement program, with any excess revenues supporting highway safety or law enforcement programs.

Automated traffic enforcement clearly presents an opportunity for the private sector to play a role in transportation in a unique way. This is also an area that we believe will expand significantly around the country. Even though it is controversial, it relies on technology similar to what is already used and will continue to be used even more extensively in a whole range of ITS applications. The technology is very reliable. I think the principal opposition is going to be from citizens who believe that their right to privacy or some other unstated right is being violated. But we cannot do enough to improve transportation safety, and this is one way in which we can make a difference.