



Statement of

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On behalf of:

The Intelligent Transportation Society of America (ITS America)

**BEFORE THE UNITED STATES SENATE COMMITTEE ON
ENVIRONMENT AND PUBLIC WORKS**

**Innovation and America's Infrastructure: Examining the Effects of Emerging Autonomous
Technologies on America's Roads and Bridges**

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Testimony

Chairman Barrasso, Ranking Member Carper, and Members of the Committee, thank you for the opportunity to provide the Intelligent Transportation Society of America's (ITS America) perspective on "Innovation and America's Infrastructure: Examining the Effects of Emerging Autonomous Technologies on America's Roads and Bridges."

We applaud the Committee for its interest in infrastructure needs to enable the safe and efficient operation of connected and automated vehicles. I am pleased to be joined on this panel with three ITS America members: New York City Department of Transportation Commissioner Polly Trottenberg; Wyoming Department of Transportation Director William T. "Bill" Panos; and the Center for Advanced Automotive Research at the Virginia Tech Transportation Institute Director Dr. Zachary Doerzaph.

A Better Future Transformed by Intelligent Mobility: Introduction

My name is Shailen P. Bhatt, and I am the President and CEO of ITS America. Before joining ITS America in January, I served as Executive Director for the Colorado Department of Transportation (CDOT). In that role, I oversaw the launch of the RoadX program, which is focused on deploying innovative technology solutions - including connected vehicles - and teaming with the private sector to shape the future of transportation. While at CDOT, I also served as the national Chair of the Vehicle-to-Infrastructure Deployment Coalition and the Chair of the National Operations Center of Excellence. Before CDOT, I served as Cabinet Secretary with the Delaware Department of Transportation and Deputy Executive Director of the Kentucky Transportation Cabinet. I also had the pleasure of serving as Associate Administrator at the Federal Highway Administration under U.S. Department of Transportation Secretary Ray H. LaHood.

It is an honor to testify on behalf of ITS America and our members who have been researching, developing, testing or deploying connected and automated driving technologies for more than two



decades. Founded as an official advisory board on road technology to the U.S. Department of Transportation, ITS America represents state and city departments of transportation, metropolitan planning organizations, automotive manufacturers, technology companies, engineering firms, automotive suppliers, insurance companies, and research and academic universities. Our Board Chair is Carlos Braceras, Executive Director of the Utah Department of Transportation, and our Vice-Chair is Gary Smyth, Executive Director Global Research and Development Laboratories at General Motors.¹ These members come to one table—ITS America—to shape the next generation of transportation and infrastructure driven by intelligent mobility.

ITS America is united around a shared vision of a better future transformed by intelligent mobility that is safer, greener, and smarter. Our mission is to advance the research and deployment of intelligent transportation technologies to save lives, improve mobility, promote sustainability, and increase efficiency and productivity. For nearly 30 years, ITS America has been educating policy and decision makers at every level of government and in the private sector on policy that supports intelligent transportation technologies. Our focus is policy that accelerates deployment of connected and automated vehicle technology and smart infrastructure; policy that breathes new life into our transportation infrastructure by expanding investments in technologies that support smart and sustainable states and cities; and policy that support new models and modes of transportation including micro-transit, rideshare, carshare, bikeshare, and unmanned systems. That said, our first and foremost priority has been, and continues to be, safety.

¹ The ITS America Board of Directors includes AAA, Arizona Department of Transportation, California Partners for Advanced Transportation Technology at University of California Berkeley, California Department of Transportation, Conduent, Cubic, Delaware Department of Transportation, Econolite, General Motors, GRIDSMART, HELP Inc., Iteris, Kapsch TrafficCom North America, Metropolitan Transportation Commission, Michael Baker International, National Renewable Energy Laboratory, New York City Department of Transportation, Pennsylvania Department of Transportation, Qualcomm, Serco, Southwest Research Institute, State Farm Insurance, Texas A&M Transportation Institute, Toyota, Utah Department of Transportation, and Virginia Tech Transportation Institute.



