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October 30, 2014

Marlene H. Dortch
Secretary
Federal Communications Commission
445 12th Street, S.W.
Room TW-A325
Washington, D.C. 20554

Re: ET Docket No. 13-49, *Revision of Part 15 of the Commission's Rules to Permit Unlicensed National Information Infrastructure (U-NII) Devices in the 5 GHz Band*

Dear Ms. Dortch:

Throughout this proceeding, the Alliance of Automobile Manufacturers, Inc. ("Alliance")[1] has urged the Commission to act deliberately and cautiously in examining whether to allow Unlicensed National Information Infrastructure ("U-NII") use of the 5850-5925 MHz ("5.9 GHz") band.[2] The Alliance has urged such restraint because of the severe negative impact that harmful interference from U-NII devices could have on the viability of the U.S. Department of Transportation's ("DOT") National Highway Traffic Safety Administration's ("NHTSA") vehicle-to-vehicle ("V2V") communications program,[3] which will rely on use of the 5.9 GHz band. Among other things, the Alliance has indicated that V2V technologies are "at an advanced stage" and being readied for deployment, and that NHTSA plans to soon consider mandating the deployment of connected vehicle technologies in all new vehicles.[4]

[1] The Alliance is an association of twelve of the world's leading car and light truck manufacturers, including BMW Group, Chrysler Group LLC, Ford Motor Company, General Motors Company, Jaguar, Land Rover, Mazda, Mercedes-Benz USA, Mitsubishi Motors, Porsche, Toyota, Volkswagen Group of America, and Volvo Cars. *See* Alliance of Automobile Manufacturers, Members, http://www.autoalliance.org/about-the-alliance/overview.

[2] *See, e.g.*, Comments of the Alliance and the Association of Global Automakers, ET Docket No. 14-39 (filed May 28, 2013).

[3] *See, e.g., id*. at 1-3.

[4] *See, e.g., id*. at 4-5; Letter from Ari Fitzgerald, Counsel, the Alliance, to Marlene H. Dortch, Secretary, FCC, ET Docket No. 13-49 (filed Feb. 5, 2014).

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On August 20, 2014, NHTSA initiated a rulemaking to create a new Federal Motor Vehicle Standard that would require 5.9 GHz V2V communication capability for light vehicles and establish minimum performance requirements for V2V devices and messages.[5] NHTSA invited comment on the rulemaking and on a concurrently-released Research Report that analyzes the DOT's findings in areas such as V2V technical feasibility, privacy and security, and preliminary estimates on costs and safety benefits.[6]

On October 20, 2014, the Alliance filed with NHTSA the attached comments, which address a number of issues related to the new rulemaking and the Research Report. For instance, the Alliance's comments explain that the 5.9 GHz band must be preserved for "traffic safety" operations. The Alliance now submits those comments into the record of this proceeding for the Commission's consideration.

Pursuant to Section 1.206(b)(2) of the Commission's rules, an electronic copy of this letter is being filed for inclusion in the above-referenced docket.

Respectfully submitted,

/s/ Ari Q. Fitzgerald

Ari Q. Fitzgerald

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[5] *See Federal Motor Vehicle Safety Standards: Vehicle-to-Vehicle (V2V) Communications*, Advance Notice of Proposed Rulemaking, 79 Fed. Reg. 49270 (Aug. 20, 2014).

[6] *Id*.

AUTO ALLIANCE

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October 20, 2014

Mr. Daniel C. Smith, Esq.
Senior Associate Administrator for Vehicle Safety
U.S. Department of Transportation
National Highway Traffic Safety Administration
1200 New Jersey Avenue, S.E.
West Building Ground Floor
Room W12–140
Washington, DC 20590

Dear Mr. Smith:

Re.: **Proposed Federal Motor Vehicle Safety Standard No. 150; Vehicle–to–Vehicle (V2V) Communications**

Ref.: [1] 79 Fed. Reg. 49270; August 20, 2014 (Docket No. NHTSA–2014–0022)

[2] "Vehicle–to–Vehicle Communications: Readiness of V2V Technology for Application," DOT HS 812 014, August 2014

[3] ET Docket No. 13– 49, *Revision of Part 15 of the Federal Communication Commission's Rules to Permit Unlicensed National Infrastructure Devices in the 5 GHz Band*

On behalf of the members of the Alliance of Automobile Manufacturers, Inc. ("Alliance"), this responds to the *Federal Register* notice referenced above which initiates rulemaking that would propose to create a new Federal Motor Vehicle Safety Standard ("FMVSS"), FMVSS No. 150, to (1) require vehicle–to–vehicle ("V2V") communication capability for passenger cars and light trucks, and (2) create minimum performance requirements for V2V devices and messages. This also responds to a technical report, "Vehicle–to–Vehicle Communications (V2V): Readiness of V2V Technology for Applications" ("V2V Report") issued concurrently in support of the proposed rulemaking.

This notice invites comment on the research findings of the U.S. Department of Transportation's (DOT) National Highway Traffic Safety Administration ("NHTSA" or "agency") in several key areas including: technical feasibility; privacy and security; preliminary estimates on costs and safety benefits; and how the agency can best evaluate the need for and likely effects of any mandate for V2V communications capability. The information provided in response to this notice could be used to assist the agency in deciding whether to proceed with a regulatory proposal that would require V2V devices in new vehicles in a future year.

The ability of cars and light trucks to communicate wirelessly, via Dedicated Short Range Communications ("DSRC"), with other vehicles or the infrastructure to exchange vehicle position and dynamics information has the potential to enhance road safety by alerting drivers to dangerous driving situations, such as cross traffic running a red light. NHTSA predicts that V2V and vehicle–to–infrastructure ("V2I") DSRC–based communications (collectively "V2x communications") will significantly reduce non–impaired crashes. Additional safety, mobility and environmental benefits could be realized early on with widespread deployment of roadside DSRC–based infrastructure.

With this submission, the Alliance presents its high–level policy views and technical considerations regarding this rulemaking and our preliminary findings and analyses of the existing rulemaking record. The Alliance and its Members continue to review the extensive documentation docketed in support of this rulemaking and may provide supplemental comments at a later date.

I. Successful Establishment of a National DSRC–based V2x Communications Capability and Network Hinges on the Federal Government Assuming a Significant Role

A. Successful Deployment of a National DSRC–based V2x Communications Network Requires a Firm Foundation with a Stable Operating and Investment Environment; the Federal Government is the Best Positioned to Accomplish This

NHTSA's V2V Report makes clear that the proposed V2x communications network, *"is not complete without communications and security components,"* that is, a Security Credentials Management System ("SCMS"). This report suggests three possible business models for establishing the SCMS as does the U.S. Government Accountability Office.[1] These are: a federal model; public–private model; and a private model.

[1] "Intelligent Transportation Systems: Vehicle–to–Vehicle Technologies Expected to Offer Safety Benefits, but a Variety of Deployment Challenges Exist," U.S. Government Accountability Office, GAO–14–13, November 2013.

However, in the V2V Report, NHTSA indicates that it is not considering models that involve public participation due to resource constraints stating:

> "Arguably, direct Federal operation or operation via service contracts would be the most effective mechanisms to ensure appropriate security, privacy, and long-term, stable continuity of operations, thereby reducing some of the more significant risks stemming from deployment of V2V technologies via an FMVSS dependent on a security system not directly regulated by the agency. However, absent substantial new appropriations – which NHTSA has no plans to seek at this time – NHTSA lacks the resources to contemplate public ownership, control, or administration of a system the size and scope of the SCMS, as currently conceived. For this reason, DOT research to date has not fully explored a public governance model for the SCMS. Due to the current fiscal environment it does not seem plausible."[2]

The federal government's role in transportation is authorized by Article I, Section 8, of the U.S. Constitution, which gives the U.S. Congress the power to regulate interstate commerce and to establish "post roads." The U.S. Congress has used this authority to implement many national transportation programs, including the transcontinental railroad, and the Interstate Highway System.[3] The Alliance submits that a strong leadership role from the federal government will be essential to the successful implementation of V2x communications network and capability.

Of course, resolution of the policy issues in particular, requires coordination among multiple federal agencies, including the Federal Communication Commission ("FCC"), the Federal Highway Administration ("FHwA"), the Federal Trade Commission ("FTC"), NHTSA, the Office of the Secretary of Transportation ("OST"), possibly the U.S. Environmental Protection Agency ("EPA") and others. The U.S. Congress is best positioned to provide the needed coordination. Important policy considerations include:

- Infrastructure for DSRC–based V2x communications security networks;
- Governance of the V2x communications network, including the SCMS (rules of use, certification, access, operations);
- Protection of consumer privacy;
- Sustainable funding for implementation, on–going operations, and expansion over time of the V2x communications network;
- International cross-border needs and agreements;
- Liability risk and intellectual property protection; and
- Security licensing requirements.

Resolution of the policy issues above must be national in scope which requires strong unified federal leadership, not just presence, to encourage private investment in

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[2] "Vehicle–to–Vehicle Communications: Readiness of V2V Technology for Application," U.S. Department of Transportation, National Highway Traffic Safety Administration, DOT HS 812 014, August 2014, p. 199.
[3] The Federal Aid Highway Act of 1956 (P.L. 84–627) established the Nation's interstate highway system.

V2x communications technology and to encourage participation by state and local government partners whose involvement will likely be necessary to establish the roadside infrastructure.

B. Standardization of DSRC–based V2x Communications Equipment, Coupled with Measures to Encourage Deployment, are Imperative to Ensuring Interoperability Nationally and Rapid Widespread Deployment

NHTSA could help ensure the successful deployment of DSRC–based V2x communications, including safety and other applications, by establishing a common set of operating criteria for DSRC–based V2x communications equipment that enables data–sharing between vehicles and between vehicles and other devices, including roadside hardware. The main aim of standardized operating criteria should be to enable interoperability in a national environment consisting of multiple equipment vendors, networks, and services. Standardized operating criteria would also likely foster broader investment in technologies and applications and greater innovation involving these technologies and applications.

NHTSA should explore alternatives to a vehicle mandate to move public acceptance and deployment of V2V communications capability into the vehicle car parc as quickly as possible for passenger cars and light trucks. The Alliance agrees with the agency that V2V communications begin to provide safety benefits, *"only if a significant number of vehicles in the fleet are equipped with it."* Given this, the Alliance asserts that there are multiple paths that can be taken to ensure that this communications capability develops.

NHTSA should take into consideration that the rapid deployment of network goods, especially in communications and software, after technological breakthroughs is typical of network industries. According to Nicholas Economides, a leading scholar of network industries, *"Generally, the pace of market penetration (network expansion) is much faster in network industries than in non-network industries."*[4] Therefore, NHTSA should consider the opportunity to take a leadership role in providing incentives for early and rapid introduction of V2V technology. For example, NHTSA could consider giving vehicle manufacturers bankable credits for early adoption of V2V for later use as any mandated requirements are phased in. NHTSA could also consider working with the EPA to provide vehicle manufacturers credits for fuel economy standards since a reduction in crashes is expected to result in traffic efficiency gains and less fuel consumption.[5]

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[4] http://www.academia.edu/2721210/Public_Policy_in_Network_Industries, last accessed October 10, 2014.
[5] "Accelerating Sustainability: Demonstrating the Benefits of Transportation Technology," Intelligent Transportation Society of America available at http://digitalenergysolutions.org/dotAsset/933052fc-0c81-43cf-a061-6f76a44459d6.pdf, last accessed October 17, 2014.

C. The 5.9 GHz DSRC Radio Frequency Band Must be Preserved for its Intended Purpose – "Traffic Safety" Operations

On February 20, 2013, the U.S. Federal Communications Commission ("FCC") published a notice seeking comment on making available an additional 195 megahertz of spectrum in the 5.35–5.47 GHz and 5.850–5.925 GHz bands for use by Unlicensed National Information Infrastructure ("U–NII") devices. The radio frequency band between 5.850–5.925 gigahertz ("5.9 GHz") is currently dedicated for DSRC service.[6]

As a critical, enabling component of successful deployment of V2x communications technologies, the entire allocated 5.9 GHz spectrum must be adequately protected from harmful interference. If the spectrum is not protected, progress towards implementing DSRC–based V2x communications systems will be hampered.

