April 12, 2017

Docket Management Facility, M-30,
U.S. Department of Transportation,
West Building, Ground Floor, Rm. W12-140,
1200 New Jersey Avenue SE
Washington, DC 20590

Re: ET Docket No. NHTSA-2016-0126

To whom it may concern: (or Mr. Gregory Powell and Ms. Rebecca Koon)

COMMENTS OF DELPHI AUTOMOTIVE to:
NHTSA’s JANUARY 12, 2017, NOTICE AND REQUEST FOR PUBLIC COMMENT ON THE AGENCY’S FEDERAL MOTOR VEHICLE SAFETY STANDARDS #150; V2v COMMUNICATIONS

Delphi Automotive is ready to deploy the first of the nation’s US DOT production OEM factory installed and aftermarket Smart City DSRC V2x installed devices to meet many US DOT’s V2v safety, Vulnerable Road users V2P, and ITS VII Smart City V2I initiatives underway.

Following many years of Dedicated Short Range Communications (DSRC) spectrum coordination, connected vehicle test pilots, standards development, vehicle systems development, rigorous automotive safety field testing, ITS infrastructure development alignment, ITS services development, automated transport channelization, vulnerable road users integration, automotive validations, and unique cyber secure privacy insured transportation security systems development, the DSRC launch schedules are at the final stages to start the commercialization phase and rapid deployment of critically needed 21st transformational Century US Transportation initiatives. These initiatives provide to the US significant new capabilities, ubiquitous secure interoperability, and high performance for evolutionary vehicle to everything transport (V2e) communications to meet crucial US transportation and mobility needs.

Delphi recently launched OEM V2v DSRC devices for GM’s Model 2017 Cadillac CTS and will launch University of Michigan’s Upshot sponsored Ann Arbor Connected Vehicle Test Environment (AACVTE) aka Pillar 1 in 2017.

Delphi is pleased to submit the following comments in response to the Public notice ET Docket No.NHTSA-2016-0126, in which NHTSA seeks inputs for the Notice for Proposed Rule Making for FMVSS #150 of V2v devices in the 5.9GHz DSRC Band and requesting public comments of the rule proposal.

Delphi entities have worked in the transportation communications industry helping create, launch, and commercialize new, progressively high quality-of-service transport communications systems which became important standard automotive links.

Delphi entities have worked for 80 years to help launch and commercialize virtually every US automotive vehicle communication bands into vehicles and has a long history of mobile communications systems including as examples in: broadcast such as Satellite Radio (both XM and Sirius), FM, AM; peer to peer cellular such as 1G to 4G, E-ZPass (electronic tolling), On-Star, Delphi Connect, LTE; peer to peer “IoT” (Internet of Things) such as Wi-Fi; local vehicle
area communications such as Bluetooth; and positioning such as GPS, navigation. Additionally, we have developed and produced inertial navigation systems for automotive, aerospace, and spacecraft. Delphi is a leading global supplier of electronics and technologies for automotive, commercial vehicle and other market segments. Operating major technical centres, manufacturing sites and customer support facilities in 30 countries, Delphi is actively working to further advance automotive active safety, autonomous, and connected automated systems.

SUPPLEMENTARY INFORMATION COMMENTS

Delphi has technology on-the-shelf and stands ready to support the OEMs for this rulemaking. We also support the rulemaking on reducing congestion and saving lives through fewer accidents.

This “Transportation DSRC System” has been specifically designed to meet the high speed, high congestion and high positional accuracy for secure coverage for every type of vehicle commercial transport system. Many current transformational US initiatives are underway utilizing this Transportation DSRC System which is finalizing deployment plans. The entire current 75 MHz DSRC spectrum will be required to fulfill these commercial transportation initiatives.  

*It is important to note that once these transportation initiatives begin with vehicle launches, the Transportation DSRC System will have to remain in place for the life of these vehicles.*

The game changing benefits of just this single element of the Transportation DSRC System are the following:

1. The potential to avoid or mitigate 80% of unimpaired crashes.
2. Eliminate significant traffic congestion
3. Significantly reduce US greenhouse gas production, reduce fossil fuel consumption and reduce dependency on foreign sources of petroleum. Examples include Truck platooning, automated collaborations.
4. Enable accelerated deployment of many other new evolutionary transportation capabilities including automated transportation.
5. Cybersecurity: Ensure secure un-interrupted modern transportation communications thru PKI, and SCMS, and protect vehicles from unwanted hacking and outside control.
6. Protection of Drivers personal information (privacy): Driver privacy and privacy rights issue concerns are addressed by the overall DSRC architecture.

