

The Future Of Transportation Starts Here.

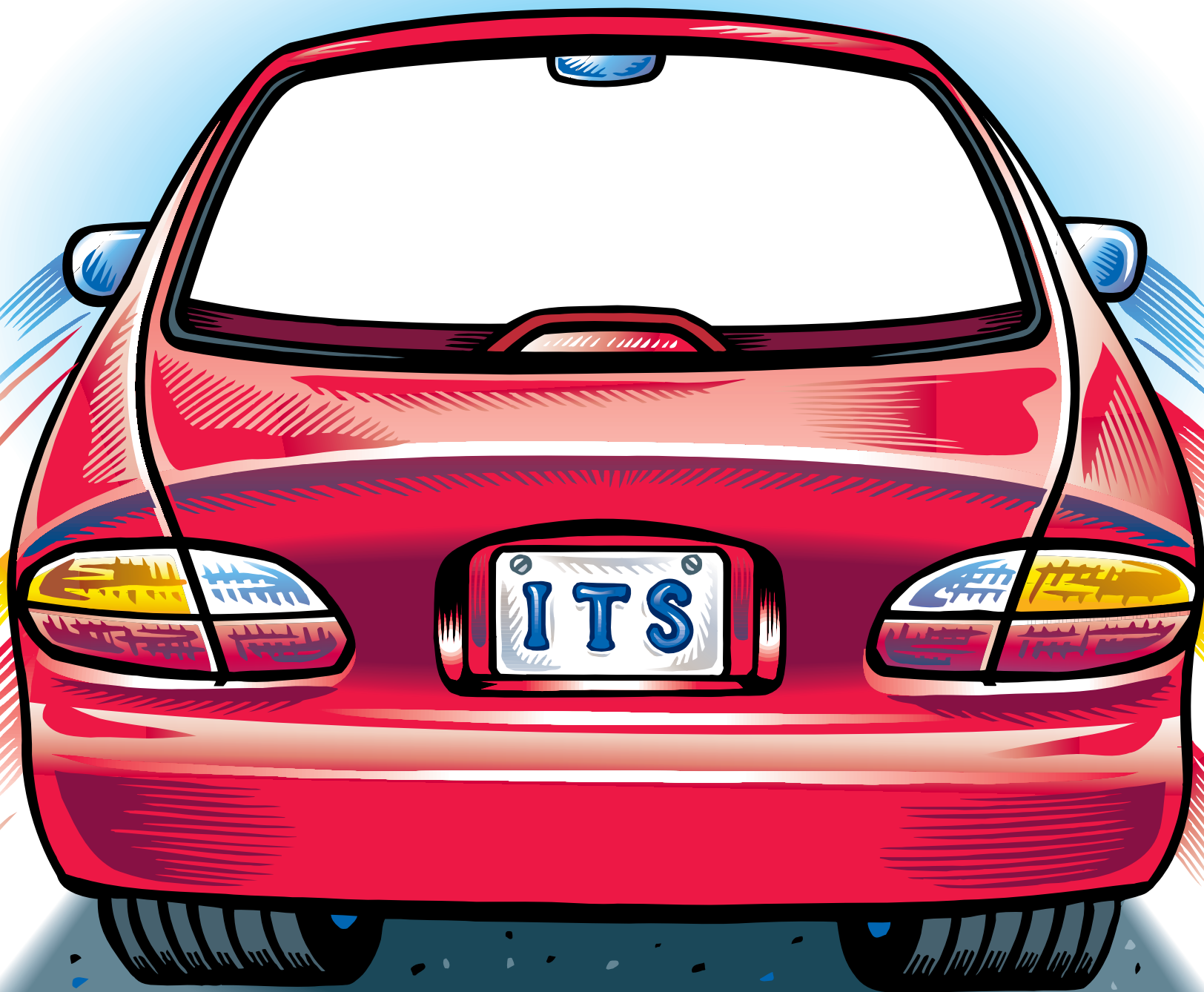


**INTELLIGENT TRANSPORTATION SYSTEMS**

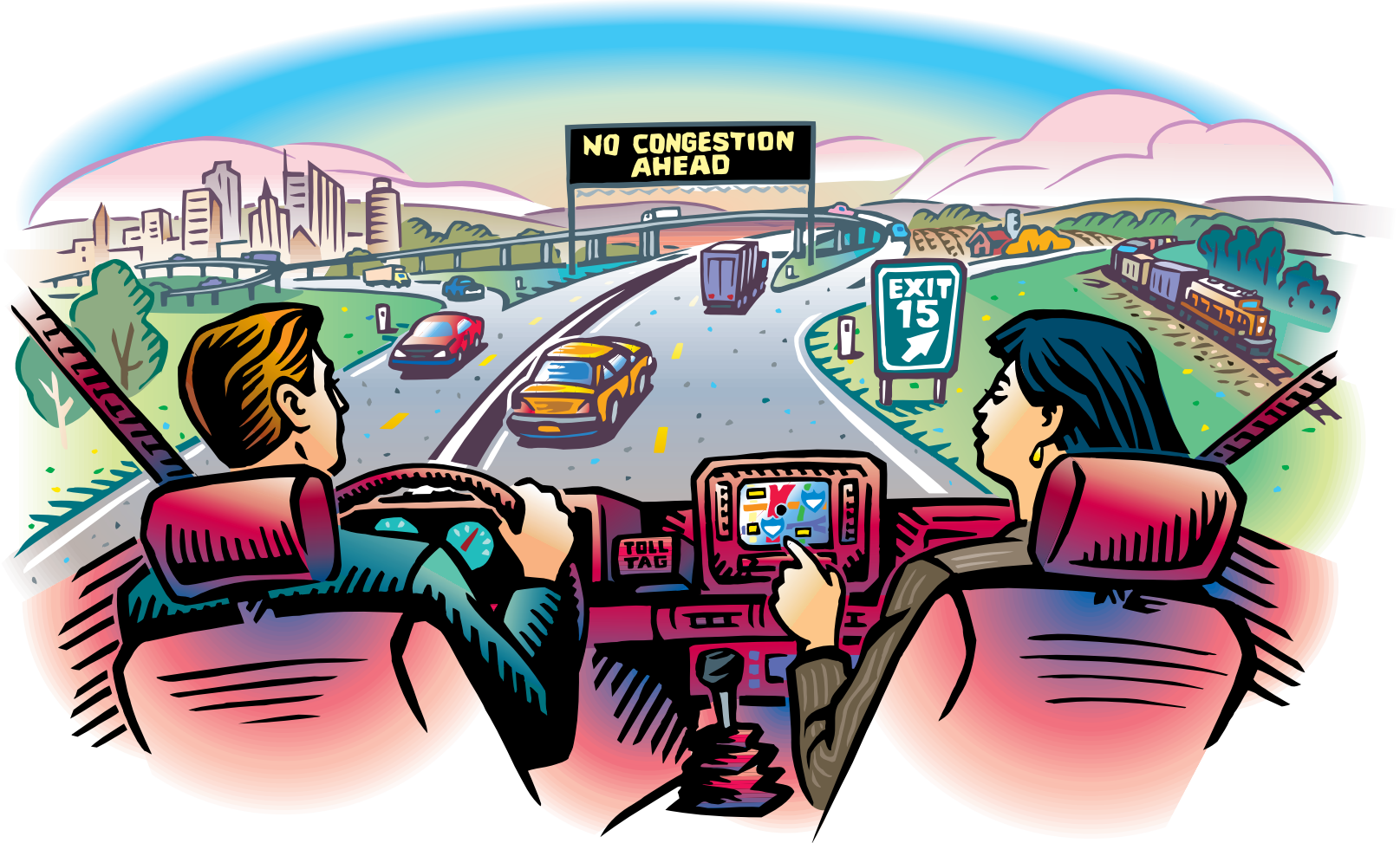


U.S. Department of Transportation

**YOU ARE ABOUT TO ENTER THE AGE  
OF INTELLIGENT TRANSPORTATION.**



**INTELLIGENT TRANSPORTATION SYSTEMS**



**The future of transportation is here—today—in the United States and along with it, smoother traffic flow and hassle-free traveling.**

Consider, for instance:

Zooming to work knowing that you're on the quickest path given the current traffic conditions

Using the train or bus with confidence and convenience

Not having to stop at one red light after another

Knowing that the trucks driving alongside you are truly safe

Not being tailgated

Having your car automatically slow down when you're going too fast on a sharp curve

Not having to stop and fumble for change to pay tolls

Having help instantly and automatically dispatched to you in case of emergency

These things are all possible—and are happening now—through Intelligent Transportation Systems, or ITS for short.

# W E L C O M E T O T H E W O R L D O F I T S

ITS represents the next step in the evolution of the nation's entire transportation system.

As information technologies and advances in electronics continue to revolutionize all aspects of our modern-day world, from our homes and offices to our schools and even our recreation, they are also being applied to our transportation network.