A Better Future Transformed by Intelligent Mobility: The Next Generation of Mobility

Today's hearing takes place at an important time. Just as infrastructure was critical to the development of our economy in the 20th century, maintenance of existing infrastructure, and deployment of smart infrastructure, will be critical for our global competitiveness in this century. Advances in robotics, artificial intelligence, and wireless communications have inspired a race to make the next generation of mobility a reality. We are entering a technology revolution that will define the way people, goods, services, and information move in the 21st century. It is a whirlwind of innovation that will change entire industries as well as transform communities large and small, urban and rural. It is a new transportation era as dramatic as the period where the car supplanted the horse and buggy.

A Better Future Transformed by Intelligent Mobility: Safer. Greener. Smarter

According to the U.S. Department of Transportation's National Highway Traffic Safety Administration (NHTSA), 37,461 people died in U.S. road crashes in 2016. This is a nine-year high, and it is an increase of 5.6 percent from the 35,485 fatalities in 2015. The 5.6 percent increase, following the 2015 increase of 7.2 percent, is the largest back-to-back percentage increase in fatalities since the 1963-1965 reporting period. In addition, there were 6.29 million crashes in 2015, which resulted in 2.44 million injuries, which is up from 2.34 million in 2014. Another alarming statistic is that pedestrian fatalities rose by nine percent in 2016. Deaths related to reckless behaviors including speeding, alcohol impairment, and not wearing seat belts also continued to increase. Every day on average in the United States, 100 people lose their lives on our roadways.

As fatalities continue to trend upwards, mobility and environmental challenges continue to worsen. According to the 2017 Global Traffic Scorecard by ITS America member INRIX, U.S. drivers spent an average of 41 hours a year in traffic during peak hours, which cost drivers nearly \$305 billion, an average of \$1,445 per driver. Three of the world's top five most congested cities are in the United



States, with Los Angeles (first), New York (tied for second with Moscow) and San Francisco (fifth) costing upwards of \$2.5 billion. According ITS America member Texas Transportation Institute (TTI), congestion produced 56 billion pounds of carbon dioxide (CO₂) pollution and contributed to 3.1 billion gallons of wasted fuel in 2015.

We need a safer, greener, smarter future where vehicles don't crash and lives aren't lost on our roads. Today, we are on the cusp of that future transformed by connected and automated vehicle technologies. These technologies have the potential to be the best tools in our toolbox to drastically reduce and potentially eliminate crashes caused by human error. Researchers believe that more than 90 percent of car crashes in the U.S. involves some form of driver error, so driverless and driver assisted systems are strongly believed to have the potential to reduce damage and fatalities on our roads. Furthermore, fewer crashes mean less congestion, so it will be a future with reduced travel delays, more travel time reliability, reduced fuel consumption, and more sustainable and resilient communities.

Connected and automated vehicle technologies also have the potential to expand access to transportation. Older Americans and people with disabilities are demographics that are impossible to ignore. According to the U.S. census, residents age 65 and over grew from 35.0 million in 2000, to 49.2 million in 2016, accounting for 12.4 percent and 15.2 percent of the total population, respectively; and nearly one in five people have a disability. They also represent a significant demand for transportation services, with explosive growth in travel occurring should fully automated vehicles succeed in expanding mobility access. We hope to have a future in which people with disabilities have full freedom of transportation; older adults have greater independence; and people in underserved communities and transit deserts - who are often low-income, minority, and immigrant - will have better work opportunities, better education, and access to better healthcare.

