Next-Generation Traffic Incident Management

Every Day Counts
Innovation for a Nation on the Move

Local Programs

Training

Data

Technology

Header Photos Source: Enforcement Engineering, Inc

RESPONDER-TO-VEHICLE ALERTS FACTSHEET

Every day, police, fire, emergency medical services (EMS), transportation, and towing professionals are working on or near our Nation's roadways, clearing roadway incidents and helping the safe and efficient flow of traffic. Their familiar emergency lights (amber, blue, and red) are meant to alert drivers to their presence and cue them to use greater caution. In addition, Move Over laws require motorists to move over and/or slow down when emergency vehicles are present.

Increasing the time and distance at which approaching motorists are aware of roadside incident responders provides them with greater opportunities to move over or slow down. Responder-to-vehicle (R2V) technology allows responders and roadside workers to alert motorists of their position directly inside the approaching motorists' vehicles, sometimes miles before the motorists see the flashing lights. Better awareness among drivers increases safety for incident responders.

What is R2V?

Sometimes called digital alert systems, or R2V alerts, these real-time alerts will give motorists another opportunity to become aware of roadway maintenance vehicles or emergency responder vehicles roadside at an incident scene. These alerts rely on Global Positioning System (GPS) technology that knows the location of the responder. This can be accomplished with a small transponder specifically for this purpose, separate vehicle location systems, or by connecting with vehicle manufacturer systems.

A digital alert occurs when an equipped traffic control device is deployed, or when a response or maintenance vehicle's emergency lights are activated. Automated alerts ensure that response personnel are not burdened with manually activating the alerts while responding to incidents. Conversely, response vehicle alerts can be turned off by the responder on a case-by-case basis, which is sometimes necessary for covert law enforcement activities.

Source: Enforcement Engineering, Inc.

Motorists receive alerts through traveler information systems, navigation providers, smartphone apps, or a connected vehicle on-board unit (OBU). When the activation of an R2V or digital alert occurs, work zone and traffic incident data are pushed to third-party navigation providers. The alerts can also trigger Federal Emergency Management Agency (FEMA) Wireless Emergency Alerts, activating messages on cellular phones that enter a geofenced area around roadway incidents.

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Benefits of R2V Technology

Motorist alert systems work to inform motorists of first responder activity on roadways where they travel. Timely awareness of incident activity ahead can increase driver attentiveness and responsiveness, making safer conditions for incident responders and other road users.

- The Pennsylvania Turnpike has equipped 158 maintenance and service patrol vehicles with the ability to broadcast emergency alerts, reducing roadside crashes involving roadside agency vehicles from thirty in 2018 to zero in 2020.[1]
- In Indiana, queue warning trucks equipped with digital alert systems and arrow boards reduced the incidents of "hard braking" among vehicles approaching roadway backups.[2]
- Dashboards associated with vehicle alert technology allows public agencies to monitor the location of response vehicles and the duration of incident response activities.
- Digital alerts can warn drivers when emergency vehicles in response mode are approaching from behind, prompting them to yield and allow them to pass.
- In North Carolina, they are piloting a variety of alert systems that provide different outputs. When their safety service patrols (known as Incident Management Assistance Patrol, IMAP) vehicles activate their flashers, warning lights, or arrow panel, some of the systems provide general alerts to motorists to be aware of their upcoming vehicles and to move over a lane or slow down. Other systems provide more detailed directions such as indicating to move over to a specific lane depending on the activated arrow direction.

State of the Practice

Many public safety, transportation, and private sector agencies are using R2V or digital alerts to improve situational awareness among drivers.

- Transportation agencies and the digital alert industry are also working with automakers to deliver alerts directly to cars as part of vehicle- to-vehicle (V2V) communications. The FHWA developed the Cooperative Automation Research Mobility Applications (CARMA) program to fully explore cooperative driving automation (CDA), where vehicles communicate with each other (V2V), the infrastructure (V2I), and other equipped devices (V2X which is defined as vehicle-to-everything, such as smart phones).
- Police, fire, EMS, transportation, and towing agencies are all using digital alert systems to augment incident response and expand advance warning.
- Smart traffic cones, arrow boards, and construction equipment are protecting roadway workers and incident responders by making drivers aware of changing roadway conditions.

Resources

FHWA EDC-6 Next-Generation TIM

[1] Leiss, Todd. PA Turnpike Commission. November 2021.

[2] Sakhare, R.S., Desai, J.C., Mahlberg, J., Mathew, J.K., Kim, W., Li, H., McGregor, J.D. and Bullock, D.M. (2021) Evaluation of the Impact of Queue Trucks with Navigation Alerts Using Connected Vehicle Data. Journal of Transportation.

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