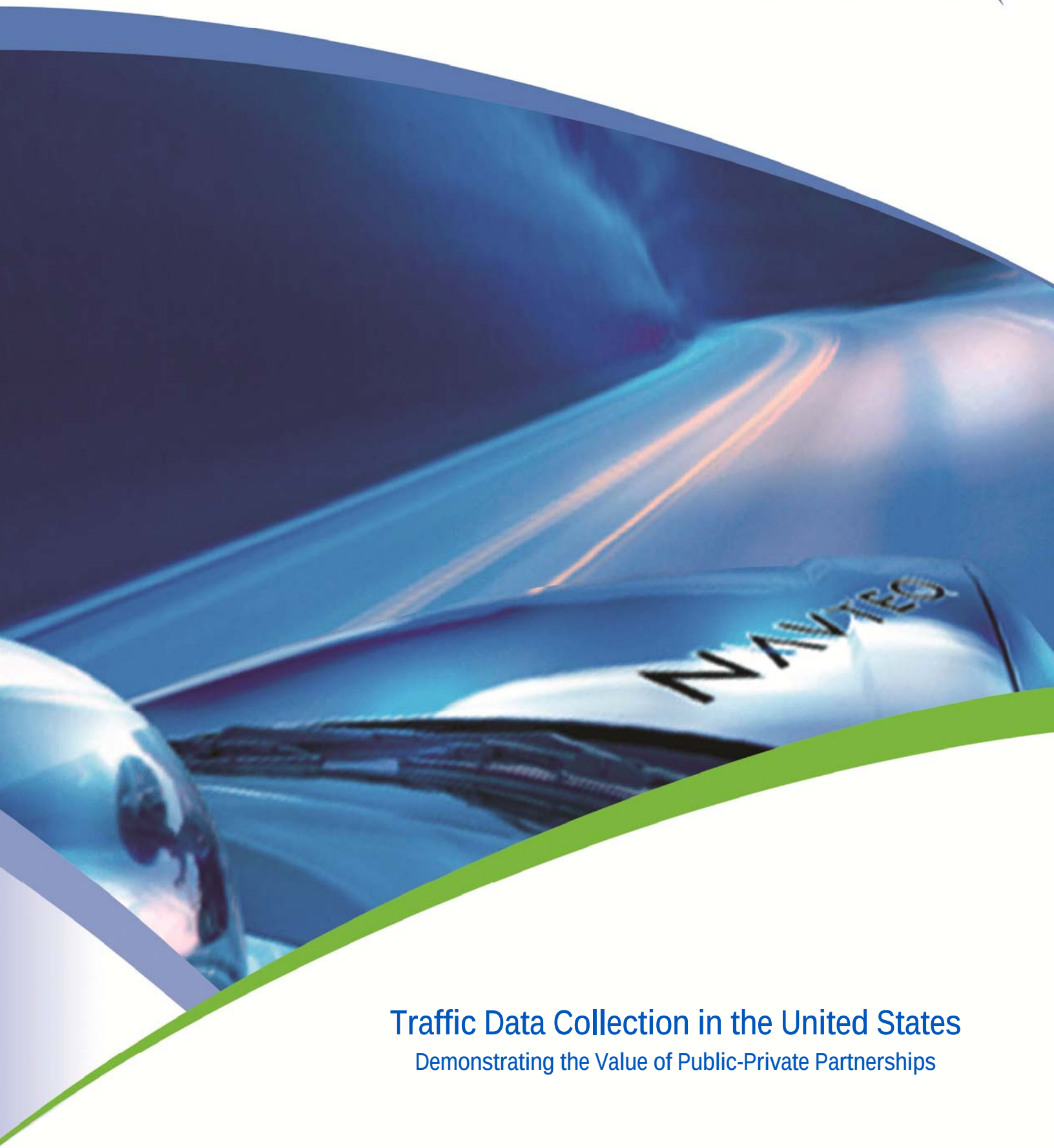
NAVTEQ



Traffic Data Collection in the United States

Demonstrating the Value of Public-Private Partnerships

Executive Summary

No one would dispute that Americans love their cars. Since the advent of the automobile, Americans have cherished the freedom their cars have given them to go anywhere, on their own schedule, and at their own pace. And they have welcomed with open arms the improvements the government has made in the country's roads during the past 50 years, providing ever-greater reach and speed of travel to drivers everywhere.

In recent years, however, governments have found it increasingly difficult to keep up with citizen demand for more and better road and highway access to desired destinations. The massive increase in the U.S. population in the past 50 years, and the consequent explosion in the number of cars and trucks on the road have substantially ratcheted up the wear and tear on the country's highway infrastructure, resulting in huge increases in the amount of money needed to maintain and expand roadways. Also, the steady migration of people from center cities to the suburbs has made traffic congestion one of the biggest headaches for individuals, employers and governments alike—negatively affecting quality of life, reducing worker productivity and increasing pollution as vehicles sit idling in traffic jams during rush hour (which, in most cities around the country, has become rush *hours*).

There are no easy solutions to what are, indeed, enormous challenges facing the country. Money is increasingly hard to find for even the most routine highway improvement projects, let alone for addressing the dire conditions of many roads, bridges, transit systems and highways around the country. And in already built-out cities and suburbs, adding more roads and highways, or new or expanded rapid transit systems to relieve congestion is either impossible, impractical or both.

Clearly, much creative thinking is needed about new approaches to the highway infrastructure dilemma. And that's where traffic data—collected, analyzed and distributed via public-private partnerships—can be a major, positive force.

The U.S. government for several decades has been a proponent of using traffic data in the management of the country's highway infrastructure. Its first serious commitment to the issue was in the form of the Intermodal Surface Transportation Efficiency Act (ISTEA) of 1991 which established a federal program to research, develop, and operationally test Intelligent Transportation Systems (ITS) and promote their implementation. Under ISTEA, numerous initiatives were launched to build traffic-information systems and services in various cities around the country, many of them involving commercial enterprises providing key products and services. However, none of those enterprises was based on a business model that was sustainable without continued government funding.

Learning from these experiences, the U.S. Congress once again authorized funding for the development of an ITS infrastructure under the Transportation Efficiency Act for the 21st Century (TEA-21). However, this time Congress mandated a new model that specified commercial enterprises partnering with the government were required to be self-sustaining. They would not receive additional investment from the government for ongoing system operation and maintenance.