The Transportation DSRC System represents an evolutionary artificially Intelligent Transportation System (ITS) In-Vehicle Ad-Hoc Network (InVaNET) system using the WAVE (IEEE 1609 Family - Wireless Access In-vehicular Environment) protocol. It has been specifically designed and developed by the transportation industry, and has already undergone many years of rigorous testing for many automotive safety and soft-safety uses.

V2v via DSRC WAVE is a revolutionary continuously real time self configuring, infrastructure-less network of transportation vehicle nodes connected wirelessly with very high quality of automotive grade M2M messaging. Each vehicle is free to move independently in any direction, and instantly network with all vehicles within optimized safety short range (300m) cocoon, in which are constantly moving in and out of each other’s short ranges. This creates constantly re-configuring virtual cocoons of safety and collaboration even in non-line of sight, high congested, emergency, national security, and natural disaster conditions. Existing 20th century sensors and communications systems fail to self- reconfigure across the extreme dynamics of US transportation environments.

V2v DSRC WAVE is an in-vehicle artificial intelligence system that sets up vital new transport networking. This new networking system has capabilities necessary for US transportation system modernization for crash avoidance, secure national transport of things, congestion and time inefficiencies reduction, US energy savings, and automated collaborative networking requirements.
There is no known alternative technology, to DSRC that is validated, standardized, test certifiable, ready to deploy, or shown to meet NPRM and deployment requirements for US connected and automated automotive safety. DSRC will meet “crisis” US evolutions necessary for US automotive crash safety, USDOT’s “Road to Zero”, US congestion and energy optimizations, plus US Transportation’s Automated and self-driving initiatives.

Implementation Timeline – Delphi has technology roadmap solutions to support NHTSA’s proposed timelines, provided that some missing requirements are completed before issuance of mandate and by start of lead time phase “VIII.A.1”

Delphi has technology on-the-shelf and stands ready to support the OEMs for this rulemaking. NPRM proposed timeline to accelerate US market availability of new critical safety capabilities for crash avoidance which has been noted in “crisis” situation for US resident lives, helps reduce congestion, and helps US optimization of energy and environmental impacts. Yet, Delphi notes that timelines achievability is related with provisions of finalization of dependent requirements and key items:

1. DSRC key eco-system requirements are available before start of lead time, assumes Sept 1, 2018
2. Key items: Include, but not limited to, full pre-production SCMS with consumer accessible vehicle life cycle management paths such as SCMS-OTA, device interoperability certification requirements, and interoperable auto-safety grade vehicle installation/certification requirements.
3. SCMS v2.0, OBU-SCMS Authorities life cycle management requirements, SCMS management board, Production Test Cert Board i.e., Certificate Operating Council) and the management boards are operational prior lead time start. The devices and car integration test and factory installation certification requirements also need to be in place.
4. IEEE 802.11p, SAE 2945, SAE 2735, and IEEE 1609 documents will require updates based on interoperable DSRC requirement.

Single V2v Channel: Delphi notes that more than one DSRC channel will be needed for V2v BSMs, and V2v support applications.

V2v will require multiple V2v safety channels (of capacity for lifetime BSM support and full US vehicle fleet conversion).

Delphi notes future constraints with single channel V2v and foresees the need to expand BSM support beyond a single 6Mbs channel capacity. As NHTSA comments in NPRM III.E.1.b.ii “The agency is continuing to refine congestion mitigation approaches including device density in real-world conditions, beyond those tested in the specific Safety Pilot testing and Safety Pilot Model Deployment.” Delphi also notes NHTSA proposal of 5,500 BSMs/sec which is device density expansion related. Combine full fleet device density growth, with expanding BSM sizes pushed by collaborative and automated needs, including higher precision messages, PER, and cyber security event robustness, BSM capacity will exceed a single V2v channel capacity. Delphi recommends the following in line with DSRC and WAVE capabilities.

