



Intelligent Transportation Systems
U.S. Department of Transportation



ITS: Now and the Future

Shelley Row

Director, ITS Joint Program Office

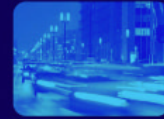
Research and Innovative Technology Administration

U.S. Department of Transportation

January 14, 2008

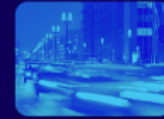
Transportation Research Board 87th Annual Meeting





What to Expect in 2008

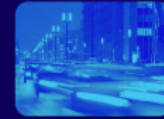
- **Current Program:** A year of research results
- **Future Program:** A strategic vision and action plan



Current Program: A Year of Research Results

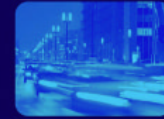
Clarus

- 8 states and 3 Canadian provinces have integrated their road weather data into a nationally available system
- 3 multi-state teams have drafted Concepts of Operation that define *Clarus*-based applications
- Regional demonstrations to build these applications are starting in '08
- Innovations:
 - Most advanced quality checking of road weather (pavement-specific) observations ever
 - Demonstrating international data exchange and shared development of road weather information systems



Current Program: A Year of Research Results

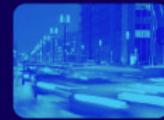
- **Electronic Freight Management**
 - Developed and evaluated an open architecture information exchange to improve cargo visibility and the efficiency of a truck-air-truck supply chain.
 - Six month operational test with an active supply chain was conducted May - Dec. '07
 - Early results:
 - Reduced freight forwarder time to prepare transportation status by 4 hours per day each (>75%)
 - Improved data accuracy at container freight station by at least 12%
 - Eliminated manual data entry and re-keying errors
 - Validated information exchange protocols / standards
 - Ready to advance industry adoption



Current Program: A Year of Research Results

Integrated Corridor Management

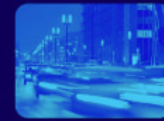
- Pioneer sites completed concepts of operation
- Finishing requirements documents
- Up to three sites selected for analysis, modeling and simulation of ICM in Summer '08
- Modeling Innovations:
 - Combine macro-, meso- and micro-scopic modeling to conduct **full multimodal corridor modeling** addressing interacting effects of
 - **Transit service** enhancements
 - Responses to **traveler information**
 - **Tolling, HOT lanes, and congestion pricing**
 - Varying **corridor conditions**: weather, incident patterns, demand



Current Program: A Year of Research Results

Integrated Vehicle-Based Safety Systems

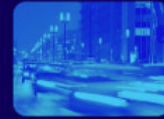
- Prototype testing for Phase I is nearing completion
- Expect to initiate Phase II including field testing for light and heavy vehicle platforms Spring '08
- Fall '08: Initiate light & heavy vehicle full-scale Field Operational Tests (FOT)
- Test Innovations:
 - Multiple warning systems integrated into a vehicle
 - Arbitration between warning systems
 - FOTs to assess real-world system effectiveness



Current Program: A Year of Research Results

Maintenance Decision Support System

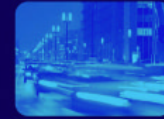
- Version 5.0: incorporates radar and satellite images, updates the road temperature model, and generates alerts to predicted problems
- Moved from a research project to a market ready technology
- Innovations:
 - First program to convert weather forecasts into a transportation decision tool
 - Integrated AVL data into MDSS for tactical tool and strategic use



Current Program: A Year of Research Results

Mobility Services for All Americans

- Phase I sites design development in Summer '08
- Two sites selected for field testing to begin in '08
- Test Innovations:
 - Electronically connected human services transportation network
 - Optimizing human services transportation providers for efficient service
 - Single point of contact for the customer
- Multi-modal trip planner: First door-to-door multi-modal regional trip planner

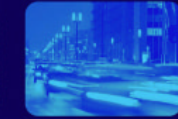


Current Program: A Year of Research Results

Next Generation 911



- Concept of Operations, Requirements and Architecture documents completed in '07
- Proof of Concept: combination Lab / Live PSAP testing of selected components of the NG911 architecture (Spring 2008)
- Test Innovations:
 - Ability to place 911 “calls” to PSAPs via text message
 - Ability to transmit telematics data directly to PSAPs
 - Ability to interconnect individual PSAP networks



Current Program: A Year of Research Results

Vehicle Infrastructure Integration

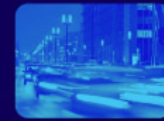
- Safe Trip 21: demo in November '08
- Proof of concept test underway in MI and CA
 - **Innovations:**
 - Most extensive DSRC/WAVE protocol test bed to date (56 RSEs)
 - Prioritization of radio channel access for safety (while also supporting other applications)
 - Multi-channel DSRC radios use entire 75 MHz DSRC bandwidth to assure capacity; Supports many vehicles and many services
 - System supports wide diversity of applications with single radio
 - Local safety systems, network services, V2V, Probe Data, Advisories, etc
 - Groundbreaking method to maintain privacy & anonymity while ensuring legitimacy of messages & data
 - Common vehicle data interface across vehicle OEMs
- Applications development starting with stakeholder discussions
- **New public web site:** <http://www.vehicle-infrastructure.org/>



Current Program: A Year of Research Results

ITS Standards Program

- SAFETEA-LU Section 5307, Part 4 directed ITS Standards Expert Panel
- TRB Published June 18, 2007 Report Recommendation:
 - “Articulate a strategic vision of the role of standards in furthering the development and use of ITS and define USDOT’s role in realizing this vision.”
- JPO developing Standards Program Strategic Plan
 - Process defined by March '08, plan complete Fall '08
 - Will engage relevant stakeholders in process



Current Program: A Year of Research Results

Professional Capacity Building

- New look at workforce development, education and training
- Engage associations and universities in discussion to leverage and coordinate all resources