Connected vehicles have arrived, and automated vehicles are coming, but this should come as no surprise because we have seen technology being added to cars, trucks, and buses since the 1950s. Cruise



control, an early example of vehicle automation, was first introduced in the 1958 models of the Chrysler Imperial, New Yorker and Windsor. According to NHTSA, vehicle safety technologies have been researched, developed, tested, and deployed safely over nearly 70 years, include cruise control, anti-lock brakes, electronic stability control, blind spot detection, forward collision warning, lane departure warning, rearview video systems, vehicle and pedestrian automatic emergency braking, pedestrian protection, rear cross traffic alert, and lane centered assist.

New vehicle technologies, in particular cooperative crash avoidance and automated driving systems, are game changers. We now have the technical capability to connect vehicles to other vehicles, to the infrastructure, and to pedestrians - collectively referred to as Vehicle-to-Everything (V2X) communications or Connected Vehicle - via the Dedicated Short Range Communications (DSRC) standard utilizing the 5.9 GHz spectrum band. In particular, advanced traffic management infrastructure, Vehicle-to-Infrastructure (V2I) communications, and Vehicle-to-Pedestrian (V2P) communications can reduce crashes, smooth traffic flow, reduce pollution, and most importantly, save lives. As advanced vehicles add automation features, from adaptive cruise control, to freeway “autopilot,” all the way to a completely driverless mode, having infrastructure accommodate these advanced vehicles will be a challenge, but the success of the technology will dramatically affect how we live and how we travel.

A Better Future Transformed by Intelligent Mobility: Vehicle-to-Infrastructure

The modern world literally turns on the boundary of where the tire rubber meets the paved road. For over a century, this was the most important interface between the car and the infrastructure. For automakers, the objective was always to design vehicles that were “road friendly” to the greatest extent practical. However, with new information and wireless technologies, there is a new interface -- a digital interface between the car, driver, and the road infrastructure. This has presented an opportunity for road infrastructure operators to manage traffic and improve safety in ways that were previously unknown.



The concept of V2I was to provide the vehicle and the driver information about infrastructure operations -- weather and pavement condition, how signals were directing traffic, and even the location of potential hazards at intersections and other critical road safety hotspots. V2I communications benefit from interoperability with vehicle equipment. Major domestic and global automakers have agreed to standards that allow not only vehicles to communicate with one another to improve safety, but allow infrastructure operators to use that same capability to improve the safety and productivity of their operations. As NHTSA considers establishing V2X as a Federal Motor Vehicle Safety Standard (draft FMVSS 150), some companies have moved ahead of the agency. ITS America members Toyota and Volkswagen have already committed to deploying DSRC V2X in Japan and Europe respectively. Toyota and ITS America member General Motors have committed to deploy DSRC V2X in new cars over the next decade in the United States.

NHTSA estimates that safety applications enabled by V2V and V2I could eliminate or mitigate the severity of up to 80 percent of non-impaired crashes, including crashes at intersections or while changing lanes. Twenty-six states and 45 cities are deploying V2I communications that use the DSRC safety spectrum band to enhance safety, reduce crashes, and decrease fatalities. V2I deployments include expansions of the Safety Pilot Model Deployment in Ann Arbor (MI), large Pilot Deployments in New York City (NY), Tampa (FL), and Wyoming, and the Smart City Challenge in Columbus (OH).

DSRC supports multiple V2I applications to include, for example, red light violation warnings, reduced speed zone warnings, curve speed warnings, and spot weather impact warnings. V2I in the near future may also support other applications that will disseminate the condition of the infrastructure such as bridge integrity, and may even collect data from cars that describe the condition of pavement. ITS America, along with the American Association of State Highway Transportation Officials (AASHTO) and the Institute of Transportation Engineers (ITE) instituted the Signal Phase and Timing (SPaT) Deployment Challenge. SPaT would enable an automated vehicle to be advised of the future settings of any oncoming traffic signal that it might encounter, as well as (or instead of) the traffic signal only using



its location to determine the appropriate timing. This technique has been shown to manage queues and reduce delays significantly.

