Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

In the Matter of	)	
	)	
Revision of Part 15 of the Commission’s Rules	)	ET Docket No. 13-49
To Permit Unlicensed Information Infrastructure	)	
(U-NII) Devices in the 5 GHz Band	)	

To: The Commission

COMMENTS OF
AMERICAN ASSOCIATION OF STATE
<u>HIGHWAY & TRANSPORTATION OFFICIALS</u>

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Date: May 28, 2013

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SUMMARY

The American Association of State Highway Transportation Officials, Inc. ("AASHTO") hereby respectfully submits their comments in response to the Notice of Proposed Rulemaking ("*NPRM*") in the above-captioned proceeding.

At this time, AASHTO recommends that no action be taken on allowing U-NII devices to operate in the DSRC 5.850 GHz to 5.925 GHz band. Rather, AASHTO recommends that the FCC assemble an advisory panel comprised of the appropriate stakeholders to identify the best candidate sharing scenarios. The FCC could then request that the potential U-NII-4 product manufacturers, in collaboration with the AASHTO State DOT members, other public sector agencies and auto manufacturers who are actively involved in Connected Vehicle proof of concept studies and who will benefit from the sale of future equipment, undertake coordinated studies to simulate, test, demonstrate, and ultimately give guidance on which candidate sharing scenarios will provide the most protection to DSRC users, while providing a viable operational profile for new U-NII-4 users. Such studies should be open and subject to critical review by the advisory panel. At the conclusion of the studies, and subsequent report on the results by the advisory panel, the FCC should have the necessary information to make an informed decision on how best to mitigate the technical challenges associated with sharing the band.

AASHTO stands ready to work with stakeholders to explore, simulate, and test ideas for sharing the DSRC spectrum.

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The American Association of State Highway Transportation Officials, Inc. ("AASHTO") through counsel and pursuant to Section 1.415 of the Commission's Rules, 47 C.F.R. §1.415, hereby respectfully submits their comments in response to the Notice of Proposed Rulemaking ("*NPRM*") in the above-captioned proceeding.

I. BACKGROUND

A. The American Association of State Highway & Transportation Officials

AASHTO is a non-profit, non-partisan association representing all 50 states, the District of Columbia and Puerto Rico. Established in 1914, AASHTO plays an important role as an international leader in setting technical standards for all phases of highway system development, including design, construction of highways and bridges, materials, maintenance and many other technical areas. AASHTO serves as a liaison between the state departments of transportation and the federal government in the areas of policy development, standards setting, and technical activities, all of which are the products of volunteer state department of transportation personnel who work through the AASHTO committee structure. AASHTO's committees support all transportation modes and represent the highest standard of transportation expertise in the country, addressing every element of planning, design, construction, and maintenance.

AASHTO is designated by the Federal Communications Commission as the only agency authorized to recommend or approve applications for radio frequencies in the Public Safety Highway Maintenance Pool. This authorization was subsequently extended to include all frequencies assigned to the Public Safety Frequency Pool and the SMR 800 MHz pool being vacated by Sprint-Nextel. In its role of representing state departments of transportation, AASHTO directly supports and integrates with the police, fire and medical services operated by its members for the protection of life, health and property of those using the nation's multiple transportation systems.

AASHTO is a founding member of the National Public Safety Telecommunications Council ("NPSTC") and an initial member of the Public Safety Spectrum Trust Corporation ("PSST"), which held the nationwide public safety broadband network license. AASHTO has been selected to serve as a member of the Emergency Response Interoperability Center's Public Safety Advisory Committee ("ERIC PSAC"). AASHTO works with the other Frequency Advisory Committees ("FACs") on the Land Mobile Communications Council ("LMCC") and the Public Safety Communications Council ("PSCC") in setting policy and procedures for coordinating and assigning radio frequencies under Part 90 of the Commission's Rules.

