U.S. Department of Transportation
Office of the Assistant Secretary for Research and Technology

Connected Vehicle Deployments & Device Certification

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U.S. Department of Transportation

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

How Connected Vehicles Work

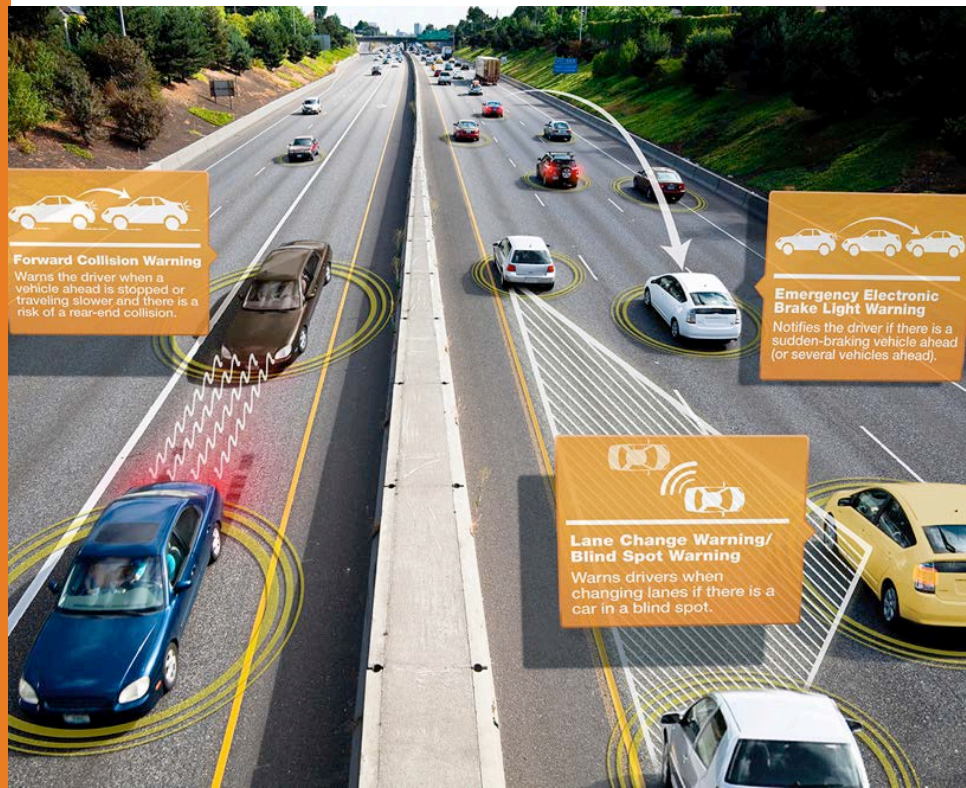
1. A wireless device in a car sends basic safety messages 10 times per second
2. Other nearby cars and roadside equipment receive the messages
3. Drivers get a warning of a potential crash

*Connected vehicles have the potential to reduce non-impaired crash scenarios by **80%****

*Source: NHTSA

Connected Vehicles
What can they do?