Traffic.com, a leading provider of personalized real-time traffic information for drivers across the U.S., was the lead for a team that won a competitive bid to provide traffic data services to the United States Department of Transportation (USDOT) and build and roll out its digital roadside sensor network in states across the country. To date, the company has forged innovative and sustainable public-private partnerships with state and local agencies (DOTs) for 27 metropolitan areas and is generating comprehensive, timely data on traffic conditions on key roads

and highways for public agencies and citizens. Under these agreements, Traffic.com—often with little or no cost to the state and local agencies—assumes full responsibility for the deployment of its system and, in turn, is permitted to package and sell the data generated by the systems to other commercial enterprises such as television and radio stations. The revenue from these sales help fund the expansion and ongoing maintenance of the systems, thus enabling states to dramatically expand their traffic data collection capabilities and take advantage of state-of-the-art technology—and do so for far less money than if the government agencies had built, deployed, and maintained the systems themselves, thereby saving taxpayers millions of dollars.

Today, DOTs around the country are benefiting from their innovative public-private partnerships with Traffic.com. These organizations have developed and deployed sophisticated traffic data collection systems on critical stretches of roads that provide intelligence on how those roads are used by the traveling public, where the biggest problems are, and possible ways to address them. Such intelligence, in turn, is being used in several important ways:

- DOTs are making such intelligence available to the public so drivers can choose the best routes given traffic conditions—thus alleviating congestion, improving travel time and increasing driver safety and quality of life.
- By understanding where and why problems occur, DOTs are taking more fully informed actions to maximize the capacity inherent in their existing infrastructure and are able to avoid spending millions or billions of dollars unnecessarily on new roads and highways.
- Some DOTs have gone a step further by using traffic data to help identify and plan for future infrastructure needs to ensure their states can accommodate anticipated changes in population, highway use and overall citizen demand.

But DOTs also recognize they can't afford to rest on their successes. Changing technologies and citizen behavior are requiring a stronger push into mobility. Increasingly pervasive mobile devices such as smart phones and PDAs are making it possible for DOTs to gather much more comprehensive data from private companies, and data on thousands of miles of roads not currently covered. Mobile technologies also allow DOTs to communicate that data directly to travelers' handsets, and to do so for far less cost than today's fixed-roadside or overhead sensors. Traffic.com accelerates this process and ensures that NAVTEQ is at the forefront of initiatives to explore this new frontier with industry and DOT leaders. This includes an extensive pilot studying how such technology can best be put to use in areas not covered by existing sensor networks.

Despite high gas prices, there is little doubt most Americans will still consider the automobile their primary mode of transportation well into the future. And if recent demographic trends continue, the number of Americans and cars on the road will only rise, making it all the more critical for DOTs to make smart choices about how they manage their roads and highways, as well as provide the information that enable drivers to choose the best routes to their destinations. Traffic data generated by the Traffic.com network as part of a public-private partnership plays a key role in both of these efforts, as it enables government and citizens to utilize the country's vital highway infrastructure to their best advantage.

The History of Traffic Data Collection in the United States

Over the course of the 100-plus years Americans have been driving automobiles, the need for government to find better ways to build, maintain and manage the country's highway infrastructure has increased exponentially. This is especially true in the past two or three decades as road use by the traveling public has skyrocketed, resulting in increased wear and tear on roads, highways and bridges as well as stifling congestion in major cities and their suburbs.

Today, with the country's infrastructure requiring hundreds of billions of dollars of investment simply to keep it in working order, the pressure is on DOTs to manage their roads and highways more effectively and maximize the use

of existing system capacity. For many DOTs, a powerful weapon in that battle is real-time traffic data that can be used as the basis for creating the most intelligent transportation systems

During the past two decades, the United States government has been a strong proponent of using traffic data to benefit both the country's highway infrastructure and the mobility of the traveling public. The rationale has been that with more data on how the country's roads and highways are used, DOTs can make better decisions about how to prioritize their road operations and maintenance budgets and also help the drivers themselves make better decisions about the routes they take, thereby reducing congestion and travel time.

Yet in the early 1990s, the federal government recognized that it had a critical deficiency in transportation-related intelligence. The USDOT had no mechanism for supporting and distributing transportation intelligence across the country because each area had separate, incompatible systems for traffic information collection and analysis. This was in distinct contrast to other countries at the time (such as Japan, Germany and France) which already had taken major strides toward building a robust, unified transportation knowledge base.

Understanding the value in collecting and disseminating traffic information to improve the mobility of the traveling public—and seeing their role as a catalyst for creating a traffic information market that eventually would be taken over by the private sector—USDOT executives and members of Congress, in conjunction with state and local transportation agencies, began intensive efforts to address the traffic-information deficiency.

The Passage of ISTEA

The first major show of support for the creation of a nationwide transportation knowledge base was the Intermodal Surface Transportation Efficiency Act (ISTEA) of 1991. ISTEA established a federal program to research, develop, and operationally test Intelligent Transportation Systems (ITS) and promote implementation of these systems. The program was designed to facilitate the deployment of technology to enhance the efficiency, safety, and convenience of surface transportation, resulting in improved access, saved lives and time, and increased productivity.

The program began as a three-pronged effort that fostered the development of ITS through three avenues: basic research and development; operational tests that served as the bridge between basic research and full deployment; and various technology transfer activities that facilitated the implementation of ITS technologies. ISTEA originally authorized $659 million for fiscal years 1992-1997, with additional funds appropriated for a total of approximately $1.2 billion. Under ISTEA, numerous initiatives were launched to build traffic-information systems and services in various cities around the country, many of them involving private enterprises as partners. Some of these early initiatives included primitive Voice Response systems (IVR), which citizens could call to get prerecorded information on traffic conditions on the routes the caller indicated he or she was interested in traveling. Although these systems couldn't reroute callers based on traffic conditions, they could at least give commuters a sense of where they might encounter bottlenecks and how those obstacles would affect their travel time.

In addition to such initiatives as the IVR systems, the USDOT began funding the pilot deployment of sensors in major cities to collect traffic data, as well as university research on and evaluation of the efficacy of these systems. The government hoped these efforts eventually would pay off in the form of a network of traffic data collection systems that would help the DOTs more effectively manage their part of the country's critical transportation infrastructure and move traffic more efficiently.