B. The FCC's Proposal

In the NPRM, the FCC proposes to use the current U-NII-3 technical rules for a new U-NII-4 band that will be shared with Dedicated Short Range Communications Service ("DSRC") mobile only systems operating in the same band between 5.85 GHz and 5.925 GHz. The rules proposed by the FCC would permit operation of unlicensed fixed or mobile transmitters operating with up to 36 dBm (4 Watts) EIRP ("Effective Isotropic Radiated Power") in all directions and also permit operation of unlicensed fixed transmitters with up to 53 dBm (200 Watts) EIRP in a focused direction (for point to point operation). U-NII-3 users must comply with undesirable emission limits at the band edge[1] but within the band they may operate in any bandwidth greater than 500 kHz[2] and conceivably can occupy the entire 100 MHz bandwidth from 5.725 GHz to 5.825 GHz. AASHTO's primary concern in this proceeding is the U-NII-4 band and the disparities between currently authorized and proposed devices.

C. Dedicated Short Range Communications Service

DSRC is essential to the success of the Connected Vehicle program, which uses wireless technology to enable vehicles to communicate with each other and with the infrastructure around them. The goal of the Connected Vehicle program is to significantly improve safety and mobility through such measures as alerting motorists of dangerous roadway conditions, impending collisions, or dangerous curves. Connected vehicles will also be able to "talk" to traffic signals, work zones, toll booths, school zones, and other types of infrastructure.

There are three types of DSRC units, each of which are treated differently by the FCC's rules. Road-Side Units (RSU) which communicate with vehicles, are licensed transmitters.[3] State and local government agencies (public safety agencies) operating RSUs may transmit a maximum power of 44.8 dBm or 30 Watts EIRP, depending on the band channel they are operating on. Non-governmental (private) RSUs are limited to a maximum power of 33 dBm (2 Watts) EIRP, depending on the band channel. Additionally, RSUs must reduce their authorized

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[1] See CFR Title 47, Part 15.407 (b).
[2] See CFR Title 47, Part 15.247 (a)(2).
[3] See CFR Title 47, Part 90, Subpart M. The Institute of Electrical and Electronics Engineers ("IEEE") uses the term Equipment in lieu of Unit in their 802.11p family of standards.

transmit power when their antenna is located more than 8 meters (26 feet) above the roadway surface.[4] DSRC units mounted on a vehicle are referred to as mobile On-Board Units or Equipment ("OBU" or "OBE"). The FCC rules treat OBUs as unlicensed intentional radiators[5] operating not under Part 15 but Part 95 of the FCC rules. For mobile OBUs, the FCC rules[6] reference the technical specifications in the DSRC standards maintained by the American Society of Testing and Materials ("ASTM").[7] These standards limit public safety mobile OBUs to a maximum power of 40 dBm (10 Watts) EIRP, depending on the band channel. Private mobile OBUs are limited to a maximum power of 33 dBm (2 Watts) EIRP, depending on the band channel. The third type of DSRC unit is the portable OBU. In all cases these units are limited to 0 dBm output[8] which is one milliwatt (mW).

As indicated above, the DSRC maximum power limitations vary with band channel assignment. Unlike the U-NII-3 FCC rules, the DSRC FCC Part 90 rules (and associated ASTM standard by reference in FCC rule 95.1509) specifically divide up the band into seven (7) 10 MHz channels, with an additional two (2) 20 MHz channels overlaid on top of two pairs of the 10 MHz channels.[9] Depending on which channel the DSRC unit is operating on, the maximum power limits stated above may be reduced. In addition, DSRC OBU units are assigned classes of operation that may reduce their output power to as low as 0 dBm (1 mW).

Current FCC rules require that DSRC messages involving public safety and safety of life be given the highest priority among all DSRC traffic.[10] The specific DSRC channel assigned to

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[4] See CFR Title 47, Part 90.377(b).
[5] See CFR Title 47, Part 95, Subpart L.
[6] See CFR Title 47, Part 95.1509.
[7] See ASTM E2213-03 2003.
[8] See CFR Title 47, Part 95.639 (i).
[9] There is also a reserved 5 MHz channel between 5.850 MHz and 5.855 MHz.
[10] See CFR Title 47, Part 90.377 (d) (1) and Part 95.1511 (c) (1).

carry this highest priority traffic is channel 172 (5.855 GHz to 5.865 GHz).[11] This high priority traffic is transmitted as short duration Basic Safety Messages ("BSM").[12] These BSMs are used, for instance, to help prevent collisions by notifying following vehicles that a lead vehicle has strongly applied its brake system or is approaching an intersection. BSMs are also used by public safety vehicles to inform private vehicles ahead that they are approaching so the private vehicles can pull over and clear the roadway. To meet the demands of such a real time notification system requires that the channel carrying BSMs in particular, and to a lesser extent the DSRC control channel (channel 176, 5.885 to 5.895 GHz), operate with High Availability and Low-Latency ("HALL").

