

# HOW CONNECTED VEHICLES WORK

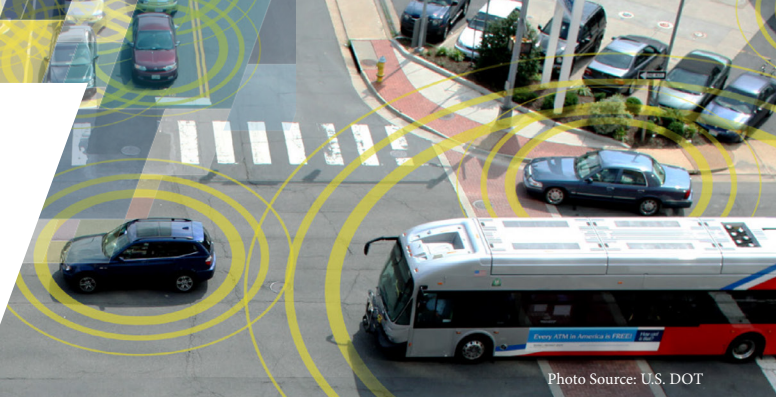


Photo Source: U.S. DOT

Connected vehicles have the potential to transform the way Americans travel through the creation of a safe, interoperable wireless communications network—a system that includes cars, buses, trucks, trains, traffic signals, smart phones, and other devices. In the past, the U.S. Department of Transportation (U.S. DOT) has focused on helping people survive crashes. Connected vehicle technology changes that paradigm by giving people the tools to *avoid* crashes.

## Why Connected Vehicle Technologies Are Needed

Connected vehicle technologies aim to tackle some of the biggest challenges in the surface transportation industry—in the areas of safety, mobility, and environment.

- **Safety:** According to the National Highway Traffic Safety Administration (NHTSA), there were 6.7 million crashes in 2018. The number of fatalities from vehicle crashes is falling but still accounted for 36,560. Connected vehicle technologies give drivers the tools they need to anticipate potential crashes and significantly reduce the number of lives lost each year.
- **Mobility:** According to the Texas Transportation Institute, U.S. highway users wasted 8.8 billion hours stuck in traffic in 2017. Connected vehicle mobility applications enable system users and system operators to make smart choices that reduce travel delay.
- **Environment:** According to the Texas Transportation Institute, the total amount of wasted fuel topped 3.3 billion gallons in 2017. Connected vehicle environmental applications give motorists the real-time information they need to make “green” transportation choices.

Connected vehicles feature safety warnings that alert drivers of potentially dangerous conditions — impending collisions, icy roads, and dangerous curves — before the driver is aware of them.

Connected vehicle applications provide connectivity between and among vehicles, infrastructure, and wireless devices to:

- Enable crash prevention
- Enable safety, mobility and environmental benefits
- Provide continuous real-time connectivity to all system users

Motor vehicle crashes are a leading cause of death and kill over 100 people every day, according to the Centers for Disease Control.

Agencies involved in connected vehicle research:

- Federal Highway Administration (FHWA)
- Federal Motor Carrier Safety Administration (FMCSA)
- Federal Railroad Administration (FRA)
- Federal Transit Administration (FTA)
- National Highway Traffic Safety Administration (NHTSA)
- Office of the Assistant Secretary for Research and Technology

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## How Connected Vehicles Work

Different communications technologies (satellite, cellular, dedicated short-range communications) may be utilized depending on the performance requirements of the connected vehicle applications. Cars, trucks, buses, and other vehicles can “talk” to each other with in-vehicle or aftermarket devices that continuously share important safety and mobility information. Connected vehicles can also use wireless communication to “talk” to traffic signals, work zones, toll booths, school zones, and other types of infrastructure. The vehicle information communicated does not identify the driver or vehicle, and technical controls have been put in place to help prevent vehicle tracking and tampering with the system.



With connected vehicle technology, drivers get warning messages in their vehicles when a potential crash is imminent.

## How Connected Vehicles Improve Safety

Connected vehicle safety applications enable drivers to have 360-degree awareness of hazards and situations they cannot even see. Through in-car warnings, drivers are alerted to imminent crash situations, such as merging trucks, cars in the driver’s blind side, or when a vehicle ahead brakes suddenly. By communicating with roadside infrastructure, drivers can be alerted when they enter a school zone, if workers are on the roadside, and if an upcoming traffic light is about to change.

The connected vehicle system creates a dynamic transportation network based on an open platform to allow for new and creative applications. Open standards allow anyone to develop new products and applications that will work in this space.

## How Connected Vehicles Keep People Moving

Private signals in vehicles help generate new data about how, when, and where vehicles travel—information that transportation managers can analyze to help make roads safer and less congested.

The same signals could also be shared among mobile devices and roadside sensors. This exciting new data-rich environment provides the genesis for a multitude of new mobility applications that help to keep traffic flowing and make it easier for people to plan their travel experience. For example, apps can help you find open parking spaces, locate available last-minute ride-share partners, guarantee you make your bus or train connection, or help a blind pedestrian cross the street. With an open source system for mobility applications, there will be minimal restrictions and limitless opportunities.

## How Connected Vehicles Improve the Environment

Mitigating greenhouse gas (GHG) contributions is everyone’s responsibility. In 2018, the transportation sector contributed 28.2 percent of the country’s GHG emissions, according to the Environmental Protection Agency’s Inventory of U.S. Greenhouse Gas Emissions and Sinks. Connected vehicle technologies generate real-time data that drivers and transportation managers can use to make green transportation choices.

For example, real-time information about traffic conditions help motorists eliminate unnecessary stops and vehicles reach optimal fuel-efficiency. Informed travelers may also be able to avoid congestion by taking alternate routes or public transit, or rescheduling their trip—any of which can make their trip more eco-friendly. With real-time information, travelers have a realistic idea of when transit vehicles will arrive. That information also can help improve bus and train connections, and this will help make public transportation more appealing to the average traveler.

For more information about this initiative, please contact:

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