These technologies include the latest in computers, electronics, communications and safety systems.

The latest advancements can be applied to our vast transportation infrastructure of highways, streets and bridges, as well as to a growing number of vehicles, including cars, buses, trucks and trains.

These information and communications technologies can also be used to better manage and improve how transportation providers such as governments, transit agencies and truckers offer services to the public.

# PROMISING SOLUTIONS TO PRESSING PROBLEMS

The need for new approaches is critical – to save time, to save money, to save lives.

## Time ...

In the past decade alone, traffic has grown by 30 percent in our metropolitan areas. In the next 10 years, the number of cars on our roads and highways will increase by 50 percent. The annual cost of congestion to our nation has skyrocketed to over \$48 billion in lost productivity and will continue to grow.



At the same time, state and local governments are struggling to meet the enormous demands this places on our infrastructure, residents and businesses. Traffic volumes continue to grow while transportation budgets continue to shrink. Furthermore, even if funds were available, the lack of

physical space to widen or build new highways renders many alternatives obsolete.

## Money ...

The lifeblood of the American economy depends on the ability of our transportation system to bring our products to market—from groceries, furniture and computers to gasoline and even hazardous chemicals. More than 4.2 trillion ton-miles of freight are moved on our highways every year. That's more than 25 tons per person!

The motor carrier industry, including trucks and private bus lines, is made up of over 300,000 separate businesses and 6.6 million commercial drivers. Obviously, safety and regulatory compliance are a huge concern. Numerous credentials and clearances are required for safety inspections, vehicle and driver registrations, tax reporting and more. The administrative burden for regulatory compliance is estimated to be as high as \$5 billion every year for private industry, and even higher for the public sector.



## Lives ...

The real tragedy, however, is the needless loss of human lives. Even with vast improvements over the past several decades, more than six million motor vehicle crashes occur on our highways every year. They cause approximately 5.2 million injuries and more than 41,000 fatalities, costing more than \$150 billion per year.

Our rural areas, comprising over 80 percent of the nation's land, experience their own unique transportation problems. Crashes on rural roads account for sixty-six percent of all traffic fatalities due to higher speeds and longer emergency response times. And sixty-six percent of

our rural residents live with little or no public transit service. Also, many of the country's tourist destinations are found in rural America, where access to basic travel information, such as weather or emergency services, is severely limited.

ITS offers promising solutions to these pressing problems.



# ON THE ROAD TO A WORLD WITH ITS

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In 1991, recognizing the critical need to address our aging transportation network and its pressing challenges, Congress created an ITS program. The program is guided by four key principles:

- 1** To promote the implementation of a technically integrated and jurisdictionally coordinated transportation system across the country;
- 2** To support ongoing applied research and technology transfer;
- 3** To ensure that newly developed ITS technologies and services are safe and cost-effective; and
- 4** To create a new industry by involving and emphasizing the private sector in all aspects of the program.

People from dozens of disciplines are actively working to bring about intelligent transportation systems and foster this industry. Engineers, planners, transit experts, scientists, scholars, doctors, lawyers, elected and other public officials, and average citizens all over the country are getting involved.

Because of this active participation, the ITS program has been able to mature and center its sights on distinct program areas that have a dual focus: intelligent infrastructure and intelligent vehicles. Intelligent infrastructure is geared to satisfying the transportation needs of metropolitan areas, rural areas and the trucking industry. Intelligent vehicles, on the other hand, complement the ITS infrastructure by focusing on safety and information systems for cars, trucks, buses and trains.



# ITS FOR METROPOLITAN AREAS

The goal of the Metropolitan ITS program is to manage and operate our nation's regional transportation systems to reduce congestion and enhance emergency response through the use of advanced technologies and new institutional arrangements. The Metropolitan ITS approach combines several key elements:

- **Traffic signal control**  
modernized systems that automatically adjust themselves to optimize traffic flow;
- **Freeway management**  
the latest in systems that provide information to motorists, detect problems to allow for increased capacity and flow, and minimize congestion resulting from crashes;
- **Transit management**  
updated systems that allow new ways of monitoring and maintaining our nation's sizable transit fleets through advanced locating devices and equipment-monitoring systems;
- **Incident management**  
innovative programs that enable communities to identify and respond to crashes or breakdowns with the best and quickest emergency services, minimizing clean-up time;
- **Electronic toll collection**  
that provides drivers and transportation agencies with convenient and reliable automated transactions, dramatically improving traffic flow at toll plazas and increasing the operational efficiency of toll collecting;
- **Electronic fare payment**  
new systems that enable a person to pay for parking, bus and train fares, as well as tolls, by using a single smart card;
- **Railroad crossings**  
that are coordinated with traffic signals and train movements, and that notify drivers of approaching trains through in-vehicle warning systems;

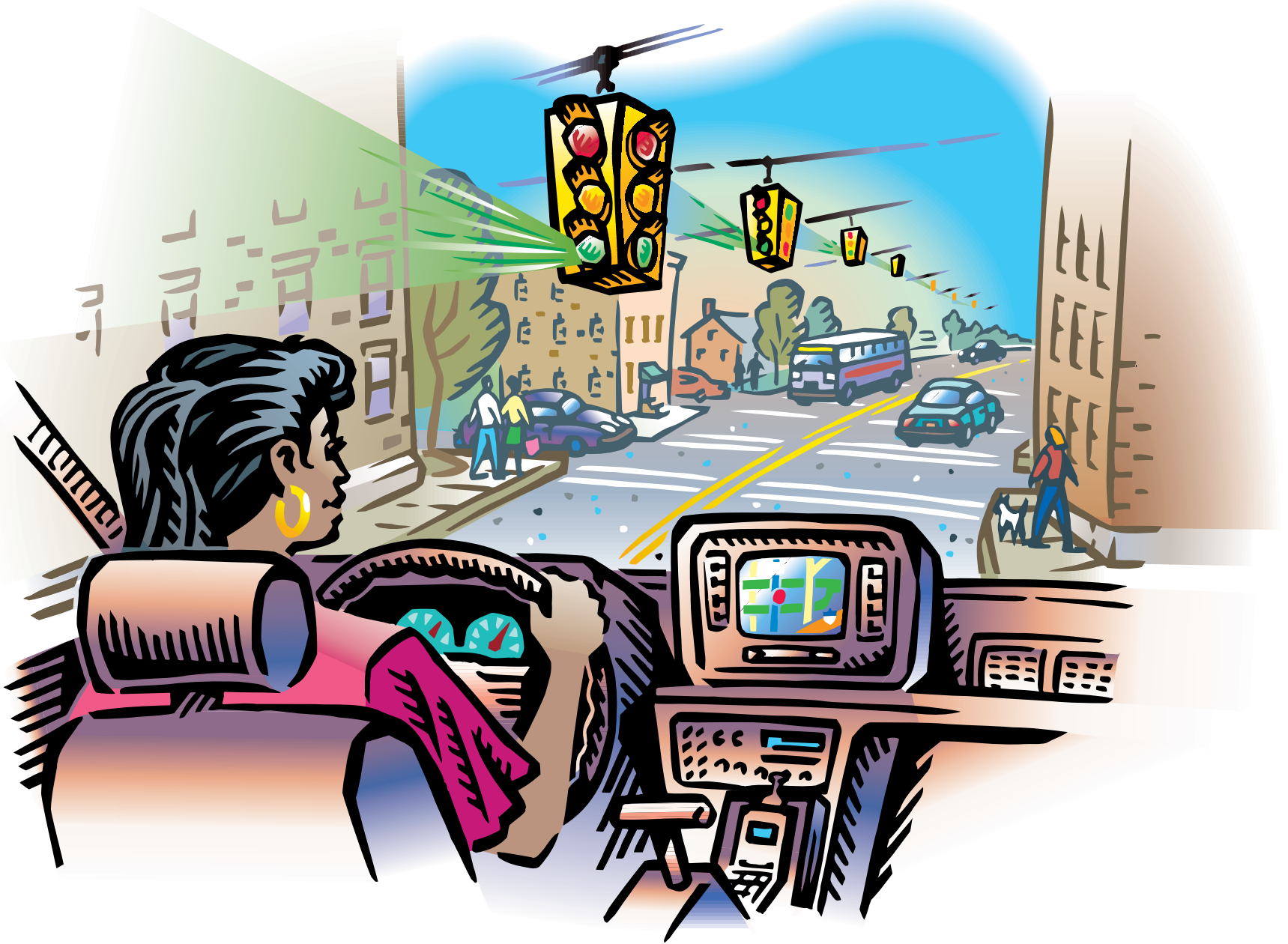
- **Emergency response**  
coordination that ensures the closest available and most appropriate emergency unit can be dispatched to a crash;
- **Regional multi-modal traveler information**  
widely expanded systems that provide road and transit information to travelers, businesses and truckers, so they can adjust their travel plans when necessary.

