



2016 NVLA Annual Conference

How Talking Cars Will Transform the Future of Driving

Tuesday, April 12, 2016

Egan Smith

Managing Director, Intelligent Transportation System Joint Program
Office

(ITS JPO)

U.S. Department of Transportation (USDOT)

Presentation Overview

- Our Transportation Challenges
- Where We're Headed – the *Intelligent Transportation System Strategic Plan*
- Connected Vehicles
 - What Are They?
 - What Can They Do?
- In the News (Video)
- Is This Real
 - Pilots and Deployment of Connected Vehicles
- The Big Picture
 - Smart City Challenge
- The Time Is Now
 - Why Should You Be Interested



Today's Transportation Challenges



Safety

- 32,675 highway deaths in 2014
- 6 million crashes in 2014
- Leading cause of death for ages 11, 16-24



Mobility

- 6.9 billion hours of travel delay
- \$160 billion cost of urban congestion



Environment

- 3.1 billion gallons of wasted fuel
- 56 billion lbs of additional CO₂



Data Sources:

Quick Facts: 2014 Data, National Highway Traffic Safety Administration (January 2016); 2015 Annual Urban Mobility Report, Texas Transportation Institute (Aug 2015); Centers for Disease Control



U.S. Department of Transportation
ITS Joint Program Office

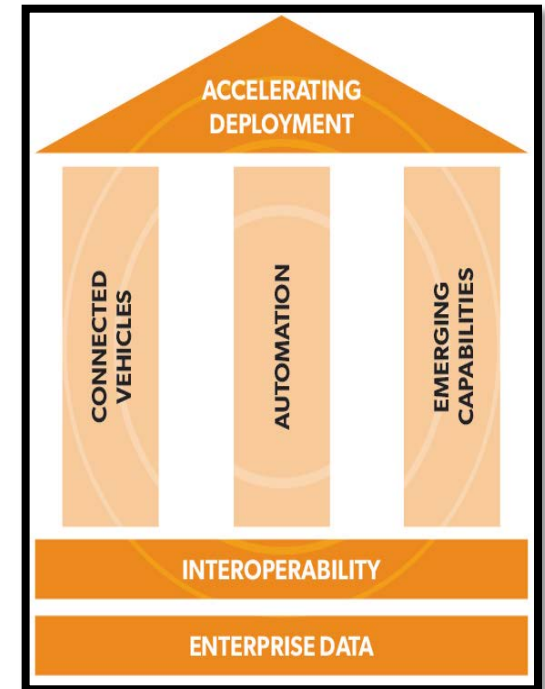
Intelligent Transportation System Strategic Plan 2015-2019



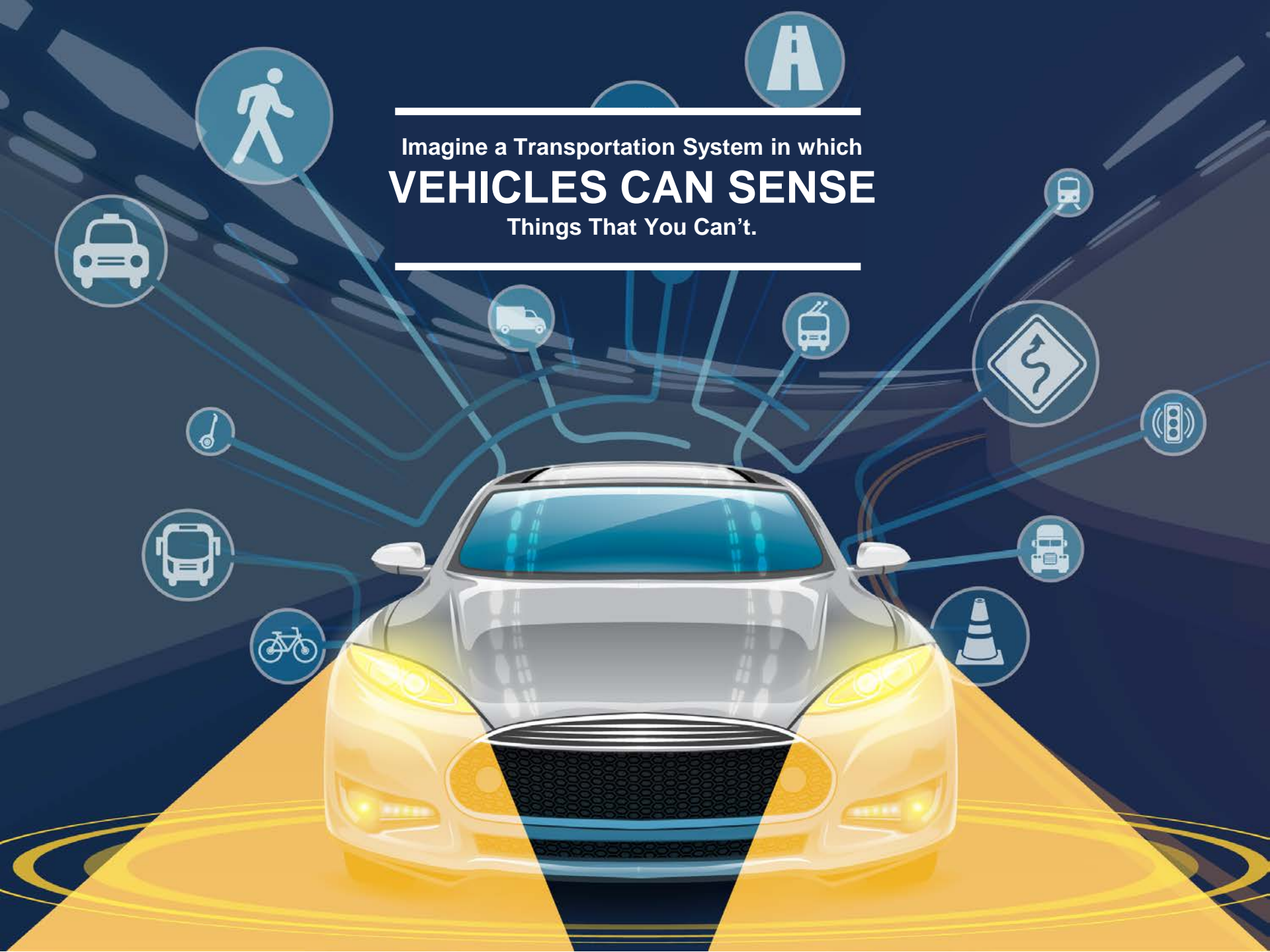
<http://its.dot.gov/strategicplan/index.html>

Strategic Plan Program Categories

- **Accelerating Deployment** advances ITS work from adoption to wider scale deployment in coordination with multiple disciplines and stakeholders.
- **Connected Vehicles** focuses on adoption and deployment.
- **Automation research** focuses on automated road-vehicle systems that transfer some vehicle control from the driver to the vehicle.
- **Emerging Capabilities** focuses on future generations of transportation systems.
- **Enterprise Data** focuses on operational data capture from sensors, mobile devices, and vehicles, and applying data across all modes of transport.
- **Interoperability** emphasizes effective connectivity among devices and systems.



Imagine a Transportation System in which
VEHICLES CAN SENSE
Things That You Can't.