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



U.S. Department of Transportation

Connected Vehicle Pilot Deployment Sites

ICF/Wyoming

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

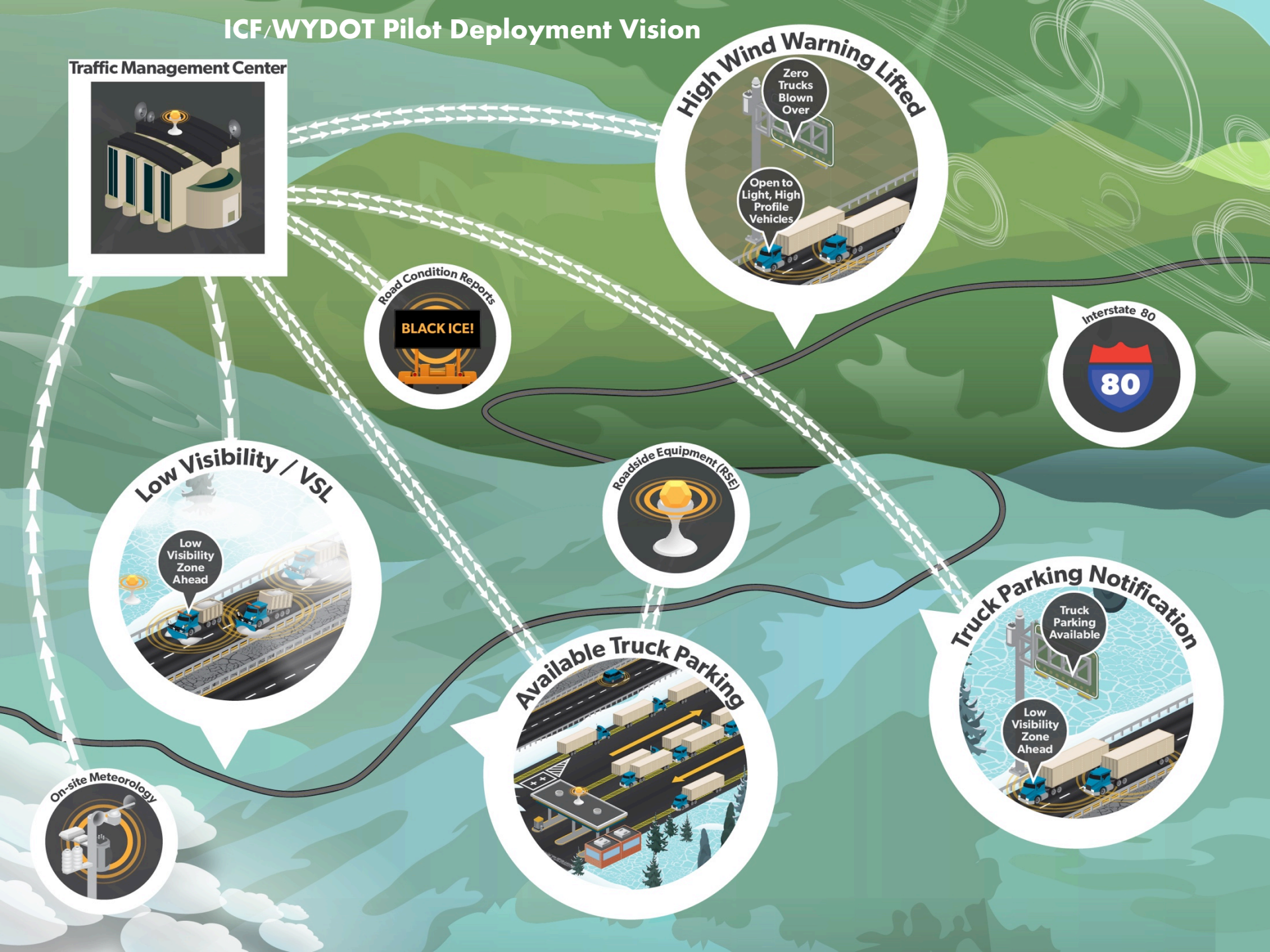
New York City

- 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.