These key elements make up the Metropolitan ITS "infrastructure." Many regions may already have one or more of these components in place. However, it is the technical integration and the institutional coordination of these elements that create synergy and allow metropolitan areas to enjoy the full benefits of ITS.

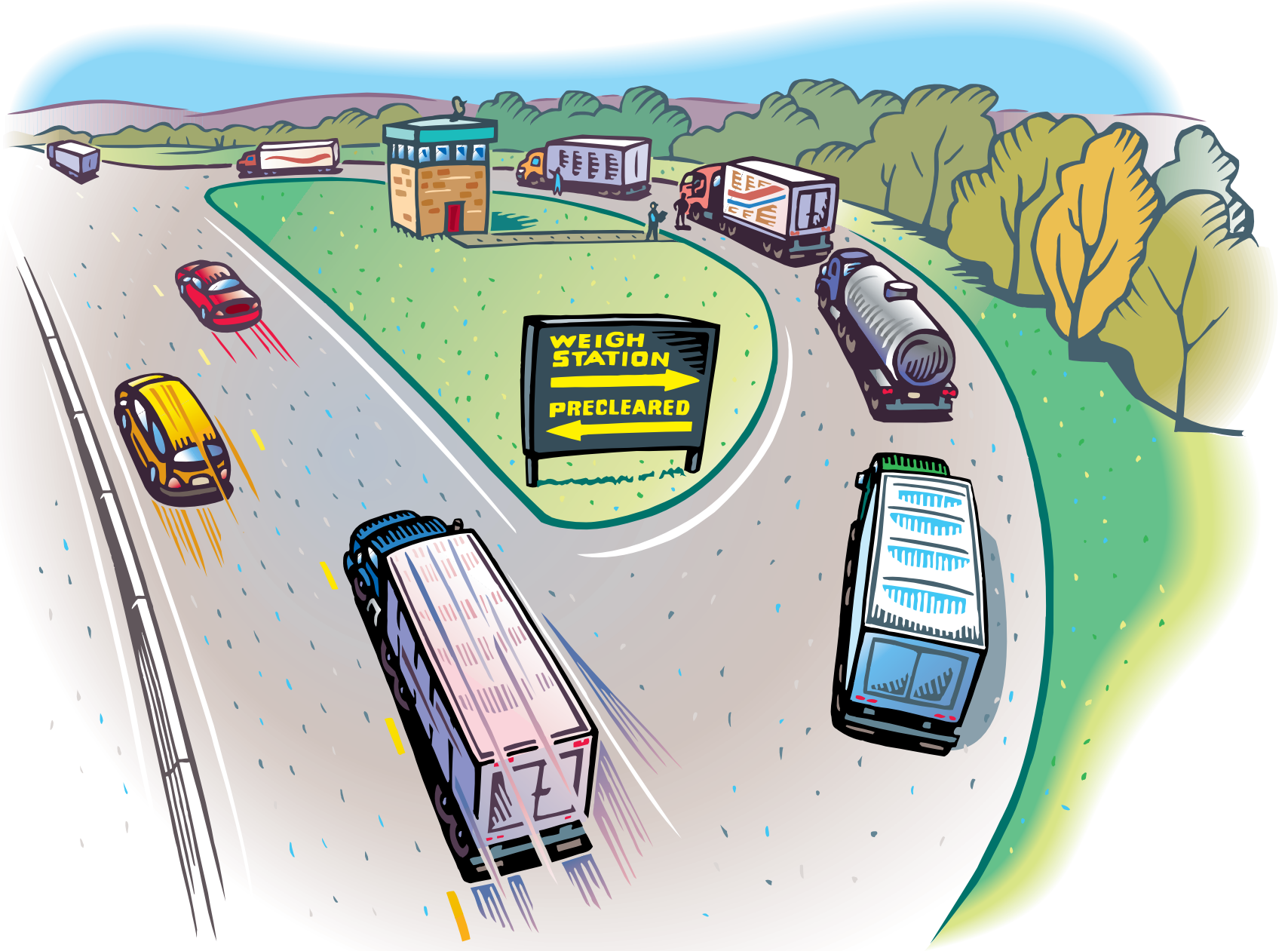
## THE BENEFITS

- ✚ **Advanced traffic surveillance and signal control systems have resulted in travel time improvements ranging from 8 to 25%.**
- ✚ **Freeway management systems, primarily through ramp metering, have reduced crashes by 24 to 50% while handling 8 to 22% more traffic at speeds 13 to 48% faster than pre-existing congested conditions.**
- ✚ **Electronic fare payment technologies for transit systems have resulted in increased revenues of 3 to 30% due to fewer evasions.**
- ✚ **Incident management programs can reduce delay associated with congestion caused by incidents by 10 to 45%.**
- ✚ **Electronic toll collection increases capacity by 200 to 300% compared to attended lanes.**





Computerized traffic signals give green lights to speed the commute home. In case of trouble ahead, an in-vehicle navigation system immediately notifies the driver and offers alternate routes around congestion.



Previously cleared truckers can bypass time-consuming weight and safety inspections no matter where they are in the country. This time savings translates into higher productivity, efficiency and, ultimately, lower product costs to consumers.

# ITS FOR COMMERCIAL VEHICLES

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ITS applications for commercial vehicles aim to streamline the commercial vehicle safety regulatory system and enhance its effectiveness in the trucking industry. They apply both to truck fleet operators and state regulators. These systems are meant to support a safe and seamless intrastate and interstate transportation system. The ITS program for commercial vehicles comprises the following:

- **Electronic clearance** systems that enable safe and legal carriers automatically to communicate with and bypass weigh stations, border crossings and other inspection sites without stopping, saving time and money.
- **Automated roadside** safety inspection systems that use up-to-date inspection information electronically to monitor and determine a vehicle's safety and a driver's fitness for duty.
- **Onboard safety monitoring systems** that monitor the driver, vehicle and cargo, and can alert the driver and even enforcement personnel of any potential safety problems such as driver fatigue, vehicle failure, and shifting or unbalanced cargo.
- **Automated administrative processes** that allow motor carriers to electronically obtain all necessary credentials and report fuel and mileage taxes to the numerous affected agencies within each of the states across the nation.
- **Freight mobility systems** that improve how fleets are managed by providing links between drivers and dispatchers, thereby supplying up-to-the-minute information for planning, scheduling and vehicle routing.

- **Hazardous materials incident response** systems that instantly tell emergency personnel the types of materials involved and provide necessary instructions for responding quickly and effectively to hazardous emergencies.

Together, these elements create the commercial vehicle infrastructure—a publicly oriented, national information network and a privately oriented, vehicle-based safety approach.

## THE BENEFITS

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- ✚ **Onboard safety systems, along with electronic clearance and automated roadside safety inspections, are estimated to reduce fatalities by 14 to 32%.**
- ✚ **Cost savings associated with hazardous materials incident response programs are estimated to be \$1.7 million annually per state, or \$85 million nationwide.**
- ✚ **Automated administrative processes yield benefit/cost ratios of 4:1 for medium-sized carriers and 20:1 for large-sized carriers; and electronic clearance systems have been shown to reduce motor carrier labor costs resulting in a benefit/cost ratio of 7:1.**
- ✚ **Freight mobility systems have shown productivity gains for private carriers of sometimes more than 25% per truck per day.**

# ITS FOR RURAL AREAS

Many of the solutions offered by ITS in rural areas involve similar approaches to those for urban and commercial vehicle applications. Yet, as applied, they are still distinctly rural in nature. The Rural ITS program is concerned with:

- **Traveler safety and security technologies** that alert drivers to hazardous conditions and dangers, and include wide-area information dissemination of site-specific safety advisories and warnings.
- **Emergency services** technologies that automatically mobilize the closest police, ambulances or fire-fighters in cases of collisions or other emergencies — even in the most remote locations.
- **Fleet operations and maintenance systems** that improve the efficiency of rural transit and other rural fleets, such as snowplows and law enforcement vehicles, through advanced vehicle tracking and on-board equipment monitoring systems.
- **Public traveler and mobility services** that improve the efficiency of transit services and their accessibility to rural residents. Better scheduling, improved dispatching, smart card payment transactions, and advanced ride-sharing and ride-matching systems can be achieved through advanced vehicle-locating devices and communications systems.
- **Roadway operations and maintenance technologies** that improve the ability of our highway workers to maintain and operate rural roads. These include severe weather information systems, early detection of pavement and bridge failures, and immediate detection of dangers to work zone crews.
- **Tourism and travel information** services that provide information to travelers who are unfamiliar with the local rural area. These services can be provided at specific locations en route or even well in advance of the destination.
- **Commercial vehicle systems** that manage the movement and logistics of commercial vehicles, and locate vehicles during emergencies and breakdowns. They can also monitor driver performance—a critical concern particularly on long-haul night trips.