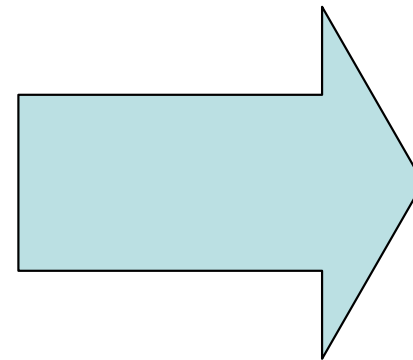
Future Program: A Strategic Vision & Action Plan

ITS Advisory Committee

Program Plan

Major Initiatives Ending

Reauthorization



**Common,
Clear,
Concise
Vision**



Future Program: A Strategic Vision & Action Plan

Transportation Problems

- Congestion
- Safety
- Productivity

System Performance



Weather
Today: Partly sunny.
High 50, Low 30.
Friday: Mostly sunny.
High 46, Low 34.
Details, Page B8

123RD YEAR No. 11

The Washington Post

THURSDAY, DECEMBER 16, 1999

Bad Traffic Grows Worse, Study Says

By ALAN SIPRESS
Washington Post Staff Writer

Severe congestion has spread to vast stretches of Washington area highway where only three years ago traffic moved freely, drastically slowing commuters on roads such as I-95, I-270 and the Capital Beltway, according to a regional study released yesterday.

The analysis by the Metropolitan Washington Council of Governments, based on extensive aerial photography, represents the

grown considerably worse. Since COG's last study in 1996, daily backups have developed on dozens more miles of highway, aggravating traffic that was already ranked the second-worst in the country behind the Los Angeles area.

The swelling congestion on the Beltway is perhaps the most dramatic illustration. Morning commuters had previously encountered severe tie-ups on the Maryland portion of the outer loop between Interstate 95 and Georgia Avenue. But now that bumper-to-

"It has gotten quite a bit worse over quite a short period of time," said Ronald F. Kirby, COG's director of transportation planning. "It was bad only up there in Maryland. Now it's getting bad in Virginia."

The finding that the region's congestion is now spreading like an epidemic comes only weeks before the Virginia and Maryland legislatures are expected to tackle proposals for raising billions of dollars to expand roads and transit.

The COG analysis offers a lesson, because it shows

the AFFIC, A20, Col. 1

Morning Congestion has spread on the Capital Beltway:

— Highway at capacity — Highway over capacity, with severe congestion

1996 1999

D.C. MD. VA. Inner loop Outer loop

BY WILLIAM MCNULTY—THE WASHINGTON POST

Familiar sight: Traffic slows to a crawl during the morning rush hour on the Beltway's Inner Loop near Providence Road. A recent study says congestion on I-695 is worsening.

KEIM HARRISTON / KIM STAFF

Slow going getting slower

Beltway: We're stuck on commuting by car. As a result, we're spending more time stuck in traffic on Interstate 695.

One in a series of occasional articles
By LIZ ATWOOD
KIM STAFF

Caution: congestion ahead. State officials are trying everything to ease traffic on the Baltimore Beltway.

tearing up a bridge to make way for another widening, pinpointing rush-hour snags by satellite and adding emergency vehicles to help stranded motorists.

Despite those efforts and millions of dollars spent, traffic on the 50-mile loop is getting worse. "We can expect the congestion to grow over time," says Parker Williams, administrator of the State Highway Administration.

More than 500,000 vehicles a day jam the roadway that was originally built to handle 80,000. A Baltimore-area resident spends an average of 47 hours a year stuck in traffic, much of it on Interstate 695,

the heart of the area's transportation network. That's twice as much as 10 years ago, according to a study recently released by the Texas Transportation Institute.

Persuading drivers to use car pools and mass transit is critical to alleviating the congestion, Williams says. Mass transit is used for only 4 percent of the 14 million commuter trips made daily in Maryland.

For most, driving to work is a way of life.

"I just got into the habit of driving," says R.D. Randall, as he passes the Metro station on Old Court Road on his way from [See Beltway, 7A]

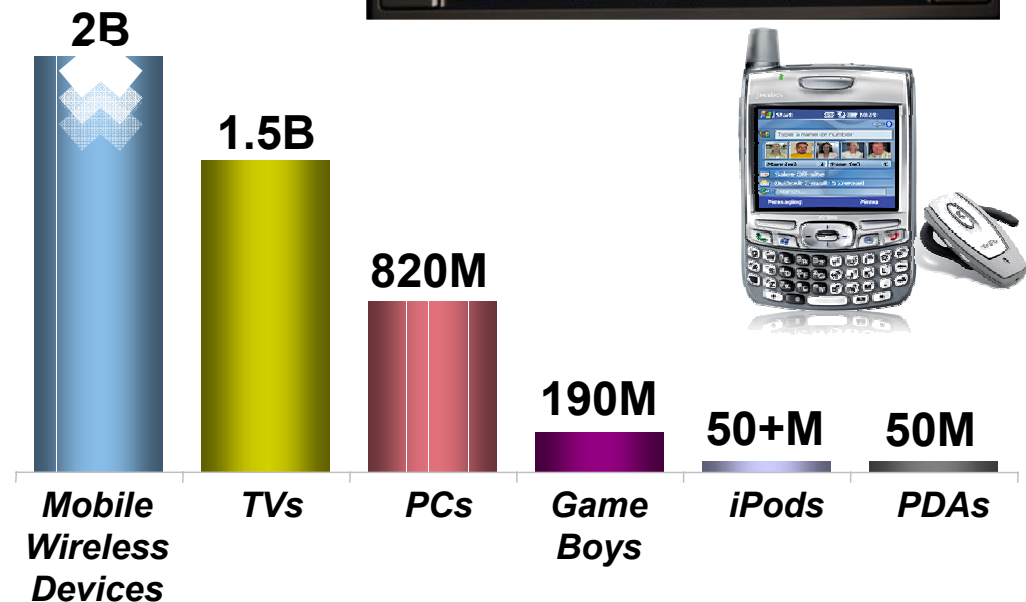


Future Program: A Strategic Vision & Action Plan

Information Technology Explosion

- Expectations for information
- Ubiquitous Connectivity
- Hand-held devices
- Person-to-person Networking

