GAO Highlights

INTELLIGENT TRANSPORTATION SYSTEMS

Vehicle-to-Vehicle Technologies Expected to Offer Safety Benefits, but a Variety of Deployment Challenges Exist

Why GAO Did This Study

In 2011, 5.3 million vehicle crashes in the United States resulted in more than 2.2 million injuries and about 32,000 fatalities. While improvements in automobile safety have reduced the number of fatalities in recent decades, DOT has worked with the automobile industry to develop V2V technologies, through which vehicles are capable of warning drivers of imminent collisions by sharing data, including information on speed and location, with nearby vehicles. GAO was asked to review the status of V2V technologies. GAO examined (1) the state of development of V2V technologies and their anticipated benefits; (2) the challenges, if any, that will affect the deployment of these technologies and what actions, if any, DOT is taking to address them; and (3) what is known about the potential costs associated with these technologies.

GAO reviewed documentation on V2V technology-related efforts by DOT and automobile manufacturers, visited a pilot study of V2V technologies in Michigan, and interviewed DOT officials, automobile manufacturers, and 21 experts identified by the National Academies of Sciences. Experts were selected based on their level of knowledge and to represent a variety of subject areas related to V2V technology development.

DOT and the Federal Communications Commission reviewed a draft of this report and provided technical comments which were incorporated as appropriate.

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What GAO Found

The development of vehicle-to-vehicle (V2V) technologies has progressed to the point of real world testing, and if broadly deployed, they are anticipated to offer significant safety benefits. Efforts by the U.S. Department of Transportation (DOT) and the automobile industry have focused on developing: 1) in-vehicle components such as hardware to facilitate communications among vehicles, 2) safety software applications to analyze data and identify potential collisions, 3) vehicle features that warn drivers, and 4) a national communication security system to ensure trust in the data transmitted among vehicles. According to DOT, if widely deployed, V2V technologies could provide warnings to drivers in as much as 76 percent of potential multi-vehicle collisions involving at least one light vehicle, such as a passenger car. Ultimately, however, the level of benefits realized will depend on the extent of the deployment of these technologies and the effectiveness of V2V warnings in eliciting appropriate driver responses. The continued progress of V2V technology development hinges on a decision that the National Highway Traffic Safety Administration (NHTSA) plans to make in late 2013 on how to proceed regarding these technologies. One option would be to pursue a rulemaking requiring their inclusion in new vehicles.

The deployment of V2V technologies faces a number of challenges, which DOT is working with the automobile industry to address. According to experts, DOT officials, automobile manufacturers, and other stakeholders GAO interviewed, these challenges include: 1) finalizing the technical framework and management framework of a V2V communication security system, which will be unique in its size and structure; 2) ensuring that the possible sharing with other wireless users of the radio-frequency spectrum used by V2V communications will not adversely affect V2V technology's performance; 3) ensuring that drivers respond appropriately to warnings of potential collisions; 4) addressing the uncertainty related to potential liability issues posed by V2V technologies; and 5) addressing any concerns the public may have, including those related to privacy. DOT is collaborating with automobile manufacturers and others to find potential technical and policy solutions to these challenges and plans to continue these efforts. Although V2V technologies are being tested in a real-world pilot that will end in February 2014, DOT officials stated that they cannot fully plan for deployment until NHTSA decides how to proceed later this year.

DOT and the automobile industry are currently analyzing the total costs associated with V2V technologies, which include the costs of both in-vehicle components and a communication security system. All of the automobile manufacturers GAO interviewed said that it is difficult to estimate in-vehicle V2V component costs at this time because too many factors—such as future production volumes and the time frame of deployment—remain unknown. The costs associated with a V2V communication security system also remain unknown as the specifics of the system's technical framework and management structure are not yet finalized. While the costs of in-vehicle V2V components may be modest relative to the price of a new vehicle, some experts noted that the potential costs associated with the operation of a V2V communication security system could be significant. Further, it is currently unclear who—consumers, automobile manufacturers, DOT, state and local governments, or others—would pay the costs associated with a V2V communication security system.

_____ **United States Government Accountability Office**