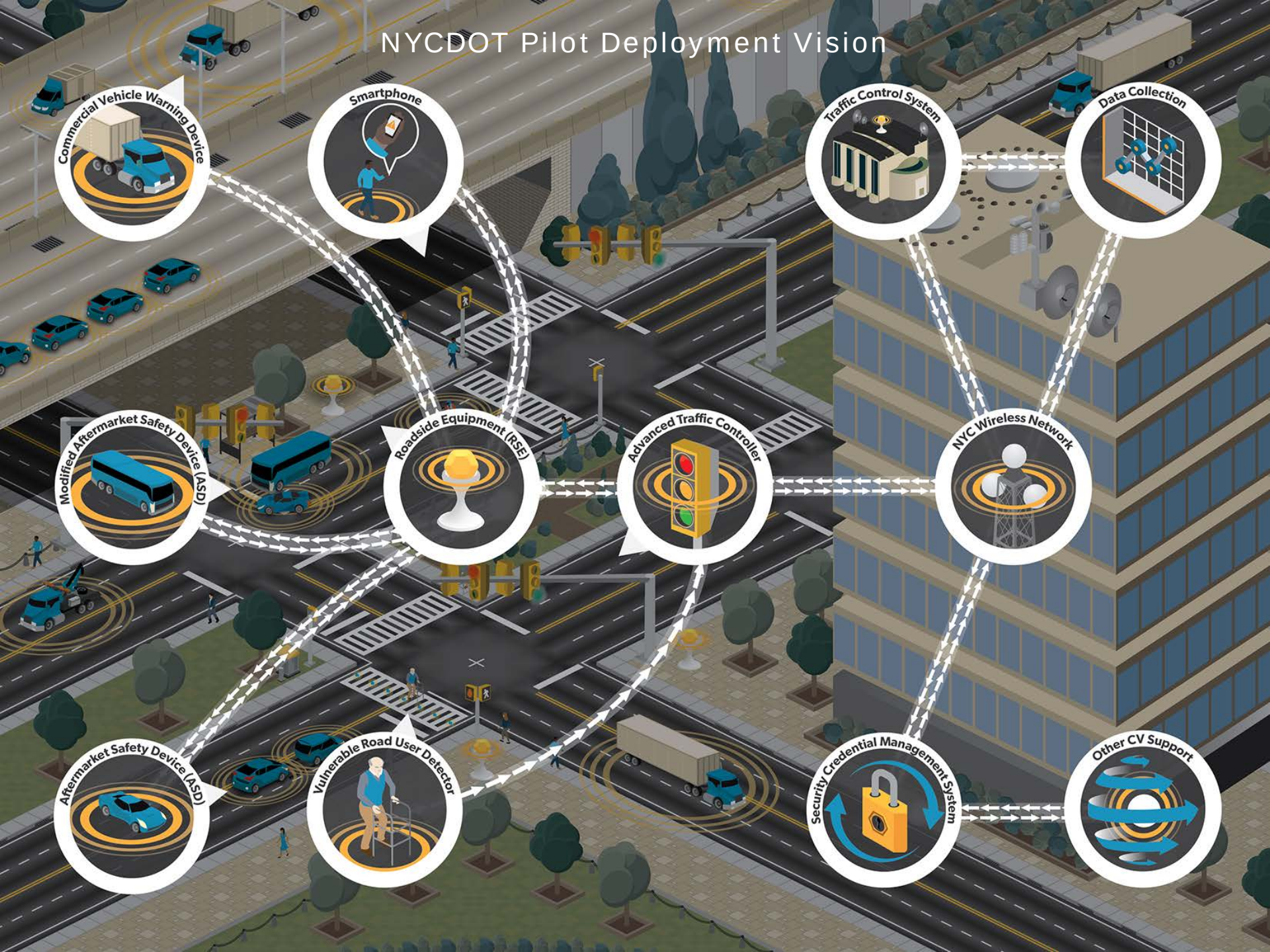
Tampa (THEA)

- 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.

