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Free-flowing hope

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With a change in leadership in Washington, optimism in the ITS industry is running high

- By Al Karr

As technological developments continue to mount, and with the arrival of the Obama administration and a new and more heavily dominant Democratic Congress, hopes are running high for increased spending on infrastructure—and a new surge of success within the ITS industry.

That feeling was described by observers as prominent in November at the recent 15th World Congress on Intelligent Transport Systems in New York, marked by numerous discussions and demonstrations of new or enhanced approaches to traffic management—everything from new wrinkles on congestion pricing schemes to advanced toll-collection methods to improved car-to-car and vehicle-to-roadway safety communication systems. Optimism was high despite the dire straits of much of the economy, especially the Big Three automakers themselves, some participants noted.

The World Congress featured “the largest fully integrated demonstration of deployed and marketable ITS technologies ever,” said show sponsors ITS America, Ertico (ITS Europe) and ITS Japan. Added Tyler Duvall, DOT acting undersecretary for transportation policy: “An amazing number of companies are focused on transportation and technology innovations that were not focused five years ago.”

Scott Belcher, president and CEO of ITS America, the U.S. industry group, told TM&E, “We’re at a point where we’re poised” to take advantage of all the technology that has been developed so far. “Most of the technology we’re talking about is mature.”

Increasingly, with space for new highways limited, environmental concerns and funding constraints, “there’s a limit to our ability to build our way out of the situation,” so renovating roads, using ITS techniques for traffic control and safer motoring, is clearly the answer, Belcher said. “People are coming to expect information about traffic, problems and how to get to places”—information coming from other cars, public and satellite radios, handheld devices, phones and signage on roads, he said.

Despite the relative invisibility of much of the ITS technology that makes this possible, “I think the public is making the connection [between ITS and their own mobility], although they may not see it as ‘ITS’—they just expect it,” Belcher said.

“We finally have gotten people’s attention about ITS. Before they didn’t know what it was,” said Rep. Mike Rogers (R-Mich.), co-chairman of the House ITS caucus. “It is looked at not as one of those ugly competitors for funds, but as a cost-efficient” way to deal with transportation challenges.

Adolescent behavior

But so far, ITS is still in many ways a gangling teenager, slowly moving into the mainstream of transportation but not yet established as an entrenched industry. In the nearly 20 years of ITS existence, some things have become commonplace, such as electronic toll collection (80% of U.S. collection facilities—over 160—have electronic capability), 5-1-1 (in half the country or so, to this point), General Motors’ OnStar driver assistance and automatic crash notification system (GM said it will be standard equipment on 95% of its 2009-model vehicles) and state-run traffic management centers (about 150 nationwide).

Others are still in the trial stage or being developed, like high-occupancy toll (HOT) lanes, and

other congestion pricing methods; or vehicle-infrastructure integration initiatives, which use wireless communication to let motorists know when there's a hazard such as another vehicle or a dangerous intersection looming ahead.

By 2006, there were 4,700 dynamic message signs (with some, but not many, giving travel times) in the U.S.; 53% of transit buses with safety and security audio or video surveillance technologies in the 108 largest metropolitan areas; 41 states with a traveler information website; and over 6,000 closed-circuit television (CCTV) cameras, providing 32% of freeway miles and 5% of arterial miles visible for incident detection, according to a new report by the Research and Innovative Technology Administration's (RITA) ITS Joint Program Office (JPO).

RITA's new report also shows 30 states participating in the Commercial Vehicle Information System Network in 2006. Among emergency management technologies in the 108 largest metropolitan areas, emergency vehicle traffic pre-emption was installed at 31,000 signals, including more than 20% of intersections in metropolitan areas; emergency response agencies in 63 metropolitan areas and law enforcement agencies in 94 such areas used both automatic vehicle location and computer-aided dispatch. Law enforcement, emergency management and other agencies in 37 areas used regional multiagency communication networks to coordinate evacuations in 2006.