Early Solutions: Ineffective and Unsustainable

However, while hundreds of millions of dollars were allocated to cities under ISTEA for traffic data collection, few if any of these projects produced successfully self-sustaining traffic data systems. In fact, during the years of ISTEA funding, many companies tried and ultimately failed to provide a sustainable traffic data collection and management

solution that would support the government's objectives without requiring additional operating assistance from the government. Included among these enterprises were SmartRoute Systems, Traffic Station, and US Wireless. After investing considerable public resources in the attempt, an umbrella not-for-profit agency in the New York metropolitan area abandoned its effort to create a self-supporting personal transportation service (PTS) to provide traveler information.

Many factors played a role in these companies' inability to achieve long-term success, but two factors were especially significant. One involved the limits of technology. The Internet had yet to be adopted widely and mobile phone usage was limited because airtime, charged by the minute, was very expensive (not to mention the fact that mobile handsets at that time were not able to do much more than send and receive calls). This made the collection and distribution of data and information both more difficult and more expensive than it is today.

A more important factor, however, was the structure of the relationship between the government entities and private enterprises. Although the arrangements were billed as "public-private partnerships," in reality the bulk of the investment from the private side came in the form of in-kind contributions; most, if not all of the actual funding came from the government. In essence, the private enterprises contracted to build and operate these services lacked a business model that would enable them to fulfill their obligations to the government and still make a profit. Instead, they relied on a continual stream of government funding to subsidize the ongoing operation and maintenance of their systems—funding that ultimately wasn't available.

Recognizing the need for further investment that would result in a more robust and coordinated traffic program across the country, the federal government—upon the expiration of ISTEA—authorized a broader ITS program within the Transportation Efficiency Act for the 21st Century (TEA-21), which appropriated a total of $1.3 billion through fiscal year 2003. Under TEA-21, $10.6 million in dedicated funding, plus eligibility under other programs, was made available for purchasing data services that would enable the building of an ITS infrastructure that would cover up to 40 metropolitan areas. Importantly, state and local governments, or their private-sector partners, were expected to provide a 20 percent match of federal funds. The DOTs, although not obligated to participate in the program, could only receive part of the dedicated funding by joining the program.

The USDOT hoped TEA-21 would be a strong answer to the growing challenge of transportation management in America.

Traffic.com Becomes a Key Player in the ITS Build-Out

Despite authorizing funding for the ITS build-out under TEA-21, the federal government recognized that far more money—not to mention deep expertise in traffic data collection systems—would be needed to make a cross-country ITS a reality. Therefore, the USDOT once again turned to the private sector for help, placing an advertisement in the *Congress Business Daily* in December 1998 soliciting private companies to submit proposals for how they could help the government build out the ITS infrastructure.

In 1999 the USDOT put out for competitive bidding a $4 million contract requiring a demonstration of transportation system initiatives for two cities, Pittsburgh and Philadelphia. Significantly, one of the main requirements for all proposals was that they be self-sustaining—i.e., they should require no further investment from the government for ongoing operation and maintenance.

Competition for the contract was intense, with 12 companies participating in the process. Seven months later, after oral presentations and following formal and approved government procedures, the USDOT selection committee reviewed all bids and ultimately awarded the contract for the pilot to a joint team composed of Traffic.com and Signal Corporation.

The Pittsburgh and Philadelphia Pilots

Working with PennDOT and local agencies, Traffic.com set to work launching the pilots—installing its pole-mounted radar traffic sensors along the sides of the roads in Pittsburgh and Philadelphia. After just a little more than two years (traffic information systems typically take more than 10 years to design, fund, install, and be formally accepted by the USDOT), the system—the Digital Traffic Pulse network—went live in both cities, generating lane-by-lane traffic data (including actual speeds, volumes and point-to-point travel times), as well as identifying the types of vehicles passing through, and all updated every 60 seconds, 24 hours a day.

Traffic.com was able to implement the system so expeditiously and efficiently for two key reasons. First, because all the sensors were solar powered there was no need to locate power sources and tie into the power grid. This saved a tremendous amount of time. Second, each sensor was equipped with a wireless modem that communicated data to the data center immediately upon being switched on. That meant valuable traffic data was being collected by the two cities from the day the sensors were turned on.

Traffic.com's performance in the Pittsburgh and Philadelphia pilots impressed government leaders. The company proved it had the technical ability to deliver what it promised, and did so on time and without requesting additional subsidies for operations and maintenance. Based on the success of the pilots, the USDOT and Congressional representatives determined that Traffic.com had the expertise and experience to manage the larger 25-state rollout that could be funded from an additional $50 million that was added to the program in 2001. In June 2002, the USDOT signed the order expanding the scope of the contract and making the Traffic.com team the provider for the data services program.

Under this innovative public-private partnership, Traffic.com agreed to fund the equipment, maintenance, and ongoing operating expenses of expanded coverage in the selected cities and offer integrated traffic data services for the federal, state, and local agencies to use for planning purposes, emergency response, and highway operations. Of critical importance is the fact the partnership agreement specifies that Traffic.com would request no additional subsidies or funding from the government for ongoing maintenance or operation of the systems deployed. In exchange, the government agreed that Traffic.com could package and sell the traffic data collected to commercial enterprises to fund the activities necessary for Traffic.com to build, maintain, and subsequently expand the ITS infrastructure.

Yet while the contract was a major win for Traffic.com, it was far from a windfall. In fact, given the complexity and scale of the ITS program called for in TEA-21, the company estimated it would have to invest an additional $100 million of its own money to build out and operate the system and establish the marketing and sales capabilities necessary to generate an acceptable return on its investment. This was a critical point of departure from the business models of other companies previously involved in ITS initiatives, and one that was viewed very favorably by DOT executives, according to Dave Jannetta, Traffic.com co-founder. "As a private company, we committed to operating and maintaining these systems on our dime and that was unique," he said. "I don't think anyone has ever done that before. It was risky, obviously, and we had our challenges early on, but the fact is we have operated, maintained, and upgraded these networks at our cost because we found a way to sell the traffic data to various end users, which generated enough revenue to fund those activities and provide a high level of service to our government customers."