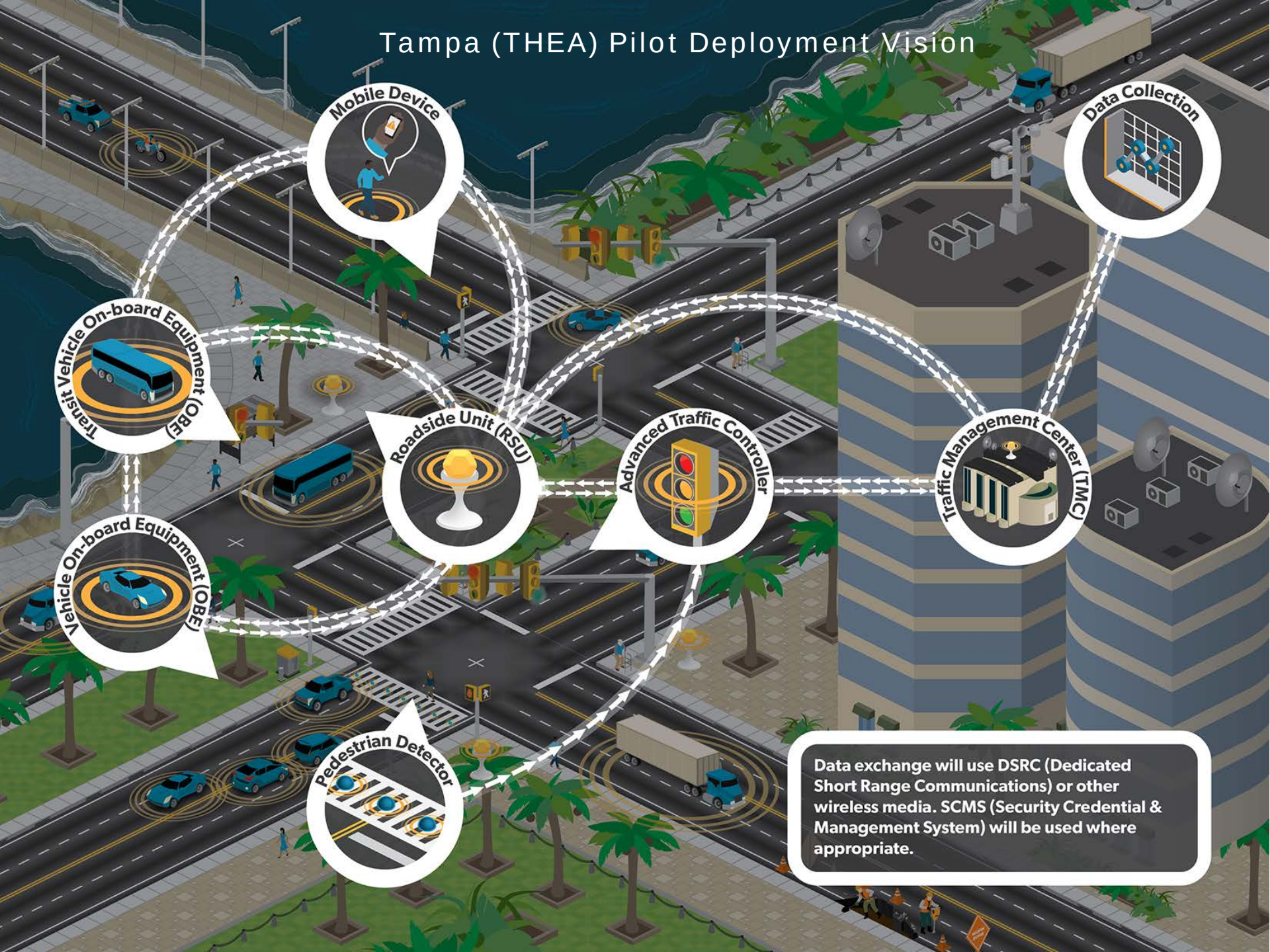
ICF/WYDOT Pilot Deployment Vision



NYCDOT Pilot Deployment Vision



Tampa (THEA) Pilot Deployment Vision



Overview of Pilot Deployment Proposed CV Applications

Category	WYDOT – CV Application
V2V Safety	Forward Collision Warning (FCW)
V2I/I2V Safety	**I2V Situational Awareness***
	Work Zone Warnings (WZW)*
	Spot Weather Impact Warning (SWIW)*
V2I and V2V Safety	**Distress Notification (DN)**

Category	Tampa (THEA) – CV Application
V2I Safety	Curve Speed Warning (CSW)
	Pedestrian in Signalized Crosswalk Warning (PED-X)
	Red Light Violation Warning (RLVW)
V2V Safety	Emergency Electronic Brake Lights (EEBL)
	Forward Collision Warning (FCW)
	Intersection Movement Assist (IMA)
	Vehicle Turning Right in Front of a Transit Vehicle (VTRFTV)
Mobility	Mobile Accessible Pedestrian Signal System (PED-SIG)
	Intelligent Traffic Signal System (I-SIG)
	Transit Signal Priority (TSP)
Agency Data	Probe-enabled Data Monitoring (PeDM)

Category	NYCDOT – CV Application
V2I/I2V Safety	Speed Compliance
	Curve Speed Compliance
	Speed Compliance/Work Zone
	Red Light Violation Warning
	Oversize Vehicle Compliance
	Emergency Communications and Evacuation Information
V2V Safety	Forward Crash Warning (FCW)
	Emergency Electronics Brake Lights (EEBL)
	Blind Spot Warning (BSW)
	Lane Change Warning/Assist (LCA)
	Intersection Movement Assist (IMA)
	Vehicle Turning Right in Front of Bus Warning
V2I/I2V Pedestrian	Pedestrian in Signalized Crosswalk
	Mobile Accessible Pedestrian Signal System (PED-SIG)
Mobility	Intelligent Traffic Signal System (I-SIGCVDATA)