Multiple V2v Channels:

Congestion, emergency, security, and automated environments in full fleet applications will continue to rapidly increase the 300m short range BSM message capacity requirements. Automated driving messaging will increase the BSM sizes and needs significantly. To meet the NPRM’s 5500 BSMs/sec proposed requirement, multiple channels of application capacity for connected and automated congestion are required. As to be noted in later sections, Delphi concurs with NHTSA that each OBU shall have capacity of at least 5500 BSMs per second. This is required to meet newly installed vehicle’s lifetime capacity needs as the various transportation fleets fully implement DSRC V2v and full density of DSRC vehicles in 300m areas is deployed. Delphi notes that 1000 vehicles can be within 300m range in many real world transportation conditions which have been noted in various studies of capacity needs. By limiting V2v safety messages to
a single V2v 10MHz safety channel, which supports 6Mbs safety grade messaging, that single channel for BSMs will not adequately support 550 or above vehicles in non-congestion control mode, and also will not support upcoming automated mode BSM needs. Congestion controls will also need additional V2v channel capacity beyond the single channel 172 to adequately support higher congestion, emergency, national security, FAA, and automated extreme conditions.

Thus, simply, additional V2v channelization will be required over and above the single 10MHz V2v safety channel 172 to support Basic Safety Messaging in short range US fleet operations with very reasonably high application rate concentrations, and higher BSM sizes of automated applications.

V2v Guard Band channel:

DSRC Reserved 5MHz Channel (5.850-5.855Ghz) is required for V2v interference protection. The Guard Band insulates the Transportation DSRC Safety Communications System from lower band Unlicensed National Information Infrastructure (U-NII) users. The elimination of the allocated 5 MHz Guard Band (GB) between the UNII Band and the DSRC V2v channel will create additional interference to high quality safety V2v from the UNII devices into the resulting adjacent V2v frequency channel. This will increase V2v safety message losses, significantly increasing safety risk, and interrupted transportation, while driving up DSRC interference mitigation costs.

V2v will require multiple support channels via DSRC V2I: (lifecycle BSM support & full fleet conversion)

SCMS support:

Ad hoc VANET operations requires real time V2v SCMS Revocation management, V2v misbehavior reporting, DSRC V2v OBU new certificate “top offs”, and SCMS management exchanges. The DSRC control channel (178) along with SCMS V2I service channel will be required. This will require DSRC V2I OTA support to insure V2v on going safety operations are uninterrupted and secure across the nation’s entire 1st to last mile transportation grid, where alternatives can’t meet requirements and are not available.

National and local disaster, emergency, security, and natural events such as sudden congestion or individual car events (such as resolvable misbehavior) also need to insure low and mid latency safety support across DSRC and will require DSRC’s V2I grid’s support for V2v uninterrupted secure safety exchanges.

Additional Delphi single channel comments: (related to other events)

Proposed “re-channelization” consolidation of current US DSRC safety thrusts, V2v, V2P, and V2v-automated messaging (30 MHz – V2v 172, SAE tbd., SAE 176) channels capacity needs into one 10Mhz channel endangers NHTSA’s V2v and national “crisis” VRU (Vulnerable Road Users) initiatives. It will severely limit network access and NOT allow for successful exchanges of many critical real time messages. The limiting factors include: 300-1000m range; large numbers of transportation user nodes in congested city area; and automated communications. This endangers large numbers of US citizen’s lives and will cripple V2X connected vehicle capabilities needed for the transformation and modernization of the US transportation system.

The potential “rechannelization” movement of the low power safety channels (172, 174 and 176) from the current 30 MHz total bandwidth to the “Transport Services” channel 180 having only 10 MHz bandwidth is an unworkable scenario. It is not possible for a single 10 MHz channel to handle the thousands vehicles, vulnerable road user, and other transportation users safety communications simultaneously that would protect drivers, passengers and pedestrians. This will also drive significant additional interference mitigation costs into both the OBU V2v safety and Traffic Infrastructure (PSI) channel hardware. One lost message at 60 mph introduces 9 feet (vehicle position variability) of critical data error into crash trajectory algorithms. This loss equates to a full lane width (urban environments) and close to half a car length.
Additionally, the potential movement of the DSRC (Control) channel 178 to be included in channel 182 (creating a “universal” control channel) will suffer significantly more interference as it would be adjacent to the PSI channel. It will not have the capacity necessary for all the V2I use cases now being readied for deployment. As a final point, both of these scenarios would eliminate the 5 MHz “Guard Band” as shown in Table 1 below. The significantly increased interferences will create significant losses of critical safety messages and information critical for V2v, V2P, and CAV. V2v requires more than one channel to support the massive amount of BSM safety exchanges necessary for full US deployment of US Transportation fleet and insure lifetime rollout of NHTSA V2v safety requirements.