While the FCC DSRC rules reference the ASTM DSRC standards, these standards closely follow the Institute of Electrical and Electronics Engineers IEEE Wireless Local Area Networking ("WLAN") standards in general.[13] Specifically the ASTM DSRC standards and the IEEE 802.11p standard are technically compatible, both addressing the physical layer and medium access control aspects of how to implement DSRC in the 5.850 GHz to 5.925 GHz band. In addition, the FCC DSRC rules use channel assignments that are defined in the IEEE 802.11 standard.[14] The modulation and data rates used by DSRC are derived from IEEE 802.11a. In fact, other than to support the unique characteristics of the BSM HALL transmissions, the DSRC physical layer and medium access control standards are essentially identical to the 802.11a standards.

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[11] See CFR Title 47, Part 90.377 (b) and Part 95.1511 (a).
[12] BSMs are one of several available DSRC messages defined in Society of Automotive Engineers (SAE) Standard J2735 "Dedicated Short Range Communications (DSRC) Message Set Dictionary".
[13] See IEEE standard 802.11-2012.
[14] See IEEE standard 02.11-2012 section 20.3.15 and Annex E.

The IEEE 802.11a standard used by DSRC implements a scalable modulation technique that can support multiple data rates as high as 54 Mega-bits-per-second ("Mbps"). The scheme is referred to as Orthogonal Frequency Division Multiplexing (OFDM)[15] and makes efficient use of the available bandwidth by parsing the data stream into multiple, slower streams and sending each stream in a parallel but closely spaced section of bandwidth, where each section has its own sub-carrier. These slower streams are essentially less vulnerable to channel imperfections that are associated, in particular, with urban and mobile wireless communications. As applied to DSRC operations, the 802.11a data rates from 3 to 54 Mbps are supported, with data rates of 3, 6, and 12 Mbps being mandatory. The 12 Mbps data rate is typically used for BSMs. Both-low order and high-order OFDM modulation schemes are used to achieve these data rates. Either Phase Shift Key ("PSK") modulation or Quadrature Amplitude Modulation ("QAM") is used by each sub-carrier to create the OFDM signal. As a result, the DSRC standards dictate a receiver sensitivity performance criteria that can be as low as -85 dBm with 10% packet error rate for 3Mbps operation using Binary Phase Shift Keying (BPSK) or as high as -67 dBm for 27 Mbps operation using 64-QAM. For 12Mbps operation needed to support BSMs, the 16 QAM receiver sensitivity is specified at -77dBm. During transmission these schemes experience typical impairments such as non-line-of-sight conditions (obstructions including vehicles or buildings) and delay spread (caused by multi-path). These impairments are aggravated in a mobile environment where the dynamics of relative vehicle motion mean that the effects from signal impairment change more quickly. In the presence of these impairments, the Signal-to-Noise Ratio ("SNR") that may be necessary to meet the performance requirements of the more complex schemes can be quite high.

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[15] See http://en.wikipedia.org/wiki/OFDM for an overview of the scheme.

To understand when an unwanted co-channel interference signal may start to impact a DSRC signal, consider an example where a high-order modulation scheme like 64 QAM is used and assume the DSRC receiver requires only an SNR of 25 dB to meet the DSRC receiver performance specification. Using this SNR would infer that a broadband co-channel interfering signal would need to remain below approximately -95 dBm for 64 QAM DSRC operation to not be effected by its presence.[16] A similar calculation for 12 Mbps DSRC operations using 16 QAM and assuming an approximate minimum SNR of 20 dB, suggests a broadband co-channel interfering signal would need to remain below approximately -100 dBm.[17]

The range of operation for DSRC networks is not large. The FCC rules specify RSU communications with OBUs in four classes out to a maximum of 1000 meters,[18] but RSUs will generally only communicate with proximate vehicles within several hundred meters. Similarly, vehicle to vehicle communications will be over short ranges of several hundred meters at most. However, in the case of vehicle to vehicle communications the range of operation is moving along the roadway, inferring that the DSRC network coverage will expand and contract along any roadway depending on whether vehicles are present. The relatively small area of coverage also means that the potential for interference to disrupt the transmission of BSMs is more acute.

