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Regulation of the ñConnected Vehicleò ï Issues and Models

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Introduction and Background

ñIntelligentò cars that drive themselves? While this futuristic concept has generated media buzz, the federal government, a number of states, the automakers, and a growing array of equipment and service providers, both domestic and foreign, have devoted significant efforts to the development and deployment of connected vehicle technologies in recent years.

In broadest terms, the ñconnected vehicleò envisions a system of electronic communications ï vehicle-to-vehicle (V2V), vehicle-to-infrastructure (V2I), and vehicle-to-mobile (V2M) ï to enhance vehicle safety, mobility, and traveler convenience, including commercial applications. The U.S. Department of Transportation (DOT), the federal department leading this effort under its IntelliDrive[SM] banner, has announced that the National Highway Traffic Safety Administration (NHTSA) will decide in 2013 whether to initiate a rulemaking on deployment of V2V safety systems. To assist in that regulatory effort, DOT is undertaking a pilot project on connected vehicle deployment in real-world driving environments.

From the earliest DOT discussions of the connected vehicle predecessor to IntelliDrive[SM], then known as Vehicle Infrastructure Integration (VII), it was at least implicitly assumed that deployment of connected vehicle technologies for vehicle safety would entail regulatory oversight. Of the numerous VII potential applications originally contemplated, many

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either related directly to vehicle collision avoidance (e.g., lane change warnings, forward collision avoidance warnings, intersection collision avoidance warnings) or road or traffic safety conditions (e.g., curve speed warnings, icy road warnings, bridge safety warnings).

At that time, the principal VII focus was on the use of Dedicated Short Range Communications (DSRC) in V2I applications. As then envisioned, this concept would have involved deployment of an extensive network of road-side equipment (RSE) receiving and transmitting messages via on board equipment (OBE) embedded in new vehicles and connected to in-vehicle sensors.

Over time, this original connected vehicle focus has shifted, partly because of the extent of public sector involvement and investment such an extensive V2I system would have entailed. Although DSRC-based messaging remains the communication medium of the DOT IntelliDrive^{SM} effort (including the announced pilot project and NHTSA 2013 regulatory decision), the principal regulatory emphasis has shifted to V2V safety applications. DOT hopes to ñleverageò its V2V efforts to V2I as an important secondary objective in more limited and localized applications. In addition, the advancement of mobile messaging has expanded the potential for V2M applications, which DOT is also reviewing, although not as a primary safety application.

The regulatory challenges presented by connected vehicle technologies are unique and unprecedented in the highway vehicle context. Using the framework of U.S. motor vehicle regulation, this paper will examine some of the more significant challenges and evaluate whether existing safety regulatory models may provide insight or guidance with regard to how those challenges may be met.

Overview of U.S. Safety Regulation

In order to place potential connected vehicle regulation in general ï and NHTSAôs projected rulemaking decision in particular ï in context, a brief overview of U.S. safety motor vehicle regulation is necessary.

Federal

The two DOT agencies principally involved in regulating vehicle safety are NHTSA and the Federal Motor Carrier Safety Administration (FMCSA).[2] Although NHTSAôs broad enforcement authority, including recall authority, extends to vehicles in use, the agency regulates the safety of new vehicles and original equipment through its rulemaking authority, primarily mandatory Federal Motor Vehicle Safety Standards (FMVSS).

FMVSS are promulgated through public notice-and-comment rulemaking proceedings which, depending on the complexity of the subject standard, can be lengthy and can consume enormous time and effort on the part of agency officials and the community of potentially affected parties. With limited exceptions, FMVSS apply only to new vehicles and original equipment, not aftermarket equipment or accessories, and are performance, not design, standards. To manufacture, import, distribute or sell new vehicles in the U.S., manufacturers must self-certify compliance with all applicable FMVSS. Dealers cannot install equipment on their vehicles that would defeat an FMVSS requirement. Since FMVSS requirements do not apply to post-sale aftermarket applications, the FMVSS do not apply to vehicle owner modifications of their vehicles.

[2] Another DOT agency, the Pipeline and Hazardous Materials Safety Administration (PHMSA), regulates the transportation, including highway transportation, of hazardous materials. Much of the initial federal VII effort was directed by the Federal Highway Administration (FHWA). The Research and Innovative Technology Administration (RITA), a DOT agency formed in 2005, oversees the IntelliDrive^{SM} research effort.