Consistent with our comments to the FCC[7], the Alliance remains extremely concerned that if the FCC decides to permit unlicenses U-NII wireless devices to operate in the 5.9 GHz radio frequency spectrum this could have a severe negative impact on the viability of DSRC–based communications. Most commenters to the FCC's feasibility sharing proposal agree that rigorous testing will be required to determine whether harmful interference from U–NII devices into 5.9 GHz DSRC devices can be avoided. In addition, this concern has been acknowledged and articulated by the National Telecommunications and Information Administration (NTIA) report which concluded that more analysis is needed in order to determine whether the 5.9 GHz band can accommodate U–NII operations without causing harmful interference to "traffic safety" DSRC operations.[8] In fact, the NTIA stated in comments to the FCC rulemaking:

> *"DSRC should continue to be protected for the uses and goals for which it was allocated: reducing crashes, injuries, and fatalities. The FCC's proposals should not be implemented until and unless rigorous testing has shown that these critical safety goals will be satisfied."*[9]

The National Traffic and Motor Vehicle Safety Act ("Vehicle Safety Act"), currently codified at 49 U.S.C. Chapter 301, specifies that each FMVSS "... shall be practicable, meet the need for motor vehicle safety, and be stated in objective terms." See 49 U.S.C. § 30111(a). The NHTSA notice does not attempt to demonstrate that proposed FMVSS No. 150 would satisfy these three statutory requirements, particularly in light of the possibility of an FCC spectrum sharing proposal.

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[6] See http://apps.fcc.gov/ecfs/proceeding/view?name=13-49.
[7] See http://apps.fcc.gov/ecfs/document/view?id=7022418843 and http://apps.fcc.gov/ecfs/document/view?id=7520933337.
[8] U.S. Department of Commerce, Evaluation of the 5350–5470 MHz and 5850–5925 MHz Bands Pursuant to Section 6406(b) of the Middle Class Tax Relief and Job Creation Act of 2012 at 5–13 (2013), available at http://www.ntia.doc.gov/files/ntia/publications/ntia_5_ghz_report_01-25-2013.pdf ("NTIA 5 GHz Report").
[9] See http://apps.fcc.gov/ecfs/document/view?id=7022424618

Similarly, Part 15 of the FCC rules requires that unlicensed spectrum devices not cause harmful interference to licensed services.[10] Therefore, the Alliance expects that the FCC will allow U–NII operations in the 5.9 GHz band only if it can demonstrate with absolute certainty that such use will comport with its Part 15 rules.

To date, it appears that neither NHTSA nor the FCC have performed the testing needed to determine whether U–NII devices operating in the 5.9 GHz band can coexist safely with DSRC operations. Anything short of a deliberate, data–driven testing process for evaluating U–NII/DSRC compatibility raises serious concerns regarding the viability and practicability of V2x communications.

Given the foregoing, it remains critically important that the FCC preserve the 5.9 GHz radio frequency spectrum for use by DSRC "traffic safety" devices. At the same time, the Alliance understands the pressing need for additional spectrum and is open to sharing the 5.9 GHz spectrum if it can be demonstrated that sharing can be done safely without adversely affecting the effectiveness of DSRC and V2x. Thus, the Alliance remains committed to working with not only the FCC and NHTSA, but also other stakeholders, including the NTIA, to ensure that the risk of harmful interference from U–NII operations does not derail the development and deployment of V2x communications.

II. NHTSA Analysis of Legal Authority and Liability Risks

A. While NHTSA's Existing Legal Authority is Sufficient to Encourage V2V Communications Capability, NHTSA has Additional Work to Demonstrate it has met Statutory Requirements for this Rulemaking

The Alliance agrees that NHTSA's existing rulemaking authority is sufficient to enable the agency to encourage adoption of V2V communications technology capability for passenger cars and light trucks. As indicated previously, the Vehicle Safety Act establishes three criteria that each FMVSS must meet, i.e., each FMVSS, *"... shall be practicable, meet the need for motor vehicle safety, and be stated in objective terms."* 49 U.S.C. § 30111(a). With these criteria in mind, there are some fundamental assumptions that underlie the Alliance's conclusion that the agency has sufficient authority.

First, any new FMVSS must demonstrate that it "meet<s> the need for motor vehicle safety." This means that NHTSA must show that the standard will improve safety as compared with not adopting the new FMVSS. As NHTSA notes in its V2V Report, there is additional work needed to make the required demonstration.

Second, as NHTSA's V2V Report makes clear, the proposed V2V communications network, *"is not complete without communications and security components that*

[10] See 47 C.F.R.§ 15.5.

NHTSA cannot mandate fully under its Safety Act authority" given NHTSA's current lack of appropriations for this purpose. Without an understanding of how a security function is to be established, funded, governed and operated, it is not possible to demonstrate that a V2x communication capability mandate will meet the criteria specified by 49 U.S.C. § 30111(a).

Third, as noted before, a viable V2x communications network depends on the availability of adequate radio spectrum unspoiled by harmful interference to support the demands of V2x communications when deployed in all motor vehicles. If the FCC decides to permit unlicensed wireless devices to operate in the 5.9 GHz radio frequency spectrum, and such operation results in harmful interference to V2x communications, it is difficult to see how NHTSA will be able to establish that a V2x mandate would meet the criteria specified by 49 U.S.C. § 30111(a). This further illustrates the need for the FCC to protect the allocated 5.9 GHz spectrum from harmful interference.

Finally, as NHTSA correctly notes, the public acceptability of a V2x communications capability will depend on many considerations, including the public's perception of the privacy implications of the V2x communications network as well as the public's confidence that it will work well over the lifetime of the vehicle. However, as the agency acknowledges in the V2V Report, it does not have the legal authority to compel consumers to renew their vehicles' security certificates, or to accept a downloaded certificate that is pushed to the vehicle.

Further, NHTSA's legal authority does not extend quite as far as the agency's V2V Report suggests in at least two ways.

One, NHTSA's FMVSS authority is generally limited to regulating the performance of new motor vehicles, not the relationship between the vehicle manufacturers and their customers (except as it relates to communicating about safety recalls).

Two, it is not clear that that the Vehicle Safety Act extends NHTSA's authority to the design and performance of roadside infrastructure, even when used to facilitate V2V communications. The agency will need to consider how to address these issues as it moves forward. Please see Attachment A for more information.

B. The Liability Risks to Vehicle Manufacturers Have Not Been Adequately Evaluated; The Proposed Liability–limiting Measures are anti–Consumer or are Unproven

NHTSA's V2V Report addresses the liability risks facing vehicle manufacturers who install V2x communications technology on new motor vehicles and separately assesses the liability risks that may be associated with the formation and management of the SCMS.

With respect to the liability risks facing vehicle manufacturers in connection with V2x communications technology on new motor vehicles, NHTSA dismisses the concerns

raised, concluding that the risks are not materially different than the liability risks currently faced and managed by manufacturers when new on–board safety warning technology of any kind is introduced.

The Alliance believes that NHTSA should consider further the important differences between on–board safety warning systems being installed in vehicles today, and the interdependent warning systems that are contemplated by a V2x communications network. V2x safety warnings are interdependent on information coming into the host vehicle from other vehicles, roadside equipment, or portable devices. After any given device is certified and is in use, the host vehicle's manufacturer has no control over the quality, durability or maintenance status of those external sources of information – yet the V2x safety warning generated by the host vehicle may be partially or completely dependent on these external sources.

In such cases, the liability risks associated with traditional on–board warning technologies do not help inform the discussion about the liability risks associated with the V2x communications environment. Thus, conclusions about the applicability of the state of the law with respect to traditional "failure to warn" claims involving on–board warning technologies grossly oversimplifies the way such claims are likely to evolve in V2x–related litigation.

NHTSA's V2V Report further concludes that any risks associated with the SCMS can be managed either by specifications in the terms of use with consumers that would limit the liability of the SCMS manager, or the procurement of insurance against losses associated with SCMS failures, or both. The Alliance has at least two concerns with the agency's analysis.

First, while liability–limiting clauses can be effective in allocating risk among businesses, they are not likely to be effective in limiting liability for negligence that allegedly causes personal injury to a consumer. When it comes to contracts with consumers, there is strong disapproval of liability–limiting clauses and such clauses may be contrary to public policy (or may be unconscionable).

Second, NHTSA seems to assume that the SCMS manager will be able to procure insurance to manage liability risks associated with failures of the SCMS. But this assumption does not recognize the fundamental basis of conventional insurance underwriting, which is reliance on actuarially based data to inform underwriters of how to price the insurance offerings. In the V2x environment, there is no experience to date with potential SCMS failures on which to base such pricing decisions. When actuarially based data is not available, the insurance industry has been reluctant to offer products.

Please see Attachment B for more information.

III. NHTSA Should Expand its Benefit–Cost Analysis to Include Non–FMVSS Approaches for Achieving a V2x Communications Network and Capability

NHTSA asserts, *"... if V2V were not mandated by the government it would fail to develop or would develop slowly."*[11] However, NHTSA's belief that no manufacturer would "go first" proved to be inaccurate following the publication of its notice.[12] NHTSA expressed concern that, even if there is a first mover, deployment will be too slow compared to its mandated FMVSS strategy. However, taking into consideration the rapid deployment of network goods discussed previously in this submission, NHTSA should analyze V2x communications deployment rates that might be attained in the absence of government mandates, taking into consideration what network industries have attained in the past and whether such non–FMVSS options and incentive approaches might hasten the development of a V2x communications network.

Please see Attachment C for a preliminary review of NHTSA's benefit–cost analysis described in the subject notice and V2V Report that was commissioned by the Alliance.

IV. Fully Addressing Data Security, Integrity and Data Privacy are the Imperatives for Gaining Consumer Acceptance of a V2x Communications Network.

"Network effect" is the, *"phenomenon whereby a good or service becomes more valuable when more people use it. The chief hurdle for any good or service which uses the network effect is to get enough users initially so that the network effects take hold. The amount of users required for significant network effects is often referred to as critical mass."*[13] The success of the V2x communications capability that NHTSA proposes to establish with the subject notice relies on the network effect.

NHTSA correctly notes in its V2V Report, the public acceptability of V2x communications network will depend on many considerations, chief among these are the public's perception of the privacy implications of the network as well as data security and integrity. If the V2x communications network is not widely accepted by the public, critical mass will not be achieved. Further still, not only will a mandate for it not be practicable, as shown by the 1970s experience with first generation safety belt interlocks, a mandate will also not cure a market failure in this instance.[14] Thus, consumer acceptance of V2x communications capability is critical requiring, among other things, that concerns regarding data security, integrity, and privacy be transparently explained and fully addressed.

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[11] 79 Fed. Reg. 49275.

[12] See "2017 Cadillacs to Feature Hands – Free Driving, V2V Technology," by Keith Naughton, September 8 2014 reported by Bloomberg in *Insurance Journal*.

[13] http://www.investopedia.com/terms/n/network-effect.asp, last accessed October 13, 2014.

[14] TRB Special Report 278, Buckling Up: Technologies to Increase Seat Belt Use @ www.TRB.org/publications/sr/sr278.pdf, last accessed October 13, 2014.

A survey of 4,660 consumers conducted by the Alliance in June 2014 regarding vehicle technology that "enables cars to communicate with each other" found that just under half (48%) of those surveyed responded that such communications capability was "a good idea that will improve safety."

Our members recognize that strong consumer data security, integrity and privacy protections are essential to maintaining customers' trust. All automakers today have implemented technical and organizational security measures to protect consumer data against manipulation, loss, destruction, or access by unauthorized parties. The Alliance of Automobile Manufacturers, Inc. and the Association of Global Automakers, Inc. are collaborating on two initiatives to further enhance industry practices and standards.[15]

First, the two associations are developing consumer privacy protection principles. Development of the principles reflects a major unified step in protecting personal information collected in vehicles. For the first time, the industry is working to adopt central concepts to demonstrate a unified commitment to the responsible stewardship of information used to provide vehicle technologies and services. Sensitive information, such as geolocation, driver behavior, and biometric information, receives additional, heightened protections under the Principles.