HOW CONNECTED VEHICLES WORK

1. A wireless device in a car sends basic safety messages 10 times per second
2. Other nearby cars and roadside equipment receive the messages
3. Drivers get a warning of a potential crash

Connected Vehicles have the potential to reduce non-impaired crash scenarios by

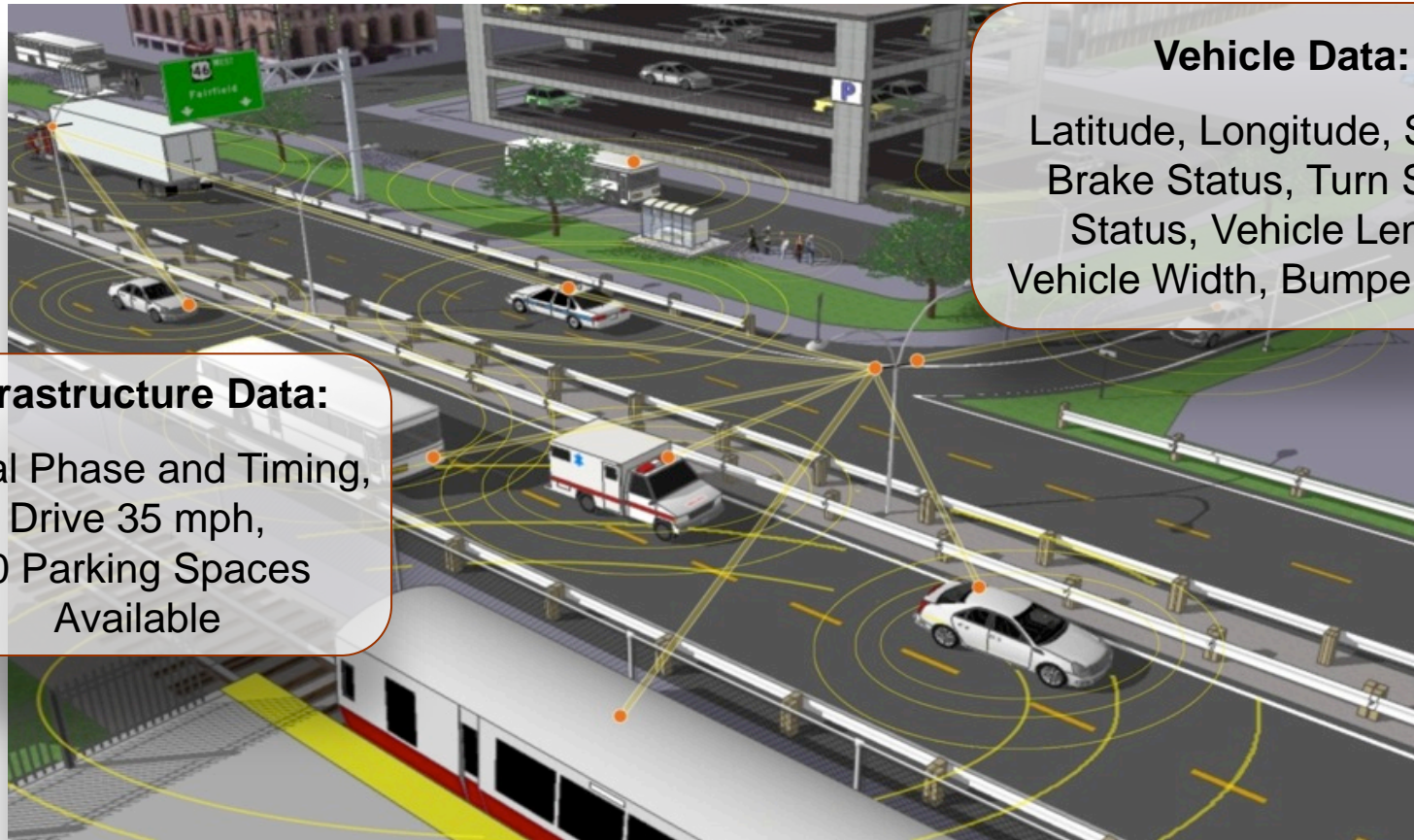
80%*

*Source: NHTSA



Connected Vehicles: *What Are They?*

A connected vehicle talks to other connected vehicles and advanced roadside infrastructure like traffic signals and work zones, as well as our smart phones, over a secure wireless network.



Vehicle Data:

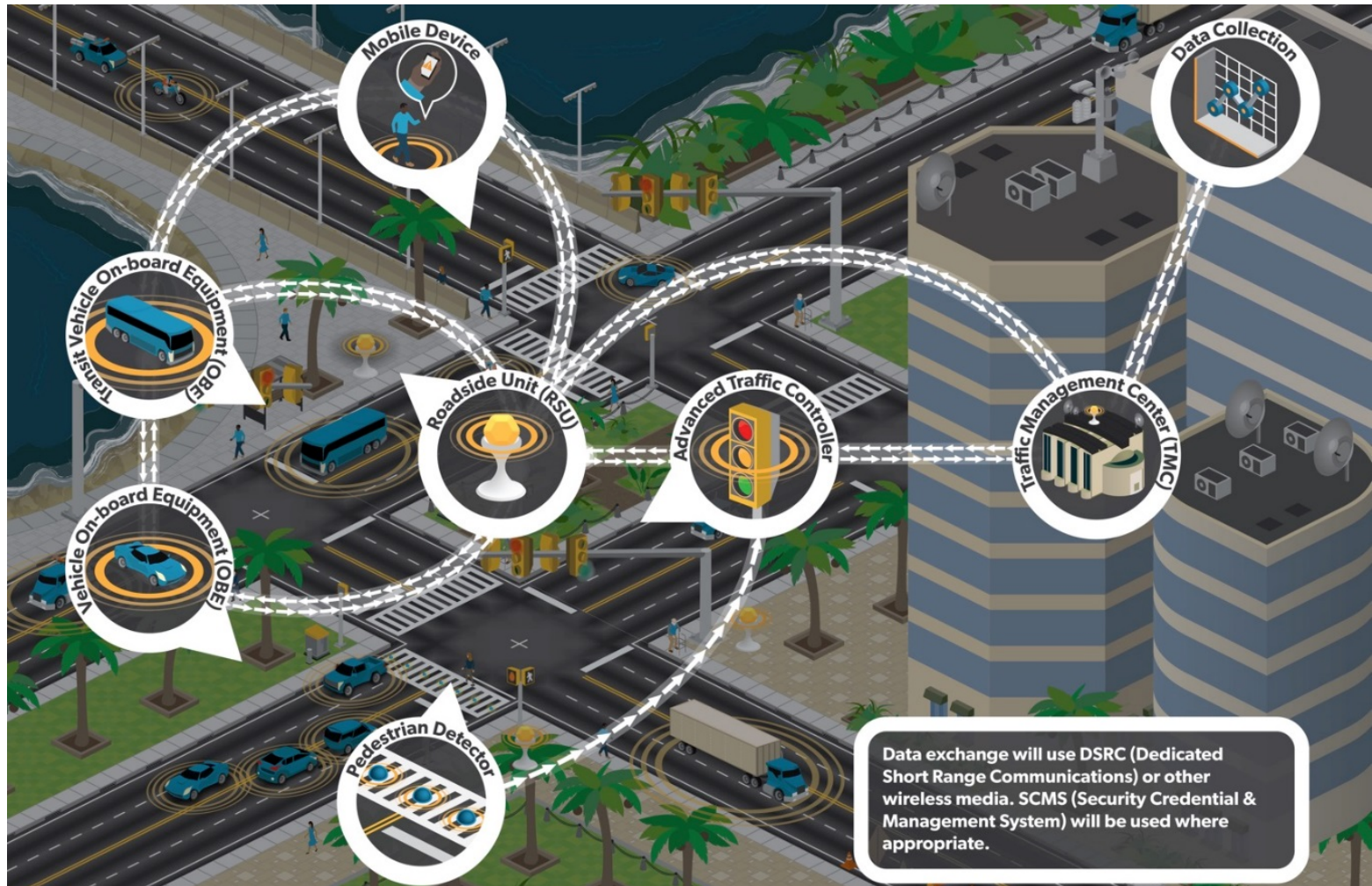
Latitude, Longitude, Speed,
Brake Status, Turn Signal
Status, Vehicle Length,
Vehicle Width, Bumper Height