"ITS has come a long way, but it has a ways to go" before achieving its stated goals of safety, mobility and efficiency, said Galen McGill, ITS manager for the Oregon Department of Transportation.

Paul Brubaker, RITA's administrator, told TM&E recently that he has challenged his JPO to the "bold, very audacious goal" of achieving 90% reductions by 2030 or 2040 from the year 2000 totals from \$230 billion in economic costs of highway crashes and fatalities of more than 40,000 annually during recent years. In 2002, ITS America had set more modest goals, but then, in 2004, announced at the World Congress in Nagoya, Japan, a new, extremely ambitious goal of zero fatalities and zero delays for transportation.

"Five years ago, the OEMs would tell you that safety doesn't sell," Brubaker said. "We believe that not only does it sell, but there's a pretty good business case from a public health and safety perspective." Much of RITA's emphasis is on Safe Trip-21, an initiative which will test various ITS technology applications designed to reduce gridlock, fatalities and injuries and improve public transportation.

Electronic payments needed

As usual, the name of the game is deployment and integration, but the game is far from over for many ITS initiatives.

"It's still a bit more developmental than operational," said Jim Wright, vehicle-infrastructure integration and 5-1-1 program manager for the American Association of State Highway & Transportation Officials (AASHTO).

Though the federal government has plowed \$3.45 billion specifically into ITS between 1991 and 2009, with additional sums used by each state for ITS out of general highway/transit funding, ITS advocates insist that increased financing is necessary for their traffic-management objectives to be reached with enough speed.

"Funding in all of transportation is a big issue right now," said the Oregon DOT's McGill. The gasoline-tax-fueled Highway Trust Fund itself was recently depleted for the first time and had to be beefed up from the Treasury Department's general revenues.

AASHTO has come up with a set of recommendations for revamping the federal highway/transit program, which would include a 35% increase in research outlays, to \$150 million a year, plus \$3

billion in annual operations funding and \$2.6 billion a year for safety, both of which would include ITS deployment. That could mean a major rise in deployment money from previous years, when the budget called for a specific deployment amount—\$122 million in FY 2005. Under the \$286 billion Safe, Accountable, Flexible and Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU), which expires on Sept. 30 of this year, earmarked ITS deployment funding ended, with state DOTs eligible to use as much or as little as they desired from core surface transportation financing.

"A more robust budget for ITS R&D is needed," said Rep. Ellen Tauscher (D-Calif.). "For example, technical issues related to widespread tabulation of vehicle-miles traveled (VMT) and vehicle-infrastructure integration (VII) are not yet complete." Also, "further deployment of ITS in our transportation infrastructure is important to maintain and continue the already-realized progress."

President-elect Barack Obama and Congressional Democrats have been advocating a major economic stimulus program that would include sizable outlays on the nation's deteriorating roads, bridges and other infrastructure components. ITS America's Belcher, noting at the World Congress that lawmakers will be working this year on a new six-year surface transportation measure, declared, "For the sake of improved safety and mobility, economic productivity, a cleaner environment and a better quality of life, Congress and the new administration should make the deployment of intelligent transportation systems a centerpiece of the bill."

In the House, an ITS caucus that last year numbered 52 members champions ITS funding and projects. The caucus is co-chaired by Reps. Tauscher and Rogers, and leads the ITS charge, also championed by House leadership. Chairman James Oberstar (D-Minn.) of the House Transportation and Infrastructure Committee has been described by ITS America officials as "a huge supporter of ITS," having strongly supported the potential ITS can play in improving mobility, reducing congestion and greenhouse gas emissions, and in reducing crashes and fatalities. In any event, Rick Capka, a former FHWA administrator, has said that ITS will be the story of the next multiyear highway bill.

Oberstar may advocate more ITS implementation and the use of technology to make the transportation infrastructure more effective instead of just building more of it, especially with the shortfall of available funds as compared with infrastructure needs. ITS, Congressional backers contend, also has the potential to significantly help create a performance-based highway program, ensuring that the goals of infrastructure investments are met.