Development of the principles reflects the reality that automobiles increasingly rely on innovative technologies and services that are designed to enhance vehicle safety, improve vehicle performance, and augment the driving experience. Many of these technologies and services rely upon the collection of data from vehicle systems. These data, which may include precise location information of the vehicle, need to be carefully protected. The Alliance expects any implementation of a V2V communications network and capability would include appropriate protection.

Second, the establishment of these Principles complements another joint action by our two associations to help ensure the security of vehicle–generated data. In July of this year, the Alliance and Global Automakers began collaborating on the creation of a voluntary center to share and analyze potential cyber–related threats and vulnerabilities in the automotive sector.[16] This effort represents yet another significant step forward in protecting data privacy and data security in the automotive industry.

As noted earlier here and elaborated upon in several of the other attachments, public acceptance is critical in the development of new technologies. The Alliance recommends that the agency consider working with appropriate federal entities that may have more experience and more direct statutory authorities to address and evaluate some of the health and privacy concerns that have been raised in the docket. These concerns must be addressed or such negative perceptions may pose a roadblock to widespread deployment. The Alliance believes that the development of a

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[15] Collectively, the members of the Alliance and Global Automakers sell nearly 100 percent of new light vehicles in the United States.

[16] See NHTSA Docket No. NHTSA–2014–0071.

Privacy Impact Assessment will be an essential element in building public trust that privacy issues have been researched and appropriately addressed.

V. Technical Considerations

The Alliance response to selected questions posed in the rulemaking notice is contained in Attachment D. These responses are focused on the following sections of the Notice: Section c) What's Necessary for DSRC to Work; Section d) Safety Applications that V2V Could Facilitate; Section e) Public Acceptance and Section g) V2V Communication Security.

In general, while important work remains, The Alliance believes that much work has been done by standards organizations like SAE and IEEE that can help NHTSA in setting performance standards for V2x systems. The issues such as the substance of the Basic Safety Message ("BSM") and the communication requirements for V2x communications systems have been well researched by those organizations and provide a foundation that the agency can build upon in continued collaboration with the industry.

As to the safety applications that a V2x communications network could facilitate, the Alliance generally agrees with the agency's description of possible safety applications that could emerge. We would note that V2V has some unique features compared to current sensing technologies to enable features that may not be possible otherwise such as Left Turn Across Path ("LTAP") and Intersection Movement Assist ("IMA"). V2x capability would extend this capability further.

In response to the communication security questions, Alliance members support Public–Key Infrastructure ("PKI") as the most effective solution to protect V2x communications. The current security system design that is based upon a "privacy by design" philosophy seems the most reasonable of the options available because it addresses privacy against intruders to the system and privacy against insiders, including those running active components of the security system. It also assures efficient and privacy–preserving certificate update mechanisms providing a high level of flexibility as well as efficient conditional certificate revocation.

With respect to vehicle system and network cybersecurity, the Alliance's member companies individually and collectively continue to pursue risk mitigation strategies and urge NHTSA to recognize the importance of allowing flexibility in the development of these strategies. A more detailed explanation of each of these areas is contained in the attachment.

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The Alliance appreciates the agency's consideration of these comments and would be pleased to provide any additional information needed.

Sincerely,

ALLIANCE OF AUTOMOBILE MANUFACTURERS, INC.

Robert Strassburger
Vice President
Vehicle Safety & Harmonization

Attachments:

Attachment A: Analysis of Legal Authority
Attachment B: Analysis of Liability
Attachment C: Review of NHTSA's Preliminary Benefit–Cost Analysis
Attachment D: Question–by–Question Response to ANPRM Questions
Attachment E: Comments to FCC Rulemaking Docket
Attachment F: Reply Comments to FCC Rulemaking Docket

cc: ET Docket No. 13–49

Attachment A
Alliance of Automobile Manufacturers, Inc.
Issues related to NHTSA's Authority to Regulate Vehicle-to-Vehicle (V2V) Technology

The NHTSA ANPRM seeks comments on several issues related to the agency's authority to regulate V2V technology. In this appendix, the Alliance will address some overarching issues related to the agency's authority to regulate motor vehicles and motor vehicle equipment, as well as the specific questions raised by NHTSA.

Overarching Issues. The agency's authority to regulate motor vehicles and motor vehicle equipment is found in Section 30111 of the National Traffic and Motor Vehicle Safety Act, which authorizes NHTSA to establish federal motor vehicle safety standards that are practicable, that meet the need for motor vehicle safety, and that are stated in objective terms. NHTSA also has the authority to adopt general regulations that are necessary to carry out the Safety Act (49 U.S.C. §322), but the Alliance agrees with NHTSA that the regulation of V2V would "likely be more comprehensively successful" if the regulatory scheme is based on one or more FMVSSs.

The Alliance agrees that the agency's existing authority is sufficiently nimble to enable NHTSA to adopt standards requiring V2V technology in new motor vehicles and, to some extent, governing its performance. However, there are some questionable assumptions that underlie this conclusion. Furthermore, NHTSA's authority does not extend quite as far as the agency's report suggests. Specifically, NHTSA's scope of authority is limited such that it is unable to contain new and unquantifiable risk to OEMs in the areas of governance, privacy/security, liability, funding, intellectual property, rules of use and access to data outside of the envisioned V2V and V2I ecosystem that will have considerable impact OEM business models and customer acceptance.

First, any new FMVSS must "meet the need for motor vehicle safety." This means that NHTSA has to show that the standard will improve safety as compared with not adopting the new FMVSS. It is not sufficient merely to assert that the FMVSS "relates to safety" because it would be directed at the possibility of reducing crashes. NHTSA will have to show that the safety warnings enabled by DSRC will actually work to motivate drivers to take effective avoidance actions to prevent a crash, and that drivers will not be deterred from reliance on the warnings as a result of seemingly unreliable performance due to sporadic encounters while fleet penetration builds over several periods, excessive false positives, or other reasons. As noted in the report, there is much additional work needed in these areas.

Moreover, for some of the safety applications identified by NHTSA, such as Forward Collision Warning, some new motor vehicles are equipped with this technology today, and obviously those vehicles are not equipped with DSRC devices. NHTSA will need to be cautious that it is not attributing benefits to the DSRC devices if those benefits are achievable without DSRC.

Second, as NHTSA's report makes clear, the V2V system "is not complete without communications and security components that NHTSA cannot mandate fully under its Safety Act authority." Specifically, NHTSA notes that a communications infrastructure with a robust Security Credentials Management System (SCMS) is an essential element to making the V2V system work. But NHTSA has said that it has no funding to establish and run the SCMS, and

that it prefers to see the private sector "create financial models to support development and operation of the communications and security infrastructure that are consistent with the Department's V2V principles (i.e. no recurring fees for consumers, appropriate privacy and security protections and extensibility to V2I and V2X applications). It has also said that it envisions the SCMS to be largely self-governed by the private industry participants and stakeholders.

The Alliance submits that the SCMS function is a core government responsibility that cannot be left to a self-governing industry coalition. For V2V to work effectively, every vehicle manufacturer will have to participate in the SCMS and abide by its rules. A private organization, such as a voluntary coalition of manufacturers, cannot compel unwilling manufacturers to join the organization, and cannot enforce deviations from the organization's rules except by expelling misbehaving members. There is no effective mechanism to ensure the universal participation of all manufacturers and to compel their obedience to the necessary common SCMS requirements except through an enforceable government requirement and through the exercise of government supervision over the SCMS. Moreover, as V2V transitions to V2I or V2X, as NHTSA envisions, the role of the SCMS becomes even more complex, and moves into areas in which NHTSA has no jurisdiction or authority. For example, it is the FHWA that ordinarily has jurisdiction over road-side equipment (RSE), not NHTSA. Yet, it is not clear whether FHWA (or any other federal entity) has the authority to dictate rules of use for the information. In the event that a non-funded contract is issued to a private entity to run the SCMS, the contracted party will likely seek ways to monetize the system in other ways, such as demanding services to be included in vehicles or access to data that the OEMs have no control over and is not restricted under NHTSA's authority.

If there is no understanding of how the SCMS function is going to be established, funded, governed and operated, then there is fundamentally no basis to believe that a V2V mandate will meet the need for motor vehicle safety, nor will it be practicable.

Third, a viable V2V system depends on the availability of adequate radio spectrum to support the demands of the V2V system when deployed in all motor vehicles. Currently, spectrum around 5.9 GHz has been allocated by the Federal Communications Commission for this purpose. However, the FCC's recent proposal to permit unlicensed short-range wireless connections in the same spectrum band raises serious concerns about the viability of reliable V2V communications. If the FCC decides to permit the sharing of the 5.9 GHz spectrum with unlicensed wireless operations, it is difficult to see how NHTSA will be able to establish that a V2V mandate would meet the need for motor vehicle safety.

Finally, as NHTSA correctly notes, the public acceptability of a V2V mandate will depend on many considerations, including the public's perception of the privacy, use in enforcement, and health implications of such a mandated system as well as the public's confidence that the V2V system will work well over the lifetime of the vehicle. If the V2V system is not widely accepted by the public, a mandate for it will not be practicable.

Attachment A
Alliance of Automobile Manufacturers, Inc.
Issues related to NHTSA's Authority to Regulate Vehicle-to-Vehicle (V2V) Technology

NHTSA correctly notes that consumers might choose to live with a non-functioning V2V system, rather than engage in the affirmative steps needed to renew a security certificate, if those steps are perceived as onerous or as degrading privcacy while updating. Because such inaction could well reduce the benefits of the V2V system, NHTSA stated that it was exploring ways to make the download of new certificates automatic. However, as NHTSA acknowledges in the V2V Report, it does not have the authority to compel consumers to renew their vehicles' security certificates, or to accept a downloaded certificate that is pushed to the vehicle. And, there could be potential issues under the Computer Fraud and Abuse Act (18 U.S.C. § 1030) with "pushing" certificate renewals to consumers without their consent. Moreover, to the extent that NHTSA is contemplating a mandate for vehicle manufacturers to retain the obligation to push certificate renewals to vehicles for the lifetime of those vehicles, the Alliance respectfully submits that the agency does not have the authority to do so. NHTSA's FMVSS authority is generally limited to regulating the performance of new motor vehicles, not the relationship between the vehicle manufacturers and their customers (except as it relates to communicating about safety recalls). Nothing in the Safety Act authorizes NHTSA to impose a continuing duty on manufacturers to maintain an element of a motor vehicle for its lifetime. The Alliance agrees that the security certificate renewal process is important to the continued viability of the V2V system, and is committed to working with the agency to develop workable and publicly acceptable ways to manage this process; however, a lifetime maintenance mandate on vehicle manufacturers is not authorized by the Safety Act.

With these overarching principles in mind, the Alliance will now turn to the specific questions raised in the ANPRM regarding the agency's authority to regulate V2V:

Authority to Regulate Non-integrated Aftermarket Equipment and Software Related to V2V. The Alliance agrees that NHTSA has the authority to regulate aftermarket equipment that is "manufactured or sold for replacement or improvement of a system, part, or component [of a motor vehicle], or as an accessory or addition to a motor vehicle," as well as equipment that is "manufactured, sold, delivered, or offered to be sold for use on public streets, roads, and highways with the apparent purpose of safeguarding users of motor vehicles against risk of accident, injury, or death." Section 30102(a)(7) of the Vehicle Safety Act, as amended by MAP-21.

Specifically, the Alliance agrees that NHTSA's authority extends to nomadic devices that are intended to emit and/or receive "basic safety messages" about the vehicle's location and speed, and to the associated software for such tasks, and that NHTSA could regulate the performance of such devices to the extent needed for motor vehicle safety. However, the Alliance does not agree that NHTSA has the authority to write and enforce technical specifications for the interface between mobile applications and hardware, such as NHTSA describes on page 40 of the V2V report. Authority to issue this type of regulation belongs, if anywhere, to the Federal Communications Commission.

With respect to software applications, the Alliance agrees that vehicle -related software applications can be "motor vehicle equipment" under the Vehicle Safety Act. If NHTSA can demonstrate that an FMVSS regulating the performance of a vehicle-related software application

would meet the need for motor vehicle safety and otherwise meet the statutory requirements for FMVSSs, the Alliance agrees that NHTSA has the authority to adopt such an FMVSS.

