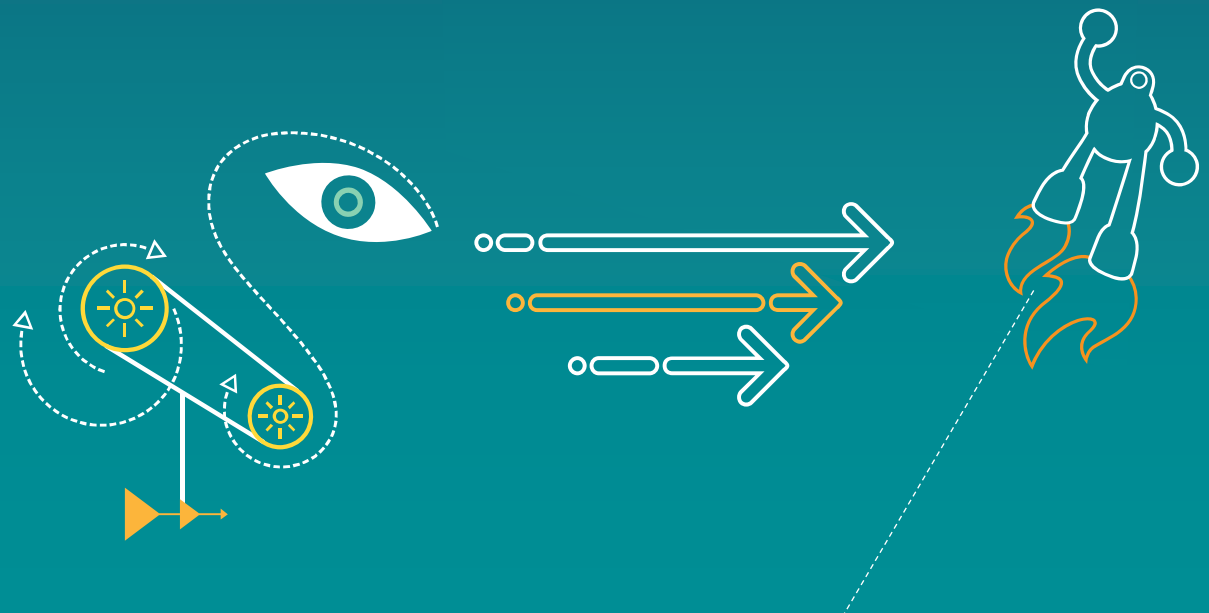
American Honda Motor Co.
Audi of America and INRIX
Qualcomm Technologies
NHTSA

Smart America Challenge Advanced Vehicular Communications

QUALCOMM®



QUALCOMM®

Born Mobile™

27+

years of driving the evolution of wireless

#1

in wireless semiconductors

15B+

cumulative ASIC shipments

Changing Transportation

~60% New cars

shipped in 2017 will be connected through mobile technology.

By 2018, **one in five** cars on the road will be **"self- aware..."**

Source: ABI, 2013, Gartner, Jan. '14

Technologies developed in consumer markets are becoming part of the ‘Connected Car’ ecosystem

News/ Entertainment

Text

Voice

Internet access

Email/Calendar

Apps

Video

Maps

Shopping

Movies

Photography

Social networking

Enabling the connected car

From telematics to enabled cloud services

Head unit connectivity

Vehicle diagnostics

Vehicle to vehicle communication (DSRC)

Enhanced security features

Wireless charging

Wi-Fi hotspot

Navigation services

Safety

Security

Object detection

Bringing ‘Vehicle-to-Cloud’ connectivity

Connecting vehicles to the cloud infrastructure using embedded 4G-LTE

Audi, INRIX and Qualcomm collaborate on V2C applications:

Photo © Jim Pond

ROAD FRUSTRATION INDEX

http://senseable.mit.edu/rfi/

Traffic Congestion is a Critical and Growing Unmet Issue…

Societal Impact to U.S. Annually

Source: Texas Transportation Institute 2012 Urban Mobility Report

[1] Represents wasted fuel and productivity as a result of traffic congestion.

