U.S. Department of Transportation
Federal Railroad Administration

OFFICE OF RESEARCH & DEVELOPMENT

Connected Vehicles Applications for Rail

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CV Ecosystem

- **USDOT ITS JPO**
  - Facilitate development of standards and protocols
  - Plan/support large scale tests and model deployments
 - Coordinate multimodal engagement

- **SAE/IEEE**
  - Publish and maintain detailed hardware/software/comm standard and specifications

- **DOT Modes**
  - Research technology needs
  - Industry stakeholder engagement
 - Develop reference applications/hardware platforms

- **Automakers/Suppliers**
  - Control the final vehicle-based products
  - Shoulder most of the liability in trade for business benefit

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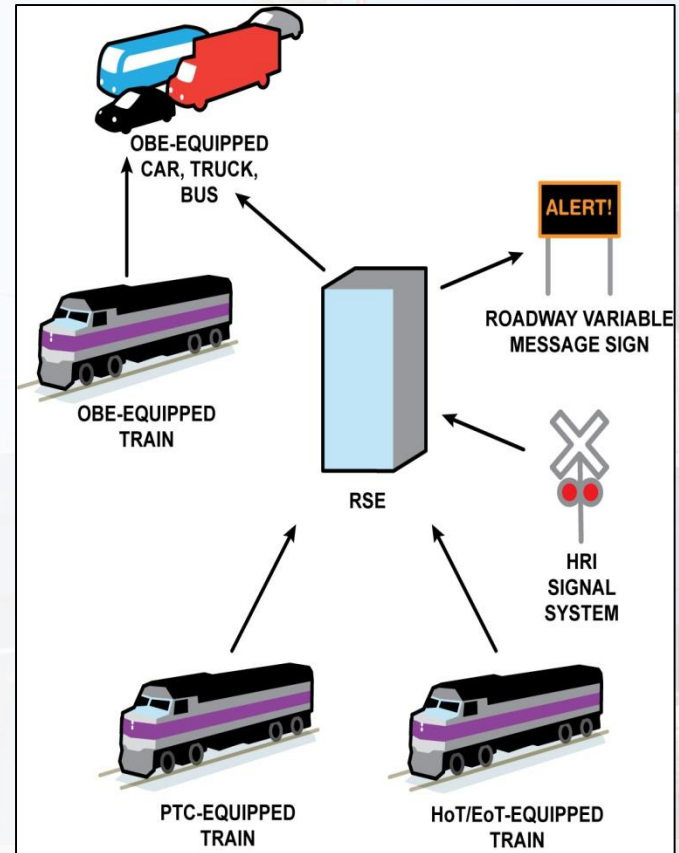
FRA Accomplishments