[16] This approximate calculation assumes an interfering signal has a flat spectrum in the DSRC channel. The power of the interfering signal is referenced to the DSRC channel bandwidth downstream of the DSRC receiver filters. Therefore its total power would be greater. For instance an interfering broadband signal occupying 40 MHz of overlapping bandwidth would essentially have to present -94dBm of total power at a DSRC receiver operating in only 10 MHz of bandwidth to be seen as having -100 dBm of interfering signal power in the DSRC receiver. For 64 QAM the calculation was achieved as follows: -67 dBm - 25 dB SNR = -92 dBm noise floor. To prevent the interfering signal from raising the noise floor it should be at least 3 dB below it. Therefore -92 dBm – 3 dB = -95 dBm interference signal level in the same DSRC channel bandwidth.

[17] For 12 Mbps, 16QAM operation and a DSRC receiver sensitivity of -77 dBm, the approximate calculation is as follows: -77 dBm – 20 dB SNR = -97 dBm noise floor, adjusting down 3 dB to keep the interfering signal from raising the noise floor results in a -100 dBm interfering signal level in the same DSRC channel bandwidth.

[18] See CFR Title 47, Part 90.375.

Relatively small roadway locations and or short intervals of time during which BSMs are interfered with could create an unsafe driving condition.

The impact of interference to DSRC receivers is additive when more than one interfering signal is present. A famous cocktail party analogy explains that the first two guests that arrive can hold a conversation at a relatively low volume. However, as additional guests arrive and hold conversations of their own (representing interfering signals) the first two guests must continually raise their voices to be heard above the "noise" of other guests. For DSRC signals the limit to raising the transmitted signal power (conversation volume) is set in the FCC rules and is different for different band channels. Once the number of interfering broadband signals increases the noise floor far enough to compromise the required SNR, the error rate will increase.

The above discussion on interference signals is focused on broadband interfering signals that are co-channel to DSRC channels. Not all interference signals exhibit such easy to understand characteristics. Some broadband interfering signals may only cover a portion of a DSRC channel. Still other interference signals may not be broadband at all and may appear as narrowband signals relative to the 10 MHz or 20 MHz bandwidth associated with DSRC channels. The above discussion also does not address interference from other DSRC signals operating in adjacent channels. However this topic is addressed in the DSRC specifications.[19]

The WLAN industry has strongly embraced the IEEE 802.11 WLAN standard operating under FCC Part 15 for unlicensed omni-directional point-to-multi-point access and the user community has universally come to call such connectivity: WiFi. In contrast, FCC Part 15, unlicensed point-to-point, directional wireless network connectivity is often implemented using proprietary, non-standard protocols that are optimized for maximum throughput.

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[19] See ASTM E2213-03, section 8.11.1 or IEEE 802.11-2012, section 18.3.10.3.

The IEEE 802.11 standard working groups have been very responsive to user needs in the 16 years since the standards were first ratified. Improvements in throughput, spectrum usage, security, and quality of service have helped to make the standard the defacto protocol for WLAN implementations. The current IEEE 802.11n standard now permits two IEEE 802.11, 20 MHz channels to be bonded together creating a 40 MHz channel and achieving 600 Mbps throughputs. Very shortly, the IEEE 802.11ac standard will achieve Giga-bit-per-second (Gbps) performance in part by bonding together as much as 160 MHz of bandwidth in the 5 GHz range.