While an escalating spending program for highway infrastructure is basically good news for ITS, it would contain some troublesome aspects as well. The trouble is that with all the emphasis on jobs, public officials will want to emphasize highly visible projects like new or repaved roads and bridges, and more sophisticated electronically controlled operating features will have to compete hard for the new money.

"In most people's minds, capital projects transcend operational improvements," even though ITS can reduce maddening and wasteful congestion, said Jim Misener, executive director of California Partners for Advanced Transit and Highways (PATH), whose researchers are spread across the University of California and other colleges. "ITS itself should be invested more," he said, "because there is a whole bunch of inefficiency out there that needs to be squeezed out."

"But it's hard to convince someone by asking, 'Did you see that a traffic jam was prevented by 5-1-1, or a metered ramp or variable message signs?' in comparison with the allure of a shiny silver bridge," Misener said. Surface transportation operations are "significantly underfunded; there's not enough data, not enough money, to make things as effective as they should be."

Too many state DOTs want flexibility, but "when they get the money, they spend it on laying concrete and asphalt, and ITS suffers," said Brent Bair, managing director of the Road Commission for Oakland County (Mich.). "Once they get involved in ITS, they see the value of it, and they stay with it. The problem is getting them involved." And with states' own financial problems, "we might be in the position where we can't use all that federal money, because we won't have the match."

Added Rep. Tauscher: "I do not believe that most states and municipalities are making sufficient use of the technology that exists."

And there's lots of new technology arriving almost every day, many of it featured at the World Congress in November, including new wireless communications, traffic monitoring, video detection and other systems.

Here is a brief rundown on the mixed-bag of ITS progress on some of its major fronts:

Congestion Relief

Projects, basically involving monetary charges for reserved HOT lanes, including encouraging driver-only vehicles to pay for use of lanes normally reserved for multioccupant cars, which pay lower rates or none at all, are being tried in areas including southern California, Florida and Minneapolis, where congestion has been sharply reduced.

The U.S. DOT also has given special Urban Partnership grants as an inducement, involving congestion pricing plans in Minneapolis, Miami, San Francisco (including a program that prices parking based on whether space is scarce or plentiful, with motorists getting parking space information on cell phones, the Internet or changeable message signs), Chicago and Los Angeles.

"There is not a major urban area in the United States that is not pursuing a pricing project right now," said Duvall.

One congestion-pricing project, the most ambitious one—charging motorists to enter the downtown area of large cities with the amounts varying according to the existing congestion—was proposed for traffic-choked New York City, modeled after successful programs in London, Stockholm and Singapore. But the New York state legislature didn't approve it, so the plan failed, despite vigorous support from Mayor Michael Bloomberg and various transportation, planning and environmental groups. Oregon has tested a pricing scheme involving per-mile charges and possible peak-period area or roadway fees, using GPS technologies on vehicle odometers, which might replace fuel taxes in the future.

The average yearly delay per U.S. traveler in the nation's 437 urban areas was 38 hours in 2005, up from 34 hours in fewer such areas in 2000, Texas A&M University's Texas Transportation Institute's 2007 Urban Mobility Report showed.

In urban areas with more than 1 million population, the "rush hour" concept doesn't apply. Congestion might occur for three hours in each peak, according to the report. The Los Angeles area led the list with 72 hours of delay, followed by a three-way tie at 60 hours by the San Francisco, Washington, D.C., and Atlanta areas. Despite numerous efforts at reducing congestion, increasing traffic—until last year's big gas-price climb—has meant those efforts have continued to lag behind the problem.

"There is no magic technology or solution on the horizon because there is no single cause of congestion," said Tim Lomax, TTI research engineer and the study's co-author. But four strategies—freeway-incident management and entrance-ramp metering, traffic-signal coordination and arterial-street access management—have reduced delays by 10% in 85 urban areas. "If we fully deployed all four of these ITS treatments, the delay savings would double," said David Schrank, TTI associate research engineer and Lomax' co-author.