The combination of these seven services characterizes the ITS infrastructure for rural areas in the United States and a direction toward smarter, safer travel.

## THE BENEFITS

- ✚ Widespread use of Mayday emergency notification devices could reduce the time it takes to discover a rural crash from an average of 9.6 minutes to 1 minute.
- ✚ Advanced lane-keeping and collision-avoidance technologies could prevent 19,000 crashes in rural areas every year due to vehicles running off the road.



Natural disasters and severe weather often impede travel in remote, rural areas. Advanced communications systems can speed emergency response to the scene and inform travelers of problems in time to choose alternate routes.



Driver error is cited as the primary cause in about 90 percent of all police-reported crashes. Advances in safety systems, such as blind spot detection and collision avoidance, can constantly monitor a vehicles surroundings and enhance a drivers ability to operate a vehicle safely.

# THE INTELLIGENT VEHICLE INITIATIVE

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Where the Metropolitan, Commercial Vehicle and Rural program areas are focused primarily on the ITS infrastructure, the Intelligent Vehicle Initiative aims to accelerate the development and availability of advanced safety and information systems applied to all types of vehicles. The goal is to integrate driver assistance and motorist information functions so that vehicles operate more safely and effectively.

The Intelligent Vehicle Initiative covers applications for passenger vehicles, commercial trucks, buses and specialized vehicles such as snowplows. Other special applications to emergency response, law enforcement and highway maintenance vehicles are also included.

Many of these applications are based on ongoing and recently completed research on crash avoidance, in-vehicle safety and automated highway systems. Continuing research on human factors, and advanced driver warning and vehicle control systems are a major thrust of the Intelligent Vehicle Initiative.

This initiative seeks to bring together public and private stakeholders to ensure that in-vehicle systems are technologically, socially, institutionally and economically viable.

Partnerships with the motor vehicle industry and its suppliers, states, government organizations, academic institutions and other interested parties are being aggressively pursued.

## THE BENEFITS

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- ✚ In-vehicle devices addressing lane-change, rear-end and roadway-departure crashes are estimated to offset 1.1 million crashes per year.
- ✚ In urban areas, 52,000 crashes could be prevented annually by advanced lane-keeping and collision-avoidance technologies.
- ✚ Enhancements in nighttime and bad weather vision applications may significantly improve drivers' abilities to stay in lanes and distinguish hazards in the road.

# WHAT IS THE FEDERAL ROLE?

The ITS infrastructure is ready now. In fact, ITS products, services and technologies are already being implemented in states and localities around the country. However, only pieces of the ITS infrastructure are being put in at any given time, and in a narrowly focused, piecemeal fashion. These individual applications of ITS technologies are actually fragmenting our transportation networks instead of serving as a bridge to a new era. This pattern brings great long-term risk of electronic “hardening” of these systems. This fragmentation would take decades and billions of dollars to overcome.

In order to close the gap between the great potential that ITS solutions have to offer and the current state of fragmentation, the United States Department of Transportation is following a five-pronged strategy for encouraging the development of technically integrated and institutionally coordinated intelligent transportation systems.

## 1 Showcasing the Benefits of ITS

The more exposure people have to useful products and services, the more likely they are to understand, purchase and use them. Approximately one dozen sites around the country have been funded to demonstrate the benefits of the ITS infrastructure. These demonstrations aim to raise awareness of the capabilities of ITS technologies and encourage public-sector officials to embrace and build locally applied ITS infrastructure.

## 2 Creating Funding Incentives

Again, ITS is gaining momentum under existing surface transportation programs, however, not in a consistent, optimal or systematic fashion. Temporary funding incentives have proved to be dramatically effective in halting fragmentation and fostering technical integration and institutional coordination.

## 3 Establishing Technical Standards

Establishing technical standards that are in line with an overall national operating framework—or architecture—is crucial to achieving technical “interoperability” across the nation. In other words, without technical standards, state and local governments, as well as consumers, would risk buying products that do not necessarily work together or work in different parts of the country. By facilitating the creation of technical standards, this risk is minimized and lower consumer prices may result due to increased competition.

## 4 Building Professional Knowledge

When the interstate highway construction program began, new skills in road building and civil engineering were essential. ITS requires new skills in systems engineering, electronics and communications to become a reality.

Because our nation does not currently have a sufficient number of professionals to support the effective delivery of ITS, the Department of Transportation is actively carrying out an ambitious Professional Capacity Building plan for education and training at all levels.

## 5 Research

Research provides the basic tools and knowledge required to advance the implementation of ITS and to continue to push the state-of-the-art to new heights. The Federal interest in ongoing ITS research is to lead the development, testing and to evaluation of new technologies in order to accelerate their market availability. For ITS, this means saving more lives, more time and more money—more quickly.



# THE FUTURE HAS ARRIVED

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It is easy to see how ITS can improve the world of travel. Imagine:

- Driving a car that automatically charts an alternate route to keep out of congestion
- Having public transportation as reliable and convenient as your own car
- Driving down the road through one green light after another
- Sharing the road with trucks and feeling confident they're safe
- Never being bothered by another tailgater
- Having your car automatically adjust your speed to the curve of the road
- Driving right through the toll-booth with just a wave "hello"
- Having the peace of mind that comes from knowing emergency vehicles will be automatically dispatched if you're ever in trouble

The future holds great promise, along with a great deal of hard work and determination. This evolution of the nation's transportation network into the age of intelligent transportation poses great challenges. But enormous change has already begun. Transportation professionals and key public decision makers are getting into the act all over the country and the world. Join the drive for ITS.

# **WE'RE HERE TO HELP**

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The national ITS program involves several different Federal agencies in carrying out its mission, including:

Federal Highway Administration

Federal Transit Administration

National Highway Traffic Safety Administration

Federal Railroad Administration

Maritime Administration

The overall program is coordinated by the United States Department of Transportation's  
Intelligent Transportation Systems Joint Program Office.

For additional information on any or all aspects of the National ITS program, please contact:

U.S. Department of Transportation

ITS Joint Program Office

Room 3422, HVH-1

400 7th Street, SW

Washington, DC 20590

Phone: (202) 366-9536

Facsimile: (202) 366-3302

Or visit our Web site at [www.its.dot.gov](http://www.its.dot.gov)

## **INTELLIGENT TRANSPORTATION SYSTEMS**

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# METROPOLITAN ITS

## What are the challenges?

Metropolitan areas in the United States are experiencing unprecedented challenges to mobility. In the past decade alone, metropolitan traffic has grown by 30 percent, resulting in chronic gridlock. This shows no sign of subsiding. In the next 10 years, the number of cars on our roads and highways will increase by 50 percent. Because Americans spend 2 billion hours stuck in traffic every year, the annual cost of congestion has skyrocketed to over \$48 billion in lost productivity.

State and local governments are struggling with the demands this places on our infrastructure, residents and businesses. Traffic volumes in most areas are growing at a time when transportation budgets are shrinking. Furthermore, even if the money were available, the lack of space to expand or build new highways renders many alternatives obsolete. Transit providers also are contending with slashed budgets while straining to meet greater expectations from customers for improved service.

Metropolitan ITS offers some solutions. It points to a new paradigm of managing and operating our current transportation system as a whole with an intermodal, single-system view of regional mobility. Metropolitan ITS can also help ensure the long-term economic prosperity of our nation's urban and suburban areas.

## What are the solutions?

ITS offers new ways of thinking about metropolitan mobility and allows us to consider urban transportation as a comprehensive,

seamless system. ITS offers the opportunity to manage our transportation system and give our customers more choices and greater predictability, along with a better quality of life.

The main focus of Metropolitan ITS is to optimize the current transportation system through the use of advanced technologies and new institutional arrangements. The concept is similar to what the aviation industry implemented several years ago. By managing the fixed amount of airspace through air traffic control, the industry grew substantially – all without building any new airports. They did it through tighter management of airspace, pricing strategies, real-time operation and sharing of information.

ITS will transform our surface transportation system by taking it to a new level of system performance. In metropolitan areas, ITS can be characterized as a combination of several key elements:



### TRAFFIC SIGNAL CONTROL SYSTEMS

that automatically adjust themselves to optimize traffic flow.

**FREEWAY MANAGEMENT SYSTEMS** that provide information to motorists, detect problems for increased capacity and flow, and minimize congestion from crashes.

**TRANSIT MANAGEMENT SYSTEMS** that allow new ways of monitoring and maintaining our nation's sizable transit fleets through advanced locating devices and equipment-monitoring systems.

**INCIDENT MANAGEMENT PROGRAMS** that enable communities to identify and respond to crashes or breakdowns with the best and quickest type of emergency services, minimizing clean-up and medical response time.

