



Vehicle-to-Vehicle (V2V) Communications

A major change in vehicle technology is on the horizon, which will require ALL vehicles using our public road network to comply. V2V is a system designed to transmit basic safety information between vehicles to enable warnings to drivers of impending crashes. The United States Department of Transportation and National Highway Traffic Safety Administration (NHTSA) have been conducting research on this technology for more than a decade. Authorities believe that a significant number of crashes could be potentially avoided through use of more crash avoidance technologies. These technologies, like electronic stability control (ESC), have helped *vehicles* react to crash-imminent situations, but have not yet been able to help the *driver* react ahead of time. To fill that gap, some of the most advanced systems present on vehicles today include a host of on-board sensors, cameras, and radar applications. These technologies can warn drivers of impending danger so that the driver can take corrective action, or may even be able to intervene on the driver's behalf.

V2V Communications represent an additional step in helping to warn drivers about impending danger. V2V communications use on-board dedicated short-range radio communication devices to transmit messages about a vehicle's speed, heading, brake status, and other information to other vehicles. They also receive the same information from other vehicles, with range and "line-of-sight" capabilities that exceed current and foreseeable "vehicle-resident" systems - in some cases, nearly twice the range. This longer detection distance and ability to "see" around corners or "through" other vehicles helps V2V-equipped vehicles perceive some threats sooner than sensors, cameras, or radar can, and warn their drivers accordingly.

The NHTSA conducted a field test of V2V between August 2012 and February 2014 in Ann Arbor, Michigan, gathering real-world data and experience in the technology. 2,800 vehicles participated on the 75 miles of roadways involved. As well as V2V, tests included V2I (vehicle to infrastructure) and V2P (vehicle to pedestrian) systems. Motorcycles are also likely to benefit greatly from avoidance systems, given their relative size to other road users and high accident rates.

In general, two sets of components are needed for V2V communications to operate. The first are those required for a device to transmit an accurate and trusted basic safety message (BSM) and the second are the components needed for a device to receive and interpret a BSM transmitted from another entity. A V2V communication system requires components located in vehicles and along roadways to enable complete system operation. At a minimum, V2V devices would require two radios and a GPS receiver with a processor to derive information such as vehicle speed and predicted path from the device's GPS data. The anticipated costs for V2V are about US\$350 per vehicle, still less than the cost of air bags and antilock brake systems. This is for a new vehicle, fitted by a manufacturer, while pre-existing vehicles will need an aftermarket V2V device, ranging from a US\$250 'retrofit' unit in newer vehicles to a simple US\$215 unit for older vehicles plugged only into a power source. This latter option is most likely for older enthusiast vehicles.

The full NHTSA report (over 300 pages, 4.8MB) is well worth a read. See : <http://www.nhtsa.gov/staticfiles/rulemaking/pdf/V2V/Readiness-of-V2V-Technology-for-Application-812014.pdf>



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