A Wireless World



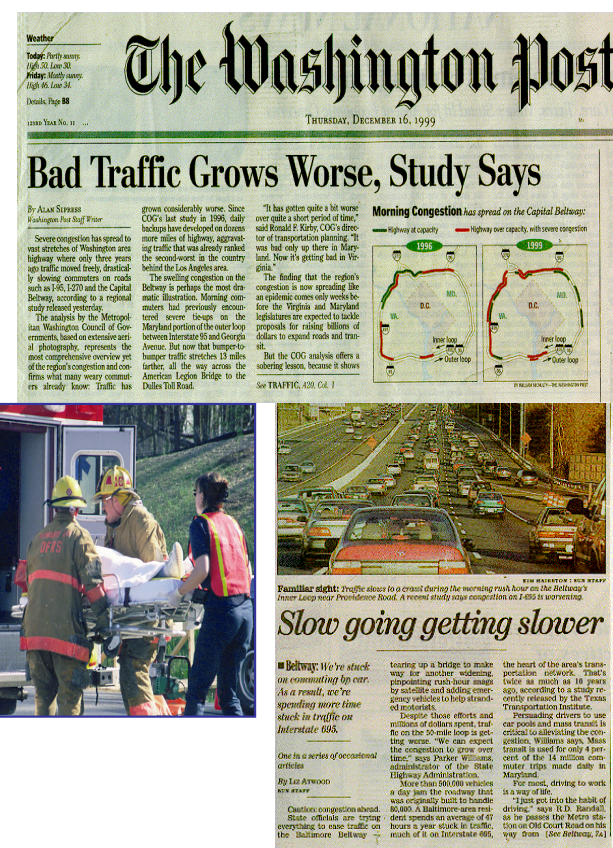


Future Program: A Strategic Vision & Action Plan



Wireless World

Federal Research & Technology Transfer

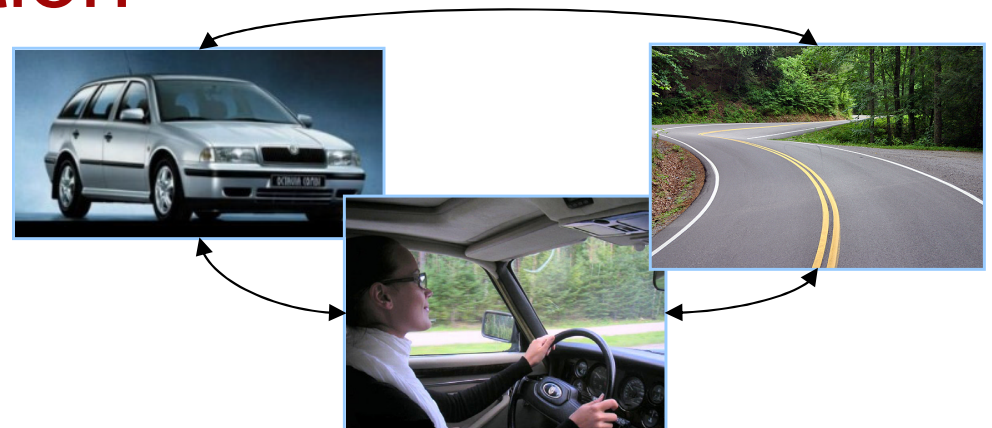


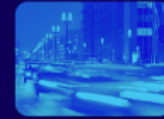
System Performance



Future Program: A Strategic Vision & Action Plan

- Connected vehicle
 - Vehicle to vehicle
 - Vehicle to infrastructure
 - Communicate appropriately with driver
- Real time information
 - All roads
 - All modes
 - All the time

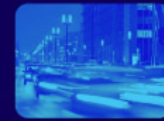




Future Program: A Strategic Vision & Action Plan

Observations: Public Sector

- General acceptance of technology in transportation
 - **ITS use has grown**: TIM, signals, freeway mgt, transit mgt, toll collection, CVISN
 - **ITS investment is slow**;
 - **Constrained resources**
 - Growth in public/private partnerships
 - Growth in tolling & pricing
 - **Data limitations** (extent and quality) limit value
 - Looking for **new models** for data acquisition

