Smart America Challenge
Advanced Vehicular Communications
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..."
Technologies developed in consumer markets are becoming part of the ‘Connected Car’ ecosystem.
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:
Traffic Congestion is a Critical and Growing Unmet Issue...

Societal Impact to U.S. Annually

Costs of Congestion

- 2011: $121 Billion
- 2015: $201 Billion
- 2020: $301 Billion

Gallons of Extra Fuel Consumed Due to Congestion

- 2011: 2.9 Billion
- 2015: 6.9 Billion
- 2020: 11.9 Billion

Annual Hours Lost Due to Congestion

- 2011: 9.3 Billion
- 2015: 17.6 Billion
- 2020: 22 Billion

Source: Texas Transportation Institute 2012 Urban Mobility Report

* Represents wasted fuel and productivity as a result of traffic congestion.
12 spaces in Penn Ave Parking Garage – make next left

Smart Parking

Reserve Space #232…Making next left

Vehicle to cloud communication

3G/4G cellular
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...

The car seamlessly connects to the cloud and environment.

- Emergency alert to infrastructure
- Smart traffic lights
- Vehicle to bicyclist
- Vehicle to vehicle communication
- Vehicle to pedestrian
- 3G/4G cellular communication
- Wireless Vehicle Charging

Vehicle to cloud communication
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
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
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.
V2P technology can also bring safety benefits to motorcyclists, bicyclists and people with disabilities

- **Bicyclist**
  - Rider’s smartphones can signal the location of their bicycles and motorcycles to surrounding vehicles.

- **Motorcyclist**

- **Disabled population**
  - Wheelchair users can leverage DSRC enabled smartphones to interact with traffic lights to more safely cross the street.
Both drivers and pedestrians can receive warnings when in near-collision situations

**VEHICLE DSRC SYSTEM**
- DSRC & GPS-equipped vehicle
- Vehicle periodically sends Basic Safety Messages
- Vehicle assesses/calculates potential collisions and threat levels
- Visual and audible warnings are provided to the driver

**SMARTPHONE (PEDESTRIAN) DSRC SYSTEM**
- DSRC requires no additional hardware in the smartphone
- Smartphone sends location, direction & other information
- Smartphone also assesses/calculates potential threat levels
- Situational awareness gates DSRC operation for power efficiency
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
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
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’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:

- 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
Thank you
NHTSA/USDOT Vehicle to Vehicle (V2V) Program

Vehicles “talk” to each other exchanging information in real time (10 msec) including vehicle size, position, speed, heading, to enable safety applications.

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

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