The SPaT challenge seeks “20 by 2020” -- the goal of each of all 50 states to deploy V2I with SPaT broadcasts in at least one corridor or network (approximately 20 signalized intersections) by January 2020. Infrastructure must be deployed in coordination with vehicle equipage of DSRC. According to Navigant Research in a 2017 study, annual sales of light duty vehicles with factory-installed V2X are expected to reach nearly 70 million by 2025, with revenue from sales of original equipment and aftermarket DSRC-based V2X systems projected to reach more than \$25.5 billion in the same period.

As the auto industry’s readiness to commit to deploying V2X has grown with more mature standards and an ever expanding supplier base for equipment, so too has market competition. Recent wireless technology alternatives to DSRC V2X include Cellular Vehicle to Everything (C-V2X) technologies which is undergoing further standardization, field validations and assessment. Designed to work on an 4G LTE-based telematics unit and intended to be compatible with future 5G, the C-V2X direct communication mode also offers V2V, V2I, and V2P (without the involvement of a cellular network, or cellular network subscription) by operating on designated and harmonized 5.9 GHz ITS spectrum. Global C-V2X field validations with car manufacturers, automotive ecosystem participants, and in cooperation with regional governments are currently underway in Germany, France, Korea, China, Japan and the United States, with industry deployment expected to take place as early as 2020. ITS America members Qualcomm Technologies, Panasonic, and the Colorado Department of Transportation are assessing C-V2X capabilities on select roadways this year. At nearly the same time, Institute of Electrical and Electronics Engineers (IEEE) 802.11 Working Group has formed a Study Group to consider a Next Generation V2X (NGV) project that is addressing potential changes to the current DSRC V2X wireless standard that had been already tested assessed and validated extensively in major V2X operational tests in Ann Arbor Michigan (University of Michigan Safety Pilot Model Deployment 2012-2015) and several other locations over the last several years.



No matter the path the underlying wireless technology may take, V2X applications have incredible potential to dramatically improve the safety and operational performance of our road infrastructure. According to NHTSA, V2I technology helps drivers safely negotiate intersections and could help prevent 41 to 55 percent of intersection crashes. Another connected vehicle safety application that helps drivers with left turns at intersections could help prevent 36 to 62 percent of left-turn crashes, according to NHTSA. In addition to the lives saved, just these two applications alone could prevent up to 592,000 crashes and 270,000 injuries each year.

Vehicle automation is also likely to be supported by V2X systems in the near future. One of our members, Peloton Systems, is connecting freight trucks using direct V2V communications that allows a rear truck to react immediately to the actions of the front truck traveling at highway speeds. By electronically coupling the trucks in this way, they accelerate and brake together and can safely operate at closer distances to form a platoon. This kind of connected “cooperative” automation improves safety as well as fuel efficiency and emissions -- Peloton has realized savings of more than seven percent when V2V platooning using industry standard tests.

As we prepare for deployment of connected and automated vehicles by addressing infrastructure needs, it may be instructive to take a look back at the Fixing America’s Surface Transportation Act (FAST Act). ITS America commends the Committee’s leadership, which made V2I an eligible activity under most of the core highway programs including the National Highway Performance Program, Surface Transportation Block Grant Program, Congestion Mitigation and Air Quality Program, Highway Safety Improvement Program, and Advanced Transportation and Congestion Management Technologies Deployment Program. Your action enables many states and cities to invest in V2I to avoid or mitigate vehicle crashes and provide mobility and environmental benefits.



A Better Future Transformed by Technology: Road Environment and Traffic Management²

As ITS America generally believes that to maximize the safety benefits of connected and automated vehicles, roadways must be better maintained and modernized, traffic signals and ramp meters must be further standardized and connected, and road signage and lane markings may need to be maintained or upgraded.