Building Out Intelligent Transportation Systems

After winning the expanded contract, Traffic.com began the ambitious work of building the expanded traffic data infrastructure. With Pittsburgh and Philadelphia enjoying the benefits of comprehensive, real-time data collection, the company next turned its attention to those cities with congestion issues serious enough that Congress made them eligible for the program: Baltimore, Birmingham, Boston, Chicago, Cleveland, Dallas/Ft. Worth, Denver, Detroit,

Houston, Indianapolis, Las Vegas, Los Angeles, Miami, New York/Northern New Jersey, Northern Kentucky/Cincinnati, Oklahoma City, Orlando, Philadelphia, Phoenix, Pittsburgh, Portland, Providence, Salt Lake, San Diego, San Francisco, St. Louis, Seattle, Tampa, and Washington, D.C.

At the same time, Traffic.com was laying the groundwork for the commercial application of the traffic data it was collecting. In the beginning, the company created a unique approach to selling the digital traffic data to radio stations (and, later, television stations as well). Instead of being paid in cash for the data, Traffic.com received advertising sponsorships, which Traffic.com then packaged into a network and sold to other companies. This enabled Traffic.com to provide free, real-time traffic data to consumers around the country both via Traffic.com's website and the sites of the state DOTs with which Traffic.com was working.

However, despite these successes and the high level of satisfaction among both government and commercial customers, Traffic.com confronted a painful reality: It still was unprofitable. Even after building a solid business selling traffic data to radio and television stations for traffic reports, and raising $78.6 million in its January 2006 initial public offering, the company was operating in the red because of the substantial cost involved in building and maintaining the ITS infrastructure in more than eight cities. This fact certainly belies a misperception among some players in the traffic industry that Traffic.com was profiting immensely from its contract with the government. The truth is that the revenue Traffic.com generated from selling traffic data to commercial enterprises was reinvested in the rollout and maintenance of the systems the company was deploying in states around the country—to the substantial benefit of the government and its constituents.

NAVTEQ Acquires Traffic.com

While Traffic.com was trying to reach profitability and build out the ITS infrastructure, the international mapping company NAVTEQ, faced a challenge of its own: How to take its own mapping offerings to the next level to meet growing customer demand.

NAVTEQ for years had been building its reputation as leading force in mapping and navigation technology. In fact, the company has developed one of the most comprehensive and accurate geographic databases in the world, covering more than 70 countries on six continents. NAVTEQ solutions form the basis for most of the in-vehicle navigation systems sold in the U.S. and Europe, drive Location Based Services (LBS) used in devices such as personal navigation devices (PNDs) and mobile phones, and they power some of the world's top geographic information system applications on which fleet and mobile enterprise solution providers rely.

But despite its leadership position, NAVTEQ was being pressured by its business partners to accelerate the integration of real-time traffic with its navigation maps. NAVTEQ knew it had substantial opportunities to expand its solutions and grow its markets, and recognized high-quality traffic information was the next big enhancement for in-vehicle navigation systems. NAVTEQ believed delivering real-time traffic information would further drive the market for navigation solutions by overcoming the limitations of existing applications. For instance, at the time, navigation systems provided the best routes based on speed limits, but didn't reflect real-time traffic conditions. NAVTEQ, therefore, determined it needed a way to collect, aggregate, normalize and link real-time traffic data to the NAVTEQ map.

To offer a viable real-time traffic solution that could be integrated with its navigation solutions, NAVTEQ recognized it needed a national "footprint" of traffic data—i.e., traffic information had to be available for a sizable number of large metro areas. Therefore, the company made a strategic decision to become a traffic data aggregator and distributor to satisfy its customers and enhance the value and quality of its navigation map. NAVTEQ invested millions of dollars to establish an in-house facility that would acquire traffic data from all sources (government and commercial entities, free and for sale), aggregate it, ensure its quality, process and model it, and distribute it to customers.

One of the sources of data for NAVTEQ was Traffic.com, whose overall solution and data sources were closely aligned with NAVTEQ's vision for building and delivering a real-time traffic data solution. Over several years, NAVTEQ became one of Traffic.com's biggest customers. As the relationship grew, NAVTEQ wanted to move beyond the static map content that was typical of the traffic business circa 2005 and feature more dynamic content that complemented its core mapping business. "We started talking about providing more types of data and more expansive data feeds to NAVTEQ," recalled Jannetta. "As the contracts kept coming up for renewal, it became obvious to both NAVTEQ and Traffic.com that it made sense to join forces."

NAVTEQ officially completed its acquisition of Traffic.com in March 2007, creating a combination that substantially strengthened NAVTEQ's offerings in the marketplace and gave Traffic.com the infusion of resources it needed to continue the ITS build-out and improve the quality of the traffic data it collected. This was especially critical to executives in the U.S. and state DOTs as NAVTEQ's acquisition helped preserve and protect the government's investment in ITS and helped ensure that the experiences of the companies that preceded Traffic.com—particularly their inability to develop a self-sustaining business model—would not be repeated.

The NAVTEQ/Traffic.com Experience Today

In the seven years since the initial implementation in Pittsburgh, Traffic.com has deployed its traffic sensor data system in an additional 18 cities, with more on the horizon. According to Jannetta, these deployments all have achieved the ambitious goals set for them by both Traffic.com and the respective DOTs. "We are 19 for 19 in achieving system acceptance in our first pass, which is really unprecedented," he noted. "There's not another ITS program in the nation that has seen that type of an acceptance record: on time, on budget, no cost overruns. That's what really made us unique in the DOT contracting world."

Of course, things have changed over the years since the first deployment in 2001. Increasingly, congestion, which continues to be a huge challenge for big cities, now affects smaller ones as well. As more people have moved farther from the city centers, they face increasingly longer commutes—which only get longer when accidents or construction interfere with their normal routes. And as navigation units linked to real-time data become more popular and accessible to more people, with their prices continuing to fall, consumers are demanding better, more timely intelligence that can help them avoid congestion and reduce their travel times.

In response to these challenges, both states and media outlets continue to use Traffic.com's services to meet the needs of citizens and customers. The experiences of three such organizations—the states of Missouri and California and WMAQ-TV in Chicago—illustrate how traffic data is being collected and used to improve traffic flow, make commutes faster and safer, and help state governments make critical decisions regarding transportation system maintenance and expansion.

Missouri: The "Show-Me" State Sees Improvement

The state of Missouri is a strong believer in the value of traffic data. According to Pete Rahn, the director of the Missouri Department of Transportation (MODOT), traffic data is critical not only to helping the public navigate the state's roads more efficiently, but also to managing the state's highway infrastructure more effectively. "To operate [our highway system] better, we need data," said Rahn. "We need to understand what's going on in our system so that we can make operational decisions that will improve the experience for our customers and increase capacity for our system. And, ultimately, if it operates better, that reduces the demand for additional construction in the future, or at least lessens it."

