Inevitable drive

Michigan becomes test bed for advanced ITS technology, including mileage-based user fee

The potential uses for IntelliDrive technology are innovative and almost futuristic:

Crash avoidance alert warnings. Signal-change countdown. Parking availability notification and the ability to “purchase” a parking spot from your vehicle.

But now—as concerns mount regarding the nation’s crumbling transportation infrastructure and the inability of the fuel tax to keep up with demand—the latest potential use of IntelliDrive technology is coming crisply into focus: mileage-based user fees.

The concept went for a test drive during the 2009 Michigan ITS annual meeting, a state that is at the epicenter of the IntelliDrive movement. There, attendees saw first-hand how the technology is largely in place. They witnessed how the concept would work, how drivers might one day pay taxes not on the fuel they purchase but on the roads they choose to drive on and the number of miles they accumulate.

The concept of a mileage-based user fee (MBUF) has been around for years, but it is gaining traction now more than ever. The final report of the National Surface Transportation Infrastructure Financing Commission—a 15-member commission appointed by Congress in 2007—earlier this year recommended a nationwide MBUF system be in place by 2020.

“Transitioning from a fuel-tax based system to one based more directly on use of the highway system measured by miles driven undoubtedly will require a great deal of planning and public education,” the commission said in its executive...
summary. “But that is no reason to delay initiating the process.”

The summary continued, “If the federal government fails to act now and to act dramatically . . . we will face increasingly deteriorating roadways, bridges and transit systems. We will suffer from more accidents and fatalities on our transportation system.”

The 252-page final report even made a recommendation as to how the MBUF system might be put in place: “Pricing technology could be implemented in conjunction with a program such as IntelliDrive.”

**IntelliDrive and Michigan: A road well-traveled**

Few states in the country are as active in the IntelliDrive movement as Michigan.

It is home to numerous IntelliDrive test projects and test beds. Several roadway miles have been outfitted with IntelliDrive infrastructure to allow the automotive industry to further explore the pioneering technology’s many possibilities.

Partnering with consulting firms such as HNTB Corp., the state has spent more than four years and $2 million exploring the technology. It is a firm commitment, one borne out of the knowledge that IntelliDrive cannot be tested in a garage but must be explored in real traffic conditions. The state has demonstrated the complete physical deployment of a wireless communication system and a mobile application platform that operates several prototype IntelliDrive applications.

IntelliDrive equips vehicles with sophisticated computing and communications devices that store, dissect and disseminate data. Those devices calculate a vehicle’s position, speed, rate of acceleration, internal diagnostics and more, transmitting some of the data to other vehicles and some to roadside communication and computing infrastructure. The roadside units, often not much bigger than a shoe box, then feed centralized computers that compile, analyze and redistribute the data to vehicles on the road, back to roadside devices and to other interested parties.

And most of it happens within milliseconds.

“In the future, we may well look back on travel before IntelliDrive the way we now look back on life before the Internet,” said Shelley Row, director of the Intelligent Transportation Systems Joint Program Office in the Research and Innovative Technology Administration of the U.S. Department of Transportation. “By enabling wireless connectivity with and between vehicles, between vehicles and the roadway . . . IntelliDrive has the potential to dramatically transform surface transportation in our lifetimes.”

Providing a “sandbox” for the automotive industry to play in has paid huge dividends, as numerous applications of IntelliDrive have already been demonstrated in Michigan by the state’s department of transportation and HNTB:

- Emergency vehicle signal pre-emption;
- Traffic-signal countdown;
- Incident beacon (vehicle hazard warning);
- Mileage-based user fee;
- Congestion pricing;
- Merge warning;
- Bridge height warning;
- Parking availability information and e-payment;
- Emergency vehicle warning;
- Work-zone warning; and
- Commercial services information.

Nothing is more important than IntelliDrive’s potential safety features, designed to cut into the up to 42,000 deaths that occur annually on our nation’s roadways. Through IntelliDrive, an in-vehicle warning system using vehicle-to-vehicle communication could sound an alert if the driver is approaching an accident he or she cannot see. It could warn a driver that he or she is close to running a red light. It might sound a series of loud chirps or vibrate the seat if sensors detect the driver is veering...
onto the shoulder and perhaps falling asleep.

