

The Connected Responder

David J. Mulholland

Administrator, Arlington County

Emergency Communications Center

2013 Public Safety Crashes

- 5,747 crashes involving ambulances (3,167 during emergency response)
- 2,508 crashes involving fire apparatus (1,730 during emergency response)
- 34,821 crashes involving police vehicles (10,657 during emergency response)
- 21 persons killed in crashes involving ambulances (7 ambulance drivers or occupants) and 3,236 persons injured

The National Safety Council Injury Facts –
2015 Edition

2013 Public Safety Crashes

- 12 persons killed in crashes involving fire apparatus (2 fire apparatus drivers or occupants) and 1,430 persons injured
- 87 persons killed in crashes involving law enforcement vehicles (18 involving law enforcement vehicle drivers) and 12,363 persons injured

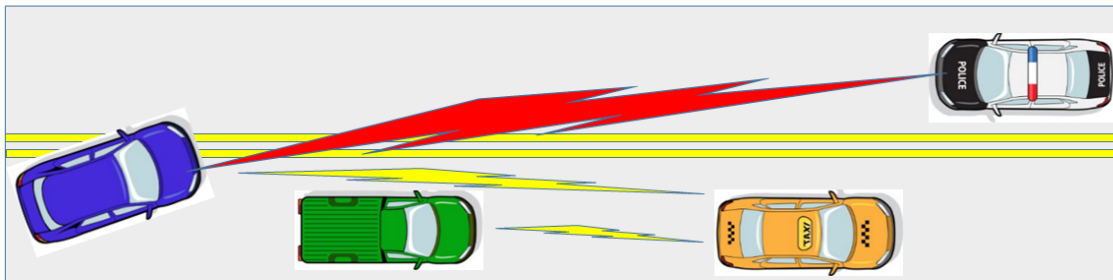
The National Safety Council Injury Facts –
2015 Edition

Onboard Unit (OBU) – In-vehicle device transmits and receives Basic Safety Messages 10 times per second – determines if warning is necessary

Basic Safety Message (BSM) – Includes speed, location, and heading

Connected Vehicles Vehicle to Vehicle (V2V) Communications

Application Interface – In-cockpit device which provides warning messages to drivers



OBU from taxi transmits BSM that cab is moving slowly. OBU from blue vehicle transmits BSM that it is changing heading, potentially encroaching into pathway of police vehicle. Application Interface in police vehicle warns that blue vehicle may be encroaching into lane, while application interface in blue vehicle warns that there is an approaching vehicle (police car)

The Basic Safety Message

- Includes position, speed, and heading
- Normally transmitted at 10 times/sec
- Anonymous information
- Vehicles “listen” for other vehicles’ BSMs and continuously analyze possible crash threats.
- Warnings are issued as needed

The OBU Today

- Uses Dedicated Short Range Communications (DSRC) (802.11p)
- Use 75 MHz of 5.9 GHz spectrum band
- Fast communication speed with low latency
- Invulnerability to extreme weather
- Tolerance of multi-path transmissions
- Not dependent on an existing network
- Technology based on standards to enable interoperability

Vehicle to Vehicle (V2V) Safety Apps

Near Future

- **Blind Spot Warning + Lane Change Warning**
- **Control Loss Warning**
- **Emergency Electronic Brake Light**
- **Emergency Vehicle Alert**
- **Forward Collision Warning**
- **Intersection Movement Assist**

Mid to Far Future

- **Do Not Pass Warning**
- **Motorcycle Approaching Indication International Icon**
- **Pre-Crash Actions**
- **Situational Awareness**
- **Slow Vehicle Warning International Icon**
- **Stationary Vehicle Warning International Icon**
- **Tailgating Advisory**
- **Vehicle Emergency Response**

Vehicle to Infrastructure (V2I) Safety Apps

- **Curve Speed Warning**
- **In-Vehicle Signage**
- **Oversize Vehicle Warning**
- **Pedestrian in Signalized Crosswalk Warning**
- **Railroad Crossing Violation Warning**
- **Red Light Violation Warning**
- **Reduced Speed Zone Warning / Lane Closure**
- **Restricted Lane Warnings**
- **Signal Preemption/Priority**
- **Spot Weather Impact Warning**
- **Stop Sign Gap Assist**
- **Stop Sign Violation Warning**
- **Warnings about Hazards in a Work Zone**
- **Warnings about Upcoming Work Zone**