- ** The applications have mobility/ efficiency as a secondary benefit.*

Overview of Pilot Deployment Proposed Devices Deployed

WYDOT – Devices	Estimated Number
Roadside Unit (RSU)	75
WYDOT Fleet Subsystem On-Board Unit (OBU)	100
Integrated Commercial Truck Subsystem OBU	150
Retrofit Vehicle Subsystem OBU	20-30
Basic Vehicle Subsystem OBU	100-150
Total Equipped Vehicles	**400**

Tampa (THEA) – Devices	Estimated Number
Roadside Unit (RSU) at Intersection	40
Vehicle Equipped with On-Board Unit (OBU)	1,500
Pedestrian Equipped with App in Smartphone	500
HART Transit Bus Equipped with OBU	10
TECO Line Street Car Equipped with OBU	10
Total Equipped Vehicles	**1,520**

NYCDOT – Devices	Estimated Number
Roadside Unit (RSU) at Manhattan and Brooklyn Intersections and FDR Drive	353
Taxi Equipped with Aftermarket Safety Device (ASD)*	5,850
MTA Fleet Equipped with ASD*	1,250
UPS Truck Equipped with ASD*	400
NYCDOT Fleet Equipped with ASD*	250
DSNY Fleet Equipped with ASD*	250
Vulnerable Road User (Pedestrians/Bicyclists) Device	100
PED Detection System	10 + 1 spare
Total Equipped Vehicles	**8,000**

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.

The Smart City Challenge

- Encourage cities to put forward their best and most creative ideas for innovatively addressing the challenges they are facing.
- Demonstrate how advanced data and intelligent transportation systems (ITS) technologies and applications can be used to reduce congestion, keep travelers safe, protect the environment, respond to climate change, connect underserved communities, and support economic vitality.

The Smart City Challenge

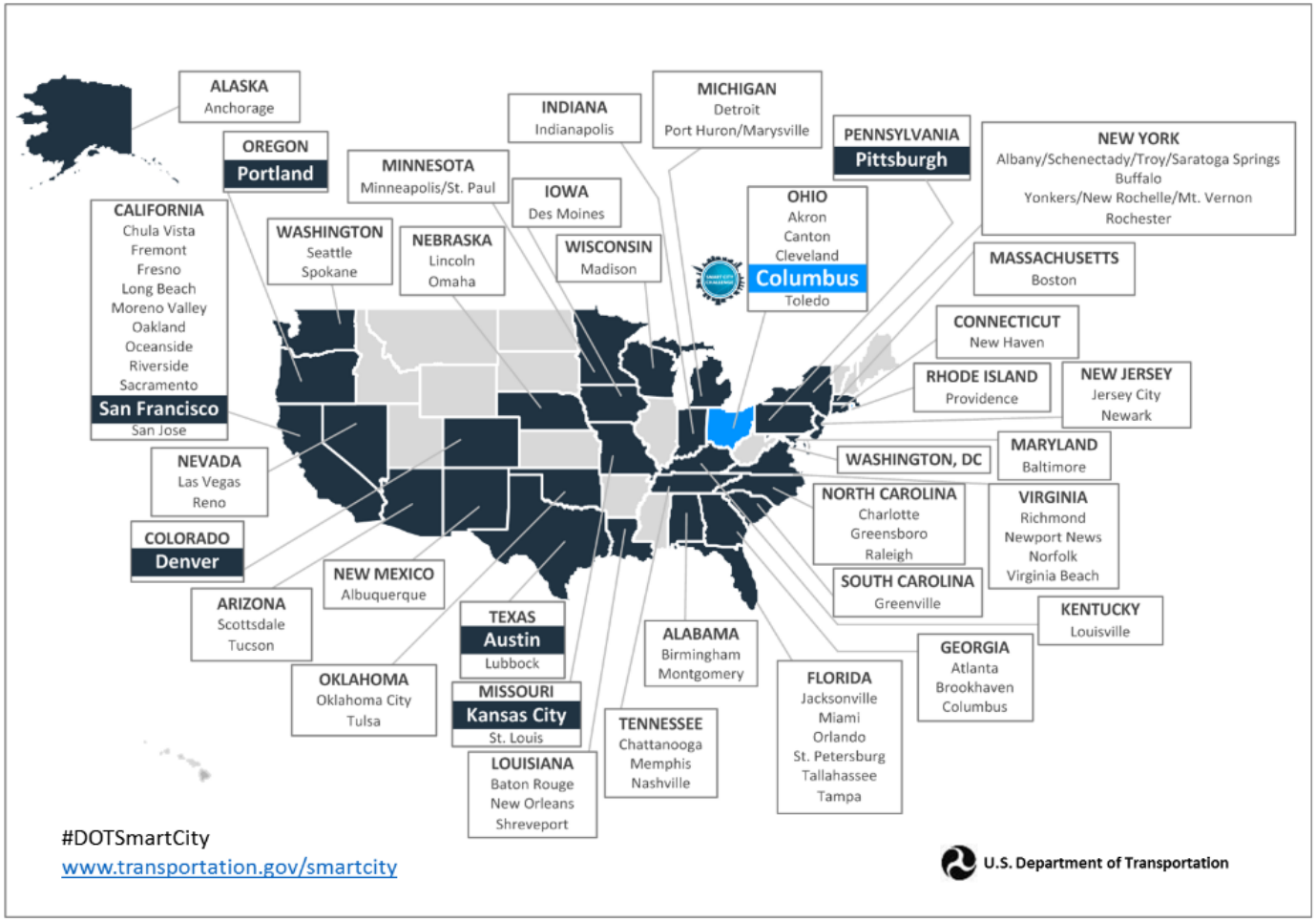
$500 million in partnerships identified in by the seven Smart City Challenge Finalists