Authority to Regulate Roadside Infrastructure Used to Facilitate V2V Communications. The Alliance is skeptical that the Vehicle Safety Act extends NHTSA's authority to the design and performance of roadside infrastructure, even when used to facilitate V2V communications. Roadside infrastructure is not "similar" to a part or component installed on a motor vehicle as originally manufactured, so the definition of motor vehicle equipment in §30102(7)(B) does not apply, and NHTSA seems to agree that roadside infrastructure is not an "accessory" to a motor vehicle.

However, NHTSA suggests that V2V infrastructure might be considered a device that is "manufactured … with the apparent purpose of safeguarding users of motor vehicles against risk of accident, injury or death," and therefore is encompassed by the definition of motor vehicle equipment in §30102(7)(C). The Alliance does not agree that the Vehicle Safety Act reaches so far. The Alliance believes that any roadside infrastructure that is used to facilitate V2V communications will likely also facilitate other public purposes, such as traffic congestion management, in order to justify the expenditures of installing and maintaining the infrastructure. Moreover, the Alliance believes that the role of the roadside infrastructure will be primarily safety-neutral – e.g. providing location coordinates, or signal timing information. This type of information is not for "the apparent purpose of safeguarding users of motor vehicles against risk of accident, injury or death." Even if the roadside infrastructure contributes to the V2V operations, and thus indirectly supports a safety purpose, it does not become "motor vehicle equipment," as NHTSA acknowledged with respect to a stop sign, which NHTSA said is not "motor vehicle equipment."

NHTSA's Authority to Establish an FMVSS Mandating DSRC Devices in New Motor Vehicles. If NHTSA can demonstrate that an FMVSS mandating DSRC devices would meet the need for motor vehicle safety and otherwise meet the statutory requirements for FMVSSs, the Alliance agrees that NHTSA has the authority to adopt such an FMVSS. The Alliance also agrees that NHTSA has the authority to regulate certain aspects of the performance of the DSRC devices, such as requiring the use of a specified congestion mitigation algorithm, or specifying certain objective tests for survivability.

However, NHTSA's authority to promulgate any such FMVSS is predicated upon the statutory requirement to demonstrate that the FMVSS will meet the need for motor vehicle safety and be practicable, as discussed above.

The Structure of One or More Potential FMVSSs For Safety Applications. NHTSA has stated that it is considering six safety applications that could be enabled by DSRC: Intersection Movement Assist, Forward Collision Warning, "Do Not Pass" Warning, Emergency Electronic Brake Lights, Blind Spot Warning/Lane Change Warning and Left Turn Assist, Page 59], and requested comments on "how a potential FMVSS for a safety application would be structured."

NHTSA noted that some of these applications may be capable of being met through technology other than DSRC, but observed that DSRC-enabled applications might provide more robust performance, in which case NHTSA asserted that it could require the more robust DSRC-enabled performance through an FMVSS for the safety application. While the Alliance agrees in theory that NHTSA can require a safety application to meet a specified level of performance, even if that indirectly eliminates some forms of delivering that safety application within the motor vehicle, there is much additional work needed before it will be clear whether an FMVSS regulating the performance of any of these applications can be justified under the Safety Act criteria. As NHTSA itself notes, the evidence supporting whether the safety applications meet the need for motor vehicle safety "needs to be stronger." And, much additional work needs to be done to address potential public acceptance problems arising from false positives, privacy concerns and other public acceptability issues that could undermine the practicability of the rule.

Attachment B
Alliance of Automobile Manufacturers, Inc.
Issues related to NHTSA's Assessment of Liability Issues Associated With Vehicle-to-Vehicle (V2V) Technology

The NHTSA ANPRM seeks comment on the agency's assessment of legal liability issues. Specifically, NHTSA asks whether its assessment of liability is accurate. The agency also asks whether there are other issues associated with liability that the agency should consider and, if so, how the agency should address them.

NHTSA's Assessment of Legal Liability Issues. NHTSA's Report (the V2V Report) in support of the ANPRM addresses the liability risks facing vehicle manufacturers who install V2V technology on new motor vehicles and separately assesses the liability risks that may be associated with the formation and management of the Security Credentials Management System (SCMS).

1. Liability Risks Facing Vehicle Manufacturers. With respect to the liability risks facing vehicle manufacturers in connection with V2V technology on new motor vehicles, NHTSA dismisses the concerns raised by manufacturers and others, concluding that the risks are not materially different than the liability risks currently faced and managed by manufacturers when new on-board safety warning technology of any kind is introduced. NHTSA relies extensively on a report prepared by the firm of Dykema Gossett PLLC for the VIIC and submitted to NHTSA (the Dykema Report) to conclude that the liability risk is not significant.

NHTSA's primary rationale for this conclusion appears to be that the V2V systems currently contemplated will be producing safety warnings, rather than engaging in vehicle control. As NHTSA sees it, "[i]t will be difficult for a driver to prove that an accident would have been avoided had the V2V system functioned properly." NHTSA thus concludes that the potential liability based on V2V defects 'will be limited substantially by lack of causation due to drivers' roles in failing to avoid crashes."

The Alliance submits that this conclusion oversimplifies the state of the law with respect to "failure to warn" claims and the way they are likely to evolve in V2V-related litigation. As discussed in the Dykema Report, V2V safety warnings are not the same as the safety warnings that are generated solely by a driver's own vehicle. In traditional technologies, the vehicle generates the safety warning based on information available to it, and advises the driver, who can then choose to act or not on the warning. In this paradigm, a "failure to warn" can be attributed to the manufacturer of the vehicle that failed to warn. By contrast, V2V safety warnings are interdependent on information coming into the host vehicle from other vehicles, the roadside equipment, or both. See Dykema Report at 35. The host vehicle's manufacturer has no control over the quality, durability or maintenance status of those external sources of information – yet the V2V safety warning generated by the host vehicle may be partially or completely dependent on those external sources. In such cases, the liability risks associated with traditional warning technologies do not help to inform the discussion about the liability risks associated with the V2V environment.

The report also concludes that "we would not expect alleged failures in V2V infrastructure to impact OEM liability in a significant way," because the agency observes (again, in reliance on the Dykema Report) that lawsuits alleging infrastructure failures "typically are brought against public or quasi-public entities and not against vehicle manufacturers." But the Dykema Report based this observation on an important assumption that does not apply to the V2V system that NHTSA envisions in its Report. The Dykema Report specifically assumes that "[r]esponsibility for the design, manufacture, installation, and maintenance of RSE [road-side equipment] and other infrastructure will not reside with the OEMs, nor would the OEMs determine the communications system interfaces between the RSE network and VII [vehicle infrastructure integration] OBE [on-board equipment]." Dykema Report at 32.

The NHTSA Report, however, does not appear to envision that the V2V system road side equipment will be installed and maintained by public or quasi-public entities. To the contrary, NHTSA has stated that "a nationwide network of RSE DSRC devices does not exist at this time and Congress has yet to allocate funds to build such a network," and has repeatedly stated that it has no plans to seek V2V-related funding. NHTSA suggests instead that existing 3G/4G cellular networks could potentially be used to support V2V communications. But not only are these networks privately owned and managed, they also have an inadequate level of security for V2V purposes, according to NHTSA's contractor, Booz Allen Hamilton, and would be the most expensive option to run and maintain, again according to Booz Allen Hamilton. Indeed, Booz Allen Hamilton estimated that a cellular-based V2V infrastructure would cost ***nearly $2 billion*** annually to run and maintain, compared with $177 million annually to maintain an RSE-based infrastructure. Booz Allen Hamilton notes that the source of funding for any of these costs is uncertain and ***could require private sector investments*** after encroachment permits are granted by the state and local agencies owning the public right-of-ways. See **Communications Data Delivery System Analysis for Connected Vehicles, Revision 5, May 29, 2013,** docketed at NHTSA 2014-0022-0025, at page 84. Thus, NHTSA's conclusion that there are no liability risks for the private sector from infrastructure failures is not consistent with the assumptions about SCMS financing, ownership and maintenance in the NHTSA Report.

Finally, the agency notes that V2V safety warnings "are not very different in terms of application or interaction with the driver than on-board safety warning systems found in many of today's motor vehicles." The agency reasons that manufacturers already manage the liability risks associated with current safety warning systems, citing the Dykema Report, and concludes that manufacturers will manage the risks presented by V2V safety warnings through the same mechanisms used to manage current risks – compliance with applicable safety standards, contractual indemnification by equipment and component suppliers, and dispute resolution or arbitration clauses applicable to suppliers and consumers. NHTSA thus concludes that the liability risks to manufacturers are not an impediment to V2V implementation.

The Alliance believes that NHTSA has not adequately considered the important differences between on-board safety warning systems being installed in vehicles today, and the interdependent warning systems that are contemplated by a V2V system. As discussed above,

V2V safety warnings are interdependent on information coming into the host vehicle from other vehicles, the roadside equipment, or both. See Dykema Report at 35.

Thus, the liability risks to vehicle manufacturers have not adequately been evaluated. The agency's twin conclusions that the liability risks are not likely to be an impediment to V2V deployment, and that no liability-limiting mechanisms are needed, are both premature.

2. Liability Risks Associated with the Security Credential Management System. The NHTSA report concludes that any risks associated with the Security Credential Management System (SCMS) can be managed either by specifications in the terms of use with consumers that would limit the liability of the SCMS manager, or the procurement of insurance against losses associated with SCMS failures, or both.

First, NHTSA suggests that it is "not clear to the agency why an SCMS Manager could not require that individuals and entities participating in an SCMS agree to terms of use that would limit the liability of the SCMS and its component entities …". This observation does not take into account the strong disapproval of liability-limiting clauses in contracts with consumers. Such clauses are variously referred to as contracts of adhesion (if the consumer has no real choice about whether to agree to the terms) or simply against public policy (or unconscionable). While such clauses can be effective in allocating risk among businesses, they are not likely to be effective in limiting liability for negligence that allegedly causes personal injury to a consumer.

Second, NHTSA seems to assume that the SCMS manager will be able to procure insurance to manage any liability risks associated with failures of the SCMS. But this assumption fails to recognize the fundamental basis of conventional insurance underwriting, which is reliance on actuarially based data to inform the underwriters of how to price the insurance offerings. In the V2V environment, there is no experience to date with potential SCMS failures on which to base such pricing decisions. When actuarially based data is not available, the insurance industry has been reluctant to offer products.

A useful analogy may be the market for cybersecurity insurance. A recent review by the Department of Homeland Security of the cybersecurity insurance market found the following:

> "Among its initial findings, NPPD [National Protection and Programs Directorate] learned that the first-party cybersecurity insurance market is a nascent one, particularly when it comes to coverage for cyber-related critical infrastructure loss. Carriers cited several reasons for their limited offerings in this area, chief among them being: a lack of actuarial data; aggregation concerns; and the unknowable nature of all potential cyber threat vectors."
>
> From: "Insurance Industry Working Session Readout Report: Insurance for Cyber-Related Critical Infrastructure Loss: Key Issues." Page 2. Department of Homeland Security. July 2014.

While cybersecurity insurance is not a perfect surrogate for V2V SCMS failure insurance, it is instructive that the insurance industry has not been rushing to market with products to address the risks of cybersecurity losses, even though there have been many high-profile incidents and a presumably hungry market for such insurance. NHTSA cites no evidence to suggest that the insurance industry will be forthcoming with competitively priced insurance for losses associated with V2V SCMS failures, and certainly has not estimated the cost of any such insurance, even if it were to be available.

V2V technology is supposed to reduce, or even eliminate, certain types of crashes. This means that the traditional paradigm of automotive product liability, in which driver error is presumed to be at fault most of the time, will not apply after V2V and other autonomous technologies become more prevalent. With the dearth of evidence that insurance against these undefined risks will even be available, it is not a sufficient answer to the concerns that industry has raised about liability risks for the SCMS to dismiss those concerns in favor of as-yet-unavailable insurance products with unknown costs.

