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Paul P. Skoutelas

1300 I Street NW
Suite 1200 East
Washington, DC 20005
p: (202) 496-4800
f: (202) 496-4324

APTA.COM

April 2, 2020

Docket Operations
U.S. Department of Transportation
1200 New Jersey Avenue, SE
West Building, Ground Floor
Room W12-140
Washington, DC 20590-0001

Re: DOT-OST-2019-0179

Dear Docket Clerk:

These comments and recommendations are submitted on behalf of the American Public Transportation Association (APTA) on the Department of Transportation (DOT) Office of the Secretary (OST) Notice of Request for Comments: Ensuring American Leadership in Automated Vehicle Technologies: Automated Vehicles 4.0 (AV 4.0), published on February 6, 2020 at 85 FR 7011.

About APTA

APTA is a non-profit international trade association of more than 1,500 public and private member organizations, including public transit systems; high-speed intercity passenger rail agencies; planning, design, construction and finance firms; product and service providers; academic institutions; and state associations and departments of transportation.

General Comments

APTA applauds the DOT for issuing a multimodal framework for new automated technologies, and a regulatory environment supportive of innovation. The transit industry has witnessed many changes over the last several years and is poised to embrace technology-driven mobility solutions to continue to efficiently meet passengers' needs and expectations. A fundamental role of government is to assure that technology trends are steered toward favorable public outcomes. At state and local levels, AVs must be coupled with policies that achieve critical mobility goals in order to be successful. For example, local policies such as congestion pricing, bus priority, and electrification of the transportation network become that much more critical. Comments will highlight areas that require further consideration on the way to automation in the transit operations. APTA's comments are structured around the key areas of AV 4.0 (1) organizing data collection, (2) specific policy goals for public transportation, (3) supporting public transit agencies through federal research & development programs as they adopt automated systems, (4) a national policy framework as a safeguard against increased VMT, emissions, traffic and sprawl, and other considerations.

Organizing Data Collection

The lack of centralized and objective public data makes AV technology less trustworthy to public transportation agencies. A repository of information on AV demonstrations would be very useful to inform future planning and other deployments. This should capture the use cases, policy and regulatory environment, business models, operational design domain, supporting infrastructure, public acceptance, safety and operations, and other relevant topics from a demonstration/pilot. These technologies include onboard vehicles, infrastructure, and back office systems. There needs to be consensus on how to assess the safety and certification of such systems and what technologies and design methodologies are required to meet the safety standards. The repository should focus on public transit agencies and avoid capturing too much detailed data on the vehicle systems. Data collected during AV demonstration/pilot programs would be a key success factor to guide clients, both public transit agencies and private agencies, to include AV in their planning process. And would encourage more cautious transit agencies with an innovation clearance from a well establish and reliable body.

One simple strategy could be prioritized: test multiple techniques at many systems in controlled settings (parking lot, fuel/wash cycles). This approach could maximize study data and minimize safety issues.

APTA further emphasizes that data on demonstration projects can be helpful in building the next generation of pilots. For example, the cost per person served compared with traditional transit vehicles providing similar service, notwithstanding that such data would need to be considered in its context.

Specific policy goals to benefit public transportation

AV development and policy shall consider that one of the key benefits is to improve the performance of public transportation and mobility overall. Specific goals include developing:

- comprehensive roadway infrastructure and safety standards and regulations,
- well-coordinated communications infrastructure
- standards that will support integrations of AV and other transit systems and services.

New policy goals on automation for public transportation would also help to establish clear iterative milestones for agencies to use higher levels of automation and also provide clear guidance on opportunities to partner with Mobility as a Service (MaaS)/Mobility on Demand (MOD) and other mobility providers and technology companies to address first/last mile issues.

There have been a significant number of low-speed AV shuttles in cities and transit agencies across the United States. AV shuttles are unique as they are one of the few commercially available automated vehicles that are mostly designed to have no operator that can be purchased or leased. Such shuttles have focused on testing whether people would actually board driverless vehicles and whether they could satisfy basic operational functions. The next wave of pilots will include next-generation vehicles and will be more suited to addressing market needs. Building one step at a time! Approaches and deployment regarding AV shuttles as first/last mile solutions, however, is fragmented across public transportation agencies. State and local policies and legislation make for a confusing landscape and lack clear understanding of AV shuttle capabilities and use cases by public agencies which inhibits AV shuttle deployments on a meaningful scale in the US.