150+ partnerships identified by the Smart City Challenge Finalist

78 applications received for the Smart City Challenge

7 Smart City Challenge Finalists announced in March 2016

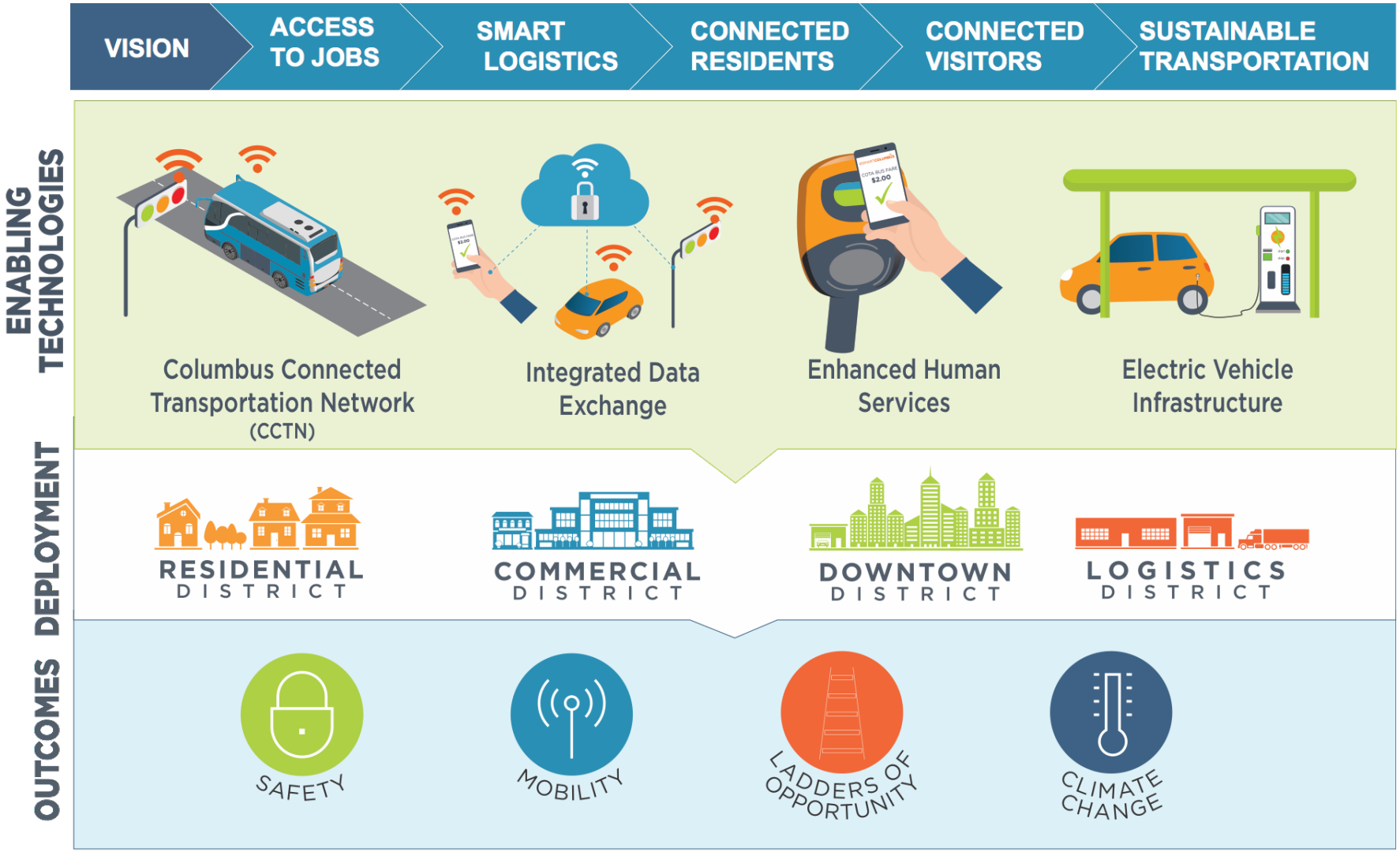
1 Smart City Challenge Winner



Source: The City of Columbus

https://www.youtube.com/watch?v=bFobyi6eRGI

SMARTCOLUMBUS



Source: The City of Columbus

CCTN Components

200 Dedicated Short Range Communications (DSRC) Roadside Units

3,000 Connected Vehicles

200 Smart Street Lights and Free Public Wi-Fi

350 Mobileye Shield + and Enhanced Transit Safety Retrofit

12 Bus Stop Pedestrian Warning Systems

100 Traffic Signal Controller Upgrades

10 Multimedia Kiosks

10 Parking Detection Systems

50,000 Customized Radio Frequency Identification (RFID) Windshield Stickers

10 Point of Service RFID Readers

Advanced Transportation and Congestion Management Technologies Deployment Program (ATCMTD)

- Funds cutting-edge transportation technologies that help reduce congestion and improve the safety of our transportation system
- Up to $60M in funding available annually between 2016 and 2020.

Grantees (FY2016)	Federal Funding
City and County of Denver, CO	$6.0 M
Los Angeles County Metropolitan Transportation Authority, CA	$3.0 M
City of Los Angeles, CA	$3.0 M
City of Marysville, OH	$6.0 M
Niagara Frontier Transportation Authority, NY	$7.8 M
City of Pittsburgh, PA	$10.9 M
City and County of San Francisco, CA	$11.0 M
