



UNITED STATES
DEPARTMENT OF TRANSPORTATION

Connected Vehicle Overview

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Today's Transportation Challenges

Safety

- 32,367 highway deaths in 2011
- 5.3 million crashes in 2011
- Leading cause of death for ages 4, 11-27



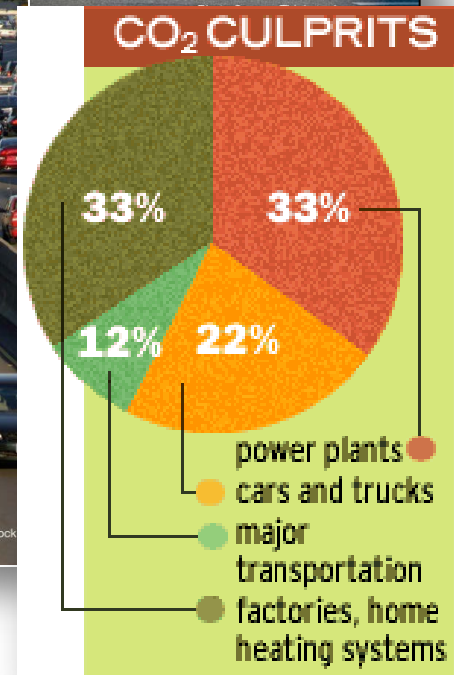
Mobility

- 4.8 billion hours of travel delay
- \$101 billion cost of urban congestion



Environment

- 1.9 billion gallons of wasted fuel

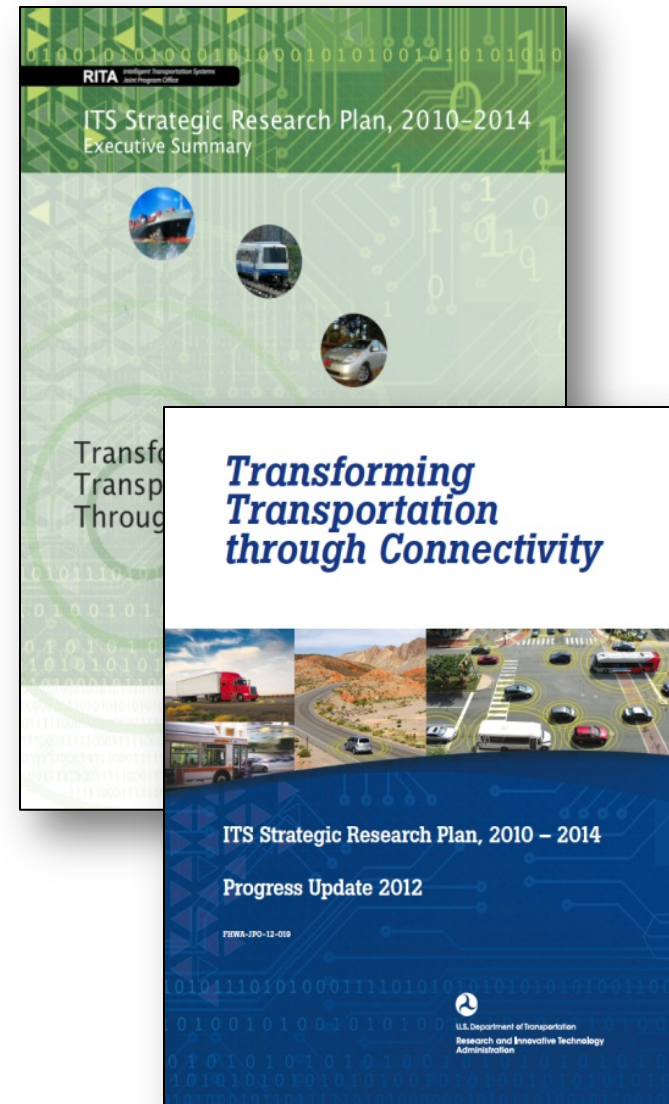


Data Sources: *Traffic Safety Facts: 2010 Data*, National Highway Traffic Safety Administration, June 2012; *2011 Annual Urban Mobility Report*, Texas Transportation Institute