SCMS: Delphi supports NHTSA SCMC PKI, Misbehavior, recertification, and OTA proposals

Delphi supports NHTSA proposal for the DSRC PKI system. Delphi is implementing DSRC PKI based systems into both of our OEM and Smart Cities products. Secure exchanges of BSMs are critical for the road user safety and non-disruption of the US Transportation grid through high reliability and secure V2v communications. The DSRC PKI system that has been proposed and is currently operating under Phase 1 of the US DOT Test Pilot with CAMP, has very advanced safeguard capabilities and unique overall design incorporated to provide safe and reliable transportation even in times of emergency, localized cybersecurity attack attempts, very fast assessment between valid and misbehaving devices, and times of national security.

The SCMS’s misbehavior Phase II PoC requirements need to be released prior to the start of Lead Time (VIII.A.1) in order to successfully complete the remaining lead time and deployment timelines for interoperability and V2v independent self-reconfiguration network management. The DSRC SCMS recertification (i.e. certificate “top offs”) system and requirements also need be completed with Phase II for commercialization.

Delphi supports NHTSA’s proposed rulemaking to include over the air (OTA) updates. Consumers need to have alternate solutions for recertification and real time in-service misbehavior management updates, including through OTA capability. OTA will help consumers insure uninterrupted V2v services with secure access to updates in many environments than systems with only dealer required visits, or mechanical updates such as USB sticks, and enable dynamic update modes when necessary.

Short Range vehicle capacity and congestion: Delphi supports NHTSA’s proposal of 5500 BSMs per second

The DSRC ad hoc network of surrounding vehicles with complete coverage of 300m target range will have many conditions with occurrences of 550 to 1000 vehicles within the OBU (each vehicle’s) 300m radius DSRC coverage area. Correspondingly, concentrations of at least 5500 BSMs per second will occur inside each OBU vehicle’s range in these conditions. Several studies have noted these numbers. Congestion controls can help reduce the in-range vehicles requirements to 5500 BSMs coverage needs in many circumstances. National emergency, congestion and natural disaster evacuation events are examples that raise Delphi’s concern of going below the capacity requirements as proposed by NHTSA.

PER: Delphi proposes that the current PER as defined (PER received) and tests are not enough to measure vehicular safety system performance; additional QoS requirements should be considered:

BSM message safety use exchange quality is not measured fully by PER as described. The NPRM PER requirements are basically measuring a receiver’s sensitivity in optimal conditions. This potentially misses many exchange errors between transmitting device and the receiving device. Current PER test requirements and PER received also misses challenged conditions exchange quality typical in vehicle environments.

Thus a Quality of Service (QoS) measurement for the system is needed. Vehicular transportation challenged conditions performance requirements need to be identified such as foliage, non-line of sight, and interference conditions to insure minimum safety message exchange reliability between OBU’s and required safety interoperability. Delphi recommends fading and path loss models and tests for challenged conditions also are included by NHTSA, similar to C2C.
Max Transmission Range: Delphi supports certain Maximum Transmission Range conditions.

DSRC’s dedicated short range communications ad hoc networks need to place emphasis on interoperability and optimized communication with vehicles within targeted safety design cocoon (i.e. near 300m+, pending condition), and avoid communication congestion created by many more vehicles/devices communicating within significantly longer ranges.

The 10 MHz 6Mbs V2v channel would unnecessarily hit its channel capacity message limits much quicker without a maximum range limit or managing capability for many future situations. This could prematurely trigger congestion controls and reduce safety messaging between vehicles within the intended range capabilities. As an example, a 50% increase in transmit range can increase the number of vehicles of each ad-hoc network by over 2x. This would double the BSMs received by each vehicle versus DSRC targeted design. Improvements in system designs and vehicle integration continue to improve DSRC tuner, antenna, and on-car sensitivities. These are extending ranges of the vehicles’ DSRC signals. This has the potential to cause higher instances of unnecessary congestion control and create unplanned impacts to current safety messaging. Higher range vehicles could also begin to impact older or other less sensitive tuned vehicle systems and create situations where these vehicles aren’t addressing congestion as intended. Thus, an at-congestion control range maximum is a recommendation that should be considered to help bridge non congestion condition range allowances; with congestion conditions range limitation needs, and continuously improving range technologies.