Infrastructure Data:

Signal Phase and Timing,
Drive 35 mph,
50 Parking Spaces
Available

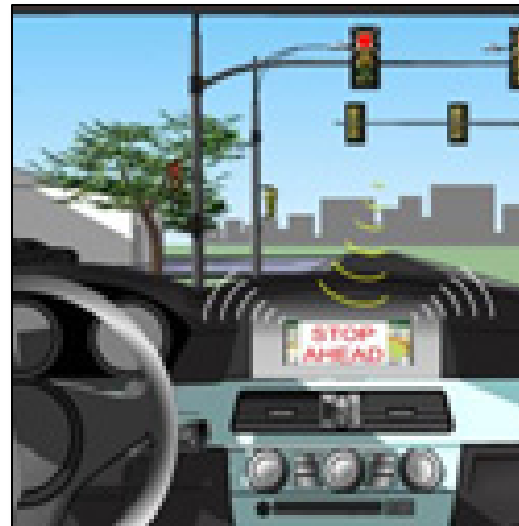


Connected Vehicles: *What Are They?*



Connected Vehicles: *What Can They Do?*

- Save lives by significantly reducing traffic accidents
- Make travel easier, more efficient, and more enjoyable
- Help curb pollution



Connected Vehicles: *Saving Lives*

Intersection Movement Assist:

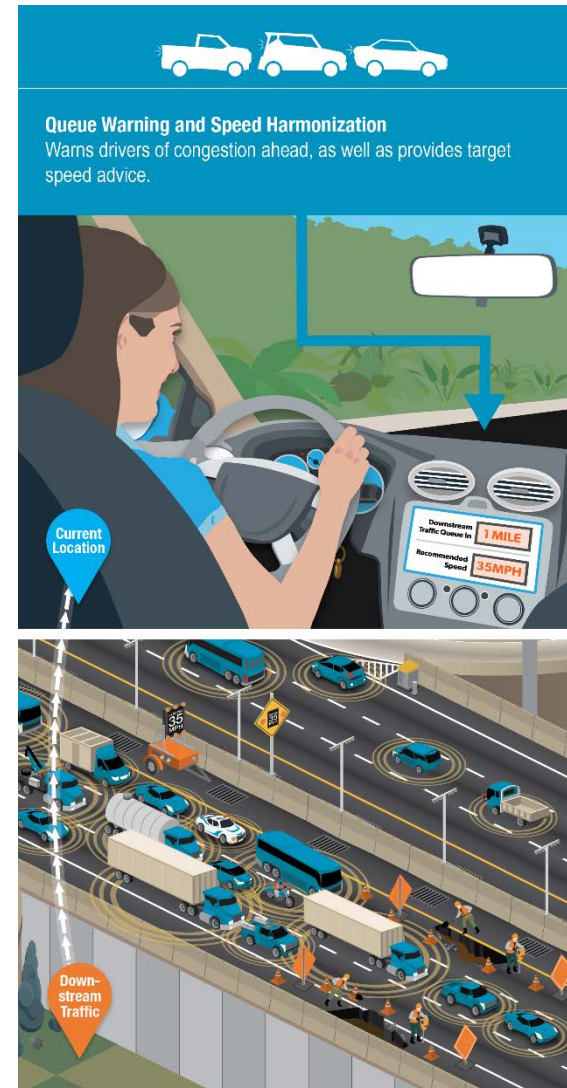
Warns the driver when it is not safe to enter an intersection—for example, when something is blocking the driver's view of opposing or crossing traffic



Connected Vehicles: *Improving Mobility*

Queue Warning and Speed Harmonization:

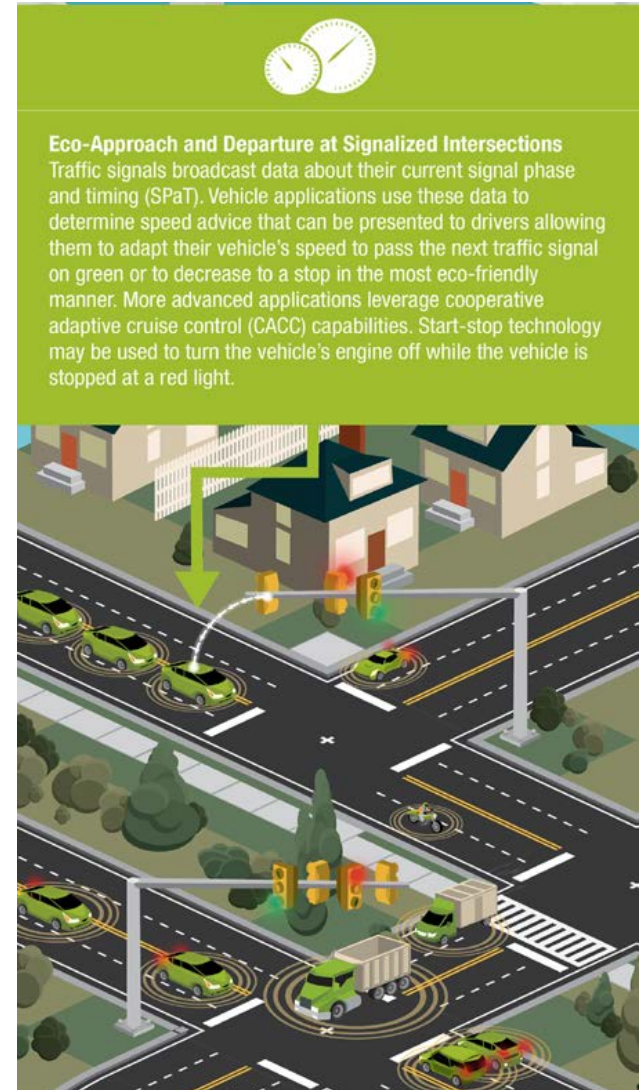
Warns drivers of upcoming congestion and provides speed recommendations



Connected Vehicles: *Protecting the Environment*

Eco Approach and Departure at Signalized Intersections:

Presents information to drivers about traffic signal timing, allowing drivers to adapt their speed to pass the signal on green or decrease speed to a stop in the most eco-friendly way possible.