II. <u>COMMENTS</u>

AASHTO is a strong supporter of the greatest, most efficient use of the public airways possible. However, that use must be tempered by the realities of radio waves. Radio is not always the most consistent performer, but rather is influenced by a variety of factors, from terrain and weather conditions to the ability of transmitter equipment. In the particular case of this FCC proposed rule, AASHTO urges careful review of any proposed sharing regimens and thorough vetting and testing of protocols before implementation. Following are AASHTO comments that provide a more in-depth explanation that justifies the need for a thorough assessment and evaluation prior to proposing rulemakings on any proposed sharing regimens:

Comment 1: Define Sharing

AASHTO strongly suggests that the Commission must define "spectrum sharing", as there are multiple types of sharing possible and it is essential to have a thorough assessment of these sharing possibilities to determine if this may lead to compromising the safety application. For example, sharing may involve adjacent channel operation. In such a scenario, concerns arise as to the relative power of each service, and whether there is an interference potential resulting from such adjacency. There is also co-channel sharing, where geographic spacing is used to prevent interference. Another type of sharing is both co-channel and geographic area, or time-sharing.

Discussion

Each sharing scenario, while potentially expanding the number of potential users in the band, has its drawbacks. For example, adjacent channel or co-channel geographically-spaced sharing reduce the ultimate capacity for either service. Co-channel same-location sharing reduces the throughput for either service. Any delay in signal transmission or reception for DRSC devices cannot be tolerated for the service to be effective.

Sharing Conclusion

Until it is clear how the Commission envisions sharing in the band, it is difficult to respond to the various scenarios in which interference can occur, or to make specific recommendations as to how to avoid interference. Regardless, it is AASHTO's position that none of these potential sharing methodologies can be implemented until further studies have been completed.

Comment 2: Sharing Between Consumer Devices and DSRC Devices

Thorough review prior to implementation is vital where sharing occurs between public safety systems and consumer users. The Commission has sufficient history with sharing between public safety and commercial systems in the Part 90 services to recognize that once consumer equipment is in the field, correcting interference problems after they arise is impossible.

With this in mind, AASHTO has concerns with regard to sharing between consumer devices and DSRC devices in the transportation industry operating under FCC Code of Federal Regulations Title 47, Parts 90 and 95.[20]

Discussion

As discussed above, the FCC proposes to make the spectrum from 5.850 GHz to 5.925 GHz available to U-NII devices using the rules that apply to U-NII-3 users.[21] These rules[22] would permit new U-NII-band 4 users to transmit broadband data in omni-directional configurations of up to 4 Watts Effective Isotropic Radiated Power (EIRP) or in directional configurations up to 200 Watts EIRP. AASHTO is concerned that this new U-NII-4 spectrum operation will cause frequent, harmful interference to existing and planned DSRC operations in the same band at many locations throughout the United States.

Issue Conclusion

AASHTO believes that the proposed U-NII-4 operation in the same band needs to be modified if spectrum sharing is to be accommodated by DSRC users. While the FCC is seeking with this NPRM to harmonize the operation of current and new U-NII devices across all bands,[23] the technical challenges associated with sharing the spectrum currently used by DSRC devices will require different rules for U-NII-4 users.

Comment 3: Technical Challenges and AASHTO's "What if Scenarios"

AASHTO believes that the technical challenges associated with the proposed introduction of Part 15 U-NII devices into the 5.850 GHz to 5.925 GHz spectrum will require

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[20] For an overview of how the transportation industry is using DSRC see http://www.safercar.gov/staticfiles/safercar/connected/ConnectedVehicleTechnologyFactSheet-081012.pdf
[21] See NPRM, Docket 13-49, Paragraph 97.
[22] See Code of Federal Regulations (CFR), Title 47, Part 15.407.
[23] See NPRM, Docket 13-49, Paragraph 2.

