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## Intelligent Transportation Systems: Tools to Maximize State Transportation Investments

### Overview

A safe and efficient transportation system is essential to economic competitiveness as companies rely on just-in-time delivery in a “moving-warehouse” environment. However, the nation and states are confronting enormous infrastructure challenges. The number of roads and bridges at or near poor condition is increasing. The number of vehicles on U.S. roads is at an all-time high, and the number of miles driven by motorists is increasing every year; both trends are contributing to increased road wear and traffic congestion. Both Congress, in considering proposals to reauthorize surface transportation legislation, and states, on an ongoing basis, face major investment decisions on infrastructure rehabilitation, congestion management, air quality management, and safety. Moreover, limited funds are available to address transportation infrastructure needs.

Among the tools to address these needs is a group of technologies known as intelligent transportation systems (ITS). ITS is the application of advanced information processing and communications, sensing, and control technologies to surface transportation. It seeks to promote more efficient use of the existing highway and transportation network, increase safety and mobility, and decrease the environmental costs of travel.

This **Issue Brief** summarizes national ITS goals and state transportation needs. It reviews states’ experience with ITS to date and discusses the utility of ITS technologies to improve transportation infrastructure. The **Issue Brief** also provides cost/benefit analysis information on state administration of commercial vehicle operations and explores the role of the federal government and the private sector with respect to ITS deployment.

### National ITS Goals

Congress and the administration have established ITS as a high priority and have developed an aggressive program aimed at deployment. In 1996 the U.S. Secretary of Transportation announced Operation Timesaver, an initiative with a stated goal of deploying an intelligent transportation infrastructure by 2005. President Bill Clinton has proposed \$4 billion for surface transportation technology in the National Economic Crossroads Transportation Efficiency Act (NEXTEA). The proposal would provide \$678 million for six years for ITS research and development and create a six-year, \$600 million ITS incentive grant program for states and localities. These grants would require matching funds at the state and local levels. Although ITS deployment is a national goal, it will require major investment by states. The U.S. Department of Transportation expects the private sector and consumers to bear 80 percent of the costs, but the deployment of ITS technologies is estimated to cost nearly \$210 billion by 2011.



During the past three years, the National Governors' Association (NGA) has entered into agreements with the Federal Highway Administration to identify issues in states' deployment and use of ITS technologies. NGA's projects are identifying institutional barriers that might delay or prevent ITS deployment and use, examining the viability of various ITS user services to address state transportation needs, and assessing the costs and potential benefits of ITS for state commercial vehicle operations.

### **State Transportation Needs**

In June 1997, NGA convened representatives from twelve states to participate in a roundtable to identify state transportation needs and examine the potential for ITS technologies to meet those needs. Participants were asked to address the following questions.

- What are your state's most pressing infrastructure needs (e.g., road and bridge construction or repair)?
- What environmental issues will drive transportation spending in your state?
- What are your state's greatest needs to ensure the mobility of people, goods, and services?
- What are the most difficult transportation safety issues facing your state?

According to the participants, aging road and bridge infrastructure is the single most pressing transportation problem facing states today. Nearly every participant cited maintenance, reconstruction, and rehabilitation costs that are two to three times greater than the amount of funds available to cover those costs. In more populous states, managing system capacity and growth while maintaining air quality poses substantial challenges. In less populous states, rural mobility and safety are of primary concern. Most participants cited tourism, economic development, and intermodal freight movement as common state priorities.

### **State ITS Experience**

The Intermodal Surface Transportation Efficiency Act of 1991 authorized \$659 million for ITS research, development, and testing from fiscal 1992 through fiscal 1997. During this period, more than 400 demonstration projects and operational tests have been carried out within and among states.

State experience with ITS has been varied and diverse. Several states have integrated ITS technologies into urban traffic management systems. -Georgia probably has the most notable urban ITS deployment, which was showcased in the Atlanta metropolitan area during the 1996 Summer Olympics. The state got its start in ITS with \$58.1 million in federal demonstration funds because of the need to manage transportation for the Olympics. To date, Georgia has invested \$104 million in ITS technologies, mainly in and around Atlanta. Cameras monitor 48 miles of roadway, and 159 miles are under traffic flow control. To manage traffic flow and minimize congestion, system operators adjust traffic signals and provide information to commuters through variable-message road signs. Georgia, like several other states, coordinates incident response teams to respond rapidly to highway incidents observed by cameras or reported by commuters on major commuter routes.

California has invested nearly \$500 million in metropolitan traffic management systems, and local governments have invested similar amounts. The state is investing approximately \$100 million per year in transportation systems management that is focused primarily on improving air quality and reducing traffic congestion. Similarly, Puerto Rico has reduced congestion in metropolitan San Juan by 25 percent after investing \$20 million in traffic management systems. These systems monitor traffic by camera, use variable-message signage, and integrate arterial traffic flows. Texas has established priority traffic corridors and integrated ITS technologies in San Antonio and Houston and traffic management projects in Austin, Dallas, and Ft. Worth.

Nevada and Wyoming have installed remote weather information systems to provide data on road surface conditions. They use the information to dispatch highway maintenance and snow removal equipment and personnel only to areas reporting hazardous surface conditions and avoid dispatching both equipment and personnel to determine road conditions. These states pass along the information to travelers for trip planning. California also is examining ways to evolve traveler information tests into a sustainable interoperable statewide network. It is developing business models to determine the value and marketability of information that could be provided to the private sector and packaged for the traveling public.