INRIX

HOW DO WE GET…

From This…

To This?

Thank you

DSRC for Vehicle-to-Vehicle

An enabling technology to improve vehicle safety

"V2V crash avoidance technology has game-changing potential to significantly reduce the number of crashes, injuries and deaths on our nation's roads."

Anthony Foxx
US Transportation Secretary

360˚ NLOS (No line of sight) awareness

Vehicles and drivers can better detect and react to threats

Increased safety

Vehicles exchange information about speed and position (10x per second)

Qualcomm enablement

Latest Wi-Fi solutions capable of supporting DSRC features

Partnering with Honda

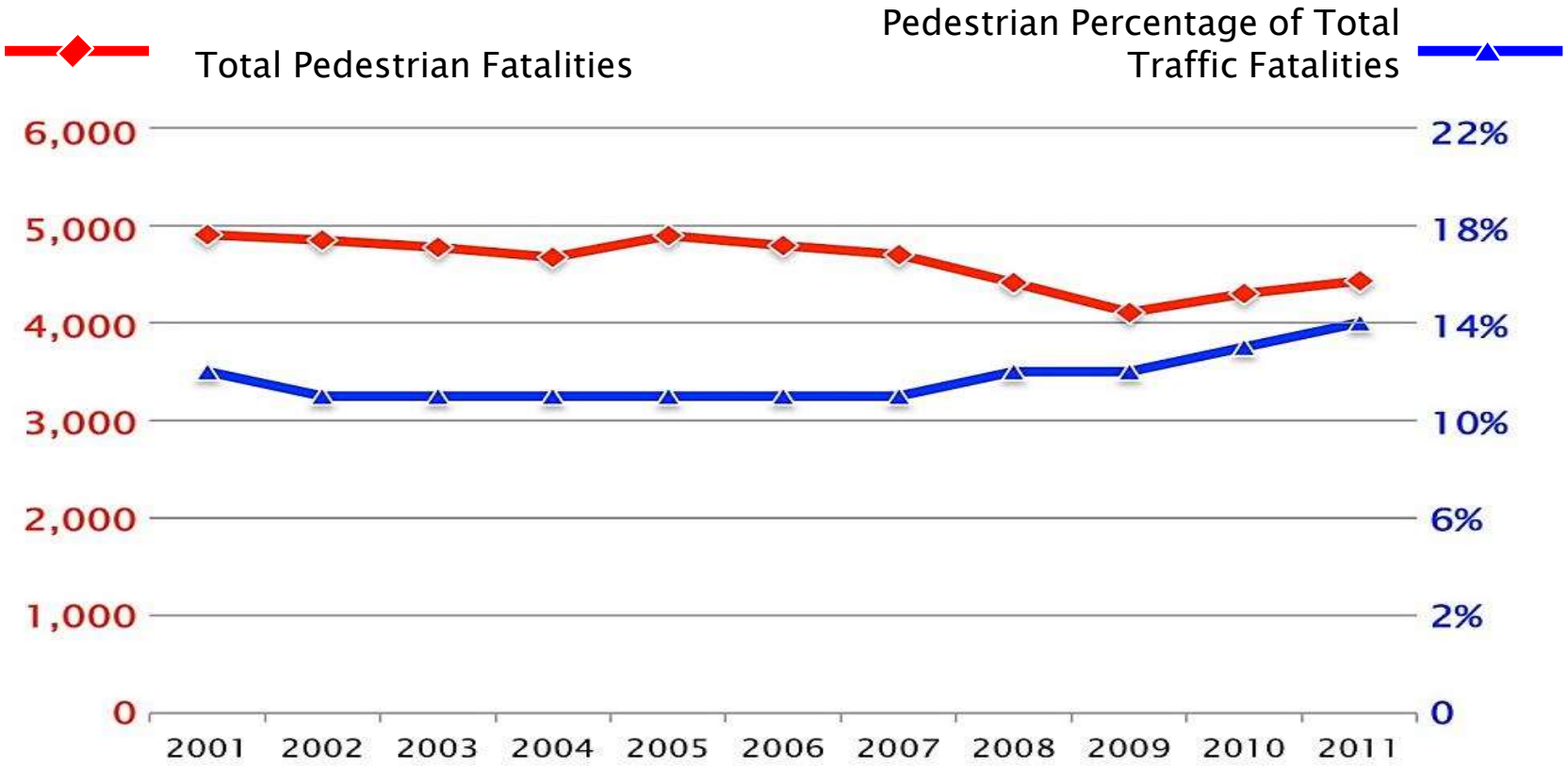
Extending the scope of V2V


Connecting everything..
Emergency alert to infrastructure
Smart traffic lights
3G/4G cellular
Vehicle to cloud communication
Vehicle to bicyclist
Vehicle to pedestrian
Vehicle to vehicle communication
Wireless Vehicle Charging