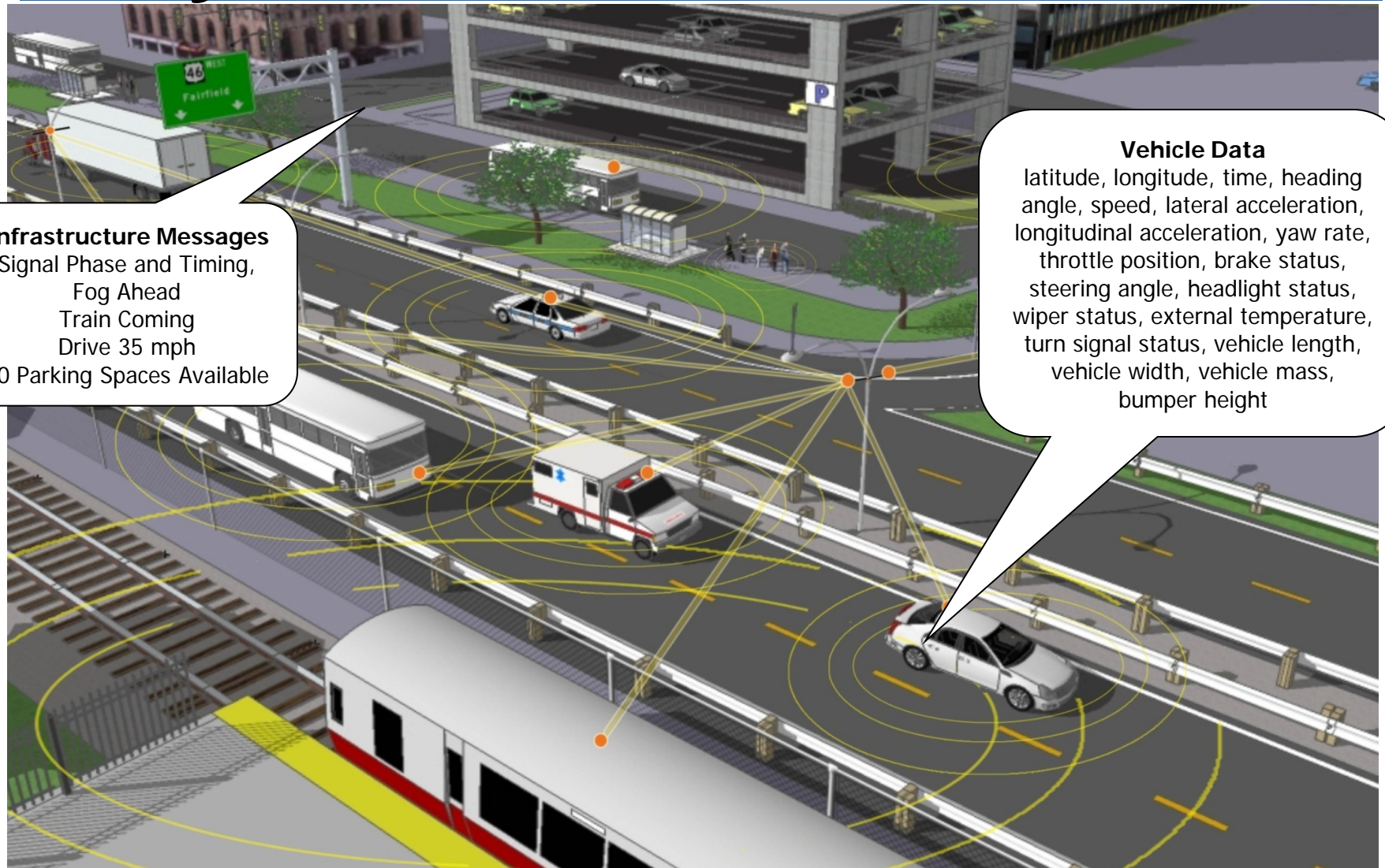


ITS Strategic Research Plan 2010-2014

- **Vision:** To research and facilitate a national, **multimodal surface transportation system** that features a connected transportation environment around **vehicles of all types**, the infrastructure, and portable devices to serve the public good by leveraging technology to maximize safety, mobility, and environmental performance
- Plan developed with full participation by all surface transportation modal administrations, as well as with significant interaction with multimodal stakeholders
- 2012 Progress Update recently completed



