Volvo Group North America

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Infrastructure, Safety and Security

Committee on Commerce, Science, and Transportation

Hearing on "Technologies Transforming Transportation: Is the Government Keeping Up?"

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Chairman Fischer, Ranking Member Booker, and distinguished members of the subcommittee, I would like to thank you all for the opportunity to appear before you today to discuss the importance of innovative transportation technologies that are improving the safety and efficiency of our transportation network and the role the Federal government plays in either facilitating or hindering that development. My name is Susan Alt and I am the Senior Vice President for Public Affairs for Volvo Group North America.

The Volvo Group is one of the world's leading manufacturers of trucks, buses, construction equipment, and drive systems for marine and industrial applications. When it comes to surface transportation, we build products that make roads and we build products that use them. In the United States, we produce heavy-duty trucks, engines, and transmissions under the Volvo and Mack brands, Volvo Construction Equipment, Volvo

Penta marine engines, plus Prevost coaches and Nova transit buses. The United States is the largest single country market for the Group worldwide and since we subscribe to a "build where you sell" philosophy, we have more than 12,500 U.S. employees and nine manufacturing facilities in six states. We firmly believe that technology drives both improved safety and efficiency of the U.S. freight system and the Volvo Group has long been a leader in developing and implementing safety technologies without regulation on all our vehicles. Our goal is zero accidents, which can only be achieved by close cooperation between public, private and non-profit stakeholders.

The primary questions before the subcommittee today are how technology can improve the safety and efficiency of our U.S. transportation system and whether the government is helping or hindering the adoption of new technologies. I am going to answer these questions primarily from a heavy-duty freight truck perspective because trucking delivers nearly 70% of the domestic tonnage and more than 80% of the value of freight shipped in the United States. These questions come at a transitional time for the heavy-duty commercial vehicle industry because a great deal of vehicle technology is emerging to help mitigate accidents and increase on-time delivery of freight. The government can help by putting in place policies to ensure the safest and most efficient adoption of these technologies in vehicles.

Let's say you want to purchase a new heavy-duty Class 8 truck, and you want to take advantage of available technologies to help reduce the risk of an accident and ensure the freight is delivered on-time all the time. Today, there are at least four areas where newly developed technology will help you.

1. The first is new safety technology on the **vehicle** itself such as electronic stability control (ESC), adaptive cruise control, rear view cameras, active braking and lane departure warning systems;
2. The second is new technology to improve **driver behavior** such as remote monitoring of the quantity of hard braking applications, the speed traveled, or hours of operation on routes;
3. The third area is new technology to predict the **vehicle uptime** such as remote vehicle monitoring and diagnosing to predict a failure and alert the driver or dispatcher to take action before it occurs;
4. And fourth, new technology to dynamically **plan the driver's route** to minimize stops or delays due to traffic congestion.

You would specify all of these options to be installed on your new truck to meet your objective. (N.B. the National Highway Traffic Safety Agency (NHTSA) recently finalized a regulation that mandates ESC for new truck tractors. The rule is applicable to typical three-axle truck tractors manufactured on or after August 1, 2017 and allows four years of lead time for all other truck tractors).

The next step to further reduce the frequency of vehicle accidents, while also improving efficiency of the freight system is the adoption of technology that wirelessly connects trucks to each other, to other vehicles and transportation users, and to the infrastructure itself. We see great potential from both vehicle-to-vehicle (V2V) and vehicle-to-infrastructure (V2I) technologies. Volvo is the only truck member of the Intelligent Transportation Society of America (ITS America) participating in the newly formed V2I Deployment Coalition. We are also the first truck OEM to formally

participate in the Crash Avoidance Metrics Partnership (CAMP) V2I consortium, whose mission is to assist the U.S. Department of Transportation in developing, evaluating and testing V2I applications to enhance safety, mobility, and environmental sustainability. The protocols for V2V and V2I applications are supported by the dedicated short range communications (DSRC) standards and operating in the licensed 5.9 GHz band of the radio frequency spectrum. With communications occurring ten times per second, it is critical that these messages be free of any signal interference. The Institute for Electrical and Electronics Engineers (IEEE) and the Society of Automotive Engineers (SAE) are professional international organizations that set standards for these communication protocols. DSRC standards are largely mature, but are in a revision phase prior to NHTSA issuing a draft rulemaking that will mandate DSRC for light duty vehicles later this year. For example, the IEEE 1609.2 standard that outlines security services needs a re-defining of the data structures and encoding. The SAE J2735 message set dictionary is currently being finalized. The SAE J2945.0 and J2945.1 standards that specify the on-board minimum performance requirements for V2V safety systems are expected to be published later this year. These examples show that solutions are coming to address concerns regarding security/privacy, positioning, and scalability, to name a few.