Delphi recommends that the DSRC vehicle maximum range and/or correlated power level needs to be considered when under heavy channel use congestion conditions.

Navigational Position Accuracy: Delphi generally supports NHTSA positional accuracy proposals.

V2v is a transportation safety communication system with positional location accuracy as a critical element of its vehicle safety messaging, warning, cooperative, and automated collaborative applications. Delphi agrees that it will be necessary for NHTSA to establish minimum performance standards for positional accuracy.

The wide range of expanding safety applications for connected and automated use cases pushing growing requirements for DSRC V2v are also pushing a wide range of positional accuracy needs. Delphi agrees that NHTSA should establish minimum location performance requirements for the initial V2v warning devices and support the initial requirements of 1.5m horizontal longitude and latitude proposal, along with the 3m elevation at 1 sigma, under most reasonable conditions such as open sky and reasonable warm start up.

Requirement allowances should be made for acceptable use cases, where lower accuracy GNSS conditions exist such as in challenged GPS/GNSS areas, V2v/GPS receiver cold start conditions, other GNSS environment reception, and other non-open sky challenged environments, and the V2v module should still broadcast lower accuracy BSMs. Example is car in reverse starting to back out of parking slot. Confidence factors for various accuracy conditions are already included in the existing positional accuracy data fields in the BSM. Also, different classes of approval or certification grades for higher performance application needs (e.g. low bridge warnings, lane departure, etc.) could be granted for the class of GNSS location performance of the receiver.

Higher accuracy requirements, and or grade classes, should also be considered in NHTSA’s positional accuracy requirements beyond the initial mandate deployment and alert/warning applications, especially in Connected Automated vehicle requirements, such as platooning, but not limited to, as more accurate positioning systems are included and/or developed.

Please also see our additional comments in for S5.1.3 below.
Initialization Time – DSRC must begin transmitting BSMs within 2 seconds (of ignition):

Delphi generally agrees with the NHTSA requirement proposal as stated, with potential comment conditions. Delphi comments of potential need to clarify BSM data requirements at 2 second transmission. As example, we note that BSM accuracy may not be at GPS receiver hot start levels at initial 2 seconds, and will be degraded with the accuracy levels indicated in the BSM’s positional and time accuracy confidence level fields. Please see S5.2 and S5.1.2 comments below.

Alternate mandate (if equipped):

Delphi supports the NHTSA primary mandate of required equipment. An alternate mandate of “if equipped” will potentially adversely impact the societal benefits of NHTSA’s Road to Zero and automated initiative.

Aftermarket Certification Standards requirement:

Delphi supports NHTSA proposals regarding Aftermarket device performances. Aftermarket devices must meet same performance standards as OEM devices.

Cost vs Value of V2v and DSRC: Delphi strongly supports “free use” DSRC based V2v for US implementation.

V2v US full fleet implementation will depend on a cost effective, and high reliability, transport based 1st through last mile CONUS communications solution for all US drivers and operations. This includes US citizens who cannot afford additional recurring cost burdens for transportation.

DSRC will drive huge US costs savings from insurance, energy, personal crash costs, and congestion. These savings will come from significant crash reductions, injuries eliminations, congestion reductions, energy, and time lost/inefficiency savings. DSRC use and rapid rollout will add significant jobs to the American workforce as we enable rapid deployment of high technology connected and automated transportation, overcome constraints and limitations with the expansion of US roadway pavement and concrete infrastructure, and improve transportation efficiencies. The return on investment on the spectrum use to the US will be many times that of alternative uses.

High recurring data costs, along with low quality and availability, will be prohibitive to rapid and successful rollout, including aftermarket acceptance which is required beyond the mandate of OEM factory installation for more rapid deployment across the entire US transportation fleets, along with necessary continued follow-up voluntary “re-opt” of V2v security management, and high take rate of OTA deployments of additional safety applications implementations beyond initial voluntary and factory installed mandated.

Ex. DSRC V2v data use in typical rush hour environments can be over 100GB per month for a 2 hour per day user, and over many times that per month per 10 and more hours per day fleet operations user. This will be cost, capacity, and availability prohibitive with cellular based alternatives.

As noted above, Delphi is currently deploying the full 75 MHz DSRC spectrum as defined by various governing transportation commissions.