♦ Engaging rail industry stakeholders

♦ Developed RCVW system concept and design documents

♦ Supporting ITS Joint Program Office (JPO) standards development

♦ Executing JPO funding to develop and test RCVW demonstration system
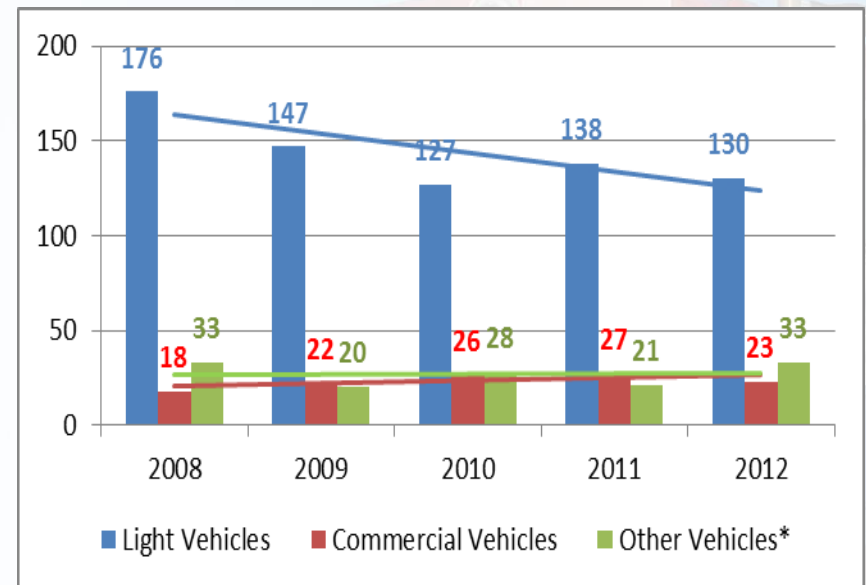
Public and Private HRI Fatality Statistics by Motor Vehicle Type from 2008-2012, excluding pedestrians
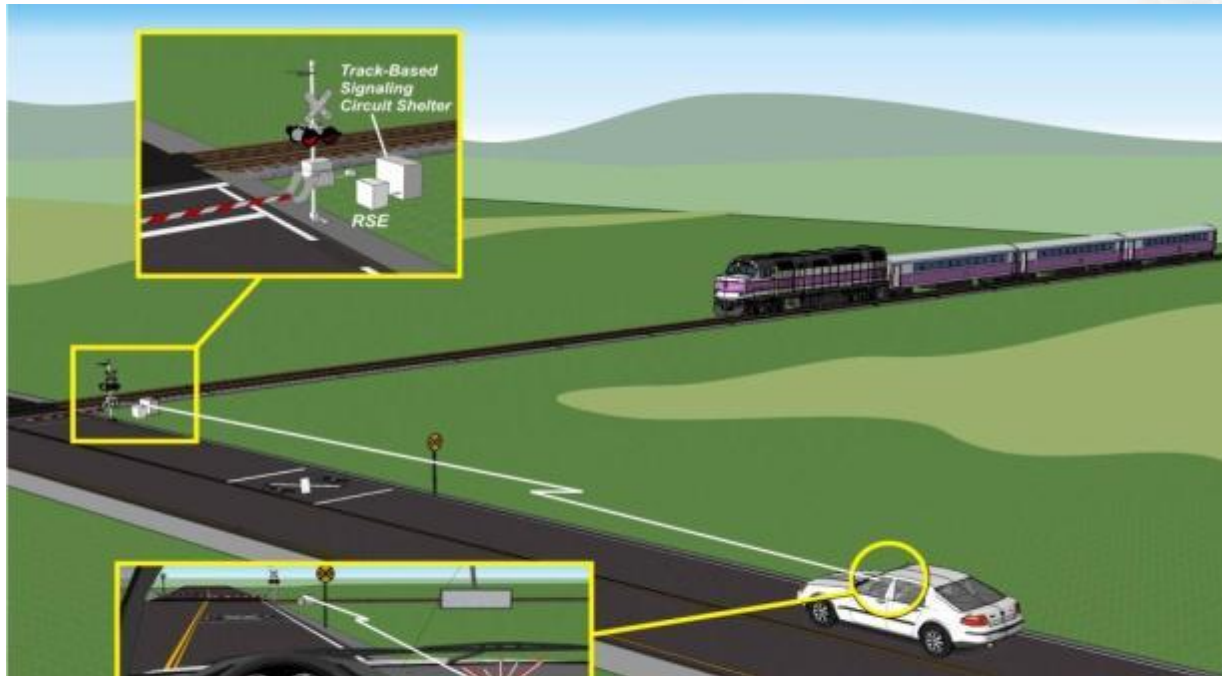
Current Research

- ◆ DSRC Performance Evaluation for Rail
  - ◆ Can DSRC Support V2V rail comms?
  - ◆ Antenna configurations?
  - ◆ Locomotive EMI impacts?

- ◆ Rail Crossing Violation Warning (RCVW)
  - ◆ Retrofit existing active crossings
  - ◆ Leverage track circuit train detection
  - ◆ Leverage signal preemption functionality
  - ◆ RSE/Signal Controller integration

- ◆ Advancing from Connected Vehicles to Autonomous Vehicles

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Operational Concept

Active Crossing

LEGEND
RSE – Road Side Equipment
OBE – On Board Equipment
DSRC – Digital Short Range Communication

1. Approaching train activates crossing.
2. RSE transmits a "crossing active" signal via DSRC radio.
3. Drivers approaching the crossing receive an in-car warning if the do not heed infrastructure warning systems.

RCVW System Demo

4/26/17

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Ongoing Objectives

♦ Keep rail in the ITS conversation

♦ Educate stakeholders

♦ Research technology gaps

♦ Work with industry to reduce crossing fatalities/injuries

Messages to vehicle

Driver warned if signal violation is predicted