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Department	Executive
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Date	February 2, 2021

Attention: Steve Cliff
Deputy Administrator
National Highway Traffic Safety Administration

RE: Docket No. NHTSA-2020-0106

Dear Deputy Administrator Cliff:

ZF North America (ZF) appreciates the opportunity to respond to NHTSA's Advanced Notice of Proposed Rulemaking (ANPRM) regarding the Framework for Automated Driving System (ADS) Safety outlined in this proceeding. As a leading producer of technologies that enable automated driving, ZF is pleased to inform this process.

ZF North America is headquartered in Livonia, Michigan, and is a primary developer and producer of active, passive, and integrated safety systems, serving all major vehicle manufacturers. We proudly design and produce many of these technologies and products here in the United States.

ZF is appreciative of this initiative to pursue a clear and pragmatic path forward to an ADS-reliant future that continues to put safety first. In order to achieve that end, we support a gradual approach that will transition from today's guidance, voluntary information sharing, and waiver process to a formal Federal Motor Vehicle Safety Standards (FMVSS)-based process that enables broad deployment of ADS-equipped vehicles while fostering innovation and maintaining NHTSA's longstanding top priority of automotive safety. In the comments below, ZF provides feedback regarding a selection of the questions posed in this ANPRM.

Highlights of ZF's Comments:

- ZF concurs that the four core functions NHTSA outlines (sensing, perception, planning, and control) should form the basis of its future ADS framework.
- Key among the other safety functions considered should be the ability of ADS to self-diagnose if the system capability is degraded or the operational design domain limits are exceeded and leverage system redundancies to perform minimum risk maneuvers to protect occupants and other road users.

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- To accelerate testing and deployment without inhibiting innovation, NHTSA's future guidance and standards would benefit from practicable alignment with standards developed by other government and nongovernmental entities around the world.
- To address the need for adequate safety and cybersecurity in ADS-equipped vehicles, NHTSA could consider a requirement that manufacturers have a safety and cybersecurity risk management system in place. Some models for how this might be developed include UNECE R155 and ISO/SAE 21434, which is under development.
- NHTSA should act to update and expand future ADS guidance and regulations, as appropriate, with a regular and predictable cadence, allowing for adequate lead time for OEMs, suppliers, and road users to plan and prepare for those changes.
- In so doing, NHTSA could build from today's regime, gathering and leveraging intelligence at each step of the process to inform the next round of regulatory activity.
- An important step in this process toward increased ADS testing and deployment could be an automated vehicles pilot program like the one outlined in the Alliance for Automotive Innovation's recent "Policy Roadmap to Advance Automated Vehicle Innovation."
- As the formal regulatory process develops and evolves, it will be important for NHTSA to exercise technology neutrality through the rulemaking process to the greatest extent possible, avoiding overly prescriptive standards that could stifle innovation without benefitting safety.
- Also of importance to ZF is to achieve parity between ADS system suppliers and OEMs in terms of regulatory approval requirements for on-road testing of ADS-equipped vehicles.

ZF's full comments are provided on the following pages.

Again, ZF appreciates this opportunity to share our perspective with NHTSA. We stand ready to provide further clarification and insights regarding this feedback, as needed.

Best regards,

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ZF Response to NHTSA-2020-0106: Framework for Automated Driving System Safety

ZF is pleased to offer its perspective on this ANPRM. Below are ZF's responses to the general questions in this Notice, as well as the enumerated questions pertaining to a future safety framework, NHTSA research, and administrative mechanisms that might be considered in furthering this framework.

General Questions:

Four Core Functions (sensing, perception, planning, control):

Question: NHTSA requests comment on these four core functions, including whether commenters agree that these are the core functions, views on NHTSA's description of these functions, and whether and how NHTSA should prioritize its research as it develops a safety framework.

ZF Response:

ZF sees the value of measuring and eventually regulating based on the four core functions outlined. In fact, ZF's See Think Act approach to automation – through which we develop technologies to enable vehicles to observe and collect information, process it, and take proactive measures to adapt – aligns well with NHTSA's proposed core functions.

Other Safety Functions (identifying reduced system performance/ODD; operating in degraded mode; transporting to chosen destination; recognizing/reacting to first responders; OTA software updates; system maintenance; safety/cybersecurity risks; system redundancies):

Question: NHTSA requests comment on which of these aspects the Agency should prioritize as it continues the research necessary to develop a safety framework. NHTSA also seeks comment on whether it has an appropriate role to play with any or all of these elements outside of research. If so, which element(s)? For each such element, should NHTSA's role be regulatory or subregulatory, and in what manner?

ZF Response:

Each of these functions could be considered by NHTSA as it moves ahead with a regulatory framework. Key among these is the ability to manage ADS system degradation through design redundancies that can mitigate risks to vehicle occupants and other road users. One example would be the performance of minimum risk maneuvers to protect vehicle occupants and other road users if the ADS system capability is degraded or the operational design domain limits are exceeded. Establishing these risk maneuvers would encourage innovation in ADS vehicle deployment while promoting minimum performance thresholds.

