

Publications

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Overview of NHTSA's Federal Automated Vehicles Policy

The National Highway Traffic Safety Administration (NHTSA) issued a comprehensive policy on "automated vehicles," commonly known as self-driving cars. The automated vehicle policy (AV Policy), issued on September 20, 2016, represents a significant step in the development of a federal regulatory framework to guide the development of automated vehicle technologies.

In broad terms, the new policy is significant for several reasons:

- It signals the beginning of a new period in which the federal government is likely to take a more active role in overseeing the development of a comprehensive federal/state regulatory regime for automated vehicles.
- It reflects a recognition that safety regulation for automated vehicles will require NHTSA to employ more flexible approaches to regulation, which may require statutory changes in addition to changes in the way NHTSA uses its existing authorities.
- It includes guidance that, as a practical matter, will require manufacturers to submit extensive information (a Safety Assessment) to NHTSA prior to the testing or deployment of automated vehicle systems on public roads.

The AV Policy takes effect immediately, except that some portions—including the guidance calling for manufacturers to submit a Safety Assessment—will not take effect until NHTSA has completed a notice-and-comment process. On September 23, NHTSA issued notices in the Federal Register announcing a 60-day public comment period, ending on November 22, 2016.[1] The policy itself and related documents are available at: <https://www.transportation.gov/AV>.

Background

NHTSA is the federal agency with primary responsibility for regulating motor vehicle safety. It is part of the U.S. Department of Transportation (USDOT) and was created by the National Traffic and Motor Vehicle Safety Act of 1966 (Vehicle Safety Act).

Under the Vehicle Safety Act, NHTSA is charged with issuing and enforcing a set of regulations known as the Federal Motor Vehicle Safety Standards (Safety Standards), which apply to all new motor vehicles sold in the United States. The Safety Standards include 73 separate standards relating to crash avoidance, crashworthiness and post-crash survivability. The standards apply to specific components or systems of the motor vehicle—e.g., controls and displays, braking systems, seat belts, etc. The Safety Standards are codified at 49 CFR Part 571.

Motor vehicle manufacturers are required to self-certify compliance with the Safety Standards. The manufacturer is not required to obtain NHTSA's approval prior to the sale of the vehicle. However, NHTSA does have safety enforcement authority, including the authority to order recalls based on identified safety defects as well as non-compliance with the Safety Standards.

To date, NHTSA has not issued any Safety Standards specifically for automated driving systems. To the extent that the existing Safety Standards limit the ability to sell automated vehicles, the limitation is almost incidental: many of the Safety Standards assume the vehicle can be operated by a human driver—e.g., they require various physical components that enable a human to operate the motor vehicle with a steering wheel and thus prohibit the sale of vehicles that lack those components. The Safety Standards may be compatible with automated vehicles that follow a conventional design (i.e., include a steering wheel), but a vehicle with a less conventional

design may not be able to meet the standards.

As automated vehicles have emerged, NHTSA has begun to consider the issue of how to address those vehicles in the context of NHTSA's existing Safety Standards. Issues facing NHTSA have included:

- How to apply the existing Safety Standards to motor vehicles that have automated capabilities—e.g., whether to issue exemptions on a limited basis to allow testing of vehicles that otherwise would not meet the Safety Standards;
- Whether to issue guidance that applies to automated vehicles in the absence of any Safety Standards specifically applicable to automated vehicles;
- Whether to modify existing Safety Standards to remove obstacles to automated vehicles;
- Whether to issue new Safety Standards that apply specifically to automated vehicles;
- Whether entirely new approaches are needed for automated vehicles, and if so, what additional statutory authority is necessary to carry out those approaches.

Prior to the recent guidance, NHTSA had begun to address the regulatory issues associated with automated vehicles by taking several preliminary steps:

- In May 2013, NHTSA issues a brief policy statement that laid out NHTSA's research plan and provided broad policy guidance to states.
- In March 2016, NHTSA issued an update to its May 2013 policy statement and a Federal Register notice inviting comments on the planned development of guidelines for the safe development and deployment of automated vehicles.

The AV Policy, issued in September 2016, represents the next step in NHTSA's ongoing process to adapt its existing regulatory framework to address automated vehicles.

Levels of Automation

The AV Policy divides automated vehicles into five levels, based on a set of definitions developed by the Society of Automotive Engineers (SAE). In **Levels 0 through 2**, the driver must monitor the driving task at all times, with varying degrees of assistance from the vehicle. At **Level 3**, the driver may turn over control of the vehicle to the automated system at times but must remain attentive and ready to re-assume control of the vehicle in response to a warning. At **Level 4 and 5**, the vehicle can fully carry out the driving task without the need for the driver to re-assume control. NHTSA uses the term **Highly Automated Vehicles (HAVs)** to refer to vehicles in Levels 3 through 5.