NHTSAôs FMVSS cover the broad range of new passenger vehicles, trucks, buses and other highway vehicles. Although the FMVSS apply to commercial vehicles such as trucks, the FMCSA issues additional safety regulations addressed to truck equipment. In addition, unlike NHTSA, which does not regulate vehicle use, FMCSA is authorized to prescribe commercial vehicle usage requirements, including vehicle operator requirements (e.g., hours of operation, substance abuse requirements, etc.). Pursuant to this authority, for example, the FMCSA has issued regulations prohibiting video displays within the operatorôs view and, more recently, an anti-texting rule. Because of this different scope of authority, the FMCSA may pursue regulation of connected vehicle applications differently than NHTSA by addressing uses or requirements specific to commercial vehicles and operators.

State

By statute, the FMVSS expressly preempt any non-identical vehicle safety standards at the state level. Thus, state motor vehicle regulation typically focuses on use-related requirements (e.g., driver age and other licensing requirements, vehicle registration and inspections, etc.). In some cases, state enforcement may be tied to federal highway funding incentives, such as seat belt use laws and state drinking age laws. Legislation introduced in Congress in 2009 would have linked federal funding to state enactment of electronic device anti-distraction laws.

State laws, however, may figure prominently in connected vehicle regulation. Most states have some form of driver distraction laws, including a growing number of states with laws restricting use of cell phones or texting. In addition, a number of states have privacy laws which govern access to personal information regarding the vehicle and operator. While connected vehicle safety applications typically will use only anonymous information (i.e., do not require

information identifying the vehicle or owner/operator), commercial applications that are tied to personal information (e.g., toll payments, automated parking payments) may be subject to state privacy laws. As will be seen below in the discussion of event data recorders, the question of data-related privacy may be a significant federal-state policy and legal issue.

Potential Regulatory Models

Against this factual and regulatory backdrop, are there existing vehicle safety regulatory ñmodelsò that may provide useful insight or guidance for potential regulation of connected vehicle deployment? For illustrative purposes, we have chosen two fairly recent examples of NHTSA regulation. While many other examples could be cited for comparative purposes, we have chosen the NHTSA 2006 regulation on event data recorders (EDRs) and the agencyôs pending regulation of backover collision avoidance both because they are fairly recent and because they share some commonalities with connected vehicle technologies while offering useful distinctions that highlight the unique challenges presented by connected vehicle deployment.

EDRs

EDRs, so-called ñblack boxes,ò have been in use in the transportation sector for many years. In the early 1990ôs, NHTSA began using EDR data in selected crash investigations. Both the National Transportation Safety Board (NTSB) and National Aeronautics and Space Administration (NASA) subsequently made recommendations to DOT for increased use of event data. In late 2001, a NHTSA EDR working group issued its findings which, among other things, recognized the potential for EDRs to ñgreatly improve highway safety.ò NHTSA issued a request for public comments in October 2002 and proposed an EDR rule in June 2004. The rule

was finalized in August 2006 and modified slightly in 2008. Significantly, in model year 2004 more than half of the U.S. passenger fleet had some crash-recordation capability.

The EDR rule has certain unique aspects within the NHTSA safety regulation context. It is not an FMVSS, but rather is a stand-alone, voluntary rule with which manufacturers must comply only if they choose to install an EDR in their new vehicles. If manufacturers do so, the EDR regulation requires that they comply with specific requirements regarding data collection, storage, retrievability, and owner manual disclosures with respect to new vehicles by September 2012. The overall purpose of the rule was to ensure broad application of evolving EDR technologies, while at the same time establishing standardization of technical requirements to maximize usefulness of the data in crash investigations and related safety analyses.

NHTSA carefully confined the scope of the EDR regulation with regard to use of EDR data. Recognizing the existence of various state disclosure laws, the agency concluded that none of these laws would conflict with the NHTSA EDR disclosure statement in the vehicle ownerôs manual. Beyond owner manual disclosure, however, privacy and related issues were expressly left to state law, including questions such as who owns the EDR data, how it may be used in civil litigation or criminal proceedings, how it may be accessed for law enforcement purposes, and how private parties (e.g., insurers, vehicle manufacturers, etc.) may access the data.

The proposed Motor Vehicle Safety Act of 2010 (MVSA) would impact the current EDR rule significantly. The MVSA would require NHTSA to modify the existing EDR regulation to establish various technical requirements and to require manufacturers to install compliant EDR systems in all their new vehicles by model year 2015. The legislation also would require that the NHTSA rule specify that EDR data would be owned by the vehicle owner or lessee and that the data could not be retrieved by a person other than the owner or lessee except in specifically

prescribed circumstances. This approach to establishing federal requirements regarding data ownership and privacy issues may be significant by analogy to regulation of connected vehicle technologies where DOT has identified these issues as policy issues in the IntelliDrive^{SM} program.