Another approach, called the Mobile Millennium, is being explored under the Safe Trip-21 program by California PATH, the California DOT (Caltrans) and Nokia's Navteq unit, using GPS-enabled cell phones in vehicles as traffic/travel-time probes.

Traffic Management

A major weapon against congestion and crashes alike is the metered ramp, which uses stop lights to pace the flow of traffic onto major routes. RITA said there were more than 4,000 ramp meters in the U.S. in 2006, in more than 30 metropolitan areas, boosting freeway speeds by up to 26% and capacity by up to 30%, with crashes reduced by as much as 50%. After the Minnesota legislature ordered some 420 ramp meters turned off to gauge the public's reaction, crashes rose, speeds fell and travel times increased, said Ray Starr, assistant state traffic engineer. The meters were later turned on again, with the support of more than 85% of the public, RITA said.

Washington state and Minnesota are developing another approach to controlling traffic: using spans over freeways with signs that control traffic lane by lane and provide messages about trouble ahead, building on successful European programs, where crashes were lowered by 30%. Washington hopes to start building in 2010, putting the spans about every half mile along a 6.5-mile stretch of I-5 into Seattle, the scene of numerous rear-end collisions, said Ted Trepanier, state traffic engineer. On any lane, speeds can be controlled, lanes closed because of crashes up ahead or for sole use by emergency vehicles, and HOT charges can be applied to some lanes.

Traffic management centers respond to communications about incidents, helping to reduce congestion and save lives, but they do not blanket the nation. And keeping the existing ones in repair has proved difficult. "Though [the states] have invested in ITS, they don't have the money to maintain it," ITS America's Belcher said. Future centers will be much different: smaller, more efficient using more device-to-device communication, RITA's Brubaker said.

Traveler Information

Radio traffic advisories, variable message signs and private- or state-DOT-offered Internet traffic maps, often showing live action, are proliferating. Cell phones and other handheld devices are not only frequent recipients of such information, but as noted earlier may be used to provide probes that relay traffic conditions back to the receiver. Meanwhile, the student newspaper Exponent reported that Purdue University engineering students tracked the fastest routes to fight traffic after the Oct. 4 Purdue vs. Penn State football game, finding the best route as shown by signals from stations along major routes.

Another major source of traffic information involves 5-1-1 phone systems, but while about 35 states have full 5-1-1 operations, recent expansion has been slow. New York state started up a new 5-1-1 system in November, and a few states including Pennsylvania, Wisconsin and South Carolina are expected to be up and running this year.

"5-1-1 isn't expanding as fast as it should," said Oakland County's Bair. And in some states, like Minnesota, Internet versions of the 5-1-1 system are getting more hits than the phone version.

Safety

All the traffic managing, congestion fighting and traveler information activity is designed to improve highway safety as well as mobility. In addition, vehicle and road technology designed to save lives and prevent injuries is developing apace. World Congress organizers built two test beds—one on a 5-mile loop in west Manhattan and the other along 50 miles of the Long Expressway—both demonstrating sensors and probes that send data to a traffic management center, including travel times and other information that can be relayed to vehicles. A major aim is to respond to crashes quickly, as well as managing traffic. Technology companies and other groups also demonstrated developing VII systems along the test beds, which will remain in place for future research.

Meanwhile, automakers keep coming up with new VII-related and other safety-oriented features, including cars that communicate with others or roadside devices to show looming hazards such as a vehicle that has suddenly stopped ahead or is coming fast at an intersection, and even to bring one's car to a stop if the driver fails to do so. At the World Congress, GM announced a portable device that enables motorists, roadways, bicyclists and pedestrians to "speak" to each other; Mercedes Benz showed a vehicle that automatically stops at a red light; and Honda unveiled one that warns of impending collisions. Other systems can detect vehicles or persons while one's car is