significant study to resolve. The work presently being conducted by NTIA should be permitted to finish and be thoroughly vetted by all concerned parties before any decision is made by the FCC. Further, AASHTO recommends that should the FCC move forward with the proposal to allow U-NII devices in the 5.85 – 5.925 GHz band, it assemble an advisory panel, comprised of the appropriate stakeholders, to identify appropriate candidate scenarios. The FCC could then request that the potential U-NII-4 product manufacturers, who will benefit from the sale of future equipment, undertake coordinated studies to simulate, test, demonstrate, and ultimately give guidance on which candidate scenarios will maintain the viability of the Connected Vehicle program and provide the most protection to DSRC users. Such studies should be open and subject to critical review by the advisory panel. At the conclusion of the studies (including the NTIA study), and subsequent report on the results by the advisory panel, the FCC should have the necessary information to make an informed decision on how best to mitigate the technical challenges associated with opening the band to U-NII devices. AASHTO has considered two "What If Scenarios addressing potential interference issues if U-NII-4 systems and DSRC systems were to share the same spectrum. These "What If" Scenarios, below, present some real-world examples of interference situations that may arise under the assumption that proposed U-NII-4 users are operating as type U-NII-3 users.

AASHTO "What if Scenario" #1 - DSRC OBUs are attempting to communicate with each other, potentially to pass BSMs

Figure 1 illustrates Scenario 1, in which an urban city street environment is depicted where vehicles with DSRC OBUs are attempting to communicate with each other, potentially to pass BSMs. Both outdoor and indoor U-NII-4 WLAN users operating omni-directional point-to-multipoint systems in the same area have strong enough signals to cause interference to the DSRC signals. The amount of interference that is caused depends on several factors including the distance from the U-NII-4 user. However, if the U-NII-4 user has significantly more power than the OBU, as is possible if the U-NII-3 rules are applied to the U-NII-4 band, then at some distance away from the U-NII-4 user, interference is highly probable. It is in these regions in particular that the ability of DSRC to enhance safety may be significantly reduced. It is difficult to accurately quantify the distances at which interference is probable or possible without performing simulations or conducting field trials at a specific site, however consider the simple example where the OBUs and the U-NII-4 user (operating under U-NII-3 rules) are all in clear line of sight of each other and all are operating without significant channel impairments. Assume that the DSRC user is monitoring for BSM messages in the DSRC channel 172 (a channel with 10 MHz bandwidth), and is expecting 12 Mbps 16QAM modulation. Assume further that the noise floor is at -97 dBm (permitting the DSRC receiver to operate over its full range of sensitivity. In that case, a U-NII-4 user occupying 40 MHz of overlapping bandwidth and transmitting with an EIRP of 36 dBm would present approximately 30 dBm interfering noise to the channel bandwidth of the DSRC receiver. Using the review of DSRC performance analyzed above, this example infers that the transmitted U-NII-4 signal is 10,000,000,000,000 times more powerful than the maximum signal level a DSRC receiver can tolerate without impacting performance. If there is really nothing else besides propagation loss that will affect the channel, the U-NII-4 user would need to be 8 miles from the DSRC receiver to avoid the possibility of causing interference at 5.855 GHz.