The car seamlessly connects to the cloud and environment

‘Smart Walking’ – keeping cars and pedestrians aware

HONDA
The Power of Dreams

Overall U.S. traffic fatalities are consistently declining, but pedestrian fatalities are rising



1 pedestrian fatality every 2 hours

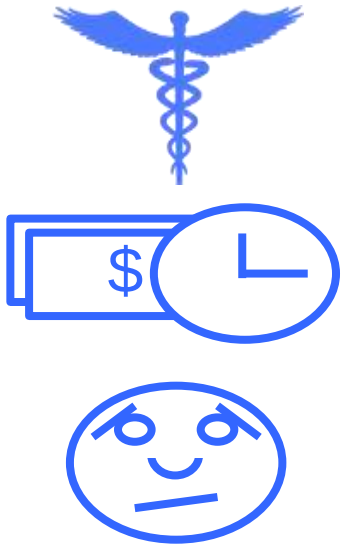
1 pedestrian injury every 8 minutes

Pedestrians are 1.5X more likely to be killed than vehicle occupants on each trip

Data source: NHTSA

HONDA
The Power of Dreams

Beyond loss of life, collisions involving pedestrians cost an estimated $20 BILLION annually, from a comprehensive analysis including:



- **Medical Costs**
- **Household & Wage Work Losses**
- **Value of Pain & Loss of Quality of Life**

Data source: AAAM

Vehicle to pedestrian (V2P) safety

Visual and audible warnings separately alert driver and pedestrian of potential risk.

V2P applications uniquely address difficult safety challenges:

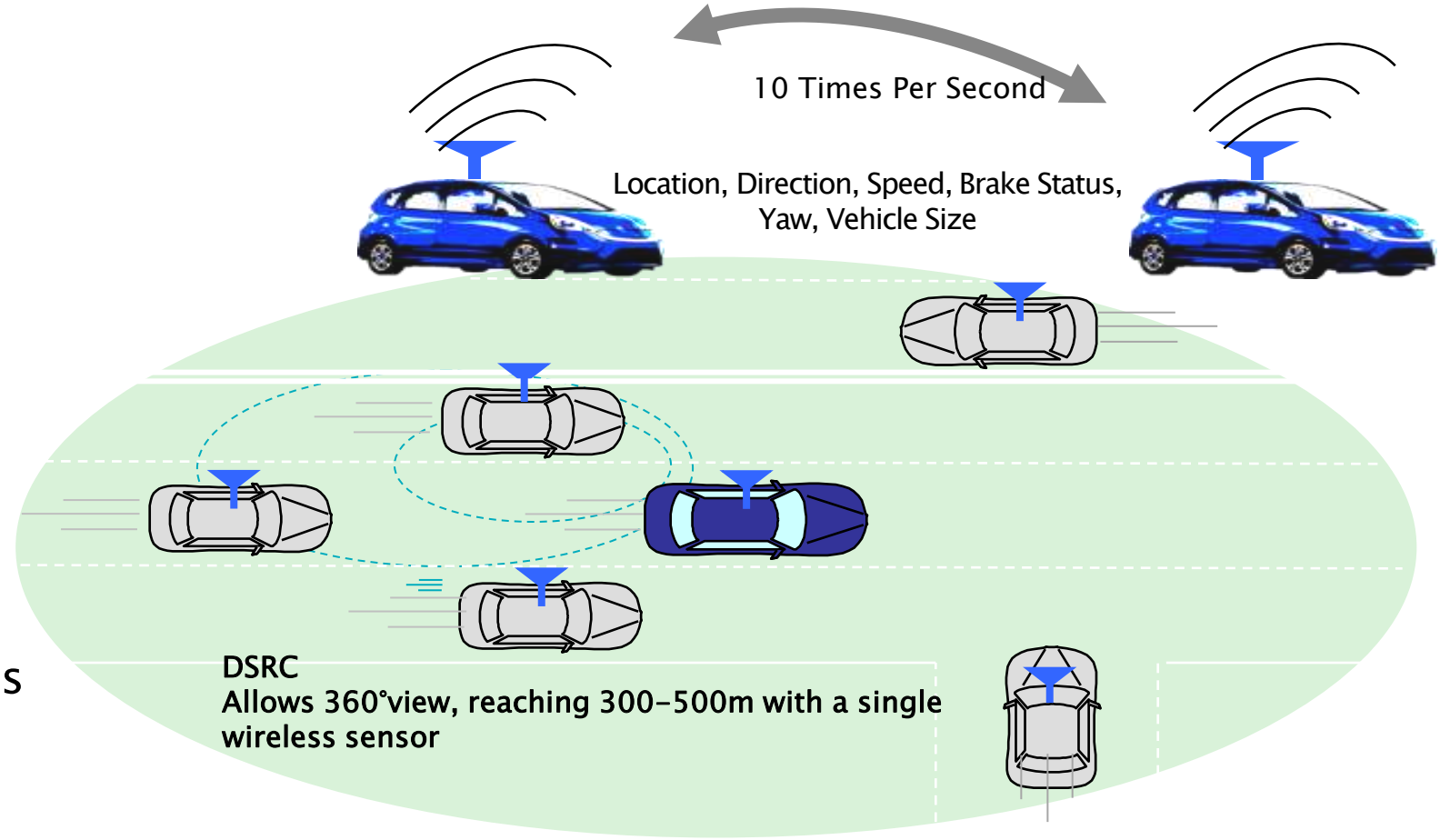
Backing up, obstructed views, low light roadways

V2P technology can also bring safety benefits to motorcyclists, bicyclists and people with disabilities

HONDA
The Power of Dreams

Dedicated Short-Range Communications (DSRC) are wireless signals typically applied to automotive use for vehicle-to-vehicle (V2V) safety applications

- Vehicles continuously exchange messages using 5.9 GHz radios
- Enhances existing safety system performance
- May have a role in up to **80%** of non-impairment involved crashes



HONDA
The Power of Dreams

V2P technology can also bring safety benefits to motorcyclists, bicyclists and people with disabilities

Bicyclist

Motorcyclist

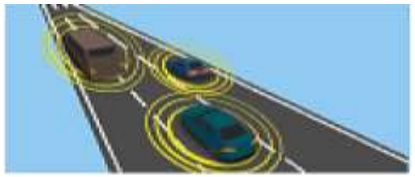
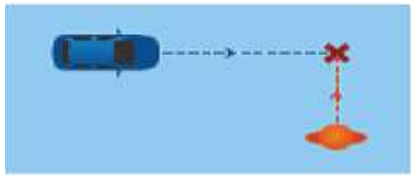
Rider's smartphones can signal the location of their bicycles and motorcycles to surrounding vehicles