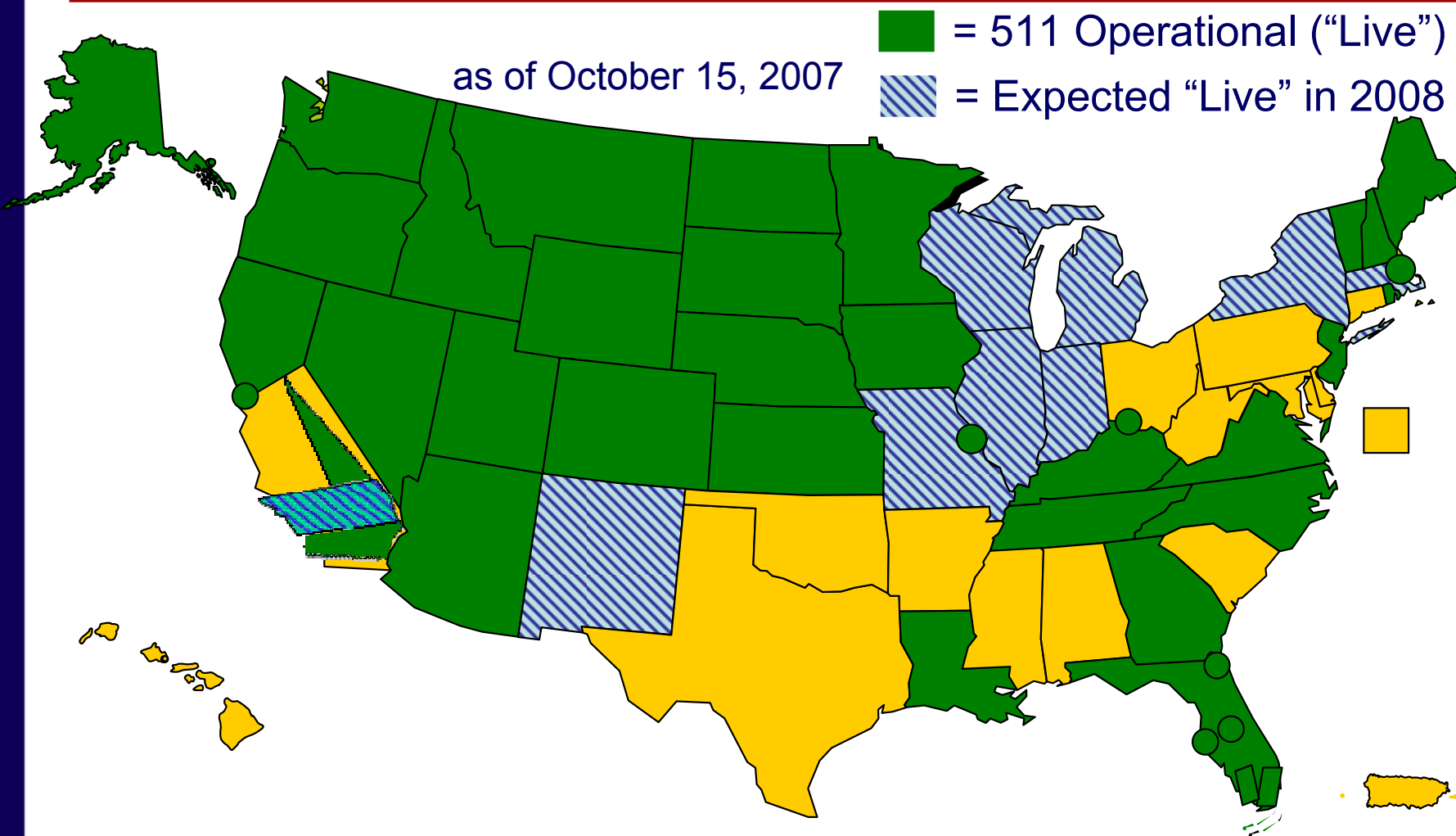


Current Statistics – 2006 Deployment Statistics Database (108 metro areas surveyed)

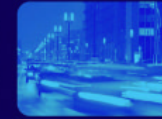
- 70-77% freeway/arterial agencies collect **volume**
- 61% of freeway & arterial agencies collect **speed**
- 39% signalized **intersections** covered by electronic surveillance
- 39% freeway agencies disseminate **weather** info
- 38% freeway miles in metro areas with **R-T traffic data** collection by the public sector
- 35% freeway agencies disseminate **travel times**
- 14% states disseminate **transit** data
- 13% arterial agencies deploy **parking** data collection systems
- 8% freeway agencies disseminate **parking** information



Accessible by 46% of Population

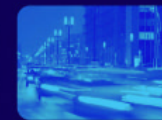


Accessible by 65% of Population in 2008



Current Statistics – *National Traffic & Road Closure Information Web Site* (public agencies)

- 98% include **work zone** locations
- 80% provide **camera** images
- 78% provide **incident** information
- 68% link to **private data sources**
- 58% provide **weather** conditions
- 46% provide **traffic flow** information
- 28% provide traffic **speed**
- 22% provide **travel time** or **delay**
- 14% provide **transit** information