**ELECTRONIC TOLL COLLECTION** that provides both drivers and transportation agencies with convenient and reliable automated transactions, dramatically improving traffic flow at toll plazas and increasing the operational efficiency of toll collecting.

**ELECTRONIC FARE PAYMENT SYSTEMS** that enable a person to use a single smart card to pay for parking, bus and train fares, as well as tolls.

**RAILROAD CROSSINGS** that are coordinated with traffic signals and train movements.

**EMERGENCY RESPONSE COORDINATION** that ensures the closest available and most appropriate emergency unit can be dispatched to a crash.

**REGIONAL MULTIMODAL TRAVELER INFORMATION** systems that provide road and transit information to travelers, businesses and motor carriers, so they can adjust their travel plans when necessary.



**Transportation management centers can integrate traffic and transit data to provide a comprehensive approach to real-time system management and a focal point for disseminating information to travelers.**

These are the main elements that make up the Metropolitan ITS “infrastructure.” Of course, many regions already have one or more of these components in place. However, it is the technical integration and the institutional coordination of the components that provide the true benefits of ITS and make the most out of every transportation dollar spent.

### What are the benefits?

The benefits of Metropolitan ITS are well documented through actual operations and testing. An overview of benefits reveals:

- Advanced traffic surveillance and signal control systems have resulted in travel time improvements ranging from 8 to 25 percent.
- Freeway management systems, primarily through ramp metering, have reduced crashes by 24 to 50 percent while handling 8 to 35 percent more traffic at speeds 13 to 48 percent faster than previous, congested conditions.
- Electronic fare payment technologies for transit systems have resulted in increased revenues of 3 to 30 percent due to fewer fare evasions.
- Incident management programs can reduce delay associated with congestion caused by traffic incidents by 10 to 45 percent.
- Electronic toll collection increases capacity by 200 to 300 percent compared to attended lanes.

The direct and indirect benefits of Metropolitan ITS are impressive and, in some cases, quite surprising. Studies show that investing in metropolitan infrastructure will yield an eight-dollar benefit for every dollar invested. Benefits can range from measurably less congestion and fewer crashes, to better relationships among service providers and a stronger national economy through increased mobility and new markets for products and services.

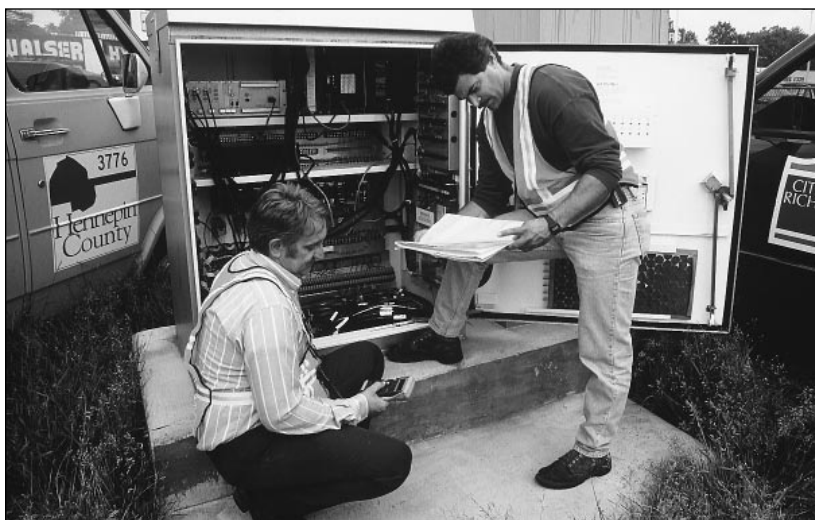
## What is the Federal implementation strategy?

The Federal program is attempting to help metropolitan areas move quickly along an evolutionary path. In 1996, the Secretary of Transportation established a goal of deploying the Metropolitan ITS infrastructure in over 75 of the nation's largest regions by 2005.

In 1997, the U.S. Department of Transportation developed a Metropolitan ITS Deployment Strategy. It focuses its attention on making sure that decision makers have the necessary resources and information to make smart investment choices. The overall approach is proactive. It provides for training and education, showcasing the benefits of ITS, technical assistance, financial incentives and ongoing research in travel management technologies and applications.

### TRAINING AND EDUCATION

Under the ITS Professional Capacity Building program, the Department of Transportation offers a wide variety of courses aimed at several different audiences. They range from seminars geared to increasing the awareness of ITS among the broader transportation community to detailed courses designed to provide professionals with the key technical skills necessary to make ITS a reality.



**Regional cooperation is a key element to optimizing local traffic conditions within the context of the greater community.**



**ITS helps improve the operations and management of public transportation. When transit and traffic information is integrated, the entire transportation system benefits from the multimodal approach.**

### EXECUTIVE SCANNING REVIEWS

Visiting actual ITS sites, such as centralized advanced transportation management centers, is one of the most effective ways to see the real benefits of ITS and how its applications are a viable solution in many jurisdictions. Scanning reviews allow delegations of local decision makers to travel to see model ITS applications in action. Some of the most frequented sites include Atlanta, Phoenix, Seattle, Houston and even Yosemite National Park. In addition to showcasing advanced systems, these sites provide useful examples of interagency coordination.

### TECHNICAL ASSISTANCE

The ITS Peer-to-Peer program provides expert assistance to state, local and regional transportation agencies as they encounter issues or problems related to the planning, design, implementation, operations or maintenance of ITS applications. Its aim is to bring people together – transit expert to transit expert, or systems engineer to systems engineer – who can provide timely guidance and advice based on real-world experiences.

### INCENTIVE FUNDING

In addition to regular Federal aid, and state and local funding, incentive funding is periodically available to regions that are inter-

ested in pursuing ITS. As demonstrated in the past, these 50-50 match incentives have proven to be dramatically effective in fostering technical integration of multiple infrastructure components, as well as institutional coordination.

### What does the future hold?

The future holds great promise, along with a great deal of hard work and determination. The power of real-time transportation management can open up a new dimension of service to the consumer. And for transportation managers, ITS is helping to get more out of every infrastructure dollar spent.

This enormous change has already begun. Just as canals, railroads and interstate highways determined the economic fate of regions, ITS technologies will provide a competitive edge to forward-looking regions.

### Want more information?

A great deal of specific information is available – particularly on benefits. For more information on Metropolitan ITS, please contact your local Federal Transit Administration or Federal Highway Administration field representative. Or, at the national level, contact the United States Department of Transportation, Intelligent Transportation Systems Joint Program Office, at the address below.

## INTELLIGENT TRANSPORTATION SYSTEMS

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U.S. Department of Transportation

## What are the challenges?

Rural areas are primarily characterized by long travel distances and tourist areas, creating unique transportation challenges, as well as the greatest opportunities for achieving large safety gains and enhanced economic activity. Rural areas encompass 83 percent of the nation's land and contain larger percentages of elderly and poor households than urban areas.

The nature of rural highways affects their safety. Crashes on rural roads account for 60 percent of all traffic fatalities nationwide due to a combination of highway deficiencies, severe weather conditions, drivers' unfamiliarity with roadways, and longer emergency response times.

Sixty-six percent of rural residents live with little or no public transit service. Where there is transit service, it is geared more to mobility-impaired residents and often requires coordination with health and human services agencies.

Rural traffic can also be seasonal or episodic, leading to congestion problems at tourist hot-spots such as national parks, recreation areas and special events.

At some point almost everyone in the country will find himself or herself traveling on an interstate highway between two cities or on a remote steep mountain pass, unsure about the coming storm or what's waiting on the road ahead. Rural ITS offers some solutions to many of these challenges.



## What are the solutions?

Rural ITS applications have the potential to make dramatic improvements in safety, mobility and tourist information services. These applications have been categorized into the following elements:

**TRAVELER SAFETY AND SECURITY** technologies use in-vehicle sensors and information systems to alert drivers to hazardous conditions and dangers. This also includes wide-area information dissemination of site-specific safety advisories and warnings.

**EMERGENCY SERVICES** technologies use satellites and advanced communications systems to automatically notify the nearest police, rescue squad or firefighters in cases of collisions or other emergencies – even in the most remote locations.

**TOURISM AND TRAVEL INFORMATION** services use in-vehicle navigation and roadside communications systems to provide information to travelers who are unfamiliar with the local area. These services can be provided at specific locations en route or before travelers even begin their trip.

**PUBLIC TRAVELER AND MOBILITY SERVICES** improve the efficiency of transit services and their accessibility to rural residents. Better scheduling, improved dispatching, smart card payment transactions, and computerized ride-sharing and ride-matching systems can be achieved through advanced vehicle-locating devices and communications systems.



**ROADWAY OPERATIONS AND MAINTENANCE** technologies improve the ability of highway workers to maintain and operate rural roads. These include severe weather information systems and immediate detection and alert of dangers to work zone crews.