Fully Connected Vehicle



Infrastructure Messages

Signal Phase and Timing,
Fog Ahead
Train Coming
Drive 35 mph
50 Parking Spaces Available

Vehicle Data

latitude, longitude, time, heading angle, speed, lateral acceleration, longitudinal acceleration, yaw rate, throttle position, brake status, steering angle, headlight status, wiper status, external temperature, turn signal status, vehicle length, vehicle width, vehicle mass, bumper height



Technology for Safety – 5.9 GHz DSRC

■ What it is

- Wi-Fi radio adapted for vehicle environment
- Inexpensive to produce in quantity
- Original FCC spectrum allocation in 1999
- FCC revised allocation in 2004 and 2006



■ How the technology works

- Messages transmitted 10 times/sec (300m range – line of sight)
Image Source: USDOT
 - *Basic Safety Message*: vehicle position, speed, heading, acceleration, size, brake system status, etc.
 - Privacy is protected (vehicle location is **NOT** recorded or tracked)

■ Benefits of DSRC technology compared to radar/laser technology

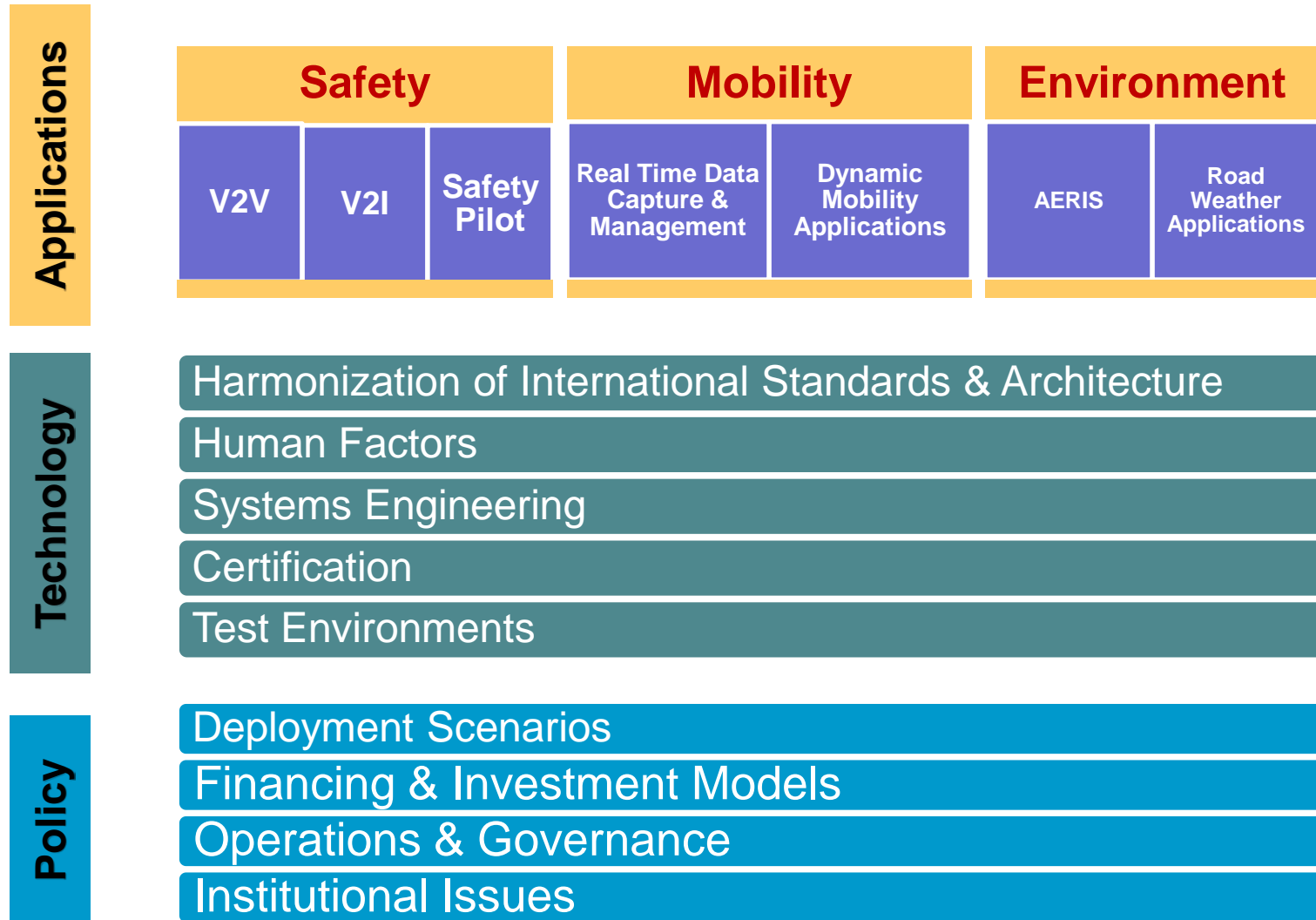
- Reduced price
- Improved reliability → fewer false alarms
- Increased performance → addresses more crash scenarios