Supporting public transit agencies through federal research & development (R&D) programs as they adopt automated systems

Federal approaches and timelines for R&D will struggle to keep pace with changes in private industry R&D. Development of a joint public-private R&D roadmap should be considered to optimize the efforts of public agencies versus that of the private sector in order maximize the capabilities of public and private sectors

Federally funded pilot projects should encourage and facilitate coordinated planning, development, testing, and evaluation of automated systems. Pilots help to understand automation within the context of existing federal laws and regulation such as Americans with Disabilities Act (ADA), Title VI, labor standards, etc. Federal R&D programs can help advance the state of practice and move agencies towards consistent and meaningful deployment of automated vehicle technologies. AV R&D projects should be required to have an element for transit system review to show opportunities for integration. In order to further advance research, pilots are needed for high capacity automation since most efforts up to now have focused on smaller low speed shuttle uses.

Similar to the current funded pilots on the Fuel Cell Electric Bus Program, AV funded pilots would bring return on experience from real life operations. This kind of data is key to make the technology evolve in the right way for public transportation. An example to test the technology in a closed environment could be to develop a pilot for automated maintenance garage applications.

A national policy framework as a safeguard against increased Vehicle Miles Traveled (VMT), emissions, traffic and sprawl

A national policy framework is absolutely essential to assure that increased VMT, emissions, traffic and sprawl do not increase in urban areas. All four will occur under current policies. A framework should be established that more specifically outlines the vision, goals, business case, and phased national deployment for higher levels of automation. Indeed, as of today, autonomous shuttles are the easiest autonomous mode to set up though not the most interesting in terms number of passengers carried. Replacing transit buses by autonomous shuttle service would result in more traffic and maintenance facilities sprawl, reducing the environmental benefits of this technology.

Vehicle automation should be a gradual process

While there is value in planning for level 5 automation, we are likely to see level 3-4 automation on our streets much sooner than level 5. There may be reason to believe that the critical issues lie within the transition to full automation. A shared public and private approach to advancing vehicle automation should be developed that focuses on incremental advances in vehicle automation. This will allow for the proliferation of lifesaving automated features on public and private fleet vehicles that work towards progress to level 4 and level 5 automation. Public transportation operators have been early adopters and haver realized significant benefits from driver assist, automating docking and other aspects of AV technology.

The federal government should consider requirements for cell phone and portable electronic devices manufacturers to include software/hardware that will automatically disable distractive functions that would be detrimental to safe operation of an AV. These requirements would be applicable during the complete transition to level 5. This effort would be performed in close collaboration with AV manufacturers, and standards could be developed to advance this initiative.

Workforce Development

Workforce considerations are critical in assessing the anticipated impacts to public transit vehicle operators and maintenance crews as well as needed skills in data science, intelligent transportation systems, and telecommunications that agencies will need to fully leverage automated vehicle technologies to accomplish their mission and innovate as technology matures and market demands and consumer habits evolve.

Public transportation systems shall be a stakeholder as AV develops workforce training. With respect to labor standards, existing law appears to present a challenge for transit agencies that may wish to pursue automation. There should be thought, and policy guidance given with regards to transit operator layoffs. What kinds of safety nets and education/training can we assemble for workers laid off due to automation?

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Research needs to look into how to deploy labor to provide a high-quality customer experience while reaping the benefits that full automation could enable i.e. much higher frequency services at current or lower costs. The goal should be not to reduce the labor force but ultimately increase the amount of service available with this labor force. Full automation may not occur for some time but planning and preparing needs to take place now and transit should be the first adopter of full automation.

AV impacts on the drivers' workforce is a sensitive issue which would be eased by the introduction of the need for various levels of automation in transit. AV could also be used to extend transit operations at night, when they are less passengers to carry, possibly on an on-demand mode. Such extensions would not impact the numbers of drivers. As of today, AV still need to be maintained by people.