**FLEET OPERATIONS AND MAINTENANCE** systems improve the efficiency of rural transit and other rural fleets, such as snowplows and law enforcement vehicles, through advanced vehicle tracking and on-board equipment monitoring systems.

**COMMERCIAL VEHICLES** use satellites, computers and communications systems to manage the movement and logistics of commercial vehicles, and locate vehicles during emergencies and breakdowns. These technologies also assist drivers' performance – a critical concern particularly on long-haul night trips.

The combination of these seven services characterizes the ITS infrastructure for rural areas in the United States and indicates a direction toward smarter, safer travel.

## What are the benefits?

The potential is great for Rural ITS applications to address the varied needs of rural travelers. Rural ITS services will bring about significant benefits, such as:

- More efficient highway operations and management activities such as snow removal;
- Quicker response to traffic incidents and crashes, saving lives and reducing medical costs;
- More efficient rural transit operations and vehicle fleet management;
- Greater peace of mind from advanced safety and security systems;
- Better traveler information through in-vehicle communications and signing, particularly for hazardous weather conditions; and
- Fewer fog-related, multi-vehicle crashes in rural areas through advanced sensor systems.



**Environmental conditions such as weather, fog and even blowing dust can pose a real threat to highway safety. In locations with recurring problems, remote sensors can detect situations as they occur and automatically advise drivers ahead of time.**

## What is the Federal implementation strategy?

The Federal Rural ITS program strategy uses a three-pronged approach aimed directly at meeting the rural transportation challenges.

### DEVELOPMENT

Developing and testing technologies will accelerate delivery of new products and services to rural transportation users. Development includes key research studies and operational field tests aimed at understanding the effectiveness and feasibility of Rural ITS applications.

### INCENTIVE FUNDING

Incentive funding will be made available periodically to regions that are interested in pursuing Rural ITS. As demonstrated in the past, these 50-50 match incentives have proven to be dramatically effective in fostering technical integration and institutional coordination. In rural areas, money will be focused on experimenting with new ITS services and expanding and integrating existing services.

### TRAINING AND TECHNOLOGY TRANSFER

The U.S. Department of Transportation provides training and technical support for Rural ITS planning, implementation and operations to state and local transportation agencies. Particular emphasis is on providing knowledge and skills for incorporating Rural ITS into the normal transportation planning and programming processes.

## What does the future hold?

The application of Rural ITS holds great promise of helping rural America reduce its isolation, improve travel safety and enhance economic development *without* sacrificing the character of the rural environment. It offers the hope of improving access to some of our most beautiful natural landscapes in our National Parks



**Vehicles traveling too fast for conditions on curves or long downslopes increase their risk and likelihood of crashing. Real-time warnings to drivers of impending dangers have proven to dramatically change driver behavior and are particularly effective in remote rural environments.**

while preserving the natural environment that makes them so attractive. And, importantly, it offers public officials greater efficiency and cost savings in managing maintenance operations and responding to weather emergencies.

## Want more information?

There is a great deal of specific information available. For more information on Rural ITS, please contact your local Federal Transit Administration or Federal Highway Administration field representative. Or, at the national level, contact the United States Department of Transportation, Intelligent Transportation Systems Joint Program Office, at the address on the back page.

## **INTELLIGENT TRANSPORTATION SYSTEMS**

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**U.S. Department of Transportation**

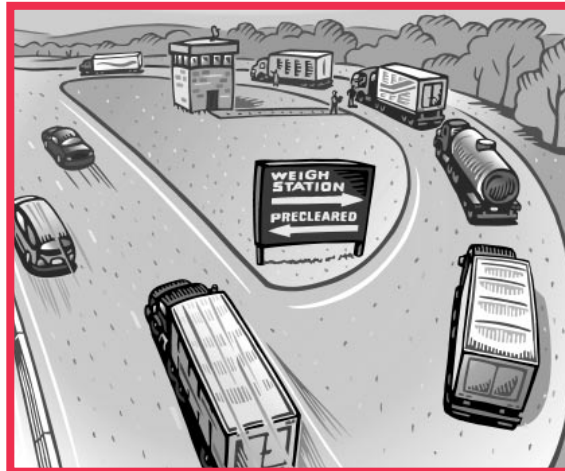
# COMMERCIAL VEHICLE ITS

## What are the challenges?

The commercial motor carrier industry is a complex mix of businesses ranging from small owner-operators to huge fleets with thousands of vehicles transporting both goods and passengers. The lifeblood of the American economy depends on the ability of our transportation system to safely and efficiently bring products to market – everything from groceries, furniture and computers to gasoline and other hazardous chemicals.

In the United States more than 4.2 trillion ton-miles of freight are moved on our highways each year – that is more than 25 tons per person! Trucking is a \$300 billion per year industry, not including the trillions of dollars in attributable consumer sales. The motor carrier industry, including private bus lines as well as trucks, has over 400,000 carriers engaged in interstate commerce and many more intrastate carriers.

Safety and regulatory compliance is an enormous public responsibility borne largely by a number of state agencies working with shrinking budgets and often with partial information. From a carriers perspective, the need to work with five or six different agencies within 50 different states is inefficient. Indeed, the administrative burden on the motor carrier industry for regulatory compliance is estimated to be as high as \$5 billion per year. The public sector's costs may be even greater due to the paperwork associated with inspecting vehicles, issuing credentials and collecting taxes.



## What are the solutions?

Commercial Vehicle ITS offers some solutions and benefits to both states and carriers. Using technological advances, state-centered regulatory operations can be dramatically improved resulting in less administrative red tape and more time for targeted safety enforcement.

Commercial Vehicle ITS applies technologies to help enhance safety and simplify credentialing and tax administration, roadside enforcement, freight and fleet management, and vehicle operations. It also has applications to intermodal connections, such as at rail and sea ports, and international border crossings.

Commercial Vehicle ITS involves linking key information systems in order to exchange information on safety, registration, fuel tax, hazardous materials and commercial driver licenses between carriers, states, state agencies and national systems. This infrastructure is designed to provide the motor carrier industry with a straightforward way to electronically obtain all the credentials needed to operate legally. At the same time, it provides state agencies with current information on a carrier's status allowing inspectors, for example, to focus on those carriers with the worst safety records and expedite travel of carriers with good records.

The Commercial Vehicle ITS program aims to help improve the commercial vehicle safety and regulatory processes and enhance the efficiency of the trucking industry. The infrastructure that links these information systems is known as Commercial Vehicle Information Systems and Networks, or CVISN (pronounced "see vision"). It provides an electronic framework which supports the following services:

**SAFETY ASSURANCE** programs and services designed to assure the safety of commercial drivers, vehicles and cargo. These include automated roadside safety screening and inspections, safety information systems, and on-board safety monitoring.

**CREDENTIALS ADMINISTRATION** programs and services designed to improve the deskside procedures and systems to apply for and manage motor carrier credentials. These include electronic application, purchase and issuance of credentials, as well as automated fuel tax reporting and filing.

**ELECTRONIC SCREENING** systems and services designed to facilitate the verification of size, weight, safety and credential information. These include the automated screening of commercial vehicles at fixed weigh stations, mobile sites and international border crossings.



**Electronic screening enables states to identify, weigh and check safety and credentials for trucks at highway speeds. Drivers of safe and legal trucks are electronically notified of their status and directed past the station.**

**CARRIER OPERATIONS** activities and services designed to reduce congestion and manage the flow of commercial vehicle traffic. The private sector is taking the lead in implementing fleet and vehicle management technologies and systems that improve motor carrier productivity.

CVISN provides the architecture and standards to link these activities and information systems, among participating agencies and carriers. CVISN is being prototyped and piloted in 10 states for key safety, credentialing and screening capabilities. CVISN will eventually function nationally as the backbone for these systems and networks. Both technical integration and institutional coordination will bring about the true benefits of Commercial Vehicle ITS.

### **What are the benefits?**

Commercial Vehicle ITS and CVISN will result in enhanced safety for drivers, trucks and buses, and greater operating efficiencies for linked government agencies and motor carriers. In turn, both the public and private sectors will realize savings in time, resources and the cost of doing business. Specific benefits of Commercial Vehicle ITS have been estimated and will be documented in evaluating the pilots. Initial estimates reveal:

- Automated credentialing processes can potentially yield four times the benefit for every dollar invested for medium-size carriers and twenty times for large-size carriers by saving time through more efficient credentialing.
- In a recent study of 40,000 inspections, safety inspectors increased the number of unsafe commercial drivers and vehicles removed from the highway from 8,000 to 12,000 by using advanced safety information systems instead of traditional methods.
- Roadside electronic clearance allows safe and legal carriers to bypass weigh and inspection stations, relieving congestion at the stations and allowing authorities to concentrate on the remainder.

- Freight mobility systems can result in up to 25 percent productivity gains for some fleets.