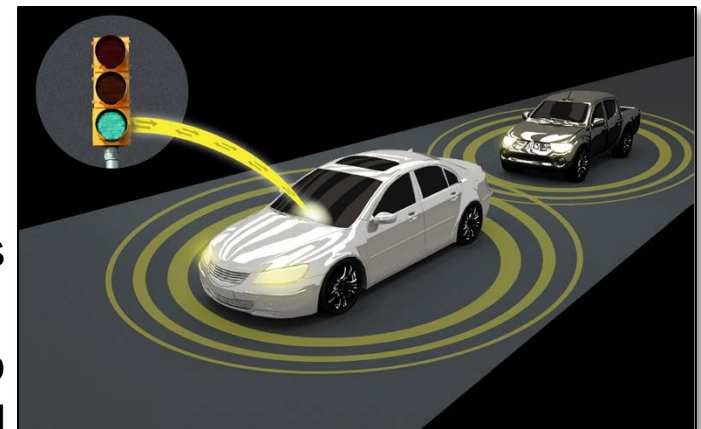
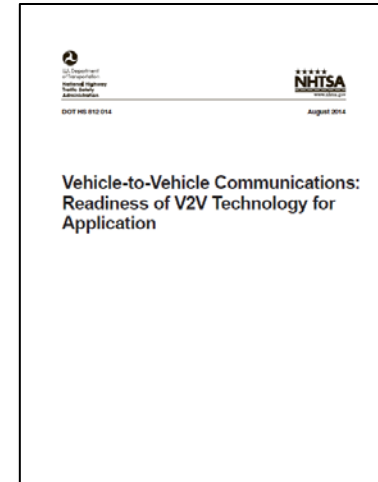


Eco-Approach and Departure at Signalized Intersections
Traffic signals broadcast data about their current signal phase and timing (SPaT). Vehicle applications use these data to determine speed advice that can be presented to drivers allowing them to adapt their vehicle's speed to pass the next traffic signal on green or to decrease to a stop in the most eco-friendly manner. More advanced applications leverage cooperative adaptive cruise control (CACC) capabilities. Start-stop technology may be used to turn the vehicle's engine off while the vehicle is stopped at a red light.



Paving the Way for Connected Vehicles

- In May 2015, Secretary Foxx announced the USDOT would accelerate the deployment of connected vehicles. NHTSA has moved ahead of its timetable for the proposed vehicle to vehicle (V2V) rule to require this communication capability in every vehicle.
- This summer, the Federal Highway Administration (FHWA) will release a vehicle to infrastructure (V2I) guidance document to assist transportation managers and operators interested in adapting their traffic signals and other roadside devices so they are compatible with the new connected vehicles.



IN THE NEWS



IS
THIS
REAL



Successfully Piloting Connected Vehicles

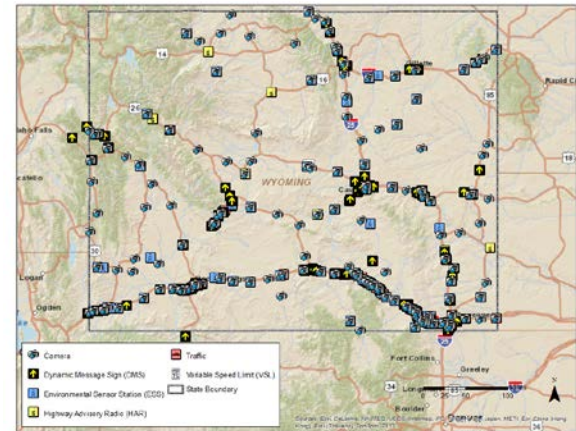
Safety Pilot laid the groundwork for understanding how this technology interacts in a real-world setting and how drivers respond to it

- Data collection exceeded our expectations
- Regular drivers experienced proven technology
- Connectivity was achieved across various types and modes
- Risk reductions were achieved



Paving the Way for Connected Vehicles

- In September 2015, Secretary Foxx announced that New York City, Wyoming, and Tampa, FL were selected for the Connected Vehicle Pilot Deployment Program - to pilot next-generation technology in infrastructure and in vehicles to share and communicate with each other and their surroundings in real time, reducing congestion and greenhouse gas emissions, and cutting the unimpaired vehicle crash rate.



Source: THEA



Source: NYC DOT





Connected Vehicle Pilot Deployment Program

PROGRAM GOALS



PILOT SITES

ICF/Wyoming

New York City

Tampa (THEA)
Tampa Hillsborough Expressway Authority

STAY CONNECTED

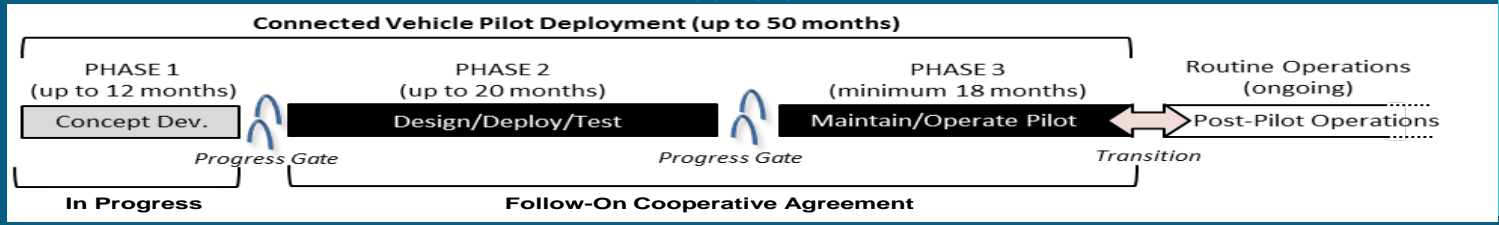
- Participate in Concept Development Phase Webinars for the three Pilot Sites (see website for exact dates and times)

Feb 2016	Mar 2016	Apr 2016	May 2016	Jun 2016	Jul 2016	Aug 2016
◆ ◆	◆		◆ ◆ ◆			◆ ◆ ◆

Concept of Operations Webinars

Performance Measurement Webinars

Comprehensive Deployment Plan Webinars



Connected Vehicle Pilot Deployment Sites



- Reduce the number and severity of adverse weather-related incidents in the I-80 Corridor in order to improve safety and reduce incident-related delays.
- Focused on the needs of commercial vehicle operators in the State of Wyoming.



- Improve safety and mobility of travelers in New York City through connected vehicle technologies.
- Vehicle to vehicle (V2V) technology installed in up to 10,000 vehicles in Midtown Manhattan, and vehicle to infrastructure (V2I) technology installed along high-accident rate arterials in Manhattan and Central Brooklyn.



- Alleviate congestion and improve safety during morning commuting hours.
- Deploy a variety of connected vehicle technologies on and in the vicinity of reversible express lanes and three major arterials in downtown Tampa to solve the transportation challenges.