■ Drawback of the technology

- Both vehicles need to be equipped to gain benefit
- Requires security infrastructure

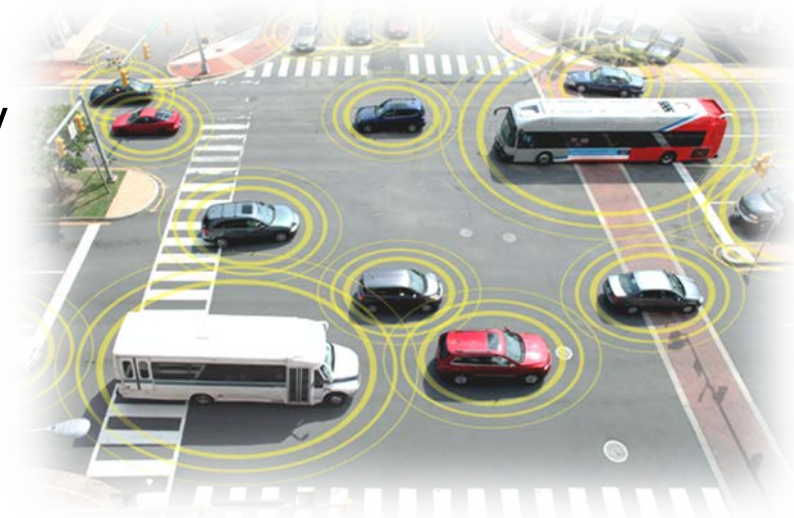


ITS Research Program Components



Connected Vehicle Safety

- **NHTSA Agency Decisions**
 - 2013 NHTSA agency decision on V2V safety communications systems
 - Similar milestone in 2014 for a decision regarding V2V safety technology on heavy vehicles
 - Information to support the decisions will come from many sources, including the **Safety Pilot Model Deployment**
- **Policy work**
 - System security
 - Privacy
 - Governance
 - Business Models
 - Legal Issues