The direct and indirect benefits to both states and the motor carrier industry can be far-reaching. As vehicles keep moving, the flow of goods from manufacturer to distributor to consumer is streamlined and on-time deliveries are improved. New technologies are cheaper to install and use than constructing new weigh stations, and they also increase the efficiency of existing facilities.

In an era of shrinking budgets, these technologies allow government agencies to improve efficiency and create an environment that increases safety and productivity, resulting in lower costs to consumers and a stronger national economy.

### What is the Federal implementation strategy?

The Federal program is one that encourages states and motor carriers to work together to promote these advances, solve institutional issues and increase uniformity. The strategy is to develop the CVISN architecture and standards, test them in the pilot states, give ongoing technical assistance, and provide funding for training, solving



**Safety assurance programs allow states to have electronic access to national safety data at the roadside. By having up-to-the-minute information, inspectors can identify safe carriers and focus limited resources on unsafe trucks and drivers.**

institutional issues and deployment incentives. The strategy aims to assist individual states in developing integrated electronic motor carrier systems that can ultimately link together into a nationwide system of systems.

### STRATEGIC BUSINESS PLANNING

The Office of Motor Carriers is working with states to help educate and train staff in Commercial Vehicle ITS and CVISN, and assist them in developing business plans for deployment. A series of training courses and small grants are available to provide state personnel and other stakeholders with the skills they need to get started.

### INCENTIVE FUNDING

Once individual states have business and CVISN design plans completed, it is expected that incentive funding will be available. The funding is intended to help states integrate their existing legacy systems and then link them to other states, carriers and national systems.



**On-board computers and satellite tracking systems can improve communications between dispatchers and drivers. This translates into more efficient equipment utilization, better routing schemes, higher driver job satisfaction, and improved customer service.**

## NATIONAL LEADERSHIP AND ONGOING TECHNICAL ASSISTANCE

Following deployment, the actual operations and management of these integrated systems and networks will be primarily a carrier and state responsibility. The Federal role will continue to focus on leadership in safety, compatibility through standards, and other key issues such as high-risk research. And, ongoing technical assistance will continue to be provided as states encounter issues or problems related to the planning, design, implementation and maintenance of Commercial Vehicle ITS applications.

## What does the future hold?

The vision is that by the year 2005, assisted by technology, trucks and buses will travel safely and freely throughout North America. Motor carriers will apply and pay for credentials electronically, including registration and permits. They will also file and pay for fuel taxes electronically and will deal with one base state for all business transactions, simplifying carrier administration by distributing fees and taxes to other states.

These far-reaching changes have already begun. By forging ahead with this infrastructure- and vehicle-based approach, motor carrier professionals are working to make the commercial vehicle industry safer and more efficient around the country.

## Where is more information?

There is a great deal of specific information available on CVISN. For more information on Commercial Vehicle ITS and CVISN, please contact your local Federal Highway Administration Office of Motor Carriers field representative. Or at the national level, contact the United States Department of Transportation, Intelligent Transportation Systems Joint Program Office, at the address below.

## COMMERCIAL VEHICLE ITS

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# INTELLIGENT VEHICLE INITIATIVE

## What are the challenges?

The loss of human life due to highway crashes is tragic. Driver error is cited as the primary cause in about 90 percent of all police-reported crashes involving passenger vehicles, trucks and buses. Even with vast improvements over the last several decades, more than 6 million motor vehicle crashes continue to occur on our highways every year, causing approximately 5.2 million injuries and more than 41,000 fatalities, and costing more than \$150 billion per year.

Aside from the direct personal costs of human pain and suffering, the social and economic costs of motor vehicle crashes are enormous. Health care, emergency services, property damage, lost productivity and resulting highway congestion all pose huge burdens to taxpayers and our society as a whole. Solutions such as seatbelts, airbags, improved highway design and anti-drinking-and-driving campaigns have helped make tremendous strides in protecting people and improving overall safety. However, the nation now sits on the brink of a new era in motor vehicle safety.



## What are the solutions?

The era of intelligent vehicles is dawning. It represents a fundamental shift in focus from preventing the injuries and deaths caused by crashes, to preventing crashes in the first place.

A great deal of research has been done that points to new safety approaches and promising solutions. Many of these are based on ongoing and recently completed research on systems that,

for example, can detect vehicles in a driver's blind spot. Other examples include intelligent cruise control, run-off-the-road detection and enhanced night vision.

The mission of the Intelligent Vehicle Initiative is to accelerate the development and availability of advanced safety and information systems applied to all types of vehicles. Its primary goal is to help drivers operate vehicles more safely and effectively.

These technologies offer both opportunity and risk. The opportunity lies in enhanced driver performance, and therefore safety, by preventing crashes. In the future, however, information will

also be coming into the vehicle to enhance driver and passenger convenience in the form of navigation assistance, yellow pages, tourism information and even Internet services. The risk is that non-integrated combinations of these services may overload drivers and degrade their performance. The purpose of the Intelligent Vehicle Initiative is to focus the development of human-factors considerations so these

services maximize the safety opportunity and minimize the risk.

The Intelligent Vehicle Initiative covers applications for passenger vehicles, commercial trucks, buses, and specialized vehicles such as emergency response, law enforcement and highway maintenance vehicles. This initiative seeks to bring together public and private stakeholders to ensure that in-vehicle systems are technologically, socially, institutionally and economically viable.

Partnerships with the motor vehicle industry and its suppliers, states, government organizations, academic institutions and other interested parties are aggressively being pursued.



## What are the benefits?

Research and demonstrations to date have shown the viability and capabilities of several of these advanced, vehicle-based safety systems. The estimated safety improvements of using just three of these systems across the nation are truly impressive.

**REAR-END CRASH AVOIDANCE SYSTEMS** could apply to over 1.5 million of the 1.7 million rear-end crashes that occur every year. In fact, the National Highway Traffic Safety Administration estimates that driver warning systems alone would be effective in preventing 49 percent of rear-end crashes (or 759,000 crashes) every year.

**ROAD DEPARTURE COLLISION AVOIDANCE SYSTEMS** could apply to about 458,000 of the 1.2 million annual roadway departure crashes. With an overall effectiveness of 65 percent, the systems could prevent 296,000 crashes every year.

**LANE-CHANGE/MERGE CRASH AVOIDANCE SYSTEMS** could apply to 192,000 of the approximately 200,000 lane-change/merge crashes per year. Even at an estimated system effectiveness of about 20 percent, almost 40,000 crashes per year could be prevented.



**Collision avoidance systems, such as blind spot detection, can assist drivers in safely merging into traffic or alert them to unseen hazards when backing up.**

All told, these new advances could actually prevent over one million or 17 percent of crashes annually. And with more and more vehicles on the nation's highways every year, the intelligent vehicle is needed now more than ever.

## What is the Federal implementation strategy?

The Intelligent Vehicle Initiative is still in its early planning stages. Its overall strategy is to make safety advances through a carefully structured research program. The specific goals of this research program point to advancing both the state of the art and the state of the practice. They include:

- Accelerating product introduction of driver information, assistance and control systems that will significantly improve the safety of motor vehicle operations;
- Demonstrating that intelligent vehicles can improve driver safety while recognizing the complexity of the driving task;
- Developing and validating performance specifications and design guidelines for intelligent vehicle systems that will be commonly used in motor vehicles in the next 10 years;
- Reaching agreement on the basic functional requirements of driver assistance features and targeting those features as the basis for industry investment in working prototypes;
- Recognizing the need for balance between public benefit and private incentive, while ensuring that reasonably achievable safety benefits are attained;
- Prototyping and evaluating intelligent vehicles as a complete market package; and
- Estimating benefits and costs in order to justify investments and stimulate the creation of new consumer safety products.

## Who is involved?

The U.S. Department of Transportation has gathered together its pre-eminent experts from several different agencies to collaborate on the Intelligent Vehicle Initiative. These experts come from the National Highway Traffic Safety Administration, the Federal Highway Administration and the Federal Transit Administration. Together with automobile, truck and bus manufacturers, the goals of the Intelligent Vehicle Initiative will be achieved.

Working under cooperative programs and partnerships, these groups will plan for and facilitate the incremental introduction of both vehicle-based and, ultimately, vehicle-infrastructure-based driver assistance safety systems.