Since Notice of “Proposed Rulemaking in February 2013”, Delphi has participated and has been a partner in numerous rule and requirements making commissions including IEEE, SAE, VII, CV and CAV. Initial GM, USDOT NPRM, and ITS Smart Cities are adopting use of the 75MHz DSRC band network band. An example is illustrated below would allow for multiple V2v channel capacity for previously discussed V2v congestion area needs, and other V2v support required such as SCMS and OTA. Delphi requests that NHTSA consider the multiple V2v channel needs, and the V2v support channel needs into its rulemaking. This includes protection of DSRC spectrum allocation with the FCC, and the transportation community.
The Delphi on-board unit (OBU) channelization implementation plan example proposal enables US Smart Transport interoperability across the continental US, and amalgamates the SAE, IEEE, OEM, and Smart City CV, VII and CAV standards and initiatives underway.

As seen above in the Table 1 example, the entire 5.9 GHz DSRC Spectrum Band (as currently allocated) as assigned, coordinated, and developed for exclusive Dedicated Short Range Communications for Transportation use, in order to allow for 2017-2021 launches to proceed and for full deployment of the US transportation industry’s critical modernization, safety, and automated initiatives. SAE is finalizing the DSRC channelization and that should be included in NHTSA requirements as applicable to meet the US’s V2v connected and automated safety initiatives.

**Required, opt-out, or opt- in active operation equipment modes – Delphi supports required active operating mode.**

Delphi supports the NHTSA mandate proposal of required active operation without options to turnoff. Delphi does not support “opt out” or “opt in” alternatives that adversely impact the societal benefits of NHTSA’s proposed mandate. Delphi notes that first, turning off DSRC V2v will eliminate the turned off (non-active) vehicle from being securely recognized by other V2v vehicles, and also causes the turned off “opted out non active” vehicle from properly recognizing the active vehicles in DSRC range. This endangers both the active and non-active vehicle occupants in the DSRC area along with active vulnerable road users utilizing V2v and/or V2p exchanges. These alternate modes will have an even higher impact to road users’ safety than just the direct vehicle occupants making the choice to opt out of use. Impacts are broader than occurs with opt out of autonomous safety technologies such as seat belts, air bags, and even brake lights. The other vehicles’ occupants and road users around the alternative choice mode vehicle are endangered directly when a vehicle with V2v is allowed to turn off. Delphi agrees with NHTSA that automated and connected vehicles safety related interactions will be compromised without the V2v capabilities active. Rights of others to properly enable V2v warnings are directly affected, properly react to other vehicle’s changes, others will be put at direct risk, and many lives will be endangered by opt on/in choices.

These opt in/out alternatives will also not insure wide acceptance, will stunt application of V2v across the US fleet, and thus significantly impact effective crash safety elimination results. Reductions in fleet application further endanger more and more occupants of non-active vehicles along with occupants in many additional vehicles in the vicinity of the non-active vehicle. It will affect USDOT’s “Road to Zero” initiatives, automated transformation of US transportation, and users such as owners of driverless cars. Thus, non-strong mandated “required” active operation will endanger significant numbers of American lives, and our nation’s transportation safety initiatives, by those vehicles and drivers who aren’t alerting or alerted by non-active DSRC equipped vehicles. Privacy is protected as noted in the Appendix A of the NPRM and Delphi comment on Privacy.

### Table 1  Delphi V2x OBU - DSRC Smart City/Transport Channels

<table>
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<tr>
<th>Channel Name</th>
<th>GuardBand</th>
<th>Public Safety V2v-CV</th>
<th>Public Safety V2v-CAV/CV</th>
<th>Public Safety V2p</th>
<th>Control Channel</th>
<th>Transport Services</th>
<th>Probe Data</th>
<th>Public Safety Intersections</th>
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</table>

VAD - Vehicle Awareness Device
ASD - Aftermarket Safety Device
RSD - Retrofit Safety Device and OEM Device
CAD - Connected Automated Device
CR - Coordination Recommendation
Driver privacy and privacy rights issue concerns are addressed by the overall DSRC architecture and its SCMS system, which utilizes unique short range and time span of each security encoding with the DSRC WAVE system, and is designed with very highly encrypted which reasonably de-links messaging from an individual vehicle or person’s identity.

REGULATORY TEXT COMMENTS

S5.1 Content Each BSM must contain the following elements, except as provided in S5.1.7.