Backover Avoidance

The ongoing backover avoidance rulemaking at NHTSA is an example of a safety regulation that followed a different path of development than the EDR rulemaking. Responding to congressional direction in the SAFETEA-LU legislation, NHTSA submitted a report to Congress in November 2006 on vehicle backover avoidance technology. Among other things, the report discussed NHTSAôs evaluation of different technologies and set out future agency tasks, including additional research, consultation with industry and other stakeholders, and public education efforts.

The following year, Congress passed the Cameron Gulbransen Kids Transportation Safety Act of 2007. This legislation required NHTSA within 12 months to initiate rulemaking to amend the current FMVSS 111 on rearview mirrors to expand the rearward field of view on all vehicles less than 10,000 lbs. GVWR. Under the Act, the final rule when issued by NHTSA may set different requirements for different vehicles and may allow a range of different technologies (e.g., mirrors, sensors, cameras). NHTSA also will determine the phase-in period for compliance, which may be specific to vehicle categories, but full phase-in must occur within 48 months after the final rule issues.

In March 2009, NHTSA began the rulemaking process by issuing an Advance Notice of Proposed Rulemaking (ANPRM). Unlike notices of proposed rulemaking in which the agency issues an actual proposal for comment, an ANPRM typically is a preliminary, largely exploratory

exercise to allow the agency to pose questions and gather information necessary to frame a potential proposed rule. In the backover avoidance ANPRM, NHTSA acknowledged the ñwide variety of means to address the problemò and solicited comments on the current state of research in the area and the ñefficacy of available countermeasures.ò As of November 2010, NHTSA had not yet issued a proposed rule for public comment.

Although backover avoidance is a single-vehicle, non-cooperative system (i.e., not a V2V or V2I system), it seeks to accomplish a similar objective as V2V and V2I warning systems by enabling the vehicle operator to ñseeò and avoid a potential collision situation by electronic or other non-visual means. It shares this messaging objective with various other emerging safety communications technologies such as lane change collision avoidance and forward collision avoidance systems, although these warning systems may also be linked to driver-assisted collision avoidance features.

The history of the backover avoidance rulemaking illustrates a fairly typical safety-standard rulemaking scenario when a specific rule is mandated by Congress: Required regulatory action within a specific time frame; by normal agency rulemaking processes; allowing the agency the flexibility to satisfy the desired safety-performance objective by various means; and allowing the agency to set the phase-in compliance period within a fixed outer limit set by Congress. As with FMVSS generally, the standard would apply to new vehicles only.

Challenges to Connected Vehicle Regulation

The challenges confronting decision-makers evaluating potential regulation of connected vehicle deployment are formidable. Major vehicle safety technologies typically have been available and in use on new vehicles ï sometimes for years - before they have become mandatory safety standards. Therefore, the decision, whether by Congress or DOT, to require

these systems has essentially been aimed at taking a proven safety technology and expanding its existing use across the new vehicle fleet. The decision to regulate connected vehicle technologies presents a contrasting situation in which the regulatory decision likely will be based on proof-of-concept and pilot projects, rather than incorporating a safety technology already in use into a mandatory standard.

A related challenge is the absence of any closely analogous regulatory model in the motor vehicle context. Even the most advanced emerging warning and collision avoidance safety systems now available on some new model vehicles are single-vehicle systems. While they may detect and warn of the proximity of other vehicles or objects, they do not communicate with those vehicles or otherwise rely on a cooperative data system or network. Similarly, vehicle data collection storage systems, such as EDRs, do not involve data communication from other vehicles. The cooperative messaging aspect of connected vehicle deployment also raises issues as to which safety applications should be regulated. One potential regulatory approach would be to require basic messaging capability in vehicles, leaving specific applications to development by the OEMs and possible future regulation.

Another question for policymakers may be how deployment of connected vehicle technologies will be impacted by more widespread use of emerging collision warning and avoidance systems, such as lane change and forward collision avoidance. On the one hand, since the performance requirements and dynamics of these systems are different, connected vehicle safety technologies would augment, not replace, currently available safety collision warning and avoidance technologies. On the other hand, if these existing technologies are incorporated into the FMVSS body of mandatory standards, the timing and regulatory cost-benefit analysis of

connected vehicle safety applications conceivably could be affected by the complementary aspects of these systems.

Vehicle safety-related regulations typically take the form of FMVSS. As discussed above, FMVSS, with limited exceptions, apply only to new vehicles and equipment. To the extent that regulatory consideration is given to aftermarket devices as part of a connected vehicle network, regulators would have to decide how to address those devices in a retrofit or other aftermarket application. A key issue that DOT is currently exploring in this regard is how connected vehicle equipment should be certified as meeting prescribed operational requirements. DOTôs policy issue documents set forth a range of questions and issues on this important topic.