The government got it right when in 1999 the Federal Communications Commission (FCC) had the vision to set aside and protect the 5.9 GHz frequency spectrum for only safety related communication. However, in 2013, the FCC began exploring the possibility of using the 5.9 GHz spectrum to also support unlicensed Wi-Fi users and the coexistence of Wi-Fi and vehicle safety communications on the same spectrum. Two proposals to share the spectrum using different access mechanisms have

been developed; however, no consensus position was reached. The concern is that by allowing other technologies to be shared on the same spectrum, it could create a lag or latency in sending critical and lifesaving communication signals. Therefore, we join with the automotive industry, ITS America, and others in opposing S. 424, the Wi-Fi Innovation Act that would open up the 5.9 GHz frequency spectrum to Wi-Fi access for non-safety and other applications such as entertainment and advertising. Passage of this legislation is premature as the automotive, Wi-Fi and transportation safety communities work with the FCC, NHTSA, and the Department of Commerce's National Telecommunications and Information Administration (NTIA) to explore whether a technical solution exists that would not compromise the opportunity to save lives.

To clarify how this works, let me provide an example: a Vehicle to Vehicle (V2V) safety message may be something as simple as vehicle #1 (a loaded tractor-trailer operated by a professional commercial driver) approaching a signal intersection that is green, but the view of oncoming vehicles is blocked by a building. Using a DSRC based V2V application, it is possible to alert the truck driver of an oncoming vehicle #2 that is not slowing down for his/her red light, and the system alert will allow the collision to be avoided. Furthermore, there are opportunities to integrate this alert with the vehicle braking system to achieve partial automation to enhance safety. If there is any latency in that signal because of interference from (e.g.) a Wi-Fi user watching a video, the accident likely would not be avoided. Consider how such risks can multiply exponentially in situations involving not just two vehicles in an intersection, but hundreds of vehicles moving through a heavily congested area. For this reason, until a solution is found for

spectrum sharing of the 5.9 GHz frequency, we want the spectrum to remain dedicated for safety related applications only.

Getting back to that next technology – the V2V and V2I connected vehicle technology -- to further improve safety and efficiency in our transportation system, let me share an example of a Vehicle to Infrastructure (V2I) message that could greatly improve safety and freight efficiency. Truck inspections play an important role in maintaining safety. However stopping along the interstate to wait in long lines at weigh stations negatively impacts fuel efficiency and the environment, increases driver fatigue, and causes potential delivery delays. To avoid these disadvantages, the Volvo Group has already demonstrated technology using V2I communications protocols from the truck to the weigh station here in the U.S that allows moving trucks to wirelessly communicate their safety and maintenance credentials to inspections stations – keeping them moving and allowing authorities to focus on the condition of trucks that haven't been validated in what was called Trusted Truck®. These messages coming from sensors on the vehicle can provide driver's credentials such as if he is wearing a seatbelt or the "health" of a truck, such as if the tires are fully inflated or the overall weight is legal. Field testing such a system could further validate this concept.

Another example of V2I technology's potential contribution to play an important part of safer and efficient transportation is the Volvo Group's experimental technology that allows a 360 degree scan of everything that happens in a truck's environment. The truck analyzes the traffic around it, with the possibility to predict up to 5 seconds ahead what surrounding objects like people, cyclists and other vehicles will do – even when moving. If a collision is imminent, the driver is warned audibly and if the driver doesn't

stop the truck, the truck brakes for him or her. By alerting the driver of risks and, when needed taking control of the vehicle, the system helps eliminate human error and further mitigates the risk of accidents.

I've told you about newly available technology and I have given you a look into the potential of connected vehicles. Let me end with what is perhaps the final frontier – automated or autonomous driving technologies. That is, using the connected vehicle technology fused with on-board collision avoidance technology. NHTSA has defined this as Level 3 in its criteria for Driving Automation. With many OEMs touting some version of this technology in the works, trucks equipped with autonomous driving technology seem to be the "talk of the town" in our industry.

Volvo Group believes that vehicle automation has significant potential to improve traffic safety and transport efficiency while reducing the environmental and other societal costs. It also has the potential to increase road capacity with limited investment in road construction as more trucks could travel safely within shorter driving distances. Given the "high tech" character of trucks equipped with autonomous driving technology, and the fact even a so-called "autonomous truck" will still need a human driver for the foreseeable future, it may even lure younger drivers to an industry sorely lacking drivers. As an OEM with a global presence and many product areas, the Volvo Group sees potential for autonomous driving technologies for many types of transportation scenarios and application areas.