The AV Policy uses the term "**automated vehicle system**" to refer to "a combination of hardware and software (both remote and on-board) that performs a driving function, with or without a human actively monitoring the driving environment." This term encompasses systems that are included in vehicles ranging from Level 1 through Level 5. The term "**deployment**" refers to "the operation of an HAV by members of the public who are not the employees or agents of the designer, developer, or manufacturer of that HAV."

SAE Level	NHTSA Description
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Level 0	Human driver does everything.
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Level 1	Automated system can sometimes assist the human driver in conducting some parts of the driving task.
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Level 2	Automated system can actually conduct some parts of the driving task, while the human continues to monitor the driving environment and performs the rest of the driving task.
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- Automated system can actually conduct some parts of the driving task and monitor the driving environment in some instances—but the human driver must be ready to take back control when the automated system requests.
- Level 3
- Automated system can conduct the driving task and monitor the driving environment, and the human need not take back control—but the automated system can operate only under certain conditions.
- Level 4
- Automated system can perform all driving tasks, under all conditions that a human driver could perform them.
- Level 5

Levels 3 to 5 = Highly Automated Vehicles (HAVs)

NHTSA Automated Vehicles Policy

The AV Policy is a comprehensive document, over 100 pages in length, addressing many facets of the regulation of automated vehicles. The policy consists of four parts:

- Part 1: Vehicle Performance Guidance for Automated Vehicles
- Part 2: Model State Policy for Automated Vehicles
- Part 3: NHTSA's Current Regulatory Tools
- Part 4: Potential New NHTSA Regulatory Tools

In the near term, Part 1 has the greatest practical significance because it sets forth a "Safety Assessment" that manufacturers are expected to perform prior to the testing or deployment of automated vehicles on public roads. The other sections provide insight into the federal and state regulatory framework that applies to automated vehicles today and ways that regulatory framework may evolve in the coming years.

Part 1: NHTSA Guidance on Testing and Deployment of Automated Vehicles

Part 1 of the AV Policy consists of "vehicle performance guidance" for companies involved in the manufacture, designing, testing and sale of automated vehicle systems. The guidance provides an overall framework for assessing the safety of automated vehicles during design, testing and deployment. The guidance calls for manufacturers to submit a 15-point "Safety Assessment" to NHTSA showing how the guidance is being followed. The Safety Assessment would need to be submitted to NHTSA prior to testing or deployment of a vehicle or system on public roads.

Who is subject to the guidance?

The guidance applies to "all individuals and companies manufacturing, designing, testing and/or planning to sell automated vehicle systems in the United States." The guidance applies not only to manufacturers but also "other entities," such as equipment designers and suppliers, entities that outfit vehicles with automation capabilities for testing, automated fleet operators, "driverless" taxi companies and other entities that offer services utilizing highly automated vehicles.

What types of vehicles are covered?

The guidance applies to vehicles with automated driving systems if the vehicles are tested or deployed for use on public roadways. It covers light-, medium- and heavy-duty vehicles, and it applies to both test-vehicles and production-vehicles.

Are the requirements different for test vehicles?

As noted above, the guidance applies to both test-vehicles and production-vehicles. In addition, the guidance makes clear that all vehicles operated on public roads are subject to NHTSA's Safety Standards and therefore must either comply with those standards or obtain an exemption from NHTSA pursuant to NHTSA's regulations.

What does compliance with the guidance involve?

The guidance calls for manufacturers and other entities to:

- Ensure that the vehicle complies with the Safety Standards or receives an exemption from those standards.
- Clearly define and document the Operational Driving Domain (ODD)—i.e., driving conditions—under which the automated driving system is intended to be used and the corresponding SAE driving level for that system.
- Develop a documented process for assessment, testing and validation of the vehicle's Object and Event Detection and Response (OEDR) capabilities—i.e., its ability to operate safely under the driving conditions for which the automated system is designed. The OEDR should be designed to deal with a variety of conditions, including emergency vehicles, temporary work zones and other unusual conditions.
- Create a documented process for transitioning to a "minimal risk condition" when a problem is encountered—e.g., bring the vehicle safely to a stop if a system is not working properly, or if it is being operated outside its intended driving conditions.
- Develop tests and validation methods to ensure a high level of safety in the operation of their HAVs. This would include demonstrating the performance of the HAV system during normal operation and during crash avoidance situations, as well as its performance of "fallback" strategies to achieve a minimal risk condition.
- Address cross-cutting issues, including:
 - Data recording and sharing
 - Privacy
 - System safety
 - Vehicle cybersecurity
 - Human-machine interface
 - Crashworthiness
 - Consumer education and training
 - Registration and certification
 - Post-crash behavior
 - Compliance with federal, state and local laws governing vehicle operation
 - Ethical considerations
- Submit a Safety Assessment to NHTSA documenting how the guidance has been followed. This assessment should follow a template provided in the guidance.
 - Once the guidance takes effect, manufacturers will have four months to submit the safety assessment for vehicles already in testing and deployment.
 - Going forward, manufacturers and other entities would be expected to submit a Safety Assessment "at least four months before active public road testing begins on a new automated feature."
 - A "new automated feature" could include "any significant updates" to an automated driving system, including any software or hardware update that "materially change the way in which

the vehicle complies (or take it out of compliance)" with the guidance.