Texas Department of Transportation (Houston, TX)	$8.9 M
Total	**$56.6 M**

https://www.transportation.gov/sites/dot.gov/files/docs/ATCMTD_One_Pager.pdf

Mobility on Demand (MOD) Sandbox

- Helps communities nationwide incorporate the latest technology into their public transit services, with the goal of making them more effective, efficient, and equitable.
- $8 million awarded to 11 projects that will use innovative public-private partnerships to demonstrate and evaluate on-demand concepts in transit.

o Regional Transportation Authority o (Pima County, AZ)	o Los Angeles County Metropolitan Transportation Authority
o Valley Metro Rail (Phoenix, AZ)	o Tri-County Metropolitan Transportation District of Oregon
o City of Palo Alto, CA	o Dallas Area Rapid Transit
o Chicago Transit Authority	o Vermont Agency of Transportation
o San Francisco Bay Area Rapid Transit	o Pierce Transit
o Pinellas Suncoast Transit Authority (Pinellas County, FL)	

https://www.transportation.gov/sites/dot.gov/files/docs/FactSheet_MOD_20161013.pdf

Locations Using 5.9GHz DSRC for Connected Vehicle Deployment

* Planned deployments in 2017

Source: Volpe – The National Transportation Systems Center (USDOT)

Number of DSRC-Enabled Vehicles: 32,813

Number of DSRC-Enabled Devices (V2V and V2I): 1,864

Role of Certification

Role of Technical Support Services

Role of Security Credential Management System

For More Information

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