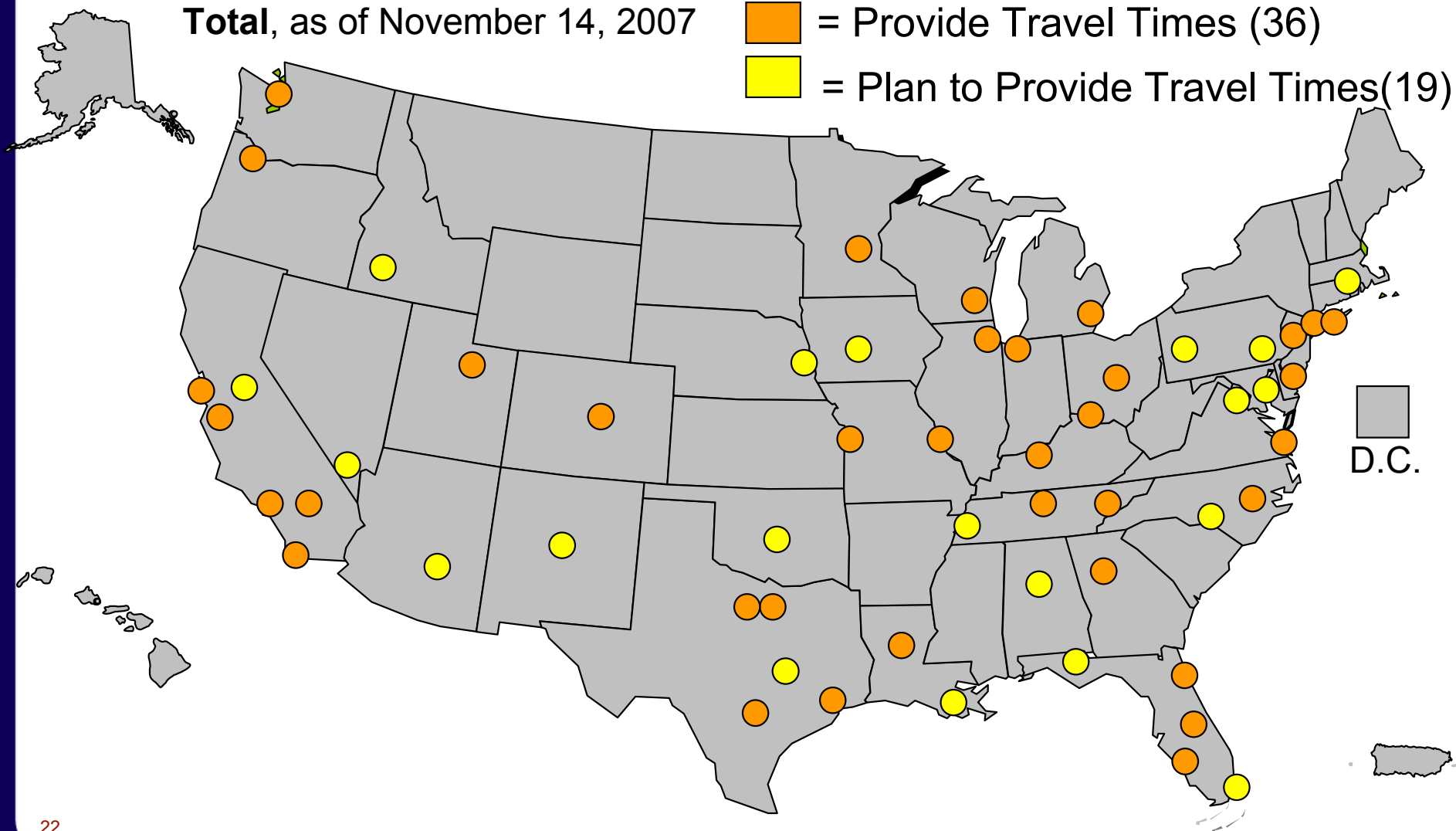


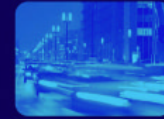
Travel Times on DMS Status

Total, as of November 14, 2007

 = Provide Travel Times (36)

 = Plan to Provide Travel Times(19)





Future Program: A Strategic Vision & Action Plan

Observations: Technology Private Sector

- Fast technology evolution
 - Growing use of navigation systems (on 69% of all models)
 - Growing desire to deliver real-time traffic information
 - Some are marketing real-time information
 - Data quality and coverage is limited
 - Many technologies are vying to be the data solution
 - No clear winner...yet
 - OEMs are looking to technology for vehicular safety
 - Autonomous safety systems are growing