While designs vary, most automated vehicles analyze real-time inputs from a combination of active sensors (e.g. emitting systems such as radar, LIDAR, infrared, piezoelectric sensors etc.), passive sensors (e.g. non-emitting camera based detection/classification) and even vehicle-infrastructure communications (e.g. traffic signals and vehicles that beacon safety and other status information). An automated vehicle then processes those inputs, compares results with preloaded maps and driving models, plots a path, and sends instructions to the vehicle's powertrain and control systems to manage acceleration, braking, and steering. Ideally, supervised and/or unsupervised "machine learning" occurs to improve performance of these processes over time – extending and expanding safety capabilities across vehicle makes and models.

Roadway environments, however, are diverse -- from freeway, arterial, collector/distributor, and local roads, intersections, traffic circles and ramps, each with different lane configurations and access rules, and traffic control device placement that support these configurations. These configurations also change temporarily with specialized so-called "managed" lanes such as reversible lanes, or planned or ad-hoc road construction within work zones, with some construction efforts leading to redesign of the roadway. Weather conditions also are a key environmental factor, especially where weather and infrastructure

² ITS America acknowledges the contributions of members Texas Department of Transportation, Utah Department of Transportation, and WSP in analyzing road environment and traffic management requirements for automated vehicles. We also want to thank the Alliance of Automobile Manufacturers and the American Trucking Associations for their contributions.



configuration interact (e.g. where precipitation may degrade visibility or utility of traffic control devices etc.).

Consistency in the implementation and maintenance of traffic control devices is therefore important, and in some select circumstances might be more important than diversity and innovation in design. Signage and markings provides direction, guidance and warnings to drivers. Some states elect to follow the Federal Manual of Uniform Traffic Control Devices (MUTCD), while other states may generate different iterations of the Manual. Even if a road sign design is not the easiest to perceive or assimilate for a human driver, for an automated vehicle vision detection and classification system -- it is likely easier to learn how to interpret a single but ambiguous traffic sign as opposed to having to learn to interpret a large number of different but more easily identifiable signs. Not only is consistency important, maintenance is also vital. In some circumstances, poorly maintained markings and signage can be worse than having no markings and signage at all, since they may cause unintended responses by the automated driving system.

Road surface conditions are also important. Poorly maintained roadway surfaces (buckled asphalt, potholes, etc.) could increase the risk of damaging vehicle sensors. Damage to sensors can compromise vehicle performance and may force a vehicle into a degraded state where automation must be deactivated. Poor surface conditions will decrease the vehicle's lifetime durability and increase the cost and complexity of vehicle operations and maintenance.

There are new infrastructure technologies, however, that may improve automated vehicle performance. There is an effort to design new types of road markings, signs, and other kinds of connected infrastructure that would make driving in highly automated vehicles potentially safer. Existing traffic control devices, specifically signage, road markings and traffic signals were designed for human drivers and use shapes colors, graphs and texts to convey relevant information. Making these devices easier for machines to read, or to embed additional static data that would be relevant to automated driving system



is a potential innovation. For example, some companies have experimented with embedding machine-readable GPS coordinates and other encoded metadata into road signs that are invisible to drivers but provide useful information to driverless cars. In its Interstate 75 Modernization project, the Michigan Department of Transportation deployed advanced all-weather lane markings, retroreflective signs with smart sign technology and DSRC devices for vehicle-to-infrastructure communications. These innovations improve the robustness of automated vehicle sensing and perception.

Automated vehicles may even improve infrastructure by reporting deficiencies. Automated vehicle operators and infrastructure stakeholders may in the future be able to create a common mechanism for automated vehicles to report an infrastructure item which needs a repair. The Utah Department of Transportation (UDOT) Roadway Imaging and Inventory program called for the collection of 14,000 miles of geolocated road geometry, pavement distress, surfaces, imagery, lane-mile, bridge clearance and sign data and was expanded to require collection of nearly all right-of-way assets. Utah has also made inventory data available across all divisions within the department through its UPLAN website, which includes data describing the roadway asset purpose and function, as well as other metadata.