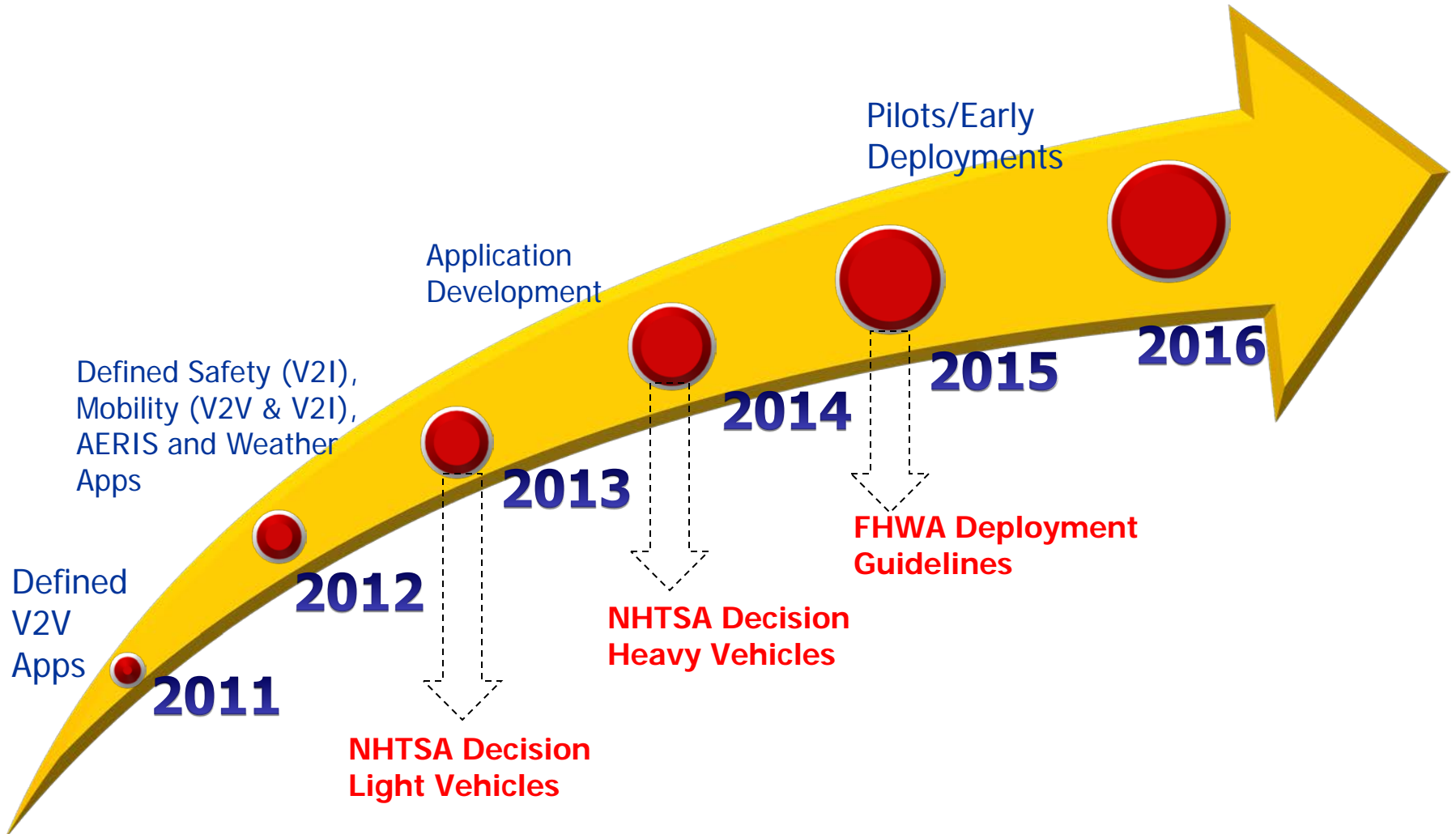


Safety Pilot Model Deployment

- 2800 vehicles (cars, buses, and trucks) equipped with V2V devices
- Provide data for determining the technologies' effectiveness at reducing crashes
- Includes vehicles with integrated safety applications and others that use aftermarket devices (i.e., not built into the vehicle)
- Applications to be tested include:
 - Blind Spot Warning/Lane Change Warning
 - Forward Collision Warning
 - Electronic Emergency Brake Lights
 - Intersection Movement Assist
 - Do Not Pass Warning
 - Control Loss Warning



Moving towards Infrastructure Deployment



Connected Vehicle Applications

SAFETY APPS (V2V)

- Forward Collision Warning (FCW)
- Emergency Electronic Brake Light (EEBL)
- Intersection Movement Ass (IMA)
- Blind Spot Warning (BSW)
- Change Warning (LCWA)
- Left Turn Dire

SAFETY APPS (V2I)

- Red Light Violation Warning
- Curve Speed Warning
- Stop Sign Gap Assist
- Stop Sign Violation
- Railroad Crossing Violation Warning
- Spot Weather Impact Warning
- Oversize Vehicle Warning
- Reduced Speed/ Work Zone Warning
- Pedestrian Warning for Transit Vehicles
- Smart Roadside

MOBILITY APPS

- Integrated Dynamic Transit Operations (IDTO)
- Intelligent Network Flow Optimization (INFLO)
- Multi-Modal Intelligent Traffic Signal System (M-ISIG)
- Response, Emergency Staging and Communications, Uniform Management, and Evacuation (R.E.S.C.U.M.E.)
- Enable Advanced Traveler Information System (EnableATIS)
- Freight Advanced Traveler Information System (FRATIS)