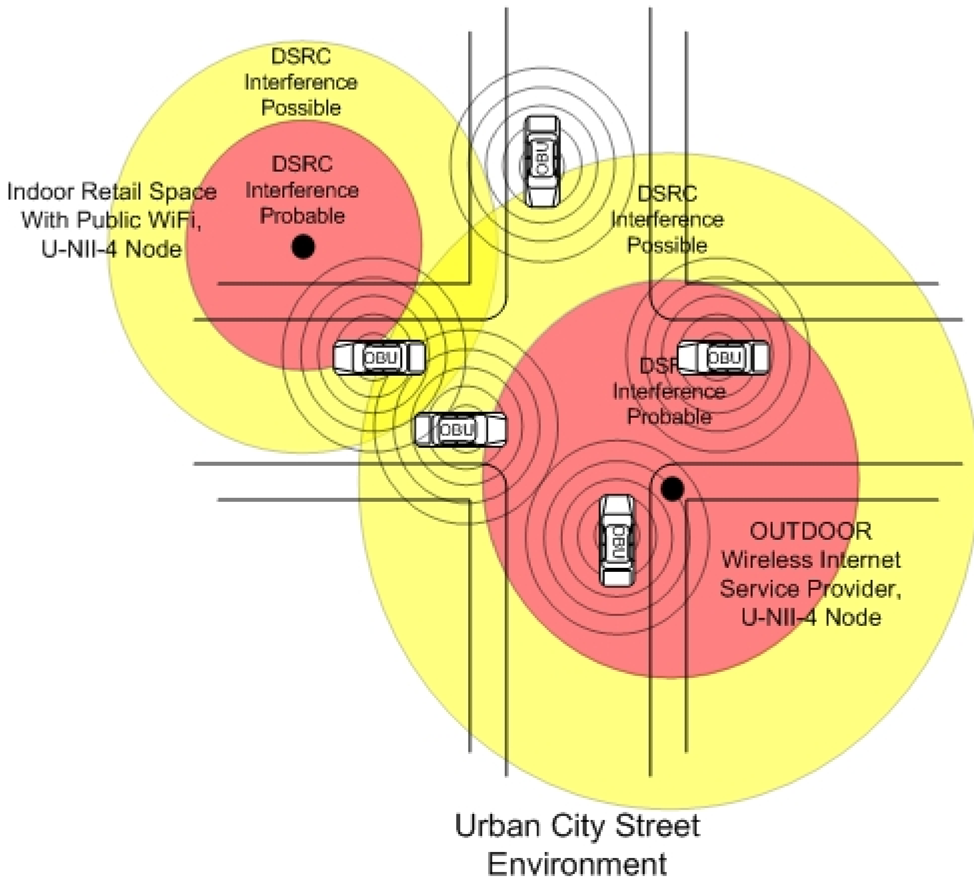
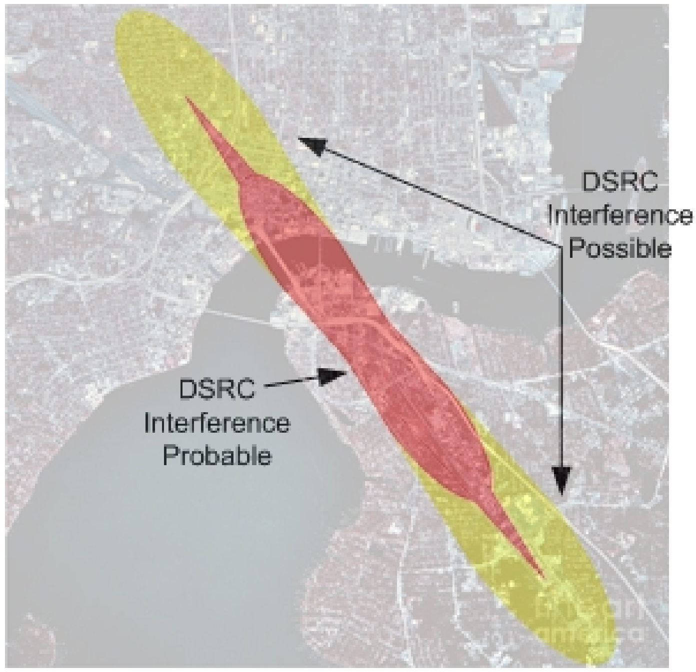


Figure 1. Potential Interference in an Urban City Street Environment.

AASHTO "What if Scenario" #2 - Point-to-point U-NII-4 users operating under U-NII-3 rules

Figure 2 illustrates Scenario 2. In this scenario, a pair of point-to-point U-NII-4 users would be operating under U-NII-3 rules in a moderate sized city. The areas of interference have been generalized, meaning there will be some locations in the affected urban environments that are shadowed from the interfering signals and will therefore be able to provide some limited operating ability for DSRC. However, in general, the area of interference is significantly larger than that of Figure 1, encompassing large sections of highways and city streets and even two entire road bridges. This increased interference area is due to the increased gain afforded the U-NII-4 point-to-point users under the U-NII-3 rules. At a maximum of 200 Watts EIRP (a higher power than is depicted in Figure 2), applying the same analysis as was performed for Figure 1 increases the necessary separation that will prevent interference to more than 50 miles, assuming the DSRC user and the U-NII-4 user are really still in line of sight.



U-NII-4 Node P2P Installation at 4-5 miles,
With Example Propagation Projections

Figure 2. Potential Interference with U-NII-4 Point-to-Point Operation.