Attachment C
Interim Report on NHTSA's Preliminary Cost-Benefit Analysis of its Proposed Vehicle-to-Vehicle Communications Standard

John F. Morrall III, PhD
October 8, 2014

The National Highway Traffic Safety Administration (NHTSA) published an Advanced Notice of Proposed Rulemaking (ANPRM) on August 20, 2014 (79 FR 49270) that proposes to create a new Federal Motor Vehicle Safety Standard, FMVSS 150, to require Vehicle-to-Vehicle (V2V) communication capability for light vehicles (passenger cars and light trucks) and to create minimum performance requirements for V2V devices and messages. NHTSA believes that requiring V2V communication capability in new light vehicles would facilitate the development and introduction of a number of advanced vehicle safety applications that have the potential of providing significant safety as well as other benefits. NHTSA also issued a technical report, "Vehicle-to-Vehicle Communications (V2V): Readiness of V2V Technology for Applications" that preliminarily supported NHTSA's moving forward with its proposal.[1]

The Office of Management and Budget reviewed the pre-rule under Executive Order 12866, "Regulatory Planning and Review" issued October 4, 1993 by President Clinton (58 FR 51735) and Executive Order 13563, "Improving Regulation and Regulatory Review" issued January 21, 2011 by President Obama (76 FR 3821). OMB determined under EO 12866 that it was a "major" rule, which would require a Regulatory Impact Analysis (RIA) if NHTSA goes forward with a Notice of Proposed Rule Making (NPRM) as it stated it would by 2016.[2] A rule with an effect on the economy of $100 million or more is considered a "major" rule under EO 12866. NHTSA's Technical Report estimates that costs could peak at $6.4 billion per year by 2022.[3] OMB's Circular A-4, "Regulatory Analysis" advises agencies on the standards they should follow in the preparation of the cost and benefit analyses needed to produce an RIA and comply with EO 12866 and EO 13563. Those Executive Orders both state: "to the extent permitted by law, each agency must, among other things: (1) propose or adopt a regulation only upon a reasoned determination that its benefits justify its costs (recognizing that some benefits and costs are difficult to quantify):..[4]."

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[1] NHTSA "Vehicle-to-Vehicle Communications (V2V): Readiness of V2V Technology for Applications:" DOT HS 812 014 (August 2014). Hereafter: NHTSA Technical Report.
[2] OMB also reported that the rule has both global and small business impact. OMB's review is reported at http://www.reginfo.gov/public/do/eoDetails?rrid=124324
[3] NHTSA Technical Report p. 257.
[4] See Section 1(b) EO 13563 (76 FR 3821).

According to OMB, the purpose of an RIA is broader than its own use in regulatory review. An RIA also contains important information for the public, the White House and other parts of government such as the Congress, Courts and the agency itself as well as other agencies of the likely consequences of the proposed and possible alternative actions.[5] Thus even if the law does not permit the agency to take the information in an RIA into account in its final decision, agencies are still required to do the analysis and report it to the public.

The following interim report reviews NHTSA preliminary cost and benefit estimates using the standards of the Executive Orders and OMB Circular A-4. The preliminary conclusion of this interim report is that the NHTSA Technical Report alone does not currently provide an adequate basis for concluding as required by EO 12866 and 13566 that a reasonable determination can be made that (1) the benefits of the proposed V2V standard would likely justify its costs or (2) which of various possible alternatives would be the most cost-effective.[6] For NHTSA to move forward with an NPRM, it should provide an RIA that meets the following criteria.

Key Elements of a Regulatory Analysis

According to OMB Circular A-4:

> "A good regulatory analysis should include the following three basic elements: (1) a statement of the need for the proposed action, (2) an examination of alternative approaches, and (3) an evaluation of the benefits and costs—quantitative and qualitative—of the proposed action and the main alternatives identified by the analysis.
>
> To evaluate properly the benefits and costs of regulations and their alternatives, you will need to do the following:

- Explain how the actions required by the rule are linked to the expected benefits. For example, indicate how additional safety equipment will reduce safety risks. A similar analysis should be done for each of the alternatives.
- Identify a baseline. Benefits and costs are defined in comparison with a clearly stated alternative. This normally w no action a "no action" baseline: what the world will be like if the proposed rule is not adopted. Comparisons to a "next best" alternative are also especially useful.

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[5] OMB's Circular A-4, "Regulatory Analysis" September 17, 2003 (p. 2) http://www.whitehouse.gov/sites/default/files/omb/assets/regulatory_matters_pdf/a-4.pdf

[6] EO 12866 states that these principles are only required to the extent permitted by law.

- Identify the expected undesirable side-effects and ancillary benefits of the proposed regulatory action and the alternatives. These should be added to the direct benefits and costs as appropriate." [7]

The following reviews the NHTSA Technical Report using the above criteria and offers suggestions so that a future analysis would.

Does NHTSA Demonstrate a Significant Market Failure?

The first step before estimating the benefits and costs of a government intervention is to determine whether material failures of private markets to protect the public exist.[8] If there are no significant market failures, it is likely that government intervention will produce social costs greater than benefits and thus a benefit-cost analysis of a government intervention that finds net benefits should be viewed with suspicion. EO 12866 embodies this principle of economics and good government by requiring that: "Each agency shall identify the problem that it intends to address (including, where applicable, the failures of private markets or public institutions that warrant new agency action) as well as assess the significance of that problem." [9] Thus as OMB Circular A-4 explains: "You should show that a government intervention is likely to do more good than harm." [10]

NHTSAs Technical Report does not show that mandating a V2V standard is likely to do more good than harm or that a significant market failure exists. NHTSA states its view that a market failure exists because V2V is a "network good "which economists define as a good that becomes more valuable the more consumers use it. NHTSA asserts, "… if V2V were not mandated by the government it would fail to develop or would develop slowly.[11]" NHTSA reasons:

> "[B]ecause the value of V2V to one driver depends upon other drivers' adoption of the technology, it seems unlikely to NHTSA that a manufacturer would volunteer to "go first" with adding DSRC [Dedicated Short Range Communication system] to its new vehicles, because those units would provide little benefit to their drivers until some critical mass of V2V-equipped vehicles is achieved, and that manufacturer could not know whether other manufacturers would soon follow suit. Moreover, an underlying security system to ensure the

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[7] OMB Circular A-4 pp. 2-3.
[8] The terms "material" and "significant" are used to modify market failure because it is well know that "government failures" also can exist. See Charles Wolf, "A Theory of Non-Market Failures" *Journal of law and Economics* (April 1978).
[9] Section 1(b)(1) of EO 12866.
[10] OMB Circular A-4 p. 4.
[11] 79 FR 49275, issue 57.

> validity of basic safety messages exchanged between vehicles is an essential element of V2V. NHTSA believes it is not likely that an entity would step forward to provide such a system absent a predictable, industry-wide demand that only a government mandate is likely to provide[12]."

However, NHTSA does ask for commentators' views on this issue and how fast and how V2V would occur in the absence of a government mandate of this technology.

The first NHTSA point that it seems unlikely that any manufacture would "go first" was proven wrong less than three weeks after the ANPRM was published on August 20, 2014 with the announcement by the CEO of a major manufacturer at Intelligent Transport System World Congress in Detroit that it would go first and encouraged other manufactures to offer the new technology.[13]

The rapid deployment of network goods especially in communications and software after technological breakthroughs is typical of network industries despite the apparent logic of the "who-will-go-first" argument. As the examples of facsimile, email, mobile phone networks, Facebook, search engines, Twitter, new payment systems, Airbnb, Uber and the rest of the sharing economy illustrate, innovators have a strong incentives to price their products and services low in anticipation of future economies of scale for both supply and demand. "Who-will-go-first" is a static analysis and innovators do not use static analysis. They base their decisions on demand expectations and often expect upward sloping demand curves as well as downward sloping cost curves, often characteristics of network goods.

NHTSAs is also concerned that, even if there is a first mover, deployment will be too slow compared to their mandated standard strategy. However that strategy sets a very low bar compared to what network industries have attained in the past and V2V manufactures are likely to attain in the absence of government mandates. The NHTSA regulatory strategy assumes that MY 2020 will be the first model year impacted by the new standard implying a final regulation would have to be set by 2016 to allow for a 2.5 to 3 year lead time that original equipment manufactures said they would need. According to NHTSA Technical Report, under its Scenario (2) its phase-in schedule (35% for MY 2020, 70% for MY 2021 and 100% for MY 2022) without after-market devices included will only achieve a vehicle fleet communication rate of about 1% by CY 2022 and not attain over 50% until 2034 and 99.91% in 2059. NHTSA assumes in its Scenario (3), which appears to be the no regulation baseline scenario with no after market safety devices sold that the vehicle fleet communication rate would be only 0.09% in 2022 and 6.255% in 2059, based on a V2V rate of 5% for MY 2020, 15% for MY 2021, and 25% MY 2022 and for each model year to 2059.

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[12] Ibid.

[13] See "2017 Cadillacs to Feature Hands-Free Driving, V2V Technology,"
By Keith Naughton,| September 8, 2014 reported by Bloomberg in *Insurance Journal.*

Since the NHTSA estimated benefits of the V2V system is directly proportional to the fleet communication rate, estimated benefits from both the standard and the baseline scenarios are in the distant future. NHTSA calculates the fleet communication rate as the square of the fraction of installed V2V vehicles to total light vehicles since it assumes that communications will be random. Thus if only 25% of the fleet is V2V enabled, only 6.25% of vehicles will likely be able to communicate with each other. Based on these scenarios NHTSA assumes it must mandate V2V. But these rather static assumptions give rise to two major concerns that should be addresses in a future RIA.

The first concern is that the NHTSA proposal appears to provide limited safety benefits compared to the potential of V2V. NHTSA discounts it cost estimates at 7% and 3% but presents undiscounted benefits from 2020 to 2059 for fatalities, injuries, and crashes avoided. NHTSA estimates that 49 to 1,083 lives could be saved per year and 11,000 to 593,000 crashes potentially prevented. But the Technical Report projects that would not occur until 2059 when V2V spreads though the whole fleet. Discounting benefits as well as costs by the same rate (as OMB Circular A-4 and both DOT and EPA RIA guidance all recommend) places benefits on an equivalent footing with the base year cost estimates (2012) and a 7% discount rate produces estimates of 2 to 43 fatalities and 440 to 23,720 crashes. This implies that NHTSA and DOT should consider non-FMVSS options and incentive approaches to speed up the spread of V2V communications and to make sure that its mandatory approach does not have the unintended consequence of slowing innovations and public acceptance.

The second concern is that Scenario 3, which appears to be the sales scenario without the standard appears to be very unrealistic. It assumes that 45 years from now only 25% of the fleet will have V2V technology although some manufactures are intending to introduce it on their own and there are many advantages to the technology other than the narrow safety benefits modeled by NHTSA. OMB circular A-4 states that the proper baseline to use to compare an intended action is the way the world would look absent the proposed action including:

. • evolution of the market,

• changes in external factors affecting expected benefits and costs,

• changes in regulations promulgated by the agency or other government entities, and

• the degree of compliance by regulated entities with other regulations.[14]

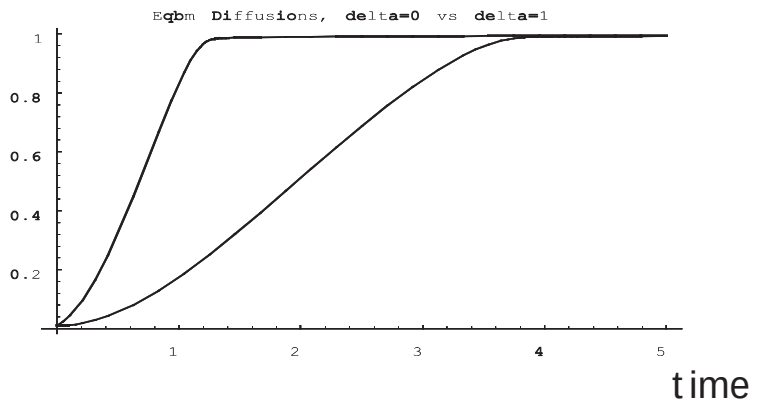
As pointed out above, network industries tend to by quite dynamic. According to Nicholas Economidas, a leading scholar of network industries, "market penetration of

[14] Circular A-4 p. 14

network industries tends to be much faster than non-network industries.[15]" He present the following slides:

Market penetration of innovations is much faster in network industries than in non-network industries