ICF/Wyoming Pilot Deployment Vision

Traffic Management Center



ICF/WYOMING PILOT DEPLOYMENT OVERVIEW

Objective:

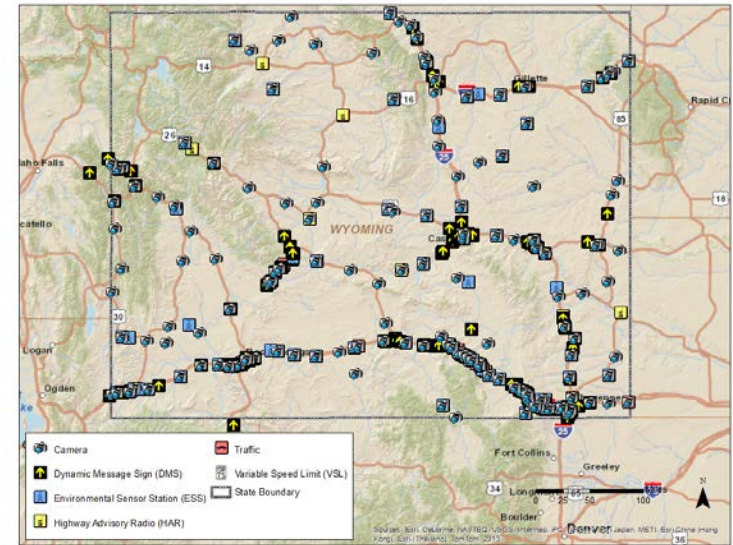
- Reduce the number and severity of adverse weather-related incidents (including secondary incidents) in the I-80 Corridor in order to improve safety and reduce incident-related delays.
 - Focused on the needs of the commercial vehicle operator in the State of Wyoming

Approach:

- Equip fleet vehicles (combination of snow plows, maintenance fleet vehicles, emergency vehicles, and private trucks) that frequently travel the I-80 corridor to transmit basic safety messages (BSMs), collect vehicle and road condition data and provide it remotely to the WYDOT TMCs
- Deploy DSRC roadside equipment (RSE) to supplement existing assets and initiatives
- Road weather data shared with freight carriers who will transmit to their trucks using exiting in-vehicle systems

Deployment Team:

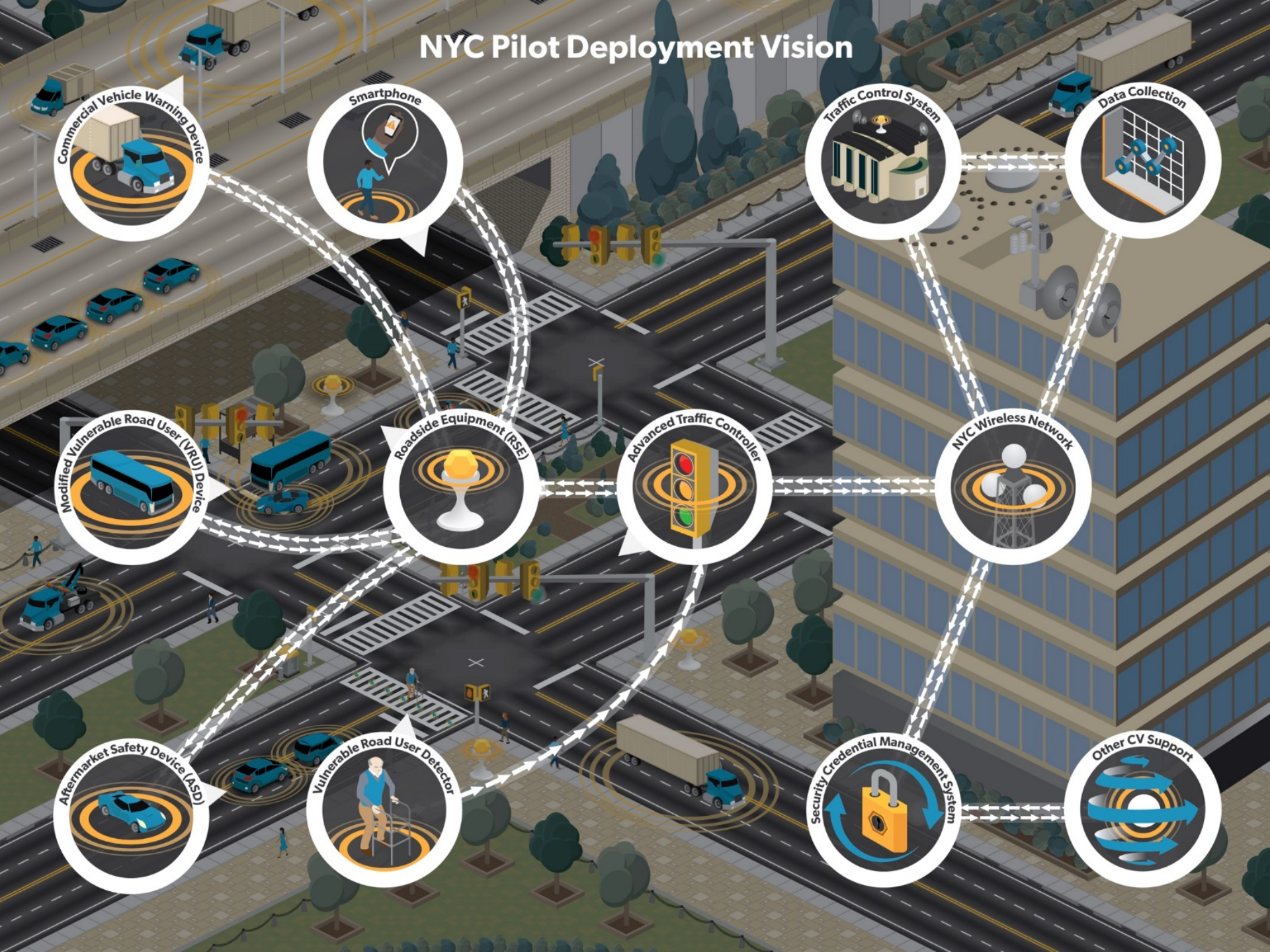
- Prime Consultant: ICF International; Partner State: Wyoming DOT
- Sub Consultants: Trihydro Corporation, National Center for Atmospheric Research, University of Wyoming, Catt Laboratory and McFarland Management



Source: Wyoming DOT



NYC Pilot Deployment Vision



NEW YORK CITY (NYC) PILOT DEPLOYMENT OVERVIEW

Objective:

- Improve safety and mobility of travelers in New York City through connected vehicle technologies
 - Aligned with the NYC's Vision Zero initiative, which seeks to reduce crashes and pedestrian fatalities, and increase safety of travelers in all modes of transportation

Approach:

- Equip up to 10,000 vehicles (taxis, buses, commercial fleet delivery trucks, and City-owned vehicles) that frequently travel in Midtown Manhattan and Central Brooklyn to transmit and receive connected vehicle data
- Install V2I technology at high-accident rate arterials:
 - Upgrade 239 traffic signals along 1st, 2nd, 5th, and 6th Avenues in Manhattan and Flatbush Avenue in Central Brooklyn (emergency evacuation route)
 - Deploy Roadside equipment (RSE) along FDR Drive

Deployment Team:

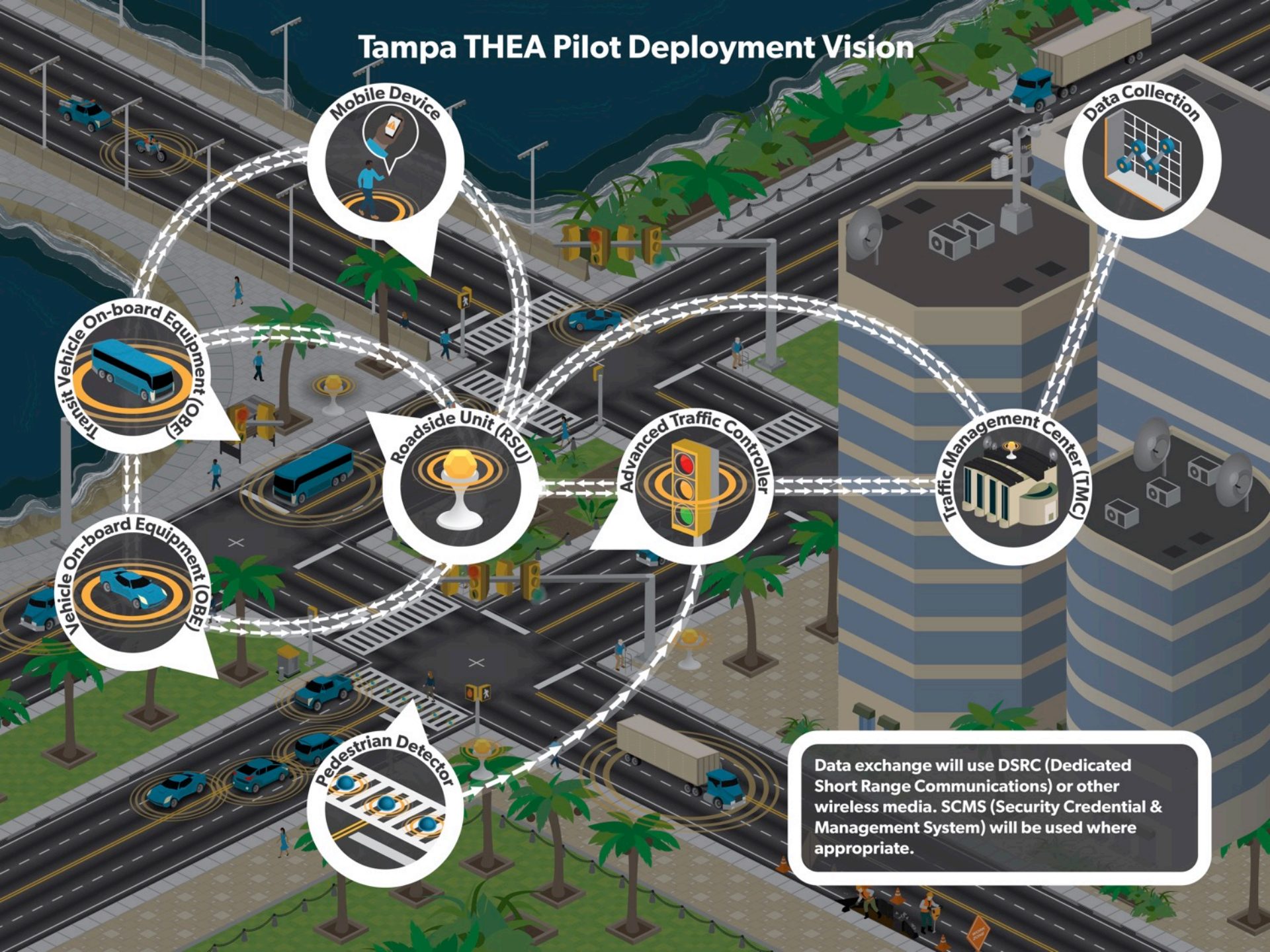
- Prime Consultant: NYC DOT
- Sub Consultants: JHK Engineering, Battelle, Cambridge Systematics, KLD Engineering, Security Innovation and Region 2 University Transportation Research Center



Source: NYC DOT



Tampa THEA Pilot Deployment Vision



Mobile Device

Transit Vehicle On-board Equipment (OBE)

Vehicle On-board Equipment (OBE)

Pedestrian Detector

Roadside Unit (RSU)

Advanced Traffic Controller

Traffic Management Center (TMC)

Data Collection

Data exchange will use DSRC (Dedicated Short Range Communications) or other wireless media. SCMS (Security Credential & Management System) will be used where appropriate.

TAMPA (THEA) PILOT DEPLOYMENT OVERVIEW

Objective:

- The primary objective of this deployment is to alleviate congestion and improve safety during morning commuting hours.
 - Deploy a variety of vehicle-to-vehicle (V2V) and vehicle-to-infrastructure (V2I) safety, mobility, and agency data applications to create reinforcing benefits for motorists, pedestrians, and transit operation.

Approach:

- Deploy a variety of connected vehicle technologies on and in the vicinity of reversible express lanes and three major arterials in downtown Tampa to solve the following transportation challenges:
- Morning peak hour queues, wrong-way entries, pedestrian safety, bus rapid transit (BRT) signal priority optimization, trip time and safety, streetcar trolley conflicts, and enhanced signal coordination and traffic progression.

Deployment Team:

- Prime Consultant: Tampa Hillsborough Expressway Authority (THEA)
- Sub Consultants: HNTB Corporation, Siemens Industry, Inc., Booz Allen Hamilton, Center for Urban Transportation Research at University of South Florida and Global-5 Communications



Source: THEA



THE BIG PICTURE



Smart City

“A city that uses information and communications technology (ICT) to enhance its livability, workability, and sustainability.”

The Smart Cities Council

Source: Microsoft Clip Art (Bobby Mikul)

Advanced Technologies and Smart Cities

Technology convergence will revolutionize transportation, dramatically improving safety and mobility while reducing costs and environmental impacts

Connected Vehicles

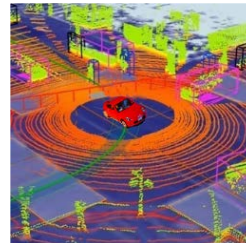
Vehicle Automation

Internet of Things

Machine Learning

Big Data

Mobility on Demand



Connected-Automated Vehicles



Smart Cities

Benefits

- Order of magnitude safety improvements
- Reduced congestion
- Reduced emissions and use of fossil fuels
- Improved access to jobs and services
- Reduced transportation costs for gov't and users
- Improved accessibility and mobility