Perhaps you have driven a car with adaptive cruise control or ACC? It is where you take a "leap of faith" by allowing the car's automation technology to slow itself if the distance set between you and another car becomes too close. We have the same adaptive

cruise control technology in our heavy-duty trucks. **Cooperative** Adaptive Cruise Control (C-ACC), Adaptive Cruise Control married with vehicle connectivity technology, also called "platooning," is an early application of automation that we believe will have a positive impact on safety, reduce road surface usage, improve traffic flow, as well as provide a significant potential to reduce fuel consumption. Full-scale experiments indicate that platooning reduces fuel consumption for long haul transports by approximately 10% over a complete transport mission due to reduced air drag.

Future development will continue with vehicles equipped with autonomous driving technologies to be confined to operating in areas at low speed as an important first step towards higher degree of automation. Full automation and operating at higher speeds on public roads will take longer and need more research. Research needs to be performed in close collaboration with governmental entities in order to handle legal issues and public acceptance. Vehicle connectivity (V2X) will increase the performance of existing and future safety systems and is a prerequisite for vehicle automation; also, collaboration is necessary to agree on standards and implementation roadmaps. The technical solutions and advanced concepts for both V2X networks and integration of autonomous technologies are being conceptualized by researchers around the world. The U.S. could take a leading position in this field with more robust research and development funding for academia and the private sector.

A challenge for us as a U.S. manufacturer is that different states are developing different rules and regulations to promote autonomous vehicle testing, but a national standard is needed as our vehicles travel across all state lines. For example, there are regulations regarding the allowable distance to follow a truck on public roadways that

need to be changed to allow for further testing and demonstration. Clear, precise and thoughtful definitions must be provided. In this brave new world of "automation," careful consideration must be given when writing new regulations for this area. Using generic terms like "driver", "control", or even "system" in regulations can create confusion and misinterpretation. Additionally, regulations written when trucks were not as "smart" as they are today can have a drag on adoption. There are inconsistent state laws for axle loading that prevents the wider adoption of 6x2 liftable axle configurations. The required position of marker lights at the rear of a trailer conflicts with the aerodynamic position of a boat tail is another such example

Volvo Group and the California Partners for Advanced Transportation Technology (PATH) are in the process of implementing a two-truck platoon at slow speeds that will be extended to three trucks in 2016. These trucks leverage the V2V messages in addition to forward-looking sensors, using radar plus a camera, to help maintain constant clearance and dynamically harmonize cruising speeds. The SAE standards organization is working to develop and harmonize the message sets and protocols together with the European Telecommunication Standards Institute (ETSI).

We are interested in developing technologies for connected and automated driving because of their potential to enhance safety, environmental efficiency, and productivity that are paramount to us and our customers. This may substantially change how the traffic system and the vehicles are designed, both in urban and extra-urban environments. With these technologies in widespread use, we will be able to more efficiently use the available road space to increase mobility and transportation efficiency. This will truly

support sustainable development in the face of growing population and transportation needs.

I've mentioned several times that a faster rate of adoption of these technologies will help meet our overall goals, but they will only be achieved if the customer can make a business case for their purchase. Today there is a 12% Federal Excise Tax (FET) on the purchase price of each new Class 8 heavy-duty truck. As advanced technologies are added to trucks and the purchase price increases, this FET becomes more onerous. If we eliminated that FET, and offset it with a higher fuel tax, it would encourage faster integration of vehicles with new technologies on our roads.

In the face of either stagnating or uncertain funding for our U.S. surface transportation systems, it is the adoption of these new areas of technologies that will allow us to move increasing amounts of freight for a growing population. The technology will help ease congestion on the roads, but it won't solve all our freight capacity problems and doesn't let Congress off the hook to do its job of providing Federal funding to maintain and grow the overall infrastructure.

The last major transportation reauthorization, Moving Ahead for Progress in the 21st Century (MAP-21), was an important step in implementing key surface transportation policy reforms. However, infrastructure investment must be considered as a long-term strategic objective. The Volvo Group believes that a full six year, well-funded reauthorization is needed to address the persistent challenges that are already well-documented and recognized as problems facing our transportation system. We are encouraged by the recent action of the Environment & Public Works Committee to pass

the DRIVE Act and stand ready to work with the Commerce, Science, and Transportation Committee on its portion of the Senate's reauthorization bill this year.

Transportation moves our economy, and we need every sector of our economy functioning to maintain growth and remain competitive globally. A strong infrastructure has a direct and vital impact on America's competitiveness. Technological innovations in the trucking industry can not only improve safety, but can also improve the efficiency and productivity of the network. The Federal government should continue to work collaboratively with the industry to ensure that these innovations are accepted in the market. Thank you for the opportunity to testify today, and I will be happy to respond to any questions.

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