When does the guidance take effect?

The guidance takes effect immediately, except that the Safety Assessment provision will take effect only after NHTSA completes a required public notice-and-comment process in accordance with the federal Paperwork Reduction Act. The comment deadline is Nov. 22, 2016.

Part 2: Role for States in Regulation of Automated Vehicles

The AV Policy recognizes that vehicles operating on public roads are subject to both federal and state jurisdiction. In general, the federal government (through NHTSA) regulates the safety of the vehicles themselves, while state governments regulate the use of those vehicles—e.g., registration of vehicles, licensing of drivers and operation of the vehicles. The emergence of automated vehicles, in which the vehicle itself is the driver under some conditions, has created uncertainty about the respective roles of federal and state governments as automated vehicles become more widespread and their capabilities increase.

In its new policy, NHTSA has sought to outline the respective regulatory roles of the federal and state governments with respect to automated vehicles, while also providing a set of recommendations regarding policies that state governments themselves should adopt.

Do states have authority to set safety standards for automated vehicles?

States are preempted from issuing any vehicle safety standard that regulates vehicle performance unless that standard is identical to an existing NHTSA standard governing the same aspect of performance. Therefore, if NHTSA were to issue a Safety Standard governing automated vehicle systems, states would be preempted from issuing standards applicable to the same systems (unless the standards were identical).

Currently, there are no NHTSA safety standards that specifically apply to automated vehicle systems. Nonetheless, the AV Policy makes clear that NHTSA seeks to preserve the exclusive federal role in setting vehicle safety standards, stating that NHTSA "strongly encourages States to allow DOT alone to regulate the performance of HAV technology and vehicles."

What are NHTSA's recommendations regarding state regulation of automated vehicles?

The AV Policy includes a "model regulatory framework" for the development of state laws and regulations relating to the testing, deployment and operation of automated vehicles. Elements of this model policy include:

- In general, the federal and state roles would be allocated as follows:
 - NHTSA regulates motor vehicles and motor vehicle equipment, including hardware and software that performs functions formerly performed by the driver.
 - States would continue to regulate human drivers, vehicle registration, traffic laws (including enforcement), insurance and liability.
- For purposes of state laws that apply to the "driver" of the vehicle, the driver could be defined as the vehicle—i.e., the HAV system – at SAE Levels 3 through 5. By contrast, the human operator would be considered the driver at Levels 0 through 2.
- States should develop a process for manufacturers and other entities to obtain permission for testing automated vehicles on public roads in the state.
- States should review existing laws and regulations and seek to identify "gaps" that may need to be addressed during the transition from human-driven vehicles to vehicles with higher levels of automated

- driving capabilities—e.g., in areas such as law enforcement and emergency response; motor vehicle insurance; crash investigations and reporting; safety inspections; and liability under tort and criminal laws.
- State vehicle registration laws should specifically identify HAVs on title and registration documents with the code "HAV."

Part 3: Use of Current NHTSA Regulatory Authorities

The AV Policy summarizes existing NHTSA regulatory authorities and describes how those authorities can be applied to address the introduction of automated vehicle systems.

Is NHTSA approval needed prior to testing or deployment of automated vehicles?

The AV Policy explains that, under current law, manufacturers are required to self-certify compliance with the NHTSA safety standards. There is no requirement for pre-approval by NHTSA, nor does NHTSA have authority to require manufacturers to obtain pre-approval. Rather, NHTSA has authority to bring an enforcement action when the agency finds either non-compliance with a safety standard or a vehicle poses an unreasonable risk.

What tools does NHTSA have to address testing and deployment of automated vehicles?

The AV Policy identifies four types of actions that NHTSA can take to address the introduction of new technologies where there is uncertainty about whether the technology complies with NHTSA safety standards or the technology conflicts with those standards. These include the following:

- Letter of interpretation of existing NHTSA safety standards
- Exemptions from existing NHTSA safety standards
- Rulemakings to amend existing NHTSA safety standards or create new standards
- Enforcement authority to address defects that pose an unreasonable risk to safety

The AV Policy points out that a manufacturer should ask NHTSA about a new technology or vehicle design "when it will not comply with applicable standards, or when there might be a question as to compliance." If the manufacturer seeks a confirmation that its technology complies with the standards, it would seek a letter of interpretation. If the technology does not comply with one or more standards, the manufacturer could seek an exemption from the standard or a rulemaking to modify the standard or create a new one.