Other considerations NHTSA may want to keep at the center of its future actions include how automated vehicles interact with first responders as well as how manufacturers maintain an acceptable safety and cybersecurity risk management system. More detail regarding this second point is in the following response.

Process Measures—Safety Risk Minimization in the Design, Development, and Refinement of ADS:

Question: With the descriptions of Functional Safety, SOTIF, and UL 4600 as background, NHTSA is considering how it might make use of these process standards in the context of developing a new framework concerning ADS, based either in regulation or providing guidance. Traditional FMVSS may not be suitable for addressing certain critical safety issues relating to aspects of the core safety functions of perception, planning, and control. NHTSA requests comment on the specific ways in which Functional Safety, SOTIF, and/or UL 4600 could be adopted, either modified or as-is, into a mechanism that NHTSA could use to consider the minimum performance of an ADS or a minimum risk threshold an ADS must meet within the context of Vehicle Safety Act requirements.

ZF Response:

For safety and cybersecurity risk management, NHTSA could consider following a path similar to that used by UNECE for R155 for approval of vehicles regarding cybersecurity and cybersecurity management systems. Although R155 is aimed at type approval, the basic idea could still be applicable. R155 requires a Cybersecurity Management System (CSMS), which includes rules for cybersecurity by design and establishes standards for applying the risk management system. Industry standards, such as the emerging ISO/SAE 21434, can be used to satisfy the CSMS, but the main idea is to have a risk management system in place. NHTSA could require that manufacturers employ a comprehensive risk management system in design, examples of which include ISO 26262, ISO 21448 and UL 4600 for safety, and ISO/SAE 21434 for cybersecurity, without prescribing the details of the risk management system.

Enumerated Questions:

A. Safety Framework

Question 4. How would your framework assist NHTSA in engaging with ADS development in a manner that helps address safety, but without unnecessarily hampering innovation?

ZF Response:

As the type, purpose, and ODD of ADS vehicles can vary widely, developing standardized tests is a significant challenge. At a minimum, ADS vehicles operating on public roads should meet minimum NHTSA thresholds for interacting with other road users (e.g. lighting, signaling) and occupant protection. One example of a baseline consideration for ADS would be the capability to perform minimum risk maneuvers if performance is degraded or the vehicle is outside of its ODD.

Generally speaking, in order to accelerate testing and deployment without inhibiting innovation, NHTSA's future guidance and standards should, where possible, align with standards development from other global regulators and standards organizations. This will help avoid duplicative standards designed to achieve identical or near-identical safety outcomes.

Question 6. Do you agree or disagree with the core elements (i.e., "sensing," "perception," "planning" and "control") described in this notice? Please explain why.

ZF Response:

Yes, ZF agrees that these four core functions are essential considerations as NHTSA charts a path forward. These elements encapsulate, at a high level, the capabilities expected of a well-functioning automated vehicle operating as designed within its established ODD.

Question 8. At this early point in the development of ADS, how should NHTSA determine whether regulation is actually needed versus theoretically desirable? Can it be done effectively at this early stage and would it yield a safety outcome outweighing the associated risk of delaying or distorting paths of technological development in ways that might result in forgone safety benefits and/or increased costs?

ZF Response:

NHTSA should continue to be guided by its core mission of safety. This will help to reduce the risk of overly prescriptive standards that would hinder safety advances, while maintaining NHTSA's essential safety role as the automotive sector transforms.

Question 9. If NHTSA were to develop standards before an ADS-equipped vehicle or an ADS that the Agency could test is widely available, how could NHTSA validate the appropriateness of its standards? How would such a standard impact future ADS development and design? How would such standards be consistent with NHTSA's legal obligations?

ZF Response:

As ADS vehicle performance and applications will evolve rapidly, NHTSA could consider defining a planned schedule or cadence to review and update ADS-related standards to maintain relevance – perhaps every 4-5 years. It should also strive to maintain technology neutrality to the greatest extent possible when developing standards so that if preferred technology to execute an ADS action is changed, a waiver is not required to deploy vehicles equipped with that new technology.

B. NHTSA Research

Question 14. What additional research would best support the creation of a safety framework? In what sequence should the additional research be conducted and why? What tools are necessary to perform such research?

ZF Response:

As a starting point, data could be collected on the performance of the large number of ADAS-equipped vehicles in fleets and entering the market to get early indicators of feasibility and practicality (e.g. for production Level 2+ systems as surrogates for more highly automated vehicles). For the foreseeable future, this could be done through NHTSA's AV Test Initiative and other voluntary reporting systems – either direct or third party.

C. Administrative Mechanisms

Question 15. Discuss the administrative mechanisms described in this notice in terms of how well they meet the selection criteria in this notice.