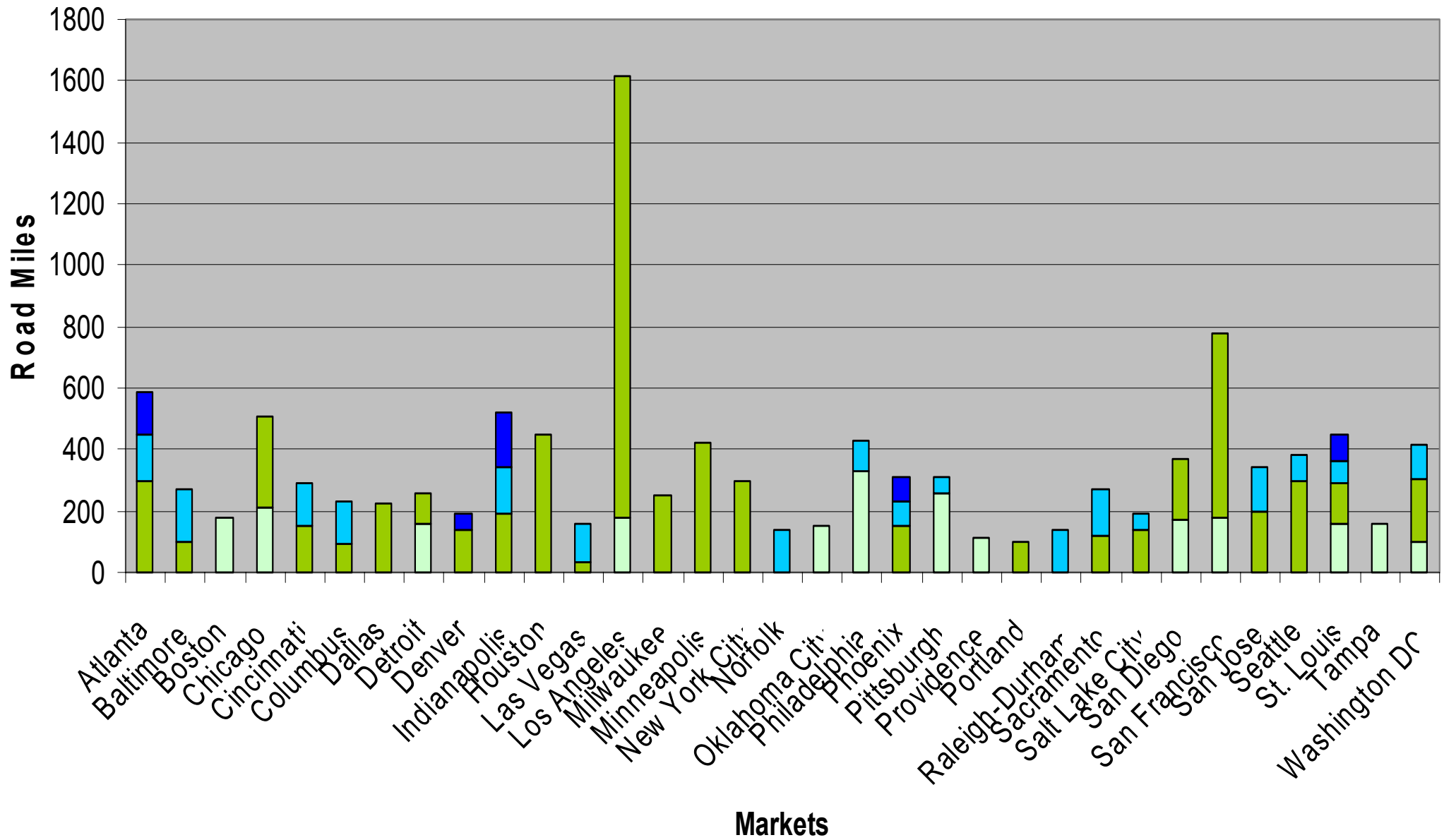


“NavTraffic” coverage growth since launch

- **2004 Launch: 20 Markets**
 - Flow data in 15 Markets (4,800 road miles with flow)
- **Today: 79 Markets**
 - Flow in 24 Markets (8,500 road miles with flow)

	2005	2006	2007	2008
Markets with Incident data	22	44	80	100
Markets with Flow data	17	20	24	33
Road miles with DOT flow data	5,000	5,500	6,100	7,200
Road miles with ITIP flow data	1,900	2,200	2,400	4,400
Total road miles with flow data	6,900	7,700	8,500	11,600

Sensor Coverage



■ T.Com Existing
 ■ DOT Existing
 ■ T.Com Future
 ■ DOT Future

Source: Vehicle Traffic Information Coalition

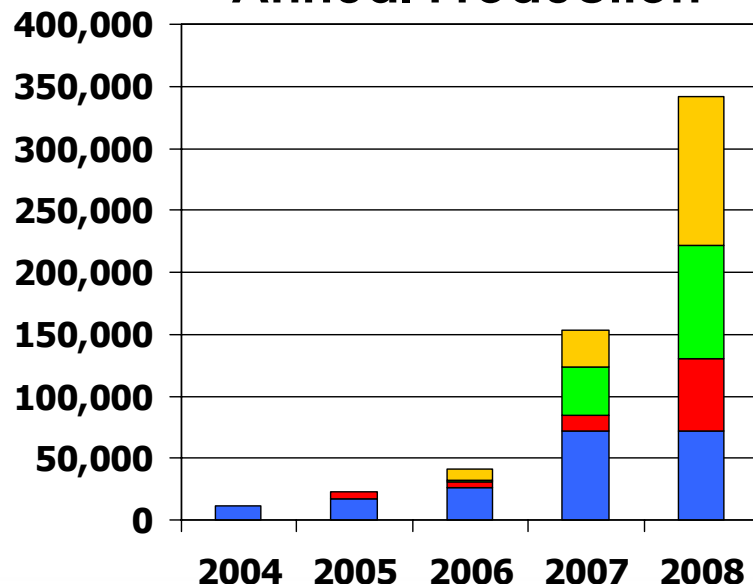


Automotive Adoption of Real-Time Traffic

Number of OEM Models with available factory-installed XM NavTraffic

OEM	Traffic Intro	2004	2005	2006	2007	2008	2009
Honda/Acura	MY 2005	1	1	4	4	-	-
GM/Cadillac	MY 2005	1	1	1	1	-	-
Toyota/Lexus	MY 2007	0	0	2	5	-	-
Nissan/Infiniti	MY 2007	0	0	2	8	-	-
Ferrari	MY 2008	0	0	0	1	-	-
Total		2	2	9	19	40+	50+

OEM NavTraffic Annual Production



ACURA



Cadillac

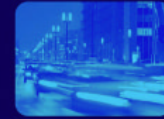


INFINITI



LEXUS

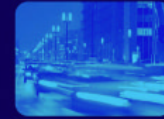
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Future Program: A Strategic Vision & Action Plan

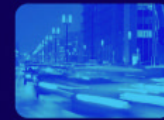
Observations of the ITS Program

- Specific ITS applications are moving forward through leadership in the **modal administrations** (FHWA, FTA, FMCSA, NHTSA)
 - Signal systems
 - Freeway & traffic incident management
 - Transit management
 - CVISN
- **ITS program** should focus on a few high-leverage issues
 - Potential for significant pay off at a national scale
 - Issues that transcend a single mode



Vision – What would we wish for?

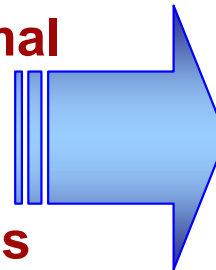
- **End-to-end transportation trip information**
 - Everything I need to know for my trip (time, cost, weather, environmental impacts)
 - Supports transportation options for personal lifestyle choices
 - Available whenever and however I want
- **Transportation network is managed for optimal performance** (including the use of pricing)
- **Technology-enabled performance measures support outcome-based investment decisions**
 - Infrastructure
 - Maintenance
 - Operational performance
- **End-to-end freight movement is seamless and secure**



Future Program: A Strategic Vision & Action Plan

Vision – What would we wish for?