DOT Smart City Challenge

1,400

local officials, companies, academics and non-profits joined our webinars

800

people participated in our Smart City Forum

300

companies have expressed interest in partnering

78

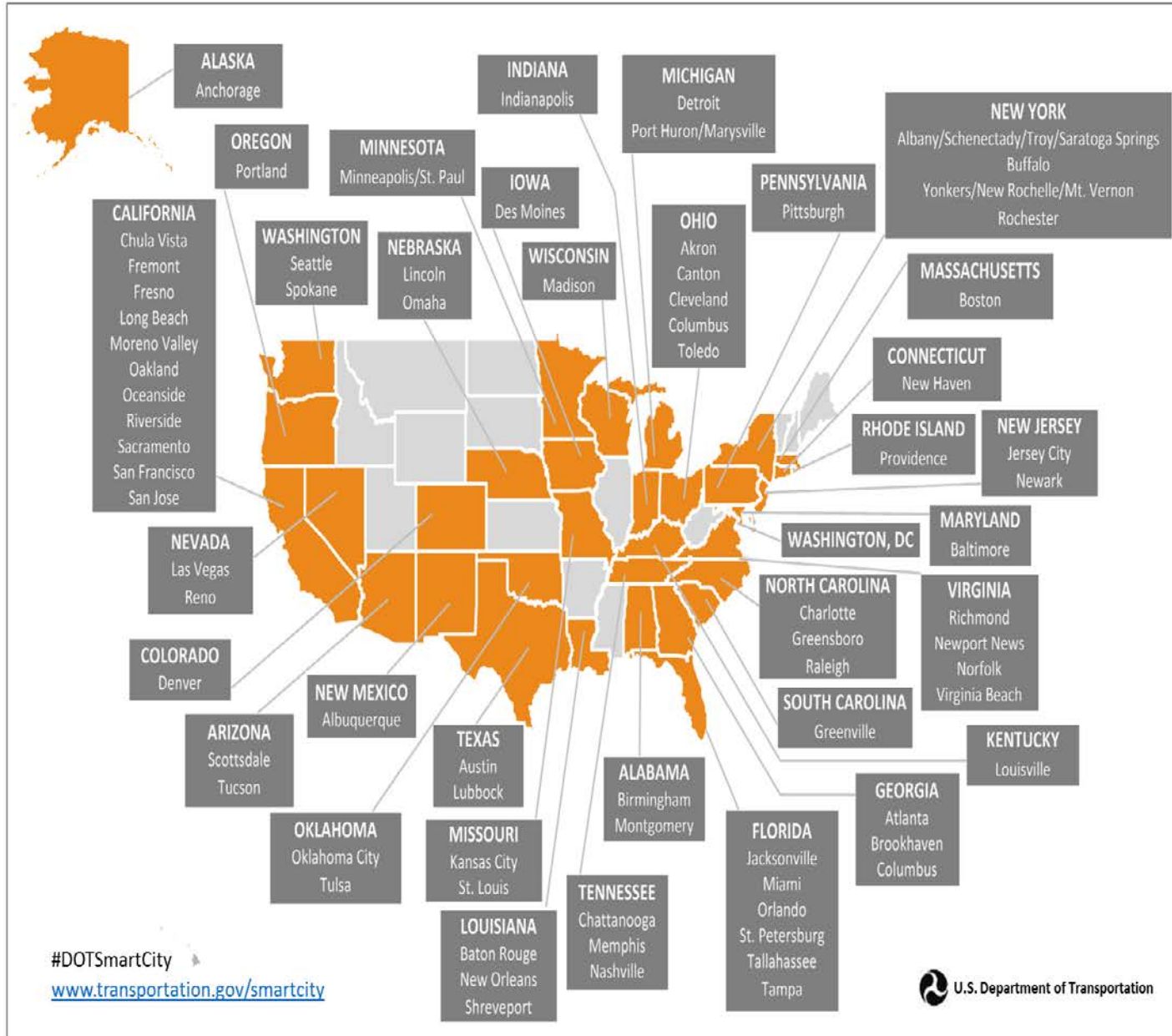
applications received for the Smart City Challenge

5

Smart City Challenge Finalists to be announced in March at SXSW

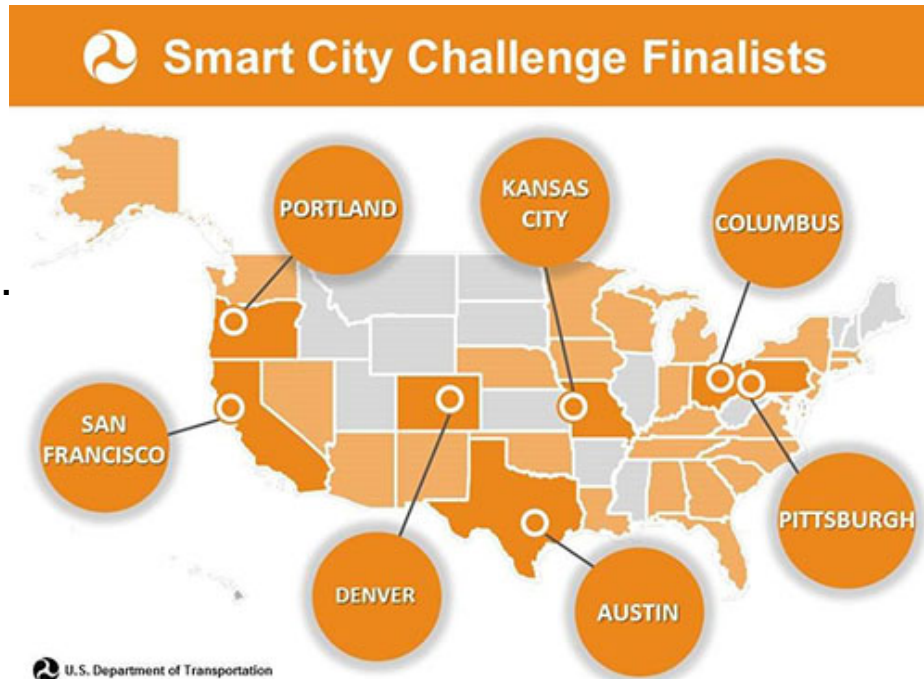
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Smart City Challenge Winner announced in June