## What does the future hold?

The future is one of collaboration between government and industry that will lead to the deployment of advanced safety systems enhancing the driver's ability to maintain vigilance and control. These sys-

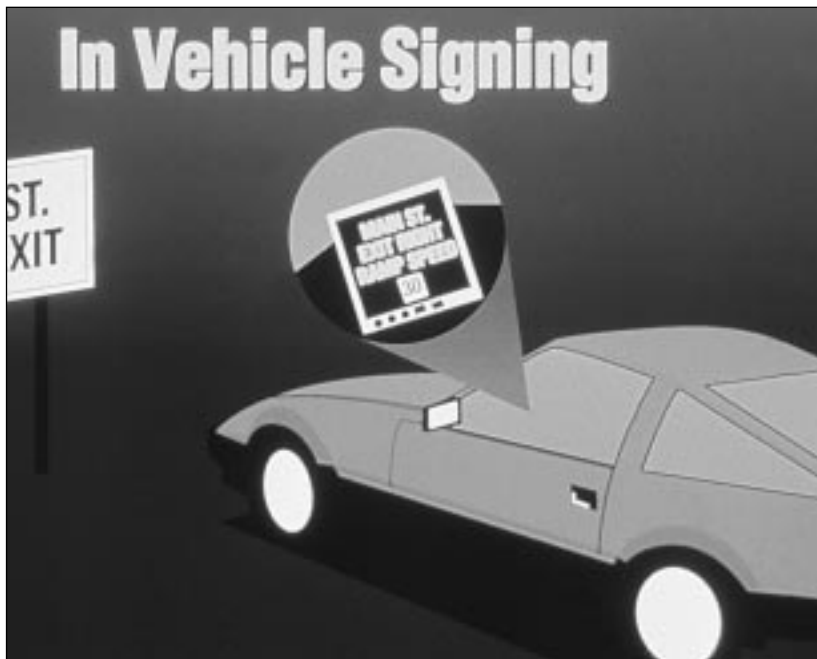


**As more and more information systems and gadgets find their way into vehicles, information overload may degrade driver performance. The Intelligent Vehicle Initiative will examine the human interface with these systems so they can be designed to enhance rather than detract from driver capabilities.**

tems will be available to benefit drivers of all classes of vehicles including passenger cars, light trucks, transit vehicles, commercial vehicles and specialty vehicles. The new era of actually preventing crashes through technological applications is dawning.

## Want more information?

A great deal of specific information is available – particularly on details of the emerging program. For more information on the Intelligent Vehicle Initiative, please contact the United States Department of Transportation, Intelligent Transportation Systems Joint Program Office, at the address on the back page.



**The Intelligent Vehicle Initiative will examine new ways of giving relevant information to drivers that are less distracting and aimed at making the task of driving easier.**

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# THE NATIONAL ITS ARCHITECTURE

## Why is it important?

Just as an architect's plans lay out the design of a house, the National ITS Architecture provides a master blueprint for building an integrated, multimodal, intelligent transportation system. It defines the framework around which a generally common ITS infrastructure can be developed, while ensuring that local needs are met. This will help state and local decision makers plan smarter and buy smarter, ultimately saving time and money in the future while making their regions more economically attractive.

The National ITS Architecture gives guidance on the broad range of transportation functions and information flows which an ITS implementer should consider when planning or implementing systems. Without it, even in the narrow scope of a single project, designers may risk overlooking the numerous information exchanges that should be considered in the larger context.

By framing these information flows, the National ITS Architecture also serves as a tool that provides stakeholders with an understanding of the entire transportation network and how various service providers can work together. It serves as a focal point for agency leaders to consider new ways of enhancing the existing physical infrastructure to provide the most efficient transportation system possible. Leaders concerned with metropolitan, rural and commercial vehicle intelligent transportation systems will all benefit from using the National ITS Architecture.

## What will it help me do?

Using the National ITS Architecture will save significant time and effort for local project planners and implementers. It will also minimize many of the risks associated with deploying a major new transportation system.

## SAVE TIME AND MONEY

The National ITS Architecture has already done most of the high-level ITS planning and system interface design. It provides information for state and local ITS decision makers to understand the potential ITS has for regional and statewide applications.

## ENCOURAGE COMPATIBILITY

For state and local decision makers, the National ITS Architecture greatly minimizes the risks associated with buying individual components of a transportation management system. It provides a high level of confidence that future components will be technically compatible.

## ENABLE FUTURE EXPANSION

Using the National ITS Architecture will enable designers to consider in advance the technical requirements for future system expansion. In applying the National ITS Architecture at the regional and state levels, future transportation needs can be anticipated and planned. Even people in the first stages of implementing ITS can consider future enhancements and know that system expansions will be easier and more cost-effective.

## BRING STAKEHOLDERS TOGETHER

ITS will be successful only if all of the transportation stakeholders are involved in its planning and agree on a long-range ITS vision. Applying the National ITS Architecture at regional levels ensures a broad range of stakeholders are included in the planning and implementation stages, easing eventual deployment.

## FULFILL LOCAL NEEDS

Importantly, using the National ITS Architecture does not imply a one-size-fits-all approach to designing intelligent systems at a statewide, regional or project level. In fact, quite to the contrary,

it is extremely flexible and will accommodate for and tailor to local needs while still maintaining an overall framework for compatibility.

### What is the end result?

The vision of the future is to have a transportation system where individual travelers, businesses, traffic and transit managers, emergency service providers and motor carriers will benefit from compatible transportation systems. The National ITS Architecture provides the framework for compatibility to achieve this vision.

### What do I do next?

Several jurisdictions have already benefited from using the National ITS Architecture. You can start right now by thinking about your transportation system from a regional perspective.

- Find out if your current and planned equipment is capable of “talking” to other systems;
- Understand your community’s communications backbone and determine if there are options for shared investments;

- Find out if your databases can be read by other agencies and if you can read theirs;
- Develop an inventory of existing systems and their current interface and information flow requirements;
- Become a catalyst for getting the right players together and develop an overall ITS plan;
- Train your work force through available ITS training courses; and
- Use the various architecture guidance documents when planning a project.

### Where is more information?

We can help you understand your alternatives and plan for a smarter future. For more information on how to get started, please contact your local Federal Transit Administration or Federal Highway Administration field representative. Or, at the national level, contact the United States Department of Transportation, Intelligent Transportation Systems Joint Program Office, at the address below.

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# ITS STANDARDS

## What are ITS standards and why are they important?

ITS standards define how system components interconnect and interact within an overall framework, known as an architecture. Standards specify how various technologies, products, and components interconnect so they can be used together. For example, in a typical stereo system, a consumer can buy a variety of products, such as a receiver, CD player and speakers, from a variety of manufacturers. Open standards ensure they will all connect together and ensure the electronics between them function properly.

In deploying ITS, transportation agencies expect that the systems and technologies they implement will be able to exchange pertinent data and that their investments can be upgraded and expanded over time in cost-effective ways. Similarly, the traveling public expects that the ITS products they purchase will function consistently and reliably anywhere in the country.

Intelligent transportation systems require the ability to integrate and share information among various users and across institutional and jurisdictional boundaries. Open ITS standards are essential ingredients for achieving the interoperability and compatibility necessary to meet these expectations at regional and national levels.

## What are the benefits?

Standards help create markets by increasing the possibility that manufacturers will produce products which match buyers' needs and specifications. Buyers benefit by having several manufacturers making products to the same specifications and competing for their business. The results are lower prices, higher quality and easier upgrades, thereby extending the lives

of countless systems across the country. Manufacturers benefit from larger markets and more satisfied customers.

Understandably, many agencies focus on short term needs and payback. This often results in systems using closed, proprietary standards. In deploying ITS, however, agencies must consider the full life cycle costs and benefits and not just those associated with initial implementation. In the long run, making the transition to common ITS standards will allow agencies to reap the advantages of competition.

## Where do ITS standards come from and how many are there?

For the past several years, transportation experts from all levels of government, private industry and academia have worked together to develop a unified framework for ITS that is robust enough to enable interoperability and compatibility, yet flexible enough to accommodate a variety of local needs and preferences. These efforts have resulted in a consensus National ITS Architecture and a cooperative standards-setting process.

The National ITS Architecture identifies about 100 ITS standards that are needed. Most ITS standards address the need for common data definitions and message sets to enable information sharing among agencies. Some also address needs for compatible ITS communications technologies.

The U.S. Department of Transportation has sponsored the accelerated development of ITS standards by funding existing standards-setting organizations. Over the next several years, the Department plans to adopt national ITS standards based on the results of these efforts.

Once adopted, national ITS standards will be used on transportation projects receiving Federal funds. However, not all will be adopted as national standards. Those not adopted nationally may be promoted as good engineering practice.

### What can I do next?

Start by determining the need for ITS standards within your agency and region by identifying those that are pertinent to your implementation plans. This depends on which elements of the National ITS Architecture are appropriate to your region or state, as well as to the overall ITS concept of operations envisioned in your community. Once a regional ITS concept has been established through cooperative interagency planning, pertinent standards can be determined.

You can also get involved at the national level by participating in one or more of the development efforts underway by the various standards-setting organizations in order to ensure that your particular needs are addressed.

### Where is more information?

For more information on ITS standards, please contact your local Federal Transit Administration Regional Office, Metropolitan Office, or Federal Highway Administration field representative, typically located in your state capital. Or, at the national level, contact the United States Department of Transportation, Intelligent Transportation Systems Joint Program Office, at the address below.

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