Other Safety Apps

- **Vehicle to Pedestrian (V2P)**
- **Vehicle to Everything (V2X)**
- **Brain to Vehicle (B2V) – Nissan**

Full list of apps can be found at:

<http://local.iteris.com/cvria/html/applications/applications.html>

Timeline

1990's
Automated
Highway System

2003 - Vehicle
Infrastructure
Integration
Initiative

2003 - FCC
allocates
portion 5.9 GHz
for research
purposes

2006 -
ITS/CAMP
V2V
research

2011-2014 -
Safety Pilot
Driver
Clinics/
Safety Pilot
Model
Deployment

Timeline

August 2014 –
Advanced Notice of
Proposed
Rulemaking

2016 - Issue
Notice of
Proposed
Rulemaking

**2018 - Issue
regulation
mandating
V2V
technology**

**2019 - 2021
- Begin
phase-in
period for
new car
production**

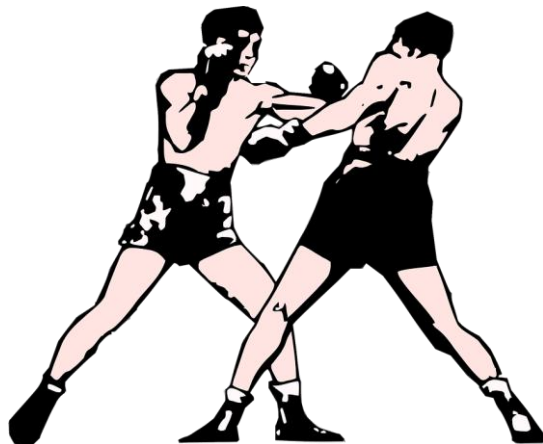
**2021-2024
V2V
technology
included on
100% of
new car
production**

Proposed Rulemaking

Will require vehicle-to-vehicle (V2V) communication capability for light vehicles (passenger cars and light truck vehicles (LTVs)) and create minimum performance requirements for V2V devices and messages.

The Connection Conundrum

DSRC



C-V2X

C-V2X

- Uses LTE for communications
- Designed for high-speed vehicle use
- Increased communication range and can leverage cellular network
- Can connect to other devices
- Strong line of sight performance
- High capacity/Good congestion control in denser environments
- Clear evolution path to 5G

DSCR

Toyota

General Motors

Volkswagen

C-V2X

Ford

Nissan

Fiat-Chrysler

Honda

Hyundai

Public Safety Strategic Plan Alignment

- Reduce incidents that result in injury, death, and property damage
- Provide timely, effective, and consistent emergency response
- Enhance traffic incident management procedures
- Increase the public's perception of safety
- Enhance employee safety
- Manage agency resources effectively
- Improve the efficiency and effectiveness of service delivery by expanding the use of technology

**100 strategic
plans reviewed**

**Law
Enforcement,
Fire, EMS,**

**State, local,
university, and
tribal agencies**

ROI Considerations

- Tangible return on investment (equipment costs, personnel time, etc.)
- Public perception and trust
- Employee morale
- Effect of injury or death from a motor vehicle incident or crash on family members and members of the community
- Availability of equipment
- Lives saved or incidents resolved due to more efficient and timely response
- Lives saved or damage prevented through effective and efficient commercial vehicle enforcement

ROI Considerations

- Efficiency of rapid traffic incident management and reopening of roadways, including socio-economic implications
- Ability to fully evaluate policies and practices with more comprehensive data including near-miss incidents
- Value of data utilized by other organizations (e.g. traffic engineers, Federal Motor Carrier Safety Administration, National Highway Safety Administration, etc.) to reduce future traffic and motor vehicle crash issues and concerns

Does Connected Vehicle Technology Make Sense for Your Agency?

- Is there sufficient ROI?
- Is there capability to execute?
- How does this integrate with other governmental technology plans (smart cities, etc.)?
- Which technology do you choose?

Dave Mulholland
Administrator, Arlington County Emergency
Communications Center

dmulholland@arlingtoncountyva.us

(703) 228-4820