Disabled population

Wheelchair users can leverage DSRC enabled smartphones to interact with traffic lights to more safely cross the street

HONDA
The Power of Dreams

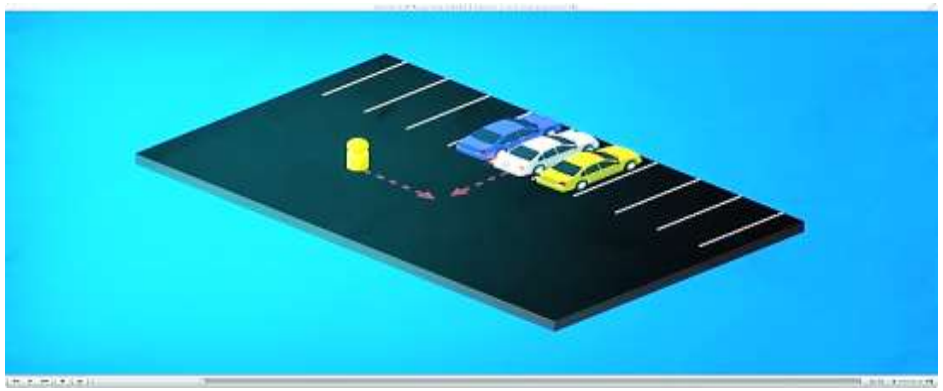
Both drivers and pedestrians can receive warnings when in near-collision situations

	Vehicle DSRC System	Smartphone (Pedestrian) DSRC System
DSRC & GPS-equipped vehicle		 DSRC requires no additional hardware in the smartphone
Vehicle periodically sends Basic Safety Messages		 Smartphone sends location, direction & other information
Vehicle assesses/calculates potential collisions and threat levels		 Smartphone also assesses/calculates potential threat levels
Visual and audible warnings are provided to the driver		 Situational awareness gates DSRC operation for power efficiency

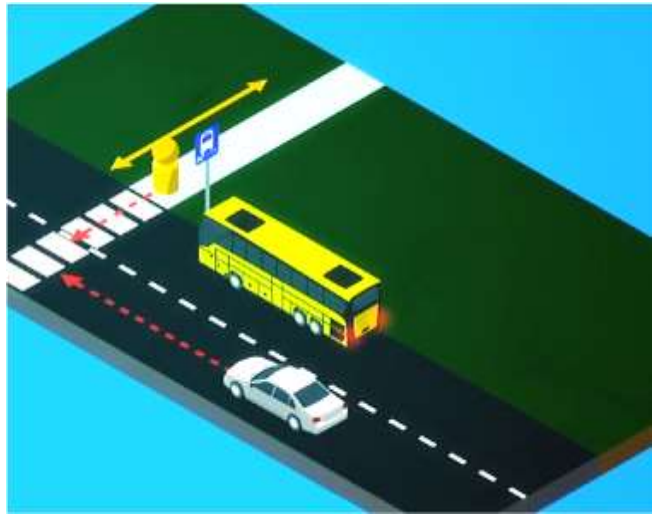
HONDA
The Power of Dreams

Drivers and pedestrians are issued warnings to raise their awareness of risk. V2P applications uniquely address difficult safety challenges.