It might even use sensors to measure atmospheric conditions such as temperature, pressure and humidity. Integrating that information with indirect signs of road conditions—the windshield wipers being on, for example—might allow IntelliDrive to warn drivers when road hazards are present or that the driver is driving too fast for the current conditions.

IntelliDrive also could provide mobility assistance for a nation stuck in perpetual highway gridlock. According to the Texas Transportation Institute, traffic congestion in the nation’s 437 urban areas costs $78 billion annually in lost time, wasted fuel and vehicle wear and tear. IntelliDrive could help drivers avoid those congested roads by suggesting less-congested routes.

It could even tell drivers the price of gas at the nearest gas station or reserve a parking space in a lot equipped with IntelliDrive technology.

“The general public is not aware of how much is being done with this,” said Jim Wright, a transportation technology expert for the American Association of State Highway & Transportation Officials. “Our belief is that there’s nothing on the horizon that will help us reduce accidents and help us with our mobility challenges like IntelliDrive.”

Now, add to that list of technologies the concept of mileage-based user fees.

**IntelliDrive and MBUF:**

*The road to the future*

As the director of the Center for Transportation Studies at the University of Minnesota, Bob Johns believes the fuel tax has run its course.

“It is not keeping up with our funding needs,” Johns said. “And it will become more and more obsolete as more vehicles are powered by alternative energy sources. MBUF is a rational user-based approach that makes sense. It could be adjusted for various policy goals, such as congestion pricing and rewarding energy-efficient vehicles.”

So how would it work?

The technology as it pertains to MBUF would be versatile, giving users a thrill ride of options. For example: IntelliDrive, integrated with a vehicle’s Global Positioning System (GPS) device, could inform drivers of cheaper rates for taking less-congested roads. Since the vehicles on the less-congested routes would not be crawling along in snarled traffic while emissions pollute the air, the per-mile fee might be $.05 instead of $.10. The system could send drivers live traffic congestion updates or alert them to lower rates for driving in off-peak hours or simply inform them of the per-mile rate on each road they are about to enter.

The IntelliDrive system would keep a detailed log of the vehicle’s travel history—number of miles driven, the per-mile rate on various streets and highways, etc.—and consumers could pull into a designated area to find their current balance. Or, drivers might simply receive a tax bill in the mail or pay their user fees the next time they refill their tank.

During this year’s annual ITS meeting in Michigan, the Michigan DOT and HNTB demonstrated that IntelliDrive MBUF applications can be
implemented right now with off-the-shelf technologies and minimal customized coding. They showed how the state agency could collect congestion information and determine pricing based on that data, then relay the information back to the vehicle and the driver.

The demonstration was a success, perhaps moving the state of Michigan—and the country—one step closer to a nationwide MBUF system.

The current federal fuel tax, 18.5 cents a gallon, will continue to lag behind the nation’s infrastructure needs, according to the federal commission. That will be especially true with the advent of vehicles like the Chevy Volt, an electric car that will make its debut next year. The commission estimated annual capital needs for maintaining surface infrastructure at $172 billion. As former U.S. Secretary of Transportation Mary Peters once said, “Relying on the gas tax is like relying on cardboard to keep rain out: The longer you use it, the less it works.”

Many challenges await a nationwide MBUF system utilizing IntelliDrive technology, of course. Estimates for equipping the nation’s roadways with IntelliDrive infrastructure range from $5 billion to $7 billion. That is a steep price, especially considering the nation’s current economic climate and the financial challenges facing the automobile industry.

There are privacy concerns, too, since the system would depend on GPS technology tracking the movement of every equipped vehicle. And even Row cautioned that IntelliDrive, “as it is currently envisioned, is not intended to support mileage-based user fees.”

But the “car of tomorrow” seems inevitable. Intelligent transportation systems and IntelliDrive technologies are moving forward every day, and industry experts believe IntelliDrive will one day be as commonplace as seatbelts.

A fully integrated system of mileage-based user fees cannot be far behind.

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