ZF Response:

A combination of each of the administrative mechanisms described in this ANPRM would probably be needed to move from present day to a ubiquitous ADS future. This should be a gradual process in which each step sets the groundwork for moving to the next level of administrative action.

Question 16. Of the administrative mechanisms described in this notice, which single mechanism or combination of mechanisms would best enable the Agency to carry out its safety mission, and why? If you believe that any of the mechanisms described in this notice should not be considered, please explain why.

ZF Response:

NHTSA has developed and disseminated ADS guidance though AV 4.0 and earlier iterations, and it has gathered vehicle safety data through voluntary disclosure processes like the AV Test Initiative. These methods have been useful in expanding the understanding of the scope of ADS operations across the country and forming a basis for future action to drive greater ADS deployment.

Moving forward, these efforts could be enhanced through more unified reporting structures and a pathway to formal regulation. This could be done through a standardized reporting framework focusing on vehicle design, performance/outcomes and incidents associated with ADS.

In order to promote transparency and enable effective planning for automakers and suppliers, we also recommend that any future plan to impose regulations provide significant advance notice regarding planned regulations of ADS technologies. The more detail provided through these notices, the better, but they should at least identify which capabilities/behaviors NHTSA plans to regulate.

Question 17. Which mechanisms could be implemented in the near term or are the easiest and quickest to implement, and why?

ZF Response:

Existing guidance and voluntary information sharing (AV 4.0, AV Test Initiative, NHTSA's Voluntary Safety Self-Assessment) should be maintained in the near term as further regulation is considered and implemented.

Question 18. Which mechanisms might not be implementable until the mid or long term but might be a logical next step to those mechanisms that could be implemented in the near term, and why?

ZF Response:

Formal regulation and FMVSS will likely facilitate widespread ADS deployment but more information should be gathered and analyzed regarding ADS design, function, opportunities, and challenges before moving to this step.

Question 19. What additional mechanisms should be considered, and why?

ZF Response:

As NHTSA transitions from a guidance and voluntary disclosure structure to a more formalized regulatory approach, ZF encourages NHTSA to consider a national pilot program to encourage and study ADS-equipped vehicle deployment. In the "Policy Roadmap to Advance Automated Vehicle Innovation" published by the Alliance for Automotive Innovation (AAI), a national AV pilot program is recommended as an intermediate step between today's ADS landscape and future safety regulations. ZF concurs with AAI that designing such a program would promote innovation, testing, and deployment. It would also improve consumer awareness about ADS and enhance the data at NHTSA's disposal to regulate automated vehicles in the future.

Likewise, existing regulations have limited the capacity of automotive ADS system suppliers to conduct on-road testing for ADS-equipped vehicle testing. While statutory limitations are sometimes to blame for these hinderances, where possible, NHTSA should seek to establish parity between automotive and supplier testing. This would facilitate the broader and more expeditious testing of promising ADS technologies.

Question 20. What are the pros and cons of incorporating the elements of the framework in new FMVSS or alternative compliance pathways?

ZF Response:

Due to the incredibly fast pace of ADS development and the complexity of ADS architecture, NHTSA's caution in its approach to regulating this technology is understandable. Regulations that are too prescriptive could stifle innovation and limit the deployment of ADS-equipped vehicles. Alternatively, a long-term absence of regulation could result in an inconsistent approach to ADS that could leave consumers confused and less comfortable with the technology, and ultimately inhibit broad deployment.

Ultimately, ZF agrees that FMVSS updates will be required for ADS. When that occurs, these standards should provide ample lead-time to implementation. These FMVSS could also strive wherever possible to remain technology neutral to the greatest extent possible, with NHTSA's focus on ability to perform automated driving tasks rather than the manner in which those tasks are performed. This approach would enable greater regulatory flexibility and likely reduce the need for near-constant updates to FMVSS moving forward.

Question 21. Should NHTSA consider an alternative regulatory path, with a parallel path for compliance verification testing, that could allow for flexible demonstrations of competence with respect to the core functions of ADS safety performance? If so, what are the pros and cons of such alternative regulatory path? What are the pros and cons of an alternative pathway that would allow a vehicle to comply with either applicable FMVSS or with novel demonstrations, or a combination of both, as is appropriate for the vehicle design and its intended operation? Under what authority could such an approach be developed?

ZF Response:

ZF agrees that the national AV pilot program proposal from AAI would serve as a useful tool in the transition from today's ADS approach to a FMVSS-based future for ADS-equipped vehicles. This approach could allow for divergent approaches to be explored to solve complex design or operations challenges simultaneously, conserving time and resources. This could build on the collaborative information sharing approach already utilized by NHTSA in the AV Test Initiative and other efforts, enabling automakers and suppliers to share best practices and work under a common umbrella to inform FMVSS development. It could also lead to greater awareness, understanding and acceptance of ADS systems for consumers who could presumably be participants in the pilot program.