Delphi recommends additional clarity included with S5.1 and S5.2 text, to note conditions that apply to each throughout section S5 be noted in S5.1 and S5.2. Thus as example, S5.1 and S5.2 could be edited as follows:

“S5.1 Content Each BSM must contain the following elements, except as provided in S5.1.7, and as provided with modified performance, test, and procedure conditions.”

S5.2 Initialization time A DSRC device must begin transmitting the BSM within 2 seconds

As discussed throughout Sections III.E.2.(2) Proposed BSM Data Initialization requirements section, the NPRM proposes pre-conditioning and as one example of text states “, the test should specify environmental conditions that approximate the level of access to characteristics of its surrounding environment that a vehicle would normally have to populate the information in the basic safety message (e.g., open sky access to GPS signals, potential saved location/heading information from the basic safety messages prior to vehicle shutdown, etc. Thus, the pre-conditioning test applied to the vehicle would need to be modified in these ways. In summary, NHTSA is proposing to require that, after a conditioning procedure, vehicles begin transmitting basic safety messages with the required content and at the required frequency within 2.0 seconds after the driver puts the vehicle into the forward or reverse gear. The conditioning procedure would specify that the vehicle is under open sky conditions as in our test procedure for evaluating the content of the basic safety message. Then the procedure would specify that the test technician,” Delphi recommends clarity for S5.2 conditions.

S5.1.3.1 Longitudinal and lateral location within 1.5 meters of the actual position

Refer to S5.1 and S5.2 conditions above. Conditions are +/-1.5 meters 2D horizontal accuracy is too stringent for challenged GNSS conditions and coverage areas. A confidence level is included in each positional BSM report. Delphi notes that additional correction systems are necessary to achieve high levels of positional accuracy beyond GPS only conditions and are being addressed for appropriate use cases and future developments and future NHTSA actions.

S5.1.3.2 Elevation location within 3 meters of the actual position

Similar comments as S5.1.3.1 above. Additional correction / Future action also apply with elevation precision relative to application requirements.

S5.1.4.1 Speed must be reported in increments of 0.02 m/s, within 1 km/h (0.28 m/s) of the vehicle’s actual speed.

Refer to comments of S5.1 and S5.2. SAEJ2945 provides more detail about speed accuracy in different speeds and GPS coverage scenarios. This requirement does not take into account all speeds or all GPS coverage scenarios.

S5.1.4.3 Acceleration Horizontal (longitudinal and lateral) acceleration must be reported accurately to 0.3 m/s², and vertical acceleration must be reported accurately to 1 m/s².

Refer to comments of S5.1 and S5.2. SAEJ2945 provides more detail about acceleration accuracy in different speeds. Delphi recommends following SAEJ2945 for acceleration at different speeds.
S5.1.5.4  Event flags. If a stated criterion is met as indicated for each Event Flag listed,

Delphi notes that some of these events flags such as “Stop Line Violation” may not be available and likely addressed in future OEM systems and NHTSA future actions.

S5.2  Initialization time

A DSRC device must begin transmitting the BSM within 2 seconds

Recommend additional conditional reference (such as): add following text. “S5.2.1  The BSMs within the initialization timespan are subject to conditions and allowances vs the requirements in S5.1, and test requirements of S6 and S7. Also, these include items such position accuracy/confidence, as UTC time accuracy/confidence, and other initialization period parameters. Fields are included in the BSM for these allowances and/or conditions referenced in SAE2935. “

Comments: Delphi agrees with S5.2 generally, however must include conditions as referenced throughout III E 2 (2): 2s is not enough time to wake up and transmit BSMs with many of the requirements in S5.1 met. However, many safety situations will be valid and crash situations avoided with BSMs with less than the performance levels in S5.1. Examples include in-proximity based warnings such as Vulnerable Road users and children with portable V2v/v2x devices in proximity of car being placed into reverse, receiving BSMs from other cars in proximity also in their initialization phase that may also be changing motion and transmission modes etc.

S5.5.1  Calculate Tracking Error.

Delphi requests additional time for later comments, as Delphi is still assessing NHTSA language.

S5.5.2.3  If the channel busy ratio is above 80% (Umax) and the transmission reduces to 10dBm.

Delphi sees this power level as too low to be effective in many safety conditions. Power drop from 20dBm to 10dBm is a transmit distance reduction to 31.6%. This would significantly drop the effective transmit distance of a system with 300m capability. This distance is too small to help with many safety environments. Multiple channels of V2v will provide additional relief to help many constrained congestion conditions and eliminate gap.