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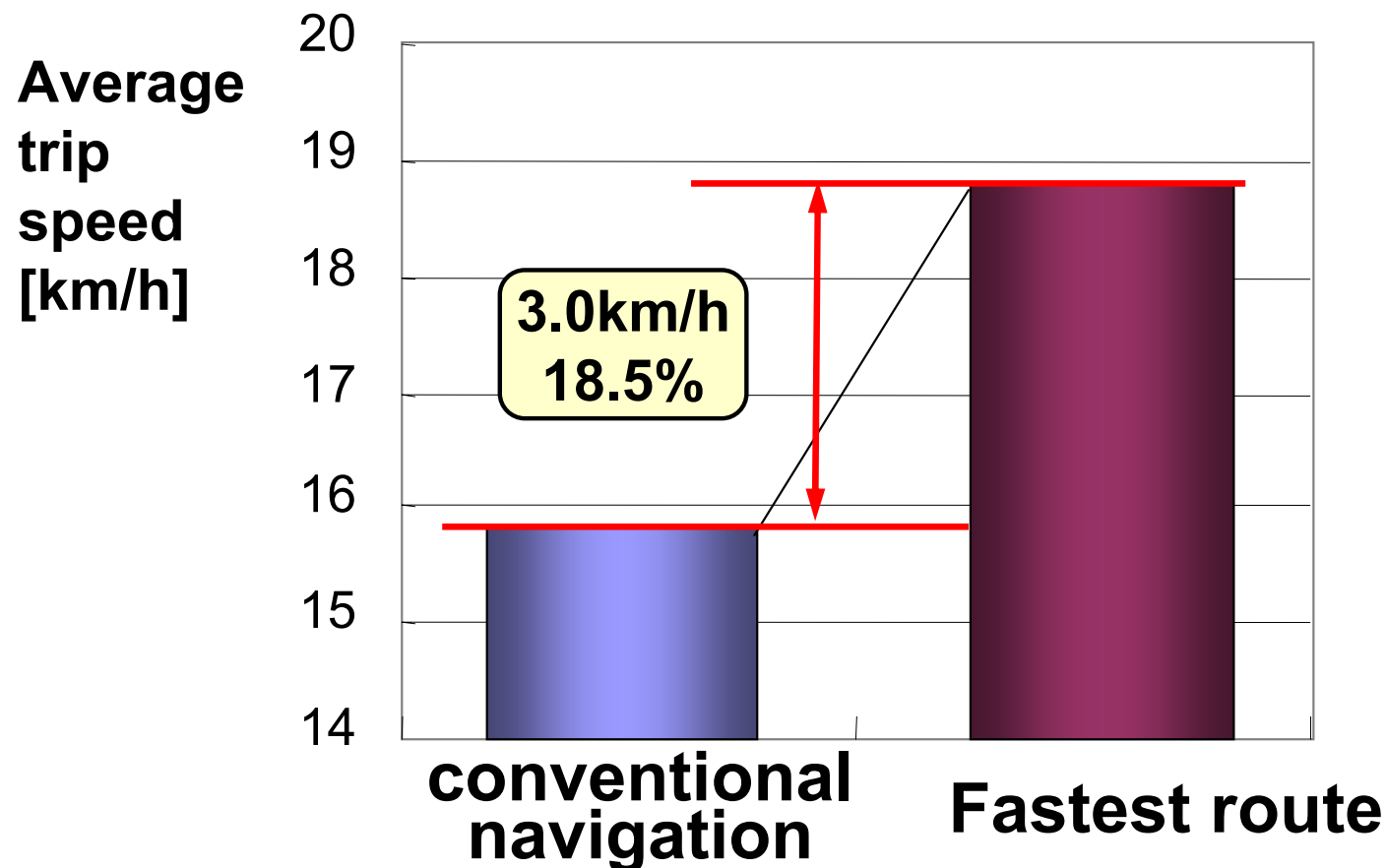


Real Time Travel Data

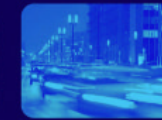
- All Roads
- All Modes
- All the Times



Average trip speed was 18.5% faster than conventional navigation.

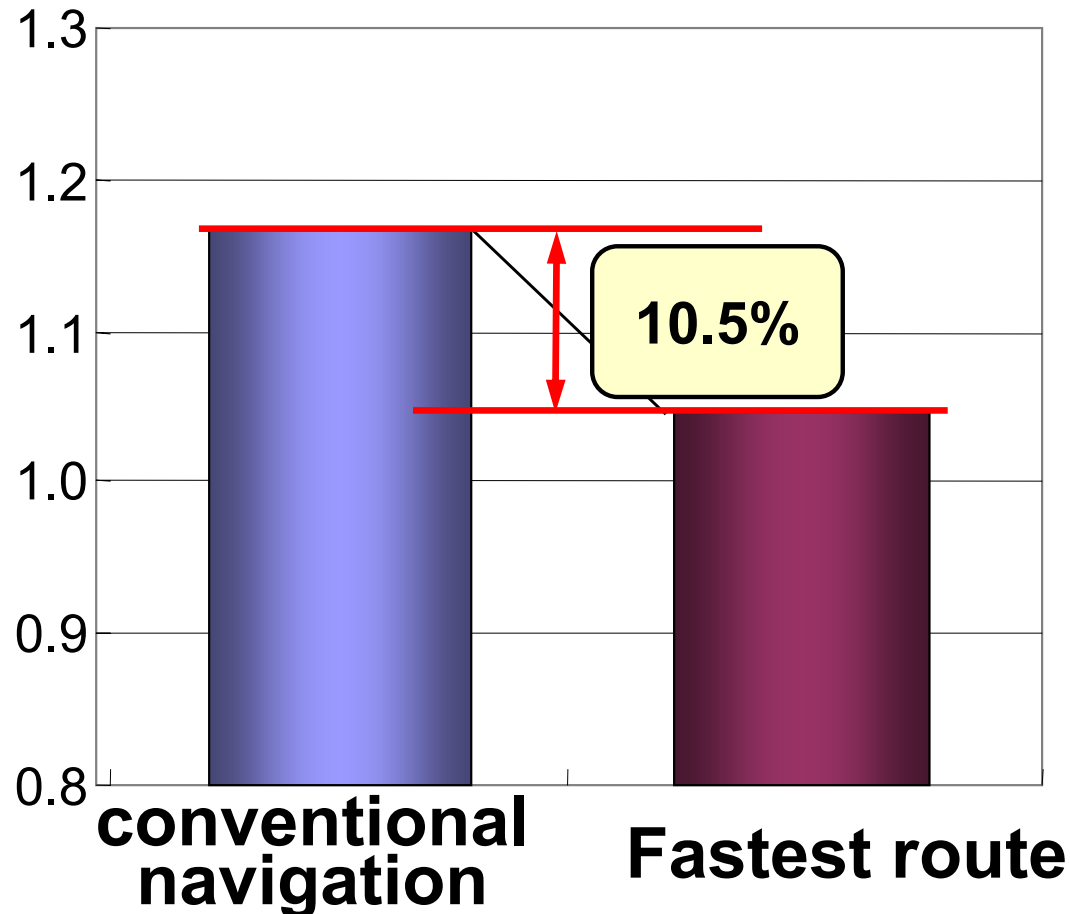


Comparison of average trip speed during Feb '07

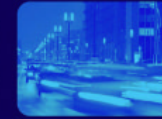
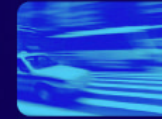