Such infrastructure asset management strategies may support automated vehicle deployment in a supplemental way. Planned construction and temporary or permanent changes to roadways, e.g. intersection geometry, traffic pattern changes (i.e. rush hour and other time-dependent right of way operations) can be tracked and information disseminated. Such modifications include events such as changes to traffic light positions, the introduction of new traffic light types, and changes to road geometry or lane lines such as when new pavement islands are created or double yellow lines are moved that modify traffic flow. Databases also can contain information and location about the signs and signals which do not conform to national standards, as well maps of where local traffic codes may change from jurisdiction-to-jurisdiction.



Such “digital infrastructure” is important. Additionally, sharing information regarding weather and traffic flow conditions will increase roadway safety and streamlined mobility.

Automated vehicles may find it difficult to navigate construction zones, accident areas, and other unexpected scenarios. Since some current automated vehicle prototypes rely on pre-compiled maps of the roadway for perception and path planning, temporary changes to the roadway may need to be disseminated on short notice.

This digital infrastructure requires connectivity to disseminate information about adverse conditions and events. Events may include crashes and other traffic incidents, construction, weather and other sources of congestion. In the future, this may require a means for local traffic operating management centers to directly message driverless vehicles. For traffic events that require split second responses, it may also require other vehicles or personnel at the scene of a work zone or a crash to send secure ad-hoc safety or traveler information messages either vehicle-to-vehicle, to or from the roadside or pedestrians at the scene. It should be noted, however, that the FCC seeks to allow unlicensed services supporting wireless consumer internet access in its current proceeding on the 5.9GHz spectrum band, and final action in the proceeding may preclude some types of DSRC/V2X applications that have been described so far. Although supportive of sharing DSRC spectrum with Wi-Fi in principle, ITS America members are concerned that any regulatory action that reduces the effectiveness of DSRC could mean more unnecessary crashes, injuries and potentially deaths on our nation’s roads.

More automated vehicle research is still needed to address infrastructure needs. New driving conventions, such as how robotic vehicles might “wave through” pedestrians on crosswalks, or they how to identify and pull over for emergency vehicles, will be required for robotic vehicles to interact with other road users. Operations research must be conducted in order to ensure that the infrastructure operations and traffic codes can be adjusted where necessary to improve traffic safety while accommodating these new classes of advanced vehicles. Understanding how to transition from driver and driverless needs to be studied. Human-controlled vehicles are likely to remain on the roads for many



years and even decades to come. How people and driverless cars will mix together is a question that needs to be addressed. Many of our academic and research members have been active in advising state and local transportation authorities on how to plan for vehicle and infrastructure connectivity and automation

While I was at Colorado DOT, we understood in particular the need to address infrastructure needs to improve safety and accommodate new connected and automated vehicle technologies. We worked to improve the reflectivity and durability of roadway pavement markings throughout major corridors in the state. We also deployed V2I DSRC along Interstate 70. And of course, we worked with tech companies to begin to explore the capabilities of automated vehicles. In 2016, we worked with Otto and Uber to allow their 120-mile demonstration of the world's first commercial delivery by a self-driving truck.

A Better Future Transformed by Intelligent Mobility: Electric Vehicle Charging Infrastructure

An increasing number of automakers are committing to deploy automated electric vehicles. ITS America believes that an automated electric vehicle represents one of the best ways to reduce carbon dioxide (CO₂) pollution and our nation's dependence on oil from volatile and unpredictable regions of the world.

One of my last acts as head of the CDOT was to work across state agencies to help implement Governor John Hickenlooper's Executive Order D 2017-015, "Supporting Colorado's Clean Energy Transition." The executive order directs state agencies to develop a plan to electrify Colorado's transportation corridor.