To lend a "real world" scenario to this interference potential, Figure 3 shows two U-NII 4W devices, with signal levels at a 2 meter and a 36 meter AGL elevation in Virginia Beach, Virginia. One device is postulated at the tenth floor of a beachside hotel, and the other in a typical frame residence. This picture will give some perspective to not only the extent of the DSRC interference that could be caused by U-NII devices, but also the very large difference in interference potential when the interference source is elevated. The residential unit interference (at -100 dBm) is plotted in gray and light blue, while the tenth floor unit is light red. Note particularly that from the elevated unit more than ten miles of I-264 would be impacted.

Figure 3. Plot of Residential and Commercial DSRC Interference

Discussion

The two urban examples above demonstrate how individual U-NII-4 users, operating as U-NII-3 users, would potentially interfere with DSRC users. It is important to note that with the continuing growth in unlicensed Part 15 wireless networking, the number of U-NII-4 users will likely grow quickly as well.

The above two simple examples may quickly be replaced by much more complicated scenarios with dozens, if not hundreds of U-NII-4 users. Contributing to this growth will be the increasing use by cellular carriers as they continue to support the customer's use of available WiFi hotspots, which in the process offloads cellular data traffic to terrestrial WLAN networks.

AASHTO recognizes there are many more assessment and mitigation concepts that may be proposed in the course of this proceeding and AASHTO would like to have the opportunity to actively participate by providing review comments and assessments on such proposals. As discussed in the NPRM, one concept which may be proposed includes possible mitigations resulting from dynamic frequency selection or "frequency hopping" when a DSRC signal is detected. In these suggested concepts, AASHTO has identified severe technical complexities that will result due to the disparities between the proposed U-NII power levels with their large interference contours and the low-level DSRC signals and their limited service areas which are set by rule. Another potential concept that may be proposed is to reallocate a portion of the DSRC spectrum. This would result in compromising the communication options offered by DSRC for safety applications benefiting travelers. For instance, due to the proposed sharing of the spectrum, real-time data regarding weather and travel conditions would not be available in a secured communication medium to travelers. This in turn will impact future decisions on the viability of DSRC and the pertinent Connected Vehicle Program safety applications. Analyses by the U.S. Department of Transportation's National Highway Traffic Safety Administration show that Connected Vehicle technology could potentially address approximately 80 percent of the crash scenarios involving non-impaired drivers. AASHTO seeks a balanced solution that will not compromise the ongoing DSRC efforts to implement Connected Vehicle safety applications with the potential to significantly reducing the number of unimpaired vehicle accidents, while still allowing DSRC spectrum sharing that would bring additional commercial Internet applications and solutions to unlicensed Wi-Fi devices.

III. CONCLUSION

At this time, AASHTO recommends that no action be taken on allowing U-NII devices to operate in the DSRC 5.850 GHz to 5.925 GHz band. Rather, AASHTO recommends that the FCC assemble an advisory panel comprised of the appropriate stakeholders to identify the best candidate sharing scenarios. The FCC could then request that the potential U-NII-4 product manufacturers, in collaboration with the AASHTO State DOT members, other public sector agencies and auto manufacturers who are actively involved in Connected Vehicle proof of concept studies and who will benefit from the sale of future equipment, undertake coordinated studies to simulate, test, demonstrate, and ultimately give guidance on which candidate sharing scenarios will provide the most protection to DSRC users, while providing a viable operational profile for new U-NII-4 users. Such studies should be open and subject to critical review by the advisory panel. At the conclusion of the studies, and subsequent report on the results by the advisory panel, the FCC should have the necessary information to make an informed decision on how best to mitigate the technical challenges associated with sharing the band.

AASHTO stands ready to work with the FCC, the National Telecommunications and Information Administration, the United States Department of Transportation (DOT) and the National Highway Traffic Safety Administration, the Research and Innovative Technology Administration, State DOTs, the ASTM, the IEEE 802.11 working groups, the SAE, the Intelligent Transportation Systems industry, the public safety and private transportation user communities, DSRC equipment manufacturers, and the U-NII broadband equipment manufacturers to explore, simulate, and test ideas for sharing the DSRC spectrum.

WHEREFORE, the premises considered, it is respectfully requested that the Commission act in accordance with the views expressed herein.

Respectfully submitted,

AMERICAN ASSOCIATION OF
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