**Average Fuel Consumption was
10.5% less than conventional navigation.**

**Average Fuel
Consumption
[Liters]**



Comparison of Fuel Consumption during Feb '07



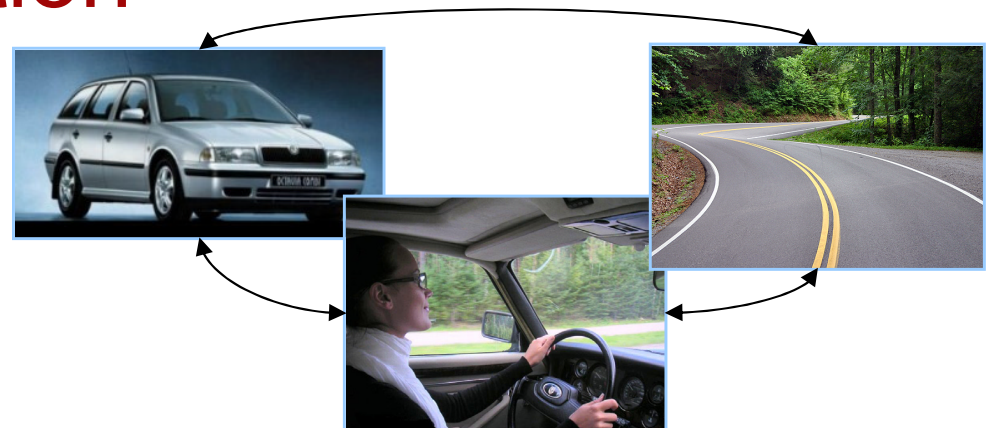
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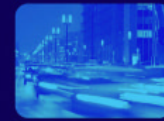
- **Vehicles can “see” what’s happening around them and communicate appropriately with drivers**
 - Vehicles are wrapped in information
 - Everyone has technology-enabled safety in their vehicles
 - Information is communicated to drivers appropriately
- **Technology in transportation reduces negative impact on the environment (air quality & fuel consumption)**
 - Improved system performance
 - Improved driver decision-making



Future Program: A Strategic Vision & Action Plan

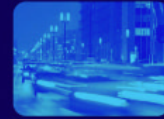
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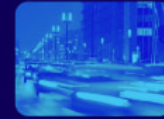
Future Program: A Strategic Vision & Action Plan

- Reconceive public and private roles and responsibilities
- Understand the benefits
 - Safety
 - Mobility
 - Productivity
 - Environmental
- Look to the next generation technology solutions
- Leverage worldwide research



Mission & Goal Areas

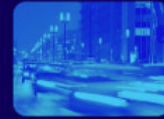
- JPO's mission is to lead the creation of information and communications technology solutions to achieve the best performing surface transportation system in the world.
- Goal Areas
 - Safety
 - Mobility
 - Environment
 - 21st Century Institutions and Partnerships



Goal: Safety

Theme: Prevent fatalities and injuries on the surface transportation network

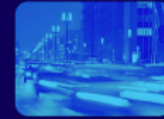
- **Connected Vehicle** – Create capability for all vehicles to have 360 degree awareness of hazards, and communicate appropriately with drivers



Goal: Mobility

Theme: Improve network performance for movement of people and goods

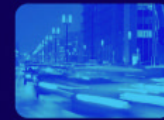
- **Realize complete transportation system visibility**
 - Real Time data on all roads, all modes, all the time
- Enable **performance measurement** across the transportation system
- Catalyze the development of **applications** to optimize network performance
- Enable delivery of **end-to-end transportation information** for trip planning (personal & business)



Goal: Environment/Energy

Theme: Minimize impact of surface transportation on the environment by reducing the carbon footprint and increasing fuel efficiency

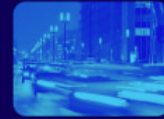
- Conduct research to understand relationship between technology-enabled congestion reduction and environmental impacts (carbon footprint & fuel efficiency)
- Conduct research to understand the relationship of the combined impacts of safety, mobility, and environment on the transportation system



Goal: 21st Century Institutions and Partnerships

Theme: Foster new institutional relationships to enable better use of technologies in transportation

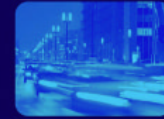
- Research new public-private partnerships to improve the use of ITS technologies in transportation
- Examine innovative financing models to foster use of ITS technologies in transportation
- Identify and research solutions to address institutional barriers in the use of ITS technologies in transportation



Future Program: A Strategic Vision & Action Plan

Next Steps

- Comments on mission and goal areas
- Refine and narrow goal areas
- Clarify Federal role
- Develop metrics for each goal
- Develop an action plan
- Publish the updated Program Plan
 - Update on current program status
 - New section on the Strategic Vision and Action Plan



What to Expect in 2008

- **Current Program:** A year of research results
- **Future Program:** A strategic vision and action plan
 - **Connected vehicle**
 - Vehicle to vehicle
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 - Communicate appropriately with driver
 - **Real time information**
 - All roads
 - All modes
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Your thoughts and comments are welcomed