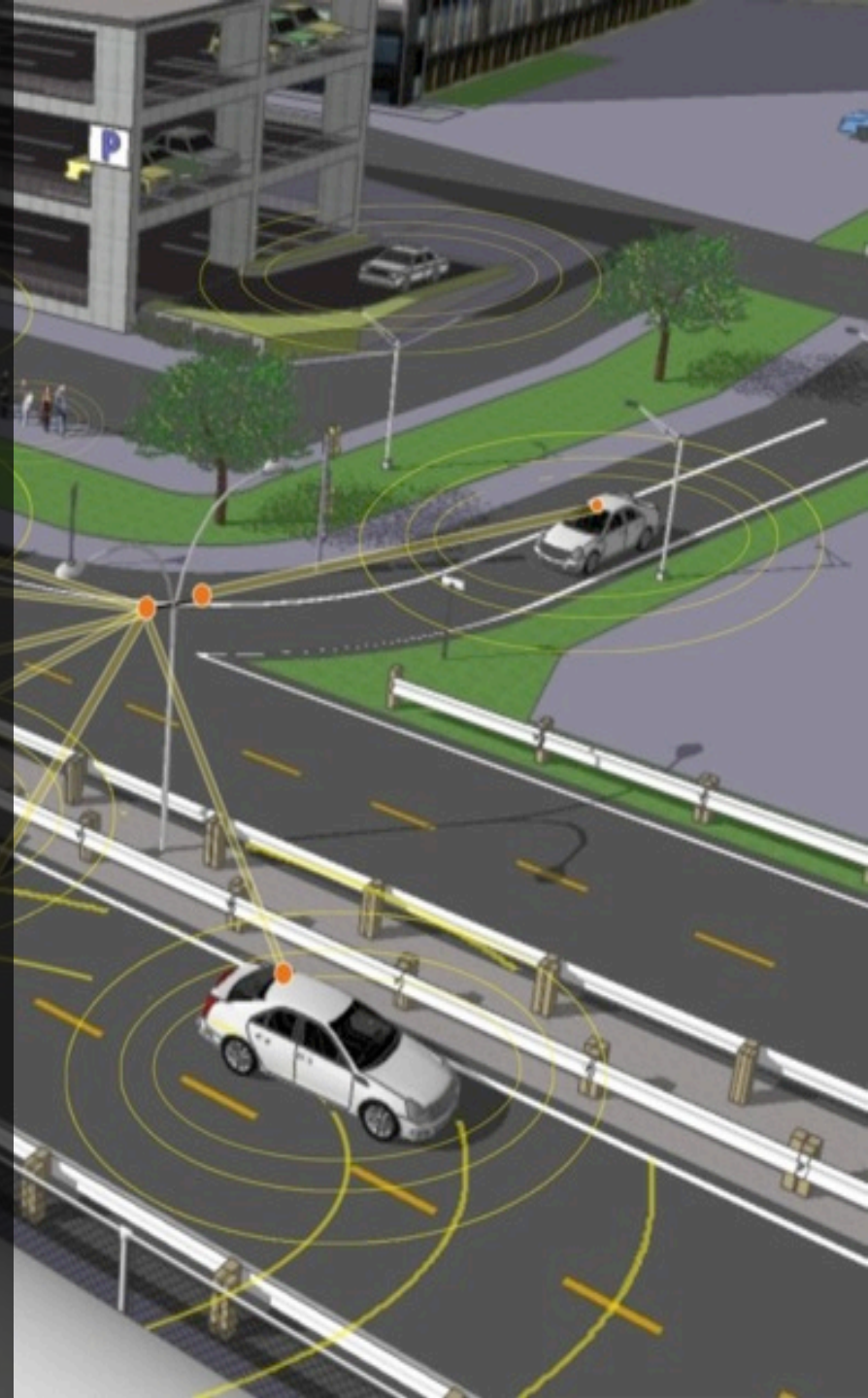
Paving the Way for Connected Vehicles

- In March, U.S. Transportation Secretary Anthony Foxx announced seven finalists for the USDOT Smart City Challenge. The finalists are: Austin, TX; Columbus, OH; Denver, CO; Kansas City, MO; Pittsburgh, PA; Portland, OR; and San Francisco, CA.
- The USDOT will pledge up to \$40 million (funding subject to future appropriations) to one city to help it define what it means to be a “Smart City” and become the country’s first city to fully integrate innovative technologies – self-driving cars, connected vehicles, and smart sensors – into their transportation network.



Smart Cities and Connected Vehicles

Smart Cities incorporate and expand connected transportation to ensure that connected transportation data, technologies and applications – as well as connected travelers – are fully integrated with other systems across a city, and fulfill their potential to improve safety, mobility and environmental outcomes in a complexly interdependent and multimodal world that supports a more sustainable relationship between transport and the city.



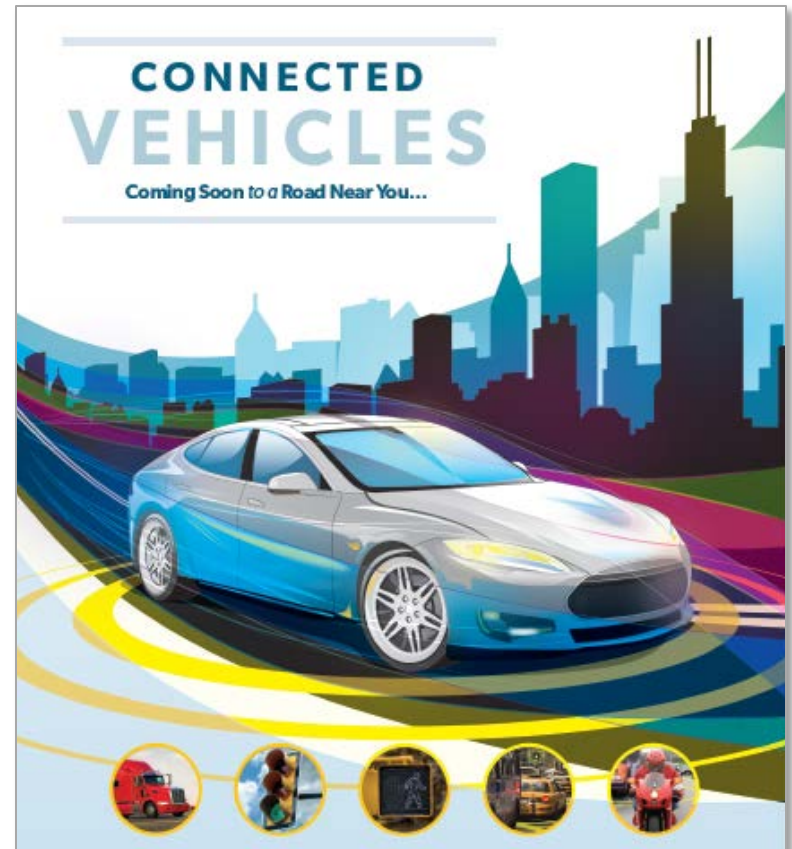
RECAP

THE
TIME
IS NOW



The Time Is Now...

- First new cars with connected vehicle technology available for sale/lease in 2017
- National deployment of connected vehicles is likely by 2020
- Aftermarket devices will bring older vehicles into the connected environment



Why Should Leasers Be Interested?

Consumer Trends:

- Focus on new technology
- Demand for more robust real-time travel data
- Interest in greener transportation options

Connected Vehicles:

- ✓ Bring advanced technology and connectivity into the driver experience
- ✓ Millions of connected vehicles will create new robust data stream that will provide new applications for drivers
- ✓ Connected vehicle data will give drivers the information they need to make greener travel choices



How Connected Vehicles Can Help Your Business

- ***Reduce collisions*** in your parking lot
- Make your ***vehicles more appealing*** to customers
- If your local community is retrofitting traffic signals, stop signs, work zones, and other infrastructure, your vehicle fleet may have ***even more benefits***



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**PREVIEW THE
FUTURE OF
TRANSPORTATION**

CONNECTED VEHICLES




Watch as this animated video shows how connected vehicle technology works and the many benefits it can provide.

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**Connected
Vehicle TEST BED**

**CV Pilots
Deployment
Project**

**Planning
for the
Future of ITS**



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Current Research

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- + Mobility
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- + Road Weather
- + Policy
- + Connected Vehicle Technology
- + Intermodal Research
- + Exploratory
- + ITS Cross-Cutting Support
- + Success Stories

[All Research >>](#)

Spotlight

June 11, 2015

The U.S. Department of Transportation (USDOT) Releases a New Fact Sheet on Planning for the Future of Connected Vehicles and Intelligent Transportation Systems (ITS) ... [Read more](#)

June 10, 2015

NTSB Calls for Immediate Action on Collision Avoidance Systems for Vehicles; Cites Slow Progress as Major Safety Issue ... [Read more](#)

June 4, 2015

USDOT Releases Vehicle to Pedestrian Technical Scan Summary. ... [Read more](#)

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