Despite the recent growth in Colorado's electric vehicle (EV) market, including that the first eight months of 2017 saw EV sales jump 73 percent over the same period in 2016, we found significant barriers to adoption. These barriers included a lack of public charging stations, particularly EV fast-charging along major transportation corridors. Consumers were apprehensive about the availability of



public charging, including local, community-based charging stations and fast-charging stations along Colorado's transportation corridors, and build-out of an EV fast-charging network would likely require significant public funding due to the high cost of installation. These barriers are not unique to Colorado. Now, as head of a national association, I hear similar concerns from our member states and cities as well as automobile manufacturers. As companies prepare to deploy automated electric vehicles, ITS America calls on federal, state, and local governments and the private sector to build-out the charging infrastructure to support the next generation of mobility powered by electricity.

A Better Future Transformed by Intelligent Mobility: An Infrastructure Plan that Lays the Groundwork for Connected and Automated Vehicles

Once the envy of the world, our increasingly outmoded roads, bridges, transit, freight, and intercity passenger systems are struggling to move the nation's technology-driven economy. Investment in far-sighted intelligent transportation technologies will enable scarce infrastructure funds to reach farther and with longer-lasting results. As owners, operators, builders, innovators, and users of transportation infrastructure, we urge Congress to pass, and the Administration to support, an infrastructure bill that prioritizes investments in intelligent transportation technologies that modernize the infrastructure that will enable the safe and efficient operation of connected and automated vehicles.

ITS America recommends that an infrastructure bill should:

- *Leverage existing FAST Act programs:* Increase funding for FAST Act programs. Intelligent transportation technologies, including V2I, are eligible uses of most FAST Act highway program funds. Specifically increase funding for the Intelligent Transportation Systems Program, Advanced Transportation and Congestion Management Technologies Deployment Program, Technology and Innovation Deployment Program, and for the Surface Transportation Block Grant program, and



Congestion Mitigation and Air Quality program – flexible programs that often fund intelligent transportation deployment activities.

- *Create grants for emerging technologies that support congestion relief:* Provide new funding for intelligent transportation deployment activities that support congestion relief. The program would include both formula and grant funding. Eligible projects would include capital and operational investments that improve system safety and performance. Examples include priced managed lanes; transportation demand management programs; strategic transit investments; advanced parking, freight delivery, and incident management systems; and programs to support the deployment of connected and automated vehicles, including V2V and V2I technologies.
- *Expand opportunities for smart communities:* Build on the successes of the 2015 Strengthening Mobility and Revolutionizing Transportation (SMART) Cities Challenge administered by the U.S. Department of Transportation by including new federal grants to expand opportunities for communities – large and small/urban and rural – to compete for resources that will fund innovative and sustainable smart transportation projects. Projects should emphasize maturing technologies and performance goals. Incentivize the connection of smart cities and assist in the advancement of testing and deployment of automated vehicles
- *Increase development of Electric Vehicle (EV) charging infrastructure:* Additional development of EV charging station corridors based on federal and state incentive projects as well as public private partnerships. Continue to look at new technologies such as inductive charging to speed the deployment of EVs.
- *Develop additional opportunities for broadband deployment:* Provide new federal funding and grants for broadband in unserved areas—both rural and metropolitan—to support the deployment of intelligent transportation applications that depend on connectivity.



- *Provide investments to stabilize the Highway Trust Fund and more resources for intelligent transportation technologies:* Provide new and long-term investments to stabilize the Highway Trust Fund, increase federal funding for intelligent transportation technologies, and provide a multi-faceted approach to leveraging public and private resources.

A Better Future Transformed by Intelligent Mobility: A National Framework for Automated Vehicle Development and Deployment

Connected and automated vehicle technology is the best tool in our toolbox to drastically reduce crashes. As we have seen over the past few months, technology is not infallible. While we must study each of these fatalities, we must not forget that every day on average in the United States, 100 people lose their lives on our roadways.

