R2V™ (Responder-to-Vehicle) Technology: Enabling Safer, Faster, Emergency Response
There are over 60,000 collisions per year involving emergency responders in the U.S.

– NHTSA, GES
When the call for emergency responders rings, the men and women who jump into action know there may be danger at the scene. But the highest potential for danger actually occurs on the way to the call through collisions with motorists on the roadways.

**It’s a common scenario:** A fire crew is dispatched to an incident, they hurry into their apparatus, prepare their equipment and speedily head to the scene. With sirens engaged and lights flashing, they’re counting on motorists to see them, hear them and pull over. But, there are many impediments: the motorist is distracted on their phone, or sitting in their nearly sound-proof vehicle and cannot hear the siren and clogs the lane; another motorist can’t tell where the truck is coming from so doesn’t react until it’s on their bumper; or worse - a vehicle enters an intersection with the fire truck fast approaching and a collision occurs.

The cost of such collisions is huge (it can cost cities upwards of $1M any time an injury is incurred) -- both in terms of physical injury and damage to the vehicles, as well as delays in the emergency crews reaching the original incident, which may worsen that situation. But many emergency responders are finding a simple fix in new R2V Technology that allows not just Fire but also Police, EMS and other municipal fleets to alert motorists directly in their vehicles of emergency conditions on the road ahead. The results are striking and the potential for this new technology to impact safety on the road and speed up response times overall is growing daily.

This overview will describe key advancements in technology that are enabling R2V alerts and give you an inside look at how it’s affecting emergency crews’ ability to improve their performance overall. Read on to learn:

- Why the systems in place today aren’t doing enough
- How R2V works to improve safety and speed in the line of duty
- How emergency crews are using analytics to improve overall performance
- Why the simple installation process makes this technology accessible to all
What may be in place today isn’t enough

The inherent risks for emergency crews and motorists on the road have always been a reality and there are some solutions in place today to try to solve for them. But, they leave considerable gaps and just don’t do enough.

SIRENS AND LIGHT BARS

Everyone’s familiar with the sound of a blaring siren and we know it means to pull over. But driving behaviors today are making it more difficult to rely on that happening. The consumer driving experience has become highly refined and more luxurious, but it still ignores important factors. Auto manufacturers have introduced cars with near soundproof interiors and enhanced audio systems -- so much so that drivers may not even hear the sirens at all -- and in-dash infotainment systems plus mobile devices have drivers distracted with content, texts and phone calls. By 2020, there will be a quarter billion connected vehicles on the road. Emergency crews cannot rely on motorists simply pulling over safely and quickly to let them through anymore.

PRE-EMPTION

Certain technologies are available to proactively give emergency vehicles the right of way by changing traffic signals or otherwise pre-empting traffic flow. While this can help prevent collisions at intersections, there are drawbacks. First of all, these systems require a direct line-of-sight to the emergency truck and will experience interference from the environment including weather, large passing trucks and even tree branches. Also, it’s costly -- upward of $10k-$15k per intersection and still provides no mode of outbound communication, they’re just supposed to change the light. And even that is unreliable -- many times the system doesn’t work until the emergency crew is very close or even already inside the intersection.
In recent years, auto makers have made advancements in the development of important ADAS (Advanced Driver Assistance Systems) features, some cars are even entering the roadways equipped with DSRC systems that enable vehicle-to-vehicle (V2V) communications to transmit and receive messages about a vehicle’s speed, direction and other information to help avoid a crash. While these systems are highly effective in situations where cars are about to bump into each other or when a driver inadvertently veers out of their lane, they’re insufficient because they only operate in close range. Motorists need alerts well in advance of encountering emergency vehicles moving at a high rate of speed in order to have enough time to react. Once the emergency vehicle is close enough for DSRC to detect -- the window for preventative action is already closed.

Furthermore, the timeline for DSRC to be fully operational is decades out. It will be years before auto manufacturers begin to include DSRC in consumer vehicles at scale and the infrastructure (e.g. traffic signal interfaces and roadside equipment to send and receive DSRC messages) isn’t even built yet. The costs are estimated to be in the billions. According to the Department of Transportation, such widespread adoption and infrastructure changes will be many years in the making.