Missouri was one of the states that teamed up with Traffic.com under the TEA-21 program in 2004. Under the federal program, Traffic.com installed sensors on a portion of Missouri's highway system at no charge to the state

(the cost was funded by Traffic.com and the traffic data services contract with USDOT). At the same time, MODOT was installing its own traffic monitoring and communication devices on Missouri highways at its own cost. But as the cost to deploy those devices continued to rise, MODOT decided to investigate how a private enterprise might be able to do the work for less.

The state issued a request for proposals to cover key parts of its highway system in the metropolitan St. Louis area not already served by MODOT-installed devices. Traffic.com won the competitive bidding process—scoring the highest point total based on a combination of factors including total cost, experience, and technical ability. There was a cost to MODOT associated with the expanded program, but the contract was structured to mirror the earlier effort so that MODOT was guaranteed five years in which no further state funding would be necessary for the operation and maintenance of the sensor system.

Under the agreement, Traffic.com deployed 26 sensors along more than 25 miles of highways in and around St. Louis to complete the system's coverage of the area (40 percent is covered by the devices MODOT installed itself and the remaining 60 percent is covered by Traffic.com sensors). In addition to what was in the original agreement, Traffic.com built and deployed (at no additional cost to MODOT) a traveler information system that citizens can access by dialing 511 on their cell phone.

The MODOT solution works in much the same way as others that Traffic.com has deployed around the country. Traffic.com detectors send XML feeds every 60 seconds that provide information on vehicle speed, occupancy, and counts. Similar information is provided by the MODOT-installed devices. The data is fed into MODOT's advanced transportation management system, which aggregates and analyzes the data to provide actionable information that MODOT can use to serve the traveling public, such as detecting incidents on the highway, posting travel times on MODOT's dynamic message signs that reflect current traffic conditions, and setting a variable speed limit on one of the area's routes depending on conditions at any given time.

The system has generated many benefits for MODOT. By supplying real-time data, the system has helped reduce incident response time, reduced the time it takes to clear a queue of vehicles, and improved travel times. The system also generates historical data such as traffic patterns over time that is valuable to MODOT for planning purposes. For instance, by getting a picture of traffic and highway use across the entire system over months or years, MODOT can plan more effectively for road expansion and maintenance.

But even with these inarguable and valuable benefits, Teresa Krenning, St. Louis Transportation Operation Center Manager at MODOT, said she believes the state has only scratched the surface of what's possible. MODOT eventually wants to use the system's data to guide plan more effectively for real-time operations—for instance, gaining enough visibility to avoid sending snow plows to parts of the highway that are already congested, thereby allowing them to remain active clearing streets instead of sitting stuck in traffic.

Currently, MODOT is focusing traffic data collection only on the state's major metro areas—St. Louis, Kansas City, and Springfield. "The metropolitan area is where you get your biggest return for dealing with routine congestion, and the incident management side," said Krenning. "And because the interstates [in the metro areas] are almost fully built out, we're stretching our resources to put devices and be able to display travel times and traffic conditions on the arterial routes."

MODOT also is looking to provide more traffic information on the highways outside the metro areas—such as the stretch of Interstate 70 between St. Louis and Kansas City, and Interstate 44 proceeding from St. Louis to Springfield in the southwest portion of the state. "That's a tougher thing to do statewide, because that's a lot of infrastructure to put out there," Krenning noted. "We're trying to find ways to get that information and generate travel times, or at least

identify where there are incidents, without having to wait for a phone call from law enforcement, highway patrol, or some other response agency."

From a citizen perspective, the service MODOT provides apparently is resonating with the traveling public which increasingly is putting the availability of traffic data "right up there with the weather [information]," according to Krenning. She said citizens generally used to be concerned only with getting traffic information during two peak times of the day—morning and late afternoon, coinciding with their work commutes. Now travelers expect to get up-to-date information all day long—and they are using both the MODOT website and the 511 system to get it. Krenning said the number of hits on the MODOT website and the calls to 511 continually increase as MODOT promotes the availability of highly accurate, timely data. "We want people to keep coming back and using the information we provide to help reduce congestion by making educated decisions on which way to go or how long to delay their travel to avoid congested areas," Krenning said.

Beyond citizens, the partnership between NAVTEQ and MODOT has done also has caught the attention of the organization's peers. In recognition of the work in St. Louis, the Intelligent Transportation Society of America (ITS) awarded the agency a 2008 "Best of ITS" honor. This "highly competitive program recognizes the organizations whose projects have demonstrated specific and measurable outcomes and exemplified innovation by establishing a 'new dimension' of performance."[1] NAVTEQ and MODOT were a winner in the competition's Best New Innovative Practices category.

But even as the successes mount, the challenges only get more difficult, according to Pete Rahn. "We're a mobile society," he said. "People see [advanced traffic data] in one city and wonder why they can't have it in their area. There is now a public expectation that travel data should be provided to them as a service, and this expectation is only going to grow as congestion gets worse. The reality is that no [state] wants to pay to build its way out of congestion, so we've got to find the technology solutions out there that can improve [highway] system performance."

California: Planning to Make a Crowded Future Less Congested

California is another state that has reaped the benefits of traffic data collection by teaming with Traffic.com. With more than 15,000 centerline miles of freeways, California faces a major challenge operating and maintaining its highway system. The state's Governor's Strategic Growth Plan calls for a $222 billion infrastructure improvement program to "fortify the state's transportation system, education, housing and waterways."[2] Of that total, $19.9 billion is allocated for transportation improvements. The plan includes a "comprehensive investment package designed to decrease congestion, reduce travel times and increase safety, while accommodating future growth in the population and the economy."[3] The plan is based on the premise that investments in mobility throughout the system yield significant improvements in congestion relief. The foundation of the strategies developed to achieve congestion reduction is "system monitoring and preservation," which requires (among other things) highly detailed and accurate traffic data.