S5.6.2.2  A DSRC device must be able to perform the …checks at least 5,500 BSMs per second.

Delphi generally concurs. Currently at a BSM rate of 100ms and an example BSM size of 350B, a single channel (172), only 200 RVs could be tracked and received. This means 2000 BSMs/second would be the maximum practical value for a single channel before congestion controls are utilized that work in many conditions and applications, but not all future actions, as we increase vehicle densities and BSM expansion needs into higher order V2v collaborative, security, and automated uses. A requirement of 5500 BSMs/second can be met utilizing multiple V2v channels for these future requirements and actions.

S5.6.2.4  A DSRC device must support the detection of other devices which are misbehaving....

Delphi generally concurs. The Misbehavior requirements need to be released prior to lead time. Delphi requires additional information in order to comment on the as yet released CAMP SCMS v2.0 requirements for misbehavior for RVs. Delphi requests additional time for later comment after release.
S6 and S7 Test Conditions and Test Procedures

Delphi generally concurs. The actual mandated test procedures and conditions need to be referenced as noted in Section III of NRPM. Delphi reserved the right for further comment once the test requirements are released.

S9 Interoperable technology

Delphi understands that other communication mediums, other than DSRC, are being developed for V2v vehicular safety intent. Delphi is in fact developing augmented cellular collaboration to assist DSRC (DSRC/LTE) in non-near real time, non-safety critical V2v operational needs. Alternate technologies need to satisfy all the V2v safety/soft safety criteria including future action for more advanced vehicular safety and higher precision communications. These technologies will also need to support the rapid future evolution of planned automated and connected collaborative transportation modernization (such as platooning, self-driving, etc.) for vehicular needs across the entire continental US transportation grid. Additionally the medium needs to meet the increasing challenges and crisis conditions underway throughout the US transportation network, which is being deployed by DSRC now.

No other known alternatives exists that meet the V2v safety critical performance requirements, OEM rapid deployment needs, nor NHTSA’s US deployment readiness milestones.

APPENDIX A - PRIVACY COMMENTS

Delphi supports NHTSA Appendix A regarding DSRC Privacy protection.

Delphi notes that driver privacy and privacy rights issue concerns are further addressed by the overall DSRC architecture and its advanced SCMS system. The DSRC V2v utilizes unique short range and time span of each security encoding with the DSRC WAVE system, adds further security advancements with very highly encrypted PKI based system which de-links messaging from an individual vehicle’s or person’s identity.

IN SUMMARY:

Delphi has on-the-shelf technology and stands ready to support the OEMs for this rulemaking. We believe NHTSA’s issuance of the proposed mandate for V2v FMVSS #150 predicated on DSRC technology is appropriate path toward reducing congestion and saving lives. We hope Delphi’s comments are beneficial as it finalizes regulatory requirements for rapid deployment of US transportation safety technologies. We look forward to any questions and follow up requests that the agency needs clarification regarding our submission.

Delphi highlights that we and the US Transportation industry are now beginning the integration and deployment of a much larger number of significant DSRC and V2x applications since the October 20th, 2014 V2v ANPRM comment period closed. US transportation related deaths have suddenly increased at “crisis levels” with significant impact to new “Road to Zero” initiatives, which DSRC based V2v is a key transformational and rapid deployment ready technology necessary to help eliminate the crash destruction that is rapidly increasing. Collaborative and automated capabilities with related DSRC V2v/V2x demands are accelerating. USDot’s new funding bill, the FAST ACT’s FHWA and DoE Smart Transport initiatives, are pushing us for the interoperability and performance requirements that the NHTSA mandate drives. As the US includes new pedestrian safety, CVRIA, and automated applications, the spectrum plan and its available capacity will be critical for full deployment. Successful implementation of the vital transformational value that DSRC brings is a key element of the modernization of the US Transportation network.
The FMVSS #150 mandate is essential to rapid deployment of life saving and vital crash elimination capabilities. The full utilization of the allocated US DSRC spectrum will be a key enabler for tremendous economic and US Transportation usage benefits.

Once fully deployed, the Transportation DSRC system will be a self-intelligent network that is secure and safe, having the lowest cost to US consumers, with a modern spectrum efficient communication system, specifically developed for the broad transformational US Transportation system modernization needs.

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