The AV Policy includes specific recommendations regarding the information to be included when requesting that NHTSA provide a letter of interpretation or exemption, or undertake a rulemaking to modify or set a safety standard.

How does NHTSA use its enforcement authorities with regard to automated vehicle technologies?

The AV Policy notes that NHTSA has "broad enforcement authority under existing statutes and regulations to address existing and emerging automotive technologies." Its exercise of that authority is guided by an Enforcement Guidance Bulletin, which sets forth NHTSA's views that:

- NHTSA's enforcement authority over motor vehicles and equipment applies regardless of whether there is a NHTSA safety standard for a particular type of advanced technology.
- When vulnerabilities of automated driving technologies or equipment pose an unreasonable risk to safety, those vulnerabilities constitute a safety-related defect.
- NHTSA has the authority to respond to a safety problem posed by new technologies in the same manner it has responded to safety problems posed by more established technologies.

- When an automated vehicle or technology causes a crashes or injuries, or has manifested a failure or defect that presents a safety concern, NHTSA will evaluate the vehicle or technology through its investigative authority and, if necessary, will "exercise its enforcement authority to the fullest extent."

NHTSA issued the proposed Enforcement Guidance Bulletin on May 1, 2016 and issued the bulletin in final form on September 23, 2016.[2]

Part 4: Potential New NHTSA Regulatory Authorities

Recognizing that its existing tools may not be well-suited to the rapid pace of innovation in automated vehicle technologies, NHTSA identifies a range of potential new regulatory tools that could be adopted. Most, but not all, of these tools would require statutory changes. The potential new tools include the following:

- **Safety Assurance:** Manufacturers would be required to provide NHTSA with information in advance of testing and employment "about their efforts to ensure safe introduction of complex safety systems and HAVs, through systematic risk analysis, identification, classification, and reduction." This is similar to the Safety Assessment that manufacturers would expected to submit under the NHTSA guidance.
- **Pre-Market Approval Authority:** Manufacturers would be required to obtain NHTSA approval in advance of testing or deployment. This approach differs from the current regulatory requirement, under which manufacturers self-certify compliance subject only to NHTSA's enforcement authority.
- **Hybrid Certification/Approval Process:** Manufacturers would self-certify compliance with some requirement, but would need to obtain pre-approval from NHTSA for certain technologies. The requirement for pre-approval could be limited to specific technologies—e.g., those that involve the most safety-critical HAV systems.
- **Cease-and Desist Authority:** NHTSA would have authority to require manufacturers to take immediate action to mitigate "imminent hazards."
- **Expanded Exemption Authority:** NHTSA's existing authority to approve exemptions to the safety standards would be expanded—e.g., by raising the number of vehicles that can be manufactured under an exemption (currently 2,500) or the number of years an exemption can be used (currently two or three).
- **Post-Sale Authority to Require Software Changes:** NHTSA's existing authority to regulate post-sale software updates would be clarified through rulemaking or guidance.

In addition to these changes, the AV Policy discusses a range of other potential tools, including the development of new vehicle testing protocols, additional record-keeping and reporting requirements, and enhanced data collection requirements.

Next Steps for NHTSA

The AV policy represents a step on a path toward a more well-defined federal role in regulating automated driving systems. NHTSA identifies nearly two dozen next steps, which include the following:

- Seeking public comment on the entire policy, including the vehicle performance guidance in Part 1 of the policy.
- Publishing a template for the Safety Assessment required under the vehicle performance guidance.
- Exploring a mechanism for allow for "anonymous data sharing" among parties testing and deploying HAVs.
- Publishing an objective method to be used for classifying automated vehicle systems.
- Potentially conducting a rulemaking that would require any entity planning to test or operate HAVs on the public roads (Levels 3 through 5) to register with NHTSA.

- Potentially developing additional safety standards that would apply specifically to HAVs—e.g., a safety standard for a vehicle that does not permit operation by a human driver.

ENDNOTES

[1] 81 Fed. Reg. 65703 (Sept. 23, 2016) (request for comment on AV Policy); 81 Fed. Reg. 65709 (Sept. 23, 2016) (request for comment on Safety Assessment requirement, pursuant to Paperwork Reduction Act).

[2] 81 Fed. Reg. 18936 (April 1, 2016) (proposed Enforcement Guidance Bulletin); 81 Fed. Reg. 65705 (Sept. 23, 2016) (final Enforcement Guidance Bulletin).

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