INTRODUCTION

Technology Scan and Assessment identifies, analyzes, and presents technology options that might enable successful connected vehicle deployments. The activity is part of a multimodal research program, referred to as the connected vehicle research program, led by the ITS Joint Program Office (JPO) within the U.S. Department of Transportation’s (U.S. DOT) Research and Innovative Technology Administration (RITA). This research is focused on leveraging the potentially transformative capabilities of wireless technology to enhance the safety, mobility, and environmental sustainability of surface transportation systems.

The mission of the Technology Scan and Assessment program is to identify critical technologies or technical trends that may enable successful deployment of ITS technologies. The Technology Scan focuses on long range, global, and cross-cutting technologies. The Technology Assessment is specific to the U.S DOT’s plans for connected vehicle research, and highlights particular global technical risks such as security, or uncertainties such as “game-changing” scenarios where a potential technological breakthrough, or social or economic changes that may tilt the playing field to favor one technology over another.

The Technology Scan and Assessment is designed to identify and explore issues regarding trends outside of transportation that may potentially impact state-of-the-art ITS deployment over the next decade.

IDENTIFYING CRITICAL TECHNOLOGIES

The Technology Scan and Assessment program is designed to: (1) identify new or converging technologies that may influence specific trade-offs that occur along the path of research and development, prototyping, testing, and model deployments; and (2) facilitate discussion among the engineering community and decision makers to enable continued progress in technical research. The research plan is to:

• Cover technologies over three time horizons - science base (10 to 30 years perspective), emerging technologies (5 to 10 years), and pacing technologies (3 to 5 years applied on trial basis) in the information technology, telecommunications, transportation, and energy sectors.

• Focus on technologies centered on efficient data and information flow, from acquisition (sensors) and dissemination (wireless) to processing (computing) and management (decision support) systems.

EVALUATING TECHNOLOGY EVOLUTION

Technology Scan and Assessment also seeks to:

• Evaluate a given technology’s technical merit and evolution, but also search for constraints or compromises that may reduce capability, affordability, adaptability, economies of scale and scope, or market demand.

• Examine, across several technologies, competitive and complementary elements and nascent development of industry value chains that can encourage a given technology’s widespread application.
The U.S. Government’s role
The U.S. DOT’s Research and Innovative Technology Administration’s (RITA) Intelligent Transportation Systems (ITS) Joint Program Office fosters the development and future deployment of these connected vehicle technologies. But Connected Vehicle research involves all agencies within U.S. DOT including NHTSA, the Federal Highway Administration (FHWA), the Federal Motor Carrier Safety Administration (FMCSA), Federal Transit Administration and the Federal Railroad Administration.

U.S. DOT and its public and private partners are working to address the technical, safety and policy challenges and are helping to create the standards and the wireless architecture that will be the backbone of the system.

Connected vehicle research will leverage the potentially transformative capabilities of wireless technology to make surface transportation safer, smarter and greener. If successful, connected vehicles will ultimately enhance the mobility and quality of life of all Americans, while helping to reduce the environmental impact of surface transportation.

For more information about this initiative, please contact

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The Technology Assessment highlights particular risks or uncertainties that are broadly understood to impact a number of sectors, not just transportation. Assessment topics will discuss:

- **Security**: Global innovations in computing and design of secure systems, as well as risk management —addressing unique challenges in securing safety-critical systems fashion.
- **Energy**: Global innovation in the development of utility “smart grid” and electric vehicle powertrains and support systems, and how they may leverage to improve vehicle safety, mobility and environmental sustainability.

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TECHNOLOGY SCAN AND ASSESSMENT RESEARCH OUTCOMES
Through the structured, comprehensive research and analysis framework cited above, the Technology Scan has provided perspective on a number of long range technology trends:

- Navigation, ranging, and computer vision-based object detection sensors, along with innovations such as sensor fusion and processing algorithms, will likely exploit a wealth of information that may support future connected vehicle collision avoidance or mobility applications.
- Computer vision has been long used in highway infrastructure, but may be as common as GPS as a data acquisition platform on vehicles.
- Fourth Generation (4G) wireless networks will likely become “application-aware,” intelligently supporting critical “off-board” or “cloud-based” ITS applications such as automated collision notification.
- Future advanced 4G systems may be able to establish and manage communication sessions that hop between many wireless nodes (e.g., 4G, WiFi, DSRC) in a coordinated fashion, a concept known as heterogeneous or “vertical” roaming, operating based on application needs such as coverage availability and cost.
- Telematics (or more broadly, machine-to-machine applications) architecture may evolve to allow resources to be pooled, allowing any sensor to be securely addressable and accessible to any ITS application service.

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