Penetration

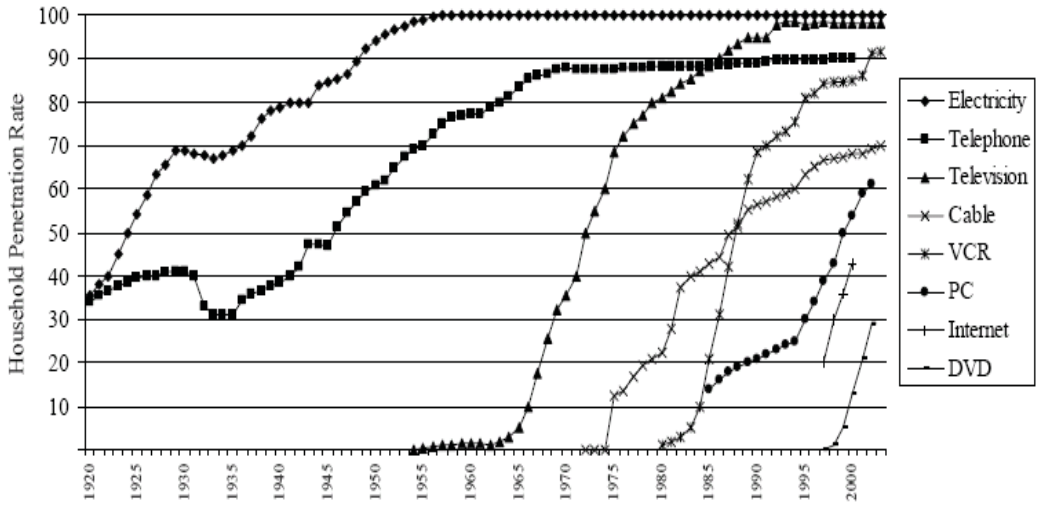


Diffusion of an innovation with and without network effects

43

[15] Quote from slide 43 of Nicholas Economidas, Presentation for Network Economics at his MBA course at the Stern School of Business of New Your University, (copyright 2009).

Adoption S-curves from various network industries



Note from these examples that the rate of diffusion of new network technologies has appeared to speed up over time. It also is likely that the rate of penetration has continued to increase over the last ten years or so for the new network technologies in software and mobile communications. The NHTSA baseline analysis does not include any aftermarket, which it assumes only occurs with its mandatory standards. But it is likely that motorists, commercial vehicles, motorcycles, bicyclists and pedestrians will want either two- or one-way awareness devices for safety and other reasons and that their prices will fall as competitors strive for future market share. NHTSA may have undercounted these devices by not including smart phones and wearable devices in their aftermarket definitions. The example of safety device OEM, Mobileye, which has characteristics of a one-way network product and recently went public with a market cap now of over $10 billion, is illustrative of the potential demand and excitement for collision avoidance devices. NHTSA also does not factor in the benefits drivers would enjoy from non-safety benefits such as traffic avoidance and better mileage from V2I which will likely be implemented by State and local government on their own or by DOT funding. The fact that Europe and Japan are moving forward with in these areas will also provide additional incentives and demonstration effects for global manufactures and US consumers.

In any future RIA, NHTSA should establish a more realistic baseline with which to compare its proposed actions using the guidance OMB recommends they be

constructed. OMB guidance also suggests that if an agency is uncertain about the way the world would look without its intended action, it should provide multiple baselines. At the very least, OMB recommends that the agency model the impacts of other regulations and government actions including its own that may have not taken full effect or may be implemented in the future. The present Technical Report appears to be narrowly focused, pursuing a particular standard without taking into account alternatives and unintended consequences that could produce more harm than good.[16] The Technical Report points out that DOT and NHTSA have been conducting research on V2V technology for more than a decade and it appears to be a very promising technology that is about to be widely adopted. DOT must step back and make sure that it does not jeopardize its acceptance.

Could the NHTSA Mandated Standard have Unintended Consequences?

A fair question to ask is if V2V communication devices are likely to be implemented without a NHTSA requirement, what is the harm of mandating it? The answer in part depends upon the timing. If the government mandates a standard too soon it could freeze the technology and slow innovation and diffusion. This is a particular concern for fast innovating network industries. Oz Shy, another leading scholar on network economics after surveying network industries in his classic 2001 book, the *Economics of Network Industries* concludes:

"From this discussion it is clear why government intervention in standard setting is undesirable." And explains: "Therefore, despite the market failures recognized in this book, the reader must bear in mind that the author does not [emphasis in the original] advocate government intervention in standard setting." [17]

A second concern with government standard setting, which applies to the communications and tracking area in particular, is public concerns with the role of government in privacy, security, and software implementation and design expertize in general. Comments from the public already expressed about the government requiring mandatory location devices, whether well founded or not, suggest that consumer acceptance might be slower under a government requirement than under a voluntary system promoted by manufactures and other entities concerned about safety. NHTSA is, of course, concerned about the privacy and security issues and addresses them in the Technical Report outlining its plans to assure consumers: "that V2V technologies do not pose a significant threat to privacy and have been designed to help protect against vehicle tracking by the government or others." [18] The Technical Report also states "industry members have expressed concern that consumers will opt not to buy new vehicles if the agency mandates V2V technologies without protecting consumer privacy to the extent industry believes is necessary" and suggests that: "Industry also may be able to use

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[16] For a discussion of the problem of a narrow focus see Stephen Breyer, Breaking the Vicious Circle: Toward Effective Risk Regulation (Harvard 1993).
[17] Oz Shy, *The Economics of Network Industries,* (Cambridge University Press: 2001) p.6.
[18] See NHTSA Technical Report, p. 136.

suggestions from the agency on how to facilitate consumer acceptance of V2V technologies if the agency eventually decides to require them." [19] NHTSA appears to fail to consider that it may not be V2V technology that is the concern but that the government requiring it is the main concern. NHTSA should factor these considerations into any future RIA.

Does NHTSA Examine Available Alternatives?

As discussed above, the NHTSA Technical Document presents three consumption Scenarios, one of which appears to be the baseline and the other two the proposed FMVSS (phased in at 35%, 70%, and 100% starting with model year 2020) with and without a small voluntary after market. OMB Circular A-4 recommends that agencies consider performance standards, informational measures, incentives and increased flexibility as alternatives because they tend to be more cost-effective. We have already mentioned informational programs, grants to States for V2I programs, and commercial vehicle standards as ways to encourage consumer adoption. DOT and NHTSA could also consider incentive programs to encourage adoption of awareness signals for both vehicle and non-motorists. If NHTSA does go forward with its schedule, one improvement would be to give vehicle manufacturers bankable credits for early adoption for later use as the requirements are phased in. Another more creative incentive would provide manufacturers mileage credits for fuel economy standards since it is likely that reduced accidents will result in traffic efficiency gains and less mileage. This list is clearly not exhaustive.

Does NHTSA Quantify and Monetize Benefits and Costs of the Proposed Action and its Alternatives to the Extant Practicable?

The NHTSA Technical Report monetizes some of the costs of the proposed standard but only quantifies and does not discount certain theoretical potential safety benefits based on simulations and assumptions about effectiveness. Since it presents no alternatives, it obviously does not estimate their costs and benefits nor perform cost-effective analyses. This it will need to do for any RIA for a NPRM.

As far as NHTSA goes with the its cost estimates, which are mainly based on confidential business information supplied by OEMs, the estimates seem reasonable and assume falling costs with scale and learning by doing. However, NHTSA should consider including some more difficult to quantify costs such as loss of perceived privacy by consumers, possible opportunity costs to society if spectrum is found to be scarce and

[19] Ibid.

other uses are precluded by the FCC, and any increased litigation transactions costs that might result from this complicated and novel two-way technology.[20]

On the benefit side, NHTSA needs a lot more work to meet OMB RIA quality standards. As pointed out above, it needs to provide comparable benefit estimates to its cost estimates by discounting and monetizing. Although V2V looks promising, right now there is no economic efficiency basis to conclude that a mandated standard would produce benefits that are justified by its costs or that the proposed action is cost-effective compared to other NHTSA safety standards. NHTSA needs to include the non-safety benefits such as reduced traffic congestion, energy savings, and thus possible environmental benefits, which may very well tip the balance, but these benefits may also increase consumers rate of adoption so that a mandatory requirements is not cost-effective.

Final Thoughts

NHTSA has a well-earned reputation for performing excellent RIAs for its major regulations and is thus capable of signicantly improving its benefit and cost estimates for the NPRM stage. However, I have one concern with NHTSA recent methodology for monetizing future fatalities and injuries avoided. That is its use of future value of statistical lives (VSLs) that increase and compound over time due to assumptions about the growth of income. Since NHTSA projects benefits to 2059, this can be problematic. Real median family incomes are no higher today than in 1989. I urge NHTSA to give this issue careful attention.

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[20] NHTSA claims that there should not be any new liability concerns but this is an opinion not based on evidence. The possible costs of any increased monetary awards are transfers not included in estimates of social costs but the legal bills of both parties are real social costs. So even if NHTSA is right that manufacturers would not face increased product liability, they could still face heavy litigation costs to prove that they have no liability.

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Current Positions

John Morrall is an Affiliated Senior Scholar with the Mercatus Center of George Mason University and President of Morrall Economics an independent contractor. He specializes in regulatory impact analysis, reform, and governance; benefit-cost and cost-effective analysis; health, labor, housing, and homeland security policy; and risk assessment. In the last five years, he has also performed work USAID, the School of Public and Environmental Affairs of Indiana University, the Pew Charitable Trust, the US Chamber of Commerce, the Institute of Brazilian Issues at George Washington University, the OECD in South Africa, the Institute for Applied Economic Research, Brazil, iMapData and Bloomberg Government.

Previous Positions

1989-2008: Branch Chief for the Office of Information and Regulatory Affairs (OIRA) of the Office of Management and Budget, Executive Office of the President. Acting Deputy Administer May 2006 to August 2007. The Deputy Administrator is the highest career job in OIRA.

- Responsible for reviewing the regulations and regulatory impact analyses issued by the Departments and agencies of the Federal government under E. O. 12866. OIRA currently has five branches: three that review regulations, one that coordinates statistical policy, and one that coordinates information policy.
- Before becoming Acting Deputy Administrator in June 2006, Branch Chief for Health, Transportation and General Government.
- Lead author for OMB's annual *Report to Congress on the Costs and Benefits of Federal Regulations.*

1996: Consultant with the Program for the Support for Improvement in Governance and Management in Central and Eastern European Countries (SIGMA) Paris and Riga

1986 - 1989: Acting Branch Chief and Assistant Branch Chief for Human Resources and Housing, OMB

1981 - 1985: Deputy Chief for Social Statistics and Regulatory Analysis, OMB

1980- 1981: Visiting Economist, American Enterprise Institute for Public Policy Research

1975 - 1981: Deputy Assistant Director and Senior Economist, Office of Government Programs and Regulations, Council on Wage and Price Stability, Executive Office of the President

1974: Kogod College of Business Administration, American University, Adjunct Faculty Member

1973 - 1975: Social Science Research Analyst, Office of the Assistant Secretary for Policy Development and Research, Department of Housing and Urban Development

1972 - 1973: Brookings Institution Economic Policy Fellow, Office of the Assistant Secretary for Policy, Evaluation, and Research, Department of Labor

1969 - 1974: Assistant Professor of Economics, College of Business, University of Florida, Gainesville (on leave 1972--1974)

1967 - 1969: Instructor of Economics, University of North Carolina, Chapel Hill

Education

Ph.D., University of North Carolina at Chapel Hill, 1971 (International Economics)
A.B., Tufts University, 1965 (Economics)

Awards and Fellowships

Magna cum laude in studies economics, Tufts University, 1965

NDEA Title IV fellowship, University of North Carolina, 1965-1968

Semi-finalist, Standard Oil (Indiana) Foundation's Good Teaching Award, University of Florida, 1970

Brookings Institution Economics Policy Fellow, 1972--1973

Various OMB and SES awards, including a 2004 Presidential Rank Award for Meritorious Service

Articles in Refereed Journals

(With Stuart Shapiro) “Does Haste Make Waste? How Long Does It Take to Do a Good Regulatory Impact Analysis,” published online 21 August 2013, *Administration & Society*.