California has a substantial network of traffic data collection devices in its large metro areas, part of which was initially built by the state itself. However, according to Randell "Randy" Iwasaki, chief deputy director at the California Department of Transportation (Caltrans), while this part of the network was beneficial, it was expensive to deploy, operate and maintain—all of which made it difficult for the state to achieve wider coverage. After winning the federal TEA-21 contract, Traffic.com met with Caltrans executives to discuss how Traffic.com had been helping other cities improve and expand their traffic data collection capabilities and to explore ways the company could do the same for

[1] "Best of ITS Award Winners Announced," ITS press release, November 17, 2008, http://www.itsa.org/press_release_content/c217_d2566/News/Newsroom/Press_Releases_.html
[2] From the California Strategic Growth Initiative 2007-2012, http://www.dot.ca.gov/docs/strategicgrowth.pdf
[3] Ibid.

California's metro areas. These discussions ultimately led to agreements under which Traffic.com would deploy its sensors to augment what the state already had in place in three regions: San Diego, the San Francisco Bay area and the Inland Empire (which is centered in Riverside and San Bernadino counties just east of Los Angeles). The data collected across these and other areas in the state is fed into the performance measurement system (PeMS) at Caltrans' transportation management center, where it is aggregated, synthesized and made available to anyone who wants it for non-commercial use, free of charge.

The additional data generated by the Traffic.com sensors was a boon for Caltrans' decision makers, as it helped provide a far more complete and accurate picture of highway traffic conditions. Using this data, the PeMS system clearly showed where congestion occurred each day, which helped Caltrans identify recurring problem areas that merited investigation and remediation. In the San Francisco Bay area, for example, one "choke point" that consistently showed up was on Interstate 880 near a certain overpass. After identifying the choke point, traffic operations specialists were able to determine that the congestion was not a product of too much traffic; rather, the culprit was actually a crest in the roadway profile just before the overpass. As trucks would come over the top of this crest, drivers would suddenly see the overpass and, thinking it might be too low, would begin slowing down, causing a ripple effect in the traffic behind them. Without such data, a decision might have been made to build an extra lane to accommodate the volume that was presumably causing the congestion. Instead, based on the data, Caltrans determined that more aggressive metering of traffic and appropriate signage informing truckers that the overpass indeed was sufficiently high would be an effective (and certainly far less costly) solution to the Interstate 880 chokepoint problem.

In addition to providing insights (with resultant solutions) like this one, Iwasaki said the traffic data Caltrans collects was key to gaining the support of California voters for the $19.9 billion in transportation funding that was included in the state's Strategic Growth Plan. In 2005, the Caltrans data revealed the state had experienced about 550,000 daily vehicle hours of delay. Using data models that combined Traffic.com data with projections of California's population growth, Caltrans found that without some type of intervention that number would increase to 750,000 daily vehicle hours of delay over a 10-year period. Ultimately, Caltrans was able to demonstrate the money it was requesting would fund initiatives that within 10 years would cut congestion to 454,000 daily vehicle hours of delay despite rising population. "That kind of information helped build our Strategic Growth Plan, which ultimately led to a bond initiative that passed," said Iwasaki.

As was the case in Missouri, California drivers have stepped up their demand for and use of more robust traffic information as quickly as Caltrans could collect and disseminate it. The Caltrans website, says Iwasaki, gets hundreds of thousands of hits a day from people checking traffic conditions—not only for their work commutes, but whenever they need to hit the roads. Caltrans also uses the Traffic.com data to post predicted or actual travel times on its website and on highway signs to help commuters plan their optimal routes. "An informed traveler is a safe and efficient traveler," said Iwasaki. Caltrans found Traffic.com's business model so attractive it entered into contracts to have Traffic.com provide similar services in two other areas: the state capitol in Sacramento and the congested area of San Jose, south of San Francisco.

WMAQ-TV in Chicago: Hooking Viewers with Traffic

A key aspect of the Traffic.com business model that enables the company to serve its DOT partners cost-effectively are the relationships Traffic.com has established with commercial customers—especially the television and radio stations that rely on Traffic.com data for the traffic reports they provide to listeners and viewers. By purchasing the data Traffic.com collects from the highways around the country, these enterprises provide the revenue stream Traffic.com continues to invest in its data collection, processing and analysis capabilities which, in turn, provides continually higher value to the state governments with which Traffic.com partners.

One commercial Traffic.com customer is WMAQ, the NBC television affiliate in Chicago. The station produces 30 hours of news each week, which includes traffic reports every 10 minutes as part of the morning newscasts. Augmenting the newscasts is the station's website, NBCChicago.com, which contains an area that provides in-depth traffic information and enables consumers to sign up for personalized traffic alerts that can be sent via email, pager or cell phone. "The traffic in the morning is probably one of the most critical pieces of information that we can give our viewers," said Frank Whittaker, WMAQ station manager and vice president of news. "People are getting up, getting ready for work; they want to know what the weather's going be and they want to know how the traffic is. [Traffic information] is a key component of our morning newscasts and it has been for quite a long time."

WMAQ has relied heavily on Traffic.com to meet its viewers' traffic information needs. For starters, Traffic.com collects and aggregates traffic data from two main sources: the Illinois Department of Transportation, which provides data on vehicle volume, movement and travel times on interstates in the metro area, and the network of sensors on the Chicagoland tollways that Traffic.com has deployed in partnership with the Illinois Tollway Authority. Prior to this partnership, traffic data was not available for the tollways that comprise a major portion of the Chicagoland freeway system. Traffic.com uses both sets of data to create the unique NAVTEQ-powered traffic map graphics that WMAQ uses in its newscasts, providing a more compelling experience for their audience.

In addition to the map graphics during the newscasts, a Traffic.com reporter in the WMAQ helicopter provides a birds-eye view of area highways during the traffic segment of the station's newscast. And, with its recent subscription to Traffic.com's JamCast, an automated service that delivers 24-hour up-to-date traffic information via an animated video feed, WMAQ can provide consumers with a real-time look at traffic conditions all over the Chicago area via the station's multicast digital cable television stations.

In 2007, the relationship between Traffic.com and WMAQ deepened when the station outsourced its entire traffic reporting function to Traffic.com. To better serve the station's needs under this arrangement, Traffic.com built its own television studio at the NAVTEQ headquarters in Chicago, making WMAQ the only station in the city with a dedicated on-air traffic center (while saving the station money in reduced overhead and labor costs). "On the air, the studio looks like a whole center dedicated to reporting the morning traffic, which nobody else has," said WMAQ's Whittaker. "I think it lends credibility and makes it look like we're serious about traffic."