Other objectives that would be important from the perspective of public transportation operations

Other key objectives include:

- Data sharing between AV and transit systems on a common platform
- Equity - both in terms of outcomes as well as access to opportunities and impacts on marginalized communities. APTA believes there is a critical need for equity in our transportation system and acknowledges the potential of AVs to be beneficial in that area. Goals should be less focused on AVs as a means to allow people to sleep or recreate while traveling when there are more fundamental issues to address.
- Accessibility - individuals with disabilities need to be part of the development, planning, and implementation process to facilitate the accessibility of the technology. The voices of individuals with disabilities can also be important in communications, outreach, and marketing of the service, and thereby help with increasing diverse ridership. it is important that autonomous vehicles and the services they provide be designed to accommodate all passengers, particularly passengers with disabilities. Public transportation is intended to serve everyone, and customers with disabilities are a growing and important segment of transit ridership. As transit evolves, we must ensure that all services we offer remain available to passengers with disabilities and are designed in a way that they will not require supplemental paratransit, to the greatest extent possible.

- Resiliency: AV technologies as a strategy for system resiliency
- Innovation: AV technologies as tools for ongoing innovation and improvements in service delivery.
- Safety in its holistic context: Priority needs to be given to buses and other high occupancy vehicles in congested or potentially congested areas. On the federal side incentives and funds should be available to provide for prioritizing high occupancy motorized transportation and active transportation. The most important focus must be placed on the safety and collision avoidance components. There have been no credible arguments to reduce or impede these strategies.

AV 4.0 continues to highlight traffic safety as the primary benefit. Research by APTA and embraced by National Transportation Safety Board (NTSB) and others quantify that persons traveling via public transportation are nine-times safer than persons auto travelers. While AVs can certainly provide safety benefits in a number of ways, improved safety will only come through a broader set of policies, including public transportation.

Federal Communications Commission (FCC) notice of proposed rulemaking (NPRM) that would permit unlicensed devices to operate under spectrum currently devoted to transportation operations. Spectrum will be essential as transportation operations increasing become automated

Allow communication-based train control system for accessing of AV's dispatching, routing and synchronization. Proper bandwidth in the 5.9 gigahertz (GHz) band for Vehicle-to-everything (V2X) is a critical tool to help advance the safety and consistency of automated vehicles across multiple AV developers. It is also a critical tool to facilitate cooperative automation and operational strategies, such as automated vehicle platooning, dedicated lanes for AVs, and specific use cases. Without proper bandwidth in the 5.9 GHz band to deploy V2X technologies at a larger national scale, the progress of higher levels of automated vehicles will be mostly dependent on the advancement of sensors and artificial intelligence (AI), of which many AV developers are now acknowledging the difficulty in mastering the difficult to solve AV "edge cases."

Additional Comments

A clearly defined national policy should be developed, working in close collaboration with the Central Intelligence Agency (CIA), Federal Bureau of Investigation (FBI), National Security Agency (NSA), Office of the Director of National Intelligence (ODNI), Defense Intelligence Agency (DIA), National Reconnaissance Office (NRO) and other relevant intelligence agencies, to address the very real threat posed by non-cybersecurity terrorism, and to provide guidance and assistance in the development and formulation of proactive mitigation strategies (to counter these non-cybersecurity terrorism threats) that AV designers and manufacturers can design and build their AV technology.
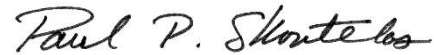
There is, at present, no complete framework for safety assessment and safety certification of AV technology. This is an area of primary importance as this will allow all manufacturers and integrators to design to clear safety targets. The federal government could facilitate such safety standard development by encouraging institutions such as Society of Automotive Engineers (SAE), Institute of Electrical and Electronics Engineers (IEEE), or other similar entity to take the lead in such development with support from relevant agencies and institutions. NTSB would also collaborate in such effort and add significant value based on their investigation of events that occurred in the US and their interaction with their foreign counterparts that investigate similar events throughout the world.

Various suppliers, agencies and consultants have been engaged in driverless transit since the late 1960's. Existing standards (ASCE-21, NFPA 130, IEEE 1474, etc.) could help in providing valuable guidance to the development and deployment of Autonomous Decentralized System (ADS). Although generally established for

driverless systems utilizing a dedicated guideway, these standards and establish industry specifications could help evoke conceptual considerations which would be invaluable to the ADS development. In addition, collaboration with automated transit could help migrate ADS technology for systems such as automated people movers, light rail and metros.

We appreciate the opportunity to assist the DOT in this important endeavor. For additional information, please contact Linda Ford, APTA's General Counsel, at (202) 496-4808 or lford@apta.com.

Sincerely,

Paul P. Skoutelas
President and CEO