Regulatory decision-makers also will need to be convinced that deployment of connected vehicle technologies will not increase driver distraction. With driver distraction now one of the most pressing vehicle safety issues at DOT and at the state level, the potential impact of connected vehicle deployment on driver distraction will be a significant focal point of NHTSAôs analysis. Driver distraction, however, is not unique to connected vehicle applications. Existing and emerging safety warning systems all involve some degree of potential driver distraction that must be weighed against the safety benefits of the technology. OEMs and suppliers can also be expected to provide detailed instructions and warnings to vehicle owners regarding the operation and limitations of these systems.

As mentioned in the discussion of EDRs, privacy and data ownership have been important policy aspects of VII and IntelliDrive^{SM}. Personal privacy issues should not be a major concern in connected vehicle safety applications since the applications depend on anonymous information unrelated to identification of the driver or vehicle. DOT policy documents have clearly circumscribed the use of connected vehicle safety messaging to such

anonymous information applications. Privacy issues do arise in other contexts (e.g., commercial/payment applications), but these applications already exist in various contexts subject to applicable privacy laws (e.g., toll payments).

Data ownership and security in cooperative vehicle systems present more complex issues than in the case of single-vehicle systems such as EDRs. As discussed above, current EDR regulation leaves data ownership to the laws of the various states, while the pending MVSA of 2010 would bring data ownership under the federal regulatory umbrella. DOT has recognized data ownership as a key policy issue and has identified a range of questions that may be appropriate for further analysis. Similarly, DOT will examine a range of certification, enforcement, and other measures to confirm or validate the legitimacy of user access to the system and prevent unauthorized access.

With any new safety system, product liability inevitably will raise concerns. In a cooperative information messaging system, these concerns may be heightened by the multiplicity of parties involved, whether in a V2V, V2I, or V2M context. While these concerns for both private sector and public sector participants should not be understated, risk assessments may be informed by existing tort law addressing electronic information system failures in the motor vehicle and other transportation sectors (i.e., aviation, maritime, rail, transit). Lawyers evaluating these cases can draw conclusions as to how liability issues have arisen and how they have been resolved both with respect to private sector and governmental liability claims. In addition, in assessing whether liability concerns should be left to resolution under the existing tort system, or whether supplemental legal measures should be considered, policymakers can review a wide range of general and specific immunity, indemnification and other laws, at both

the federal and state level, that may be appropriate for consideration in the connected vehicle context.

Potential Non-Motor Vehicle Regulatory Models

Given the absence of a distinct regulatory model in the motor vehicle context, policymakers likely will consider whether warning or collision avoidance systems in other contexts may provide useful insights for regulation of vehicle connectivity. In all other major transportation systems ï aviation, maritime, rail, and transit ï some types of vehicle-to-vehicle or vehicle-to-infrastructure warning systems exist. Although the technical and policy issues involved in a public transportation system such as commercial aviation or transit, including safety risk assessments, clearly will be different than in a motor vehicle context involving primarily private vehicles, the existence of these electronic warning/collision avoidance mechanisms in the various transportation sectors may offer valuable assistance in assessing development and deployment scenarios in the connected vehicle context.

For example, train-infrastructure collision and derailment avoidance systems known as Positive Train Control (PTC) systems have had a lengthy history of public and private sector involvement. In the 1980ôs the NTSB and Federal Railroad Administration (FRA) made recommendations concerning use of these systems. In 1994 the FRA reported to Congress on a PTC action plan and federal funding was allocated for PTC development, testing, and pilot deployment. In 1999, the PTC Working Group outlined the core functions for PTC systems.

Although the FRA later viewed the costs of PTC deployment as too excessive to warrant an ñimmediate regulatory mandate for widespread PTC implementation,ò the agency in 2005 issued a rule for a technology-neutral performance standard for automatic train control systems. Then, in 2008, reacting to several major train accidents, Congress passed the Rail Safety Act,

requiring mandatory, accelerated installation of approved PTC systems on identified commuter and freight lines by 2015. In January 2010, the FRA issued its final rule for PTC deployment. Currently, various rail pilot projects are underway to develop information and experience to assist in meeting the 2015 deployment date.

Conclusion

The issues confronting decision-makers assessing potential regulation of connected vehicle technologies are complex and unprecedented. Although no closely analogous regulatory templates exist specifically in the motor vehicle safety regulatory context, insights may be gained both from the history of various motor vehicle standards as well as how issues involving electronic warning systems in other contexts have been handled within those regulatory frameworks. DOT has set out many of these issues for examination in its IntelliDrive^{SM} policy issue papers. Analysis of these issues and input from the planned IntelliDrive^{SM} pilot project will form a major part of the rationale for NHTSAôs regulatory decision-making in 2013.

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