The studio is not the station's only unique traffic-related capability WMAQ also is the only station in the area that provides pictures of conditions on area toll roads—the result of a unique arrangement between the station, Traffic.com and the Illinois Tollway Authority. Under this arrangement—which was struck through a competitive bidding process—WMAQ receives access to the 120 Tollway Authority and Traffic.com cameras stationed on toll roads throughout the Chicagoland area. However, before agreeing to provide this access, the Tollway Authority required the station to offer commuters the ability to sign up for traffic email alerts—a capability WMAQ lacked at the time. Traffic.com stepped in and agreed to build that feature into the WMAQ website, thus enabling the agreement to be finalized.

Whittaker says all of WMAQ's traffic-related capabilities are helping the station differentiate itself from its competition and increase the number of people it interacts with on a daily basis. "I think we have more traffic information and more ways to get it than our competitors, and I think people are responding to that," he said. "Our morning viewership is up. There are a lot of different reasons for that, but I think our change in traffic presentation is one of them. And Internet [activity] on our traffic page on the Web seems to climb every year."

The ability to customize traffic information, in fact, is one of the biggest drivers of increased consumer interest, according to Whittaker. He sees people increasingly using the Web and other devices to get specific information about the roads they're traveling and the locations to which they're headed—and doing so at their convenience. "The basic information people want is still the same: How long is it going to take on the expressway? Are there any

crashes they have to avoid and are there any alternate routes they have to take," said Whittaker. "What's changed is that people now can be proactive and get the information that pertains only to them. We as broadcasters and providers of traffic information have to respond to that shift."

The Value of Public-Private Partnerships

While the arrangements Traffic.com and NAVTEQ have forged with DOTs have not been without challenges, such public-private partnerships (PPPs) have been critical to the viability of the USDOT's ITS initiative. At the most basic level, these partnerships have been instrumental in enabling states to expand their traffic data collection capabilities dramatically and take advantage of state-of-the-art technology—and do so with far fewer taxpayer dollars. In fact, the experiences of Traffic.com and the state DOTs with which the company has worked are consistent with those of other current relationships between private and public entities.

According to a recent report from the USDOT, "PPPs have been widely recognized over the last several years as an innovative approach to transportation funding and procurement that can reduce project costs, accelerate project delivery, transfer project risks to the private sector, and provide valuable, high-quality projects.[4] The report further articulates the benefits of PPPs to the nation's transportation infrastructure and government operations, noting PPPs are able to:

- Respond to congestion and system unreliability by providing high-quality, well managed projects and better performance
- Address the demand for transportation investment by providing access to a vast amount of private capital
- Reduce the wasteful effects of political and special-purpose spending by incorporating financial accountability for investment decisions into the transportation funding process
- Help align the nation's transportation funding policy with its critical energy and environmental policies by substituting private capital for fuel tax revenue
- Significantly accelerate project delivery by providing upfront private capital for a project's full cost.[5]

While these benefits and capabilities provide a compelling argument in favor of PPPs in general, PPPs are especially relevant and promising given the current state of the U.S. highway system. While government entities are under pressure to satisfy citizens' increasing demand for real-time traffic information, they also know that such initiatives are competing for funding with other large priorities, including the billions and billions of dollars worth of work needed on the country's roads and bridges. By transferring a substantial portion of the funding and risk to the private sector, PPPs can make traffic data collection initiatives more financially viable.

"There's a business model in which [a private company] can provide traffic data," said Pete Rahn of MODOT. "And instead of costing the state DOTs millions of dollars, it's being provided through this private-sector business model that saves the state money while providing vital information to travelers."

Randy Iwasaki of Caltrans agreed. "When you have gaps in your transportation system with no detection, [a private sector provider] works out great," he said. "They come in, maintain your infrastructure, provide you with the data, and they make money. That's the beauty of the business model. In order to get that same data on our own, it would cost us a lot of money."

[4] "Innovation Wave: An Update on the Burgeoning Private Sector Role in U.S. Highway and Transit Infrastructure, United States Department of Transportation, July 18, 2008, page 4.
[5] Ibid.

In some cases, a state simply would not have been able to build an important capability without private sector involvement. One example is Missouri and its 511 system which, according to Teresa Krenning, would not have been developed if Traffic.com had not been willing to provide the service to Missouri for free.

Also making PPPs an extremely attractive and viable solution for DOTs is the fact that the traffic data solution is based on technologies that are continually evolving and improving. On its own, a state DOT would be hard pressed to find the funding to keep any traffic data solution upgraded and current. "The technology has been advancing so quickly that by the time various governments have implemented it, it's been superseded by some other technology that could be less expensive or provide more information than the previous one," Rahn pointed out. "But for the most part, [the states] haven't been prepared to invest the resources necessary [to keep their solutions current]. ITS and traffic data is something that you just have to be prepared to invest in continually, year after year. That's expensive. And that's the benefit of the Traffic.com model: As a business, they know what they're going to have to invest to provide quality data and they know it's going to be a continuous investment, which relieves the states of that necessity."

Yet for all their potential benefits, PPPs still require government executives to step out of their comfort zone and take a different approach. "It requires thinking outside the box for a lot of DOT employees," noted Krenning of MODOT. "But, fortunately, we've had some senior management members who were willing to say, 'Let's do what we do well and let the private side to do the things they do well,' like keeping up with changing technology. The industry changes faster than we can keep up with sometimes, so let's leave that to the private sector because they can react a lot faster. They're built for it."

Mobility: The Next Frontier of Traffic Data Collection and Dissemination

As the preceding examples illustrate, traffic data availability and dissemination certainly has come a long way from the early days of ITS. And if history is any indication, it's likely to change even more in the next few years. One of the clear trends affecting the traffic data arena is ubiquity—both in terms of data dissemination and collection.

From a dissemination perspective, executives in government, technology and media envision a much broader use of mobile devices—PDAs, smart phones and the like—to provide consumers with richer traffic data via a channel that is more convenient and portable.

"I'm a big fan of mobile technology and I think the use of cell phones and PDAs to get information is just going to grow—whether it's information on traffic or visualization of traffic conditions," said Frank Whittaker of WMAQ. Teresa Krenning of MODOT echoed Whittaker's thoughts. "I see traffic reporting going more into consumers' hands—their iPhones and PDAs—and less reliance on the radio broadcast," she said. "Information will be much more at their fingertips; people will actually be able to pull up and look at a map for their entire area rather than just calling 511 and getting information about a specific route."