Meanwhile, lives are at stake today.
Studies that incorporated Advanced Warning Devices

Drivers using AWDs compared to controls, reduced their driving speed earlier, used more controlled braking pressure (i.e., more controlled yielding) and tended to change lanes earlier to allow ESVs (Emergency Services Vehicles) to pass.

Source
Another pilot simulation study conducted at the University of Minnesota found drivers using AWDs significantly increased safety margins (distance between civilian driver and ESV when ESV entered cross-traffic intersection), reduced civilian reaction time to ESV lights and sirens, and had significantly better braking control than drivers not using AWDs.

...The study’s simulation experiments found the odds of crash were between 60% (OR=0.4, 95% CI=0.2-0.8) and 90% (OR=0.1, 95%CI=0.0-0.2) lower among the drivers using AWDs compared to controls not using AWDs.

Source

R2V is different from anything else on the market today because it enables emergency vehicles to seamlessly send real-time information, delivered as alerts inside motorists’ vehicles, via a unique safety data cloud. It solves multiple challenges...
R2V enables safer, faster emergency response

1. R2V captures drivers’ attention in a way they can’t miss
2. Alerts are delivered in real-time
3. Alerts are detected from close-range and mid-to-far-range with no line-of-sight dependencies
4. Responders gain a holistic view of their response data and performance metrics

Most importantly, R2V delivers data over existing cellular infrastructure so it is available today at minimal cost to Cities and Responders.
Drivers receive alerts inside their vehicles

Every time an emergency vehicle equipped with R2V engages its light bar and sirens in emergency mode, it sends a signal via mobile networks through to drivers indicating its nearby location and notifying drivers to caution. When emergency vehicles come into the vicinity, the alert cautions the driver with a short message via the in-vehicle infotainment (IVI) system. The alerts also get delivered to motorists via navigation apps in wide use, such as Waze, that operate in-dash or on mobile devices.

In addition to in-car alerts, smart city infrastructure can also detect R2V alerts and be set to react. For example, intersection signals can be changed from some distance away and street lights can illuminate to further alert motorists, bicyclists and even pedestrians.
By 2020, there will be a quarter Billion connected vehicles on the road.

Emergency crews cannot rely on motorists simply pulling over safely and quickly to let them through anymore.
Of the Firefighter fatalities in the last decade, 1 in 5 occurred while Firefighters were responding to or returning from calls.

— National Fire Protection Association
R2V delivers safety using existing cellular networks

The key to R2V is seamless, real-time transmission of data. There are three aspects to this method:

1. Transmission of data out: knowing where first responders are and when they are in “emergency” or “code 3” mode.

2. Passing the data through the “Safety Data Cloud” using existing mobile networks.

3. Receiving the data in the form of an alert through in-dash, navigation apps (e.g. Waze), traffic data suppliers (e.g. INRIX) and smart city grids.
The Internet of Things (IoT) is a growing network of interrelated devices, objects, vehicles and buildings embedded with sensors that can exchange data.

R2V is most commonly installed as an IoT device that connects to any aftermarket light bar/siren on any emergency services vehicle. It’s a small transponder that installs in as little as five minutes, requiring no down-time for the fleet. And, since the cost is minimal (less than the cost of a pair of some Firefighter gloves) budget is usually not a barrier for emergency departments wanting to implement R2V technology.

R2V also integrates seamlessly with vehicles through centralized systems. Through its API (Application Programming Interface), R2V data can be collected directly from Responder fleets where available, without need for a transponder.

Once R2V is up and running on a vehicle, it requires no changes to the crew’s operating procedures.

There are no additional steps to turn on the system. R2V is configurable per the needs of the department. When lights and sirens are in variable states of “emergency mode,” R2V is engaged and transmitting. Metrics are also captured so analysis and historical patterns can be leveraged into insights for more efficient day-to-day response operations for departments and cities.
Thank you

To learn more about **R2V technology** and how it’s helping improve safety standards for Emergency Responders, contact HAAS Alert.

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