Our members must redouble efforts to ensure any deployments of automated vehicles are safe. Private sector innovators — car and tech companies alike — along with research organizations, must work with government agencies to safeguard the public. We need a federal framework for automated vehicle development and deployment, as well as reinforced state and local roles. We must allow these vehicles to drive the hundreds of millions of miles required to make them safer. Automated vehicles are much like new drivers — they have a great capacity to learn, but they need experience. Just as a human driver improves with time, so too will automated vehicles. Unlike humans, however, they do not get distracted, they won't fall asleep, and they will not drive under the influence.

ITS America believes that the AV START Act (S. 1885) achieves these objectives by maintaining state and local authority over the operation of highly automated vehicles on public roads and memorializing the federal role in ensuring the safety of highly automated vehicles as it relates to design, construction, or performance. The bill's Report language is clear that "performance with regards to NHTSA's traditional authority over design, construction, or performance, excludes the act of a highly automated



vehicle or a vehicle equipped with automated driving systems from complying with state and local traffic laws and rules.” We also believe that the recent crash in Tempe (AZ) involving a highly automated vehicle highlights the need for federal oversight of how manufacturers are addressing the safety of these vehicles. Currently, there are no federal regulations specifically governing the safety of highly automated vehicles. The AV START Act would put in place federal oversight of the safety of highly automated vehicles. The AV START Act’s Safety Evaluation Report would require manufacturers and other entities developing and testing highly automated vehicles to explain to NHTSA and the public how vehicle safety is being addressed, including how they would address pedestrian protection.

We think it is important to point out that the AV START Act creates a process where developers can apply to NHTSA to demonstrate that features of their products provide equivalent level of safety to those required by Federal Motor Vehicle Safety Standards (FMVSS). One of the most important aspects of the bill is that it requires NHTSA to develop FMVSS for self-driving vehicles on an expedited basis. This is necessary because the automobile and technology industries need experience operating these vehicles in sufficiently substantial numbers to generate the broad data across a multitude of scenarios and environmental operating conditions necessary to ensure safety. As these supervised automated vehicles gain experience, they will develop greater awareness of roadway hazards, which is key to preventing crashes.

We can have a better, safer future transformed by connected and automated vehicles. We can have a world in which cars don’t crash. We must learn from the recent tragedies, but we cannot lose sight of our goal to prevent future tragedies and save more lives.

A Better Future Transformed by Intelligent Mobility: Conclusion

I would be remiss if I did not strongly urge Congress and the Administration to identify long-term and sustainable funding for the Highway Trust Fund before the FAST Act expires in 2020 to ensure the law



is reauthorized on time. Maintaining our infrastructure is vital. Funding for research examining the transition to a connected and automated vehicle environment and a “connected infrastructure” is also important. This kind of research requires funding.

In conclusion, the future of mobility is happening today with ITS America members. From connected and automated vehicles and infrastructure to delivery drones to the Internet-of-Things to Mobility on Demand to When-I-Want-It/Where-I-Want-It-Logistics, our members are researching, developing, testing, and deploying technology that will create a better future. In fact, last week I was with more than 2,500 people - from corporate executives to city, state and federal government officials - at our annual meeting in Detroit. We spent hours discussing automated vehicles on panels such as “Connected and Highly Automated Vehicles are Coming: What Needs to be Done Now to Prepare for Them” with Detroit, Colorado Department of Transportation, New York City Department of Transportation, Utah Department of Transportation, Texas Department of Transportation, and AECOM. In addition, the Federal Highway Administration launched its National Dialogue on Highway Automation at our annual meeting.

Changes are happening today that will fundamentally affect how people interact with transportation in the months and years ahead. ITS America is helping states, cities, the private sector, and researchers as we work toward our vision of a better world transformed by intelligent mobility - one that is safer, greener, and smarter.

Thank you again for the opportunity to testify today, and I am happy to answer any questions you may have.

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ITS America advances the research and deployment of intelligent transportation technologies to save lives, improve mobility, promote sustainability, and increase efficiency and productivity. For more information, visit <https://www.itsa.org/>.



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