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(With Edgar Olsen) "A Cost-Effectiveness Study of Leased Public Housing" *Policy Analysis*, (Spring 1980); reprinted by Institute for Research on Poverty, University of Wisconsin-Madison

"The Cost and Benefits of the Proposed Standard for the Control of Cotton Dust,*" Review of Industrial Management and Textile Science*, (Spring 1978)

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OSHA: After Ten Years (Working Paper in Government Regulation, American Enterprise Institute, November 1981)

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Chapters in Books, and Miscellany

(With Matt Barry) **"**Making Healthy Foods Safer: FDA's Proposed Produce Safety Standards," *Bloomberg Government Regulatory Analysis* (April 23, 2013)

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(With Ivy Broder) "US Regulatory Framework and its Relevance for Brazil" in Lucia Helena Salgada (ed.) *Revisiting State Role: 5h Regulatory Studies Forum* (Rio de Janeiro, IPEA, (2010)

(With Dominic J. Mancini) "The American Experience in Regulatory Review and Reform: Lessons for Korea" in MoonJooong Tcha (ed.) *Regulatory Reform to Improve the Business Environment in Korea* (Seoul: Korea Development Institute, 2006).

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(With Ivy Broder) "Collecting and Using Data for Regulatory Decision-making" in *Regulatory Impact Analysis: Best Practices in OECD Countries*, (Paris: OECD, 1997).

"Using Regulatory Impact Analysis to Improve Legislation and Regulation: The American Experience and Its Relevance for Central and Eastern European Countries" in *Assessing the Impacts of Proposed Laws and Regulations*, SIGMA Papers: No. 13 (OECD: Paris, 1997).

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"An Economic Analysis of OSHA's Cotton Dust Standard" in L. Lave and R. Crandall (eds.), The Scientific Basis for Health and Safety Regulation (Washington, D.C.: Brookings Institution, 1981)

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"Exposure to Occupational Noise" in J. Miller and B. Yandle (eds.), *Benefit Cost Analysis of Social Regulation*. (Washington, D.C.: American Enterprise Institute, 1979)

(With Robert S. Goldfarb) "Reply to Response of Armand J. Thieblot, Jr. To (our) Study of Davis-Bacon Act." *Construction Labor Report*, 1112, (February 23, 1977)

(With Robert S. Goldfarb) "An Analysis of Certain Aspects of the Administration of the Davis-Bacon Act" *Construction Labor Report*, 1079 (June 30, 1976)

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"Import Substitution and Industrial Exporting: An Analysis of Recent Argentine Experience; A Comment," in D. Geithman (Ed.), *Fiscal Policy for Industrialization in Latin America* (Gainesville, Florida: University of Florida Press, 1972)

Other Information

Over 100 papers presented and lectures given at various academic and professional association meetings and universities in the U.S. and abroad. These include:
Academic Associations: American Economic Association, Western Economic Association, Southern Economic Association, Association for Policy Analysis and Management, American Chemical Society, American Bar Association's Section on Administrative Law and Regulatory Practice, American Academy of Occupational Medicine, American Academy of Mechanical Engineers, American Institute of Chemical Engineers, National Association of Secretaries of State, American Public Health Association, Society for Medical Decision Making, Association of Private Enterprise Education, Society of Government Economists, Society of Risk Analysis and Society for Benefit-Cost Analysis.
Public Policy Institutions: Institute of Medicine, Brookings Institution, American Enterprise Institute, Cato Institute, Political Economy Research Center, Resources for the Future, Weidenbaum Center on the Economy, Government, and Public Policy, Korean Economic Research Institute, National Academy of Sciences, Institute of Public Administration of Canada, Mercatus Center at George Mason University.
Academic Institutions: American University, Georgetown Law School, Cornell University, Duke University, University of Florida, Harvard University, University of Maryland, Montana State University, North Carolina State University, George Washington University, Rochester Institute of Technology, Indiana University program at Kings College, London and Vanderbilt Law School.
Foreign Government Officials at conferences in Washington, Montreal, Toronto, Paris, Brussels, Vienna, Seoul, Riga, Moscow, Budapest, Tbilisi, Rabat, Singapore, Brasilia, Hanoi, Da Nang, Pretoria, Rio de Janeiro and Bangkok.
Other Activities: Testified at various hearings held by agencies and Congress including: Senate Committee on Governmental Affairs, International Trade Commission, and Occupational Safety and Health Administration.

Attachment D
Alliance of Automobile Manufacturers, Inc.
ANPRM Vehicle-to-Vehicle Communications
Proposed Federal Motor Vehicle Safety Standard No. 150
Docket NHTSA-2014-0022

NOTE: The Alliance and its members continue to review the extensive documentation docketed in support of this ANPRM. In addition to the 67 questions posed in the ANPRM and the 327-page report it references, the agency docketed 23 supporting reports, many of which run into the hundreds of pages. It has not been possible to fully review and comment on all of these materials within the comment period allowed by the ANPRM. As such, the agency should expect that comments and supporting data and analyses will continue to be added to the docket as they are completed. Hence, the answers provided herein should be considered preliminary.

Safety Need

The Alliance response to questions and issues raised on safety need is in Attachment C.

NHTSA's Exercise of Its Legal Authority to Require V2V

The Alliance response to questions and issues raised on NHTSA's exercise of its legal authority to require V2V is in Attachment A.

What's Necessary for DSRC to Work

10. Can V2V safety applications only be addressed through the use of DSRC devices, or is there some other method of communication that could be used?

While there are several communication protocols that operate on various spectra that can support this type of communication, because V2V safety applications (as well as most V2x safety applications) require low-latency, local broadcast communications to support the envisioned applications, DSRC should be used.

The proposed DSRC method uses a standard derived from the family of Wi-Fi standards, namely IEEE 802.11p, that has been researched and developed to operate on a dedicated band in the 5.9 GHz spectrum. The only other option that has been researched significantly and suggested as an alternative is Device-to-Device communication, specified by the Third Generation Partnership Project (3GPP). Device-to Device communication devices would directly communicate on spectrum licensed to LTE network providers. Whereas the IEEE standard has been researched thoroughly, the 3GPP standard has not yet been investigated to determine if it could support V2V applications.

The Alliance submits that the IEEE 802.11p standard has many relative advantages as a communication protocol when compared with 3GPP, the first of which is the maturity of the research. The IEEE 802.11 standard is well researched and understood by car manufacturers and consortia. The standard is stable, drawbacks are known, and solutions have been identified to allow the system to function properly in the intended operational domain. In comparison, there are many research challenges for V2V to be accomplished via 3GPP Release 12 (or higher).

Research challenges to 3GPP Release 12 or higher include:

-Device-to-Device communication builds on timing information in the LTE network. How does Device-to-Device communication work in the complete absence of network coverage?

-Would V2V be realized using the discovery feature of Device-to-Device or by means a scheduled data transfer between devices? In the former case, are payload sizes sufficient to transport BSMs?

-Is the rate of sub-frames dedicated to Device-to-Device communications sufficient for V2V applications? In terms of long-term sustainability, is this rate guaranteed to stay sufficiently high? If the standard allows for dynamic allocation, it may be in the providers' interest to lower the number of Device-to-Device sub-frames in favor of other services.

-How does interoperability between different network providers work? Does it cause delays? Assuming different frequency bands, would switching between bands be a power issue?

-From a security perspective, can authentication methods of the LTE network be trusted, or should signatures on the application layer be used?

-For privacy, IEEE 802.11p uses media-access control (MAC) address randomization. It remains unclear if the LTE Device-to-Device feature can work without static unique device identifiers.

-In addition, telecommunications networks are subject to CALEA[1]. This law, which requires telecommunications networks to be designed to facilitate surveillance by law enforcement, would undermine the agreed-upon privacy-by-design concept.

There are other advantages to choosing IEEE 802.11p over 3GPP's Device-to-Device or another system. First, the 5.9 GHz spectrum is allocated to be used principally for transportation safety applications, independently of the need to interact with a LTE network, unlike 3GPP's Device-to-Device system which operates in a commercial band licensed to telecommunications providers.[2] The chipset and required hardware is expected to have comparably low monetary costs. DSRC is also free of usage fees and this has not been clearly established for 3GPP's Device-to-Device system.

The Alliance recognizes that the IEEE 802.11p standard has several known drawbacks that have been outlined in other responses to this ANPRM. Nonetheless, under a potential mandate, the advantages of utilizing the 802.11p communication protocol within the 5.9 GHz allocated spectrum, including the completeness of research and availability of solutions to challenges facing the protocol, outweigh the disadvantages of unknown research questions associated with the Device-to-Device protocols and the spectrum licensing and network usage fees that do not support a stable financial model required under a mandate. Therefore, the Alliance does not

[1] http://www.gpo.gov/fdsys/granule/USCODE-2010-title18/USCODE-2010-title18-partI-chap119-sec2522/content-detail.html

[2] More information about the use of the 5.9GHz spectrum is available in Attachments E and F.

recommend switching to LTE-based Device-to-Device Communication, unless all issues with respect to performance, cost, and availability are thoroughly researched and associated concerns are resolved prior to the issuance of a mandate on any other technology.

11. Of the research needs identified in the report, do commenters believe that any of the descriptions should be modified to better support wide-scale implementation of V2V technology? If so, how should they be modified? Additionally, are there research needs that are not identified or addressed? If so, please identify those needs and suggest how the agency may address them.

In addition to research needs summarized in sections V-IX of the *Readiness Report*, research is required to determine the following:

-Confirmation of the ability for a single DSRC radio to satisfy requirements for BSM transmission / reception and security communication.

-The acceptability of allowing other messages on the channel used for BSM transmission.

-The need for a "spectrum manager" to enforce proper channel utilization.

-The acceptability of CRL distribution via epidemic (viral) distribution. As listed in footnote 238 of the *Readiness Report*, this research should include evaluation of:

(1) How onboard diagnostics for V2V devices for local detection (malfunction) could reduce the size of the CRL;

(2) How misbehavior search algorithms for global detection (malfunction and malicious) could be developed; and

(3) What new vulnerabilities to attack and what new enhanced data communication capability exist.

12. Do commenters agree with the agency's preliminary conclusions about what should be included as part of the Basic Safety Message (BSM)? Are there any additional elements that should be included?

Based on the specification in SAE J2735, the Alliance supports the agency's conclusions for the BSM content. The Safety Pilot Model Deployment demonstrated that the data structures included in Part I, as well as select data structures from Part II can support select V2V warning applications; therefore, Alliance members are confident that BSM can be used as the foundation for V2V deployment. The Alliance also supports the further development and use of SAE J2945.1 to define minimum communication performance requirements and prioritize BSM data elements, along with SAE J2735. NHTSA should work with stakeholders to determine which data elements will be required to enable safety applications and which will be permitted for deployment under a potential mandate.

13. NHTSA currently does not plan to propose to require specific V2V-based safety applications. Rather, we plan to propose to require that new vehicles be equipped with DSRC devices, which

will enable a variety of applications that may provide various safety-critical warnings to drivers. Should vehicle manufacturers be allowed to choose what form of warning should be provided to drivers? Should drivers be able to modify or turn off any warnings that they receive?

The agency should allow maximum flexibility in the manner with which V2V alerts are provided to the driver. There is currently no consensus among safety and human factor experts that would support the specification of common alert designs for safety systems. On the contrary, research suggests that differing alerts produce comparable responses. Experience with current "active" safety and assist technologies suggests drivers value the ability to customize their human machine interface (HMI) experience, as well as the unique attributes offered by various automakers. V2V alerts should be allowed to be integrated into a vehicle interior in a manner that harmonizes with the overall HMI theme of the vehicle in question, including with other alerting technologies that may be present on the vehicle. By allowing flexibility, OEMs will be able to provide alerts consistent with their overall HMI strategies that cater to their customers preferences, thereby likely increasing driver recognition of the alerts, acceptance and facilitating an appropriate response. For example, it would be unwise for a V2V system to mandate a haptic warning for a forward collision event if other systems present in the same vehicle rely on haptic warnings to warn of lane violations because the driver could be easily confused about what a particular haptic warning indicated.