ENVIRONMENT APPS *AERIS*

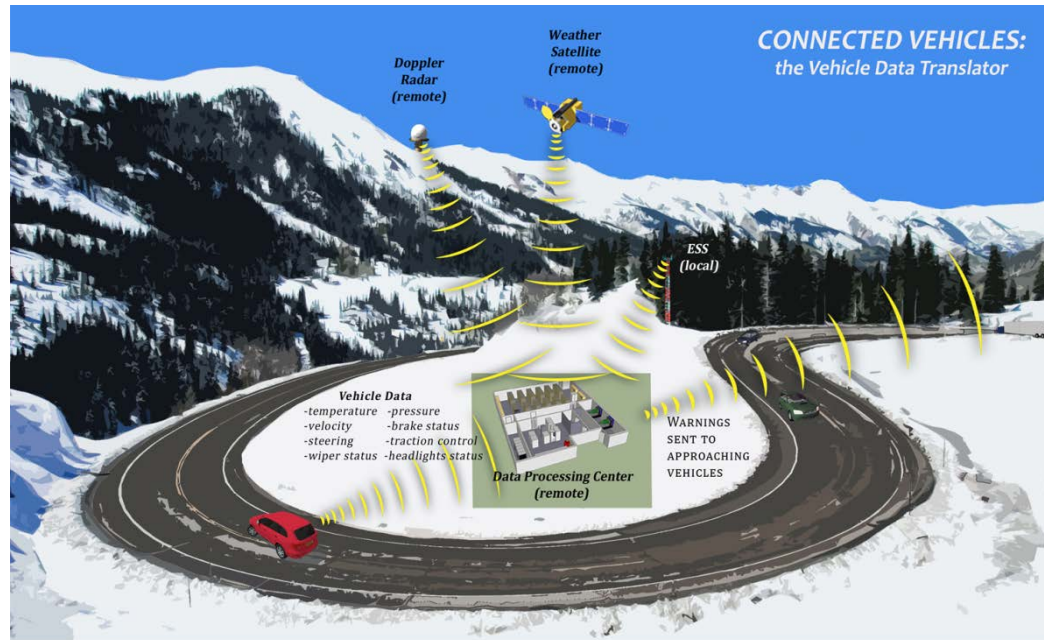
- Dynamic Low Emissions Zone
- Dynamic Eco-Lanes
- Eco-Traveler Information
- Eco-Signal Operations
- Eco-ICM
- Support AFV Operations