As far as collection is concerned, mobile devices offer enormous potential to gather better data, as well as data on thousands of miles of roads not currently covered by embedded sensors, and to do so for far less money than today's fixed-roadside or overhead sensors.

NAVTEQ already has been very active in this arena, having deployed such "mobile probes" to commercial truck fleets in North America for years. In fact, by the end of 2008 NAVTEQ will more than double the number of probe records it generates, from 22 million to 45 million a day. Yet while the data provided by such commercial probes is valuable, it has limitations. Commercial fleets often don't travel on primary and secondary road networks during peak travel times (e.g., rush hour); the number of trucks on the road, while significant, is much lower than the number of cars, and the driving patterns of truckers differ substantially from those of consumers.

With that in mind, NAVTEQ is exploring how to extend the commercial fleet probe concept to the consumer side via mobile phones. Mobile phone-based consumer probes have the potential to spur a major improvement in the accuracy and coverage of real-time traffic data because for the first time they will facilitate the gathering of data on secondary roads, which have not been targets of traffic data collection efforts to date. This, combined with the sheer number of mobile phones in use around the country and the world, would provide unparalleled coverage of both primary and secondary roads (even in countries where the basic roadway infrastructure is not advanced) and a more complete picture of the overall traffic situation (including drive times and volume). Best of all, this expanded coverage would come without the substantial infrastructure costs associated with deploying fixed sensors along roadways.

An initiative led by cell-phone giant Nokia, Caltrans and NAVTEQ is exploring just this potential future. In a pilot program being conducted in California, 10,000 consumers are carrying GPS-enabled cell phones to anonymously report their positions and driving speeds automatically at various locations throughout the transportation system in the San Francisco Bay area. The test is helping to identify traffic conditions (i.e., vehicle location, speed, direction and motion) on all types of streets in the area, giving travelers more alternatives for avoiding congestion and more accurate travel times on non-freeway roads in an area known for highly congested roadways.

Such a consumer probe system, when launched commercially, could have major environmental benefits. According to a 2007 study from the Texas Transportation Institute, traffic congestion in the United States accounts for 4.2 billion hours in extra travel time and 2.9 billion of extra gallons of fuel burned—for a total cost of $78 billion.[6] And the number of vehicles on the road is increasing every year. Having comprehensive, accurate, real-time traffic data on all types of roads could help drivers make smarter decisions about the routes they take and, thus, substantially reduce the time and fuel they expend during trips.

“Let's say you're a ‘green’ person, and so instead of saying ‘shortest distance’ you say ‘shortest time’ and it saves you 10 minutes a trip,” said Randy Iwasaki of Caltrans. “That means you're polluting the air 10 minutes less and you get 10 minutes more to spend with your family. Over the year what does that add up to? Well, quite a bit.”

To be sure, the future of traffic data collection looks to be mobile—much to the benefit of governments, media outlets and, ultimately, America’s drivers.

Conclusion

America’s transportation infrastructure is vital to so many aspects of America’s economic, social and recreational life. From an economic perspective, that infrastructure provides the network through which the raw materials and finished goods are transported for consumption, and it serves as the principal way by which millions of Americans commute to and from their jobs each day. It also gives citizens a fast and efficient way to personally visit with friends and loved ones, tap into the amenities in one’s city, and experience the myriad parks, lakes, oceans and other natural attractions the country has to offer.

Of course, like any physical infrastructure, the nation’s roads and highways are not immune to the effects of heavy use and forces of nature, and are beginning to show their age—in some instances in startling and tragic fashion. (The collapse of the Minneapolis I-35W bridge is a recent example.) In fact, the American Society of Civil Engineers estimates it will take more than $1 trillion to repair America’s transportation infrastructure.[7] And as anyone living in a

[6] “Joint Nokia research project to capture traffic data,” University of California, Berkeley press release, February 6, 2008, http://www.citris-uc.org/nokia_traffic_data
[7] “Public-Private About-Face,” Ari Natter, *Traffic World*, September 29, 2008, http://www.trafficworld.com/newssection/government.asp?id=47978

major city who has to commute by car knows, congestion on urban and suburban streets reaches gridlock levels at certain times of the day, causing stress, generating pollution, diminishing our productivity, and, in general, stealing hours and days from our lives.

In short, as federal lawmakers meet to draft the next highway reauthorization bill—due for enactment in 2009—they will be forced to balance the country's needs against its finances to get the biggest bang for the taxpayers' buck. And as they do, they are likely to consider strongly the role that public-private partnerships—involving traffic data collection as well as myriad other aspects of transportation—will play in addressing the country's evolving transportation needs. Indeed, legislators estimate the new bill will call for between $450 million and $500 million in transportation investments—a large sum to be sure, but far short of the $1 trillion the American Society of Civil Engineers estimated is needed to do the job. Other entities besides the government will have to fill that gap, and those entities are likely to include private enterprises with critical expertise.

"Public-private partnerships are going to be part of the mix," said Jim Berard, spokesman for Rep. James L. Oberstar, D-Minn., the chairman of the House Transportation and Infrastructure Committee.[8] The fact that Rep. Oberstar has been a staunch opponent of PPPs until now suggests more and more lawmakers are recognizing the benefits the private sector can bring to the table—in the form of capital, certainly, but also in applying innovative new technologies and practices for the benefit of the public.

Echoing lawmakers' comments was a recent report by the National Surface Transportation Policy and Revenue Study Commission, which recommended the federal government act as a full partner with state and local governments, as well as the private sector, to provide the additional investment necessary to equip the country's infrastructure to handle future demands. The commission estimated that investment should be at least $225 billion per year for the next 50 years,[9] clearly a sum the government could not cover on its own.

The need for PPPs in the transportation infrastructure arena has never been clearer or greater. The success of the Traffic.com partnerships in building and deploying traffic data collection systems demonstrate what can be achieved when government and the private sector bring together their best and brightest to solve the most pressing issues confronting the country.

[8] Ibid.
[9] "Transportation Infrastructure: National Surface Transportation Policy and Revenue Study Commission Releases Findings to Fix U.S. Surface Transportation Systems," Jeff Berman, *Logistics Management*, January 15, 2008, http://www.logisticsmgmt.com/article/CA6522887.html