14. NHTSA is considering including in its proposed rule technical standards for V2V communications, drawing heavily on standards under development by the auto industry. This may be necessary to ensure compatibility of all V2V devices, whether installed in new vehicles or made available in the aftermarket. How can NHTSA choose the correct standard(s) for V2V? Executive Order 12866 directs agencies to use performance-based standards whenever possible. Should NHTSA mandate a particular standard or only mandate V2V, but allow market participants to choose a standard? If you believe a standard should be chosen, how specific should the standard be? Should the standard mandate a particular form of communication? Should cellphones be an option for the communication or must V2V be a component of the vehicle? Does cellular technology have the low latency and security necessary for safety-critical communications?

The continued advancements in the high performance information transfer electronic process, both in hardware and software, and the potential for improvement in vehicle crash reductions that may improve active safety make V2V an attractive approach. However, it should be noted that active safety technologies do not have the extensive body of information and research databases nor the mature standards of passive safety.

NHTSA should proceed with a development process of the V2V standard that focuses on a rigorous, scientific approach, including extensive evaluation processes, as well as verification and validation of all aspects of the resulting standard. This should include, but not be limited to, the experimental and numerical models used in the standard development. In addition, the

agency should attempt to determine the potential errors that may result with the goal of minimizing those errors.

Prior to a Notice of Proposed Rulemaking (NPRM), the agency should include an explicit, well-defined technical standard for V2V communications. The standard should articulate the communication band and protocols necessary to ensure compatibility of all V2V devices, whether installed in new vehicles or offered in the aftermarket. The standard must be performance-based and include specific forms of communication, including the corresponding performance criteria. At the same time, it should leave room for market participants to choose the technologies used to meet the performance standard and the criteria.

15. Do commenters believe that the current standards for interoperability are mature enough to support the more wide-scale deployment of V2V devices, given that interoperability was achieved in the context of the Safety Pilot Model Deployment in Ann Arbor, Michigan?

Although not fully developed and finalized, the emerging standards for Safety Messages (SAE J2735 and J2945.x) are undergoing revisions or are being developed. Interoperability (IEEE 802.11p, IEEE 1609.x) appear to be reasonably comprehensive for addressing V2V Safety Communications and vehicle/device interoperability. Further work on the message sets may be required to achieve additional mobility, environmental and convenience application goals associated with broader V2X deployment.

16. Section V of the research report discusses additional work on interoperability that the agency expects will be performed by voluntary standards organizations such as Society of Automotive Engineers (SAE), Institute of Electrical and Electronics Engineers (IEEE), International Standards Organization (ISO), etc., along with additional research underway by the agency itself. Do commenters believe that this research will be sufficient to facilitate interoperability for wide-scale V2V deployment, or do commenters believe that additional research is needed? If so, what additional research could be beneficial, and why?

The Alliance is aware of the research undertaken by these voluntary standards organizations. Interoperability testing is an important step to validate standards that are developed, but we note that neither SAE nor IEEE conduct such testing. In addition, all parties will need to coalesce around a certification method in order to ensure that devices conform to the standards and operate correctly and with each other. As technology is readied, NHTSA should work with stakeholders to come to a consensus on technologies for deployment and work together to determine what, if any, additional research should be conducted.

17. Do commenters believe that the agency's preliminary assessment that V2V devices would require two DSRC radios, one for safety communications and the other for security-related communications, is accurate? If not, why not, and how do commenters suggest safety messages maintain priority?

Preliminary research suggests that two radios are not necessary and further research is ongoing.

There are three types of security-related capabilities required to support V2V communication[3]: 1) retrieve device certificates from security backend, 2) update of certificate revocation information, and 3) submit misbehavior report to the backend. These three communications functions feature small payload sizes and have low to modest delay constraints when compared to safety messages. The communications occur infrequently; the highest frequency is the update of revocation information, which would likely only occur daily (at full deployment).

The corresponding protocols can and should be designed such that all security-related communications can be performed on the same channel as safety messages. To this end, the communications protocols are being developed to meet the following requirements:

- Security related messages should be segmented into small, over-the-air packets to prevent causing major delay to other messages.
- The transmission rate of security-related packages should be significantly lower than the rate of safety messages to avoid contention.

The small payload and the allowable delay constraints suggest that these requirements can be met. Research should remain focused in the direction of one-antenna solutions. Research related to solutions on how to implement the three types of security-related communications above include:

- Performing certificate updates when the vehicle is stationary and in communication range of a RSE at traffic light, or as a background task while driving involving several RSEs. (The communications protocols can be tailored such that they are robust, provide certificate batches in small chunks, and allow for a "resume" functionality such that partial downloads can be completed without loss of prior data.)
- A distribution scheme, known as epidemic distribution, is being designed to be a background process to update certificate revocation information.
- Submission of misbehavior reports can be performed whenever road side equipment is encountered. Rate control can be used to avoid high traffic load.

As already noted, research continues to determine if security can be supported on one channel such that the use of a second radio can be avoided. Ongoing channel congestion studies indicate that channel congestion may only become an issue with the most extreme vehicle densities. In a condition where additional security communications would challenge vehicle-to-vehicle communication, the security related communication could be delayed until channel congestion reaches a reasonable state.

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[3] William Whyte, André Weimerskirch, Virendra Kumar, and Thorsten Hehn, "A Security Credential Management System for V2V Communications", 2013 IEEE Vehicular Networking Conference (VNC 2013), December 16-18, 2013, Boston, USA.

18. The Federal Communication Commission (FCC) has proposed the possibility of sharing the DSRC frequency of 5.9 GHz with other unlicensed devices. What are the possible ramifications of this sharing on current safety applications and future applications that may be developed? If commenters believe that spectrum sharing in the 5.9 GHz frequency is feasible and will not interfere with V2V communications, can commenters provide research to support that belief? Please also share any research and evidence that there will be interference. If sharing is not possible, how might NHTSA evaluate opportunity cost associated with those forgone alternative uses of the spectrum? Because the sharing decision will not be made by NHTSA, need the agency evaluate that opportunity cost as part of its rulemaking?

As noted (and discussed in further detail) in the Alliance's comment to the Federal Communications Commission found as Attachments E and F:

"Consistent with our comments to the FCC, the Alliance remains extremely concerned that the FCC's proposal, if finalized as proposed, could have a severely negative impact on the viability of V2V communications as a result of harmful interference from U–NII devices operating in the 5.9 GHz radio frequency band.

Most commenters to the FCC's sharing proposal agree that rigorous testing will be required to determine whether co–channel interference from U–NII devices into 5.9 GHz DSRC devices can be avoided. In addition, this concern has been acknowledged and articulated by the National Telecommunications and Information Administration (NTIA) report which concluded that more analysis is needed in order to determine whether the 5.9 GHz band can accommodate U–NII operations without causing harmful interference to "safety–of–life" DSRC operations. In fact, in its comments to the FCC rulemaking, the NTIA stated:

> DSRC should continue to be protected for the uses and goals for which it was allocated: reducing crashes, injuries, and fatalities. The FCC's proposals should not be implemented until and unless rigorous testing has shown that these critical safety goals will be satisfied.

Both NHTSA and the FCC have legal duties to perform certain testing before proceeding with finalizing their respective proposals that has not been performed to date. The National Traffic and Motor Vehicle Safety Act, currently codified at 49 U.S.C. Chapter 301, specifies that each FMVSS "…shall be practicable, meet the need for motor vehicle safety, and be stated in objective terms." 49 U.S.C. § 30111(a). The NHTSA notice does not attempt to demonstrate that proposed FMVSS No. 150 would satisfy these three statutory requirements, particularly in light of the FCC's sharing proposal. The Alliance expects that NHTSA will provide the needed demonstration when it issues its notice of proposed rulemaking.

Similarly, Part 15 of the FCC rules requires that unlicensed spectrum devices not cause harmful interference to licensed services. The FCC has not demonstrated that U–NII devices will avoid

interfering with licensed DSRC services, nor is the Alliance aware that there has been any testing to date. The Alliance expects that the FCC will allow U–NII operations in the 5.9 GHz band only if it is can demonstrate with absolutely certainty that such use will comport with its Part 15 rules.

To date, it appears that neither NHTSA nor the FCC have performed the testing needed to determine whether U–NII devices operating in the 5.9 GHz band can coexist with DSRC operations. Anything short of a deliberate, data–driven testing process for evaluating U–NII/DSRC compatibility raises serious concerns regarding the viability and practicability of DSRC."

19. How could spectrum sharing affect business interests and possible business approaches in relation to the deployment of the V2V technology? That is, if the FCC concludes that some spectrum sharing will not result in interference, will that decision discourage some investment in V2V and V2I technology implementation and delay the realization of certain benefits? If so, what kinds of business development would be deterred or delayed?

Any increased uncertainty due to sharing could likely increase the development time to fully assess technical robustness and delay or eliminate introduction of applications.

20. Can message congestion be managed, or might some kind of active mitigation be needed in a V2V system? Any information that commenters can provide about past or current research on this issue, including research content and methodology, would be helpful to the agency. If commenters have conducted such research, how close are you to a production-ready implementation that ensures effective V2V operation in high-congestion environment? What statistics and measurements have you collected that illustrate effective, production-ready congestion mitigation strategies?

The Alliance is aware that technical investigation in certain on-going government-industry projects indicates that, by full deployment, channel congestion could become an issue in the most extreme cases. The current industry experience is that channel congestion may be managed through some combination of broadcast power management and message timing or communication distance limit. However, until the true level of congestion is known, the countermeasures are uncertain.

21. The agency requests comment on whether DSRC systems should be expected to last the life of the vehicle, and if not, how one might ensure that DSRC systems in individual vehicles remain operable after the consumer has purchased the vehicle.

The Alliance does not foresee that deployment of DSRC will fundamentally change the way vehicles are repaired and maintained in use, including the on-board DSRC equipment. Presumably, on-board DSRC systems will indicate a fault condition to the driver, and it will then

be up to the owner (or lessee) of the vehicle to elect to make repairs (or not). Manufacturers can and do encourage owners to have repairs performed, but cannot compel them to do so.

It is well-established under the Motor Vehicle Safety Act that manufacturers, distributors, dealers, or motor vehicle repair businesses may not knowingly render a part of a vehicle subject to a motor vehicle safety standard inoperative.[4] However, this prohibition does not forbid vehicle owners from taking their own vehicles out of compliance. Thus, NHTSA cannot "ensure that DSRC systems in individual vehicles remain operable after the consumer has purchased the vehicle."[5]

It is also unclear whether on-board DSRC equipment will remain interoperable with off-board equipment and devices over the life of the vehicle. USDOT anticipates deployment of infrastructure, as well as other devices, that would also communicate with vehicles, whether for security communications or for other safety and non-safety purposes. Without enforceable rules and sufficient federal preemption to ensure backwards and forwards compatibility, it will be impossible to prevent state or municipalities from developing unique communication requirements or content that interfere with performance requirements.

22. Although NHTSA does not have the authority to require drivers to retrofit existing passenger vehicles with V2V devices, do commenters believe that the agency's decision to propose mandating V2V devices for new vehicles will spur development and application of aftermarket V2V devices? Can commenters provide research or evidence to support this view?

The marketplace for aftermarket V2V devices will be limited in volume and duration, and will also face many technical and policy challenges in the initial phases of deployment. Some of these challenges may be similar to those faced by light vehicles. The Alliance acknowledges that in the initial years, there is a use for the installation of aftermarket V2V devices: to increase the penetration rate and level. However, the functionality of these devices will be limited. Vehicle system status data cannot be expected to be available to devices that do not have authorized access to any particular vehicle's databus (see Question 23 for further detail). The restricted access to vehicle status data will severely limit the range of applications that can be supported on that particular device. In addition, the actual application performance of aftermarket devices may be degraded. Performance degradation could be caused by environmental positioning challenges found in both dense urban and forested areas or by send/receive challenges caused by the antenna installation locations on vehicles. These performance challenges are currently being researched, but the question of whether or not aftermarket devices can be certified to operate to the minimum performance requirements in the specified conditions is yet to be determined.

Driver distraction is an additional concern with aftermarket devices. Such devices do not have connection to the vehicle to enable control of information and warnings provided to drivers, so

[4] *See* 49 U.S.C. § 30122
[5] For more discussion on NHTSA's legal authority, please see Attachment A.