**Costs and Benefits of Commercial Vehicle Operations.** Nationwide, one of the broadest applications of ITS has been in commercial vehicle operations. Many states have participated in operational tests for commercial vehicle clearance, safety assurance, and credentials administration. Commercial vehicle clearance includes weighing and verifying the credentials of vehicles at weigh stations, ports of entry, mobile sites, and international border crossings. Safety assurance includes driver and vehicle inspections and information. Credentials administration includes processing applications for registrations, permits, and fuel tax accounts; issuing credentials; reporting by carriers; and auditing.

It is expected that the application of ITS to commercial vehicle operations (CVO) will enable both states and motor carriers to realize significant operating efficiencies and other benefits. A study completed by the American Trucking Associations Foundation has projected significant benefits for motor carriers. NGA has just completed an analysis of the cost and benefits of ITS/CVO to provide a model that states can use to determine the benefit of using these technologies in state administration of motor carrier regulatory programs. Funding for the project was provided by the Federal Highway Administration and primary research was conducted by Apogee Research, Inc.

The focus of the analysis is on state agencies rather than the private sector or the general public. For example, some of the more significant benefits of ITS/CVO, such as time savings for commercial motor carriers and enhanced highway safety, are discussed but not quantified in this analysis. The findings include the following.

- States' approach to administering and enforcing CVO regulations vary significantly depending on the organizational, operational, regulatory, and technical characteristics of each state.
- The direct costs and benefits to states investing in ITS/CVO applications also vary considerably for the same reason.
- State agency benefits from electronic credentialing typically exceed the costs of ITS systems, suggesting that these applications are financially self-supporting within the context of state operations alone.
- Direct state agency benefits from electronic clearance and safety are less than the costs of these systems, although the benefits to motor carriers and the general public may warrant further consideration for state investment.
- For all ITS/CVO applications, motor carrier acceptance of these technologies and participation in state deployment will play a significant role in the realization of maximum potential benefits to states, motor carriers, and the general public.

A guidance document and spreadsheet model for states to complete an individual analysis of the direct benefits and costs of ITS/CVO are being prepared for distribution to all states.

### **ITS as a Tool to Improve Transportation Infrastructure**

Although ITS technologies cannot address directly pressing infrastructure maintenance and rehabilitation needs, it can change the way states view transportation systems and provide a basis for improving the efficiency and safety of existing infrastructure. Of the states participating in the roundtable, none has substituted significant ITS deployment for road construction or repair. However, ITS has enabled several of these states to recover lost capacity from existing infrastructure.

Georgia has diverted funds from construction to ITS, including the development of a high-occupancy-vehicle (HOV) lane from existing lanes and shoulders by narrowing their width. To expand capacity, the state integrated ITS technologies along forty-four miles of existing highway. Without ITS, state transportation officials believe that safely creating an HOV lane from existing roadway would have been impossible. In Puerto Rico, transportation officials believe that ITS enables them to develop a better construction project because the project can rely more on technology and less on pavement. California officials note that the cost of traditional system expansion is incremental, but the cost of ITS is not incremental. The state can build an entire traffic management system for all roads and transportation modes for the cost of one to two miles of new interstate construction.

ITS appears to hold great potential for improving transit system performance and user acceptance. State officials believe that transit systems must be safe, reliable, and sensitive to demand. Users want timely service, links to other modes of transportation, and a secure environment. ITS can improve substantially system monitoring and dispatch. San Antonio and Houston are using ITS technologies in transit systems to improve service. Nevada has a small system in the Lake Tahoe area that has begun coordinating five small separate systems and providing demand-response transit to rural riders. California is examining ways to better connect transit users with other transportation systems.

To many state officials, ITS is a customer service issue. The needs of transportation system users have changed dramatically since the interstate highway system was developed. Increasingly, they are relying on technology in their homes and automobiles. Using technology to provide information and increase user awareness is in line with their needs. Many drivers are less likely to act unsafely if they are made aware of alternatives or are warned of impending delays. Transit riders are more likely to use a system if they are given current information on schedules and can move among transportation modes safely and conveniently. However, all roundtable participants agreed that the information must be current and accurate, or states risk losing user confidence in the system. Most participants believe that ITS technologies enable a state to maintain such a system.

### **The Private Sector Role in ITS**

Both the federal government and state governments envision a substantial private sector role in the deployment and operation of ITS services. As one state official noted, because ITS integration and use are relatively invisible, it is difficult to post a roadside sign that says "Your Tax Dollars at Work." Most states participating in the roundtable believed that although the private sector is in a better position to anticipate markets for ITS-generated information, this information is a revenue source for states. States will need to explore new institutional arrangements to build and share infrastructure to facilitate ITS deployment and use, as well as establish agreements with the private sector to offer information that makes ITS practical for users.

### **The Federal Role in ITS**

As states look to make ITS integration a reality, most agree that the appropriate federal role is a mainstreaming approach in which the technologies are integrated into existing state systems. States will

continue to seek federal leadership on funding research and development, but they believe that program flexibility is important so states can assess their needs and develop systemwide plans for ITS integration. Another important federal role is to develop standards to ensure system interoperability.

### **Conclusion**

Although ITS is not a viable alternative to rehabilitating aging roads and bridges, it does offer states new opportunities for recovering and expanding infrastructure capacity, improving highway safety, managing air quality, and administering state regulatory programs. Governors can position their states to use ITS effectively by promoting new arrangements among state agencies and encouraging the use of cost/benefit models to determine appropriate public and private roles in integrating ITS technologies into state transportation systems. As potential benefits are identified, Governors can better define the appropriate level of state investment in ITS technologies to meet their state's transportation needs.