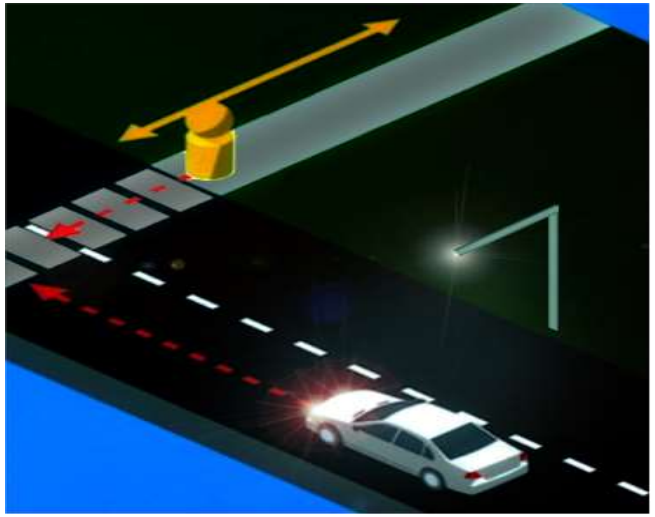
Backing-up



Obstructed Crossings



Night and Low-light Situations



HONDA
The Power of Dreams

Government and industry cooperation are key to assuring privacy protection, system security and maintenance and address new infrastructure challenges

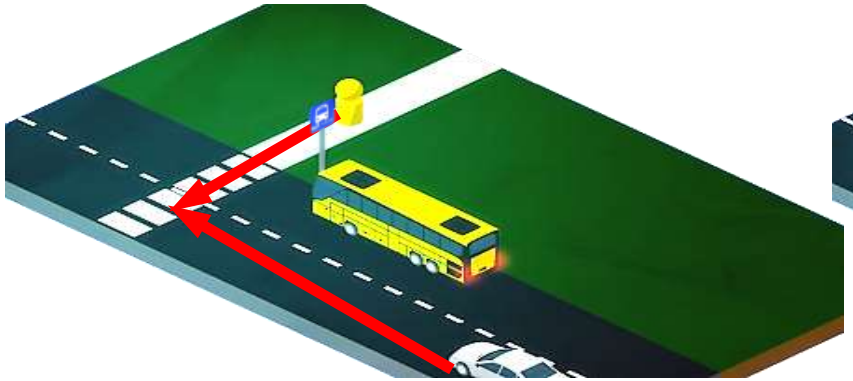
This V2P concept demonstrates support for:

- Building on U.S. Department of Transportation momentum toward regulating V2V
- V2P as a critical, timely extension of existing research
- The need for continued government support to avoid harmful interference to DSRC 5.9 GHz spectrum currently reserved for transportation safety use
- The need for government's help on spreading the word and encouraging more innovative use of the technology
- Demonstrate US leadership in V2P with global benefit, especially pedestrian safety challenges are severe

HONDA
The Power of Dreams

This scenario sequence demonstrates one example of the crash reduction potential of this new technology

Additional scenarios address specific pedestrian distractions or potential crash conflicts when a vehicle is backing-up



~350 Feet Away
INFORM
(10 to 6 Seconds)

~200 Feet Away
WARN
(6 to 3 Seconds)

~100 Feet Away
BRAKE
(3 to 0 Seconds)

Driver Sees:

HONDA
The Power of Dreams

Honda's efforts are always toward "being a company that society wants to exist" and Qualcomm shares in this effort. V2P research is consistent with that dream.

V2P research will lead to innovations that:

SAVE LIVES

- Most importantly, save lives

- Lessen injuries, improve quality of life and reduce loss of productivity

- Create and sustain jobs in the tech-meets-automotive industry

- Can be expanded to help protect all road users

HONDA
The Power of Dreams

Thank you

NHTSA/USDOT Vehicle to Vehicle (V2V) Program

- High safety benefit potential – may address up to 80% of crashes involving unimpaired drivers!

NHTSA V2V Program - Status

- Significant NHTSA/DOT research completed within the last 10 years including:
  - Safety applications, interoperability, security, human factors, and driver acceptance
- NHTSA/DOT team formed to analyze key technical and policy issues to facilitate an agency decision - research report being finalized
- Decision Announcement (February 2013)
  - NHTSA will publish the research report for public comment
  - Plan to begin work on a regulatory proposal for light vehicles

Thank you

Follow us on:

For more information, visit us at:
www.qualcomm.com & www.qualcomm.com/blog