ENVIRONMENT APPS *Road Weather*

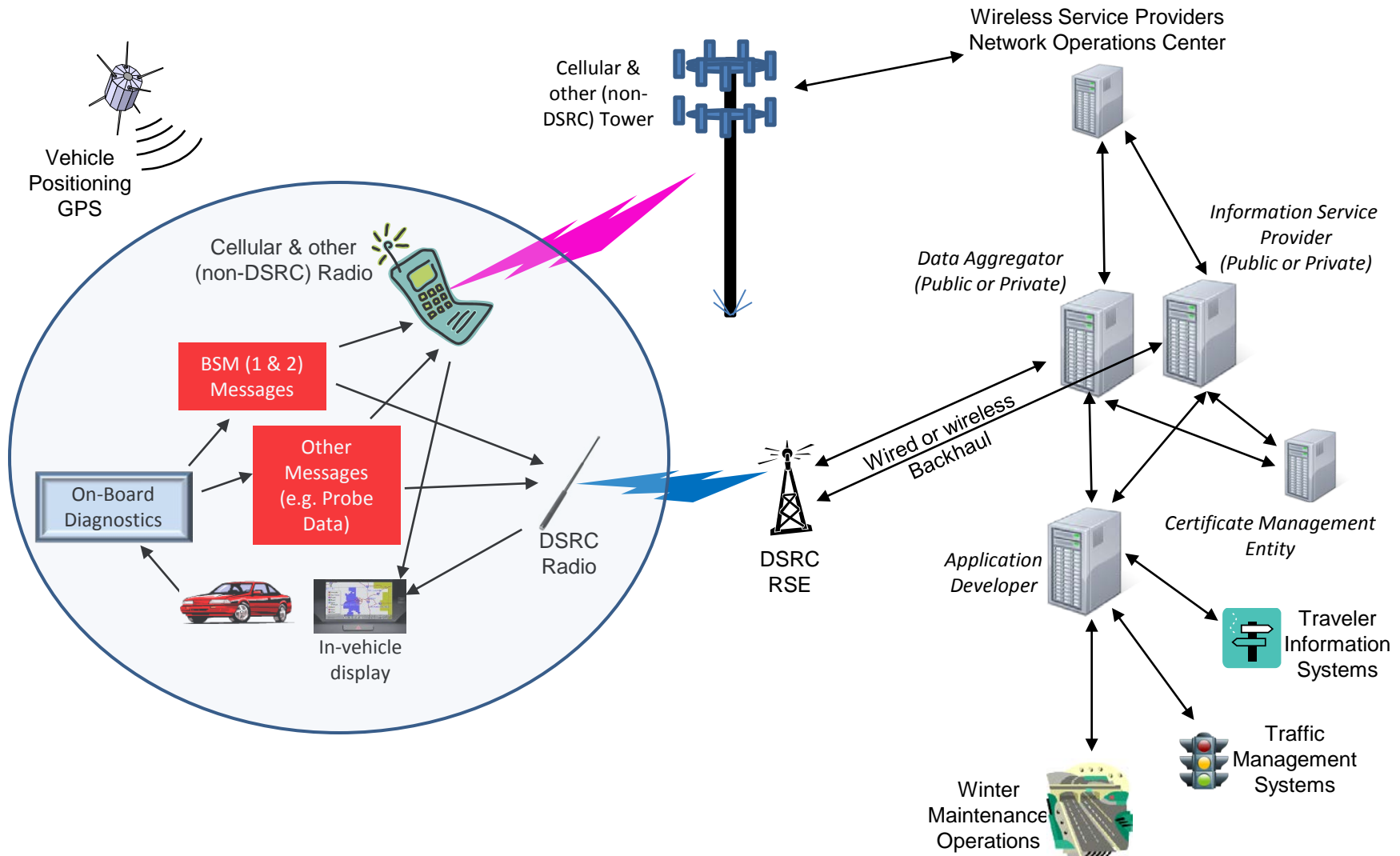
- Enhanced Maintenance Decision Support System
- Information for Maintenance and Fleet Management Systems
- Variable Speed Limits for Weather-Responsive Traffic Management
- Motorist Advisories and Warnings
- Information for Freight Carriers
- Information and Routing Support for Emergency Responders



Mobility, Weather, and AERIS



Deployment Scenario



Affiliated Connected Vehicle Test Beds



- **Real-world, operational test beds that offer the supporting vehicles, infrastructure, and equipment to serve the needs of public and private sector testing and certification activities**
- **Draft Memorandum of Cooperation (MOC) - create an affiliation of 5.9GHz DSRC infrastructure device makers, operators of V2I installations, and developers of applications that use V2I communication**
 - Agreements will help to facilitate the sharing of tools and resources across all facilities to bring about the future deployment of 5.9GHz DSRC and other V2I wireless communication technology
 - MOC commenting period ended recently (Jan 11, 2013); currently assimilating input; lots of interest from stakeholders
- **Finalized MOC expected for review shortly (starting 1st quarter of 2013)**



To Do:

1. NHTSA Decision on Safety
2. Understand the Market Potential for New Vehicle Based Data Enabled by Connected Vehicles
3. Partner with the Community to Define and Test Applications based on additional SAE J2735 Messages (Probe Data, Environment ...)
4. Understand the landscape for Data Aggregation in a Connected Vehicle World



For More Information

RITA U.S. Department of Transportation
Research and Innovative Technology Administration

Intelligent Transportation Systems
Joint Program Office

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Updated October 1, 2012 1:46 PM

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Procurement Opportunities
As we implement the ITS Research Strategic Plan, open procurements may become available through a variety of solicitations. [More >>](#)

Public Meetings View >>
MARK YOUR CALENDAR
The Intelligent Transportation Systems Joint Program Office (ITS JPO) has the following meetings and webinars planned. All events are free and open to the public.

U.S. DOT Announces Public Meeting and Webinar to Discuss Connected Vehicle Safety Program
September 25-27, 2012. [Read more...](#)

Our Current Research
Applications Mode-Specific Cross-Cutting

- Vehicle-to-Vehicle Safety
- Vehicle-to-Infrastructure Safety
- Real-Time Data Capture
- Dynamic Mobility Applications
- Environment
- Road Weather
- Connected Vehicle Policy

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